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SOIL EXPLORATION AND FOUNDATION REPORT

FOR THE PROPOSED BUILDING

AT

"BBCL SANSKRITI"

OLD DOOR NO. 37/50, 54/56

BLOCK NO. 46, T.S. NO. 16/3 & 16/4

BRINDAVAN STREET

T.N.S.C.E. TENEMENTS 1 TO 13 LANES

WEST MAMBALAM, PULIYUR

CHENNAI-600 033

PROJECT NO. TJE/003112/2024

T.J.ENGINEERS

SOIL EXPLORATION AND FOUNDATION DESIGN DIVISION
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EXPLORATION REPORT

PROJECT NO. TJE/003112/2024

1.INTRODUCTION:

M/S BBCL PRIME CONSTRUCTION PRIVATE LIMITED has proposed to construct a Stilt Floor + Five Floors Building at **"BBCL Sanskriti",** Old Door No. 37/50, 54/56, Block No. 46, T.S. No. 16/3 & 16/4, Brindavan Street, T.N.S.C.B. Tenements 1 to 13 Lanes West, Mambalam, Puliyur, Chennai-600 033. 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 22.00m below existing ground level. The bore hole location is shown in Fig No.1 and bore log details

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are given in Fig No. 2,3&4. The bore holes were terminated in the Very Dense Gravel-(Slate) layer.

4.0. GEOTECHNICAL INVESTIGATIONS

4.1. Filed 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 in 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.

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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, 1c 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, 1c and Table-2a, 2b,2c.

7.0. GROUND WATER TABLE

The ground water table was encountered at the **depth of 2.50m**, below the existing ground level at the time of soil exploration.

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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 eight distinctive layers.

i. Filled Up Soil, 0.00m to 1.90m

ii. Loose Silty Sand, 1.90m to 3.60m SPT's N= 5-7

iii. Medium Stiff Sandy Silty Clay, 3.60m to 5.90m SPT's N= 6

iv. Medium Stiff Sandy Silty Clay, 5.90m to 8.00m SPT's N= 5-6

v. Loose to Medium Dense Clayey Silty Sand, 8.00m to 13.20m SPT's N= 8-13

vi. Medium Stiff to Stiff Sandy Silty Clay, 13.20m to 19.20m SPT's N= 7-10

vii. Very Dense Clayey Silty Sandy Gravel, 19.20m to 21.50m SPT's N= >100

viii. Very Dense Gravel, 21.50m to 22.00m SPT's N= >100

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

i. Filled Up Soil, 0.00m to 1.70m

ii. Medium Stiff Silty Sandy Clay, 1.70m to 2.90m SPT's N= 6

iii. Medium Dense Silty Sand, 2.90m to 4.90m SPT's N= 13-16

iv. Medium Stiff Silty Clay, 4.90m to 6.50m SPT's N= 7

v. Loose Clayey Silty Sand, 6.50m to 8.90m SPT's N= 9

vi. Medium Stiff Sandy Silty Clay, 8.90m to 10.00m SPT's N= 5

vii. Medium Dense Clayey Silty Sand, 10.00m to 13.10m SPT's N= 11-14

viii. Medium Stiff to Stiff Sandy Silty Clay, 13.10m to 19.20m SPT's N= 8-10

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ix. Very Dense Clayey Silty Sandy Gravel, 19.20m to 21.50m

SPT's N= >100

x. Very Dense Gravel, 21.50m to 22.00m SPT's N= >100

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

i. Filled Up Soil, 0.00m to 1.80m

ii. Stiff Silty Sandy Clay, 1.80m to 2.90m SPT's N= 10

iii. Loose Silty Sand, 2.90m to 4.90m SPT's N= 9-10

iv. Medium Stiff Silty Clay, 4.90m to 8.80m SPT's N= 6-8

v. Medium Dense Silty Sand, 8.80m to 13.20m SPT's N= 14-18

vi. Medium Stiff to stiff Sandy Silty Clay, 13.20m to 19.30m SPT's N= 7-10

vii. Very Dense Clayey Silty Sandy Gravel, 19.30m to 21.50m

SPT's N= >100

viii. Very Dense Gravel, 21.50m to 22.00m SPT's N= >100

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

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9.0 FOUNDATION ANALYSIS

From the bore log data from 0.00m to 1.90m Filled Up Soil layer is present. From 1.90m to 19.30m medium stiff to stiff Sandy Silty Clay/Silty Sandy Clay/Silty Clay and loose to medium dense Silty Sand /Clayey Silty Sand layers are present, and the Sandy Silty Clay/Silty Sandy Clay/Silty Clay layer has got swelling character. From 19.30m to 21.50m very dense Clayey Silty Sandy Gravel layer is present. Below 21.50m very dense Gravel-(Slate) layer is seen, this layer is fair to rest pile foundation for heavy loaded structure.

The layer up to 19.30m is the critical zone for open foundation system for light loaded structure, within the critical zone medium stiff to very stiff Clayey and loose to medium dense Sandy layers are present, and the Clayey layer has got swelling character. For the proposed Stilt Floor + Five Floors structure, if the column positions are symmetrical, evenly loaded and short span, open foundation of **Isolated Footing** can be adopted and if the column positions are unsymmetrical, not evenly loaded and long span, open foundation of **Continues Strip Raft Footing** or **Raft Foundation** can be adopted. The open foundation can be placed at the minimum **depth of 2.10m** below the existing ground level. The existing ground level was 0.30m higher than the road level at the time of soil investigation. The Safe Bearing Capacity (SBC) at 2.10m depth has been worked out and given below.

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 22.00m (Including Anchorage Depth)** below existing ground level.

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The pile should be anchored into the very dense Gravel- (Slate) layer for minimum of 1.00m depth.

