REPORT ON
SOIL INVESTIGATION WORK AT THE PROPOSED SITE OF S+5 STORIED RESIDENTIAL APARTMENT "ESSEN KAILASH" OVER PLOT NO.1403/1404/1412/1413/1414 AT NAHARAKANTA, BHUBANESWAR

Submitted to
ESSEN CONSTRUCTION
Mancheswar Industrial Estate
Bhubaneswar.

Geotech Consultant

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1.0 INTRODUCTION

For the design of foundation of structures at any site it is essential to have accurate & reliable information on the soil/rock strata met at the site to required depth. Geotechnical Investigations form an important part of the site investigation in any construction project. The objectives of the sub surface investigation is to provide the owner/Architect/ structural designer/builder with adequate information about the existing geological features at the site and to enable them to design appropriate foundation system capable of supporting the loads to be transferred by the structure to the under lying soil/rock strata without causing any distress.

2.0 THE PROJECT

Essen Construction has the plans to construct S+5 storied Residential Apartment " ESSEN KAILASH" over plot No. 1403/1404/1412/1413/ 1414 at Naharakanta, Bhubaneswar.

3.0 SCOPE OF WORK

The scope of geotechnical investigation work undertaken at the proposed site of S+5 storied Residential Apartment " ESSEN KAILASH" over plot No. 1403/1404/1412/1413/1414 at Naharakanta, Bhubaneswar, comprised of drilling 2 nos of bore holes, at locations indicated by the client at the site. Each bore hole was drilled upto a depth of 20.0 m below existing ground level. Drilling in soil was under taken at the demarkated locations using manual drilling rig with facility for drilling 150 mm dia bore holes.

SPT was conducted at 1.5 m depth interval upto termination of drilling in each bore hole.

The scope of work also included determination of properties of soil through laboratory testing as per relevant I.S code and preparing a technical report indicating the properties of soil strata encountered at the site and suggesting the type of foundation suitable for the proposed S+5 storied Residential Apartment " ESSEN KAILASH" over plot No. 1403/1404/1412/1413/1414 at Naharakanta, Bhubaneswar.

4.0 INVESTIGATION

The geotechnical investigations undertaken at the proposed site of S+5 storied Residential Apartment " ESSEN KAILASH" over plot No. 1403/ 1404/1412/1413/1414 at Naharakanta, Bhubaneswar comprised of drilling 2 Nos of bore holes, each upto 20.0 m depth below existing ground level over the demarkated location.

The scope of investigation also included collecting soil samples, conducting field and laboratory tests, analysing the results and preparing a geotechnical report indicating the properties of soil met at the site. The report also indicates the type of foundation considered suitable for the construction of S+5 storied Residential Apartment " ESSEN KAILASH" over plot No. 1403/1404/1412/1413/1414 at Naharakanta, Bhubaneswar.

5.0 FIELD WORK

The field work comprised of locating the bore hole points, installing the manual drilling rig at the site and drilling 2 Nos of bore holes, each upto a depth of 20.0 m below existing ground level at the locations as indicated by the client.

Drilling was resorted to by using a manual drilling rig.

Drilling is effected by the cutting action of a rotating tool bit kept in firm contact with the bottom of the bore hole. The bit is carried at the end of the hollow jointed drill rods.The drill rod is rotated by a suitable chuk. Bentonite slurry of required consistency is circulated continuously through the hollow drill rods.The slurry returns to the ground surface through the annular space between the drill rod and the wall of the bore hole/casing. The slurry flowing out of the cutter bottom gets mixed up with the cut soil and flows to the groundsurface and returns back to the slurry tank. The process is continuous and is used throughout the drilling process.

6.0 SAMPLING

SPT samples were collected at different depths from the soil strata below existing ground level at each borehole. SPT was conducted using a Standard SPT sampler, at 1.5 m depth interval, in each bore hole

upto termination of boring at 20.0 m depth below ground alevel.

SPT was conducted at 1.5 m depth interval. Field N values obtained at each depth have been reported in the borelog and summarised data sheets.

7.0 INSITU TESTS

Insitu tests measure the consistency of cohesive soil deposits and the relative density of cohesionless soil deposits. The procedure consists of measuring the resistance offered by the soil strata to the advancement of a device called Split Spoon Sampler.

A standard split spoon sampler was used for the test. The SPT sampler was advanced into the soil strata vertically, due to the free fall of a 63.5 kg. hammer falling through a height of 750 mm. Number of blows required to produce three successive 150 mm.of penetration of the sampler was recorded. The sum of the total number of blows required to produce the last 300 mm. of penetration has been taken as the 'N' value or the standard penetration resistance of the soil at the depth under consideration. In case of very hard, compact soil strata, total penetration of less than 300 mm is achieved. In such cases, the depth of penetration and the number of blows are recorded. The 'N' values recorded during field work at the above site have been reported in the record of boring and summarised data sheets.disturbed soil samples from the strata below existing ground level at each location. SPT was conducted in soil at 1.5 m depth interval as indicated in the Record of Boring.

Field N values obtained from SPT at each depth have been reported in the borelog and summarised data sheets.

7.0 INSITU TESTS

Insitu tests such as SPT measure the consistency of cohesive soil deposits and relative density of cohesionless soil deposits/rocks. The procedure consists of measuring the resistance offered by the soil/ rock strata to the advancement of a device called Split Spoon Sampler. A standard split spoon sampler is used for the test. The sampler is

advanced into the soil strata vertically, due to the free fall of a 63.5 kg. hammer falling through a height of 750 mm. Number of blows required to produce three successive 150 mm or less.of penetration is recorded. The sum of the total number of blows required to produce the last 300mm or less of penetration is taken as the 'N' value or the Standard Penetration Resistance of the soil/rock at the depth under consideration. In case of very hard, compact soil/rock strata, total penetration of less than 300 mm is achieved. In such cases, the depth of penetration and the number of blows are recorded. The 'N' values recorded during field work at the above site have been reported in the record of boring and summarised data sheets.

