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PROJECT

GEOTECHNICAL INVESTIGATION FOR THE PROPOSED CONSTRUCTION OF STILT FLOOR (PARKING) + 5 FLOORS RESIDENTIAL BUILDING WITH 15 DWELLING UNITS AT PLOT.68, BLOCK NO. 4, EAST AVENUE ROAD, KORATTUR, CHENNAI – 600080, COMPRISED IN OLD SURVEY NO.1189/PART, 1191/1A1 PART, T.S. NO. 32/1/2, BLOCK NO.81. WARD NO 7(E), KORATTUR VILLAGE, WITHIN THE LIMITS OF GRATER CHENNAI CORPORATION

CLIENT

M/s PUSHKAR PROPERTIES PRIVATE LIMITED,
ETHIRAJ HOUSE, F BLOCK NO: 205,
1st STREET, ANNA NAGAR EAST,
CHENNAI – 600102.

TITLE

GEOTECHNICAL INVESTIGATION REPORT

REPORT NO.: GT- 2448

DATE	REVISON	DESCRIPTION		AUTHORISED SIGNATORY
02/12/2022	FIRST SUBMISSION	SUBMISSION OF FINAL GEOTECHNICAL REPORT	SIGN	
			DATE	02/12/2022
			DESIGNATION	**MANAGING DIRECTOR**
			NAME	**DR. C.V.PRASAD**

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REPORT TEXT

CHAPTER-1

INTRODUCTION

1.0 PROJECT INFORMATION MATRIX:

Nature of project : **PROPOSED RESIDENTIAL BUILDING**

Structure : **STILT + 5 UPPER FLOORS**

Project Owner : **M/s PUSHKAR PROPERTIES PRIVATE LIMITED**

Project Location : **EAST AVENUE ROAD, KORATTUR, CHENNAI**

Job Code : **GT-2448**

1.1 SCOPE OF WORK:

1.1.1 FIELD WORK:

- Conducting three soil investigation bore holes of 150 mm diameter in Soil & Overburden. In case of rock formation NX Diameter with Core barrel shall be adopted to progress the drilling up the termination depth.
- Conducting Standard Penetration Test (SPT) within the borehole at:
  - Every 1.0m depth interval up to 6.0m.
  - From 6.0m to 12.0m, SPT is conducted at every 1.5m depth interval
  - From 12.0m to 20.0m SPT is conducted at every 2.0m depth interval
  - Beyond 20.0m SPT is conducted at every 2.5m depth interval
  - Core drilling is carried out at every 1.5m depth interval
- Collection of disturbed soil samples at SPT location and undisturbed samples from the clayey strata with SPT-value greater than 2 to less than 15 if met within the investigation depth
- Collection of water samples if groundwater table met within the investigation depth

1.1.2 LABORATORY WORK:

- Natural Moisture Content
- Atterberg's limits
- Grain Size Analysis
- Consolidation test on undisturbed samples if applicable
- Chemical Analysis test on soil and water samples to give pH, Chlorides and Sulphates

1.2 STRUCTURE OF THE REPORT:

- Contents
- Introduction
- Investigation Methodology & Test Results
- Sub-Surface Stratification
- Foundation System
- Recommendation
- Annexure

CHAPTER-2

INVESTIGATION METHODOLOGY & TEST RESULTS

2.0 PREAMBLE:

Three soil investigation boreholes were put as per the planning of the engineer in-charge and these locations are shown in Fig.2.0.The equipment used and the methodology adopted to carry out the fieldwork is described below.

2.1 METHODOLOGY OF FIELD WORK:

2.1.1 EQUIPMENT USED AND METHOD OF DRILLING:

All the boreholes were sunk by conventional rotary drilling rigs. For borehole Methodology followed for boring conformed to IS: 1892 -2000. Boring was progressed by the cutting action of rotating bit with water circulation and stabilizing the side of the boreholes by using casing pipes/bentonite slurry up to required depth to prevent collapse of sidewall. Boring was continued by normal boring process using MS soil cutter in soil. However Tungsten Carbide (TC) bit drilling was resorted to drill in highly weathered rock stratum where the normal boring process became slow. Diamond Core (DC) bit drilling was adopted in moderately weathered rock formations where penetration using TC bit was became slow.

2.1.2 STANDARD PENETRATION TESTS:

This is a field test to determine “Penetration Resistance of Stratum at the Test Depth”. This has been conducted in the boreholes generally up to refusal depth using procedures described in IS: 2131- 2002. In this test, split spoon sampler (50.8 mm OD and 35 mm ID) has replaced driving bit. Sampler is then driven by dropping 63.5 kg hammer on top of driving collar with free fall of 75 cm. The length of sampler is 60 cm.

The tests were conducted at the depth intervals indicated in Chapter-1 (Sec.1.1.1).

2.1.3 COLLECTION OF SOIL SAMPLES:

2.1.3.1 DISTURBED SAMPLES:

The SPT-samples collected were used as disturbed soil samples. These samples were used for visual and physical identification and for conducting laboratory classification tests as per I.S.1498-1970.

2.1.3.2 UNDISTURBED SAMPLES:

From the soft to stiff clay layer, representative undisturbed samples were collected. These samples were used primarily to establish the compressibility parameters to estimate the settlements of shallow foundation system wherever applicable.

2.1.4 COLLECTION OF GROUND WATER SAMPLES:

One representative water sample from each borehole was collected after 24 hours of completing the borehole if water table met within the investigated depth.

NOTE ON GROUNDWATER TABLE RECORD:

- Groundwater table observation in geotechnical report is predominantly to arrive at foundation design criteria and shall not be construed as design guidelines for the design of dewatering systems
- The groundwater level indicated in the bore logs is specific to the duration of investigation and intensity of the monsoon rains during the time of investigation. Hence, the level shall be taken as guidelines only to plan the investigation for the dewatering system
- No foundation excavation or basement excavations if anticipated within the groundwater table zone shall be carried out without implementing groundwater lowering schemes

2.2 LABORATORY TESTING:

2.2.1 ON COARSE GRAINED SOIL:

On the representative samples, sieve analysis tests were conducted to arrive at grain size distribution. These tests were conducted as per I.S.2720 (part 4)-1985 and the results are presented in Tables-2.1 to 2.3. The graphical representation of grainsize distribution curve for the representative samples in each bore is presented in Fig. 2.5 to 2.7.

2.2.2 ON FINE GRAINED SOIL:

On the SPT sample index property tests were conducted to estimate consistency. These test results are presented in Tables-2.1 to 2.3. The graphical representation of hydrometer analyses curve for the representative samples in each bore is presented in Fig. 2.8 to 2.12.

2.2.3 CHEMICAL ANALYSIS TESTS:

On representative soil and water samples chemical analysis tests were conducted to estimate pH, Chloride and Sulphates and these results are presented in Table - 2.4 & 2.5.

2.3 SUMMARY:

The locations of the field investigation boreholes are shown in site plan given in Fig.2.0. The average sub soil profiles encountered at each location along with their classification and engineering properties are presented in Figs.2.1 to 2.3.

The cross sectional variation of sub soil formation is presented in Fig. 2.4

SITE PLAN

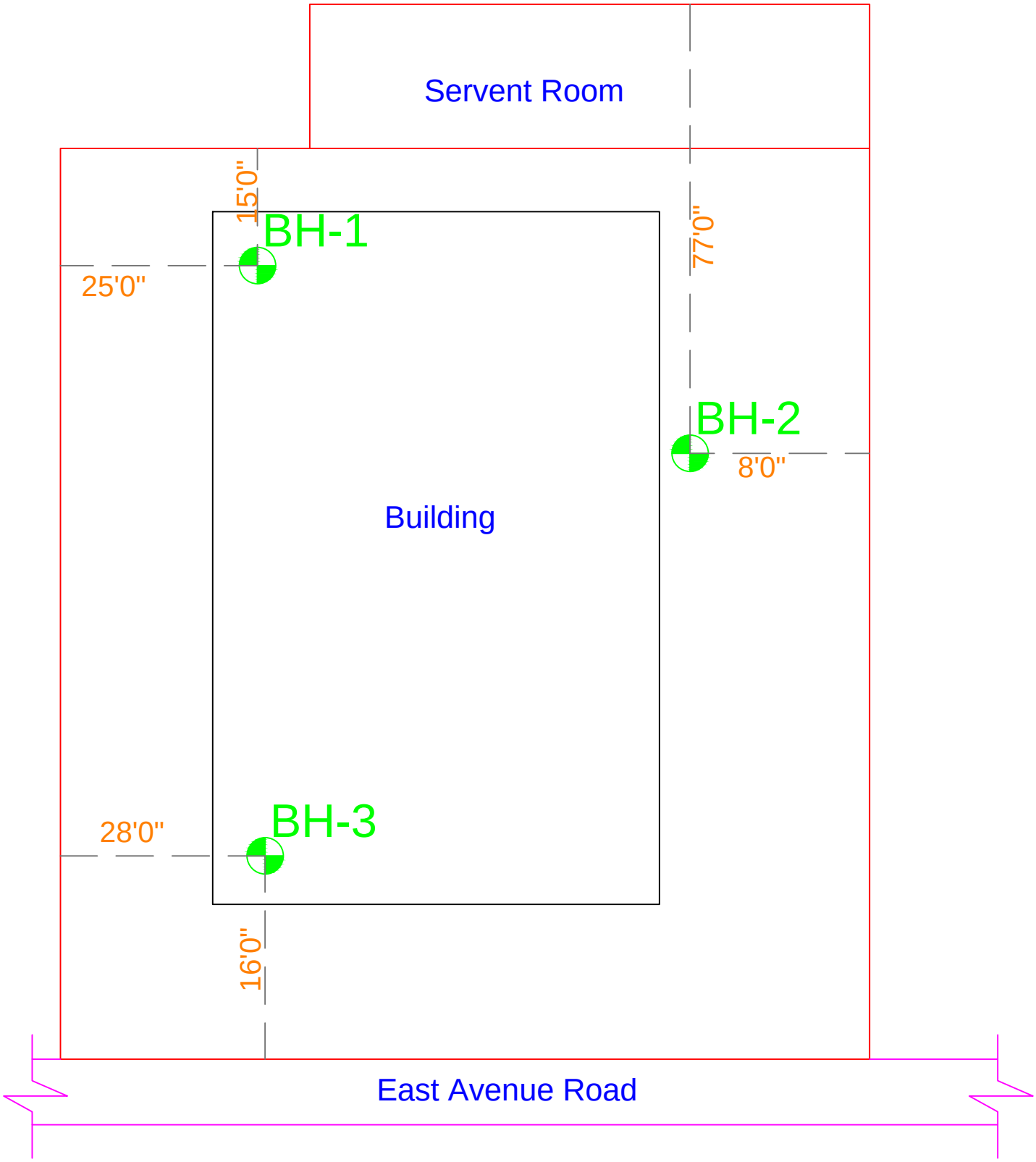


FIG. 2.0 SITE PLAN SHOWING THE FIELD INVESTIGATION BOREHOLE LOCATION

SOIL PROFILES

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SITE INVESTIGATION RECORD

BORE HOLE No.	BH-01		
SHEET	1	OF	3
DIA OF BORE HOLE	150mm ✓		
	NX		

PROJECT NAME	PROPOSED CONSTRUCTION OF A RESIDENTIAL BUILDING					BORE START DATE	21/09/2022
LOCATION	Korattur, Chennai	MACHINE No.	-	CHAINAGE (m)	-		
STRUCTURE	Stilt + 5 Upper Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N -	BORE END DATE	23/09/2022
JOB CODE	GT-2448	FLUSHING MEDIUM	Bentonite		E -	TOTAL DRILL DAYS	3

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	15-30	30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	RL (m)	Layer Data: Legend	No	Depth	Geotechnical Description
0	21/09/2022	14	40															
			To	SC	-	-												
		14	41				3	7	8	15	0.50	1	SS	-0.5		L1	0.5	Grey,Brownish Grey,Moist,Poorly Graded,Fine Grains Sand ,**Sandy Silt**
		15	05								0.95							
1			To	SC	-	-												
		15	06				4	8	9	17	1.25	2	SS	-1.3				Brownish Grey,Moist,Stiff & Very Stiff,**Silty CLAY (CI)** With Sand Mixture Lean Clay of Medium Plasticity
		15	28								1.70							
			To	SC	-	-												
2		15	29				7	9	11	20	2.00	3	SS	-2.0		L2	2.0	
		16	05								2.45							Grey,Yellow Shades,Moist,Poorly Graded,Fine Grains Sands,Medium Dense,**Sandy SILT (ML) With Binder @ Times**
			To	SC	-	-												
3		16	06				2	3	4	7	3.00	4	SS	-3.0		L3	3.0	
		16	30								3.45							
			To	SC	-	-												
		16	31															
4							6	3	4	7	4.00	5	SS	-4.0				Brownish Grey,Moist,Medium Stiff,**Silty CLAY (CH) & Clayey SILT (ML)** Clays of High Plasticity & Silt of Low to Non Plastic
		16	55								4.45							
			To	SC	-	-												
		16	56															
5							2	4	13	17	5.00	6	SS	-5.0		L4	5.0	
	22/09/2022	09	30								5.45							
			To	SC	-	-												
		09	31															
6							7	8	10	18	6.00	7	SS	-6.0				
		09	55								6.45							
			To	SC	-	-												
7		09	56															
							9	11	13	24	7.50	8	SS	-7.5				Grey,Black,Moist,Very Stiff,**Silty CLAY (CL) & Silty CLAY (CI)** Clay of Medium & Low Plasticity
											7.95							
8		10	30															
			To	SC	-	-												
		10	31															
9							5	7	9	16	9.00	9	SS	-9.0				
											9.45							
		10	55															
			To	SC	-	-												
10		10	56															

CS - Core Sample	DS - Disturbed Sample	LOGGED	S.Ananth	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	22/09/2022	GROUND LEVEL (m) 0.00	
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	G.Sharmila	WATER TABLE (m) 2.30	
WS - Wash Sample	DB - Diamond Bit	DATE	26/09/2022	CASING DEPTH (m) 0.00	

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SITE INVESTIGATION RECORD

BORE HOLE No.	BH-01		
SHEET	2	OF	3
DIA OF BORE HOLE	150mm ✓		
	NX		

PROJECT NAME	PROPOSED CONSTRUCTION OF A RESIDENTIAL BUILDING					BORE START DATE	21/09/2022
LOCATION	Korattur, Chennai	MACHINE No.	-	CHAINAGE (m)	-		
STRUCTURE	Stilt + 5 Upper Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N -	BORE END DATE	23/09/2022
JOB CODE	GT-2448	FLUSHING MEDIUM	Bentonite		E -	TOTAL DRILL DAYS	3

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	15-30	30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	RL (m)	Layer Data: Legend	No	Depth	Geotechnical Description
							2	3	3	**6**	10.50	10	SS	-10.5		L5	10.5	Grey,Black,Moist,Very Stiff,**Silty CLAY (CL) & Silty CLAY (CI)** Clay of Medium & Low Plasticity
11		11	15	SC	-	-					10.95							Grey,Moist,Medium Stiff,**Silty CLAY (CH)** Clays of High Plasticity
		To																
		11	17															
12							5	7	9	**16**	12.00	11	SS	-12.0		L6	12.0	
											12.45							
		12	25															
13		To		SC	-	-												
		12	27															
14							10	11	13	**24**	14.00	12	SS	-14.0				Grey,Yellow Grey at Times,Moist,Very Stiff,**Silty CLAY (CH) With Traces of Sand** Clays of High Plasticity
											14.45							
		14	30															
15	22/09/2022	To		SC	-	-												
		14	33															
16							12	16	19	**35**	16.00	13	SS	-16.0		L7	16.0	
											16.45							
		15	10															
17		To		SC	-	-												Yellow Grey,Moist,Sub Fissile,Hard, **Fissile Silty CLAY (CH)** Clay of High Plasticity
		15	14															
18							15	20	27	**47**	18.00	14	SS	-18.0		L8	18.0	
											18.45							
		16	20															
19		To		SC	-	-												Brownish Yellow,Moist,Poorly Graded, Fine to Coarse Sand Fraction With Traces of Gravels, Dense,**Clayey Silty SAND (SC)/ Residual Soil Texture**
		16	28															
20							12cm penet for 60 blows			**>100**	20.00	15	SS	-20.0	+ + +	L9	20.0	**Residual Soil or Completely Weathered Rock / Grade W5 Rock Formation**
											20.12							

CS - Core Sample	DS - Disturbed Sample	LOGGED	S.Ananth	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	22/09/2022	GROUND LEVEL (m) 0.00	
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	G.Sharmila	WATER TABLE (m) 2.30	
WS - Wash Sample	DB - Diamond Bit	DATE	26/09/2022	CASING DEPTH (m) 0.00	

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SITE INVESTIGATION RECORD

BORE HOLE No.	BH-01		
SHEET	3	OF	3
DIA OF BORE HOLE	150mm ✓		
	NX ✓		

PROJECT NAME	PROPOSED CONSTRUCTION OF A RESIDENTIAL BUILDING					BORE START DATE	21/09/2022
LOCATION	Korattur, Chennai	MACHINE No.	-	CHAINAGE (m)	-		
STRUCTURE	Stilt + 5 Upper Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N -	BORE END DATE	23/09/2022
JOB CODE	GT-2448	FLUSHING MEDIUM	Bentonite		E -	TOTAL DRILL DAYS	3

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	15-30	30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	RL (m)	Layer Data: Legend	No	Depth	Geotechnical Description
21	23/09/2022	09	40	SC	-	-												Brown Yellow,Moist,Fine & Medium Grains Structure,Very Dense,**Residual Soil/ Completely Weathered Rock - Grade W5 Rock Formation** Disintegrated Hypersthene Granitic Rock
		To																
22		09	54															
							SPT-Hammer Rebound			>100	22.50	-	WS	-22.5		L10	22.5	
23		10	30	DB	10	10												Grey,Brown Yellow Shades at Parts,Medium to Coarse Grain Structure,Highly Fractured,**Highly Weathered Rock - Grade W4 Rock Formation** Hypersthene Granitic Rock
		To																
24		11	10				-	-	-	-	24.00	16	CS	-24.0				
		11	45															
		To		DB	15	0												
25		12	30				-	-	-	-	25.00	17	CS	-25.0		L11	25.0	
26																		
27																		
28																		
29																		
30																		

CS - Core Sample	DS - Disturbed Sample	LOGGED	S.Ananth	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	23/09/2022	GROUND LEVEL (m) 0.00	
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	G.Sharmila	WATER TABLE (m) 2.30	
WS - Wash Sample	DB - Diamond Bit	DATE	26/09/2022	CASING DEPTH (m) 0.00	

Borehole terminated at 25 m depth below E.G.L

FIG.2.1 Sub Soil Profile at BH-01 Location

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SITE INVESTIGATION RECORD

BORE HOLE No.	BH-02		
SHEET	1	OF	3
DIA OF BORE HOLE	150mm ✓		
	NX		

PROJECT NAME	PROPOSED CONSTRUCTION OF A RESIDENTIAL BUILDING					BORE START DATE	15/09/2022
LOCATION	Korattur, Chennai	MACHINE No.	-	CHAINAGE (m)	-		
STRUCTURE	Stilt + 5 Upper Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N -	BORE END DATE	16/09/2022
JOB CODE	GT-2448	FLUSHING MEDIUM	Bentonite		E -	TOTAL DRILL DAYS	2

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	Blows/cm. 15-30	Blows/cm. 30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	RL (m)	Layer Data: Legend	No	Depth	Geotechnical Description
0		16	00															
			To	SC	-	-												
		16	04				10	13	13	26	0.50	1	SS	-0.5				
		15	05								0.95							
1			To	SC	-	-												Brown,Moist,Stiff & Very Stiff,**Silty CLAY (CI)** Clay of Medium Plasticity Top Soil is Predominantly Silt
	15/09/2022	15	06				5	4	8	12	1.25	2	SS	-1.3				
		15	28								1.70							
			To	SC	-	-												
2		15	29				12	7	7	14	2.00	3	SS	-2.0		L1	2.0	
		16	05								2.45							Brown,Moist,Poorly Graded,Fine & Medium Grains Sands,Medium Dense,**Silty SAND (SM) With Binder**
			To	SC	-	-												
3		16	06				2	3	2	5	3.00	4	SS	-3.0		L2	3.0	
		09	25								3.45							
			To	SC	-	-												
4		09	33				-	-	-	-	4.00	5	UDS	-4.0				
		09	58															Brown,Grey/Black,Moist,Medium Stiff, **Silty CLAY (CH) & Silty CLAY (CL)** Clays of High & Low Plasticity
			To	SC	-	-												
5		09	59				1	2	2	4	5.00	6	SS	-5.0				
		10	15								5.45							
			To	SC	-	-												
6		10	18				4	8	9	17	6.00	7	SS	-6.0		L3	6.0	
	16/09/2022	10	40								6.45							
			To	SC	-	-												
7		10	45															
							6	10	10	20	7.50	8	SS	-7.5				
											7.95							Grey,Black,Moist,Very Stiff,**Silty CLAY (CI) & Silty CLAY (CH) & Sandy Silty CLAY (CL)** Clay of Low to High Plasticity
8		11	05															
			To	SC	-	-												
		11	13															
9							7	12	10	22	9.00	9	SS	-9.0				
											9.45							
		11	35															
			To	SC	-	-												
10		11	39															