9.1. COMPUTATION OF THE SAFE BEARING CAPACITY AT 2.10m DEPTH

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

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

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

The corresponding bearing capacity factors are,

$Nc = 5.7$

$N_q = 1$

Where,

C = Un drained shear strength = 3.38 t/m^2

γ = Unit weight of the soil = 1.50 t/m^3

γ' = Submerged unit weight of the soil = 0.50 t/m^3

D_f = Depth of footing = 2.10 m

D_w = Depth of water table = 2.50m

Substitute all the above values in the formula,

$q_u = 1.2 \times 3.38 \times 5.7 + 1.50 \times 2.10 \times 1$

$= 23.119 + 3.15 = 26.269\ t/m^2$

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

Hence, safe bearing capacity $q_s = 26.269/2.50 = 10.507\ t/m^2$. Say 10.50 t/m^2.

Therefore, safe bearing capacity of the soil at 2.10m is 10.50 t/m^2

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9.2. SETTLEMENT ANALYSIS FOR THE LOADING INTENSITY OF 10.50 t/m^2

LAYER -1, SILTY CLAY/SANDY SILTY CLAY/SILTY SANDY CLAY

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

$$S_1 = (C_c / 1 + e_0) H \quad \text{Log}_{10} (\sigma'_0 + \Delta\sigma / \sigma'_0)$$

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

= 17.20m

σ'_0 = The original effective over burden pressure at the centre of the clay layer

= 7.85 t/m^2

$\Delta\sigma$ = The stress increases at the centre of the clay layer due to foundation loads (or) pressure

= 0.076 t/m^2

S_1 = (0.35/1+1.80) 17.20 Log_{10} (7.85 + 0.076 /7.85)

= 0.125 x 17.20 x 4.18 x 10^{-3}m

= 8.99x 10^{-3}m

= 8.99mm

TOTAL SETTLEMENT

= 8.99mm < 50mm

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

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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.

$$\mathbf{Qu} = \mathbf{Qb} + \mathbf{Qs}$$

Qs = Ultimate unit skin friction on an individual layer

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

Where

Ks = Co-efficient of horizontal soil stress = 0.471

σ'_{vo} = average effective overburden pressure = 10.75 t/m^2

δ = angle of wall friction = 32

D = Dia meter of pile = 0.40m

L = Length of individual layer = 1.00 m

= 0.471 x 10.75 x 0.624 x 3.14 x 0.40 x 1.00

= 3.876 t

$q_b = Nq\ \sigma'_{vo}\ Ab$

where

Nq = Bearing Capacity Factor = 120

σ'_{vo} = effective overburden pressure at the toe = 11.00 t/m^2

Ab = Cross sectional area at the base

D = Dia of Pile = 0.40m

= 120 x 11.00 x 3.14 x 0.40^2 /4

= 165.792 t

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$$Qu = Qb + Qs$$

$$= 165.792 + 3.876 = 169.668 \text{ t}$$

Q safe = Qu/F.S = 169.668/2.5 = 67.867 say 68.00 t

The safe load carrying capacity for five different diameter of piles for the **depth of 22.00m** are worked and are given below.

Dia of Pile	Depth of Pile	Safe Load (Tones)
400mm	22.00m	68
450mm	22.00m	86
500mm	22.00m	106
600mm	22.00m	152
750mm	22.00m	236

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).

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10.0. CONCLUSIONS

1. Soil in the shallow depth is fair to adopt open foundation system for light loaded structure.
2. For the proposed Stilt Floor + Five Floors structure, if the column positions are symmetrical, evenly loaded and short span, open foundation of **Isolated Footing** can be adopted and if the column positions are unsymmetrical, not evenly loaded and long span, open foundation of **Continues Strip Raft Footing** or **Raft Foundation** can be adopted. The open foundation can be placed at the minimum **depth of 2.00m** below the existing ground level. The existing ground level was 0.30m higher than the road level.
3. The **Safe Bearing Capacity** of the soil at **2.10m depth** is **10.50 t/m ^{2}**
4. All the foundation should rest on 100 mm thick river sand or M Sand and 100mm thick 1:4:8 concrete mat.
5. The foundation bed should be well compacted by ramming before laying PCC.
6. **If Isolated footing provided** it is advisable to make the structure as rigid as possible by providing two layers of **grade beam** one at the top of the footing and another one at plinth level, **continues sill slab** and **continues lintel beam** connecting monolithically with column.
7. **For heavy loaded structure**, if the SBC is not sufficient for the expected loading intensity it is advisable to provide **deep foundation of pile.** The pile foundation can be **Bored Cast in situ pile**. The pile foundation can be terminated at the minimum depth of **22.00m (Including Anchorage Depth)** below existing ground level, existing ground level at the time of soil investigation.

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8. The safe load carrying capacity for five different diameter of piles for the **depth of 22.00m** are worked and are given below.

Dia of Pile	Depth of Pile	Safe Load (Tones)
400mm	**22.00m**	**68**
450mm	**22.00m**	**86**
500mm	**22.00m**	**106**
600mm	**22.00m**	**152**
750mm	**22.00m**	**236**

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)

9. The **pile should be anchored** in to the very dense **Gravel-(Slate) layer** for **minimum 1.00m depth**.
10. The pile boring should be done with **Percussion** drilling or **Hydraulic** Rotary Drilling with DMC method.
11. Proper precaution should be taken while boring the pile against sliding of bore hole, by maintaining the proper dense bentonite slurry or providing temporary casing or permanent casing and pile concreting should be done as soon as boring is over.
12. The bore hole should be flushed properly before laying concrete. It has to be ensured by comparing the depth of pile bore hole and Tremie Pipe. The depth of Tremie Pipe lowered can be 300mm less than borehole depth. If the gap between bore hole bottom and Tremie Pipe bottom is more than 300mm, there is a possibility of slush deposit in the bore hole.

