FIG DRILLING LOG

Project No.

Hole Number BH-3NF1 (PAGE 2 of 2)

Water Table a.- m.

Project The Study on Construction of Bridge over the River Rupsa in Khulna

Elevation FM012079 m.

Type of Drilling Rotary

Date 10/8/99 - 12/8/99

Driller

Remarks
D : Disturbed Soil Sample

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks	Sampling: Depth in m	Sampling: Sample No.	Standard Penetration Test: N-Value Blows/30cm	Blows Per Each 15 cm: 1st 15cm	2nd 15cm	3rd 15cm
31					Silty Sand	Light Grey	Dense	Sand is fine grained. Very silty and non plastic. Trace of mica throughout.	30.15 30.45	D-20	50	11	23	27
32									31.65 31.95	D-21	47	17	22	25
33							Very Dense		33.15 33.45	D-22	66	19	25	41
34														
35									34.65 34.95	D-23	32	10	16	16
36									36.15 36.45	D-24	41	13	18	23
37														
38									37.65 37.95	D-25	44	14	20	24
39									39.15 39.45	D-26	45	16	21	24
40	-37.92	42.00	25.20				Dense							
41					Clayey Silt	Grey	Very Stiff	Plastic and homogeneous.	40.65 40.95	D-27	23	9	10	13
42									42.15 42.45	D-28	24	9	11	13
43														
44									43.65 43.95	D-29	15	7	7	8
45									45.15 45.45	D-30	19	8	9	10
46														
47									46.65 46.95	D-31	21	8	10	11
48									48.15 48.45	D-32	27	11	13	14
49														
50	-47.87	53.95	9.95						49.65 49.95	D-33	28	11	14	14
51					-END OF DRILLING-									
52														
53														
54														
55														
56														
57														
58														
59														
60														
61														

N - Value 10 20 30 40 50

50 BLOWS/30cm

66 BLOWS/30cm

Page.....

FIG DRILLING LOG

Project No.

Project The Study on Construction of Bridge over the River Rupsa in Khulna

Type of Drilling Rotary

Hole Number BH-3(A1) (PAGE 1 of 2)

Date 10/1/99 - 12/1/99

Water Table GL.-0.40 m.

Elevation PWD+3.30 m.

Driller

Remarks
D : Disturbed Soil Sample
UD : Undisturbed Soil Sample taken by Shelby Tube

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks
1					Clayey Silt	Grey	Soft	Low plastic. Little organic matter.
2	1.33	1.80	1.80					
	0.63	2.50	0.70		Sand	Light Grey	Very Loose	Fine sand with silt. Trace of mica.
3					Clayey Silt	Grey To Brownish Grey	Very Soft	With organic matter throughout. Low plastic to plastic.
4								
5								
6								
7	-4.37	7.50	5.00					
8	-5.37	8.50	1.00		Clayey Silt	Light Grey	Medium	Plastic. Little organic matter.
9					Silt	Light Grey	Medium	Seams of fine sand. Little clay and trace of mica.
10								
11	-8.37	11.50	3.00					
12					Silt	Light Grey	Very Soft	Seams of fine sand. Little clay and trace of mica.
13	-9.87	13.00	1.50					
14					Silty Sand	Light Grey	Medium	Sand is fine grained. Trace of mica. Less silt content at bottom.
15								
16	-12.87	16.00	3.00					
17					Silt	Light Grey	Very Stiff	Seams of fine sand. Trace of clay and mica.
	-14.37	17.50	1.50					
18					Clayey Silt	Light Grey	Stiff	With seams of fine sand and clay. Trace of mica.
19								
20	-17.37	20.50	3.00					
21					Sand	Light Grey	Medium	With silt. Trace of clay and mica.
22								
23								
24								
25	-21.87	25.00	4.50					
26					Clayey Silt	Light Grey	Medium	Low plastic. Trace of roots and sand.
27								
28	-24.87	28.00	3.00					
29					Sandy Silt	Light Grey	Stiff	Trace of organic matter and mica. Sand is fine grained.
	-26.37	29.50	1.50					
30					Clayey Silt	Light Grey	Medium	Non plastic. With organic matter. Little fine sand.
31	-29.37	32.50	3.00					

Sampling Depth in m	Sample No.	N-Value Blows/30cm	Blows Per Each 15 cm 1st 15cm	2nd 15cm	3rd 15cm
1.65 1.95	D-1	4	0	2	2
3.15 3.45	D-2	2	0	0	2
4.65 4.95	D-3	1	0	0	1
6.15 6.45	D-4	1	0	0	1
7.00 7.45	UD-1				
7.65 7.95	D-5	6	1	4	2
9.15 9.45	D-6	4	1	2	2
10.65 10.95	D-7	5	3	3	2
12.15 12.45	D-8	2	1	1	1
13.65 13.95	D-9	25	10	12	13
15.15 15.45	D-10	15	4	5	9
16.65 16.95	D-11	17	4	7	10
18.15 18.45	D-12	13	5	5	8
19.65 19.95	D-13	12	5	5	7
21.15 21.45	D-14	27	9	13	14
22.65 22.95	D-15	28	12	13	15
24.15 24.45	D-16	28	11	13	15
25.65 25.95	D-17	8	4	4	4
26.50 26.95	UD-2				
27.15 27.45	D-18	10	2	4	6
28.65 28.95	D-19	9	4	4	5
30.15 30.45	D-20	6	3	2	4

Standard Penetration Test

N - Value 10 20 30 40 50

Page.....

FIG DRILLING LOG

Project No.

Hole Number BH-SEAT (PAGE 2 of 2)

Water Table 0.-0.40 m.

Project the Study on Construction of Bridge over the River Rupsa in Khulna

Type of Drilling Rotary

Date 10/7/99 - 12/7/99

Elevation PWD+3.130 m.

Driller

Remarks

D : Disturbed Soil Sample

UD : Undisturbed Soil Sample taken by Shelby Tube

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks
31					Clayey Silt	Light Grey	Medium	Non plastic. With organic matter. Little fine sand.
32	-29.37	32.50	3.00					
33					Sand	Light Grey	Dense	Fine sand with silt. Trace of clay and mica.
34	-30.87	34.00	1.50					
35					Silt	Light Grey	Very Stiff	With fine sand. Little clay. Trace of mica.
36	-32.37	35.50	1.50		Sand	Light Grey	Medium	Fine sand with silt. Trace of clay and mica.
37	-33.87	37.00	1.50					
38					Silty Sand	Light Grey	Dense	Non plastic. Sand is fine grained. Trace of mica.
39								
40								
41	-38.37	41.50	4.50					
42					Silty Sand	Light Grey	Very Dense	Material is same as above layer.
43								
44								
45								
46								
47	-44.37	47.50	6.00					
48					Sand	Light Grey	Dense	Sand is fine grained. Little silt. Trace of mica.
49	-45.87	49.00	1.50					
50					Clayey Silt	Light Grey	Stiff to Very Stiff	Trace of organic matter. Low plastic at top and low to medium plastic at bottom. Little fine sand at top and with fine sand at bottom.
51								
52	-48.87	52.00	3.00					
53					Sandy Silt	Grey	Very Stiff to Hard	Low plastic. Trace of organic matter at top.
54	-50.97	54.10	2.10					
55					Silty Sand	Light Grey	Very Dense	Sand is fine grained. Non plastic. Trace of mica throughout.
56								
57								
58								
59								
60	-57.32	60.45	6.35					
61					-END OF DRILLING-			

Sampling		Standard Penetration Test				
Depth in m	Sample No.	N-Value Blows/30cm	Blows Per Each 15 cm 1-15cm	15-30cm	30-45cm	N - Value 10 20 30 40 50
30.15 30.45	D-20	6	3	2	4	
31.65 31.95	D-21	7	4	3	4	
33.15 33.45	D-22	37	11	18	19	
34.65 34.95	D-23	25	4	7	18	
36.15 36.45	D-24	28	6	12	16	
37.65 37.95	D-25	45	11	21	25	
39.15 39.45	D-26	44	18	22	22	
40.65 40.95	D-27	47	20	23	24	
42.15 42.45	D-28	68	30	32	36	68 BLOWS/30cm
43.65 43.95	D-29	70	30	34	36	70 BLOWS/30cm
45.15 45.45	D-30	73	32	35	38	73 BLOWS/30cm
45.65 46.95	D-31	70	26	34	36	70 BLOWS/30cm
48.15 48.45	D-32	38	24	19	19	
49.65 49.95	D-33	10	5	4	6	
50.50 50.95	UD-3					
51.15 51.45	D-34	18	8	10	8	
52.65 52.95	D-35	26	12	11	15	
54.15 54.45	D-36	61	17	27	34	61 BLOWS/30cm
55.65 55.95	D-37	68	22	23	45	68 BLOWS/30cm
57.15 57.45	D-38	62	20	28	34	62 BLOWS/30cm
58.65 58.95	D-39	75	22	33	42	75 BLOWS/30cm
60.15 60.45	D-40	72	20	34	38	72 BLOWS/30cm

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FIG DRILLING LOG

Project No.

Hole Number BH-30A2 (PAGE 1 of 2)

Water Table 0.-0.70 m.

Project The Study on Construction of Bridge over the River Rupsa in Khulna

Elevation PWD+3.354 m.

Type of Drilling Rotary

Date 14/1/99 - 17/1/99

Driller

Remarks
D Disturbed Soil Sample

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks
1								
2	0.89	2.50	2.50		Clayey Silt	Grey	Very Soft	Plastic. Little sand. Trace of decomposed organic matter.
3								
4	-0.61	4.00	1.50		Clayey Silt	Dark Grey	Very Soft	Plastic. Trace of organic matter and sand.
5								
6								
7	-3.61	7.00	3.00		Clayey Silt	Brown To Light Brown	Very Soft	With decomposed organic matter throughout.
8	-5.11	8.50	1.50		Clayey Silt	Grey	Very Soft	Low to slightly plastic. Trace of root at top and sand at bottom.
9					Sand	Light Grey	Loose	Sand is fine grained. Little silt throughout. Trace of mica.
10								
11							Medium	
12							Loose	
13	-9.61	13.00	4.50		Sand	Light Grey	Medium	Material is same as above layer.
14	-11.11	14.50	1.50					
15					Silty Sand	Grey To Light Grey	Medium	Sand is fine grained. Trace of mica.
16								
17	-14.11	17.50	3.00					
18					Silt	Grey	Stiff	With seams of fine sand. Little clay.
19	-15.61	19.00	1.50					
20	-17.11	20.50	1.50		Sandy Silt	Light Grey	Stiff	Low plastic. Sand is fine grained. Trace of mica.
21					Silt	Light Grey	Very Stiff	With seams of fine sand. Little clay. Trace of mica.
22	-18.61	22.00	1.50					
23	-20.11	23.50	1.50		Sand	Light Grey	Medium	Sand is fine grained. Little silt and trace of mica.
24					Silty Sand	Light Grey	Dense	Sand is fine to medium grained. Trace of mica.
25								
26	-23.11	26.50	3.00					
27					Clayey Silt	Grey	Stiff	Little sand. Trace of root throughout.
28								
29								
30								
31	-27.61	31.00	4.50					

Sampling		Standard Penetration Test				
Depth in m.	Sample No.	N-Value Blows/30cm	Blows Per Each 15 cm 15cm	15cm	15cm	N – Value 10 20 30 40 50
1.65 1.95	D-1	2	3	1	1	
3.15 3.45	D-2	0	0	0	0	SELF PENETRATION BY HAMMER
4.65 4.95	D-3	0	0	0	0	SELF PENETRATION BY HAMMER
6.15 6.45	D-4	0	0	0	0	SELF PENETRATION BY HAMMER NO RECOVERY
7.65 7.95	D-5	2	0	1	1	
9.15 9.45	D-6	9	4	4	5	
10.65 10.95	D-7	11	3	4	7	
12.15 12.45	D-8	8	3	4	4	
13.65 13.95	D-9	14	5	7	7	
15.15 15.45	D-10	24	4	8	16	
16.65 16.95	D-11	11	8	6	5	
18.15 18.45	D-12	11	8	6	5	
19.65 19.95	D-13	10	3	4	6	
21.15 21.45	D-14	19	5	10	9	
22.65 22.95	D-15	29	8	12	17	
24.15 24.45	D-16	33	9	13	20	
25.65 25.95	D-17	35	10	15	20	
27.15 27.45	D-18	11	4	5	6	
28.65 28.95	D-19	9	4	4	5	
30.15 30.45	D-20	10	4	5	5	

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FIG DRILLING LOG

Project No.

Project the Study on Construction of Bridge over the River Rupsa in Khulna

Type of Drilling Rotary

Hole Number BH-38A2 (PAGE 2 of 2)

Date 14/1/99 - 17/1/99

Water Table 0.-0.70 m.

Elevation PWD+3.384 m.

Driller

Remarks

D : Disturbed Soil Sample

UD : Undisturbed Soil Sample taken by Shelby Tube

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks	Sampling Depth in m.	Sampling Sample No.	Standard Penetration Test N-Value Blows/30cm	Blows Per Each 15 cm 15cm	15cm	15cm	N -- Value 10 20 30 40 50
31	-27.61	31.00	4.50		Clayey Silt	Grey	Stiff	Little sand. Trace of root throughout.	30.15 30.45	D-20	10	4	5	5	
									31.00						
					Sand	Light Grey	Medium	Sand is fine grained. Little silt.	31.45	UD-1	NO RECOVERY				
32	-28.41	31.80	0.80						31.85 31.95	D-21	21	8	9	12	
	-29.11	32.50	0.70		Sandy Silt	Grey	Very Stiff	Trace of organic matter.							
33					Clayey Silt	Grey	Stiff	Low plastic to plastic. Little organic matter at top. Trace of sand and organic matter.	33.15 33.45	D-22	13	7	6	7	
34															
35									34.65 34.95	D-23	15	6	7	8	
	-32.11	35.50	3.00						35.50						
36					Sandy Silt	Grey	Stiff	Sand is fine grained. Trace of organic matter.	35.90	UD-2	NO RECOVERY				
									36.15 36.45	D-24	14	6	6	8	
37	-33.61	37.00	1.50		Clayey Silt	Grey	Stiff	Plastic. Little organic matter.							
38									37.65 37.95	D-25	14	4	6	8	
	-35.11	38.50	1.50												
39					Sandy Silt	Grey	Very Stiff	Sand is fine grained. Trace of organic matter throughout.	39.15 39.45	D-26	18	10	9	9	
40															
41									40.65 40.95	D-27	18	7	8	10	
42															
									42.15 42.45	D-28	20	7	9	11	
43	-39.61	43.00	4.50												
44					Clayey Silt	Grey	Very Stiff	Low plastic. Little organic matter and fine sand.	43.65 43.95	D-29	19	6	8	11	
45							Stiff		45.15 45.45	D-30	13	4	6	7	
46															
47							Very Stiff		46.65 46.95	D-31	20	7	9	11	
	-44.11	47.50	4.50												
48					Clayey Silt	Grey	Very Stiff	Little fine sand. Trace of organic matter.	48.15 48.45	D-32	27	10	11	16	
49															
50									49.65 49.95	D-33	28	12	12	16	
	-47.11	50.50	3.00												
51					Sandy Silt	Grey	Hard	Low plastic. Sand is fine grained. Little nodules. Trace of organic matter.	51.15 51.45	D-34	40	10	15	25	
52															
53									52.65 52.95	D-35	31	8	11	20	
	-50.11	53.50	3.00												
54					Sandy Silt	Grey	Very Dense	Sand is fine grained. Little clay and mica.	54.15 54.45	D-36	50	15	20	30	50 BLOWS/30cm
55															
56									55.65 55.95	D-37	60	23	29	31	60 BLOWS/30cm
	-53.11	56.50	3.00												
57					Sand	Grey	Very Dense	Sand is fine grained. Little silt. Trace of mica.	57.15 57.45	D-38	115	30	51	64	115 BLOWS/30cm
58															
59									58.65 58.95	D-39	85	22	35	50	85 BLOWS/30cm
60															
	-57.06	60.45	3.95						60.15 60.45	D-40	66	30	28	38	66 BLOWS/30cm
61					-END OF DRILLING-										

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FIG DRILLING LOG

Project No.

