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GEOTECHNICAL INVESTIGATION FOR BINNY MILLS

Project at Stephenson Road RS.No.218/2, 218/5, 219/1 to 6, 220/2 of Block No.11
and R.S No.221/2, 222/1 & 2 of Block No.12, Perambur Town, Division 73,
Zone VI, Purasaiwalkam - Perambur Taluk, Chennai.

CLIENT

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

TITLE

FINAL REPORT

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

OCTOBER 2016



GEO FOUNDATIONS & STRUCTURES PVT LTD

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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 1: 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 medium 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 to 26 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 to 4 m, very loose clayey sand up to 5 m, 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, 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 to 17 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 **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 to 11 m, medium dense sandy silt up to 14 m, and very dense sandy silt up to 17 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 zone 1, 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	275	2	1.8
			90	380	2.6	2.4
			100	450	3	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	275	2.5	2
			90	380	3	2.6
			100	450	3.3	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/m²

- 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/m^3 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/m^3 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)	Recommended safe Lateral capacity (T) at 4 m from GL (fixed head condition)
6 (Phase 2)	BH 28, 29 & 30	18 to 23 m	75	275	2	1.5
			90	380	2.5	2
			100	450	3	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 SO₃) 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/ m³ of concrete and with maximum free water: cement ratio of 0.5, super sulphated cement or sulphate resisting portland cement with a minimum cement content of 310kg/ m³ 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.



A.Suresh Kumar, M.Tech. (Geo Technical).

D.G.M. (Geo Technical).

APPROVED BY,

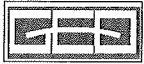
Dr. K. Muthukrishnaiah BE(Hons), M.Tech., Ph.D.,

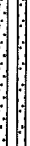
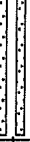
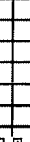
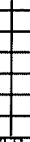
(Professor & Head, Ocean Engineering Dept. IIT Madras)(Rtd),

(Chief Consultant)

APPENDIX I

BORE LOGS

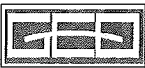
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																										
 GEO FOUNDATIONS & STRUCTURES PVT. LTD			Bore Hole No. BH-04 Location Perambur Co-ordinates Cooks Road Type of Boring Calyx Ground Water Level 2.20 m from G.L on 07.09.2016 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)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D (%)	REMARKS			
										15cm	30cm	45cm		20	40	60	80	100								
Filed up soil		Building debris	5.00			SPT-1	SS	1.00																		
								2.00																		
								3.00																		
								4.00																		
								5.00																		
Sandy CLAY (CH-SC)	Dark Grey	Medium stiff, Layered	9.50			UDS-1	SS	5.00-5.45	2	3	4	7														
								6.50-6.95	-	-	-	-														
								8.00-8.45	2	3	4	7														
								9.50-9.95	6	8	11	19														
								11.00-11.45	5	8	9	17														
Silty SAND (SM)	Grey	Medium Dense, Granular	11.00			SPT-2	SS	8.00-8.45	2	3	4	7														
								9.50-9.95	6	8	11	19														
								11.00-11.45	5	8	9	17														
								12.50-12.95	7	12	18	30														
								12.50-12.95	7	12	18	30														
Silty SAND with Gravel (SM-G)	Grey	Medium Dense, Granular	12.50			SPT-3	SS	9.50-9.95	6	8	11	19														
								11.00-11.45	5	8	9	17														
								12.50-12.95	7	12	18	30														
								12.50-12.95	7	12	18	30														
								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														

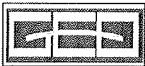
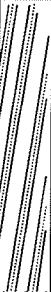
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																						
 GEO FOUNDATIONS & STRUCTURES PVT. LTD					Bore Hole No : BH-04 Location : Perambur Co-ordinates : Cooks Road Type of Boring : Calyx Ground Water Level : 2.20 m from G.L on 07/09/2016 Termination Depth : 29.00 m										Drill hole Record - BH-04 Fig No. 1 Start Date : 03.09.2016 End Date : 06.07.2016							
SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D (%)	REMARKS		
									15cm	30cm	45cm		20	40	60	80	100					
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																			
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										
Silty SAND with Gravel (SM-G)	Brown	Very Dense, Granular	24.50		SPT-13	SS	24.50	24.50-24.52	>50	-	-	>100										
Weathered Rock			26.00		CR-1	CS	26.00	26.00-27.50	-	-	-	-									2 pieces	
					CR-2	CS	27.50	27.50-29.00	-	-	-	-										
Soft Rock			29.00																			
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										

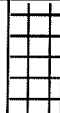
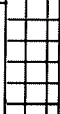
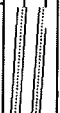
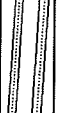
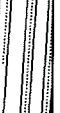
Note: SPT-Standard Penetration Test SS-Soil Sample

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-05				Drillhole Record -BH-05														
				Location : Perambur Co-ordinates : 1684 E, 737 N Type of Boring : Calyx Ground Water Level : 2.00 m from G.L on 21.08.2016 Termination Depth : 27.50 m				Fig No. 2 Start Date : 18.08.2016 End Date : 20.08.2016														
SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D (%)	REMARKS		
									15cm	30cm	45cm		20	40	60	80	100					
Clayey SAND (SC-CH)	Brown	Very loose, Granular	3.00		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										
	Grey	Medium Dense,	4.00		SPT-3	SS	3.00	3.00-3.45	8	12	15	27										
					SPT-4	SS	4.00	4.00-4.45	0	0	0	0										
Clayey SAND (SC-CI)	Grey	Medium Dense, Granular	8.50		SPT-5	SS	5.00	5.00-5.45	0	0	0	0										
					UDS-1	SS	6.50	6.50-6.95	-	-	-	-										
					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										
					SPT-9	SS	12.50	12.50-12.95	10	14	19	33										
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										

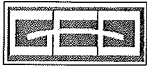
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																					
 GEO FOUNDATIONS & STRUCTURES PVT. LTD					Bore Hole No : BH-05 Location : Perambur Co-ordinates : 1684 E, 737 N Type of Boring : Calyx Ground Water Level : 2.00 m from G.L on 21.08.2016 Termination Depth : 27.50 m							Drillhole Record -BH-05									
												Fig No. 2									
												Start Date : 18.08.2016 End Date : 20.08.2016									
SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES				SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D(%)	REMARKS
									15cm	30cm	45cm		20	40	60	80	100				
Clayey SAND (SC-CI)	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					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			25.50		CR-1	CS	25.50	25.50-27.50	-	-	-	>100								4 pieces	
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 24.08.2016 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)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R. (%)	R.Q.D(%)	REMARKS				
									15cm	30cm	45cm		20	40	60	80	100							
Sandy CLAY (CH-SC)	Brown	Medium Stiff, Layered	3.00		SPT-1	SS	1.00	1.00-1.00	2	2	3	5												
					SPT-2	SS	2.00	2.00-2.45	2	3	3	6												
	Dark Grey	Soft, Layered	5.00		SPT-3	SS	3.00	3.00-3.45	0	1	1	2												
					UDS-1	SS	4.00	4.00-4.45	-	-	-	-												
Clayey SAND (SC-CL)	Dark Grey	Very Loose Granular	6.50		SPT-4	SS	5.00	5.00-5.45	0	0	1	1												
					UDS-2	SS	6.50	6.50-6.95	-	-	-	-												
	Dark Grey	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												
Clayey SAND (SC-CL)	Grey	Medium Dense, Granular			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)					SPT-9	SS	14.00	14.00-14.45	13	18	21	39												
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 Penetration Test SS-Soil Sample

UDS-Un Disturbed Sample CS-Core Sample

CR-Core Recovery, RQD-Rock Quality Designation

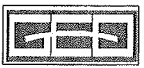
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																									
				Bore Hole No : BH-06 Location : Perambur Co-ordinates : 1737 E, 733 N Type of Boring : Calyx Ground Water Level : 1.80 m from G.L on 24.08.2016 Termination Depth : 30.50 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)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D (%)	REMARKS					
									15cm	30cm	45cm		20	40	60	80	100								
Sandy CLAY (CL-SC)	Grey	Hard Layered	18.00		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													
					SPT-12	SS	18.00	18.00-19.50	-	-	-	>100													
Weathered Rock			25.50		SPT-13	SS	19.50	19.50-21.00	-	-	-	>100													
					SPT-14	SS	21.00	21.00-22.50	-	-	-	>100													
					SPT-15	SS	22.50	22.50-24.00	-	-	-	>100													
					SPT-16	SS	24.00	24.00-25.50	-	-	-	>100													
Soft Rock			30.50		CR-1	CS	25.50	25.50-26.50	-	-	-	-							14		2 pieces				
					CR-2	CS	26.50	26.50-28.00	-	-	-	-									12		3 pieces		
					CR-3	CS	28.00	28.00-29.00	-	-	-	-									17		5 pieces		
					CR-4	CS	29.00	29.00-30.50	-	-	-	-									12		12 pieces		
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													

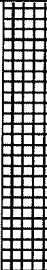
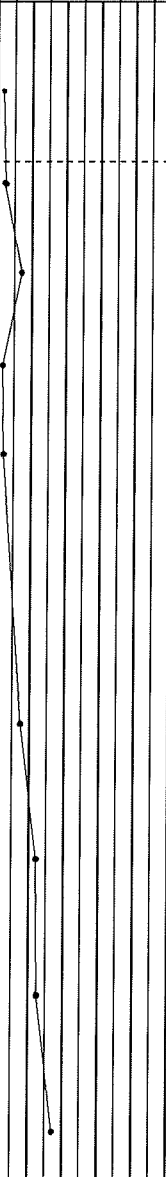
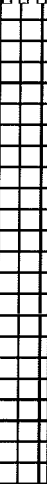
Note: SPT-Standard Penetration Test SS-Soil Sample

UDS-Un Disturbed Sample CS-Core Sample

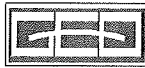
CR-Core Recovery, RQD-Rock Quality Designation

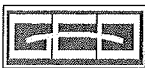
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																					
				Bore Hole No : BH-07 Location : Perambur Co-ordinates : E 1764 N 731 Type of Boring : Co/yx Ground Water Level : 2.10 m from G.L on 18.08.2016 Termination Depth : 29.0 m				Drillhole Record -07 Fig No. 4		Start Date : 13.08.2016 End Date : 17.08.2016											
SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES				SPT 'N' Blow/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D (%)	REMARKS
									15cm	30cm	45cm		20	40	60	80	100				
Brownish, soft, Sandy CLAY (CI-SC)			2.00		SPT-1	SS	1.00	1.00-1.45	1	1	2	3									
					SPT-2	SS	2.00	2.00-2.45	0	0	0	0									
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													
CLAY (CI)			6.50		SPT-4	SS	5.00	5.00-5.45	0	0	0	0									
					SPT-5	SS	6.50	6.50-6.95	0	0	0	0									
Clayey SAND (SC-CI)	Grey	Medium Dense, Granular			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									
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												

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																					
 GEO FOUNDATIONS & STRUCTURES PVT. LTD				Bore Hole No: BH-07				Dillhole Record -07													
				Location: Perambur				Fig No. 4													
Co-ordinates: E 1764 N 731				Type of Boring: Calyx				Start Date: 13.08.2016													
Ground Water Level: 2.10 m from G.L on 18.08.2016				Termination Depth: 29.0 m				End Date: 17.08.2016													
SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES				SPT 'N' Blow/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D (%)	REMARKS
Sandy SILT (ML)	Brown	Medium Dense Granular	15.50		SPT-10	SS	14.00	14.00-14.45	9	10	15	25									
					SPT-11	SS	15.50	15.50-15.94	18	38	>50	>100									
Silty SAND (SM)	Brown	Very Dense, Granular	21.50		SPT-12	SS	17.00	17.00-17.44	22	31	>50	>100									
					SPT-13	SS	18.50	18.50-18.89	21	38	>50	>100									
					SPT-14	SS	20.00	20.00-20.41	28	42	>50	>100									
					SPT-15	SS	21.50	20.00-21.50	-	-	-	>100									
Weathered Rock			29.00		SPT-16	SS	23.00	21.50-23.00	-	-	-	>100									
					SPT-17	SS	24.50	23.00-24.50	-	-	-	>100									
					SPT-18	SS	26.00	24.50-26.00	-	-	-	>100									
					SPT-19	SS	27.50	26.00-27.50	-	-	-	>100									
					SPT-20	SS	29.00	27.50-29.00	-	-	-	>100									
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												

