

H RESULT OF SOIL INVESTIGATION

GEOLOGY OF YANGON AREA

The geology of Yangon area was classified into the following geological units:

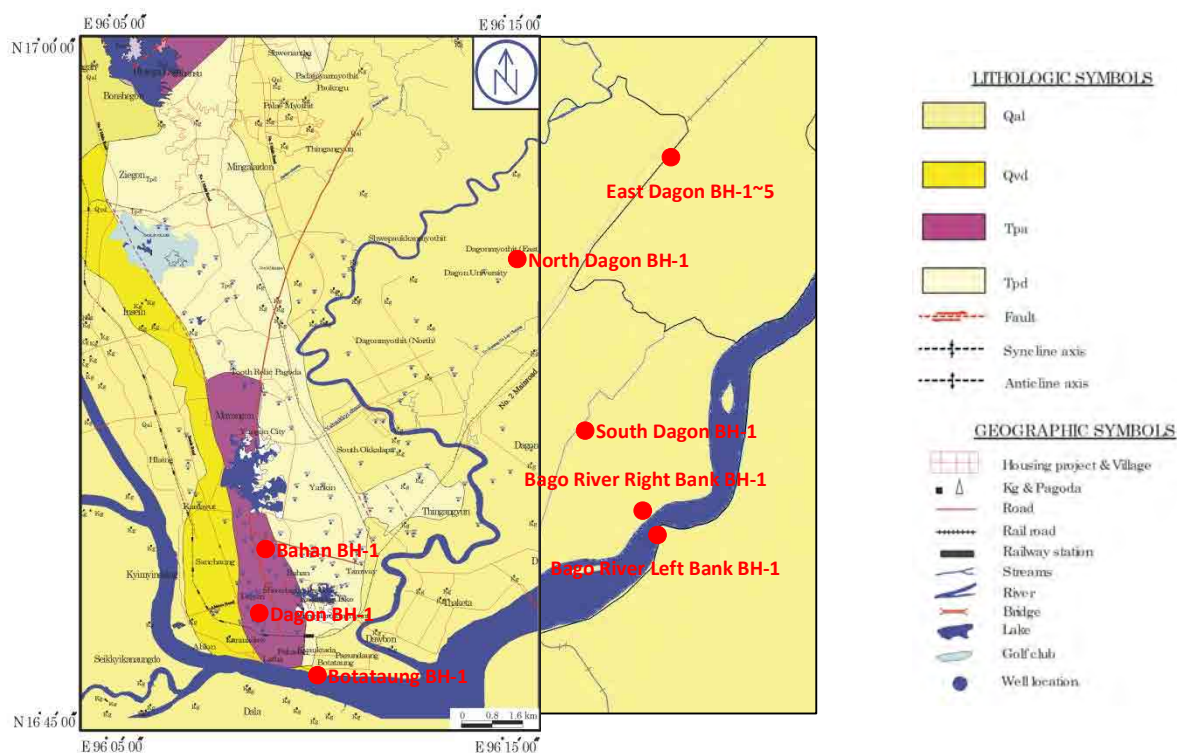
- (a) Quaternary deposits
 - 4. Upper Delta Alluvium, Pleistocene and Recent
 - 3. Lower Delta Alluvium, Pleistocene
- (b) Tertiary deposits
 - 2. Irrawaddian Series, Pliocene
 - 1. Pegu Series, Oligocene-Miocene

The regional geological study has been made in an area which includes ridges and deltaic lands lying south of the Bago Yoma. This area is in a north-south trending synclinal basin containing a thick Tertiary - Quaternary deposits.

The Tertiary deposits are strongly folded into narrow en-echelon anticlinal folds such as the ridge, which is trending south towards the Gulf of Martaban.

The rocks of the Tertiary age contain well-consolidated marine sandstone and shales of the Pegu Group and semi-consolidated, continental deltaic and marginal marine (?) deposits of the Irrawaddy Formation. The synclinal valley west of the Yangon anticlinal ridge is filled with unconsolidated water laid deposit of Quaternary age. These form a wedge shaped alluvial accumulation ranging in thickness from a few meter near the ridge about 60 to 90 meter in the valley. These sediments include clays, silts, sands and predominantly fine to coarse gravels.

The Boreholes Location Points with the geological Map of Yangon area is presented as following.



Source: Myint Lwin Thein et al., 1972

The Boreholes Location Points with the Geological Map of Yangon Area

Bahan BH-1 for Kokine Service Reservoir

LOCATION OF THE PROJECT SITE

The proposed site of The Improvement Of Water supply is situated near San Chuan Restaurant, Bahan Township, Yangon Division. The location of project site is shown in Fig. (1) .

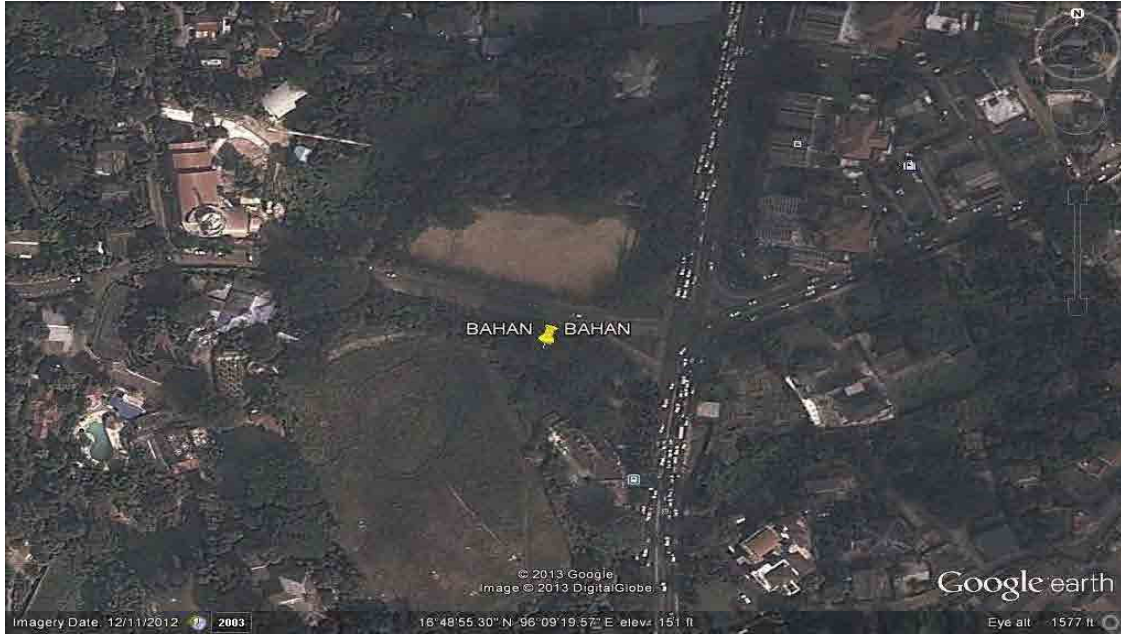


Fig. (1) Location Map of the Project Area

SOIL INVESTIGATION LOG

Project : The Improvement Of Water Supply	Type of Hammer : Automatic	Sheet : 1 of 3
Location : Bahan Township	Boring Started : 23 . 3 . 2013	Hole No : 1
Coordinates : N-1860987.90,E-197174.6	Boring Completed : 25 . 3 . 2013	Total Depth (m) : 30 m
Elevation (m) : 37.63 m	Logged by : Phyo Ko Ko Oo	Water Level (m) : 7.95 m
	Checked by : Wai Phyo Aung	Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)		
					0	10	20	30	40	50				
Reddish brown, firm to very firm, Clayey SILT with lateritic soil (0.0 m ~ 3.5 m).		1	36.63	3.00							19	⊗	1.71	
		2	35.63									10	⊗	0.90
		3	34.63										26	⊗
Reddish brown, very firm, Clayey SILT with lateritic soil (3.5 m ~ 5.5 m).		4	33.63	6.00								28	⊗	2.52
		5	32.63										21	⊗
Gray and yellowish brown, very firm, Silty CLAY (5.5 m ~ 6.5 m).		6	31.63	6.00								18	⊗	1.84
Gray, firm, Silty CLAY (6.5 m ~ 7.5 m).		7	30.63									12	⊗	1.37
Gray, Silty CLAY (7.5 m ~ 10.0 m).		8	29.63	9.00								□	UD	
		9	28.63										□	UD
		10	27.63									47	⊗	5.36

Type of Sample	Strength of Consistency of Cohesive Soils	Density of Cohesionless Soils
Undisturbed Sample	<2 Very Soft	<4 Very Loose
Disturbed Sample (Split spoon)	2 - 4 Soft	4 - 10 Loose Sand
Rock Sample	4 - 8 Medium	10 - 30 Medium Dense
	8 - 15 Firm	30 - 50 Dense
	15 - 30 Very Firm	>50 Very Dense
	>30 Hard	

SOIL INVESTIGATION LOG

Project : The Improvement Of Water Supply
 Location : Bahan Township
 Coordinates : N-1860987.90,E-197174.6
 Elevation (m) : 37.626 m

Type of Hammer : Automatic
 Boring Started : 23 . 3 . 2013
 Boring Completed : 25 . 3 . 2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung



Sheet 2 of 3
 Hole No : 1
 Total Depth (m) : 30 m
 Water Level (m) : 7.95 m
 Driller : Than Maung




Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)		
					0	10	20	30	40	50				
Yellowish brown, medium dense to dense, Silty SAND with a little amount of Clay (10.0 m ~ 20.0 m).		11	26.63								39	⊗	4.68	
		12	25.63	12.00								28	⊗	3.36
		13	24.63									23	⊗	2.76
		14	23.63									34	⊗	4.08
		15	22.63	15.00								31	⊗	3.72
Yellowish brown, medium dense to dense, Silty SAND with a little amount of Clay (10.0 m ~ 20.0 m).		16	21.63								30	⊗	3.60	
		17	20.63								32	⊗	3.84	
		18	19.63	18.00								36	⊗	4.32
		19	18.63									37	⊗	4.44
		20	17.63	20.00								39	⊗	4.68

Type of Sample	Strength of Consistency of Cohesive Soils	Density of Cohesionless Soils
Undisturbed Sample	<2 Very Soft	<4 Very Loose
Disturbed Sample (Split spoon)	2 - 4 Soft	4 - 10 Loose Sand
Rock Sample	4 - 8 Medium	10 - 30 Medium Dense
	8 - 15 Firm	30 - 50 Dense
	15 - 30 Very Firm	>50 Very Dense

SOIL INVESTIGATION LOG

Project : The Improvement Of Water Supply Type of Hammer : Automatic Sheet 3 of 3
 Location : Bahan Township Boring Started : 23 . 3 . 2013 Hole No : 1
 Coordinates : N-1860987.90,E-197174.6 Boring Completed : 25 . 3 . 2013 Total Depth (m) : 30 m
 Elevation (m) : 37.626 m Logged by : Phyo Ko Ko Oo Water Level (m) : 7.95 m
 Checked by : Wai Phyo Aung Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)
					0	10	20	30	40	50		
Reddish brown,dense, Silty SAND with a little amount of Clay (20.0 m ~ 22.5 m).		21	16.63	21.00						38	⊗	4.56
		22	15.63							40	⊗	4.80
		23	14.63							>50	⊗	>5
Yellowish brown,very dense, Silty SAND (22.5 m ~ 30.0 m).		24	13.63	24.00						>50	⊗	>5
		25	12.63							>50	⊗	>5
		26	11.63							>50	⊗	>5
		27	10.63	27.00						>50	⊗	>5
		28	9.63							>50	⊗	>5
		29	8.63							>50	⊗	>5
		30	7.63	30.00						>50	⊗	>5

Type of Sample	Strength of Consistency of Cohesive Soils	Density of Cohesionless Soils
 Undisturbed Sample	<2 Very Soft	<4 Very Loose
 Disturbed Sample (Split spoon)	2 - 4 Soft	4 - 10 Loose Sand
 Rock Sample	4 - 8 Medium	10 - 30 Medium Dense
	8 - 15 Firm	30 - 50 Dense
	15 - 30 Very Firm	>50 Very Dense

SOIL TEST RESULTS

Project : The Improvement of Water Supply Project													Date : 24-4-2013							
Location : Bahan , Yangon													Borehole No : BH-1							
Sr; No,	Depth (m)		Description of Soil	Specific gravity	Grain Size Analysis				Atterberg Limit			Moisture content	Bulk density	Dry density	Triaxial Compression Test		U C S Test	Consolidation Test		
					Gravel	Sand	Silt	Clay	(L.L)	(P.L)	(P. I)				C	φ		Initial Void Ratio (e)	Pre-consolidation Pressure (kg/cm ²)	Compression Index (Cc)
	Fr	To			(%)	(%)	(%)	(%)	(%)	(%)	(%)									
1	1.00	1.45	Reddish Brown colour, very firm , Clayey Silt and sand (Lateritic soil) .	2.56	0.00	46.20	53.80	33.91	16.50	17.41	19.7	2.03	1.69	0.30	11.00	0.41				
2	3.00	3.45	Reddish Brown colour, very firm , Clayey Silt and sand (Lateritic soil) .	2.56	0.00	41.84	58.16	41.45	21.46	19.99	24.00	2.00	1.61	0.42	14.00	0.53				
3	6.00	6.45	Gray colour, very firm , Silty CLAY with alittle amount of sand .	2.51	0.00	14.40	85.60	35.89	19.38	16.51	18.7	1.94	1.63	0.32	8.00	0.38				
4	7.00	7.45	Gray colour, firm , Silty CLAY with trace amount of Sand .	2.48	0.00	2.60	97.40	45.88	26.07	19.81	29.17	1.96	1.52	0.31	5.00	0.44				
5	8.00	9.00	Gray colour, Silty CLAY with trace amount of Sand .	2.50	0.00	4.68	95.32	40.51	22.00	18.51	30.50	1.89	1.45	0.35	5.00	0.36	0.83	2.60	0.27	
6	9.00	10.00	Reddish Brown colour, Silty CLAY with trace amount of Sand .	2.52	0.00	7.54	92.46	41.31	23.48	17.83	31.70	1.88	1.43	0.32	6.00	0.34	0.86	2.20	0.26	

SOIL TEST RESULTS

Project		: The Improvement Of Water Supply Project											Date		: 24-4-2013					
Location		: Bahan , Yangon											Borehole No		: BH-1					
Sr; No,	Depth (m)		Description of Soil	Specific gravity	Grain Size Analysis				Atterberg Limit			Moisture content	Bulk density	Dry density	Triaxial Compression Test		U C S Test	Consolidation Test		
					Gravel	Sand	Silt	Clay	(L.L)	(P.L)	(P. I)				C	φ		Initial Void Ratio (e)	Pre-consolidation Pressure (Pc	Compression Index (Cc)
	Fr	To			(%)	(%)	(%)	(%)	(%)	(%)	(%)				(%)	g/cm ³		g/cm ³	kg/cm ²	(°)
7	11.00	11.45	Yellowish Brown colour,dense, Silty SAND with alittle amount of Clay	2.59	0.00	75.90	24.10	NL	NP	NI	15.72	2.02	1.75	0.33	11.00	0.34				
8	13.00	13.45	Yellowish Brown colour, medium dense, Silty SAND with alittle amount of Clay	2.57	0.00	68.30	31.70	NL	NP	NI	20.00	1.99	1.66	0.14	9.00	0.25				
9	18.00	18.45	Yellowish Brown colour,dense, Silty SAND with alittle amount of Clay	2.60	0.00	70.60	29.40	NL	NP	NI	23.50	1.89	1.52	0.28	10.00	0.35				
10	22.00	22.45	Yellowish Brown colour,dense, Silty SAND with alittle amount of Clay	2.60	0.00	71.40	28.60	NL	NP	NI	21.00	1.91	1.57	0.38	13.00	0.40				
11	26.00	26.45	Yellowish Brown colour, very dense, Silty SAND with alittle amount of Clay	2.62	0.00	75.70	24.30	NL	NP	NI	19.00	2.02	1.70	0.30	15.00	0.36				
12	28.00	28.45	Yellowish Brown colour, very dense, Silty SAND with alittle amount of Clay	2.65	0.00	80.20	19.80	NL	NP	NI	17.00	2.03	1.72	0.27	14.00	0.34				

Soil Test Results For Triaxial Permeability Test

Project : The Improvement of Water Supply Project		Date:7.5.2013		
Location : Bahan ,Yangon				
BORING NO : BH-1				
SAMPLE TYPE :: UD				
SPECIMEN DEPTH (M)		From	8.00	9.00
		To	9.00	10.00
Triaxial	Coefficient of	TP	TP	
Premeability	Permeability at 20 c m/s	7.15×10^{-9}	9.00×10^{-10}	

Dagon BH-1 for Central Service Reservoir

LOCATION OF THE PROJECT SITE

The proposed site of The Improvement Of Water supply is situated near Mahawizaya pagoda, Dagon Township, Yangon Division. The location of project site is shown in Fig. (1) .

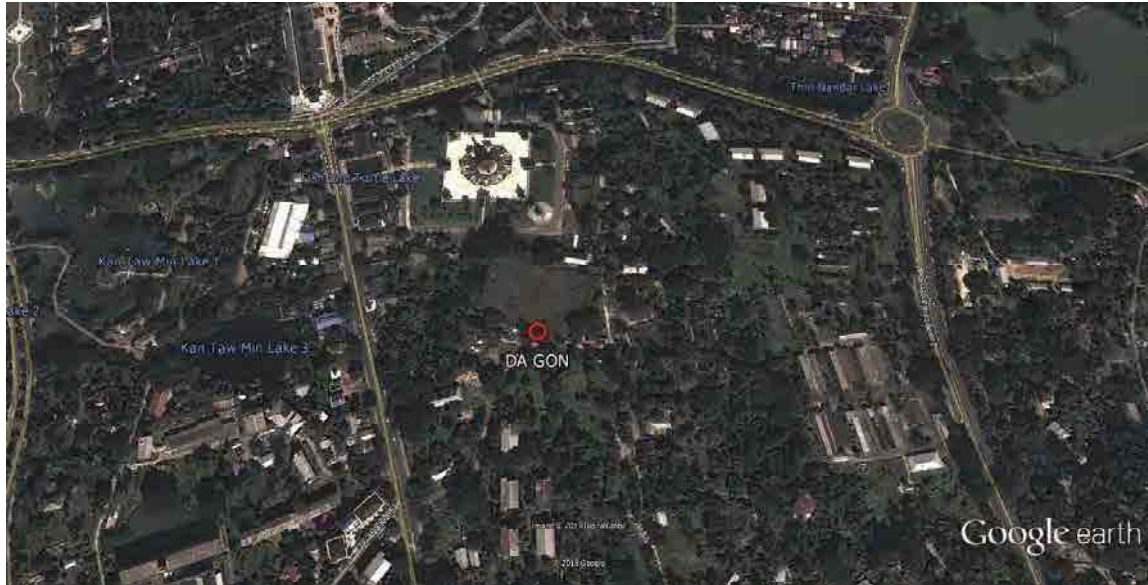


Fig. (1) Location Map of the Project Area

SOIL INVESTIGATION LOG



Project : The Improvement Of Water Supply	Type of Hammer : Automatic	Sheet : 1 of 3
Location : Dagon Township	Boring Started : 25 . 3 . 2013	Hole No : 1
Coordinates : N-1858540.52,E-196868.55	Boring Completed : 27 . 3 . 2013	Total Depth (m) : 25.5 m
Elevation (m) : 37.39 m	Logged by : Phyo Ko Ko Oo	Water Level (m) : 6.1 m
	Checked by : Wai Phyo Aung	Driller : Than Maung




Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)	
					0	10	20	30	40	50			
Reddish brown, medium dense, Clayey SAND with some silt and lateritic soil (0.0 m ~ 3.5 m).		1	36.39	3.00				12				⊗	1.08
		2	35.39					11				⊗	0.99
		3	34.39		10							⊗	0.90
Light gray to reddish brown, medium dense, Silty SAND and lateritic soil (3.5 m ~ 4.5 m).		4	33.39				12				⊗	1.08	
Reddish brown, Silty SAND with some lateric soil (4.5 m ~ 7.0 m).		5	32.39	6.00								□	UD
		6	31.39									□	UD
		7	30.39							>50			⊗
Gray to light gray, dense to very dense, Silty SAND with some lateric soil (7.0 m ~ 10.0 m).		8	29.39									⊗	>5
		9	28.39	9.00								⊗	>5
		10	27.39									⊗	>5

Type of Sample	Strength of Consistency of Cohesive Soils	Density of Cohesionless Soils
Undisturbed Sample	<2 Very Soft	<4 Very Loose
Disturbed Sample (Split spoon)	2 - 4 Soft	4 - 10 Loose Sand
Rock Sample	4 - 8 Medium	10 - 30 Medium Dense
	8 - 15 Firm	30 - 50 Dense
	15 - 30 Very Firm	>50 Very Dense
	>30 Hard	

SOIL INVESTIGATION LOG

Project : The Improvement Of Water Supply	Type of Hammer : Automatic	Sheet : 2 of 3
Location : Dagon Township	Boring Started : 25 . 3 . 2013	Hole No : 1
Coordinates : N-1858540.52,E-196868.55	Boring Completed : 27 . 3 . 2013	Total Depth (m) : 25.5 m
Elevation (m) : 37.39 m	Logged by : Phyo Ko Ko Oo	Water Level (m) : 6.1 m
	Checked by : Wai Phyo Aung	Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)					Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)		
					0	10	20	30	40			50	
Light gray, very dense, Silty SAND (10.0 m ~ 15.5 m).		11	26.39							>50	⊗	>5	
		12	25.39	12.00							>50	⊗	>5
		13	24.39								>50	⊗	>5
		14	23.39								>50	⊗	>5
		15	22.39	15.00							>50	⊗	>5
Dark gray, very dense, Silty SAND and gravels (15.5 m ~ 20.0 m).		16	21.39							>50	⊗	>5	
		17	20.39							>50	⊗	>5	
		18	19.39	18.00							>50	⊗	>5
		19	18.39								>50	⊗	>5
		20	17.39	20.00							>50	⊗	>5

Type of Sample	Strength of Consistency of Cohesive Soils	Density of Cohesionless Soils
 Undisturbed Sample	<2 Very Soft	<4 Very Loose
 Disturbed Sample (Split spoon)	2 - 4 Soft	4 - 10 Loose Sand
 Rock Sample	4 - 8 Medium	10 - 30 Medium Dense
	8 - 15 Firm	30 - 50 Dense
	15 - 30 Very Firm	>50 Very Dense

SOIL INVESTIGATION LOG

Project : The Improvement Of Water Supply
 Location : Dagon Township
 Coordinates : N-1858540.52, E-196868.55
 Elevation (m) : 37.39 m

Type of Hammer : Automatic
 Boring Started : 25 . 3 . 2013
 Boring Completed : 27 . 3 . 2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 3 of 3
 Hole No : 1
 Total Depth (m) : 25.5 m
 Water Level (m) : 6.1 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)
					0	10	20	30	40	50		
Gray, very dense, Silty SAND (20.0 m ~ 25.5 m).		21	16.39	21.00							⊗	>5
		22	15.39								⊗	>5
		23	14.39								⊗	>5
		24	13.39	24.00							⊗	>5
		25	12.39								⊗	>5
		26										
		27										
		28										
		29										
		30										

Type of Sample	Strength of Consistency of Cohesive Soils	Density of Cohesionless Soils
Undisturbed Sample	<2 Very Soft	<4 Very Loose
Disturbed Sample (Split spoon)	2 - 4 Soft	4 - 10 Loose Sand
Rock Sample	4 - 8 Medium	10 - 30 Medium Dense
	8 - 15 Firm	30 - 50 Dense
	15 - 30 Very Firm	>50 Very Dense

SOIL TEST RESULTS

Project : The Improvement of Water Supply Project													Date : 28-4-2013							
Location : Dagon , Yangon													Borehole No : BH-1							
Sr; No,	Depth (m)		Description of Soil	Specific gravity	Grain Size Analysis				Atterberg Limit			Moisture content	Bulk density	Dry density	Triaxial Compression Test		U C S Test	Consolidation Test		
					Gravel	Sand	Silt	Clay	(L.L)	(P.L)	(P. I)				C	φ		Initial Void Ratio (e)	Pre-consolidation Pressure (Pc)	Compression Index (Cc)
	(%)	(%)			(%)	(%)	(%)	(%)	(%)	kg/cm ²	(°)									
Fr	To			(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	g/cm ³	g/cm ³	kg/cm ²		kg/cm ²				
1	2.00	2.45	Reddish brown colour,medium dense, Clayey SAND with some Silt and trace amount of Gravels.	2.54	8.50	60.40	31.10	NL	NP	NI	14.72	1.97	1.71	0.16	20.00	0.21				
2	3.00	3.45	Reddish brown colour,medium dense, Clayey SAND with some Silt and trace amount of Gravels.	2.58	7.00	64.40	28.60	NL	NP	NI	16.50	1.90	1.60	0.18	16.00	0.25				
3	5.00	6.00	Reddish brown colour, Silty SAND with some Clay with trace amount of Gravels.	2.60	3.50	71.40	25.10	NL	NP	NI	13.16	2.03	1.70	0.30	10.00	0.32	0.560	1.40	0.1	
4	6.00	7.00	Reddish brown colour, Silty SAND with some Clay with trace amount of Gravels.	2.60	3.00	73.80	23.20	NL	NP	NI	12.60	2.02	1.74	0.28	11.00	0.36	0.526	1.30	0.1	
5	8.00	8.45	Light gray colour,dense, Silty SAND with Clay.	2.55	0.00	72.90	27.10	25.88	15.83	10.05	18.11	1.85	1.56	0.35	21.00	0.36				
6	10.00	10.45	Light gray colour,very dense, Silty SAND with alittle amount of Clay.	2.64	0.00	80.20	19.80	NL	NP	NI	11.94	2.20	1.97	0.38	26.00	0.33				

SOIL TEST RESULTS

Project : The Improvement Of Water Supply Project												Date : 28-4-2013								
Location : Dagon , Yangon												Borehole No : BH-1								
Sr; No,	Depth (m)		Description of Soil	Specific gravity	Grain Size Analysis				Atterberg Limit			Moisture content	Bulk density	Dry density	Triaxial Compression Test		U C S Test	Consolidation Test		
					Gravel	Sand	Silt	Clay	(L.L)	(P.L)	(P. I)				C	φ		Initial Void Ratio (e)	Pre-consolidation Pressure (Pc)	Compression Index (Cc)
	(%)	(%)			(%)	(%)	(%)	(%)	(%)	kg/cm ²	(°)									
Fr	To		(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	g/cm ³	g/cm ³	kg/cm ²	(°)	kg/cm ²		kg/cm ²			
7	12.00	12.45	Light gray colour,very dense, Silty SAND with alittle amount of Clay.	2.60	0.00	82.60	17.40	NL	NP	NI	15.49	1.97	1.68	0.19	24.00	0.20				
8	14.00	14.45	Light gray colour,very dense, Silty SAND with alittle amount of Clay.	2.64	0.00	85.45	14.55	NL	NP	NI	11.17	1.99	1.71	0.22	25.00	0.25				
9	16.00	16.45	Dark gray colour,very dense, Silty SAND with trace amount of Gravels.	2.65	1.30	89.00	9.70	NL	NP	NI	11.44	2.01	1.70	0.20	28.00	0.21				
10	18.00	18.45	Dark gray colour,very dense, Silty SAND with trace amount of Gravels.	2.65	1.00	90.20	8.80	NL	NP	NI	10.35	1.96	1.62	0.18	29.00	0.23				
11	20.00	20.45	Dark gray colour,very dense, Silty SAND with trace amount of Gravels.	2.70	1.40	94.00	4.60	NL	NP	NI	12.67	2.23	1.98	0.16	30.00	0.19				
12	22.00	22.45	Gray colour,very dense , Silty SAND with some Clay.	2.56	0.00	67.30	32.70	NL	NP	NI	11.11	1.78	1.60	0.21	26.00	0.22				

Soil Test Results For Triaxial Permeability Test

Project : The Improvement of Water Supply Project		Date: 28.4.2013		
Location : Dagon ,Yangon				
BORING NO : BH-1				
SAMPLE TYPE ::		UD	UD	
SPECIMEN DEPTH (M)		From	5.00	6.00
		To	6.00	7.00
Triaxial	Coefficient of	TP	TP	
Premeability	Permeability at 20 c m/s	5.2×10^{-9}	5.4×10^{-9}	

Botataung BH-1 for Existing WWTP

LOCATION OF THE PROJECT SITE

The proposed site of The Improvement Of Water supply is situated Botataung Township, Yangon Division. The location of project site is shown in Fig. (1) .