8.0 GROUND WATER TABLE

Location of the position of ground water table with respect to the proposed depth of foundation below ground surface plays an important part in the design of foundation.Position of ground water table influences many engineering properties of soil including its bearing capacity. The position of ground water table fluctuates during wet and dry seasons. The depth of ground water table was ascertained by observing the level of free standing water in the washed and cleaned bore hole 24 hours after the completion of boring. The recorded depth of water level in the bore holes have been reported in the record of boring and summarised data sheets.

9.0 LABORATORY TESTS

The soil samples (UDS & SPT) collected from the field are subjected to laboratory tests to determine the related properties. Laboratory tests were conducted as per the provisions of the work order and in conformity with the relevant code of practice prescribed by the Bureau of Indian Standards.

The tests conducted in the laboratory included Moisture content, Bulk density, Specific gravity, Atterberg limits (LL & PL), Grain size analysis, Free swell index (DFS) of the soil. Results of tests have been reported in the Summarised data sheets, grain size curves.

10.0 BORELOG

The bore log was prepared using the field data and Laboratory test results obtained on soil/rock samples collected from the bore holes at different depths at the proposed site of S+5 storied Residential Apartment "ESSEN KAILASH" over plot No. 1403/1404/1412/1413/1414 at Naharakanta, Bhubaneswar.

The field data have been reported in the Record of Boring & Summarised Data sheets. The Laboratory test results on soil samples collected at site have been reported in the Summarised data Sheets, tables and graphs.

10.1 Bore Hole No. 1

Bore hole No.1 was drilled upto a depth of 20.0 m below existing ground level at the demarkated location.

SPT was conducted at 1.5 m depth. Field N value of 02 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CI).

SPT was conducted at 3.0 m depth. There was refusal to penetraton at this depth, therefore field N value of 50 has been recorded to indicate refusal to penetration at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CL).

SPT was conducted at 4.5 m depth.There was refusal to penetraton at this depth, therefore field N value of 50 has been recorded to indicate refusal to penetration at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CI).
SPT was conducted at 6.0 m depth. Field N value of 15 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CI).

SPT was conducted at 7.5 m depth. Field N value of 19 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CL).

SPT was conducted at 9.0 m depth. Field N value of 24 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CI).

SPT was conducted at 10.5 m depth. Field N value of 05 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CI).

SPT was conducted at 12.0 m depth. Field N value of 20 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CI).

SPT was conducted at 13.5 m depth. Field N value of 24 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CI).

SPT was conducted at 15.0 m depth. Field N value of 25 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CI).

SPT was conducted at 16.5 m depth. Field N value of 18 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (MI).

SPT was conducted at 18.0 m depth. Field N value of 16 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CI).

SPT was conducted at 19.5 m depth. Field N value of 18 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CI).

SPT was conducted at 20.0 m depth. Field N value of 19 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CI).

Drilling was terminated at 20.0 m depth.

Ground water table was met at ground level.

10.2 Bore Hole No. 2

Bore hole No.2 was drilled upto a depth of 20.0 m below existing ground level at the demarkated location.

SPT was conducted at 1.5 m depth. Field N value of 03 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CI).

SPT was conducted at 3.0 m depth. Field N value of 04 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CI).

SPT was conducted at 4.5 m depth.Field N value of 05 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CI).

SPT was conducted at 6.0 m depth. Field N value of 13 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CI).

SPT was conducted at 7.5 m depth. Field N value of 15 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CI).

SPT was conducted at 9.0 m depth. Field N value of 19 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CI).

SPT was conducted at 10.5 m depth. Field N value of 18 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (MI).

SPT was conducted at 12.0 m depth. Field N value of 20 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (MI).

SPT was conducted at 13.5 m depth. Field N value of 24 was recorded

at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (MI).

SPT was conducted at 15.0 m depth. Field N value of 25 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (MI).

SPT was conducted at 16.5 m depth. Field N value of 17 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (MI).

SPT was conducted at 18.0 m depth. Field N value of 13 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (MI).

SPT was conducted at 19.5 m depth. Field N value of 12 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (MI).

SPT was conducted at 20.0 m depth. Field N value of 13 was recorded at this depth.The soil sticking to the SPT shoe was analysed and found to be Poorly graded clayey silt & sand (CI).

Drilling was terminated at 20.0 m depth.

Ground water table was met at 1.0 m ground level.

11.0 FOUNDATION ANALYSIS

The proposed site for the construction of S+5 storied Residential Apartment " ESSEN KAILASH" over plot No. 1403/1404/1412/1413/ 1414 at Naharakanta, Bhubaneswar.

Two bore holes were drilled at the proposed site. Each bore hole was drilled upto 20.0 m depth below existing ground level.

The soil met at the site is Poorly graded clayey silt & sand (CI/CL/MI). The DFS value of soil ranges from 20 % to 40 % indicating moderate degree of expansiveness.

Bored cast in situ under ream piles 50 cm stem dia, 125 cm bulb dia with two under ream bulbs, 15.0 m long with an estimated load carrying capacity of 100 t may be considered suitable.

Number of piles under each pile cap, supporting a column may be worked out accordingly.

However the actual load carrying capacity of the selected pile, may be worked out by conducting pile load test at the site.

12.0 RECOMMENDATIONS

Considering the properties of soil encountered at the proposed site of S+5 storied Residential Apartment " ESSEN KAILASH" over plot No. 1403/1404/1412/1413/1414 at Naharakanta, Bhubaneswar, it is recommended that:

(i) Bored cast in situ under ream piles of 50 cm stem dia, 125 cm bulb dia 15.0 m long with two under ream bulbs may be considered suitable.

(ii) The load carrying capacity each pile of above description is estimated at 100.0t .

(iii) Number of piles under each pile cap supporting a column may be worked out considering the load of the structure to be transmitted through the column.

(iv) Pile load test is to be conducted to arrive at the safe load carrying capacity of the piles of selected dimension at the site.

