

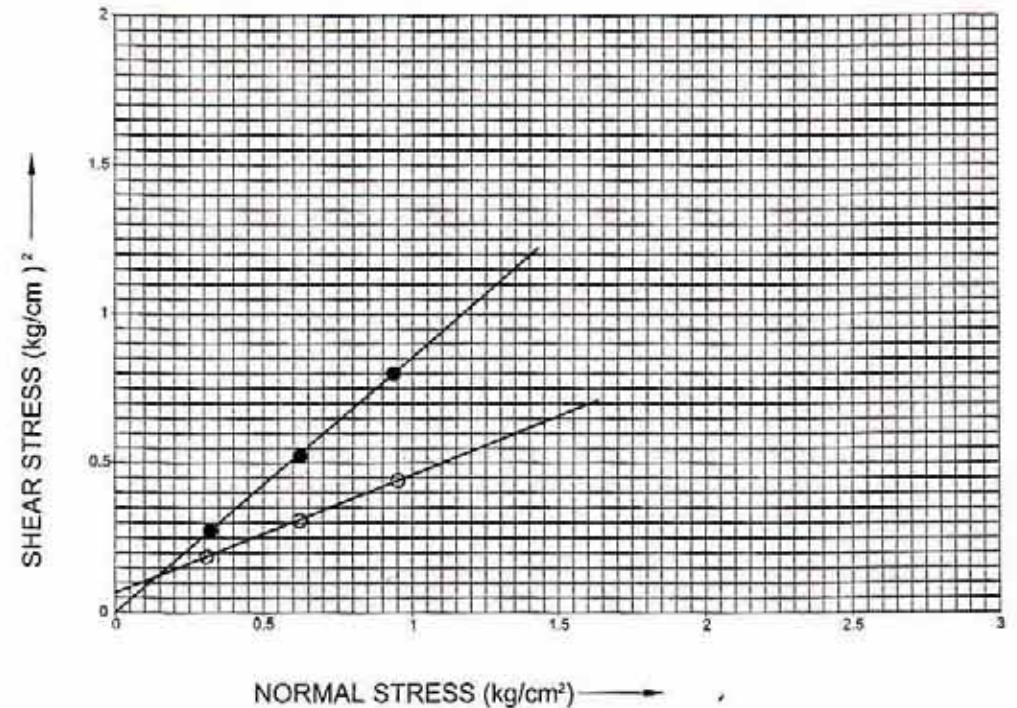
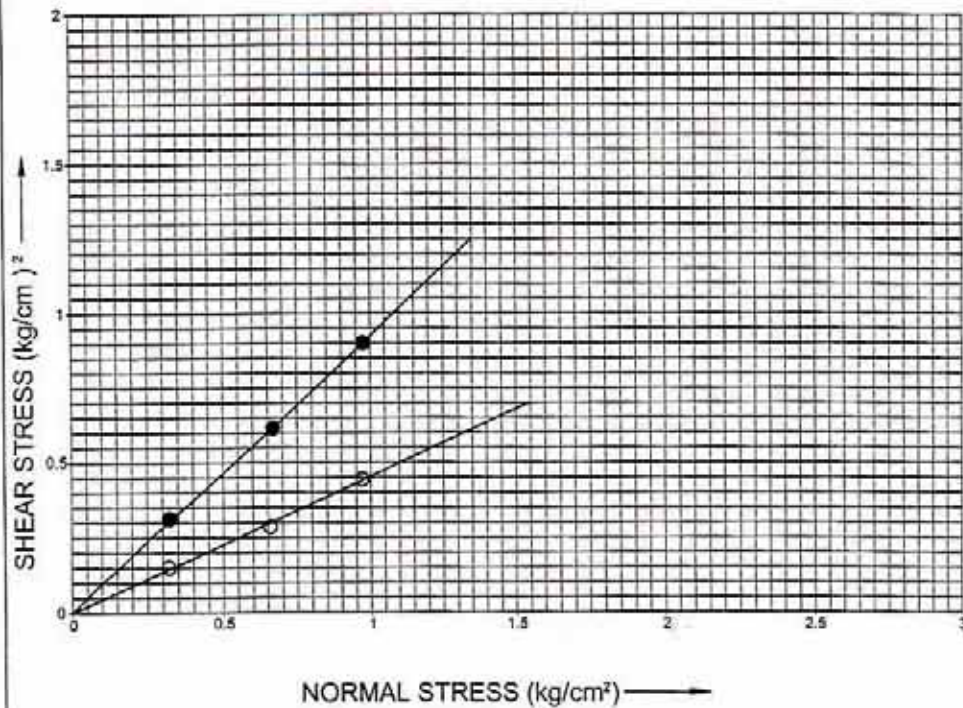
**GRAIN SIZE ANALYSIS /  
DIRECT SHARE TEST**

# DIRECT SHEAR TEST

Client :-TEPSCO

Location :-Bheramara Power Station Area,  
Kushtia Bangladesh.

Project :-Feasibility Study on 450MW Combined  
Cycle Power Station at Bheramara



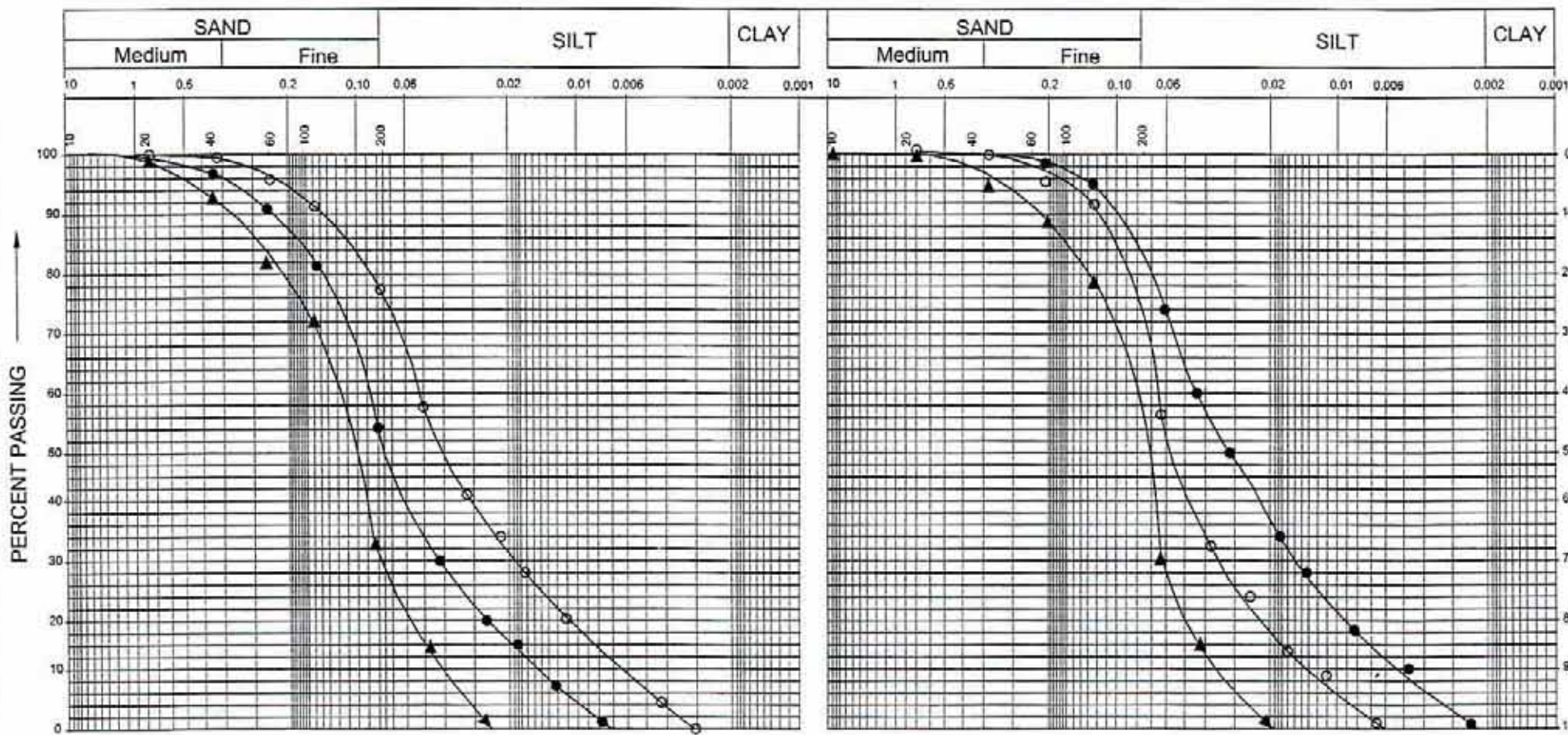
SYMBOL	BORING NO	SAMPLE NO	DEPTH (m)	COHESION (kg/cm)	ANGLE (0)	SYMBOL	BORING NO	SAMPLE NO	DEPTH (m)	COHESION (kg/cm)	ANGLE (0)
○—○	1	D - 10	10m	00	25	○—○	2	D - 6	6m	0.05	00
●—●	1	D - 24	24m	00	44	●—●	2	D - 21	21m	00	40

# GRAIN SIZE ANALYSIS

Client :-TEPSCO

Location :-Bheramara Power Station Area,  
Kushtia Bangladesh.

