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SOIL INVESTIGATION FOR PROPOSED STRUCTURE (2 BASEMENTS + STILT + 14 FLOORS) RESIDENTIAL PROJECT "VGN FAIRMONT" LOCATED AT TOWN SURVEY NOS. 22/5, 23/4, 24/4, 25/2, 29/2, 30/1, 30/4, 31/2, 32/2, 33/2 & 34/2, BLOCK NO. 2, IN ALANDUR VILLAGE, THIRU. VI. KA INDUSTRIAL ESTATE, GUINDY, CHENNAI – 600 032.

CLIENT

M/s. VGN INFRA INDIA PVT. LTD.

TITLE

FINAL REPORT

REPORT NO: SI/CHN/13/1139/02

JUNE 2013

GEO FOUNDATIONS & STRUCTURES PVT LTD
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SOIL INVESTIGATION REPORT

1.0 INTRODUCTION

1.1 The work of Soil Investigation for Proposed Structure (2 Basements + Stilt + 14 Floors) Residential Project "VGN FAIRMONT" Located at Town Survey Nos. 22/5, 23/4, 24/4, 25/2, 29/2, 30/1, 30/4, 31/2, 32/2,33/2 & 34/2, Block No. 2, in Alandur Village, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai – 600 032.was entrusted to **M/s. Geo Foundations and Structures (P) Ltd.**, Adyar, Chennai – 600 020, by **M/s. VGN Infra India Pvt. Ltd.**, Second Street, Nungambakkam, Chennai-600 006.

1.2 The soil Investigation and laboratory studies were carried out during **April** and **May 2013.** This report summarizes the results of the soil investigation, and presents recommendation for suitable type of foundations.

2.0 OBJECTIVE OF INVESTIGATION

2.1 The objective of soil investigation is to determine the nature and characteristics of sub-soil below the ground level for the proposed structure. The study includes identification of a suitable type of foundation for the proposed structures and assessment of safe capacity.

3.0 SCOPE OF WORK

The scope of work at this site comprises of the following:

3.1 Mobilization of boring rigs with all necessary equipment's and personnel.

3.2 Boring of **nineteen** bore holes of 150 mm dia with Calyx drilling equipment's through sand, silt, clay & rock etc. up to **hard strata.**

3.3 Conducting Standard Penetration Tests in the bore holes and collecting the representative soil samples including packing and transportation to laboratory.

3.4 To conduct the following laboratory tests on soil samples:

(a) Sieve analysis

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(b) Index properties:

(i) Liquid limit

(ii) Plastic limit

(c) Dry & wet density

(d) Water content

(e) Specific gravity

(f) Direct shear test

(g) UCS

3.5 Preparation and submission of detailed report of field and laboratory results with recommendations for foundations.

4.0 FIELD INVESTIGATIONS-GEO-TECHNICAL STUDIES

4.1 Boring rigs with all requisite equipment's and accessories were mobilized at the worksite. A team of technical personnel with skilled labours was also deputed.

4.2 **Nineteen** bore holes of 150 mm diameters were bored to a maximum depth of **13.50 m** below the existing ground level. The bore holes were made as per relevant Indian Standard IS: 1892.

4.3 Representative soil samples were collected at every change of strata or about 1 m depth interval up to 5 m from the existing ground level, followed by 1.50 m up to the hard strata. The samples so collected were sealed and numbered with full particulars for identification and sent to the laboratory for conducting the required tests.

4.4 Standard Penetration tests were conducted in the bore holes at 1 m depth interval up to 5 m from the existing ground level, followed by 1.5 m depth intervals up to the hard strata, as per the relevant Indian Standard, IS: 2131. In this test, a standard split spoon sampler is driven into the ground at the required depth by means of standard hammer of 63.5 kgs weight, falling from a height of 75 cm. Number of

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blows for the first 15 cm is not taken into consideration because of possible disturbances or presence of settled, suspended matters at the bottom of the bore-holes. The total number of blows for the next 30 cm depth of penetration is considered as SPT 'N' value as shown in Figure nos 1 to 19.

5.0 LABORATORY INVESTIGATION

The following laboratory tests were conducted on the selected soil samples collected from the test bore holes:

(a) Sieve analysis

(b) Index properties:

  (i) Liquid limit

  (ii) Plastic limit

(c) Dry & wet density

(d) Water content

(e) Specific gravity

(f) Direct shear test

(g) UCS

All the above laboratory tests were carried out as per relevant Indian Standards.

All the samples were identified and classified as per relevant Indian Standard, IS: 1498.

The results are shown in Table Nos. 1 to 19.

6.0 SOIL PROFILE

Soil profiles of bore holes is as given below.

In bore hole **BH-1** medium dense silty clayey sand occurs from ground level up to a depth of 2.00 m, followed by dense silty sand up to 3.00 m, medium dense silty sand up to 4.00 m, loose sand up to 5.00 m, medium dense silty sand up to 6.50 m, medium stiff sandy clay up to 8.00m, stiff sandy clay up to 11.00 m, very dense silty gravely sand up to 12.00 m, very

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dense silty sand up to **12.50 m,** followed by very dense sand at which depth the bore hole was terminated.

In bore hole **BH-2** stiff sandy clay occurs from ground level up to a depth of 2.00 m, followed by very stiff sandy clay up to 3.00 m, medium dense silty sand up to 6.50 m, stiff sandy clay up to 11.00 m, followed by very dense silty sand up to **13.50 m,** at which depth the bore hole was terminated.

In bore hole **BH-3** medium dense silty sand occurs from ground level up to a depth of 2.00 m, medium dense silty clayey sand up to 3.00 m, medium dense silty sand up to 6.50 m, stiff to very stiff sandy clay up to 9.50 m, very dense sand up to 11.00 m, followed by very dense sandy gravel up to **12.50 m,** at which depth the bore hole was terminated.

In bore hole **BH-4** medium dense silty sand occurs from ground level up to a depth of 3.00 m, followed by medium dense sand up to 4.00 m, medium dense silty sand up to 6.50 m, stiff sandy clay up to 8.00 m, medium dense sandup to **9.50 m**, followed by very dense sandy gravel, at which depth the bore hole was terminated.

In bore hole **BH-5** medium dense silty sand occurs from ground level up to a depth of 6.50 m, followed by stiff sandy clay up to **9.50 m**, followed by very dense sandy gravel at which depth the bore hole was terminated.

In bore hole **BH-6** medium dense silty sand occurs from ground level up to a depth of 5.00 m, followed by loose sand up to 6.50 m, medium stiff to stiff sandy clay up to 9.50 m, followed by very dense sandy gravel up to **11.00 m,**at which depth the bore hole was terminated.

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In bore hole **BH-7** loose clayey sand occurs from ground level up to a depth of 2.00 m, medium dense silty sand up to 4.00 m, medium dense sand up to 6.50 m, medium stiff to stiff sandy clay up to 9.50 m, followed by very dense sand up to **11.00 m**, at which depth the bore hole was terminated.

In bore hole **BH-8** loose clayey sand occurs from ground level up to a depth of 2.00 m, followed by medium dense silty sand up to 3.00 m, medium dense sandy silt up to 4.00 m, Medium dense sand up to 8.00 m, medium dense clayey sand up to 9.50 m, followed very dense sandy gravel up to **11.00 m**at which depth the bore hole was terminated.

In bore hole **BH-9** loose sand occurs from ground level up to a depth of 2.00 m, followed by medium dense silty sand up to 5.00 m, medium dense sand up to 6.50 m, stiff to very stiff sandy clay up to 9.50 m, followed by very dense sandy gravel up to **11.00 m,** at which depth the bore hole was terminated.

In bore hole **BH-10** medium dense sand occurs from ground level up to a depth of 2.00 m, followed by medium dense silty sand up to 4.00 m, medium dense sand up to 5.00 m, dense sand up to 6.50 m, medium stiff to stiff sandy clay up to 9.50 m, followed by very dense sandy gravel up to **10.00 m**, at which depth the bore hole was terminated.

In bore hole **BH-11** medium stiff sandy clay occurs from ground level up to a depth of2.00 m, followed by medium dense silty sand up to 4.00 m, dense sand up to 6.50 m, stiff sandy clay up to 8.00 m, very stiff sandy clay up to **9.50** m, followed by very dense sandy gravel.

In bore hole **BH-12** medium dense silty sand occurs from ground level up to a depth of 2.00 m, followed by loose sand up to 3.00 m, medium dense sand 5.00 m, medium dense silty

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sand up to 6.50 m, medium dense clayey sand up to 8.00 m, loose clayey sand up to 9.50 m, followed by very dense sandy gravel up to **11.00 m,** at which depth the bore hole was terminated.

In bore hole **BH-13** medium dense silty sand occurs from ground level to a depth of 3.00 m, followed by medium dense sand up to 8.00 m, medium dense clayey sand up to 9.50 m, followed by very dense sandy gravel up to **11.00 m,** at which depth the bore hole was terminated.

In bore hole **BH-14** medium dense silty sand occurs from ground level up to a depth of 2.00 m, followed by medium dense sand up to 6.50 m, stiff sandy clay up to 8.00 m, very loose clayey sand up to 9.50 m, followed by very dense sandy gravel up to **11.00 m,** at which depth the bore hole was terminated.

In bore hole **BH-15** medium dense sand occurs fromground level up to a depth of 2.00 m, followed by medium dense silty sand up to 4.00 m, medium dense sand up to 6.50 m, medium dense clayey sand up to 9.50 m, followed by very dense sand up to **11.00 m,** at which depth the bore hole was terminated.

