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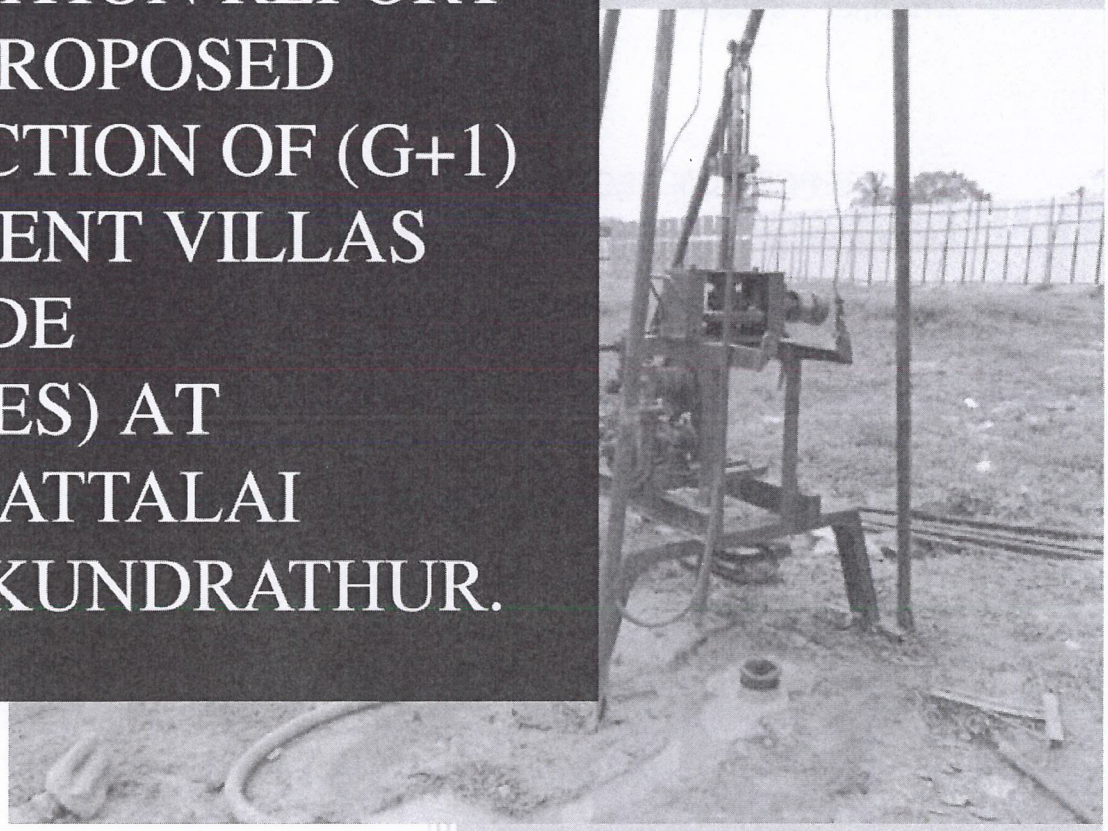
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Report No: Falcon/GIR/TR2307031

GEOTECHNICAL INVESTIGATION REPORT

GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED CONSTRUCTION OF (G+1) INDEPENDENT VILLAS (BROOKSIDE RESIDENCES) AT RENDAMKATTALAI VILLAGE, KUNDRATHUR.



FALCON LAB™
Building Materials & Soil Testing

Falcon Industrial Testing Laboratory Pvt Ltd
ISO/IEC 17025:2017 Accredited NABL Lab
Plot No.181, Estate 2nd Main Road,
Burma Colony, Perungudi, Chennai-600096.
www.fitpl.in / Email:lab@fitpl.in
Cell: 8939896691/8056159517

ST. ANGELOS VNCT VENTURES LLP CHENNAI

14.07.2023

To

M/S. ST.ANGELO'S VNCT VENTURES LLP,
No.2, Tank Bund Round,
Nungambakkam,
Chennai – 600034.

Sub: REPORT ON GEOTECHNICAL INVESTIGATION CONDUCTED FOR THE PROPOSED CONSTRUCTION OF (G+1) INDEPENDENT VILLAS (BROOKSIDE RESIDENCES) AT PAMMAL, CHENNAI.

Dear Sir,

Sub: Report on Geotechnical Investigation conducted for the proposed construction of (G+1) Independent Villas situated in Plot Numbers, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 24, 25, 29, 30, 31, 32, 33, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44 comprised in Survey Nos. 223/1A, 223/1B, 240, 241, 242, in the Proposed Project "Brookside Residences" in the Layout approved by CMDA vide P.P.D.L.O. No. 126 / 2021 in Letter No. L1/13899/2020 dated 31/08/2021, situated at Rendamkattalai Village, Kundrathur Taluk (Previously Pallavaram Taluk), Kanchipuram District

Should you have any questions, please do not hesitate to contact this office.
It has been a pleasure being of service to you on this project. We assure you of our Best Technical Service.

Thank you,

Yours Truly,

for Falcon Industrial Testing Laboratory Pvt Ltd

Dr.S.Sherlin Prem Nishold, M.E., Ph.D.,
Technical Manager

ST. ANGELOS VNCT VENTURES LLP CHENNAI

GEOTECHNICAL INVESTIGATION REPORT

Customer Name & Address:

M/S. ST.ANGELO'S VNCT VENTURES LLP,

No.2, Tank Bund Round,

Nungambakkam,

Chennai – 600034

Project Details: Proposed construction of (G+1) Independent Villas situated in Plot Numbers, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 24, 25, 29, 30, 31, 32, 33, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44 comprised in Survey Nos. 223/1A, 223/1B, 240, 241, 242, in the Proposed Project "Brookside Residences" in the Layout approved by CMDA vide P.P.D.L.O. No. 126 / 2021 in Letter No. L1/13899/2020 dated 31/08/2021, situated at Rendamkattalai Village, Kundrathur Taluk (Previously Pallavaram Taluk), Kanchipuram District

Test Report No: TR2307031

Falcon Industrial Testing Lab. Pvt. Ltd.,
Plot No: 181, Estate 2nd main Road, Burma Colony,
Perungudi, Chennai 600 096 / www. fitpl.in /
Email: lab@fitpl.in Cell: 8939054595 / 8754595273

ST. ANGELOS VNCT VENTURES LLP CHENNAI

Index

S. no	Description	Page no.
1	Summary	3
2	Introduction - Purpose and Scope	4
3	Scope of the exploration	4
4	Method of exploration	5
5	Depth of Exploration	5
6	Ground water level	5
7	Field Tests	6
8	Laboratory Tests	10
9	Soil profile and its characteristics	10
10	Water table fluctuations	11
11	Assessment of Bearing Capacity	11
12	Foundation Consideration	12
13	Backfilling & Compaction	12
14	Excavation	12
15	Conclusion	12
16	Abstract	13

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Summary:

The field investigation has been started on 06.07.2023 and completed on 06.07.2023. Location of the borehole was selected based on the proposed construction of Proposed Construction of (G+1) Independent Villas (BROOKSIDE RESIDENCES) at Pammal, Chennai. Boreholes were drilled up to a maximum depth of 16.50m in BH-01 according to the standard penetration procedure laid by IS 2131-1980 as per client requirements. Three boreholes were bored and a test was conducted to determine the Index and Engineering properties of the soils encountered.

The Soil boring details were furnished in the report. Encountered Soil Profile infers the presence of mostly Coarse-grained soils along with fine grained soils. Test (SPT) was conducted at each 1.00m interval of the borehole starts from 0.00m to 3.00m depth and 1.50m interval, till the termination depth of 16.50m in BH-01. More detailed information is given in Bore log report and Laboratory test results as annexure.

In rainy season, groundwater may be at higher level than the present level. Hence, foundation work has to be planned accordingly.

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1. Introduction:

Purpose and Scope

It has been proposed to construct a (G+1) Independent Villas (BROOKSIDE RESIDENCES) at Pammal, Chennai. For the construction of any structure a detailed soil investigation is essential for collecting the relevant data required for preparing the design. The sub surface investigation reveals the presence and the extent of soil and rock stratum in the region likely to be affected by the proposed work and determines the nature of each stratum and engineering properties of soil which may affect the design. The data collected provide reliable, specific and detailed information to facilitate a safe and economic design of the proposed structure.

The scope of this investigation is to:

a) Three Bore holes was drilled up to the maximum depth of 16.50m in BH-01 and Laboratory tests were conducted for assessing the index and engineering properties of soil at each layer.

b) Engineering Properties were analyzed to develop the foundation design for the proposed building.

Report Format

a) Bore log details were furnished with SPT "N" values and Soil profile was reported in bore log.

b) Summary of laboratory test results was given briefly for each bore hole.

2. Scope of the exploration:

For analyzing the field condition and the soil strata at the site, Soil investigation has been done by drilling three bore holes. Bore hole was terminated at the maximum depth of 16.50m in BH-01. Where the N Value reaches more than 50 or the hammer gets rebound. It is determined that the field SPTs were conducted to assess the safe bearing capacity of the soil for resting the foundation at the proposed site.

