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Project :

RESIDENTIAL BUILDING, AT NEW NO.2, OLD NO.43 SECOND MAIN ROAD, KASTURIBAI NAGAR, ADYAR, CHENNAI.

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GEOTECHNICAL INVESTIGATION REPORT

for Residential Building at Second Main Road, Kasturibai Nagar, Adyar, Chennai

EXECUTIVE SUMMARY

M/s. Khurinji Homes Private Limited, Chennai are associated in construction of Residential Building at Second Main Road, Kasturibai Nagar, Adyar, Chennai - 600 020.

The site for the proposed Residential Building is situated at New No.2, Old No.43 on the Western side of 1st Cross Street in Second Main Road, Kasturibai Nagar, Adyar, Chennai - 600 020. The site measures approximately 22.5m x 25.8m in size. The site is having boundary wall on all the sides and is fairly level in topography. Vegetation in the form of trees was observed within the site during the period of field investigations. As per the information provided by the client, the existing double storeyed building (on the Northern side of the site) will be demolished prior to the construction of the new building.

The proposed Residential Building consists of an open stilt floor at ground level and five upper floors.

Geotechnical investigations have been undertaken at the site as per the scope of investigations, stipulated by the client, which consisted of conducting 2 boreholes down to refusal/rock strata (where N-value is >100) and further drilling in refusal/rock strata by minimum 3m depth.

The results of borehole investigations indicate the presence of Brown sandy silty clay down 2.3/3.6m depth below existing ground level underlined by Brown/Grey silty sand /Grey clayey silty sand with/without gravel down to 14/14.5m depth below existing ground level at which refusal strata was encountered. The refusal strata encountered is in the form of completely weathered rock (Charnockite Based) and continued down to the maximum investigated depth of 17/17.5m below existing ground level.

The soil strata is in a medium dense state down to the depths of refusal strata encountered between 14/14.5m depth below existing ground level.

Ground water table was encountered between 4.2m and 4.9m depth in the boreholes during the period of field investigations.

In view of the observed subsoil conditions, the proposed residential building can be supported on *Isolated/Strip Footings laid at a minimum depth of 2m below the existing ground level with a Net allowable bearing pressure of 12t/m^2 (1.2kg/cm^2) for widths of foundations ≥1.5m.*

The excavated soil cannot be used for backfilling purposes as the soil is medium swelling type. The foundation surface should be watered for at least 24 hours. The top slush should then be removed and the surface compacted heavily. If any loose pockets are observed, the same shall be filled with brickbats/ gravel and compacted well. Foundations can subsequently be placed over such a prepared surface.

Stiff Tie-beams connecting the columns in both directions may be provided which will render additional rigidity to the structure.

There is a well located in the site. In case, the well is not utilised, the same be closed by backfilling with sand-gravel mix. The back filling should be done in layers and well compacted. Incase, the well is to be utilised, the sides of the well should be properly lined. Additionally, the distance of the nearest footing to the well should not be less than 1 time the width of foundation.

REPORT ON GEOTECHNICAL INVESTIGATION FOR RESIDENTIAL BUILDING AT SECOND MAIN ROAD, KASTURIBAI NAGAR, ADYAR, CHENNAI

1.0 INTRODUCTION

1.1 Overview

1.1.1 M/s. Khurinji Homes Private Limited, Chennai are associated in construction of Residential Building at Second Main Road, Kasturibai Nagar, Adyar, Chennai - 600 020.

1.1.2 The geotechnical investigations have been carried out to ascertain the soil conditions for the design of foundations of the proposed Residential Building.

1.2 Authority

A detailed geotechnical investigations programme has been conducted as per the authorisation by M/s. Khurinji Homes Private Limited, Chennai vide their Work order no: 0004/KHPL/23-24 dated 20.09.2023.

2.0 PROJECT DETAILS

2.1 Site Location

The site for the proposed Residential Building is situated at New No.2, Old No.43 on the Western side of 1st Cross Street in Second Main Road, Kasturibai Nagar, Adyar, Chennai - 600 020.

2.2 Site Layout and Topography

2.2.1 The site measures approximately 22.5m x 25.8m in size. The site is having boundary wall on all the sides and is fairly level in topography. Vegetation in the form of trees was observed within the site during the period of field investigations. As per the information provided by the client, the existing double storeyed building (on the

Northern side of the site) will be demolished prior to the construction of the new building.

2.2.2 The colour of the exposed soil surface is Brown.

2.3 The Structure

As per information provided by the client, the proposed Residential Building consists of an open stilt floor at ground level and five upper floors.

2.4 Seismic Zone

Site for the proposed Residential Building is situated in Adyar, Chennai which falls under Seismic Zone III as per IS 1893 (Part 1) - 2016.

2.5 Geographical Information

2.5.1 Site for the proposed Residential Building is located at:

a) Latitude : 13°00'

b) Longitude : 80°15'

3.0 OBJECT OF INVESTIGATIONS

3.1 For designing the foundation system of the proposed Residential Building, the following data are required:

a) Type of foundation system.

b) Depth below the ground level at which the foundation system is to be laid.

c) Allowable bearing pressure on the foundations levels.

3.2 To determine above factors, the following information would be required:

a) The subsoil profile indicating thicknesses of the various soil strata, to a depth down to the influence zone below the foundations.

b) Engineering properties of the soil strata at various levels.

c) Physical characteristics of the soil strata.

d) Variation of the strength of the strata with depth.

3.3 For evaluating the above parameters, field investigations and laboratory investigations on the soil samples collected during the field investigations, have been carried out.

3.4 The results from these investigations have been analysed to provide the recommendations for the design of foundations.

4.0 SCOPE OF INVESTIGATIONS

4.1 Scope of investigations as given in the work order consisted of:

a) Conducting 2 boreholes down to refusal strata (where N-value is >100); and further drilling in refusal/rock strata by a minimum of 3m depth, as required by the client.

b) Conducting standard penetration tests at 1.5m depth intervals.

c) Recovering undisturbed soil samples from various levels of the subsoil strata.

d) Recording ground water table levels, if met with.

e) Conducting relevant laboratory tests on soil samples recovered.

f) Preparation and submission of a technical report containing the details of the tests carried out, their analysis and recommendations regarding the foundation system to be adopted. Two copies of the report are to be submitted.

5.0 FIELD INVESTIGATIONS

5.1 General Details

5.1.1 The locations of the boreholes were shown at site by the client's representative. A Schematic site plan showing the boreholes locations marked by the client is given in fig. 1.