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																			
 GEO FOUNDATIONS & STRUCTURES PVT. LTD				Bore Hole No BH-08 Location Perambur 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 Termination Depth 27.5m				Drillhole Record - 8					Start Date 17.08.2016 End Date 18.08.2016						
								Fig No. 5											
SOIL DESCRIPTION	COLOR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES			SPT'N' Blow/300mm	SPT 'N' PROFILE					REMARKS	
									15cm	30cm	45cm		20	40	60	80	100		C.R (%)
CLAY (CH)	Brown	Soft, Layered	3.00		SPT-1	SS	1.00	1.00-1.45	2	2	2	4							
					SPT-2	SS	2.00	2.00-2.45	2	2	3	5							
Silty SAND (SM)	Brown	Medium Dense, Granular	4.00		SPT-3	SS	3.00	3.00-3.45	3	5	10	15							
					SPT-4	SS	4.00	4.00-4.45	1	1	1	2							
Sandy CLAY (CI-SC)	Dark Brown	Soft, layered	8.00		SPT-5	SS	5.00	5.00-5.45	1	1	1	2							
					UDS-1	SS	6.50	6.50-6.95	-	-	-	-							
					SPT-6	SS	8.00	8.00-8.45	6	7	9	16							
					SPT-7	SS	9.50	9.50-9.95	8	11	14	25							
Clayey SAND (SC-CL)	Dark Brown	Medium Dense, Granular	12.50		SPT-8	SS	11.00	11.00-11.45	7	12	13	25							
					SPT-9	SS	12.50	12.50-12.95	14	18	16	34							
Greyish, Medium Dense, Sandy SILT (ML)					SPT-9	SS	12.50	12.50-12.95	14	18	16	34							
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 Location : Perambur 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 Termination Depth : 27.5m							Drillhole Record - 8								
												Fig No. 5								
												Start Date : 17.08.2016 End Date : 18.08.2016								
SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES			SPT 'N' Blow/300mm	SPT 'N' PROFILE					Ck (%)	R.Q.D(%)	REMARKS
									15cm	30cm	45cm		20	40	60	80	100			
Sandy SILT (H.L)	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								
Silty SAND (SM)	Brown	Very Dense, Granular	15.50		SPT-12	SS	17.00	17.00-17.45	19	26	39	65								
					SPT-13	SS	18.50	18.50-18.76	28	>50	-	>100								50/11 cm penetration
Weathered Rock			20.00		SPT-14	SS	20.00	20.00-20.09	>50	-	-	>100								50/09 cm penetration
					SPT-15	SS	21.50	21.50-23.00	-	-	-	>100								Rebound
					SPT-16	SS	23.00	23.00-24.50	-	-	-	>100								
Soft Rock			24.50		CR-1	CS	24.50	24.50-26.00	-	-	-	-							6	3 pieces
					CR-2	CS	26.00	26.00-27.50	-	-	-	-								8
			27.50	No. of SPT: 16 Nos	No. of UDS: 01 Nos			No. of CR: 02 Nos				Remarks								
G.W.L: 1.80 m from G.L on 19.08.2016																				

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																					
 GEO FOUNDATIONS & STRUCTURES PVT. LTD				Bore Hole No. BH-09 Location Perambur Co-ordinates 1657 E, 739 N Type of Boring Calyx Ground Water Level 2.00 m from G.L on 21.08.2016 Termination Depth 26.00 m				Drillhole Record -BH-09 Fig No. 6 Start Date 19.08.2016 End Date 20.08.2016													
SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D(%)	REMARKS	
									15cm	30cm	45cm		20	40	60	80	100				
Clayey SAND (SC-CI)	Brown	Very loose, Granular	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									
	Dark Grey	Loose, Granular	4.00		SPT-3	SS	3.00	3.00-3.45	3	3	3	6									
					SPT-4	SS	4.00	4.00-4.45	0	1	1	2									
					SPT-5	SS	5.00	5.00-5.45	0	0	1	1									
Sandy CLAY (CH-SC)	Dark Grey	Very Soft, Layered	8.00		UDS-1	SS	6.50	6.50-6.95	-	-	-	-									
					SPT-6	SS	8.00	8.00-8.45	5	8	10	18									
Clayey SAND (SC-CL)	Brown	Medium Dense, Granular	12.50		SPT-7	SS	9.50	9.50-9.95	7	10	12	22									
					SPT-8	SS	11.00	11.00-11.45	10	12	15	27									
					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									

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 Co-ordinates : 16.57 E, 73.9 N Type of Boring : Calyx Ground Water Level : 2.00 m from G.L on 21.08.2016 Termination Depth : 28.00 m				Fig No : 6 Start Date : 19.08.2016 End Date : 20.08.2016																
SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D (%)	REMARKS				
									15cm	30cm	45cm		20	40	60	80	100							
Clayey SAND (SC-CL)	Grey	Very Dense, Granular	17.00		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												
					SPT-12	SS	17.00	17.00-17.39	28	40	>50	>100												
Silty SAND With Gravel (SM-G)	Red	Very Dense, Granular	20.00		SPT-13	SS	18.50	18.50-18.90	22	40	>50	>100												
					SPT-14	SS	20.00	20.00-20.34	25	41	>50	>100												
					SPT-15	SS	21.50	21.50-23.00	-	-	-	>100												
Weathered Rock					SPT-16	SS	23.00	23.00-24.50	-	-	-	>100												
					SPT-17	SS	24.50	24.50-26.00	-	-	-	>100												
					CR-1	CS	26.00	26.00-28.00	-	-	-	-												
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 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-10 Location : Perambur Co-ordinates : E 1707, N 811 23 Type of Boring : Cdyx 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	COLOR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	REMARKS		
									15cm	30cm	45cm		20	40	60	80	100				
Sandy CLAY (C-SC)	Brown	Medium Silty, 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	3	4									
					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									
Clayey SAND (SC-CL)	Grey	Loose Granular Medium Dense Granular			SPT-6	SS	6.50	6.50-6.95	2	2	3	5									
					SPT-7	SS	8.00	8.00-8.45	3	4	5	9									
					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									
					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 Boing : Cdyx 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			SPT 'N' Blow / 300mm	SPT 'N' PROFILE					C.E (%)	R.Q.D(%)	REMARKS	
									15cm	30cm	45cm		20	40	60	80	100				
Clayey SAND (SC-CL)	Gray	Dense, Granular	18.50		SPT-13	SS	17.00	17.00-17.45	10	17	20	37									
					SPT-14	SS	18.50	18.50-18.95	9	20	23	43									
Silty SAND (SM)	Brown	Dense, Granular	23.00		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									
					SPT-17	SS	23.00	23.00-23.45	15	24	31	55									
					SPT-18	SS	24.50	24.50-24.95	20	26	39	65									
Soft Rock			33.50		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	
					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															

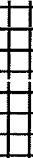
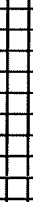
Note: SPT-Standard Penetration Test SS-Soil Sample

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-14 Location Perambur Co-ordinates E 1812 N 782 Type of Boring Cdyx 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	COLOR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES			SPT 'N' Blow/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D (%)	REMARKS				
									15cm	30cm	45cm		20	40	60	80	100							
Sandy CLAY (CI-SC)	Brown	Medium stiff, Layered	2.00		SPT-1	SS	1.00	1.00-1.45	2	3	3	6												
					SPT-2	SS	2.00	2.00-2.45	2	3	4	7											G.W.L	
Clayey SAND (SC-CI)	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 (SI-1)	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 Cdr 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			SPT 'N' Blow/300mm	SPT 'N' PROFILE					C.U (%)	R.Q.D (%)	REMARKS					
										15cm	30cm	45cm		20	40	60	80	100								
Silty SAND (SM)		Brown	Medium Dense, Granular	17.00		SPT-12	SS	17.00	17.00-17.45	13	29	49	78													
			Very Dense, Granular	18.50		SPT-13	SS	18.50	18.50-18.55	>50	-	-	>100											50/5 cm Penetration		
Weathered Rock						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
						SPT-21	SS	31.50	29.00-31.50	-	-	-	>100													Rebound
G.W.L. 2.2m from G.L on 19.08.16			No. of SPT-21 Max			No. of RQS-01 Max		Remarks																		

Project : Geo-technical Investigation for the proposed township at Old Binny Mills, Perambur, Chennai																				
 GEO FOUNDATIONS & STRUCTURES PVT. LTD				Bore Hole No : SH-15 Location : Perambur Co-ordinates : E 1753 N 826 Type of Boring : Cally Ground Water Level : 2 m from G.L. on 15.08.2016 Termination Depth : 35.00 m								Borehole 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			SPT 'N' Blow/300mm	SPT 'N' PROFILE					C.F. (%)	REMARKS	
									15cm	30cm	45cm		20	40	60	80	100			
Sandy CLAY with Gravel (CI-SC-G)	Brown	Self Layered	2.00		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	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								
					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								
Clayey SAND (SC-CL)	Gray	Medium Dense Granular	8.00		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								
					SPT-9	SS	11.00	11.00-11.45	5	7	10	17								
		Dense Granular	11.00		SPT-10	SS	12.50	12.50-12.95	8	9	11	20								
					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								
Silty SAND (SM)	Brown	Medium Dense Granular	12.50																	
Silty SAND (SM)	Brown	Medium Dense Granular	15.50																	
G.W.L. : 2 m from G.L. on 15.08.16			No. of SPT : 18 Nos			No. of CR : 06 Nos			Remarks											

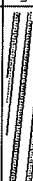
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																			
 GEO FOUNDATIONS & STRUCTURES PVT. LTD				Bore Hole No : BH-15 Location : Perambur Co-ordinates : E 1753 N 826 Type of Boring : Cdrx Ground Water Level : 2 m from G.L. on 15.08.2016 Termination Depth : 35.00 m								Drillhole Record -15							
												Fig No. 9							
												Start Date : 11.05.2016 End Date : 14.08.2016							
SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES			SPT 'N' Blow/200mm	SPT 'N' PROFILE					C.R.(%)	REMARKS
									15cm	30cm	45cm		20	40	60	80	100		
Silty SAND (Sd)	Brown	Dense, Granular	18.50		SPT-13	SS	17.00	17.00-17.45	13	20	25	45							
					SPT-14	SS	18.50	18.50-18.95	10	22	27	49							
	Brown	Very Dense, Granular	23.00		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							
Silty SAND With Gravel (SMA-G)	Brown	Very Dense, Granular	24.50		SPT-17	SS	23.00	23.00-23.45	14	21	32	53							
					SPT-18	SS	24.50	24.50-24.64	>50	-	-	>100							
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	-	-	-	-					28	nil	
					CR-3	CS	29.00	29.00-30.50	-	-	-	-					24	42 pieces	
					CR-4	CS	30.50	30.50-32.00	-	-	-	-					15	13 pieces	
					CR-5	CS	32.00	32.00-33.50	-	-	-	-					12	4 pieces	
					CR-6	CS	33.50	33.50-35.00	-	-	-	-					15	29 pieces	
G.W.L. : 2 m from G.L. on 15.08.16					No. of SPT : 18 Nos				No. of CR : 06 Nos				Remarks						

Note: SPT-Standard Penetration Test SS-Soil Sample

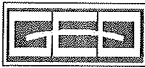
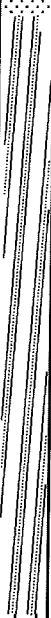
UDS-Un Disturbed Sample CS-Core Sample