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3. Method of exploration:

(i) Borings were drilled using rotary drilling Unit of dia.150mm has been used for making bore holes duly circulating Bentonite slurry. In this method, the advancement of boring is made by the cutting action of a rotating bit that is kept in firm contact with the bottom of the hole. SPT (IS: 2131-1981) consists of driving a standard Split Spoon Sampler (IS: 9640-1980), 51 mm outside diameter and 38 mm inside diameter into soil under the blows of a drop hammer of 63.5 kg falling weight freely through 75-cm. The number of Blows required for 30 cm penetration of sampler in soil is designated as N value and it is termed as SPT blow count.

(ii) The bit is attached to the lower end of hollow drill rod, which is rotated by a suitable chuck. Drilling mud, (viz) Bentonite is continuously forced down the hollow drill rods. The mud returning upward through the annular space between the drill rods and side of the hole brings the soil particles to the surface. The soil exploration consists of three stages i.e., boring, sampling and testing which includes both field and lab tests. The Samples were collected at different depth up to final depth of bore hole. Samples were properly labeled for Lab tests. Bore log particulars and location of bore holes were annexed with this report.

4. Depth of Exploration:

Exploration was carried out to a depth at which N Value should be more than 50 as per client requirement. Based on which, Foundation Type and depth shall be determined adopted.

5. Ground water level:

Observation of location of water table and its fluctuation under different seasons is very important. The location of ground water level (GWL) is also important for deep excavation and foundation works and also on sites susceptible to be water logged. Open wells at the site or in the vicinity of the site can give a clear idea of water table and its fluctuation. Boreholes can also be used for recording water level at the site.

6. Field Tests:

Penetration and sounding tests are the generally adopted field Tests. Standard Penetration Test is performed as per IS: 2131-1981 (RA: 2007) as an in-situ test especially for cohesion less soils. The resistance is empirically correlated with some of the Engineering properties of soil such as density index, consistency, bearing capacity, etc. These tests are useful for general exploration of erratic soil profiles for finding depth to bedrock or hard stratum and to have an approximate indication of the strength and other properties of soils, particularly for cohesion less soil.

In the field test, Standard Penetration Test (SPT) was conducted using split barrel sampler at top layers to determine the "N" value of the soil layers. SPT was conducted at every 1.00m depth intervals in each borehole to determine penetration resistance. Number of blows was recorded for every 15cm penetration for a total of 45cm penetration. The number of blows required to drive the sampler for 30 cm apart from the seating drive is termed as penetration resistance "N". The SPT value at the top layers in each borehole at different depths has been recorded in the bore logs.

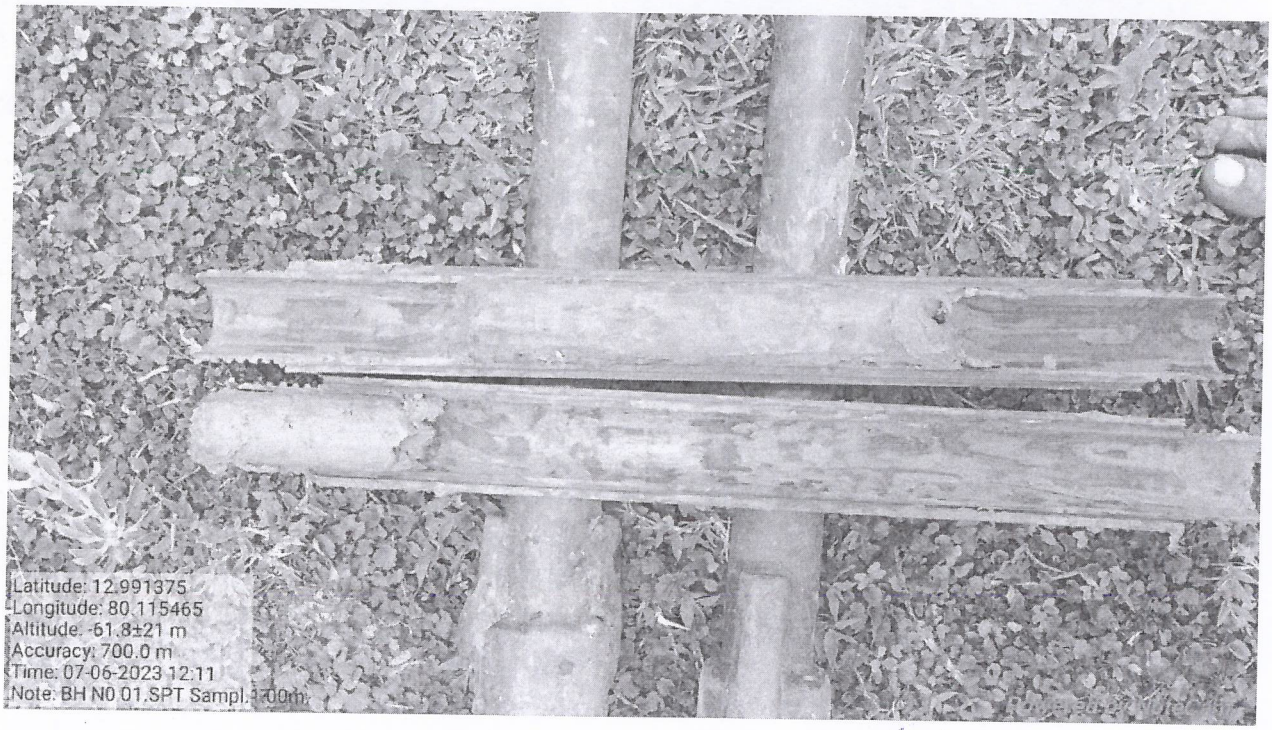
Project Location: Proposed Construction Of (G+1) Independent Villas (BROOKSIDE RESIDENCES) at Pammal, Chennai.

