

GEO TECHNICAL INVESTIGATION REPORT

REPORT No.: GT / 3485 / 2024 – 25

**PROJECT: Proposed Construction of (S+5) & (S+4)
Buildings at Alwal, Hyderabad**

CLIENT: M/s Avison Properties LLP

DURATION: February 2025

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CONSULTANTS:**



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CONTENTS

S.NO.	TITLE	PAGE
1.	INTRODUCTION	3
2.	FIELD INVESTIGATIONS	3
3.	LABORATORY TESTING	4
4.	RESULTS	4
5.	SUB SOIL PROFILE	4
6.	RECOMMENDATIONS	5
7.	TABLE-1: Results of tests on soil samples	6
8.	APPENDIX: Calculations for SBC	6
9.	FIG-1: Site plan showing Borehole locations	
10.	FIG-2: Combined Bore Logs	
11.	Annexure-1: Field Bore Log charts	
12.	Annexure-2: BIS (IS) Codes	

1. INTRODUCTION

M/s Avison Properties LLP have engaged M/s GEO TECHNOLOGIES as consultant for Soil investigation for the proposed Construction of (S+5) & (S+4) Floors Buildings at Alwal, Hyderabad.

Soil investigation was conducted by drilling two (2) boreholes, conducting standard Penetration Tests, and lab testing of soil and rock samples.

The results of this investigation and recommendations are presented in this Report. All the investigations are conducted in accordance with the relevant IS Codes.

2. FIELD INVESTIGATIONS

DRILLING:

The bore holes were drilled in the site at the locations specified by the client (Fig.1).

Rotary Drilling was performed as per IS: 1892. The size of the casing used was 150 / 90 mm.

The following information was collected during the drilling operations:

- | | |
|--------------------------|---------------------------|
| - Nature of strata | - Details of soil samples |
| - Colour of Return Water | - Rate of drilling |

STANDARD PENETRATION TEST (SPT):

SPT were conducted at 1.5 m depth intervals in soil, in accordance with IS: 2131-1981.

Soil samples were extracted from the SPT sampler and preserved in polythene bags.

SAMPLES:

Soil samples were collected as per IS: 2132. All the samples collected from the bore holes were properly packed, labeled and transported to Geo Technologies Soil Testing Laboratory at Hyderabad.

FIELD BORE LOGS:

All the details collected from the field operations are presented in Logs of Bore holes in Annexure-1 at the end of this Report. These logs contain depth wise strata details, depth and type of soil & rock samples collected, results of Standard Penetration Tests, and color of return water etc.

3. LABORATORY TESTING

The following tests were performed on the Soil samples:

- Natural Moisture Content
- Specific gravity (IS: 2720: part3 – 1980)
- Grain size distribution (IS 2720 part 4 – 1985)

No cores were recovered in SDR strata.

4. RESULTS

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

Fig. 1 gives the site plan showing the locations of boreholes.

Fig. 2 gives the combined Log of bore holes.

Appendix gives the calculations for SBC.

Annexure-1 gives the field bore log charts.

Annexure-2 gives the BIS Codes.

5. SUBSOIL PROFILE

The subsoil profile in the boreholes is as follows:

Depth, m	Strata	N
0.0 – 1.5	Filling / silty clay	-
1.5 – 3.0	Silty gravel	21 – 35
3.0 – 10.0	Soft Disintegrated Rock (SDR)	>50

At the time of drilling, no water table was seen in the boreholes.

6. RECOMMENDATIONS

The following recommendations are made for the proposed (S+5) & (S+4) Floors Buildings at Alwal, Hyderabad. These are based on drilling of 2 boreholes.