Project :-Feasibility Study on 450MW Combined  
Cycle Power Station at Bheramara



SYMBOL	BORING NO	SAMPLE NO	DEPTH (m)	SAND(%)	SILT(%)	CLAY(%)
○-○	1	D - 2	2m	23	77	00
●-●	1	D - 4	4m	47	53	00
▲-▲	1	D - 20	20m	68	32	00

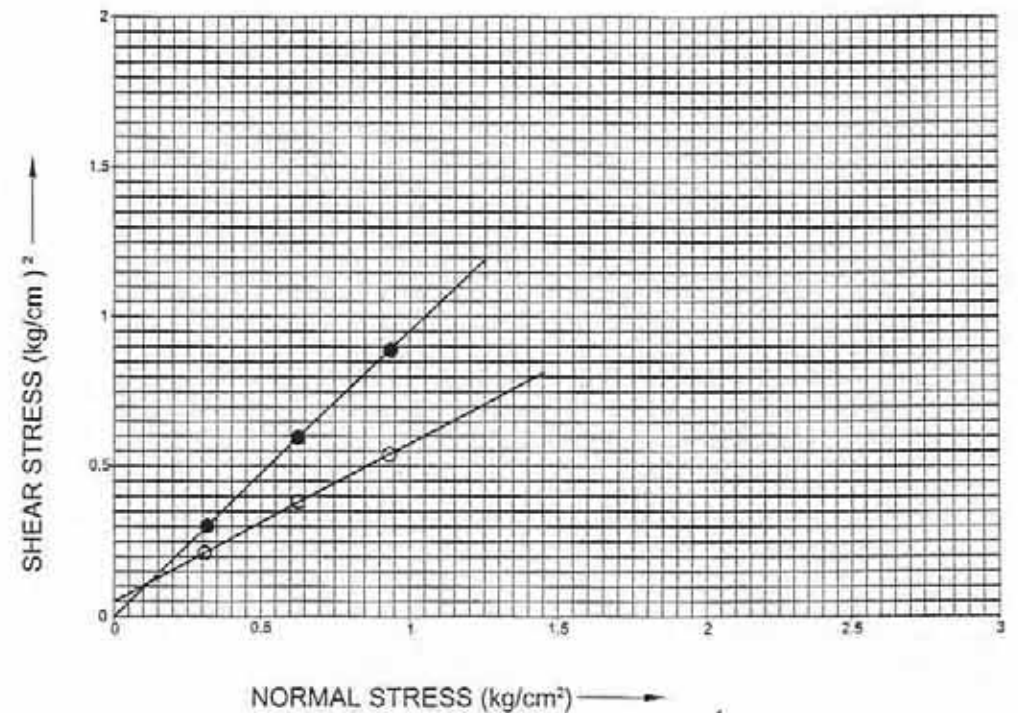
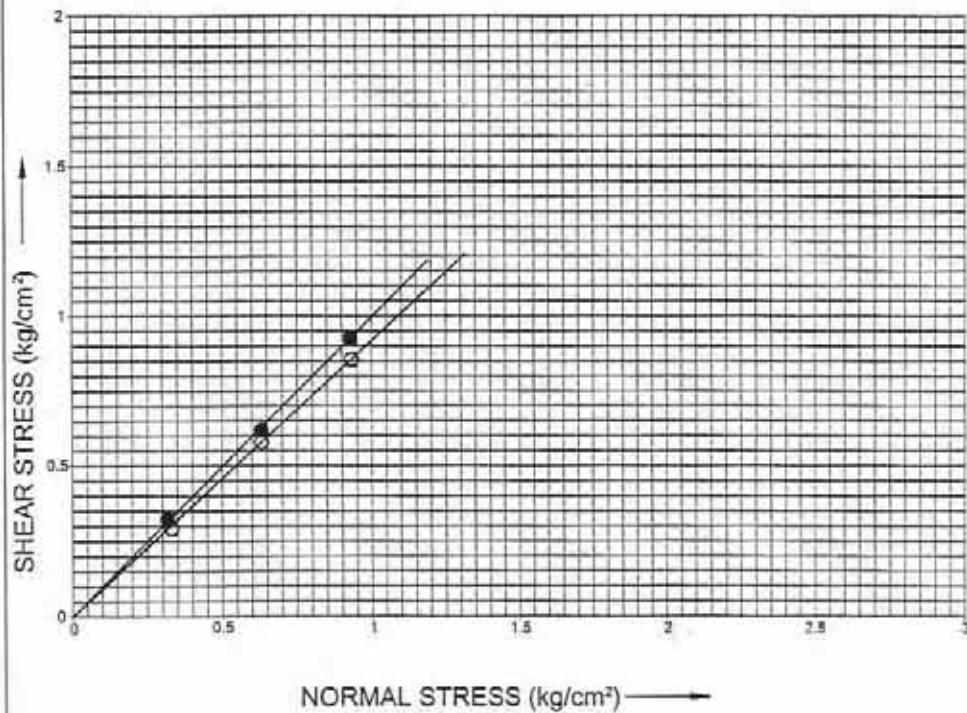
SYMBOL	BORING NO	SAMPLE NO	DEPTH (m)	SAND(%)	SILT(%)	CLAY(%)
○-○	2	D - 6	6m	45	55	00
●-●	2	D - 17	17m	26	74	00
▲-▲	2	D - 28	28m	70	30	00

# DIRECT SHEAR TEST

Client :-TEPSCO

Location :-Bheramara Power Station Area,  
Kushtia Bangladesh.

Project :-Feasibility Study on 450MW Combined  
Cycle Power Station at Bheramara



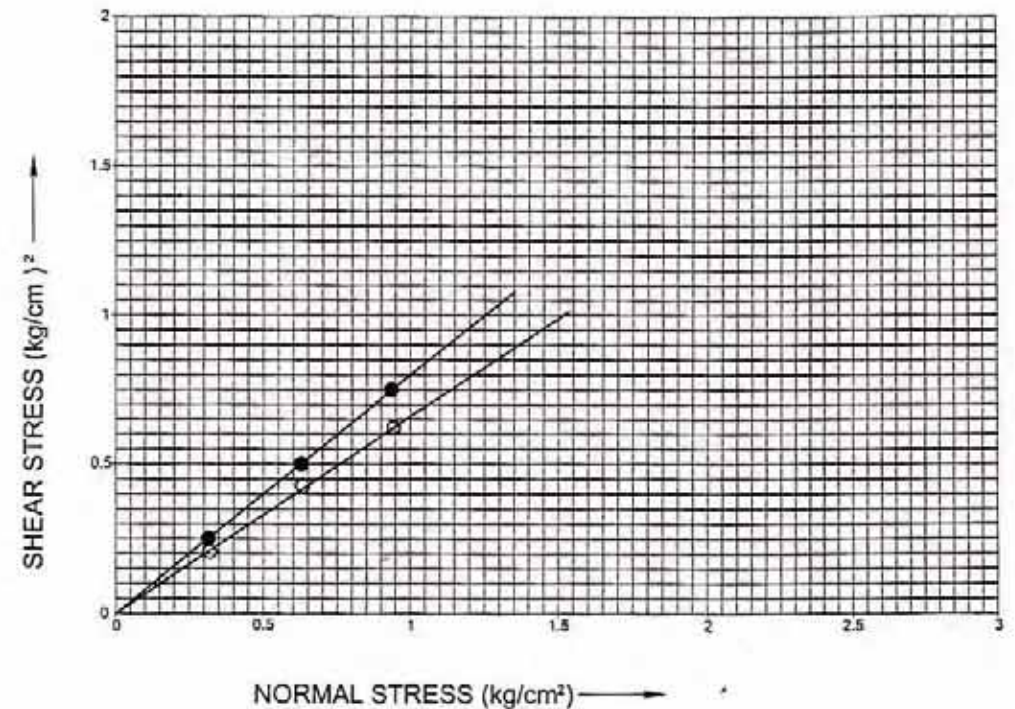
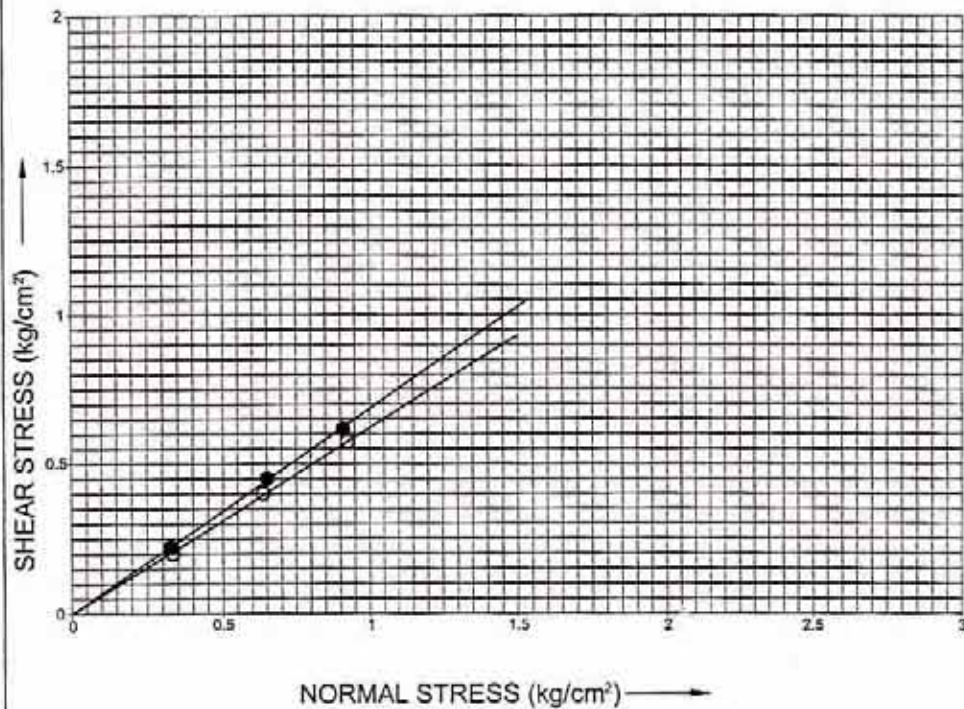
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○-○	3	D - 8	8m	00	42	○-○	4	D - 11	11m	0.05	27
●-●	3	D - 25	25m	00	44	●-●	4	D - 23	23m	00	43