CR-Core Recovery, ROD-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-16 Location : Perambur Coordinates : 13°44' E 85°44' N Type of Boring : Cyclic Ground Water Level : 1.80 m from G.L on 28.08.2016 Termination Depth : 33.00 m				Drill Hole Record - BH-16 Fig No. 10		Start Date : 24.08.2016 End Date : 27.08.2016													
SOIL DESCRIPTION	COLOR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT 'N' PROFILE				CR (%)	RA (%)	REMARKS					
								15cm	30cm	45cm	SPT 'N'	Blows/300mm	20	40	60	80	100						
Sandy CLAY (CH-SC)	Brown	Soft Clayey	3.00		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											
					SPT-3	SS	3.00	3.00-3.45	4	6	9	15											
Clayey SAND (SC-CL)	Grey	Medium Dense Granular	4.00		SPT-4	SS	4.00	4.00-4.45	1	1	1	2											
					UDS-1	SS	5.00	5.00-5.45	-	-	-	-											
					SPT-5	SS	6.50	6.50-6.95	4	5	7	12											
	Brown	Medium Dense Granular		UDS-2	SS	8.00	8.00-8.45	-	-	-	-												
				SPT-6	SS	9.50	9.50-9.95	7	7	10	17												
				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												
				SPT-10	SS	15.50	15.50-15.95	12	16	23	39												
G.W.L: 1.50m 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 Coordinates : 1684 E 854N Type of Boring : Cyclic 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 : 24.06.2016		End Date : 27.06.2016				
SOIL DESCRIPTION	COLOR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES			Penetration Blow/300mm	SPT 'N' PROFILE					REMARKS
Clayey SAND (SC-Cl)	Gray	Dense, Granular	18.50		SPT-11	SS	17.00	17.00-17.45	13	19	24	43						
		Very Dense, Granular			SPT-12	SS	18.50	18.50-18.91	18	39	>50	>100						50/11 cm penetration
	Silty SAND (SA)	Brown	Very Dense, Granular	20.00		SPT-13	SS	20.00	20.00-20.29	38	>50	-	>100					
22.00				SPT-14		SS	21.50	21.50-21.77	39	>50	-	>100						50/12 cm penetration
Weathered Rock			29.50		SPT-15	SS	22.00	22.00-23.50	-	-	-	>100						
	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
Soft Rock		33.00		CR-1	CS	29.50	29.50-30.00	-	-	-	-							12 Pieces
				CR-2	CS	30.00	30.00-31.50	-	-	-	-							Nil
				CR-3	CS	31.50	31.50-33.00	-	-	-	-							Nil
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					

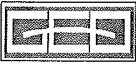
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																				
 GEO FOUNDATIONS & STRUCTURES PVT. LTD				Bore Hole No : BH-21 Location : Perambur Co-ordinates : 1869 E, 860 N Type of Boring : Cofix Ground Water Level : 2.00 m from G.L on 02.09.2016 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			SPT 'N' Blow/300mm	SPT 'N' PROFILE					C.R. (%)	R.Q.D. (%)	REMARKS
									15cm	30cm	45cm		20	40	60	80	100			
Filled up soil		Building Debris	3.00		SPT-1	SS	1.00	1.00-1.45												
							2.00	2.00-2.45												
							3.00	3.00-3.45	1	2	3	5								
							4.00	4.00-4.45	0	1	1	2								
							5.00	5.00-5.45	0	1	1	2								
							6.50	6.50-6.95	4	5	7	12								
							8.00	8.00-8.45	6	10	13	23								
							9.50	9.50-9.95	8	14	16	30								
							11.00	11.00-11.45	10	13	16	29								
							12.50	12.50-12.95	12	15	18	33								
																</				

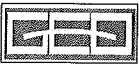
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																					
 GEO FOUNDATIONS & STRUCTURES PVT. LTD					Bore Hole No : BH-21 Location : Perambur Co-ordinates : 1869 E, 860 N Type of Boring : Calyx Ground Water Level : 2.00 m from G.L on 02.09.2016 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			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D(%)	REMARKS	
									15cm	30cm	45cm		20	40	60	80	100				
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 (CI-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	-	-	-	-									Nil
			26.50		CR-2	CS	26.50	26.50-28.00	-	-	-	-									
Soft Rock			28.00																15		7 Pieces
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 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																					
										Bore Hole No : BH-22		Drillhole Record - BH-22									
										Location : Perambur		Fig No: 12									
GEO FOUNDATIONS & STRUCTURES PVT. LTD										Co-ordinates : 1762 E, 916 N		Start Date : 25.08.2016									
Type of Boring : Calyx										Ground Water Level : 2.10 m from G.L on 28.08.2016		End Date : 27.08.2016									
Termination Depth : 29.00 m																					
SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D (%)	REMARKS	
									15cm	30cm	45cm		20	40	60	80	100				
Sandy CLAY (CI-SC)	Brown	Medium Stiff, Layered	3.00		SPT-1		1.00	1.00-1.45	2	2	3	5									
					SPT-2		2.00	2.00-2.45	4	3	4										
					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										
Clayey SAND (SC-CL)	Brown	Medium Dense, Granular	8.00		UDS-2		6.50	6.50-6.95	-	-	-	-									
					SPT-5		8.00	8.00-8.45	4	4	8	12									
	Grey			SPT-6		9.50	9.50-9.95	6	9	11	20										
				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									

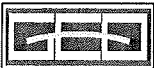
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																								
										Bore Hole No : BH-22 Location : Perambur Co-ordinates : 1762 E, 916 N Type of Boring : Calyx Ground Water Level : 2.10 m from G.L on 28.08.2016 Termination Depth : 29.00 m					Drillhole Record - BH-22 Fig No. 12 Start Date : 25.08.2016 End Date : 27.08.2016									
SOIL DESCRIPTION	COLOR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT 'N' Blow/300mm	SPT 'N' PROFILE					C.F. (%)	R.Q.D. (%)	REMARKS				
									15cm	30cm	45cm		20	40	60	80	100							
Clayey SAND (SC-CL)	Grey	Medium Dense, Granular	17.00		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												
					SPT-11	SS	17.00	17.00-17.43	12	27	>50	>100												50/13 cm penetration
					SPT-12	SS	18.50	18.50-18.92	19	30	>50	>100												50/12 cm penetration
Silty SAND (SL)	Brown	Very Dense, Granular	20.00		SPT-13	SS	20.00	20.00-20.45	20	27	38	65												
					SPT-14	SS	21.50	21.50-21.79	27	>50	-	>100												50/14 cm penetration
Weathered Rock			23.00		SPT-15	SS	23.00	23.00-23.26	34	>50	-	>100											50/11 cm penetration	
					CR-1	CS	25.00	25.00-27.50	-	-	-	-												Nil
Soft Rock			27.50		CR-2	CS	27.50	27.50-29.00	-	-	-	-											19 Pieces	
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												

Note: SPT-Standard Penetration Test SS-Soil Sample

UDS-Un Disturbed Sample CS-Core Sample

CR-Core Recovery, RQD-Rock Quality Designation

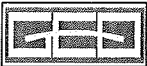
CR-Core Recovery, RQD-Rock Quality Designation

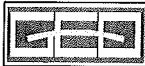
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																				
 GEO FOUNDATIONS & STRUCTURES PVT. LTD					Bore Hole No : BH-23 Location : Perambur Co-ordinates : 1683 E, 960 N Type of Boring : Calyx Ground Water Level : 1.90 m from G.L on 30.08.2016 Termination Depth : 29.00 m							Drillhole Record -23								
												Fig No. 13								
												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			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D(%)	REMARKS
									15cm	30cm	45cm		20	40	60	80	100			
Silty SAND With Gravel (SM-G)	Grey	Very Dense, Granular	18.50		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
Clayey SAND (SC-CL)	Brown	Very Dense, Granular	20.00		SPT-9	SS	18.50	18.50-18.75	46	>50	-	>100							50/10 cm penetration	
					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	
					SPT-12	SS	23.00	23.00-23.23	42	>50	-	>100								50/8 cm penetration
Weathered Rock			26.50		SPT-13	CS	25.00	25.00-25.06	>50	-	-	>100							50/6 cm penetration	
					CR-1	CS	26.50	26.50-29.00	-	-	-	-						10	3 Pieces	
Soft Rock			29.00																	
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 Penetration Test SS-Soil Sample

UDS-Un Disturbed Sample CS-Core Sample

CR-Core Recovery, RQD-Rock Quality Designation

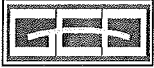
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																					
 GEO FOUNDATIONS & STRUCTURES PVT. LTD				Bore Hole No : BH-24 Location : Perambur Co-ordinates : 1923 E, 877 N Type of Boring : Calyx Ground Water Level : 2.20m from G.L on 03.09.2016 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)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES			SPT 'N' Blow/300mm	SPT 'N' PROFILE						C.R (%)	R.Q.D(%)	REMARKS
									15cm	30cm	45cm		20	40	60	80	100				
Filled up Soil		Building Debris	8.00		SPT-1	SS	1.00	1.00-1.00													
							2.00	2.00-2.00													
							3.00	3.00-3.00													
							4.00	4.00-4.00													
							5.00	5.00-5.00													
							6.50	6.50-6.50													
Clayey SAND (SC-CL)	Grey	Loose, Granular	9.50		SPT-2	SS	8.00	8.00-8.45	2	3	5	8									
Silty SAND (SM)	Grey	Medium Dense, Granular	12.50		SPT-3	SS	9.50	9.50-9.95	4	10	12	22									
Greyish, Medium Dense, Sandy SILT (ML)					SPT-4	SS	11.00	11.00-11.45	5	13	16	29									
							12.50	12.50-12.95	5	10	13	23									
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 C.R: 01 Nos																					
Remarks																					

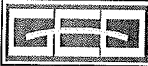
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																					
 GEO FOUNDATIONS & STRUCTURES PVT. LTD					Bore Hole No : BH-24 Location : Perambur Co-ordinates : 1923 E, 877 N Type of Boring : Calyx Ground Water Level : 2.20m from G.L on 03.09.2016 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)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D(%)	REMARKS	
									15cm	30cm	45cm		20	40	60	80	100				
Sandy SILT (ML)	Grey	Medium Dense, Granular	14.00		SPT-5	SS	14.00	14.00-14.45	8	15	18	33									
Clayey SAND (SC-CL)	Grey	Medium Dense, Granular	17.00		SPT-6	SS	15.50	15.50-15.95	8	14	15	29									
					SPT-7	SS	17.00	17.00-17.45	15	18	35	53									
	Brown	Very Dense, Granular	18.50		SPT-8	SS	18.50	18.50-18.95	17	28	41	69									
Silty SAND (SM)	Brown	Very Dense, Granular	21.50		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									
					SPT-11	SS	23.00	23.00-23.10	>50	-	-	>100									50/10 cm penetration
Weathered Rock					SPT-12	SS	24.50	24.50-26.00	-	-	-	>100									Rebound
					SPT-13	SS	26.00	26.00-27.00	-	-	-	>100									
Soft Rock			27.00		CR-1	CS	27.00	27.00-28.00	-	-	-	-									29 pieces
							28.00														
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 Penetration Test SS-Soil Sample

UDS-Un Disturbed Sample CS-Core Sample

CR-Core Recovery, RQD-Rock Quality Designation

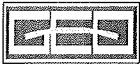
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																					
 GEO FOUNDATIONS & STRUCTURES PVT. LTD				Bore Hole No : BH-25				Drillhole Record -BH-25													
				Location : Perambur				Fig No. 15													
				Co-ordinates : 1818 E, 926 N																	
				Type of Boring : Calyx				Start Date : 25.08.2016													
				Ground Water Level : 2.00 m from G.L on 28.08.2016				End Date : 27.08.2016													
				Termination Depth : 27.00 m																	
SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES			SPT N	SPT 'N' PROFILE					C.R (%)	R.Q.D (%)	REMARKS	
									15cm	30cm	45cm	Blows/300mm	20	40	60	80	100				
Filled up soil		Building Debris	4.00		SPT-1	SS	1.00	1.00-1.00													
							2.00	2.00-2.00													
							3.00	3.00-3.00													
							4.00	4.00-4.45	0	0	1	1									
Sandy CLAY (CH-SC)	Brown	Very Soft, Layered	6.50		UDS-1	SS	5.00	5.00-5.45	-	-	-	-									
							6.50	6.50-6.95	8	12	14	26									
							8.00	8.00-8.45	4	6	6	12									
Clayey SAND (SC-CL)	Dark Grey	Medium Dense, Granular			SPT-3	SS	9.50	9.50-9.95	-	-	-	-									
							11.00	11.00-11.45	7	10	13	23									
	Grey				SPT-4	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									

