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SOIL EXPLORATION AND FOUNDATION REPORT

FOR THE PROPOSED BUILDING

AT

DOOR NO. 13

BALFOUR ROAD

KILPAUK

CHENNAI

PROJECT NO. TJE/001531/2020

T.J.ENGINEERS

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EXPLORATION REPORT

PROJECT NO. TJE/001531/2020

1. INTRODUCTION:

M/S LIFESTYLE HOUSING AND INFRASTRUCTURE has proposed to construct a Stilt Floor + Five Floors Building at Door No. 13, Balfour Road, Kilpauk, Chennai-600 010. The soil investigation 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 two bore holes were bored up to maximum depth of 22.50m 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. The bore holes were terminated in the Very Dense Sandy Gravel (Disintegrated Rock) layer.

4.0. GEOTECHNICAL INVESTIGATIONS

4.1. Filed Investigations of Boreholes

Rotary drilling 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. 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 code 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' 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. 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 is given in Fig No. 2&3. 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 & Table-2a, 2b.

7.0. GROUND WATER TABLE

The ground water table was **encountered** at the **depth of 3.00m** 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 and BH-02 location.

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

i. Filled Up Soil 0.00m to 1.10m

ii. Loose Dense Clayey Silty Sand, 1.10m to 2.20m SPT's N= 5

iii. Medium Dense Silty Sand, 2.20m to 8.30m SPT's N= 13-25

iv. Stiff Sandy Silty Clay, 8.30m to 10.00m SPT's N= 9

v. Medium Stiff Sandy Silty Clay, 10.00m to 11.00m SPT's N= 6

vi. Medium Dense Silty Clayey Sand, 11.00m to 15.50m SPT's N= 13-23

vii. Dense Clayey Silty Sand, 15.50m to 17.00m SPT's N= 37

viii. Dense to Very Dense Silty Sand, 17.00m to 20.50m SPT's N= 46-55

ix. Very Dense Gravelly Silty Clayey Sand, 20.50m to 22.00m SPT's N= >100

x. Very Dense Sandy Gravel, 22.00m to 22.50m SPT's N= >100

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

i. Filled Up Soil 0.00m to 1.00m

ii. Very Loose Clayey Silty Sand, 1.00m to 2.10m SPT's N= 4

iii. Medium Dense Silty Sand, 2.10m to 8.20m SPT's N= 12-24

iv. Medium Stiff Sandy Silty Clay, 8.20m to 11.00m SPT's N= 5-8

v. Loose Silty Clayey Sand, 11.00m to 12.70m SPT's N= 7

vi. Medium Dense Silty Clayey Sand, 12.70m to 14.50m SPT's N= 12

vii. Medium Dense Silty Clayey Sand, 14.50m to 16.00m SPT's N= 23

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viii. Medium Dense Silty Sand, 16.00m to 17.50m SPT's N= 28

ix. Dense Silty Clayey Sand, 17.50m to 19.70m SPT's N= 45

x. Very Dense Silty Clayey Sand, 19.70m to 21.00m SPT's N= 51

xi. Very Dense Sandy Gravel, 21.00m to 22.00m SPT's N= >100

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

9.0. FOUNDATION ANALYSIS AND DESIGN

From the bore log data soil strata is not similar in both the locations. From 0.00m to 1.10 filled up soil is present. From 1.10m to 2.20m loose Clayey Silty Sand layer is present. From 2.20m to 8.30m medium dense Silty Sand layer is present. From 8.30m to 11.00m medium stiff to stiff Sandy Silty Clay layer is present, this layer has got swelling character. From 11.00m to 20.00m medium dense to dense Clayey Silty Sand/ Silty Clayey Sand layer is present. From 20.00m to 22.00m very dense Silty Clayey Sand/ Gravelly Silty Clayey Sand layer is present. Below 22.00m very dense (Dis-integrated Rock) layer is seen, this layer is fair to rest yhe pile foundation for heavy loaded structure..

