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GEO TECHNICAL AND SURVEY WORKS	
SOIL INVESTIGATION REPORT	
SITE	: CHITTOOR ROAD
DETAILS OF STRUCTURE	: PROPOSED INSTITUTION BUILDING (2B+G+4)
TIME OF INVESTIGATION:	13/06/2023 TO 23/06/2023
CLIENT	: ICAI BHAWAN, ICAI- INSTITUTE OF CHARTED ACCOUNTANTS OF INDIA
CONSULTANTS	:

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REPORT ON SUB SOIL EXPLORATION FOR THE PROPOSED INSTITUTION BUILDING (2B+G+4) FOR ICAI BHAWAN, ICAI- INSTITUTE OF CHARTED ACCOUNTANTS OF INDIA AT CHITTOOR ROAD

1. INTRODUCTION

There is a proposal to construct an institution building (2B+G+4) at Chittoor Road for ICAI Bhawan, ICAI- Institute of Chartered Accountants of India. It is decided to carry out a detailed sub soil investigation to find out Safe bearing capacity and selection of appropriate foundation for the building.

The work was awarded to M/s. Spreads Foundation, G-171, Nr. Shopping Complex, Panampilly Nagar, Cochin-36. A detailed investigation and laboratory studies were carried out from 13/06/2023 to 23/06/2023.

This report summarizes the subsoil investigations and furnishes the recommendation on the type of the foundation to be provided.

2. SCOPE OF WORK

The scope of work at this site, entrusted with us comprised of

- 2.1 Mobilization of boring rigs with all necessary equipment's and skilled/unskilled personnel for the field work.
- 2.2 Boring two bore holes of diameter 150 mm, with drilling equipments in sand, silt, clay and gravel to a maximum depth as recommended by the geotechnical consultant or till the spoon rebound at the selected location fixed by the client.
- 2.3 Conduction of Standard Penetration test in the bore holes at every 1.0m interval for a depth of 6.0m, at an interval of 1.50m interval for a depth of 15.0m and thereafter at an interval of 3.0m depth or change of strata and prepare bore log showing details.
- 2.4 Collection of disturbed samples in air-tight polythene bags with proper labelling and transportation to laboratory.
- 2.5 Conducting the laboratory tests on the disturbed samples as per Indian Standards and furnishing the results.
- 2.6 Preparation and submission of the detailed report with field and laboratory results.

3. PROGRAMME OF INVESTIGATION

3.1 FIELD INVESTIGATION

- 3.1.1 One boring unit with all necessary equipment along with a team of technical personnel with skilled labourers were mobilised at the work site.

- 3.1.2 Two bore holes of 150mm were bored to a depth suggested by client, below the existing ground level. Bore holes were made as per IS: 1892-1979, using Rotary Drilling.
- 3.1.3 Representative samples were collected at every 1.0m interval for a depth of 6.0m, at an interval of 1.50m interval for a depth of 15.0m and thereafter at an interval of 3.0m depth or change or change of strata or change of strata, whichever is earlier.
- 3.1.4 The samples collected were carefully sealed and transported to laboratory for tests.
- 3.1.5 Standard Penetration Tests were conducted at every 1.0m interval for a depth of 6.0m, at an interval of 1.50m interval for a depth of 15.0m and thereafter at an interval of 3.0m depth or change, as per IS: 2131-1981. Before testing, the boreholes were cleaned properly and Split Spoon Sampler is placed centrally in the bore holes. A standard hammer of 63.5 kg is dropped from a height of 75 cm and number of blows for penetration of sampler for 0-15 cm, 15-30 cm and 30-45 cm were noted. Number of blows required for 15-45 cm penetration is reported as N value.
- 3.1.6 Bore holes were terminated after the investigation.