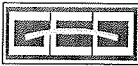
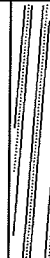
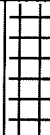
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																				
 GEO FOUNDATIONS & STRUCTURES PVT. LTD						Bore Hole No : BH-25 Location : Perambur Co-ordinates : 1818 E, 926 N Type of Boring : Calyx Ground Water Level : 2.00 m from G.L on 28.08.2016 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			SPT'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D(%)	REMARKS
									15cm	30cm	45cm		20	40	60	80	100			
Clayey SAND (SC-CL)	Grey	Medium Dense, Granular	17.00		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								
					SPT-8	SS	17.00	17.00-17.45	17	25	47	72								
Silty SAND (SM)	Grey	Very Dense, Granular	18.50		SPT-9	SS	18.50	18.50-18.95	50	-	-	>100								
					SPT-10	SS	20.00	20.00-20.27	20	>50	-	>100								
Clayey SAND (SC-CL)	Grey	Very Dense, Granular	20.00		SPT-11	SS	21.50	21.50-21.74	41	>50	-	>100								
					SPT-12	SS	23.00	23.00-23.09	-	-	-	>100								
Weathered Rock			23.00		SPT-13	SS	24.50	24.50-25.50	-	-	-	>100								
																				50/9 cm penetration
Soft Rock			25.50		CR-I	CS	25.50	25.50-27.00	-	-	-	-								
																				Rebound
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

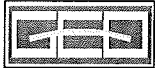
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																					
 GEO FOUNDATIONS & STRUCTURES PVT. LTD					Bore Hole No : BH-26					Drillhole Record -24											
					Location : Perambur					Fig No. 16											
					Co-ordinates : 1723 E, 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	COLOR	STRUCTURE	GROUND LEVEL (m)	LEG END	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D (%)	REMARKS	
									15cm	30cm	45cm		20	40	60	80	100				
Filled Up Soil		Building Debris	5.00		SPT-1	SS	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	5.00-5.45	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									
							8.00	8.00-8.45	-	-	-	-									
							9.50	9.50-9.95	8	10	13	23									
							11.00	11.00-11.45	9	13	17	30									
Clayey SAND (SC-CI)	Grey	Medium Dense, Granular			SPT-4	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				Drillhole Record -26								
							Location : Perambur				Fig No. 16								
							Co-ordinates : 1723 E, 974 N												
							Type of Boring : Calyx				Start Date : 27.08.2016								
							Ground Water Level : 2.00 m from G.L on 30.08.2016				End Date : 29.08.2016								
							Termination Depth : 29.50 m												
SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES			SPT 'N' Blow/300mm	SPT 'N' PROFILE					C.R. (%)	REMARKS
									15cm	30cm	45cm		20	40	60	80	100		
Clayey SAND (SC-CL)	Brown	Medium Dense, Granular	15.50		SPT-6	SS	14.00	14.00-14.45	11	14	19	33							
		Dense, Granular		SPT-7	SS	15.50	15.50-15.95	13	19	23	42								
				SPT-8	SS	17.00	17.00-17.45	14	19	31	50								
Sandy CLAY (CI-SC)	Grey	Hard, Layered	20.00		SPT-9	SS	18.50	18.50-18.95	21	26	32	58							
					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							
		Very Dense, Granular		SPT-12	SS	23.00	23.00-23.45	16	27	39	66								
				SPT-13	SS	24.50	24.50-24.56	>50	-	-	>100								
Weathered Rock	Brown		24.50																
Soft Rock			28.00		CR-1	CS	28.00	28.00-29.50	-	-	-	-					6	2 Pieces	
			29.50																
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 Penetration Test SS-Soil Sample

UDS-Un Disturbed Sample CS-Core Sample

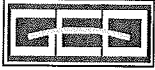
CR-Core Recovery, RQD-Rock Quality Designation

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																									
 GEO FOUNDATIONS & STRUCTURES PVT. LTD		Bore Hole No : BH-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)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT 'N' PROFILE	C.R (%)	R.Q.D (%)	REMARKS								
									15cm	30cm	45cm	SPT 'N' Blows/300mm	20	40	60	80	100								
Filled up soil	Building Debris		9.50					1.00																	
								2.00																	
								3.00																	
								4.00																	
								5.00																	
								6.50																	
								8.00																	
								9.50																	
								11.00																	
								12.50																	
Clayey SAND (SC-CL)	Grey	Medium Dense, Granular	12.50					9.50	9.50-9.95	8	11	12	23												
								11.00	11.00-11.45	10	14	16	30												
								12.50	12.50-12.95	14	17	21	38												
								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 Penetration Test SS-Soil Sample

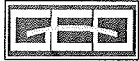
UDS-Un Disturbed Sample CS-Core Sample

CR-Core Recovery, RQD-Rock Quality Designation

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																						
				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														
GEO FOUNDATIONS & STRUCTURES PVT. LTD				Start Date : 30.08.2016 End Date : 31.08.2016																		
SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D (%)	REMARKS		
									15cm	30cm	45cm		20	40	60	80	100					
Silty SAND (SM)	Grey	Dense, Granular	18.50		SPT-5	SS	15.50	15.50-15.95	12	15	20	35										
	Brown				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 (CI-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	
Soft Rock			27.00		CR-1	CS	27.00	27.00-29.00	-	-	-	-									13	
			29.00																		11 pieces	
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										

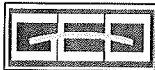
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																					
					Bore Hole No : BH-28 Location : Perambur Co-ordinates : 1900 E, 948 N Type of Boring : Calyx Ground Water Level : 2.30 m from G.L on 02.09.2016 Termination Depth : 29.00 m					Drillhole Record -28 Fig No. 18 Start Date : 30.08.2016 End Date : 31.08.2016											
SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					CR (%)	R.Q.D (%)	REMARKS	
									15cm	30cm	45cm		20	40	60	80	100				
Filled up Soil		Building Debris	5.00		SPT-1	SS	1.00	1.00-1.00													
							2.00	2.00-2.00													
							3.00	3.00-3.00													
							4.00	4.00-4.00													
							5.00	5.00-5.45	0	0	1	1									
Clayey SAND (SC-CI)	Dark Grey	Very Loose, Granular	6.50		UDS-1	SS	6.50	6.50-6.95	-	-	-	-									
							8.00	8.00-8.45	0	0	1	1									
Sandy CLAY (CH-SC)	Dark Grey	Very Soft, Layered	9.50		SPT-2	SS	8.00	8.00-8.45	0	0	1	1									
							9.50	9.50-9.95	13	14	19	33									
							11.00	11.00-11.45	5	6	7	13									
Clayey SAND (SC-CI)	Grey	Medium Dense, Granular	11.00		SPT-3	SS	9.50	9.50-9.95	13	14	19	33									
							12.50	12.50-12.95	7	8	8	16									
							14.00	14.00-14.45	13	24	27	51									
Sandy SILT (ML)	Grey	Medium Dense, Granular	14.00		SPT-4	SS	11.00	11.00-11.45	5	6	7	13									
							12.50	12.50-12.95	7	8	8	16									
							14.00	14.00-14.45	13	24	27	51									
							14.00	14.00-14.45	13	24	27	51									
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													

CR-Core Recovery, RQD-Rock Quality Designation

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																					
				Bore Hole No : BH-29 Location : Perambur Co-ordinates : 179.4E, 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	COLOR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT 'N' PROFILE					CR (%)	RQD (%)	REMARKS		
									15cm	30cm	45cm	SPT 'N' Blows/300mm	20	40	60	80	100				
Filled up soil		Building Debris	2.00				1.00	1.00-1.00													
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									
					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									
Clayey SAND (SC-CL)	Dark Grey	Very Loose, Granular	6.50		UDS-1	SS	6.50	6.50-6.95													
	Brown	Medium Dense, Granular			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									
					SPT-7	SS	11.00	11.00-11.45	7	10	13	23									
Silly SAND (SM)	Grey	Medium Dense, Granular	14.00		SPT-8	SS	12.50	12.50-12.95	6	15	18	33									
					SPT-9	SS	14.00	14.00-14.45	9	12	15	27									
Clayey SAND with Gravel (SC-CL-G)	Grey	Medium Dense, Granular	15.50		SPT-10	SS	15.50	15.50-15.95	11	24	29	53									
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									

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																							
										Bore Hole No : BH-29 Location : Perambur Co-ordinates : 1794E, 1001N Type of Boring : Callyx Ground Water Level : 1.9 m from G.L on 30.08.2016 Termination Depth : 30.00 m													
										Drillhole Record - 29 Fig No. 19													
GEO FOUNDATIONS & STRUCTURES PVT. LTD										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			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D (%)	REMARKS			
									15cm	30cm	45cm		20	40	60	80	100						
Sandy CLAY (CL-SC)	Grey	Hard Layered	17.00		SPT-11	SS	17.00	17.00-17.45	14	29	48	77											
Clayey SAND (SC-CL)	Brown	Very Dense, Granular			SPT-12	SS	18.50	18.50-18.95	17	27	34	61											
					SPT-13	SS	20.00	20.00-20.40	21	41	>50	>100											
					SPT-14	SS	21.50	21.50-21.88	22	38	>50	>100											
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											
Clayey SAND (SC-CL)	Grey	Very Dense, Granular	24.00		SPT-16	SS	24.00	24.00-24.05	>50	-	-	>100											
Soft Rock					CR-1	CS	24.05-25.50	-	-	-	-	-									1 pieces		
					CR-2	CS	25.50-27.00	-	-	-	-	-											3 pieces
					CR-3	CS	27.00-28.50	-	-	-	-	-											10 pieces
					CR-4	CS	28.50-30.00	-	-	-	-	-											6 pieces
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											

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																					
 GEO FOUNDATIONS & STRUCTURES PVT. LTD		Bore Hole No : 8H-30 Location : Perambur Co-ordinates : 1728 E, 1041 N Type of Boring : Calyx Ground Water Level : 2.10 m from G.L. on 31.8.2016 Termination Depth : 29.00 m				Drillhole Record -30 Fig No. 20		Start Date : 27.08.2016 End Date : 30.08.2016													
		SOIL DESCRIPTION	COLOR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT 'N' PROFILE	CR (%)	R.Q.D (%)	REMARKS				
										15cm	30cm	45cm	SPT 'N' Blows/300mm	20	40	60	80	100			
Filled up soil		Building Debris							1.00	1.00-1.00	-	-	-								
			5.00			SPT-1	SS	5.00	5.00-5.45	0	0	1	1								
Silty SAND with gravel (SM-G)	Red	Very loose, Granular	6.50			SPT-2	SS	6.50	6.50-6.95	0	0	1	1								
Clayey SAND (SC-CL)	Grey	Dense, Granular	8.00			SPT-3	SS	8.00	8.00-8.45	8	14	24	38								
Silty SAND (SM)	Brown	Dense, Granular	9.50			SPT-4	SS	9.50	9.50-9.45	9	13	17	30								
		Medium Dense, Granular				SPT-5	SS	11.00	11.00-11.45	8	12	16	28								
Greyish, Dense, Clayey SAND (SC-CL)			12.50			SPT-6	SS	12.50	12.50-12.95	17	21	30	51								
G.W.L: 2.10 m from G.L. on 31.08.16		No of SPT: 13 Nos		No. of CR: 02 Nos		Remarks															

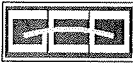
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																				
 GEO FOUNDATIONS & STRUCTURES PVT. LTD						Bore Hole No : BH-30 Location : Perambur Co-ordinates : 1728 E, 1041 N Type of Boring : Calyx Ground Water Level : 2.10 m from G.L. on 31.8.2016 Termination Depth : 29.00 m						Drillhole Record -30								
												Fig No. 20								
												Start Date : 27.08.2016 End Date : 30.08.2016								
SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D(%)	REMARKS
									15cm	30cm	45cm		20	40	60	80	100			
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	-	-	-	-							Nil	
Fractured Hard Rock			26.50		CR-2	CS	26.50	26.50-29.00	-	-	-	-						24	6 pieces	
			29.00																	
G.W.L: 2.10 m from G.L on 31.08.16			No of SPT: 13 Nos			No. of CR: 02 Nos			Remarks											