The SPT was conducted at the bore holes as shown below in the photos

BH-01



Sample collection photo of BH-01

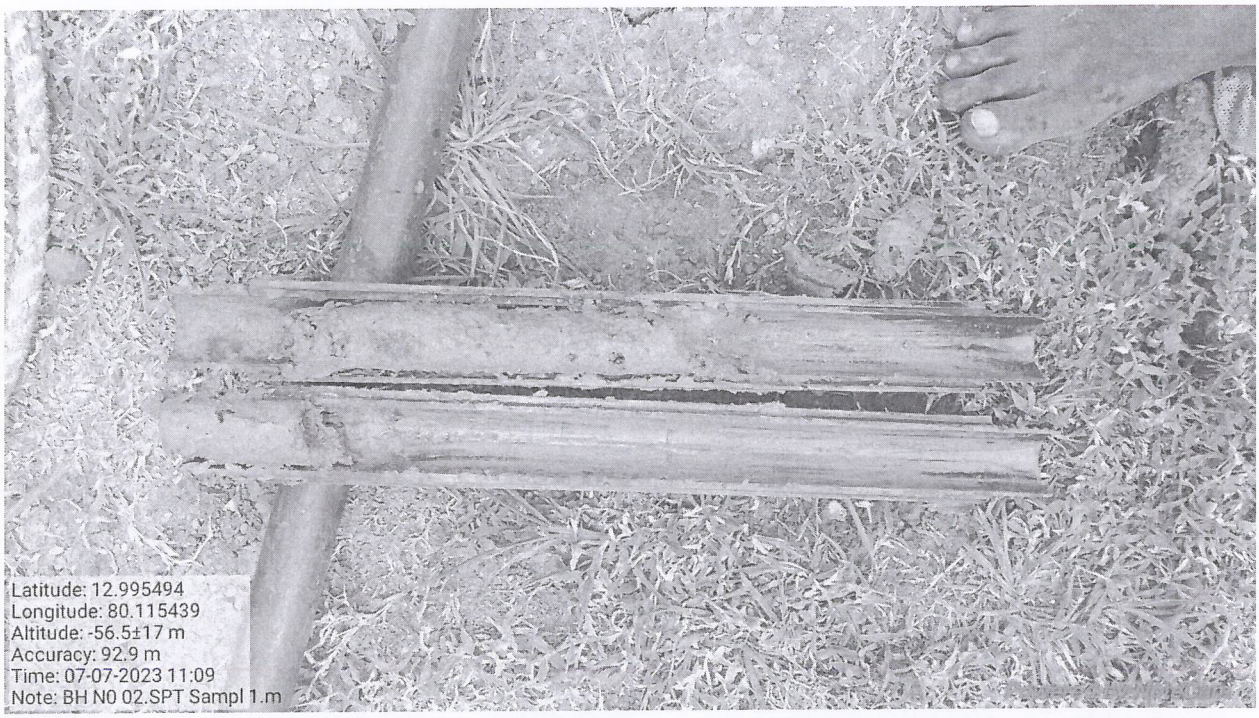


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BH-02



Sample collection photo of BH-02

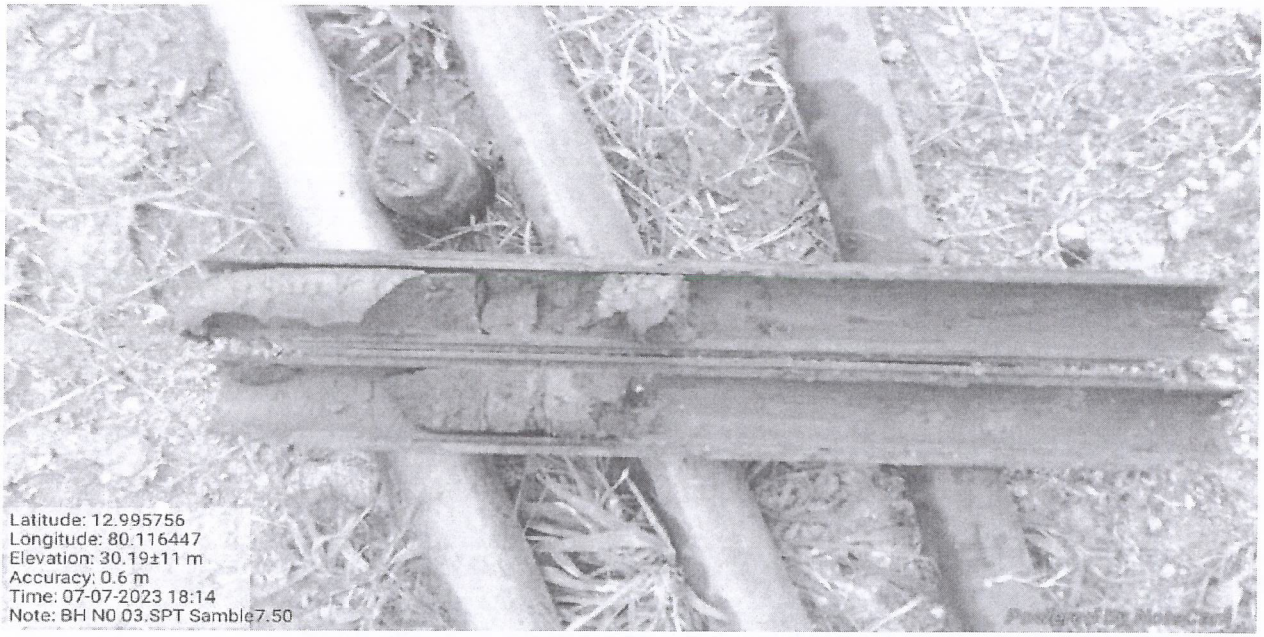


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BH-03



Sample collection photo of BH-03



The fieldwork was carried out under the close supervision of our engineer in accordance with Indian Standard mentioned earlier.

Field Test

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7. Laboratory Tests:

All the extracted soil samples were brought to the Falcon Industrial Testing Laboratory for further examination in accordance with IS: 1498-1970. The test results are tabulated and annexed with this report.

1. Excavation of bore holes (IS:1892-1979,RA 2021)
2. Standard Penetration Test (IS: 2131-1981,RA2021)
3. Moisture Content (IS 2720 (Part 2) :1973,RA2020)
4. Specific Gravity of Soil (IS 2720 (Part 3):1980,RA 2021)
5. Liquid limit (IS 27 20 (Part 5) : 1985,RA 2020)
6. Plastic Limit (IS 27 20 (Part 5) : 1985,RA 2020)
7. Grain Size Distribution In Soils (IS 2720 (Part 4) : 1985,RA 2020)
8. Free Swell Index (IS 2720 (Part 40) : 1977,RA 2021)
9. Determination of Shear parameters (IS 2720 (Part 13) : 1986,RA 2021)
10. (IS 2720 (Part 13): 1986, RA 2021), IS 2720 (Part 10): 1991), RA 2020

8. Soil profile and its characteristics:

In case of BH-01,

Sl.No	Start Depth (m)	End Depth (m)	Profile	Symbol	Relative Density
1.	0.00	0.00	Natural Soil	-	-
2.	0.00	1.50	Brownish silty clay with high swelling and high plasticity	CH	Firm (Medium)
3.	1.50	3.50	Brownish poorly graded sands, gravelly sand with fines	SP	Medium Dense
4.	3.50	5.00	Blackish silty clay with high swelling and high plasticity	CH	Stiff
5.	5.00	8.00	Greyish, well graded sands, gravelly sand with little fines	SW	Medium Dense
6.	8.00	12.50	Blackish silty clay with high swelling and high plasticity	CH	Medium to Stiff
7.	12.50	16.50	Greyish silty sands, poorly graded sand - silt mixtures	SM	Medium to Dense

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In case of BH-02,

Sl.No	Start Depth (m)	End Depth (m)	Profile	Symbol	Relative Density
1.	0.00	0.00	Natural Soil	-	-
2.	0.00	1.50	Brownish silty clay with medium swelling and medium plasticity	CI	Stiff
3.	1.50	3.50	Brownish poorly graded sands, gravelly sand with fines	SP	Medium Dense
4.	3.50	10.50	Blackish clayey silt with medium to high swelling and medium to high plasticity	CI-CH	Medium to Stiff

In case of BH-03,

Sl.No	Start Depth (m)	End Depth (m)	Profile	Symbol	Relative Density
1.	0.00	0.00	Natural Soil	-	-
2.	0.00	10.50	Brownish silty clay with medium swelling and medium plasticity	CI	Medium to Stiff

9. Water table fluctuations:

Groundwater was identified 1.50m from below ground level during the time of field investigation. However, it may fluctuate due to the tidal variations/rainy seasons, slightly.

10. Assessment of Bearing Capacity:

The site soil encountered is suitable for shallow foundation and it contains the load capacity is enough for proposed building of (G+1) Independent Villas (BROOKSIDE RESIDENCES) at Pammal, Chennai. A factor of safety of 2.5 has been adopted for the safe bearing capacity calculation.

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11. Foundation Considerations

A PCC (Plain Cement Concrete) layer of 10cm thickness is recommended below the foundation. Any over excavation in the foundation trenches should be re-filled by plain concrete and any disturbed and loose materials found in the foundation trenches should be removed before placement of P.C.C.

12. Backfilling and Compaction

Excavated material cannot be used as general backfill material. As per general practice the backfill material should not contain more than 15% fines passing 0.075 mm sieve, retain 40% on 4.75mm size sieve while the maximum size of gravel allowed is 50mm. Backfilling materials shall be placed in horizontal layers not exceeding 25 cm thickness and each layer shall be compacted to at least 95% of the maximum dry density.

13. Excavation

Excavation through the overburden soil can be carried out by conventional equipment such as dozers and porcelain excavators.

14. Conclusion:

For foundation suitability, the following criteria have been taken into account.

- Subsoil characteristics
- Nature of structure

To meet the above requirements the following type of foundation will be suitable.

Spread / Isolated foundation shall be adopted for the proposed structure.

- Removal of soft soil/filling material should be up to -3.30m from below ground level.
- The foundation should be placed on stabilized soil at -2.00m depth from the below ground level and the foundation width restricted to 2.00m.

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- Ground improvement for 1.30m thickness (gravel/murram soil mix) should be filled from the foundation level.
- Each layer should be compacted well to attain more than the 95% of the relative compaction.
- An Allowable bearing pressure of 100 kPa (10.20 t/m^2) shall be taken for design purposes.
- Grade beam shall be adopted in order to minimize the differential settlements.
- Expected settlements shall be less than the permissible limits for the foundation and the differential settlement shall be considered up to 75% of the expected total settlement.

Abstract Report	
Location of site:	Pammal, Chennai.
Details of Recommended foundation	
Shallow foundation by Isolated square footing	
Size of footing	2.00m X 2.00m
Excavation depth	3.30m
Footing Depth	2.00m
Safe Bearing Capacity	100 kN/m^2 (10.20 t/m^2)
Total Settlement	49 mm
Allowable Settlement	**50mm**

Note:

1. **The above details are provided based on the soil exploration conducted over the site.**

2. **Three boreholes have been requested by the client and the borehole was terminated at a maximum depth of 16.50m in BH-01.**

3. **Site-specific soil properties may vary depending on the location and environmental conditions. In case of any variations in the soil profile, the above SBC values need to be validated with further investigation.**

4. **The suggestions have been provided in this report based on the factual condition of the site. However, the structural engineer may decide on the foundation design based on the above report.**

5. **The above Safe Bearing Capacity of 100kPa is arrived for (G+1) Independent Villa & The estimated settlement is restricted to maximum allowable Safe Bearing Capacity of 100kPa.**

