REPORT ON GEOTECHNICAL INVESTIGATION

Work For The Proposed 5 (G+IV) Storied Building

At

131/2B, Bakrahat Road, Ward No. – 144,
Borough No. – XVI, Mouza – Hanspukuria,
J.L. No. – 20, R.S. – 36, R.S. Khatian No. – 217,
L.R. Khatian No. – 339, Dag No. – 273, 274, 275, 276,
Touzi No. – 15, P.S. – Thakurpukur,
Kolkata – 700 104, Dist: 24 Pgs (S), under K.M.C.

For SANGITAA CONSTRUCTION

Proprietor

GEOTECHNICAL INVESTIGATION BY

CALCUTTA TEST CENTRE
AN ISO 9001:2015 CERTIFIED ORGANIZATION

4K, Sisir Bagan Road, Kolkata - 700 034
Phone : 033- 2397 8832
E-mail : calcuttatestcentre@gmail.com

ACCREDITED

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SITE: 131/2B, BAKRAHAT ROAD, WARD NO. – 144, BOROUGH NO. – XVI, KOLKATA – 700 104.

INTRODUCTION :

The soil investigation work for the proposed **5 (G+IV) storied building at Premises No. 131/2B, Bakrahat Road, Ward No. – 144, Borough No. – XVI, Mouza – Hanspukuria, J.L. No. – 20, R.S. – 36, R.S. Khatian No. – 217, L.R. Khatian No. – 339, Dag No. – 273, 274, 275, 276, Touzi No. – 15, P.S. – Thakurpukur, Kolkata – 700 104, Dist: 24 Pgs (S), under K.M.C.** was entrusted to **M/S CALCUTTA TEST CENTRE** with a view to determining the soil properties.

This report presents the findings of the above soil investigation work and then recommends the probable foundation systems for the structure envisaged.

1.0 SCOPE OF WORK :

Scope of the investigation work includes

i. Sinking of a total of **2 (two)** nos. bore holes, at maximum depth of **24.45m** below Existing Ground Level, conducting standard penetration tests and collection of soil samples.

ii. Laboratory testing on selected soil samples for classification purpose and to determine their strength and other physical properties.

iii. Engineering analysis to determine safe bearing pressure to be applied on soil through suitable type of foundation for the proposed structure.

iv. Preparation and submission of report in **2 (two)** copies, which will include the results of study, analysis and recommendations of suitable parameters for the purpose of designing foundations.

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2.0 FIELD WORK:

Necessary field work was carried out during the period between **26.07.2023** to **28.07.2023** and subsequently laboratory tests were taken up on sufficient no. of selected samples collected from site. A brief description of method of boring, field tests, collection of samples etc. and type of equipment used are given below.

TABLE :1

BORE HOLE NO.	TERMINATING DEPTH OF BORE HOLE BELOW E.G.L.	DATE OF COMMENCEMENT	DATE OF COMPLETION	S.W.L BELOW E. G. L. DURING FIELD WORK (m)	NO. OF SAMPLES COLLECTED		
					UNDISTURBED (U)	DISTURBED (D)	PENETROMETER (P)
1	10.45 m	26.07.2023	27.07.2023	1.80	2	2	04
2	24.45 m	27.07.2023	28.07.2023	1.80	1	1	12

2.1 BORING:

Auger boring was adopted up to a depth of about 3.0 m below the Existing Ground Level (E.G.L.) followed by Rotary Wash boring technique to advance the 150 mm dia. boreholes up to termination depths. Casing was used at top and bentonite slurry was used for stabilization of boreholes.

2.2 STANDARD PENETRATION TEST:

S.P.T. was conducted at the boring points at suitable intervals. The number of blows required for last 30.0 cm penetration of split spoon sampler out of a total penetration of 45.0 cm driven by a 63.5 kg hammer falling freely through a height of 75 cm was recorded as 'N' value. The sample from split spoon sampler was collected after each test and was properly labeled and placed in air-tight polythene bag before sending it to the laboratory. The test procedure conformed to IS- 2131-1981.

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2.3 COLLECTION OF SOIL SAMPLES:

Undisturbed soil samples were collected, wherever required and feasible, by means of a two tier 100 mm I.D. open drive sampling assembly. Before sampling, the borehole was thoroughly cleaned. The sampling assembly was driven to the required depth manually with the help of a jarring link. Sample collected in the lower tube was retained, labeled and waxed at both ends before sending to the laboratory.

Representative disturbed soil samples were collected frequently from auger, split spoon sampler of standard penetrometer and cutting shoe of undisturbed sampling assembly to maintain a continuous record of strata encountered.

3.0 LABORATORY TESTS:

All samples brought to the laboratory were first subjected to through physical examination before judiciously selecting a few of them for carrying out various relevant tests as per IS specifications. The following laboratory tests were conducted on soil samples.

⇒ Determination of Natural Moisture Content and Bulk density.

⇒ Determination of Liquid Limit and Plastic Limit

⇒ Sieve and Hydrometer Analysis.

⇒ Determination of Specific Gravity.

⇒ Triaxial Compression (UU) Test.

⇒ One-dimensional Consolidation Test.

Laboratory test results are summarized in "Test Result Sheet".

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3.1 Natural moisture content & Atterberg limits

Natural moisture content of this soil samples have been determined by oven drying liquid limit and plastic limit of clayey samples were determined (a) to classify the soil by the IS classification system and (b) to qualitatively assess their consistency and compressibility.

3.2 Bulk density & Dry density

These were determined by measuring the weights and dimensions of tri-axial shear and unconfined compressive strength test samples before testing and after oven drying. The bulk density and dry density values of the samples have been given in the enclosed laboratory sheet.

3.3 Grain size analysis

The grain size distributions of some representative samples were determined from hydrometer and /or sieve analysis. The results are plotted and shown in this report.

3.4 Tri-axial shear test (UU)/ Unconfined compressive strength

For triaxial shear and unconfined compressive strength tests, three no. 38 mm diameter 76 mm long specimens were obtained by jacking out the soil core, each into a thin-walled brass tube, having the wall thickness of 1/32". The inside of the tubes was coated with a thin layer of silicon oil. The tests were run on the clayey silt samples to determine their shear strengths. The cell pressures employed, in case of triaxial tests were 0.5, 1.0 and 1.5 kg/sq.cm. Unconfined Compression strength tests were conducted for the samples which had higher clay content. The samples were tested under quick condition at a rate of 1.25 mm/min and were loaded up to maximum 20% axial strain.

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3.5 Consolidation test

To obtain specimens for consolidation test, the odometer ring was placed on the trimmed horizontal faces of the soil within the 10 cm diameter sampling tube and the soil around the cutting edge was gradually removed with a spatula as the ring was gently pushed into the soil. The ring with the soil was then removed by cutting across the soil core with the help of a piano wire saw. Consolidation tests were run in floating ring type odometers, mounted in single & four unit consolidation frames under standard load increment ratio starting from 0.25 kg/sq.cm and going up to 8 kg/sq.cm in general. The pressure vs void ratio curves are given in this report.

3.6 Specific Gravity

The Specific Gravity of the soil samples was determined by adopting standard procedure. The soil sample was dried in oven dried for 24 hours and pulverized. The sample was then poured into a specific gravity bottle and topped up with distilled water. The specific gravity bottle was stirred and heated to eliminate air bubbles. The weight of the specific gravity bottle was recorded along with the temperature of the sample.

3.7 STANDING WATER LEVEL:

Standing Water levels in the bore holes were observed during field investigation. Final water reading in each bore hole was recorded 24 hours after completion of boring operation in the bore hole and is shown in the respective Borelog Data Sheet. The average level of standing water was found approximately at **1.80m** below the average E.G.L. at the borehole locations. However, for design purpose, it will be wise to consider water level at ground level for the worst case.

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4.0 SUB-SOIL STRATIFICATION AND PROPERTIES:

A study of the borehole logs, laboratory test results and field standard penetration test results indicates the following stratification of the sub-soil deposit.

