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Egmore, Chennai-600 008.

PROFESSIONAL REGISTRATION CERTIFICATE

This is to certify that theTmtVASANTHIPADMANABAN has enrolled as **Registered Geo-Technical Engineer (RGTE)** with Chennai Metropolitan Development Authority (CMDA) who has the qualification of **M.Tech.,(Soil Mechanics & Foundation Engg.)** and experience in the relevant field for **6years.**

She has been given the Registration No.**GTE/2019/04/016** Renewed on **03.04.2024.** She shall be required to comply with the duties and responsibilities prescribed by the Government of Tamil Nadu in Part-V, "Registration of Professionals", Tamil Nadu Combined Development and Building Rules, 2019 approved vide G.O.(Ms) No.18 MAWS (MA1) Dept. dated 04.02.2019.

This Registration is valid upto **02.04.2029.**



3/4/2024.

(A. MEGANATHAN)
Superintendent

VASANTHI PADMANABAN, M.Tech.,
Registered Geotechnical Engineer
Reg. No: GTE/19/04/016

PROPOSED CONSTRUCTION OF COMMERCIAL BUILDING (S+4) AT T.NAGAR, CHENNAI.

Report on Geotechnical Investigation

Client:

Mr. Rashi k.chandan,
Chennai.

VASANTHI PADMANABAN, M.Tech.,
Registered Geotechnical Engineer
Reg. No: GTE/19/04/016

MS GEOTECH
Geotechnical, Geophysical & Engineering Survey in Offshore & Onshore

MARS SYNERGY GEOTECH Pvt Ltd
An ISO 9001: 2015 Certified Company
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Plot No.145A, 2nd Cross Street, Developed Plots Estate,
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Mail : info@msgeotech.com, projects@msgeotech.com,
Web: www.msgeotech.com

NABL : ULR-TC867822100000382F

Project No: MSGTPL/SI-5642/22-23

Nov-2022

MS GEOTECH
Geotechnical, Geophysical & Engineering Survey in Offshore & Onshore

To

Mr. Rashi k.chandan,

Chennai.

22nd Nov 2022

Reg: Proposed construction of Commercial Building (S+4) at Old no 97, New.no 72, G.N.Chetty road, T.Nagar, Chennai 600017,Tamil Nadu, INDIA.

The **Mars Synergy Geotech Pvt Ltd**, Chennai has completed the geotechnical engineering services for the above referred project.

This geotechnical engineering report presents the results of the subsurface exploration and the recommendations for your proposed structures foundation are presented here in final form together with a summary of field and laboratory data.

We appreciate the opportunity to be of service to you on this project. If you have any comments concerning this report, or if we may be of further services, please contact us/mail.

Note:

1. The test results enclosed are only related to the sample tested by us.
2. The Report shall not be reproduced in full or part without written permission from Mars Synergy Geotech Laboratory.
3. All the lab related tested values are as per the standard conditions followed by the lab.
4. Samples are retained for 30 days from sample received date at lab.

Sincerely,

Mars Synergy Geotech Pvt Ltd.

VASANTHI PADMANABAN, M.Tech.,
Registered Geotechnical Engineer
Reg. No: GTE/19/04/016

ULR-TC867822100000382F

Report No: **MSGTPL/SI-5642/22-23**

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TABLE OF CONTENTS

1.0 INTRODUCTION..... 1

1.1 DESCRIPTION OF STRUCTURE..... 1

1.2 SOIL INVESTIGATION PROGRAMME 1

1.3 FIELD SAMPLING..... 2

1.4 LABORATORY TESTS..... 2

1.5 SOIL PROFILE..... 2

1.6 GROUND WATER TABLE..... 3

1.7 DISCUSSION ON FOUNDATION..... 3

1.8 RECOMMENDATIONS..... 3

2.0 BORED CAST-IN-SITU PILE FOUNDATION 5

3.0 SITE PLAN –MSGTPL/SI-**5642**..... 7

4.0 BORE-LOGS..... 8

5.0 TEST RESULTS..... 12

6.0 NATURAL MOISTURE CONTENT..... 14

7.0 GRAIN SIZE ANALYSIS..... 20

8.0 ATTERBERG LIMITS..... 28

MARS SYNERGY GEOTECH PVT LTD

REPORT ON SUBSOIL INVESTIGATION AND RECOMMENDATION FOR THE PROPOSED CONSTRUCTION OF COMMERCIAL BUILDING (S+4) AT T.NAGAR, CHENNAI.

1.0 INTRODUCTION

Mr. Rashi k.chandan is planning to construct of Commercial building (S+4) at Old no 97, New.no 72, G.N.Chetty road, T.Nagar, Chennai 600017,Tamil Nadu, INDIA. **M/s. Mars Synergy Geotech Pvt Ltd**, Chennai, carried out this investigation and completed on 16th Nov 2022 according to the instructions from owner of the project.

The scope of work includes the following:

- Making two numbers of Standard Soil Investigation bore-holes
- Collecting soil samples at regular depth intervals
- Conducting SPTs at every 1.0m/1.50m depth intervals
- Conducting laboratory tests on samples collected
- Submitting report with laboratory test results and recommendations for foundations.

1.1 DESCRIPTION OF STRUCTURE:

The proposed structure is a commercial building (S+4). The exact details of columns are not available at the time of preparation of this report. Assuming an approximate column spacing of 4.5 to 5.5 m c/c considering this the central column load works about 125 to 150 tones for proposed building. These loads are assumed for the purpose of foundation only and for the structural design, exact loads are to be estimated based on a suitable structural analysis.

1.2 SOIL INVESTIGATION:

The field investigation works were carried out using 1 set of Rotary mechanical drilling Rig. The following activities, carried out in chronological sequence, comprised the field work for the project

- Mobilisation of rotary drill rig, water pump, testing tools and accessories.
- Collection of disturbed samples of non-cohesive soils.
- Sampling and logging of the boreholes. Packing, labeling and dispatching the samples to laboratory.
- Field investigation, tests and laboratory tests conducted as per IS-1892 and IS -2720

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1.3 FIELD SAMPLING

Two number of standard soil investigation boreholes of 100mm diameter was made at the locations shown in the drawing, **MSGTPL/SI-5642** enclosed. Investigations were conducted 25.0m from existing ground level. SPTs were conducted at every 1.0m/1.5m depth intervals and samples were collected for identification and testing.

1.4 LABORATORY TESTS

The laboratory-testing scheme is so designed to obtain the design parameters for the foundations. The following parameters are evaluated:

- Type of soil and it's gradation properties
- Atterberg Limits
- Specific Gravity
- Natural Moisture Content (NMC)
- Strength Parameters such as Cohesion,
- Angle of Shearing Resistance
- Sieve analysis on the coarse-grained soil fraction

All the test results are presented in the tabular forms. Comprehensive field information along with SPT values is presented on separate sheet.

1.5 SOIL PROFILE

Based on visual identification of soil samples and test results (of both field and laboratory tests), the soil profile arrived. Subsoil is made-up of six distinctive layers there are

BH-1 & BH-2

(i) Loose SAND soil up to-2.50m with **SPT's N=5-8**
(ii) Medium Dense SAND -2.50m to -5.50m with **SPT's N=11-16**
(iii) Loose SAND -5.50m to -8.50m with **SPT's N=6-7**
(iv) Medium dense clayey SAND -8.50m to -18.0m with **SPT's N=12-24**
(v) Dense SAND-18.0m to -20.0m with **SPT's N=31-34**
(vi) Dense to Very Dense SAND -20.0m to -25.0m with **SPT's N=>50**

The soil profile details are presented in the bore-chart.

1.6 GROUND WATER TABLE

Determination of Ground Water Table and water depth from Existing Ground level was done using Steel tape with weight. The depth of Ground water table was determined as per procedure laid in IS 6935-1973. At the time of Soil Investigation (14/11/2022 to 16/11/2022) at site, ground water table was encountered at **2.0m** depth from Existing Ground Level.

1.7 DISCUSSION ON FOUNDATION

The proposed structure is a commercial building with four floors, the central column loads are assumed about 125 to 150 tones. At this location two boreholes were investigated up to 25.0m depth. From two bore holes it is observed that top 2.50/3.0m soil varying between BH-1 & BH-2. From 3.0m depth onwards soil is more or less similar. Out of these 2 BH's, BH-2 is a weaker borehole comparatively BH-1.

Based on soil strata, for the proposed structure it is ideal to adopt deep foundation such as Bored cast in-situ pile foundation.

1.8 RECOMMENDATIONS

- ✓ The proposed structure is a five storied Commercial building.
- ✓ Bored cast-In-situ pile foundation is recommended.
- ✓ The estimated safe load carrying capacity of bored cast in situ piles as per IS 2911 (Part 1/Sec2): 2010
- ✓ The pile bore may be terminated at a depth of minimum three times diameter of the pile in to hard strata (where three consecutive SPT 'N' values of more than 100 are obtained in each test at depth intervals of one pile diameter).
- ✓ To satisfy the above criterion the pile length may be about ***22.0 m*** from the existing ground level.
- ✓ The pile capacities for varying diameters are provided below for (S+4) Floors Building.

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BORED CAST IN SITU PILE CAPACITIES					
Pile Termination Depth Below EGL (m)	Pile Dia (mm)	Safe Vertical Capacity (Tones)	Safe uplift capacity (Tones)	Safe Lateral capacity wrt 5mm Deflection	
				Free Head (Tones)	*Fixed Head (Tones)
22.0	500	80	45	1.5	3.9
	600	125	70	2.0	5.2
	750	210	110	2.9	7.5
*Note: Apply 0.75 for Group efficiency for lateral capacities					

General Recommendation

- The proposed project site is situated in T.Nagar, Chennai which falls under Seismic Zone III as per IS 1893 (Part 1) - 2002. Structure should be design against Earth quake resistance
- Pile Cut of level is considered 1.0m below EGL.
- Use minimum M25 Grade concrete
- Centre to centre spacing of piles shall not be less than 3 times of the diameter of the pile shaft.
- In view of the presence of loose SAND layer up to about 5.5m to 8.5m depth below the surface, the stability of borehole walls is doubtful within the thickness of this soft clay layer. In view of this, a steel lining for a depth of about 5.5m to 8.5 m becomes necessary.
- The above safe loads suggested are only tentative and these have to be confirmed by conducting through pile load tests conducted as per I.S-2911part –IV:2013

VASANTHI PADMANABAN, M.Tech.,
Registered Geotechnical Engineer
Reg. No: GTE/19/04/016

ESTIMATION OF VERTICAL CAPACITY OF PILE

Project:	5642
Location:	Commercial Building (S+4) at T.Nagar
Reference BH's	BH-1 & BH-2

$$Q_u = A_p(\tfrac{1}{2}D\gamma N_\gamma + P_D N_q) + \sum_{i=1}^{n} K_i P_{Di} \tan\delta_i A_{si}$$

$$Q_u = A_p N_c c_p + \sum_{i=1}^{n} \alpha_i c_i A_{si}$$

Dia of Pile	750	mm
Elevation	0	m
Pile Cut off Level	1.0	m
Pile termination level below G.L	22	m
Total Length of Pile	21.0	m
Factor of safety	**2.5**	
Pdi & PD is Limted to 20 D	15	m

Soil Design Parameters

Sl.No	From (m)	To (m)	Thickness (m)	Soil Type	Avg 'N'	γ' (kN/m³)	C (kPa)	α	ϕ	K	Pdi (kN/m²)
1	0	2.5	2.5	Loose SAND	6	6.5	-	-	18	1	8.125
2	2.5	5.5	3	Medium Dense SAND	13	8	-	-	30	1	28.25
3	5.5	8.5	3	Loose SAND	6	6.5	-	-	18	1	50
4	8.5	18	9.5	Medium Dense clayey SAND	18	8.5	-	-	32	1.1	115
5	18	20	2	Dense SAND	32	9	-	-	34	1.15	115
6	20	25	5	Very Dense SAND	>50	10	-	-	35	1.25	115

