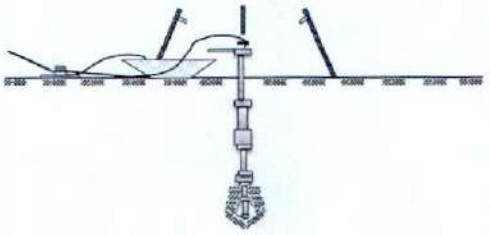
REPORT ON SOIL INVESTIGATION



-: NAME OF WORK :-

CONSTRUCTION OF PROPOSED
G+VII(SEVEN) STORIED RESIDENTIAL BUILDING

-: LOCATION AT :-

SHANTIPUR, SHIV MANDIR, P.S.- MATIGARA,
DIST. DARJEELING, G.P.- ATHARAKHAI

-: LAND SCHEDULE :-

MOUZA –BAIRITISHAL, J.L NO. -70
KHATIAN NO. –R.S.- 19, 21 & 22. L.R.-6056 & 7262
PLOT NO.- R.S.-351,354,355,356 & 357, L.R.-388,389, 390 & 391,
P.S.-MATIGARA, DIST.- DARJEELING,

-: NAME OF OWNER :-

1. SRI.GURU CHARAN ROY, S/O. LATE ANANTA KUMAR ROY,
2.SRI.SANTANU CHAKRABORTY. S/O. SRI. SHIBATOSH CHAKRABORTY.

-: NAME OF THE DEVELOPER :-

DARJEELING REAL ESTATE AGENTS & DEVELOPERS.
REPRESENTED BY: SRI NISITH KUMAR AGARWAL.

INVESTIGATOR

a house of quality assurance GTH

Er. AVIJIT GHOSH
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ACHARYA ASSOCIATES SILIGURI

REPORT.NO. 569
DATED:- 22.07.2021

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ACHARYA ASSOCIATES SILIGURI

INTRODUCTION AND SCOPE :

Soil investigation has been carried out at Shantipur, Shiv Mandir, P.S.- Matigara, Dist. Darjeeling, G.P.- Atharakhai for the purpose of designing suitable foundation **G+VII(SEVEN) STORIED RESIDENTIAL BUILDING.**

The objective of the exploration work was to determine the probable sub surface conditions such as stratification, denseness or hardness of the strata, position of ground water table etc. and to evaluate probable range of safe bearing capacity for preparing safe and economic design of foundation.

The plot is more or less level and the Spot is same from existing road level. Twelve 150 mm dia bore holes were taken down to a depth of 8m below the existing ground level at the site as per location shown in the site plan. Auger boring and bentonite mud drilling were used for drilling the holes. Standard Penetration Test was done on the soil at different depth.

Laboratory testing on selected undisturbed/representative soil samples were done for classification purpose and to determine their strength & other physical properties.

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THE FOLLOWING TESTS WERE DONE FOR DETAILS SOIL INVESTIGATION:-

(A) FIELD TESTS:

1. Standard penetration tests.
2. Determination of In-Situ density.

(B) LABORATORY TESTS:

1. Natural moisture content
2. Specific Gravity
3. Grain size analysis.

1. Standard Penetration Tests :-

A standard split spoon sampler is driven 45 cm into the ground by means of a 63.5 kg hammer falling freely from a height of 75 cm. The total number of blows required to drive the second and third depth of 15 cm (i.e. total 30 cm) is called the standard Penetration resistance (N blows per 30 cm). After the blow counts are recorded, the spoon is withdrawn and a representative sample is obtained for identification tests. The N value has been corrected as per IS: 2123-1981.

Corrections:

a) Due to Overburden – The N value for cohesion less soil shall be corrected for overburden (N').

b) Due to Dilatancy – The value obtained after correction due to overburden shall be corrected for dialatancy if the stratum consists of fine sand and silt below water table for values of N' greater than 15, as under (N"):

$$N" = 15 + \tfrac{1}{2}(N' - 15)$$

2. Determination of In-Situ density:

The in-situ density of soil is determined by core cutter method as per IS: 2720 (Part XXIX) - 1975.

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(B) LABORATORY TESTS:

The soil samples collected from the bore holes during field Investigation were sent to the laboratory for determination of soil classification and physical properties.

The following laboratory tests were conducted on soil sample.

1. **Natural moisture content**: It is the ratio of weight of water in the voids to the weight of solids. It is expressed as percentage.

   It is determined in the laboratory by Oven drying method as per IS: 2720 (Part-II)-1973. In this method the soil sample (collected in the air tight polythene pack) is dried in thermostatically controlled oven at 105-110°C for 24 hours.

2. **Specific Gravity**: Specific gravity is the ratio of the weight in air of a given volume of a material at a standard temperature to the weight in air of an equal volume of distilled water at the same stated temperature.

The specific gravity of soil sample is determined by density bottle method as per IS: 2720 (Part III/Sec 1) - 1980.

3. Shear Strength test:

When an external load is applied on a soil mass, shearing stresses are induced in it. If the shear stress developed on any plane in the soil exceeds a certain limiting value, failure of the soil occurs.

The maximum shear stress which a given soil can withstand is called its shear strength.

The factors governing the shear strength of a soil are:

(a) Internal friction.

(b) Cohesion.

As it is seen from two no's bore log data sheet that the average soil strata at 2 to 4 m is fine, medium & coarse sand, which is **cohesion less(C=0)**, so **shear parameter angle of internal friction (Ø) is found out from correlation between angle of internal friction and corrected SPT value as per IS 6403 : 1981.**

Unconfined Compression test and Vane Shear test is applicable for pure forms of clay.

2. **Grain size analysis :**

The soil samples collected from the different depths were used for determination of Grain Size analysis. This is determined in the laboratory by the mechanical analysis, which consists of:

(a) Dry mechanical analysis or sieve analysis.[IS-2720 (Part-4)- 1985]

(b) Wet mechanical analysis or hydrometer analysis. [IS-2720 (Part-4)-1985]

Determination of Net Safe Bearing Capacity of Soil:

Net Safe Bearing capacity of soil is determined considering the following two aspects :

1. **Shear failure of soil as per IS:6403-1981**: Under this aspect calculations are made for both General Shear failure and Local Shear failure and appropriate value of the either, or a interpolated value as per void ratio is determined as the net safe bearing capacity from shear failure point of view.

2. **Allowable settlement as per IS: 8009 (Part-1)-1986:** Maximum permissible settlement for R.C.C. structure and the type of soil as mentioned in the report(sandy) is 50mm as per IS: 8009 (Part-1)-1986. In the present case considering all aspects, allowable settlement as indicated in the Net allowable bearing capacity Table has been assumed to determine the Net Safe bearing capacity by the formula suggested by Bowles (1988):

Net Safe Bearing Capacity $=48N_{cor}R_d\,(B+.33)/2)^2S_aR_w$

Where

N_{cor}= Design N (SPT) Value

S_a= Allowable Settlement

R_d= Depth Correction Factor =

B= Width of Footing

R_w= Water Table Correction

The **Net allowable bearing capacity** is taken as the lesser of the two values determined considering the above two aspects.

The calculations are shown in table- 13, 14, 15, 16 & 17

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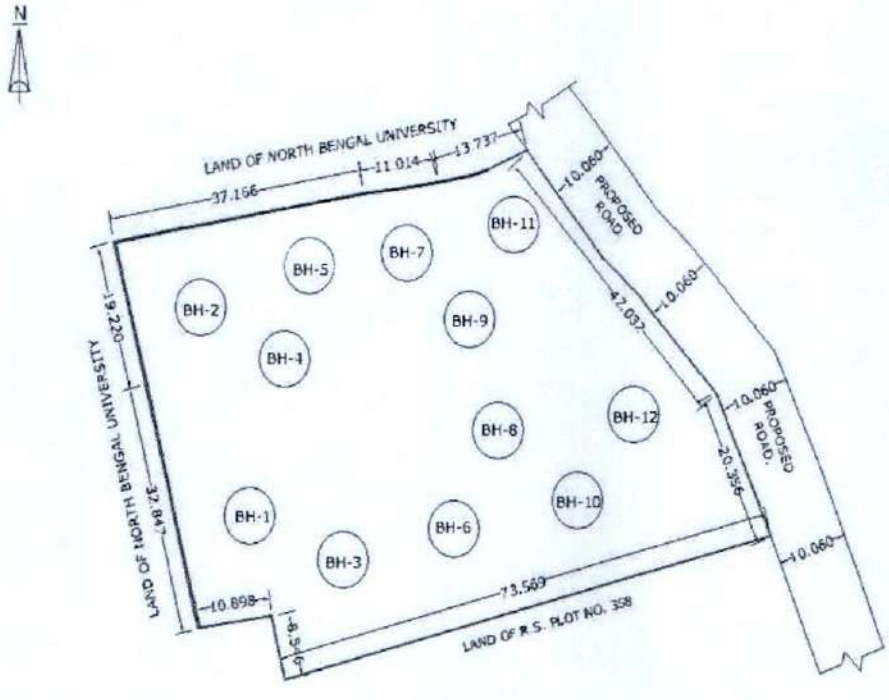
SITE PLAN

SITE PLAN SHOWING THE BORE HOLE LOCATION FOR PROPOSED G + VII(SEVEN) STORIED RESIDENTIAL BUILDING. AT SHIVMANDIR, P.S. MATIGARA, DIST. DARJEELING .

NAME OF THE LAND OWNERS . :-
1) SRI GURU CHARAN ROY.
S/O. LATE ANANTA KUMAR ROY.
AT SARAT NAGAR, SHIVMANDIR,
P.O. NEW RANGIA, P.S. MATIGARA,
DIST. DARJEELING.
2) SRI SANTANU CHAKRABORTY.
S/O. SRI SHIBATOSH CHAKRABORTY.
AT MATRI ASHISH, PATEL ROAD,
P.O. & P.S. PRADHAN NAGAR, DIST. DARJEELING.
NAME OF THE DEVELOPER . :-
DARJEELING REAIL ESTATE AGENT & DEVELOPER.
OFFICE AT NEELKAMAL PLAZA, H.C. ROAD, SILIGURI,
DIST. DARJEELING.
REPRESENTED BY ONE OF ITS PARTNER .:-
SRI NISIHT KUMAR AGARWAL.

NOTE:- (BH) = BORE HOLE LOCATION

LAND SCHEDULE . :-
MOUZA. :- BAIRITISAL.
J. L. NO. :- 70
KHATIAN NO.:- R.S.- 19, 21 & 22
L.R.- 6056 & 7262
PLOT NO. :- R.S.- 351, 354,355, 356 & 357,
L.R.- 388, 389, 390 & 391,
P.S. :- MATIGARA.
DIST. :- DARJEELING.



DRAWN BY.:-

SITE PLAN.
NOT TO SCALE.

ACHARYA ASSOCIATES SILIGURI

Table-1

BORE LOG DATA SHEET

TYPE OF BORING	DIA OF BORE	TYPE OF DRILLING
SHELL & AUGER	150 MM	BMD
TERMINATION DEPTH	8.00 M	
COMMENCED ON : 28/06/2021	COMPLETED ON : 28/06/2021	
GROUND WATER LEVEL	2m down from G.L.	