CS - Core Sample	DS - Disturbed Sample	LOGGED	S.Ananth	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	16/09/2022	GROUND LEVEL (m) 0.00	
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	G.Sharmila	WATER TABLE (m) 2.10	
WS - Wash Sample	DB - Diamond Bit	DATE	26/09/2022	CASING DEPTH (m) 0.00	

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SITE INVESTIGATION RECORD

BORE HOLE No.	BH-02		
SHEET	2	OF	3
DIA OF BORE HOLE	150mm ✓		
	NX		

PROJECT NAME	PROPOSED CONSTRUCTION OF A RESIDENTIAL BUILDING							BORE START DATE	15/09/2022
LOCATION	Korattur, Chennai	MACHINE No.	-	CHAINAGE (m)	-			BORE END DATE	16/09/2022
STRUCTURE	Stilt + 5 Upper Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N	-		TOTAL DRILL DAYS	2
JOB CODE	GT-2448	FLUSHING MEDIUM	Bentonite		E	-			

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	Blows/cm. 15-30	Blows/cm. 30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	RL (m)	Legend	Layer Data: No	Depth	Geotechnical Description
							2	2	3	**5**	10.50	10	SS	-10.5		L4	10.5	Grey,Black,Moist,Very Stiff,**Silty CLAY (CI) & Silty CLAY (CH) & Sandy Silty CLAY (CL)**
11		12	00								10.95							
		To		SC	-	-												
		12	06															
12							1	2	2	**4**	12.00	11	SS	-12.0				Grey,Black,Moist,Very Soft & Medium Stiff,**Silty CLAY (CH)** Clays of High Plasticity
											12.45							
		12	35															
13		**To**		SC	-	-												
		12	41															
14							6	10	10	**20**	14.00	12	SS	-14.0		L5	14.0	
											14.45							
		14	00															
15	**22/09/2022**	**To**		SC	-	-												
		14	09															
16							8	10	19	**29**	16.00	13	SS	-16.0				Grey,Offwhite at Times,Moist,Very Stiff, **Silty CLAY (CH)** Clay of High Plasticity
											16.45							
		15	00															
		To		SC	-	-												
17		15	09															
18							26	27	35	**62**	18.00	14	SS	-18.0		L6	18.0	
											18.45							
		16	25															
19		**To**		SC	-	-												
		16	35															
20							12cm penet for 60 blows			**>100**	20.00	15	SS	-20.0	+ + + + +	L7	20.0	**Residual Soil/ Completely Weathered Rock - Grade W5 Rock**
											20.12							

CS - Core Sample	DS - Disturbed Sample	LOGGED	S.Ananth	PROJECT SITE DETAILS		REMARKS	
SS - Split Spoon Sample	SC - Soil Cutter	DATE	22/09/2022	GROUND LEVEL (m)	0.00		
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	G.Sharmila	WATER TABLE (m)	2.10		
WS - Wash Sample	DB - Diamond Bit	DATE	26/09/2022	CASING DEPTH (m)	0.00		

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SITE INVESTIGATION RECORD

BORE HOLE No.	BH-02		
SHEET	3	OF	3
DIA OF BORE HOLE	150mm ✓		
	NX ✓		

PROJECT NAME	PROPOSED CONSTRUCTION OF A RESIDENTIAL BUILDING					BORE START DATE	15/09/2022
LOCATION	Korattur, Chennai	MACHINE No.	-	CHAINAGE (m)	-		
STRUCTURE	Stilt + 5 Upper Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N -	BORE END DATE	16/09/2022
JOB CODE	GT-2448	FLUSHING MEDIUM	Bentonite		E -	TOTAL DRILL DAYS	2

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	SPT Details: Blows/cm. 15-30	SPT Details: Blows/cm. 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Sample Details: RL (m)	Layer Data: Legend	Layer Data: No	Layer Data: Depth	Geotechnical Description
21	23/09/2022	11	40	SC	-	-												Brown Yellow,Fine to Coarse Grain Structue With Traces of Gravels Rock Mass,Very Dense,**Completely Weathered Rock - Grade W5 Formation** Disintegrated Hypersthene Granitic Rock
		To																
		12	05															
22																		
							SPT-Hammer Rebound			>100	22.50	16	WS	-22.5		L8	22.5	
23																		Offwhite, Brown Grey,Medium to Coarse Grain Structure,High Fractured & Disintegrated,**Highly Weathered Rock - Grade W4 Rock Formation** Hypersthene Granitic Rock
		14	25	DB	10	10												
		To																
		15	05															
24							-	-	-	-	24.00	17	CS	-24.0		L9	24.0	
		15	45															Grey,Brown Shades @ Times,Medium to Coarse Grain Structure,Fractured @ Times,**Moderately Weathered Rock - Grade W3 Rock Formation** Hypersthene Granitic Rock
		To		DB	45	0												
		16	40															
25							-	-	-	-	25.00	18	CS	-25.0		L10	25.0	
26																		
27																		
28																		
29																		
30																		

CS - Core Sample	DS - Disturbed Sample	LOGGED	S.Ananth	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	23/09/2022	GROUND LEVEL (m) 0.00	
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	G.Sharmila	WATER TABLE (m) 2.10	
WS - Wash Sample	DB - Diamond Bit	DATE	26/09/2022	CASING DEPTH (m) 0.00	

Borehole terminated at 25 m depth below E.G.L

FIG.2.2 Sub Soil Profile at BH-02 Location

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SITE INVESTIGATION RECORD

BORE HOLE No.	BH-03		
SHEET	1	OF	3
DIA OF BORE HOLE	150mm ✓		
	NX		

PROJECT NAME	PROPOSED CONSTRUCTION OF A RESIDENTIAL BUILDING					BORE START DATE	17/09/2022
LOCATION	Korattur, Chennai	MACHINE No.	-	CHAINAGE (m)	-		
STRUCTURE	Stilt + 5 Upper Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N -	BORE END DATE	20/09/2022
JOB CODE	GT-2448	FLUSHING MEDIUM	Bentonite		E -	TOTAL DRILL DAYS	3

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	15-30	30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	RL (m)	Layer Data: Legend	No	Depth	Geotechnical Description
0		14	25													L1	0.5	Filled Up Soil
		To		SC	-	-												
		14	27				6	7	9	16	0.50	1	SS	-0.5				
		14	50								0.95							
1		To		SC	-	-												Brown,Grey Brown,Moist,Stiff & Very Stiff,**Silty CLAY (CL) & Silty CLAY (CH)** Clay of High & Low Plasticity
		14	51				4	5	6	11	1.25	2	SS	-1.3				
		15	20								1.70							
		To		SC	-	-												
2		15	21				15	18	23	41	2.00	3	SS	-2.0		L2	2.0	
		15	40								2.45							
		To		SC	-	-												Brown,Moist,Poorly Graded,Fine to Medium Sand Fraction,Dense,**Silty SAND (SM) With Binder**
		15	42															
3	17/09/2022						2	3	2	5	3.00	4	SS	-3.0		L3	3.0	
		16	05								3.45							
		To		SC	-	-												
		16	06															
4							5	2	2	4	4.00	5	SS	-4.0				
		16	28								4.45							Grey,Brown Grey,Soft & Medium Stiff,**Silty CLAY (CI) & Silty CLAY (CH) & Sandy Silty CLAY (CL)** Clay of Low to High Plasticity
		To		SC	-	-												
		16	30															
5							3	3	3	6	5.00	6	SS	-5.0				
		16	55								5.45							
		To		SC	-	-												
		16	56															
6							-	-	-	-	6.00	7	UDS	-6.0		L4	6.0	
		09	40															
		To		SC	-	-												Grey,Moist,Poorly Graded,Fine Grains Sands,**Silty Fine SAND (SM)**
		09	42															
7																L5	7.5	
							13	10	12	22	7.50	8	SS	-7.5				
											7.95							
8	19/09/2022	11	05															
		To		SC	-	-												
		11	13															
9							6	11	9	20	9.00	9	SS	-9.0				Grey,Black,Moist,Very Stiff,**Silty CLAY (CH)** Clays of High Plasticity
		10	45								9.45							
		To		SC	-	-												
10		10	47															

CS - Core Sample	DS - Disturbed Sample	LOGGED	S.Ananth	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	19/09/2022	GROUND LEVEL (m) 0.00	
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	G.Sharmila	WATER TABLE (m) 2.40	
WS - Wash Sample	DB - Diamond Bit	DATE	26/09/2022	CASING DEPTH (m) 0.00	

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SITE INVESTIGATION RECORD

BORE HOLE No.	BH-03		
SHEET	2	OF	3
DIA OF BORE HOLE	150mm ✓		
	NX		

PROJECT NAME	PROPOSED CONSTRUCTION OF A RESIDENTIAL BUILDING							BORE START DATE	17/09/2022
LOCATION	Korattur, Chennai	MACHINE No.	-	CHAINAGE (m)	-				
STRUCTURE	Stilt + 5 Upper Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N	-		BORE END DATE	20/09/2022
JOB CODE	GT-2448	FLUSHING MEDIUM	Bentonite		E	-		TOTAL DRILL DAYS	3

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	15-30	30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	RL (m)	Legend	Layer Data: No	Depth	Geotechnical Description
11	19/09/2022	11	40	SC	-	-	2	2	3	5	10.50	10	SS	-10.5		L6	10.5	Grey,Black,Moist,Very Stiff,**Silty CLAY (CH)** Clays of High Plasticity
		To									10.95							
		11	42															
12							2	3	2	5	12.00	11	SS	-12.0				Grey,Black,Moist,Medium Stiff,**Silty CLAY (CH)** Clay of High Plasticity
											12.45							
		14	20															
13		To		SC	-	-												
		14	22															
14							9	8	12	20	14.00	12	SS	-14.0		L7	14.0	
											14.45							
		14	55															
15		To		SC	-	-												
		14	57															
16							12	11	17	28	16.00	13	SS	-16.0				Grey,Black,Moist,Very Stiff,**Silty CLAY (CH)** Clays of High Plasticity
											16.45							
		15	35															
17		To		SC	-	-												
		15	38															
18							32	27	36	63	18.00	14	SS	-18.0		L8	18.0	
											18.45							
		16	25															Grey Yellow,Moist,Poorly Graded,Fine to Coarse Sand With Gravels,Very Dense,**Silty SAND (SM)/ Residual Soil Texture**
19		To		SC	-	-												
		16	29															
20							6cm penet for 55 blows			>100	20.00	15	SS	-20.0	+ + + + +	L9	20.0	**Residual Soil/ Completely Weathered Rock - Grade W5 Rock**
											20.06							

CS - Core Sample	DS - Disturbed Sample	LOGGED	S.Ananth	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	19/09/2022	GROUND LEVEL (m) 0.00	
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	G.Sharmila	WATER TABLE (m) 2.40	
WS - Wash Sample	DB - Diamond Bit	DATE	26/09/2022	CASING DEPTH (m) 0.00	

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SITE INVESTIGATION RECORD

BORE HOLE No.	BH-03		
SHEET	3	OF	3
DIA OF BORE HOLE	150mm ✓		
	NX ✓		

PROJECT NAME	PROPOSED CONSTRUCTION OF A RESIDENTIAL BUILDING							BORE START DATE	17/09/2022
LOCATION	Korattur, Chennai	MACHINE No.	-	CHAINAGE (m)	-				
STRUCTURE	Stilt + 5 Upper Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N	-		BORE END DATE	20/09/2022
JOB CODE	GT-2448	FLUSHING MEDIUM	Bentonite		E	-		TOTAL DRILL DAYS	3

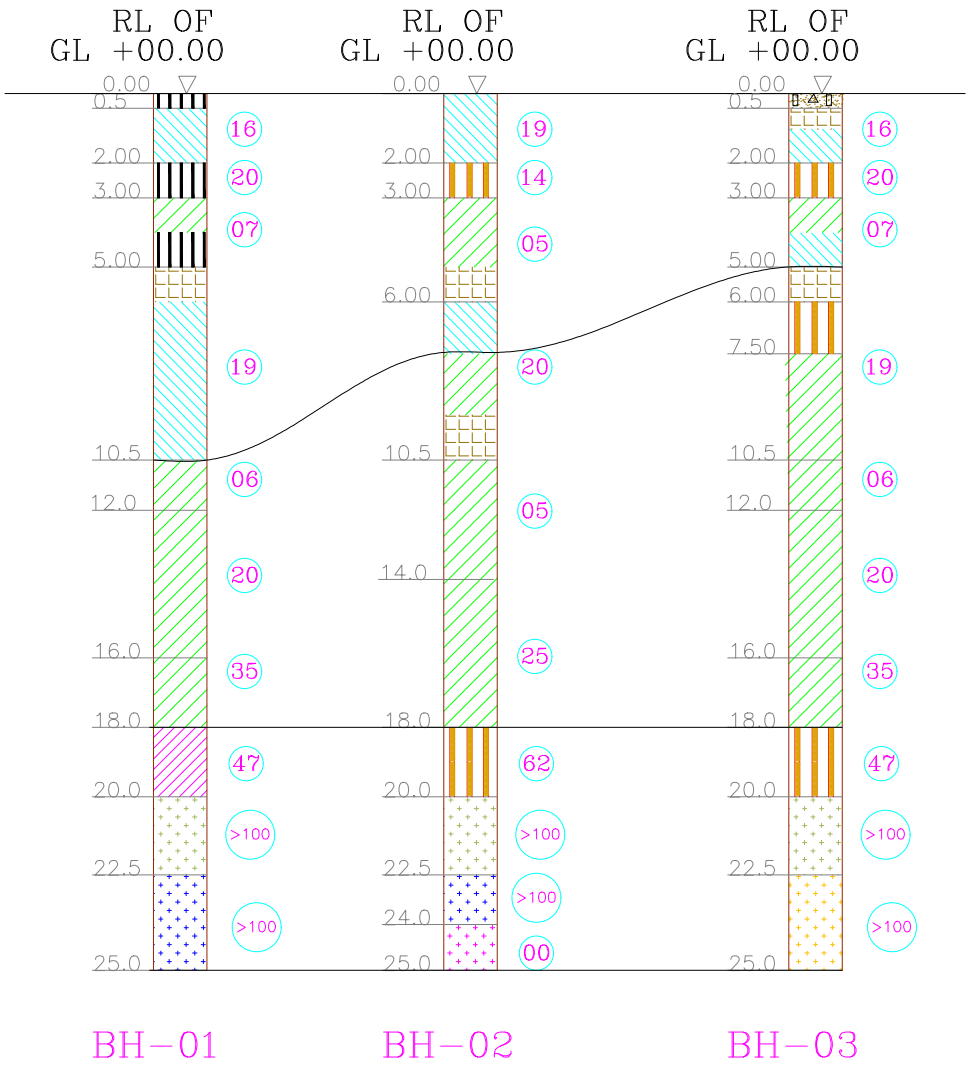
Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min.	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	15-30	30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	RL (m)	Layer Data: Legend	No	Depth	Geotechnical Description
21	20/09/2022	09	35	SC	-	-												Brown Yellow,Fine to Coarse Grain Structue With Traces of Gravels Rock Mass,Very Dense,**Completely Weathered Rock - Grade W5 Formation** Disintegrated Hypersthene Granitic Rock
		To																
		09	44															
22							SPT Hammer Rebound			**>100**	22.00	-	WS	-22.0		L10	22.0	
23		10	20															No Penetration Return Mud Sample Identified and the formation is completely disintegrated & fractured rock formation **Highly Weathered Rock to Completely Weathered Rock - Grade W5 & W4 Rock**
		To		DB	0	0	SPT-Hammer Rebound			**>100**	23.50	-	WS	-23.5				
24		10	55															
		11	25															
		To		DB	0	0												
25		12	05				SPT-Hammer Rebound			**>100**	25.00	-	WS	-25.0		L11	25.0	
26																		
27																		
28																		
29																		
30																		

CS - Core Sample	DS - Disturbed Sample	LOGGED	S.Ananth	PROJECT SITE DETAILS	REMARKS
SS - Split Spoon Sample	SC - Soil Cutter	DATE	20/09/2022	GROUND LEVEL (m) 0.00	
UDS- Undisturbed Sample	TCB - Tungsten Carbide Bit	CHECKED	G.Sharmila	WATER TABLE (m) 2.40	
WS - Wash Sample	DB - Diamond Bit	DATE	26/09/2022	CASING DEPTH (m) 0.00	

Borehole terminated at 25 m depth below E.G.L

FIG.2.3 Sub Soil Profile at BH-03 Location

CROSS SECTION PROFILE



LEGEND

- SILTY CLAY (CI)
- SILTY SAND (SM)
- Silty Clay (CI)
- CLAYEY SILTY SAND (SC)
- Sandy Silty SHALE (CL)
- Completely Weathered Rock − W5 Grade
- Highly to Moderately Weathered Rock− Grade W4 & W3 Rock
- Highly Weathered Rock to Completely Weathered Rock − Grade W5 & W4 Rock
- Clayey SILT (ML)
- SILTY CLAY (CH)