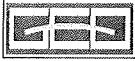
Note: SPT-Standard Penetration Test SS-Soil Sample

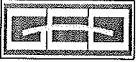
UDS-Un Disturbed Sample CS-Core Sample

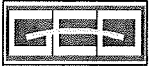
CR-Core Recovery, RQD-Rock Quality Designation

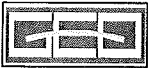
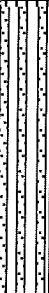
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																				
 Bore Hole No : BH-31 Location : Perambur Co-ordinates : E 1982 N 970 Type of Boring : Calyx Ground Water Level : 4.90 m from G.L on 24.8.2016 Termination Depth : 30.00 m Drillhole Record -31 Fig No. 21 Start Date : 21.08.2016 End Date : 23.08.2016										Drillhole Record -31										
										Fig No. 21										
SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT N°	SPT N° PROFILE					CR (%)	R.Q.D (%)	REMARKS
									15cm	30cm	45cm	Blows/300mm	20	40	60	80	100			
Stiff 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, Stiff 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								
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	SS	6.50	6.50-6.95	2	2	2	4								
					UDS-1	SS	8.00	8.00-8.45	-	-	-	-								
Stiff SAND (SM)	Brown	Dense, Granular			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								
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								

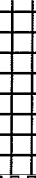
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																								
										Drillhole Record -31 Fig No. 21														
Bore Hole No : BH-31 Location : Perambur Co-ordinates : E 1982 N 970 Type of Boring : Calyx Ground Water Level : 4.90 m from G.L. on 24.8.2016 Termination Depth : 30.00 m										Start Date : 21.08.2016 End Date : 23.08.2016														
SOIL DESCRIPTION	COLOR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					CR (%)	RQD (%)	REMARKS				
									15cm	30cm	45cm		20	40	60	80	100							
Stiff SAND (SM)	Brown	Dense, Granular	17.00		SPT-11	SS	15.50	15.50-15.95	19	24	31	55												
					SPT-12	SS	17.00	17.00-17.41	19	29	>50	>100												50/11 cm penetration
Sandy SILT (ML)	Grey	very Dense, Granular	22.50		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												
					SPT-16	SS	22.50	22.50-22.59	>50	-	-	>100												
Weathered Rock			27.00		SPT-17	SS	24.00	24.0-25.50	-	-	-	>100											Rebound	
					SPT-18	SS	25.50	25.50-27.00	-	-	-	>100												
Soft Rock			30.00		CR-1	CS	27.00	27.00-28.50	-	-	-	-							18			24 pieces		
					CR-2	CS	28.50	28.50-30.00	-	-	-	-										25		
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												

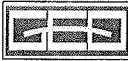
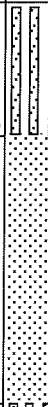
Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																					
 GEO FOUNDATIONS & STRUCTURES PVT. LTD				Bore Hole No : BH-32				Drillhole Record -32													
				Location : Perambur				Fig No. 22													
				Co-ordinates : E 1872 N 1025																	
				Type of Boring : Cyclic				Start Date : 21.08.2016													
				Ground Water Level : 3.00 m from G.L. on 26.8.2016				End Date : 25.08.2016													
				Termination Depth : 30.00 m																	
SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT N°	SPT N° PROFILE					C.R (%)	R.Q.D (%)	REMARKS	
									15cm	30cm	45cm	Blows/300mm	20	40	60	80	100				
Filled up Soil	Building Debris		4.00		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	-	-	-	-										
Sandy CLAY (CL-SC)	Dark Grey	Soft layered	9.50		SPT-2	SS	4.00	4.00-4.45	2	2	3	5									
					UDS-1	SS	5.00	5.00-5.45	-	-	-	-									
					SPT-3	SS	6.50	6.50-6.95	1	1	2	3									
					UDS-2	SS	8.00	8.00-8.45	-	-	-	-									
Clayey SAND (SC-CL)	Grey	Medium Dense Granular	11.00		SPT-4	SS	9.50	9.50-9.95	7	12	15	27									
					SPT-5	SS	11.00	11.00-11.38	9	11	>50	>100									
Stiffy SAND (SM)	Grey	very Dense, Granular	12.50		SPT-6	SS	12.50	12.50-12.95	11	15	33	48									
					SPT-7	SS	14.00	14.00-14.45	22	23	20	43									
Sandy CLAY (CL-SC)	Grey	Hard layered	15.50		SPT-8	SS	15.50	15.50-15.87	29	48	>50	>100									
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			SPT 'N'	SPT 'N' PROFILE					C.R (%)	R.Q.D (%)	REMARKS				
									15cm	30cm	45cm	Blows/300mm	20	40	60	80	100							
Clayey SAND (SC-CL)	Grey	very Dense, Granular	19.00		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	
					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	-	-	-	-												NH
Fractured Hard Rock					CR-2	CS	27.50	27.50-28.50	-	-	-	-										NH		
					CR-3	CS	30.00	28.50-30.00	-	-	-	-											2 pieces	
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-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	COLOR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					REMARKS					
									15cm	30cm	45cm		20	40	60	80	100		C.R (%)	R.Q.D (%)			
Silty SAND (SM)	Brown	Medium Dense, Granular	2.00		SPT-1	SS	1.00	1.00-1.45	4	7	11	18											
Filled up Soil		Building Debris	3.00		SPT-2	SS	2.00	2.00-2.45	-	-	-	-											
Sandy CLAY (CI-SC)	Dark Grey	Medium Stiff, Layered	5.00		UDS-1	SS	3.00	3.00-3.45	2	3	4	7											
		Soft Layered	6.50		SPT-3	SS	4.00	4.00-4.45	-	-	-	-											
Silty SAND (SM)	Grey	Dense Granular			UDS-2	SS	5.00	5.00-5.45	1	1	2	3											
Greyish, Very Dense, Clayey SAND (SC-CL)					UDS-3	SS	6.50	6.50-6.95	-	-	-	-											
					SPT-4	SS	8.00	8.00-8.45	-	-	-	-											
					SPT-5	SS	9.50	9.50-9.95	7	12	21	33											
					SPT-6	SS	11.00	11.00-11.45	12	15	27	42											
							12.50	12.50-12.95	8	14	17	31											
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)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH (m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D (%)	REMARKS		
									15cm	30cm	45cm		20	40	60	80	100							
Clayey SAND (SC-CL)	Grey	Very Dense, Granular	17.00		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	
					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	22.00		SPT-11	SS	20.00	20.0-20.41	18	42	>50	>100										50/11 cm penetration		
					SPT-12	SS	21.50	21.50-21.28	33	>50	-	>100											50/13 cm penetration	
					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
					CR-1	CS	26.00	26.00-27.50	-	-	-	-												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														

Project : Geo-technical investigation for the proposed township at Old Binny Mills, Perambur, Chennai																							
 GEO FOUNDATIONS & STRUCTURES PVT. LTD				Bore Hole No : BH-34 Location : Perambur Co-ordinates : Stephens Road Type of Boring : Calyx Ground Water Level : 2.10 m from G.L on 10.09.2016 Termination Depth : 29.50 m						Drillhole Record -34													
										Fig No. 24													
										Start Date : 07.09.2016 End Date : 09.09.2016													
SOIL DESCRIPTION		COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D(%)	REMARKS		
15cm	30cm	45cm	20	40	60	80	100																
Sandy CLAY (CH-SC)	Brown	Soft, Layered	2.00		UDS-1	SS	0.50	0.50-0.95	-	-	-	-											
					SPT-1	SS	1.00	1.00-1.00	1	1	1	2											
Silty SAND (SM)	Grey	Loose, Granular	3.00		SPT-2	SS	2.00	2.00-2.45	2	3	4	7											
					SPT-3	SS	3.00	3.00-3.45	2	3	3	6											
Clayey SAND (SC-CI)	Grey	Loose, Granular	6.50		SPT-4	SS	4.00	4.00-4.45	2	3	4	7											
					UDS-2	SS	5.00	5.00-5.45	-	-	-	-											
Clayey SAND (SC-CI)	Dark Grey	Very Loose, Granular	8.00		SPT-5	SS	6.50	6.50-6.95	0	1	1	2											
					SPT-6	SS	8.00	8.00-8.45	3	4	4	8											
Sandy CLAY (CI-SC)	Brown	Soft, Layered	11.00		SPT-7	SS	9.50	9.50-9.95	4	5	6	11											
					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)																							
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 Location : Perambur Co-ordinates : Stephens Road Type of Boring : Calyx Ground Water Level : 2.10 m from G.L on 10.09.2016 Termination Depth : 29.50 m								Drillhole Record -34 Fig No. 24 Start Date : 07.09.2016 End Date : 09.09.2016								
SOIL DESCRIPTION	COLOUR	STRUCTURE	GROUND LEVEL (m)	LEGEND	TEST NO	SAMPLE TYPE	DEPTH (m)	TEST DEPTH(m)	PENETRATION VALUES			SPT 'N' Blows/300mm	SPT 'N' PROFILE					C.R (%)	R.Q.D (%)	REMARKS
									15cm	30cm	45cm		20	40	60	80	100			
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-CI)	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		
					CR-1	CS	28.50	28.50-29.50	-	-	-	-					4	3 pieces		
Soft Rock							28.50													
							29.50													
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 Boring End : 06.09.2016		CO-ORDINATES		Table No				
												Termination Depth m		COOKES ROAD		1				
												29				Bore Hole No				
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	TEST METHOD	C in kg/cm²	Φ in degrees			
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX										
-	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	Non Plastic			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	Non Plastic			13									
71	21.50	SPT-11	Sandy CLAY	CL-SC	1	40	59				47	17	30	12						
>100	23.00	SPT-12	Silty SAND with Gravel	SM-G	15	61	24	Non Plastic			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 Boring End : 20.08.2016		CO-ORDINATES 1684 E 737 N		Table No 2		
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS: CLASSIFICATION	GRAIN SIZE ANALYSIS			ATTERBERG LIMITS			Termination Depth m	Bore Hole No	SHEAR PARAMETERS					
					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
2	1.00	SPT-1	Clayey SAND	SC-CH	0	67	33	62	22	40	16	5						
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															

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai										Boring Start: 21.08.2016 Boring End : 23.08.2016		CO-ORDINATES 1737 E 733 N		Table No 3	
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS CLASSIFICATION	GRAIN SIZE ANALYSIS			ATTERBERG LIMITS				Termination Depth 30.5 m				Bore Hole No 6		
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX	G.W.1 m	1.80 m	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc			WET DENSITY, gm/cc
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		Weathered Rock														
-	19.50	SPT-13																
-	21.00	SPT-14																
-	22.50	SPT-15																
-	24.00	SPT-16	Soft Rock															
-	25.50	CR-1																
-	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										CO-ORDINATES		Table No				
												1764E		4				
												73.1 N						
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	TEST METHOD	C in Kg/cm²	Φ in degrees	
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX								
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	Silty SAND	ML				Non - Plastic										
>100	15.50	SPT - 11		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										Boiling Start: 17.08.2016 Boiling End :18.08.2016		CO-ORDINATES 1742 E 774 N		Table No 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	TEST METHOD	C in Kg/cm²	Φ in degrees	
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX								
4	1.00	SPT - 1	CLAY	CH	0	7	93	64	26	38	12							
5	2.00	SPT - 2																
15	3.00	SPT - 3																
2	4.00	SPT - 4	Silty SAND	SM	0	83	17				11							
2	5.00	SPT - 5																
			Sandy CLAY	CI-SC	0	35	65	43	17	26	19							
-	6.50	UDS - 1	CI-SC															
16	8.00	SPT - 6																
25	9.50	SPT - 7																
25	11.00	SPT - 8	Clayey SAND	SC-CL	0	68	32	32	14	18	18							
34	12.50	SPT - 9																
44	14.00	SPT - 10	Sandy SILT	ML	0	68	32	Non-Plastic										
46	15.50	SPT - 11																
65	17.00	SPT - 12																
>100	18.50	SPT - 13	Silty SAND	SM	5	72	23				10							
>100	20.00	SPT - 14																
>100	21.50	SPT - 15	Weathered ROCK															
>100	23.00	SPT - 16																
>100	24.50	SPT - 17																
-	26.00- 27.50	CR-1	Soft Rock															

