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SOIL EXPLORATION AND FOUNDATION REPORT

FOR THE PROPOSED BUILDING

AT

PLOT NO. R-99, BLOCK NO. 3

GANGA NAGAR 2ND MAIN ROAD

MADURAVOYAL

CHENNAI

PROJECT NO. TJE/002142/2022



T.J.ENGINEERS

SOIL EXPLORATION AND FOUNDATION DESIGN DIVISION

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CONTENTS OF THE REPORT

1.0 INTRODUCTION

2.0 SCOPE OF WORK

3.0 LOCATION AND NUMBER OF BORE HOLES

4.0 GEO TECHNICAL INVESTIGATION

4-1. Field Investigation of Bore Holes

4.2. Grain Size Analysis

4-3. Laboratory Test for Bore Hole Sample

5.0 BORE HOLE DATA

6.0 LABORATORY TEST RESULTS

7.0 GROUND WATER TABLE

8.0 SUB SOIL PROFILE

9.0 FOUNDATION ANALYSIS AND DESIGN

9.1. Computation of Safe Bearing Capacity of Soil at 1.80m depth

9.2. Settlement Analysis

9.3. Load Carrying Capacity of conventional pile

10.0 CONCLUSIONS

11.0 TABLES AND FIGURES



EXPLORATION REPORT

PROJECT NO. TJE/002142/2022

1.INTRODUCTION:

M/S BEAVER CONSTRUCTION COMPANY has proposed to construct a Stilt Floor + Five Floors Building at Block No:3, Plot No R 99, Maduravoyal Scheme Ganga Nagar , 2nd Main Road , measuring around 6840 sq.ft compressing in New Survey Nos 173/ 1D2 & 173 / 5 of Maduravoyal Village, Chennai- 600 095. The work was entrusted to T.J.Engineers by the promoter. The location is shown in Fig No.1. The object of the soil exploration work done is to determine the soil properties of the proposed area and to arrive at a most suitable type of foundation system for the proposed structure.

2.0 SCOPE OF WORK

The Scope of Work includes the following

Boreholes

- ❖ Drilling of borehole at the proposed borehole locations as per the direction of the client.
- ❖ Collection of disturbed and undisturbed soil samples and carrying out the relevant laboratory test on soils.
- ❖ Conducting of standard penetration test (SPT) within the borehole at every 1.50m depth interval or as required.
- ❖ Collection of soil sample from bore hole.
- ❖ Preparation of geotechnical investigation Report.

3.0. LOCATION & NUMBER OF BORE HOLES

For this purpose three bore holes were bored up to maximum depth of 32.00m below existing ground level. The bore hole location is shown in Fig No.1 and bore log details



are given in Fig No. 2,3&4. The bore holes were terminated in the Very Dense Clayey Silty Sand (Cemented Sand) layer.

4.0. GEOTECHNICAL INVESTIGATIONS

4.1. Field Investigations of Boreholes

Rotary drilling boring technique was adopted for boring in this area. The Standard penetration tests were conducted at change of layers and at specified intervals, commencing the test at 1.50m below the existing ground level. The relative density of different soil layers obtained from the N-Values are given in the Fig No. 2,3&4. Disturbed and un disturbed samples were collected from all the layers for visual observation, classification tests and strength characteristics of the soil layers.

Standard Penetration Test (SPT)

Standard Penetration Tests were conducted using a split spoon sampler, as per relevant codal provision (IS: 2131 – 1981). The SPT is generally conducted in sandy and completely weathered rock strata till 45 cm penetration with number of blows recorded for every 15 cm penetration. The number of blows required for first 15 cm is neglected. The blows for last 30 cm penetration or refusal 'N' value of 100 whichever is earlier is taken as the 'N' value. In the clayey strata, when driving of sampling tube is not possible, SPT was conducted to know the consistency of the soil strata and to retrieve the disturbed soil sample. The soil samples obtained in the split spoon sampler are carefully packed in polythene bags for testing in the laboratory. The SPT values obtained at every 1.50m interval are given in the bore logs.



4.2. Grain Size Analysis

Combined sieve and hydrometer analyses were conducted on the various samples collected. The results are given in Table-1a, 1b. Based on the proportion of the different soil constituents, the soil is classified.

4.3. Laboratory Tests for Borehole samples

The following laboratory tests were conducted on collected Soil Samples.

- I. Moisture Content as per IS: 2720 (Part 2)
- II. Specific Gravity as per IS: 2720 (Part 2)
- III. Sieve Analysis as per IS: 2720 (Part 4)
- IV. Hydrometer Analysis as per IS: 2720 (Part 4)
- V. Liquid Limit as per IS: 2720 (Part 5)
- VI. Plastic Limit as per IS: 2720 (Part 5)
- VII. Swelling Index as per IS: 2720 (Part 40)

5.0. BORE LOG DATA

The Summary of bore hole log data for BH-01, BH-02 & BH-03 is given in Fig-2,3&4.

Bore hole location is given in Fig.1.

6.0. LABORATORY TEST RESULTS

The laboratory test results of boreholes samples are presented in Table-1a, 1b and Table-2a, 2b.

7.0. GROUND WATER TABLE

The ground water table was encountered at the **depth of 3.20m**, below the existing ground level at the time of soil exploration.



8.0. SUB SOIL PROFILE

From the visual identification from field test results, it is concluding that soil strata is not similar in BH-01, BH-02 & BH-03 location.

In BH-01 Location the soil strata is made-up of four distinctive layers

- | | | |
|------|--|----------|
| i. | Filled Up Soil 0.00m to 1.00m | |
| ii. | Medium Dense Silty Sand, 1.00m to 3.90m SPT's | N= 12-20 |
| iii. | Medium Dense Clayey Silty Sand, 3.90m to 9.60m SPT's | N= 13-19 |
| iv. | Medium Stiff Sandy Silty Clay, 9.60m to 10.50m SPT's | N= 5 |

In BH-02 Location the soil strata is made-up of six distinctive layers

- | | | |
|------|---|----------|
| i. | Filled Up Soil 0.00m to 1.20m | |
| ii. | Medium Dense Silty Sand, 1.20m to 3.70m SPT's | N= 14-22 |
| iii. | Medium Dense Clayey Silty Sand, 3.70m to 5.50m SPT's | N= 15 |
| iv. | Loose to Medium Dense Silty Clayey Sand, 5.50m to 8.70m | |
| | SPT's | N= 8-11 |
| v. | Medium Dense Clayey Silty Sand, 8.70m to 9.50m SPT's | N= 13 |
| vi. | Soft Sandy Silty Clay, 9.50m to 10.50m SPT's | N= 4 |