Fig. (1) Location Map of the Project Area

SOIL INVESTIGATION LOG

Project : The Improvement Of Water Supply	Type of Hammer : Automatic	Sheet : 1 of 4
Location : Botataung Township	Boring Started : 20 . 3 . 2013	Hole No : 1
Coordinates : N-1855515.95,E-200826.3	Boring Completed : 23 . 3 . 2013	Total Depth (m) : 35.5 m
Elevation (m) : 4.56 m	Logged by : Phyto Ko Ko Oo	Water Level (m) : 2.45 m
	Checked by : Wai Phyto Aung	Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)					Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)	
					0	10	20	30	40			50
Brown, loose, Silty SAND and a little amount of gravels (0.0 m ~ 1.5 m).		1	3.56			8					⊗	0.72
Dark gray, soft, Silty CLAY (1.5 m ~ 6.0 m).		2	2.56			3					⊗	0.27
		3	1.56	3.00							□	UD
		4	0.56								□	UD
		5	-0.44								□	UD
		6	-1.44	6.00			2					⊗
Dark gray, very soft to soft, Silty CLAY (6.0 m ~ 7.5 m).		7	-2.44			3					⊗	0.34
Gray, medium firm to firm, Sandy CLAY with some silt (7.5 m ~ 10.0 m).		8	-3.44			6					⊗	0.68
		9	-4.44	9.00			12				⊗	1.36
		10	-5.44				12				⊗	1.44
Type of Sample		Strength of Consistency of Cohesive Soils				Density of Cohesionless Soils						
□ Undisturbed Sample		<2 Very Soft				<4 Very Loose						
⊗ Disturbed Sample (Split spoon)		2 - 4 Soft				4 - 10 Loose Sand						
■ Rock Sample		4 - 8 Medium				10 - 30 Medium Dense						
		8 - 15 Firm				30 - 50 Dense						
		15 - 30 Very Firm				>50 Very Dense						
		>30 Hard										

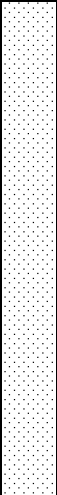
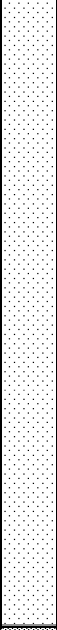
SOIL INVESTIGATION LOG

Project : The Improvement Of Water Supply	Type of Hammer : Automatic	Sheet : 2 of 4
Location : Botataung Township	Boring Started : 20 . 3 . 2013	Hole No : 1
Coordinates : N-1855515.95,E-200826.3	Boring Completed : 23 . 3 . 2013	Total Depth (m) : 35.5 m
Elevation (m) : 4.56 m	Logged by : Phyo Ko Ko Oo	Water Level (m) : 2.45 m
	Checked by : Wai Phyo Aung	Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)					Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)		
					0	10	20	30	40			50	
Gray, medium firm, Sandy CLAY and a little amount of silt (10.0 m ~ 12.5 m).		11	-6.44							7	⊗	0.84	
		12	-7.44	12.00							6	⊗	0.72
Gray, medium firm, Silty CLAY with sand (12.5 m ~ 18.5 m).		13	-8.44								8	⊗	0.96
		14	-9.44								9	⊗	1.08
		15	-10.44	15.00							9	⊗	1.08
		16	-11.44								13	⊗	1.56
		17	-12.44								12	⊗	1.44
		18	-13.44	18.00							11	⊗	1.32
Gray, medium dense, Silty SAND with a little amount of clay (18.5 m ~ 20.0 m).		19	-14.44								14	⊗	1.68
		20	-15.44	20.00							18	⊗	2.16
Type of Sample		Strength of Consistency of Cohesive Soils				Density of Cohesionless Soils							
<input type="checkbox"/> Undisturbed Sample		<2 Very Soft				<4 Very Loose							
<input checked="" type="checkbox"/> Disturbed Sample (Split spoon)		2 - 4 Soft				4 - 10 Loose Sand							
<input type="checkbox"/> Rock Sample		4 - 8 Medium				10 - 30 Medium Dense							
		8 - 15 Firm				30 - 50 Dense							
		15 - 30 Very Firm				>50 Very Dense							


SOIL INVESTIGATION LOG

Project : The Improvement Of Water Supply	Type of Hammer : Automatic	Sheet : 3 of 4
Location : Botataung Township	Boring Started : 20 . 3 . 2013	Hole No : 1
Coordinates : N-1855515.95,E-200826.3	Boring Completed : 23 . 3 . 2013	Total Depth (m) : 35.5 m
Elevation (m) : 4.56 m	Logged by : Phyo Ko Ko Oo	Water Level (m) : 2.45 m
	Checked by : Wai Phyo Aung	Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)	
					0	10	20	30	40	50			
Gray, medium dense, Silty SAND with little Clay (20.0 m ~ 24.5 m).		21	-16.44	21.00				24			<input checked="" type="checkbox"/>	2.88	
		22	-17.44					21			<input checked="" type="checkbox"/>	2.52	
		23	-18.44						19			<input checked="" type="checkbox"/>	2.28
		24	-19.44	24.00					25			<input checked="" type="checkbox"/>	3.00
		25	-20.44							34		<input checked="" type="checkbox"/>	4.08
Gray, dense, Silty SAND with little Clay (24.5 m ~ 30.0 m).		26	-21.44						31		<input checked="" type="checkbox"/>	3.72	
		27	-22.44	27.00					30		<input checked="" type="checkbox"/>	3.60	
		28	-23.44							35		<input checked="" type="checkbox"/>	4.20
		29	-24.44							38		<input checked="" type="checkbox"/>	4.56
		30	-25.44	30.00						43		<input checked="" type="checkbox"/>	5.16
Type of Sample		Strength of Consistency of Cohesive Soils				Density of Cohesionless Soils							
<input type="checkbox"/> Undisturbed Sample	<2 Very Soft				<4 Very Loose								
<input checked="" type="checkbox"/> Disturbed Sample (Split spoon)	2 - 4 Soft				4 - 10 Loose Sand								
<input type="checkbox"/> Rock Sample	4 - 8 Medium				10 - 30 Medium Dense								
	8 - 15 Firm				30 - 50 Dense								
	15 - 30 Very Firm				>50 Very Dense								

SOIL INVESTIGATION LOG

Project : The Improvement Of Water Supply	Type of Hammer : Automatic	Sheet : 4 of 4
Location : Botataung Township	Boring Started : 20 . 3 . 2013	Hole No : 1
Coordinates : N-1855515.95,E-200826.3	Boring Completed : 23 . 3 . 2013	Total Depth (m) : 35.5 m
Elevation (m) : 4.56 m	Logged by : Phyo Ko Ko Oo	Water Level (m) : 2.45 m
	Checked by : Wai Phyo Aung	Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)					Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)			
					0	10	20	30	40			50		
Gray, very dense, Silty SAND (30.0 m ~ 35.5 m).		31	-26.44	X						>50	⊗	>5		
		32	-27.44								>50	⊗	>5	
		33	-28.44		33.00							>50	⊗	>5
		34	-29.44									>50	⊗	>5
		35	-30.44									>50	⊗	>5
		36												
		37												
		38												
		39												
		40												

Type of Sample	Strength of Consistency of Cohesive Soils	Density of Cohesionless Soils
<input type="checkbox"/> Undisturbed Sample	<2 Very Soft	<4 Very Loose
<input checked="" type="checkbox"/> Disturbed Sample (Split spoon)	2 - 4 Soft	4 - 10 Loose Sand
<input type="checkbox"/> Rock Sample	4 - 8 Medium	10 - 30 Medium Dense
	8 - 15 Firm	30 - 50 Dense
	15 - 30 Very Firm	>50 Very Dense

SOIL TEST RESULTS

Project : The Improvement Of Water Supply Project													Date : 1-4-2013							
Location : Botahtaung , Yangon													Borehole No : BH-1							
Sr; No,	Depth (m)		Description of Soil	Specific gravity	Grain Size Analysis				Atterberg Limit			Moisture content	Bulk density	Dry density	Triaxial Compression Test		U C S Test	Consolidation Test		
					Gravel	Sand	Silt	Clay	(L.L)	(P.L)	(P. I)				C	φ		Initial Void Ratio (e)	Pre-consolidation Pressure (Compression Index (Cc)
	Fr	To			(%)	(%)	(%)	(%)	(%)	(%)	(%)				(%)	g/cm ³		g/cm ³	kg/cm ²	(°)
1	1.00	1.45	Brown colour, loose, SAND with some silt and clay with trace gravel.	2.57	5.70	86.00	8.30	NL	NP	NI	23.81	1.92	1.55	0.11	5.00	0.18				
2	3.00	4.00	Bluish grey colour, Soft, Silty CLAY with trace sand.	2.60	0.00	1.60	98.40	48.32	25.13	23.19	41.2	1.87	1.32	0.16	7.00	0.21	1.234	1.25	0.46	
3	4.00	5.00	Bluish grey colour, Soft, Silty CLAY with trace sand.	2.45	0.00	0.40	99.60	55.84	31.15	24.69	48.96	1.85	1.24	0.19	5.00	0.32	1.245	1.13	0.44	
4	5.00	6.00	Bluish grey colour, Soft, Silty CLAY with trace sand.	2.56	0.00	2.80	97.20	52.10	28.97	23.12	45.90	1.82	1.25	0.15	7.00	0.25	1.252	0.85	0.43	
5	8.00	8.45	Grey colour, medium firm, Silty CLAY with a little amount of sand.	2.53	0.00	3.50	96.50	41.33	23.71	17.62	44.26	1.81	1.25	0.12	6.00	0.22				
6	10.00	10.45	Grey colour, firm, Sandy CLAY with some silt .	2.58	0.00	33.90	66.10	33.93	16.28	17.65	35.53	1.86	1.37	0.15	9.00	0.21				

SOIL TEST RESULTS

Project : The Improvement Of Water Supply Project													Date : 10-4-2013							
Location : Botahtaung , Yangon													Borehole No : BH-1							
Sr. No,	Depth (m)		Description of Soil	Specific gravity	Grain Size Analysis				Atterberg Limit			Moisture content	Bulk density	Dry density	Triaxial Compression Test		U C S Test	Consolidation Test		
					Gravel	Sand	Silt	Clay	(L.L)	(P.L)	(P. I)				C	φ		Initial Void Ratio (e)	Pre-consolidation Pressure (Pc)	Compression Index (Cc)
	Fr	To			(%)	(%)	(%)	(%)	(%)	(%)	(%)				(%)	g/cm ³		g/cm ³	kg/cm ²	(°)
7	15.00	15.45	Grey colour,firm,Silty CLAY with some sand.	2.60	0.00	20.70	79.30	40.62	20	20.62	36.20	1.85	1.35	0.18	8.00	0.25				
8	18.00	18.45	Grey colour,firm,Silty CLAY with some sand.	2.60	0.00	17.60	82.40	38.41	20.48	17.93	33.53	1.79	1.34	0.12	10.00	0.31				
9	21.00	21.45	Grey colour,medium dense, SAND with some silt and clay.	2.52	0.00	80.00	20.00	NL	NP	NI	25.40	1.98	1.57	0.05	14.00	0.15				
10	25.00	25.45	Grey colour,dense, SAND with some silt and clay.	2.64	0.00	71.60	28.40	NL	NP	NI	27.84	1.95	1.52	0.07	13.00	0.16				
11	30.00	30.45	Grey colour,dense, SAND with alittle amount of silt and clay.	2.55	0.00	86.50	13.50	NL	NP	NI	19.77	1.79	1.49	0.04	16.00	0.12				
12	32.00	32.45	Grey colour,very dense, SAND with alittle amount of silt and clay.	2.65	0.00	92.40	7.60	NL	NP	NI	21.2	1.86	1.53	0.03	18.00	0.13				

Soil Test Results For Triaxial Permeability Test

Project : The Improvement Of Water Supply		Date: 25.3.2013	Date: 30.3.2013	Date: 6.4.2013
Location : Botahtaung ,Yangon				
BORING NO : BH-1				
SAMPLE TYPE :: UD		UD	UD	UD
SPECIMEN DEPTH (M)				
	From	3.0 (m)	4.0 (m)	5.0 (m)
	To	4.0 (m)	5.0 (m)	6.0 (m)
Triaxial	Coefficient of	TP	TP	TP
Premeability	Permeability at 20 c m/s	1.9×10^{-9}	1.9×10^{-10}	2.1×10^{-10}

East Dagon BH-1~5 for Lagunpyin WTP

LOCATION OF THE PROJECT AREA

The proposed site of Lagunpyin Water Treatment Plant is situated near 56 Qrt, East Dagon Township, Yangon Division.



Boreholes Location Point of the Project Area

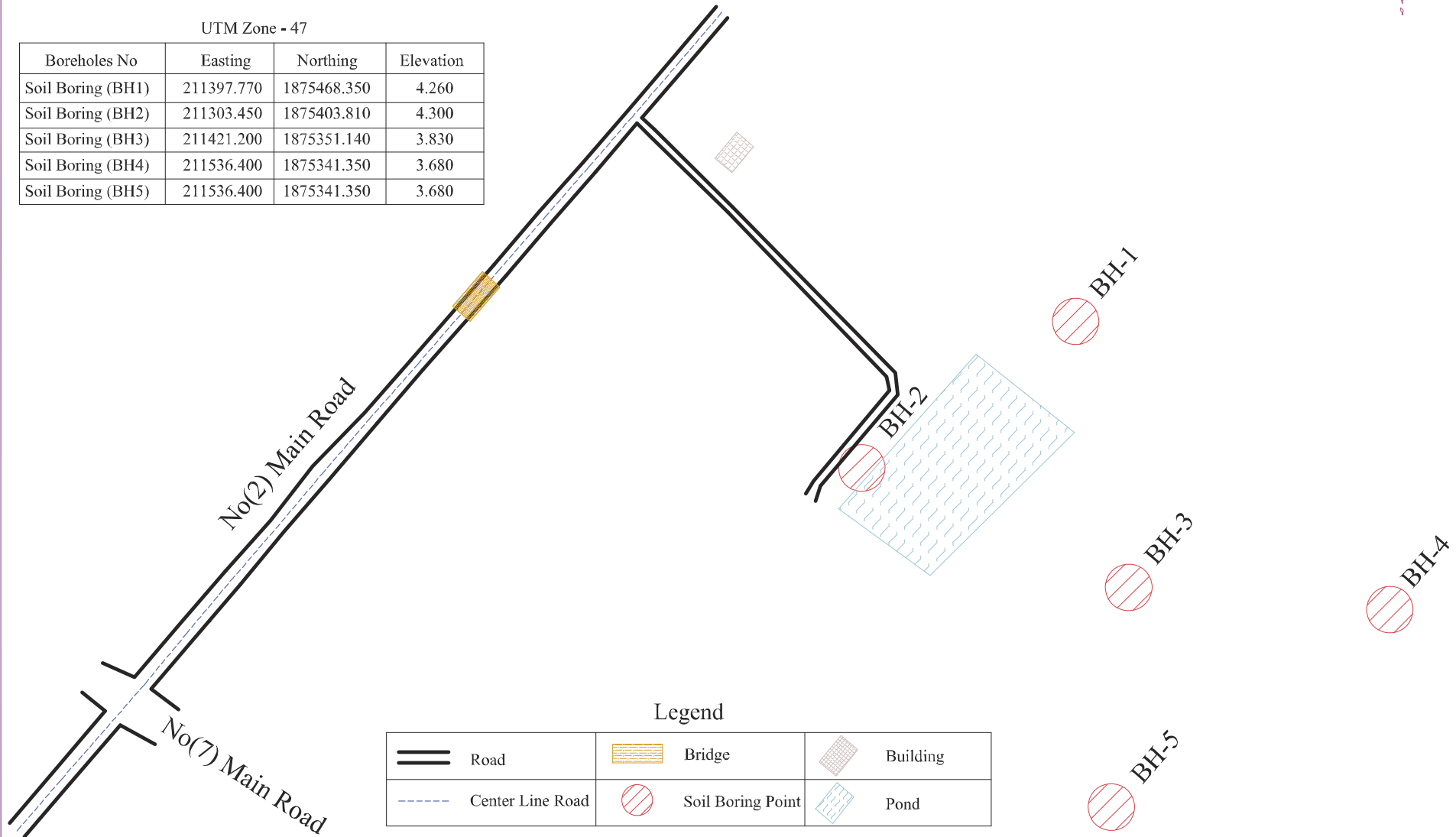
Boreholes Location Plan For Lagunpyin Water Treatment Plants



UTM Zone - 47

Boreholes No	Easting	Northing	Elevation
Soil Boring (BH1)	211397.770	1875468.350	4.260
Soil Boring (BH2)	211303.450	1875403.810	4.300
Soil Boring (BH3)	211421.200	1875351.140	3.830
Soil Boring (BH4)	211536.400	1875341.350	3.680
Soil Boring (BH5)	211536.400	1875341.350	3.680

H-25











	Road		Bridge		Building
	Center Line Road		Soil Boring Point		Pond

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875468.35, E-211397.77
 Elevation (m) : 4.26 m

Type of Hammer : Automatic
 Boring Started : 25.7.2013
 Boring Completed : 27.7.2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 1 of 5
 Hole No : BH - 1
 Total Depth (m) : 42.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (kg/cm ²)	SPT (No. of Blow)			
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)	
Brownish gray to reddish brown, Soft to Stiff, Silty CLAY with a little amount of sand. (0.0 m ~ 10.0 m).		1	3.26									0.70	2	3	4	
		2	2.26													
		3	1.26	3.00									0.44	2	2	3
		4	0.26													
		5	-0.74										0.50	1	2	3
		6	-1.74	6.00												
		7	-2.74										0.44	1	2	2
		8	-3.74										0.44	2	2	2
		9	-4.74	9.00									1.22	3	4	7
		10	-5.74										1.45	5	5	8

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
 Undisturbed Sample	 Clayey SILT	<2	Very Soft	<4	Very Loose
 Disturbed Sample (Split spoon)	 Silty CLAY	2 - 4	Soft	4 - 10	Loose Sand
 Rock Sample	 Silty SAND	4 - 8	Firm	10 - 30	Medium Dense
	 Sandy SILT	8 - 15	Stiff	30 - 50	Dense
		15 - 30	Very Stiff	>50	Very Dense
		>30	Hard		

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875468.35, E-211397.77
 Elevation (m) : 4.26 m

Type of Hammer : Automatic
 Boring Started : 25.7.2013
 Boring Completed : 27.7.2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 2 of 5
 Hole No : BH - 1
 Total Depth (m) : 42.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (kg/cm ²)	SPT (No. of Blow)		
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)
Gray to reddish brown, tiff to Very stiff, Silty CLAY with a little amount sand. (10.0 m ~ 12.5 m).		11	-6.74	12.0			12					1.40	5	5	7
		12	-7.74		16							1.87	6	8	8
Gray, Firm to Stiff, Silty CLAY with a little amount sand. (12.5 m ~ 16.5 m).		13	-8.74	15.0		6						0.70	3	3	3
		14	-9.74		10							1.17	4	5	5
		15	-10.74		8							0.94	3	3	5
		16	-11.74		8							0.94	3	4	4
Brownish gray to brown, Stiff to Very stiff, Silty CLAY (16.5 m ~ 20.0 m).		17	-12.74	18.0			11					1.29	5	5	6
		18	-13.74		13						1.53	5	6	7	
		19	-14.74		18						2.10	7	8	10	
		20	-15.74		28						3.28	9	13	15	

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
Undisturbed Sample	Clayey SILT	<2	Very Soft	<4	Very Loose
Disturbed Sample (Split spoon)	Silty CLAY	2 - 4	Soft	4 - 10	Loose Sand
Rock Sample	Silty SAND	4 - 8	Firm	10 - 30	Medium Dense
	Sandy SILT	8 - 15	Stiff	30 - 50	Dense
		15 - 30	Very Stiff	>50	Very Dense
		>30	Hard		

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875468.35, E-211397.77
 Elevation (m) : 4.26 m

Type of Hammer : Automatic
 Boring Started : 25.7.2013
 Boring Completed : 27.7.2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 3 of 5
 Hole No : BH - 1
 Total Depth (m) : 42.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (kg/cm ²)	SPT (No. of Blow)		
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)
Brown, Very stiff, Silty CLAY with a little amount sand (20.0 m ~ 22.5 m).		21	-16.74	21.0				24				2.81	9	11	13
		22	-17.74					21				2.46	8	10	11
Brown to reddish brown to gray, Dense to Very dense, Silty SAND with trace clay (22.5 m ~ 28.5 m).		23	-18.74					37				4.34	10	16	21
		24	-19.74	24.0				41				4.80	11	18	23
		25	-20.74					47				5.50	12	22	25
		26	-21.74					>50					16	27	30
		27	-22.74					41				4.80	10	21	20
		28	-23.74					38				4.45	8	18	20
Gray, Very stiff, Silty CLAY with trace sand (28.5 m ~ 30.0 m).		29	-24.74				20				2.34	6	8	12	
		30	-25.74				16				1.87	4	7	9	

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
	Undisturbed Sample	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample	4 - 8	Firm	10 - 30	Medium Dense
	Clayey SILT	8 - 15	Stiff	30 - 50	Dense
	Silty CLAY	15 - 30	Very Stiff	>50	Very Dense
	Silty SAND	>30	Hard		
	Sandy SILT				

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875468.35, E-211397.77
 Elevation (m) : 4.26 m

Type of Hammer : Automatic
 Boring Started : 25.7.2013
 Boring Completed : 27.7.2013
 Logged by : Phyto Ko Ko Oo
 Checked by : Wai Phyto Aung

Sheet 4 of 5
 Hole No : BH - 1
 Total Depth (m) : 42.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (kg/cm ²)	SPT (No. of Blow)			
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)	
Gray to reddish brown, Very stiff, Silty CLAY with trace sand (30.0 m ~ 36.5 m).		31	-26.74				16					1.87	5	8	8	
		32	-27.74				17					1.99	6	8	9	
		33	-28.74					18					2.10	7	9	9
		34	-29.74					21					2.46	8	10	11
		35	-30.74					23					2.69	8	11	12
		36	-31.74					25					2.93	9	11	14
		37	-32.74					37					4.34	11	16	21
Reddish brown, Dense to Very dense, Silty SAND with trace clay (36.5 m ~ 40.0 m).		38	-33.74									>5	13	22	34	
		39	-34.74									>5	15	25	31	
		40	-35.74									>5	19	26	32	

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
	Undisturbed Sample	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample	4 - 8	Firm	10 - 30	Medium Dense
	Clayey SILT	8 - 15	Stiff	30 - 50	Dense
	Silty CLAY	15 - 30	Very Stiff	>50	Very Dense
	Silty SAND	>30	Hard		
	Sandy SILT				

Project : Lagonpyin Type of Hammer : Automatic Sheet 5 of 5
 : Water Treatment Plant Boring Started : 25.7.2013 Hole No : BH- 1
 Location : South Dagon Township Boring Completed : 27.7.2013 Total Depth (m) : 42.5 m
 Coordinates : N-1875468.35,E-211397.77 Logged by : Phyo Ko Ko Oo Water Level (m) : 1.3 m
 Elevation (m) : 4.26 m Checked by : Wai Phyo Aung Driller : Than Maung


Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)					Type of sample	Field Bearing capacity calculated from SPT value (Kg/cm ²)	SPT (No. of Blow)			
					0	10	20	30	40			50	SD(6in)	TD(6in)	TD(6in)
Reddish brown,Dense to Very dense,Silty SAND with trace clay (40.0 m ~ 42.5 m).		41	-36.74								>50	>5	21	28	37
		42	-37.74								>50	>5	24	27	35
		42.5													
		43			END OF BOREHOLE										
		44													
		45													
		46													
		47													
		48													
		49													
		50													








Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
	Undisturbed Sample	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample	4 - 8	Firm	10 - 30	Medium Dense
	Clayey SILT	8 - 15	Stiff	30 - 50	Dense
	Silty CLAY	15 - 30	Very Stiff	>50	Very Dense
	Silty SAND	>30	Hard		
	Sandy SILT				

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875403.81, E-211303.45
 Elevation (m) : 4.30 m

Type of Hammer : Automatic
 Boring Started : 8.8.2013
 Boring Completed : 11.8.2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 1 of 5
 Hole No : BH - 2
 Total Depth (m) : 43.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung


Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (kg/cm ²)	SPT (No. of Blow)			
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)	
Brown, Very soft to Stiff, Silty CLAY (0.0 m ~ 10.0 m).		1	3.30			8						0.70	3	4	4	
		2	2.30			10						0.88	4	5	5	
		3	1.30	3.00			11						0.97	3	5	6
		4	0.30				8						0.70	4	4	4
		5	-0.70													
		6	-1.70	6.00			2						0.20	0	1	1
		7	-2.70				3						0.33	1	1	2
		8	-3.70													
		9	-4.70	9.00			4						0.44	2	2	2
		10	-5.70													








Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
 Undisturbed Sample	 Clayey SILT	<2	Very Soft	<4	Very Loose
 Disturbed Sample (Split spoon)	 Silty CLAY	2 - 4	Soft	4 - 10	Loose Sand
 Rock Sample	 Silty SAND	4 - 8	Firm	10 - 30	Medium Dense
	 Sandy SILT	8 - 15	Stiff	30 - 50	Dense
		15 - 30	Very Stiff	>50	Very Dense
		>30	Hard		

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875403.81, E-211303.45
 Elevation (m) : 4.30 m

Type of Hammer : Automatic
 Boring Started : 8.8.2013
 Boring Completed : 11.8.2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 2 of 5
 Hole No : BH - 2
 Total Depth (m) : 43.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung




Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (kg/cm ²)	SPT (No. of Blow)		
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)
Gray to reddish brown, Firm to Very stiff, Silty CLAY with a little amount of sand (10.0 m ~ 20.0 m)		11	-6.70	12.0	21						⊗	2.46	5	9	12
		12	-7.70		18						⊗	2.11	4	8	10
		13	-8.70		16						⊗	1.87	5	7	9
		14	-9.70		14						⊗	1.64	4	6	8
		15	-10.70		11						⊗	1.29	3	5	6
		16	-11.70		8						⊗	0.94	4	4	4
		17	-12.70		9						⊗	1.05	4	4	5
		18	-13.70		11						⊗	1.29	4	5	6
		19	-14.70		11						⊗	1.29	5	5	6
		20	-15.70		18						⊗	2.11	6	8	10








Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
 Undisturbed Sample	 Clayey SILT	<2	Very Soft	<4	Very Loose
 Disturbed Sample (Split spoon)	 Silty CLAY	2 - 4	Soft	4 - 10	Loose Sand
 Rock Sample	 Silty SAND	4 - 8	Firm	10 - 30	Medium Dense
	 Sandy SILT	8 - 15	Stiff	30 - 50	Dense
		15 - 30	Very Stiff	>50	Very Dense
		>30	Hard		

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875403.81, E-211303.45
 Elevation (m) : 4.30 m

Type of Hammer : Automatic
 Boring Started : 8.8.2013
 Boring Completed : 11.8.2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 3 of 5
 Hole No : BH- 2
 Total Depth (m) : 43.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (kg/cm ²)	SPT (No. of Blow)					
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)			
Gray, Very stiff, Silty CLAY with a little amount of sand (20.0 m ~ 20.5 m).																		
Gray to reddish brown, Very stiff to Hard, Clayey SILT with a little amount of sand (20.5 m ~ 26.5 m).		21	-16.70	21.0					37			4.34	11	15	22			
		22	-17.70						39			4.57	11	18	21			
		23	-18.70						37			4.34	13	17	20			
		24	-19.70	24.0					26			3.05	10	11	15			
		25	-20.70						21			2.46	8	10	11			
		26	-21.70						18			2.11	8	8	10			
		27	-22.70	27.0					17			1.99	7	8	9			
Gray, Very stiff, Silty CLAY with a little amount of sand (26.5 m ~ 30.0 m).		28	-23.70					16			1.87	6	8	8				
		29	-24.70					16			1.87	5	7	9				
		30	-25.70	30.0				17			1.99	7	8	9				

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
 Undisturbed Sample	 Clayey SILT	<2	Very Soft	<4	Very Loose
 Disturbed Sample (Split spoon)	 Silty CLAY	2 - 4	Soft	4 - 10	Loose Sand
 Rock Sample	 Silty SAND	4 - 8	Firm	10 - 30	Medium Dense
	 Sandy SILT	8 - 15	Stiff	30 - 50	Dense
		15 - 30	Very Stiff	>50	Very Dense
		>30	Hard		

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875403.81, E-211303.45
 Elevation (m) : 4.30 m

Type of Hammer : Automatic
 Boring Started : 8.8.2013
 Boring Completed : 11.8.2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 4 of 5
 Hole No : BH - 2
 Total Depth (m) : 43.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (kg/cm ²)	SPT (No. of Blow)			
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)	
Gray, very stiff, Silty CLAY with a little amount of sand (30.0 m ~ 32.5 m).		31	-26.70	33.0	16							1.87	7	7	9	
		32	-27.70		19								2.23	8	9	10
Light gray to reddish brown, Very stiff to Hard, Clayey SILT with a little amount of sand (32.5 m ~ 35.5 m).		33	-28.70	33.0	24							2.81	9	11	13	
		34	-29.70		27								3.16	8	13	14
		35	-30.70		33									3.86	9	15
Light gray, Dense to Very dense, Silty SAND with trace clay (35.5 m ~ 38.5 m).		36	-31.70	33.0	41							4.80	10	19	22	
		37	-32.70		>50								>5	11	27	32
		38	-33.70		26									3.05	10	21
Gray to brown, Hard, Clayey SILT with some sand (38.5 m ~ 40.0).		39	-34.70	33.0	>50							>5	21	>50		
		40	-35.70		>50								>5	25	>50	

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
	Undisturbed Sample	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample	4 - 8	Firm	10 - 30	Medium Dense
	Clayey SILT	8 - 15	Stiff	30 - 50	Dense
	Silty CLAY	15 - 30	Very Stiff	>50	Very Dense
	Silty SAND	>30	Hard		
	Sandy SILT				

Project : Water Treatment Plant Type of Hammer : Automatic Sheet : 5 of 5
 Location : South Dagon Township Boring Started : 8.8.2013 Hole No : BH - 2
 Coordinates : N-1875403.81,E-211303.45 Boring Completed : 11.8.2013 Total Depth (m) : 43.5 m
 Elevation (m) : 4.30 m Logged by : Phyo Ko Ko Oo Water Level (m) : 1.3 m
 Checked by : Wai Phyo Aung Driller : Than Maung


Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (K _n /cm ²)	SPT (No. of Blow)		
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)
Gray to brown, Hard, Clayey SILT with some sand (40.0 m ~ 43.5 m).		41	-36.7								X	>5	32	>50	
		42	-37.7								X	>5	31	>50	
		43	-38.7									X	>5	35	>50
		43.5										X	>5		
		44			END OF BOREHOLE										
		45													
		46													
		47													
		48													
		49													
		50													








Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
Undisturbed Sample	Clayey SILT	<2	Very Soft	<4	Very Loose
Disturbed Sample (Split spoon)	Silty CLAY	2 - 4	Soft	4 - 10	Loose Sand
Rock Sample	Silty SAND	4 - 8	Firm	10 - 30	Medium Dense
	Sandy SILT	8 - 15	Stiff	30 - 50	Dense
		15 - 30	Very Stiff	>50	Very Dense
		>30	Hard		

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875351.14, E-211421.20
 Elevation (m) : 3.83 m

Type of Hammer : Automatic
 Boring Started : 2 . 8 . 2013
 Boring Completed : 6 . 8 . 2013
 Logged by : Phyto Ko Ko Oo
 Checked by : Wai Phyto Aung

Sheet 1 of 5
 Hole No : BH - 3
 Total Depth (m) : 45.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung




Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/sqft)	SPT (No. of Blow)			
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)	
Brown to grey, Firm, Silty CLAY with some peats and lateric soils (0.0 m ~ 10.0 m).		1	2.83			5						0.44	2	2	3	
		2	1.83			6						0.53	2	3	3	
		3	0.83	3.00												
		4	-0.17				3						0.26	1	1	2
		5	-1.17													
		6	-2.17	6.00			4						0.40	1	2	2
		7	-3.17				4						0.44	1	2	2
		8	-4.17					15					1.67	3	6	9
		9	-5.17	9.00				15					1.67	4	7	8
		10	-6.17								29		3.23	7	12	17








Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
 Undisturbed Sample	 Clayey SILT	<2	Very Soft	<4	Very Loose
 Disturbed Sample (Split spoon)	 Silty CLAY	2 - 4	Soft	4 - 10	Loose Sand
 Rock Sample	 Silty SAND	4 - 8	Firm	10 - 30	Medium Dense
	 Sandy SILT	8 - 15	Stiff	30 - 50	Dense
		15 - 30	Very Stiff	>50	Very Dense
		>30	Hard		

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875351.14, E-211421.20
 Elevation (m) : 3.83 m

Type of Hammer : Automatic
 Boring Started : 2 . 8 . 2013
 Boring Completed : 6 . 8 . 2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 2 of 5
 Hole No : BH - 3
 Total Depth (m) : 45.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung


Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/sqft)	SPT (No. of Blow)		
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)
Grey to brown, Very Stiff, SILT and CLAY (10.0 m ~ 12.5 m).		11	-7.17	12.0	20						⊗	2.34	6	9	11
		12	-8.17		17						⊗	1.99	5	8	9
Grey, Firm to Stiff, Silty CLAY with trace peats (12.5 m ~ 18.5 m).		13	-9.17	15.0	8						⊗	0.94	4	4	4
		14	-10.17								⊗				
		15	-11.17		9						⊗	1.05	4	4	5
		16	-12.17		11						⊗	1.29	4	5	6
		17	-13.17		12						⊗	1.46	4	6	6
		18	-14.17		13						⊗	1.52	4	6	7
Light grey, Very stiff, SILT and CLAY (18.5 m ~ 20.0 m).		19	-15.17		17						⊗	1.99	5	7	10
		20	-16.17		23						⊗	2.69	7	10	13








Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
 Undisturbed Sample	 Clayey SILT	<2	Very Soft	<4	Very Loose
 Disturbed Sample (Split spoon)	 Silty CLAY	2 - 4	Soft	4 - 10	Loose Sand
 Rock Sample	 Silty SAND	4 - 8	Firm	10 - 30	Medium Dense
	 Sandy SILT	8 - 15	Stiff	30 - 50	Dense
		15 - 30	Very Stiff	>50	Very Dense
		>30	Hard		

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875351.14, E-211421.20
 Elevation (m) : 3.83 m

Type of Hammer : Automatic
 Boring Started : 2 . 8 . 2013
 Boring Completed : 6 . 8 . 2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 3 of 5
 Hole No : BH - 3
 Total Depth (m) : 45.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/sqft)	SPT (No. of Blow)			
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)	
Light grey to reddish brown , Very stiff to Hard, SILT and CLAY with trace peats (20.0 m ~ 30.0 m).		21	-17.17	21.0				30				3.51	9	11	19	
		22	-18.17						37				4.34	12	16	21
		23	-19.17						37				4.34	10	18	19
		24	-20.17	24.0					38				4.45	9	17	21
		25	-21.17						33				3.87	9	15	18
		26	-22.17						27				3.16	8	12	15
		27	-23.17	27.0					23				2.69	6	10	13
		28	-24.17						20				2.34	6	9	11
		29	-25.17						21				2.46	7	10	11
		30	-26.17	30.0					22				2.58	8	10	12

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
	Undisturbed Sample	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample	4 - 8	Firm	10 - 30	Medium Dense
	Clayey SILT	8 - 15	Stiff	30 - 50	Dense
	Silty CLAY	15 - 30	Very Stiff	>50	Very Dense
	Silty SAND	>30	Hard		
	Sandy SILT				

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875351.14, E-211421.20
 Elevation (m) : 3.83 m

Type of Hammer : Automatic
 Boring Started : 2 . 8 . 2013
 Boring Completed : 6 . 8 . 2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 4 of 5
 Hole No : BH - 3
 Total Depth (m) : 45.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/sqft)	SPT (No. of Blow)			
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)	
Grey to reddish brown, Very stiff to Hard, SILT and CLAY with trace peats and sand (30.0 m ~ 37.5 m).		31	-27.17				25					2.93	8	11	14	
		32	-28.17				28					3.28	9	12	16	
		33	-29.17	33.0				33					3.87	11	15	18
		34	-30.17							42			4.92	14	19	23
		35	-31.17							39			4.57	15	18	21
		36	-32.17	35.0						42			4.92	17	20	22
		37	-33.17							46			>5	16	21	25
Grey, Very dense, Silty SAND with little clay (37.5 m ~ 38.5 m).		38	-34.17								>50	>5	15	25	28	
Grey to brown, Hard, SILT and CLAY with trace sand (38.5 m ~ 40.0 m).		39	-35.17						33			3.87	10	15	18	
		40	-36.17									>5	12	20	28	

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
	Undisturbed Sample	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample	4 - 8	Firm	10 - 30	Medium Dense
	Clayey SILT	8 - 15	Stiff	30 - 50	Dense
	Silty CLAY	15 - 30	Very Stiff	>50	Very Dense
	Silty SAND	>30	Hard		
	Sandy SILT				

Project : Lagonpyin Type of Hammer : Automatic Sheet 5 of 5
 : Water Treatment Plant Boring Started : 2 . 8 . 2013 Hole No : BH - 3
 Location : South Dagon Township Boring Completed : 6 . 8 . 2013 Total Depth (m) : 45.5 m
 Coordinates : N-1875351.14,E-211421.20 Logged by : Phyo Ko Ko Oo Water Level (m) : 1.3 m
 Elevation (m) : 3.83 m Checked by : Wai Phyo Aung Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/soft)	SPT (No. of Blow)				
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)		
Grey,Hard, SILT and CLAY with trace sand (40.0 m ~ 40.5 m).																	
Grey, Very dense, Silty SAND with little clay (40.5 m ~ 45.5 m).		41	-37.17							>50	>5	18	27	32			
		42	-38.17							>50	>5	16	24	38			
		43	-39.17							>50	>5	20	26	34			
		44	-40.17							>50	>5	22	31	35			
		45	-41.17							>50	>5	25	29	38			
		46															
		47															
		48															
		49															
		50															

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
Undisturbed Sample	Clayey SILT	<2	Very Soft	<4	Very Loose
Disturbed Sample (Split spoon)	Silty CLAY	2 - 4	Soft	4 - 10	Loose Sand
Rock Sample	Silty SAND	4 - 8	Firm	10 - 30	Medium Dense
	Sandy SILT	8 - 15	Stiff	30 - 50	Dense
		15 - 30	Very Stiff	>50	Very Dense
		>30	Hard		

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875341.35, E-211536.40
 Elevation (m) : 3.68 m

Type of Hammer : Automatic
 Boring Started : 29.7.2013
 Boring Completed : 31.7.2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 1 of 5
 Hole No : BH - 4
 Total Depth (m) : 45.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/sqft)	SPT (No. of Blow)			
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)	
Brown, Very soft to Soft, SILT and CLAY (0.0 m ~ 2.5 m).		1	2.68			2						0.18	1	1	1	
		2	1.68			3						0.26	1	1	2	
Grey, Very soft to Soft, Silty CLAY with trace peats (2.5 m ~ 8.0 m).		3	0.68	3.00												
		4	-0.32			2						0.19	0	1	1	
		5	-1.32													
		6	-2.32	6.00		3						0.30	1	2	1	
		7	-3.32													
		8	-4.32			6						0.67	2	3	3	
Reddish brown, Firm to Stiff, SILT and CLAY with some lateric (8.0 m ~ 10.0 m).		9	-5.32	9.00		9					1.00	3	4	5		
		10	-6.32									1.22	4	5	6	

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
Undisturbed Sample	Clayey SILT	<2	Very Soft	<4	Very Loose
Disturbed Sample (Split spoon)	Silty CLAY	2 - 4	Soft	4 - 10	Loose Sand
Rock Sample	Silty SAND	4 - 8	Firm	10 - 30	Medium Dense
	Sandy SILT	8 - 15	Stiff	30 - 50	Dense
		15 - 30	Very Stiff	>50	Very Dense
		>30	Hard		

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875341.35, E-211536.40
 Elevation (m) : 3.68 m

Type of Hammer : Automatic
 Boring Started : 29.7.2013
 Boring Completed : 31.7.2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 2 of 5
 Hole No : BH - 4
 Total Depth (m) : 45.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/sqft)	SPT (No. of Blow)											
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)									
Brown to grey, Stiff to Very stiff, SILT and CLAY with some lateric soil (10.0 m ~ 12.5 m).		11	-7.32	12.0	20						⊗	2.34	7	10	10									
		12	-8.32		12											⊗	1.41	5	6	6				
Grey, Firm to Stiff, Silty CLAY with trace peats (12.5 m ~ 14.5 m).		13	-9.32	15.0	8						⊗	0.94	3	4	4									
		14	-10.32		9											⊗	1.05	3	4	5				
Grey, Firm, SILT and CLAY (14.5 m ~ 15.5 m).		15	-11.32	18.0	8						⊗	0.94	4	4	4									
Grey, Stiff to Very stiff, SILT and CLAY with trace lateric soil (15.5 m ~ 20.0 m).		16	-12.32		10											⊗	1.17	4	5	5				
		17	-13.32	12						⊗	1.41	4	6	6										
		18	-14.32	13											⊗						1.52	4	6	7
		19	-15.32	17																				
20	-16.32	40						⊗	4.69							14	20	20						

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
Undisturbed Sample	Clayey SILT	<2	Very Soft	<4	Very Loose
Disturbed Sample (Split spoon)	Silty CLAY	2 - 4	Soft	4 - 10	Loose Sand
Rock Sample	Silty SAND	4 - 8	Firm	10 - 30	Medium Dense
	Sandy SILT	8 - 15	Stiff	30 - 50	Dense
		15 - 30	Very Stiff	>50	Very Dense
		>30	Hard		

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875341.35, E-211536.40
 Elevation (m) : 3.68 m

Type of Hammer : Automatic
 Boring Started : 29.7.2013
 Boring Completed : 31.7.2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 3 of 5
 Hole No : BH - 4
 Total Depth (m) : 45.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/sqft)	SPT (No. of Blow)		
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)
Brown, Stiff to Very stiff to Hard, SILT and CLAY with trace lateric soil (20.0 m ~ 30.0 m).		21	-17.32	21.0				33				3.87	9	15	18
		22	-18.32					33				3.87	11	14	19
		23	-19.32					32				3.75	13	15	17
		24	-20.32	24.0				31				3.63	11	13	18
		25	-21.32					31				3.63	10	15	16
		26	-22.32					25				2.93	9	12	13
		27	-23.32	27.0				20				2.34	7	9	11
		28	-24.32					22				2.58	7	11	11
		29	-25.32					14				1.64	6	6	8
		30	-26.32	30.0				15				1.76	6	7	8

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
	Undisturbed Sample	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample	4 - 8	Firm	10 - 30	Medium Dense
	Clayey SILT	8 - 15	Stiff	30 - 50	Dense
	Silty CLAY	15 - 30	Very Stiff	>50	Very Dense
	Silty SAND	>30	Hard		
	Sandy SILT				

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875341.35, E-211536.40
 Elevation (m) : 3.68 m

Type of Hammer : Automatic
 Boring Started : 29.7.2013
 Boring Completed : 31.7.2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 4 of 5
 Hole No : BH - 4
 Total Depth (m) : 45.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/sqft)	SPT (No. of Blow)			
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)	
Grey to reddish brown, Stiff to Very stiff, SILT and CLAY with trace peats and sand (30.0 m ~ 38.5 m).		31	-27.32				16					1.87	6	7	9	
		32	-28.32				17					1.99	6	7	10	
		33	-29.32	33.0				17					1.99	6	8	9
		34	-30.32					18					2.11	8	8	10
		35	-31.32					20					1.34	10	10	10
		36	-32.32	35.0				23					2.69	8	10	13
		37	-33.32					27					3.16	8	12	15
		38	-34.32					28					3.28	7	13	15
Brown, Firm, Silty SAND with trace clay (38.5 m ~ 40.0 m).		39	-35.32				30					3.51	8	11	19	
		40	-36.32				40					4.69	10	18	22	

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
	Undisturbed Sample	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample	4 - 8	Firm	10 - 30	Medium Dense
	Clayey SILT	8 - 15	Stiff	30 - 50	Dense
	Silty CLAY	15 - 30	Very Stiff	>50	Very Dense
	Silty SAND	>30	Hard		
	Sandy SILT				

Project : Lagonpyin Type of Hammer : Automatic Sheet 5 of 5
 : Water Treatment Plant Boring Started : 29.7.2013 Hole No : BH - 4
 Location : South Dagon Township Boring Completed : 31.7.2013 Total Depth (m) : 45.5 m
 Coordinates : N-1875341.35,E-211536.40 Logged by : Phyo Ko Ko Oo Water Level (m) : 1.3 m
 Elevation (m) : 3.68 m Checked by : Wai Phyo Aung Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/soft)	SPT (No. of Blow)			
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)	
Brown, very dense, SILT and CLAY with trace clay (40.0 m ~ 42.5 m).		41	-37.32	X						>50	X	>5	16	26	35	
		42	-38.32							>50	X	>5	15	26	34	
Brown, very dense, Silty SAND with trace clay (42.5 m ~ 45.5 m).		43	-39.32							>50	X	>5	12	24	35	
		44	-40.32							>50	X	>5	16	28	37	
		45	-41.32							>50	X	>5	19	27	39	
		46			END OF BOREHOLE											
		47														
		48														
		49														
		50														

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
Undisturbed Sample	Clayey SILT	<2	Very Soft	<4	Very Loose
Disturbed Sample (Split spoon)	Silty CLAY	2 - 4	Soft	4 - 10	Loose Sand
Rock Sample	Silty SAND	4 - 8	Firm	10 - 30	Medium Dense
	Sandy SILT	8 - 15	Stiff	30 - 50	Dense
		15 - 30	Very Stiff	>50	Very Dense
		>30	Hard		

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875341.35, E-211536.40
 Elevation (m) : 3.68 m

Type of Hammer : Automatic
 Boring Started : 10.8.2013
 Boring Completed : 12.8.2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 1 of 5
 Hole No : BH - 5
 Total Depth (m) : 44.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/sqft)	SPT (No. of Blow)			
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)	
Dark brown, Stiff, SILT and CLAY (0.0 m ~ 3.5 m).		1	2.68			11						0.97	3	4	7	
		2	1.68			11						0.97	3	5	6	
		3	0.68	3.00			12						1.05	3	5	7
Brown to grey, Soft, Silty CLAY with some peats (3.5 m ~ 10.0 m).		4	-0.32													
		5	-1.32			4						0.40	2	2	2	
		6	-2.32	6.00												
		7	-3.32				5						0.56	2	2	3
		8	-4.32				5						0.56	2	2	3
		9	-5.32	9.00												
		10	-6.32													
						16						1.11	7	8	8	








Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
	Undisturbed Sample	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample	4 - 8	Firm	10 - 30	Medium Dense
	Clayey SILT	8 - 15	Stiff	30 - 50	Dense
	Silty CLAY	15 - 30	Very Stiff	>50	Very Dense
	Silty SAND	>30	Hard		
	Sandy SILT				

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875341.35, E-211536.40
 Elevation (m) : 3.68 m

Type of Hammer : Automatic
 Boring Started : 10.8.2013
 Boring Completed : 12.8.2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 2 of 5
 Hole No : BH - 5
 Total Depth (m) : 44.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung




Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/sqft)	SPT (No. of Blow)					
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)			
Grey to reddish brown, Very stiff, Silty CLAY with some lateric soil (10.0 m ~ 10.5 m).																		
Grey to brown, Very stiff, SILT and CLAY with some lateric soil (10.5 m ~ 17.5 m).		11	-7.32					22				2.58	8	10	12			
		12	-8.32	12.0				26				3.05	8	11	15			
		13	-9.32						37			4.34	13	18	19			
		14	-10.32						32			3.75	10	15	17			
		15	-11.32	15.0					26			3.05	8	11	15			
		16	-12.32						21			2.46	7	10	11			
		17	-13.32						16			1.87	6	8	8			
		18	-14.32	18.0					12			1.41	5	6	6			
Grey, Stiff, Silty CLAY with some peats (17.5 m ~ 20.0 m).		19	-15.32					14			1.64	6	6	8				
		20	-16.32					17			1.99	8	8	9				








Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
	Undisturbed Sample	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample	4 - 8	Firm	10 - 30	Medium Dense
	Clayey SILT	8 - 15	Stiff	30 - 50	Dense
	Silty CLAY	15 - 30	Very Stiff	>50	Very Dense
	Silty SAND	>30	Hard		
	Sandy SILT				

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875341.35, E-211536.40
 Elevation (m) : 3.68 m

Type of Hammer : Automatic
 Boring Started : 10.8.2013
 Boring Completed : 12.8.2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 3 of 5
 Hole No : BH - 5
 Total Depth (m) : 44.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung





Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/sqft)	SPT (No. of Blow)		
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)
Grey, stiff to very stiff, Silty CLAY with some peats (20.0 m ~ 25.5 m).		21	-17.32	21.0			15					1.76	6	6	9
		22	-18.32					13				1.52	5	6	7
		23	-19.32						15			1.76	6	7	8
		24	-20.32	24.0				18				2.11	7	8	10
		25	-21.32							24		2.81	8	11	13
		26	-22.32								>50	>5	17	23	31
Brown to grey, Hard to Very hard, SILT and CLAY (25.5 m ~ 27.5 m).		27	-23.32						46		>5	15	21	25	
		28	-24.32							43		>5	14	20	23
Brown, Hard, Clayey SILT (27.5 m ~ 30.0 m).		29	-25.32						31		3.63	10	15	16	
		30	-26.32							25		2.93	8	12	13








Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
	Undisturbed Sample	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample	4 - 8	Firm	10 - 30	Medium Dense
	Clayey SILT	8 - 15	Stiff	30 - 50	Dense
	Silty CLAY	15 - 30	Very Stiff	>50	Very Dense
	Silty SAND	>30	Hard		
	Sandy SILT				

Project : Lagonpyin
 : Water Treatment Plant
 Location : South Dagon Township
 Coordinates : N-1875341.35, E-211536.40
 Elevation (m) : 3.68 m



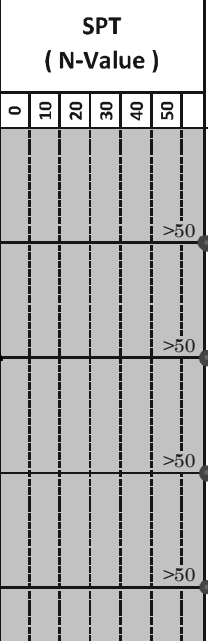




Type of Hammer : Automatic
 Boring Started : 10.8.2013
 Boring Completed : 12.8.2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 4 of 5
 Hole No : BH - 5
 Total Depth (m) : 44.5 m
 Water Level (m) : 1.3 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/sqft)	SPT (No. of Blow)		
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)
Brown, Very stiff, Clayey SILT (30.0 m ~ 31.5 m).		31	-27.32						26			3.05	9	11	15
		32	-28.32						28			3.28	10	12	16
Grey, Very stiff, SILT and CLAY (31.5 m ~ 35.5 m).		33	-29.32						28			3.28	9	13	15
		34	-30.32						29			3.40	8	14	15
		35	-31.32						30			3.51	9	14	16
Reddish brown, Hard, Clayey SILT (35.5 m ~ 37.5 m).		36	-32.32						31			3.63	11	15	16
		37	-33.32						40			4.69	16	19	21
Grey, Dense, Silty SAND with little clay (37.5 m ~ 40.0 m)		38	-34.32						47			>5	19	22	25
		39	-35.32						48			>5	15	21	27
		40	-36.32						>50			>5	11	28	31