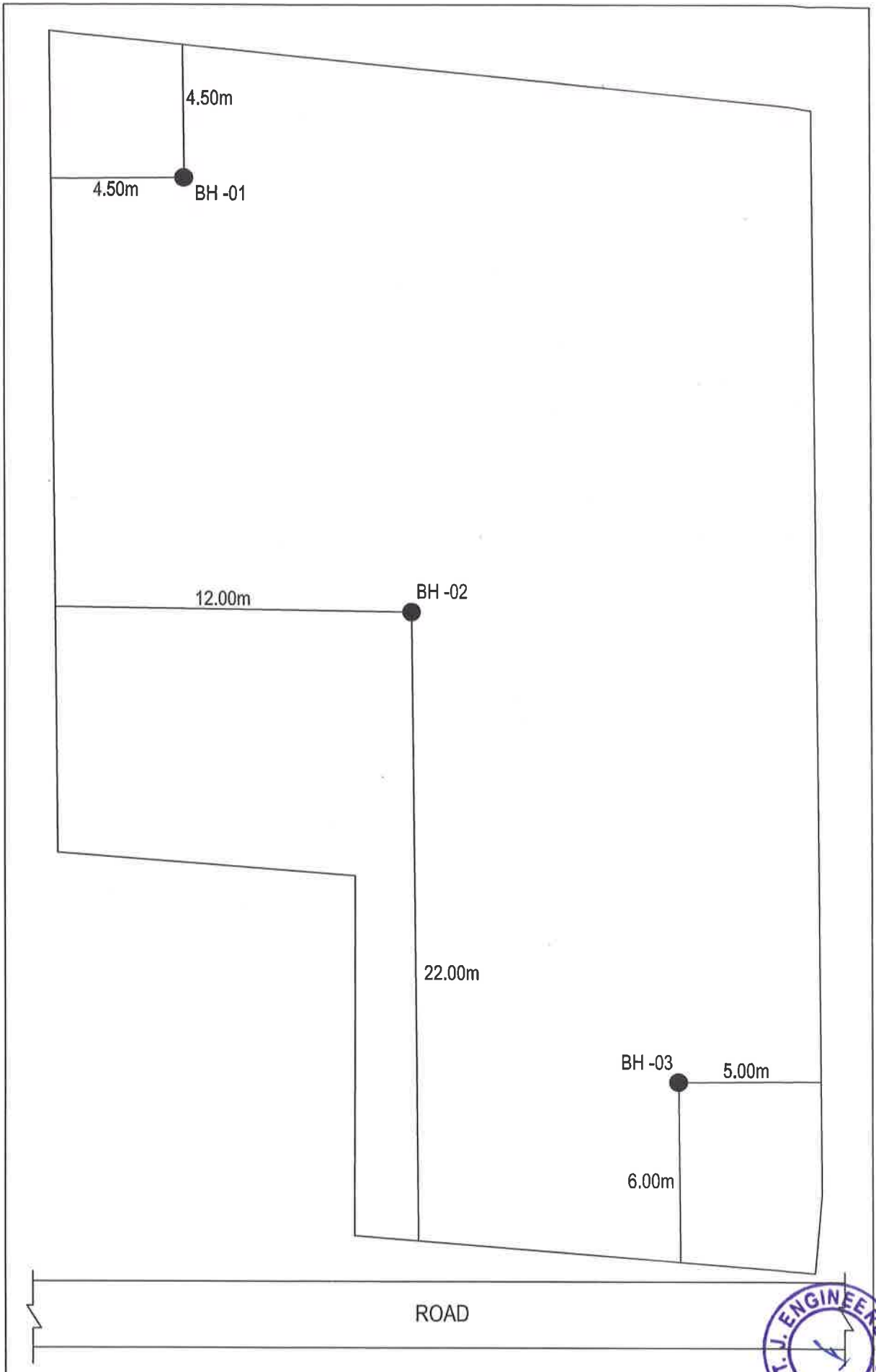
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13. For foundation design stress due to any eccentricity and horizontal force should be considered and stability should be checked.
14. It is advisable not to mix deep foundation and shallow foundation in same building. Combined Raft cum Pile can be adopted.
15. All suggested foundation recommendations and precautions should be adopted while undertaking the design aspects and construction activities.

For T.J. Engineers

07 – 02 – 2024

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



CLIENT:-	PROJECT:-		
M/S BBCL PRIME CONSTRUCTION PRIVATE LIMITED CHENNAI	PROPOSED BUILDING AT "BBCL SANSKRITI", OLD DOOR NO. 37/50, 54/56, BLOCK NO. 46, T.S. NO. 16/3 & 16/4, BRINDAVAN STREET, T.N.S.C.B. TENEMENTS 1 TO 13 LANES WEST, MAMBALAM, PULIYUR, CHENNAI-600 033.	SITE PLAN FIG.1	T.J. ENGINEERS soil investigation and foundation design division T.J. HOUSE PLOT NO. 4, ANNA NAGAR, 1ST STREET, VELACHERY, CHENNAI-42, tjengineers@yahoo.com tjengineers1998@gmail.com OFF: 044-42334194

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BORE LOG

PROJECT : Proposed Building at "BBCL Sanskriti", Old Door No. 37/50, 54/56, Block No. 46, T.S. No. 16/3 & 16/4, Brindavan Street, T.N.S.C.B. Tenements 1 to 13 Lanes West, Mambalam, Puliyur, Chennai-600 033.

BORE HOLE NO : B.H:01

TYPE OF BORING : Rotary Drilling

DATE OF COMMENCEMENT : 22 - 01 - 2024

DATE OF COMPLETION : 23 - 01 - 2024

G.W.L : 2.50m

Depth below G.L	Soil profile	Description of soil	Thickness of layer	Depth at witch samples are collected D.S	Depth at witch samples are collected U.D.S	Standard penetration testdata: Depth at witch test is conducted	N-Value	Relative density/ Consistency
0.00		Filled Up Soi1	1.90					
1.00								
2.00				1.90		1.90	5	Loose
		Silty Sand-SLS1	1.70					
3.00		(Brown)				3.00	7	Loose
				3.60				
4.00		Sandy Silty Clay-SSLC1	2.30			4.50	6	Medium Stiff
5.00		(Brown)						
				5.90				
6.00						6.00	5	Medium Stiff
		Sandy Silty Clay-SSLC2	2.10					
7.00		(Gray)				7.50	6	Medium Stiff
8.00				8.00				
9.00						9.00	8	Loose
10.00		Clayey Silty Sand-CSLS1	5.20					
		(Grayish Brown)				10.50	13	Medium Dense
11.00								
12.00						12.00	10	Loose
13.00				13.20				
						13.50	8	Medium Stiff
14.00		Sandy Silty Clay-SSLC3	6.00					
15.00		(Gray)				15.00	7	Medium Stiff
16.00								
						16.50	8	Medium Stiff

Graphical representation of penetration resistance: 10 20 30 40 50

Remark: All Dimensions in meters

End of Boring

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FIG:2

cont....

