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SOIL EXPLORATION REPORT

For

Mr. BHUPENDRA KUMAR

Ref: GEO – 122– 2023-24

Date: 09.09.2023 - 10.09.2023

PROJECT NAME

SOIL INVESTIGATION FOR THE PROPOSED CONSTRUCTION OF APARTMENT BUILDING WITH STILT + 5 FLOORS OF PLINTH AREA 4,000 SQ. FT., @ TS. NO. : 1084, EAST PONNURANGAM ROAD, RS PURAM, COIMBATORE DISTRICT - 641002.

GEODESIGN INDIA PRIVATE LIMITED®

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Soil Investigations, SPT Test, DTH, Diamond core drilling, & Grouting works

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S.NO.	CONTENTS	PAGE NO.
1.	INTRODUCTION	3
	1.1 PURPOSE AND SCOPE	3
	1.2 THE SITE	3
2.	FIELD INVESTIGATIONS	3
	2.1 ROTARY BORING	3
	2.2 STANDARD PENETRATION TEST	4
	2.3 SAMPLING	4
3.	LABOATORY TEST	4
4.	FOUNDATION ANALYSIS	5
	4.1 SOIL PROFILE	5
	4.2 SAFE BEARING CAPACITY	5
5.	RECOMMENDATION	6
6.	REFERENCES	7
7.	ANNEXURE	
	7.1 LOG OF BORINGS	8 - 9
	7.2 LABORATORY TEST RESULTS	10 - 11
8.	PHOTOS	12
9.	ANNEXURE	
	9.1 BOREHOLE LOCATION DRAWING	13

1. INTRODUCTION

1.1. PURPOSE AND SCOPE

Geotechnical site investigation work for "SOIL INVESTIGATION FOR THE PROPOSED CONSTRUCTION OF APARTMENT BUILDING WITH STILT + 5 FLOORS OF PLINTH AREA 4,000 SQ. FT., @ TS. NO. : 1084, EAST PONNURANGAM ROAD, RS PURAM, COIMBATORE DISTRICT - 641002." The primary purpose of our investigation is to obtain data to develop foundation design recommendations for the above work. At, first instance, Two boreholes was bored at site. Client's representatives selected the locations of borings. To accomplish these purposes, the following tasks were performed:

1. Detailed soil borings were done up to stratum to explore the sub surface stratigraphy and obtain soil samples for testing. Field and laboratory tests were conducted to evaluate the index and engineering properties of the soils
2. Engineering analysis was performed to develop foundation design information for proposed structure.

1.2. THE SITE

"SOIL INVESTIGATION FOR THE PROPOSED CONSTRUCTION OF APARTMENT BUILDING WITH STILT + 5 FLOORS OF PLINTH AREA 4,000 SQ. FT., @ TS. NO. : 1084, EAST PONNURANGAM ROAD, RS PURAM, COIMBATORE DISTRICT - 641002."

2. FIELD INVESTIGATIONS

2.1. ROTARY BORING

Rotary drilling technique was adapted using Calyx machine in this field. In this method, boring is effected by the cutting action of a rotating bit that is kept in firm contact with the bottom of the hole. The bit is attached to the lower end of a hollow drill rod that is rotated by a suitable chuck. Drilling mud (usually Bentonite) is continuously forced down the hollow drill rods. The mud returning upwards though the annular space between the drill rods and the side of the hold bring the cutting to the surface.

2.2. STANDARD PENETRATION TEST

It is now most commonly used in site test. The test measures the penetration resistance of the split spoon sampler, when it is driven into the soil, at the bottom of a borehole in a standard manner. The N-value, which is the number of blow required to achieve 300mm penetration of the soil, indicates the relative density of sand or gravel, the consistency of other soil such as silts or clays and the strength of weak rocks. The test is described in IS 2131 - 1981. The split spoon sampler is attached to stiff drill rod and lowered to the bottom of the bore hold. A standard blow consists of dropping a mass of 63.5kg free fall through 750 mm on to an donut hammer at the top of the rods and ensuing that this amount of dynamic energy is transferred to the sampler as much as possible.