The layer up to 17.00m is the critical zone for open foundation system. With in the critical zone loose to medium dense sandy layer and medium stiff to stiff Clayey layer is present. For light loaded structure open foundation of **Isolated Footing** (or) **Continuous Strip 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. Existing ground level is same as the road level. The 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, **deep foundation of pile** can be provided. The pile foundation can be

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Bored Cast in situ pile. The pile foundation can be terminated at the minimum depth of **23.00m** below existing ground level, existing ground level at the time of soil investigation. The pile should be anchored into the very dense Sandy Gravel 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 bearing capacity (qu) could be calculated from the following formula.

$qu = \gamma\ Df\ Nq + 0.4\ \gamma'\ B\ N\gamma$

The observed N-Value is taken as 12 from Fig. 2&3.

The corresponding bearing capacity factors are,

$Nq = 10.33$

$N\gamma = 7.70$

Where,

γ = Bulk density = 1.50 t/m 3

γ' = Submerged density = 0.50 t/m 3

Df = Depth of footing = Considered minimum of 2.10 m.

Dw = Depth of water table = 3.00m

B = Breadth of the footing = Consider minimum of 1.00m.

Substitute all the above values in the formula,

$q_u = 1.50 \times 2.10 \times 10.33 + 0.4 \times 0.50 \times 1.00 \times 7.70$

$= 32.539 + 1.54$

$= 34.079\ t/m^2$

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

Hence, safe bearing capacity $q_s = q_u / 2.5$

$= 34.079 / 2.50$

$= 13.631\ t/m^2$. Say $14.00\ t/m^2$

Therefore, Safe Bearing Capacity of the soil at the depth of 2.10m is 14.00 t/m^2

9.2. LOAD CARRYING CAPACITY OF THE CONVENTIONAL PILE-23.00m DEPTH

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

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

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 efficient overburden pressure = $11.25\ t/m^2$

δ = angle of wall friction = 32

D = Dia meter of pile = 0.40m

L = Length of individual layer = 1.00m

$= 0.471 \times 11.25 \times 0.624 \times 3.14 \times 0.40 \times 1.00$

$= 4.152\ t$

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

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where

Nq = Bearing Capacity Factor = 105

σ'_{vo} = effective overburden pressure at the toe = 11.50 t/m^2

Ab = Cross sectional area at the base

D = Dia of Pile = 0.40m

= 105 x 11.50 x 3.14 x 0.40^2 /4

= 151.662 t

Qu = Qb + Qs

= 151.662 +4.152 = 155.814 t

Q safe = Qu/F.S

= 155.814 / 2.5

= 62.325 say 62.00 t

The safe load carrying capacity for six different diameter of piles for the **depth of 23.00m** for the worst case is worded out and given below.

Dia of Pile	Depth of Pile	Safe Load (Tones)
400mm	23.00m	62
450mm	23.00m	79
500mm	23.00m	97
600mm	23.00m	139
750mm	23.00m	216

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. The foundation can be **Isolated Footing or Continues strip Raft Foundation (Inverted T Beam connecting column on both directions)** or **Raft Foundation.**
3. The foundation can be placed at the **minimum depth** of about **2.10m** below existing ground level. (Ground level at the time of soil investigation). The existing ground level is same as the existing Road level.
4. The **Safe Bearing Capacity** of the soil at the minimum **depth of 2.10m** is **14.00 t / m^2.**
5. The minimum width of footing should be maintained as 1.00m to avoid any punching shear failure and to achieve suggested SBC.
6. All the foundation should rest on 100 mm thick 1:4:8 concrete mat, over 100mm thick river sand or M Sand layer.
7. **For heavy loaded structure**, if the SBC is not sufficient for the expected loading intensity, **deep foundation of pile foundations can be provided.** The pile foundation can be Bored Cast in situ pile. The pile foundation should be terminated at the **minimum depth of 23.00m** below existing ground level. The load carrying capacity for five different diameter of pile for the minimum depth of 23.00m is worked out and given below.

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Dia of Pile	Depth of Pile	Safe Load (Tones)
400mm	23.00m	62
450mm	23.00m	79
500mm	23.00m	97
600mm	23.00m	139
750mm	23.00m	216

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)

8. The pile should be **anchored** into the Very Dense Sandy Gravel (Disintegrated Rock) layer for minimum of **1.00m depth.** The depth of pile may vary slightly according to site condition.