BORE HOLE NO. 1	
GROUND/ BED RL	The spot is same as road level.
LOCATION	
Shivmandir, P.S.- Matigara, Dist. Darjeeling, G.P.- Atharakhai	

DESCRIPTION OF STRATA	LEGEND	FROM	TO	Thickness	N	SAMPLES		DEPTH
		m	m	m	Value	Type	Ref. No.	m
Silty,fine,medium & coarse sand with grey in colour.		2.00	2.45	0.45	8	P	P-I/1	2.15-2.45
DO		3.00	3.45	0.45	6	P	P-I/2	3.15-3.45
DO		4.00	4.45	0.45	10	P	P-I/3	4.15-4.45
Silty,fine,medium & coarse sand with grey in colour.		5.00	5.45	0.45	33	P	P-I/4	5.15-5.45
DO		6.00	6.45	0.45	52	P	P-I/5	6.15-6.45
DO		7.00	7.45	0.45	R	P	P-I/6	7.15-7.45
DO		8.00	8.45	0.45	R	P	P-I/7	8.15-8.45

Code : U-Undisturbed sample, D – Disturbed Sample, L – Large Diameter, C – Core W-Water Sample, P-Penetration. Test, V – Vane Shear Test

No. of disturbed Sample : NIL No. of UDS : NIL No. of Vane Test : NIL
No. of Large Diameter Sample : NIL No. of S.P.T. : Seven(07) No. of Water Sample : NIL

ACHARYA ASSOCIATES SILIGURI

Table-2

BORE LOG DATA SHEET

TYPE OF BORING	DIA OF BORE	TYPE OF DRILLING
SHELL & AUGER	150 MM	BMD
TERMINATION DEPTH	8.00 M	
COMMENCED ON : 28/06/2021	COMPLETED ON : 28/06/2021	
GROUND WATER LEVEL	2m down from G.L.	

BORE HOLE NO. 2	
GROUND/ BED RL	The spot is same as road level.
LOCATION	
Shivmandir, P.S.- Matigara, Dist. Darjeeling, G.P.- Atharakhai	

DESCRIPTION OF STRATA	LEGEND	FROM	TO	Thickness	N	SAMPLES		DEPTH
		m	m	m	Value	Type	Ref. No.	m
Silty,fine,medium & coarse sand with grey in colour.		2.00	2.45	0.45	8	P	P-I/1	2.15-2.45
DO		3.00	3.45	0.45	4	P	P-I/2	3.15-3.45
DO		4.00	4.45	0.45	9	P	P-I/3	4.15-4.45
Silty,fine,medium & coarse sand with grey in colour.		5.00	5.45	0.45	36	P	P-I/4	5.15-5.45
DO		6.00	6.45	0.45	57	P	P-I/5	6.15-6.45
DO		7.00	7.45	0.45	R	P	P-I/6	7.15-7.45
DO		8.00	8.45	0.45	R	P	P-I/7	8.15-8.45

Code : U-Undisturbed sample, D – Disturbed Sample, L – Large Diameter, C – Core W-Water Sample, P-Penetration. Test, V – Vane Shear Test

No. of disturbed Sample : NIL No. of UDS : NIL No. of Vane Test : NIL
No. of Large Diameter Sample : NIL No. of S.P.T. : Seven(07) No. of Water Sample : NIL

ACHARYA ASSOCIATES SILIGURI

Table-3

BORE LOG DATA SHEET

TYPE OF BORING	DIA OF BORE	TYPE OF DRILLING
SHELL & AUGER	150 MM	BMD
TERMINATION DEPTH	8.00 M	
COMMENCED ON : 28/06/2021	COMPLETED ON : 28/06/2021	
GROUND WATER LEVEL	2m down from G.L.	

BORE HOLE NO. 3	
GROUND/ BED RL	The spot is same as road level.
LOCATION	
Shivmandir, P.S.- Matigara, Dist. Darjeeling, G.P.- Atharakhai	

DESCRIPTION OF STRATA	LEGEND	FROM	TO	Thickness	N	SAMPLES		DEPTH
		m	m	m	Value	Type	Ref. No.	m
Silty,fine,medium & coarse sand with grey in colour.		2.00	2.45	0.45	8	P	P-I/1	2.15-2.45
DO		3.00	3.45	0.45	5	P	P-I/2	3.15-3.45
DO		4.00	4.45	0.45	10	P	P-I/3	4.15-4.45
Silty,fine,medium & coarse sand with grey in colour.		5.00	5.45	0.45	39	P	P-I/4	5.15-5.45
DO		6.00	6.45	0.45	R	P	P-I/5	6.15-6.45
DO		7.00	7.45	0.45	R	P	P-I/6	7.15-7.45
DO		8.00	8.45	0.45	R	P	P-I/7	8.15-8.45

Code : U-Undisturbed sample, D – Disturbed Sample, L – Large Diameter, C – Core W-Water Sample, P-Penetration. Test, V – Vane Shear Test

No. of disturbed Sample : NIL No. of UDS : NIL No. of Vane Test : NIL
No. of Large Diameter Sample : NIL No. of S.P.T. : Seven(07) No. of Water Sample : NIL

ACHARYA ASSOCIATES SILIGURI

Table-4

BORE LOG DATA SHEET

TYPE OF BORING	DIA OF BORE	TYPE OF DRILLING
SHELL & AUGER	150 MM	BMD
TERMINATION DEPTH	8.00 M	
COMMENCED ON : 29/06/2021	COMPLETED ON : 29/06/2021	
GROUND WATER LEVEL	2m down from G.L.	

BORE HOLE NO. 4	
GROUND/ BED RL	The spot is same as road level.
LOCATION	
Shivmandir, P.S.- Matigara, Dist. Darjeeling, G.P.- Atharakhai	

DESCRIPTION OF STRATA	LEGEND	FROM	TO	Thickness	N	SAMPLES		DEPTH
		m	m	m	Value	Type	Ref. No.	m
Silty,fine,medium & coarse sand with grey in colour.		2.00	2.45	0.45	16	P	P-I/1	2.15-2.45
DO		3.00	3.45	0.45	18	P	P-I/2	3.15-3.45
DO		4.00	4.45	0.45	18	P	P-I/3	4.15-4.45
Silty,fine,medium & coarse sand with grey in colour.		5.00	5.45	0.45	30	P	P-I/4	5.15-5.45
DO		6.00	6.45	0.45	52	P	P-I/5	6.15-6.45
DO		7.00	7.45	0.45	R	P	P-I/6	7.15-7.45
DO		8.00	8.45	0.45	R	P	P-I/7	8.15-8.45

Code : U-Undisturbed sample, D – Disturbed Sample, L – Large Diameter, C – Core W-Water Sample, P-Penetration. Test, V – Vane Shear Test

No. of disturbed Sample : NIL No. of UDS : NIL No. of Vane Test : NIL
No. of Large Diameter Sample : NIL No. of S.P.T. : Seven(07) No. of Water Sample : NIL

ACHARYA ASSOCIATES SILIGURI

Table-5

BORE LOG DATA SHEET

TYPE OF BORING	DIA OF BORE	TYPE OF DRILLING
SHELL & AUGER	150 MM	BMD
TERMINATION DEPTH	8.00 M	
COMMENCED ON : 29/06/2021	COMPLETED ON : 29/06/2021	
GROUND WATER LEVEL	2m down from G.L.	

BORE HOLE NO. 5	
GROUND/ BED RL	The spot is same as road level.
LOCATION	
Shivmandir, P.S.- Matigara, Dist. Darjeeling, G.P.- Atharakhai	

DESCRIPTION OF STRATA	LEGEND	FROM	TO	Thickness	N	SAMPLES		DEPTH
		m	m	m	Value	Type	Ref. No.	m
Silty,fine,medium & coarse sand with grey in colour.		2.00	2.45	0.45	15	P	P-I/1	2.15-2.45
DO		3.00	3.45	0.45	8	P	P-I/2	3.15-3.45
DO		4.00	4.45	0.45	12	P	P-I/3	4.15-4.45
Silty,fine,medium & coarse sand with grey in colour.		5.00	5.45	0.45	33	P	P-I/4	5.15-5.45
DO		6.00	6.45	0.45	55	P	P-I/5	6.15-6.45
DO		7.00	7.45	0.45	R	P	P-I/6	7.15-7.45
DO		8.00	8.45	0.45	R	P	P-I/7	8.15-8.45

Code : U-Undisturbed sample, D – Disturbed Sample, L – Large Diameter, C – Core W-Water Sample, P-Penetration. Test, V – Vane Shear Test

No. of disturbed Sample : NIL No. of UDS : NIL No. of Vane Test : NIL
No. of Large Diameter Sample : NIL No. of S.P.T. : Seven(07) No. of Water Sample : NIL

ACHARYA ASSOCIATES SILIGURI

Table-6

BORE LOG DATA SHEET

TYPE OF BORING	DIA OF BORE	TYPE OF DRILLING
SHELL & AUGER	150 MM	BMD
TERMINATION DEPTH	8.00 M	
COMMENCED ON : 29/06/2021	COMPLETED ON : 29/06/2021	
GROUND WATER LEVEL	2m down from G.L.	

BORE HOLE NO. 6	
GROUND/ BED RL	The spot is same as road level.
LOCATION	
Shivmandir, P.S.- Matigara, Dist. Darjeeling, G.P.- Atharakhai	

DESCRIPTION OF STRATA	LEGEND	FROM	TO	Thickness	N	SAMPLES		DEPTH
		m	m	m	Value	Type	Ref. No.	m
Silty,fine,medium & coarse sand with grey in colour.		2.00	2.45	0.45	5	P	P-I/1	2.15-2.45
DO		3.00	3.45	0.45	7	P	P-I/2	3.15-3.45
DO		4.00	4.45	0.45	10	P	P-I/3	4.15-4.45
Silty,fine,medium & coarse sand with grey in colour.		5.00	5.45	0.45	31	P	P-I/4	5.15-5.45
DO		6.00	6.45	0.45	57	P	P-I/5	6.15-6.45
DO		7.00	7.45	0.45	R	P	P-I/6	7.15-7.45
DO		8.00	8.45	0.45	R	P	P-I/7	8.15-8.45

Code : U-Undisturbed sample, D – Disturbed Sample, L – Large Diameter, C – Core W-Water Sample, P-Penetration. Test, V – Vane Shear Test

No. of disturbed Sample : NIL No. of UDS : NIL No. of Vane Test : NIL
No. of Large Diameter Sample : NIL No. of S.P.T. : Seven(07) No. of Water Sample : NIL

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Table-7

BORE LOG DATA SHEET

TYPE OF BORING	DIA OF BORE	TYPE OF DRILLING
SHELL & AUGER	150 MM	BMD
TERMINATION DEPTH	8.00 M	
COMMENCED ON : 30/06/2021	COMPLETED ON : 30/06/2021	
GROUND WATER LEVEL	2m down from G.L.	

BORE HOLE NO. 7	
GROUND/ BED RL	The spot is same as road level.
LOCATION	
Shivmandir, P.S.- Matigara, Dist. Darjeeling, G.P.- Atharakhai	

DESCRIPTION OF STRATA	LEGEND	FROM	TO	Thickness	N	SAMPLES		DEPTH
		m	m	m	Value	Type	Ref. No.	m
Silty,fine,medium & coarse sand with grey in colour.		2.00	2.45	0.45	11	P	P-I/1	2.15-2.45
DO		3.00	3.45	0.45	19	P	P-I/2	3.15-3.45
DO		4.00	4.45	0.45	13	P	P-I/3	4.15-4.45
Silty,fine,medium & coarse sand with grey in colour.		5.00	5.45	0.45	34	P	P-I/4	5.15-5.45
DO		6.00	6.45	0.45	R	P	P-I/5	6.15-6.45
DO		7.00	7.45	0.45	R	P	P-I/6	7.15-7.45
DO		8.00	8.45	0.45	R	P	P-I/7	8.15-8.45

Code : U-Undisturbed sample, D – Disturbed Sample, L – Large Diameter, C – Core W-Water Sample, P-Penetration. Test, V – Vane Shear Test

No. of disturbed Sample : NIL No. of UDS : NIL No. of Vane Test : NIL
No. of Large Diameter Sample : NIL No. of S.P.T. : Seven(07) No. of Water Sample : NIL

ACHARYA ASSOCIATES SILIGURI

Table-8

BORE LOG DATA SHEET

TYPE OF BORING	DIA OF BORE	TYPE OF DRILLING
SHELL & AUGER	150 MM	BMD
TERMINATION DEPTH	8.00 M	
COMMENCED ON : 30/06/2021	COMPLETED ON : 30/06/2021	
GROUND WATER LEVEL	2m down from G.L.	

