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GEOTECHNICAL REPORT FOR

RESIDENTIAL BUILDING AT ADHANUR ROAD, VARADHARAJAPURAM VILLAGE, KUNDRATHUR TALUK, KANCHEEPURAM DISTRICT, CHENNAI

Client :

M/s. Nest Zone India Pvt Ltd.,
Chennai

Architect :

Consultant :

Structural Consultant :

Job No. : G(C)9936 Date : 30.05.2024

NAGADI CONSULTANTS PRIVATE LIMITED

Branch :

Chennai

Project : **RESIDENTIAL BUILDING AT ADHANUR ROAD, VARADHARAJAPURAM VILLAGE, KUNDRATHUR TALUK, KANCHEEPURAM DISTRICT, CHENNAI**

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GEOTECHNICAL INVESTIGATION REPORT

for Residential Building at Adhanur Road, Varadharajapuram Village, Kundrathur Taluk, Kancheepuram District, Chennai

EXECUTIVE SUMMARY

M/s. Nest Zone India Pvt Ltd., Chennai are proposing to construct a Residential Building "Nest Charisma" at Adhanur Road, Varadharajapuram Village, Kundrathur Taluk, Kancheepuram District, Chennai - 600 048.

The site for the proposed residential building is situated at S.Nos.44/2B1, 46/2A1, 46/2A2 & 46/2A3 on the Eastern side of Adhanur road in Varadharajapuram Village, Kundrathur Taluk, Kancheepuram District, Chennai - 600 048. The site measures approximately 3159m^2 in area. The site is open on all the sides and is fairly level in topography. Vegetation in the form of grass and bushes were observed within the site during the period of field investigations. The site is lower than the adjacent road by about 0.8m.

The proposed residential building consists of a ground floor 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 4 boreholes down to 8m depth or refusal/rock strata (where N-value is >50); whichever is met earlier.

The results of borehole investigations indicate the presence of Brown/brownish grey clayey silty sand with or without gravel down to 2.5/3m depths below existing ground level at which refusal/rock strata in the form of weathered rock (Charnockites based) was encountered. Atthe location of boreholes BH1 and BH2, a layer of silty sand was encountered between 2/2.3 to 3/3.5m depth below existing ground level. At the location of borehole BH4, Brown/brownish grey clayey sandy silt was encountered from ground level down to 3.9m depth below existing ground level at which refusal strata was encountered.

The soil strata is in a medium stiff/medium dense state down to the depths of refusal strata encountered between 3m to 3.9m depth below existing ground level.

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Ground water table was encountered between 2.9m and 3.4m depths 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 at a minimum depth of 2m below the existing ground level. Recommended Net Allowable Bearing Pressures for various widths of foundations at various depths below exisitng ground level are given below:*

Depth of Foundations Below EGL (m)	Net Allowable Bearing Pressure (t/m^2) for Widths of Foundations	
	1.5m	≥3m
2	15	17
3m or on Refusal/Rock Strata (where N-value is >50) whichever is deeper	25	25
0.5m in Refusal/Rock Strata (where N-value is >50)	30	30

The excavated soil can be used for backfilling purposes.

After the excavation, the foundation trenches should be flooded for 24 hours and then the top slush should be removed and the surface compacted properly before laying foundation. As a precautionary measure, brick-bats/gravels/coarse aggregates (20mm down) should be spread on the flooded surface and then the compaction should be done. The foundations can be subsequently be built over this prepared surface.

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

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REPORT ON GEOTECHNICAL INVESTIGATION FOR RESIDENTIAL BUILDING AT ADHANUR ROAD, VARADHARAJAPURAM VILLAGE, KUNDRATHUR TALUK, KANCHEEPURAM DISTRICT, CHENNAI

1.0 INTRODUCTION

1.1 Overview

1.1.1 M/s. Nest Zone India Pvt Ltd., Chennai are proposing to construct a Residential Building "Nest Charisma" at Adhanur Road, Varadharajapuram Village, Kundrathur Taluk, Kancheepuram District, Chennai - 600 048.

