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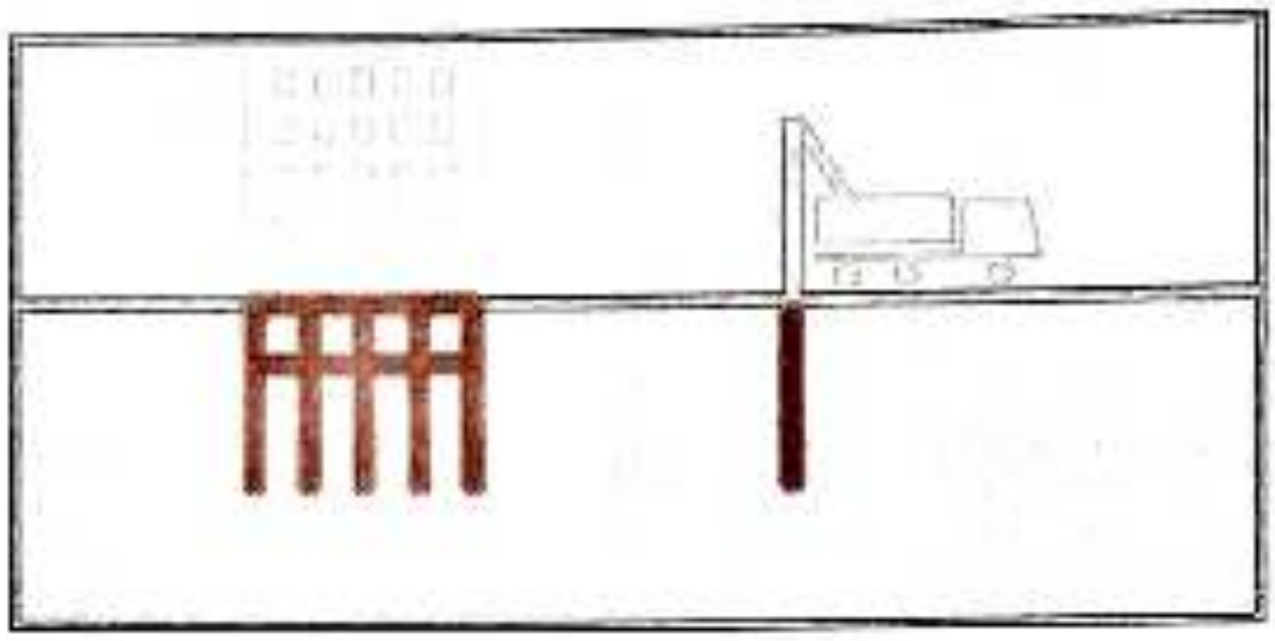
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VELTECH CONSULTING ENGINEERS

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GEOTECHNICAL INVESTIGATION REPORT

PROJECT: GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED CONSTRUCTION OF (STILT+3) RESIDENTIAL BUILDING AT S.NO:441/1A2 & 441/1B,PLOT NO:11,SRI BALAJI AVENUE, AYANAMBAKKAM VILLAGE.

CLIENT : M/S.SRI HARI HOMES.,

REPORT NO	DATE	REVISION-0
VCE/21/GIR–564	09.05.2021	Submission for Design of Foundation

For SRI HARI HOMES

Proprietor

09.05.2021

To

CLIENT : M/S.SRI HARI HOMES.,

SUB: GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED CONSTRUCTION OF (STILT+3) RESIDENTIAL BUILDING AT S.NO:441/1A2 & 441/1B,PLOT NO:11,SRI BALAJI AVENUE, AYANAMBAKKAM VILLAGE.

Dear Sir,

We are glad to submit two copy of our final Geotechnical Investigation Report for the above captioned project.

We look forward to hearing from you at your earliest convenience regarding this report.

We are pleased to work for you in this project. We assure our continual services to our best.

Yours Truly,

FOR VELTECH CONSULTING ENGINEERS

VELTECH CONSULTING ENGINEERS * CHENNAI 600073

Er.R.VENKATA KRISHNAIAH.M.E.,

Geotechnical Consultant

For SRI HARI HOMES

Proprietor

GEOTECHNICAL INVESTIGATION REPORT

VELTECH CONSULTING ENGINEERS

CLIENT : M/S.SRI HARI HOMES.,

PROJECT : (Stilt+3) Residential building

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- **Pile calculation**

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VELTECH CONSULTING ENGINEERS CHENNAI 600073

For **SRI HARI HOMES**

Proprietor

GEOTECHNICAL INVESTIGATION REPORT

VELTECH CONSULTING ENGINEERS

CLIENT : M/S.SRI HARI HOMES.,

PROJECT : (Stilt+3) Residential building

INTRODUCTION

This report presents the geotechnical investigations results curried out by Veltech Consulting Engineers, for the proposed Construction of (Stilt+3) Residential Building At S.No:441/1A2 & 441/1B, Plot No:11,Sri Balaji Avenue, Ayanambakkam Village.