BORE HOLE NO. 8	
GROUND/ BED RL	The spot is same as road level.
LOCATION	
Shivmandir, P.S.- Matigara, Dist. Darjeeling, G.P.- Atharakhai	

DESCRIPTION OF STRATA	LEGEND	FROM	TO	Thickness	N	SAMPLES		DEPTH
		m	m	m	Value	Type	Ref. No.	m
Silty,fine,medium & coarse sand with grey in colour.		2.00	2.45	0.45	11	P	P-I/1	2.15-2.45
DO		3.00	3.45	0.45	15	P	P-I/2	3.15-3.45
DO		4.00	4.45	0.45	9	P	P-I/3	4.15-4.45
Silty,fine,medium & coarse sand with grey in colour.		5.00	5.45	0.45	30	P	P-I/4	5.15-5.45
DO		6.00	6.45	0.45	54	P	P-I/5	6.15-6.45
DO		7.00	7.45	0.45	R	P	P-I/6	7.15-7.45
DO		8.00	8.45	0.45	R	P	P-I/7	8.15-8.45

Code : U-Undisturbed sample, D – Disturbed Sample, L – Large Diameter, C – Core W-Water Sample, P-Penetration. Test, V – Vane Shear Test

No. of disturbed Sample : NIL No. of UDS : NIL No. of Vane Test : NIL
No. of Large Diameter Sample : NIL No. of S.P.T. : Seven(07) No. of Water Sample : NIL

ACHARYA ASSOCIATES SILIGURI

Table-9

BORE LOG DATA SHEET

TYPE OF BORING	DIA OF BORE	TYPE OF DRILLING
SHELL & AUGER	150 MM	BMD
TERMINATION DEPTH	8.00 M	
COMMENCED ON : 30/06/2021	COMPLETED ON : 30/06/2021	
GROUND WATER LEVEL	2m down from G.L.	

BORE HOLE NO. 9	
GROUND/ BED RL	The spot is same as road level.
LOCATION	
Shivmandir, P.S.- Matigara, Dist. Darjeeling, G.P.- Atharakhai	

DESCRIPTION OF STRATA	LEGEND	FROM	TO	Thickness	N	SAMPLES		DEPTH
		m	m	m	Value	Type	Ref. No.	m
Silty,fine,medium & coarse sand with grey in colour.		2.00	2.45	0.45	18	P	P-I/1	2.15-2.45
DO		3.00	3.45	0.45	41	P	P-I/2	3.15-3.45
DO		4.00	4.45	0.45	49	P	P-I/3	4.15-4.45
Silty,fine,medium & coarse sand with grey in colour.		5.00	5.45	0.45	51	P	P-I/4	5.15-5.45
DO		6.00	6.45	0.45	R	P	P-I/5	6.15-6.45
DO		7.00	7.45	0.45	R	P	P-I/6	7.15-7.45
DO		8.00	8.45	0.45	R	P	P-I/7	8.15-8.45

Code : U-Undisturbed sample, D – Disturbed Sample, L – Large Diameter, C – Core W-Water Sample, P-Penetration. Test, V – Vane Shear Test

No. of disturbed Sample : NIL No. of UDS : NIL No. of Vane Test : NIL
No. of Large Diameter Sample : NIL No. of S.P.T. : Seven(07) No. of Water Sample : NIL

ACHARYA ASSOCIATES SILIGURI

Table-10

BORE LOG DATA SHEET

TYPE OF BORING	DIA OF BORE	TYPE OF DRILLING
SHELL & AUGER	150 MM	BMD
TERMINATION DEPTH	8.00 M	
COMMENCED ON : 01/07/2021	COMPLETED ON : 01/07/2021	
GROUND WATER LEVEL	2m down from G.L.	

BORE HOLE NO. 10	
GROUND/ BED RL	The spot is same as road level.
LOCATION	
Shivmandir, P.S.- Matigara, Dist. Darjeeling, G.P.- Atharakhai	

DESCRIPTION OF STRATA	LEGEND	FROM	TO	Thickness	N	SAMPLES		DEPTH
		m	m	m	Value	Type	Ref. No.	m
Silty,fine,medium & coarse sand with grey in colour.		2.00	2.45	0.45	16	P	P-I/1	2.15-2.45
DO		3.00	3.45	0.45	13	P	P-I/2	3.15-3.45
DO		4.00	4.45	0.45	6	P	P-I/3	4.15-4.45
Silty,fine,medium & coarse sand with grey in colour.		5.00	5.45	0.45	31	P	P-I/4	5.15-5.45
DO		6.00	6.45	0.45	56	P	P-I/5	6.15-6.45
DO		7.00	7.45	0.45	R	P	P-I/6	7.15-7.45
DO		8.00	8.45	0.45	R	P	P-I/7	8.15-8.45

Code : U-Undisturbed sample, D – Disturbed Sample, L – Large Diameter, C – Core W-Water Sample, P-Penetration. Test, V – Vane Shear Test

No. of disturbed Sample : NIL No. of UDS : NIL No. of Vane Test : NIL
No. of Large Diameter Sample : NIL No. of S.P.T. : Seven(07) No. of Water Sample : NIL

ACHARYA ASSOCIATES SILIGURI

Table-11

BORE LOG DATA SHEET

TYPE OF BORING	DIA OF BORE	TYPE OF DRILLING
SHELL & AUGER	150 MM	BMD
TERMINATION DEPTH	8.00 M	
COMMENCED ON : 01/07/2021	COMPLETED ON : 01/07/2021	
GROUND WATER LEVEL	2m down from G.L.	

BORE HOLE NO. 11	
GROUND/ BED RL	The spot is same as road level.
LOCATION	
Shivmandir, P.S.- Matigara, Dist. Darjeeling, G.P.- Atharakhai	

DESCRIPTION OF STRATA	LEGEND	FROM	TO	Thickness	N	SAMPLES		DEPTH
		m	m	m	Value	Type	Ref. No.	m
Silty,fine,medium & coarse sand with grey in colour.		2.00	2.45	0.45	14	P	P-I/1	2.15-2.45
DO		3.00	3.45	0.45	10	P	P-I/2	3.15-3.45
DO		4.00	4.45	0.45	14	P	P-I/3	4.15-4.45
Silty,fine,medium & coarse sand with grey in colour.		5.00	5.45	0.45	33	P	P-I/4	5.15-5.45
DO		6.00	6.45	0.45	R	P	P-I/5	6.15-6.45
DO		7.00	7.45	0.45	R	P	P-I/6	7.15-7.45
DO		8.00	8.45	0.45	R	P	P-I/7	8.15-8.45

Code : U-Undisturbed sample, D – Disturbed Sample, L – Large Diameter, C – Core W-Water Sample, P-Penetration. Test, V – Vane Shear Test

No. of disturbed Sample : NIL No. of UDS : NIL No. of Vane Test : NIL
No. of Large Diameter Sample : NIL No. of S.P.T. : Seven(07) No. of Water Sample : NIL

ACHARYA ASSOCIATES SILIGURI

Table-12

BORE LOG DATA SHEET

TYPE OF BORING	DIA OF BORE	TYPE OF DRILLING
SHELL & AUGER	150 MM	BMD
TERMINATION DEPTH	8.00 M	
COMMENCED ON : 01/07/2021	COMPLETED ON : 01/07/2021	
GROUND WATER LEVEL	2m down from G.L.	

BORE HOLE NO. 12	
GROUND/ BED RL	The spot is same as road level.
LOCATION	
Shivmandir, P.S.- Matigara, Dist. Darjeeling, G.P.- Atharakhai	

DESCRIPTION OF STRATA	LEGEND	FROM	TO	Thickness	N	SAMPLES		DEPTH
		m	m	m	Value	Type	Ref. No.	m
Silty,fine,medium & coarse sand with grey in colour.		2.00	2.45	0.45	16	P	P-I/1	2.15-2.45
DO		3.00	3.45	0.45	22	P	P-I/2	3.15-3.45
DO		4.00	4.45	0.45	14	P	P-I/3	4.15-4.45
Silty,fine,medium & coarse sand with grey in colour.		5.00	5.45	0.45	35	P	P-I/4	5.15-5.45
DO		6.00	6.45	0.45	R	P	P-I/5	6.15-6.45
DO		7.00	7.45	0.45	R	P	P-I/6	7.15-7.45
DO		8.00	8.45	0.45	R	P	P-I/7	8.15-8.45

Code : U-Undisturbed sample, D – Disturbed Sample, L – Large Diameter, C – Core W-Water Sample, P-Penetration. Test, V – Vane Shear Test

No. of disturbed Sample : NIL No. of UDS : NIL No. of Vane Test : NIL
No. of Large Diameter Sample : NIL No. of S.P.T. : Seven(07) No. of Water Sample : NIL

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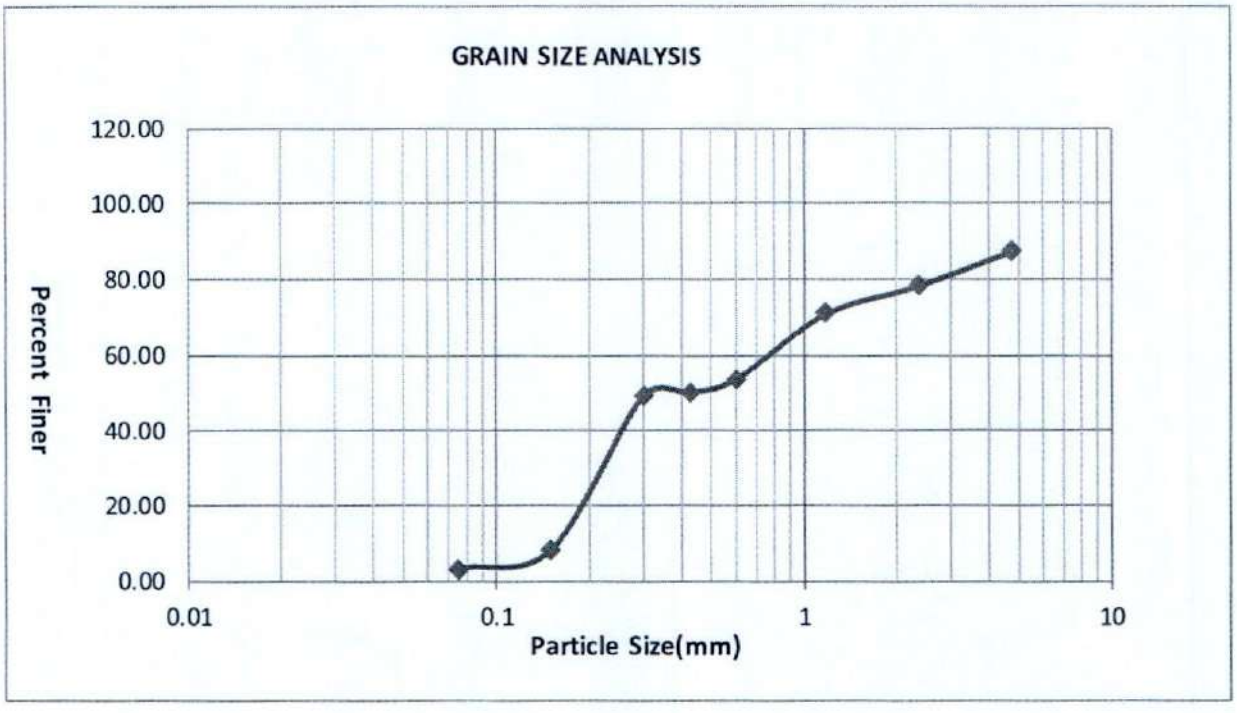
GRAIN SIZE ANALYSIS OF BORE HOLE 1 AT DEPTH 3 M

