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PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING (S+4) AT CHETPET

Report on Geotechnical Investigation

Client:

Mr. Ketan M Chandan,
Chennai.



[®] MARS SYNERGY GEOTECH Pvt Ltd

An ISO 9001: 2015 Certified Company
NABL Accredited Laboratory

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NABL : ULR-TC867822100000080F

Project No : MSGTPL/SI-5286/21-22

Mar-2022

To

12th Mar 2022

Mr. Ketan M Chandan,
Chennai.

Reg: Proposed construction of residential building (S+4) at Door No. 31, Harrington Road, Chetpet, Chennai -600031, Tamil Nadu, INDIA.

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

This geotechnical engineering report presents the results of the subsurface exploration and provides geotechnical recommendations design recommendations for your structure 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. *Not under NABL scope and NABL is applicable only to tested results enclosed.
5. Samples are retained for 30 days from sample received date at lab.

Sincerely,

Mars Synergy Geotech Pvt Ltd.

ULR-TC867822100000080F

Report No: **MSGTPL/SI-5286/21-22**

Copies Submitted: (2)

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REPORT ON GEOTECHNICAL INVESTIGATION AND FOUNDATION RECOMMENDATIONS FOR THE PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING (S+4) AT CHETPET, CHENNAI.

1.0 INTRODUCTION

Mr. Ketan M Chandan is planning to construct of residential building (S+4) at Door No. 31, Harrington Road, Chetpet, Chennai -600031, Tamil Nadu, INDIA. **M/s. Mars Synergy Geotech Pvt Ltd**, Chennai, carried out this investigation and completed on 01st Mar 2022 as per client instructions.

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 Residential 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 to 5 m c/c considering this the central column load works about 100 to 120 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 fieldwork 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

1.3 FIELD SAMPLING

Two numbers of standard soil investigation boreholes of 100mm diameter was made at the locations shown in the figure, **MSGTPL/SI-5286** enclosed. Investigations were conducted up to 13.0m and 16.0m from existing ground level where SPT is more than 50blows. SPTs were conducted at every 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)
- 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 four distinctive layers there are

- (i) Medium stiff to stiff CLAY up to -3.50m with **SPT's N=6-13**
- (ii) Medium dense to dense SAND -3.50m to -5.50m with **SPT'S N=21-29**
- (iii) Dense SAND -5.50m to -8.50m with **SPT's N=36-49**
- (iv) Very dense SAND -8.50m to -16.0m 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 (28/02/2022 to 01/03/2022) at site, ground water table was **4.0m** depth encountered within the drilled depth from Existing Ground Level.

1.7 DISCUSSION ON FOUNDATION

From the sub soil profile and field test data, seen from borehole, the top 3.50m soil is medium stiff to stiff CLAY(CH) layers, below this layer 2.0m thick medium dense Sand up to 5.50m depth. From 5.50m to 5.0m depth dense SAND, followed by very dense SAND up to -16.0m depth below existing ground level.

Due Medium stiff to stiff Clay layer up to 3.50m depth and average SPT N value is approximately 10 below 2.0m to 3.50m depth. At 2.0m depth shallow foundation worked out the SBC is 13.0 Ton/Sq.m. which is less than intensity pressure hence shallow foundation is not satisfactory, shallow foundation calculation is provided below.

Deep foundation suggested such as Bored Cast in-situ pile foundation is recommended for proposed building.

Shallow foundation Calculations

This soil stratum can be considered as a medium stiff to stiff clay with a compressive strength between 5 Ton/sq.m. For this condition, the ultimate bearing capacity as per IS6403 can be taken as

$$Q_{ult} = C N_c \cdot s_c \cdot d_c \cdot i_c$$

Where $C=5.0\text{Ton/sq.m.}$ $N_c=5.14$ as per the code, it can be assumed that $s_c=i_c=1$ and $d_c=1.27$

$$\text{Hence, } \sigma_{u(\text{net})} = 5 \times 5.14 \times 1.0 \times 1.27 \times 1.0 = 32.63\text{t/sq.m.}$$

$$\text{Safe bearing capacity is } Q_{\text{safe}} = 32.63/2.5 = 13.0\text{Ton/sq.m.}$$

If there are 4 columns with approx. maximum load of column taken as 120 tonnes with average column spacing of 4.5m.

$$\text{The approximate load on 4 column strip} = 4 \times 120 = 480 \text{ tonnes}$$

$$\text{The approximate strip length} = 4 \times 4.5 = 18.0\text{m, Strip width is 1.50m take for calculations}$$

$$\text{The average load intensity on the foundation soil} = \frac{480}{1.5 \times 18} = 17.77\text{t/m}^2 \text{ Say } 18 \text{ Ton/Sq.m}$$

➤ Required SBC is **>18Ton/sq.m**

The load intensity from the super structure without considering wind load is=18ton/sq.m.

The Safe bearing capacity is less than the building intensity pressure hence STRIP RAFT is not Safe. Hence deep foundation is suggested.

1.8 RECOMMENDATIONS

- ✓ 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 into hard strata (where three consecutive SPT 'N' values of more than >50 are obtained in each test at depth intervals of one pile diameter).
- ✓ To satisfy the above criterion the pile length may be about 15.0m from the existing ground level.
- ✓ The capacities of piles of varying diameters are provided below for 5 storied building.

Length of Pile (m) below EGL	Pile Dia (mm)	Safe Vertical Capacity (Tones)	Safe uplift capacity (Tones)	Safe Lateral capacity w.r.t 5mm Deflection	
				Free Head (Tones)	Fixed Head (Tones)
15	450	80	58	1.5	3.9
15	500	85	65	1.7	4.3
15	600	110	79	2.0	5.2

- ✓ **Use minimum M30 Grade Concrete**
- ✓ **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**

ESTIMATION OF VERTICAL CAPACITY OF PILE

Project No:	5286- Residentail Building (S+4)
Location:	Chetpet
Reference BH's	BH-1 to BH-3

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

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

Dia of Pile	600	mm
Elevation	0	m
Pile Cut off Level (Below E.G.L)	1.0	m
Pile termination level below G.L	15	m
Total Length of Pile	14.0	m
Factor of safety	2.5	
$P_D = 15 * \text{Dia} * \gamma'$	60	kN/Sq.m

Soil Design Parameters

Sl.No	From (m)	To (m)	Thickness (m)	Soil Type	Avg 'N'	γ' (kN/m ³)	C (kN/m ²)	α	ϕ (Deg)	K	Pdi (kN/m ²)
1	0	3.5	3.5	Medium Stiff to Stiff CLAY	10	8.0	50	0.9	-	-	14.0
2	3.5	5.5	2	Medium Dense SAND	25	8.0	-	-	32	1.1	36.0
3	5.5	8.5	3	Dense SAND	42	9.0	-	-	34	1.2	57.5
4	8.5	16	7.5	Very Dense SAND	>50	10.0	-	-	36	1.3	108.5

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

Sl.No	From (m)	To (m)	Thickness (m)	Avg 'N'	γ' (kN/m ³)	C (kN/m ²)	α	ϕ (Deg)	K	Asi	Sf (kN)	Sfi (kN)
1	1.0	3.5	2.5	10	8.0	50	0.9	-	-	4.71	212.06	212.06
2	3.5	5.5	2	25	8.0	-	-	32	1.1	3.77	93.29	305.34
3	5.5	8.5	3	42	9.0	-	-	34	1.2	5.65	263.18	568.53
4	8.5	15	6.5	>50	10.0	400	-	36	1.3	12.25	1255.59	1824.12

End Bearing Strata	Very Dense SAND										
Dia of Pile(m)	Ap (m ²)	γ (kN/m ³)	P _D	ϕ (Deg)	Nq	Nγ	Nc	C (kN/m ²)	Qp (kN)	Qult (kN)	Qallow (kN)
0.6	0.28274	10.00	60	36	57.3	60.31	-	-	1023.23	2847.35	1138.94