In bore hole **BH-16** filled up rubbish, sand and debris of existing foundation occurs from ground level up to a depth of 3.00 m, followed by medium dense sand up to 5.00 m, medium dense silty sand up to 6.50m, stiff sandy clay up to 8.00 m, medium dense clayey sand up to 9.50 m, followed by very dense sand with rock pebbles up to **11.00 m,** at which depth the bore hole was terminated.

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In bore hole **BH-17** loose sand occurs from ground level up to 2.00 m, medium dense sand up to 4.00 m, medium dense silty sand up to 6.50 m, stiff sandy clay up to 9.50 m, followed by very dense sand up to a depth of **11.00 m,** at which depth the bore hole was terminated.

In bore hole **BH-18** filled up rubbish, sand and debris of existing foundation occurs from ground level up to a depth of 2.00 m, followed by medium dense silty sand up to 4.00 m, dense silty sand up to 5.00 m, dense sand up to 6.50 m, medium stiff sandy clay up to 8.00 m, stff sandy clay up to 9.50 m, followed by very dense sandy gravel up to **11.00 m,** at which depth the bore hole was terminated.

In bore hole **BH-19** loose silty sand occurs from ground level up to a depth of 2.00 m, followed by medium dense silty sand up to 6.50 m, medium stiff sandy clay up to 8.00 m, very stiff sandy clay up to 9.50 m, followed by very dense sand with rock pebbles up to **12.50 m,** at which depth the bore hole was terminated.

7.0 GROUND WATER TABLE

Ground water table was met at a depth of **3.0 m to 4.9 m** below the existing ground level in all the bore holes, during boring from ***18/04/2013*** to ***27/04/2013***.

8.0 DISCUSSION AND RECOMMENDATIONS ON RESULTS AND TYPE OF FOUNDATION

For the soil conditions discussed in Sl.no.6 above, the following recommendations are made for foundations of the proposed buildings of 2B+stilt+14 upper floors.

Open Foundations

- For the proposed two basements, excavation up to a depth of 8 m to 9 m will be required for the foundations the ground conditions are almost same at all the borehole locations, but hard strata varies from 9.5 m to 11.0 m below ground level. For the proposed structures raft foundation is recommended.

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- After thorough compaction of the soil at the bottom of excavation in the foundation pits, 75 mm or 100 mm thick PCC 1:4:8 may be laid, to serve as a leveling course for the RCC foundations.
- A safe bearing capacity of **30 t/ m²** is recommended under the foundations @ NIL
- At the time of excavation for foundation, if ground water table occurs within the recommended depth of excavation, sumps may be made to an additional depth of 0.3 m at desired locations along the periphery of excavation for raft foundation and the water collected in the sumps may be bailed out. At the time of laying the PCC layer, the bottom of excavation shall be relatively dry (not slushy). Dewatering shall be maintained until the construction progresses well above the ground Water Table level.
- Dewatering shall be maintained until the construction progresses well above the ground Water Table level.
- The enclosure walls (outer walls) of the proposed two basements for the portion below the filled up ground level shall be designed for lateral earth pressure. The applicable lateral earth pressure is "at rest" earth pressure. The co-efficient of lateral earth pressure at rest is 0.6. Hydrostatic pressure on the enclosure walls shall be considered for the depth below the highest possible ground water table level, in addition to lateral earth pressure. At the time of soil investigation itself (18.04.2013 to 27.04.2013), the ground water table was at 3 m to 4.9 m below the existing ground level. Therefore, it is recommended that the highest ground water table may be assumed to rise up to the existing ground level.
- A submerged unit weight of soil of 1 t/m³ shall be considered for calculating the lateral earth pressure below ground water table level, along with the hydro static pressure. For the height above the ground water table level, a bulk unit weight of 2 t/ m³ may be considered to calculate the lateral earth pressure.

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- The base slab of the bottom most Basement floor shall be designed for uplift pressure due to the ground water table for the depth below the highest possible ground water table level, assuming that the highest ground water table level may rise up to the existing ground level.
- The outer walls of the two Basement Floors shall be very dense, so that there will not be any seepage of the water in to the Basement, thereby avoiding problems of corrosion of reinforcement in the walls & collection and disposal of the seeped water.
- Back filling around the two Basement floors shall be done using clean river sand or M-sand (Quarry sand, but not Quarry Dust, in layers of not more than 200 mm thickness, earth level. Each layer shall be well compacted (mere spreading the back fill material for back filling is not adequate. Layered compaction shall be done for back filling).

9. 0 The results and recommendations given in this report are based on the results of the tests on sub soil samples collected from the bore holes. If, in actual execution, any variation is found, the consultants may also be referred to.

APPROVED BY,

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APPENDIX- I

BORE LOGS

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Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

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Location	: Guindy	Drillhole Record - BH 1	
Bore Hole No	: 1	Fig No. 1	
Type of Boring	: Calyx		
Ground Water Level	: 4.2 m on 20.04.2013	Start Date	: 18.04.2013
Termination Depth	: 12.5 m	End Date	: 19.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT"N" Blows/300mm	REMARKS
Silty Clayey **SAND**	Brown	Medium Dense, Granular		SPT-1	SS	1.00	1.00-1.45	5	9	15	24	
			2.00	SPT-2	SS	2.00	2.00-2.45	9	12	20	32	
Silty **SAND**	Brown	Dense, Granular		SPT-3	SS	3.00	3.00-3.45	8	12	13	25	
Brownish, Medium Dense Silty **SAND**			4.00	SPT-4	SS	4.00	4.00-4.45	2	1	4	5	G.W.L
SAND	Brown	Loose, Granular	5.00	SPT-5	SS	5.00	5.00-5.45	11	7	7	14	
Silty **SAND**	Brown	Medium Dense, Granular	6.50	SPT-6	SS	6.50	6.50-6.95	3	4	4	8	
Sandy **CLAY**	Grey	Medium Stiff, Layered		SPT-7	SS	8.00	8.00-8.45	4	5	10	15	
		Stiff, Layered	11.00	SPT-8	SS	9.50	9.50-9.95	4	5	11	16	
				SPT-9	SS	11.00	11.00-11.12	50	-	-	>100	50/12 cm Penetration
Weathered rock				SPT-10	SS	12.00	12.00-12.13	50	-	-	>100	50/13 cm Penetration
			12.60	SPT-11	SS	12.50	12.50-12.60	50	-	-	>100	50/10 cm Penetration

SPT 'N' PROFILE: 20 40 60 80 100 | C.R (%) | R.Q.D(%)

G.W.L on : 20.04.2013	4.2 m	No. of. SPT	11 nos	REMARKS

Note: SPT-Standard Penetration Test SS-Soil Sample, CR-Core Recovery , RQD-Rock Quality Designation

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Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

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Location	: Guindy	**Drillhole Record - BH 2**	
Bore Hole No	: 2	Fig No. 2	
Type of Boring	: Calyx		
Ground Water Level	: 3.8 m on 21.04.2013	Start Date	: 19.04.2013
Termination Depth	: 13.5 m	End Date	: 20.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT"N" Blows/300mm	SPT 'N' PROFILE	C.R (%)	R.Q.D(%)	REMARKS
Sandy **CLAY**	Brown	Stiff, Layered			SPT-1	SS	1.00	1.00-1.45	5	7	9	16				
					SPT-2	SS	2.00	2.00-2.45	4	7	11	18				
		Very Stiff, Layered	3.00		SPT-3	SS	3.00	3.00-3.45	7	10	12	22				
Silty **SAND**	Brown	Medium Dense, Granular			SPT-4	SS	4.00	4.00-4.45	7	12	12	24				
					SPT-5	SS	5.00	5.00-5.45	10	12	13	25				
			6.50		SPT-6	SS	6.50	6.50-6.95	4	5	5	10				
Sandy **CLAY**	Grey	Stiff, Layered			SPT-7		8.00	8.00-8.45	3	6	7	13				
					SPT-8	SS	9.50	9.50-9.95	5	6	9	15				

G.W.L

G.W.L on : 21.04.2013	3.8 m	No. of. SPT	11 nos	REMARKS

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Note: SPT-Standard Penetration Test SS-Soil Sample, CR-Core Recovery , RQD-Rock Quality Designation

Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

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Location	: Guindy	**Drillhole Record - BH 2**	
Bore Hole No	: 2	Fig No. 2	
Type of Boring	: Calyx		
Ground Water Level	: 3.8 m on 21.04.2013	Start Date	: 19.04.2013
Termination Depth	: 13.5 m	End Date	: 20.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT 'N' Blows/300mm	SPT 'N' PROFILE	C.R (%)	R.Q.D(%)	REMARKS
Sandy CLAY	Grey	Stiff, Layered	11.00													
					SPT-9	SS	11.00	11.00-11.45	41	50	55	>100				
Weathered rock					SPT-10	SS	12.50	12.50-12.50	>100	-	-	>100				Rebound
			13.50		SPT-11	SS	13.50	13.50-13.50	>100	-	-	>100				Rebound

G.W.L on : 21.04.2013	3.8 m	No. of. SPT	11 nos	REMARKS

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Note: SPT-Standard Penetration Test SS-Soil Sample, CR-Core Recovery , RQD-Rock Quality Designation

Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

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Location	: Guindy	**Drillhole Record - BH 3**	
Bore Hole No	: 3	Fig No. 3	
Type of Boring	: Calyx		
Ground Water Level	: 4.1 m on 21.04.2013	Start Date	: 19.04.2013
Termination Depth	: 12.5 m	End Date	: 20.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT"N" Blows/300mm	REMARKS
Silty **SAND**	Brown	Medium Dense, Granular		SPT-1	SS	1.00	1.00-1.45	7	8	10	18	
			2.00	SPT-2	SS	2.00	2.00-2.45	7	7	10	17	
Brownish, Medium dense, Silty Clayey **SAND**			3.00	SPT-3	SS	3.00	3.00-3.45	7	9	12	21	
Silty **SAND**	Brown	Medium Dense, Granular		SPT-4	SS	4.00	4.00-4.45	6	8	11	19	G.W.L
				SPT-5	SS	5.00	5.00-5.45	8	9	13	22	
			6.50	SPT-6	SS	6.50	6.50-6.95	5	7	8	15	
Sandy **CLAY**	Dark grey	Stiff, Layered		SPT-7	SS	8.00	8.00-8.45	5	8	10	18	
	Grey	Very Stiff, Layered	9.50	SPT-8	SS	9.50	9.50-9.50	>100	-	-	>100	Rebound
Weathered rock				SPT-9	SS	11.00	11.00-11.00	>100	-	-	>100	Rebound
			12.50	SPT-10	SS	12.50	12.50-12.50	>100	-	-	>100	Rebound

SPT 'N' PROFILE: 20 40 60 80 100 | C.R (%) | R.Q.D(%)

G.W.L on : 21.04.2013	4.1 m	No. of. SPT	10 nos	REMARKS

Note: SPT-Standard Penetration Test SS-Soil Sample, CR-Core Recovery , RQD-Rock Quality Designation

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Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

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Location	: Guindy	**Drillhole Record - BH 4**	
Bore Hole No	: 4	Fig No. 4	
Type of Boring	: Calyx		
Ground Water Level	: 4.6 m on 21.04.2013	Start Date	: 20.04.2013
Termination Depth	: 9.5 m	End Date	: 20.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT"N" Blows/300mm	C.R (%)	R.Q.D(%)	REMARKS
Silty **SAND**	Brown	Medium Dense, Granular		SPT-1	SS	1.00	1.00-1.45	9	7	11	18			
				SPT-2	SS	2.00	2.00-2.45	11	8	7	15			
			3.00	SPT-3	SS	3.00	3.00-3.45	9	11	8	19			
Bronwish, Medium Dense, **SAND**			4.00	SPT-4	SS	4.00	4.00-4.45	12	8	12	20			G.W.L
Silty **SAND**	Brown	Medium Dense, Granular		SPT-5	SS	5.00	5.00-5.45	16	7	13	20			
			6.50	SPT-6	SS	6.50	6.50-6.95	4	3	7	10			
Sandy **CLAY**	Dark grey	Stiff, Layered	8.00	SPT-7	SS	8.00	8.00-8.45	7	3	8	11			
SAND	Dark grey	Medium Dense, Granular	9.50	SPT-8	SS	9.50	9.50-9.54	>50	-	-	>100			50/4cm penetration
Weathered rock														

SPT 'N' PROFILE: 20 40 60 80 100

G.W.L on : 21.04.2013	4.6 m	No. of. SPT	8 nos	REMARKS

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Note: SPT-Standard Penetration Test SS-Soil Sample, CR-Core Recovery , RQD-Rock Quality Designation

Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

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Location	: Guindy	**Drillhole Record - BH 5**	
Bore Hole No	: 5	Fig No. 5	
Type of Boring	: Calyx		
Ground Water Level	: 3.6 m on 21.04.2013	Start Date	: 20.04.2013
Termination Depth	: 9.5 m	End Date	: 20.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT 'N' Blows/300mm	SPT 'N' PROFILE	C.R (%)	R.Q.D(%)	REMARKS
Silty **SAND**	Brown	Medium Dense, Granular			SPT-1	SS	1.00	1.00-1.45	7	9	8	17				
					SPT-2	SS	2.00	2.00-2.45	9	7	12	19				
					SPT-3	SS	3.00	3.00-3.45	11	12	14	26				G.W.L
					SPT-4	SS	4.00	4.00-4.45	12	11	9	20				
					SPT-5	SS	5.00	5.00-5.45	14	17	13	30				
			6.50		SPT-6	SS	6.50	6.50-6.95	7	7	8	15				
Sandy **CLAY**	Dark gray	Stiff, Layered			SPT-7	SS	8.00	8.00-8.45	6	7	3	10				
			9.50		SPT-8	SS	9.50	9.50-9.50	>100	-	-	>100				Rebound
Weathered rock																

G.W.L on : 21.04.2013	3.6 m	No. of. SPT	8 nos	REMARKS



Note: SPT-Standard Penetration Test SS-Soil Sample, CR-Core Recovery , RQD-Rock Quality Designation

Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Location	: Guindy	**Drillhole Record - BH 6**	
Bore Hole No	: 6	Fig No. 6	
Type of Boring	: Calyx		
Ground Water Level	: 3.0 m on 23.04.2013	Start Date	: 22.04.2013
Termination Depth	: 11.0 m	End Date	: 22.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT"N" Blows/300mm	C.R (%)	R.Q.D(%)	REMARKS
Silty **SAND**	Brown	Medium Dense, Granular		SPT-1	SS	2.00	2.00-2.45	5	6	9	15			
				SPT-2	SS	3.00	3.00-3.45	6	8	11	19			G.W.L
				SPT-3	SS	4.00	4.00-4.45	8	10	13	23			
			5.00	SPT-4	SS	5.00	5.00-5.45	3	4	5	9			
SAND	Brown	Loose, Granular	6.50	SPT-5	SS	6.50	6.50-6.95	3	3	3	6			
Sandy **CLAY**	Grey	Medium Stiff, Layered	8.00	SPT-6	SS	8.00	8.00-8.45	3	5	6	11			
		Stiff, Layered	9.50	SPT-7	SS	9.50	9.50-9.64	>50	-	-	>100			50/14 cm Penetration
Weathered rock			11.00	SPT-8	SS	11.00	11.00-11.07	>50	-	-	>100			50/7 cm Penetration

SPT 'N' PROFILE: 20 | 40 | 60 | 80 | 100

G.W.L on : 20.04.2013	3.00 m	No. of. SPT	8 nos	REMARKS

Note: SPT-Standard Penetration Test SS-Soil Sample,

CR-Core Recovery , RQD-Rock Quality Designation

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Location	: Guindy	**Drillhole Record - BH 7**	
Bore Hole No	: 7	Fig No. 7	
Type of Boring	: Calyx		
Ground Water Level	: 4.5 m on 23.04.2013	Start Date	: 22.04.2013
Termination Depth	: 11.0 m	End Date	: 22.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT 'N' Blows/300mm	SPT 'N' PROFILE	C.R (%)	R.Q.D(%)	REMARKS
Clayey SAND	Brown	Loose, Granular	2.00		SPT-1	SS	1.00	1.00-1.45	3	4	4	8				
Silty SAND	Brown	Medium Dense, Granular	4.00		SPT-2	SS	2.00	2.00-2.45	4	7	7	14				
					SPT-3	SS	3.00	3.00-3.45	6	8	11	19				
					SPT-4	SS	4.00	4.00-4.45	7	11	14	25				
SAND	Brown	Medium Dense, Granular	6.50		SPT-5	SS	5.00	5.00-5.45	9	13	16	29				
					SPT-6	SS	6.50	6.50-6.95	2	3	3	6				
Sandy CLAY	Grey	Medium Stiff, Layered	8.00		SPT-7	SS	8.00	8.00-8.45	4	4	5	9				
	Grey	Stiff, Layered	9.50		SPT-8	SS	9.50	9.50-9.12	>50	-	-	>100				50/12 cm Penetration
Weathered rock			11.00		SPT-9	SS	11.00	11.00-11.06	>50	-	-	>100				50/6 cm Penetration

G.W.L

G.W.L on : 23.04.2013	4.5 m	No. of. SPT	9 nos	REMARKS

Note: SPT-Standard Penetration Test SS-Soil Sample, CR-Core Recovery , RQD-Rock Quality Designation

GEO FOUNDATIONS AND STRUCTURES PVT LTD. Chennai-20

Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Location	: Guindy	**Drillhole Record - BH 8**	
Bore Hole No	: 8	Fig No. 8	
Type of Boring	: Calyx		
Ground Water Level	: 3.5 m on 24.04.2013	Start Date	: 23.04.2013
Termination Depth	: 11.0 m	End Date	: 23.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT "N" Blows/300mm	SPT 'N' PROFILE	C.R (%)	R.Q.D(%)	REMARKS
Clayey **SAND**	Brown	Loose, Granular			SPT-1	SS	1.00	1.00-1.45	4	3	6	9				
			2.00		SPT-2	SS	2.00	2.00-2.45	6	7	6	13				
Silty **SAND**	Brown	Medium Dense, Granular	3.00		SPT-3	SS	3.00	3.00-3.45	8	11	9	20				
Sandy **SILT**			4.00		SPT-4	SS	4.00	4.00-4.45	7	9	13	22				G.W.L
SAND	Brown	Medium Dense, Granular	8.00		SPT-5	SS	5.00	5.00-5.45	9	10	12	22				
					SPT-6	SS	6.50	6.50-6.95	3	4	7	11				
Clayey **SAND**	Grey	Medium Dense, Granular	9.50		SPT-7	SS	8.00	8.00-8.45	4	8	12	20				
Weathered rock			11.00		SPT-8	SS	9.50	9.50-9.50	-	-	-	>100				Rebound
					SPT-9	SS	11.00	11.00-11.00	-	-	-	>100				Rebound

G.W.L on : 24.04.2013	3.5 m	No. of. SPT	9 nos	REMARKS

Note: SPT-Standard Penetration Test SS-Soil Sample, CR-Core Recovery , RQD-Rock Quality Designation