FIG.No.2.4 CROSS SECTIONAL VARIATION OF SUB SOIL PROFILE THROUGH BH−01,02 & 03

GRAIN SIZE DISTRIBUTION CURVE



Fig. 2.5 GRAIN SIZE DISTRIBUTION CURVE - BH-01

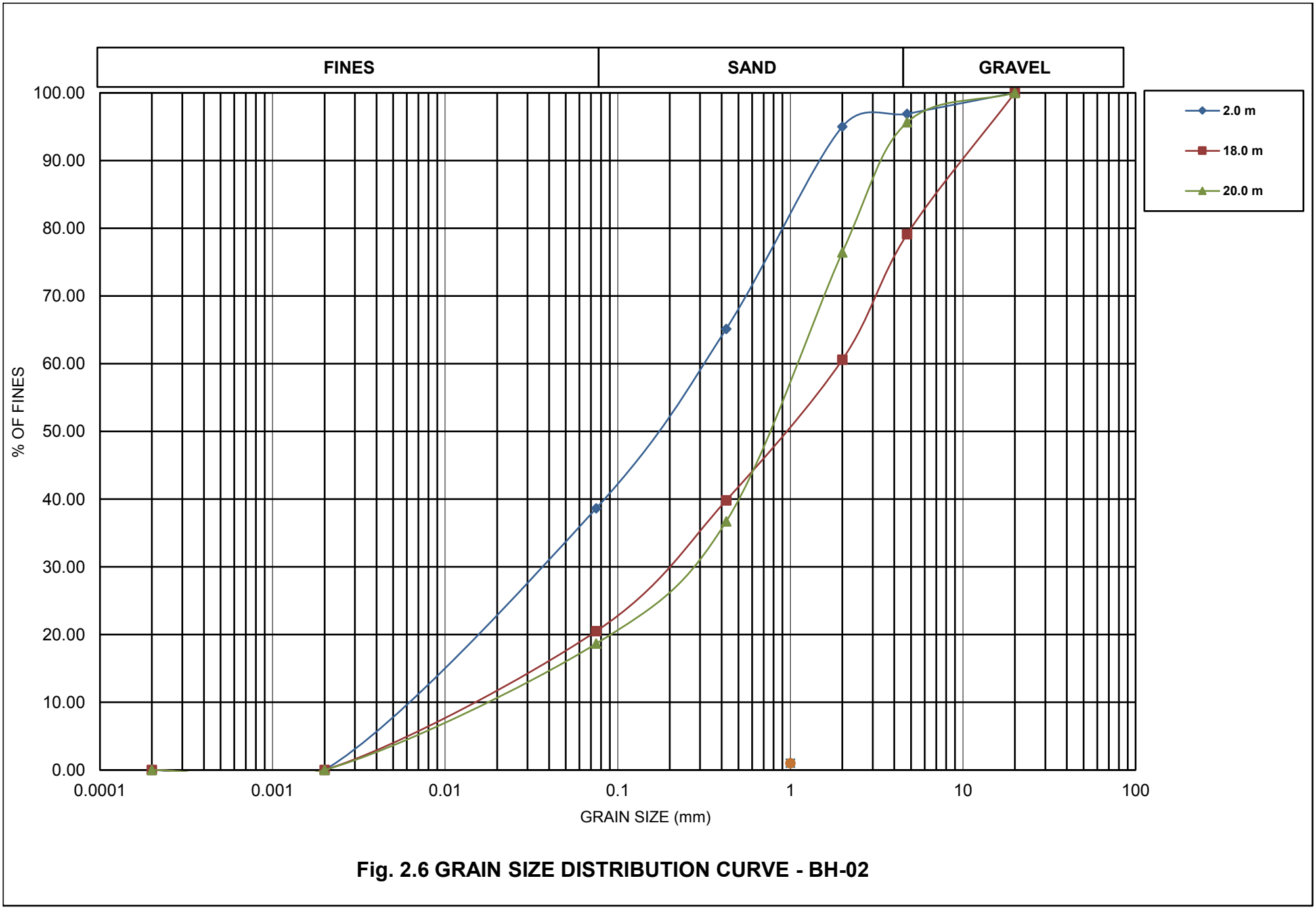


Fig. 2.6 GRAIN SIZE DISTRIBUTION CURVE - BH-02



Fig. 2.7 GRAIN SIZE DISTRIBUTION CURVE - BH-03

HYDROMETER ANALYSIS CURVE

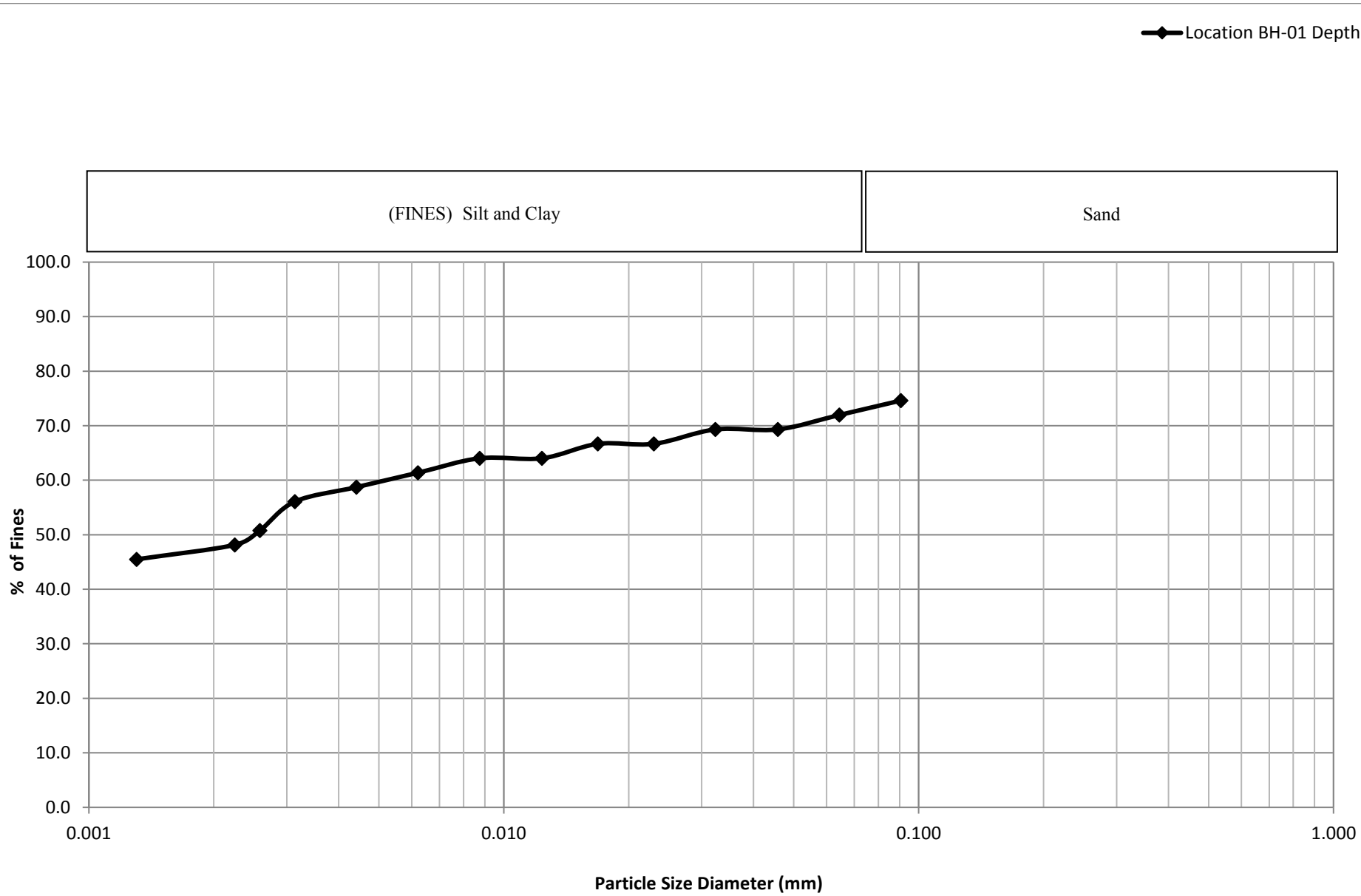


Fig 2.8 Hydrometer Analysis Master Curve

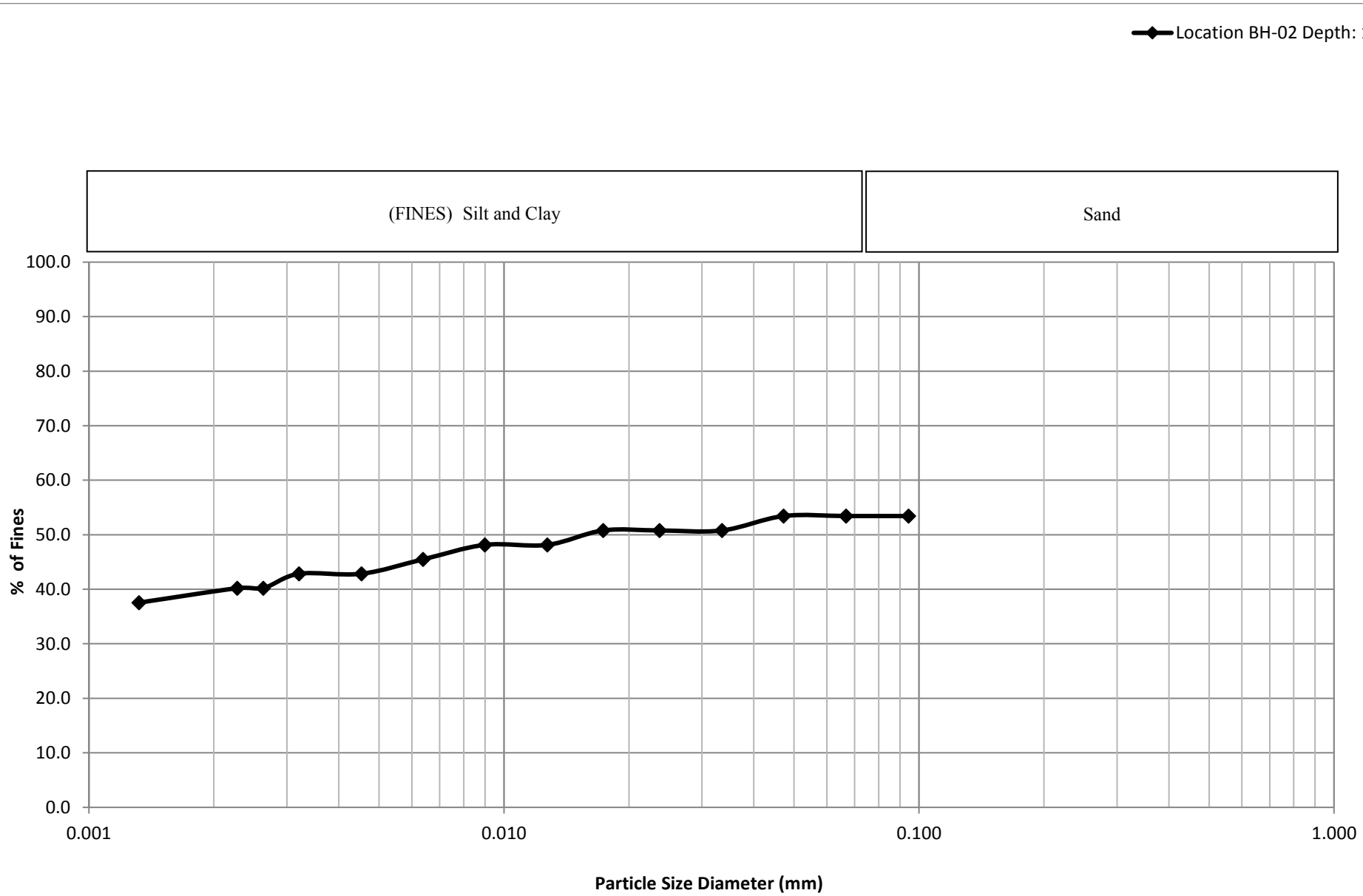


Fig 2.9 Hydrometer Analysis Master Curve

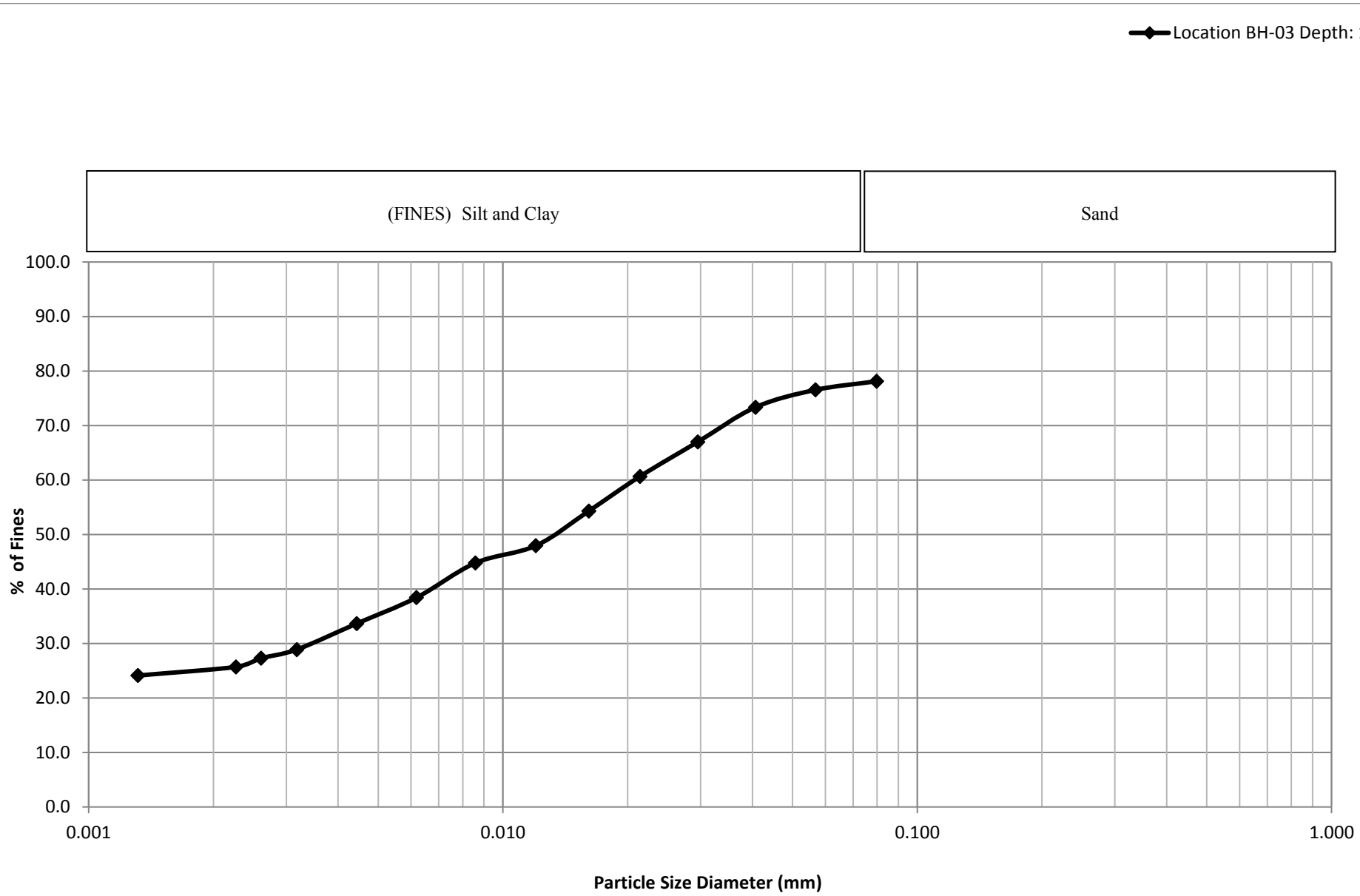


Fig 2.10 Hydrometer Analysis Master Curve

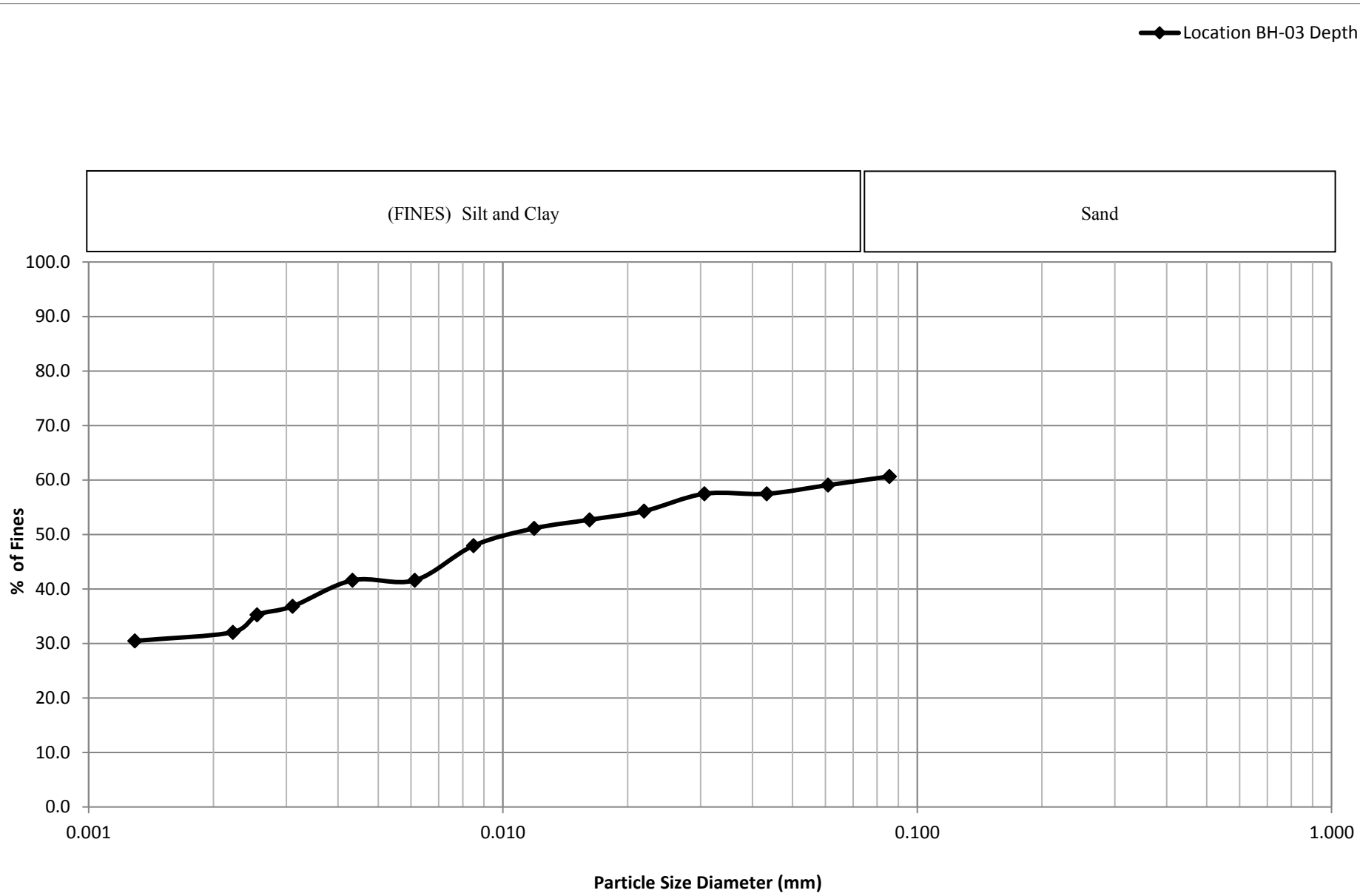


Fig 2.11 Hydrometer Analysis Master Curve

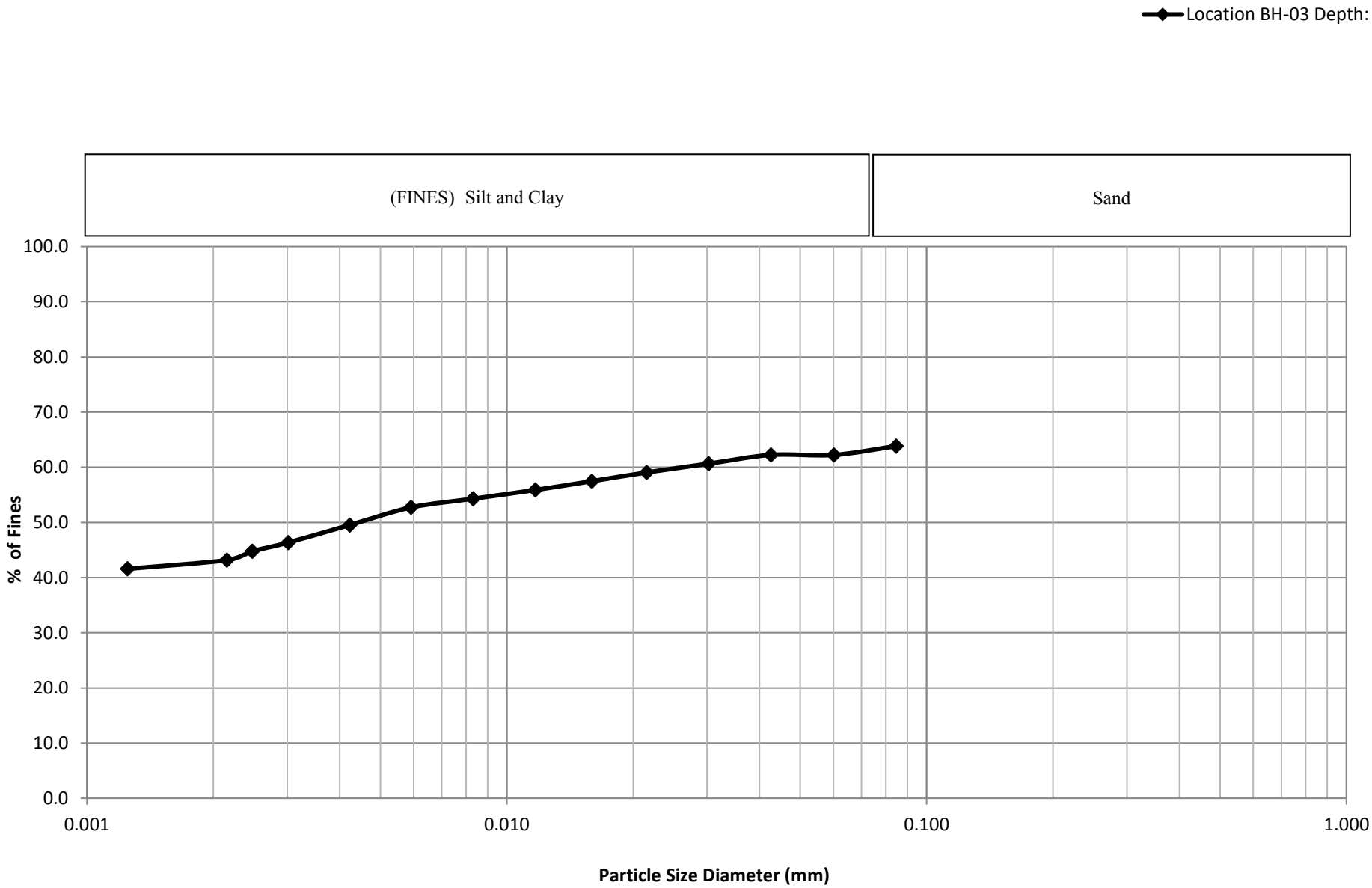


Fig 2.12 Hydrometer Analysis Master Curve

LABORATORY TEST RESULTS

GEOMARINE
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Phone No.: 044-24481485, 044-24480305