for Falcon Industrial Testing Laboratory Pvt Ltd

Dr.S.Sherlin Prem Nishold, M.E., Ph.D.,

Technical Manager

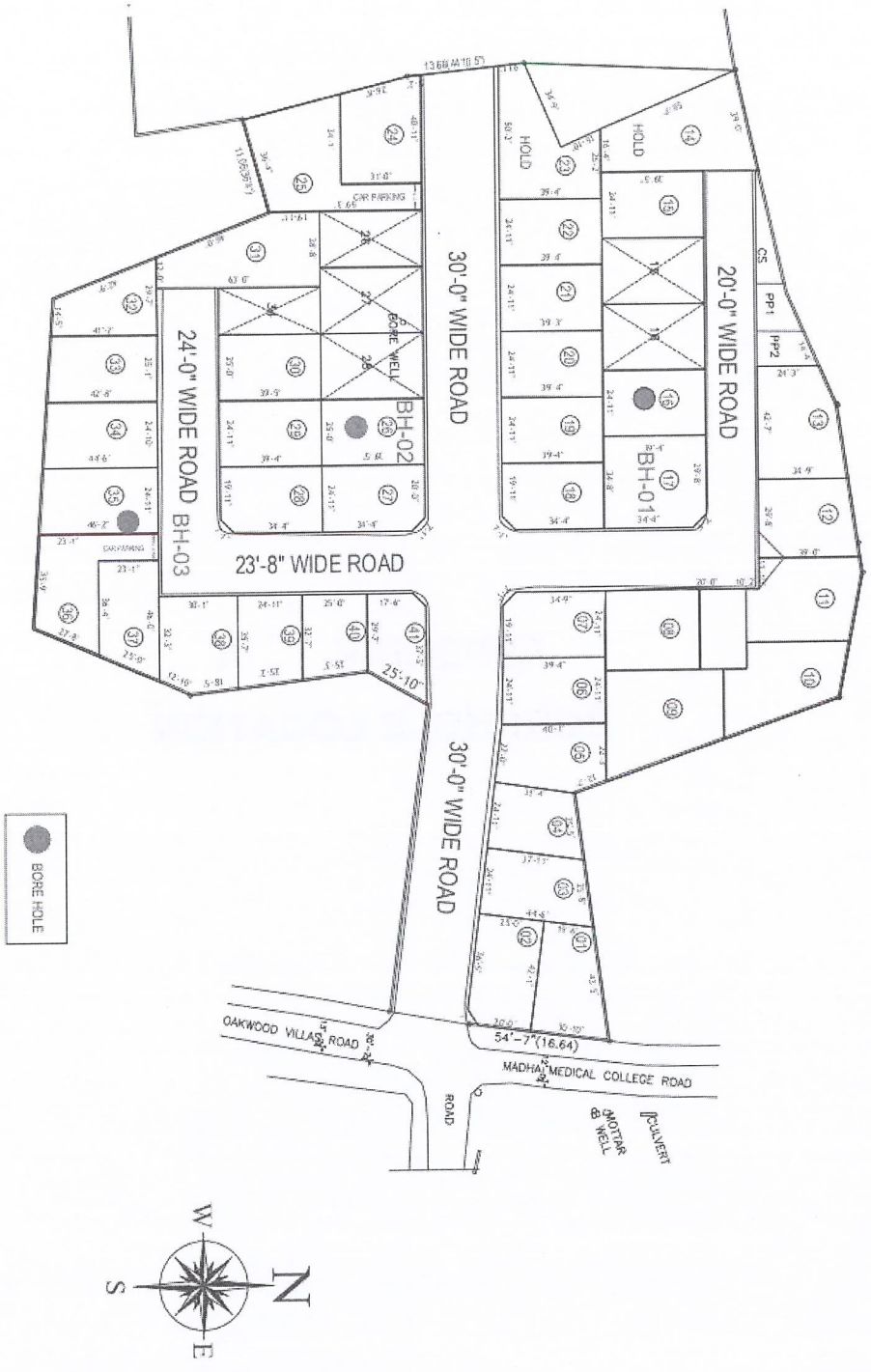
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GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED CONSTRUCTION OF (G+1) INDEPENDENT VILLAS (BROOKSIDE RESIDENCES) AT PAMMAL, CHENNAI.

APPENDIX A
BOREHOLE LOCATION

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GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED CONSTRUCTION OF (G+1) INDEPENDENT VILLAS (BROOKSIDE RESIDENCES) AT PAMMAL, CHENNAI.



APPENDIX B
BOREHOLE LOGS

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BOREHOLE LOG

Client	: M/s.VNCT GLOBAL LLP	**Ele . Of G.L**	: Nil
Project	: (G+1) Independent Villas (BROOKSIDE RESIDENCES)	**Water Table**	: 1.50m
Location	: 12.996362, 80.116437	**Type Of Boring**	: Rotary
B.H. No	: BH-01	**Dia of Boring**	: 150mm
Final Depth	: 16.50m	**Started on**	: 06.07.2023
Address	: Irendamkattalai, Pammal, Chennai.	**Ended on**	: 06.07.2023

Depth (m)	GWL	SYMBOL	DESCRIPTION	SPT COUNT 0 -15 cm	15 -30 cm	30 -45 cm	N-Value	N60-Value	Relative Density /Consistency
			Natural soil						
0.0 – 1.5			Brownish silty clay with high swelling and high	3	3	4	7	7	Firm (Medium)
1.5 – 3.0			Brownish poorly graded sands, gravelly sand with fines (SP)	5	7	9	16	20	Medium Dense
			As Above	6	8	10	18	20	Medium Dense
3.5 – 4.5			Blackish silty clay with high swelling and high	3	4	4	8	8	Stiff
5.0 – 7.5			Greyish, well graded sands, gravelly sand with little fines (SW)	6	6	8	14	16	Medium Dense
			As Above	7	8	9	17	17	Medium Dense
8.0 – 9.5			Blackish silty clay with high swelling and high	4	5	6	11	11	Stiff
10.0 – 10.5			As Above	4	6	6	12	12	Stiff

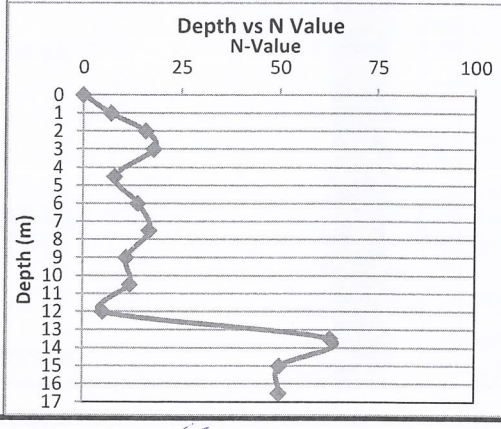
VNCT VENTURES LLP ST. ANGELOS CHENNAI

BOREHOLE LOG

Client	: M/s.VNCT GLOBAL LLP	**Ele . Of G.L**	: Nil
Project	: (G+1) Independent Villas (BROOKSIDE RESIDENCES)	**Water Table**	: 1.50m
Location	: 12.996362, 80.116437	**Type Of Boring**	: Rotary
B.H. No	: BH-01	**Dia of Boring**	: 150mm
Final Depth	: 16.50m	**Started on**	: 06.07.2023
Address	: Irendamkattalai, Pammal, Chennai.	**Ended on**	: 06.07.2023

Depth (m)	GWL	SYMBOL	DESCRIPTION	SPT COUNT 0 -15 cm	15 -30 cm	30 -45 cm	N- Value	N60- Value	Relative Density /Consistency
11.0 – 12.5			Blackish silty clay with high swelling and high plasticity (CH)	2	2	3	5	5	Firm (Medium)
13.0 – 14.5			Greyish silty sands, poorly graded sand - silt mixtures (SM)	23	20	43	63	35	Dense
15.0 – 15.5			As Above	50/7cm Penetration			50	29	Medium Dense
16.0 – 16.5			As Above	50/2cm Penetration			50	28	Medium Dense
17.0 – 21.5			BH-01 terminated at a depth of 16.50m, in medium dense strata						

Graphical Representation of Penetration



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BOREHOLE LOG

Client	: M/s.VNCT GLOBAL LLP	**Ele . Of G.L**	: Nil
Project	: (G+1) Independent Villas (BROOKSIDE RESIDENCES)	**Water Table**	: 1.50m
Location	: 12.996058, 80.116435	**Type Of Boring**	: Rotary
B.H. No	: BH-02	**Dia of Boring**	: 150mm
Final Depth	: 10.00m	**Started on**	: 07.07.2023
Address	: Irendamkattalai, Pammal, Chennai.	**Ended on**	: 07.07.2023

Depth (m)	GWL	SYMBOL	DESCRIPTION	SPT COUNT 0 -15 cm	15 -30 cm	30 -45 cm	N-Value	N_{60}-Value	Relative Density /Consistency
			Natural soil						
0.0 – 1.5	▼		Brownish silty clay with medium swelling and	3	4	4	8	8	Stiff
1.5 – 3.5			Brownish poorly graded sands, gravelly sand with fines (SP)	4	5	7	12	12	Medium Dense
			As Above	5	6	8	14	14	Medium Dense
3.5 – 5.0			Blackish clayey silt with medium to high swelling	3	3	3	6	6	Firm (Medium)
5.0 – 6.5			As Above	3	4	3	7	7	Firm (Medium)
6.5 – 8.0			As Above	3	3	4	7	7	Firm (Medium)
8.0 – 9.5			As Above	3	4	5	9	9	Stiff
9.5 – 10.5			As Above	4	5	5	10	10	Stiff