9. The soil strata is sandy and medium stiff Clay, 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.

10. The bore hole should be flushed properly before laying concrete.

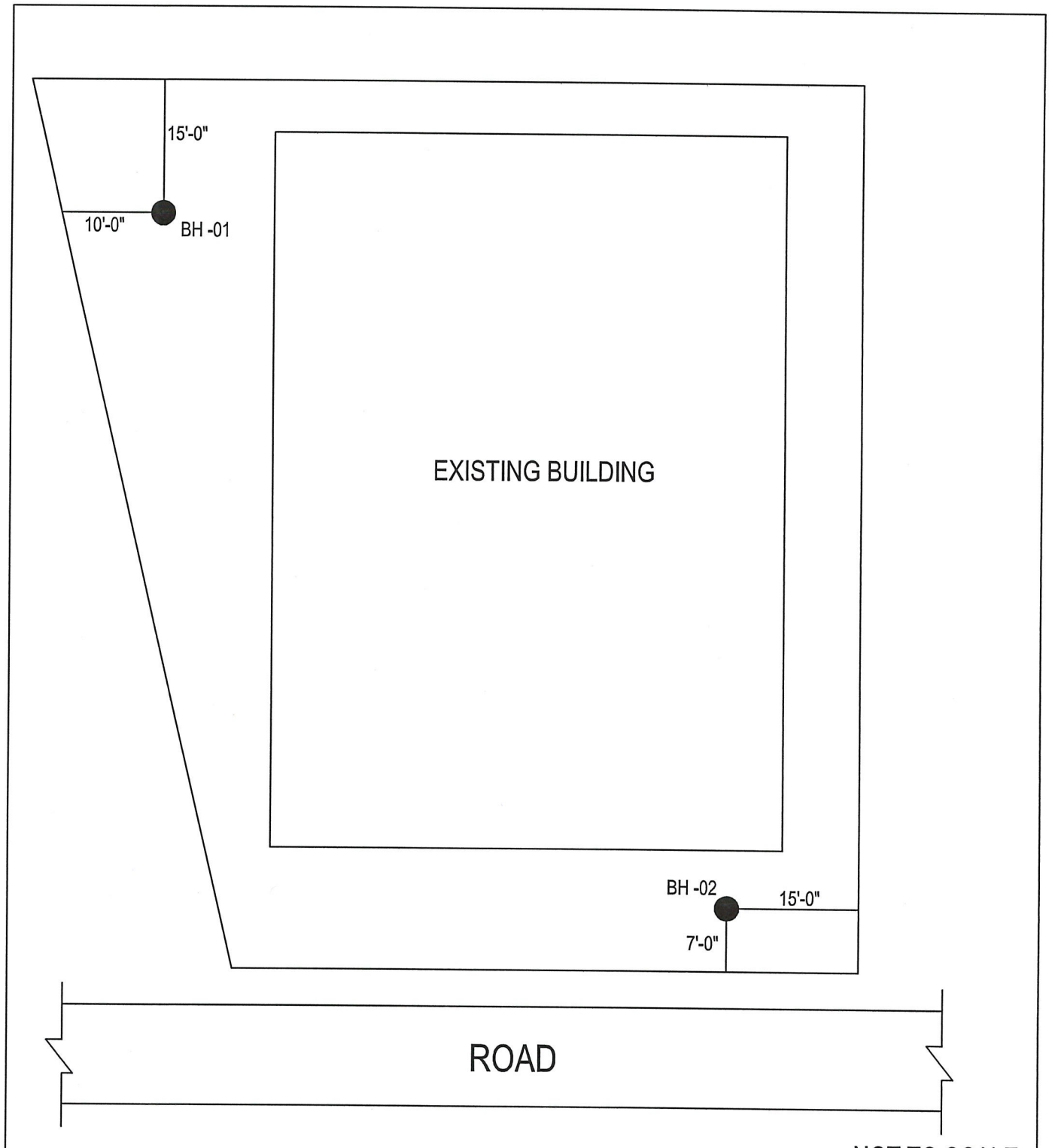
11. It is advisable not to mix the deep foundation and shallow foundation in the same building, combined Pile cum Raft can be adopted.