LABORATORY TEST REPORT

GEOMARINE CONSULTANTS PVT LTD- GEOTECHNICAL LABORATORY
NO.11 2nd MAIN ROAD, KANNAPA NAGAR EXTN,
KOTTIVAKKAM, CHENNAI

Name & Address of the Customer	:	**M/s Pushkar Properties Pvt Ltd., Chennai**	**Customer Reference**	:	By Email
Sample Description	:	Soil Sample	**Period of Testing**	:	06/10/2022 to 13/10/2022
Source of Sample	:	Customer Supplied- Borehole No. BH-01	**Sample Identification Number**	:	SS/GMC/092022/544/BH01
Sample Condition	:	Satisfactory	**Test Report No.**	:	GT-2448/BH-01
Test Method	:	As per Bureau of Indian Standards	**Report Date**	:	29/10/2022
Sample Receipt Date	:	27/09/2022	**Test Report Pages**	:	One Page

Table-2.1 Laboratory Classification of Soil Samples from BH-01

Sample Depth (m)	SPT- "N" Value	Type of Sample	Fine Grained (FG)										Coarse Grained (CG)													
			Moisture Content (%) **AS PER IS 2720 (P-II) - 1973, RA-2015**	LIQUID LIMIT (%) **AS PER IS 2720 (P-V) - 1985, RA-2015**	PLASTIC LIMIT (%) **AS PER IS 2720 (P-V) - 1985, RA-2015**	**Plasticity Index (I_P= LL-PL)**	**Consistency Index (Ic=LL-NMC/I_p)**	SHRINKAGE LIMIT (%) **AS PER IS 2720 (P-VI) - 1972, RA-2011**	FREE SWELL INDEX (%) **AS PER IS 2720 (P-XL) - 1977, RA-2011**	**Consistancy**	**Position With Respect to A-Aline**	**IS:Notation**	SPECIFIC GRAVITY **AS PER IS 2720 (P-III, SEC-1) - 1980, RA-2010**	GRAIN SIZE ANALYSIS **AS PER IS 2720 (P-IV) - 1985, RA-2015**						**D_{10} (mm)**	**D_{30}(mm)**	**D_{60} (mm)**	Uniformity Co-Efficient **$C_U=D_{60}/D_{10}$**	Co-Efficient of Curvature **$C_c=D_{30}^2/(D_{10}xD_{60})$**	**Relative Density**	**IS-Notation**	
														Gravel (%)	**Coarse (%)**	**Medium (%)**	**Fine (%)**	**Silt (%)**	**Clay (%)**							**Gravel**	**Sand**
0.2	2	SS	12.2	Non Plastic Fine Sand With Silt								ML	-	0.0	0.8	9.7	30.7	58.8		-	-	-	-	-	FG>50%	FG>50%	FG>50%
0.5	17	SS	21.0	37.8	21.8	15.9	1.1	14.2	8.3	V.Stiff	Above	CI	-	0.0	2.4	19.3	17.7	60.6		-	-	-	-	-	FG>50%	FG>50%	FG>50%
1.3	17	SS	15.2	44.6	19.7	24.9	1.2	13.9	16.7	V.Stiff	Above	CI	2.52	0.0	0.0	6.9	24.8	68.3		-	-	-	-	-	FG>50%	FG>50%	FG>50%
2.0	20	SS	26.2	Non Plastic Fine Sand With Silt								ML	2.59	0.0	0.0	5.2	39.2	55.7		-	-	-	-	-	FG>50%	FG>50%	FG>50%
3.0	7	SS	42.3	63.7	29.3	34.4	0.6	11.5	21.4	M.Stiff	Above	CH	-	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
4.0	7	SS	30.0	Non Plastic Fine Sand With Silt								ML	2.61	0.0	0.0	15.5	34.2	50.3		-	-	-	-	-	FG>50%	FG>50%	FG>50%
5.0	17	SS	30.7	34.8	13.7	21.2	0.2	14.2	33.5	-	Above	CL	-	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
6.0	18	SS	19.7	39.9	21.2	18.7	1.1	14.0	23.1	V.Stiff	Above	CI	-	0.0	0.0	1.5	5.1	93.4		-	-	-	-	-	FG>50%	FG>50%	FG>50%
7.5	23	SS	20.5	48.8	25.2	23.6	1.2	-	6.7	V.Stiff	Above	CI	-	0.0	0.0	2.2	2.3	95.5		-	-	-	-	-	FG>50%	FG>50%	FG>50%
9.0	16	SS	22.7	45.5	24.0	21.5	1.1	-	81.8	V.Stiff	Above	CI	-	-	-	-	-	51.9	48.1	-	-	-	-	-	FG>50%	FG>50%	FG>50%
10.5	6	SS	41.4	59.2	27.1	32.1	0.6	12.3	63.6	M.Stiff	Above	CH	-	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
12.0	16	SS	24.5	57.9	25.5	32.4	1.0	-	45.5	V.Stiff	Above	CH	-	2.6	4.7	15.3	24.6	52.8		-	-	-	-	-	FG>50%	FG>50%	FG>50%
14.0	24	SS	20.7	55.3	23.8	31.5	1.1	-	69.2	V.Stiff	Above	CH	-	10.4	6.4	12.3	15.0	56.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
16.0	35	SS	20.6	64.2	27.7	36.5	1.2	11.5	25.0	Hard	Above	CH	2.53	4.8	1.3	4.9	25.7	63.4		-	-	-	-	-	FG>50%	FG>50%	FG>50%
18.0	47	SS	22.3	59.5	22.1	37.3	1.0	-	14.3	CG>50%	Above	-	-	11.3	2.1	18.1	24.3	44.3		-	-	-	-	-	Dense	<50%	SC
20.0	>100	SS	16.8	-	-	-	-	-	-	CG>50%	-	-	-	5.6	7.3	32.7	27.2	27.2		-	-	-	-	-	V.Dense	<50%	SM
22.5	>100	WS	-	-	-	-	-	-	-	CG>50%	-	-	-	0.0	3.0	86.8	9.1	1.1		-	-	-	-	-	V.Dense	<50%	SP

**** END OF REPORT****

Terms and Conditions

(1) The test results furnished corresponds to the sample received

(2) The tested sample will not be retained for more than 45 days from the date of issue of test report except in the case as required by the applicable regulations.

(3) Any correction in this reports invalidates the reports

Authorised Signatory

A. VINOTH
(Technical Manager)

GEOMARINE
THE SPIRIT OF ENGINEERING
Phone No.: 044-24481485, 044-24480305

LABORATORY TEST REPORT

GEOMARINE CONSULTANTS PVT LTD- GEOTECHNICAL LABORATORY
NO.11 2nd MAIN ROAD, KANNAPA NAGAR EXTN,
KOTTIVAKKAM. CHENNAI

Name & Address of the Customer	:	**M/s Pushkar Properties Pvt Ltd., Chennai**	**Customer Reference**	:	By Email
Sample Description	:	Soil Sample	**Period of Testing**	:	06/10/2022 to 13/10/2022
Source of Sample	:	Customer Supplied- Borehole No. BH-02	**Sample Identification Number**	:	SS/GMC/092022/544/BH02
Sample Condition	:	Satisfactory	**Test Report No.**	:	GT-2448/BH-02
Test Method	:	As per Bureau of Indian Standards	**Report Date**	:	29/10/2022
Sample Receipt Date	:	27/09/2022	**Test Report Pages**	:	One Page

Table-2.2 Laboratory Classification of Soil Samples from BH-02

Sample Depth (m)	SPT- "N" Value	Type of Sample	Fine Grained (FG)										Coarse Grained (CG)													
			Moisture Content (%) AS PER IS 2720 (P-II) - 1973, RA-2015	LIQUID LIMIT (%) AS PER IS 2720 (P-V) - 1985, RA-2015	PLASTIC LIMIT (%) AS PER IS 2720 (P-V) - 1985, RA-2015	Plasticity Index (I_P= LL-PL)	Consistency Index (Ic=LL-NMC/I_p)	SHRINKAGE LIMIT (%) AS PER IS 2720 (P-VI) - 1972, RA-2011	FREE SWELL INDEX (%) AS PER IS 2720 (P-XL) - 1977, RA-2011	Consistancy	Position With Respect to A-Aline	IS:Notation	SPECIFIC GRAVITY AS PER IS 2720 (P-III, SEC-1) - 1980, RA-2010	GRAIN SIZE ANALYSIS AS PER IS 2720 (P-IV) - 1985, RA-2015						D_{10} (mm)	D_{30}(mm)	D_{60} (mm)	Uniformity Co-Efficient $C_U=D_{60}/D_{10}$	Co-Efficient of Curvature $C_c=D_{30}^2/(D_{10}xD_{60})$	Relative Density	IS-Notation	
														Gravel (%)	Coarse (%)	Medium (%)	Fine (%)	Silt (%)	Clay (%)							Gravel	Sand
0.5	26	SS	12.1	36.1	15.5	20.6	1.2	14.8	0.0	V.Stiff	Above	CI	-	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
1.3	12	SS	23.5	46.8	18.0	28.9	0.8	14.0	15.4	Stiff	Above	CI	-	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
2.0	14	SS	18.4	Little Plastic Clay Binder					10.0	CG>50%	-	-	-	3.1	1.9	29.9	26.5	38.6		-	-	-	-	-	M.Dense	<50%	SM
3.0	5	SS	38.6	54.8	23.4	31.5	0.5	12.3	0.0	M.Stiff	Above	CH	-	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
5.0	4	SS	25.5	32.2	12.0	20.2	0.3	15.5	7.7	Soft	Above	CL	-	0.0	0.0	1.1	39.8	59.1		-	-	-	-	-	FG>50%	FG>50%	FG>50%
6.0	17	SS	18.8	43.6	22.1	21.5	1.2	14.0	15.4	V.Stiff	Above	CI	-	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
7.5	20	SS	21.5	58.3	24.8	33.5	1.1	13.8	14.3	V.Stiff	Above	CH	2.42	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
9.0	22	SS	15.2	32.6	16.2	16.4	1.1	14.8	25.5	V.Stiff	Above	CL	-	0.0	0.0	19.0	28.1	52.9		-	-	-	-	-	FG>50%	FG>50%	FG>50%
10.5	5	SS	48.0	77.9	34.9	42.9	0.7	10.0	75.0	M.Stiff	Above	CH	-	-	-	-	-	59.8	40.2	-	-	-	-	-	FG>50%	FG>50%	FG>50%
12.0	4	SS	40.2	52.4	24.7	27.6	0.4	12.6	25.0	Soft	Above	CH	2.44	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
14.0	20	SS	27.3	65.9	29.5	36.4	1.1	11.2	40.0	V.Stiff	Above	CH	-	0.0	7.1	5.4	11.2	76.4		-	-	-	-	-	FG>50%	FG>50%	FG>50%
16.0	29	SS	22.5	56.4	25.1	31.3	1.1	12.3	15.4	V.Stiff	Above	CH	-	1.2	4.5	9.1	24.0	61.2		-	-	-	-	-	FG>50%	FG>50%	FG>50%
18.0	62	SS	14.3	-	-	-	-	-	-	CG>50%	-	-	-	20.9	18.5	20.8	19.3	20.5		-	-	-	-	-	V.Dense	<50%	SM
20.0	>100	SS	14.3	-	-	-	-	-	-	CG>50%	-	-	-	4.4	19.2	39.7	18.0	18.7		-	-	-	-	-	V.Dense	<50%	SM

**** END OF REPORT****

Terms and Conditions

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(3) Any correction in this reports invalidates the reports

Authorised Signatory

A. VINOTH
(Technical Manager)

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Phone No.: 044-24481485, 044-24480305

LABORATORY TEST REPORT

GEOMARINE CONSULTANTS PVT LTD- GEOTECHNICAL LABORATORY
NO.11 2nd MAIN ROAD, KANNAPA NAGAR EXTN,
KOTTIVAKKAM. CHENNAI

Name & Address of the Customer	:	**M/s Pushkar Properties Pvt Ltd., Chennai**	**Customer Reference**	:	By Email
Sample Description	:	Soil Sample	**Period of Testing**	:	06/10/2022 to 13/10/2022
Source of Sample	:	Customer Supplied- Borehole No. BH-03	**Sample Identification Number**	:	SS/GMC/092022/544/BH03
Sample Condition	:	Satisfactory	**Test Report No.**	:	GT-2448/BH-03
Test Method	:	As per Bureau of Indian Standards	**Report Date**	:	29/10/2022
Sample Receipt Date	:	27/09/2022	**Test Report Pages**	:	One Page

Table-2.3 Laboratory Classification of Soil Samples from BH-03

Sample Depth (m)	SPT- "N" Value	Type of Sample	Fine Grained (FG)										Coarse Grained (CG)													
													Coarse Grained (CG)											Relative Density	IS-Notation	
			Moisture Content (%) AS PER IS 2720 (P-II) - 1973, RA-2015	LIQUID LIMIT (%) AS PER IS 2720 (P-V) - 1985, RA-2015	PLASTIC LIMIT (%) AS PER IS 2720 (P-V) - 1985, RA-2015	Plasticity Index (I_P= LL-PL)	Consistency Index (Ic=LL-NMC/I_p)	SHRINKAGE LIMIT (%) AS PER IS 2720 (P-VI) - 1972, RA-2011	FREE SWELL INDEX (%) AS PER IS 2720 (P-XL) - 1977, RA-2011	Consistancy	Position With Respect to A-Aline	IS:Notation	SPECIFIC GRAVITY AS PER IS 2720 (P-III, SEC-1) - 1980, RA-2010	Gravel (%)	Coarse (%)	Medium (%)	Fine (%)	Silt (%)	Clay (%)	D_{10} (mm)	D_{30}(mm)	D_{60} (mm)	Uniformity Co-Efficient $C_U=D_{60}/D_{10}$	Co-Efficient of Curvature $C_c=D_{30}^2/(D_{10}xD_{60})$		Gravel	Sand
0.5	16	SS	15.5	33.4	15.8	17.6	1.0	15.7	27.3	V.Stiff	Above	CL	-	14.7	0.9	8.2	15.1	61.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
1.25	11	SS	24.0	41.6	18.1	23.4	0.8	14.1	18.2	Stiff	Above	CI	-	0.0	0.0	2.8	6.7	67.3	23.3	-	-	-	-	-	FG>50%	FG>50%	FG>50%
2.0	41	SS	26.2	Little Plastic Clay Binder					22.2	CG>50%	-	-	-	4.9	4.1	29.5	28.8	32.7		-	-	-	-	-	Dense	<50%	SM
3.0	5	SS	38.6	59.9	26.8	33.1	0.6	11.8	20.0	M.Stiff	Above	CH	-	0.0	0.0	2.1	2.8	95.1		-	-	-	-	-	FG>50%	FG>50%	FG>50%
4.0	4	SS	33.2	37.9	23.3	14.6	0.3	13.5	0.0	Soft	Above	CI	-	0.0	0.0	2.1	2.8	95.1		-	-	-	-	-	FG>50%	FG>50%	FG>50%
5.0	6	SS	22.4	30.2	15.9	14.3	0.5	15.9	14.3	M.Stiff	Above	CL	-	0.0	0.0	0.0	36.1	63.9		-	-	-	-	-	FG>50%	FG>50%	FG>50%
6.0	-	UDS	-	-	-	-	-	-	-	CG>50%	-	-	-	0.0	0.0	5.8	81.2	13.1		-	-	-	-	-	-	<50%	SM
7.5	22	SS	28.4	63.1	29.9	33.2	1.0	11.3	15.4	V.Stiff	Above	CH	-	-	-	-	-	67.9	32.1	-	-	-	-	-	FG>50%	FG>50%	FG>50%
9.0	20	SS	25.8	61.8	29.5	32.3	1.1	11.8	15.4	V.Stiff	Above	CH	-	0.0	0.0	1.8	3.5	94.7		-	-	-	-	-	FG>50%	FG>50%	FG>50%
10.5	5	SS	46.3	74.8	31.7	43.1	0.7	10.2	75.0	M.Stiff	Above	CH	-	-	-	-	-	56.8	43.2	-	-	-	-	-	FG>50%	FG>50%	FG>50%
12.0	5	SS	52.1	72.7	32.5	40.2	0.5	10.5	66.7	M.Stiff	Above	CH	2.39	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
14.0	20	SS	21.9	52.6	24.2	28.4	1.1	12.1	66.7	V.Stiff	Above	CH	-	0.0	2.2	15.2	28.2	54.4		-	-	-	-	-	FG>50%	FG>50%	FG>50%
16.0	28	SS	26.4	56.1	26.7	29.4	1.0	12.5	66.7	V.Stiff	Above	CH	-	-	-	-	-	100.0		-	-	-	-	-	FG>50%	FG>50%	FG>50%
18.0	63	SS	19.9	Little Plastic Clay Binder					7.7	CG>50%	-	-	-	0.0	2.2	21.4	36.3	40.1		-	-	-	-	-	V.Dense	<50%	SM
20.0	>100	SS	22.4	-	-	-	-	-	-	CG>50%	-	-	-	2.6	5.1	37.1	29.2	26.1		-	-	-	-	-	V.Dense	<50%	SM
23.5	>100	WS	-	-	-	-	-	-	-	CG>50%	-	-	-	1.7	2.2	74.6	18.5	3.1		-	-	-	-	-	V.Dense	<50%	SP
25.0	>100	WS	-	-	-	-	-	-	-	CG>50%	-	-	-	8.0	2.1	75.0	13.2	1.6		-	-	-	-	-	V.Dense	<50%	SP

**** END OF REPORT****

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Authorised Signatory

A. VINOTH
(Technical Manager)

CHEMICAL LABORATORY TEST RESULTS

GEOMARINE
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LABORATORY TEST REPORT
GEOMARINE CONSULTANTS PVT LTD- GEOTECHNICAL LABORATORY
NO.11 2nd MAIN ROAD, KANNAPA NAGAR EXTN,
KOTTIVAKKAM, CHENNAI

Table 2.4 Result of Chemical Test

Name of the Customer: **M/s Pushkar Properties Pvt Ltd., Chennai**

Sample Identification Number: GMC/092022/544 **Customer Reference:** By Email

Source of Sample: Customer Supplied **Period of Testing:** 10/10/2022

Sample Condition: Satisfactory **Report Date:** 29/10/2022

Sample Description: Water and Soil **Test Report No.:** GT-2448

Sample Receipt Date: 27/09/2022 **Test Report Pages:** One Page

S No.	SAMPLE REFERENCE NO	Water				SOIL		
		DEPTH OF SAMPLE (m)	pH AS PER IS 3025 (P-XI) - 2022	SULPHATES (mg/l) AS PER APHA 23rd Edn.2017-4500	CHLORIDES (mg/l) AS PER IS 3025(P-XXXII) - 1988, RA-2019	DEPTH OF SAMPLE (m)	pH AS PER IS 2720 (P-XXVI) - 1987, RA-2021	SULPHATES (mg/kg) AS PER IS 2720 (P-XXVII) - 1977, RA-2020
1.0	BH-01	2.30	7.82	246.9	385.7	1.25	7.26	82.2
2.0	BH-02	2.10	7.88	111.7	340.3	1.25	7.14	72.9
3.0	BH-03	2.40	7.79	214.6	351.8	2.00	7.22	85.9

**** END OF REPORT****

Authorised Signatory

A. VINOTH
(Technical Manager)

Terms and Conditions

(1) The test results furnished corresponds to the sample received
(2) The tested sample will not be retained for more than 30 days from the date of issue of test report except in the case as required by the applicable regulations.
(3) Any correction in this reports invalidates the reports

Table-2.5 Results of Chemical Test for Chloride in Soil Sample			
SL No.	Bore HoleNo.	Soil (2:1)	
		Depth of Sample (m)	Chlorides (mg/kg)
1.0	BH-01	1.25	168.4
2.0	BH-02	1.25	182.6
3.0	BH-03	2.00	180.1

CHAPTER-3

GEOLOGY & SUB-SURFACE STRATIFICATION

3.0 PREAMBLE:

Geotechnical investigation carried out at a specific site provides location specific sub surface engineering characteristics. However in major project sites where the construction activities spread over a very large area location specific sub surface strata characteristics are studied together with the geological mapping data.

This is required to incorporate the impact of any documented macro-level geological characteristics of the region on the foundation design, irrespective of the location specific sub surface strata characteristics.