Hole Number B4-3W2 (PAGE 1 of 2)

Water Table 0.-0.69 m.

Project the Study on Construction of Bridge over the River Rupsa in Khulna

Elevation EWD+2.082 m.

Type of Drilling Rotary

Date 28/1/99 - 30/1/99

Driller

Remarks
D : Disturbed Soil Sample
UD : Undisturbed Soil Sample taken by Shelby Tube

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks
1					Ooze Silt	Light Grey	Very Soft	Plastic.
2								
3	-0.82	2.90	2.90					
4					Ooze Silt	Light Grey To Black	Very Soft	Plastic. With organic matter.
5								
6								
7	-4.92	7.00	4.10					
8	-5.92	8.00	1.00		Sandy Silt	Light Grey	Very Loose	Slightly plastic. Slightly clay
9					Silty Sand	Light Grey	Medium	Non plastic. Very silty fine sand. Trace of mica throughout.
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20							Dense	
21								
22								
23								
24								
25								
26	-24.42	25.50	18.50				Medium	
27					Ooze Silt	Grey To Black	Stiff	Plastic. With organic matter and decayed wood.
28	-25.92	28.00	1.50		Silt	Light Grey	Very Stiff	Slightly plastic. Slightly clay and sand.
29								
30								
31								

Sampling Depth in m.	Sample No.	Standard Penetration Test N-Value Blows/30cm	Blows Per Each 15 cm 15cm	15cm	15cm
1.65 1.95	D-1	1	0	0	1
3.15 3.45	D-2	0	0	0	0
4.65 4.95	D-3	1	0	0	1
5.55 6.00	UD-1	NO RECOVERY			
6.15 6.45	D-4	1	0	0	1
7.65 7.95	D-5	4	0	2	2
9.15 9.45	D-6	11	6	5	6
10.65 10.95	D-7	12	6	6	6
12.15 12.45	D-8	12	5	6	6
13.65 13.95	D-9	22	8	10	12
15.15 15.45	D-10	27	7	12	15
16.65 16.95	D-11	27	4	13	14
18.15 18.45	D-12	28	5	12	16
19.65 19.95	D-13	31	8	14	17
21.15 21.45	D-14	32	7	14	18
22.65 22.95	D-15	35	8	16	19
24.15 24.45	D-16	39	9	17	22
25.65 25.95	D-17	20	9	10	10
27.15 27.45	D-18	14	7	7	7
28.65 28.95	D-19	27	11	13	14
30.15 30.45	D-20	26	11	12	14

N - Value 10 20 30 40 50

CUT PENETRATION BY HAMMER

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FIG DRILLING LOG

Project No.

Hole Number BH-3/P2 (PAGE 2 of 2)

Water Table GL.-0.60 m.

Project The Study on Construction of Bridge over the River Rupsa in Khulna

Elevation PWD+2.082 m.

Type of Drilling Rotary

Date 28/1/99 - 30/1/99

Driller

Remarks
D : Disturbed Soil Sample
UD : Undisturbed Soil Sample taken by Shelby tube

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks	Sampling: Depth in m.	Sampling: Sample No.	Standard Penetration Test: N-Value Blows/30cm	Blows Per Each 15 cm: 15cm	15cm	15cm	N -- Value (10 20 30 40 50)
31					Silt	Light Grey	Very Stiff	Slightly plastic. Slightly clay and sand.	30.15 30.45	D-20	26	11	12	14	
32	-29.92	32.00	4.00						31.65 31.95	D-21	28	12	14	14	
33					Clayey Silt	Light Grey To Black	Stiff	Plastic. Homogeneous. With decayed woods at D-22 and D-23.	33.15 33.45	D-22	9	5	4	5	
34									34.05 34.50	UD-2	NO RECOVERY				
35									34.65 34.95	D-23	10	7	5	5	
36									36.15 36.45	D-24	11	5	5	6	
37															
38									37.65 37.95	D-25	12	5	5	7	
39						Light Grey			39.15 39.45	D-26	15	6	7	8	
40	-37.92	40.00	8.00		Clayey Silt	Light Grey	Very Stiff	Plastic. Homogeneous.	40.65 40.95	D-27	20	7	9	11	
41															
42									42.15 42.45	D-28	24	9	11	13	
43															
44									43.65 43.95	D-29	33	12	16	17	
45							Hard		45.15 45.45	D-30	40	15	19	21	
46															
47									46.65 46.95	D-31	19	5	8	11	
48									48.15 48.45	D-32	20	6	9	11	
49							Very Stiff								
50	-47.87	49.95	9.95		-END OF DRILLING-				49.65 49.95	D-33	23	7	9	14	
51															
52															
53															
54															
55															
56															
57															
58															
59															
60															
61															

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FIG DRILLING LOG

Project No.

Hole Number BH-3VA2 (PAGE 1 of 2)

Water Table 0.-0.40 m.

Project The Study on Construction of Bridge over the River Rupsa in Khulna

Elevation PWD+2.189 m.

Type of Drilling Rotary

Date 22/8/99 - 24/8/99

Driller

Remarks

D : Disturbed Soil Sample

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks
1					Silty Clay	Light Brownish Grey	Soft	Plastic. Oxidized zone.
2	-0.31	2.50	2.50					
3					Silty Clay	Grey	Very Soft	Plastic. Trace of fine sand and decomposed organic matter.
4								
5								
6								
7								
8	-6.31	8.50	6.00					
9					Silty Sand	Light Grey	Loose	Non plastic. Sand is fine grained. With seams of clayey silt.
10	-7.81	10.00	1.50		Silty Sand	Light Grey	Medium	Non plastic. Sand is fine grained. Trace of mica.
11	-9.31	11.50	1.50					
12					Silty Sand	Light Grey	Medium	Non plastic. Sand is fine grained. With seams of clayey silt.
13	-10.81	13.00	1.50					
14					Sand	Light Grey	Medium	Sand is fine grained. Slightly silty. Trace of mica throughout. With seams of clayey silt at D-10.
15								
16								
17								
18								
19	-16.81	19.00	6.00					
20					Silty Sand	Light Grey	Medium	Non plastic. Sand is fine grained.
21								
22	-19.81	22.00	3.00					
23					Silty Clay	Grey	Very Soft	Plastic. Trace of decomposed organic matter.
24								
25	-22.81	25.00	3.00					
26	-24.31	25.50	1.50		Silty Clay	Grey	Soft	Material is same as above layer.
27					Silty Clay	Grey	Medium	Material is same as above layer.
28	-25.81	28.00	1.50					
29					Silty Clay	Grey	Very Soft	Plastic. Trace of decomposed organic matter and mica.
30								
31	-28.81	31.00	3.00					

Sampling		Standard Penetration Test				
Depth in m.	Sample No.	N-Value Blows/30cm	Blows Per Each 15 cm 15cm	15cm	15cm	N - Value 10 20 30 40 50
1.65 1.95	D-1	3	0	1	2	
3.15 3.45	D-2	3	0	1	2	
4.65 4.95	D-3	0	0	0	0	SELF PENETRATION BY HAMMER
6.15 6.45	D-4	0	0	0	0	SELF PENETRATION BY HAMMER
7.65 7.95	D-5	1	0	0	1	
9.15 9.45	D-6	9	1	4	5	
10.65 10.95	D-7	20	5	10	10	
12.15 12.45	D-8	12	4	5	7	
13.65 13.95	D-9	15	4	7	8	
15.15 15.45	D-10	22	11	11	11	
16.65 16.95	D-11	21	6	8	13	
18.15 18.45	D-12	23	7	10	13	
19.65 19.95	D-13	12	4	5	7	
21.15 21.45	D-14	11	3	3	8	
22.65 22.95	D-15	1	0	0	1	
24.15 24.45	D-16	0	0	0	0	SELF PENETRATION BY HAMMER
25.65 25.95	D-17	4	0	1	3	
27.15 27.45	D-18	7	0	2	5	
28.65 28.95	D-19	2	0	0	2	
30.15 30.45	D-20	2	0	0	2	

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FIG DRILLING LOG

Project No.

Hole Number BH-3/A2 (PAGE 2 of 2)

Water Table G.-0.40 m.

Project The Study on Construction of Bridge over the River Rupsa in Khulna

Elevation PWD+2.189 m.

Type of Drilling Rotary

Date 22/8/99 - 24/8/99

Driller

Remarks
D : Disturbed Soil Sample

Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks	Sampling Depth in m.	Sample No.	Standard Penetration Test N-Value Blows/30cm	Blows Per Each 15 cm 15cm	15cm	15cm
31	-28.81	31.00	3.00		Silty Clay	Grey	Very Soft	Plastic. Trace of decomposed organic matter and mica.	30.15 30.45	D-20	2	0	0	2
32	-30.31	32.50	1.50		Silty Clay	Light Grey	Soft	Plastic. Trace of organic matter and mica.	31.65 31.95	D-21	3	0	1	2
33					Silty Clay	Light Grey	Stiff	Plastic. Trace of organic matter and sand throughout.	33.15 33.45	D-22	12	1	5	7
34									34.65 34.95	D-23	11	4	5	6
35									36.15 36.45	D-24	10	4	4	6
36									37.65 37.95	D-25	11	4	5	6
37									39.15 39.45	D-26	12	5	6	6
38									40.65 40.95	D-27	8	2	4	4
39									42.15 42.45	D-28	12	4	6	6
40	-37.81	40.00	2.50						43.65 43.95	D-29	13	5	6	7
41	-39.31	41.50	1.50		Silty Clay	Grey	Medium	Plastic. Trace of organic matter and sand.	45.15 45.45	D-30	18	8	8	10
42					Silty Clay	Grey	Stiff	Plastic. Trace of decomposed organic matter and sand.	46.65 46.95	D-31	18	8	9	9
43									48.15 48.45	D-32	25	8	10	15
44	-42.31	44.50	3.00						49.65 49.95	D-33	45	14	21	24
45					Sandy Silt	Grey	Very Stiff	Slightly plastic. Sand is fine grained. Trace of decomposed organic matter throughout.	51.15 51.45	D-34	54	15	24	30
46									52.65 52.95	D-35	48	14	20	28
47									54.15 54.45	D-36	147	34	61	86
48									55.65 55.95	D-37	124	30	42	82
49	-46.81	49.00	4.50						57.15 57.45	D-38	120	32	43	77
50	-48.31	50.50	1.50		Silty Clay	Grey	Hard	Plastic. Trace of decomposed organic matter and mica.	58.65 58.95	D-39	100	31	45	55
51					Silty Sand	Light Grey	Very Dense	Sand is fine grained. Trace of mica.	60.15 60.45	D-40	104	32	44	60
52														
53	-51.31	53.50	3.00				Dense							
54					Sand	Light Grey	Very Dense	Sand is fine grained. Slightly silty and trace of mica throughout.						
55														
56														
57														
58														
59														
60	-58.26	60.45	6.95											
61					-END OF DRILLING-									

N - Value 10 20 30 40 50

54 BLOWS/30cm

147 BLOWS/30cm

124 BLOWS/30cm

120 BLOWS/30cm

100 BLOWS/30cm

104 BLOWS/30cm

Page.....

FIG DRILLING LOG

Project No.

Project The Study on Construction of Bridge over the River Rupsa in Khulna

Type of Drilling Wash Boring

Hole Number BH-X61 (PAGE 1 of 1)

Date 28/7/89

Water Table G.L.-2.00 m.

Elevation PWD+3.357 m.

Driller

Remarks
D : Disturbed Soil Sample
UD : Undisturbed Soil Sample taken by Shelby Tube

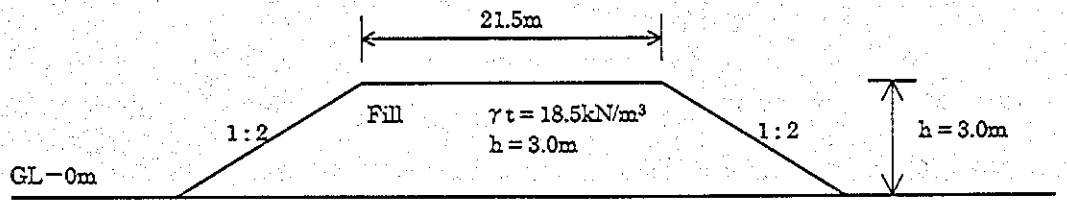
Scale in m	Elevation in m	Depth in m	Thickness in m	Legend	Type of Soil	Colour	Relative Density or Consistency	General Remarks
1					Clayey Silt	Light Grey	Medium	Low plastic.
2	0.86	2.50	2.50					
3					Silty Clay	Brownish Grey	Soft	Trace of fine sand.
4	-0.64	4.00	1.50					
5					Silty Clay	Grey	Very Soft	High plastic. With decomposed organic matter.
	-2.14	5.50	1.50					
6					Clayey Silt	Grey	Very Soft	Trace of fine sand.
7	-3.64	7.00	1.50					
8					Silty Sand	Grey	Loose	Sand is fine grained. Trace of mica throughout.
16	-12.64	16.00	9.00				Medium	
17					Silty Clay	Grey	Medium	With seams of fine sand.
	-14.14	17.50	1.50					
18					Silty Sand	Grey	Loose	Sand is fine grained. Mixed with clay. Trace of mica.
20	-17.14	20.50	3.00					
21					Silty Sand	Grey	Medium	Sand is fine grained. Trace of mica.
23							Dense	
24	-20.96	24.32	3.82				Very Dense	
25					-END OF DRILLING-			

Sampling Depth in m	Sample No.	Standard Penetration Test N-Value Blows/30cm	Blows Per Each 15 cm 15cm	15cm	15cm	N - Value 10 20 30 40 50
1.65 1.95	D-1	7	3	3	4	
3.15 3.45	D-2	3	1	1	2	
4.05 4.50	UD-1					
4.65 4.95	D-3	0	0	0	0	SELF PENETRATION BY HAMMER
6.15 6.45	D-4	2	0	0	2	
7.65 7.95	D-5	4	0	2	2	
9.15 9.45	D-6	10	3	4	6	
10.65 10.95	D-7	9	3	4	5	
12.15 12.45	D-8	6	1	3	3	
13.65 13.95	D-9	7	2	3	4	
15.15 15.45	D-10	19	5	9	10	
16.65 16.95	D-11	7	4	2	5	
18.15 18.45	D-12	8	2	3	5	
19.65 19.95	D-13	7	3	3	4	
21.15 21.45	D-14	22	8	7	15	
22.65 22.95	D-15	38	12	16	22	
24.15 24.32	D-16	50/17	22	44	6/2	50 & 0.05/17cm

Page.....