In BH-03 Location the soil strata is made-up of twelve distinctive layers

- | | | |
|------|--|--------|
| i. | Filled Up Soil 0.00m to 1.00m | |
| ii. | Medium Stiff to Stiff Silty Clay, 1.00m to 3.60m SPT's | N= 7-9 |
| iii. | Medium Stiff Sandy Silty Clay, 3.60m to 5.50m SPT's | N= 6 |
| iv. | Very Loose Clayey Silty Sand, 5.50m to 7.30m SPT's | N= 4 |
| v. | Medium Stiff Sandy Silty Clay, 7.30m to 9.00m SPT's | N= 5 |
| vi. | Loose Clayey Silty Sand, 9.00m to 10.50m SPT's | N= 9 |



vii.	Medium Dense Silty Sand, 10.50m to 11.00m SPT's	N= 11
viii.	Medium Stiff to Stiff Sandy Silty Clay, 11.00m to 19.00m	
	SPT's	N= 6-9
ix.	Loose Clayey Silty Sand, 19.00m to 21.00m SPT's	N= 7-8
x.	Medium Stiff Sandy Silty Clay, 21.00m to 22.00m SPT's	N= 7
xi.	Very Stiff to Very Hard Sandy Silty Clay, 22.00m to 29.80m	
	SPT's	N= 18-65
xii.	Very Dense Clayey Silty Sand (Cemented Sand), 29.80m to 32.00m	
	SPT's	N= 78->100

The soil profile details are presented in the Bore logs, in Fig. 2,3&4.

9.0 FOUNDATION ANALYSIS

From the bore log data from 0.00m to 1.20m filled up soil layer is present. From 1.20m to 9.60m medium dense Silty Sand/Clayey Silty Sand layer is present. In BH-03 location From 1.20m to 9.60m medium stiff to stiff Sandy Silty Clay layer is present, this layer has got swelling character, and not present in BH-01&02 location. From 9.60m to 22.00m medium soft to stiff Sandy Silty Clay layer and loose Clayey Silty Sand layer is present, and the Sandy Silty Clayey layer has got swelling character. From 22.00m to 29.80m very stiff to very hard Sandy Silty Clay layer is present, this layer also has got swelling character. Below 29.80m Very dense Clayey Silty Sand (Cemented Sand) layer is seen, this layer is fair to rest pile foundation for heavy loaded structure.

The layer up to 22.00m is the critical zone for open foundation system for light loaded structure, within the critical zone Soft to stiff Clayey layer and loose to medium dense Sandy layer is present, and the Clayey layer has got swelling character. Soil strata is



not similar in all the three locations. For light loaded structure open foundation of Continuous Strip Raft Footing or Raft Foundation can be adopted. The open foundation can be placed at the minimum **depth of 1.80m** below the existing ground level. The existing ground level was same as the road level at the time of soil investigation.

For heavy loaded structure, if the SBC is not sufficient for the expected loading intensity, it is advisable to provide deep foundation of pile foundations. The pile foundation can be Bored Cast in situ pile. The pile foundation should be terminated at the minimum **depth of 32.00m** below existing ground level. The pile should be anchored into the very dense Clayey Silty Sand (Cemented Sand) layer for minimum of 2.00m depth.

9.1. COMPUTATION OF THE SAFE BEARING CAPACITY AT 1.80m DEPTH

Based on the standard penetration test value the ultimate net bearing capacity (q_u) could be calculated from the following formula.

$$q_u = 1.2 C N_c + \gamma D_f N_q$$

The minimum observed N-Value is taken as 6 from Fig. 2,3&4.

The corresponding bearing capacity factors are,

$$N_c = 5.7$$

$$N_q = 1$$

Where,

$$C = \text{Un drained shear strength} = 3.62 \text{ t/m}^2$$

$$\gamma = \text{Unit weight of the soil} = 1.50 \text{ t/m}^3$$

$$\gamma' = \text{Submerged unit weight of the soil} = 0.50 \text{ t/m}^3$$

$$D_f = \text{Depth of footing} = 1.80 \text{ m}$$



D_f = Depth of water table = 3.20 m

Substitute all the above values in the formula,

$$q_u = 1.2 \times 3.62 \times 5.7 + 1.50 \times 1.80 \times 1$$
$$= 24.760 + 2.70 = 27.460 \text{ t/m}^2$$

Safe bearing capacity could be considered with a factor of safety of 2.5

Hence, safe bearing capacity $q_s = 27.460/2.50 = 10.98 \text{ t/m}^2$. Say 11.00 t/m^2 .

Therefore, safe bearing capacity of the soil at 1.80m is 11.00 t/m^2

9.2. SETTLEMENT ANALYSIS FOR THE LOADING INTENSITY OF 11.00 t/m^2

LAYER -1, SILTY CLAY/SANDY SILTY CLAY

The Consolidation Settlement of the Clay layer can be calculated using the following formula.

$$S_1 = (C_c / 1 + e_0) H \log_{10} (\sigma'_0 + \Delta\sigma / \sigma'_0)$$

Where

C_c = Coefficient of compression index
= 0.35

e_0 = The initial void ratio
= 1.80

H = The thickness of the compressible clay layer
= 20.20m

σ'_0 = The original effective over burden pressure at the centre of the clay layer
= 9.15 t/m^2

$\Delta\sigma$ = The stress increases at the centre of the clay layer due to foundation loads
(or) pressure
= 0.0661 t/m^2

$$S_1 = (0.35 / 1 + 1.80) 20.20 \log_{10} (9.15 + 0.0661 / 9.15)$$



$$= 0.125 \times 20.20 \times 3.126$$

$$= 7.893 \text{m} \times 10^{-3}$$

$$= 7.893 \text{mm}$$

TOTAL SETTLEMENT

$$= S_1$$

$$= 7.893 \text{mm} < 50 \text{mm}$$

The maximum allowable settlement as per IS: 1904-1986 for R.C.C structure with Isolated footing foundation is 50mm- 75mm. **The settlement is within the permissible limit. Hence it is Safe**