In view on the above, though it is beyond the scope of the present study to carry out macro-level geological investigation the regional geology based on the published data is presented and discussed.

3.1 CLIMATE AND RAINFALL:

The study area receives the rain under the influence of both southeast and northeast monsoons. Predominantly northeast monsoon contributes rainfall and most of the precipitation occurs in the form of cyclonic storm caused due to the depressions in Bay of Bengal. The north east monsoon occurs between October & December. The southwest monsoon rainfall is highly erratic and summer rains are negligible.

The normal annual rainfall over the study area varies from 1100 mm to 1200mm.

3.2 GEOMORPHOLOGY:

Chennai district forms part of coastal plains of northern Tamil Nadu. Major part of the district is having flat topography with very gentle slope towards east. The altitudes of land surface vary from 10 m above MSL in the west to sea level in the east.

Fluvial, marine and erosional landforms are noticed in the district. Marine transgression and regressions and neo-tectonic activity during the recent past have influenced the morphology and resulted in various present landforms.

Meandering streams with small sand bars are present along the course of Adyar River. The pediment and buried pediment in Guindy area in and around the reserved forest, is the only area where the ecological system is less disturbed, while the other areas are completely disturbed by built up area with large-scale human interference and pollution.

3.3 GEOLOGY OF CHENNAI DISTRICT:

Chennai district is underlain by various geological formations from ancient Archaean to the Recent Alluvium. The geological formations of the district can be grouped into three units, namely

i) Archaean crystalline rocks

ii) Gondwana (Consolidated Clay/Clayey Silt) and Tertiary sediments and

iii) Recent Alluvium.

The Archaean crystalline rocks of the district comprise chiefly of Charnockite, gneisses and the associated basic and ultra-basic intrusive dykes.

3.4 GEOLOGICAL ORDER OF THE STUDY AREA:

The stratigraphy of the study area can be classified as recent formation which is underlain by basement rock of meta-igneous origin (hypersthene granite/ Charnockite rock)

Deposits of Recent Age

---------- Eparchean Unconformity ----------

Archaean Basement Rock (Charnockite Rock / Hypersthene Granite)

3.5 DESIGN SUB SOIL PROFILE: (WRT Foundation Engineering Application)

The sub soil characteristics obtained at the test location are further processed to arrive at the design soil parameters required for the design of sub structure using the following shear strength correlations with respect to the Standard Penetration Test Values of different layers.

- For Coarse Grained Material, Ref. IS: 6403 to estimate Angle of Shearing Resistance (Reproduced and shown in Fig.A1)
- For Fine Grained Material, Ref. Terzaghi & Peck, 1948, to estimate Unconfined Compressive Strength (Reproduced and shown in Fig.A2)

Based on the above, the average design soil characteristics are given below:

REFERENCE BORE HOLE					BH-01	Ref R.L. of G.L. (m):			0.00		
Layer No.	Layer Thk. (m)			Type of Strata	Colour	Ave. Design SPT	Relative Density	Consistency	(γ) kN/m^3	Shear Parameters	
	Top BGL	Bottom BGL	Thickness							(C_u) kPa	(ϕ) Deg.
1.0	0.00	0.50	0.50	Sandy Silt	Grey	-	Very Dense	-	-	-	-
2.0	0.50	2.00	1.50	Silty Clay	Brown Grey	16	-	Very Stiff	20	107	-
3.0	2.00	3.00	1.00	Sandy Silt	Grey	20	Medium Dense	-	18	-	33
4.0	3.00	5.00	2.00	Silty Clay	Brown Grey	7	-	Medium Stiff	16	47	-
5.0	5.00	10.50	5.50	Silty Clay	Grey	19	-	Very Stiff	20	127	-
6.0	10.50	12.00	1.50	Silty Clay	Grey	6	-	Medium Stiff	15.5	40	-
7.0	12.00	16.00	4.00	Silty Clay	Grey	20	-	Very Stiff	20	133	-
8.0	16.00	18.00	2.00	Silty Clay	Yellow Grey	35	-	Hard	21	233	-
9.0	18.00	20.00	2.00	Clayey Sand	Brown Yellow	47	Dense	-	20	-	40.33
10.0	20.00	22.50	2.50	Residual Soil	Brown Yellow	>100	Very Dense	-	21	-	42.5
11.0	22.50	25.00	2.50	Highly Weathered Rock	Grey	CRR 10% to 15%, RQD 0% to 10%					

REFERENCE BORE HOLE					BH-02	Ref R.L. of G.L. (m):			0.00		
Layer No.	Layer Thk. (m)			Type of Strata	Colour	Ave. Design SPT	Relative Density	Consistency	(γ) kN/m^3	Shear Parameters	
	Top BGL	Bottom BGL	Thickness							(C_u) kPa	(ϕ) Deg.
1.0	0.00	2.00	2.00	Silty Clay	Brown	19	-	Very Stiff	20	127	-
2.0	2.00	3.00	1.00	Silty Sand	Brown	14	Medium Dense	-	17	-	31.2
3.0	3.00	6.00	3.00	Silty Clay	Brown	5	-	Medium Stiff	15	33	-
4.0	6.00	10.50	4.50	Silty Clay	Grey	20	-	Very Stiff	20	133	-
5.0	10.50	14.00	3.50	Silty Clay	Grey	5	-	Medium Stiff	15	33	-
6.0	14.00	18.00	4.00	Silty Clay	Grey	25	-	Very Stiff	20.5	167	-
7.0	18.00	20.00	2.00	Silty Sand	Yellow Grey	62	Very Dense	-	21	-	42.5
8.0	20.00	22.50	2.50	Completely Weathered Rock	Brown Yellow	>100	Very Dense	-	21	-	42.5
9.0	22.50	24.00	1.50	Highly Weathered Rock	Offwhite	>100	Very Dense	-	21	-	42.5
10.0	24.00	25.00	1.00	Moderately Weathered Rock	Grey	CRR 10% to 45%, RQD 0% to 10%					

REFERENCE BORE HOLE					BH-03	Ref R.L. of G.L. (m):			0.00		
Layer No.	Layer Thk. (m)			Type of Strata	Colour	Ave. Design SPT	Relative Density	Consistency	(γ) kN/m^3	Shear Parameters	
	Top BGL	Bottom BGL	Thickness							(C_u) kPa	(ϕ) Deg.
1.0	0.00	0.50	0.50	Filledup Soil	-	-	-	-	-	-	-
2.0	0.50	2.00	1.50	Silty Clay	Brown	14	-	Stiff	19.5	93	-
3.0	2.00	3.00	1.00	Silty Sand	Brown	41	Dense	-	20	-	38.98
4.0	3.00	6.00	3.00	Silty Clay	Grey	5	-	Medium Stiff	15	33	-
5.0	6.00	7.50	1.50	Silty Sand	Grey	-	-	-	-	-	-
6.0	7.50	10.50	3.00	Silty Clay	Grey	21	-	Very Stiff	20.5	140	-
7.0	10.50	14.00	3.50	Silty Clay	Grey	5	-	Medium Stiff	15	33	-
8.0	14.00	18.00	4.00	Silty Clay	Grey	24	-	Very Stiff	20.5	160	-
9.0	18.00	20.00	2.00	Silty Sand	Grey Yellow	63	Very Dense	-	21	-	42.5
10.0	20.00	22.00	2.00	Completely Weathered Rock	Brown Yellow	>100	Very Dense	-	21	-	42.5
11.0	22.00	25.00	3.00	Highly Weathered Rock	-	>100	Very Dense	-	21	-	42.5

FOUNDATION SYSTEM

CHAPTER-4

FOUNDATION SYSTEM

4.0 PREAMBLE:

In the design of foundation system, the stress-strain compatibility of the super structure, sub structure and the bearing strata should be satisfied both individually and as a combined system. In view of this, the following data are needed for the design of foundation system, defined in terms of the type of sub structure and the bearing strata characteristics.

- The super structure characteristics along with the loading pattern on the sub structure
- The sub soil characteristics that define the required substructure configuration for a safe transfer of super-structural loads to the bearing strata

Considering the above aspects of the foundation design, the suitable type of foundation system is presented below.

4.1 PROPOSED STRUCTURES:

An understanding of the proposed construction and the order of loads on the foundations is needed for choosing the appropriate foundation system. In the present case, the proposed structure is configured with stilt and five upper floors which is meant for residential occupancy. For this kind of structure, the column loads could vary between 1500 kN to 2000kN.

The above mentioned loads have no bearing on the design of either sub or super structures and are mentioned just to provide an insight to choose an appropriate foundation system with respect to subsoil conditions.

4.2 SUB SOIL STRATIFICATION:

The project site geological succession is as given below:

Stratum-I, Stiff to Very Stiff, Silty Clay With an layer of sandy silt to silty sand, 0.0m to 3.0m

Stratum-II, Soft to Medium Stiff, Silt Clay, 3.0m to 6.0m

Stratum-III, Very Stiff, Silty Clay, 6.0m to 10.0m

Stratum-IV, Very Soft to Medium Stiff, Silty Clay, 10.0m to 14.0m

Stratum-V, Very Stiff to Hard, Silty Clay, 14.0m to 18.0m

Stratum-VI, Dense, Clayey Sand, 18.0m to 20.0m

Stratum-VII, Very Dense, Disintegrated Rock Formation, 20.0m to 22.5m/25.0m

Stratum-VIII, Highly to Moderately Weathered Rock, 22.5m/25.0m to 25.0m

4.3 FOUNDATION SYSTEM:

4.3.1 OPTION-I (SHALLOW FOUNDATION – STRIP RAFT)

For the kind of proposed construction and for the kind of sub surface stratification with large thickness of clayey strata, in case of shallow foundation is preferred, provide strip raft foundation. The RCC strip raft can be located at a depth of 0.75m below the existing ground level over a well compacted sand-gravel mix/quarry dust/GSB of 0.45m thickness. Thus the overall depth of foundation excavation is 1.2m below the existing ground level.

In the present case, shallow foundations with allowable safe bearing pressure not more than 80kPa is feasible.

Typical computation is presented in the Annexure-I.

4.3.2 OPTION-II (DEEP PILE FOUNDATION SYSTEM)

In case 80kpa bearing pressure does not meet the requirements, alternatively pile foundation shall be provided. The piles can be installed by drilling with direct mud circulation technique *(Bored Cast Insitu Piles)* and the recommended safe load carrying capacity of bored cast insitu piles taken to a depth of 22.0m below the existing ground level in compression, pull out and lateral for different diameters is worked out as per IS 2911-Part-I-Section-2 and are presented in Table-4.1.

Typical computations are presented in Annexure-I.

TABLE:- 4.1 RECOMMENDED SAFE LOAD CARRYING CAPACITIES OF BORED CAST-IN SITU PILES

Sl.No	Reference Bore hole No.	Length of Pile below E.G.L	Assumed Length of Cut-Off Below E.G.L	Length of Pile below Cut-off	Dia.of Pile in (mm)	SAFE LOAD CARRYING CAPACITY (kN)		
						Vertical Load Carrying Capacity	Pull Out Capacity	Lateral Load Carrying Capacity
1.0	BH-03	22.0	1.0	21.00	500	1350	600	60
2.0					550	1500	650	65
3.0					600	1850	700	70
4.0					650	2100	750	75
5.0					750	2600	900	90

RECOMMENDATIONS

CHAPTER-5

RECOMMENDATIONS

5.1 RECOMMENDATION FOR SHALLOW STRIP RAFT:

- For the kind of proposed construction, Strip Raft can be located at a depth of 0.75m over a well compacted sand-gravel (1:1) mix or quarry dust or GSB of 450mm thickness. The overall depth of foundation excavation is 1.2m below the existing ground level.
- The Strip/Inverted T Beam foundation can be designed for an allowable net safe bearing pressure of 80kPa.
- It is recommended to restrict the width of the strip to maximum 1.5m such that the total settlement corresponding to 80 kPa is within the permissible limit of 100mm

5.2 RECOMMENDATION FOR PILE FOUNDATION SYSTEM:

- For the kind of proposed structure Bored Cast in situ piles are recommended as the suitable foundation system.
- The allowable safe load carrying capacities of different diameters of piles as given in Table-4.1 can be adopted as provisional design loads, as the load carrying capacity of piles is not only depends upon the sub soil properties, but also depends on the care and experience of installation piles.
- The theoretical load carrying estimates of piles shall be confirmed by conducting pile loads tests as per the guide lines laid down in IS: 2911-Part-IV.
- The boring shall be carried out using direct mud circulation prepared out of sodium bentonite.
- After reaching the borehole termination depth, the borehole shall be cleaned using mud circulation for a minimum period of 30min or till the return mud is relatively clear of soil particles.
- After ensuring the borehole is clean, the tremie pipe shall be lowered and concreting can be done.

5.2.1 CONSTRUCTION METHOD STATEMENT OF PILE FOUNDATION:

- The mud used shall be made out of sodium bentonite with minimum frees swell index of more than 300% and liquid limit more than 100%. The silt content in bentonite shall not more than 5%.
- The mud was prepared using sodium bentonite with a density of 1.10 to 1.15 g/cc.

5.3 GENERAL RECOMMENDATIONS:

- The chlorides content in ground water & soil-water extract is less than the permissible limit of 500 mg/l as per IS 456 Table 1.0. Hence no special steel is a requirement.
- Corresponding to the sulphate content in 2:1 Water-Soil extract and ground water use Table 4.0 of IS 456 for minimum cement content and maximum water cement ratio. Hence, ordinary Portland cement is suitable for the construction.
- The present project site fall in seismic zone-III as per IS 1893-P-I and based on the liquefaction analysis the sub soil formation exists at site is non-liquefiable considering the zone-III seismic intensity.

- ❖ It is recommended to install test pile and confirm the theoretical load carrying capacity by carrying out pile load test before commencing the piling operations.

AUTHORISED SIGNATORY

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ANNEXURE-I

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TYPICAL BEARING CAPACITY COMPUTATIONS

1.0 COMPUTATION OF BEARING CAPACITY AS PER IS:6403

Ref. BH-03

1.1 Geometrical Data :

Shape of the Foundation	Strip
Depth of Foundation Below E.G.L"Df" (m)	0.75
Thickness of soil replacement (m)	0.45
Total Depth of Foundation (m)	1.20
Breadth of Footing "B" (m)	1.50
Length of Footing "L" (m)	5.00
L/B:	3.33
Inclination of Vertical Load with the Vertical (a)	0.00

1.2 Soil Data :

Type of Effective Bearing Strata :	Clay
Avg SPT-value of the Bearing Strata	9.00
Type of Shear Failure:	General
Undrained Shear Strength (Cu)	60.00

1.3 Design Parameters:

Bulk Density of Soil above the foundation depth (g_{bulk})	18.0
Water Table Correction Factor (w')	0.50
Effective Overburden pressure at foundation level (q)	6.00
Bearing Capacity Factors:	
N_c =	5.14
N_q =	-
N_g =	-
Shape Factors:	
S_c =	1.00
S_q =	-
S_g =	-
Depth Factors :	
D_c =	1.10
D_q =	-
D_g =	-
Inclination Factor:	
I_c =	1.00
I_q =	-
I_g =	-

1.4 Ultimate Bearing Capacity (Qu) :

Qu=Cu*Nc*Sc*Dc*Ic	339.24	kPa

1.5 Safe Bearing Capacity (Qsafe) :

Factor of Safety (F.S.) :	2.50	
Qsafe :	135.70	kPa
Say Q_{safe}	**80**	**kPa**

2 Computation of Settlement for Maximum Pressure and Size of Footing: (as per IS:8009-Part-I-Ref. Eq.11) (Elastic Analysis)

The immediate elastic settlement (S_i)=	$qB(1-\mu^2)*I/E_s$
q= bearing pressure	80.00
Poission's Ratio (μ)	0.35
Modulus of Elasticity (E_s)(Ref. Joseph E Bowels,1996,page316,Table5.6, Japanese design standards)	
Modulus of Elasticity ($E_{s)}$	30000.00
Width of the Foundaiton (m)	1.50
Influence factor	1.54
Depth factor	0.86
Rigidity factor	0.80
Elastic Settlement (DH_i)	3.72 mm

2.2 Computation of Settlement as per IS:8009-Part I

2.2.1 Compression Parameters:

Average Water Content (NMC)	31.40	
Specific gravity	2.65	
Liquid Limit:	42.60	
Compression Index form consolidation test results (C_c):	0.293	
Initial Void Ratio (e_o):	0.832	
Stress history factor (λ)	0.70	

2.2.2 Geometrical Data:

Depth to top of compressible layer below E.G.L:	3.00	m
Detph to bottom of compressible layer below E.G.L:	6.00	m
Depth to top of compressible layer below the foundation level,Z1:	1.80	m
Depth to bottom of compressible layer below the foundation level,Z2:	4.80	m
Thickness of compressible soft clay influenced by stress bulb (ΔH)	3.00	m

2.2.3 Stress Computations:

Effective overburden pressue at the middle of the compressible layer (P_0):	36.00	kPa
B/Z1	0.83	
L/Z1	2.78	
B/Z2	0.31	
L/Z2	1.04	
Stress Reduction Factor (I_B)	0.57	
Additional stress due to the superstructure construction (Δp)=Q_{safe}*$I_{B\text{-}ave}$)	45.60	kPa

2.2.4 Settlement Computations:

Consolidation Settlement (S_c=C_c*λ*ΔH*log{(P_0+Δp)/P_0}/(1+e_0)	119.52	mm
Rigidity Factor	0.80	
Corrected Settlement(S_c) :	95.61	mm
Total Settlement :	99.33	mm
Settlement Criteria:	**<100**	**mm**

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ESTIMATION OF SAFE LOAD CARRYING CAPACITY OF BORED CAST-INSITU PILES

Type of Pile	Bored	Diameter of Pile			Length of Pile below G.L. (m)	22.0	As Per IS:2911-(P-I,S-2)-2010	
Reference Bore Hole	BH-01		500	mm	Surcharge Pressure	0	kPa	

Layer No.	Layer Thk. (m) Top. R.L.	Bot. R.L.	Thickness	Type of Strata	Ave. SPT	(γ) kN/m³ of Layer	Ave. upto Layer	Shear Parameters (C_u) kPa	(ϕ) Deg.	Effective Overburden Pressure (kPa) At top of Layer	At Bot. of Layer	At Mid. of Layer	Adhesion Factor (α)	Earth Pressure Coefficient (k)	Skin Friction (Q_f) kN		
1.0	0.0	1.0	1.0	Cut-Off Level													
2.0	1.0	2.0	1.0	Clay	17	20.0	20.0	113	-	0.0	10.0	5.0	0.4	-	qf	2	69.2
3.0	2.0	3.0	1.0	Sandy Silt	20	18.0	19.0	-	33.0	10.0	18.0	14.0	-	1.2	qf	3	16.5
4.0	3.0	5.0	2.0	Clay	7	16.0	17.0	47	-	18.0	30.0	24.0	0.9	-	qf	4	132.9
5.0	5.0	10.5	5.5	Silty Clay	19	20.0	18.0	127	-	30.0	85.0	57.5	0.4	-	qf	5	384.0
6.0	10.5	12.0	1.5	Silty Clay	6	15.5	17.8	40	-	85.0	93.3	89.1	1.0	-	qf	6	94.2
7.0	12.0	16.0	4.0	Silty Clay	20	20.0	17.8	133	-	93.3	133.3	113.3	0.4	-	qf	7	292.5
8.0	16.0	18.0	2.0	Silty Clay	35	21.0	20.5	233	-	133.3	155.3	144.3	0.3	-	qf	8	190.3
9.0	18.0	20.0	2.0	Clayey Sand	47	20.0	20.5	-	38.0	155.3	175.3	165.3	-	1.5	qf	9	608.4
10.0	20.0	22.0	2.0	Weathered Rock	50	20.5	20.3	-	38.0	175.3	196.3	185.8	-	1.5	qf	10	683.9

Summation of Positive Skin Resitance (kN) Q_f= 2471.92

Summation of Negative Skin Resistance (kN) -Qf= 0.00

Computation of End Bearing Resistance

		SPT	ϕ	C_u	N_q	N_c			
Bearing Stratum	Weathered Rock	50	38.00	-	82.03	-	Eff.Ht.of Overburden	8	m
							Effective Overburden Pressure	78.75	kN/m²