The number of blows required to achieve each 150mm penetration is recorded for a fall penetration of 450mm. The initial 150mm penetration is referred to as seating drive and the blows required for this penetration are not considered as this zone is in disturbed soil. The next 300mm of penetration is referred to as the test drive and the number of blows required to achieve this fully is termed the penetration resistance or N-value.

2.3. SAMPLING

Soil samples were collected through Split spoon and rock core sample were collected through single tube core barrel.

3. LABORATORY TESTS

The operations to be performed in the laboratory depend upon the type of the nature of data required for the problem at hand. In case of cohesionless material, like sand, the laboratory tests are usually minimum and the design parameters are worked out from field test data such as form SPT- N value, Core resistance and plate load test data.

In the case of cohesive soils, the programme of laboratory testing can vary from carrying out simple tests such as unconfined tests to comprehensive study of soil behaviour using triaxial shear tests and consolidation tests.

Following laboratory tests are conducted.

For Cohesion & cohesionless soil

a) Specific gravity

b) Sieve analysis

c) Atterberg's limits

d) Natural moisture content.

4. FOUNDATION ANALYSIS

4.1 Soil Profile

The profile of the area as observed in the bore hole is given in the chart. The water level is observed far below. The soil layer up to 12.00m depth SOFT DISINTEGRATED ROCK was obtained.

4.2 Safe Bearing Capacity

The bearing capacity of granular soil depends upon the unit weight and angle of internal friction of the soil. These two properties of granular soils are determined by standard penetration tests.

The allowable bearing pressure based on tolerable settlement has been established empirically by Terzaghi and Peck, 1948 and may be expressed by the equation.

Safe bearing capacity (SBC) = $3.5\ (N-3)\ \{(B+0.3)/2B\}^2 \times R_W \times F_D + P$

Where

N = Corrected N value N1
B = Width of Foundation = constant 1
RW = Water Correction = constant 0.5
FD = Depth of Factor = constant 1
P = Over Burden Pressure

5. RECOMMENDATION

For the site, "SOIL INVESTIGATION FOR THE PROPOSED CONSTRUCTION OF APARTMENT BUILDING WITH STILT + 5 FLOORS OF PLINTH AREA 4,000 SQ. FT., @ TS. NO. : 1084, EAST PONNURANGAM ROAD, RS PURAM, COIMBATORE DISTRICT – 641002," the borehole investigation was conducted and SBC was determined.

- In this site, up to 12.00m, SOFT DISINTEGRATED ROCK is obtained.
- The **ISOLATED FOOTING** is recommended for this site.
- **Rest the Foundation at 3.00m from the Existing Ground Level.**
- The **SBC at 3.00m is 36.85 Ton/m^2** is determined in All Borehole Locations @ Foundation Level.

Note:

- The detailed SBC is mentioned in Page No's – 10 - 11.

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6. REFERENCES

1. **IS: 1892-1979** – Indian Standard Code of Practice for Determination of Bearing Capacity Of Shallow Foundation

2. **IS: 1892-1979** - Indian Standard Code of Practice for Subsurface Investigation for Foundations

3. **IS: 2131-1981** - Indian Standard Method for Standard Penetration Test for Soils

4. **IS: 8009 (Part 1) - 1976** - Indian Standard Code of Practice for Calculation of Settlements of Foundations

5. **IS: 2720 (Part-2) - 1973** - Indian Standard Methods of Test for Soils, Determination of Water Content

6. **IS: 2720 (Part-4) - 1985** - Indian Standard Methods of Test for Soils, Grain Size Analysis

7. **IS: 2720 (Part-5) – 1985** - Indian Standard Method of Test for Soils, Determination of Liquid and Plastic Limit

8. **IS: 2720 (Part-3/Sec-1)1980** - Indian Standard Methods of Test for Soils, Determination of Specific Gravity.