BORE LOG

PROJECT : Proposed Building at "BBCL Sanskriti", Old Door No. 37/50, 54/56, Block No. 46, T.S. No. 16/3 & 16/4, Brindavan Street, T.N.S.C.B. Tenements 1 to 13 Lanes West, Mambalam, Puliyur, Chennai-600 033.

BORE HOLE NO : B.H:01

TYPE OF BORING : Rotary Drilling

DATE OF COMMENCEMENT: 22 - 01 - 2024

DATE OF COMPLETION : 23 - 01 - 2024

G.W.L : 2.50m

Depth below G.L	Soil profile	Description of soil	Thickness of layer	Depth at witch samples are collected D.S	Depth at witch samples are collected U.D.S	Standard penetration testdata: Depth at witch test is conducted	N-Value	Relative density/ Consistency	Graphical representation of penetration resistance
17.00		Sandy Silty Clay-SSLC3 (Gray)	6.00			18.00	10	Stiff	
18.00									
19.00				19.20					
20.00		Clayey Silty Sandy Gravel-CSLSG1 (Gray)	2.30			20.00	>100	Very Dense	
21.00						21.00	>100	Very Dense	
				21.50					
22.00		Gravel (Slate) (Whitish Gray)				22.00	>100	Very Dense	
23.00									
24.00									
25.00									
26.00									
27.00									
28.00									
29.00									
30.00									

Graphical representation of penetration resistance: 10 20 30 40 50

Remark: All Dimensions in meters

→ End of Boring

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FIG: 2

BORE LOG

PROJECT : Proposed Building at "BBCL Sanskriti", Old Door No. 37/50, 54/56, Block No. 46, T.S. No. 16/3 & 16/4, Brindavan Street, T.N.S.C.B. Tenements 1 to 13 Lanes West, Mambalam, Puliyur, Chennai-600 033.

BORE HOLE NO : B.H:02

TYPE OF BORING : Rotary Drilling

DATE OF COMMENCEMENT : 23 - 01 - 2024

DATE OF COMPLETION : 24 - 01 - 2024

G.W.L : 2.50m

Depth below G.L	Soil profile	Description of soil	Thickness of layer	Depth at witch samples are collected D.S	Depth at witch samples are collected U.D.S	Standard penetration testdata: Depth at witch test is conducted	N-Value	Relative density/ Consistency
0.00		Filled Up Sol1	1.70					
1.00								
				1.70		1.70	6	Medium Stiff
2.00		Silty Sandy Clay-SLSC1 (Brown)	1.20					
				2.90				
3.00		Silty Sand-SLS1 (Brown)	2.00			3.00	13	Medium Dense
4.00						4.50	16	Medium Dense
				4.90				
5.00		Silty Clay-SLC1 (Gray)	1.60					
6.00						6.00	7	Medium Stiff
				6.50				
7.00		Clayey Silty Sand-CSLS1 (Grayish Brown)	2.40			7.50	9	Loose
8.00								
				8.90				
9.00		Sandy Silty Clay-SSLC1 (Gray)	1.10			9.00	5	Medium Stiff
10.00				10.00				
		Clayey Silty Sand-CSLS2 (Grayish Brown)	3.10			10.50	11	Medium Dense
11.00								
12.00						12.00	14	Medium Dense
13.00				13.10				
		Sandy Silty Clay-SSLC2 (Gray)	6.10			13.50	8	Medium Stiff
14.00								
15.00						15.00	10	Stiff
16.00								
						16.50	9	Stiff

Graphical represenation of penetration resistance: 10 20 30 40 50

Remark: All Dimensions in meters

End of Boring

FIG:3

cont....

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BORE LOG

PROJECT : Proposed Building at "BBCL Sanskriti", Old Door No. 37/50, 54/56, Block No. 46, T.S. No. 16/3 & 16/4, Brindavan Street, T.N.S.C.B. Tenements 1 to 13 Lanes West, Mambalam, Puliyur, Chennai-600 033.

BORE HOLE NO : B.H:02

TYPE OF BORING : Rotary Drilling

DATE OF COMMENCEMENT : 22 - 01 - 2024

DATE OF COMPLETION : 23 - 01 - 2024

G.W.L : 2.50m

Depth below G.L	Soil profile	Description of soil	Thickness of layer	Depth at witch samples are collected D.S	Depth at witch samples are collected U.D.S	Standard penetration testdata: Depth at witch test is conducted	N-Value	Relative density/ Consistency	Graphical representation of penetration resistance (10 20 30 40 50)
17.00									
		Sandy Silty Clay-SSLC2	6.10						
18.00		(Gray)				18.00	8	Medium Stiff	
19.00				19.20					
		Clayey Silty Sandy Gravel-CSLSG1	2.30						
20.00		(Gray)				20.00	>100	Very Dense	
21.00				21.50		21.00	>100	Very Dense	
		Gravel							
22.00 →		(Slate)				22.00	>100	Very Dense	
		(Whitish Gray)							
23.00									
24.00									
25.00									
26.00									
27.00									
28.00									
29.00									
30.00									

Remark: All Dimensions in meters

→ End of Boring

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FIG: 3

BORE LOG

PROJECT : Proposed Building at "BBCL Sanskriti", Old Door No. 37/50, 54/56, Block No. 46, T.S. No. 16/3 & 16/4, Brindavan Street, T.N.S.C.B. Tenements 1 to 13 Lanes West, Mambalam, Puliyur, Chennai-600 033.