3.2 LABORATORY INVESTIGATION

- 3.2.1 The following laboratory tests were conducted on the selected samples as per the relevant IS codes.
 - a) Particle size Analysis (IS .2720-Part 4-1985)
 - b) Water content (IS .2720-Part 2-1973)
 - c) Bulk density (IS .2720-Part 9-1992)
 - d) Specific Gravity (IS .2720-Part 3-1980)
 - e) Direct Shear Test (IS .2720-Part 13-1986)
 - f) Triaxial Test (IS .2720-Part 11-1993)
 - g) Liquid Limit & Plastic Limit (IS .2720-Part 5-1985)
 - h) Unconfined Compression Test of Soil (IS .2720-Part 10-1991)

CLIENT		ICAI BHAWAN, ICAI- THE INSTITUTE OF CHARTED ACCOUNTANTS OF INDIA													
PROJECT:		PROPOSED INSTITUTION BUILDING (2B+G+4)													
SITE:		CHITTOOR ROAD													
BORE HOLE NO. : BH-I						Date of start: 13/06/2023									
						Date of completion: 14/06/2023									
TYPE OF BORING: Rotary Drilling						Ground water table: 0.70m below GL									
Description of soil	Thickness of layer m	Depth in m below GL	Bore log	Standard Penetration Test					Graph of 'N' value					Remarks	
				depth (m)	15 cm	30 cm	45 cm	N Value	10	20	30	40	50		log
Sand	2.50	2.50		1.00	3	4	5	9							
				2.00	3	7	6	13							
Clayey Sand (Grey)	1.10	3.60		3.00	1	0	0	0							
Sand	1.20	4.80		4.00	1	1	2	3							
Clayey Sand (Grey)	1.20	6.00		5.00	4	3	3	6							
Sandy Clay (black)	4.50	10.50		6.00	1	1	2	3							
				7.50	1	2	2	4							
				9.00	1	0	0	0							
Clayey sand	1.50	12.00		10.50	1	0	1	1							
Sandy Clay (black)	1.50	13.50		12.00	1	1	1	2							
Clay (Grey)	2.70	16.20		13.50	1	0	2	2							
				15.00	2	2	2	4							
Clayey Sand (Grey)	4.20	20.40		18.00	1	1	1	2							
Lateritic Clayey Sand with Gravel (Grey,Brown)	1.60	22.00		21.00	10	30	20	>50							7cm balance

Lateritic Clay with Sand & Decayed Wood (Brwon,Grey,Black)	2.40	24.40	24.00	10	10	16	26											
Clayey Sand with Decayed Wood	8.40	32.80	27.00	7	10	14	24											
			30.00	10	21	24	45											
Clayey Sand (Whitish Grey)	4.20	37.00	33.00	50	-	-	>50										32cm balance	
			36.00	50	-	-	>50											34cm balance
Sand (Grey)	2.12	39.12	39.00	50	-	-	>50											33cm balance
Bore hole terminated at 39.12m depth																		

CLIENT		ICAI BHAWAN, ICAI- THE INSTITUTE OF CHARTED ACCOUNTANTS OF INDIA													
PROJECT:		PROPOSED INSTITUTION BUILDING (2B+G+4)													
SITE:		CHITTOOR ROAD													
BORE HOLE NO. : BH-II						Date of start: 10/06/2023									
						Date of completion: 12/06/2023									
TYPE OF BORING: Rotary Drilling						Ground water table: 0.70m below GL									
Description of soil	Thickness of layer m	Depth in m below GL	Bore log	Standard Penetration Test					Graph of 'N' value					Remarks	
				depth (m)	15 cm	30 cm	45 cm	N Value	10	20	30	40	50		60
Sand	2.60	2.60		1.00	4	4	6	10							
				2.00	7	12	20	32							
Clay (black)	1.20	3.80		3.00	3	1	1	2							
Sand with Clay	0.80	4.60		4.00	0	1	1	2							
Clay	6.90	11.50		5.00	1	1	1	2							
				6.00	0	0	1	1							
				7.50	0	1	1	2							
				9.00	1	1	1	2							
				10.50	1	1	2	3							
Sand with Clay	1.70	13.20		12.00	3	3	7	10							
Clay (black)	3.40	16.60		13.50	1	1	1	2							
				15.00	1	1	4	5							
Sand with Clay	2.20	18.80		18.00	4	4	5	9							
Laterite	4.60	23.40		21.00	24	50	-	>50							15cm balance