1.1.2 The geotechnical investigations have been carried 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. Nest Zone India Pvt Ltd., Chennai vide our oral Work Order No. NCC/OWO/TNB/36/C/2024.

2.0 PROJECT DETAILS

2.1 Site Location

The site for the proposed residential building is situated at S.Nos.44/2B1, 46/2A1, 46/2A2 & 46/2A3 on the Eastern side of Adhanur road in Varadharajapuram Village, Kundrathur Taluk, Kancheepuram District, Chennai - 600 048.

2.2 Site Layout and Topography

2.2.1 The site measures approximately 3159m^2 in area. The site is open on all the sides and is fairly level in topography. Vegetation in the form of grass and bushes were observed within the site during the period of field investigations. The site is lower than the adjacent road by about 0.8m.

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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 a ground floor and five upper floors.

2.4 Seismic Zone

Site for the proposed residential building is situated in Varadharajapuram Village, 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 situated at:

a) Latitude : 12°53'

b) Longitude : 80°03'

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

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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 4 boreholes down to 8m depth or refusal strata (where N-value is >50); whichever is met earlier, as required by the client.

b) Conducting standard penetration tests at 1.5m 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 borehole 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 third week of May 2024.

5.2 Boreholes

5.2.1 The boreholes were progressed by shell and auger method.

5.2.2 The boreholes were terminated at refusal strata where further augering and penetration

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were not possible. The refusal strata encountered is in the form of weathered rock (Charnockites based). The N value in refusal strata is >50.

5.2.3 The depths at which ground water table was encountered in the boreholes during the period of field investigations and the termination depths of the boreholes are given below:

Borehole No.	Depth of Ground Water Table Below EGL (m)	Termination Depth Below EGL (m)
1	2.9	3
2	3	3.5
3	3.2	3.4
4	3.4	3.9

5.2.4 Ground water table was encountered between 2.9m and 3.4m depths in the boreholes during the period of field investigations.

5.2.5 Standard Penetration Tests were conducted in soil strata at 1.5m depth intervals.

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

5.2.7 Undisturbed soil sample was recovered by thin walled tube conforming to IS 2132. The tube had an area ratio of less than 10%. The diameter of soil sample was 50mm and length was 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

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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 compression 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 borehole have been presented in the form of soil profile table in Table Nos. 1 to 4.

7.1.2 The soil profile table indicates 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 compression test results

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7.2 Analysis of Soil Profile

7.2.1 A perusal of the data presented in the soil profile table indicates the presence of the

following substrata.

a) Stratum - I : Brown/brownish grey clayey silty sand with or without gravel

b) Stratum - II : Brown silty sand with or without gravel

c) Stratum - III : Brown/brownish grey clayey sandy silt

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

BH No.	Depth (m) : from - to		
	Stratum - I	Stratum - II	Stratum - III
1	0.0 - 2	2 - 3	-
2	0.0 - 2.5	2.5 - 3.5	-
3	0.0 - 3.4	-	-
4	-	-	0.0 - 3.9

7.2.3 The above results show that :

a) Stratum - I consisting of Brown/brownish grey clayey silty sand with or without gravel having significant percentages of sand and varying percentages of silt clay and gravel, has been encountered from ground level down to 2/2.5/3.4m depths below existing ground level only at the locations of boreholes BH1, BH2 and BH3.

b) Stratum - II consisting of Brown silty sand with or without gravel having significant percentages of sand and varying percentages of silt and gravel, has been encountered from 2/2.5m depths down to 3/3.5m depths below existing ground level only at the locations of boreholes BH1 and BH2.

c) Stratum - III consisting of Brown/brownish grey clayey sandy silt having significant percentages of silt and varying percentages of sand and clay has been encountered from ground level down to the termination depth of 3.9m below

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existing ground level only at the location of borehole BH4.

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 fig. 3.