(v) Dimensions of the pile proposed is indicative and may be modified keeping in view the requirements of the structure at the site.

(vi) Since the ground water level is close to the ground surface adequate measures to be taken to limit the ground water level well below the foundation by suitable drainage arrangement.

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Prof.(Dr.) A.C. Ray

Foundation Engineering Consultant

Computation of Safe Load Bearing Capacity of Bored Cast in situ Under-Ream Pile at S+5 storied Residential Apartment " ESSEN KAILASH" over plot No. 1403/1404/1412/1413/1414 at Naharakanta, Bhubaneswar.

Average Corrected N value upto 20.0 depth = 16.83 or say 15

The soil is Poorly graded clayey silt & sand (CI/CL/MI)

DFS= (20 % - 40 %)

Dimeter of pile (stem dia) = 50.0 cm

Under ream bulb dia = 125 cm.

No. of under ream bulbs = 2

Minimum length of pile = 5.0 m

Load bearing capacity of each pile in compression (as per safe load table) = 63.0 t.

Increase in load bearing capacity due to increase in length of pile by 30 cm = 2.4 t

Proposed length of pile = 15.0 m

Load bearing capacity of each pile = 63 + ((15.0 - 5.0)/0.3) x 2.4

= 63.0 + 80.0 = 143.0 t.

Since, the ground water table is at close to ground level, the pile bore holes will be filled with sub soil water of drilling mud during concreting. Therefore, the load bearing capacity of the pile will be reduced by 25% of the estimated load.

Hence the safe load capacity of each bored cast in situ under ream pile of above description will be = 143.5 x 0.75 = 107.25 t or say 100.0 t

However, Initial load test on the pile should be conducted to determine the actual safe load capacity of the pile at the site.

Number of piles under each pile cap supporting a column may be ascertained by considering the column load and safe load capacity of each pile.

COMPUTATION OF AVERAGE CORRECTED N VALUE

Name of the site: S+5 storied Residential Apartment " ESSEN KAILASH" over plot No. 1403/1404/1412/1413/1414 at Naharakanta, Bhubaneswar

Soil Properties: γ_{sub} = 10.0 kN/m^3

Depth	Field N value (Nf)			Over burden pressure (P) $=\gamma_{sub} \times D$ kn/m^2	Correction factor (CN) $=0.77\log \frac{2000}{P}$	N value corrected for over burden pressure ($N=N_f \times C_N$)	N value Corrected for dilatancy
	BH-1	BH-2	Average N value				
1.5	2	3	3	15.0	1.64	4.91	9.95
3.0	50	4	27	30.0	1.40	37.92	26.46
4.5	50	5	28	45.0	1.27	35.53	25.26
6.0	15	13	14	60.0	1.17	16.42	15.71
7.5	19	15	17	75.0	1.10	18.67	16.83
9.0	24	19	22	90.0	1.04	22.81	18.91
10.5	5	18	12	105.0	0.99	11.83	13.41
12.0	20	20	20	120.0	0.94	18.82	16.91
13.5	24	24	24	135.0	0.90	21.63	18.32
15.0	25	25	25	150.0	0.87	21.66	18.33
16.5	18	17	18	165.0	0.83	15.02	15.01
18.0	16	13	15	180.0	0.81	12.08	13.54
19.5	18	12	15	195.0	0.78	11.68	13.34
20.0	19	13	16	200.0	0.77	12.32	13.66

Average Correcte N value=235.64/14= 16.83 or say 15.0

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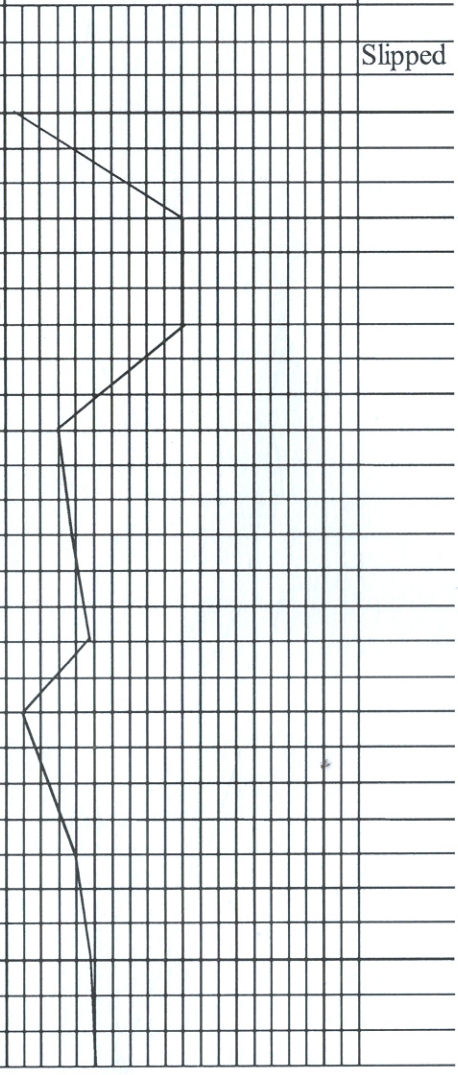
RECORD OF BORING

S+5 Storied Residential Apartment over

Bored for ESSEN Construction, Bhubaneswar
Location plot No. 1403/1404/1412/1413/1414 at Naharakanta
Ground surface level
Ground water level 0.0 mts
Type of boring : Rotary Drilling
Soil sampler used SPT
Diameter of boring 150 mm/Nx
Date started 28.03.2021
Inclination : Vertical
Date completed 29.03.2021
Boring No 1
Recorded Narayan