1. The detailed subsoil profiles each borehole are given in bore log diagram (Fig.2). The subsurface profile in the site can be generalized as follows:

Depth, m	Strata	N
0.0 – 1.5	Filling / silty clay	-
1.5 – 3.0	Silty gravel	21 – 35
3.0 – 10.0	Soft Disintegrated Rock (SDR)	>50

2. No water table was encountered till borehole termination depth.
3. Open foundations are recommended at 2.0 / 3.0 m depth below EGL
4. SBC is recommended as follows:

Depth, m	Strata	SBC, t/m ²
2.0	Silty gravel	25
3.0	Soft Disintegrated Rock (SDR)	35

5. This is based on the assumption of footing width of 2 m. Actual shape and size will be based on the loads from the superstructure.
6. All loose / isolated boulders at foundation level should be fully removed and the
7. As per IS Code of Practice 2950 (Part -1) 1981, Reaffirmed, 2008, App B: Subgrade reaction modulus (k-value) is recommended as 5 kg/cm²/cm for dry conditions.

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Project: Proposed (S+5) & (S+4) Floors Buildings at Alwal, Hyderabad

TABLE-1: Results of Lab testing of Soil samples

BH No.	Depth, m	Soil	NMC%	Sp. gr.	Grain size, %		
					Gr >4.75 mm	Sa 4.75 to 0.075 mm	Fines (Si+Cl) <0.075 mm
BH-1	1.5	Silty gravel	2.1	-	41	36	23
BH-2	1.5	Silty gravel	2.2	-	45	35	20

Appendix: Calculations for SBC

Isolated Footings in Silty gravel at 2.0 m depth:

a) Shear criterion:

As per Teng's equation, Net Safe bearing capacity based on shear failure criterion (with F.S. = 3.0) is given as:

$$q \text{ (safe)} = 1/18 [2 N^2 B R_r + 6 (100 + N^2) D R_q] \quad \text{kN/m}^2$$

B = width of Footing, assumed as 2 m, D = depth of foundation = 1.0 m (Effective),

N = corrected N value = 20

R_q & R_r = correction factors for water table = 0.5

$$q \text{ (safe)} = 255 \text{ kN/m}^2.$$

b) Settlement Criterion:

For a settlement of 40 mm (N = 20, B = 3 m)

$$q \text{ (Net Allowable)} = 12.25 N [(B + 0.3) / B] = 281 \text{ KN/ m}^2.$$

Recommended net safe bearing pressure for Isolated footings of width 2 m resting in silty gravel at 2 m below EGL is 25 t/m² for allowable settlement of 40 mm.

Isolated Footings in SDR at 3.0 m depth:

a) Shear criterion:

As per Teng's equation, Net Safe bearing capacity based on shear failure criterion (with F.S. = 3.0) is given as:

$$q \text{ (safe)} = 1/18 [2 N^2 B R_r + 6 (100 + N^2) D R_q] \quad \text{kN/m}^2$$

B = width of Footing, assumed as 2 m, D = depth of foundation = 2.0 m,

N = corrected N value = 35

R_q & R_r = correction factors for water table = 0.5

$$q \text{ (safe)} = 577 \text{ kN/m}^2.$$

b) Settlement Criterion:

For a settlement of 40 mm (N = 35, B = 2 m)

$$q \text{ (Net Allowable)} = 12.25 N [(B + 0.3) / B] = 493 \text{ KN/ m}^2.$$

Recommended net safe bearing pressure for Isolated footings of width 2 m resting in SDR at 3 m below EGL is 45 t/m² for allowable settlement of 40 mm.

Annexure-1

FIELD BORE CHARTS

FIG:1 SITE PLAN SHOWING THE LOCATION OF BORE HOLE
Project:Avisun Properties Alwal Feb-2024

