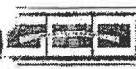







# Bore Hole Locations

**Co-ordinates of the Bore Holes**

Details of Bore Holes		Latitude	Longitude
Land Bore Hole-LBH-01		9° 57' 29.94" N	76° 16'42.61" E ✓
Marine Bore Holes	BH-01	9° 57' 34.32" N	76° 16'45.56" E ✓
	BH-02	9° 57' 35.13" N	76° 16'45.30" E ✓
	BH-03	9° 57' 35.75" N	76° 16'44.77" E ✓
	BH-04	9° 57' 36.29" N	76° 16'44.18" E ✓
	BH-05	9° 57' 31.15" N	76° 16'45.17" E ✓
	BH-06	9° 57' 30.78" N	76° 16'44.43" E ✓
	BH-07	9° 57' 28.44" N	76° 16'48.68" E ✓
	BH-08	9° 57' 30.20" N	76° 16'45.26" E ✓



PROJECT : SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY													
	GEO FOUNDATIONS & STRUCTURES PVT. LTD	Bore Hole No	: BH-01	Boring Started	: 22.11.2012		T-1613						
		Type of Boring	: Rotary	Boring Completed	: 27.11.2012								
		Termination Depth	: 45.0m	Ground Water Level	: 0.80m								
		Co-ordinates: Lat - 9° 57' 29.94" N, Long - 76° 16' 42.61" E											
LOCATION : INS VENDURUTHY													
SOIL PROFILE	THICKNESS OF STRATA (m)	DESCRIPTION OF STRATA	IS CLASSIFICATION	DEPTH (m)	SAMPLES TEST DEPTH IN m	BLOWS/15cm			SPT "N"	Rock Core characteristics			REMARKS
						15cm	15cm	15cm		C.R (%)	R.Q.D (%)	UCS KG/CM <sup>2</sup>	
	1.00	Filled Weast											
	1.80	Silty Clayey Sand with Presence of Gravel (Grey)	SC	1.50	1.50-1.95	2	3	3	6				
				3.00	3.00-3.45	2	3	2	5				
	6.70	Fine Sand (Grey)	SP-SM	4.50	4.50-4.95	3	4	5	9				
				6.00	6.00-6.45	4	4	6	10				
				7.50	7.50-7.95	4	6	7	13				
				9.00	9.00-9.45	3	3	4	7				
	19.0	Clayey Silt with Presence of Sand (D/Grey)	CH	10.5	10.5-10.95	2	1	1	2				
				12.0	12.0-12.45	1	0	1	1				
				13.5	13.5-13.95	UDS-1							
				15.0	15.0-15.45	1	1	2	3				
				16.5	16.5-16.95	2	1	2	3				
				18.0	18.0-18.45	UDS-2							
				19.5	19.5-19.95	1	1	1	2				
				21.0	21.0-21.45	2	2	3	5				
				22.5	22.5-22.95	1	1	2	3				
				24.0	24.0-24.45	1	2	2	4				
				25.5	25.5-25.95	2	1	2	3				
				27.0	27.0-27.45	2	2	3	5				
				28.5	28.5-28.95	2	2	2	4				

Note : UDS- Undisturbed Sample







SPT "N"-Standard Penetration Test "N"

Fig : 3

## PROJECT : SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY

	<b>GEO FOUNDATIONS &amp; STRUCTURES PVT. LTD</b>	Bore Hole No : BH-01	Boring Started : 22.11.2012	
		Type of Boring : Rotary	Boring Completed : 27.11.2012	
		Termination Depth : 65.0m	Ground Water Level : 0.80m	
Co-ordinates: Lat - 9° 57' 29.94" N, Long - 76° 16' 42.61" E				T-1613

LOCATION : INS VENDURUTHY

SOIL PROFILE	THICKNESS OF STRATA (m)	DESCRIPTION OF STRATA	IS CLASSIFICATION	DEPTH (m)	SAMPLES TEST DEPTH IN m	BLOWS/15cm			SPT "N"	Rock Core characteristics			REMARKS
						15cm	15cm	15cm		C.R (%)	R.Q.D (%)	UCS KG/CM <sup>2</sup>	
	9.50	Clayey Silt with Presence of Sand - (D/Brown)	CH	30.0	30.0-30.45	4	4	6	10				
				31.5	31.5-31.95	5	6	7	13				
				33.0	33.0-33.45	3	5	6	11				
				34.5	34.5-34.95	6	7	8	15				
				36.0	36.0-36.45	3	4	4	8				
				37.5	37.5-37.95	4	5	6	11				
				39.0	39.0-39.45	6	8	8	16				
	5.80	Silly Sand (Yellow)	SM	40.5	40.5-40.95	20	26	35	61				
				42.0	42.0-42.95	26	29	37	66				
				43.5	43.5-43.95	31	38	42	80				
	1.30	Fine Sand with Presence of Gravel (Grey)	SP-SM	45.0	45.0-45.45	16	14	18	32				
				46.5	46.5-46.95	8	12	14	26				
	5.40	Silly Sand (Grey)	SM	48.0	48.0-48.45	7	8	13	21				
				50.0	50.0-50.45	10	13	14	27				
				51.5	51.5-51.95	16	22	26	48				
	4.50	Fine Sand with Presence of Gravel (Grey)	SP-SM	53.0	53.0-53.45	66	100	-	>100				28/45cm penetration 15/45cm penetration
				54.5	54.5-54.95	100	-	-	>100				
				56.0	56.0-56.45	9	17	18	35				
	2.50	Clayey Sandy Silt with Presence of Organic Matter (D/Black)	CI	57.5	57.5-57.95	16	18	18	31				

Note : UDS- Undisturbed Sample

SPT "N"-Standard Penetration Test "N"

Fig : 4

Geo Foundations Structures Pvt Ltd

**PROJECT : SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY**

	<b>GEO FOUNDATIONS &amp; STRUCTURES PVT. LTD</b>	Bore Hole No : <b>BH-01</b>	Boring Started : <b>22.11.2012</b>	
		Type of Boring : <b>Rotary</b>	Boring Completed : <b>27.11.2012</b>	
		Termination Depth : <b>65.0m</b>	Ground Water Level : <b>0.80m</b>	<b>T-1613</b>
Co-ordinates: Lat - 9° 57' 29.94" N, Long - 76° 16' 42.61" E				

**LOCATION : INS VENDURUTHY**

SOIL PROFILE	THICKNESS OF STRATA (m)	DESCRIPTION OF STRATA	IS CLASSIFICATION	DEPTH (m)	SAMPLES TEST DEPTH IN m	BLOWS/15cm			SPT "N"	Rock Core characteristics			REMARKS
						15cm	15cm	15cm		C.R (%)	R.Q.D (%)	UCS KG/CM <sup>2</sup>	
	3.00	Clayey Silt with Presence of Gravel (D/Brown)	CH	59.0	59.0-59.45	14	17	17	34				29/45cm penetration 41/45cm penetration 40/45cm penetration
				60.0	60.0-60.45	10	10	12	22				
	4.50	Silly Sand (Grey)	SM	61.5	61.5-61.95	56	100	-	>100				
				63.0	63.0-63.45	33	49	51	>100				
				65.0	65.0-65.45	39	51	49	>100				

Termination Depth: 65.0 M

Note : UDS - Undisturbed Sample

SPT "N" - Standard Penetration Test "N"

Fig : 5

LOCATION: NAVAL BASE		Ground Water Level : 0.80 M		Date of Boring Started : 22.11.2012		Date of Boring Completed : 27.11.2012		Termination Depth : 65.0 M		Table No.1							
N	DEPTH (M)	SAMPLE	SOIL DESCRIPTION	I.S. CLASSIFICATION	GRAIN SIZE ANALYSIS(%) IS 2720(Part-5):1985			LL	PL	PI	SL (%) S 2720(Part-6): 1972	FSI (%) IS2720 (Part4):1977	SFG(g/s 2220(Part-3/Sec1):1980	UNIT WEIGHT (gm/cc)		SHEAR PARAMETERS-IS 2720(Part-13):1986	
					GRAVEL	SAND	SILT							CLAY	WET		DRY
<b>BOREHOLE BH/1</b>																	
6	1.50	SPT1	Silty Clayey Sand with Presence of Gravel (Grey)	SC	9	58	13	19	39	19	20						
5	3.00	SPT2	Fine Sand (Grey)	SP-SM	0	92	8	0	No Limit			2.61		1.71	1.43	DST	0 25
9	4.50	SPT3	Fine Sand (Grey)	SP-SM													
10	6.00	SPT4	Fine Sand (Grey)	SP-SM	0	91	9	0	No Limit								
18	7.50	SPT5	Fine Sand (Grey)	SP-SM	0	91	9	0	No Limit								
7	9.00	SPT6	Fine Sand (Grey)	SP-SM													
2	10.5	SPT7	Clayey Silt with Presence of Sand (D/Grey)	CH	0	7	61	32	136	41	95						
1	10.0	SPT8	Clayey Silt with Presence of Sand (D/Grey)	CH													
2	13.5	UDS1	Clayey Silt with Presence of Sand (D/Grey)	CH	0	5	64	31	98	39	84		2.40	1.42	0.72	Triaxial	0.10 0
3	15.0	SPT9	Clayey Silt with Presence of Sand (D/Grey)	CH	0	3	60	37	95								
3	16.5	SPT10	Clayey Silt with Presence of Sand (D/Grey)	CH													
2	18.0	UDS2	Clayey Silt with Presence of Sand (D/Grey)	CH	0	10	60	30	100	43	84						
2	19.5	SPT11	Clayey Silt with Presence of Sand (D/Grey)	CH	0	8	60	32	97								
2	21.0	SPT12	Clayey Silt with Presence of Sand (D/Grey)	CH													
3	22.5	SPT13	Clayey Silt with Presence of Sand (D/Grey)	CH	0	5	60	35	96								
4	24.0	SPT14	Clayey Silt with Presence of Sand (D/Grey)	CH	0	3	69	28	105	37	68						

