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GEOTECHNICAL INVESTIGATION FOR BINNY MILLS PROJECT AT PERAMBUR, CHENNAI

CLIENT

M/s. SPR CONSTRUCTIONS Pvt. Ltd., CHENNAI

TITLE

FINAL REPORT

REPORT NO: SI/CHN/16/1336/05

OCTOBER 2016

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SOIL INVESTIGATION REPORT

1.0 INTRODUCTION

1.1 The work of sub-soil investigation for the proposed structures at Binny Mills, Perambur, Chennai was entrusted to M/s. Geo Foundations and Structures (P) Ltd., Adyar, Chennai – 600 020, by M/s SPR Construction Pvt Ltd, Chennai.

1.2 The soil Investigation and laboratory studies were carried out during **July 2016 to August 2016.** This report summarizes the results of the soil investigation and presents recommendation for suitable type of foundations.

1.3 The proposed site is divided in to 11 zones, and all the proposed structures are located only in 4 zones namely,

Zone I: BH 4, BH 5, BH 6, BH 7, BH 8, BH 9, BH 10, BH 14, BH 15 & BH 16.

Zone 5: BH 21 to BH 27

Zone 6: BH 28 to BH 33

Zone 7: BH 34

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 structures. The study includes identification of a suitable type of foundations for the proposed structures and assessment of safe bearing 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 equipments and personnel.

3.2 Boring of **twenty four** bore holes of 150 mm diameter with Calyx drilling equipments 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) Natural Moisture Content

(b) Sieve Analysis

(c) Index properties:

(i) Liquid limit

(ii) Plastic limit

(d) Dry & wet density

(e) Specific gravity

(f) Direct shear test

(g) UCS

(h) Chemical analysis on water samples

3.5 Conducting Two Electrical resistivity test

3.6 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 equipments and accessories were mobilized at the worksite. A team of technical personnel with skilled labours was also deputed.

4.2 **Twenty Four** boreholes of 150 mm diameters were bored to a maximum depth of **35 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 1.5 m regular intervals up to 20 m and 2 m interval up to 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 intervals up to 5 m from the existing ground level, followed by 1.5 m regular

intervals up to 20 m and 2 m interval up to 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 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 24.**

5.0 LABORATORY INVESTIGATION

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

(a) Natural Moisture Content

(b) Sieve Analysis

(c) Index properties:

(i) Liquid limit

(ii) Plastic limit

(d) Dry & wet density

(e) Specific gravity

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

All the soil samples were identified and classified as per relevant Indian Standard, IS: 1498. The results are shown in **Tables Nos. 1 to 24.**

6.0 SOIL PROFILE

Soil profiles of bore holes are as given below.

Zone 1

In bore hole BH 4, Building debris filling occurs from ground level up to 5 m, followed by medium stiff clay of high plasticity up to 9.5 m , medium dense silty sand up to 11 m , medium dense silty sand with gravel up to 14 m, medium dense sandy silt up to 15.5 m

medium dense silty sand up to 17 m, dense silty sand up to 18.5 m, hard sandy clay of high plasticity up to 20 m, very dense silty sand up to 21.5 m, hard sandy clay of meduium plasticity up to 23 m, very dense silty sand with gravel up to 24.5 m , followed by weathered rock up to 26 m, thereafter soft rock occurs up to **29 m**, at which depth the bore hole was terminated.

In bore hole BH 5, very loose clayey sand occurs from ground level up to 3 m, medium dense clayey sand up to 15.5 m , hard sandy clay of medium plasticity up to 17 m , very dense sand with gravel up to 18.5 m, very dense silty sand up to 20 m, weathered rock up to 25.5, thereafter soft rock occurs up to **27.5 m**, at which depth the bore hole was terminated.

In bore hole BH 6, medium stiff to soft sandy clay of high plasticity occurs from ground level up to 5 m, very loose clayey sand up to 6.5m , medium clayey sand up to 14 m, hard sandy clay of low plasticity up to 18 m , followed by weathered rock up to 25.5 m, thereafter soft rock occurs up to **30.5 m** at which depth the bore hole was terminated.

In bore hole BH 7, Soft sandy clay of medium plasticity occurs from ground level up to 1 m, followed by very soft clay of high plasticity up to 6.5 m , followed by medium dense clayey sand up to 11 m followed by medium dense sandy silt up to 15.5 m , followed by very dense silty sand up to 21.5 m, followed by weathered rock up to **29 m**, at which depth the bore hole was terminated.

In bore hole BH 8, Soft clay of high plasticity occurs from ground level up to 3m, followed by medium dense silty sand at 4 m , soft sandy clay of medium plasticity up to 8 m, very stiff sandy clay of medium plasticity up to 9.5 m, medium dense clayey sand up to 12.5 m , medium dense sandy silt up to 14 m, dense sandy silt up to 17 m, very dense silty sand up to 20 m, weathered rock up to 24.5 m, followed by soft rock up to **27.5 m**, at which depth the bore hole was terminated.

In bore hole BH 9, very loose clayey sand occurs from ground level up to 2 m, loose clayey sand up to 4 m, very loose clayey sand up to 5 m, very soft sandy clay of high plasticity up

to 8 m, medium dense clayey sand up to 12.5 m , very dense clayey sand up to 17 m, very dense silty sand with gravel up to 20 m, followed by weathered rock up to 26 m, thereafter soft rock occurs up to **28 m** at which depth the bore hole was terminated.

In bore hole BH 10, medium stiff sandy clay of medium plasticity occurs from ground level up to 6.5 m, loose clayey sand up to 8 m, medium dense clayey sand up to 15.5 m, dense clayey sand up to 18.5, dense silty sand up to 23 m, very dense silty sand up to 24.5 m , followed by soft rock up to **33.5 m** at which depth the bore hole was terminated.

In bore hole BH 14, medium stiff sandy clay of medium plasticity occurs from ground level up to 2 m, followed by very loose clayey sand up to 6.5 m, very stiff sandy clay up to of low plasticity up to 9.5 m , medium dense silty sand up to 17 m, very dense silty sand up to 18.5 m followed by weathered rock up to **31.5 m** at which depth the bore hole was terminated.

In bore hole BH 15, soft sandy clay with gravel of medium plasticity occurs from ground level up to 2m, followed by medium stiff sandy clay up to 6.5 m, medium dense clayey sand up to 8 m, dense clayey sand up to 11 m, medium dense silty sand up to 15.5 m, dense silty sand up to 18.5 m, very dense silty sand up to 23 m, very dense silty sand up to 24.5 m, followed by weathered rock up to26 m, thereafter soft occurs up to **35 m** at which depth the bore hole was terminated.

In bore hole BH 16, soft sandy clay of high plasticity occurs from ground level up to 3 m, medium dense clayey sand up to4 m, very loose clayey sand up to 5 m, medium dense clayey sand up to15.5 m, dense clayey sand up to 18.5 m, very dense clayey sand up to 20 m, very dense silty sand up to 22 m, followed by weathered rock up to 29.5 m , there after soft rock occurs up to **33 m** at which depth the bore hole was terminated.

Zone 5

In bore hole BH 21, Building debris filling occurs from ground level up to 3 m, medium stiff sandy clay of high plasticity occurs up to 4 m, soft sandy clay of high plasticity up to 6.5 m, stiff sandy clay of high plasticity up to 8 m, medium dense clayey sand up to 11 m,

medium dense sand up to 14 m, followed by medium dense clayey sand up to 15.5 m, dense clayey sand up to 18.5 m, very dense clayey sand up to 20 m, hard sandy clay of medium plasticity up to 21.5 m, very dense silty sand up to 24.5 m, followed by weathered rock up to 26.5 m , thereafter soft rock occurs up to **28 m** at which depth the bore hole was terminated.

In bore hole BH 22, medium stiff sandy clay of medium plasticity occurs up to 3 m, soft sandy clay of medium plasticity occurs up to 8 m, medium dense clayey sand up to17 m, very dense clayey sand up to 20 m, very dense silty sand up to 23 m, followed by weathered rock up to 27.5 m, thereafter soft rock occurs up to **29 m** at which depth the bore hole was terminated.

In bore hole BH 23, Building debris filling occurs from ground level up to 5 m, followed by very loose silty sand up to 9.5 m, soft sandy clay of medium plasticity up to 11 m, medium dense silty sand up to 12.5 m, very dense silty sand with gravel up to 18.5 m, very dense clayey sand up to 20 m, very dense silty sand up to 23 m, followed by weathered rock up to 26.5 m followed by soft rock up to to **29 m**, at which depth the bore hole was terminated.

In bore hole BH 24, Building debris filling occurs from ground level up to 8 m, followed by loose clayey sand up to 9.5 m , medium dense silty sand up to 12.5 m, medium dense sandy silt up to 14 m, followed by medium dense clayey sand up to 17 m, very dense clayey sand up to 18.5 m, very dense silty sand up to 21.5 m, dense silty sand with gravel up to 23 m, weathered rock up to 27 m, and followed by soft rock up to **28 m** at which depth the bore hole was terminated.

In bore hole BH 25, Building debris filling occurs from ground level up to 4 m, followed by very soft sandy clay of high plasticity up to 6.5 m, medium dense clayey sand up to 17 m, very dense clayey sand up to 18.5 m, followed by very dense silty sand up to 20 m, very dense clayey sand up to 23 m, weathered rock up to 24.5 m, and followed by soft rock up to **27 m** at which depth the bore hole was terminated.

In bore hole BH 26, Building debris filling occurs from ground level up to 5 m, followed by loose silty sand up to 6.5 m ,very loose silty sand up to 9.5 m, medium dense clayey sand up to 15.5 m, dense clayey sand up to 18.5 m, followed by hard sandy clay of medium plasticity up to 20 m, dense silty sand up to 21.5 m, and very dense silty sand up to 24.5 m, followed by weathered rock up to 28 m, followed by soft rock up to **29.5 m**, at which depth the bore hole was terminated.

In bore hole BH 27, Building debris filling occurs from ground level up to 9.5 m, followed by medium dense clayey sand up to 12.5 m, dense clayey sand up to 14 m, dense silty sand up to 18.5 m, hard sandy clay of medium plasticity up to 21.5 m, dense silty sand up to 23 m, very dense silty sand with gravel up to 24 m, weathered rock up to 27 m, and soft rock up to **29 m** at which depth the bore hole was terminated.

Zone 6

In bore hole BH 28, Building debris filling occurs from ground level up to 5 m, followed by very loose clayey sand up to 6.5 m , followed by very soft sandy clay of high plasticity up to 9.5 m, medium dense clayey sand up to11 m, medium dense sandy silt up to 14 m, and very dense sandy silt up to17 m, very dense silty sand up to 21.5 m, and dense silty sand up to 23 m, followed by weathered rock up to 27.5 m, and soft rock up to **29 m** at which depth the bore hole was terminated.

In bore hole BH 29 debris filling occurs from ground level up to 2 m, medium stiff sandy clay of medium plasticity occurs up to 3 m, very soft sandy clay of high plasticity up to 4 m, very loose clayey sand up to 6.5 m, medium dense clayey sand up to 11 m, medium dense silty sand up to 14 m, medium dense clayey sand with gravel up to 15.5 m, hard sandy clay with low plasticity up to 17 m, very dense clayey sand up to 21.5 m, very dense clayey sand with gravel up to 23 m, very dense clayey sand up to 24 m, thereafter soft rock occurs up to **30 m** at which depth the bore hole was terminated.

In bore hole BH 30, filled up soil occurs from ground level up to a depth of 5 m, followed by very loose silty sand with gravel up to 6.5 m, dense clayey sand up to 8 m, dense silty sand up to 9.5 m, medium dense silty sand up to 12.5 m, dense clayey sand up to 14 m, dense silty sand up to 15.5 m, dense clayey sand up to 17 m, very dense clayey sand up to 18.5 m, very dense sandy gravel up to 20 m, very dense silty sand up to 23 m, followed by weathered rock up to 26.5 m, thereafter fractured hard rock up to **29 m** at which depth the bore hole was terminated.

In bore hole BH 31, dense silty sand occurs from ground level up to a depth of 2 m, soft sandy clay of low plasticity up to 3 m of low plasticity, medium dense silty sand up to 4 m, soft sandy clay of low plasticity up to 5 m, very loose clayey sand up to 8 m, dense silty sand up to 17 m, very dense sandy silt up to 22.5 m, weathered rock up to 27 m, followed by soft rock up to **30 m,** at which depth the bore hole is terminated.

In bore hole BH 32, filled up soil occurs from ground level up to a depth of 4 m, followed by soft sandy clay of low plasticity up to 9.5 m, medium dense clayey sand up to 11 m, very dense silty sand at 12.5 m, hard sandy clay of medium plasticity up to 15.5 m, very dense clayey sand up to 19 m, weathered rock up to 26 m, followed by fractured hard rock up to **30 m,** at which depth the bore hole is terminated.

In bore hole BH 33, medium dense silty sand occurs from ground level up to a depth of 2 m, followed by filled up soil up to 3 m, medium stiff sandy clay of medium plasticity up to 5 m, soft sandy clay of medium plasticity up to 6.5 m, dense silty sand up to 11 m, medium dense silty sand up to 12.5 m, very dense clayey sand up to 17 m, hard clay of high plasticity up to 18.5 m, very dense silty sand up to 22 m, weathered rock up to 26 m, followed by fractured hard rock up to **27.5 m,** at which depth the bore hole is terminated.

Zone 7

In bore hole BH 34, soft sandy clay of high plasticity occurs from ground level up to a depth of 2 m, followed by loose silty sand up to 3 m, loose clayey sand up to 6.5 m, very loose clayey sand up to 8 m, loose clayey sand up to 9.5 m, stiff sandy clay of medium

plasticity up to 11 m, medium dense silty sand up to 12.5 m, medium dense sandy silt up to 14 m, very dense sandy silt up to 17 m, dense silty sand up to 18.5 m, medium dense silty sand up to 20 m, dense clayey sand up to 23 m, very dense clayey sand up to 24.5 m followed by weathered rock up to 28.5 m, followed by soft rock up to **29.5 m** at which depth the bore hole is terminated.

7.0 GROUND WATER TABLE

Ground water table was met at a depth of **1.8 m to 4.9 m** below the existing ground level for the **four boreholes**, during boring from **11/08/2016** to **09/09/2016**.

8.0 DISCUSSION AND RECOMMENDATIONS ON SUITABLE TYPE OF FOUNDATIONS:

The recommendations are given to the four zones namely zone1, zone 5, zone 6 & zone 7 separately. It is to be noted that minimum grade of concrete is M30.

For Zone 1

For this particular area, bore holes were made for soil investigation to assess the nature of the subsoil strata for sustainability of the loads. This report gives the details of the soil strata, suitable type of foundation and safe bearing capacity. Based on the subsoil conditions described in Sl. No. 6, the following recommendations are made for suitable type of foundation for the proposed structures.

- Bored cast insitu piles are recommended.
- The pile bore may be terminated at a depth of minimum three times diameter of the pile in to hard strata (where four consecutive SPT 'N' values of more than 100 are obtained in each test at depth intervals of one pile diameter).
- To satisfy the above criterions, the pile length may be about **21 m to 31 m** from the existing ground level.

- The recommended safe load carrying capacity of bored cast in situ concrete piles as per IS 2911 (Part 1/Sec2) for different pile diameters are presented in Table 25.

Table 25

Zone	Bore holes	Pile length (m) from GL	Diameter (cm)	Recommended safe vertical capacity (T)	Recommended safe Lateral capacity (T) at 1 m from GL (fixed head condition)	Recommended safe Lateral capacity (T) at 1 m from GL (fixed head condition)
1	BH 4, 5, 6, 7, 8, 9, 10, 14, 15 & 16.	21 to 31 m	75 90 100	275 380 450	2 2.6 3	1.8 2.4 2.8

For Zone 5

For this particular area, bore holes were made for soil investigation to assess the nature of the subsoil strata for sustainability of the loads. This report gives the details of the soil strata, suitable type of foundation and safe bearing capacity. Based on the subsoil conditions described in Sl. No. 6, the following recommendations are made for suitable type of foundation for the proposed structures.

- Bored cast insitu piles are recommended.
- The pile bore may be terminated at a depth of minimum three times diameter of the pile in to hard strata (where four consecutive SPT 'N' values of more than 100 are obtained in each test at depth intervals of one pile diameter).
- To satisfy the above criterions, the pile length may be about **17 to 27 m** from the existing ground level.
- The recommended safe load carrying capacity of bored cast in situ concrete piles as per IS 2911 (Part 1/Sec2) for different pile diameters are presented in Table 26.

Table 26

Zone	Bore holes	Pile length (m) from GL	Diameter (cm)	Recommended safe vertical capacity (T)	Recommended safe Lateral capacity (T) at 1 m from GL (fixed head condition)	Recommended safe Lateral capacity (T) at 4 m from GL (fixed head condition)
5	BH 21 to BH 27	17 to 27 m	75 90 100	275 380 450	2.5 3 3.3	2 2.6 3

For Zone 6

The entire zone has been split into two phase namely phase I & Phase II

Phase1: BH 31, 32 & 33.

Phase 2: BH 28, 29 & 30.

For Phase1 (Zone 6):

The proposed structures are multistoried buildings with maximum three basements + ground+ upper floors. For this particular area, bore holes were made for soil investigation to assess the nature of the subsoil strata for sustainability of the loads. This report gives the details of the soil strata, suitable type of foundation and safe bearing capacity. Based on the subsoil conditions described in Sl. No. 6, the following recommendations are made for suitable type of foundation for the proposed structures.

- For the proposed three basements with minimum 9 m clear height requirement, excavation for the foundations may be required up to a depth of about **12 m** below the existing ground level.

- After thorough compaction of bottom of excavation, PCC for the Isolated or raft foundation may then be laid.
- Recommended safe bearing capacities for raft at different depths are presented in **Table 27.**

Table 27

ZONE	Bore Holes	Critical Bore hole	Type	Depth of Foundation (m)	Recommended safe bearing capacity for 50 mm permissible Settlement (T/m^2)	Spring Constant T/m^3
6 (Phase1)	31, 32 & 33	BH 33	Raft	12.5	50	1000
		BH 32		14	60*	1250

*SBC is restricted to $50T/m^2$

- Minimum width of foundation must be at least 1.5 m.
- At the time of excavation for foundations, sumps may be made to an additional depth of 0.3 m at desired locations along the periphery of excavation for the raft foundation and the water collected in the sumps may be bailed out. At the time of laying the sand cushion layer & PCC, the bottom of excavation shall be relatively dry (not slushy).
- Dewatering shall be maintained until the construction progresses well above the ground water level.
- The enclosure walls (outer walls) of the proposed basement 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, the ground water table was at 2.1 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.
- 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.
- Back filling around the Basement floors shall be done using clean river sand in layers of not more than 150 mm thickness. 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).

For Phase2 (Zone 6):

The proposed structures are multistoried buildings with maximum one basement + ground+ upper floors. For this particular area, bore holes were made for soil investigation to assess the nature of the subsoil strata for sustainability of the loads. This report gives the details of the soil strata, suitable type of foundation and safe bearing capacity. Based on the subsoil conditions described in Sl. No. 6, the following recommendations are made for suitable type of foundation for the proposed structures.

- Bored cast insitu piles are recommended.

- The pile bore may be terminated at a depth of minimum three times diameter of the pile in to hard strata (where four consecutive SPT 'N' values of more than 100 are obtained in each test at depth intervals of one pile diameter).
- To satisfy the above criterions, the pile length may be about **18 to 23 m** from the existing ground level.
- The recommended safe load carrying capacity of bored cast in situ concrete piles as per IS 2911 (Part 1/Sec2) for different pile diameters are presented in Table 28.

Table 28

Zone	Bore holes	Pile length (m) from GL	Diameter (cm)	Recommended safe vertical capacity (T)	Recommended safe Lateral capacity (T) at 1 m from GL (fixed head condition)	Recommendec safe Lateral capacity (T) at 4 m from GL (fixed head condition)
6 (Phase 2)	BH 28, 29 & 30	18 to 23 m	75 90 100	275 380 450	2 2.5 3	1.5 2 2.2

For Zone 7

The proposed structures are multistoried buildings with maximum three basements + ground + upper floors. For this particular area, one bore hole was made for soil investigation to assess the nature of the subsoil strata for sustainability of the loads. This report gives the details of the soil strata, suitable type of foundation and safe bearing capacity. Based on the subsoil conditions described in Sl. No. 6, the following recommendations are made for suitable type of foundation for the proposed structures.

- For the proposed three basements, excavation for the foundations may be required up to a depth of about **12 m** below the existing ground level.
- Bored cast insitu piles are recommended.
- The pile bore may be terminated at a depth of minimum three times diameter of the pile in to hard strata (where four consecutive SPT 'N' values of more than 100 are obtained in each test at depth intervals of one pile diameter).
- To satisfy the above criterions, the pile length may be about **28 m** from the existing ground level.
- The recommended safe load carrying capacity of bored cast in situ concrete piles as per IS 2911 (Part 1/Sec2) for different pile diameters are presented in Table 29.

TABLE 29

Zone	Bore hole	Pile length (m) from GL	Diameter (cm)	Recommended safe vertical capacity (T)	Recommended safe Lateral capacity (T) at 12 m from G.L	Fixity depth from G.L(m)
7	34	28	75	275	10	19

Note:

- The Modulus of Subgrade reaction (K) can be obtained as Ratio of allowable Bearing Pressure divided by Estimated Settlement.