Appendix 4.2.9.A

Figures 1 through 19
Ground Model
for
Settlement Analysis



ho = 2.6m
h ≒ ho + Settlement

1. Very Soft Silty Clay with Organic matter — Wn = 88%, γt = 14.2kN/m³ — e - log P : 1EB1

GL−6m

2. Soft Clay Silt — Wn = 35%, γt = 18.5kN/m³ — e - log P : 1EB5, UD-2

GL−7.5m

Cv = 110cm²/day
Tv = 2.152×10⁻⁴t

3. Very Soft Silty Clay with Organic matter — Wn = 68%, γt = 16.0kN/m³ — e-log P : 1EB4

GL−10.5m

4. Soft Clay Silt — γt = 18.7kN/m³ — e-log P : 1EB5, UD-2

The model is prepared based on BH1EB1.

GL−15m

5. Sand

Figure-1 Ground Model of Settlement Analysis for STA 0+000 to STA 2+000

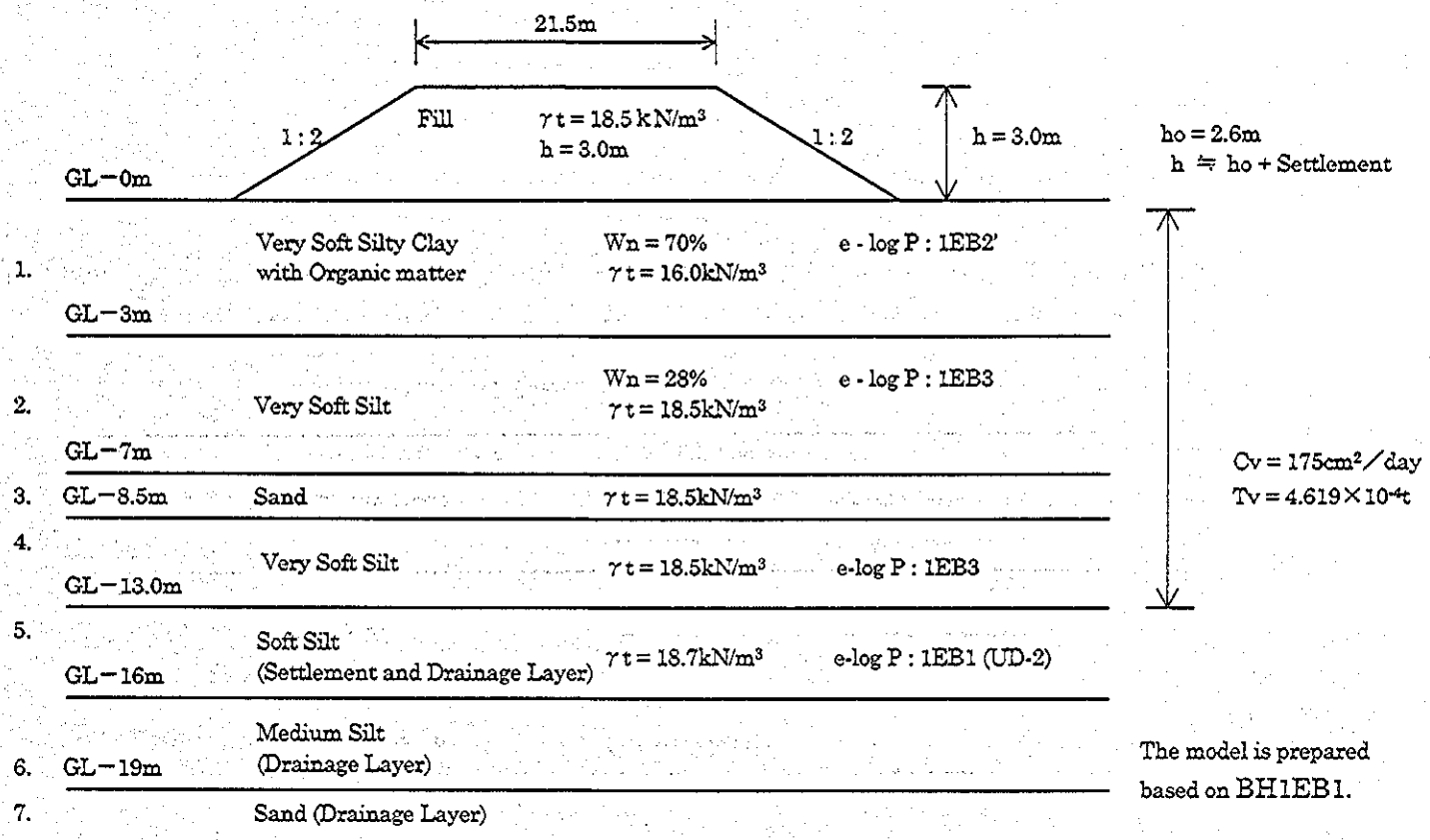
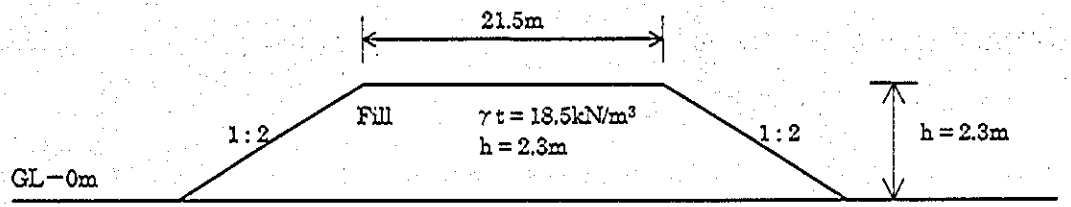


Figure-2 Ground Model of Settlement Analysis for STA 2+000 to Hatia River West Bank



ho = 1.8m
h ≒ ho + Settlement

1. Very Soft Silty Clay with Organic matter — Wn = 73%, γt = 14.0kN/m³ — e - log P : 1EB2'

GL−3m

2. Very Soft Clay and Sandy Silt — Wn = 42%, γt = 17.7kN/m³ — e - log P : 1EB2

GL−5.5m

3. Medium Clayey Silt — Wn = 30 to 32%, γt = 18.5kN/m³ — e - log P : 1EB5

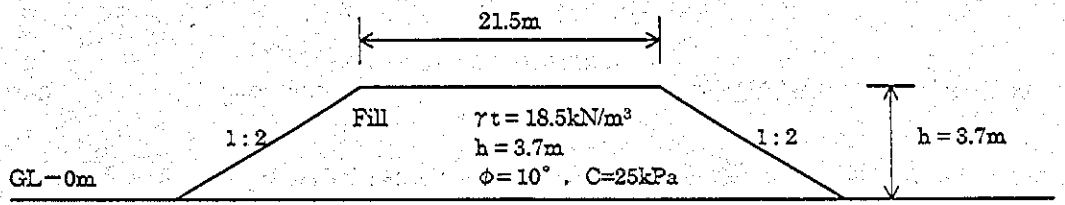
GL−11.5m

4. Medium Silt to Sandy Silt (Drainage Layer)

$Cv = 330cm^2/day$
$Tv = 1.323 \times 10^{-3} t$

The model is prepared based on BH1EB2'.

Figure-3 Ground Model of Settlement Analysis for Hatia River East Bank to STA 3+700



ho = 3.2m
h ≒ ho + Settlement

1. Soft Silty Clay — Wn = 37%, γt = 18.3kN/m³, e - log P : 1EB3
GL−4m

2. Soft Clay Silt with Organic Matter — Wn = 52%, γt = 16.7kN/m³, e - log P : 1EB4
GL−4m

Cv = 130cm²/day
Tv = 3.939×10⁻⁴t

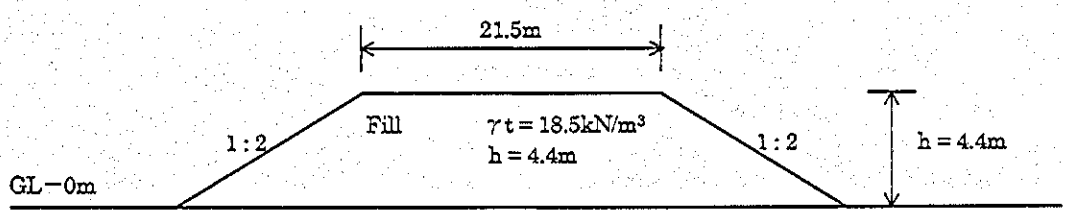
3. Very Soft Clayey Silt — Wn = 50%, γt = 16.7kN/m³, e - log P : 1EB4
GL−10m

4. Medium Sandy Silt — γt = 18.5kN/m³, e - log P : 1EB5, UD-2
GL−11.5m

5. Sand (Drainage Layer)

The model is prepared based on BH1EB3.

Figure-4 Ground Model of Settlement Analysis for STA 3+700 to STA 5+400



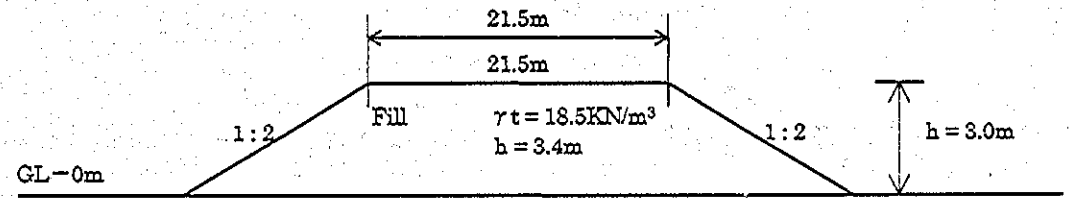
ho = 2.6m
h ≒ ho + Settlement

1.		Very Soft Silty Clay	Wn = 52% γt = 16.7kN/m³	e - log P : BH1EB4
	GL−3m			
2.	GL−4.5m	Very Soft Silty Clay with Organic matter	Wn = 83% γt = 14.3kN/m³	e - log P : BH1EB2"
3.		Very Soft Silty Clay with Organic matter	Wn = 51% γt = 16.7kN/m³	e - log P : BH1EB4
	GL−7.5m			
4.	GL−9.0m	Very Soft	Wn = 31% γt = 18.7kN/m³	e - log P : BH1EB5
		Sand (Drainage Layer)	γt = 18.5kN/m³	
5.	GL−12.0m			
6.	GL−13.5m	Medium Silty Clay	γt = 18.5kN/m³	e - log P : BH2BA1
7.		Sand (Drainage Layer)		

$Cv = 120cm^2/day$
$Tv = 6.770 \times 10^{-4} t$

The model is prepared based on BH1EB4.

Figure-5 Ground Model of Settlement Analysis for STA 5+400 to STA 6 + 500



ho = 2.8m
h ≒ ho + Settlement

1. Very Soft Silty Clay with Organic matter

Wn = 66%
γt = 15.6kN/m³
e - log P : BH1EB2'

Cv = 100cm²/day
Tv = 1.890×10⁻³t

GL−4.6m

The model is prepared based on BH1WA1.

2. Sand (Drainage Layer)

Figure-6 Ground Model of Settlement Analysis for STA 6+500 to STA 6+900

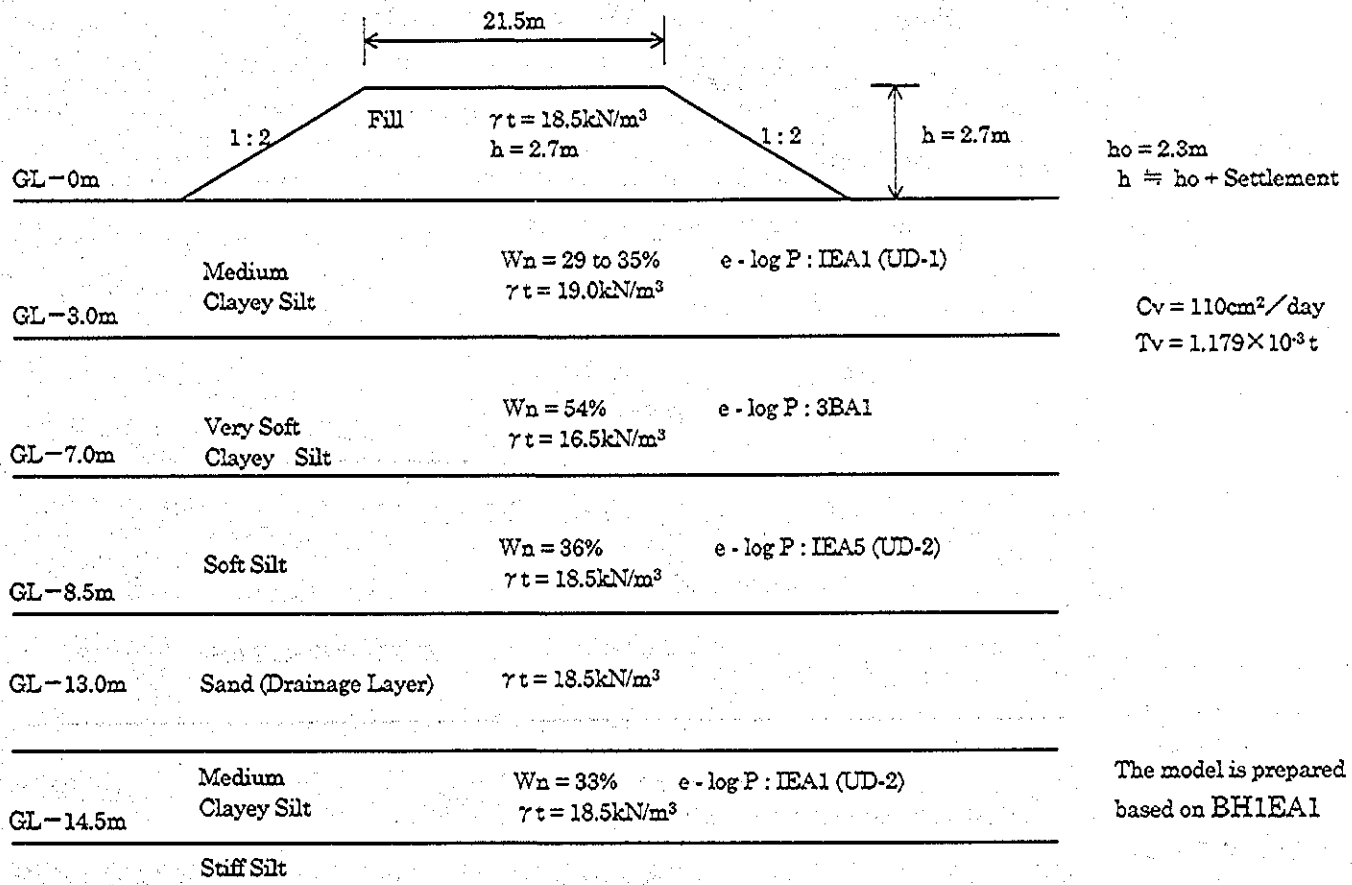
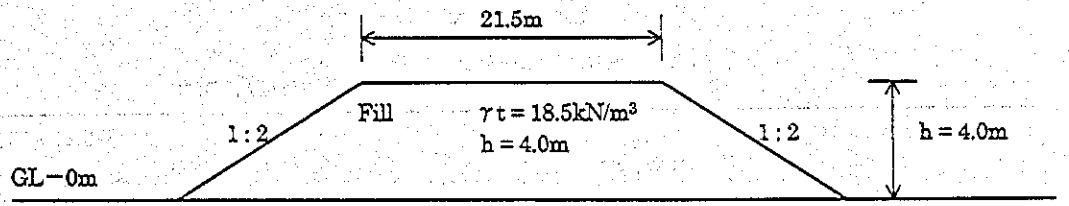