5.1.2 Weather was clear during the period of field investigations which were carried out in the fourth week of September 2023.

5.2 Boreholes

5.2.1 The boreholes were progressed by mechanically operated rotary core drill method.

5.2.2 Refusal strata (i.e. N-value > 100) was encountered between 14 and 14.5m depth below the existing ground level in the form of completely weathered rock (Charnockites based). The drilling in refusal/rock strata was conducted using NX size core barrel fitted with diamond bits.

5.2.3 The boreholes were to be terminated after drilling a minimum of 3m in refusal/rock strata as per the stipulated scope of work.

5.2.4 The depths at which ground water table was encountered in the boreholes during the period of field investigations, depths at which refusal/rock strata was encountered in the boreholes and termination depths of the boreholes are given below:

Borehole No.	Depth of Ground Water Table Below EGL (m)	Depth of Rock Strata Below EGL (m)	Termination Depth Below EGL (m)
1	4.9	14	17
2	4.2	14.5	17.5

5.2.5 Ground water table was encountered between 4.2m and 4.9m depth in the boreholes during the period of field investigations.

5.2.6 Standard Penetration Tests were conducted in soil strata at 1/1.5m depth intervals.

5.2.7 Disturbed soil samples recovered from split spoon sampler were packed in polythene bags, labelled and retained for identification purposes.

5.2.8 Undisturbed soil samples were recovered by thin walled tubes conforming to IS:2132. These tubes had an area ratio of less than 10%. The diameter of soil samples were 50mm and length 45cm.

6.0 LABORATORY INVESTIGATIONS

6.1 The soil samples brought to the laboratory were subjected to various tests to determine the following properties

a) Type of soil and its gradation

b) Consistency limits

c) Natural density

d) Natural water content

e) Shear strength properties

6.2 In order to determine the above properties listed in 6.1, the following tests were conducted.

a) Sieve analysis on the coarse grained soil fraction

b) Hydrometer analysis on the fine grained soil fraction

c) Liquid and plastic limits

d) Natural Density and Water Content tests

e) Triaxial tests

f) Free Swell Index tests

7.0 RESULTS AND ANALYSIS

7.1 Presentation of Results

7.1.1 The results of borehole investigations and of the laboratory investigations conducted on the soil samples collected from the boreholes have been presented in the form of soil profile tables in Table Nos.1 to 4.

7.1.2 The soil profile tables indicate the following:

a) Standard Penetration Test Values (i.e. N- values observed) at various depths

b) Soil description identifying the type of soil

c) Grain size analysis indicating composition of subsoil

d) Consistency limits

e) In-situ bulk density and Water content

f) Triaxial test results

7.2 Analysis of Soil Profile

7.2.1 A perusal of the data presented in the soil profile tables indicate the presence of the following substrata.

a) Stratum - I : Brown sandy silty clay

b) Stratum - II : Brown/grey silty sand

c) Stratum - III : Grey clayey silty sand with or without gravel

d) Stratum - IV : Grey completely weathered rock strata (Charnockite Based)

7.2.2 The thicknesses in each borehole of each strata described in 7.2.1 is given in the table below:

BH No.	Depth (m) : from - to			
	Stratum - I	Stratum - II	Stratum - III	Stratum - IV
1	0.0 - 2.3	2.3 - 14	-	14 - 17
2	0.0 - 3.6	3.6 - 8 9.2 - 11.3	8 - 9.2 11.3 - 14.5	14.5 - 17.5

7.2.3 The above results- show that :

a) Stratum - I consisting of Brown sandy silty clay having significant percentages of clay and varying percentages of sand and silt, has been encountered from ground level down to 2.3/3.6m depth below existing ground level.

b) Stratum - II consisting of Brown/grey silty sand having significant percentages of sand and varying percentages of silt, has been encountered form 2.3/3.6/9.2m to 8/11.3/14m depths below existing ground level.

c) Stratum - III consisting of Brown clayey silty sand with or without gravel having significant percentages of sand and varying percentages of clay, silt and gravel, has been encountered form 8/11.3m depth down to 9.2/14.5m depth below existing ground level only at the location of borehole BH2.

d) Stratum - IV consisting of Grey completely weathered rock strata (Charnockite Based) has been encountered from 14/14.5m depth down to the termination depths of boreholes of 17/17.5m below existing ground level.

7.3 Soil Composition

7.3.1 The grain size distribution of the soil samples at various depths, as determined in the laboratory have been presented in the form of grain size analysis curves in figs. 3a to 3c.

7.3.2 The variations in the grain size distribution - strata wise across the boreholes are as follows:

a) Stratum - I : Brown sandy silty clay

BH No.	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
1	0	24	35	41
2	0	13 - 33	33 - 42	34 - 45

b) Stratum - II : Brown/grey silty sand

BH No.	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
1	0	77 - 85	15 - 23	0
2	0	78 - 92	8 - 22	0

c) Stratum - III : Grey clayey silty sand with or without gravel

BH No.	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
2	12	55 - 64	13 - 23	11 - 22

This stratum was encountered only at the location of borehole BH2.

7.3.3 The above results indicate that :

a) Stratum - I consists of about 13-33% of sand, 33-42% of silt and 34-45% of clay.

b) Stratum - II consists of about 77 - 92% of silt and 8 - 23% of sand.

c) Stratum - III consists of about 11-22% of clay, 13-23% of silt, 55-64% of sand and 12% of gravel.

7.4 In-situ Bulk Density, Water Content and Dry density

7.4.1 The in-situ bulk density, water content and dry density obtained from undisturbed soil sample are tabulated below.

BH No.	Depth (m)	In-situ Bulk Density (g/cm^3)	Water Content (%)	Dry Density (g/cm^3)
1	2	1.89	15.2	1.64
	3.5	1.91	6.6	1.79
2	1.5	1.86	13.9	1.63
	3	1.91	17.2	1.63
	9	1.97	15.3	1.71
	12	2.07	19.2	1.74

7.4.2 The dry density indicates that the soil strata is in a medium dense state down to the depths of refusal strata encountered at 14/14.5m depth below existing ground level. Undisturbed soil samples could not be collected satisfactorily at some depths below 5m, as the samples were cohesionless and sampling was done below ground water table level.

7.5 Consistency Limits

7.5.1 The Consistency Limits determined for the soil in Stratum - I (Brown sandy silty clay) indicate that the liquid limit varies between 45% to 52%, plastic limit varies between

17% to 25% and plasticity index varies between 28% to 27 %.