9.0 CHEMICAL ANALYSIS ON GROUND WATER

The results of chemical analysis on the water samples presented in Appendix – III show that:

- The chloride content is higher than the permissible upper limit of 500 mg/l.
- The sulphate content (expressed as SO_3) is also higher than the permissible upper limit of 400 mg/l for use of ground water for mixing in concrete, as per IS: 456-2000 (Reaffirmed 2005). **Hence, the ground water is not suitable for Construction purposes.**

The sulphate content (expressed as SO3) comes under Class 2 of "Requirements for concrete exposed to sulphate attack", as per IS:456-2000, Table-4. For this Class, the requirements are: Ordinary Portland cement or Portland Slag Cement or Portland pozzolana cement, can be used with a minimum cement content of 330kg/ m^3 of concrete and with maximum free water: cement ratio of 0.5, super sulphated cement or sulophate resisting portland cement with a minimum cement content of 310kg/ m^3 of concrete and with maximum free water: cement ratio of 0.5.

10.0 The results and recommendations given in this report are based on the results of the soil investigation carried out. In actual execution, if any variation is found, the consultants may also be referred to.

For GEO FOUNDATIONS & STRUCTURES PVT. LTD.

GEO FOUNDATIONS & STRUCTURES PVT. LTD. CHENNAI 600 020.

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APPROVED BY,

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APPENDIX I

BORE LOGS

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-04	Drill hole Record -BH-04	
Location	Perambur	Fig No. 1	
Co-ordinates	Cooks Road		
Type of Boring	: Calyx		
Ground Water Level	: 2.20 m from G.L on 07.09.2016	Start Date	: 03.09.2016
Termination Depth	: 29.00 m	End Date	: 06.09.2016

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
Filed up soil		Building Debris	5.00				1.00, 2.00, 3.00, 4.00									G.W.L
Sandy **CLAY** (CH-SC)	Dark Grey	Medium Stiff, Layered	9.50		SPT-1	SS	5.00	5.00-5.45	2	3	4	7				
					UDS-1	SS	6.50	6.50-6.95	-	-	-	-				
					SPT-2	SS	8.00	8.00-8.45	2	3	4	7				
Silty **SAND** (SM)	Grey	Medium Dense, Granular	11.00		SPT-3	SS	9.50	9.50-9.95	6	8	11	19				
Silty **SAND** with Gravel (SM-G)	Grey	Medium Dense, Granular	12.50		SPT-4	SS	11.00	11.00-11.45	5	8	9	17				
					SPT-5	SS	12.50	12.50-12.95	7	12	18	30				

G.W.L: 2.20 m from G.L on 07.09.2016	No. of SPT: 13 Nos	No. of UDS: 01 Nos	No. of CR: 02 Nos	Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-04
Location	: Perambur
Co-ordinates	: Cooks Road
Type of Boring	: Calyx
Ground Water Level	: 2.20 m from G.L on 07.09.2016
Termination Depth	: 29.00 m

Drill hole Record -BH-04

Fig No. 1

Start Date : 03.09.2016

End Date : 06.09.2016

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** with Gravel (SM-G)	Grey	Medium Dense, Granular	14.00	SPT-6	SS	14.00	14.00-14.45	10	13	16	29			
Sandy **SILT** (ML)	Brown	Medium Dense, Granular	15.50	SPT-7	SS	15.50	15.50-15.95	8	14	17	31			
Silty **SAND** (SM)	Brown	Medium Dense, Granular	17.00	SPT-8	SS	17.00	17.00-17.45	11	20	27	47			
		Dense, Granular	18.50	SPT-9	SS	18.50	18.50-18.95	17	22	31	53			
Sandy **CLAY** (CH-SC)	Grey	Hard, Layered	20.00	SPT-10	SS	20.00	20.00-20.45	22	27	35	62			
Silty **SAND** (SM)	Brown	Very Dense, Granular	21.50	SPT-11	SS	21.50	20.50-21.95	14	31	40	71			
Sandy **CLAY** (CI-SC)	Brown	Hard, Layered	23.00	SPT-12	SS	23.00	23.00-23.38	15	38	>50	>100			50/8 cm penetration
Silty **SAND** with Gravel (SM-G)	Brown	Very Dense, Granular	24.50	SPT-13	SS	24.50	24.50-24.52	>50	-	-	>100			50/6 cm penetration
Weathered Rock			26.00	CR-1	CS	26.00	26.00-27.50	-	-	-	-	4		2 pieces
Soft Rock			29.00	CR-2	CS	27.50	27.50-29.00	-	-	-	-	7		8 pieces

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

G.W.L: 2.20 m from G.L on 07.09.2016 | No of SPT: 13 Nos | No. of UDS: 01 Nos | No. of CR: 02Nos | Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-05	**Drillhole Record -BH-05**	
Location	: Perambur	Fig No. 2	
Co-ordinates	: 1684 E, 737 N		
Type of Boring	: Calyx		
Ground Water Level	: 2.00 m from G.L on 21.08.201	Start Date	: 18.08.2016
Termination Depth	: 27.50 m	End Date	: 20.08.2016

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
Clayey **SAND** (SC-CH)	Brown	Very loose, Granular		SPT-1	SS	1.00	1.00-1.45	1	1	1	2			
				SPT-2	SS	2.00	2.00-2.45	1	2	2	4			G.W.L
			3.00	SPT-3	SS	3.00	3.00-3.45	8	12	15	27			
	Grey	Medium Dense,	4.00	SPT-4	SS	4.00	4.00-4.45	0	0	0	0			
Clayey **SAND** (SC-CL)	Grey	Medium Dense, Granular		SPT-5	SS	5.00	5.00-5.45	0	0	0	0			
	Brown			UDS-1	SS	6.50	6.50-6.95	-	-	-	-			
			8.50	SPT-6	SS	8.50	8.50-8.95	7	9	13	22			
Clayey **SAND** (SC-CL)	Brown	Medium Dense, Granular		SPT-7	SS	9.50	9.50-9.95	6	8	13	21			
				SPT-8	SS	11.00	11.00-11.45	9	14	13	27			
	Grey			SPT-9	SS	12.50	12.50-12.95	10	14	19	33			

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

G.W.L: 2.00 m from G.L on 21.08.2016	No. of SPT: 17Nos	No. of UDS: 01 Nos	No. of CR: 01 Nos	Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	BH-05	**Drillhole Record -BH-05**	
Location	Perambur	Fig No. 2	
Co-ordinates	1684 E, 737 N		
Type of Boring	Calyx		
Ground Water Level	2.00 m from G.L on 21.08.201	Start Date	18.08.2016
Termination Depth	27.50 m	End Date	20.08.2016

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
Clayey **SAND** (SC-CL)	Grey	Medium Dense, Granular	15.50	SPT-10	SS	14.00	14.00-14.45	11	15	18	33			
Sandy **CLAY** (CI-SC)	Grey	Hard Layered	17.00	SPT-11	SS	15.50	15.50-15.76	30	>50	-	>100			50/11 cm penetration
SAND with Gravel (SP-G)	Grey	Very Dense, Granular	18.50	SPT-12	SS	17.00	17.00-17.24	33	>50	-	>100			50/9 cm penetration
Silty **SAND** (SM)	Grey	Very Dense, Granular	20.00	SPT-13	SS	18.50	18.50-18.95	17	31	42	73			
Weathered Rock			25.50	SPT-14	SS	20.00	20.00-20.37	25	41	>50	>100			50/7 cm penetration
				SPT-15	SS	21.50	21.50-23.00	-	-	-	>100			
				SPT-16	SS	23.00	23.00-24.50	-	-	-	>100			
				SPT-17	SS	24.50	24.50-25.50	-	-	-	>100			
Soft Rock			27.50	CR-1	CS	25.50	25.50-27.50	-	-	-	>100	5		4 pieces

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

G.W.L: 2.00 m from G.L on 21.08.2016	No of SPT: 17 Nos	No. of UDS: 01 Nos	No. of CR: 01 Nos	Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-06
Location	: Perambur
Co-ordinates	: 1737 E, 733 N
Type of Boring	: Calyx
Ground Water Level	: 1.80 m from G.L on 24.08.201
Termination Depth	: 30.50 m
Start Date	: 21.08.2016
End Date	: 23.08.2016

Drillhole Record - BH-06

Fig No. 3

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
Sandy **CLAY** (CH-SC)	Brown	Medium Stiff, Layered		SPT-1	SS	1.00	1.00-1.00	2	2	3	5			G.W.L
				SPT-2	SS	2.00	2.00-2.45	2	3	3	6			
			3.00	SPT-3	SS	3.00	3.00-3.45	0	1	1	2			
	Dark Grey	Soft, Layered		UDS-1	SS	4.00	4.00-4.45	-	-	-	-			
			5.00	SPT-4	SS	5.00	5.00-5.45	0	0	1	1			
Clayey **SAND** (SC-CL)	Dark Grey	Very Loose, Granular	6.50	UDS-2	SS	6.50	6.50-6.95	-	-	-	-			
		Medium Dense Granular		SPT-5	SS	8.00	8.00-8.45	3	5	7	12			
				SPT-6	SS	9.50	9.50-9.95	7	9	10	19			
				SPT-7	SS	11.00	11.00-11.45	9	10	11	21			
				SPT-8	SS	12.50	12.50-12.95	11	12	15	27			
Clayey **SAND** (SC-CL)	Grey	Medium Dense, Granular	14.00	SPT-9	SS	14.00	14.00-14.45	13	18	21	39			

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

G.W.L: 1.80 m from G.L on 24.08.2016	No of SPT: 16 Nos	No. of UDS: 02 Nos	No. of CR: 04 Nos	Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	BH-06
Location	Perambur
Co-ordinates	1737 E, 733 N
Type of Boring	Calyx
Ground Water Level	1.80 m from G.L on 24.08.201
Termination Depth	30.50 m

Drillhole Record - BH-06

Fig No. 3

Start Date 21.08.2016

End Date 23.08.2016

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
Sandy **CLAY** (CL-SC)	Grey	Hard Layered		SPT-10	SS	15.50	15.50-15.95	19	25	31	56			
				SPT-11	SS	17.00	17.00-17.37	23	33	>50	>100			50/7 cm penetration
			18.00	SPT-12	SS	18.00	18.00-19.50	-	-	-	>100			Rebound
Weathered Rock				SPT-13	SS	19.50	19.50-21.00	-	-	-	>100			Rebound
				SPT-14	SS	21.00	21.00-22.50	-	-	-	>100			Rebound
				SPT-15	SS	22.50	22.50-24.00	-	-	-	>100			Rebound
				SPT-16	SS	24.00	24.00-25.50	-	-	-	>100			Rebound
			25.50	CR-1	CS	25.50	25.50-26.50	-	-	-	-	14		2 pieces
Soft Rock				CR-2	CS	26.50	26.50-28.00	-	-	-	-	12		3 pieces
				CR-3	CS	28.00	28.00-29.00	-	-	-	-	17		5 pieces
			30.50	CR-4	CS	29.00	29.00-30.50	-	-	-	-	12		12 pieces

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

G.W.L: 1.80 m from G.L on 24.08.2016	No of SPT: 16 Nos	No. of UDS: 02 Nos	No. of CR: 04 Nos	Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-07	**Drillhole Record -07**	
Location	: Perambur	Fig No. 4	
Co-ordinates	: E 1764 N 731		
Type of Boring	: Calyx		
Ground Water Level	: 2.10 m from G.L on 18.08.2016	Start Date	: 13.08.2016
Termination Depth	: 29.0 m	End Date	: 17.08.2016

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
Brownish, soft, Sandy **CLAY** (CL-SC)				SPT-1	SS	1.00	1.00-1.45	1	1	2	3	
			2.00	SPT-2	SS	2.00	2.00-2.45	0	0	0	0	G.W.L
CLAY (CH)	Grey	Very soft layered		SPT-3	SS	3.00	3.00-3.45	0	0	0	0	
				UDS-1	SS	4.00	4.00-4.45	-	-	-	-	
				SPT-4	SS	5.00	5.00-5.45	0	0	0	0	
CLAY (CI)			6.50									
Clayey **SAND** (SC-CI)	Grey	Medium Dense, Granular		SPT-5	SS	6.50	6.50-6.95	0	0	0	0	
				SPT-6	SS	8.00	8.00-8.45	7	10	13	23	
				SPT-7	SS	9.50	9.50-9.95	7	9	14	23	
			11.00	SPT-8	SS	11.00	11.00-11.45	5	8	10	18	
Sandy **SILT** (ML)	Brown	Medium Dense, Granular		SPT-9	SS	12.50	12.50-12.95	7	9	12	21	

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

C.R (%) R.Q.D (%)

G.W.L: 2.10 m from G.L on 18.08.2016	No of SPT: 20 Nos	No. of UDS: 01 Nos	No. of CR: 0 Nos	Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	BH-07
Location	Perambur
Co-ordinates	E 1764 N 731
Type of Boring	Calyx
Ground Water Level	2.10 m from G.L on 18.08.2016
Termination Depth	29.0 m
Start Date	13.08.2016
End Date	17.08.2016

Drillhole Record -07

Fig No. 4

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 20 40 60 80 100	C.R (%)	R.Q.D(%)	REMARKS
Sandy SILT (ML)	Brown	Medium Dense, Granular			SPT-10	SS	14.00	14.00-14.45	9	10	15	25				
			15.50		SPT-11	SS	15.50	15.50-15.94	18	38	>50	>100				50/14 cm penetration
Silty SAND (SM)	Brown	Very Dense, Granular			SPT-12	SS	17.00	17.00-17.44	22	31	>50	>100				50/14 cm penetration
					SPT-13	SS	18.50	18.50-18.89	21	38	>50	>100				50/09 cm penetration
					SPT-14	SS	20.00	20.00-20.41	28	42	>50	>100				50/11 cm penetration
			21.50		SPT-15	SS	21.50	20.00-21.50	-	-	-	>100				Rebound
Weathered Rock					SPT-16	SS	23.00	21.50-23.00	-	-	-	>100				Rebound
					SPT-17	SS	24.50	23.00-24.50	-	-	-	>100				Rebound
					SPT-18	SS	26.00	24.50-26.00	-	-	-	>100				Rebound
					SPT-19	SS	27.50	26.00-27.50	-	-	-	>100				Rebound
			29.00		SPT-20	SS	29.00	27.50-29.00	-	-	-	>100				Rebound

G.W.L: 2.10 m from G.L on 18.08.2016	No of SPT: 20 Nos	No. of UDS: 01 Nos	No. of CR: 0 Nos	Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-08	**Drillhole Record - 8**	
Location	: Perambur	Fig No. 5	
Co-ordinates	: E 1742.746, N 774.555		
Type of Boring	: Calyx		
Ground Water Level	: 1.80 m from G.L on 19.08.2016	Start Date	: 17.08.2016
Termination Depth	: 27.5m	End Date	: 18.08.2016

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
CLAY (CH)	Brown	Soft, Layered		SPT-1	SS	1.00	1.00-1.45	2	2	2	4			G.W.L
				SPT-2	SS	2.00	2.00-2.45	2	2	3	5			
			3.00	SPT-3	SS	3.00	3.00-3.45	3	5	10	15			
Silty SAND (SM)	Brown	Medium Dense, Granular	4.00	SPT-4	SS	4.00	4.00-4.45	1	1	1	2			
Sandy CLAY (CI-SC)	Dark Brown	Soft, layered		SPT-5	SS	5.00	5.00-5.45	1	1	1	2			
				UDS-1	SS	6.50	6.50-6.95	-	-	-	-			
			8.00	SPT-6	SS	8.00	8.00-8.45	6	7	9	16			
		Very Stiff layered	9.50	SPT-7	SS	9.50	9.50-9.95	8	11	14	25			
Clayey SAND (SC-CL)	Dark Brown	Medium Dense, Granular		SPT-8	SS	11.00	11.00-11.45	7	12	13	25			
			12.50	SPT-9	SS	12.50	12.50-12.95	14	18	16	34			
Greyish, Medium Dense, Sandy SILT (ML)														

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

G.W.L: 1.80 m from G.L on 19.08.2016	No of SPT: 17 Nos	No. of UDS: 01 Nos	No. of CR: 02 Nos	Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-08	**Drillhole Record -8**	
Location	: Perambur	Fig No. 5	
Co-ordinates	: E 1742.746, N 774.555		
Type of Boring	: Calyx		
Ground Water Level	: 1.80 m from G.L on 19.08.2016	Start Date	: 17.08.2016
Termination Depth	: 27.5m	End Date	: 18.08.2016

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
Sandy **SILT** (ML)	Grey	Dense, Granular	14.00	SPT-10	SS	14.00	14.00-14.45	13	20	22	44			
				SPT-11	SS	15.50	15.50-15.95	15	22	24	46			
			15.50	SPT-12	SS	17.00	17.00-17.45	19	26	39	65			
Silty **SAND** (SM)	Brown	Very Dense, Granular		SPT-13	SS	18.50	18.50-18.76	28	>50	-	>100			50/11 cm penetration
			20.00	SPT-14	SS	20.00	20.00-20.09	>50	-	-	>100			50/09 cm penetration
Weathered Rock				SPT-15	SS	21.50	21.50-23.00	-	-	-	>100			Rebound
				SPT-16	SS	23.00	23.00-24.50	-	-	-	>100			Rebound
			24.50	CR-1	CS	24.50	24.50-26.00	-	-	-	-	6		3 pieces
Soft Rock				CR-2	CS	26.00	26.00-27.50	-	-	-	-	8		3 pieces
			27.50											

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

G.W.L: 1.80 m from G.L on 19.08.2016	No of SPT: 16 Nos	No. of UDS: 01 Nos	No. of CR: 02 Nos	Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	BH-09	**Drillhole Record -BH-09**	
Location	Perambur	Fig No. 6	
Co-ordinates	1657 E, 739 N		
Type of Boring	Calyx		
Ground Water Level	2.00 m from G.L on 21.08.201	Start Date	19.08.2016
Termination Depth	28.00 m	End Date	20.08.2016

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	SPT 'N' PROFILE	C.R (%)	R.Q.D(%)	REMARKS
Clayey **SAND** (SC-Cl)	Brown	Very loose, Granular		SPT-1	SS	1.00	1.00-1.45	2	2	2	4				G.W.L
			2.00	SPT-2	SS	2.00	2.00-2.45	2	3	3	6				
	Dark Grey	Loose, Granular		SPT-3	SS	3.00	3.00-3.45	3	3	3	6				
			4.00	SPT-4	SS	4.00	4.00-4.45	0	1	1	2				
		Very loose, Granular	5.00	SPT-5	SS	5.00	5.00-5.45	0	0	1	1				
Sandy **CLAY** (CH-SC)	Dark Grey	Very Soft, Layered		UDS-1	SS	6.50	6.50-6.95	-	-	-	-				
	Brown		8.00	SPT-6	SS	8.00	8.00-8.45	5	8	10	18				
Clayey **SAND** (SC-CL)	Brown	Medium Dense, Granular		SPT-7	SS	9.50	9.50-9.95	7	10	12	22				
	Grey			SPT-8	SS	11.00	11.00-11.45	10	12	15	27				
			12.50	SPT-9	SS	12.50	12.50-12.95	17	26	29	55				

G.W.L: 2.00 m from G.L on 21.08.2016	No. of SPT: 17 Nos	No. of UDS: 01 Nos	No. of CR: 01 Nos	**Remarks**

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	BH-09	**Drillhole Record -BH-09**	
Location	: Perambur	Fig No. 6	
Co-ordinates	: 1657 E, 739 N		
Type of Boring	: Calyx		
Ground Water Level	: 2.00 m from G.L on 21.08.201	Start Date	: 19.08.2016
Termination Depth	: 28.00 m	End Date	: 20.08.2016

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 20 40 60 80 100	C.R (%)	R.Q.D(%)	REMARKS
Clayey **SAND** (SC-CL)	Grey	Very Dense, Granular			SPT-10	SS	14.00	14.00-14.45	19	28	34	62				
					SPT-11	SS	15.50	15.50-15.95	19	29	40	69				
			17.00		SPT-12	SS	17.00	17.00-17.39	28	40	>50	>100				50/9 cm penetration
Silty **SAND** With Gravel (SM-G)	Red	Very Dense, Granular			SPT-13	SS	18.50	18.50-18.90	22	40	>50	>100				50/10 cm penetration
			20.00		SPT-14	SS	20.00	20.00-20.36	25	41	>50	>100				50/6 cm penetration
Weathered Rock					SPT-15	SS	21.50	21.50-23.00	-	-	-	>100				Rebound
					SPT-16	SS	23.00	23.00-24.50	-	-	-	>100				Rebound
					SPT-17	SS	24.50	24.50-26.00	-	-	-	>100				Rebound
			26.00		CR-1	CS	26.00	26.00-28.00	-	-	-	-		8		7 Pieces
Soft Rock			28.00													

G.W.L: 2.00 m from G.L on 21.08.2016	No of SPT: 17 Nos	No. of UDS: 01 Nos	No. of CR: 01 Nos	**Remarks**

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	BH-10	Drillhole Record -10	
Location	Perambur	Fig No : 7	
Co-ordinates	: E 1707, N 811.23		
Type of Boring	Calyx		
Ground Water Level	: 2.20 m from G.L on 14.08.2016	Start Date	: 11.08.2016
Termination Depth	: 33.50 m	End Date	: 13.08.2016

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 (20, 40, 60, 80, 100)	C.R (%)	R.Q.D(%)	REMARKS
Sandy **CLAY** (CI-SC)	Brown	Medium Stiff, Layered			SPT-1	SS	1.00	1.00-1.45	2	1	2	3				
					SPT-2	SS	2.00	2.00-2.45	3	2	6	8				G.W.L
					SPT-3	SS	3.00	3.00-3.45	3	2	3	5				
					SPT-4	SS	4.00	4.00-4.45	3	2	2	4				
					SPT-5	SS	5.00	5.00-5.45	2	3	3	6				
			6.50		SPT-6	SS	6.50	6.50-6.95	2	2	3	5				
Clayey **SAND** (SC-CL)	Grey	Loose, Granular	8.00		SPT-7	SS	8.00	8.00-8.45	3	4	5	9				
		Medium Dense, Granular			SPT-8	SS	9.50	9.50-9.95	5	8	10	18				
					SPT-9	SS	11.00	11.00-11.45	5	10	13	23				
					SPT-10	SS	12.50	12.50-12.95	6	9	12	21				
					SPT-11	SS	14.00	14.00-14.45	8	10	15	25				
			15.50		SPT-12	SS	15.50	15.50-15.95	8	15	20	35				