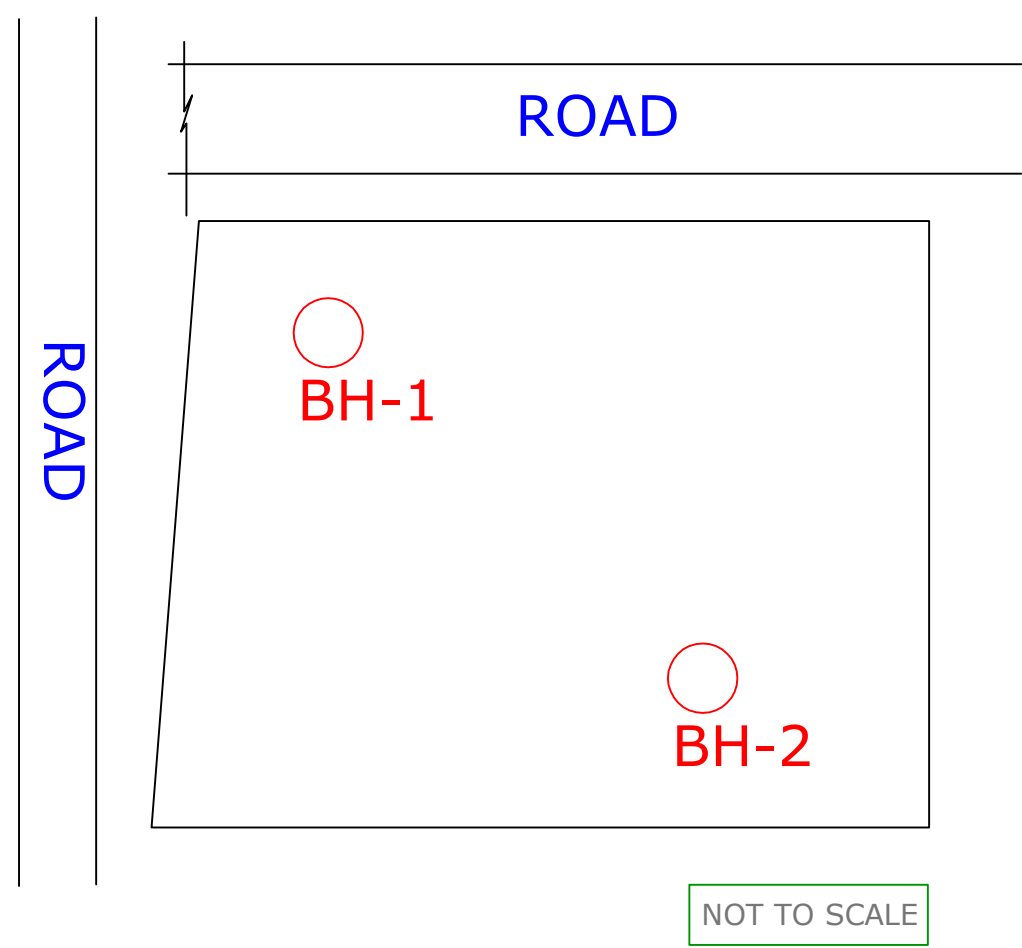
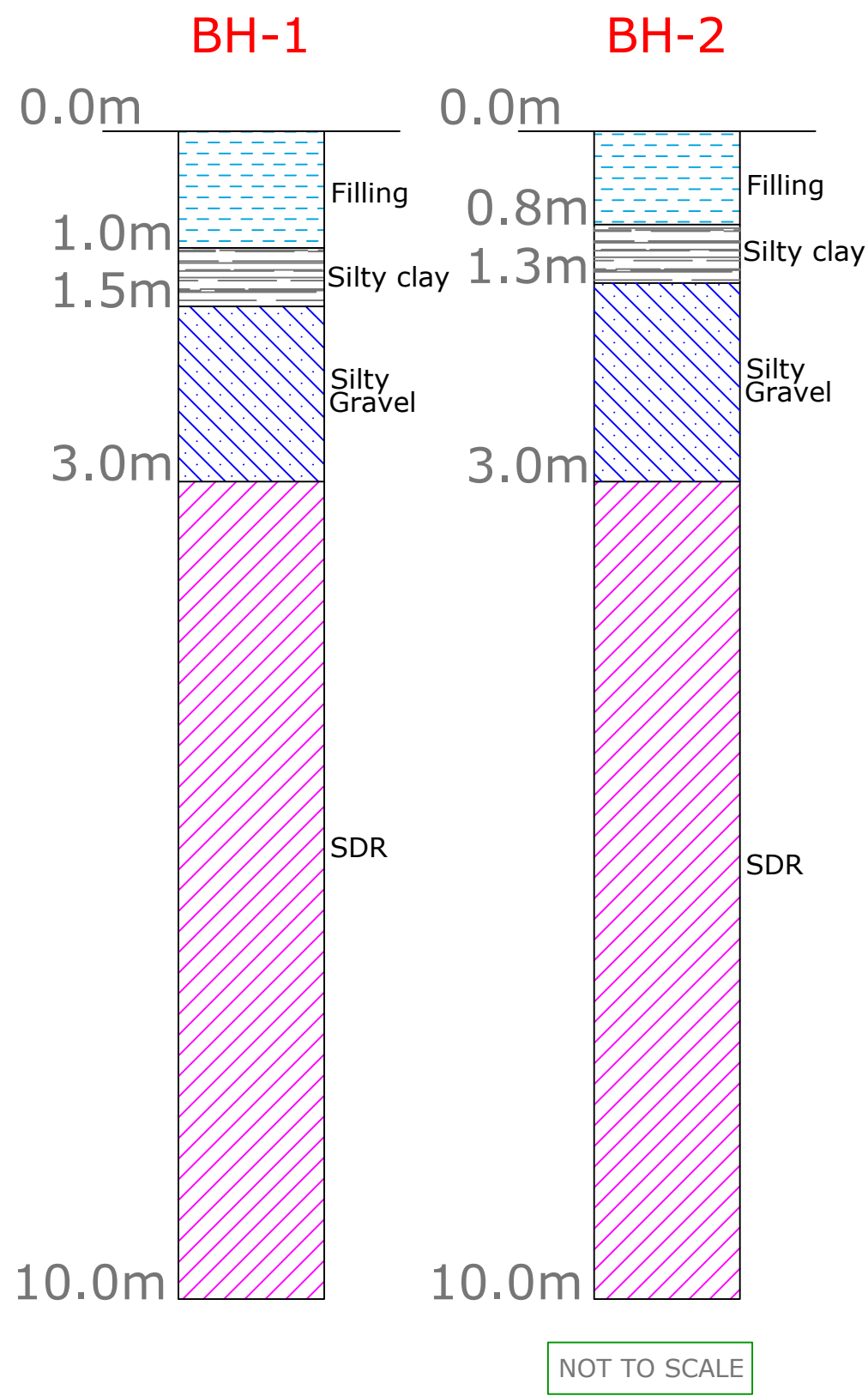