BORE HOLE NO : B.H:03

TYPE OF BORING : Rotary Drilling

DATE OF COMMENCEMENT : 24 - 01 - 2024

DATE OF COMPLETION : 25 - 01 - 2024

G.W.L : 2.50m

Depth below G.L	Soil profile	Description of soil	Thickness of layer	Depth at witch samples are collected D.S	Depth at witch samples are collected U.D.S	Standard penetration testdata: Depth at witch test is conducted	N-Value	Relative density/ Consistency
0.00								
		Filled Up Soi1	1.80					
1.00				1.80		1.70	10	Stiff
2.00		Silty Sandy Clay-SLSC1 (Brown)	1.10					
				2.90		3.00	10	Loose
3.00		Silty Sand-SLS1 (Brown)	2.00					
4.00						4.50	9	Loose
				4.90				
5.00		Silty Clay-SLC1 (Gray)	3.90					
6.00						6.00	6	Medium Stiff
7.00						7.50	8	Medium Stiff
8.00								
				8.80				
9.00		Silty Sand-SLS2 (Grayish Whitish Brown)	4.30			9.00	14	Medium Dense
10.00								
						10.50	18	Medium Dense
11.00								
12.00						12.00	15	Medium Dense
13.00								
				13.10				
						13.50	7	Medium Stiff
14.00		Sandy Silty Clay-SSLC1 (Gray)	16.20					
15.00						15.00	8	Medium Stiff
16.00						16.50	9	Stiff

Graphical representation of penetration resistance: 10 20 30 40 50

Remark: All Dimensions in meters

End of Boring

FIG:4

cont....

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BORE LOG

PROJECT : Proposed Building at "BBCL Sanskriti", Old Door No. 37/50, 54/56, Block No. 46, T.S. No. 16/3 & 16/4, Brindavan Street, T.N.S.C.B. Tenements 1 to 13 Lanes West, Mambalam, Puliyur, Chennai-600 033.

BORE HOLE NO : B.H:03

TYPE OF BORING : Rotary Drilling

DATE OF COMMENCEMENT: 22 - 01 - 2024

DATE OF COMPLETION : 23 - 01 - 2024

G.W.L : 2.50m

Depth below G.L	Soil profile	Description of soil	Thickness of layer	Depth at witch samples are collected D.S	Depth at witch samples are collected U.D.S	Standard penetration testdata: Depth at witch test is conducted	N-Value	Relative density/ Consistency	Graphical representation of penetration resistance
17.00									10 20 30 40 50
		Sandy Silty Clay-SSLC2	6.20						
18.00		(Gray)				18.00	10	Stiff	
19.00				19.30					
		Clayey Silty Sandy Gravel-CSLSG1	2.20			20.00	>100	Very Dense	
20.00		(Gray)							
21.00						21.00	>100	Very Dense	
				21.50					
22.00		Gravel				22.00	>100	Very Dense	
→		(Slate)							
		(Whitish Gray)							
23.00									
24.00									
25.00									
26.00									
27.00									
28.00									
29.00									
30.00									

Remark: All Dimensions in meters

→ End of Boring

FIG: 4

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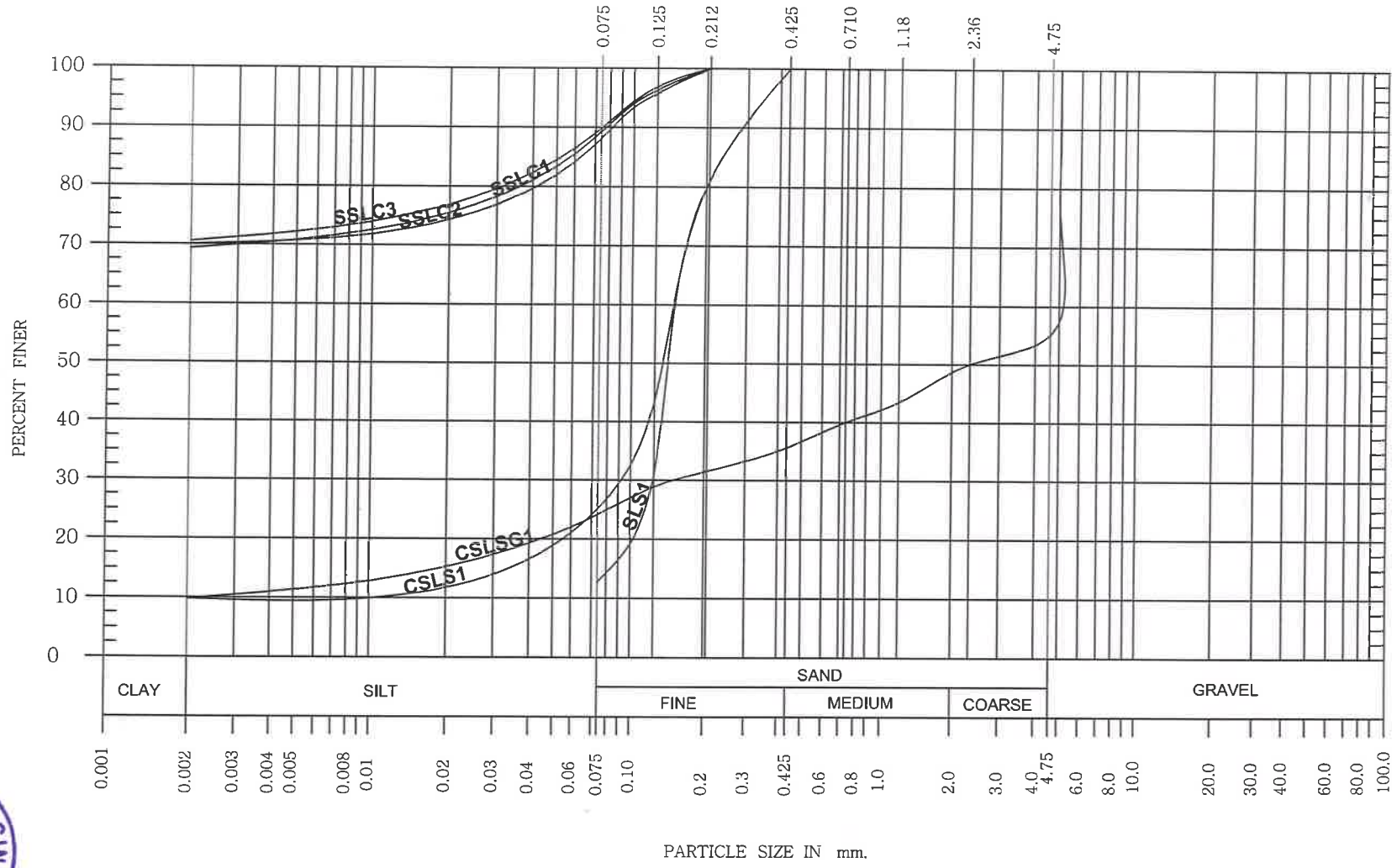