Table-2 : SUB-SOIL STRATIFICATION

STRATUM	DESCRIPTION OF STRATUM	DEPTH OF EXISTENCE BELOW E.G.L.			THICKNESS (m)
		B.H	From (m)	To (m)	
I	Fill: brown silty clay / clayey silt mixed with brick pcs and rubbish.	1	0.00	0.80	0.80
		2	0.00	3.50	3.50
II	Soft grayish brown / grey silty clay with high silt content.	1	0.80	3.00	2.20
		2	3.50	6.50	3.00
III	Medium grey sandy silt with lenses of silt and sand in varying percentages and some clay fraction.	1	3.00	6.00	2.50
		2	6.50	9.00	2.50
IV	Medium to dense grey sand with some fines.	1	6.00	10.45*	≥ 4.45
		2	9.00	24.45*	≥ 15.45

*Up to termination Depth.

Brief descriptions of the various soil strata and physical practices are as follows.

STRATUM I :

Filling with brown silty clay mixed with rubbish, brick pcs etc. Thickness of this stratum is **0.80m to 3.50m**. For calculation of overburden pressure, its bulk unit weight may be considered as **1.75 t/m^3**. Thickness of fill varies from one borehole location to other and it should be noted and weightage is to be given from foundation point of view.

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STRATUM II :

Soft to medium grayish brown / grey silty clay with high silt content. The soil in this stratum had intermediate plasticity. Field 'N' values were ***3 to 4*** *blows / 30 cm. Consistency of soil is soft to medium. As per IS, the soil may be classified as* ***CI.*** *The following values of relevant soil parameters may be considered in design (Based on field 'N' values, and laboratory tests):*

Thickness : 2.20m to 3.50m.

Bulk Unit Weight γ : 1.83 t/m^3

Cohesion Value, C_u = 2.60 t/m^2

m_v : 0.042 cm^2/kg

STRATUM III :

Medium grey sandy silt with lenses of silt and sand in varying percentages and some clay fraction. The soil in this stratum was non plastic in nature with cohesive touch also. Field 'N' values were ***5*** *to* ***8*** *blows / 30 cm. Consistency of soil was medium. As per IS, the soil may be classified as* ***ML/CL.*** *The following values of relevant soil parameters may be considered in design (Based on field 'N' values, laboratory tests and standard charts):* ***BH. No. 1*** *was terminated in this stratum.*

Thickness : 2.50m to 3.00m.

Bulk Unit Weight γ : 1.80 t/m^3

Cohesion Value, C_u = 2.0 t/m^2

Angle of Internal Friction, $\phi_u = 15^0$

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STRATUM IV :

Medium dense to dense grey sand with some fines. The soil in this stratum was non plastic. Field 'N' values varied from ***10*** *to* ***31*** *blows / 30 cm or more. Compactness of soil was medium to dense. As per IS, the soil may be classified as* ***SP/SM.*** *The following values of relevant soil parameters may be considered in design (Based on field 'N' values, laboratory tests and standard charts):* ***BH No. 1*** *&* ***2*** *were terminated in this layer. As such actual thickness could not be estimated.*

Thickness : ≥15.45 m.

Bulk Unit Weight γ *: 1.85 t/m*^{3}

Angle of Internal Friction, $\phi_u \approx 30^0$ *to* 33^0

5.0 DISCUSSION ON FOUNDATION ASPECTS AND RECOMMENDATION:

Referring to this report there is a fill layer of ***3.50m*** *thick. The removal and its replacement with good earth to form an engineering is trouble some and problematic. For the proposed* ***(G+IV)*** *type R.C.C. framed building.*

On view of the above Deep foundation in the form of Bored – cast – in – situ piles is suggested and recommended to support the proposed building structure ***(G+IV)*** *type. This has been discussed below.*

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SITE: 131/2B, BAKRAHAT ROAD, WARD NO. – 144, BOROUGH NO. – XVI, KOLKATA – 700 104.

5.1 Type 1 : Deep Foundation:

R.C.C. Bored Cast-in-situ pile is considered as deep foundation. The recommended values of Safe Vertical and Lateral Capacities of **450 mm** and **500 mm** nominal diameter R.C.C. Bored Cast-in-situ Piles having cut-off level at **1.50 m** and tip level at **18.00 m** below E.G.L. are shown in **Table-3** below. The generalized sub-soil profile, based on which pile capacities are calculated is shown in **Fig. 1**.

The actual pile capacity, however, shall be checked at site by load test and pile integrity test as per latest I.S. specifications and design load should be chosen accordingly.

A typical calculation of pile capacities is enclosed for reference.

Table–3 : R.C.C. BORED CAST-IN-SITU PILE FOUNDATION

Pile Dia. (mm)	Cut-off Level below E.G.L.	Pile Tip Level below E.G.L.	Pile Shaft Length	Safe Vertical Capacity of Pile		Grade of Concrete in pile = M25	
				In Compre-ssion	In Tension (Uplift)	Safe lateral Capacity for a deflection of 5 mm	Depth of fixity below C.O.L.
450 mm	1.5 m	18.0 m	16.5 m	37 ton	16 ton	2.80 ton	4.74 m
500 mm	1.5 m	18.0 m	16.5 m	45 ton	19 ton	3.15 ton	5.28 m

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SITE: 131/2B, BAKRAHAT ROAD, WARD NO. – 144, BOROUGH NO. – XVI, KOLKATA – 700 104.

6.0 Recommendation:

1) From the subsoil exploration it is observed that the soil below existing G.L consists of heterogeneous fill upto a maximum depth of **0.80m** to **3.50m.** Shallow foundation is not provide due to unequal stratification and maximum order of settlement.

2) In view of the above, pile foundation is suggested for the proposed structure. It provides more safety and stability to be built on it.

3) **Bored Cast – in – situ pile** foundation for structures proposed to be constructed at the site. Bearing capacity of such piles resting at a depth of **18.0m** below G.L. have been given in **Table – 3.**

4) Pile integrity tests and pile load tests should be conducted as per IS. Code of practice to check the quality of construction and load carrying capacity respectively.

5) Adequate precautions during constructions of piles should be taken in order to prevent collapse of the walls of the boreholes. For this bentonite slurry and liner are to be used and proper schedule of construction and methodology should be maintained and followed. Boreholes should be cleaned properly after lowering the reinforcement case and before concreting the piles and guide lines as per relevant IS code should be followed in this context with skilled field personnel and supervision there to.

6) Safety of adjacent structures must be ensured during excavation and construction of foundations. All stability criteria etc. should be checked as per BIS code of practices.

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For SANGITAA CONSTRUCTION

Proprietor

SITE: 131/2B, BAKRAHAT ROAD, WARD NO. – 144, BOROUGH NO. – XVI, KOLKATA – 700 104.