7.5.2 The Consistency Limits determined for the soil in Stratum - II (Brown/grey silty sand) indicate that the soil in this strata is non plastic in nature.

7.5.3 The Consistency Limits determined for the soil in Stratum - III (Grey clayey silty sand with or without gravel) indicate that the liquid limit varies between 22% to 29%, plastic limit varies between 14% to 16% and plasticity index varies between 8% to 13 %.

7.5.4 The Consistency Limits indicate that the soil in :

a) Stratum - I (Brown sandy silty clay) is medium plastic in nature.

b) Stratum - II (Brown/grey silty sand) is non plastic in nature

c) Stratum - III (Grey clayey silty sand with or without gravel) is low plastic in nature.

7.6 Standard Penetration Tests

7.6.1 Standard Penetration Test values (N-values observed) are presented in the soil profile table nos.1 to 4.

7.6.2 Standard Penetration Test values (N-values observed) have also been presented in form of plots of N-values vs depth in fig. 4.

7.6.3 The N-values indicate that soil strata is in a medium dense state down to the depths of refusal strata encountered between 14/14.5m depth below existing ground level with N-values ranging between 7 and 30.

7.7 Triaxial Test Results

The cohesion 'c' obtained from consolidated drained triaxial compression test varies between 0.10kg/cm² to 0.28kg/cm² and the angle of shearing resistance 'ϕ' of the soil varies between 16° and 30°.

7.8 Free Swell Index

7.8.1 The free swell index of the soil samples collected at various depths are given below:

BH No.	Free Swell Index (%) at depths (m)			
	1	1.5	2.5	3
1	-	49.2	-	6.7
2	53.5	-	43.8	-

7.8.2 The above results indicate that the top soil strata is medium swelling in nature. Hence, the excavated soil cannot be used for backfilling purposes.

7.9 Compiled Soil Profile

7.9.1 An overview of the results and their analysis has been presented in the form of a compiled soil (fig. 2).

7.9.2 The above figure shows the various strata encountered and their thicknesses in each of the boreholes and also gives the soil composition and the observed N-values at various depths along with the depth at which undisturbed soil samples were collected.

8.0 DESIGN CRITERIA

8.1 Design Parameters

8.1.1 The parameters required for the design of foundation system for the proposed Residential Building are:

a) Type of foundation to be adopted

b) Depth at which the foundations have to be laid

c) Allowable bearing pressure on the soil at the foundation level

8.1.2 On the basis of the analysis of the results of investigations, the required design parameters have been arrived at and are given in the following sections.

8.2 Type of Foundations

8.2.1 The type of foundation depends on the following:

a) Subsoil conditions

b) Type of structure

c) Configuration at loading points

d) Loading intensity on each sub-structure/structural element.

8.2.2 As per information provided by the client, the proposed structure is a Residential Building consists of an open stilt floor at ground level and five upper floors.

8.2.3 The results of the investigations have shown that soil strata is in a medium dense state down to the depths of refusal strata encountered at 14/14.5m depth below existing ground level.

8.2.4 In view of the above, *Shallow Foundations - Isolated/Strip Footings* can be adopted for the proposed Residential Building.

8.3 Depth of Foundations

8.3.1 The depth at which foundations should be laid will be governed by the following criteria.

a) Top filled up strata/loose soil, if any

b) There should be sufficient thickness of soil above the footing/foundations so that the bearing capacity of the soil can be fully mobilised.

c) Soil below the level of footings/foundations should have the requisite strength to support the anticipated bearing pressures on the foundations without allowing the settlement of footings/foundations to exceed the acceptable limits.

d) Requirements of the type of structure (Residential Building consists of an open stilt floor at ground level and five upper floors).

8.3.2 In view of the above factors, foundations of the proposed residential building can be made to rest at a minimum depth of *2m below the existing ground level*. The soil available at the founding level will be Brown sandy silty clay.

8.4 Allowable Bearing Pressure

8.4.1 Allowable bearing pressure has been evaluated by:

a) Shear failure criteria based on the average soil data

b) Settlement criteria based on the SPT values (N-values)

c) Settlement criteria based on deformation modulus

8.4.2 A water table correction factor of 0.5 has been considered.

8.4.3 An allowable settlement of 50mm has been considered to evaluate the allowable bearing pressure for Isolated/Strip footings.

8.4.4 On the basis of the above analysis, *net allowable bearing pressure of 12t/m² can be adopted for widths of foundations ≥1.5m.*

9.0 RECOMMENDATIONS

9.1 Type of Foundations

Shallow Foundations - Isolated/Strip Footings

9.2 Depth of Foundations

Minimum 2m below the existing ground level

9.3 Allowable Bearing Pressure

Net Allowable Bearing Pressure of 12t/m² can be adopted for Footings of widths ≥1.5m for an allowable settlement of 50mm.

9.4 Construction Advisories

9.4.1 The soil of each strata has been described with name, colour etc. During excavation, any variations observed in the nature and condition of the soil from those given in this

Report should be noted and appropriate action should be taken.

9.4.2 The excavated soil cannot be used for backfilling purposes as the soil is medium swelling type.

9.4.3 The foundation surface should be watered for at least 24 hours. The top slush should then be removed and the surface compacted heavily. If any loose pockets are observed, the same shall be filled with brickbats/ gravel and compacted well. Foundations can subsequently be placed over such a prepared surface.

9.4.4 Stiff Tie-beams connecting the columns in both directions may be provided which will render additional rigidity to the structure.

9.4.5 There is a well located in the site. In case, the well is not utilised, the same be closed by backfilling with sand-gravel mix. The back filling should be done in layers and well compacted. Incase, the well is to be utilised, the sides of the well should be properly lined. Additionally, the distance of the nearest footing to the well should not be less than 1 time the width of foundation.

9.5 Appendices

9.5.1 The calculations for the allowable bearing pressure have been provided in Appendix-A of this report.

9.5.2 The List of IS codes referred for providing the recommendations and that which might be required to implement the same have been given in Appendix-B of this report.

9.6 Notes

9.6.1 The recommendations given in this report have been arrived at on the basis of design parameters which have been judiciously adopted by giving due consideration to the results of field and laboratory investigations as well as NAGADI's experience of over four decades in working in various types of soil and rock conditions all over India.