NAME OF WORK: SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY		Ground Water Level : 0.80 M		Date of Boring Started : 22.11.2012		Table No. 2															
LOCATION: NAVAL BASE		Termination Depth : 45.0 M		Date of Boring Completed : 27.11.2012		UNIT WEIGHT (gm/cc)															
N	DEPTH (M)	SAMPLE	SOIL DESCRIPTION	I.S. CLASSIFICATION	GRAIN SIZE ANALYSIS (%) IS 2720 (Part-5): 1985			WET	DRY	METHOD	SHEAR PARAMETERS- IS 2720 (Part-13): 1986										
					GRAVEL	SAND	SILT					CLAY	SPG (IS 2720 (Part-1): 1980)								
				ATERBERG'S LIMIT (%) IS 2720 (Part-5): 1985			SF (IS 2720 (Part-1): 1980)														
				FL (%)			PL (%)														
				PI (%)			PI (%)														
				W.C. (%)			W.C. (%)														
3	25.0	SPT15	Clayey Silt with Presence of Sand (D/Grey)	CH	0	6	65	29	103	116	40	76									
5	27.0	SPT16	Clayey Silt with Presence of Sand (D/Grey)	CH	0	6	65	29	103	116	40	76									
4	25.5	SPT17	Clayey Silt with Presence of Sand (D/Grey)	CH																	
10	30.0	SPT18	Clayey Silt with Presence of Sand (D/Brown)	CH	0	10	62	29	64	84	32	52	2.45	1.64	1.00	UCS	0.35				
13	31.5	SPT19	Clayey Silt with Presence of Sand (D/Brown)	CH	0	12	56	32													
11	33.0	SPT20	Clayey Silt with Presence of Sand (D/Brown)	CH																	
15	34.5	SPT21	Clayey Silt with Presence of Sand (D/Brown)	CH																	
6	36.0	SPT22	Clayey Silt with Presence of Sand (Grey)	CH	0	3	53	45	52	92	34	58									
17	37.5	SPT23	Clayey Silt with Presence of Sand (Grey)	CH	0	2	56	42	50												
16	35.0	SPT24	Clayey Silt with Presence of Sand (Grey)	CH																	
61	40.5	SPT25	Silty Sand (Yellow)	SM	0	73	27	0	16	No Limit			2.60	1.96	1.69	DST	0	36			
46	42.0	SPT26	Silty Sand (Yellow)	SM	0	75	25	0	17	No Limit											
50	43.5	SPT27	Silty Sand (Yellow)	SM																	
52	45.0	SPT28	Fine Sand with Presence of Gravel (Grey)	SP-SM	1	93	6	0	17	No Limit											
26	46.5	SPT29	Silty Sand (Grey)	SM	0	71	29	0	24	No Limit											
21	48.0	SPT30	Silty Sand (Grey)	SM																	

Client: M/s. Naval Ship Repair Yard

**Report No: R-272**

Soil Investigation work for the Proposed North Jetty

**NAME OF WORK: SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY**

LOCATION: NAVAL BASE		Ground Water Level : 0.80 M		Date of Boring Started : 22.11.2012		Date of Boring Completed : 27.11.2012		Termination Depth : 65.0 M		UNIT WEIGHT (gm/cc)		SHEAR PARAMETERS-IS			
N	DEPTH (M)	SAMPLE	SOIL DESCRIPTION	I.S. CLASSIFICATION	GRAIN SIZE ANALYSIS IS 2720(Part-5):1985			ATTERBERG'S LIMITS IS 2720(Part-5):1985			2720(Pct-3/Sec1):1980	2720(Pct-1972)	FSI (%) 152720 (Part-4):1977	SF G(s)	METHOD
					GRAVEL	SAND	SILT	CLAY	LL	PL					
<b>BOREHOLE BH/1</b>															
27	50.0	SPT31	Silty Sand (Grey)	SM	0	75	25	0	20	No Limit					
48	51.0	SPT32	Fine Sand with Presence of Gravel (Grey)	SP-SM	1	94	5	0	16	No Limit	2.62	2.06	1.78	DST	0 37
>100	53.0	SPT33	Fine Sand with Presence of Gravel (Grey)	SP-SM											
>100	54.5	SPT34	Fine Sand with Presence of Gravel (Grey)	SP-SM	0	95	5	0	15						
35	56.0	SPT35	Clayey Sandy Silt with Presence of Organic Matter (D/Black)	CI	0	36	42	22	50	46					
31	57.5	SPT36	Clayey Sandy Silt with Presence of Organic Matter (D/Black)	CI											
34	59.0	SPT37	Clayey Silt with Presence of Gravel (D/Brown)	CH	0	2	35	26	37	75	29	46			
22	60.0	SPT38	Clayey Silt with Presence of Gravel (D/Brown)	CH	0	3	33	64	35						
>100	61.5	SPT39	Silty Sand (Grey)	SM	0	76	24	0	14	No Limit	2.61	2.12	1.86	DST	0 38
>100	63.0	SPT40	Silty Sand (Grey)	SM											
>100	65.0	SPT41	Silty Sand (Grey)	SM	0	80	20	0	15	No Limit					



**PROJECT : SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY**

	<b>GEO FOUNDATIONS &amp; STRUCTURES PVT. LTD</b>	Bore Hole No : <b>BH-02</b>	Boring Started : <b>31.12.2012</b>	
		Type of Boring : <b>Rotary</b>	Boring Completed : <b>02.01.2013</b>	
		Termination Depth : <b>60.0m</b>	Length of water column : <b>6.60m</b>	<b>T-1613</b>
Co-ordinates: Lat - 9°57'35.13"N, Long - 76°16'45.30"E				

**LOCATION : INS VENDURUTHY(UNDER WATER BORING)**

SOIL PROFILE	THICKNESS OF STRATA (m)	DESCRIPTION OF STRATA	IS CLASSIFICATION	DEPTH (m)	SAMPLES TEST DEPTH IN m	BLOWS/15cm			SPT "N"	Rock Core characteristics			REMARKS
						15cm	15cm	15cm		C.R (%)	R.Q.D (%)	UCS KG/CM <sup>2</sup>	
	6.00	WATER											
		EXISTING BED LEVEL		0.00									
	24.0	Clayey Silt with Traces of Sand (Grey)		1.50	1.50-1.95	1	0	0	<1				
				3.00	3.00-3.45	1	0	0	<1				
				4.50	4.50-4.95	1	0	1	1				
				5.00	5.00-5.45	VST-1							
				6.00	6.00-6.45	1	1	1	2				
				7.50	7.50-7.95	1	1	1	2				
				9.00	9.00-9.45	1	0	2	2				
				10.0	10.0-10.45	VST-2							
				10.5	10.5-10.95	1	1	1	2				
				12.0	12.0-12.45	UDS-1							
				13.5	13.5-13.95	1	2	1	3				
				15.0	15.0-15.45	UDS-2							
				16.5	16.5-16.95	1	1	1	2				
				18.0	18.0-18.45	1	2	1	3				
				19.5	19.5-19.95	7	8	13	21				
				21.0	21.0-21.45	9	13	17	30				
22.5	22.5-22.95	8	14	21	35								
24.0	24.0-24.45	7	10	14	24								

(Contd.....fig. 40)

Code : UDS- Undisturbed Sample

SPT "N"- Standard Penetration Test "N"

Fig : 40

**PROJECT : SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY**

	<b>GEO FOUNDATIONS &amp; STRUCTURES PVT. LTD</b>	Bore Hole No : <b>BH-02</b>	Boring Started : <b>31.12.2012</b>	
		Type of Boring : <b>Rotary</b>	Boring Completed : <b>02.01.2013</b>	
		Termination Depth : <b>60.0m</b>	Length of water column : <b>6.60m</b>	
Co-ordinates: Lat - 9°57'35.13"N, Long - 76°16'45.30"E				<b>T-1613</b>

**LOCATION : INS VENDORUTHY**

SOIL PROFILE	THICKNESS OF STRATA (m)	DESCRIPTION OF STRATA	IS CLASSIFICATION	DEPTH (m)	SAMPLES TEST DEPTH IN m	BLOWS/15cm			SPT "N"	Rock Core characteristics			REMARKS
						15cm	15cm	15cm		C.R (%)	R.Q.D (%)	UCS KG/CM <sup>2</sup>	
	7.90	Clayey Silt with Traces of Sand (Grey)	CH	25.5	25.5-25.95	7	9	13	22				
				27.0	27.0-27.45	8	11	9	20				
				28.5	28.5-28.95	6	10	13	23				
				30.0	30.0-30.45	9	12	15	27				
				32.0	32.0-32.45	10	19	28	47				
	11.20	Clayey Silty Sand (G/Yellow)	SC	34.0	34.0-34.45	18	23	41	64				42/45cm penetration
				36.0	36.0-36.45	28	50	50	>100				
				38.0	38.0-38.45	23	37	54	91				
				40.0	40.0-40.45	26	51	49	>100				40/45cm penetration
				42.0	42.0-42.45	29	46	54	>100				43/45cm penetration
				44.0	44.0-44.45	17	19	26	45				
	4.90	Sandy Clayey Silt (Grey)	CH	46.0	46.0-46.45	12	17	21	38				
				48.0	48.0-48.45	14	16	20	36				
				50.0	50.0-50.45	17	20	25	45				
	12.00	Silty sand (Grey)	SM	52.0	52.0-52.45	53	100	-	>100				25/45cm penetration
				54.0	54.0-54.45	71	100	-	>100				19/45cm penetration
				56.0	56.0-56.45	29	79	21	>100				33/45cm penetration
				58.0	58.0-58.45	100	-	-	>100				15/45cm penetration
				60.0	60.0-60.45	68	100	-	>100				28/45cm penetration

Termination Depth : 60.0m  
 Note : UDS- Undisturbed Sample  
 SPT "N"-Standard Penetration Test "N"