Safe Vertical Capacity of Single Pile

114

Tones

Lateral Pile Capacity Calculation

Project Title : Residential Building (S+4)
Site : Chetpet
BH: BH-1 to BH-2

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

$\text{Deflection, } y = \frac{H(e + Z_f)^3}{3EI} \times 10^3 \quad \dots \text{for free head pile}$	$\text{Deflection, } y = \frac{H(e + Z_f)^3}{12EI} \times 10^3 \quad \dots \text{for fixed head pile}$
--	--

Input

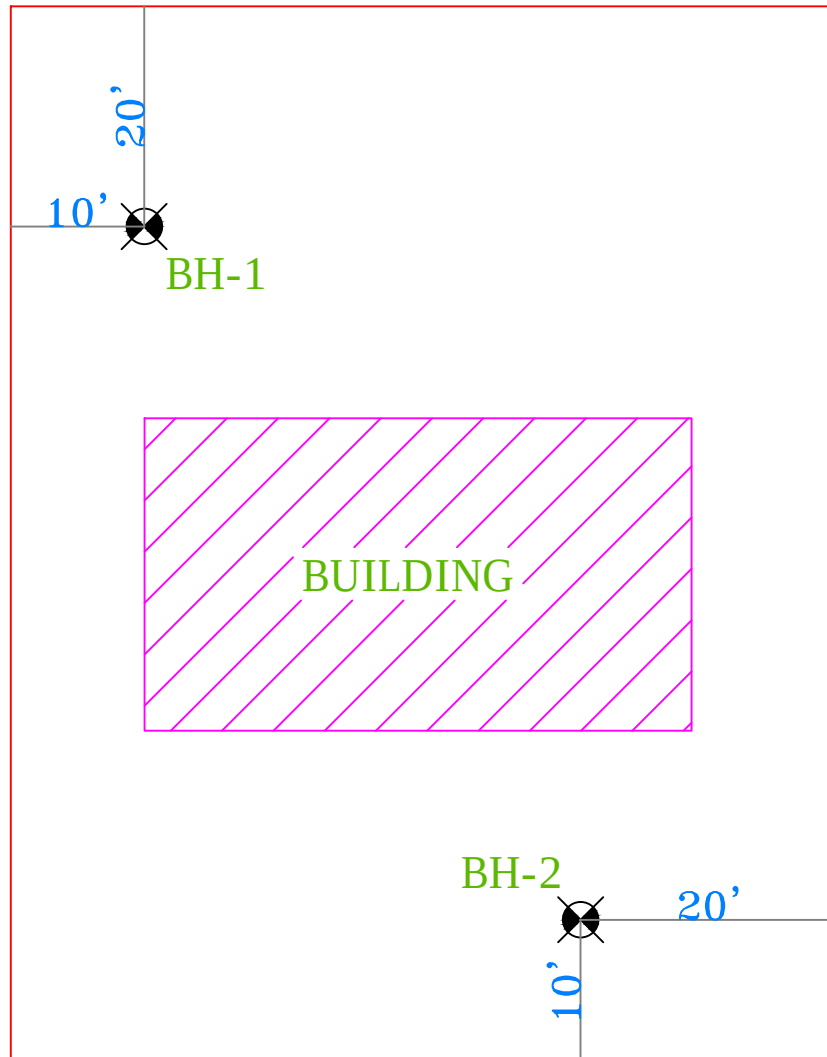
Soil		Stiff CLAY		For CLAY	Stiffness factor R , in m = $\sqrt[4]{\frac{EI}{KB}}$
Diameter of Pile	=	600	mm	$k_1 =$	18 MN/m ²
Length of Pile Below FGL, (L)	=	15	m	$K =$	6 MN/m ³
Length of Pile Above FGL, (L1=e)	=	0	m	$R =$	2.58 m
Grade of Concrete	=	25		For SAND	
Allowable Deflection, (y)	=	5	mm	$\eta_h =$	MN/m ³
Young's modulus of pile material, (E)	=	25000.00	MN/m ²	$T =$	#DIV/0! m
Moment Inertia of the Pile Cross section (I)	=	0.0064	m ⁴	$L_1/T =$	#DIV/0!
					Stiffness factor T , in m = $\sqrt[5]{\frac{EI}{\eta_h}}$
					L_f/T (Free Head)=
					L_f/T (Fixed Head)=

Output for CLAY Soil

Z_f (Free Head)/ Depth of Fixity = 4.90 m
 Z_f (Fixed Head) / Depth of Fixity = 5.67 m

Result

Lateral Load Free Head = 2.03 Tones
 Lateral Load Fixed Head = 5.23 Tones



ROAD

TITLE: DRAWING SHOWING THE SOIL INVESTIGATION BORE HOLE LOCATIONS

PROJECT: PROPOSED CONSTRUCTION OF RESIDENTIAL BUILDING (S+4) AT CHETPET

LEGEND:

BH: BORE HOLE	SOIL TEST LOCATION	SCALE: N T S
ACTIVITY	EXECUTED BY	DATE
FOREMEN	RAJA	28.02.2022
DRAFTING	JEGAN	11.03.2022



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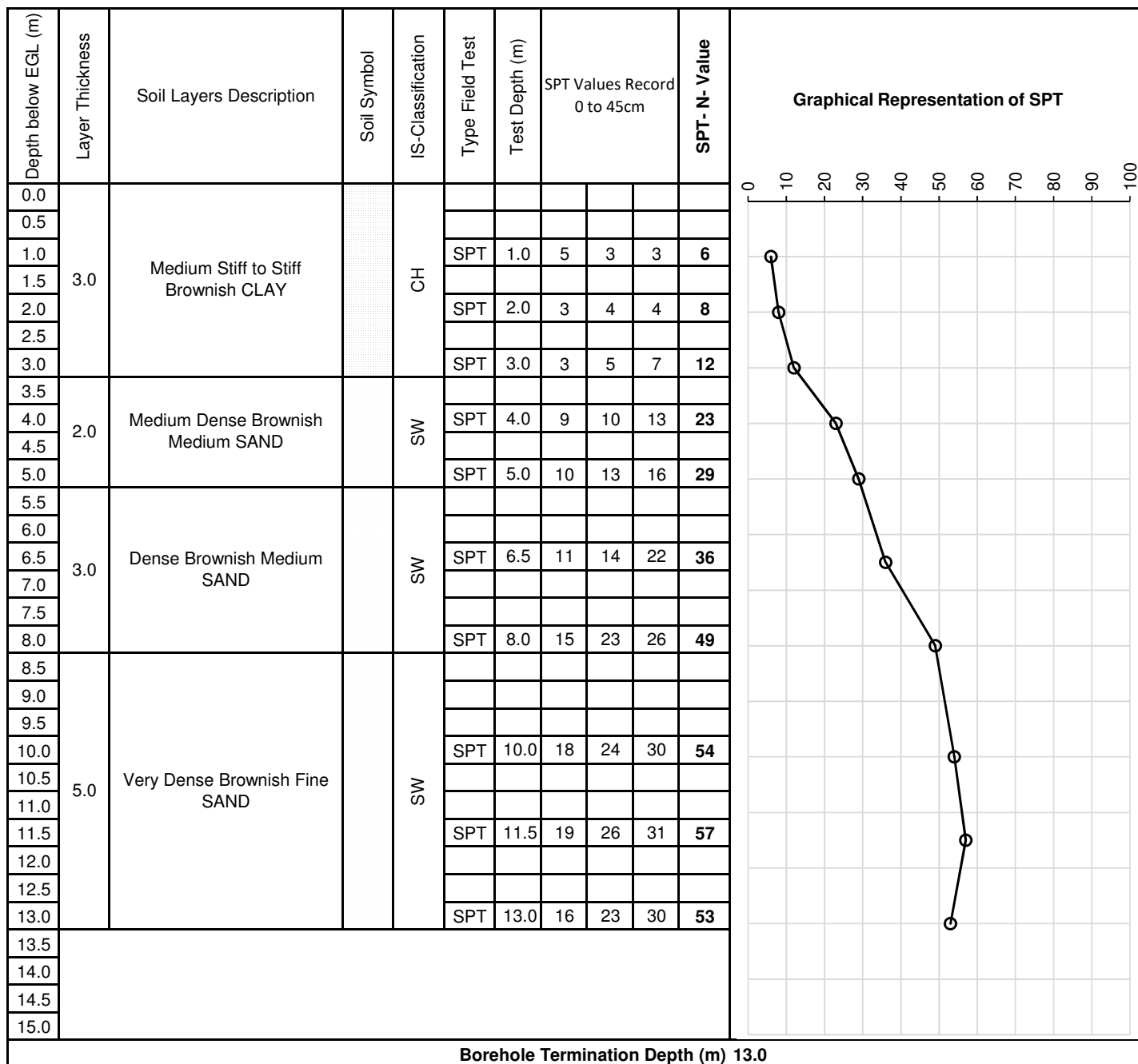
MARS SYNERGY GEOTECH Pvt Ltd
(An ISO 9001: 2015 Certified Company)
Engineering Survey & Soil Investigation
Plot No:145A, Developed Plots Estate,
Perungudi, Chennai-600 096,
Mobile: 94440 51563 / 94441 22047