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Location	: Guindy	**Drillhole Record - BH 9**	
Bore Hole No	: BH -9	Fig No.9	
Type of Boring	: Calyx		
Ground Water Level	: 3.15 m on 25.04.2013	Start Date	: 24.04.2013
Termination Depth	: 11.00 m	End Date	: 24.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT 'N' Blows/300mm	C.R (%)	R.Q.D(%)	REMARKS
SAND	Gray	Loose, Granular	2.00	SPT-1		1.00	1.00-1.45	4	4	6	10			
Silty SAND	Brown	Medium Dense, Granular	5.00	SPT-2	SS	2.00	2.00-2.45	6	6	7	13			
				SPT-3	SS	3.00	3.00-3.45	8	9	10	19			G.W.L
				SPT-4	SS	4.00	4.00-4.45	7	10	13	23			
				SPT-5	SS	5.00	5.00-5.45	9	11	13	24			
SAND	Gray	Medium Dense, Granular	6.50	SPT-6	SS	6.50	6.50-6.95	3	4	6	10			
Sandy CLAY	Gray	Stiff, Layered / Very Stiff, Layered	9.50	SPT-7	SS	8.00	8.00-8.45	4	6	14	20			
				SPT-8	SS	9.50	9.50-9.50	>100	-	-	>100			Rebound
Weathered rock			11.00	SPT-9	SS	11.00	11.00-11.00	>100	-	-	>100			Rebound

SPT 'N' PROFILE: 20 | 40 | 60 | 80 | 100

G.W.L on : 25.04.13	3.15 m	No. of. SPT	9 nos	REMARKS

Note: SPT-Standard Penetration Test SS-Soil Sample, UDS-Un Disturbed Sample CS-Core Sample CR-Core Recovery , RQD-Rock Quality Designation

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Location	: Guindy	**Drillhole Record - BH 10**	
Bore Hole No	: BH -10	Fig No.10	
Type of Boring	: Calyx		
Ground Water Level	: 3.10 m on 20.04.2013	Start Date	: 19.04.2013
Termination Depth	: 10.00 m	End Date	: 19.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT"N" Blows/300mm	SPT 'N' PROFILE	C.R (%)	R.Q.D(%)	REMARKS
SAND	Brown	Medium Dense, Granular			SPT-1	SS	1.00	1.00-1.45	6	10	13	23				
			2.00		SPT-2	SS	2.00	2.00-2.45	10	13	15	28				
Silty SAND	Brown	Medium Dense, Granular			SPT-3	SS	3.00	3.00-3.45	8	12	14	26				G.W.L
			4.00		SPT-4	SS	4.00	4.00-4.45	13	15	15	30				
SAND	Brown	Dense, Granular			SPT-5	SS	5.00	5.00-5.45	11	16	17	33				
			6.50		SPT-6	SS	6.50	6.50-6.95	4	3	3	6				
Sandy CLAY	Dark grey	Medium Stiff, Layered			SPT-7	SS	8.00	8.00-8.45	5	4	5	9				
		Stiff, Layered	9.50		SPT-8	SS	9.50	9.50-9.50	>100	-	-	>100				Rebound
Weathered rock			10.00		SPT-9	SS	10.00	10.00-10.00	>100	-	-	>100				Rebound

G.W.L on : 20.04.13	3.10 m	No. of. SPT	9 nos	REMARKS

Note: SPT-Standard Penetration Test SS-Soil Sample, UDS-Un Disturbed Sample CS-Core Sample CR-Core Recovery , RQD-Rock Quality Designation

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Location	: Guindy
Bore Hole No	: BH -11
Type of Boring	: Calyx
Ground Water Level	: 3.10 m on 21.04.2013
Termination Depth	: 9.50 m

Drillhole Record - BH 11

Fig No.11

Start Date : 20.04.2013

End Date : 20.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT 'N' Blows/300mm	SPT 'N' PROFILE	C.R (%)	R.Q.D(%)	REMARKS
Sandy CLAY	Brown	Medium Stiff, Layered			SPT-1		1.00	1.00-1.45	4	3	4	7				
			2.00		SPT-2	SS	2.00	2.00-2.45	8	9	11	20				
Silty SAND	Brown	Medium Dense, Granular			SPT-3	SS	3.00	3.00-3.45	11	12	10	22			G.W.L	
			4.00		SPT-4	SS	4.00	4.00-4.45	14	16	17	33				
SAND	Brown	Dense, Granular			SPT-5	SS	5.00	5.00-5.45	12	14	20	34				
			6.50		SPT-6	SS	6.50	6.50-6.95	7	9	6	15				
Sandy CLAY	Grey	Stiff, Layered			SPT-7	SS	8.00	8.00-8.45	11	12	8	20				
		Very Stiff, Layered	9.50		SPT-8	SS	9.50	9.50-9.60	>50	-	-	>100				50/10 cm Penetration
Weathered rock																

G.W.L on : 21.04.13	3.10 m	No. of. SPT	8 nos	REMARKS

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Note: SPT-Standard Penetration Test SS-Soil Sample, UDS-Un Disturbed Sample CS-Core Sample CR-Core Recovery , RQD-Rock Quality Designation

Client:M/s. VGN Infra India Pvt. Ltd. *M/s.GEO FOUNDATIONS AND STRUCTURES PVT. LTD.*

Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Location	: Guindy
Bore Hole No	: BH -12
Type of Boring	: Calyx
Ground Water Level	: 4.00 m on 25.04.2013
Termination Depth	: 11.00 m

Drillhole Record - BH 12

Fig No.12

Start Date : 24.04.2013

End Date : 24.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT 'N' Blows/300mm	SPT 'N' PROFILE	C.R (%)	R.Q.D(%)	REMARKS
Silty SAND	Brown	Medium Dense, Granular			SPT-1		1.00	1.00-1.45	4	6	9	15				
			2.00		SPT-2	SS	2.00	2.00-2.45	6	7	3	10				
SAND	Brown	Loose, Granular			SPT-3	SS	3.00	3.00-3.45	7	6	8	14				
	Brown	Medium Dense, Granular			SPT-4	SS	4.00	4.00-4.45	7	9	10	19			G.W.L	
			5.00		SPT-5	SS	5.00	5.00-5.45	10	13	9	22				
Silty SAND	Brown	Medium Dense, Granular	6.50		SPT-6	SS	6.50	6.50-6.95	3	4	7	11				
Clayey SAND	Grey	Medium Dense, Granular			SPT-7	SS	8.00	8.00-8.45	2	3	2	5				
	Grey	Loose, Granular	9.50		SPT-8	SS	9.50	9.50-9.62	>50	-	-	>100				50/12 cm Penetration
Weathered rock			11.00		SPT-9	SS	11.00	11.00-11.03	>50	-	-	>100				50/3 cm Penetration

G.W.L on : 25.04.13	4.00 m	No. of. SPT	9 nos	REMARKS

Note: SPT-Standard Penetration Test SS-Soil Sample, UDS-Un Disturbed Sample CS-Core Sample CR-Core Recovery , RQD-Rock Quality Designation

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Client:M/s. VGN Infra India Pvt. Ltd. *M/s.GEO FOUNDATIONS AND STRUCTURES PVT. LTD.*

Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Location	: Guindy
Bore Hole No	: BH -13
Type of Boring	: Calyx
Ground Water Level	: 4.5 m on 23.04.2013
Termination Depth	: 11.00 m

Drillhole Record - BH 13

Fig No.13

Start Date : 22.04.2013

End Date : 22.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT "N" Blows/300mm	SPT 'N' PROFILE	C.R (%)	R.Q.D(%)	REMARKS
Silty SAND	Brown	Medium Dense, Granular			SPT-1	SS	1.00	1.00-1.45	10	14	9	23				
					SPT-2	SS	2.00	2.00-2.45	6	7	9	16				
			3.00		SPT-3	SS	3.00	3.00-3.45	9	7	8	15				
SAND	Brown	Medium Dense, Granular			SPT-4	SS	4.00	4.00-4.45	4	6	9	15				G.W.L
					SPT-5	SS	5.00	5.00-5.45	12	16	9	25				
			8.00		SPT-6	SS	6.50	6.50-6.95	9	7	12	19				
Clayey SAND	Dark grey	Medium Dense, Granular			SPT-7	SS	8.00	8.00-8.45	4	7	8	15				
			9.50		SPT-8	SS	9.50	9.50-9.59	>50	-	-	>100				50/9 cm Penetration
Weathered rock					SPT-9	SS	11.00	11.00-11.06	>50	-	-	>100				50/6 cm Penetration
			11.00													

G.W.L on : 23.04.13	4.50 m	No. of. SPT	9 nos	REMARKS

Note: SPT-Standard Penetration Test SS-Soil Sample, UDS-Un Disturbed Sample CS-Core Sample CR-Core Recovery RQD-Rock Quality Designation

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Location	: Guindy
Bore Hole No	: BH -14
Type of Boring	: Calyx
Ground Water Level	: 3.8 m on 25.04.2013
Termination Depth	: 11.00 m

Drillhole Record - BH 14

Fig No.14

Start Date : 24.04.2013

End Date : 24.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT"N" Blows/300mm	SPT 'N' PROFILE	C.R (%)	R.Q.D(%)	REMARKS
Silty **SAND**	Brown	Medium Dense, Granular			SPT-1		1.00	1.00-1.45	4	7	8	15				
			2.00		SPT-2	SS	2.00	2.00-2.45	4	9	11	20				
SAND	Brown	Medium Dense, Granular			SPT-3	SS	3.00	3.00-3.45	7	9	9	18				G.W.L
					SPT-4	SS	4.00	4.00-4.45	9	11	12	23				
					SPT-5	SS	5.00	5.00-5.45	7	11	8	19				
			6.50		SPT-6	SS	6.50	6.50-6.95	6	4	7	11				
Sandy **CLAY**	Dark grey	Stiff, Layered														
			8.00		SPT-7	SS	8.00	8.00-8.45	2	1	3	4				
Clayey **SAND**	Dark grey	Very Loose, Granular														
			9.50		SPT-8	SS	9.50	9.50-9.61	>50	-	-	>100				50/11 cm Penetration
Weathered rock																
			11.00		SPT-9	SS	11.00	11.00-11.07	>50	-	-	>100				50/7 cm Penetration

