SURVEY DRAWING

NIT NO.: AGIHF/Executing Agency/2023-24/05 dt. 7.03.2024

PART G

AREA:

Total Area-:
= 79375.531Sq.m.
= 854398.215Sq.ft.
= 59 BIGHA 1 KATHA 13.320 LESSA
= 19.61 Acre.

LEGENDS:

- TBM
- ELECTRIC POLE
- TREE
- GATE
- BOUNDARY LINE
- DRAIN
- MAIN ROAD

Notes:-

1. ALL DIMENSION ARE IN METERS.
2. GRID INTERVAL IS 10.00M
4. BENCH MARK (B.M.) IS TAKEN ON THE CENTRE OF MAIN ROAD AS SHOWN IN THE DRAWING.
5. R.L. OF B.M. HAS BEEN TAKEN AS 99.70 M.
6. ALL BOUNDARY POINT IS TAKEN AT INNER SIDE.
7. ALL THE BOUNDARY LINES ARE SURVEYED AS GUIDED BY THE AUTHORITY.

GEO -TECHNICAL INVESTIGATION REPORT

NIT NO.: AGIHF/Executing Agency/2023-24/05 dt. 7.03.2024

PART G

REPORT ON

GEO-TECHNICAL INVESTIGATION WORK
FOR
PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY
OF
ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION

REPORT SUBMITTED TO

DDF CONSULTANTS PVT. LTD.

REPORT PREPARED BY:

RELIANT FOUNDATIONS PVT LTD

(An ISO 9001:2015 certified company)

Sun-Polo Colony ,Byelane - DiparBoroPath ,
NearAyursundraSuperspecialty Hospital,
Ahomgaon ,GARCHUK Guwahati-781035

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RELIANT FOUNDATIONS PVT. LTD.

1. **INTRODUCTION:** The work of soil Investigation was awarded to RELIANT FOUNDATIONS PVT. LTD & RELIANT ENGINEERS .Sun-Polo Colony, Byelane - Dipar Boro Path, Near Ayursundra Superspecialty Hospital, Ahomgaon , GARCHUK Guwahati-781035.

2. Soil investigation work by making boreholes :

2.1 The field and laboratory investigations carried out by us to access the nature of sub-strata and to evaluate the soil parameters required for design of foundations proposed to be constructed for proposed construction.

2.2 Client's help is gratefully acknowledged in providing bore hole locations, close supervision and checking during boring, sampling, various testing operations and cooperation and guidance during finalization of report.

2.3 This report is based upon the results of field, laboratory tests conducted on selected soil samples collected from borehole locations.

3. SCOPE OF WORK:

The scope of work provided to us for this project was limited to the following:-

3.1 Mobilizing necessary plant, equipments and personnel to the project site, setting up the equipment, carrying out the field investigations on land and demobilization on completion of work.

3.2 Making 150 mm nominal diameter bore holes at the site in all types of soil using suitable approved method of boring to be given at site by the Engineer-in-Charge. Refusal shall mean when SPT field 'N' value reaches 100 for 30 cm or less penetration of SPT sampler.

3.2.1 Conducting standard penetration tests in the bore holes at 1.50 m interval in depth as per specifications / instructions of Engineer-in-Charge.

3.2.2 Collecting undisturbed soil samples from bore holes at 3.0m interval or every change of strata, whichever is earlier as per specifications.

3.2.3 Collecting disturbed soil samples from bore hole at regular interval and at every identifiable change of strata to supplement the boring records.

3.2.4 Recording the depth of ground water table in all the bore hole if observed up to the depth of exploration during boring work as per specifications & withdrawing the casing pipe.

3.3 Conducting the following laboratory tests on selected disturbed / undisturbed soil samples collected from bore hole / test locations :-

(a) Bulk density and Moisture content
(b) Sieve analysis
(c) Hydrometer analysis
(d) Liquid limit & Plastic limits
(e) Specific gravity
(f) Shear test on undisturbed and remoulded saturated disturbed soil samples

(g) Determination of void ratio.

3.4 Preparation and submission of report in three copies.

4.0 FIELD INVESTIGATIONS:

4.1Necessary plant, equipment and personnel for conducting the requisite field work were mobilized to the site.

4.2 Bore hole was bored at this site using Auger and wash boring method as per IS: 1892-1979. Casing or Bentonite has been used as required to retain the bore hole. Depth of Bore hole was 35.50M.

4.3.1 **Standard penetration** tests were conducted in the above bore hole at every 1.50 m interval & at change of strata as per specifications / instructions of Engineer-in-Charge. The bore was cleaned up to the desired depths. Standard split spoon sampler attached to lower end of 'A' drill rods was driven in the bore holes by means of standard hammer of 63.5 Kg. falling freely from a height of 75 cm. The sampler was driven 45 cm as per specifications & the numbers of blows required for each 15 cm penetration were recorded. The numbers of blows for the first 15 cm penetration were not taken into account. This was considered as seating drive. The numbers of blows for next 30 cm penetration were designated as SPT 'N' value. Wherever the total penetration was less than 45 cm, the number of blows & the depth penetrated is incorporated in respective bore logs. Disturbed soil samples obtained from standard split spoon sampler for all the above standard penetration tests were collected in polythene bags of suitable size. These samples were properly sealed, labeled, recorded and carefully transported to the laboratory for testing.

4.3.2 **Undisturbed** soil samples were collected from the bore hole at every 3.00 m interval in depth & at change of strata as per sampling specifications. These sampling tubes after retrieval from the bore hole was properly waxed and sealed at both ends. These were carefully labeled and transported to the laboratory for testing. Undisturbed soil samples wherever slipped during lifting, were duly marked in the field bore logs as well as in the soil profile.

4.3.3 **Disturbed soil** samples were also collected from the borehole at suitable depths/intervals to supplement the boring records. These samples were collected in polythene bags of suitable size. These samples were properly sealed, labeled, recorded & carefully transported to the laboratory for testing.

4.3.4 The depth of ground water table was checked / measured in all boreholes.

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4.3.5 **Summary of boreholes:**

Sl. No	Borehole number	Depth of borehole (M)	Depth of water table(M)
1	BH01	35.50	0.00M From EGL
2	BH02	35.50	1.00M From EGL
3	BH03	35.50	1.00M From EGL
4	BH04	35.50	0.50M From EGL
5	BH05	35.50	0.50M From EGL
6	BH06	35.50	0.00M From EGL
7	BH07	35.50	1.50M From EGL
8	BH08	35.50	3.00M From EGL
9	BH09	35.50	1.00M From EGL
10	BH10	35.50	0.00M From EGL
11	BH11	35.50	0.00M From EGL
12	BH12	35.50	0.00M From EGL
13	BH13	35.50	0.00M From EGL
14	BH14	35.50	0.00M From EGL
15	BH15	35.50	0.00M From EGL
16	BH16	35.50	0.50M From EGL

5.0 LABORATORY INVESTIGATIONS:

5.1 The following laboratory tests were conducted on selected soil samples recovered

From borehole / test locations: -

(a) Bulk density and Moisture content

(b) Sieve analysis

(c) Hydrometer analysis

(d) Liquid limit & Plastic limits

(e) Specific gravity

(f) Shear test on remolded and saturated disturbed soil samples

(g) Determination of void ratio..

All the above laboratory tests were carried out as per relevant Indian Standards. All the soil samples were identified and classified as per IS: 1498-1970.

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6.0 FINDING OF GEOTECHNICAL INVESTIGATION:

The study of bore logs/results of laboratory and other field tests are tabulated through different tables as annexure.

7.0 CALCULATION OF BEARING CAPACITY

Calculation of Net Safe Bearing Capacity based on shear Criteria

IS: 6403-1981 recommends the following equation to calculate the net Safe Bearing Capacity ' q_s' based on Hansen's Bearing Capacity analysis:

$$q_s = 1/F \{CNc\, S_c\, d_c\, I_c + q\,(N_q - 1)\, S_q\, d_q\, i_q + 0.5\,\gamma\, B\, N_\gamma\, S_\gamma\, d_\gamma\, i_\gamma \times R_w\}$$

Where, C = Cohesion of soil.

γ = Saturated Density of soil

B = Width of footing = 2.0 m (assumed)

R_w = Water table correction factor depending upon position of water table with respect to founding level

Q = Effective surcharge at footing level = γ D (D = depth of footing)

N_c, Nq , N_γ = Bearing capacity factor

S_c, S_q ,S_γ = Shape factor

d_c, d_q, d_γ = depth factor

i_c, i_q , i_γ = inclination factors

F = Factor of safety =3

B) Calculation of safe bearing pressure based on tolerable settlement.

The safe bearing pressure is to be found out from the elastic settlement consideration and is found from the following equation given I.S. 8009 (part-1) 1976

$$S_f = S_{oed} = (H_t/ 1+e_o)\, C_c \log_{10} (po + \Delta p)/ p_o$$

S_f= Final settlement in mm

S_{oed} = Settlement computed from one dimensional test

H_t = Thickness of soil layer in m

e_o = Initial void ratio at mid height of of layer

C_c = Compression Index

Po = Initial effective pressure at mid height of layer

Δp = pressure increment

For the computation of settlement of foundation founded at certain depth, a correction should be applied to the calculated S_f in the form of a depth factor to be read from Fig: 12 of I.S. 8009 (part-1) 1976.

Corrected settlement $S_{fd} = S_f$ x depth factor

Depth factor is dependent on the following

i. D= Depth of footing ii. L= Length of footing iii. B= Width of footing

For granular soil settlement is calculated from the *method Based on Dynamic PetutrationTest as per IS 8009-Part-I, 1976, reaffirmed 1998*

— Settlement of a footing of width *B* under unit **intensity** of pressure resting on dry cohesion less deposit with known standard **penetration** resistance value N, (determined according to IS: 2131- 1963t), may be read from Fig. 9 (*IS 8009-Part-I)* . The settlement under any other pressure may be **computed by** assuming that the settlement is proportional to the intensity of pressure.

8.0 Pile load capacity in compression

Ultimate bearing capacity in compression in sand, Q_U from IS: 2911(Part-I)-1981

$$Qu = Q_P + Qf$$

= End bearing resistance + Frictional resistance of pile in sand and clay.

$$Qu = Ap\,(1/2\ D\ \gamma\ N\gamma + P_D\ Nq) + \Sigma\ K\ P_{Di}\ \tan\delta\ A_{Si} + \alpha\ Ca\ As + Ap\ Nc\ Cp$$

$$Q_{Ps} = Ap\,(1/2\ D\ \gamma\ N\gamma + P_D\ Nq)$$

$$Q_{fs} = \Sigma\ K\ P_{Di}\ \tan\delta\ A_{Si}$$

$$Q_{fc} = \alpha\ Ca\ As$$

$$Q_{pc} = Ap\ Nc\ Cp$$

$$Qsafe = Q_U/FOS = Q_U/2.5$$

Where

Ap	= Cross sectional area of pile toe in cm^2.
$N\gamma$, Nq	= bearing capacity factors depending upon the angle of internal friction
K	= earth pressure coefficient (usually taken as 1.5 for sandy soils)
δ	= Angle of wall friction between pile and soil.
As	= Circumferential area of pile stem = Πx l x d
l	= Length of embedment.
d	= Diameter of the pile.

8.2 Pile load capacity in uplift

Ultimate uplift capacity Q_{Uf} = Skin friction in sand + Self weight of pile

$$= Q_{fs} + Q_{self\ wt}$$

9. RECOMMENDATION OF FOUNDATION:

After obtaining the laboratory test results of the samples collected from the field and analyzing the subsoil parameters in a very careful manner, the net safe bearing capacities of isolated footing foundation at different depths are calculated and shown in table 1.1 & 1.2

Table 1.1: Safe Bearing Capacities of Footing Foundations

For Borehole:2,3,6,7,8

Depth of footing from EGL (M)	Footing size (M^2)	Net Safe Bearing Capacities (Metric Ton /Sqm.) Shear Criteria	Allowable Bearing Capacity for 40mm settlement	Recommended Bearing Capacity for 40mm settlement
2.0	2.0×2.0	11.55	14.72	11.55
2.5	2.0×2.0	12.35	16.11	12.35
3.0	2.0×2.0	13.15	17.42	13.15

Table 1.2: Safe Bearing Capacities of Footing Foundations

For Borehole-1,4,5,9,10,11,12,13,14,15,16

Depth of footing from EGL (M)	Footing size (M^2)	Net Safe Bearing Capacities (Metric Ton /Sqm.) Shear Criteria	Allowable Bearing Capacity for 40mm settlement	Recommended Bearing Capacity for 40mm settlement
2.0	2.0×2.0	10.27	10.31	10.27
2.5	2.0×2.0	11.28	11.34	11.28
3.0	2.0×2.0	12.31	12.33	12.31

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RCC Pile Foundation:

The load carrying capacities of bored cast in situ uniform diameter piles of 12.00M to 26.00M length with pile diameters 45 cm, 50 cm and 60cm. respectively are calculated and shown in Table2.

Table2: Safe Load carrying capacity of bored cast in situ uniform diameter pile:

For Borehole:2,3,6,7,8

Pile Stem Dia. (cm)	Length of Pile from E.G.L. (m)	Pile Cutoff Length (m)	Recommended Safe Load Carrying Capacity (tone)				Lateral Pile Capacity (Ton)
			Compression (Non Seismic)	Compression (Seismic)	Uplift (Non Seismic)	Uplift (Seismic)	
45	12.0	1	21.45	26.81	11.04	13.80	4.80
50		1	24.98	31.23	12.56	15.70	5.92
60		1	32.74	40.93	15.77	19.71	8.53
45	14.0	1	23.87	29.84	13.24	16.55	4.80
50		1	27.67	34.59	15.07	18.84	5.92
60		1	35.97	44.96	18.93	23.66	8.53
45	16.0	1	26.29	32.86	15.45	19.31	4.80
50		1	30.36	37.95	17.58	21.98	5.92
60		1	39.20	49.00	22.08	27.60	8.53
45	18.0	1	28.71	35.89	17.66	22.08	4.80
50		1	33.06	41.33	20.09	25.11	5.92
60		1	42.43	53.04	25.24	31.55	8.53
45	20.0	1	75.10	93.88	22.79	28.49	4.80
50		1	91.47	114.34	25.85	32.31	5.92
60		1	130.42	163.03	32.29	40.36	8.53
45	22.0	1	89.90	112.38	33.84	42.30	4.80
50		1	107.91	134.89	38.19	47.74	5.92
60		1	150.15	187.69	47.24	59.05	8.53
45	24.0	1	106.27	132.84	46.01	57.51	4.80
50		1	126.10	157.63	51.77	64.71	5.92
60		1	171.98	214.98	63.68	79.60	8.53
45	26.0	1	124.22	155.28	59.30	74.13	4.80
50		1	146.04	182.55	66.60	83.25	5.92
60		1	195.91	244.89	81.62	102.03	8.53

For Borehole:1,4,5,9,10,11,12,13,14,15,16

Pile Stem Dia. (cm)	Length of Pile from E.G.L. (m)	Pile Cutoff Length (m)	Recommended Safe Load Carrying Capacity (tone)				Lateral Pile Capacity (Ton)
			Compression (Non Seismic)	Compression (Seismic)	Uplift (Non Seismic)	Uplift (Seismic)	
45	12.0	1	18.66	23.33	9.98	12.48	4.80
50		1	21.72	27.15	11.39	14.24	5.92
60		1	28.44	35.55	14.37	17.96	8.53
45	14.0	1	21.32	26.65	12.36	15.45	4.80
50		1	24.67	30.84	14.09	17.61	5.92
60		1	31.98	39.98	17.75	22.19	8.53
45	16.0	1	59.20	74.00	19.12	23.90	4.80
50		1	72.51	90.64	21.66	27.08	5.92
60		1	104.73	130.91	26.98	33.73	8.53
45	18.0	1	69.63	87.04	27.05	33.81	4.80
50		1	84.10	105.13	30.53	38.16	5.92
60		1	118.64	148.30	37.77	47.21	8.53
45	20.0	1	81.70	102.13	36.15	45.19	4.80
50		1	97.51	121.89	40.70	50.88	5.92
60		1	134.73	168.41	50.11	62.64	8.53
45	22.0	1	95.40	119.25	46.42	58.03	4.80
50		1	112.74	140.93	52.16	65.20	5.92
60		1	153.01	191.26	64.01	80.01	8.53
45	24.0	1	110.74	138.43	57.85	72.31	4.80
50		1	129.78	162.23	64.92	81.15	5.92
60		1	173.46	216.83	79.46	99.33	8.53
45	26.0	1	127.71	159.64	70.45	88.06	4.80
50		1	148.64	185.80	78.98	98.73	5.92
60		1	196.09	245.11	96.48	120.60	8.53

10.0 CONCLUSION: Pile foundation recommended. Safe pile load capacities are shown in above Table. Safe bearing capacity of soil as wll as pile load capacities shown in above table . soil at this site is of silty clay type upto an average depth of 18.00m so that it is predominantly sandy. Pile resting on sandy strata shows relatively higher capacity.

:ANNEX-I:

BORE LOG CUM LABORATORY TEST RESULT

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 29-01-2024 | Date completed: 30-01-2024

BH: 01 | DEPTH OF WATER TABLE=0.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
0.00-0.50					Filling SAND															
1.5-1.95	P	3	3	CL	Grayish CLAY with Silt															
2	U							100	1.68	1.31	2.65	1.02	28.21		0.20	7	0.23	39.65	25.90	13.75
2.5	P																			
3.0-3.45	P	19	19																	
3.5	D																			
4.5-4.95	P	25	25																	
5	U							100	2.15	1.82	2.65	0.46	18.32		0.73	8	0.06	38.56	25.57	12.99
6.0-6.45	P	31	31																	
6.5	D																			
7.5-7.95	P	33	33																	
8	U							100	2.18		2.66			3.46	1.73			37.66	25.30	12.36
9.0-9.45	P	39	39																	
9.5	D																			
10.5-10.95	P	43	43																	
11	U							100	2.21		2.66							36.67	25.00	11.67
12.00-12.45	P	47	47																	
12.5	D																			
13.5-13.95	P	51	51																	
14	U							100	2.23		2.67			3.76	1.88			35.8	24.74	11.06
15.00-15.45	P	59	59																	
15.5	D																			

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 29-01-2024 | Date completed: 30-01-2024

BH: 01 | DEPTH OF WATER TABLE=0.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
16.5-16.95	P	62	62	CL	Grayish CLAY with Silt															
17	U				18.00M		100		2.24		2.66			3.90	1.95					
18.0-18.45	P	67	37																	
18.5	D																			
19.50-19.95	P	70	38																	
20	D						100		2.31											
21.0-21.45	P	74	39																	
21.5	D						100													
22.5-22.95	P	78	40																	
23	D						100		2.35		2.64					38				
24.0-24.45	P	82	41																	
24.5	D						100													
25.5-25.95	P	86	41		Grayish fine to medium SAND															
26	D			SW			100													
27.0-27.45	P	89	41																	
27.5	D						100													
28.5-28.95	P	94	42																	
29	D						100		2.39		2.64					39				
30.0-30.45	P	97	42																	
30.5	D						100													
31.50-31.95	P	100	43																	
32	D						100													
33.00-33.45	P	105	43																	
33.5	D						100													
34.50-34.95	P	109	44																	
35.5	D				35.50M		100		2.4		2.64					40				

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 25-01-2024 | Date completed: 26-01-2024

BH: 02 | DEPTH OF WATER TABLE=1.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
1.5-1.95	P	3	3																	
2	U							100	1.85	1.53	2.67	0.75	21.01		0.20	7	0.14	39.24	25.77	13.47
2.5	P																			
3.0-3.45	P	10	10																	
3.5	D																			
4.5-4.95	P	14	14																	
5	U							100	1.95	1.62	2.67	0.64	20.05		0.47	8	0.11	38.37	25.51	12.86
6.0-6.45	P	17	17																	
6.5	D																			
7.5-7.95	P	24	24																	
8	U			CL	Grayish CLAY with Silt			100	2.15		2.66			3.38	1.69			37.39	25.22	12.17
	P	26	26																	
9.5	D																			
10.5-10.95	P	29	29																	
11	U							100												
12.00-12.45	P	31	31																	
12.5	D																			
13.5-13.95	P	34	34																	
14	U							100	2.22		2.67			3.54	1.77			35.88	24.76	11.12
15.00-15.45	P	37	37																	
15.5	D																			

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 25-01-2024 | Date completed: 26-01-2024

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Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ')	Compression Index Cc	LL%	PL%	PI%
16.5-16.95	P	44	44	CL	Grayish CLAY with Silt															
17	U						100		2.27		2.66			3.60	1.80					
18.0-18.45	P	53	53																	
18.5	D				18.50M															
19.50-19.95	P	55	30	SW	Grayish fine to medium SAND															
20	D						100													
21.0-21.45	P	59	31																	
21.5	D						100													
22.5-22.95	P	64	33																	
23	D						100		2.25		2.64					36				
24.0-24.45	P	69	34																	
24.5	D						100													
25.5-25.95	P	75	36																	
26	D						100													
27.0-27.45	P	78	36																	
27.5	D						100													
28.5-28.95	P	80	36																	
29	D						100		2.28		2.64					38				
30.0-30.45	P	82	36																	
30.5	D						100													
31.50-31.95	P	86	37																	
32	D						100													
33.00-33.45	P	91	38																	
33.5	D						100													
34.50-34.95	P	94	38																	
35	D				35.00M		100													

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 21-01-2024 | Date completed: 24-01-2024

BH: 03 | DEPTH OF WATER TABLE=1.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
1.5-1.95	P	7	7		Grayish CLAY with Silt															
2	U							100	1.85	1.51	2.67	0.77	22.70		0.47	7	0.15	39.79	25.94	13.85
2.5	P																			
3.0-3.45	P	12	12																	
3.5	D																			
4.5-4.95	P	16	16																	
5	U							100	2.12	1.75	2.67	0.52	21.05		0.66	8	0.08	37.25	25.18	12.07
6.0-6.45	P	20	20																	
6.5	D																			
7.5-7.95	P	27	27																	
8	U			CL				100	2.17		2.66			3.44	1.72			36.74	25.02	11.72
9.0-9.45	P	30	30																	
9.5	D																			
10.5-10.95	P	32	32																	
11	U							100												
12.00-12.45	P	36	36																	
12.5	D																			
13.5-13.95	P	33	33																	
14	U							100	2.25		2.67			3.52	1.76			36.10	24.83	11.27
15.00-15.45	P	32	32																	
15.5	D				16.50M															

RELIANT FOUNDATION PVT. LTD.

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 21-01-2024 | Date completed: 24-01-2024

BH: 03 | DEPTH OF WATER TABLE=1.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm^3	Dry density, gms/cm^3	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm^2)	Cohesion 'c' Kg/cm^2	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
16.5-16.95	P	35	35		Grayish fine to medium SAND															
17	D						100		2.12		2.65					35				
18.0-18.45	P	34	17																	
18.5	D						100													
19.50-19.95	P	39	21																	
20	D						100													
21.0-21.45	P	42	22																	
21.5	D						100													
22.5-22.95	P	47	24																	
23	D						100		2.25		2.64					38				
24.0-24.45	P	54	37																	
24.5	D						100													
25.5-25.95	P	59	29	SW																
26	D						100													
27.0-27.45	P	64	30																	
27.5	D						100													
28.5-28.95	P	68	31																	
29	D				30.00M		100		2.28		2.64					39				
30.0-30.45	P	74	33																	
30.5	D						100													
31.50-31.95	P	76	33																	
32	D				Grayish medium to Coarse SAND		100													
33.00-33.45	P	80	34																	
33.5	D						100													
34.50-34.95	P	86	35																	
35	D				35.00M		100													

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 06-02--2024 | Date completed: 07-02-2024

BH: 04 | DEPTH OF WATER TABLE=0.50M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
0.00-0.50					Filling SAND															
1.5-1.95	P	3	3																	
2	U							100	1.69	1.31	2.65	1.02	28.69		0.22	7	0.22	38.25	25.48	12.77
2.5	P																			
3.0-3.45	P	4	4																	
3.5	D																			
4.5-4.95	P	9	9																	
5	U							100	1.95	1.65	2.65	0.61	18.32		0.61	8	0.10	36.21	24.86	11.35
6.0-6.45	P	12	12																	
6.5	D				Grayish CLAY with Silt															
7.5-7.95	P	16	16																	
8	U			CL				100	2.09		2.66			1.56	0.78			36.08	24.82	11.26
9.0-9.45	P	20	20																	
9.5	D																			
10.5-10.95	P	24	24																	
11	U							100	2.15		2.66									
12.00-12.45	P	28	28																	
12.5	D																			
13.5-13.95	P	31	31																	
14	U							100	2.20		2.67			2.10	1.05			35.74	24.72	11.02
15.00-15.45	P	33	33																	
15.5	D				15.50M															

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 06-02--2024 | Date completed: 07-02-2024

BH: 04 | DEPTH OF WATER TABLE=0.50M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ')	Compression Index Cc	LL%	PL%	PI%
16.5-16.95	P	35	21																	
17	D						85	15	2.12		2.66					33				
18.0-18.45	P	39	23																	
18.5	D				Brownish SANDY Clay															
19.50-19.95	P	46	27	SC																
20	D						90	10	2.21							35				
21.0-21.45	P	53	30																	
21.5	D				21.50M															
22.5-22.95	P	55	30																	
23	D						100		2.23		2.64					36				
24.0-24.45	P	59	31																	
24.5	D						100													
25.5-25.95	P	64	33																	
26	D						100													
27.0-27.45	P	70	35																	
27.5	D						100													
28.5-28.95	P	79	38	SW	Grayish medium SAND															
29	D						100		2.29		2.64					38				
30.0-30.45	P	83	39																	
30.5	D						100													
31.50-31.95	P	90	42																	
32	D						100													
33.00-33.45	P	97	43																	
33.5	D						100													
34.50-34.95	P	107	46																	
35.5	D				35.50M		100		2.35		2.64					40				

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 31-01-2024 | Date completed: 02-02-2024

BH: 05 | DEPTH OF WATER TABLE=0.50M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm^3	Dry density, gms/cm^3	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm^2)	Cohesion 'c' Kg/cm^2	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
0.00-1.50					Filling SAND															
1.5-1.95	P	4	4	CL	Grayish CLAY with Silt															
2	U							100	1.76	1.37	2.65	0.93	28.01		0.27	7	0.20	38.63	25.59	13.04
2.5	P																			
3.0-3.45	P	9	9																	
3.5	D																			
4.5-4.95	P	19	19																	
5	U							100	2.11	1.76	2.65	0.51	20.21		0.69	8	0.07	37.50	25.25	12.25
6.0-6.45	P	26	26																	
6.5	D																			
7.5-7.95	P	29	29																	
8	U							100	2.18		2.66			2.04	1.02			36.41	24.92	11.49
9.0-9.45	P	34	34																	
9.5	D																			
10.5-10.95	P	35	35																	
11	U							100	2.20											
12.00-12.45	P	37	37																	
12.5	D																			
13.5-13.95	P	40	40																	
14	U							100	2.22		2.67			2.8	1.4			35.60	24.68	10.92
15.00-15.45	P	44	44																	
15.5	D																			

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

RELIANT FOUNDATIONS PVT. LTD. *

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 31-01-2024 | Date completed: 02-02-2024

BH: 05 | DEPTH OF WATER TABLE=0.50M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
16.5-16.95	P	49	49																	
17	U							100	2.24		2.66			2.94	1.47					
18.0-18.45	P	53	53																	
18.5	D																			
19.50-19.95	P	57	57		Grayish CLAY with Silt															
20	U			CL				100	2.25		2.66			3.04	1.52					
21.0-21.45	P	61	61																	
21.5	D																			
22.5-22.95	P	66	66																	
23	U				23.00M			100	2.26		2.64									
24.0-24.45	P	70	32																	
24.5	D						100				2.64					36				
25.5-25.95	P	74	33																	
26	D						100													
27.0-27.45	P	81	35																	
27.5	D						100													
28.5-28.95	P	87	39																	
29	D			SW	Grayish fine to medium SAND		100		2.39		2.64					38				
30.0-30.45	P	94	39																	
30.5	D						100													
31.50-31.95	P	100	40																	
32	D						100													
33.00-33.45	P	104	40																	
33.5	D						100													
34.50-34.95	P	110	41																	
35.5	D				35.50M		100		2.4		2.64					38				

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 20-01-2024 | Date completed: 23-01-2024

BH: 06 | DEPTH OF WATER TABLE=0.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
1.5-1.95	P	14	14		Grayish CLAY with Silt															
2	U							100	1.97	1.61	2.67	0.66	22.36		0.73	8	0.12	37.05	25.12	11.93
2.5	P																			
3.0-3.45	P	17	17																	
3.5	D																			
4.5-4.95	P	22	22																	
5	U							100	2.10	1.73	2.66	0.54	21.22		0.87	8	0.08	36.44	24.93	11.51
6.0-6.45	P	26	26																	
6.5	D																			
7.5-7.95	P	31	31																	
8	U			CL				100	2.20		2.66			3.60	1.80			36.07	24.82	11.25
9.0-9.45	P	27	27																	
9.5	D																			
10.5-10.95	P	30	30																	
11	U																			
12.00-12.45	P	33	33																	
12.5	D																			
13.5-13.95	P	31	31																	
14	U							100	2.23		2.67			3.64	1.82			35.34	24.60	10.74
15.00-15.45	P	34	34																	
15.5	D																			

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 20-01-2024 | Date completed: 23-01-2024

BH: 06 | DEPTH OF WATER TABLE=0.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
16.5-16.95	P	30	30		Grayish CLAY with Silt															
17	U			CL				100	2.19		2.67			3.56	1.78					
18.0-18.45	P	32	32																	
18.5	D				19.50M															
19.50-19.95	P	36	19		Grayish sandy CLAY															
20	D						75	25												
21.0-21.45	P	44	23	SC																
21.5	D						80	20												
22.5-22.95	P	46	23																	
23	D				24.00M		85	15	2.27		2.64					38				
24.0-24.45	P	49	24		Grayish fine to medium SAND															
24.5	D						100													
25.5-25.95	P	52	25																	
26	D						100													
27.0-27.45	P	55	26																	
27.5	D				28.50M		100													
28.5-28.95	P	59	27																	
29	D			SW			90	10	2.29		2.64					41				
30.0-30.45	P	64	28																	
30.5	D																			
31.50-31.95	P	73	31		Grayish fine to medium SAND with Silt															
32	D						95	5												
33.00-33.45	P	76	34																	
33.5	D																			
34.50-34.95	P	81	38																	
35	D				35.00M		98	2												

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 25-01-2024 | Date completed: 26-01-2024

BH: 07 | DEPTH OF WATER TABLE=1.50M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
1.5-1.95	P	7	7		Grayish CLAY with Silt															
2	U							100	1.88	1.54	2.67	0.74	22.32		0.60	8	0.14	38.52	25.56	12.96
2.5	P																			
3.0-3.45	P	13	13																	
3.5	D																			
4.5-4.95	P	17	17																	
5	U							100	2.20	1.81	2.67	0.47	21.43		0.60	8	0.06	37.33	25.20	12.13
6.0-6.45	P	20	20																	
6.5	D																			
7.5-7.95	P	22	22																	
8	U			CL				100	2.13		2.66			2.94	1.47			36.55	24.97	11.58
9.0-9.45	P	24	24																	
9.5	D																			
10.5-10.95	P	29	29																	
11	U							100												
12.00-12.45	P	31	31																	
12.5	D																			
13.5-13.95	P	34	34																	
14	U							100	2.2		2.67			3.32	1.66			35.12	24.54	10.58
15.00-15.45	P	36	36																	
15.5	D																			

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

RELIANT FOUNDATIONS PVT. LTD. GHY-35

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 25-01-2024 | Date completed: 26-01-2024

BH: 07 | DEPTH OF WATER TABLE=1.50M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
16.5-16.95	P	40	40	CL	Grayish CLAY with Silt															
17	U				18.00M			100	2.28		2.66			3.52	1.76					
18.0-18.45	P	46	26		Grayish fine to medium SAND															
18.5	D						100													
19.50-19.95	P	49	27																	
20	D						100													
21.0-21.45	P	54	29																	
21.5	D						100													
22.5-22.95	P	57	30																	
23	D						100		2.25		2.64					37				
24.0-24.45	P	60	31																	
24.5	D						100													
25.5-25.95	P	65	32																	
26	D			SW			100													
27.0-27.45	P	69	33																	
27.5	D						100													
28.5-28.95	P	73	34																	
29	D						100		2.29		2.64					39				
30.0-30.45	P	75	34																	
30.5	D						100													
31.50-31.95	P	80	36																	
32	D						100													
33.00-33.45	P	83	37																	
33.5	D						100													
34.50-34.95	P	87	38																	
35	D				35.00M		100													

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

RELIANT FOUNDATIONS PVT. LTD. GHY-35

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 27-01-2024 | Date completed: 28-01-2024

BH: 08 | DEPTH OF WATER TABLE=1.50M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
1.5-1.95	P	3	3		Grayish CLAY with Silt															
2	U							100	1.96	1.62	2.66	0.64	21.09		0.25	7	0.11	39.13	25.74	13.39
2.5	P																			
3.0-3.45	P	13	13																	
3.5	D																			
4.5-4.95	P	8	8																	
5	U							100	2.10	1.75	2.67	0.52	19.66		0.56	8	0.08	38.23	25.13	13.10
6.0-6.45	P	10	10																	
6.5	D																			
7.5-7.95	P	14	14																	
8	U			CL				100	2.05		2.66			1.86	0.93			37.38	25.21	12.17
9.0-9.45	P	19	19																	
9.5	D																			
10.5-10.95	P	24	24																	
11	U							100												
12.00-12.45	P	29	29																	
12.5	D																			
13.5-13.95	P	31	31																	
14	U							100	2.2		2.67			3.38	1.69			35.70	24.71	10.99
15.00-15.45	P	39	39																	
15.5	D																			

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 27-01-2024 | Date completed: 28-01-2024

BH: 08 | DEPTH OF WATER TABLE=1.50M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
16.5-16.95	P	48	48		Grayish CLAY with Silt															
17	U							100	2.21		2.67			3.66	1.83					
18.0-18.45	P	54	54	CL																
18.5	D																			
19.50-19.95	P	58	58																	
20	U				21.00M			100												
21.0-21.45	P	63	32		Grayish fine to medium SAND															
21.5	D						100													
22.5-22.95	P	70	35																	
23	D						100		2.25		2.64					39				
24.0-24.45	P	75	37																	
24.5	D						100													
25.5-25.95	P	81	37	SP																
26	D						100													
27.0-27.45	P	86	38																	
27.5	D						100													
28.5-28.95	P	88	38																	
29	D						100		2.31		2.64					40				
30.0-30.45	P	92	40																	
30.5	D				31.50M		100													
31.50-31.95	P	R	R		Grayish fine to medium SAND with															
32	D				Silt		97	3												
33.00-33.45	P	R	R	SW																
33.5	D																			
34.50-34.95	P	R	R																	
35	D				35.00M		95	5												

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 29-01-2024 | Date completed: 30-01-2024

BH: 09 | DEPTH OF WATER TABLE=1.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
1.5-1.95	P	3	3																	
2	U							100	1.69	1.39	2.67	0.92	21.39		0.22	7	0.19	38.39	25.77	12.62
2.5	P																			
3.0-3.45	P	6	6																	
3.5	D																			
4.5-4.95	P	9	9																	
5	U							100	1.95	1.61	2.67	0.66	20.89		0.60	8	0.12	37.20	25.16	12.04
6.0-6.45	P	8	8																	
6.5	D																			
7.5-7.95	P	15	15																	
8	U			CL	Grayish CLAY with Silt			100	2.06		2.66			3.38	1.69			37.12	25.14	11.98
	P	20	20																	
9.5	D																			
10.5-10.95	P	26	26																	
11	U							100												
12.00-12.45	P	31	31																	
12.5	D																			
13.5-13.95	P	35	35																	
14	U							100	2.25		2.67			3.54	1.77			35.30	24.59	10.71
15.00-15.45	P	40	40																	
15.5	D																			

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 29-01-2024 | Date completed: 30-01-2024

BH: 09 | DEPTH OF WATER TABLE=1.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
16.5-16.95	P	45	45		Grayish CLAY with Silt															
17	U			CL			100		2.28		2.66			4.02	2.01					
18.0-18.45	P	49	49																	
18.5	D				19.50M															
19.50-19.95	P	53	29		Grayish fine SAND															
20	D						100													
21.0-21.45	P	58	31																	
21.5	D						100													
22.5-22.95	P	64	33																	
23	D						100		2.25		2.64					36				
24.0-24.45	P	71	36																	
24.5	D			SP			100													
25.5-25.95	P	79	39																	
26	D						100													
27.0-27.45	P	84	40																	
27.5	D						100													
28.5-28.95	P	92	42																	
29	D						100		2.28		2.64					39				
30.0-30.45	P	97	43																	
30.5	D				30.50M		100													
31.50-31.95	P	99	43		Grayish fine to medium SAND															
32	D						100													
33.00-33.45	P	105	44	SW																
33.5	D						100													
34.50-34.95	P	108	44																	
35	D				35.50M		100													

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 01-02-2024 | Date completed: 02-02-2024

BH: 10 | DEPTH OF WATER TABLE=0.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
1.5-1.95	P	1	1	CL	Grayish CLAY with Silt															
2	U							100							0.10	7		39.70	25.91	13.79
2.5	P																			
3.0-3.45	P	2	2																	
3.5	D																			
4.5-4.95	P	4	4																	
5	U							100	1.80	1.49	2.67	0.79	20.44		0.30	7	0.15	37.98	25.39	12.59
6.0-6.45	P	6	6																	
6.5	D																			
7.5-7.95	P	9	9																	
8	U							100	1.94		2.66				0.61	8		37.23	25.17	12.06
9.0-9.45	P	11	11																	
9.5	D																			
10.5-10.95	P	14	14																	
11	U							100												
12.00-12.45	P	15	15																	
12.5	D																			
13.5-13.95	P	20	15																	
14	D				14.00M			100	1.90		2.64					31		36.55	24.97	11.58
15.00-15.45	P	45	23	SW	Grayish fine to medium SAND															
15.5	D																			

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 01-02-2024 | Date completed: 02-02-2024

BH: 10 | DEPTH OF WATER TABLE=0.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
16.5-16.95	P	49	33																	
17	D						100		2.12		2.65					36				
18.0-18.45	P	55	35																	
18.5	D						100													
19.50-19.95	P	60	39																	
20	D						100													
21.0-21.45	P	66	40																	
21.5	D						100													
22.5-22.95	P	70	41																	
23	D						100		2.27		2.64					38				
24.0-24.45	P	75	42																	
24.5	D			SW	Grayish fine to medium SAND		100													
25.5-25.95	P	78	43																	
26	D						100													
27.0-27.45	P	81	43																	
27.5	D						100													
28.5-28.95	P	86	44																	
29	D						100		2.35		2.64					39				
30.0-30.45	P	90	45																	
30.5	D						100													
31.50-31.95	P	94	46																	
32	D						100													
33.00-33.45	P	97	46																	
33.5	D						100													
34.50-34.95	P	102	47																	
35	D				35.00M		100		1.41		2.64					40				

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100. NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 03-02-2024 | Date completed: 06-02-2024

BH: 11 | DEPTH OF WATER TABLE=0.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
1.5-1.95	P	2	2																	
2	U							100	1.60	1.23	2.67	1.17	30.24		0.13	7	0.27	38.36	25.51	12.85
2.5	P																			
3.0-3.45	P	4	4																	
3.5	D				Organic CLAY															
4.5-4.95	P	6	6																	
5	U							100	1.84	1.46	2.67	0.83	26.32		0.40	7	0.17	36.69	25.01	11.68
6.0-6.45	P	9	9																	
6.5	D																			
7.5-7.95	P	11	11	CL																
8	U				8.50M			100	1.98		2.66				0.73	8		36.20	24.86	11.34
9.0-9.45	P	15	15																	
9.5	D																			
10.5-10.95	P	19	19		Silty CLAY															
11	U							100	2.10		2.66			1.56	0.78			35.88	24.76	11.12
12.00-12.45	P	22	22																	
12.5	D																			
13.5-13.95	P	27	27																	
14	U				14.50M			100												
15.00-15.45	P	31	20	SC	SANDY Clay															
15.5	D						85	15	2.08		2.65					33				

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

PVT. LTD ★ RELIANT

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 03-02-2024 | Date completed: 06-02-2024

BH: 11 | DEPTH OF WATER TABLE=0.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ')	Compression Index Cc	LL%	PL%	PI%
16.5-16.95	P	34	22	SC	SANDY Clay															
17	D						90	10	2.11		2.65					34				
18.0-18.45	P	39	24																	
18.5	D				18.50M															
19.50-19.95	P	46	28	SW	Brownish medium SAND															
20	D						100		2.21							35				
21.0-21.45	P	57	33																	
21.5	D						100													
22.5-22.95	P	66	37																	
23	D						100		2.25		2.64					37				
24.0-24.45	P	71	39																	
24.5	D						100													
25.5-25.95	P	82	44																	
26	D						100													
27.0-27.45	P	90	46																	
27.5	D						100													
28.5-28.95	P	103	52																	
29	D						100		2.31		2.64					40				
30.0-30.45	P	106	51																	
30.5	D						100													
31.50-31.95	P	113	53																	
32	D						100													
33.00-33.45	P	115	53																	
33.5	D						100													
34.50-34.95	P	118	52																	
35	D				35.50M		100		2.41		2.64					41				

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

RELIANT FOUNDATIONS PVT. LTD.

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 07-02-2024 | Date completed: 08-02-2024

BH: 12 | DEPTH OF WATER TABLE=0.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
1.5-1.95	P	3	3																	
2	U							100	1.66	1.29	2.65	1.05	28.21		0.19	7	0.23	38.69	25.61	13.08
2.5	P																			
3.0-3.45	P	8	8		CLAY with Silt															
3.5	D																			
4.5-4.95	P	13	13																	
5	U				5.50M			100	1.97	1.66	2.65	0.59	18.32		0.87	8	0.10	36.21	24.86	11.35
6.0-6.45	P	10	10		Organic Clay															
6.5	D																			
7.5-7.95	P	13	13																	
8	U			CL				100	2.02		2.66			1.78	0.89			36.11	24.83	11.28
9.0-9.45	P	17	17																	
9.5	D				9.50M															
10.5-10.95	P	21	21																	
11	U							100	2.12		2.66									
12.00-12.45	P	27	27																	
12.5	D																			
13.5-13.95	P	30	30		CLAY with Silt															
14	U							100	2.19		2.67			2.04	1.02			35.73	24.72	11.01
15.00-15.45	P	33	33																	
15.5	D																			

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 07-02-2024 | Date completed: 08-02-2024

BH: 12 | DEPTH OF WATER TABLE=0.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
16.5-16.95	P	45	45	CL	CLAY with Silt															
17	U				17.50M		100		2.23		2.66			3.88	1.94					
18.0-18.45	P	53	31	SW																
18.5	D																			
19.50-19.95	P	58	32																	
20	D						100		2.25							37				
21.0-21.45	P	64	35																	
21.5	D						100													
22.5-22.95	P	74	40																	
23	D						100		2.28		2.64					38				
24.0-24.45	P	79	40																	
24.5	D						100													
25.5-25.95	P	84	42		Brownish medium SAND															
26	D						100													
27.0-27.45	P	87	42																	
27.5	D						100													
28.5-28.95	P	93	44																	
29	D						100		2.35		2.64					39				
30.0-30.45	P	99	45																	
30.5	D						100													
31.50-31.95	P	103	46																	
32	D						100													
33.00-33.45	P	106	45																	
33.5	D						100													
34.50-34.95	P	109	45																	
35.5	D				35.50M		100		2.4		2.64					40				

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 09-02-2024 | Date completed: 10-02-2024

BH: 13 | DEPTH OF WATER TABLE=0.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
1.5-1.95	P	5	5																	
2	U				Silty CLAY			100	1.80	1.43	2.67	0.86	25.63		0.33	7	0.18	37.33	25.20	12.13
2.5	P																			
3.0-3.45	P	6	6																	
3.5	D				3.50M															
4.5-4.95	P	3	3		Organic CLAY															
5	U							100	1.69	1.33	2.67	1.01	27.25		0.20	7	0.22	39.32	25.80	13.52
6.0-6.45	P	4	4																	
6.5	D																			
7.5-7.95	P	5	5																	
8	U			CL	8.50M			100	1.82		2.66				0.35	8		38.50	25.55	12.95
9.0-9.45	P	12	12																	
9.5	D																			
10.5-10.95	P	19	19																	
11	U							100	2.10		2.66			1.7	0.85			36.53	24.96	11.57
12.00-12.45	P	24	24		Silty CLAY															
12.5	D																			
13.5-13.95	P	29	29																	
14	U																			
15.00-15.45	P	32	32																	
15.5	D							100	2.21		2.65			2.42	1.21			35.69	24.71	10.98

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

RELIANT FOUNDATIONS PVT. LTD. * GHY-05 *

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 09-02-2024 | Date completed: 10-02-2024

BH: 13 | DEPTH OF WATER TABLE=0.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
16.5-16.95	P	37	37	CL	Silty CLAY															
17	U				17.50 M			100	2.23		2.65			2.62	1.31					
18.0-18.45	P	41	24																	
18.5	D																			
19.50-19.95	P	47	27																	
20	D						100		2.25		2.65					35				
21.0-21.45	P	53	29																	
21.5	D						100													
22.5-22.95	P	55	29																	
23	D						100		2.31		2.64					36				
24.0-24.45	P	59	31																	
24.5	D						100													
25.5-25.95	P	64	32		Brownish medium SAND															
26	D			SW			100													
27.0-27.45	P	71	35																	
27.5	D						100													
28.5-28.95	P	77	37																	
29	D						100		2.37		2.64					37				
30.0-30.45	P	81	37																	
30.5	D						100													
31.50-31.95	P	89	40																	
32	D						100													
33.00-33.45	P	96	42																	
33.5	D						100													
34.50-34.95	P	101	42																	
35	D				35.50M		100		2.43		2.64					39				

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 10-02-2024 | Date completed: 13-02-2024

BH: 14 | DEPTH OF WATER TABLE=0.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
1.5-1.95	P	3	3																	
2	U				Grayish CLAY with Silt			100	1.70	1.33	2.65	0.99	27.52		0.24	7	0.22	39.58	25.87	13.71
2.5	P																			
3.0-3.45	P	6	6																	
3.5	D				3.50M															
4.5-4.95	P	4	4																	
5	U							100	1.78	1.38	2.65	0.91	28.63		0.27	7	0.19	38.68	25.60	13.08
6.0-6.45	P	5	5																	
6.5	D				Organic Clay															
7.5-7.95	P	8	8	CL																
8	U							100	1.92		2.66				0.53	8		37.16	25.15	12.01
9.0-9.45	P	10	10																	
9.5	D				9.50M															
10.5-10.95	P	14	14																	
11	U							100	2.04		2.66									
12.00-12.45	P	19	19		Grayish CLAY with Silt															
12.5	D																			
13.5-13.95	P	24	24																	
14	U				14.50M			100	2.14		2.67			3.2	1.6			36.22	24.87	11.35
15.00-15.45	P	31	18		Grayish medium SAND															
15.5	D																			

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

LTD. ★ GHY-06 ★ RELIANT ... FOUNDATIONS PVT.

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 10-02-2024 | Date completed: 13-02-2024

BH: 14 | DEPTH OF WATER TABLE=0.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
16.5-16.95	P	41	26																	
17	D						100		2.17		2.66					35				
18.0-18.45	P	47	29																	
18.5	D																			
19.50-19.95	P	56	34																	
20	D						100		2.19		2.66					37				
21.0-21.45	P	61	36																	
21.5	D						100													
22.5-22.95	P	67	38																	
23	D						100		2.22		2.64					38				
24.0-24.45	P	71	39																	
24.5	D				Grayish medium SAND		100													
25.5-25.95	P	79	42	SW																
26	D						100													
27.0-27.45	P	86	45																	
27.5	D						100													
28.5-28.95	P	94	47																	
29	D						100		2.29		2.64					39				
30.0-30.45	P	99	49																	
30.5	D						100													
31.50-31.95	P	103	49																	
32	D						100													
33.00-33.45	P	108	50																	
33.5	D						100													
34.50-34.95	P	111	50																	
35.5	D				35.50M		100		2.36		2.64					40				

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 16-02-2024 | Date completed: 17-02-2024

BH: 15 | DEPTH OF WATER TABLE=0.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
1.5-1.95	P	7	7																	
2	U							100	1.87	1.51	2.65	0.75	23.65		0.47	7	0.14	36.14	24.57	11.57
2.5	P																			
3.0-3.45	P	10	10																	
3.5	D																			
4.5-4.95	P	13	13																	
5	U							100	2.02	1.57	2.65	0.69	28.63		0.88	7	0.13	36.10	24.83	11.27
6.0-6.45	P	19	19																	
6.5	D																			
7.5-7.95	P	18	18	CL	Grayish CLAY with Silt															
8	U							100	2.10		2.66				0.60	8		35.72	24.56	11.16
9.0-9.45	P	18	18																	
9.5	D																			
10.5-10.95	P	24	24																	
11	U							100	2.14		2.66									
12.00-12.45	P	39	39																	
12.5	D																			
13.5-13.95	P	44	44																	
14	U				14.50M			100	2.17		2.67			3.3	1.65			35.14	24.54	10.60
15.00-15.45	P	51	32		Grayish medium SAND															
15.5	D																			

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 16-02-2024 | Date completed: 17-02-2024

BH: 15 | DEPTH OF WATER TABLE=0.00M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
16.5-16.95	P	59	36																	
17	D						100		2.23		2.66					37				
18.0-18.45	P	64	38																	
18.5	D																			
19.50-19.95	P	68	39																	
20	D						100		2.26		2.66					38				
21.0-21.45	P	73	41																	
21.5	D						100													
22.5-22.95	P	80	43																	
23	D						100		2.30		2.64					39				
24.0-24.45	P	84	44																	
24.5	D				Grayish medium SAND		100													
25.5-25.95	P	91	47	SW																
26	D						100													
27.0-27.45	P	87	43																	
27.5	D						100													
28.5-28.95	P	93	45																	
29	D						100		2.39		2.64					40				
30.0-30.45	P	97	45																	
30.5	D						100													
31.50-31.95	P	103	47																	
32	D						100													
33.00-33.45	P	107	47																	
33.5	D						100													
34.50-34.95	P	111	47																	
35.5	D				35.50M		100		2.42		2.64					40				

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 14-02-2024 | Date completed: 16-02-2024

BH: 16 | DEPTH OF WATER TABLE=0.50M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
1.5-1.95	P	5	5																	
2	U							100	1.81	1.44	2.65	0.84	25.63		0.33	7	0.17	38.69	25.61	13.08
2.5	P																			
3.0-3.45	P	13	13																	
3.5	D																			
4.5-4.95	P	17	17																	
5	U							100	2.09	1.74	2.65	0.52	20.21		0.96	8	0.08	37.60	25.28	12.32
6.0-6.45	P	8	8																	
6.5	D																			
7.5-7.95	P	14	14	CL	Reddish,Brown CLAY with Silt															
8	U							100	2.04		2.66				0.93	8		36.48	24.94	11.54
9.0-9.45	P	19	19																	
9.5	D																			
10.5-10.95	P	21	21																	
11	U							100	2.12		2.66									
12.00-12.45	P	25	25																	
12.5	D																			
13.5-13.95	P	29	29																	
14	U				14.50M			100	2.18		2.67			3.48	1.74			35.17	24.55	10.62
15.00-15.45	P	37	19		Grayish medium SAND															
15.5	D																			

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

BORE LOG CUM LABORATORY TEST RESULT

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

Boring method: AUGER & WASH BORING | Boring dia: 150mm | Date Commenced: 14-02-2024 | Date completed: 16-02-2024

BH: 16 | DEPTH OF WATER TABLE=0.50M From EGL

Depth in meters below reference	Types of Sample	Observed N-Value	Corrected N-Value	Group Symbol	Visual description of soil	% Gravel > 4.75 mm	% Sand 4.75-0.075 mm	% Silt and Clay <0.075mm	Field density, gms/cm³	Dry density, gms/cm³	Specific Gravity	Void Ratio	Natural moisture content	Unconfined compressive Strength (Kg/cm²)	Cohesion 'c' Kg/cm²	Angle of shearing resistance (Φ°)	Compression Index Cc	LL%	PL%	PI%
16.5-16.95	P	43	27																	
17	D						100		2.18		2.66					35				
18.0-18.45	P	53	32																	
18.5	D																			
19.50-19.95	P	61	36																	
20	D						100		2.21		2.66					37				
21.0-21.45	P	63	36																	
21.5	D						100													
22.5-22.95	P	65	36																	
23	D						100		2.25		2.64					38				
24.0-24.45	P	80	43																	
24.5	D			SW	Grayish medium SAND		100													
25.5-25.95	P	86	44																	
26	D						100													
27.0-27.45	P	93	47																	
27.5	D						100													
28.5-28.95	P	101	49																	
29	D						100		2.32		2.64					40				
30.0-30.45	P	104	49																	
30.5	D						100													
31.50-31.95	P	109	50																	
32	D						100													
33.00-33.45	P	111	50																	
33.5	D						100													
34.50-34.95	P	118	51																	
35.5	D				35.50M		100		2.38		2.64					41				

U: Undisturbed Sample:: D: Disturbed Sample:: P: Standard Penetration test:: EGL: Existing Ground Level :: R : Refusal N>100, NP: Non plastic

:ANNEX-II:

BORE LOG CHART

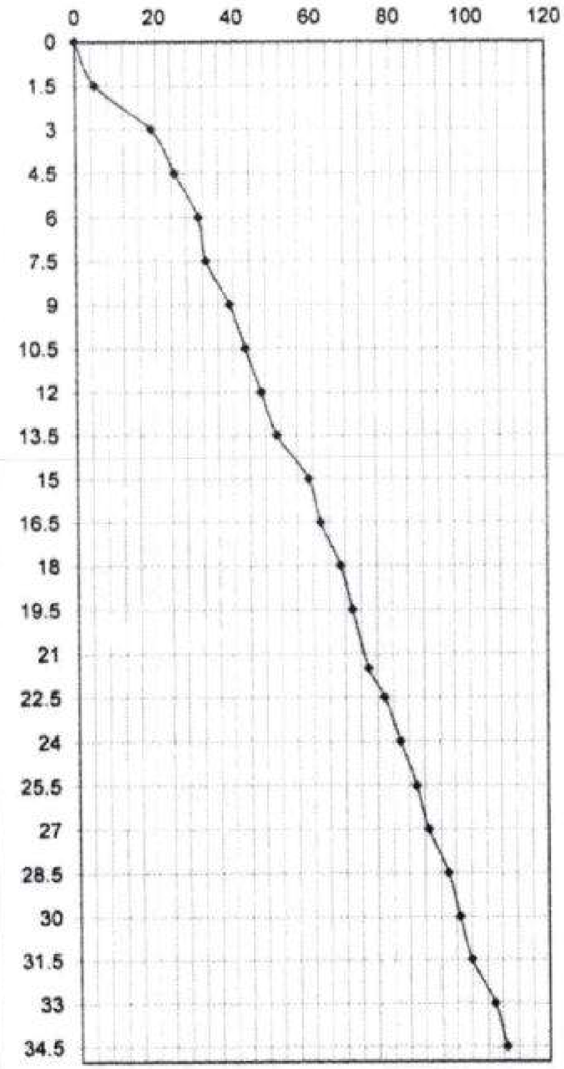
BORE LOG CHART

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

BORE HOLE NO: 01	DATE OF STARTING: 29-01-2024 DATE OF COMPLETION: 30-01-2024	GROUND WATER LEVEL 0.0M From EGL	AUGER & WASH BORING

DEPTH (M)	TYPE OF SAMPLE	SPT 15 CM	SPT 15 CM	SPT 15 CM	N-Value	VISUAL DESCRIPTION OF SOIL
0.00-0.50						Filling SAND
1.5-1.95	P	1	2	3	5	
2	U					
2.5	P					
3.0-3.45	P	5	8	11	19	
3.5	D					
4.5-4.95	P	6	11	14	25	
5	U					
6.0-6.45	P	7	13	18	31	
6.5	D					
7.5-7.95	P	9	14	19	33	
8	U					Grayish CLAY with Silt
9.0-9.45	P	11	17	22	39	
9.5	D					
10.5-10.95	P	13	19	24	43	
11	U					
12.00-12.45	P	14	21	26	47	
12.5	D					
13.5-13.95	P	16	24	27	51	
14	U					
15.00-15.45	P	17	29	30	59	
15.5	D					
16.5-16.95	P	18	30	32	62	
17	U					18.00M
18.0-18.45	P	21	32	35	67	
18.5	D					
19.50-19.95	P	22	33	37	70	
20	D					
21.0-21.45	P	24	35	39	74	
21.5	D					
22.5-22.95	P	24	37	41	78	
23	D					
24.0-24.45	P	27	39	43	82	
24.5	D					
25.5-25.95	P	28	41	45	86	
26	D					Grayish fine to medium SAND
27.0-27.45	P	30	42	47	89	
27.5	D					
28.5-28.95	P	31	45	49	94	
29	D					
30.0-30.45	P	32	46	51	97	
30.5	D					
31.50-31.95	P	35	48	52	100	
32	D					
33.00-33.45	P	36	52	54	106	
33.5	D					
34.50-34.95	P	38	53	56	109	
35.5	D					35.50M

GRAPHICAL REPRESENTATION OF N-Value



RELIANCE FOUNDATIONS PVT. LTD. * GHY-35 *

U: UNDISTURBED SAMPLE:: D: DISTURBED SAMPLE:: P: STANDARD PENETRATION TEST::
EGL: EXISTING GROUND LEVEL R:REFUSAL:N>100::

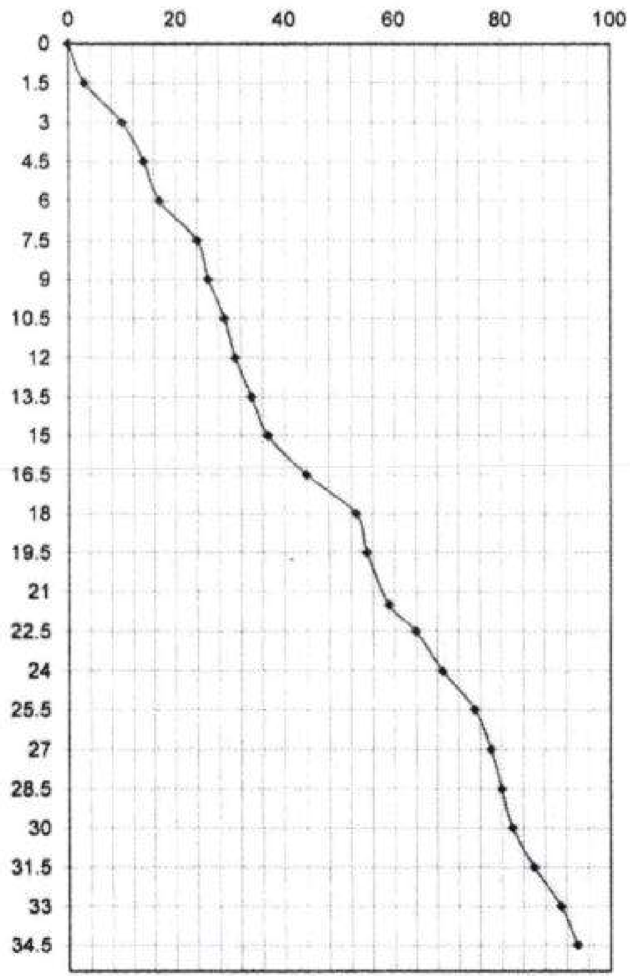
BORE LOG CHART

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

BORE HOLE NO: 02	DATE OF STARTING: 25-01-2024	GROUND WATER LEVEL	AUGER & WASH BORING
	DATE OF COMPLETION: 26-01-2024	1.00M From EGL	

DEPTH (M)	TYPE OF SAMPLE	SPT 15 CM	SPT 15 CM	SPT 15 CM	N-Value	VISUAL DESCRIPTION OF SOIL	LOG
1.5-1.95	P	1	1	2	3	Grayish CLAY with Silt	
2	U						
2.5	P						
3.0-3.45	P	3	4	6	10		
3.5	D						
4.5-4.95	P	4	6	8	14		
5	U						
6.0-6.45	P	5	8	9	17		
6.5	D						
7.5-7.95	P	6	11	13	24		
8	U						
9.0-9.45	P	7	12	14	26		
9.5	D						
10.5-10.95	P	8	13	16	29		
11	U						
12.00-12.45	P	9	14	17	31		
12.5	D						
13.5-13.95	P	11	16	18	34		
14	U						
15.00-15.45	P	13	18	19	37		
15.5	D						
16.5-16.95	P	14	21	23	44		
17	U						
18.0-18.45	P	17	25	28	53		
18.5	D					18.50M	
19.50-19.95	P	19	26	29	55	Grayish fine to medium SAND	
20	D						
21.0-21.45	P	21	28	31	59		
21.5	D						
22.5-22.95	P	25	31	33	64		
23	D						
24.0-24.45	P	26	33	36	69		
24.5	D						
25.5-25.95	P	28	36	39	75		
26	D						
27.0-27.45	P	30	37	41	78		
27.5	D						
28.5-28.95	P	31	38	42	80		
29	D						
30.0-30.45	P	32	39	43	82		
30.5	D						
31.50-31.95	P	34	41	45	86		
32	D						
33.00-33.45	P	35	43	48	91		
33.5	D						
34.50-34.95	P	36	45	49	94		
35	D					35.50M	

GRAPHICAL REPRESENTATION OF N-Value



RELIANT FOUNDATIONS PVT. LTD. * GHY-35 *

U: UNDISTURBED SAMPLE:: D: DISTURBED SAMPLE::	P: STANDARD PENETRATION TEST::
EGL: EXISTING GROUND LEVEL	R:REFUSAL:N>100::

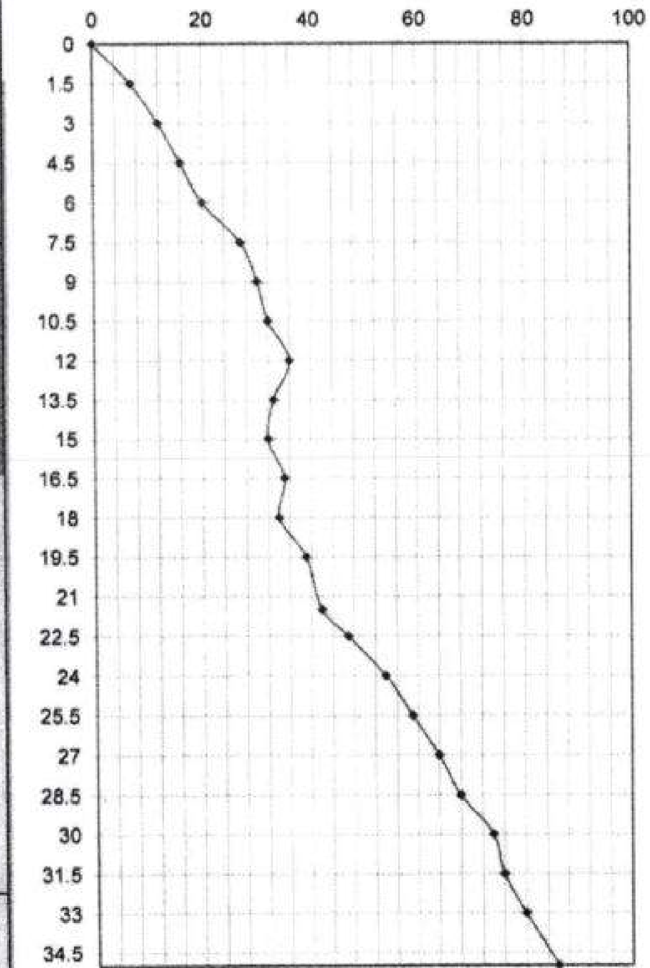
BORE LOG CHART

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

BORE HOLE NO: 03	DATE OF STARTING: 21-01-2024	GROUND WATER LEVEL	AUGER & WASH BORING
	DATE OF COMPLETION: 24-01-2024	1.00M From EGL	

DEPTH (M)	TYPE OF SAMPLE	SPT 15 CM	15 CM	15 CM	N-Value	VISUAL DESCRIPTION OF SOIL	LOG
1.5-1.95	P	4	6	8	7	Grayish CLAY with Silt	
2	U						
2.5	P						
3.0-3.45	P	5	7	10	12		
3.5	D						
4.5-4.95	P	6	9	13	16		
5	U						
6.0-6.45	P	7	11	15	20		
6.5	D						
7.5-7.95	P	8	14	17	27		
8	U						
9.0-9.45	P	7	13	14	30		
9.5	D						
10.5-10.95	P	9	14	16	32		
11	U						
12.00-12.45	P	10	16	17	36		
12.5	D						
13.5-13.95	P	9	15	16	33		
14	U						
15.00-15.45	P	10	16	18	32		
15.5	D					16.50M	
16.5-16.95	P	12	14	16	35		
17	D						
18.0-18.45	P	13	15	17	34		
18.5	D						
19.50-19.95	P	12	17	19	39		
20	D						
21.0-21.45	P	14	21	23	42		
21.5	D						
22.5-22.95	P	17	22	25	47	Grayish fine to medium SAND	
23	D						
24.0-24.45	P	18	26	28	54		
24.5	D						
25.5-25.95	P	19	28	31	59		
26	D						
27.0-27.45	P	21	31	33	64		
27.5	D						
28.5-28.95	P	22	23	35	68		
29	D					30.00M	
30.0-30.45	P	24	38	33	74	Grayish medium to Coarse SAND	
30.5	D						
31.50-31.95	P	26	37	39	76		
32	D						
33.00-33.45	P	28	39	41	80		
33.5	D						
34.50-34.95	P	30	41	45	86		
35	D					35.50M	

GRAPHICAL REPRESENTATION OF N-Value



U: UNDISTURBED SAMPLE:: D: DISTURBED SAMPLE:: P: STANDARD PENETRATION TEST::

EGL: EXISTING GROUND LEVEL R:REFUSAL:N>100::

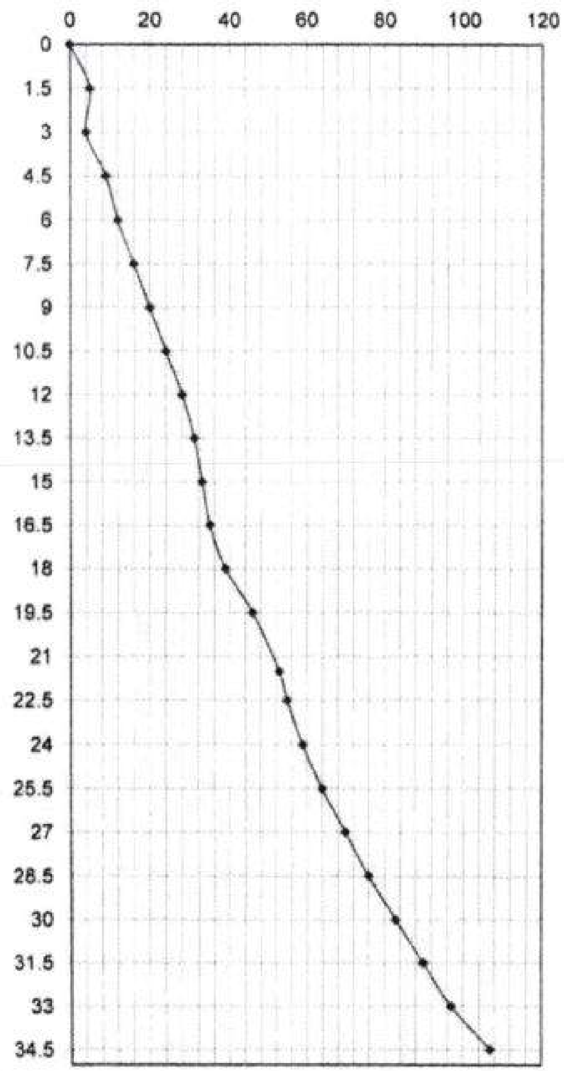
BORE LOG CHART

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION.

BORE HOLE NO: 04	DATE OF STARTING: 06-02-2024	GROUND WATER LEVEL	AUGER & WASH BORING
	DATE OF COMPLETION: 07-02-2024	0.50M From EGL	

DEPTH (M)	TYPE OF SAMPLE	SPT 15 CM	SPT 15 CM	SPT 15 CM	N-Value	VISUAL DESCRIPTION OF SOIL	LOG
0.00-0.50						Filling SAND	
1.5-1.95	P	1	2	3	5	Grayish CLAY with Silt	
2	U						
2.5	P						
3.0-3.45	P	1	2	2	4		
3.5	D						
4.5-4.95	P	2	3	6	9		
5	U						
6.0-6.45	P	3	5	7	12		
6.5	D						
7.5-7.95	P	5	7	9	16		
8	U						
9.0-9.45	P	6	9	11	20		
9.5	D						
10.5-10.95	P	7	11	13	24		
11	U						
12.00-12.45	P	8	13	15	28		
12.5	D						
13.5-13.95	P	9	14	17	31		
14	U						
15.00-15.45	P	11	15	18	33		
15.5	D					15.50M	
16.5-16.95	P	12	16	19	35	Brownish SANDY Clay	
17	D						
18.0-18.45	P	14	18	21	39		
18.5	D						
19.50-19.95	P	16	22	24	46		
20	D						
21.0-21.45	P	17	25	28	53		
21.5	D					21.50M	
22.5-22.95	P	19	26	29	55	Grayish medium SAND	
23	D						
24.0-24.45	P	21	28	31	59		
24.5	D						
25.5-25.95	P	23	31	33	64		
26	D						
27.0-27.45	P	26	34	36	70		
27.5	D						
28.5-28.95	P	28	37	39	76		
29	D						
30.0-30.45	P	31	41	42	83		
30.5	D						
31.50-31.95	P	32	44	46	90		
32	D						
33.00-33.45	P	35	48	51	97		
33.5	D						
34.50-34.95	P	41	52	55	107		
35.5	D					35.50M	

GRAPHICAL REPRESENTATION OF N-Value



U: UNDISTURBED SAMPLE:: D: DISTURBED SAMPLE:: P: STANDARD PENETRATION TEST::
EGL: EXISTING GROUND LEVEL R:REFUSAL:N>100::

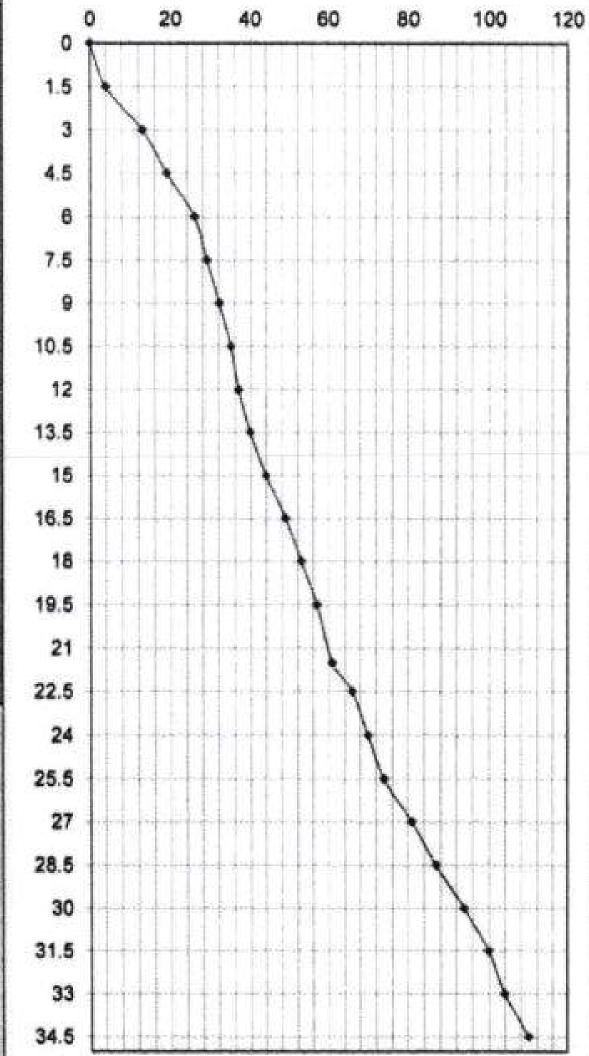
BORE LOG CHART

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

BORE HOLE NO: 05	DATE OF STARTING: 31-01-2024	GROUND WATER LEVEL	AUGER & WASH BORING
	DATE OF COMPLETION: 02-02-2024	0.50M From EGL	

DEPTH (M)	TYPE OF SAMPLE	SPT 15 CM	SPT 15 CM	SPT 15 CM	N-Value	VISUAL DESCRIPTION OF SOIL	LOG
0.00-1.50						Filling SAND	
1.5-1.95	P	1	2	2	4	Grayish CLAY with Silt	
2	U						
2.5	P						
3.0-3.45	P	3	4	9	13		
3.5	D						
4.5-4.95	P	5	8	11	19		
5	U						
6.0-6.45	P	7	12	14	26		
6.5	D						
7.5-7.95	P	8	13	16	29		
8	U						
9.0-9.45	P	10	14	18	32		
9.5	D						
10.5-10.95	P	11	15	20	35		
11	U						
12.00-12.45	P	12	16	21	37		
12.5	D						
13.5-13.95	P	13	17	23	40		
14	U						
15.00-15.45	P	14	19	25	44		
15.5	D						
16.5-16.95	P	16	22	27	49		
17	U						
18.0-18.45	P	18	24	29	53		
18.5	D						
19.50-19.95	P	19	26	31	57		
20	U						
21.0-21.45	P	21	28	33	61		
21.5	D						
22.5-22.95	P	22	31	35	66		
23	U					23.00M	
24.0-24.45	P	23	33	37	70	Grayish fine to medium SAND	
24.5	D						
25.5-25.95	P	24	35	39	74		
26	D						
27.0-27.45	P	25	41	40	81		
27.5	D						
28.5-28.95	P	26	42	45	87		
29	D						
30.0-30.45	P	27	46	48	94		
30.5	D						
31.50-31.95	P	31	49	51	100		
32	D						
33.00-33.45	P	34	51	53	104		
33.5	D						
34.50-34.95	P	38	54	56	110		
35.5	D					35.50M	

GRAPHICAL REPRESENTATION OF N-Value



U: UNDISTURBED SAMPLE:: D: DISTURBED SAMPLE:: P: STANDARD PENETRATION TEST::

EGL: EXISTING GROUND LEVEL R:REFUSAL;N>100::

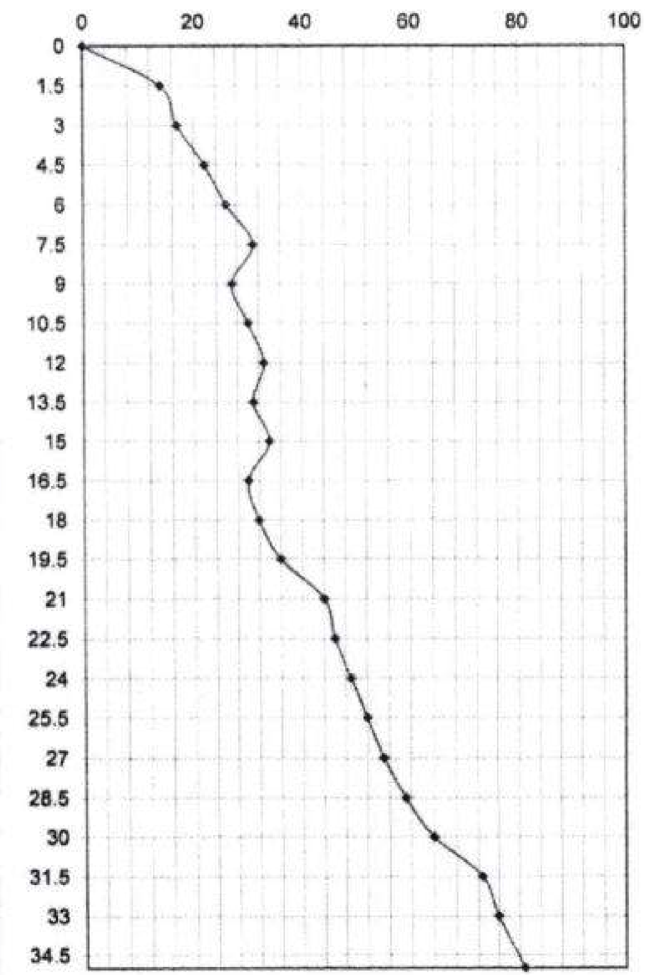
BORE LOG CHART

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

BORE HOLE NO: 06	DATE OF STARTING: 20-01-2024	GROUND WATER LEVEL	AUGER & WASH BORING
	DATE OF COMPLETION: 23-01-2024	0.00M From EGL	

DEPTH (M)	TYPE OF SAMPLE	SPT 15 CM	SPT 15 CM	SPT 15 CM	N-Value	VISUAL DESCRIPTION OF SOIL	LOG
1.5-1.95	P	4	6	8	14	Grayish CLAY with Silt	
2	U						
2.5	P						
3.0-3.45	P	5	7	10	17		
3.5	D						
4.5-4.95	P	6	9	13	22		
5	U						
6.0-6.45	P	7	11	15	26		
6.5	D						
7.5-7.95	P	8	14	17	31		
8	U						
9.0-9.45	P	7	13	14	27		
9.5	D						
10.5-10.95	P	9	14	16	30		
11	U						
12.00-12.45	P	10	16	17	33		
12.5	D						
13.5-13.95	P	9	15	16	31		
14	U						
15.00-15.45	P	10	16	18	34		
15.5	D						
16.5-16.95	P	12	14	16	30	Grayish CLAY with Silt	
17	U						
18.0-18.45	P	13	15	17	32		
18.5	D					19.50M	
19.50-19.95	P	12	17	19	36	Grayish sandy CLAY	
20	D						
21.0-21.45	P	14	21	23	44		
21.5	D						
22.5-22.95	P	15	22	24	46		
23	D					24.00M	
24.0-24.45	P	16	23	26	49	Grayish fine to medium SAND	
24.5	D						
25.5-25.95	P	18	25	27	52		
26	D						
27.0-27.45	P	19	26	29	55		
27.5	D					28.50M	
28.5-28.95	P	21	28	31	59	Grayish fine to medium SAND with Silt	
29	D						
30.0-30.45	P	23	31	33	64		
30.5	D						
31.50-31.95	P	28	35	38	73		
32	D						
33.00-33.45	P	29	37	39	76		
33.5	D						
34.50-34.95	P	31	39	42	81	35.50M	
35	D						

GRAPHICAL REPRESENTATION OF N-Value



U: UNDISTURBED SAMPLE:: D: DISTURBED SAMPLE:: P: STANDARD PENETRATION TEST::

EGL: EXISTING GROUND LEVEL R:REFUSAL;N>100::

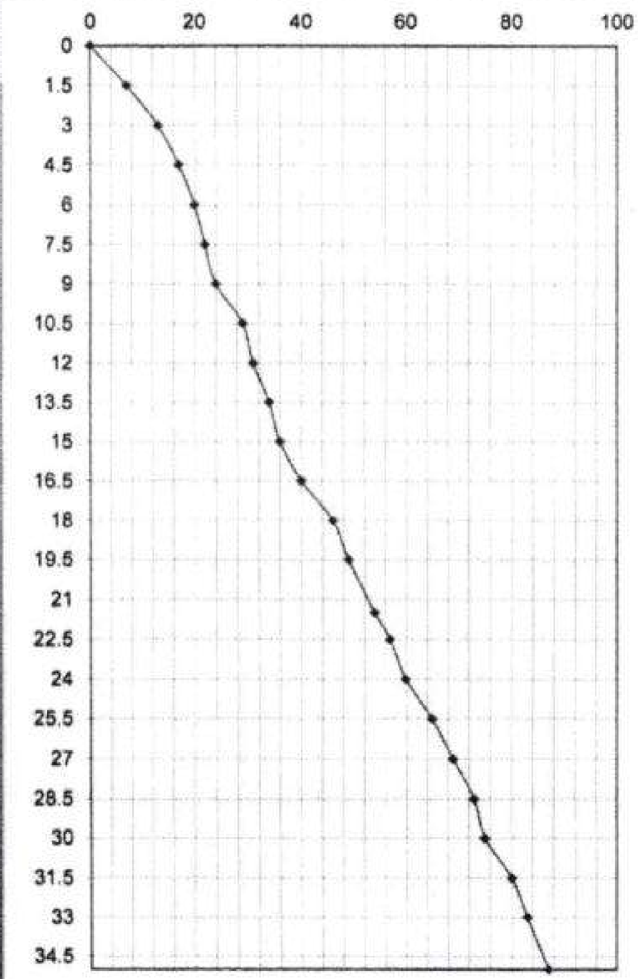
BORE LOG CHART

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION.