Description of Strata	Soil Group	Thickness of stratum	Depth from Ground Surface	Samples Type	No.	No. blow counts	Standard Penetration Tests No. of Blows for 300 mm.	Remarks
Poorly graded				UDS				Slipped
Clayey silt & Sand	CI		1.50	SPT	1	1,1,1=2		
Poorly graded								
Clayey silt & Sand	CL		3.00	SPT	2	$1_{(45.0)}$=50		
Poorly graded								
Clayey silt & Sand	CI		4.50	SPT	3	$1_{(30.0)}1_{(15.0)}$=50		
Poorly graded								
Clayey silt & Sand	CI		6.00	SPT	4	1,7,8=15		
Poorly graded								
Clayey silt & Sand	CL		7.50	SPT	5	8,8,11=19		
Poorly graded								
Clayey silt & Sand	CI		9.00	SPT	6	10,11,13=24		
Poorly graded								
Clayey silt & Sand	CI		10.50	SPT	7	1,2,3=5		
Poorly graded								
Clayey silt & Sand	CI		12.00	SPT	8	9,10,11=20		
Poorly graded								
Clayey silt & Sand	CI		13.50	SPT	9	9,11,13=24		
Poorly graded								
Clayey silt & Sand	CI		15.00	SPT	10	8,12,13=25		



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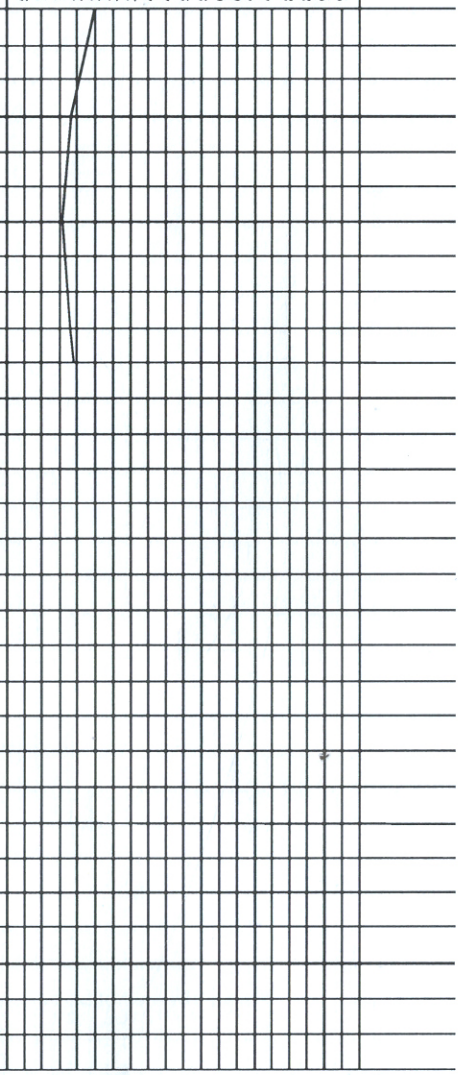
RECORD OF BORING

S+5 Storied Residential Apartment over

Bored for ESSEN Construction, Bhubaneswar — Location plot No. 1403/1404/1412/1413/1414 at Naharakanta
Ground surface level — Ground water level 0.0 mts
Type of boring : Rotary Drilling — Soil sampler used SPT
Diameter of boring 150 mm/Nx — Date started 28.03.2021
Inclination : Vertical — Date completed 29.03.2021
Boring No 1 — Recorded Narayan

Description of Strata	Soil Group	Thickness of stratum	Depth from Ground Surface	Samples Type	Samples No.	Samples No. blow counts	Standard Penetration Tests No. of Blows for 300 mm.	Remarks
Poorly graded								
Clayey silt & Sand	MI		16.50	SPT	11	6,8,10=18		
Poorly graded								
Clayey silt & Sand	CI		18.00	SPT	12	4,7,9=16		
Poorly graded			19.50	SPT	13	5,8,10=18		
Clayey silt & Sand	CI		20.00	SPT	14	6,8,11=19		



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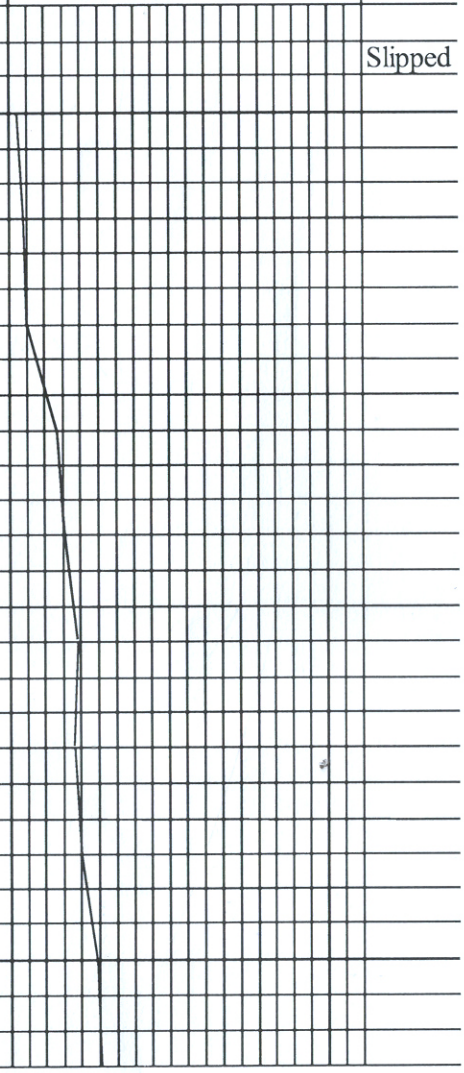
RECORD OF BORING

Bored for ESSEN Construction, Bhubaneswar
Location S+5 Storied Residential Apartment over plot No. 1403/1404/1412/1413/1414 at Naharakanta
Ground surface level
Ground water level 1.0 mts
Type of boring : Rotary Drilling
Soil sampler used SPT
Diameter of boring 150 mm/Nx
Date started 30.03.2021
Inclination : Vertical
Date completed 31.03.2021
Boring No 2
Recorded Narayan