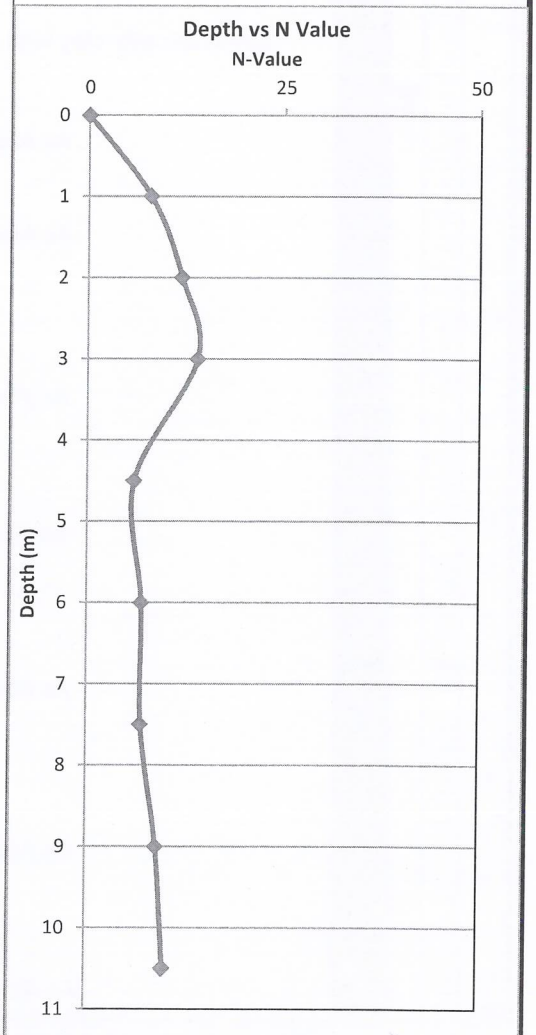
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BOREHOLE LOG

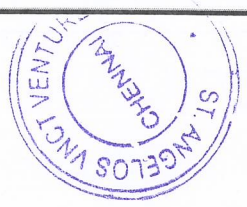
Client	: M/s.VNCT GLOBAL LLP	**Ele . Of G.L**	: Nil
Project	: (G+1) Independent Villas (BROOKSIDE RESIDENCES)	**Water Table**	: 1.50m
Location	: 12.996058, 80.116435	**Type Of Boring**	: Rotary
B.H. No	: BH-02	**Dia of Boring**	: 150mm
Final Depth	: 10.00m	**Started on**	: 07.07.2023
Address	: Irendamkattalai, Pammal, Chennai.	**Ended on**	: 07.07.2023

Depth (m)	GWL	SYMBOL	DESCRIPTION	SPT COUNT 0 -15 cm	15 -30 cm	30 -45 cm	N- Value	N60- Value	Relative Density /Consistency
11.0 – 21.5			BH-01 terminated at a depth of 10.50m, in medium dense strata						

Graphical Representation of Penetration







BOREHOLE LOG

Client	: M/s.VNCT GLOBAL LLP	**Ele . Of G.L**	: Nil
Project	: (G+1) Independent Villas (BROOKSIDE RESIDENCES)	**Water Table**	: 1.50m
Location	: 12.995756, 80.116447	**Type Of Boring**	: Rotary
B.H. No	: BH-03	**Dia of Boring**	: 150mm
Final Depth	: 10.00m	**Started on**	: 07.07.2023
Address	: Irendamkattalai, Pammal, Chennai.	**Ended on**	: 07.07.2023

Depth (m)	GWL	SYMBOL	DESCRIPTION	SPT COUNT 0 -15 cm	15 -30 cm	30 -45 cm	N-Value	N60-Value	Relative Density /Consistency
			Natural soil						
0.0 – 0.5 – 1.0	▼		Brownish silty clay with medium swelling and	3	3	4	7	7	Firm (Medium)
1.5 – 2.0			As Above	3	4	4	8	8	Firm (Medium)
2.5 – 3.0			As Above	3	4	3	7	7	Firm (Medium)
3.5 – 4.0 – 4.5			As Above	3	3	3	6	6	Firm (Medium)
5.0 – 5.5 – 6.0			As Above	2	3	2	5	5	Firm (Medium)
6.5 – 7.0 – 7.5			As Above	3	3	4	7	7	Firm (Medium)
8.0 – 8.5 – 9.0			As Above	3	4	4	8	8	Firm (Medium)
9.5 – 10.0 – 10.5			As Above	4	4	5	9	9	Stiff

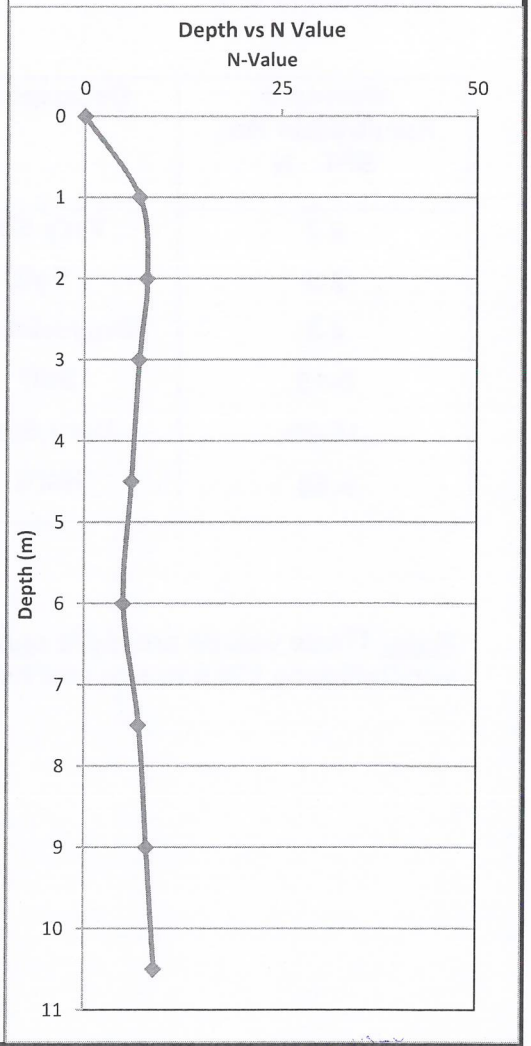
VNCT VENTURES LLP ST.ANGELOS CHENNAI

BOREHOLE LOG

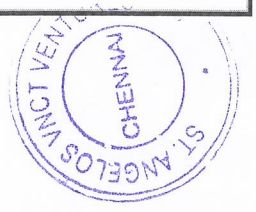
Client	: M/s.VNCT GLOBAL LLP	**Ele . Of G.L**	: Nil
Project	: (G+1) Independent Villas (BROOKSIDE RESIDENCES)	**Water Table**	: 1.50m
Location	: 12.995756, 80.116447	**Type Of Boring**	: Rotary
B.H. No	: BH-03	**Dia of Boring**	: 150mm
Final Depth	: 10.00m	**Started on**	: 07.07.2023
Address	: Irendamkattalai, Pammal, Chennai.	**Ended on**	: 07.07.2023

Depth (m)	GWL	SYMBOL	DESCRIPTION	SPT COUNT 0 -15 cm	15 -30 cm	30 -45 cm	N- Value	N60- Value	Relative Density /Consistency
11.0 – 21.5			BH-01 terminated at a depth of 10.50m, in medium dense strata						

Graphical Representation of Penetration







Correlations of SPT N values with Common properties of soils

A) Granular Soil

36Standard Penetration No., SPT N	Description	Relative Density, Dr %	Approx. Angle of Internal Friction, Φ°	Approx. Rang of Most. Unit Wt.,ɣ kN/m^3
< 4	Very loose	< 20	< 29	11-16
4-10	Loose	20-40	29-30	14-18
10-30	Medium Dense	40-60	30-36	17-20
30-50	Dense	60-80	36-41	17-22
> 50	Very Dense	> 80	> 41	20-29

B) Cohesive Soil

Standard Penetration No., SPT N	Description	Unconfined Compressive Strength, kPa	Approx. Rang of Most. Unit Wt., , ɣkN/m^3
< 2	Very Soft	0-25	14.4-16
2-4	Soft	25-50	16-17.4
4-8	Firm (medium)	50-100	17.6-19.2
8-15	Stiff	100-200	19.2-20.8
15-30	Very Stiff	200-400	20.8-22.4
> 30	Hard	> 400	> 20

Note: These values are most appropriate values in general. However, the soil properties vary between sites to site and hence it shall be used only for guidance

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APPENDIX C
LABORATORY TEST RESULTS

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GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED CONSTRUCTION OF (G+1) INDEPENDENT VILLAS (BROOKSIDE RESIDENCES) AT PAMMAL, CHENNAI.

PHYSICAL ANALYSIS OF SOIL- BH – 01

DEPTH (m)	W_N %	W_L %	W_P %	I_P %	FSI %	IS	GRAVE %	COARS %	MEDIUM %	FINE %	SILT + CLAY %	G_S
1.00	27	56	27	29	50	CH	-	0.99	3.28	21.98	71.75	2.494
2.00	18	NON-PLASTIC				SP	-	2.33	55.34	30.38	11.95	2.568
3.00	16	NON-PLASTIC				SP	-	-	58.25	31.65	10.10	2.571
4.50	42	64	31	33	65	CH	-	-	4.70	6.49	88.81	2.486
6.00	17	NON-PLASTIC				SW	-	-	80.24	15.80	3.96	2.584
7.50	16	NON-PLASTIC				SW	-	-	82.11	15.06	2.83	2.594
9.00	53	78	38	40	75	CH	-	-	-	1.36	98.64	2.480
10.50	53	79	39	40	78	CH	-	-	-	1.50	98.50	2.481
12.00	52	69	34	35	70	CH	-	-	11.56	4.19	84.25	2.491
13.50	15	NON-PLASTIC				SM	-	-	30.67	45.25	24.08	2.596
15.00	16	NON-PLASTIC				SM	-	-	18.19	55.14	26.67	2.598
16.50	15	NON-PLASTIC				SM	-	-	42.74	45.16	12.10	2.496

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GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED CONSTRUCTION OF (G+1) INDEPENDENT VILLAS (BROOKSIDE RESIDENCES) AT PAMMAL, CHENNAI.