Figure-7 Ground Model of Settlement Analysis for Rupsa East Viaduct to STA 8+900

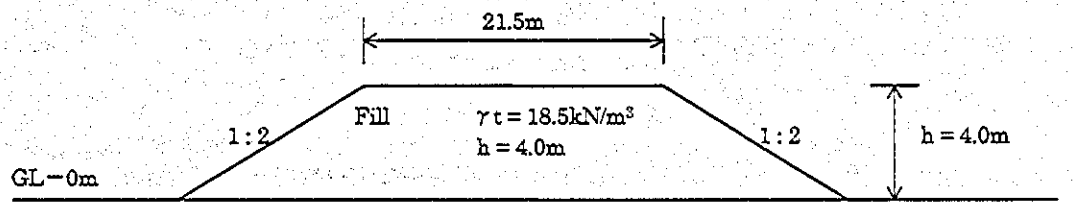


ho = 3.5m
h ≒ ho + Settlement

1.	Medium Clayey Silt	Wn = 26 - 32% γt = 19.3kN/m³	e - log P : 1EB5, ID-1	
	GL−2.6m			
2.	Very Soft Clay	Wn = 57% γt = 16.2kN/m³	e - log P : 1EB4	Cv = 100cm²/day Tv = 4.695×10⁻⁴t
	GL−7.1m			
3.	Soft Sandy Silt	Wn = 35% γt = 18.5kN/m³	e - log P : 1EB5, UD-2	
	GL−8.6m			
4.	Medium Clayey Silt	γt = 18.5kN/m³	e-log P : 1EB5, UD-2	The model is prepared based on BH1EB5.
	GL−11.6m			

Sand (Drainage Layer)

Figure-8 Ground Model of Settlement Analysis for STA 8+900 to STA 9+900



ho = 3.5m
h ≒ ho + Settlement

Very Soft Silty Clay — Wn = 35 to 44%, γt = 19.0kN/m³ — e-log P : 1EB7

1. Cv = 80 cm²/day
   Tv = 2.673 ×10⁻³t

GL−2.6m

Very Soft Silt — Wn = 30%, γt = 18.8kN/m³ — e-log P : 1EB4

2. GL−5.1m

Sand (Drainage Layer) — γt = 18.5kN/m³

3. GL−9.6

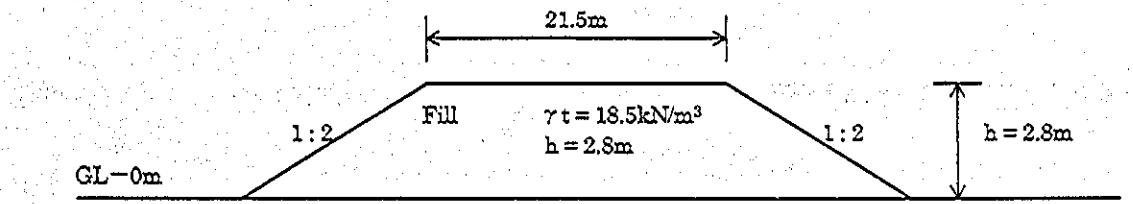
Soft Silt — Wn = 33%, γt = 18.5 kN/m³ — e-log P : 1EB5 (UD-2)

4. GL−11.6m

5. Sand (Drainage Layer)

The model is prepared based on BH1EB7.

Figure-9 Ground Model of Settlement Analysis for STA 9+900 to Molonghata Bridge



ho = 2.4m
h ≒ ho + Settlement

Sand

1. GL−2.5m

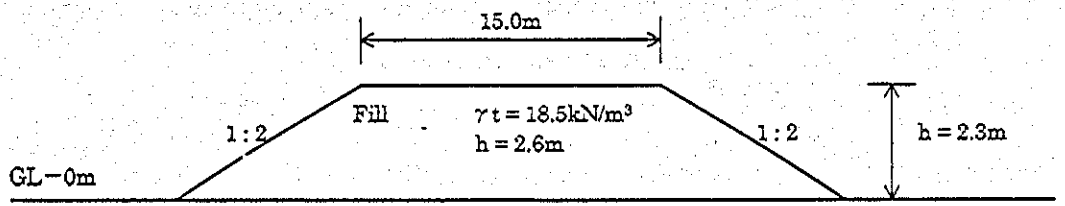
2. GL−3.5m	Very Soft Silty Clay with Organic matter	Wn = 87% γt = 14.2kN/m³	e-log P : 1EB1
3. GL−5.5m	Very Soft Silty Clay	Wn = 40% γt = 18.0kN/m³	e-log P : 1EB6
4. GL−8.5m	Very Soft Clayey Silt	Wn = 31% γt = 18.8kN/m³	e-log P : 1EB4

Cv = 115 cm²/day
Tv = 1.825×10⁻³t

The model is prepared based on BH1B6

5. Sand (Drainage Layer)

Figure-10 Ground Model of Settlement Analysis for Molonghata Bridge to End of Route 1



ho = 2.3m
h ≒ ho + Settlement

Medium Clayey Silt — γt = 18.7kN/m³ — e - log P : 1EB5, UDH

1. GL−1.8m

Very Soft Clayey Silt — Wn = 32% — γt = 18.5kN/m³ — e - log P : 1WA1

Cv = 260 cm²/day
Tv = 3.376×10⁻³t

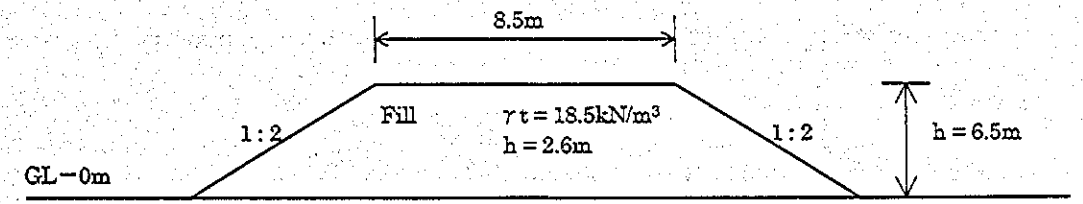
2. GL−6.3m

The model is prepared based on BH1BA1.

Sand (Drainage Layer)

3.

Figure-11 Ground Model of Settlement Analysis for Rupsa River West Access Road at River Bank Side



ho = 2.1
h ≒ ho + Settlement

Cv = 260m²/day
Tv = 4.915×10⁻²t

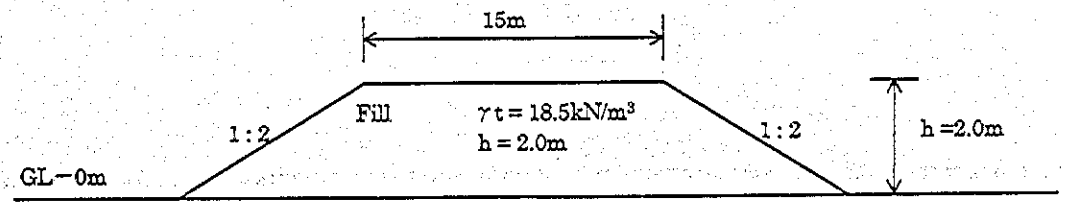
1. Very Soft Clayey Silt with Organic matter
Wn = 66%
γt = 15.3kN/m³
e - log P : BH1EB2"

GL−4.6m

The model is prepared based on BH1WA1.

2. Sand (Drainage Layer)

Figure-12 Ground Model of Settlement Analysis for Rupsa River West Access Road at Viaduct Side



ho =1.6m
h ≒ ho + Settlement

1.	GL−2.4m	Medium Silty Clay	γt = 18.5kN/m³	e - log P : 1EB5, UD-1
2.	GL−3.9m	Soft Silty Clay	Wn = 45% γt = 17.5kN/m³	e - log P : 1EB4
3.	GL−6.9m	Very Soft to Soft Silty Clay with Organic matter	γt = 14.0kN/m³	e - log P : 1VP2
4.	GL−8.4m	Soft Sandy Silt	Wn = 34% γt = 18.5kN/m³	e - log P : 1EB5, UD-2
5.		Sand (Drainage Layer)		

Cv = 180 cm²/day
Tv = 1.055×10⁻³t

The model is prepared based on BH1BA2.

Figure-13 Ground Model of Settlement Analysis for Rupsa River East Access Road

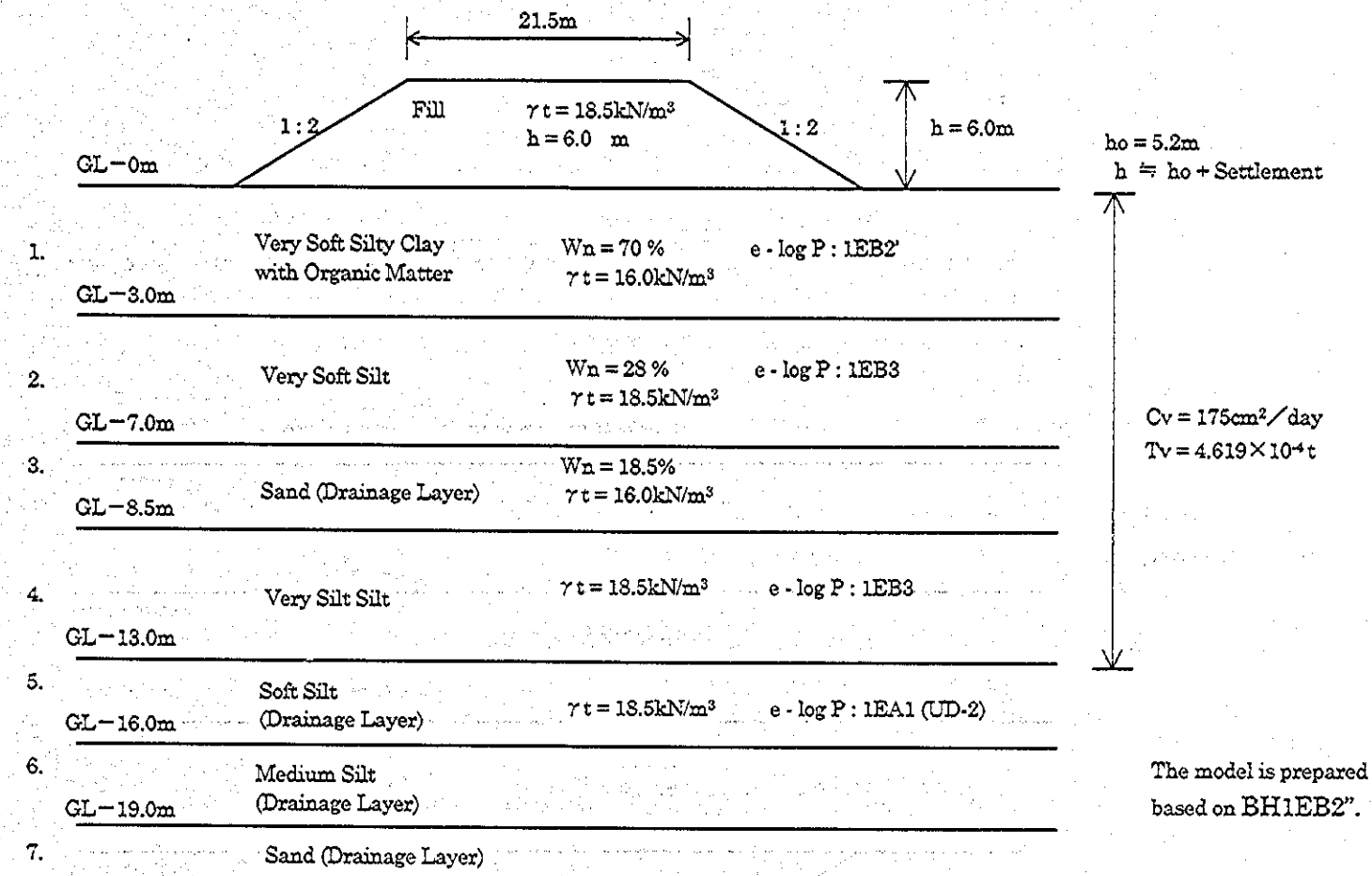
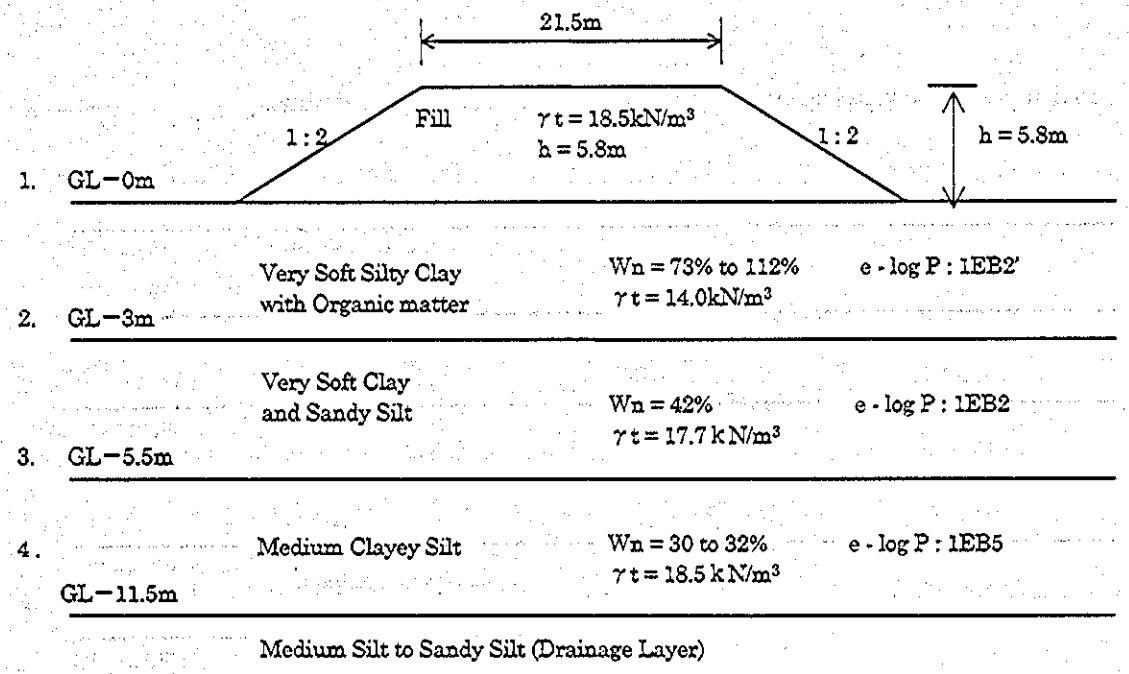


Figure-14 Ground Model of Settlement Analysis for to Hatia Bridge West Abutment

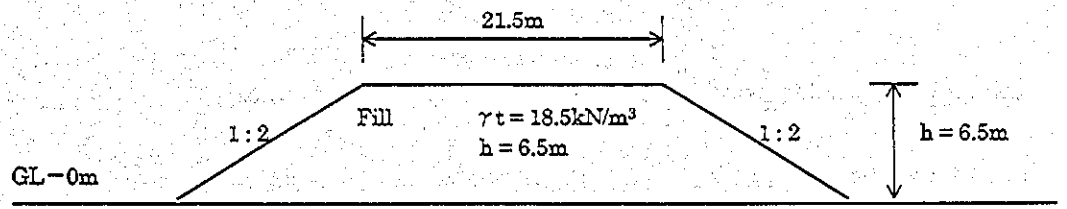


ho = 5.2m
h ≒ ho + Settlement

Cv = 330cm²/day
Tv = 1.323×10⁻³t

The model is prepared based on BH1EB2'.