Decayed Wood	9.10	32.50	24.00	20	38	12	>50									7cm balance	
			27.00	7	18	20	38										
			30.00	7	10	20	30										
Sand	6.59	39.09	33.00	50	-	-	>50									30cm balance	
			36.00	50	-	-	>50									33cm balance	
			39.00	50	-	-	>50									36cm balance	
Bore hole terminated at 39.09m depth																	



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LAB TEST REPORT

Client:		ICAI Bhawan, ICAI- Institute of Chartered Accountants Of India (C/o. M/s. Spreads Foundation)										Report No: RT/L/296/23				
Project:		Proposed Institution building (2B+G+4)										Test Date: 21/06/2023				
Site:		Chittoor Road														
Bore hole No.	Depth (m)	Description of soil	Natural water content (%)	Bulk density (g/cc)	LL (%)	PL (%)	Grain size distribution (%)				Type of Sample	Type of test	Specific gravity	Cohesion c (kg/cm ²)	Angle of internal friction (φ °)	
							Silt & Clay	Sand								Gravel
								Fine	Medium	Coarse						
I	1.0	Sand (SP)	22.66	1.627	-	-	1	86	12	1	0	ds	Triaxial	2.63	0.00	26
I	3.0	Clayey Sand (SC)	69.59	1.460	99.7	61.2	47	41	3	3	6	ds	UCC	-	0.05	6
I	4.0	Sand (SP)	35.01	1.614	-	-	4	95	1	0	0	ds	Triaxial	2.63	0.00	18
I	6.0	Sandy Clay (CH-SP)	80.85	1.441	100.3	80.5	61	37	2	0	0	ds	Direct Shear	-	0.05	2
I	9.0	Sandy Clay (CH-SP)	74.73	1.487	92.0	63.4	74	24	2	0	0	ds	Triaxial	2.55	0.06	2
I	12.0	Sandy Clay (CH-SC)	112.66	1.356	126.9	76.9	91	4	5	0	0	ds	Triaxial	-	0.07	0

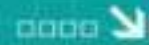
(All the tests are done on remoulded sample collected from SPT spoon)

Lab in Charge

Jayaraj A.R.

Engineer in Charge

Megha A, M.Tech



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Bore hole No.	Depth (m)	Description of soil	Natural water content (%)	Bulk density (g/cc)	LL (%)	PL (%)	Grain size distribution (%)					Type of Sample	Type of test	Specific gravity	Cohesion c (kg/cm ²)	Angle of internal friction (φ °)
							Silt & Clay	Sand			Gravel					
								Fine	Medium	Coarse						
I	15.0	Clay (CH)	97.52	1.367	132.5	35.2	97	1	2	0	0	ds	UCC	2.54	0.08	0
I	21.0	Gravelly Sandy Clay (SC-GC)	28.50	1.687	56.0	26.7	41	16	18	5	20	ds	Direct Shear	-	0.18	16
I	27.0	Clayey sand (SC)	37.26	1.38	-	-	27	49	22	Wood-1%		ds	Direct Shear	2.62	0.05	14
I	33.0	Clayey sand (SC)	14.23	1.708	-	-	17	43	40	0	0	ds	Direct Shear	-	0.05	30
I	39.0	Sand (SP)	17.47	1.713	-	-	3	18	79	0	0	ds	Direct Shear	2.65	0.00	34

(All the tests are done on remoulded sample collected from SPT spoon)

Lab in Charge

Jayaraj A.R.

