

VOLUME-IV
SECTION - 11
GEOTECHNICAL INVESTIGATION REPORT

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A SCOPE OF WORK

- 1.1 Conducting Geo-Technical Investigation up to a depth of 70m below the existing sea- bed level.
- 1.2 Conducting laboratory tests on the samples collected and thereby determining various index and engineering properties and summarising the detail of soil classification.

B DETAILS OF FIELD INVESTIGATION

1 BORING AND SAMPLING

- 1.1 The drilling was advanced with the help of rotary drilling machine equipped with diesel engine and high-pressure water pump and other drilling accessories, rods, core barrels, etc., The drilling was conducted as per relevant IS Specifications.

2 DISTURBED AND UNDISTURBED SAMPLE

- 2.1 Disturbed and Undisturbed soil samples were obtained depending upon the nature of soil from different depths in the bore hole. The Undisturbed samples were collected in sampling tubes. The ends of the tubes are sealed with molten wax to prevent evaporation. These samples were subsequently tested in the laboratory so as to determine the various index and engineering proportion of various sub soil strata met in the bore holes.

3 STANDARD PENETRATION TEST

- 3.1 Standard Penetration Test (SPT) was performed in the borehole. The standard split spoon sampler, attached to a string of drill rods was lowered to the bottom of the hole and allowed to rest under self-weight. The drill rods were connected to driving assembly which consisted of a hosting equipment's, a drive weight of 63.5kg, and a guide to ensure a 75cm free fall of hammer on an anvil. The number of hammer blows that were required to penetrate the sampler through three runs of 150mm each were recorded. Initial driving of 150mm was disregarded and the number of blows required to drive the sampler through the remaining 300mm is called blow count or penetration number (N). At the end of the test, the sampler was withdrawn and the soil extracted for subsequent testing in the laboratory. If the penetration was less than 30cm for 50 blows, it is considered as refusal and the actual penetration was recorded.

4 BORELOG REPORT

Bore log data of Marine Bore Hole – 1

Depth below G.L (m)	Soil Profile	Sample type SPT/UDS	SPT Details			“N” Value	Remarks
			15	30	45		
0m to 1.50m	Very loose silty clay with sea shells	1.50m	1	0	1	01	Washed sample
1.50m to 3.00m	Very loose silty clay with sea shells	3.00m	1	0	1	01	Washed sample
3.00m to 4.50m	Very loose silty clay with sea shells	4.50m	1	1	0	01	Washed sample
4.50m to 6.00m	Very loose silty clay with sea shells	6.00m	2	4	5	09	
6.00m to 7.50m	Blackish silty clay with sea shells	7.50m	2	5	7	12	
7.50m to 9.00m	Blackish silty clay with sea shells	9.00m	2	4	7	11	
9.00m to 10.50m	Blackish silty clay with sea shells	10.50m	3	5	7	12	
10.50m to 12.00m	Blackish silty clay with sea shells	12.00m	3	6	7	13	
12.00m to 13.50m	Blackish silty clay with sea shells	13.50m	3	5	7	12	
13.50m to 15.00m	Blackish silty clay with sea shells	15.00m	3	6	8	14	
15.00m to 16.50m	Blackish silty clay with sea shells	16.50m	5	6	9	15	
16.50m to 18.00m	Grayish silty clay with fine particles of whitish yellow colour	18.00m	6	10	15	25	
18.00m to 19.50m	Grayish silty clay with fine particles of whitish yellow colour	19.50m	9	15	20	35	

Depth below G.L (m)	Soil Profile	Sample type SPT/UDS	SPT Details			"N" Value	Remarks
			15	30	45		
19.50m to 21.00m	Grayish silty clay with fine particles of whitish yellow colour	21.00m	10	15	21	36	
21.00m to 23.50m	Grayish silty clay with fine particles of whitish yellow colour	23.50m	13	18	24	42	
23.50m to 25.00m	Grayish silty clay with fine particles of whitish yellow colour	25.00m	15	20	25	45	
25.00m to 26.50m	Grayish silty clay with fine particles of whitish yellow colour	26.50m	9	15	18	33	
26.50m to 28.00m	Silty clay in whitish grey colour	28.00m	18	31	41	72	
28.00m to 29.50m	Silty clay in whitish grey colour	29.50m	20	33	45	78	
29.50m to 31.00m	Grayish silty clay with shells and kankar	31.00m	22	35	45	80	
31.00m to 32.50m	Grayish silty clay with shells and kankar	32.50m	23	35	46	81	
32.50m to 34.00m	Grayish silty clay with shells and kankar	34.00m	15	18	20	38	
34.00m to 35.50m	Silty clay in greenish gray colour	35.50m	16	18	21	39	
35.50m to 37.00m	Silty clay in greenish gray colour	37.00m	16	19	22	41	
37.00m to 38.50m	Blackish silty clay	38.50m	10	18	24	42	