Pile Calculations As per IS-2911 part-1/Sec-2-2010

Sl.No	From (m)	To (m)	Thickness (m)	Avg 'N'	γ' (kN/m³)	C (kPa)	α	ϕ	K	Asi	Sf (kN)	Sfi (kN)
1	1	2.5	1.5	6	6.5	-	-	18	1	3.53	9.33	9.33
2	2.5	5.5	3	13	8	-	-	30	1	7.07	115.29	124.62
3	5.5	8.5	3	6	6.5	-	-	18	1	7.07	114.84	239.46
4	8.5	18	9.5	18	8.5	-	-	32	1.1	22.38	1769.35	2008.81
5	18	20	2	32	9	-	-	34	1.15	4.71	420.36	2429.17
6	20	22	2	>50	10	-	-	35	1.25	4.71	474.32	**2903.50**

End Bearing

Bearing Strata	Dia (m)	Ap (m²)	γ' (kN/m³)	φ	Nq	Ng	q	Qp (kN)	Qult (kN)	Qallow (kN)
Very Dense SAND	0.75	0.4417865	10	35	49	48.03	115	2569.0	5472.5	**2189.01**

Safe vertical Capacity of Single Pile	**219**	**Tones**

Lateral Pile Capacity Calculation

Project Title : Commercial Building (S+4)
Site : T.Nagar
BH: BH-1 & BH-2

As Per IS-2911(Part-1/Sec-2):2010

$Deflection, y = \frac{H(e+Z_f)^3}{3EI} X10^3$ ... for free head pile	$Deflection, y = \frac{H(e+Z_f)^3}{12EI} X10^3$ ... for fixed head pile

Input

Soil		Medium sand (Submerged)	
Diameter of Pile	=	750	mm
Length of Pile Below FGL, (L)	=	22	m
Length of Pile Above FGL, (L1=e)	=	0	m
Grade of Concrete	=	25	
Allowable Deflection, (y)	=	5	mm
Young's modulus of pile material, (E)	=	25000.00	MN/m^2
Moment Inertia of the Pile Cross section (I)	=	0.0155	m^4

For CLAY			Stiffness factor R, in m = $\sqrt[4]{\frac{EI}{KB}}$	
k_1=		MN/m^2	L1/R=	#DIV/0!
K=	0	MN/m^3	Lf/R (Free Head)=	1.9
R=	#DIV/0!	m	Lf/R (Fixed Head)=	2.2
For SAND			Stiffness factor T, in m = $\sqrt[5]{\frac{EI}{\eta_h}}$	
η_h=	1.4	MN/m^3	L_f/T(Free Head)=	1.9
T=	3.08	m	L_f/T(Fixed Head)=	2.2
L_1/T=	0			

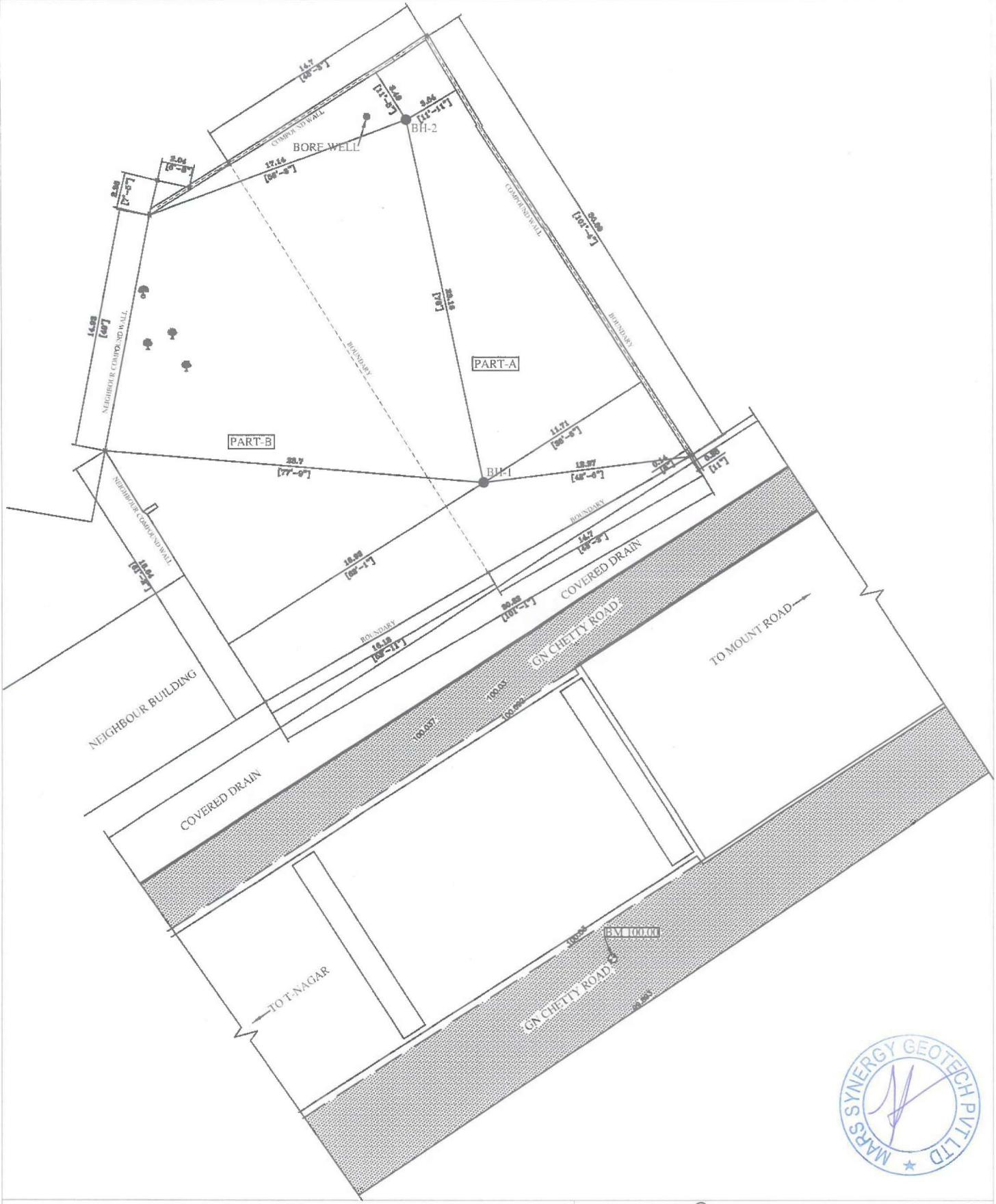
Output for SANDY Soil

Z_F (Free Head) / Depth of Fixity =	5.85	m
Z_f (Fixed Head) / Depth of Fixity =	6.78	m

Result

Lateral Load Free Head =	**2.91**	**Tones**
Lateral Load Fixed Head =	**7.49**	**Tones**

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TITLE: DRAWING SHOWING THE SOIL INVESTIGATION BORE HOLE LOCATIONS

PROJECT: PROPOSED CONSTRUCTION OF COMMERCIAL BUILDING (S+4) AT T-NAGAR

LEGEND:

BH: BORE HOLE	-SOIL TEST LOCATION	SCALE: N T S

ACTIVITY	EXECUTED BY	DATE STARTED	DATE FINISHED
FOREMEN	RAJA	15.11.2022	16.11.2022
DRAFTING	J.BABU	22.11.2022	22.11.2022

MARS SYNERGY GEOTECH Pvt Ltd
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Engineering Survey & Soil Investigation
Plot No:145A, Developed Plots Estate,
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DRAWING NO: MSGTPL/SI-5642/22-23

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BOREHOLE LOG

Project No: MSGTPL/SI-5642/22-23

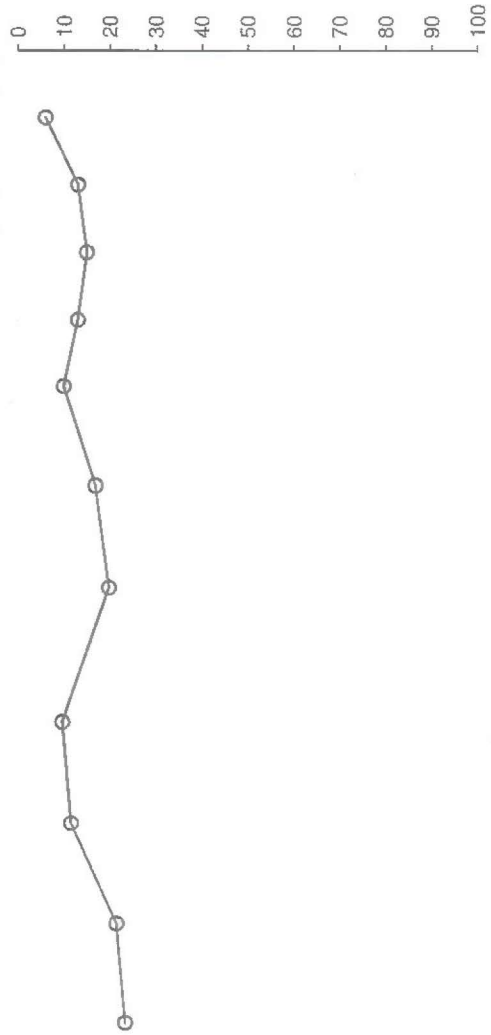
Project: Proposed Construction of Commercial Building (S+4) at T.Nagar

Location	T Nagar
Ground R.L	Nil
Drilling	Rotary

Borehole No	BH-1	
G.W.T (m)	(-)2.0m	
Date of Start	14-Nov-2022	
Date of Complete	15-Nov-2022	
Dia of Bore (mm)	100	Sheet
Termination Depth (m)	25.00	1 of 2

Depth below EGL (m)	Layer Thickness	Soil Layers Description	Soil Symbol	IS-Classification	Type Field Test	Test Depth (m)	SPT Values Record 0 to 45cm			SPT- N- Value
0.0										
0.5	1.0	Medium Stiff Brownish CLAY		CI						
1.0					SPT	1.0	2	3	3	6
1.5	1.0	Medium Dense Brownish Clayey SAND		SC						
2.0					SPT	2.0	4	6	7	13
2.5										
3.0	2.0	Medium Dense Brownish Fine SAND		SW	SPT	3.0	6	7	8	15
3.5										
4.0					SPT	4.0	6	6	7	13
4.5	1.0	Stiff Greyish Sandy CLAY		CH						
5.0					SPT	5.0	3	4	6	10
5.5										
6.0	1.5	Medium Dense Greyish Fine to Medium SAND		SW						
6.5					SPT	6.5	6	8	9	17
7.0										
7.5	1.5	Medium Dense Greyish Medium to Fine SAND		SW						
8.0					SPT	8.0	8	10	10	20
8.5										
9.0										
9.5										
10.0					SPT	10.0	4	4	6	10
10.5										
11.0										
11.5	6.5	Medium Dense Greyish Clayey SAND		SC	SPT	11.5	5	6	6	12
12.0										
12.5										
13.0					SPT	13.0	9	10	12	22
13.5										
14.0										
14.5					SPT	14.5	10	10	14	24
15.0										

Graphical Representation of SPT



Borehole Termination Depth (m) 25.0

EGL- Existing Ground Level
R.L- Reduced Level
GWT- Ground Water Table
SPT- Standard Penetration Test
UDS- Undisturbed Sample
VST- Vane Shear Test
DS- Disturbed Sample
CR- Core Recovery
RQD- Rock Quality Designation

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BOREHOLE LOG

Project No: MSGTPL/SI-5642/22-23

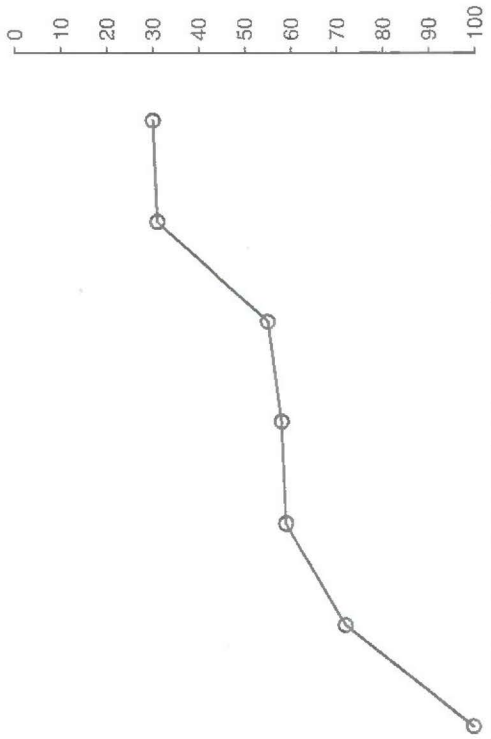
Project: Proposed Construction of Commercial Building (S+4) at T.Nagar

