GEO TECHNICAL INVESTIGATION REPORT

REPORT No.: **GT / 3280 / 2023 – 24**

PROJECT: **Proposed Construction of Residential Building at Yapral**

CLIENT: **M/s. Avisun Properties**

W O Ref.: **GT/QUO/Soil/2023-24/223**

DURATION: **November 2023**

GEOTECHNICAL CONSULTANTS:

GEO TECHNOLOGIES

ISO 9001:2015 COMPANY

5-83/B, V. V. NAGAR

HABSIGUDA, STREET No. 8

HYDERABAD - 500 007

Tele/Fax: 040 – 42217757; M: 9347275255

Email: geotech999@gmail.com

Website: www.geotechnologies.in

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1. INTRODUCTION

M/s. Avisun Properties have engaged M/s Geo Technologies as Consultant to carryout soil investigation work for the proposed Construction of Residential Apartment at Yapral

Soil investigation was carried out by drilling three (3) bore holes.

The results of these investigations and recommendations are presented in this Report.

2. FIELD INVESTIGATIONS

DRILLING:

150 mm / NX size rotary core drilling was performed. The size of the casing used was 150 mm / 90 mm.

All the field operations were conducted as per IS: 1892.

Depth of drilling was 6.0 m.

Standard Penetration Tests (SPT):

Standard Penetration Tests were conducted in accordance with IS: 2131-1981, in soil and completely weathered rock (SDR) layers, and SPT samples were collected.

Collection of samples

Split-spoon samples and disturbed soil samples were collected from boreholes at frequent intervals. All the samples collected from the bore holes were properly packed, labeled and transported to Geo Technologies Soil Testing Laboratory.

Field Bore Logs:

All the details collected from the field operations are recorded in Field Bore Log Chart (devised by combining the Record of Boring of IS: 1892 and Drilling Log of IS: 4464).The field bore log charts are given in Annexure-1.

3. LABORATORY TESTING

The samples were tested at Soil Testing Laboratory of GEO TECHNOLOGIES at Hyderabad.

As the soil in the site is essentially coarse grained and cohesionless, the following tests were performed on the Soil samples:

- Specific gravity (IS: 2720: part3 – 1980)
- Bulk Density (IS: 2720: part29 – 1975)
- Grain size distribution (IS 2720 part 4 – 1985)
- Direct Shear test (IS 2720 – part 13 – 1986)

No cores were recovered in SDR strata.

The following tests were conducted on rock core samples:

Uniaxial Compressive Strength test (UCS) of rock cores (IS: 9143 – 1979)

4. RESULTS

Fig. 1 gives the combined Log of bore holes.

Table 1 gives the results of lab tests of soil samples.

Table 2 gives the results of lab tests of rock cores.

Appendix gives the calculations of SBC for foundations.

Annexure-1 gives the Field Bore Log Charts.

5. SUB SOIL PROFILE

Based on the bore log data, the subsoil profile in the entire site is generalized as follows:

Depth, m	Strata	N value
0.0 – 1.3	Filling	-
1.3 – 4.0	Silty clay / Sandy clay / Silty sand	5 – 10
4.0 – 6.5	Silty gravel / Gravel	35 – 50
6.5 – 8.0	SDR	> 50
8.0 – 10.0	Hard Rock	Cores

At the time of drilling, Water table was observed in the bore hole at about 0.2 m depth.

6. RECOMMENDATIONS

The following recommendations are made for the proposed Construction of Residential Apartment at Yapral. These are based on three (3) bore holes.

1) The subsoil profile in the bore holes is as follows:

Depth, m	Strata	N value
0.0 – 1.3	Filling	-
1.3 – 4.0	Silty clay / Sandy clay / Silty sand	5 – 10
4.0 – 6.5	Silty gravel / Gravel	35 – 50
6.5 – 8.0	SDR	> 50
8.0 – 10.0	Hard Rock	Cores

2) At the time of drilling, Water table was observed in the bore hole at 0.2 m depth.
3) Proposed Building consists of R.C.C. structure with S+5 upper floors.
4) Based on the above, open foundations are recommended.
5) Safe Bearing Capacity is recommended as 30 t / sq m for foundations resting in Silty Gravel / Gravel at 4.5 m depth.
6) All Foundations should be backfilled with well-compacted gravelly morum. Top soil from site is not suitable for this purpose.
7) All concreting should be done in dry condition.
8) Shallow water table should be taken into account in designing foundations and grade slabs.

For ***GEO TECHNOLOGIES***

(Dr. D. BABU RAO)
M.E., Ph.D. (USA), FIE, MIGS
Former Professor & Head of Civil Engineering
Principal Geotechnical Consultant

(Dr. N. VENKAT RAO)
M.Sc. Tech., Ph.D. FAEG, MIGS
Former Professor & Head of Geophysics
Geological Consultant & Proprietor

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TABLE-1: Results of Lab testing of Soil samples

BH No.	Depth,m	Soil	Sp. Gr.	Grain size, Percentage			γ KN/ Cum	Direct Shear Test	
				Gr >4.75mm	Sa 4.75 to 0.075 mm	Fines (Si+Cl) <0.075 mm		C	Ø
BH-1	3.0	Silty sand	2.66	0	85	15	17.6	0	30
	4.5	Gravel	2.67	57	26	27	-	11	35
BH-2	3.0	Silty gravel	2.67	41	33	26	19.6	12	34
BH-3	4.5	Gravel	2.67	53	30	17	-	10	35

TABLE-2: RESULTS OF TESTS ON ROCK CORES

Rock: Granite

B H No.	DEPTH OF SAMPLE (m)	CR%	RQD%	UCS kg/ sq cm
BH-1	8.0 – 9.0	50	15	530
	9.0 – 10.0	79	79	810
BH-2	6.0 – 7.0	77	77	880
	7.0 – 8.0	93	93	870
BH-3	6.5 – 7.5	75	64	760
	8.5 – 9.5	94	94	850

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Appendix: Typical Calculation of SBC for Open foundations

Foundations in Silty Gravel:

a) Shear criterion:

Depth of foundation D = 2.0 m; (Effective) Assumed width of foundation B …2.0 m

γ = 19.6 KN/m^3; γ' = 9.8 KN/m^3; c = 12 KN/m^2; (Neglected) $\varphi = 34^o$.

Nc = 42.92 Nq = 30.32 Nr = 42.90

Net, Ult B.C. = 1.3 c Nc + r' D (Nq – 1) + 0.4 r' B Nr = 911 KN per sq m

With a F.S. of 3.0, SBC = 303.67 KN per sq m

b) Settlement Criterion:

From IS 6403, Table-1, for $\varphi = 34^o$ N=23

For permissible settlement of 40 mm,

Allowable Bearing Pressure = 12.25 N (B + 0.3) / B = 324 kN / sq m

Recommended Safe Bearing Capacity is 30 t per sq m

Annexure-1

FIELD BORE CHARTS