Engineer in Charge

Megha A, M.Tech



27 June 2023

Site: Chittoor Road

Project: Proposed Institution Building (2B+G+4)

Client: M/s. ICAI Bhawan, ICAI-Institute of Chartered Accountants of India

Soil investigator: Spreads Foundation

Bore Hole details: BH-I dated 13-06-2023, BH-II dated 10-06-2023

Ground Water table: 0.70m below ground level for BH-I & BH-II

Recommendation:

Recommendations are based on the assumption that the soil profile found in the bore hole tested is indicative of the entire plot area. Any deviation in soil profile other than that observed in the bore hole tested should immediately be referred to the consultant and proper modification should be implemented.

1. Soil Profile :

As per the instruction of the engineer, it was decided to take two boreholes at the site. In BH-I, the top 2.50m comprises of Sand with S.P.T Value between 9 and 13. Below this is Clayey Sand (Grey) up to 3.60m depth with S.P.T Value 0.

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This is followed by Sand up to 4.80m depth with S.P.T Value 3. After this it is Clayey Sand (Grey) up to 6.0m depth with S.P.T Value 6. Below this is Sandy Clay (Black) up to 10.50m depth with S.P.T Value between 0 and 4. This is followed by Clayey Sand up to 12.0m depth with S.P.T Value 1. After this it is Sandy Clay (Black) up to 13.50m depth with S.P.T Value 2. Below this is Clay (Grey) up to 16.20m depth with S.P.T Value between 2 and 4. This is followed by Clayey Sand (Grey) up to 20.40m depth with S.P.T Value 2. After this it is Lateritic Clayey Sand with Gravel (Grey, Brown) up to 22.0m depth with S.P.T Value >50. Below this is Lateritic Clay with Sand & Decayed Wood (Brown, Grey, Black) up to 24.40m depth with S.P.T Value 26. Beneath this is Clayey Sand with Decayed Wood up to 32.80m depth with S.P.T Value between 24 and 45. This is followed by Clayey Sand (Whitish Grey) up to 37.0m depth with S.P.T Value >50. After this it is Sand (Grey) up to 39.12m depth with S.P.T Value >50. Bore hole was terminated at 39.12m depth. Water table was met at 0.70m below the ground level.

In BH-II, the top 2.60m comprises of Sand with S.P.T Value between 10 and 32. Below this is Clay (Black) up to 3.80m depth with S.P.T Value 2. This is followed by Sand with Clay up to 4.60m depth with S.P.T Value 2. After this it is Clay up to 11.50m depth with S.P.T Value between 1 and 3. Below this is Sand with Clay up to 13.20m depth with S.P.T Value 10. This is followed by Clay (Black) up to 16.60m depth with S.P.T Value between 2 and 5. After this it is Sand with Clay up to 18.80m depth with S.P.T Value 9.

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Below this is Laterite up to 23.40m depth with S.P.T Value >50. This is followed by Decayed Wood up to 32.50m depth with S.P.T Value between 30 and >50. After this it is Sand up to 39.09m depth with S.P.T Value >50. Bore hole was terminated at 39.09m depth. Water table was met at 0.70m below the ground level.

- It is recommended to stabilize the soil up to 5.0m depth using sand piling with lime mix of 10cm diameter at 50cm c/c throughout the plan area of the building plus 100cm offset all around to prevent settlement of soil.
- Mechanically augured (Tractor) pile may be provided up to 33.0m depth with following capacities. Ensure the same stratum is available throughout the site.

Dia (cm)	Capacity (T)
50	69
60	87
70	106

- D.M.C piles may be provided up to 36.0m depth with following capacities. Proper seating of piles must be ensured. Ensure same stratum is available throughout the site.

Dia (cm)	Capacity (T)
50	80
60	106
70	128

- Pile load test is recommended at the site.
- Foundation shall be constructed using various relevant Indian Standard Codes.

For, Stuba Engineering Consultancy Pvt. Ltd.

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