DRAWING NO: MSGTPL/SI-5286/21-22

BOREHOLE LOG**Project No:** MSGTPL/SI-5286/21-22**Project:** Proposed Construction of Residential Building (S+4) at Chetpet

Location	Chetpet
Ground R.L	Nil
Drilling	Rotary

Borehole No	BH-1	
G.W.T (m)	(-)4.0m	
Date of Start	28-Feb-2022	
Date of Complete	28-Feb-2022	
Dia of Bore (mm)	100	Sheet
Termination Depth (m)	13.00	1 of 1



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

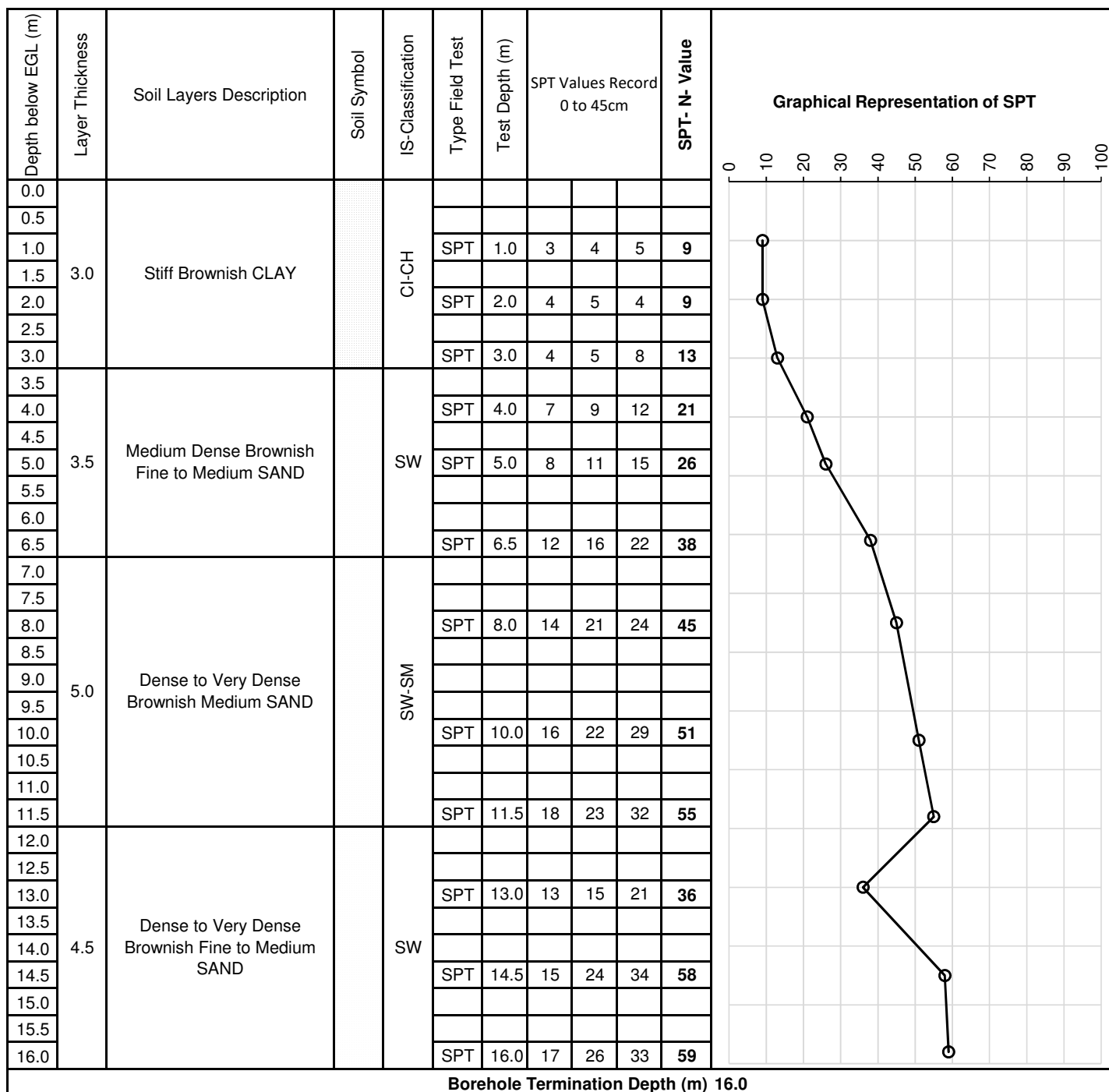
BOREHOLE LOG

Project No: MSGTPL/SI-5286/21-22

Project: Proposed Construction of Residential Building (S+4) at Chetpet

Location	Chetpet
Ground R.L	Nil
Drilling	Rotary

Borehole No	BH-2	
G.W.T (m)	(-)4.0m	
Date of Start	1-Mar-2022	
Date of Complete	1-Mar-2022	
Dia of Bore (mm)	100	Sheet
Termination Depth (m)	16.00	1 of 1



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-5286/21-22																
Project : Proposed Construction of Residential Building (S+4) at Chetpet																
BH No		1			Ground Water Level:(-)4.0m						Termination Depth:20.50m					
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	I _c	FreeSwell		Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay
	3.0	0.00	Medium Stiff to Stiff Brownish CLAY	CH												
6		1.00														
8		2.00			34	64	25	39		2.65						
12		3.00			33	65	26	38								
23	2.0	4.00	Medium Dense Brownish Medium SAND	SW	14					2.66	0	0	78	13	9	
29		5.00			14						0	0	80	17	3	
36	3.0	6.50	Dense Brownish Medium SAND	SW	12						0	2	78	18	2	
49		8.00			14				2.68	0	3	78	17	2		
54	5.0	10.00	Very Dense Brownish Fine SAND	SW	12						0	3	72	22	3	
57		11.50			14				2.65	0	0	80	16	4		
53		13.00			16						0	0	74	20	6	

Project No: MSGTPL/SI-5286/21-22																
Project : Proposed Construction of Residential Building (S+4) at Chetpet																
BH No		2			Ground Water Level:(-)4.0m						Termination Depth:16.0m					
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	I _c	FreeSwell		Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay
	3.0	0.00	Stiff Brownish CLAY	CI-CH												
9		1.00			30	55	20	35			2.62					
9		2.00			24											
13		3.00			17	49	20	28			2.65					
21	3.5	4.00	Medium Dense Brownish Fine to Medium SAND	SW	17							0	0	61	34	5
26		5.00			16						0	0	68	30	2	
38		6.50			16					2.63	0	0	55	38	7	
45	5.0	8.00	Dense to Very Dense Brownish Medium SAND	SW-SM	16							0	0	73	17	10
51		10.00			16						0	0	67	17	16	
55		11.50			13					2.64	0	0	88	10	2	
36	4.5	13.00	Dense to Very Dense Brownish Fine to Medium SAND	SW	15							0	0	69	27	4
58		14.50			16					2.68	0	0	68	27	5	
59		16.00			15							0	0	64	32	4