End Bearing Resistance (kN) Q_p= 1268.32

Skin Resistance in Clay Layer is $\pi*d*T_l*C_u*\alpha$	Ultimate Load Carrying Capacity (Q_{ult})	**$Q_u=Q_f-Q_f+Q_p$ (kN)** 3740.23
Skin Resistance in Sand Layer is $\pi*d*T_l*q_l*K*Tan(\phi)$	Safe Load Carrying Capacity (Q_{safe})	**$Q_u/2.5$ (kN)** 1496.09
End Bearing Resistance in Clay Layer is $\pi*d^2/4*C_u*N_c$	Allowable Safe Load Carrying Capacity	**$Q_{A\text{-}safe}$ (kN)** 1496.09
End Bearing Resistance in Sand Layer is $\pi*d^2/4*Q*N_q$	Allowable Safe Pull out Capacity	**$Q_{A\text{-}pull}$: Qf/3 (kN)** 823.97

Where

Cu=Undrained Shear Strength of Clay
K=Coef. Earth Pressure at Rest
d=Dia. Of Pile
ϕ=Angle of Shearing Resistance
q_l=Effecitve Overburden Pressure at middle of Layer
α=Adhesion Factor
N_c=Bearing Capacity Factor = 9
N_q=Bearing Capacity Factor, Ref. Fig.1 of IS: Code Referred above
T_l=Thickness of Layer
Q (i.e) Effecitve Overburden Pressure at pile tip=Effective height of overburden X (γ-10)

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ESTIMATION OF SAFE LOAD CARRYING CAPACITY OF BORED CAST-INSITU PILES

Type of Pile	Bored	Diameter of Pile		Length of Pile below G.L. (m)	22	As Per IS:2911-(P-I,S-2)-2010
Reference Bore Hole	BH-02	500	mm	Surcharge Pressure	0	kPa

Layer No.	Layer Thk. (m) Top. R.L.	Bot. R.L.	Thickness	Type of Strata	Ave. SPT	(γ) kN/m³ of Layer	Ave. upto Layer	Shear Parameters (C_u) kPa	(ϕ) Deg.	Effective Overburden Pressure (kPa) At top of Layer	At Bot. of Layer	At Mid. of Layer	Adhesion Factor (α)	Earth Pressure Coefficient (k)	Skin Friction (Q_f) kN		
1.0	0.0	1.0	1.0	Cut-Off Level													
2.0	1.0	2.0	1.0	Silty Clay	12	18.5	18.5	80	-	0.0	8.5	4.3	0.6	-	qf	2	69.1
3.0	2.0	3.0	1.0	Silty Sand	14	17.0	17.8	-	31.2	8.5	15.5	12.0	-	1.1	qf	3	12.1
4.0	3.0	6.0	3.0	Silty Clay	5	15.0	16.0	33	-	15.5	30.5	23.0	1.0	-	qf	4	155.5
5.0	6.0	10.5	4.5	Silty Clay	20	20.0	17.5	133	-	30.5	75.5	53.0	0.4	-	qf	5	329.0
6.0	10.5	14.0	3.5	Silty Clay	5	15.0	17.5	33	-	75.5	93.0	84.3	1.0	-	qf	6	181.4
7.0	14.0	18.0	4.0	Silty Clay	25	20.5	17.8	167	-	93.0	135.0	114.0	0.3	-	qf	7	314.8
8.0	18.0	20.0	2.0	Silty Sand	50	20.5	20.5	-	38.0	135.0	156.0	145.5	-	1.5	qf	8	535.7
9.0	20.0	22.0	2.0	Weathered Rock	50	20.5	20.5	-	38.0	156.0	177.0	166.5	-	1.5	qf	9	613.0

Summation of Positive Skin Resitance (kN) Q_f= 2210.69

Summation of Negative Skin Resistance (kN) -Qf= 0.00

Computation of End Bearing Resistance

		SPT	ϕ	C_u	N_q	N_c			
Bearing Stratum	Weathered Rock	50	38.00	-	82.03	-	Eff.Ht.of Overburden	8	m
							Effective Overburden Pressure	78.75	kN/m²

End Bearing Resistance (kN) Q_p= 1268.32

Skin Resistance in Clay Layer is $\pi*d*T_l*C_u*\alpha$

Skin Resistance in Sand Layer is $\pi*d*T_l*q_l*K*Tan(\phi)$

End Bearing Resistance in Clay Layer is $\pi*d^2/4*C_u*N_c$

End Bearing Resistance in Sand Layer is $\pi*d^2/4*Q*N_q$

Ultimate Load Carrying Capacity (Q_{ult})	**$Q_u=Q_f-Q_f+Q_p$ (kN)**	3479.00
Safe Load Carrying Capacity (Q_{safe})	**$Q_u/2.5$ (kN)**	1391.60
Allowable Safe Load Carrying Capacity	**$Q_{A\text{-}safe}$ (kN)**	1391.60
Allowable Safe Pull out Capacity	**$Q_{A\text{-}pull}$: Qf/3 (kN)**	736.90

Where

Cu=Undrained Shear Strength of Clay

ϕ=Angle of Shearing Resistance

N_c=Bearing Capacity Factor = 9

K=Coef. Earth Pressure at Rest

q_l=Effecitve Overburden Pressure at middle of Layer

N_q=Bearing Capacity Factor, Ref. Fig.1 of IS: Code Referred above

d=Dia. Of Pile

α=Adhession Factor

T_l=Thickness of Layer

Q (i.e) Effecitve Overburden Pressure at pile tip=Effective height of overburden X (γ-10)

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ESTIMATION OF SAFE LOAD CARRYING CAPACITY OF BORED CAST-INSITU PILES

Type of Pile	Bored	Diameter of Pile		Length of Pile below G.L. (m)		20	As Per IS:2911-(P-I,S-2)-2010
Reference Bore Hole	BH-01		500	mm	Surcharge Pressure	0	kPa

Layer No.	Layer Thk. (m) Top. R.L.	Bot. R.L.	Thickness	Type of Strata	Ave. SPT	(γ) kN/m³ of Layer	Ave. upto Layer	Shear Parameters (C_u) kPa	(ϕ) Deg.	Effective Overburden Pressure (kPa) At top of Layer	At Bot. of Layer	At Mid. of Layer	Adhesion Factor (α)	Earth Pressure Coefficient (k)	Skin Friction (Q_f) kN		
1.0	0.0	1.0	1.0	Cut-Off Level													
2.0	1.0	2.0	1.0	Silty Clay	11	18.0	18.0	73	-	0.0	8.0	4.0	0.6	-	qf	2	71.1
3.0	2.0	3.0	1.0	Silty Sand	41	20.0	19.0	-	39.0	8.0	18.0	13.0	-	1.5	qf	3	24.0
4.0	3.0	6.0	3.0	Silty Clay	5	15.0	17.5	33	-	18.0	33.0	25.5	1.0	-	qf	4	155.5
5.0	6.0	7.5	1.5	Sand	21	18.5	16.8	-	33.3	33.0	45.8	39.4	-	1.2	qf	5	71.1
6.0	7.5	10.5	3.0	Silty Clay	21	20.5	19.5	140	-	45.8	77.3	61.5	0.3	-	qf	6	197.9
7.0	10.5	14.0	3.5	Silty Clay	5	15.0	17.8	33	-	77.3	94.8	86.0	1.0	-	qf	7	181.4
8.0	14.0	18.0	4.0	Silty Clay	24	20.5	17.8	160	-	94.8	136.8	115.8	0.3	-	qf	8	301.6
9.0	18.0	20.0	2.0	Silty Sand	50	20.5	20.5	-	38.0	136.8	157.8	147.3	-	1.5	qf	9	542.1
10.0	20.0	22.0	2.0	Weathered Rock	50	20.5	20.5	-	38.0	157.8	178.8	168.3	-	1.5	qf	10	619.4

Summation of Positive Skin Resitance (kN) Q_f= 2164.29

Summation of Negative Skin Resistance (kN) -Qf= 0.00

Computation of End Bearing Resistance

		SPT	ϕ	C_u	N_q	N_c			
Bearing Stratum	Weathered Rock	50	38.00	-	82.03	-	Eff.Ht.of Overburden	8	m
							Effective Overburden Pressure	78.75	kN/m²

End Bearing Resistance (kN) Q_p= 1268.32

Skin Resistance in Clay Layer is $\pi*d*T_l*C_u*\alpha$	Ultimate Load Carrying Capacity (Q_{ult})	**$Q_u=Q_f-Q_f+Q_p$ (kN)** 3432.61
Skin Resistance in Sand Layer is $\pi*d*T_l*q_l*K*Tan(\phi)$	Safe Load Carrying Capacity (Q_{safe})	**$Q_u/2.5$ (kN)** 1373.04
End Bearing Resistance in Clay Layer is $\pi*d^2/4*C_u*N_c$	Allowable Safe Load Carrying Capacity	**$Q_{A\text{-}safe}$ (kN)** 1373.04
End Bearing Resistance in Sand Layer is $\pi*d^2/4*Q*N_q$	Allowable Safe Pull out Capacity	**$Q_{A\text{-}pull}$: Qf/3 (kN)** 721.43

Where

Cu=Undrained Shear Strength of Clay
K=Coef. Earth Pressure at Rest
d=Dia. Of Pile
ϕ=Angle of Shearing Resistance
q_l=Effecitve Overburden Pressure at middle of Layer
α=Adhesion Factor
N_c=Bearing Capacity Factor = 9
N_q=Bearing Capacity Factor, Ref. Fig.1 of IS: Code Referred above
T_l=Thickness of Layer
Q (i.e) Effecitve Overburden Pressure at pile tip=Effective height of overburden X (γ-10)

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LATERAL LOAD CARRYING CAPACITY OF BORED CAST- SITU PILES

Reference Bore Hole : BH-02

1.0 Geometrical Data

Type of Pile Head Considered		Fixed	
Diameter of Pile (d)	:	0.50	m
Free standing Length of Pile (e)	:	0	m
Length of Pile below E.G.L (Le)	:	22.0	m
Cut-Off Level From E.G.L	:	1.0	
Length of Pile below Cut-Off Level (Le)	:	21.0	m
Grade of Concrete (M)	:	25	MN/m^2
Young's Modulus of Concrete (E)	:	25000000	kN/m^2
Momemnt of Inertia (I)	:	0.003068	m^4

2.0 Determination of Depth of Fixity

Type of Soil Strata	:	Clay	
Ground Water Condition	:	Submerged	
Design SPT "N" Value	:	12	
K=((k1/1.5)*(0.3/B))			
(n can be read as h in the above and below equation in case of Sand)			
K1=	:	29250	kN/m^3
K=	:	11700	kN/m^4
R=	:	1.90	m
L1/R	:	0.00	
Lf/R	:	2.20	
Depth of Fixity below Cut off (z_f)	:	4.19	m

3.0 Determincation of Lateral Load and Moment Carrying Capacity for 0.005 m Lateral Deflection:

Allowable Lateral Deflection (Y)	:	0.005	m
Lateral Load Carrying Capacity (H)= Y*12EI/(e+zf)^3	:	62.73	kN
Recommended Design Lateral Load carrying Capacity	:	**60**	**kN**
Fixed End Moment,M_F=H(e+z_f)/2		131	
Reduction Factor (L_1/T)	:	0.67	m
Actual Moment (Fixed End Moment/Reduction Factor),M_F		**88**	kN-m

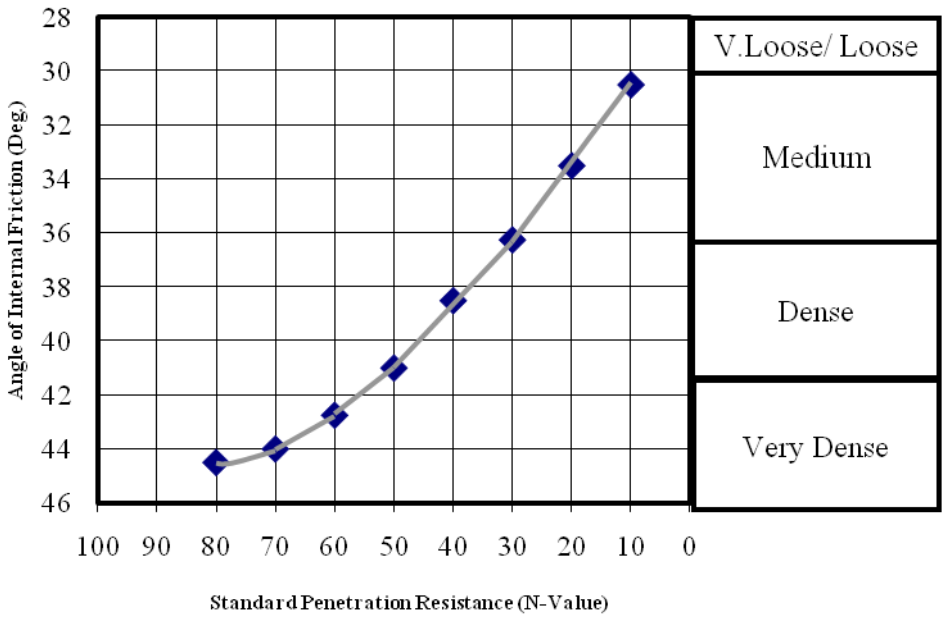


FIG. A1 Relation Ship between Angle of Internal Friction & N-value (Reproduced from IS:6403-1981)

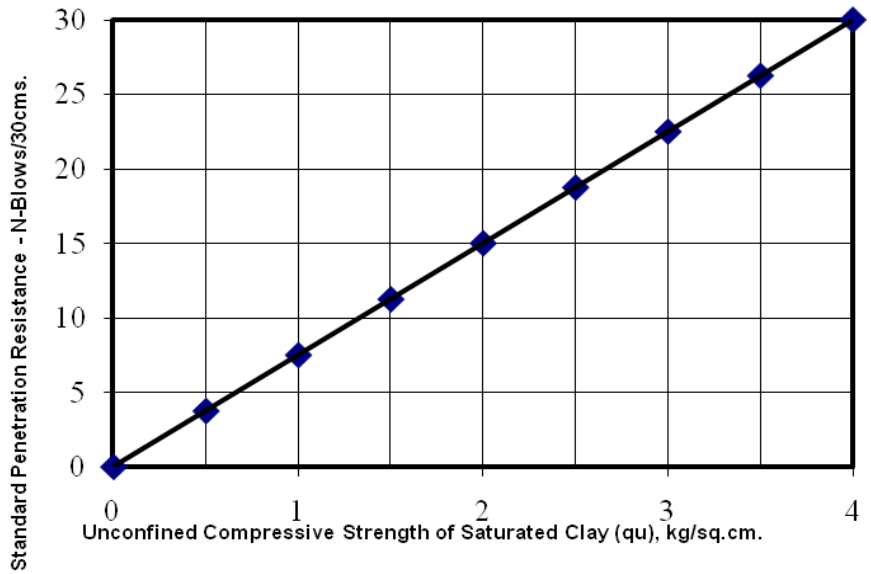


FIG. A2 : Relationship between UCC & SPT-Value (N) of Saturated Clay (AfterTerzhagi & Peck, 1948)

ANNEXURE-II

GEOMARINE
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SITE INVESTIGATION RECORD

BORE HOLE No.	01
PAGE No.	1
DIA OF BORE HOLE	150mm — / 100mm
BORE START DATE	21/09/2022
BORE END DATE	23/09/2022
TOTAL DRILLING DAYS	3

PROJECT NAME	PUSHKAR PROPERTIES				
LOCATION	KORATTUR	MACHINE No.		CHAINAGE (m)	
STRUCTURE		DRILLING METHOD	Rotary	CO-ORDINATES	N
JOB CODE		FLUSHING MEDIUM	Bentonite		E

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	15-30	30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	Layer Data: Depth (m)	Geotechnical Description
0	21/09/2022	14	40											TOP	Brownish Silt.
		14	41	SC			3	7	8	15	0.50	1	SS	0.50	Stiff, Brownish Grey, Sandy Silt with Compact CLAY.
1		15	05												
		15	06	SC			4	8	9	17	1.25	2	SS	1.25	V.Stiff, Brownish Grey, Sand with Compact Silt CLAY.
		15	28												
2		15	29	SC			7	9	11	20	2.00	3	SS	2.00	V.Stiff, Yellowish Grey, fine Sand with Silty CLAY.
		16	05												
		16	06												
3				SC			2	3	4	7	3.00	4	SS	3.00	M.Stiff, Brownish Grey, Silty CLAY.
		16	30												
		16	31												
4				SC			6	3	4	7	4.00	5	SS	4.00	M.Stiff, Brownish Grey Sand with Silty CLAY.
		16	55												
		16	56												
5	22/09/2022			SC			2	4	13	17	5.00	6	SS	5.00	V.Stiff, Greyish Sandy Silty CLAY.
		9	30												
		9	31												
6				SC			7	8	10	18	6.00	7	SS		V.Stiff, Blackish Grey, Silty CLAY.
		9	55												
7		9	56												
				SC			9	11	13	23	7.50	8	SS		—— DO ——
8															
		10	30												
		10	31												
9				SC			5	7	9	16	9.00	9	SS		V.Stiff, Blackish Grey, Silty CLAY.
		10	55												
10		10	56												
				SC			2	3	3	6	10.50	10	SS		M.Stiff, Greyish Silty CLAY

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	S. ADVANTH	PROJECT SITE DETAILS	
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE		GROUND LEVEL (m)	
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	22/09/2022	WATER TABLE (m)	
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE		CASING DEPTH (m)	

GEOMARINE
THE SPIRIT OF ENGINEERING

SITE INVESTIGATION RECORD

BORE HOLE No.	01
PAGE No.	2

PROJECT NAME	PUSHKAR PROPERTIES					DIA OF BORE HOLE	150mm ✓ / 100mm
LOCATION	KORATTUR	MACHINE No.		CHAINAGE (m)		BORE START DATE	21/9/2022
STRUCTURE		DRILLING METHOD	Rotary	CO-ORDINATES	N	BORE END DATE	23/09/2022
JOB CODE		FLUSHING MEDIUM	Bentonite		E	TOTAL DRILLING DAYS	3

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	15-30	30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	Layer Data: Depth (m)	Geotechnical Description
1	22/09/2022	11	15								1.50				
		11	17												
2				SC			5	7	9	16	12.00	11	SS		V. Stiff, Greyish Silty Clayey with Pebbles.
3		12	25												
		12	27												
4				SC			10	11	13	24	14.00	12	SS		——— Do ———
5		14	30												
		14	33												
6				SC			12	16	19	35	16.00	13	SS		V. Hard, Yellowish Grey, Compact Silty CLAY.
7		15	10												
		15	14												
8				SC			15	20	27	47	18.00	14	SS		V. Hard, Yellowish Grey Sandy Silty CLAY (mix) (R. Soil).
9		16	20												
		16	28												
0				SC			120cm / 60 blows		H.R	N>100	20.00	15	SS		V. Dense, Brownish Yellow, (mix), Sandy Silt (R. Soil).