Bore Log

Ref: *GEO – 122 – 2023-24*

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Soil Investigation done by: GEODESIGN INDIA PRIVATE LIMITED Soil Exploration Consultant, Coimbatore-38

Type of Drilling: Rotary – Mud Circulation
LOCATION – 1

G.W.T-Not met

Bore hole No. : 1

Date of commencement : 09.09.2023
Date of completion : 10.09.2023

Depth below G.L	Soil Profile	Description of Soil	Thickness of layer (m)	Standard penetration test data: Depth at which test is conducted	N – Value- Depth of penetration: 15cm	30cm	45cm	For 30cm	Relative density / Consistency	Graphical representation of penetration resistance
1.60		**Filling Soil**	**1.60**	1.00	4	5	5	10	Loose	
2.10		**Clay**	**0.50**	2.00	5	12	13	25	Medium	
2.60		**Poorly Graded Gravel With SDR**	**0.50**	3.00	36	50/11	-	>50	V.Dense	
9.30		**Soft Disintegrated Rock**	**6.70**	4.50	>50	-	-	>50	V.Dense	
				6.00	>50	-	-	>50	V.Dense	
				7.50	>50	-	-	>50	V.Dense	
				9.00	>50	-	-	>50	V.Dense	
12.00m		**Soft Rock** End of Bore hole	**2.70**							

Graphical representation of penetration resistance: 0 20 40 60 80 100

Contd...2

2

Bore Log

Ref: *GEO – 122 – 2023-24*

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Soil Investigation done by: GEODESIGN INDIA PRIVATE LIMITED Soil Exploration Consultant. Coimbatore-38

Type of Drilling: Rotary – Mud Circulation
LOCATION – 2

G.W.T-Not met

Bore hole No. : 2

Date of commencement : 10.09.2023
Date of completion : 10.09.2023

Depth below G.L	Soil Profile	Description of Soil	Thickness of layer (m)	Standard penetration test data: Depth at which test is conducted	N – Value- Depth of penetration: 15cm	30cm	45cm	For 30cm	Relative density / Consistency	Graphical representation of penetration resistance (0 20 40 60 80 100)
1.70		**Filling Soil**	**1.70**	1.00	8	4	4	8	Loose	
2.30		**Clay**	**0.60**	2.00	10	16	15	31	Dense	
2.80		**Poorly Graded Gravel With SDR**	**0.50**	3.00	42	50/9	-	>50	V.Dense	
				4.50	>50	-	-	>50	V.Dense	
				6.00	>50	-	-	>50	V.Dense	
10.50		**Soft Disintegrated Rock**	**7.70**	7.50	>50	-	-	>50	V.Dense	
				9.00	>50	-	-	>50	V.Dense	
12.00m		**Soft Rock** End of Bore hole	**1.50**							

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GEODESIGN INDIA PRIVATE LIMITED

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SOIL TEST RESULTS

Name of Project: "SOIL INVESTIGATION FOR THE PROPOSED CONSTRUCTION OF APARTMENT BUILDING WITH STILT + 5 FLOORS OF PLINTH AREA 4,000 SQ. FT., @ TS. NO. : 1084, EAST PONNURANGAM ROAD. RS PURAM, COIMBATORE DISTRICT - 641002."

GEODESIGN INDIA PRIVATE LIMITED Soil Exploration Consultant. Coimbatore-38	BORE NUMBER - 1	LOCATION : 1	GROUND WATER LEVEL: Not met	COMMENCEMENT OF LAB TESTING 11.09.2023	COMPLETION OF LAB TESTING 13.09.2023

SOIL PROFILE AND DEPTH IN METRES	DEPTH OF SAMPLING (m)	IS SOIL CLASSIFICATION	NATURAL WET DENSITY (kN/m³)	NATURAL MOISTURE CONTENT %	INDEX TEST			SIEVE ANALYSIS % PASSING IS SIEVE ANALYSIS				SPECIFIC GRAVITY	SHEAR TEST		STANDARD PENETRATION TEST				CONSOLIDATION TEST			
					LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	% of GRAVEL	% of SAND	% of SILT	% of CLAY		COHESION C (Ton / m²)	ANGLE OF INTERNAL FRICTION ⁰	DEPTH OF TESTING (m)	OBSERVED N VALUE	CORRECTED N VALUE	SAFE BEARING CAPACITY (T/m²)	COMPRESSION INDEX C_c	PRE - CONSOLIDATION PRESSURE (kg/cm²)	INITIAL VOIDS RATIO	CO-EFFECT OF CONSOLIDATION Cv (cm²/sec)
		FS	-	-	-	-	-	-	-	-	-	-	-	-	1.00	10	10	5.87	-	-	-	-
	1.60														2.00	25	25	17.66				
		CL	17.53	14.81	-	-	-	-	-	-	-	-	-	-	3.00	>50	50	36.85				
	2.10														4.50	>50	50	37.90	-	-	-	-
															6.00	>50	50	38.95				
		GP-SDR	15.71	11.45	-	-	-	47	30	23		-	-	30	7.50	>50	50	40.00	-	-	-	-
	2.60														9.00	>50	50	41.05				
		SDR	-	-	-	-	-	-	-	-	-	-	-	-					-	-	-	-
	9.30																					
		SR	-																-	-	-	-
	12.00																					