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai										CO-ORDINATES		Table No		
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	TEST METHOD	C in Kg/cm²	Φ in degrees
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX							
Termination Depth 28.00 m																	
G.W.T m 2.00 m																	
SHEAR PARAMETERS																	
Bore Hole No																	
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										CO-ORDINATES		Table No				
												1707 E		7				
												811 N						
	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS CLASSIFICATION	GRAIN SIZE ANALYSIS			ATTERBERG LIMITS				WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	TEST METHOD	C in Kg/cm²	D in degrees
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX								
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	Clayey SAND	CI - SC	0	37	63	47	19	28	26							
6	5.00	SPT - 5									25							
5	6.50	SPT - 6		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	Silty SAND	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	Soft Rock	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																
-	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										CO-ORDINATES		Table No	
													1812 E		8	
													782 N			
															Bore Hole No	
															14	
															SHEAR PARAMETERS	

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

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

CR- Core Recovery

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai										Boring Start : 24.08.2016 Boring End : 27.08.2016		CO-ORDINATES 1684 E 854 N		Table No 10	
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	TEST METHOD	C in Kg/cm²	Φ in degrees
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX								
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		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	Clayey SAND	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 Boring End : 01.09.2016		CO-ORDINATES 1889 E 860 N		Table No 11	
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	TEST METHOD	C in Kg/cm²	Φ in degrees	
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX								
-	1.00		Filled Up Soil															
-	2.00																	
5	3.00	SPT-1			CH-SC	3	35	62	56	22	34	18						
2	4.00	SPT-2	Sandy CLAY		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		0	76	24				11							
30	9.50	SPT-6			SC-Cl	0	77	23	34	13	21	13						
29	11.00	SPT-7	SAND		0	92	8				13							
33	12.50	SPT-8			SP	0	96	4				23						
33	14.00	SPT-9	Clayey SAND		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		6	46	48	42	16	26	15							
>100	21.50	SPT-14	Silty SAND		5	73	22											
>100	23.00	SPT-15			SM	8	79	13				11						
>100	24.50	SPT-16	Weathered Rock															
-	25.00	CR-1			SM													
-	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 Boring End : 27.08.2016		CO-ORDINATES 1762 E 916 N		Table No 12	
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	TEST METHOD	C in Kg/cm²	Φ in degrees
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX							
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	Clayey SAND	CI-SC													
12	8.00	UDS-2		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	Silty SAND	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		SM	11	71	18				11						
>100	21.50	SPT-14	Weathered Rock	SM	3	81	16				11						
>100	23.00	SPT-15															
-	25.00	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: 27.08.2016 Boring End : 29.08.2016		CO-ORDINATES 1683 E 960 N		Table No 13	
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	TEST METHOD	C in Kg/cm ²	Φ in degrees
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX							
	1.00																
	2.00																
	3.00																
	4.00																
1	5.00	SPT-1															
1	6.50	SPT-2	Silty SAND	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				14						
58	12.50	SPT-5		SM-G	14	44	42				17						
>100	14.00	SPT-6		SM-G	27	34	39				13						
>100	15.50	SPT-7	Silty SAND with Gravel	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		SM													
>100	21.50	SPT-11	Silty SAND	SM	6	69	25				14						
>100	23.00	SPT-12															
>100	25.00	SPT-13															
-	26.50- 29.00	CR-1	Weathered Rock														
			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										CO-ORDINATES		Boring Start: 31.08.2016 Boring End: 02.09.2016		Table No	
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS CLASSIFICATION	GRAIN SIZE ANALYSIS			LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	TEST METHOD	C in kg/cm ²	Φ in degrees
					GRAVEL, %	SAND, %	SILT & CLAY, %										
	1.00																
	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	Weathered 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

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

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai										CO-ORDINATES		Table No											
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	TEST METHOD	C in Kg/cm²	Φ in degrees									
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX																
-	1.00		Filled Up soil																							
-	2.00																									
-	3.00																									
-	4.00																									
5	5.00	SPT-1	Silty SAND	SM	2	83	15	28	12	16	2.62															
1	6.50	SPT-2			0	87	13		29	12								17								
-	8.00	UDS - 1																								
23	9.50	SPT-3			SC-CL	2	68		30																	
30	11.00	SPT-4			SC-CL	0	56		44																	
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			CI-SC	1	43		56	35								17	18							
45	20.00	SPT-10			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										CO-ORDINATES		Boring Start: 30.08.2016 Boring End : 31.08.2016		Table No	
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	TEST METHOD	C in Kg/cm ²	Φ in degrees
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX							
	1.00		FILLED UP SOIL							2.5							
	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	Weathered 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 Boring End : 31.08.2016		CO-ORDINATES 1900 E 948 N		Table No 18	
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	TEST METHOD	C in Kg/cm²	Φ in degrees	
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX								
-	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 Boring End : 29.08.2016		CO-ORDINATES 1794 E 1001 N		Table No 19	
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	TEST METHOD	C in Kg/cm²	Φ in degrees
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX							
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	Silty SAND	SC-CL													
23	11.00	SPT-7		SM	1	74	25				16						
33	12.50	SPT-8	Clayey SAND with Gravel	SM													
27	14.00	SPT-9		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		SC-CL													
-	25.50	CR-1	Soft Rock														
-	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										CO-ORDINATES		Table No	
												Boring Start: 27.08.2016 Boring End : 30.08.2016		20	
												1728 E 1041 N			
												Termination Depth		Bore Hole No	
												G.W.T		30	
												2.10 m			
												ATERBERG LIMITS			
												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			
												SHEAR PARAMETERS			

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

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

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

TEST RESULTS			PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai										Boring Start: 21.08.2016 Boring End : 25.08.2016		CO-ORDINATES 1872 E 1025 N		Table No 22	
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAIN SIZE ANALYSIS			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	
					GRAVEL. %	SAND. %	SILT & CLAY. %											
ATTERBERG LIMITS																		
G.W.T																		
Termination Depth																		
30 m																		
Bore Hole No																		
32																		
SHEAR PARAMETERS																		
Filled up SOIL																		
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	CL-SC	0	43	57	35	17	18	13							
43	14.00	SPT-7		CL-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																
>100	20.50	SPT-12	Weathered Rock															
>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 Boring End: 25.08.2016		CO-ORDINATES 1783 E 1077 N		Table No 23				
N VALUE	DEPTH (m)	SAMPLE	SOIL DESCRIPTION	IS. CLASSIFICATION	GRAIN SIZE ANALYSIS			ATTERBERG LIMITS			PLASTICITY INDEX	Termination Depth G.W.T	27.50 m 2.50 m	WATER CONTENT, %	SPECIFIC GRAVITY	DRY DENSITY, gm/cc	WET DENSITY, gm/cc	TEST METHOD	C in Kg/cm²	Φ in degrees
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT, %	PLASTIC LIMIT, %											
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										
-	4.00	UDS-1		CI-SC																
3	5.00	SPT-3	Silty SAND	CI-SC	0	31	69	38	16	22										
-	6.50	UDS-2		SM	7	68	25													
-	8.00	UDS-3		SM																
33	9.50	SPT-4		SM	3	78	19													
42	11.00	SPT-5	SM																	
31	12.50	SPT-6	Clayey SAND	SC-CL	1	68	31	32	12	20										
>100	14.00	SPT-7		SC-CL																
>100	15.50	SPT-8		SC-CL	0	63	37	34	11	23										
>100	17.00	SPT-9	CLAY	CH	1	12	87	56	21	35										
>100	18.50	SPT-10	Silty SAND	SM	3	56	41													
>100	20.00	SPT-11		SM																
>100	21.50	SPT-12		SM																
>100	22.00	SPT-13		SM	4	67	29													
>100	23.50	SPT-14	Weathered Rock																	
>100	25.00	SPT-15																		
-	26.00- 27.50	CR-1	Fractured Hard Rock																	

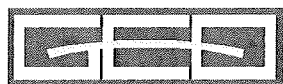
NOTE: Type of Sample
SPT- Standard Penetration Test
UDS- Un Disturbed Sample
CR- Core Recovery

TEST RESULTS		PROJECT: Soil Investigation work for Binny Mills Project, Perambur , Chennai										Boring Start: 07.09.2016 Boring End : 09.09.2016		CO-ORDINATES		Table No		
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	TEST METHOD	C in Kg/cm²	Φ in degrees	
					GRAVEL, %	SAND, %	SILT & CLAY, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX								
-	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	Sandy CLAY	SC-CI	0	53	47	41	17	24	15							
11	9.50	SPT-7		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	Sandy SILT	ML	6	35	59				17							
39	14.00	SPT-10		ML	4	32	64				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, 1st Main Road, Gandhi Nagar, Adyar, Chennai – 600 020. Ph: 044 - 24430399Website: 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

<u>TESTS</u>					
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 indicator	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