12. All suggested foundation recommendations and precautions should be adopted while undertaking the design aspects and construction activities.

For T.J. Engineers

10 - 02 – 2020

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



NOT TO SCALE

PROJECT:-	CLIENT:-		
PROPOSED BUILDING AT DOOR NO. 13, BALFOUR ROAD, KILPAUK, CHENNAI-600 010.	M/S LIFESTYLE HOUSING AND INFRASTRUCTURE CHENNAI.	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 tjengineers1990@gmail.com OFF: 044-42314194

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BORE LOG

PROJECT : **Proposed Building at Door No. 13, Balfour Road, Kilpauk, Chennai-600 010.**
BORE HOLE NO : **B.H:01**
TYPE OF BORING : **Rotary Drilling**

DATE OF COMMENCEMENT: **02 - 02 - 2020**
DATE OF COMPLETION : **02 - 02 - 2020**
G.W.L : **3.00m**

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 Soil**	1.10					
1.00				1.10		1.50	5	Loose
2.00		**Clayey Silty Sand-CSLS1 (Grayish Brown)**	1.10	2.20				
3.00						3.00	13	Medium Dense
4.00						4.50	21	Medium Dense
5.00		**Silty Sand-SLS1 (Whitish Yellowish Brown)**	6.10					
6.00						6.00	23	Medium Dense
7.00						7.50	25	Medium Dense
8.00				8.30				
9.00		**Sandy Silty Clay-SSLC1 (Whitish Gray)**	1.70			9.00	9	Stiff
10.00				10.00				
11.00		**Sandy Silty Clay-SSLC2 (Grayish)**	1.00	11.00		10.50	6	Medium Stiff
12.00						12.00	13	Medium Dense
13.00		**Silty Clayey Sand-SLCS1 (Grayish Brown)**	4.50			13.50	16	Medium Dense
14.00								
15.00						15.00	23	Medium Dense
16.00		**Clayey Silty Sand-CSLS2 (Whitish Gray Yellowish Brown)**	1.50	15.50		16.50	37	Dense

Graphical representation of penetration resistance: 10 20 30 40 50

Remark: All Dimensions in meters
End of Boring

FIG: 2

cont....

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BORE LOG

PROJECT : **Proposed Building at Door No. 13, Balfour Road, Kilpauk, Chennai-600 010.**
BORE HOLE NO : **B.H:01**
TYPE OF BORING : **Rotary Drilling**

DATE OF COMMENCEMENT: **02 - 02 - 2020**
DATE OF COMPLETION : **02 - 02 - 2020**
G.W.L : **3.00m**

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	Standard penetration testdata: N-Value	Standard penetration testdata: Relative density/ Consistency	Graphical representation of penetration resistance (10 20 30 40 50)
17.00				17.00					
18.00		**Silty Sand-SLS2 (Whitish Gray Yellowish Brown)**	3.50			18.00	46	Very Dense	
19.00									
20.00						20.00	55	Very Dense	
20.50				20.50					
21.00		**Gravelly Silty Clayey Sand-GSLCS1 (Yellowish Brown)**	1.50			21.00	>100	Very Dense	
22.00				22.00					
22.50 →		**Sandy Gravel-SG1 (Disintegrated Rock) (Yellowish Brown Whitish Grayish)**				22.50	>100	Very Dense	
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: 2

BORE LOG

PROJECT : **Proposed Building at Door No. 13, Balfour Road, Kilpauk, Chennai-600 010.**
BORE HOLE NO : **B.H:02**
TYPE OF BORING : **Rotary Drilling**