9.3. LOAD CARRYING CAPACITY OF THE CONVENTIONAL PILE

Based on the standard penetration test value the ultimate load carrying capacity (q_u) could be calculated from the following formula.

$$Q_u = Q_b + Q_s$$

$$Q_s = \text{Ultimate unit skin friction on an individual layer}$$

$$= K_s \sigma'_{vo} \tan \delta \pi D L$$

Where

$$K_s = \text{Co-efficient of horizontal soil stress} = 0.471$$

$$\sigma'_{vo} = \text{average effective overburden pressure} = 14.12 \text{ t/m}^2$$

$$\delta = \text{angle of wall friction} = 32$$

$$D = \text{Dia meter of pile} = 0.40 \text{m}$$

$$L = \text{Length of individual layer} = 2.00 \text{m}$$

$$= 0.471 \times 15.50 \times 0.624 \times 3.14 \times 0.40 \times 2.00$$

$$= 11.443 \text{ t}$$



$$q_b = N_q \sigma'_{vo} A_b$$

where

$$N_q = \text{Bearing Capacity Factor} = 85$$

$$\sigma'_{vo} = \text{effective overburden pressure at the toe} = 16.00 \text{ t/m}^2$$

$$A_b = \text{Cross sectional area at the base}$$

$$\begin{aligned} D &= \text{Dia of Pile} = 0.40\text{m} \\ &= 85 \times 16.00 \times 3.14 \times 0.40^2 / 4 \\ &= 170.816 \text{ t} \end{aligned}$$

$$Q_u = Q_b + Q_s$$

$$= 170.816 + 11.443 = 182.259 \text{ t}$$

$$Q_{\text{safe}} = Q_u / F.S = 182.259 / 2.5 = 72.903 \text{ say } 73.00 \text{ t}$$

The safe load carrying capacity for five different diameter of piles for the **depth of 32.00m** are worked out and are given below.

Dia of Pile	Depth of Pile	Safe Load (Tones)
400mm	32.00m	73
450mm	32.00m	92
500mm	32.00m	112
600mm	32.00m	161
750mm	32.00m	249

The above safe loads are provisional and shall be confirmed by conducting pile load test as per the guide line laid down in IS: 2911 (Part: IV).



10.0. CONCLUSIONS

1. Soil in the shallow depth is fair to adopt open foundation system for light loaded structure.
2. For light loaded structure, open foundation of **Continues Strip Raft Footing** or **Raft Foundation** can be adopted.
3. The open foundation can be placed at the minimum **depth of 1.80m** below the existing ground level. The existing ground level was same as the road level at the time of soil investigation.
4. The **Safe Bearing Capacity (SBC) at 1.80m depth is 11.00 t/m^2** .
5. All the foundation should rest on 100 mm thick river sand or M Sand and 100mm thick 1:4:8 concrete mat.
6. The foundation bed should be well compacted by ramming before laying PCC.
7. The foundation should rest on the natural undisturbed strata.
8. **For heavy loaded structure**, if the SBC is not sufficient for the expected loading intensity, it is advisable to provide deep foundation of pile foundations. The pile foundation can be **Bored Cast in situ pile**. The pile foundation can be terminated at the minimum depth of **32.00m** below existing ground level, existing ground level at the time of soil investigation.
9. The safe load carrying capacity for five different diameter of piles for the **depth of 32.00m** are worked and are given below.



Dia of Pile	Depth of Pile	Safe Load (Tones)
400mm	32.00m	73
450mm	32.00m	92
500mm	32.00m	112
600mm	32.00m	161
750mm	32.00m	249

The above safe loads are provisional and shall be confirmed by conducting pile load test as per the guide line laid down in IS: 2911 (Part: IV)

10. The **pile should be anchored** in to the very dense Clayey Silty Sand (Cemented Sand) layer for minimum of **2.00m depth**.
11. The pile boring should be done with Percussion drilling or **Hydraulic Rotary Drilling** with DMC method.
12. The bore hole should be flushed properly before laying concrete.
13. Proper precaution should be taken against sliding of bore hole by maintaining proper dense bentonite slurry or providing temporary casing or permanent casing.
14. For foundation design stress due to any eccentricity and horizontal force should be considered and stability should be checked.
15. All suggested foundation recommendations and precautions should be adopted while undertaking the design aspects and construction activities.