This work was authorized by the Client : **M/S.Sri Hari Homes.,**

Standard Penetration Testing boreholes were drilled at the site up to a maximum depth of 20.0m and 28.0m below existing ground level.

The investigation consists of drilling Four boreholes, soil sampling, field and laboratory testing and preparation of a Geotechnical Report for the Proposed Construction of (Stilt+3) Residential Building At S.No:441/1A2 & 441/1B, Plot No:11,Sri Balaji Avenue, Ayanambakkam Village.

SCOPE OF WORK

The scope of this investigation is to:

- Conducting Standard Penetration Test (SPT) at regular depth intervals.
- Collecting split spoon samples or disturbed soil samples
- Conducting relevant laboratory tests

SITE DESCRIPTION

The site for the proposed Construction of (Stilt+3) Residential Building At S.No:441/1A2 & 441/1B, Plot No:11,Sri Balaji Avenue, Ayanambakkam Village.The elevation of site for BH-1to BH-4 is 1.0m below from the road level.

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Proprietor

EXPLORATION TECHNIQUES

After the visual inspection of the site, the subsurface investigation was carried out as mentioned below:

Four (4) exploration boreholes were drilled to a maximum depth of 20.0m.

BH -1 was started on 05.05.2021 and completed on 05.05.2021.

BH -2,3 & 4 was started on 06.05.2021 and completed on 06.05.2021.

Equipment Used

The equipment used for performing the drilling operations is a Calyx Rotary Drill Rig with direct mud circulation technique. The drill mud used was made out of Sodium Bentonite.

Methodology of drilling

In the soil strata, the drilling operations have been carried out using special drill bits and cutters coupled with direct mud circulation.

In-Situ Strength Tests:
Standard Penetration Test:

Standard penetration tests were conducted at the borehole locations, in accordance with IS: 2131. The tests were conducted at every change of strata up to the depth of termination of the borehole as directed by the engineer-in-charge.

Collection of Samples:
Disturbed Soil Samples

The SPT-samples collected were used as disturbed soil samples. These samples were used for visual and physical identification and for conducting laboratory classification tests as per I.S.1498-1970.

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For **SRI HARI HOMES**

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GEOTECHNICAL INVESTIGATION REPORT

VELTECH CONSULTING ENGINEERS

CLIENT : M/S.SRI HARI HOMES..

PROJECT : (Stilt+3) Residential building

LABORATORY TESTING

All the extracted soil samples were brought to our Laboratory for further examination in accordance with IS: 1498-1970. Selected samples were subjected to the following physical tests.

1. **Moisture Content**
2. **Sieve Analysis (IS: 2720 Part IV — 1985)**
3. **Liquid limit (IS: 2720 Part V — 1985)**
4. **Plastic Limit and Plasticity Index (IS: 2720 Part VI — 1972)**
5. **Differential Free Swell Test**

The laboratory test results are given in Appendix "C".

SUBSURFACE SOIL DESCRIPTION

Based on boreholes information, sub surface soil profile for the proposed Construction of (Stilt+3)Residential Building is given below:

BH-1

Depth (m)		Soil Description
From	To	
0.0	2.5	Dark brownish grey fine silty sand
2.5	7.5	Greyish high plastic and high swelling clay
7.5	9.0	Greyish medium to fine silty sand
9.0	10.0	Greyish yellow medium to fine sand

BH-2

Depth (m)		Soil Description
From	To	
0.0	1.5	Brownish grey fine silty sand
1.5	2.5	Brownish black medium plastic and medium swelling clay
2.5	9.0	Blackish grey high plastic and high swelling clay
9.0	11.5	Greyish medium to fine sand
11.5	14.0	Dark brownish grey silty sand
14.0	17.0	Greyish yellow silty sand
17.0	19.0	Dark brownish yellow medium to fine sand with gravel
19.0	20.0	Dark brownish yellow weathered rock

VELTECH CONSULTING ENGINEERS CHENNAI 600073

For SRI HARI HOMES

Proprietor

GEOTECHNICAL INVESTIGATION REPORT

VELTECH CONSULTING ENGINEERS

CLIENT : M/S.SRI HARI HOMES.,

PROJECT : (Stilt+3) Residential building

BH-3

Depth (m)		Soil Description
From	To	
0.0	1.5	Dark brownish fine silty sand
1.5	4.0	Light brownish grey medium to fine sand
4.0	7.5	Blackish grey high plastic and high swelling clay
7.5	9.0	Blackish grey medium plastic and medium swelling clay
9.0	10.0	Greyish fine silty sand

BH-4

Depth (m)		Soil Description
From	To	
0.0	4.0	Brownish medium to fine sand
4.0	7.5	Blackish grey high plastic and high swelling clay
7.5	10.0	Blackish grey fine silty sand with clay binding

GROUND WATER

Ground water table was found at the depth of 2.2m below the ground level at the time of field investigation. However it will fluctuate due to seasonal variations.

