GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED FACTORY OF BELLSONICA AUTO COMPONENT INDIA PVT LTD., AT KHARKHODA, HARYANA

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GEOTECHNICAL INVESTIGATION REPORT for the Proposed Factory of Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

EXECUTIVE SUMMARY

Takenaka India Private Limited., Gurgaon - 122002 are in the process of constructing a Factory Complex for Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

The proposed structures are Factory Buildings.

To obtain adequate information regarding the subsoil conditions, for the design of the substructures for the proposed structures, a detailed geotechnical investigation programme has been undertaken at the site.

The scope of work consisted of conducting boreholes in soil strata down to 30m depth at twenty five locations, conducting modified proctor density tests on five soil samples and conducting chemical analysis on soil/ water samples.

The results of the investigations indicate that the subsoil strata generally consists of clayey sandy silt/ sandy clayey silt down to the depth investigated except for random layers sand soils inbetween down to the depth investigated.

Filled-up soils have also been encountered down to a maximum depth of about 2m below the existing ground level, in occasional boreholes.

The N-values (N-values 2 - 28) indicate that the subsoil is loose to medium dense down to about 10m depth below which the subsoil is medium dense (N-values 8 - 97) down to the depth investigated.

Ground water table had been encountered at a depth of about 5m below the existing ground level, during the period of field investigations i.e May-June 2023.

The subsoil down to about 10m depth below the existing ground level, has been considered to be susceptible to liquefaction due to which shallow foundations are not feasible.

Considering the type of structures involved and the subsoil characteristics as determined from the geotechnical investigations, **Straight Bored Pile foundations** have been recommended.

The following safe pile capacities have been recommended for various diameters and effective lengths of pile.

Pile Dia (mm)	*Pile Effective Length (m)*	*Pile Vertical Load Capacity (tons)*	*Uplift Capacity of pile (tons)*	*Safe Lateral Load Capacity of pile (tons)*	
				Free Head	*Fixed Head*
450	15	25	10	0.1	0.2
600	15	40	20	0.1	0.4
	20	70	35		
800	15	65	30	0.3	1
	20	115	55		
	25	145	80		

However, For Boundary wall and minor structures of less importance at ground level, net allowable bearing pressures 6 t/m^2 have been recommended for various widths of foundations for an allowable settlement of 50mm at a depth of 2m below the existing ground level.

Precaution :

For straight bored Piles, after reaching the required depth in the pile bore, 15cm thick layer of gravel should be placed and compacted at the bottom so that the slush formed at the bottom is diminished.

For Isolated/Strip footings, foundation surface must be compacted heavily. If any loose pockets are observed, the same shall be filled with brickbats/gravel and compacted. Foundations can subsequently be placed over such a prepared surface.

1.0 INTRODUCTION

1.1 Takenaka India Private Limited., 1st Floor, Tower 'C', Vatika First India Place, Mehrauli Gurgaon Road, Gurgaon - 122002 , Haryana are in the process of constructing a Factory Complex for Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

1.2 To design the substructures for the proposed structures, adequate information regarding the subsoil conditions is required. For this purpose, detailed geotechnical investigations had been undertaken.

1.3 This report contains the details of the geotechnical investigations conducted along with the results and analysis of the investigations and the recommendations thereof.

1.4 Geotechnical investigations for this purpose have been carried out as per the verbal authorization of the authorities of Takenaka India Private Limited vide their work order reference number TIPL/BLMS/WO/001 dated 31st January 2023h. This authorization has been given in response to our offer no NCD/Q/TAKENAKA/158/2022 dated 30th January 2023.

2.0 PROJECT DETAILS

2.1 Site Location

2.1.1 The site for the proposed project is located at IMT Kharkhoda on Western Peripheral Expressway, Kharkhoda, District Sonipat, Haryana and which is situated at a distance of about 8.5 km from Kharkhoda towards village Sohati.

2.2 Site Layout and Topography

2.2.1 A schematic site plan showing the dimensions and other details of the site is enclosed in this report (fig.1a).

2.2.2 Maximum level differences of about 0.5m had been observed at the site. However, the general level of the site had been observed to be about 1m above the adjacent road level, during the period of field investigations.

2.2.3 The boundaries of the site along two sides of the plot had been observed to be demarcated with reinforced cement concrete boundary wall of about 2.5m height. However, construction of the boundary wall had been observed to be under progress, during the period of field investigations.

2.2.4 The colour of the surface earth had been observed to be Yellowish brown.

2.3 Seismic Zone

The present site is located in the Seismic Zone - IV which is the zone of high seismic intensity, as per the seismic zoning map of India given in BIS code IS:1893 (Part1)-2016.

2.4 The Structure/s

2.4.1 The proposed structures are Factory Buildings.

2.4.2 The structures are understood to be framed ones and the construction to be of Reinforced Cement Concrete.

3.0 OBJECT OF INVESTIGATIONS

3.1 For designing the foundation system of the proposed structures, the following data are required :

a) Type of foundation

b) Depth below the ground level at which the foundation system is to be laid.

c) Allowable bearing pressure at the foundation level.

3.2 To determine the above factors, the following information would be required:

a) The subsoil profile indicating thicknesses of the various soil strata, to a depth within the influence zone below the foundations

b) Engineering properties of the soil strata at various levels

c) Physical characteristics of the soil strata

d) Variation of strength of soil strata with depth

3.3 For evaluating the above parameters, field investigations and laboratory investigations on the soil samples collected during the field investigations, have been carried out.

3.4 The results from these investigations have been analysed to provide the recommendations for the design of foundations.

4.0 SCOPE OF INVESTIGATIONS

4.1 The final scope of investigations as stipulated by the client consists of :

a) Conducting boreholes in soil strata down to 30m depth at twenty five locations.

b) Conducting modified proctor density test for determination of optimum moisture contents and maximum dry densities on five soil samples.

c) Conducting chemical analysis on soil/ water samples.

d) Preparation and submission of a technical report in three copies containing the details of the tests carried out, their analysis and recommendations regarding the foundation system to be adopted.

4.2 The following operations were to be undertaken while progressing the boreholes:

a) Conducting standard penetration tests at regular intervals in soil strata.

b) Recovering undisturbed soil samples from various levels of the subsoil strata.

c) Recording ground water table levels, if met with.

5.0 FIELD INVESTIGATIONS

5.1 Preliminary Details

5.1.1 Field investigations had been carried out between 17th May 2023 and 25th June 2023.

5.1.2 A schematic site plan showing the test locations has been given in fig. 1a of the report.

5.1.3 Google Map Image showing the test locations has been given in fig. 1b of the report.

5.1.4 Photographs showing view of the site and work under progress have been given in figs. 1c & 1d of the report.

5.2 Boreholes

5.2.1 Boreholes were progressed by shell and auger method. Casing pipe were used to stabilize the sides of the boreholes below the water table level.

5.2.2 All the boreholes (BH1 to BH25) had been conducted down to the stipulated depth of 30m below the existing ground level.

5.2.3 The UTM coordinates of the borehole locations for all the twenty five boreholes are as follows :

BH No.	Boreholes Coordinates (m)	
	North	East
1	3189661.418	687451.5069
2	3189691.489	687482.9385
3	3189721.561	687514.3701
4	3189751.632	687545.8018
5	3189781.704	687577.2334
6	3189810.607	687549.5814
7	3189780.535	687518.1497
8	3189750.463	687486.7181
9	3189720.392	687455.2864

BH No.	Boreholes Coordinates (m)	
	North	East
10	3189690.32	687423.8548
11	3189719.223	687396.2027
12	3189749.294	687427.6344
13	3189779.366	687459.0660
14	3189809.438	687490.4977
15	3189839.509	687521.9294
16	3189868.412	687494.2773
17	3189838.340	687462.8457
18	3189808.269	687431.414
19	3189778.197	687399.9823
20	3189748.126	687368.5507
21	3189777.028	687340.8986
22	3189807.100	687372.3303
23	3189837.171	687403.7620
24	3189867.243	687435.1936
25	3189897.315	687466.6253

5.2.4 The diameter of the boreholes was 150/100mm.

5.2.5 Standard penetration tests were conducted at 1.5/3m intervals. Disturbed soil samples recovered from split spoon samplers were retained for identification purposes.

5.2.6 Undisturbed soil samples were recovered by thin walled Shelby tubes conforming to IS : 2132. These tubes had an area ratio of less then 10%.

5.2.7 The diameter of undisturbed soil samples was 50mm and the length was 45cm.

5.2.8 The ends of sample tubes were sealed by wax to prevent loss / ingress of moisture. Disturbed soil samples were enclosed in polythene bags.

5.2.9 The samples thus recovered were transported to the laboratory for testing purposes

5.2.10 Ground water table had been encountered in all the boreholes at a depth varying between 4.6m and 5.3m below the existing ground level, during the period of field investigation i.e. May - June 2023

6.0 LABORATORY INVESTIGATIONS

6.1 Tests on Soil Samples From Boreholes

6.1.1 The soil samples brought to the laboratory were subjected to various tests to determine the following properties :

a) Type of soil and its gradation

b) Consistency limits

c) Natural Bulk Density & Water Content

d) Strength parameters like cohesion, angle of shearing resistance

6.1.2 In order to determine the above properties, the following tests have been conducted :

a) Sieve analysis on coarse grained soil fraction

b) Hydrometer analysis on fine grained soil fraction

c) Liquid and plastic limits tests

d) Natural Density and Water Content determination

e) Triaxial compression tests

6.2 Chemical Analysis

6.2.1 The water samples and soil samples collected from the boreholes have been tested to determine the pH-value and the presence of salts harmful to reinforced cement concrete construction namely Chloride and Sulphate contents.

6.3 Modified Proctor Density Tests

6.3.1 The modified proctor density tests are conducted to determine the maximum dry densities and corresponding optimum moisture contents of the soil samples.

6.3.2 The UTM coordinates of the locations from where the samples had been collected for modified proctor density tests are as follows :

MPD	Coordinates (m)	
	North	East
1	3189715.832	687421.590
2	3189810.022	687520.040
3	3189755.574	687383.568
4	3189804.518	687465.104
5	3189837.756	687433.304

6.3.3 The modified proctor density test is conducted on a representative portion of air dried soil sample finer than 20mm.

6.3.4 The test involves first mixing thoroughly the air dried soil sample with a fixed known amount of water and filling the mixed soil in a mould of 1000cm^3 capacity with base plate attached, in five different layers of approximately equal weight with simultaneous compaction of each layer by giving 25 blows from a standard 4.9kg hammer falling through a standard 45cm height above the soil surface with the blows being distributed uniformly over the surface of each layer.

6.3.5 The density and the water content of the soil in the mould is determined. This process is repeated by gradually increasing the water content of the soil by adding fixed quantities of water till the measured densities after compaction show a decrease with increase in water content.

6.3.6 The maximum dry density and optimum moisture content of the soil is then determined from a plot of the measured dry density vs the corresponding measured water content of the soil.

7.0 RESULTS & ANALYSIS

7.1.1 The results of the boreholes investigations have been presented in the form of soil profile tables.

7.1.2 The soil profile tables indicate the following:

a) Standard penetration test values at various depths

b) Soil description identifying the type of soil

c) Grain size analysis indicating composition of subsoil

d) Atterberg limits

e) Natural density and water content

f) Triaxial compression test results

7.2 Soil Profile

7.2.1 A perusal of the data presented in the soil profile tables indicates that the subsoil mainly consists of the following four strata in the twenty five boreholes:

a) Stratum - I : Filled-up soil

b) Stratum - II : Clayey sandy silt with occasional gravel/ sandy clayey silt

c) Stratum - III : Silty sand with occasional clay and gravel

d) Stratum - IV : Sand with traces of silt and occasional gravel/ sand with silt

7.2.2 The thickness of the four strata in the twenty five boreholes are as follows :

BH. No.	Strata (depth in m : from : to)			
	Stratum - I	Stratum - II	Stratum - III	Stratum - IV
1	N.E.	0 - 4 7 - 8 9 - 19.8 23.2 - 26.2 28.5 - 30	4 - 4.5 8 - 9 19.8 - 23.2 26.2 - 28.5	4.5 - 7
2	N.E.	0 - 4 6 - 7 8 - 10 11.4 - 13.2 14.4 - 19 23 - 26 29 - 30	4 - 6 7 - 8 10 - 11.4 13.2 - 14.4 19 - 20.4 26 - 29	20.4 - 23
3	N.E.	0 - 4 7 - 10 11 - 18.7 19.5 - 21.7 28.5 - 30	4 - 5 6 - 7 10 - 11 18.7 - 19.5 21.7 - 28.5	5 - 6
4	N.E.	0 - 5 10 - 11 14.7 - 19.4 23 - 26.7 29.4 - 30	5 - 10 11 - 12.5 19.4 - 23	12.5 - 14.7 26.7 - 29.4
5	N.E.	0 - 3.5 6.7 - 7.5 8.7 - 12.5 13.5 - 26.2 28.5 - 30	7.5 - 8.7 12.5 - 13.5	3.5 - 6.7 26.2 - 28.5
6	0 - 1.5	1.5 - 4 6 - 10 11.7 - 20.4 23.9 - 26.4	5 - 6 10 - 11.7 26.4 - 30	4 - 5 20.4 - 23.9
7	0 - 0.8	0.8 - 4 6 - 10 11.2 - 14.2 15.7 - 18.2 28 - 30	4 - 6 10 - 11.2 14.2 - 15.7 18.2 - 28	N.E.

BH. No.	Strata (depth in m : from : to)			
	Stratum - I	Stratum - II	Stratum - III	Stratum - IV
8	0 - 0.8	0.8 - 4 6 - 8 8.5 - 10 11.7 - 20.7 23.7 - 30	4 - 6 8 - 8.5 10 - 11.7 20.7 - 23.7	N.E.
9	0 - 0.5	0.5 - 3 6 - 8 9 - 10 10.5 - 19.5 22.5 - 30	4 - 5 8 - 9 10 - 10.5 19.5 - 22.5	3 - 4 5 - 6
10	0 - 0.5	0.5 - 4 7 - 8 8.5 - 19 23.7 - 30	5 - 7 8 - 8.5 19 - 20.4	4 - 5 20.4 - 23.7
11	0 - 0.6	2 - 3.5 6.5 - 26.2 28.5 - 30	0.6 - 2 3.5 - 6.5 26.2 - 28.5	N.E.
12	N.E.	0 - 1.5 3 - 6 7 - 15.5 17 - 18.3 20.4 - 21.8	1.5 - 3 6 - 7 15.5 - 17 18.3 - 20.4 26.7 - 30	21.8 - 26.7
13	N.E.	0 - 4 6 - 8 9 - 12.7 13.5 - 18.7 28.5 - 30	4 - 4.5 8 - 9 12.7 - 13.5 18.7 - 22.5 26 - 28.5	4.5 - 6 22.5 - 26
14	N.E.	0 - 4 6 - 8 9 - 10 11 - 23.7 29.7 - 30	8 - 9 10 - 11 23.7 - 29.7	4 - 6
15	N.E.	4 - 5 6 - 10 11 - 20 25.8 - 30	0 - 4 10 - 11 20 - 25.8	5 - 6

BH. No.	Strata (depth in m : from : to)			
	Stratum - I	Stratum - II	Stratum - III	Stratum - IV
16	N.E.	0 - 2.8 8 - 10 11 - 20.7 23.7 - 26.4 29.4 - 30	2.8 - 4 7 - 8 10 - 11 20.7 - 23.7 26.4 - 29.4	4 - 7
17	N.E.	0 - 5 6.5 - 19.9 23.2 - 26 28.5 - 30	5 - 6.5 26 - 28.5	19.9 - 23.2
18	N.E.	0 - 2.5 7 - 23.7 28 - 30	2.5 - 7 23.7 - 28	N.E.
19	0 - 1	9 - 17.2 20.2 - 30	1 - 9 17.2 - 20.2	N.E.
20	0 - 2	2 - 3.5 7 - 9 14.8 - 30	3.5 - 5 9 - 12	5 - 7 12 - 14.8
21	N.E.	2 - 4 7 - 14.2 15.7 - 18.7 23 - 27.2 29.5 - 30	0 - 2 4 - 7 14.2 - 15.7 18.7 - 23	27.2 - 29.5
22	N.E.	6 - 7 8 - 19 29 - 30	0 - 4 5 - 6 7 - 8 19 - 29	4 - 5
23	N.E.	3 - 3.5 6 - 10 11 - 26	0 - 3 3.5 - 5 10 - 11 26 - 30	5 - 6
24	N.E.	3 - 5 9 - 10 11.2 - 19.8 26.7 - 30	0 - 3 5 - 9 10 - 11.2 19.8 - 26.7	N.E.

BH. No.	Strata (depth in m : from : to)			
	Stratum - I	Stratum - II	Stratum - III	Stratum - IV
25	0 - 1	3 - 4 7 - 10 11 - 20.2	1 - 3 4 - 5 6 - 7 10 - 11 20.2 - 30	5 - 6

N.E. : not encountered

7.2.3 The above results show that :

a) Stratum - I consisting of filled-up soils, has been encountered down to a maximum depth of about 2m below the existing ground level in occasional boreholes.

b) Stratum - II consisting predominantly of silty soils with varying percentages of clay and sand, is predominant down to the depth investigated except for random layers of stratum-III and stratum-IV inbetween.

c) Stratum - III consisting predominantly of sandy soils with significant percentages of silt, has been encountered randomly down to the maximum depth investigated.

d) Stratum - IV consisting predominantly of sandy soils, has been encountered in occasional thin layers between 4m and 29.5m depths, in occasional boreholes.

7.3 Soil Composition

7.3.1 The grain size distributions of the soil samples collected from various depths in the twenty five boreholes have been presented in the form of grain size analysis curves in figs. 6a to 6bl.

7.3.2 The variations in the grain size distributions in each of the three strata (except Stratum - I i.e. filled strata) in the twenty five boreholes are as follows:

a) Stratum - II : Clayey sandy silt with occasional gravel/ sandy clayey silt

BH. No.	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
1	0 - 23	46 - 62	46 - 65	3 - 27
2	0 - 10	11 - 41	51 - 74	6 - 18
3	0 - 11	3 - 44	40 - 69	5 - 29
4	0 - 8	12 - 46	42 - 70	8 - 22
5	0 - 26	10 - 39	37 - 70	8 - 22
6	0 - 15	5 - 43	44 - 71	9 - 28
7	0 - 7	7 - 36	49 - 70	7 - 28
8	0 - 8	5 - 41	51 - 72	3 - 23
9	0 - 10	3 - 44	45 - 70	3 - 38
10	0 - 16	6 - 49	47 - 78	6 - 36
11	0 - 6	6 - 48	40 - 74	6 - 22
12	0 - 7	29 - 43	42- 62	6 - 22
13	0 - 8	11 - 48	45 -73	4 - 17
14	0 - 17	16 - 39	45 - 69	3 - 26
15	0 - 22	5 - 44	48 - 69	6 - 26
16	0 - 10	7 - 45	45 - 69	3 - 25
17	0 - 18	4 - 43	48 - 71	5 - 25
18	0 - 11	14 - 46	42 - 76	3 - 18
19	0 - 17	7 - 51	41 - 73	8 - 20
20	0 - 10	16 - 43	49 - 67	4 - 15
21	0 - 14	8 - 43	45 - 73	3 - 21
22	0 - 3	5 - 38	49 - 78	5 - 33
23	0 - 8	23 - 39	42 - 75	7 - 17
24	0 - 20	3 - 43	45 - 73	4 - 46
25	0 - 7	8 - 35	51 - 75	9 - 17

b) Stratum - III : Silty sand with occasional clay and gravel

BH. No.	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
1	0	49 - 75	25 - 39	0 - 12
2	0 - 6	57 - 78	22 - 44	0 - 8
3	0 - 6	51 - 77	21 - 43	0 - 6
4	0 - 13	48 - 75	22 - 42	0 - 10
5	0	50 - 72	28 - 43	0 - 7
6	0 - 2	48 - 73	27 - 42	0 - 10
7	0 - 15	46 - 79	21 - 49	0 - 2
8	0 - 3	45 - 69	29 - 47	0 - 9
9	0 - 2	48 - 74	24 - 40	0 - 10
10	0 - 6	51 - 71	27 - 40	0 - 2
11	0	49 - 69	31 - 48	0 - 12
12	0 - 9	45 - 76	24 - 44	0 - 8
13	0 - 4	50 - 71	31 - 45	0 - 7
14	0 - 3	60 - 76	24 - 37	0
15	0 - 2	51 - 70	30 - 43	0 - 6
16	0	57 - 76	24 - 36	0 - 7
17	0 - 5	64 - 76	20 - 34	0 - 6
18	0 - 5	59 - 77	21 - 37	0 - 3
19	0 - 15	49 - 76	24 - 50	0 - 8
20	0 - 7	47 - 69	24 - 46	0 - 5
21	0 - 2	51 - 70	30 - 41	0 - 8
22	0 - 2	50 - 74	26 - 44	0 - 6
23	0 - 13	42 - 73	26 - 46	0 - 13
24	0 - 4	48 - 71	29 - 44	0 - 7
25	0 - 8	50 - 71	22 - 44	0 - 10

c) Stratum - IV: Sand with traces of silt and occasional gravel/ sand with silt

BH. No.	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
1	0	80 - 86	14 - 20	0
2	0	90	10	0
3	0	85	15	0
4	0	83 - 86	14 - 17	0
5	0	82 - 85	15 - 18	0
6	0	80 - 86	14 - 20	0
7		N.E.		
8		N.E.		
9	0	88	12	0
10	0 - 2	81 - 84	9 - 14	0
11		N.E.		
12	0	98	2	0
13	0	82 - 86	14 - 18	0
14	0 - 2	81 - 86	14 - 17	0
15	0	87	13	0
16	0 - 2	89 - 95	5 - 11	0
17	0	86	14	0
18		N.E.		
19		N.E.		
20	0	83 - 86	14 - 17	0
21	0	84	16	0
22	2	82	16	0
23	0	85	15	0
24		N.E.		
25	0	88	12	0

N.E. : not encountered

7.4 The above results indicate that :

a) Stratum - II consists of about 37% to 78% of silt, 3% to 62% of sand and 3% to 46% of clay with occasional gravel.

b) Stratum - III consists of about 42% to 79% of sand, 20% and 50% of silt with occasional clay and gravel.

c) Stratum - IV consists of an average of about 85% of sand and 15% of silt with occasional gravel.