Project No: MSGTPL/SI-5286/21-22

Project :Proposed Construction of Residential Building (S+4) at Chetpet

Method: IS-2720 P-2

Natural Moisture Content Data Sheet

BH.No/ Pit no	1		1		1		1		1		1	
Depth (m)	2.0		3.0		4.0		5.0		6.5		8.0	
Tare No	14	200	231	221	68	64	108	96	222	245	118	232
Wt of Tare (gr)	30.18	29.04	27.50	28.56	28.27	29.13	29.77	28.88	28.63	30.29	29.57	29.95
Tare + Soil (gr)	55.35	44.76	51.02	58.15	54.52	50.61	54.11	55.12	51.73	55.25	56.81	56.65
Tare+Dry soil (gr)	48.98	40.80	45.13	50.75	51.32	48.00	51.03	51.85	49.19	52.45	53.61	53.35
Wt of Water (gr)	6.37	3.96	5.89	7.40	3.20	2.61	3.08	3.27	2.54	2.80	3.20	3.30
Wt Dry soil (gr)	18.80	11.76	17.63	22.19	23.05	18.87	21.26	22.97	20.56	22.16	24.04	23.40
Water Content (%)	33.88	33.67	33.41	33.35	13.88	13.83	14.49	14.24	12.35	12.64	13.31	14.10
Average Water Content (%)	34		33		14		14		12		14	

Project No: MSGTPL/SI-5286/21-22

Project :Proposed Construction of Residential Building (S+4) at Chetpet

Method: IS-2720 P-2

Natural Moisture Content Data Sheet

BH.No/ Pit no	1		1		1		2		2		2	
Depth (m)	10.0		11.5		13.0		1.0		2.0		3.0	
Tare No	5	296	259	265	280	272	225	42	230	237	26	115
Wt of Tare (gr)	31.87	29.05	31.05	30.46	29.38	30.82	28.45	30.29	28.39	29.68	29.08	31.25
Tare + Soil (gr)	58.50	51.51	54.49	58.04	52.03	56.21	62.97	56.53	59.97	63.41	59.99	60.65
Tare+Dry soil (gr)	55.47	49.18	51.61	54.63	49.03	52.69	54.95	50.43	54.03	56.70	55.30	56.38
Wt of Water (gr)	3.03	2.33	2.88	3.41	3.00	3.52	8.02	6.10	5.94	6.71	4.69	4.27
Wt Dry soil (gr)	23.60	20.13	20.56	24.17	19.65	21.87	26.50	20.14	25.64	27.02	26.22	25.13
Water Content (%)	12.84	11.57	14.01	14.11	15.27	16.10	30.26	30.29	23.17	24.83	17.89	16.99
Average Water Content (%)	12		14		16		30		24		17	

Project No: MSGTPL/SI-5286/21-22

Project :Proposed Construction of Residential Building (S+4) at Chetpet

Method: IS-2720 P-2

Natural Moisture Content Data Sheet

BH.No/ Pit no	2		2		2		2		2		2	
Depth (m)	4.0		5.0		6.5		8.0		10.0		11.5	
Tare No	90	154	218	114	63	78	189	74	165	93	151	273
Wt of Tare (gr)	29.42	29.66	29.83	29.40	29.97	28.61	30.31	29.71	29.96	31.28	29.92	29.73
Tare + Soil (gr)	50.70	54.06	53.76	52.49	55.33	53.95	50.55	52.54	51.61	52.25	54.06	52.65
Tare+Dry soil (gr)	47.62	50.55	50.42	49.25	51.93	50.48	47.74	49.41	48.66	49.32	51.34	49.98
Wt of Water (gr)	3.08	3.51	3.34	3.24	3.40	3.47	2.81	3.13	2.95	2.93	2.72	2.67
Wt Dry soil (gr)	18.20	20.89	20.59	19.85	21.96	21.87	17.43	19.70	18.70	18.04	21.42	20.25
Water Content (%)	16.92	16.80	16.22	16.32	15.48	15.87	16.12	15.89	15.78	16.24	12.70	13.19
Average Water Content (%)	17		16		16		16		16		13	

Project No: MSGTPL/SI-5286/21-22

Project :Proposed Construction of Residential Building (S+4) at Chetpet

Method: IS-2720 P-2

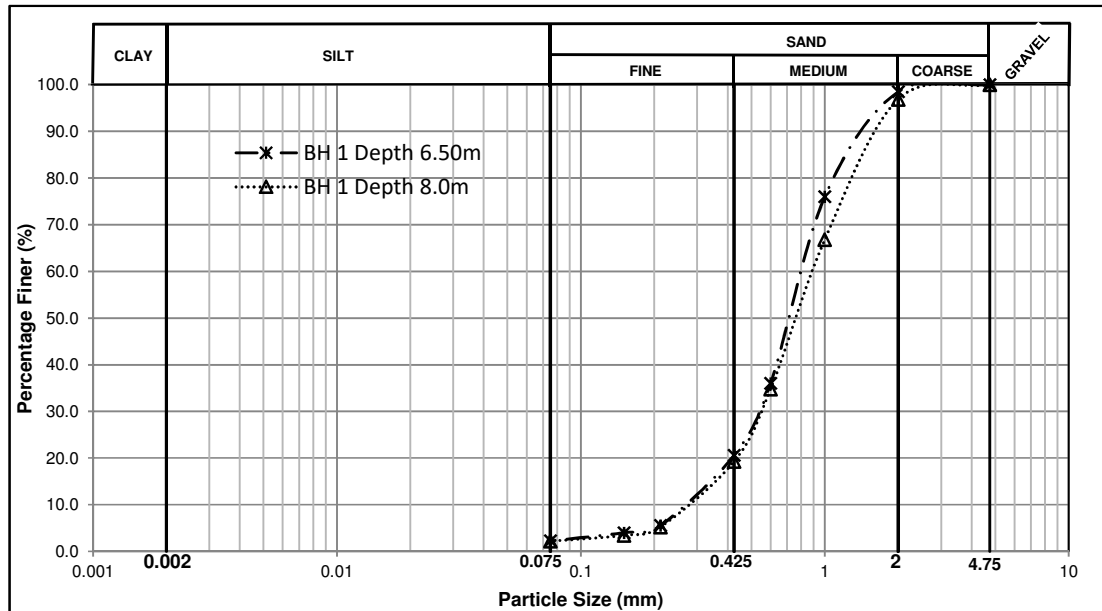
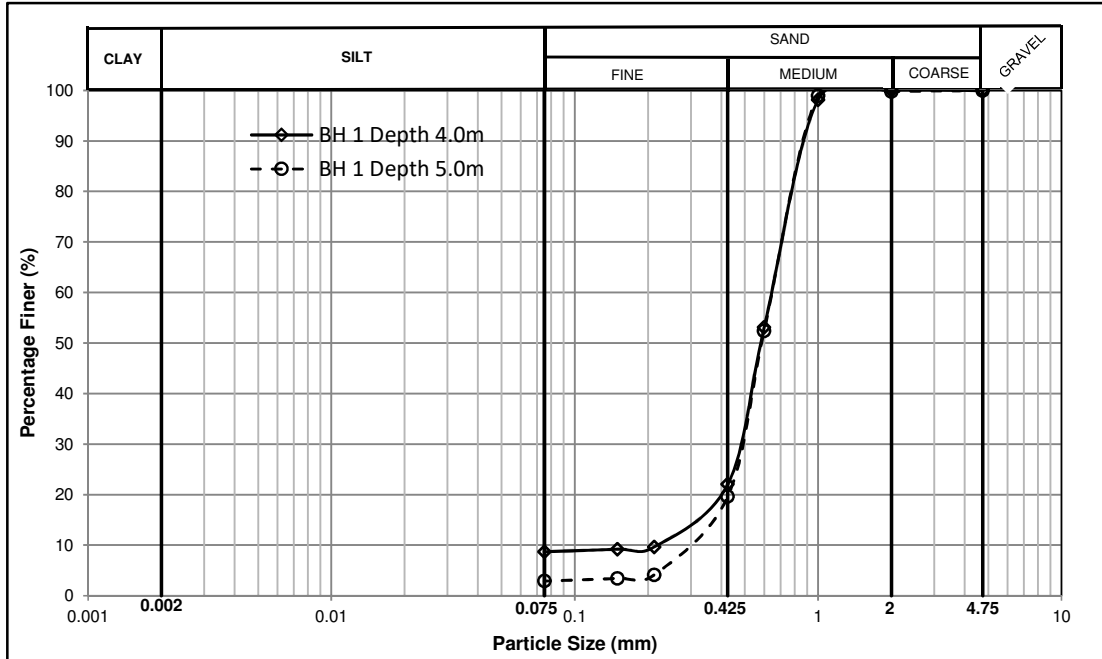
Natural Moisture Content Data Sheet