Total wt of sample = 142 gm

Sieve size	Wt. of Sieve	Wt.of Sieve + soil	Wt. of soil	Percent retained	Cumulative retained	Percent finer
mm	gm	gm	gm	(%)	(%)	(%)
4.75	424.2	442.2	18	12.68	12.68	87.32
2.36	377.8	390.8	13	9.15	21.83	78.17
1.18	342	352.4	10.4	7.32	29.15	70.85
0.6	363.8	388.2	24.4	17.18	46.34	53.66
0.425	321.4	326.4	5	3.52	49.86	50.14
0.3	345.6	347	1.4	0.99	50.85	49.15
0.15	346.2	404.6	58.4	41.13	91.97	8.03
0.075	338	345	7	4.93	96.90	3.10
PAN			4.4			



CLAY %	SILT %	SAND %			GRAVEL %
		FINE %	MEDIUM %	COARSE %	
0	3.10	47.04	28.03	9.15	12.68

100

Uniformity Co-efficient(Cu)	=	D60/D10	5.18
Co-efficient of Curvature(Cc)	=	(D30)2/(D60*D10)	0.41

SOIL IS POORLY GRADED SANDY SOIL

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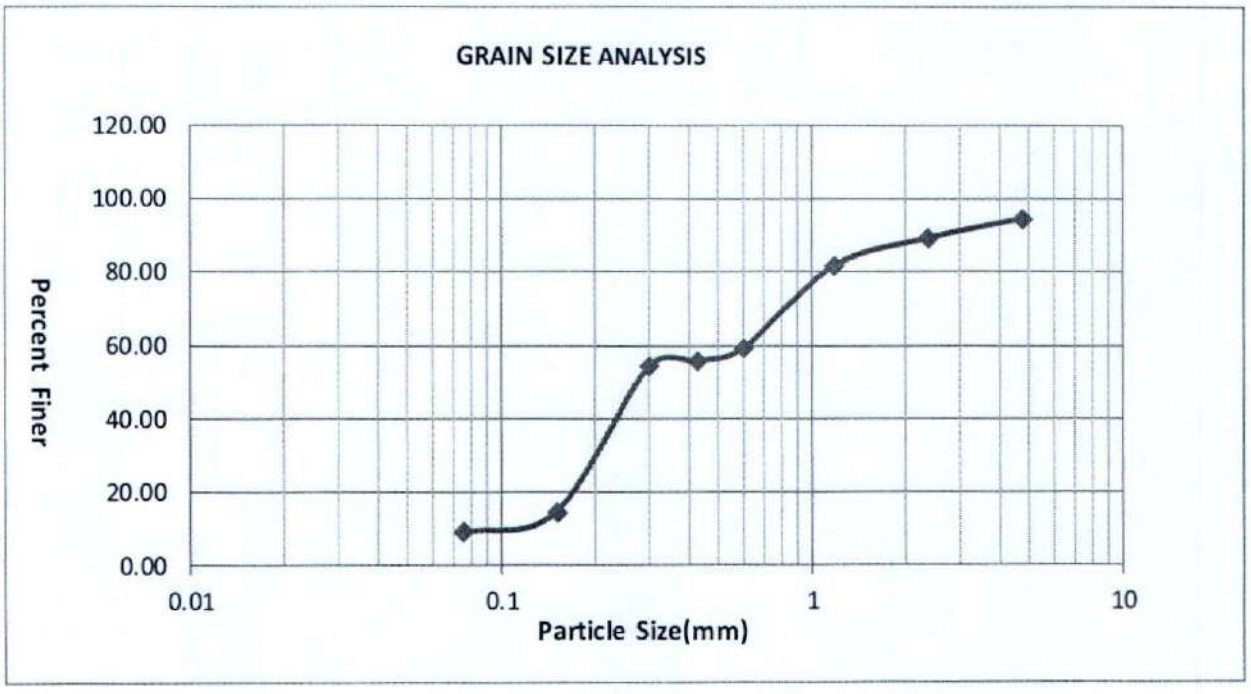
GRAIN SIZE ANALYSIS OF BORE HOLE 2 AT DEPTH 3 M

Total wt of sample 125.4 gm

Sieve size	Wt. of Sieve	Wt.of Sieve + soil	Wt. of soil	Percent retained	Cumulative percent retained	Percent finer
mm	gm	gm	gm	(%)	(%)	(%)
4.75	424.2	431.4	7.2	5.74	5.74	94.26
2.36	377.8	384.4	6.6	5.26	11.00	89.00
1.18	342	351.4	9.4	7.50	18.50	81.50
0.6	363.8	391.8	28	22.33	40.83	59.17
0.425	321.4	325.8	4.4	3.51	44.34	55.66
0.3	345.6	347.4	1.8	1.44	45.77	54.23
0.15	346.2	396.2	50	39.87	85.65	14.35
0.075	338	345	7	5.58	91.23	8.77
PAN			11	8.77		



CLAY %	SILT %	SAND %			GRAVEL %
		FINE %	MEDIUM %	COARSE %	
0	8.77	46.89	33.33	5.26	5.74

100

Uniformity Co-efficient(Cu)	=D60/D10 D60/D10	6.79
Co-efficient of Curvature(Cc)	= (D30)2/(D60*D10)	0.77

SOIL IS POORLY GRADED SANDY SOIL

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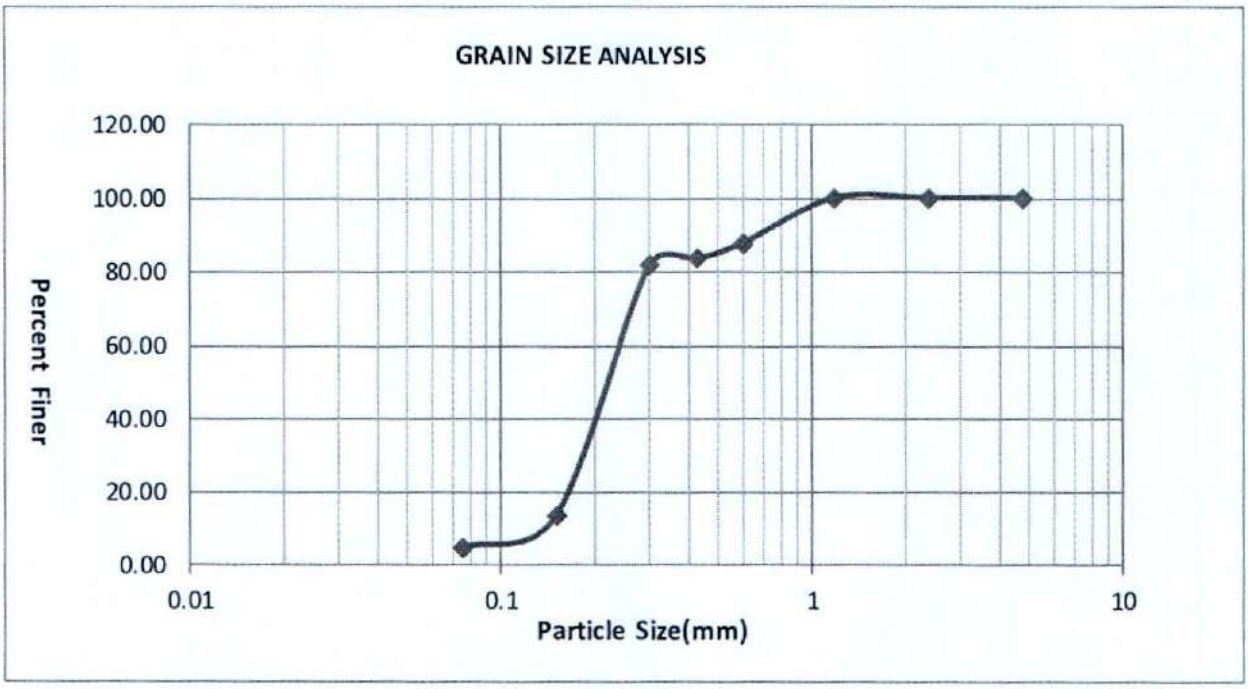
GRAIN SIZE ANALYSIS OF BORE HOLE 3 AT DEPTH 3 M

Total wt of sample 142 gm

Sieve size	Wt. of Sieve	Wt.of Sieve + soil	Wt. of soil	Percent retained	Cumulative percent retained	Percent finer
mm	gm	gm	gm	(%)	(%)	(%)
4.75	424.2	424.2	0	0.00	0.00	100.00
2.36	377.8	377.8	0	0.00	0.00	100.00
1.18	342	342	0	0.00	0.00	100.00
0.6	363.8	381.2	17.4	12.25	12.25	87.75
0.425	321.4	327.6	6.2	4.37	16.62	83.38
0.3	345.6	348	2.4	1.69	18.31	81.69
0.15	346.2	443.4	97.2	68.45	86.76	13.24
0.075	338	350	12	8.45	95.21	4.79
PAN			6.8	4.79		



CLAY %	SILT %	SAND %			GRAVEL %
		FINE %	MEDIUM %	COARSE %	
0	4.79	78.59	16.62	0.00	0.00

100

Uniformity Co-efficient(Cu)	=D60/D10	D60/D10	2.08
Co-efficient of Curvature(Cc)	=	(D30)2/(D60*D10)	1.14

SOIL IS POORLY GRADED SANDY SOIL

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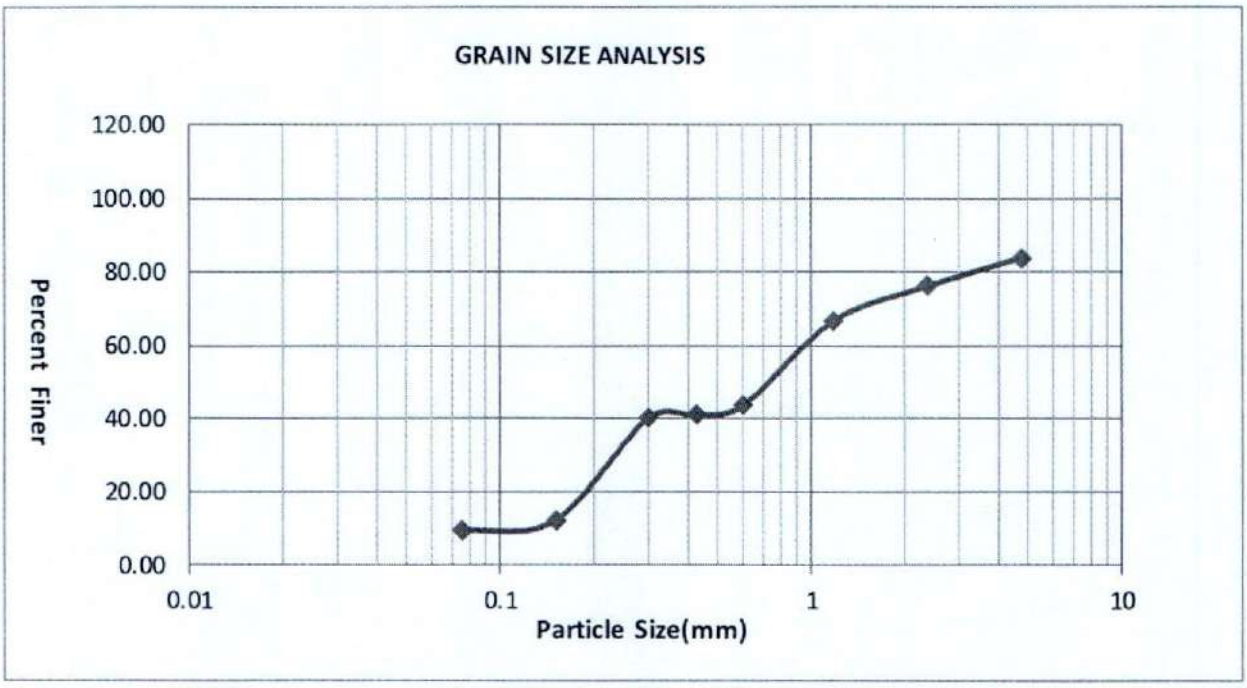
GRAIN SIZE ANALYSIS OF BORE HOLE 4 AT DEPTH 3 M