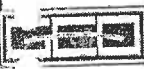


Fig : 41

Geo Foundations Structures Pvt Ltd

NAME OF WORK: SOIL INVESTIGATION WORK FOR THE PROPOSED OF NORTH JETTY		Date of Boring Started : 31.12.2012		Table No7																
LOCATION: NAVAL BASE		Low Tide water : 6.00 m		Termination Depth : 60.00 M																
N	DEPTH (M)	SOIL DESCRIPTION	I.S. CLASSIFICATION	GRAIN SIZE ANALYSIS (%)-IS 2720(Part-5):1985			GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	M.C (%)	L.L (%)	P.L (%)	P.I (%)	S.L (%)	F.S.I (%)	S.F.G.I (S)	UNIT WEIGHT (gm/cc)	SHEAR PARAMETERS-IS 2720(Part-13):1986	
				GRAVEL (%)	SAND (%)	SILT (%)														CLAY (%)
<b>BOREHOLE BH/02</b>																				
41	1.50	SPT1	CH	0	3	60	37	118	126	36	90									
41	3.00	SPT2	CH	0	2	60	38	115												
1	4.50	SPT3	CH																	
-	5.00	VST1	CH																	VST 0.03
2	6.00	SPT4	CH	0	2	63	35	110	117	35	82									
2	7.50	SPT5	CH																	
2	9.00	SPT6	CH																	
-	10.0	VST-2	CH																	VST 0.06
2	10.5	SPT7	CH	0	4	57	39	109												
-	12.0	UPS1	CH	0	3	59	38	107	119	36	83						2.41	1.41	0.68	UCS 0.09
3	13.5	SPT8	CH																	
-	15.0	UPS2	CH	0	6	52	42	99	112	38	74									
2	16.5	SPT9	CH	0	5	50	45	95	101	39	62									
3	18.0	SPT10	CH																	
21	19.5	SPT11	CH	0	4	41	55	68	72	40	32									
30	21.0	SPT12	CH																	
35	22.5	SPT13	CH	0	5	45	50	65												

NAME OF WORK: SOIL INVESTIGATION WORK FOR THE PROPOSED OF NORTH JETTY		Date of Boring Started : 31.12.2012		Date of Boring Completed : 02.01.2013		Table No. 8										
LOCATION: NAVAL BASE		Hide Tide Water : 6.60 m		Termination Depth : 60.00 M		T-1613										
SOIL DESCRIPTION		GRAIN SIZE ANALYSIS(%) IS 2720(Part-5):1985		ATTERBERG'S LIMIT(%) IS 2720(Part-5): 1985		SHEAR PARAMETERS-IS 2720(Part-13):1986										
N	DEPTH (M)	I.S. CLASSIFICATION	GRA - VEL	SAND	SILT	CLAY	SL (%) IS 2720(Part-6): 1972	FSI (%) IS 2720 (Part-40):1977	5P G (IS 2720(Part-3):1980)	UNIT WEIGHT (gm/cc)		SHEAR METHOD				
										WET	DRY		kg/cm <sup>2</sup>	( $\sigma$ )		
<b>BOREHOLE BH/02</b>																
21	24.0	SPT14	CH	0	1	48	51	57	70	38	32	2.39	1.73	1.10	UCS	0.95
22	25.5	SPT15	CH													
20	27.0	SPT16	CH													
23	28.5	SPT17	CH	0	2	52	46	38								
27	30.0	SPT18	CH													
27	32.0	SPT19	SC	0	51	33	16	23	38	19	19					
28	34.0	SPT20	SC	0	55	30	15	22								
> 30	36.0	SPT21	SC													
31	38.0	SPT22	SC	0	55	27	18	26	40	20	20					
> 32	40.0	SPT23	SC	0	58	23	19	25								
> 34	42.0	SPT24	SC													
35	44.0	SPT25	CH	0	24	42	34	37	56	25	31	2.46	1.86	1.36	UCS	1.33
36	46.0	SPT26	CH	0	20	45	35	34								
37	48.0	SPT27	CH													
38	50.0	SPT28	SM	0	73	27	0	11	No Limit							
> 40	52.0	SPT29	SM	0	75	25	0	14								
> 42	54.0	SPT30	SM													
> 44	56.0	SPT31	SM	0	88	12	0	15	No Limit			2.63	2.20	1.91	DST	0

NAME OF WORK: SOIL INVESTIGATION WORK FOR THE PROPOSED OF NORTH JETTY															
LOCATION: NAVAL BASE		High Tide Water	: 6.60 m		Date of Boring Started	: 31.12.2012		Table No.9							
		Low Tide water	: 6.00 m		Date of Boring Completed	: 02.01.2013									
		Termination Depth			: 60.00 M										
M	DEPTH (M)	SAMPLE	SOIL DESCRIPTION	I.S. CLASSIFICATION	GRAIN SIZE ANALYSIS(%): 1985			ATTERBERG'S LIMIT(%): 1985			SFG (IS 2720 (Part-13): 1986)	UNIT WEIGHT (gm/cc)		SHEAR PARAMETERS - IS 2720 (Part-13): 1986	
					GRAVEL	SAND	SILT.	CLAY	LL	PL		PI	WET		DRY
BOREHOLE BH/02															
>100	58.0	SPT32	Silty Sand (Grey)	SM											
>100	60.0	SPT33	Silty Sand (Grey)	SM	0	79	21	0	13	No Limit					

PROJECT : SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY													
 <b>GEO FOUNDATIONS &amp; STRUCTURES PVT. LTD</b>		Bore Hole No : <b>BH-03</b> Type of Boring : <b>Rotary</b> Termination Depth : <b>60.0m</b>			Boring Started : <b>02.01.2013</b> Boring Completed : <b>04.01.2013</b> Length of water column : <b>7.50m</b>			 <b>T-1613</b>					
		Co-ordinates: Lat - 9°57'35.75"N, Long - 76°16'44.77"E											
LOCATION : INS VENDURUTHY(UNDER WATER BORING)													
SOIL PROFILE	THICKNESS OF STRATA (m)	DESCRIPTION OF STRATA	IS CLASSIFICATION	DEPTH (m)	SAMPLES TEST DEPTH IN m	BLOWS/15cm			SPT "N"	Rock Core characteristics			REMARKS
						15cm	15cm	15cm		C.R (%)	R.Q.D (%)	UCS KG/CM <sup>2</sup>	
	6.00	WATER		0.00									
		EXISTING BED LEVEL											
	24.0	Clayey Silt with Traces of Sand (Grey)	CH	1.50	1.50-1.95	1	0	0	0				
				3.00	3.00-3.45	1	0	0	0				
				4.50	4.50-4.95	1	0	1	1				
				6.00	6.00-6.45	1	0	1	1				
				7.00	7.00-7.45	VST-1							
				7.50	7.50-7.95	1	0	1	1				
				9.00	9.00-9.45	1	1	1	2				
				10.0	10.0-10.45	VST-2							
				10.5	10.5-10.95	1	1	1	2				
				12.0	12.0-12.45	UDS-1							
				13.5	13.5-13.95	1	1	2	3				
				15.0	15.0-15.45	UDS-2							
				16.5	16.5-16.95	1	2	2	4				
				18.0	18.0-18.45	2	2	3	5				
				19.5	19.5-19.95	5	6	7	13				
				21.0	21.0-21.45	8	12	13	25				
				22.5	22.5-22.95	9	11	14	25				
				24.0	24.0-25.45	9	13	16	29				

(Contd.....fig. 57)

ate : UDS- Undisturbed Sample

SPT "N"-Standard Penetration Test "N"

Fig : 57

Geo Foundations Structures Pvt Ltd

## PROJECT : SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY

	<b>GEO FOUNDATIONS &amp; STRUCTURES PVT. LTD</b>	Bore Hole No : <b>BH-03</b>	Boring Started : <b>02.01.2013</b>	
		Type of Boring : <b>Rotary</b>	Boring Completed : <b>04.01.2013</b>	
		Termination Depth : <b>60.0m</b>	Length of water column : <b>7.50m</b>	
Co-ordinates: Lat - 9°57'35.75"N, Long - 76°16'44.77"E				<b>T-1613</b>

## LOCATION : INS VENDURUTHY

SOIL PROFILE	THICKNESS OF STRATA (m)	DESCRIPTION OF STRATA	IS CLASSIFICATION	DEPTH (m)	SAMPLES	BLOWS/15cm			SPT "N"	Rock Core characteristics			REMARKS	
						TEST DEPTH IN m	15cm	15cm		15cm	C.R (%)	R.Q.D (%)		UCS KG/CM <sup>2</sup>
	3.00	Clayey Silt with Traces of Sand (G/Yellow)	CH	25.5	25.5-25.95	10	15	21	36					
				27.0	27.0-27.45	7	9	13	22					
	3.50	Sandy Clayey Silt (Grey)	CI	28.5	28.5-28.95	10	13	26	39					
				30.0	30.0-30.45	11	17	29	46					
	11.40	Clayey Silty Sand with Presence of Organic Matter (Grey)	SC	32.0	32.0-32.45	10	24	45	69				43/45cm penetration	
				34.0	34.0-34.45	13	21	36	57					
				36.0	36.0-36.45	16	28	40	68					
				38.0	38.0-38.45	18	29	47	76					
				40.0	40.0-40.45	20	44	56	>100					
				42.0	42.0-42.45	19	24	29	53					
	7.50	Sandy Clayey Silt (P/Grey)	CH	44.0	44.0-44.45	13	20	26	46				30/45cm penetration 40/45cm penetration 32/45cm penetration 15/45cm penetration 21/45cm penetration	
				46.0	46.0-46.45	14	17	23	40					
				48.0	48.0-48.45	20	27	30	57					
				50.0	50.0-50.45	19	28	46	74					
				52.0	52.0-52.45	34	100	-	>100					
				54.0	54.0-54.45	21	69	31	>100					
	10.6	Silty Sand (P/Grey)	SM	56.0	56.0-56.45	43	76	24	>100					
				58.0	58.0-58.45	100	-	-	>100					
				60.0	60.0-60.45	62	100	-	>100					

Termination Depth : 60.0m

Note : UDS- Undisturbed Sample

SPT "N"-Standard Penetration Test "N"

Fig : 58

Geo Foundations Structures Pvt Ltd



NAME OF WORK: SOIL INVESTIGATION WORK FOR THE PROPOSED OF NORTH JETTY



Table No.10  
T-1613



Hide Tide Water : 7.50 M  
Low Tide water : 6.90 M

Date of Boring Started : 02.01.2013  
Date of Boring Completed : 04.01.2013  
Termination Depth : 60.00 M

GRAIN SIZE ANALYSIS (%) IS 2720 (Part-5): 1985  
GRA - VEL SAND SILT. CLAY

SL (%) IS 2720 (Part-6): 1972  
FSI (%) IS 2720 (Part-40): 1977  
SFG (IS 2720 Part-3) (Part-1): 1980  
UNIT WEIGHT (gm/cc)  
WET DRY  
SHEAR PARAMETERS- IS 2720 (Part-13): 1986  
METHOD kg/cm<sup>2</sup> Ø (°)