Description of Strata	Soil Group	Thickness of stratum	Depth from Ground Surface	Samples Type	Samples No.	Samples No. blow counts	Standard Penetration Tests No. of Blows for 300 mm.	Remarks
Poorly graded				UDS				Slipped
Clayey silt & Sand	CI		1.50	SPT	1	2,1,2=3		
Poorly graded								
Clayey silt & Sand	CI		3.00	SPT	2	1,2,2=4		
Poorly graded								
Clayey silt & Sand	CI		4.50	SPT	3	2,2,3=5		
Poorly graded								
Clayey silt & Sand	CI		6.00	SPT	4	4,6,7=13		
Poorly graded								
Clayey silt & Sand	CI		7.50	SPT	5	4,7,8=15		
Poorly graded								
Clayey silt & Sand	CI		9.00	SPT	6	7,9,10=19		
Poorly graded								
Clayey silt & Sand	MI		10.50	SPT	7	5,8,10=18		
Poorly graded								
Clayey silt & Sand	MI		12.00	SPT	8	7,9,11=20		
Poorly graded								
Clayey silt & Sand	MI		13.50	SPT	9	8,11,13=24		
Poorly graded								
Clayey silt & Sand	MI		15.00	SPT	10	10,11,14=25		



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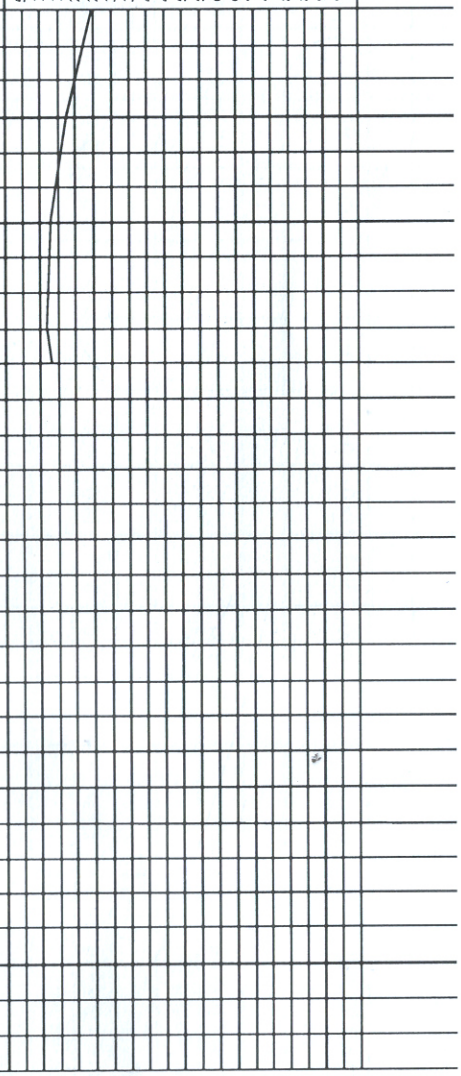
RECORD OF BORING

Bored for ESSEN Construction, Bhubaneswar
Location S+5 Storied Residential Apartment over plot No. 1403/1404/1412/1413/1414 at Naharakanta
Ground surface level
Ground water level 1.0 mts
Type of boring : Rotary Drilling
Soil sampler used SPT
Diameter of boring 150 mm/Nx
Date started 30.03.2021
Inclination : Vertical
Date completed 31.03.2021
Boring No 2
Recorded Narayan

Description of Strata	Soil Group	Thickness of stratum	Depth from Ground Surface	Samples Type	Samples No.	Samples No. blow counts	Standard Penetration Tests No. of Blows for 300 mm.	Remarks
Poorly graded								
Clayey silt & Sand	MI		16.50	SPT	11	6,8,9=17		
Poorly graded								
Clayey silt & Sand	MI		18.00	SPT	12	5,6,7=13		
Poorly graded			19.50	SPT	13	3,6,6=12		
Clayey silt & Sand	MI		20.00	SPT	14	4,6,7=13		



GEOTECH RESEARCH LABORATORY, RAY INFRATECH, BHUBANESWAR - 751 003

SUMMARISED DATA SHEET

PROJECT - S+5 Storied Residential Apartment over plot No. 1403/1404/1412/1413/1414 at Naharakanta

BORE HOLE NO. - 1

TYPE OF BORING - Rotary Drilling

DIAMETER OF BORE HOLE - 150mm

DATE OF COMMENCEMENT - 28.03.2021

DATE OF COMPLETION - 29.03.2021

GROUND RL. -

DEPTH OF GROUND WATER - 0.00 m

DEPTH FROM G.L. m	SAMPLE TYPE	DESCRIPTION OF SOIL GROUP	GROUP LETTER SYMBOL	NATURAL MOISTURE CONTENT %	LIQUID LIMIT % (w_L)	PLASTIC LIMIT % (w_P)	PLASTISITY INDEX % (I_P)	DIFFERENTIAL FREE SWELL %	GRAVEL + 4.75 mm	COARSE SAND + 2.00 mm	MEDIUM SAND + 0.425 mm	FINE SAND + 0.075 mm	SILT + 0.002 mm	CLAY -0.002 mm	'N' VALUE FROM SPT	UNIT WEIGHT / BULK DENSITY KN / m^3	SPECIFIC GRAVITY	COHESION KN / m^2	ANGLE OF INTERNAL FRICTION^0	COMPRESSION INDEX	UC Compressive STRENGTH qu kN/m^2 un soaked	Compressive STRENGTH qu kN/m^2 soaked
		Poorly graded																				
1.50	SPT	Clayey silt & Sand	CI		37.0	24.0	13.0	30.0	0.00	0.00	2.05	7.72	66.33	23.90	02							
		Poorly graded																				
3.00	SPT	Clayey silt & Sand	CL		35.0	23.0	12.0	20.0	0.00	0.00	4.39	30.27	42.03	23.31	50							
		Poorly graded																				
4.50	SPT	Clayey silt & Sand	CI		39.0	24.0	15.0	40.0	0.00	0.00	1.52	4.13	61.41	32.94	50							
		Poorly graded																				
6.00	SPT	Clayey silt & Sand	CI		36.0	22.0	14.0	40.0	0.00	0.00	1.71	29.88	45.73	22.68	15							
		Poorly graded																				
7.50	SPT	Clayey silt & Sand	CL		35.0	22.0	13.0	40.0	0.00	0.00	1.31	31.63	44.65	22.41	19							
		Poorly graded																				
9.00	SPT	Clayey silt & Sand	CI		39.0	25.0	14.0	40.0	0.00	0.00	1.85	1.61	61.27	35.27	24							
		Poorly graded																				