BORE HOLE NO: 07	DATE OF STARTING: 25-01-2024	GROUND WATER LEVEL	AUGER & WASH BORING
	DATE OF COMPLETION: 26-01-2024	1.50M From EGL	

DEPTH (M)	TYPE OF SAMPLE	SPT 15 CM	SPT 15 CM	SPT 15 CM	N-Value	VISUAL DESCRIPTION OF SOIL
1.5-1.95	P	2	3	4	7	
2	U					
2.5	P					
3.0-3.45	P	4	6	7	13	
3.5	D					
4.5-4.95	P	5	8	9	17	
5	U					
6.0-6.45	P	6	9	11	20	
6.5	D					
7.5-7.95	P	7	10	12	22	
8	U					Grayish CLAY with Silt
9.0-9.45	P	8	11	13	24	
9.5	D					
10.5-10.95	P	9	13	16	29	
11	U					
12.00-12.45	P	10	14	17	31	
12.5	D					
13.5-13.95	P	11	16	18	34	
14	U					
15.00-15.45	P	12	17	19	36	
15.5	D					
16.5-16.95	P	13	19	21	40	
17	U					18.00M
18.0-18.45	P	14	22	24	46	
18.5	D					
19.50-19.95	P	16	23	26	49	
20	D					
21.0-21.45	P	18	25	28	54	
21.5	D					
22.5-22.95	P	22	26	31	57	
23	D					
24.0-24.45	P	23	28	32	60	
24.5	D					
25.5-25.95	P	24	31	34	65	
26	D					Grayish fine to medium SAND
27.0-27.45	P	26	33	36	69	
27.5	D					
28.5-28.95	P	28	35	38	73	
29	D					
30.0-30.45	P	29	36	39	75	
30.5	D					
31.50-31.95	P	30	38	42	80	
32	D					
33.00-33.45	P	31	39	44	83	
33.5	D					
34.50-34.95	P	33	41	46	87	
35	D					35.50M

GRAPHICAL REPRESENTATION OF N-Value



U: UNDISTURBED SAMPLE:: D: DISTURBED SAMPLE:: P: STANDARD PENETRATION TEST::

EGL: EXISTING GROUND LEVEL R:REFUSAL:N>100::

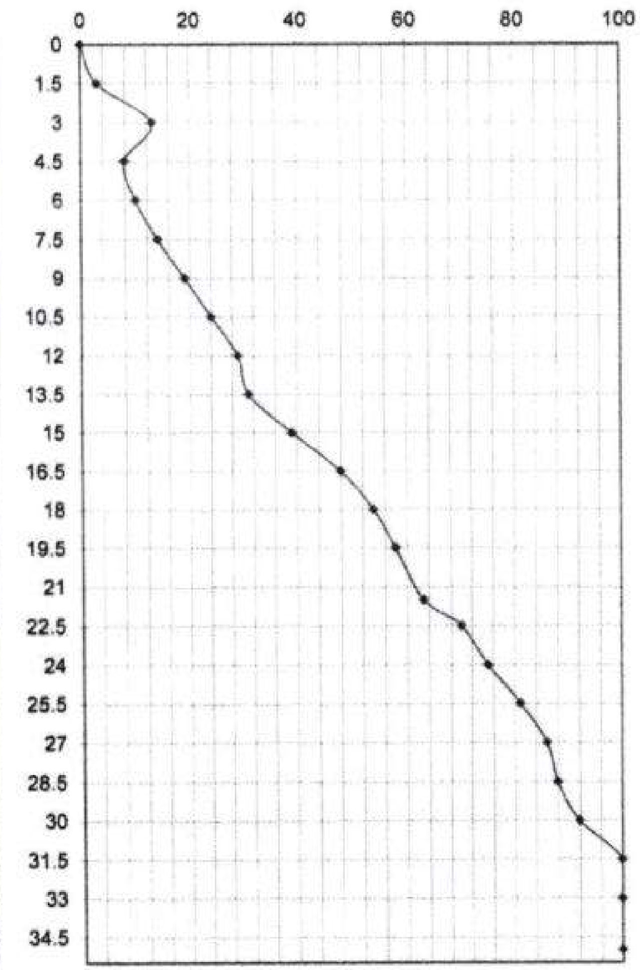
BORE LOG CHART

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

BORE HOLE NO: 08	DATE OF STARTING: 27-01-2024	GROUND WATER LEVEL	AUGER & WASH BORING
	DATE OF COMPLETION: 28-01-2024	1.60M From EGL	

DEPTH (M)	TYPE OF SAMPLE	SPT 15 CM	SPT 15 CM	SPT 15 CM	N-Value	VISUAL DESCRIPTION OF SOIL
1.5-1.95	P	1	1	2	3	Grayish CLAY with Silt
2	U					
2.5	P					
3.0-3.45	P	4	6	7	13	
3.5	D					
4.5-4.95	P	2	3	5	8	
5	U					
6.0-6.45	P	3	4	6	10	
6.5	D					
7.5-7.95	P	4	6	8	14	
8	U					
9.0-9.45	P	6	8	11	19	
9.5	D					
10.5-10.95	P	8	11	13	24	
11	U					
12.00-12.45	P	9	13	16	29	
12.5	D					
13.5-13.95	P	11	14	17	31	
14	U					
15.00-15.45	P	13	18	21	39	
15.5	D					
16.5-16.95	P	18	21	27	48	
17	U					
18.0-18.45	P	19	23	31	54	
18.5	D					
19.50-19.95	P	21	25	33	58	
20	U					21.00M
21.0-21.45	P	23	28	35	63	Grayish fine to medium SAND
21.5	D					
22.5-22.95	P	26	32	24	70	
23	D					
24.0-24.45	P	26	34	41	75	
24.5	D					
25.5-25.95	P	29	38	43	81	
26	D					
27.0-27.45	P	31	41	45	86	
27.5	D					
28.5-28.95	P	33	42	46	88	
29	D					
30.0-30.45	P	34	44	48	92	
30.5	D					31.50M
31.50-31.95	P	R	R	R	R	Grayish fine to medium SAND with Silt
32	D					
33.00-33.45	P	R	R	R	R	
33.5	D					
34.50-34.95	P	R	R	R	R	
35	D					35.50M

GRAPHICAL REPRESENTATION OF N-Value



U: UNDISTURBED SAMPLE:: D: DISTURBED SAMPLE:: P: STANDARD PENETRATION TEST::

EGL: EXISTING GROUND LEVEL R:REFUSAL;N>100::

RELIANT FOUNDATIONS PVT. LTD.

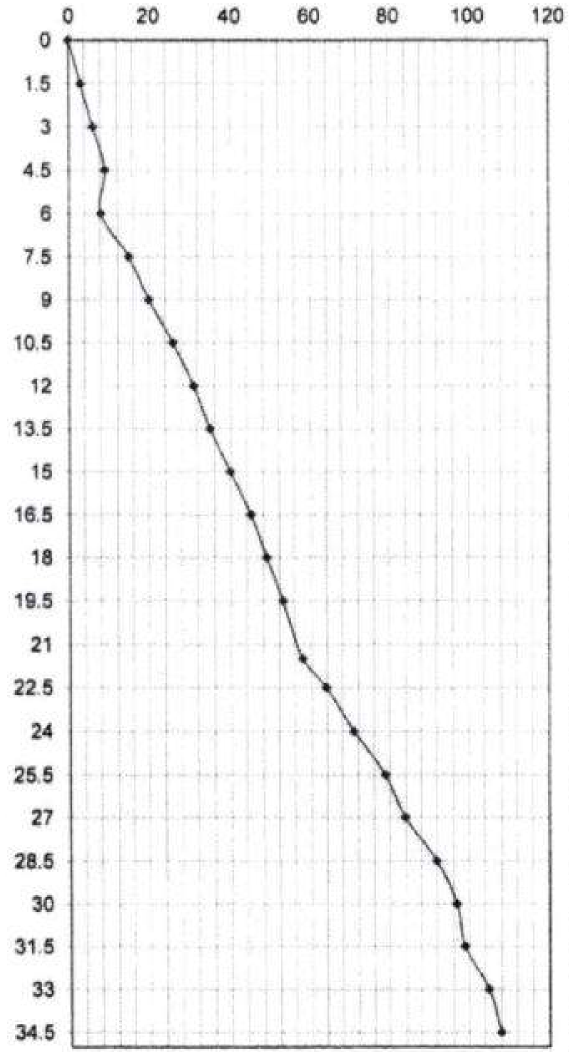
BORE LOG CHART

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

BORE HOLE NO: 09	DATE OF STARTING: 29-01-2024	GROUND WATER LEVEL	AUGER & WASH BORING
	DATE OF COMPLETION: 30-01-2024	1.00M From EGL	

DEPTH (M)	TYPE OF SAMPLE	SPT 15 CM	SPT 15 CM	SPT 15 CM	N-Value	VISUAL DESCRIPTION OF SOIL	LOG
0.00-1.50							
1.5-1.95	P	1	1	2	3	Grayish CLAY with Silt	
2	U						
2.5	P						
3.0-3.45	P	2	3	3	6		
3.5	D						
4.5-4.95	P	3	4	5	9		
5	U						
6.0-6.45	P	3	4	4	8		
6.5	D						
7.5-7.95	P	5	7	8	15		
8	U						
9.0-9.45	P	6	9	11	20		
9.5	D						
10.5-10.95	P	8	12	14	26		
11	U						
12.00-12.45	P	11	14	17	31		
12.5	D						
13.5-13.95	P	12	16	19	35		
14	U						
15.00-15.45	P	13	18	22	40		
15.5	D						
16.5-16.95	P	14	21	24	45		
17	U						
18.0-18.45	P	15	23	26	49		
18.5	D					19.50M	
19.50-19.95	P	16	25	28	53	Grayish fine SAND	
20	D						
21.0-21.45	P	18	27	31	58		
21.5	D						
22.5-22.95	P	19	31	33	64		
23	D						
24.0-24.45	P	21	35	36	71		
24.5	D						
25.5-25.95	P	23	38	41	79		
26	D						
27.0-27.45	P	25	41	43	84		
27.5	D						
28.5-28.95	P	28	44	48	92		
29	D						
30.0-30.45	P	31	46	51	97		
30.5	D					30.50M	
31.50-31.95	P	33	48	51	99	Grayish fine to medium SAND	
32	D						
33.00-33.45	P	35	51	54	105		
33.5	D						
34.50-34.95	P	38	52	56	108		
35.5	D					35.00M	

GRAPHICAL REPRESENTATION OF N-Value



U: UNDISTURBED SAMPLE:: D: DISTURBED SAMPLE:: P: STANDARD PENETRATION TEST::

EGL: EXISTING GROUND LEVEL R:REFUSAL:N>100::

RELIANT FOUNDATIONS PVT. LTD. * GHY-35 *

BORE LOG CHART

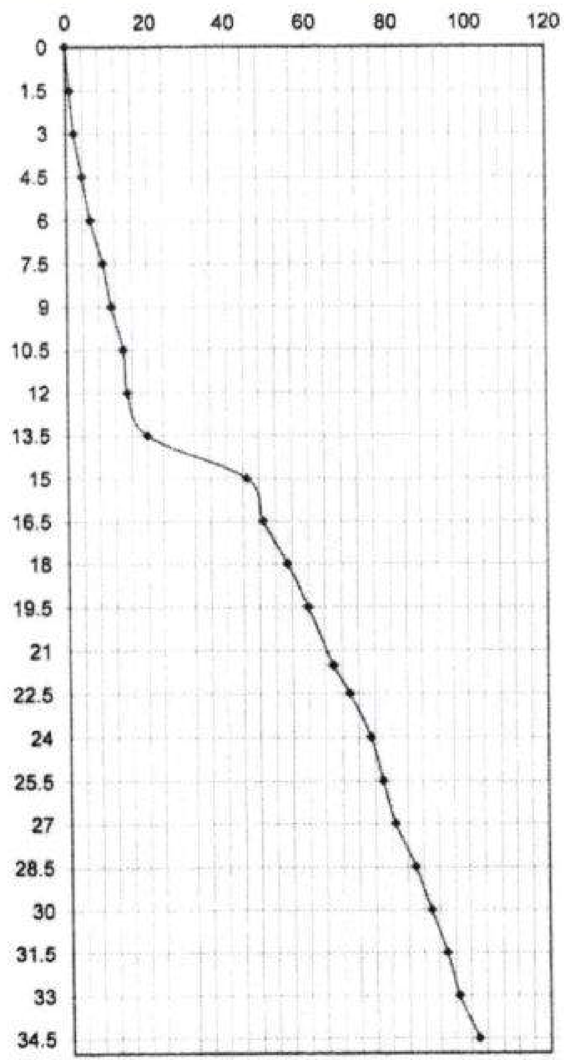
Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION.

BORE HOLE NO:10	DATE OF STARTING: 01-02-2024 DATE OF COMPLETION: 02-02-2024	GROUND WATER LEVEL 0.00M From EGL	AUGER & WASH BORING

DEPTH (M)	TYPE OF SAMPLE	SPT 15 CM	SPT 15 CM	SPT 15 CM	N-Value	VISUAL DESCRIPTION OF SOIL
1.5-1.95	P	1	0	1	1	Grayish CLAY with Silt
2	U					
2.5	P					
3.0-3.45	P	1	1	1	2	
3.5	D					
4.5-4.95	P	1	2	2	4	
5	U					
6.0-6.45	P	1	3	3	6	
6.5	D					
7.5-7.95	P	1	4	5	9	
8	U					
9.0-9.45	P	2	5	6	11	
9.5	D					
10.5-10.95	P	3	6	8	14	
11	U					
12.00-12.45	P	3	7	8	15	
12.5	D					
13.5-13.95	P	4	9	11	20	
14	U					14.00M
15.00-15.45	P	18	21	24	45	Grayish fine to medium SAND
15.5	D					
16.5-16.95	P	19	23	26	49	
17	D					
18.0-18.45	P	20	25	30	55	
18.5	D					
19.50-19.95	P	21	28	32	60	
20	D					
21.0-21.45	P	23	31	35	66	
21.5	D					
22.5-22.95	P	26	33	37	70	
23	D					
24.0-24.45	P	28	36	39	75	
24.5	D					
25.5-25.95	P	29	37	41	78	
26	D					
27.0-27.45	P	31	39	42	81	
27.5	D					
28.5-28.95	P	31	42	44	86	
29	D					
30.0-30.45	P	32	44	46	90	
30.5	D					
31.50-31.95	P	34	46	48	94	
32	D					
33.00-33.45	P	36	48	49	97	
33.5	D					
34.50-34.95	P	40	50	52	102	
35.5	D					35.50M

LOG

GRAPHICAL REPRESENTATION OF N-Value



U: UNDISTURBED SAMPLE:: D: DISTURBED SAMPLE:: P: STANDARD PENETRATION TEST::

EGL: EXISTING GROUND LEVEL R:REFUSAL;N>100::

PVT. LTD. GHY-35

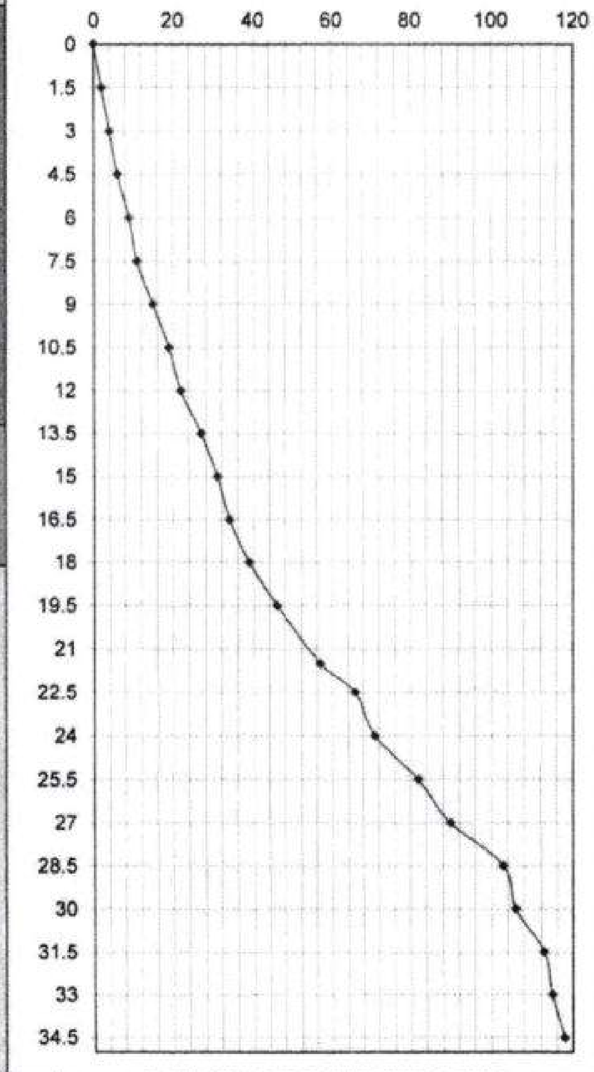
BORE LOG CHART

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION.

BORE HOLE NO:11	DATE OF STARTING:03-02-2024 DATE OF COMPLETION: 06-02-2024	GROUND WATER LEVEL 0.00M From EGL	AUGER & WASH BORING

DEPTH (M)	TYPE OF SAMPLE	SPT 15 CM	15 CM	15 CM	N-Value	VISUAL DESCRIPTION OF SOIL	LOG
1.5-1.95	P	1	1	1	2		
2	U						
2.5	P						
3.0-3.45	P	1	2	2	4		
3.5	D						
4.5-4.95	P	1	3	3	6	Organic CLAY	
5	U						
6.0-6.45	P	2	4	5	9		
6.5	D						
7.5-7.95	P	2	5	6	11		
8	U					8.50M	
9.0-9.45	P	3	7	8	15		
9.5	D						
10.5-10.95	P	5	8	11	19	Silty CLAY	
11	U						
12.00-12.45	P	6	9	13	22		
12.5	D						
13.5-13.95	P	8	11	16	27		
14	U					14.50M	
15.00-15.45	P	10	13	18	31		
15.5	D						
16.5-16.95	P	11	15	19	34	SANDY Clay	
17	D						
18.0-18.45	P	13	18	21	39		
18.5	D					18.50M	
19.50-19.95	P	14	21	25	46		
20	D						
21.0-21.45	P	16	28	29	57		
21.5	D						
22.5-22.95	P	17	31	35	66		
23	D						
24.0-24.45	P	21	32	39	71		
24.5	D						
25.5-25.95	P	25	38	44	82		
26	D						
27.0-27.45	P	31	42	48	90	Brownish medium SAND	
27.5	D						
28.5-28.95	P	35	51	52	103		
29	D						
30.0-30.45	P	40	52	54	106		
30.5	D						
31.50-31.95	P	45	55	58	113		
32	D						
33.00-33.45	P	48	56	59	115		
33.5	D						
34.50-34.95	P	50	57	61	118		
35.5	D					35.50M	

GRAPHICAL REPRESENTATION OF N-Value



U: UNDISTURBED SAMPLE:: D: DISTURBED SAMPLE:: P: STANDARD PENETRATION TEST::

EGL: EXISTING GROUND LEVEL R:REFUSAL:N>100::

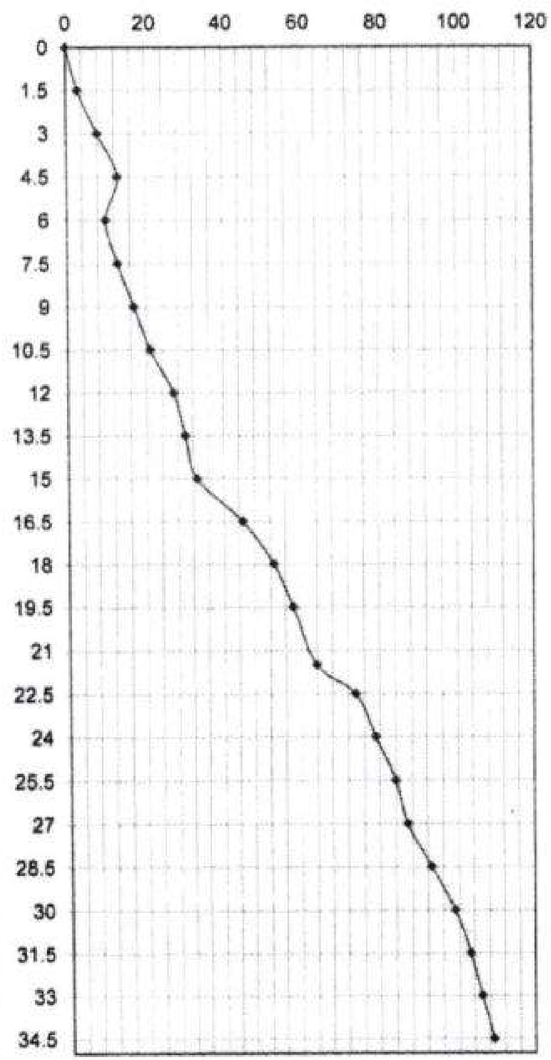
BORE LOG CHART

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION.

BORE HOLE NO: 12	DATE OF STARTING: 07-02-2024	GROUND WATER LEVEL	AUGER & WASH BORING
	DATE OF COMPLETION:08-02-2024	0.0M From EGL	

DEPTH (M)	TYPE OF SAMPLE	SPT 15 CM	SPT 15 CM	SPT 15 CM	N-Value	VISUAL DESCRIPTION OF SOIL	LOG
1.5-1.95	P	1	1	2	3	CLAY with Silt	
2	U						
2.5	P						
3.0-3.45	P	2	3	5	8		
3.5	D						
4.5-4.95	P	3	6	7	13		
5	U					5.50M	
6.0-6.45	P	3	4	6	10	Organic Clay	
6.5	D						
7.5-7.95	P	4	6	7	13		
8	U						
9.0-9.45	P	5	7	10	17		
9.5	D					9.50M	
10.5-10.95	P	6	9	12	21		
11	U						
12.00-12.45	P	7	11	16	27		
12.5	D						
13.5-13.95	P	9	13	17	30	CLAY with Silt	
14	U						
15.00-15.45	P	11	15	18	33		
15.5	D						
16.5-16.95	P	13	21	24	45		
17	U					17.50M	
18.0-18.45	P	15	25	28	53		
18.5	D						
19.50-19.95	P	16	27	31	58		
20	D						
21.0-21.45	P	18	31	33	64		
21.5	D						
22.5-22.95	P	21	35	39	74		
23	D						
24.0-24.45	P	23	38	41	79		
24.5	D						
25.5-25.95	P	25	41	43	84		
26	D					Brownish medium SAND	
27.0-27.45	P	28	42	45	87		
27.5	D						
28.5-28.95	P	31	45	48	93		
29	D						
30.0-30.45	P	34	48	51	99		
30.5	D						
31.50-31.95	P	35	51	52	103		
32	D						
33.00-33.45	P	37	52	54	106		
33.5	D						
34.50-34.95	P	39	53	56	109		
35.5	D					35.50M	

GRAPHICAL REPRESENTATION OF N-Value



U: UNDISTURBED SAMPLE:: D: DISTURBED SAMPLE:: P: STANDARD PENETRATION TEST::
EGL: EXISTING GROUND LEVEL R:REFUSAL:N>100::

BORE LOG CHART

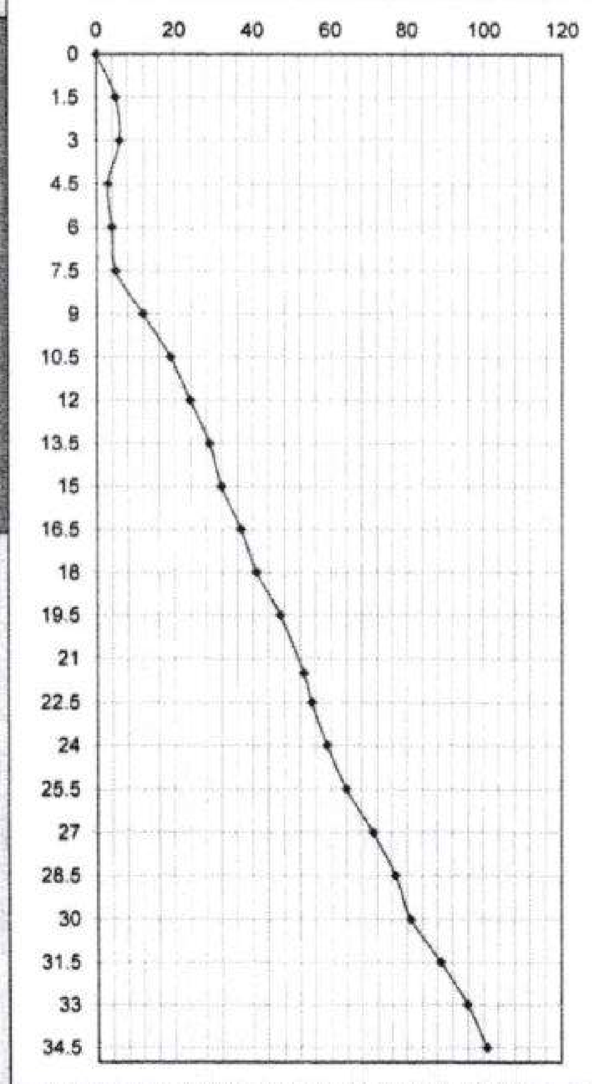
Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

BORE HOLE NO: 13	DATE OF STARTING:09-02-2024	GROUND WATER LEVEL	AUGER & WASH BORING
	DATE OF COMPLETION:10-02-2024	0.0M From EGL	

DEPTH (M)	TYPE OF SAMPLE	SPT 15 CM	SPT 15 CM	SPT 15 CM	N-Value	VISUAL DESCRIPTION OF SOIL
1.5-1.95	P	1	2	3	5	
2	U					Silty CLAY
2.5	P					
3.0-3.45	P	2	3	3	6	
3.5	D					3.50M
4.5-4.95	P	1	1	2	3	
5	U					
6.0-6.45	P	1	2	2	4	Organic CLAY
6.5	D					
7.5-7.95	P	1	2	3	5	
8	U					8.50M
9.0-9.45	P	3	5	7	12	
9.5	D					
10.5-10.95	P	4	8	11	19	
11	U					
12.00-12.45	P	6	11	13	24	
12.5	D					Silty CLAY
13.5-13.95	P	9	13	16	29	
14	U					
15.00-15.45	P	11	14	18	32	
15.5	D					
16.5-16.95	P	12	16	21	37	
17	U					17.50M
18.0-18.45	P	13	18	23	41	
18.5	D					
19.50-19.95	P	14	22	25	47	
20	D					
21.0-21.45	P	16	25	28	53	
21.5	D					
22.5-22.95	P	18	26	29	55	
23	D					
24.0-24.45	P	21	28	31	59	
24.5	D					
25.5-25.95	P	23	31	33	64	
26	D					Brownish medium SAND
27.0-27.45	P	25	34	37	71	
27.5	D					
28.5-28.95	P	28	36	41	77	
29	D					
30.0-30.45	P	29	38	43	81	
30.5	D					
31.50-31.95	P	31	42	47	89	
32	D					
33.00-33.45	P	34	45	51	96	
33.5	D					
34.50-34.95	P	38	49	52	101	
35.5	D					35.50M

RELIANT FOUNDATIONS PVT. LTD. * GHY-35 *

GRAPHICAL REPRESENTATION OF N-Value



U: UNDISTURBED SAMPLE:: D: DISTURBED SAMPLE:: P: STANDARD PENETRATION TEST::
EGL: EXISTING GROUND LEVEL R:REFUSAL:N>100::

BORE LOG CHART

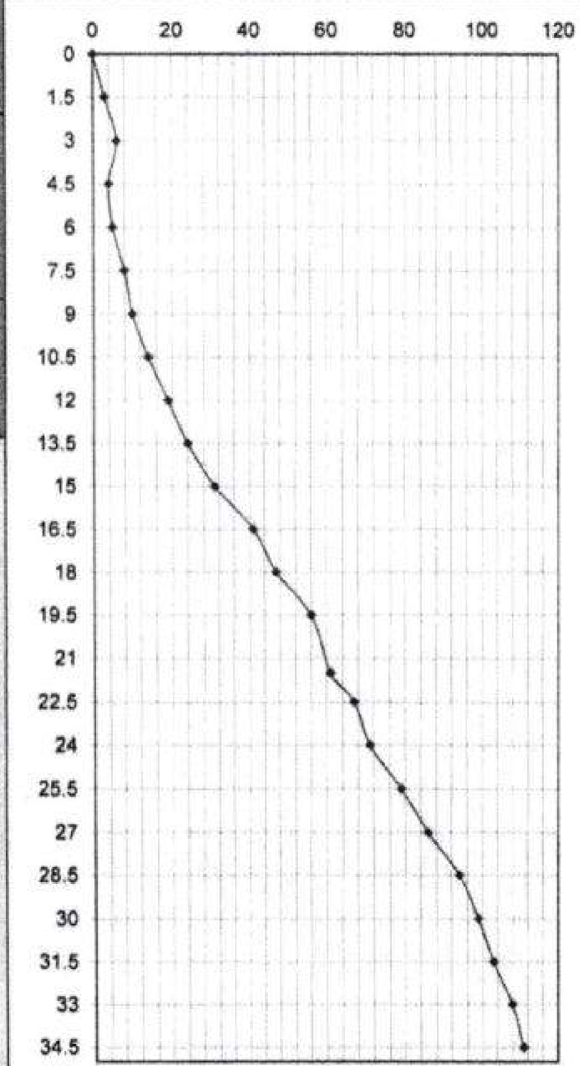
Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

BORE HOLE NO: 14	DATE OF STARTING: 10-02-2024	GROUND WATER LEVEL	AUGER & WASH BORING
	DATE OF COMPLETION:13-02-2024	0.0M From EGL	

DEPTH (M)	TYPE OF SAMPLE	SPT 15 CM	SPT 15 CM	SPT 15 CM	N-Value	VISUAL DESCRIPTION OF SOIL	LOG
1.5-1.95	P	1	1	2	3		
2	U						
2.5	P					Grayish CLAY with Silt	
3.0-3.45	P	2	3	3	6		
3.5	D					3.50M	
4.5-4.95	P	1	2	2	4		
5	U						
6.0-6.45	P	1	2	3	5		
6.5	D					Organic Clay	
7.5-7.95	P	2	3	5	8		
8	U						
9.0-9.45	P	3	4	6	10		
9.5	D					9.50M	
10.5-10.95	P	4	6	8	14		
11	U						
12.00-12.45	P	6	8	11	19	Grayish CLAY with Silt	
12.5	D						
13.5-13.95	P	8	11	13	24		
14	U					14.50M	
15.00-15.45	P	11	13	18	31		
15.5	D						
16.5-16.95	P	13	16	25	41		
17	D						
18.0-18.45	P	14	19	28	47		
18.5	D						
19.50-19.95	P	16	24	32	56		
20	D						
21.0-21.45	P	18	28	33	61		
21.5	D						
22.5-22.95	P	21	32	35	67		
23	D						
24.0-24.45	P	25	34	37	71		
24.5	D					Grayish medium SAND	
25.5-25.95	P	25	38	41	79		
26	D						
27.0-27.45	P	27	41	45	86		
27.5	D						
28.5-28.95	P	31	45	49	94		
29	D						
30.0-30.45	P	33	48	51	99		
30.5	D						
31.50-31.95	P	38	51	52	103		
32	D						
33.00-33.45	P	41	53	55	108		
33.5	D						
34.50-34.95	P	43	55	56	111		
35.5	D					35.50M	

RELIANT FOUNDATIONS PVT. LTD

GRAPHICAL REPRESENTATION OF N-Value



U: UNDISTURBED SAMPLE:: D: DISTURBED SAMPLE:: P: STANDARD PENETRATION TEST::

EGL: EXISTING GROUND LEVEL R:REFUSAL:N>100::

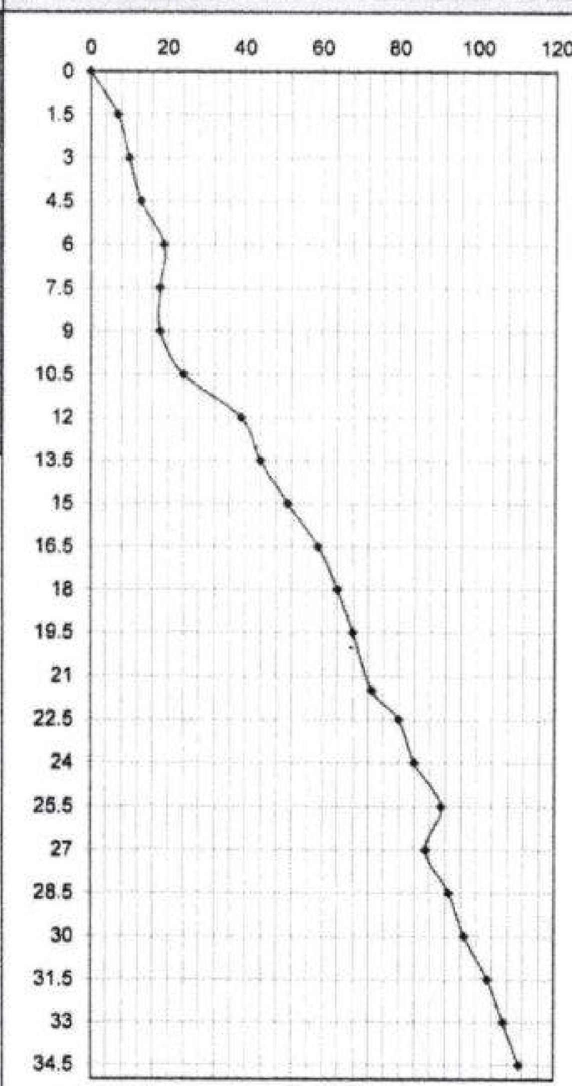
BORE LOG CHART

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION.

BORE HOLE NO: 15	DATE OF STARTING:16-02-2024	GROUND WATER LEVEL	AUGER & WASH BORING
	DATE OF COMPLETION:17-02-2024	0.0M From EGL	

DEPTH (M)	TYPE OF SAMPLE	SPT 15 CM	SPT 15 CM	SPT 15 CM	N-Value	VISUAL DESCRIPTION OF SOIL
1.5-1.95	P	2	3	4	7	
2	U					
2.5	P					
3.0-3.45	P	3	5	5	10	
3.5	D					
4.5-4.95	P	4	6	7	13	
5	U					
6.0-6.45	P	5	8	11	19	
6.5	D					
7.5-7.95	P	6	9	9	18	Grayish CLAY with Silt
8	U					
9.0-9.45	P	7	8	10	18	
9.5	D					
10.5-10.95	P	8	11	13	24	
11	U					
12.00-12.45	P	15	18	21	39	
12.5	D					
13.5-13.95	P	16	21	23	44	
14	U					14.50M
15.00-15.45	P	18	24	27	51	
15.5	D					
16.5-16.95	P	19	28	31	59	
17	D					
18.0-18.45	P	21	31	33	64	
18.5	D					
19.50-19.95	P	23	33	35	68	
20	D					
21.0-21.45	P	24	35	38	73	
21.5	D					
22.5-22.95	P	27	39	41	80	
23	D					
24.0-24.45	P	31	41	43	84	
24.5	D					Grayish medium SAND
25.5-25.95	P	33	44	47	91	
26	D					
27.0-27.45	P	35	38	49	87	
27.5	D					
28.5-28.95	P	36	41	52	93	
29	D					
30.0-30.45	P	38	44	53	97	
30.5	D					
31.50-31.95	P	41	49	54	103	
32	D					
33.00-33.45	P	42	51	56	107	
33.5	D					
34.50-34.95	P	44	53	58	111	
35.5	D					35.50M

GRAPHICAL REPRESENTATION OF N-Value



RELIANT FOUNDATIONS PVT. LTD. * GHY-35 *

U: UNDISTURBED SAMPLE:: D: DISTURBED SAMPLE:: P: STANDARD PENETRATION TEST::

EGL: EXISTING GROUND LEVEL R:REFUSAL:N>100::

BORE LOG CHART

Name of Project: GEO-TECHNICAL INVESTIGATION WORK FOR PROPOSED CONSTRUCTION OF ESTABLISHMENT OF CENTER OF EXCELLENCE IN HEALTHCARE R & D FACILITY OF ASSAM GOVERNMENT - IITG HEALTHCARE FOUNDATION .

BORE HOLE NO: 16

DATE OF STARTING: 14-02-2024

DATE OF COMPLETION:16-02-2024

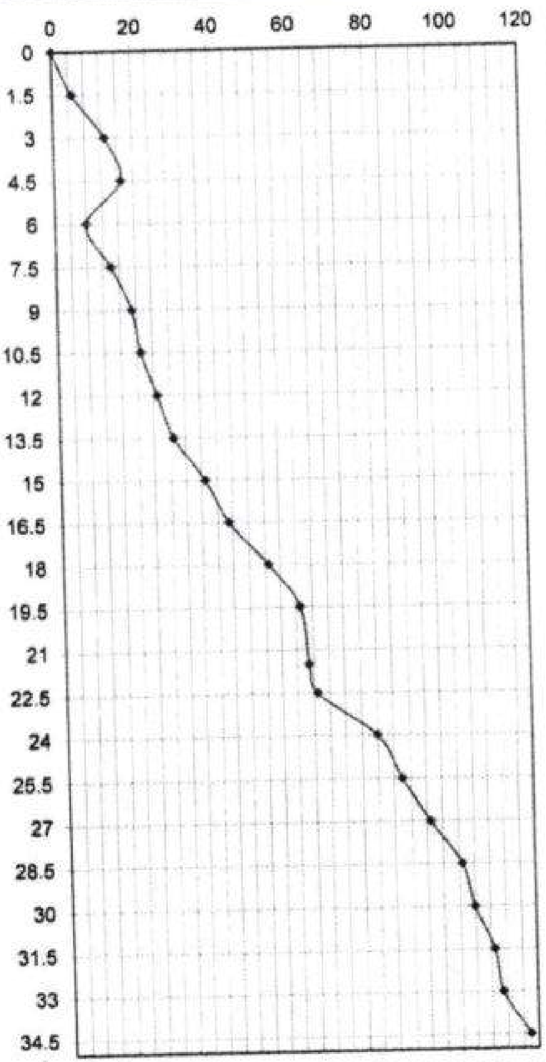
GROUND WATER LEVEL: 0.50M From EGL

AUGER & WASH BORING

DEPTH (M)	TYPE OF SAMPLE	SPT 15 CM	SPT 15 CM	SPT 15 CM	N-Value	VISUAL DESCRIPTION OF SOIL
1.5-1.95	P	1	2	3	5	Reddish,Brown CLAY with Silt (up to 14.50M)
2	U					
2.5	P					
3.0-3.45	P	4	6	7	13	
3.5	D					
4.5-4.95	P	5	8	9	17	
5	U					
6.0-6.45	P	3	4	4	8	
6.5	D					
7.5-7.95	P	4	6	8	14	
8	U					
9.0-9.45	P	5	8	11	19	
9.5	D					
10.5-10.95	P	6	9	12	21	
11	U					
12.00-12.45	P	7	11	14	25	
12.5	D					
13.5-13.95	P	8	13	16	29	
14	U					14.50M
15.00-15.45	P	10	16	21	37	
15.5	D					
16.5-16.95	P	12	19	24	43	
17	D					
18.0-18.45	P	14	24	29	53	
18.5	D					
19.50-19.95	P	16	29	32	61	
20	D					
21.0-21.45	P	17	30	33	63	
21.5	D					
22.5-22.95	P	18	31	34	65	
23	D					
24.0-24.45	P	21	38	42	80	
24.5	D					
25.5-25.95	P	38	41	45	86	
26	D					
27.0-27.45	P	31	45	48	93	
27.5	D					
28.5-28.95	P	33	49	52	101	
29	D					
30.0-30.45	P	38	51	53	104	
30.5	D					
31.50-31.95	P	41	53	56	109	
32	D					
33.00-33.45	P	45	56	55	111	
33.5	D					
34.50-34.95	P	50	57	61	118	
35.5	D					35.50M

LOG

GRAPHICAL REPRESENTATION OF N-Value



RELIANCE FOUNDATIONS PVT. LTD. * GHY-35 *

U: UNDISTURBED SAMPLE:: D: DISTURBED SAMPLE:: P: STANDARD PENETRATION TEST:: R:REFUSAL,N>100::

EGL: EXISTING GROUND LEVEL

:ANNEX-III:

CALCULATION OF SAFE BEARING CAPACITY AND SETTLEMENT ANALYSIS

:FOR BORHOLE :

2,3,6,7,8

FOR BORE HOLE 2,3,6,7,8

Caculation of Net safe bearing capacity (Shear Criteria)

Depth of foundn , Df = 2 m

Width(B)M=	2	Length L =	2

Soil parameter

Cohesion, C= **0.39** kg/scm= 3.9 t/sqm

Saturated density , γ (Metric ton/m3) = **1.80**

Submerged density , γ (Metric ton/m3) = **1.80**

Angle of internal friction, $\varnothing_{(deg)}$= . , shear condition Local

Angle of shearing resistance for local failure = $\varnothing_m = \tan^{-1} 2/3 \tan\varnothing$

		Bearing capacity factor		
Ø	11	Nc	Nq	Nγ
Ø m	7	7.23	1.93	0.75

Shape, Depth and inclination factor

Shape factor		Depth factor		Inclination factor		Water table corection factor
Sc=	1.3	dc=	1.23	ic=	1	
Sq=	1.2	dq=	1	iq=	1	W' = 0.5
Sγ =	0.8	dγ =	1	iγ =	1	

Ultimate bearing capacity (qd) (Local shear Condition)

q_d= {2/3 c Nc sc dc ic } + {γ D (Nq – 1)sq dq iq } + {0.5 γ B Nγ sγ dγ iγ W' }

q_d = {0.67x 3.9 x 7.23 x 1.3 x 1.23 x 1 }
.+{ 1.8 x 2 x (1.93 .- 1) x 1.2 x 1 x 1 }
.+{ 0.5 x 1.8 x 2 x 0.75 x 0.8 x 1 x 1 x 0.5 }

q_d = 30.11 .+ 4.0176 .+ 0.54 .= 34.66 Metric tonne/sqm

Net Safe bearing capacity , q_{ns} .= q_d/F = 34.66 Metric tonne/sqm / 3

F= factor of safety = 3.0

q_{ns} =	11.55 Metric tonne/sqm
q_{ns} =	113.2 KN/sqm

FOUNDATIONS PVT. LTD.

Settlement Analysis as per IS 8003-1976

Total settlement , St = Si+Sc

St= Total settlement , Si= Immediate (elastic) settlement , Sc = Primary consolidation settlement

$Si = pB(1-\mu^2) I/Es$ $\qquad$ Sc = Soed = (Ht/ 1+eo) Cc log10 (po + Δp)/ po

p = Load intensity , B = Width of foundation , μ = Poissons ratio

I = Influence factor , Es = Modulus of elasticity of soil

Ht = Thickness of soil layer , eo = Initial void ratio at mid height of of layer

Cc = Compression Index , Po = Initial effective pressure at mid height of layer

Δp = Average pressure increment due to foundation loading

1. Settlement of clay strata

A. Calculation of Immediate settlement (Si)

Depth of foundation Df (M) =	2
LENGTH (L) in m =	2
BREATH (B) in m =	2
L/B=	1
INFLUNCE FACTOR (If)=	1.12
Load intensity (t/m^2)=	14.72

E (t/m^2)=	2100
μ=	0.5

Settlement (m), Si =	0.011774764
Settlement (mm), Si =	11.77476355

B.Calculation of Primary consolidation settlement= Sc

Cc=	0.11
eo=	0.54
H (m)=	4
field density (t/m^3)=	1.9
P=	7.6
ΔP = (at H/2 m depth)	3.679613611
Settlement Sc (m)=	0.04899
Settlement Sc (mm)=	48.994

Total settlement Sc = A+B = 60.769

L/B=	1.00		
D/√(LB)=	1.00	√(LB) / D=	1.00

Correction factors

i	Depth correction factor from Fig 12 of IS -8009 Pt1. C.F=	0.65
ii	Rigidity factor (for raft foundation) cl 9.5.2	
iii	λ= (Pore pressure correction factor, Cl9.2.3 of IS 8009, Pt1)	0.8

Total Corrected settlement , Sc = 39.49999914 mm <40MM Safe

RELIANT FOUNDATIONS PVT. LTD. CITY-35

Settlement Analysis as per IS 8003-1976

Total settlement , St = Si+Sc

St= Total settlement , Si= Immediate (elastic) settlement , Sc = Primary consolidation settlement

$Si = pB(1-\mu^2)I/Es$ $\quad$ Sc = Soed = (Ht/ 1+eo) Cc log10 (po + Δp)/ po

p = Load intensity , B = Width of foundation , μ = Poissons ratio

I = Influence factor , Es = Modulus of elasticity of soil

Ht = Thickness of soil layer , eo = Initial void ratio at mid height of of layer

Cc = Compression Index , Po = Initial effective pressure at mid height of layer

Δp = Average pressure increment due to foundation loading

1. Settlement of clay strata

A. Calculation of Immediate settlement (Si)

Depth of foundation Df (M) =	2.5
LENGTH (L) in m =	2
BREATH (B) in m =	2
L/B=	1
INFLUNCE FACTOR (If)=	1.12
Load intensity (t/m^2)=	16.11

E (t/m^2)=	2100
μ=	0.5

Settlement (m), Si =	0.012884927
Settlement (mm), Si =	12.88492736

B.Calculation of Primary consolidation settlement= Sc

Cc=	0.11
eo=	0.54
H (m)=	4
field density (t/m^3)=	1.9
P=	8.55
ΔP = (at H/2 m depth)	4.026539799
Settlement Sc (m)=	0.04788
Settlement Sc (mm)=	47.884

Total settlement Sc = A+B = 60.769

Correction factors

i	Depth correction factor from Fig 12 of IS -8009 Pt1. C.F=	0.65
ii	Rigidity factor (for raft foundation) cl 9.5.2	
iii	λ= (Pore pressure correction factor, Cl9.2.3 of IS 8009, Pt1)	0.8

L/B=	1.00		
D/√(L.B)=	1.25	√(L.B) / D=	0.80

Total Corrected settlement , Sc = 39.49999867 mm <40MM Safe

RELIANT FOUNDATIONS PVT. LTD. GHY-35

Settlement Analysis as per IS 8003-1976

Total settlement , St = Si+Sc

St= Total settlement , Si= Immediate (elastic) settlement , Sc = Primary consolidation settlement

$Si = pB(1-\mu^2)I/Es$ Sc = Soed = (Ht/ 1+eo) Cc log10 (po + Δp)/ po

p = Load intensity , B = Width of foundation , μ = Poissons ratio

I = Influence factor , Es = Modulus of elasticity of soil

Ht = Thickness of soil layer , eo = Initial void ratio at mid height of of layer

Cc = Compression Index , Po = Initial effective pressure at mid height of layer

Δp = Average pressure increment due to foundation loading

1. Settlement of clay strata

A. Calculation of Immediate settlement (Si)

Depth of foundation Df (M) =	3
LENGTH (L) in m =	2
BREATH (B) in m =	2
L/B=	1
INFLUNCE FACTOR (Ir)=	1.12
Load intensity (t/m^2)=	17.42

E (t/m^2)=	2100
μ=	0.5

Settlement (m), Si =	0.013938507
Settlement (mm), Si =	13.93850696

B.Calculation of Primary consolidation settlement= Sc

Cc=	0.11
eo=	0.54
H (m)=	4
field density (t/m^3)=	1.9
P=	9.5
ΔP = (at H/2 m depth)	4.355783424
Settlement Sc (m)=	0.04683
Settlement Sc (mm)=	46.831

Total settlement Sc = A+B = 60.769

	Correction factors	
i	Depth correction factor from Fig 12 of IS -8009 Pt1. C.F=	0.65
ii	Rigidity factor (for raft foundation) cl 9.5.2	
iii	λ= (Pore pressure correction factor, Cl9.2.3 of IS 8009, Pt1)	0.8

L/B=	1.00		
D/√(LB)=	1.50	√(LB) / D=	0.67

Total Corrected settlement , Sc = 39.49999029 mm <40MM Safe

RELIANT FOUNDATIONS PVT. LTD.

:FOR BORHOLE :

1,4,5,9,10,11,

12,13,14,15,16

FOR BOREHOLE-1,4,5,9,10,11,12,13,14,15,16

Caculation of Net safe bearing capacity (Shear Criteria)

Depth of foundn , Df = **2** m

Width(B)M=	2	Length L =	2

Soil parameter

Cohesion, C= **0.34** kg/scm= 3.4 t/sqm

Saturated density , γ (Metric ton/m3) = **1.80**

Submerged density , γ (Metric ton/m3) = **1.80**

Angle of internal friction, $Ø_{(deg)}$= . , shear condition Local

Angle of shearing resistance for local failure = $Ø_m = \tan^{-1} 2/3 \tan Ø$

		Bearing capacity factor		
Ø	11	Nc	Nq	Nγ
Ø m	7	7.23	1.93	0.75

Shape, Depth and inclination factor

Shape factor		Depth factor		Inclination factor		Water table corection factor
Sc=	1.3	dc=	1.23	ic=	1	
Sq=	1.2	dq=	1	iq=	1	W' = 0.5
Sγ =	0.8	dγ =	1	iγ =	1	

Ultimate bearing capacity (qd) (Local shear Condition)

q_d= {2/3 c Nc sc dc ic } + {γ D (Nq – 1)sq dq iq } + {0.5 γ B Nγ sγ dγ iγ W' }

q_d = {0.67x 3.4 x 7.23 x 1.3 x 1.23 x 1 }

.+{ 1.8 x 2 x (1.93 .- 1) x 1.2 x 1 x 1 }

.+{ 0.5 x 1.8 x 2 x 0.75 x 0.8 x 1 x 1 x 0.5 }

q_d = 26.25 .+ 4.0176 .+ 0.54 .= 30.8 Metric tonne/sqm

Net Safe bearing capacity , q_{ns} .= q_d/F = 30.80 Metric tonne/sqm / 3

F= factor of safety = 3.0

q_{ns} =	10.27 Metric tonne/sqm
q_{ns} =	100.6 KN/sqm

RELIANT FOUNDATIONS PVT. LTD.

Settlement Analysis as per IS 8003-1976

Total settlement , St = Si+Sc

St= Total settlement , Si= Immediate (elastic) settlement , Sc = Primary consolidation settlement

$Si = pB(1-\mu^2) I/Es$ $\qquad$ $Sc = Soed = (Ht/ 1+eo)\ Cc\ \log_{10} (po + \Delta p)/ po$

p = Load intensity , B = Width of foundation , μ = Poissons ratio

I = Influence factor , Es = Modulus of elasticity of soil

Ht = Thickness of soil layer , eo = Initial void ratio at mid height of of layer

Cc = Compression Index , Po = Initial effective pressure at mid height of layer

Δp = Average pressure increment due to foundation loading

1. Settlement of clay strata

A. Calculation of Immediate settlement (Si)

Depth of foundation Df (M) =	2
LENGTH (L) in m =	2
BREATH (B) in m =	2
L/B=	1
INFLUNCE FACTOR (Ir)=	1.12
Load intensity (t/m^2)=	10.31

E (t/m^2)=	1800
μ=	0.5

Settlement (m), Si =	0.009618804
Settlement (mm), Si =	9.618803723

B.Calculation of Primary consolidation settlement= Sc

Cc=	0.18
eo=	0.87
H (m)=	4
field density (t/m^3)=	1.8
P=	7.2
ΔP = (at H/2 m depth)	2.576465283
Settlement Sc (m)=	0.05115
Settlement Sc (mm)=	51.151

Total settlement Sc = A+B = 60.769

Correction factors

i	Depth correction factor from Fig 12 of IS -8009 Pt1. C.F=	0.65
ii	Rigidity factor (for raft foundation) cl 9.5.2	
iii	λ= (Pore pressure correction factor, Cl9.2.3 of IS 8009, Pt1)	0.8

L/B=	1.00		
D/√(LB)=	1.00	√(LB) / D=	1.00

Total Corrected settlement , Sc = 39.50008513 mm <40MM Safe

RELIANT FOUNDATIONS PVT. LTD.

Settlement Analysis as per IS 8003-1976

Total settlement , St = Si+Sc

St= Total settlement , Si= Immediate (elastic) settlement , Sc = Primary consolidation settlement

$Si = pB(1-\mu^2) I / Es$

Sc = Soed = (Ht/ 1+eo) Cc log10 (po + Δp)/ po

p = Load intensity , B = Width of foundation , μ = Poissons ratio

I = Influence factor , Es = Modulus of elasticity of soil

Ht = Thickness of soil layer , eo = Initial void ratio at mid height of of layer

Cc = Compression Index , Po = Initial effective pressure at mid height of layer

Δp = Average pressure increment due to foundation loading

1. Settlement of clay strata

A. Calculation of Immediate settlement (Si)

Depth of foundation Df (M) =	2.5
LENGTH (L) in m =	2
BREATH (B) in m =	2
L/B=	1
INFLUNCE FACTOR (Ir)=	1.12
Load intensity (t/m^2)=	11.34

E (t/m^2)=	1800
μ=	0.5

Settlement (m), Si =	0.010584664
Settlement (mm), Si =	10.58466391

B.Calculation of Primary consolidation settlement= Sc

Cc=	0.18
eo=	0.87
H (m)=	4
field density (t/m^3)=	1.8
P=	8.1
ΔP = (at H/2 m depth)	2.835177832
Settlement Sc (m)=	0.05018
Settlement Sc (mm)=	50.185

Total settlement Sc = A+B = 60.769

Correction factors

i	Depth correction factor from Fig 12 of IS -8009 Pt1. C.F=	0.65
ii	Rigidity factor (for raft foundation) cl 9.5.2	
iii	λ= (Pore pressure correction factor, Cl9.2.3 of IS 8009, Pt1)	0.8

L/B=	1.00		
D/√(LB)=	1.25	√(LB) / D=	0.80

Total Corrected settlement , Sc = 39.50008984 mm <40MM Safe

RELIANT FOUNDATIONS PVT. LTD.

Settlement Analysis as per IS 8003-1976

Total settlement , St = Si+Sc

St= Total settlement , Si= Immediate (elastic) settlement , Sc = Primary consolidation settlement

$Si = pB(1-\mu^2) I / Es$ $\quad$ $Sc = Soed = (Ht/ 1+eo)\, Cc \log_{10} (po + \Delta p)/ po$

p = Load intensity , B = Width of foundation , μ = Poissons ratio

I = Influence factor , Es = Modulus of elasticity of soil

Ht = Thickness of soil layer , eo = Initial void ratio at mid height of of layer

Cc = Compression Index , Po = Initial effective pressure at mid height of layer

Δp = Average pressure increment due to foundation loading

1. Settlement of clay strata

A. Calculation of Immediate settlement (Si)

Depth of foundation Df (M) =	3
LENGTH (L) in m =	2
BREATH (B) in m =	2
L/B=	1
INFLUNCE FACTOR (If)=	1.12
Load intensity (t/m^2)=	12.33

E (t/m^2)=	1800
μ=	0.5

Settlement (m), Si =	0.011510313
Settlement (mm), Si =	11.51031323

B.Calculation of Primary consolidation settlement= Sc

Cc=	0.18
eo=	0.87
H (m)=	4
field density (t/m^3)=	1.8
P=	9
ΔP = (at H/2 m depth)	3.083119615
Settlement Sc (m)=	0.04926
Settlement Sc (mm)=	49.259

Total settlement Sc = A+B = 60.769

Correction factors

i	Depth correction factor from Fig 12 of IS -8009 Pt1. C.F=	0.65
ii	Rigidity factor (for raft foundation) cl 9.5.2	
iii	λ= (Pore pressure correction factor, Cl9.2.3 of IS 8009, Pt1)	0.8

L/B=	1.00		
D/√(LB)=	1.50	√(LB) / D=	0.67

Total Corrected settlement , Sc = 39.50005256 mm <40MM Safe

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:ANNEX-IV:

CALCULATION OF PILE

AND

LATERAL CAPACITY

RELIANT FOUNDATIONS PVT. LTD.

:FOR BORHOLE :

2,3,6,7,8

RELIANT FOUNDATIONS PVT. LTD.

CALCULATION OF PILE CAPACITY

Pile Length .(M)	12.000	If Liquified strata than liquified level	No
Pile cutoff Length (m)	2.000	Pile Terminating level	
Angle of Internal Friction at Pile Tip (Degree)	ø	0	
Cohesion at Pile tip (t/m2)	c	16.30	

Bearing Capacity Factor		
Nc	Nq	Ny
9	0.00	0.00

Ultimate pile capacity , Qu = QP + Qs = { Ap Nc Cp + Ap (1/2 D γ Nγ + PD Nq} +{ Sum (K PDi tan d Asi) + alpha x Ca As }

Qp = End bearing resistnce , Qs = Frictional resistsnce

1 Pile dia (m) = 0.45

Depth from	Depth to	Length below cutoff (m)	Thickness of sand layer	Li	Cav, T/m2	alpha	Pile dia D, m	Circumferential area As, m2	K	phi	Y (metric ton/m3)	Ysub (metric ton/m3)	po' ton/m2	Qs, Tonne	Qp, Tonne	Qu, Tonne	Qsafe in copression , Metric Tonne	Q safe Uplift, Metric Tonne
0.00	2.00			2.00			Ignored											
2.00	12.00			10.00	5.10	0.42	0.45	14.14						30.28				
		10.00					0.45							30.28	23.33	53.61	21.45	11.04

2 Pile dia (m) = 0.50

0.00	2.00			2.00			Ignored											
2.00	12.00			10.00	5.10	0.42	0.50	15.71						33.65				
		10.00					0.50							33.65	28.80	62.45	24.98	12.56

3 Pile dia (m) = 0.60

0.00	2.00			2.00			Ignored											
2.00	12.00			10.00	5.10	0.42	0.60	18.85						40.38				
		10.00					0.60							40.38	41.48	81.85	32.74	15.77

CALCULATION OF PILE CAPACITY

Pile Length .(M)	18.000	If Liquified strata than liquified level	No
Pile cutoff Length (m)	2.000	Pile Terminating level	
Angle of Internal Friction at Pile Tip (Degree)	Ø	0	
Cohesion at Pile tip (t/m2)	c	16.30	

Bearing Capacity Factor		
Nc	Nq	Ny
9	0.00	0.00

Ultimate pile capacity , Qu = QP + Qs = { Ap Nc Cp + Ap (1/2 D γ Nγ + P_D Nq} +{ Sum (K P_{Di} tan d Asi) + alpha x Ca As }

Qp = End bearing resistnce , Qs = Frictional resistsnce

1 Pile dia (m) = 0.45

Depth from	Depth to	Length below cutoff (m)	Thickness of sand layer	Li	Cav, T/m2	alpha	Pile dia D, m	Circumferential area As, m2	K	phi	Y (metric ton/m3)	Ysub (metric ton/m3)	po' ton/m2	Qs, Tonne	Qp, Tonne	Qu, Tonne	Qsafe in copression , Metric Tonne	Q safe Uplift, Metric Tonne
0.00	2.00			2.00				Ignored										
2.00	18.00			16.00	5.10	0.42	0.45	22.62						48.45				
		16.00					0.45							48.45	23.33	71.78	28.71	17.66

2 Pile dia (m) = 0.50

Depth from	Depth to	Length below cutoff (m)	Thickness of sand layer	Li	Cav, T/m2	alpha	Pile dia D, m	Circumferential area As, m2	K	phi	Y (metric ton/m3)	Ysub (metric ton/m3)	po' ton/m2	Qs, Tonne	Qp, Tonne	Qu, Tonne	Qsafe in copression , Metric Tonne	Q safe Uplift, Metric Tonne
0.00	2.00			2.00				Ignored										
2.00	18.00			16.00	5.10	0.42	0.50	25.13						53.83				
		16.00					0.50							53.83	28.80	82.64	33.06	20.09

3 Pile dia (m) = 0.60

Depth from	Depth to	Length below cutoff (m)	Thickness of sand layer	Li	Cav, T/m2	alpha	Pile dia D, m	Circumferential area As, m2	K	phi	Y (metric ton/m3)	Ysub (metric ton/m3)	po' ton/m2	Qs, Tonne	Qp, Tonne	Qu, Tonne	Qsafe in copression , Metric Tonne	Q safe Uplift, Metric Tonne
0.00	2.00			2.00				Ignored										
2.00	18.00			16.00	5.10	0.42	0.60	30.16						64.60				
		16.00					0.60							64.60	41.48	106.08	42.43	25.24

RELIANT FOUNDATIONS PVT. LTD.

:FOR BORHOLE :

1,4,5,9,10,11,

12,13,14,15,16

RELIANT FOUNDATIONS PVT. LTD.