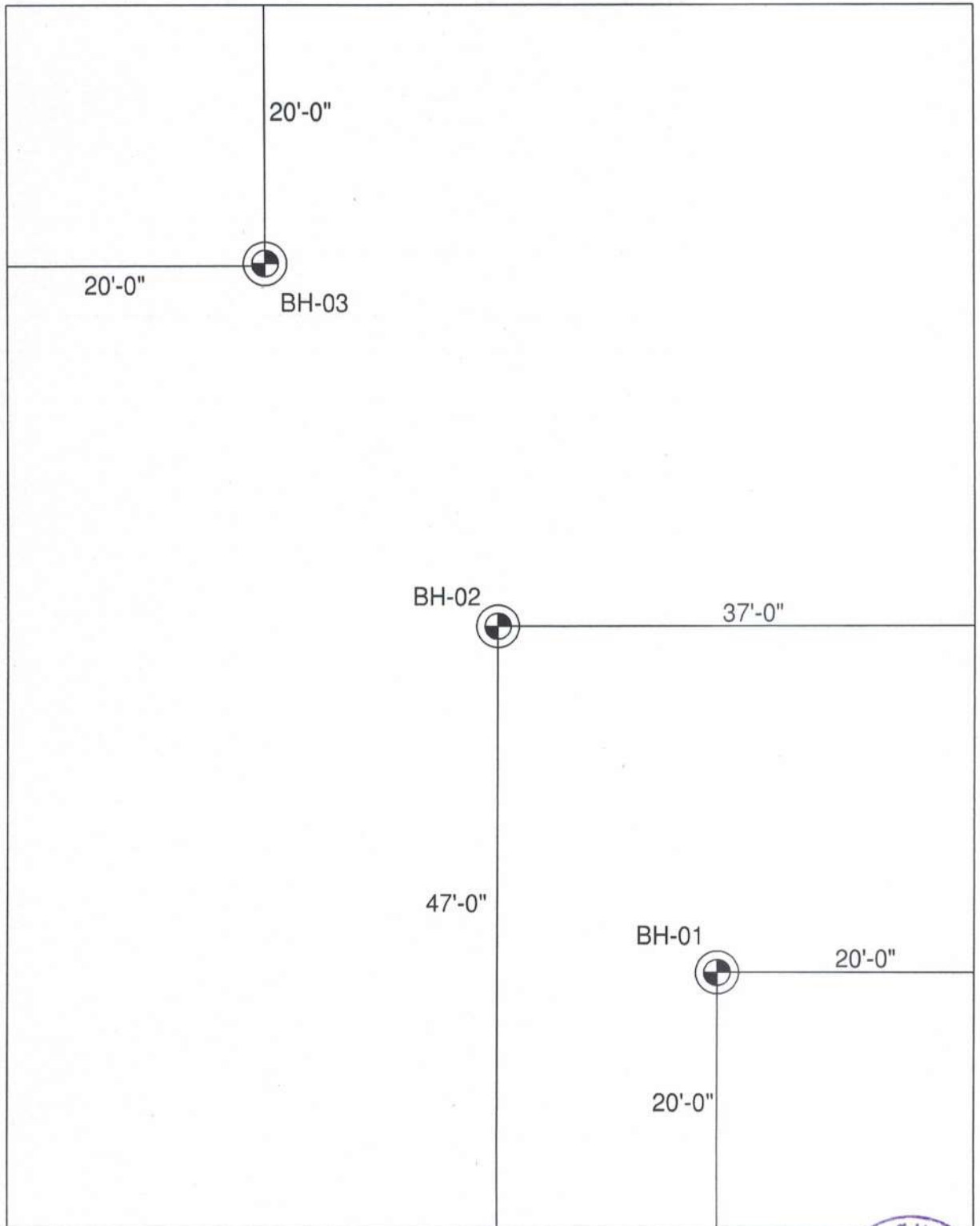


For T.J. Engineers

20-01-2022


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 DTCP Reg. No: CGLRGN/RGTE/2019/07/010





CLIENT:-

M/S BEAVER CONSTRUCTION COMPANY
CHENNAI

PROJECT:-

PROPOSED BUILDING AT
PLOT NO. R-99, BLOCK NO. 3,
GANGA NAGAR 2ND MAIN ROAD,
MADURAVOYAL, CHENNAI-600 095.

SITE PLAN
FIG.1



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BORE LOG

PROJECT : Proposed Building at Plot No. R-99, Block No. 3, Ganga Nagar 2nd Main Road, Maduravoyal,
Chennai-600 095.
BORE HOLE NO : B.H:01
TYPE OF BORING : Rotary Drilling

DATE OF COMMENCEMENT : 04 - 01 - 2022
DATE OF COMPLETION : 04 - 01 - 2022
G.W.L : 3.20m

Depth below G.L	Soil profile	Description of soil	Thickness of layer	Depth at which samples are collected		Standard penetration test data			Graphical representation of penetration resistance									
				D.S	U.D.S	Depth at which test is conducted	N-Value	Relative density/ Consistency	10	20	30	40	50					
0.00		Filled Up Soil	1.00															
1.00																		
2.00		Silty Sand-SLS1 (Yellowish Brown)	2.90			1.50	12	Medium Dense										
3.00								3.00	20	Medium Dense								
4.00								3.90			4.50	17	Medium Dense					
5.00		Clayey Silty Sand-CSLS1 (Grayish Brown)	5.70			6.00	13	Medium Dense										
6.00								7.50	13	Medium Dense								
7.00																		
8.00																		
9.00								9.60			9.00	19	Medium Dense					
10.00		Sandy Silty Clay-SSLC1 (Dark Gray)				10.50	5	Medium Stiff										
10.50																		
11.00																		
12.00																		
13.00																		
14.00																		
15.00																		
16.00																		

Remark: All Dimensions in meters
→ End of Boring



FIG: 2

BORE LOG

PROJECT

Proposed Building at Plot No. R-99, Block No. 3, Ganga Nagar 2nd Main Road, Maduravoyal,
Chennai-600 095.

DATE OF COMMENCEMENT

04 - 01 - 2022

BORE HOLE NO
TYPE OF BORING

B.H:02
Rotary Drilling

DATE OF COMPLETION
G.W.L

05 - 01 - 2022
3.20m

Depth below G.L	Soil profile	Description of soil	Thickness of layer	Depth at which samples are collected		Standard penetration test data			Graphical representation of penetration resistance				
				O.S	U.D.S	Depth at which test is conducted	N-Value	Relative density/ Consistency	10	20	30	40	50
0.00		Filled Up Soil	1.20										
1.00													
1.20		Silty Sand-SLS1 (Yellowish Brown)	1.20			1.50	14	Medium Dense					
2.00													
2.50													
3.00		Silty Sand-SLS1 (Yellowish Brown)	2.50			3.00	22	Medium Dense					
3.70													
4.00		Clayey Silty Sand-CSLS1 (Grayish Brown)	1.80			4.50	15	Medium Dense					
5.00													
5.50		Clayey Silty Sand-CSLS1 (Grayish Brown)	1.80			6.00	8	Loose					
6.00													
6.70													
7.00		Silty Clayey Sand-SLCS1 (Gray)	3.20			7.50	11	Medium Dense					
8.00													
8.70		Silty Clayey Sand-SLCS1 (Gray)	3.20			9.00	13	Medium Dense					
9.00													
9.50		Silty Clayey Sand-SLCS1 (Gray)	0.80			10.50	4	Soft					
10.00													
10.50		Silty Clayey Sand-SLCS1 (Gray)	0.80										
11.00													
11.50		Silty Clayey Sand-SLCS1 (Gray)	0.80										
12.00													
12.50		Silty Clayey Sand-SLCS1 (Gray)	0.80										
13.00													
13.50		Silty Clayey Sand-SLCS1 (Gray)	0.80										
14.00													
14.50		Silty Clayey Sand-SLCS1 (Gray)	0.80										
15.00													
15.50		Silty Clayey Sand-SLCS1 (Gray)	0.80										
16.00													

Remark: All Dimensions in meters
→ End of Boring

FIG: 3



BORE LOG

PROJECT : Proposed Building at Plot No. R-99, Block No. 3, Ganga Nagar 2nd Main Road, Maduravoyal,
Chennai-600 095.
BORE HOLE NO : B.H:03
TYPE OF BORING : Rotary Drilling