GEOTECH RESEARCH LABORATORY, RAY INFRATECH, BHUBANESWAR - 751 003

SUMMARISED DATA SHEET

PROJECT - S+5 Storied Residential Apartment over plot No. 1403/1404/1412/1413/1414 at Naharakanta

BORE HOLE NO. - 1

TYPE OF BORING - Rotary Drilling

DIAMETER OF BORE HOLE - 150mm

DATE OF COMMENCEMENT - 28.03.2021

DATE OF COMPLETION - 29.03.2021

GROUND RL. -

DEPTH OF GROUND WATER - 0.00 m

DEPTH FROM GL. m	SAMPLE TYPE	DESCRIPTION OF SOIL GROUP	GROUP LETTER SYMBOL	NATURAL MOISTURE CONTENT %	LIQUID LIMIT % (w_L)	PLASTIC LIMIT % (w_p)	PLASTISITY INDEX % (I_p)	DIFFERENTIAL FREE SWELL %	GRAVEL + 4.75 mm	COARSE SAND + 2.00 mm	MEDIUM SAND + 0.425 mm	FINE SAND + 0.075 mm	SILT + 0.002 mm	CLAY -0.002 mm	'N' VALUE FROM SPT	UNIT WEIGHT / BULK DENSITY KN / m^3	SPECIFIC GRAVITY	COHESION KN / m^2	ANGLE OF INTERNAL FRICTION^0	COMPRESSION INDEX	UC Compressive STRENGTH qu kN/m^2 un soaked	Compressive STRENGTH qu kN/m^2 soaked
10.50	SPT	Clayey silt & Sand	CI		39.0	24.0	15.0	40.0	0.00	0.00	1.16	0.85	63.68	34.31	05							
		Poorly graded																				
12.00	SPT	Clayey silt & Sand	CI		39.0	25.0	14.0	40.0	0.00	0.00	0.00	1.55	63.85	34.60	20							
		Poorly graded																				
13.50	SPT	Clayey silt & Sand	CI		39.0	24.0	15.0	40.0	0.00	0.00	1.19	1.33	63.75	33.73	24							
		Poorly graded																				
15.00	SPT	Clayey silt & Sand	CI		39.0	25.0	14.0	40.0	0.00	0.00	1.73	1.82	64.15	32.30	25							
		Poorly graded																				
16.50	SPT	Clayey silt & Sand	MI		40.0	26.0	14.0	40.0	0.00	0.00	1.27	2.72	63.01	33.0	18							
		Poorly graded																				
18.00	SPT	Clayey silt & Sand	CI		40.0	24.0	16.0	40.0	0.00	0.00	0.00	1.74	54.10	44.16	16							
		Poorly graded																				
19.50	SPT	Clayey silt & Sand	CI		40.0	25.0	15.0	40.0	0.00	0.00	1.74	3.46	50.10	44.70	18							
20.00	SPT	Poorly graded Clayey silt & Sand	CI		41.0	25.0	16.0	40.0	0.00	0.00	1.31	1.96	52.43	44.30	19							

GEOTECH RESEARCH LABORATORY, RAY INFRATECH, BHUBANESWAR - 751 003

SUMMARISED DATA SHEET

PROJECT - S+5 Storied Residential Apartment over plot No. 1403/1404/1412/1413/1414 at Naharakanta

BORE HOLE NO. - 2

TYPE OF BORING - Rotary Drilling

DIAMETER OF BORE HOLE - 150mm

DATE OF COMMENCEMENT - 30.03.2021

DATE OF COMPLETION - 31.03.2021

GROUND RL. -

DEPTH OF GROUND WATER - 1.00 m

DEPTH FROM G.L. m	SAMPLE TYPE	DESCRIPTION OF SOIL GROUP	GROUP LETTER SYMBOL	NATURAL MOISTURE CONTENT %	LIQUID LIMIT % (w_L)	PLASTIC LIMIT % (w_P)	PLASTISITY INDEX % (I_P)	DIFFERENTIAL FREE SWELL %	GRAVEL + 4.75 mm	COARSE SAND + 2.00 mm	MEDIUM SAND + 0.425 mm	FINE SAND + 0.075 mm	SILT + 0.002 mm	CLAY -0.002 mm	'N' VALUE FROM SPT	UNIT WEIGHT / BULK DENSITY KN / m^3	SPECIFIC GRAVITY	COHESION KN / m^2	ANGLE OF INTERNAL FRICTION^0	COMPRESSION INDEX	UC Compressive STRENGTH qu kN/m^2 un soaked	Compressive STRENGTH qu kN/m^2 soaked
		Poorly graded																				
1.50	SPT	Clayey silt & Sand	CI		38.0	24.0	14.0	30.0	0.00	0.00	4.94	16.52	44.81	33.73	03							
		Poorly graded																				
3.00	SPT	Clayey silt & Sand	CI		39.0	25.0	14.0	30.0	0.00	0.00	1.83	11.82	52.22	34.13	04							
		Poorly graded																				
4.50	SPT	Clayey silt & Sand	CI		41.0	25.0	16.0	40.0	0.00	0.00	0.00	1.90	51.35	46.75	05							
		Poorly graded																				
6.00	SPT	Clayey silt & Sand	CI		40.0	25.0	15.0	40.0	0.00	0.00	1.84	3.75	49.75	44.66	13							
		Poorly graded																				
7.50	SPT	Clayey silt & Sand	CI		38.0	24.0	14.0	40.0	0.00	0.00	2.71	10.36	42.05	44.88	15							
		Poorly graded																				
9.00	SPT	Clayey silt & Sand	CI		41.0	25.0	16.0	40.0	0.00	0.00	0.00	1.75	53.45	44.80	19							
		Poorly graded																				