G.W.L on : 25.04.13	3.80 m	No. of. SPT	9 nos	REMARKS

Note: SPT-Standard Penetration Test SS-Soil Sample. UDS-Un Disturbed Sample CS-Core Sample CR-Core Recovery , RQD-Rock Quality Designation

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Location	: Guindy
Bore Hole No	: BH -15
Type of Boring	: Calyx
Ground Water Level	: 3.5 on 25.04.2013
Termination Depth	: 11.00 m

Drillhole Record - BH 15

Fig No.15

Start Date : 24.04.2013

End Date : 24.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT"N" Blows/300mm	SPT 'N' PROFILE	C.R (%)	R.Q.D(%)	REMARKS
SAND	Brown	Medium Dense, Granular			SPT-1		1.00	1.00-1.45	7	8	9	17				
			2.00		SPT-2	SS	2.00	2.00-2.45	6	10	13	23				
Silty SAND	Brown	Medium Dense, Granular			SPT-3	SS	3.00	3.00-3.45	8	11	9	20				G.W.L
			4.00		SPT-4	SS	4.00	4.00-4.45	12	13	11	24				
SAND	Brown	Medium Dense, Granular			SPT-5	SS	5.00	5.00-5.45	11	14	12	26				
			6.50		SPT-6	SS	6.50	6.50-6.95	6	7	9	16				
Clayey SAND	Gray	Medium Dense, Granular			SPT-7	SS	8.00	8.00-8.45	4	5	6	11				
			9.50		SPT-8	SS	9.50	9.50-9.61	>50	-	-	>100				50/11 cm Penetration
Weathered rock					SPT-9	SS	11.00	11.00-11.04	>50	-	-	>100				50/4 cm Penetration
			11.00													

G.W.L on : 25.04.13	3.50 m	No. of. SPT	9 nos	REMARKS

Note: SPT-Standard Penetration Test SS-Soil Sample. UDS-Un Disturbed Sample CS-Core Sample CR-Core Recovery , RQD-Rock Quality Designation

GEO FOUNDATIONS AND STRUCTURES PVT LTD. Chennai-20

Client:M/s. VGN Infra India Pvt. Ltd.

M/s.GEO FOUNDATIONS AND STRUCTURES PVT. LTD.

Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Location	: Guindy
Bore Hole No	: BH -16
Type of Boring	: Calyx
Ground Water Level	: 4 m on 25.04.2013
Termination Depth	: 11.00 m

Drillhole Record - BH 16

Fig No.16

Start Date : 24.04.2013

End Date : 24.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT 'N' Blows/300mm	SPT 'N' PROFILE	C.R (%)	R.Q.D(%)	REMARKS
Filled up Rubbish, Sand & Debris of Existing foundation			3.00		SPT-1	SS	1.00	1.00-1.45	3	4	5	9				Filled up Soil
					SPT-2	SS	2.00	2.00-2.45	4	5	6	11				
SAND	Grey	Medium Dense, Granular	5.00		SPT-3	SS	3.00	3.00-3.45	7	8	11	19				G.W.L
					SPT-4	SS	4.00	4.00-4.45	9	11	12	23				
Silty SAND	Grey	Medium Dense, Granular	6.50		SPT-5	SS	5.00	5.00-5.45	7	9	10	19				
					SPT-6	SS	6.50	6.50-6.95	5	9	7	16				
Sandy CLAY	Dark Grey	Stiff, Layered	8.00		SPT-7	SS	8.00	8.00-8.45	6	7	6	13				
Clayey SAND	Dark Grey	Medium Dense ,Granular	9.50		SPT-8	SS	9.50	9.50-9.64	>50	-	-	>100				50/14 cm Penetration
Weathered rock			11.00		SPT-9	SS	11.00	11.00-11.07	>50	-	-	>100				50/7 cm Penetration

SPT 'N' PROFILE: 20, 40, 60, 80, 100

G.W.L on : 25.04.13	4.00 m	No. of. SPT	9 nos	REMARKS

Note: SPT-Standard Penetration Test SS-Soil Sample. UDS-Un Disturbed Sample CS-Core Sample CR-Core Recovery . RQD-Rock Quality Designation

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Client:M/s. VGN Infra India Pvt. Ltd. *M/s.GEO FOUNDATIONS AND STRUCTURES PVT. LTD.*

Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Location	: Guindy
Bore Hole No	: BH -17
Type of Boring	: Calyx
Ground Water Level	: 4 m on 26.04.2013
Termination Depth	: 11.00 m

Drillhole Record - BH 17

Fig No.17

Start Date : 25.04.2013

End Date : 25.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT 'N' Blows/300mm	SPT 'N' PROFILE	C.R (%)	R.Q.D(%)	REMARKS
SAND	Gray	Loose, Granular			SPT-1	SS	1.00	1.00-1.45	4	5	4	9				
					SPT-2	SS	2.00	2.00-2.45	7	6	8	14				
	Gray	Medium Dense, Granular	4.00		SPT-3	SS	3.00	3.00-3.45	9	8	10	18				
					SPT-4	SS	4.00	4.00-4.45	11	10	13	23				G.W.L
Silty SAND	Gray	Medium Dense, Granular	6.50		SPT-5	SS	5.00	5.00-5.45	13	10	15	25				
					SPT-6	SS	6.50	6.50-6.95	4	5	7	12				
Sandy CLAY	Dark Gray	Stiff, Layered	9.50		SPT-7	SS	8.00	8.00-8.45	3	7	9	16				
					SPT-8	SS	9.50	9.50-9.64	>50	-	-	>100				50/14 cm Penetration
Weathered rock			11.00		SPT-9	SS	11.00	11.00-11.07	>50	-	-	>100				50/7 cm Penetration
G.W.L on : 26.04.13	4.00 m		No. of. SPT		9 nos											REMARKS

Note: SPT-Standard Penetration Test SS-Soil Sample, UDS-Un Disturbed Sample CS-Core Sample CR-Core Recovery, RQD-Rock Quality Designation

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Location	: Guindy
Bore Hole No	: BH -18
Type of Boring	: Calyx
Ground Water Level	: 3.90 on 27.04.2013
Termination Depth	: 11.00 m

Drillhole Record - BH 18

Fig No.18

Start Date : 25.04.2013

End Date : 26.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT"N" Blows/300mm	C.R (%)	R.Q.D(%)	REMARKS
Filled up Rubbish, Sand & Debris of Existing foundation			2.00				1.00								
Silty SAND	Grey	Medium Dense, Granular			SPT-1	SS	2.00	2.00-2.45	6	8	9	17			
					SPT-2	SS	3.00	3.00-3.45	9	11	14	25			G.W.L
	Grey	Dense, Granular	5.00		SPT-3	SS	4.00	4.00-4.45	12	16	17	33			
SAND	Grey	Dense, Granular	6.50		SPT-4	SS	5.00	5.00-5.45	10	15	19	34			
Sandy CLAY	Grey	Medium Stiff, Layered			SPT-5	SS	6.50	6.50-6.95	3	3	4	7			
	Grey	Stiff, Layered	9.50		SPT-6	SS	8.00	8.00-8.45	4	6	8	14			
Weathered rock					SPT-7	SS	9.50	9.50-9.50	>50	-	-	>100			Rebound
			11.00		SPT-8	SS	11.00	11.00-11.00	>50			>100			Rebound

SPT 'N' PROFILE: 20 | 40 | 60 | 80 | 100

G.W.L on : 27.04.13	3.90 m	No. of. SPT	8 nos	REMARKS

Note: SPT-Standard Penetration Test SS-Soil Sample. UDS-Un Disturbed Sample CS-Core Sample CR-Core Recovery . RQD-Rock Quality Designation

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Project : Soil Investigation for the Proposed Structure (2 Basement + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Location	: Guindy	**Drillhole Record - BH 19**	
Bore Hole No	: BH -19	Fig No.19	
Type of Boring	: Calyx		
Ground Water Level	: 3.90 on 27.04.2013	Start Date	: 25.04.2013
Termination Depth	: 12.50 m	End Date	: 26.04.2013

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT"N" Blows/300mm	C.R (%)	R.Q.D(%)	REMARKS
	Brown	Loose, Granular		SPT-1		1.00	1.00-1.45	4	4	6	10			
			2.00	SPT-2	SS	2.00	2.00-2.45	6	7	11	18			
Silty **SAND**	Brown	Medium Dense, Granular		SPT-3	SS	3.00	3.00-3.45	8	10	16	26			G.W.L
				SPT-4	SS	4.00	4.00-4.45	6	8	13	21			
				SPT-5	SS	5.00	5.00-5.45	7	9	16	25			
			6.50	SPT-6	SS	6.50	6.50-6.95	3	3	4	7			
Sandy **CLAY**	Brownish gray	Medium Stiff, Layered		SPT-7	SS	8.00	8.00-8.45	6	8	11	19			
		Very Stiff, Layered	9.50	SPT-8	SS	9.50	9.50-9.57	>50	-	-	>100			50/7 cm Penetration
Weathered rock				SPT-9	SS	11.00	11.00-11.04	>50	-	-	>100			50/4 cm Penetration
			12.50	SPT-10	SS	12.50	12.50-12.50	>50	-	-	>100			Rebound