7.5 Natural Density and Water Content

7.5.1 The natural bulk densities, water contents and dry densities of soil samples collected at various depths in twenty five boreholes vary as follows :

BH. No.	Bulk Density (g/cm^3)	Water Content (%)	Dry Density (g/cm^3)
1	1.69 - 2.04	11.8 - 24.0	1.51 - 1.77
2	1.98 - 2.08	12.3 - 24.5	1.63 - 1.83
3	1.75 - 2.11	8.4 - 27.8	1.61 - 1.74
4	1.93 - 2.11	16.1 - 31.1	1.58 - 1.77
5	1.91 - 2.12	14.7 - 26.9	1.64 - 1.78
6	1.90 - 2.07	16.7 - 27.8	1.57 - 1.73
7	1.86 - 2.07	11.6 - 22.7	1.62 - 1.73
8	1.75 - 2.08	11.3 - 31.6	1.57 - 1.76
9	1.95 - 2.10	16.1 - 22.1	1.66 - 1.78
10	1.81 - 2.08	15.4 - 28.6	1.56 - 1.77
11	1.75 - 2.12	11.8 - 28.9	1.57 - 1.74
12	1.76 - 2.09	12.2 - 26.7	1.57 - 1.78
13	1.75 - 2.10	13.8 - 23.6	1.54 - 1.73
14	1.86 - 2.15	10.4 - 34.9	1.50 - 1.85

BH. No.	Bulk Density (g/cm^3)	Water Content (%)	Dry Density (g/cm^3)
15	1.81 - 2.06	12.1 - 26.4	1.58 - 1.72
16	1.81 - 2.09	10.9 - 24.5	1.59 - 1.80
17	1.89 - 2.12	18.7 - 24.1	1.54 - 1.78
18	1.79 - 2.13	9.9 - 27.8	1.60 - 1.77
19	1.69 - 2.12	8.4 - 29.5	1.56 - 1.74
20	1.90 - 2.12	14.5 - 26.2	1.58 - 1.78
21	1.66 - 2.11	6.9 - 25.9	1.55 - 1.75
22	1.82 - 208	6.5 - 27.5	1.56 - 1.79
23	1.81 - 2.06	9.5 - 26.5	1.60 - 1.77
24	1.96 - 2.12	10.6 - 25.8	1.57 - 1.77
25	1.74 - 2.11	7.3 - 25.7	1.62 - 1.78

7.5.2 The dry densities of the soil have also been presented in the form of plots of dry density vs depth for the twenty five boreholes conducted, in figs 3a to 3e.

7.5.3 The above results indicate that the subsoil is in a loose to medium dense state down to about 10m depth below which the subsoil is in a medium dense state down to the depth investigated.

7.6 Atterberg Limits

7.6.1 The Atterberg limits indicate that the subsoil is generally low plastic down to the depth investigated except for random layers of non-plastic soils inbetween. Additionally, occasional thin layers of medium plastic soils have also been encountered between 11m and 13m depths.

7.7 Standard Penetration Tests Values (N-values)

7.7.1 The observed Standard Penetration Test values (N-values) vary between 2 and 98 as indicated in the soil profile tables and as also shown in the figs. 4a to 4e wherein the observed N-values have been plotted with respect to depth.

7.7.2 The above results indicate that the subsoil is in a loose to medium dense state down to about 10m depth below which the subsoil is in a medium dense state down to the depth investigated.

7.8 Triaxial Test Results

7.8.1 The results of triaxial tests are indicated in the respective soil profile tables. These results have been considered in providing the recommendations.

7.9 Modified Density Tests

7.9.1 Modified Proctor density tests have been conducted on the samples collected from the specified locations.

7.9.2 The results of the Modified Proctor density tests have been presented in the form of plots of dry density vs water content in figs. 5a to 5e.

7.9.3 The maximum dry densities and corresponding optimum moisture contents (OMC) determined from the above given tests for the various samples are as follows :

MPD Test No.	Modified Proctor Density	
	Maximum Dry Density (g/cm^3)	Optimum Moisture Content (%)
1	1.93	10.6
2	1.84	14
3	2.04	9.6
4	2.06	9.6

MPD Test No.	Modified Proctor Density	
	Maximum Dry Density (g/cm^3)	Optimum Moisture Content (%)
5	2.09	9.2

7.9.4 The results of Modified Proctor density indicate that the top soil at the site has maximum dry density or Modified Proctor density varying between 1.93 g/cm^3 and 2.09g/cm^3 for optimum moisture content varying between 9.2% and 14 %.

7.10 Chemical Analysis

7.10.1 The results of the chemical analysis conducted on water and soil samples collected from the twenty boreholes, for determining the presence of any harmful salts which can have adverse effects on concrete construction, are as follows :

a) Water Samples

Borehole no.	pH value	Chloride Content (ppm)	Sulphate Content (ppm)
BH1	7.5	>1000	742
BH2	8	>1000	764
BH3	8	>1000	698
BH4	8	>1000	762
BH5	7.5	>1000	624
BH6	8	>1000	678
BH7	8	>1000	700
BH8	8	>1000	689
BH9	7.5	>1000	715
BH10	8	>1000	700
BH11	8	>1000	650

Borehole no.	pH value	Chloride Content (ppm)	Sulphate Content (ppm)
BH12	8	>1000	726
BH13	8	>1000	710
BH14	7.5	>1000	648
BH15	8	>1000	705
BH16	7.5	>1000	680
BH17	7.5	>1000	649
BH18	8	>1000	490
BH19	7.5	>1000	659
BH20	8	>1000	570
BH21	8	>1000	630
BH22	7.5	>1000	580
BH23	6.5	508	371
BH24	8	>1000	660
BH25	8	>1000	720

b) Soil Samples

Borehole no./ Depth (m)	pH value	Chloride Content (ppm)	Sulphate Content (ppm)
BH1 / 3m	6.5	18	35
BH5 / 1m	6.5	22	41
BH7 / 2m	6.5	26	49
BH14 / 4m	6.5	19	37
BH18 / 3m	6.5	24	43
BH21 / 2m	6.5	25	41
BH25 / 6m	6.5	27	38

IS LIMITS	
pH value	*Not less than 6*
Chloride content (ppm)	*Maximum 500 ppm*
Sulphate content (ppm)	*Maximum 400 ppm*

7.10.2 The above results of chemical analysis of water samples have exceeded the IS limits. Hence, the water encountered in the boreholes should not be used for concrete construction works.

8.0 ANALYSIS OF LIQUEFACTION SUSCEPTIBILITY

8.1.1 Analysis of the susceptibility to liquefaction of the subsoil at the site has been carried out in the form of a comparison of the shear stress induced/developed in event of an earthquake with the in-situ shear resistance of the subsoil at various depths in the different boreholes.

8.1.2 This method has been found to be very reliable and is used as one of the main criteria in almost all countries. The shear stress induced/developed at different depths during an earthquake depends upon the overburden pressure and the soil characteristics while the shear resistance is calculated based on the N-values and other soil properties for a maximum repeated strain of 2%.

8.1.3 The shear stress induced/developed and the shear resistance offered by the soil are evaluated in terms of the Cyclic Stress Ratio (CSR) and the Cyclic Resistance Ratio (CRR) respectively. The CSR is the ratio of the shear stress developed to the effective overburden pressure at various depths while the CRR is the ratio of the shear resistance of the soil to the effective overburden pressure at various depths. The analysis of variation of the CSR and the CRR with depth based on the results of each of the boreholes conducted, have been given in figs. C1 to C25 of this report.

8.1.4 The soil will liquefy in the depth zones where the CSR exceeds the CRR i.e. where the shear stress developed exceeds the shear resistance or in other words, where the factor of safety defined as the ratio of the CRR to CSR, is less than 1.

8.1.5 From the above analysis, it can be observed that subsoil down to about 10m depth is susceptible to liquefaction.

8.1.6 Considering the above and also that the site is located in Seismic Zone - IV of seismic zoning map of India, the subsoil down to about 10m depth has been considered to be susceptible to liquefaction. Hence shallow foundations are not feasible, the proposed structures shall have to be supported over ***Straight Bored Pile foundations***.

9.0 DESIGN CRITERIA

9.1 Design Parameters

9.1.1 The parameters required for the design of the foundation system for the proposed structures are:

a) Type of foundation to be adopted

b) Depth at which the foundations have to be laid

c) Allowable bearing pressure on the soil/rock at the foundation level

9.1.2 On the basis of the analysis of the results of the investigations, the required design parameters have been arrived at as given in the following sections.

9.2 Type of Foundation

9.2.1 The type of foundation depends upon the following :

a) Subsoil/rock conditions

b) Type of structure

c) Configuration of loading points

d) Loading intensity on each column at the foundation level

9.2.2 The proposed structures are Factory Buildings.

9.2.3 Considering the above, medium heavy loads can be anticipated on the foundations.

9.2.4 The results of the investigations have shown that the subsoil below the likely founding is in a loose to medium dense state down to about 10m depth below which the subsoil is medium dense state down to the depth investigated.

9.2.5 As mentioned in the earlier sections, the subsoil strata down to about 10m depth has been considered to be susceptible to liquefaction.

9.2.6 In view of the above, the proposed structures can be supported over ***Straight Bored Pile foundations.***

9.2.7 However, boundary wall and minor structures of less importance at ground level, can be supported over ***Isolated / Strip Footing***.

9.3 Depth of Pile Foundation

9.3.1 The minimum depth of pile foundations depends upon the following factors :

a) Top filled-up strata / loose soil, if any

b) Adequate depth of soil strata below the founding level of the pile foundations of requisite strength to mobilize the safe end bearing capacity

c) Adequate depth of soil strata above the founding level of the pile foundations of requisite strength to mobilize the safe friction capacity.

9.3.2 Taking the above into consideration, the pile foundations for the proposed structures shall be made to rest at a depth greater than 17m below the existing ground level. Accordingly, considering the cut-off level of the piles as 2m below the existing ground level and effective length of piles of 15m, 20m and 25m, the founding levels of the piles will be about 17m, 22m and 27m respectively, below the existing ground level.

9.3.3 The soil encountered at the founding levels of the pile foundations will either be ***Yellowish brown clayey sandy silt or silty sand.***

9.4 Pile Capacities

9.4.1 Load carrying capacities of bored pile foundation have been analysed and given for piles having various diameters and effective length.

9.4.2 The parameters considered for the analysis of the pile capacities are given below :

S. No.	Parameter	Value/s
1	Effective length (m)	15 & 20
2	Cohesion (kg/cm²)	0.10
3	Angle of shearing resistance	27°
4	Submerged density (g/cm³)	0.8
5	SPT Value at pile tip	15 & 25
6	Factor of safety	2.5

9.4.3 Considering the above parameters, the following safe pile capacities have been recommended for various diameters and effective lengths of piles.

Pile Dia (mm)	*Pile Effective Length (m)*	*Pile Vertical Load Capacity (tons)*	*Uplift Capacity of pile (tons)*	*Safe Lateral Load Capacity of pile (tons)*	
				Free Head	*Fixed Head*
450	15	25	10	0.1	0.2
600	15	40	20	0.1	0.4
	20	70	35		
800	15	65	30	0.3	1
	20	115	55		
	25	145	80		

9.4.4 As the subsoil down to about 10m depth below the existing ground level has been considered to be susceptible to liquefaction, the frictional component down to this depth has been neglected for evaluating the above recommended pile capacities.

9.4.5 The typical calculations of safe pile capacity and safe uplift pile capacity have been given in Appendix - A.

9.4.6 The group action of piles depends upon the number of piles in the group and their arrangement. Therefore, the efficiency factor for each pile group can be considered and checked as per the relevant BIS codes.

9.5 Special Note

9.5.1 After reaching the required depth in the pile bore, 15cm thick layer of gravel should be placed and compacted at the bottom so that the slush formed at the bottom is diminished.

9.6 Depth of Isolated/ Strip Footings

9.6.1 The minimum depth of shallow foundations depends upon the following factors :

a) Top filled-up strata / loose soil, if any

b) Adequate depth of soil above founding level, to ensure mobilization of full safe bearing capacity

c) Adequate depth of soil strata below founding level of requisite strength to mobilize the safe bearing capacity

9.6.2 The results of the investigations have indicated that the subsoil is in a loose to medium dense state down to about 10m depth below which the subsoil is in a medium dense state down to the depth investigated.

9.6.3 Considering the above, the foundations for the boundary wall can be placed at a depth of ***2m below the existing ground level***.

9.6.4 The soil available at the founding level of Isolated/Strip footings will either be ***Yellowish brown clayey sand silt / sandy clayey silt or silty sandy soils.***

9.7 Allowable Bearing Pressure

9.7.1 Allowable bearing pressure depends upon the allowable settlement. Allowable settlements of 50mm has been considered to evaluate the allowable bearing pressures for ***Isolated/Strip Footings***.

9.7.2 Allowable bearing pressure has been evaluated by :

a) Shear failure criterion using average soil data

b) Settlement criterion taking SPT values

9.7.3 On the basis of the above analysis, the following recommendations regarding the net allowable bearing pressure are being made :

Net allowable bearing pressure (A.B.P.) for various widths of Isolated/Strip Footings for an allowable settlement of 50mm

Width of foundation (m)	*1.5*	*3*
Net Allowable Bearing Pressure (t/m^2)	*6 t/m^2 for all the widths*	

9.8 Note

9.8.1 As mentioned in the earlier sections, the subsoil strata down to about 10m depth has been considered to be susceptible to liquefaction. Hence, shallow foundations are not feasible. However, the above allowable bearing pressures have been given considering that in the event of an earthquake, there is a possibility that the foundations may under go differential settlements which may cause distress to the minor structure of less importance at ground level and develop cracks. In such a case repair/ reconstruction of the boundary wall may have to be taken up accordingly.

10.0 RECOMMENDATIONS

10.1 Type of Foundations

a) *Straight Bored Pile foundations*

b) *Isolated/ Strip Footings (for minor structures at ground level)*

10.2 Depth of Foundations

a) For Pile Foundations

Considering the cut-of level of the piles as 2m below the existing ground level and for effective length of pile of 15m, 20m *and 25m the pile shall rest at a depth of about 17m,22m and 27m respectively, below the existing ground level.*

b) For Isolated/ Strip Footings (for minor structures at ground level)

2m below the existing ground level

10.3 Safe Pile Capacities

Pile Dia (mm)	*Pile Effective Length (m)*	*Pile Vertical Load Capacity (tons)*	*Uplift Capacity of pile (tons)*	*Safe Lateral Load Capacity of pile (tons)*	
				Free Head	*Fixed Head*
450	15	25	10	0.1	0.2
600	15	40	20	0.1	0.4
	20	70	35		
800	15	65	30	0.3	1
	20	115	55		
	25	145	80		

10.4 Allowable Bearing pressure

10.4.1 For boundary wall, Net allowable bearing pressure (A.B.P.) for various widths of Isolated/Strip Footings for an allowable settlement of 50mm

Width of foundation (m)	***1.5***	***3***
Net Allowable Bearing Pressure (t/m^2)	***6 for all the widths***	

10.4.2 The above allowable bearing pressures have been given considering that in the event of an earthquake, there is a possibility that the foundations may under go differential settlements which may cause distress to the minor structure of less importance at ground level and develop cracks. In such a case repair/ reconstruction of the boundary wall may have to be taken up accordingly.

10.5 Note

10.5.1 As the subsoil down to about 10m depth below the existing ground level has been considered to be susceptible to liquefaction, the frictional component down to this depth has been neglected for evaluating the pile capacities.

10.5.2 The above recommended safe pile capacities have been arrived at on the basis of provisions given in the BIS code IS:2911 (Part1/Sec2) - 2010 and can therefore, be used for design purposes. These pile capacities should be confirmed / validated by carrying out initial pile load test/s as per the provisions given in BIS code IS:2911 (Part-4) - 2013, prior to finalizing the working loads on the pile foundations.

10.6 Special Note

10.6.1 For straight bored pile foundations, after reaching the required depth in the pile bore, 15cm thick layer of gravel should be placed and compacted at the bottom so that the slush formed at the bottom is diminished.

10.6.2 For Isolated/Strip footing, surface must be compacted heavily. If any loose pockets are observed, the same shall be filled with brickbats/gravel and compacted. Foundations can subsequently be placed over such a prepared surface.

10.7 Appendices

10.7.1 An appendix sheet showing the typical analysis of vertical pile capacity and uplift pile capacity calculations have been given in Appendix - A of this report.

10.7.2 An appendix sheet showing the typical analysis of Lateral load capacity of the pile has been given in Appendix - B of this report.

10.7.3 An appendix sheet showing the typical analysis of the allowable bearing pressure for Isolated/ Strip Footings is enclosed in Appendix - C of this report.

10.7.4 An appendix sheet showing the typical procedure for liquefaction analysis is given in Appendix - D of this report.

10.7.5 A list of IS Codes referred for providing the recommendations and that which might be required to implement the same is also enclosed in this report in Appendix - E.

10.8 NOTE

The recommendations given in this report have been arrived at on the basis of design parameters which have been judiciously adopted by giving due consideration to the results of field and laboratory investigations as well as NAGADI's experience of over four decades in working in various types of soil and rock conditions all over India.

10.9 LIMITATIONS

This geotechnical investigations have been carried out at locations in the site chosen by the clients so as to represent the entire site. The recommendations provided in this report are hence valid only for these test locations. However, if there is any change in subsoil conditions and properties at places between or beyond chosen test locations, fresh investigations will have to be carried out at such locations.

Dr. N. Santosh Rao

Technical Director

*For **Nagadi Consultants Pvt. Ltd***

Appendix -A

(refer para no. 10.7.1)

CALCULATIONS FOR PILE CAPACITY

A.1 Methodology

A.1.1 A typical calculation for the pile capacity has been given hereunder for a pile of diameter 'D' = 600mm and for a length of pile 'L' = 20m.

A.1.2 The pile is designed primarily as an end bearing cum friction pile.

A.1.3 The end bearing capacity has been determined based on observed N-values while the friction capacity has been determined as per the relevant provisions of the BIS code IS:2911(part1/sec4).

A.1.4 For determining the end bearing capacity, the N- value at the level of the pile tip has been taken as 25.

A.1.5 For determining the friction capacity, the average angle of shearing resistance ϕ has been taken as 27° and the frictional resistance developed in the top 8m length (i.e. L_1 below cutoff level of 2m below the existing ground level) of the pile foundation is neglected on account of the possibility of liquefaction of the subsoil.

A.1.6 A typical sketch showing the considered design parameters of the pile section and soil layers for pile capacity calculations, has been given in sheet no. 41 of the report.

A.2 DETERMINATION OF PILE CAPACITY

A.2.1 Pile end bearing capacity based on N-values

A.2.1.1 The ultimate end bearing capacity of the Bored pile foundation is determined as given below:

$$Q_{bu} = 10 \cdot N \cdot A_p$$

where N = N-value at the level of the pile tip

$A_p = \frac{\pi \cdot D^2}{4}$ = cross - sectional area of pile toe = 2827 cm^2

D = diameter of pile shaft = 600 mm

A.2.1.2 Therefore, the ultimate end bearing capacity of the bored pile foundation is :

Q_{bu} = 70.7 tons

A.2.2 Pile friction capacity based on IS:2911 (Part 1/Sec 4)

A.2.2.1 The ultimate friction capacity of the pile is :

$$Q_{fu} = \pi \cdot D \cdot (L - L_1) \cdot \alpha \cdot c + \sum_1^n K \cdot P_{Di} \cdot \tan\delta \cdot A_{si}$$

where c = cohesion of the soil along the pile shaft = 0.1 kg/cm^2

α = adhesion factor = 1

K = coefficient of earth pressure = 1

P_{Di} = effective overburden pressure at for the ith layer = $\gamma.d_i$

γ = submerged unit weight of soil below water table = 0.8 g/cm^3

d_i = depth of the ith layer from ground level

A_{si} = surface area of the pile stem in the ith layer

δ = angle of wall friction between pile and soil

= ϕ = angle of shearing resistance of the soil = 27°

A.2.2.2 For calculation purposes, the submerged unit weight of the soil has been taken as the effective unit weight of the soil. The submerged unit weight considered is 0.8 g/cm^3.

A.2.2.3 As per the IS provisions, the effective overburden pressure P_{Di} is limited to a value equivalent to a depth of overburden equal to 15 times the diameter of the pile.

A.2.2.4 The skin friction capacity 'Q_{fu}' is determined as :

$$Q_{fu} = \pi \cdot d \cdot (L - L_1) \cdot \alpha \cdot c + K \cdot \tan\delta \cdot \begin{bmatrix} \frac{1}{2} \cdot (\gamma \cdot 15 \cdot D) \cdot (15 \cdot D) \cdot (\pi \cdot D) + \\ (\gamma \cdot 15 \cdot D) \cdot (L - 15 \cdot D) \cdot (\pi \cdot D) - \\ \frac{1}{2} \cdot (\gamma \cdot L_1) \cdot (L_1) \cdot (\pi \cdot D) \end{bmatrix}$$

For $L_1 > 15$ *times the pile diameter D*

$$Q_{fu} = \pi \cdot D \cdot (L - L_1) \cdot \alpha \cdot c + K \cdot \tan\delta \cdot \left[(\gamma \cdot 15 \cdot D) \cdot (L - L_1) \cdot (\pi \cdot D) \right]$$

A.2.2.5 The skin friction capacity 'Q_{fu}' of the Bored pile foundation is :

Q_{fu} = 105.2 tons

A.3 SAFE PILE CAPACITY

A.3.1 The safe pile capacity is determined by applying appropriate factors of safety to the ultimate values determined above. A factor of safety of 3 has been adopted for determination of the safe pile capacity.

A.3.2 Therefore, the safe pile capacity of Bored pile foundation is :

$$Q_s = \frac{Q_{bu} + Q_{fu}}{2.5}$$

Hence,

Q_s = 70.4 tons say 70 tons

A.4 SAFE UPLIFT PILE CAPACITY

A.4.1 The safe pile uplift capacity is determined by applying appropriate factors of safety to the ultimate frictional value determined above. A factor of safety of 3 has been adopted for determination of the safe uplift pile capacity.

A.4.2 Therefore, the safe uplift pile capacity of Bored pile foundation is :

$$Q_{us} = \frac{Q_{fu}}{3}$$

Hence,

Q_{us} = 35.1 tons say 35 tons

Appendix -B

(refer para no. 10.7.2)

TYPICAL CALCULATION OF LATERAL PILE LOAD CAPACITY

(As per IS : 2911 (Part1/Sec2) - 2010)

B.1 Methodology

B.1.1 A typical calculation for the lateral pile load capacity has been given hereunder for a pile of diameter 'D' = 600mm.

B.1.2 For determining the lateral pile load capacity, the depth of fixity of the piles or in other words, the equivalent cantilever length of the pile, has to be first determined. The depth of fixity is determined based on the modulus of horizontal subgrade reaction η_h value which in turn is considered based on the relative density/ soil consistency of the soil as observed in the boreholes conducted, as per table 3 of Annex - C of the BIS code IS:2911(part1/sec2).

B.1.3 Considering that the soil in is on an average in a loose to medium dense state, the modulus of horizontal subgrade reaction can be taken as $\eta_h = 2.12 \times 10^3$ kN/m^2 or 0.212 kg/cm^3 applicable for submerged conditions (as ground water table is at a shallow depth), as per table 1 of Annex - C of the BIS code IS:2911(part1/sec2).

B.1.4 Considering the subsoil to be susceptible to liquefaction down to about 10m depth below the existing ground level, in the event of earthquake the restraint provided by the soil against lateral load on the pile will almost nil within this depth. Hence the pile length of about 8m below cut off level (i.e. 2m below the existing ground level) will behave like cantilever (i.e. e =8m).

B.2 Stiffness Factor and Depth of Fixity

B.2.1 The stiffness factor T is calculated as per C - 2.3.1 of Annex - C of the BIS code IS:2911(part1/sec2) , as given below:

$$Stiffness.\,factor = T = 5\sqrt{\frac{EI}{\eta_h}}$$

Stiffness factor = T = 2.42 m

B.2.2 The equivalent cantilever length or in other words the depth of fixity (**L_e**) of the pile works out to be based on stiffness factor (T) and the plot given in fig.4 in C - 3 of Annex - C of the BIS code IS:2911(part1/sec2)

L_e = 1.9 × T = 1.9 × 2.42 = 4.59m (for free head condition)

L_e = 2.2 × T = 2.2 × 2.42 = 5.31m (for fixed head condition)

B.2.3 The lateral pile load capacity is then determined as the horizontal force required for causing the allowable horizontal deflection of the pile head when considering the pile as a cantilever.