PHYSICAL ANALYSIS OF SOIL- BH – 02

DEPTH (m)	W_N %	W_L %	W_P %	I_P %	FSI %	IS	GRAVE %	COARS %	MEDIUM %	FINE %	SILT + CLAY %	Gs
1.00	29	40	19	21	35	CI	-	-	12.92	20.41	66.67	2.502
2.00	17	NON-PLASTIC				SP	-	-	73.08	19.82	7.10	2.594
3.00	17	NON-PLASTIC				SP	-	-	73.46	21.07	5.47	2.586
4.50	38	50	24	26	45	CI	-	6.27	12.12	9.92	71.69	2.486
6.00	35	46	22	24	40	CI	-	-	20.95	9.39	69.66	2.487
7.50	58	78	38	40	75	CH	-	-	-	4.36	95.64	2.456
9.00	57	79	39	40	78	CH	-	-	-	1.34	98.66	2.456
10.00	58	78	38	40	75	CH	-	-	-	1.54	98.46	2.458

PHYSICAL ANALYSIS OF SOIL- BH – 03

DEPTH (m)	W_N %	W_L %	W_P %	I_P %	FSI %	IS	GRAVE %	COARS %	MEDIUM %	FINE %	SILT + CLAY %	Gs
1.00	30	69	34	35	50	CH	-	-	-	8.94	91.06	2.464
2.00	26	56	27	29	45	CH	7.72	-	7.81	21.55	70.64	2.450
3.00	28	54	26	28	48	CH	-	-	1.38	21.30	77.32	2.464
4.50	39	59	29	30	45	CH	-	-	2.67	13.12	84.12	2.456
6.00	38	58	28	30	50	CH	-	-	2.64	16.22	81.14	2.458
7.50	46	69	34	35	65	CH	-	-	1.16	6.68	92.16	2.459
9.00	58	76	37	39	70	CH	-	-	-	1.36	98.64	2.464
10.50	60	78	38	40	73	CH	-	-	-	1.18	98.82	2.468

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Sieve Analysis



Symbol	Borehole No.	Depth, M
●	BH-01	0.00-1.00
△	BH-01	1.00-2.00
■	BH-01	2.00-3.00
◇	BH-01	3.00-4.50
X	BH-01	4.50-6.00
+	BH-01	6.00-7.50

Date : 13.07.2023

Drawing Title : **GRAIN SIZE ANALYSIS**

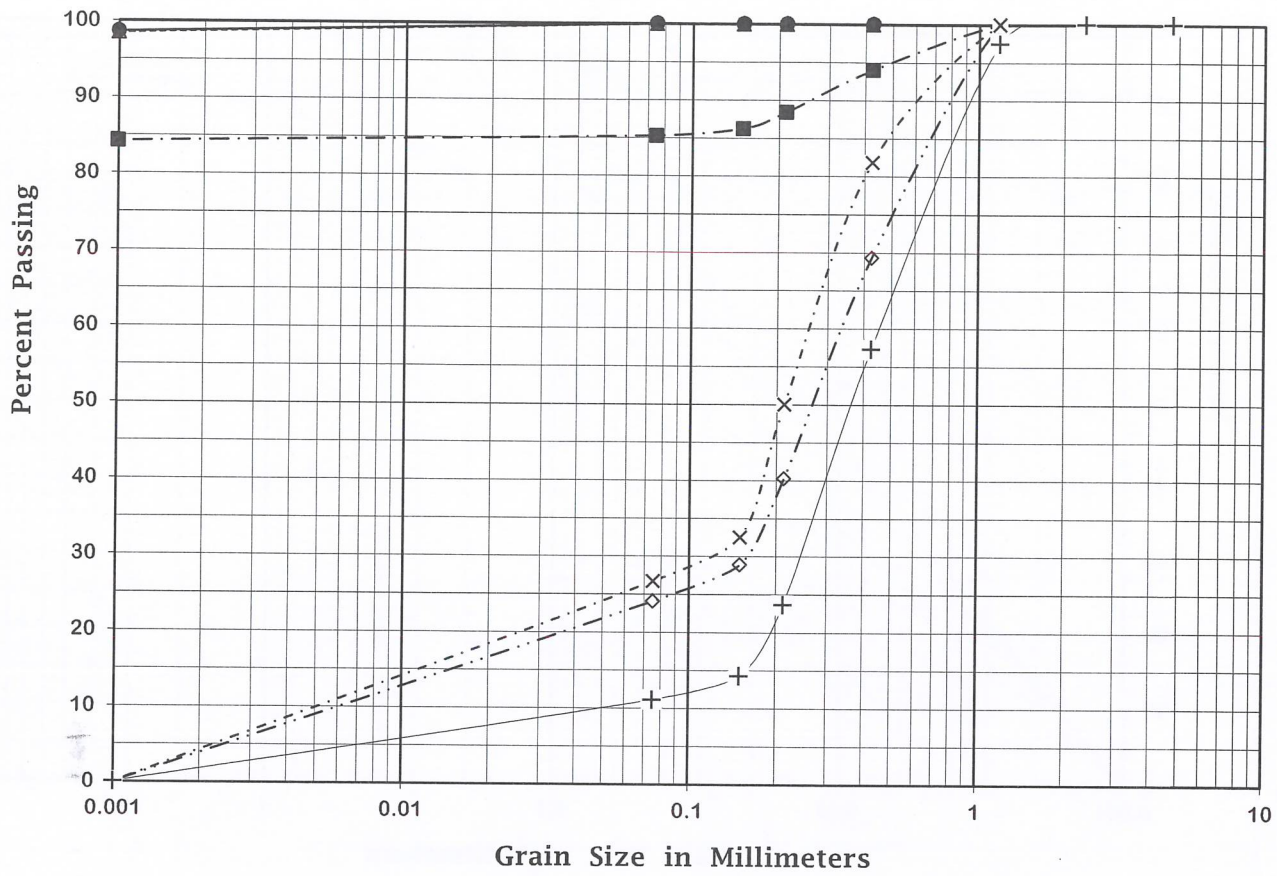
FALCON INDUSTRIAL TESTING LABORATORY PVT. LTD.,

PROJECT: Geotechnical Investigation for the proposed construction of (G+1) Independant Villas (BROOKSIDE RESIDENCES) at Pammal, Chennai.

Client / Owner : M/s.VNCT GLOBAL LLP

FALCON LAB TM
Building Materials & Soil Testing

Sieve Analysis



Symbol	Borehole No.	Depth, M
●	BH-01	7.50-9.00
△	BH-01	9.00-10.50
■	BH-01	10.50-12.00
◇	BH-01	12.00-13.50
X	BH-01	13.50-15.00
+	BH-01	15.00-16.50

Date : 13.07.2023

Drawing Title : **GRAIN SIZE ANALYSIS**

PROJECT: Geotechnical Investigation for the proposed construction of (G+1) Independant Villas (BROOKSIDE RESIDENCES) at Pammal, Chennai.