CALCULATION OF PILE CAPACITY

Pile Length .(M)	12.000	If Liquified strata than liquified level	No
Pile cutoff Length (m)	2.000	Pile Terminating level	
Angle of Internal Friction at Pile Tip (Degree)	Ø	0	
Cohesion at Pile tip (t/m2)	c	14.00	

Bearing Capacity Factor		
Nc	Nq	Nγ
9	0.00	0.00

Ultimate pile capacity , Qu = QP + Qs = { Ap Nc Cp + Ap (1/2 D γ Nγ + PD Nq} +{ Sum (K PDi tan d Asi) + alpha x Ca As }

Qp = End bearing resistnce , Qs = Frictional resistsnce

1 Pile dia (m) = 0.45

Depth from	Depth to	Length below cutoff (m)	Thickness of sand layer	Li	Cav, T/m2	alpha	Pile dia D, m	Circumferential area As, m2	K	phi	Y (metric ton/m3)	Ysub (metric ton/m3)	po' ton/m2	Qs, Tonne	Qp, Tonne	Qu, Tonne	Qsafe in copression , Metric Tonne	Q safe Uplift, Metric Tonne
0.00	4.00			4.00			Ignored											
4.00	12.00			8.00	5.60	0.42	0.45	11.31						26.60				
		10.00					0.45							26.60	20.04	46.64	18.66	9.98

2 Pile dia (m) = 0.50

0.00	4.00			4.00			Ignored											
4.00	12.00			8.00	5.60	0.42	0.50	12.57						29.56				
		10.00					0.50							29.56	24.74	54.30	21.72	11.39

3 Pile dia (m) = 0.60

0.00	4.00			4.00			Ignored											
4.00	12.00			8.00	5.60	0.42	0.60	15.08						35.47				
		10.00					0.60							35.47	35.63	71.09	28.44	14.37

CALCULATION OF PILE LOAD CAPACITY

Pile Length .(M)	18.000	If Liquified strata than liquified level	No
Pile cutoff Length (m)	2.000	Pile Terminating level	
Angle of Internal Friction at Pile Tip (Degree)	Ø	35	
Cohesion at Pile tip (t/m2)	c	0	

Bearing Capacity Factor			
Nc	Nq	Ny	Ø
9	40.00	48.03	35

Ultimate pile capacity , Qu = QP + Qs = { Ap Nc Cp + Ap (1/2 D γ Nγ + PD Nq} +{ Sum (K PDi tan d Asi) + alpha x Ca As }

Qp = End bearing resistnce , Qs = Frictional resistsnce

1 Pile dia (m) = 0.45

Depth from	Depth to	Length below cutoff (m)	Thickness of sand layer	Li	C, T/m2	alpha	Pile dia D, m	Circumferential area As, m2	K	phi	Y (metric ton/m3)	Ysub (metric ton/m3)	po' ton/m2	Qs, Tonne	Qp, Tonne	Qu, Tonne	Qsafe in copression , Metric Tonne	Q safe Uplift, Metric Tonne
0.00	4.00			4.00	Ignored						0.0							
4.00	14.00			10.00	5.60	0.42	0.45	14.14		0	1.84	0.84	8.40	33.25				
14.00	18.00		4.00	4.00			0.45	5.65	1.20	35	1.86	0.86	10.12	48.09				
15D =	6.75	16.00		6.75			0.45			0	1.88	0.88	14.34	81.34	92.74	174.08	69.63	27.05

2 Pile dia (m) = 0.50

0.00	4.00			4.00	Ignored						0.0							
4.00	14.00			10.00	5.60	0.42	0.50	15.71		0	1.84	0.84	8.40	36.95				
14.00	18.00		4.00	4.00			0.50	6.28	1.20	35	1.86	0.86	10.12	53.43				
15D =	7.50	16.00		7.50			0.50			0	1.88	0.88	15.00	90.37	119.88	210.26	84.10	30.53

3 Pile dia (m) = 0.60

0.00	4.00			4.00	Ignored						0.0							
4.00	14.00			10.00	5.60	0.42	0.60	18.85		0	1.84	0.84	8.40	44.33				
14.00	18.00		4.00	4.00			0.60	7.54	1.20	35	1.86	0.86	10.12	64.11				
15D =	9.00	16.00		9.00			0.60			0	1.88	0.88	16.32	108.45	188.16	296.61	118.64	37.77

RELIANT FOUNDATIONS PVT. LTD. * GHY-35 *

Ref : Appendix-C (cl 6.5.2) of IS 2911 (Part I/Sec. 2) – 2010

Stiffness factor $R = \sqrt[4]{\dfrac{EI}{KB}}$ for clay soil

$T = \sqrt[5]{\dfrac{EI}{\eta h}}$ for sandy soil

E = Modulus of Elasticity of pile material= $5000\sqrt{f_{ck}}$

$E = 25\times10^6\ KN/m^2$ for concrete for $f_{ck} = 35 N/mm^2$

I = Moment of Inertia = $\pi D^4/64$

B= D = diameter of pile

Deflection of pile

$$y = \frac{H(e+Zf)\times1000}{12\ EI}$$

H= lateral load in KN

y = deflection of pile head in mm

e = cantilever length above ground/ bed

E= Modulus of elasticity in KN/m^2

I = Moment of Inertia in m^4

Z_f = Depth of point of fixity in m

Calculation Details (Clay)

	fck=	35 N/mm2		
	E=	29580398.92 KN/m2		
1 Pile dia	B=D(m)	0.45		
2 Pile Length	L(m)	14.00		
3 Pile Length (soft soil)	L1(m)	0.00		
5 k1= Modulus of subgrade reaction		17500.00 KN/m3	for Cohesive soil (medium stiff)	
6 K = k1x0.3/(1.5 xB)		7777.78		
7 I= Moment of inertia		0.00 m4		
8 E = Modulus of elasticity		29580399 KN/m2		
9 R		2.03		
10 L1/R		0.00		
11 2R		4.06	L=12 > 2R	
12 3.5R				
13 Lf/R		2.00		
14 Lf		4.06		
15 e (m)	eccentricity	0.00		
16	(Length of fixity)	6.68		
17 y=(Permissible deflection mm)		4.50		
18 H = lateral load capacity		**47.97 KN =**	**4.80**	**Ton**

Ref : Appendix-C (cl 6.5.2) of IS 2911 (Part 1/Sec. 2) – 2010

Stiffness factor $R = \sqrt[4]{\frac{EI}{KB}}$ for clay soil

$T = \sqrt[5]{\frac{EI}{\eta h}}$ for sandy soil

E = Modulus of Elasticity of pile material= $5000\sqrt{f_{ck}}$

$E = 25x10^6$ KN/m^2 for concrete for $f_{ck} = 35$ N/mm^2

I = Moment of Inertia = $\pi D^4/64$

B= D = diameter of pile

Deflection of pile

$$y = \frac{H(e+Zf)x1000}{12\ EI}$$

H= lateral load in KN

y = deflection of pile head in mm

e = cantilever length above ground/ bed

E= Modulus of elasticity in KN/m^2

I = Moment of Inertia in m^4

Z_f = Depth of point of fixity in m

Calculation Details (Clay)

fck= 35 N/mm2

E= 29580398.92 KN/m2

1 Pile dia	B=D(m)	0.50		
2 Pile Length	L(m)	12.00		
3 Pile Length (soft soil)	L1(m)	0.00		
5 k1= Modulus of subgrade reaction		17500.00 KN/m3	for Cohesive soil (medium stiff)	
6 K = k1x0.3/(1.5 xB)		7000.00		
7 I= Moment of inertia		0.00 m4		
8 E = Modulus of elasticity		29580399 KN/m2		
9 R		2.26		
10 L1/R		0.00		
11 2R		4.51	L=12 > 2R	
12 3.5R				
13 Lf/R		2.00		
14 Lf		4.51		
15 e (m)	eccentricity	0.00		
16	(Length of fixity)	6.68		
17 y=(Permissible deflection mm)		5.00		
18 H = lateral load capacity		**59.23 KN =**	**5.92**	**Ton**

Ref : Appendix-C (cl 6.5.2) of IS 2911 (Part 1/Sec. 2) – 2010

Stiffness factor $R = \sqrt[4]{\dfrac{EI}{KB}}$ for clay soil

$T = \sqrt[5]{\dfrac{EI}{\eta h}}$ for sandy soil

E = Modulus of Elasticity of pile material= $5000\sqrt{f_{ck}}$

$E = 25\text{x}10^6$ KN/m^2 for concrete for $f_{ck} = 35N/mm^2$

I = Moment of Inertia = $\pi D^4/64$

B= D = diameter of pile

Deflection of pile

$$y = \frac{H(e+Zf)\text{x}1000}{12\ EI}$$

H= lateral load in KN

y = deflection of pile head in mm

e = cantilever length above ground/ bed

E= Modulus of elasticity in KN/m^2

I = Moment of Inertia in m^4

Z_f = Depth of point of fixity in m

Calculation Details (Clay)

fck= 35 N/mm2

E= 29580398.92 KN/m2

1 Pile dia	B=D(m)	0.60	
2 Pile Length	L(m)	12.00	
3 Pile Length (soft soil)	L1(m)	0.00	
5 k1= Modulus of subgrade reaction		17500.00 KN/m3	for Cohesive soil (medium stiff)
6 K = k1x0.3/(1.5 xB)		5833.33	
7 I= Moment of inertia		0.01 m4	
8 E = Modulus of elasticity		29580399 KN/m2	
9 R		2.71	
10 L1/R		0.00	
11 2R		5.42	L=12 > 2R
12 3.5R			
13 Lf/R		2.00	
14 Lf		5.42	
15 e (m)	eccentricity	0.00	
16	(Length of fixity)	6.68	
17 y=(Permissible deflection mm)		6.00	
18 H = lateral load capacity		**85.29 KN =**	**8.53 Ton**

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:ANNEX-V:

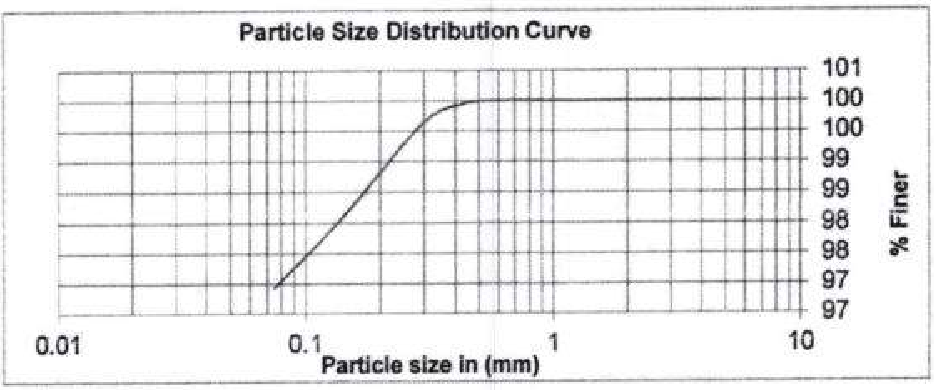
GRAIN SIZE ANALYSIS AND CURVE

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-01

Depth:3.00m

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.25	0.06	0.06	99.94
0.300	1.32	0.30	0.35	99.65
0.150	6.35	1.43	1.78	98.22
0.075	5.69	1.28	3.07	96.93
pan	430.14	96.93	100.00	0.00
	443.75			



Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	3.07	96.93

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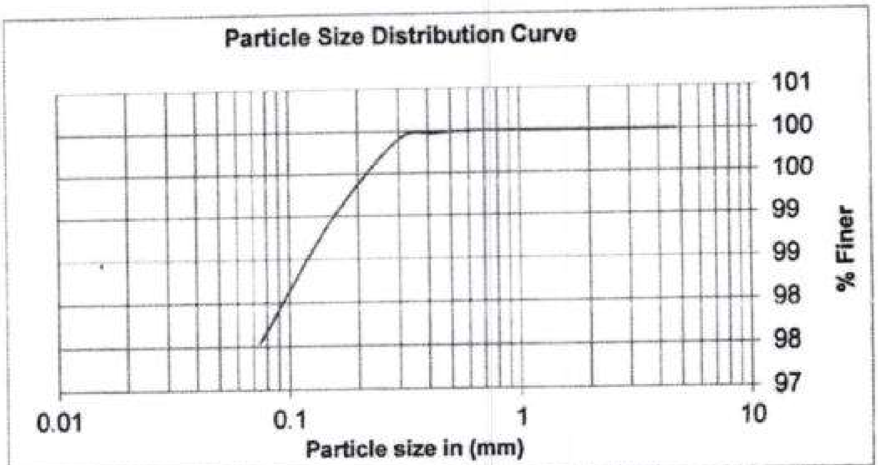
GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-01 **Depth:6.00m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.15	0.03	0.03	99.97
0.300	0.58	0.13	0.16	99.84
0.150	5.24	1.18	1.34	98.66
0.075	7.10	1.59	2.94	97.06
pan	432.21	97.06	100.00	0.00
	445.28			

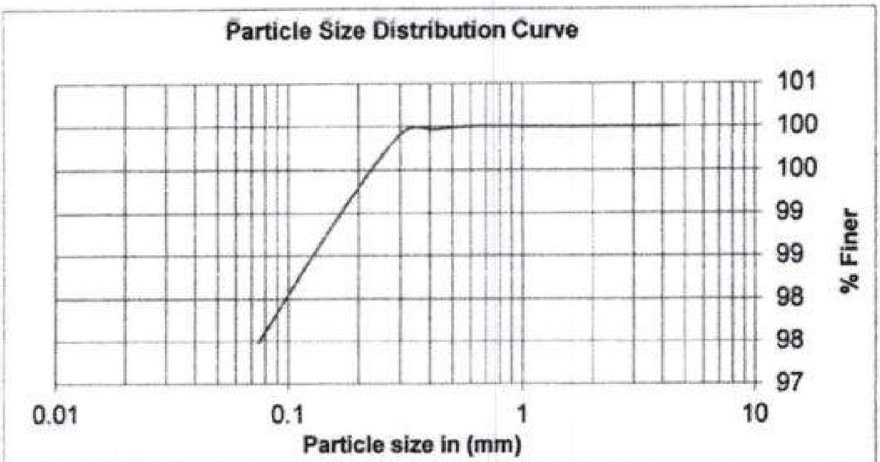


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	2.94	97.06

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-01 Depth:19.50m

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.25	0.09	0.09	99.91
1.18	0.96	0.34	0.43	99.57
0.600	1.70	0.60	1.02	98.98
0.425	22.32	7.86	8.88	91.12
0.300	25.69	9.05	17.93	82.07
0.150	178.21	62.75	80.68	19.32
0.075	35.21	12.40	93.08	6.92
pan	19.65	6.92	100.00	0.00
	283.99			

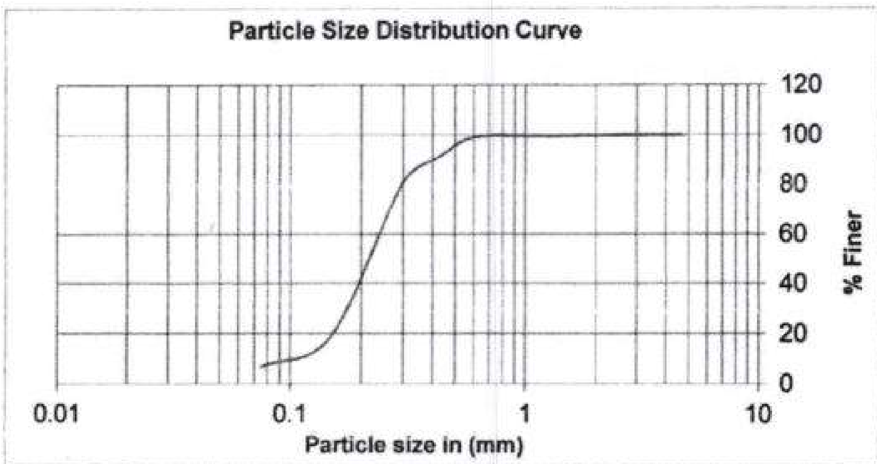


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	93.08	6.92

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-01 ***Depth:21.00m***

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.35	0.12	0.12	99.88
1.18	0.80	0.28	0.41	99.59
0.600	1.80	0.64	1.05	98.95
0.425	20.14	7.14	8.18	91.82
0.300	28.63	10.14	18.32	81.68
0.150	174.21	61.72	80.04	19.96
0.075	38.12	13.51	93.55	6.45
pan	18.21	6.45	100.00	0.00
	282.26			

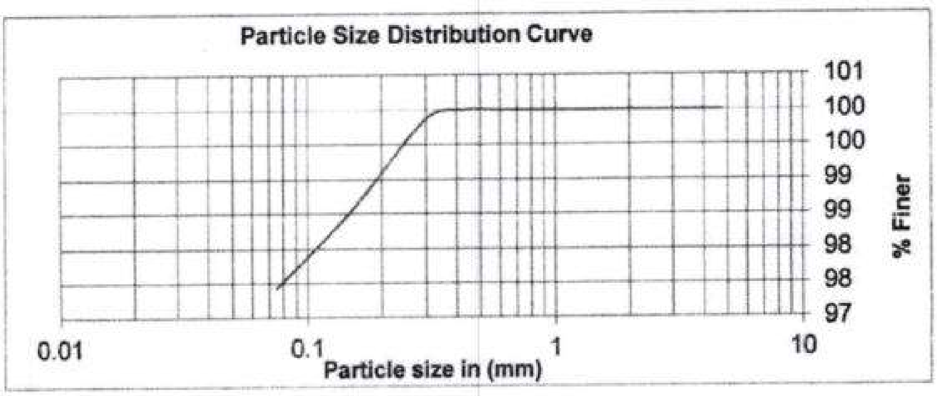


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	93.55	6.45

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-02 **Depth:3.00m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	0.58	0.13	0.13	99.87
0.150	6.00	1.33	1.46	98.54
0.075	5.00	1.11	2.57	97.43
pan	438.42	97.43	100.00	0.00
	450.00			



Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	2.57	97.43

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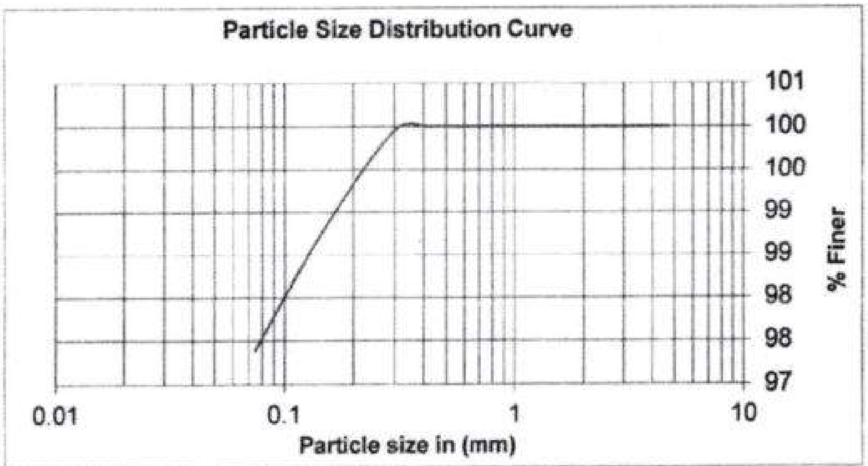
A

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-02 **Depth:4.50m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	0.20	0.04	0.04	99.96
0.150	5.10	1.13	1.18	98.82
0.075	6.45	1.43	2.61	97.39
pan	438.22	97.39	100.00	0.00
	449.97			

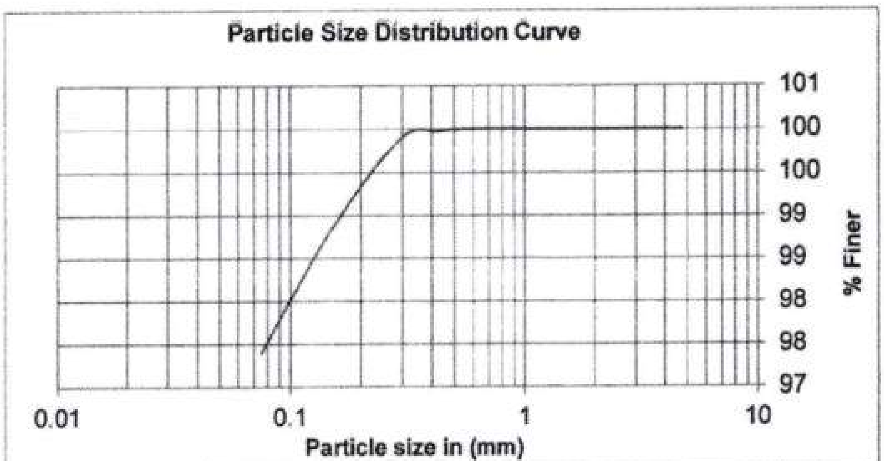


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	2.61	97.39

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-02 Depth:6.00m

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.10	0.02	0.02	99.98
0.300	0.30	0.07	0.09	99.91
0.150	4.78	1.06	1.15	98.85
0.075	6.55	1.46	2.61	97.39
pan	438.12	97.39	100.00	0.00
	449.85			

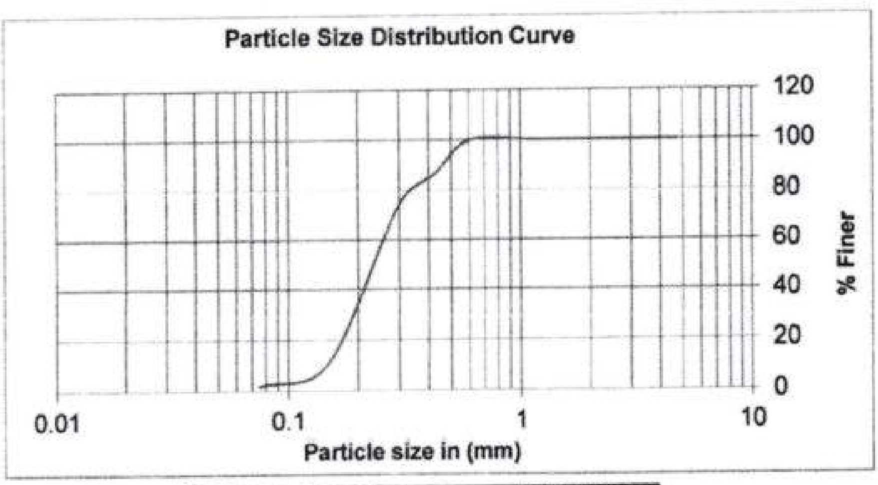


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	2.61	97.39

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-02 ***Depth:19.50m***

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.15	0.06	0.06	99.94
0.600	0.45	0.17	0.23	99.77
0.425	35.00	13.38	13.61	86.39
0.300	30.51	11.66	25.27	74.73
0.150	165.82	63.39	88.67	11.33
0.075	24.91	9.52	98.19	1.81
pan	4.74	1.81	100.00	0.00
	261.58			



Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	98.19	1.81

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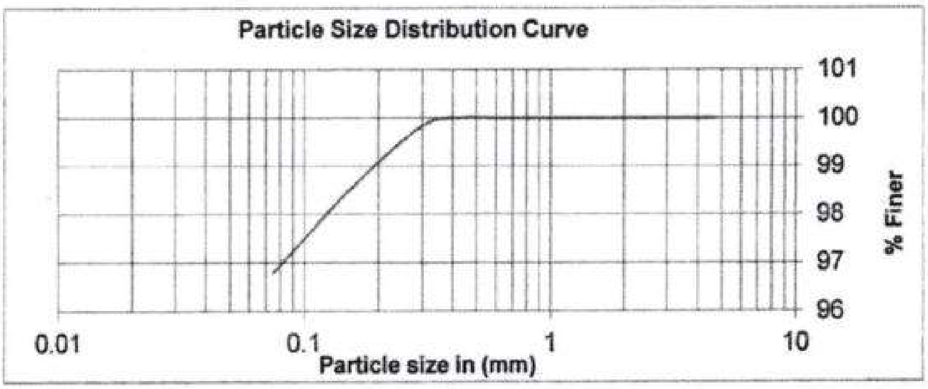
GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-03

Depth:4.50m

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	0.74	0.16	0.16	99.84
0.150	6.35	1.38	1.54	98.46
0.075	7.69	1.67	3.21	96.79
pan	445.36	96.79	100.00	0.00
	460.14			

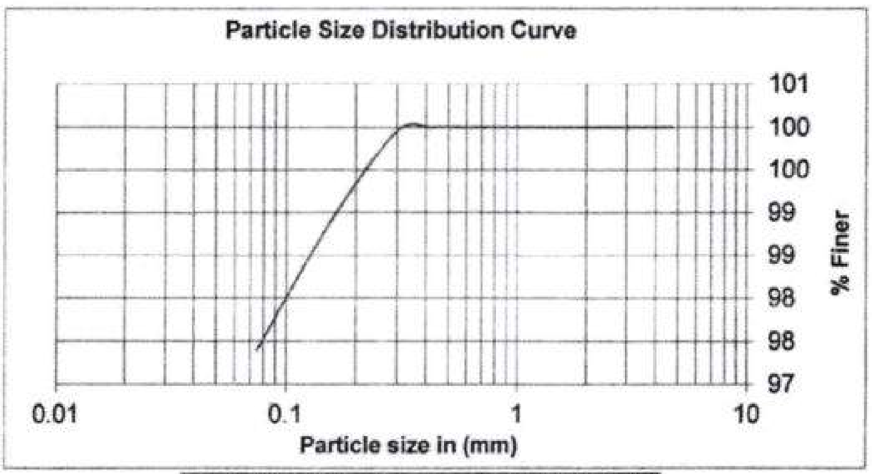


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	3.21	96.79

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-03 **Depth:6.00m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	0.20	0.05	0.05	99.95
0.150	1.01	0.25	0.30	99.70
0.075	4.56	1.12	1.42	98.58
pan	400.21	98.58	100.00	0.00
	405.98			

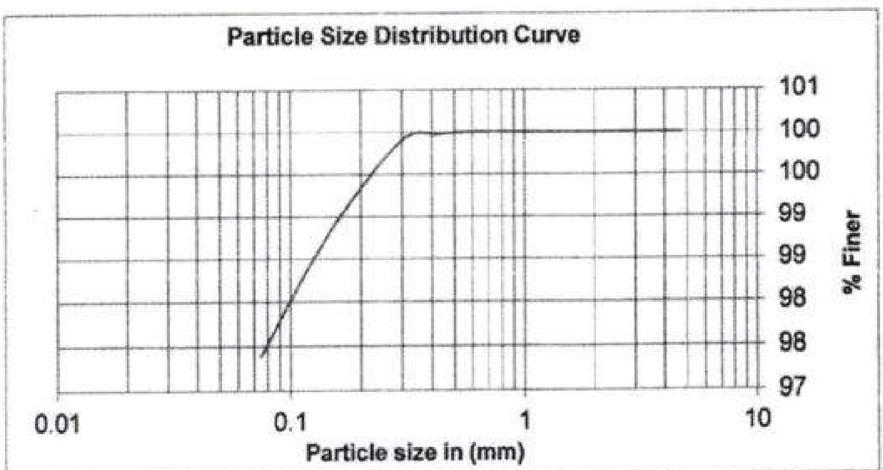


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	1.42	98.58

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-03 *Depth:19.50m*

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.15	0.06	0.06	99.94
0.600	0.32	0.14	0.20	99.80
0.425	30.21	12.76	12.96	87.04
0.300	25.32	10.69	23.65	76.35
0.150	155.21	65.56	89.21	10.79
0.075	23.21	9.80	99.02	0.98
pan	2.33	0.98	100.00	0.00
	236.75			

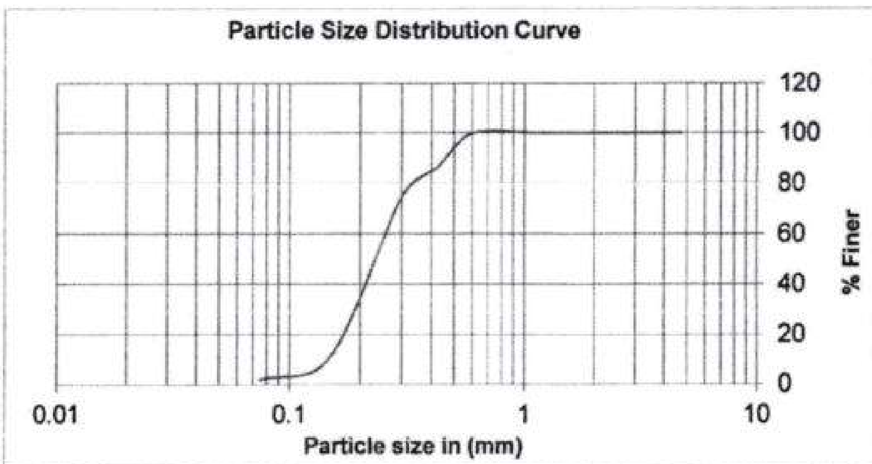


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	99.02	0.98

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-03 ***Depth:24.00m***

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.13	0.05	0.05	99.95
0.600	0.47	0.19	0.24	99.76
0.425	34.21	13.48	13.72	86.28
0.300	30.14	11.88	25.60	74.40
0.150	161.21	63.54	89.14	10.86
0.075	24.33	9.59	98.73	1.27
pan	3.21	1.27	100.00	0.00
	253.70			

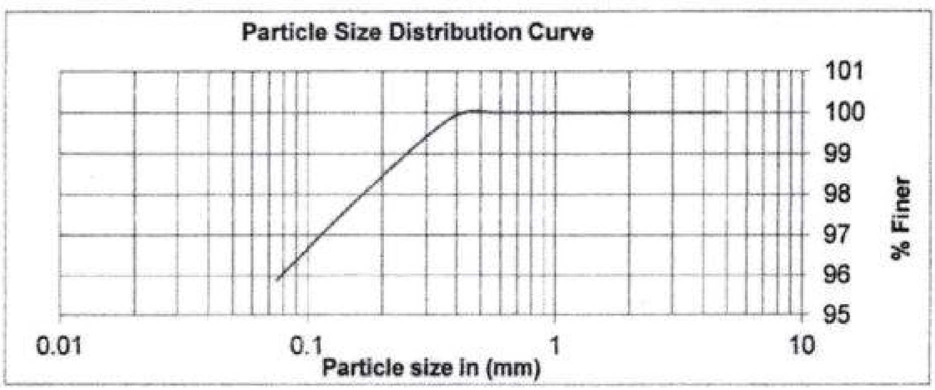


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	98.73	1.27

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-04 **Depth:7.50m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	2.58	0.58	0.58	99.42
0.150	7.47	1.68	2.26	97.74
0.075	8.21	1.85	4.11	95.89
pan	425.69	95.89	100.00	0.00
	443.95			

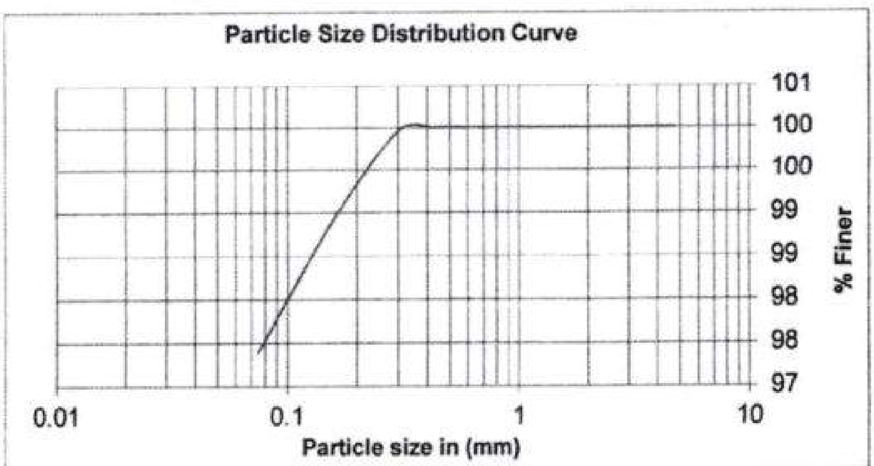


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	4.11	95.89

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-04 Depth:13.50m

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	1.25	0.27	0.27	99.73
0.150	8.63	1.85	2.12	97.88
0.075	10.21	2.19	4.32	95.68
pan	445.21	95.68	100.00	0.00
	465.30			

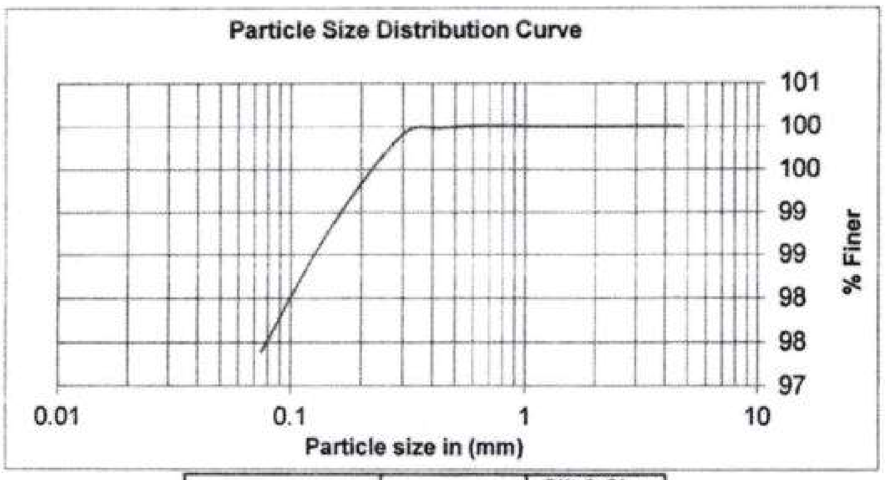


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	4.32	95.68

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-04 **Depth:16.50m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	1.01	0.41	0.41	99.59
0.425	24.58	9.90	10.31	89.69
0.300	35.69	14.38	24.69	75.31
0.150	125.45	50.55	75.24	24.76
0.075	23.21	9.35	84.59	15.41
pan	38.25	15.41	100.00	0.00
	248.19			

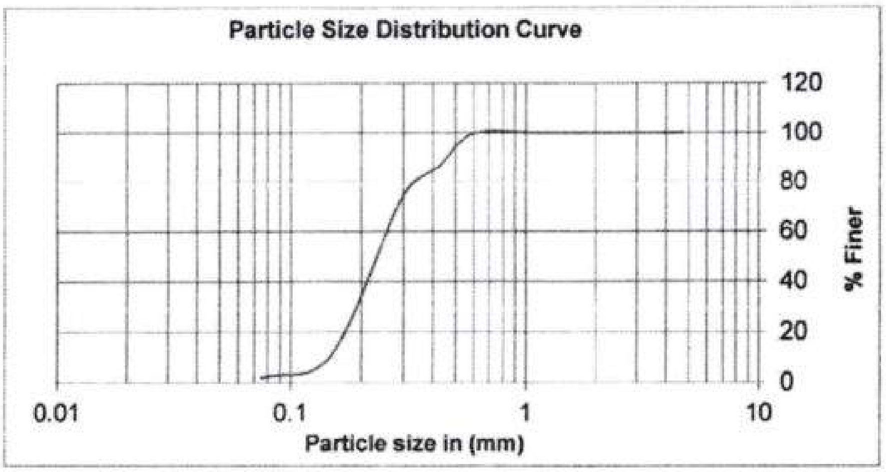


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	84.59	15.41

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-04 ***Depth:22.50m***

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.30	0.13	0.13	99.87
0.600	1.17	0.52	0.65	99.35
0.425	28.52	12.67	13.32	86.68
0.300	24.14	10.72	24.04	75.96
0.150	140.21	62.27	86.32	13.68
0.075	24.53	10.89	97.21	2.79
pan	6.28	2.79	100.00	0.00
	225.15			

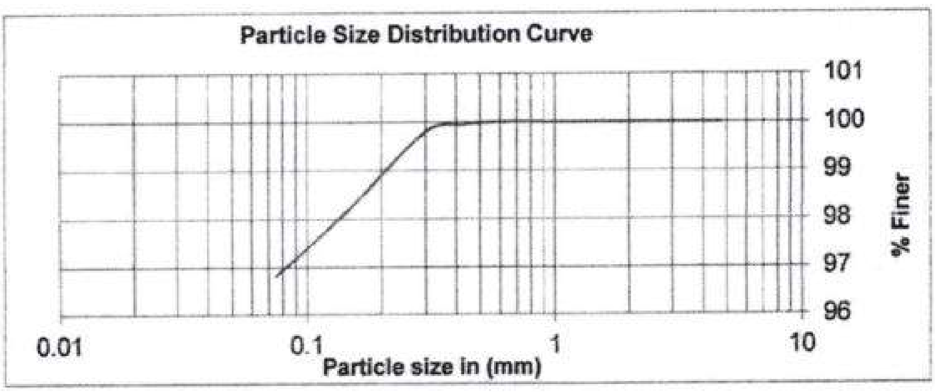


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	97.21	2.79

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-05 Depth:3.00m

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.25	0.06	0.06	99.94
0.300	0.63	0.14	0.20	99.80
0.150	7.01	1.57	1.77	98.23
0.075	6.33	1.42	3.18	96.82
pan	432.58	96.82	100.00	0.00
	446.80			

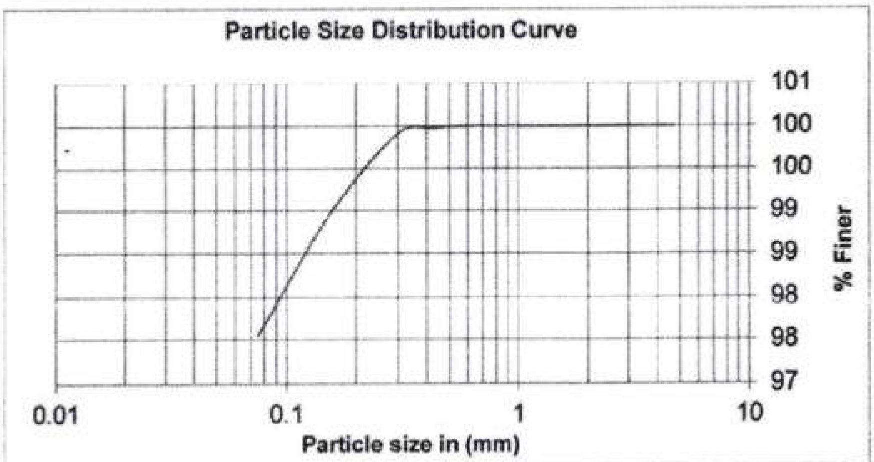


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	3.18	96.82

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-05 **Depth:6.00m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.14	0.03	0.03	99.97
0.300	1.25	0.27	0.31	99.69
0.150	5.69	1.25	1.56	98.44
0.075	7.69	1.69	3.25	96.75
pan	440.21	96.75	100.00	0.00
	454.98			

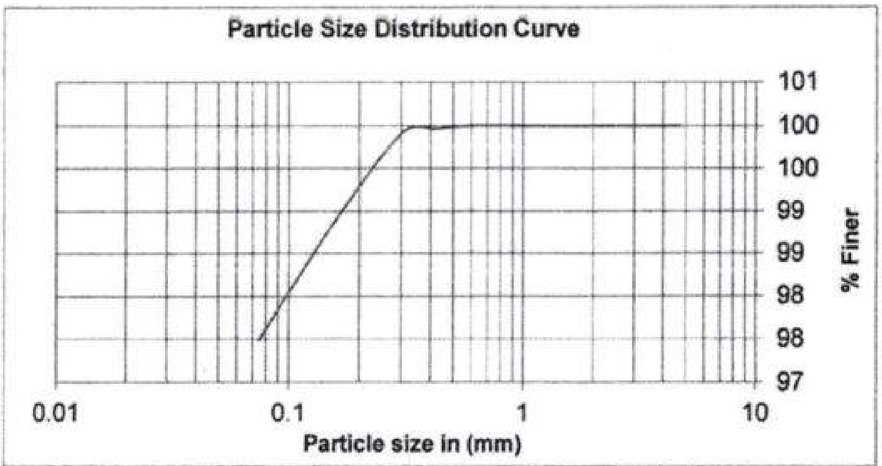


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	3.25	96.75

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-05 ***Depth:24.00m***

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.50	0.18	0.18	99.82
1.18	0.92	0.33	0.51	99.49
0.600	1.00	0.36	0.86	99.14
0.425	14.52	5.17	6.03	93.97
0.300	30.25	10.77	16.80	83.20
0.150	175.63	62.51	79.30	20.70
0.075	39.63	14.10	93.41	6.59
pan	18.52	6.59	100.00	0.00
	280.97			

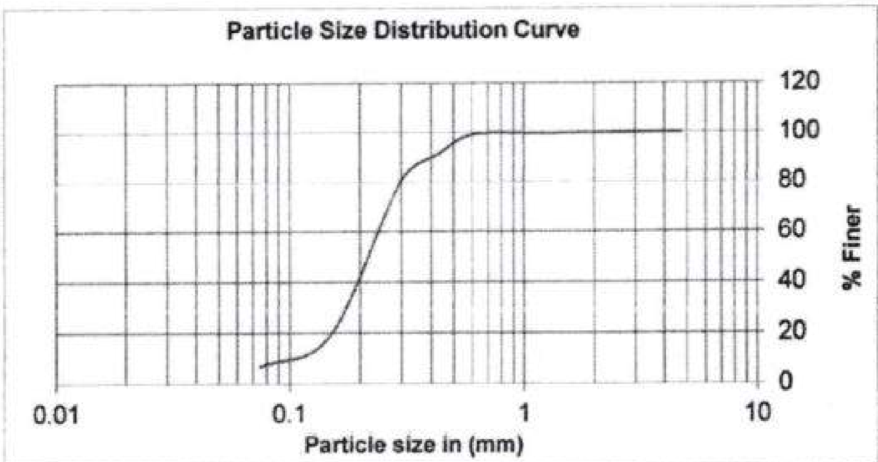


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	93.41	6.59

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-05 ***Depth:28.50m***

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.50	0.17	0.17	99.83
1.18	0.74	0.26	0.43	99.57
0.600	1.63	0.56	0.99	99.01
0.425	25.21	8.73	9.73	90.27
0.300	30.22	10.47	20.20	79.80
0.150	174.52	60.47	80.67	19.33
0.075	35.21	12.20	92.87	7.13
pan	20.58	7.13	100.00	0.00
	288.61			

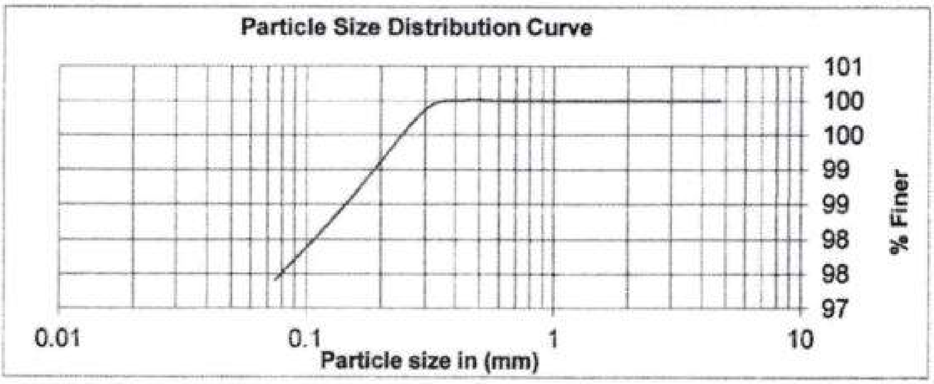


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	92.87	7.13

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-06 Depth:3.00m

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	0.60	0.13	0.13	99.87
0.150	5.89	1.30	1.44	98.56
0.075	5.23	1.16	2.59	97.41
pan	440.21	97.41	100.00	0.00
	451.93			

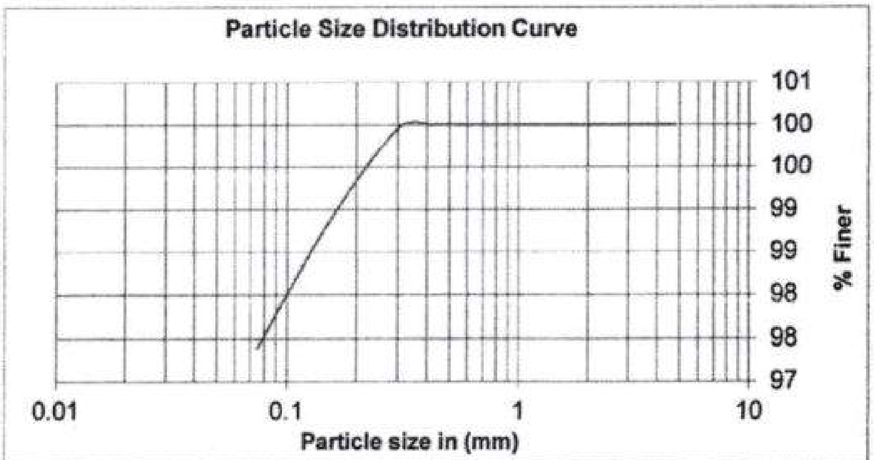


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	2.59	97.41

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-06 **Depth:4.50m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	0.30	0.07	0.07	99.93
0.150	1.25	0.28	0.35	99.65
0.075	6.60	1.49	1.84	98.16
pan	435.36	98.16	100.00	0.00
	443.51			

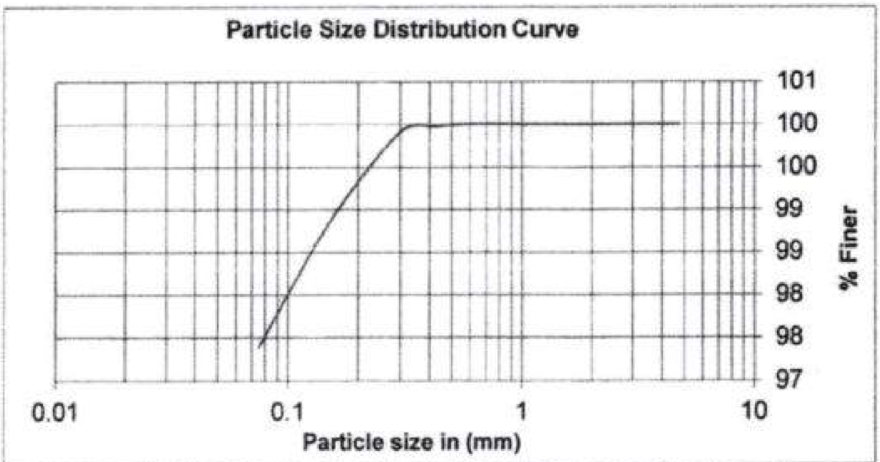


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	1.84	98.16

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-06 **Depth:6.00m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.12	0.03	0.03	99.97
0.300	0.23	0.05	0.08	99.92
0.150	4.25	0.97	1.05	98.95
0.075	6.32	1.45	2.50	97.50
pan	425.31	97.50	100.00	0.00
	436.23			



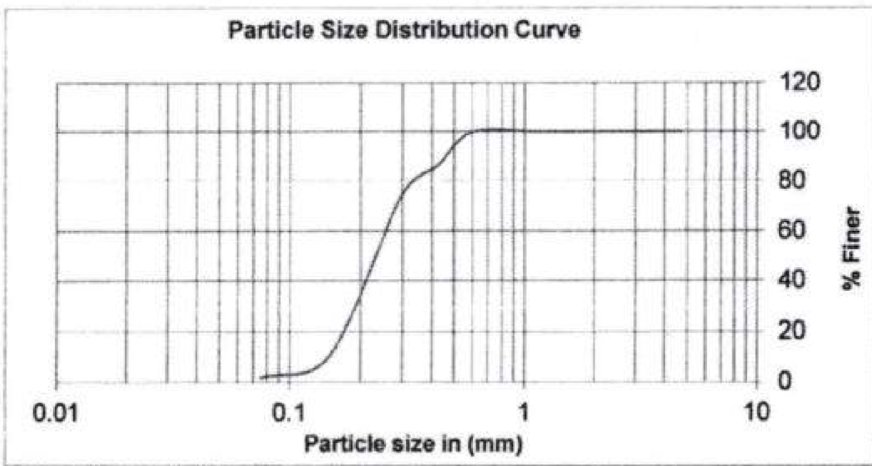
Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	2.50	97.50

RELIANT FOUNDATIONS PVT. LTD. GHY-35

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-06 Depth:24.00m

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.13	0.05	0.05	99.95
0.600	0.50	0.19	0.25	99.75
0.425	35.32	13.77	14.02	85.98
0.300	30.25	11.80	25.81	74.19
0.150	160.32	62.51	88.33	11.67
0.075	25.92	10.11	98.43	1.57
pan	4.02	1.57	100.00	0.00
	256.46			



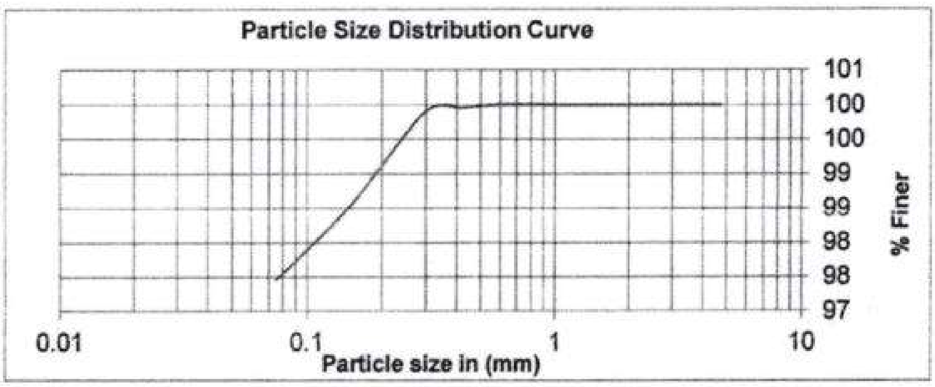
Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	98.43	1.57

RELIANT FOUNDATIONS PVT. LTD.

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-07 **Depth:3.00m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.20	0.04	0.04	99.96
0.300	0.23	0.05	0.10	99.90
0.150	6.10	1.36	1.45	98.55
0.075	4.89	1.09	2.54	97.46
pan	437.98	97.46	100.00	0.00
	449.40			



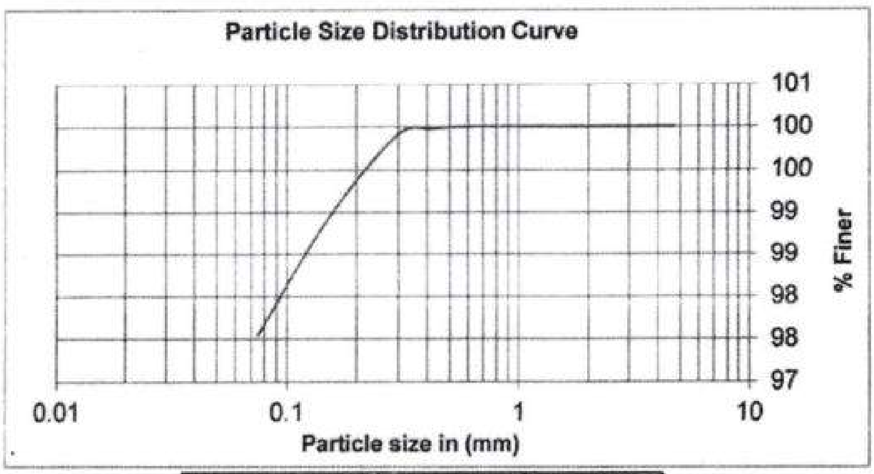
Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	2.54	97.46

RELIANT FOUNDATIONS PVT. LTD.

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-07 Depth:4.50m

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.10	0.02	0.02	99.98
0.300	0.30	0.07	0.09	99.91
0.150	4.45	0.99	1.08	98.92
0.075	6.21	1.38	2.46	97.54
pan	438.85	97.54	100.00	0.00
	449.91			

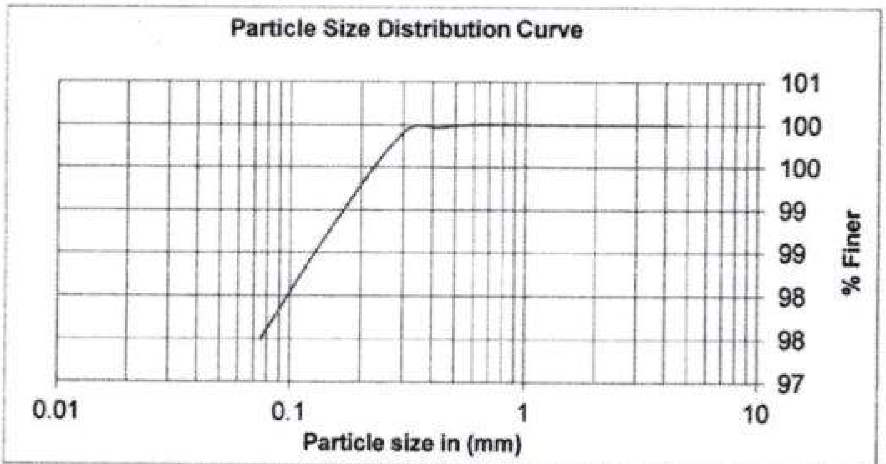


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	2.46	97.54

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-07 **Depth:6.00m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.15	0.03	0.03	99.97
0.300	0.25	0.06	0.09	99.91
0.150	4.98	1.11	1.20	98.80
0.075	5.89	1.31	2.51	97.49
pan	438.55	97.49	100.00	0.00
	449.82			

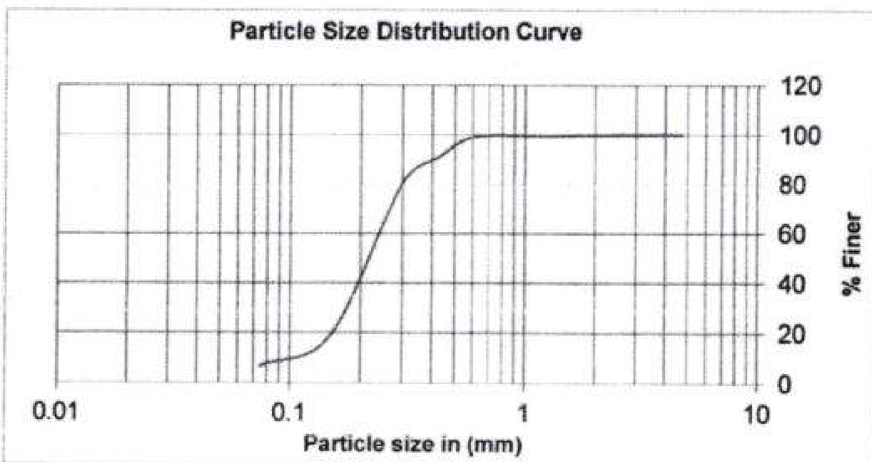


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	2.51	97.49

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-07 **Depth:21.00m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.31	0.11	0.11	99.89
1.18	0.77	0.26	0.37	99.63
0.600	1.75	0.60	0.96	99.04
0.425	23.66	8.05	9.01	90.99
0.300	30.16	10.26	19.27	80.73
0.150	180.12	61.27	80.54	19.46
0.075	37.16	12.64	93.18	6.82
pan	20.06	6.82	100.00	0.00
	293.99			

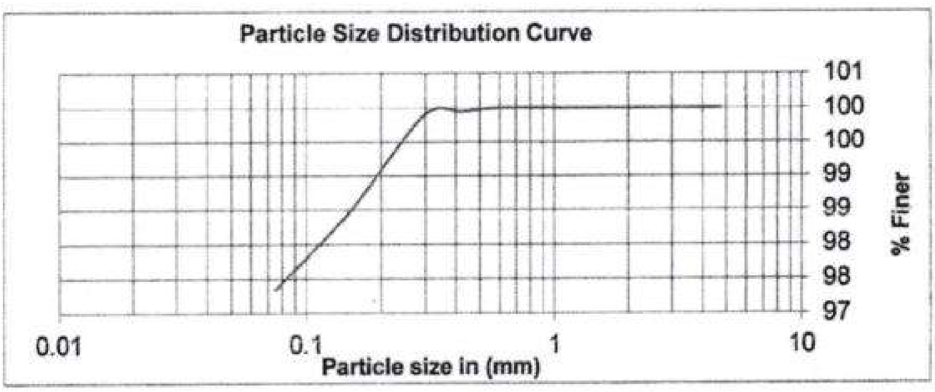


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	93.18	6.82

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-08 **Depth:3.00m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.22	0.05	0.05	99.95
0.300	0.18	0.04	0.09	99.91
0.150	6.32	1.43	1.52	98.48
0.075	5.01	1.13	2.65	97.35
pan	430.14	97.35	100.00	0.00
	441.87			

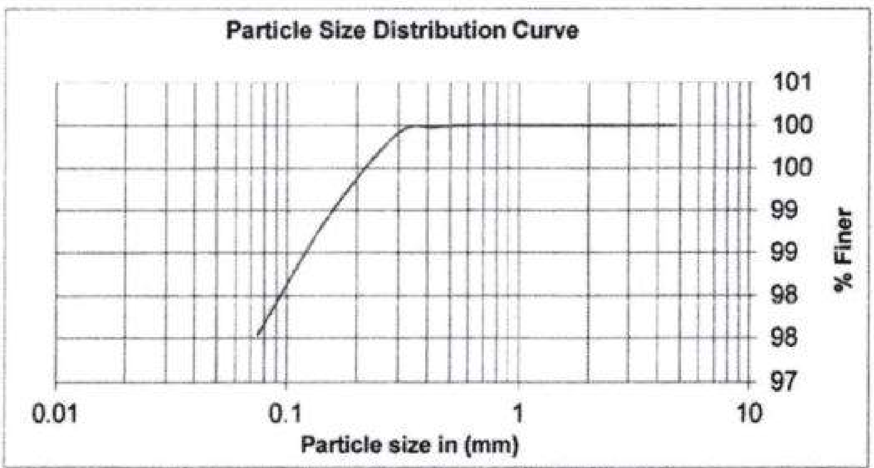


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	2.65	97.35

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-08 **Depth:4.50m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.12	0.03	0.03	99.97
0.300	0.36	0.08	0.11	99.89
0.150	4.25	0.94	1.05	98.95
0.075	6.69	1.48	2.52	97.48
pan	441.21	97.48	100.00	0.00
	452.63			



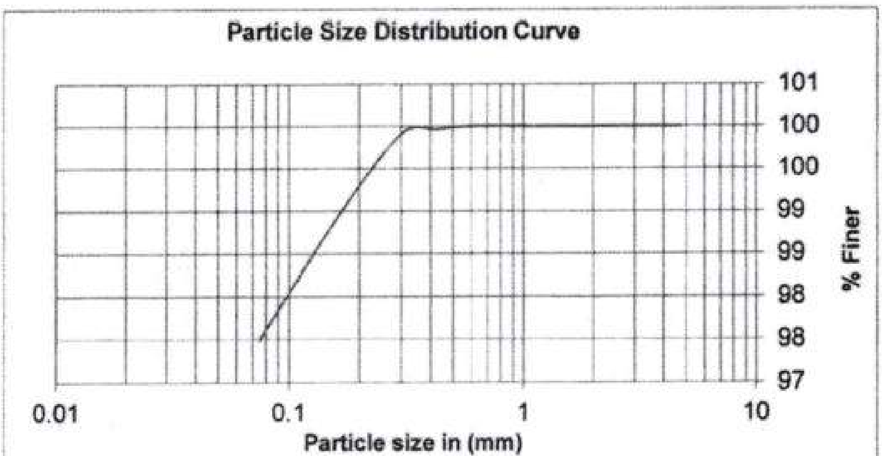
Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	2.52	97.48

RELIANT FOUNDATIONS PVT. LTD.

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-08 ***Depth:6.00m***

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.19	0.04	0.04	99.96
0.300	0.34	0.08	0.12	99.88
0.150	5.01	1.16	1.28	98.72
0.075	6.01	1.39	2.68	97.32
pan	420.14	97.32	100.00	0.00
	431.69			



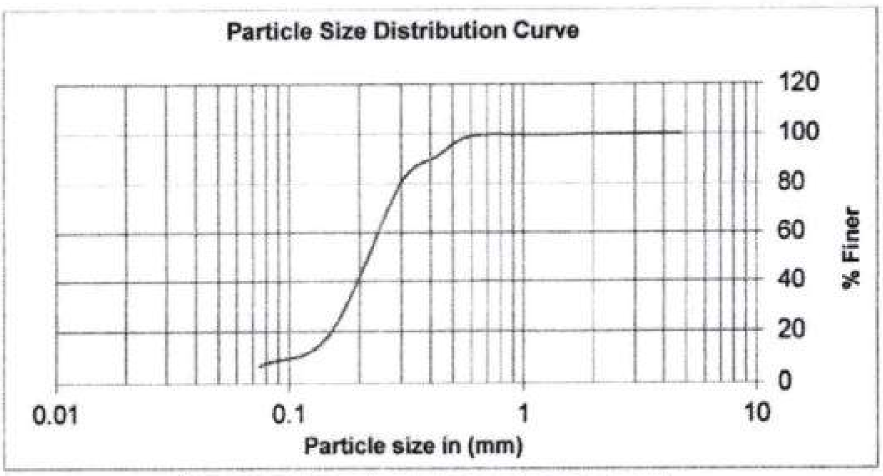
Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	2.68	97.32

RELIANT FOUNDATIONS PVT. LTD. GHY-35

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-08 ***Depth:21.00m***

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.47	0.16	0.16	99.84
1.18	0.89	0.30	0.46	99.54
0.600	1.56	0.53	0.98	99.02
0.425	23.47	7.90	8.89	91.11
0.300	31.02	10.45	19.34	80.66
0.150	181.24	61.04	80.38	19.62
0.075	36.69	12.36	92.73	7.27
pan	21.58	7.27	100.00	0.00
	296.92			

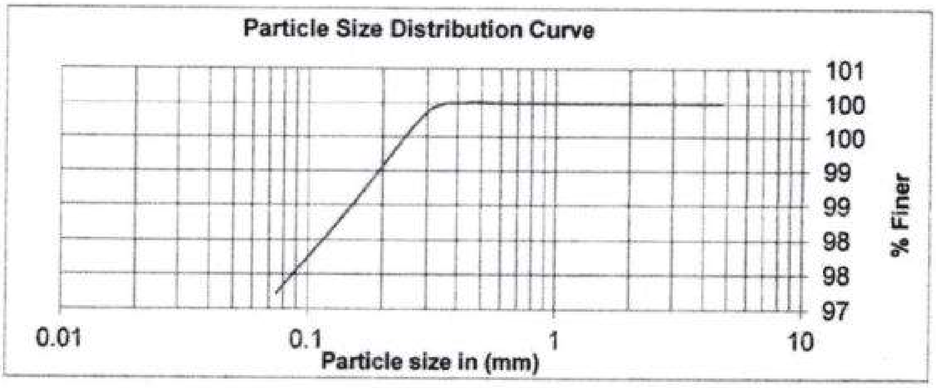


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	92.73	7.27

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-09 Depth:3.00m

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	0.63	0.14	0.14	99.86
0.150	6.25	1.38	1.52	98.48
0.075	5.69	1.26	2.78	97.22
pan	440.28	97.22	100.00	0.00
	452.85			



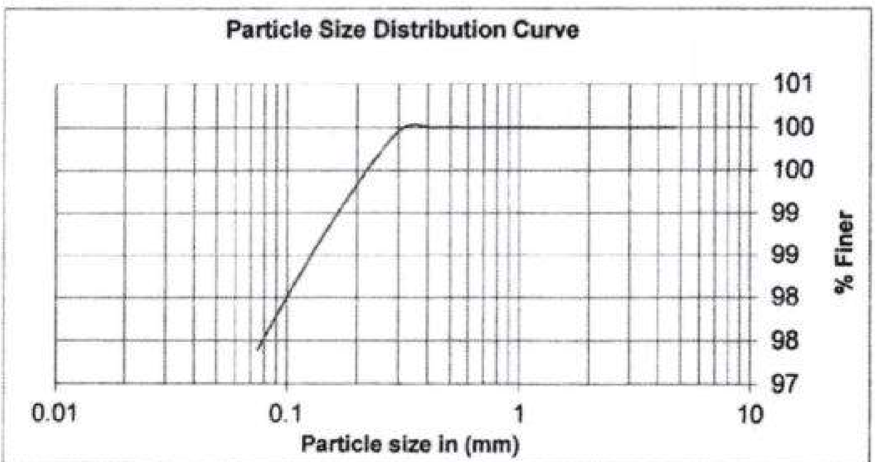
Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	2.78	97.22

RELIANT FOUNDATIONS PVT. LTD. GHY-35

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-09 **Depth:6.00m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	0.58	0.13	0.13	99.87
0.150	6.32	1.45	1.59	98.41
0.075	7.58	1.74	3.33	96.67
pan	420.25	96.67	100.00	0.00
	434.73			

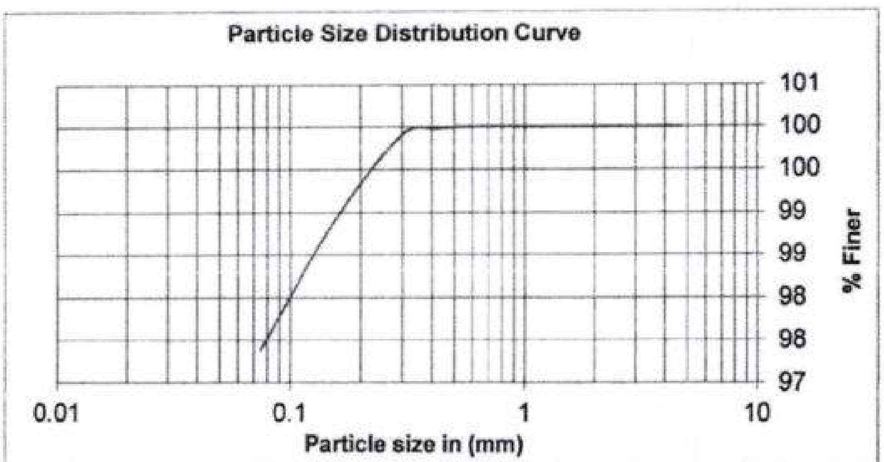


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	3.33	96.67

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-09 Depth:21.00m

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.48	0.20	0.20	99.80
0.600	0.56	0.24	0.44	99.56
0.425	35.21	14.85	15.29	84.71
0.300	30.14	12.71	28.00	72.00
0.150	145.21	61.24	89.25	10.75
0.075	20.14	8.49	97.74	2.26
pan	5.36	2.26	100.00	0.00
	237.10			

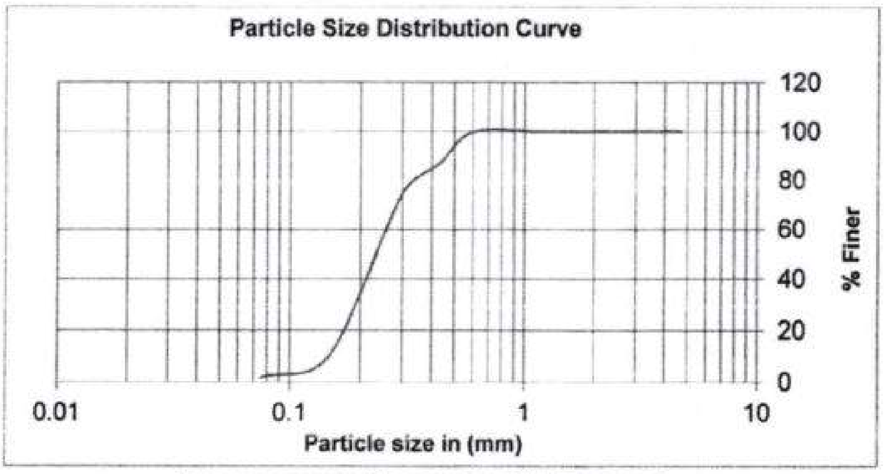


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	97.74	2.26

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-09 ***Depth:24.00m***

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.25	0.11	0.11	99.89
0.600	0.50	0.21	0.32	99.68
0.425	32.21	13.73	14.05	85.95
0.300	30.51	13.00	27.05	72.95
0.150	140.21	59.76	86.81	13.19
0.075	25.69	10.95	97.76	2.24
pan	5.25	2.24	100.00	0.00
	234.62			

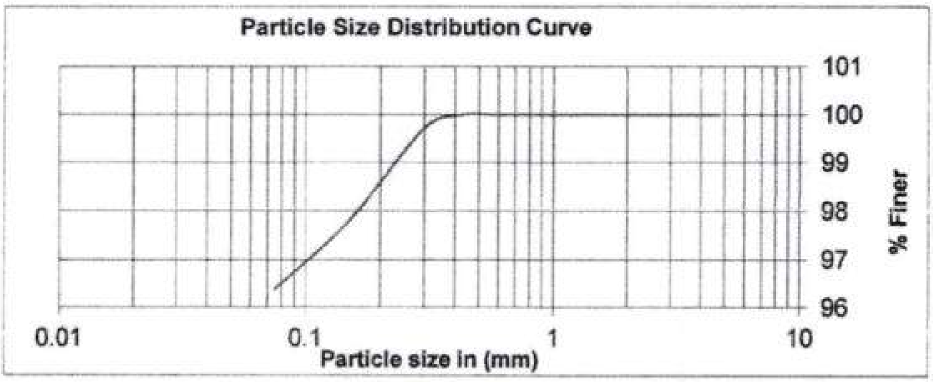


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	97.76	2.24

__GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)__

__BH:-10__ *__Depth:3.00m__*

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	1.24	0.28	0.28	99.72
0.150	8.52	1.91	2.19	97.81
0.075	6.36	1.42	3.61	96.39
pan	430.21	96.39	100.00	0.00
	446.33			

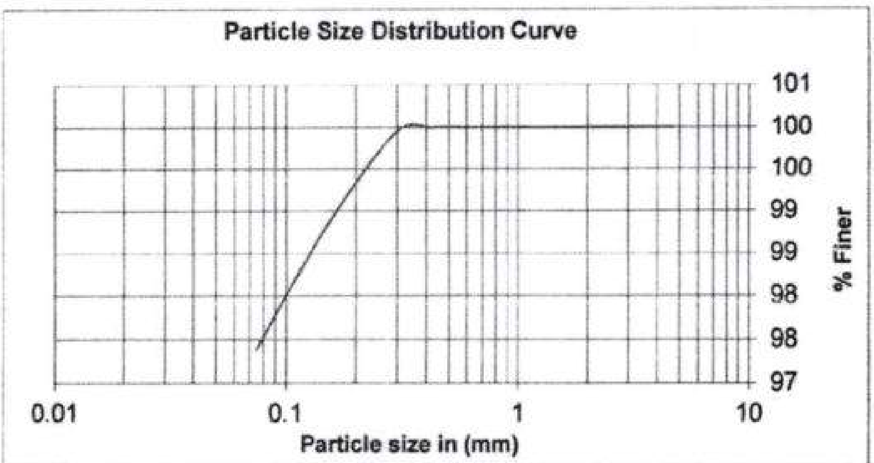


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	3.61	96.39

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-10 *Depth:6.00m*

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	1.01	0.22	0.22	99.78
0.150	8.58	1.83	2.04	97.96
0.075	9.65	2.06	4.10	95.90
pan	450.21	95.90	100.00	0.00
	469.45			



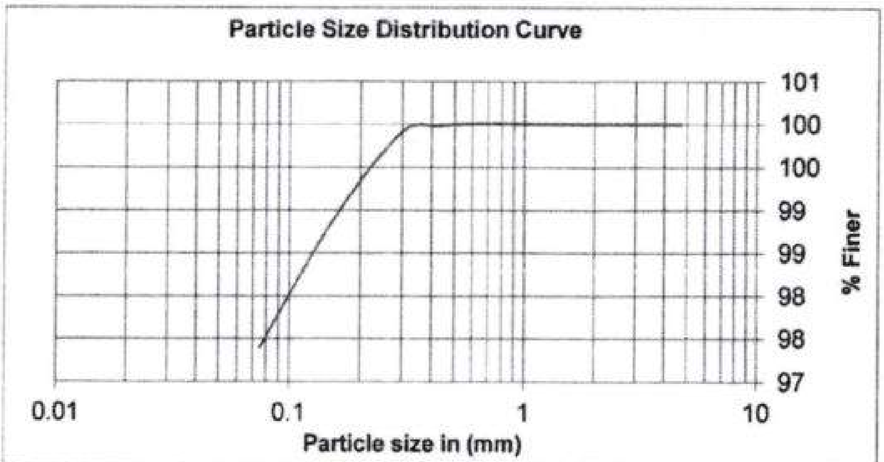
Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	4.10	95.90

RELIANT FOUNDATIONS PVT. LTD. * GHY-35 *

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-10 Depth:21.00m

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	1.01	0.45	0.45	99.55
0.600	0.98	0.44	0.90	99.10
0.425	32.21	14.49	15.38	84.62
0.300	25.62	11.52	26.91	73.09
0.150	130.47	58.69	85.60	14.40
0.075	25.69	11.56	97.16	2.84
pan	6.32	2.84	100.00	0.00
	222.30			



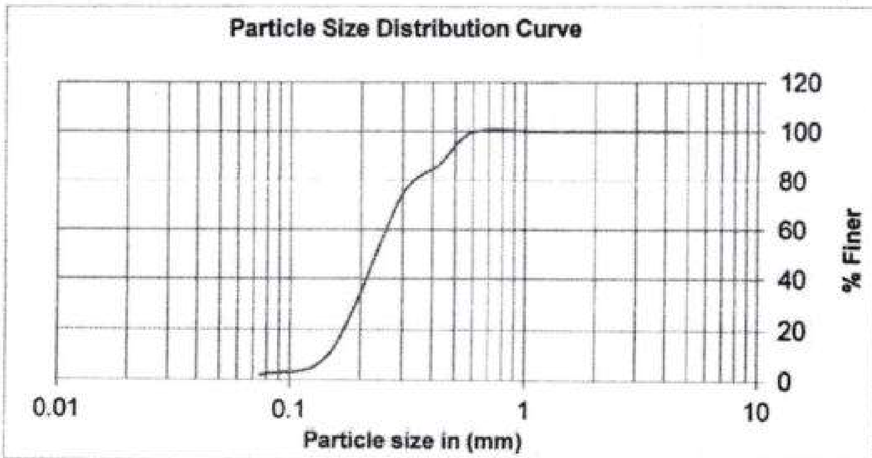
Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	97.16	2.84

RELIANT FOUNDATIONS PVT. LTD. * GHY-35 *

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-10 *Depth:24.00m*

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.32	0.14	0.14	99.86
0.600	1.25	0.53	0.67	99.33
0.425	30.14	12.80	13.47	86.53
0.300	20.14	8.56	22.03	77.97
0.150	147.58	62.70	84.73	15.27
0.075	29.63	12.59	97.31	2.69
pan	6.32	2.69	100.00	0.00
	235.38			

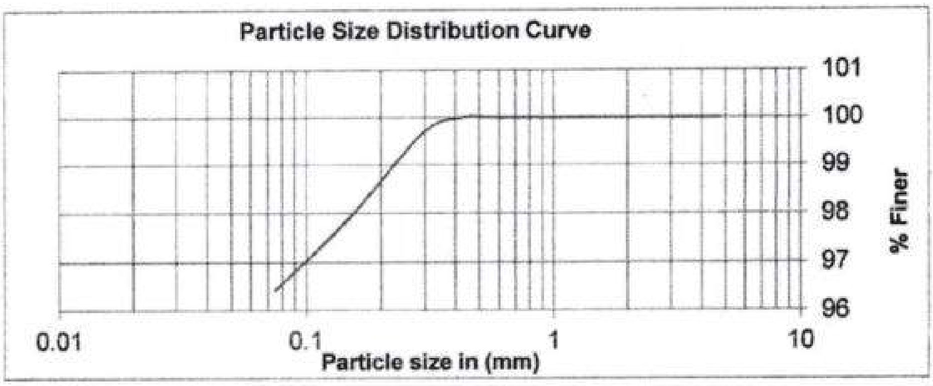


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	97.31	2.69

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-11 ***Depth:7.50m***

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	1.32	0.29	0.29	99.71
0.150	8.02	1.79	2.08	97.92
0.075	6.69	1.49	3.57	96.43
pan	432.52	96.43	100.00	0.00
	448.55			

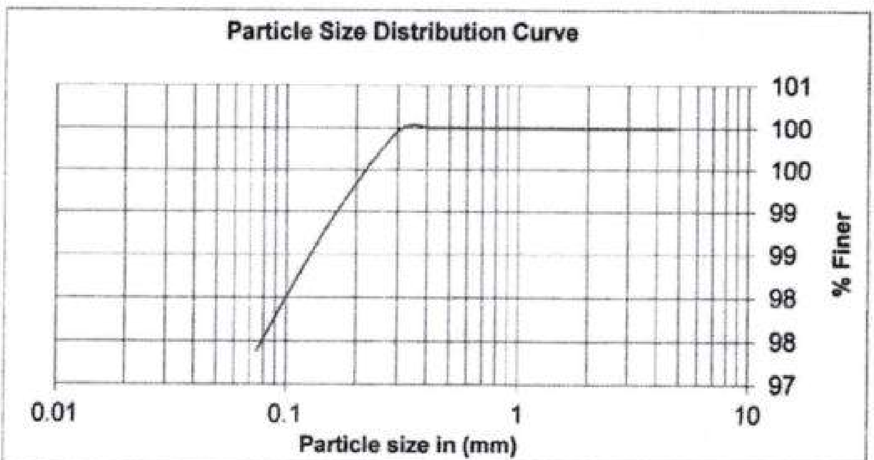


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	3.57	96.43

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-11 ***Depth:13.50m***

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	1.25	0.27	0.27	99.73
0.150	8.63	1.85	2.12	97.88
0.075	10.21	2.19	4.32	95.68
pan	445.21	95.68	100.00	0.00
	465.30			



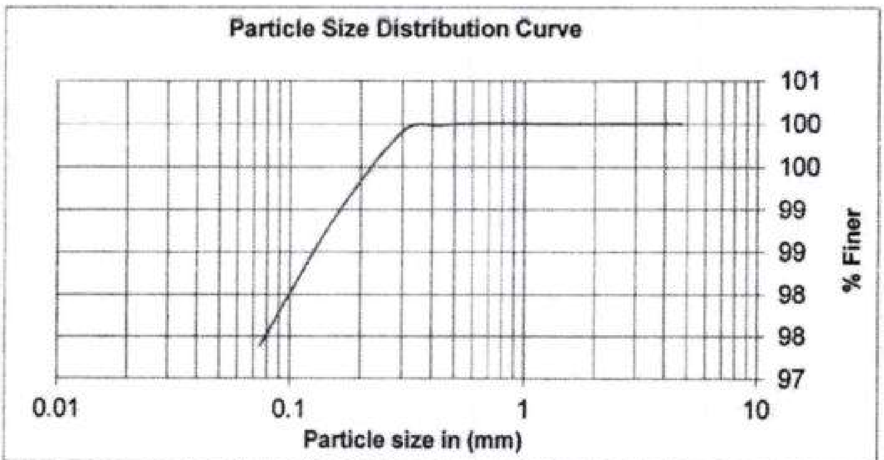
Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	4.32	95.68

RELIANCE FOUNDATIONS PVT. LTD.

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-11 Depth:15.00m

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	1.25	0.48	0.48	99.52
0.425	30.21	11.66	12.14	87.86
0.300	35.21	13.59	25.73	74.27
0.150	128.63	49.63	75.36	24.64
0.075	24.21	9.34	84.70	15.30
pan	39.65	15.30	100.00	0.00
	259.16			

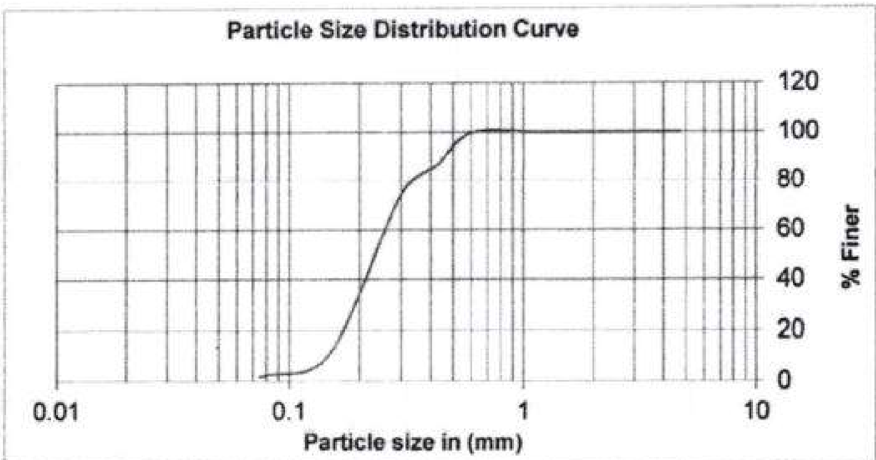


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	84.70	15.30

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-11 *Depth:19.50m*

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.32	0.14	0.14	99.86
0.600	1.21	0.52	0.66	99.34
0.425	30.14	12.92	13.57	86.43
0.300	25.63	10.98	24.56	75.44
0.150	145.21	62.23	86.78	13.22
0.075	25.63	10.98	97.77	2.23
pan	5.21	2.23	100.00	0.00
	233.35			



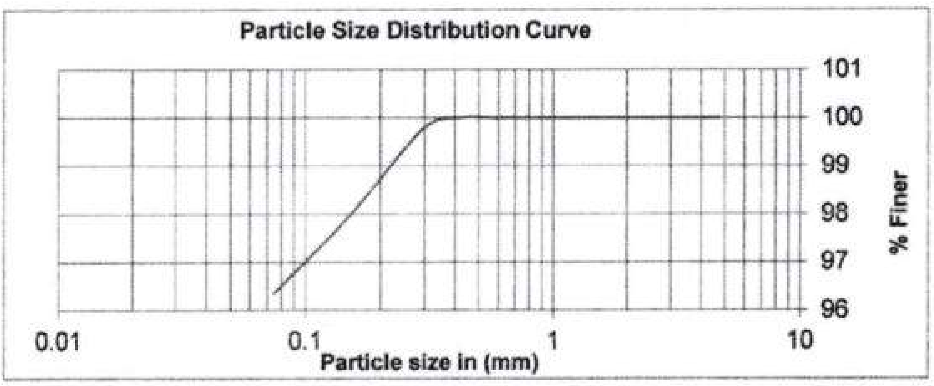
Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	97.77	2.23

RELIANT FOUNDATIONS PVT. LTD. * GHY-35 *

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-12 ***Depth:7.50m***

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	0.96	0.21	0.21	99.79
0.150	8.32	1.84	2.05	97.95
0.075	7.21	1.59	3.64	96.36
pan	436.69	96.36	100.00	0.00
	453.18			



Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	3.64	96.36

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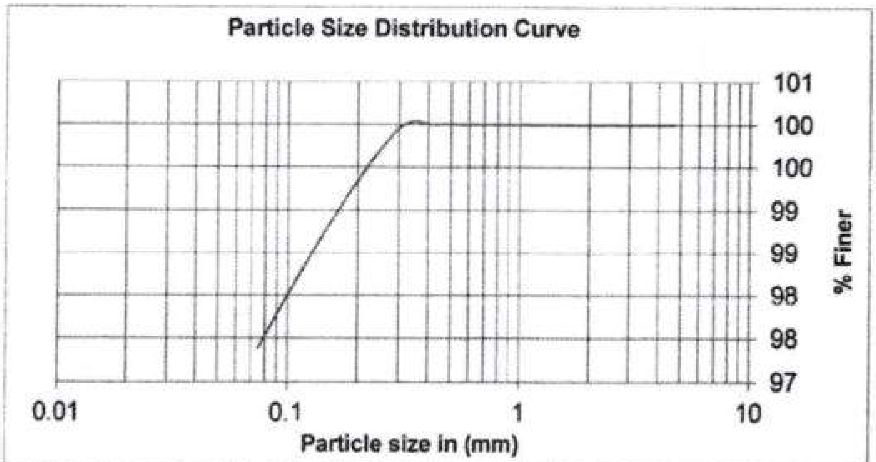
* GHY-35 * PVT. LTD.