# DIRECT SHEAR TEST

Client :-TEPSCO

Location :-Bheramara Power Station Area,  
Kushtia Bangladesh.

Project :-Feasibility Study on 450MW Combined  
Cycle Power Station at Bheramara



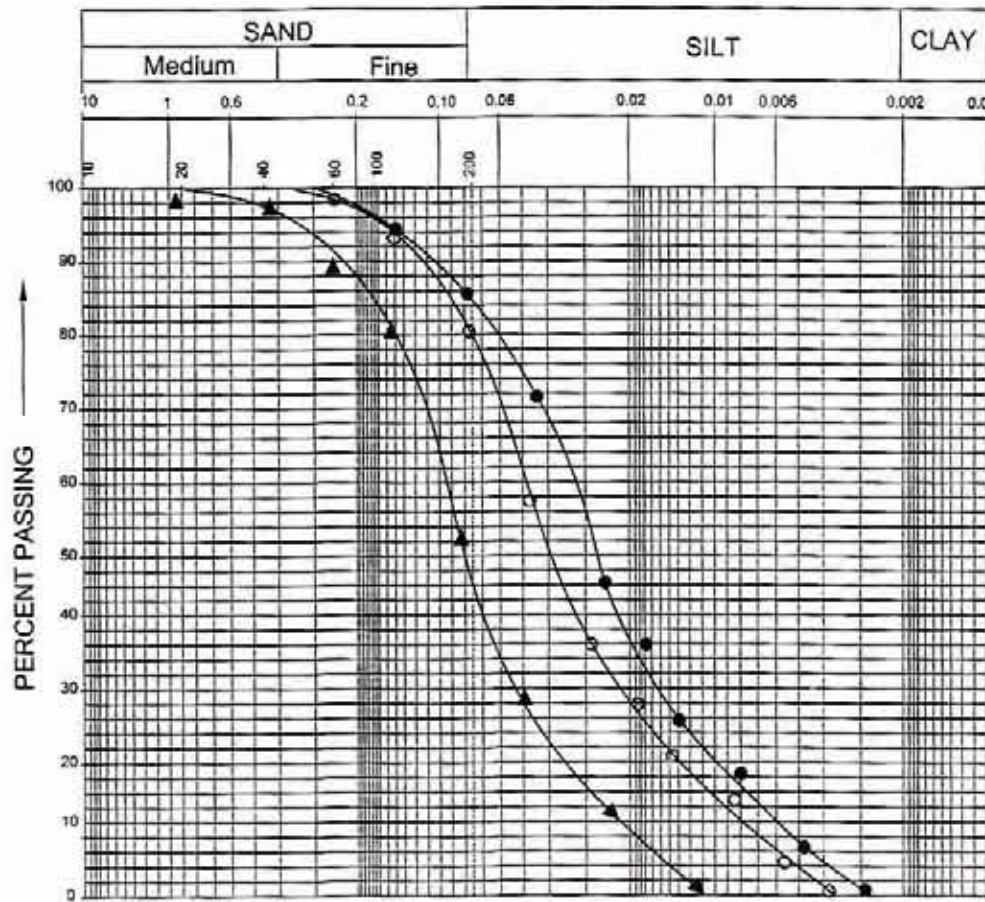
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○-○	5	D - 13	13m	00	32	○-○	6	D - 12	12m	00	33
●-●	5	D - 25	25m	00	34	●-●	6	D - 27	27m	00	38

# GRAIN SIZE ANALYSIS

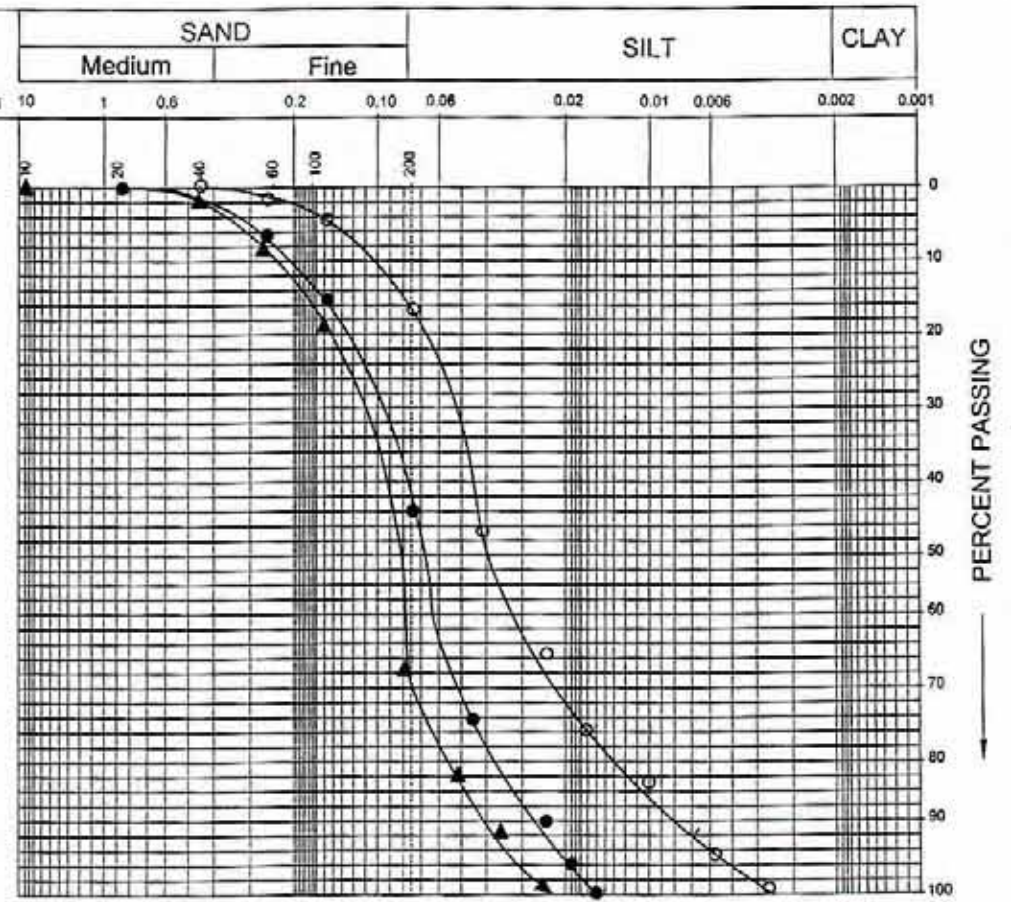
Client :-TEPSCO

Location :-Bheramara Power Station Area,  
Kushtia Bangladesh.