G.W.L: 2.20 m from G.L on 14.08.2016	No of SPT: 18 Nos	No. of CR: 06 Nos	Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-10
Location	: Perambur
Co-ordinates	: E 1707, N 811.23
Type of Boring	: Calyx
Ground Water Level	: 2.20 m from G.L on 14.08.2016
Termination Depth	33.50 m

Drillhole Record -10

Fig No. 7

Start Date : 11.08.2016

End Date : 13.08.2016

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 (SC-CL)	Gray	Dense, Granular			SPT-13	SS	17.00	17.00-17.45	10	17	20	37				
			18.50		SPT-14	SS	18.50	18.50-18.95	9	20	23	43				
Silty SAND (SM)	Brown	Dense, Granular			SPT-15	SS	20.00	20.00-20.45	10	18	22	40				
					SPT-16	SS	21.50	21.50-21.95	14	19	25	44				
			23.00		SPT-17	SS	23.00	23.00-23.45	15	24	31	55				
		Very Dense, Granular	24.50		SPT-18	SS	24.50	24.50-24.95	20	26	39	65				
Soft Rock					CR-1	CS	25.00	25.00-26.00	-	-	-	-		4		1 pieces
					CR-2	CS	26.00	26.00-27.50	-	-	-	-		6		2 pieces
					CR-3	CS	27.50	27.50-29.00	-	-	-	-		8		4 pieces
					CR-4	CS	29.00	29.00-30.50	-	-	-	-		25		14 pieces
					CR-5	CS	30.50	30.50-32.00	-	-	-	-		13		3 pieces
			33.50		CR-6	CS	32.00	32.00-33.50	-	-	-	-		16		4 pieces

G.W.L: 2.20 m from G.L on 14.08.2016 | No of SPT: 18 Nos | No. of CR: 06 Nos | Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-14
Location	: Perambur
Co-ordinates	: E 1812 N 782
Type of Boring	: Calyx
Ground Water Level	: 2.2m from G.L on 19.08.2016
Termination Depth	: 31.50 m

Drillhole Record - 14

Fig No. 8

Start Date	14.08.2016
End Date	18.08.2016

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** (CI-SC)	Brown	Medium stiff, Layered	2.00		SPT-1	SS	1.00	1.00-1.45	2	3	3	6				G.W.L
					SPT-2	SS	2.00	2.00-2.45	2	3	4	7				
Clayey **SAND** (SC-CL)	Grey	Very Loose, Granular	6.50		SPT-3	SS	3.00	3.00-3.45	0	0	0	0				
					SPT-4	SS	4.00	4.00-4.45	0	0	1	1				
					UDS-1	SS	5.00	5.00-5.45	-	-	-	-				
					SPT-5	SS	6.50	6.50-6.95	4	5	8	13				
Sandy **CLAY** (CI-SC)	Brown	Very Stiff, Layered	9.50		SPT-6	SS	8.00	8.00-8.45	7	11	13	24				
					SPT-7	SS	9.50	9.50-9.95	11	15	21	36				
Silty **SAND** (SM)	Brown	Medium Dense, Granular			SPT-8	SS	11.00	11.00-11.45	11	14	14	28				
					SPT-9	SS	12.50	12.50-12.95	6	7	9	16				
					SPT-10	SS	14.00	14.00-14.45	8	8	9	17				
					SPT-11	SS	15.50	15.50-15.95	6	11	17	28				

G.W.L: 2.2 m from G.L on 19.08.16 | No of SPT: 21 Nos | No. of UDS: 01 Nos | Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	BH-14
Location	Perambur
Co-ordinates	E 1812 N 782
Type of Boring	Calyx
Ground Water Level	2.2m from G.L on 19.08.2016
Termination Depth	31.50 m

Drillhole Record -14

Fig No. 8

Start Date : 14.08.2016
End Date : 18.08.2016

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15cm	30cm	45cm	SPT'N' Blows/30cm	C.R (%)	R.Q.D(%)	REMARKS
Silty SAND (SM)	Brown	Medium Dense, Granular	17.00											
		Very Dense, Granular	18.50	SPT-12	SS	17.00	17.00-17.45	13	29	49	78			
Weathered Rock				SPT-13	SS	18.50	18.50-18.55	>50	-	-	>100			50/5 cm Penetration
				SPT-14	SS	20.00	20.00-21.50	-	-	-	>100			Rebound
				SPT-15	SS	21.50	21.50-23.00	-	-	-	>100			Rebound
				SPT-16	SS	23.00	23.00-24.50	-	-	-	>100			Rebound
				SPT-17	SS	24.50	24.50-26.00	-	-	-	>100			Rebound
				SPT-18	SS	26.00	26.00-27.50	-	-	-	>100			Rebound
				SPT-19	SS	27.50	26.00-27.50	-	-	-	>100			Rebound
				SPT-20	SS	29.00	27.50-29.00	-	-	-	>100			Rebound
			31.50	SPT-21	SS	31.50	29.00-31.50	-	-	-	>100			Rebound

G.W.L: 2.2 m from G.L on 19.08.16 | No of SPT: 21 Nos | No. of UDS: 01 Nos | Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-15
Location	: Perambur
Co-ordinates	: E 1753 N 826
Type of Boring	: Calyx
Ground Water Level	: 2 m from G.L on 15.08.2016
Termination Depth	: 35.00 m

Drillhole Record -15

Fig No. 9

Start Date : 11.08.2016

End Date : 14.08.2016

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
Sandy **CLAY** with Gravel (CI-SC-G)	Brown	Soft Layered	2.00	SPT-1	SS	1.00	1.00-1.45	2	2	2	4	
				SPT-2	SS	2.00	2.00-2.45	2	3	3	6	
Sandy **CLAY** (CI-SC)	Brown	Medium Stiff, Layered	6.50	SPT-3	SS	3.00	3.00-3.45	3	3	5	8	
				SPT-4	SS	4.00	4.00-4.45	1	2	2	4	
Clayey **SAND** (SC-CL)	Gray	Medium Dense, Granular	8.00	SPT-5	SS	5.00	5.00-5.45	2	2	4	6	
				SPT-6	SS	6.50	6.50-6.95	3	4	7	11	
		Dense, Granular	11.00	SPT-7	SS	8.00	8.00-8.45	3	6	10	16	
				SPT-8	SS	9.50	9.50-9.95	10	12	15	27	
Silty **SAND** (SM)	Brown	Medium Dense, Granular	12.50	SPT-9	SS	11.00	11.00-11.45	5	7	10	17	
				SPT-10	SS	12.50	12.50-12.95	8	9	11	20	
Silty **SAND** (SM)	Brown	Medium Dense, Granular	15.50	SPT-11	SS	14.00	14.00-14.45	8	13	18	31	
				SPT-12	SS	15.50	15.50-15.95	11	18	22	40	

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

C.R (%) R.Q.D(%)

G.W.L

G.W.L: 2 m from G.L on 15.08.16 | No of SPT: 18 Nos | No. of CR: 06 Nos | Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-15
Location	: Perambur
Co-ordinates	: E 1753 N 826
Type of Boring	: Calyx
Ground Water Level	: 2 m from G.L on 15.08.2016
Termination Depth	: 35.00 m

Drillhole Record -15

Fig No. 9

Start Date : 11.08.2016

End Date : 14.08.2016

SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES 15 cm	30 cm	45 cm	30"N" Blows/300mm	SPT 'N' PROFILE	C R (%)	R.Q.D(%)	REMARKS
Silty SAND (SM)	Brown	Dense, Granular			SPT-13	SS	17.00	17.00-17.45	13	20	25	45				
			18.50		SPT-14	SS	18.50	18.50-18.95	10	22	27	49				
	Brown	Very Dense, Granular			SPT-15	SS	20.00	20.00-20.45	10	24	30	54				
					SPT-16	SS	21.50	21.50-21.95	11	23	28	51				
			23.00		SPT-17	SS	23.00	23.00-23.45	16	21	32	53				
Silty SAND With Gravel (SM-G)	Brown	Very Dense, Granular														
			24.50		SPT-18	SS	24.50	24.50-24.64	>50	-	-	>100				50/14 cm penetration
Weathered Rock																
			26.00		CR-1	CS	26.00	26.00-27.50	-	-	-	-		12		5 pieces
Soft Rock					CR-2	CS	27.50	27.50-29.00	-	-	-	-				Nil
					CR-3	CS	29.00	29.00-30.50	-	-	-	-		24		62 pieces
					CR-4	CS	30.50	30.50-32.00	-	-	-	-		15		13 pieces
					CR-5	CS	32.00	32.00-33.50	-	-	-	-		12		6 pieces
					CR-6	CS	33.50	33.50-35.00						15		29 pieces
			35.00													

G.W.L: 2 m from G.L on 15.08.16 | No. of SPT: 18 Nos | No. of CR: 06 Nos | Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-16
Location	: Perambur
Co-ordinates	: 1684 E 854N
Type of Boring	: Calyx
Ground Water Level	: 1.80 m from G.L on 28.08.2016
Termination Depth	: 33.00 m

Drillhole Record -BH-16

Fig No. 10

Start Date : 24.08.2016
End Date : 27.08.2016

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 (CH-SC)	Brown	Soft Layered	3.00		SPT-1	SS	1.00	1.00-1.45	1	1	1	2				G.W.L
					SPT-2	SS	2.00	2.00-2.45	1	2	2	4				
Clayey SAND (SC-CL)	Grey	Medium Dense, Granular	4.00		SPT-3	SS	3.00	3.00-3.45	4	6	9	15				
		Very loose, Granular	5.00		SPT-4	SS	4.00	4.00-4.45	1	1	1	2				
					UDS-1	SS	5.00	5.00-5.45	-	-	-	-				
	Brown				SPT-5	SS	6.50	6.50-6.95	4	5	7	12				
					UDS-2	SS	8.00	8.00-8.45	-	-	-	-				
					SPT-6	SS	9.50	9.50-9.95	7	7	10	17				
	Grey				SPT-7	SS	11.00	11.00-11.45	7	9	13	22				
					SPT-8	SS	12.50	12.50-12.95	8	11	14	25				
					SPT-9	SS	14.00	14.00-14.45	10	14	19	33				
			15.50		SPT-10	SS	15.50	15.50-15.95	12	16	23	39				

G.W.L: 1.80 m from G.L on 28.08.2016	No of SPT: 19 Nos	No. of UDS: 02 Nos	No. of CR: 03 Nos	Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-16
Location	: Perambur
Co-ordinates	: 1684 E, 854N
Type of Boring	: Calyx
Ground Water Level	: 1.80 m from G.L on 28.08.2016
Termination Depth	: 33.00 m

Drillhole Record -BH-16

Fig No. 10

Start Date : 24.08.2016
End Date : 27.08.2016

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 (SC-CL)	Grey	Dense, Granular			SPT-11	SS	17.00	17.00-17.45	13	19	24	43				
			18.50		SPT-12	SS	18.50	18.50-18.91	18	39	>50	>100				50/11 cm penetration
		Very Dense, Granular	20.00		SPT-13	SS	20.00	20.00-20.29	38	>50	-	>100				50/14 cm penetration
Silty SAND (SM)	Brown	Very Dense, Granular			SPT-14	SS	21.50	21.50-21.77	39	>50	-	>100				50/12 cm penetration
			22.00		SPT-15	SS	22.00	22.00-23.50	-	-	-	>100				Rebound
Weathered Rock					SPT-16	SS	23.50	23.50-25.00	-	-	-	>100				Rebound
					SPT-17	SS	25.00	25.00-26.50	-	-	-	>100				Rebound
					SPT-18	SS	26.50	26.50-28.00	-	-	-	-				Nil
					SPT-19	SS	28.00	28.00-29.50	-	-	-	-				Nil
			29.50		CR-1	CS	29.50	29.50-30.00	-	-	-	-		5		12 Pieces
Soft Rock					CR-2	CS	30.00	30.00-31.50	-	-	-	-				Nil
					CR-3	CS	31.50	31.50-33.00	-	-	-	-				Nil
			33.00													

G.W.L: 1.80m from G.L on 28.08.2016 | No of SPT: 19 Nos | No. of UDS: 02 Nos | No. of CR: 03 Nos | Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-21	**Drillhole Record -BH-21**	
Location	: Perambur	Fig No. 11	
Co-ordinates	: 1869 E, 860 N		
Type of Boring	: Cafyx		
Ground Water Level	: 2.00 m from G.L on 02.09.201	Start Date	: 30.08.2016
Termination Depth	: 28.00 m	End Date	: 01.09.2016

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	SPT 'N' PROFILE	C.R (%)	R.Q.D(%)	REMARKS
Filled up soil	Building Debris					1.00	1.00-1.45								G.W.L
						2.00	2.00-2.45								
			3.00	SPT-1	SS	3.00	3.00-3.45	1	2	3	5				
Sandy **CLAY** (CH-SC)	Dark Grey	Medium Stiff, Layered	4.00	SPT-2	SS	4.00	4.00-4.45	0	1	1	2				
		Soft Layered		SPT-3	SS	5.00	5.00-5.45	0	1	1	2				
	Grey		6.50	SPT-4	SS	6.50	6.50-6.95	4	5	7	12				
		Stiff, Layered	8.00	SPT-5	SS	8.00	8.00-8.45	6	10	13	23				
Clayey **SAND** (SC-CI)	Grey	Medium Dense, Granular		SPT-6	SS	9.50	9.50-9.95	8	14	16	30				
			11.00	SPT-7	SS	11.00	11.00-11.45	10	13	16	29				
SAND (SP)	Brown	Medium Dense, Granular		SPT-8	SS	12.50	12.50-12.95	12	15	18	33				

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

G.W.L: 2.00 m from G.L on 02.09.2016	No. of SPT: 16 Nos	No. of CR: 02 Nos		**Remarks**

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-21
Location	: Perambur
Co-ordinates	: 1869 E, 860 N
Type of Boring	: Calyx
Ground Water Level	: 2.00 m from G.L on 02.09.201
Termination Depth	: 28.00 m

Drillhole Record -BH-21

Fig No. 11

Start Date : 30.08.2016

End Date : 01.09.2016

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
SAND (SP)	Brown	Medium Dense, Granular	14.00												
					SPT-9	SS	14.00	14.00-14.45	9	13	20	33			
Clayey **SAND** (SC-CL)	Grey	Medium Dense, Granular	15.50												
					SPT-10	SS	15.50	15.50-15.95	10	15	22	37			
	Grey	Dense, Granular													
					SPT-11	SS	17.00	17.00-17.45	16	18	22	40			
	Brown		18.50												
					SPT-12	SS	18.50	18.50-18.95	18	22	30	52			
	Grey	Very Dense, Granular	20.00												
					SPT-13	SS	20.00	20.00-20.45	22	23	29	52			
Sandy **CLAY** (Cl-SC)	Grey	Hard Layered	21.50												
					SPT-14	SS	21.50	21.50-21.91	24	38	>50	>100			50/11 cm penetration
Silty **SAND** (SM)	Brown	Very Dense, Granular													
					SPT-15	SS	23.00	23.00-23.43	22	35	>50	>100			50/13 cm penetration
			24.50												
					SPT-16	SS	24.50	24.50-24.54	>50	-	-	>100			50/4 cm penetration
Weathered Rock					CR-1	CS	25.00	25.00-26.50	-	-	-	-			Nill
			26.50		CR-2	CS	26.50								
Soft Rock			28.00					26.50-28.00	-	-	-	-	15		7 Pieces

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

G.W.L: 2.00 m from G.L on 02.09.2016 | No of SPT: 16 Nos | No. of CR: 02 Nos | Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-22	**Drillhole Record - BH-22**	
Location	: Perambur	Fig No. 12	
Co-ordinates	: 1762 E, 916 N		
Type of Boring	: Calyx		
Ground Water Level	: 2.10 m from G.L on 28.08.2016	Start Date	: 25.08.2016
Termination Depth	: 29.00 m	End Date	: 27.08.2016

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	SPT 'N' PROFILE	C.R.(%)	R.Q.D(%)	REMARKS
Sandy **CLAY** (Cl-SC)	Brown	Medium Stiff, Layered		SPT-1		1.00	1.00-1.45	2	2	3	5				
				SPT-2		2.00	2.00-2.45	2	3	4	7				G.W.L
			3.00	SPT-3		3.00	3.00-3.45	1	1	2	3				
	Grey	Soft Layered		UDS-1		4.00	4.00-4.45	-	-	-	-				
				SPT-4		5.00	5.00-5.45	1	1	1	2				
				UDS-2		6.50	6.50-6.95	-	-	-	-				
	Brown		8.00	SPT-5		8.00	8.00-8.45	4	4	8	12				
Clayey **SAND** (SC-CL)	Brown	Medium Dense, Granular		SPT-6		9.50	9.50-9.95	6	9	11	20				
	Grey			SPT-7	SS	11.00	11.00-11.45	8	11	15	26				
				SPT-8	SS	12.50	12.50-12.95	11	13	17	30				

G.W.L: 2.10 m from G.L on 28.08.2016	No. of SPT: 15 Nos		No. of UDS: 02 Nos	No. of CR: 02 Nos	**Remarks**

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-22
Location	: Perambur
Co-ordinates	: 1762 E, 916 N
Type of Boring	: Calyx
Ground Water Level	: 2.10 m from G.L on 28.08.2016
Termination Depth	: 29.00 m

Drillhole Record - BH-22

Fig No. 12

Start Date : 25.08.2016
End Date : 27.08.2016

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 (SC-CL)	Grey	Medium Dense, Granular			SPT-9	SS	14.00	14.00-14.45	6	8	14	22				
					SPT-10	SS	15.50	15.50-15.95	10	13	18	31				
			17.00		SPT-11	SS	17.00	17.00-17.43	12	27	>50	>100				50/13 cm penetration
		Very Dense, Granular			SPT-12	SS	18.50	18.50-18.92	19	30	>50	>100				50/12 cm penetration
			20.00		SPT-13	SS	20.00	20.00-20.45	20	27	38	65				
Silty SAND (SM)	Brown	Very Dense, Granular			SPT-14	SS	21.50	21.50-21.79	27	>50	-	>100				50/14 cm penetration
			23.00		SPT-15	SS	23.00	23.00-23.26	34	>50	-	>100				50/11cm penetration
Weathered Rock					CR-1	CS	25.00	25.00-27.50	-	-	-	-				Nil
			27.50		CR-2	CS	27.50	27.50-29.00	-	-	-	-		7		19 Pieces
Salt Rock			29.00													

G.W.L. 2.10 m from G.L on 28.08.2016 | No of SPT: 15 Nos | No. of UDS: 02 Nos | No. of CR: 02 Nos | Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-23	Drillhole Record -23	
Location	: Perambur	Fig No. 13	
Co-ordinates	1683 E, 960 N		
Type of Boring	: Calyx		
Ground Water Level	: 1.90 m from G.L on 30.08.2016	Start Date	: 27.08.2016
Termination Depth	: 29.00 m	End Date	: 29.08.2016

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 soil	Building Debris						1.00	1.00-1.00	-	-	-	-				G.W.L
							2.00	2.00-2.00	-	-	-	-				
							3.00	3.00-3.00	-	-	-	-				
							4.00	4.00-4.00	-	-	-	-				
			5.00		SPT-1	SS	5.00	5.00-5.45	0	0	1	1				
Silty SAND (SM)	Dark Grey	Very Loose, Granular			SPT-2	SS	6.50	6.50-.6.95	0	0	1	1				
					UDS-1	SS	8.00	8.00-8.45	-	-	-	-				
			9.50		SPT-3	SS	9.50	9.50-9.95	0	0	1	1				
Sandy CLAY (CI-SC)	Grey	Soft Layered														
			11.00		SPT-4	SS	11.00	11.00-11.45	5	7	12	19				
Silty SAND (SM)	Grey	Medium Dense, Granular														
			12.50		SPT-5	SS	12.50	12.50-12.95	17	24	34	58				
Silty SAND With Gravel (SM-G)																

G.W.L: 1.90 m from G.L on 30.08.2016	No of SPT: 13 Nos	No. of UDS: 01 Nos	No. of CR: 01 Nos	Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-23	Drillhole Record -23	
Location	: Perambur	Fig No. 13	
Co-ordinates	1683 E, 960 N		
Type of Boring	: Calyx		
Ground Water Level	: 1.90 m from G.L on 30.08.2016	Start Date	: 27.08.2016
Termination Depth	: 29.00 m	End Date	: 29.08.2016

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 With Gravel (SM-G)	Grey	Very Dense, Granular		SPT-6	SS	14.00	14.00-14.44	15	32	>50	>100			50/14 cm penetration
				SPT-7	SS	15.50	15.50-15.74	38	>50	-	>100			50/9 cm penetration
				SPT-8	SS	17.00	17.00-17.37	20	42	>50	>100			50/7 cm penetration
	Brown		18.50	SPT-9	SS	18.50	18.50-18.75	46	>50	-	>100			50/10 cm penetration
Clayey SAND (SC-CL)	Brown	Very Dense, Granular	20.00	SPT-10	SS	20.00	20.00-20.26	42	>50	-	>100			50/11 cm penetration
Silty SAND (SM)	Brown	Very Dense, Granular	23.00	SPT-11	SS	21.50	21.50-21.74	41	>50	-	>100			50/9 cm penetration
Weathered Rock				SPT-12	SS	23.00	23.00-23.23	42	>50	-	>100			50/8 cm penetration
				SPT-13	CS	25.00	25.00-25.06	>50	-	-	>100			50/6 cm penetration
			26.50	CR-1	CS	26.50	26.50-29.00	-	-	-	-	10		3 Pieces
Soft Rock			29.00											