Depth below G.L (m)	Soil Profile	Sample type SPT/UDS	SPT Details			“N” Value	Remarks
			15	30	45		
38.50m to 40.00m	Blackish silty clay	40.00m	12	19	25	44	
40.00m to 41.50m	Blackish silty clay	41.50m	12	17	23	40	
41.50m to 43.00m	Blackish silty clay	43.00m	14	18	25	43	
43.00m to 44.50m	Blackish silty clay	44.50m	15	18	26	44	
44.50m to 46.00m	Blackish silty clay	46.00m	15	19	25	44	
46.00m to 47.50m	Blackish silty clay with decayed coal particles	47.50m	27	35	48	83	
47.50m to 49.00m	Blackish silty clay with decayed coal particles	49.00m	30	38	50	88	
49.00m to 50.50m	Blackish silty clay with decayed coal particles	50.50m	48	>100	>100	>100	
50.50m to 52.00m	Blackish silty clay with decayed coal particles	52.00m	50	>100	>100	>100	
52.00m to 53.50m	Grayish silty clay with mica	53.50m	17	30	43	73	
53.50m to 55.00m	Grayish silty clay with mica	55.00m	19	31	45	76	
55.00m to 56.50m	Grayish silty clay with mica	56.50m	37	48	>52 for 14cm	>100	
56.50m to 58.00m	Grayish silty clay with mica	58.00m	39	50	>50 for 13cm	>100	

Depth below G.L (m)	Soil Profile	Sample type SPT/UDS	SPT Details			“N” Value	Remarks
			15	30	45		
58.00m to 59.50m	Grayish silty clay with mica	59.50m	12	30	36	66	
59.50m to 61.00m	Blackish sandy silty clay with mica	61.00m	14	32	37	69	
61.00m to 62.50m	Blackish silty clay with decayed coal particles	62.50m	21	60	>40 for 5cm	>100	
62.50m to 64.00m	Blackish silty clay with decayed coal particles	64.00m	22	62	>38 for 5cm	>100	
64.00m to 65.50m	Blackish silty clay with decayed coal particles	65.50m	22	60	>40 for 5cm	>100	
65.50m to 67.00m	Blackish silty clay with decayed coal particles	67.00m	23	63	>37 for 5cm	>100	
67.00m to 68.50m	Blackish silty clay with decayed coal particles	68.50m	22	64	>36 for 4cm	>100	
68.50m to 70.00m	Blackish silty clay with decayed coal particles	70.00m	23	65	>35 for 4cm	>100	

Bore log data of Marine Bore Hole – 2

Depth below G.L (m)	Soil Profile	Sample type SPT/UDS	SPT Details			“N” Value	Remarks
			15	30	45		
0m to 1.50m	Very loose silty clay with sea shells	1.50m	1	1	0	01	Washed sample
1.50m to 3.00m	Very loose silty clay with sea shells	3.00m	1	0	1	01	Washed sample

Depth below G.L (m)	Soil Profile	Sample type SPT/UDS	SPT Details			“N” Value	Remarks
			15	30	45		
3.00m to 4.50m	Very loose silty clay with sea shells	4.50m	1	1	0	01	Washed sample
4.50m to 6.00m	Very loose silty clay with sea shells	6.00m	3	4	6	10	
6.00m to 7.50m	Blackish silty clay with sea shells	7.50m	2	6	6	12	
7.50m to 9.00m	Blackish silty clay with sea shells	9.00m	3	5	8	13	
9.00m to 10.50m	Blackish silty clay with sea shells	10.50m	4	7	8	15	
10.50m to 12.00m	Blackish silty clay with sea shells	12.00m	3	6	5	11	
12.00m to 13.50m	Blackish silty clay with sea shells	13.50m	4	7	5	12	
13.50m to 15.00m	Blackish silty clay with sea shells	15.00m	4	7	8	15	
15.00m to 16.50m	Blackish silty clay with sea shells	16.50m	5	8	6	14	