9.6.2 The entire report should be studied before adopting the recommendations given in the report.

10.0 LIMITATIONS

This Geotechnical investigation has been carried out at locations in the site chosen by the client as representing the entire site. The recommendations provided in this Report are hence valid only for those test locations. However, if there is any change in the subsoil conditions and properties at places between or beyond the chosen test locations, Nagadi may be contacted for further actions. Fresh investigations will have to be carried out at such locations.

Dr. N. Santosh Rao
Technical Director
For NAGADI CONSULTANTS PVT. LTD.

ANALYSIS FOR ALLOWABLE BEARING PRESSURE (BH 3)

Data

(i) Soil Properties :

c (kg/cm^2) = 0.28 ϕ = 18 ° γ (g/cm^3) = 1.9

(ii) Depth of Foundation, D (m) = 2

(iii) Allowable Settlement, s (mm) = 50

Shear Failure Criterion (Ref. IS : 6403)

N_c = 11.25 N_q = 4.14 N_γ = 2.90 R_w = 0.50 R_w' = 0.50

$$q_s = \frac{1}{3}\left(c \cdot N_c + \gamma D \cdot N_q \cdot R_w + 0.5 \cdot \gamma \cdot B \cdot N_\gamma \cdot R'_w\right) - \gamma D.R_w$$

B (m)	1.5	≥3
q_s (t/m^2)	11.9	12.6

Settlement Criterion (Ref. IS : 8009)

(i) From N Values

B (m)	1.5	≥3
H (m)	3	6
N_{av}	13	15
q_a (t/m^2)	12.5	12.6

(ii) From Triaxial Compression Tests : $q_a = \frac{s \cdot E}{0.7 \cdot H}$

B (m)	1.5	≥3
H (m)	3	6
E (kg/cm^2)	85	100
q_a (t/m^2)	20.2	11.9

ADOPT	**B (m)**	**1.5**	**≥3**
	q (t/m^2)	**12**	**12**

Note : q_s and q_a are NET VALUES, Weight of backfill etc. need not be added to the loading except in case of filling above original G.L.

LIST OF IS CODES

Field Investigation

1. IS : 1498 - 1970 : Classification and identification of soils for general engineering purposes (First Revision) (Amendment 2)
2. IS : 1892 - 1979 : Code of practice for sub surface investigations for foundations (First revision)
3. IS : 2131 - 1981 : Method of Standard Penetration Tests for soils (First revision)
4. IS : 2132 - 1986 : Code of practice for thin walled tube sampling of soils (Second revision)

Laboratory Tests

1. IS : 2720 - 1983 (Part 1) : Methods of test for soils: Preparation of dry soil samples for various tests (Second revision)
2. IS : 2720 - 1980 (Part 2) : Method of test for soils: Determination of water content (Second revision) Amendment 1
3. IS : 2720 - 1980 (Part 3/Sec 1) : Method of test for soils : Determination of Specific Gravity : Fine grained soils. (First revision)
4. IS : 2720 - 1980 (Part 3/Sec 2) : Method of test for soils : Determination of Specific Gravity : Fine, Medium & Coarse grained soils. (First revision).
5. IS : 2720 - 1985 (Part 4) : Method of test for soils : Grain size analysis (Second revision)
6. IS : 2720 - 1985 (Part 5) : Method of test for soils : Determination of liquid and plastic limit (Second revision)
7. IS : 2720 - 1977 (Part 40) : Methods of tests for soils: Determination of free swell index of soils.

Foundation Construction

1. IS : 1080 - 1986 : Code of practice for design and construction of shallow foundations on soils (other than raft, ring and shell) (Second revision)
2. IS : 1904 - 1986 : Code of practice for design and construction of foundation in soils: General requirements (Third revision)
3. IS 6403 - 1981 : Code of practice for determination of bearing capacity of shallow foundations : First revision (Amendment 1)
4. IS 8009 - 1976 (Part 1) : Code of practice for calculation of settlements of foundations : Shallow foundations subject to symmetrical static vertical loads (Amendment 2)

SOIL PROFILE

Project: Residential Building at Second Main Road, Kasturibai Nagar, Adyar, Chennai - 600 020.

B. H. Location: | Water Table: 4.9m | Term. Depth : 17m | B.H. No. : 1

N - Value#	Depth (m)	Soil Description	Grain Size Analysis				Atterberg Limits		In-situ properties		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density* (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
	0.0	Ground level											
8	1.5	Brown sandy silty clay	0	24	35	41	48	21					
	2.0	Brown sandy silty clay							1.89	15.2	CD	0.28	18
	2.3	Change of strata											
13	3.0	Brown silty sand	0	77	23	0	-	NP					
	3.5	Brown silty sand							1.91	6.6	CD	-	30
16	4.5	Brown silty sand	0	85	15	0	-	NP					
	5.0	Brown silty sand									Sample slipped		
18	6.0	Grey silty sand	0	83	17	0	-	NP					
	6.5	Grey silty sand									Sample slipped		
20	7.5	Grey silty sand	0	79	21	0	-	NP					
	8.0	Grey silty sand									Sample slipped		
21	9.0	Grey silty sand	0	80	20	0	-	NP					
	9.5	Grey silty sand									Sample slipped		
26	10.5	Grey silty sand	0	83	17	0	-	NP					

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Job No. : G(C)9867

Sheet No. : 1

SOIL PROFILE

Project: Residential Building at Second Main Road, Kasturibai Nagar, Adyar, Chennai - 600 020.

B. H. Location: | Water Table: 4.9m | Term. Depth : 17m | B.H. No. : 1

N - Value#	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg Limits: Liquid (%)	Plastic (%)	In-situ properties: Density* (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	ϕ (°)
	11.0	Grey silty sand									Sample slipped		
30	12.0	Grey silty sand	0	79	21	0	-	NP					
	13.5	Grey silty sand									Sample slipped		
	14.0	Change of strata											
100 (9/33cm)		Grey completely weathered rock (Charnockites based)											
100 (40/13cm)	15.5	Grey completely weathered rock (Charnockites based)											
100 (50/7cm)	17.0	Grey completely weathered rock (Charnockites based)											
		*-Natural Bulk Density # -N Values (Observed)											

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Job No. : G(C)9867

Sheet No. : 2

SOIL PROFILE

Project: Residential Building at Second Main Road, Kasturibai Nagar, Adyar, Chennai - 600 020.