FOUNDATION RECOMMENDATIONS

Based on the borehole information and laboratory test results in addition to the nature of structure, the recommendations for the proposed structure are given below.

BORED PILE FOUNDATION:

A Pile length of 20.0m has been analyzed below and the corresponding Pile capacities are given. Selection of Pile length was estimated according to soil profile and soil stiffness as obtained from SPT values. In case of bored pile the pile cap shall be placed 1.0m below ground level.

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Proprietor

PILE CAPACITIES

Bedrock was not encountered up to a maximum explored depth. Hence, the Piles utilizing friction and End bearing shall be adopted for the proposed structures. The Pile capacities of the bored piles are worked out considering a depth of 20.0m below ground level as the top of pile level. Estimation of Pile capacities are given below with reference to the boreholes drilled at site

PILE CAPACITY CALCULATIONS				
Pile Length (m)	**Pile Diameter (mm)**	**Factor of Safety = 3.0 Allowable Pile Load Capacity (kN)**	**Lateral load bearing capacity(kN)**	**Uplift Resistance(kN)**
20.0	400	575	46	390
20.0	500	780	62	490
20.0	600	1000	80	590

PILE GROUPING

The group efficiency shall be worked out based on number of Piles in a group. Piles shall have a minimum spacing of 2.5 times diameter centre to centre or minimum 1.5 times diameter as clear spacing in order to mobilise frictional resistance, which is a key factor in achieving better Pile capacities. Larger spacing is always preferable, in case of bored piles.

PILE GROUP EFFICENCY

Pile group efficiency will depend on the pattern of arrangement of piles and number of piles in a group. An efficiency of about 60 to 70% shall be considered for the on site soil condition, in general.

However, it shall be decided based on pile load tests. Sequence of casting of Piles shall be such that the adjacent Piles do not get affected during Pile drilling. Tremmie concrete shall be carried out in order to minimise segregation. Water-cement ratio shall also be controlled in order not to be affected by water, existing inside the Pile boring. Gradual pull out of Pile casing is necessary, to avoid necking of Piles.

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UPLIFT CAPACITY

Uplift capacity of piles shall be considered as 50% of the ultimate frictional capacity of Piles.

PILE TESTING

The group efficiency shall be worked out based on number of Piles in a group. However, Pile load tests are recommended to observe the performance of the Piles and to re-confirm the theoretical Pile capacities. Load tests to be carried out after a minimum period of 1 week after driving of Pile.

Pile load tests should be conducted by loading up to 1.5 times the service load on working Pile, while minimum two (2) times the service load on Pilot Piles. A minimum of (two) 2 pile load test can be conducted for this project.

FOUNDATION CONSIDERATIONS

A PCC (Plain Cement Concrete) layer of 15cm 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.

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.

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For SRI HARI HOMES

S. Mysan

Proprietor

VELTECH CONSULTING ENGINEERS

CLIENT : M/S.SRI HARI HOMES.,

PROJECT : (Stilt+3) Residential building

GENERAL CONSIDERATIONS

The recommendations for foundation design and construction are based on the information obtained from the boreholes drilled at site. When foundation construction is underway, the recommendations of this report should be checked through field inspection, to validate the information for use during the construction stage. Any variation in underground conditions revealed by the borehole should be brought to our attention for alternate recommendations, if required.