SAMPLE CALCULATIONS FOR R.C.C. BORED CAST-IN-SITU PILE

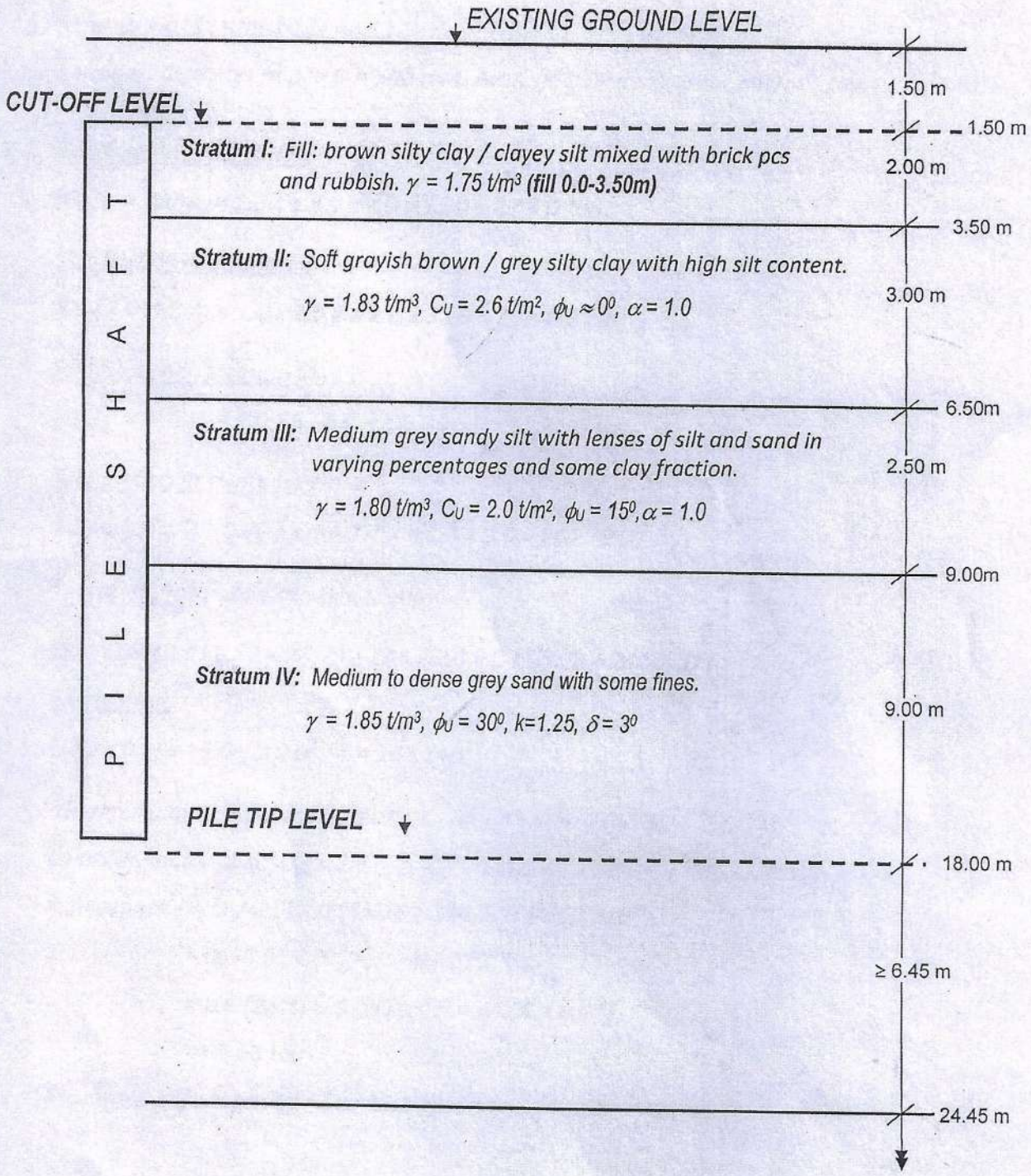

Fig 1 : Generalized Sub-soil Profile for calculation of pile capacity

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Calculation is done by Static Capacity formula as given in IS : 2911(Part-I / Sec.-2) -2010.

Refer to Fig. 1 in the page no.11

Consider, diameter of pile D = 500 mm. Average bulk density = 1.80t/m^3, say.

Skin friction in stratum I

$(Q_{su})_{II} = \alpha.C.A_s = 1.0 \times 1.8 \times \pi \times D \times 1.50 = 8.48\ D$ ton

Skin friction in stratum II

$(Q_{su})_{III} = \alpha.C.A_s = 1.0 \times 2.6 \times \pi \times D \times 3.50 = 28.57\ D$ ton

Skin friction in stratum III

$(Q_{su})_{III} = \alpha.C.A_s = 1.0 \times 3.66 \times \pi \times D \times 2.50 = 28.73\ D$ ton

Skin friction in stratum IV

$1.25 \times (17 \times D \times 0.80) \times \tan 27^0 \times \pi \times D \times 9.0 = 244.78\ D^2$

Therefore, total ultimate skin friction,

$Q_{su} = D(8.48 + 28.57 + 28.73 + 244.78D) = D (65.78 + 244.78D)$

End bearing

$(17D \times 0.8) \times 15.0 \times \pi \times D^2 / 4 = 160.14D^3$

Therefore, total ultimate capacity, $Q_u = D (65.78 + 244.78D + 160.14D^2)$

Consider, factor of safety = 2.5

Safe capacity = $(1 / 2.5) \times D (65.78 + 244.78D + 160.14D^2)$

$= D(26.31 + 97.91D + 64.05D^2)$

$= 0.5 (26.31 + 97.91 \times 0.5 + 64.05 \times 0.5^2)$

$= 45.63$ ton

Therefore, safe capacity = Say **45.0 ton.**

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Vertical Capacity in Tension (Uplift) :

From above, total ultimate skin friction in compression, $Q_{suc} = D(65.78 + 244.78D)$

Total ultimate skin friction in tension (uplift), Q_{sut} = 0.50 of Q_{suc}

$= 0.50 \times D(65.78 + 244.78D)$

Safe load = $D(32.9 + 122.39D) \times (1 / 2.50) = D(13.16 + 48.95D)$

Buoyant weight of pile has been ignored.

Therefore, safe capacity in tension (uplift) = **19 ton**

Lateral Capacity:

Consider, grade of pile concrete = M25

E of pile concrete = $5000\sqrt{f_{ck}} = 5000 \times \sqrt{25} = 25000\ N/mm^2 = 25000\ MN/m^2$

I of pile cross section (only concrete) = $(\pi/64) \times (0.50)^4 \approx 3.10 \times 10^{-3}\ m^4$.

$C = 1.8 + 2.6 / 2 = 4.4 / 2 = 2.2\ ton/m^2$

$U_{cs} = 4.4\ t/m^2$

Considering $q_u = 44\ kN/m^2$, k_1 (vide Table 4) = $7.92\ MN/m^3$

$KB = 0.3k_1/1.5 = 0.3 \times 7.92 / 1.5 = 1.584\ MN/m^2$

Stiffness factor, $R = (EI/KB)^{1/4} = (25000 \times 3.10 \times 10^{-3}/1.584)^{1/4} = 2.64\ m$

$\therefore 3.5R = 3.5 \times 2.64 = 9.24\ m < 16.5\ m$ (shaft length)

Therefore, the pile will act as Long (Elastic) Pile.

$e = L_1 = 0$ $\therefore L_1/R = 0$. Correspondingly, $L_f/R = 2.0$

$\therefore L_f = Z_f = 2.0 \times 2.64 = 5.28\ m$

Now, applying formula given in the code,

Horizontal load causing a deflection of 5 mm is found out as

$Q = 5 \times (12 \times 25000 \times 10^3 \times 3.10 \times 10^{-3}) / \{(0 + 5.28)^3 \times 10^3\} = 31.59\ kN \approx$ **3.15 ton**