Location	T Nagar
Ground R.L	Nil
Drilling	Rotary

Borehole No	BH-1	
G.W.T (m)	(-)2.0m	
Date of Start	15-Nov-2022	
Date of Complete	16-Nov-2022	
Dia of Bore (mm)	100	Sheet
Termination Depth (m)	25.00	2 of 2

Depth below EGL (m)	Layer Thickness	Soil Layers Description	Soil Symbol	IS-Classification	Type Field Test	Test Depth (m)	SPT Values Record 0 to 45cm			SPT- N- Value
15.0	3.0	Dense Brownish Medium SAND		SW						
15.5										
16.0					SPT	16.0	12	14	16	30
16.5										
17.0										
17.5					SPT	17.5	13	15	16	31
18.0	6.0	Very Dense Brownish and Light Greyish Clayey SAND		SC						
18.5										
19.0					SPT	19.0	20	25	30	55
19.5										
20.0										
20.5					SPT	20.5	21	28	30	58
21.0										
21.5										
22.0					SPT	22.0	24	27	32	59
22.5										
23.0										
23.5					SPT	23.5	24	32	40	72
24.0	1.5	Very Dense Brownish Coarse SAND		SW						
24.5										
25.0					SPT	25.0	50 Blows for 1Cm			
25.5										
26.0										
26.5										
27.0										
27.5										
28.0										
28.5										
29.0										
29.5										
30.0										

Graphical Representation of SPT



Borehole Termination Depth (m) 25.0

EGL- Existing Ground Level
R.L- Reduced Level
GWT- Ground Water Table
SPT- Standard Penetration Test
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BOREHOLE LOG

Project No: MSGTPL/SI-5642/22-23

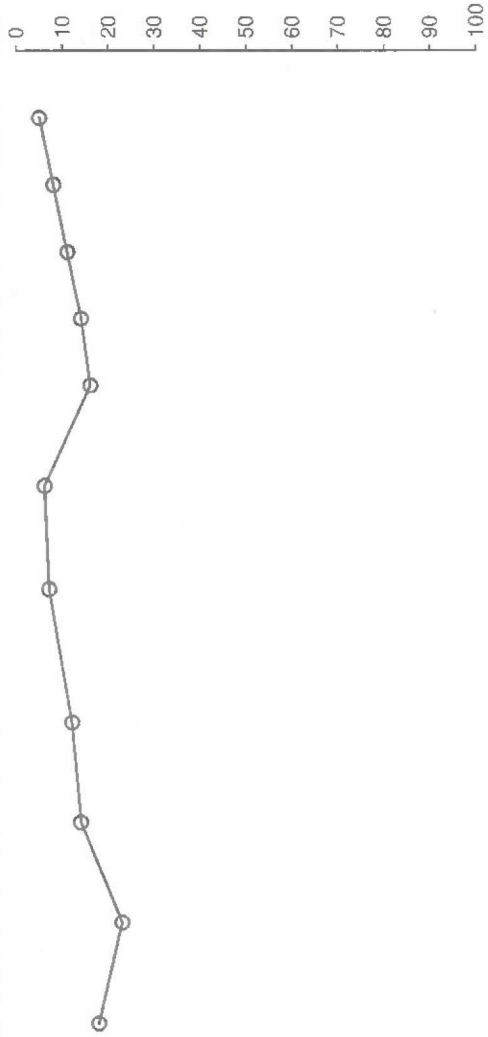
Project: Proposed Construction of Commercial Building (S+4) at T.Nagar

Location	T Nagar
Ground R.L	Nil
Drilling	Rotary

Borehole No	BH-2	
G.W.T (m)	(-)2.0m	
Date of Start	15-Nov-2022	
Date of Complete	16-Nov-2022	
Dia of Bore (mm)	100	Sheet
Termination Depth (m)	25.00	1 of 2

Depth below EGL (m)	Layer Thickness	Soil Layers Description	Soil Symbol	IS-Classification	Type Field Test	Test Depth (m)	SPT Values Record 0 to 45cm			SPT- N- Value
0.0										
0.5	1.0	Loose Brownish Clayey SAND		SC						
1.0					SPT	1.0	2	2	3	5
1.5	1.0	Loose Brownish Fine SAND		SW						
2.0					SPT	2.0	4	4	4	8
2.5										
3.0					SPT	3.0	4	5	6	11
3.5	3.0	Medium Dense Brownish and Greyish Fine SAND		SW						
4.0					SPT	4.0	6	6	8	14
4.5										
5.0					SPT	5.0	6	7	9	16
5.5										
6.0										
6.5	3.0	Loose Greyish Clayey SAND		SC	SPT	6.5	2	3	3	6
7.0										
7.5										
8.0					SPT	8.0	3	3	4	7
8.5										
9.0										
9.5										
10.0					SPT	10.0	4	5	7	12
10.5										
11.0										
11.5	6.5	Medium Dense Greyish Clayey SAND		SC	SPT	11.5	5	6	8	14
12.0										
12.5										
13.0					SPT	13.0	7	10	13	23
13.5										
14.0										
14.5					SPT	14.5	6	9	9	18
15.0										

Graphical Representation of SPT



Borehole Termination Depth (m) 25.0

EGL- Existing Ground Level
R.L- Reduced Level
GWT- Ground Water Table
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UDS- Undisturbed Sample
VST- Vane Shear Test
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Project No: MSGTPL/SI-5642/22-23

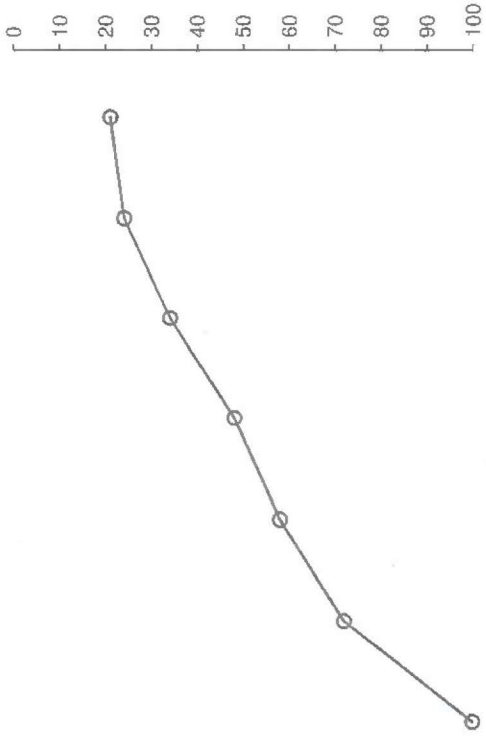
Project: Proposed Construction of Commercial Building (S+4) at T.Nagar

Location	T Nagar
Ground R.L	Nil
Drilling	Rotary

Borehole No	BH-2	
G.W.T (m)	(-)2.0m	
Date of Start	15-Nov-2022	
Date of Complete	16-Nov-2022	
Dia of Bore (mm)	100	Sheet
Termination Depth (m)	25.00	2 of 2

Depth below EGL (m)	Layer Thickness	Soil Layers Description	Soil Symbol	IS-Classification	Type Field Test	Test Depth (m)	SPT Values Record 0 to 45cm			SPT- N- Value
15.0										
15.5	1.5	Medium Dense Greyish Clayey SAND		SC						
16.0					SPT	16.0	8	10	11	21
16.5										
17.0	1.5	Medium Dense Brownish Medium SAND		SW						
17.5					SPT	17.5	9	10	14	24
18.0										
18.5	1.5	Dense Light Greyish Fine to Medium SAND		SM						
19.0					SPT	19.0	10	14	20	34
19.5										
20.0										
20.5					SPT	20.5	14	25	23	48
21.0										
21.5	4.5	Very Dense Reddish and Light Greyish Clayey SAND		SC						
22.0					SPT	22.0	22	26	32	58
22.5										
23.0										
23.5					SPT	23.5	20	25	27	52
24.0										
24.5	1.5	Very Dense Brownish Coarse SAND		SW						
25.0					SPT	25.0	50 Blows for 1Cm			
25.5										
26.0										
26.5										
27.0										
27.5										
28.0										
28.5										
29.0										
29.5										
30.0										

Graphical Representation of SPT



Borehole Termination Depth (m) 25.0

EGL- Existing Ground Level
R.L- Reduced Level
GWT- Ground Water Table
SPT- Standard Penetration Test
UDS- Undisturbed Sample
VST- Vane Shear Test
DS- Disturbed Sample
CR- Core Recovery
RQD- Rock Quality Designation

Project No: MSGTPL/SI-5642/22-23

Project : Proposed Construction of Commercial Building (S+4) at T.Nagar

BH No 1 | **Ground Water Level:(-)2.0m** | **Termination Depth:25.0m**

SUMMARY OF TEST RESULTS

N Value	Layer Thickness	Depth (m)	Soil Description	IS Classification	Index Properties (%)						Specific Gravity	Grain Size Analysis (%)				
					NMC	W_L	W_P	I_P	Ic	FreeSwell		Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay
	1.0	0.00	Medium Stiff Brownish CLAY	CI												
6		1.00			29	40	15	25			2.65					
	1.0		Medium Dense Brownish Clayey SAND	SC												
13		2.00			18							3	0	4	61	32
15	2.0	3.00	Medium Dense Brownish Fine SAND	SW	20							0	0	7	83	10
13		4.00			21						2.66	0	0	14	76	10
	1.0		Stiff Greyish Sandy CLAY	CH												
10		5.00			34	64	25	39								
	1.5		Medium Dense Greyish Fine to Medium SAND	SW												
17		6.50			15							0	6	55	31	8
	1.5		Medium Dense Greyish Medium to Fine SAND	SW												
20		8.00			18							1	7	33	50	9
10	6.5	10.00	Medium Dense Greyish Clayey SAND	SC	20							0	1	33	36	30
12		11.50			16						2.63	0	0	32	37	31
22		13.00			16							0	1	36	42	21
24		14.50			15							1	2	32	42	23
30	3.0	16.00	Dense Brownish Medium SAND	SW	12							0	11	69	19	1
31		17.50			13							0	11	64	20	5
55	6.5	19.00	Very Dense Brownish and Light Greyish Clayey SAND	SC	16						2.64	1	2	34	31	32
58		20.50			12							1	6	41	22	30
59		22.00			18							5	6	31	25	33
72		23.50			14							8	7	44	19	22
>100	1.5	25.00	Very Dense Brownish Coarse SAND	SW												

Project No: MSGTPL/SI-5642/22-23

Project : Proposed Construction of Commercial Building (S+4) at T.Nagar

BH No 2 | **Ground Water Level:(-)2.0m** | **Termination Depth:25.0m**

SUMMARY OF TEST RESULTS

N Value	Layer Thickness	Depth (m)	Soil Description	IS Classification	Index Properties (%)						Specific Gravity	Grain Size Analysis (%)				
					NMC	W_L	W_P	I_P	Ic	FreeSwell		Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay
	1.0	0.00	Loose Brownish Clayey SAND	SC												
5		1.00			26	35	12	23								
8	1.0	2.00	Loose Brownish Fine SAND	SW	21							0	1	6	83	10
11	3.0	3.00	Medium Dense Brownish and Greyish Fine SAND	SW	19						2.65	0	0	11	84	5
14		4.00			20							0	0	24	72	4
16		5.00			18							1	0	30	62	7
6	3.0	6.50	Loose Greyish Clayey SAND	SC	29						2.66	4	6	26	29	35
7		8.00			26							3	12	29	22	34
12	8.0	10.00	Medium Dense Greyish Clayey SAND	SC	21							11	3	31	37	18
13		11.50			21							1	1	32	43	23
23		13.00			16							0	0	29	40	31
18		14.50			19						2.60	1	4	27	36	32
21		16.00			16							0	3	34	37	26
24	1.5	17.50	Medium Dense Brownish Medium SAND	SW	8							1	11	63	20	5
34	1.5	19.00	Dense Light Greyish Fine to Medium SAND	SM	12							3	7	49	27	14
53	4.5	20.50	Very Dense Reddish and Light Greyish Clayey SAND	SC	14						2.66	1	1	22	31	45
58		22.00			16							2	4	44	28	22
52		23.50			19							1	3	26	36	34
>100	1.5	25.00	Very Dense Brownish Coarse SAND	SW												