SPT 'N' PROFILE: 20 | 40 | 60 | 80 | 100

G.W.L on : 27.04.13	3.90 m	No. of. SPT	10 nos	REMARKS

Note: SPT-Standard Penetration Test SS-Soil Sample. UDS-Un Disturbed Sample CS-Core Sample CR-Core Recovery RQD-Rock Quality Designation

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

APPENDIX – II

LABORATORY TEST RESULTS

GEO FOUNDATIONS AND STRUCTURES PVT LTD.
CHENNAI-20

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**					Boring Start: 18.04.2013 Boring End : 19.04.2013				Termination Depth 12.50 m				Table No. 1		
								Location Guindy				G.W.T 4.20 m on 20.04.2013				Bore-Hole No. 1		
				GRAIN SIZE ANALYSIS				ATTERBERG LIMITS								SHEAR PARAMETERS		
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	TEST METHOD	C in Kg/cm²	Φ in degrees
24	1.00	SPT-1	Silty Clayey **SAND**	SC-CL	0	50	50	32	12	20			14					
32	2.00	SPT-2	Silty **SAND**	SM	4	53	43	10	Non-Plastic				11	2.56				
25	3.00	SPT-3	Silty **SAND**	SM	1	94	5						12			DS		31
5	4.00	SPT-4	**SAND**	SW	0	99	1						13					
14	5.00	SPT-5	Silty **SAND**	SM	1	93	6						23					
8	6.50	SPT-6	Sandy **CLAY**	CI-SC				45	14	31			32		18			
15	8.00	SPT-7	Sandy **CLAY**	CI-SC				48	15	33			31	2.59				
16	9.50	SPT-8	Sandy **CLAY**	CI-SC				43	14	29			42			UCS	0.91	
>100	11.00	SPT-9	**Weathered rock**															
>100	12.00	SPT-10	**Weathered rock**															
>100	12.50	SPT-11	**Weathered rock**															

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Note: Type of Sample: SPT- Standard Penetration Test

Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**					Boring Start: 19.04.2013 Boring End : 20.04.2013				Termination Depth 13.50 m				Table No. 2		
								Location Guindy				G.W.T 3.80 m on 21.04.2013				Bore-Hole No. 2		
				GRAIN SIZE ANALYSIS				ATTERBERG LIMITS								SHEAR PARAMETERS		
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	TEST METHOD	C in Kg/cm²	Φ in degrees
16	1.00	SPT-1	Sandy **CLAY**	CI-SC				49	13	36			29					
18	2.00	SPT-2	Sandy **CLAY**	CI-SC				50	13	33			26	2.59				
22	3.00	SPT-3	Silty **SAND**	SM	0	92	8						11			DS		32
24	4.00	SPT-4	Silty **SAND**	SM	4	86	10						11					
25	5.00	SPT-5	Silty **SAND**	SM	2	92	6						19	2.54				
10	6.50	SPT-6	Sandy **CLAY**	CI-SC				48	13	29			35					
13	8.00	SPT-7	Sandy **CLAY**	CI-SC				49	13	31			28					
15	9.50	SPT-8	Sandy **CLAY**	CH-SC				62	15	49			37					
>100	11.00	SPT-9	**Weathered rock**	SM	3	84	13						19			DS		40
>100	12.50	SPT-10	**Weathered rock**															
>100	13.50	SPT-11	**Weathered rock**															

Note: Type of Sample: SPT- Standard Penetration Test

Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**	Boring Start: 19.04.2013 Boring End : 20.04.2013				Termination Depth 12.50 m				Table No. 3					
				Location Guindy				G.W.T 4.10 m on 21.04.2013				Bore-Hole No. 3					
				GRAIN SIZE ANALYSIS				ATTERBERG LIMITS								SHEAR PARAMETERS		
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	TEST METHOD	C in Kg/cm²	Φ in degrees
18	1.00	SPT-1	Silty **SAND**	SM	3	89	8						18					
17	2.00	SPT-2	Silty Clayey **SAND**	SC-CL	0	61	39	26	8	18			12	2.52				
21	3.00	SPT-3	Silty **SAND**	SM	1	90	9						14			DS		32
19	4.00	SPT-4	Silty **SAND**	SM	3	89	8						16					
22	5.00	SPT-5	Silty **SAND**	SM	4	90	6						22					
15	6.50	SPT-6	Sandy **CLAY**	CI				49	16	33			33	2.53	34			
18	8.00	SPT-7	Sandy **CLAY**	CI				48	15	33			32			UCS	0.97	
>100	9.50	SPT-8	**Weathered rock**															
>100	11.00	SPT-9	**Weathered rock**															
>100	12.50	SPT-10	**Weathered rock**															

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Note: Type of Sample: SPT- Standard Penetration Test

Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**	Boring Start: 20.04.2013 Boring End : 20.04.2013	Termination Depth 9.50 m	Table No. 4
				Location Guindy	G.W.T 4.60 m on 21.04.2013	Bore-Hole No. 4

N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	GRAIN SIZE ANALYSIS				ATTERBERG LIMITS			DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	SHEAR PARAMETERS		
				IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX						TEST METHOD	C in Kg/cm²	Φ in degrees
18	1.00	SPT-1	Silty **SAND**	SM	1	92	7						19					
15	2.00	SPT-2	Silty **SAND**	SM	3	76	21						25	2.56				
19	3.00	SPT-3	**SAND**	SP	1	96	3						24			DS		32
20	4.00	SPT-4	Silty **SAND**	SM	0	87	13						27					
20	5.00	SPT-5	Silty **SAND**	SM	0	94	6						21			DS		31
10	6.50	SPT-6	Sandy **CLAY**	CL-SC				33	11	22			31	2.61	19			
11	8.00	SPT-7	**SAND**	SP	0	99	1						39					
>100	9.50	SPT-8	**Weathered rock**															

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Note: Type of Sample: SPT- Standard Penetration Test

Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**					Boring Start: 20.04.2013 Boring End : 20.04.2013				Termination Depth 9.50 m				Table No. 5		
								Location Guindy				G.W.T 3.60 m on 21.04.2013				Bore-Hole No. 5		
				GRAIN SIZE ANALYSIS				ATTERBERG LIMITS								SHEAR PARAMETERS		
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	TEST METHOD	C in Kg/cm²	Φ in degrees
17	1.00	SPT-1	Silty **SAND**	SM	0	89	11						30					
19	2.00	SPT-2	Silty **SAND**	SM	1	91	8						24	2.53				
26	3.00	SPT-3	Silty **SAND**	SM	3	88	9						22			DS		32
20	4.00	SPT-4	Silty **SAND**	SM	2	88	10						23					
30	5.00	SPT-5	Silty **SAND**	SM	1	94	5						13	2.56				
15	6.50	SPT-6	Sandy **CLAY**	CL-SC				30	13	27			33					
10	8.00	SPT-7	Sandy **CLAY**	CL-SC				25	12	13			38			UCS		
>100	9.50	SPT-8	**Weathered rock**															

GEO FOUNDATIONS AND STRUCTURES PVT. LTD.

Note: Type of Sample: SPT- Standard Penetration Test

Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**	Boring Start: 22.04.2013 Boring End : 22.04.2013				Termination Depth 11.00 m				Table No. 6					
				Location Guindy				G.W.T 3.00 m on 23.04.2013				Bore-Hole No. 6					
				GRAIN SIZE ANALYSIS				ATTERBERG LIMITS								SHEAR PARAMETERS		
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	TEST METHOD	C in Kg/cm²	Φ in degrees
	1.00																	
15	2.00	SPT-1	Silty **SAND**	SM	1	92	7						13					
19	3.00	SPT-2	Silty **SAND**	SM	5	90	5						23			DS		32
23	4.00	SPT-3	Silty **SAND**	SM	8	85	7						17	2.56				
9	5.00	SPT-4	**SAND**	SP	1	98	1						17					
6	6.50	SPT-5	Sandy **CLAY**	CI-SC				46	12	34			50					
11	8.00	SPT-6	Sandy **CLAY**	CH-SC				59	14	45			36	2.55				
>100	9.50	SPT-7	**Weathered rock**															
>100	11.00	SPT-8	**Weathered rock**															

Note: Type of Sample: SPT- Standard Penetration Test

Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

GEO FOUNDATIONS AND STRUCTURES PVT LTD

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**					Boring Start: 22.04.2013 Boring End : 22.04.2013				Termination Depth 11.00 m				Table No. 7		
								Location Guindy				G.W.T 4.50 m on 23.04.2013				Bore-Hole No. 7		
				GRAIN SIZE ANALYSIS				ATTERBERG LIMITS								SHEAR PARAMETERS		
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	TEST METHOD	C in Kg/cm²	Φ in degrees
8	1.00	SPT-1	Clayey **SAND**	SC-CL	3	67	30	31	10	21			33					
14	2.00	SPT-2	Silty **SAND**	SM	0	90	10						17	2.54				
19	3.00	SPT-3	Silty **SAND**	SM	9	81	10						13			DS		32
25	4.00	SPT-4	**SAND**	SP	0	99	1						45					
29	5.00	SPT-5	**SAND**	SP	0	97	3						15					
6	6.50	SPT-6	Sandy **CLAY**	CI-SC				39	12	27			51	2.61				
9	8.00	SPT-7	Sandy **CLAY**	CI-SC				36	12	24			36					
>100	9.50	SPT-8	**Weathered rock**															
>100	11.00	SPT-9	**Weathered rock**															

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Note: Type of Sample: SPT- Standard Penetration Test

Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**					Boring Start: 23.04.2013 Boring End : 23.04.2013				Termination Depth 11.00 m				Table No. 8		
								Location Guindy				G.W.T 3.50 m on 24.04.2013				Bore-Hole No. 8		
				GRAIN SIZE ANALYSIS				ATTERBERG LIMITS								SHEAR PARAMETERS		
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	TEST METHOD	C in Kg/cm²	Φ in degrees
9	1.00	SPT-1	Clayey **SAND**	SC-CL	0	62	38	33	12	21			7					
13	2.00	SPT-2	Silty **SAND**	SM	0	94	6						7					
20	3.00	SPT-3	Sandy **SILT**	ML-SM	0	22	78	15	Non-Plastic				5	2.53				
22	4.00	SPT-4	**SAND**	SP	0	99	1						5			DS		34
22	5.00	SPT-5	**SAND**	SP	0	98	2						8					
11	6.50	SPT-6	**SAND**	SP	0	96	4						23					
20	8.00	SPT-7	Clayey **SAND**	SC-CI	2	61	37	37	9	28			23					
>100	9.50	SPT-8	**Weathered rock**															
>100	11.00	SPT-9	**Weathered rock**															

GEO FOUNDATIONS AND STRUCTURES PVT LTD

Note: Type of Sample: SPT- Standard Penetration Test

Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**					Boring Start: 24.04.2013 Boring End : 24.04.2013				Termination Depth 11.00 m				Table No. 9		
								Location Guindy				G.W.T 3.15 m on 25.04.2013				Bore-Hole No. 9		
				GRAIN SIZE ANALYSIS				ATTERBERG LIMITS								SHEAR PARAMETERS		
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	TEST METHOD	C in Kg/cm²	Φ in degrees
10	1.00	SPT-1	**SAND**	SP	0	98	2						14					
13	2.00	SPT-2	Silty **SAND**	SM	0	94	6						8			DS		31
19	3.00	SPT-3	Silty **SAND**	SM	0	95	5						23					
23	4.00	SPT-4	Silty **SAND**	SM	0	92	8						13					
24	5.00	SPT-5	**SAND**	SP	0	96	4						14	2.56				
10	6.50	SPT-6	Sandy **CLAY**	CI-SC				45	14	31			29					
20	8.00	SPT-7	Sandy **CLAY**	CI-SC				38	12	26			31		13			
>100	9.50	SPT-8	**Weathered rock**															
>100	11.00	SPT-9	**Weathered rock**															

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Note: Type of Sample: SPT- Standard Penetration Test

Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**	Boring Start: 19.04.2013 Boring End : 19.04.2013				Termination Depth 10.00 m				Table No. 10		
				Location Guindy				G.W.T 3.10 m on 20.04.2013				Bore-Hole No. 10		
				GRAIN SIZE ANALYSIS				ATTERBERG LIMITS									SHEAR PARAMETERS		
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	TEST METHOD	C in Kg/cm²	Φ in degrees
23	1.00	SPT-1	**SAND**	SP	2	94	4						17					
28	2.00	SPT-2	Silty **SAND**	SM	1	90	9						21	2.56				
26	3.00	SPT-3	Silty **SAND**	SM	0	95	5						21			DS		33
30	4.00	SPT-4	**SAND**	SP	2	95	3						27					
33	5.00	SPT-5	**SAND**	SP	3	94	3						23					
6	6.50	SPT-6	Sandy **CLAY**	CI-SC				48	15	31			37	2.61				
9	8.00	SPT-7	Sandy **CLAY**	CI-SC				47	15	32			42		31	UCS	0.93	
>100	9.50	SPT-8	**Weathered rock**															
>100	10.00	SPT-9	**Weathered rock**															

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-96

Note: Type of Sample: SPT- Standard Penetration Test

Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**	Boring Start: 20.04.2013 Boring End : 20.04.2013	Termination Depth 9.50 m	Table No. 11
				Location Guindy	G.W.T 3.10 m on 21.04.2013	Bore-Hole No. 11

N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	GRAIN SIZE ANALYSIS				ATTERBERG LIMITS			DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	SHEAR PARAMETERS		
				IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX						TEST METHOD	C in Kg/cm²	Φ in degrees
7	1.00	SPT-1	Sandy **CLAY**	CI-SC				39	12	27			32					
20	2.00	SPT-2	Silty **SAND**	SM	0	93	7						24	2.56				
22	3.00	SPT-3	Silty **SAND**	SM	3	85	12						22			DS		30
33	4.00	SPT-4	**SAND**	SP	0	97	3						20					
34	5.00	SPT-5	**SAND**	SP	0	98	2						37					
15	6.50	SPT-6	Sandy **CLAY**	CI-SC				42	13	28			31	2.59	38			
20	8.00	SPT-7	Sandy **CLAY**	CI-SC				45	14	32			43			UCS	0.93	
>100	9.50	SPT-8	**Weathered rock**															

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Note: Type of Sample: SPT- Standard Penetration Test

Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**	Boring Start: 24.04.2013 Boring End : 24.04.2013	Termination Depth 11.00 m	Table No. 12
				Location Guindy	G.W.T 4.00 m on 25.04.2013	Bore-Hole No. 12

N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	GRAIN SIZE ANALYSIS				ATTERBERG LIMITS			DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	SHEAR PARAMETERS		
				IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX						TEST METHOD	C in Kg/cm²	Φ in degrees
15	1.00	SPT-1	Silty **SAND**	SM	0	87	13						25					
10	2.00	SPT-2	**SAND**	SP	0	98	2						19	2.51		DS		31
14	3.00	SPT-3	**SAND**	SP	0	99	1						21					
19	4.00	SPT-4	**SAND**	SP	0	99	1						20					
22	5.00	SPT-5	Silty **SAND**	SM	0	91	9						16					
11	6.50	SPT-6	Clayey **SAND**	SC-CL				29	10	21			30	2.54				
5	8.00	SPT-7	Clayey **SAND**	SC-CL	4	64	32	29	10	19			28					
>100	9.50	SPT-8	**Weathered rock**															
>100	11.00	SPT-9	**Weathered rock**															

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Note: Type of Sample: SPT- Standard Penetration Test

Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**					Boring Start: 22.04.2013 Boring End : 22.04.2013				Termination Depth 11.00 m				Table No. 13		
								Location Guindy				G.W.T 4.50 m on 23.04.2013				Bore-Hole No. 13		
				GRAIN SIZE ANALYSIS				ATTERBERG LIMITS								SHEAR PARAMETERS		
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	TEST METHOD	C in Kg/cm²	Φ in degrees
23	1.00	SPT-1	Silty **SAND**	SM	0	70	30						13					
16	2.00	SPT-2	Silty **SAND**	SM	0	95	5						5					
15	3.00	SPT-3	**SAND**	SP	0	97	3						10	2.54		DS		30
15	4.00	SPT-4	**SAND**	SP	0	96	4						10					
25	5.00	SPT-5	**SAND**	SP	0	98	2						10					
19	6.50	SPT-6	**SAND**	SP	0	99	1						14					
15	8.00	SPT-7	Clayey **SAND**	SC-CL	0	64	36	30	10	20			14	2.51				
>100	9.50	SPT-8	**Weathered rock**															
>100	11.00	SPT-9	**Weathered rock**															

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Note: Type of Sample: SPT- Standard Penetration Test

Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**					Boring Start: 24.04.2013 Boring End : 24.04.2013				Termination Depth 11.00 m				Table No. 14		
								Location Guindy				G.W.T 3.80 m on 25.04.2013				Bore-Hole No. 14		
				GRAIN SIZE ANALYSIS				ATTERBERG LIMITS								SHEAR PARAMETERS		
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	TEST METHOD	C in Kg/cm²	Φ in degrees
15	1.00	SPT-1	Silty **SAND**	SM	0	82	18						17					
20	2.00	SPT-2	**SAND**	SP	0	97	3						83	2.54				
18	3.00	SPT-3	**SAND**	SP	0	98	2						21			DS		31
23	4.00	SPT-4	**SAND**	SP	0	99	1						19					
19	5.00	SPT-5	**SAND**	SP	0	100	0						14					
11	6.50	SPT-6	Sandy **CLAY**	SC-CL				33	12	24			36		12			
4	8.00	SPT-7	Clayey **SAND**	SC-CL	4	64	32	21	11	13			26					
>100	9.50	SPT-8	**Weathered rock**															
>100	11.00	SPT-9	**Weathered rock**															

GEO FOUNDATIONS AND STRUCTURES PVT. LTD.