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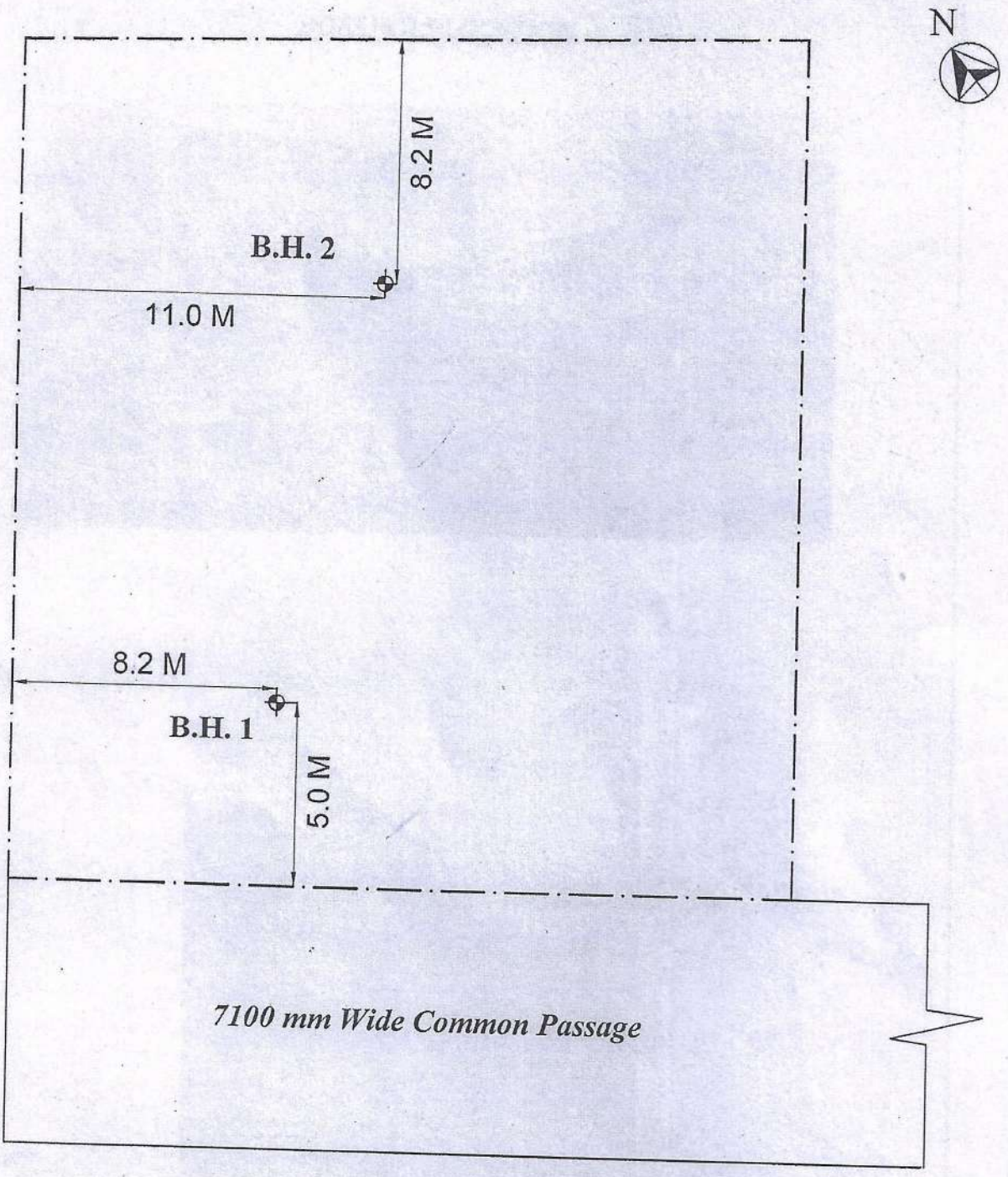
LOCATION : 131/2B, BAKRAHAT ROAD, WARD NO. 144, BOROUGH NO. XVI, KOL - 104.



NOTE :

1. THIS DRAWING IS NOT TO SCALE
2. DIMENSIONS ARE APPROXIMATE
3. BORE HOLE LOCATIONS ARE SHOWN THUS ⊕

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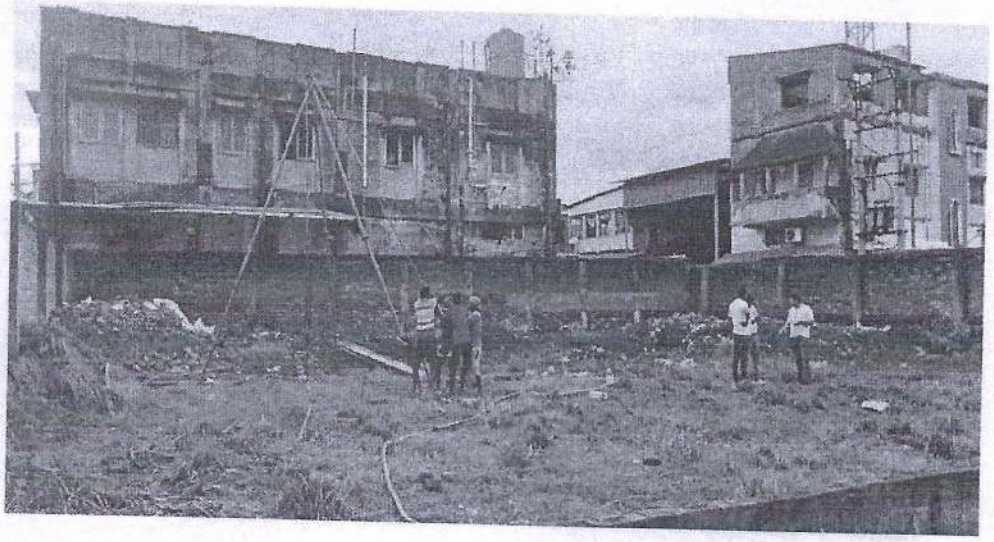
LOCATIONS OF BORE-HOLES

SITE: 131/2B, BAKRAHAT ROAD, WARD NO. – 144, BR NO. – XVI, KOLKATA – 700 104.

BOREHOLE LOCATION



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BORELOG DATA SHEET

SITE : 131/2B, BAKHRAHAT ROAD, WARD NO. - 144, BOROUGH NO. - XVI, KOLKATA – 700 104.

COMMENCED ON	26.07.2023		BOREHOLE NO.	1 (One)	SAMPLES	NOS.
COMPLETED ON	27.07.2023		TERMINATION DEPTH (Mtr.)	10.45 Mtr.	UNDISTURBED (UDS)	2
BOREHOLE DIA	150 MM				PENETROMETER (SPT)	4
R.L.GROUND	(-)1.00 M				DISTURBED (DS)	1
WATER STRUCK					WATER SAMPLES (WS)	Nil
STANDING WATER LEVEL		1.80 Mtr			CO - ORDINATES	
TYPE OF BORING	Augar and Wash method.					

ALL DEPTHS ARE MEASURED FROM EXISTING GROUND LEVEL (E.G.L).

DESCRIPTION	DEPTH (m)		Thk	SAMPLES		N-VALUE
	From	To	(m)	Type	Depth (m)	
Fill: brown silty clay / clayey silt mixed with brick pcs and rubbish.	0.00	0.80	0.80	D	0.50	
Soft grayish brown / grey silty clay with high silt content.	0.80	3.00	2.20	D U	1.00 2.00-2.45	
Medium grey sandy silt with lense of silt and sand in varying percentages and some clay fraction.	3.00	6.00	3.00	P U	3.50-3.95 5.00-5.45	4
Medium to dense grey sand with some fines.	6.00	10.45	4.45	P P P	6.50-6.95 8.00-8.45 10.00-10.45	10 12 15

BOREHOLE TERMINATED AT 10.45 M DEPTH

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BORELOG DATA SHEET

SITE : 131/2B, BAKHRAHAT ROAD, WARD NO. - 144, BOROUGH NO. - XVI, KOLKATA – 700 104.

COMMENCED ON	27.07.2023		BOREHOLE NO.	2 (Two)	SAMPLES	NOS.
COMPLETED ON	28.07.2023		TERMINATION DEPTH (Mtr.)	24.45 Mtr.	UNDISTURBED (UDS)	1
BOREHOLE DIA	150 MM				PENETROMETER (SPT)	12
R.L.GROUND	(-)1.00 M				DISTURBED (DS)	1
WATER STRUCK					WATER SAMPLES (WS)	Nil
STANDING WATER LEVEL		1.80 Mtr			CO - ORDINATES	
TYPE OF BORING	Augar and Wash method.					

ALL DEPTHS ARE MEASURED FROM EXISTING GROUND LEVEL (E.G.L).