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-12 **Depth:13.50m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	1.63	0.35	0.35	99.65
0.150	9.32	2.02	2.37	97.63
0.075	10.25	2.22	4.59	95.41
pan	440.21	95.41	100.00	0.00
	461.41			

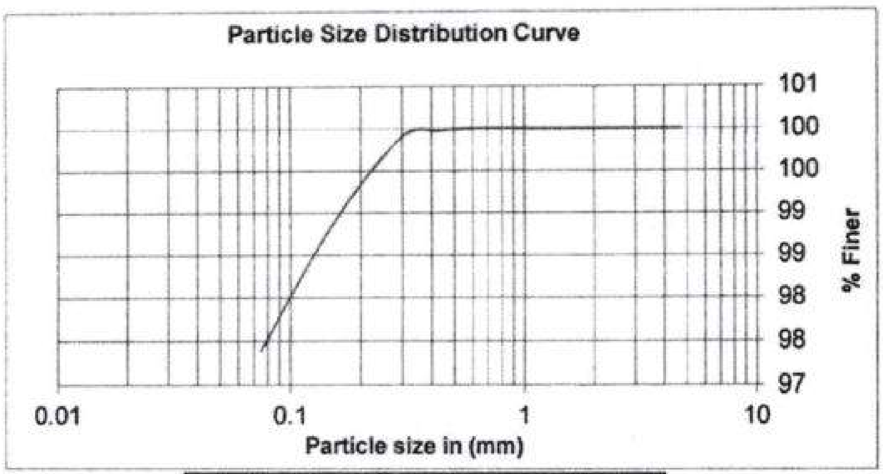


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	4.59	95.41

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-12 *Depth:18.00m*

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	1.02	0.48	0.48	99.52
0.425	25.69	12.04	12.51	87.49
0.300	34.21	16.03	28.54	71.46
0.150	120.21	56.32	84.85	15.15
0.075	23.21	10.87	95.73	4.27
pan	9.12	4.27	100.00	0.00
	213.46			



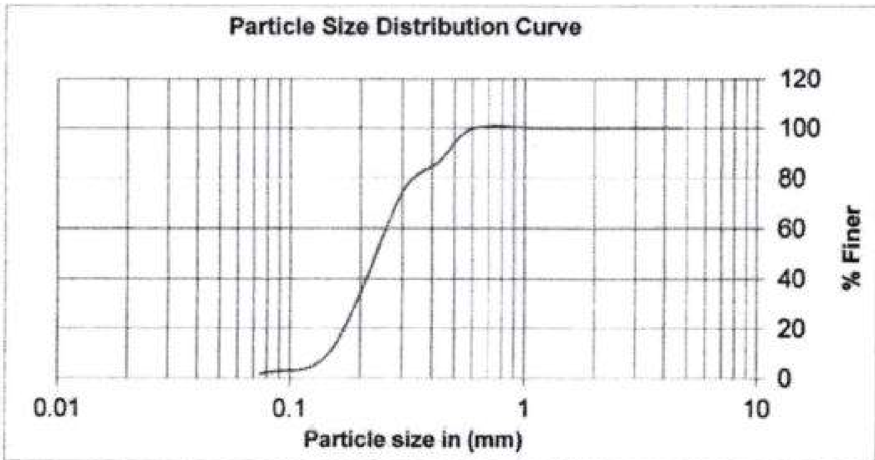
Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	95.73	4.27

RELIANT FOUNDATIONS PVT. LTD. * GHY-35

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-12 Depth:22.50m

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.33	0.16	0.16	99.84
0.600	1.19	0.58	0.74	99.26
0.425	25.69	12.58	13.33	86.67
0.300	20.21	9.90	23.23	76.77
0.150	130.21	63.78	87.00	13.00
0.075	20.21	9.90	96.90	3.10
pan	6.32	3.10	100.00	0.00
	204.16			

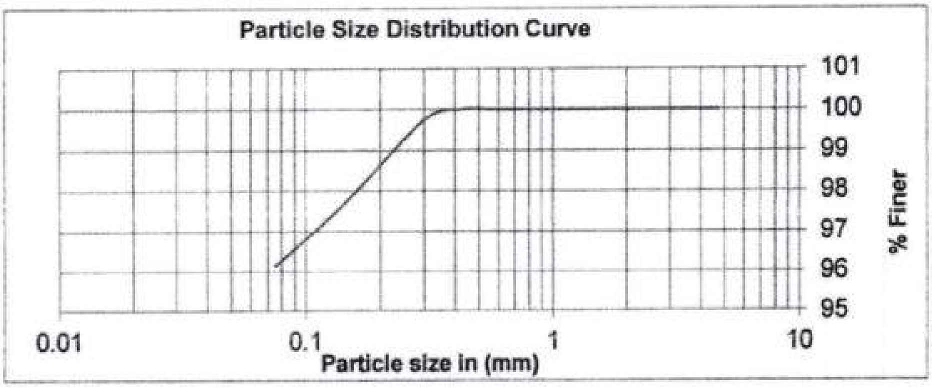


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	96.90	3.10

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-13 **Depth:7.50m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	1.11	0.25	0.25	99.75
0.150	8.69	1.94	2.19	97.81
0.075	7.54	1.68	3.87	96.13
pan	430.25	96.13	100.00	0.00
	447.59			



Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	3.87	96.13

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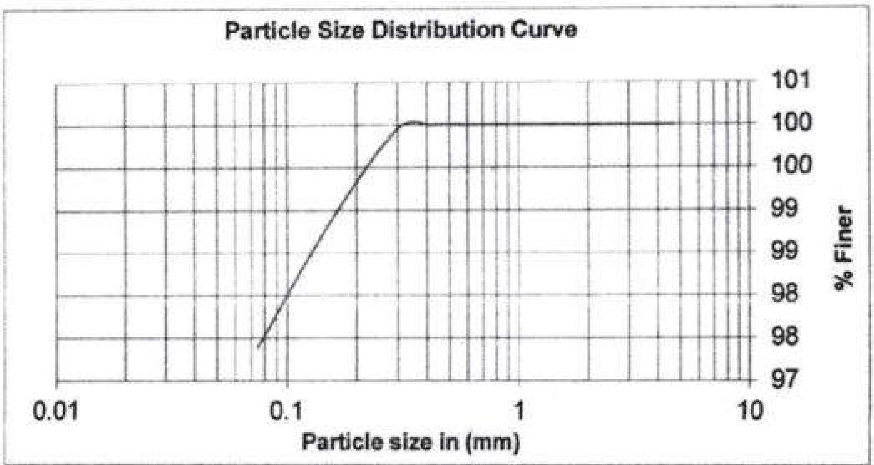
GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-13 ***Depth:15.00m***

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	1.25	0.28	0.28	99.72
0.150	10.21	2.29	2.58	97.42
0.075	13.21	2.97	5.54	94.46
pan	420.35	94.46	100.00	0.00
	445.02			

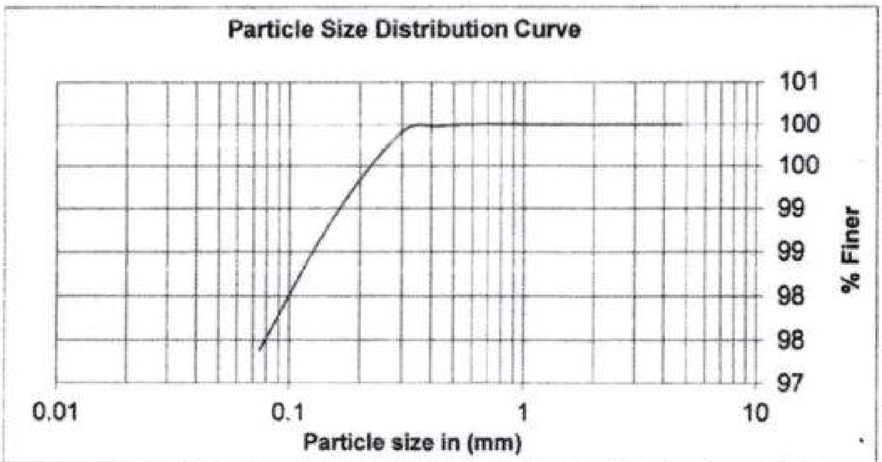


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	5.54	94.46

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-13 Depth:19.50m

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	1.21	0.62	0.62	99.38
0.425	20.14	10.25	10.87	89.13
0.300	30.21	15.38	26.24	73.76
0.150	115.69	58.89	85.13	14.87
0.075	20.25	10.31	95.44	4.56
pan	8.96	4.56	100.00	0.00
	196.46			

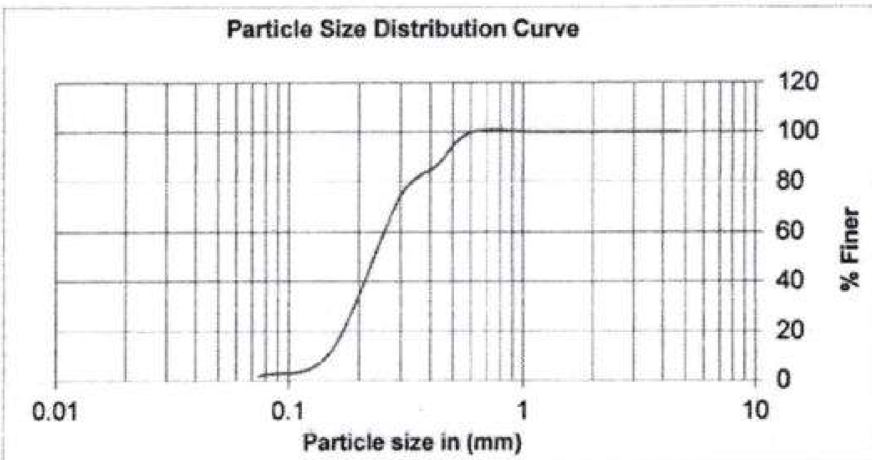


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	95.44	4.56

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-13 ***Depth:21.00m***

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.33	0.16	0.16	99.84
0.600	1.21	0.60	0.76	99.24
0.425	24.69	12.22	12.99	87.01
0.300	19.21	9.51	22.50	77.50
0.150	131.21	64.97	87.46	12.54
0.075	19.63	9.72	97.18	2.82
pan	5.69	2.82	100.00	0.00
	201.97			



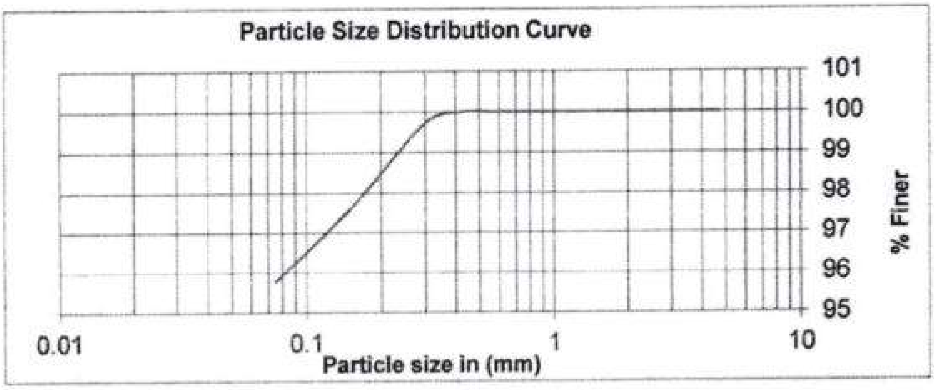
Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	97.18	2.82

RELIANT FOUNDATIONS PVT. LTD.

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-14 **Depth:10.50m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	1.24	0.27	0.27	99.73
0.150	9.62	2.13	2.41	97.59
0.075	8.21	1.82	4.23	95.77
pan	432.14	95.77	100.00	0.00
	451.21			

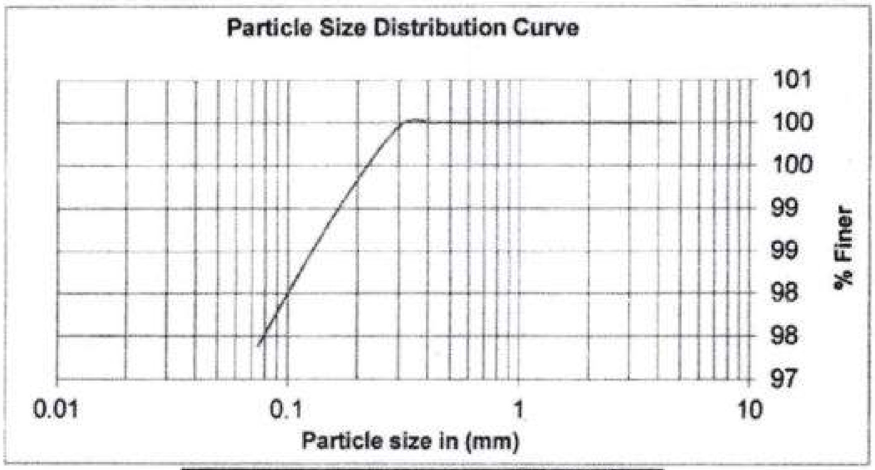


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	4.23	95.77

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-14 *Depth:13.50m*

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	1.02	0.32	0.32	99.68
0.150	9.62	3.00	3.32	96.68
0.075	10.21	3.18	6.50	93.50
pan	300.01	93.50	100.00	0.00
	320.86			

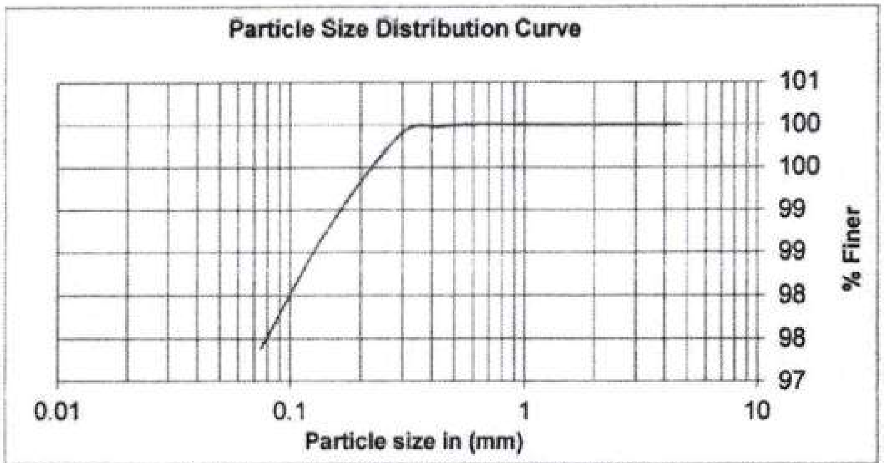


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	6.50	93.50

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-14 **Depth:19.50m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.96	0.55	0.55	99.45
0.425	18.65	10.65	11.20	88.80
0.300	18.25	10.42	21.62	78.38
0.150	110.21	62.94	84.56	15.44
0.075	19.52	11.15	95.71	4.29
pan	7.52	4.29	100.00	0.00
	175.11			



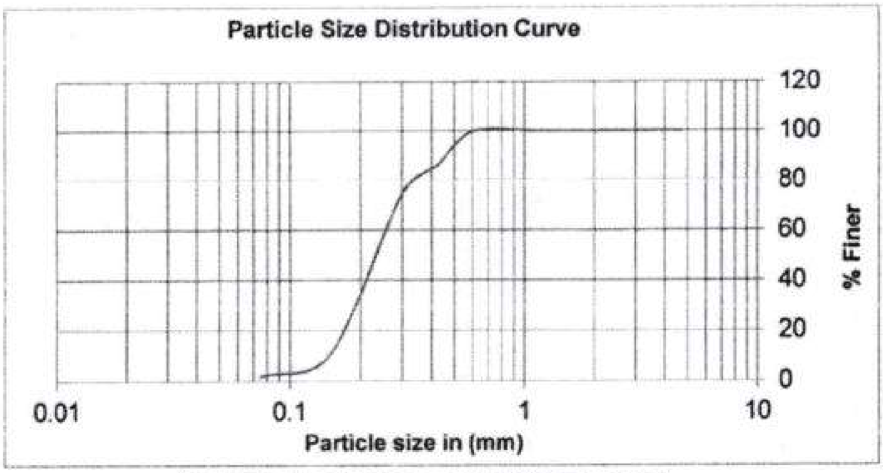
Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	95.71	4.29

RELIANT FOUNDATIONS PVT. LTD.

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-14 *Depth:22.500m*

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.32	0.17	0.17	99.83
0.600	1.02	0.53	0.70	99.30
0.425	24.69	12.92	13.62	86.38
0.300	18.58	9.72	23.35	76.65
0.150	125.63	65.75	89.10	10.90
0.075	14.50	7.59	96.69	3.31
pan	6.32	3.31	100.00	0.00
	191.06			

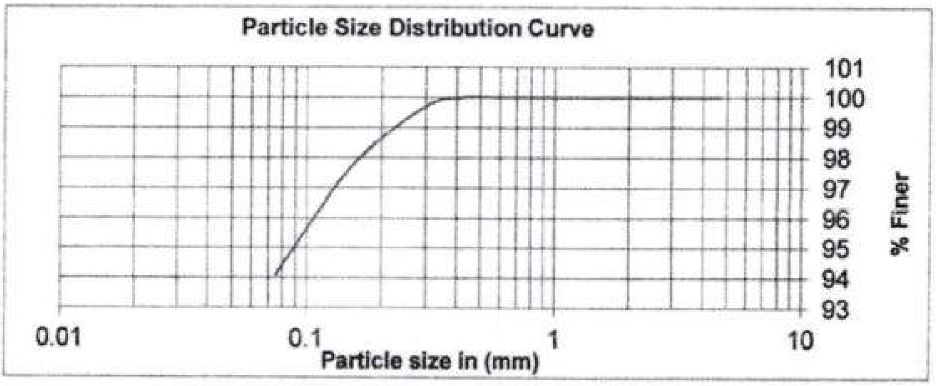


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	96.69	3.31

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-15 **Depth:7.50m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	1.25	0.29	0.29	99.71
0.150	8.69	2.04	2.34	97.66
0.075	15.21	3.58	5.91	94.09
pan	400.21	94.09	100.00	0.00
	425.36			

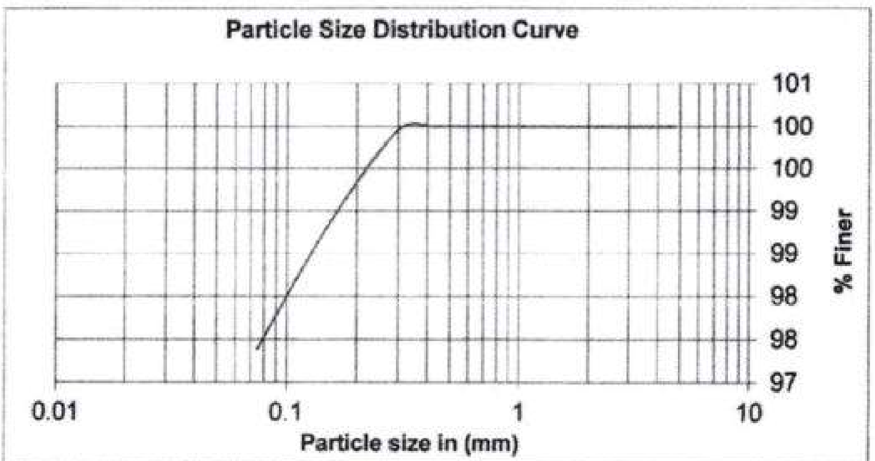


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	5.91	94.09

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-15 Depth:13.50m

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	2.21	0.62	0.62	99.38
0.150	10.21	2.86	3.48	96.52
0.075	24.58	6.88	10.36	89.64
pan	320.14	89.64	100.00	0.00
	357.14			

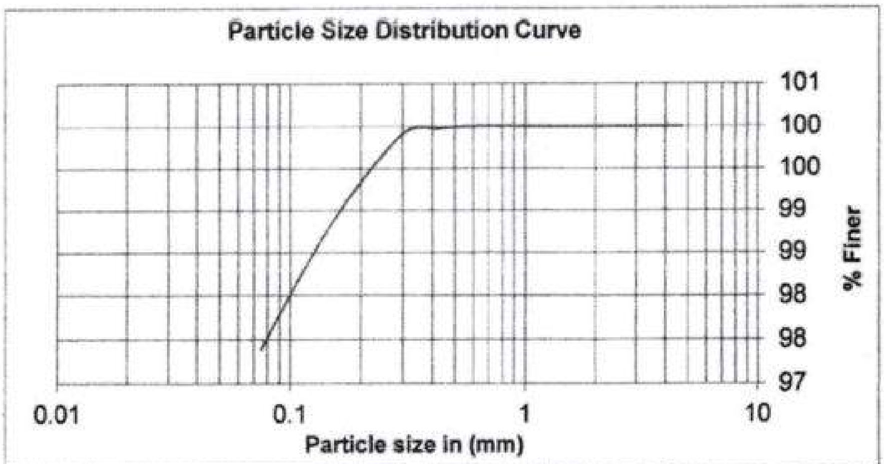


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	10.36	89.64

__GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)__

__BH:-15__ *__Depth:16.50m__*

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	2.01	0.99	0.99	99.01
0.425	14.65	7.21	8.20	91.80
0.300	36.58	18.00	26.20	73.80
0.150	120.21	59.15	85.34	14.66
0.075	20.14	9.91	95.25	4.75
pan	9.65	4.75	100.00	0.00
	203.24			



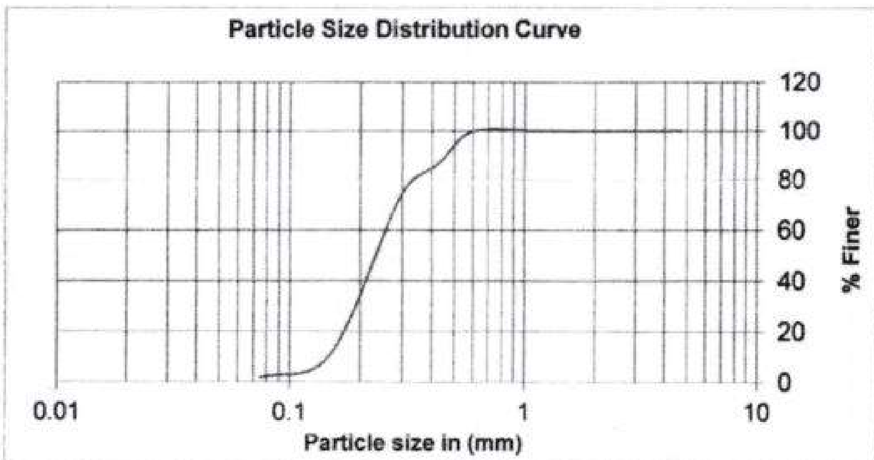
Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	95.25	4.75

RELIANT FOUNDATIONS PVT. LTD. * GH-35 *

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-15 ***Depth:21.00m***

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.25	0.12	0.12	99.88
0.600	2.21	1.07	1.19	98.81
0.425	25.39	12.24	13.43	86.57
0.300	20.17	9.72	23.15	76.85
0.150	130.21	62.77	85.92	14.08
0.075	21.33	10.28	96.21	3.79
pan	7.87	3.79	100.00	0.00
	207.43			

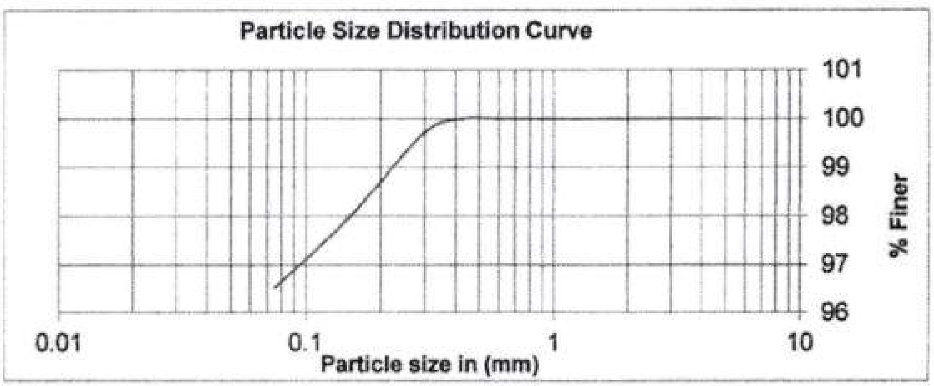


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	96.21	3.79

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-16 ***Depth:7.50m***

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	1.21	0.28	0.28	99.72
0.150	7.58	1.74	2.02	97.98
0.075	6.32	1.45	3.47	96.53
pan	420.21	96.53	100.00	0.00
	435.32			

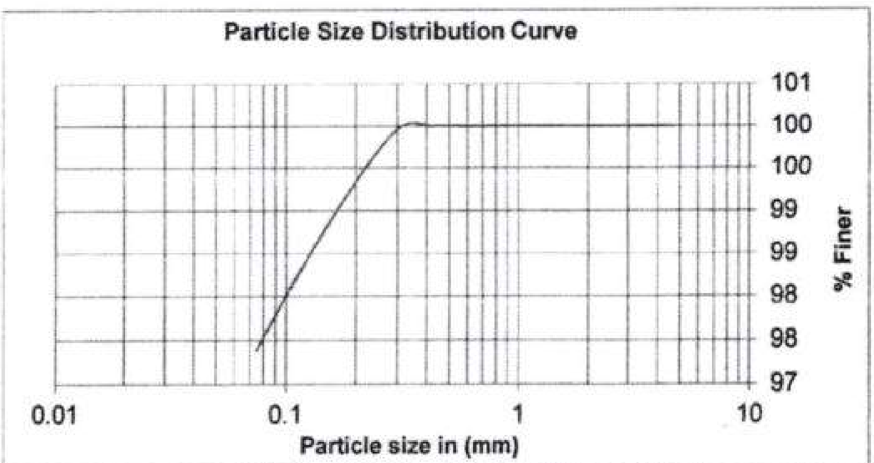


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	3.47	96.53

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-16 Depth:13.50m

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	0.00	0.00	0.00	100.00
0.425	0.00	0.00	0.00	100.00
0.300	1.01	0.30	0.30	99.70
0.150	9.87	2.94	3.24	96.76
0.075	25.63	7.62	10.86	89.14
pan	299.65	89.14	100.00	0.00
	336.16			

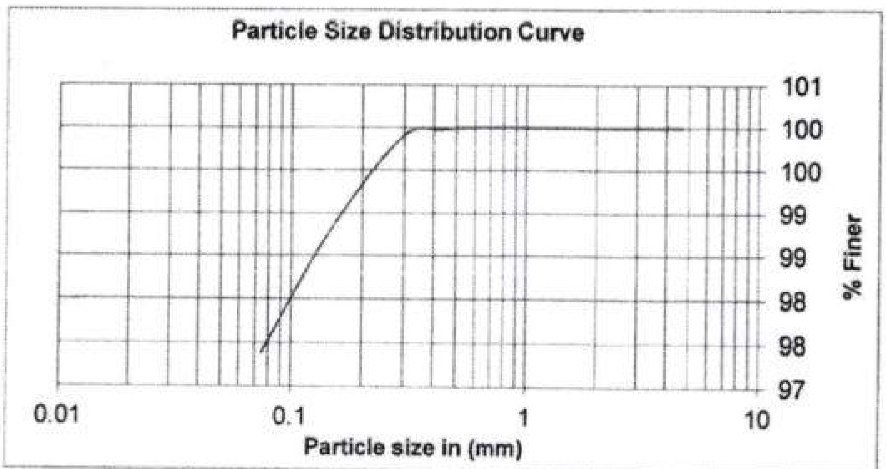


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	10.86	89.14

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-16 Depth:16.50m

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.00	0.00	0.00	100.00
0.600	1.47	0.73	0.73	99.27
0.425	15.21	7.56	8.29	91.71
0.300	35.69	17.73	26.02	73.98
0.150	118.36	58.80	84.81	15.19
0.075	21.25	10.56	95.37	4.63
pan	9.32	4.63	100.00	0.00
	201.30			

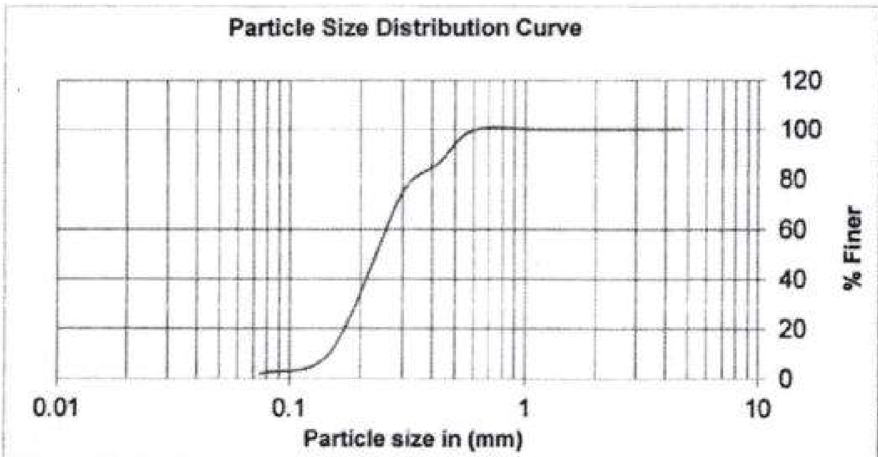


Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	95.37	4.63

GRAIN SIZE ANALYSIS, As per IS: 2720 (Part- IV)

BH:-16 **Depth:21.00m**

IS Sieve Size (mm)	Wt. Retained (gm)	Percentage Wt. retained (gm)	Cumulative percent retained (%)	Percent finer (%)
4.75	0.00	0.00	0.00	100.00
2.36	0.00	0.00	0.00	100.00
1.18	0.21	0.10	0.10	99.90
0.600	2.21	1.06	1.16	98.84
0.425	25.39	12.14	13.30	86.70
0.300	21.58	10.32	23.62	76.38
0.150	132.58	63.41	87.03	12.97
0.075	20.14	9.63	96.66	3.34
pan	6.99	3.34	100.00	0.00
	209.10			



Gravel (%)	Sand (%)	Silt & Clay (%)
0.00	96.66	3.34

RELIANT FOUNDATIONS PVT. LTD.

:ANNEX-VI:

SHEAR TEST RESULT

(DIRECT & TRIAXIAL SHEAR TEST)

SHEAR TEST RESULT

BH NO.	DEPTH(M)	COHESION 'C' kg/cm²	ANGLE OF INTERNAL FRICTION (Φ°)	TYPE OF TEST
BH01	23.00	0	38	Direct Shear Test
	29.00	0	39	
BH02	23.00	0	36	
	29.00	0	38	
BH03	23.00	0	38	
	29.00	0	39	
BH04	20.00	0	35	
	23.00	0	36	
BH05	24.50	0	36	
	29.00	0	38	
BH06	23.00	0	38	
	29.00	0	39	
BH07	23.00	0	37	
	29.00	0	39	
BH08	23.00	0	39	
	29.00	0	40	
BH09	23.00	0	36	
	29.00	0	39	
BH10	23.00	0	38	
	29.00	0	39	
BH11	15.50	0	33	
	17.00	0	34	
BH12	20.00	0	37	
	23.00	0	38	
BH13	20.00	0	35	
	23.00	0	36	
BH14	17.00	0	35	
	20.00	0	37	
BH15	17.00	0	37	
	20.00	0	38	
BH16	17.00	0	35	
	20.00	0	37	

RELIANT FOUNDATIONS PVT. LTD. * GHY-35 *

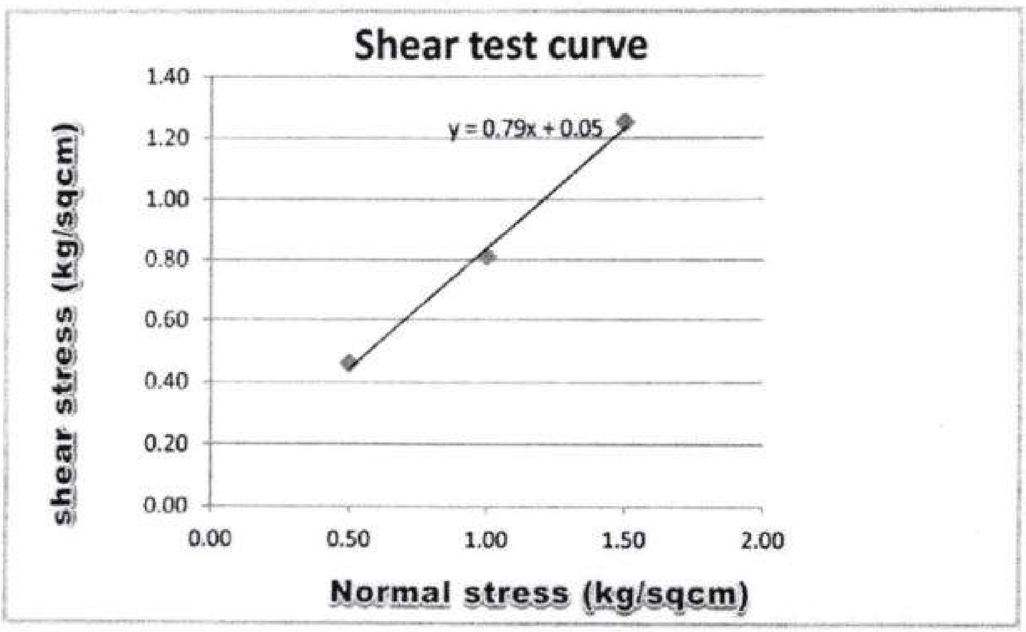
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

Sample **BH-01** **Depth =23.0m**

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.46
2.00	1.00	0.81
3.00	1.50	1.25



c=0.0kg/sqcm
Φ = 38˚

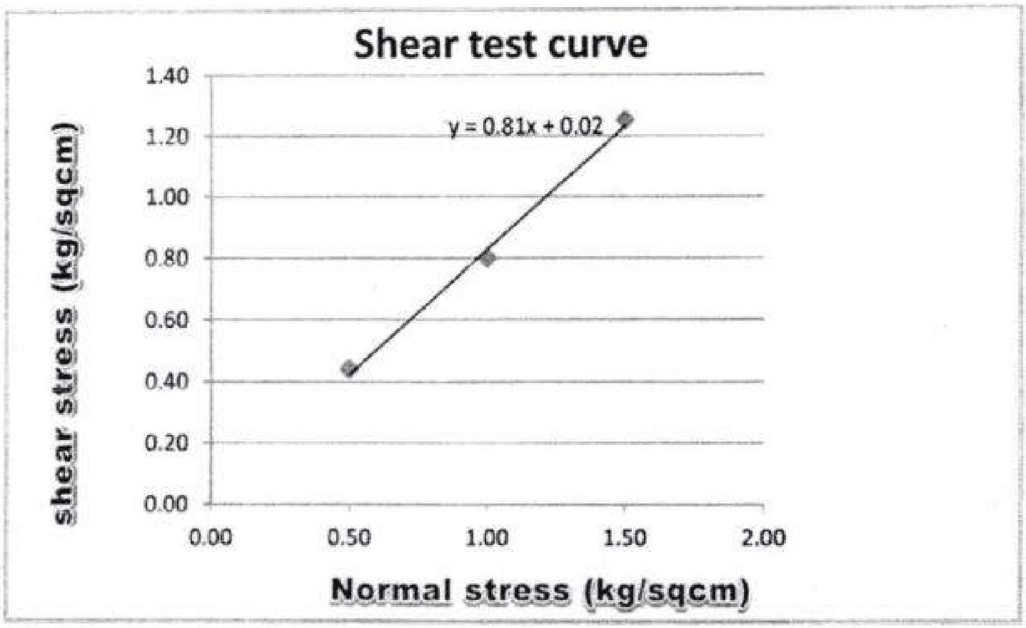
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

Sample **BH-01** **Depth =29.0m**

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.44
2.00	1.00	0.80
3.00	1.50	1.25



c=0.0kg/sqcm
Φ = 39°

SHEAR

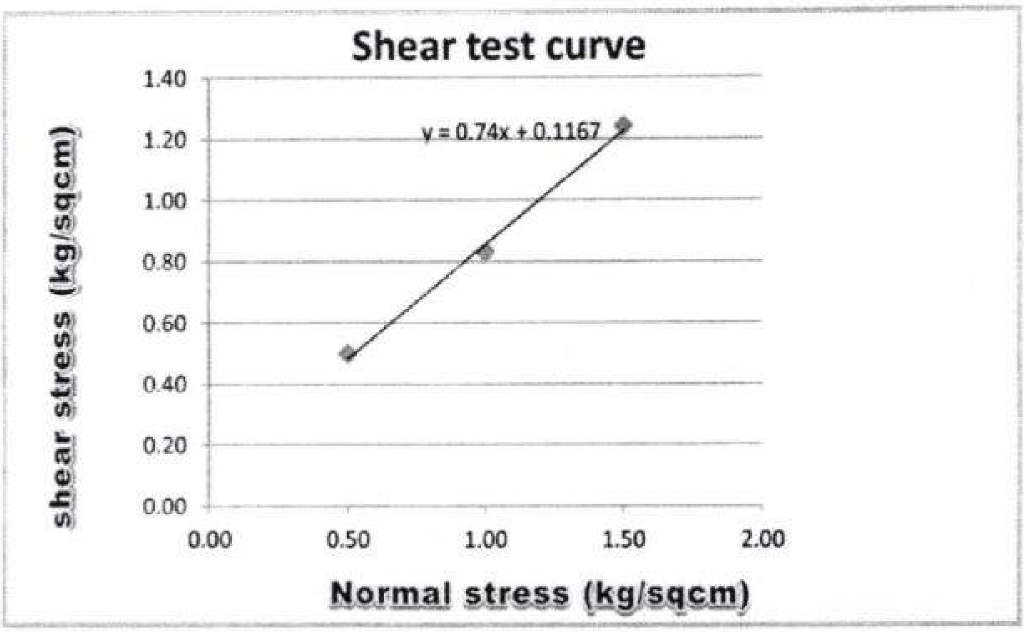
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-02 , Depth =23.00m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.50
2.00	1.00	0.83
3.00	1.50	1.24



c=0.0kg/sqcm
$\Phi = 36^{\circ}$

SHEAR

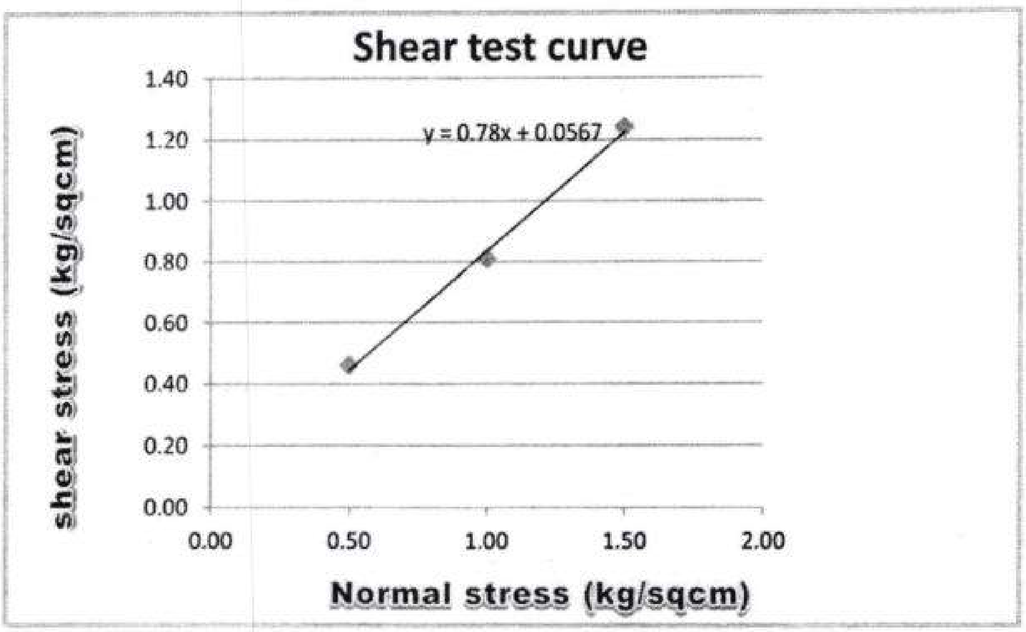
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-02 , Depth =29.00m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.46
2.00	1.00	0.81
3.00	1.50	1.24



c=0.0kg/sqcm
Φ = 38°

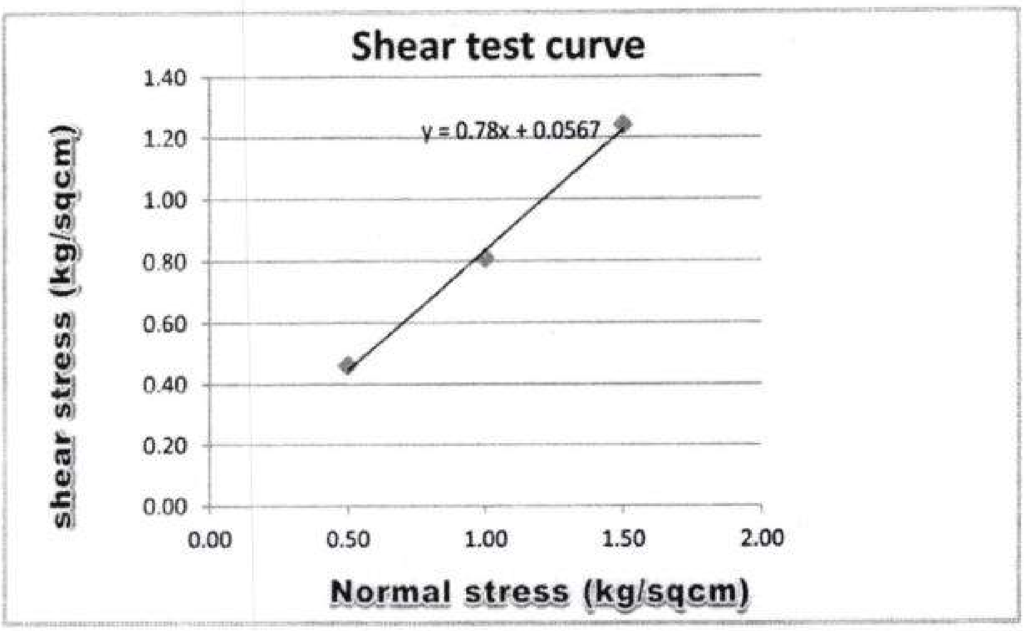
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-03 Depth =23.00m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.46
2.00	1.00	0.81
3.00	1.50	1.24



c=0.0kg/sqcm
$\Phi = 38^{\circ}$

SHEAR

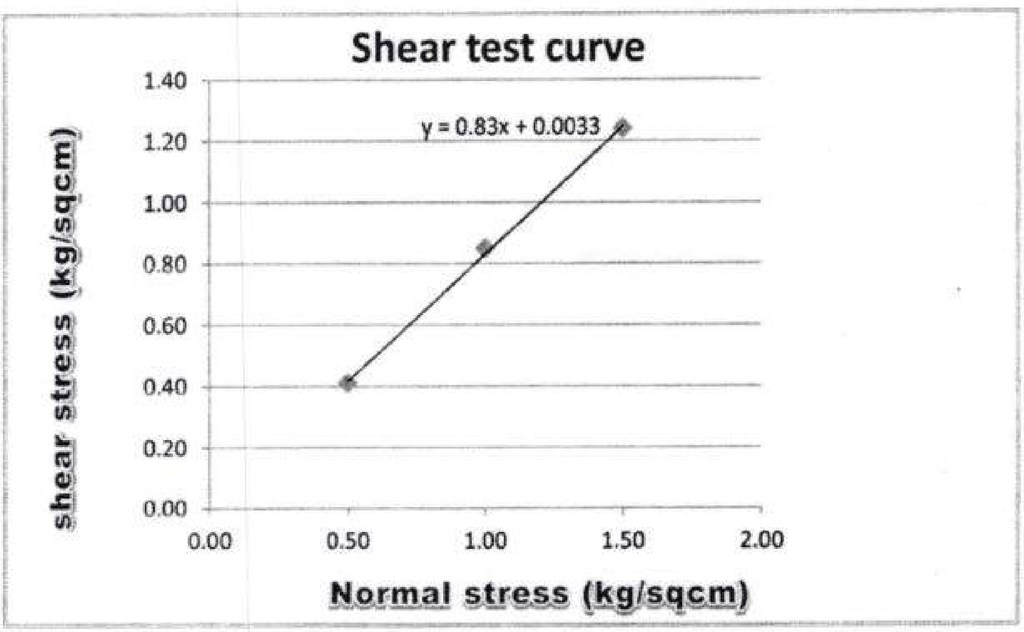
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-03 Depth =29.00m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.41
2.00	1.00	0.85
3.00	1.50	1.24



c=0.0kg/sqcm
Φ = 39°

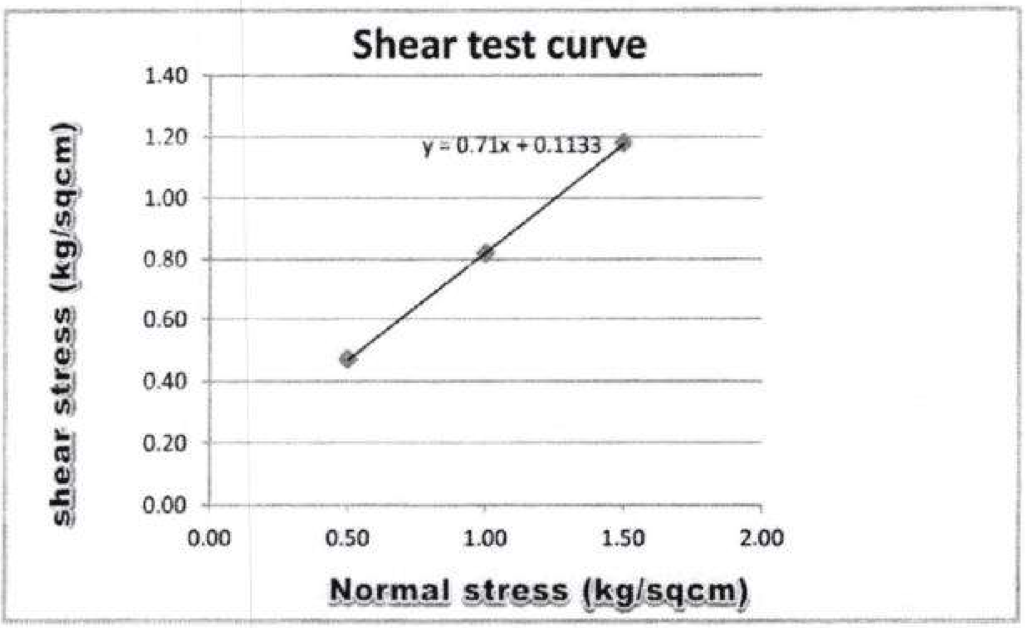
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-04 Depth =20.0m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.47
2.00	1.00	0.82
3.00	1.50	1.18



c=0.0kg/sqcm
Φ =35˚

SHEAR

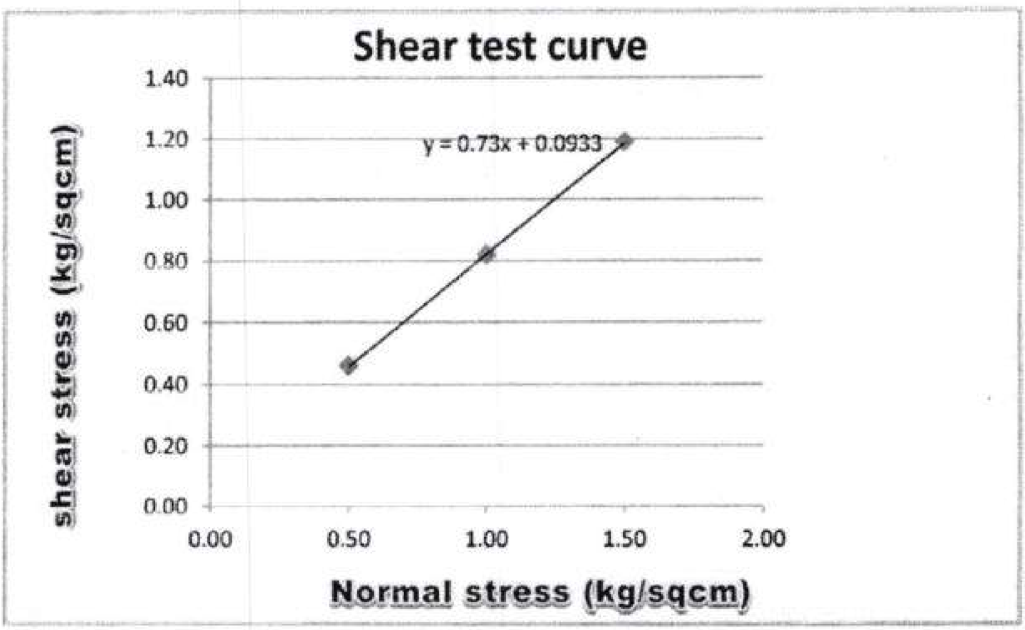
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-04 Depth =23.0m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.46
2.00	1.00	0.82
3.00	1.50	1.19



c=0.0kg/sqcm
Φ =36˚

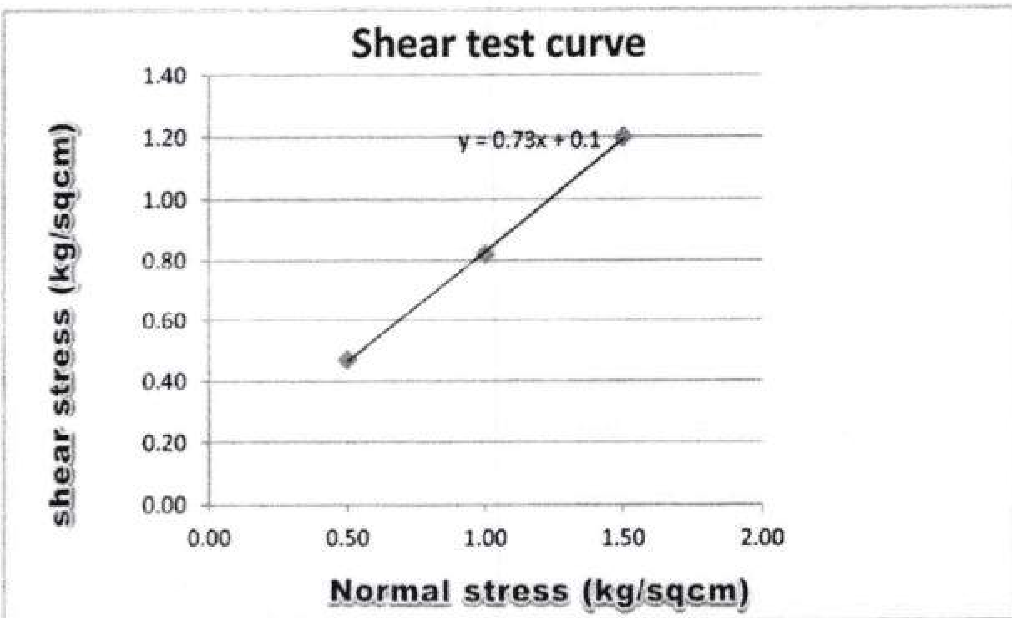
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-05 Depth =24.50m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.47
2.00	1.00	0.82
3.00	1.50	1.20



c=0.0kg/sqcm
Φ =36˚

SHEAR

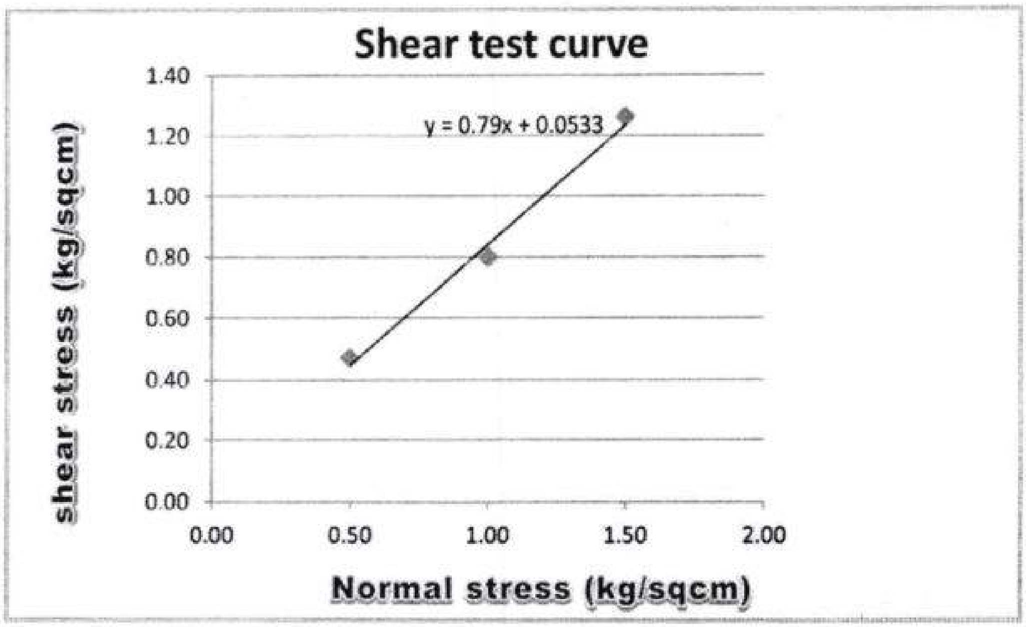
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-05 Depth =29.0m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.47
2.00	1.00	0.80
3.00	1.50	1.26



c=0.0kg/sqcm
Φ = 38°

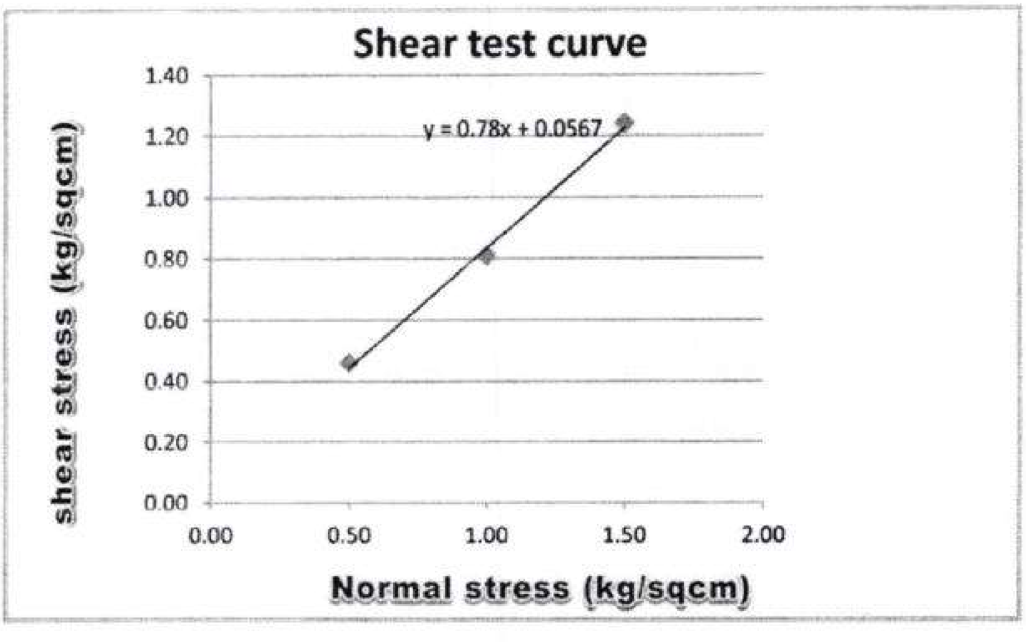
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-06 Depth =23.00m

Shear Parameters determination

SI No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.46
2.00	1.00	0.81
3.00	1.50	1.24



c=0.0kg/sqcm
Φ = 38°

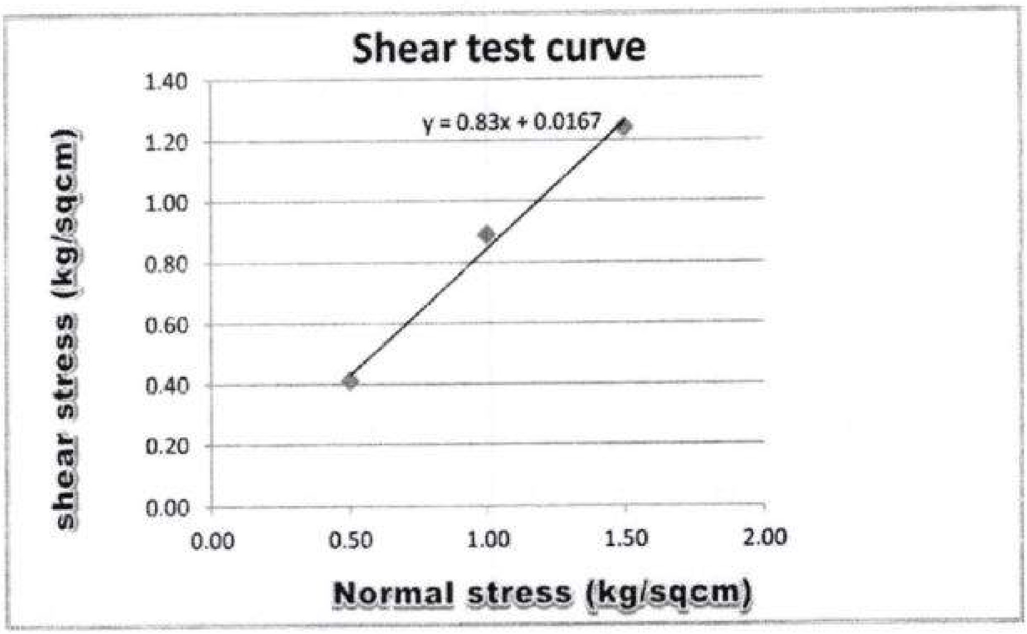
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-06 Depth =29.00m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.41
2.00	1.00	0.89
3.00	1.50	1.24



c=0.0kg/sqcm
Φ = 39˚

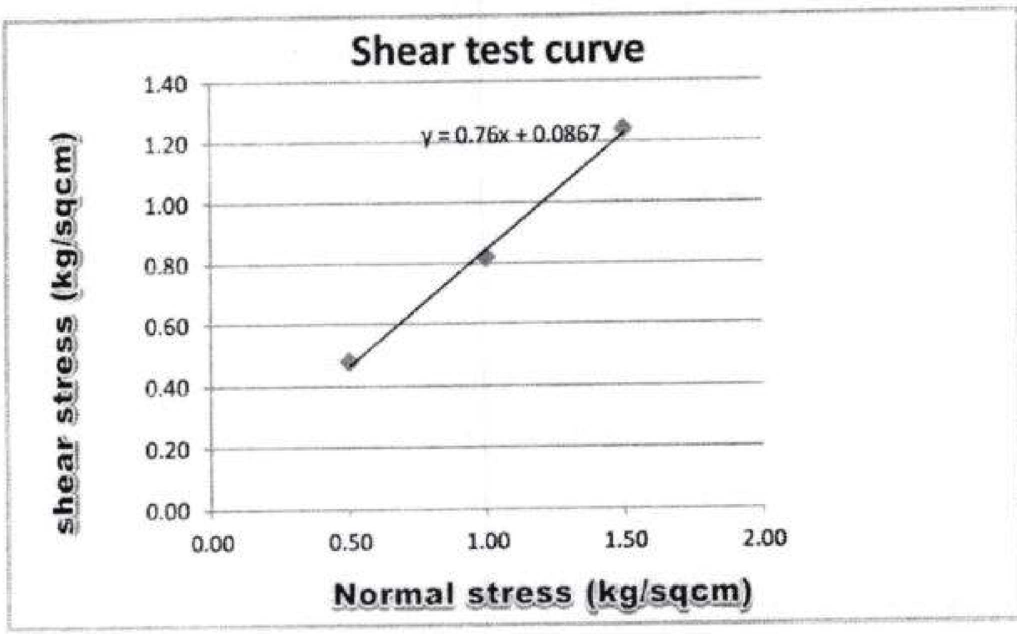
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-07 Depth =23.00m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.48
2.00	1.00	0.82
3.00	1.50	1.24



c=0.0kg/sqcm
Φ = 37°

SHEAR

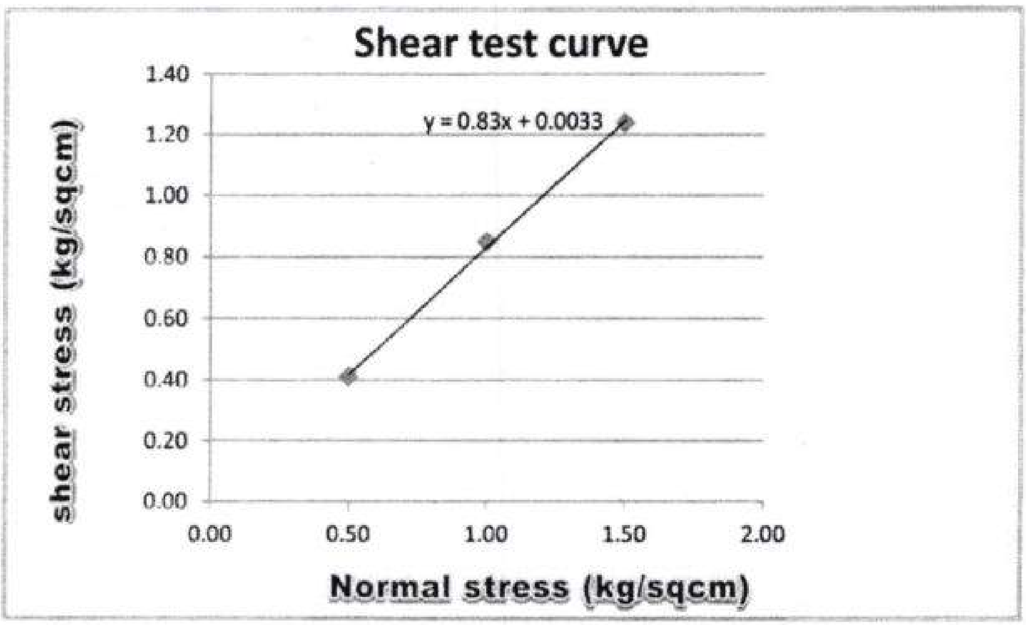
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-07 Depth =29.00m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.41
2.00	1.00	0.85
3.00	1.50	1.24



c=0.0kg/sqcm
$\Phi = 39^{\circ}$

SHEAR

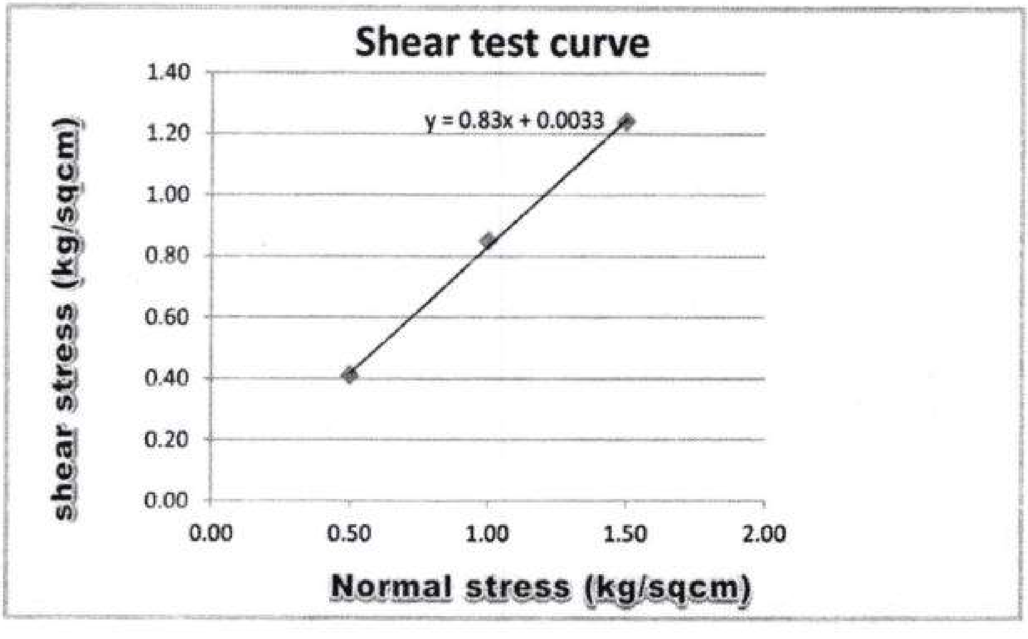
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-08 Depth =23.00m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.41
2.00	1.00	0.85
3.00	1.50	1.24



c=0.0kg/sqcm
Φ = 39˚

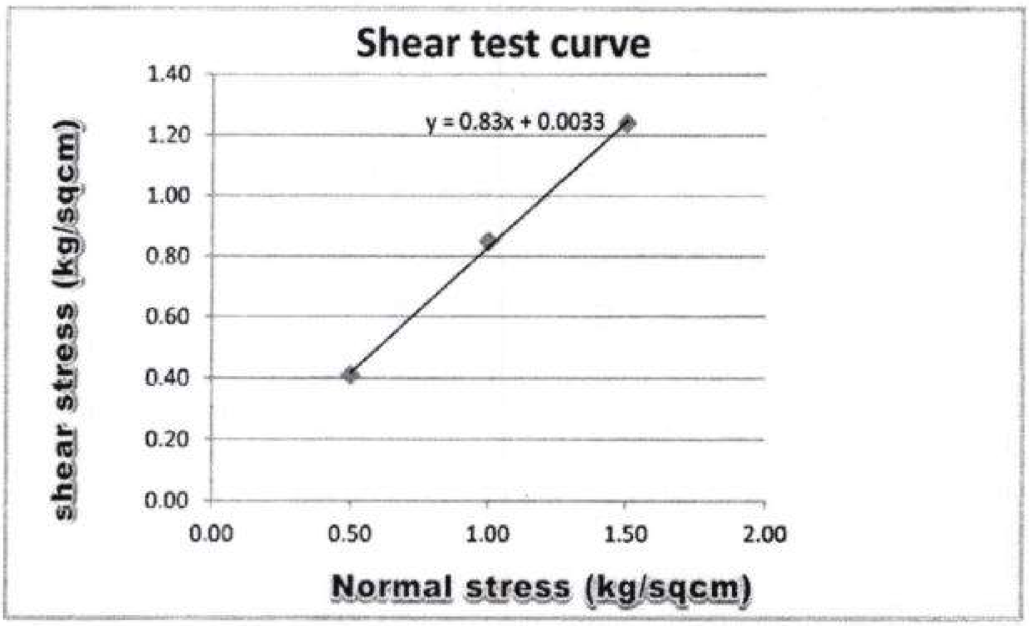
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-08 **Depth =29.00m**

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.41
2.00	1.00	0.85
3.00	1.50	1.24



c=0.0kg/sqcm
Φ = 40°

SHEAR

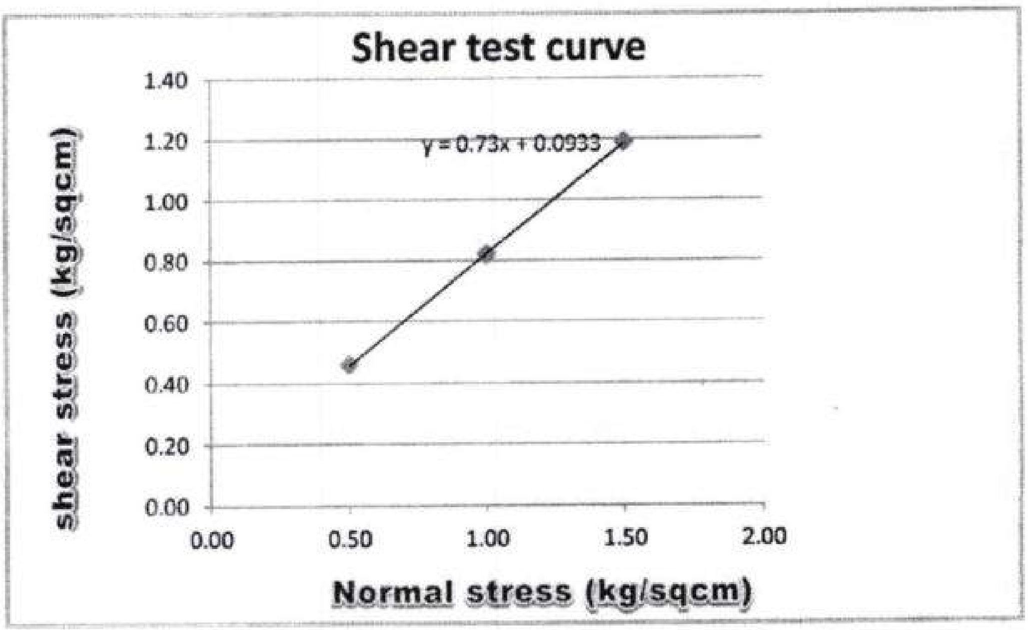
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-09 Depth =23.0m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.46
2.00	1.00	0.82
3.00	1.50	1.19



c=0.0kg/sqcm
Φ =36°

SHEAR

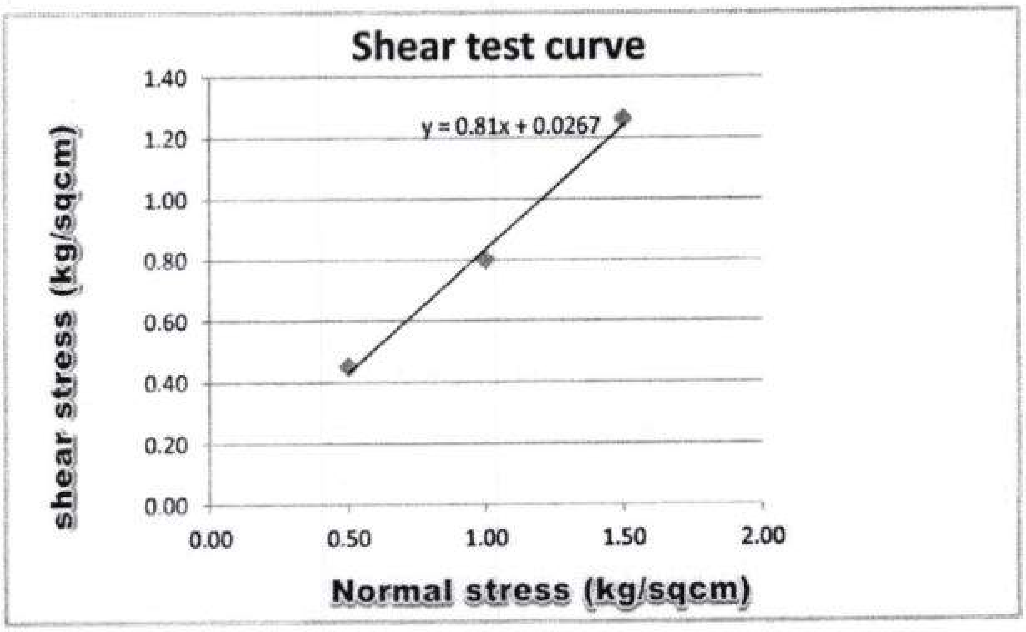
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-09 Depth =29.0m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.45
2.00	1.00	0.80
3.00	1.50	1.26



c=0.0kg/sqcm
Φ = 39˚

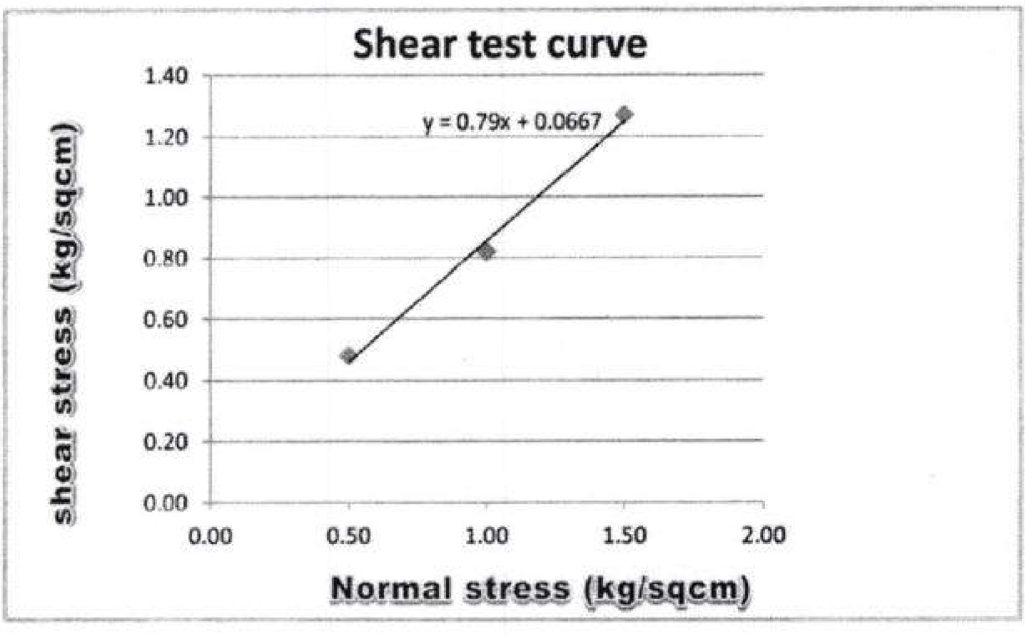
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-10 **Depth =23.0m**