FIG. 5 GRAIN SIZE DISTRIBUTION CURVE-BH-01

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T.J. ENGINEERS
soil exploration & foundation design division

Project: Proposed Building at "BBCL Sanskriti", Old Door No. 37/50, 54/56, Block No. 46, T.S. No. 16/3 & 16/4, Brindavan Street, T.N.S.C.B. Tenements 1 to 13 Lanes West, Mambalam, Puliyur, Chennai-600 033.

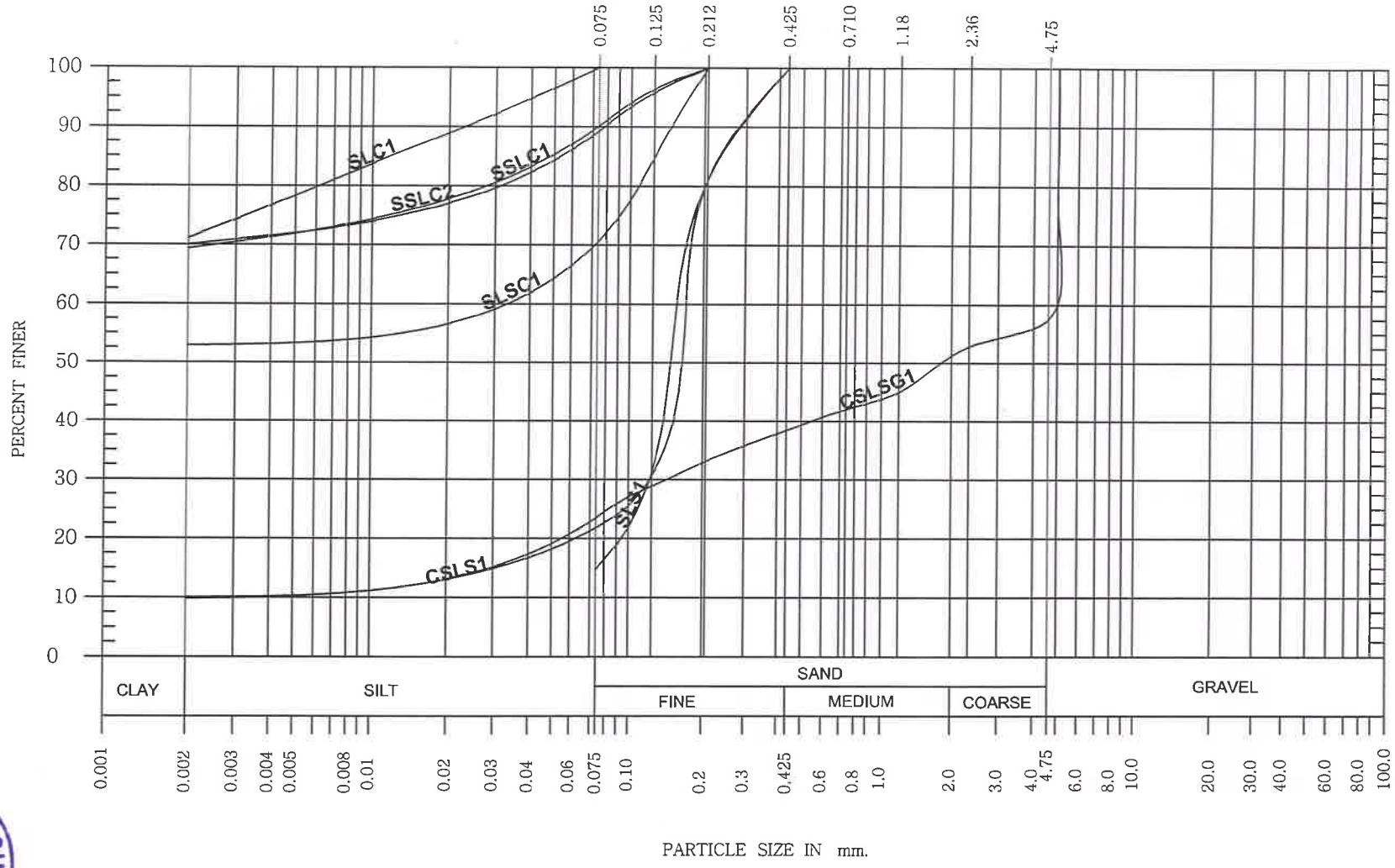


FIG. 6 GRAIN SIZE DISTRIBUTION CURVE-BH-02

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Project: Proposed Building at "BBCL Sanskriti", Old Door No. 37/50, 54/56, Block No. 46, T.S. No. 16/3 & 16/4, Brindavan Street, T.N.S.C.B. Tenements 1 to 13 Lanes West, Mambalam, Puliyur, Chennai-600 033.