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
	Undisturbed Sample	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample	4 - 8	Firm	10 - 30	Medium Dense
	Clayey SILT	8 - 15	Stiff	30 - 50	Dense
	Silty CLAY	15 - 30	Very Stiff	>50	Very Dense
	Silty SAND	>30	Hard		
	Sandy SILT				

Project : Lagonpyin Type of Hammer : Automatic Sheet 5 of 5
 : Water Treatment Plant Boring Started : 10.8.2013 Hole No : BH - 5
 Location : South Dagon Township Boring Completed : 12.8.2013 Total Depth (m) : 44.5 m
 Coordinates : N-1875341.35,E-211536.40 Logged by : Phyo Ko Ko Oo Water Level (m) : 1.3 m
 Elevation (m) : 3.68 m Checked by : Wai Phyo Aung Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/soft)	SPT (No. of Blow)													
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)											
Reddish brown to grey, Very dense, Clayey SILT (40.0 m ~ 44.5 m).		41	-37.32									>5	20	>50												
		42	-38.32													>5	22	>50								
		43	-39.32																	>5	28	>50				
		44	-40.32																					>5	32	>50
		45	END OF BOREHOLE																							
		46																								
		47																								
		48																								
		49																								
		50																								








Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
	Undisturbed Sample	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample	4 - 8	Firm	10 - 30	Medium Dense
	Clayey SILT	8 - 15	Stiff	30 - 50	Dense
	Silty CLAY	15 - 30	Very Stiff	>50	Very Dense
	Silty SAND	>30	Hard		
	Sandy SILT				

TABLE 3.2 Summary of Soil Properties

Project : Lagonpyin Water Treatment Plant Project																	Date : 24-8-2013			
Location : E. 211397.77, N. 1875468.35																	Borehole No : BH-1			
Sr: No,	Depth (m)		Description of Soil	Specific gravity	Grain Size Analysis				Atterberg Limit			Moisture content	Bulk density	Dry density	Triaxial Compression Test		UCSTest	Consodration Test		
					Gravel	Sand	Silt	Clay	(L.L)	(P.L)	(P. I)				C	φ		Initial Void Ratio (e)	Pre-consolidation Pressure (Pc)	Compression Index (Cc)
	(%)	(%)																		
Fr	To			(%)	(%)	(%)	(%)	(%)	(%)	(%)	g/cm ³	g/cm ³	kg/cm ²	(°)	kg/cm ²		kg/cm ²			
1	2.00	3.00	Brownish grey, Silty CLAY	2.75		1.10	98.90	64.81	28.76	36.05	30.0	1.730	1.33	0.32	7.00	0.26	0.795	2.45	0.23	
2	4.00	5.00	Brown, Silty CLAY with a little amount of sand.	2.72		0.40	99.60	63.15	20.30	42.85	33.0	1.670	1.31	0.17	7.00	0.26	1.068	1.32	0.34	
3	6.00	7.00	Brownish grey, Silty CLAY with a little amount sand.	2.57		1.50	98.50	56.95	23.20	33.75	55.0	1.960	1.26	0.09	5.00	0.27	1.372	0.66	0.50	
4	12.00	12.45	Grey to reddish brown, Silty CLAY with a little amount of sand.	2.76		4.20	95.80	63.00	20.24	42.76	36.0	1.740	1.27							
5	20.00	20.45	Brwon, Silty CLAY with a little amount of sand.	2.78		7.00	93.00	65.05	24.48	40.57	27.0	1.820	1.43							
6	23.00	23.45	Brown, Silty SAND with trace clay.	2.68		64.10	35.90	NL	NP	NI	21.1	1.880	1.55	0.05	14.00	0.16				
7	32.00	32.45	Grey to brown, Silty CLAY with trace sand.	2.75		18.30	81.70	58.90	21.70	37.20	37.0	1.910	1.39							
8	40.00	40.45	Reddish brown, Silty SAND with trace clay	2.70		49.80	50.20	NL	NP	NI	36.0	1.770	1.30	0.03	18.00	0.13				

IS-H

TABLE 3.2 Summary of Soil Properties

Project : Lagonpyin Water Treatment Plant Project													Date : 24-8-2013							
Location : E. 211303.45 , N. 1875403.81													Borehole No : BH-2							
Sr: No,	Depth (m)		Description of Soil	Specific gravity	Grain Size Analysis				Atterberg Limit			Moisture content	Bulk density	Dry density	Triaxial Compression Test		UCSTest	Consodration Test		
					Gravel	Sand	Silt	Clay	(L.L)	(P.L)	(P. I)				C	φ		Initial Void Ratio (e)	Pre-consolidation Pressure (Pc)	Compression Index (Cc)
	Fr	To																		
1	3.00	3.45	Brown, Stiff, Silty CLAY	2.73		0.10	99.90	65.50	28.50	37.00	33.96	1.82	1.36							
2	5.00	6.00	Grey, Clayey SILT	2.74		0.20	99.80	64.50	39.50	25.00	52.77	1.80	1.17							
3	8.00	9.00	Grey, Silty CLAY	2.70			100	68.00	28.00	40.00	55.00	1.95	1.25	0.07	5.00	0.15	1.461	1.38	0.63	
4	10.00	11.00	Grey, Silty CLAY	2.71		0.30	99.70	56.75	20.25	36.50	53.5	1.82	1.20	0.09	7.00	0.23	1.201	1.43	0.45	
5	15.00	15.45	Grey, Stiff, Silty CLAY with a little amount of sand.	2.75		2.20	97.80	40.62	20.00	20.62	54.3	1.74	1.13	0.11	6.00	0.21	1.041	1.80	0.39	
6	21.00	21.45	Grey, Hard, Clayey SILT with a little amount of sand.	2.78		3.70	96.30	57.17	36.36	20.81	25.69	1.91	1.52	0.18	8.00	0.22	1.248	1.23	0.49	
7	25.00	25.45	Reddish brown, Very Stiff, Silty CLAY	2.76		0.80	99.20	74.77	26.58	48.19	36.05	1.84	1.35							
8	39.00	39.45	Grey to brown, Hard, Clayey SILT with some sand.	2.71		14.60	85.40	55.65	35.52	20.13	35.69	1.92	1.43	0.12	10.00	0.31	1.213	1.4	0.44	

TABLE 3.2 Summary of Soil Properties

Project : Lagonpyin Water Treatment Plant Project																	Date : 24-8-2013			
Location : E. 211421.20, N. 1875351.14																	Borehole No : BH-3			
Sr: No,	Depth (m)		Description of Soil	Specific gravity	Grain Size Analysis				Atterberg Limit			Moisture content	Bulk density	Dry density	Triaxial Compression Test		UC'S Test	Consodration Test		
					Gravel	Sand	Silt	Clay	(L.L)	(P.L)	(P. I)				C	φ		Initial Void Ratio (e)	Pre-consolidation Pressure (Pc)	Compression Index (Cc)
	Fr	To																		
1	3.00	4.00	Brown to gray, Silty CLAY	2.73		0.10	99.90	61.35	26.58	34.77	35.75	1.78	1.31	0.36	3.00	0.15	0.895	1.91	0.16	
2	5.00	6.00	Gray, Silty CLAY	2.71		0.05	99.50	56.35	21.83	34.52	52.00	1.80	1.18	0.40	5.00	0.20	0.912	1.89	0.3	
3	10.00	10.45	Gray, Very stiff, Silty CLAY	2.75		0.80	99.20	55.50	24.22	31.28	25.88	1.92	1.53	0.42	6.00	0.25	1.064	1.02	0.41	
4	14.00	15.00	Gray, Silty CLAY	2.73			100.00	71.00	32.00	39.00	40.00	1.83	1.31	0.43	3.00	0.56	1.071	5.10	0.45	
5	24.00	24.45	Reddish brown, Hard, Silty CLAY trace sand.	2.78		6.60	93.40	52.45	29.90	22.55	21.88	1.98	1.62							
6	32.00	32.45	Gray, Very stiff, Clayey SILT with a little amount of sand.	2.75		2.90	97.10	51.13	27.62	23.51	22.55	1.86	1.52							
7	40.00	40.45	Gray, Hard, Clayey SILT with trace sand	2.75		12.20	87.80	36.00	29.00	7.00	21.42	1.84	1.51	0.15	19.00	0.30	1.252	1.29	0.50	
8	45.00	45.45	Gray, Very dense, Silty SAND with allite amount of clay	2.69		48.50	51.50	NL	NP	NI	20.35	2.08	1.72							

TABLE 3.2 Summary of Soil Properties

Project : Lagonpyin Water Treatment Plant Project																	Date : 24-8-2013			
Location : E. 211536.40 , N. 1875341.35																	Borehole No : BH-4			
Sr: No,	Depth (m)		Description of Soil	Specific gravity	Grain Size Analysis				Atterberg Limit			Moisture content	Bulk density	Dry density	Triaxial Compression Test		U C S Test	Consodration Test		
					Gravel	Sand	Silt	Clay	(L.L)	(P.L)	(P. I)				C	φ		Initial Void Ratio (e)	Pre-consolidation Pressure (Pc)	Compression Index (Cc)
	Fr	To																		
1	3.00	4.00	Gray, Silty CLAY with a little amount of sand.	2.78	0.00	0.20	99.80	43.50	30.70	12.80	53.56	1.89	1.23	0.38	3.00	0.16	1.034	1.83	0.39	
2	5.00	6.00	Gray, Silty CLAY with a little amount of sand.	2.74	0.00	0.90	99.10	33.50	29.90	3.60	41.60	1.80	1.27	0.08	5.00	0.19	1.293	1.12	0.52	
3	11.00	11.45	Brown, Very stiff, Silty CLAY with a little amount of sand.	2.66	0.00	0.80	99.20	67.48	25.00	42.48	29.75	1.92	1.48	0.15	6.00	0.22	1.248	1.27	0.52	
4	19.00	19.45	Gray, Very stiff, Clayey SILT with trace sand.	2.75	0.00	11.60	88.40	73.82	20.00	53.82	24.79	1.86	1.49							
5	25.00	25.45	Brown, Hard, Clayey SILT with trace sand.	2.72	0.00	6.30	93.70	76.97	45.99	30.98	32.56	2.00	1.51							
6	31.00	31.45	Gray, Very stiff, Clayey SILT with a little amount of sand and gravels.	2.80	0.60	4.50	94.90	35.91	25.00	10.91	34.11	1.92	1.43							
7	35.00	35.45	Gray to brown, Very stiff, Silty CLAY with some sand.	2.69	0.00	21.40	78.60	49.92	23.20	26.72	26.14	1.90	1.60	0.12	10.00	0.31	1.252	1.29	0.58	
8	41.00	41.45	Brown, Very dense, Sandy CLAY and silt.	2.70	0.00	36.00	64.00	44.48	21.97	22.51	22.76	2.00	1.63	0.03	18.00	0.13	1.26	1.21	0.50	

F9-H

TABLE 3.2 Summary of Soil Properties

Project : Lagonpyin Water Treatment Plant Project																	Date : 24-8-2013			
Location : E. 211536.40, N. 1875341.35																	Borehole No : BH-5			
Sr. No,	Depth (m)		Description of Soil	Specific gravity	Grain Size Analysis				Atterberg Limit			Moisture content	Bulk density	Dry density	Triaxial Compression Test		UCS Test	Consodration Test		
					Gravel	Sand	Silt	Clay	(L.L)	(P.L)	(P. I)				C	φ		Initial Void Ratio (e)	Pre-consolidation Pressure (Pc)	Compression Index (Cc)
	Fr	To			(%)	(%)	(%)	(%)	(%)	(%)	(%)				(%)	g/cm ³		g/cm ³	kg/cm ²	(°)
1	3.00	3.45	Dark brown, Stiff, Clayey SILT	2.71		0.20	99.80	57.50	30.78	26.72	27.12	1.92	1.51	0.39	3.00	0.17	0.891	1.91	0.15	
2	4.00	5.00	Brown to gray, Silty CLAY	2.73		0.30	99.70	58.85	22.13	36.72	48.35	1.75	1.18	0.78	4.00	0.19	0.902	1.89	0.23	
3	6.00	7.00	Gray, Silty CLAY	2.76		0.20	99.80	61.29	23.2	38.04	46.93	1.74	1.18	0.55	4.00	0.20	1.080	1.76	0.31	
4	9.00	10.00	Gray, Silty CLAY	2.72		1.00	99.00	62.00	27.00	35.00	48.00	1.73	1.17	0.10	4.00	0.22	1.194	1.02	0.41	
5	13.00	13.45	Gray to brown, Very stiff, Silty CLAY	2.74		0.10	99.90	52.00	26.58	25.42	31.72	1.91	1.45	0.12	7.00	0.22	1.203	1.42	0.44	
6	21.00	21.45	Gray, Stiff, Silty CLAY with a little amount of sand.	2.73		0.90	99.10	54.37	25.62	28.75	50.12	1.80	1.19							
7	36.00	36.45	Reddish brown, Hard, Clayey SILT with trace sand.	2.78		10.50	89.50	57.50	33.96	23.54	26.77	2.02	1.59							
8	41.00	41.45	Gray, Hard, Clayey SILT with trace sand.	2.77		12.60	87.40	48.56	30.06	18.50	26.51	1.94	1.53							

95-H

SOIL TEST RESULTS For Triaxial Permeability

Project : Lagonpyin Water Treatment Plant		Date : 24 . 8 . 2013					
Location : South Dagon , Yangon							
BORING NO :			BH - 1				
SAMPLE TYPE :			UD	SPT	UD	SPT	UD
SPECIMEN DEPTH (M)		From	2.00	3.00	4.00	5.00	6.00
		To	3.00	3.45	5.00	5.45	7.00
Triaxial Premeability	Cofficient of Permeability at 20 c m/s		TP	TP	TP	TP	TP
			0.38×10^{-9}	0.23×10^{-9}	0.17×10^{-9}	0.38×10^{-9}	0.59×10^{-9}

SOIL TEST RESULTS For Triaxial Permeability

Project		: Lagonpyin Water Treatment Plant				Date	:24 . 8 . 2013
Location		: South Dagon , Yangon					
BORING NO :		BH - 2					
SAMPLE TYPE :		UD	UD	SPT	UD	SPT	
SPECIMEN DEPTH (M)	From	5.00	8.00	9.00	10.00	12.00	
	To	6.00	9.00	9.45	11.00	12.45	
Triaxial Premeability	Cofficient of Permeability at 20 c m/s	TP	TP	TP	TP	TP	
		1.01×10^{-9}	1.07×10^{-9}	0.98×10^{-9}	0.27×10^{-9}	0.31×10^{-9}	

SOIL TEST RESULTS For Triaxial Permeability

Project : Lagonpyin Water Treatment Plant		Date : 24 . 8 . 2013				
Location : South Dagon , Yangon						
BORING NO :		BH - 3				
SAMPLE TYPE :		UD	SPT	UD	UD	SPT
SPECIMEN DEPTH (M) From		3.00	4.00	5.00	14.00	15.00
		To		4.00	4.45	6.00
Triaxial Premeability	Cofficient of Permeability at 20 c m/s	TP	TP	TP	TP	TP
		0.56×10^{-9}	0.86×10^{-9}	1.03×10^{-9}	0.43×10^{-9}	0.58×10^{-9}

SOIL TEST RESULTS For Triaxial Permeability

Project		: Lagonpyin Water Treatment Plant				Date	:24 . 8 . 2013
Location		: South Dagon ,Yangon					
BORING NO :		BH - 4					
SAMPLE TYPE :		UD	SPT	UD	SPT	UD	
SPECIMEN DEPTH (M)	From	3.00	4.00	5.00	6.00	7.00	
	To	4.00	4.45	6.00	6.45	8.00	
Triaxial Premeability	Cofficient of Permeability at 20 c m/s	TP	TP	TP	TP	TP	
		0.25×10^{-9}	0.38×10^{-9}	0.52×10^{-9}	0.48×10^{-9}	0.40×10^{-9}	

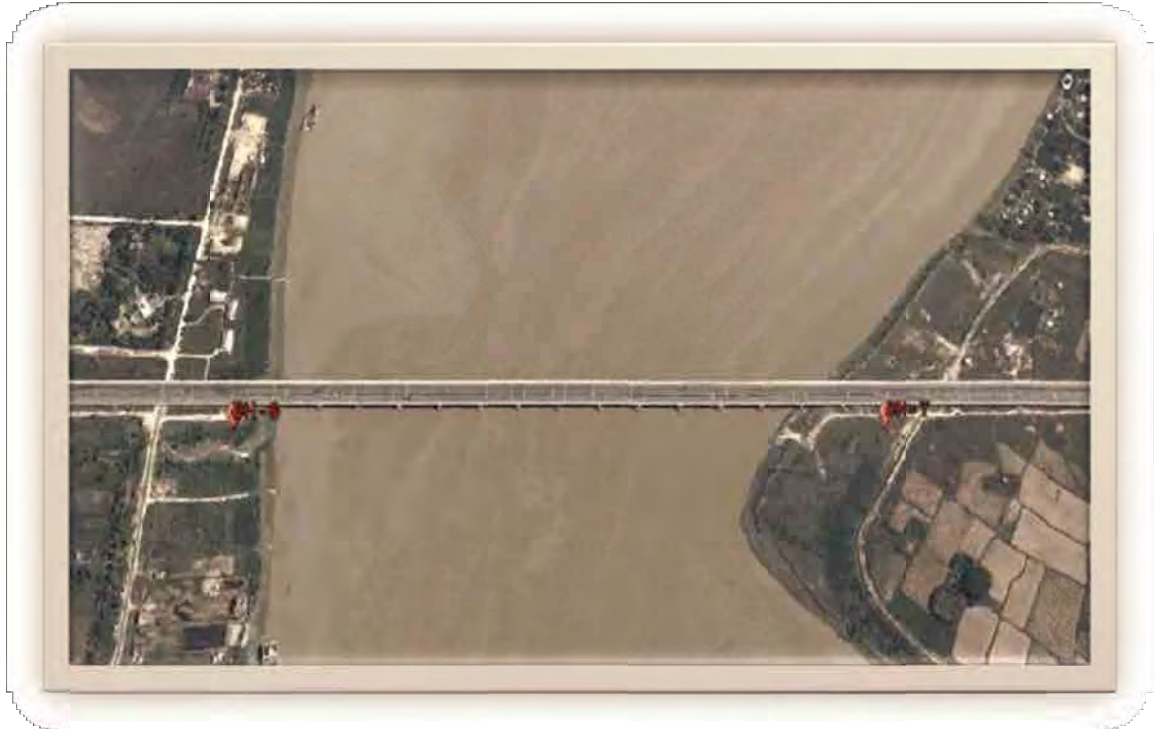
SOIL TEST RESULTS For Triaxial Permeability

Project		: Lagonpyin Water Treatment Plant				Date	:24 . 8 . 2013
Location		: South Dagon , Yangon					
BORING NO :		BH - 5					
SAMPLE TYPE :		UD	SPT	UD	SPT	UD	
SPECIMEN DEPTH (M)	From	4.00	5.00	6.00	7.00	9.00	
	To	5.00	5.45	7.00	7.45	10.00	
Triaxial Premeability	Cofficient of Permeability at 20 c m/s	TP	TP	TP	TP	TP	
		1.27×10^{-9}	1.13×10^{-9}	1.08×10^{-9}	0.58×10^{-9}	0.25×10^{-9}	

East Dagon BH-6~7 for Bago river

3. LOCATION OF THE PROJECT AREA

The proposed site of Lagonpyin Water Treatment Plant is situated near Dagon Bridge, Dagon Seikkan and Thanlyin Township, Yangon Division.



Boreholes Location Point of the Project Area

Project : **Lagonpyin (Bago River)**
 : **Water Treatment Plant**
 Location : Dagon Seikkan Township
 Coordinates : N-1862002.371,E-210562.598
 Elevation (m) : 3.26m

Type of Hammer : Automatic
 Boring Started : 29.11.2013
 Boring Completed : 1.12.2013
 Logged by : Win Ko Ko Lwin
 Checked by : Phyo Ko Ko Oo








Sheet 1 of 5
 Hole No : **BH - 6**
 Total Depth (m) : 40.5 m
 Water Level (m) : 3.2 m
 Driller : Maung Htay

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (K _a /cm ²)	SPT (No. of Blow)				
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)		
Grey, Very soft, Clayey SILT with little roots (0.0 ~ 3.45) m.		1	2.26	3.00	2							0.18	1	1	1		
		2	1.26		2								0.18	1	1	1	
		3	0.26		2									0.18	1	1	1
Grey, Very soft to Firm, Clayey SILT (3.45 ~ 10.00) m.		4	-0.74	6.00	2							0.20	1	1	1		
		5	-1.74		2												
		6	-2.74		2									0.22	1	1	1
		7	-3.74		2												
		8	-4.74		2									0.22	1	1	1
		9	-5.74		9.00												
		10	-6.74		6									0.70	2	3	3

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
Undisturbed Sample	Clayey SILT	<2	Very Soft	<4	Very Loose
Disturbed Sample (Split spoon)	Silty CLAY	2 - 4	Soft	4 - 10	Loose Sand
Rock Sample	Silty SAND	4 - 8	Firm	10 - 30	Medium Dense
	Sandy SILT	8 - 15	Stiff	30 - 50	Dense
		15 - 30	Very Stiff	>50	Very Dense
		>30	Hard		

Project : **Lagonpyin (Bago River)** Type of Hammer : Automatic Sheet 2 of 5
 : **Water Treatment Plant** Boring Started : 29.11.2013 Hole No : **BH - 6**
 Location : Dagon Seikkan Township Boring Completed : 1.12.2013 Total Depth (m) : 40.5 m
 Coordinates : N-1862002.371,E-210562.598 Logged by : Win Ko Ko Lwin Water Level (m) : 3.2 m
 Elevation (m) : 3.26m Checked by : Phyo Ko Ko Oo Driller : Maung Htay

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)					Type of sample	Field Bearing capacity calculated from SPT value (Kc/cm ²)	SPT (No. of Blow)		
					0	10	20	30	40			50	SD(6in)	TD(6in)
Grey, Firm to Stiff, Clayey SILY (10.00 ~ 20.00) m.		11	-7.74	12.0	4						0.47	1	2	2
		12	-8.74		4						0.47	1	1	3
		13	-9.74		4						0.47	1	2	2
		14	-10.74		5						0.59	1	2	3
		15	-11.74		5						0.59	2	2	3
		16	-12.74		6						0.70	2	2	4
		17	-13.74		6						0.70	2	3	3
		18	-14.74		7						0.82	2	3	4
		19	-15.74		6						0.70	3	3	3
		20	-16.74		7						0.82	3	3	4

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils			
	Undisturbed Sample		Clayey SILT	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)		Silty CLAY	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample		Silty SAND	4 - 8	Firm	10 - 30	Medium Dense
			Sandy SILT	8 - 15	Stiff	30 - 50	Dense
				15 - 30	Very Stiff	>50	Very Dense
				>30	Hard		

Project : **Lagonpyin (Bago River)**
 : **Water Treatment Plant**
 Location : Dagon Seikkan Township
 Coordinates : N-1862002.371, E-210562.598
 Elevation (m) : 3.26m

Type of Hammer : Automatic
 Boring Started : 29.11.2013
 Boring Completed : 1.12.2013
 Logged by : Win Ko Ko Lwin
 Checked by : Phyo Ko Ko Oo

Sheet 3 of 5
 Hole No : **BH - 6**
 Total Depth (m) : 40.5 m
 Water Level (m) : 3.2 m
 Driller : Maung Htay

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)					Type of sample	Field Bearing capacity calculated from SPT value (K _{sat})	SPT (No. of Blow)			
					0	10	20	30	40			50	SD(6in)	TD(6in)	TD(6in)
Grey, Firm to Stiff, Clayey SILT (20.00 ~ 24.45) m.		21	-17.74	21.0			9					1.06	3	4	5
		22	-18.74				12					1.41	4	5	7
		23	-19.74				8					0.94	4	4	4
		24	-20.74	24.0			11					1.29	3	4	7
		25	-21.74				13					1.52	6	6	7
Grey, Medium dense, Silty SAND with a little amount of Clay (24.45 ~ 30.00) m.		26	22.74				16					1.88	7	8	8
		27	-23.74	27.0			16					1.88	7	7	9
		28	-24.74				17					1.99	7	7	10
		29	-25.74				14					1.64	5	7	7
		30	-26.74	30.0			18					2.11	5	8	10

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
	Undisturbed Sample	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample	4 - 8	Firm	10 - 30	Medium Dense
	Clayey SILT	8 - 15	Stiff	30 - 50	Dense
	Silty CLAY	15 - 30	Very Stiff	>50	Very Dense
	Silty SAND	>30	Hard		
	Sandy SILT				

Project : **Lagonpyin (Bago River)** Type of Hammer : Automatic Sheet 4 of 5
 : **Water Treatment Plant** Boring Started : 29.11.2013 Hole No : **BH - 6**
 Location : Dagon Seikkan Township Boring Completed : 1.12.2013 Total Depth (m) : 40.5 m
 Coordinates : N-1862002.371,E-210562.598 Logged by : Win Ko Ko Lwin Water Level (m) : 3.2 m
 Elevation (m) : 3.26m Checked by : Phyo Ko Ko Oo Driller : Maung Htay

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Kc/cm ²)	SPT (No. of Blow)			
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)	
Grey, Medium dense, Silty SAND with a little amount of Caly (30.00 ~ 31.45) m.		31	-27.74	33.0						19	⊗	2.23	5	8	11	
		32	-28.74								>50	⊗	>5	15	30	25
Grey, Very dense, Silty SAND (31.45 ~ 40.00) m.		33	-29.74								>50	⊗	>5	15	29	26
		34	-30.74								>50	⊗	>5	14	25	29
		35	-31.74								>50	⊗	>5	12	22	31
		36	-32.74								>50	⊗	>5	15	25	22
		37	-33.74								>50	⊗	>5	11	25	27
		38	-34.74								>50	⊗	>5	15	22	25
		39	-35.74								>50	⊗	>5	16	25	30
		40	-36.74								>50	⊗	>5	16	26	31

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
	Undisturbed Sample	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample	4 - 8	Firm	10 - 30	Medium Dense
	Clayey SILT	8 - 15	Stiff	30 - 50	Dense
	Silty CLAY	15 - 30	Very Stiff	>50	Very Dense
	Silty SAND	>30	Hard		
	Sandy SILT				