Figure-15 Ground Model of Settlement Analysis for to Hatia Bridge East Abutment



ho = 5.6m
h ≒ ho + Settlement

1. Very Soft Clayey Silt with Organic matter — Wn = 63%, e - log P : 3BA1, γt = 15.6kN/m³

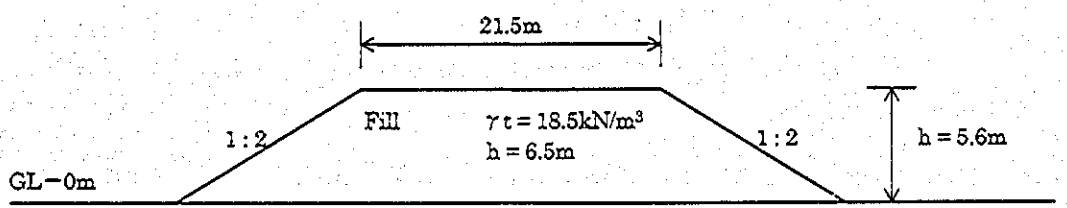
Cv = 100 cm²/day
Tv = 1.322×10⁻³t

GL−5.5m

2. Silty Sand (Drainage Layer)

The model is prepared based on BH1VA1.

Figure-16 Ground Model of Settlement Analysis for West Approach to Viaduct



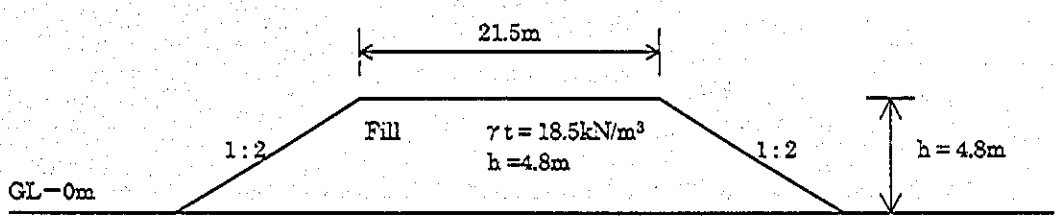
ho = 5.6m
h ≒ ho + Settlement

1.	GL−3.0m	Medium Clayey Silt	Wn = 29 to 35% γt = 19.0kN/m³	e - log P : IEA1 (UD-1)
2.	GL−7.0m	Very Soft Clayey Silt	Wn = 54% γt = 16.5kN/m³	e - log P : 3BA1
3.	GL−8.5m	Soft Silt	Wn = 36% γt = 18.5kN/m³	e - log P : IEA5 (UD-2)
4.	GL−13.0m	Sand (Drainage Layer)	γt = 18.5kN/m³	
5.	GL−14.5m	Medium Clayey Silt	Wn = 33% γt = 18.5kN/m³	e - log P : IEA1 (UD-2)
6.		Stiff Silt		

Cv = 110cm²/day
Tv = 1.179×10⁻³t

The model is prepared based on BH1EA1.

Figure-17 Ground Model of Settlement Analysis for East Approach to Viaduct



ho = 4.3m
h ≒ ho + Settlement

1. Very Soft Clayey Silt — Wn = 44%, γt = 19.0kN/m³, e - log P : 1EB7
GL−2.6m

2. Very Soft Silt — Wn = 30%, γt = 18.75 kN/m³, e - log P : 1EB4
GL−5.1m

3. Sand (Drainage Layer) — γt = 18.5kN/m³
GL−9.6m

4. Soft Silt — Wn = 33%, γt = 18.5kN/m³, e - log P : 1EB5, UD-2
GL−11.6m

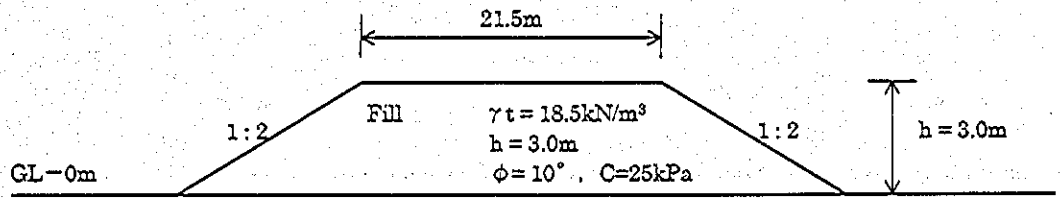
5. Sand (Drainage Layer)

The configuration of the fill indicates a transverse section.

Cv = 80 cm²/day
Tv = 2.673×10⁻³t

The model is prepared based on BH1EB7.

Figure- 18 Ground Model of Settlement Analysis for Molonghata Bridge Approach



ho = 2.6m
h ≒ ho + Settlement

1. Very Soft Silty Clay with Organic matter
   Wn = 88%
   γt = 14.2kN/m³
   Co = 20 kPa, φ = 0° , m = 0.30

GL−6m

2. Soft Clay Silt
   Wn = 35%
   GL−7.5m
   γt = 18.5kN/m³ Co = 30 kPa, φ = 0° , m = 0.18

3. Very Soft Silty Clay with Organic matter
   Wn = 68%
   γt = 16.0kN/m³ Co = 30 kPa, φ = 0° , m = 0.18

GL−10.5m

4. Soft Clay Silt
   γt = 18.7kN/m³ Co = 35 kPa, φ = 0° , m = 0.18

GL−15m

5. Sand
   γt = 20.0kN/m³ φ = 45°

The ground model is prepared Based on BH1EB1.

Figure-19 Ground Model of Stability Analysis for STA 0+000 to STA 2+000

Appendix 4.2.9.B

Tables-1 through 38
Settlement Calculation Sheet
And
Settlement VS. Time

Table-1 Settlement Calculation Sheet, STA 0+000 to STA 2+000

Layer No.	D (cm)	σ vó (kPa)	σ vó+△P (kPa)	e_0	e_1	S (cm)
1	600	30.1	8.33	2.115	2.00	22.2
2	150	49.1	10.02	0.925	0.900	1.9
3	300	64.5	11.11	1.195	1.130	8.9
4	450	93.0	13.96	0.905	0.890	3.5
					Total	36.6

Table-2 Settlement VS. Time, STA 0+000 to STA 2+000

Time (months) *	6	12	24	36	60
Settlement (cm)	8	15	20	23	29
Residual Settlement (cm)	29	22	17	14	8

* Time from reaching height of 3.0m

Table-3 Settlement Calculation Sheet, STA 2+000 to Hatia River

Layer No.	D (cm)	σ vó (kPa)	σ vó+△P (kPa)	e_0	e_1	S (cm)
1	300	12.5	71.7	2.84	2.60	18.8
2	400	38.5	96.5	0.959	0.918	8.4
3	450	87.4	139.7	0.924	0.894	7.0
5	300	119.3	166.8	0.856	0.838	2.9
					Total	37.1

Table-4 Settlement VS. Time, STA 2+000 to Hatia River

Time (months) *	6	12	24	36	60
Settlement (cm)	15	21	27	31	34
Residual Settlement (cm)	22	16	10	6	3

* Time from reaching height of 3.0m

Table-5 Settlement Calculation Sheet, Hatia River East Bank to SAT 3+700

Layer No.	D (cm)	σ vó (kPa)	σ vó+ΔP (kPa)	e_0	e_1	S (cm)
1	150	10.0	52.6	2.86	2.63	17.9
2	425	25.6	61.2	0.918	0.872	6.0
3	850	60.8	95.8	0.918	0.902	2.5*
					Total	26.4

* Half of calculated value

Table-6 Settlement VS. Time, Hatia River East Bank to SAT 3+700

Time (months) *	6	12	24	36	60
Settlement (cm)	18	21	24	--	--
Residual Settlement (cm)	9	6	3	--	--

* Time from reaching height of 2.3m

Table-7 Settlement Calculation Sheet, STA 3+700 to SAT 5+400

Layer No.	D (cm)	σ vó (kPa)	σ vó+ΔP (kPa)	e_0	e_1	S (cm)
1	400	22.1	90.6	0.968	0.917	10.4
2	300	48.8	115.6	1.216	1.106	14.9
3	300	68.9	133.8	1.138	1.100	12.1
4	150	85.3	146.7	0.906	0.89	0.7*
					Total	38.1

* Half of calculated value

Table-8 Settlement VS. Time, STA 3+700 to SAT 5+400

Time (months) *	6	12	24	36	60	72
Settlement (cm)	9	12	17	24	33	34
Residual Settlement (cm)	29	26	11	7	5	4

* Time from reaching height of 3.7m

Table-9 Settlement Calculation Sheet, STA 5+400 to SAT 6+500

Layer No.	D (cm)	σ vó (kPa)	σ vó+△P (kPa)	e_0	e_1	S (cm)
1	300	21.1	100.7	1.259	1.145	15.1
2	150	34.3	113.1	1.23	1.05	12.1
3	300	47.6	12436	1.218	1.117	13.7
4	150	64.1	139.1	0.917	0.890	2.1
6	150	102.3	172.0	0.738	0.722	0.7*
					Total	43.7

* Half of calculated value

Table-10 Settlement VS. Time, STA 5+400 to SAT 6+500

Time (months) *	6	12	24	36	48
Settlement (cm)	19	24	36	39	40
Residual Settlement (cm)	25	20	10	5	4

* Time from reaching height of 4.4m

Table-11 Settlement Calculation Sheet, STA 6+500 to Rupsa West Viaduct

Layer No.	D (cm)	σ vó (kPa)	σ vó+△P (kPa)	e_0	e_1	S (cm)
1	550	30.4	80.6	1.31	1.12	37.8
					Total	37.8

Table-12 Settlement VS. Time, STA 6+500 to Rupsa West Viaduct

Time (months) *	3	6	12	18
Settlement (cm)	14	24	32	36
Residual Settlement (cm)	24	14	6	2

* Time from reaching height of 3.7m

Table-13 Settlement Calculation Sheet, Rupsa East Viaduct to SAT 8+900

Layer No.	D (cm)	σ vó (kPa)	σ vó+△P (kPa)	e_0	e_1	S (cm)
1	300	21.5	71.5	0.925	0.872	8.2
2	400	48.0	97.9	1.373	1.21	27.4
3	150	67.4	115.3	0.915	0.896	1.5
5	150	118.4	161.2	0.855	0.840	1.2
					Total	38.3

Table-14 Settlement VS. Time, Rupsa East Viaduct to SAT 8+900

Time (months) *	6	12	24
Settlement (cm)	21	28	34
Residual Settlement (cm)	17	10	4

* Time from reaching height of 2.7m

Table-15 Settlement Calculation Sheet, STA 8+900 to SAT 9+900

Layer No.	D (cm)	σ vó (kPa)	σ vó+△P (kPa)	e_0	e_1	S (cm)
1	260	21.7	95.7	0.862	0.815	6.7
2	450	47.4	120.2	1.218	1.125	18.9
3	150	67.6	137.6	0.915	0.890	2.0
4	300	87.1	154.0	0.906	0.887	3.0
					Total	30.6

Table-16 Settlement VS. Time, STA 8+900 to SAT 9+900

Time (months) *	6	12	24	36	60
Settlement (cm)	18	21	24	27	29
Residual Settlement (cm)	13	10	7	4	2

* Time from reaching height of 4.0m

Table-17 Settlement Calculation Sheet, STA 9+900 to Molonghata Bridge

Layer No.	D (cm)	σ vó (kPa)	σ vó+△P (kPa)	c_0	e_1	S (cm)
1	260	11.7	85.7	0.918	0.918	8.9
2	250	34.3	107.6	1.239	1.239	11.1
4	200	92.0	159	0.904	0.904	2.0
					Total	22.0

Table-18 Settlement VS. Time (STA 9+900 to Molonghata Bride)

Most part of the settlement will be developed during construction of the fill.