N	DEPTH (M)	SAMPLE	SOIL DESCRIPTION	I.S. CLASSIFICATION	GRAIN SIZE ANALYSIS (%) IS 2720 (Part-5): 1985			ATTERBERG'S LIMIT (%) IS 2720 (Part-5): 1985			SL (%) IS 2720 (Part-6): 1972	FSI (%) IS 2720 (Part-40): 1977	SFG (IS 2720 Part-3) (Part-1): 1980	UNIT WEIGHT (gm/cc)		SHEAR PARAMETERS- IS 2720 (Part-13): 1986
					GRA - VEL	SAND	SILT.	CLAY	LL	PL				PI	WET	

BOREHOLE BH/03

1	1.50	SPT1	Sandy Silt with traces of Sand (Grey)	CH	0	3	60	37	131	39	92					
1	3.00	SPT2	Sandy Silt with traces of Sand (Grey)	CH												
1	4.20	SPT3	Sandy Silt with traces of Sand (Grey)	CH	0	5	60	35	110	35	84					
1	6.00	SPT4	Sandy Silt with traces of Sand (Grey)	CH	0	8	53	39	106	38	77					
	7.00	VST1	Sandy Silt with traces of Sand (Grey)	CH											VST	0.027
1	7.50	SPT5	Sandy Silt with traces of Sand (Grey)	CH												
2	9.00	SPT6	Sandy Silt with traces of Sand (P/Grey)	CH	0	3	56	41	94							
	10.00	VST-2	Sandy Silt with traces of Sand (P/Grey)	CH											VST	0.06
2	10.5	SPT7	Sandy Silt with traces of Sand (P/Grey)	CH												
	12.00	UDS1	Sandy Silt with traces of Sand (P/Grey)	CH	0	1	65	34	101	37	73	2.38	1.41	0.70	Triaxial	0.18
3	13.5	SPT8	Sandy Silt with traces of Sand (P/Grey)	CH												
	15.00	SPT9	Sandy Silt with traces of Sand (P/Grey)	CH	0	3	60	37	97	35	71	2.40	1.48	0.78	UCS	0.12
4	16.5	UDS2	Sandy Silt with traces of Sand (G/Yellow)	CH	0	2	60	38	90							
5	18.0	SPT10	Sandy Silt with traces of Sand (G/Yellow)	CH												
19	19.5	SPT11	Sandy Silt with traces of Sand (G/Yellow)	CH	0	9	52	38	62							
25	21.0	SPT12	Sandy Silt with traces of Sand (G/Yellow)	CH	0	5	55	40	61	30	44					



**NAME OF WORK: SOIL INVESTIGATION WORK FOR THE PROPOSED OF NORTH JETTY**

**LOCATION: NAVAL BASE**

Hide Tide Water : 7.50 M Date of Boring Started : 02.01.2013  
 Low Tide water : 6.90 M Date of Boring Completed : 04.01.2013  
 Termination Depth : 60.00 M



**Table No. 11**

T-1613


N	DEPTH (M)	SAMPLE	SOIL DESCRIPTION	I.S. CLASSIFICATION	GRAIN SIZE ANALYSIS (%) IS 2720 (Part 5): 1985				ATERBERG'S LIMIT (%) IS 2720 (Part 5): 1985			SF <sub>G</sub> (IS 2720 (Part 1): 1977)	UNIT WEIGHT (gm/cc)		SHEAR PARAMETERS- IS 2720 (Part-13): 1986	
					GRAVEL	SAND	SILT	CLAY	LI	PL	PI		WET	DRY		METHOD
<b>BOREHOLE BH/03</b>																
25	22.5	SPT13	Sandy silt with traces of Sand (G/Yellow)	CH	0	2	43	55	61							
26	24.0	SPT14	Sandy silt with traces of Sand (G/Yellow)	CH	0	2	43	55	61							
26	25.5	SPT15	Sandy silt with traces of Sand (G/Yellow)	CH	0	2	46	52	54	77	32	45				
27	27.0	SPT16	Sandy silt with traces of Sand (G/Yellow)	CH	0	2	46	52	54	77	32	45	2.41	1.64	1.06	UCS 0.80
39	28.5	SPT17	Sandy Clayey Silt (Grey)	CI	0	35	33	32	24							
46	30.0	SPT18	Sandy Clayey Silt (Grey)	CI												
69	32.0	SPT19	Clayey / Silty Sand with Presence of Organic Matter (Grey)	SC	0	58	27	15	27	40	20	20				
57	34.0	SPT20	Clayey Silty Sand with Presence of Organic Matter (Grey)	SC	0	55	27	18	25							
48	36.0	SPT21	Clayey Silty Sand with Presence of Organic Matter (Grey)	SC	0	54	29	17	23	41	20	21				
76	38.0	SPT22	Clayey Silty Sand with Presence of Organic Matter (Grey)	SC	0	54	29	17	23	41	20	21				
100	40.0	SPT23	Clayey Silty Sand with Presence of Organic Matter (Grey)	SC												
83	42.0	SPT24	Sandy Clayey Silt (Grey)	CH	0	23	40	37	40	66	29	39	2.47	1.78	1.27	UCS 1.45
46	44.0	SPT25	Sandy Clayey Silt (Grey)	CH												
57	46.0	SPT26	Sandy Clayey Silt (Grey)	CH	0	21	45	34	38							
74	48.0	SPT27	Sandy Clayey Silt (Grey)	CH	0	19	50	31	37	62	28	34				
100	50.0	SPT28	Silty Sand (P/Grey)	SM	0	75	25	0	18	No Limit						
100	52.0	SPT29	Silty Sand (P/Grey)	SM												



**PROJECT : SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY**

	<b>GEO FOUNDATIONS &amp; STRUCTURES PVT. LTD</b>	Bore Hole No : <b>BH-04</b>	Boring Started : 05.01.2013	
		Type of Boring : Rotary	Boring Completed : 08.01.2013	
		Termination Depth : <b>60.0m</b>	Length of water column : 8.70m	<b>T-1613</b>
Co-ordinates: Lat - 9° 57' 36.29" N, Long - 76° 16' 44.18" E				

**LOCATION : INS VENDORUTHY(UNDER WATER BORING)**

SOIL PROFILE	THICKNESS OF STRATA (m)	DESCRIPTION OF STRATA	IS CLASSIFICATION	DEPTH (m)	SAMPLES TEST DEPTH IN m	BLOWS/15cm			SPT "N"	Rock Core characteristics			REMARKS
						15cm	15cm	15cm		C.R (%)	R.Q.D (%)	UCS KG/CM <sup>2</sup>	
	8.70	WATER											
		EXISTING BED LEVEL		0.00									
	24.0	Clayey Silt with Traces of Sand (Grey)	CH	1.50	1.50-1.95	1	0	0	<1				
				3.00	3.00-3.45	1	0	0	<1				
				4.50	4.50-4.95	1	0	1	1				
				5.00	5.00-5.45	VST-1							
				6.00	6.00-6.45	1	0	1	1				
				7.50	7.50-7.95	1	0	1	1				
				8.00	8.00-8.45	VST-2							
				9.00	9.00-9.45	1	1	1	2				
				10.5	10.5-10.95	UDS-1							
				12.0	12.0-12.45	1	1	1	2				
				13.5	13.5-13.95	UDS-2							
				15.0	15.0-15.45	6	9	14	23				
				16.5	16.5-16.95	9	12	24	36				
				18.0	18.0-18.45	9	16	23	39				
				19.5	19.5-19.95	13	15	18	33				
				21.0	21.0-21.45	11	14	18	32				
22.5	22.5-22.95	8	15	17	32								
24.0	24.0-25.45	10	9	14	23								

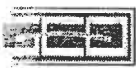

(Contd.....fig. 3)

Note : UDS- Undisturbed Sample


SPT "N"-Standard Penetration Test "N"

Fig : 73

## PROJECT : SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY

	<b>GEO FOUNDATIONS &amp; STRUCTURES PVT. LTD</b>	Bore Hole No : <b>BH-04</b>	Boring Started : <b>05.01.2013</b>	
		Type of Boring : <b>Rotary</b>	Boring Completed : <b>08.01.2013</b>	
		Termination Depth : <b>60.0m</b>	Length of water column : <b>8.70m</b>	
Co-ordinates: Lat - 9° 57' 36.29" N, Long - 76° 16' 44.18" E				

## LOCATION : INS VENDURUTHY

SOIL PROFILE	THICKNESS OF STRATA (m)	DESCRIPTION OF STRATA	IS CLASSIFICATION	DEPTH (m)	SAMPLES TEST DEPTH IN m	BLOWS/15cm			SPT "N"	Rock Core characteristics			REMARKS
						15cm	15cm	15cm		C.R (%)	R.Q.D (%)	UCS KG/CM <sup>2</sup>	
	2.20	Clayey Silt with Traces Of Sand (Grey)	CH	25.5	25.5-25.95	9	11	11	22				
	19.8	Clayey Silty Sand (Grey)	SC	27.0	27.0-27.45	8	9	11	20				
28.5				28.5-28.95	10	8	12	20					
30.0				30.0-30.45	9	11	12	23					
32.0				32.0-32.45	10	13	16	29					
34.0				34.0-34.45	14	21	33	54					
36.0				36.0-36.45	14	39	50	89					
38.0				38.0-38.45	19	28	43	71					
40.0				40.0-40.45	13	30	49	79					
42.0				42.0-42.45	18	29	33	62					
44.0				44.0-44.45	17	31	43	74					
14.0	Silty Sand (Y/Grey)	SM	46.0	46.0-46.45	53	100	-	>100				27/45cm penetration	
			48.0	48.0-48.45	41	81	19	100				32/45cm penetration	
			50.0	50.0-50.45	63	100	-	>100				25/45cm penetration	
			52.0	52.0-52.45	100	-	-	>100				15/45cm penetration	
			54.0	54.0-54.45	100	-	-	>100				14/45cm penetration	
			56.0	56.0-56.45	71	100	-	>100				21/45cm penetration	
			58.0	58.0-58.45	66	100	-	>100				25/45cm penetration	
	Silty Sand (P/Grey)		60.0	60.0-60.45	100	-	-	>100			15/45cm penetration		

Termination Depth : 60.0m

Note : UDS- Undisturbed Sample

SPT "N"-Standard Penetration Test "N"