GEOTECH RESEARCH LABORATORY, RAY INFRATECH, BHUBANESWAR - 751 003

SUMMARISED DATA SHEET

PROJECT - S+5 Storied Residential Apartment over plot No. 1403/1404/1412/1413/1414 at Naharakanta
BORE HOLE NO. - 2
TYPE OF BORING - Rotary Drilling
DIAMETER OF BORE HOLE - 150mm

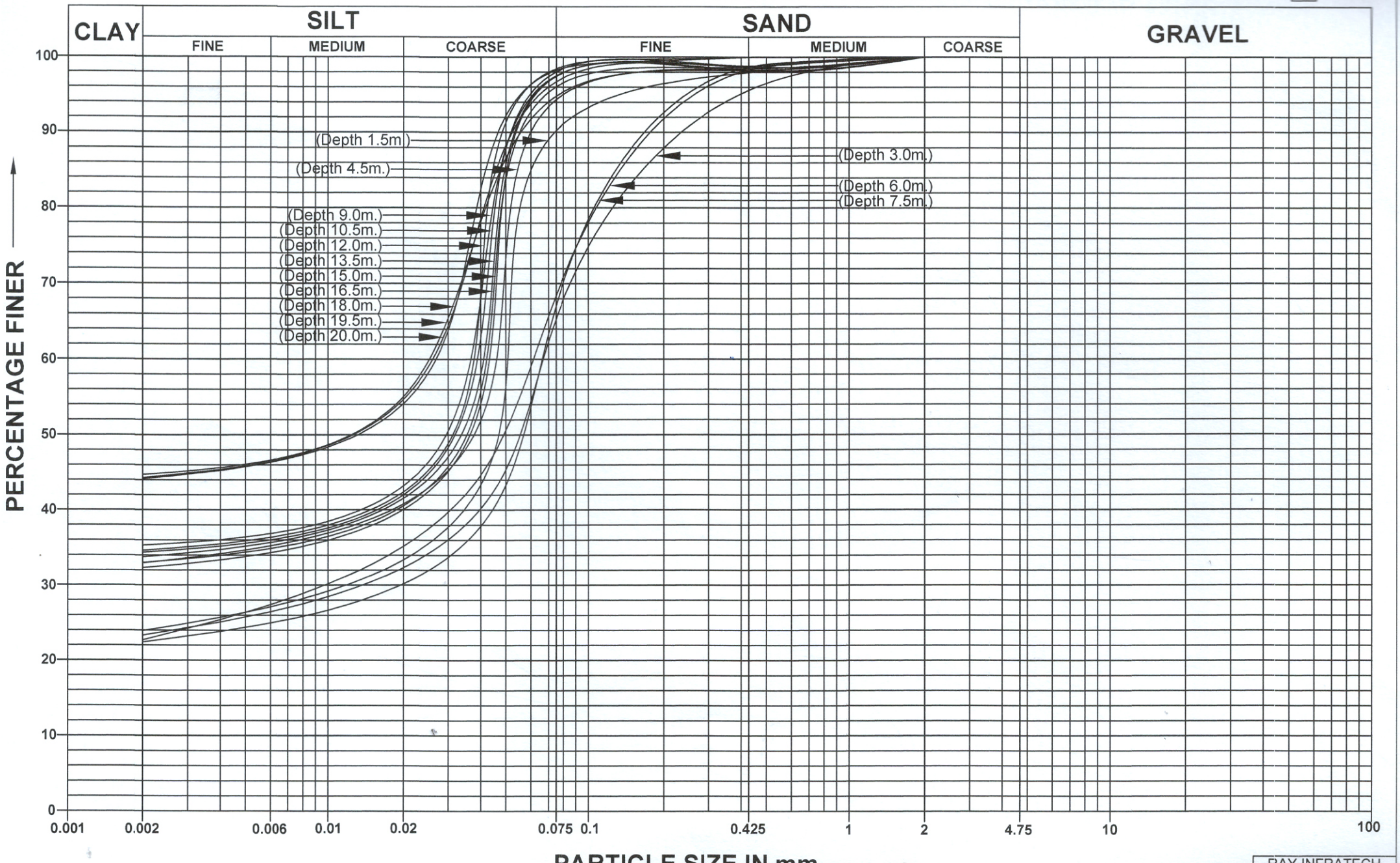
DATE OF COMMENCEMENT - 30.03.2021
DATE OF COMPLETION - 31.03.2021
GROUND RL. -
DEPTH OF GROUND WATER - 1.00 m