NABL
CERTIFICATE NO.TC-8678

ULR-TC867822100000382F

MS GEOTECH
Geotechnical, Geophysical & Engineering Survey in Offshore & Onshore

Project No: MSGTPL/SI-5642/22-23
Project : Proposed Construction of Commercial Building (S+4) at T.Nagar

Method: IS-2720 P-2

Natural Moisture Content Data Sheet

BH.No/ Pit no	1		1		1		1		1		1	
Depth (m)	1.0		2.0		3.0		4.0		5.0		6.5	
Tare No	256	12	38	206	143	284	265	175	129	208	103	165
Wt of Tare (gr)	30.00	29.79	29.28	28.60	29.52	29.60	30.46	29.30	28.47	29.02	29.72	29.96
Tare + Soil (gr)	51.13	60.95	63.51	56.95	57.42	53.49	58.64	58.88	59.49	57.83	61.84	63.45
Tare+Dry soil (gr)	46.35	53.98	58.40	52.70	52.70	49.43	53.71	53.65	51.70	50.55	57.55	58.98
Wt of Water (gr)	4.78	6.97	5.11	4.25	4.72	4.06	4.93	5.23	7.79	7.28	4.29	4.47
Wt Dry soil (gr)	16.35	24.19	29.12	24.10	23.18	19.83	23.25	24.35	23.23	21.53	27.83	29.02
Water Content (%)	29.24	28.81	17.55	17.63	20.36	20.47	21.20	21.48	33.53	33.81	15.42	15.40
Average Water Content (%)	29		18		20		21		34		15	

MARS SYNERGY GEOTECH PVT LTD

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Project : Proposed Construction of Commercial Building (S+4) at T.Nagar

Method: IS-2720 P-2

Natural Moisture Content Data Sheet

BH.No/ Pit no	1		1		1		1		1		1	
Depth (m)	8.0		10.0		11.5		13.0		14.5		16.0	
Tare No	261	25	90	16	239	37	264	26	201	83	220	33
Wt of Tare (gr)	28.95	30.41	29.42	29.72	29.86	29.38	31.62	29.08	28.03	29.23	30.05	28.55
Tare + Soil (gr)	62.28	66.20	64.90	59.15	54.49	54.38	64.25	61.12	60.86	59.52	53.41	56.16
Tare+Dry soil (gr)	57.24	60.78	58.90	54.18	50.92	51.00	59.74	56.69	56.58	55.48	50.93	53.30
Wt of Water (gr)	5.04	5.42	6.00	4.97	3.57	3.38	4.51	4.43	4.28	4.04	2.48	2.86
Wt Dry soil (gr)	28.29	30.37	29.48	24.46	21.06	21.62	28.12	27.61	28.55	26.25	20.88	24.75
Water Content (%)	17.82	17.85	20.35	20.32	16.95	15.63	16.04	16.04	14.99	15.39	11.88	11.56
Average Water Content (%)	18		20		16		16		15		12	

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Geotechnical, Geophysical & Engineering Survey in Offshore & Onshore

Project No: MSGTPL/SI-5642/22-23
Project : Proposed Construction of Commercial Building (S+4) at T.Nagar

Method: IS-2720 P-2

Natural Moisture Content Data Sheet

BH.No/ Pit no	1		1		1		1		1		2	
Depth (m)	17.5		19.0		20.5		22.0		23.5		1.0	
Tare No	207	262	56	260	237	128	113	190	58	108	101	28
Wt of Tare (gr)	29.11	31.53	30.13	29.05	29.68	30.45	29.49	29.88	29.66	29.77	29.61	28.33
Tare + Soil (gr)	57.58	59.59	65.90	70.25	68.35	61.96	59.10	61.25	54.38	60.43	54.90	60.32
Tare+Dry soil (gr)	54.20	56.34	60.85	64.45	64.05	58.47	54.59	56.40	51.25	56.66	49.70	53.65
Wt of Water (gr)	3.38	3.25	5.05	5.80	4.30	3.49	4.51	4.85	3.13	3.77	5.20	6.67
Wt Dry soil (gr)	25.09	24.81	30.72	35.40	34.37	28.02	25.10	26.52	21.59	26.89	20.09	25.32
Water Content (%)	13.47	13.10	16.44	16.38	12.51	12.46	17.97	18.29	14.50	14.02	25.88	26.34
Average Water Content (%)	13		16		12		18		14		26	

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MS GEOTECH
Geotechnical, Geophysical & Engineering Survey in Offshore & Onshore

Project No: MSGTPL/SI-5642/22-23
Project : Proposed Construction of Commercial Building (S+4) at T.Nagar

Method: IS-2720 P-2

Natural Moisture Content Data Sheet

BH.No/ Pit no	2		2		2		2		2		2	
Depth (m)	2.0		3.0		4.0		5.0		6.5		8.0	
Tare No	3	272	126	65	188	168	167	93	295	292	236	233
Wt of Tare (gr)	28.55	30.82	29.61	30.62	30.53	29.40	27.19	31.28	29.49	30.78	30.55	31.14
Tare + Soil (gr)	56.18	55.90	55.01	59.73	63.35	60.71	55.04	63.88	69.38	59.18	60.92	68.51
Tare+Dry soil (gr)	51.38	51.48	50.89	55.04	57.82	55.42	50.78	58.86	60.36	52.82	54.70	60.90
Wt of Water (gr)	4.80	4.42	4.12	4.69	5.53	5.29	4.26	5.02	9.02	6.36	6.22	7.61
Wt Dry soil (gr)	22.83	20.66	21.28	24.42	27.29	26.02	23.59	27.58	30.87	22.04	24.15	29.76
Water Content (%)	21.02	21.39	19.36	19.21	20.26	20.33	18.06	18.20	29.22	28.86	25.76	25.57
Average Water Content (%)	21		19		20		18		29		26	

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Geotechnical, Geophysical & Engineering Survey in Offshore & Onshore

Project No: MSGTPL/SI-5642/22-23
Project : Proposed Construction of Commercial Building (S+4) at T.Nagar

Method: IS-2720 P-2

Natural Moisture Content Data Sheet

BH.No/ Pit no	2		2		2		2		2		2	
Depth (m)	10.0		11.5		13.0		14.5		16.0		17.5	
Tare No	249	216	185	133	300	30	203	81	78	194	240	297
Wt of Tare (gr)	30.20	29.38	29.63	28.56	30.89	28.12	29.21	29.11	28.61	29.14	28.80	27.95
Tare + Soil (gr)	64.61	56.66	63.26	64.29	72.35	63.11	61.21	60.81	56.76	58.47	56.01	60.11
Tare+Dry soil (gr)	58.53	51.88	57.47	58.20	66.48	58.17	56.20	55.80	52.90	54.33	53.94	57.60
Wt of Water (gr)	6.08	4.78	5.79	6.09	5.87	4.94	5.01	5.01	3.86	4.14	2.07	2.51
Wt Dry soil (gr)	28.33	22.50	27.84	29.64	35.59	30.05	26.99	26.69	24.29	25.19	25.14	29.65
Water Content (%)	21.46	21.24	20.80	20.55	16.49	16.44	18.56	18.77	15.89	16.44	8.23	8.47
Average Water Content (%)	21		21		16		19		16		8	

MARS SYNERGY GEOTECH PVT LTD

Project No: MSGTPL/SI-5642/22-23
Project : Proposed Construction of Commercial Building (S+4) at T.Nagar

Method: IS-2720 P-2

Natural Moisture Content Data Sheet

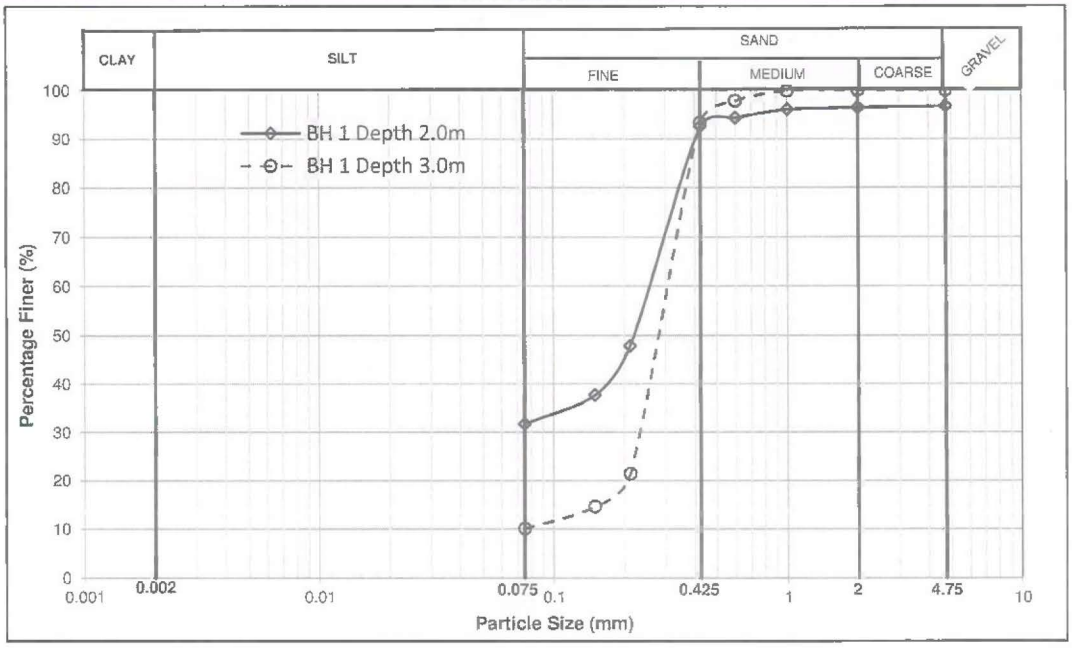
BH.No/ Pit no	2		2		2		2					
Depth (m)	19.0		20.5		22.0		23.5					
Tare No	35	263	197	279	255	120	57	100				
Wt of Tare (gr)	30.77	29.92	30.61	29.61	28.66	29.13	29.25	29.66				
Tare + Soil (gr)	90.85	85.94	62.01	63.33	64.02	64.12	63.75	60.42				
Tare+Dry soil (gr)	84.32	79.75	58.27	59.16	59.20	59.23	58.19	55.57				
Wt of Water (gr)	6.53	6.19	3.74	4.17	4.82	4.89	5.56	4.85				
Wt Dry soil (gr)	53.55	49.83	27.66	29.55	30.54	30.10	28.94	25.91				
Water Content (%)	12.19	12.42	13.52	14.11	15.78	16.25	19.21	18.72				
Average Water Content (%)	12		14		16		19					