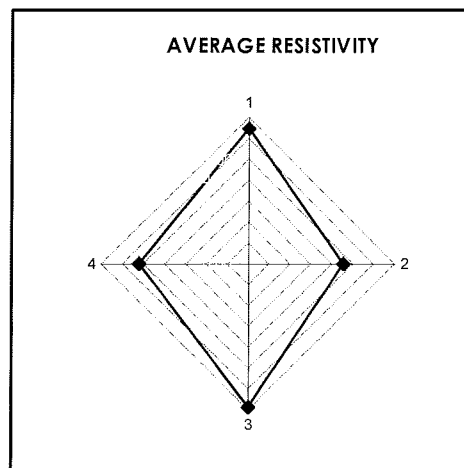


FIG NO 1.1

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

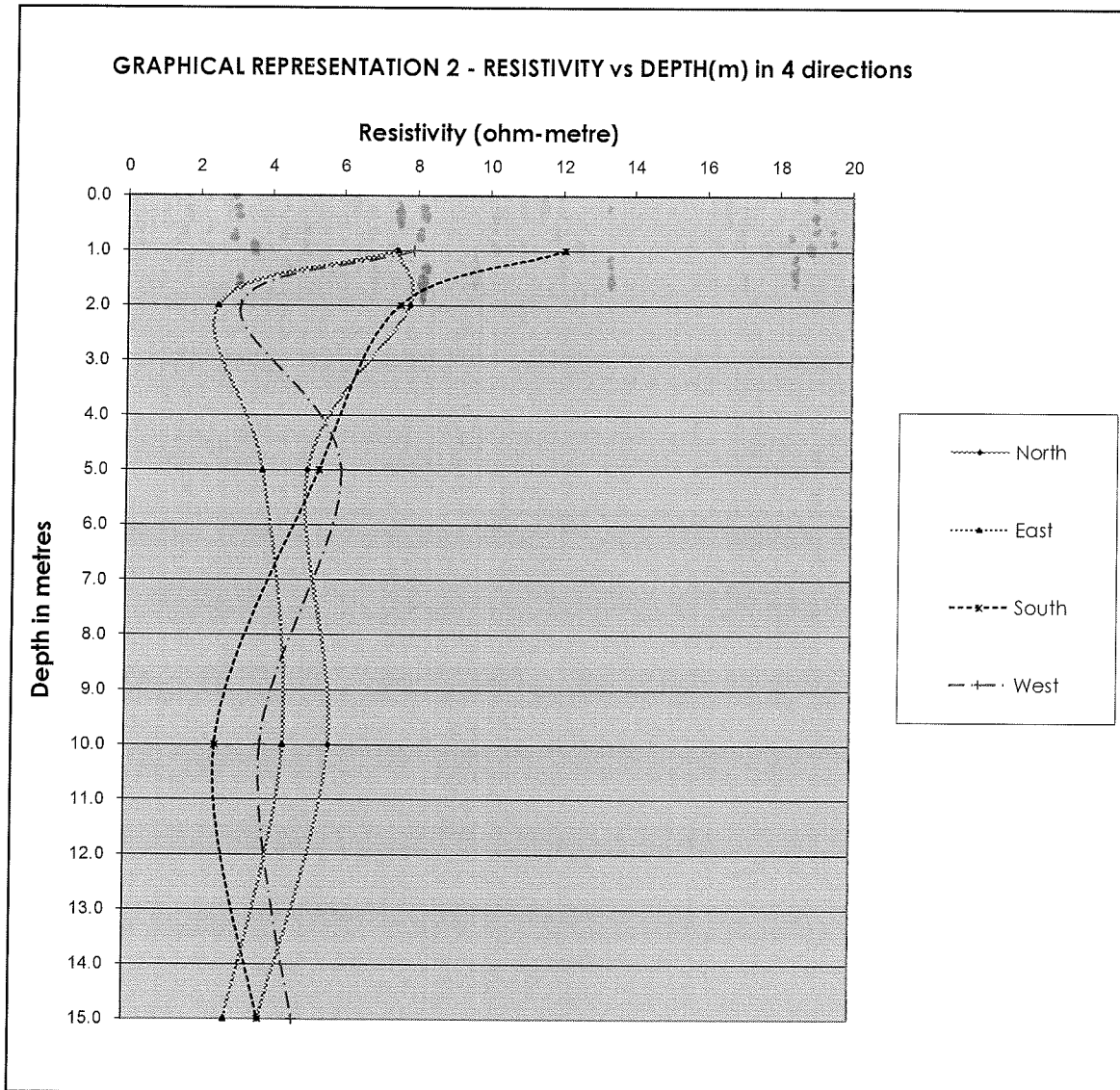


Fig No : 1.2

ERT 1

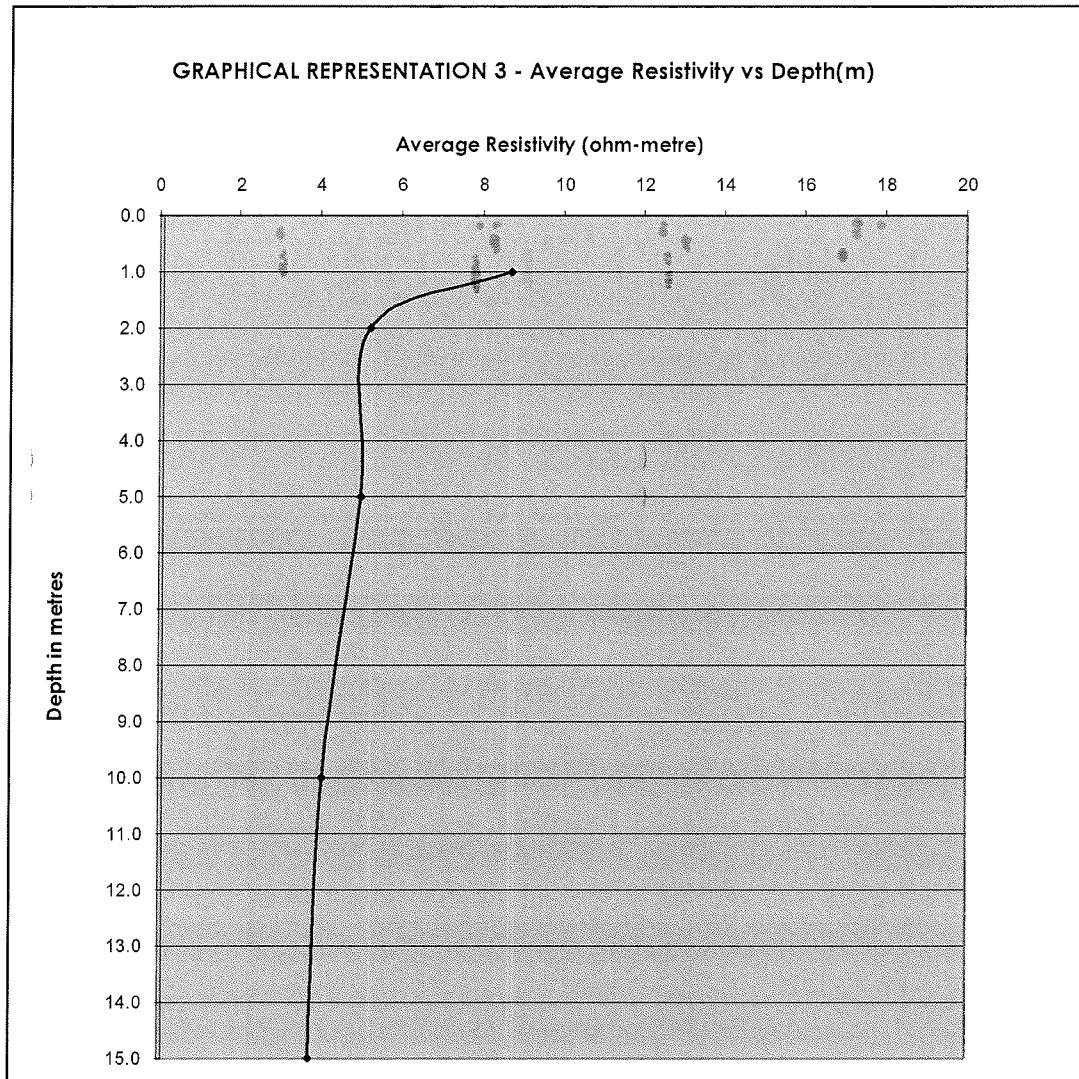


Fig No : 1.3

ERT 1

GRAPHICAL REPRESENTATION 4 - Cumulative Resistivity vs Depth(m)