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.48
2.00	1.00	0.82
3.00	1.50	1.27



c=0.0kg/sqcm
$\Phi = 38^\circ$

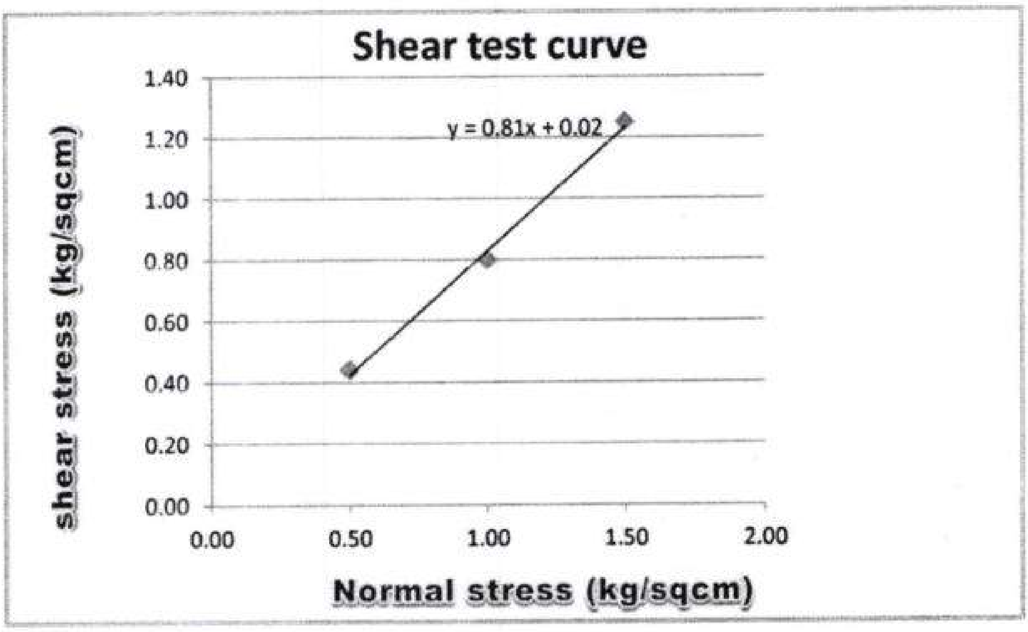
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-10 Depth =29.0m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.44
2.00	1.00	0.80
3.00	1.50	1.25



c=0.0kg/sqcm
$\Phi = 39^{\circ}$

SHEAR

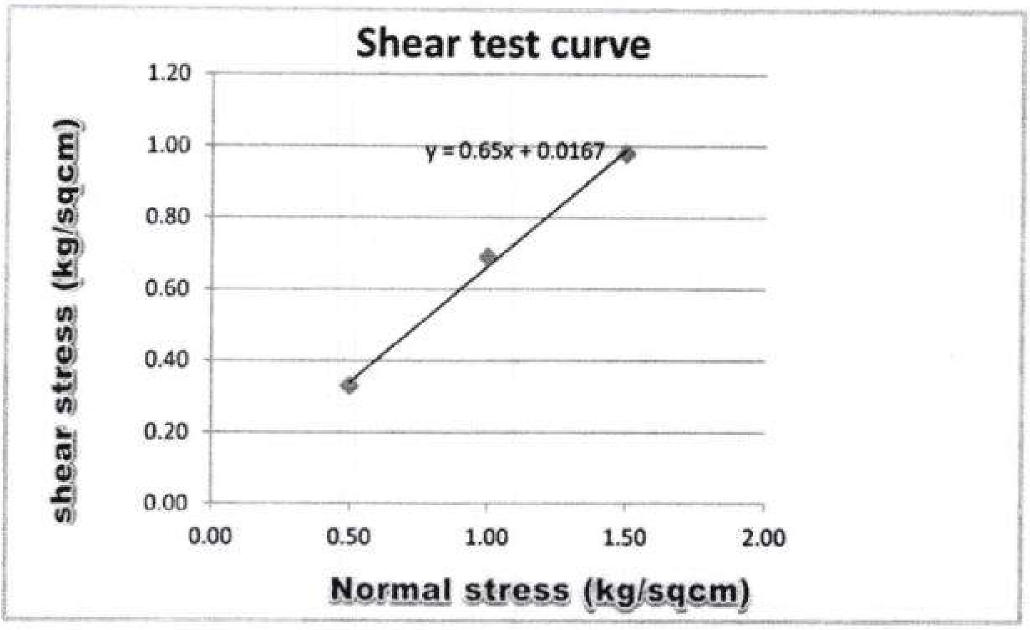
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-11 Depth =15.50m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.33
2.00	1.00	0.69
3.00	1.50	0.98



c=0.0kg/sqcm
$\Phi = 33^{\circ}$

SHEAR

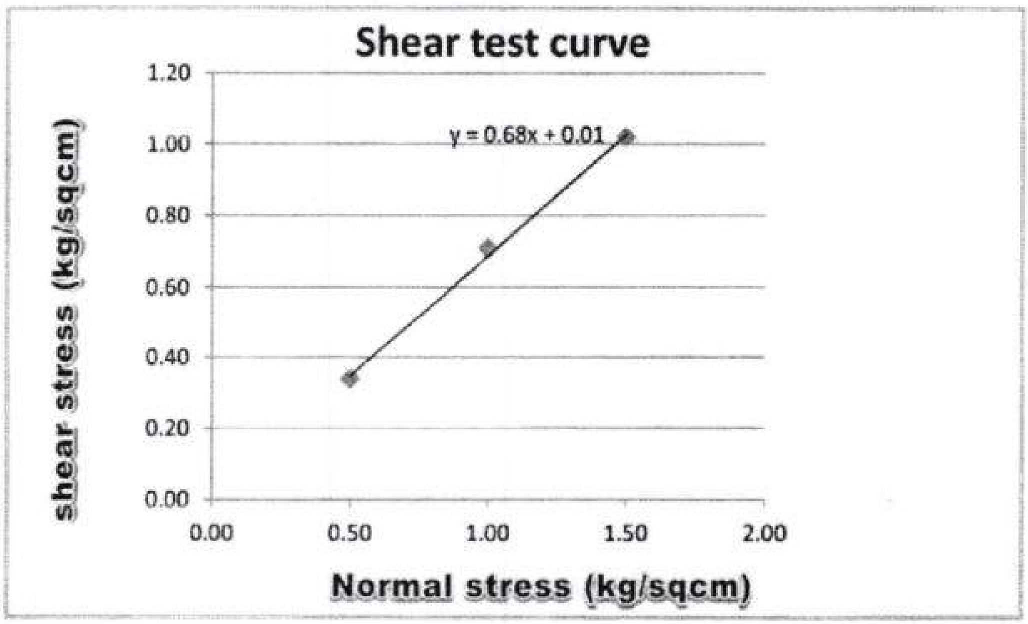
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-11 Depth =17.00m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.34
2.00	1.00	0.71
3.00	1.50	1.02



c=0.0kg/sqcm
Φ = 34°

SHEAR

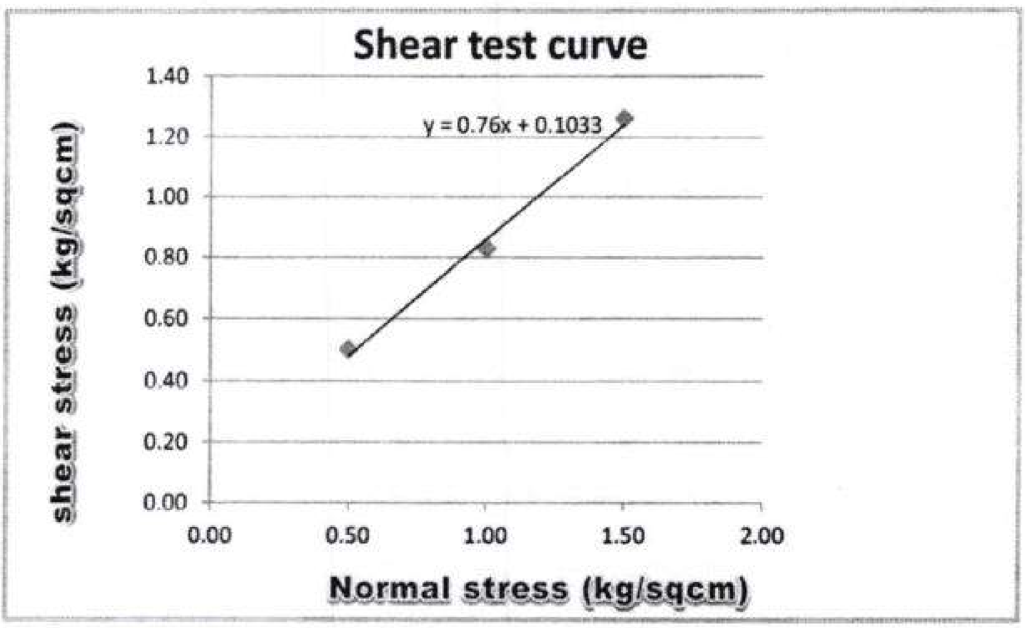
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-12 Depth =20.0m

Shear Parameters determination

SI No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.50
2.00	1.00	0.83
3.00	1.50	1.26



c=0.0kg/sqcm
Φ = 37°

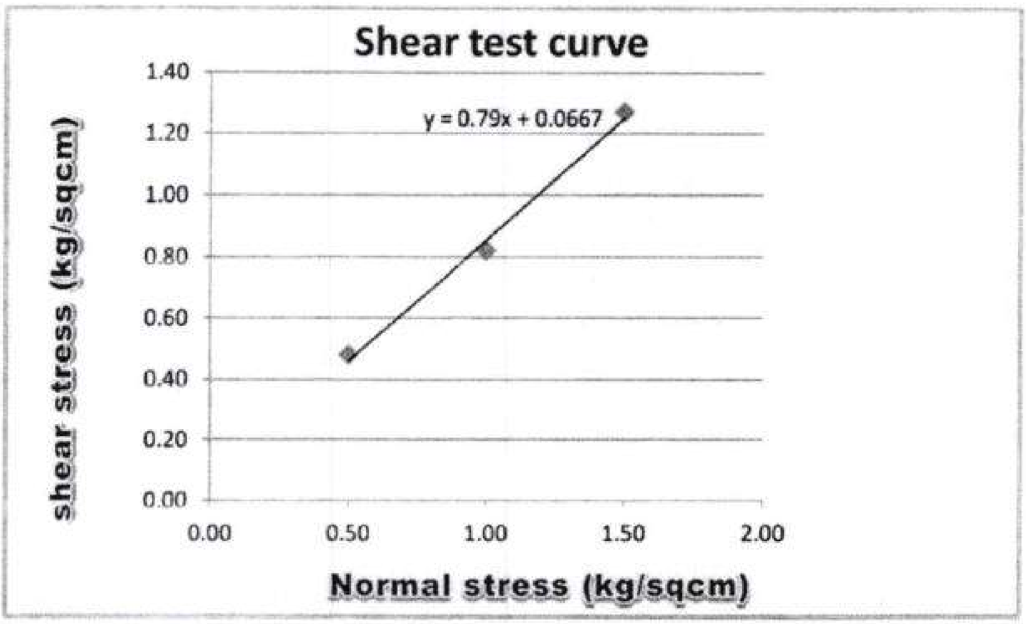
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-12 Depth =23.0m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.48
2.00	1.00	0.82
3.00	1.50	1.27



c=0.0kg/sqcm
Φ = 38°

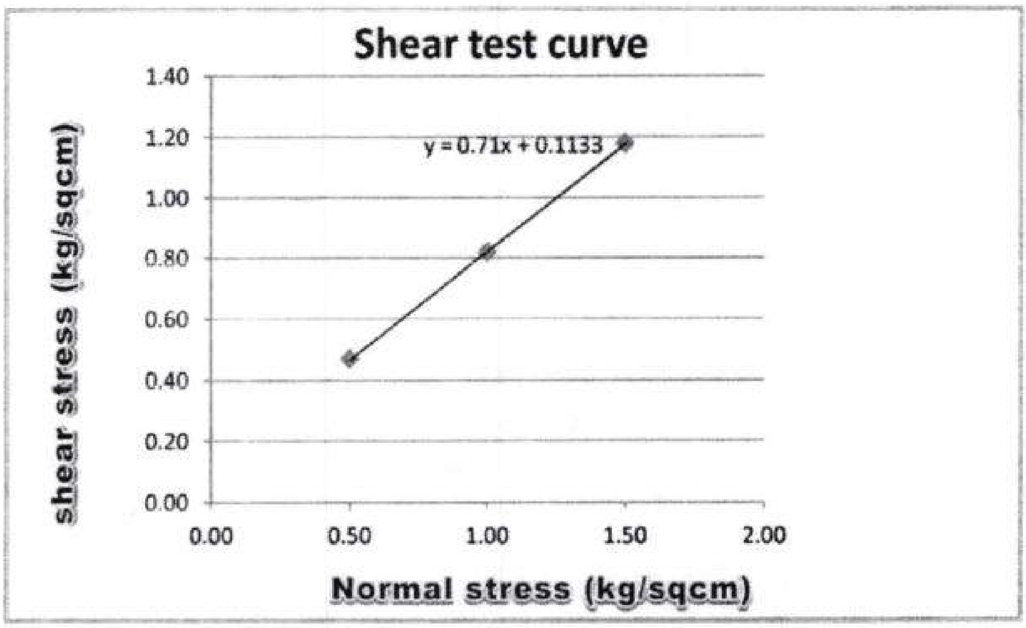
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-13 Depth =20.0m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.47
2.00	1.00	0.82
3.00	1.50	1.18



c=0.0kg/sqcm
Φ =35°

SHEAR

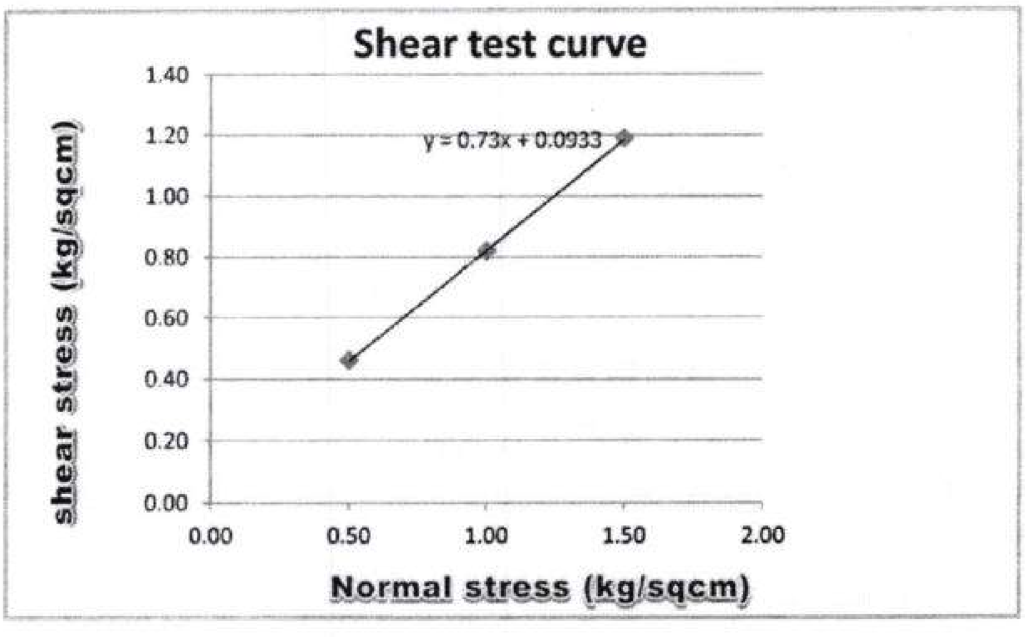
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-13 Depth =23.0m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.46
2.00	1.00	0.82
3.00	1.50	1.19



c=0.0kg/sqcm
Φ =36˚

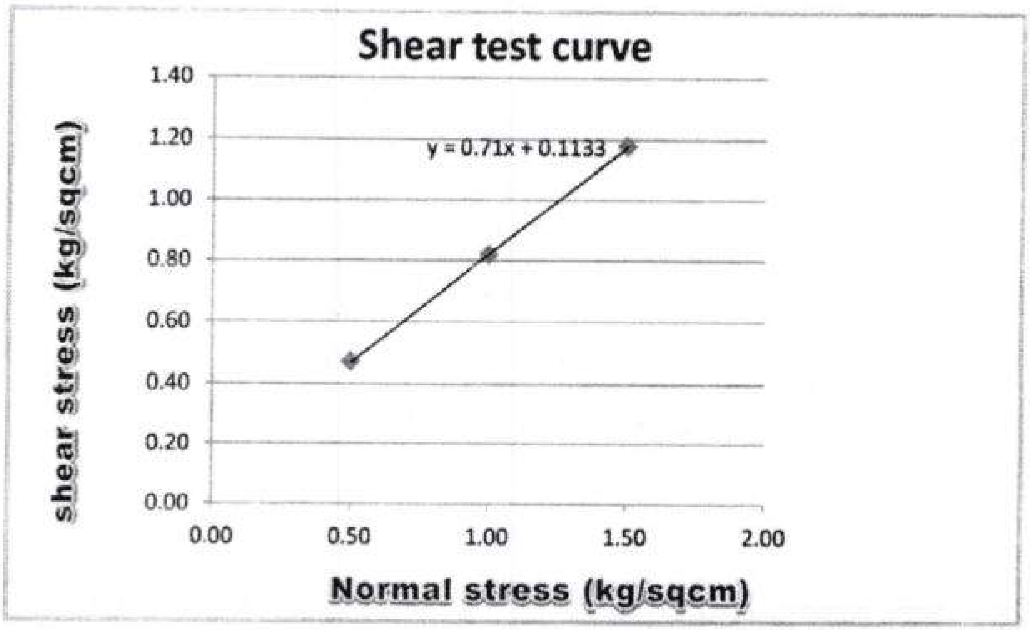
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-14 Depth =17.0m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.47
2.00	1.00	0.82
3.00	1.50	1.18



c=0.0kg/sqcm
Φ =35°

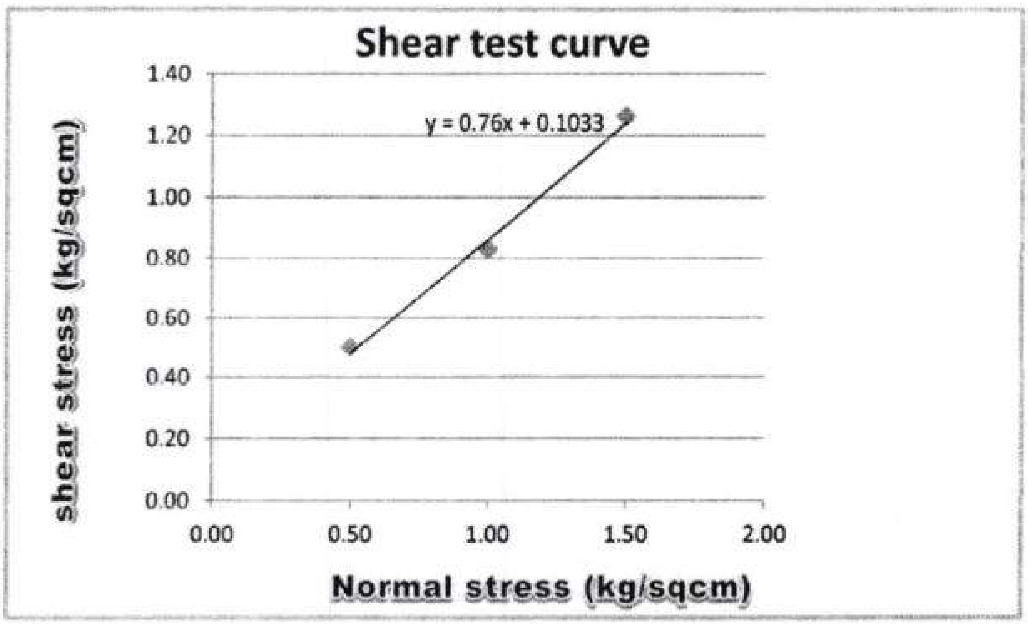
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-14 **Depth =20.0m**

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.50
2.00	1.00	0.83
3.00	1.50	1.26



c=0.0kg/sqcm
Φ = 37°

SHEAR

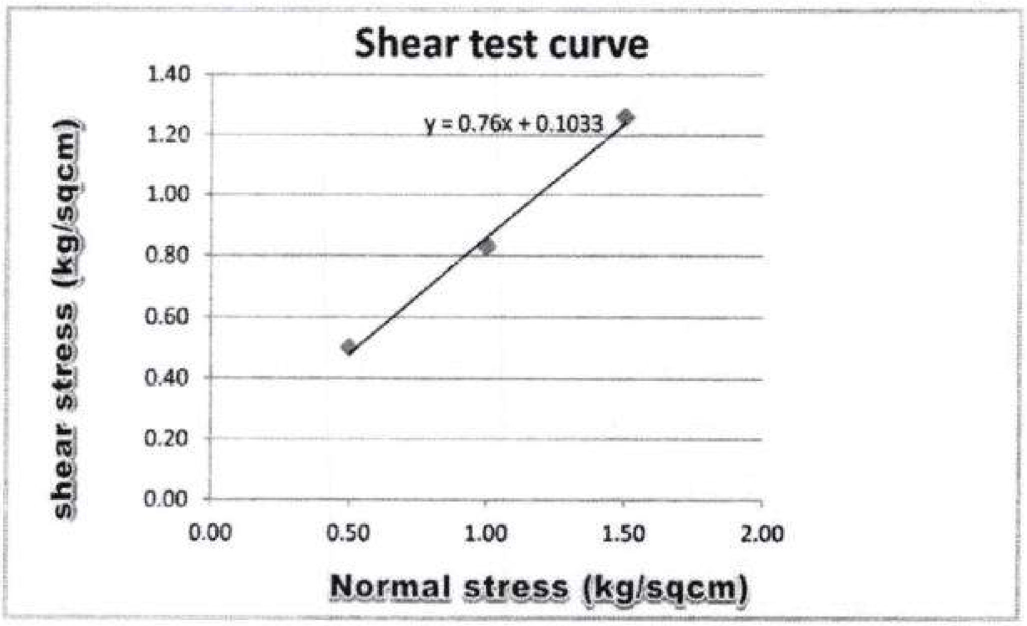
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-15 Depth =17.00m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.50
2.00	1.00	0.83
3.00	1.50	1.26



c=0.0kg/sqcm
Φ = 37°

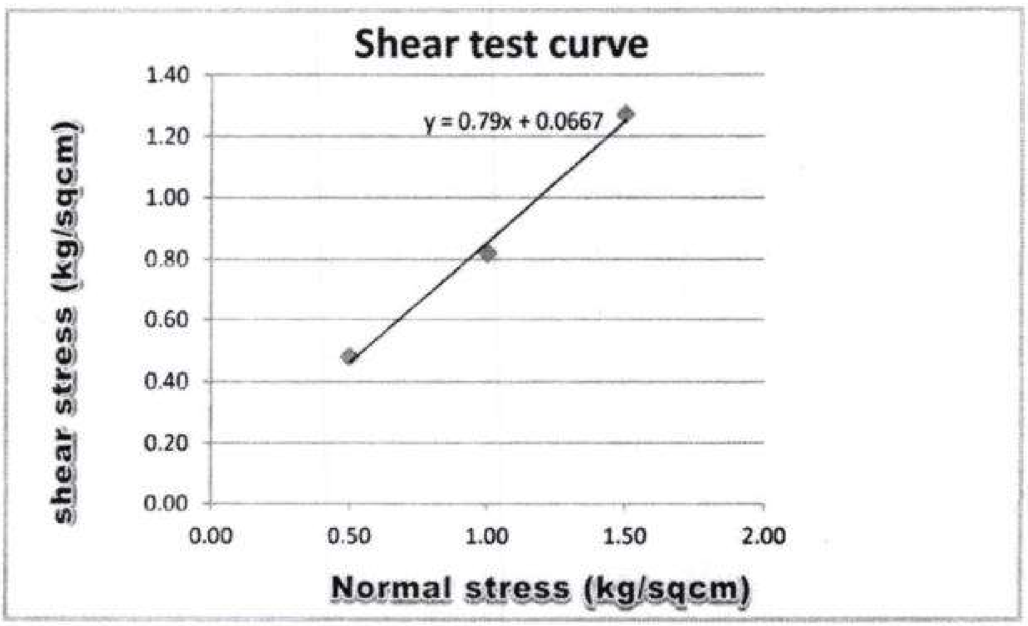
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-15 **Depth =20.0m**

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.48
2.00	1.00	0.82
3.00	1.50	1.27



c=0.0kg/sqcm
Φ = 38°

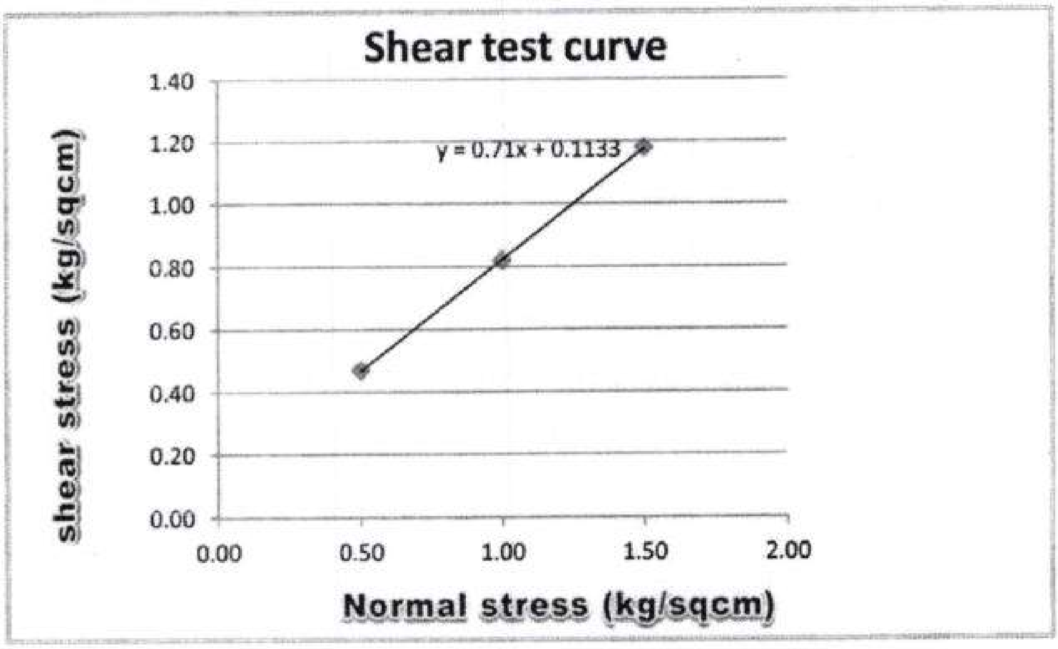
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-16 Depth =17.0m

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.47
2.00	1.00	0.82
3.00	1.50	1.18



c=0.0kg/sqcm
Φ =35°

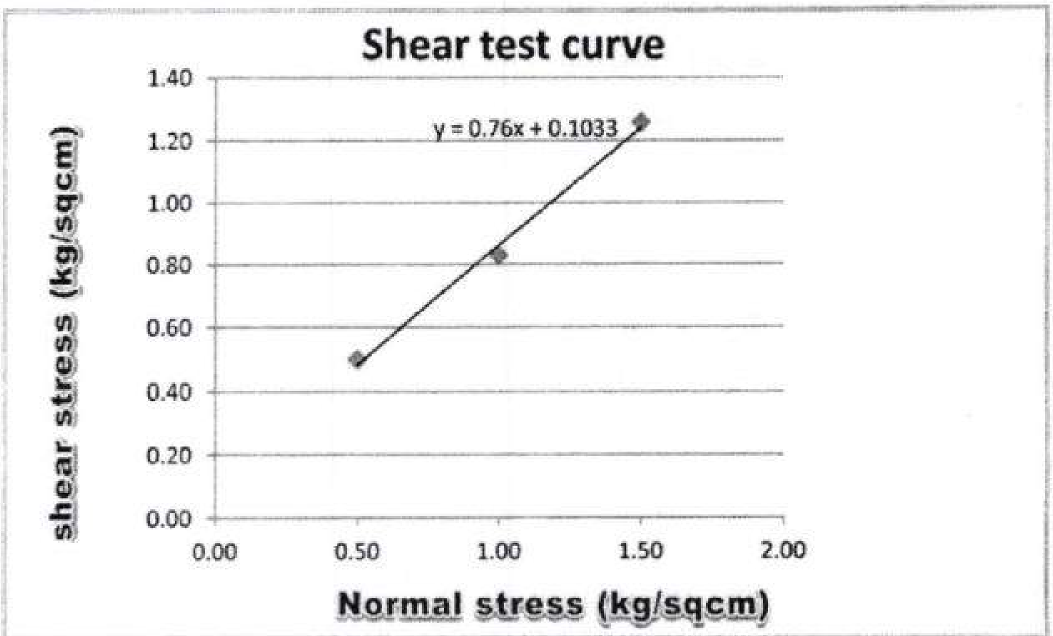
Direct Shear test result

1 Dimension : 6 cm x 6 cm
2 Thickness : 2.5 cm
3 Test condition : Drained

BH-16 **Depth =20.0m**

Shear Parameters determination

Sl No	Normal stress(Kg/sqcm)	Shear stress (Kg/sqcm)
1.00	0.50	0.50
2.00	1.00	0.83
3.00	1.50	1.26



c=0.0kg/sqcm
$\Phi = 37^{\circ}$

SHEAR TEST RESULT

BH NO.	DEPTH(M)	COHESION 'C' kg/cm²	ANGLE OF INTERNAL FRICTION (Φ°)	TYPE OF TEST
BH01	2.00	0.20	7	**Triaxial Shear Test**
	5.00	0.73	8	
BH02	2.00	0.20	7	
	5.00	0.47	8	
BH03	2.00	0.47	7	
	5.00	0.66	8	
BH04	2.00	0.22	7	
	5.00	0.61	8	
BH05	2.00	0.27	7	
	5.00	0.69	8	
BH06	2.00	0.73	8	
	5.00	0.87	8	
BH07	2.00	0.33	7	
	5.00	0.60	8	
BH08	2.00	0.25	7	
	5.00	0.56	8	
BH09	2.00	0.22	7	
	5.00	0.60	8	
BH010	5.00	0.30	7	
	8.00	0.61	8	
BH11	5.00	0.40	7	
	8.00	0.73	8	

BH NO.	DEPTH(M)	COHESION 'C' kg/cm²	ANGLE OF INTERNAL FRICTION (Φ°)	TYPE OF TEST
BH12	2.00	0.19	7	**Triaxial Shear Test**
	5.00	0.87	8	
BH13	2.00	0.33	7	
	5.00	0.20	7	
BH14	5.00	0.27	7	
	8.00	0.53	8	
BH15	2.00	0.47	7	
	5.00	0.88	8	
BH16	2.00	0.33	7	
	5.00	0.96	8	

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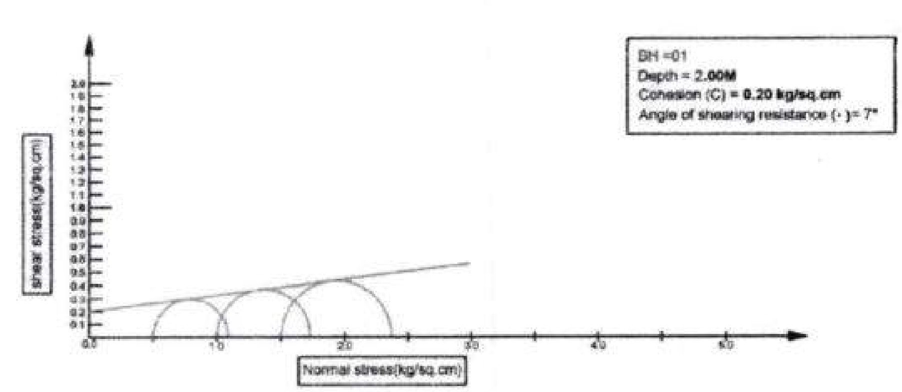
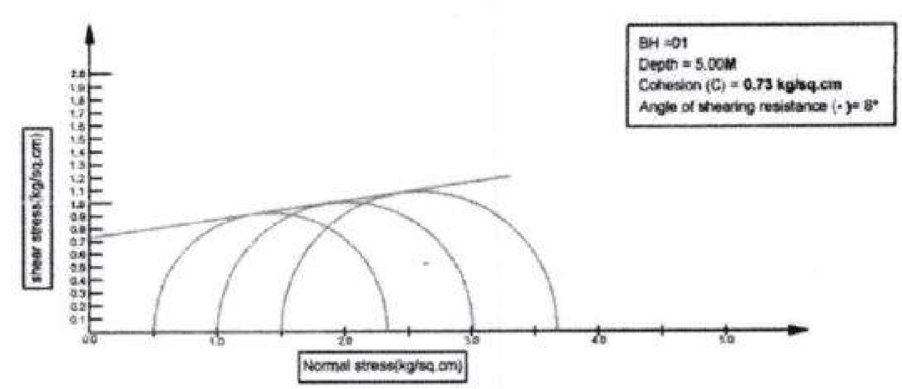
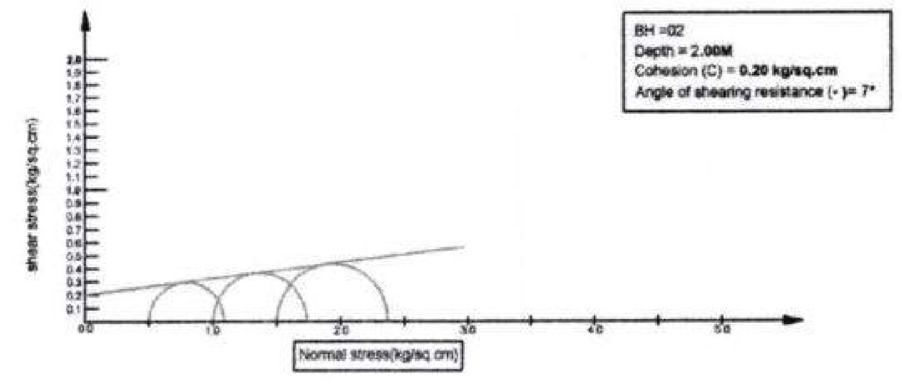
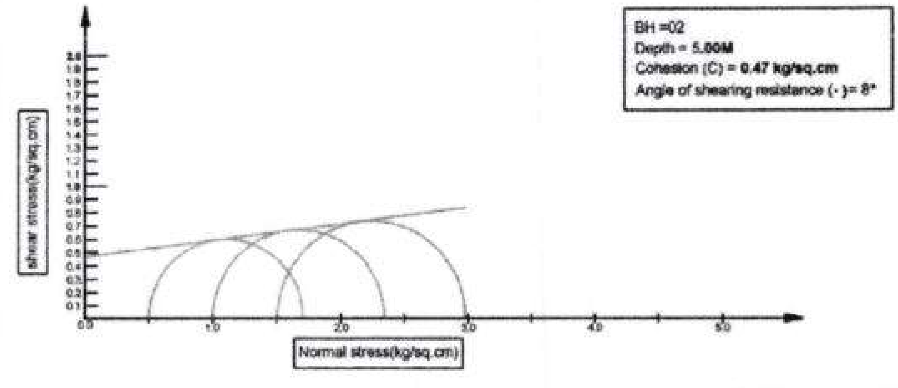
TRIAXIAL SHAER TEST









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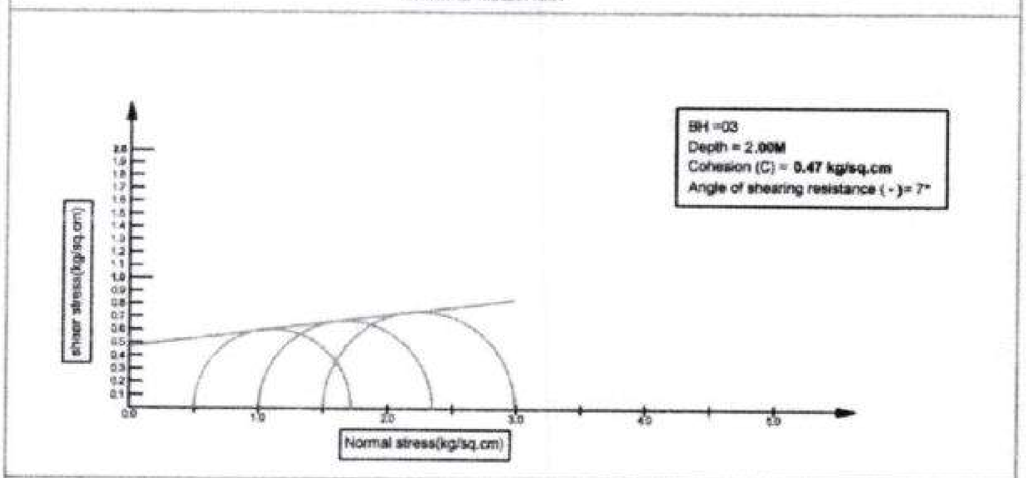

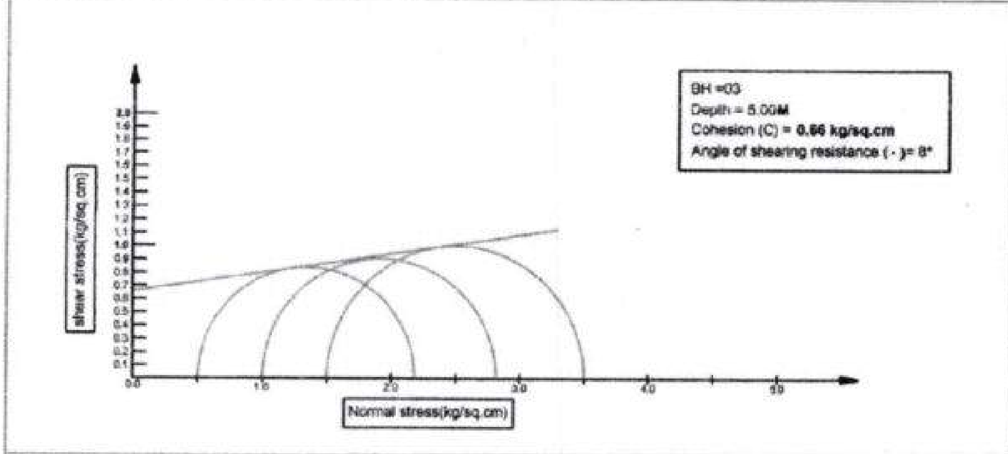

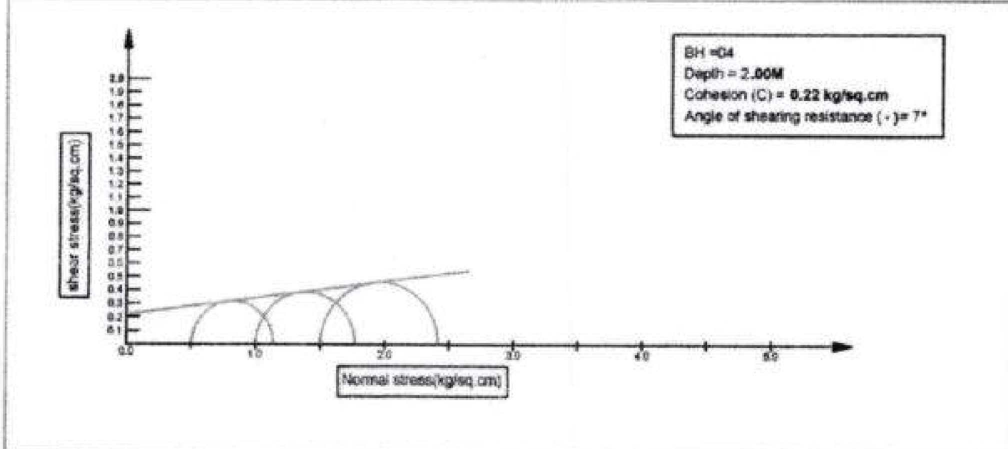

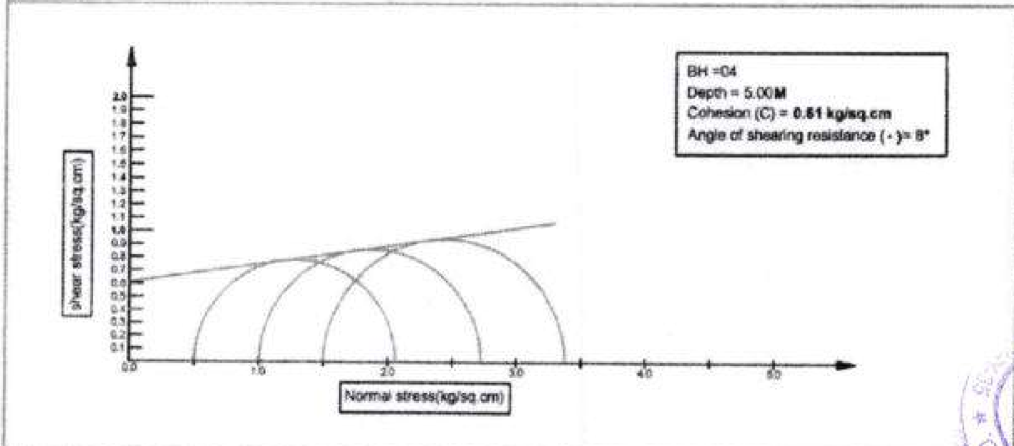

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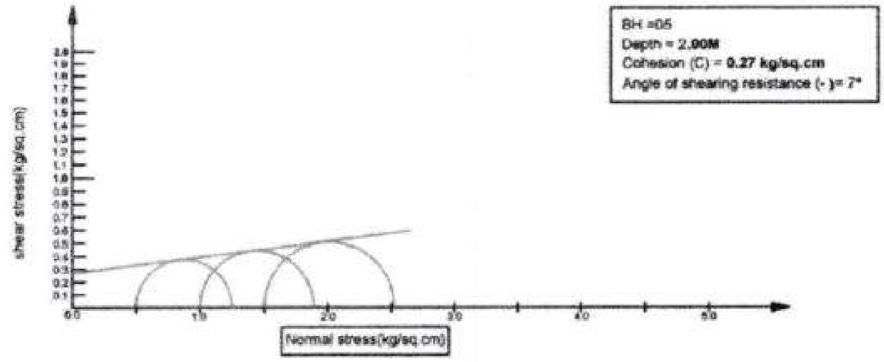

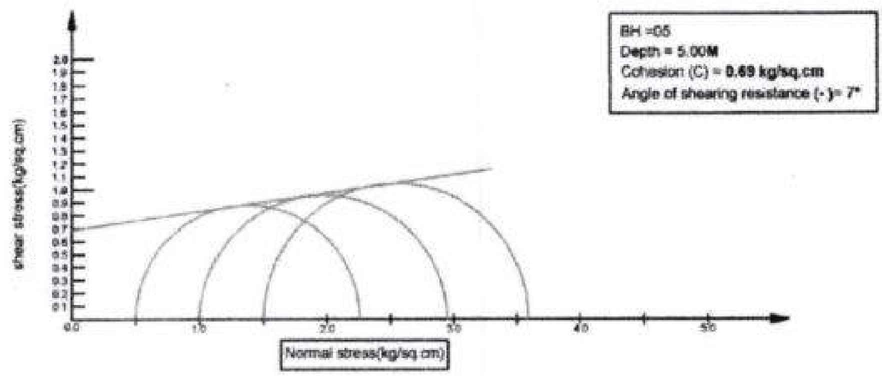

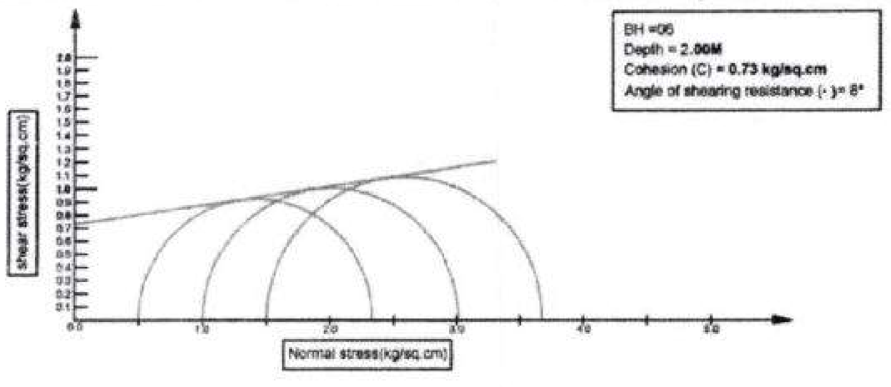

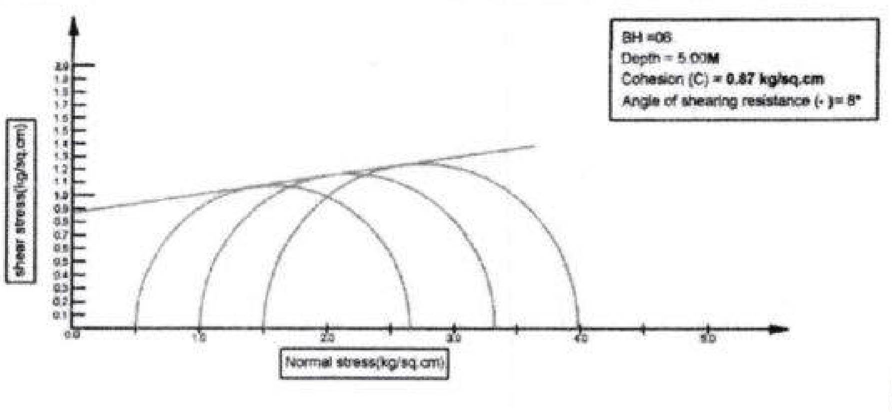

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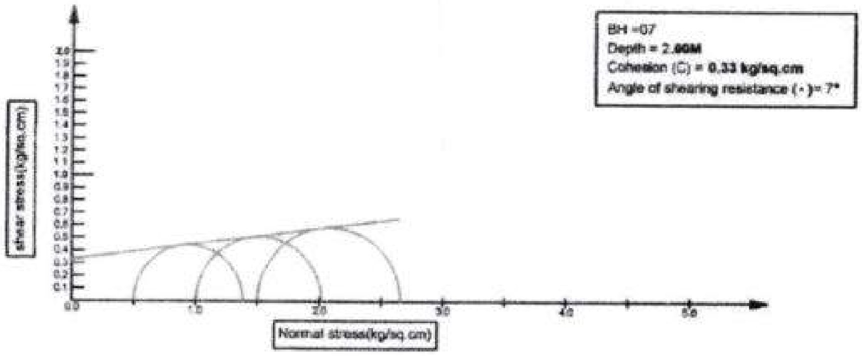

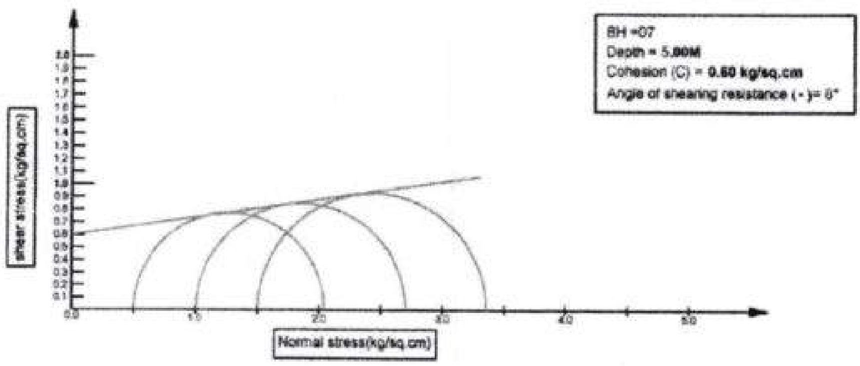

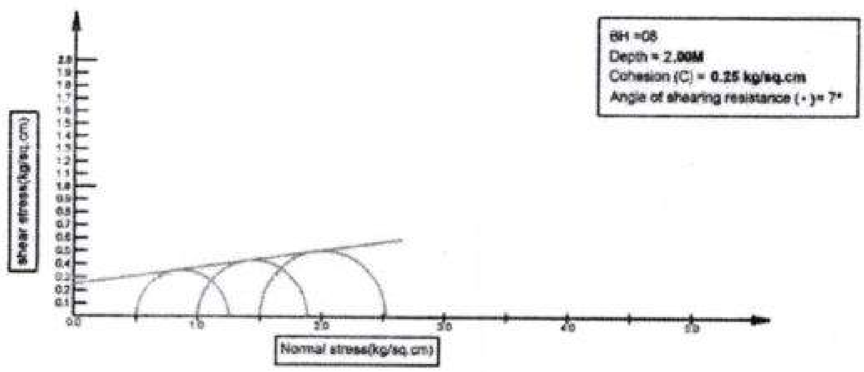

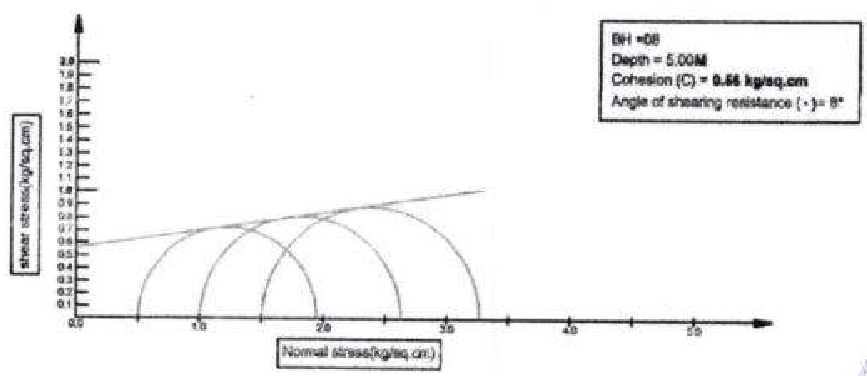

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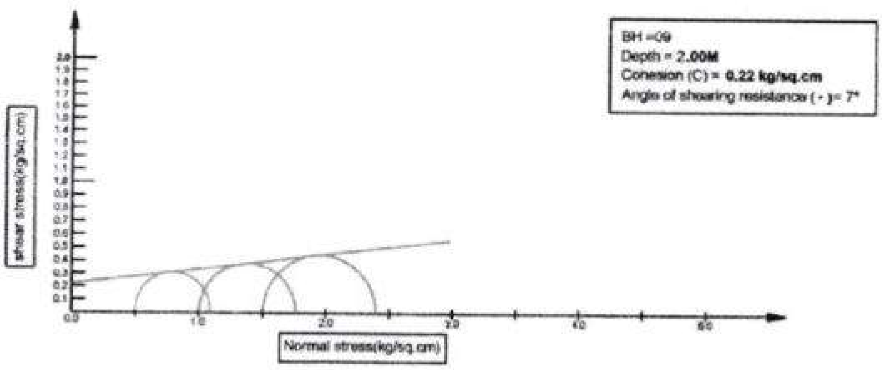

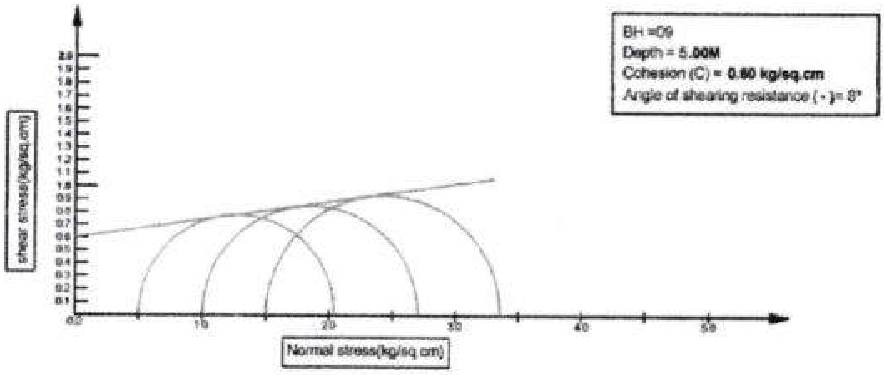

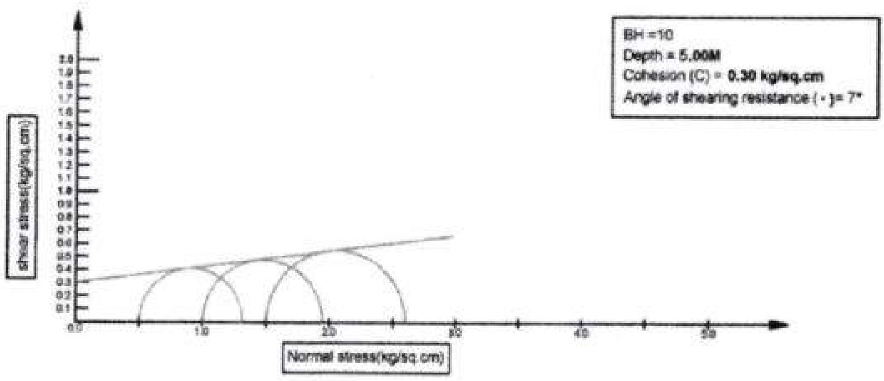

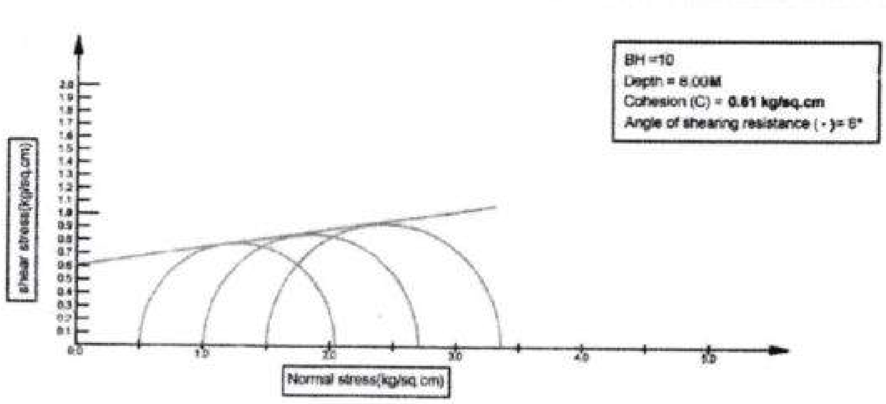

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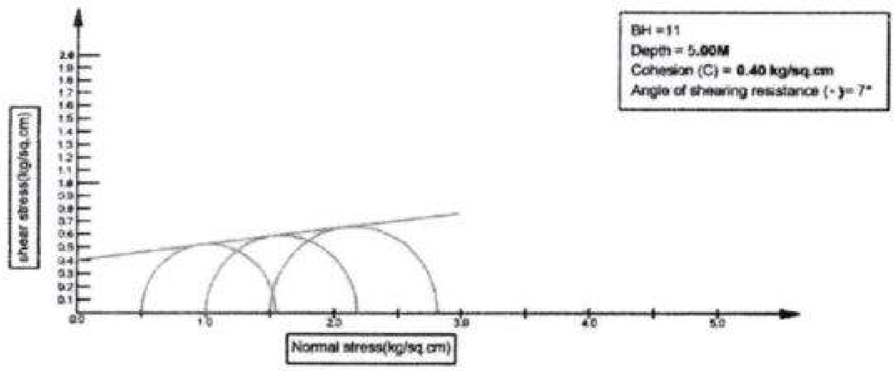

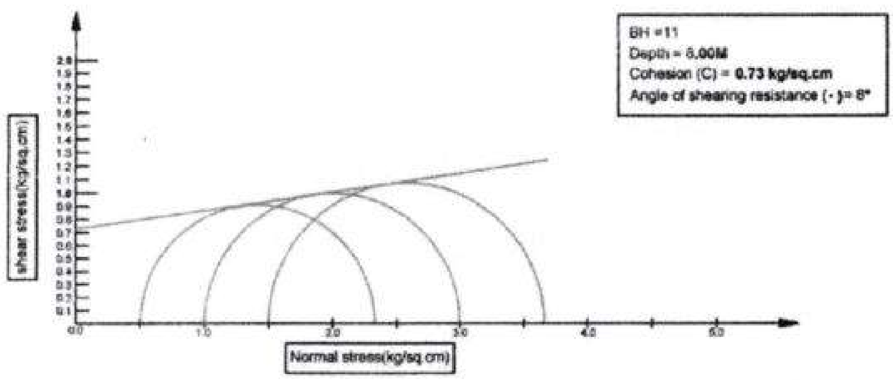

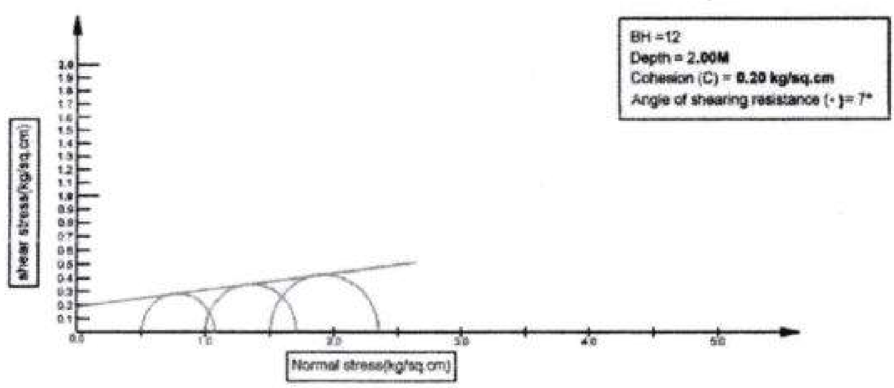

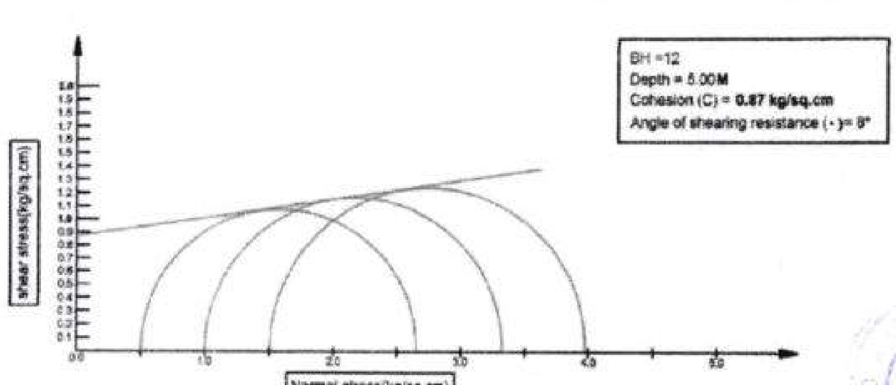

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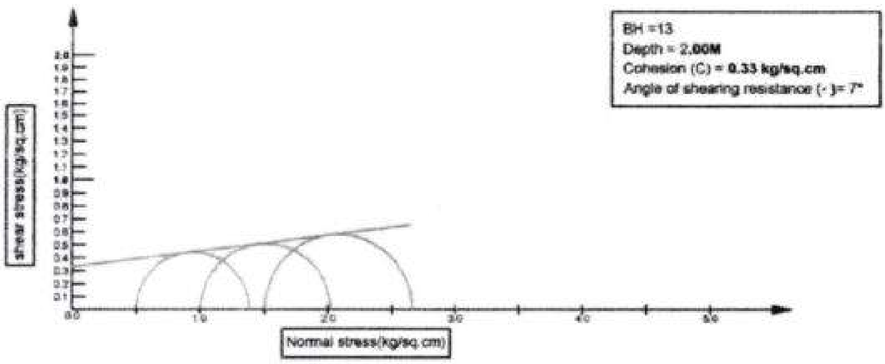

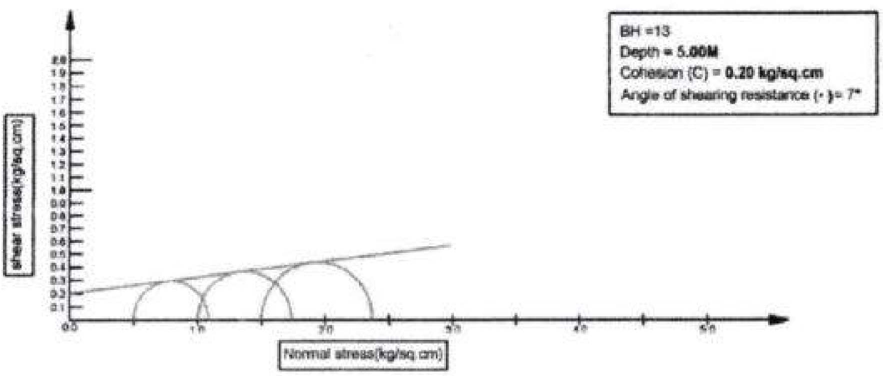

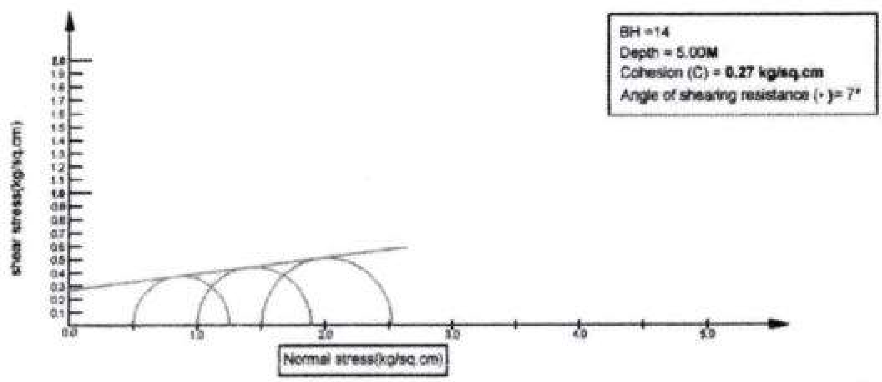

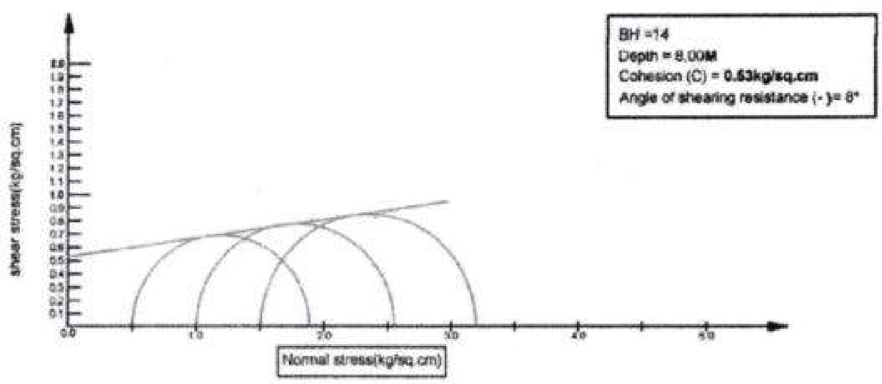

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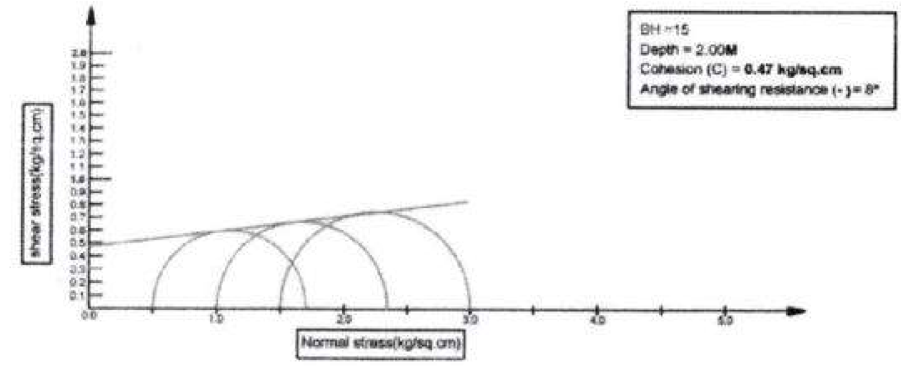

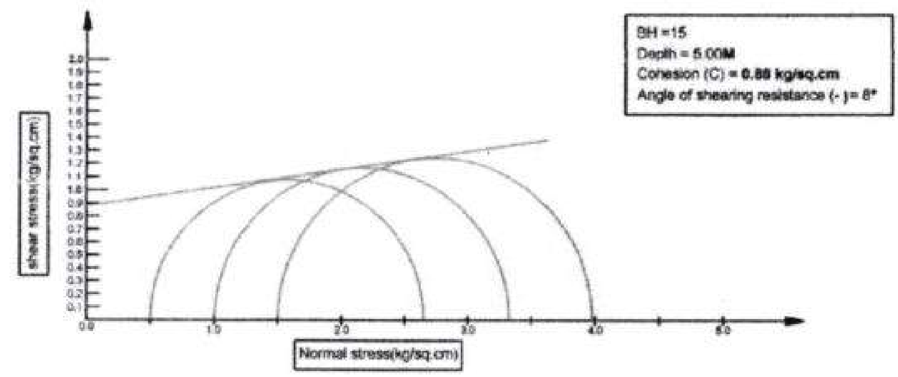

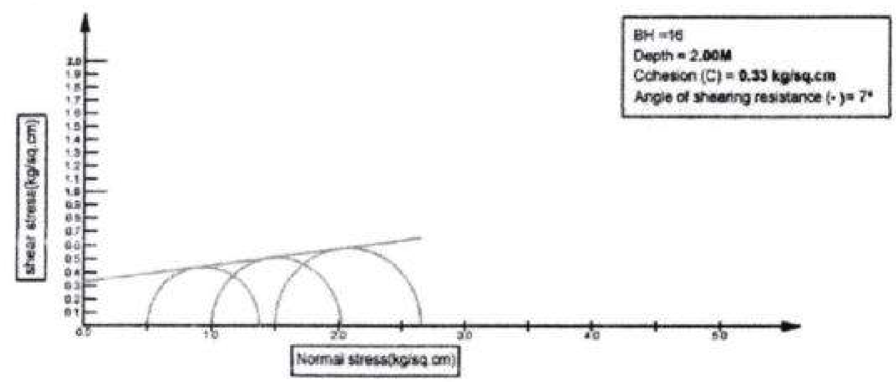

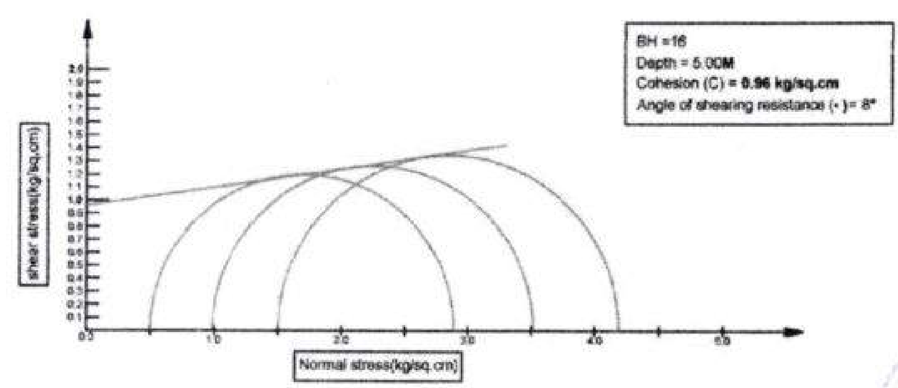

:ANNEX-VII:

SUMMARY OF TEST RESULTS

SWELL PRESSURE AND FREE SWELL INDEX:

BH Location	Depth (m)	Swell pressure (KN/m^2)	Free swell Index (%)
BH01	5.00	6.20	7.05
BH02	5.00	6.60	7.14
BH03	5.00	8.50	6.99
BH04	5.00	6.60	7.15
BH05	5.00	7.20	7.19
BH06	5.00	6.10	7.01
BH07	5.00	7.50	7.21
BH08	5.00	6.40	7.55
BH09	5.00	6.90	7.11
BH10	5.00	7.80	7.13
BH11	5.00	7.20	7.19
BH12	5.00	7.50	7.23
BH13	5.00	6.70	7.15
BH14	5.00	6.50	7.05
BH15	5.00	6.40	7.12
BH16	5.00	6.90	7.00

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:ANNEX-VIII:

CHEMICAL ANALYSIS OF SOIL & WATER

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CHEMICAL ANALYSIS OF SOIL & WATER

LOCATION: -BH1

***Name of Test*: Chemical Analysis of Water Sample**

Source: Ground water

SL NO	DETAILS OF TESTS	RESULT OBTAINED
1	Chlorides (as Cl)	225 mg/lit
2	Sulphates (as SO_4)	187mg/lit
3	PH	6.2

Name of Test: Chemical Analysis Of Soil Sample

Depth of sample: 1.0m from existing ground level

SL NO.	DETAILS OF TESTS	RESULT OBTAINED (% by Weight)
1	Sulphate content	0.15
2	Chloride content	0.137
3	Carbonate	Practically Nil
4	Organic matter	Practically Nil

CHEMICAL ANALYSIS OF SOIL & WATER

LOCATION: -BH2

***Name of Test*: Chemical Analysis of Water Sample**

Source: Ground water

SL NO	DETAILS OF TESTS	RESULT OBTAINED
1	Chlorides (as Cl)	226 mg/lit
2	Sulphates (as SO_4)	189mg/lit
3	PH	6.4

Name of Test: Chemical Analysis Of Soil Sample

Depth of sample: 1.0m from existing ground level

SL NO.	DETAILS OF TESTS	RESULT OBTAINED (% by Weight)
1	Sulphate content	0.11
2	Chloride content	0.136
3	Carbonate	Practically Nil
4	Organic matter	Practically Nil

CHEMICAL ANALYSIS OF SOIL & WATER

LOCATION: -BH3

***Name of Test*: Chemical Analysis of Water Sample**

Source: Ground water

SL NO	DETAILS OF TESTS	RESULT OBTAINED
1	Chlorides (as Cl)	223 mg/lit
2	Sulphates (as SO_4)	183mg/lit
3	PH	6.3

Name of Test: Chemical Analysis Of Soil Sample

Depth of sample: 1.0m from existing ground level

SL NO.	DETAILS OF TESTS	RESULT OBTAINED (% by Weight)
1	Sulphate content	0.14
2	Chloride content	0.134
3	Carbonate	Practically Nil
4	Organic matter	Practically Nil

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CHEMICAL ANALYSIS OF SOIL & WATER

LOCATION: -BH4

***Name of Test*: Chemical Analysis of Water Sample**

Source: Ground water

SL NO	DETAILS OF TESTS	RESULT OBTAINED
1	Chlorides (as Cl)	221 mg/lit
2	Sulphates (as SO_4)	184mg/lit
3	PH	6.9

Name of Test: Chemical Analysis Of Soil Sample

Depth of sample: 1.0m from existing ground level

SL NO.	DETAILS OF TESTS	RESULT OBTAINED (% by Weight)
1	Sulphate content	0.18
2	Chloride content	0.134
3	Carbonate	Practically Nil
4	Organic matter	Practically Nil

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CHEMICAL ANALYSIS OF SOIL & WATER

LOCATION: -BH5

***Name of Test*: Chemical Analysis of Water Sample**

Source: Ground water

SL NO	DETAILS OF TESTS	RESULT OBTAINED
1	Chlorides (as Cl)	220 mg/lit
2	Sulphates (as SO_4)	181mg/lit
3	PH	6.0

Name of Test: Chemical Analysis Of Soil Sample

Depth of sample: 1.0m from existing ground level

SL NO.	DETAILS OF TESTS	RESULT OBTAINED (% by Weight)
1	Sulphate content	0.16
2	Chloride content	0.139
3	Carbonate	Practically Nil
4	Organic matter	Practically Nil

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CHEMICAL ANALYSIS OF SOIL & WATER

LOCATION: -BH6

***Name of Test*: Chemical Analysis of Water Sample**

Source: Ground water

SL NO	DETAILS OF TESTS	RESULT OBTAINED
1	Chlorides (as Cl)	225 mg/lit
2	Sulphates (as SO_4)	188mg/lit
3	PH	6.7

Name of Test: Chemical Analysis Of Soil Sample

Depth of sample: 1.0m from existing ground level

SL NO.	DETAILS OF TESTS	RESULT OBTAINED (% by Weight)
1	Sulphate content	0.11
2	Chloride content	0.134
3	Carbonate	Practically Nil
4	Organic matter	Practically Nil

CHEMICAL ANALYSIS OF SOIL & WATER

LOCATION: -BH7

***Name of Test*: Chemical Analysis of Water Sample**

Source: Ground water

SL NO	DETAILS OF TESTS	RESULT OBTAINED
1	Chlorides (as Cl)	227mg/lit
2	Sulphates (as SO_4)	181mg/lit
3	PH	6.4

Name of Test: Chemical Analysis Of Soil Sample

Depth of sample: 1.0m from existing ground level

SL NO.	DETAILS OF TESTS	RESULT OBTAINED (% by Weight)
1	Sulphate content	0.11
2	Chloride content	0.131
3	Carbonate	Practically Nil
4	Organic matter	Practically Nil

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CHEMICAL ANALYSIS OF SOIL & WATER

LOCATION: -BH8

***Name of Test*: Chemical Analysis of Water Sample**

Source: Ground water

SL NO	DETAILS OF TESTS	RESULT OBTAINED
1	Chlorides (as Cl)	228mg/lit
2	Sulphates (as SO_4)	180mg/lit
3	PH	6.1