BH.No/ Pit no	2		2		2							
Depth (m)	13.0		14.5		16.0							
Tare No	113	238	247	34	36	207						
Wt of Tare (gr)	29.49	27.59	30.38	29.74	30.41	29.11						
Tare + Soil (gr)	50.45	47.68	55.49	52.36	50.72	52.83						
Tare+Dry soil (gr)	47.72	45.05	52.13	49.31	48.00	49.69						
Wt of Water (gr)	2.73	2.63	3.36	3.05	2.72	3.14						
Wt Dry soil (gr)	18.23	17.46	21.75	19.57	17.59	20.58						
Water Content (%)	14.98	15.06	15.45	15.59	15.46	15.26						
Average Water Content (%)	15		16		15							

Project No: MSGTPL/SI-5286/21-22

Project :Proposed Construction of Residential Building (S+4) at Chetpet

GRAIN SIZE ANALYSIS

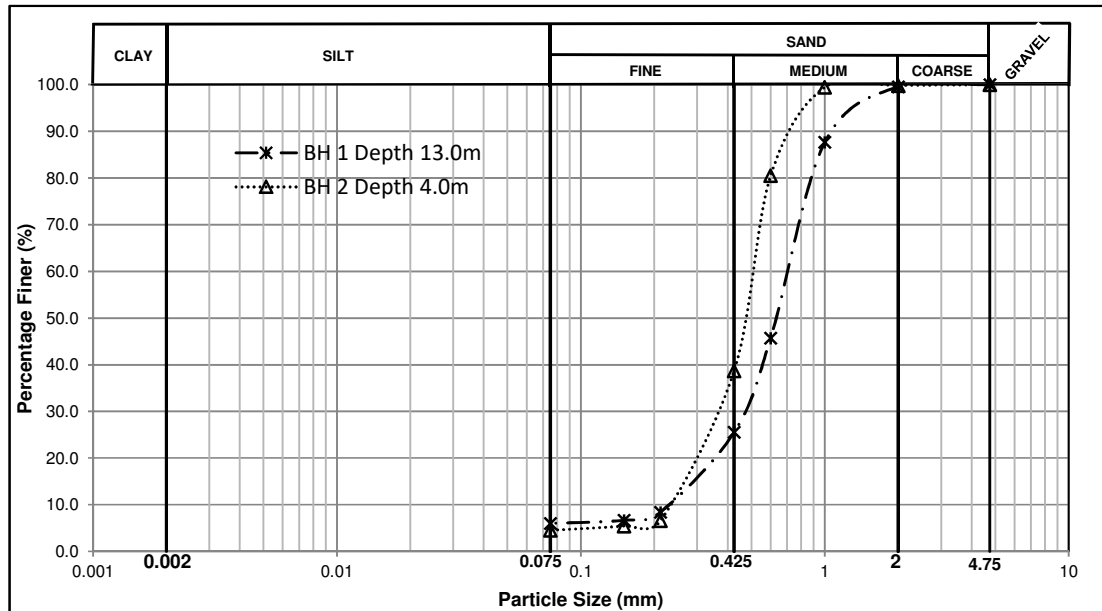
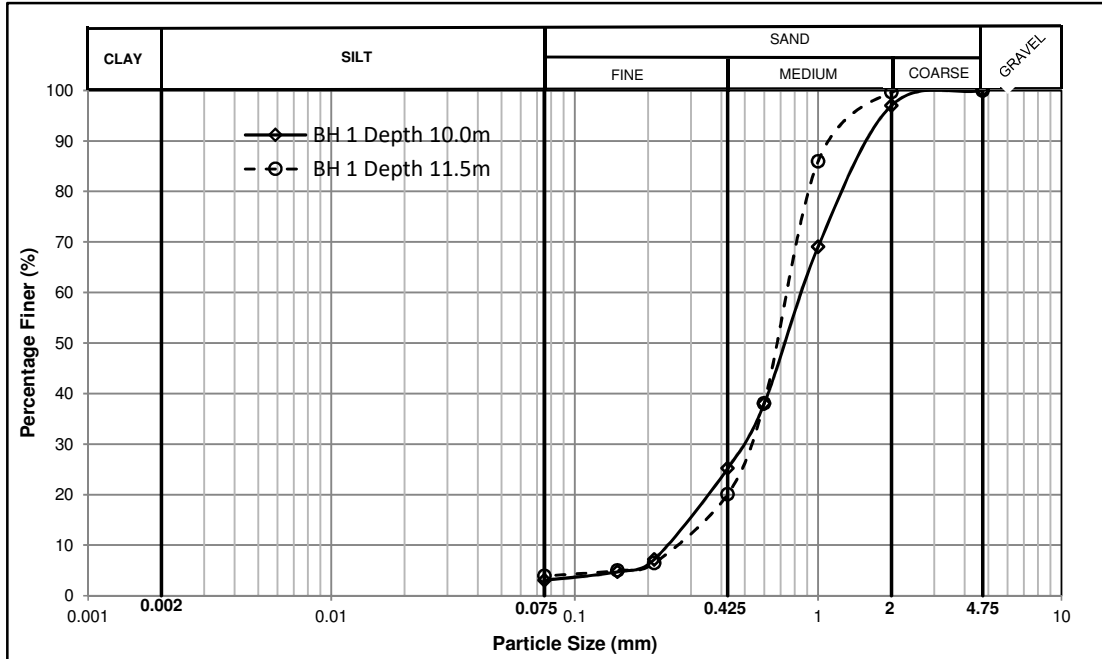


BH-No	Depth (m)	Gravel (%)	SAND (%)			SILT & CLAY (%)	D ₁₀ (mm)	D ₃₀ (mm)	D ₆₀ (mm)	Cu	Cc
			Coarse	Medium	Fine						
1	4.0m	0	0	78	13	9	0.218	0.470	0.661		1.5
1	5.0m	0	0	80	17	3	0.293	0.480	0.665		1.2
1	6.50m	0	2	78	18	2	0.242	0.477	0.759		
1	8.0m	0	3	78	17	2	0.284	0.546	0.915		1.1