Project :-Feasibility Study on 450MW Combined  
Cycle Power Station at Bheramara



SYMBOL	BORING NO	SAMPLE NO	DEPTH (m)	SAND(%)	SILT(%)	CLAY(%)
○-○	5	D - 2	2m	20	80	00
●-●	5	D - 6	6m	15	85	00
▲-▲	5	D - 19	19m	49	51	00



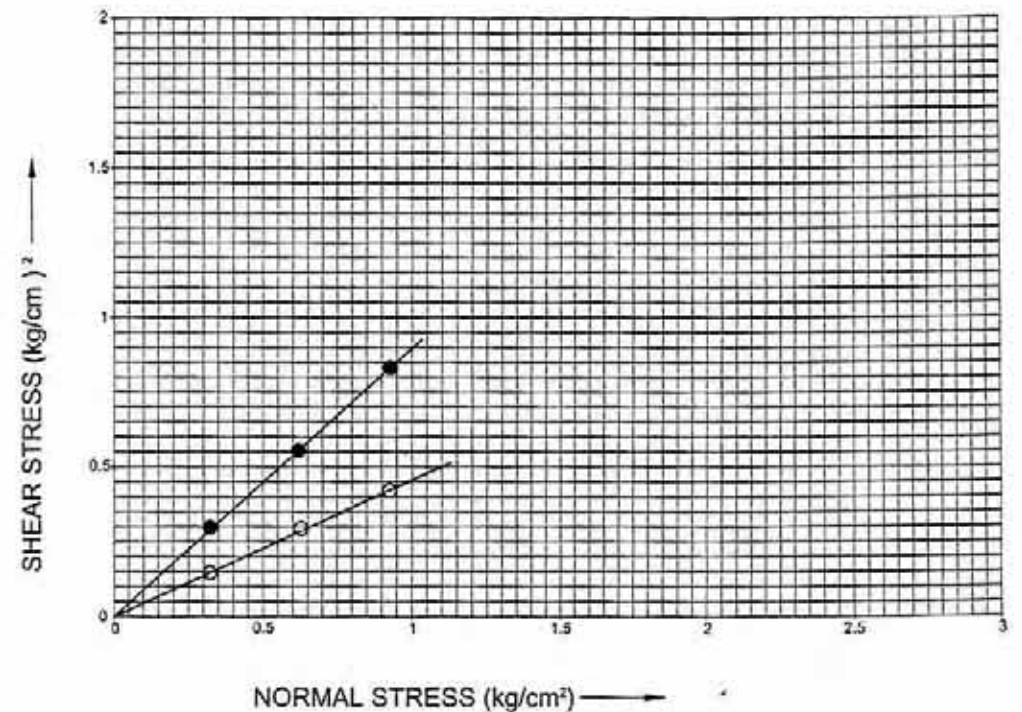
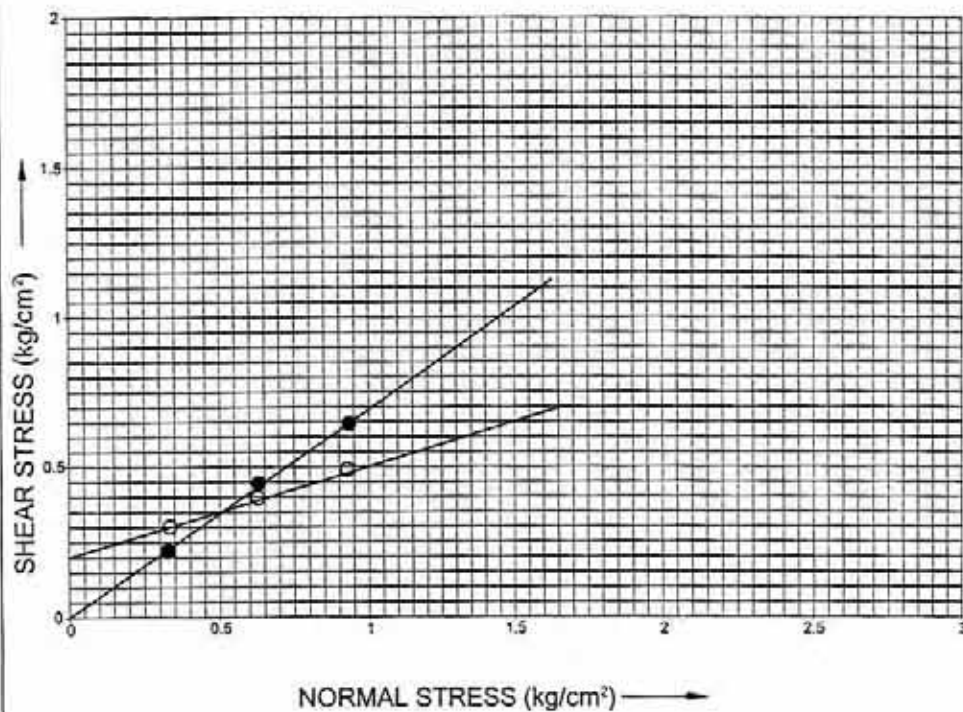
SYMBOL	BORING NO	SAMPLE NO	DEPTH (m)	SAND(%)	SILT(%)	CLAY(%)
○-○	6	D - 5	5m	17	83	00
●-●	6	D - 15	15m	45	55	00
▲-▲	6	D - 25	25m	68	32	00

# DIRECT SHEAR TEST

Client :-TEPSCO

Location :-Bheramara Power Station Area,  
Kushtia Bangladesh.

Project :-Feasibility Study on 450MW Combined  
Cycle Power Station at Bheramara



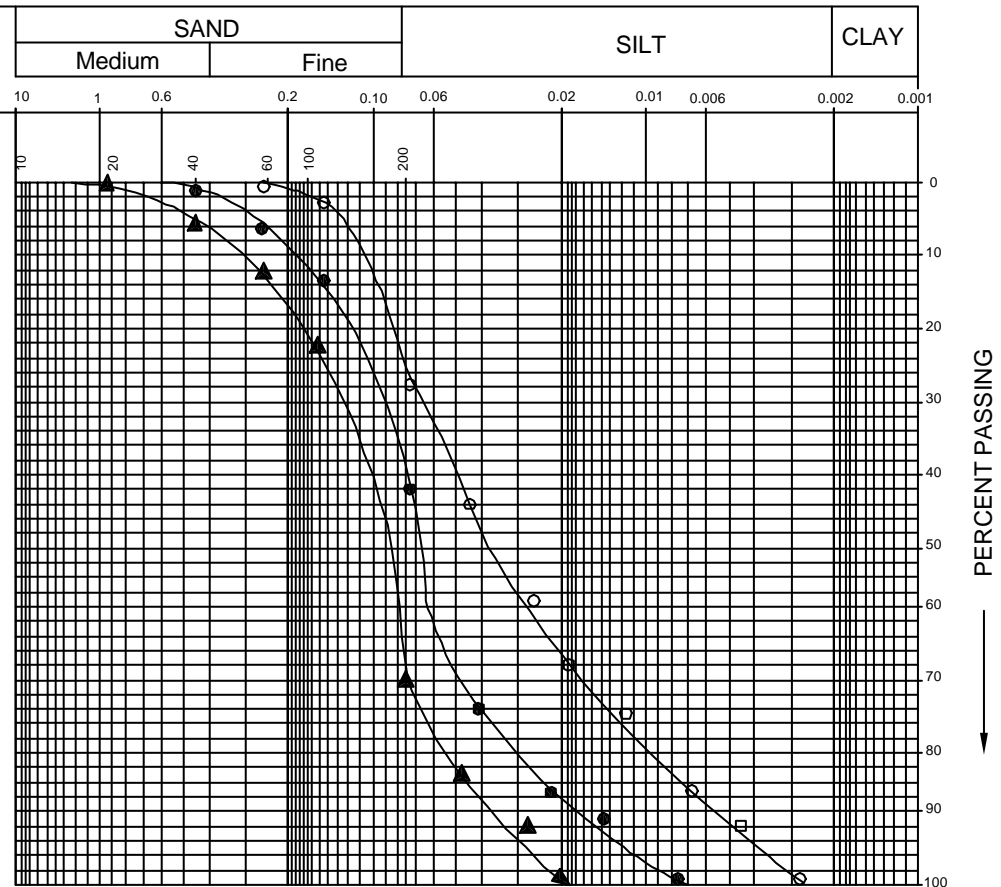
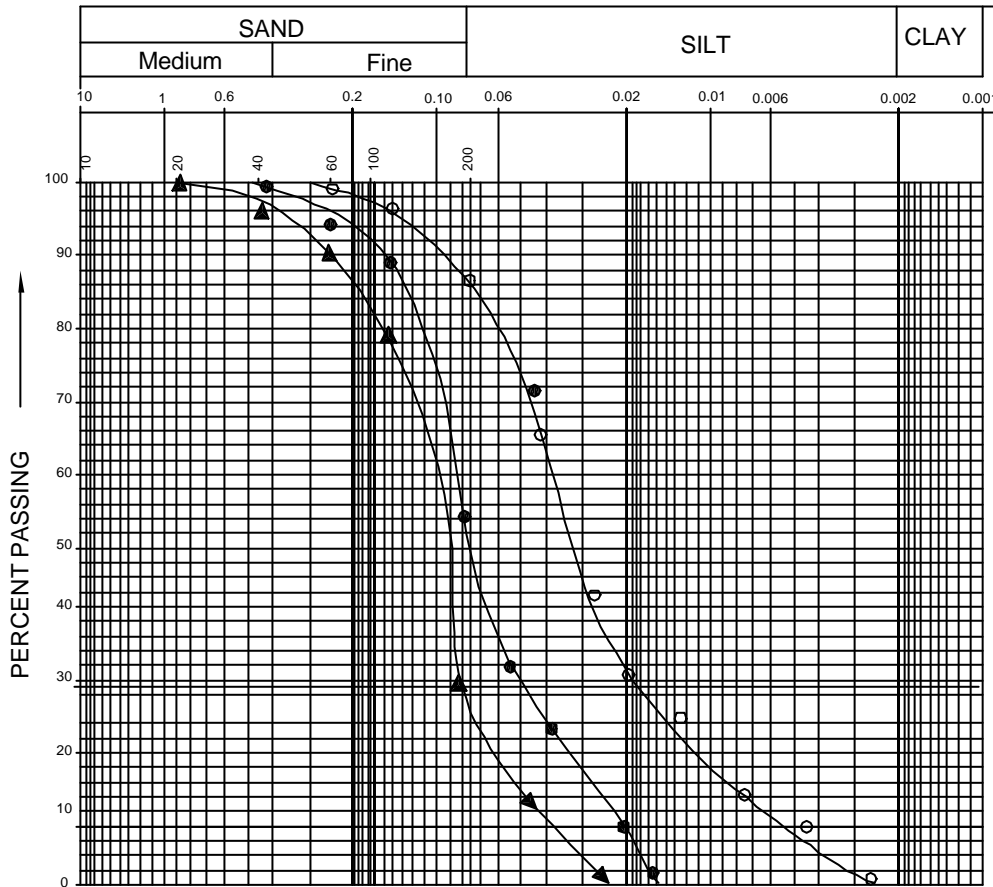
SYMBOL	BORING NO	SAMPLE NO	DEPTH (m)	COHESION (kg/cm)	ANGLE (0)	SYMBOL	BORING NO	SAMPLE NO	DEPTH (m)	COHESION (kg/cm)	ANGLE (0)
○-○	7	D - 10	10m	0.20	17	○-○	8	D - 17	17m	00	24
●-●	7	D - 23	23m	00	35	●-●	8	D - 27	27m	00	45