Project : **Lagonpyin (Bago River)** Type of Hammer : Automatic Sheet 5 of 5
 : **Water Treatment Plant** Boring Started : 29.11.2013 Hole No : **BH - 6**
 Location : Dagon Seikkan Township Boring Completed : 1.12.2013 Total Depth (m) : 40.5 m
 Coordinates : N-1862002.371,E-210562.59 Logged by : Win Ko Ko Lwin Water Level (m) : 3.2 m
 Elevation (m) : 3.26m Checked by : Phyo Ko Ko Oo Driller : Maung Htay

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (kN/cm ²)	SPT (No. of Blow)					
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)			
Grey, Very dense, Silty SAND (40.00 ~ 40.45) m.																		
		41			END OF BORE-HOLE													
		42																
		43																
		44																
		45																
		46																
		47																
		48																
		49																
		50																

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
	Undisturbed Sample	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample	4 - 8	Firm	10 - 30	Medium Dense
	Clayey SILT	8 - 15	Stiff	30 - 50	Dense
	Silty CLAY	15 - 30	Very Stiff	>50	Very Dense
	Silty SAND	>30	Hard		
	Sandy SILT				

Project : **Lagonpyin (Bago River)**
 : **Water Treatment Plant**
 Location : **Thanlyin Township**
 Coordinates : **N-1861365.045,E-211005.719**
 Elevation (m) : **4.31m**



Type of Hammer : **Automatic**
 Boring Started : **25.11.2013**
 Boring Completed : **27.11.2013**
 Logged by : **Win Ko Ko Lwin**
 Checked by : **Phyo Ko Ko Oo**








Sheet : **1 of 5**
 Hole No : **BH - 7**
 Total Depth (m) : **40.5 m**
 Water Level (m) : **2.0 m**
 Driller : **Maung Htay**

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (kg/cm ²)	SPT (No. of Blow)			
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)	
Dark grey, Medium dense, Sandy SILT (0.00 ~ 1.45) m.		1	3.31									1.85	10	11	10	
		2	2.31													
Brownish grey, Firm to Soft, Clayey SILT (1.45 ~ 6.45) m.		3	1.31	3.00								0.53	2	2	4	
		4	0.31									0.60	2	2	4	
		5	-0.69									0.30	1	1	2	
		6	-1.69	6.00								0.56	2	3	2	
		7	-2.69													
		8	-3.69										0.22	1	1	1
Grey, Very soft, Clayey SILT (6.45 ~ 10.00) m.		9	-4.69	9.00												
		10	-5.69									0.23	1	1	1	

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
	Undisturbed Sample	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample	4 - 8	Firm	10 - 30	Medium Dense
	Clayey SILT	8 - 15	Stiff	30 - 50	Dense
	Silty CLAY	15 - 30	Very Stiff	>50	Very Dense
	Silty SAND	>30	Hard		
	Sandy SILT				

Project : **Lagonpyin (Bago River)** Type of Hammer : Automatic Sheet 2 of 5
 : **Water Treatment Plant** Boring Started : 25.11.2013 Hole No : **BH - 7**
 Location : Thanlyin Township Boring Completed : 27.11.2013 Total Depth (m) : 40.5 m
 Coordinates : N-1861365.045,E-211005.719 Logged by : Win Ko Ko Lwin Water Level (m) : 2.0 m
 Elevation (m) : 4.31m Checked by : Phyo Ko Ko Oo Driller : Maung Htay

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)					Type of sample	Field Bearing capacity calculated from SPT value (K _{sat})	SPT (No. of Blow)			
					0	10	20	30	40			50	SD(6in)	TD(6in)	TD(6in)
Grey to yellowish brown, Soft to Firm to Stiff, Clayey SILT with a little amount of peats (10.00 ~ 18.45) m.		11	-6.69	12.0	4						0.47	1	2	2	
		12	-7.69		6							0.70	2	3	3
		13	-8.69		8							0.94	2	4	4
		14	-9.69		6							0.70	2	2	4
		15	-10.69		15.0	5						0.59	2	2	3
		16	-11.69		4							0.47	2	2	2
		17	-12.69		11							1.29	3	5	6
		18	-13.69		18.0	12						1.41	3	5	7
Yellowish brown to grey, Stiff to Firm, Clayey SILT (18.45 ~ 20.00) m.		19	-14.69		10						1.17	3	5	5	
		20	-15.69		8						0.94	3	3	5	

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
 Undisturbed Sample	 Clayey SILT	<2	Very Soft	<4	Very Loose
 Disturbed Sample (Split spoon)	 Silty CLAY	2 - 4	Soft	4 - 10	Loose Sand
 Rock Sample	 Silty SAND	4 - 8	Firm	10 - 30	Medium Dense
	 Sandy SILT	8 - 15	Stiff	30 - 50	Dense
		15 - 30	Very Stiff	>50	Very Dense
		>30	Hard		

Project : Lagonpyin (Bago River)	Type of Hammer : Automatic	Sheet : 3 of 5
Location : Water Treatment Plant	Boring Started : 25.11.2013	Hole No : BH - 7
Coordinates : Thanlyin Township	Boring Completed : 27.11.2013	Total Depth (m) : 40.5 m
Elevation (m) : 4.31m	Logged by : Win Ko Ko Lwin	Water Level (m) : 2.0 m
	Checked by : Phyo Ko Ko Oo	Driller : Maung Htay

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)					Type of sample	Field Bearing capacity calculated from SPT value (K _{sat})	SPT (No. of Blow)		
					0	10	20	30	40			50	SD(6in)	TD(6in)
Yellowish brown to grey, Stiff to Firm, Clayey SILT (20.00 ~ 23.45) m.		21	-16.69	21.0	7						0.82	3	3	4
		22	-17.69		7						0.82	3	3	4
		23	-18.69		7						0.82	3	4	3
Grey, Firm, Clayey SILT (23.45 ~ 30.00) m.		24	-19.69	24.0	8						0.94	4	4	4
		25	-20.69		8						0.94	3	4	4
		26	-21.69		6						0.70	3	3	3
		27	-22.69	27.0	7						0.82	3	3	4
		28	-23.69		8						0.94	3	4	4
		29	-24.69		6						0.70	3	3	3
		30	-25.69	30.0	7					0.82	3	3	4	

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
Undisturbed Sample	Clayey SILT	<2	Very Soft	<4	Very Loose
Disturbed Sample (Split spoon)	Silty CLAY	2 - 4	Soft	4 - 10	Loose Sand
Rock Sample	Silty SAND	4 - 8	Firm	10 - 30	Medium Dense
	Sandy SILT	8 - 15	Stiff	30 - 50	Dense
		15 - 30	Very Stiff	>50	Very Dense
		>30	Hard		

Project : **Lagonpyin (Bago River)** Type of Hammer : Automatic Sheet 4 of 5
 : **Water Treatment Plant** Boring Started : 25.11.2013 Hole No : **BH - 7**
 Location : **Thanlyin Township** Boring Completed : 27.11.2013 Total Depth (m) : 40.5 m
 Coordinates : **N-1861365.045,E-211005.719** Logged by : **Win Ko Ko Lwin** Water Level (m) : 2.0 m
 Elevation (m) : 4.31m Checked by : **Phyo Ko Ko Oo** Driller : **Maung Htay**

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)					Type of sample	Field Bearing capacity calculated from SPT value (Kc/cm ²)	SPT (No. of Blow)		
					0	10	20	30	40			50	SD(6in)	TD(6in)
Grey, Firm to Hard, Clayey SILT with a little amount of Sand (30.00 ~ 37.45) m.		31	-26.69	33.0		7					0.82	3	3	4
		32	-27.69			8					0.94	3	4	4
		33	-28.69			10					1.17	4	5	5
		34	-29.69			7					0.82	4	4	3
		35	-30.69			6					0.70	4	3	3
		36	-31.69			>30					>5	10	21	30
		37	-32.69			>50					>5	10	20	32
Grey, Very dense, Silty SAND with a little amount of Clay (37.45 ~ 40.00) m.		38	-33.69							>5	13	21	31	
		39	-34.69							>5	25	26	30	
		40	-35.69							>5	17	24	35	

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
Undisturbed Sample	Clayey SILT	<2	Very Soft	<4	Very Loose
Disturbed Sample (Split spoon)	Silty CLAY	2 - 4	Soft	4 - 10	Loose Sand
Rock Sample	Silty SAND	4 - 8	Firm	10 - 30	Medium Dense
	Sandy SILT	8 - 15	Stiff	30 - 50	Dense
		15 - 30	Very Stiff	>50	Very Dense
		>30	Hard		

Project : **Lagonpyin (Bago River)** Type of Hammer : Automatic Sheet 5 of 5
 : **Water Treatment Plant** Boring Started : 25.11.2013 Hole No : **BH - 7**
 Location : Thanlyin Township Boring Completed : 27.11.2013 Total Depth (m) : 40.5 m
 Coordinates : N-1861365.045,E-211005.71 Logged by : Win Ko Ko Lwin Water Level (m) : 2.0 m
 Elevation (m) : 4.31m Checked by : Phyo Ko Ko Oo Driller : Maung Htay

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (kN/cm ²)	SPT (No. of Blow)					
					0	10	20	30	40	50			SD(6in)	TD(6in)	TD(6in)			
Grey, Very dense, Silty SAND with a little amount of Clay (40.00 - 40.45) m.																		
		41			END OF BORE-HOLE													
		42																
		43																
		44																
		45																
		46																
		47																
		48																
		49																
		50																

Type of Sample		Strength of Consistency of Cohesive Soils		Density of Cohesionless Soils	
	Undisturbed Sample	<2	Very Soft	<4	Very Loose
	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand
	Rock Sample	4 - 8	Firm	10 - 30	Medium Dense
	Clayey SILT	8 - 15	Stiff	30 - 50	Dense
	Silty CLAY	15 - 30	Very Stiff	>50	Very Dense
	Silty SAND	>30	Hard		
	Sandy SILT				

TABLE 3.2 Summary of Soil Properties

Project : Lagonpyin Water Treatment Plant Project (Bago River)															Date : 12-12-2013					
Location : E. 210562.598, N. 1862002.371															Borehole No : BH-6					
Sr; No,	Depth (m)		Description of Soil	Specific gravity	Grain Size Analysis				Atterberg Limit			Moisture content	Bulk density	Dry density	Triaxial Compression Test		UCS Test	Consodration Test		
					Gravel	Sand	Silt	Clay	(L.L)	(P.L)	(P. I)				C	φ		Initial Void Ratio (e)	Pre-consolidation Pressure (Pc)	Compression Index (Cc)
	Fr	To																		
1	3.00	3.45	Grey, Very Soft Clayey SILT	2.62		2.00	86.00	12.00	41.00	20.00	21.00	36.0	1.810	1.33						
2	5.00	6.00	Grey, Very Soft Clayey SILT	2.67		1.00	89.00	10.00	43.00	22.00	21.00	39.0	1.790	1.29	12.00	5.00	12.00	1.085	80	0.46
3	7.00	8.00	Grey, Soft Clayey SILT	2.65		11.00	81.00	8.00	42.00	22.00	20.00	37.0	1.840	1.34	14.00	5.00	16.00	0.948	140	0.25
4	9.00	10.00	Grey, Soft Clayey SILT	2.64		5.00	73.00	22.00	50.00	22.00	28.00	40.0	1.850	1.32	20.00	5.00	35.00	0.983	165	0.24
5	12.00	12.45	Grey, Firm Clayey SILT	2.62		13.00	87.00		49.00	21.00	28.00	35.0	1.880	1.39	18.00	4.00	35.00			
6	17.00	17.45	Grey, Firm Clayey SILT	2.64		8.00	92.00		53.00	20.00	33.00	32.0	1.890	1.43	15.00	4.00	22.00			
7	26.00	26.45	Grey, Medium Dense Silty SAND	2.65	2.00	71.00	27.00		NA	NA	NA	28.0	1.890	1.48						
8	35.00	35.45	Grey, Very Dense Silty SAND	2.69	1.00	62.00	37.00		NA	NA	NA	20.0	1.840	1.53						

Remark: Gravels size was 2mm to 3.35mm

TABLE 3.2 Summary of Soil Properties

Project : Lagonpyin Water Treatment Plant Project (Bago River)																	Date : 12-12-2013			
Location : E. 211005.719 , N. 1861365.045																	Borehole No : BH-7			
Sr; No,	Depth (m)		Description of Soil	Specific gravity	Grain Size Analysis				Atterberg Limit			Moisture content	Bulk density	Dry density	Triaxial Compression Test		U C S Test	Consodration Test		
					Gravel	Sand	Silt	Clay	(L.L)	(P.L)	(P. I)				C	φ		Initial Void Ratio (e)	Pre-consolidation Pressure (Pc)	Compression Index (Cc)
	Fr	To																		
1	2.00	3.00	Grey, Very Soft Clayey SILT	2.67		1.00	68.00	31.00	61.00	25.00	36.00	32.00	1.92	1.45	81.00	7.00	90.00	0.839	220	0.34
2	7.00	8.00	Grey, Very Soft Clayey SILT	2.66		14.00	64.00	22.00	53.00	19.00	34.00	32.00	1.81	1.37	10.00	2.00	18.00	0.979	150	0.34
3	9.00	10.00	Grey, Very Soft Clayey SILT	2.66		2.00	64.00	34.00	45.00	21.00	24.00	28.00	1.99	1.55	19.00	5.00	28.00	0.739	115	0.20
4	14.00	14.45	Grey, Firm Clayey SILT	2.65		3.00	73.00	24.00	49.00	19.00	30.00	33	1.86	1.40						
5	19.00	19.45	Yellowish brown, Stiff Clayey SILT	2.68		3.00	75.00	22.00	43.00	19.00	24.00	33	1.80	1.41						
6	25.00	25.45	Grey, Firm Clayey SILT	2.62		2.00	75.00	23.00	46.00	23	23.00	35	1.83	1.36	25.00	8.00	48.00			
7	32.00	32.45	Grey, Firm Clayey SILT	2.65	2.00	12.00	49.00	37.00	72.00	26	46.00	34	1.87	1.40	30.00	5.00	62.00			
8	38.00	38.45	Grey, Very Dense Silty SAND	2.69		75.00	25.00		NA	NA	NA	24	1.98	1.60						

Remark: Gravels size was 2mm to 3.35mm

82-H

SOIL TEST RESULTS For Triaxial Permeability

Project : Lagonpyin Water Treatment Plant		Date :12 . 12 . 2013				
Location : Dagon Seikkan ,Yangon						
BORING NO :			BH - 6			
SAMPLE TYPE :			UD	UD	UD	
SPECIMEN DEPTH (M)	From	5.00	7.00	9.00		
	To	6.00	8.00	10.00		
Triaxial Premeability	Cofficient of Permeability at 20 c m/s	TP	TP	TP		
		2.00×10^{-9}	5.10×10^{-9}	3.60×10^{-9}		

SOIL TEST RESULTS For Triaxial Permeability

Project : Lagonpyin Water Treatment Plant		Date :12 . 12 . 2013				
Location : Thanlyin ,Yangon						
BORING NO :			BH - 7			
SAMPLE TYPE :			UD	UD	UD	
SPECIMEN DEPTH (M)	From	2.00	7.00	9.00		
	To	3.00	8.00	10.00		
Triaxial Premeability	Cofficient of Permeability at 20 c m/s	TP	TP	TP		
		0.73×10^{-9}	0.27×10^{-9}	0.09×10^{-9}		

North Dagon BH-1 for Zone7 Service Reservoir

LOCATION OF THE PROJECT SITE

The proposed site of The Improvement Of Water supply is situated near Dagon University, EastDagonTownship, YangonDivision. The location of project site is shown in Fig. (1) .



Fig. (1) Location Map of the Project Area

SOIL INVESTIGATION LOG

Project : The Improvement Of Water Supply	Type of Hammer : Automatic	Sheet : 1 of 4
Location : East Dagon Township	Boring Started : 6 . 4 . 2013	Hole No : 1
Coordinates : N-1872962.98,E-204352.74	Boring Completed : 9 . 4 . 2013	Total Depth (m) : 40.5 m
Elevation (m) : 2.78 m	Logged by : Phyo Ko Ko Oo	Water Level (m) : 4.3 m
	Checked by : Wai Phyo Aung	Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)					Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)		
					0	10	20	30	40			50	
Brown, soft, Silty CLAY (0.0 m ~ 1.5 m).		1	1.78			4					⊗	0.370	
Gray colour, very soft, Silty CLAY (1.5 m ~ 5.5 m)		2	0.78								□	UD	
		3	-0.22	3.00								□	UD
		4	-1.22									□	UD
		5	-2.22									⊗	0.105
		6	-3.22	6.00								⊗	0.315
Gray colour, soft to very soft, Silty CLAY with some peat. (5.5 m ~ 8.5 m)		7	-4.22								⊗	0.118	
		8	-5.22								⊗	0.118	
		9	-6.22	9.00								⊗	0.118
Dark gray colour, very soft, Silty CLAY with some peat. (8.5 m ~ 10.0 m)		10	-7.22								⊗	0.235	

Type of Sample	Strength of Consistency of Cohesive Soils	Density of Cohesionless Soils
<input type="checkbox"/> Undisturbed Sample	<2 Very Soft	<4 Very Loose
<input checked="" type="checkbox"/> Disturbed Sample (Split spoon)	2 - 4 Soft	4 - 10 Loose Sand
<input type="checkbox"/> Rock Sample	4 - 8 Medium	10 - 30 Medium Dense
	8 - 15 Firm	30 - 50 Dense
	15 - 30 Very Firm	>50 Very Dense
	>30 Hard	

SOIL INVESTIGATION LOG

Project : The Improvement Of Water Supply	Type of Hammer : Automatic	Sheet : 2 of 4
Location : East Dagon Township	Boring Started : 6 . 4 . 2013	Hole No : 1
Coordinates : N-1872962.98,E-204352.74	Boring Completed : 9 . 4 . 2013	Total Depth (m) : 40.5 m
Elevation (m) : 2.78 m	Logged by : Phyo Ko Ko Oo	Water Level (m) : 4.3 m
	Checked by : Wai Phyo Aung	Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)	
					0	10	20	30	40	50			
Dark gray colour, soft, Silty CLAY with some peat. (10.0 m ~ 11.5 m)		11	-8.22			4						⊗	0.495
Gray to brown colour, medium firm, Silty CLAY (11.5 m ~ 13.5 m)		12	-9.22	12.00		8						⊗	0.990
		13	-10.22			5						⊗	0.618
Dark gray colour, soft, Silty CLAY. (13.5 m ~ 15.5 m)		14	-11.22			4						⊗	0.495
		15	-12.22	15.00		4						⊗	0.495
Dark gray, medium firm, Silty CLAY with alittle amount of peat (15.5 m ~ 17.5 m).		16	-13.22			4						⊗	0.495
		17	-14.22			5						⊗	0.618
Gray, very firm, Silty CLAY with lateritic soil (17.5 m ~ 20.0 m).		18	-15.22	18.00		19						⊗	2.35
		19	-16.22			23						⊗	2.85
		20	-17.22			24						⊗	2.97
Type of Sample		Strength of Consistency of Cohesive Soils				Density of Cohesionless Soils							
<input type="checkbox"/>	Undisturbed Sample	<2	Very Soft	<4	Very Loose								
<input checked="" type="checkbox"/>	Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand								
<input type="checkbox"/>	Rock Sample	4 - 8	Medium	10 - 30	Medium Dense								
		8 - 15	Firm	30 - 50	Dense								
		15 - 30	Very Firm	>50	Very Dense								

Project : The Improvement Of Water Supply	Type of Hammer : Automatic	Sheet : 3 of 4
Location : East Dagon Township	Boring Started : 6 . 4 . 2013	Hole No : 1
Coordinates : N-1872962.98,E-204352.74	Boring Completed : 9 . 4 . 2013	Total Depth (m) : 40.5 m
Elevation (m) : 2.78 m	Logged by : Phyo Ko Ko Oo	Water Level (m) : 4.3 m
	Checked by : Wai Phyo Aung	Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)	
					0	10	20	30	40	50			
Grayish brown, very firm, Silty CLAY with alittle amount of sand (20.0 m ~ 23.5 m).		21	-18.22	21.00				19				⊗	2.35
		22	-19.22					17				⊗	2.10
		23	-20.22					27				⊗	3.34
Brown, dense, Silty SAND with alittle amount of clay (23.5 m ~ 30.0 m)		24	-21.22	24.00					40			⊗	4.95
		25	-22.22					38				⊗	4.70
		26	-23.22					36				⊗	4.45
		27	-24.22	27.00				35				⊗	4.33
		28	-25.22					35				⊗	4.33
		29	-26.22					38				⊗	4.70
		30	-27.22	30.00				41				⊗	5.07

Type of Sample	Strength of Consistency of Cohesive Soils	Density of Cohesionless Soils
Undisturbed Sample	<2 Very Soft	<4 Very Loose
Disturbed Sample (Split spoon)	2 - 4 Soft	4 - 10 Loose Sand
Rock Sample	4 - 8 Medium	10 - 30 Medium Dense
	8 - 15 Firm	30 - 50 Dense
	15 - 30 Very Firm	>50 Very Dense

SOIL INVESTIGATION LOG

Project : The Improvement Of Water Supply	Type of Hammer : Automatic	Sheet : 4 of 4
Location : East Dagon Township	Boring Started : 6 . 4 . 2013	Hole No : 1
Coordinates : N-1872962.98,E-204352.74	Boring Completed : 9 . 4 . 2013	Total Depth (m) : 40.5 m
Elevation (m) : 2.78 m	Logged by : Phyo Ko Ko Oo	Water Level (m) : 4.3 m
	Checked by : Wai Phyo Aung	Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)
					0	10	20	30	40	50		
Brown, dense, Silty SAND with a little amount of clay (30.0 m ~ 31.5 m)		31	-28.22							39	⊗	4.82
Yellowish brown, dense, Silty SAND with a little amount of clay (31.5 m ~ 33.5 m)		32	-29.22							38	⊗	4.70
		33	-30.22	33.00						45	⊗	5.57
Gray, dense, Silty SAND (33.5 m ~ 35.5 m)		34	-31.22							47	⊗	5.81
		35	-32.22							49	⊗	>5
Gray, very dense, Silty SAND (35.5 m ~ 40.5 m)		36	-33.22	36.00						>50	⊗	>5
		37	-34.22							>50	⊗	>5
		38	-35.22							>50	⊗	>5
		39	-36.22							>50	⊗	>5
		40	-37.22								>50	⊗
Type of Sample		Strength of Consistency of Cohesive Soils			Density of Cohesionless Soils							
<input type="checkbox"/> Undisturbed Sample	<2 Very Soft	<4 Very Loose										
<input checked="" type="checkbox"/> Disturbed Sample (Split spoon)	2 - 4 Soft	4 - 10 Loose Sand										
<input type="checkbox"/> Rock Sample	4 - 8 Medium	10 - 30 Medium Dense										
	8 - 15 Firm	30 - 50 Dense										
	15 - 30 Very Firm	>50 Very Dense										

SOIL TEST RESULTS

Project		: The Improvement of Water Supply Project											Date		: 8-5-2013					
Location		: East Dagon Township, Yangon											Borehole No		: BH-1					
Sr; No,	Depth (m)		Description of Soil	Specific gravity	Grain Size Analysis				Atterberg Limit			Moisture content	Bulk density	Dry density	Triaxial Compression Test		U C S Test	Consolidation Test		
					Gravel	Sand	Silt	Clay	(L.L)	(P.L)	(P. I)				C	φ		Initial Void Ratio (e)	Pre-consolidation Pressure (Pc)	Compression Index (Cc)
	Fr	To			(%)	(%)	(%)	(%)	(%)	(%)	(%)				(%)	g/cm ³		g/cm ³	kg/cm ²	(°)
1	2.00	3.00	Gray colour, Silty CLAY with trace amount of sand.	2.58	0.00	3.10	96.90	64.03	36.67	27.36	39.96	1.84	1.31	0.19	3.00	0.21	0.990	1.39	0.29	
2	3.00	4.00	Gray colour, Silt CLAY with trace amount of sand.	2.58	0.00	4.83	95.17	59.44	33.61	25.83	40.80	1.79	1.27	0.14	6.00	0.22	1.090	1.35	0.35	
3	4.00	5.00	Gray colour, Silty CLAY with trace amount of sand.	2.59	0.00	2.76	97.24	66.27	36.94	29.33	41.24	1.76	1.25	0.21	2.00	0.24	1.060	1.40	1.32	
4	6.00	6.45	Gray colour, very soft Silty CLAY with trace amount of sand.	2.57	0.00	5.87	94.13	51.33	31.19	20.14	42	1.71	1.20	0.23	4.00	0.18				
5	9.00	9.45	Dark gray colour, very soft Silty CLAY with trace amount of sand.	2.51	0.00	5.10	94.90	57.36	32.74	24.62	46.88	1.79	1.22	0.21	1.00	0.22				
6	15.00	15.45	Dark gray colour, soft Silty CLAY with trace amount of sand.	2.53	0.00	7.43	92.57	49.68	29.75	19.93	50	1.89	1.26	0.28	4.00	0.19				
7	18.00	18.45	Dark gray colour, Silty CLAY with sand and trace amount of Gravels.	2.55	1.20	46.00	52.80	39.41	20.00	19.41	23.48	1.99	1.61	0.17	9.00	0.20				

18-H

SOIL TEST RESULTS

Project : The Improvement Of Water Supply Project												Date : 8-5-2013								
Location : East Dagon Township, Yangon												Borehole No : BH-1								
Sr; No,	Depth (m)		Description of Soil	Specific gravity	Grain Size Analysis				Atterberg Limit			Moisture content	Bulk density	Dry density	Triaxial Compression Test		U C S Test	Consolidation Test		
					Gravel	Sand	Silt	Clay	(L.L)	(P.L)	(P. I)				C	φ		Initial Void Ratio (e)	Pre-consolidation Pressure (Pc)	Compression Index (Cc)
	Fr	To			(%)	(%)	(%)	(%)	(%)	(%)	(%)									
8	22.00	22.45	Grayish brown colour, very firm Silty CLAY with sand.	2.59	0.00	48.61	51.39	24.83	15.38	9.45	27	1.97	1.55	0.20	4.00	0.21				
9	26.00	26.45	Brown colour, dense, Silty SAND with a little amount of clay.	2.62	0.00	55.40	44.60	NL	NP	NI	29.23	1.82	1.41	0.19	10.00	0.16				
10	30.00	30.45	Brown colour, dense, Silty SAND with a little amount of clay.	2.60	0.00	68.31	31.89	NL	NP	NI	21.00	1.96	1.62	0.17	12.00	0.08				
11	32.00	32.45	Yellowish brown colour, dense, Silty SAND with trace amount of clay.	2.57	3.10	75.00	21.90	NL	NP	NI	26.35	1.86	1.47	0.19	13.00	0.23				
12	36.00	36.45	Gray colour, very dense, Silty SAND with trace amount of clay.	2.58	0.00	60.40	39.60	NL	NP	NI	22.55	2.05	1.67	0.22	15.00	0.18				
13	38.00	38.45	Gray colour, very dense, Silty SAND with trace amount of clay.	2.63	0.00	82.20	17.80	NL	NP	NI	28.00	1.9	1.48	0.26	12.00	0.14				

Soil Test Results For Triaxial Permeability Test

Project : The Improvement of Water Supply Project		Date: 15.4.2013	Date: 28.4.2013	Date: 8.5.2013
Location : East Dagon ,Yangon				
BORING NO : BH-1				
SAMPLE TYPE ::		UD	UD	UD
SPECIMEN DEPTH (M)				
	From	2.00	3.00	4.00
	To	3.00	4.00	5.00
Triaxial	Coefficient of	TP	TP	TP
Premeability	Permeability at 20 c m/s	4.2×10^{-10}	3.9×10^{-10}	4.1×10^{-10}

South Dagon BH-1 for Zone8 Service Reservoir

LOCATION OF THE PROJECT SITE

The proposed site of The Improvement Of Water supply is situated near 56 Ort, South Dagon Township, Yangon Division. The location of project site is shown in Fig. (1) .