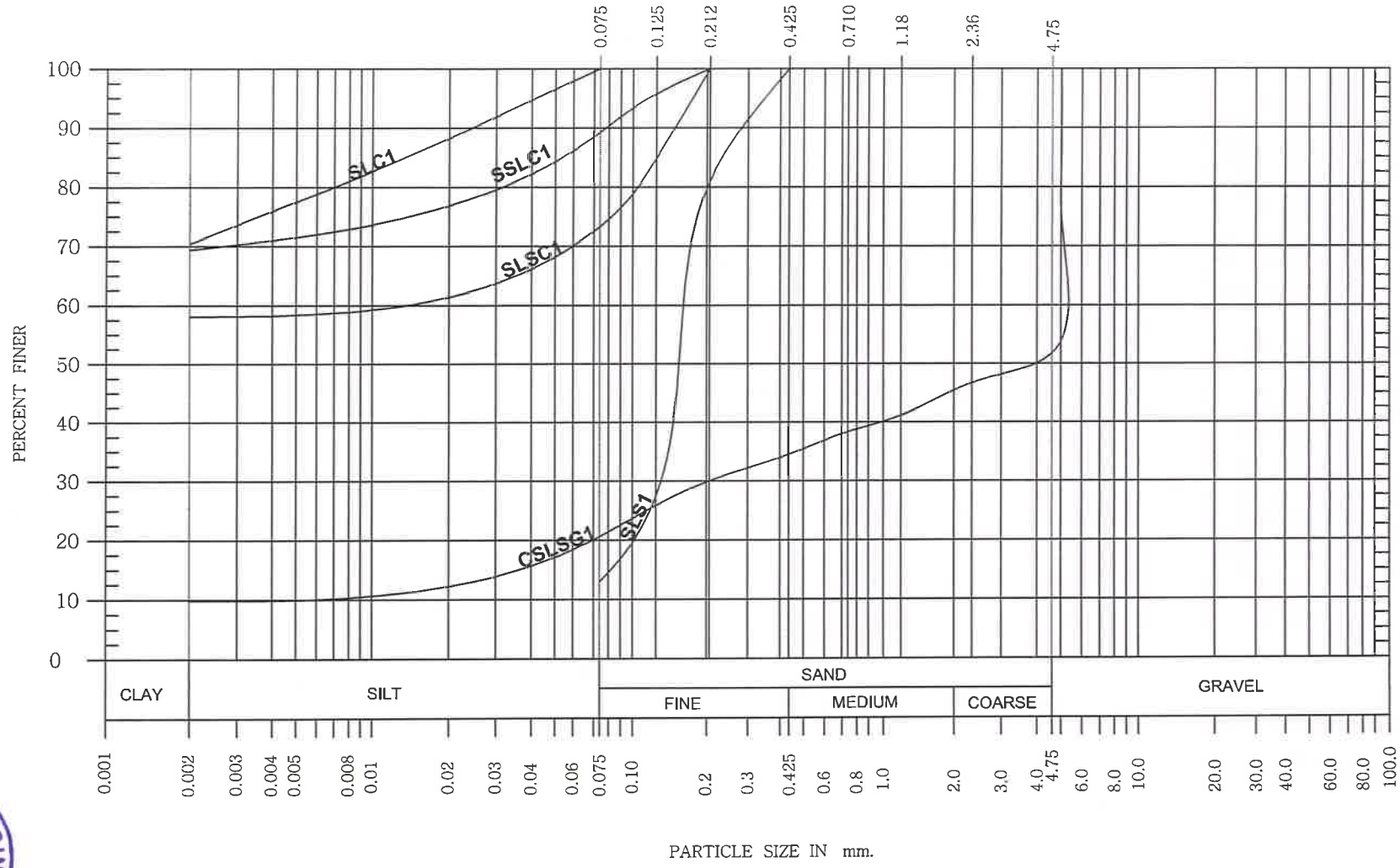


FIG. 7 GRAIN SIZE DISTRIBUTION CURVE-BH-03

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LABORATARY TEST RESULTS

TABLE-1a

B.H No	Layer thickness	Soil classification	Depth of sample collected		SP. gravity	%of free swell	Grain size distribution				Remarks
			DS / SPT	UDS			Clay	Silt	Sand	Gravel	
	m		m	m		%	%	%	%	%	
1	0.00 - 1.90	Filled Up Soil	–	–	–	–	–	–	–	–	–
	1.90 - 3.60	Silty Sand-SLS1	1.90	–	2.63	–	0	13	87	0	–
	3.60 - 5.90	Sandy Silty Clay-SSLC1	4.50	–	2.65	35	68	20	12	0	–
	5.90 - 8.00	Sandy Silty Clay-SSLC2	6.00	–	2.66	41	70	17	13	0	–
	8.00 - 13.20	Clayey Silty Sand-CSLS1	9.00	–	2.64	–	9	17	74	0	–
	13.20 - 19.20	Sandy Silty Clay-SSLC3	13.50	–	2.70	43	71	18	11	0	–
	19.20 - 21.50	Clayey Silty Sandy Gravel-CSLSG1	20.00	–	2.64	–	9	16	31	44	–
	21.50 - 22.00	Gravel-(Slate)	22.00	–	2.63	–	0	0	0	100	–

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LABORATARY TEST RESULTS

TABLE-1b

B.H No	Layer thickness	Soil classification	Depth of sample collected		SP. gravity	%of free swell	Grain size distribution				Remarks
			DS / SPT	UDS			Clay	Silt	Sand	Gravel	
	m		m	m		%	%	%	%	%	
2	0.00 - 1.70	Filled Up Soil	_	_	_	_	_	_	_	_	_
	1.70 - 2.90	Silty Sandy Clay-SLSC1	.1.70	_	2.64	37	53	18	29	0	_
	2.90 - 4.90	Silty Sand-SLS1	3.00	_	2.63	_	0	15	85	0	_
	4.90 - 6.50	Silty Clay-SLC1	6.00	_	2.70	41	72	28	0	0	_
	6.50 - 8.90	Clayey Silty Sand-CSLS1	7.50	_	2.64	_	9	14	77	0	_
	8.90 - 10.00	Sandy Silty Clay-SSLC1	9.00	_	2.65	39	69	21	10	0	_
	10.00 - 13.10	Clayey Silty Sand-CSLS2	10.50	_	2.64	_	11	16	73	0	_
	13.10 - 19.20	Sandy Silty Clay-SSLC2	13.50	_	2.70	41	70	18	12	0	_
	19.20 - 21.50	Clayey Silty Sandy Gravel-CSLSG1	20.00	_	2.64	_	10	14	33	43	_
	21.50 - 22.00	Gravel-(Slate)	22.00	_	2.63	_	0	0	0	100	_