B. H. Location: | Water Table: 4.2m | Term. Depth : 17.5m | B.H. No. : 2

N - Value#	Depth (m)	Soil Description	Grain Size Analysis				Atterberg Limits		In-situ properties		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density * (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
	0.0	Ground level											
7	1.0	Brown sandy silty clay	0	13	42	45	52	25					
	1.5	Brown sandy silty clay							1.86	13.9	CD	0.26	16
12	2.5	Brown sandy silty clay	0	33	33	34	45	17					
	3.0	Brown sandy silty clay							1.91	17.2	CD	0.25	20
	3.6	Change of strata											
15	4.0	Brown silty sand	0	92	8	0	-	NP					
	4.5	Brown silty sand									Sample slipped		
16	5.5	Brown silty sand	0	78	22	0	-	NP					
	6.0	Brown silty sand									Sample slipped		
17	7.0	Brown silty sand	0	89	11	0	-	NP					
	7.5	Brown silty sand									Sample slipped		
	8.0	Change of strata											
20	8.5	Grey clayey silty sand	0	64	19	17	22	14					
	9.0	Grey clayey silty sand							1.97	15.3	CD	0.10	27

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Job No. : G(C)9867

Sheet No. : 3

SOIL PROFILE

Project: Residential Building at Second Main Road, Kasturibai Nagar, Adyar, Chennai - 600 020.

B. H. Location: | Water Table: 4.2m | Term. Depth : 17.5m | B.H. No. : 2

N-Value#	Depth (m)	Soil Description	Grain Size Analysis				Atterberg Limits		In-situ properties		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density* (g/cm³)	Water Cont (%)	Type	c (kg/cm²)	ϕ (°)
	9.2	Change of strata											
21	10.0	Brown silty sand	0	88	12	0	-	NP					
	10.5	Brown silty sand									Sample slipped		
	11.3	Change of strata											
23	11.5	Grey clayey silty sand	0	55	23	22	29	16					
	12.0	Grey clayey silty sand							2.07	19.2	CD	0.13	26
	13.0	Change of strata											
21		Grey clayey silty sand with gravel	12	64	13	11	-	NP					
	14.5	Change of strata											
100 (3/42cm)		Grey completely weathered rock (Charnockites based)											
100 (97/25cm)	16.0	Grey completely weathered rock (Charnockites based)											
> 100 (60/15cm)	17.5	Grey completely weathered rock (Charnockites based)											

*-Natural Bulk Density # -N Values (Observed)

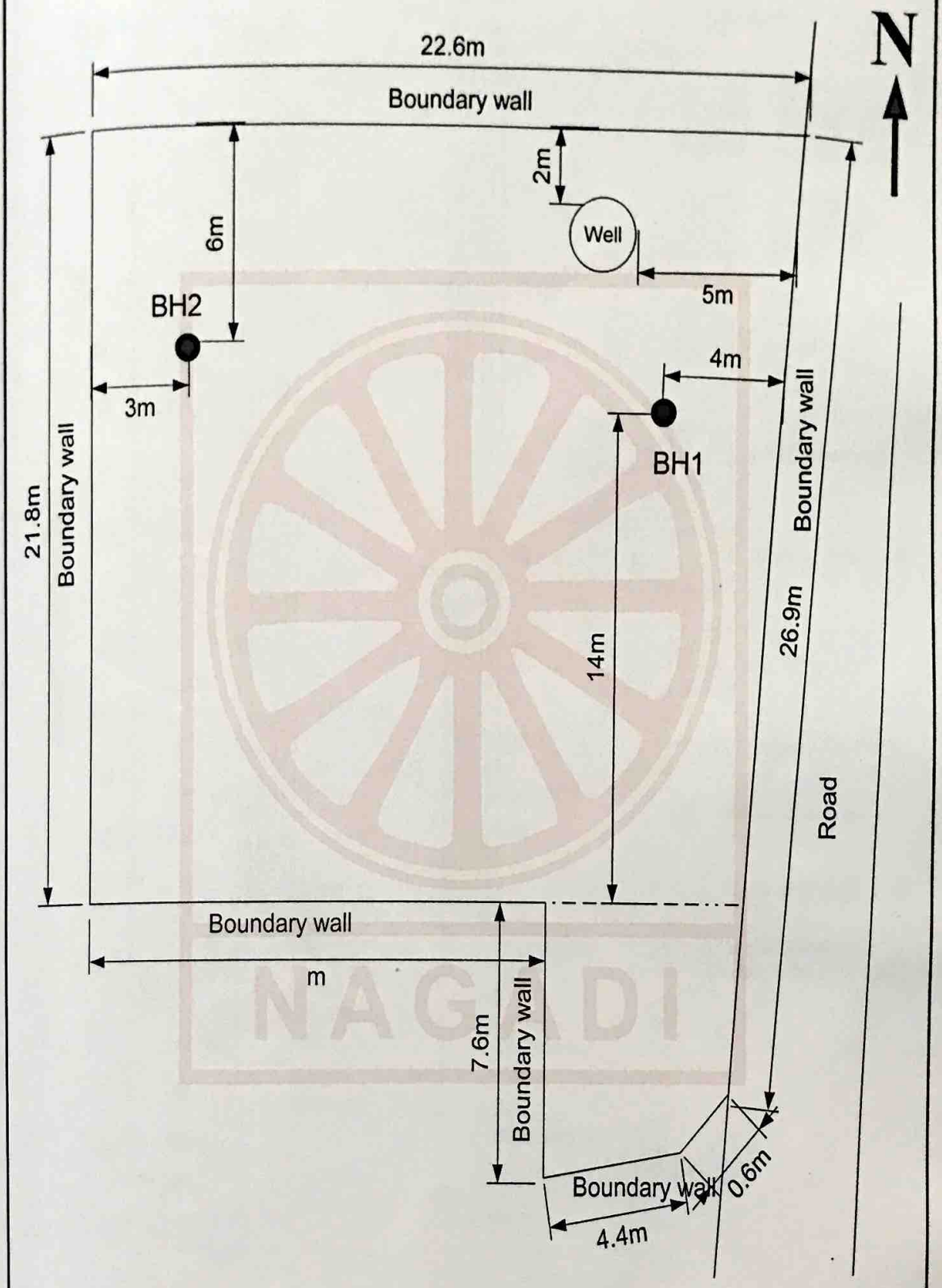
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Job No. : G(C)9667

Sheet No. : 4



SCHEMATIC SITE PLAN
(Not to Scale)