Name of Test: Chemical Analysis Of Soil Sample

Depth of sample: 1.0m from existing ground level

SL NO.	DETAILS OF TESTS	RESULT OBTAINED (% by Weight)
1	Sulphate content	0.11
2	Chloride content	0.130
3	Carbonate	Practically Nil
4	Organic matter	Practically Nil

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CHEMICAL ANALYSIS OF SOIL & WATER

LOCATION: -BH9

***Name of Test*: Chemical Analysis of Water Sample**

Source: Ground water

SL NO	DETAILS OF TESTS	RESULT OBTAINED
1	Chlorides (as Cl)	221 mg/lit
2	Sulphates (as SO_4)	185mg/lit
3	PH	6.6

Name of Test: Chemical Analysis Of Soil Sample

Depth of sample: 1.0m from existing ground level

SL NO.	DETAILS OF TESTS	RESULT OBTAINED (% by Weight)
1	Sulphate content	0.12
2	Chloride content	0.134
3	Carbonate	Practically Nil
4	Organic matter	Practically Nil

CHEMICAL ANALYSIS OF SOIL & WATER

LOCATION: -BH10

***Name of Test*: Chemical Analysis of Water Sample**

Source: Ground water

SL NO	DETAILS OF TESTS	RESULT OBTAINED
1	Chlorides (as Cl)	226mg/lit
2	Sulphates (as SO_4)	180mg/lit
3	PH	6.9

Name of Test: Chemical Analysis Of Soil Sample

Depth of sample: 1.0m from existing ground level

SL NO.	DETAILS OF TESTS	RESULT OBTAINED (% by Weight)
1	Sulphate content	0.15
2	Chloride content	0.132
3	Carbonate	Practically Nil
4	Organic matter	Practically Nil

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CHEMICAL ANALYSIS OF SOIL & WATER

LOCATION: -BH11

***Name of Test*: Chemical Analysis of Water Sample**

Source: Ground water

SL NO	DETAILS OF TESTS	RESULT OBTAINED
1	Chlorides (as Cl)	226mg/lit
2	Sulphates (as SO_4)	180mg/lit
3	PH	6.9

Name of Test: Chemical Analysis Of Soil Sample

Depth of sample: 1.0m from existing ground level

SL NO.	DETAILS OF TESTS	RESULT OBTAINED (% by Weight)
1	Sulphate content	0.15
2	Chloride content	0.132
3	Carbonate	Practically Nil
4	Organic matter	Practically Nil

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A

CHEMICAL ANALYSIS OF SOIL & WATER

LOCATION: -BH12

***Name of Test*: Chemical Analysis of Water Sample**

Source: Ground water

SL NO	DETAILS OF TESTS	RESULT OBTAINED
1	Chlorides (as Cl)	231mg/lit
2	Sulphates (as SO_4)	1.82mg/lit
3	PH	6.3

Name of Test: Chemical Analysis Of Soil Sample

Depth of sample: 1.0m from existing ground level

SL NO.	DETAILS OF TESTS	RESULT OBTAINED (% by Weight)
1	Sulphate content	0.17
2	Chloride content	0.14
3	Carbonate	Practically Nil
4	Organic matter	Practically Nil

GHY-35 ★ RELIANT FOUNDATIONS PVT. LTD. ★

CHEMICAL ANALYSIS OF SOIL & WATER

LOCATION: -BH13

***Name of Test*: Chemical Analysis of Water Sample**

Source: Ground water

SL NO	DETAILS OF TESTS	RESULT OBTAINED
1	Chlorides (as Cl)	222 mg/lit
2	Sulphates (as SO_4)	182mg/lit
3	PH	6.2

Name of Test: Chemical Analysis Of Soil Sample

Depth of sample: 1.0m from existing ground level

SL NO.	DETAILS OF TESTS	RESULT OBTAINED (% by Weight)
1	Sulphate content	0.17
2	Chloride content	0.139
3	Carbonate	Practically Nil
4	Organic matter	Practically Nil

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CHEMICAL ANALYSIS OF SOIL & WATER

LOCATION: -BH14

***Name of Test*: Chemical Analysis of Water Sample**

Source: Ground water

SL NO	DETAILS OF TESTS	RESULT OBTAINED
1	Chlorides (as Cl)	220 mg/lit
2	Sulphates (as SO_4)	180mg/lit
3	PH	6.5

Name of Test: Chemical Analysis Of Soil Sample

Depth of sample: 1.0m from existing ground level

SL NO.	DETAILS OF TESTS	RESULT OBTAINED (% by Weight)
1	Sulphate content	0.19
2	Chloride content	0.15
3	Carbonate	Practically Nil
4	Organic matter	Practically Nil

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CHEMICAL ANALYSIS OF SOIL & WATER

LOCATION: -BH15

***Name of Test*: Chemical Analysis of Water Sample**

Source: Ground water

SL NO	DETAILS OF TESTS	RESULT OBTAINED
1	Chlorides (as Cl)	220 mg/lit
2	Sulphates (as SO_4)	181mg/lit
3	PH	6.0

Name of Test: Chemical Analysis Of Soil Sample

Depth of sample: 1.0m from existing ground level

SL NO.	DETAILS OF TESTS	RESULT OBTAINED (% by Weight)
1	Sulphate content	0.19
2	Chloride content	0.140
3	Carbonate	Practically Nil
4	Organic matter	Practically Nil

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CHEMICAL ANALYSIS OF SOIL & WATER

LOCATION: -BH16

***Name of Test*: Chemical Analysis of Water Sample**

Source: Ground water

SL NO	DETAILS OF TESTS	RESULT OBTAINED
1	Chlorides (as Cl)	225 mg/lit
2	Sulphates (as SO_4)	185mg/lit
3	PH	6.8

Name of Test: Chemical Analysis Of Soil Sample

Depth of sample: 1.0m from existing ground level

SL NO.	DETAILS OF TESTS	RESULT OBTAINED (% by Weight)
1	Sulphate content	0.19
2	Chloride content	0.139
3	Carbonate	Practically Nil
4	Organic matter	Practically Nil

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:ANNEX-IX:

PERMEABILITY TEST RESULT

BH Location	Depth (m)	Coefficient of permeability K(cm/sec)
01	2.00	2.22×10-7
02	2.00	2.21×10-7
03	2.00	1.31×10-7
04	2.00	2.02×10-7
05	2.00	1.30×10-7
06	2.00	2.30×10-8
07	2.00	1.08×10-8
08	2.00	1.21×10-9
09	2.00	2.35×10-8
10	2.00	2.04×10-8
11	2.00	1.11×10-7
12	2.00	1.25×10-7
13	2.00	1.96×10-8
14	2.00	2.02×10-7
15	2.00	2.23×10-8
16	2.00	2.56×10-7

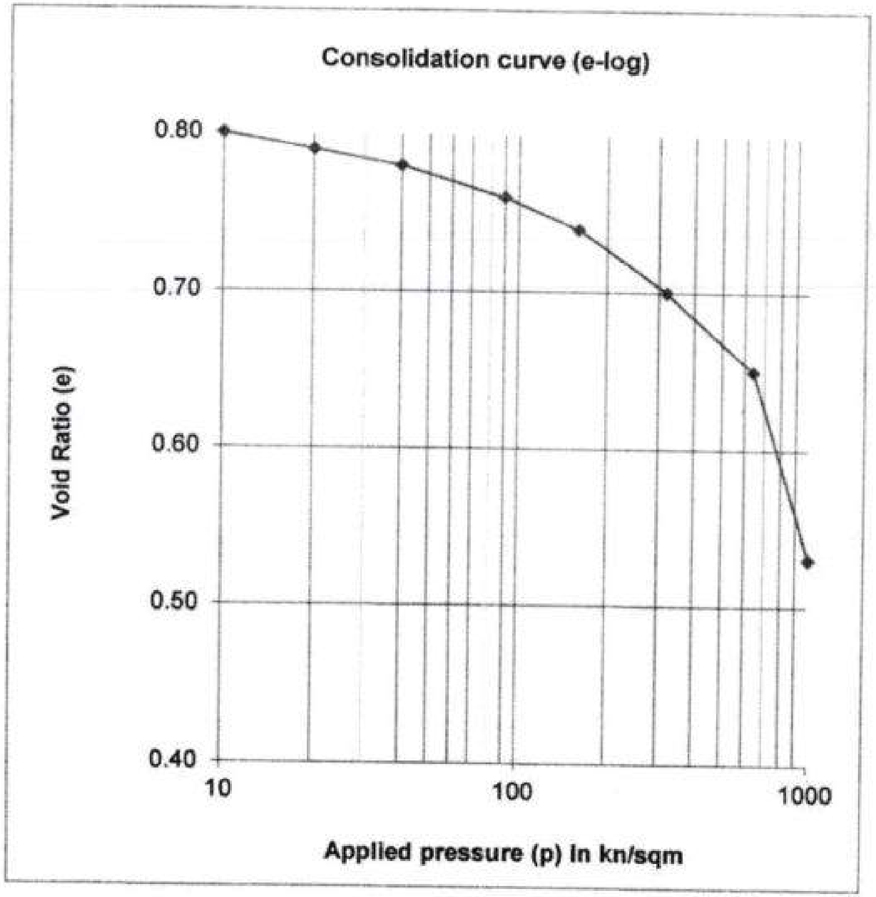
:ANNEX-X:

CONSOLIDATION TEST RESULT

Consolidation test Result

BH-01 Depth:2.00M

Sl No	Applied Pressure (kn/sqm)	Void Ratio
1	10	0.80
2	20	0.79
3	40	0.78
4	90	0.76
5	160	0.74
6	320	0.70
7	640	0.65
8	1000	0.53

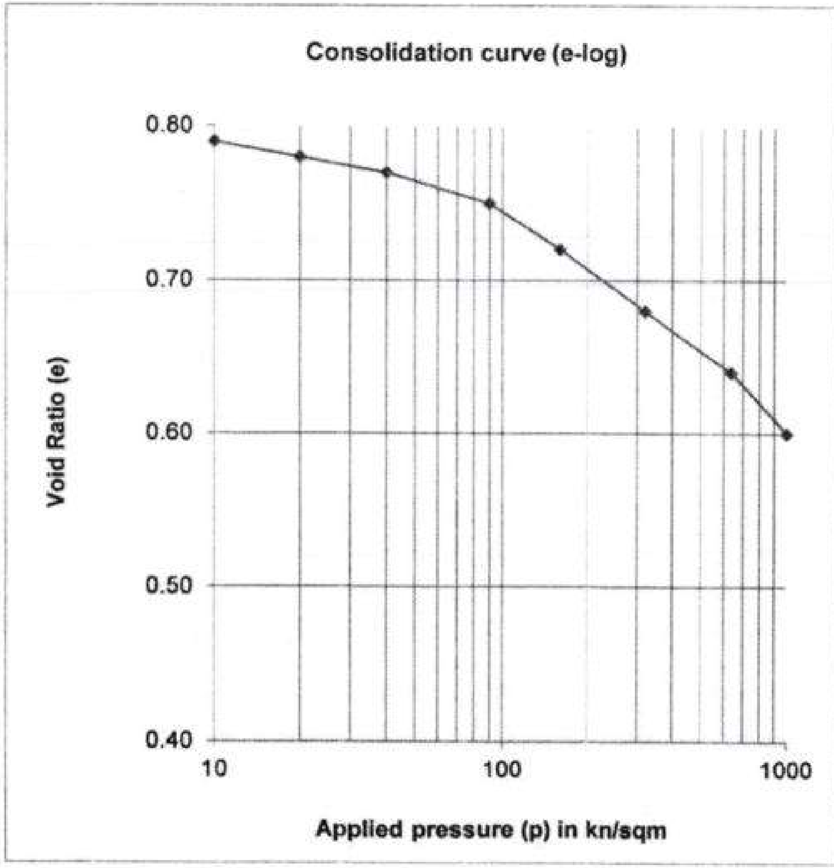


Compression Index Cc = (0.76-0.53)/log (1000/90) = 0.23

Consolidation test Result

BH-2 Depth: 2.0M

Sl No	Applied Pressure (kn/sqm)	Void Ratio
1	10	0.79
2	20	0.78
3	40	0.77
4	90	0.75
5	160	0.72
6	320	0.68
7	640	0.64
8	1000	0.60



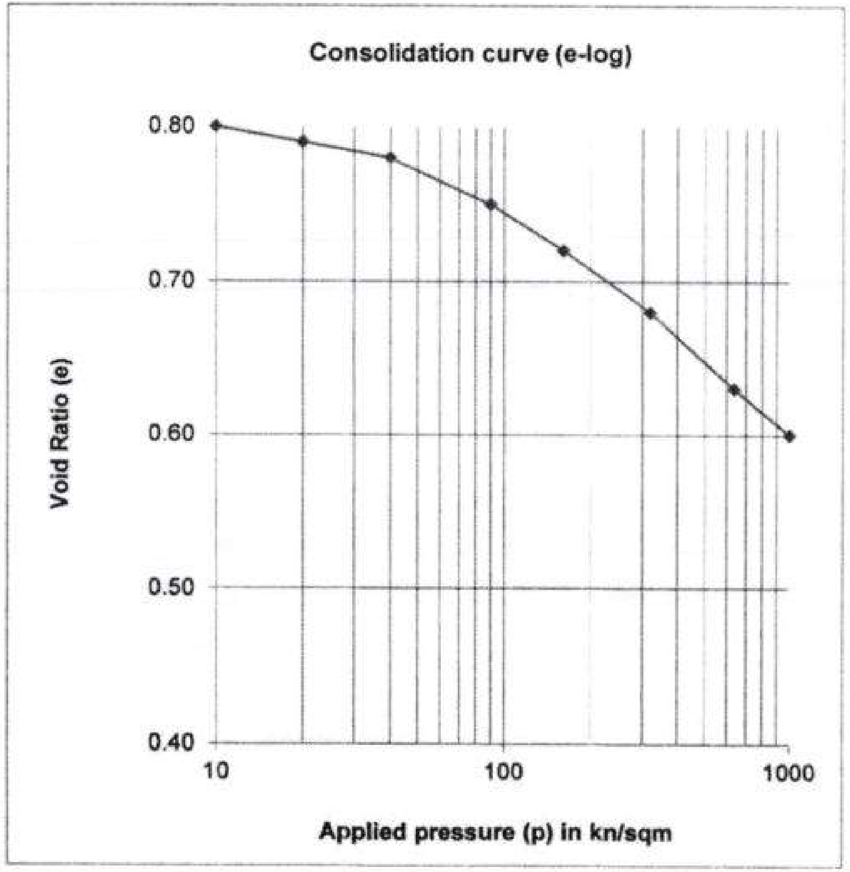
Compression Index Cc = (0.75-0.60)/log (1000/90) = 0.14

RELIANT FOUNDATIONS PVT. LTD. ★ CHY-35 ★

Consolidation test Result

BH-3 Depth: 2.0M

Sl No	Applied Pressure (kn/sqm)	Void Ratio
1	10	0.80
2	20	0.79
3	40	0.78
4	90	0.75
5	160	0.72
6	320	0.68
7	640	0.63
8	1000	0.60

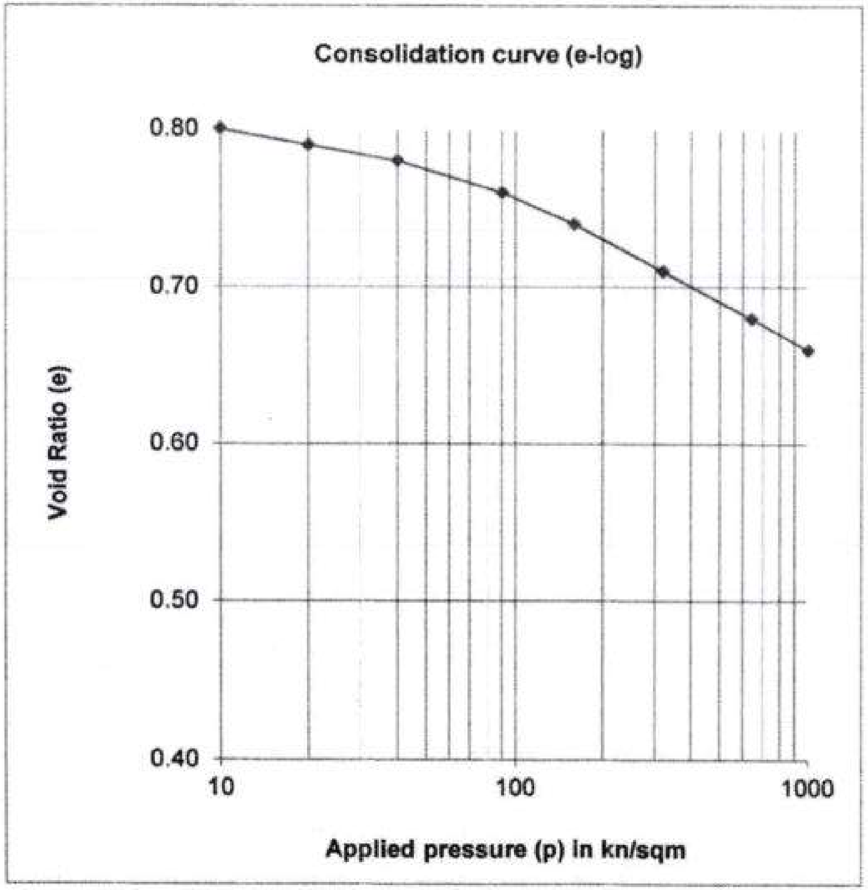


Compression Index Cc = (0.75-0.60)/log (1000/90) = 0.15

Consolidation test Result

BH- 4 Depth: 5.00M

Sl No	Applied Pressure (kn/sqm)	Void Ratio
1	10	0.80
2	20	0.79
3	40	0.78
4	90	0.76
5	160	0.74
6	320	0.71
7	640	0.68
8	1000	0.66

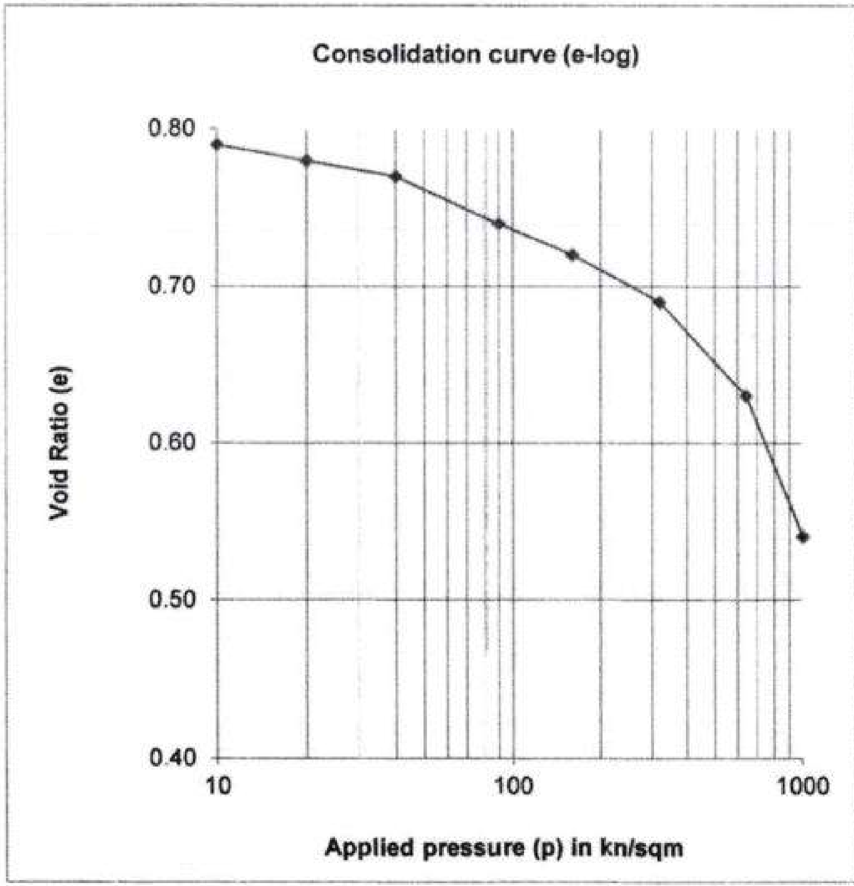


Compression Index Cc = (0.76-0.66)/log (1000/90) = 0.10

Consolidation test Result

BH-05 Depth:2.00M

Sl No	Applied Pressure (kn/sqm)	Void Ratio
1	10	0.79
2	20	0.78
3	40	0.77
4	90	0.74
5	160	0.72
6	320	0.69
7	640	0.63
8	1000	0.54



Compression Index Cc = (0.74-0.54)/log (1000/90) = 0.20

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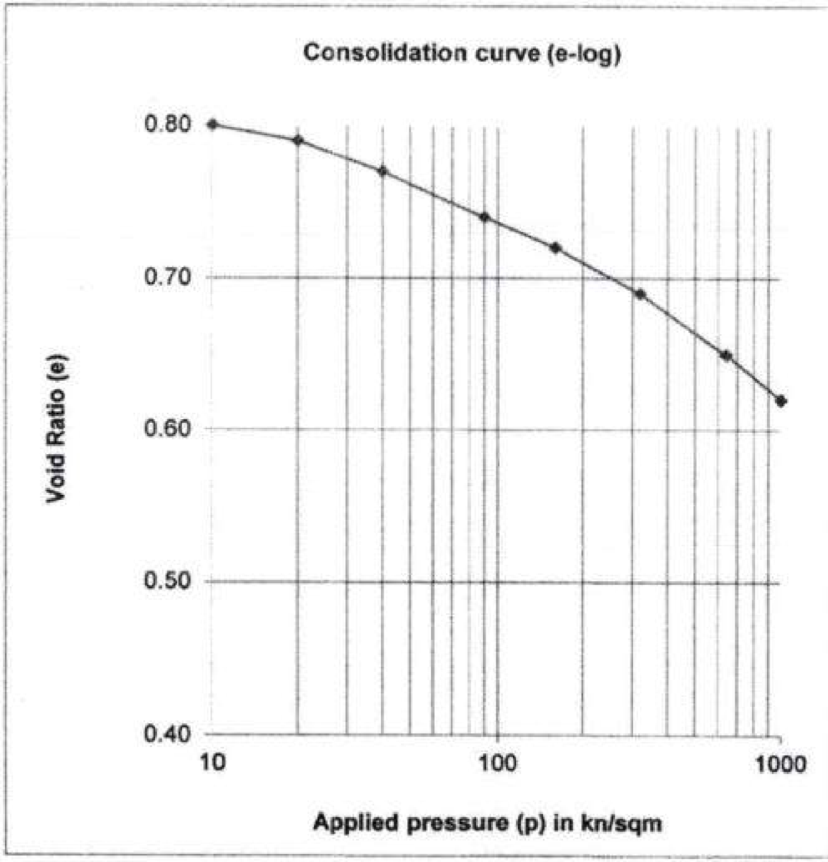
Consolidation test Result

BH-06 **Depth: 2.00M**

Sl No	Applied Pressure (kn/sqm)	Void Ratio
1	10	0.80
2	20	0.79
3	40	0.77
4	90	0.74
5	160	0.72
6	320	0.69
7	640	0.65
8	1000	0.62

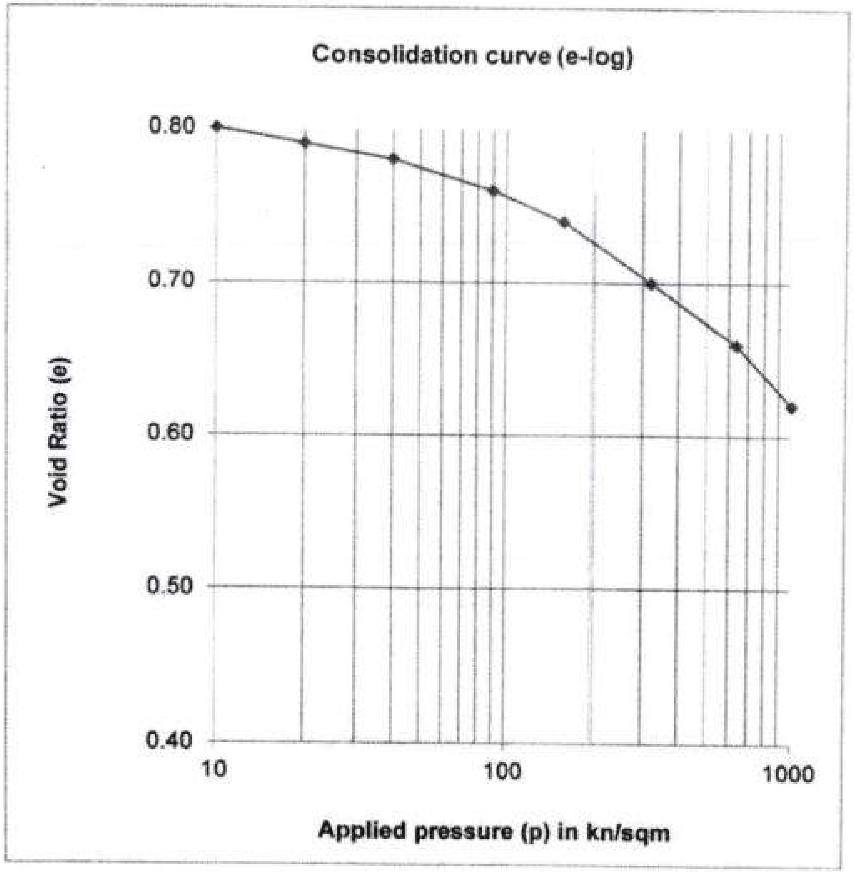


Compression Index Cc = (0.74-0.62)/log (1000/90) = 0.12

Consolidation test Result

BH-7 Depth: 2.0M

Sl No	Applied Pressure (kn/sqm)	Void Ratio
1	10	0.80
2	20	0.79
3	40	0.78
4	90	0.76
5	160	0.74
6	320	0.70
7	640	0.66
8	1000	0.62



Compression Index Cc = (0.76-0.62)/log (1000/90) = 0.14

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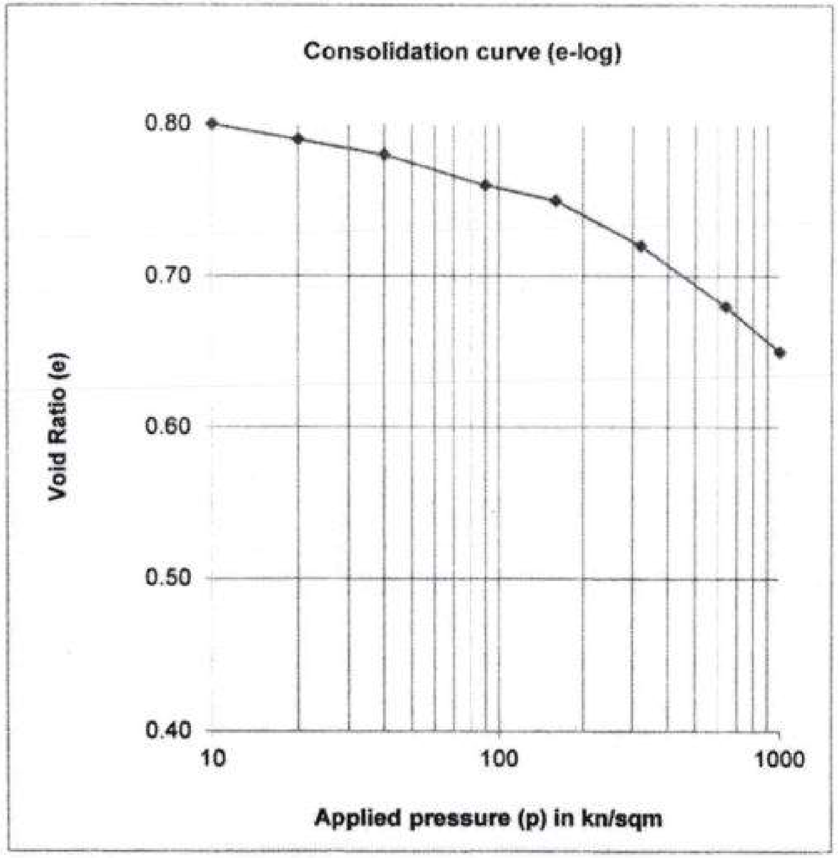
Consolidation test Result

BH-8 **Depth: 2.00M**

Sl No	Applied Pressure (kn/sqm)	Void Ratio
1	10	0.80
2	20	0.79
3	40	0.78
4	90	0.76
5	160	0.75
6	320	0.72
7	640	0.68
8	1000	0.65



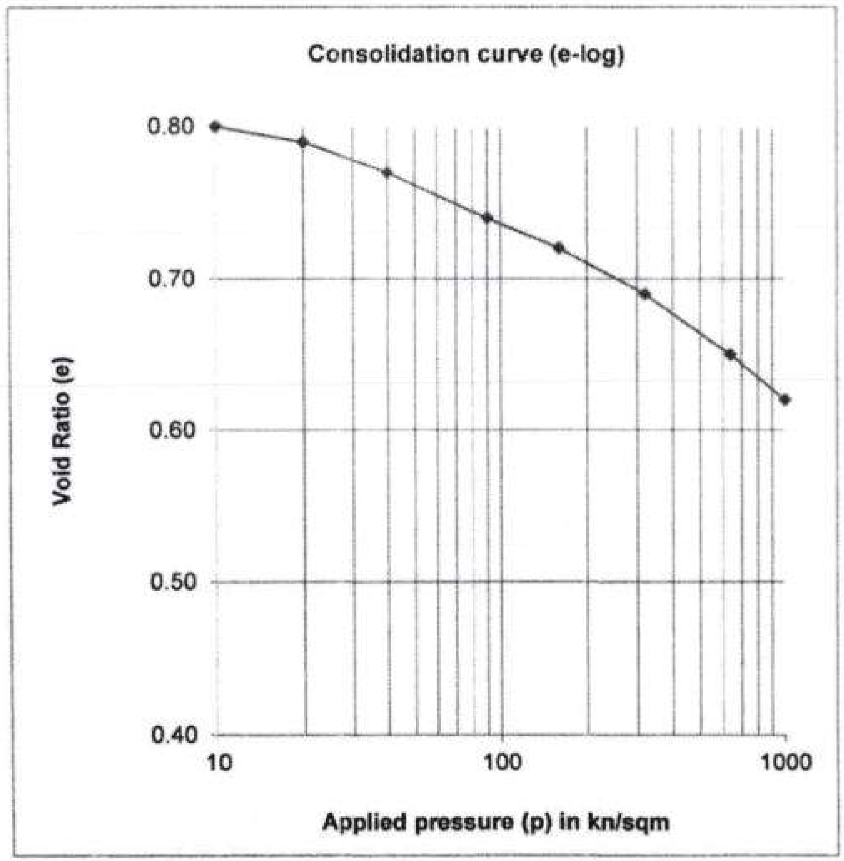
Compression Index Cc = (0.76-0.65)/log (1000/90) = 0.11

RELIANT FOUNDATIONS PVT. LTD.

Consolidation test Result

BH-9 **Depth: 5.00M**

Sl No	Applied Pressure (kn/sqm)	Void Ratio
1	10	0.80
2	20	0.79
3	40	0.77
4	90	0.74
5	160	0.72
6	320	0.69
7	640	0.65
8	1000	0.62

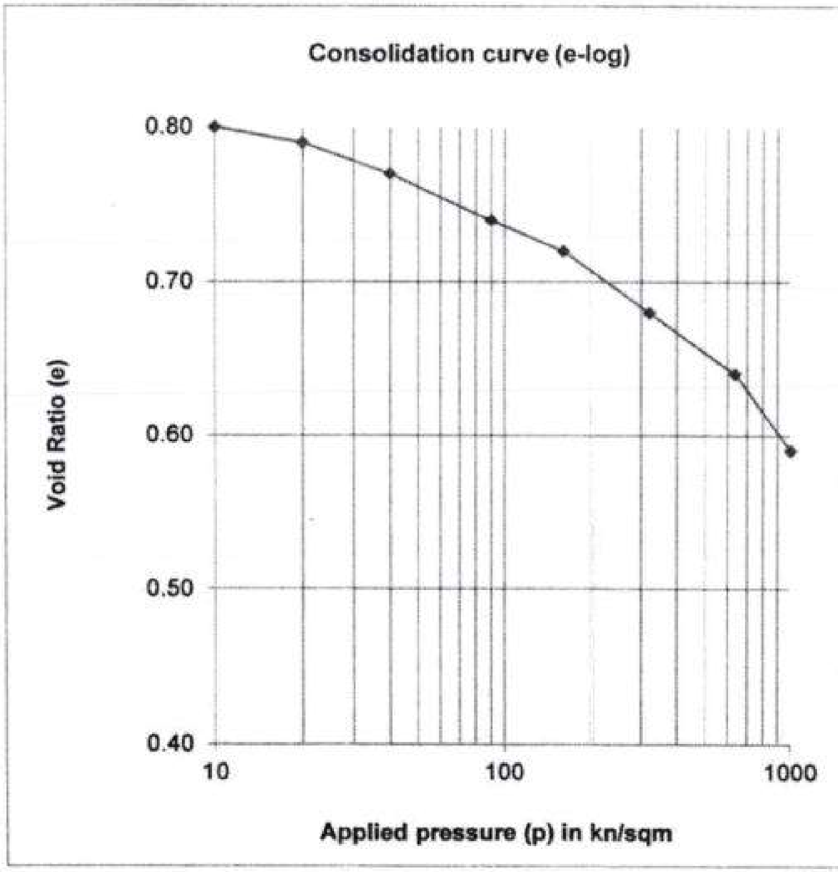


Compression Index Cc = (0.74-0.62)/log (1000/90) = 0.12

Consolidation test Result

BH-10 Depth: 5.00M

Sl No	Applied Pressure (kn/sqm)	Void Ratio
1	10	0.80
2	20	0.79
3	40	0.77
4	90	0.74
5	160	0.72
6	320	0.68
7	640	0.64
8	1000	0.59

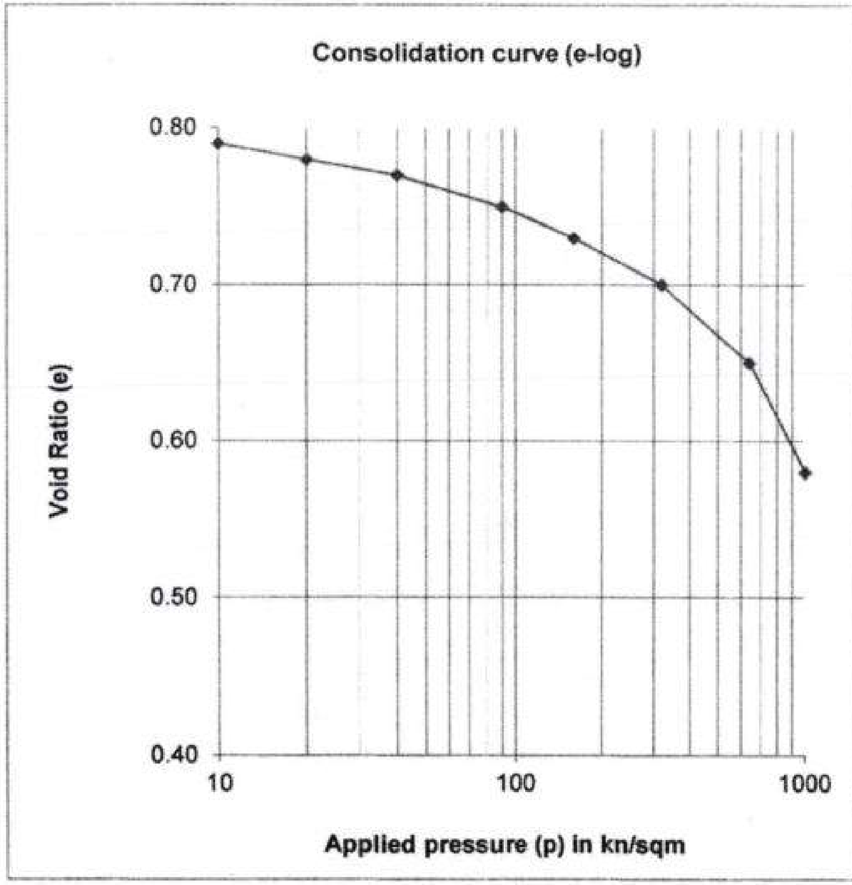


Compression Index Cc = (0.74-0.59)/log (1000/90) = 0.15

Consolidation test Result

BH-11 Depth: 5.00M

Sl No	Applied Pressure (kn/sqm)	Void Ratio
1	10	0.79
2	20	0.78
3	40	0.77
4	90	0.75
5	160	0.73
6	320	0.70
7	640	0.65
8	1000	0.58



Compression Index Cc = (0.75-0.58)/log (1000/90) = 0.17

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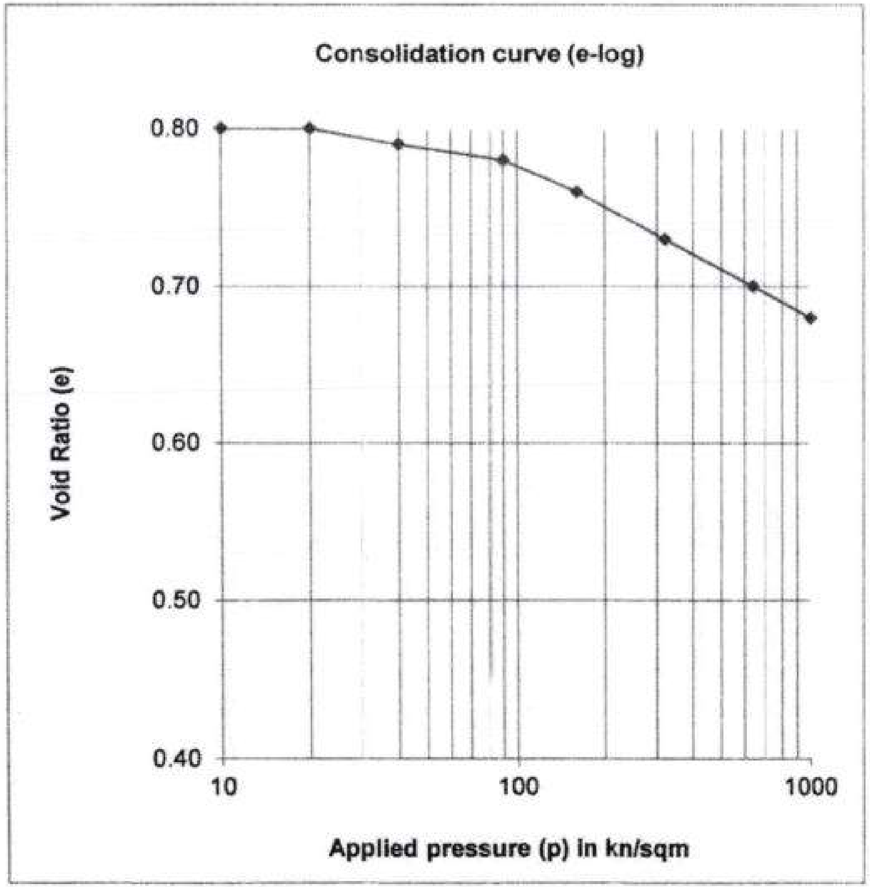
Consolidation test Result

BH- 12 Depth: 5.00M

Sl No	Applied Pressure (kn/sqm)	Void Ratio
1	10	0.80
2	20	0.80
3	40	0.79
4	90	0.78
5	160	0.76
6	320	0.73
7	640	0.70
8	1000	0.68

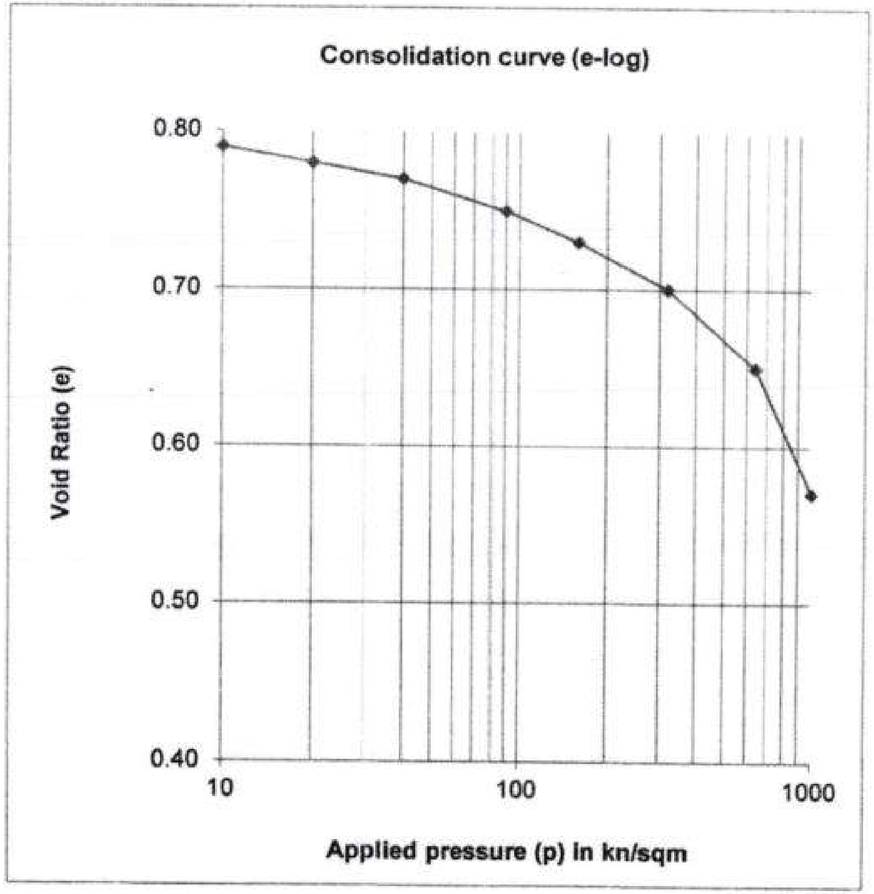


Compression Index Cc = (0.78-0.68)/log (1000/90) = 0.10

Consolidation test Result

BH-13 Depth: 2.00M

Sl No	Applied Pressure (kn/sqm)	Void Ratio
1	10	0.79
2	20	0.78
3	40	0.77
4	90	0.75
5	160	0.73
6	320	0.70
7	640	0.65
8	1000	0.57

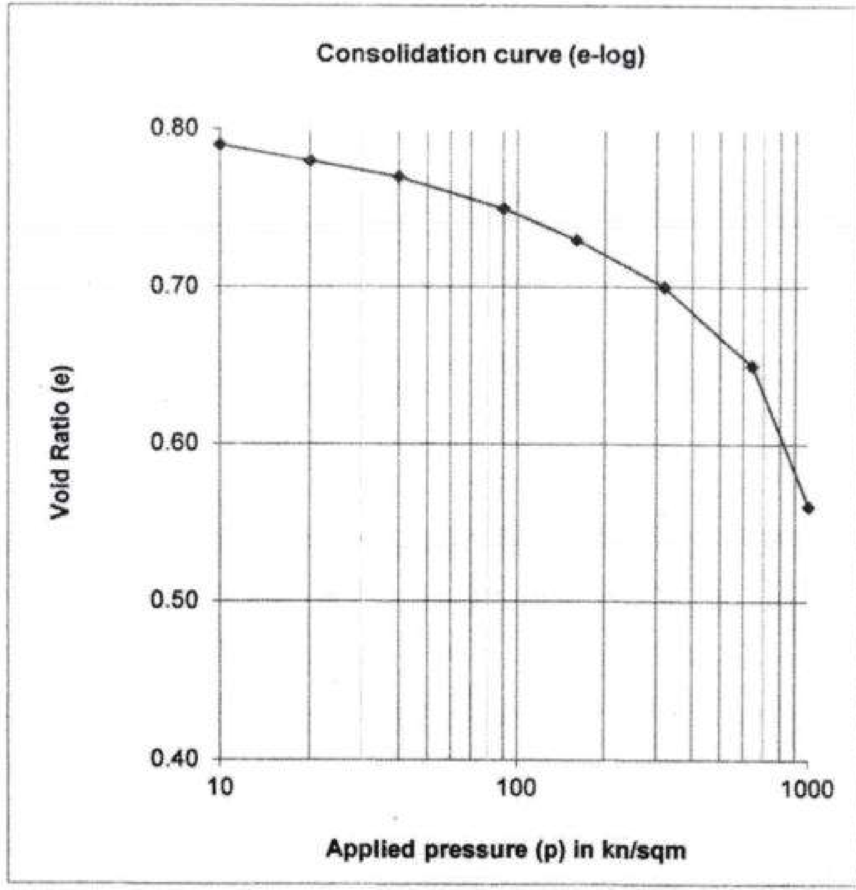


Compression Index Cc = (0.75-0.57)/log (1000/90) = 0.18

Consolidation test Result

BH-14 Depth: 5.00M

Sl No	Applied Pressure (kn/sqm)	Void Ratio
1	10	0.79
2	20	0.78
3	40	0.77
4	90	0.75
5	160	0.73
6	320	0.70
7	640	0.65
8	1000	0.56



Compression Index Cc = (0.75-0.56)/log (1000/90) = 0.19

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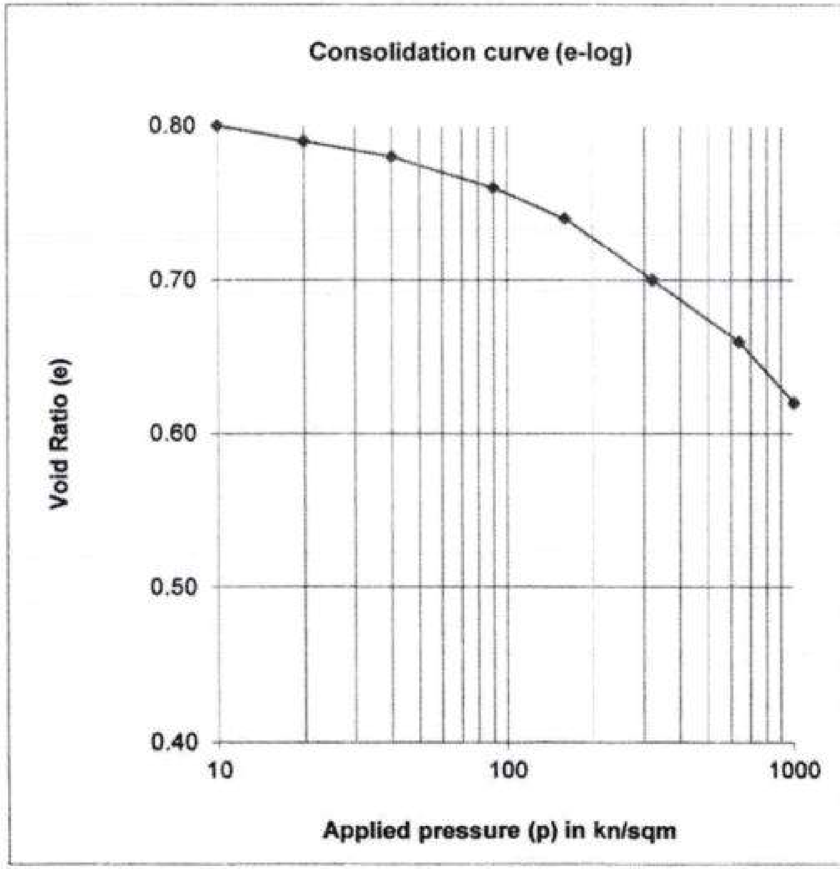
Consolidation test Result

BH-15 Depth: 2.0M

Sl No	Applied Pressure (kn/sqm)	Void Ratio
1	10	0.80
2	20	0.79
3	40	0.78
4	90	0.76
5	160	0.74
6	320	0.70
7	640	0.66
8	1000	0.62

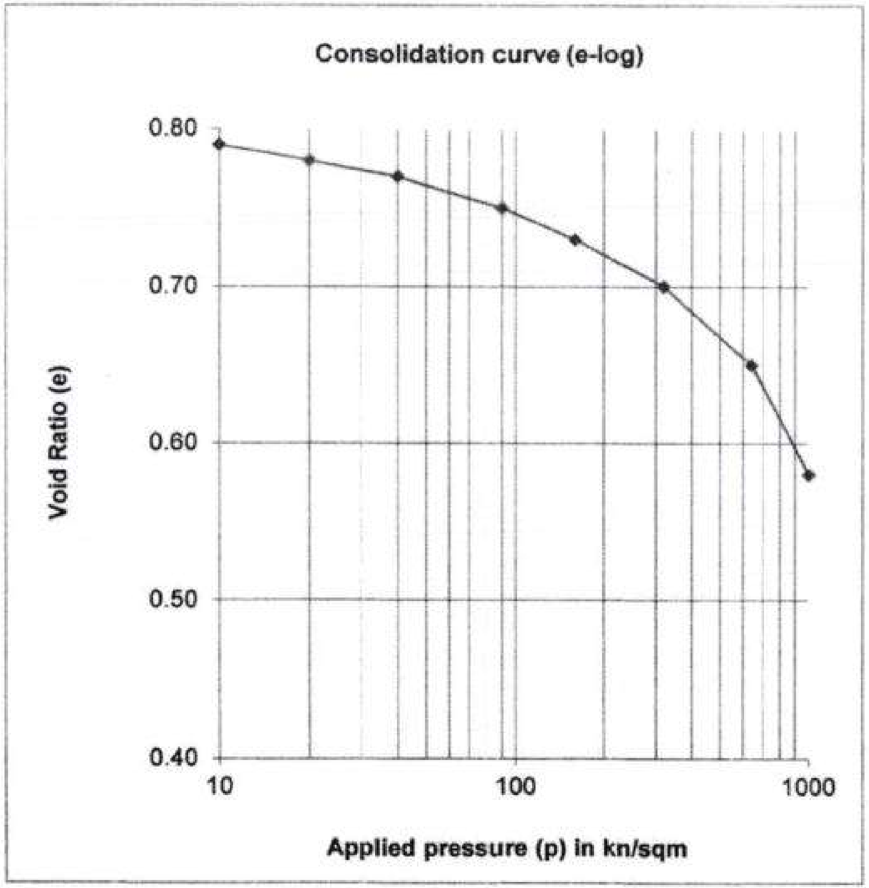


Compression Index Cc = (0.76-0.62)/log (1000/90) = 0.14

Consolidation test Result

BH-16 Depth: 2.00M

Sl No	Applied Pressure (kn/sqm)	Void Ratio
1	10	0.79
2	20	0.78
3	40	0.77
4	90	0.75
5	160	0.73
6	320	0.70
7	640	0.65
8	1000	0.58



Compression Index Cc = (0.75-0.58)/log (1000/90) = 0.17

:ANNEX-XI:

ANALYSIS OF LIQUEFACTION POTENTIAL

LIQUEFACTION ANALYSIS

(AS PER IS 1893 (PART1) - 2016, SEED & IDRISS, IDRISS & BOULANGER APPROACH)

Introduction

The first step in engineering assessment of the potential of initiation of soil liquefaction is the determination of whether the soils present at the site are potentially liquefiable or not. It is generally adopted that loose, saturated, cohesionless soils are susceptible to liquefaction while dense cohesion less soils are considered to be non liquefiable, because they tend to dilate during shearing.Cohesive soils are to be consideredsusceptible to liquefaction when they fulfil all the three criteria listed below, originallystated by Seed and Idriss (1982) and subsequently confirmed by Youd and Gilstrap(1999):

- The soil must have less than 15 percent of the particles, based on dry weight, that arefiner than 0.005 mm (i.e., percent finer at 0.005 mm < 15 percent).
- The soil must have a liquid limit (LL) that is less than 35 (that is, LL < 35).
- The water content w of the soil must be greater than 90% of the liquid limit [i.e.,$w >$ 0.9 (LL)].

If the cohesive soil does not fulfil all the three criteria, then it is generally considered to benot susceptible to liquefaction. Although the cohesive soil may not liquefy, but there could stillbe a significant undrained shear strength loss due to the seismic shaking.

The most common type of analysis for determiningthe liquefaction potential is the use of standard penetration test (SPT) (Seed et al. 1985, Stark and Olson 1995). The analysis is based on a method often termed as the *simplified procedure*proposed by Seed and Idriss (1971). This is the most commonly used and the oldest method to evaluate the liquefaction potential of a site. The steps are as follows:

1. ***Appropriate soil type:***As discussed above, the first step is to determine if the soil has the ability to liquefy during an earthquake. The soil must meet the requirements listed in Sec. 2.1.

2. ***Groundwater table:***The soil must be below the groundwater table. However, the liquefaction analysis could also be performed if it is anticipated that the groundwater table will rise in the future, and thus the soil will eventually be below the groundwater table.

3. ***CSR induced by earthquake:***If the soil meets the above two requirements, then the simplified procedure can be performed. The first step in the simplified procedure is to determine the cyclic stress ratio (CSR) that will be induced by the earthquake (Sec. 2.2). A major unknown in the calculation of the CSR induced by the earthquake is the peak horizontal ground acceleration a_{max} that should be used in the analysis. A liquefaction analysis would typically not have required for sites having a peak ground acceleration a_{max} less than 0.10g or a local magnitude $M_L$less than 5.

4. ***CRR from standard penetration test:***By using the standard penetration test, the cyclic resistance ratio (CRR) of the in situ soil is then determined (Sec. 2.3). If the CSR induced by the earthquake is greater than the CRR determined from the standard penetration test, then liquefaction may occur during the earthquake, and vice versa.

5. ***Factor of safety (FS):*** The final step is to determine the factor of safety against liquefaction , which is defined as

$$\mathrm{FS} = \mathrm{CRR/CSR}$$

Cyclic Stress Ratio Caused by the Earthquake

If it is found by analysis that the soil has the potential to liquefy during an earthquake and the soil is below or will be below the groundwater table, then the liquefaction analysis is performed. Asper Seed and Idriss (1971), the first step in the simplified procedure is to calculate the cyclic stress ratio(C.S.R), which is caused by the earthquake.

To develop the equation for CSR, it is assumed that there is a level ground surface and a soil column of unit width and length, and that the soil column will move horizontally as a rigid body in response to the maximum horizontal acceleration,a_{max}exerted by the earthquake at ground surface. Figure 2.1 shows a diagram of these assumed conditions. Given these assumptions, the weight W of the soil column is equal to $\gamma_t z$, where γ_t = totalunit weight of the soil and z = depth below ground surface. The horizontal earthquake force, F acting on the soil column (which has a unit width and length) is:

$$F = ma = \left(\frac{W}{g}\right) a = (\gamma_t z/g)\, a_{max} = \sigma_{vo}\,(a_{max}/g) \qquad (2.1)$$

where,

F =horizontal earthquake force acting on soil column that has a unit width and length, kN.

m = total mass of soil column, kg, which is equal to W/g.

W = total weight of soil column, kN.

γ_t = total unit weight of soil, kN/m^3.

z = depth below ground surface of soil column.

a =acceleration, which in this case is the maximum horizontal acceleration atground surface caused by the earthquake ($a = a_{max}$), m/s^2.

a_{max} = maximum horizontal acceleration at ground surface that is induced by the earthquake,m/s^2. The maximum horizontal acceleration is also commonlyreferred to as the peak ground acceleration.

σ_{vo} =total vertical stress at bottom of soil column, kN/m^2.

As shown in Fig. 2.1, taking summation of the forces in the horizontal direction, the force F acting on the rigid soil element is equal to the maximum shear force at the base on the soil element. Since the soil element is assumed to have a unit base width and length, the maximum shear force F is equal to the maximum shear stress τ_{max}, or from Eq. (2.1):

$$\tau_{max} = F = \sigma_{vo} (a_{max}/g) \quad (2.2)$$

Dividing both sides of the equation by the vertical effective stress σ'_{vo} gives

$$\tau_{max}/ \sigma'_{vo} = (\sigma_{vo} / \sigma'_{vo})(a_{max}/g) \quad (2.3)$$

Since the soil column does not act as a rigid body during the earthquake, but rather the soil is deformable, Seed and Idriss (1971) incorporated a depth reduction factor $r_d$into the right side of Eq. (2.3), or

$$\tau_{max}/ \sigma'_{vo} = r_d (\sigma_{vo} / \sigma'_{vo})(a_{max}/g) \quad (2.4)$$

For the simplified method, Seed et al. (1975) converted the typical irregular earthquake record to an equivalent series of uniform stress cycles by assuming the following:

$$\tau_{cyc} = 0.65\, \tau_{max} \quad (2.5)$$

where, τ_{cyc} = uniform cyclic shear stress amplitude of the earthquake (kN/m^2).

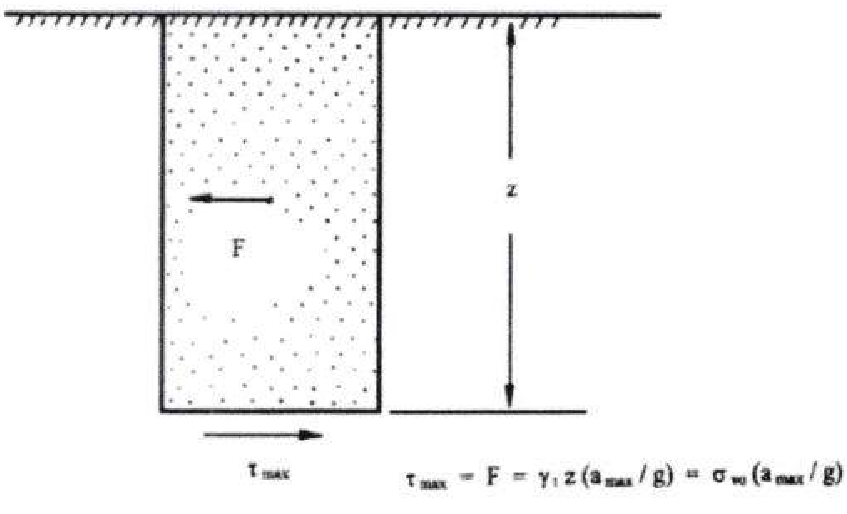


Fig 1: Conditions assumed for the derivation of the earthquake equation.

In essence, the erratic earthquake motion was converted to an equivalent series of uniform cycles of shear stress, referred to as τ_{cyc}. By substituting Eq. (2.5) into Eq. (2.4), the earthquake-induced cyclic stress ratio is obtained.

$$CSR = \tau_{cyc} / \sigma'_{vo} = 0.65\, r_d\, (\sigma_{vo} / \sigma'_{vo})(a_{max}/g) \qquad (2.6)$$

where

CSR = cyclic stress ratio (dimensionless), also commonly referred to as seismic stress ratio.

a_{max} = maximum horizontal acceleration at ground surface that is induced by the earthquake, m/s^2, also commonly referred to as the peak ground acceleration.

g = acceleration of gravity (9.81 m/s^2).

σ_{v0} = total vertical stress at a particular depth where the liquefaction analysis is being performed, kN/m^2. To calculate total vertical stress, total unit weight γ_t of soil layer (s) must be known.

σ'_{v0} = vertical effective stress at that same depth in soil deposit where σ_{v0} was calculated, kN/m^2. To calculate vertical effective stress, location of groundwater table must be known.

r_d = depth reduction factor, also known as stress reduction coefficient (dimensionless).

As previously mentioned, the depth reduction factor was introduced to account for the fact that the soil column shown in Fig. 1 does not behave as a rigid body during the earthquake.

Fig.2.2 presents the range in values for the depth reduction factor r_d versus depth below ground surface. Point to note that with depth, the depth reduction factor decreases to account for the fact that the soil is not a rigid body, but is rather deformable. As indicated in Fig. 2 Idriss (1999) indicates that the values of r_d depend on the magnitude of the earthquake. As a practical matter, the r_d values are usually obtained from the curve labelled "Average values by Seed & Idriss (1971)" in Fig. 2

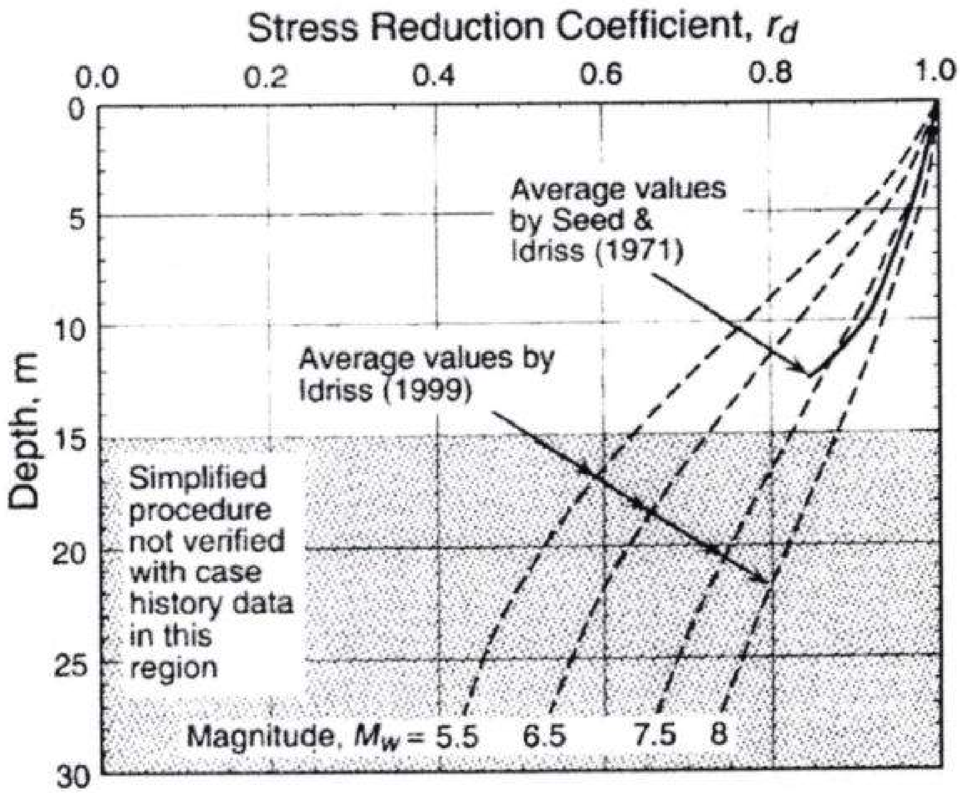


Fig. 2: Reduction factor r_d versus depth below level or gently sloping ground surfaces.

Another option is to assume a linear relationship of r_d versus depth and use the following equation (Kayen et al. 1992):

$$r_d = 1 - 0.012z \tag{2.7}$$

where z = depth in meters below the ground surface where the liquefaction analysis is being performed (i.e., the same depth used to calculate σ_{vo} and σ'_{vo}).

For Eq. (2.6), the vertical total stress σ_{vo} and vertical effective stress σ'_{vo} can be readily calculated using basic geotechnical principles. Equation (2.7) or Fig. 2 could be used to determine the depth reduction factor r_d. Thus all parameters in Eq. (2.6) can be readily calculated, except for the peak ground acceleration a_{max}.

Cyclic Resistance Ratio (CRR) from the Standard Penetration Test

The second step in the simplified procedure is to determine the cyclic resistance ratio of the in situ soil. The cyclic resistance ratio represents the liquefaction resistance of the in situ soil. The most commonly used method for determining the liquefaction resistance is to use the data obtained from the standard penetration test. The advantages of using the standard penetration test to evaluate the liquefaction potential are as follows:

1. *Groundwater table:* A boring must be excavated in order to perform the standard penetration test. The location of the groundwater table can be measured in the borehole. Another option is to install a piezometer in the borehole, which can then be used to monitor the groundwater level over time.

2. *Soil type:* In clean sand, the SPT sampler may not be able to retain a soil sample. But for most other types of soil, the SPT sampler will be able to retrieve a soil sample. The soil sample retrieved in the SPT sampler can be used to visually classify the soil and to estimate the percent fines in the soil. In addition, the soil specimen can be returned to the laboratory, and classification tests can be performed to further assess the liquefaction susceptibility of the soil.

3. *Relationship between N value and liquefaction potential:* In general, the factors that increase the liquefaction resistance of a soil will also increase the $(N_1)_{60}$ from the standard penetration test. For example, a well-graded dense soil that has been preloaded or aged will be resistant to liquefaction and will have high values of $(N_1)_{60}$. Likewise, a uniformly graded soil with a loose and segregated soil structure will be more susceptible to liquefaction and will have much lower values of $(N_1)_{60}$.

Based on the standard penetration test and field performance data, Seed et al. (1985) concluded that there are three approximate potential damage ranges that can be identified:

Table 1: $(N_1)_{60}$ values

$(N_1)_{60}$	0–20	20–30	> 30
Potential damage	High	Intermediate	No significant damage

A

As indicated in above table, an $(N_1)_{60}$ value of 20 is the approximate boundary between the medium and dense states of the sand. Above an $(N_1)_{60}$ of 30, the sand is in either a dense or a very dense state. For this condition, initial liquefaction does not produce large deformations because of the dilation tendency of the sand upon reversal of the cyclic shear stress. This is the reason that such soils produce no significant damage, as indicated by the above table.

Figure 3 presents a chart that can be used to determine the cyclic resistance ratio of the in situ soil. This figure was developed from investigations of numerous sites that had liquefied or did not liquefy during earthquakes. For most of the data used in Fig. 3, the earthquake magnitude was close to 7.5 (Seed et al. 1985). The three lines shown in Fig. 3 are for soil that contains 35, 15, or 5 percent fines. The lines shown in Fig. 3 represent approximate dividing lines, where data to the left of each individual line indicate field liquefaction, while data to the right of the line indicate sites that generally did not liquefy during the earthquake.

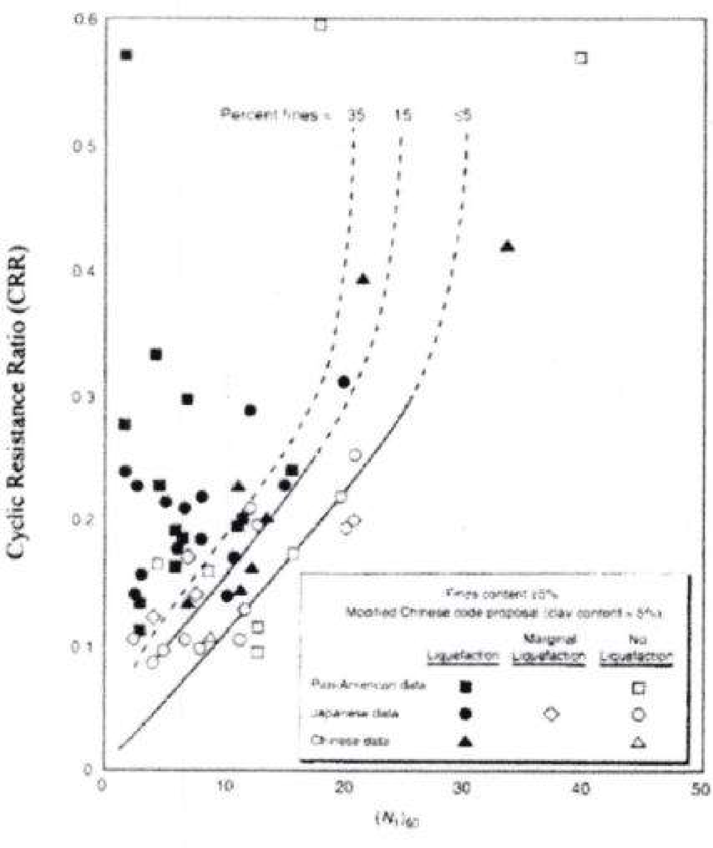


Fig. 3: Plot used to determine the cyclic resistance ratio for clean and silty sands for M= 7.5 earthquakes.

Use of Fig. 2.3 to determine the cyclic resistance ratio of the in situ soil is as follows:

1. ***Standard penetration test*** $(N_1)_{60}$***value:***In Fig. 2.3 that the horizontal axis represents data from the standard penetration test, which must be expressed in terms of the $(N_1)_{60}$ value. In the liquefaction analysis, the standard penetration test N_{60} value is corrected for the overburden pressure and after the correction is applied to the N_{60} value to account for the effect of overburden pressure, this value is referred to as $(N_1)_{60}$.

2. ***Percent fines:***Once the $(N_1)_{60}$ value has been calculated, the next step is to determine or estimate the percent fines in the soil. For a given $(N_1)_{60}$ value, soils with more fines have a higher liquefaction resistance. Figure 2.3 is applicable for nonplastic silty sands or for plastic silty sands that meet the criteria for cohesive soils.

3. ***Cyclic resistance ratio for an anticipated magnitude 7.5 earthquake:***Once the $(N_1)_{60}$ value and the percent fines in the soil have been determined, then Fig. 2.3 can be used to obtain the cyclic resistance ratio of the soil. To use Fig. 2.3, the figure is entered with the corrected standard penetration test $(N_1)_{60}$ value, and then by intersecting the appropriate fines content curve, the cyclic resistance ratio is obtained. As shown in Fig. 2.3, for a magnitude 7.5 earthquake, clean sand will not liquefy if the $(N_1)_{60}$values exceeds 30. For an $(N_1)_{60}$ value of 30, the sand is in either a dense or a very dense state. As previously mentioned, dense sands will not liquefy because they tend to dilate during shearing.

4. ***Correction for other magnitude earthquakes:***Fig.2.3 is for a projected earthquake that has a magnitude of 7.5. The final factor that must be included in the analysis is the magnitude of the earthquake. The higher the magnitude of the earthquake, the longer the duration of ground shaking. A higher magnitude will thus result in a higher number of applications of cyclic shear strain, which will decrease the liquefaction resistance of the soil. Fig.2.3 was developed for an earthquake magnitude of 7.5; and for other different magnitudes, the CRR values from Fig. 2.3 would be multiplied by the magnitude scaling factor indicated in Table 2.2. Fig.2.4 presents other suggested magnitude scaling factors.

Table .2: Magnitude scaling factors

Anticipated earthquake magnitude	Magnitude scaling factor
8.5	0.89
7.5	1.00
6.75	1.13
6	1.32
5.25	1.50

(Source: Seed et al. (1985))

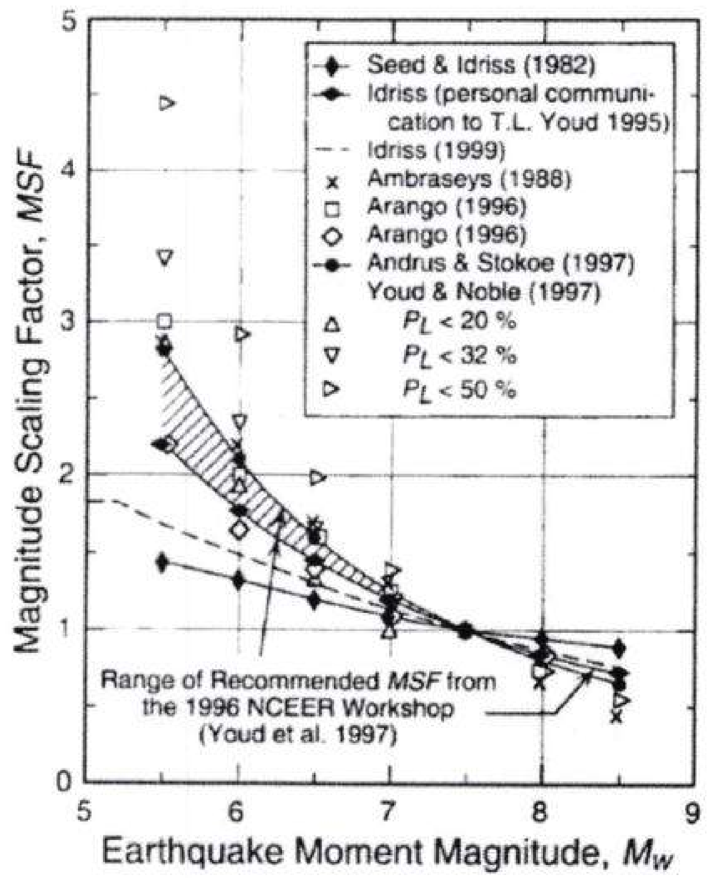


Fig. 4: Magnitude scaling factors derived by various investigators.

It could be concluded that the local magnitude M_L, the surface wave magnitude M_s, and moment magnitude M_w scales are reasonably close to one another below a value of about 7. Thus for a magnitude of 7 or below, any one of these magnitude scales can be used to determine the magnitude scaling factor. At high magnitude values, the moment magnitude M_w tends to significantly deviate from the other magnitude scales, and the moment magnitude M_w should be used to determine the magnitude scaling factor from Table 2.2 or Fig. 2.4.

Two additional correction factors may need to be included in the analysis. The first correction factor is for the liquefaction of deep soil layers (i.e., depths where σ'_{vo}>100 kN/m^2, in which liquefaction has not been verified by the Seed and Idriss simplified procedure). The second correction factor is for sloping ground conditions.

Both the peak ground acceleration a_{max} and the length of ground shaking increase for sites having soft, thick, and submerged soils. In a sense, the earthquake magnitude accounts for the increased shaking at a site; that is, the higher the magnitude, the longer the ground is subjected to shaking. Thus for sites having soft, thick, and submerged soils, it may be prudent to increase both the peak ground acceleration a_{max} and the earthquake magnitude to account for local site effects.

Factor of Safety against Liquefaction

The final step in the liquefaction analysis is to calculate the factor of safety against liquefaction. If the cyclic stress ratio caused by the anticipated earthquake [Eq. (2.6)] is greater than the cyclic resistance ratio of the in situ soil (Fig. 2.3), then liquefaction could occur during the earthquake, and vice versa. The factor of safety against liquefaction (FS) is defined as follows:

$$FS = CRR/CSR \qquad (2.8)$$

The higher the factor of safety, the more resistant the soil is to liquefaction. However, soil that has a factor of safety slightly greater than 1.0 may still liquefy during an earthquake. For example, if a lower layer liquefies, then the upward flow of water could induce liquefaction of the layer that has a factor of safety slightly greater than 1.0.

In the above liquefaction analysis, there are many different equations and corrections that are applied to both the cyclic stress ratio induced by the anticipated earthquake and the cyclic resistance ratio of the in situ soil. For example, there are four different corrections (that is,

E_m, C_b, C_r , and σ'_{v0}) that are applied to the standard penetration test N value in order to calculate the $(N_1)_{60}$ value. All these different equations and various corrections may provide the engineer with a sense of high accuracy, when in fact the entire analysis is only a gross approximation. The analysis should be treated as such, and engineering experience and judgment are essential in the final determination of whether a site has liquefaction potential.

Conclusion :

From liquefaction analysis it is found that soil is found to be non-liquefiable.