# GRAIN SIZE ANALYSIS

Client :-TEPSCO

Location :-Bheramara Power Station Area,  
Kushtia Bangladesh.

Project :-Feasibility Study on 450MW Combined  
Cycle Power Station at Bheramara



SYMBOL	BORING NO	SAMPLE NO	DEPTH (m)	SAND(%)	SILT(%)	CLAY(%)
○-○	7	D - 7	7m	14	86	00
●-●	7	D - 14	14m	47	53	00
▲-▲	7	D - 29	25m	71	29	00

SYMBOL	BORING NO	SAMPLE NO	DEPTH (m)	SAND(%)	SILT(%)	CLAY(%)
○-○	8	D - 7	7m	28	72	00
●-●	8	D - 9	9m	43	57	00
▲-▲	8	D - 23	23m	70	30	00

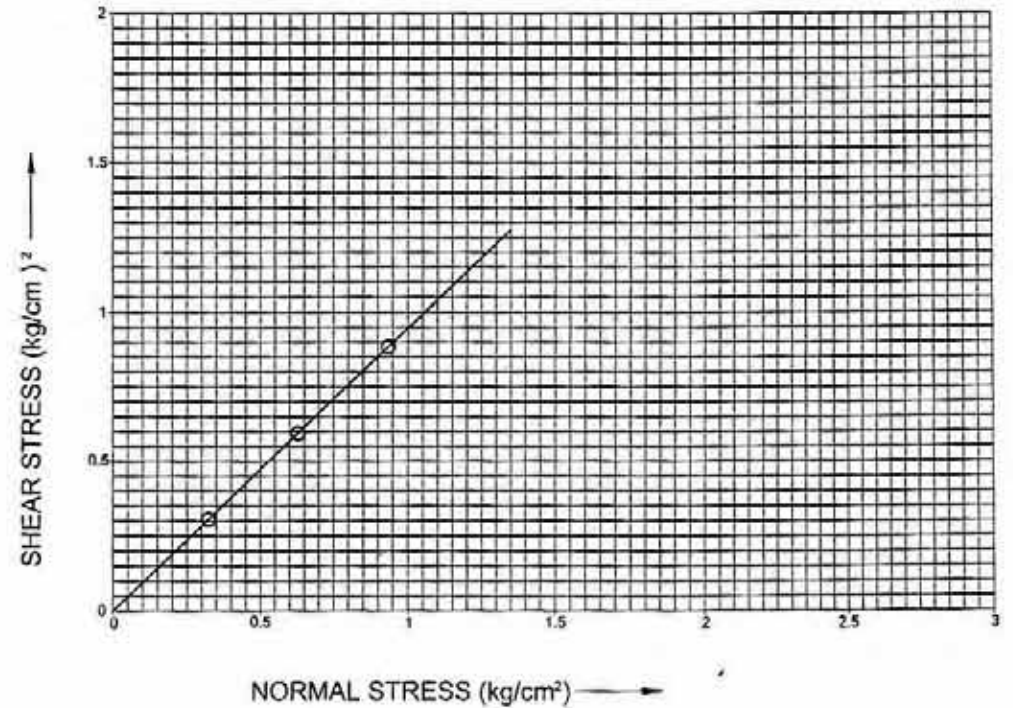
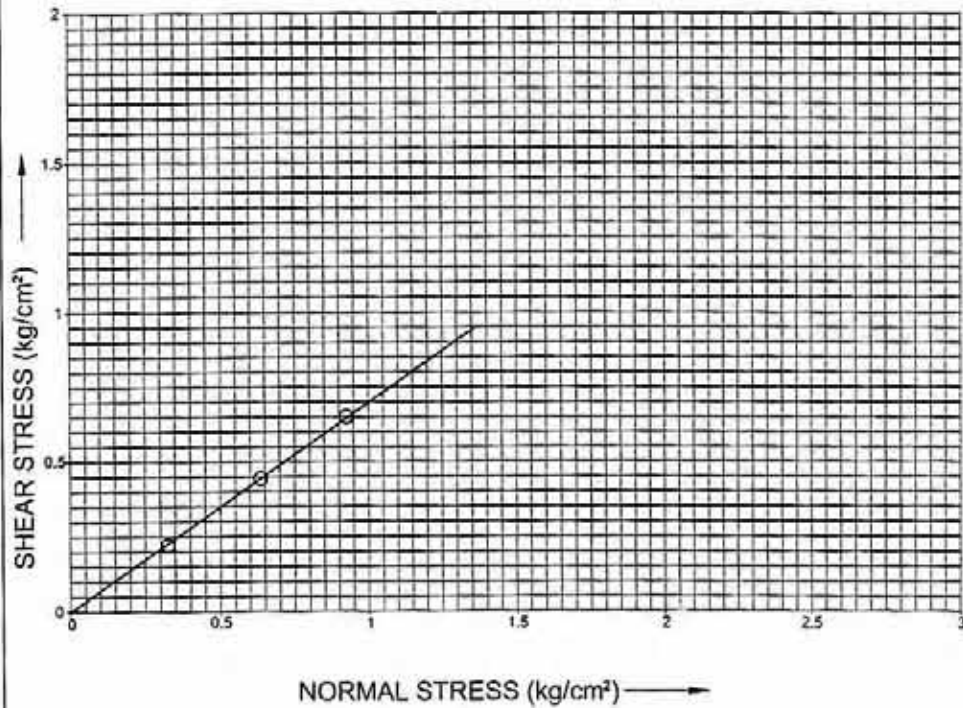


# DIRECT SHEAR TEST

Client :-TEPSCO

Location :-Bheramara Power Station Area,  
Kushtia Bangladesh.