DESCRIPTION	DEPTH (m) From	DEPTH (m) To	Thk (m)	SAMPLES Type	SAMPLES Depth (m)	N-VALUE
Fill: brown silty clay / clayey silt mixed with brick pcs and rubbish.	0.00	3.50	3.50	D	2.80	
Soft grayish brown / grey silty clay with high silt content.	3.50	6.50	3.00	U	3.50-3.95	
				P	4.50-4.95	3
				P	6.00-6.45	5
Medium grey sandy silt with lense of silt and sand in varying percentages and some clay fraction.	6.50	9.00	2.50	P	7.50-7.95	8
Medium to dense grey sand with some fines.	9.00	24.45	15.45	P	9.00-9.45	11
				P	10.50-10.95	15
				P	12.00-12.45	19
				P	14.00-14.45	21
				P	16.00-16.45	25
				P	18.00-18.45	31
				P	20.00-20.45	43
				P	22.00-22.45	50
				P	24.00-24.45	57

BOREHOLE TERMINATED AT 24.45 M DEPTH

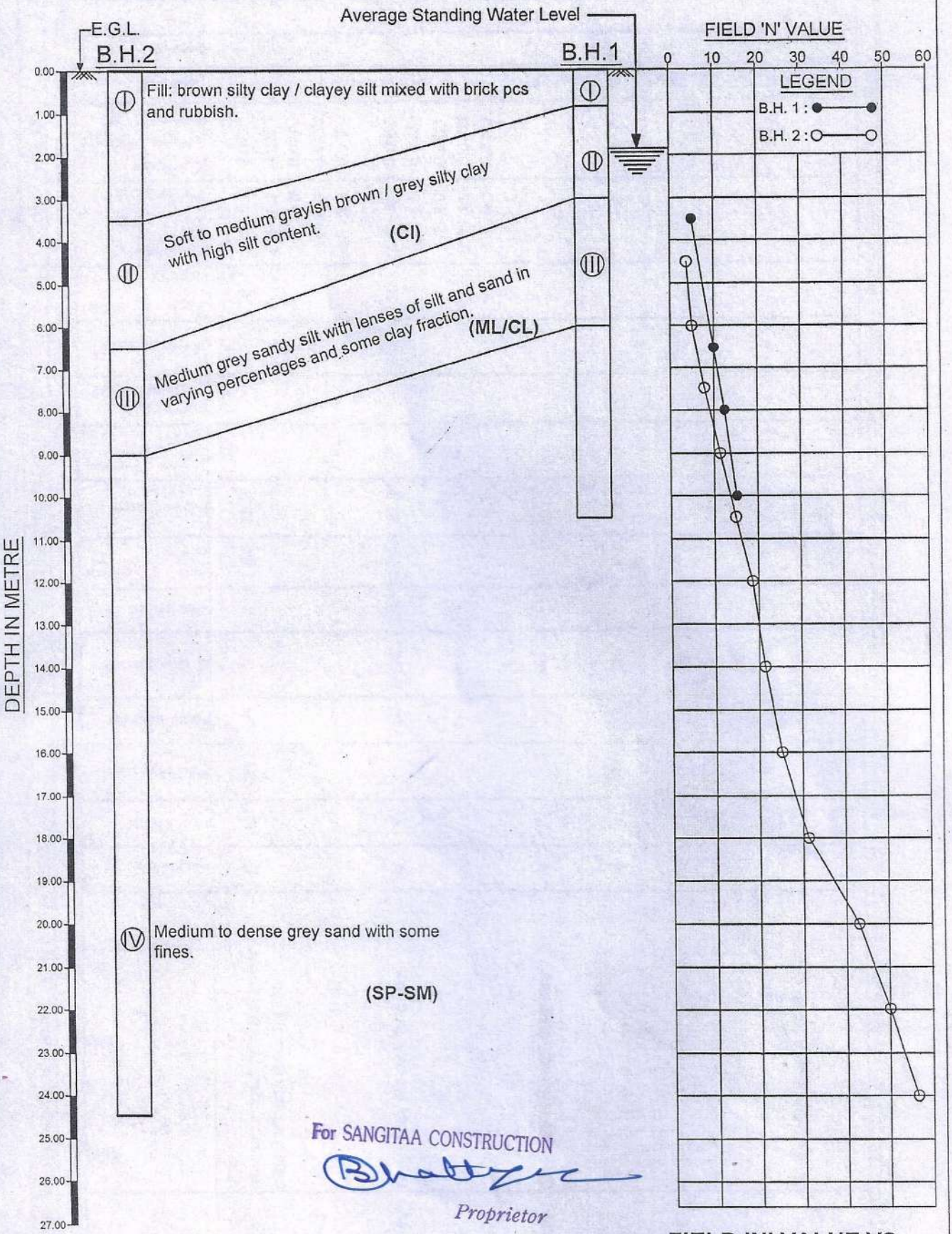
For SANGITAA CONSTRUCTION

Proprietor

CALCUTTA TEST CENTRE

PAGE NO. : 17

LOCATION : 131/2B, BAKRAHAT ROAD, WARD NO. - 144, BOROUGH NO. - XVI, KOLKATA - 104.



For SANGITAA CONSTRUCTION

Proprietor

SUB-SOIL PROFILE

FIELD 'N' VALUE VS. DEPTH PLOT

SUB-SOIL PROFILE WITH FIELD 'N' VALUE Vs. DEPTH PLOT

CALCUTTA TEST CENTRE

LOCATION : 131/2B, BAKHRAHAT ROAD, WARD NO. - 144, BOROUGH NO. - XVI, KOLKATA – 700 104.

LABORATORY TEST RESULT SHEET — UNCONFINED/ TRIAXIAL COMPRESSION

SHEET NO. 18 — CONSOLIDATION

JOB NO. — GRADING

B.H No. & Sample No.	Type of Sample	Depth (meter)	Description	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	IS Classification	Type of Test	Bulk density gm/cc	Water Content %	Lateral Pressure Kg/Cm²	Compressive Strength Kg/cm2	Cohesion Kg/cm²	Angle of friction degrees	Consolidation Pressure Kg/cm2	Coefficient of Volume decrease Cm²/kg	Gravel %	Sand %	Silt %	Clay%	% Passing 75 micron IS Sieve
1	U	2.00-2.45	Medium grayish brown silty clay / clayey silt with lenses of silt.	47	22	25	2.65	CI	UU	1.84	25.9			0.26	0	0.25 - 0.5 0.5 - 1.0 1.0 - 2.0 2.0 - 4.0 4.0 - 8.0	0.0415 0.0281 0.0200 0.0130 0.0090	0	1	75	24	99 (hyd)
1	U	5.00-5.45	Grey sandy silt with little clay fraction.	N	P		2.64	ML/CL	UU	1.79	36.3			0.20	10	0.25 - 0.5 0.5 - 1.0 1.0 - 2.0 2.0 - 4.0 4.0 - 8.0	0.0656 0.0440 0.0317 0.0235 0.0142	0	27	60	13	73 (hyd)
1	P	6.50-6.95	Grey silty sand with little clay fraction.	N	P			SM			32.7							0	62	27	11	38 (hyd)
1	P	10.00-10.45	Medium grey silty fine sand.	N	P			SP			23.1							0	97	3	0	3
2	U	3.50-3.95	Grey silty clay / clayey silt with high silt content.	45	21	24		CI	UU	1.83	25.5			0.26	10			0	4	76	20	96 (hyd)
2	P	4.50-4.95	Grey clayey silt with traces of sand.	-	-			ML/CL			31.8							0	15	69	16	85 (hyd)

NOTE :N.P.=Non-Plastic,Hyd= Hydrometer,UU= Triaxial Undrained,UD= Triaxial Drained,UC= Unconfined,UCR= Unconfined Remoulded,CU/CD= Consolidated Undrained/Drained,DS= Direct Shear.

For SANGITAA CONSTRUCTION

Proprietor

CALCUTTA TEST CENTRE

LOCATION : 131/2B, BAKHRAHAT ROAD, WARD NO. - 144, BOROUGH NO. - XVI, KOLKATA – 700 104.