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

a) Stratum - I : Brown/brownish grey clayey silty sand with or without gravel

BH No.	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
1	2	32	43	24
2	3	55	28	15
3	0 - 8	40 - 51	39 - 25	16 - 21

This stratum was not encountered at the location of borehole BH4.

b) Stratum - II : Brown silty sand with or without gravel

BH No.	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
1	6	76	18	0
2	0	85	15	0

This stratum was encountered only at the locations of boreholes BH1 and BH2.

c) Stratum - III : Brown/brownish grey clayey sandy silt

BH No.	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
4	0	28 - 34	38 - 43	19 - 28

This stratum was encountered only at the location of borehole BH4.

7.3.3 The above results indicate that the soil in :

a) Stratum - I consists of about 15-24% of clay, 25-43% of silt, 32-55% of sand and 0.8% of gravel.

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b) Stratum - II consists of about 15-18% of silt, 76-85% of sand and 0-6% of gravel.

c) Stratum - III consists of about 19% of clay, 28% of sand and 43% of silt.

7.4 In-situ Density and Water Content

7.4.1 The in-situ bulk densities, water contents and dry densities obtained from undisturbed soil samples are tabulated below.

BH No.	Depth (m)	In-situ Bulk Density (g/cm^3)	Water Content (%)	Dry Density (g/cm^3)
1	1.5	1.83	14.2	1.60
2	2	1.86	13.6	1.64
3	1.5	1.85	13.9	1.62
4	2	1.84	14.2	1.61

7.4.2 The above results indicate that the subsoil is in a medium stiff/medium dense state.

7.5 Consistency Limits

7.6 The Consistency Limits determined for the soil in Stratum - I (Brown/brownish grey clayey silty sand with or without gravel) indicates that the liquid limit varies between 22% to 33%, plastic limit varies between 14% to 17% and plasticity index varies between 8% to 16%.

7.7 The Consistency Limits determined for the soil in Stratum - II (Brown silty sand with or without gravel) indicate that the soil in this strata is non plastic in nature.

7.7.1 The Consistency Limits determined for the soil in Stratum - III (Brown/brownish grey clayey sandy silt) indicates that the liquid limit varies between 32% to 39%, plastic limit varies between 16% to 19% and plasticity index varies between 16% to 20%.

7.7.2 The Consistency Limits indicate that the soil in :

a) Stratum - I (Brown/brownish grey clayey silty sand with or without gravel) is

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medium plastic in nature.

b) Stratum - II (Brown silty sand with or without gravel) is non plastic in nature.

c) Stratum - III (Brown/brownish grey clayey sandy silt) is medium plastic in nature.

7.8 Standard Penetration Tests

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

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

7.8.3 The N-values indicate that the soil strata is in a medium stiff/medium dense state down to the depths of refusal/rock strata encountered at 3m-3.9m depths below existing ground level with N-values ranging between 8 to 38.

7.9 Triaxial Test Results

The cohesion 'c' obtained from consolidated drained triaxial compression tests varies between 0.15kg/cm² to 0.19kg/cm² and the angle of shearing resistance 'ϕ' of the soil varies between 23° and 26°.

7.10 Free Swell Index

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

BH No.	Free Swell Index (%) at Depth (m)			
	1	1.5	2.5	3
1	19.3	-	4.7	-
2	-	14.9	-	-
3	18.6	-	16.1	-
4	-	22.3	-	33.8

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7.10.2 The above results indicate that the soil is predominantly low swelling in nature. Hence, the excavated soil can be used for backfilling purposes.

7.11 Compiled Soil Profile

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

7.11.2 The above figure shows the various strata encountered and their thicknesses in the borehole and also gives the soil composition and the observed N-values at various depths along with the depth at which undisturbed soil sample was 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

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8.2.2 As per information provided by the client, the proposed residential building consists of ground floor and four upper floors.

8.2.3 The results of the investigations have shown that the soil strata is in a medium

stiff/medium dense state down to the depths of refusal/rock strata encountered at depths varying between 3m to 3.9m 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 ground floor and five upper floors).