Yours Truly,
FOR VELTECH CONSULTING ENGINEERS

CHENNAI 600073

Er.R.VENKATA KRISHNAIAH.M.E.,
Geotechnical Consultant

For SRI HARI HOMES

Proprietor

VELTECH CONSULTING ENGINEERS

CLIENT : M/S.SRI HARI HOMES.,

PROJECT : (Stilt+3) Residential building

APPENDIX A

BORE HOLE LOG

For SRI HARI HOMES

S. Vijay

Proprietor

BOREHOLE LOG

Client	: M/s.Sri Hari Homes.,	Ele. Of GL	: below 1.0 m
		Water Table	: 2.2m
Type of building	: (Stilt+3)Residential building	Type Of Boring	: Rotary
Location	: Ayanambakakam	Dia of Boring	: 150mm
B.H. No	: 1	Started on	:05.05.2021
Final Depth	: 10.0m	Ended on	: 05.05.2021

Depth (m)	GWL	SYMBOL	DESCRIPTION	SPT COUNT 0-15 cm	15-30 cm	30-45 cm	N-Value	Relative Density /Consistency
0.0			Dark brownish grey fine silty sand					
1.0			Ditto	4	4	5	9	Loose
2.5			Ditto	5	6	8	14	Medium dense
2.5			Greyish high plastic and high swelling clay	4	5	5	10	Stiff
4.5			Ditto	6	6	8	14	Stiff
5.5			Ditto	3	3	4	7	Firm
7.5			Greyish medium to fine silty sand	4	4	7	11	Medium dense
9.5			Greyish yellow medium to fine sand	6	7	9	16	Medium dense
10.0			Borehole 1 terminated at the depth of 10.0m					

For SRI HARI HOMES

Proprietor

(103)

BOREHOLE LOG

Client : M/s.Sri Hari Homes.,

Type of building : (Stilt+3)Residential building

Location : Ayanambakakm

B.H. No : 2

Final Depth : 20.0m

Ele. Of GL : below 1.0 m

Water Table : 2.2m

Type Of Boring : Rotary

Dia of Boring : 150mm

Started on :06.05.2021

Ended on : 06.05.2021

Depth (m)	GWL	SYMBOL	DESCRIPTION	SPT COUNT 0-15 cm	15-30 cm	30-45 cm	N- Value	Relative Density /Consistency
0			Brownish grey fine silty sand					
0.5								
1.0			Ditto	6	6	7	13	Medium dense
1.5			Brownish black medium plastic and medium swelling clay	4	5	6	11	Stiff
2.0								
2.5			Blackish grey high plastic and high swelling clay	6	8	9	17	Very stiff
3.0								
3.5								
4.0			Ditto	5	8	10	18	Very stiff
4.5								
5.0								
5.5			Ditto	5	8	7	15	Very stiff
6.0								
6.5								
7.0								
7.5			Ditto	3	5	6	11	Stiff
8.0								
8.5								
9.0								
9.5								
10.0								
10.5			Greyish medium to fine sand	10	10	13	23	Medium dense

For SRI HARI HOMES

Proprietor

(10)

BOREHOLE LOG

Client	: M/s.Sri Hari Homes.,	Ele. Of GL	: below 1.0 m
		Water Table	: 2.2m
Type of building	: (Stilt+3)Residential building	Type Of Boring	: Rotary
Location	: Ayanambakakm	Dia of Boring	: 150mm
B.H. No	: 2	Started on	:06.05.2021
Final Depth	: 20.0m	Ended on	: 06.05.2021

Depth (m)	GWL	SYMBOL	DESCRIPTION	SPT COUNT 0-15 cm	15-30 cm	30-45 cm	N- Value	Relative Density /Consistency
11.0			Greyish medium to fine sand					
12.0			Dark brownish grey silty sand	12	15	15	30	Dense
14.0			Greyish yellow silty sand	14	18	26	44	Dense
17.0			Dark brownish yellow medium to fine sand with gravel	51/13cm penetration				Very dense
19.0			Dark brownish yellow weathered rock	50/6cm penetration				Very dense
20.0			Borehole 2 terminated at the depth of 20.0m					

For SRI HARI HOMES

Proprietor

102

BOREHOLE LOG

Client : M/s.Sri Hari Homes.,

Type of building : (Stilt+3)Residential building

Location : Ayanambakakm

B.H. No : 3

Final Depth : 10.0m

Ele. Of GL : below 1.0 m

Water Table : 2.2m

Type Of Boring : Rotary

Dia of Boring : 150mm

Started on :06.05.2021

Ended on : 06.05.2021

Depth (m)	GWL	SYMBOL	DESCRIPTION	SPT COUNT 0-15 cm	15-30 cm	30-45 cm	N-Value	Relative Density /Consistency
			Dark brownish fine silty sand					
1.5			Ditto	7	7	9	16	Medium dense
3.0			Light brownish grey medium to fine sand	8	10	10	20	Medium dense
4.5			Ditto	7	5	6	11	Medium dense
6.0			Blackish grey high plastic and high swelling clay	7	9	9	18	Very stiff
7.5			Ditto	7	7	7	14	Stiff
9.0			Blackish grey medium plastic and medium swelling clay	3	4	4	8	Firm
10.5			Greyish fine silty sand	11	15	16	31	Dense
12.0			Borehole 3 terminated at the depth of 10.0m					