Note: Type of Sample: SPT- Standard Penetration Test

Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**					Boring Start: 24.04.2013 Boring End : 24.04.2013	Termination Depth 11.00 m		Table No. 15							
								Location Guindy			G.W.T 3.50 m on 25.04.2013				Bore-Hole No. 15					
				GRAIN SIZE ANALYSIS				ATTERBERG LIMITS								SHEAR PARAMETERS		
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	TEST METHOD	C in Kg/cm²	Φ in degrees
17	1.00	SPT-1	**SAND**	SP	0	99	1						1					
23	2.00	SPT-2	Silty **SAND**	SM	0	94	6						16					
23	3.00	SPT-3	Silty **SAND**	SM	0	95	5						18	2.51				
24	4.00	SPT-4	**SAND**	SP	0	98	2						17			DS		33
26	5.00	SPT-5	**SAND**	SP	0	99	1						19					
16	6.50	SPT-6	Clayey **SAND**	SC-CL				32	11	21			36					
11	8.00	SPT-7	Clayey **SAND**	SC-CL	1	63	36	31	12	19			21	2.54	9			
>100	9.50	SPT-8	**Weathered rock**															
>100	11.00	SPT-9	**Weathered rock**															

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-20

Note: Type of Sample: SPT- Standard Penetration Test

Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**					Boring Start: 24.04.2013 Boring End : 24.04.2013				Termination Depth 11.00 m				Table No. 16		
								Location Guindy				G.W.T 4.00 m on 26.04.2013				Bore-Hole No. 16		
				GRAIN SIZE ANALYSIS				ATTERBERG LIMITS								SHEAR PARAMETERS		
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	TEST METHOD	C in Kg/cm²	Φ in degrees
9	1.00	SPT-1	Filled up Soil															
11	2.00	SPT-2	Filled up Soil															
19	3.00	SPT-3	**SAND**	SP	0	98	2						14					
23	4.00	SPT-4	**SAND**	SP	0	96	4						12	2.56				
19	5.00	SPT-5	Silty **SAND**	SM	0	93	7						50			DS		33
16	6.50	SPT-6	Sandy **CLAY**	CI-SC				40	12	28			34					
13	8.00	SPT-7	Clayey **SAND**	SC-CL	0	65	35	30	8	22			24					
>100	9.50	SPT-8	**Weathered rock**															
>100	11.00	SPT-9	**Weathered rock**															

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. ★ Chennai-20

Note: Type of Sample: SPT- Standard Penetration Test

Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**	Boring Start: 25.04.2013 Boring End : 25.04.2013				Termination Depth 11.00 m				Table No. 17					
				Location Guindy				G.W.T 4.00 m on 26.04.2013				Bore-Hole No. 17					
				GRAIN SIZE ANALYSIS				ATTERBERG LIMITS								SHEAR PARAMETERS		
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	TEST METHOD	C in Kg/cm²	Φ in degrees
9	1.00	SPT-1	**SAND**	SP	0	97	3						15					
14	2.00	SPT-2	**SAND**	SP	0	98	2						15					
18	3.00	SPT-3	**SAND**	SP	0	96	4						16	2.56				
23	4.00	SPT-4	Silty **SAND**	SM	0	95	5						11			DS		35
23	5.00	SPT-5	Silty **SAND**	SM	0	95	5						14					
12	6.50	SPT-6	Sandy **CLAY**	CI-SC				44	12	22			29					
16	8.00	SPT-7	Sandy **CLAY**	CI-SC				41	10	31			22		13	UCS	0.81	
>100	9.50	SPT-8	**Weathered rock**															
>100	11.00	SPT-9	**Weathered rock**															

Note: Type of Sample: SPT- Standard Penetration Test

Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

GEO FOUNDATIONS AND STRUCTURES PVT. LTD.

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**					Boring Start: 25.04.2013 Boring End : 26.04.2013				Termination Depth 11.00 m				Table No. 18		
								Location Guindy				G.W.T 3.90 m on 27.04.2013				Bore-Hole No. 18		
				GRAIN SIZE ANALYSIS				ATTERBERG LIMITS								SHEAR PARAMETERS		
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	TEST METHOD	C in Kg/cm²	Φ in degrees
-	1.00	SPT-1	Filled up Soil															
17	2.00	SPT-2	Silty **SAND**	SM	0	93	7						14					
25	3.00	SPT-3	Silty **SAND**	SM	9	85	6						25			DS		30
33	4.00	SPT-4	Silty **SAND**	SM	0	91	9						11	2.54				
34	5.00	SPT-5	**SAND**	SP	1	95	4						14					
7	6.50	SPT-6	Sandy **CLAY**	CI-SC	1	43	56	45	14	31			26		23			
14	8.00	SPT-7	Sandy **CLAY**	CI-SC	5	43	52	41	13	28			26			UCS	0.75	
>100	9.50	SPT-8	**Weathered rock**															
>100	11.00	SPT-9	**Weathered rock**															
-	12.00	SPT-10	**Weathered rock**															

Note: Type of Sample: SPT- Standard Penetration Test

Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. Chennai-29

TEST RESULTS			**Project : Soil Investigation for the Proposed Structure (2 Basements + Stilt + 14 Floors) at Block No.2, Thiru. Vi. Ka Industrial Estate, Guindy, Chennai.**	Boring Start: 25.04.2013 Boring End : 26.04.2013				Termination Depth 12.50 m				Table No. 19		
				Location Guindy				G.W.T 3.80 m on 27.04.2013				Bore-Hole No. 19		
				GRAIN SIZE ANALYSIS				ATTERBERG LIMITS								SHEAR PARAMETERS		
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	WATER CONTENT, %	SPECIFIC GRAVITY	FREE SWELL INDEX, %	TEST METHOD	C in Kg/cm²	Φ in degrees
10	1.00	SPT-1	Silty **SAND**	SP	4	91	5											
18	2.00	SPT-2	Silty **SAND**	SM	0	94	6						24					
26	3.00	SPT-3	Silty **SAND**	SM	1	88	11						26	2.51		DS		34
21	4.00	SPT-4	Silty **SAND**	SM	0	95	5						18					
25	5.00	SPT-5	Silty **SAND**	SM	0	91	9						13					
7	6.50	SPT-6	Sandy **CLAY**	CI				44	14	29			27		21			
19	8.00	SPT-7	Sandy **CLAY**	CI				48	15	34			23			UCS	0.82	
>100	9.50	SPT-8	**Weathered rock**															
>100	11.00	SPT-9	**Weathered rock**															
>100	12.50		**Weathered rock**															

Note: Type of Sample: SPT- Standard Penetration Test

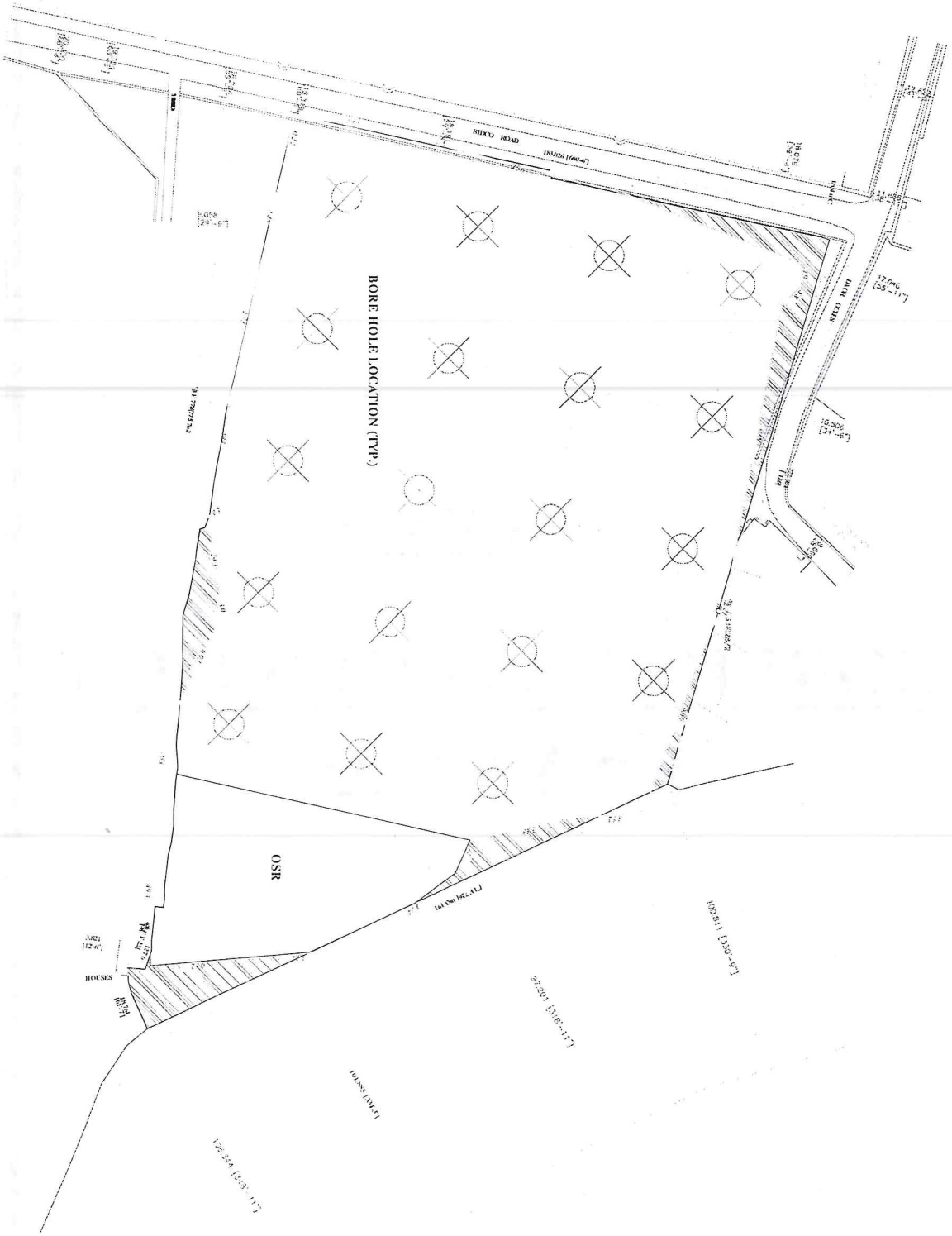
Test Method: UCS- UnConfined Compressive Strength, DS-Direct Shear

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APPENDIX-III

BOREHOLES LOCATION DRAWING

GEO FOUNDATIONS AND STRUCTURES PVT. LTD. ★ Chennai-20



GEO FOUNDATIONS AND STRUCTURES PVT LTD
Chennai-20

Our services go beyond

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.

Smarter Tools, Stronger Decisions

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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