8.3.2 In view of the above factors, foundations of the proposed residential building can be laid at a minimum depth of *2m below the existing ground level*. The soil available at the founding level will be Brown/brownish grey silty sand with gravel/clayey silty sand with or without gravel/clayey sandy silt.

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

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

8.4.4 The Allowable bearing pressure on/in weathered rock strata is based on the provisions given in Table 2 of BIS code IS 12070 - 1987 (RA - 1995).

8.4.5 On the basis of the above analysis, *net allowable bearing pressures for various widths of foundations are given below:*

Depth of Foundations Below EGL (m)	Net Allowable Bearing Pressure (t/m²) for Widths of Foundations	
	1.5m	≥3m
2	15	17
3m or on Refusal/Rock Strata (where N-value is >50) whichever is deeper	25	25
0.5m in Refusal/Rock Strata (where N-value is >50)	30	30

9.0 RECOMMENDATIONS

9.1 Type of Foundations

Shallow Foundations - Isolated/Strip Footings

9.2 Allowable Bearing Pressure

Net Allowable Bearing Pressures for various widths of foundations at various depth of foundations below existing ground level are given below

Depth of Foundations Below EGL (m)	*Allowable Settlement (mm)*	*Net Allowable Bearing Pressure (t/m²) for Widths of Foundations*	
		1.5m	*≥3m*
2	*50*	*15*	*17*

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Depth of Foundations Below EGL (m)	*Allowable Settlement (mm)*	*Net Allowable Bearing Pressure (t/m²) for Widths of Foundations*	
		1.5m	*≥3m*
3m or on Refusal/rock Strata (where N-value is >50) whichever is deeper	*25*	*25*	*25*
0.5m in Refusal/Rock Strata (where N-value is >50)	*12 as per IS 13063-1991 (RA 1996)*	*30*	*30*

9.3 Construction Advisories

9.3.1 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.

9.3.2 The excavated soil can be used for backfilling purposes.

9.3.3 After the excavation, the foundation trenches should be flooded for 24 hours and then the top slush should be removed and the surface compacted properly before laying foundation. As a precautionary measure, brick-bats/gravels/coarse aggregates (20mm down) should be spread on the flooded surface and then the compaction should be done. The foundations can be subsequently be built over this prepared surface.

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

9.4 Appendices

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

9.4.2 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.

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9.5 Notes

9.5.1 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.

9.5.2 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.



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ANALYSIS FOR ALLOWABLE BEARING PRESSURE

Data

(i) Soil Properties :

c (kg/cm^2) = 0.19 $\phi = 23°$ γ (g/cm^3) = 1.85

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

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

Shear Failure Criterion (Ref. IS : 6403)

$N_c = 14.77$ $N_q = 6.45$ $N_\gamma = 5.58$ $R_w = 0.50$ $R_w' = 0.50$

$$q_s = \frac{1}{2.5}\left(c \cdot N_c + \gamma . D \cdot N_q \cdot R_w + 0.5 \cdot \gamma \cdot B \cdot N_\gamma \cdot R'_w\right) - \gamma . D . R_w$$

B (m)	1.5	≥3
q_s (t/m^2)	15.7	17.3

Settlement Criterion (Ref. IS : 8009)

(i) From N Values

B (m)	1.5	≥3
H (m)	2	2
N_{av}	27	29
q_a (t/m^2)	29.9	27.2

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

B (m)	1.5	≥3
H (m)	2	2
E (kg/cm^2)	80	100
q_a (t/m^2)	28.5	35.7

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ADOPT	B (m)	1.5	≥3
	q (t/m^2)	15	17

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.*

Appendix-B

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)
5. IS 12070 - 1987 : Design and construction of shallow foundations in rocks (RA - 1995)
6. IS 13063-1991 (RA 1996): Structural safety of buildings on shallow foundations on rocks — Code of practice