Table-19 Settlement Calculation Sheet, Molonghata Bridge to End

Layer No.	D (cm)	σ vó (kPa)	σ vó+△P (kPa)	c_0	e_1	S (cm)
2	100	29.9	81.6	2.15	2.00	4.8
3	200	40.0	91.0	0.984	0.920	6.5
4	300	61.1	110.5	1.198	1.140	7.9
					Total	19.2

Table-20 Settlement VS. Time, Molonghata Bridge to End

Time (months) *	6	12	24
Settlement (cm)	12	16	18
Residual Settlement (cm)	6	3	1

* Time from reaching height of 2.8m

Table-21 Settlement Calculation Sheet, West Access Road, River Bank Side

Layer No.	D (cm)	σ vó (kPa)	σ vó+△P (kPa)	e_0	e_1	S (cm)
1	180	11.9	6.03	0.874	0.837	3.6
2	450	38.9	85.8	0.900	0.865	8.3
					Total	11.9

Table-22 Settlement VS. Time, West Access Road, River Bank Side

Time (months) *	6	12
Settlement (cm)	9	11
Residual Settlement (cm)	2	1

* Time from reaching height of 2.6m

Table-23 Settlement Calculation Sheet, West Access Road, Viaduct Side

Layer No.	D (cm)	σ vó (kPa)	σ vó+△P (kPa)	e_0	e_1	S (cm)
1	460	15.9	62.9	1.13	1.16	29.9
					Total	29.9

Table-24 Settlement VS. Time, West Access Road, Viaduct Side

Time (Months) *	6	12
Settlement (cm)	27	29
Residual Settlement (cm)	3	1

* Time from reaching height of 2.6m

Table-25 Settlement Calculation Sheet, East Access Road

Layer No.	D (cm)	σ vó (kPa)	σ vó+ΔP (kPa)	e_0	e_1	S (cm)
1	240	17.2	54.1	0.866	0.840	3.3
2	150	33.0	68.8	1.242	1.189	3.5
3	300	44.7	76.5	4.46	4.36	5.5
4	10	57.0	85.7	0.92	0.906	1.1
					Total	13.4

Table-26 Settlement VS. Time, East Access Road

Time (months) *	6	12	24	36
Settlement (cm)	9	11	12	13
Residual Settlement (cm)	5	3	2	1

* Time from reaching height of 2.0m

Table-27 Settlement Calculation Sheet, Hatia Bridge West Approach, 18m behind abutment

Layer No.	D (cm)	σ vó (kPa)	σ vó+ΔP (kPa)	e_0	e_1	S (cm)
1	300	12.5	123.5	2.79	2.33	36.4
2	400	38.5	147.5	0.959	0.890	14.1
3	450	87.4	189.3	0.924	0.868	13.1
5	300	119.3	213.0	0.855	0.828	2.2*
					Total	65.8

* Half of the calculated settlement

Table-28 Settlement Calculation Sheet, Hatia Bridge West Approach, 5m behind abutment

Layer No.	D (cm)	σ vó (kPa)	σ vó+ΔP (kPa)	e_0	e_1	S (cm)
1	300	12.5	118.1	2.79	2.355	34.4
2	400	38.5	129.8	0.959	0.898	12.5
3	450	87.4	163.5	0.924	0.878	10.8
5	300	119.3	181.8	0.855	0.836	1.5*
						59.2
					Total	61.8**

* Half of the calculated Settlement
**After correction of stress

Table-29 Settlement VS. Time, Hatia Bridge West Approach, 18m behind Abutment

Time *	1	2	3	4	5	6	7	8
Settlement (cm)	21	36	40	42	46	53	57	62
Residual Settlement (cm)	45	30	26	24	20	13	9	4

* 1. At reaching to 6.0m (12 months from commencement of fill)
2. At the end of 11 months' curing period (23 months from commencement of fill)
3. At the completion of backfill behind abutment (Assumed 29 months from commencement of fill)
4. At 0.5 year after completion of backfill behind abutment
5. At 1 year after completion of backfill behind abutment
6. At 2 year after completion of backfill behind abutment
7. At 3 year after completion of backfill behind abutment
8. At 5 year after completion of backfill behind abutment

Table-30 Settlement VS. Time, Hatia Bridge West Approach, 5m behind Abutment

Time *	1	2	3	4	5	6	7	8
Settlement (cm)	Nil	5	5	21	29	40	48	56
Residual Settlement (cm)	62	57	57	41	33	22	14	6

* 1. At reaching to 6.0m (12 months from commencement of fill)
2. At the end of 11 months' curing period (23 months from commencement of fill)
3. At the completion of backfill behind abutment (Assumed 29 months from commencement of fill)
4. At 0.5 year after completion of backfill behind abutment
5. At 1 year after completion of backfill behind abutment
6. At 2 year after completion of backfill behind abutment
7. At 3 year after completion of backfill behind abutment
8. At 5 year after completion of backfill behind abutment

Table-31 Settlement Calculation Sheet Hatia Bridge Eest Approach

Layer No.	D (cm)	σ vó (kPa)	σ vó+ΔP (kPa)	e_0	e_1	S (cm)
1	300	6	113.3	2.820	2.372	35.2
2	250	21.6	127.2	0.910	0.832	10.2
3	600	56.7	1583.0	0.920	0.900	3.1 *
					Total	48.5

* Half of the calculated settlement

Table-32 Time VS. Settlement, Hatia Bridge East Approach

Time *	1	2	3	4	5	6
Settlement (cm)	18	26	33	38	44	46
Residual Settlement (cm)	31	23	16	11	5	3

* 1. At reaching to5.8m (7 months from commencement of fill)
2. At the end of 5 months' curing period (12 months from commencement of fill)
3. At 0.5 year after completion of backfill behind abutment
4. At 1 year after completion of backfill behind abutment
5. At 2 years after completion of backfill behind abutment
6 At 3 years after completion of backfill behind abutment

Table-33 Settlement Calculation Sheet, West Approach to Viaduct

Layer No.	D (cm)	σ vó (kPa)	σ vó+△P (kPa)	e_0	e_1	S (cm)
1	550	20.0	140.2	1.41	1.065	78.7
					Total	78.7

Table-34 Settlement VS. Time, Hatia Bridge East Approach

Time *	1	2	3	4	5	6
Settlement (cm)	30	46	60	68	73	76
Residual Settlement (cm)	49	33	19	11	6	3

* 1. At reaching to 6.5m (6 months from commencement of fill)
2. At the end of 4 months curing period (10 months from commencement of fill)
3. At 0.5 year after completion of backfill behind abutment
4. At 1 year after completion of backfill behind abutment
5. At 1.5 years after completion of backfill behind abutment
6. At 2 years after completion of backfill behind abutment

Table-35 Settlement Calculation Sheet, East Approach to Viaduct

Layer No.	D (cm)	σ vó (kPa)	σ vó+ΔP (kPa)	e_0	e_1	S (cm)
1	300	21.5	141.8	0.925	0.840	13.2
2	400	48.0	166.8	1.373	1.210	58.8
3	150	67.4	182.8	0.915	0.880	2.7
5	150	118.4	221.6	0.855	0.826	2.3
					Total	77.0

Tabl-36 Settlement VS. Time, East Approach to Viaduct

Time *	1	2	3	4	5	6
Settlement (cm)	31	58	41	65	70	72
Residual Settlement (cm)	46	19	36	12	7	5

* 1. At reaching to 6.5m (6 months from commencement of fill)
2. At the end of 4 months curing period (10 months from commencement of fill)
3. At 0.5 year after completion of backfill behind abutment
4. At 1 year after completion of backfill behind abutment
5. At 1.5 years after completion of backfill behind abutment
6 At 2 years after completion of backfill behind abutment

Table-37 Settlement Calculation Sheet, Molonghata Bridge Approach

Layer No.	D (cm)	σ vó (kPa)	σ vó+ΔP (kPa)	e_0	e_1	S (cm)
1	260	11.7	10.1	0.918	0.839	10.7
2	250	34.3	12.2	1.239	1.125	12.7
4	200	92.0	17.3	0.904	0.885	2.0
					Total	25.4

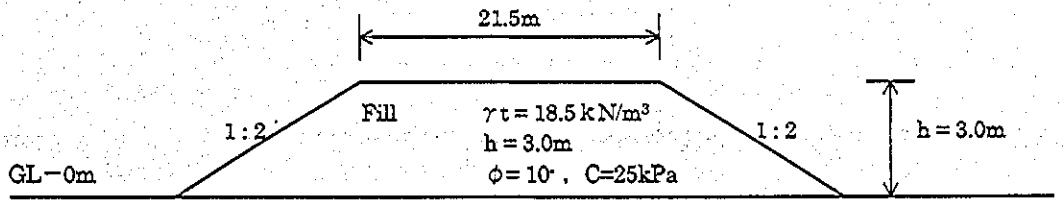
Table-38 Settlement VS. Time, Molonghata Bridge Approach

Time (months) *	6	12	24
Settlement (cm)	20	24	25
Residual Settlement (cm)	6	2	1

* Time from reaching height of 4.8m

Appendix 4.2.9.C

Figures-20 through 36
Ground Model
Of
Stability Analysis

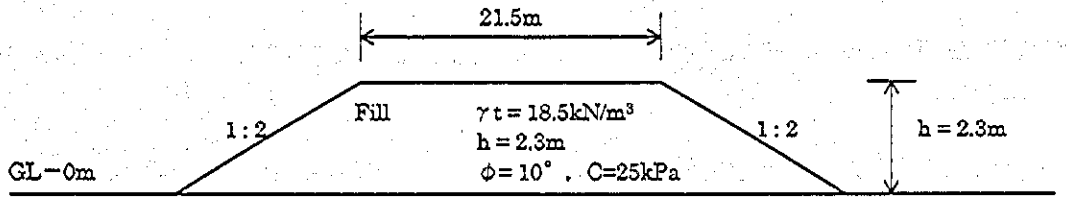


ho = 2.6m
h ≒ ho + Settlement

1.		Very Soft Silty Clay with Organic matter	Wn = 70% γt = 16.0kN/m³	Co = 21 kPa, ϕ = 0°,	m = 0.30
	GL−3m				
2.		Very Soft Silt	Wn = 28% γt = 18.5kN/m³	Co = 21 kPa, ϕ = 0°,	m = 0.18
	GL−7m				
3.	GL−8.5m	Sand	γt = 18.5kN/m³	Co = 0, ϕ = 21°,	
4.		Very Soft Silt	γt = 18.5kN/m³	Co = 35 kPa, ϕ = 0°,	m = 0.18
	GL−13.0m				
5.					
	GL−16m	Soft Silt (Drainage Layer)	γt = 18.7kN/m³	Co = 35 kPa, ϕ = 0°,	m = 0.18
6.	GL−19m	Medium Silt (Drainage Layer)	γt = 18.5kN/m³,	Co = 40 kPa,	
7.		Sand	γt = 19.5kN/m³,	Co = 0kPa, ϕ = 32°	C = 0

The ground model is prepared Based on BH1EB2".

Figure-20 Ground Model of Stability Analysis for STA 2+000 to Hatia River West Bank

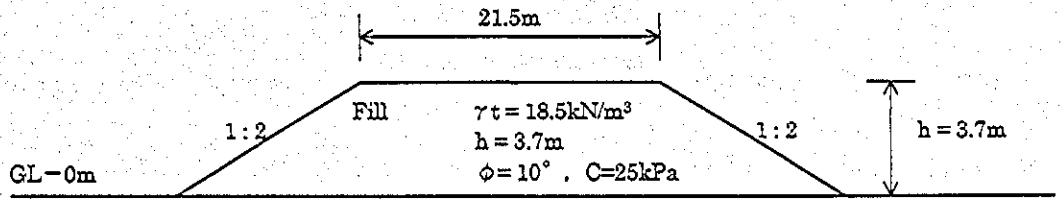


ho = 1.8m
h ≒ ho + Settlement

1.	Very Soft Silty Clay with Organic matter	Wn = 73% γt = 14.0kN/m³	Co = 20 kPa, φ = 0° , m = 0.30	GL−3m
2.	Very Soft Clay and Sandy Silt	Wn = 42% γt = 17.7kN/m³	Co = 25 kPa, φ = 0° , m = 0.18	GL−5.5m
3.	Medium Clayey Silt	Wn = 30 to 32% γt = 18.5kN/m³	Co = 40 kPa, φ = 0°	GL−9.0m
4.	Soft Clayey Silt	γt = 18.5kN/m³	Co = 30 kPa, φ = 0° , m = 0.18	GL−10.0m
5.	Medium Clayey Silt	γt = 18.5kN/m³	Co = 40 kPa, φ = 0°	

The ground model is prepared Based on BH1EB2'.

Figure-21 Ground Model of Stability Analysis for Hatia River East Bank to STA 3+700



ho = 3.2m
h ≒ ho + Settlement

1. GL−4m — Soft Silty Clay
   Wn = 37%
   γt = 18.3kN/m³ Co = 45kPa, ϕ = 0°

2. GL−4m — Soft Clay Silt with Organic Matter
   Wn = 52%
   γt = 16.7kN/m³
   Co = 30kPa, ϕ = 0° , m = 0.30

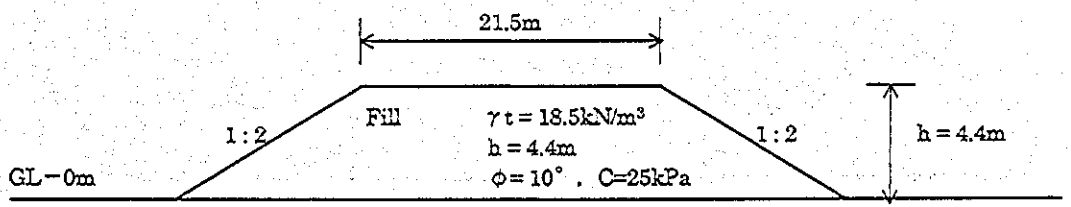
3. GL−10m — Very Soft Clayey Silt
   Wn = 50%
   γt = 16.7kN/m³
   Co = 25kPa, ϕ = 0° , m = 0.18

4. GL−11.5m — Midium Sandy Silt
   γt = 18.3kN/m³
   Co = 40kPa, ϕ = 0°

5. Sand
   γt = 18.5kN/m³ ϕ = 30° Co = 0

The ground model is prepared Based on BH1EB3.

Figure-22 Ground Model of Stability Analysis for STA 3+700 to STA 5+400

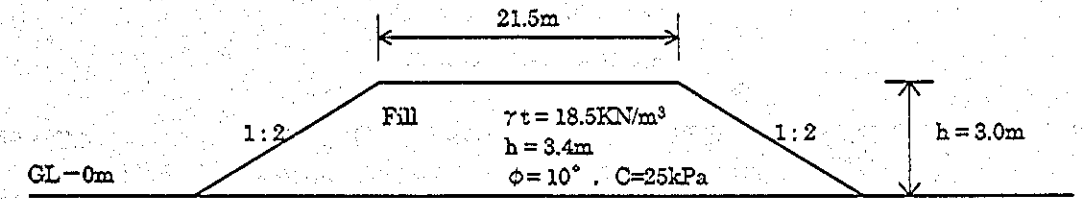


ho = 2.6m
h ≒ ho + Settlement

1.		Very Soft Silty Clay	Wn = 52% γt = 16.7kN/m³ Co = 20kPa, φ = 0° , m = 0.30
	GL−3m		
2.	GL−4.5m	Very Soft Silty Clay with Organic matter	Wn = 83% γt = 14.3kN/m³ Co = 20kPa, φ = 0° , m = 0.30
3.		Very Soft Silty Clay with Organic matter	Wn = 51% γt = 16.7kN/m³ Co = 20kPa, φ = 0° , m = 0.30
	GL−7.5m		
4.	GL−9.0m	Very Soft Clayey Silt	Wn = 31% γt = 18.7kN/m³ Co = 25kPa, φ = 0° , m = 0.18
5.	GL−12.0m	Sand	γt = 18.7kN/m³ φ = 28° , C = 0
6.	GL−13.5m	Medium Silty Clay	γt = 18.5kN/m³ Co = 30kPa, φ = 0° , m = 0.18
7.		Sand	γt = 18.5kN/m³ φ = 33° , C = 0

The ground model is prepared Based on BH1EB4.