Total wt of sample 129.4 gm

Sieve size	Wt. of Sieve	Wt.of Sieve + soil	Wt. of soil	Percent retained	Cumulative percent retained	Percent finer
mm	gm	gm	gm	(%)	(%)	(%)
4.75	424.2	445.2	21	16.23	16.23	83.77
2.36	377.8	387.8	10	7.73	23.96	76.04
1.18	342	354.2	12.2	9.43	33.38	66.62
0.6	363.8	393.8	30	23.18	56.57	43.43
0.425	321.4	324.8	3.4	2.63	59.20	40.80
0.3	345.6	346.6	1	0.77	59.97	40.03
0.15	346.2	382.4	36.2	27.98	87.94	12.06
0.075	338	341.6	3.6	2.78	90.73	9.27
PAN			12	9.27		



CLAY %	SILT %	SAND %			GRAVEL %
		FINE %	MEDIUM %	COARSE %	
0	9.27	31.53	35.24	7.73	16.23

100

Uniformity Co-efficient(Cu)	=D60/D10	D60/D10	10.73
Co-efficient of Curvature(Cc)	=	(D30)2/(D60*D10)	0.63

SOIL IS POORLY GRADED SANDY SOIL

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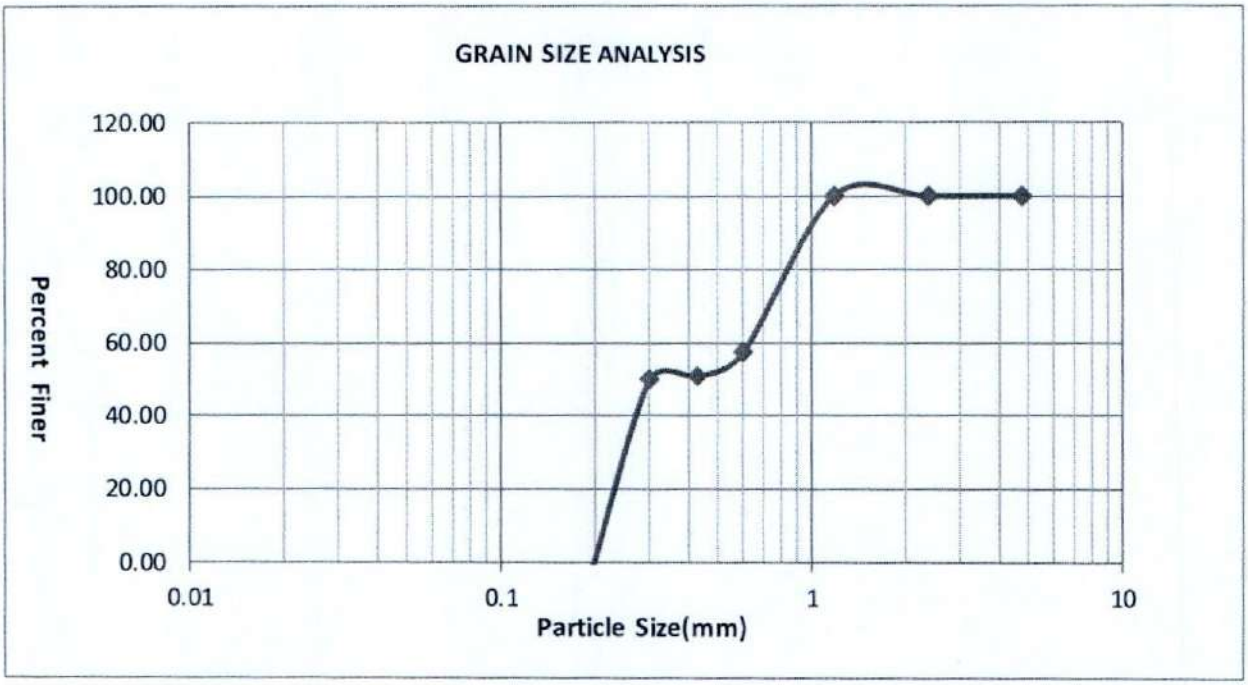
GRAIN SIZE ANALYSIS OF BORE HOLE 5 AT DEPTH 3 M

Total wt of sample 142 gm

Sieve size	Wt. of Sieve	Wt.of Sieve + soil	Wt. of soil	Percent retained	Cumulative percent retained	Percent finer
mm	gm	gm	gm	(%)	(%)	(%)
4.75	424.2	424.2	0	0.00	0.00	100.00
2.36	377.8	377.8	0	0.00	0.00	100.00
1.18	342	342	0	0.00	0.00	100.00
0.6	363.8	424.6	60.8	42.82	42.82	57.18
0.425	321.4	330.6	9.2	6.48	49.30	50.70
0.3	345.6	347.2	1.6	1.13	50.42	49.58
0.15	346.2	457	110.8	78.03	128.45	-28.45
0.075	338	350.8	12.8	9.01	137.46	-37.46
PAN			-53.2	-37.46		



CLAY %	SILT %	SAND %			GRAVEL %
		FINE %	MEDIUM %	COARSE %	
0	-37.46	88.17	49.30	0.00	0.00

100

Uniformity Co-efficient(Cu)	=D60/D10	D60/D10	2.85
Co-efficient of Curvature(Cc)	=	(D30)2/(D60*D10)	0.48

SOIL IS POORLY GRADED SANDY SOIL

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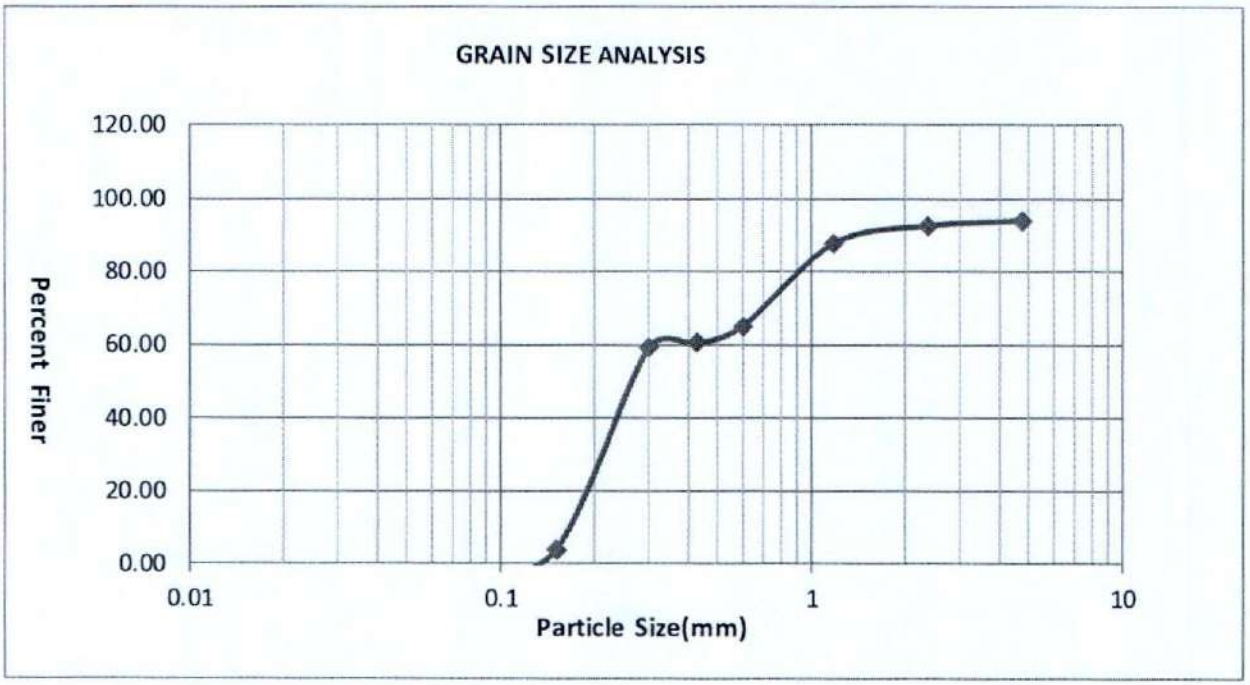
GRAIN SIZE ANALYSIS OF BORE HOLE 6 AT DEPTH 3M

Total wt of sample 129.4 gm

Sieve size	Wt. of Sieve	Wt.of Sieve + soil	Wt. of soil	Percent retained	Cumulative percent retained	Percent finer
mm	gm	gm	gm	(%)	(%)	(%)
4.75	424.2	432.2	8	6.18	6.18	93.82
2.36	377.8	379.6	1.8	1.39	7.57	92.43
1.18	342	348.2	6.2	4.79	12.36	87.64
0.6	363.8	393.2	29.4	22.72	35.09	64.91
0.425	321.4	327.6	6.2	4.79	39.88	60.12
0.3	345.6	347.2	1.6	1.24	41.11	58.89
0.15	346.2	417.6	71.4	55.18	96.29	3.71
0.075	338	347.6	9.6	7.42	103.71	-3.71
PAN			-4.8	-3.71		



CLAY %	SILT %	SAND %			GRAVEL %
		FINE %	MEDIUM %	COARSE %	
0	-3.71	63.83	32.30	1.39	6.18

100

Uniformity Co-efficient(Cu)	=D60/D10	D60/D10	2.47
Co-efficient of Curvature(Cc)	=	(D30)2/(D60*D10)	0.71

SOIL IS POORLY GRADED SANDY SOIL

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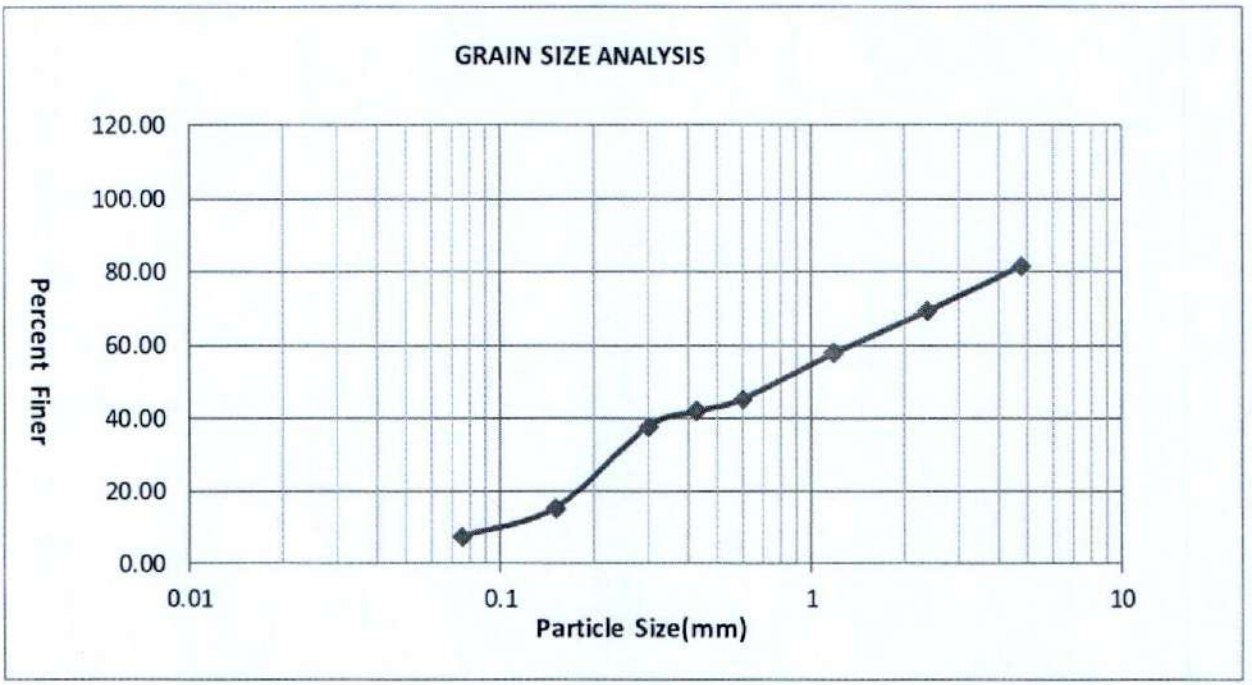
GRAIN SIZE ANALYSIS OF BORE HOLE 7 AT DEPTH 3 M