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TABLES



SOIL PROFILE

Project: Proposed Residential Building at Adhanur Rd, Varadharajapuram Village, Kundrathur Tk, Kancheepuram Dist, Ch-600048

B.H. Location: | Water Table: 2.90m | Term. Depth : 3m | 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 (°)
	0.0	Ground level											
8	1.0	Brownish grey clayey silty sand with gravel	2	32	43	24	33	17					
	1.5	Brownish grey clayey silty sand with gravel							1.83	14.2	CD	0.17	24
	2.0	Change of strata											
38	2.5	Brown silty sand with gravel	6	76	18	0	-	NP					
	3.0	Change of strata											
>50 (88/42cm)		Brown weathered rock (Charnockites Based)											

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

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Job No. : G(C)9936

Sheet No. : 1

SOIL PROFILE

Project: Proposed Residential Building at Adhanur Rd, Varadharajapuram Village, Kundrathur Tk, Kancheepuram Dist, Ch-600048

B.H. Location: | Water Table: 3.0m | Term. Depth : 3.5m | B.H. No. : 1

Depth (m)	Soil Description	N - Value#	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg Limits: Liquid (%)	Atterberg Limits: Plastic (%)	In-situ properties: Density* (g/cm³)	In-situ properties: Water Cont (%)	Triaxial Test: Type	Triaxial Test: c (kg/cm²)	Triaxial Test: ϕ (°)
0.0	Ground level												
1.5	Brown clayey silty sand with gravel	12	3	55	28	15	22	14					
2.0	Brown clayey silty sand with gravel								1.86	13.6	CD	0.15	26
2.5	Change of strata												
2.6	Brown silty sand		0	85	15	0	-	NP					
3.5	Change of strata												
	Brown weathered rock (Charnockites Based)	>50 (69)											

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

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SOIL PROFILE

Project: Proposed Residential Building at Adhanur Rd, Varadharajapuram Village, Kundrathur Tk, Kancheepuram Dist, Ch-600048

B.H. Location: | Water Table: 3.2m | Term. Depth : 3.4m | B.H. No. : 3

Depth (m)	N - Value#	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 (°)
0.0		Ground level											
1.0	11	Brown clayey silty sand	0	40	39	21	29	15					
1.5		Brownish grey clayey silty sand							1.85	13.9	CD	0.16	25
2.3		Change of strata											
2.5	29	Brownish grey clayey silty sand with gravel	8	51	25	16	25	14	Tube Damaged				
3.0		Brownish grey clayey silty sand with gravel											
3.40		Change of strata											
	>50 (8")	Brown weathered rock (Charnockites Based)											

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

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SOIL PROFILE

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B.H. Location: | Water Table: 3.4m | Term. Depth : 3.9m | B.H. No. : 4

Soil Description	Depth (m)	N - Value#	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg Limits: Liquid (%)	Atterberg Limits: Plastic (%)	In-situ properties: Density* (g/cm³)	In-situ properties: Water Cont (%)	Triaxial Test: Type	Triaxial Test: c (kg/cm²)	Triaxial Test: ϕ (°)
Ground level	0.0												
Brown clayey sandy silt	1.5	10	0	28	43	19	32	16					
Brown clayey sandy silt	2.0								1.84	14.2	CD	0.19	23
Brownish grey clayey sandy silt	3.0	37	0	34	38	28	39	19					
Change of strata	3.9	>50 (89)											
Brown weathered rock (Charnockites Based)													