Figure-23 Ground Model of Stability Analysis for STA 5+400 to STA 6 + 500



ho = 2.8m
h ≒ ho + Settlement

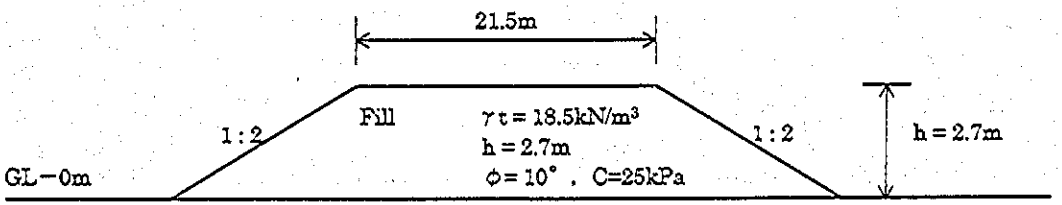
1. Very Soft Silty Clay with Organic matter
   Wn = 66%
   γt = 15.6kN/m³
   Co = 20kPa, φ = 0° , m = 0.30

GL−4.6m

2. Sand
   γt = 18.5kN/m³
   Co = 27kPa, φ = 0°

The ground model is prepared Based on BH1WA1.

Figure-24 Ground Model of Stability Analysis for STA 6+500 to STA 6+900

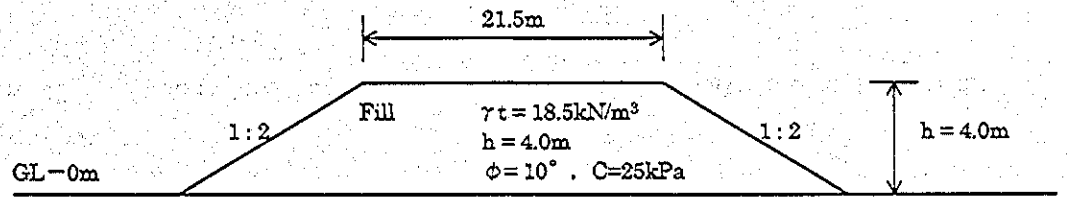


ho = 2.3m
h ≒ ho + Settlement

1.	GL−3.0m	Medium Clayey Silt	Wn = 29 to 35% γt = 19.0kN/m³	Co = 30kPa, ϕ = 0° , m = 0.18
2.	GL−7.0m	Very Soft Clayey Silt	Wn = 54% γt = 16.5kN/m³	Co = 20kPa, ϕ = 0° , m = 0.30
3.	GL−8.5m	Soft Silt	Wn = 36% γt = 18.5kN/m³	Co = 30kPa, ϕ = 0° , m = 0.18
4.	GL−13.0m	Sand	γt = 18.5kN/m³ ϕ = 30° , C = 0	
5.	GL−14.5m	Medium Clayey Silt	Wn = 36% γt = 18.5kN/m³	Co = 27kPa, ϕ = 0° , m = 0.18
6.		Stiff Silt	Co = 50kPa, ϕ = 0°	

The ground model is prepared Based on BH1EA1.

Figure-25 Ground Model of Stability Analysis for Rupsa East Viaduct to STA 8+900



ho = 3.5m
h ≒ ho + Settlement

1. Medium Clayey Silt
   Wn = 26 - 32%
   γt = 19.3kN/m³ Co = 45kPa, φ = 0°

GL−2.6m

2. Very Soft Clay
   Wn = 57%
   γt = 16.2kN/m³
   Co = 20kPa, φ = 0° , m = 0.20

GL−7.1m

3. Soft Sandy Silt
   Wn = 35%
   γt = 18.5kN/m³ Co = 33kPa, φ = 0° , m = 0.18

GL−8.6m

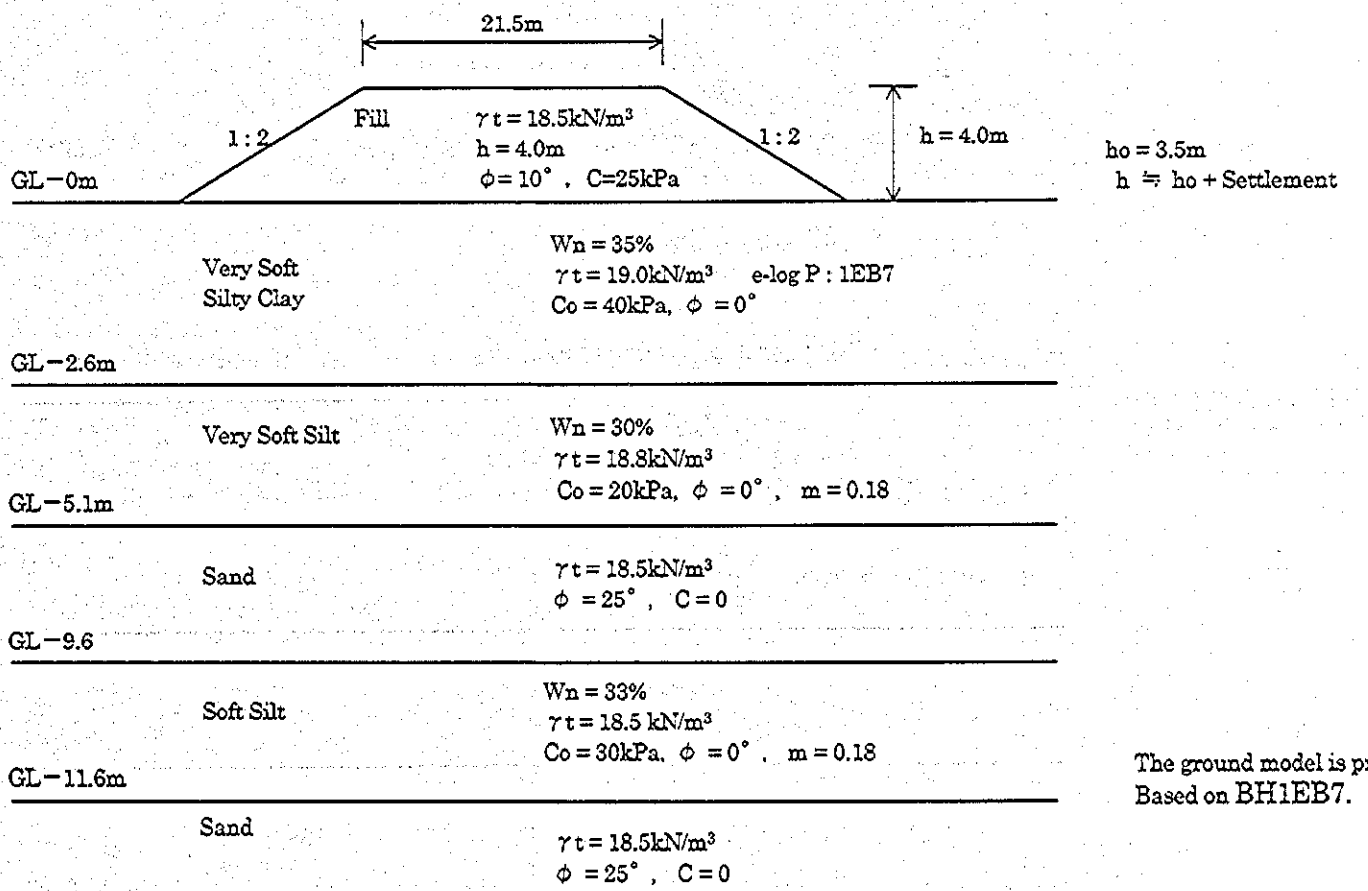
4. Soft Clay Silt
   γt = 18.5kN/m³ e-log P : 1EB5,UD-2
   Co = 34kPa, φ = 0°

GL−11.6m

Sand
γt = 18.5kN/m³ φ = 29° , C = 0

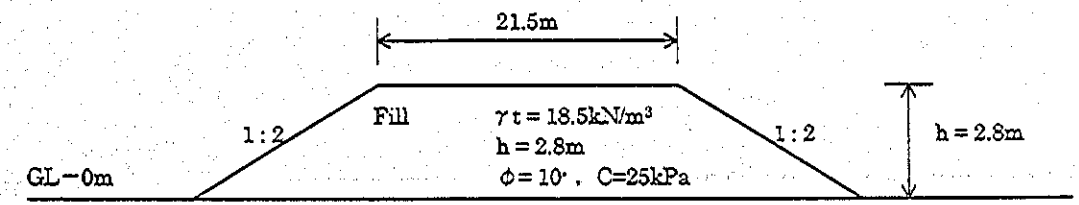
The ground model is prepared Based on BH1EB5.

Figure-26 Ground Model of Stability Analysis for STA 8+900 to STA 9+900



The ground model is prepared Based on BH1EB7.

Figure-27 Ground Model of Stability Analysis for STA 9+900 to Molonghata Bridge



ho = 2.4m
h ≒ ho + Settlement

		Sand	σt = 18.5kN/m³ Co = 20kPa, φ = 27°, C = 0
1.	GL−2.5m		
		Very Soft Silty Clay with Organic matter	Wn = 87% γt = 14.2kN/m³ Co = 20kPa, φ = 0°, m = 0.30
2.	GL−3.5m		
		Very Soft Silty Clay	Wn = 40% γt = 18.0kN/m³ Co = 20kPa, φ = 0°, m = 0.20
3.	GL−5.5m		
		Very Soft Clayey Silt	γt = 18.7kN/m³ Co = 20kPa, φ = 0°, m = 0.18
4.	GL−8.5m		
5.	GL−11.5m	Sand	γt = 18.5kN/m³ Co = 0kPa, φ = 26°
6.		Sand	γt = 20.0kN/m³ Co = 0kPa, φ = 45°

The ground model is prepared Based on BH1B6.

Figure-28 Ground Model of Stability Analysis for Molonghata Bridge to End of Route 1

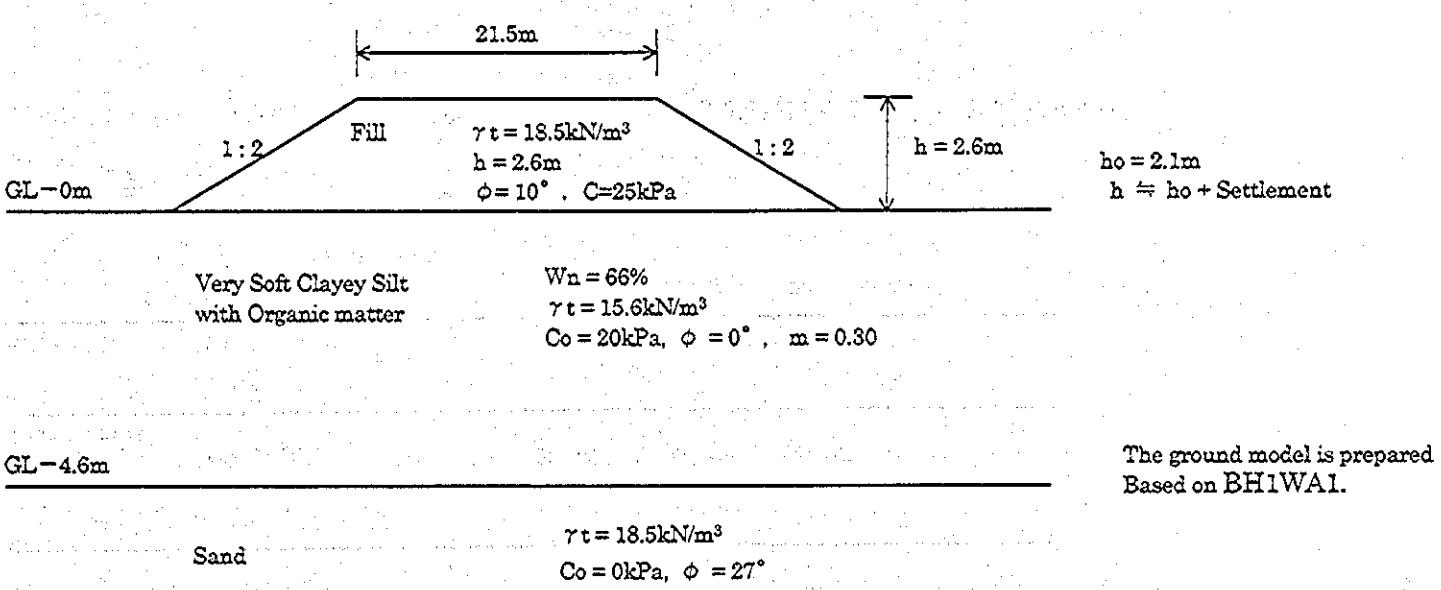
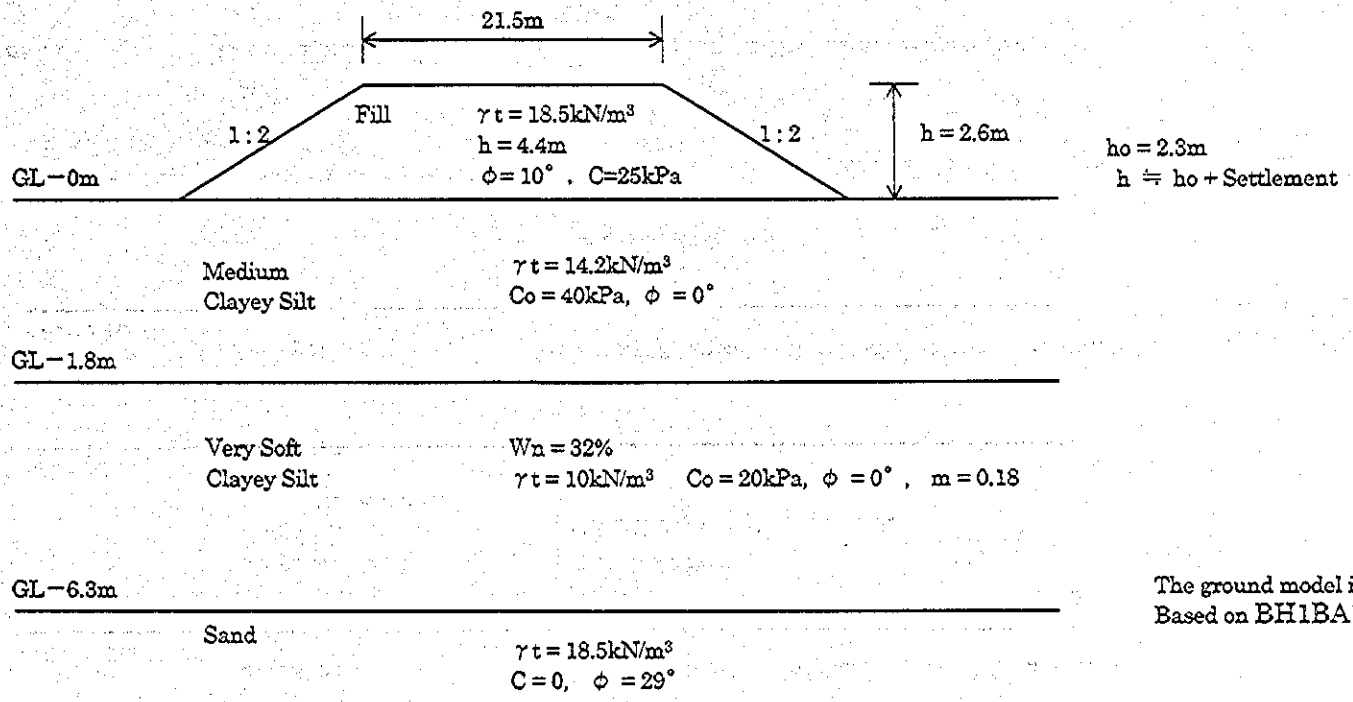
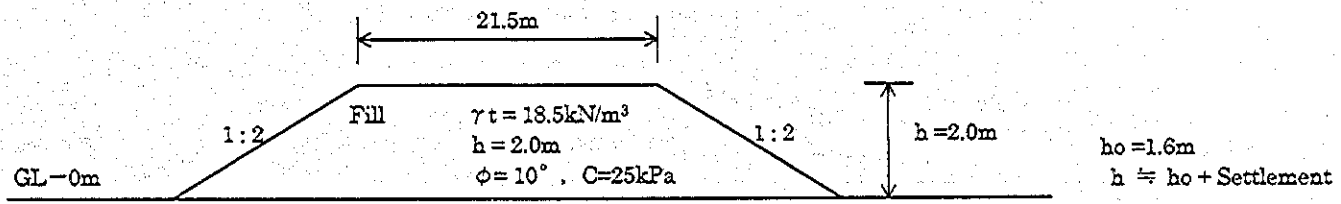


Figure-29 Ground Model of Stability Analysis for Rupsa River West Access Road (Viaduct Side)



The ground model is prepared Based on BH1BA1.