For SRI HARI HOMES

S. Hari

Proprietor

103

BOREHOLE LOG

Client : M/s.Sri Hari Homes.,

Type of building : (Stilt+3)Residential building

Location : Ayanambakakm

B.H. No : 4

Final Depth : 10.0m

Ele. Of GL : below 1.0 m

Water Table : 2.2m

Type Of Boring : Rotary

Dia of Boring : 150mm

Started on :06.05.2021

Ended on : 06.05.2021

Depth (m)	GWL	SYMBOL	DESCRIPTION	SPT COUNT 0-15 cm	15-30 cm	30-45 cm	N- Value	Relative Density /Consistency
0.0			Brownish medium to fine sand					
1.0			Ditto	6	7	8	15	Medium dense
2.5			Ditto	9	9	10	19	Medium dense
3.5			Ditto	5	6	6	12	Medium dense
4.0			Blackish grey high plastic and high swelling clay	7	9	10	19	Very stiff
5.5			Ditto	6	6	8	14	Stiff
7.5			Blackish grey fine silty sand with clay binding	5	5	7	12	Medium dense
9.5			Ditto	9	10	10	20	Medium dense
10.0			Borehole 4 terminated at the depth of 10.0m					

For SRI HARI HOMES

S. Vijay

Proprietor

APPENDIX B

LABORATORY TEST RESULTS

For SRI HARI HOMES

S. Ilayaraj

Proprietor

GEOTECHNICAL INVESTIGATION REPORT

VELTECH CONSULTING ENGINEERS

CLIENT : M/S.SRI HARI HOMES.,

PROJECT : (Stilt+3) Residential building

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1- a) PHYSICAL ANALYSIS OF SOIL BH-1

Test results of Moisture content , Atterberg limits

DEPTH M	Moisture Content%	Atterberg limits				IS Classification
		W_L%	W_P%	I_P%	FSI%	
1.0	15.82	Non plastic				SM
2.0	11.98	Non plastic				SM
3.0	28.80	64	34	30	65	CH
4.5	30.98	62	31	29	62	CH
6.0	31.13	67	34	33	68	CH
8.0	22.27	Non plastic				SM
10.0	18.42	Non plastic				SP

1-b) GRAIN SIZE ANALYSIS OF SOIL – BH-1

DEPTH M	GRAVEL SAND %	COARSE SAND %	MEDIUM SAND %	FINE SAND %	SILT + CLAY%
1.0	-	-	31	44	25
2.0	-	-	40	45	15
3.0	-	-	-	1	99
4.5	-	-	1	2	97
6.0	-	-	-	1	99
8.0	-	1	32	26	51
10.0	2	4	67	21	6

For SRI HARI HOMES

Proprietor

GEOTECHNICAL INVESTIGATION REPORT

VELTECH CONSULTING ENGINEERS

CLIENT : M/S.SRI HARI HOMES.,

PROJECT : (Stilt+3) Residential building

106

2- a) PHYSICAL ANALYSIS OF SOIL BH-2

Test results of Moisture content , Atterberg limits

DEPTH M	Moisture Content%	Atterberg limits				IS Classification
		W_L%	W_P%	I_P%	FSI%	
1.0	22.98	Non plastic				SM
2.0	28.88	43	24	19	47	CI
3.0	32.93	66	33	33	58	CH
4.5	26.13	64	31	33	65	CH
6.0	32.61	62	33	29	58	CH
8.0	38.37	69	35	34	54	CH
10.0	17.63	Non plastic				SM
12.5	17.23	Non plastic				SM
15.0	16.36	Non plastic				SM
17.5	11.49	Non plastic				SP
20.0	Weathered rock					

For SRI HARI HOMES

S. Vijay

Proprietor

2-b) GRAIN SIZE ANALYSIS OF SOIL – BH-2

DEPTH M	GRAVEL SAND %	COARSE SAND %	MEDIUM SAND %	FINE SAND %	SILT + CLAY%
1.0	-	-	13	39	49
2.0	-	-	6	18	76
3.0	-	-	2	4	94
4.5	-	-	-	1	99
6.0	-	-	1	4	95
8.0	-	-	-	2	98
10.0	2	3	57	24	14
12.5	6	2	14	25	53
15.0	4	3	18	30	45
17.5	21	14	35	19	11