DATE OF COMMENCEMENT: **02 - 02 - 2020**
DATE OF COMPLETION : **02 - 02 - 2020**
G.W.L : **3.00m**

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 Soil**	1.00	1.00				
1.00		**Clayey Silty Sand-CSLS1 (Grayish Brown)**	1.10	2.10		1.50	4	Very Loose
2.00						3.00	12	Medium Dense
3.00						4.50	20	Medium Dense
4.00		**Silty Sand-SLS1 (Whitish Yellowish Brown)**	6.10			6.00	22	Medium Dense
5.00						7.50	24	Medium Dense
6.00						9.00	8	Medium Stiff
7.00						10.50	5	Medium Stiff
8.00				8.20		12.00	7	Loose
9.00		**Sandy Silty Clay-SSLC1 (Dark Gray)**	2.80			13.50	12	Medium Dense
10.00						15.00	23	Medium Dense
11.00				11.00		16.50	28	Medium Dense
12.00		**Silty Clayey Sand-SLCS1 (Dark Gray)**	1.70	12.70				
13.00		**Silty Clayey Sand-SLCS2 (Yellowish Brown Whitish Gray)**	1.80					
14.00				14.50				
15.00		**Silty Clayey Sand-SLCS3 (Whitish Gray Yellowish Brown)**	1.50					
16.00				16.00				
		Silty Sand-SLS2 (Grayish Brown)	1.50					

Graphical representation of penetration resistance: 10 20 30 40 50

Remark: All Dimensions in meters
End of Boring

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FIG: 3

cont....

BORE LOG

PROJECT : Proposed Building at Door No. 13, Balfour Road, Kilpauk, Chennai-600 010.
BORE HOLE NO : B.H:02
TYPE OF BORING : Rotary Drilling

DATE OF COMMENCEMENT: 02 - 02 - 2020
DATE OF COMPLETION : 03 - 02 - 2020
G.W.L : 3.00m

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	Standard penetration testdata: N-Value	Standard penetration testdata: Relative density/ Consistency	Graphical representation of penetration resistance
17.00		Silty Sand-SLS2 (Grayish Brown)		17.50					
18.00		Silty Clayey Sand-SLCS4 (Whitish Gray Yellowish Brown)	2.20			18.00	45	Very Dense	
19.00									
20.00		Silty Clayey Sand-SLCS5 (Whitish Gray)	1.30	19.70		20.00	51	Very Dense	
21.00		Sandy Gravel-SG1 (Disintegrated Rock) (Yellowish Brown)	1.00	21.00		21.50	>100	Very Dense	
22.00 →		Sandy Gravel-SG2 (Disintegrated Rock) (Grayish Brown)		22.00		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: 3

Project: Proposed Building at Door No. 13, Balfour Road, Kilpauk, Chennai-600 010.