Figure-30 Ground Model of Stability Analysis for Rupsa River West Access Road (River Bank Side)



ho =1.6m
h ≒ ho + Settlement

1. GL−2.4m — Medium Silty Clay: γt = 18.5kN/m³, Co = 40kPa, φ = 0°

2. GL−3.9m — Soft Silty Clay: Wn = 45%, γt = 17.5kN/m³, Co = 30kPa, φ = 0° , m = 0.18

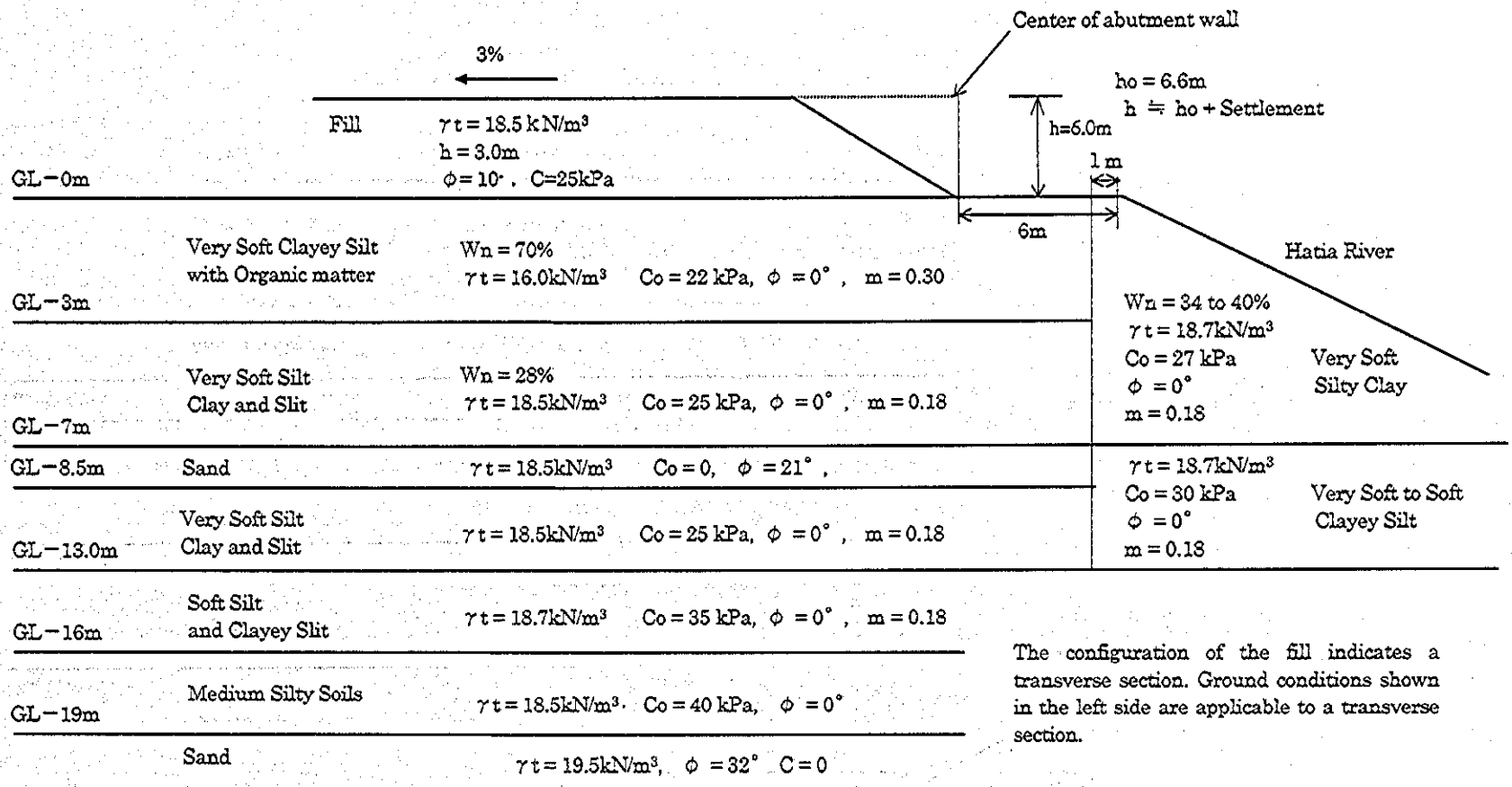
3. GL−6.9m — Very Soft to Soft Silty Clay with Organic matter: γt = 14.0kN/m³, Co= 25kPa, φ = 0° , m = 0.30

4. GL−8.4m — Soft Sandy Silt: Wn = 34%, γt = 18.5kN/m³, Co = 30kPa, φ = 0° , m = 0.17

5. Sand: γt = 19.0kN/m³, Co = 0kPa, φ = 35°

The ground model is prepared Based on BH1BA2.

Figure-31 Ground Model of Stability Analysis for Rupsa River East Access Road



The configuration of the fill indicates a transverse section. Ground conditions shown in the left side are applicable to a transverse section.

The ground model is prepared
Based on BH1EB2" and BH1EB2.

Figure-32 Ground Model of Stability Analysis for Hatia Bridge West Approach

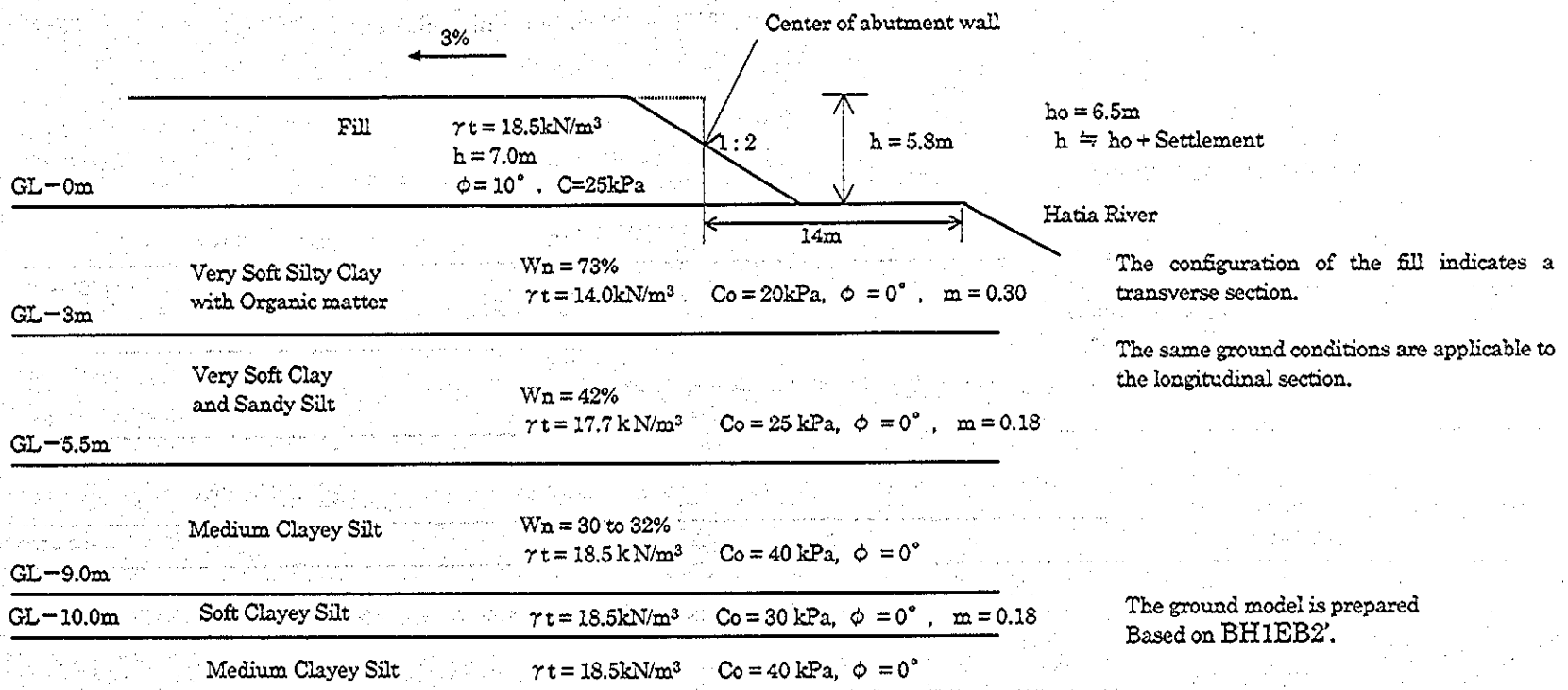
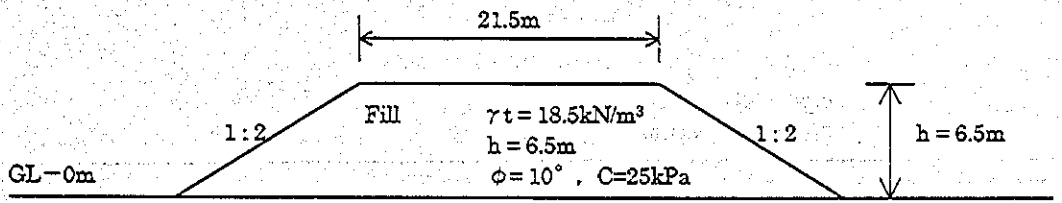


Figure-33 Ground Model of Stability Analysis for Hatia River East Approach



ho = 5.6m
h ≒ ho + Settlement

The configuration of the fill indicates a transverse section.

1. Very Soft Silty Clay with Organic matter
   Wn = 63%
   γt = 15.8kN/m³
   Co = 20 kPa, φ = 0° , m = 0.30

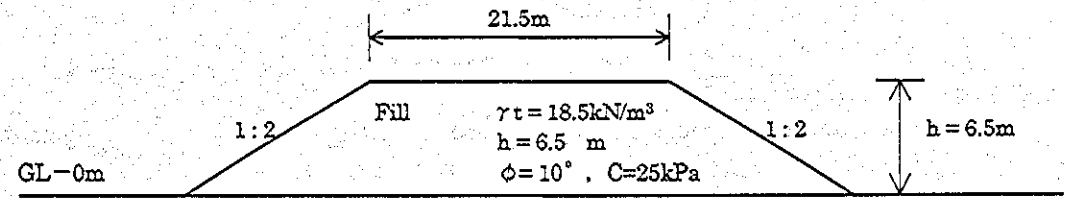
GL−5.5m

2. Silty Sand
   γt = 18.5 kN/m³
   Co = 0 kPa, φ = 27°

The same ground conditions are applicable to the longitudinal section. Configurations of the fill in the longitudinal section should be referred to Figures 2.4.15 and 2.4.16 of the main text.

The ground model is prepared Based on BH1VA1.

Figure-34 Ground Model of Stability Analysis for West Approach to Viaduct



ho = 5.6m
h ≒ ho + Settlement

1. Medium to Very Soft Clayey Silt
   Wn = 30 to 35 %
   γt = 1.90 kN/m³
   Co = 30 kPa, φ = 0° , m = 0.18

GL−3.0m

2. Very Soft Clayey Silt
   Wn = 54 %
   γt = 16.5kN/m³ Co = 20 kPa, φ = 0° , m = 0.30

GL−7.0m

3. Soft Silt
   Wn = 68%
   γt = 16.0kN/m³ Co = 30 kPa, φ = 0° , m = 0.18

GL−8.5m

4. Sand
   γt = 18.5kN/m³
   Co = 0 kPa, φ = 30°

GL−14.5m

5. Medium Clayey Silt
   Wn = 33%
   γt = 18.5kN/m³ Co = 27 kPa, φ = 0° , m = 0.18

GL−13.0m

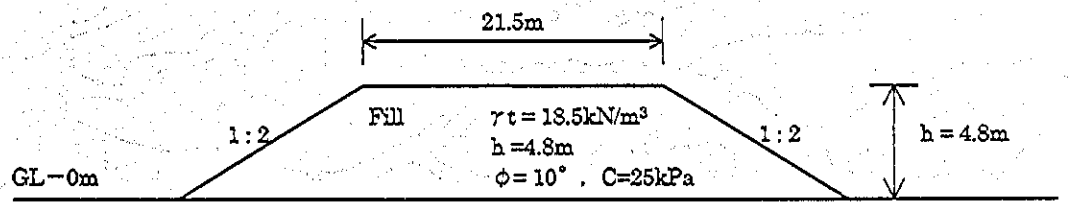
6. Stiff Silt
   (Non-Compressive Layer)
   γt = 18.5kN/m³ Co = 50 kPa, φ = 0°

The configuration of the fill indicates a transverse section.

The same ground conditions are applicable to the longitudinal section. Configurations of the fill in the longitudinal section should be referred to Figures 2.4.15 and 2.4.16 of the main text.

The ground model is prepared Based on BH1EA1.

Figure-35 Ground Model of Stability Analysis for East Approach Viaduct



ho = 4.3m
h ≒ ho + Settlement

1. Very Soft Clayey Silt
   Wn = 44%
   γt = 19.0kN/m³
   Co = 50 kPa, ϕ = 0° , m = 0.18

GL−2.6m

Very Soft Silt
Wn = 30%
γt = 18.75 kN/m³ Co = 25 kPa, ϕ = 0°

2. GL−5.1m

3. Sand
   γt = 18.5kN/m³
   Co = 0 kPa, ϕ = 25°

GL−10.5m

Wn = 33%
γt = 18.5kN/m³ Co = 35 kPa, ϕ = 0° , m = 0.18

4. Soft Clay Silt

GL−11.5m

5. Sand
   γt = 18.5 kN/m³ Co = 0 kPa, ϕ = 29°

The configuration of the fill indicates a transverse section.

The ground model is prepared Based on BH1EB7.

Figure-36 Ground Model of Stability Analysis for Molonghata Bridge Approaches