Project :-Feasibility Study on 450MW Combined  
Cycle Power Station at Bheramara



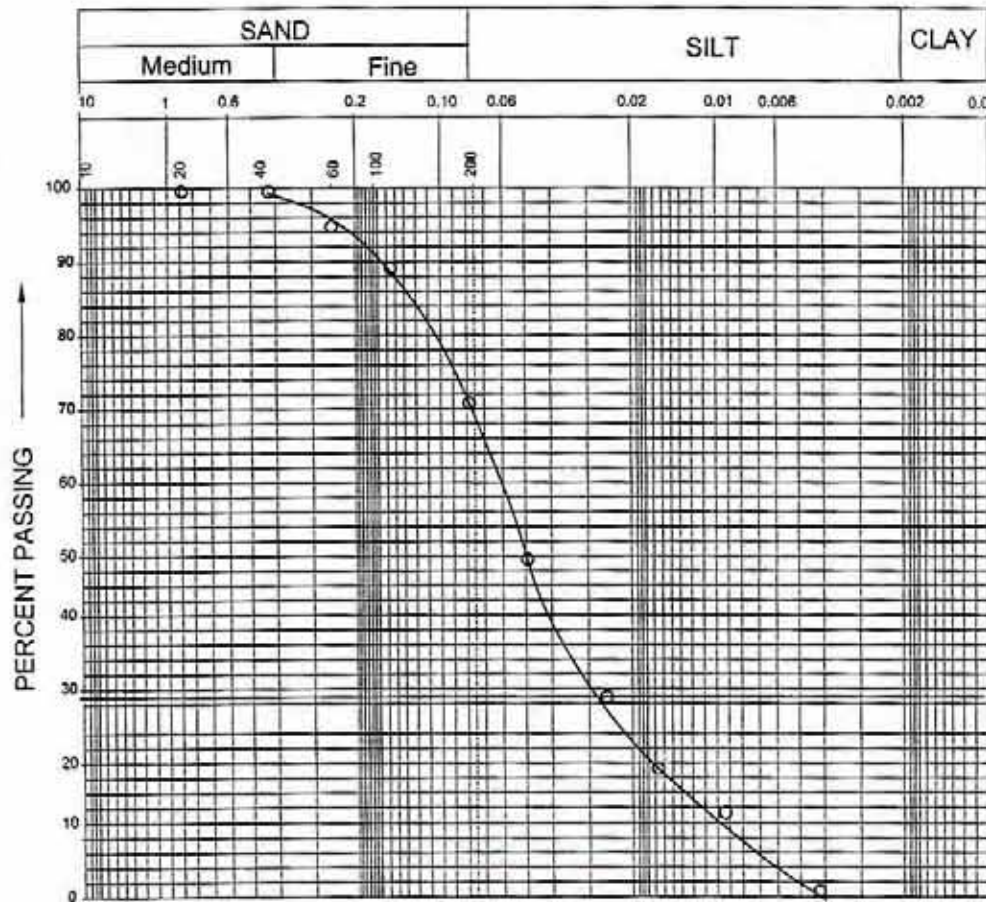
SYMBOL	BORING NO	SAMPLE NO	DEPTH (m)	COHESION (kg/cm)	ANGLE (0)	SYMBOL	BORING NO	SAMPLE NO	DEPTH (m)	COHESION (kg/cm)	ANGLE (0)
○-○	9	D - 13	13m	00	35	○-○	9	D - 26	26m	00	42
●-●						●-●					

# GRAIN SIZE ANALYSIS

Client :-TEPSCO

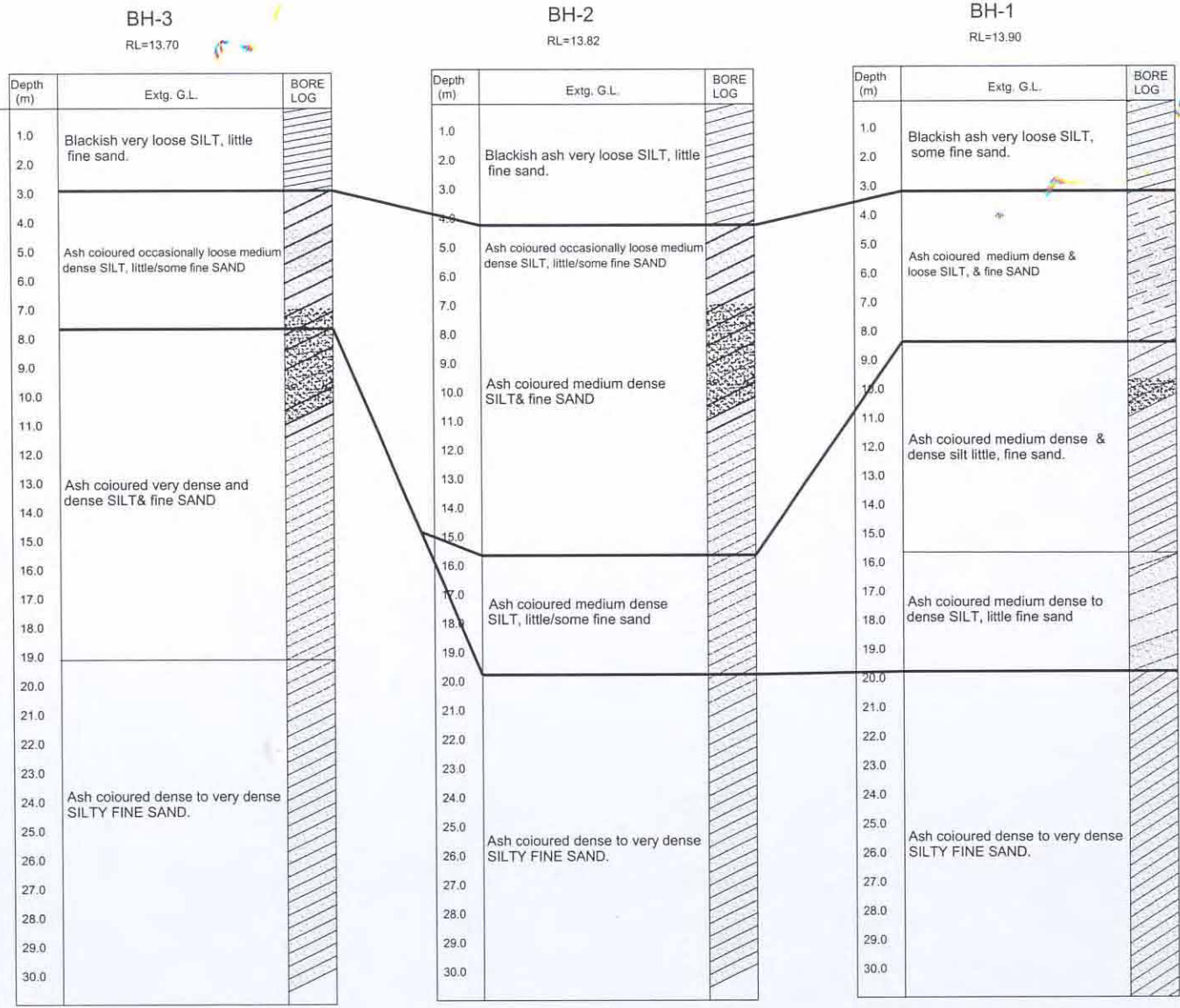
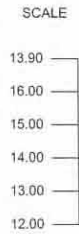
Location :-Bheramara Power Station Area,  
Kushtia Bangladesh.

Project :-Feasibility Study on 450MW Combined  
Cycle Power Station at Bheramara



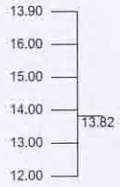
# **LONGITUDINAL CROSS SECTION OF BORE HOLE**

# LONGITUDINAL CROSS SECTION-1, OF BH # 3,2&1



# LONGITUDINAL CROSS SECTION -2, OF BH # 2,3&4

SCALE



**BH-2**

RL=13.82

Depth (m)	Extg. G.L.	BORE LOG
1.0		
2.0	Blackish ash very loose SILT, little fine sand.	
3.0		
4.0		
5.0	Ash coloured occasionally loose medium dense SILT, little/some fine SAND	
6.0		
7.0		
8.0		
9.0		
10.0	Ash coloured medium dense SILT & fine SAND	
11.0		
12.0		
13.0		
14.0		
15.0		
16.0		
17.0	Ash coloured medium dense SILT, little/some fine sand	
18.0		
19.0		
20.0		
21.0		
22.0		
23.0		
24.0		
25.0	Ash coloured dense to very dense SILTY FINE SAND.	
26.0		
27.0		
28.0		
29.0		
30.0		

**BH-3**

RL=13.70

Depth (m)	Extg. G.L.	BORE LOG
1.0	Blackish very loose SILT, little fine sand.	
2.0		
3.0		
4.0		
5.0	Ash coloured occasionally loose medium dense SILT, little/some fine SAND	
6.0		
7.0		
8.0		
9.0		
10.0		
11.0		
12.0		
13.0	Ash coloured very dense and dense SILT & fine SAND	
14.0		
15.0		
16.0		
17.0		
18.0		
19.0		
20.0		
21.0		
22.0		
23.0		
24.0	Ash coloured dense to very dense SILTY FINE SAND.	
25.0		
26.0		
27.0		
28.0		
29.0		
30.0		