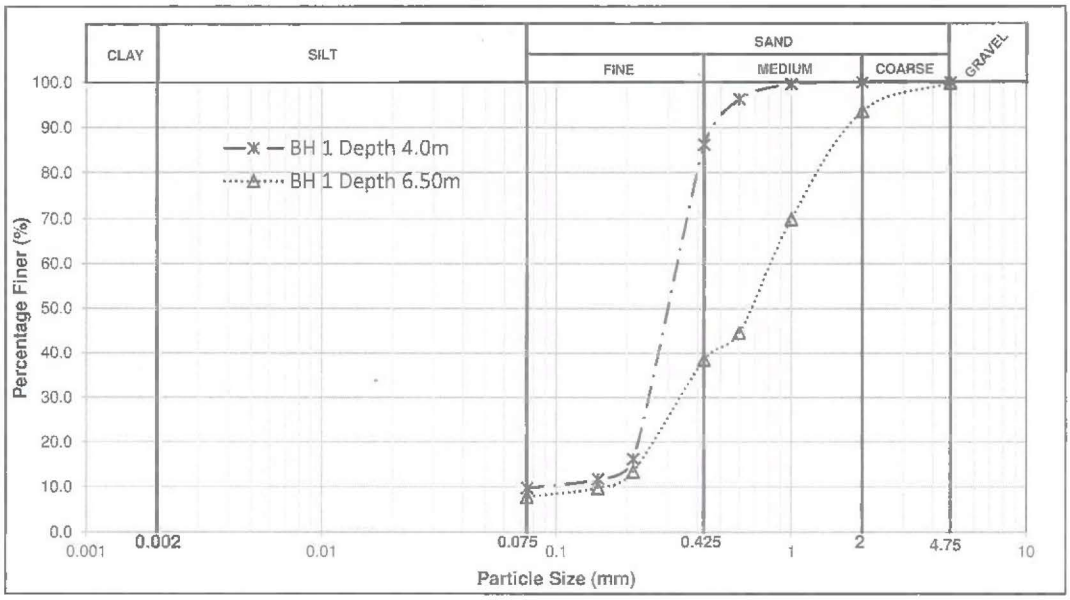
MARS SYNERGY GEOTECH PVT LTD

Project No: MSGTPL/SI-5642/22-23

Project :Proposed Construction of Commercial Building (S+4) at T.Nagar

GRAIN SIZE ANALYSIS





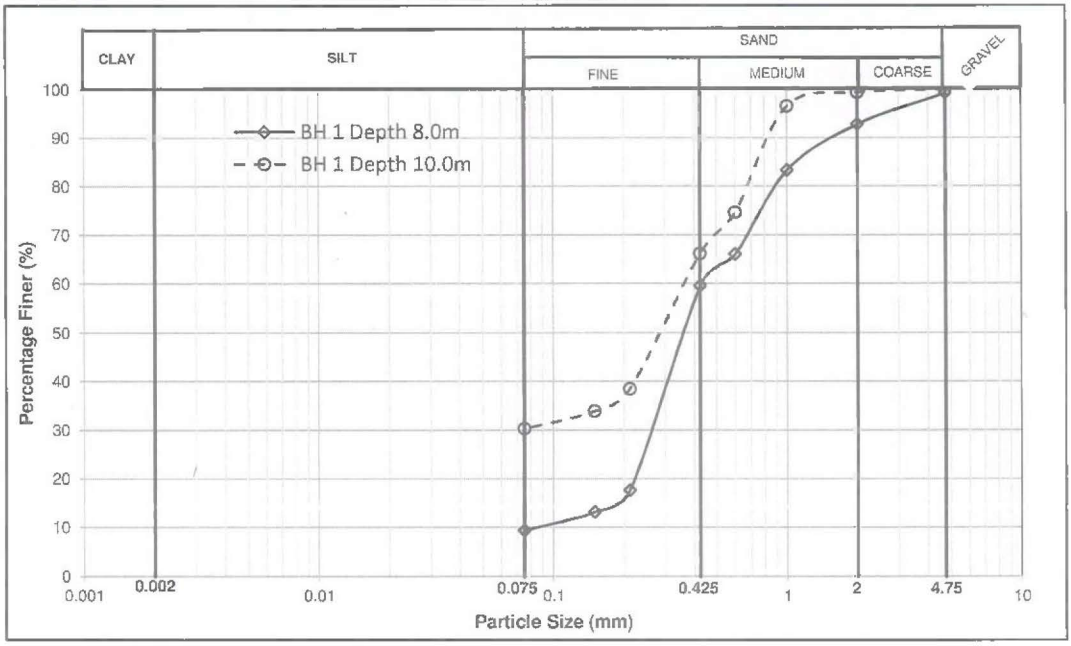
BH-No	Depth	Gravel	SAND (%)			SILT& CLAY	D_{10}	D_{30}	D_{60}	Cu	Cc
	(m)	(%)	Coarse	Medium	Fine	(%)	(mm)	(mm)	(mm)		
1	2.0m	3	0	4	61	32			0.270		
1	3.0m	0	0	7	83	10		0.237	0.326		
1	4.0m	0	0	14	76	10		0.352	0.656		
1	6.50m	0	6	55	31	8	0.154	0.353	0.843		

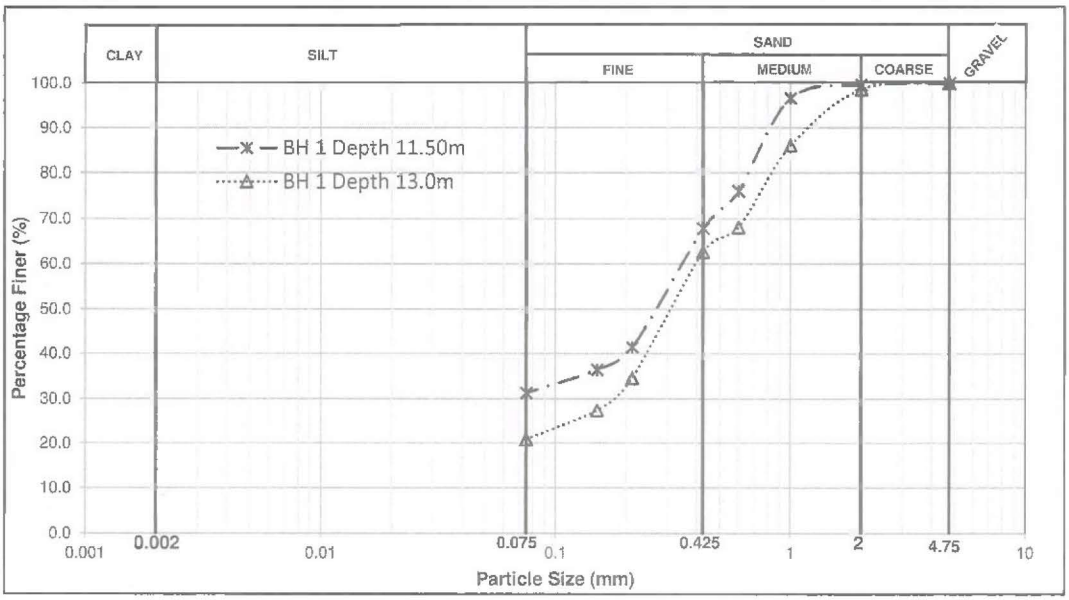
MARS SYNERGY GEOTECH PVT LTD

Project No: MSGTPL/SI-5642/22-23

Project :Proposed Construction of Commercial Building (S+4) at T.Nagar

GRAIN SIZE ANALYSIS





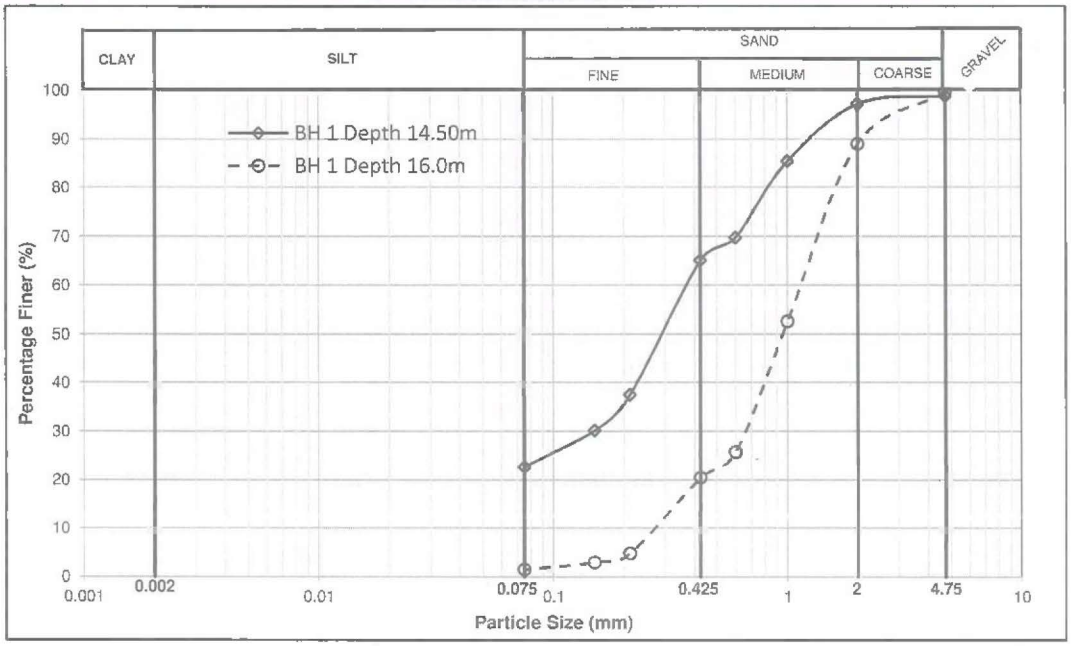
BH-No	Depth	Gravel	SAND (%)			SILT& CLAY	D_{10}	D_{30}	D_{60}	Cu	Cc
	(m)	(%)	Coarse	Medium	Fine	(%)	(mm)	(mm)	(mm)		
1	8.0m	1	7	33	50	9		0.275	0.438		
1	10.0m	0	1	33	36	30			0.377		
1	11.50m	0	0	32	37	31			-0.730		
1	13.0m	0	1	36	42	21		0.173	0.405		