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

G.W.L: 1.90 m from G.L on 30.08.2016	No of SPT: 13 Nos	No. of UDS: 01 Nos	No. of CR: 01 Nos	Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-24	Drillhole Record -24	
Location	: Perambur	Fig No. 14	
Co-ordinates	1923 E, 877 N		
Type of Boring	: Calyx		
Ground Water Level	: 2.20m from G.L on 03.09.2016	Start Date	: 31.08.2016
Termination Depth	: 28.00 m	End Date	: 02.09.2016

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 20 40 60 80 100	C.R (%)	R.Q.D(%)	REMARKS
Filled up Soil		Building Debris					1.00	1.00-1.00								
							2.00	2.00-2.00								G.W.L
							3.00	3.00-3.00								
							4.00	4.00-4.00								
							5.00	5.00-5.00								
							6.50	6.50-.6.50								
			8.00		SPT-1	SS	8.00	8.00-8.45	2	3	5	8				
Clayey **SAND** (SC-CL)	Grey	Loose, Granular														
			9.50		SPT-2	SS	9.50	9.50-9.95	4	10	12	22				
Silty **SAND** (SM)	Grey	Medium Dense, Granular			SPT-3	SS	11.00	11.00-11.45	5	13	16	29				
			12.50		SPT-4	SS	12.50	12.50-12.95	5	10	13	23				
Greyish, Medium Dense, Sandy **SILT** (ML)																

G.W.L: 2.20 m from G.L on 03.09.2016	No of SPT: 13 Nos	No. of UDS: 0 Nos	No. of CR: 01 Nos	Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-24
Location	: Perambur
Co-ordinates	1923 E, 877 N
Type of Boring	: Calyx
Ground Water Level	: 2.20m from G.L on 03.09.2016
Termination Depth	: 28.00 m

Drillhole Record -24

Fig No. 14

Start Date : 31.08.2016
End Date : 02.09.2016

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
Sandy SILT (ML)	Grey	Medium Dense, Granular	14.00											
Clayey SAND (SC-CL)	Grey	Medium Dense, Granular	17.00	SPT-5	SS	14.00	14.00-14.45	8	15	18	33			
				SPT-6	SS	15.50	15.50-15.95	8	14	15	29			
	Brown	Very Dense, Granular	18.50	SPT-7	SS	17.00	17.00-17.45	15	18	35	53			
Silty SAND (SM)	Brown	Very Dense, Granular	21.50	SPT-8	SS	18.50	18.50-18.95	17	28	41	69			
				SPT-9	SS	20.00	20.00-20.41	31	45	>50	>100			50/11 cm penetration
Silty SAND with Gravel (SM-G)	Brown	Dense, Granular	23.00	SPT-10	SS	21.50	21.50-21.95	18	23	19	42			
Weathered Rock			27.00	SPT-11	SS	23.00	23.00-23.10	>50	-	-	>100			50/10 cm penetration
				SPT-12	SS	24.50	24.50-26.00	-	-	-	>100			Rebound
				SPT-13	SS	26.00	26.00-27.00	-	-	-	>100			Rebound
Soft Rock			28.00	CR-1	CS	27.00	27.00-28.00	-	-	-	-	15		29 pieces

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

G.W.L: 2.20 m from G.L on 03.09.2016	No of SPT: 13 Nos	No. of UDS: 0 Nos	No. of CR: 01 Nos	Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-25
Location	: Perambur
Co-ordinates	1818 E, 926 N
Type of Boring	: Calyx
Ground Water Level	: 2.00 m from G.L on 28.08.2016
Termination Depth	: 27.00 m

Drillhole Record -BH-25

Fig No. 15

Start Date : 25.08.2016
End Date : 27.08.2016

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 soil	Building Debris						1.00	1.00-1.00								
							2.00	2.00-2.00								G.W.L
							3.00	3.00-3.00								
			4.00		SPT-1	SS	4.00	4.00-4.45	0	0	1	1				
Sandy CLAY (CH-SC)	Brown	Very Soft, Layered			UDS-1		5.00	5.00-5.45	-	-	-	-				
			6.50		SPT-2	SS	6.50	6.50-.6.95	8	12	14	26				
Clayey SAND (SC-CL)	Dark Grey	Medium Dense, Granular			SPT-3	SS	8.00	8.00-8.45	4	6	6	12				
					UDS-2	SS	9.50	9.50-9.95	-	-	-	-				
	Grey				SPT-4	SS	11.00	11.00-11.45	7	10	13	23				
					SPT-5	SS	12.50	12.50-12.95	5	11	14	25				

G.W.L: 2.00 m from G.L on 28.08.2016	No of SPT: 13 Nos	No. of UDS: 02 Nos	No. of CR: 01 Nos	Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-25
Location	: Perambur
Co-ordinates	1818 E, 926 N
Type of Boring	: Calyx
Ground Water Level	: 2.00 m from G.L on 28.08.2016
Termination Depth	: 27.00 m

Drillhole Record -BH-25

Fig No. 15

Start Date : 25.08.2016

End Date : 27.08.2016

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
Clayey SAND (SC-CL)	Grey	Medium Dense, Granular		SPT-6	SS	14.00	14.00-14.45	9	12	15	27			
				SPT-7	SS	15.50	15.50-15.95	11	14	17	31			
			17.00	SPT-8	SS	17.00	17.00-17.45	17	25	47	72			
		Very Dense, Granular	18.50	SPT-9	SS	18.50	18.50-18.95	50	-	-	>100			
Silty SAND (SM)	Grey	Very Dense, Granular	20.00	SPT-10	SS	20.00	20.00-20.27	20	>50	-	>100			50/12 cm penetration
Clayey SAND (SC-CL)	Grey	Very Dense, Granular		SPT-11	SS	21.50	21.50-21.74	41	>50	-	>100			50/10 cm penetration
			23.00	SPT-12	SS	23.00	23.00-23.09	-	-	-	>100			50/9 cm penetration
Weathered Rock				SPT-13	SS	24.50	24.50-25.50	-	-	-	>100			Rebound
			25.50	CR-1	CS	25.50	25.50-27.00	-	-	-	-	23		44 Pieces
Soft Rock			27.00											

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

G.W.L: 2.00m from G.L on 28.08.2016 | No of SPT: 13 Nos | No. of UDS: 02 Nos | No. of CR: 01 Nos | Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-26	Drillhole Record -26	
Location	: Perambur	Fig No. 16	
Co-ordinates	: 1723 E, 974 N		
Type of Boring	: Calyx		
Ground Water Level	: 2.00 m from G.L on 30.08.2016	Start Date	: 27.08.2016
Termination Depth	: 29.50 m	End Date	: 29.08.2016

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 Soil		Building Debris					1.00	1.00-1.00	-	-	-	-				G.W.L
							2.00	2.00-2.00	-	-	-	-				
							3.00	3.00-3.00	-	-	-	-				
							4.00	4.00-4.00	-	-	-	-				
			5.00		SPT-1	SS	5.00	5.00-5.45	1	2	3	5				
Silty **SAND** (SM)	Brown	Loose, Granular														
			6.50		SPT-2	SS	6.50	6.50-6.95	0	0	1	1				
	Dark Grey	Very Loose, Granular			UDS-1	SS	8.00	8.00-8.45	-	-	-	-				
			9.50		SPT-3	SS	9.50	9.50-9.95	8	10	13	23				
Clayey **SAND** (SC-CL)	Grey	Medium Dense, Granular			SPT-4	SS	11.00	11.00-11.45	9	13	17	30				
					SPT-5	SS	12.50	12.50-12.95	10	11	15	26				

G.W.L: 2.00 m from G.L on 30.08.2016	No of SPT: 13 Nos	No. of UDS: 1 Nos	No. of CR: 01 Nos	**Remarks**

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-26
Location	: Perambur
Co-ordinates	1723 E, 974 N
Type of Boring	: Calyx
Ground Water Level	: 2.00 m from G.L on 30.08.2016
Termination Depth	: 29.50 m

Drillhole Record -26

Fig No. 16

Start Date : 27.08.2016
End Date : 29.08.2016

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 (SC-CL)	Brown	Medium Dense, Granular			SPT-6	SS	14.00	14.00-14.45	11	14	19	33				
			15.50		SPT-7	SS	15.50	15.50-15.95	13	19	23	42				
		Dense, Granular			SPT-8	SS	17.00	17.00-17.45	14	19	31	50				
			18.50		SPT-9	SS	18.50	18.50-18.95	21	26	32	58				
Sandy CLAY (CI-SC)	Grey	Hard, Layered	20.00		SPT-10	SS	20.00	20.00-20.45	10	16	29	45				
Silty SAND (SM)	Grey	Dense, Granular	21.50		SPT-11	SS	21.50	21.50-21.95	12	18	37	55				
	Brown	Very Dense, Granular			SPT-12	SS	23.00	23.00-23.45	16	27	39	66				
			24.50		SPT-13	SS	24.50	24.50-24.56	>50	-	-	>100				50/6 cm penetration
Weathered Rock																
			28.00		CR-1	CS	28.00	28.00-29.50	-	-	-	-		6		2 Pieces
Soft Rock			29.50													

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

G.W.L: 2.00m from G.L on 30.08.2016	No of SPT: 13 Nos	No of UDS: 1 Nos	No. of CR: 01 Nos	Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-27	Drillhole Record -27
Location	: Perambur	Fig No. 17
Co-ordinates	: 1684 E, 1002 N	
Type of Boring	: Calyx	
Ground Water Level	: 2.50 m from G.L on 01.09.2016	Start Date : 30.08.2016
Termination Depth	: 29.0m	End Date : 31.08.2016

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 soil		Building Debris					1.00, 2.00, 3.00, 4.00, 5.00, 6.50, 8.00									G.W.L
			9.50		SPT-1	SS	9.50	9.50-9.95	8	11	12	23				
Clayey SAND (SC-CL)	Grey	Medium Dense, Granular			SPT-2	SS	11.00	11.00-11.45	10	14	16	30				
			12.50		SPT-3	SS	12.50	12.50-12.95	14	17	21	38				
		Dense, Granular	14.00		SPT-4	SS	14.00	14.00-14.45	13	16	23	39				

G.W.L: 2.50 m from G.L on 01.09.2016	No of SPT: 12 Nos	No. of UDS: 0 Nos	No. of CR: 01 Nos	Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-27
Location	: Perambur
Co-ordinates	: 1684 E, 1002 N
Type of Boring	: Calyx
Ground Water Level	: 2.50 m from G.L on 01.09.2016
Termination Depth	: 29.0m

Drillhole Record -27

Fig No. 17

Start Date : 30.08.2016

End Date : 31.08.2016

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 (SM)	Grey / Brown	Dense, Granular	18.50	SPT-5	SS	15.50	15.50-15.95	12	15	20	35			
				SPT-6	SS	17.00	17.00-17.45	14	18	23	41			
				SPT-7	SS	18.50	18.50-18.95	15	21	23	44			
Sandy CLAY (Cl-SC)	Brown	Hard, Layered	21.50	SPT-8	SS	20.00	20.00-20.45	17	23	25	48			
				SPT-9	SS	21.50	21.50-21.95	18	22	27	49			
Silty SAND (SM)	Brown	Dense, Granular	23.00	SPT-10	SS	23.00	23.00-23.45	26	28	32	60			
Silty SAND With Gravel (SM-G)	Brown	Very Dense, Granular	24.00	SPT-11	SS	24.00	24.00-24.01	-	-	-	>100			Rebound
Weathered Rock				SPT-12	SS	25.50	25.50-27.00	-	-	-	>100			Rebound
			27.00	CR-1	CS	27.00	27.00-29.00	-	-	-	-	13		11 pieces
Soft Rock			29.00											

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

G.W.L: 2.50 m from G.L on 01.09.2016	No of SPT: 12 Nos	No. of UDS: 0 Nos	No. of CR: 01 Nos	Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-28	Drillhole Record -28	
Location	: Perambur	Fig No. 18	
Co-ordinates	1900 E, 948 N		
Type of Boring	: Calyx		
Ground Water Level	: 2.30 m from G.L on 02.09.2016	Start Date :	30.08.2016
Termination Depth	: 29.00 m	End Date :	31.08.2016

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
Filled up Soil	Building Debris		5.00			1.00	1.00-1.00							
						2.00	2.00-2.00							G.W.L
						3.00	3.00-3.00							
						4.00	4.00-4.00							
Clayey SAND (SC-Cl)	Dark Grey	Very Loose, Granular	6.50	SPT-1	SS	5.00	5.00-5.45	0	0	1	1			
Sandy CLAY (CH-SC)	Dark Grey	Very Soft, Layered	9.50	UDS-1	SS	6.50	6.50-.6.95	-	-	-	-			
				SPT-2	SS	8.00	8.00-8.45	0	0	1	1			
Clayey SAND (SC-Cl)	Grey	Medium Dense,Granular	11.00	SPT-3	SS	9.50	9.50-9.95	13	14	19	33			
Sandy SILT (ML)	Grey	Medium Dense,Granular	14.00	SPT-4	SS	11.00	11.00-11.45	5	6	7	13			
				SPT-5	SS	12.50	12.50-12.95	7	8	8	16			
				SPT-6	SS	14.00	14.00-14.45	13	24	27	51			

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

G.W.L: 2.30 m from G.L on 02.09.2016	No of SPT: 14 Nos	No. of UDS: 01 Nos	No. of CR: 01 Nos	Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-28	Drillhole Record -28	
Location	: Perambur	Fig No. 18	
Co-ordinates	1900 E, 948 N		
Type of Boring	: Calyx		
Ground Water Level	: 2.30 m from G.L on 02.09.2016	Start Date :	30.08.2016
Termination Depth	: 29.00 m	End Date :	31.08.2016

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
Sandy SILT (ML)	Grey	Very Dense, Granular		SPT-7	SS	15.50	15.50-15.79	23	>50	-	>100			50/14 cm penetration
			17.00	SPT-8	SS	17.00	17.00-17.39	26	41	>50	>100			50/9 cm penetration
Silty SAND (SM)	Brown	Very Dense, Granular		SPT-9	SS	18.50	18.50-18.91	21	41	>50	>100			50/11 cm penetration
	Grey			SPT-10	SS	20.00	20.00-20.40	27	36	>50	>100			50/10 cm penetration
			21.50	SPT-11	SS	21.50	21.50-21.95	12	17	22	39			
	Brown	Dense, Granular	23.00	SPT-12	SS	23.00	23.00-23.06	>50	-	-	>100			50/6 cm penetration
Weathered Rock				SPT-13	CS	25.00	25.00-26.50	-	-	-	>100			Rebound
				SPT-14	CS	26.50	26.50-27.50	-	-	-	>100			Rebound
			27.50	CR-1	CS	27.50	27.50-29.00	-	-	-	-	4		pieces
Soft Rock			29.00											

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

G.W.L: 2.30 m from G.L on 02.09.2016	No of SPT: 14 Nos	No. of UDS: 01 Nos	No. of CR: 01 Nos	Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-29
Location	: Perambur
Co-ordinates	: 1794E, 1001N
Type of Boring	: Calyx
Ground Water Level	: 1.9 m from G.L on 30.08.2016
Termination Depth	: 30.00 m
Start Date	: 27.08.2016
End Date	: 29.08.2016

Drillhole Record -29

Fig No. 19

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
Filled up soil	Building Debris		2.00			1.00	1.00-1.00							G.W.L
Sandy **CLAY** (CI-SC)	Dark Grey	Medium Stiff, Layered	3.00	SPT-1	SS	2.00	2.00-2.45	2	3	5	8			
Sandy **CLAY** (CH-SC)	Dark Grey	Very Soft, Layered	4.00	SPT-2	SS	3.00	3.00-3.45	0	0	1	1			
Clayey **SAND** (SC-CL)	Dark Grey	Very Loose, Granular	6.50	SPT-3	SS	4.00	4.00-4.45	0	0	1	1			
				SPT-4	SS	5.00	5.00-5.45	0	0	1	1			
	Brown	Medium Dense, Granular		UDS-1	SS	6.50	6.50-6.95	-	-	-	-			
				SPT-5	SS	8.00	8.00-8.45	5	6	8	14			
	Grey		11.00	SPT-6	SS	9.50	9.50-9.95	5	11	16	27			
Silty **SAND** (SM)	Grey	Medium Dense, Granular	14.00	SPT-7	SS	11.00	11.00-11.45	7	10	13	23			
				SPT-8	SS	12.50	12.50-12.95	6	15	18	33			
Clayey **SAND** with Gravel (SC-CL-G)	Grey	Medium Dense, Granular	15.50	SPT-9	SS	14.00	14.00-14.45	9	12	15	27			
				SPT-10	SS	15.50	15.50-15.95	11	24	29	53			

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

G.W.L: 1.90 m from G.L on 30.08.2016 | No of SPT: 16 Nos | No. of UDS: 01 Nos | No. of CR: 04 Nos | Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-29
Location	: Perambur
Co-ordinates	: 1794E, 1001N
Type of Boring	: Calyx
Ground Water Level	: 1.9 m from G.L on 30.08.2016
Termination Depth	: 30.00 m

Drillhole Record -29

Fig.No. 19

Start Date : 27.08.2016
End Date : 29.08.2016

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
Sandy **CLAY** (CL-SC)	Grey	Hard Layered	17.00											
Clayey **SAND** (SC-CL)	Brown	Very Dense, Granular		SPT-11	SS	17.00	17.00-17.45	14	29	48	77			
				SPT-12	SS	18.50	18.50-18.95	17	27	34	61			
	Grey			SPT-13	SS	20.00	20.00-20.40	21	41	>50	>100			50/10 cm penetration
			21.50	SPT-14	SS	21.50	21.50-21.88	22	38	>50	>100			50/8 cm penetration
Clayey **SAND** With Gravel (SC-CL-G)	Grey	Very Dense, Granular	23.00	SPT-15	SS	23.00	23.00-23.28	23	>50	-	>100			50/13 cm penetration
Clayey **SAND** (SC-CL)	Grey	Very Dense, Granular	24.00	SPT-16	SS	24.00	24.00-24.05	>50	-	-	>100			50/5 cm penetration
Soft Rock				CR-1			24.05-25.50	-	-	-	-	7		1 pieces
				CR-2	CS	25.50	25.50-27.00	-	-	-	-	8		3 pieces
				CR-3	CS	27.00	27.00-28.50	-	-	-	-	12		10 pieces
			30.00	CR-4	CS	28.50	28.50-30.00	-	-	-	-	14		6 pieces

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

G.W.L: 1.90 m from G.L on 30.08.2016	No of SPT: 16 Nos	No. of UDS: 01 Nos	No. of CR: 04 Nos	Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-30	Drillhole Record -30	
Location	: Perambur	Fig No. 20	
Co-ordinates	: 1728 E, 1041 N		
Type of Boring	: Calyx		
Ground Water Level	: 2.10 m from G.L. on 31.8.2016	Start Date	: 27.08.2016
Termination Depth	: 29.00 m	End Date	: 30.08.2016

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
Filled up soil	Building Debris		5.00			1.00	1.00-1.00	-	-	-	-			
						2.00	2.00-2.60	-	-	-	-			
						3.00	3.00-3.00	-	-	-	-			
						4.00	4.00-4.00	-	-	-	-			
Silty SAND with gravel (SM-G)	Red	Very loose, Granular	6.50	SPT-1	SS	5.00	5.00-5.45	0	0	1	1			
Clayey SAND (SC-CL)	Grey	Dense, Granular	8.00	SPT-2	SS	6.50	6.50-6.95	0	0	1	1			
Silty SAND (SM)	Brown	Dense, Granular	9.50	SPT-3	SS	8.00	8.00-8.45	8	14	24	38			
		Medium Dense, Granular	12.50	SPT-4	SS	9.50	9.50-9.45	9	13	17	30			
				SPT-5	SS	11.00	11.00-11.45	8	12	16	28			
Greyish, Dense, Clayey SAND (SC-CL)				SPT-6	SS	12.50	12.50-12.95	17	21	30	51			

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

G.W.L

G.W.L: 2.10 m from G.L on 31.08.16	No of SPT: 13 Nos	No. of CR: 02 Nos	Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-30	Drillhole Record -30	
Location	: Perambur	Fig No. 20	
Co-ordinates	: 1728 E, 1041 N		
Type of Boring	: Calyx		
Ground Water Level	: 2.10 m from G.L. on 31.8.2016	Start Date	: 27.08.2016
Termination Depth	: 29.00 m	End Date	: 30.08.2016

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
Clayey SAND (SC-CL)	Grey	Dense, Granular	14.00											
				SPT-7	SS	14.00	14.00-14.45	13	18	23	41			
Silty SAND (SM)	Brown	Dense, Granular	15.50											
				SPT-8	SS	15.50	15.50-15.45	18	21	24	45			
Clayey SAND (SC-CL)	Brown	Dense, Granular	17.00											
				SPT-9	SS	17.00	17.00-17.45	26	29	38	67			
		Very Dense, Granular	18.50											
				SPT-10	SS	18.50	18.50-18.63	>50	-	-	>100			50/13 cm Penetration
Sandy GRAVEL (GP)	Brown	Very Dense, Granular	20.00											
				SPT-11	SS	20.00	20.00-20.44	19	26	>50	>100			50/14 cm penetration
Silty SAND (SM)	Brown	Very Dense, Granular	23.00											
				SPT-12	SS	21.50	21.50-21.73	29	>50	-	>100			50/8 cm penetration
				SPT-13	SS	23.00	23.00-23.07	>50	-	-	>100			50/7 cm penetration
Weathered Rock				CR-1	CS	25.00	25.00-26.50	-	-	-	-			Nill
			26.50	CR-2	CS	26.50	26.50-29.00	-	-	-	-	24		6 pieces
Fractured Hard Rock			29.00											

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

G.W.L: 2.10 m from G.L on 31.08.16 | No of SPT: 13 Nos | No. of CR: 02 Nos | Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-31
Location	: Perambur
Co-ordinates	: E 1982 N 970
Type of Boring	: Calyx
Ground Water Level	: 4.90 m from G.L on 24.8.2016
Termination Depth	: 30.00 m