FIG:2 LOG OF BORE HOLES
Project:Avisun Properties Alwal Feb-2024







FIELD BORE LOG CHART																	
Project: Proposed Construction of (S+5) & (S+4) Buildings at Alwal, Hyderabad								BORE HOLE NO. 1		Ground Level:							
										Dia. Of Casing: NX							
Date : 16-02-2025										Water Table:							
Depth (m)		Length of Run (m)	Description	Log of Bore	Sampling		SPT		Details of Rock core				RQD Value %	Avg. RQD %	Water colour	Rate of Drill Min/m	
From	To				Depth (m)	Type	No. blows for Penetration of (15-30-45)cm	N Value	>10cm core Pieces(cm)	Total Length (cm)	No. of Pieces	% of core Recovery					
0.0	1.0	1.0	Filling		1.00	D/S									—		
1.0	1.5	0.5	Silty clay		1.50	SPT	7-8-13	21							Reddish		
1.5	3.0	1.5	Silty Gravel		2.50	D/S									Brownish		
					3.00	SPT	22cm/50blows	>50									
3.0	4.5	1.5	SDR		4.00	D/S											
					4.50	SPT	20cm/50blows	>50									
4.5	6.0	1.5			5.50	D/S											
					6.00	SPT	16cm/50blows	>50									
6.0	7.5	1.5			7.00	D/S											
					7.50	SPT	13cm/50blows	>50									
7.5	9.0	1.5			8.50	D/S											
					9.00	SPT	12cm/50blows	>50									
9.0	10.0	1.0			10.00	D/S											