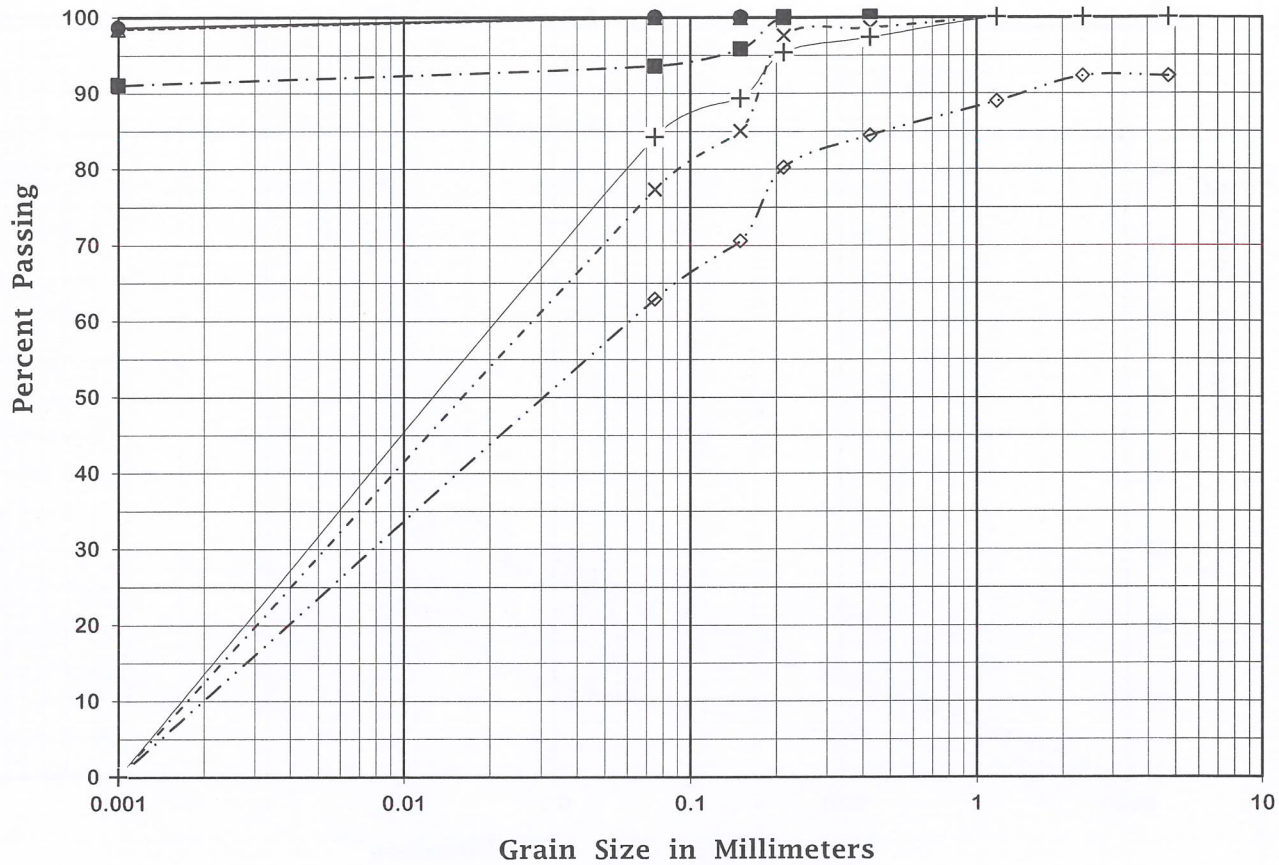
Client / Owner : M/s.VNCT GLOBAL LLP

FALCON INDUSTRIAL TESTING LABORATORY PVT. LTD.,

FALCON LAB ™

Building Materials & Soil Testing

Sieve Analysis



Symbol	Borehole No.	Depth, M
●	BH-02	7.50-9.00
△	BH-02	9.00-10.50
■	BH-03	0.00-1.00
◇	BH-03	1.00-2.00
X	BH-03	2.00-3.00
+	BH-03	3.00-4.50

Date : 13.07.2023

Drawing Title : **GRAIN SIZE ANALYSIS**

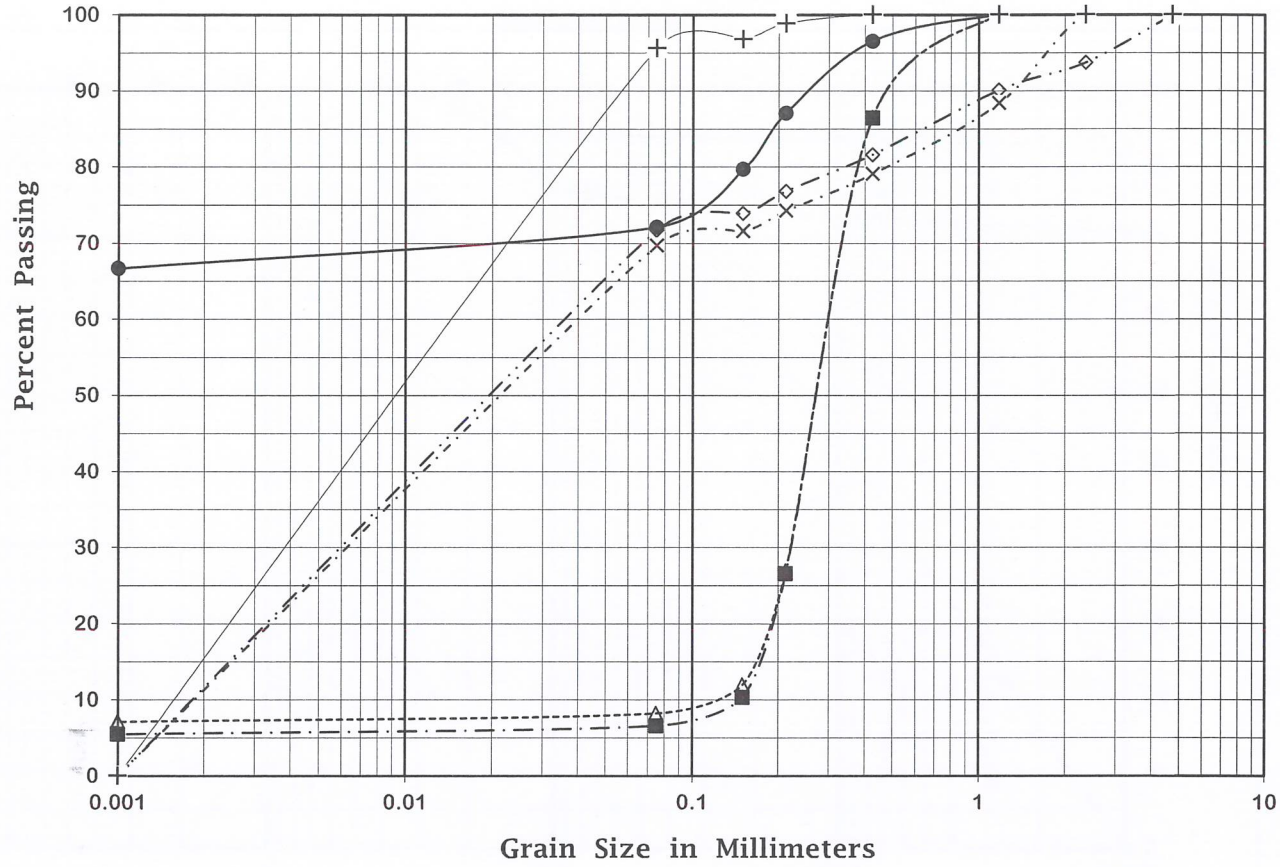
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Client / Owner : M/s.VNCT GLOBAL LLP

FALCON LAB™
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Sieve Analysis



Symbol	Borehole No.	Depth, M
●	BH-02	0.00-1.00
△	BH-02	1.00-2.00
■	BH-02	2.00-3.00
◇	BH-02	3.00-4.50
X	BH-02	4.50-6.00
+	BH-02	6.00-7.50

Date : 13.07.2023

Drawing Title : **GRAIN SIZE ANALYSIS**

FALCON INDUSTRIAL TESTING LABORATORY PVT. LTD.,

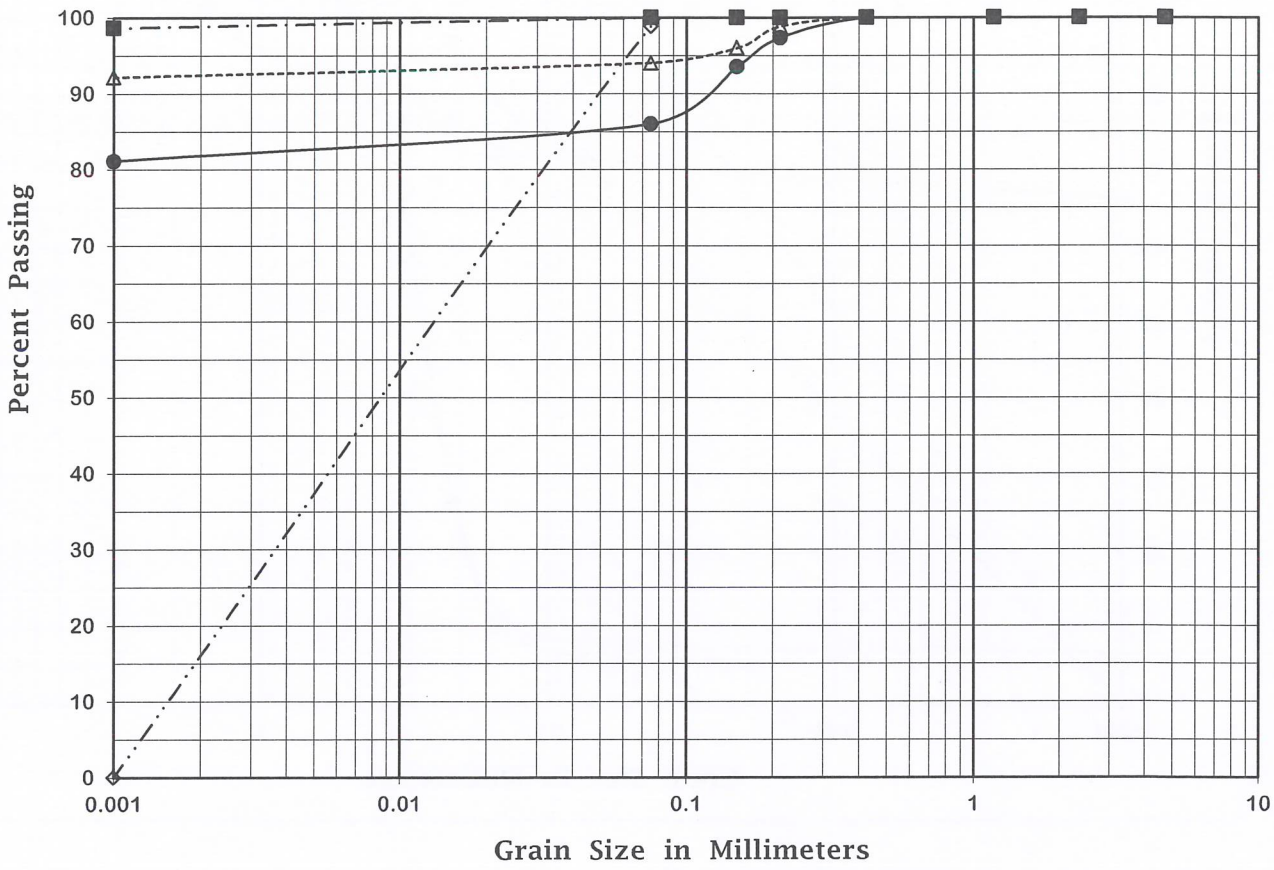
PROJECT: Geotechnical Investigation for the proposed construction of (G+1) Independant Villas (BROOKSIDE RESIDENCES) at Pammal, Chennai.