Fig : 74

Geo Foundations Structures Pvt Ltd

NAME OF WORK: SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY		Date of Boring Started : 05.01.2013		Date of Boring Completed : 08.01.2013		Termination Depth : 60.00 M		Table No.13													
LOCATION: NAVAL BASE		High Tide Water : 8.70 m		Low Tide Water : 8.10 m				UNIT WEIGHT (gm/cc)													
DEPTH (M)	SAMPLE	SOIL DESCRIPTION	L.S. CLASSIFICATION	GRAIN SIZE ANALYSIS (%) IS 2720 (Part 5): 1985			NMC (%) IS 2720 (Part 2): 1973	ATTERBERG'S LIMIT (%) - IS 2720 (Part 5): 1985	SPG (IS 2720 (Part 1): 1980)	SHEAR PARAMETERS - IS 2720 (Part 13): 1986											
				GRAVEL	SAND	SILT					CLAY	WET	DRY	METHOD	kg/cm <sup>2</sup>	φ (°)					
<b>BOREHOLE BH/04</b>																					
1	SPT1	Clayey silt with traces of sand (Grey)	CH	0	6	60	34	116	122	39	83										
1	SPT2	Clayey silt with traces of sand (Grey)	CH																		
1	SPT3	Clayey silt with traces of sand (Grey)	CH	0	5	60	35	110	119	37	82										
1	VST1	Clayey silt with traces of sand (Grey)	CH																	VST	0.03
1	SPT4	Clayey silt with traces of sand (Grey)	CH	0	4	66	30	112													
1	SPT5	Clayey silt with traces of sand (Grey)	CH																		
1	VST2	Clayey silt with traces of sand (Grey)	CH																	VST	0.04
2	SPT6	Clayey silt with traces of sand (G/Yellow)	CH																		
2	UDS1	Clayey silt with traces of sand (G/Yellow)	CH	0	2	61	37	110	115	38	77			2.38	1.32	0.63	UCS	0.12			
2	SPT7	Clayey silt with traces of sand (G/Yellow)	CH																		
2	UDS2	Clayey silt with traces of sand (G/Yellow)	CH	0	5	61	34	80	96	37	59			2.39	1.58	0.88	Triaxial	0.15	1		
23	SPT8	Sandy silty Clay with ravel (P/Grey)	CH	11	19	20	50	88													
36	SPT9	Clayey silt traces of sand (Y/Grey)	CH	0	4	64	32	87													
39	SPT10	Clayey silt traces of sand (Y/Grey)	CH	0	6	41	53	58	76	38	38										
33	SPT11	Clayey silt traces of sand (Y/Grey)	CH																		
32	SPT12	Clayey silt traces of sand (Y/Grey)	CH	0	5	40	55														
32	SPT13	Clayey silt traces of sand (Grey)	CH	0	7	43	50	62	68	34	34			2.40	1.66	1.02	UCS	1.25			

Client: M/s Naval Ship Repair Yard

Report No: R-272

Soil Investigation work for the Proposed North Jetty

**NAME OF WORK: SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY**



Table No: 14

T-1613

Hide Tide Water : 8.70 m  
Low Tide water : 8.10 m

Date of Boring Started : 05.01.2013  
Date of Boring Completed : 08.01.2013  
Termination Depth : 60.00 M

GRAIN SIZE ANALYSIS(%) IS 2720(Part-5):1985  
GRAVEL (GRA) : 0  
SAND : 5  
SILT : 47  
CLAY : 48

IS 2720(Part-5):1985  
LL : 39  
PL : 20  
PI : 19


UNIT WEIGHT (gm/cc)  
WET : 1.98  
DRY : 1.57

SFG (IS 2720(Part-14):1977) : 2.60  
SFG (IS 2720(Part-14):1977) : 2.60

SHEAR PARAMETERS- IS 2720(Part-13):1986  
METHOD : DST  
C : 0  
φ (°) : 37

**BOREHOLE BH/04**

N	DEPTH (M)	SAMPLE	SOIL DESCRIPTION	I.S. CLASSIFICATION	GRAIN SIZE ANALYSIS(%) IS 2720(Part-5):1985				M.C (%) IS 2720(Part-2):1973	ATTERBERG'S LIMIT(%) IS 2720(Part-5): 1985			SL (%) IS 2720(Part-6): 1972	FSI (%) IS 2720(Part-4):1977	SFG (IS 2720(Part-14):1977)	UNIT WEIGHT (gm/cc)		SHEAR PARAMETERS- IS 2720(Part-13):1986			
					GRAVEL (GRA)	SAND	SILT	CLAY		LL	PL	PI				WET	DRY		METHOD	C	φ (°)
23	24.0	SPT14	Clayey Silty traces of Sand (Grey)	CH	0	5	47	48	60												
22	25.5	SPT15	Clayey Silty traces of Sand (Grey)	CH																	
20	27.0	SPT16	Clayey Silty Sand (Grey)	SC	0	57	27	16	23	39	20	19									
20	28.5	SPT17	Clayey Silty Sand (Grey)	SC																	
23	30.0	SPT18	Clayey Silty Sand (Grey)	SC	0	59	23	18	21												
29	32.0	SPT19	Clayey silty Sand (Grey)	SC	0	62	20	18	27	39	19	20									
54	34.0	SPT20	Clayey Silty Sand (Grey)	SC																	
89	36.0	SPT21	Clayey Silty Sand (Grey)	SC	0	59	26	15	24												
71	38.0	SPT22	Clayey silty Sand (Grey)	SC																	
79	40.0	SPT23	Clayey Silty Sand (Grey)	SC	0	60	22	18	22	40	19	21									
82	42.0	SPT24	Clayey silty sand with Gravel (Grey)	SC	4	60	25	11	21												
74	44.0	SPT25	Clayey silty sand with Gravel (Grey)	SC																	
>100	46.0	SPT26	Silty Sand (Y/Grey)	SM	0	72	28	0	26	No Limit						1.98	1.57	DST	0	37	
>100	48.0	SPT27	Silty Sand (Y/Grey)	SM	0	75	25	0	25	No Limit											
>100	50.0	SPT28	Silty Sand (Y/Grey)	SM																	
>100	52.0	SPT29	Silty Sand (P/Grey)	SM	0	74	26	0	23	No Limit											
>100	54.0	SPT30	Silty Sand (P/Grey)	SM																	
>100	56.0	SPT31	Silty Sand (P/Grey)	SM	0	71	29	0	20	No Limit											
>100	58.0	SPT32	Silty Sand (P/Grey)	SM																	

		<b>Table No. 15</b>		<b>T-1613</b>	
<b>NAME OF WORK: SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY</b>		Date of Boring Started : 05.01.2013 Date of Boring Completed : 08.01.2013 Termination Depth : 60.00 M		UNIT WEIGHT (gm/cc) WET DRY	
<b>LOCATION: NAVAL BASE</b>		Hide Tide Water : 8.70 m Low Tide Water : 8.10 m		SFQ(S) 2720(Part-3):1986 S/sect:1980	
SOIL DESCRIPTION	I.S. CLASSIFICATION	GRAIN SIZE ANALYSIS(%) IS 2720(Part-5):1985 GRA - VEL SAND SILT. CLAY		SFG(S) 2720(Part-4):1977 (Part-40):1977	
		ATTERBERG'S LIMIT(%) IS 2720(Part-5): 1985 (Part-12):1973 2720 NMC(%) LL PL PI		SC (%) IS 2720(Part-6): 1972 FS1 (%) IS 2720 (Part-40):1977	
<b>BOREHOLE BH/04</b>					
>100	60.0	SPT30	Silty Sand (P/Grey)	SM	0 79 21 0 18 No Limit
					2.62 2.09 1.77 DST 0 39



**PROJECT : SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY**

	<b>GEO FOUNDATIONS &amp; STRUCTURES PVT. LTD</b>	Bore Hole No : <b>BH-05</b>	Boring Started : <b>24.12.2012</b>	
		Type of Boring : <b>Rotary</b>	Boring Completed : <b>28.12.2012</b>	
		Termination Depth : <b>60.0m</b>	Length of water column : <b>2.40m</b>	
Co-ordinates: Lat - 9° 57' 31.15" N, Long - 76° 16' 45.17" E				<b>T-1613</b>

**LOCATION : INS VENDURUTHY(UNDER WATER BORING)**

SOIL PROFILE	THICKNESS OF STRATA (m)	DESCRIPTION OF STRATA	IS CLASSIFICATION	DEPTH (m)	SAMPLES TEST DEPTH IN m	BLOWS/15cm			SPT "N"	Rock Core characteristics			REMARKS
						15cm	15cm	15cm		C.R (%)	R.Q.D (%)	UCS KG/CM <sup>2</sup>	
	2.40	WATER EXISTING BED LEVEL		0.00									
	24.0	Clayey Silt with Traces of Sand (Grey)	CH	1.50	1.50-1.95	1	0	0	<1				
				3.00	3.00-3.45	1	0	0	<1				
				4.50	4.50-4.95	1	0	0	<1				
				6.00	6.00-6.45	1	0	1	1				
				7.50	7.50-7.95	1	0	1	1				
				9.00	9.00-9.45	1	0	1	1				
				10.0	10.0-10.45	VST-1							
				10.5	10.5-10.95	1	0	1	1				
				12.0	12.0-12.45	1	1	1	2				
				13.0	13.0-13.45	VST-2							
				13.5	13.5-13.95	1	0	1	1				
				15.0	15.0-15.45	1	1	1	2				
				16.5	16.5-16.95	UDS-1(SAMPLE SLIPPED)							
				18.0	18.0-18.45	1	1	2	3				
				19.5	19.5-19.95	1	2	1	3				
				21.0	21.0-21.45	UDS-2							
				22.5	22.5-22.95	1	2	2	4				
24.0	24.0-25.45	1	1	2	3								

(Contd.....fig. 81)

Note : UDS- Undisturbed Sample

SPT "N"- Standard Penetration Test "N"

Fig : 81



**PROJECT : SOIL INVESTIGATION WORK FOR THE PROPOSED BUILDING FOR NSRY**

	<b>GEO FOUNDATIONS &amp; STRUCTURES PVT. LTD</b>	Bore Hole No : BH-05	Boring Started : 24.12.2012	
		Type of Boring : Rotary	Boring Completed : 28.12.2012	
		Termination Depth : 60.0m	Length of water column : 2.40m	
Co-ordinates: Lat - 9° 57' 31.15" N, Long - 76° 16' 45.17" E				T-1613