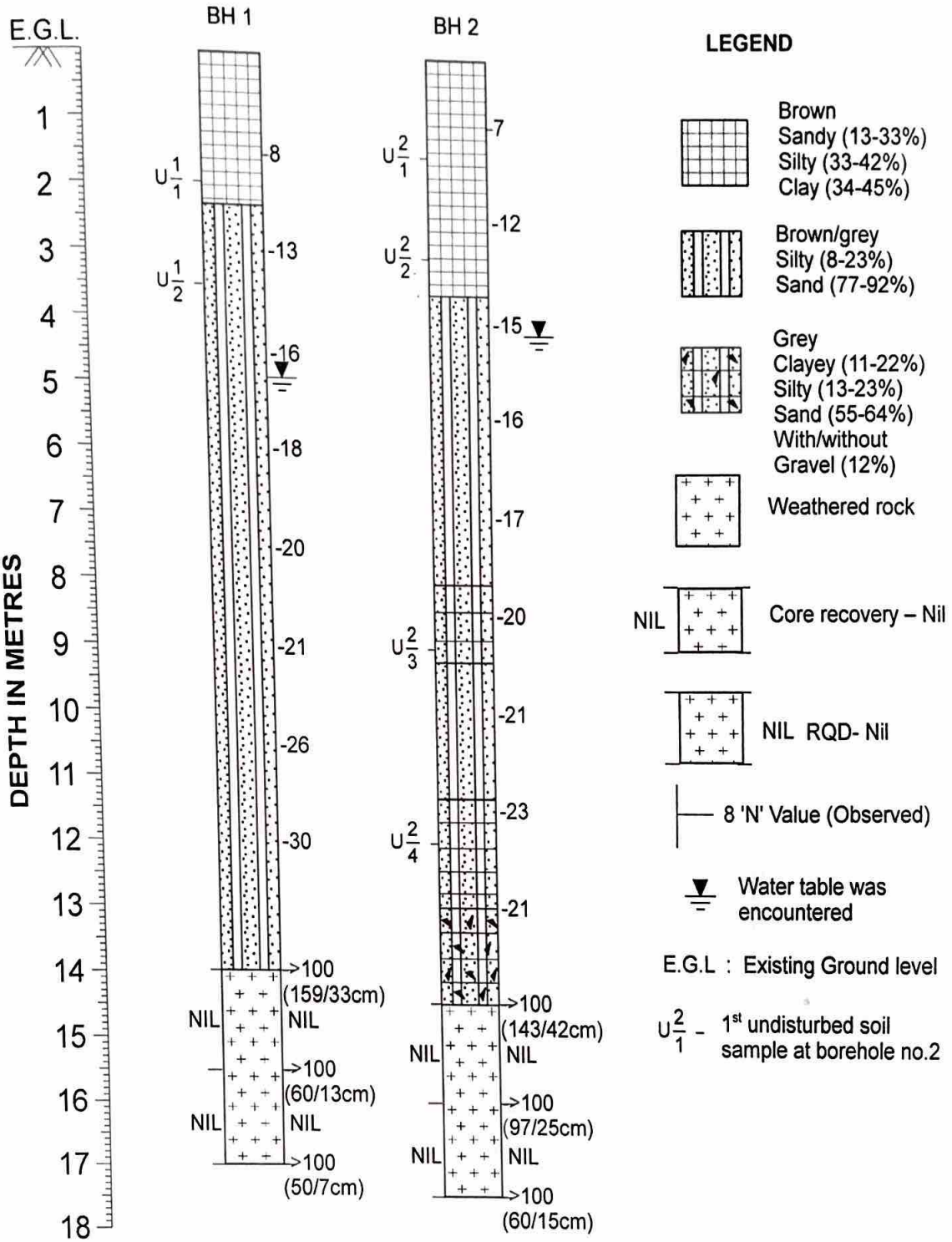
Legend
BH -Borehole

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Job No. : G(C)9867

Sheet No. : 1



COMPILED SOIL PROFILE

PROJECT : RESIDENTIAL BUILDING AT SECOND MAIN ROAD, KASTURIBAI NAGAR, ADYAR, CHENNAI - 600 020

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Job No. : G(C)9867

Sheet No. : 2a

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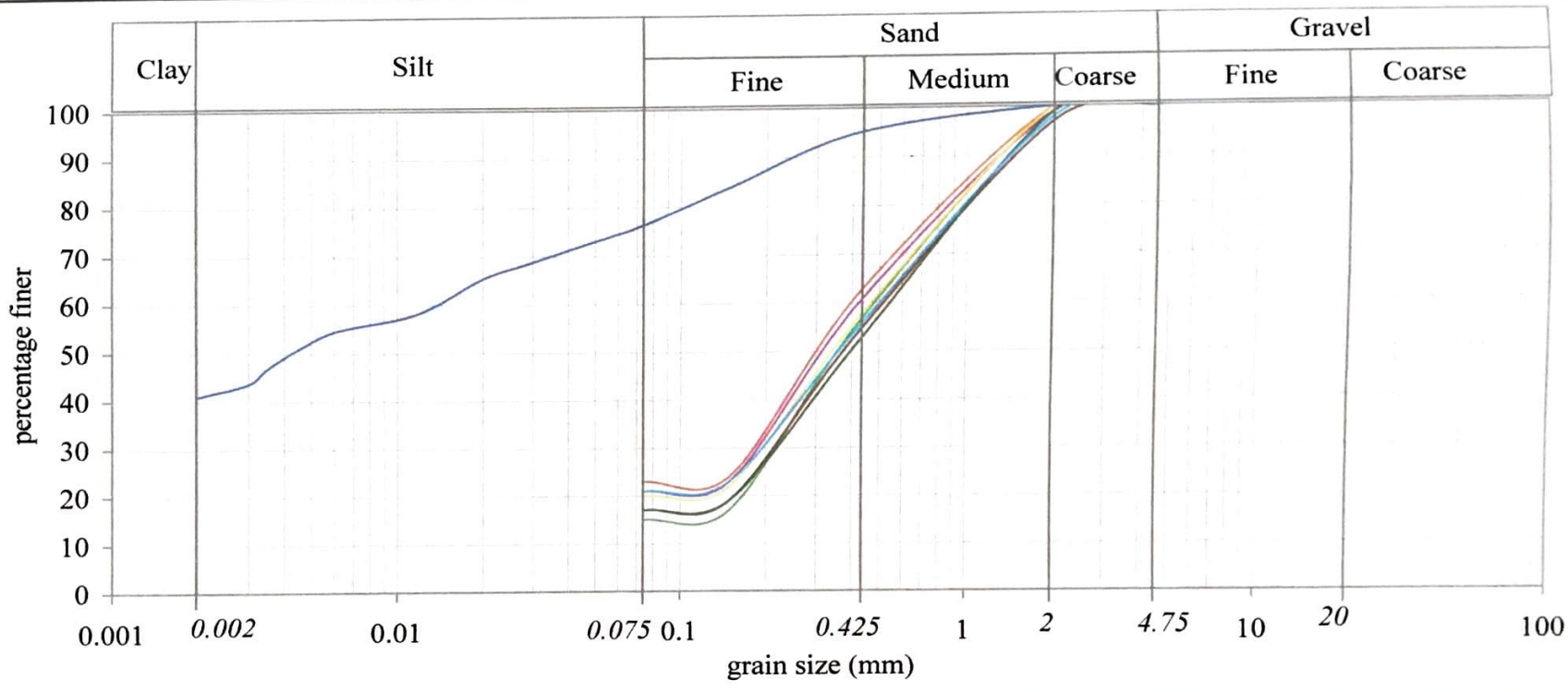
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Job No. : G(C)9679