DATE OF COMMENCEMENT : 05 - 01 - 2022
DATE OF COMPLETION : 06 - 01 - 2022
G.W.L : 3.20m

Depth below G.L	Soil profile	Description of soil	Thickness of layer	Depth at which samples are collected		Standard penetration test data			Graphical representation of penetration resistance				
				D.S	U.D.S	Depth at which test is conducted	N-Value	Relative density/ Consistency	10	20	30	40	50
0.00		Filled Up Soil	1.00										
1.00													
2.00		Silty Clay-SLC1 (Brown)	2.60			1.50	7	Medium Stiff					
3.00						3.00	9	Stiff					
4.00		Sandy Silty Clay-SSLC1 (Dark Gray)	1.90			4.50	6	Medium Stiff					
5.00													
6.00		Clayey Silty Sand-CSLS1 (Gray)	1.80			6.00	4	Very Loose					
7.00						7.50	5	Medium Stiff					
8.00		Sandy Silty Clay-SSLC2 (Dark Gray)	1.70			9.00	9	Loose					
9.00													
10.00		Clayey Silty Sand-CSLS2 (Grayish Brown)	1.50			10.50	11	Medium Dense					
11.00													
12.00		Silty Sand-SLS1 (Grayish Brown)	0.50										
13.00						12.00	8	Medium Stiff					
14.00		Sandy Silty Clay-SSLC3 (Dark Gray)	8.00			13.50	7	Medium Stiff					
15.00						15.00	9	Stiff					
16.00						16.50	6	Medium Stiff					

Remark: All Dimensions in meters
→ End of Boring

FIG: 4

cont....

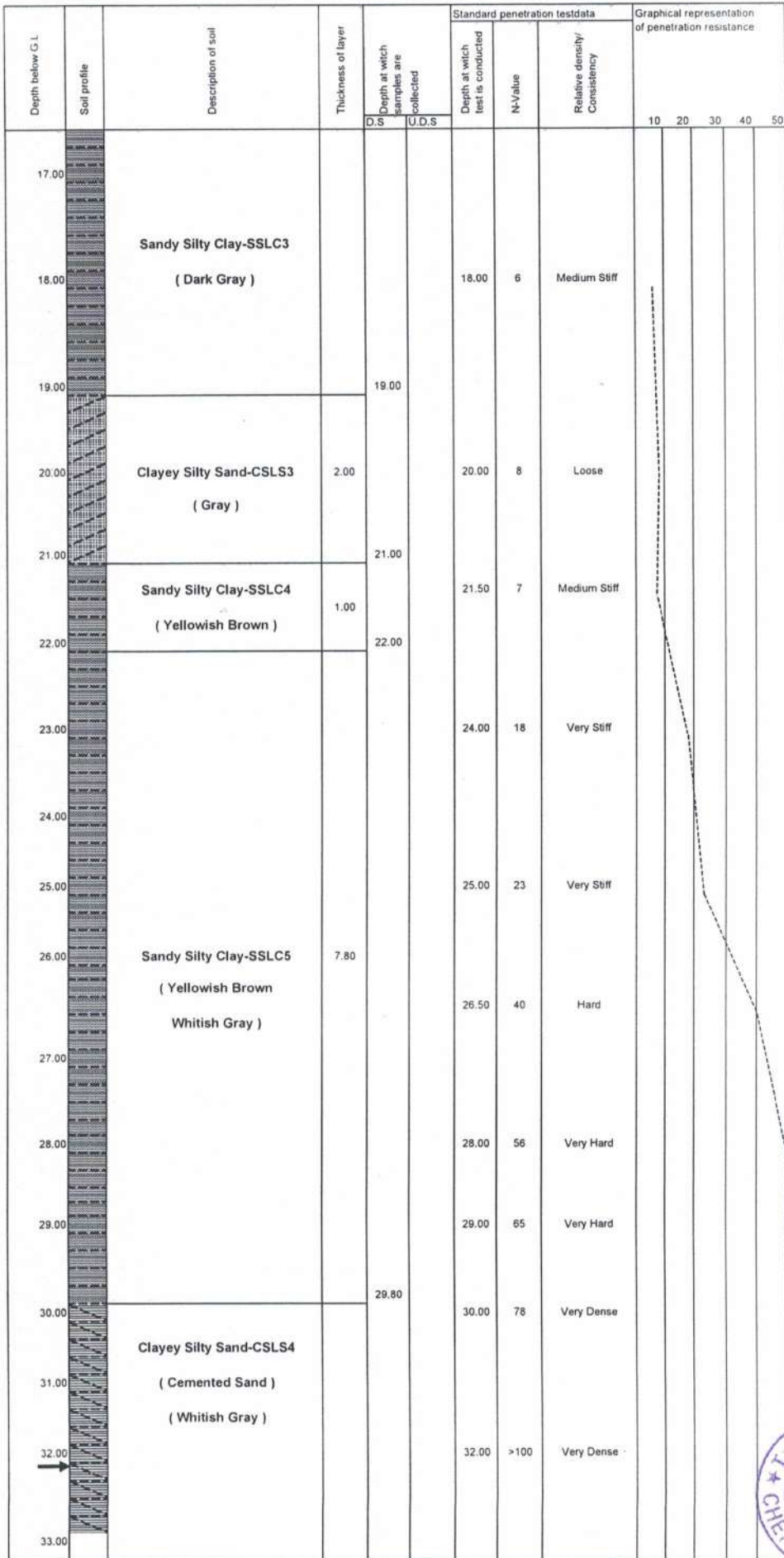


BORE LOG

PROJECT
BORE HOLE NO
TYPE OF BORING

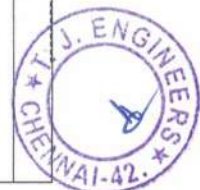
Proposed Building at Plot No. R-99, Block No. 3, Ganga Nagar 2nd Main Road,
Maduravoyal, Chennai-600 095.
B.H:03
Rotary Drilling

DATE OF COMMENCEMENT 05 - 01 - 2022
DATE OF COMPLETION 06 - 01 - 2022
GWL 3.20m



Remark: All Dimensions in meters
→ End of Boring

FIG: 4



Project: Proposed Building at Plot No. R-99, Block No. 3, Ganga Nagar 2nd Main Road, Maduravoyal, Chennai-600 095.