LABORATORY TEST RESULT SHEET — SHEET NO. 19 — JOB NO.

UNCONFINED/ TRIAXIAL COMPRESSION — CONSOLIDATION — GRADING

B.H No. & Sample No.	Type of Sample	Depth (meter)	Description	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity	IS Classification	Type of Test	Bulk density gm/cc	Water Content %	Lateral Pressure Kg/Cm²	Compressive Strength Kg/cm2	Cohesion Kg/cm²	Angle of friction degrees	Consolidation	Pressure Kg/cm2	Coefficient of Volume decrease Cm²/kg	Gravel %	Sand %	Silt %	Clay%	% Passing 75 micron IS Sieve
2	P	7.50-7.95	Grey clayye silt with traces of sand.	-	-			ML/CL	DS	1.82	36.9			0.25	15				0	15	70	15	85 (hyd)
2	P	12.00-12.45	Medium grey silty fine sand.	N	P			SP/SM			24.3								0	94	6	0	6
2	P	20.00-20.45	Dense grey silty fine sand.	N	P			SP/SM	DS	1.88	21.5			0.10	34				0	93	7	0	7
2	P	24.00-24.45	Dense grey silty fine sand.	N	P			SP/SM			24.9								0	92	8	0	8

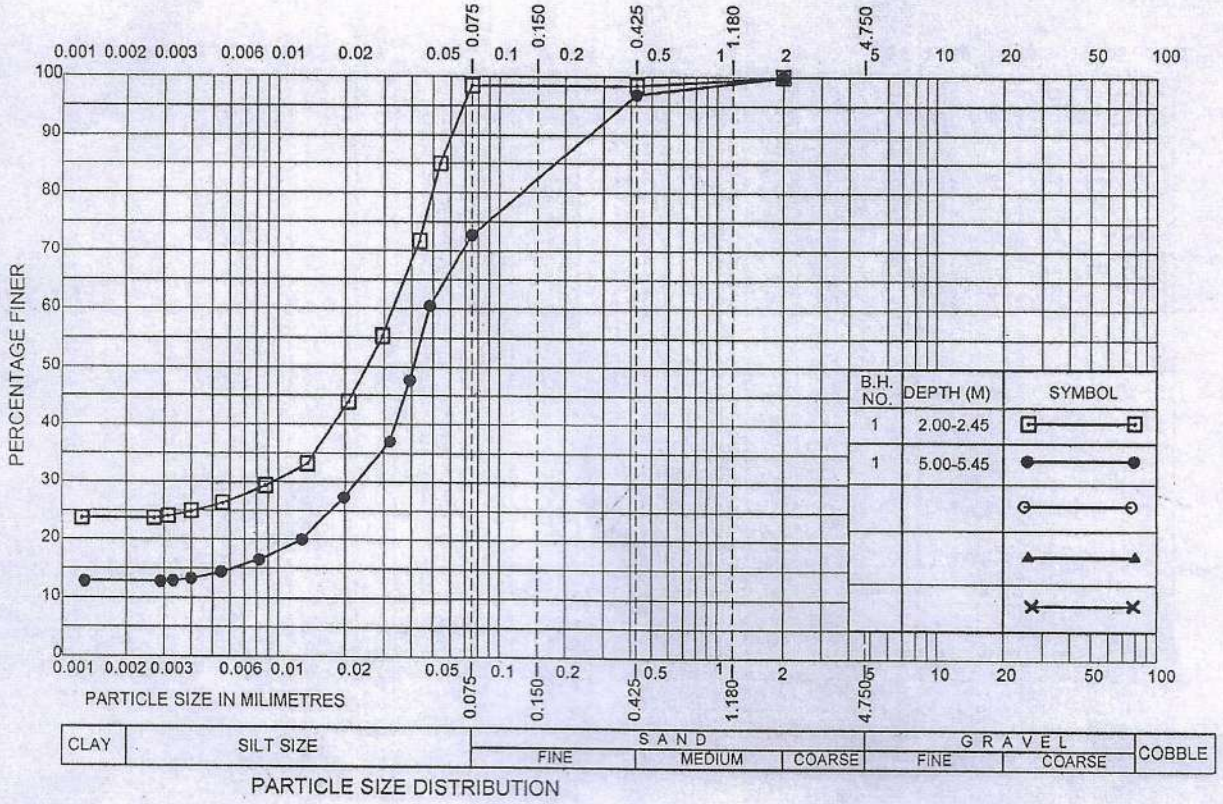
NOTE :N.P.=Non-Plastic,Hyd= Hydrometer,UU= Triaxial Undrained,UD= Triaxial Drained,UC= Unconfined,UCR= Unconfined Remoulded,CU/CD= Consolidated Undrained/Drained,DS= Direct Shear.

For SANGITAA CONSTRUCTION

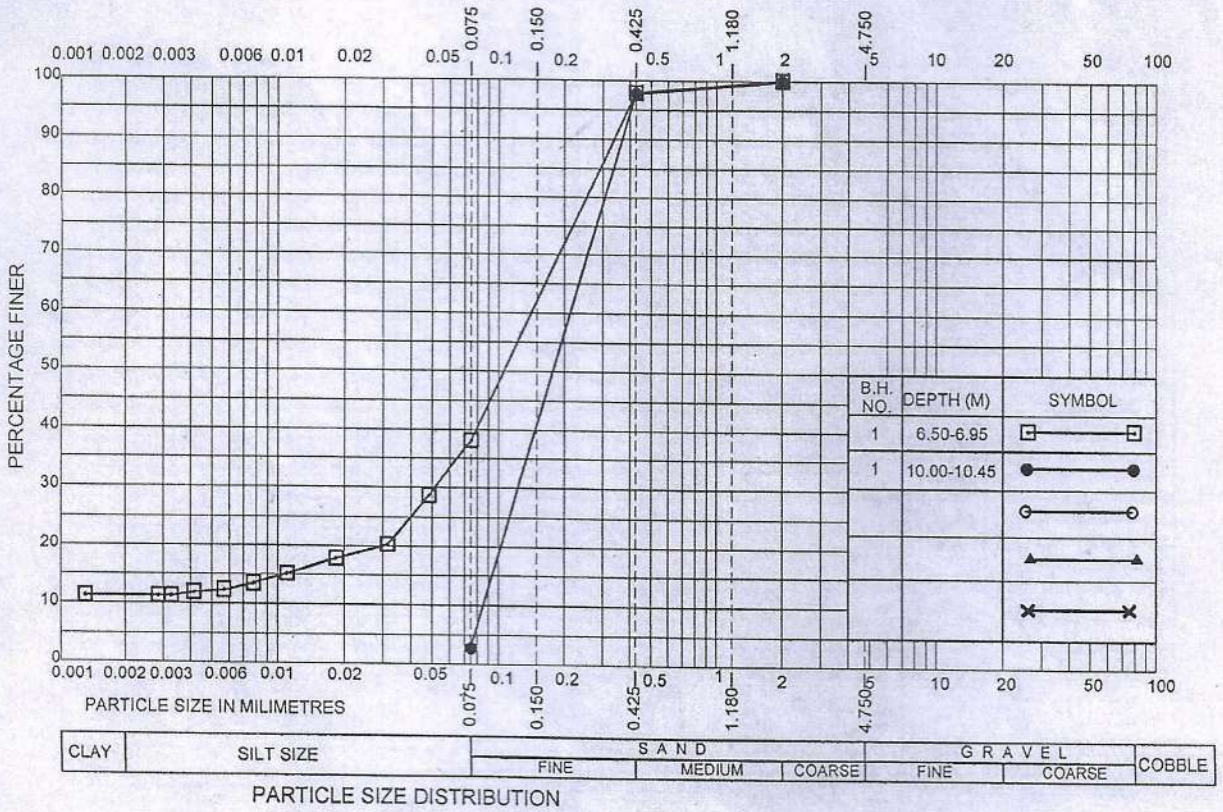
Proprietor

PROJECT :

LOCATION : 131/2B, BAKRAHAT ROAD, WARD NO. - 144, KOLKATA - 700 104.