B.2.4 For calculation purposes, the concrete of pile has been considered to be of M30 grade.

B.2.5 For the determination of the lateral pile load capacity, the allowable horizontal deflection of the pile head has been considered as 5mm based on the provisions of clause 7.4 of BIS code IS:2911 (Part4) - 1985.

B.3 Determination of Lateral Pile Load Capacity

B.3.1 The horizontal deflection of the pile head, is determined by the following equations :

$$y = \frac{Q_L \cdot (e + z_f)^3}{3 \cdot E \cdot I} \quad \text{(for free head condition)}$$

$$y = \frac{Q_L \cdot (e + z_f)^3}{12 \cdot E \cdot I} \quad \text{(for fixed head condition)}$$

where,

e = cantilever length above ground/ bed to the point of load application

z = depth to point of fixity

B.3.2 The flexural rigidity 'E·I' of the pile section has to be then determined by taking into account the flexural rigidity provided by the reinforcement. For this purpose, the moment of inertia 'I' is determined by taking into account the area of reinforcement along with the appropriate value of modular ratio 'm'.

B.3.3 The elastic modulus of concrete is determined as :

$$E = 5000 \cdot \sqrt{f_{ck}}$$

Where f_{ck} = characteristic strength of concrete = 30N/mm^2

Hence, E = 27,386 N/mm^2 or 273,860 kg/cm^2

B.3.4 The moment of inertia of the pile section is determined as :

$$I = \frac{\pi \cdot d^4}{64}$$

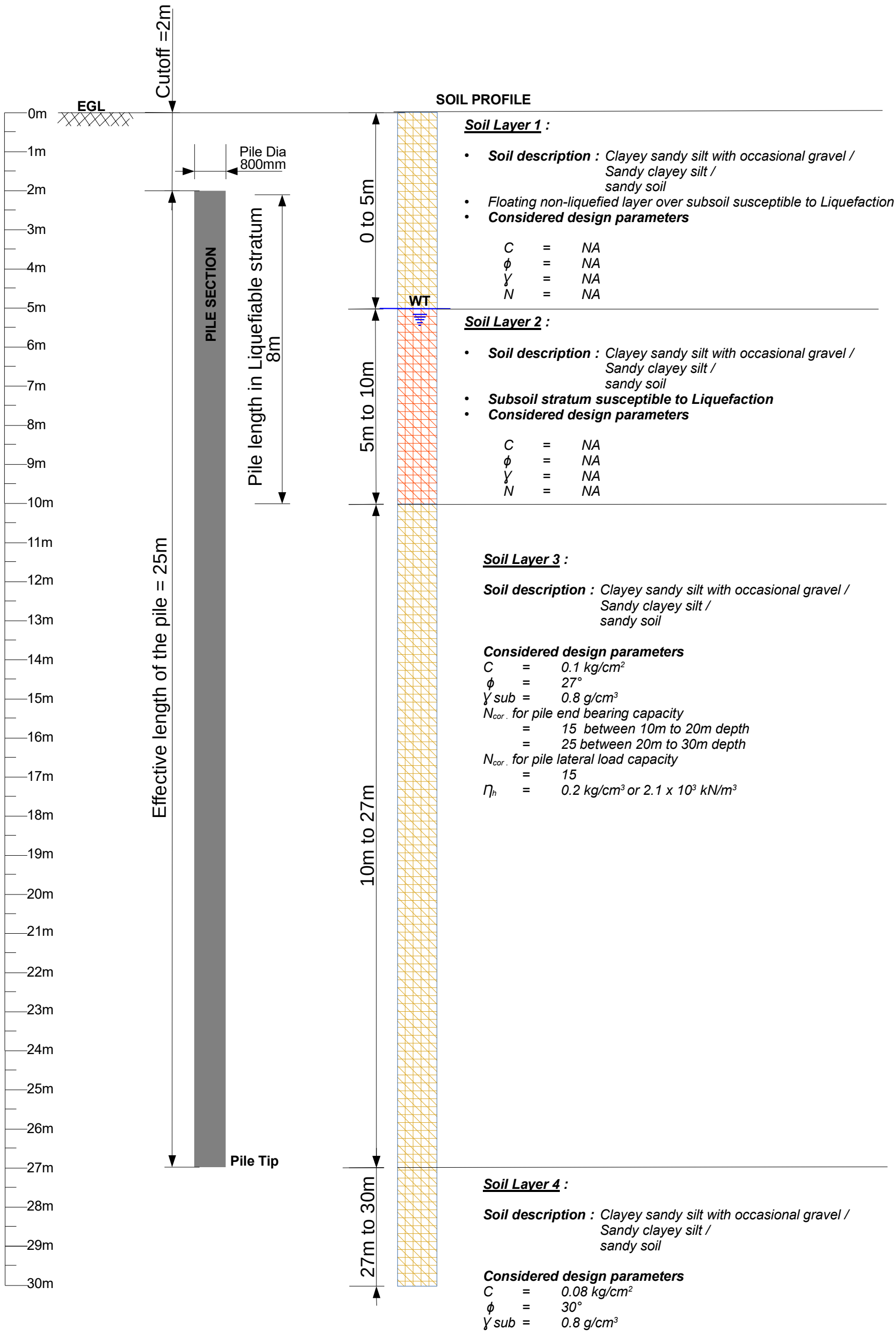
Hence, I = 636173512 mm^4 = 636173 cm^4

B.3.2 Considering an allowable horizontal deflection of the pile head of 5mm, the lateral pile load capacity works out to be :

Q_L = 0.1 tons (for free head condition)

Q_L = 0.4 tons (for fixed head condition)

TYPICAL SKETCH OF PILE SECTION AND SOIL LAYERS
(Soil Parameters for Pile Capacity Calculations)



Note : *The above sketch is not to scale*

Appendix - C

(refer para no. 10.7.3)

ANALYSIS FOR ALLOWABLE BEARING PRESSURE

Data

(i) Soil Properties :

(kg/cm^2) = 0.10 ϕ = 22° γ (g/cm^3) = 1.75

(ii) Depth of Foundation, D (m) = 2

(iii) Allowable Settlement, s (mm) = 50

Atypical sketch showing the considered design parameters of the Isolated / Strip footing and soil layers for foundation bearing pressure calculations, has been given in sheet no. 43 of the report.

Shear Failure Criterion (Ref. IS : 6403)

N_c' = 13.95 N_q' = 5.89 N_γ'= 4.90 R_w' =R_w = 0.50 (*worst case*)

$$q_s = \frac{1}{3}\cdot\left(c\cdot N_c' + 0.5.\gamma\cdot B\cdot N_\gamma'\ Rw + \gamma\cdot D\cdot N_q'.\ R_w'\right) - \gamma\cdot D.\ R_w'$$

B (m)	1.5	3	>4.5
q_s (t/m^2)	7.4	8.5	-

Settlement Criterion (Ref. IS : 8009)

(i) From N Values

B (m)	1.5	3	>4.5
H (m)	3	6	9
N_{av}	8	9	10
q_a (t/m^2)	6.2	6.3	-

(ii) From Triaxial Compression Tests

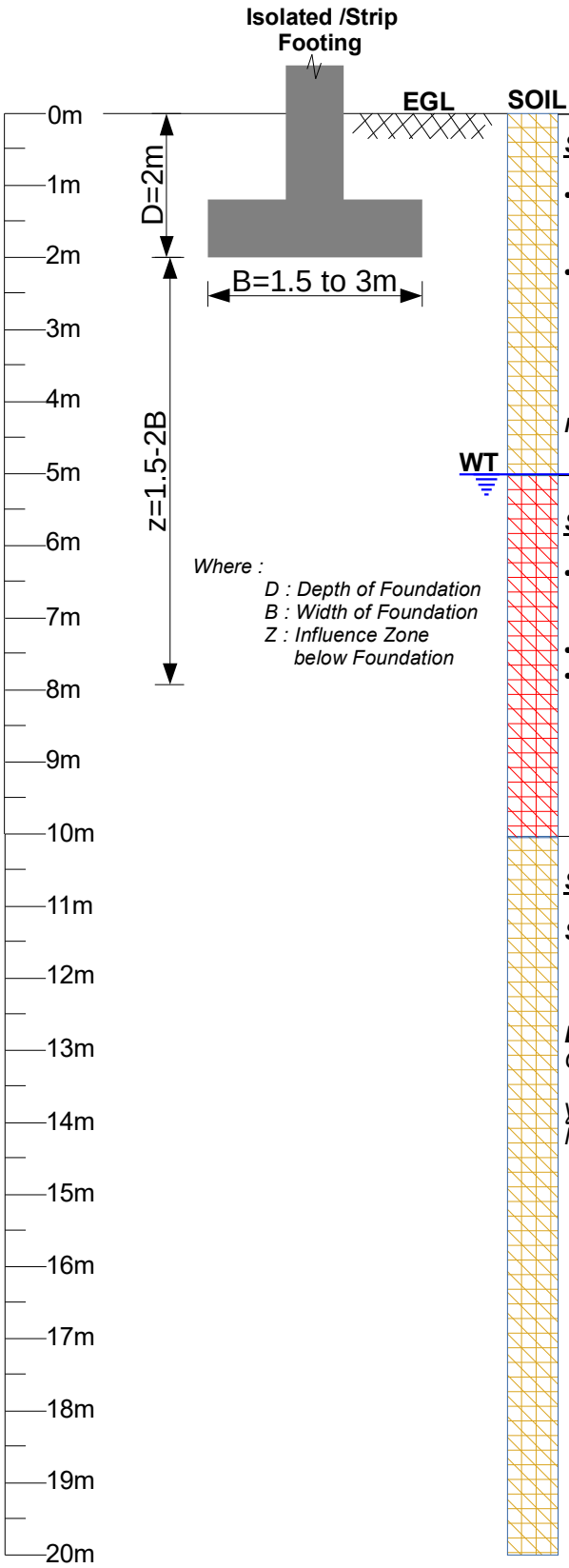
$$q_a = \frac{s}{m_v\cdot H}$$

B (m)	1.5	3	>4.5
H (m)	3	6	9
m_v $(t/m^2)^{-1}$	-	-	-
q_a (t/m^2)	-	-	-

ADOPT	B (m)	1.5	3	>4.5
	q (t/m^2)	6	6	-

Note : ***q_s and q_a are NET VALUES, Weight of backfill etc. need not be added to the loading except in case of filling above original G.L.***

TYPICAL SKETCH OF SHALLOW FOUNDATION AND SOIL LAYERS
(Soil Parameters for Shallow Foundation Calculation)



Soil Layer 1 :

- ***Soil description :*** *Clayey sandy silt with occasional gravel / Sandy clayey silt / sandy soil*
- ***Considered design parameters***

C	=	$0.1\ kg/cm^2$
ϕ	=	$22°$
γ	=	$1.75\ g/cm^3$
N_{cor}	=	8 to 10
WT	=	0.5 for worst conditions

Note: *This soil layer is also under susceptibility to liquefaction as this is a floating non-liquefied layer over subsoil susceptible to Liquefaction*

Soil Layer 2 :

- ***Soil description :*** *Clayey sandy silt with occasional gravel / Sandy clayey silt / sandy soil*
- ***Subsoil stratum susceptible to Liquefaction***
- ***Considered design parameters same as given above***

Soil Layer 3 :

Soil description : *Clayey sandy silt with occasional gravel / Sandy clayey silt / sandy soil*

Design parameters

C	=	$0.10\ kg/cm^2$
ϕ	=	$27°$
γ	=	1.75 to $1.80\ g/cm^3$
$N_{cor.}$	=	15

Note : *The above sketch is not to scale*

Appendix - D

(refer para no. 10.7.4)

STANDARD PROCEDURE FOR LIQUEFACTION ANALYSIS

(Reference : Annex F of IS 1893 Part 1- 2016)

B.1 EVALUATION OF CYCLIC STRESS RATIO (CSR)

$$CSR = (\tau_{av} / \sigma'_{vo}) = 0.65(a_{\max} / g).(\sigma_{vo} / \sigma'_{vo}).r_d \qquad \textbf{(i)}$$

where, $r_d = (1.0 - 0.00765z), for, (z \le 9.15m)$

$$r_d = (1.174 - 0.0267z), for, (9.15m < z \le 23m)$$

B.2 EVALUATION OF LIQUEFACTION RESISTANCE (CRR)

$$CRR_{7.5} = f(N_1)_{60} \qquad \textbf{(ii)}$$

$$\textbf{i.e.}\ CRR_{7.5} = \frac{1}{34 - (N_1)_{60}} + \frac{(N_1)_{60}}{135} + \frac{50}{[10.(N_1)_{60} + 45]^2} - \frac{1}{200}$$

B.2.1. Influence of Fine Content

$$(N_1)_{60cs} = \alpha + \beta(\mathrm{N}_1)_{60}$$

where, $\alpha = 0, for, (FC \le 5\%)$

$$\alpha = \exp[1.76 - (190 / FC^2)], for, (5\% < FC < 35\%)$$

$$\alpha = 5, for, (FC \ge 35\%)$$

$$\beta = 1, for, (FC \le 5\%)$$

$$\beta = [0.99 + (FC^{1.5} / 1{,}000)], for, (5\% < FC < 35\%)$$

$$\beta = 1.2, for, (FC \ge 35\%)$$

B.2.1. Other Corrections

$$(N_1)_{60} = N_m C_N C_E C_B C_R C_S$$

B.3 *NOTATIONS*

Notation	Description
CSR	Cyclic Stress Ratio
CRR	Cyclic Resistance Ratio
σ_{vo}	Total Vertical Overburden Stresses
σ'_{vo}	Effective vertical overburden stresses
τ_{av}	Average horizontal shear stress acting on soil layer during shaking generated by given earthquake
a_{max}	Peak horizontal acceleration at ground surface
g	Acceleration of gravity
r_d	Stress reduction coefficient to account for flexibility in soil profile
z	Depth below ground surface (m)
$CRR_{7.5}$	Cyclic resistance ratio for $M_w = 7.5$ earthquakes
$(N_1)_{60}$	Corrected standard penetration resistance
$(N_1)_{60cs}$	$(N_1)_{60}$ adjusted to equivalent clean-sand value
N_m	Measured standard penetration resistance
C_N	Correction factor for overburden pressure applied to SPT
C_E	Correction factor for hammer energy
C_B	Correction factor for borehole diameter
C_R	Correction factor for drilling rod length
C_S	Correction factor for split spoon sampler without liners
α, β	Coefficients, that are functions of fines content, used to correct $(N_1)_{60}$ to $(N_1)_{60cs}$

Appendix - E

(refer para no. 10.7.5)

LIST OF IS CODES

Field Investigation

1. IS : 1892 - 2021 : Code of practice for sub surface investigations for foundations (First revision)
2. IS : 2131 - 1981 : Method of Standard Penetration Tests for soils (First revision)
3. IS : 2132 - 1986 : Code of practice for thin walled tube sampling of soils (Second revision)

Laboratory Tests

1. IS : 2720 - 1983 (Part 1) : Methods of test for soils: Preparation of dry soil samples for various tests (Second revision)
2. IS : 2720 - 1980 (Part 2) : Method of test for soils: Determination of water content (Second revision) Amendment 1
3. IS : 2720 - 1980 (Part 3/sec 1) : Method of Test for Soils : Determination of Specific Gravity : Fine Grained Soils. (First Revision)
4. IS : 2720 - 1980 (Part 3/Sec 2) : Method of test for soils : Determination of Specific Gravity : Fine, Medium & Coarse grained soils. (First revision)
5. IS : 2720 - 1985 (Part 4) : Method of test for soils : Grain size analysis (Second revision)

6.	IS : 2720 (Part 8) -1983:	Determination of water content - dry density relation using heavy compaction. (First revision)
7.	IS : 2720 - 1985 (Part 5) :	Method of test for soils : Determination of liquid and plastic limit (Second revision)
8.	IS 2720-1981 Part 12:	Method of tests for soils : Determination of shear strength parameters using triaxial apparatus.
9.	IS : 2720 -1987 (Part 26):	Methods of tests for soils: Determination of pH value (Second revision).
10.	IS :2720 - 1977 (Part 27):	Methods of tests for soils: Determination of total soluble sulphate (First revision).

Foundation Construction

1.	IS : 1080 - 1986 :	Code of practice for design and construction of shallow foundations on soils (other than raft, ring and shell) (Second revision)
2.	IS : 1904 - 1986 :	Code of practice for design and construction of foundation in soils: General requirements (Third revision)
3.	IS : 6403 - 1981 :	Code of practice for determination of bearing capacity of shallow foundations : First revision (Amendment 1)
4.	IS : 8009 - 1976 (Part 1) :	Code of practice for calculation of settlements of foundations : Shallow foundations subject to symmetrical static vertical loads (Amendment 2)

5. IS : 2911 - 1979 (P1/Sec 1): Code of practice for design and construction of pile foundations : concrete piles - Driven cast insitu (First revision) Amendment 2

Analysis of Susceptibility to Liquefaction for Borehole BH1

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	15	1.70	1	1	0.75	1	19	67	5.00	1.200	28	**0.370**	***2.37***
2	0.24	1.000	0.998	**0.156**	8	1.64	1	1	0.8	1	11	67	5.00	1.200	18	**0.192**	***1.23***
3	0.24	1.057	0.998	**0.164**	7	1.34	1	1	0.85	1	8	64	5.00	1.200	15	**0.160**	***0.97***
4	0.24	1.207	0.997	**0.188**	17	1.16	1	1	0.85	1	17	25	4.29	1.115	23	**0.257**	***1.37***
5	0.24	1.315	0.996	**0.204**	15	1.05	1	1	0.95	1	15	20	3.61	1.079	20	**0.215**	***1.05***
6	0.24	1.398	0.995	**0.217**	5	1.00	1	1	0.95	1	5	14	2.20	1.042	7	**0.088**	***0.40***
7	0.24	1.463	0.995	**0.227**	7	0.95	1	1	0.95	1	6	65	5.00	1.200	12	**0.131**	***0.58***
8	0.24	1.515	0.994	**0.235**	9	0.91	1	1	0.95	1	8	37	5.00	1.200	15	**0.160**	***0.68***
9	0.24	1.558	0.993	**0.241**	8	0.88	1	1	1	1	7	57	5.00	1.200	13	**0.141**	***0.58***
10	0.24	1.594	0.907	**0.226**	10	0.85	1	1	1	1	8	82	5.00	1.200	15	**0.160**	***0.71***
11.4	0.24	1.635	0.870	**0.222**	11	0.81	1	1	1	1	9	92	5.00	1.200	16	**0.170**	***0.77***
12.9	0.24	1.671	0.830	**0.216**	27	0.77	1	1	1	1	21	55	5.00	1.200	30	**0.468**	***2.16***
14.4	0.24	1.701	0.790	**0.209**	21	0.74	1	1	1	1	15	54	5.00	1.200	23	**0.257**	***1.23***
15.9	0.24	1.725	0.749	**0.202**	15	0.71	1	1	1	1	11	74	5.00	1.200	18	**0.192**	***0.95***
17.4	0.24	1.746	0.709	**0.193**	14	0.68	1	1	1	1	10	67	5.00	1.200	17	**0.181**	***0.94***
18.9	0.24	1.764	0.669	**0.184**	24	0.66	1	1	1	1	16	63	5.00	1.200	24	**0.273**	***1.48***
20.4	0.24	1.780	0.629	**0.175**	59	0.64	1	1	1	1	38	26	4.39	1.123	47	**0.500**	***2.86***

Analysis of Susceptibility to Liquefaction for Borehole BH2

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	21	1.70	1	1	0.75	1	27	61	5.00	1.200	37	**0.500**	***3.21***
2	0.24	1.000	0.998	**0.156**	7	1.64	1	1	0.8	1	9	84	5.00	1.200	16	**0.170**	***1.09***
3	0.24	1.037	0.998	**0.161**	8	1.34	1	1	0.85	1	9	61	5.00	1.200	16	**0.170**	***1.05***
4	0.24	1.188	0.997	**0.185**	13	1.16	1	1	0.85	1	13	23	4.06	1.100	18	**0.192**	***1.04***
5	0.24	1.298	0.996	**0.202**	12	1.05	1	1	0.95	1	12	32	4.83	1.171	19	**0.203**	***1.01***
6	0.24	1.382	0.995	**0.215**	4	1.00	1	1	0.95	1	4	68	5.00	1.200	10	**0.113**	***0.53***
7	0.24	1.448	0.995	**0.225**	7	0.95	1	1	0.95	1	6	51	5.00	1.200	12	**0.131**	***0.58***
8	0.24	1.501	0.994	**0.233**	9	0.91	1	1	0.95	1	8	61	5.00	1.200	15	**0.160**	***0.69***
9	0.24	1.545	0.993	**0.239**	11	0.87	1	1	1	1	10	59	5.00	1.200	17	**0.181**	***0.76***
10	0.24	1.582	0.907	**0.224**	15	0.84	1	1	1	1	13	48	5.00	1.200	21	**0.228**	***1.02***
12.5	0.24	1.652	0.840	**0.217**	31	0.78	1	1	1	1	24	78	5.00	1.200	34	**0.500**	***2.31***
13.5	0.24	1.674	0.814	**0.212**	16	0.75	1	1	1	1	12	22	3.93	1.093	17	**0.181**	***0.85***
15	0.24	1.702	0.774	**0.205**	24	0.72	1	1	1	1	17	67	5.00	1.200	25	**0.292**	***1.42***
16.5	0.24	1.726	0.733	**0.197**	26	0.70	1	1	1	1	18	72	5.00	1.200	27	**0.338**	***1.71***
18	0.24	1.746	0.693	**0.189**	23	0.67	1	1	1	1	15	71	5.00	1.200	23	**0.257**	***1.36***
19.5	0.24	1.763	0.653	**0.180**	29	0.65	1	1	1	1	19	43	5.00	1.200	28	**0.370**	***2.06***
21	0.24	1.778	0.613	**0.170**	27	0.63	1	1	1	1	17	10	0.87	1.022	18	**0.192**	***1.13***

Analysis of Susceptibility to Liquefaction for Borehole BH3

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	10	1.70	1	1	0.75	1	13	74	5.00	1.200	21	**0.228**	***1.46***
2	0.24	1.000	0.998	**0.156**	8	1.64	1	1	0.8	1	11	79	5.00	1.200	18	**0.192**	***1.23***
3	0.24	1.037	0.998	**0.161**	12	1.34	1	1	0.85	1	14	58	5.00	1.200	22	**0.242**	***1.50***
4	0.24	1.188	0.997	**0.185**	14	1.16	1	1	0.85	1	14	28	4.56	1.138	20	**0.215**	***1.17***
5	0.24	1.298	0.996	**0.202**	12	1.05	1	1	0.95	1	12	15	2.50	1.048	15	**0.160**	***0.79***
6	0.24	1.382	0.995	**0.215**	8	1.00	1	1	0.95	1	8	21	3.78	1.086	12	**0.131**	***0.61***
7	0.24	1.448	0.995	**0.225**	6	0.95	1	1	0.95	1	5	63	5.00	1.200	11	**0.122**	***0.54***
8	0.24	1.501	0.994	**0.233**	9	0.91	1	1	0.95	1	8	55	5.00	1.200	15	**0.160**	***0.69***
9	0.24	1.545	0.993	**0.239**	10	0.87	1	1	1	1	9	63	5.00	1.200	16	**0.170**	***0.71***
10	0.24	1.582	0.907	**0.224**	12	0.84	1	1	1	1	10	49	5.00	1.200	17	**0.181**	***0.81***
11.4	0.24	1.624	0.870	**0.220**	29	0.80	1	1	1	1	23	97	5.00	1.200	33	**0.500**	***2.27***
12.9	0.24	1.661	0.830	**0.215**	27	0.77	1	1	1	1	21	61	5.00	1.200	30	**0.468**	***2.18***
14.4	0.24	1.691	0.790	**0.208**	14	0.74	1	1	1	1	10	69	5.00	1.200	17	**0.181**	***0.87***
15.9	0.24	1.717	0.749	**0.201**	33	0.71	1	1	1	1	23	81	5.00	1.200	33	**0.500**	***2.49***
17.4	0.24	1.738	0.709	**0.192**	27	0.68	1	1	1	1	18	76	5.00	1.200	27	**0.338**	***1.76***
18.9	0.24	1.757	0.669	**0.183**	23	0.66	1	1	1	1	15	48	5.00	1.200	23	**0.257**	***1.40***
20.4	0.24	1.773	0.629	**0.174**	32	0.64	1	1	1	1	20	63	5.00	1.200	29	**0.410**	***2.36***