Total wt of sample 139 gm

Sieve size	Wt. of Sieve	Wt.of Sieve + soil	Wt. of soil	Percent retained	Cumulative percent retained	Percent finer
mm	gm	gm	gm	(%)	(%)	(%)
4.75	424.2	450	25.8	18.56	18.56	81.44
2.36	377.8	395	17.2	12.37	30.94	69.06
1.18	342	358	16	11.51	42.45	57.55
0.6	363.8	381	17.2	12.37	54.82	45.18
0.425	321.4	326.2	4.8	3.45	58.27	41.73
0.3	345.6	351.2	5.6	4.03	62.30	37.70
0.15	346.2	377.4	31.2	22.45	84.75	15.25
0.075	338	349	11	7.91	92.66	7.34
PAN			10.2	7.34		



CLAY %	SILT %	SAND %			GRAVEL %
		FINE %	MEDIUM %	COARSE %	
0	7.34	34.39	27.34	12.37	18.56

100

Uniformity Co-efficient(Cu)	=D60/D10	D60/D10	14.28
Co-efficient of Curvature(Cc)	=	(D30)2/(D60*D10)	0.43

SOIL IS POORLY GRADED SANDY SOIL

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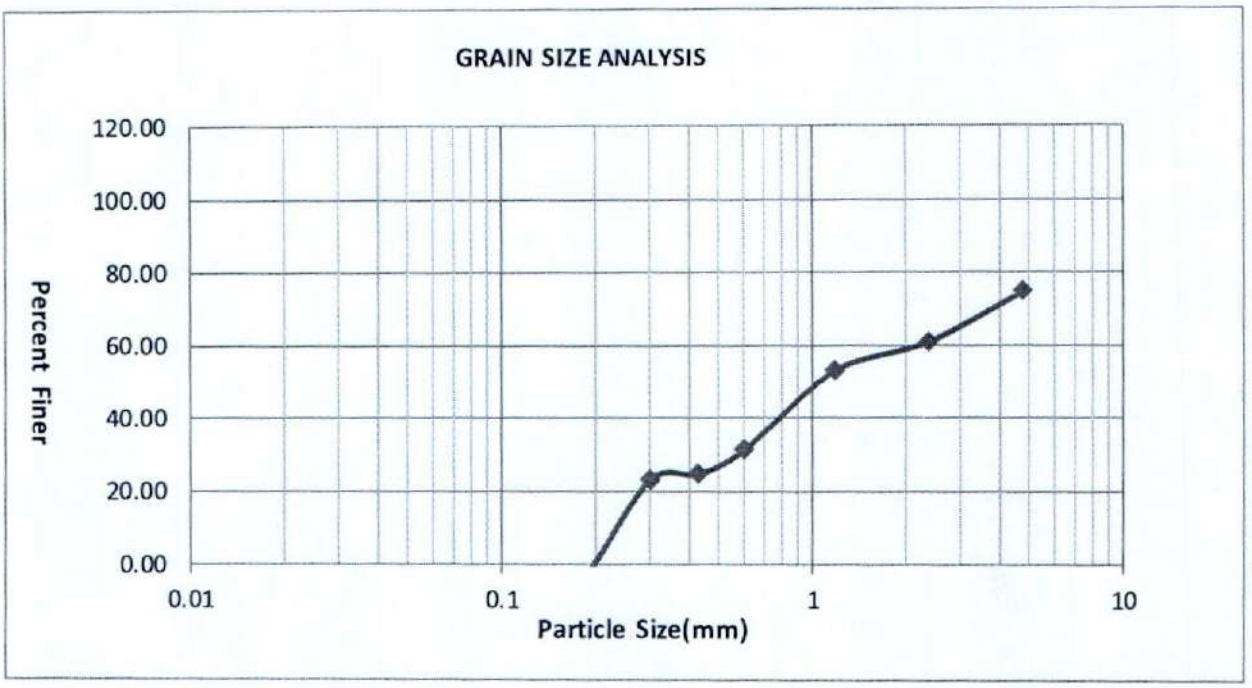
GRAIN SIZE ANALYSIS OF BORE HOLE 8 AT DEPTH 3 M

Total wt of sample 129.4 gm

Sieve size	Wt. of Sieve	Wt.of Sieve + soil	Wt. of soil	Percent retained	Cumulative percent retained	Percent finer
mm	gm	gm	gm	(%)	(%)	(%)
4.75	424.2	456.8	32.6	25.19	25.19	74.81
2.36	377.8	395.8	18	13.91	39.10	60.90
1.18	342	352.2	10.2	7.88	46.99	53.01
0.6	363.8	392	28.2	21.79	68.78	31.22
0.425	321.4	330	8.6	6.65	75.43	24.57
0.3	345.6	347.6	2	1.55	76.97	23.03
0.15	346.2	392.4	46.2	35.70	112.67	-12.67
0.075	338	343.2	5.2	4.02	116.69	-16.69
PAN			-21.6	-16.69		



CLAY %	SILT %	SAND %			GRAVEL %
		FINE %	MEDIUM %	COARSE %	
0	-16.69	41.27	36.32	13.91	25.19

100

Uniformity Co-efficient(Cu) =D60/D10	D60/D10	9.08
Co-efficient of Curvature(Cc) =	(D30)2/(D60*D10)	0.59
SOIL IS POORLY GRADED SANDY SOIL		

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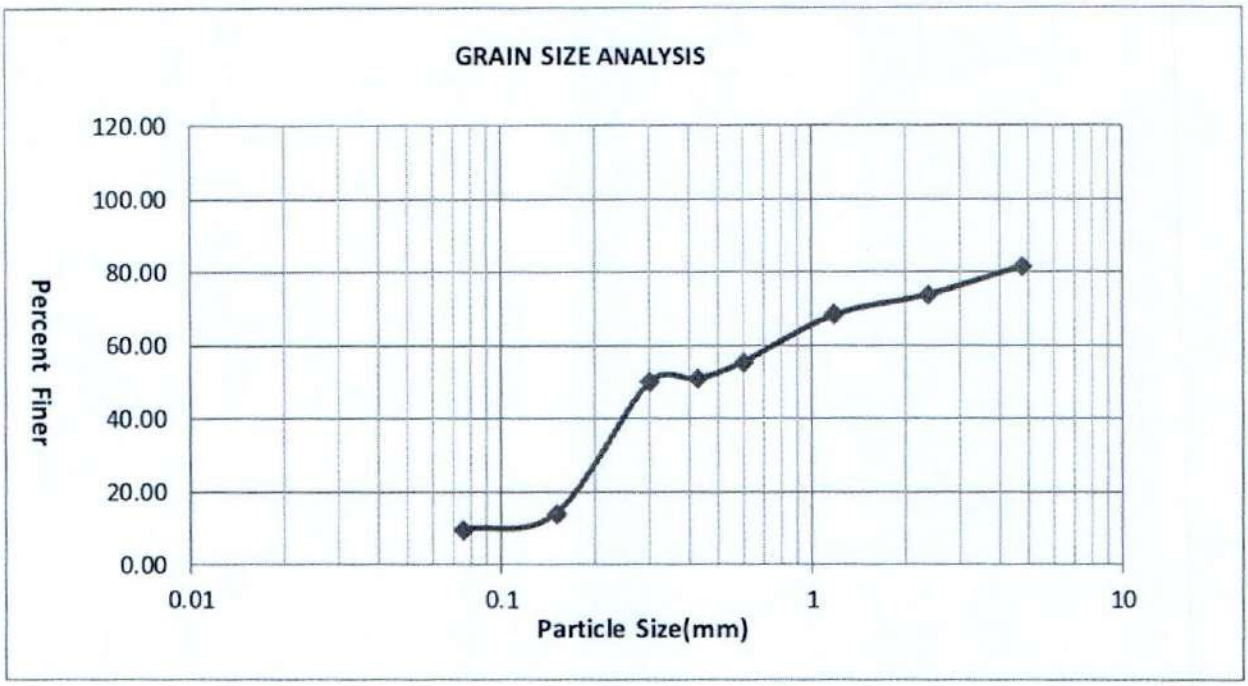
GRAIN SIZE ANALYSIS OF BORE HOLE 9 AT DEPTH 3 M

Total wt of sample 142 gm

Sieve size	Wt. of Sieve	Wt.of Sieve + soil	Wt. of soil	Percent retained	Cumulative percent retained	Percent finer
mm	gm	gm	gm	(%)	(%)	(%)
4.75	424.2	450.6	26.4	18.59	18.59	81.41
2.36	377.8	389	11.2	7.89	26.48	73.52
1.18	342	349.8	7.8	5.49	31.97	68.03
0.6	363.8	382	18.2	12.82	44.79	55.21
0.425	321.4	328	6.6	4.65	49.44	50.56
0.3	345.6	346.8	1.2	0.85	50.28	49.72
0.15	346.2	397	50.8	35.77	86.06	13.94
0.075	338	344.2	6.2	4.37	90.42	9.58
PAN			13.6	9.58		



CLAY %	SILT %	SAND %			GRAVEL %
		FINE %	MEDIUM %	COARSE %	
0	9.58	40.99	22.96	7.89	18.59

100

Uniformity Co-efficient(Cu)	=D60/D10 D60/D10	9.93
Co-efficient of Curvature(Cc)	= (D30)2/(D60*D10)	0.70

SOIL IS POORLY GRADED SANDY SOIL

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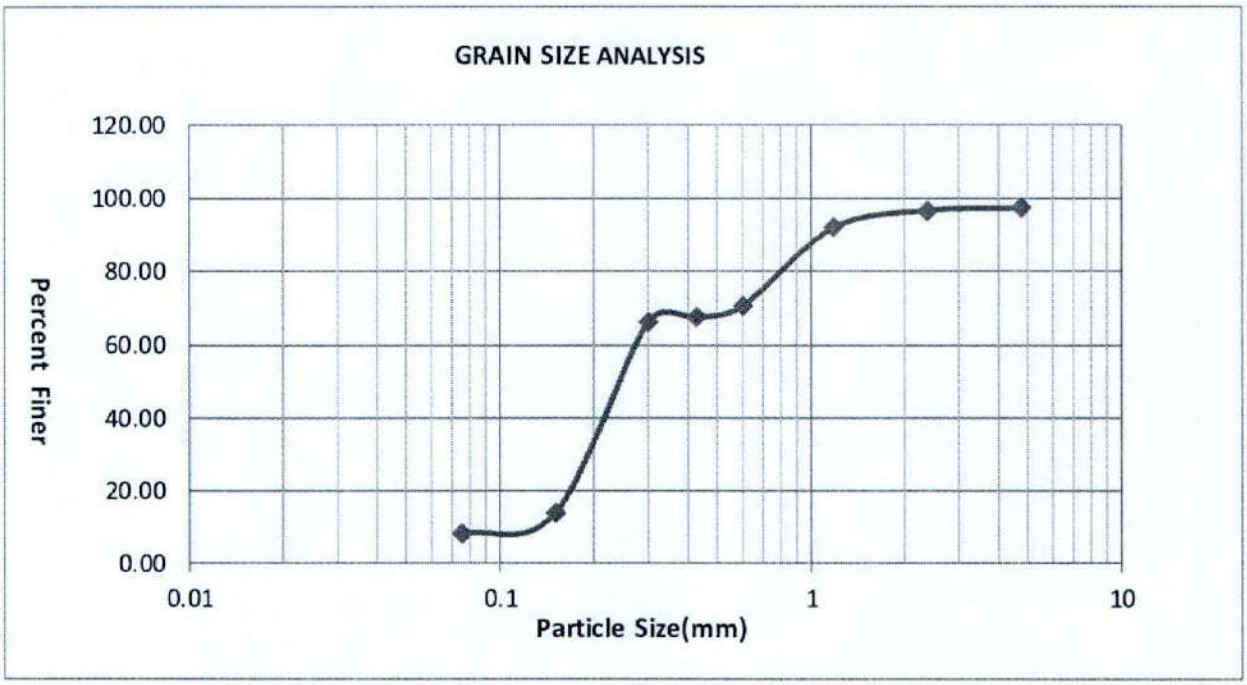
GRAIN SIZE ANALYSIS OF BORE HOLE 8 AT DEPTH 3 M