PARTICLE SIZE DISTRIBUTION



PARTICLE SIZE DISTRIBUTION

CALCUTTA TEST CENTRE

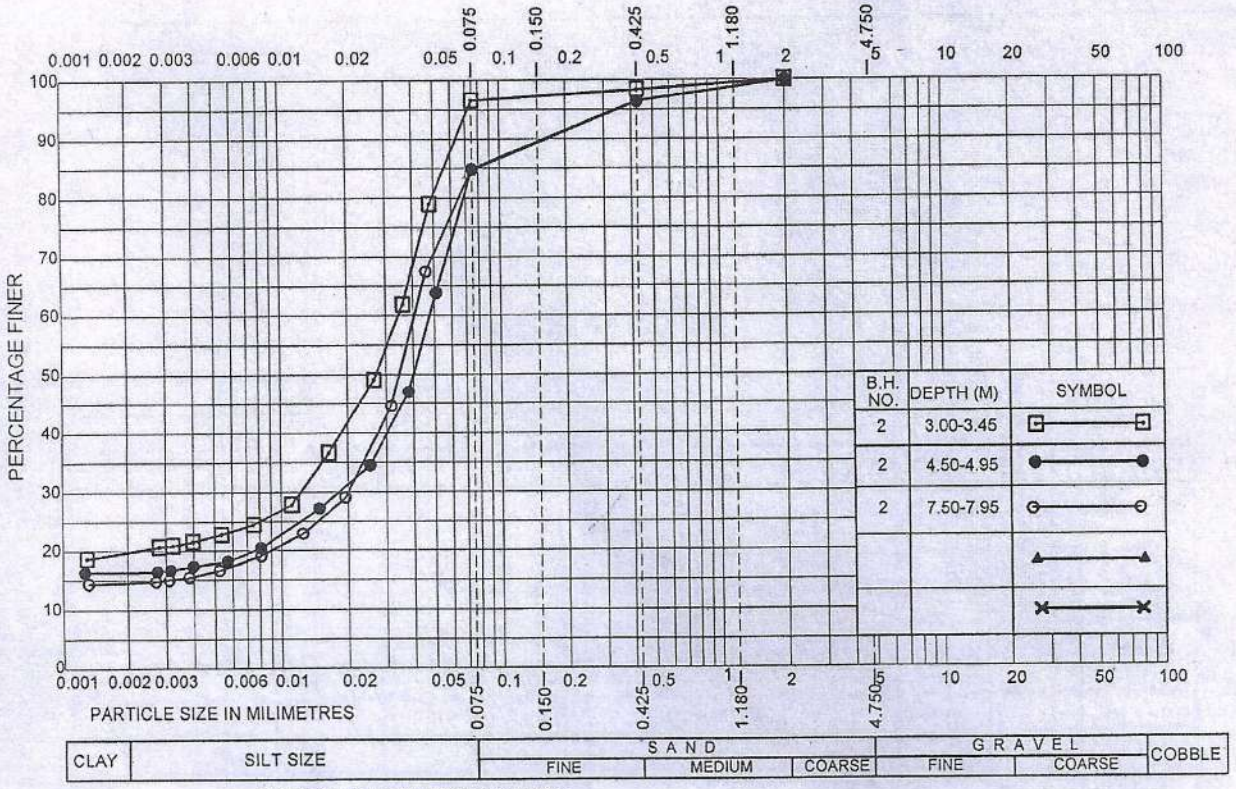
For SANGITAA CONSTRUCTION

Proprietor

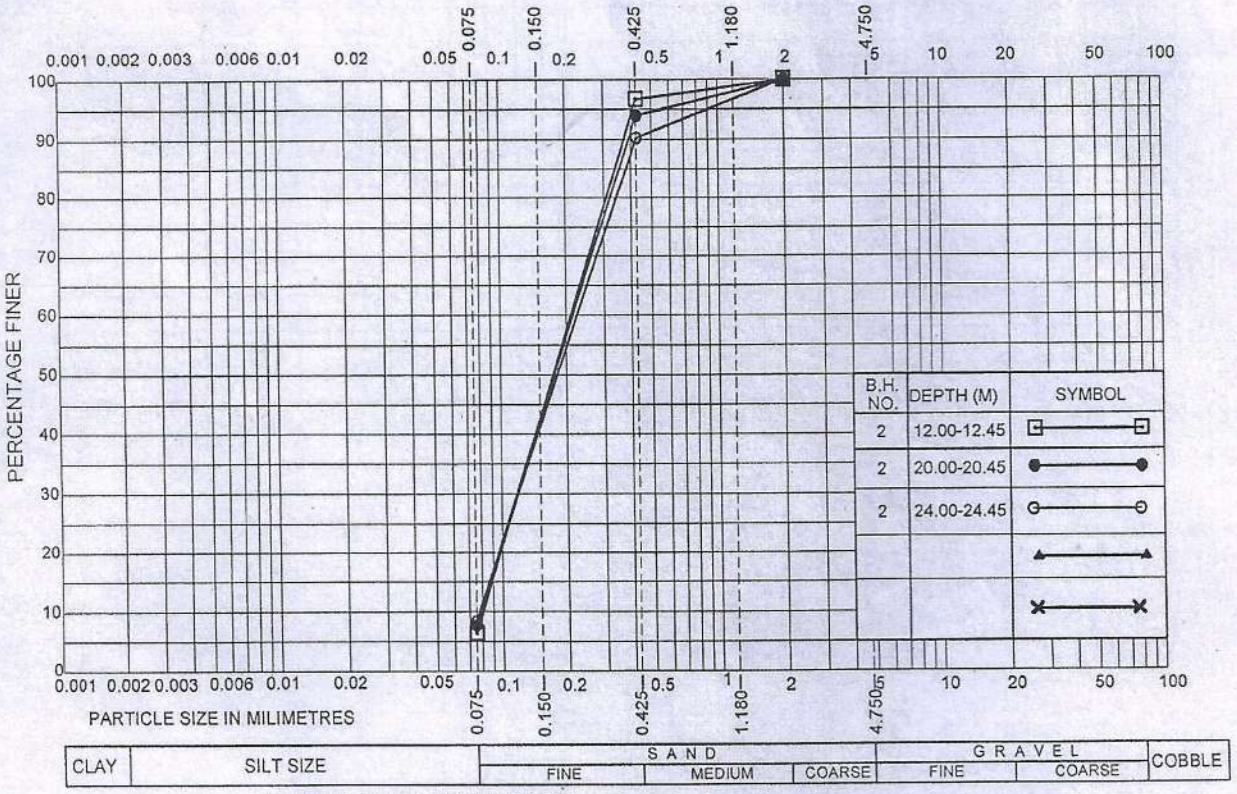
CALCUTTA TEST CENTRE

PROJECT :

LOCATION : 131/2A, BAKRAHAT ROAD, WARD NO. - 144, KOLKATA - 700 104.