Analysis of Susceptibility to Liquefaction for Borehole BH4

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	28	1.70	1	1	0.75	1	36	69	5.00	1.200	48	**0.500**	***3.21***
2	0.24	1.000	0.998	**0.156**	8	1.64	1	1	0.8	1	11	85	5.00	1.200	18	**0.192**	***1.23***
3	0.24	1.018	0.998	**0.158**	12	1.34	1	1	0.85	1	14	54	5.00	1.200	22	**0.242**	***1.53***
4	0.24	1.170	0.997	**0.182**	15	1.16	1	1	0.85	1	15	56	5.00	1.200	23	**0.257**	***1.41***
5	0.24	1.281	0.996	**0.199**	22	1.04	1	1	0.95	1	22	22	3.93	1.093	28	**0.370**	***1.86***
6	0.24	1.366	0.995	**0.212**	5	0.99	1	1	0.95	1	5	25	4.29	1.115	10	**0.113**	***0.53***
7	0.24	1.433	0.995	**0.222**	8	0.95	1	1	0.95	1	7	44	5.00	1.200	13	**0.141**	***0.63***
8	0.24	1.487	0.994	**0.231**	12	0.91	1	1	0.95	1	10	51	5.00	1.200	17	**0.181**	***0.78***
9	0.24	1.532	0.993	**0.237**	11	0.87	1	1	1	1	10	52	5.00	1.200	17	**0.181**	***0.76***
10	0.24	1.570	0.907	**0.222**	9	0.84	1	1	1	1	8	51	5.00	1.200	15	**0.160**	***0.72***
12.5	0.24	1.641	0.840	**0.215**	28	0.77	1	1	1	1	22	30	4.71	1.154	30	**0.468**	***2.17***
13.5	0.24	1.664	0.814	**0.211**	29	0.75	1	1	1	1	22	17	3.01	1.060	26	**0.313**	***1.48***
15	0.24	1.693	0.774	**0.204**	13	0.72	1	1	1	1	9	71	5.00	1.200	16	**0.170**	***0.83***
16.5	0.24	1.717	0.733	**0.196**	15	0.70	1	1	1	1	10	73	5.00	1.200	17	**0.181**	***0.92***
18	0.24	1.738	0.693	**0.188**	20	0.67	1	1	1	1	13	69	5.00	1.200	21	**0.228**	***1.21***
19.5	0.24	1.756	0.653	**0.179**	26	0.65	1	1	1	1	17	40	5.00	1.200	25	**0.292**	***1.63***
21	0.24	1.771	0.613	**0.169**	33	0.63	1	1	1	1	21	49	5.00	1.200	30	**0.468**	***2.76***

Analysis of Susceptibility to Liquefaction for Borehole BH5

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	20	1.70	1	1	0.75	1	26	69	5.00	1.200	36	**0.500**	***3.21***
2	0.24	1.000	0.998	**0.156**	4	1.64	1	1	0.8	1	5	55	5.00	1.200	11	**0.122**	***0.78***
3	0.24	1.000	0.998	**0.156**	7	1.34	1	1	0.85	1	8	59	5.00	1.200	15	**0.160**	***1.03***
4	0.24	1.136	0.997	**0.177**	18	1.16	1	1	0.85	1	18	16	2.77	1.054	22	**0.242**	***1.37***
5	0.24	1.249	0.996	**0.194**	14	1.04	1	1	0.95	1	14	18	3.23	1.066	18	**0.192**	***0.99***
6	0.24	1.336	0.995	**0.207**	6	0.98	1	1	0.95	1	6	18	3.23	1.066	10	**0.113**	***0.55***
7	0.24	1.405	0.995	**0.218**	4	0.94	1	1	0.95	1	4	63	5.00	1.200	10	**0.113**	***0.52***
8	0.24	1.461	0.994	**0.226**	6	0.90	1	1	0.95	1	5	50	5.00	1.200	11	**0.122**	***0.54***
9	0.24	1.507	0.993	**0.233**	9	0.87	1	1	1	1	8	57	5.00	1.200	15	**0.160**	***0.69***
10	0.24	1.546	0.907	**0.219**	16	0.84	1	1	1	1	13	87	5.00	1.200	21	**0.228**	***1.04***
11.4	0.24	1.591	0.870	**0.216**	28	0.80	1	1	1	1	22	90	5.00	1.200	31	**0.500**	***2.32***
12.9	0.24	1.631	0.830	**0.211**	29	0.76	1	1	1	1	22	28	4.56	1.138	30	**0.468**	***2.22***
14.4	0.24	1.663	0.790	**0.205**	18	0.73	1	1	1	1	13	55	5.00	1.200	21	**0.228**	***1.11***
15.9	0.24	1.691	0.749	**0.198**	20	0.70	1	1	1	1	14	71	5.00	1.200	22	**0.242**	***1.22***
17.4	0.24	1.714	0.709	**0.190**	37	0.68	1	1	1	1	25	72	5.00	1.200	35	**0.500**	***2.64***
18.9	0.24	1.734	0.669	**0.181**	40	0.66	1	1	1	1	26	72	5.00	1.200	36	**0.500**	***2.76***
20.4	0.24	1.751	0.629	**0.172**	26	0.64	1	1	1	1	17	71	5.00	1.200	25	**0.292**	***1.70***

Analysis of Susceptibility to Liquefaction for Borehole BH6

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	12	1.70	1	1	0.75	1	15	59	5.00	1.200	23	**0.257**	***1.65***
2	0.24	1.000	0.998	**0.156**	12	1.64	1	1	0.8	1	16	69	5.00	1.200	24	**0.273**	***1.76***
3	0.24	1.000	0.998	**0.156**	5	1.34	1	1	0.85	1	6	59	5.00	1.200	12	**0.131**	***0.84***
4	0.24	1.119	0.997	**0.174**	15	1.16	1	1	0.85	1	15	20	3.61	1.079	20	**0.215**	***1.24***
5	0.24	1.233	0.996	**0.192**	12	1.04	1	1	0.95	1	12	27	4.48	1.130	18	**0.192**	***1.00***
6	0.24	1.321	0.995	**0.205**	3	0.98	1	1	0.95	1	3	70	5.00	1.200	9	**0.104**	***0.51***
7	0.24	1.391	0.995	**0.216**	7	0.94	1	1	0.95	1	6	57	5.00	1.200	12	**0.131**	***0.61***
8	0.24	1.448	0.994	**0.224**	8	0.90	1	1	0.95	1	7	62	5.00	1.200	13	**0.141**	***0.63***
9	0.24	1.495	0.993	**0.232**	10	0.86	1	1	1	1	9	63	5.00	1.200	16	**0.170**	***0.74***
10	0.24	1.535	0.907	**0.217**	12	0.83	1	1	1	1	10	50	5.00	1.200	17	**0.181**	***0.83***
12.5	0.24	1.611	0.840	**0.211**	26	0.77	1	1	1	1	20	92	5.00	1.200	29	**0.410**	***1.94***
13.5	0.24	1.635	0.814	**0.208**	36	0.75	1	1	1	1	27	85	5.00	1.200	37	**0.500**	***2.41***
15	0.24	1.666	0.774	**0.201**	28	0.72	1	1	1	1	20	75	5.00	1.200	29	**0.410**	***2.04***
16.5	0.24	1.692	0.733	**0.194**	29	0.69	1	1	1	1	20	82	5.00	1.200	29	**0.410**	***2.12***
18	0.24	1.714	0.693	**0.185**	30	0.67	1	1	1	1	20	59	5.00	1.200	29	**0.410**	***2.21***
19.5	0.24	1.734	0.653	**0.177**	24	0.65	1	1	1	1	16	67	5.00	1.200	24	**0.273**	***1.55***
21	0.24	1.750	0.613	**0.167**	81	0.63	1	1	1	1	51	14	2.20	1.042	55	**0.500**	***2.99***

Analysis of Susceptibility to Liquefaction for Borehole BH7

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	14	1.70	1	1	0.75	1	18	64	5.00	1.200	27	**0.338**	***2.17***
2	0.24	1.000	0.998	**0.156**	6	1.64	1	1	0.8	1	8	86	5.00	1.200	15	**0.160**	***1.03***
3												81					
4	0.24	1.153	0.997	**0.179**	14	1.16	1	1	0.85	1	14	50	5.00	1.200	22	**0.242**	***1.35***
5	0.24	1.265	0.996	**0.197**	14	1.04	1	1	0.95	1	14	21	3.78	1.086	19	**0.203**	***1.03***
6	0.24	1.351	0.995	**0.210**	6	0.99	1	1	0.95	1	6	67	5.00	1.200	12	**0.131**	***0.63***
7	0.24	1.419	0.995	**0.220**	5	0.94	1	1	0.95	1	4	65	5.00	1.200	10	**0.113**	***0.51***
8	0.24	1.474	0.994	**0.229**	5	0.90	1	1	0.95	1	4	60	5.00	1.200	10	**0.113**	***0.49***
9	0.24	1.519	0.993	**0.235**	8	0.87	1	1	1	1	7	53	5.00	1.200	13	**0.141**	***0.60***
10	0.24	1.558	0.907	**0.220**	16	0.84	1	1	1	1	13	31	4.77	1.163	20	**0.215**	***0.98***
11.4	0.24	1.602	0.870	**0.217**	19	0.80	1	1	1	1	15	93	5.00	1.200	23	**0.257**	***1.18***
12.9	0.24	1.641	0.830	**0.212**	20	0.76	1	1	1	1	15	73	5.00	1.200	23	**0.257**	***1.21***
14.4	0.24	1.673	0.790	**0.206**	28	0.73	1	1	1	1	21	27	4.48	1.130	28	**0.370**	***1.79***
15.9	0.24	1.699	0.749	**0.199**	16	0.70	1	1	1	1	11	75	5.00	1.200	18	**0.192**	***0.97***
17.4	0.24	1.722	0.709	**0.191**	23	0.68	1	1	1	1	16	65	5.00	1.200	24	**0.273**	***1.43***
18.9	0.24	1.741	0.669	**0.182**	19	0.66	1	1	1	1	12	32	4.83	1.171	19	**0.203**	***1.12***
20.4	0.24	1.758	0.629	**0.173**	27	0.64	1	1	1	1	17	29	4.64	1.146	24	**0.273**	***1.58***

Analysis of Susceptibility to Liquefaction for Borehole BH8

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	13	1.70	1	1	0.75	1	17	65	5.00	1.200	25	**0.292**	***1.87***
2	0.24	1.000	0.998	**0.156**	12	1.64	1	1	0.8	1	16	61	5.00	1.200	24	**0.273**	***1.76***
3	0.24	1.018	0.998	**0.158**	11	1.34	1	1	0.85	1	13	71	5.00	1.200	21	**0.228**	***1.44***
4	0.24	1.170	0.997	**0.182**	20	1.16	1	1	0.85	1	20	29	4.64	1.146	28	**0.370**	***2.03***
5	0.24	1.281	0.996	**0.199**	14	1.04	1	1	0.95	1	14	49	5.00	1.200	22	**0.242**	***1.22***
6	0.24	1.366	0.995	**0.212**	6	0.99	1	1	0.95	1	6	57	5.00	1.200	12	**0.131**	***0.62***
7	0.24	1.433	0.995	**0.222**	5	0.95	1	1	0.95	1	4	69	5.00	1.200	10	**0.113**	***0.51***
8	0.24	1.487	0.994	**0.231**	7	0.91	1	1	0.95	1	6	49	5.00	1.200	12	**0.131**	***0.57***
9	0.24	1.532	0.993	**0.237**	14	0.87	1	1	1	1	12	63	5.00	1.200	19	**0.203**	***0.86***
10	0.24	1.570	0.907	**0.222**	8	0.84	1	1	1	1	7	37	5.00	1.200	13	**0.141**	***0.63***
12.5	0.24	1.641	0.840	**0.215**	24	0.77	1	1	1	1	19	88	5.00	1.200	28	**0.370**	***1.72***
13.5	0.24	1.664	0.814	**0.211**	37	0.75	1	1	1	1	28	59	5.00	1.200	39	**0.500**	***2.37***
15	0.24	1.693	0.774	**0.204**	48	0.72	1	1	1	1	35	52	5.00	1.200	47	**0.500**	***2.45***
16.5	0.24	1.717	0.733	**0.196**	28	0.70	1	1	1	1	19	74	5.00	1.200	28	**0.370**	***1.88***
18	0.24	1.738	0.693	**0.188**	18	0.67	1	1	1	1	12	67	5.00	1.200	19	**0.203**	***1.08***
19.5	0.24	1.756	0.653	**0.179**	29	0.65	1	1	1	1	19	54	5.00	1.200	28	**0.370**	***2.07***
21	0.24	1.771	0.613	**0.169**	37	0.63	1	1	1	1	23	41	5.00	1.200	33	**0.500**	***2.95***

Analysis of Susceptibility to Liquefaction for Borehole BH9

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	18	1.70	1	1	0.75	1	23	60	5.00	1.200	33	**0.500**	***3.21***
2	0.24	1.000	0.998	**0.156**	8	1.64	1	1	0.8	1	11	71	5.00	1.200	18	**0.192**	***1.23***
3	0.24	1.037	0.998	**0.161**	11	1.34	1	1	0.85	1	13	15	2.50	1.048	16	**0.170**	***1.05***
4	0.24	1.188	0.997	**0.185**	18	1.16	1	1	0.85	1	18	24	4.18	1.108	24	**0.273**	***1.48***
5	0.24	1.298	0.996	**0.202**	15	1.05	1	1	0.95	1	15	12	1.55	1.032	17	**0.181**	***0.90***
6	0.24	1.382	0.995	**0.215**	8	1.00	1	1	0.95	1	8	54	5.00	1.200	15	**0.160**	***0.75***
7	0.24	1.448	0.995	**0.225**	6	0.95	1	1	0.95	1	5	65	5.00	1.200	11	**0.122**	***0.54***
8	0.24	1.501	0.994	**0.233**	7	0.91	1	1	0.95	1	6	38	5.00	1.200	12	**0.131**	***0.56***
9	0.24	1.545	0.993	**0.239**	8	0.87	1	1	1	1	7	60	5.00	1.200	13	**0.141**	***0.59***
10	0.24	1.582	0.907	**0.224**	13	0.84	1	1	1	1	11	42	5.00	1.200	18	**0.192**	***0.86***
11.4	0.24	1.624	0.870	**0.220**	26	0.80	1	1	1	1	21	64	5.00	1.200	30	**0.468**	***2.12***
12.9	0.24	1.661	0.830	**0.215**	43	0.77	1	1	1	1	33	69	5.00	1.200	45	**0.500**	***2.33***
14.4	0.24	1.691	0.790	**0.208**	40	0.74	1	1	1	1	29	59	5.00	1.200	40	**0.500**	***2.40***
15.9	0.24	1.717	0.749	**0.201**	20	0.71	1	1	1	1	14	74	5.00	1.200	22	**0.242**	***1.21***
17.4	0.24	1.738	0.709	**0.192**	19	0.68	1	1	1	1	13	75	5.00	1.200	21	**0.228**	***1.19***
18.9	0.24	1.757	0.669	**0.183**	26	0.66	1	1	1	1	17	57	5.00	1.200	25	**0.292**	***1.59***
20.4	0.24	1.773	0.629	**0.174**	51	0.64	1	1	1	1	33	50	5.00	1.200	45	**0.500**	***2.87***

Analysis of Susceptibility to Liquefaction for Borehole BH10

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	21	1.70	1	1	0.75	1	27	69	5.00	1.200	37	**0.500**	***3.21***
2	0.24	1.000	0.998	**0.156**	14	1.64	1	1	0.8	1	18	93	5.00	1.200	27	**0.338**	***2.17***
3	0.24	1.098	0.998	**0.171**	9	1.34	1	1	0.85	1	10	64	5.00	1.200	17	**0.181**	***1.06***
4	0.24	1.245	0.997	**0.194**	16	1.16	1	1	0.85	1	16	19	3.43	1.073	21	**0.228**	***1.18***
5	0.24	1.351	0.996	**0.210**	14	1.06	1	1	0.95	1	14	27	4.48	1.130	20	**0.215**	***1.03***
6	0.24	1.431	0.995	**0.222**	9	1.01	1	1	0.95	1	9	47	5.00	1.200	16	**0.170**	***0.77***
7	0.24	1.493	0.995	**0.232**	10	0.96	1	1	0.95	1	9	54	5.00	1.200	16	**0.170**	***0.73***
8	0.24	1.543	0.994	**0.239**	8	0.92	1	1	0.95	1	7	49	5.00	1.200	13	**0.141**	***0.59***
9	0.24	1.584	0.993	**0.245**	13	0.88	1	1	1	1	11	61	5.00	1.200	18	**0.192**	***0.78***
10	0.24	1.619	0.907	**0.229**	22	0.85	1	1	1	1	19	94	5.00	1.200	28	**0.370**	***1.61***
12.5	0.24	1.684	0.840	**0.221**	27	0.78	1	1	1	1	21	94	5.00	1.200	30	**0.468**	***2.12***
13.5	0.24	1.704	0.814	**0.216**	25	0.76	1	1	1	1	19	83	5.00	1.200	28	**0.370**	***1.71***
15	0.24	1.730	0.774	**0.209**	18	0.73	1	1	1	1	13	65	5.00	1.200	21	**0.228**	***1.09***
16.5	0.24	1.752	0.733	**0.200**	41	0.70	1	1	1	1	29	79	5.00	1.200	40	**0.500**	***2.49***
18	0.24	1.770	0.693	**0.191**	27	0.68	1	1	1	1	18	69	5.00	1.200	27	**0.338**	***1.77***
19.5	0.24	1.786	0.653	**0.182**	37	0.65	1	1	1	1	24	29	4.64	1.146	32	**0.500**	***2.75***
21	0.24	1.800	0.613	**0.172**	46	0.63	1	1	1	1	29	14	2.20	1.042	32	**0.500**	***2.90***

Analysis of Susceptibility to Liquefaction for Borehole BH11

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	6	1.70	1	1	0.75	1	8	51	5.00	1.200	15	**0.160**	***1.03***
2	0.24	1.000	0.998	**0.156**	8	1.64	1	1	0.8	1	11	71	5.00	1.200	18	**0.192**	***1.23***
3	0.24	1.077	0.998	**0.168**	15	1.34	1	1	0.85	1	17	57	5.00	1.200	25	**0.292**	***1.74***
4	0.24	1.225	0.997	**0.191**	18	1.16	1	1	0.85	1	18	37	5.00	1.200	27	**0.338**	***1.78***
5	0.24	1.333	0.996	**0.207**	18	1.06	1	1	0.95	1	18	31	4.77	1.163	26	**0.313**	***1.51***
6	0.24	1.414	0.995	**0.220**	12	1.00	1	1	0.95	1	11	37	5.00	1.200	18	**0.192**	***0.87***
7	0.24	1.478	0.995	**0.229**	10	0.96	1	1	0.95	1	9	57	5.00	1.200	16	**0.170**	***0.74***
8	0.24	1.529	0.994	**0.237**	17	0.92	1	1	0.95	1	15	52	5.00	1.200	23	**0.257**	***1.08***
9	0.24	1.571	0.993	**0.243**	12	0.88	1	1	1	1	11	64	5.00	1.200	18	**0.192**	***0.79***
10	0.24	1.606	0.907	**0.227**	17	0.85	1	1	1	1	14	84	5.00	1.200	22	**0.242**	***1.06***
11.4	0.24	1.647	0.870	**0.223**	23	0.81	1	1	1	1	19	72	5.00	1.200	28	**0.370**	***1.65***
12.9	0.24	1.682	0.830	**0.218**	42	0.77	1	1	1	1	32	50	5.00	1.200	43	**0.500**	***2.30***
14.4	0.24	1.710	0.790	**0.211**	18	0.74	1	1	1	1	13	62	5.00	1.200	21	**0.228**	***1.08***
15.9	0.24	1.734	0.749	**0.203**	14	0.71	1	1	1	1	10	76	5.00	1.200	17	**0.181**	***0.89***
17.4	0.24	1.755	0.709	**0.194**	25	0.69	1	1	1	1	17	77	5.00	1.200	25	**0.292**	***1.50***
18.9	0.24	1.772	0.669	**0.185**	26	0.66	1	1	1	1	17	70	5.00	1.200	25	**0.292**	***1.58***
20.4	0.24	1.787	0.629	**0.175**	47	0.64	1	1	1	1	30	51	5.00	1.200	41	**0.500**	***2.85***

Analysis of Susceptibility to Liquefaction for Borehole BH12

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	7	1.70	1	1	0.75	1	9	57	5.00	1.200	16	**0.170**	***1.09***
2	0.24	1.000	0.998	**0.156**	7	1.64	1	1	0.8	1	9	30	4.71	1.154	15	**0.160**	***1.03***
3	0.24	1.037	0.998	**0.161**	11	1.34	1	1	0.85	1	13	71	5.00	1.200	21	**0.228**	***1.41***
4	0.24	1.188	0.997	**0.185**	99	1.16	1	1	0.85	1	98	64	5.00	1.200	123	**0.500**	***2.71***
5	0.24	1.298	0.996	**0.202**	13	1.05	1	1	0.95	1	13	59	5.00	1.200	21	**0.228**	***1.13***
6	0.24	1.382	0.995	**0.215**	11	1.00	1	1	0.95	1	10	46	5.00	1.200	17	**0.181**	***0.84***
7	0.24	1.448	0.995	**0.225**	4	0.95	1	1	0.95	1	4	64	5.00	1.200	10	**0.113**	***0.50***
8	0.24	1.501	0.994	**0.233**	7	0.91	1	1	0.95	1	6	52	5.00	1.200	12	**0.131**	***0.56***
9	0.24	1.545	0.993	**0.239**	10	0.87	1	1	1	1	9	57	5.00	1.200	16	**0.170**	***0.71***
10	0.24	1.582	0.907	**0.224**	10	0.84	1	1	1	1	8	53	5.00	1.200	15	**0.160**	***0.72***
12.5	0.24	1.652	0.840	**0.217**	10	0.78	1	1	1	1	8	69	5.00	1.200	15	**0.160**	***0.74***
13.5	0.24	1.674	0.814	**0.212**	48	0.75	1	1	1	1	36	54	5.00	1.200	48	**0.500**	***2.35***
15	0.24	1.702	0.774	**0.205**	21	0.72	1	1	1	1	15	61	5.00	1.200	23	**0.257**	***1.25***
16.5	0.24	1.726	0.733	**0.197**	23	0.70	1	1	1	1	16	37	5.00	1.200	24	**0.273**	***1.38***
18	0.24	1.746	0.693	**0.189**	26	0.67	1	1	1	1	17	59	5.00	1.200	25	**0.292**	***1.55***
19.5	0.24	1.763	0.653	**0.180**	24	0.65	1	1	1	1	16	44	5.00	1.200	24	**0.273**	***1.52***
21	0.24	1.778	0.613	**0.170**	25	0.63	1	1	1	1	16	59	5.00	1.200	24	**0.273**	***1.61***