Total wt of sample 128 gm

Sieve size	Wt. of Sieve	Wt.of Sieve + soil	Wt. of soil	Percent retained	Cumulative percent retained	Percent finer
mm	gm	gm	gm	(%)	(%)	(%)
4.75	424.2	428	3.8	2.97	2.97	97.03
2.36	377.8	378.6	0.8	0.63	3.59	96.41
1.18	342	348	6	4.69	8.28	91.72
0.6	363.8	391	27.2	21.25	29.53	70.47
0.425	321.4	325.4	4	3.13	32.66	67.34
0.3	345.6	347	1.4	1.09	33.75	66.25
0.15	346.2	413.4	67.2	52.50	86.25	13.75
0.075	338	345	7	5.47	91.72	8.28
PAN			10.6	8.28		



CLAY %	SILT %	SAND %			GRAVEL %
		FINE %	MEDIUM %	COARSE %	
0	8.28	59.06	29.06	0.63	2.97

100

Uniformity Co-efficient(Cu)	=D60/D10	D60/D10	2.86
Co-efficient of Curvature(Cc)	=	(D30)2/(D60*D10)	1.39

SOIL IS POORLY GRADED SANDY SOIL

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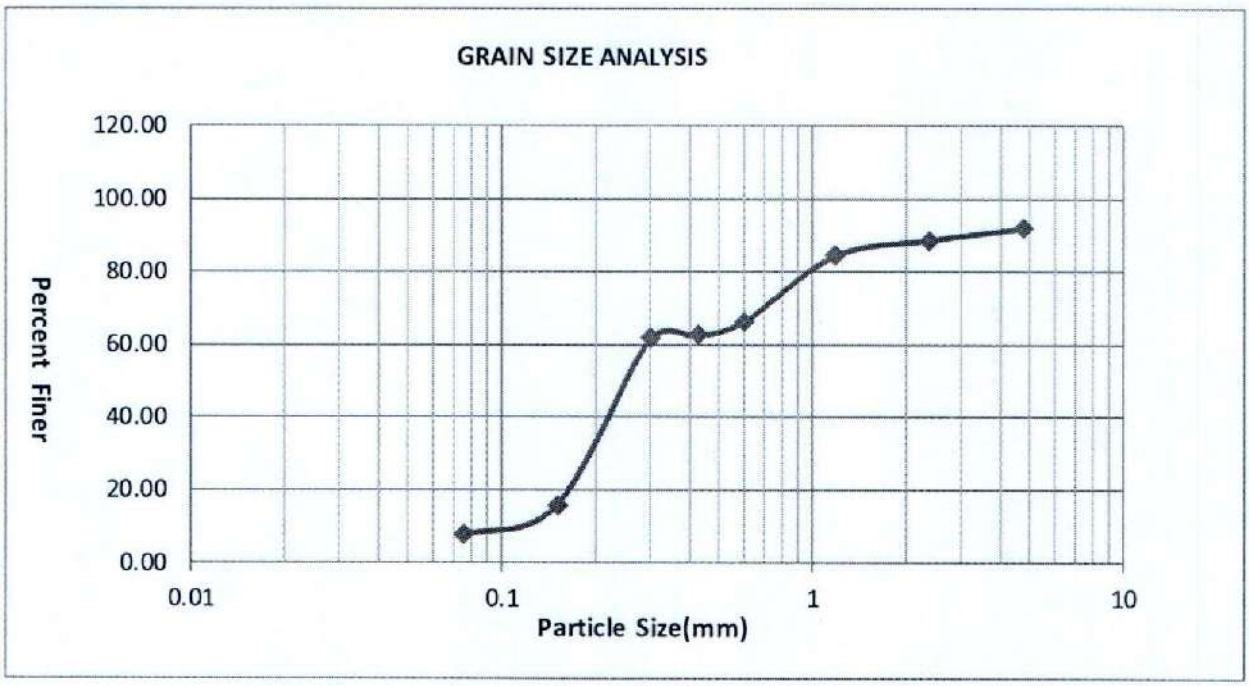
GRAIN SIZE ANALYSIS OF BORE HOLE 8 AT DEPTH 3 M

Total wt of sample 135 gm

Sieve size	Wt. of Sieve	Wt.of Sieve + soil	Wt. of soil	Percent retained	Cumulative percent retained	Percent finer
mm	gm	gm	gm	(%)	(%)	(%)
4.75	424.2	435.2	11	8.15	8.15	91.85
2.36	377.8	382.2	4.4	3.26	11.41	88.59
1.18	342	347.6	5.6	4.15	15.56	84.44
0.6	363.8	388.4	24.6	18.22	33.78	66.22
0.425	321.4	326.6	5.2	3.85	37.63	62.37
0.3	345.6	346.8	1.2	0.89	38.52	61.48
0.15	346.2	408	61.8	45.78	84.30	15.70
0.075	338	349	11	8.15	92.44	7.56
PAN			10.2	7.56		



CLAY %	SILT %	SAND %			GRAVEL %
		FINE %	MEDIUM %	COARSE %	
0	7.56	54.81	26.22	3.26	8.15

100

Uniformity Co-efficient(Cu)	=D60/D10	D60/D10	3.03
Co-efficient of Curvature(Cc)	=	(D30)2/(D60*D10)	1.35

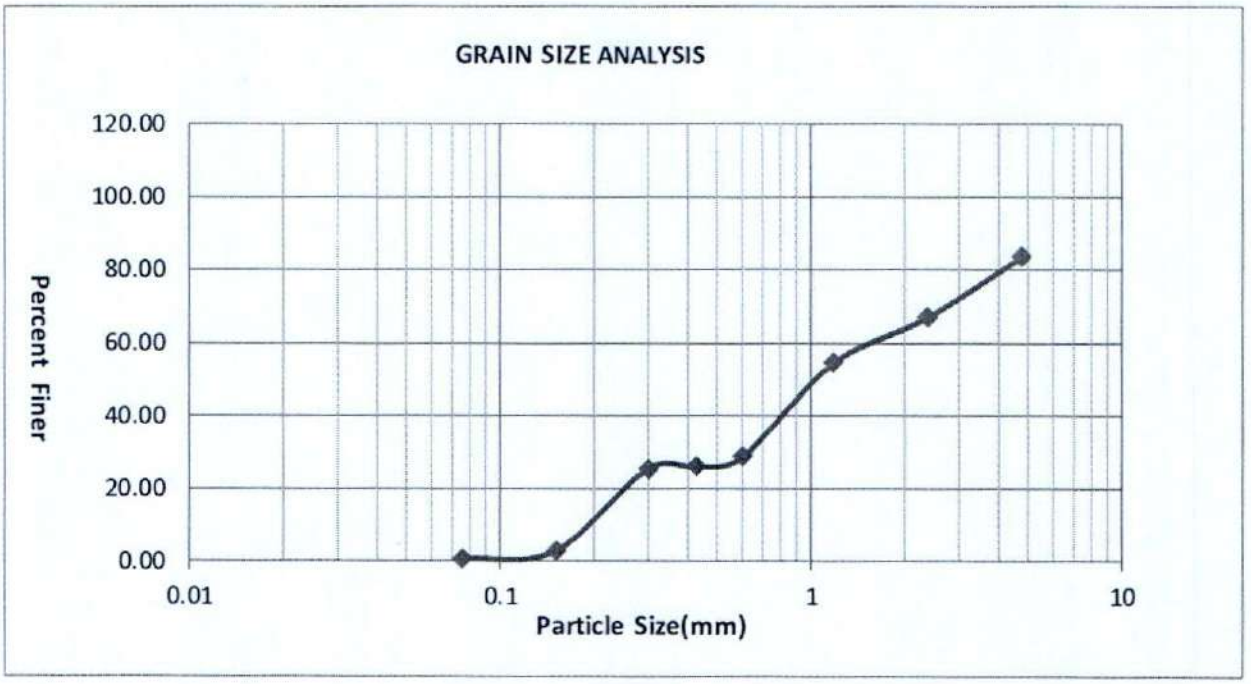
SOIL IS POORLY GRADED SANDY SOIL

ACHARYA ASSOCIATES SILIGURI

GRAIN SIZE ANALYSIS OF BORE HOLE 12 AT DEPTH 3 M

Total wt of sample 155 gm

Sieve size	Wt. of Sieve	Wt.of Sieve + soil	Wt. of soil	Percent retained	Cumulative percent retained	Percent finer
mm	gm	gm	gm	(%)	(%)	(%)
4.75	424.2	449.8	25.6	16.52	16.52	83.48
2.36	377.8	403.6	25.8	16.65	33.16	66.84
1.18	342	361.2	19.2	12.39	45.55	54.45
0.6	363.8	404	40.2	25.94	71.48	28.52
0.425	321.4	325.4	4	2.58	74.06	25.94
0.3	345.6	346.4	0.8	0.52	74.58	25.42
0.15	346.2	381.4	35.2	22.71	97.29	2.71
0.075	338	341.2	3.2	2.06	99.35	0.65
PAN			1	0.65		



CLAY %	SILT %	SAND %			GRAVEL %
		FINE %	MEDIUM %	COARSE %	
0	0.65	25.29	40.90	16.65	16.52

100

Uniformity Co-efficient(Cu)	=D60/D10	D60/D10	8.62
Co-efficient of Curvature(Cc)	=	(D30)2/(D60*D10)	1.18

SOIL IS WELL GRADED SANDY SOIL

ACHARYA ASSOCIATES SILIGURI

Table-13

ESTIMATED PHYSICAL PROPERTIES OF SOIL			
Depth	2	3	4
Bulk Density, γ_{bulk}(t/m^3)	1.92	1.92	1.92
NatUral Moisture content,w(%)	36.92	36.92	36.92
Natural dry density,γ_{dry}(t/m^3)	1.40	1.40	1.40
Specific Gravity,G	2.64	2.64	2.64
Void Ratio, e	0.88	0.88	0.88
Saturated density,γsat(t/m3)	1.87	1.87	1.87
Submerged Density γsub(t/m3)	0.87	0.87	0.87
Angle of Internal Friction(Ø)	29.50	29.20	30.67
Angle of Internal Friction(Ø')	20.76	20.53	21.67

ACHARYA ASSOCIATES SILIGURI

Table-14

SPT(N) VALUE CORRECTION							
Depth(M)	Ybulk (gm /cc)	EOP	(C_n).	N	N'	N"	Design N Value
2	1.92	0.384	1.32	5	6.58	6.58	7.50
3	1.92	0.576	1.17	4	4.68	4.68	6.00
4	1.92	0.768	1.09	8	8.74	8.74	12.00
5	1.92	0.96	1.02	30	30.48	22.74	22.67
6	1.92	1.152	0.96	33	31.80	23.40	16.98
7	1.92	1.344	0.92	33	30.28	22.64	14.85
8	1.92	1.536	0.87	33	28.80	21.90	10.95
9	1.92	1.728	0.83	0	0.00	0.00	0.00

N = Field N Value(Minimum of all bore holes)