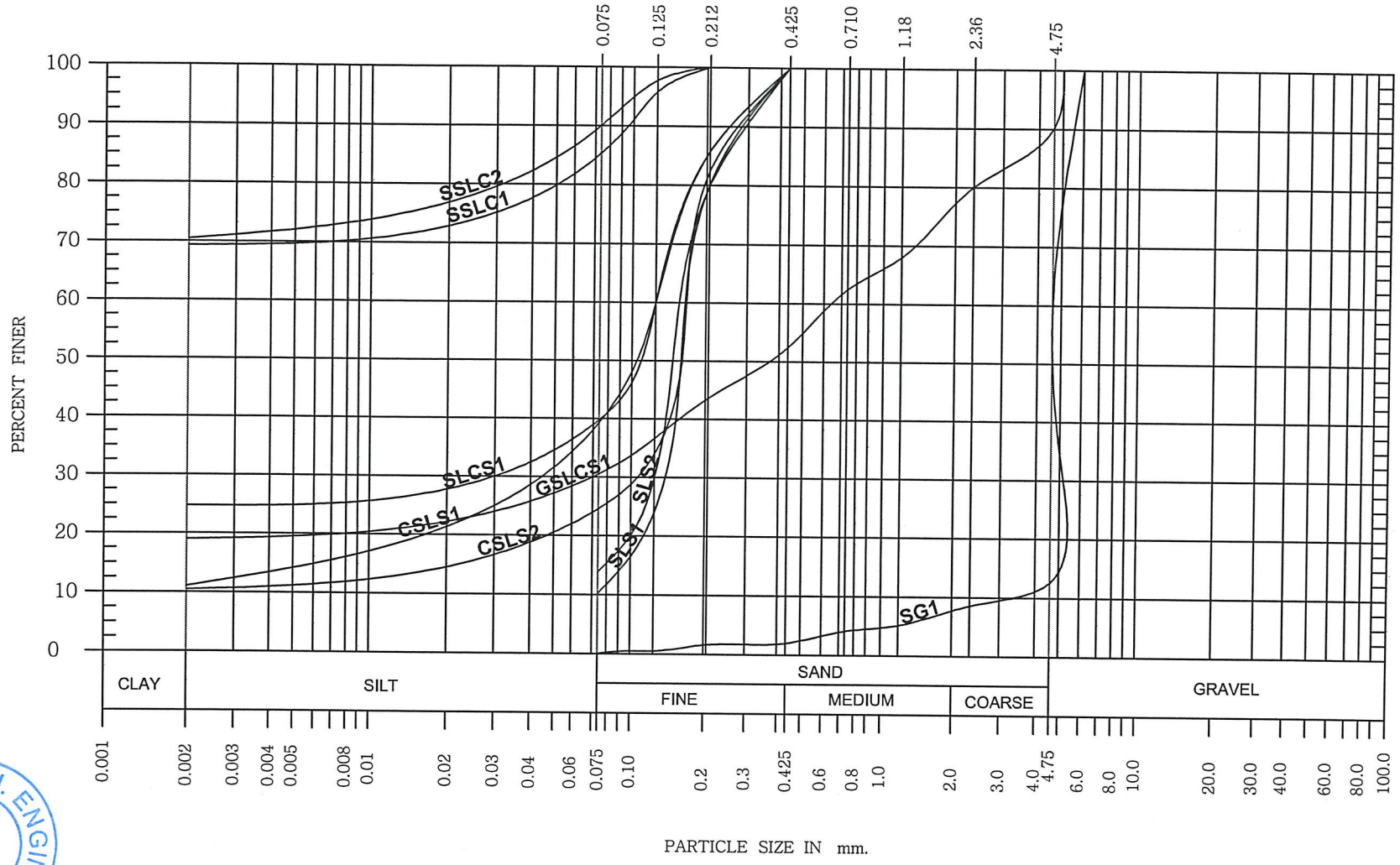


FIG. 4 GRAIN SIZE DISTRIBUTION CURVE-BH-01

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Project: Proposed Building at Door No. 13, Balfour Road, Kilpauk, Chennai-600 010.