Analysis of Susceptibility to Liquefaction for Borehole BH13

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	11	1.70	1	1	0.75	1	14	62	5.00	1.200	22	**0.242**	***1.55***
2	0.24	1.000	0.998	**0.156**	16	1.64	1	1	0.8	1	21	61	5.00	1.200	30	**0.468**	***3.00***
3	0.24	1.000	0.998	**0.156**	18	1.34	1	1	0.85	1	21	63	5.00	1.200	30	**0.468**	***3.00***
4	0.24	1.153	0.997	**0.179**	17	1.16	1	1	0.85	1	17	31	4.77	1.163	25	**0.292**	***1.63***
5	0.24	1.265	0.996	**0.197**	20	1.04	1	1	0.95	1	20	14	2.20	1.042	23	**0.257**	***1.31***
6	0.24	1.351	0.995	**0.210**	7	0.99	1	1	0.95	1	7	71	5.00	1.200	13	**0.141**	***0.67***
7	0.24	1.419	0.995	**0.220**	9	0.94	1	1	0.95	1	8	69	5.00	1.200	15	**0.160**	***0.73***
8	0.24	1.474	0.994	**0.229**	14	0.90	1	1	0.95	1	12	37	5.00	1.200	19	**0.203**	***0.89***
9	0.24	1.519	0.993	**0.235**	25	0.87	1	1	1	1	22	67	5.00	1.200	31	**0.500**	***2.12***
10	0.24	1.558	0.907	**0.220**	14	0.84	1	1	1	1	12	50	5.00	1.200	19	**0.203**	***0.92***
11.4	0.24	1.602	0.870	**0.217**	25	0.80	1	1	1	1	20	77	5.00	1.200	29	**0.410**	***1.89***
12.9	0.24	1.641	0.830	**0.212**	28	0.76	1	1	1	1	21	44	5.00	1.200	30	**0.468**	***2.20***
14.4	0.24	1.673	0.790	**0.206**	24	0.73	1	1	1	1	18	52	5.00	1.200	27	**0.338**	***1.64***
15.9	0.24	1.699	0.749	**0.199**	35	0.70	1	1	1	1	25	73	5.00	1.200	35	**0.500**	***2.52***
17.4	0.24	1.722	0.709	**0.191**	25	0.68	1	1	1	1	17	71	5.00	1.200	25	**0.292**	***1.53***
18.9	0.24	1.741	0.669	**0.182**	24	0.66	1	1	1	1	16	43	5.00	1.200	24	**0.273**	***1.50***
20.4	0.24	1.758	0.629	**0.173**	54	0.64	1	1	1	1	34	29	4.64	1.146	44	**0.500**	***2.90***

Analysis of Susceptibility to Liquefaction for Borehole BH14

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	15	1.70	1	1	0.75	1	19	69	5.00	1.200	28	**0.370**	***2.37***
2	0.24	1.000	0.998	**0.156**	10	1.64	1	1	0.8	1	13	67	5.00	1.200	21	**0.228**	***1.47***
3	0.24	1.000	0.998	**0.156**	9	1.34	1	1	0.85	1	10	61	5.00	1.200	17	**0.181**	***1.16***
4	0.24	1.153	0.997	**0.179**	14	1.16	1	1	0.85	1	14	14	2.20	1.042	17	**0.181**	***1.01***
5	0.24	1.265	0.996	**0.197**	18	1.04	1	1	0.95	1	18	17	3.01	1.060	22	**0.242**	***1.23***
6	0.24	1.351	0.995	**0.210**	7	0.99	1	1	0.95	1	7	69	5.00	1.200	13	**0.141**	***0.67***
7	0.24	1.419	0.995	**0.220**	8	0.94	1	1	0.95	1	7	63	5.00	1.200	13	**0.141**	***0.64***
8	0.24	1.474	0.994	**0.229**	11	0.90	1	1	0.95	1	9	37	5.00	1.200	16	**0.170**	***0.75***
9	0.24	1.519	0.993	**0.235**	14	0.87	1	1	1	1	12	64	5.00	1.200	19	**0.203**	***0.86***
10	0.24	1.558	0.907	**0.220**	19	0.84	1	1	1	1	16	34	4.93	1.188	24	**0.273**	***1.24***
12.5	0.24	1.631	0.840	**0.214**	23	0.77	1	1	1	1	18	94	5.00	1.200	27	**0.338**	***1.58***
13.5	0.24	1.654	0.814	**0.210**	36	0.75	1	1	1	1	27	72	5.00	1.200	37	**0.500**	***2.38***
15	0.24	1.684	0.774	**0.203**	22	0.72	1	1	1	1	16	79	5.00	1.200	24	**0.273**	***1.35***
16.5	0.24	1.709	0.733	**0.196**	21	0.69	1	1	1	1	15	77	5.00	1.200	23	**0.257**	***1.31***
18	0.24	1.730	0.693	**0.187**	30	0.67	1	1	1	1	20	73	5.00	1.200	29	**0.410**	***2.19***
19.5	0.24	1.748	0.653	**0.178**	33	0.65	1	1	1	1	21	54	5.00	1.200	30	**0.468**	***2.62***
21	0.24	1.764	0.613	**0.169**	71	0.63	1	1	1	1	45	57	5.00	1.200	59	**0.500**	***2.96***

Analysis of Susceptibility to Liquefaction for Borehole BH15

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	8	1.70	1	1	0.75	1	10	35	5.00	1.200	17	**0.181**	***1.16***
2	0.24	1.000	0.998	**0.156**	9	1.64	1	1	0.8	1	12	30	4.71	1.154	19	**0.203**	***1.31***
3	0.24	1.000	0.998	**0.156**	17	1.34	1	1	0.85	1	19	33	4.88	1.180	27	**0.338**	***2.17***
4	0.24	1.119	0.997	**0.174**	22	1.16	1	1	0.85	1	22	56	5.00	1.200	31	**0.500**	***2.87***
5	0.24	1.233	0.996	**0.192**	23	1.04	1	1	0.95	1	23	13	1.89	1.037	26	**0.313**	***1.63***
6	0.24	1.321	0.995	**0.205**	6	0.98	1	1	0.95	1	6	67	5.00	1.200	12	**0.131**	***0.64***
7	0.24	1.391	0.995	**0.216**	9	0.94	1	1	0.95	1	8	67	5.00	1.200	15	**0.160**	***0.74***
8	0.24	1.448	0.994	**0.224**	10	0.90	1	1	0.95	1	9	57	5.00	1.200	16	**0.170**	***0.76***
9	0.24	1.495	0.993	**0.232**	13	0.86	1	1	1	1	11	63	5.00	1.200	18	**0.192**	***0.83***
10	0.24	1.535	0.907	**0.217**	15	0.83	1	1	1	1	12	31	4.77	1.163	19	**0.203**	***0.94***
11.4	0.24	1.581	0.870	**0.214**	30	0.80	1	1	1	1	24	95	5.00	1.200	34	**0.500**	***2.33***
12.9	0.24	1.621	0.830	**0.210**	32	0.76	1	1	1	1	24	61	5.00	1.200	34	**0.500**	***2.38***
14.4	0.24	1.654	0.790	**0.204**	18	0.73	1	1	1	1	13	70	5.00	1.200	21	**0.228**	***1.12***
15.9	0.24	1.682	0.749	**0.197**	23	0.70	1	1	1	1	16	71	5.00	1.200	24	**0.273**	***1.39***
17.4	0.24	1.706	0.709	**0.189**	32	0.68	1	1	1	1	22	78	5.00	1.200	31	**0.500**	***2.65***
18.9	0.24	1.726	0.669	**0.180**	30	0.65	1	1	1	1	20	68	5.00	1.200	29	**0.410**	***2.28***
20.4	0.24	1.744	0.629	**0.171**	39	0.63	1	1	1	1	25	49	5.00	1.200	35	**0.500**	***2.92***

Analysis of Susceptibility to Liquefaction for Borehole BH16

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	6	1.70	1	1	0.75	1	8	71	5.00	1.200	15	**0.160**	***1.03***
2	0.24	1.000	0.998	**0.156**	9	1.64	1	1	0.8	1	12	75	5.00	1.200	19	**0.203**	***1.31***
3	0.24	1.000	0.998	**0.156**	10	1.34	1	1	0.85	1	11	32	4.83	1.171	18	**0.192**	***1.23***
4	0.24	1.103	0.997	**0.172**	19	1.16	1	1	0.85	1	19	7	0.12	1.009	19	**0.203**	***1.19***
5	0.24	1.218	0.996	**0.189**	20	1.04	1	1	0.95	1	20	5	0.00	1.000	20	**0.215**	***1.14***
6	0.24	1.307	0.995	**0.203**	7	0.98	1	1	0.95	1	6	11	1.21	1.026	7	**0.088**	***0.43***
7	0.24	1.377	0.995	**0.214**	10	0.93	1	1	0.95	1	9	27	4.48	1.130	15	**0.160**	***0.75***
8	0.24	1.435	0.994	**0.222**	12	0.89	1	1	0.95	1	10	53	5.00	1.200	17	**0.181**	***0.81***
9	0.24	1.483	0.993	**0.230**	13	0.86	1	1	1	1	11	57	5.00	1.200	18	**0.192**	***0.83***
10	0.24	1.523	0.907	**0.216**	11	0.83	1	1	1	1	9	43	5.00	1.200	16	**0.170**	***0.79***
12.5	0.24	1.601	0.840	**0.210**	27	0.77	1	1	1	1	21	91	5.00	1.200	30	**0.468**	***2.23***
13.5	0.24	1.626	0.814	**0.206**	24	0.75	1	1	1	1	18	72	5.00	1.200	27	**0.338**	***1.64***
15	0.24	1.657	0.774	**0.200**	20	0.72	1	1	1	1	14	77	5.00	1.200	22	**0.242**	***1.21***
16.5	0.24	1.684	0.733	**0.193**	21	0.69	1	1	1	1	14	81	5.00	1.200	22	**0.242**	***1.26***
18	0.24	1.707	0.693	**0.185**	25	0.67	1	1	1	1	17	77	5.00	1.200	25	**0.292**	***1.58***
19.5	0.24	1.726	0.653	**0.176**	27	0.65	1	1	1	1	17	56	5.00	1.200	25	**0.292**	***1.66***
21	0.24	1.744	0.613	**0.167**	42	0.63	1	1	1	1	26	29	4.64	1.146	34	**0.500**	***3.00***

Analysis of Susceptibility to Liquefaction for Borehole BH17

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	7	1.70	1	1	0.75	1	9	69	5.00	1.200	16	**0.170**	***1.09***
2	0.24	1.000	0.998	**0.156**	17	1.64	1	1	0.8	1	22	60	5.00	1.200	31	**0.500**	***3.21***
3																	
4	0.24	1.153	0.997	**0.179**	16	1.16	1	1	0.85	1	16	69	5.00	1.200	24	**0.273**	***1.53***
5	0.24	1.265	0.996	**0.197**	16	1.04	1	1	0.95	1	16	24	4.18	1.108	22	**0.242**	***1.23***
6	0.24	1.351	0.995	**0.210**	10	0.99	1	1	0.95	1	9	20	3.61	1.079	13	**0.141**	***0.67***
7	0.24	1.419	0.995	**0.220**	4	0.94	1	1	0.95	1	4	70	5.00	1.200	10	**0.113**	***0.51***
8	0.24	1.474	0.994	**0.229**	4	0.90	1	1	0.95	1	3	57	5.00	1.200	9	**0.104**	***0.46***
9	0.24	1.519	0.993	**0.235**	6	0.87	1	1	1	1	5	64	5.00	1.200	11	**0.122**	***0.52***
10	0.24	1.558	0.907	**0.220**	10	0.84	1	1	1	1	8	57	5.00	1.200	15	**0.160**	***0.73***
11.4	0.24	1.602	0.870	**0.217**	8	0.80	1	1	1	1	6	94	5.00	1.200	12	**0.131**	***0.60***
12.9	0.24	1.641	0.830	**0.212**	22	0.76	1	1	1	1	17	77	5.00	1.200	25	**0.292**	***1.37***
14.4	0.24	1.673	0.790	**0.206**	20	0.73	1	1	1	1	15	73	5.00	1.200	23	**0.257**	***1.25***
15.9	0.24	1.699	0.749	**0.199**	20	0.70	1	1	1	1	14	72	5.00	1.200	22	**0.242**	***1.22***
17.4	0.24	1.722	0.709	**0.191**	31	0.68	1	1	1	1	21	67	5.00	1.200	30	**0.468**	***2.45***
18.9	0.24	1.741	0.669	**0.182**	32	0.66	1	1	1	1	21	64	5.00	1.200	30	**0.468**	***2.57***
20.4	0.24	1.758	0.629	**0.173**	39	0.64	1	1	1	1	25	14	2.20	1.042	28	**0.370**	***2.14***

Analysis of Susceptibility to Liquefaction for Borehole BH18

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	12	1.70	1	1	0.75	1	15	59	5.00	1.200	23	**0.257**	***1.65***
2	0.24	1.000	0.998	**0.156**	10	1.64	1	1	0.8	1	13	60	5.00	1.200	21	**0.228**	***1.47***
3	0.24	1.018	0.998	**0.158**	4	1.34	1	1	0.85	1	5	41	5.00	1.200	11	**0.122**	***0.77***
4	0.24	1.170	0.997	**0.182**	18	1.16	1	1	0.85	1	18	30	4.71	1.154	25	**0.292**	***1.60***
5	0.24	1.281	0.996	**0.199**	12	1.04	1	1	0.95	1	12	21	3.78	1.086	17	**0.181**	***0.91***
6	0.24	1.366	0.995	**0.212**	10	0.99	1	1	0.95	1	9	27	4.48	1.130	15	**0.160**	***0.75***
7	0.24	1.433	0.995	**0.222**	5	0.95	1	1	0.95	1	4	69	5.00	1.200	10	**0.113**	***0.51***
8	0.24	1.487	0.994	**0.231**	9	0.91	1	1	0.95	1	8	67	5.00	1.200	15	**0.160**	***0.69***
9	0.24	1.532	0.993	**0.237**	9	0.87	1	1	1	1	8	52	5.00	1.200	15	**0.160**	***0.67***
10	0.24	1.570	0.907	**0.222**	12	0.84	1	1	1	1	10	55	5.00	1.200	17	**0.181**	***0.81***
12.5	0.24	1.641	0.840	**0.215**	20	0.77	1	1	1	1	15	84	5.00	1.200	23	**0.257**	***1.19***
13.5	0.24	1.664	0.814	**0.211**	24	0.75	1	1	1	1	18	69	5.00	1.200	27	**0.338**	***1.60***
15	0.24	1.693	0.774	**0.204**	14	0.72	1	1	1	1	10	67	5.00	1.200	17	**0.181**	***0.89***
16.5	0.24	1.717	0.733	**0.196**	19	0.70	1	1	1	1	13	75	5.00	1.200	21	**0.228**	***1.16***
18	0.24	1.738	0.693	**0.188**	28	0.67	1	1	1	1	19	69	5.00	1.200	28	**0.370**	***1.97***
19.5	0.24	1.756	0.653	**0.179**	26	0.65	1	1	1	1	17	75	5.00	1.200	25	**0.292**	***1.63***
21	0.24	1.771	0.613	**0.169**	37	0.63	1	1	1	1	23	53	5.00	1.200	33	**0.500**	***2.95***

Analysis of Susceptibility to Liquefaction for Borehole BH19

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	4	1.70	1	1	0.75	1	5	33	4.88	1.180	11	**0.122**	***0.78***
2	0.24	1.000	0.998	**0.156**	9	1.64	1	1	0.8	1	12	30	4.71	1.154	19	**0.203**	***1.31***
3	0.24	1.057	0.998	**0.164**	18	1.34	1	1	0.85	1	21	51	5.00	1.200	30	**0.468**	***2.84***
4	0.24	1.207	0.997	**0.188**	12	1.16	1	1	0.85	1	12	31	4.77	1.163	19	**0.203**	***1.08***
5	0.24	1.315	0.996	**0.204**	11	1.05	1	1	0.95	1	11	42	5.00	1.200	18	**0.192**	***0.94***
6	0.24	1.398	0.995	**0.217**	9	1.00	1	1	0.95	1	9	24	4.18	1.108	14	**0.150**	***0.69***
7	0.24	1.463	0.995	**0.227**	4	0.95	1	1	0.95	1	4	49	5.00	1.200	10	**0.113**	***0.50***
8	0.24	1.515	0.994	**0.235**	5	0.91	1	1	0.95	1	4	48	5.00	1.200	10	**0.113**	***0.48***
9	0.24	1.558	0.993	**0.241**	4	0.88	1	1	1	1	4	59	5.00	1.200	10	**0.113**	***0.47***
10	0.24	1.594	0.907	**0.226**	7	0.85	1	1	1	1	6	56	5.00	1.200	12	**0.131**	***0.58***
11.4	0.24	1.635	0.870	**0.222**	21	0.81	1	1	1	1	17	91	5.00	1.200	25	**0.292**	***1.32***
12.9	0.24	1.671	0.830	**0.216**	35	0.77	1	1	1	1	27	59	5.00	1.200	37	**0.500**	***2.31***
14.4	0.24	1.701	0.790	**0.209**	16	0.74	1	1	1	1	12	72	5.00	1.200	19	**0.203**	***0.97***
15.9	0.24	1.725	0.749	**0.202**	18	0.71	1	1	1	1	13	79	5.00	1.200	21	**0.228**	***1.13***
17.4	0.24	1.746	0.709	**0.193**	20	0.68	1	1	1	1	14	55	5.00	1.200	22	**0.242**	***1.25***
18.9	0.24	1.764	0.669	**0.184**	18	0.66	1	1	1	1	12	42	5.00	1.200	19	**0.203**	***1.10***
20.4	0.24	1.780	0.629	**0.175**	22	0.64	1	1	1	1	14	82	5.00	1.200	22	**0.242**	***1.38***

Analysis of Susceptibility to Liquefaction for Borehole BH20

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	5	1.70	1	1	0.75	1	6	54	5.00	1.200	12	**0.131**	***0.84***
2	0.24	1.000	0.998	**0.156**	7	1.64	1	1	0.8	1	9	31	4.77	1.163	15	**0.160**	***1.03***
3	0.24	1.077	0.998	**0.168**	12	1.34	1	1	0.85	1	14	64	5.00	1.200	22	**0.242**	***1.44***
4	0.24	1.225	0.997	**0.191**	17	1.16	1	1	0.85	1	17	24	4.18	1.108	23	**0.257**	***1.35***
5	0.24	1.333	0.996	**0.207**	15	1.06	1	1	0.95	1	15	17	3.01	1.060	19	**0.203**	***0.98***
6	0.24	1.414	0.995	**0.220**	10	1.00	1	1	0.95	1	10	17	3.01	1.060	14	**0.150**	***0.68***
7	0.24	1.478	0.995	**0.229**	4	0.96	1	1	0.95	1	4	52	5.00	1.200	10	**0.113**	***0.49***
8	0.24	1.529	0.994	**0.237**	13	0.92	1	1	0.95	1	11	57	5.00	1.200	18	**0.192**	***0.81***
9	0.24	1.571	0.993	**0.243**	14	0.88	1	1	1	1	12	34	4.93	1.188	19	**0.203**	***0.84***
10	0.24	1.606	0.907	**0.227**	16	0.85	1	1	1	1	14	47	5.00	1.200	22	**0.242**	***1.06***
12.5	0.24	1.673	0.840	**0.219**	29	0.78	1	1	1	1	23	17	3.01	1.060	27	**0.338**	***1.54***
13.5	0.24	1.694	0.814	**0.215**	33	0.76	1	1	1	1	25	14	2.20	1.042	28	**0.370**	***1.72***
15	0.24	1.721	0.774	**0.208**	8	0.73	1	1	1	1	6	77	5.00	1.200	12	**0.131**	***0.63***
16.5	0.24	1.743	0.733	**0.199**	25	0.70	1	1	1	1	17	75	5.00	1.200	25	**0.292**	***1.46***
18	0.24	1.762	0.693	**0.191**	17	0.68	1	1	1	1	11	71	5.00	1.200	18	**0.192**	***1.01***
19.5	0.24	1.778	0.653	**0.181**	22	0.65	1	1	1	1	14	71	5.00	1.200	22	**0.242**	***1.34***
21	0.24	1.793	0.613	**0.172**	34	0.63	1	1	1	1	22	67	5.00	1.200	31	**0.500**	***2.92***

Analysis of Susceptibility to Liquefaction for Borehole BH21

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	6	1.70	1	1	0.75	1	8	30	4.71	1.154	14	**0.150**	***0.96***
2	0.24	1.000	0.998	**0.156**	7	1.64	1	1	0.8	1	9	79	5.00	1.200	16	**0.170**	***1.09***
3	0.24	1.037	0.998	**0.161**	11	1.34	1	1	0.85	1	13	57	5.00	1.200	21	**0.228**	***1.41***
4	0.24	1.188	0.997	**0.185**	14	1.16	1	1	0.85	1	14	41	5.00	1.200	22	**0.242**	***1.31***
5	0.24	1.298	0.996	**0.202**	13	1.05	1	1	0.95	1	13	36	5.00	1.200	21	**0.228**	***1.13***
6	0.24	1.382	0.995	**0.215**	10	1.00	1	1	0.95	1	9	34	4.93	1.188	16	**0.170**	***0.79***
7	0.24	1.448	0.995	**0.225**	6	0.95	1	1	0.95	1	5	64	5.00	1.200	11	**0.122**	***0.54***
8	0.24	1.501	0.994	**0.233**	7	0.91	1	1	0.95	1	6	63	5.00	1.200	12	**0.131**	***0.56***
9	0.24	1.545	0.993	**0.239**	8	0.87	1	1	1	1	7	60	5.00	1.200	13	**0.141**	***0.59***
10	0.24	1.582	0.907	**0.224**	10	0.84	1	1	1	1	8	55	5.00	1.200	15	**0.160**	***0.72***
11.4	0.24	1.624	0.870	**0.220**	26	0.80	1	1	1	1	21	94	5.00	1.200	30	**0.468**	***2.12***
12.9	0.24	1.661	0.830	**0.215**	34	0.77	1	1	1	1	26	79	5.00	1.200	36	**0.500**	***2.33***
14.4	0.24	1.691	0.790	**0.208**	21	0.74	1	1	1	1	15	33	4.88	1.180	23	**0.257**	***1.23***
15.9	0.24	1.717	0.749	**0.201**	16	0.71	1	1	1	1	11	64	5.00	1.200	18	**0.192**	***0.96***
17.4	0.24	1.738	0.709	**0.192**	15	0.68	1	1	1	1	10	70	5.00	1.200	17	**0.181**	***0.94***
18.9	0.24	1.757	0.669	**0.183**	27	0.66	1	1	1	1	18	37	5.00	1.200	27	**0.338**	***1.84***
20.4	0.24	1.773	0.629	**0.174**	57	0.64	1	1	1	1	36	49	5.00	1.200	48	**0.500**	***2.87***