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

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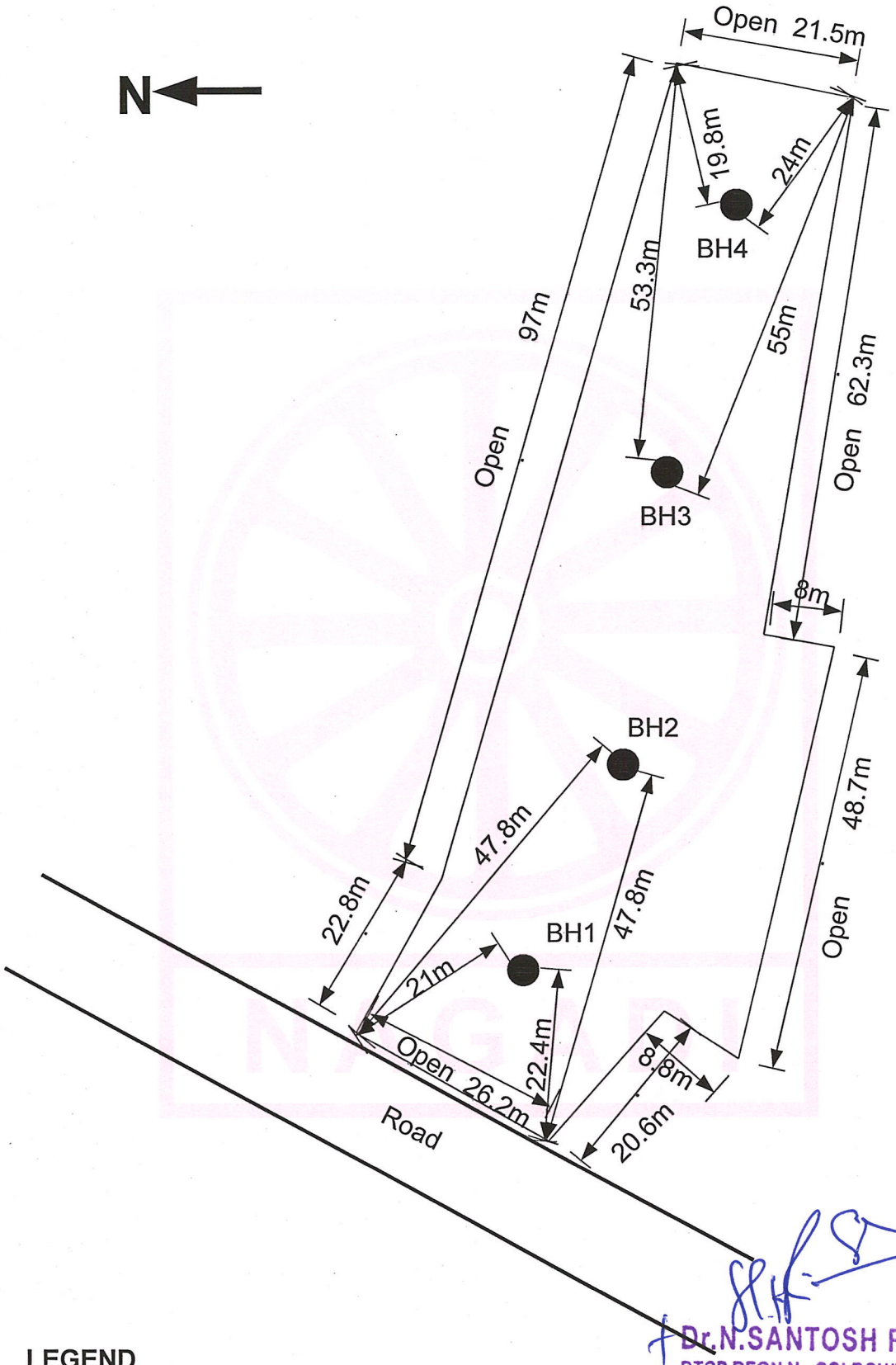
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FIGURES





LEGEND
BH ● BORE HOLE

SCHEMATIC SITE PLAN
(Not to Scale)