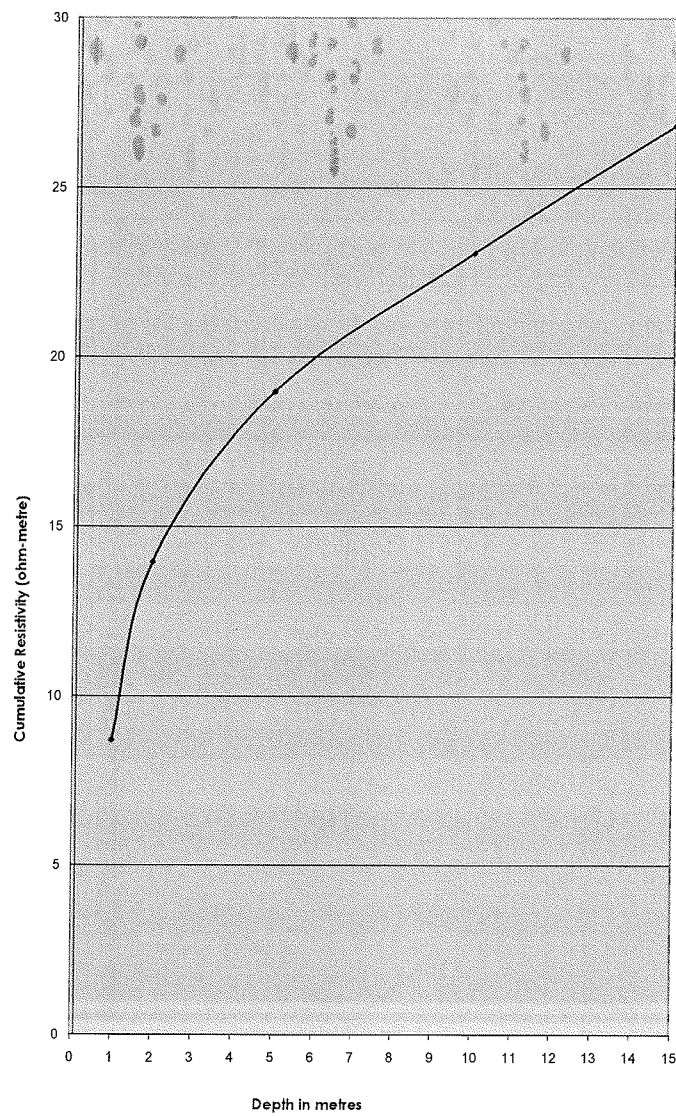


Fig No : 1.4

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

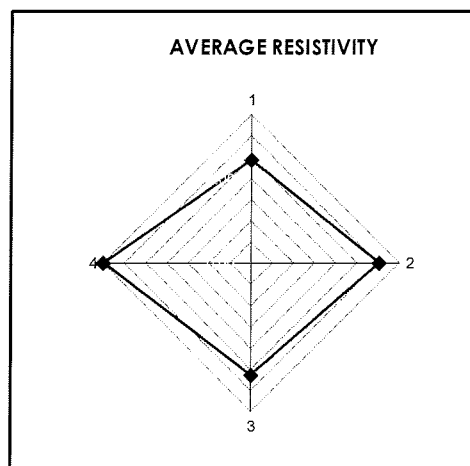


FIG NO 2.1

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

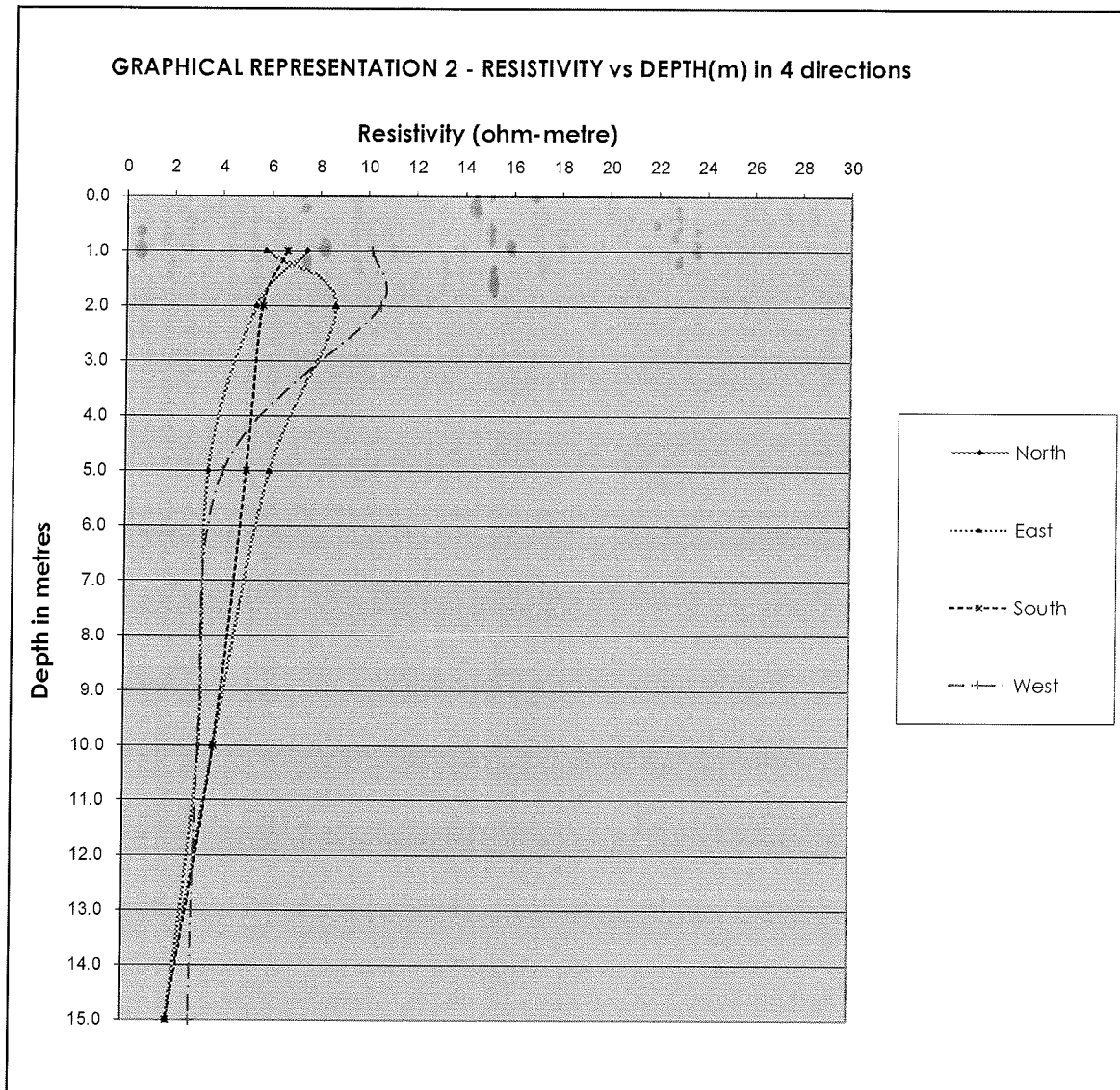


Fig No : 2.2

ERT 2

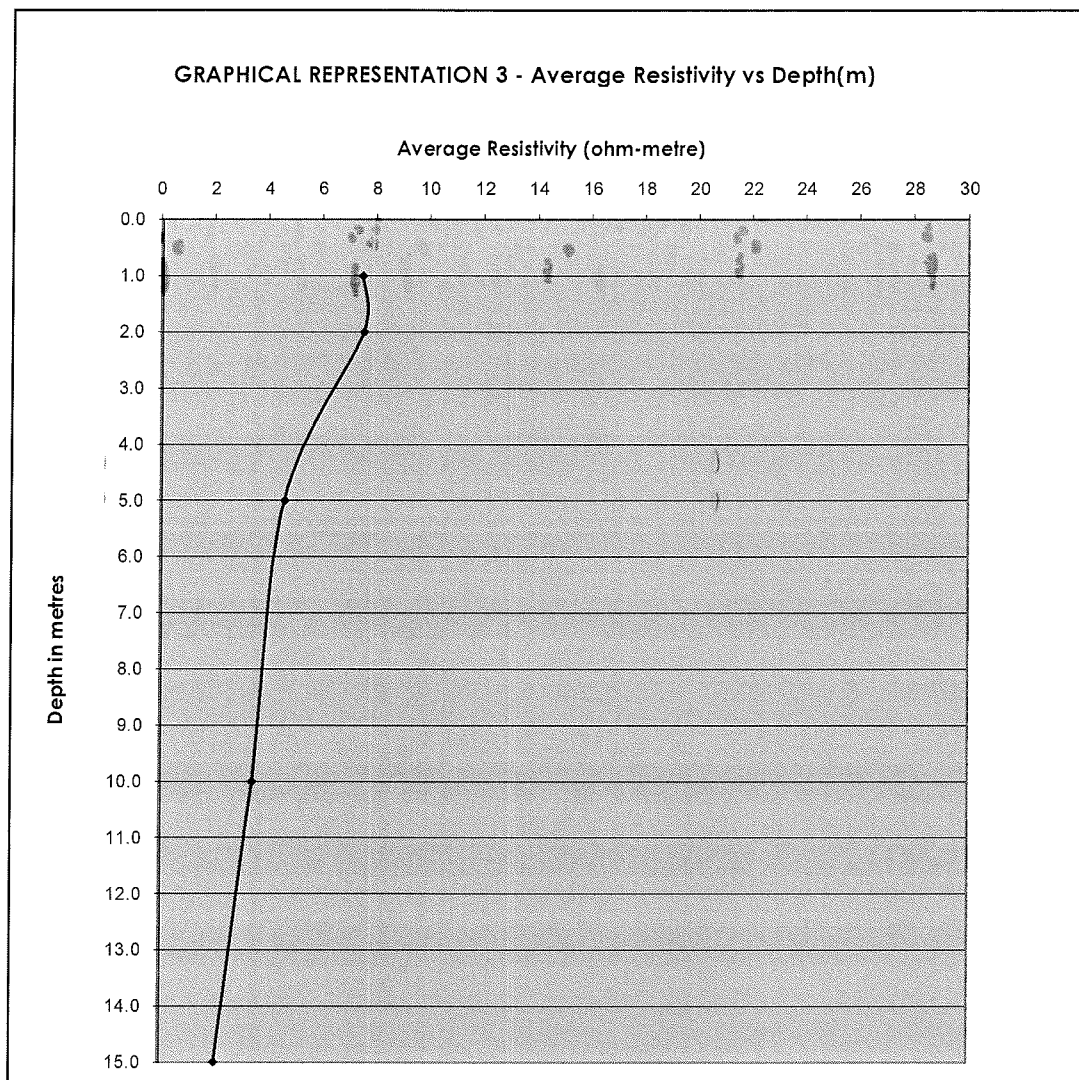
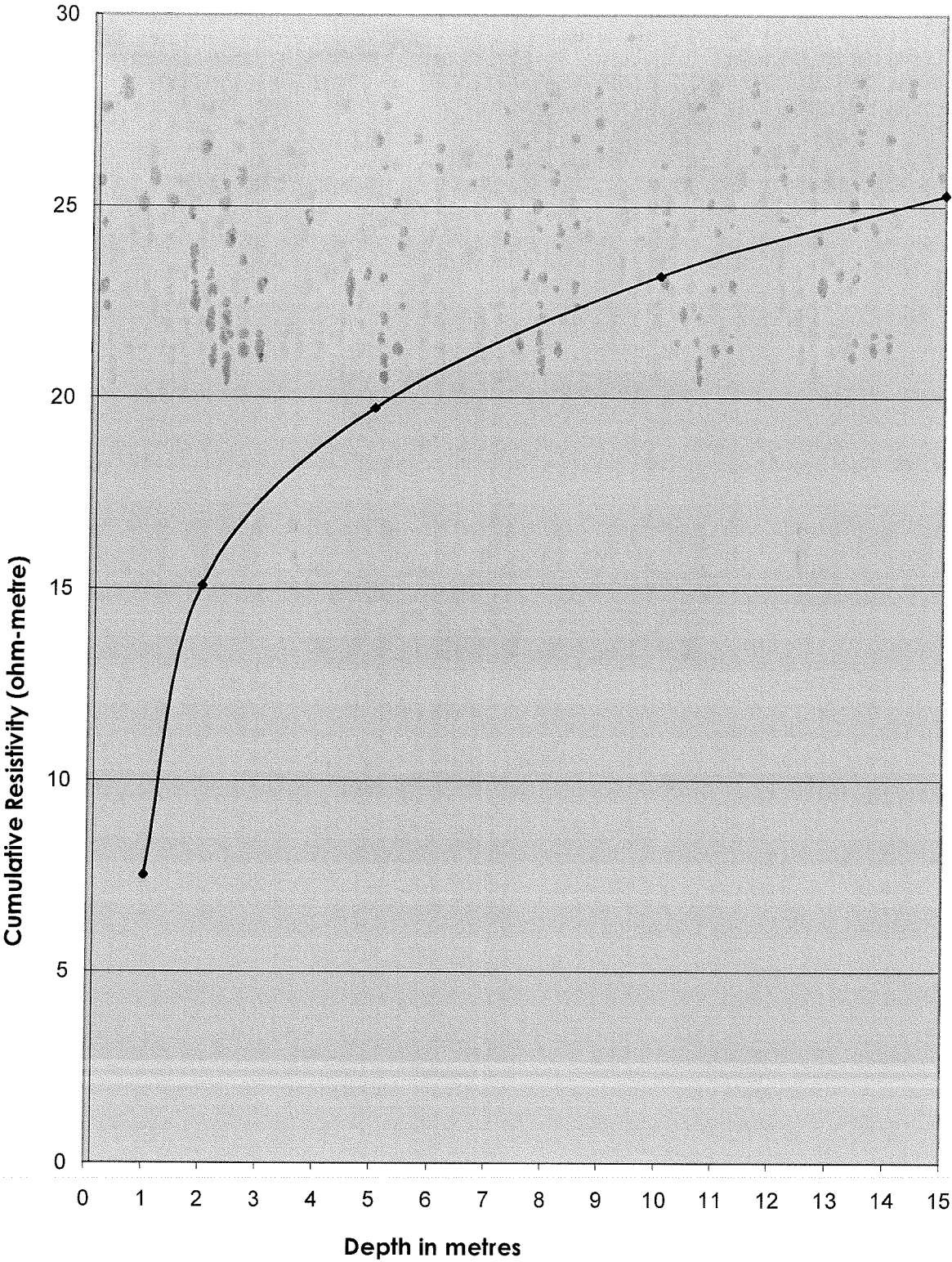


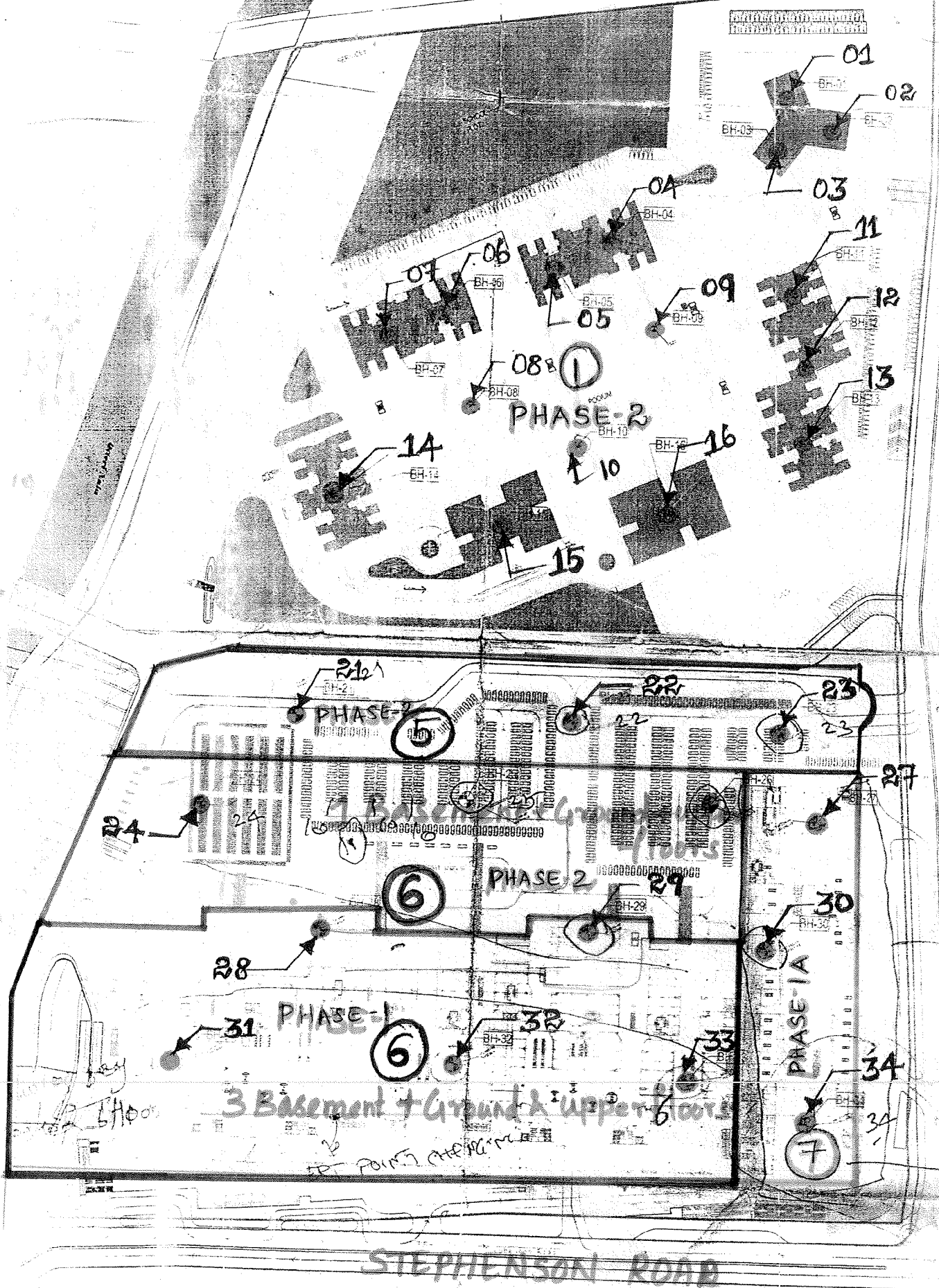
Fig No : 2.3

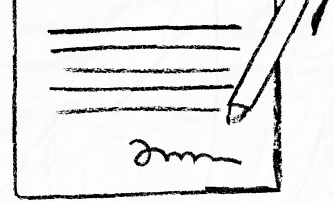
GRAPHICAL REPRESENTATION 4 - Cumulative Resistivity vs



APPENDIX V

**BORE HOLES LOCATION
DRAWING**





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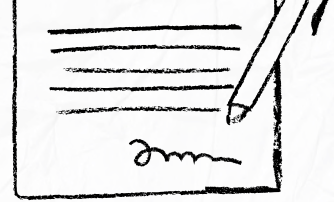
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