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LABORATARY TEST RESULTS

TABLE-1c

B.H No	Layer thickness	Soil classification	Depth of sample collected		SP. gravity	%of free swell	Grain size distribution				Remarks
			DS / SPT	UDS			Clay	Silt	Sand	Gravel	
	m		m	m		%	%	%	%	%	
3	0.00 - 1.80	Filled Up Soil	–	–	–	–	–	–	–	–	–
	1.80 - 2.90	Silty Sandy Clay-SLSC1	1.80	–	2.64	36	57	16	27	0	–
	2.90 - 4.90	Silty Sand-SLS1	3.00	–	2.63	–	0	14	86	0	–
	4.90 - 8.80	Silty Clay-SLC1	6.00	–	2.70	39	71	29	0	0	–
	8.80 - 13.20	Silty Sand-SLS2	9.00	–	2.63	–	0	19	81	0	–
	13.20 - 19.30	Sandy Silty Clay-SSLC1	13.50	–	2.66	38	69	20	11	0	–
	19.30 - 21.50	Clayey Silty Sandy Gravel-CSLSG1	20.00	–	2.64	–	9	12	31	48	–
	21.50 - 22.00	Gravel-(Slate)	22.00	–	2.63	–	0	0	0	100	–

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LABORATARY TEST RESULTS

TABLE -2a

B.H No	Layer thickness	Soil classification	Depth of sample collected		LL	PL	Bulk density	Consolidation Parameters		Shear Strength Parmeters		Remarks
			DS / SPT	UDS				e_o	Cc	Cu	ø	
	m		m	m	%	%	t/m³			t/m²	degree	
1	0.00 - 1.90	Filled Up Soil	–	–	–	–	–	–	–	–	–	–
	1.90 - 3.60	Silty Sand-SLS1	1.90	–	–	–	1.51	–	–	–	29.00	–
	3.60 - 5.90	Sandy Silty Clay-SSLC1	4.50	–	66	24	1.50	1.77	0.34	3.41	–	–
	5.90 - 8.00	Sandy Silty Clay-SSLC2	6.00	–	69	26	1.50	1.8	0.35	3.39	–	–
	8.00 - 13.20	Clayey Silty Sand-CSLS1	9.00	–	–	–	1.54	–	–	–	32	–
	13.20 - 19.20	Sandy Silty Clay-SSLC3	13.50	–	69	27	1.52	1.73	0.32	4.22	–	–
	19.20 - 21.50	Clayey Silty Sandy Gravel-CSLSG1	20.00	–	–	–	1.58	–	–	–	38	–
	21.50 - 22.00	Gravel-(Slate)	22.00	–	–	–	6.10	–	–	–	40	–

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LABORATARY TEST RESULTS

TABLE -2b

B.H No	Layer thickness	Soil classification	Depth of sample collected		LL	PL	Bulk density	Consolidation Parameters		Shear Strength Parmeters		Remarks
			DS / SPT	UDS				e_o	Cc	Cu	Ø	
	m		m	m	%	%	t/m^3			t/m^2	degree	
2	0.00 - 1.70	Filled Up Soil	–	–	–	–	–	–	–	–	–	–
	1.70 - 2.90	Silty Sandy Clay-SLSC1	.1.70	–	51	18	1.50	1.80	0.35	3.38	–	–
	2.90 - 4.90	Silty Sand-SLS1	3.00	–	–	–	1.54	–	–	–	33	–
	4.90 - 6.50	Silty Clay-SLC1	6.00	–	70	27	1.52	1.75	0.34	4.22	–	–
	6.50 - 8.90	Clayey Silty Sand-CSLS1	7.50	–	–	–	1.53	–	–	–	30	–
	8.90 - 10.00	Sandy Silty Clay-SSLC1	9.00	–	67	26	1.51	1.80	0.35	3.10	–	–
	10.00 - 13.10	Clayey Silty Sand-CSLS2	10.50	–	–	–	1.54	–	–	–	33	–
	13.10 - 19.20	Sandy Silty Clay-SSLC2	13.50	–	69	27	1.53	1.72	0.32	4.82	–	–
	19.20 - 21.50	Clayey Silty Sandy Gravel-CSLSG1	20.00	–	–	–	1.58	–	–	–	38	–
	21.50 - 22.00	Gravel-(Slate)	22.00	–	–	–	6.10	–	–	–	40	–

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LABORATARY TEST RESULTS

TABLE -2c

B.H No	Layer thickness	Soil classification	Depth of sample collected		LL	PL	Bulk density	Consolidation Parameters		Shear Strength Parmeters		Remarks
			DS / SPT	UDS				e_o	Cc	Cu	Ø	
	m		m	m	%	%	t/m^3			t/m^2	degree	
3	0.00 - 1.80	Filled Up Soil	–	–	–	–	–	–	–	–	–	–
	1.80 - 2.90	Silty Sandy Clay-SLSC1	1.80	–	56	18	1.52	1.60	0.30	5.69	–	–
	2.90 - 4.90	Silty Sand-SLS1	3.00	–	–	–	1.53	–	–	–	30	–
	4.90 - 8.80	Silty Clay-SLC1	6.00	–	69	27	1.51	1.78	0.34	3.94	–	–
	8.80 - 13.20	Silty Sand-SLS2	9.00	–	–	–	1.55	–	–	–	35	–
	13.20 - 19.30	Sandy Silty Clay-SSLC1	13.50	–	67	26	1.53	1.65	0.31	4.22	–	–
	19.30 - 21.50	Clayey Silty Sandy Gravel-CSLSG1	20.00	–	–	–	1.58	–	–	–	38	–
	21.50 - 22.00	Gravel-(Slate)	22.00	–	–	–	6.10	–	–	–	40	–

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