Fig. (1) Location Map of the Project Area

SOIL INVESTIGATION LOG





Project : The Improvement Of Water Supply
 Location : South Dagon Township
 Coordinates : N-1865562.43, E-207987.62
 Elevation (m) : 3.00 m
 Type of Hammer : Automatic
 Boring Started : 27 . 3 . 2013
 Boring Completed : 30 . 3 . 2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung
 Sheet : 1 of 5
 Hole No : 1
 Total Depth (m) : 50.0 m
 Water Level (m) : 4.4 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)
					0	10	20	30	40	50		
Brown, soft, Silty SAND and Clay (0.0 m ~ 1.5 m).		1	2.00		0	10	20	30	40	50	4	0.36
		2	1.00		14	1.26						
Gray to brown, medium dense, Silty SAND (1.5 m ~ 6.5 m).	3	0.00	3.00		11	0.99						
	4	-1.00	17		1.50							
	5	-2.00	22		2.24							
	6	-3.00	6.00		26	2.65						
	7	-4.00	22		2.51							
	Grayish brown, medium dense to dense, Silty SAND (6.5 m ~ 10.0 m).	8	-5.00		20	2.28						
9		-6.00	9.00		33	3.76						
10		-7.00	27		3.08							
Type of Sample		Strength of Consistency of Cohesive Soils				Density of Cohesionless Soils						
<input type="checkbox"/> Undisturbed Sample	<2	Very Soft	<4	Very Loose								
<input checked="" type="checkbox"/> Disturbed Sample (Split spoon)	2 - 4	Soft	4 - 10	Loose Sand								
<input type="checkbox"/> Rock Sample	4 - 8	Medium	10 - 30	Medium Dense								
	8 - 15	Firm	30 - 50	Dense								
	15 - 30	Very Firm	>50	Very Dense								
	>30	Hard										

Project : The Improvement Of Water Supply
 Location : South Dagon Township
 Coordinates : N-1865562.43, E-207987.62
 Elevation (m) : 3.00 m

Type of Hammer : Automatic
 Boring Started : 27 . 3 . 2013
 Boring Completed : 30 . 3 . 2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet : 2 of 5
 Hole No : 1
 Total Depth (m) : 50.0 m
 Water Level (m) : 4.4 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)
					0	10	20	30	40	50		
Grayish brown, medium dense to dense, Silty SAND (10.0 m ~ 13.5 m).		11	-8.00	12.00				30			⊗	3.60
		12	-9.00					40			⊗	4.80
		13	-10.00					30			⊗	3.60
Gray, firm, Sandy CLAY with silt (13.5 m ~ 15.5 m).		14	-11.00	15.00			14				⊗	1.68
		15	-12.00				12			⊗	1.44	
Gray, Sandy CLAY with silt (15.5 m ~ 17.0 m).		16	-13.00	18.00							□	UD
		17	-14.00				26			⊗	3.14	
Gray, medium dense to dense, Silty SAND (17.0 m ~ 20.0 m).		18	-15.00	18.00				32			⊗	3.84
		19	-16.00					37			⊗	4.44
		20	-17.00				22			⊗	2.64	

Type of Sample	Strength of Consistency of Cohesive Soils	Density of Cohesionless Soils
<input type="checkbox"/> Undisturbed Sample	<2 Very Soft	<4 Very Loose
<input checked="" type="checkbox"/> Disturbed Sample (Split spoon)	2 - 4 Soft	4 - 10 Loose Sand
<input type="checkbox"/> Rock Sample	4 - 8 Medium	10 - 30 Medium Dense
	8 - 15 Firm	30 - 50 Dense
	15 - 30 Very Firm	>50 Very Dense

SOIL INVESTIGATION LOG

Project : The Improvement Of Water Supply
 Location : South Dagon Township
 Coordinates : N-1865562.43, E-207987.62
 Elevation (m) : 3.00 m

Type of Hammer : Automatic
 Boring Started : 27 . 3 . 2013
 Boring Completed : 30 . 3 . 2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 3 of 5
 Hole No : 1
 Total Depth (m) : 50.0 m
 Water Level (m) : 4.4 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)
					0	10	20	30	40	50		
Gray, medium dense to dense, Silty SAND with a little amount of Clay (20.0 m ~ 23.5 m).		21	-18.00	21.00				28			⊗	3.36
		22	-19.00					39			⊗	4.68
		23	-20.00					34			⊗	4.08
Gray, very firm to hard, Silty CLAY with a little amount of sand (23.5 m ~ 28.5 m).		24	-21.00	24.00				26			⊗	3.12
		25	-22.00					30			⊗	3.60
		26	-23.00					36			⊗	4.32
		27	-24.00	27.00				34			⊗	4.08
		28	-25.00					39			⊗	4.68
Gray, hard, Clayey SILT with a little amount of sand (28.5 m ~ 30.0 m).		29	-26.00				36			⊗	4.32	
		30	-27.00	30.00				40			⊗	4.80

Type of Sample	Strength of Consistency of Cohesive Soils	Density of Cohesionless Soils
Undisturbed Sample	<2 Very Soft	<4 Very Loose
Disturbed Sample (Split spoon)	2 - 4 Soft	4 - 10 Loose Sand
Rock Sample	4 - 8 Medium	10 - 30 Medium Dense
	8 - 15 Firm	30 - 50 Dense
	15 - 30 Very Firm	>50 Very Dense

SOIL INVESTIGATION LOG

Project : The Improvement Of Water Supply
 Location : South Dagon Township
 Coordinates : N-1865562.43, E-207987.62
 Elevation (m) : 3.00 m
 Type of Hammer : Automatic
 Boring Started : 27 . 3 . 2013
 Boring Completed : 30 . 3 . 2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung
 Sheet : 4 of 5
 Hole No : 1
 Total Depth (m) : 50.0 m
 Water Level (m) : 4.4 m
 Driller : Than Maung


Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)
					0	10	20	30	40	50		
Gray, very firm to hard, Clayey SILT with a little amount of sand (30.0 m ~ 40.0 m).		31	-28.00							33	⊗	3.96
		32	-29.00							26	⊗	3.12
		33	-30.00	33.00						20	⊗	2.40
		34	-31.00							22	⊗	2.64
		35	-32.00							20	⊗	2.40
		36	-33.00	36.00						24	⊗	2.88
		37	-34.00							26	⊗	3.12
		38	-35.00							27	⊗	3.24
		39	-36.00	39.00						29	⊗	3.48
		40	-37.00							35	⊗	4.20
Type of Sample		Strength of Consistency of Cohesive Soils				Density of Cohesionless Soils						
<input type="checkbox"/> Undisturbed Sample		<2	Very Soft							<4	Very Loose	
<input checked="" type="checkbox"/> Disturbed Sample (Split spoon)		2 - 4	Soft							4 - 10	Loose Sand	
<input type="checkbox"/> Rock Sample		4 - 8	Medium							10 - 30	Medium Dense	
		8 - 15	Firm							30 - 50	Dense	
		15 - 30	Very Firm							>50	Very Dense	

SOIL INVESTIGATION LOG

Project : The Improvement Of Water Supply
 Location : South Dagon Township
 Coordinates : N-1865562.43, E-207987.62
 Elevation (m) : 3.00 m

Type of Hammer : Automatic
 Boring Started : 27 . 3 . 2013
 Boring Completed : 30 . 3 . 2013
 Logged by : Phyo Ko Ko Oo
 Checked by : Wai Phyo Aung

Sheet 5 of 5
 Hole No : 1
 Total Depth (m) : 50.0 m
 Water Level (m) : 4.4 m
 Driller : Than Maung

Soil Description	Graphic Log	Depth (m)	Elevation (m)	Casing (m)	SPT (N-Value)						Type of sample	Field Bearing capacity calculated from SPT value (Ton/ft ²)	
					0	10	20	30	40	50			
Gray, Hard, Clayey SILT with a little amount of sand (40.0 m ~ 50.0 m)		41	-38.00							39	⊗	4.68	
		42	-39.00	42.00							43	⊗	5.16
		43	-40.00								44	⊗	5.28
		44	-41.00								48	⊗	5.76
		45	-42.00	45.00							48	⊗	5.76
		46	-43.00								>50	⊗	>5
		47	-44.00								>50	⊗	>5
		48	-45.00	48.00							>50	⊗	>5
		49	-46.00								>50	⊗	>5
		50	-47.00								>50	⊗	>5
Type of Sample		Strength of Consistency of Cohesive Soils			Density of Cohesionless Soils								
<input type="checkbox"/> Undisturbed Sample <input checked="" type="checkbox"/> Disturbed Sample (Split spoon) <input checked="" type="checkbox"/> Rock Sample		<2 Very Soft 2 - 4 Soft 4 - 8 Medium 8 - 15 Firm 15 - 30 Very Firm			<4 Very Loose 4 - 10 Loose Sand 10 - 30 Medium Dense 30 - 50 Dense >50 Very Dense								

SOIL TEST RESULTS

Project : The Improvement of Water Supply Project													Date : 26-4-2013							
Location : South Dagon , Yangon													Borehole No : BH-1							
Sr; No,	Depth (m)		Description of Soil	Specific gravity	Grain Size Analysis				Atterberg Limit			Moisture content	Bulk density	Dry density	Triaxial Compression Test		U C S Test	Consolidation Test		
					Gravel	Sand	Silt	Clay	(L.L)	(P.L)	(P. I)				C	φ		Initial Void Ratio (e)	Pre-consolidation Pressure (Pc)	Compression Index (Cc)
	Fr	To			(%)	(%)	(%)	(%)	(%)	(%)	(%)									
1	2.00	2.45	Gray to Brown colour, medium dense, Silty SAND with some Clay.	2.60	0.00	44.10	55.90	NL	NP	NI	28.92	1.85	1.46	0.16	24.00	0.10				
2	4.00	4.45	Gray colour, medium dense, Silty SAND with some Clay.	2.60	0.00	75.10	24.90	NL	NP	NI	24.33	1.91	1.54	0.14	25.00	0.15				
3	8.00	8.45	Gray colour, medium dense, Silty SAND with trace amount of Clay	2.64	0.00	91.50	8.50	NL	NP	NI	23.36	1.81	1.47	0.40	11.00	0.36				
4	12.00	12.45	Gray colour, dense, Silty SAND with trace amount of Clay	2.63	0.00	91.30	8.70	NL	NP	NI	23.82	1.84	1.51	0.45	19.00	0.50				
5	16.00	17.00	Gray colour, Sandy CLAY with Silt	2.61	0.00	44.80	55.20	41.33	23.74	17.59	35.62	1.86	1.38	0.18	3.00	0.60	1.033	2.00	0.40	
6	19.00	19.45	Gray colour, hard, Sandy CLAY with Silt .	2.58	0.00	46.60	53.40	38.86	21.32	17.54	34.77	1.79	1.33	0.30	17.00	0.35				

06-H

SOIL TEST RESULTS

Project : The Improvement Of Water Supply Project													Date : 26-4-2013							
Location : South Dagon , Yangon													Borehole No : BH-1							
Sr; No,	Depth (m)		Description of Soil	Specific gravity	Grain Size Analysis				Atterberg Limit			Moisture content	Bulk density	Dry density	Triaxial Compression Test		U C S Test	Consolidation Test		
					Gravel	Sand	Silt	Clay	(L.L)	(P.L)	(P. I)				C	φ		Initial Void Ratio (e)	Pre-consolidation Pressure (Pc)	Compression Index (Cc)
	(%)	(%)			(%)	(%)	(%)	(%)	(%)	kg/cm ²	(°)									
Fr	To			(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	g/cm ³	g/cm ³	kg/cm ²		kg/cm ²				
7	21.00	21.45	Gray colour, medium dense, Silty SAND with a little amount of Clay.	2.58	0.00	84.60	15.40	NL	NP	NI	19.40	1.90	1.59	0.25	13.00	0.32				
8	24.00	24.45	Gray colour, very firm, Silty CLAY with some Sand.	2.59	0.00	10.90	89.10	33.48	20.79	12.69	34.67	1.77	1.31	0.37	10.00	0.40				
9	28.00	28.45	Gray colour, hard, Silty CLAY with some Sand.	2.59	0.00	16.91	83.10	31.55	21.37	10.18	32.16	1.72	1.30	0.55	14.00	0.33				
10	32.00	32.45	Gray colour, very firm, Clayey SILT with a little amount of Sand.	2.58	0.00	0.70	99.30	36.10	13.20	22.90	32.10	1.83	1.39	0.35	9.00	0.50				
11	37.00	37.45	Gray colour, very firm, Clayey SILT with a little amount of Sand.	2.58	0.00	1.50	98.50	36.46	25.00	11.46	32.23	1.75	1.32	0.32	10.00	0.46				
12	44.00	44.45	Gray colour, hard, Clayey SILT with trace amount of Sand.	2.58	0.00	1.70	98.30	33.77	21.70	12.07	34.17	1.89	1.41	0.36	14.00	0.55				

Soil Test Results For Triaxial Permeability Test

Project : The Improvement of Water Supply Project		Date:29.4.2013
Location : South Dagon ,Yangon		
BORING NO : BH-1		
SAMPLE TYPE :: UD		
SPECIMEN DEPTH (M)		
	From	16.00
	To	17.00
Triaxial	Cofficient of	TP
Premeability	Permeability at 20 c m/s	1.7×10^{-6}

I REVIEW FOR PRELIMINARY DESIGN OF LAGUNBYIN WTP

A series of discussions on design of Lagunbyin water treatment plant have been made with YCDC in the design review stage and revisions were made on the design by JICA Study Team.

1. Intake Canal

Intake canal was shifted from irrigation canal to existing natural creek by determination in discussion with YCDC and MOAI in October, 2013.

2. Designed Ground Level

Designed water levels are calculated by hydraulic calculation in the review. In order to apply existing foundation pillars as much as possible, Bottoms of sedimentation basins and filters are set as nearly existing ground level (+2.926m =+9.6').

3. Existing Foundation Pillars

Arrangement and size of the facilities which can apply existing foundation pillars under construction by YCDC are adopted. The location of sedimentation basins, the size of filters, and the size of clear water reservoir are changed by the review.

4. Pre-sedimentation Pond

Precipitation tests proved that turbidity decreases to 65% by settling time of approximately 12 hours. In order to take raw water of low turbidity, pre-sedimentation pond with retention time of 12 hours above is designed by the review. And since much sand settles on the bottom of the pond, the pond has 1m storage space toward the bottom from LWL.

5. Intake Pump

The Number of intake pump proposed by F/S was 4 units (3 duty + 2 stand-by). On the other hand, YCDC have proposed 6 units (4 duty + 2 stand-by).

6. Dividing Well

On the YCDC design, raw water of different quality is directly led to each sedimentation basin from each intake pump. Since PAC dosing rate differs by each basin on such a design, control of aluminum injection is complicated.

In order to supply raw water of the same quality to sedimentation basins, dividing well is generally installed in Japan. Dividing well/ tower is designed by cylindrical shape in order to distribute raw water equally to 4 sedimentation basins, and weirs are installed in the tower.

7. Iron Removal

According to water quality tests, iron of 0.3 mg/L (beyond the standard value) has been detected. In order to secure contact time of raw water with air, weirs in dividing well are set up highly.

8. PAC Dosing Facility

PAC currently used by Nyaunghnapin WTP is adopted from the result of jar tests by YCDC. According to YCDC, coagulating effect of PAC is better than aluminum sulfate. Hydraulic jump method currently used by Nyaunghnapin WTP is adopted as coagulant mixing.

9. Flocculation Basin

Horizontal and vertical zigzag flow method as Nyaunghnapin WTP with same mixing for flocculation is adopted. The widths of channels are set up by capacity calculation on the review in order that raw water and PAC might mix completely. And inlet flow to flocculation basins and sedimentation basins is changed into underflow in order that floc might not break.

10. Sludge Discharge Method of Sedimentation Basin

As sludge discharge method on the design of F/S, the bottoms of sedimentation basins have a slope, and have several hoppers. Since this design had insufficient sludge discharge, YCDC suggested that the bottoms should have more hoppers.

11. Tube Settler in Sedimentation Basin

The installation area of tube settler on the YCDC design is a few one. Based on the design standard of Japan, installation area is reconsidered on the review.

12. The number of Filter

The number of filters on the YCDC design is 24 basins x 2 trains. According to train of sedimentation basin, the number is changed into 6 basins x 4 trains on the review.

13. Flow Rate of Filter

On the YCDC design, flow rate is 240 m/day of the upper limit in two-layer filtration. In order to take stabilized raw water quality, flow rate is limited to maximum 150 m/day on the review.

14. Backwashing Method of Filter

Nyaunghnapin WTP has backwashing with surface washing for filters. YCDC suggested that the maintenance of above method takes time and effort, and many mud balls have been produced on the surface of filters. YCDC proposed that backwashing adopted air washing for the new WTP. And YCDC proposed that control valves are installed within backwashing pumps and air blowers.

15. Under Drain System of Filter

YCDC proposed that strainer type which can be manufactured in Myanmar is applied to under drain system. This method is already adopted in Phase2 of Nyaunghnapin WTP. The processing effect is not so good although traditional Tee Pee type (Made in Red Indian) is adopted in Phase1.

16. Inlet and Outlet Valves of Filter

In order to control flow by a motor, handling spaces are provided for periphery of weirs and valves on the review.

17. Clear Water Reservoir

Capacity of clear water reservoir is little on YCDC design. The capacity of 1 hour above is designed on the review, and the number of reservoirs is set to 2 trains.

18. Chlorination Facility

About chlorination facility, YCDC proposed that Electrolyzer (On-site generation of liquid hypochlorite) installed in existing Yegu pumping station is suitable from a viewpoint of finances and procurement. YCDC can procure easily the salt which is material of hypochlorite generated by Electrolyzer. According to YCDC, the viewpoint of cost to procurement is hard for imported products, such as Gas cylinder, Liquid chlorine and Powder.

Since a rough maintenance for Electrolyzer might cause explosion, the Study Team advised keeping up sufficient maintenance.

19. Sludge Treatment

YCDC proposed that Wash Water Drainage Basin, Sludge Basin, and Lagoon should be constructed at the same time as water treatment facilities. In addition, Sludge Thickener will be added according to water quality conditions of raw water.

20. Pipeline

All connection of each structure are pipelines. As for The pipe linked directly with structure, settlement should be taken into consideration. Therefore, installation of flexible joint is recommended. If they cannot be supplied, several collar joints should be installed.

21. Measurement Equipment

As for measurement equipment proposed by F/S, arrangement was changed in this review.

22. SCADA

YCDC and the Study Team identified that SCADA associated equipment (flow meter, Water quality measurement equipment) is included in Associated equipment of Electrical of yen loan.

23. Structure

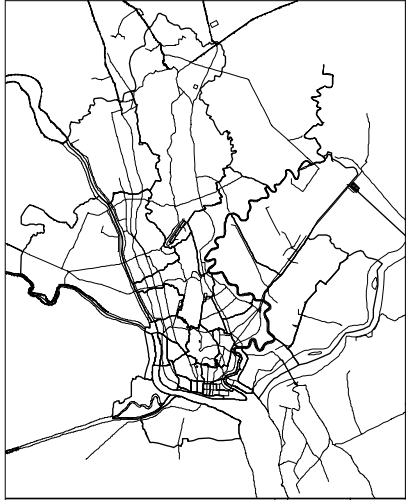
Expansion joint is set in each structure every 20-30 m. In the clear water reservoir which needs water tightness, crack-inducing joint is taken into consideration as an alternative.

24. Revised Drawings by the Review

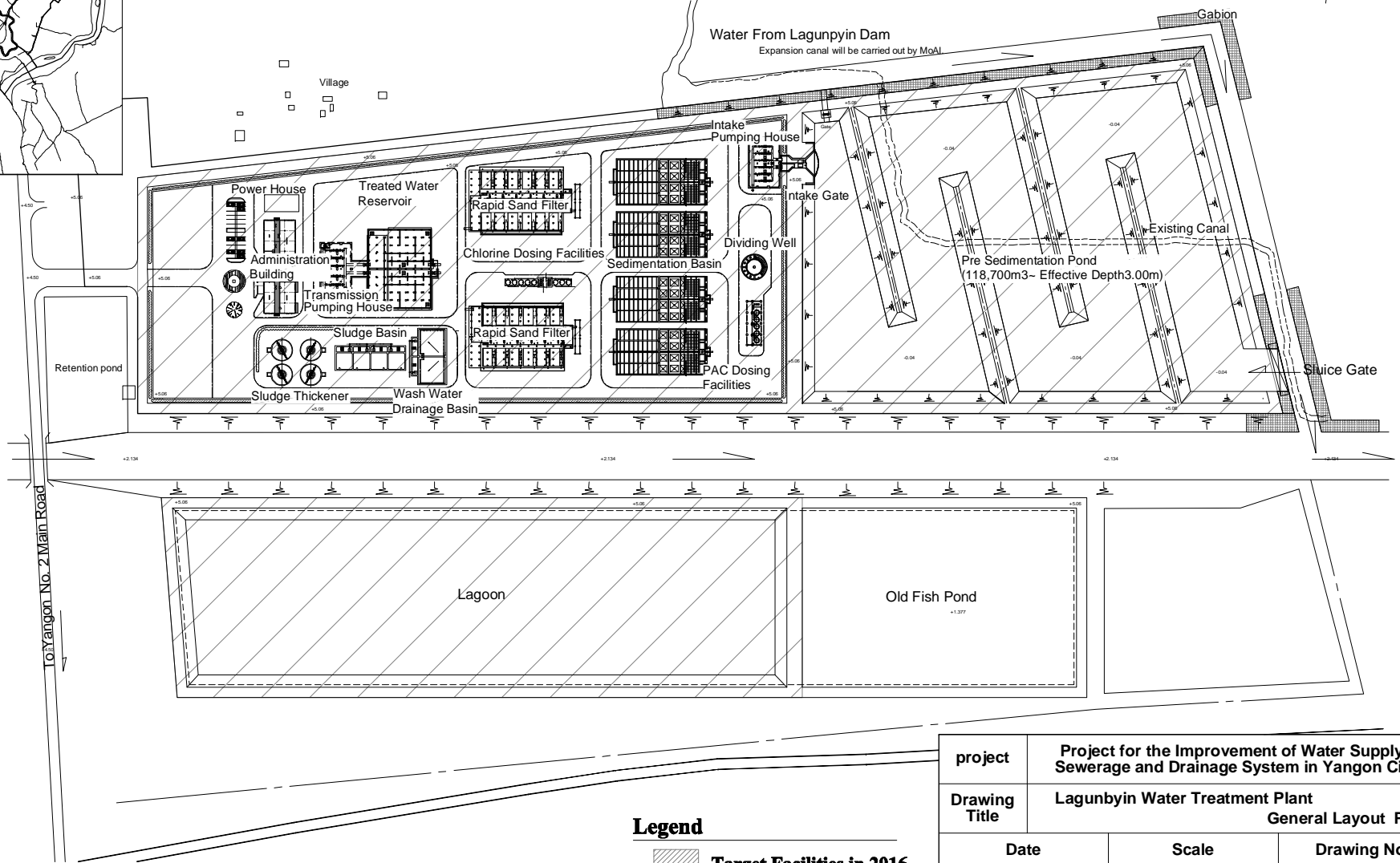
Revised drawings by review are given in the following pages.