Sheet No. : 3a



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	U
	1	1.5	Sandy silty clay	0	24	35	41	0.015	-	
	1	3.0	Silty sand	0	77	23	0	0.390	-	
	1	4.5	Silty sand	0	85	15	0	0.475	-	
	1	6.0	Silty sand	0	83	17	0	0.525	-	
	1	7.5	Silty sand	0	79	21	0	0.420	-	
	1	9.0	Silty sand	0	80	20	0	0.450	-	
	1	10.5	Silty sand	0	83	17	0	0.550	-	
	1	12.0	Silty sand	0	79	21	0	0.500	-	

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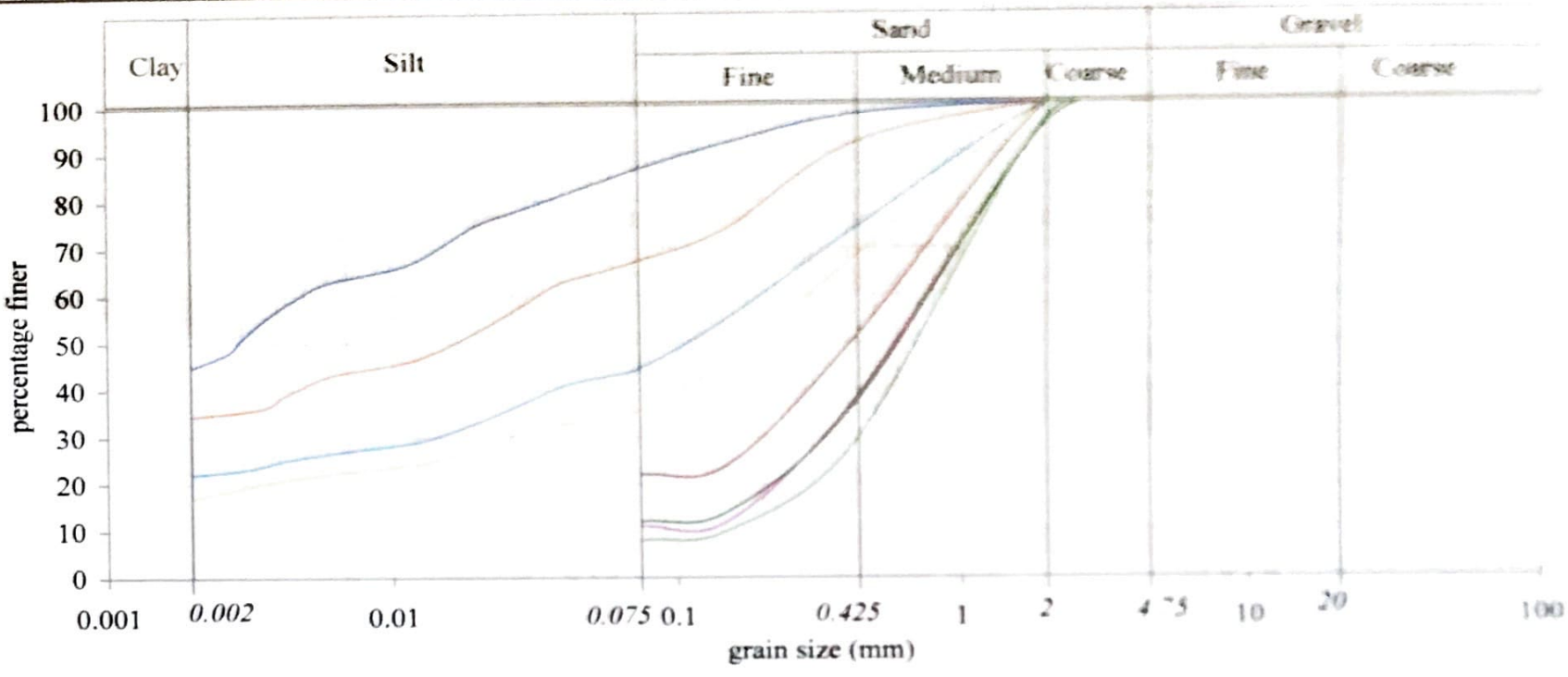
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Job No. : G(C)9867

Sheet No. : 3b



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	U
	2	1.0	Sandy silty clay	0	13	42	45	0.005	-	-
	2	2.5	Sandy silty clay	0	33	33	34	0.033	-	-
	2	4.0	Silty sand	0	92	8	0	0.850	0.15	5.7
	2	5.5	Silty sand	0	78	22	0	0.550	-	-
	2	7.0	Silty sand	0	89	11	0	0.750	-	-
	2	8.5	Clayey silty sand	0	64	19	17	0.290	-	-
	2	10.0	Silty sand	0	88	12	0	0.775	-	-
	2	11.5	Clayey silty sand	0	55	23	22	0.200	-	-