Depth (m)	Core Recovery (%)	Rock Quality Designation (%)	Allowable Bearing Pressure (Ton/m²)
9.30 – 10.50	15.83 + 3 Small pieces	9	59
10.50 – 12.00	24.33	18.33	84

FS – FILLING SOIL, CL – LOW PLASTICITY CLAY, GP – POORLY GRADED GRAVEL WITH SDR, SDR – SOFT DISINTEGRATED ROCK, SR – SOFT ROCK

Contd:..2

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2

Ref: *GEO – 122 - 2023-24*

SOIL TEST RESULTS

Name of Project: "SOIL INVESTIGATION FOR THE PROPOSED CONSTRUCTION OF APARTMENT BUILDING WITH STILT + 5 FLOORS OF PLINTH AREA 4,000 SQ. FT., @ TS. NO. : 1084, EAST PONNURANGAM ROAD, RS PURAM, COIMBATORE DISTRICT - 641002."

GEODESIGN INDIA PRIVATE LIMITED Soil Exploration Consultant, Coimbatore-38	BORE NUMBER - 2	LOCATION : 2	GROUND WATER LEVEL: Not met	COMMENCEMENT OF LAB TESTING 11.09.2023	COMPLETION OF LAB TESTING 13.09.2023

SOIL PROFILE AND DEPTH IN METRES	DEPTH OF SAMPLING (m)	IS SOIL CLASSIFICATION	NATURAL WET DENSITY (kN/m³)	NATURAL MOISTURE CONTENT %	INDEX TEST			SIEVE ANALYSIS % PASSING IS SIEVE ANALYSIS				SPECIFIC GRAVITY	SHEAR TEST		STANDARD PENETRATION TEST				CONSOLIDATION TEST			
					LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	% of GRAVEL	% of SAND	% of SILT	% of CLAY		COHESION C (Ton / m²)	ANGLE OF INTERNAL FRICTION ⁰	DEPTH OF TESTING (m)	OBSERVED N VALUE	CORRECTED N VALUE	SAFE BEARING CAPACITY (T/m²)	COMPRESSION INDEX C_c	PRE - CONSOLIDATION PRESSURE (kg/cm²)	INITIAL VOIDS RATIO	CO-EFFECT OF CONSOLIDATION C_v (cm²/sec)
		FS	-	-	-	-	-	-	-	-	-	-	-	-	1.00	8	8	4.39	-	-	-	-
	1.70														2.00	31	31	22.10				
		CL	19.37	12.79	-	-	-	9	21	70		-	-	-	3.00	>50	50	36.85				
															4.50	>50	50	37.90	-	-	-	-
	2.30														6.00	>50	50	38.95				
		GP-SDR	-	-	-	-	-	-	-			-	-	-	7.50	>50	50	40.00	-	-	-	-
	2.80														9.00	>50	50	41.05				
		SDR	-																-	-	-	-
	10.50																					
		SR	-	-	-	-	-	-	-	-	-	-	-	-					-	-	-	-
	12.00																					

Depth (m)	Core Recovery (%)	Rock Quality Designation (%)	Allowable Bearing Pressure (Ton/m²)
9.50 – 10.50	19 + 3 Small pieces	NIL	-
10.50 – 12.00	18.6	16	81

FS – FILLING SOIL, CL – LOW PLASTICITY CLAY, GP – POORLY GRADED GRAVEL WITH SDR, SDR – SOFT DISINTEGRATED ROCK, SR – SOFT ROCK.