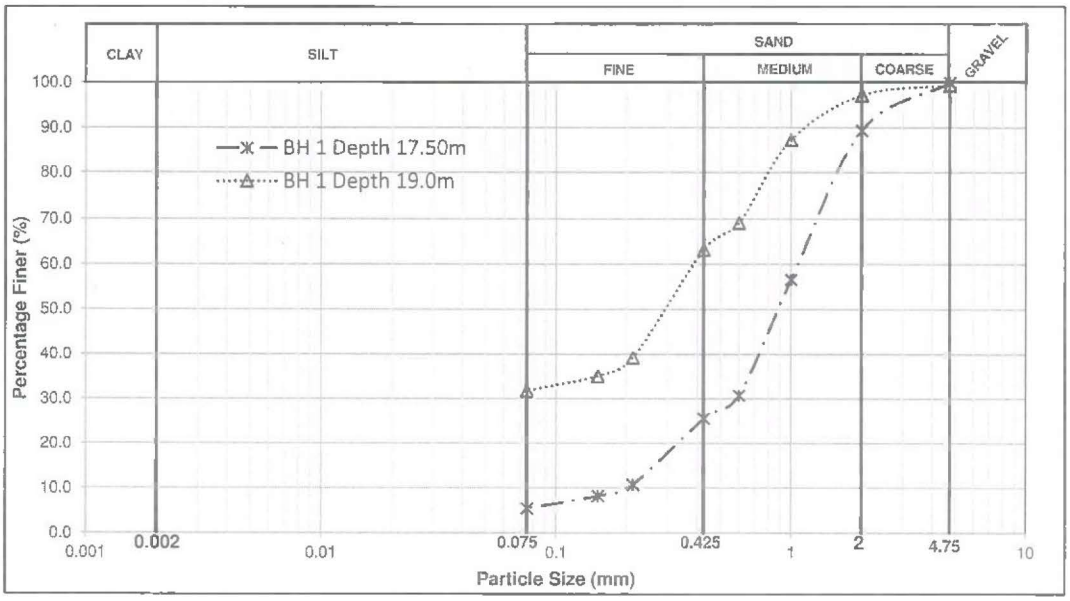
MARS SYNERGY GEOTECH PVT LTD

Project No: MSGTPL/SI-5642/22-23

Project :Proposed Construction of Commercial Building (S+4) at T.Nagar

GRAIN SIZE ANALYSIS





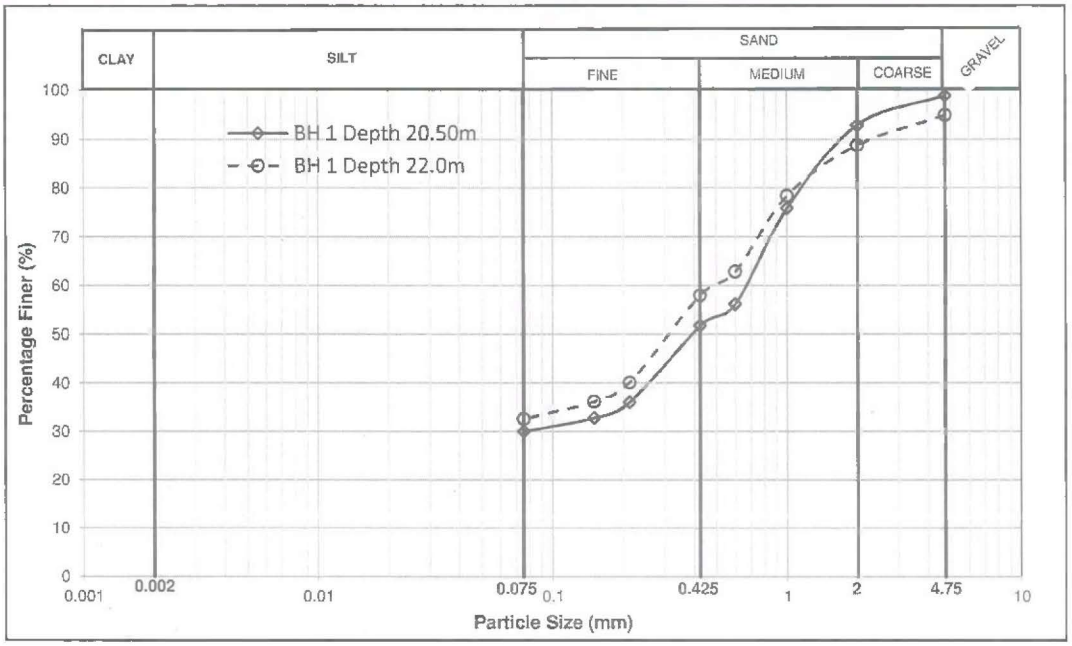
BH-No	Depth	Gravel	SAND (%)			SILT& CLAY	D_{10}	D_{30}	D_{60}	Cu	Cc
	(m)	(%)	Coarse	Medium	Fine	(%)	(mm)	(mm)	(mm)		
1	14.50m	1	2	32	42	23		0.148	0.386		
1	16.0m	0	11	69	19	1	0.283	0.664	1.204		
1	17.50m	0	11	64	20	5		0.454	1.078		
1	19.0m	1	2	34	31	32			0.396		

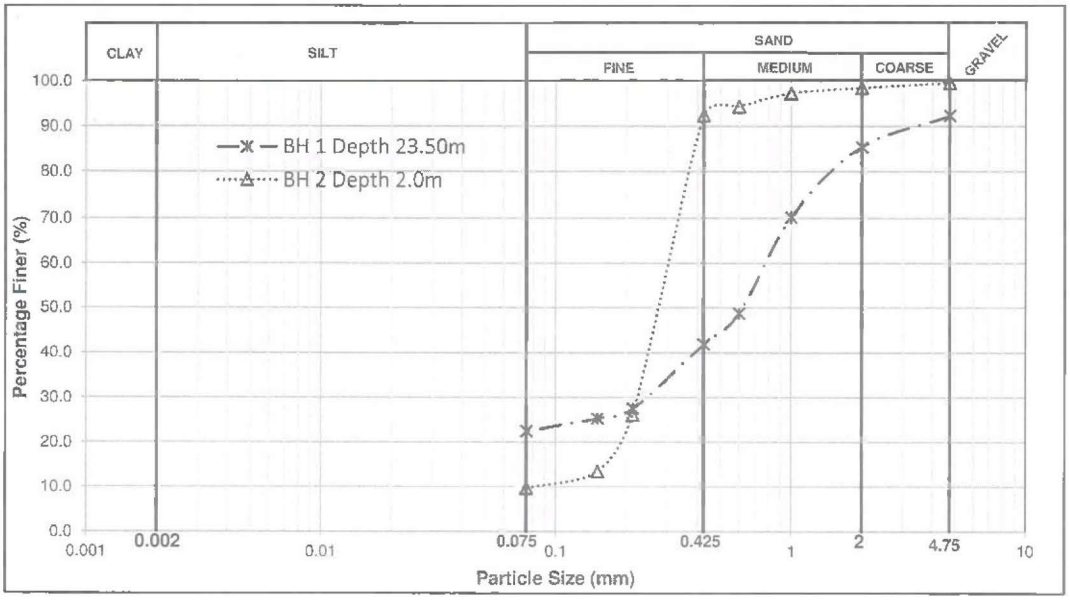
MARS SYNERGY GEOTECH PVT LTD

Project No: MSGTPL/SI-5642/22-23

Project :Proposed Construction of Commercial Building (S+4) at T.Nagar

GRAIN SIZE ANALYSIS



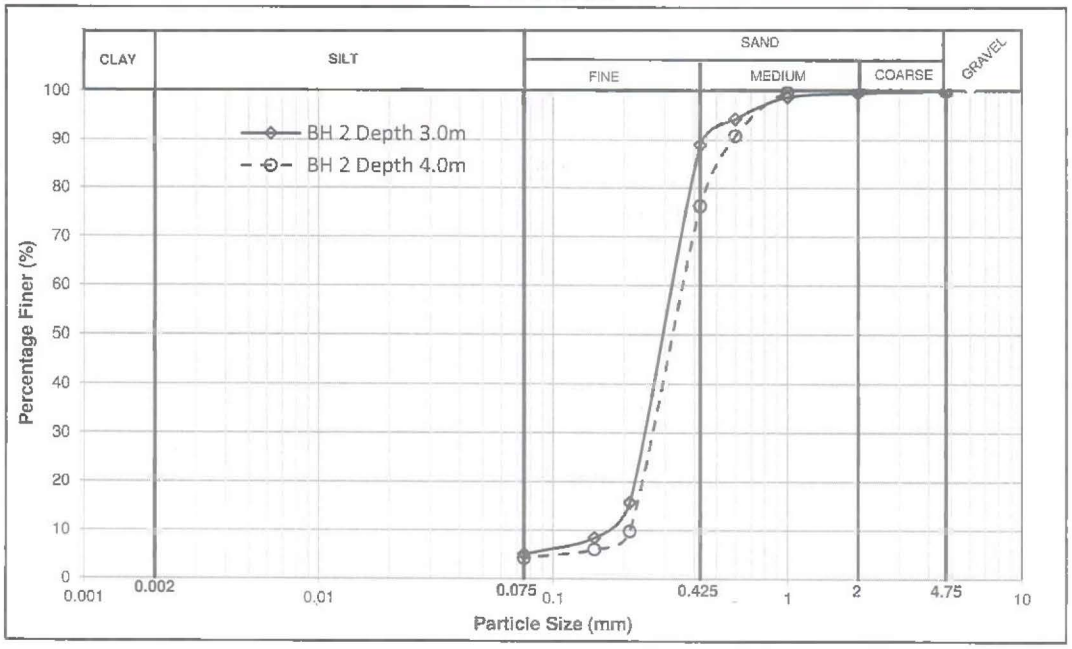


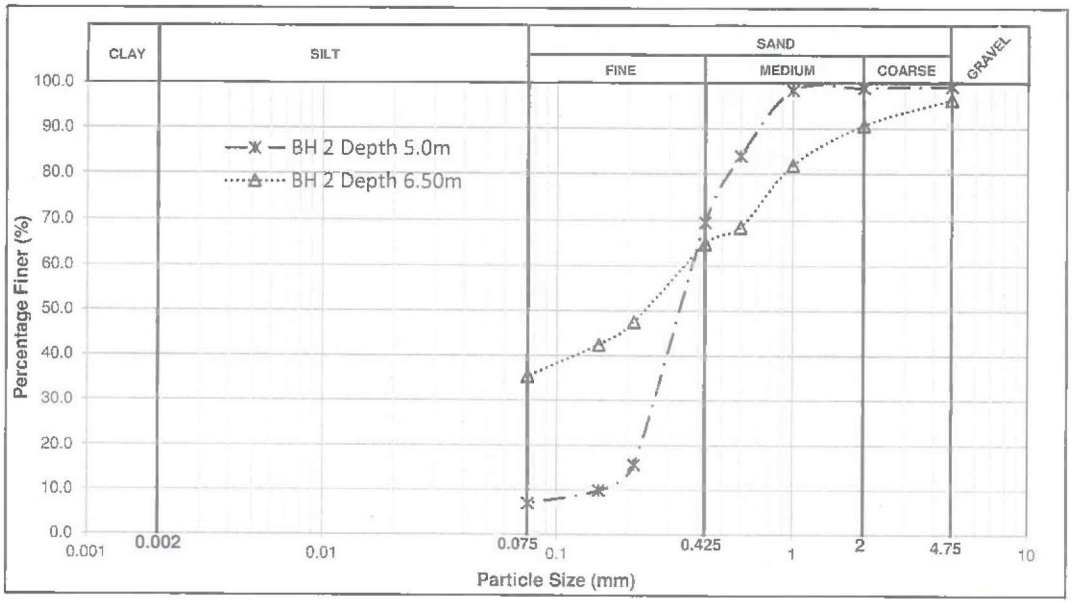
BH-No	Depth	Gravel	SAND (%)			SILT& CLAY	D_{10}	D_{30}	D_{60}	Cu	Cc
	(m)	(%)	Coarse	Medium	Fine	(%)	(mm)	(mm)	(mm)		
1	20.50m	1	6	41	22	30		0.076	0.678		
1	22.0m	5	6	31	25	33			0.498		
1	23.50m	8	7	44	19	22		0.267	0.695		
2	2.0m	0	1	6	83	10	0.082	0.225	0.321		