**LOCATION : INS VENDURUTHY**

SOIL PROFILE	THICKNESS OF STRATA (m)	DESCRIPTION OF STRATA	IS CLASSIFICATION	DEPTH (m)	SAMPLES TEST DEPTH IN m	BLOWS/15cm			SPT "N"	Rock Core characteristics			REMARKS
						15cm	15cm	15cm		C.R (%)	R.Q.D (%)	UCS KG/CM <sup>2</sup>	
	9.10	Clayey Silt with Traces of Sand (Y/Grey)	CH	25.5	25.5-25.95	6	7	8	15				25/45cm penetration
				27.0	27.0-27.45	5	8	10	18				
				28.5	28.5-28.95	6	10	11	21				
				30.0	30.0-30.45	7	9	12	21				
				32.0	32.0-32.45	8	10	13	23				
				34.0	34.0-34.45	70	100	-	>100				
	3.40	Silty Sand with Gravel (Y/Grey)	SM	36.0	36.0-36.45	16	23	27	50				
				38.0	38.0-38.45	23	18	21	39				
	2.00	Silty Clayey Sand with Gravel (Br/Grey)	SC	40.0	40.0-40.45	59	100	-	>100			30/45cm penetration	
				42.0	42.0-42.45	71	100	-	>100			27/45cm penetration	
	8.60	Fine Sand (P/Grey)	SP-SM	44.0	44.0-44.45	31	42	51	93				
				46.0	46.0-46.45	51	23	41	64				
				48.0	48.0-48.45	21	30	43	73				
				50.0	50.0-50.45	19	24	37	61				
				52.0	52.0-52.45	17	29	38	67				
	7.90	Sandy Silty Clay with Gravel (Grey)	CI	54.0	54.0-54.45	19	30	46	76				
				56.0	56.0-56.45	31	60	40	>100			40/45cm penetration	
				58.0	58.0-58.45	44	76	24	>100			32/45cm penetration	
				60.0	60.0-60.45	57	100	-	>100			30/45cm penetration	
	5.00	Silty Sand (Grey)	SM	60.0	60.0-60.45	57	100	-	>100				

Termination Depth : 60.0m

Note : UDS - Undisturbed Sample

SPT "N" - Standard Penetration Test "N"

Fig : 82



Geo Foundations Structures Pvt Ltd

NAME OF WORK: SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY												
LOCATION: NAVAL BASE		Hide Tide Water : 2.40 M	Date of Boring Started : 24.12.2012		Table No.16							
		Low Tide water : 1.80 M	Date of Boring Completed : 28.12.2012		UNIT WEIGHT (gm/cc)		SHEAR PARAMETERS-IS					
N	DEPTH (M)	SOIL DESCRIPTION	I.S. CLASSIFICATION	GRAIN SIZE ANALYSIS(%) IS 2720(Part-5):1985			SPG(S) 2720(Part-3/Sec1):1980	FSI (%) IS 2720(Part-40):1977	SL (%) IS 2720(Part-6):1972	PI	C	
				GRAVEL	SAND	SILT						CLAY
<b>BOREHOLE BH/5</b>												
<1	1.50	Clayey Silt with traces of Sand (Grey)	CH	0	2	70	28	138	146	37	109	
<1	3.00	Clayey Silt with traces of Sand (Grey)	CH	0	5	65	30	135				
<1	4.50	Clayey Silt with traces of Sand (Grey)	CH									
1	6.00	Clayey Silt with traces of Sand (Grey)	CH	0	3	64	34	122				
1	7.50	Clayey Silt with traces of Sand (Grey)	CH									
1	9.00	Clayey Silt with traces of Sand (Grey)	CH	0	5	65	30	115	128	35	93	
-	10.0	Clayey Silt with traces of Sand (Grey)	CH									VST 0.024
1	10.5	Clayey Silt with traces of Sand (Grey)	CH	0	4	60	36					
2	12.0	Clayey Silt with traces of Sand (Grey)	CH									
-	13.0	Clayey Silt with traces of Sand (Grey)	CH									
1	13.5	Clayey Silt with traces of Sand (Grey)	CH	0	3	64	33	118				VST 0.04
2	15.0	Clayey Silt with traces of Sand (Grey)	CH	0	3	60	37	110	120	33	87	
-	16.5	Clayey Silt with traces of Sand (Grey)-sample slipped	CH									
3	16.0	Clayey Silt with traces of Sand (Y/Grey)	CH	0	4	57	39	108				
3	15.5	Clayey Silt with traces of Sand (Y/Grey)	CH									


NAME OF WORK: SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY																			
LOCATION: NAVAL BASE																			
N	DEPTH (M)	SAMPLE	SOIL DESCRIPTION	I.S. CLASSIFICATION	GRAIN SIZE ANALYSIS (%) IS 2720 (Part 5): 1985			ATERBERG'S LIMITS (%) IS 2720 (Part 5): 1985			SI (%) IS 2720 (Part 5): 1972	FSI (%) IS 2720 (Part 40): 1977	SPG (IS 2720 (Part 13): 1986)	UNIT WEIGHT (gm/cc)		SHEAR PARAMETERS-IS 2720 (Part 13): 1986			
					GRA VEL	SAND	SILT	CLAY	LL	PL				PI	WET		DRY	METHOD	C
<b>BOREHOLE BH/S</b>																			
1	21.0	UDS2	Clayey Silt with traces of Sand (Y/Grey)	CH	0	7	64	29	104	110	38	72			2.37	1.49	0.73	Triaxial	0.12
4	22.5	SPT13	Clayey Silt with traces of Sand (Y/Grey)	CH															
9	24.0	SPT14	Clayey Silt with traces of Sand (Y/Grey)	CH															
15	25.5	SPT15	Clayey Silt with traces of Sand (Y/Grey)	CH	0	10	51	40	52										
19	27.0	SPT16	Clayey Silt with traces of Sand (Y/Grey)	CH	0	8	50	42	50	78	35	43			2.40	1.61	1.07	UCS	0.60
21	28.5	SPT17	Clayey Silt with traces of Sand (Y/Grey)	CH															
21	30.0	SPT18	Clayey Silt with traces of Sand (Y/Grey)	CH	0	12	50	38	56										
23	32.0	SPT19	Clayey Silt with traces of Sand (Y/Grey)	CH	0	10	50	40	55	74	32	42							
>100	34.0	SPT20	Clayey Silt with traces of Sand (Y/Grey)	CH															
50	36.0	SPT21	Silty Sand with presence of Gravel (Y/Grey)	SM	1	62	37	0	18	No Limit									
39	38.0	SPT22	Silty Clayey Sand with Gravel (B/Grey)	SC	13	61	11	16	17	38	NP								
>100	40.0	SPT23	Fine Sand (P/Grey)	SP-SM	0	91	9	0	12	No Limit					2.64	2.06	1.84	DST	0 38
>100	42.0	SPT24	Fine Sand (F/Grey)	SP-SM															
95	44.0	SPT25	Fine Sand (P/Grey)	SP-SM	0	92	8	0	15	No Limit									
54	46.0	SPT26	Fine Sand (P/Grey)	SP-SM															
75	48.0	SPT27	Sandy Silty Clay with Gravel (Grey)	CI	5	38	25	32	30	39	23	16		2.43	1.88	1.45	UCS	1.65	

NAME OF WORK: SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY		Table No. 1B															
LOCATION: NAVAL BASE		Date of Boring Started : 24.12.2012	T-1613														
Hide Tide Water : 2.40 M	Date of Boring Completed : 28.12.2012	UNIT WEIGHT (gm/cc)															
Low Tide water : 1.80 M	Termination Depth : 60.00 M	WET DRY															
DEPTH (M)	SAMPLE	SOIL DESCRIPTION	I.S. CLASSIFICATION	GRA - VEL	GRAIN SIZE ANALYSIS(%) IS 2720(Part-5):1985			N <sub>c</sub> (%)	ATTERBERG'S LIMIT(%) IS 2720(Part-5): 1985			SF <sub>G</sub> (IS 2720(Part-3/sec1):1980)	UNIT WEIGHT		SHEAR PARAMETERS - S 2720(Part-13):1986		
					SAND	SILT	CLAY		LL	PL	PI		WET	DRY		METHOD	C
BOREHOLE BH/S																	
61	SPT28	Sandy Silty Clay (Grey)	CI	0	39	41	21	36									
67	SPT29	Sandy Silty Clay (Grey)	CI														
76	SPT50	Sandy Silty Clay (Grey)	CI	0	40	40	20										
>100	SPT31	Silty Sand (Grey)	SM	0	85	15	0	15	No Limit								
>100	SPT32	Silty Sand (Grey)	SM														
>100	SPT33	Silty Sand (Grey)	SM	0	88	12	0	16	No Limit				2.61	2.11	1.82	DST	0 39

**PROJECT : SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY**

	<b>GEO FOUNDATIONS &amp; STRUCTURES PVT. LTD</b>	Bore Hole No : BH-06	Boring Started : 20.12.2012	
		Type of Boring : Rotary	Boring Completed : 22.12.2012	
		Termination Depth : 60.0m	Length of water column : 1.90m	
Co-ordinates: Lat - 9° 57' 30.78" N, Long - 76° 16' 44.43" E				T-1613

**LOCATION : INS VENDURUTHY(UNDER WATER BORING)**

SOIL PROFILE	THICKNESS OF STRATA (m)	DESCRIPTION OF STRATA	IS CLASSIFICATION	DEPTH (m)	SAMPLES TEST DEPTH IN m	BLOWS/15cm			SPT "N"	Rock Core characteristics			REMARKS	
						15cm	15cm	15cm		C.R (%)	R.Q.D (%)	UCS KG/CM <sup>2</sup>		
	1.90	WATER												
		EXISTING BED LEVEL		0.00										
	24.0	Clayey Silt with Traces of Sand (Grey)	CH	1.50	1.50-1.95	1	0	0	<1					
				3.00	3.00-3.45	1	0	0	<1					
				4.50	4.50-4.95	1	0	0	<1					
				6.00	6.00-6.45	1	0	0	<1					
				7.50	7.50-7.95	1	0	1	1					
				9.00	9.00-9.45	1	0	1	1					
				10.5	10.5-10.95	1	0	1	1					
				12.0	12.0-12.45	1	0	0	<1					
				13.5	13.5-13.95	1	0	1	1					
				14.0	14.0-14.45	VST-1								
				15.0	15.0-15.45	1	1	1	2					
				16.5	16.5-16.95	1	1	1	2					
				18.0	18.0-18.45	1	0	1	1					
				19.0	19.0-19.45	VST-2								
				19.5	19.5-19.95	1	1	2	3					
				21.0	21.0-21.45	UDS-1								
				22.5	22.5-22.95	1	2	2	4					
				24.0	24.0-25.45	UDS-2								