PARTICLE SIZE DISTRIBUTION



PARTICLE SIZE DISTRIBUTION

For SANGITAA CONSTRUCTION

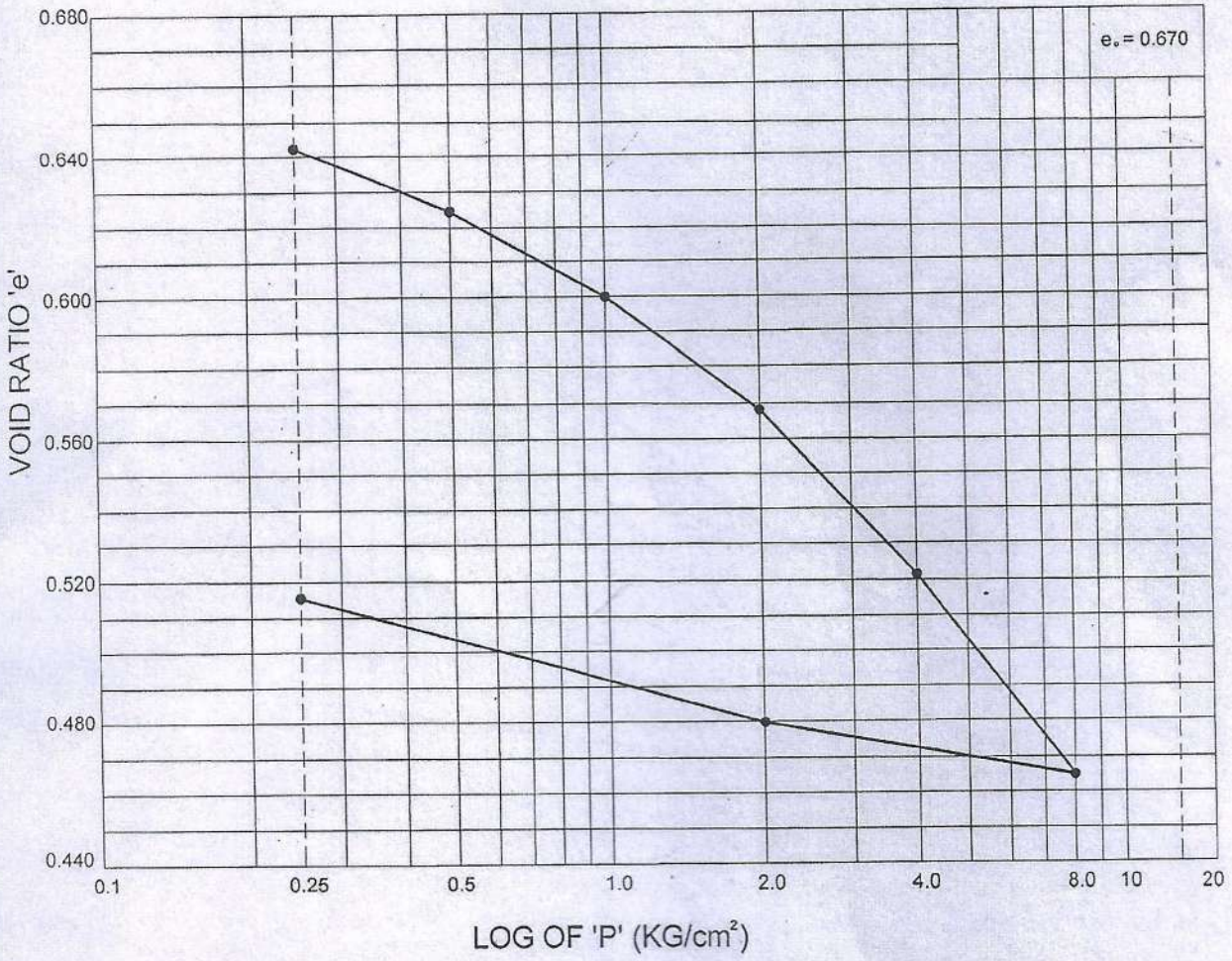
Proprietor

CALCUTTA TEST CENTRE

PROJECT :

LOCATION : 131/2B, BAKRAHAT ROAD, WARD NO. - 144, BOROUGH NO. - XVI, KOL - 700 104.

e Vs LOG 'P' CURVE



For SANGITAA CONSTRUCTION

Proprietor

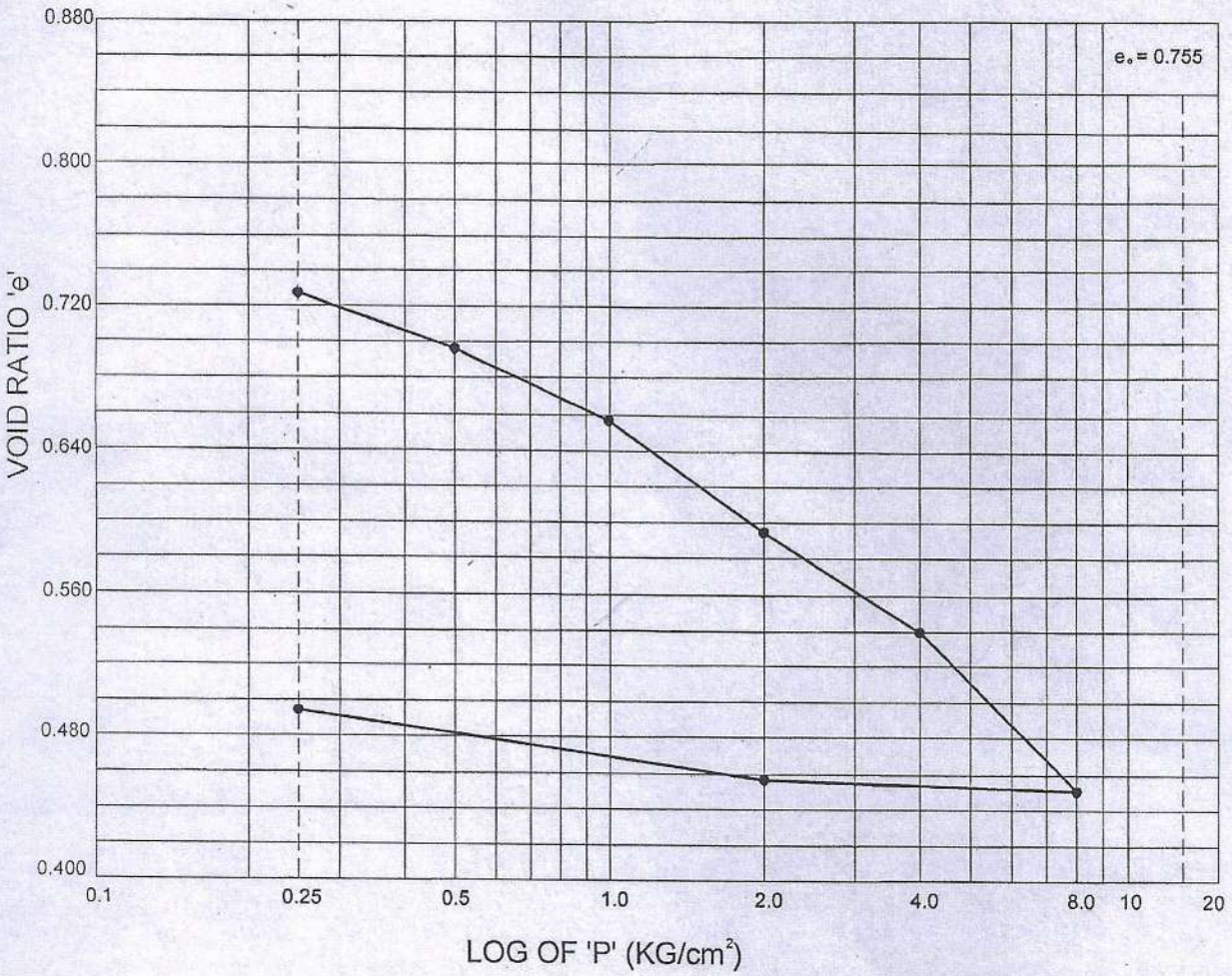
VOID RATIO(e) Vs. LOG 'P' CURVES	BH NO: 1 (ONE)	DEPTH: 2.00 - 2.45 M.

CALCUTTA TEST CENTRE

PROJECT :

LOCATION : 131/2B, BAKRAHAT ROAD, WARD NO. - 144, BOROUGH NO. - XVI, KOL - 700 104.

e Vs LOG 'P' CURVE



For SANGITAA CONSTRUCTION

Proprietor

VOID RATIO(e) Vs. LOG 'P' CURVES	BH NO: 1 (ONE)	DEPTH: 5.00 - 5.45 M.

CALCUTTA TEST CENTRE