Project No: MSGTPL/SI-5642/22-23

Project :Proposed Construction of Commercial Building (S+4) at T.Nagar

GRAIN SIZE ANALYSIS



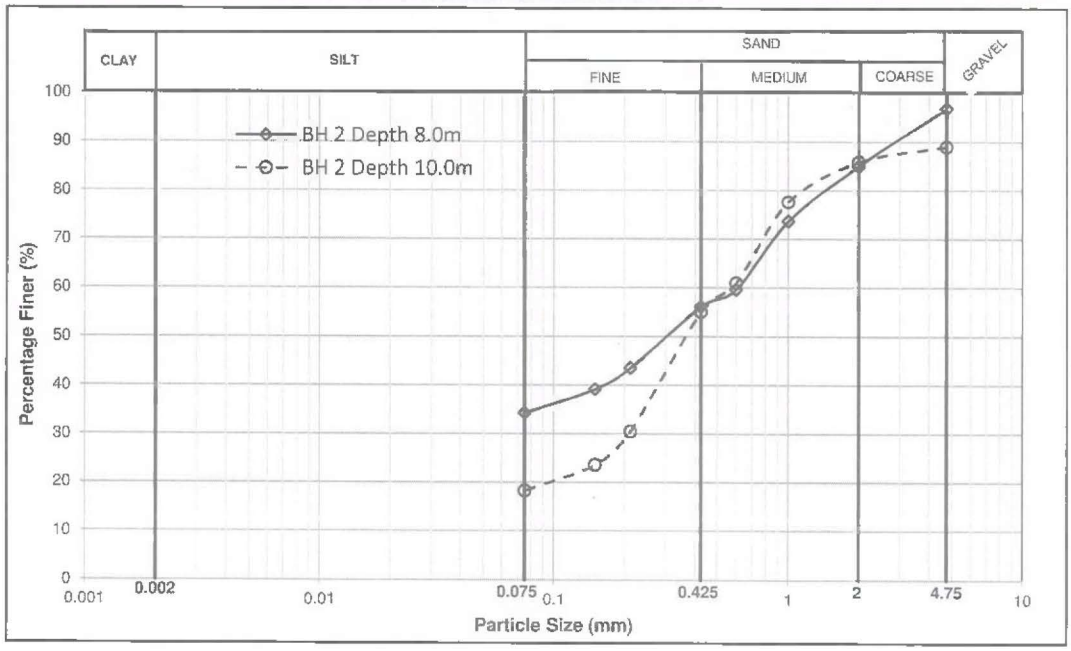


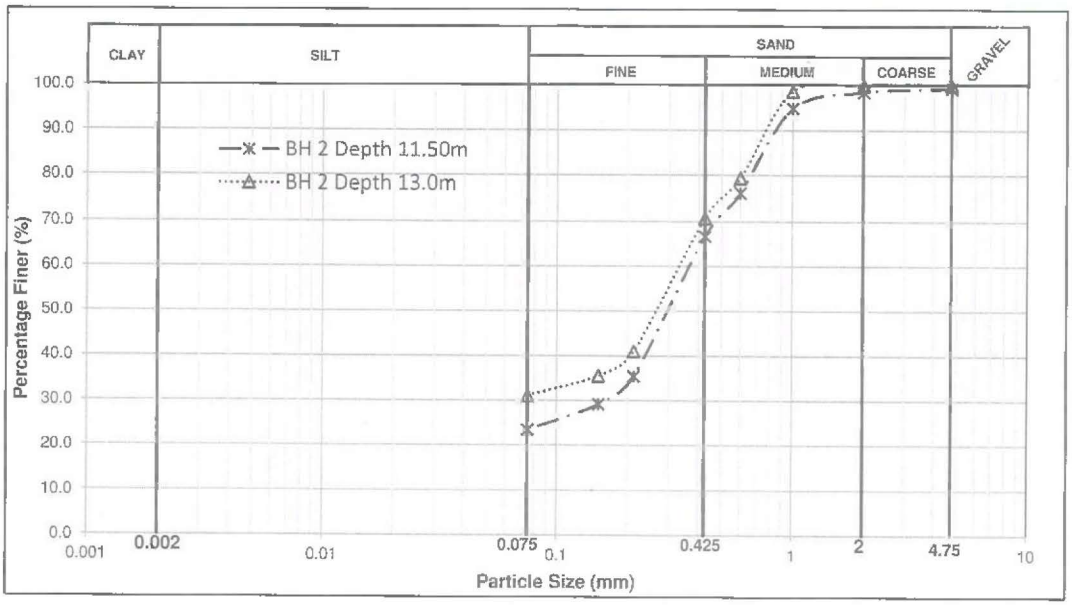
BH-No	Depth	Gravel	SAND (%)			SILT& CLAY	D_{10}	D_{30}	D_{60}	Cu	Cc
	(m)	(%)	Coarse	Medium	Fine	(%)	(mm)	(mm)	(mm)		
2	3.0m	0	0	11	84	5		0.254	0.341		
2	4.0m	0	0	24	72	4	0.213	0.277	0.373		
2	5.0m	1	0	30	62	7		0.354	0.650		
2	6.50m	4	6	26	29	35			0.365		

Project No: MSGTPL/SI-5642/22-23

Project :Proposed Construction of Commercial Building (S+4) at T.Nagar

GRAIN SIZE ANALYSIS



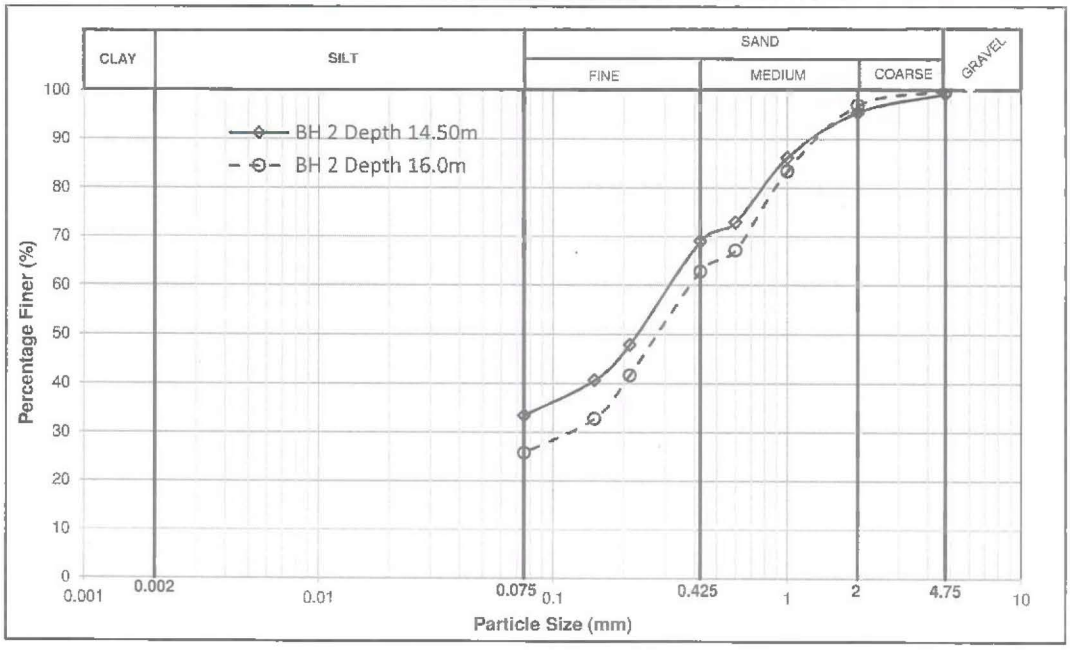


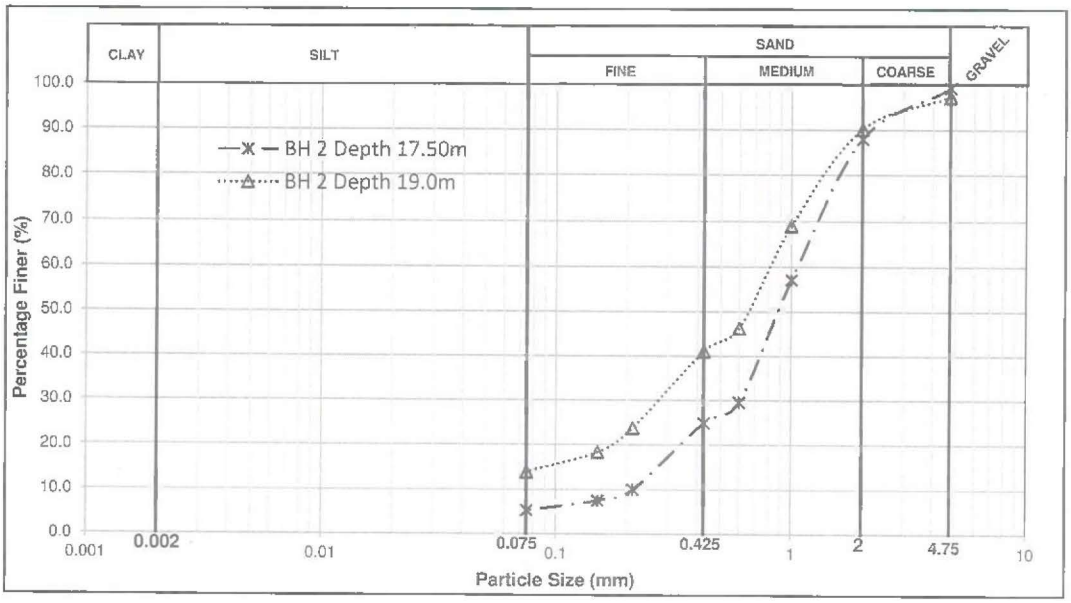
BH-No	Depth	Gravel	SAND (%)			SILT& CLAY	D_{10}	D_{30}	D_{60}	Cu	Cc
	(m)	(%)	Coarse	Medium	Fine	(%)	(mm)	(mm)	(mm)		
2	8.0m	3	12	29	22	34			0.610		
2	10.0m	11	3	31	37	18		0.208	0.572		
2	11.50m	1	1	32	43	23		0.147	3.130		
2	13.0m	0	0	29	40	31			0.348		

Project No: MSGTPL/SI-5642/22-23

Project :Proposed Construction of Commercial Building (S+4) at T.Nagar

GRAIN SIZE ANALYSIS





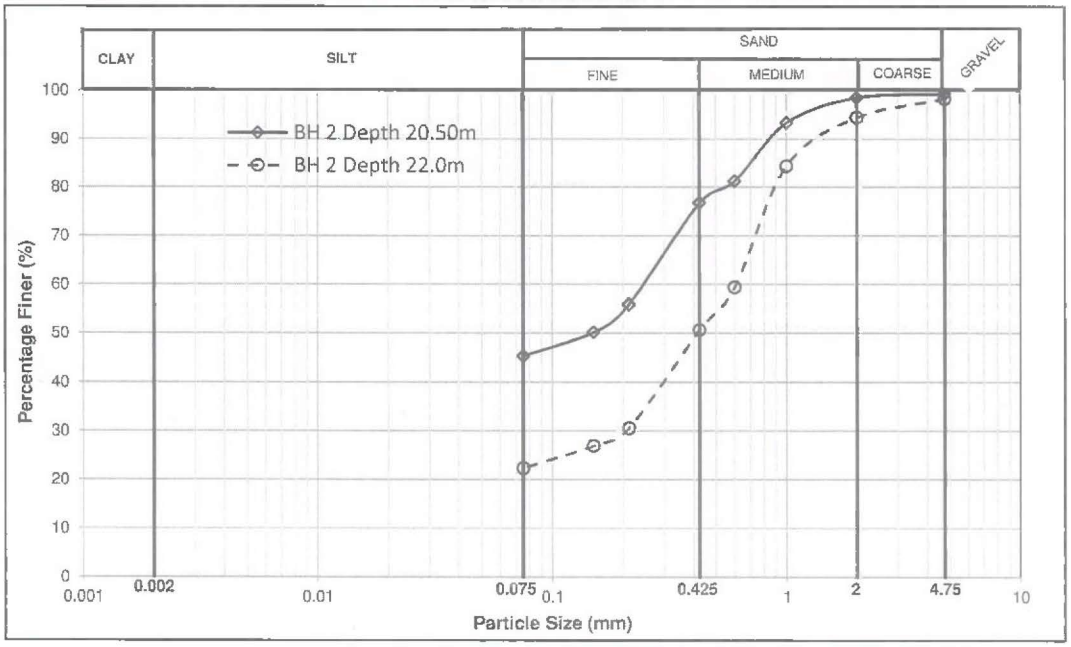
BH-No	Depth	Gravel	SAND (%)			SILT& CLAY	D_{10}	D_{30}	D_{60}	Cu	Cc
	(m)	(%)	Coarse	Medium	Fine	(%)	(mm)	(mm)	(mm)		
2	14.50m	1	4	27	36	32			0.334		
2	16.0m	0	3	34	37	26		0.120	0.396		
2	17.50m	1	11	63	20	5		0.603	1.071		
2	19.0m	3	7	49	27	14		0.289	0.842		