(Contd.....fig.199)

Note : UDS- Undisturbed Sample

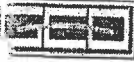

SPT "N"-Standard Penetration Test "N"

Fig 102






Client : M/s.Naval Ship Repair Yard

Soil investigation work for the Proposed North Jetty

**PROJECT : SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY**

	<b>GEO FOUNDATIONS &amp; STRUCTURES PVT. LTD</b>	Bore Hole No : BH-06	Boring Started : 20.12.2012	
		Type of Boring : Rotary	Boring Completed : 22.12.2012	
		Termination Depth : 60.0m	Length of water column : 1.90m	
Co-ordinates: Lat - 9° 57' 30.78" N, Long - 76° 16' 44.43" E				T-1613

**LOCATION : INS VENDURUTHY**

SOIL PROFILE	THICKNESS OF STRATA (m)	DESCRIPTION OF STRATA	IS CLASSIFICATION	DEPTH (m)	SAMPLES			BLOWS/15cm			SPT "N"	Rock Core characteristics			REMARKS
					TEST DEPTH IN m	15cm	15cm	15cm	C.R (%)	R.Q.D (%)		UCS KG/CM <sup>2</sup>			
	8.10	Clayey Silt with Traces of Sand (G/Yellow)	CH	25.5	25.5-25.95	2	3	6	9						
				27.0	27.0-27.45	3	4	7	11						
		Sandy Clayey Silt with Presence of Gravel (Grey)		28.5	28.5-28.95	4	5	9	14						
				30.0	30.0-30.45	4	6	8	14						
				32.0	32.0-32.45	4	11	20	31						
	15.50	Silty Sand with Presence of Gravel (P/Grey)	SM	34.0	34.0-34.45	13	27	34	61						
				36.0	36.0-36.45	17	29	38	67						
				38.0	38.0-38.45	30	43	57	100						
				40.0	40.0-40.45	19	24	31	55						
		Silty Sand (Grey)		42.0	42.0-42.45	13	19	27	46						
				44.0	44.0-44.45	13	23	34	57						
				46.0	46.0-46.45	17	25	37	62						
				48.0	48.0-48.45	21	36	41	77						
	6.40	Decayed Wood (Black)	OL	50.0	50.0-50.45	19	51	49	>100				42/45cm penetration		
				52.0	52.0-52.45	26	47	53	100						
				54.0	54.0-54.45	26	60	40	>100					40/45cm penetration	
	2.00	Fine Sand (Grey)	SP-SM	56.0	56.0-56.45	31	100	-	>100				30/45cm penetration		
	4.00	Silty Sand (P/Grey)	SM	58.0	58.0-58.45	29	79	21	>100				32/45cm penetration		
				60.0	60.0-60.45	44	100	-	>100					30/45cm penetration	

Termination Depth : 60.0m  
 Note : UDS- Undisturbed Sample

SPT "N"- Standard Penetration Test "N"

Fig : 110

Geo Foundations Structures Pvt Ltd









NAME OF WORK: SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY		Date of Boring Started : 20.12.2012		Date of Boring Completed : 22.12.2012		Termination Depth : 60.00 M		Table No. 21		T-1613							
LOCATION: NAVAL BASE		High Tide Water : 1.90 M		Low Tide Water : 1.30 M													
N	DEPTH (M)	SAMPLE	SOIL DESCRIPTION	I.S. CLASSIFICATION	GRAIN SIZE ANALYSIS (%) IS 2720(Part 5):1985			ATTERBERG'S LIMIT (%) IS 2720(Part 5):1985			UNIT WEIGHT (gm/cc)		SHEAR PARAMETERS-IS 2720(Part-13):1986				
					SAND	SILT	CLAY	LL	PL	PI	WET	DRY		METHOD	kg/cm <sup>2</sup> Ø (°)		
<b>BOREHOLE BH/6</b>																	
>100	56.0	SPT01	Silty Sand (P/Grey)	SM	0	66	34	0	12	No Limit							
>100	58.0	SPT02	Silty Sand (P/Grey)	SM													
>100	60.0	SPT03	Silty Sand (P/Grey)	SM	0	72	28	0	11	No Limit							

\* UCS test was not conducted on UDS-1 because the Natural moisture content was very high

PROJECT : SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY													
	GEO FOUNDATIONS & STRUCTURES PVT. LTD	Bore Hole No	: BH-07	Boring Started	: 08.01.2013		T-1613	Type of Boring	: Rotary	Boring Completed	: 10.01.2013	REMARKS	
		Termination Depth	: 60.0m	Length of water column	: 5.40m								
		Co-ordinates: Lat - 9° 57' 28.44" N, Long - 76° 16' 48.68" E											
LOCATION : INS VENDURUTHY(UNDER WATER BORING)													
SOIL PROFILE	THICKNESS OF STRATA (m)	DESCRIPTION OF STRATA	IS CLASSIFICATION	DEPTH (m)	SAMPLES TEST DEPTH IN m	BLOWS/15cm			SPT "N"	Rock Core characteristics			REMARKS
						15cm	15cm	15cm		C.R (%)	R.Q.D (%)	UCS KG/CM <sup>2</sup>	
	5.40	WATER											
		EXISTING BED LEVEL		0.00									
	22.0	Clayey Silt with Traces of Sand (Grey)	CH	1.50	1.50-1.95	1	0	0	<1				
3.00				3.00-3.45	1	0	0	<1					
4.50				4.50-4.95	1	0	0	<1					
5.00				5.00-5.45	VST-1								
6.00				6.00-6.45	1	0	1	1					
7.50				7.50-7.95	1	0	1	1					
9.00				9.00-9.45	1	0	1	1					
10.0				10.0-10.45	VST-2								
10.5				10.5-10.95	1	1	1	2					
12.0				12.0-12.45	UDS-1								
13.5				13.5-13.95	1	2	1	3					
15.0				15.0-15.45	1	2	2	4					
16.5				16.5-16.95	UDS-2								
18.0				18.0-18.45	1	2	2	4					
19.5	19.5-19.95	2	3	3	6								
21.0	21.0-21.45	2	3	5	8								
22.5	22.5-22.95	12	14	14	28								
	2.0	Silty Sand (Grey)	SM	24.0	24.0-24.45	9	10	11	21				

(Contd.....fig. 127)

Note : UDS - Undisturbed Sample SPT "N"-Standard Penetration Test "N"

Fig : 127

## PROJECT : SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY

	<b>GEO FOUNDATIONS &amp; STRUCTURES PVT. LTD</b>	Bore Hole No : <b>BH-07</b>	Boring Started : <b>08.01.2013</b>	
		Type of Boring : <b>Rotary</b>	Boring Completed : <b>10.01.2013</b>	
		Termination Depth : <b>60.0m</b>	Length of water column : <b>5.40m</b>	
Co-ordinates: Lat - 9° 57' 28.44" N, Long - 76° 16' 48.68" E				
<b>T-1613</b>				

## LOCATION : INS VENDURUTHY

SOIL PROFILE	THICKNESS OF STRATA (m)	DESCRIPTION OF STRATA	IS CLASSIFICATION	DEPTH (m)	SAMPLES TEST DEPTH IN m	BLOWS/15cm			SPT "N"	Rock Core characteristics			REMARKS
						15cm	15cm	15cm		C.R (%)	R.Q.D (%)	UCS KG/CM <sup>2</sup>	
	0.50	Silly Sand (P/Grey)	SM										
	15.0	Sandy Clayey Silt (P/Grey)	CH	25.5	25.5-25.95	9	7	9	16				
				27.0	27.0-27.45	5	5	6	11				
				28.5	28.5-28.95	5	7	8	15				
				30.0	30.0-30.45	6	5	8	13				
				32.0	32.0-32.45	8	9	9	18				
				34.0	34.0-34.45	7	10	11	21				
				36.0	36.0-36.45	10	10	13	23				
				38.0	38.0-38.45	9	14	16	30				
				40.0	40.0-40.45	11	15	18	33				
				42.0	42.0-42.45	17	30	39	69				
	11.5	Sandy Clayey Silt (G/Yellow)	CH	44.0	44.0-44.45	20	29	44	73				
				46.0	46.0-46.45	24	41	59	>100				25/45cm penetration
				48.0	48.0-48.45	28	39	54	93				
				50.0	50.0-50.45	31	44	56	100				
				52.0	52.0-52.45	52	100	-	>100				30/45cm penetration
				54.0	54.0-54.45	61	79	21	>100				32/45cm penetration
	6.60	Silly Sand (Grey)	SM	56.0	56.0-56.45	49	100	-	>100				30/45cm penetration
				58.0	58.0-58.45	100	-	-	>100				15/45cm penetration
				60.0	60.0-60.45	73	100	-	>100				24/45cm penetration

Termination Depth : 60.0m

Site : UDS- Undisturbed Sample

SPT "N"-Standard Penetration Test "N"