N' = N Value after overburden correction

N" = N Value after Dilatancy correction

EOP = Effective overburden pressure

C_n = Overburden correction

ACHARYA ASSOCIATES SILIGURI

Table-15

Calculation of Net Safe Bearing Capacity as per IS-6403:1981,Based on *General Shear Failure* with Ø determined from Design 'N' value, derived from corrected field N value as per IS- 2131:1981.						
Width (B in metre)	6	6	6	6	6	6
Submerged Density of Soil(t/m3)	0.87	0.87	0.87	0.87	0.87	0.87
Saturated Density of Soil(t/m3)	1.87	1.87	1.87	1.87	1.87	1.87
Depth(D in metre)	2	2	2	3	3	3
Surcharge (q in t/ m2)	1.74	1.74	1.7422	2.61	2.61	2.61
Ø(degree)	29.50	29.50	29.50	29.20	29.20	29.20
Water table correction(w^l)	0.5	0.5	0.5	0.5	0.5	0.5
Shape factors						
sq	1.2	1.2	1.2	1.2	1.2	1.2
s_γ	0.8	0.8	0.8	0.8	0.8	0.8
Depth factors						
d_q	1.06	1.06	1.06	1.09	1.09	1.09
d_γ	1.06	1.06	1.06	1.09	1.09	1.09
Inclination factors						
i_q	1	1	1	1	1	1
i_γ	1	1	1	1	1	1
Bearing capacity factors						
N_q	17.63	17.63	17.63	17.16	17.16	17.16
N_γ	21.25	21.25	21.25	20.56	20.56	20.56
$q.(N_q - 1).s_q.d_q.i_q$ (t/m2)	36.85	36.85	36.85	55.24	55.24	55.24
$0.5.B.\gamma_{sub}.N_\gamma.s_\gamma.d_\gamma.i_\gamma.w^l$ (t/m^2)	50.57	50.57	50.571	50.31	50.31	50.311
Ultimate net bearing capacity(t/m^2)	87.42	87.42	87.416	105.56	105.56	105.56
Factor of safety	3	3	3	3	3	3
Net safe bearing Capacity(t/m^2)	29.14	29.14	29.139	35.19	35.19	35.185

ACHARYA ASSOCIATES SILIGURI

Table-16

Calculation of Net Safe Bearing Capacity as per IS-6403:1981,Based on *Local Shear Failure* with Ø' determined from Design 'N' value, derived from corrected field N value as per IS- 2131:1981.						
Width (B in metre)	6	6	6	6	6	6
Submerged Density of Soil(t/m3)	0.87	0.87	0.87	0.87	0.87	0.87
Saturated Density of Soil(t/m3)	1.87	1.87	1.87	1.87	1.87	1.87
Depth(D in metre)	2	2	2	3	3	3
Surcharge (q in t/ m2)	1.74	1.7422	1.7422	2.61	2.61	2.6133
Ø'(degree)	20.76	20.76	20.76	20.53	20.53	20.53
Water table correction(w^1)	0.5	0.5	0.5	0.5	0.5	0.5
Shape factors						
sq	1.2	1.2	1.2	1.2	1.2	1.2
s_γ	0.8	0.8	0.8	0.8	0.8	0.8
Depth factors						
d_q	1.06	1.06	1.06	1.09	1.09	1.09
d_γ	1.06	1.06	1.06	1.09	1.09	1.09
Inclination factors						
i_q	1	1	1	1	1	1
i_γ	1	1	1	1	1	1
Bearing capacity factors						
N'_q	7.05	7.05	7.05	6.85	6.85	6.85
N'_γ	6.22	6.22	6.22	5.97	5.97	5.97
$q.(N'_q - 1).s_q.d_q.i_q$ (t/m2)	13.40	13.40	13.40	20.00	20.00	20.00
$0.5.B.\gamma_{sub}.N'_\gamma.s_\gamma.d_\gamma.i_\gamma.w^1$ (t/m^2)	14.81	14.81	14.815	14.61	14.61	14.612
Ultimate net bearing capacity(t/m^2)	28.22	28.22	28.217	34.61	34.61	34.609
Factor of safety	3	3	3	3	3	3
Net safe bearing Capacity(t/m^2)	9.41	9.41	9.4057	11.54	11.54	11.536

ACHARYA ASSOCIATES SILIGURI

Table-17

Summary Table of calculation of Net Safe Bearing Capacities based on Shear Failure and Settlement criteria as per Codal Provisions based on which Suggested Net Safe Bearing Capacity has been recommended.

Depth	Width (B) Metre	Length (L)	Net Safe Bearing Capacity Based on General Shear Failure (t/m^2)	Net Safe Bearing Capacity Based on Local Shear Failure (t/m^2)	Void Ratio	Net Safe Bearing Capacity Based on Void Ratio (t/m^2)	Net Safe Bearing Capacity Based on Allowable Settlement (25 to 50mm) (t/m^2)	Suggested Net Safe Bearing Capacity (t/m^2)
4 Metre Mat	6	6	51.90	16.70	0.88	16.70	18.38	**16.70**
5 Metre Mat	6	6	93.60	26.49	0.88	26.49	35.22	**26.49**

Recommendations

1. ***Above recommendations are made for Raft type footings of mentioned minimum size (6mX6m) and depth.***
2. ***All precautions as per codal provisions to be ensured by builder/ owner during excavation such that adjoining land and property is not effected.***
3. ***Setllement as per actual loading to be checked by structural engineer, to be within relevant codal permissible limits.***
4. ***PROPOSED BUILDING IS G+VII(SEVEN) STORIED RESIDENTIAL BUILDING.***

Checked By:

Prepared By:-

Er. AVIJIT GHOSH
Geotechnical Engineer, Class-1
S.M.C. Empanelment No. 1/10
Sidhan Road, Siliguri. Mob. No. 98323 75185
consultavijit@hotmail.com

ACHARYA ASSOCIATES SILIGURI

PHOTOGRAPH












Latitude & Longitude Of The Site :-

26°-42'-56.07" (N) & 88°-21'-30.13" (E)

ACHARYA ASSOCIATES SILIGURI

SILIGURI MUNICIPAL CORPORATION

P.O. SILIGURI, DIST. - DARJEELING, (W.B.) - 0353-2432804, 2435444, 2433277, 2433744

From: - Commissioner
Siliguri Municipal Corporation.

Memo no - 341 */SMC / Bldg/18-19* *Date:* 14-03-19

From: - Commissioner
Siliguri Municipal Corporation.

Memo no - 341 */SMC / Bldg/18-19* *Date:* 14-03-19

To : Acharaya Associates
35, Deshbandhu Para,
Subhash Pally,
Siliguri-734001

Sub- Enlistment Certificate for conducting of Soil investigation/testing work within Siliguri Municipal Corporation.

This is to inform you that : Acharaya Associates 35, Deshbandhu Para, Subhash Pally, Siliguri-734001has been allowed and permitted to conduct the job of soil investigation and construction material testing with Siliguri Municipal Corporation area with the terms & conditions and limits decided by the Corporation from time to time.

Terms & Conditions:

The Enlistment will be generally guided by the following Terms & Conditions :

1. The Validity of the Enlistment initially 05(Five) Years with yearly renewable as the fees decided by the Corporation.
2. The renewal fees shall be paid within last working days of March in every financial year & after the month of march, failing which fees to be paid with a fine @ Rs. 200/-(Two Hundred) only per month in additional to normal renewal fees, subject to revisions from time to time.
3. That in case renewal fee for enlistment falls due for two consecutive year (upto last working day of the second year), enlistment shall be liable to be terminated.
4. The enlistment is not transferable.
5. The fitness certificate of machineries (Testing Apparatus) to be submitted in every two years.
6. The Corporation may at any time cancelled the Enlistment during the validity of the enlistment, if the Authority is satisfied that;
   (a) The firm is adjudged insolvent or of unsound mind, or is engaged in or committed to any anti social activities.
   (b) For bad workman ship resulting of poor quality of work, failure to safe Corporation property against theft & pilferage and any other work to be considered detrimental to the Corporation's interest.
   (c) And any other activities or action or behavior against the interest of Corporation.

ACHARYA ASSOCIATES SILIGURI

7. It shall be the discretion of the Corporation Authority to include or exclude clause or clauses, rule to rules or amend any of its rule or rules from time and when necessary.

Commissioner
Siliguri Municipal Corporation

Memo No. 341 *(13)SMC/Bldg/18-19* *Dated:* 14-3-19.

Copy to:-

01. The Hon'ble Mayor, SMC, Siliguri.
02. The Hon'ble Deputy Mayor, SMC, Siliguri
03. The Commissioner of Income Tax, Siliguri,
04. The Commission · of Sales Tax, Siliguri,
05. The MMIC(Building). SMC. Siliguri.
06. The Secretary, SMC. Siliguri.
07. The Executive Engineer, SMC, Siliguri
08. The, Finance Officer, SMC, Siliguri..
09. The Head Clerk, SMC, Siliguri,
10. The Accountant, SMC, Siliguri.
11. The Cashier, SMC, Siliguri.
12. Building Section, SMC Siliguri.
13. Guard File.

Commissioner
Siliguri Municipal Corporation

ACHARYA ASSOCIATES SILIGURI

Form No 97
[Vide Rules 17 & 249]
SILIGURI Municipal Corporation

Receipt Voucher

No. 10533
Date 31-03-2023

Received From ACHARYA ASSOCIATES
WARD NO. 18, SMC
GEO TECHINICAL INVESTIGATION (S-OIL)

"শিলিগুড়ি প্লাস্টিক ব্যাগ নিষিদ্ধকরণ"

On Account of (Account Head)	Amount	Remarks(if any)
1401004 REGISTRATION OF PROFESSIONALS/ENLISTMENT FEES	7500.00	NEW
T O T A L	**7500.00**	

ACHARYA ASSOCIATES SILIGURI

LICENCE VALDI FOR THE FINANCIAL YEAR 2023 - 2024
The Sum of Rupees Seven Thousand Five Hundred Only

(in figures) Rs.*****7500.00 [Cash:*****7500.00 , Chq/DD:********0.00]

31/03/23

Cashier
CASH 01-04-23 01:01 PM

Vice Chairman/Auth.Signatory/E.O.

Empaneiled Geo Tech Engineer I/II under
Siliguri Municipal Corporation.

NAME: AVIJIT GHOSH

ADDRESS: Aargee Lodge Building
Bidhan Road Siliguri.
734501

EMPANELMETN NO: Geo Tech/Engr/I-10

CLASS: I

VALID W.E.F. 8:11:2019
Valid upto – 31-3-20

Avijit Ghosh.

Signature of Geo Tech. Engineer.

Renew for the year of 20..... 20.....

Renew for the year of 20..... 20.....

Renew for the year of 20..... 20.....

Renew for the year of 20..... 20.....

Renew for the year of 20..... 20.....

Renew for the year of 20..... 20.....

Sdt
Commissioner
Siliguri Municipal Corporation

Renew for the year of 20.20..... 20.21.....
Commissioner
Siliguri Municipal Corporation
1/6/2020

Renew for the year of 20..... 20.....

Renew for the year of 20.21..... 20.22.....
RENEWED AND VALID
UPTO 31.03.2023
Commissioner
Siliguri Municipal Corporation

Renew for the year of 20..... 20.....
Commissioner
Siliguri Municipal Corporation

Renew for the year of 20..... 20.....
RENEWED AND VALID
UPTO 31-03-2024
Commissioner
Siliguri Municipal Corporation
25/3/19

Renew for the year of 20..... 20.....

Renew for the year of 20..... 20.....

THIS CARD IS TO BE PRODUCED DURING SUBMISSION OF PLANS AND IDENTIFICATION.

Commissioner
Siliguri Municipal Corporation
7/4/19

ACHARYA ASSOCIATES
SILIGURI

Avijit Ghosh

Er. AVIJIT GHOSH
Geotechnical Engineer, Class-1
S.M.C. Empanelment No. 1/10
Bidhan Road, Siliguri. Mob. No. 98323 75155
consultavijit@hotmail.com