For SRI HARI HOMES

S. Vijay

Proprietor

GEOTECHNICAL INVESTIGATION REPORT

VELTECH CONSULTING ENGINEERS

CLIENT : M/S.SRI HARI HOMES,,

PROJECT : (S+III+3) Residential building

3- a) PHYSICAL ANALYSIS OF SOIL BH-3

Test results of Moisture content , Atterberg limits

DEPTH M	Moisture Content%	Atterberg limits				IS Classification
		W_L%	W_P%	I_P%	FSI%	
1.0	17.85	Non plastic				SM
2.0	14.47					SM
3.0	19.66	Non plastic				SM
4.5	32.55	64	33	31	63	CH
6.0	26.79	62	31	31	69	CH
8.0	38.78	46	24	22	44	CI
10.0	19.87	Non plastic				SM

3-b) GRAIN SIZE ANALYSIS OF SOIL – BH-3

DEPTH M	GRAVEL SAND %	COARSE SAND %	MEDIUM SAND %	FINE SAND %	SILT + CLAY%
1.0	-	-	21	42	37
2.0	-	2	62	18	18
3.0	1	1	59	25	14
4.5	-	-	3	5	92
6.0	-	-	-	1	99
8.0	-	-	7	26	67
10.0	-	-	28	51	31

For SRI HARI HOMES

Proprietor

GEOTECHNICAL INVESTIGATION REPORT

VELTECH CONSULTING ENGINEERS

CLIENT : M/S.SRI HARI HOMES.,

PROJECT : (Stilt+3) Residential building

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4- a) PHYSICAL ANALYSIS OF SOIL BH-4

Test results of Moisture content , Atterberg limits

DEPTH M	Moisture Content%	Atterberg limits				IS Classification
		W_L%	W_P%	I_P%	FSI%	
1.5	18.08	Non plastic				SM
2.5	18.11					SP
3.5	14.48	Non plastic				SP
4.5	27.68	61	29	32	64	CH
6.0	30.37	67	32	35	70	CH
8.0	26.13	Non plastic				SM
10.0	30.47	Non plastic				SM

4-b) GRAIN SIZE ANALYSIS OF SOIL – BH-4

DEPTH M	GRAVEL SAND %	COARSE SAND %	MEDIUM SAND %	FINE SAND %	SILT + CLAY%
1.0	-	1	38	38	13
2.0	-	-	53	39	8
3.0	1	2	61	31	5
4.5	-	-	1	3	96
6.0	-	-	-	1	99
8.0	-	-	5	64	31
10.0	-	-	8	48	44

For SRI HARI HOMES

S. Vijaya

Proprietor

GEOTECHNICAL INVESTIGATION REPORT

VELTECH CONSULTING ENGINEERS

CLIENT : M/S.SRI HARI HOMES.,

PROJECT : (Stilt+3) Residential building

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

For SRI HARI HOMES

Proprietor

APPENDIX C

PILE CAPACITY CALCULATIONS

For **SRI HARI HOMES**

S. Hyam

Proprietor

Project (Stilt+3)Residential building
Client M/s.Sri Hari Homes.,
Site Ayanambakkam.

(112)

DESIGN OF PILE FOUNDATION

1.0 Type of Installation of Pile — **Bored Cast in Situ**

1.1 Geometrical Data

Assumed Diameter of pile(D)	:	400.00 mm
Length of Pile	:	20.00 m

1.2 Design of Pile for Vertical Compression

1.2.1 Computation of Skin Resistance:

Layer-I

Type of Strata	:	Clay
Length of strata,lc		7.50 m
Average SPT of the strata,N	:	14
Bulk Density of the strata, γ	:	17.28 kN/m^3
Undrained Shear Strength (Cu)	:	20.00 kN/m^2
Adhesion, σ	:	2.00 kN/m^2
Skin Resistance of the pile,q_s	:	376.80 kN
(q :σ*Cu*pi*d*lc)		

1.2.2 Layer-II

Type of Strata	:	sand
Average SPT of the strata,N	:	40
Bulk Density of the strata, γ	:	17.23 kN/m^3
Angle of Shearing Resistance - Limited to a Maximum of	:	32.00 Deg
tan phi		0.62
Top of Strata	:	9.00 m
Bottom of Strata	:	20.00 m
Average Thickness of Strata,l_c	:	11.00 m
Effective overburden pressure at the middle of the strata,σ_{eff}	:	94.37 kN/m^2
Coef. Earth Pressure at Rest		1.00
Skin Resistance of the pile,q_s	:	814.16 kN
(q_s: σ '*k*tanϕ *pi()*d*lc)		