Drillhole Record -31

Fig No. 21

Start Date : 21.08.2016
End Date : 23.08.2016

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** (SM)	Brown	Dense Granular	2.00	SPT-1	SS	1.00	1.00-1.45	8	12	24	36			
Dark Greyish, Soft, Sandy **CLAY** (CL-SC)			3.00	SPT-2	SS	2.00	2.00-2.45	1	1	2	3			
Brownish, Medium Dense, Silty **SAND** (SM)			4.00	SPT-3	SS	3.00	3.00-3.45	4	5	7	12			
Sandy **CLAY** (CL-SC)	Dark Grey	Soft layered	5.00	SPT-4	SS	4.00	4.00-4.45	1	1	1	2			G.W.L
Clayey **SAND** (SC-CL)	Dark Grey	Very loose, Granular	8.00	SPT-5	SS	5.00	5.00-5.45	1	1	2	3			
				SPT-6		6.50	6.50-6.95	2	2	2	4			
Silty **SAND** SM)	Brown	Dense, Granular		UDS-1	SS	8.00	8.00-8.45	-	-	-	-			
				SPT-7	SS	9.50	9.50-9.95	8	16	21	37			
				SPT-8	SS	11.00	11.00-11.45	10	14	23	37			
				SPT-9	SS	12.50	12.50-12.95	9	16	16	32			
				SPT-10	SS	14.00	14.00-14.45	7	11	27	38			

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

G.W.L: 4.90 m from G.L on 24.08.16	No of SPT: 18 Nos	No. of C.R: 02 Nos	No. of UDS: 01 Nos	Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-31
Location	: Perambur
Co-ordinates	: E 1982 N 970
Type of Boring	: Calyx
Ground Water Level	: 4.90 m from G.L. on 24.8.2016
Termination Depth	: 30.00 m
Start Date	: 21.08.2016
End Date	: 23.08.2016

Drillhole Record -31

Fig No. 21

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** (SM)	Brown	Dense, Granular		SPT-11	SS	15.50	15.50-15.95	19	24	31	55			
			17.00	SPT-12	SS	17.00	17.00-17.41	19	29	>50	>100			50/11 cm penetration
Sandy **SILT** (ML)	Grey	very Dense, Granular		SPT-13	SS	18.50	18.50-18.79	22	>50	-	>100			50/14 cm penetration
				SPT-14	SS	20.00	20.00-20.45	11	12	22	34			
				SPT-15	SS	21.50	21.50-21.95	15	25	35	60			
			22.50	SPT-16	SS	22.50	22.50-22.59	>50	-	-	>100			50/9 cm penetration
Weathered Rock				SPT-17	SS	24.00	24.0-25.50	-	-	-	>100			Rebound
				SPT-18	SS	25.50	25.50-27.00	-	-	-	>100			Rebound
			27.00	CR-1	CS	27.00	27.00-28.50	-	-	-	-	18		24 pieces
Soft Rock				CR-2	CS	28.50	28.50-30.00	-	-	-	-	25		17 pieces
			30.00											

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

G.W.L: 4.90 m from G.L on 24.08.16 | No of SPT: 18 Nos | No. of CR: 02 Nos | No. of UDS: 01 Nos | Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-32
Location	: Perambur
Co-ordinates	: E 1872 N 1025
Type of Boring	: Colyx
Ground Water Level	: 3.00 m from G.L on 26.8.2016
Termination Depth	: 30.00 m

Drillhole Record -32

Fig No. 22

Start Date : 21.08.2016

End Date : 25.08.2016

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 Soil		Building Debris			SPT-1	SS	1.00	1.00-1.45	4	8	13	21				
						SS	2.00	2.00-2.45	-	-	-	-				
						SS	3.00	3.00-3.45	-	-	-	-				
			4.00		SPT-2	SS	4.00	4.00-4.45	2	2	3	5				
Sandy **CLAY** (CL-SC)	Dark Grey	Soft layered			UDS-1	SS	5.00	5.00-5.45	-	-	-	-				
					SPT-3		6.50	6.50-6.95	1	1	2	3				
					UDS-2	SS	8.00	8.00-8.45	-	-	-	-				
			9.50		SPT-4	SS	9.50	9.50-9.95	7	12	15	27				
Clayey **SAND** (SC-CL)	Grey	Medium Dense Granular														
			11.00		SPT-5	SS	11.00	11.00-11.38	9	11	>50	>100				50/8 cm Penetration
Silty **SAND** (SM)	Grey	very Dense, Granular														
			12.50		SPT-6	SS	12.50	12.50-12.95	11	15	33	48				
Sandy **CLAY** (CI-SC)	Grey	Hard layered			SPT-7	SS	14.00	14.00-14.45	22	23	20	43				
			15.50		SPT-8	SS	15.50	15.50-15.87	29	48	>50	>100				50/7 cm Penetration

G.W.L: 3.00 m from G.L on 26.08.16 | No of SPT: 15 Nos | No. of CR: 03 Nos | No. of UDS: 02 Nos | Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-32
Location	: Perambur
Co-ordinates	: E 1872 N 1025
Type of Boring	: Calyx
Ground Water Level	: 3.00 m from G.L on 26.8.2016
Termination Depth	: 30.00 m

Drillhole Record -32

Fig No. 22

Start Date : 21.08.2016
End Date : 25.08.2016

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 20 40 60 80 100	C.R (%)	R.Q.D(%)	REMARKS
Clayey SAND (SC-CL)	Grey	very Dense, Granular			SPT-9	SS	17.00	17.00-17.28	25	>50	-	>100				50/13 cm Penetration
					SPT-10	SS	18.50	18.50-18.63	>50	-	-	>100				50/13 cm Penetration
			19.00		SPT-11	SS	19.00	19.00-19.04	>50	-	-	>100				50/4 cm Penetration
Weathered Rock					SPT-12	SS	20.50	20.50-22.00	-	-	-	>100				Rebound
					SPT-13	SS	22.00	22.00-23.50	-	-	-	>100				Rebound
					SPT-14	SS	23.50	23.50-25.00	-	-	-	>100				Rebound
					SPT-15	SS	25.00	25.00-26.00	-	-	-	>100				Rebound
					CR-1	CS	26.00	26.00-27.50	-	-	-	-				Nil
			26.00													
Fractured Hard Rock					CR-2	CS	27.50	27.50-28.50	-	-	-	-				Nil
					CR-3	CS	30.00	28.50-30.00	-	-	-	-		12		2 pieces
			30.00													

G.W.L: 3.00 m from G.L on 26.08.16	No of SPT: 15 Nos	No. of CR: 03 Nos	No. of UDS: 02 Nos	Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-33	Drillhole Record -33	
Location	: Perambur	Fig No. 23	
Co-ordinates	: E 1783 N 1077		
Type of Boring	: Calyx		
Ground Water Level	: 2.50 m from G.L. on 26.08.2016	Start Date	: 24.08.2016
Termination Depth	: 27.50 m	End Date	: 25.08.2016

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** (SM)	Brown	Medium Dense, Granular	2.00	SPT-1	SS	1.00	1.00-1.45	4	7	11	18			
					SS	2.00	2.00-2.45	-	-	-	-			G.W.L
Filled up Soil	Building Debris		3.00											
Sandy **CLAY** (CI-SC)	Dark Grey	Medium Stiff, Layered	5.00	SPT-2	SS	3.00	3.00-3.45	2	3	4	7			
				UDS-1	SS	4.00	4.00-4.45	-	-	-	-			
		Soft Layered	6.50	SPT-3	SS	5.00	5.00-5.45	1	1	2	3			
				UDS-2		6.50	6.50-6.95	-	-	-	-			
Silty **SAND** (SM)	Grey	Dense Granular	11.00	UDS-3	SS	8.00	8.00-8.45	-	-	-	-			
				SPT-4	SS	9.50	9.50-9.95	7	12	21	33			
		Medium Dense Granular	12.50	SPT-5	SS	11.00	11.00-11.45	12	15	27	42			
Greyish, Very Dense, Clayey **SAND** (SC-CL)				SPT-6	SS	12.50	12.50-12.95	8	14	17	31			

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

G.W.L: 2.50 m from G.L on 26.08.16 | No of SPT: 15 Nos | No. of CR: 01 Nos | No. of UDS: 03 Nos | Remarks

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-33
Location	: Perambur
Co-ordinates	: E 1783 N 1077
Type of Boring	: Calyx
Ground Water Level	: 2.50 m from G.L. on 26.08.2016
Termination Depth	: 27.50 m

Drillhole Record -33

Fig No. 23

Start Date : 24.08.2016
End Date : 25.08.2016

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
Clayey SAND (SC-CL)	Grey	Very Dense, Granular		SPT-7	SS	14.00	14.00-14.29	16	>50	-	>100			50/14 cm penetration
				SPT-8	SS	15.50	15.50-15.85	18	37	>50	>100			50/5 cm penetration
			17.00	SPT-9	SS	17.00	17.00-17.9.46	17	28	>50	>100			50/14 cm penetration
CLAY (CH)	Brown	Hard Layered	18.50	SPT-10	SS	18.50	18.50-18.92	14	45	>50	>100			50/12 cm penetration
Silty SAND (SM)	Brown	Very Dense, Granular		SPT-11	SS	20.00	20.0-20.41	18	42	>50	>100			50/11 cm penetration
				SPT-12		21.50	21.50-21.28	33	>50	-	>100			50/13 cm penetration
			22.00	SPT-13	SS	22.00	22.0-23.50	-	-	-	>100			Rebound
Weathered Rock				SPT-14	SS	23.50	23.5-25.0	-	-	-	>100			Rebound
				SPT-15	SS	25.00	25.0-26.0	-	-	-	>100			Rebound
			26.00	CR-1	CS	26.00	26.00-27.50	-	-	-	-	14		5 pieces
Fractured Hard Rock			27.50											

G.W.L: 2.50 m from G.L on 26.08.16	No of SPT: 15 Nos	No. of CR: 1 Nos	No. of UDS: 03 Nos	Remarks

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

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-34	**Drillhole Record -34**	
Location	: Perambur	Fig No. 24	
Co-ordinates	: Stephens Road		
Type of Boring	: Calyx		
Ground Water Level	: 2.10 m from G.L on 10.09.2016	Start Date	: 07.09.2016
Termination Depth	: 29.50 m	End Date	: 09.09.2016

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
Sandy **CLAY** (CH-SC)	Brown	Soft, Layered		UDS-1	SS	0.50	0.50-0.95	-	-	-	-			
				SPT-1	SS	1.00	1.00-1.00	1	1	1	2			
			2.00	SPT-2	SS	2.00	2.00-2.45	2	3	4	7			G.W.L
Silty **SAND** (SM)	Grey	Loose, Granular	3.00	SPT-3	SS	3.00	3.00-3.45	2	3	3	6			
Clayey **SAND** (SC-Cl)	Grey	Loose, Granular		SPT-4	SS	4.00	4.00-4.45	2	3	4	7			
				UDS-2	SS	5.00	5.00-5.45	-	-	-	-			
			6.50	SPT-5	SS	6.50	6.50-6.95	0	1	1	2			
	Dark Grey	Very Loose, Granular	8.00	SPT-6	SS	8.00	8.00-8.45	3	4	4	8			
		Loose, Granular	9.50	SPT-7	SS	9.50	9.50-9.95	4	5	6	11			
Sandy **CLAY** (Cl-SC)	Brown	Stiff, Layered	11.00	SPT-8	SS	11.00	11.00-11.45	3	6	6	12			
Silty **SAND** (SM)	Grey	Medium Dense, Granular	12.50	SPT-9	SS	12.50	12.50-12.95	5	7	9	16			
Greyish, Medium Dense, Sandy **SILT** (ML)														

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

G.W.L: 2.10 m from G.L on 10.09.2016	No of SPT: 19 Nos	No. of UDS: 02 Nos	No. of CR: 01 Nos	**Remarks**

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai

GEO FOUNDATIONS & STRUCTURES PVT. LTD

Bore Hole No	: BH-34	**Drillhole Record -34**	
Location	: Perambur	Fig No. 24	
Co-ordinates	: Stephons Road		
Type of Boring	: Calyx		
Ground Water Level	: 2.10 m from G.L on 10.09.2016	Start Date	: 07.09.2016
Termination Depth	: 29.50 m	End Date	: 09.09.2016

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
Sandy **SILT** (ML)	Grey	Medium Dense, Granular	14.00											
				SPT-10	SS	14.00	14.00-14.45	7	15	24	39			
	Brown	Dense, Granular		SPT-11	SS	15.50	15.50-15.95	9	18	20	38			
			17.00	SPT-12	SS	17.00	17.00-17.45	9	17	29	46			
Silty **SAND** (SM)	Grey	Dense, Granular	18.50	SPT-13	SS	18.50	18.50-18.95	10	12	15	27			
		Medium Dense, Granular	20.00	SPT-14	SS	20.00	20.00-20.45	11	15	21	36			
Clayey **SAND** (SC-Cl)	Brown	Dense, Granular	21.50	SPT-15	SS	21.50	21.50-21.95	14	19	21	40			
Clayey **SAND** (SC-CL)		Dense, Granular	23.00	SPT-16	SS	23.00	23.00-23.45	19	25	41	66			
		Very Dense, Granular	24.50	SPT-17	SS	24.50	24.50-24.54	>50	-	-	>100			50/4 cm penetration
Weathered Rock				SPT-18	SS	26.00	26.00-27.50	-	-	-	>100			Rebound
				SPT-19	SS	27.50	27.50-28.50	-	-	-	>100			Rebound
			28.50	CR-1	CS	28.50	28.50-29.50	-	-	-	-	4		3 pieces
Soft Rock			29.50											

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

G.W.L: 2.10 m from G.L on 10.09.2016	No of SPT: 19 Nos	No. of UDS: 02 Nos	No. of CR: 01 Nos	**Remarks**

APPENDIX II

LAB RESULTS

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur, Chennai					Boring Start: 03.09.2016			CO-ORDINATES				Table No		
								Boring End : 06.09.2016			COOKES ROAD				1		
								Termination Depth m		29					Bore Hole No		
								G.W.T m		2.2					4		
					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	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	TEST METHOD	C in Kg/cm²	Φ in degrees
–	1.00		Filled Up Soil														
–	2.00																
–	3.00																
–	4.00																
7	5.00	SPT-1	Sandy **CLAY**	CH-SC	0	22	78	65	26	39							
–	6.50	UDS-1		CH-SC	0	32	68	58	25	33							
7	8.00	SPT-2		CH-SC	0	35	65	60	26	34							
19	9.50	SPT-3	Silty **SAND**	SM	0	73	27	Non Plastic			13						
17	11.00	SPT-4		SM	1	44	55										
30	12.50	SPT-5	Silty **SAND** with Gravel	SM-G	10	40	50				16						
29	14.00	SPT-6	Sandy **SILT**	ML	3	40	57				18						
31	15.50	SPT-7	Silty **SAND**	SM	3	53	44				11						
47	17.00	SPT-8		SM	4	57	39				14						
53	18.50	SPT-9	Sandy **CLAY**	CH-SC	0	31	69	52	19	33	16						
62	20.00	SPT-10	Silty **SAND**	SM	1	77	22				13						
71	21.50	SPT-11	Sandy **CLAY**	CI-SC	1	40	59	47	17	30	12						
>100	23.00	SPT-12	Silty **SAND** with Gravel	SM-G	15	61	24				13						
>100	24.50	SPT-13	**Weathered ROCK**														
–	26.00	CR-1	**Soft ROCK**														
–	27.50-29.00	CR-2															

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS	PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai	Boring Start: 18.08.2016	CO-ORDINATES	Table No
		Boring End : 20.08.2016	1684 E	2
			737 N	
		Termination Depth m	~27.5 m	Bore Hole No
		G.W.T m	2 m	5

N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAIN SIZE ANALYSIS			ATTERBERG LIMITS			WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	SHEAR PARAMETERS		
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX					TEST METHOD	C in Kg/cm²	Φ in degrees
2	1.00	SPT-1	Clayey **SAND**	SC-CH	0	67	33	62	22	40	16						
4	2.00	SPT-2		SC-CH													
27	3.00	SPT-3		SC-CH	0	63	37				22						
0	4.00	SPT-4		SC-CI	0	64	36	45	17	28	25						
0	5.00	SPT-5		SC-CI													
-	6.50	UDS-1		SC-CI													
22	8.50	SPT-6		SC-CL	0	55	45	28	11	17	16						
21	9.50	SPT-7		SC-CL													
27	11.00	SPT-8		SC-CL	0	60	40				13						
33	12.50	SPT-9		SC-CL	8	43	49				16						
33	14.00	SPT-10		SC-CL													
>100	15.50	SPT-11	Sandy **CLAY**	CI-SC	0	48	52	37	17	20							
>100	17.00	SPT-12	**SAND** with Gravel	SP-G	21	75	4				13						
73	18.50	SPT-13	Silty **SAND**	SM	6	66	28				11						
>100	20.00	SPT-14	**Weathered Rock**														
-	21.50	SPT-15															
-	23.00	SPT-16															
-	24.50	SPT-17															
-	25.50-27.50	CR-1	**Soft Rock**														

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS	PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai	Boring Start: 21.08.2016	CO-ORDINATES	Table No
		Boring End : 23.08.2016	1737 E	3
			733 N	
		Termination Depth m	30.5 m	Bore Hole No
		G.W.T m	1.80 m	6

N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAIN SIZE ANALYSIS			ATTERBERG LIMITS			WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	SHEAR PARAMETERS		
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX					TEST METHOD	C in Kg/cm²	Φ in degrees
5	1.00	SPT-1	Sandy **CLAY**	CH-SC	0	43	57	52	21	31	20						
6	2.00	SPT-2		CH-SC													
2	3.00	SPT-3		CH-SC	0	48	52	54	23	31	13						
_	4.00	UDS-1		CH-SC													
1	5.00	SPT-4	Clayey **SAND**	SC-CL	0	62	38	29	11	18	14						
_	6.50	UDS-2		SC-CL													
12	8.00	SPT-5		SC-CL	0	63	37	28	12	16	15						
19	9.50	SPT-6		SC-CL													
21	11.00	SPT-7		SC-CL							12						
27	12.50	SPT-8		SC-CL													
39	14.00	SPT-9	Sandy **CLAY**	CL-SC													
56	15.50	SPT-10		CL-SC	4	42	54	34	16	18	11						
>100	17.00	SPT-11		CL-SC													
>100	18.00	SPT-12	Weatherd **Rock**														
-	19.50	SPT-13															
-	21.00	SPT-14															
-	22.50	SPT-15															
-	24.00	SPT-16															
-	25.50	CR-1	Soft **Rock**														
-	26.50	CR-2															
_	28.00	CR-3															
_	29.00-30.50	CR-4															

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai					Boring Start: 13.08.2016			CO-ORDINATES			Table No			
								Boring End :17.08.2016			1764E			4			
											731 N						
								Termination Depth		29 m				Bore Hole No			
								G.W.T		2.1 m				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	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	TEST METHOD	C in Kg/cm²	Φ in degrees
3	1.00	SPT - 1	Sandy **CLAY**	CL- SC	0	40	60	26	11	15	20	2.65					
0	2.00	SPT - 2	**CLAY**	CH	0	9	91	56	22	34	13						
0	3.00	SPT - 3		CH													
_	4.00	UDS - 1		CH													
0	5.00	SPT - 4		CI	0	10	90	36	13	23	13						
0	6.50	SPT - 5	Clayey **SAND**	SC-CI													
23	8.00	SPT - 6		SC-CI	0	37	63	43	20	23	10						
23	9.50	SPT - 7		SC-CI	0	36	64	37	18	19	12						
18	11.00	SPT - 8	Sandy **SILT**	ML	0	36	64	on - Plastic									
21	12.50	SPT - 9		ML				Non - Plastic									
25	14.00	SPT - 10		ML				Non - Plastic									
>100	15.50	SPT - 11	Silty **SAND**	SM	9	53	38				11	2.63					
>100	17.00	SPT - 12		SM													
>100	18.50	SPT - 13		SM	3	64	33				11						
>100	20.00	SPT - 14		SM													
>100	21.50	SPT - 15	**Weathered ROCK**														
>100	23.00	SPT - 16															
>100	24.50	SPT - 17															
>100	26.00	SPT - 18															
>100	27.50-29.00	SPT - 19															

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai															
								Boring Start: 17.08.2016			CO-ORDINATES			Table No				
								Boring End :18.08.2016			1742 E			5				
											774 N							
								Termination Depth	27.5 m					Bore Hole No				
								G.W.T	1.8 m					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	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	TEST METHOD	C in Kg/cm²	Φ in degrees
4	1.00	SPT - 1	**CLAY**	CH	0	7	93	64	26	38	21						
5	2.00	SPT - 2		CH	0	5	95				11						
15	3.00	SPT - 3	Silty **SAND**	SM	0	83	17					2.60					
2	4.00	SPT - 4	Sandy **CLAY**	CI-SC	0	35	65	43	17	26	19						
2	5.00	SPT - 5		CI-SC													
--	6.50	UDS - 1		CI-SC													
16	8.00	SPT -6		CI-SC	0	46	54	36	15	21	16						
25	9.50	SPT -7	Clayey **SAND**	SC-CL	0	68	32	32	14	18	18						
25	11.00	SPT -8		SC-CL	0	72	28										
34	12.50	SPT -9	Sandy **SILT**	ML	0	68	32	Non- Plastic									
44	14.00	SPT -10		ML				Non- Plastic									
46	15.50	SPT -11		ML				Non- Plastic									
65	17.00	SPT -12	Silty **SAND**	SM	5	72	23				10						
>100	18.50	SPT -13		SM	9	67	24										
>100	20.00	SPT -14	**Weathered ROCK**														
>100	21.50	SPT -15															
>100	23.00	SPT -16															
>100	24.50	SPT -17	**Soft Rock**														
--	26.00-27.50	CR-1															