Analysis of liquefaction Potential as per IS 1893 (Part1) - 2016, Seed & Idriss, Idriss & Boulanger approach

B.H. No.	Dept h	Observed N value	(N1)60	(N1)60cs	C.S.R. (M=7.5)	C.R.R. (M=7.5)	F.O.S. (M=7.5)	σV (kPa)	σ'V (kPa)	C_{HT}	C_{HW}	C_{ss}	C_{RL}	C_{BD}	CN	FC (%)	r_d	Bulk density ton/m3	Bulk density KN/m3	Submerged densty	Liquid Limit (LL) in%	Remark
1	1.5	3	4.35	11.09	0.57	0.12	0.21	24.70	10.00	1	0.98	1.1	0.75	1.05	1.7	100	0.99	1.68	16.464	6.664	39.65	NL,LL>35
	3.0	19	26.22	41.71	0.64	0.60	0.94	55.57	19.99	1	0.98	1.1	0.75	1.05	1.7	100	0.98	2.1	20.58	10.78	39.20	NL,LL>35
	4.5	25	39.10	59.74	0.54	0.60	1.10	87.17	36.16	1	0.98	1.1	0.85	1.05	1.7	100	0.97	2.15	21.07	11.27	38.56	NL
	6.0	31	39.15	59.81	0.50	0.60	1.20	118.92	53.07	1	0.98	1.1	0.85	1.05	1.37	100	0.95	2.16	21.168	11.368	37.75	NL
	7.5	33	40.52	61.73	0.47	0.60	1.26	150.97	70.12	1	0.98	1.1	0.95	1.05	1.19	100	0.94	2.18	21.364	11.564	37.66	NL
	9.0	39	42.88	65.03	0.46	0.60	1.31	183.16	87.47	1	0.98	1.1	0.95	1.05	1.07	100	0.93	2.19	21.462	11.662	36.79	NL
	10.5	43	45.43	68.60	0.43	0.60	1.40	215.65	104.96	1	0.98	1.1	1	1.05	0.98	100	0.89	2.21	21.658	11.858	36.67	NL
	12.0	47	45.92	69.29	0.40	0.60	1.49	248.28	122.75	1	0.98	1.1	1	1.05	0.9	100	0.85	2.22	21.756	11.956	36.12	NL
	13.5	51	46.54	70.16	0.38	0.60	1.58	281.06	140.68	1	0.98	1.1	1	1.05	0.84	100	0.81	2.23	21.854	12.054	35.8	NL
	15.0	59	50.68	75.96	0.36	0.60	1.68	313.99	158.76	1	0.98	1.1	1	1.05	0.79	100	0.77	2.24	21.952	12.152	35.3	NL

C_{BD} : Borehole diameter =150mm

C_{Hw} : Weight of hammer =63.5Kg, Height of fall =750mm

L : Liquifiable
NL : Non Liquifiable

Analysis of liquefaction Potential as per IS 1893 (Part1) - 2016, Seed & Idriss, Idriss & Boulanger approach

B.H. No.	Dept h	Observed N value	(N1)60	(N1)60cs	C.S.R. (M=7.5)	C.R.R. (M=7.5)	F.O.S. (M=7.5)	σV (kPa)	σ'V (kPa)	C_{HT}	C_{HW}	C_{ss}	C_{RL}	C_{BD}	CN	FC (%)	r_d	Bulk density ton/m3	Bulk density KN/m3	Submerged densty	Liquid Limit (LL) in%	Remark
2	1.5	3	4.35	11.09	0.50	0.12	0.24	27.20	12.50	1	0.98	1.1	0.75	1.05	1.7	100	0.99	1.85	18.13	8.33	39.24	NL,LL>35
	3.0	10	13.80	24.32	0.51	0.22	0.43	56.01	24.99	1	0.98	1.1	0.75	1.05	1.7	100	0.98	1.96	19.208	9.408	38.87	NL,LL>35
	4.5	14	21.90	35.66	0.49	0.38	0.78	84.67	39.10	1	0.98	1.1	0.85	1.05	1.7	100	0.97	1.95	19.11	9.31	38.37	NL,LL>35
	6.0	17	21.47	35.06	0.49	0.36	0.74	115.40	53.07	1	0.98	1.1	0.85	1.05	1.37	100	0.95	2.09	20.482	10.682	37.8	NL,LL>35
	7.5	24	29.69	46.57	0.47	0.60	1.28	147.00	69.09	1	0.98	1.1	0.95	1.05	1.2	100	0.94	2.15	21.07	11.27	37.39	NL
	9.0	26	28.83	45.36	0.45	0.60	1.32	178.75	86.00	1	0.98	1.1	0.95	1.05	1.08	100	0.93	2.16	21.168	11.368	36.72	NL
	10.5	29	30.92	48.29	0.43	0.60	1.40	210.50	103.05	1	0.98	1.1	1	1.05	0.99	100	0.89	2.16	21.168	11.368	36.55	NL
	12.0	31	30.62	47.87	0.40	0.60	1.49	242.84	120.10	1	0.98	1.1	1	1.05	0.91	100	0.85	2.20	21.56	11.76	36.15	NL
	13.5	34	31.36	48.90	0.38	0.60	1.58	275.33	137.74	1	0.98	1.1	1	1.05	0.85	100	0.81	2.21	21.658	11.858	35.88	NL
	15.0	37	32.11	49.96	0.36	0.60	1.67	307.97	155.53	1	0.98	1.1	1	1.05	0.8	100	0.77	2.22	21.756	11.956	35.26	NL

C_{BD} : Borehole diameter =150mm

C_{Hw} : Weight of hammer =63.5Kg, Height of fall =750mm

L : Liquifiable

NL : Non Liquifiable

RELIANT FOUNDATIONS PVT. LTD.

Analysis of liquefaction Potential as per IS 1893 (Part1) - 2016, Seed & Idriss, Idriss & Boulanger approach

B.H. No.	Dept h	Observed N value	(N1)60	(N1)60cs	C.S.R. (M=7.5)	C.R.R. (M=7.5)	F.O.S. (M=7.5)	σV (kPa)	σ'V (kPa)	C_{HT}	C_{HW}	C_{ss}	C_{RL}	C_{BD}	CN	FC (%)	r_d	Bulk density ton/m3	Bulk density KN/m3	Submerged densty	Liquid Limit (LL) in%	Remark
	1.5	7	10.14	19.20	0.49	0.19	0.38	27.64	12.94	1	0.98	1.1	0.75	1.05	1.7	100	0.99	1.88	18.424	8.624	39.79	NL,LL>35
	3.0	12	16.56	28.19	0.50	0.25	0.50	57.04	25.87	1	0.98	1.1	0.75	1.05	1.7	100	0.98	2.00	19.6	9.8	38.53	NL,LL>35
	4.5	16	25.03	40.04	0.49	0.60	1.23	87.61	40.57	1	0.98	1.1	0.85	1.05	1.7	100	0.97	2.08	20.384	10.584	37.25	NL
	6.0	20	24.49	39.29	0.47	0.60	1.28	118.63	56.45	1	0.98	1.1	0.85	1.05	1.33	100	0.95	2.11	20.678	10.878	37.11	NL
3	7.5	27	32.55	50.57	0.46	0.60	1.31	150.53	72.77	1	0.98	1.1	0.95	1.05	1.17	100	0.94	2.17	21.266	11.466	36.74	NL
	9.0	30	32.52	50.53	0.44	0.60	1.36	182.72	89.96	1	0.98	1.1	0.95	1.05	1.05	100	0.93	2.19	21.462	11.662	36.51	NL
	10.5	32	33.41	51.78	0.42	0.60	1.43	215.21	107.46	1	0.98	1.1	1	1.05	0.96	100	0.89	2.21	21.658	11.858	36.33	NL
	12.0	36	34.82	53.75	0.40	0.60	1.52	247.84	125.24	1	0.98	1.1	1	1.05	0.89	100	0.85	2.22	21.756	11.956	36.19	NL
	13.5	33	29.85	46.79	0.37	0.60	1.61	280.92	143.18	1	0.98	1.1	1	1.05	0.84	100	0.81	2.25	22.05	12.25	36.1	NL
	15.0	32	27.25	43.15	0.35	0.60	1.70	314.14	161.55	1	0.98	1.1	1	1.05	0.79	100	0.77	2.26	22.148	12.348	35.48	NL

C_{BD} : Borehole diameter =150mm

C_{Hw} : Weight of hammer =63.5Kg, Height of fall =750mm

L : Liquifiable

NL : Non Liquifiable

RELIANT FOUNDATIONS PVT. LTD.

Analysis of liquefaction Potential as per IS 1893 (Part1) - 2016, Seed & Idriss, Idriss & Boulanger approach

B.H. No.	Dept h	Observed N value	(N1)60	(N1)60cs	C.S.R. (M=7.5)	C.R.R. (M=7.5)	F.O.S. (M=7.5)	σV (kPa)	σ'V (kPa)	C_{HT}	C_{HW}	C_{ss}	C_{RL}	C_{BD}	CN	FC (%)	r_d	Bulk density ton/m3	Bulk density KN/m3	Submerged densty	Liquid Limit (LL) in%	Remark
4	1.5	3	4.35	11.09	0.57	0.12	0.21	24.84	10.14	1	0.98	1.1	0.75	1.05	1.7	100	0.99	1.69	16.562	6.762	38.25	NL,LL>35
	3.0	4	5.52	12.73	0.57	0.14	0.24	50.72	20.29	1	0.98	1.1	0.75	1.05	1.7	100	0.98	1.76	17.248	7.448	37.69	NL,LL>35
	4.5	9	14.08	24.71	0.57	0.24	0.42	79.23	31.46	1	0.98	1.1	0.85	1.05	1.7	100	0.97	1.94	19.012	9.212	36.21	NL,LL>35
	6.0	12	16.41	27.97	0.54	0.26	0.49	108.63	45.28	1	0.98	1.1	0.85	1.05	1.49	100	0.95	2.00	19.6	9.8	36.15	NL,LL>35
	7.5	16	21.24	34.74	0.51	0.42	0.82	139.36	59.98	1	0.98	1.1	0.95	1.05	1.29	100	0.94	2.09	20.482	10.682	36.08	NL,LL>35
	9.0	20	23.59	38.03	0.49	0.60	1.23	170.37	76.00	1	0.98	1.1	0.95	1.05	1.15	100	0.93	2.11	20.678	10.878	36.01	NL
	10.5	24	27.04	42.85	0.46	0.60	1.31	201.98	92.32	1	0.98	1.1	1	1.05	1.04	100	0.89	2.15	21.07	11.27	35.86	NL
	12.0	28	29.00	45.60	0.43	0.60	1.40	234.02	109.22	1	0.98	1.1	1	1.05	0.96	100	0.85	2.18	21.364	11.564	35.8	NL
	13.5	31	29.83	46.76	0.40	0.60	1.50	266.36	126.57	1	0.98	1.1	1	1.05	0.89	100	0.81	2.20	21.56	11.76	35.74	NL
	15.0	33	29.74	46.64	0.38	0.60	1.60	299.15	144.21	1	0.98	1.1	1	1.05	0.83	100	0.77	2.23	21.854	12.054	35.2	NL

CBD : Borehole diameter =150mm

CHw : Weight of hammer =63.5Kg, Height of fall =750mm

L : Liquifiable

NL : Non Liquifiable

RELIANT FOUNDATIONS PVT. LTD.

Analysis of liquefaction Potential as per IS 1893 (Part1) - 2016, Seed & Idriss, Idriss & Boulanger approach

B.H. No.	Depth h	Observed N value	(N1)60	(N1)60cs	C.S.R. (M=7.5)	C.R.R. (M=7.5)	F.O.S. (M=7.5)	σV (kPa)	σ'V (kPa)	C_{HT}	C_{HW}	C_{ss}	C_{RL}	C_{BD}	CN	FC (%)	r_d	Bulk density ton/m3	Bulk density KN/m3	Submerged densty	Liquid Limit (LL) in%	Remark
	1.5	4	5.80	13.11	0.54	0.14	0.26	25.87	11.17	1	0.98	1.1	0.75	1.05	1.7	100	0.99	1.76	17.248	7.448	38.63	NL,LL>35
	3.0	9	12.42	22.39	0.56	0.22	0.40	54.39	22.34	1	0.98	1.1	0.75	1.05	1.7	100	0.98	1.94	19.012	9.212	37.70	NL,LL>35
	4.5	19	29.72	46.60	0.53	0.60	1.12	85.41	36.16	1	0.98	1.1	0.85	1.05	1.7	100	0.97	2.11	20.678	10.878	37.50	NL
	6.0	26	33.02	51.23	0.50	0.60	1.20	117.16	52.48	1	0.98	1.1	0.85	1.05	1.38	100	0.95	2.16	21.168	11.368	36.8	NL
5	7.5	29	35.76	55.07	0.47	0.60	1.27	149.21	69.53	1	0.98	1.1	0.95	1.05	1.2	100	0.94	2.18	21.364	11.564	36.41	NL
	9.0	34	37.51	57.51	0.45	0.60	1.32	181.40	86.88	1	0.98	1.1	0.95	1.05	1.07	100	0.93	2.19	21.462	11.662	36.21	NL
	10.5	35	37.08	56.92	0.43	0.60	1.40	213.74	104.37	1	0.98	1.1	1	1.05	0.98	100	0.89	2.20	21.56	11.76	36.04	NL
	12.0	37	36.26	55.76	0.40	0.60	1.49	246.23	122.01	1	0.98	1.1	1	1.05	0.91	100	0.85	2.21	21.658	11.858	35.91	NL
	13.5	40	36.62	56.27	0.38	0.60	1.58	278.86	139.80	1	0.98	1.1	1	1.05	0.85	100	0.81	2.22	21.756	11.956	35.6	NL
	15.0	44	37.92	58.09	0.36	0.60	1.68	311.79	157.73	1	0.98	1.1	1	1.05	0.8	100	0.77	2.24	21.952	12.152	35.13	NL

C_{BD} : Borehole diameter =150mm

C_{Hw} : Weight of hammer =63.5Kg, Height of fall =750mm

L : Liquifiable

NL : Non Liquifiable

RELIANT FOUNDATIONS PVT. LTD.

Analysis of liquefaction Potential as per IS 1893 (Part1) - 2016, Seed & Idriss, Idriss & Boulanger approach

B.H. No.	Dept h	Observed N value	(N1)60	(N1)60cs	C.S.R. (M=7.5)	C.R.R. (M=7.5)	F.O.S. (M=7.5)	σV (kPa)	σ'V (kPa)	C_{HT}	C_{HW}	C_{ss}	C_{RL}	C_{BD}	CN	FC (%)	r_d	Bulk density ton/m3	Bulk density KN/m3	Submerged densty	Liquid Limit (LL) in%	Remark
6	1.5	14	20.29	33.40	0.45	0.40	0.89	30.14	15.44	1	0.98	1.1	0.75	1.05	1.7	100	0.99	2.05	20.09	10.29	37.05	NL,LL>35
	3.0	17	23.46	37.85	0.45	0.60	1.33	60.86	30.87	1	0.98	1.1	0.75	1.05	1.7	100	0.98	2.09	20.482	10.682	36.80	NL
	4.5	22	34.41	53.17	0.44	0.60	1.36	91.73	46.89	1	0.98	1.1	0.85	1.05	1.7	100	0.97	2.10	20.58	10.78	36.44	NL
	6.0	26	30.12	47.17	0.44	0.60	1.37	123.48	63.06	1	0.98	1.1	0.85	1.05	1.26	100	0.95	2.16	21.168	11.368	36.23	NL
	7.5	31	35.61	54.86	0.43	0.60	1.40	155.82	80.12	1	0.98	1.1	0.95	1.05	1.12	100	0.94	2.20	21.56	11.76	36.07	NL
	9.0	27	28.08	44.31	0.42	0.60	1.43	187.72	97.76	1	0.98	1.1	0.95	1.05	1.01	100	0.93	2.17	21.266	11.466	37.28	NL
	10.5	30	30.29	47.40	0.40	0.60	1.50	219.91	114.95	1	0.98	1.1	1	1.05	0.93	100	0.89	2.19	21.462	11.662	36.21	NL
	12.0	33	31.04	48.45	0.38	0.60	1.58	252.40	132.45	1	0.98	1.1	1	1.05	0.87	100	0.85	2.21	21.658	11.858	36.29	NL
	13.5	31	27.38	43.33	0.36	0.60	1.66	285.18	150.23	1	0.98	1.1	1	1.05	0.82	100	0.81	2.23	21.854	12.054	35.34	NL
	15.0	34	28.37	44.71	0.34	0.60	1.75	318.11	168.32	1	0.98	1.1	1	1.05	0.77	100	0.77	2.24	21.952	12.152	35.09	NL

C_{BD} : Borehole diameter =150mm

C_{Hw} : Weight of hammer =63.5Kg, Height of fall =750mm

L : Liquifiable

NL : Non Liquifiable

RELIANT FOUNDATIONS PVT. LTD. * GHY-35 *

Analysis of liquefaction Potential as per IS 1893 (Part1) - 2016, Seed & Idriss, Idriss & Boulanger approach

B.H. No.	Dept h	Observed N value	(N1)60	(N1)60cs	C.S.R. (M=7.5)	C.R.R. (M=7.5)	F.O.S. (M=7.5)	σV (kPa)	σ'V (kPa)	C_{HT}	C_{HW}	C_{SS}	C_{RL}	C_{BD}	CN	FC (%)	r_d	Bulk density ton/m3	Bulk density KN/m3	Submerged densty	Liquid Limit (LL) in%	Remark
7	1.5	7	10.14	19.20	0.46	0.20	0.43	29.25	14.55	1	0.98	1.1	0.75	1.05	1.7	100	0.99	1.99	19.502	9.702	38.52	NL,LL>35
	3.0	13	17.94	30.12	0.46	0.28	0.60	58.95	29.11	1	0.98	1.1	0.75	1.05	1.7	100	0.98	2.02	19.796	9.996	37.75	NL,LL>35
	4.5	17	26.59	42.22	0.47	0.60	1.28	91.29	44.10	1	0.98	1.1	0.85	1.05	1.7	100	0.97	2.20	21.56	11.76	37.33	NL
	6.0	20	23.42	37.79	0.44	0.60	1.36	122.30	61.74	1	0.98	1.1	0.85	1.05	1.27	100	0.95	2.11	20.678	10.878	37.14	NL
	7.5	22	25.61	40.85	0.43	0.60	1.38	153.62	78.06	1	0.98	1.1	0.95	1.05	1.13	100	0.94	2.13	20.874	11.074	36.55	NL
	9.0	24	25.36	40.51	0.43	0.60	1.41	185.07	94.67	1	0.98	1.1	0.95	1.05	1.03	100	0.93	2.14	20.972	11.172	36.3	NL
	10.5	29	29.74	46.63	0.41	0.60	1.47	217.12	111.43	1	0.98	1.1	1	1.05	0.95	100	0.89	2.18	21.364	11.564	36.05	NL
	12.0	31	29.57	46.40	0.39	0.60	1.55	249.31	128.77	1	0.98	1.1	1	1.05	0.88	100	0.85	2.19	21.462	11.662	35.77	NL
	13.5	34	30.43	47.60	0.37	0.60	1.64	281.65	146.27	1	0.98	1.1	1	1.05	0.83	100	0.81	2.20	21.56	11.76	35.12	NL
	15.0	36	30.44	47.61	0.35	0.60	1.73	314.43	163.91	1	0.98	1.1	1	1.05	0.78	100	0.77	2.23	21.854	12.054	35.1	NL

C_{BD} : Borehole diameter =150mm

C_{HW} : Weight of hammer =63.5Kg, Height of fall =750mm

L : Liquifiable

NL : Non Liquifiable

FOUNDATIONS PVT. LTD. * GHY-35

Analysis of liquefaction Potential as per IS 1893 (Part1) - 2016, Seed & Idriss, Idriss & Boulanger approach

B.H. No.	Dept h	Observed N value	(N1)60	(N1)60cs	C.S.R. (M=7.5)	C.R.R. (M=7.5)	F.O.S. (M=7.5)	σV (kPa)	σ'V (kPa)	C_{HT}	C_{HW}	C_{ss}	C_{RL}	C_{BD}	CN	FC (%)	r_d	Bulk density ton/m3	Bulk density KN/m3	Submerged densty	Liquid Limit (LL) in%	Remark
8	1.5	3	4.35	11.09	0.47	0.14	0.30	28.81	14.11	1	0.98	1.1	0.75	1.05	1.7	100	0.99	1.96	19.208	9.408	39.13	NL,LL>35
	3.0	13	17.94	30.12	0.47	0.28	0.59	58.51	28.22	1	0.98	1.1	0.75	1.05	1.7	100	0.98	2.02	19.796	9.996	38.63	NL,LL>35
	4.5	8	12.51	22.52	0.45	0.23	0.51	86.73	43.22	1	0.98	1.1	0.85	1.05	1.7	100	0.97	1.92	18.816	9.016	38.23	NL,LL>35
	6.0	10	12.21	22.10	0.45	0.22	0.48	115.54	56.74	1	0.98	1.1	0.85	1.05	1.33	100	0.95	1.96	19.208	9.408	37.73	NL,LL>35
	7.5	14	17.10	28.94	0.45	0.25	0.55	145.68	70.85	1	0.98	1.1	0.95	1.05	1.19	100	0.94	2.05	20.09	10.29	37.38	NL,LL>35
	9.0	19	21.03	34.45	0.45	0.50	1.12	176.55	86.29	1	0.98	1.1	0.95	1.05	1.08	100	0.93	2.10	20.58	10.78	37.23	NL
	10.5	24	25.66	40.93	0.43	0.60	1.41	208.59	102.46	1	0.98	1.1	1	1.05	0.99	100	0.89	2.18	21.364	11.564	36.55	NL
	12.0	29	28.68	45.15	0.40	0.60	1.50	240.64	119.81	1	0.98	1.1	1	1.05	0.91	100	0.85	2.18	21.364	11.564	36.31	NL
	13.5	31	28.65	45.11	0.38	0.60	1.58	272.98	137.15	1	0.98	1.1	1	1.05	0.85	100	0.81	2.20	21.56	11.76	35.7	NL
	15.0	39	33.93	52.50	0.36	0.60	1.68	305.91	154.79	1	0.98	1.1	1	1.05	0.8	100	0.77	2.24	21.952	12.152	35.12	NL

C_{BD} : Borehole diameter =150mm

C_{Hw} : Weight of hammer =63.5Kg, Height of fall =750mm

L : Liquifiable

NL : Non Liquifiable

Analysis of liquefaction Potential as per IS 1893 (Part1) - 2016, Seed & Idriss, Idriss & Boulanger approach

B.H. No.	Dept h	Observed N value	(N1)60	(N1)60cs	C.S.R. (M=7.5)	C.R.R. (M=7.5)	F.O.S. (M=7.5)	σV (kPa)	σ'V (kPa)	C_{HT}	C_{HW}	C_{SS}	C_{RL}	C_{BD}	CN	FC (%)	r_d	Bulk density ton/m3	Bulk density KN/m3	Submerged densty	Liquid Limit (LL) in%	Remark
9	1.5	3	4.35	11.09	0.57	0.13	0.23	24.84	10.14	1	0.98	1.1	0.75	1.05	1.7	100	0.99	1.69	16.562	6.762	38.39	NL,LL>35
	3.0	6	8.28	16.59	0.58	0.16	0.27	51.89	20.29	1	0.98	1.1	0.75	1.05	1.7	100	0.98	1.84	18.032	8.232	37.86	NL,LL>35
	4.5	9	14.08	24.71	0.56	0.24	0.43	80.56	32.63	1	0.98	1.1	0.85	1.05	1.7	100	0.97	1.95	19.11	9.31	37.20	NL,LL>35
	6.0	8	10.78	20.10	0.52	0.20	0.38	108.78	46.60	1	0.98	1.1	0.85	1.05	1.46	100	0.95	1.92	18.816	9.016	37.15	NL,LL>35
	7.5	15	19.89	32.85	0.51	0.35	0.69	139.06	60.12	1	0.98	1.1	0.95	1.05	1.29	100	0.94	2.06	20.188	10.388	37.12	NL,LL>35
	9.0	20	23.64	38.09	0.49	0.60	1.23	170.08	75.71	1	0.98	1.1	0.95	1.05	1.15	100	0.93	2.11	20.678	10.878	36.71	NL
	10.5	23	25.95	41.33	0.46	0.60	1.31	201.54	92.02	1	0.98	1.1	1	1.05	1.04	100	0.89	2.14	20.972	11.172	36.52	NL
	12.0	31	32.17	50.04	0.43	0.60	1.40	233.88	108.78	1	0.98	1.1	1	1.05	0.96	100	0.85	2.20	21.56	11.76	36.33	NL
	13.5	35	33.69	52.17	0.40	0.60	1.49	266.95	126.42	1	0.98	1.1	1	1.05	0.89	100	0.81	2.25	22.05	12.25	35.3	NL
	15.0	40	35.98	55.37	0.38	0.60	1.60	300.32	144.80	1	0.98	1.1	1	1.05	0.83	100	0.77	2.27	22.246	12.446	35.17	NL

C_{BD} : Borehole diameter =150mm

C_{Hw} : Weight of hammer =63.5Kg, Height of fall =750mm

L : Liquifiable

NL : Non Liquifiable

RELIANT FOUNDATIONS PVT. LTD.

Analysis of liquefaction Potential as per IS 1893 (Part1) - 2016, Seed & Idriss, Idriss & Boulanger approach

B.H. No.	Dept h	Observed N value	(N1)60	(N1)60cs	C.S.R. (M=7.5)	C.R.R. (M=7.5)	F.O.S. (M=7.5)	σV (kPa)	σ'V (kPa)	C_{HT}	C_{HW}	C_{ss}	C_{RL}	C_{BD}	CN	FC (%)	r_d	Bulk density ton/m3	Bulk density KN/m3	Submerged densty	Liquid Limit (LL) in%	Remark
10	1.5	1	1.45	7.03	0.62	0.09	0.15	23.52	8.82	1	0.98	1.1	0.75	1.05	1.7	100	0.99	1.60	15.68	5.88	39.7	NL,LL>35
	3.0	2	2.76	8.86	0.61	0.10	0.16	47.33	17.64	1	0.98	1.1	0.75	1.05	1.7	100	0.98	1.62	15.876	6.076	38.46	NL,LL>35
	4.5	4	6.26	13.76	0.62	0.14	0.22	73.79	26.75	1	0.98	1.1	0.85	1.05	1.7	100	0.97	1.80	17.64	7.84	37.98	NL,LL>35
	6.0	6	8.90	17.45	0.58	0.16	0.27	100.84	38.51	1	0.98	1.1	0.85	1.05	1.61	100	0.95	1.84	18.032	8.232	37.45	NL,LL>35
	7.5	9	12.98	23.17	0.56	0.22	0.39	129.36	50.86	1	0.98	1.1	0.95	1.05	1.4	100	0.94	1.94	19.012	9.212	37.23	NL,LL>35
	9.0	11	14.06	24.69	0.53	0.24	0.45	158.03	64.68	1	0.98	1.1	0.95	1.05	1.24	100	0.93	1.95	19.11	9.31	37.13	NL,LL>35
	10.5	14	17.09	28.92	0.49	0.26	0.53	185.51	78.65	1	0.98	1.1	1	1.05	1.13	100	0.89	1.87	18.326	8.526	36.83	NL,LL>35
	12.0	15	16.98	28.77	0.47	0.25	0.54	213.15	91.43	1	0.98	1.1	1	1.05	1.05	100	0.85	1.88	18.424	8.624	36.67	NL,LL>35
	13.5	20	21.19	34.67	0.44	0.45	1.02	241.08	104.37	1	0.98	1.1	1	1.05	0.98	100	0.81	1.90	18.62	8.82	36.55	NL
	15.0	45	44.92	44.92	0.42	0.60	1.43	273.42	117.60	1	0.98	1.1	1	1.05	0.92	0	0.77	2.20	21.56	11.76	35.36	NL

C_{BD} : Borehole diameter =150mm

C_{Hw} : Weight of hammer =63.5Kg, Height of fall =750mm

L : Liquifiable

NL : Non Liquifiable

RELIANT FOUNDATIONS PVT. LTD. * GWALIOR *

Analysis of liquefaction Potential as per IS 1893 (Part1) - 2016, Seed & Idriss, Idriss & Boulanger approach

B.H. No.	Dept h	Observed N value	(N1)60	(N1)60cs	C.S.R. (M=7.5)	C.R.R. (M=7.5)	F.O.S. (M=7.5)	σV (kPa)	σ'V (kPa)	C_{HT}	C_{HW}	C_{SS}	C_{RL}	C_{BD}	CN	FC (%)	r_d	Bulk density ton/m3	Bulk density KN/m3	Submerged densty	Liquid Limit (LL) in%	Remark
11	1.5	2	2.90	9.06	0.62	0.10	0.16	23.52	8.82	1	0.98	1.1	0.75	1.05	1.7	100	0.99	1.60	15.68	5.88	38.36	NL,LL>35
	3.0	4	5.52	12.73	0.64	0.13	0.20	49.39	17.64	1	0.98	1.1	0.75	1.05	1.7	100	0.98	1.76	17.248	7.448	37.49	NL,LL>35
	4.5	6	9.38	18.14	0.60	0.18	0.30	76.44	28.81	1	0.98	1.1	0.85	1.05	1.7	100	0.97	1.84	18.032	8.232	36.69	NL,LL>35
	6.0	9	12.91	23.07	0.57	0.21	0.37	104.96	41.16	1	0.98	1.1	0.85	1.05	1.56	100	0.95	1.94	19.012	9.212	36.44	NL,LL>35
	7.5	11	15.25	26.36	0.54	0.25	0.46	134.06	54.98	1	0.98	1.1	0.95	1.05	1.35	100	0.94	1.98	19.404	9.604	36.2	NL,LL>35
	9.0	15	18.52	30.92	0.52	0.28	0.54	164.35	69.38	1	0.98	1.1	0.95	1.05	1.2	100	0.93	2.06	20.188	10.388	36.03	NL,LL>35
	10.5	19	22.31	36.24	0.48	0.50	1.04	195.22	84.97	1	0.98	1.1	1	1.05	1.08	100	0.89	2.10	20.58	10.78	35.74	NL
	12.0	22	23.68	38.15	0.45	0.60	1.34	226.53	101.14	1	0.98	1.1	1	1.05	0.99	100	0.85	2.13	20.874	11.074	35.53	NL
	13.5	27	26.93	42.71	0.42	0.60	1.44	258.43	117.75	1	0.98	1.1	1	1.05	0.92	100	0.81	2.17	21.266	11.466	35.19	NL
	15.0	31	28.88	31.37	0.39	0.60	1.55	289.00	134.95	1	0.98	1.1	1	1.05	0.86	15	0.77	2.08	20.384	10.584	0	NL

CBD : Borehole diameter =150mm

CHw : Weight of hammer =63.5Kg, Height of fall =750mm

L : Liquifiable
NL : Non Liquifiable

Analysis of liquefaction Potential as per IS 1893 (Part1) - 2016, Seed & Idriss, Idriss & Boulanger approach

B.H. No.	Dept h	Observed N value	(N1)60	(N1)60cs	C.S.R. (M=7.5)	C.R.R. (M=7.5)	F.O.S. (M=7.5)	σV (kPa)	σ'V (kPa)	C_{HT}	C_{HW}	C_{ss}	C_{RL}	C_{BD}	CN	FC (%)	r_d	Bulk density ton/m3	Bulk density KN/m3	Submerged densty	Liquid Limit (LL) in%	Remark
12	1.5	3	4.35	11.09	0.62	0.13	0.21	23.52	8.82	1	0.98	1.1	0.75	1.05	1.7	100	0.99	1.60	15.68	5.88	38.69	NL,LL>35
	3.0	8	11.04	20.46	0.64	0.19	0.30	49.39	17.64	1	0.98	1.1	0.75	1.05	1.7	100	0.98	1.76	17.248	7.448	37.60	NL,LL>35
	4.5	13	20.33	33.47	0.60	0.37	0.62	76.44	28.81	1	0.98	1.1	0.85	1.05	1.7	100	0.97	1.84	18.032	8.232	36.21	NL,LL>35
	6.0	10	14.34	25.08	0.57	0.23	0.40	104.96	41.16	1	0.98	1.1	0.85	1.05	1.56	100	0.95	1.94	19.012	9.212	36.15	NL,LL>35
	7.5	13	18.03	30.24	0.54	0.28	0.52	134.06	54.98	1	0.98	1.1	0.95	1.05	1.35	100	0.94	1.98	19.404	9.604	36.11	NL,LL>35
	9.0	17	20.99	34.38	0.52	0.40	0.78	164.35	69.38	1	0.98	1.1	0.95	1.05	1.2	100	0.93	2.06	20.188	10.388	36.02	NL,LL>35
	10.5	21	24.66	39.52	0.48	0.60	1.25	195.22	84.97	1	0.98	1.1	1	1.05	1.08	100	0.89	2.10	20.58	10.78	35.92	NL
	12.0	27	29.06	45.68	0.45	0.60	1.34	226.53	101.14	1	0.98	1.1	1	1.05	0.99	100	0.85	2.13	20.874	11.074	35.81	NL
	13.5	30	29.92	46.89	0.42	0.60	1.44	258.43	117.75	1	0.98	1.1	1	1.05	0.92	100	0.81	2.17	21.266	11.466	35.73	NL
	15.0	33	30.75	48.05	0.39	0.60	1.55	289.00	134.95	1	0.98	1.1	1	1.05	0.86	100	0.77	2.08	20.384	10.584	35.39	NL

C_{BD} : Borehole diameter =150mm

C_{Hw} : Weight of hammer =63.5Kg, Height of fall =750mm

L : Liquifiable

NL : Non Liquifiable

RELIANT FOUNDATIONS PVT. LTD.

Analysis of liquefaction Potential as per IS 1893 (Part1) - 2016, Seed & Idriss, Idriss & Boulanger approach

B.H. No.	Dept h	Observed N value	(N1)60	(N1)60cs	C.S.R. (M=7.5)	C.R.R. (M=7.5)	F.O.S. (M=7.5)	σV (kPa)	σ'V (kPa)	C_{HT}	C_{HW}	C_{SS}	C_{RL}	C_{BD}	CN	FC (%)	r_d	Bulk density ton/m3	Bulk density KN/m3	Submerged densty	Liquid Limit (LL) in%	Remark
13	1.5	5	7.25	15.14	0.52	0.15	0.29	26.46	11.76	1	0.98	1.1	0.75	1.05	1.7	100	0.99	1.80	17.64	7.84	37.33	NL,LL>35
	3.0	6	8.28	16.59	0.52	0.16	0.31	53.51	23.52	1	0.98	1.1	0.75	1.05	1.7	100	0.98	1.84	18.032	8.232	37.20	NL,LL>35
	4.5	3	4.69	11.57	0.49	0.12	0.24	78.35	35.87	1	0.98	1.1	0.85	1.05	1.7	100	0.97	1.69	16.562	6.762	39.32	NL,LL>35
	6.0	4	5.43	12.60	0.51	0.14	0.28	104.22	46.01	1	0.98	1.1	0.85	1.05	1.47	100	0.95	1.76	17.248	7.448	39.14	NL,LL>35
	7.5	5	6.80	14.52	0.51	0.15	0.30	130.98	57.18	1	0.98	1.1	0.95	1.05	1.32	100	0.94	1.82	17.836	8.036	38.5	NL,LL>35
	9.0	12	14.83	25.76	0.50	0.25	0.50	160.38	69.24	1	0.98	1.1	0.95	1.05	1.2	100	0.93	2.00	19.6	9.8	37.16	NL,LL>35
	10.5	19	22.45	36.43	0.48	0.60	1.26	191.25	83.94	1	0.98	1.1	1	1.05	1.09	100	0.89	2.10	20.58	10.78	36.53	NL
	12.0	24	25.96	41.35	0.44	0.60	1.35	222.71	100.11	1	0.98	1.1	1	1.05	1	100	0.85	2.14	20.972	11.172	36.33	NL
	13.5	29	29.04	45.65	0.41	0.60	1.45	254.75	116.87	1	0.98	1.1	1	1.05	0.93	100	0.81	2.18	21.364	11.564	35.71	NL
	15.0	32	29.90	46.86	0.39	0.60	1.55	287.24	134.21	1	0.98	1.1	1	1.05	0.86	100	0.77	2.21	21.658	11.858	35.69	NL

C_{BD} : Borehole diameter =150mm

C_{HW} : Weight of hammer =63.5Kg, Height of fall =750mm

L : Liquifiable

NL : Non Liquifiable

Analysis of liquefaction Potential as per IS 1893 (Part1) - 2016, Seed & Idriss, Idriss & Boulanger approach

B.H. No.	Dept h	Observed N value	(N1)60	(N1)60cs	C.S.R. (M=7.5)	C.R.R. (M=7.5)	F.O.S. (M=7.5)	σV (kPa)	σ'V (kPa)	C_{HT}	C_{HW}	C_{SS}	C_{RL}	C_{BD}	CN	FC (%)	r_d	Bulk density ton/m3	Bulk density KN/m3	Submerged densty	Liquid Limit (LL) in%	Remark
14	1.5	3	4.35	11.09	0.56	0.13	0.23	24.99	10.29	1	0.98	1.1	0.75	1.05	1.7	100	0.99	1.70	16.66	6.86	39.58	NL,LL>35
	3.0	6	8.28	16.59	0.58	0.16	0.28	52.04	20.58	1	0.98	1.1	0.75	1.05	1.7	100	0.98	1.84	18.032	8.232	38.97	NL,LL>35
	4.5	4	6.26	13.76	0.54	0.14	0.26	78.20	32.93	1	0.98	1.1	0.85	1.05	1.7	100	0.97	1.78	17.444	7.644	38.68	NL,LL>35
	6.0	5	6.90	14.67	0.53	0.15	0.28	104.66	44.39	1	0.98	1.1	0.85	1.05	1.5	100	0.95	1.80	17.64	7.84	37.71	NL,LL>35
	7.5	8	10.98	20.37	0.52	0.18	0.34	132.89	56.15	1	0.98	1.1	0.95	1.05	1.33	100	0.94	1.92	18.816	9.016	37.16	NL,LL>35
	9.0	10	12.32	22.25	0.51	0.21	0.42	161.70	69.68	1	0.98	1.1	0.95	1.05	1.2	100	0.93	1.96	19.208	9.408	37.1	NL,LL>35
	10.5	14	16.55	28.18	0.48	0.26	0.54	191.69	83.79	1	0.98	1.1	1	1.05	1.09	100	0.89	2.04	19.992	10.192	36.66	NL,LL>35
	12.0	19	20.66	33.93	0.45	0.40	0.89	223.15	99.08	1	0.98	1.1	1	1.05	1	100	0.85	2.14	20.972	11.172	36.31	NL,LL>35
	13.5	24	24.14	38.79	0.42	0.60	1.43	254.60	115.84	1	0.98	1.1	1	1.05	0.93	100	0.81	2.14	20.972	11.172	36.22	NL
	15.0	31	29.14	29.14	0.39	0.60	1.54	285.18	132.59	1	0.98	1.1	1	1.05	0.87	0	0.77	2.08	20.384	10.584	0	NL

C_{BD} : Borehole diameter =150mm

C_{Hw} : Weight of hammer =63.5Kg, Height of fall =750mm

L : Liquifiable

NL : Non Liquifiable

Analysis of liquefaction Potential as per IS 1893 (Part1) - 2016, Seed & Idriss, Idriss & Boulanger approach

B.H. No.	Dept h	Observed N value	(N1)60	(N1)60cs	C.S.R. (M=7.5)	C.R.R. (M=7.5)	F.O.S. (M=7.5)	σV (kPa)	σ'V (kPa)	C_{HT}	C_{HW}	C_{ss}	C_{RL}	C_{BD}	CN	FC (%)	rd	Bulk density ton/m3	Bulk density KN/m3	Submerged densty	Liquid Limit (LL) in%	Remark
15	1.5	7	10.14	19.20	0.50	0.19	0.38	27.49	12.79	1	0.98	1.1	0.75	1.05	1.7	100	0.99	1.87	18.326	8.526	36.14	NL,LL>35
	3.0	10	13.80	24.32	0.50	0.23	0.46	56.30	25.58	1	0.98	1.1	0.75	1.05	1.7	100	0.98	1.96	19.208	9.408	36.11	NL,LL>35
	4.5	13	20.33	33.47	0.49	0.38	0.78	86.00	39.69	1	0.98	1.1	0.85	1.05	1.7	100	0.97	2.02	19.796	9.996	36.10	NL,LL>35
	6.0	19	23.64	38.09	0.48	0.60	1.26	117.01	54.68	1	0.98	1.1	0.85	1.05	1.35	100	0.95	2.11	20.678	10.878	35.86	NL
	7.5	18	21.97	35.75	0.46	0.45	0.98	147.88	71.00	1	0.98	1.1	0.95	1.05	1.19	100	0.94	2.10	20.58	10.78	35.72	NL,LL>35
	9.0	18	19.82	32.75	0.45	0.32	0.72	179.05	87.17	1	0.98	1.1	0.95	1.05	1.07	100	0.93	2.12	20.776	10.976	35.63	NL,LL>35
	10.5	24	25.52	40.73	0.42	0.60	1.41	210.50	103.64	1	0.98	1.1	1	1.05	0.98	100	0.89	2.14	20.972	11.172	35.51	NL
	12.0	39	38.47	58.86	0.40	0.60	1.49	242.26	120.39	1	0.98	1.1	1	1.05	0.91	100	0.85	2.16	21.168	11.368	35.42	NL
	13.5	44	40.62	61.87	0.38	0.60	1.58	274.16	137.45	1	0.98	1.1	1	1.05	0.85	100	0.81	2.17	21.266	11.466	35.14	NL
	15.0	51	44.39	44.39	0.36	0.60	1.67	306.79	154.64	1	0.98	1.1	1	1.05	0.8	0	0.77	2.22	21.756	11.956	0	NL

C_{BD} : Borehole diameter =150mm

C_{Hw} : Weight of hammer =63.5Kg, Height of fall =750mm

L : Liquifiable

NL : Non Liquifiable

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Analysis of liquefaction Potential as per IS 1893 (Part1) - 2016, Seed & Idriss, Idriss & Boulanger approach

B.H. No.	Dept h	Observed N value	(N1)60	(N1)60cs	C.S.R. (M=7.5)	C.R.R. (M=7.5)	F.O.S. (M=7.5)	σV (kPa)	σ'V (kPa)	C_{HT}	C_{HW}	C_{ss}	C_{RL}	C_{BD}	CN	FC (%)	r_d	Bulk density ton/m3	Bulk density KN/m3	Submerged densty	Liquid Limit (LL) in%	Remark
16	1.5	5	7.25	15.14	0.52	0.15	0.29	26.61	11.91	1	0.98	1.1	0.75	1.05	1.7	100	0.99	1.81	17.738	7.938	38.69	NL,LL>35
	3.0	13	17.94	30.12	0.54	0.28	0.52	56.30	23.81	1	0.98	1.1	0.75	1.05	1.7	100	0.98	2.02	19.796	9.996	37.62	NL,LL>35
	4.5	17	26.59	42.22	0.51	0.60	1.18	87.02	38.81	1	0.98	1.1	0.85	1.05	1.7	100	0.97	2.09	20.482	10.682	37.60	NL
	6.0	8	9.94	18.92	0.47	0.18	0.38	115.25	54.83	1	0.98	1.1	0.85	1.05	1.35	100	0.95	1.92	18.816	9.016	37.23	NL,LL>35
	7.5	14	17.41	29.38	0.47	0.27	0.58	145.24	68.36	1	0.98	1.1	0.95	1.05	1.21	100	0.94	2.04	19.992	10.192	36.48	NL,LL>35
	9.0	19	21.36	34.91	0.46	0.48	1.05	176.11	83.64	1	0.98	1.1	0.95	1.05	1.09	100	0.93	2.10	20.58	10.78	36.3	NL
	10.5	21	22.75	36.85	0.43	0.60	1.38	207.27	99.81	1	0.98	1.1	1	1.05	1	100	0.89	2.12	20.776	10.976	35.76	NL
	12.0	25	25.09	40.13	0.41	0.60	1.46	238.88	116.28	1	0.98	1.1	1	1.05	0.93	100	0.85	2.15	21.07	11.27	35.5	NL
	13.5	29	27.20	43.08	0.39	0.60	1.55	270.92	133.18	1	0.98	1.1	1	1.05	0.87	100	0.81	2.18	21.364	11.564	35.17	NL
	15.0	37	32.64	32.64	0.36	0.60	1.65	302.38	150.53	1	0.98	1.1	1	1.05	0.82	0	0.77	2.14	20.972	11.172	0	NL

C_{BD} : Borehole diameter =150mm

C_{Hw} : Weight of hammer =63.5Kg, Height of fall =750mm

L : Liquifiable

NL : Non Liquifiable

:ANNEX-XII:

CROSS –SECTION & SUBSOIL PROFILE

CROSS-SECTION & SUBSOIL PROFILE

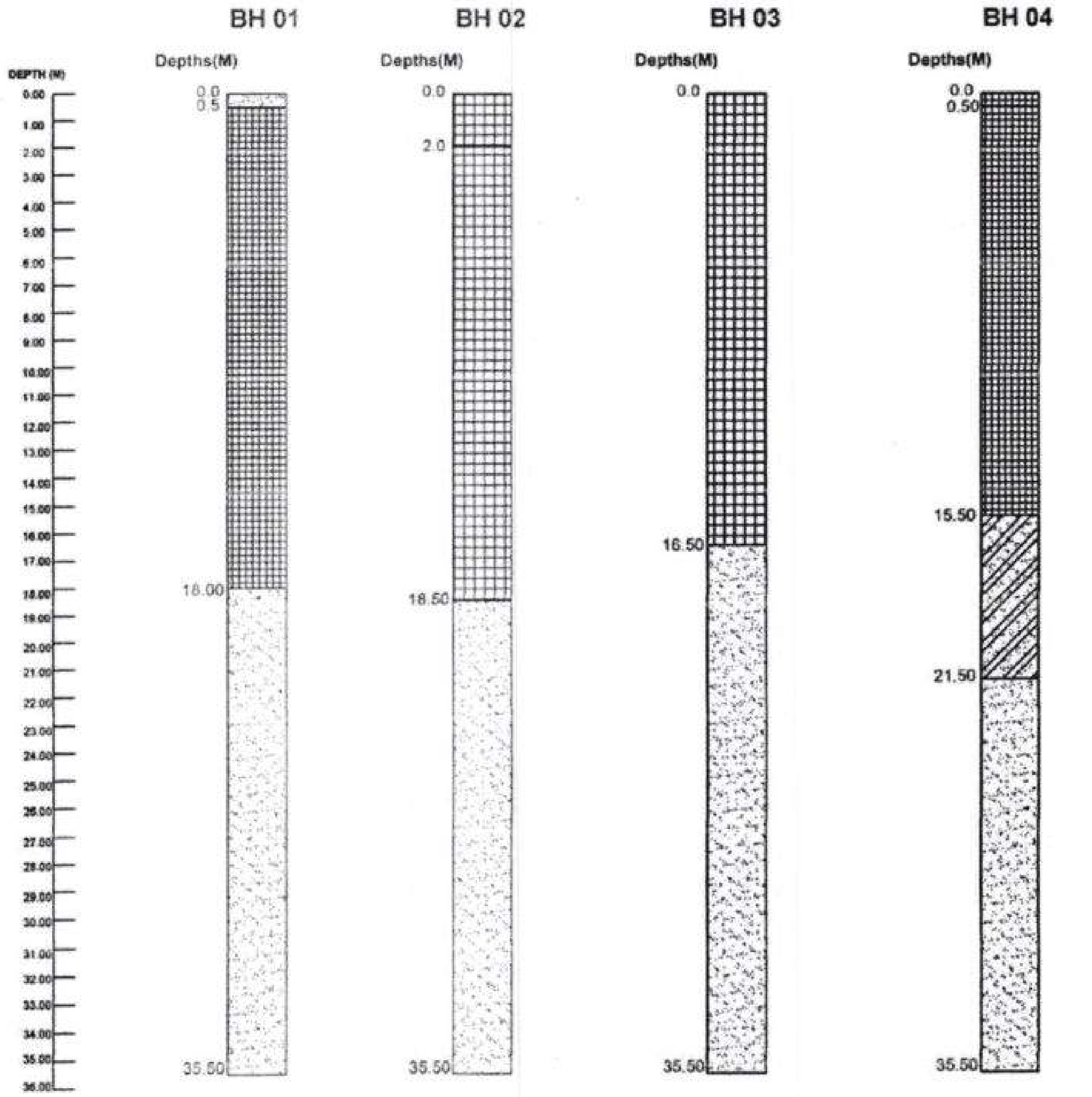

Fig. CROSS-SECTION & SUBSOIL PROFILE
(SCALE: NOT IN SCALE)

CROSS-SECTION & SUBSOIL PROFILE

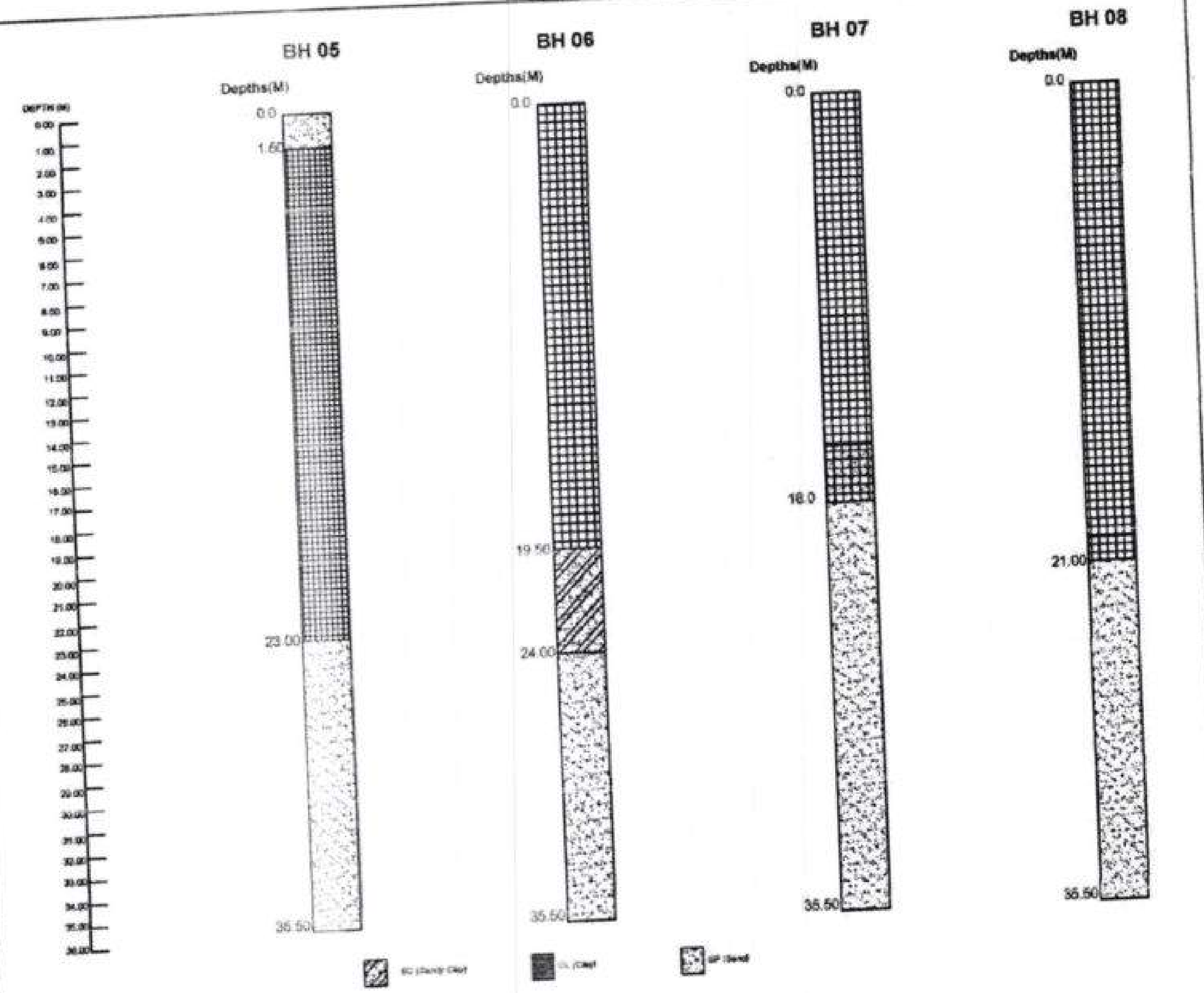

Fig: CROSS-SECTION & SUBSOIL PROFILE
(SCALE: NOT IN SCALE)

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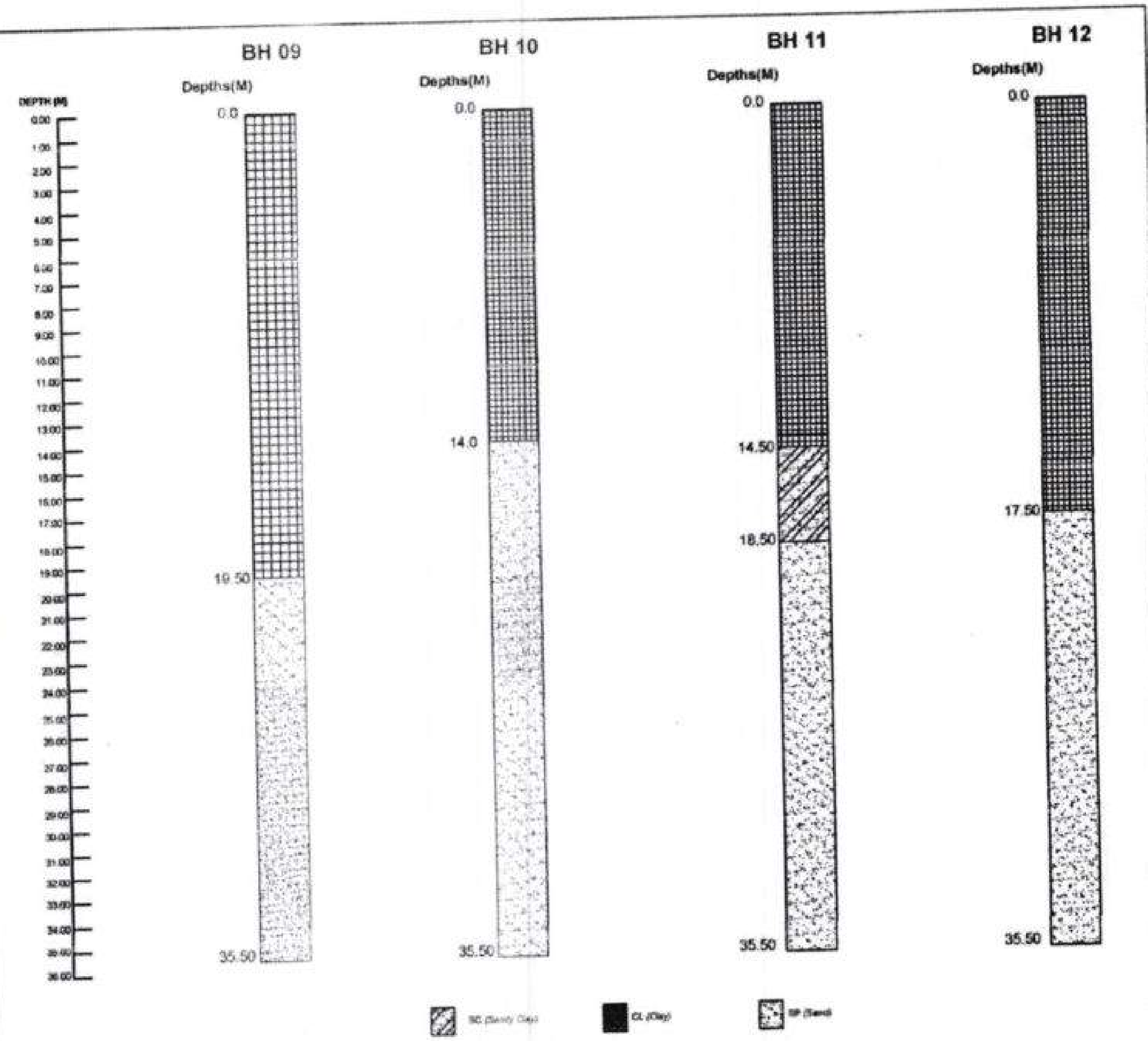

Fig: CROSS-SECTION & SUBSOIL PROFILE
(SCALE: NOT IN SCALE)

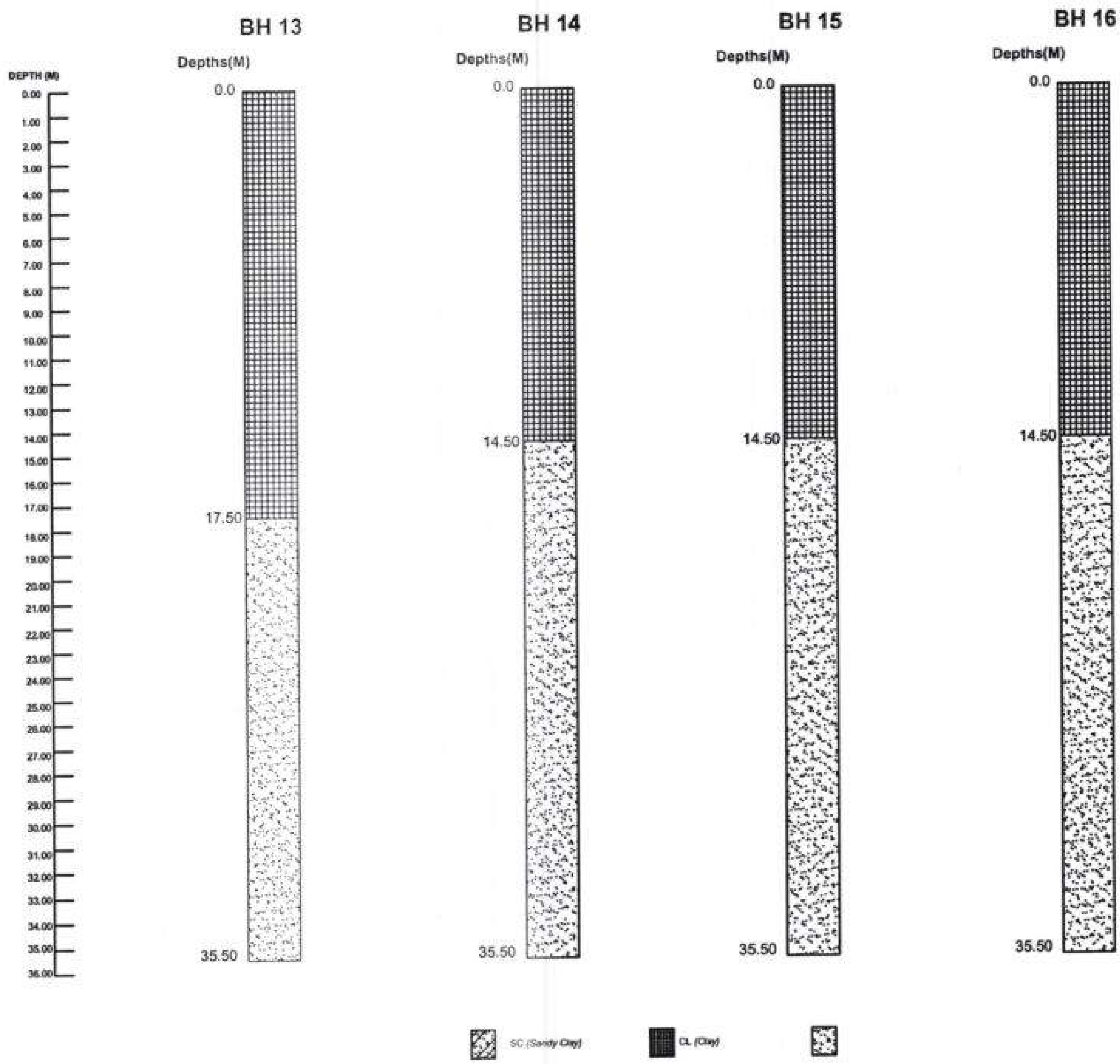

Fig: CROSS-SECTION & SUBSOIL PROFILE
(SCALE: NOT IN SCALE)

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:ANNEX-XIII:

SITE PHOTOGRAPHS OF FIELD AND SITE PLAN

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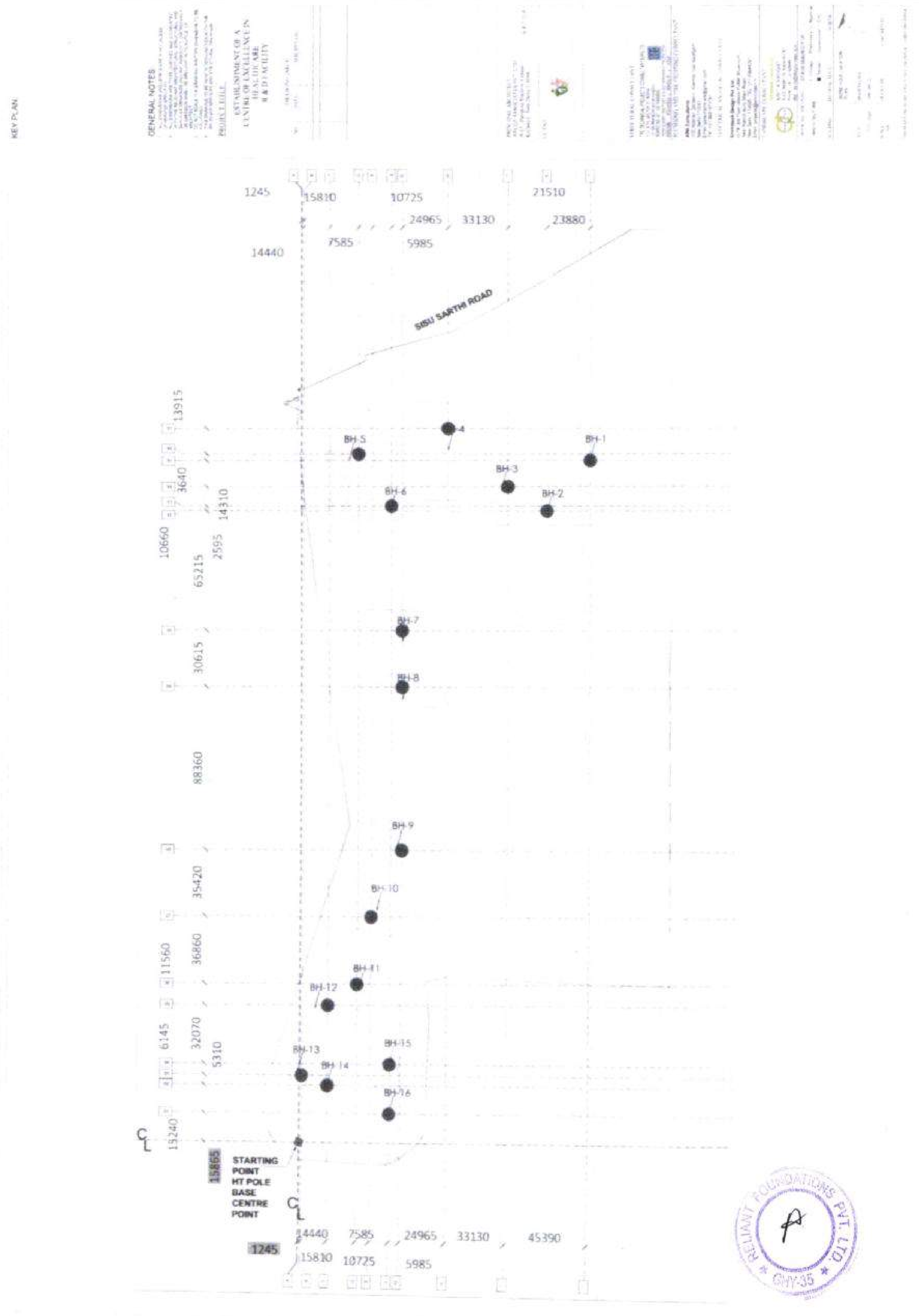
SITE PHOTOGRAPHS

RELIANT FOUNDATIONS PVT. LTD.
GHY-35

SITE PHOTOGRAPHS

RELIANT FOUNDATIONS PVT. LTD.
GHY-35


KEY PLAN
GENERAL NOTES
PROJECT TITLE
ESTABLISHMENT OF A CENTRE OF EXCELLENCE IN HEALTH CARE R & D FACILITY
SISU SARTHI ROAD
1245
15810
10725
21510
24965
33130
23880
14440
7585
5985
13915
3640
14310
10660
2595
65215
30615
88360
35420
36860
11560
32070
6145
5310
15240
15865
BH-1
BH-2
BH-3
BH-4
BH-5
BH-6
BH-7
BH-8
BH-9
BH-10
BH-11
BH-12
BH-13
BH-14
BH-15
BH-16
STARTING POINT HT POLE BASE CENTRE POINT
45390
RELIANT FOUNDATIONS PVT. LTD.
GHY-35

:ANNEX-XIV:

DETEMINATION OF MODULUS SUBGRADE REACTION BASED ON PLATE LOAD TEST ON SOIL

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Modulus of Subgrade Reaction

This is very important and versatile test which is used for design of airfields, pavements and raft foundations. This test is also called as K-value test. The methodology of this test is more or less similar to normal plate load test expect that this (K-value test) test is generally performed upto a maximum plate settlement of 3mm. Modulus of subgrade reaction (K) can be defined as the intensity of pressure on horizontal surface of a soil mass required to cause a unit settlement surface. It is thus a measure of the resistance of soils to deformation under load. The unit used for K is kg/cm^2/cm. It is determined as the slope of the secant drawn between the point of 1.25mm settlement of a load v/s deflection curve obtained from a plate load test on a strata using 75cm diameter mild steel plate.

Therefore,

$$K= \frac{\rho}{0.125}\ \mathrm{Kgf/cm^2/cm}$$

Where,

K= Modulus of Subgrade Reaction.

P= Load intensity (kg/cm^2) corresponding to 1.25 mm settlement of plate of 30 cm diameter.

Correction for smaller plate: If a plate smaller than the standard 0.798m(0.75m) diameter plate used, a correction is made assuming the behavior of soil elastic. If K is the value of the subgrade modulus with a plate of smaller diameter d', K_s with the standard plate of diameter d is is read from Fig 3 of IS 9214

Load corresponding to 1.25mm settlement = 1.55 ton/sqm = 0.155 Kg/sqcm

K = 0.155 Kg/sqcm/ 0.125 = 1.24 Kg/sqcm/cm (Against 30cm dia plate)

Correction of 'k' for 75cm dia plate (K_{sv})

K_{sv}= K x 200% = 1.24 x 200% = 2.48 Kg/sqcm/cm

Modulus of Subgrade reaction = 2.48 Kg/sqcm/cm

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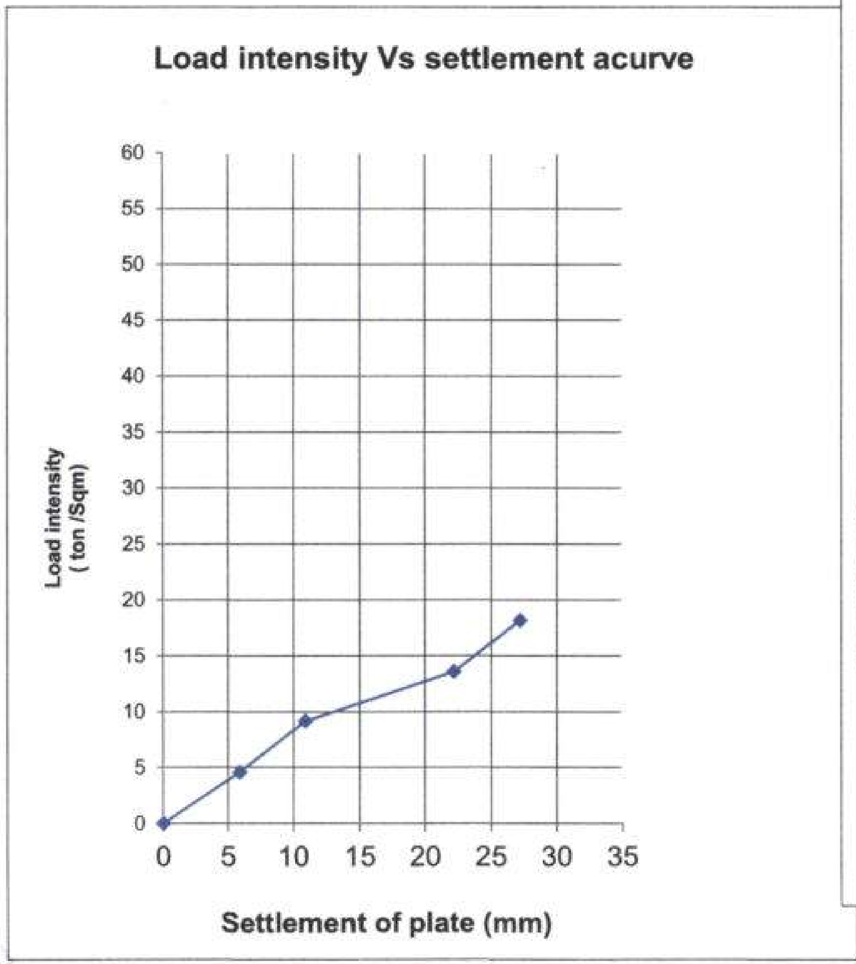
PLATE LOAD TEST

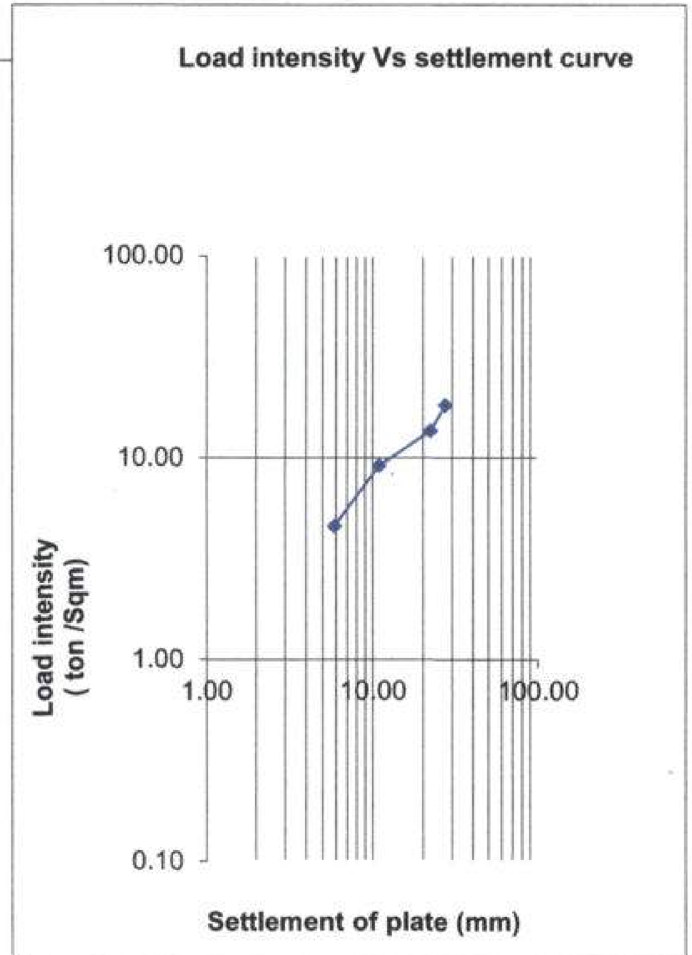
Size of Plate = 30cm diameter
Plate no.: 1
Date of testing= 22-02-2024

Observations :

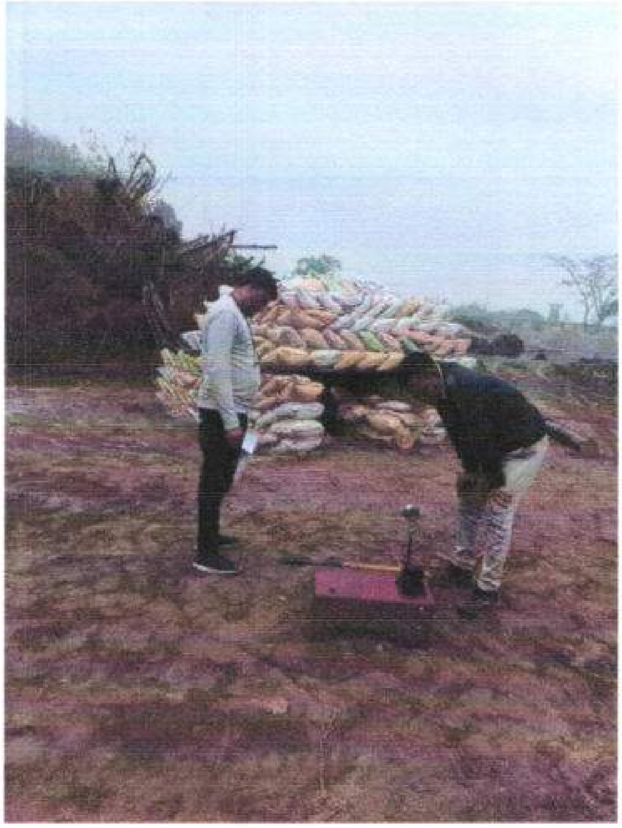
Date	Time (Hr)		Load Applied (Ton)	Load Intensity (Ton/Sqm)	Settlement (mm)				Mean (mm)
					A	B	C	D	
22.02.2024	1.20	PM	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1.30	AM	0.32	4.57	4.40	5.40	5.00	5.55	5.09
	1.00	MIN	0.32	4.57	4.62	5.51	5.10	5.60	5.21
	2.25	MIN	0.32	4.57	5.71	5.69	5.29	5.74	5.61
	4.00	MIN	0.32	4.57	5.79	5.77	5.36	5.78	5.68
	6.25	MIN	0.32	4.57	5.85	5.80	5.44	5.83	5.73
	9.00	MIN	0.32	4.57	5.89	5.85	5.49	5.88	5.78
	16.00	MIN	0.32	4.57	5.92	5.87	5.52	5.90	5.80
	25.00	MIN	0.32	4.57	5.94	5.90	5.54	5.97	5.84
	60.00	MIN	0.32	4.57	5.98	5.96	5.60	5.97	5.88
	2.30	PM	0.64	9.14	9.92	10.76	11.30	9.90	10.47
	1.00	MIN	0.64	9.14	10.05	10.90	11.38	10.00	10.58
	2.25	MIN	0.64	9.14	10.09	10.96	11.42	10.03	10.63
	4.00	MIN	0.64	9.14	10.13	10.98	11.46	10.06	10.66
	6.25	MIN	0.64	9.14	10.17	11.00	11.50	10.11	10.70
	9.00	MIN	0.64	9.14	10.20	11.04	11.56	10.13	10.73
	16.00	MIN	0.64	9.14	10.27	11.10	11.60	10.20	10.79
	25.00	MIN	0.64	9.14	10.33	11.14	11.64	10.23	10.84
	60.00	MIN	0.64	9.14	10.37	11.21	11.71	10.33	10.91
	3.30	PM	0.95	13.57	20.30	21.15	23.10	22.80	21.84
	1.00	MIN	0.95	13.57	20.35	21.18	23.15	22.87	21.89
	2.25	MIN	0.95	13.57	20.44	21.27	23.18	22.91	21.95
	4.00	MIN	0.95	13.57	20.50	21.33	23.22	22.94	22.00
	6.25	MIN	0.95	13.57	20.54	21.36	23.27	22.98	22.04
	9.00	MIN	0.95	13.57	20.57	21.38	23.30	23.00	22.06
	16.00	MIN	0.95	13.57	20.60	21.41	23.34	23.02	22.09
	25.00	MIN	0.95	13.57	20.65	21.46	23.39	23.06	22.14
	60.00	MIN	0.95	13.57	20.68	21.49	23.44	23.10	22.18
	4.30	PM	1.27	18.14	25.80	26.58	28.00	28.44	27.21

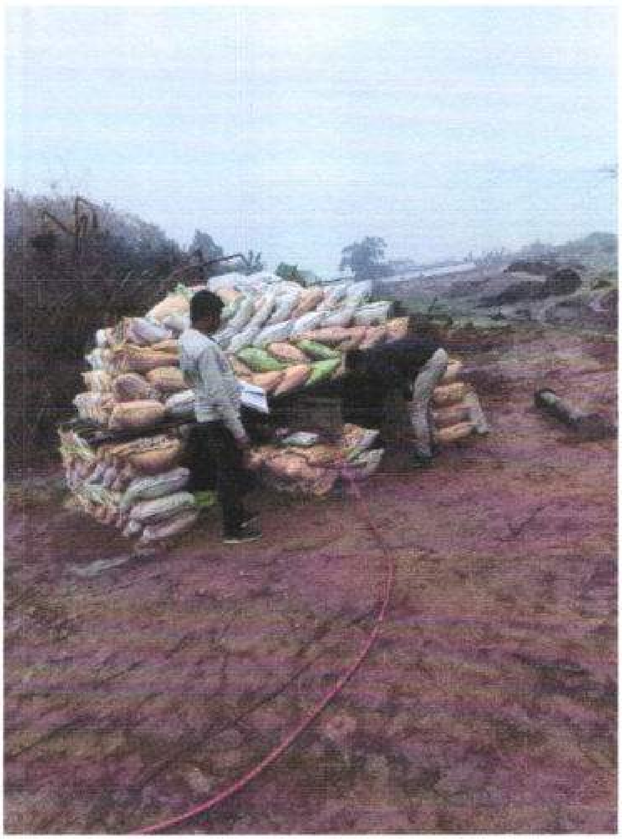


Normal Scale



log log scale





SITE PHOTOS

:ANNEX-XV:

ELECTRICAL RESISTIVITY TEST

RELIANT FOUNDATIONS PVT. LTD.