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	S. ANANTH	PROJECT SITE DETAILS	
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE	S. A	GROUND LEVEL (m)	
UDS-Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	22/09/2022	WATER TABLE (m)	
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE		CASING DEPTH (m)	

GEOMARINE
THE SPIRIT OF ENGINEERING

SITE INVESTIGATION RECORD

BORE HOLE No.	01
PAGE No.	3
DIA OF BORE HOLE	150mm ✓ / 100mm
BORE START DATE	21/09/2022
BORE END DATE	23/09/2022
TOTAL DRILLING DAYS	3

PROJECT NAME	PUSHKAR PROPERTIES						
LOCATION	KORATTUR	MACHINE No.		CHAINAGE (m)			
STRUCTURE		DRILLING METHOD	Rotary	CO-ORDINATES	N		
JOB CODE		FLUSHING MEDIUM	Bentonite		E		

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	SPT Details: Blows/cm. 15-30	SPT Details: Blows/cm. 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Layer Data: Depth (m)	Geotechnical Description
1	21/9/22														
	23/09/2022	9	40												
2		9	54	SC			Hammer Rebound			N>100	22.50	16	WS		Completely Weathered Rock (WS)
3		10	30												
		11	10												
4				DB	10%	0%					24.00	17	CS		Weak to moderate, Brownish yellow (mix) Highly Weathered Rock.
		11	45												
		12	30												
5				DB	15%	0%					25.00	18	CS		Moderate to Strong, Blackish Grey, Highly Weathered Rock.
6															
					Bore hole Terminated At 25.00 mts Depth.										
7															
8															
9															
0															

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	S. ANANTH	PROJECT SITE DETAILS	
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE		GROUND LEVEL (m)	
UDS-Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	23/09/2022	WATER TABLE (m)	
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE		CASING DEPTH (m)	

GEOMARINE
THE SPIRIT OF ENGINEERING

SITE INVESTIGATION RECORD

BORE HOLE No.	02		
PAGE No.	1		
DIA OF BORE HOLE	150mm		
	100mm		
BORE START DATE	15/9/2022		
BORE END DATE	16/9/2022		
TOTAL DRILLING DAYS	2		

PROJECT NAME	PUSHKAR PROPERTIES.				
LOCATION	KORATTUR	MACHINE No.		CHAINAGE (m)	
STRUCTURE	SILT + 9 FLOORS	DRILLING METHOD	Rotary	CO-ORDINATES	N
JOB CODE		FLUSHING MEDIUM	Bentonite		E

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	Blows/cm. 15-30	Blows/cm. 30-45	SPT 'N' Value	Sample Details: Depth	No.	Type	Layer Data: Depth (m)	Geotechnical Description
0	15/09/2022	4	00												
		4	04				10	13	13	26	0.50				CLAYEY SANDY SILT + CLAY RIVER High, Brown, Compact.
1		4	20												
		4	25				5	4	8	12	1.25		SPT		Brownish, compact, stiff, CLAY
		4	42												
2		4	50				12	7	7	14	2				Loose, Brownish, v. Amgrain. SILTY SAND.
		5	15												
		5	27	TCB											m. stiff, Brownish, Compact
3							2	3	2	5	3				SILTY CLAY
		9	25												
		9	33							(22)					
4											4				UNDISTURBED SAMPLES.
		9	58												
		9	59				1	2	2	4	5				v. soft, Blackish, Compact SILTY CLAY
5		10	15												
		10	18				4	8	9	17	6				v. stiff, moist, Blackish, Compac SILTY CLAY
6															
		10	40												
		10	45	SC											
7							1	10	10	20	7.5		SPT		v. stiff, moist, Blackish, compa SILTY CLAY
		11	05												
8		11	13												
															Blackish-Greyish (mix) firm-medium/coarser grain. CLAYEY SILT with Coarse Sand.
							7	12	10	22	9				
9															
		11	35												
		11	39												
10							2	2	3	5	10.50				m. stiff, Blackish, Compact SILTY CLAY

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	K. Srivasanlagan	PROJECT SITE DETAILS	
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE		GROUND LEVEL (m)	
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	15/09/2022	WATER TABLE (m)	
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE		CASING DEPTH (m)	

GEOMARINE
THE SPIRIT OF ENGINEERING

SITE INVESTIGATION RECORD

BORE HOLE No.	02
PAGE No.	2
DIA OF BORE HOLE	150mm / 100mm
BORE START DATE	15/9/2022
BORE END DATE	16/9/2022
TOTAL DRILLING DAYS	2

PROJECT NAME	PUSHKAR PROPERTIES.				
LOCATION	KORATTUR	MACHINE No.		CHAINAGE (m)	
STRUCTURE	SF9 Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N
JOB CODE		FLUSHING MEDIUM	Bentonite		E

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	SPT Details: Blows/cm. 15-30	SPT Details: Blows/cm. 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Layer Data: Depth (m)	Layer Data: Geotechnical Description
1	15/09/2022	12.00													
2		12.06					1	2	2	4	12				Soft, moist, Blackish, compact SILTY CLAY
3		12.35		DB											
4		12.41					6	10	10	20	14				V. stiff, greyish-Whitish (mix) compact, CLAY with Pebbles.
5		2.00													
6		2.09					8	10	19	29	16				Greyish, compact, V. stiff, Clay
7		3.00		DB											
8		3.09					26	27	35	62	18				Yellowish-Brownish. & fine grain Clay binder SANDY SILT with Gravel. Pocket
9		4.29													
0		4.38					12cm / 60 blows			NS/100	20				U. Dense, Whitish Brown, Silt Sand with Gravel (R. Soil).

Split spoon samples

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	M. VS Sankaran
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE	
UDS - Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	15/09/2022
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE	

PROJECT SITE DETAILS	
GROUND LEVEL (m)	
WATER TABLE (m)	
CASING DEPTH (m)	

GEOMARINE
THE SPIRIT OF ENGINEERING

SITE INVESTIGATION RECORD

BORE HOLE No.	02
PAGE No.	3
DIA OF BORE HOLE	150mm ✓ / 100mm
BORE START DATE	15/09/2022
BORE END DATE	16/09/2022
TOTAL DRILLING DAYS	2

PROJECT NAME	PUSHKAR PROPERTIES						
LOCATION	KORATTUR	MACHINE No.		CHAINAGE (m)			
STRUCTURE	S+9 Floors	DRILLING METHOD	Rotary	CO-ORDINATES	N		
JOB CODE		FLUSHING MEDIUM	Bentonite		E		

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	SPT Details: Blows/cm. 15-30	SPT Details: Blows/cm. 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Layer Data: Depth (m)	Geotechnical Description
1	15/09/2022	11	40												
		12	05												
2				SC			Hammer rebound				22.50		WS		Completely Weathered Rock (WS)
3		14	25												
		15	05												
4				DB	10%	0%					24.00		CS		Weak, Whitish Brownish Grey (mix), Highly weathered Rock.
		15	45												
5		16	40	DB	45%	0%					25.00		CS		Moderate to strong, Brownish Blackish Grey, Moderately weathered Rock.
6															
				Bore hole Terminated At 25.00 mts Depth.											
7															
8															
9															
0															

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	S. ANANTH	PROJECT SITE DETAILS	
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE		GROUND LEVEL (m)	
UDS-Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	16/09/2022	WATER TABLE (m)	
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE		CASING DEPTH (m)	

GEOMARINE
THE SPIRIT OF ENGINEERING

SITE INVESTIGATION RECORD

BORE HOLE No.	03
PAGE No.	1
DIA OF BORE HOLE	150mm ✓ / 100mm
BORE START DATE	17/09/2022
BORE END DATE	20/09/2022
TOTAL DRILLING DAYS	3

PROJECT NAME	PUSHKAR PROPERTIES						
LOCATION	KORATTUR	MACHINE No.		CHAINAGE (m)			
STRUCTURE	SILT +9 Floor	DRILLING METHOD	Rotary	CO-ORDINATES	N		
JOB CODE		FLUSHING MEDIUM	Bentonite		E		

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	SPT Details: Blows/cm. 15-30	SPT Details: Blows/cm. 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Layer Data: Depth (m)	Layer Data: Geotechnical Description
	17/09/2022	14	25											TOP	Ground To 0.25cm cement with filled soil & Gravels.
		14	27	SC			6	7	9	16	0.50	1	SS	0.50	M.Dense, Brownish clayey Sandy Silt with Pebbles.
1		14	50												
		14	51	SC			4	5	6	11	1.25	2	SS	1.25	M.Dense, Greyish Brown, clayey SILT.
		15	20												
2		15	21	SC			15	18	23	41	2.00	3	SS	2.00	M.Dense, Brownish Silt SAND.
		15	40												
		15	42	SC			2	3	2	5	3.00	4	SS	3.00	M.Stiff, Brownish Grey Silty CLAY.
3		16	05												
		16	06	SC			5	2	2	4	4.00	5	SS	4.00	Soft, Greyish, Silty CLAY.
4		16	28												
		16	30	SC			3	3	3	6	5.00	6	SS	5.00	—— DO ——
5		16	55												
		16	56							45cm / 52 blows					
6	19/09/2022			SC							6.00	7	UDS	6	UNDISTURBED SAMPLE
		9	40												
7		9	42												
				SC			13	10	12	22	7.50	8	SS		V.Stiff, Greyish, Silty CLAY.
8		10	05												
		10	07												
9				SC			6	11	9	20	9.00	9	SS		—— DO ——
		10	45												
0		10	47												
				SC			2	2	3	5	10.50	10	SS		M.Stiff, Blackish Grey, Silty CLAY.

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	So. ANANTH	PROJECT SITE DETAILS	
~~SS~~ - Split Spoon Sample	~~SC~~ - Soil Cutter	SIGNATURE		GROUND LEVEL (m)	
UDS-Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	19/9/2022	WATER TABLE (m)	
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE		CASING DEPTH (m)	

GEOMARINE
THE SPIRIT OF ENGINEERING

SITE INVESTIGATION RECORD

BORE HOLE No. 03
PAGE No. 2

PROJECT NAME	PUSHKAR PROPERTIES					DIA OF BORE HOLE	150mm ✓ / 100mm
LOCATION	KORATTUR	MACHINE No.		CHAINAGE (m)		BORE START DATE	17/09/2022
STRUCTURE	SILT + 9 Floor	DRILLING METHOD	Rotary	CO-ORDINATES	N	BORE END DATE	20/09/2022
JOB CODE		FLUSHING MEDIUM	Bentonite		E	TOTAL DRILLING DAYS	3

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	SPT Details: Blows/cm. 15-30	SPT Details: Blows/cm. 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Layer Data: Depth (m)	Layer Data: Geotechnical Description
1	17/09/2022	11	40												
		11	42												
2				SC			2	3	2	5	12.00	11	SS		M.Stiff, Blackish Grey, Compacted Silty CLAY.
3		14	20												
		14	22												
4				SC			9	8	12	20	14.00	12	SS		——— DO ———
5		14	55												
		14	57												
6				SC			12	11	17	28	16.00	13	SS		V.Stiff, Blackish Grey, Compacted Silty CLAY.
7		15	35												
		15	38												
8				SC			23	27	36	63	18.00	14	SS		M.Dense, Greyish Yellow (mix) SILT.
9		16	25												
		16	29												
0				SC			6cm / 55blg		H.R	N>100	20.00	15	SS		M.Dense, Brownish Yellow (mix) SILT with Pebbles. (R.SOIL)

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	S. ANANTH	PROJECT SITE DETAILS	
~~SS~~ - Split Spoon Sample	~~SC~~ - Soil Cutter	SIGNATURE	S. A	GROUND LEVEL (m)	
UDS-Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	19/09/2022	WATER TABLE (m)	
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE		CASING DEPTH (m)	

GEOMARINE
THE SPIRIT OF ENGINEERING

SITE INVESTIGATION RECORD

BORE HOLE No.	BH3
PAGE No.	3
DIA OF BORE HOLE	150mm ✓ / 100mm
BORE START DATE	17/09/2022
BORE END DATE	20/09/2022
TOTAL DRILLING DAYS	3

PROJECT NAME	PUSHKAR PROPERTIES						
LOCATION	KORATTUR	MACHINE No.		CHAINAGE (m)			
STRUCTURE		DRILLING METHOD	Rotary	CO-ORDINATES	'N		
JOB CODE		FLUSHING MEDIUM	Bentonite		E		

Depth below E.G.L. (m)	Drilling progress per metre: Date	Time: Hr.	Time: Min	Type of Drill Bit (SC / TCB / DB)	Core Details: Total Core Recovery %	Core Details: R.Q.D %	SPT Details: Blows/cm. 0-15	SPT Details: Blows/cm. 15-30	SPT Details: Blows/cm. 30-45	SPT 'N' Value	Sample Details: Depth	Sample Details: No.	Sample Details: Type	Layer Data: Depth (m)	Layer Data: Geotechnical Description
1	20/09/2022	9	35												
		9	44												
2				SC			Hammer rebound				22.00	-	-		Completely weathered rock.
		10	20												
3		10	55				Hammer								
				DB	0%	0%	rebound			N>100	23.50	16	WS		Completely weathered rock (WS)
4		11	25												
		12	05				Hammer								
5				DB	0%	0%	rebound			N>100	25.00	17	WS		Brownish Grey, fine grain, Completely weathered rock (WS)
6							Bore hole Terminated At							25.00 mts	Depth.
7															
8															
9															
0															

CS - Core Sample	DS - Disturbed Sample	SUPERVISOR NAME	S. ANANTH	PROJECT SITE DETAILS	
SS - Split Spoon Sample	SC - Soil Cutter	SIGNATURE		GROUND LEVEL (m)	
UDS-Undisturbed Sample	TCB - Tungsten Carbide Bit	DATE	20/09/2022	WATER TABLE (m)	
WS - Wash Sample	DB - Diamond Bit	CLIENT IN-CHARGE		CASING DEPTH (m)	

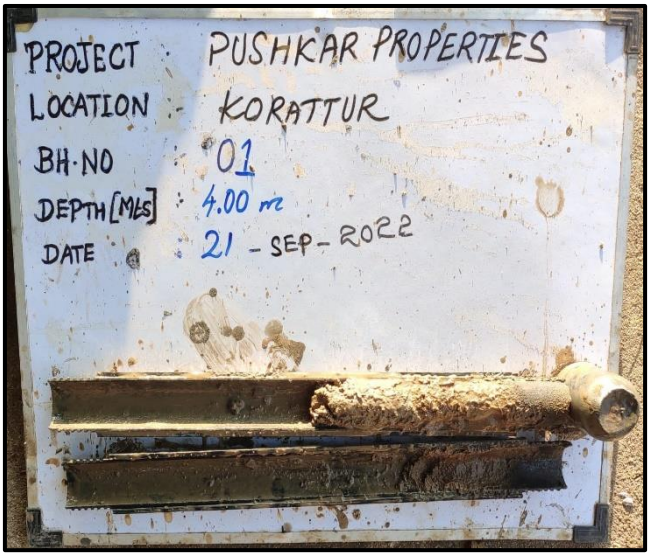
GEO MARINE
THE SPIRIT OF ENGINEERING



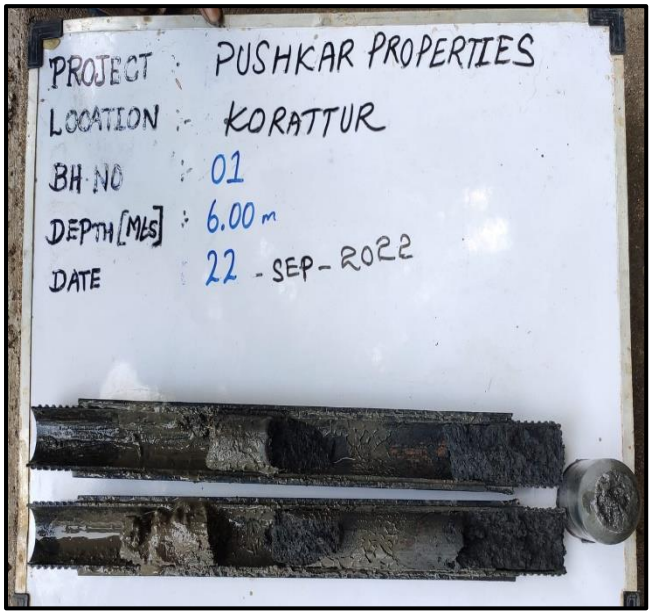


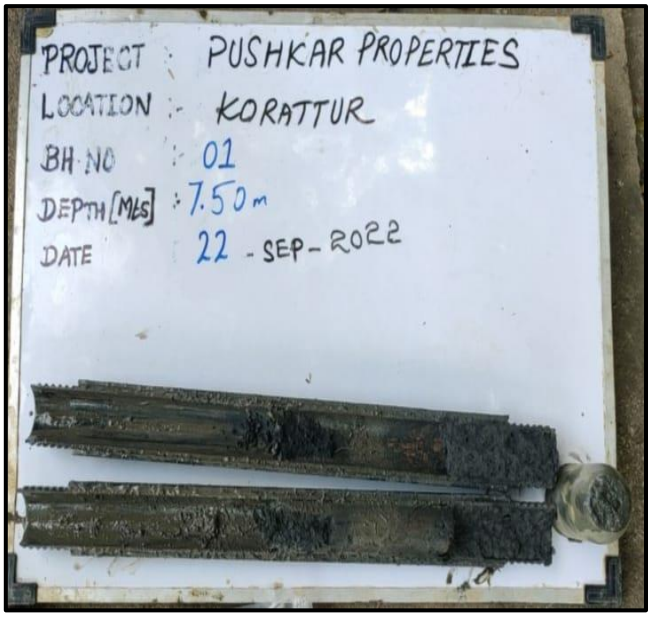


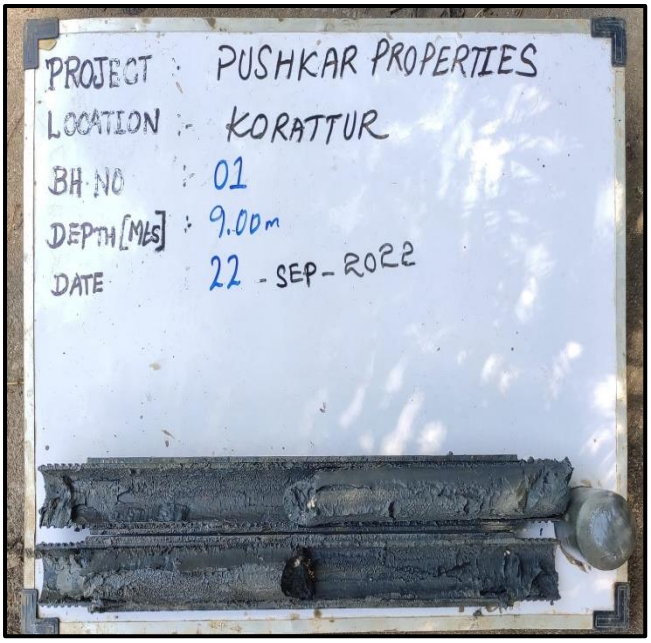


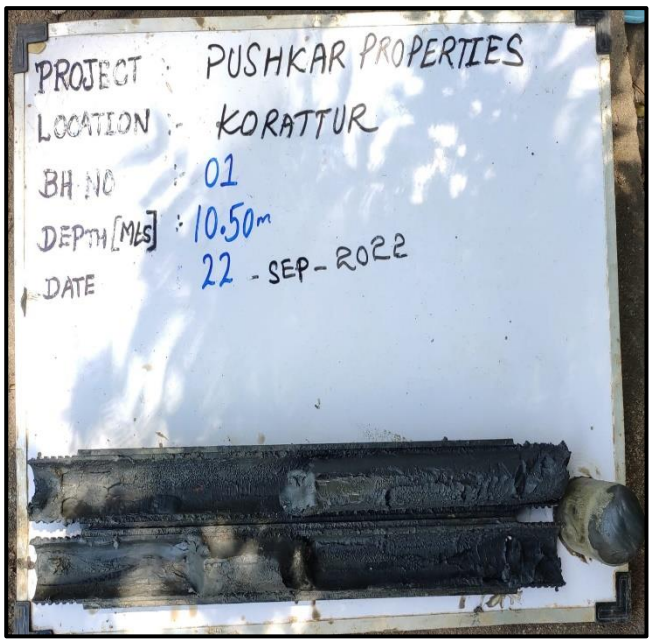

PROJECT : PUSHKAR PROPERTIES
LOCATION :- KORATTUR
BH·NO : 01
DEPTH [MLS] : 4.00 m
DATE : 21 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION :- KORATTUR
BH·NO : 01
DEPTH [MLS] : 5.00 m
DATE : 21 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION :- KORATTUR
BH·NO : 01
DEPTH [MLS] : 6.00 m
DATE : 22 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION :- KORATTUR
BH·NO : 01
DEPTH [MLS] : 7.50 m
DATE : 22 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION :- KORATTUR
BH NO : 01
DEPTH [MLS] : 9.00m
DATE 22 - SEP - 2022

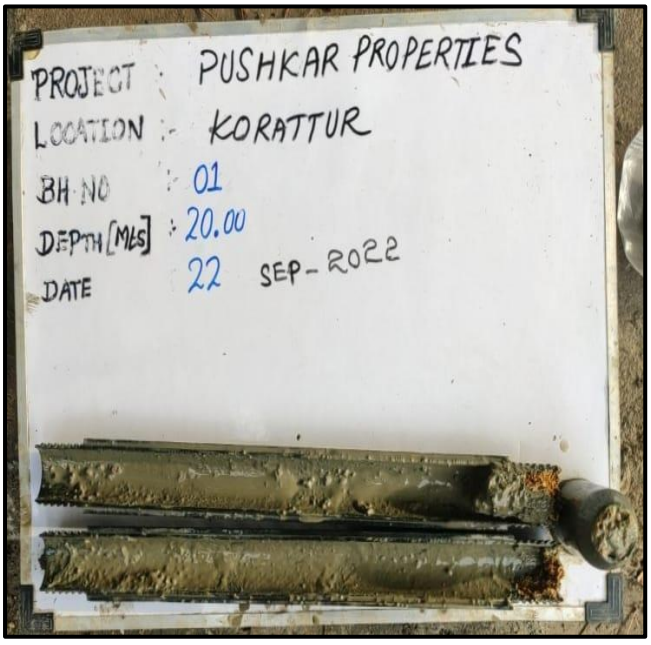

PROJECT : PUSHKAR PROPERTIES
LOCATION :- KORATTUR
BH NO : 01
DEPTH [MLS] : 10.50m
DATE 22 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION :- KORATTUR
BH NO : 01
DEPTH [MLS] : 12.00m
DATE 22 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION :- KORATTUR
BH NO : 01
DEPTH [MLS] : 14.00m
DATE 22 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION :- KORATTUR
BH NO : 01
DEPTH [MLS] : 16.00m
DATE 22 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION :- KORATTUR
BH NO : 01
DEPTH [MLS] : 18.00m
DATE 22 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION :- KORATTUR
BH NO : 01
DEPTH [MLS] : 20.00
DATE 22 SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION :- KORATTUR
BH NO : 02
DEPTH [MLS] : 0.50 m
DATE 14 - SEP - 2022