Project No: MSGTPL/SI-5286/21-22

Project :Proposed Construction of Residential Building (S+4) at Chetpet

GRAIN SIZE ANALYSIS

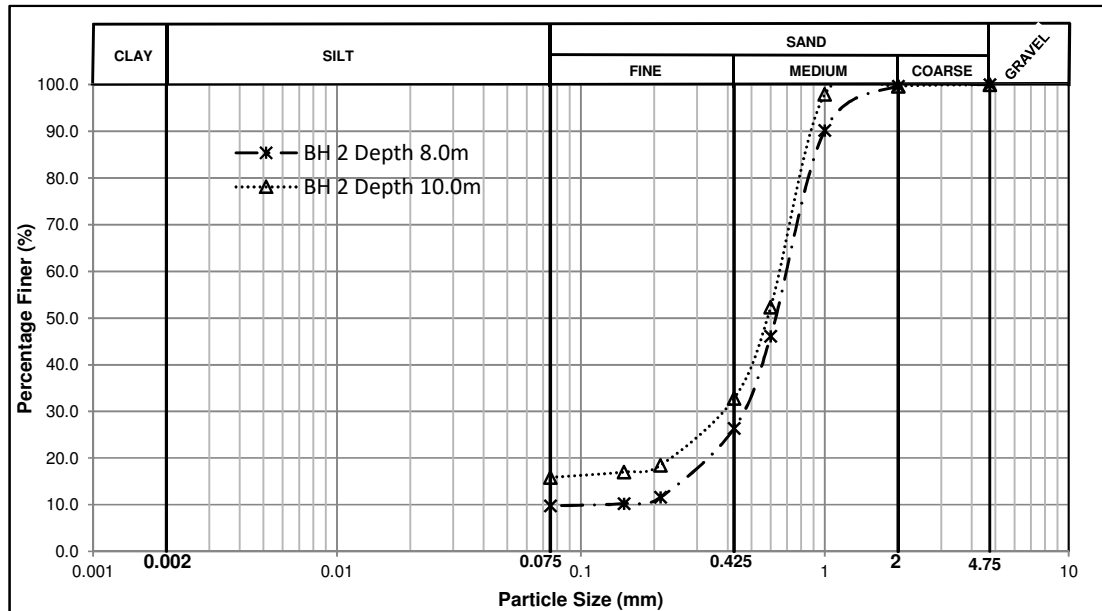
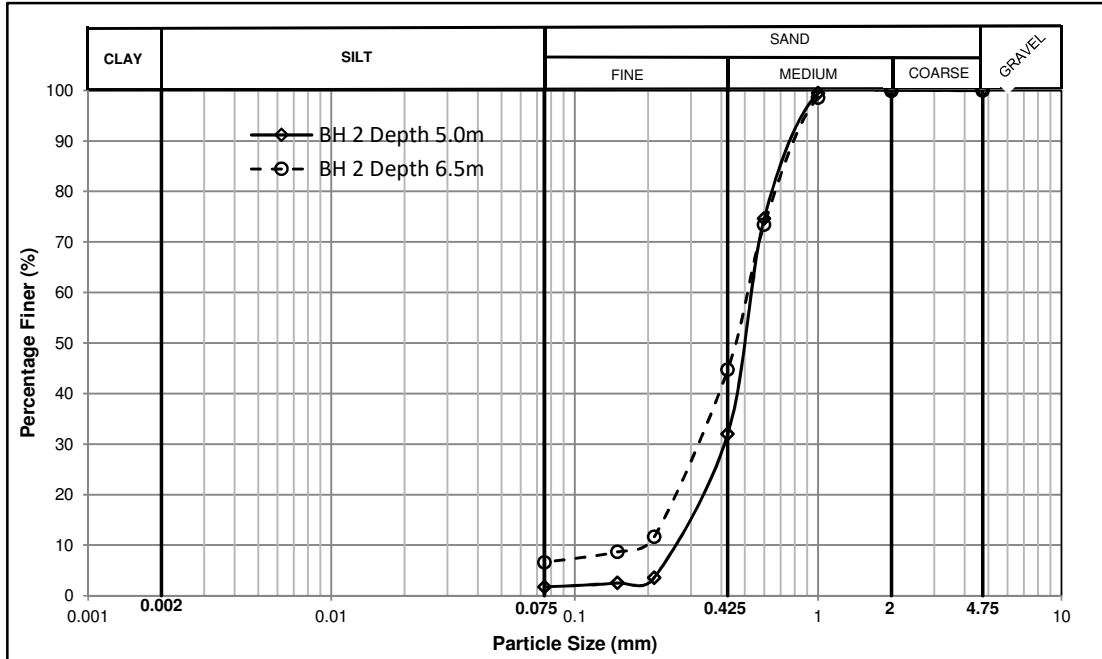


BH-No	Depth (m)	Gravel (%)	SAND (%)			SILT & CLAY (%)	D ₁₀ (mm)	D ₃₀ (mm)	D ₆₀ (mm)	Cu	Cc
			Coarse	Medium	Fine						
1	10.0m	0	3	72	22	3	0.246	0.491	0.883		1.1
1	11.5m	0	0	80	16	4	0.268	0.521	0.783		1.3
1	13.0m	0	0	74	20	6	0.224	0.454	0.713		
2	4.0m	0	0	61	34	5	0.235	0.367	0.514		1.1

Project No: MSGTPL/SI-5286/21-22

Project :Proposed Construction of Residential Building (S+4) at Chetpet

GRAIN SIZE ANALYSIS

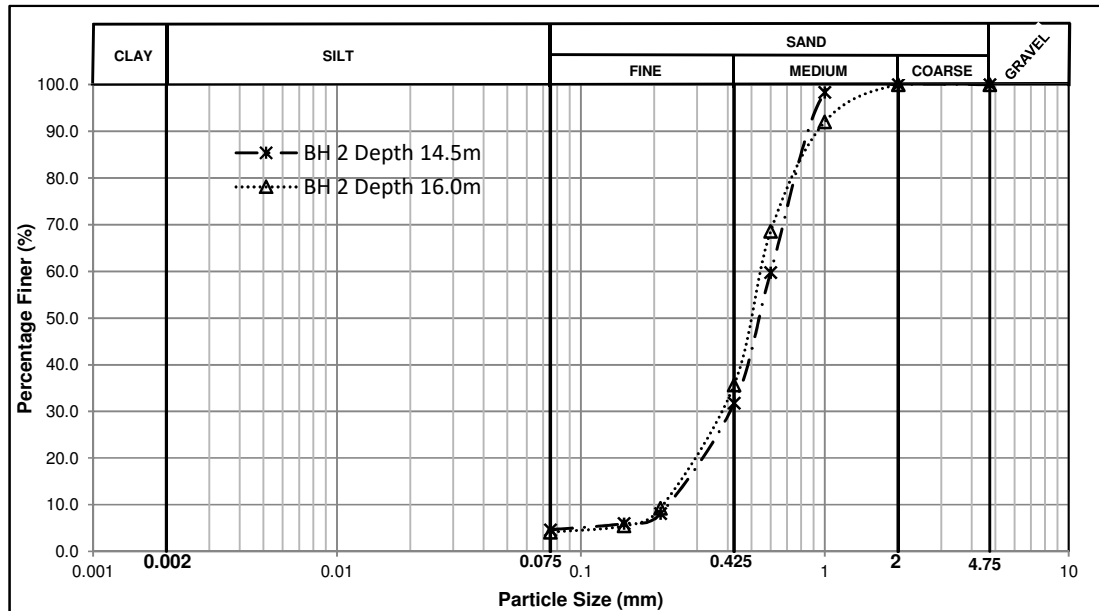
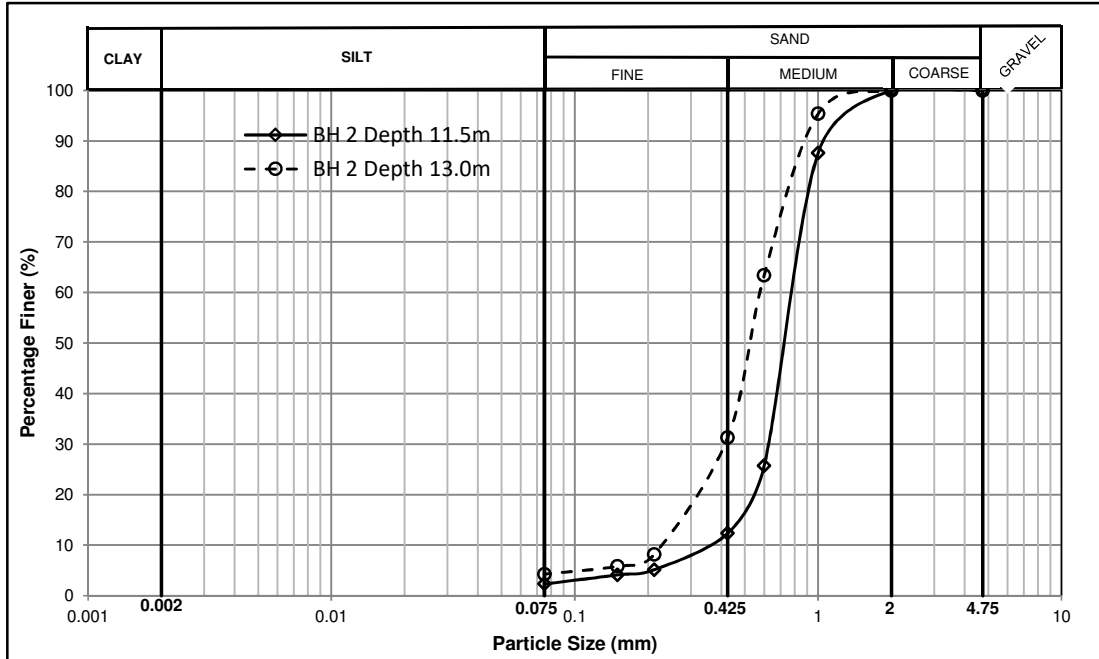