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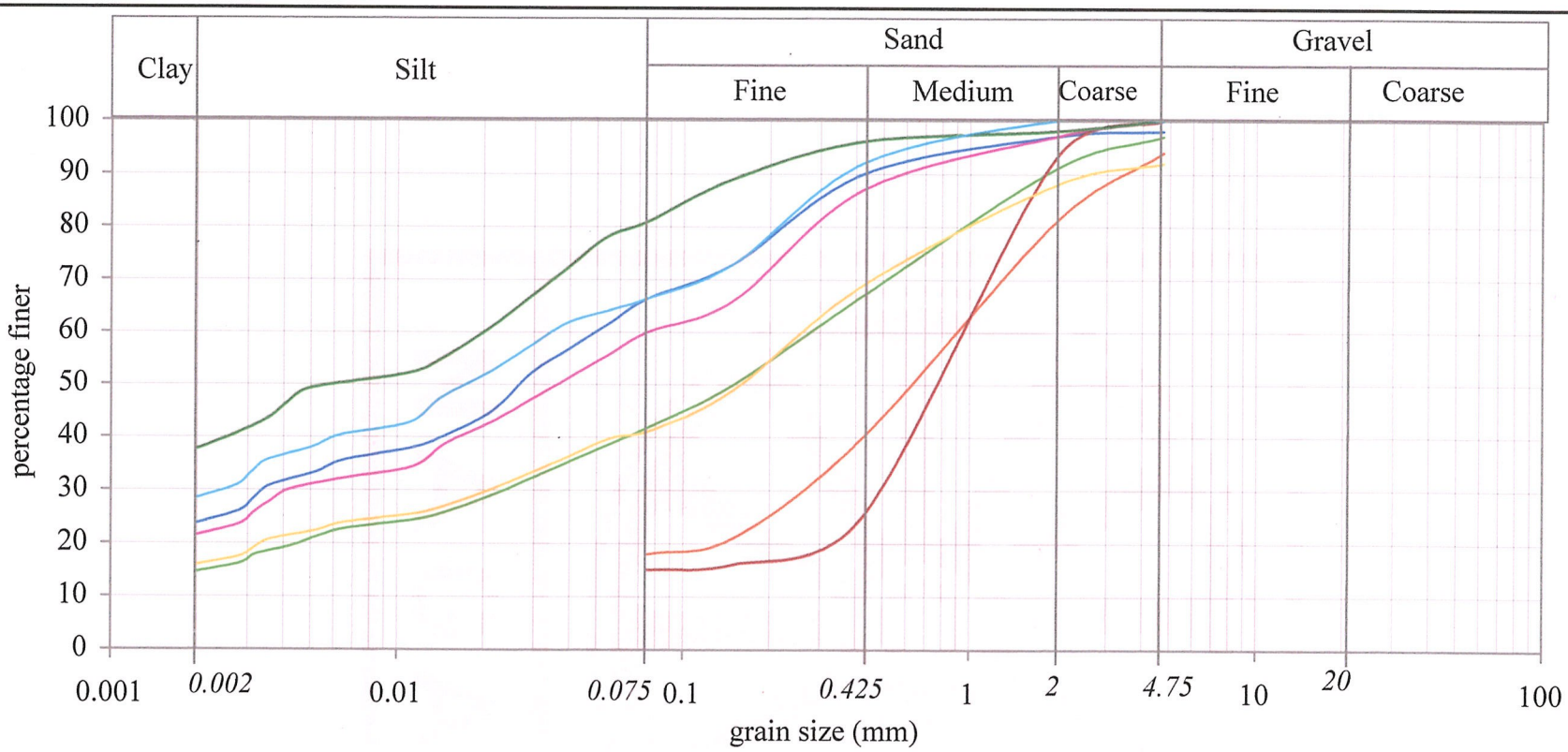
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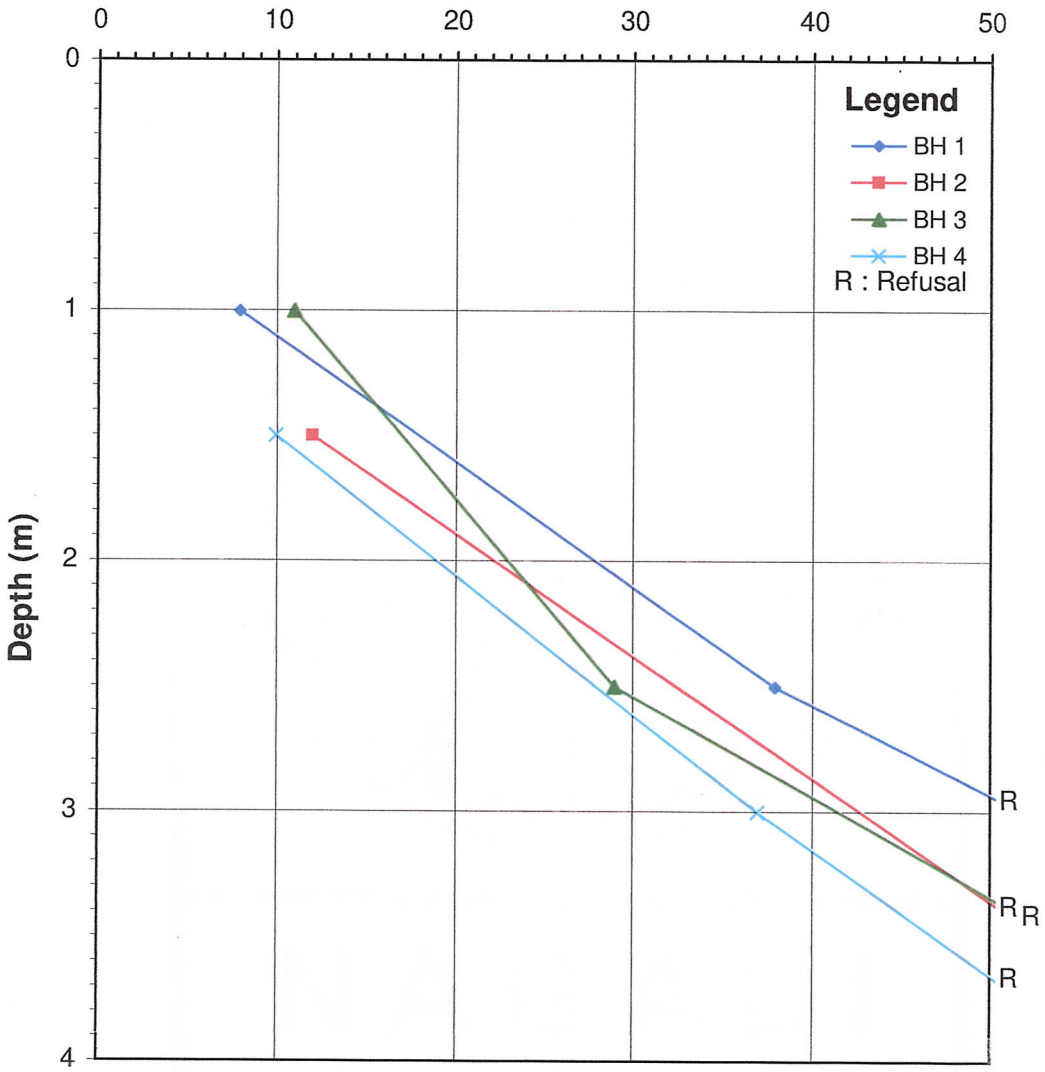
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Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	U
	1	1.0	Clayey sandy silt with gravel	2	32	43	24	0.050	-	-
	1	2.3	Silty sand with gravel	6	76	18	0	0.900	-	-
	2	1.5	Clayey silty sand with gravel	3	55	28	15	0.290	-	-
	2	2.3	Silty sand	0	85	15	0	0.950	-	-
	3	1.0	Clayey silty sand	0	40	39	21	0.075	-	-
	3	2.5	Clayey silty sand with gravel	8	51	25	16	0.260	-	-
	4	1.5	Clayey sandy silt	0	28	43	19	0.020	-	-
	4	2.5	Clayey sandy silt	0	34	38	28	0.035	-	-

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SPT Values (Observed)



SPT Values (Observed) Vs Depth Curves

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