INTRODUCTION:

Resistance of an earth electrode is heavily influenced by the resistivity of the soil in which it is driven and as such, soil resistivity measurements are an important parameter when designing earthing installations.

One of the main objectives of earthling electrical systems is to establish a common reference potential for the power supply system, building structure, plant steelwork, electrical conduits, cable ladders & trays and the instrumentation system. To achieve this objective, a suitable low resistance connection to earth is desirable. However, this is often difficult to achieve and depends on a number of factors:

• Soil resistivity
• Stratification
• Size and type of electrode used
• Depth to which the electrode is buried
• Moisture and chemical content of the soil

The resistivity test was conducted during dry weather.

THEORY OF SOIL RESISTIVITY:

Resistance is that property of a conductor which opposes electric current flow when a voltage is applied across the two ends. Its unit of measure is the Ohm (Ω) and the commonly used symbol is R. Resistance is the ratio of the applied voltage (V) to the resulting current flow (I) as defined by the well-known linear equation from Ohm's Law:

$$V = I x R$$

Where:
V - Potential Difference across the conductor (Volts)
I - current flowing through the conductor in (Amperes)
R - Resistance of the conductor in (Ohm)

"Good conductors" are those with a low resistance. "Bad conductors" are those with a high resistance. "Very bad conductors" are usually called insulators.

The Resistance of a conductor depends on the atomic structure of the material or its Resistivity (measured in Ohm-m or Ω-m), which is that property of a material that measures its ability to conduct electricity. A material with a low resistivity will behave as a "good conductor" and one with a high resistivity will behave as a "bad conductor". The commonly used symbol for resistivity is ρ (Greek symbol rho).

The resistance (R) of a conductor can be derived from the resistivity as:

$R = \rho x L/A$

Where ρ: Resistivity (Ω-m) of the conductor material

L: Length of the conductor (m)

A: Cross sectional Area (m^2)

L-Length of the conductor (m), A-Cross Sectional Area (m2), here ρ-Resistivity (Ω-m) of the conductor material between the opposite faces of a cube of material with a side dimension of 1 meter.

T. LTD. * RELIANT FOUND

PURPOSE AND PROCEDURE OF INVESTIGATION:

This test shall be conducted to determine the Electrical resistivity of soil required for designing safe grounding system for the entire station area. The specifications for the equipment and other accessories required for performing electrical resistivity test, the test procedure, and reporting of field observations shall confirm to IS: 3043. The test shall be conducted using Wagner's four electrode method as specified in IS: 1892, Appendix-B2. Unless otherwise specified at each test location, the test shall be conducted along two perpendicular lines parallel to the coordinate axis. On each line a minimum of 8 to 10 readings shall be taken by changing the spacing of the electrodes from an initial small value of 0.5 m up to a distance of 4.0 m.

COMPUTATION OF EARTH RESISTIVITY:

When the earth resistivity readings for different electrode spacing in a direction are within 20% to 30%, the soil is considered to be uniform. When the spacing is increased gradually from low values, at a stage, it may be found that the resistivity readings are more or less constant irrespective of the increase in the electrode spacing. The resistivity for this spacing is noted and taken as the resistivity for that direction. In a similar way, resistivity for atleast one equally spaced direction from the center of the site is measured. This resistivity for is plotted in a graph sheets joining all the resistivity points plotted to get the polar resistivity curve. The area inside the polar resistivity curve is measured and equivalent circle of the same area is found out. The radius of this equivalent circle is the average resistivity of the site under considerations. The average resistivity thus obtained may be used for the design of the earthing grid at that particular depth.

NOTE: FOR EARTH MAT DESIGN:

Following criteria are to be considered -

1. Average of all the resistivity values should be considered, if difference between all the average resistivity values is minimum.
2. If all the average resistivity values differ by a large margin, then highest of all average resistivity values is to be considered to be on the safer side.

Test result: Resistivity test were conducted at three locations. At each location it is calculated upto thirteen directions with electrode spacing as 0.5, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0 & 12.0 M .

LOCATION	Date of test	Depth of test level	Resistivity (Ohm-m)
• HOSPITAL BUILDING	22-02-2024	Ground level	207.37
• RESEARCH & DEVELOPMENT ACADEMIC BUILDING	22-02-2024	Ground level	342.08
• STAFF QUARTER AREA	22-02-2024	Ground level	299.77

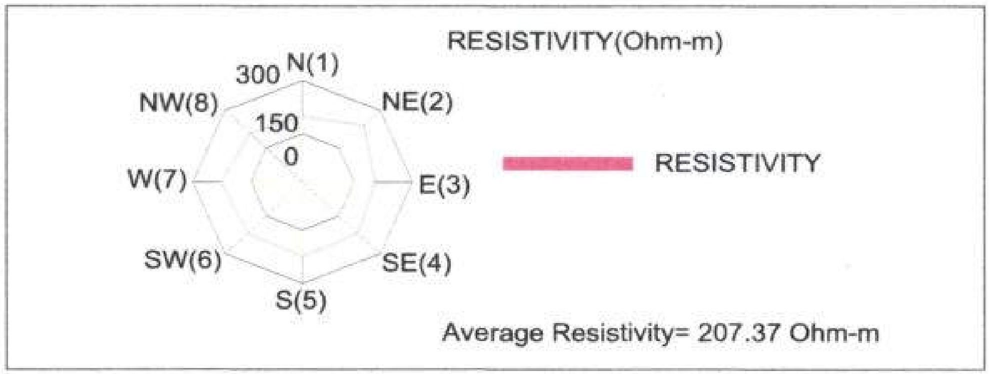
ELECTRICAL RESISTIVITY TEST

Name of the Project:	**SOIL RESISTIVTY TEST FOR IIT.**
Location:	**HOSPITAL BUILDING.**
Date of Testing:	**22/02/2024**

RESULT

DIRECTION	NORTH (1)		NORTH-EAST (2)		EAST (3)		SOUTH-EAST (4)		SOUTH (5)		SOUTH-WEST (6)		WEST (7)		NORTH-WEST (8)	
PROBE DISTANCE "S" (M)	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R
0.5	61.90	194.37	74.60	234.24	61.30	192.48	85.20	267.53	76.80	241.15	79.40	249.32	88.50	277.89	69.90	219.49
1.0	41.40	259.99	52.20	327.82	34.50	216.66	46.70	293.28	57.70	362.36	52.10	327.19	45.40	285.11	44.30	278.20
2.0	26.10	327.82	25.30	317.77	24.90	312.74	25.80	324.05	27.70	347.91	24.14	303.20	26.10	327.82	26.60	334.10
3.0	14.33	269.98	16.11	303.51	15.44	290.89	16.67	314.06	14.78	278.46	14.82	279.21	17.61	331.77	15.03	283.17
4.0	9.34	234.62	10.61	266.52	10.52	264.26	12.82	322.04	13.50	339.12	10.78	270.79	11.18	280.84	11.24	282.35
5.0	7.09	222.63	8.47	265.96	8.33	261.56	7.94	249.32	9.43	296.10	8.17	256.54	9.58	300.81	7.66	240.52
6.0	5.20	195.94	5.56	209.50	5.88	221.56	4.89	184.26	4.39	165.42	5.03	189.53	5.87	221.18	5.41	203.85
7.0	3.92	172.32	4.19	184.19	4.79	210.57	4.02	176.72	3.70	162.65	4.67	205.29	3.31	145.51	4.15	182.43
8.0	3.30	165.79	3.09	155.24	3.07	154.24	3.33	167.30	3.33	167.30	3.24	162.78	3.32	166.80	3.08	154.74
9.0	2.57	145.26	2.91	164.47	3.04	171.82	2.86	161.65	2.80	158.26	2.71	153.17	2.84	160.52	2.49	140.73
10.0	2.07	130.00			2.04	128.11	2.41	151.35	2.29	143.81	2.48	155.74	2.55	160.14	2.11	132.51
11.0	1.81	125.03			1.79	123.65	1.98	136.78	2.03	140.23	2.32	160.27	2.49	172.01	1.94	134.02
12.0	1.68	126.60			1.18	88.92	1.49	112.29	2.03	152.98	2.08	156.75	1.94	146.20	1.74	131.13
Mean		197.72		242.92		202.88		220.05		227.36		220.75		228.97		209.02

DIRECTION	AVERAGE RESISTIVITY (Ω-M)
NORTH (1)	197.72
NORTH-EAST (2)	242.92
EAST (3)	202.88
SOUTH-EAST (4)	220.05
SOUTH (5)	227.36
SOUTH-WEST (6)	220.75
WEST (7)	228.97
NORTH-WEST (8)	209.02



RESISTIVITY GRAPH

Average Resistivity =√AREA UNDER RESISTIVITY GRAPH /3.14
=√135025.45/3.14
=207.37 ohm-m

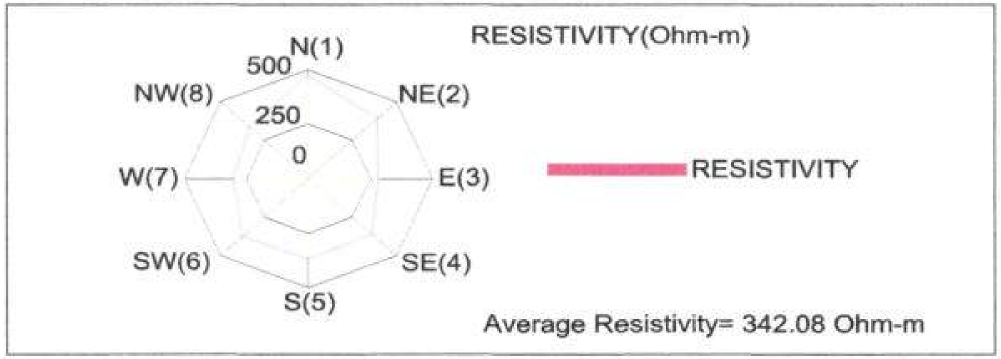
ELECTRICAL RESISTIVITY TEST

Name of the Project:	SOIL RESISTIVTY TEST FOR IIT.
Location:	R&D ACADEMIC BUILDING.
Date of Testing:	22/02/2024

RESULT

DIRECTION	NORTH (1)		NORTH-EAST (2)		EAST (3)		SOUTH-EAST (4)		SOUTH (5)		SOUTH-WEST (6)		WEST (7)		NORTH-WEST (8)	
PROBE DISTANCE "S" (M)	MEGGER READIN G "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R
0.5	111.50	350.11	149.70	470.06	117.60	369.26	156.40	491.10	133.60	419.50	138.10	433.63	188.40	591.58	142.70	448.08
1.0	68.60	430.81	84.20	528.78	68.60	430.81	76.70	481.68	125.10	785.63	89.10	559.55	93.00	584.04	76.40	479.79
2.0	50.30	631.77	38.60	484.82	31.30	393.13	41.70	523.75	28.90	362.98	52.40	658.14	46.30	581.53	39.90	501.14
3.0	31.40	591.58	26.10	491.72	18.30	344.77	21.90	412.60	24.30	457.81	29.10	548.24	15.41	290.32	20.40	384.34
4.0	10.20	256.22	12.80	321.54	12.22	306.97	10.54	264.76	17.50	439.60	13.17	330.83	9.50	238.64	12.20	306.46
5.0	13.20	414.48	8.49	266.59	6.95	218.23	7.79	244.61	12.24	384.34	8.46	265.64	8.61	270.35	9.78	307.09
6.0	25.50	960.84	7.62	287.12	6.33	238.51	6.23	234.75	8.39	316.14	7.77	292.77	7.40	278.83	7.11	267.90
7.0	15.77	693.25	6.24	274.31	5.46	240.02	5.11	224.64	7.73	339.81	6.91	303.76	5.26	231.23	6.28	276.07
8.0	7.65	384.34			4.80	241.15			5.82	292.40	6.12	307.47	3.95	198.45	5.04	253.21
9.0	4.81	271.86			4.07	230.04			5.11	288.82	4.29	242.47	3.14	177.47	4.48	253.21
10.0	3.60	226.08			3.40	213.52			4.68	293.90	2.98	187.14	2.86	179.61	3.36	211.01
11.0					3.11	214.84			3.17	218.98			2.10	145.07		
12.0					2.60	195.94			2.64	198.95			1.97	148.46		
Mean		473.76		390.62		279.78		359.73		369.14		375.42		301.20		335.30

DIRECTION	AVERAGE RESISTIVITY (Ω-M)
NORTH (1)	473.76
NORTH-EAST (2)	390.62
EAST (3)	279.78
SOUTH-EAST (4)	359.73
SOUTH (5)	369.14
SOUTH-WEST (6)	375.42
WEST (7)	301.20
NORTH-WEST (8)	335.30



Average Resistivity =√AREA UNDER RESISTIVITY GRAPH /3.14
=√367443.41/3.14
=342.08 ohm-m

RESISTIVITY GRAPH

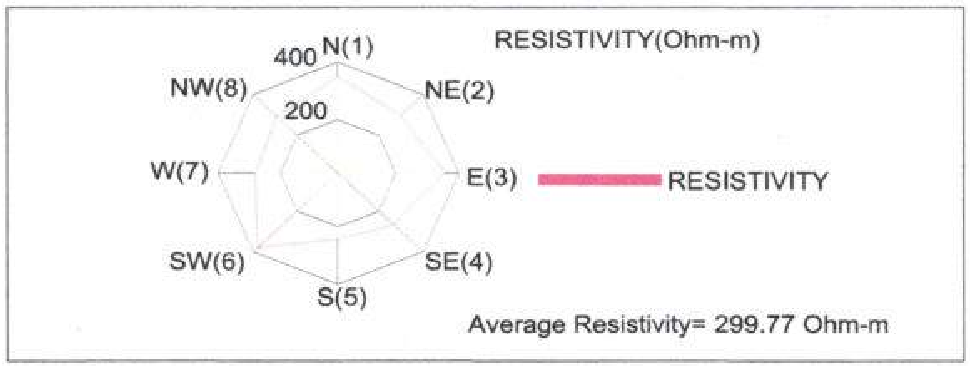
ELECTRICAL RESISTIVITY TEST

Name of the Project:	**SOIL RESISTIVTY TEST FOR IIT.**
Location:	**STAFF QUARTER BUILDING.**
Date of Testing:	**22/02/2024**

RESULT

DIRECTION	NORTH (1)		NORTH-EAST (2)		EAST (3)		SOUTH-EAST (4)		SOUTH (5)		SOUTH-WEST (6)		WEST (7)		NORTH-WEST (8)	
PROBE DISTANCE "S" (M)	MEGGER READIN G "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R	MEGGER READING "R" (Ω)	RESISTIVITY (Ω-M) p = 2 x 3.14 x S R
0.5	192.00	602.88	176.40	553.90	171.00	536.94	190.10	596.91	183.30	575.56	183.70	576.82	180.40	566.46	174.40	547.62
1.0	74.80	469.74	81.20	509.94	91.40	573.99	77.60	487.33	80.40	504.91	78.40	492.35	83.70	525.64	80.10	503.03
2.0	27.30	342.89	29.70	373.03	32.80	411.97	26.30	330.33	25.90	325.30	24.60	308.98	31.90	400.66	25.50	320.28
3.0	14.70	276.95	13.93	262.44	16.20	305.21	14.62	275.44	13.58	255.85	15.14	285.24	14.70	276.95	14.43	271.86
4.0	12.20	306.46	12.14	304.96	9.10	228.59	11.68	293.40	10.81	271.55	10.73	269.54	11.23	282.10	12.07	303.20
5.0	9.16	287.62	9.11	286.05	6.39	200.65	8.72	273.81	8.42	264.39	8.94	280.72	8.47	265.96	9.04	283.86
6.0	7.30	275.06	6.74	253.96	5.30	199.70	5.29	199.33	6.05	227.96	5.72	215.53	5.10	192.17	7.24	272.80
7.0	9.60	422.02	5.11	224.64	4.97	218.48	5.07	222.88	5.18	227.71	4.69	206.17	4.88	214.52	5.24	230.35
8.0	13.20	663.17	4.84	243.16	4.42	222.06	4.59	230.60	3.35	168.30	4.16	209.00	4.16	209.00	3.91	196.44
9.0	6.24	352.68	3.99	225.51	3.44	194.43	4.18	236.25	2.44	137.91	3.67	207.43	3.39	191.60	3.47	196.12
10.0	4.80	301.44	2.16	135.65	2.67	167.68	2.78	174.58	1.23	77.24	3.09	194.05	2.54	159.51	2.81	176.47
11.0	3.47	239.71			2.04	140.92	1.86	128.49	1.19	82.21			2.41	166.48		
12.0	2.30	173.33			1.17	88.17	1.27	95.71	1.15	86.66						
Mean		362.61		306.66		268.37		272.70		246.58		295.07		287.59		300.18

DIRECTION	AVERAGE RESISTIVITY (Ω-M)
NORTH (1)	362.61
NORTH-EAST (2)	306.66
EAST (3)	268.37
SOUTH-EAST (4)	272.70
SOUTH (5)	246.58
SOUTH-WEST (6)	295.07
WEST (7)	287.59
NORTH-WEST (8)	300.18



Average Resistivity =√AREA UNDER RESISTIVITY GRAPH /3.14
=√282160.63/3.14
=299.77 ohm-m

RESISTIVITY GRAPH

:ANNEX-XVI:

SEISMIC CROSS HOLE SURVEY

SEISMIC CROSS HOLE SURVEY AT GUWAHATI

1.0 GENERAL

1.1 INTRODUCTION

Geophysical seismic cross hole survey were carried out at one location at Guwahati (Assam) by M/s. Parsan Overseas Pvt. Ltd, New Delhi to determine the soil parameters of the proposed area.

This report presents the findings of seismic cross hole test.

1.2 SCOPE OF WORK

The cross hole seismic survey was conducted at one location down to a depth of 30 meters.

One source hole and two receiver holes were used.

1.3 PURPOSE OF INVESTIGATIONS

The aim of the investigation was to determine the soil parameters.

The cross hole test was conducted to determine dynamic soil properties.

2.0 CROSS HOLE SEISMIC SURVEY

2.1 SURVEYING OF LOCATION

One number of cross hole test was conducted.

The holes were drilled down to a depth of 30 meters at all the bore hole locations.

One source hole and two receiver hole geometry was used.

3.1.1 EQUIPMENTS AND ACCESSORIES

Following equipments and accessories were used:

1. Seismograph	:	Model Ambrogeo Signal Enhancement type fully digital 24 Channel Engineering Seismograph,
2. Sensors	:	Orthogonal Downhole Sensors-02
3. Cable	:	Geophone Spread Cables, 10m spacing, Water Proof joints, made in Germany
4. Software	:	SeisOpt@2D V6.0, WinGeo
5. Energy Source:		Shear Wave Hammer

6. Bore Hole Deviation Probe: Model Ambrogeo

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3.2.1 ENERGY SOURCE:

Shear wave hammer was used for generating waves in the source borehole. The hammer generates waves in both the directions i.e. up and down, resulting in polarized energy.

3.2.2 DOWN HOLE SENSORS:

Orthogonal downhole sensors were used to receive the waves in the two receiver holes. The sensors have two horizontal component and one vertical component geophones, encased in a steel tube and having water tight arrangement. The sensors were lowered at the same depth as the source, and the regulating screws attached to them were used so as to make them in contact with the borehole wall.

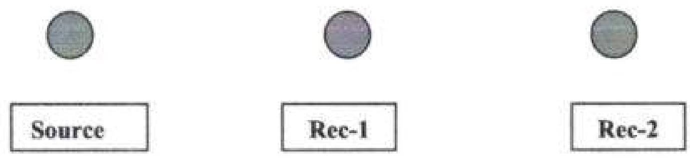
3.2.3 SEISMOGRAPH:

Ambrogeo 24 channel engineering seismograph was used to record field data. The seismograph has the signal enhancement or stacking capability. The seismograph records the arrival of seismic waves through 24 channels. Only 6 channels were used for recording cross hole data. Data was recorded with various sampling frequency rates. The seismic waves detected by each geophone are displayed simultaneously on the screen.

3.3 CROSS HOLE SEISMIC TEST

The cross hole seismic test consists of generation of horizontally traveling P and S waves at a particular level in one borehole (source hole) and recording their arrivals at same level in two nearby boreholes (receiver holes).

Geometry of source and receiver holes used were as under:



Here, source to receiver-1(B1) = 5.0m

Source to receiver-2(B2) = 10.0m

Receiver-1(B1) to receiver-2 (B2) = 5.0m

Detailed theory of cross hole test has been presented in appendix

3.4 CROSS HOLE SEISMIC SURVEY DATA INTERPRETATION

3.4.1 Data Processing

The data is stored in the hard disk of the Seismograph at the time of data acquisition. The data is transferred to the computer for further processing.

The processing involves picking the first arrivals. In case of noisy data there are intermediate steps of data processing using filtering, amplitude corrections etc.

3.4.2 Picking of First Arrivals

The picking was done manually to see arrival of P and S waves on the respective geophones. The time of travel from source to receiver hole was used to determine the velocity of seismic waves, as the distances between the boreholes were known.

The time at receiver-1 is subtracted from that of receiver-2 to arrive at the time taken by the wave to travel from receiver-1 to receiver-2.

3.4.3 Velocity Calculation

Velocity calculation was done using the time derives as above and the distance between the two receiver holes.

3.5 CALCULATION OF SOIL PARAMETERS:

The dynamic soil parameters are calculated from seismic wave and the bulk density of the corresponding of the subsurface strata.

The calculations are based on IS Code 13372 (Part-2).

Poisson's Ratio σ is determined directly from the compressional (P) wave and shear (S) wave data. It is expressed by the ratio of transverse strain to longitudinal strain. Its dynamic determination is expressed as:

$$\sigma = (m^2-2)/[2*(m^2-1)] \text{ where } m = V_P / V_s$$

Young's Modulus E is the uni-axial stress-strain ratio. Its dynamic value is expressed by the following equation:

$$E = \rho \, V_P^2 \, (1+\sigma)(1-2\sigma)/(1-\sigma)$$

Shear Modulus G is the stress-strain ratio for simple shear. Its dynamic value is obtained by the following:

$$\mathbf{G = E/2\,(1+\sigma) = \rho\, V_s^2}$$

Bulk Modulus K is calculated using the following equation:

$$\mathbf{K = E\,/\,(3\text{-}6\sigma)}$$

Where ρ is mass density in Kg/m^3 is, σ is Poisson's ratio and $\mathbf{V_P}$ is P-wave velocity in m/sec, $\mathbf{V_s}$ is S-wave velocity in m/sec, **E** & **G** are in N/m^2.

The parameters as derived from cross hole data have been presented on the following pages.

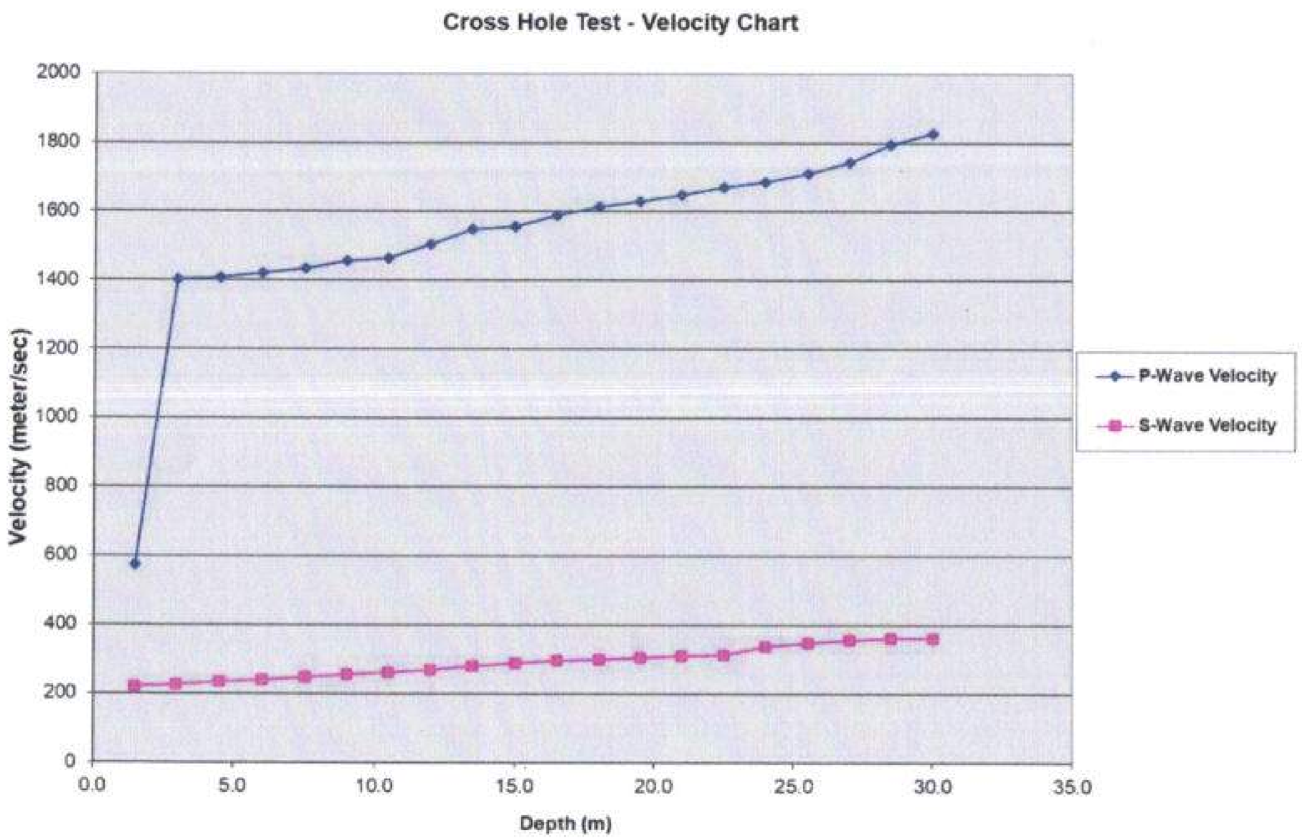
Deviation Results

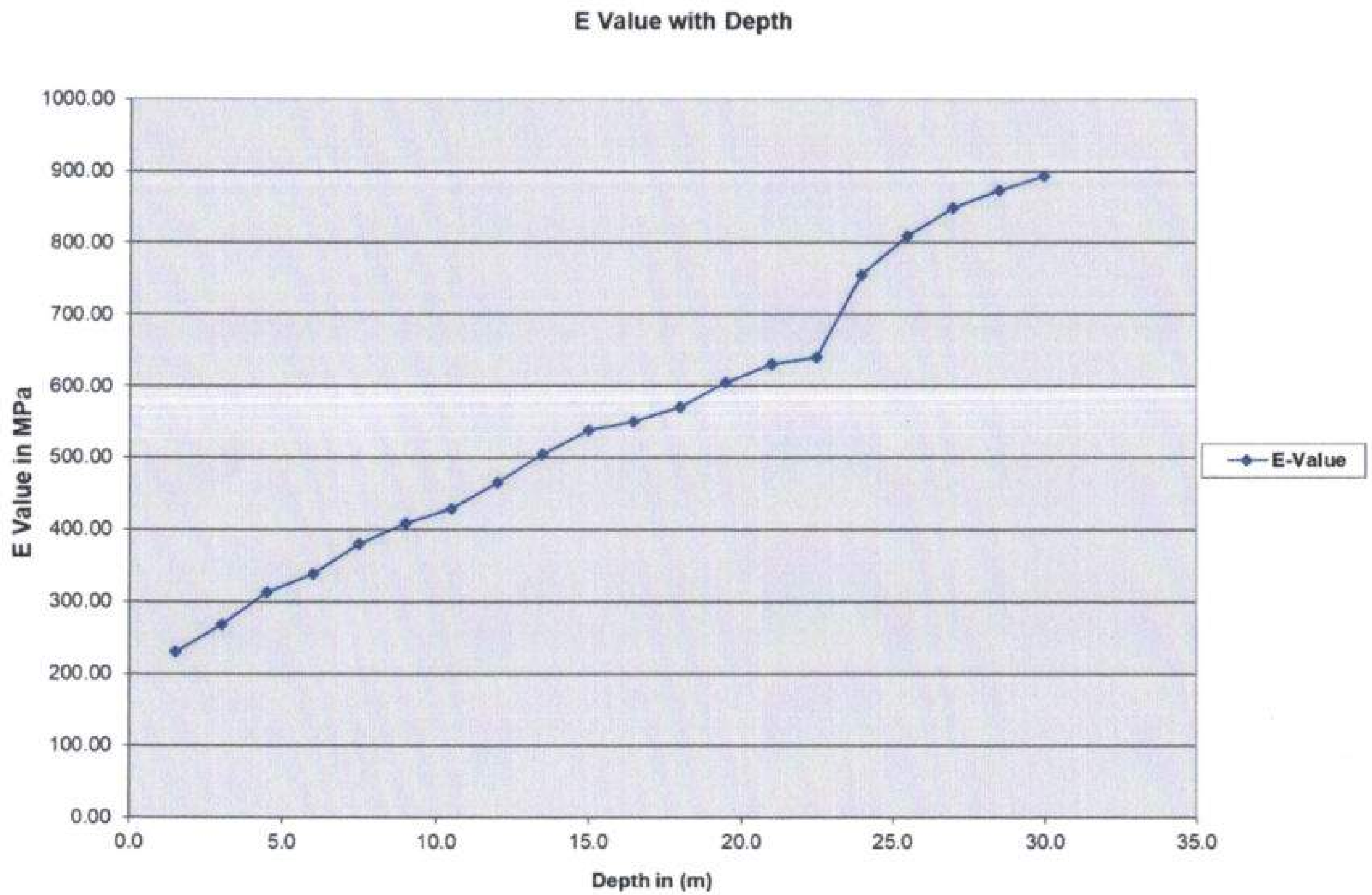
S-R1		S-R2	R1-R2
depth (m)	spacing (m)	spacing (m)	spacing (m)
0	5	10	5
1	4.961935117	9.937412055	4.975476938
2	4.956898233	9.934505948	4.977607715
3	4.957239233	9.93785093	4.980611697
4	4.92396505	9.907573578	4.983608528
5	4.9295737	9.870148672	4.940574972
6	4.92333695	9.877447893	4.954110943
7	4.93733635	9.876191735	4.938855385
8	4.922605583	9.90526889	4.982663307
9	4.91751055	9.898950713	4.981440163
10	4.910940333	9.901227265	4.990286932
11	4.913836833	9.900457217	4.986620383
12	4.913836833	9.900457217	4.986620383
13	4.905550617	9.896368965	4.990818348
14	4.950898367	9.90355048	4.952652113
15	4.959409017	9.895021182	4.935612165
16	4.94056745	9.898278623	4.957711173
17	4.9389899	9.902083588	4.963093688
18	4.939054233	9.923760703	4.98470647
19	4.929716667	9.912402558	4.982685892
20	4.913372233	9.897904055	4.984531822
21	4.907808733	9.889177893	4.98136916
22	4.904052683	9.885493677	4.981440993
23	4.9016725	9.874911675	4.973239175
24	4.904516783	9.874911675	4.970394892
25	4.904516783	9.873756015	4.969239232
26	4.907888617	9.876037521	4.968148905
27	4.909420683	9.874048525	4.964627842
28	4.9158201	9.872059529	4.956239429
29	4.9158201	9.870070533	4.954250433
30	4.90170617	9.868081537	4.966375367

Cross Hole Test											
Calculated Values of Dynamic Parameters											
Depth (m) BGL	Vp (m/s)	Vs (m/s)	Density (Kg/m^3)	m=Vp/Vs	Poisson's Ratio	Young's Modulus (N/m^2)	Young's Modulus (MPa)	Shear Modulus (N/m^2)	Shear Modulus (MPa)	Bulk Modulus (N/m^2)	Bulk Modulus (MPa)
1.5	573.6	219.2	1690	2.6168	0.4145	229720145	229.72	81202201.6	81.20	447769060	447.77
3.0	1401.6	226.3	1760	6.1935	0.4866	267985184	267.99	90132574.4	90.13	3337312540	3337.31
4.5	1407.4	232.4	1950	6.0559	0.4860	313004865	313.00	105319032	105.32	3722085406	3722.09
6.0	1422.6	238.7	2000	5.9598	0.4855	338564904	338.56	113955380	113.96	3895641013	3895.64
7.5	1436.1	247.5	2090	5.8024	0.4847	380157713	380.16	128025562.5	128.03	4139680159	4139.68
9.0	1455.6	255.6	2110	5.6948	0.4841	409161759	409.16	137849169.6	137.85	4286808677	4286.81
10.5	1463.4	259.3	2150	5.6437	0.4838	428989641	428.99	144558453.5	144.56	4411565449	4411.57
12.0	1506.3	268.3	2180	5.6142	0.4836	465639346	465.64	156927060.2	156.93	4737052444	4737.05
13.5	1547.8	278.2	2200	5.5636	0.4833	505124199	505.12	170269528	170.27	5043480611	5043.48
15.0	1555.7	286.8	2210	5.4243	0.4824	538950119	538.95	181781870.4	181.78	5106271676	5106.27
16.5	1588.8	296.1	2120	5.3658	0.4820	550926225	550.93	185871445.2	185.87	5103656539	5103.66
18.0	1613.5	299.3	2150	5.3909	0.4822	570930840	570.93	192598053.5	192.60	5340474433	5340.47
19.5	1629.1	303.9	2210	5.3606	0.4820	604956331	604.96	204105014.1	204.11	5593126631	5593.13
21.0	1647.8	309.6	2220	5.3224	0.4817	630588637	630.59	212791795.2	212.79	5744121151	5744.12
22.5	1671.4	311.2	2230	5.3708	0.4820	640140216	640.14	215965331.2	215.97	5941725076	5941.73
24.0	1687.2	336.9	2250	5.0080	0.4792	755530534	755.53	255378622.5	255.38	6064443810	6064.44
25.5	1711.3	347.4	2270	4.9260	0.4785	810101602	810.10	273958945.2	273.96	6282524663	6282.52
27.0	1742.8	354.7	2280	4.9134	0.4784	848159400	848.16	286851565.2	286.85	6542693442	6542.69
28.5	1793.6	359.1	2290	4.9947	0.4791	873574386	873.57	295301934.9	295.30	6973196285	6973.20
30.0	1827.5	361.4	2310	5.0567	0.4797	892847682	892.85	301709007.6	301.71	7312558261	7312.56

P.S. - Due to the shallower water table, an increment in compressional wave velocity observed and accordingly Vp/Vs ratio varied. But propagation of shear wave velocity is not affected by the presence of water table. Hence, variation in dynamic parameters observed.

RELIANT ... PVT. LTD. * GHY-35 *


Cross Hole Test - Velocity Chart
Velocity (meter/sec)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
Depth (m)
P-Wave Velocity
S-Wave Velocity



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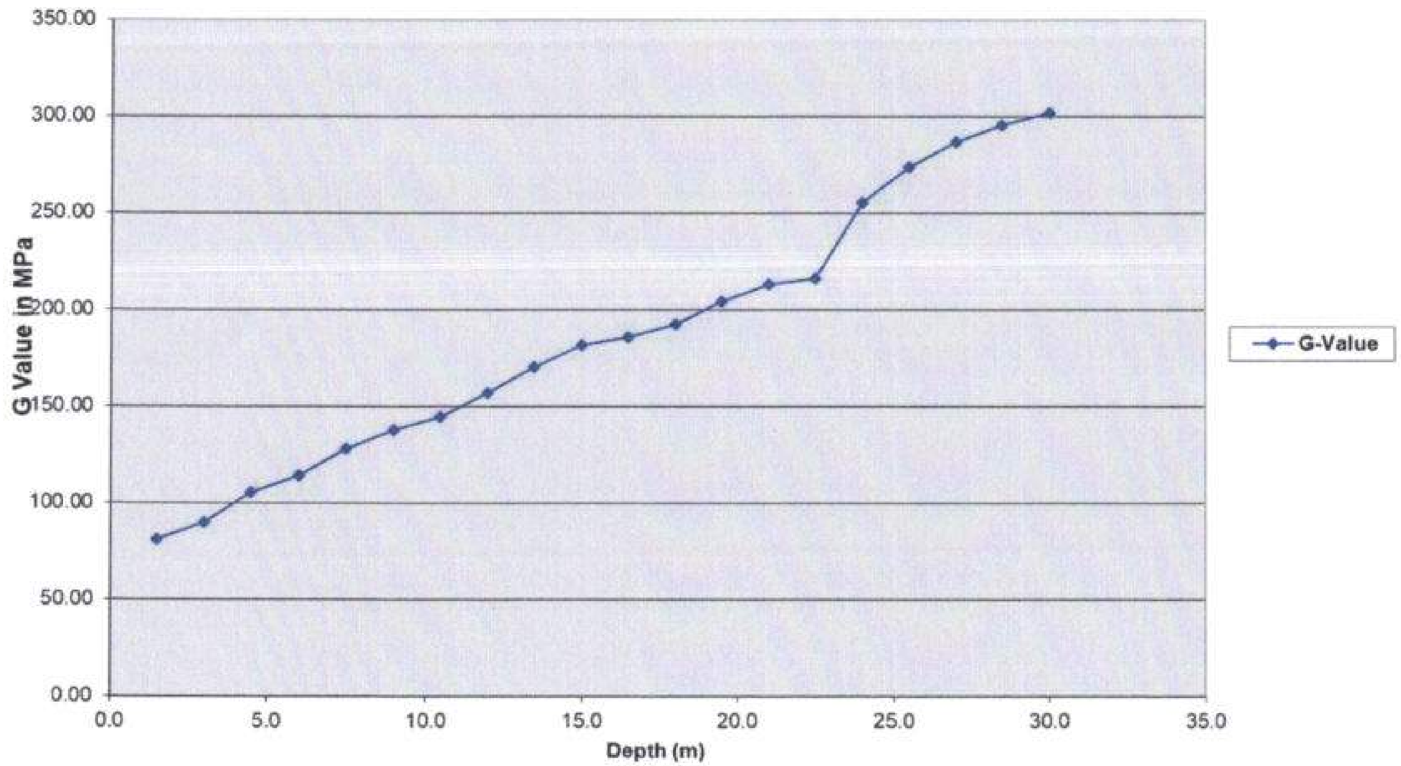
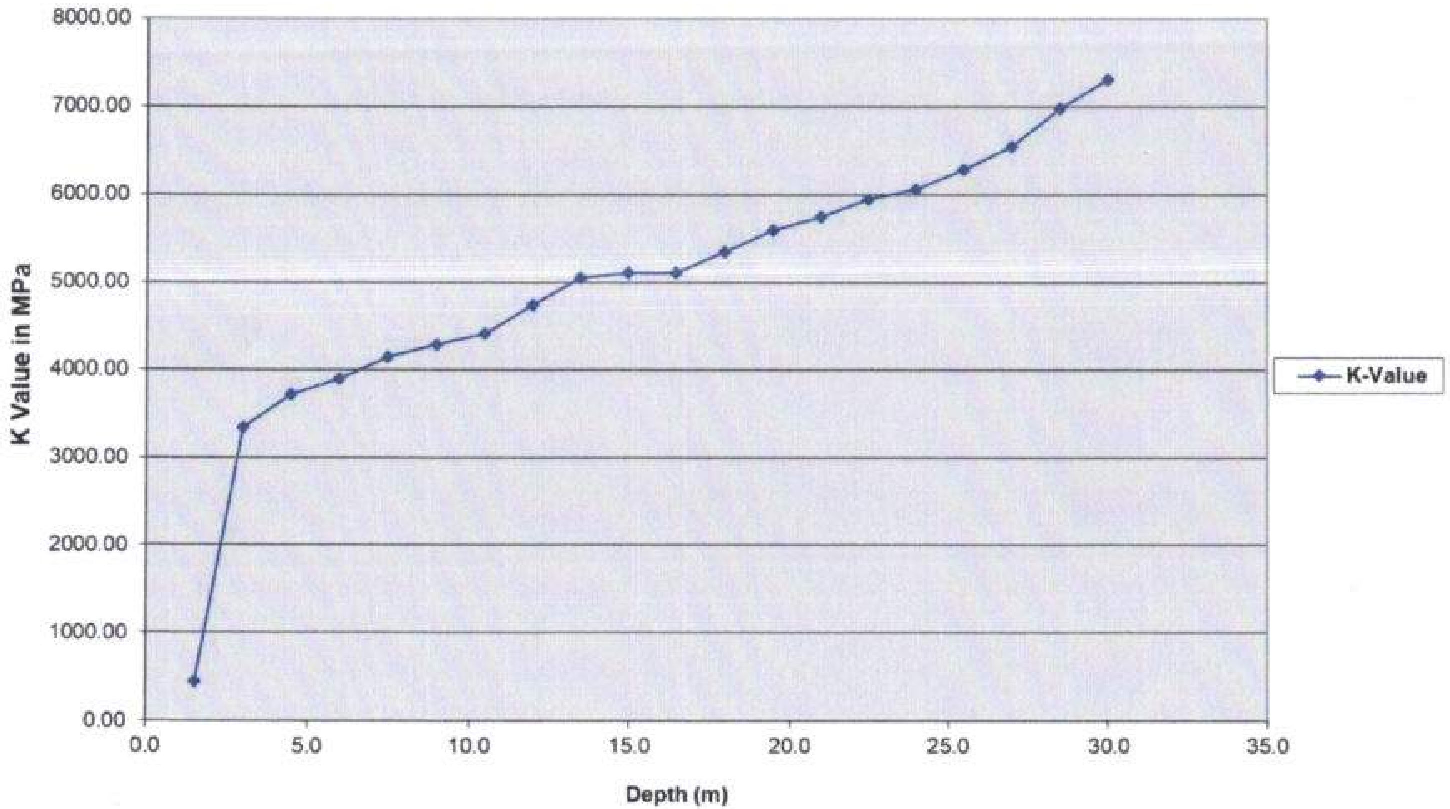
Seismic Cross Hole Survey at Guwahati
February, 2024

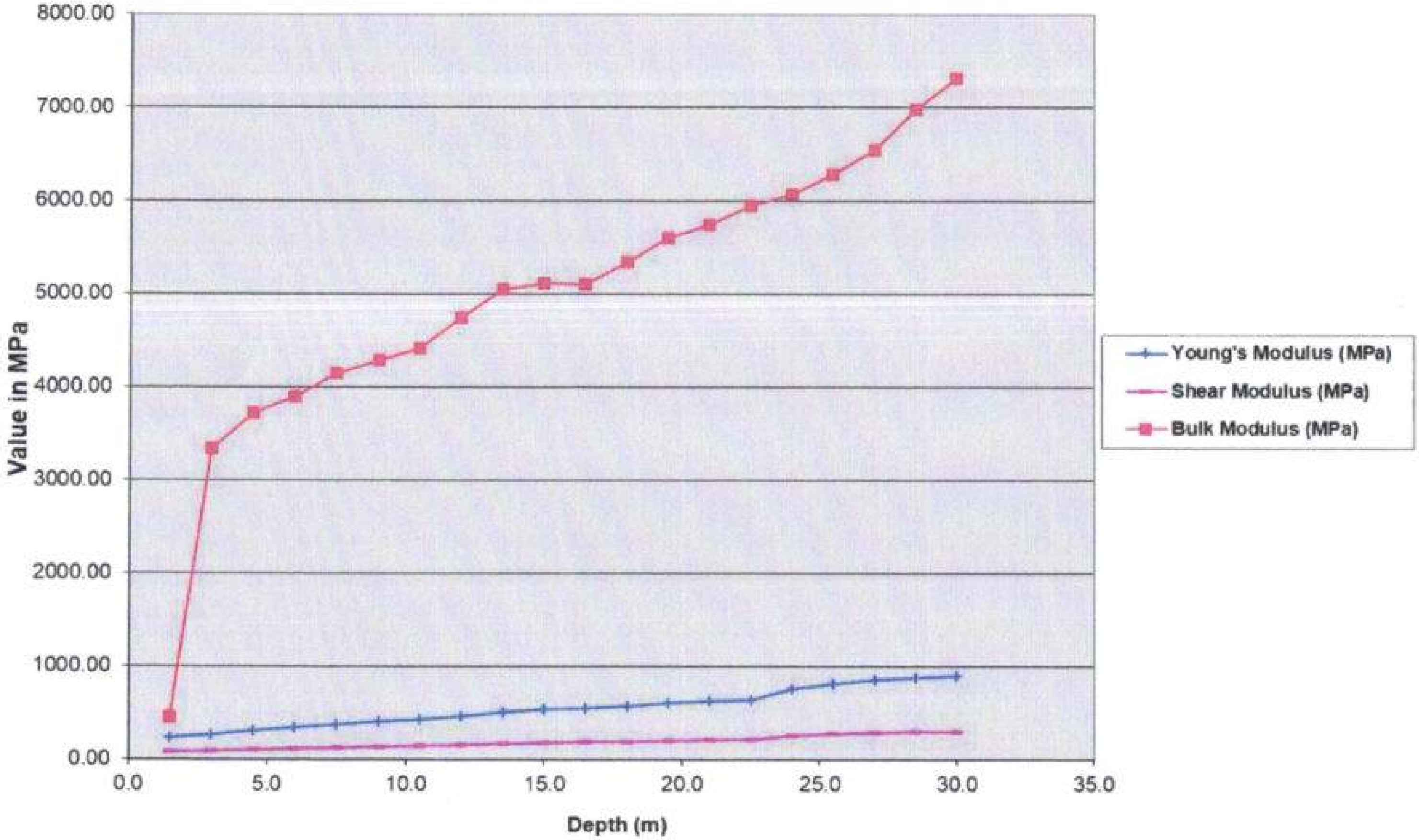
G Value with Depth



K Value with Depth



CHT-Modulus Chart



Seismic Cross Hole Survey at Guwahati
February, 2024

Appendix A: Theory of Cross Hole Seismic Survey

Introduction

The primary purpose of obtaining Cross Hole data is to obtain the most detailed in situ Seismic wave velocity profile for site-specific investigations and material Characterization. Cross Hole velocity data are valuable for assessing man-made materials, soil deposits, or rock formations.

The Seismic technique determines the Compressional (P-) and/ or Shear (S-) wave velocity of materials at depths of engineering and environmental concern where the data can be used in problems related to soil mechanics, rock mechanics, foundation studies, and earthquake engineering. Cross Hole Geophysical testing is generally conducted in the near surface (upper hundred meters) for site-specific engineering applications (Sirles and Viksne, 1990). All of the dynamic elastic moduli of a material can be determined from knowledge of the in situ density, P-, and S-wave velocity. Therefore, since procedures to determine material densities are standardized, acquiring detailed Seismic data yields the required information to analytically assess a site. Low-strain material damping and inelastic attenuation values can also be obtained from Cross Hole surveys. However, the most robust application of Cross Hole testing is the ability to define in situ Shear-wave velocity profiles for engineering investigations associated with earthquake engineering (Mooney, 1984).

The objective of acquiring Cross Hole data can be multipurpose; that is, the Seismic velocity results obtained may be used for evaluation of lateral and vertical material continuity, liquefaction analyses, deformation studies, or investigations concerning amplification or attenuation of strong ground motion. Typically, Cross Hole surveys are a Geophysical tool for performing explorations during what are considered phase two field investigations (where phase one field investigations include surface Geophysical surveys, follow-up drilling, trenching, and sampling of the in situ materials). During phase two field exploration, the information gathered is more critical to the analytical site-specific Characterization. Although both phase one and phase two results are important, the two independent sets of data must be integrated into the final analysis.

Cross Hole techniques are most useful when phase one site explorations indicate horizontal and particularly vertical variability of material properties. When layers of alternating density or stiffness are either known to exist or are encountered during phase one field investigations, Cross Hole Seismic tests are recommended to define the in situ velocities within each layer. Acquiring Cross Hole Seismic data resolves hidden layer velocity anomalies that cannot be detected with conventional surface methods, allows both final interpretation of other surface Geophysical data (Seismic or Electrical), and permits both empirical and theoretical correlation with other Geotechnical material parameters.

In order to have quantitative and quality assured results, Cross Hole tests performed for either engineering or environmental problems should be conducted in accordance with procedures established by the American Society for Testing and Materials (ASTM). Cross Hole Seismic test procedures are outlined in ASTM test designation D4428 M-84 (1984). The ASTM procedures provide specific guidelines for borehole preparation, data acquisition, and data reduction/ interpretation. Based on 10 years of experience, since the inception of the ASTM standard in 1984, Cross Hole Geophysical surveys have become more widely used and accepted for engineering as well as environmental applications. Coupling detailed site information obtained from the Cross Hole tests with the overall acceptance of the validity of the velocity data, these standards use both empirical correlations for liquefaction and specific input parameters for deformation or ground motion analyses (U.S. Bureau of Reclamation, 1989).

Theory

Cross Hole testing takes advantage of generating and recording (Seismic) body waves, both the P- and S-waves, at selected depth intervals where the Source and Receiver(s) are maintained at equal elevations for each measurement. Figure 1 illustrates a general field setup for the Cross Hole Seismic test method. Using Source-Receiver systems with preferential orientations in tandem (i.e., axial orientations, which complement the generated and received wave type/signal) allows maximum efficiency for measurement of in situ P- or S-wave velocity depending on the axial orientation. Due to the different particle motions along the Seismic ray path, it is crucial to use optimal Source-Receiver systems in order to best record Cross Hole P- or S-waves (Hoar, 1982). Because only body waves are generated in the Source borehole during Cross Hole tests, Surface waves (ground roll) are not generated and do not interfere with the recorded Body-wave Seismic signals.

Stokoe (1980) demonstrated that particle motions generated with different Seismic source types used during Cross Hole testing are three-directional. Therefore, three-component Geophones with orthogonal orientations yield optimal results when acquiring Cross Hole P- and/or S-wave Seismic signals. With three-component Geophones, there is one vertically oriented Geophone and two horizontal Geophones. For Cross Hole tests, one horizontal Geophone remains oriented parallel to the axis between the boreholes (radial orientation), and the other one remains oriented perpendicular to the borehole axis (transverse orientation). In this case, the two horizontal axis Geophones must remain oriented, radially and transversely, throughout the survey. This is accomplished with loading poles or with Geophones that can be electronically oriented.

P-waves are generated with a shear wave hammer such that along the assumed straight-ray propagation path the Seismic impulse compresses and rarefies the materials radially toward the Receiver borehole(s). Experience has proven that for optimal measurement of the P-wave signal, a Hydrophone has the greatest pressure-pulse sensitivity for Compressional-wave energy. Also, Hydrophones do not need to be clamped against the borehole wall; however, water must be present in the Receiver borehole in order to couple the Hydrophone to the casing/ formation.

For either Surface or Cross Hole Seismic testing in unconsolidated materials, P-wave velocity measurements are greatly affected by the moisture content or percent saturation (Allen, Rit, and Woods, 1980). In Cross Hole testing, the Seismic measurements encroach closer to the water surface with each successive depth interval. As the vadose zone and water surface are encountered, P-wave velocities become dependent upon the percent saturation, and the Poisson's ratio is no longer a valid representation of the formation characteristics.

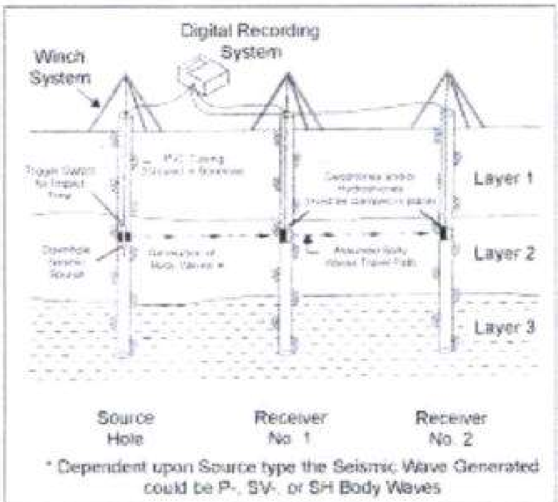


Figure 1. Schematic of Cross Hole method.

(e.g., Poisson's ratio increases to 0.48-0.49 in 100% saturated soils). Hence, below the water surface, the P-wave is commonly termed the fluid wave, because its propagation velocity is governed by the pore fluid(s), not the formation density. Fluid-wave velocities in fresh water range from 1,400 to 1,700 m/s, depending upon water temperature and salt content.

S-waves generated in Cross Hole testing may be split into two wave types, each with different particle motions--SV- and SH-waves, vertical or horizontal particle motions, respectively. Shear waves have the unique capability of polarization, which means that impacting the material to be tested in two directions (up or down, left or right) yields S-wave signals that are 180° out of phase. A Seismic source with reversible impact directions is the key factor for quality Cross Hole S-wave data acquisition and interpretation. Figure 2 shows a series of Cross Hole SV-waves with reversed polarity (note the low amplitude of the P-wave energy compared to the S-wave energy) received at both Receiver boreholes.

Typically, the S-wave generated in most Cross Hole testing is the SV-wave, which is a vertically polarized horizontally propagating Shear wave. That is, the ray path is horizontal but the (Shear) particle motion along the ray path is in the vertical plane. These SV-waves are easiest to generate because of commercially available borehole impact hammers that have reversible impact directions (up or down), and they are also the easiest to record because only one vertically oriented Geophone is required in each Receiver borehole. Alternatively, SH-waves can be generated and recorded in Cross Hole testing. SH-waves also propagate horizontally, but their (Shear) particle motion is in the horizontal plane (i.e., horizontally polarized horizontally propagating S-waves). Therefore, in order to generate and record SH-wave signals, horizontal impacts and Geophones are required; also, the orientation of the Source and Receiver must be parallel while their respective orientation remains perpendicular to the axis of the boreholes (transverse orientation).

Theoretically, there is no difference in the Body wave velocity for SV- and SH-waves, which justifies use of the uncomplicated vertical source for generation of SV-waves, and vertically oriented Geophones for signal detection. There are studies, however, which indicate significant velocity dependence of the SV- and SH-waves due to anisotropic states of stress in either the horizontal or vertical stress field (particularly in soil deposits; (Redpath, et al., 1982) or fractured rock formations (White, 1983).

The requirement for multiple drill holes in Cross Hole testing means that care must be taken when completing each borehole with casing and grout. ASTM procedures call for PVC casing and a grout mix that closely matches the formation density. Basically, borehole preparation and completion procedures are the success or failure of Cross Hole Seismic testing. Poor coupling between the casing and the formation yields delayed arrival times and attenuated signal amplitudes, particularly for (higher frequency) P-waves. Matching the formation density with a grout mix is not too difficult, but in open coarse-grained soils, problems arise during grout completion with losses into the formation. Even small grout takes begin to affect the velocity measured between two closely spaced drill holes. Several techniques to plug the porosity of the surrounding formation are commercially available (e.g., cotton-seed hulls, crushed walnut shells, or increased bentonite concentration in the grout mix). It should be recognized that increasing the ratio of bentonite/cement within the grout mix does affect density, but so long as the mix sets and hardens between the casing and in situ formation, quality Cross Hole Seismic signals will be obtained..

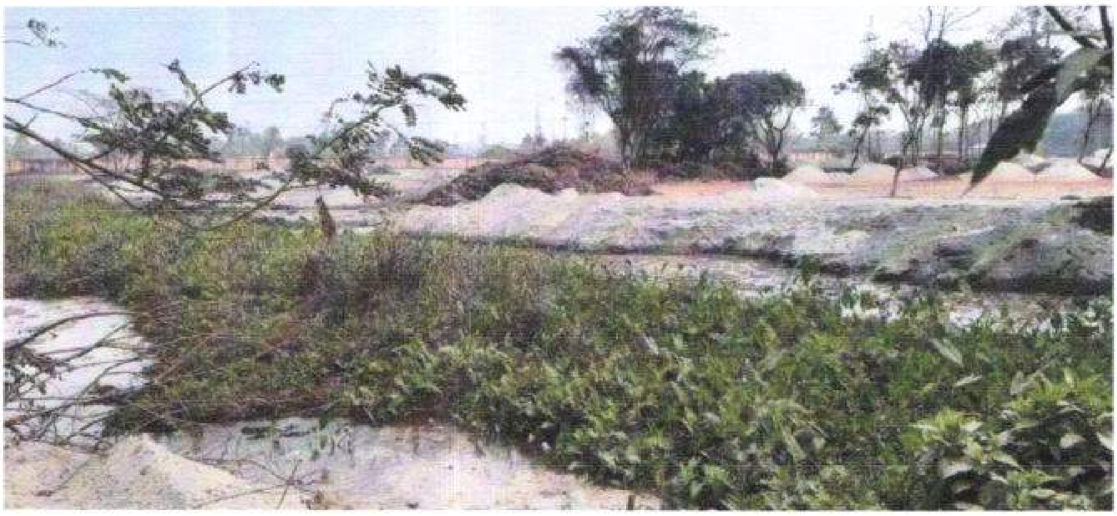
Another critical element of Cross Hole testing, which is often ignored, is the requirement for borehole directional surveys. There are several very good directional survey tools available that yield detailed deviation logs of each borehole used at a Cross Hole site. Borehole verticality and direction (azimuth) measurements should be performed at every depth interval that Seismic data are acquired. With the deviation logs, corrected Cross Hole distances between each borehole may be computed and used in the velocity analysis. Since Seismic wave travel times should be measured to the nearest tenth of a millisecond, relative borehole positions should be known to within a tenth of a foot. Assuming that the boreholes are vertical and plumb leads to computational inaccuracies and ultimately to data that cannot be quality assured.

Data Acquisition

Recording instruments used in Cross Hole testing vary considerably, but there are no standard requirements other than exact synchronization of the source pulse and instrument trigger for each recording. Cross Hole measurements rely considerably on the premise that the trigger time is precisely known as well as recorded. The recorded trigger signal from zero-time Geophones or accelerometers mounted on the Downhole impact hammer allows accurate timing for the first arrival at each drill hole. This becomes uniquely critical when only two drill holes are used (i.e., Source and one Receiver) because there is no capability of using interval travel times; in this case, the velocity is simply determined through distance traveled divided by direct travel time. Utilizing digital recording equipment affords the operator the ability to store the data on magnetic media for analysis at a later date; but more importantly, digital data can be filtered, smoothed, and time-shifted during analysis. Also, digital signal processing may be directly performed for coherence, frequency-dependent attenuation, and spectral analysis.

Numerous studies have shown that the effects on Cross Hole measurements by the choice of Geophone are not critical to the results (e.g., Hoar, 1982). There are only two requirements for the Receivers: the Receiver (velocity transducer) must have a flat or uniform output response over the frequency range of Cross Hole Seismic waves (25 to 300 Hz); and, a clamping device must force the Receiver against the borehole wall such that it is not free-hanging. The clamping device should not affect the mechanical response of the Geophone (i.e., resonance), nor should the uphole signal wire. If an SH-wave source is selected, then horizontal Geophones must be used and oriented as previously described to detect the SH-wave arrivals. It is paramount that the polarity of each Geophone be known prior to data acquisition because the direct arrivals of S-waves with reversed polarity can be easily misinterpreted. Hoar (1982) provides an excellent description of picking P- and S-wave arrivals off recorded Cross Hole signals. Hoar's dissertation shows that with proper borehole completion, digital recording equipment, and a preferential Source-Receiver system, clean reversed polarized and interpretable S-wave signals are relatively easy to acquire.

Field Photographs



Disclaimer: All projections and sections are subject to the inherent limitations of the technique employed and there could be variations as the underground conditions are not always amenable to physical interpretations.

A

:ANNEX-XVII:

STANDARD PROCTOR COMPACTION TEST

RELIANT FOUNDATIONS PVT. LTD. * GHY-35 *

Modified Proctor Test Result (As Per IS:2720-VIII)

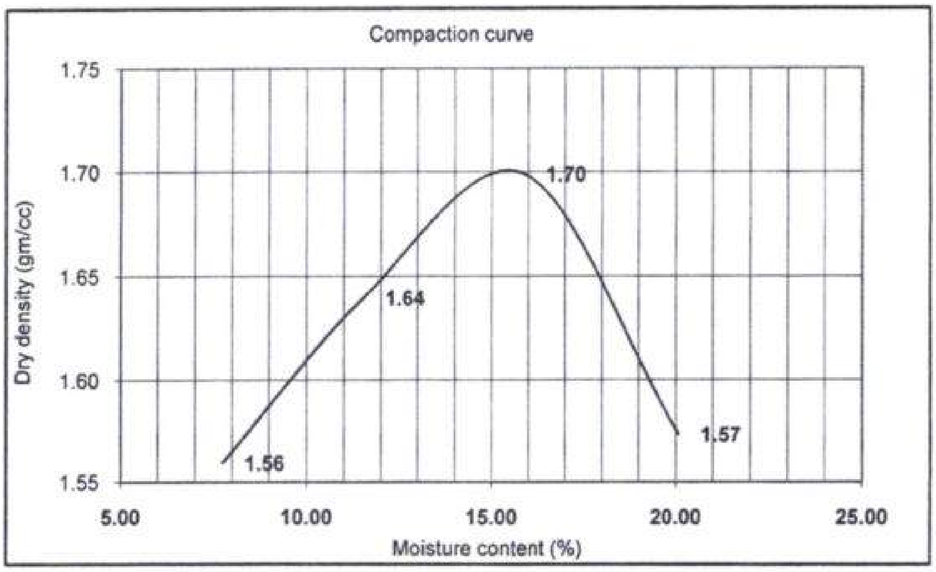
1	Size of mould	=	10 cm dia x 12.73 cm height
2	Capacity of mould	=	1000
3	Rammer	=	4.9 Kg x 450mm
4	No of layer	=	5
5	Blows per layer	=	25

(a) *Density determination*

		Test No	1	2	3	4
1	Mass of mould + soil	(gm)	3601	3750	3890	3810
2	Mass of empty mould	(gm)	1921	1921	1921	1921
3	Mass of compacted soil	(gm)	1680	1829	1969	1889
4	Bulk density	(gm/cc)	1.68	1.83	1.97	1.89
5	Dry density	(gm/cc)	1.56	1.64	1.70	1.57

(b) *Moisture content determination*

1	Container No		R-27	R-13	R-12	R-16
2	Mass of cont + wet soil (g	gm	64.31	79.34	75.91	70.44
3	Mass of cont + dry soil	gm	60.74	73.25	67.42	61.00
4	Mass of water present	gm	3.57	6.09	8.49	9.44
5	Mass of empty container	gm	14.65	20.44	14.00	14.00
6	Mass of dry soil	gm	46.09	52.81	53.42	47
7	Moisture content	%	7.75	11.53	15.89	20.09



Maximum dry density (MDD) =1.70 gm/cc
Optimum moisture content (OMC) = 15.89%

RELIANT FOUNDATIONS PVT. LTD. A

Modified Proctor Test Result (As Per IS:2720-VIII)

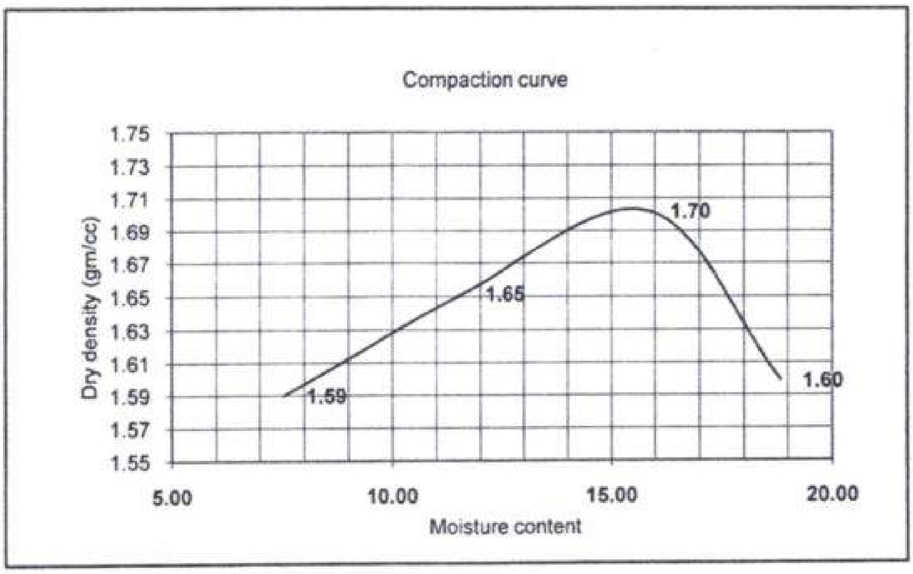
1 Size of mould = 10 cm dia x 12.73 cm height
2 Capacity of mould = 1000 cc
3 Rammer = 4.9 Kg x 450mm
4 No of layer = 5
5 Blows per layer = 25

Density determination

		Test No	1	2	3	4
1	Mass of mould + soil	(gm)	3716	3850	3978	3906
2	Mass of empty mould	(gm)	2006	2006	2006	2006
3	Mass of compacted soil	(gm)	1710	1844	1972	1900
4	Bulk density	(gm/cc)	1.71	1.84	1.97	1.90
5	Dry density	(gm/cc)	1.59	1.65	1.70	1.60

Moisture content determination

1	Container No		R-27	R-10	R-3	R-1
2	Mass of cont + wet soil	gm	67.46	72.13	68.04	76.88
3	Mass of cont + dry soil	gm	63.75	66.04	60.55	66.82
4	Mass of water present	gm	3.71	6.09	7.49	10.06
5	Mass of empty container	gm	14.58	13.63	13.28	13.41
6	Mass of dry soil	gm	49.17	52.41	47.27	53.41
7	Moisture content	%	7.55	11.62	15.85	18.84



Maximum dry density (MDD) =1.70gm/cc
Optimum moisture content (OMC) = 15.85%

Modified Proctor Test Result (As Per IS:2720-VIII)

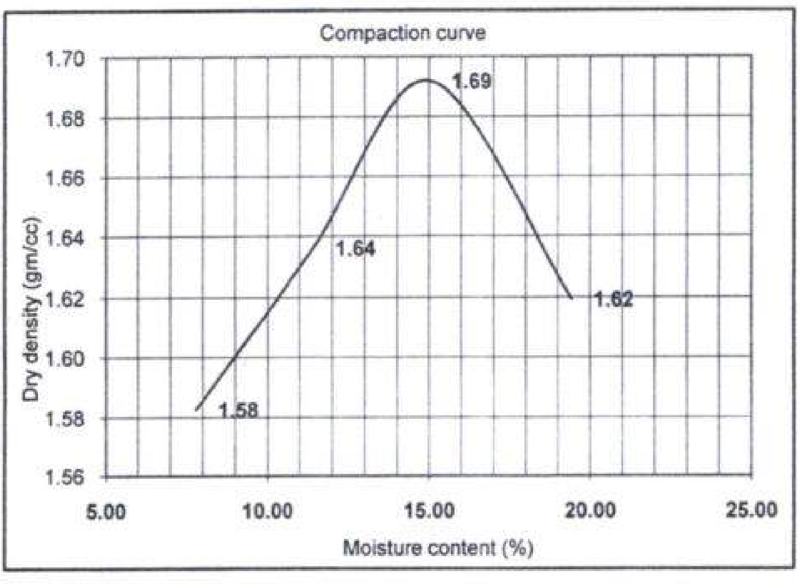
1 Size of mould = 10 cm dia x 12.73 cm height
2 Capacity of mould = 1000
3 Rammer = 4.9 Kg x 450mm
4 No of layer = 5
5 Blows per layer = 25

(a) *Density determination*

		Test No	1	2	3	4
1	Mass of mould + soil	(gm)	3627	3744	3867	3855
2	Mass of empty mould	(gm)	1921	1921	1921	1921
3	Mass of compacted soil	(gm)	1706	1823	1946	1934
4	Bulk density	(gm/cc)	1.71	1.82	1.95	1.93
5	Dry density	(gm/cc)	1.58	1.64	1.69	1.62

(b) *Moisture content determination*

1	Container No		R-23	R-2	R-26	R-27
2	Mass of cont + wet soil	gm	68.95	65.52	81.78	71.37
3	Mass of cont + dry soil	gm	65.16	60.18	73.54	62.14
4	Mass of water present	gm	3.79	5.34	8.24	9.23
5	Mass of empty container	gm	16.48	13.39	18.64	14.63
6	Mass of dry soil	gm	48.68	46.79	54.9	47.51
7	Moisture content	%	7.79	11.41	15.01	19.43



Maximum dry density (MDD) =1.69gm/cc
Optimum moisture content (OMC) = 15.01%

Modified Proctor Test Result (As Per IS:2720-VIII)

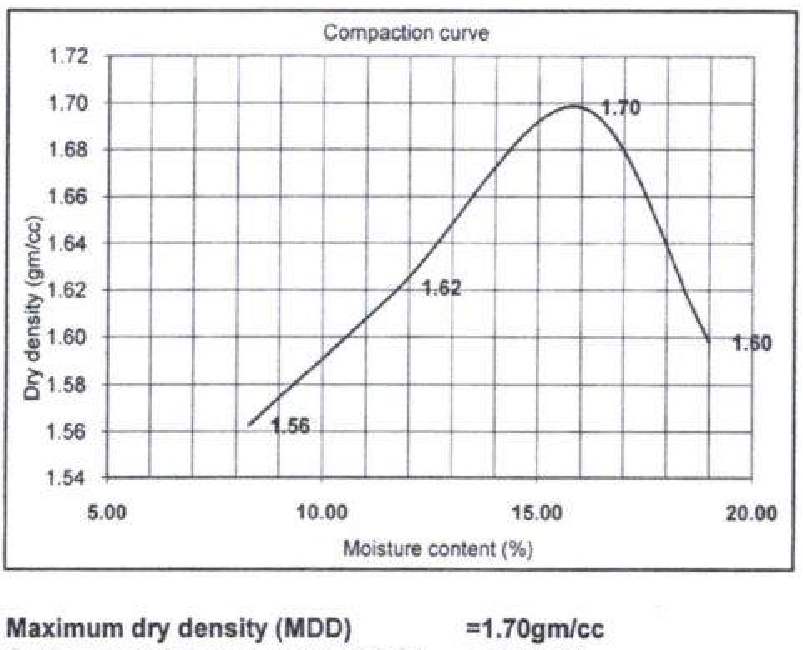
1 Size of mould = 10 cm dia x 12.73 cm height
2 Capacity of mould = 1000
3 Rammer = 4.9 Kg x 450mm
4 No of layer = 5
5 Blows per layer = 25

(a) *Density determination*

		Test No	1	2	3	4
1	Mass of mould + soil	(gm)	3613	3733	3890	3823
2	Mass of empty mould	(gm)	1921	1921	1921	1921
3	Mass of compacted soil	(gm)	1692	1812	1969	1902
4	Bulk density	(gm/cc)	1.69	1.81	1.97	1.90
5	Dry density	(gm/cc)	1.56	1.62	1.70	1.60

(b) *Moisture content determination*

1	Container No		R-22	R-15	R-21	R-16
2	Mass of cont + wet soil	gm	75.30	67.85	53.26	67.30
3	Mass of cont + dry soil	gm	70.63	62.18	47.47	58.78
4	Mass of water present	gm	4.67	5.67	5.79	8.52
5	Mass of empty container	gm	14.22	13.99	11.10	13.95
6	Mass of dry soil	gm	56.41	48.19	36.37	44.83
7	Moisture content	%	8.28	11.77	15.92	19.01



Maximum dry density (MDD) =1.70gm/cc
Optimum moisture content (OMC) = 15.92%

PVT. LTD. GHY-35