BH-No	Depth (m)	Gravel (%)	SAND (%)			SILT & CLAY (%)	D ₁₀ (mm)	D ₃₀ (mm)	D ₆₀ (mm)	Cu	Cc
			Coarse	Medium	Fine						
2	5.0m	0	0	68	30	2	0.260	0.410	0.540		1.2
2	6.5m	0	0	55	38	7	0.177	0.330	0.518		1.2
2	8.0m	0	0	73	17	10	0.070	0.450	0.711		
2	10.0m	0	0	67	17	16		0.383	0.667		#####

Project No: MSGTPL/SI-5286/21-22

Project :Proposed Construction of Residential Building (S+4) at Chetpet

GRAIN SIZE ANALYSIS



BH-No	Depth (m)	Gravel (%)	SAND (%)			SILT & CLAY (%)	D ₁₀ (mm)	D ₃₀ (mm)	D ₆₀ (mm)	Cu	Cc
			Coarse	Medium	Fine						
2	11.5m	0	0	88	10	2	0.355	0.628	0.822		1.3
2	13.0m	0	0	69	27	4	0.229	0.413	0.581		1.3
2	14.5m	0	0	68	27	5	0.226	0.372	0.603		
2	16.0m	0	0	64	32	4	0.218	0.379	0.554		1.2

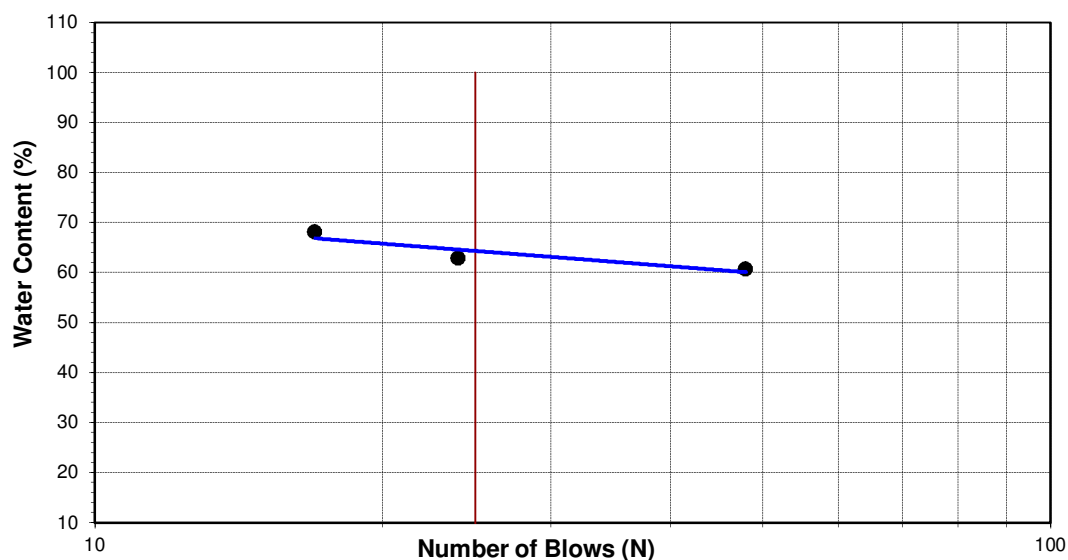
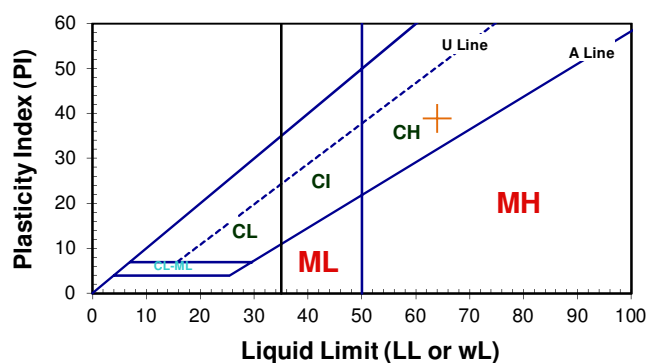
ATTERBERG LIMITS DATA SHEET

IS-2720-Part-5

Project :	Residential Building (S+4)
Location:	Chetpet
Boring No:	BH-1
Sample Depth:	2.0m
Project No:	MSGTPL/SI-5286/21-22

TEST			LIQUID LIMIT				PLASTIC LIMIT			
Variable	NO		1	2	3		1	2		
	Var.	Units								
Number of Blows	N	blows	17	24	48					
Tare Number	---	---	93	189	118		244			
Weight of Empty Tare	M _C	(g)	31.28	30.31	29.57		29.99			
Wt of Tare + Soil (Wet)	M _{CMS}	(g)	57.89	60.25	56.86		45.44			
Wt of Tare + Soil (Dry)	M _{CDS}	(g)	47.11	48.70	46.55		42.36			
Weight of Soil	M _S	(g)	15.83	18.39	16.98		12.37			
Weight of Water	M _W	(g)	10.78	11.55	10.31		3.08			
Water Content	w	(%)	68.1	62.8	60.7		24.9			

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



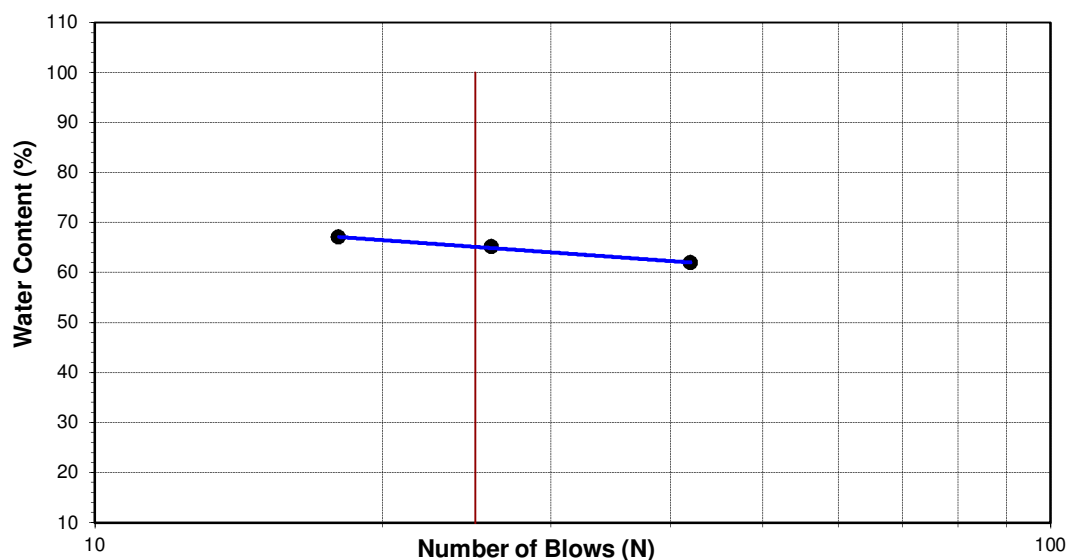
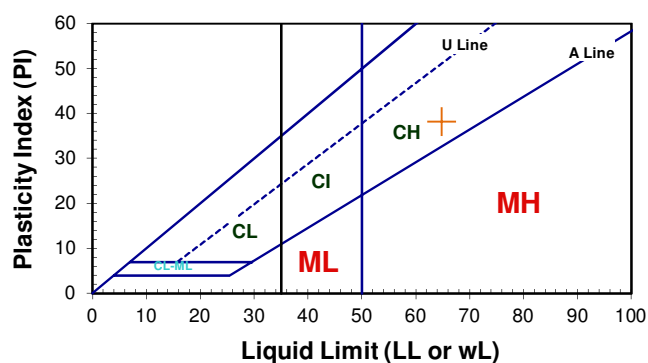
ATTERBERG LIMITS DATA SHEET