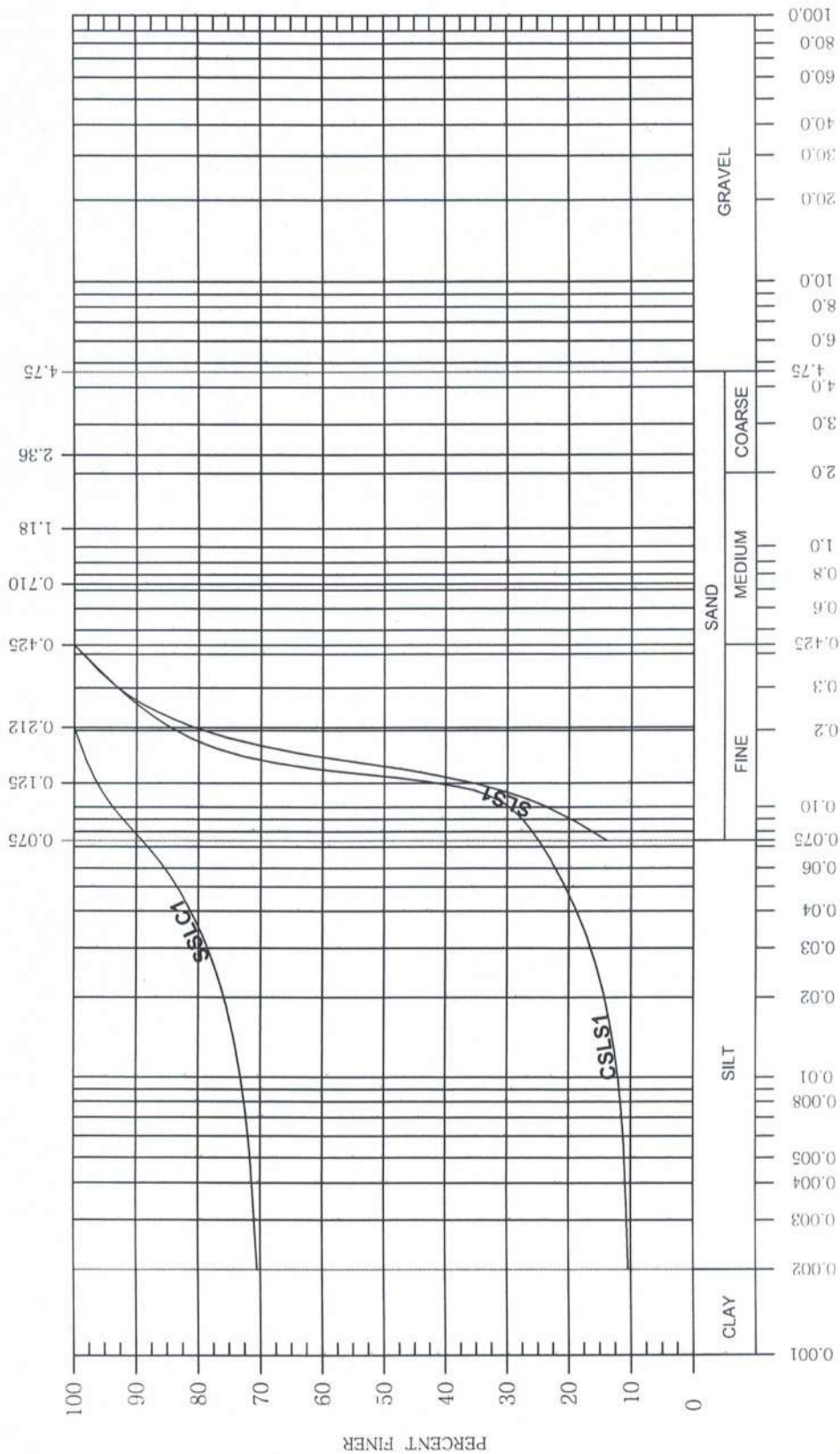


FIG. 5 GRAIN SIZE DISTRIBUTION CURVE-BH-01



Project: Proposed Building at Plot No. R-99, Block No. 3, Ganga Nagar 2nd Main Road, Maduravoyal, Chennai-600 095.