Analysis of Susceptibility to Liquefaction for Borehole BH22

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	6	1.70	1	1	0.75	1	8	35	5.00	1.200	15	**0.160**	***1.03***
2	0.24	1.000	0.998	**0.156**	11	1.64	1	1	0.8	1	14	27	4.48	1.130	20	**0.215**	***1.38***
3	0.24	1.018	0.998	**0.158**	13	1.34	1	1	0.85	1	15	33	4.88	1.180	23	**0.257**	***1.62***
4	0.24	1.170	0.997	**0.182**	18	1.16	1	1	0.85	1	18	16	2.77	1.054	22	**0.242**	***1.33***
5	0.24	1.281	0.996	**0.199**	16	1.04	1	1	0.95	1	16	39	5.00	1.200	24	**0.273**	***1.37***
6	0.24	1.366	0.995	**0.212**	7	0.99	1	1	0.95	1	7	67	5.00	1.200	13	**0.141**	***0.66***
7	0.24	1.433	0.995	**0.222**	9	0.95	1	1	0.95	1	8	46	5.00	1.200	15	**0.160**	***0.72***
8	0.24	1.487	0.994	**0.231**	13	0.91	1	1	0.95	1	11	57	5.00	1.200	18	**0.192**	***0.83***
9	0.24	1.532	0.993	**0.237**	14	0.87	1	1	1	1	12	62	5.00	1.200	19	**0.203**	***0.86***
10	0.24	1.570	0.907	**0.222**	16	0.84	1	1	1	1	13	88	5.00	1.200	21	**0.228**	***1.03***
12.5	0.24	1.641	0.840	**0.215**	35	0.77	1	1	1	1	27	95	5.00	1.200	37	**0.500**	***2.32***
13.5	0.24	1.664	0.814	**0.211**	41	0.75	1	1	1	1	31	86	5.00	1.200	42	**0.500**	***2.37***
15	0.24	1.693	0.774	**0.204**	15	0.72	1	1	1	1	11	72	5.00	1.200	18	**0.192**	***0.94***
16.5	0.24	1.717	0.733	**0.196**	30	0.70	1	1	1	1	21	81	5.00	1.200	30	**0.468**	***2.38***
18	0.24	1.738	0.693	**0.188**	21	0.67	1	1	1	1	14	69	5.00	1.200	22	**0.242**	***1.29***
19.5	0.24	1.756	0.653	**0.179**	24	0.65	1	1	1	1	16	27	4.48	1.130	23	**0.257**	***1.44***
21	0.24	1.771	0.613	**0.169**	39	0.63	1	1	1	1	25	26	4.39	1.123	32	**0.500**	***2.95***

Analysis of Susceptibility to Liquefaction for Borehole BH23

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	8	1.70	1	1	0.75	1	10	47	5.00	1.200	17	**0.181**	***1.16***
2	0.24	1.000	0.998	**0.156**	11	1.64	1	1	0.8	1	14	32	4.83	1.171	21	**0.228**	***1.47***
3	0.24	1.000	0.998	**0.156**	19	1.34	1	1	0.85	1	22	57	5.00	1.200	31	**0.500**	***3.21***
4	0.24	1.153	0.997	**0.179**	19	1.16	1	1	0.85	1	19	26	4.39	1.123	26	**0.313**	***1.75***
5	0.24	1.265	0.996	**0.197**	20	1.04	1	1	0.95	1	20	15	2.50	1.048	23	**0.257**	***1.31***
6	0.24	1.351	0.995	**0.210**	7	0.99	1	1	0.95	1	7	64	5.00	1.200	13	**0.141**	***0.67***
7	0.24	1.419	0.995	**0.220**	8	0.94	1	1	0.95	1	7	63	5.00	1.200	13	**0.141**	***0.64***
8	0.24	1.474	0.994	**0.229**	8	0.90	1	1	0.95	1	7	57	5.00	1.200	13	**0.141**	***0.62***
9	0.24	1.519	0.993	**0.235**	11	0.87	1	1	1	1	10	59	5.00	1.200	17	**0.181**	***0.77***
10	0.24	1.558	0.907	**0.220**	17	0.84	1	1	1	1	14	27	4.48	1.130	20	**0.215**	***0.98***
11.4	0.24	1.602	0.870	**0.217**	33	0.80	1	1	1	1	26	90	5.00	1.200	36	**0.500**	***2.30***
12.9	0.24	1.641	0.830	**0.212**	27	0.76	1	1	1	1	21	61	5.00	1.200	30	**0.468**	***2.20***
14.4	0.24	1.673	0.790	**0.206**	28	0.73	1	1	1	1	21	75	5.00	1.200	30	**0.468**	***2.27***
15.9	0.24	1.699	0.749	**0.199**	21	0.70	1	1	1	1	15	77	5.00	1.200	23	**0.257**	***1.29***
17.4	0.24	1.722	0.709	**0.191**	23	0.68	1	1	1	1	16	71	5.00	1.200	24	**0.273**	***1.43***
18.9	0.24	1.741	0.669	**0.182**	30	0.66	1	1	1	1	20	55	5.00	1.200	29	**0.410**	***2.26***
20.4	0.24	1.758	0.629	**0.173**	38	0.64	1	1	1	1	24	51	5.00	1.200	34	**0.500**	***2.90***

Analysis of Susceptibility to Liquefaction for Borehole BH24

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	6	1.70	1	1	0.75	1	8	51	5.00	1.200	15	**0.160**	***1.03***
2	0.24	1.000	0.998	**0.156**	8	1.64	1	1	0.8	1	11	41	5.00	1.200	18	**0.192**	***1.23***
3	0.24	1.000	0.998	**0.156**	10	1.34	1	1	0.85	1	11	59	5.00	1.200	18	**0.192**	***1.23***
4	0.24	1.136	0.997	**0.177**	15	1.16	1	1	0.85	1	15	65	5.00	1.200	23	**0.257**	***1.45***
5	0.24	1.249	0.996	**0.194**	22	1.04	1	1	0.95	1	22	30	4.71	1.154	30	**0.468**	***2.41***
6	0.24	1.336	0.995	**0.207**	10	0.98	1	1	0.95	1	9	32	4.83	1.171	15	**0.160**	***0.77***
7	0.24	1.405	0.995	**0.218**	5	0.94	1	1	0.95	1	4	37	5.00	1.200	10	**0.113**	***0.52***
8	0.24	1.461	0.994	**0.226**	9	0.90	1	1	0.95	1	8	50	5.00	1.200	15	**0.160**	***0.71***
9	0.24	1.507	0.993	**0.233**	13	0.87	1	1	1	1	11	57	5.00	1.200	18	**0.192**	***0.82***
10	0.24	1.546	0.907	**0.219**	25	0.84	1	1	1	1	21	41	5.00	1.200	30	**0.468**	***2.14***
12.5	0.24	1.621	0.840	**0.212**	32	0.77	1	1	1	1	25	97	5.00	1.200	35	**0.500**	***2.35***
13.5	0.24	1.645	0.814	**0.209**	27	0.75	1	1	1	1	20	97	5.00	1.200	29	**0.410**	***1.97***
15	0.24	1.675	0.774	**0.202**	18	0.72	1	1	1	1	13	72	5.00	1.200	21	**0.228**	***1.13***
16.5	0.24	1.700	0.733	**0.195**	19	0.69	1	1	1	1	13	72	5.00	1.200	21	**0.228**	***1.17***
18	0.24	1.722	0.693	**0.186**	22	0.67	1	1	1	1	15	69	5.00	1.200	23	**0.257**	***1.38***
19.5	0.24	1.741	0.653	**0.177**	27	0.65	1	1	1	1	17	64	5.00	1.200	25	**0.292**	***1.64***
21	0.24	1.757	0.613	**0.168**	33	0.63	1	1	1	1	21	51	5.00	1.200	30	**0.468**	***2.78***

Analysis of Susceptibility to Liquefaction for Borehole BH25

Depth (m)	a_{max}/g	σ_{vo}/σ'_{vo}	r_d	CSR	N_{obs}	C_N	C_E	C_B	C_R	C_S	$(N)_{60}$	FC (%)	α	β	$(N)_{60CR}$	CRR	*FOS*
1	0.24	1.000	0.999	**0.156**	7	1.70	1	1	0.75	1	9	29	4.64	1.146	15	**0.160**	***1.03***
2	0.24	1.000	0.998	**0.156**	11	1.64	1	1	0.8	1	14	31	4.77	1.163	21	**0.228**	***1.47***
3	0.24	1.018	0.998	**0.158**	14	1.34	1	1	0.85	1	16	46	5.00	1.200	24	**0.273**	***1.72***
4	0.24	1.170	0.997	**0.182**	12	1.16	1	1	0.85	1	12	22	3.93	1.093	17	**0.181**	***0.99***
5	0.24	1.281	0.996	**0.199**	19	1.04	1	1	0.95	1	19	12	1.55	1.032	21	**0.228**	***1.15***
6	0.24	1.366	0.995	**0.212**	8	0.99	1	1	0.95	1	8	41	5.00	1.200	15	**0.160**	***0.75***
7	0.24	1.433	0.995	**0.222**	9	0.95	1	1	0.95	1	8	70	5.00	1.200	15	**0.160**	***0.72***
8	0.24	1.487	0.994	**0.231**	7	0.91	1	1	0.95	1	6	65	5.00	1.200	12	**0.131**	***0.57***
9	0.24	1.532	0.993	**0.237**	9	0.87	1	1	1	1	8	63	5.00	1.200	15	**0.160**	***0.67***
10	0.24	1.570	0.907	**0.222**	13	0.84	1	1	1	1	11	49	5.00	1.200	18	**0.192**	***0.86***
11.4	0.24	1.613	0.870	**0.219**	21	0.80	1	1	1	1	17	92	5.00	1.200	25	**0.292**	***1.33***
12.9	0.24	1.651	0.830	**0.214**	35	0.77	1	1	1	1	27	71	5.00	1.200	37	**0.500**	***2.34***
14.4	0.24	1.682	0.790	**0.207**	22	0.73	1	1	1	1	16	77	5.00	1.200	24	**0.273**	***1.32***
15.9	0.24	1.708	0.749	**0.200**	36	0.71	1	1	1	1	25	82	5.00	1.200	35	**0.500**	***2.50***
17.4	0.24	1.730	0.709	**0.191**	26	0.68	1	1	1	1	18	80	5.00	1.200	27	**0.338**	***1.77***
18.9	0.24	1.749	0.669	**0.183**	45	0.66	1	1	1	1	30	59	5.00	1.200	41	**0.500**	***2.74***
20.4	0.24	1.765	0.629	**0.173**	89	0.64	1	1	1	1	57	32	4.83	1.171	72	**0.500**	***2.88***

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.7m | Term. Depth : 30m | B.H. No.: 1

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg Limits: Liquid (%)	Plastic (%)	In-situ properties: Density (g/cm^3)	Water Cont (%)	Triaxial Test: Type	c (kg/cm^2)	ϕ (°)
	0.0												
15	1.0	Yellowish brown clayey sandy silt with gravel	5	28	50	17	33	22					
	1.5								1.69	11.8	CD	0.12	22
8	2.0	Yellowish brown clayey sandy silt with gravel	23	10	62	5	26	17					
7	3.0	Yellowish brown clayey sandy silt	0	36	54	10	28	17					
		Change of the strata											
17	4.0	Yellowish brown silty sand	0	75	25	0	Non	Plastic					
	4.5	**Change of the strata**							1.86	17.7			
15	5.0	Yellowish brown sand with silt	0	80	20	0	Non	Plastic					
5	6.0	Yellowish brown sand with silt	0	86	14	0	Non	Plastic					
		Change of the strata											
7	7.0	Yellowish brown clayey sandy silt with gravel	2	33	55	10	28	18					
	7.5								2.02	19.9			
		Change of the strata											
9	8.0	Yellowish brown silty sand	0	63	37	0	Non	Plastic					

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Job No. : G(D)4556

Sheet No. : 1

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.7m | Term. Depth : 30m | B.H. No.: 1

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
		Change of the strata											
8	9.0	Yellowish brown clayey sandy silt with gravel	2	41	48	9	25	16					
10	10.0	Yellowish brown sandy clayey silt	0	18	62	20	37	24					
	10.5								1.99	27.9			
11	11.4	Yellowish brown sandy clayey silt	0	8	65	27	38	24					
27	12.9	Yellowish brown clayey sandy silt	0	45	46	9	25	16					
	13.5								2.03	24.9	CD	0.08	24
21	14.4	Yellowish brown clayey sandy silt	0	46	46	8	25	15					
15	15.9	Yellowish brown clayey sandy silt with gravel	8	18	62	12	28	19					
	16.5								1.95	13.3			
14	17.4	Yellowish brown clayey sandy silt with gravel	5	28	58	9	27	17					
24	18.9	Yellowish brown clayey sandy silt with gravel	9	28	50	13	28	17					
	19.5								2.04	15.3	CD	0.10	26
	19.8	**Change of the strata**											

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Job No. : G(D)4556

Sheet No. : 2

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : | Term. Depth : 30m | B.H. No.: 1

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm^3)	Water Cont (%)	Triaxial Test: Type	c (kg/cm^2)	Φ (°)
59	20.4	Yellowish brown silty sand	0	74	26	0	Non	Plastic					
	22.5								2.03	23.7			
	23.2	**Change of the strata**											
60	23.4	Yellowish brown clayey sandy silt	0	42	55	3	24	15					
	25.5								1.99	24.0			
	26.2	**Change of the strata**											
84	26.4	Yellowish brown silty sand	0	49	39	12	Low	Plastic					
	28.5	**Change of the strata**							1.98	21.6			
47	30.0	Yellowish brown clayey sandy silt	0	15	75	10	29	Plastic					

Observed 'N' Values

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Job No. : G(D)4556

Sheet No. : 3

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.8m | Term. Depth : 30m | B.H. No.: 2

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm^3)	Water Cont (%)	Triaxial Test: Type	c (kg/cm^2)	Φ (°)
	0.0												
21	1.0	Yellowish brown clayey sandy silt with gravel	10	29	51	10	28	18					
7	2.0	Yellowish brown clayey sandy silt with gravel	5	11	74	10	31	21					
	2.5								1.98	12.3	CD	0.09	22
8	3.0	Yellowish brown clayey sandy silt with gravel	2	37	53	8	25	16					
		Change of the strata											
13	4.0	Yellowish brown silty sand	0	77	23	0	Non	Plastic					
12	5.0	Yellowish brown clayey silty sand	0	68	24	8	Low	Plastic					
	5.5								1.99	20.3			
		Change of the strata											
4	6.0	Yellowish brown clayey sandy silt with gravel	3	29	61	7	28	19					
		Change of the strata											
7	7.0	Yellowish brown clayey silty sand	0	49	44	7	Low	Plastic					
		Change of the strata											
9	8.0	Yellowish brown clayey sandy silt	0	39	49	12	26	16					
	8.5								2.08	18.7			

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Job No. : G(D)4556

Sheet No. : 4

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.8m | Term. Depth : 30m | B.H. No.: 2

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
11	9.0	Yellowish brown clayey sandy silt	0	41	47	12	28	18					
		Change of the strata											
15	10.0	Yellowish brown clayey silty sand with gravel	6	46	40	8	Low	Plastic					
	11.4	**Change of the strata**							2.04	21.5			
31	12.0	Yellowish brown clayey sandy silt	0	22	68	10	27	18					
	13.2	**Change of the strata**											
16	13.5	Yellowish brown silty sand	0	78	22	0	Non	Plastic					
	14.4	**Change of the strata**							2.05	18.9	CD	0.09	25
24	15.0	Yellowish brown clayey sandy silt with gravel	5	28	57	10	27	17					
26	16.5	Yellowish brown clayey sandy silt with gravel	9	19	58	14	28	18					
	17.4								2.03	19.1			
23	18.0	Yellowish brown clayey sandy silt	0	29	53	18	27	19					
	19.0	**Change of the strata**											
29	19.5	Yellowish brown clayey silty sand	0	57	35	8	Low	Plastic					
	20.4	**Change of the strata**							2.03	19.7			

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Job No. : G(D)4556

Sheet No. : 5

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.8m | Term. Depth : 30m | B.H. No.: 2

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm^3)	Water Cont (%)	Triaxial Test: Type	c (kg/cm^2)	Φ (°)
27	21.0	Yellowish brown sand with traces of silt	0	90	10	0	Non	Plastic					
	23.0	**Change of the strata**											
	23.4								2.03	24.5	CD	0.08	28
67	24.0	Yellowish brown clayey sandy silt with gravel	4	33	57	6	25	16					
	26.0	**Change of the strata**											
	26.4								2.13	16.7			
N>100	27.0	Yellowish brown silty sand	0	75	25	0	Non	Plastic					
	29.0	**Change of the strata**											
	29.4								2.07	20.2			
67	30.0	Yellowish brown clayey sandy silt with gravel	3	14	69	14	31	21					

Observed 'N' values

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Job No. : G(D)4556

Sheet No. : 6

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.8m | Term. Depth : 30m | B.H. No.: 3

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
	0.0												
10	1.0	Yellowish brown Sandy clayey silt	0	26	46	28	34	22					
	1.5								1.75	8.4			
8	2.0	Yellowish brown sandy clayey silt with gravel	3	18	50	29	35	23					
12	3.0	Yellowish brown clayey sandy silt with gravel	8	34	41	17	31	21					
		Change of the strata											
14	4.0	Yellowish brown silty sand	0	72	28	0	Non	Plastic					
	4.5								2.00	18.8	CD	0.06	23
		Change of the strata											
12	5.0	Yellowish brown sand with silt	0	85	15	0	Non	Plastic					
		Change of the strata											
8	6.0	Yellowish brown silty sand with gravel	2	77	21	0	Non	Plastic					
		Change of the strata											
6	7.0	Yellowish brown clayey sandy silt with gravel	3	34	53	10	27	17					
	7.5								2.07	19.2	CD	0.08	22
9	8.0	Yellowish brown clayey sandy silt with gravel	2	43	47	8	27	18					
10	9.0	Yellowish brown clayey sandy silt with gravel	2	35	53	10	26	17					

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Job No. : G(D)4556

Sheet No. : 7

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.8m | Term. Depth : 30m | B.H. No.: 3

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
		Change of the strata											
12	10.0	Yellowish brown clayey silty sand	0	51	43	6	Low	Plastic					
	10.5								1.98	17.8			
	11.0	**Change of the strata**											
29	11.4	Yellowish brown sandy clayey silt	0	3	69	28	39	25					
27	12.9	Yellowish brown clayey sandy silt	0	39	58	3	24	15					
	13.5								2.03	19.0			
14	14.4	Yellowish brown clayey sandy silt with gravel	2	29	59	10	26	17					
33	15.9	Yellowish brown clayey sandy silt	0	19	69	12	28	18					
	16.5								2.06	19.7	CD	0.11	28
27	17.4	Yellowish brown clayey sandy silt with gravel	2	22	61	15	29	19					
	18.7	**Change of the strata**											
23	18.9	Yellowish brown clayey silty sand with gravel	6	46	36	12	Low	Plastic					
	19.5	**Change of the strata**							2.08	19.8			
32	20.4	Yellowish brown clayey sandy silt with gravel	2	35	47	16	29	20					

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Job No. : G(D)4556

Sheet No. : 8

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.8m | Term. Depth : 30m | B.H. No.: 3

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
	21.7	**Change of the strata**											
	22.5								2.11	27.3			
86	23.4	Yellowish brown clayey silty sand with gravel	11	44	40	5	Low	Plastic					
	25.5								2.08	27.8	CD	0.06	29
97	26.4	Yellowish brown silty sand	0	69	31	0	Non	Plastic					
	28.5	**Change of the strata**							2.05	18.8			
31	30.0	Yellowish brown clayey sandy silt	0	20	63	17	31	22					

Observed ‘N’ values

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Job No. : G(D)4556

Sheet No. : 9

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.9m | Term. Depth : 30m | B.H. No.: 4

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
	0.0												
28	1.0	Yellowish brown clayey sandy silt with gravel	2	29	47	22	32	22					
8	2.0	Yellowish brown sandy clayey silt with gravel	3	12	68	17	36	23					
	2.5								1.93	16.8	CD	0.13	23
12	3.0	Yellowish brown clayey sandy silt	0	46	46	8	26	17					
15	4.0	Yellowish brown clayey sandy silt	0	44	46	10	26	17					
		Change of the strata											
22	5.0	Yellowish brown silty sand with gravel	2	76	22	0	Non	Plastic					
	5.5								1.96	23.4			
6	6.0	Yellowish brown silty sand	0	75	25	0	Non	Plastic					
8	7.0	Yellowish brown clayey silty sand	0	56	37	7	Low	Plastic					
12	8.0	Yellowish brown clayey silty sand with gravel	2	47	43	8	Low	Plastic					
	8.5								2.02	17.9			

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Job No. : G(D)4556

Sheet No. : 10

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.9m | Term. Depth : 30m | B.H. No.: 4

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
11	9.0	Yellowish brown clayey silty sand	0	48	42	10	23	15					
		Change of the strata											
9	10.0	Yellowish brown clayey sandy silt with gravel	8	41	42	9	24	15					
	11.0	**Change of the strata**							2.06	17.2			
	11.4												
28	12.0	Yellowish brown silty sand	0	70	30	0	Non	Plastic					
	12.5	**Change of the strata**											
29	13.5	Yellowish brown sand with silt	0	83	17	0	Non	Plastic	1.98	22.7			
	14.4												
	14.7	**Change of the strata**											
13	15.0	Yellowish brown clayey sandy silt with gravel	7	22	58	13	28	18					
15	16.5	Yellowish brown clayey sandy silt with gravel	2	25	57	16	28	19	2.06	16.1	CD	0.11	26
	17.4												
20	18.0	Yellowish brown clayey sandy silt with gravel	2	29	51	18	29	19					
	19.4	**Change of the strata**											
26	19.5	Yellowish brown clayey silty sand with gravel	13	47	32	8	Low	Plastic	2.04	18.4			
	20.4												

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Job No. : G(D)4556

Sheet No. : 11

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.9m | Term. Depth : 30m | B.H. No.: 4

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	Φ (°)
33	21.0	Yellowish brown clayey silty sand with gravel	2	49	41	8	Low	Plastic					
	23.0	**Change of the strata**											
	23.4								2.02	25.4			
52	24.0	Yellowish brown clayey sandy silt with gravel	3	15	70	12	28	19					
	26.4								2.06	23.1	CD	0.11	29
	26.7	**Change of the strata**											
46	27.0	Yellowish brown sand with silt	0	86	14	0	Non	Plastic					
	29.4	**Change of the strata**							2.11	21.3	CD		
43	30.0	Yellowish brown clayey sandy silt with gravel	2	17	69	12	28	18					

Observed 'N' Value

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Job No. : G(D)4556

Sheet No. : 12

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5.1m | Term. Depth : 30m | B.H. No.: 5

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
	0.0												
20	1.0	Yellowish brown clayey sandy silt with gravel	2	29	49	20	30	20					
	1.5								1.91	14.7			
4	2.0	Yellowish brown clayey sandy silt with gravel	26	19	43	12	27	17					
7	3.0	Yellowish brown clayey sandy silt with gravel	9	32	37	22	26	17					
	3.5	**Change of the strata**											
18	4.0	Yellowish brown sand with silt	0	84	16	0	Non	Plastic					
	4.5								1.97	20.3			
14	5.0	Yellowish brown sand with silt	0	82	18	0	Non	Plastic					
6	6.0	Yellowish brown sand with silt	0	82	18	0	Non	Plastic					
	6.7	**Change of the strata**											
4	7.0	Yellowish brown clayey sandy silt	0	37	53	10	27	17					
	7.5	**Change of the strata**							2.04	17.4			
6	8.0	Yellowish brown clayey silty sand	0	50	43	7	Low	Plastic					