Lagunbyin Water Treatment Plant General Layout Plan

40MGD=181,800m³/day



Lagunbyin WTP



I-4

Legend

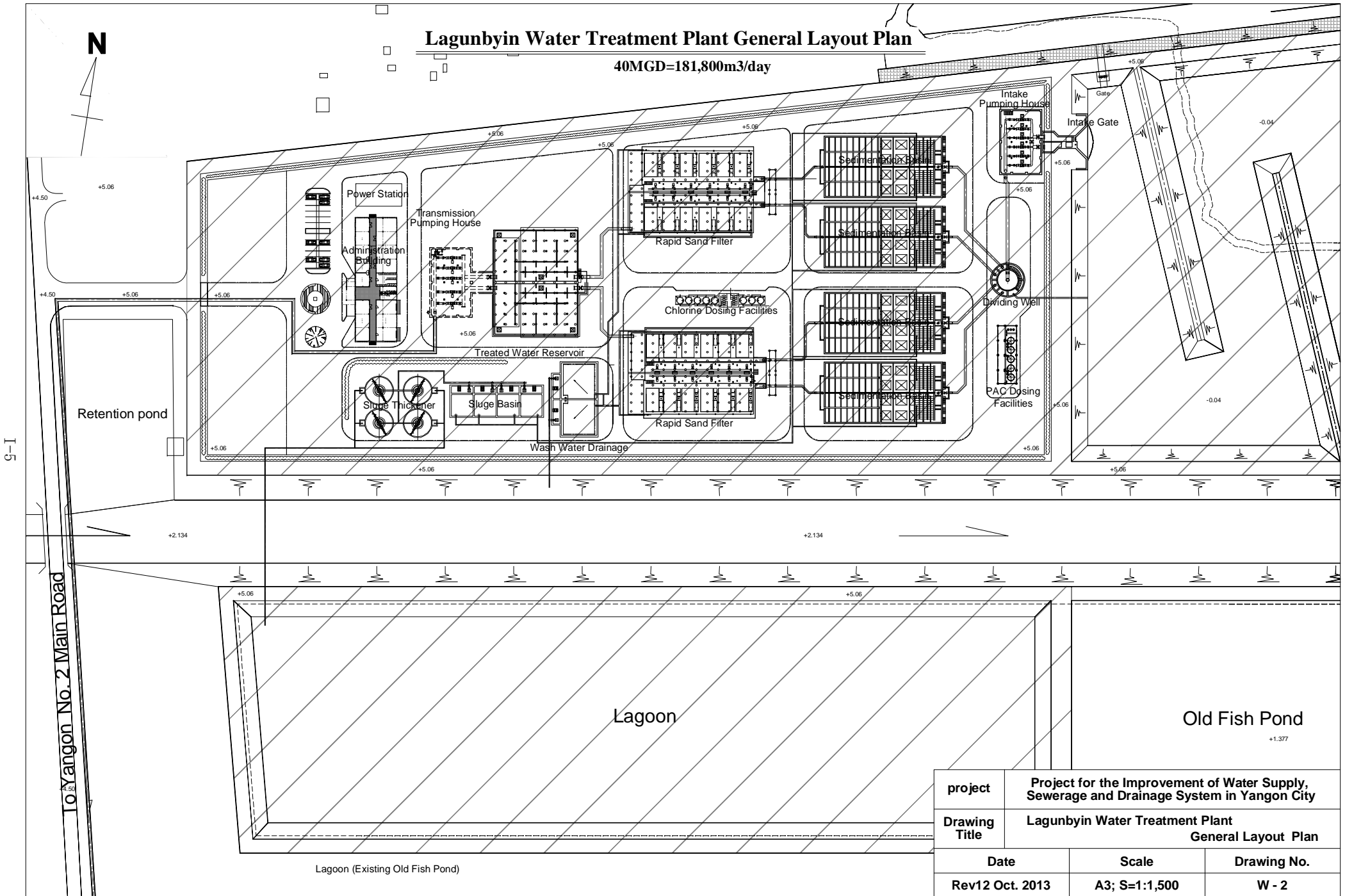
Target Facilities in 2016

project	Project for the Improvement of Water Supply, Sewerage and Drainage System in Yangon City		
Drawing Title	Lagunbyin Water Treatment Plant General Layout Plan		
Date	Scale	Drawing No.	
Rev12 Oct. 2013	A3; S=1:2,500	W - 1	

N

Lagunbyin Water Treatment Plant General Layout Plan

40MGD=181,800m³/day

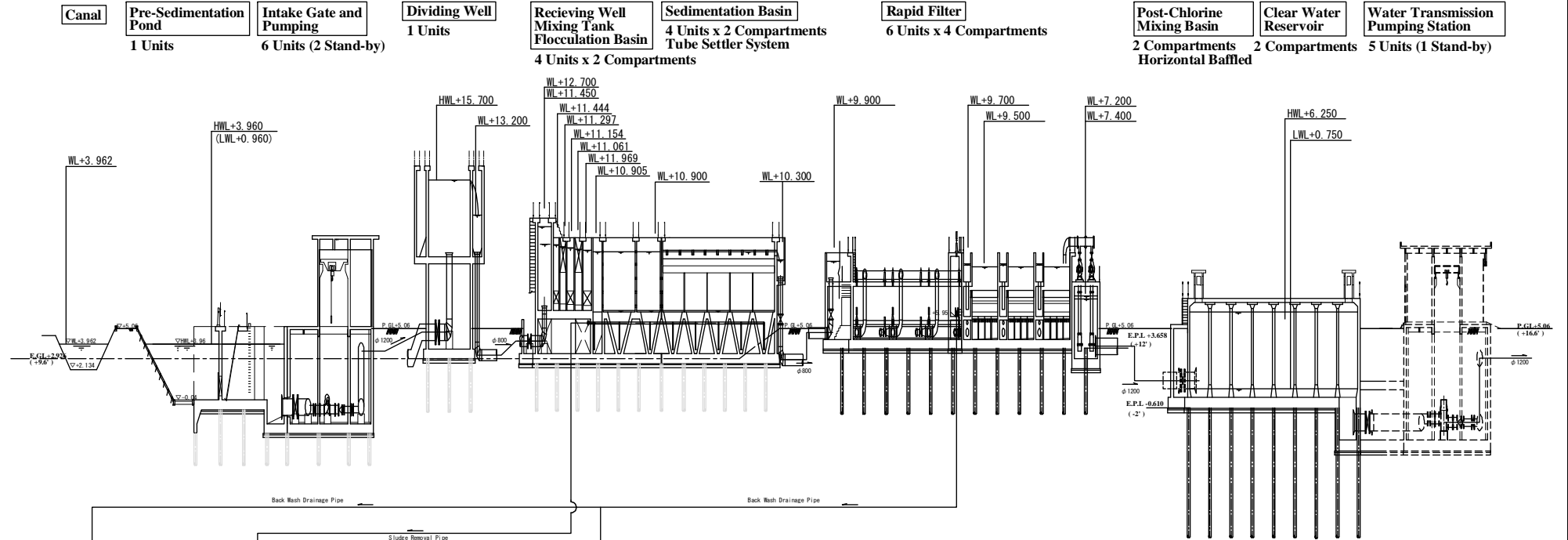


project	Project for the Improvement of Water Supply, Sewerage and Drainage System in Yangon City	
Drawing Title	Lagunbyin Water Treatment Plant General Layout Plan	
Date	Scale	Drawing No.
Rev12 Oct. 2013	A3; S=1:1,500	W - 2

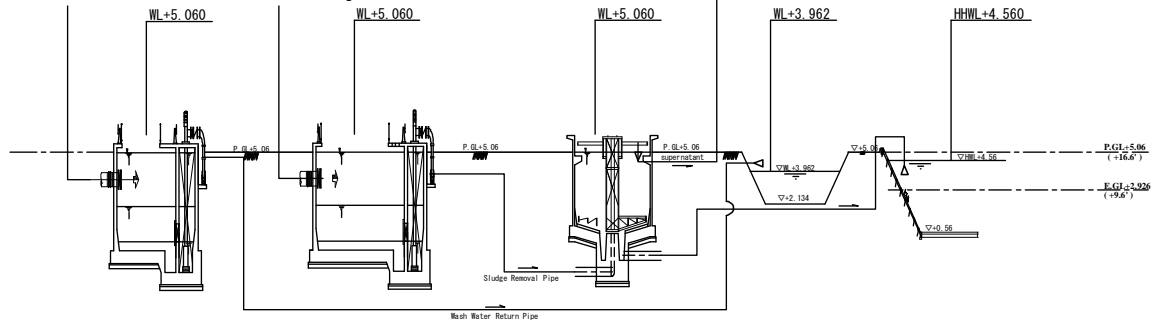
Lagunbyin WTP Water Level Chart

40MGD=181,800m³/day

[Clear Water Treatment System]



[Wastewater Treatment System]



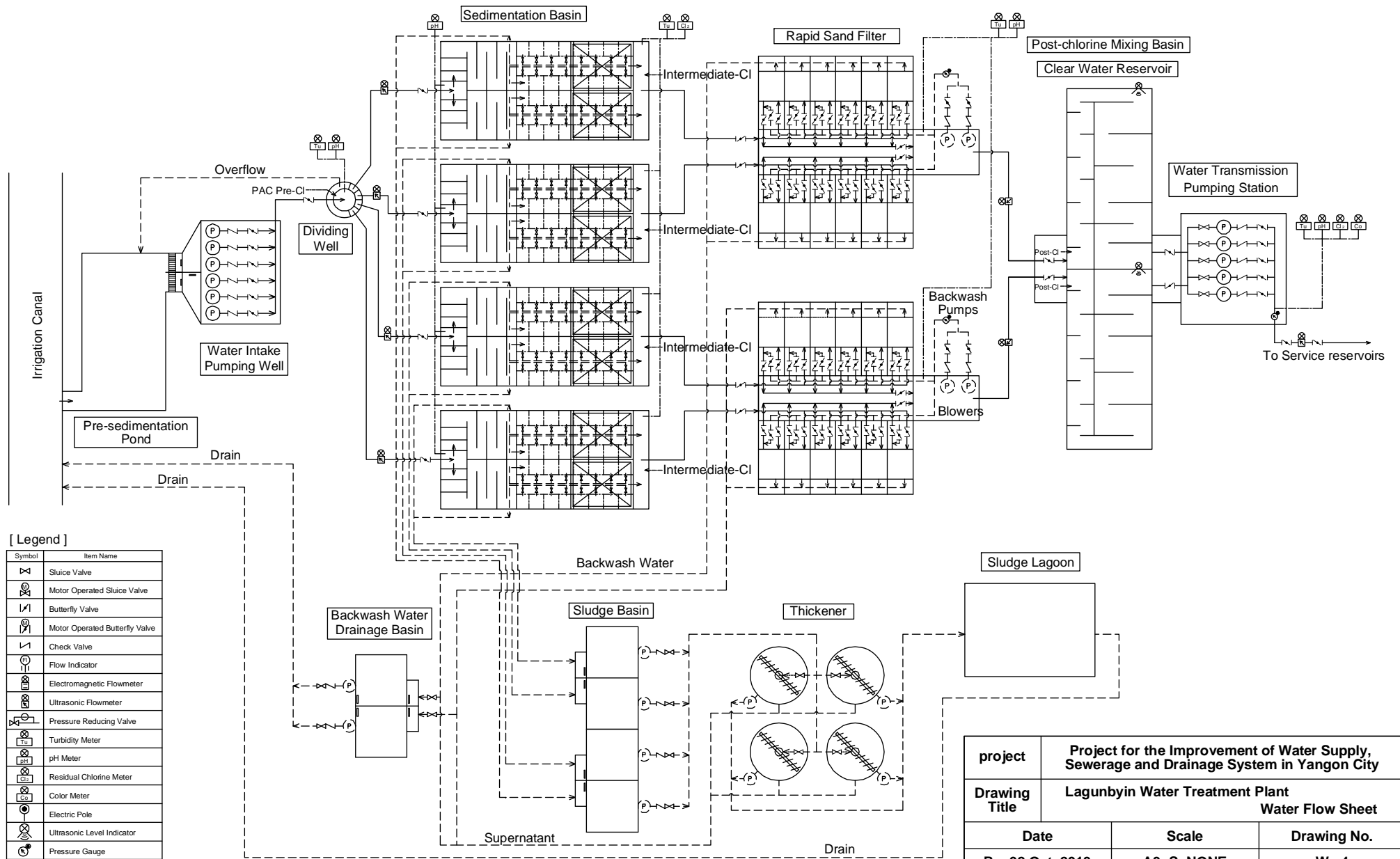
Wash Water Drainage Basin 2 Units
 Sludge Basin 4 Units
 Thickener 4 Units
 Canal Crossing Pipe Bridge
 Lagoon 1 Unit

project	Project for the Improvement of Water Supply, Sewerage and Drainage System in Yangon City	
Drawing Title	Lagunbyin Water Treatment Plant Water Level Chart	
Date	Scale	Drawing No.
Rev03 Oct. 2013	A3; S=NONE	W - 3

Lagunbyin WTP Water Flow Sheet

40MGD=181,800m³/day

L-1



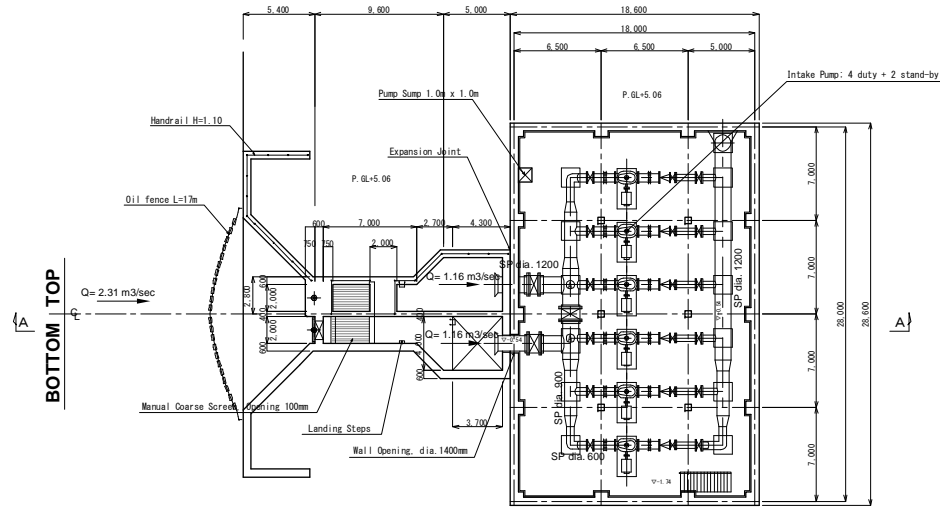
[Legend]

Symbol	Item Name
	Sluice Valve
	Motor Operated Sluice Valve
	Butterfly Valve
	Motor Operated Butterfly Valve
	Check Valve
	Flow Indicator
	Electromagnetic Flowmeter
	Ultrasonic Flowmeter
	Pressure Reducing Valve
	Turbidity Meter
	pH Meter
	Residual Chlorine Meter
	Color Meter
	Electric Pole
	Ultrasonic Level Indicator
	Pressure Gauge

project	Project for the Improvement of Water Supply, Sewerage and Drainage System in Yangon City	
Drawing Title	Lagunbyin Water Treatment Plant Water Flow Sheet	
Date	Scale	Drawing No.
Rev02 Oct. 2013	A3; S=NONE	W - 4

Intake Gate and Pumping Station

PLAN

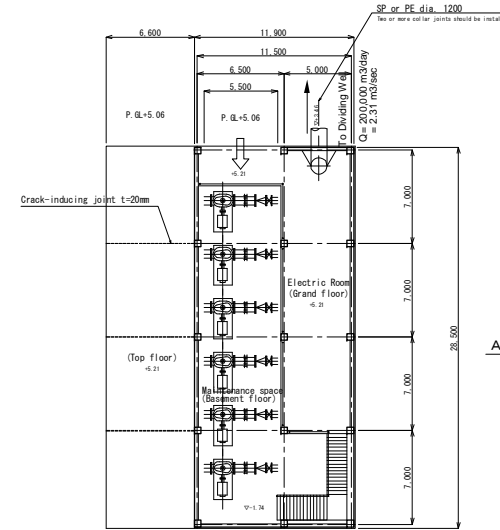


Pre-Sedimentation Pond

Intake Gate

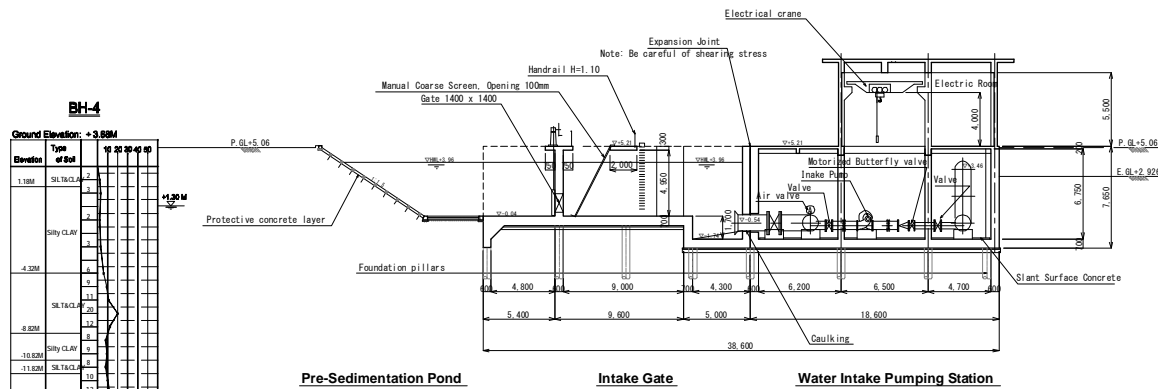
Water Intake Pumping Station

TOP PLAN



Water Intake Pumping Station

SECTION A - A



Pre-Sedimentation Pond

Intake Gate

Water Intake Pumping Station

Note : The values are indicative, and detailed values shall be decided in detailed design.

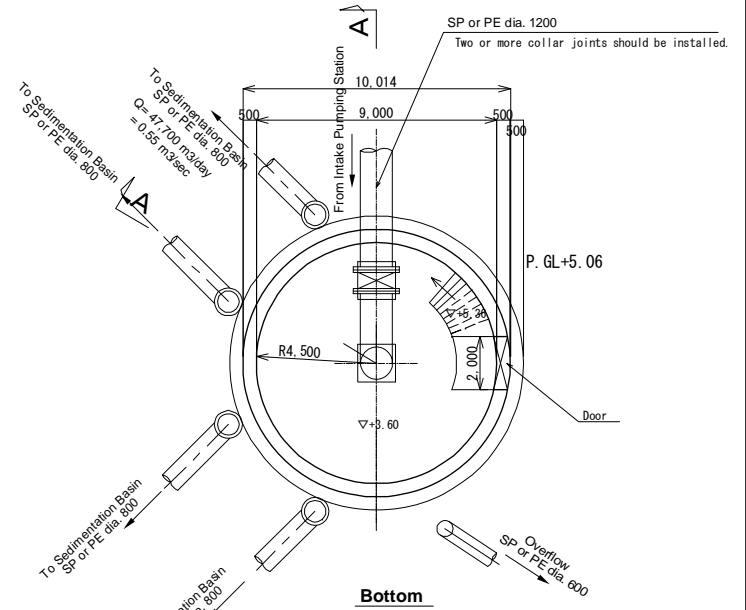
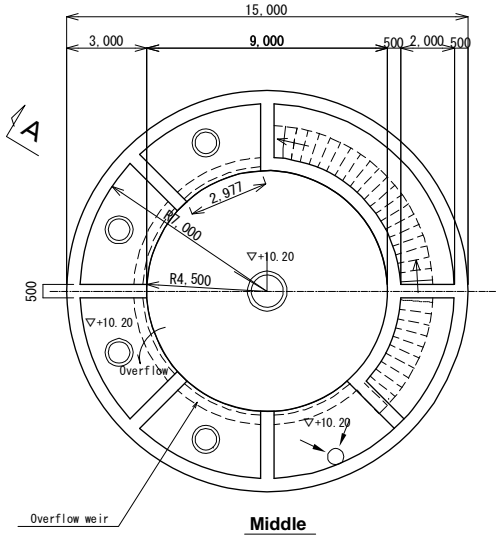
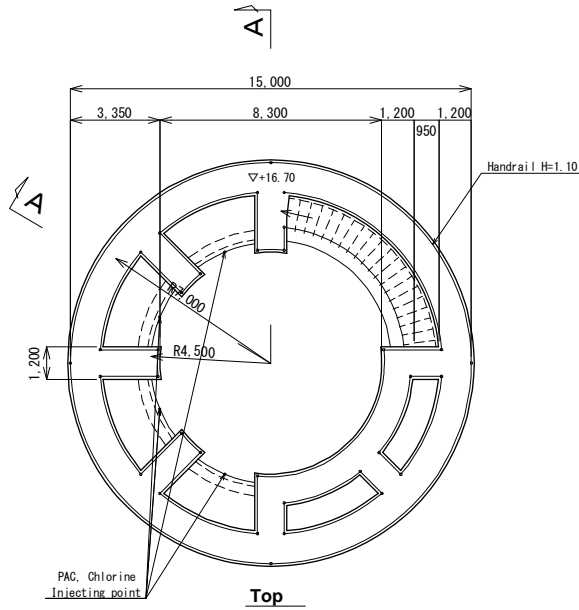
Pumping Station's roof could be changed.

Windows, Doors, Ventilations, Lighting, etc. shall be decided in detail design.

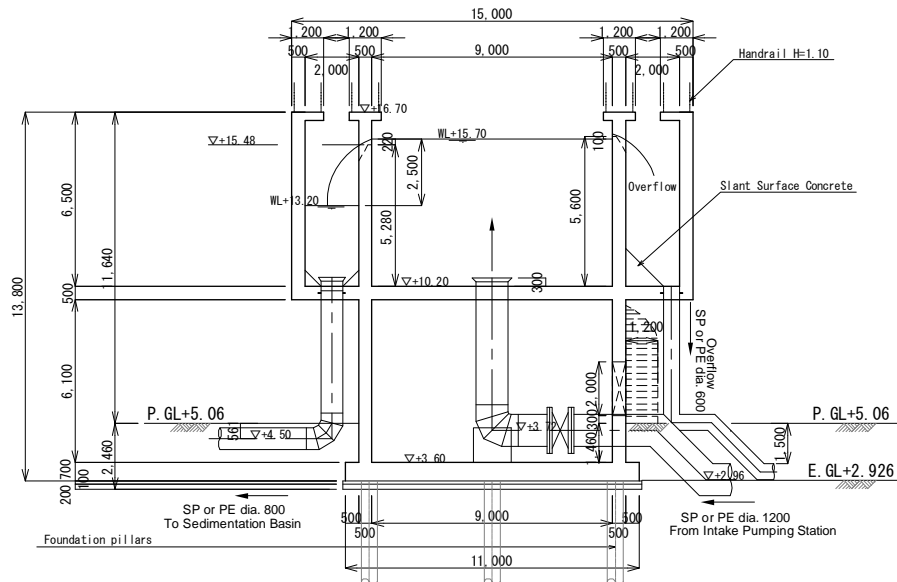
project	Project for the Improvement of Water Supply, Sewerage and Drainage System in Yangon City		
Drawing Title	Lagunbyin Water Treatment Plant Intake Gate & Pumping Station Plan and Section		
Date	Scale	Drawing No.	
Rev02 Oct. 2013	A3; S=1:400	W - 5	

Dividing Well

PLAN



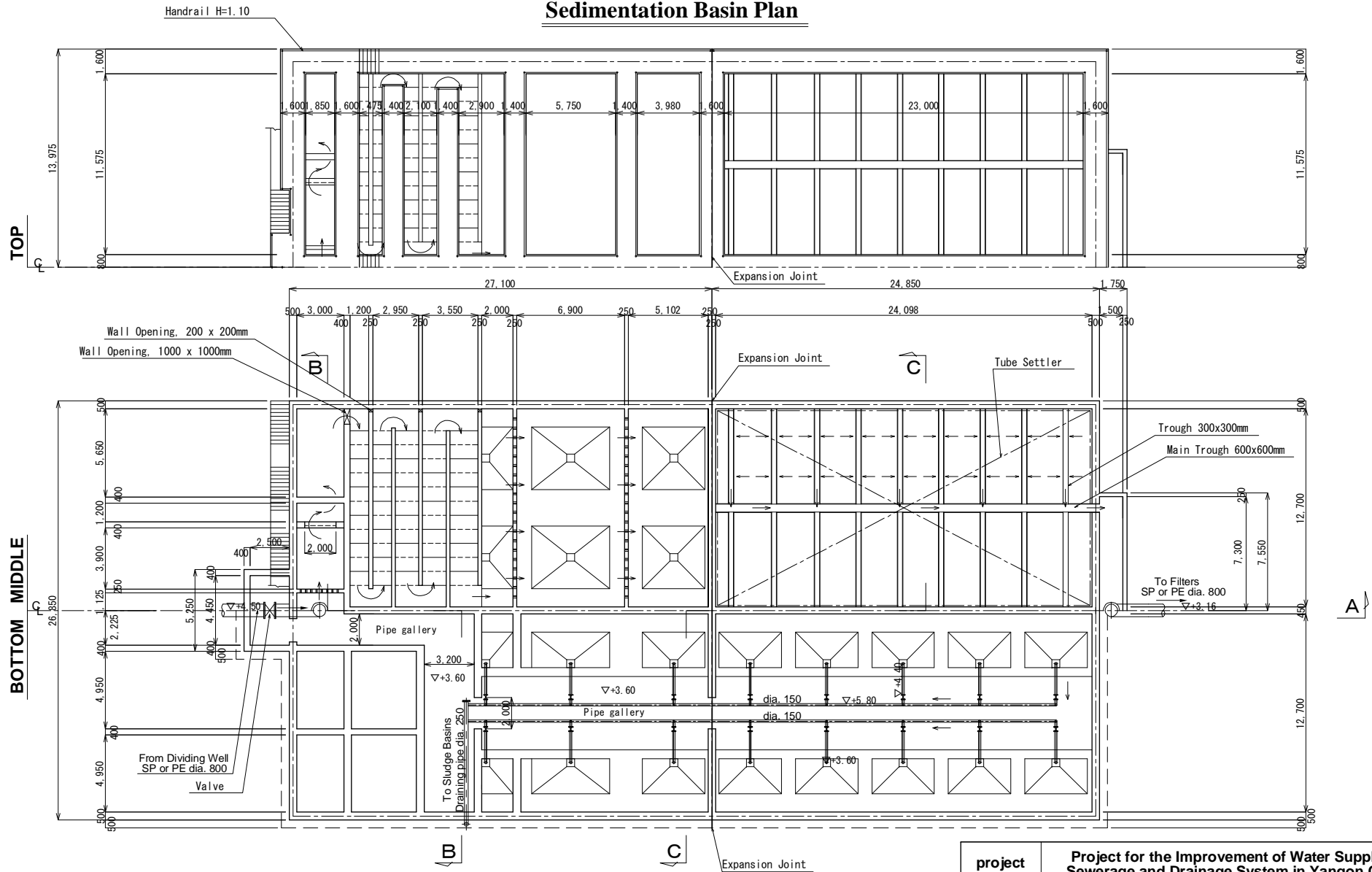
SECTION A - A



Note : The values are indicative, and detailed values shall be decided in detailed design.
Windows, Doors, Ventilations, Lighting, etc. shall be decided in detailed design.

project	Project for the Improvement of Water Supply, Sewerage and Drainage System in Yangon City	
Drawing Title	Lagunbyin Water Treatment Plant Dividing Well Plan & Section	
Date	Scale	Drawing No.
Rev02 Oct. 2013	A3; S=1:200	W - 6

Sedimentation Basin Plan

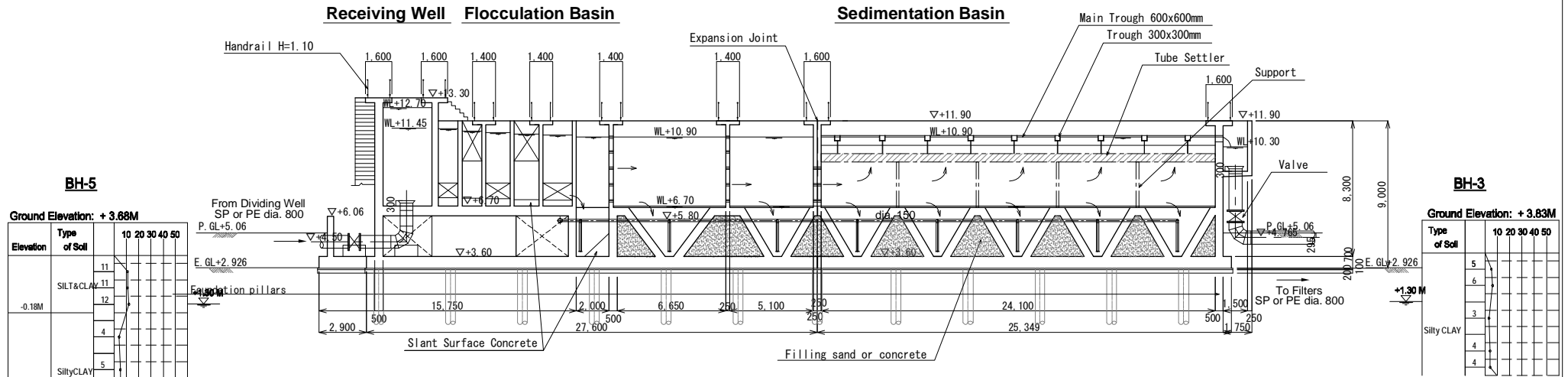


Note : The values are indicative, and detailed values shall be decided in detailed design.
 Windows, Doors, Ventilations, Lighting, etc. shall be decided in detailed design.