Client / Owner : M/s.VNCT GLOBAL LLP

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Sieve Analysis



Symbol	Borehole No.	Depth, M
●	BH-03	4.50-6.00
△	BH-03	6.00-7.50
■	BH-03	7.50-9.00
◇	BH-03	9.00-10.50

Date : 13.07.2023

Drawing Title : **GRAIN SIZE ANALYSIS**

PROJECT: Geotechnical Investigation for the proposed construction of (G+1) Independant Villas (BROOKSIDE RESIDENCES) at Pammal, Chennai.

Client / Owner : M/s.VNCT GLOBAL LLP

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GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED CONSTRUCTION OF (G+1) INDEPENDENT VILLAS (BROOKSIDE RESIDENCES) AT PAMMAL, CHENNAI.

ABBREVIATION:

Note

W_N	=	Natural Moisture content (%)
W_L	=	Liquid limit (%)
W_P	=	Plasticity Limit (%)
I_P	=	Plasticity Index (%)
F.S.I	=	Free Swell Index (%)
IS	=	Indian Standard Classification
CL	=	Low compressibility Clay of W_L < 35%
CI	=	Inorganic Clay of 35% < W_L <50%
CH	=	High Compressibility Clay of W_L > 50%
SP	=	Poorly graded sand
GP	=	Poorly graded gravel
SW	=	Well graded sand
SM	=	Silty sand
GW	=	Well graded gravel

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APPENDIX- D

ANALYSIS OF SPREAD FOOTING

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COMPUTATION OF BEARING CAPACITY AS PER IS: 6403:1981 BH-01

1 Geometrical Data :

Shape of the Foundation	Square	
Shape considered for bearing capacity design	Spread	
Size of Footing (B)	2.00	m
Breadth to Length Ratio of Foundation (B/L)	1.00	
Depth of Foundation below E.G.L. (D_f):	2.00	m
Inclination of Vertical Load with the Vertical (α)	0.00	Deg.

2 Soil Data :

Type of Bearing Strata :	Gravel	
Design SPT "N" (average) value of the Bearing Strata:	18	
Type of Shear Failure:	General	
Angle of Shearing Resistance - Limited to a Maximum of:	28.00	Deg.

3 Design Parameters:

Saturated Density of Soil above the foundation detph (γ_{bulk})	5.49	kN/m^3
Effective Overburden pressure at foundation level (q)	10.98	kPa
Water Table Correction Factor (w')	0.50	

Bearing Capacity Factors:

N_c = 26.37
N_q = 15.30
N_γ = 17.79

Shape Factors:

S_c = 1.30
S_q = 1.20
S_γ = 0.80

Depth Factors :

D_c = 1.33
D_q = 1.17
D_γ = 1.17

Inclination Factor:

I_c = 1.00
I_q = 1.00
I_γ = 1.00

4 Ultimate Bearing Capacity (Qu) :

Qu=q*(Nq-1)*Sq*Dq*Iq + 0.5*B*g*Ng*Sg*Dg*Ig*w' 265.41 kPa

5 Safe Bearing Capacity (Qsafe) :

Factor of Safety (F.S.) :	2.50	
Qsafe :	106.16	kPa
$Q_{safe\ limited\ to}$	100	kPa

This bearing capacity(100 kpa) has been fulfill the settlement limit(50mm)

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Settlement Calculation as per IS 8009-part1 for BH-01

Immediate settlement = q x B'' x (1-m2)x If / Es

q - Allowable bearing pressure	100	kPa
B - width of foundation	2	m
m - poisson's ratio of soil	0.37	
If - Influence factor (Square Center)	1.12	
Es-Modulus of Elasticity of Soil	20427	
Immediate settlement = q x B x (1-m2)x Is x If / Es =	0.00946	
Settlement	9	mm

SAFE BEARING CAPACITY BASED ON SETTLEMENT

DEPTH	WIDTH	ALL.SETTLEMENT	ALL. BEARING CAPACITY
2.00m	2.00m	50mm	100kPa

Using the ground improvement method, filling of the improved soil for 1.30m (Gravel/murram soil fill) thickness, an immediate settlement of 9mm has been expected. Pressure influence up to 7.50m has been considered. Hence, take into account both Immediate(Si = 9) and Consolidation settlement (Sc=40), the expected total settlement was 49mm and foundation width was restricted to 2.00m. It is well within the allowable limit of 50mm. Hence, spread/isolated footing shall be adopted.

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CONSOLIDATION SETTLEMENT CALCULATION

Considering BH-01 at a depth 6.00m

P_o = 4.5x9.81+1.5x17.76

= 70.8 kN/m^2

e_o = 1.27

C_c = 0.30

Mid Depth (Z/B) = 2.65/2.00

Factor = 1.33

SBC = 100 kN/m^2

Change in pressure @depth of layer - $\triangle_p$

$\triangle$ P = Factor x SBC of soil (Refer book Donald P. Coduto, From 10.9 pressure bulb chart, corrolate Z/B and σz/q values)

= 21.0 kN/m^2

$$S_c = \frac{0.30}{1+1.27} \times 2.7 \times \log\left\{\frac{70.8+21.00}{70.8}\right\}$$

Sc = 40 mm

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TABLE FOR CORRECTION OF SPT VALUES as per IS :2131-1981

CLIENT	:	M/s.VNCT GLOBAL LLP	M/s. FALCON INDUSTRIAL TESTING LABORATORY PVT. LTD.,
PROJECT	:	(G+1) Independent Villas (BROOKSIDE RESIDENCES)	
LOCATION	:	Irendamkattalai, Pammal, Chennai.	

Depth (m)	Field "N" SPT Values BH-01	Over burden pressure (t/m^2)	Over burden correction factor (C_n)	Over burden Correction (N')	Dilatancy correction (N'')	Corrected N Values
2.00	50	2	1.50	75	45	45
3.30	28	3.3	1.34	N/A	N/A	28
4.50	6	4.5	1.27	N/A	N/A	6
6.00	5	6	1.15	N/A	N/A	5
7.50	7	7.5	1.09	N/A	N/A	7
					Average of Corrected N values	18

Note: N/A = Not Applicable

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SUMMARY

LOCATION NO.	TYPE OF FOOTING	DEPTH OF FOOTING (m)	SBC (t/m^2)	TOTAL SETTLEMENT (mm)
BH-01	Spread (Square)	2.00	10.20 (100 kPa)	49

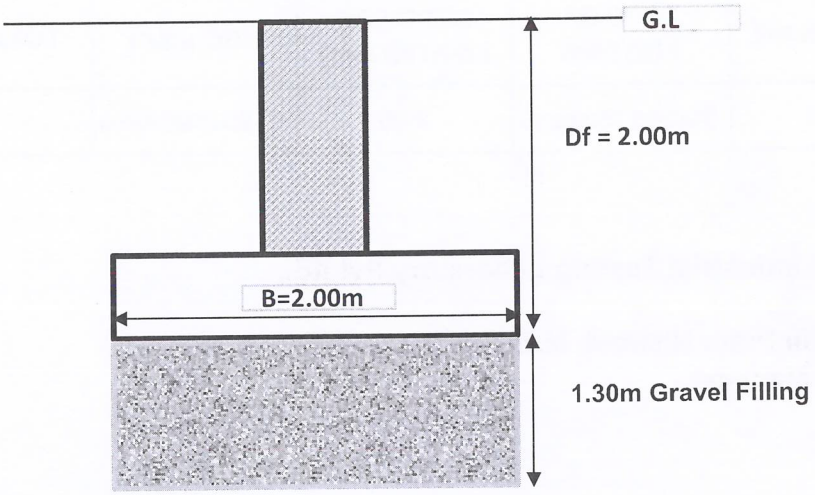
for Falcon Industrial Testing Laboratory Pvt ltd.,

Dr.S.Sherlin Prem Nishold, M.E., Ph.D.,
Technical Manager

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FOUNDATION DRAWING



Size of Footing : 2.00m X 2.00m
Depth of Footing (Df) : 2.00m
Ground Improvement : 1.30m (Gravel Filling)
Safe Bearing Capacity : 100 KN/m2 (10.20 T)
Total Settlement : 49mm
Allowable Settlement : 50mm

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Encumbrance Certificate (EC) Search, Find Your SRO, Temple Property Check, WAQF Property Check, View Patta/Chitta, View FMB, Patta Analyzer, EC Analyzer

Zoning & Land Use Analysis

Land Use Zone Finder, CRZ Zone Check, Aquifer Zone Check, CBA Check, EWS Check, Road Width Check, Proposed Road Widening Check, FSI Calculator

Property Documentation & Workflow Tools

Forms & Templates, Document Generator, Document Translation, Dictionary

Vastu & Property Management Tools

Home Vastu Shastra, Plot Vastu Shastra, Property Management

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