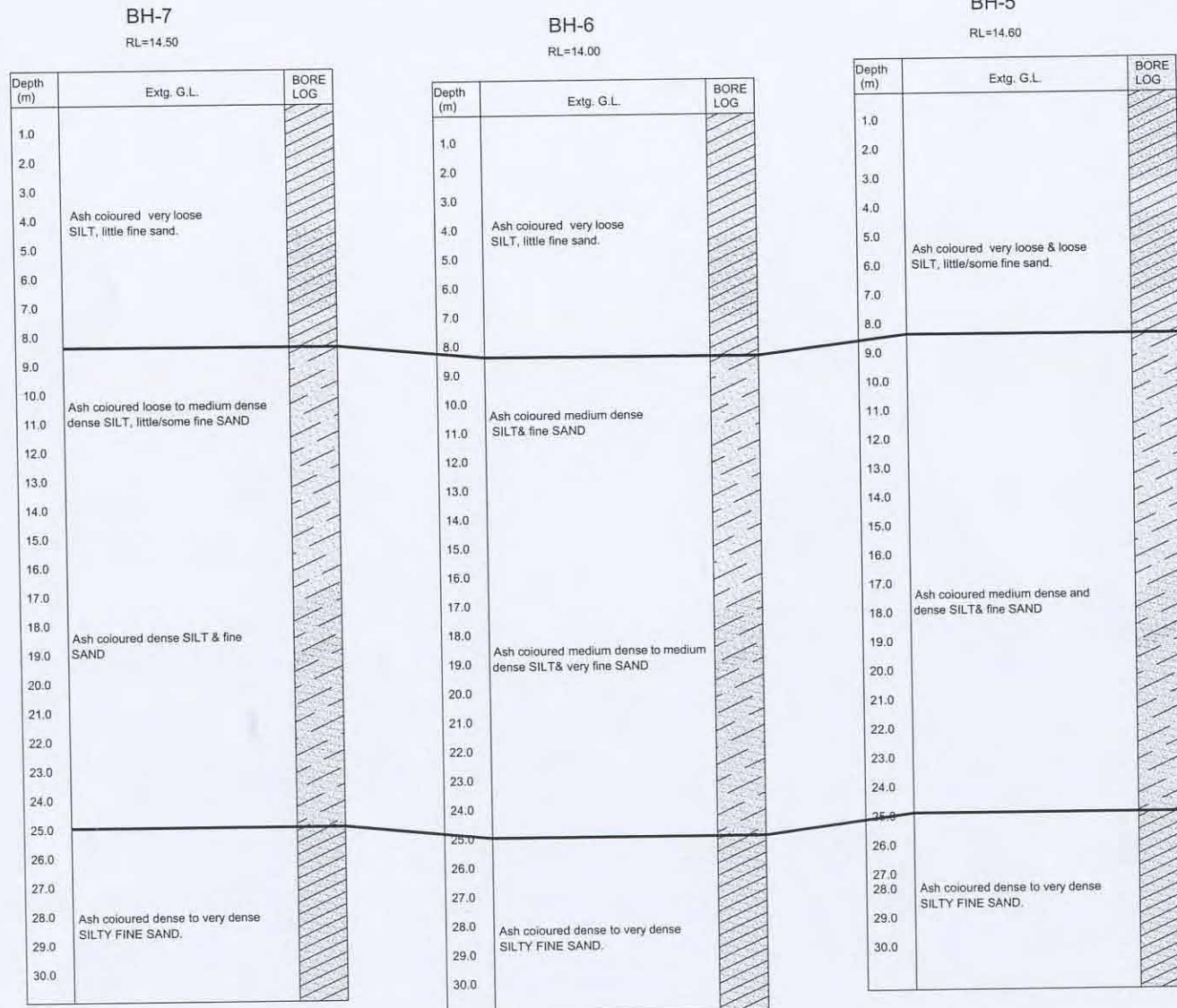
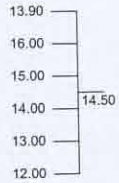
**BH-4**

RL=14.30

Depth (m)	Extg. G.L.	BORE LOG
1.0	Blackish ash very loose SILT, little fine sand.	
2.0		
3.0		
4.0		
5.0		
6.0	Ash coloured medium dense and dense SILT, little/some fine SAND	
7.0		
8.0		
9.0		
10.0		
11.0		
12.0		
13.0		
14.0		
15.0	Ash coloured medium dense to dense SILT & fine SAND	
16.0		
17.0		
18.0		
19.0		
20.0		
21.0		
22.0		
23.0		
24.0		
25.0	Ash coloured very dense SILTY	
26.0		
27.0		
28.0		
29.0		
30.0		

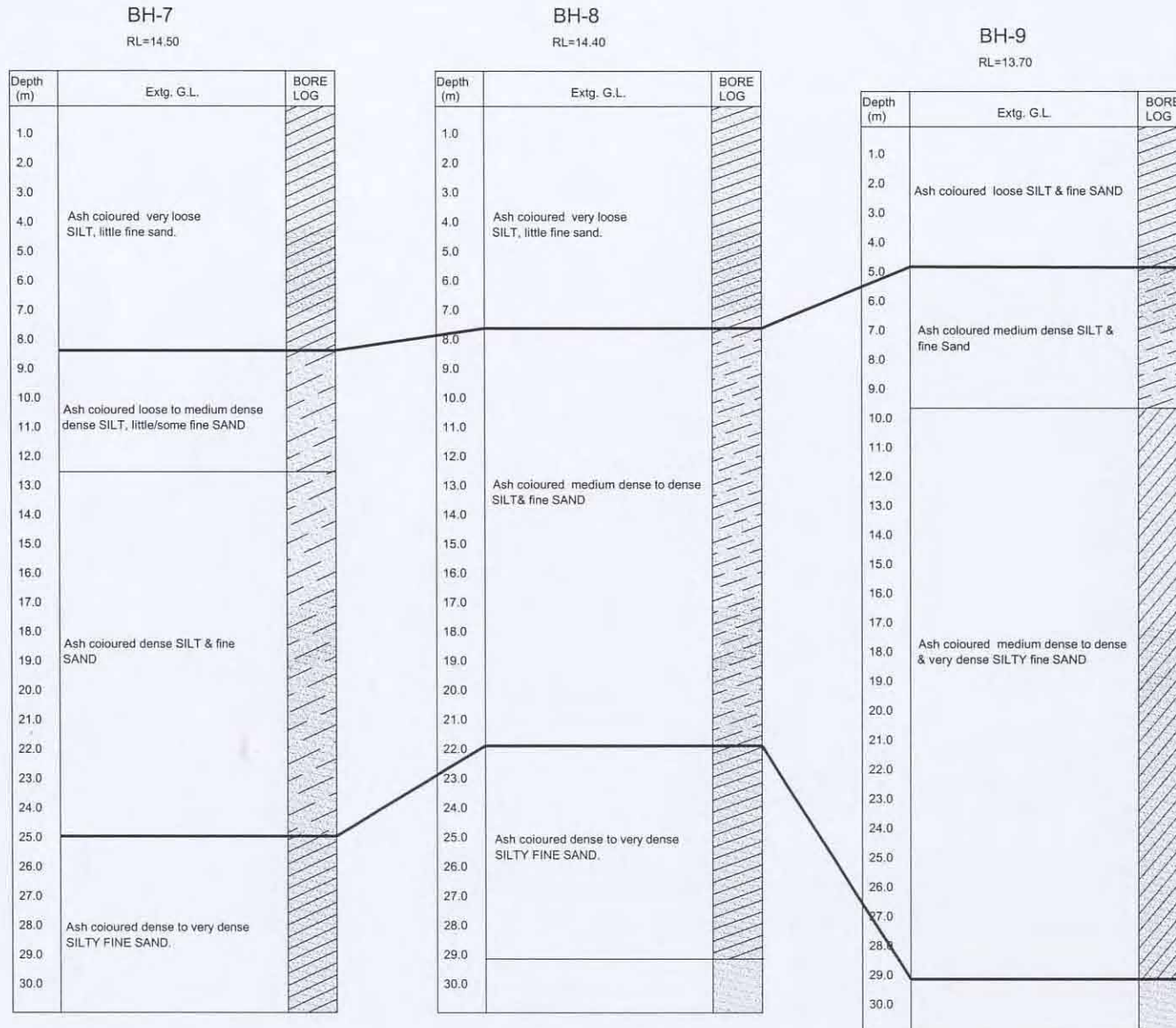
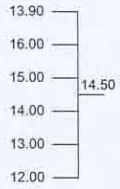
# LONGITUDINAL CROSS SECTION -3, OF BH # 7,6&5