1.2.5 Computation of End Bearing Resistance:

Type of Bearing Strata	:	sand
Dia of pile	:	0.40 m
Cross-Sectional Area of pile,Ap	:	0.1256 m^2
R.L of bottom of pile	:	20.00 m
Minimum SPT-value of the Bearing Strata	:	50
Angle of internal friction	:	31.00
Bearing Capacity Factor(Nq)	:	30.00
Effecitve Over Burden Pressure at the bottom of pile (qu	:	141.60 kN/m^2
Ultimate End Bearing Resistance (Qp)	:	**544.85 kN**
(Qp=Ap*Nq*qu)		

1.3.0 Ultimate Load Carrying Capacity (Qs+Qp) : 921.65 kN
Safe Load Carrying Capacity (Qsafe =Qu/3) : 578.6 kN
say 575 kN
Lateral Load Bearing Capacity 46 kN

Ultimate uplift resistance 1190.96 kN
Safe Uplift resistance 396.99 kN
Say 390 kN

For SRI HARI HOMES
Proprietor

Project	(Stilt+3)Residential building	
Client	M/s.Sri Hari Homes.,	
Site	Ayanambakkam.	

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DESIGN OF PILE FOUNDATION

1.0 Type of Installation of Pile — **Bored Cast in Situ**

1.1 Geometrical Data

Assumed Diameter of pile(D)	:	500.00 mm
Length of Pile	:	20.00 m

1.2 Design of Pile for Vertical Compression

1.2.1 Computation of Skin Resistance:

Layer-I

Type of Strata	:	Clay
Length of strata,lc		7.50 m
Average SPT of the strata,N	:	14
Bulk Density of the strata, γ	:	17.28 kN/m^3
Undrained Shear Strength (Cu)	:	20.00 kN/m^2
Adhesion, σ	:	2.00 kN/m^2
Skin Resistance of the pile,q_s	:	471.00 kN
(q :σ*Cu*pi*d*lc)		

1.2.2 **Layer-II**

Type of Strata	:	sand
Average SPT of the strata,N	:	40
Bulk Density of the strata, γ	:	17.23 kN/m^3
Angle of Shearing Resistance - Limited to a Maximum of	:	32.00 Deg
tan phi		0.62
Top of Strata	:	9.00 m
Bottom of Strata	:	20.00 m
Average Thickness of Strata,l_c	:	11.00 m
Effective overburden pressure at the middle of the strata,σ_{avg}	:	94.37 kN/m^2
Coef. Earth Pressure at Rest		1.00
Skin Resistance of the pile,q_s	:	1017.70 kN
(q :σ*k*tanϕ *pi()*d*lc)		

1.2.5 Computation of End Bearing Resistance:

Type of Bearing Strata	:	sand
Dia of pile	:	0.50 m
Cross-Sectional Area of pile,Ap	:	0.19625 m^2
R.L of bottom of pile	:	20.00 m
Minimum SPT-value of the Bearing Strata	:	50
Angle of internal friction	:	31.00
Bearing Capacity Factor(Nq)	:	30.00
Effecitve Over Burden Pressure at the bottom of pile (qu	:	144.60 kN/m^2
Ultimate End Bearing Resistance (Qp)	:	851.33 kN
(Qp=Ap*Nq*qu)		
1.3.0 Ultimate Load Carrying Capacity (Qs+Qp)	:	2340.03 kN
Safe Load Carrying Capacity (Qsafe =Qu/3)	:	780.0 kN
say		**780 kN**
Lateral Load Bearing Capacity		**62.4 kN**

Ultimate uplift resistance — **1488.70 kN**

Safe Uplift resistance — **496.23 kN**

Say — **490 kN**

For SRI HARI HOMES

Proprietor

Project (Stilt+3)Residential building
Client M/s.Sri Hari Homes.,
Site Ayanambakkam.

DESIGN OF PILE FOUNDATION

1.0 Type of Installation of Pile — **Bored Cast in Situ**

1.1 Geometrical Data

Assumed Diameter of pile(D)	:	600.00 mm
Length of Pile	:	20.00 m

1.2 Design of Pile for Vertical Compression

1.2.1 Computation of Skin Resistance:

Layer-I

Type of Strata	:	Clay
Length of strata,lc		7.50 m
Average SPT of the strata,N	:	14
Bulk Density of the strata, γ	:	17.28 kN/m^3
Undrained Shear Strength (Cu)	:	20.00 kN/m^2
Adhesion, σ	:	2.00 kN/m^2
Skin Resistance of the pile,q_s	:	565.20 kN
(q_s :σ*Cu*pi*d*lc)		