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS	PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai	Boring Start: 19.08.2016	CO-ORDINATES	Table No
		Boring End : 20.08.2016	1657 E	6
			739 N	
		Termination Depth m: 28.00 m		Bore Hole No
		G.W.T m: 2.00 m		9

N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAIN SIZE ANALYSIS			ATTERBERG LIMITS			WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	SHEAR PARAMETERS		
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX					TEST METHOD	C in Kg/cm²	Φ in degrees
4	1.00	SPT-1	Clayey **SAND**	SC-CI	2	53	45	36	14	22	16						
6	2.00	SPT-2		SC-CI	0	57	43	38	15	23	24						
6	3.00	SPT-3		SC-CI													
2	4.00	SPT-4		SC-CI	0	63	37	37	13	24	21						
1	5.00	SPT-5	Sandy **CLAY**	CH-SC	1	43	56	58	22	36	11						
_	6.50	UDS-1		CH-SC													
18	8.00	SPT-6	Clayey **SAND**	SC-CL	0	63	37	29	11	18	11						
22	9.50	SPT-7		SC-CL	5	52	43				13						
27	11.00	SPT-8		SC-CL	6	53	41	28	11	17							
55	12.50	SPT-9		SC-CL													
62	14.00	SPT-10		SC-CL	3	62	35	29	10	19							
69	15.50	SPT-11		SC-CL													
>100	17.00	SPT-12	Silty **SAND** With Gravel	SM-G	31	47	22		—	—	12						
>100	18.50	SPT-13		SM-G							11						
>100	20.00	SPT-14	**Weathered Rock**														
>100	21.50	SPT-15															
>100	23.00	SPT-16															
>100	24.50	SPT-17															
-	26.00-28.00	CR-1	**Soft Rock**														

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai							Boring Start: 11.08.2016			CO-ORDINATES			Table No			
										Boring End :13.08.2016			1707 E			7			
													811 N						
										Termination Depth		33.5 m				Bore Hole No			
										G.W.T		1.9 m				10			
					GRAIN SIZE ANALYSIS			ATTERBERG LIMITS								SHEAR PARAMETERS			
	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	TEST METHOD	C in Kg/cm²	Φ in degrees
3	1.00	SPT - 1	Sandy **CLAY**	CI - SC	0	38	62	36	12	24	15	2.64					
_	1.50	UDS - 1															
8	2.00	SPT - 2		CI - SC	3	34	63	40	14	26	20	2.71					
5	3.00	SPT - 3		CI - SC	0	34	66				21						
_	3.50	UDS - 2															
4	4.00	SPT - 4		CI - SC	0	37	63	47	19	28	26						
6	5.00	SPT - 5									25						
5	6.50	SPT - 6	Clayey **SAND**	SC - CL	0	58	42	31	14	17	15						
9	8.00	SPT - 7		SC - CL	1	60	39				14						
18	9.50	SPT - 8		SC - CL	0	60	40				18						
23	11.00	SPT - 9		SC - CL	3	65	32	27	12	15							
21	12.50	SPT - 10		SC - CL	6	40	54				18						
25	14.00	SPT - 11		SC - CL	4	45	51				17						
35	15.50	SPT - 12		SC - CL	8	43	49	31	17	14	17						
37	17.00	SPT - 13		SC - CL	5	52	43				16						
43	18.50	SPT - 14	Silty **SAND**	SM	0	85	15				13						
40	20.00	SPT - 15		SM													
44	21.50	SPT - 16		SM	1	80	19										
55	23.00	SPT - 17		SM	1	86	13				12						
65	24.50	SPT - 18		SM	0	82	18										
_	26.00	CR -1	**Soft Rock**														
_	27.50	CR -2															
_	29.00	CR -3															
_	30.50	CR -4															
_	32.00	CR -5															
_	33.50	CR -6															

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS	PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai	Boring Start: 14.08.2016	CO-ORDINATES	Table No
		Boring End :18.08.2016	1812 E	8
			782 N	
		Termination Depth 31.5 m		Bore Hole No
		G.W.T 2.2 m		14

N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAIN SIZE ANALYSIS			ATTERBERG LIMITS			WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	SHEAR PARAMETERS		
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX					TEST METHOD	C in Kg/cm²	Φ in degrees
6	1.00	SPT -1	Sandy **CLAY**	CI-SC	3	35	62	39	14	25	25	2.72					
7	2.00	SPT -2	Clayey **SAND**	SC-CL	0	69	31	23	12	11	26						
0	3.00	SPT -3		SC-CL							26	2.66					
1	4.00	SPT -4		SC-CL	0	52	48	23	11	12	27						
_	5.00	UDS - 1		SC-CL													
13	6.50	SPT -5	Sandy **CLAY**	CL-SC	0	57	43	29	10	19	12						
24	8.00	SPT -6		CL-SC	1	68	31	33	13	20	15						
36	9.50	SPT -7	Silty **SAND**	SM	0	73	27				14						
28	11.00	SPT -8		SM	0	53	47				13	2.65					
16	12.50	SPT -9		SM													
17	14.00	SPT -10		SM													
28	15.50	SPT -11		SM													
78	17.00	SPT -12		SM	2	63	35				12						
>100	18.50	SPT -13	**Weathered ROCK**														
>100	20.00	SPT -14															
>100	21.50	SPT -15															
>100	23.00	SPT -16															
>100	24.50	SPT -17															
>100	26.00	SPT -18															
>100	27.50	SPT -19															
>100	29.00	SPT -20															
>100	31.50	SPT -21															

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS	PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai	Boring Start: 11.08.2016	CO-ORDINATES	Table No
		Boring End :14.08.2016	1753 E	9
			826 N	
		Termination Depth 35 m		Bore Hole No
		G.W.T 1.95 m		15

N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAIN SIZE ANALYSIS			ATTERBERG LIMITS			WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	SHEAR PARAMETERS		
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX					TEST METHOD	C in Kg/cm²	Φ in degrees
4	1.00	SPT-1	Sandy **CLAY** with Gravel	CI - SC-G	22	14	64	38	13	25	21	2.72					
6	2.00	SPT-2	Sandy **CLAY**	CI - SC	3	15	82	36	15	21							
8	3.00	SPT-3									17	2.63					
4	4.00	SPT-4		CI - SC	1	22	77	37	12	25	13						
6	5.00	SPT-5															
11	6.50	SPT-6	Clayey **SAND**	SC-CL	0	63	37	29	11	18	11						
16	8.00	SPT-7		SC-CL							13						
27	9.50	SPT-8		SC-CL	0	67	33	26	15	11	13						
17	11.00	SPT-9	Silty **SAND**	SM	8	67	25										
20	12.50	SPT-10		SM	9	72	19				12						
31	14.00	SPT-11		SM													
40	15.50	SPT-12		SM													
45	17.00	SPT-13		SM	0	71	29				11	2.60					
49	18.50	SPT-14		SM													
54	20.00	SPT-15		SM	0	84	16				13						
51	21.50	SPT-16		SM													
53	23.00	SPT-17	Silty **SAND** with Gravel	SM -G	16	74	10										
>100	24.50	SPT-18	**Weathered Rock**														
_	26.00	CR-1	**Soft Rock**														
_	27.50	CR-2															
_	29.00	CR-3															
_	30.50	CR-4															
_	32.00	CR-5															
_	33.50 - 35.00	CR-6															

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai					Boring Start: 24.08.2016			CO-ORDINATES				Table No		
								Boring End : 27.08.2016			1684 E				10		
											854 N						
								Termination Depth m	33 m						Bore Hole No		
								G.W.T m	1.8 m						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	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	TEST METHOD	C in Kg/cm²	Φ in degrees
2	1.00	SPT-1	Sandy **CLAY**	CH-SC	0	22	78	52	25	27	11						
4	2.00	SPT-2		CH-SC													
15	3.00	SPT-3	Clayey **SAND**	SC-CL	0	58	42	34	16	18	19						
2	4.00	SPT-4		SC-CL	0	62	38	27	11	16	15						
–	5.00	UDS-1		SC-CL													
12	6.50	SPT-5		SC-CL	0	63	37	31	13	18	16						
–	8.00	UDS-2		SC-CL													
17	9.50	SPT-6		SC-CL	0	61	39	29	11	18	14						
22	11.00	SPT-7		SC-CL													
25	12.50	SPT-8		SC-CL													
33	14.00	SPT-9		SC-CL	9	46	45	32	12	20	11						
39	15.50	SPT-10		SC-CL													
43	17.00	SPT-11		SC-CL													
>100	18.50	SPT-12		SC-CL	6	53	41	31	12	19	17						
>100	20.00	SPT-13	Silty **SAND**	SM	0	82	18				12						
>100	21.50	SPT-14		SM	1	81	18										
–	22.00	SPT-15	**Weathered Rock**														
–	23.50	SPT-16															
–	25.00	SPT-17															
–	26.50	SPT-18															
–	28.00	SPT-19															
–	29.50	CR-1	**Soft Rock**														
–	30.00	CR-2															
–	31.50-33.00	CR-3															

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur, Chennai					Boring Start: 30.08.2016			CO-ORDINATES				Table No		
								Boring End : 01.09.2016			1869 E				11		
											860 N						
								Termination Depth m		28					Bore Hole No		
								G.W.T m		2					21		
					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	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	TEST METHOD	C in Kg/cm²	Φ in degrees
–	1.00		Filled Up Soil														
–	2.00																
5	3.00	SPT-1	Sandy **CLAY**	CH-SC	3	35	62	56	22	34	18						
2	4.00	SPT-2		CH-SC	17	28	55	51	18	33	29						
2	5.00	SPT-3		CH-SC	4	44	52	53	19	34	26						
12	6.50	SPT-4		CH-SC	0	38	62	55	17	38	14						
23	8.00	SPT-5	Clayey **SAND**	SC-Cl	0	76	24				11						
30	9.50	SPT-6		SC-Cl	0	77	23	34	13	21	13						
29	11.00	SPT-7	**SAND**	SP	0	92	8				13						
33	12.50	SPT-8		SP	0	96	4				23						
33	14.00	SPT-9	Clayey **SAND**	SC-CL	2	57	41	32	15	17	11						
37	15.50	SPT-10		SC-CL	1	54	45	25	16	9	14						
40	17.00	SPT-11		SC-CL	3	61	36	27	12	15	13						
52	18.50	SPT-12		SC-CL	5	61	34	29	13	16	15						
52	20.00	SPT-13	Sandy **CLAY**	Cl-SC	6	46	48	42	16	26	15						
>100	21.50	SPT -14	Silty **SAND**	SM	5	73	22										
>100	23.00	SPT -15		SM	8	79	13				11						
>100	24.50	SPT -16	Weathered **Rock**														
–	25.00	CR-1															
–	26.50-28.00	CR-2	**Soft Rock**														

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS

PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai

Boring Start: 25.08.2016	CO-ORDINATES		**Table No**
Boring End : 27.08.2016	1762	E	12
	916	N	
Termination Depth m: 29 m			**Bore Hole No**
G.W.T m: 2.1 m			22

N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAIN SIZE ANALYSIS: GRAVEL, %	SAND, %	SILT & CLAY, %	ATTERBERG LIMITS: LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	SHEAR PARAMETERS: TEST METHOD	C in Kg/cm²	Φ in degrees
5	1.00	SPT-1	Sandy **CLAY**	CI-SC	0	20	80	35	17	18	25						
7	2.00	SPT-2		CI-SC													
3	3.00	SPT-3		CI-SC	0	32	68	45	23	22	21						
_	4.00	SPT-4		CI-SC													
2	5.00	UDS-1		CI-SC	1	24	75	39	20	19	20						
_	6.50	SPT-5		CI-SC													
12	8.00	UDS-2	Clayey **SAND**	SC-CL	0	67	33	32	13	19	19						
20	9.50	SPT-6		SC-CL													
26	11.00	SPT-7		SC-CL	0	70	30	31	14	17							
30	12.50	SPT-8		SC-CL													
22	14.00	SPT-9		SC-CL													
31	15.50	SPT-10		SC-CL	8	73	19				11						
>100	17.00	SPT-11		SC-CL	7	62	31										
>100	18.50	SPT-12		SC-CL	2	68	30	34	16	18	12						
65	20.00	SPT-13	Silty **SAND**	SM	11	71	18				11						
>100	21.50	SPT-14		SM	3	81	16		–	–	11						
>100	23.00	SPT-15	**Weathered Rock**														
_	25.00	CR-1															
_	27.50-29.00	CR-2	**Soft Rock**														

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur, Chennai															
								Boring Start: 27.08.2016			CO-ORDINATES				Table No		
								Boring End : 29.08.2016			1683 E				13		
											960 N						
								Termination Depth m		29 m					Bore Hole No		
								G.W.T m		1.9 m					23		
					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	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	TEST METHOD	C in Kg/cm²	Φ in degrees
	1.00		FILLED UP SOIL														
	2.00																
	3.00																
	4.00																
1	5.00	SPT-1	Silty **SAND**	SM													
1	6.50	SPT-2		SM	0	67	33	Non-Plastic			22						
–	8.00	UDS-1		SM													
1	9.50	SPT-3	Sandy **CLAY**	CI-SC	9	40	51	39	16	23	25						
19	11.00	SPT-4	Silty **SAND**	SM	1	76	23	Non-Plastic			14						
58	12.50	SPT-5	Silty **SAND** with Gravel	SM-G	14	44	42				17						
>100	14.00	SPT-6		SM-G	27	34	39				13						
>100	15.50	SPT-7		SM-G	30	40	30				13						
>100	17.00	SPT-8		SM-G													
>100	18.50	SPT-9	Clayey **SAND**	SC-CL	3	56	41	29	11	18	14						
>100	20.00	SPT-10	Silty **SAND**	SM													
>100	21.50	SPT-11		SM	6	69	25				14						
>100	23.00	SPT-12	**Weathered Rock**														
>100	25.00	SPT-13															
–	26.50-29.00	CR-1	**Soft Rock**														

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai					Boring Start: 31.08.2016			CO-ORDINATES				Table No		
								Boring End : 02.09.2016			1923	E			14		
											877	N					
								Termination Depth m		28					Bore Hole No		
								G.W.T m		2.2					24		
					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	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	TEST METHOD	C in Kg/cm²	Φ in degrees
–	1.00		Filled Up Soil														
–	2.00																
–	3.00																
–	4.00																
–	5.00																
–	6.50																
8	8.00	SPT-1	Clayey **SAND**	SC-CL	0	71	29	32	12	20	15	2.62					
22	9.50	SPT-2	Silty **SAND**	SM	0	85	15										
29	11.00	SPT-3		SM	0	82	18										
23	12.50	SPT-4	Sandy **SILT**	ML	2	25	73	Non-Plastic			20						
33	14.00	SPT-5	Clayey **SAND**	SC-CL	16	45	39	27	11	16	12	2.68					
29	15.50	SPT-6		SC - CL	3	62	35	25	13	12	13						
53	17.00	SPT-7		SC - CL	1	62	37	23	12	11	13						
69	18.50	SPT-8	Silty **SAND**	SM	1	83	16										
>100	20.00	SPT-9		SM	0	79	21										
42	21.50	SPT-10	Silty **SAND** with Gravel	SM-G	11	78	11				12						
>100	23.00	SPT-11		SM-G	33	44	23				14						
>100	24.50	SPT-12	**Weatherd Rock**														
>100	26.00	SPT-13															
–	27.00-28.00	CR-1	**Soft Rock**														

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS	PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai	Boring Start: 25.08.2016	CO-ORDINATES	Table No
		Boring End : 27.08.2016	1818 E	15
			926 N	
		Termination Depth m: 27 m		Bore Hole No
		G.W.T m: 2.m		25

N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAIN SIZE ANALYSIS			ATTERBERG LIMITS			WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	SHEAR PARAMETERS		
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX					TEST METHOD	C in Kg/cm²	Φ in degrees
–	1.00		Filled Up Soil														
–	2.00																
–	3.00																
1	4.00	SPT-1	Sandy CLAY	CH-SC	1	33	66	56	24	32	16	2.65					
–	5.00	UDS-1		CH-SC													
26	6.50	SPT-2	Clayey SAND	SC-CL	0	69	31	30	11	19	14						
12	8.00	SPT-3		SC-CL	0	71	29				15						
–	9.50	UDS - 2		SC-CL													
23	11.00	SPT-4		SC-CL	0	60	40				19						
25	12.50	SPT-5		SC-CL													
27	14.00	SPT-6		SC-CL													
31	15.50	SPT-7		SC-CL													
72	17.00	SPT-8		SC-CL	2	65	33				12						
>100	18.50	SPT-9	Silty SAND	SM	6	67	27				12						
>100	20.00	SPT-10	Clayey SAND	SC-CL	5	51	44	30	11	19	19						
>100	21.50	SPT-11		SC-CL													
>100	23.00	SPT-12	Weathered Rock														
>100	24.50	SPT-13															
–	25.50 - 27.00	CR-1	Soft Rock														

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur, Chennai					Boring Start: 27.08.2016			CO-ORDINATES				Table No		
								Boring End : 29.08.2016			1723 E				16		
											974 N						
								Termination Depth m		29.5					Bore Hole No		
								G.W.T m		2					26		
					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	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	TEST METHOD	C in kg/cm²	Φ in degrees
_	1.00		Filled Up soil														
_	2.00																
_	3.00																
_	4.00																
5	5.00	SPT-1	Silty **SAND**	SM	2	83	15										
1	6.50	SPT-2		SM	0	87	13										
_	8.00	UDS - 1		SM													
23	9.50	SPT-3	Clayey **SAND**	SC-CL	2	68	30	28	12	16							
30	11.00	SPT-4		SC-CL	0	56	44	29	12	17	2.62						
26	12.50	SPT-5		SC-CL													
33	14.00	SPT-6		SC-CL													
42	15.50	SPT-7		SC-CL	7	56	37	32	15	17							
50	17.00	SPT-8		SC-CL	12	55	33	31	12	19							
58	18.50	SPT-9	Sandy **CLAY**	CI-SC	1	43	56	35	17	18							
45	20.00	SPT-10	Silty **SAND**	SM	6	66	28				2.50						
55	21.50	SPT-11		SM													
66	23.00	SPT-12		SM	5	72	23										
>100	24.50	SPT-13	**Weathered Rock**														
_	28.00-29.50	CR-1	**Soft Rock**														

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai					Boring Start: 30.08.2016			CO-ORDINATES				Table No		
								Boring End : 31.08.2016			1684.52 E				17		
											1002.68 N						
								Termination Depth m		29					Bore Hole No		
								G.W.T m		2.5					27		
					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	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	TEST METHOD	C in Kg/cm²	Φ in degrees
–	1.00		FILLED UP SOIL														
–	2.00																
–	3.00																
–	4.00																
–	5.00																
–	6.50																
–	8.00																
23	9.50	SPT-1	Clayey **SAND**	SC-CL	0	68	32	25	11	14	12	2.62					
30	11.00	SPT-2		SC-CL	0	64	36	27	11	16	14						
38	12.50	SPT-3		SC-CL	0	52	48	32	18	14	15	2.65					
39	14.00	SPT-4	Silty **SAND**	SM	8	58	34	Non Plastic			12						
35	15.50	SPT-5		SM	5	59	36				12						
41	17.00	SPT-6		SM	9	46	45				13						
44	18.50	SPT-7	Sandy **CLAY**	CI-SC	0	46	54	43	17	26	11	2.72					
48	20.00	SPT-8		CI-SC	1	43	56	38	16	22	12						
49	21.50	SPT-9	Silty **SAND**	SM	1	75	24				13						
60	23.00	SPT-10	Silty **SAND** with Gravel	SM-G	36	50	14				11						
>100	24.00	SPT-11	**Weatherd Rock**														
>100	25.50	SPT-12															
–	27.00-29.00	CR-1	**Soft Rock**														

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur, Chennai															
								Boring Start: 30.08.2016			CO-ORDINATES				Table No		
								Boring End : 31.08.2016			1900 E				18		
											948 N						
								Termination Depth m		29					Bore Hole No		
								G.W.T m		2.3					28		
					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	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	TEST METHOD	C in Kg/cm²	Φ in degrees
–	1.00		FILLED UP SOIL														
–	2.00																
–	3.00																
–	4.00																
1	5.00	SPT-1	Clayey **SAND**	SC-CI	0	56	44	39	18	21	24	2.68					
–	6.50	UDS -1	Sandy **CLAY**	CH-SC	0	35	65	56	25	31							
1	8.00	SPT-2		CH-SC	3	28	69	63	20	43	25						
33	9.50	SPT-3	Clayey **SAND**	SC-CI	0	65	35	47	16	31	12						
13	11.00	SPT-4	Sandy **SILT**	ML				Non - Plastic									
16	12.50	SPT-5		ML	0	39	61				17.5	2.55					
51	14.00	SPT-6		ML	12	36	52				20						
>100	15.50	SPT-7		ML													
>100	17.00	SPT-8	Silty **SAND**	SM													
>100	18.50	SPT-9		SM	3	50	47				15						
>100	20.00	SPT-10		SM	4	56	40				16						
39	21.50	SPT-11		SM	2	81	17				10						
>100	23.00	SPT-12	**Weathered Rock**														
>100	25.00	SPT-13															
>100	26.50	SPT-14															
–	27.50-29.00	CR-1	**Soft Rock**														

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS	PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai	Boring Start: 27.08.2016	CO-ORDINATES	Table No
		Boring End : 29.08.2016	1794 E	19
			1001 N	
		Termination Depth m: 30		Bore Hole No
		G.W.T m: 1.9		29