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Job No. : G(D)4556

Sheet No. : 13

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5.1m | Term. Depth : 30m | B.H. No.: 5

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
	8.7	**Change of the strata**											
9	9.0	Yellowish brown clayey sandy silt with gravel	3	40	45	12	25	15					
16	10.0	Yellowish brown sandy clayey silt	0	13	67	20	32	22					
	10.5								1.96	15.2	CD	0.13	25
28	11.4	Yellowish brown sandy clayey silt	0	10	70	20	34	23					
	12.5	**Change of the strata**											
28	12.9	Yellowish brown silty sand	0	72	28	0	Non	Plastic					
	13.5	**Change of the strata**							2.05	22.8			
18	14.4	Yellowish brown clayey sandy silt with gravel	6	39	47	8	24	15					
20	15.9	Yellowish brown clayey sandy silt with gravel	3	26	58	13	27	17					
	16.5								2.12	26.6	CD	0.11	27
37	17.4	Yellowish brown clayey sandy silt with gravel	3	25	57	15	28	18					
40	18.9	Yellowish brown clayey sandy silt with gravel	4	24	55	17	28	19					
	19.5								2.07	16.6			

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Job No. : G(D)4556

Sheet No. : 14

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5.1m | Term. Depth : 30m | B.H. No.: 5

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
26	20.4	Yellowish brown clayey sandy silt with gravel	2	27	63	8	28	18					
	22.5								2.12	26.9			
76	23.4	Yellowish brown clayey sandy silt with gravel	3	23	64	10	28	19					
	25.5								2.10	25.2	CD	0.09	30
	26.2	**Change of the strata**											
88	26.4	Yellowish brown sand with silt	0	85	15	0	Non	Plastic					
	28.5	**Change of the strata**							2.06	23.0			
96	30.0	Yellowish brown clayey sandy silt	0	21	66	13	29	19					

Observed 'N' values

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Job No. : G(D)4556

Sheet No. : 15

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5.2m | Term. Depth : 30m | B.H. No.: 6

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	ϕ (°)
	0.0	Fill-up soil											
12	1.0												
	1.5	**Change of the strata**											
12	2.0	Yellowish brown sandy clayey silt with gravel	15	16	53	16	33	22					
	2.5								2.05	19.7	CD	0.12	21
5	3.0	Yellowish brown clayey sandy silt with gravel	2	39	48	11	27	18					
		Change of the strata											
15	4.0	Yellowish brown sand with silt	0	80	20	0	Non	Plastic					
		Change of the strata											
12	5.0	Yellowish brown silty sand	0	73	27	0	Non	Plastic					
	5.5								1.90	20.9			
		Change of the strata											
3	6.0	Yellowish brown clayey sandy silt	0	30	61	9	28	18					
7	7.0	Yellowish brown clayey sandy silt	0	43	48	9	26	17					
8	8.0	Yellowish brown clayey sandy silt with gravel	3	35	51	11	27	18					
	8.5								1.99	18.8			

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Job No. : G(D)4556

Sheet No. : 16

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5.2m | Term. Depth : 30m | B.H. No.: 6

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
10	9.0	Yellowish brown clayey sandy silt	0	37	49	14	27	17					
		Change of the strata											
12	10.0	Yel. brown clayey silty sand with gravel	2	48	40	10	Low	Plastic					
	11.4								2.02	27.8			
	11.7	**Change of the strata**											
26	12.0	Yellowish brown sandy clayey silt with gravel	3	5	64	28	35	23					
36	13.5	Yellowish brown clayey sandy silt	0	15	71	14	30	21					
	14.4								2.07	22.2	CD	0.12	27
28	15.0	Yellowish brown clayey sandy silt	0	25	61	14	29	19					
29	16.5	Yellowish brown clayey sandy silt with gravel	2	16	66	16	30	21					
	17.4								2.01	16.7			
30	18.0	Yellowish brown clayey sandy silt with gravel	15	26	44	15	28	18					
24	19.5	Yellowish brown clayey sandy silt with gravel	12	21	49	18	29	19					
	20.4	**Change of the strata**							2.05	18.6			

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Job No. : G(D)4556

Sheet No. : 17

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5.2m | Term. Depth : 30m | B.H. No.: 6

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	ϕ (°)
81	21.0	Yellowish brown sand with silt	0	86	14	0	Non	Plastic					
	23.4								2.05	18.6			
	23.9	**Change of the strata**											
56	24.0	Yellowish brown clayey sandy silt	0	35	55	10	26	16					
	26.4	**Change of the strata**							2.01	23.7	CD	0.09	30
90	27.0	Yellowish brown clayey silty sand	0	49	42	9	24	15					
	29.4								2.03	23.0			
34	30.0	Yellowish brown clayey silty sand	0	58	38	4	Low	Plastic					

Observed 'N' Values

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Job No. : G(D)4556

Sheet No. : 18

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5m | Term. Depth : 30m | B.H. No.: 7

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
	0.0	Filled-up soil with gravel											
	0.8	**Change of the strata**											
14	1.0	Yellowish brown clayey sandy silt	0	36	49	15	31	20					
	1.5								1.86	11.6			
6	2.0	Yellowish brown sandy clayey silt	0	14	70	16	32	21					
	3.0	Yellowish brown sandy clayey silt with gravel	5	14	64	17	32	21					
		Change of the strata											
14	4.0	Yel. brown clayey silty sand with gravel	2	48	46	4	Low	Plastic					
	4.5								1.98	18.8	CD	0.07	24
14	5.0	Yellowish brown silty sand	0	79	21	0	Non	Plastic					
		Change of the strata											
6	6.0	Yellowish brown clayey sandy silt	0	33	58	9	27	18					
5	7.0	Yellowish brown clayey sandy silt with gravel	2	33	58	7	26	17					
	7.5								1.98	19.3			
5	8.0	Yellowish brown clayey sandy silt with gravel	4	36	51	9	26	16					
8	9.0	Yellowish brown clayey sandy silt with gravel	3	**44**	**46**	7	25	15					
		Change of the strata											

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Job No. : G(D)4556

Sheet No. : 19

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5m | Term. Depth : 30m | B.H. No.: 7

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
16	10.0	Yellowish brown silty sand	0	69	31	0	Non	Plastic					
	10.5								2.07	19.5			
	11.2	**Change of the strata**											
19	11.4	Yellowish brown sandy clayey silt	0	7	65	28	41	27					
20	12.9	Yellowish brown clayey sandy silt with gravel	2	25	67	6	26	17					
	13.5								1.96	19.1	CD	0.10	26
	14.2	**Change of the strata**											
28	14.4	Yellowish brown silty sand	0	73	27	0	Non	Plastic					
	15.7	**Change of the strata**											
16	15.9	Yellowish brown clayey sandy silt with gravel	2	23	64	11	29	20					
	16.5								2.01	20.2			
23	17.4	Yellowish brown clayey sandy silt with gravel	7	28	53	12	28	18					
	18.2	**Change of the strata**											
19	18.9	Yellowish brown silty sand with gravel	15	53	32	0	Non	Plastic					
	19.5												
27	20.4	Yellowish brown silty sand with gravel	5	66	29	0	Non	Plastic					

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Job No. : G(D)4556

Sheet No. : 20

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5m | Term. Depth : 30m | B.H. No.: 7

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm^3)	Water Cont (%)	Triaxial Test: Type	c (kg/cm^2)	ϕ (°)
	22.5								1.93	19.0	CD	0.04	29
75	23.4	Yellowish brown silty sand with gravel	2	66	29	0	Non	Plastic					
	25.5								2.02	22.6			
84	26.4	Yellowish brown clayey silty sand	0	47	49	2	Non	Plastic					
	28.0	**Change of the strata**											
	28.5								2.06	22.7			
74	30.0	Yellowish brown clayey sandy silt	0	36	50	14	32	21					

Observed 'N' values

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Job No. : G(D)4556

Sheet No. : 21

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.9m | Term. Depth : 30m | B.H. No.: 8

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
	0.0	Filled-up soil											
	0.8	**Change of the strata**											
13	1.0	Yellowish brown clayey sandy silt with gravel	8	27	51	14	29	19					
12	2.0	Yellowish brown clayey sandy silt with gravel	3	36	51	10	27	18					
	2.5								1.75	11.3	CD	0.10	23
11	3.0	Yellowish brown clayey sandy silt with gravel	2	27	53	18	32	21					
		Change of the strata											
20	4.0	Yellowish brown silty sand with gravel	2	69	29	0	Non	Plastic					
14	5.0	Yellowish brown clayey silty sand with gravel	2	49	47	2	Low	Plastic					
	5.5												
		Change of the strata											
6	6.0	Yellowish brown clayey sandy silt with gravel	2	41	52	5	24	15					
5	7.0	Yellowish brown clayey sandy silt with gravel	2	29	62	7	27	19					
		Change of the strata											
7	8.0	Yellowish brown clayey silty sand	0	51	41	8	26	17					
	8.5	**Change of the strata**							1.94	18.3			
14	9.0	Yellowish brown clayey sandy silt	0	37	52	11	28	18					
		Change of the strata											
8	10.0	Yellowish brown silty sand	0	63	37	0	Non	Plastic					

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Job No. : G(D)4556

Sheet No. : 22

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.9m | Term. Depth : 30m | B.H. No.: 8

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	ϕ (°)
	11.4								1.99	23.8			
	11.7	**Change of the strata**											
12	12.0	Yellowish brown sandy clayey silt	0	12	72	16	33	22					
37	13.5	Yellowish brown clayey sandy silt with gravel	2	39	56	3	25	15					
	14.4								2.03	23.4			
48	15.0	Yellowish brown clayey sandy silt with gravel	2	46	49	3	24	15					
28	16.5	Yellowish brown clayey sandy silt with gravel	2	24	60	14	30	21					
	17.4								2.08	18.5	CD	0.12	27
18	18.0	Yellowish brown clayey sandy silt with gravel	3	30	53	14	28	20					
	19.0												
29	19.5	Yellowish brown clayey sandy silt with gravel	3	**43**	**45**	9	27	17					
	20.4								2.06	26.5	CD	0.09	29
	20.7	**Change of the strata**											
37	21.0	Yellowish brown clayey silty sand with gravel	2	57	37	4	Low	Plastic					
	23.4												

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Job No. : G(D)4556

Sheet No. : 23

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.9m | Term. Depth : 30m | B.H. No.: 8

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm^3)	Water Cont (%)	Triaxial Test: Type	c (kg/cm^2)	Φ (°)
	23.7	**Change of the strata**											
76	24.0	Yellowish brown clayey sandy silt	0	25	68	7	28	19					
	26.4								2.09	25.6	CD	0.16	28
45	27.0	Yellowish brown sandy clayey silt	0	5	72	23	38	25					
	29.4								2.04	19.0			
71	30.0	Yellowish brown clayey sandy silt with gravel	2	11	78	9	29	19					

Observed 'N' values

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Sheet No. : 24

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.8m | Term. Depth : 30m | B.H. No.: 9

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
	0.0	Filled-up soil											
	0.5	**Change of the strata**											
18	1.0	Yellowish brown clayey sandy silt with gravel	10	30	50	10	26	17					
	1.5								Tube	bent			
8	2.0	Yellowish brown clayey sandy silt with gravel	6	23	56	15	32	22					
		Change of the strata											
11	3.0	Yellowish brown sand with silt	0	85	15	0	Non	Plastic					
		Change of the strata											
18	4.0	Yellowish brown silty sand with gravel	2	74	24	0	Non	Plastic					
	4.5								1.95	17.2			
		Change of the strata											
15	5.0	Yellowish brown sand with silt	0	88	12	0	Non	Plastic					
		Change of the strata											
8	6.0	Yellowish brown clayey sandy silt with gravel	2	44	50	4	24	15					
6	7.0	Yellowish brown clayey sandy silt	0	35	60	5	25	17					
	7.5								1.98	19.4			
		Change of the strata											
7	8.0	Yellowish brown silty sand	0	62	38	0	Non	Plastic					
		Change of the strata											
8	9.0	Yellowish brown clayey sandy silt	0	40	52	8	24	17					

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Job No. : G(D)4556

Sheet No. : 25

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.8m | Term. Depth : 30m | B.H. No.: 9

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
		Change of the strata											
13	10.0	Yellowish brown clayey silty sand	0	58	37	5	Low	Plastic					
	10.5	**Change of the strata**							2.01	16.1			
26	11.4	Yellowish brown clayey sandy silt	0	36	61	3	25	15					
43	12.9	Yellowish brown clayey sandy silt with gravel	2	29	45	24	34	21					
	13.5								1.98	16.4	CD	0.13	28
40	14.4	Yellowish brown clayey sandy silt	0	41	55	4	24	15					
20	15.9	Yellowish brown clayey sandy silt with gravel	3	23	60	14	29	19					
	16.5								Tube	bent			
19	17.4	Yellowish brown clayey sandy silt with gravel	2	23	61	14	29	20					
26	18.9	Yellowish brown clayey sandy silt	0	43	48	9	26	17					
	19.5	**Change of the strata**							2.10	17.9			

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Sheet No. : 26

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.8m | Term. Depth : 30m | B.H. No.: 9

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	Φ (°)
51	20.4	Yellowish brown clayey silty sand with gravel	2	48	40	10	Low	Plastic					
	22.5	**Change of the strata**							2.07	19.4			
46	23.4	Yellowish brown sandy clayey silt with gravel	2	13	70	15	33	22					
	25.5								2.03	20.2			
42	26.4	Yellowish brown sandy clayey silt	0	3	59	38	45	31					
	28.5								2.08	22.1	CD	0.11	28
49	30.0	Yellowish brown clayey sandy silt with gravel	2	29	60	9	28	18					

Observed 'N' Values

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Job No. : G(D)4556

Sheet No. : 27

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.5m | Term. Depth : 30m | B.H. No.: 10

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	ϕ (°)
	0.0	Filled-up soil											
	0.5	**Change of the strata**											
21	1.0	Yellowish brown clayey sandy silt	0	31	54	15	30	20					
14	2.0	Yellowish brown sandy clayey silt	0	7	76	17	36	24					
	2.5								1.81	15.4	CD	0.11	23
9	3.0	Yellowish brown clayey sandy silt	0	36	55	9	27	18					
		Change of the strata											
16	4.0	Yellowish brown sand with silt	0	81	19	0	Non	Plastic					
		Change of the strata											
14	5.0	Yellowish brown silty sand with gravel	2	71	27	0	Non	Plastic					
	5.5								1.89	21.3			
9	6.0	Yellowish brown clayey silty sand with gravel	2	51	45	2	Low	Plastic					
		Change of the strata											
10	7.0	Yellowish brown clayey sandy silt	0	46	47	7	25	15					
		Change of the strata											
8	8.0	Yellowish brown clayey silty sand	0	51	40	9	Low	Plastic					
	8.5	**Change of the strata**							1.95	19.2			
13	9.0	Yellowish brown clayey sandy silt with gravel	2	37	49	12	24	15					

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SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.5m | Term. Depth : 30m | B.H. No.: 10

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
22	10.0	Yellowish brown sandy clayey silt	0	6	74	20	34	22					
	11.4								2.08	28.6	CD	0.12	27
27	12.0	Yellowish brown sandy clayey silt	0	6	58	36	35	23					
25	13.5	Yellowish brown sandy clayey silt	0	17	53	30	36	22					
	14.4								1.99	21.9			
18	15.0	Yellowish brown clayey sandy silt	0	35	59	6	26	17					
41	16.5	Yellowish brown clayey sandy silt	0	21	69	10	28	17					
	17.4								2.06	16.6	CD	0.11	28
27	18.0	Yellowish brown clayey sandy silt with gravel	3	28	57	12	28	19					
	19.0	**Change of the strata**											
37	19.5	Yellowish brown silty sand with gravel	6	65	29	0	Non	Plastic					
	20.4	**Change of the strata**							1.99	18.7			

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Job No. : G(D)4556

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.5m | Term. Depth : 30m | B.H. No.: 10

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
46	21.0	Yellowish brown sand with silt and gravel	2	84	14	0	Non	Plastic					
	23.4								2.08	26.3			
	23.7	**Change of the strata**											
32	24.0	Yellowish brown sandy clayey silt with gravel	3	7	78	12	31	21					
	26.4								2.03	20.9	CD	0.09	29
48	27.0	Yellowish brown clayey sandy silt with gravel	2	39	53	6	24	15					
	29.4								2.05	18.8			
54	30.0	Yellowish brown clayey sandy silt with gravel	16	14	64	6	26	15					

Observed 'N' Values

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Job No. : G(D)4556

Sheet No. : 30

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.65m | Term. Depth : 30m | B.H. No.: 11

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
	0.0	Filled-up soil											
	0.6	Change of the strata											
6	1.0	Yellowish brown clayey silty sand	0	49	39	12	Low	Plastic					
	1.5								1.75	11.8			
		Change of the strata											
8	2.0	Yellowish brown clayey sandy silt with gravel	6	23	55	16	30	20					
15	3.0	Yellowish brown clayey sandy silt with gravel	5	38	40	17	29	20					
	3.5	**Change of the strata**							1.96	23.4	CD	0.11	23
18	4.0	Yellowish brown silty sand	0	63	37	0	Non	Plastic					
	4.5												
18	5.0	Yellowish brown silty sand	0	69	31	0	Non	Plastic					
12	6.0	Yellowish brown silty sand	0	63	37	0	Non	Plastic					
	6.5	**Change of the strata**							2.02	16.3			
10	7.0	Yellowish brown clayey sandy silt	0	43	49	8	24	15					
	7.5												
17	8.0	Yellowish brown clayey sandy silt	0	48	45	7	Low	Plastic					
12	9.0	Yellowish brown clayey sandy silt	0	36	54	10	26	16					

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Job No. : G(D)4556

Sheet No. : 31

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.65m | Term. Depth : 30m | B.H. No.: 11

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
17	10.0	Yellowish brown sandy clayey silt	0	16	64	20	33	22					
	10.5								2.04	23.3			
23	11.4	Yellowish brown clayey sandy silt	0	28	66	6	28	18					
42	12.9	Yellowish brown clayey sandy silt	0	48	50	2	Low	Plastic					
	13.5								1.98	17.2			
18	14.4	Yellowish brown clayey sandy silt	0	38	54	8	25	16					
14	15.9	Yellowish brown clayey sandy silt with gravel	2	22	61	15	27	18					
	16.5								2.04	20.4	CD	0.15	25
25	17.4	Yellowish brown clayey sandy silt with gravel	2	21	63	14	30	20					
26	18.9	Yellowish brown clayey sandy silt	0	30	59	11	28	19					
	19.5								2.11	21.5			
47	20.4	Yellowish brown clayey sandy silt with gravel	6	43	45	6	24	15					

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Job No. : G(D)4556

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.65m | Term. Depth : 30m | B.H. No.: 11

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
	22.5								2.12	28.9	CD	0.14	29
54	23.4	Yellowish brown sandy clayey silt	0	6	72	22	38	23					
	25.5								2.10	26.4			
	26.2	**Change of the strata**											
92	26.4	Yellowish brown clayey silty sand	0	51	41	8	Low	Plastic					
	28.5	**Change of the strata**							2.07	20.3			
55	30.0	Yellowish brown clayey sandy silt with gravel	2	14	74	10	29	20					

Observed 'N' Values

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Job No. : G(D)4556

Sheet No. : 33

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.8m | Term. Depth : 30m | B.H. No.: 12

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	ϕ (°)
	0.0												
7	1.0	Yellowish brown clayey sandy silt	0	43	42	15	29	19					
	1.5	**Change of the strata**											
7	2.0	Yellowish brown silty sand with gravel	9	61	30	0	Non	Plastic					
	2.5								1.76	12.2			
		Change of the strata											
11	3.0	Yellowish brown clayey sandy silt with gravel	2	27	52	19	32	22					
9	4.0	Yellowish brown clayey sandy silt with gravel	7	29	42	22	32	21					
13	5.0	Yellowish brown clayey sandy silt with gravel	4	37	47	12	28	18	1.90	20.4	CD	0.10	19
	5.5												
		Change of the strata											
11	6.0	Yellowish brown clayey silty sand with gravel	4	50	40	6	Low	Plastic					
		Change of the strata											
4	7.0	Yellowish brown clayey sandy silt with gravel	2	34	57	7	25	16					
	7.5												
7	8.0	Yellowish brown clayey sandy silt with gravel	3	**44**	**45**	8	24	15					

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Job No. : G(D)4556

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.80m | Term. Depth : 30m | B.H. No.: 12

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	ϕ (°)
	8.5								1.94	16.3			
10	9.0	Yellowish brown clayey sandy silt with gravel	2	41	50	7	25	15					
10	10.0	Yellowish brown clayey sandy silt with gravel	7	40	45	8	25	16					
	11.4								1.94	20.3	CD	0.09	23
10	12.0	Yellowish brown clayey sandy silt with gravel	2	29	60	9	26	17					
48	13.5	Yellowish brown clayey sandy silt with gravel	3	43	48	6	25	15					
	14.4								2.05	16.8			
21	15.0	Yellowish brown clayey sandy silt with gravel	5	34	52	9	25	16					
	15.5	**Change of the strata**											
23	16.5	Yellowish brown silty sand	0	63	37	0	Non	Plastic					
	17.0	**Change of the strata**											
	17.4								2.03	13.8			
26	18.0	Yellowish brown clayey sandy silt with gravel	6	35	49	10	27	18					
	18.3	**Change of the strata**											
	19.5	Yellowish brown clayey silty sand with gravel	3	53	37	7	Low	Plastic					
24	20.4	**Change of the strata**							2.08	17.3			

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Job No. : G(D)4556

Sheet No. : 35

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.8m | Term. Depth : 30m | B.H. No.: 12

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm^3)	Water Cont (%)	Triaxial Test: Type	c (kg/cm^2)	ϕ (°)
25	21.0	Yellowish brown clayey sandy silt with gravel	6	35	45	14	28	18					
	21.8	**Change of the strata**											
	23.4								2.07	18.8			
61	24.0	Yellowish brown sand with traces of silt	0	98	2	0	Non	Plastic					
	26.4								2.09	26.7			
	26.7	**Change of the strata**											
67	27.0	Yellowish brown silty sand	0	76	24	0	Non	Plastic					
	30.0								2.06	24.6	CD	0.05	30
		Observed 'N' Values											

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Job No. : G(D)4556

Sheet No. : 36

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5m | Term. Depth : 30m | B.H. No.: 13

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
	0.0												
11	1.0	Yellowish brown clayey sandy silt	0	38	45	17	26	18					
	1.5								1.75	13.8			
16	2.0	Yellowish brown clayey sandy silt with gravel	4	35	53	8	25	15					
18	3.0	Yellowish brown clayey sandy silt with gravel	3	34	58	5	25	16					
		Change of the strata											
17	4.0	Yellowish brown silty sand with gravel	3	66	31	0	Non	Plastic					
	4.5	**Change of the strata**							1.94	17.7			
20	5.0	Yellowish brown sand with silt	0	86	14	0	Non	Plastic					
		Change of the strata											
7	6.0	Yellowish brown clayey sandy silt	0	29	67	4	26	18					
9	7.0	Yellowish brown clayey sandy silt	6	25	64	5	26	18					
	7.5								1.99	17.1	CD	0.09	20
		Change of the strata											
14	8.0	Yellowish brown silty sand	0	63	37	0	Non	Plastic					