SDR=Soft Disintegrated Rock

cm/50= no.of blows

sp=Small pieces vsp=Very Small Pieces

FIELD BORE LOG CHART																
Project: Proposed Construction of (S+5) & (S+4) Buildings at Alwal, Hyderabad								BORE HOLE NO. 2		Ground Level:						
										Dia. Of Casing: NX						
Date : 16-02-2025								Water Table:								
Depth (m)		Length of Run (m)	Description	Log of Bore	Sampling		SPT		Details of Rock core				RQD Value %	Avg. RQD %	Water colour	Rate of Drill Min/m
From	To				Depth (m)	Type	No. blows for Penetration of (15-30-45)cm	N Value	>10cm core Pieces(cm)	Total Length (cm)	No. of Pieces	% of core Recovery				
0.0	0.8	0.8	Filling												—	
0.8	1.3	0.5	Silty clay		1.00	D/S									Reddish	
1.3	1.5	0.2	Silty Gravel		1.50	SPT	10-15-20	35							Brownish	
1.5	3.0	1.5			2.50	D/S										
					3.00	SPT	24cm/50blows	>50								
3.0	4.5	1.5	SDR		4.00	D/S										
					4.50	SPT	19cm/50blows	>50								
4.5	6.0	1.5			5.50	D/S										
					6.00	SPT	17cm/50blows	>50								
6.0	7.5	1.5			7.00	D/S										
					7.50	SPT	14cm/50blows	>50								
7.5	9.0	1.5			8.50	D/S										
					9.00	SPT	12cm/50blows	>50								
9.0	10.0	1.0					10.00	D/S								

SDR=Soft Disintegrated Rock

cm/50= no.of blows

sp=Small pieces vsp=Very Small Pieces

ANNEXURE – 2: IS CODES

1. IS: 1892 – 2021: Subsurface Investigations for Foundations - Code of Practice (Second Revision)
2. IS: 2131 – 1981 (Reaffirmed 2021): Method of Standard Penetration Test for Soils.
3. IS: 2132 – 1986: Code of Practice for thin walled tube sampling of Soils.
4. IS: 4464 – 2020: Code of Practice for presentation of drilling information and core description in foundation investigations (Second Revision).
5. IS: 2720 Part 4 – 1985: Methods of Test for Soils – Part 4: Grain size analysis.
6. IS: 1498 – 1970: Classification and Identification of Soils for General Engineering Purpose.
7. IS: 2720 Part 29 – 1975: Methods of Test for Soils – Part 29: Determination of dry density of soils by core-cutter method.
8. IS: 2720 Part 2 – 1973: Methods of Test for Soils – Part 2: Determination of water content.
9. IS: 2720 Part 13 – 1986: Methods of Test for Soils – Part 13: Direct shear test.
10. IS: 2720 Part 2 – 1985: Methods of Test for Soils – Part 2: Determination of water content.
11. IS: 2720 Part 3 / section 2 – 1980: Methods of Test for Soils – Part 3: Determination of Specific gravity; Section 2: Fine, Medium and Coarse Grained Soils.
12. IS: 2720 Part 7 – 1980: Methods of Test for Soils – Part 7: Determination of water content – Dry density relation using light compaction .
13. IS: 2720 Part 16 – 1979: Methods of Test for Soils – Part 16: Laboratory Determination of CBR.
14. IS: 9143 – 1979: Method for determination of unconfined compressive strength of rock materials.
15. IS: 8764 – 1998 Reaffirmed 2008: Method for determination of Point Load Strength Index of rocks.
16. IS: 11315 (Part 2) – 1987: Method for Quantitative Description of Discontinuities in Rock Mass – Part 2: Spacing.
17. IS: 11315 (Part 11) – 1985: Method for Quantitative Descriptions of Discontinuities in Rock Masses – Part 11: Core Recovery and Rock Quality Designation.
18. IS: 11315 (Part 12) – 1992: Quantitative Description of Discontinuities in Rock Mass – Methods – Part 12: Drill Core study.
19. IS: 12070 – 1987: Code of Practice for Design and Construction of Shallow Foundations on Rocks.
20. IS: 6403 – 1981: Code of Practice for determination of Bearing Capacity of Shallow Foundations.
21. IS: 8009 – 1976 (Part I): Code of Practice for calculation of settlements of Foundations.
22. IRC:78-2014 – Standard Specifications and Code of Practice for Road Bridges – Section: VIII Foundations and Substructure (Revised Edition)