1.2.2 **Layer-II**

Type of Strata	:	sand
Average SPT of the strata,N	:	40
Bulk Density of the strata, γ	:	17.23 kN/m^3
Angle of Shearing Resistance - Limited to a Maximum of	:	32.00 Deg
tan phi		0.62
Top of Strata	:	9.00 m
Bottom of Strata	:	20.00 m
Average Thickness of Strata,l_c	:	11.00 m
Effective overburden pressure at the middle of the strata,σ_{eff}	:	94.37 kN/m^2
Coef. Earth Pressure at Rest		1.00
Skin Resistance of the pile,q_s	:	1221.24 kN
(q_s: σ *k*tanϕ *pi()*d*lc)		

1.2.5 Computation of End Bearing Resistance:

Type of Bearing Strata	:	sand
Dia of pile	:	0.60 m
Cross-Sectional Area of pile,Ap	:	0.2826 m^2
R.L of bottom of pile	:	20.00 m
Minimum SPT-value of the Bearing Strata	:	50
Angle of internal friction	:	31.00
Bearing Capacity Factor(Nq)	:	30.00
Effecitve Over Burden Pressure at the bottom of pile (qu	:	144.60 kN/m^2
Ultimate End Bearing Resistance (Qp)	:	1225.92 kN
(Qp=Ap*Nq*qu)		

1.3.0 Ultimate Load Carrying Capacity (Qs+Qp) : 3012.36 kN
Safe Load Carrying Capacity (Qsafe =Qu/3) : 1004.1 kN
say 1000 kN
Lateral Load Bearing Capacity 80 kN

Ultimate uplift resistance 1786.44 kN
Safe Uplift resistance 595.48 kN
Say 590 kN

For SRI HARI HOMES
Proprietor

APPENDIX D

Photos

For **SRI HARI HOMES**

S. Vijay

Proprietor

GEOTECHNICAL INVESTIGATION REPORT

VELTECH CONSULTING ENGINEERS

CLIENT : M/S.SRI HARI HOMES.,

PROJECT : (Stilt+3) Residential building



BH-1

For **SRI HARI HOMES**

Proprietor

GEOTECHNICAL INVESTIGATION REPORT

VELTECH CONSULTING ENGINEERS

CLIENT : M/S.SRI HARI HOMES.,

PROJECT : (Stilt+3) Residential building

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BH-2

For SRI HARI HOMES

S. Nyan

Proprietor

(112)

CHENNAI METROPOLITAN DEVELOPMENT AUTHORITY
'ThalamuthuNatarajan Building', No.1, Gandhi Irwin Road,
Egmore, Chennai-600 008.

PROFESSIONAL REGISTRATION CERTIFICATE

This is to certify that the **Thiru R.VENKATA KRISHNAIAH** has enrolled as **Registered Geo-Technical Engineer (RGTE)** with Chennai Metropolitan Development Authority (CMDA) who has the qualification of **M.E.,(Civil) - Geo Technical Engg.** and experience in the relevant field for **10 years**.

He has been given the Registration No.**GTE/19/07/032** on **05.07.2019.** He shall be required to comply with the duties and responsibilities prescribed by the Government of Tamil Nadu in Part-V, "Registration of Professionals", Tamil Nadu Combined Development and Building Rules, 2019 approved vide G.O.(Ms) No.18 MAWS (MA1) Dept. dated 04.02.2019.

This Registration is valid upto **04.07.2024**.



(R.SHIVAKUMAR)

MEMBER SECRETARY
CHENNAI METROPOLITAN DEVELOPMENT AUTHORITY
CHENNAI - 600 008

R.VENKATA KRISHNAIAH
GEOTECHNICAL CONSULTANT
VELTECH CONSULTING ENGINEERS
NO.10, ELUMALAI NAICKEN STREET,
SELAIYUR, CHENNAI - 600073.
REG. NO. GTE/19/07/032

For **SRI HARI HOMES**

Proprietor



our services doesn't just end there

Buying & Selling Services

Property Buying Assistance, Property Selling Support, Market Price Analysis, Owner Outreach and Negotiation.

Legal & Documentation Services

Certified EC, Patta, legal opinions, property verification, due diligence, litigation solutions, and legal heir certificates.

Property Development & Approvals

Building plan approvals, construction, layout and sub-division approvals, zone conversion, and occupancy certification.

NRI & Investment Services

Escrow Services, Rentals, Litigation Solutions, Property Valuation and Property Management

Compliance & Special Services

Demolition, Vaasthu checks, regularization of unauthorized buildings, and office space solutions.



empowering your real estate decisions with smart tools

Property Valuation & Cost Estimation

Guideline Value, Apartment Composite Value, Stamp Duty & Registration Fees Calculator, Building Value Calculator, Capital Gains Calculator, Area Unit Converter, Length Unit Converter

Ownership, Compliance & Legal Verification

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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