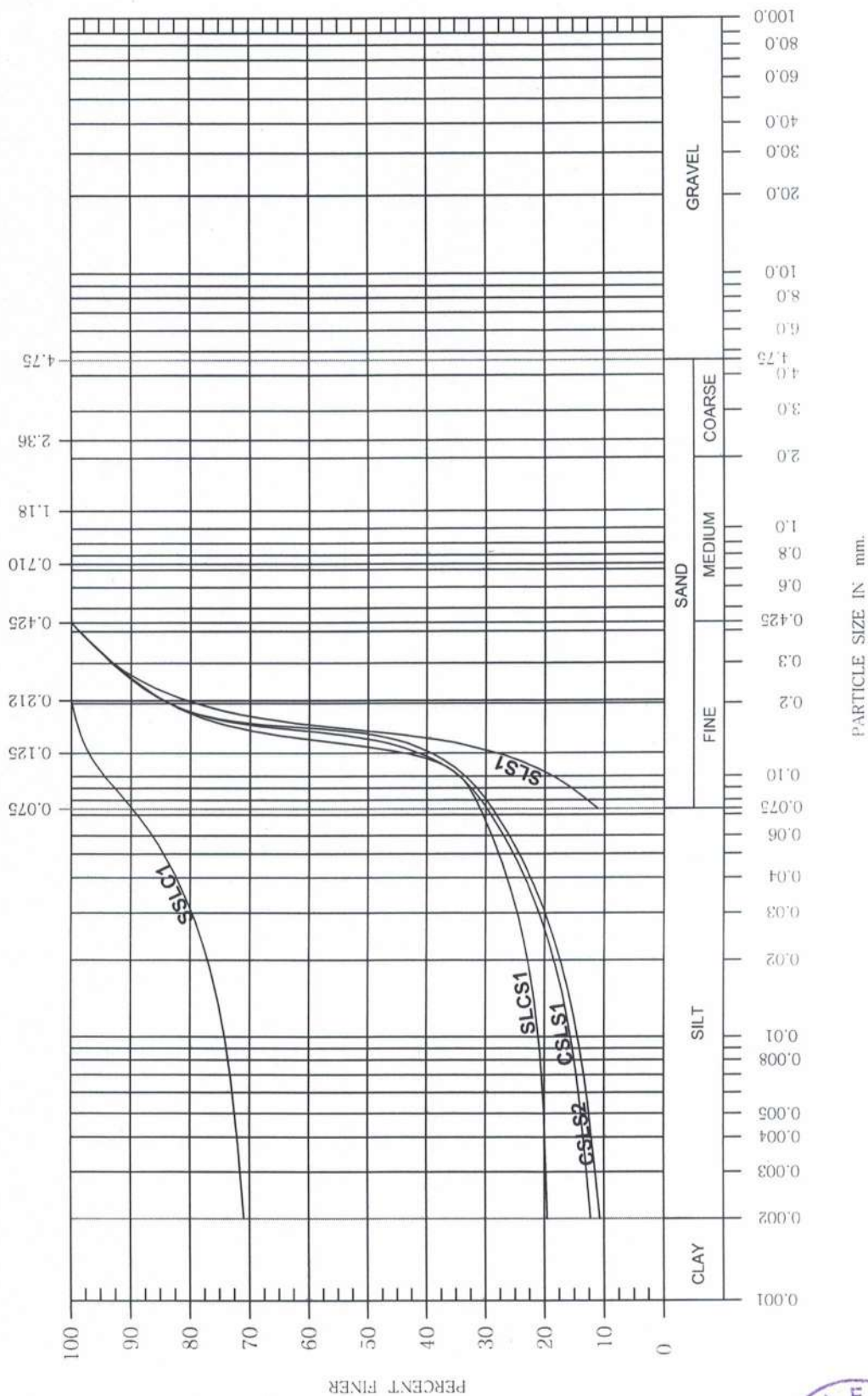


FIG. 6 GRAIN SIZE DISTRIBUTION CURVE-BH-02

Project: Proposed Building at Plot No. R-99, Block No. 3, Ganga Nagar 2nd Main Road, Maduravoyal, Chennai-600 095.

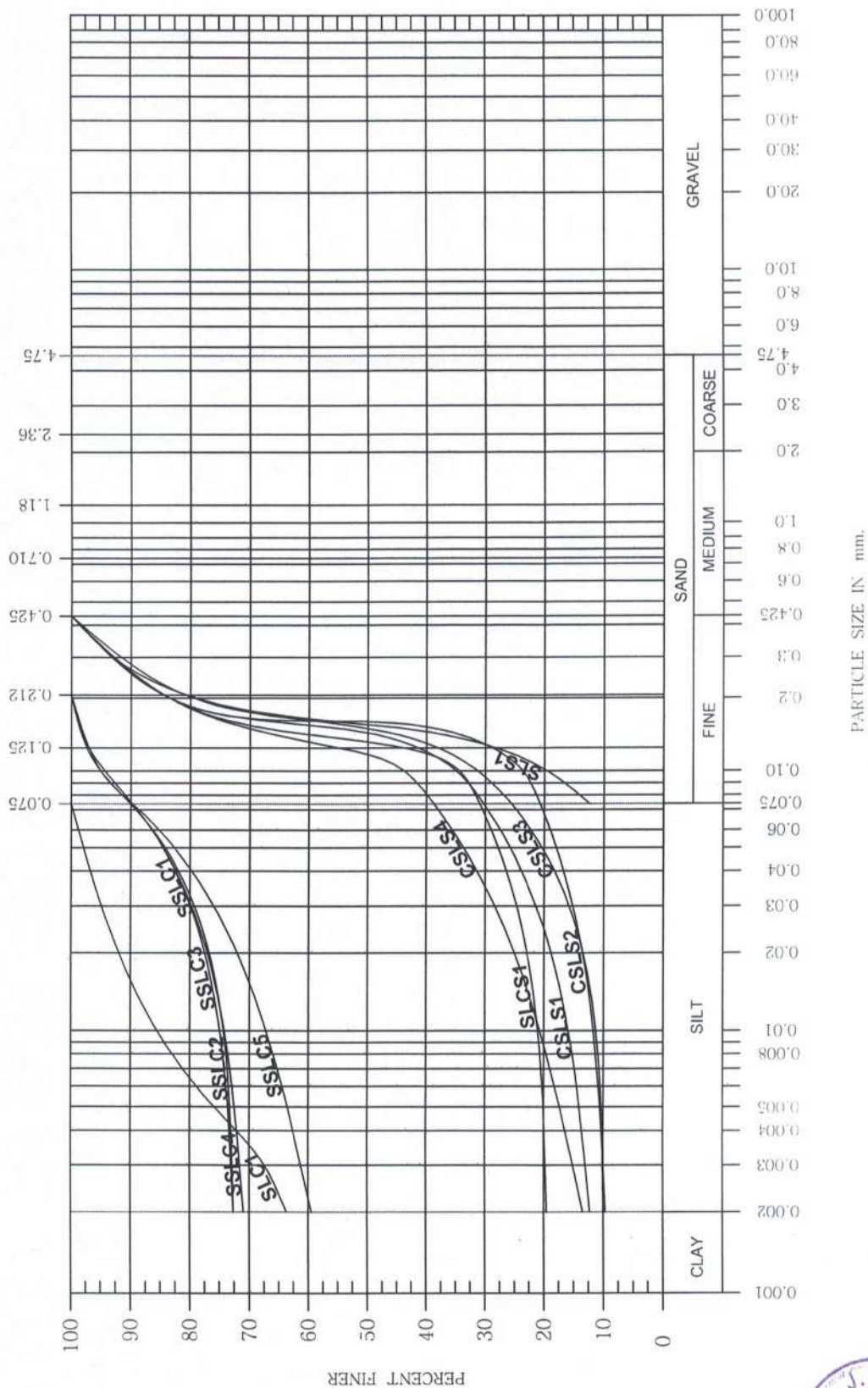


FIG. 7 GRAIN SIZE DISTRIBUTION CURVE-BH-03

LABORATORY TEST RESULTS

TABLE-1a

B. H No	Layer thickness m	Soil classification	Depth of sample collected		SP. gravity	% of free swell	Grain size distribution				Remarks
			DS / SPT m	UDS m			Clay %	Silt %	Sand %	Gravel %	
1	0.00 - 1.00	Filled Up Soil	-	-	-	-	-	-	-	-	-
	1.00 - 3.90	Silty Sand-SLS1	1.50	-	2.63	-	0	14	86	0	-
	3.90 - 9.60	Clayey Silty Sand-CSLS1	4.50	-	2.70	-	11	14	75	0	-
	9.60 - 10.50	Sandy Silty Clay-SSLC1	10.50	-	2.65	30	71	17	12	0	-
2	0.00 - 1.20	Filled Up Soil	-	-	-	-	-	-	-	-	-
	1.20 - 3.70	Silty Sand-SLS1	1.50	-	2.64	-	0	12	88	0	-
	3.70 - 5.50	Clayey Silty Sand-CSLS1	4.50	-	2.63	-	13	16	71	0	-
	5.50 - 8.70	Silty Clayey Sand-SLCS1	6.00	-	2.64	-	18	14	68	0	-
	8.70 - 9.50	Clayey Silty Sand-CSLS2	9.00	-	2.63	-	12	15	73	0	-
	9.50 - 10.50	Sandy Silty Clay-SSLC1	10.50	-	2.7	31	72	17	11	0	-