N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAIN SIZE ANALYSIS: GRAVEL, %	SAND, %	SILT & CLAY, %	ATTERBERG LIMITS: LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	SHEAR PARAMETERS: TEST METHOD	C in Kg/cm²	Φ in degrees
_	1.00		**FILLED UP SOIL**														
8	2.00	SPT-1	Sandy **CLAY**	CI-SC	3	38	59	35	15	20	14						
1	3.00	SPT-2		CH-SC				50	22	28	14						
1	4.00	SPT-3	Clayey **SAND**	SC-CL	0	57	43	29	13	16	17						
1	5.00	SPT-4		SC-CL													
_	6.50	UDS-1		SC-CL													
14	8.00	SPT-5		SC-CL	0	62	38	30	12	18	19						
27	9.50	SPT-6		SC-CL													
23	11.00	SPT-7	Silty **SAND**	SM	1	74	25				16						
33	12.50	SPT-8		SM													
27	14.00	SPT-9	Clayey **SAND** with Gravel	SC-CL - G	10	53	37	31	11	20	14						
53	15.50	SPT-10	Sandy **CLAY**	CL-SC	1	38	61				18						
77	17.00	SPT-11	Clayey **SAND**	SC-CL	9	50	41				14						
61	18.50	SPT-12		SC-CL	7	54	39				14						
>100	20.00	SPT-13		SC-CL	1	61	38	27	12	15	14						
>100	21.50	SPT-14	Clayey **SAND** with Gravel	SC-CL - G	19	42	39				12						
>100	23.00	SPT-15	Clayey **SAND**	SC-CL	2	61	37				11						
>100	24.00	SPT-16	**Soft Rock**														
_	25.50	CR-1															
_	27.00	CR-2															
_	28.50	CR-3															
_	30.00	CR-4															

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS	PROJECT: Soil Investigation work for Binny Mills Project, Perambur, Chennai	Boring Start: 27.08.2016	CO-ORDINATES	Table No
		Boring End : 30.08.2016	1728 E	20
			1041 N	
		Termination Depth 29 m		Bore Hole No
		G.W.T 2.10 m		30

N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAIN SIZE ANALYSIS			ATTERBERG LIMITS			WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	SHEAR PARAMETERS		
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX					TEST METHOD	C in Kg/cm²	Φ in degrees
-	1.00		Filled up **SOIL**														
-	2.00																
-	3.00																
-	4.00																
1	5.00	SPT-1	Silty **SAND** with Gravel	SM - G	22	68	10				26	2.65					
1	6.50	SPT-2	Clayey **SAND**	SC - CL	2	55	43	30	13	17	25						
38	8.00	SPT-3	Silty **SAND**	SM	1	70	29				14						
30	9.50	SPT-4		SM	0	74	26				13	2.55					
28	11.00	SPT-5		SM	0	70	30	Non - Plastic			13						
51	12.50	SPT-6	Clayey **SAND**	SC - CL	6	52	42	32	14	18	15						
41	14.00	SPT-7	Silty **SAND**	SM	0	68	32	Non - Plastic			11						
45	15.50	SPT-8	Clayey **SAND**	SC - CL	9	50	41	27	10	17	12						
67	17.00	SPT-9		SC - CL	2	59	39	Non - Plastic			14						
>100	18.50	SPT-10	Sandy **GRAVEL**	GP	70	21	9				14						
>100	20.00	SPT-11	Silty **SAND**	SM	0	88	12				12	2.60					
>100	21.50	SPT-12		SM	1	86	13				10						
>100	23.00	SPT-13	**Weathered Rock**														
_	25.00	CR-2															
--	26.50-29.00	CR-3	**Fractured Hard Rock**														

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur, Chennai					Boring Start: 21.08.2016			CO-ORDINATES				Table No		
								Boring End : 23.08.2016			1982 E				21		
											970 N						
								Termination Depth		30 m					Bore Hole No		
								G.W.T		4.90 m					31		
					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	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	TEST METHOD	C in Kg/cm²	Φ in degrees
36	1.00	SPT-1	Silty **SAND**	SM	5	66	29				21	2.65					
3	2.00	SPT-2	Sandy **CLAY**	CL-SC	4	36	60	29	11	18	25						
12	3.00	SPT-3	Silty **SAND**	SM	0	61	39	Non - Plastic			25						
2	4.00	SPT-4	Sandy **CLAY**	CL-SC	0	31	69	34	16	18	25	2.72					
3	5.00	SPT-5	Clayey **SAND**	SC-CL	1	50	49	28	12	16	27						
4	6.50	SPT-6		SC-CL	0	61	39										
-	8.00	UDS-1	Silty **SAND**	SM													
37	9.50	SPT-7		SM	0	85	15				12						
37	11.00	SPT-8		SM													
32	12.50	SPT-9		SM													
38	14.00	SPT-10		SM	2	81	17										
55	15.50	SPT-11		SM													
>100	17.00	SPT-12	Sandy **SILT**	ML	4	38	58	Non - Plastic			18						
>100	18.50	SPT-13		ML				Non - Plastic									
34	20.00	SPT-14		ML	3	32	65	Non - Plastic									
60	21.50	SPT-15		ML				Non - Plastic									
>100	22.50	SPT-16	**Weathered Rock**														
>100	24.00	SPT-17															
>100	25.50	SPT-18															
>100	27.00	SPT-19	**Soft Rock**														
-	28.50-30.00	CR-2															

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur, Chennai					Boring Start: 21.08.2016			CO-ORDINATES				Table No		
								Boring End : 25.08.2016			1872 E				22		
											1025 N						
								Termination Depth		30 m					Bore Hole No		
								G.W.T		3.0 m					32		
					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	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	TEST METHOD	C in Kg/cm²	Φ in degrees
21	1.00	SPT-1	Filled up **SOIL**														
-	2.00	_															
-	3.00	_															
5	4.00	SPT-2	Sandy **CLAY**	CL-SC	5	39	56	31	13	18		2.62					
-	5.00	UDS-1		CL-SC	7	45	48	34	13	21	29						
3	6.50	SPT-3		CL-SC	5	43	52										
-	8.00	UDS-2		CL-SC													
27	9.50	SPT-4	Clayey **SAND**	SC-CL	0	68	32	31	12	19	11						
>100	11.00	SPT-5	Silty **SAND**	SM	2	87	11				12	2.65					
48	12.50	SPT-6	Sandy **CLAY**	CI-SC	0	43	57	35	17	18	13						
43	14.00	SPT-7		CI-SC													
>100	15.50	SPT-8	Clayey **SAND**	SC-CL	0	64	36	29	11	18	13						
>100	17.00	SPT-9		SC-CL	0	56	44				15						
>100	18.50	SPT-10		SC-CL	4	51	45				13						
>100	19.00	SPT-11	**Weathered Rock**														
>100	20.50	SPT-12															
>100	22.00	SPT-13															
>100	23.50	SPT-14															
>100	25.00	SPT-15															
-	26.00	CR -1	**Fractured Hard Rock**														
-	27.50	CR -2															
-	28.50-30.00	CR -3															

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur, Chennai					Boring Start: 24.08.2016			CO-ORDINATES				Table No		
								Boring End : 25.08.2016			1783 E				23		
											1077 N						
								Termination Depth		27.50 m							
								G.W.T		2.50 m					Bore Hole No		
					GRAIN SIZE ANALYSIS			ATTERBERG LIMITS							33		
															SHEAR PARAMETERS		
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	TEST METHOD	C in Kg/cm²	Φ in degrees
18	1.00	SPT-1	Silty **SAND**	SM	3	82	15										
-	2.00	_	Filled up **SOIL**														
7	3.00	SPT-2	Sandy **CLAY**	CI-SC	0	35	65	36	18	18		2.72					
-	4.00	UDS-1		CI-SC													
3	5.00	SPT-3		CI-SC	0	31	69	38	16	22	21						
-	6.50	UDS-2	Silty **SAND**	SM	7	68	25										
-	8.00	UDS-3		SM													
33	9.50	SPT-4		SM	3	78	19				16						
42	11.00	SPT-5		SM													
31	12.50	SPT-6	Clayey **SAND**	SC-CL	1	68	31	32	12	20	14						
>100	14.00	SPT-7		SC-CL													
>100	15.50	SPT-8		SC-CL	0	63	37	34	11	23	16						
>100	17.00	SPT-9	**CLAY**	CH	1	12	87	56	21	35	26						
>100	18.50	SPT-10	Silty **SAND**	SM	3	56	41				13						
>100	20.00	SPT-11		SM													
>100	21.50	SPT-12		SM	4	67	29				11						
>100	22.00	SPT-13	**Weathered Rock**														
>100	23.50	SPT-14															
>100	25.00	SPT-15															
-	26.00-27.50	CR-1	**Fractured Hard Rock**														

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS	PROJECT: Soil Investigation work for Binny Mills Project, Perambur, Chennai	Boring Start: 07.09.2016	CO-ORDINATES	Table No
		Boring End : 09.09.2016	STEPHANS ROAD	24
		Termination Depth m	29.5	Bore Hole No
		G.W.T m	2.1	34

N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAIN SIZE ANALYSIS			ATTERBERG LIMITS			WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	SHEAR PARAMETERS		
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT,%	PLASTIC LIMIT,%	PLASTICITY INDEX					TEST METHOD	C in Kg/cm²	Φ in degrees
_	0.50	UDS-1	Sandy **CLAY**	CH-SC	0	35	65	50	23	27		2.72					
2	1.00	SPT-1		CH-SC	1	37	62	58	20	38	25						
7	2.00	SPT-2	Silty **SAND**	SM	9	60	31				24						
6	3.00	SPT-3	Clayey **SAND**	SC-CI	0	57	43										
7	4.00	SPT-4		SC-CI	0	59	41	36	15	21	16	2.62					
_	5.00	UDS -2		SC-CI					—	—							
2	6.50	SPT-5		SC-CI							14						
8	8.00	SPT-6		SC-CI	0	53	47	41	17	24	15						
11	9.50	SPT-7	Sandy **CLAY**	CI-SC	0	42	58	44	17	27	16						
12	11.00	SPT-8	Silty **SAND**	SM	0	65	35										
16	12.50	SPT-9		ML	6	35	59				17						
39	14.00	SPT-10	Sandy **SILT**	ML	4	32	64	Non Plastic			18						
38	15.50	SPT-11		ML	2	43	55				21						
46	17.00	SPT-12	Silty **SAND**	SM	4	49	47										
27	18.50	SPT-13		SM	10	49	41										
36	20.00	SPT-14	Clayey **SAND**	SC-CI	15	36	49	35	15	20							
40	21.50	SPT-15		SC-CL	0	63	37	32	14	18							
66	23.00	SPT-16	Silty **SAND**	SM	7	72	21										
>100	24.50	SPT -17	**Weathered Rock**														
_	26.00	CR-1															
_	27.50	CR-2															
_	28.50	CR-3															
_	29.50	CR-4	**Soft Rock**														

NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

APPENDIX III

CHEMICAL ANALYSIS OF WATER

ISO 9001 : 2008 Certified

GEO FOUNDATIONS & STRUCTURES PVT LTD

No.89, I stMain Road, Gandhi Nagar, Adyar, Chennai – 600 020. Ph: 044 - 24430399
Website: www.geofoundations.net Email: geogfs@gmail.com

PROJECT NAME: Soil Investigation for the proposed structures at Perambur, Chennai

A) NATURE OF SAMPLE : WATER

B) REFERENCE NO. : SI/CHN/16/1336/05

RESULTS OF ANALYSIS

TESTS					
Sl.No		**BH-22**	**BH-24**	**BH-30**	
1	To neutralize 100 ml. of water using Phenolphthalein as indicator.	1.50 ml	1.60 ml	1.40 ml	Not more than 5.0 ml. of 0.02N NAOH
2	To neutralize 100 ml. of water using mixed indiator	**41.5 ml**	**39.4 ml**	**43.6 ml**	Not more than 25.0 ml. of 0.02N HCl
3	Organic matters mg/l	154	165	192	200 max
4	Inorganic solids mg/l	2602	2651	2704	3000 Max
5	Sulphate as SO_3 mg/l	**402**	**405**	**404**	400 Max.
6	Chloride as Cl mg/g	**824**	**825**	**830**	I.2000 Max for Plain concrete II. 500 Max for reinforced concrete
7	Total Suspended matter mg/l	10	15	9	2000 Max
8	pH @ 25°C	7.5	7.9	8.1	6.0 Min

Remarks: The sample submitted does not conform to I.S.code with reference to Sl.No 2 , 5 and 6 hence, it cannot be used for construction purpose.

APPENDIX IV

ELECTRICAL RESISTIVITY TEST

2.0 ELECTRICAL RESISTIVITY TEST

1.0 INTRODUCTION

1.1 The field studies were carried out in **September 2016**. This report summarizes Earth Resistivity values for 2 different locations.

2.0 OBJECT OF INVESTIGATION

2.1 The object of investigation is to ascertain the variation in apparent resistivity of sub-soil below the ground level and to obtain an idea about the variation in soil profile at the proposed site. Electrical Resistivity values are required for designing safety grounding system in the area.

3.0 FIELD INVESTIGATIONS

3.1 The method depends on the difference in the electrical resistance of different soil strata. These are several methods by which the field resistivity measurements are made. The most popular method is by Wenner's four-electrode configuration. The test is carried out as per IS 3043-1987.

3.2 Four electrodes were driven into the ground at equal spacing and designed depth .The four electrodes are connected to the terminals of the earth resistivity meter. The resistivity meter is pressed "ON" to allow the current to flow through the electrodes .On pressing the "TEST" switch available in the meter for 10 ohms and 1000 ohms, the resistance value is displayed in the meter, which is noted down.

3.3 Readings of resistance for different electrode spacing in different directions are noted as per the said procedure.

4.0 METHOD OF COMPUTING OF RESISTIVITY VALUE

Earth resistivity is calculated by according to the formula.

$= 2 \pi d R$

Where

R = resistance in Ohms (megger reading for 10 ohm)

d = is the distance between spikes if spikes are placed at equal distances (m).

5.0 RESULTS

The values of resistivity, calculated as per formula given in section 4.0 above are as enclosed. After finding out the resistivity, average resistivity value at very test locations were also calculated and given in Table No: 2.1. The polar resistivity curves were drawn as per IS: 3043-1987 under Clause: 36.6. And corresponding other graphs are also drawn shown in figure no. 1.1 to 2.4.

GRAPHICAL REPRESENTATION 1- POLAR GRAPH AS PER IS 3043 - 1987

ERT - 1

Direction	Average Resistivity in each direction					
	1 m	2 m	5 m	10 m	15 m	Avg.
N	7.41	7.79	5.03	5.65	3.77	6.47
E	7.48	2.51	3.77	4.40	2.83	4.54
S	12.06	7.54	5.34	2.51	3.77	6.86
W	7.92	3.14	5.97	3.77	4.71	5.20

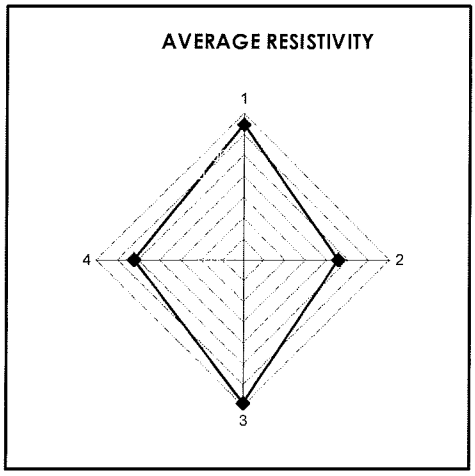


FIG NO 1.1

Average Resistivity at 15 m (ohm-meter) : 5.77

The term 1,2,3,4 in Polar graph indicates direction N, E, S, W respectively.