IS-2720-Part-5

Project :	Residential Building (S+4)
Location:	Chetpet
Boring No:	BH-1
Sample Depth:	3.0m
Project No:	MSGTPL/SI-5286/21-22

TEST			LIQUID LIMIT				PLASTIC LIMIT			
Variable	NO		1	2	3		1	2		
	Var.	Units								
Number of Blows	N	blows	18	26	42					
Tare Number	---	---	145	63	268		28			
Weight of Empty Tare	M _C	(g)	29.64	29.97	30.4		28.33			
Wt of Tare + Soil (Wet)	M _{CMS}	(g)	56.12	53.71	48.51		48.15			
Wt of Tare + Soil (Dry)	M _{CDS}	(g)	45.49	44.35	41.58		44.01			
Weight of Soil	M _S	(g)	15.85	14.38	11.18		15.68			
Weight of Water	M _W	(g)	10.63	9.36	6.93		4.14			
Water Content	w	(%)	67.1	65.1	62.0		26.4			

Liquid Limit (LL or w_L) (%)	65
Plastic Limit (PL or w_P) (%)	26
Plasticity Index (PI) (%)	38
Soil Classification	CH



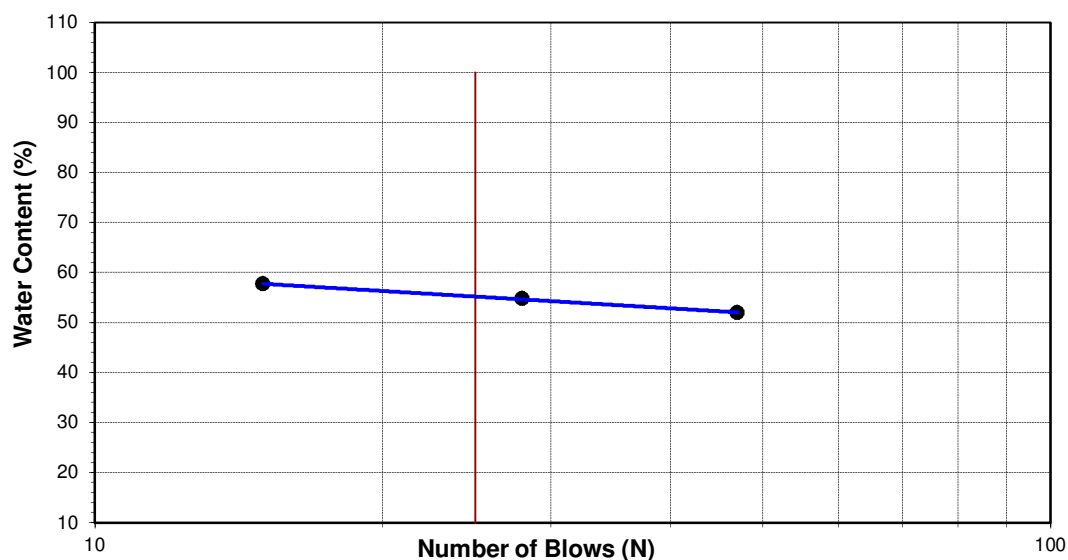
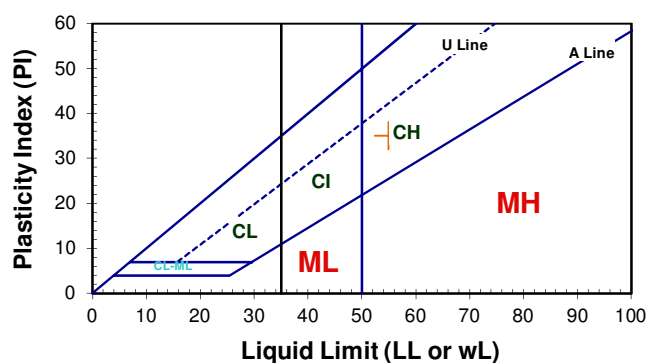
ATTERBERG LIMITS DATA SHEET

IS-2720-Part-5

Project :	Residential Building (S+4)
Location:	Chetpet
Boring No:	BH-2
Sample Depth:	1.0m
Project No:	MSGTPL/SI-5286/21-22

TEST			LIQUID LIMIT				PLASTIC LIMIT			
Variable	NO		1	2	3		1	2		
	Var.	Units								
Number of Blows	N	blows	15	28	47					
Tare Number	---	---	183	34	68		237			
Weight of Empty Tare	M _C	(g)	28.76	29.74	28.27		29.68			
Wt of Tare + Soil (Wet)	M _{CMS}	(g)	59.5	58.04	55.54		45.99			
Wt of Tare + Soil (Dry)	M _{CDS}	(g)	48.25	48.02	46.21		43.31			
Weight of Soil	M _S	(g)	19.49	18.28	17.94		13.63			
Weight of Water	M _W	(g)	11.25	10.02	9.33		2.68			
Water Content	w	(%)	57.7	54.8	52.0		19.7			

Liquid Limit (LL or w_L) (%)	55
Plastic Limit (PL or w_P) (%)	20
Plasticity Index (PI) (%)	35
Soil Classification	CH



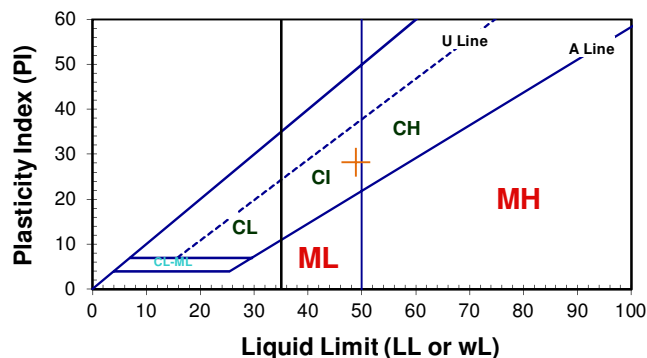
ATTERBERG LIMITS DATA SHEET

IS-2720-Part-5

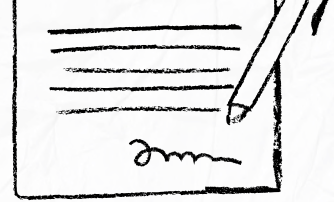
Project :	Residential Building (S+4)
Location:	Chetpet
Boring No:	BH-2
Sample Depth:	3.0m
Project No:	MSGTPL/SI-5286/21-22

TEST			LIQUID LIMIT				PLASTIC LIMIT			
Variable	NO		1	2	3		1	2		
	Var.	Units								
Number of Blows	N	blows	14	27	43					
Tare Number	---	---	57	5	131		285			
Weight of Empty Tare	M _C	(g)	29.25	31.87	29.56		29.25			
Wt of Tare + Soil (Wet)	M _{CMS}	(g)	62.11	62.46	57.43		52.48			
Wt of Tare + Soil (Dry)	M _{CDS}	(g)	50.82	52.59	48.57		48.53			
Weight of Soil	M _S	(g)	21.57	20.72	19.01		19.28			
Weight of Water	M _W	(g)	11.29	9.87	8.86		3.95			
Water Content	w	(%)	52.3	47.6	46.6		20.5			

Liquid Limit (LL or w_L) (%)	49
Plastic Limit (PL or w_P) (%)	20
Plasticity Index (PI) (%)	28
Soil Classification	CI



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



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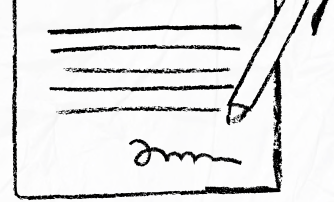
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