Depth below G.L (m)	Soil Profile	Sample type SPT/UDS	SPT Details			“N” Value	Remarks
			15	30	45		
16.50m to 18.00m	Grayish silty clay with fine particles of whitish yellow colour	18.00m	7	11	13	24	
18.00m to 19.50m	Grayish silty clay with fine particles of whitish yellow colour	19.50m	8	17	22	39	
19.50m to 21.00m	Grayish silty clay with fine particles of whitish yellow colour	21.00m	9	16	19	35	
21.00m to 23.50m	Grayish silty clay with fine particles of whitish yellow colour	23.50m	10	20	26	46	
23.50m to 25.00m	Grayish silty clay with fine particles of whitish yellow colour	25.00m	14	22	23	45	
25.00m to 26.50m	Grayish silty clay with fine particles of whitish yellow colour	26.50m	10	17	18	35	

Depth below G.L (m)	Soil Profile	Sample type SPT/UDS	SPT Details			“N” Value	Remarks
			15	30	45		
26.50m to 28.00m	Silty clay in whitist grey colour	28.00m	16	30	43	73	
28.00m to 29.50m	Silty clay in whitist grey colour	29.50m	19	35	42	77	
29.50m to 31.00m	Grayish silty clay with shells and kankar	31.00m	21	37	41	78	
31.00m to 32.50m	Grayish silty clay with shells and kankar	32.50m	27	33	47	80	
32.50m to 34.00m	Grayish silty clay with shells and kankar	34.00m	19	17	21	38	
34.00m to 35.50m	Silty clay in greenish gray colour	35.50m	17	16	25	41	
35.50m to 37.00m	Silty clay in greenish gray colour	37.00m	19	20	25	45	
37.00m to 38.50m	Blackish silty clay	38.50m	13	19	24	43	
38.50m to 40.00m	Blackish silty clay	40.00m	14	21	22	43	
40.00m to 41.50m	Blackish silty clay	41.50m	14	19	21	40	

Depth below G.L (m)	Soil Profile	Sample type SPT/UDS	SPT Details			“N” Value	Remarks
			15	30	45		
41.50m to 43.00m	Blackish silty clay	43.00m	16	16	29	45	
43.00m to 44.50m	Blackish silty clay	44.50m	13	17	29	46	
44.50m to 46.00m	Blackish silty clay	46.00m	14	23	27	50	
46.00m to 47.50m	Blackish silty clay with decayed particles	47.50m	28	37	47	84	
47.50m to 49.00m	Blackish silty clay with decayed particles	49.00m	32	35	52	87	
49.00m to 50.50m	Blackish silty clay with decayed particles	50.50m	49	>100	>100 for 10cm	>100	
50.50m to 52.00m	Blackish silty clay with decayed particles	52.00m	52	>100	>100	>100	
52.00m to 53.50m	Grayish silty clay with mica	53.50m	16	>100	>100 for 12cm	>100	

Depth below G.L (m)	Soil Profile	Sample type SPT/UDS	SPT Details			“N” Value	Remarks
			15	30	45		
53.50m to 55.00m	Grayish silty clay with mica	55.00m	21	35	49	84	
55.00m to 56.50m	Grayish silty clay with mica	56.50m	34	48	>49 for 13cm	>100	
56.50m to 58.00m	Grayish silty clay with mica	58.00m	42	50	>46 for 15cm	>100	
58.00m to 59.50m	Grayish silty clay with mica	59.50m	15	35	32	67	
59.50m to 61.00m	Blackish sandy silty clay with mica	61.00m	13	32	37	69	
61.00m to 62.50m	Blackish silty clay with decayed coal particles	62.50m	27	60	>38 for 7cm	>100	
62.50m to 64.00m	Blackish silty clay with decayed coal particles	64.00m	31	62	>42 for 6cm	>100	
64.00m to 65.50m	Blackish silty clay with decayed coal particles	65.50m	35	60	>45 for 7cm	>100	

Depth below G.L (m)	Soil Profile	Sample type SPT/UDS	SPT Details			“N” Value	Remarks
			15	30	45		
65.50m to 67.00m	Blackish silty clay with decayed particles and coal	67.00m	34	63	>45 for 4cm	>100	
67.00m to 68.50m	Blackish silty clay with decayed particles and coal	68.50m	38	64	>42 for 6cm	>100	
68.50m to 70.00m	Blackish silty clay with decayed particles and coal	70.00m	43	65	>46 for 8cm	>100	

5 RECCOMENDATION

- 5.1 Based on the physical observation from the two bore holes, it is observed that N – Value is greater than 70 from (-) 26.50m to (-) 32.50m. Tentative founding level of pile may be fixed as (-) 37m and further it can be finalized based on detailed analysis during design stage.

Note:

Full Report will be hosted in the websites and the interested bidders may download the same.

VOLUME – IV
SECTION – 12
Oceanographic Surveys (Bathymetry)