LABORATORY TEST RESULTS
TABLE-1b

B. H No	Layer thickness m	Soil classification	Depth of sample collected		SP. gravity	% of free swell	Grain size distribution				Remarks
			DS / SPT m	UDS m			Clay %	Silt %	Sand %	Gravel %	
3	0.00 - 1.00	Filled Up Soil	-	-	-	-	-	-	-	-	-
	1.00 - 3.60	Silty Clay-SLC1	1.00	-	2.63	-	64	36	0	0	-
	3.60 - 5.50	Sandy Silty Clay-SSLC1	4.50	-	2.64	32	72	17	11	0	-
	5.50 - 7.30	Clayey Silty Sand-CSLS1	6.00	-	2.64	-	13	18	69	0	-
	7.30 - 9.00	Sandy Silty Clay-SSLC2	7.50	-	2.64	32	73	17	10	0	-
	9.00 - 10.50	Clayey Silty Sand-CSLS2	9.00	-	2.64	-	9	12	79	0	-
	10.50 - 11.00	Silty Sand-SLS1	10.50	-	2.64	-	0	13	87	0	-
	11.00 - 19.00	Sandy Silty Clay-SSLC3	13.50	-	2.64	33	73	16	11	0	-
	19.00 - 21.00	Clayey Silty Sand-CSLS3	20.00	-	2.64	-	10	16	74	0	-
	21.00 - 22.00	Sandy Silty Clay-SSLC4	21.50	-	2.64	31	72	16	12	0	-
	22.00 - 29.80	Sandy Silty Clay-SSLC5	23.00	-	2.64	29	59	30	11	0	-
	29.80 - 32.00	Clayey Silty Sand-CSLS4 (Cemented Sand)	32.00	-	2.63	-	14	24	62	0	-



LABORATORY TEST RESULTS

TABLE - 2a

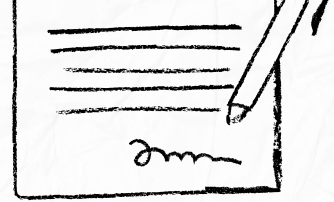
B. H No	Layer thickness m	Soil classification	Depth of sample collected		LL %	PL %	Bulk density t/m ³	Consolidation Parameters		Shear Strength Parameters		Remarks
			DS / SPT m	UDS m				e _o	Cc	Cu t/m ²	ϕ degree	
1	0.00 - 1.00	Filled Up Soil	-	-	-	-	-	-	-	-	-	-
	1.00 - 3.90	Silty Sand-SLS1	1.50	-	-	-	1.52	-	-	-	32	-
	3.90 - 9.60	Clayey Silty Sand-CSLS1	4.50	-	-	-	1.54	-	-	-	33	-
	9.60 - 10.50	Sandy Silty Clay-SSLC1	10.50	-	69	26	1.50	1.80	0.30	3.10	-	-
2	0.00 - 1.20	Filled Up Soil	-	-	-	-	-	-	-	-	-	-
	1.20 - 3.70	Silty Sand-SLS1	1.50	-	-	-	1.52	-	-	-	33	-
	3.70 - 5.50	Clayey Silty Sand-CSLS1	4.50	-	-	-	1.53	-	-	-	34	-
	5.50 - 8.70	Silty Clayey Sand-SLCS1	6.00	-	-	-	1.51	-	-	-	30	-
	8.70 - 9.50	Clayey Silty Sand-CSLS2	9.00	-	-	-	1.52	-	-	-	32	-
	9.50 - 10.50	Sandy Silty Clay-SSLC1	10.50	-	71	27	1.50	1.85	0.36	2.48	-	-



LABORATORY TEST RESULTS
TABLE - 2b

B. H No	Layer thickness m	Soil classification	Depth of sample collected		LL %	PL %	Bulk density t/m ³	Consolidation Parameters		Shear Strength Parameters		Remarks
			DS / SPT m	UDS m				e _o	Cc	Cu t/m ²	ϕ degree	
3	0.00 - 1.00	Filled Up Soil	-	-	-	-	-	-	-	-	-	-
	1.00 - 3.60	Silty Clay-SLC1	1.00	-	63	22	1.50	1.70	0.31	4.34	-	-
	3.60 - 5.50	Sandy Silty Clay-SSLC1	4.50	-	71	26	1.50	1.75	0.34	3.62	-	-
	5.50 - 7.30	Clayey Silty Sand-CSLS1	6.00	-	-	-	1.50	-	-	-	28	-
	7.30 - 9.00	Sandy Silty Clay-SSLC2	7.50	-	72	26	1.51	1.80	0.35	3.10	-	-
	9.00 - 10.50	Clayey Silty Sand-CSLS2	9.00	-	-	-	1.51	-	-	-	29	-
	10.50 - 11.00	Silty Sand-SLS1	10.50	-	-	-	1.52	-	-	-	30	-
	11.00 - 19.00	Sandy Silty Clay-SSLC3	13.50	-	72	27	1.50	1.70	0.34	4.34	-	-
	19.00 - 21.00	Clayey Silty Sand-CSLS3	20.00	-	-	-	1.51	-	-	-	29	-
	21.00 - 22.00	Sandy Silty Clay-SSLC4	21.50	-	71	25	1.50	1.70	0.34	4.34	-	-
	22.00 - 29.80	Sandy Silty Clay-SSLC5	23.00	-	58	19	1.53	-	-	15.41	-	-





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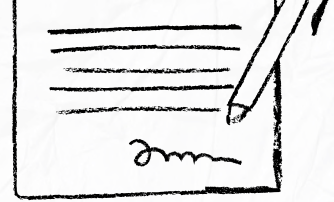
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