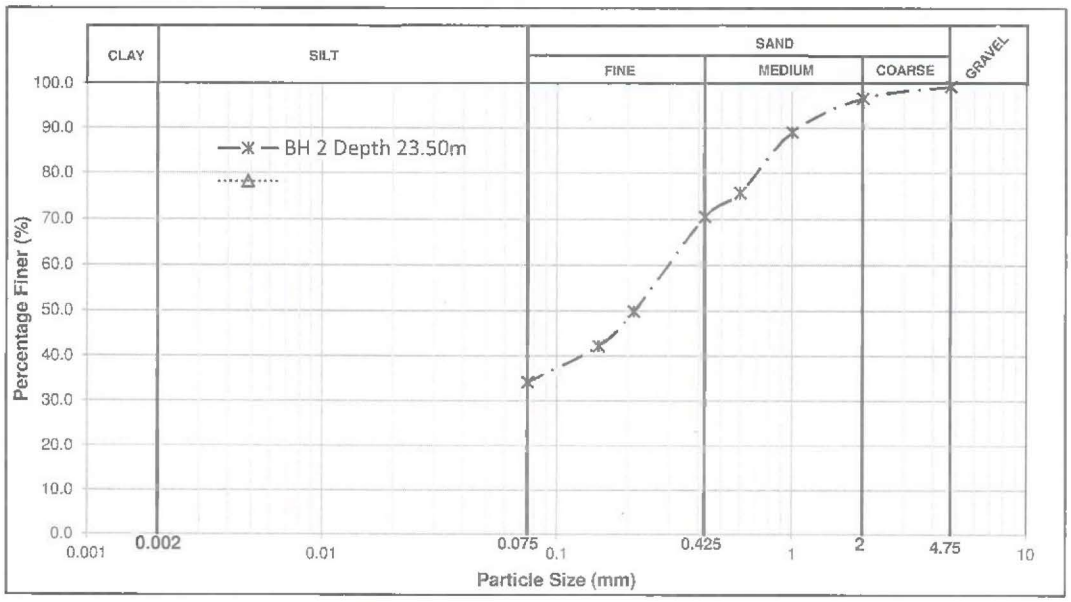
MARS SYNERGY GEOTECH PVT LTD

Project No: MSGTPL/SI-5642/22-23

Project :Proposed Construction of Commercial Building (S+4) at T.Nagar

GRAIN SIZE ANALYSIS





BH-No	Depth	Gravel	SAND (%)			SILT& CLAY	D_{10}	D_{30}	D_{60}	Cu	Cc
	(m)	(%)	Coarse	Medium	Fine	(%)	(mm)	(mm)	(mm)		
2	20.50m	1	1	22	31	45			0.253		
2	22.0m	2	4	44	28	22		0.203	0.609		
2	23.50m	1	3	26	36	34			0.041		

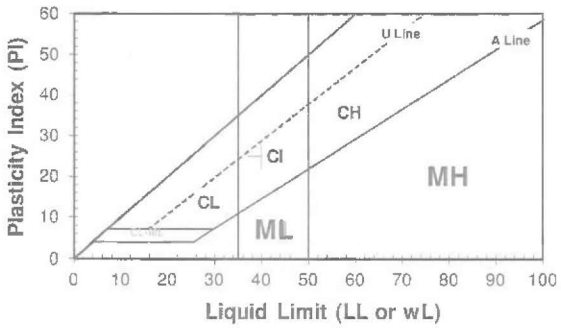
ATTERBERG LIMITS DATA SHEET

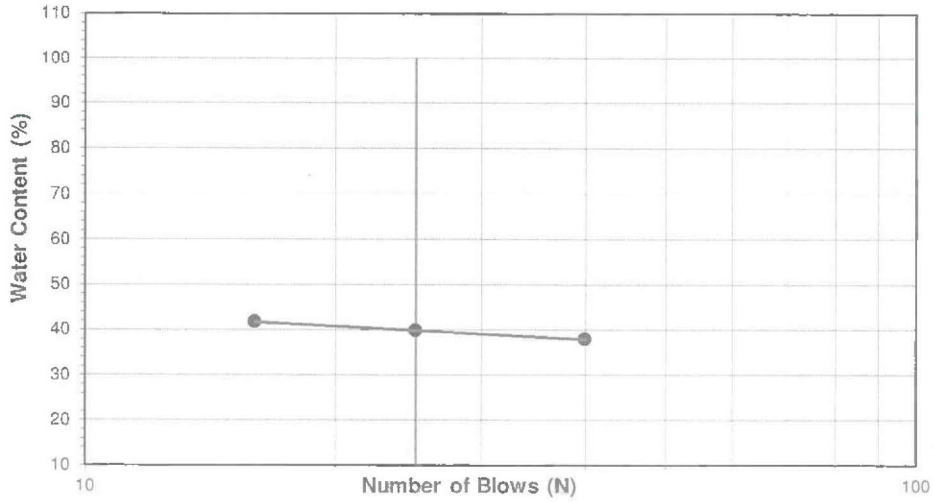
IS-2720-Part-5

Project :	Commercial Building (S+4)
Location:	T.Nagar
Boring No:	BH-1
Sample Depth:	1.0m
Project No:	MSGTPL/SI-5642/22-23

TEST			LIQUID LIMIT				PLASTIC LIMIT			
Variable	NO		1	2	3		1	2		
	Var.	Units								
Number of Blows	N	blows	16	25	40					
Tare Number	---	---	91	106	177		115			
Weight of Empty Tare	M_C	(g)	29.69	28.8	29.64		31.28			
Wt of Tare + Soil (Wet)	M_{CMS}	(g)	52.8	52.5	51.5		51.62			
Wt of Tare + Soil (Dry)	M_{CDS}	(g)	46.00	45.75	45.50		49			
Weight of Soil	M_S	(g)	16.31	16.95	15.86		17.72			
Weight of Water	M_W	(g)	6.80	6.75	6.00		2.62			
Water Content	w	(%)	**41.7**	**39.8**	**37.8**		**14.8**			

Liquid Limit (LL or w_L) (%)	40
Plastic Limit (PL or w_P) (%)	15
Plasticity Index (PI) (%)	**25**
Soil Classification	**CI**





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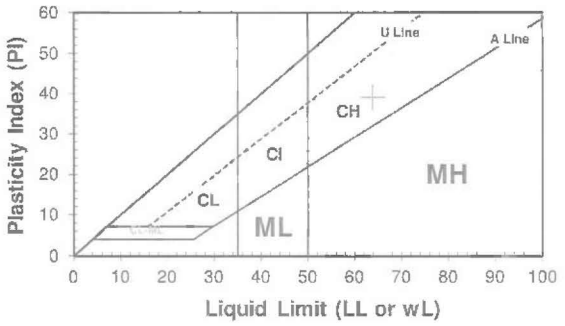
ATTERBERG LIMITS DATA SHEET

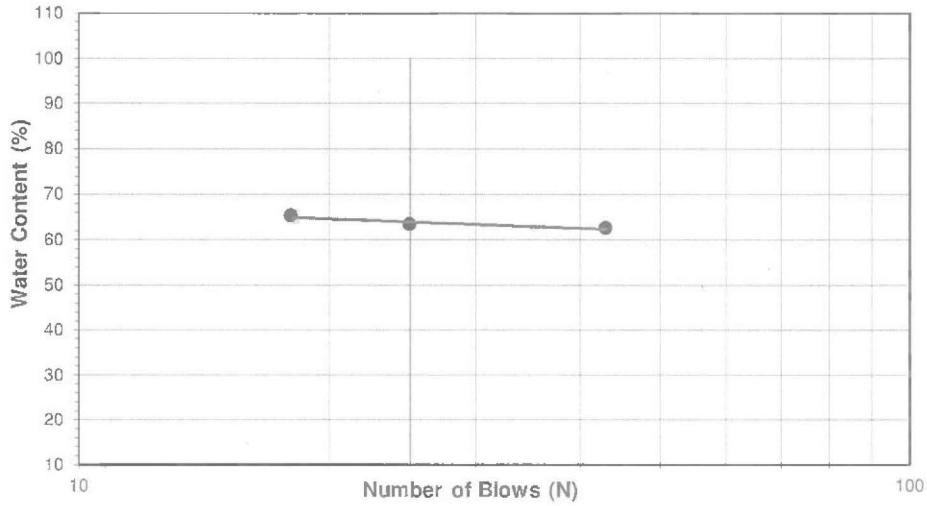
IS-2720-Part-5

Project :	Commercial Building (S+4)
Location:	T.Nagar
Boring No:	BH-1
Sample Depth:	5.0m
Project No:	MSGTPL/SI-5642/22-23

TEST			LIQUID LIMIT				PLASTIC LIMIT			
Variable	NO		1	2	3		1	2		
	Var.	Units								
Number of Blows	N	blows	18	25	43					
Tare Number	---	---	150	84	299		184			
Weight of Empty Tare	M_C	(g)	29.43	29.46	28.07		28.76			
Wt of Tare + Soil (Wet)	M_{CMS}	(g)	60.12	58.42	56.4		47.62			
Wt of Tare + Soil (Dry)	M_{CDS}	(g)	48.00	47.18	45.50		43.89			
Weight of Soil	M_S	(g)	18.57	17.72	17.43		15.13			
Weight of Water	M_W	(g)	12.12	11.24	10.90		3.73			
Water Content	w	(%)	**65.3**	**63.4**	**62.5**		**24.7**			

Liquid Limit (LL or w_L) (%)	64
Plastic Limit (PL or w_P) (%)	25
Plasticity Index (PI) (%)	39
Soil Classification	CH





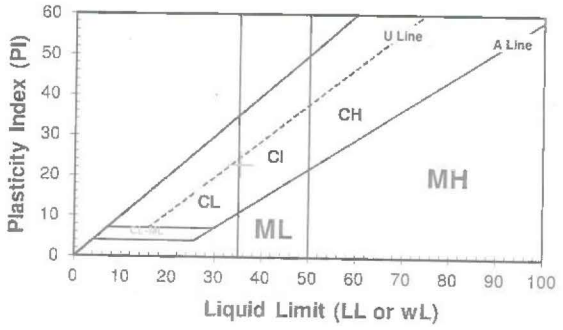
ATTERBERG LIMITS DATA SHEET

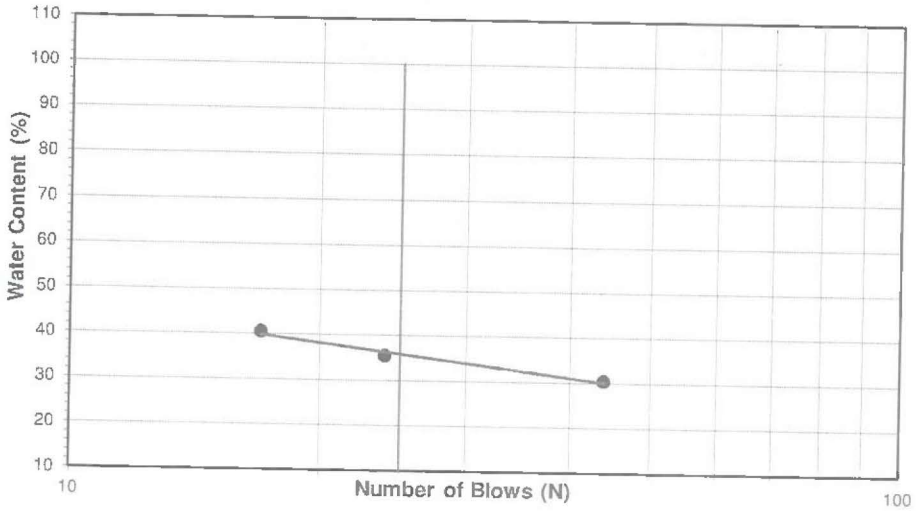
IS-2720-Part-5

Project :	Commercial Building (S+4)
Location:	T.Nagar
Boring No:	BH-2
Sample Depth:	1.0m
Project No:	MSGTPL/SI-5642/22-23

TEST			LIQUID LIMIT				PLASTIC LIMIT			
Variable	NO		1	2	3		1	2		
	Var.	Units								
Number of Blows	N	blows	17	24	44					
Tare Number	---	---	95	248	35		134			
Weight of Empty Tare	M_C	(g)	29.35	28.76	30.77		28.41			
Wt of Tare + Soil (Wet)	M_{CMS}	(g)	60.12	58.37	56.4		47.36			
Wt of Tare + Soil (Dry)	M_{CDS}	(g)	51.26	50.64	50.43		45.27			
Weight of Soil	M_S	(g)	21.91	21.88	19.66		16.86			
Weight of Water	M_W	(g)	8.86	7.73	5.97		2.09			
Water Content	w	(%)	**40.4**	**35.3**	**30.4**		**12.4**			

Liquid Limit (LL or w_L) (%)	35
Plastic Limit (PL or w_P) (%)	12
Plasticity Index (PI) (%)	23
Soil Classification	CL





.....END OF THE REPORT.....

VASANTHI PADMANABAN, M.Tech.,
Registered Geotechnical Engineer
Reg. No: GTE/19/04/016



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