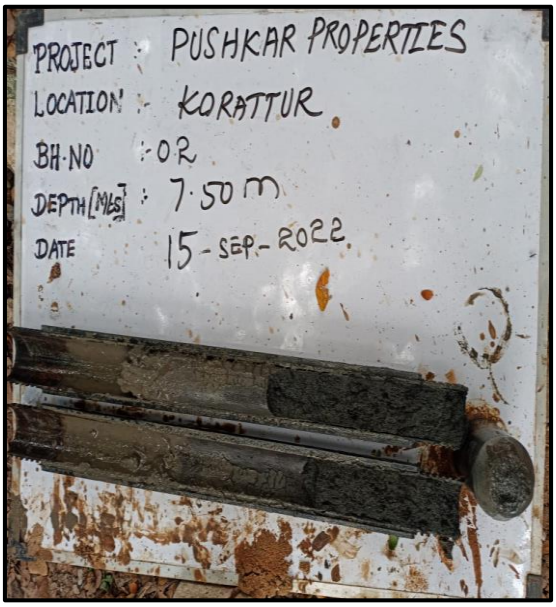

PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH NO : 02
DEPTH [MTS] : 1.25 m
DATE : 14 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH NO : 02
DEPTH [MTS] : 2.00 m
DATE : 14 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH NO : 02
DEPTH [MTS] : 3.00 m
DATE : 14 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH NO : 02
DEPTH [MTS] : 5.00 m
DATE : 15 - SEP - 2022

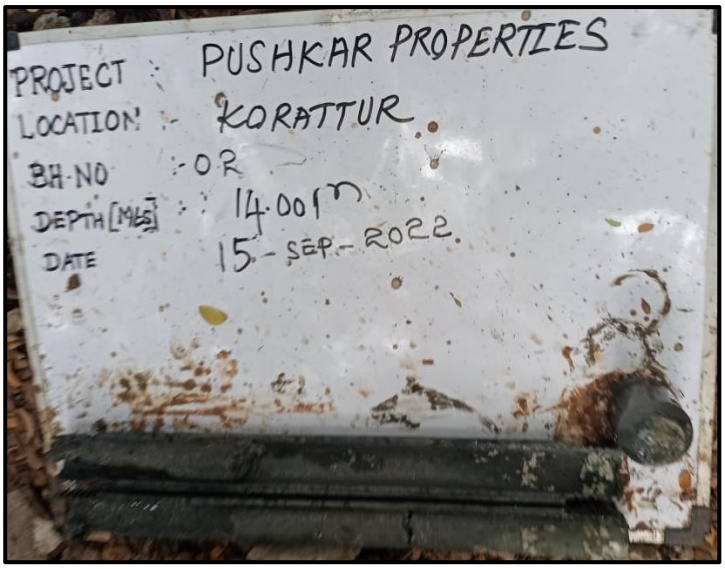

PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR.
BH.NO : OR
DEPTH [MTS] : 6.00 m
DATE 15-SEP-2022.


PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR.
BH.NO : OR
DEPTH [MTS] : 7.50 m
DATE 15-SEP-2022.


PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR.
BH.NO : OR
DEPTH [MTS] : 9.00 m
DATE 15-SEP-2022.


PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR.
BH.NO : OR
DEPTH [MTS] : 10.50 m
DATE 15-SEP-2022.

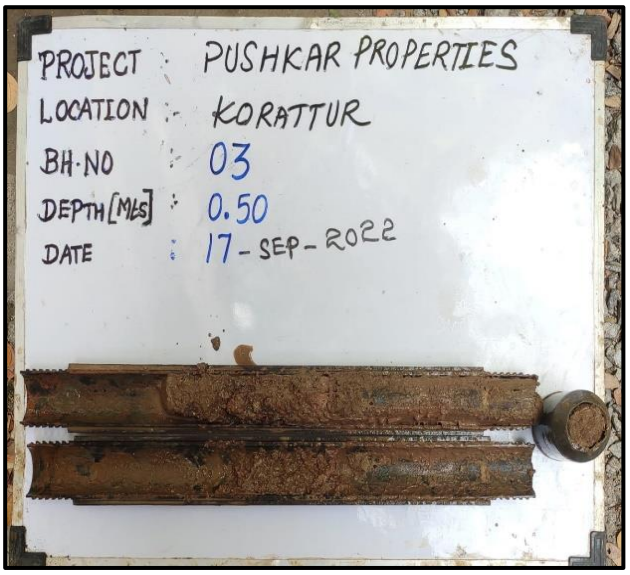

PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH NO : OR
DEPTH [MLS] : 12.00 m
DATE : 15 - SEP - 2022

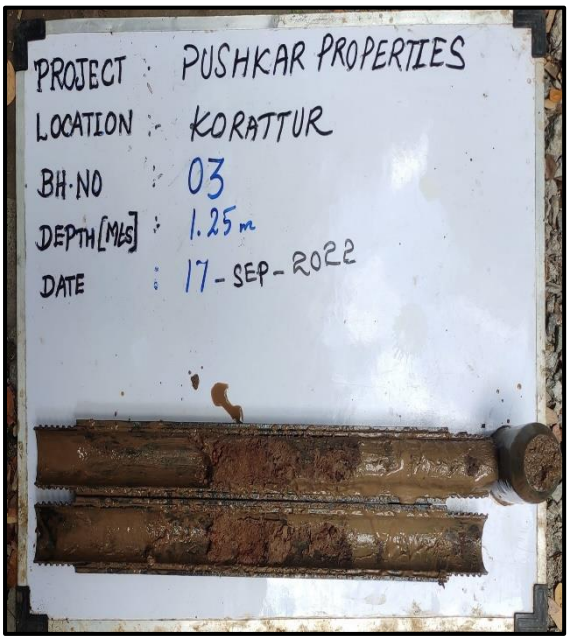

PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH NO : OR
DEPTH [MLS] : 14.00 m
DATE : 15 - SEP - 2022

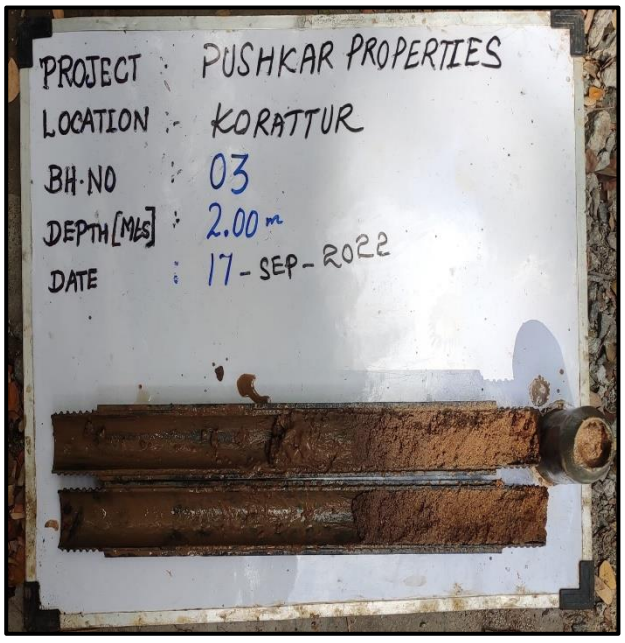

PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH NO : OR
DEPTH [MLS] : 16.00 m
DATE : 15 - SEP - 2022

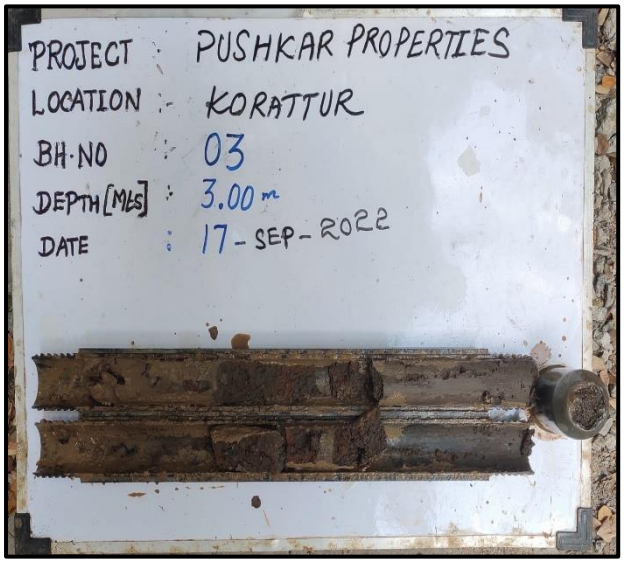

PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH NO : OR
DEPTH [MLS] : 18.00 m
DATE : 15 - SEP - 2022

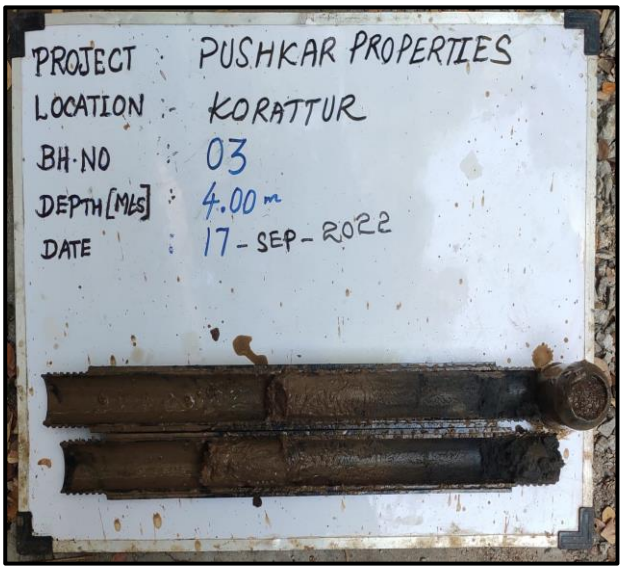

PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH·NO : 02
DEPTH [MLS] : 20.00 m
DATE : 16 - SEP - 2022

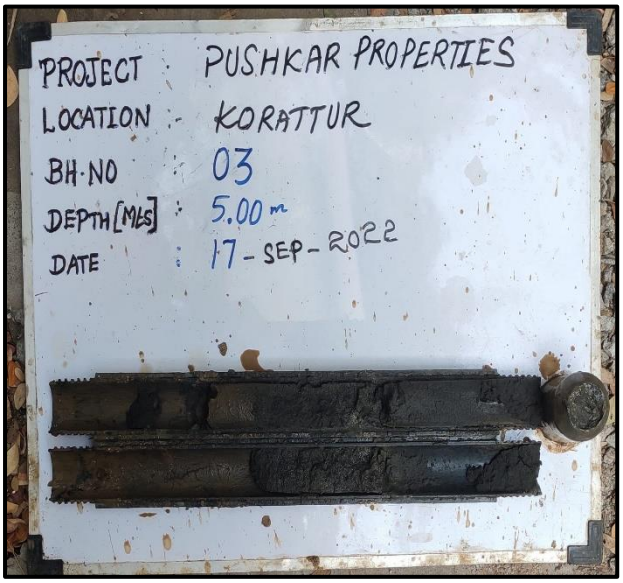

PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH·NO : 03
DEPTH [MLS] : 0.50
DATE : 17 - SEP - 2022

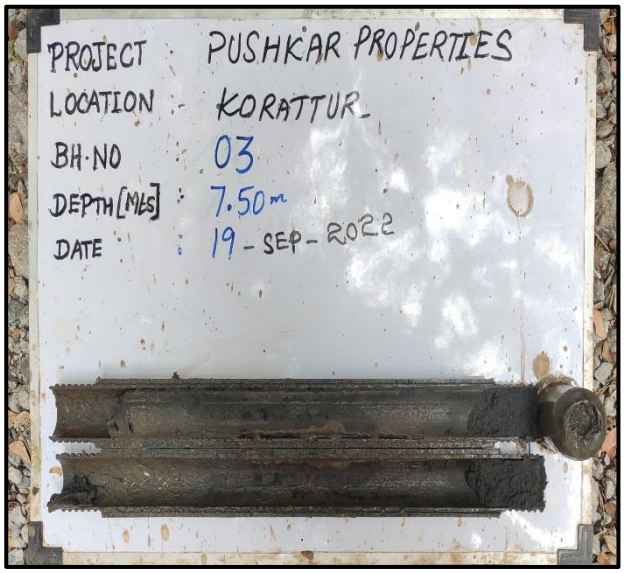

PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH·NO : 03
DEPTH [MLS] : 1.25 m
DATE : 17 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH·NO : 03
DEPTH [MLS] : 2.00 m
DATE : 17 - SEP - 2022

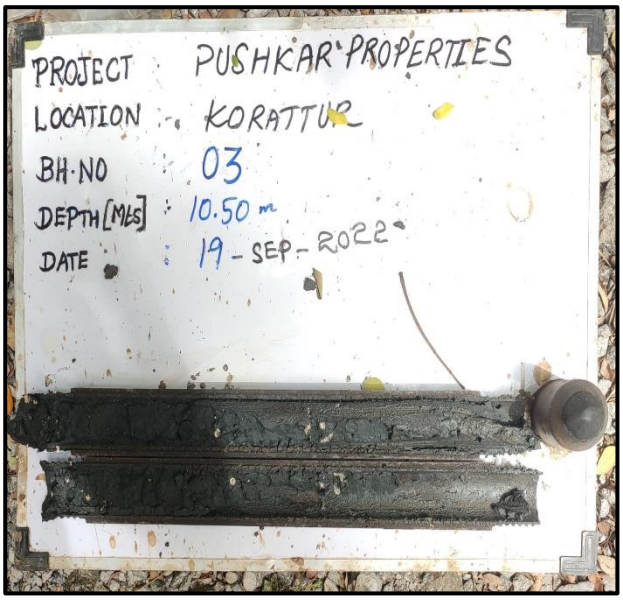

PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH·NO : 03
DEPTH [MLS] : 3.00 m
DATE : 17 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH·NO : 03
DEPTH [MLS] : 4.00 m
DATE : 17 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH·NO : 03
DEPTH [MLS] : 5.00 m
DATE : 17 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH·NO : 03
DEPTH [MLS] : 7.50 m
DATE : 19 - SEP - 2022

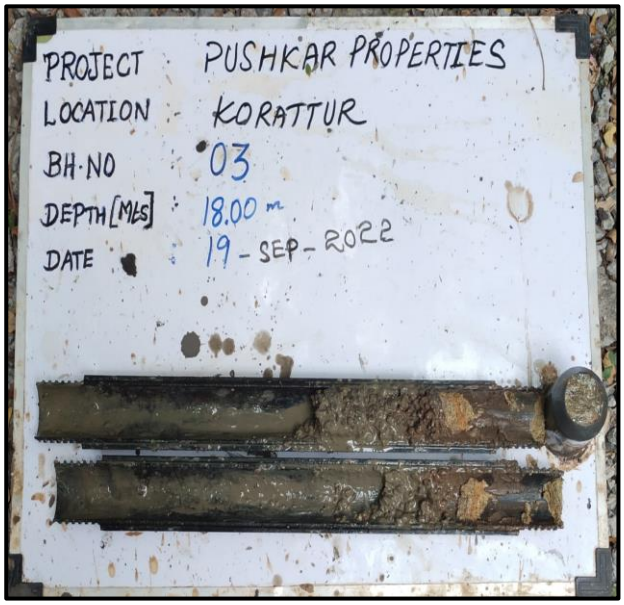

PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH·NO : 03
DEPTH [MTS] : 9.00 m
DATE : 19 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH·NO : 03
DEPTH [MTS] : 10.50 m
DATE : 19 - SEP - 2022

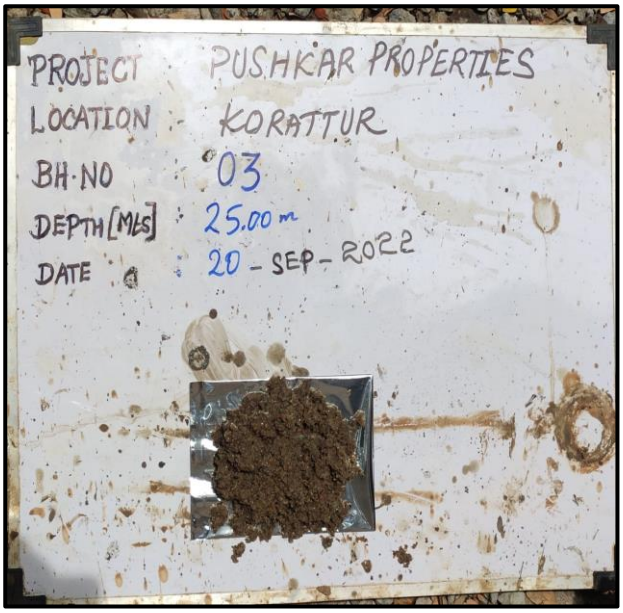

PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH·NO : 03
DEPTH [MTS] : 12.00 m
DATE : 19 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH·NO : 03
DEPTH [MTS] : 14.00 m
DATE : 19 - SEP - 2022

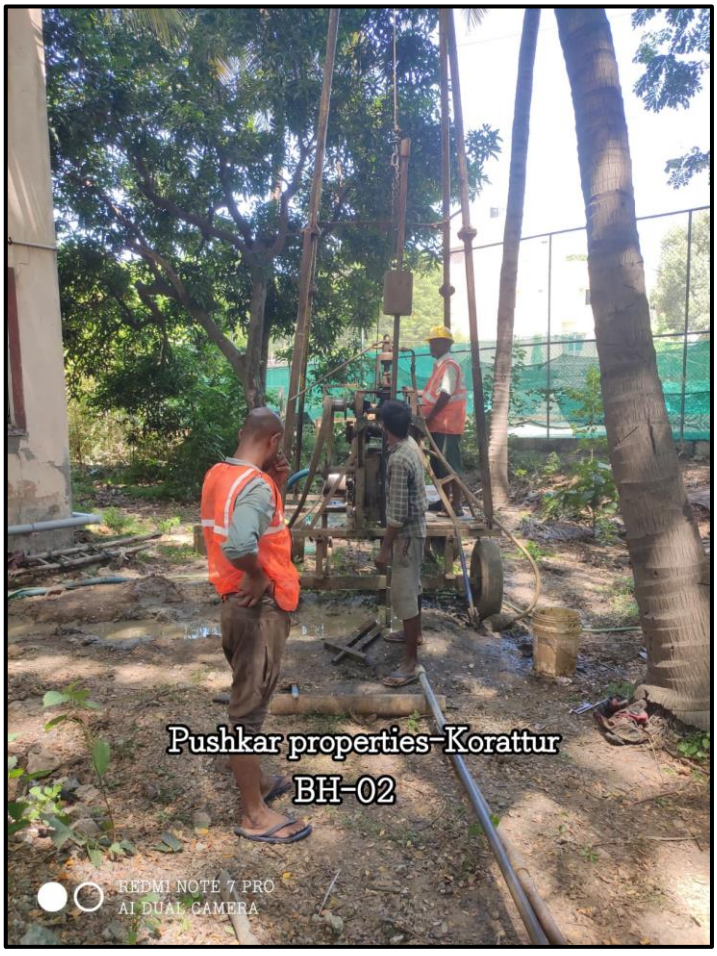

PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH·NO : 03
DEPTH [MLS] : 16.00 m
DATE : 19 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH·NO : 03
DEPTH [MLS] : 18.00 m
DATE : 19 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH·NO : 03
DEPTH [MLS] : 20.00 m
DATE : 19 - SEP - 2022


PROJECT : PUSHKAR PROPERTIES
LOCATION : KORATTUR
BH·NO : 03
DEPTH [MLS] : 25.00 m
DATE : 20 - SEP - 2022


Pushkar properties-korattur
BH-01


Pushkar properties-Korattur
BH-02
REDMI NOTE 7 PRO
AI DUAL CAMERA


Pushkar properties-Korattur
BH-03
REDMI NOTE 7 PRO
AI DUAL CAMERA



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Land Use Zone Finder, CRZ Zone Check, Aquifer Zone Check, CBA Check, EWS Check, Road Width Check, Proposed Road Widening Check, FSI Calculator

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Vastu & Property Management Tools

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