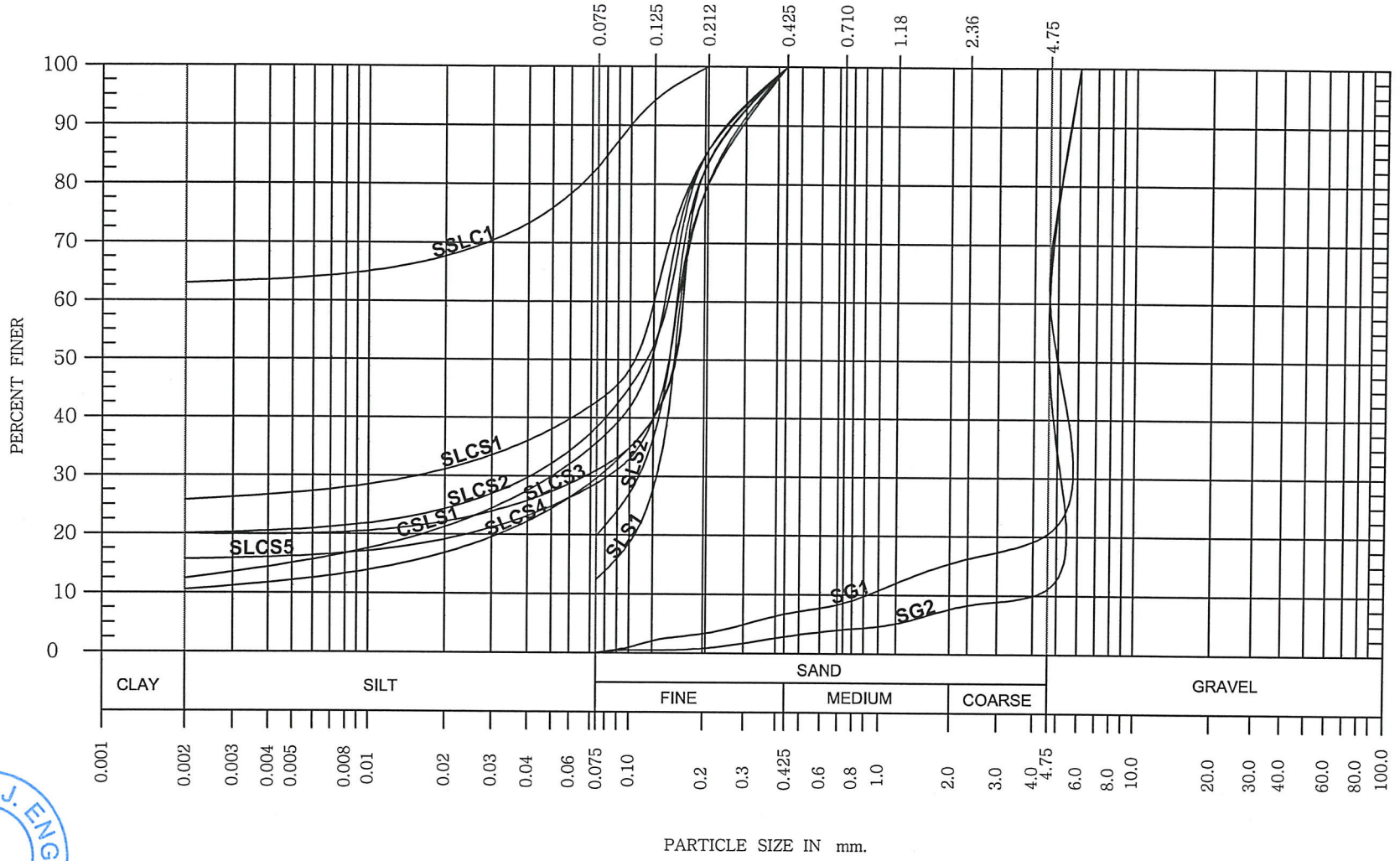


FIG. 5 GRAIN SIZE DISTRIBUTION CURVE-BH-02

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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 - 1.10	Filled Up Soil	–	–	–	–	–	–	–	–	–
	1.10 - 2.20	Clayey Silty Sand-CSLS1	1.50	–	2.64	–	12	26	62	0	–
	2.20 - 8.30	Silty Sand-SLS1	3.00	–	2.63	–	0	11	89	0	–
	8.30 - 10.00	Sandy Silty Clay-SSLC1	9.00	–	2.65	39	68	18	14	0	–
	10.00 - 11.00	Sandy Silty Clay-SSLC2	10.50	–	2.65	42	71	19	10	0	–
	11.00 - 15.50	Silty Clayey Sand-SLCS1	12.00	–	2.64	–	25	14	61	0	–
	15.50 - 17.00	Clayey Silty Sand-CSLS2	16.50	–	2.64	–	11	14	75	0	–
	17.00 - 20.50	Silty Sand-SLS2	18.00	–	2.63	–	0	14	86	0	–
	20.50 - 22.00	Gravelly Silty Clayey Sand-GSLCS1	21.50	–	2.64	–	18	14	59	9	–
	22.00 - 22.50	Sandy Gravel-SG1	22.50	–	2.63	–	0	0	13	87	–