Each axis unit indicates 1 Ohm - m

ERT 1

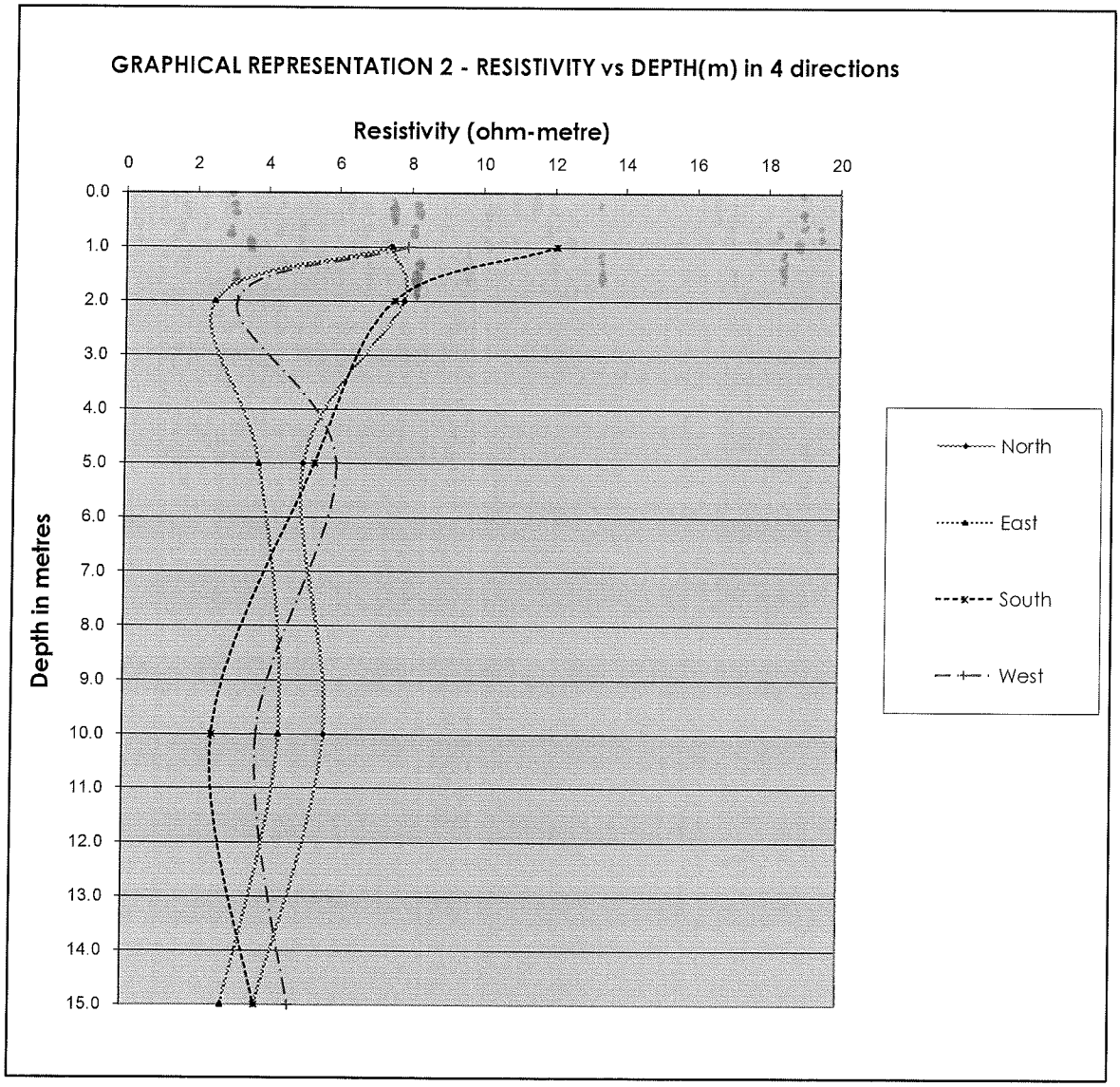


Fig No : 1.2

ERT 1

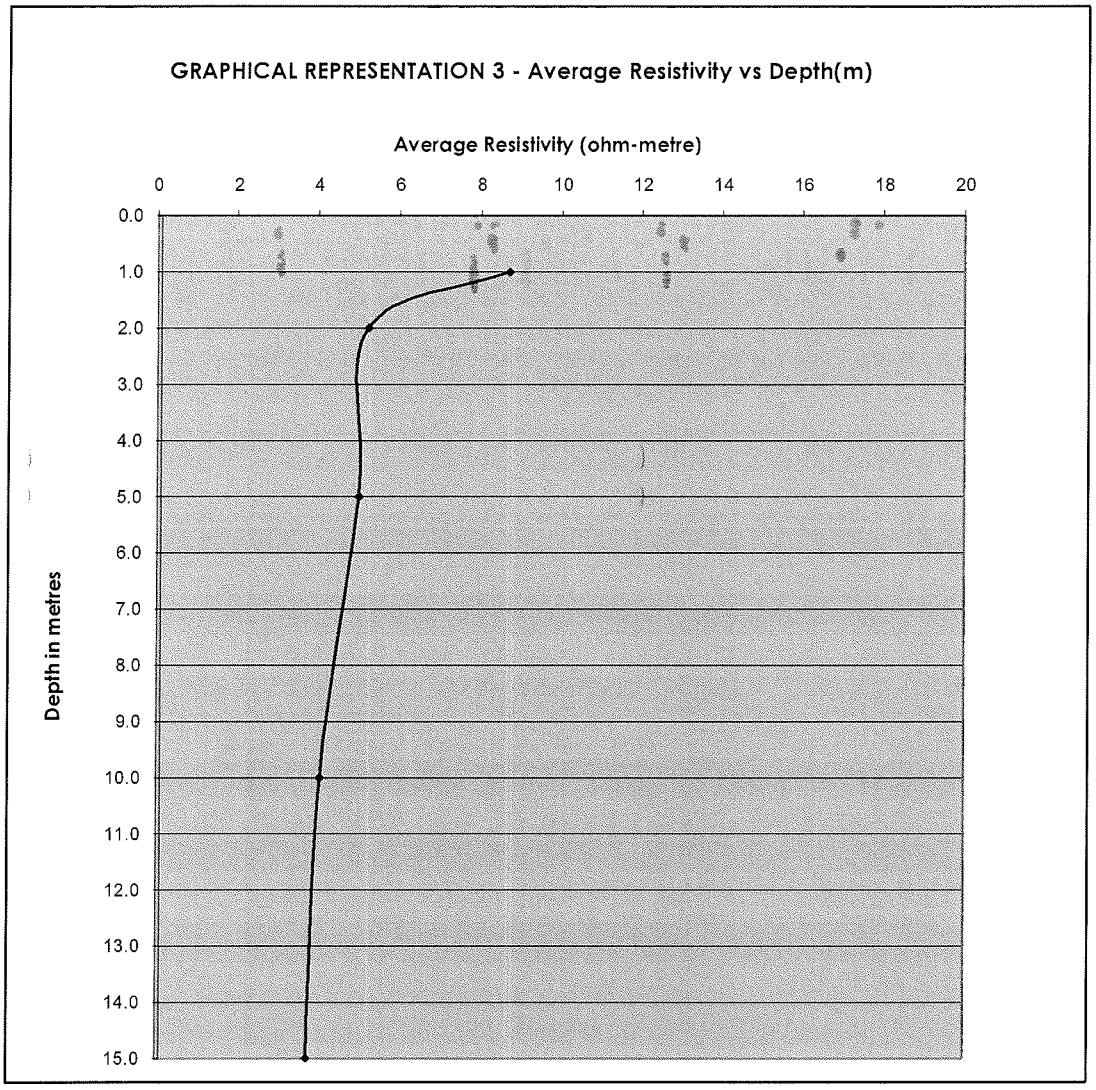


Fig No : 1.3

ERT 1

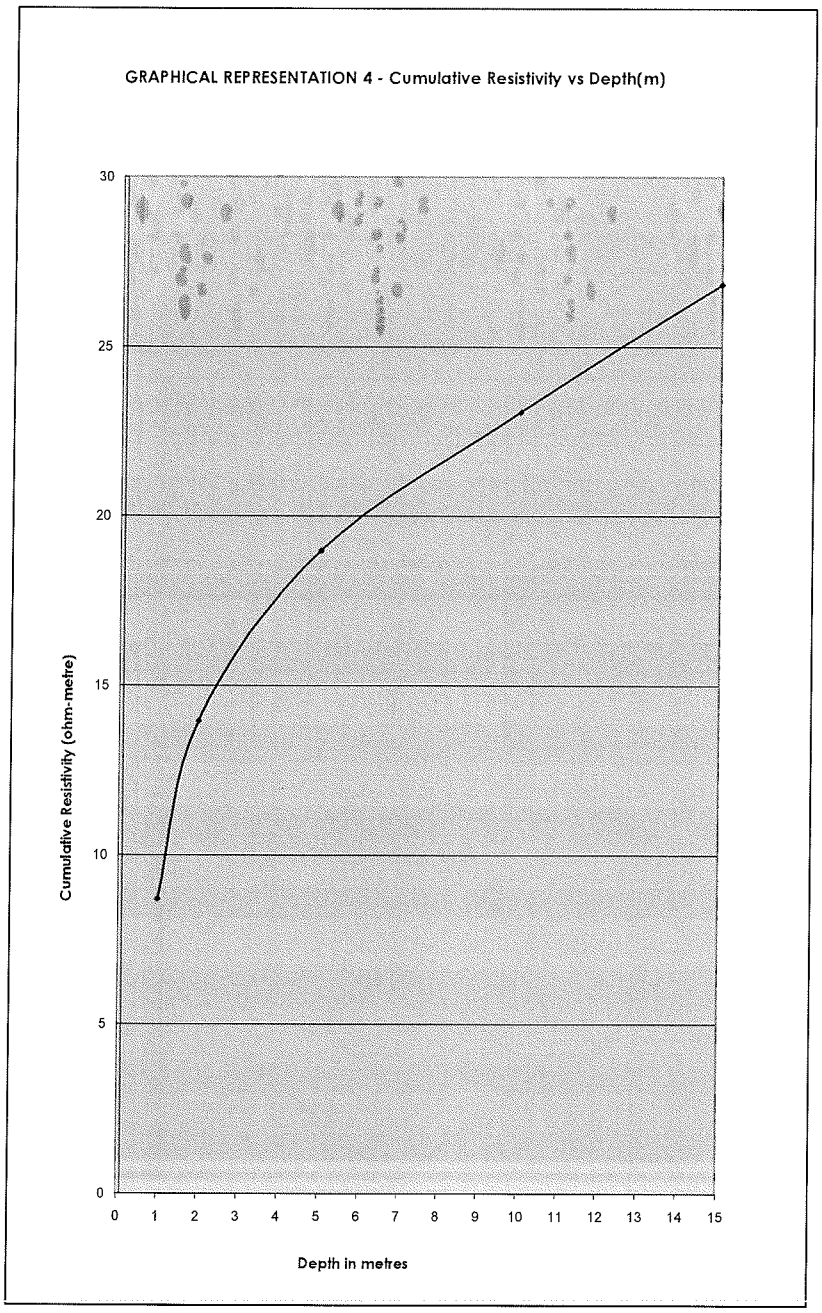


Fig No : 1.4

GRAPHICAL REPRESENTATION 1- POLAR GRAPH AS PER IS 3043 - 1987

ERT - 2

Direction	Average Resistivity in each direction					
	1 m	2 m	5 m	10 m	15 m	Avg.
N	7.48	5.40	3.46	3.14	1.88	4.87
E	5.78	8.67	5.97	3.77	1.88	6.05
S	6.66	5.65	5.03	3.77	1.88	5.28
W	10.18	10.56	4.08	3.14	2.83	6.99

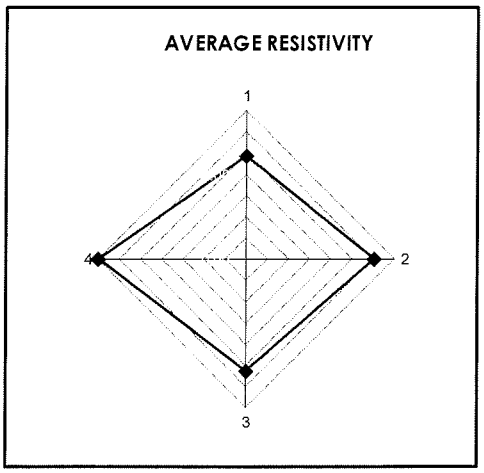


FIG NO 2.1

Average Resistivity at 10 m (ohm-meter) : 5.80

The term 1,2,3,4 in Polar graph indicates direction N, E, S, W respectively.

Each axis unit indicates 1 Ohm - m

ERT 2

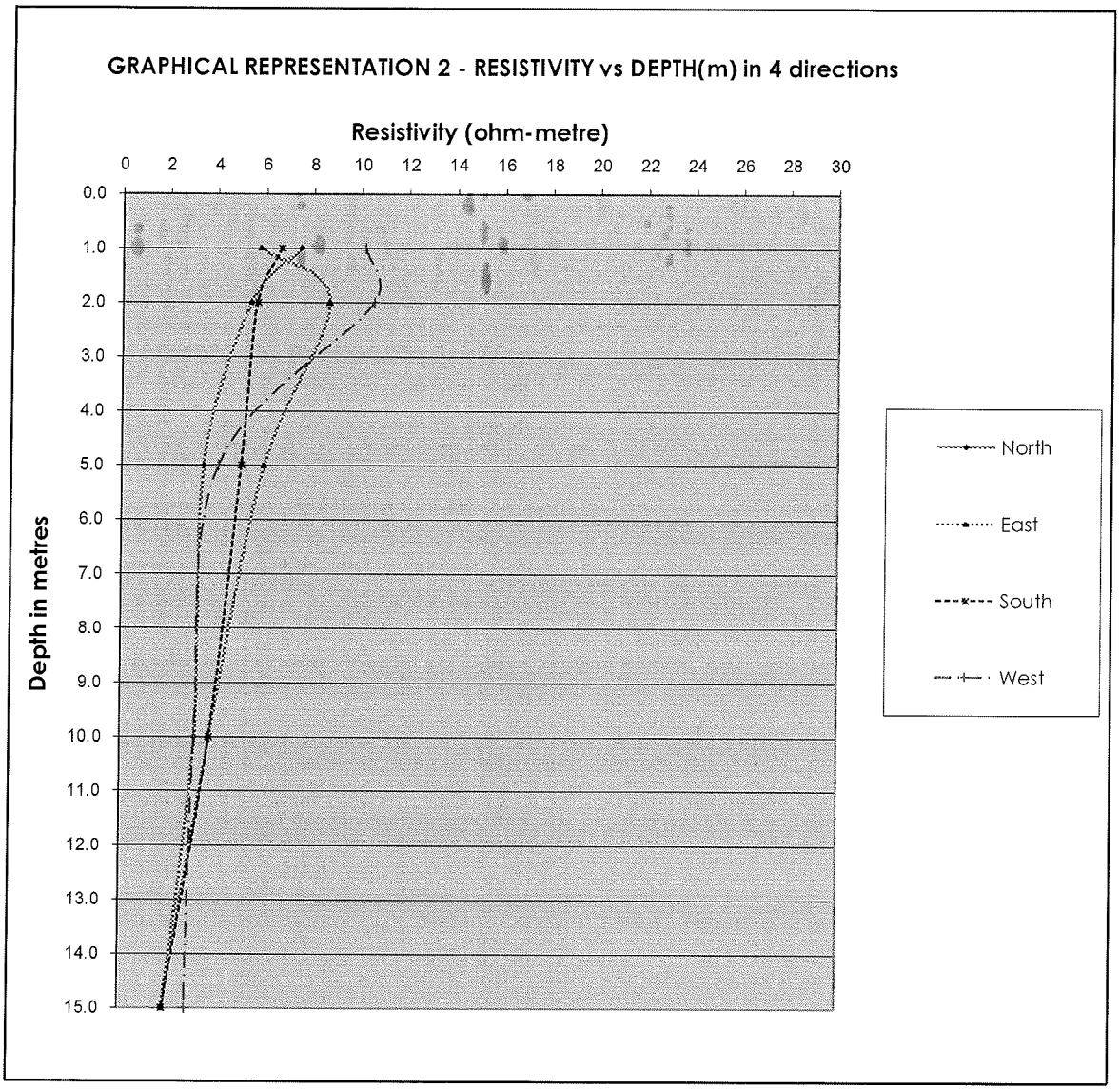


Fig No : 2.2

ERT 2

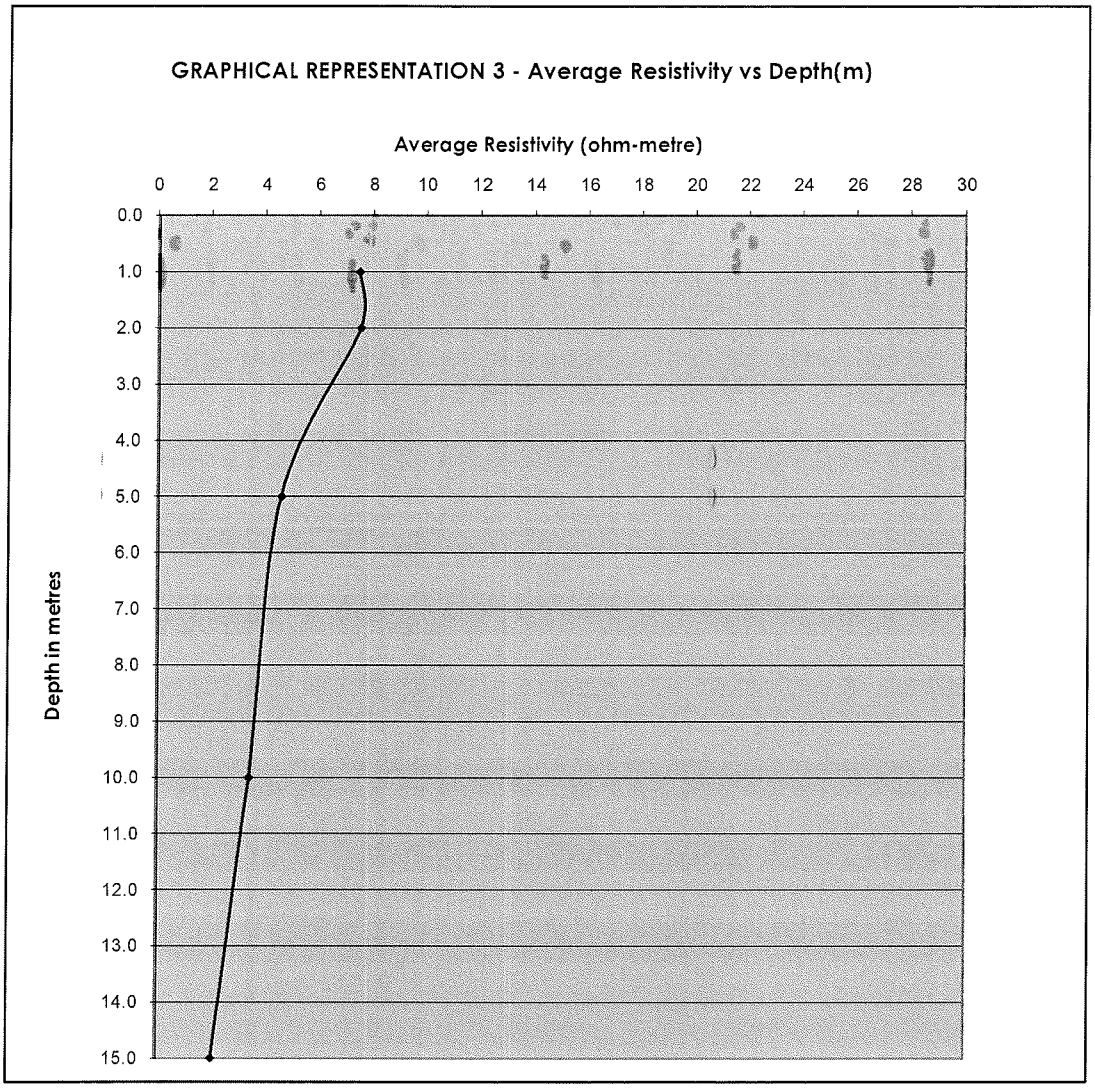
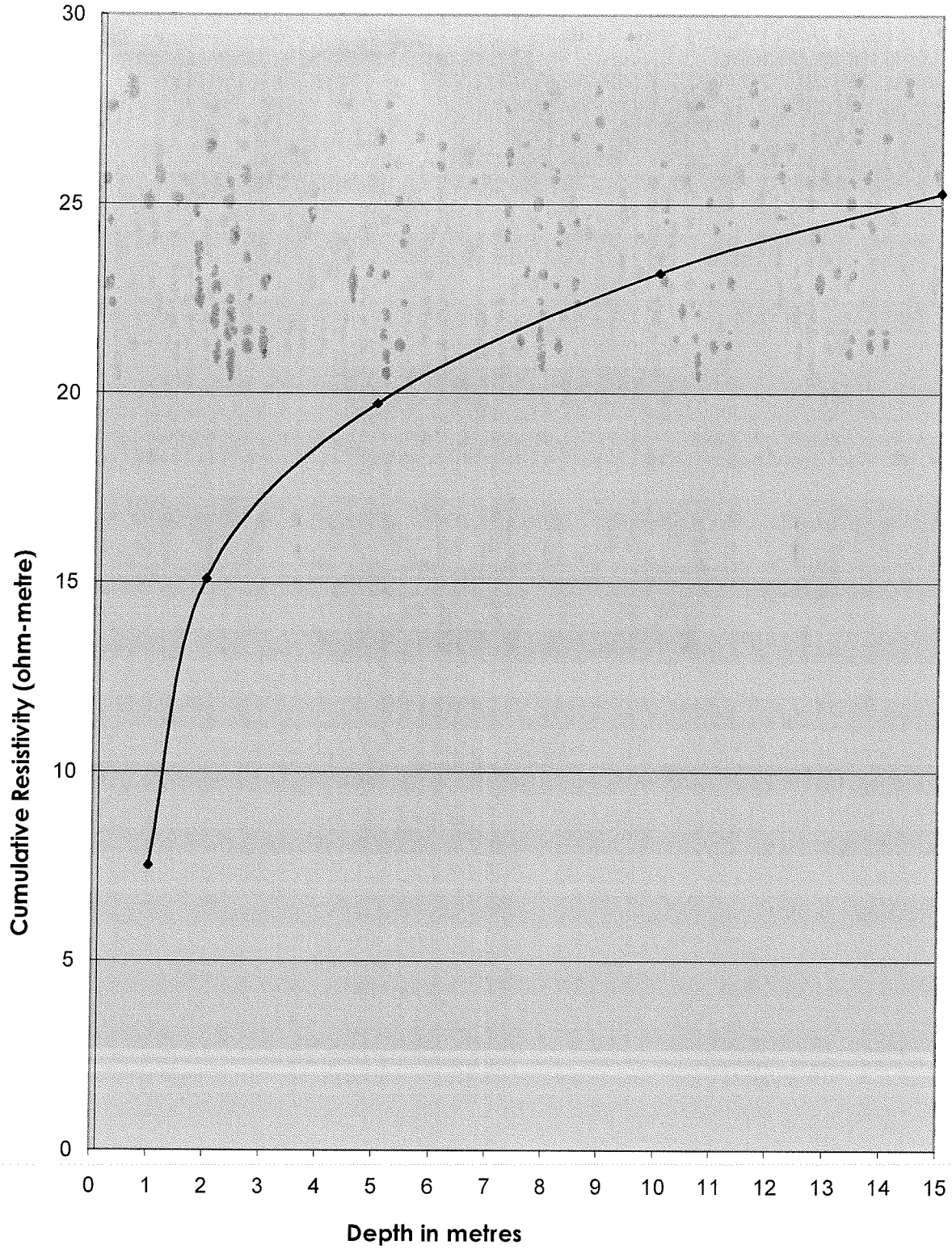


Fig No : 2.3

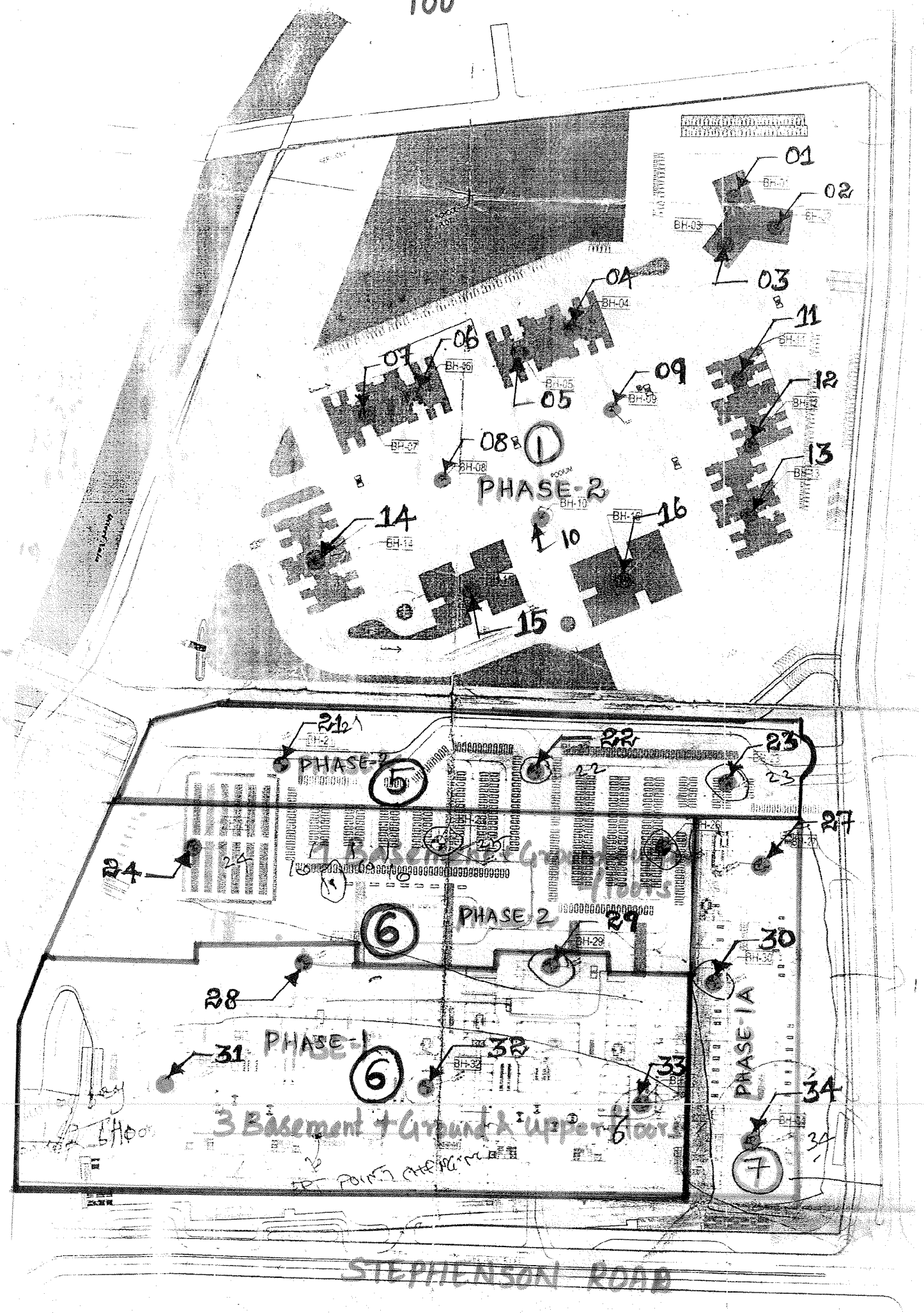
GRAPHICAL REPRESENTATION 4 - Cumulative Resistivity vs



APPENDIX V

BORE HOLES LOCATION DRAWING

100


01
02
03
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11
12
13
14
15
16
PHASE-2
21
22
23
24
25
27
28
29
30
31
32
33
34
PHASE-2
PHASE 2
PHASE-1
PHASE-1A
3 Basement + Ground + upper floors
STEPHENSON ROAD
SITE BOUNDARY LINE

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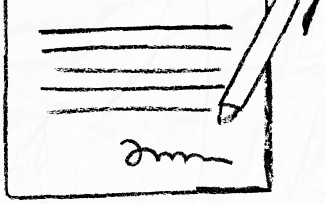

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