SCALE



# LONGITUDINAL CROSS SECTION -4, OF BH # 7,8&9

SCALE



# **SUMMARY SHEET FOR TEST RESULT**



**ENGINEERS ASSOCIATES LIMITED**

**SUMMARY SHEET FOR TEST RESULT**

**Project : 450 M.W. Combined Cycle Power Station**

**Clients : Tokyo Electric Power Services Co, Ltd.**

**Location : Bheramara, Kustia. Bangladesh.**

BORING NO.	SAMPLE	Sample Depth (M)	Moisture Content (%)	Unconfined Compression test		Unit weight (gm/cc)		Grain Size Analysis			Specific Gravity Test	Direct Shear test		Consolidation Test		Atterberg Limit Test		
				q <sub>u</sub> (kg/cm <sup>2</sup> )	Strain (%)	γ wet	γ dry	Sand (%)	Silt (%)	CLAY (%)		Cohesion (Kg/cm <sup>2</sup> )	Angle in degree	Cc	Void ratio	Liquid limit	Plastic Index	Plasticity Index
BH-1	D-2	2.0	21					23.0	77.0	00.0	2.634							
	D-4	4.0						47.0	53.0	0.00	2.62							
	D-10	10.0										0.00	25.0					
	D-20	20.0						68.0	32.0	0.00	2.60							
	D-24	24.0										0.00	44.0					
BH-2	D-1	1.0	18															
	D-6	6.0						45.0	55.0	0.00	2.62	0.05	22.0					
	D-17	17.0						26.0	74.0	0.00	2.63							
	D-21	21.0										0.0	40.0					
	D-28	28.0						70.0	30.0	0.00	2.60							
BH-3	D-3	3.0	15					20.0	80.0	0.00	2.63							
	D-8	8.0										0.00	42.0					
	D-16	16.0						52.0	48.0	00.0	2.62							
	D-22	22.0						72.0	28.0	0.00	2.60							
	D-25	25.0										0.00	44.0					
BH-4	D-3	3.0	18					24.0	76.0	0.00	2.63							
	D-11	11.0										0.05	27.0					
	D-19	19.0						48.0	52.0	0.00	2.62							
	D-23	23.0										0.00	43.0					
	D-26	26.0						74.0	26.0	0.00	2.60							

**ENGINEERS ASSOCIATES LIMITED**

**SUMMARY SHEET FOR TEST RESULT**

**Project : 450 M.W. Combined Cycle Power Station**

**Clients : Tokyo Electric Power Services Co, Ltd.**

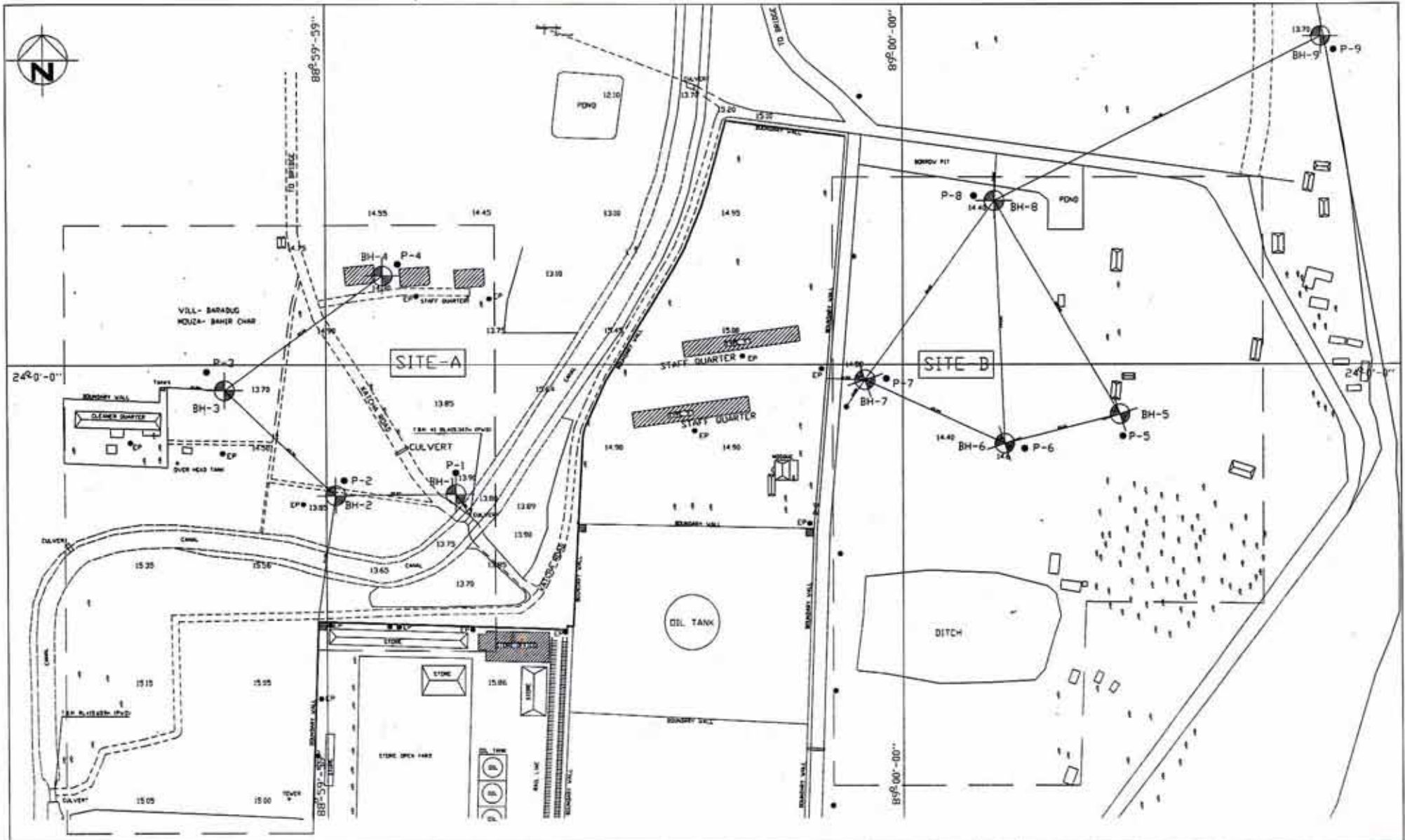
**Location : Bheramara, Kustia. Bangladesh.**


BORING NO.	SAMPLE	Sample Depth (M)	Moisture Content (%)	Unconfined Compression test		Unit weight (gm/cc)		Grain Size Analysis			Specific Gravity Test	Direct Shear test		Consolidation Test		Atterberg Limit Test		
				q <sub>u</sub> (kg/cm <sup>2</sup> )	Strain (%)	γ wet	γ dry	Sand (%)	Silt (%)	CLAY (%)		Cohesion (Kg/cm <sup>2</sup> )	Angle in degree	Cc	Void ratio	Liquid limit	Plastic Index	Plasticity Index
BH-5	D-2	2.0	12					20.0	80.0	0.00	2.642							
	D-6	6.0						15.0	85.0	0.00	2.64							
	D-13	13.0										0.00	32.0					
	D-19	19.0						49.0	51.0	0.00	2.62							
	D-25	25.0										0.00	34.0					
BH-6	D-5	5.0	17					17.0	83.0	0.00	2.64							
	D-12	12.0										0.00	33.0					
	D-15	15.0						45.0	55.0	0.00	2.62							
	D-25	25.0						68.0	32.0	0.00	2.61							
	D-27	27.0										0.00	38.0					
BH-7	D-2	2.0	20															
	D-7	7.0						14.0	86.0	0.00	2.64							
	D-10	10.0										0.20	17.0					
	D-14	14.0						47.0	53.0	0.00	2.62							
	D-23	23.0										0.0	35.0					
	D-25	25.0						71.0	29.0	0.00	2.60							
BH-8	D-2	2.00	9															
	D-7	7.00						28.0	72.0	00.0	2.632							
	D-9	9.00						43.0	57.0	00.0	2.62							
	D-17	17.0										0.00	24.0					
	D-23	23.0						70.0	30.0	00.0	2.60							
	D-27	27.0										0.00	45.0					



**ANNEX – 1 :**  
**BORE HOLE LOCATION MAP**

BOREHOLE LOCATION MAP



 LOCATION OF BORE HOLE  
 P= Pit Sample for Permeability test

PROJECT | PROPOSED 450 MW COMBINED CYCLE POWER STATION, BHERAMARA | DATE : 23-07-2008

# **PHOTOGRAPHS**



**Photograph of SPT Sample of Bore Hole – 01 in field**



**Photograph of SPT Sample of Bore Hole – 02 in field**



**Photograph of SPT Sample of Bore Hole – 03 in field**



**Photograph of SPT Sample of Bore Hole – 04 in field**





**Photograph of field Boring and  
SPT Sample of Bore Hole – 05 in field**



**Photograph of field Boring and  
SPT Sample of Bore Hole – 06 in field**



**Photograph of SPT Sample of Bore Hole – 06 in field**



**Photograph of SPT Sample of Bore Hole – 07 in field**



**Photograph of field Boring of Bore Hole – 07 in field**



**Photograph of field Boring and  
SPT Sample of Bore Hole – 08 in field**



**Photograph of field Boring of Bore Hole – 08 in field**



**Photograph of field Boring of Bore Hole – 09 in field**