DEPTH FROM G.L. m	SAMPLE TYPE	DESCRIPTION OF SOIL GROUP	GROUP LETTER SYMBOL	NATURAL MOISTURE CONTENT %	LIQUID LIMIT % (w_L)	PLASTIC LIMIT % (w_P)	PLASTISITY INDEX % (I_P)	DIFFERENTIAL FREE SWELL %	GRAVEL + 4.75 mm	COARSE SAND + 2.00 mm	MEDIUM SAND + 0.425 mm	FINE SAND + 0.075 mm	SILT + 0.002 mm	CLAY -0.002 mm	'N' VALUE FROM SPT	UNIT WEIGHT / BULK DENSITY KN / m^3	SPECIFIC GRAVITY	COHESION KN / m^2	ANGLE OF INTERNAL FRICTION^0	COMPRESSION INDEX	UC Compressive STRENGTH qu kN/m^2 un soaked	Compressive STRENGTH qu kN/m^2 soaked
10.50	SPT	Clayey silt & Sand	MI		45.0	31.0	14.0	40.0	0.00	0.00	1.39	1.00	61.31	36.30	18							
		Poorly graded																				
12.00	SPT	Clayey silt & Sand	MI		45.0	30.0	15.0	40.0	0.00	0.00	0.000	1.64	61.30	37.06	20							
		Poorly graded																				
13.50	SPT	Clayey silt & Sand	MI		45.0	31.0	14.0	40.0	0.00	0.00	0.00	2.40	61.40	36.20	24							
		Poorly graded																				
15.00	SPT	Clayey silt & Sand	MI		43.0	29.0	14.0	40.0	0.00	0.00	2.13	11.69	51.08	35.10	25							
		Poorly graded																				
16.50	SPT	Clayey silt & Sand	MI		44.0	29.0	15.0	40.0	0.00	0.00	1.01	5.25	56.14	37.60	17							
		Poorly graded																				
18.00	SPT	Clayey silt & Sand	MI		43.0	29.0	14.0	40.0	0.00	0.00	1.44	3.72	58.14	36.70	13							
		Poorly graded																				
19.50	SPT	Clayey silt & Sand	MI		45.0	30.0	15.0	40.0	0.00	0.00	1.29	1.54	61.07	36.10	12							
20.00	SPT	Poorly graded Clayey silt & Sand	MI			45.0	31.0	14.0	40.0	0.00	0.00	0.00	1.64	61.16	37.20	13							

GRAIN SIZE DISTRIBUTION CURVE AT DIFFERENT DEPTHS

LOCATION :- S+5 STORIED RESIDENTIAL APARTMENT "ESSEN KAILASH" OVER PLOT NO. 1403/1404/1412/1413/1414 AT NAHARAKANTA,BHUBANESWAR.

BORE HOLE NO.- 1

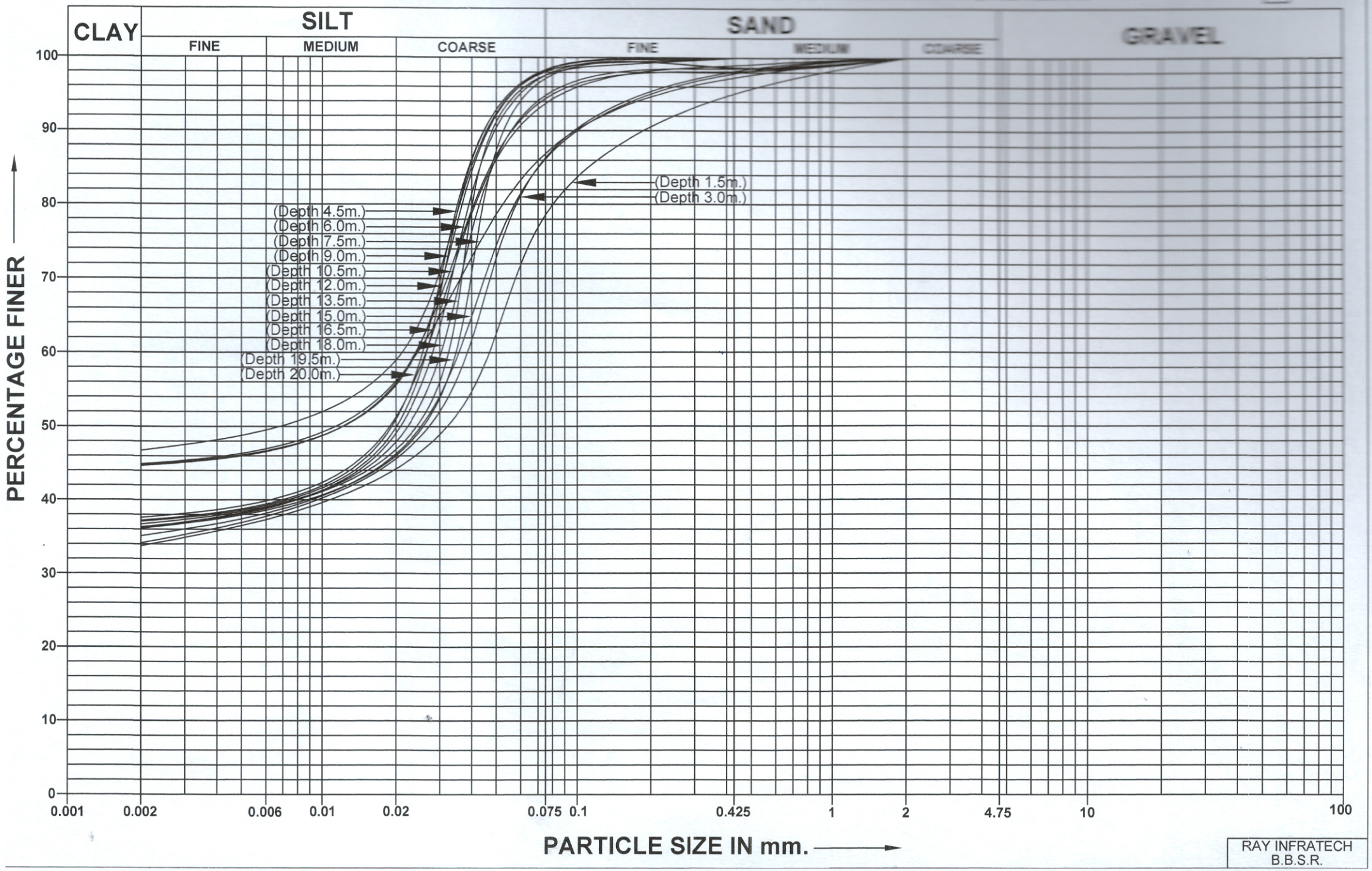


RAY INFRATECH
B.B.S.R.

GRAIN SIZE DISTRIBUTION CURVE AT DIFFERENT DEPTHS

LOCATION :- S+5 STORIED RESIDENTIAL APARTMENT "ESSEN KAILASH" OVER PLOT NO. 1403/1404/1411/2/1413/1414, AT MAHARAHGANTA, BHUBANESWAR.

BORE HOLE NO.- 2



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