Fig : 128



Geo Foundations Structures Pvt Ltd

NAME OF WORK: SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY																
LOCATION: NAVAL BASE		High Tide Water : 5.40 M		Date of Boring Started : 08.01.2013		Table No. 22										
Low Tide Water : 4.70 M		Date of Boring Completed : 10.01.2013		Termination Depth : 60.00 M		UNIT WEIGHT (gm/cc)		SFG(S (Part-13):1986)		SHEAR PARAMETERS-IS 2720(Part-13):1986						
NO	DEPTH (M)	SAMPLE	SOIL DESCRIPTION	LS. CLASSIFICATION	GRAIN SIZE ANALYSIS(%) IS 2720(Part-5):1985			ATTERBERG'S LIMIT(%) IS 2720(Part-5):1985			WET	DRY	METHOD	C	Ø (°)	
					GRA. VEL	SAND	SILT	CLAY	LL	PL						PI
BOREHOLE BH/7																
1	1.50	SPT1	Clayey silt with traces of sand (Grey)	CH	0	1	69	30	110	122	37					
1	3.00	SPT2	Clayey silt with traces of sand (Grey)	CH	0	3	62	35								
1	4.50	SPT3	Clayey silt with traces of sand (Grey)	CH												
1	5.00	VST1	Clayey silt with traces of sand (Grey)	CH										VST	0.02	-
1	6.00	SPT4	Clayey silt with traces of sand (Grey)	CH	0	3	63	34	104	112	39					
1	7.50	SPT5	Clayey silt with traces of sand (Grey)	CH												
1	9.00	SPT6	Clayey silt with traces of sand (Grey)	CH	0	5	57	38	118							
1	10.00	VST-2	Clayey silt with traces of sand (Grey)	CH										VST	0.03	-
2	10.5	SPT7	Clayey silt with traces of sand (Grey)	CH												
2	12.0	UDS1	Clayey silt with traces of sand (Grey)	CH	0	2	61	37	103	107	36	71	2.38	1.45	0.65	UCS 0.10
3	13.5	SPT8	Clayey silt with traces of sand (Y/Grey)	CH												
4	15.0	SPT9	Clayey silt with traces of sand (Y/Grey)	CH												
4	16.5	UDS2	Clayey silt with traces of sand (Y/Grey)	CH	0	7	61	32	98	110	35	75	2.39	1.50	0.67	Triaxial 0.12
4	18.0	SPT10	Clayey silt with traces of sand (Y/Grey)	CH												
6	19.5	SPT11	Silty Clay with Traces of Sand (Y/Grey)	CH	0	3	47	50	61							
6	21.0	SPT12	Silty Clay with Traces of Sand (Y/Grey)	CH												



NAME OF WORK: SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY		Date of Boring Started : 08.01.2013		Date of Boring Completed : 10.01.2013		Table No. 24		T-1613								
LOCATION: NAVAL BASE		High Tide Water : 5.40 M		Date of Boring Started : 08.01.2013		Table No. 24		T-1613								
SOIL DESCRIPTION		Low Tide Water : 4.70 M		Date of Boring Completed : 10.01.2013		Table No. 24		T-1613								
DEPTH (M)	SAMPLE	L.S. CLASSIFICATION	GRAIN SIZE ANALYSIS (%) IS 2720 (Part-5): 1985			SL (%) IS 2720 (Part-5): 1985	FSI (%) IS 2720 (Part-40): 1977	SG (IS 2720 (Part-3): 1980)	UNIT WEIGHT (gm/cc)		SHEAR PARAMETERS - IS 2720 (Part-15): 1986					
			GRAVEL	SAND	SILT				CLAY	WET		DRY	METHOD	kg/cm <sup>2</sup>	(°)	
BOREHOLE BH/7																
>100	60.0	SPT33	Stily Sand (Grey)	SM	0	80	20	0	19	No Limit	2.62	2.13	1.79	DST	0	37

**PROJECT : SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY**

 <b>GEO FOUNDATIONS &amp; STRUCTURES PVT. LTD</b>	Bore Hole No : BH-08 Type of Boring : Rotary Termination Depth : 60.0m	Boring Started : 17.12.2012 Boring Completed : 20.12.2012 Length of water column : 4.30m	 T-1613
	Co-ordinates: Lat - 9° 57' 30.20" N, Long - 76° 16' 45.26" E		

**LOCATION : INS VENDURUTHY(UNDER WATER BORING)**

SOIL ROI	THICKNESS OF STRATA (m)	DESCRIPTION OF STRATA	IS CLASSIFICATION	DEPTH (m)	SAMPLES TEST DEPTH IN m	BLOWS/15cm			SPT "N"	Rock Core characteristics			REMARKS
						15cm	15cm	15cm		C.R (%)	R.Q.D (%)	UCS KG/CM <sup>2</sup>	
	4.30	WATER EXISTING BED LEVEL		0.00									
	5.20	Clayey silt with traces of sand(Grey)	CH	1.50	1.50-1.95	1	0	0	<1				
3.00				3.00-3.45	1	0	0	<1					
4.50				4.50-4.95	1	0	0	<1					
5.00				5.00-5.45	VST-1								
6.00				6.00-6.45	5	9	15	24					
1.60	Silly sand(Pale grey)	SM	7.50	7.50-7.95	1	0	1	1					
17.20	Clayey silt(Dark grey)	CH	9.00	9.00-9.45	1	0	1	1					
			10.0	10.0-10.45	VST-2								
			10.5	10.5-10.95	1	1	1	2					
			12.0	12.0-12.45	UDS-1								
			13.5	13.5-13.95	1	2	1	3					
			15.0	15.0-15.45	UDS-2								
			16.5	16.5-16.95	1	2	2	4					
			18.0	18.0-18.45	2	2	2	4					
			19.5	19.5-19.95	2	3	3	6					
			21.0	21.0-21.45	3	4	3	7					
17.20	Sandy clayey silt(Grey)	CH	22.5	22.5-23.95	3	5	5	10					
			24.0	24.0-25.45	4	4	6	10					

(Contd.....fig. 145)

Note : UDS - Undisturbed Sample

SPT "N"- Standard Penetration Test "N"

Fig: 145



**PROJECT : SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY**

	<b>GEO FOUNDATIONS &amp; STRUCTURES PVT. LTD</b>	Bore Hole No : <b>BH-08</b>	Boring Started : 17.12.2012	
		Type of Boring : <b>Rolary</b>	Boring Completed : 20.12.2012	
		Termination Depth : <b>60.0m</b>	Length of water column : 5.40m	
Co-ordinates: Lat - 9° 57' 30.20" N, Long - 76° 16' 45.26" E				T-1613

**LOCATION : INS VENDURUTHY**

DIL. OPIL.	THICKNESS OF STRATA (m)	DESCRIPTION OF STRATA	IS CLASSIFICATION	DEPTH (m)	SAMPLES TEST DEPTH IN m	BLOWS/15cm			SPT "N"	Rock Core characteristics			REMARKS
						15cm	15cm	15cm		C.R (%)	R.Q.D (%)	UCS KG/CM <sup>2</sup>	
	9.50	Sandy clayey silt(Grey)	CH	25.5	25.5-25.95	5	7	9	16				
				27.0	27.0-27.45	5	8	13	21				
				28.5	28.5-28.95	7	9	16	25				
				30.0	30.0-30.45	6	10	17	27				
				32.0	32.0-32.45	9	9	18	27				
				34.0	34.0-34.45	16	21	18	39				
	2.30	Silly sand(Pale grey)	SM	36.0	36.0-36.45	14	19	24	43				
				38.0	38.0-38.45	11	26	26	52				
	7.20	Sandy clayey silt(Grey)	CI	40.0	40.0-40.45	13	29	34	63				
				42.0	42.0-42.45	14	30	39	69				
				44.0	44.0-44.45	27	43	57	100				
				46.0	46.0-46.45	36	100	-	>100			25/45cm penetration	
48.0				48.0-48.45	31	63	37	>100			40/45cm penetration		
50.0				50.0-50.45	29	31	37	68					
17.00	Silly sand(Pale grey)	SM	52.0	52.0-52.45	37	43	51	94					
			54.0	54.0-54.45	39	71	29	>100			33/45cm penetration		
			56.0	56.0-56.45	61	100	-	>100			30/45cm penetration		
			58.0	58.0-58.45	43	74	26	>100			32/45cm penetration		
			60.0	60.0-60.45	71	100	-	>100			26/45cm penetration		

Termination Depth : 60.0m

Note : UDS- Undisturbed Sample

SPT "N"-Standard Penetration Test "N"

Fig : 146

GEO FOUNDATIONS STRUCTURES PVT LTD





T-1613

Table No 2.5

NAME OF WORK: SOIL INVESTIGATION WORK FOR THE PROPOSED NORTH JETTY

LOCATION: NAVAL BASE

DATE OF BOILING STARTED : 17.12.2012  
 DATE OF BOILING COMPLETED : 20.12.2012  
 TERMINATION DEPTH : 60.00 M

DATE OF BOILING STARTED : 17.12.2012  
 DATE OF BOILING COMPLETED : 20.12.2012  
 TERMINATION DEPTH : 60.00 M

N	DEPTH (M)	SAMPLE	SOIL DESCRIPTION	I.S. CLASSIFICATION	GRAIN SIZE ANALYSIS (%) IS 2720 (Part-5): 1985				ATERBERG'S LIMIT (%) IS 2720 (Part-5): 1985			SF (%) IS 2720 (Part-6): 1972	FSI (%) IS 2720 (Part-40): 1977	SF G (IS 2720 (Part-1): 1980)	UNIT WEIGHT (gm/cc)		SHEAR PARAMETERS IS 2720 (Part-13): 1986
					GRAVEL	SAND	SILT	CLAY	LL	PL	PI				WET	DRY	

BOREHOLE BH/8																		
<1	1.30	SPT1	Clayey silt with traces of sand (Grey)	CH	0	2	57	41	172	148	44							
<1	3.00	SPT2	Clayey silt with traces of sand (Grey)	CH														
<1	4.50	SPT3	Clayey silt with traces of sand (Grey)	CH	0	5	55	40	155									
-	5.00	VST1	Clayey silt with traces of sand (Grey)	CH														VST 0.03
24	6.00	SPT4	Silty sand (F/Grey)	SM	0	62	38	0	32	No Limit					2.56	1.70	1.29	DST 0.02
1	7.50	SPT5	Clayey silt (D/Grey)	CH	0	0	52	48	115									
1	9.20	SPT6	Clayey silt (D/Grey)	CH														VST 0.04
-	10.0	VST2	Clayey silt (D/Grey)	CH														
2	10.5	SPT7	Clayey silt (D/Grey)	CH														
-	12.0	UCS1	Clayey silt with traces of sand (Y/Grey)	CH	0	2	59	39	107	119	38			2.35	1.46	0.71	UCS	0.28
3	13.5	SPT8	Clayey silt with traces of sand (Y/Grey)	CH														
-	15.0	UCS2	Clayey silt with traces of sand (Y/Grey)	CH	0	3	55	42	84	92	40			2.38	1.48	0.80	Triaxial	0.23
4	16.5	SPT9	Clayey silt with traces of sand (Y/Grey)	CH														
4	18.0	SPT10	Clayey silt with traces of sand (Y/Grey)	CH	0	8	52	40	80	84	39							
6	19.5	SPT11	Sandy clayey silt (Grey)	CH	0	24	55	21	55									
7	21.0	SPT12	Sandy clayey silt (Grey)	CH														
10	22.5	SPT13	Sandy clayey silt (Grey)	CH	0	21	47	32	51	69	28			2.44	1.52	1.01	UCS	0.40