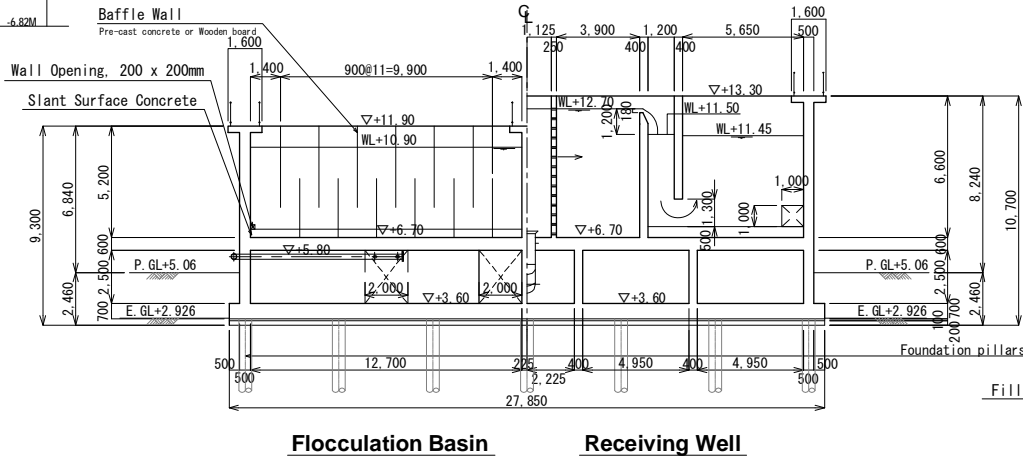
project	Project for the Improvement of Water Supply, Sewerage and Drainage System in Yangon City	
Drawing Title	Lagunbyin Water Treatment Plant Sedimentation Basin Plan	
Date	Scale	Drawing No.
Rev04 Oct. 2013	A3; S=1:250	W - 7

Sedimentation Basin Cross Section

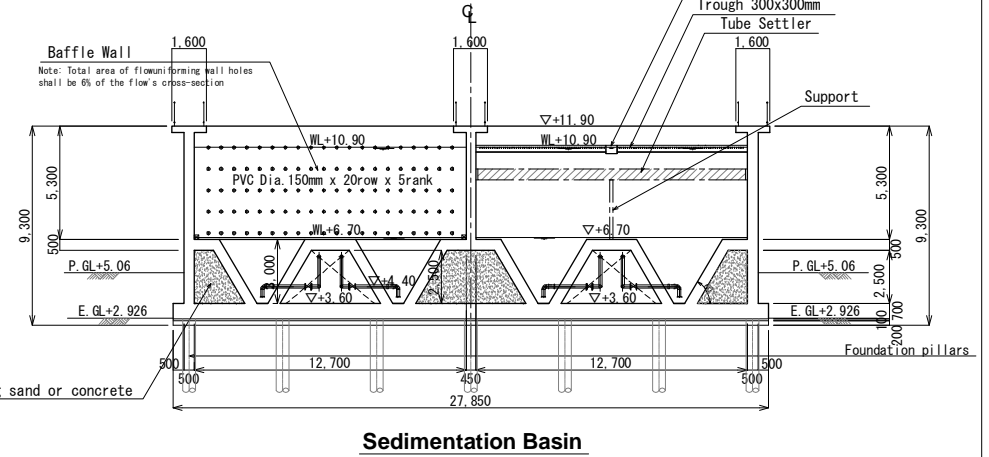
SECTION A - A



SECTION B - B



SECTION C - C



Flocculation Basin

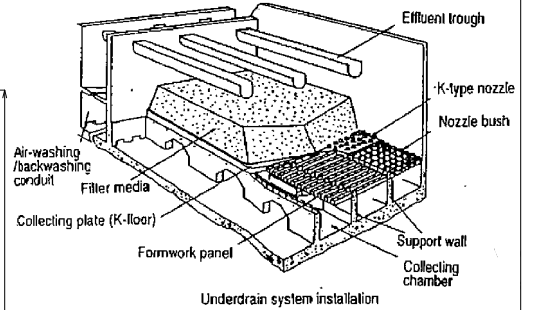
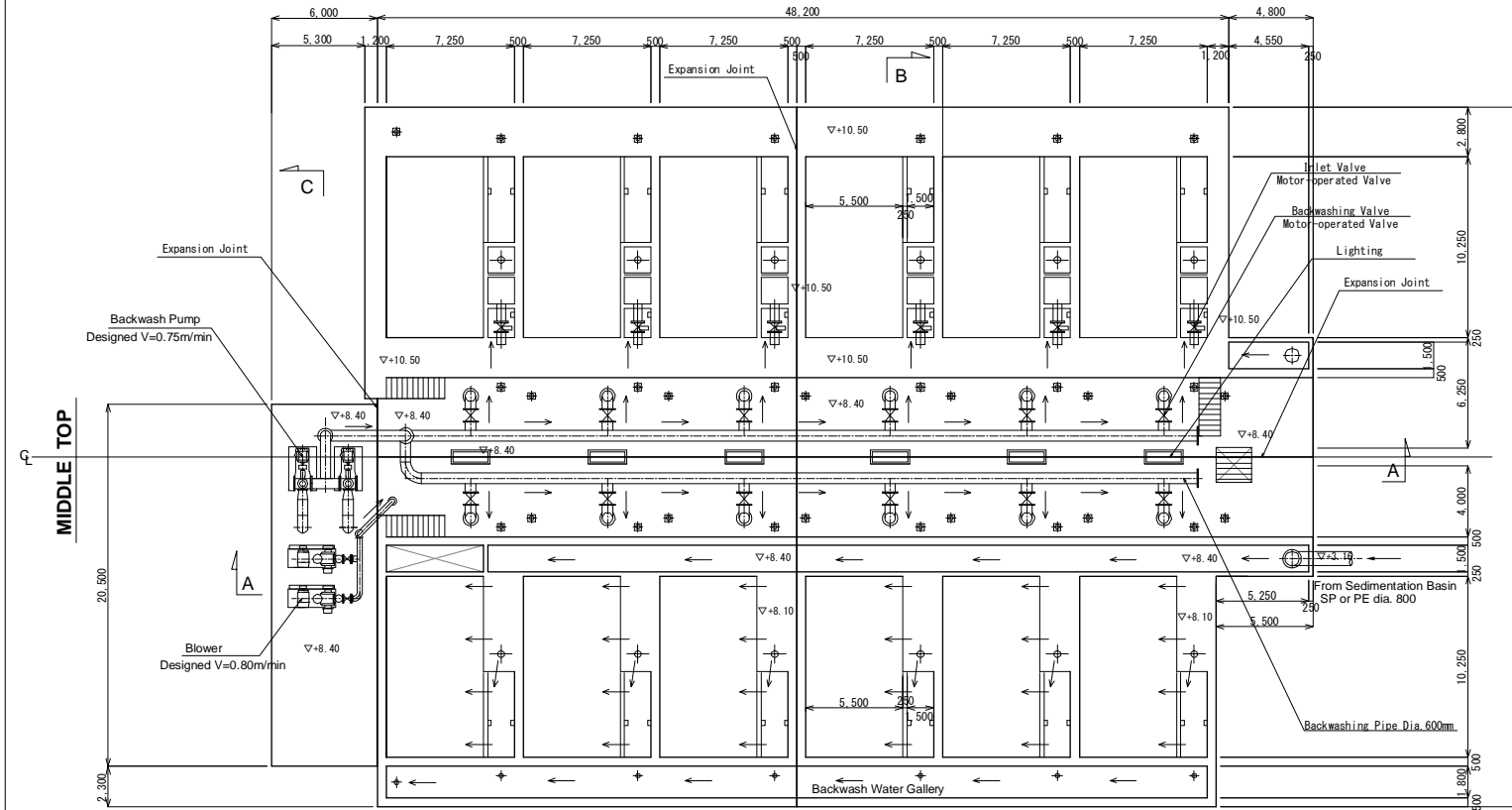
Receiving Well

Sedimentation Basin

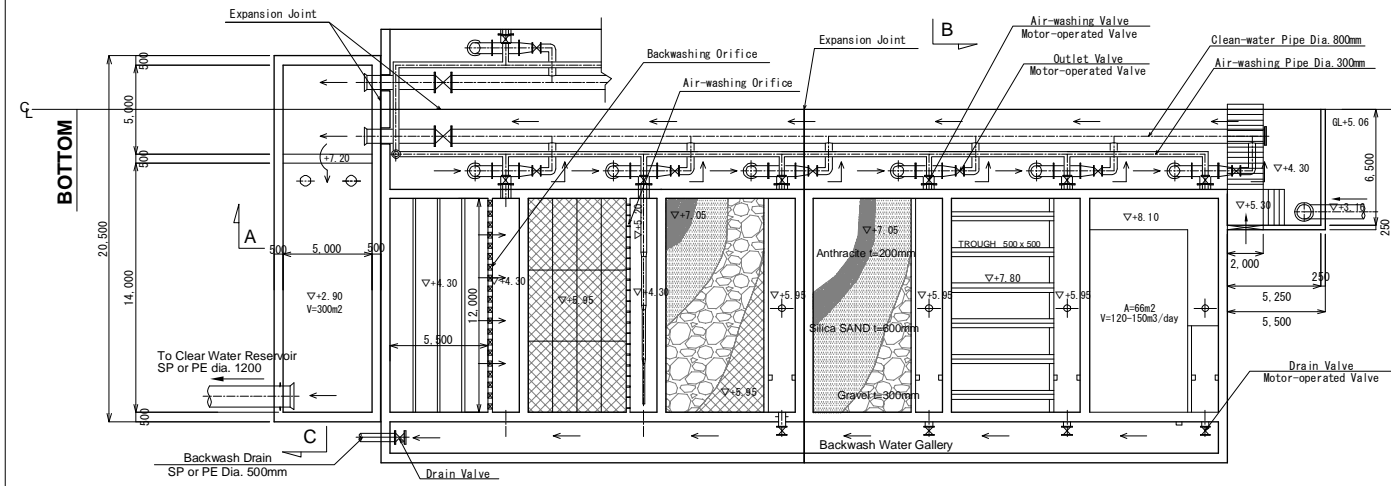
Note : The values are indicative, and detailed values shall be decided in detailed design.
Windows, Doors, Ventilations, Lighting, etc. shall be decided in detailed design.

project	Project for the Improvement of Water Supply, Sewerage and Drainage System in Yangon City	
Drawing Title	Lagunbyin Water Treatment Plant Sedimentation Basin Cross Section	
Date	Scale	Drawing No.
Rev04 Oct. 2013	A3; S=1:250	W - 8

Rapid Sand Filter Plan



Sample of Filter basin

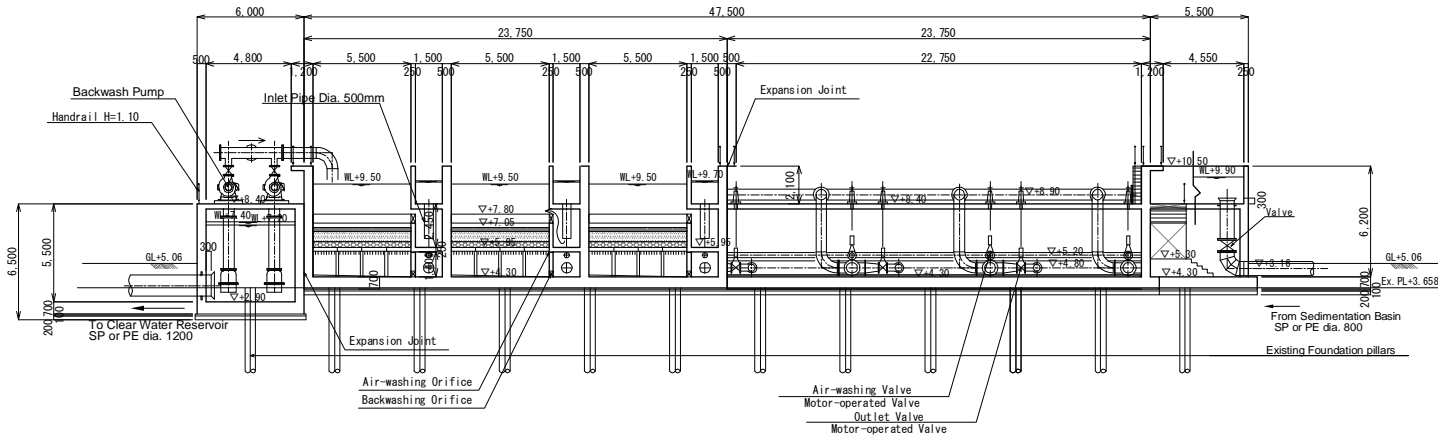


Note : The values are indicative, and detailed values shall be decided in detailed design.
Windows, Doors, Ventilations, Lighting, etc. shall be decided in detailed design.

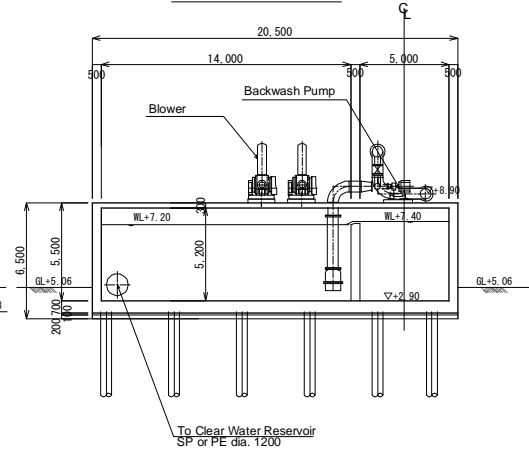
project	Project for the Improvement of Water Supply, Sewerage and Drainage System in Yangon City	
Drawing Title	Lagunbyin Water Treatment Plant Rapid Sand Filter Plan	
Date	Scale	Drawing No.
Rev02 Oct. 2013	A3; S=1:300	W - 9

Rapid Sand Filter Cross Section

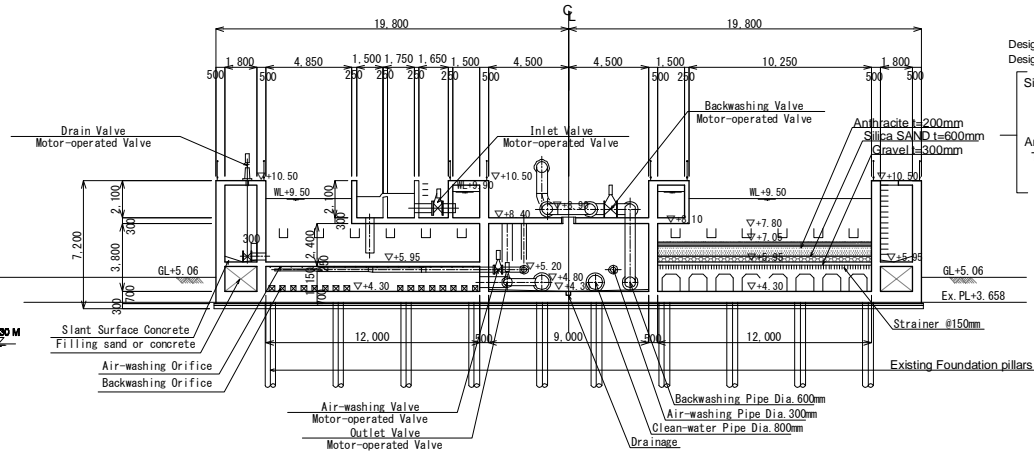
SECTION A - A



SECTION C - C



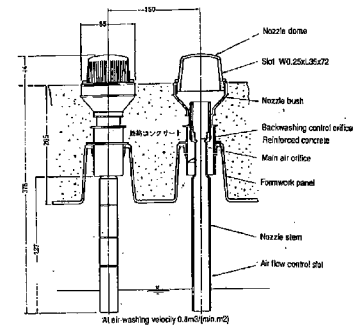
SECTION B - B



Designed Filtration Area = 66m² x 6basins x 4systems
 Designed Filtration Velocity = 120-150m³/day

Silica sand
 Thickness = 0.6m
 Uniform Coefficient = Less than 1.4
 Effective Size = 0.6mm

Anthracite
 Thickness = 0.2m
 Uniform Coefficient = Less than 1.6
 Effective Size = 1.2mm



Sample of strainer

BH-2
 Ground Elevation: + 4.30M

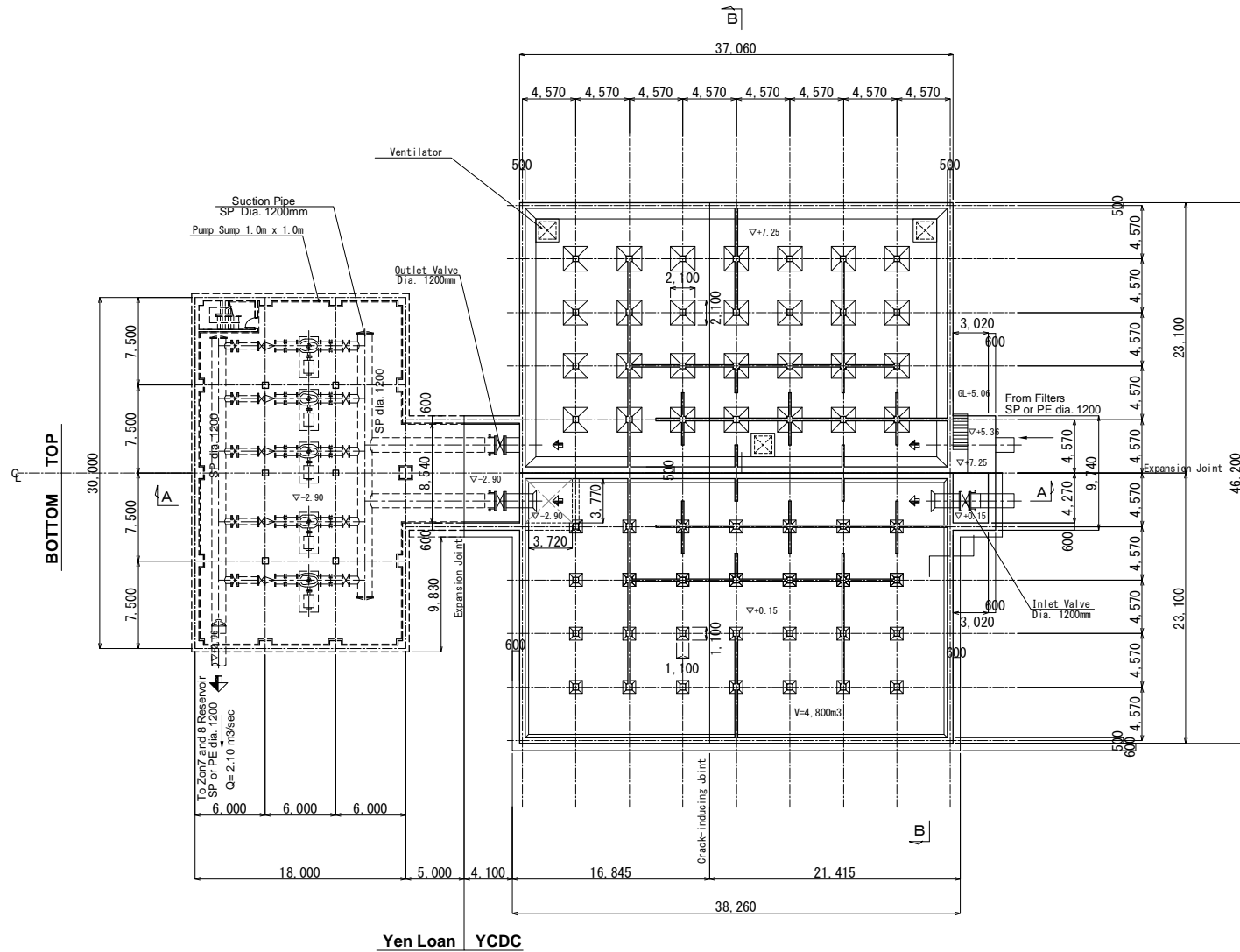
Elevation	Type of Soil	10	20	30	40	50	60
8							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
51							
52							
53							
54							
55							
56							
57							
58							
59							
60							

Silty CLAY

Note : The values are indicative, and detailed values shall be decided in detailed design.
 Windows, Doors, Ventilations, Lighting, etc. shall be decided in detailed design.

project	Project for the Improvement of Water Supply, Sewerage and Drainage System in Yangon City		
Drawing Title	Lagunbyin Water Treatment Plant Rapid Sand Filter Cross Section		
Date	Scale	Drawing No.	
Rev02 Oct. 2013	A3; S=1:300	W - 10	

Clear Water Reservoir Plan



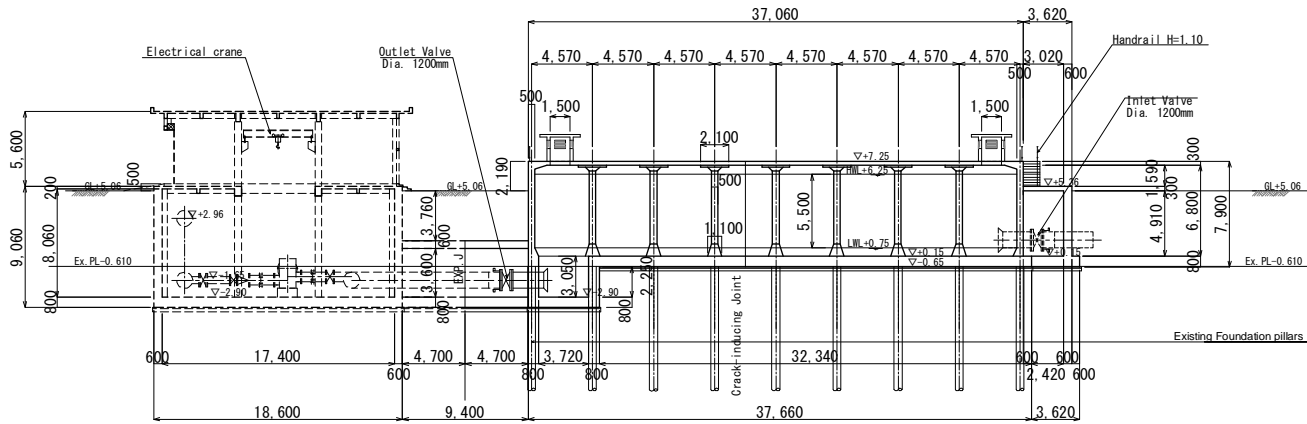
I-14

Note : The values are indicative, and detailed values shall be decided in detailed design.
 Windows, Doors, Ventilations, Lighting, etc. shall be decided in detailed design.

project	Project for the Improvement of Water Supply, Sewerage and Drainage System in Yangon City		
Drawing Title	Laganbyin Water Treatment Plant Clear Water Reservoir & Transmission Pumping Station Plan		
Date	Scale	Drawing No.	
Rev03 Oct. 2013	A3; S=1:400	W - 11	

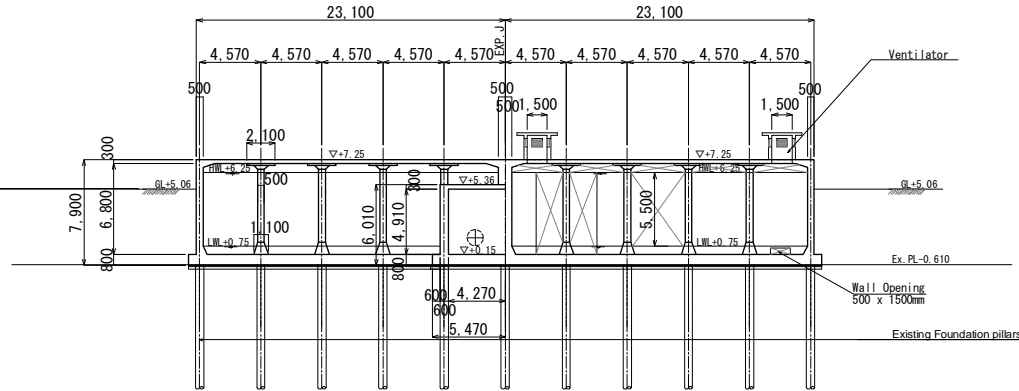
Clear Water Reservoir Cross Section

SECTION A - A

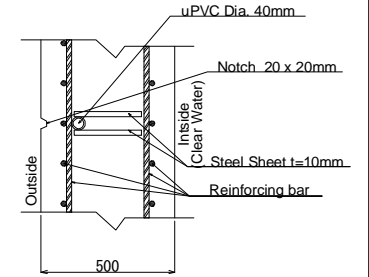


Yen Loan YCDC

SECTION B - B



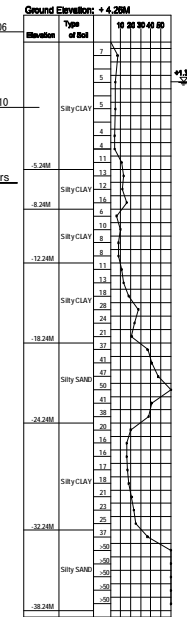
Note : The values are indicative, and detailed values shall be decided in detailed design.
Windows, Doors, Ventilations, Lighting, etc. shall be decided in detailed design.



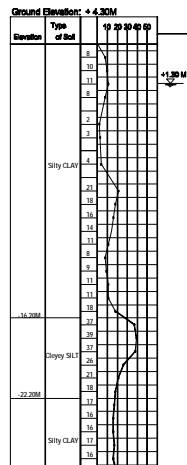
Sample of Crack-inducing Joint

Note: When cracks are detected, that should be repaired immediately.

BH-1



BH-2



project	Project for the Improvement of Water Supply, Sewerage and Drainage System in Yangon City		
Drawing Title	Lagunbyin Water Treatment Plant Clear Water Reservoir & Transmission Pumping Station Section		
Date	Scale	Drawing No.	
Rev03 Oct. 2013	A3; S=1:400	W - 12	