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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
	m		DS / SPT m	UDS m			Clay %	Silt %	Sand %	Gravel %	
2	0.00 - 1.00	Filled Up Soil	–	–	–	–	–	–	–	–	–
	1.00 - 2.10	Clayey Silty Sand-CSLS1	1.50	–	2.64	–	13	23	64	0	–
	2.10 - 8.20	Silty Sand-SLS1	3.00	–	2.63	–	0	13	87	0	–
	8.20 - 11.00	Sandy Silty Clay-SSLC1	9.00	–	2.65	43	63	21	16	0	–
	11.00 - 12.70	Silty Clayey Sand-SLCS1	12.00	–	2.64	–	26	18	56	0	–
	12.70 - 14.50	Silty Clayey Sand-SLCS2	13.50	–	2.64	–	20	17	63	0	–
	14.50 - 16.00	Silty Clayey Sand-SLCS3	15.00	–	2.64	–	20	12	68	0	–
	16.00 - 17.50	Silty Sand-SLS2	16.50	–	2.63	–	0	19	81	0	–
	17.50 - 19.70	Silty Clayey Sand-SLCS4	18.00	–	2.64	–	9	20	71	0	–
	19.70 - 21.00	Silty Clayey Sand-SLCS5	20.00	–	2.64	–	16	11	73	0	–
	21.00 - 22.00	Sandy Gravel-SG1	21.50	–	2.63	–	0	0	21	79	–
	22.00	Sandy Gravel-SG2	22.00	–	2.63	–	0	0	11	89	–

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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	φ	
	m		m	m	%	%	t/m^3			t/m^2	degree	
1	0.00 - 1.10	Filled Up Soil	–	–	–	–	–	–	–	–	–	–
	1.10 - 2.20	Clayey Silty Sand-CSLS1	1.50	–	–	–	1.50	–	–	–	28	–
	2.20 - 8.30	Silty Sand-SLS1	3.00	–	–	–	1.52	–	–	–	30	–
	8.30 - 10.00	Sandy Silty Clay-SSLC1	9.00	–	64	23	1.50	–	–	5.42	–	–
	10.00 - 11.00	Sandy Silty Clay-SSLC2	10.50	–	67	25	1.50	–	–	3.62	–	–
	11.00 - 15.50	Silty Clayey Sand-SLCS1	12.00	–	–	–	1.52	–	–	–	32	–
	15.50 - 17.00	Clayey Silty Sand-CSLS2	16.50	–	–	–	1.54	–	–	–	33	–
	17.00 - 20.50	Silty Sand-SLS2	18.00	–	–	–	1.57	–	–	–	36	–
	20.50 - 22.00	Gravelly Silty Clayey Sand-GSLCS1	21.50	–	–	–	1.58	–	–	–	39	–
	22.00 - 22.50	Sandy Gravel-SG1	22.50	–	–	–	1.62	–	–	–	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 - 1.00	Filled Up Soil	–	–	–	–	–	–	–	–	–	–
	1.00 - 2.10	Clayey Silty Sand-CSLS1	1.50	–	–	–	1.50	–	–	–	27	–
	2.10 - 8.20	Silty Sand-SLS1	3.00	–	–	–	1.52	–	–	–	31	–
	8.20 - 11.00	Sandy Silty Clay-SSLC1	9.00	–	59	22	1.50	–	–	3.10	–	–
	11.00 - 12.70	Silty Clayey Sand-SLCS1	12.00	–	–	–	1.50	–	–	–	29	–
	12.70 - 14.50	Silty Clayey Sand-SLCS2	13.50	–	–	–	1.51	–	–	–	31	–
	14.50 - 16.00	Silty Clayey Sand-SLCS3	15.00	–	–	–	1.53	–	–	–	33	–
	16.00 - 17.50	Silty Sand-SLS2	16.50	–	–	–	1.53	–	–	–	34	–
	17.50 - 19.70	Silty Clayey Sand-SLCS4	18.00	–	–	–	1.55	–	–	–	37	–
	19.70 - 21.00	Silty Clayey Sand-SLCS5	20.00	–	–	–	1.58	–	–	–	38	–
	21.00 - 22.00	Sandy Gravel-SG1	21.50	–	–	–	1.59	–	–	–	40	–
	22.00	Sandy Gravel-SG2	22.00	–	–	–	1.62	–	–	–	41	–

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