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Geotechnical Engineer

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8. PHOTOS

Borehole Location – 1



Borehole Location – 2

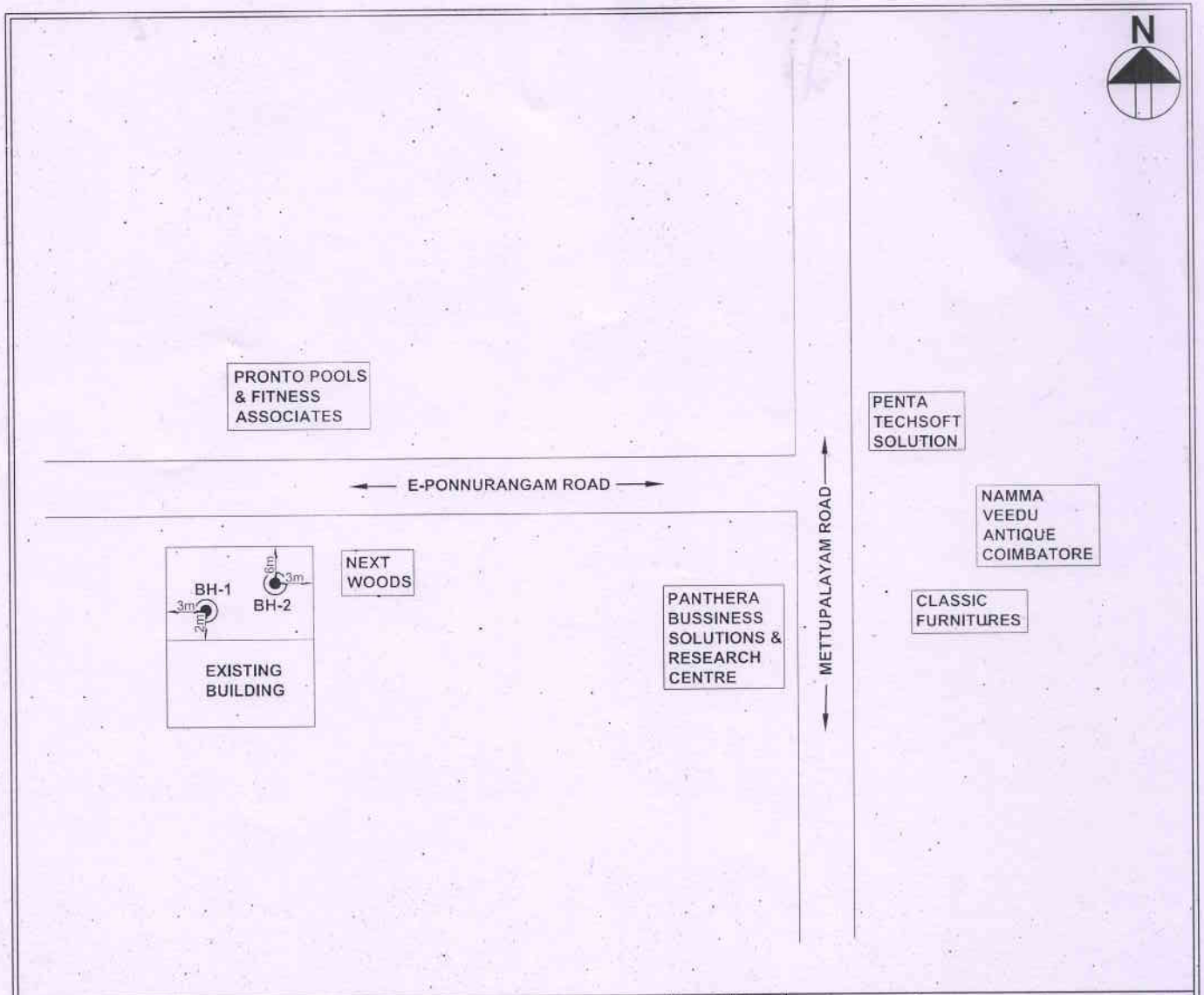


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GEODESIGN INDIA PRIVATE LIMITED COIMBATORE 38



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PREPARED: ENGINEER:

DATE: 09.09.2023-10.09.2023

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Vastu & Property Management Tools

Home Vastu Shastra, Plot Vastu Shastra, Property Management

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