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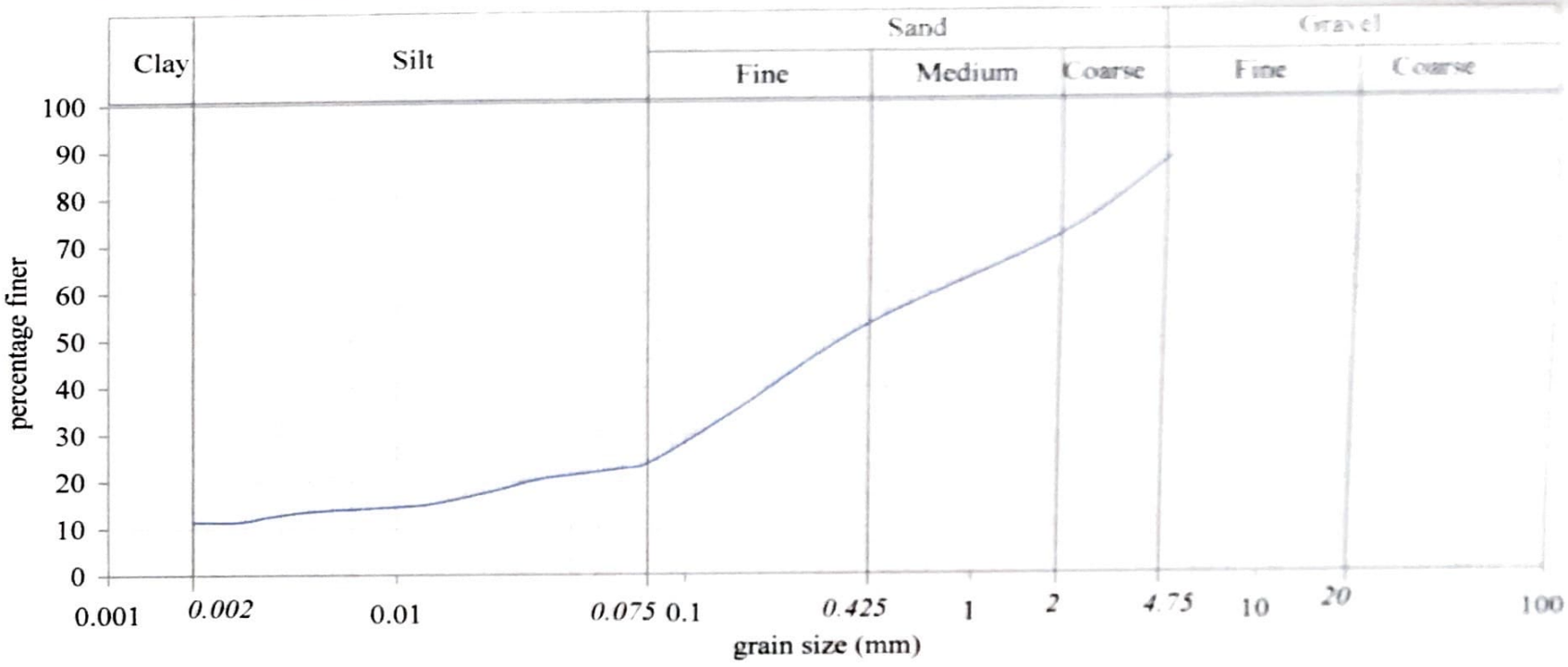
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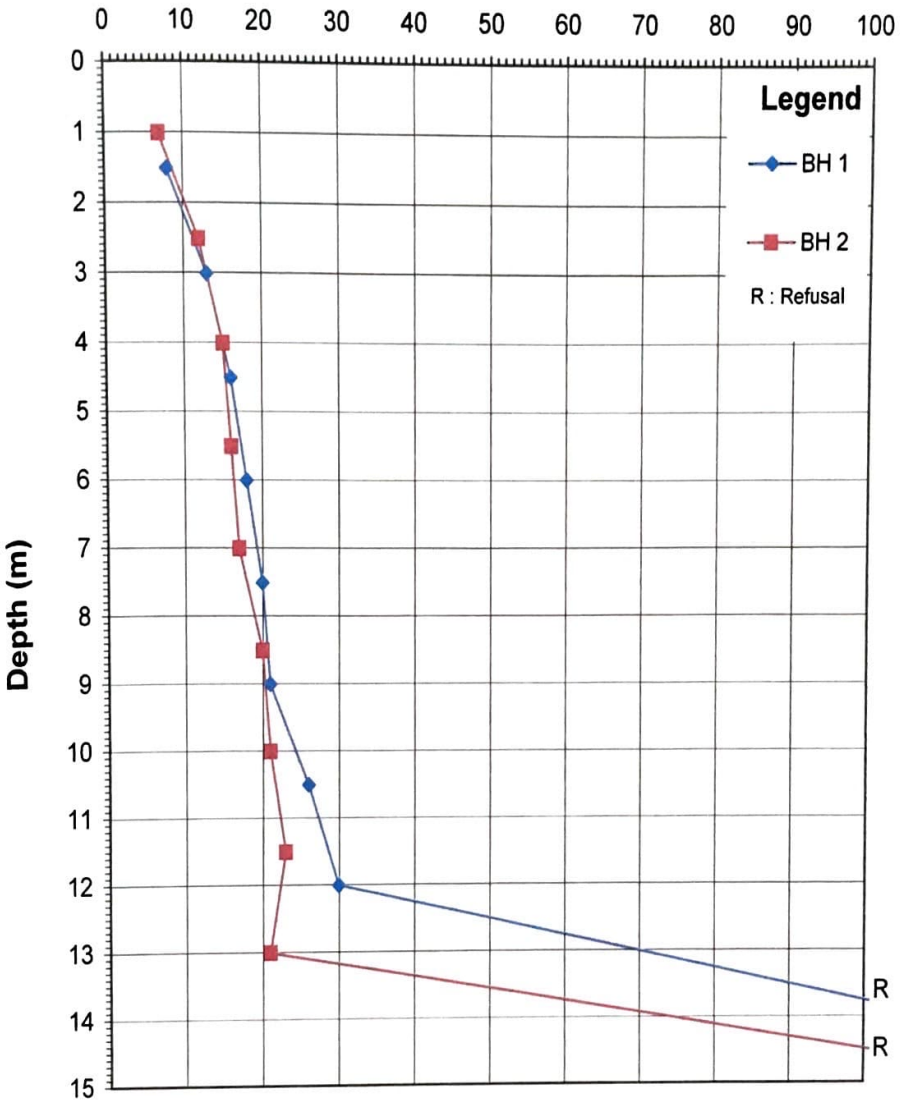
Job No. : G(C)9867

Sheet No. : 3c



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	U
	2	13.0	Clayey silty sand with gravel	12	64	13	11	0.725	-	

SPT Values (Observed)



SPT Values (Observed) Vs Depth Curves

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