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Job No. : G(D)4556

Sheet No. : 37

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5m | Term. Depth : 30m | B.H. No.: 13

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
		Change of the strata											
15	9.0	Yellowish brown clayey sandy silt	0	33	58	9	27	17					
14	10.0	Yellowish brown clayey sandy silt	0	45	50	5	24	15					
	10.5								1.96	18.4			
25	11.4	Yellowish brown clayey sandy silt	0	23	67	10	36	22					
	12.7	**Change of the strata**											
28	12.9	Yellowish brown clayey silty sand	0	56	42	2	Low	Plastic					
	13.5	**Change of the strata**							1.99	23.6	CD	0.08	27
24	14.4	Yellowish brown clayey sandy silt	0	47	49	4	23	14					
35	15.9	Yellowish brown clayey sandy silt with gravel	2	25	64	9	27	18					
	16.5								2.01	17.4			
25	17.4	Yellowish brown clayey sandy silt with gravel	4	25	60	11	28	18					
	18.7	**Change of the strata**											
24	18.9	Yellowish brown clayey silty sand with gravel	2	55	36	7	Low	Plastic					
	19.5								2.10	21.7	CD	0.07	27

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Job No. : G(D)4556

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SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5m | Term. Depth : 30m | B.H. No.: 13

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
54	20.4	Yellowish brown silty sand with gravel	4	67	29	0	Non	Plastic					
	22.5	**Change of the strata**							2.05	21.7			
79	23.4	Yellowish brown sand with silt	0	82	18	0	Non	Plastic					
	25.5								2.03	17.1	CD	0.03	31
	26.0	**Change of the strata**											
72	26.4	Yellowish brown silty sand with gravel	2	71	27	0	Non	Plastic					
	28.5	**Change of the strata**							2.01	20.5			
68	30.0	Yellowish brown clayey sandy silt with gravel	8	11	73	8	30	21					

Observed 'N' Values

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Job No. : G(D)4556

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5m | Term. Depth : 30m | B.H. No.: 14

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	ϕ (°)
	0.0												
15	1.0	Yellowish brown clayey sandy silt with gravel	4	27	54	15	32	21					
10	2.0	Yellowish brown clayey sandy silt with gravel	8	25	60	7	28	18					
	2.5								1.86	10.4			
9	3.0	Yellowish brown clayey sandy silt	0	39	54	7	27	18					
		Change of the strata											
14	4.0	Yellowish brown sand with silt	0	86	14	0	Non	Plastic					
18	5.0	Yellowish brown sand with silt and gravel	2	81	17	0	Non	Plastic					
	5.5								1.94	20.3	CD	0.04	22
		Change of the strata											
7	6.0	Yellowish brown clayey sandy silt with gravel	2	29	66	3	26	17					
8	7.0	Yellowish brown clayey sandy silt	0	37	57	6	27	17					
		Change of the strata											
11	8.0	Yellowish brown silty sand with gravel	3	60	37	0	Non	Plastic					
	8.5								2.03	34.9			

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Job No. : G(D)4556

Sheet No. : 40

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5m | Term. Depth : 30m | B.H. No.: 14

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
		Change of the strata											
14	9.0	Yellowish brown clayey sandy silt with gravel	2	34	55	9	26	16					
		Change of the strata											
19	10.0	Yellowish brown silty sand	0	66	34	0	Non	Plastic					
	11.0	**Change of the strata**											
	11.4								2.06	24.2			
23	12.0	Yellowish brown sandy clayey silt	0	6	68	26	43	27					
36	13.5	Yellowish brown clayey sandy silt with gravel	2	26	57	15	31	20					
	14.4								2.06	20.3	CD	0.12	27
26	15.0	Yellowish brown clayey sandy silt with gravel	2	19	69	10	30	20					
21	16.5	Yellowish brown clayey sandy silt with gravel	7	16	67	10	29	19					
	17.4								2.15	16.4			
30	18.0	Yellowish brown clayey sandy silt with gravel	2	25	61	12	30	20					
33	19.5	Yellowish brown clayey sandy silt with gravel	17	29	45	9	27	18					
	20.4								1.97	23.7			

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Job No. : G(D)4556

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SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5m | Term. Depth : 30m | B.H. No.: 14

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm^3)	Water Cont (%)	Triaxial Test: Type	c (kg/cm^2)	Φ (°)
71	21.0	Yellowish brown clayey sandy silt with gravel	5	38	49	8	25	16					
	23.4								1.91	22.8	CD	0.09	30
	23.7	**Change of the strata**											
77	24.0	Yellowish brown silty sand	0	76	24	0	Non	Plastic					
	26.4								1.99	26.6			
106	27.0	Yellowish brown silty sand	0	70	30	0	Non	Plastic					
	29.4								2.01	21.9			
	29.7	**Change of the strata**											
78	30.0	Yellowish brown clayey sandy silt with gravel	3	22	67	8	29	19					

Observed 'N' Values

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Job No. : G(D)4556

Sheet No. : 42

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5.2m | Term. Depth : 30m | B.H. No.: 15

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
	0.0												
8	1.0	Yellowish brown silty sand	0	65	35	0	Non	Plastic					
	1.5								1.87	12.4			
9	2.0	Yellowish brown silty sand	0	70	30	0	Non	Plastic					
17	3.0	Yellowish brown silty sand with gravel	2	65	33	0	Non	Plastic					
		Change of the strata											
22	4.0	Yellowish brown clayey sandy silt with gravel	3	41	48	8	23	15					
	4.5								1.81	14.5	CD	0.08	24
		Change of the strata											
23	5.0	Yellowish brown sand with silt	0	87	13	0	Non	Plastic					
		Change of the strata											
6	6.0	Yellowish brown clayey sandy silt with gravel	7	26	61	6	27	19					
9	7.0	Yellowish brown clayey sandy silt with gravel	2	31	61	6	27	18					
	7.5								2.04	18.9			
10	8.0	Yellowish brown clayey sandy silt with gravel	2	41	48	9	24	15					

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Job No. : G(D)4556

Sheet No. : 43

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5.2m | Term. Depth : 30m | B.H. No.: 15

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	Φ (°)
13	9.0	Yellowish brown clayey sandy silt with gravel	3	34	53	10	28	18					
		Change of the strata											
15	10.0	Yellowish brown silty sand	0	69	31	0	Non	Plastic					
	10.5								1.99	17.5			
	11.0	**Change of the strata**											
30	11.4	Yellowish brown sandy clayey silt	0	5	69	26	40	26					
32	12.9	Yellowish brown clayey sandy silt with gravel	4	35	49	12	25	16					
	13.5								2.05	23.1	CD	0.10	24
18	14.4	Yellowish brown clayey sandy silt with gravel	2	28	59	11	26	17					
23	15.9	Yellowish brown clayey sandy silt with gravel	9	20	57	14	28	18					
	16.5								1.99	20.8			
32	17.4	Yellowish brown clayey sandy silt	0	22	60	18	31	21					
30	18.9	Yellowish brown clayey sandy silt with gravel	4	28	52	16	30	20					
	19.5								2.06	26.4			

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Job No. : G(D)4556

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5.2m | Term. Depth : 30m | B.H. No.: 15

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	ϕ (°)
	20.0	**Change of the strata**											
39	20.4	Yellowish brown clayey silty sand	0	51	43	6	Low	Plastic					
	22.5								2.01	19.9	CD	0.09	28
86	23.4	Yellowish brown silty sand	0	63	37	0	Non	Plastic					
	25.5								2.00	20.9			
	25.8	**Change of the strata**											
N>100	26.4	Yellowish brown clayey sandy silt	0	28	56	16	28	19					
	28.5								1.99	18.3			
N>100	30.0	Yellowish brown sandy clayey silt with gravel	22	11	53	14	28	18					

Observed 'N' Values

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Job No. : G(D)4556

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5.3m | Term. Depth : 30m | B.H. No.: 16

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	ϕ (°)
	0.0												
6	1.0	Yellowish brown clayey sandy silt with gravel	10	19	53	18	30	20					
9	2.0	Yellowish brown clayey sandy silt with gravel	2	23	57	18	33	22					
	2.5								1.81	10.9	CD	0.13	21
	2.8	**Change of the strata**											
10	3.0	Yellowish brown silty sand	0	68	32	0	Non	Plastic					
		Change of the strata											
19	4.0	Yel. br. sand with traces of silt and gravel	2	91	7	0	Non	Plastic					
20	5.0	Yellowish brown sand with traces of silt	0	95	5	0	Non	Plastic					
	5.5								1.93	20.5			
7	6.0	Yellowish brown sand with silt	0	89	11	0	Non	Plastic					
		Change of the strata											
10	7.0	Yellowish brown silty sand	0	73	27	0	Non	Plastic					
		Change of the strata											
12	8.0	Yellowish brown clayey sandy silt with gravel	2	45	45	8	23	15					
	8.5								2.01	18.5			

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Job No. : G(D)4556

Sheet No. : 46

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5.3m | Term. Depth : 30m | B.H. No.: 16

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
13	9.0	Yellowish brown clayey sandy silt	0	43	52	5	24	18					
		Change of the strata											
11	10.0	Yellowish brown clayey silty sand	0	57	36	7	Low	Plastic					
	11.0	**Change of the strata**											
	11.4								1.97	23.5	CD	0.23	22
27	12.0	Yellowish brown sandy clayey silt with gravel	2	7	66	25	42	26					
24	13.5	Yellowish brown clayey sandy silt	0	28	69	3	26	17					
	14.4								2.09	18.6			
20	15.0	Yellowish brown clayey sandy silt with gravel	2	21	68	9	27	18					
21	16.5	Yellowish brown clayey sandy silt	0	19	67	14	29	20					
	17.4												
25	18.0	Yellowish brown clayey sandy silt with gravel	2	21	63	14	29	19	2.07	15.3	CD	0.11	24
27	19.5	Yellowish brown clayey sandy silt with gravel	5	39	47	9	25	15					
	20.4								1.99	17.8			

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Job No. : G(D)4556

Sheet No. : 47

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5.3m | Term. Depth : 30m | B.H. No.: 16

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
	20.7	**Change of the strata**											
42	21.0	Yellowish brown silty sand	0	71	29	0	Non	Plastic					
	23.4								1.98	22.6			
	23.7	**Change of the strata**											
58	24.0	Yellowish brown clayey sandy silt with gravel	5	18	67	10	27	18					
	26.4	**Change of the strata**							1.98	24.5			
78	27.0	Yellowish brown silty sand	0	76	24	0	Non	Plastic					
	29.4	**Change of the strata**							2.04	22.1			
60	30.0	Yellowish brown clayey sandy silt with gravel	3	26	62	9	27	17					

Observed 'N' Values

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Job No. : G(D)4556

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5.2m | Term. Depth : 30m | B.H. No.: 17

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	Φ (°)
	0.0												
7	1.0	Yellowish brown clayey sandy silt with gravel	5	26	57	12	29	18					
	1.5								Tube	bent			
17	2.0	Yellowish brown clayey sandy silt with gravel	2	38	54	6	25	16					
	3.0	Yellowish brown sandy clayey silt	18	10	54	18	36	23					
16	4.0	Yellowish brown clayey sandy silt	0	31	44	25	38	23					
	4.5								2.02	17.9	CD	0.15	21
		Change of the strata											
16	5.0	Yellowish brown silty sand	0	76	24	0	Non	Plastic					
10	6.0	Yellowish brown silty sand with gravel	5	75	20	0	Non	Plastic					
	6.5	**Change of the strata**											
4	7.0	Yellowish brown clayey sandy silt with gravel	2	28	64	6	27	18					
	7.5								2.01	19.0			
4	8.0	Yellowish brown clayey sandy silt with gravel	2	41	51	6	26	17					

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Job No. : G(D)4556

Sheet No. : 49

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5.2m | Term. Depth : 30m | B.H. No.: 17

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
	9.0	Yellowish brown clayey sandy silt with gravel	2	34	58	6	27	18					
6	10.0	Yellowish brown clayey sandy silt	0	43	49	8	27	17					
10	10.5								2.05	22.4			
	11.4	Yellowish brown sandy clayey silt with gravel	2	4	68	24	44	26					
22	12.9	Yellowish brown clayey sandy silt with gravel	3	20	70	7	28	18					
	13.5								2.03	24.1	CD	0.10	23
20	14.4	Yellowish brown clayey sandy silt with gravel	7	24	65	8	28	17					
20	15.9	Yellowish brown clayey sandy silt with gravel	7	21	65	7	28	18					
	16.5								2.11	18.7			
31	17.4	Yellowish brown clayey sandy silt with gravel	9	24	69	8	27	17					
32	18.9	Yellowish brown clayey sandy silt with gravel	8	28	48	16	28	19					
	19.5								2.04	18.5	CD	0.13	27
	19.9	**Change of the strata**											

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Job No. : G(D)4556

Sheet No. : 50

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5.2m | Term. Depth : 30m | B.H. No.: 17

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
39	20.4	Yellowish brown sand with silt	0	86	14	0	Non	Plastic					
	22.5								2.12	20.2			
	23.2	**Change of the strata**											
33	23.4	Yellowish brown clayey sandy silt	0	36	59	5	27	18					
	25.5								1.89	22.9	CD	0.09	26
	26.0	**Change of the strata**											
58	26.4	Yellowish brown silty sand with gravel	2	64	34	0	Non	Plastic					
	28.5	**Change of the strata**							1.99	21.1			
98	30.0	Yellowish brown clayey sandy silt with gravel	2	17	71	10	29	19					

Observed 'N' Values

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Job No. : G(D)4556

Sheet No. : 51

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.9m | Term. Depth : 30m | B.H. No.: 18

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
	0.0												
12	1.0	Yellowish brown clayey sandy silt	0	41	43	16	29	19					
10	2.0	Yellowish brown clayey sandy silt with gravel	2	38	42	18	29	20					
	2.5	**Change of the strata**							1.79	9.9	CD	0.11	21
4	3.0	Yellowish brown clayey silty sand	0	59	32	9	Low	Plastic					
18	4.0	Yellowish brown silty sand with gravel	5	65	30	0	Non	Plastic					
12	5.0	Yellowish brown silty sand with gravel	2	77	21	0	Non	Plastic					
	5.5								1.96	20.4			
10	6.0	Yellowish brown silty sand	0	73	27	0	Non	Plastic					
		Change of the strata											
5	7.0	Yellowish brown clayey sandy silt with gravel	9	22	63	6	28	19					
9	8.0	Yellowish brown clayey sandy silt with gravel	3	30	61	6	28	18					
	8.5								1.98	19.4			

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Job No. : G(D)4556

Sheet No. : 52

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.9m | Term. Depth : 30m | B.H. No.: 18

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
9	9.0	Yellowish brown clayey sandy silt with gravel	2	46	48	4	24	15					
12	10.0	Yellowish brown clayey sandy silt with gravel	2	43	50	5	24	15					
	11.4								2.11	21.9			
20	12.0	Yellowish brown clayey sandy silt with gravel	2	14	76	8	31	20					
24	13.5	Yellowish brown clayey sandy silt	0	31	67	2	28	18					
	14.4								2.09	23.6	CD	0.08	24
14	15.0	Yellowish brown clayey sandy silt with gravel	11	22	59	8	26	17					
19	16.5	Yellowish brown clayey sandy silt with gravel	2	23	63	12	29	19					
	17.4								2.06	18.4			
28	18.0	Yellowish brown clayey sandy silt with gravel	2	29	59	10	28	19					
26	19.5	Yellowish brown clayey sandy silt with gravel	2	23	64	11	29	19					

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Job No. : G(D)4556

Sheet No. : 53

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.9m | Term. Depth : 30m | B.H. No.: 18

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
	20.4								2.08	25.7			
37	21.0	Yellowish brown clayey sandy silt with gravel	2	45	48	5	Low	Plastic					
	23.4								2.05	27.8	CD	0.08	27
	23.7	**Change of the strata**											
40	24.0	Yellowish brown clayey silty sand	0	60	37	3	Low	Plastic					
	26.4								2.03	19.6			
90	27.0	Yellowish brown silty sand	0	67	33	0	Non	Plastic					
	28.0	**Change of the strata**							2.13	20.3			
	29.4												
44	30.0	Yellowish brown clayey sandy silt	0	33	60	7	28	18					

Observed 'N' Values

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Job No. : G(D)4556

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.75m | Term. Depth : 30m | B.H. No.: 19

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	ϕ (°)
	0.0	Filled-up soil											
4	1.0	Yellowish brown silty sand	0	67	33	0	Non	Plastic					
	1.5								1.69	8.4			
9	2.0	Yellowish brown silty sand with gravel	15	55	30	0	Non	Plastic					
18	3.0	Yellowish brown clayey silty sand with gravel	2	47	43	8	Low	Plastic					
12	4.0	Yellowish brown silty sand with gravel	13	56	31	0	Non	Plastic					
	4.5								1.80	14.7			
11	5.0	Yellowish brown clayey silty sand with gravel	3	55	40	2	Low	Plastic					
9	6.0	Yellowish brown silty sand	0	76	24	0	Non	Plastic					
4	7.0	Yellowish brown clayey silty sand	0	51	41	8	Low	Plastic					
	7.5								1.98	18.3	CD	0.09	18
5	8.0	Yellowish brown clayey silty sand	0	52	40	8	Low	Plastic					
		Change of the strata											
4	9.0	Yellowish brown clayey sandy silt with gravel	2	39	50	9	27	17					

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Job No. : G(D)4556

Sheet No. : 55

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.75m | Term. Depth : 30m | B.H. No.: 19

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
	10.0	Yellowish brown clayey sandy silt	0	44	48	8	24	15					
	10.5								1.99	22.7			
21	11.4	Yellowish brown sandy clayey silt	2	7	73	18	37	24					
35	12.9	Yellowish brown clayey sandy silt	0	41	43	16	31	20					
	13.5								2.02	22.1	CD	0.11	26
16	14.4	Yellowish brown clayey sandy silt with gravel	5	23	62	10	29	20					
18	15.9	Yellowish brown clayey sandy silt	0	21	67	12	28	19					
	16.5								2.09	19.9			
20	17.4	Yellowish brown clayey sandy silt with gravel	17	28	43	12	28	18					
	17.2	**Change of the strata**											
18	18.9	Yellowish brown clayey silty sand with gravel	9	49	34	8	Low	Plastic					
	19.5								2.01	17.7			
	20.2	**Change of the strata**											
22	20.4	Yellowish brown sandy clayey silt	0	18	62	20	37	22					

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Job No. : G(D)4556

Sheet No. : 56

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.75m | Term. Depth : 30m | B.H. No.: 19

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm^3)	Water Cont (%)	Triaxial Test: Type	c (kg/cm^2)	Φ (°)
	22.5								2.12	29.5			
33	23.4	Yellowish brown clayey sandy silt with gravel	15	20	62	20	36	22					
	25.5								2.11	24.6	CD	0.11	28
71	26.4	Yellowish brown clayey sandy silt	0	**35**	**56**	**9**	26	17					
	28.5								2.09	21.9			
65	30.0	Yellowish brown clayey sandy silt with gravel	7	7	71	15	31	21					

Observed 'N' Values

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Job No. : G(D)4556

Sheet No. : 57

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.6m | Term. Depth : 30m | B.H. No.: 20

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
	0.0	Filled-up soil											
5	1.0												
7	2.0	Change of the strata											
	2.5												
12	3.0	Yellowish brown clayey sandy silt with gravel	5	31	49	15	30	20					
	3.5	**Change of the strata**											
17	4.0	Yellowish brown silty sand with gravel	7	69	24	0	Non	Plastic					
		Change of the strata											
15	5.0	Yellowish brown sand with silt	0	83	17	0	Non	Plastic					
	5.5								1.90	14.5			
10	6.0	Yellowish brown sand with silt	0	83	17	0	Non	Plastic					
		Change of the strata											
4	7.0	Yellowish brown clayey sandy silt with gravel	2	**46**	**47**	5	25	15					
13	8.0	Yellowish brown clayey sandy silt	0	43	51	6	24	15					
	8.5								1.95	18.3			

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Job No. : G(D)4556

Sheet No. : 58

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.60m | Term. Depth : 30m | B.H. No.: 20

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	ϕ (°)
		Change of the strata											
14	9.0	Yellowish brown silty sand	0	66	34	0	Non	Plastic					
16	10.0	Yellowish brown clayey silty sand	0	53	43	4	Low	Plastic					
	11.4								2.08	23.1	CD	0.08	25
		Change of the strata											
29	12.0	Yellowish brown sand with silt	0	83	17	0	Non	Plastic					
33	13.5	Yellowish brown sand with silt	0	86	14	0	Non	Plastic					
	14.4								1.96	24.2			
	14.8	**Change of the strata**											
8	15.0	Yellowish brown clayey sandy silt with gravel	3	20	67	10	28	19					
25	16.5	Yellowish brown clayey sandy silt with gravel	5	20	63	12	28	18					
	17.4								2.07	16.1			
17	18.0	Yellowish brown clayey sandy silt with gravel	2	27	56	15	30	20					
22	19.5	Yellowish brown clayey sandy silt with gravel	2	27	56	15	30	20					
	20.4								2.04	17.4			

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Job No. : G(D)4556

Sheet No. : 59

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.6m | Term. Depth : 30m | B.H. No.: 20

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
34	21.0	Yellowish brown clayey sandy silt with gravel	10	23	60	7	28	17					
	23.4								2.08	26.2			
40	24.0	Yellowish brown clayey sandy silt	0	42	54	4	25	15					
	26.4								2.12	24.0	CD	0.09	28
37	27.0	Yellowish brown clayey sandy silt with gravel	6	21	64	9	29	20					
	29.4								2.05	23.0			
53	30.0	Yellowish brown clayey sandy silt with gravel	2	16	66	16	31	21					

Observed 'N' Values

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Job No. : G(D)4556

Sheet No. : 60

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.8m | Term. Depth : 30m | B.H. No.: 21

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	ϕ (°)
	0.0												
6	1.0	Yellowish brown silty sand	0	70	30	0	Non	Plastic					
	1.5								1.66	6.9			
		Change of the strata											
7	2.0	Yellowish brown sandy clayey silt with gravel	13	8	69	10	31	21					
11	3.0	Yellowish brown clayey sandy silt	0	43	45	12	27	17					
		Change of the strata											
14	4.0	Yellowish brown clayey silty sand	0	60	37	3	Low	Plastic					
	4.5								1.94	17.3			
13	5.0	Yellowish brown silty sand with gravel	2	63	35	0	Non	Plastic					
10	6.0	Yellowish brown silty sand with gravel	2	64	34	0	Non	Plastic					
		Change of the strata											
6	7.0	Yellowish brown clayey sandy silt	0	36	57	7	26	16					
	7.5								2.02	19.1			
7	8.0	Yellowish brown clayey sandy silt with gravel	2	35	53	10	26	17					

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Job No. : G(D)4556

Sheet No. : 61

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.8m | Term. Depth : 30m | B.H. No.: 21

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
8	9.0	Yellowish brown clayey sandy silt with gravel	3	37	52	8	25	16					
10	10.0	Yellowish brown clayey sandy silt with gravel	2	43	49	6	23	15					
	10.5								2.07	18.3	CD	0.12	25
26	11.4	Yellowish brown sandy clayey silt	0	6	73	21	38	24					
34	12.9	Yellowish brown clayey sandy silt with gravel	4	17	66	13	30	20					
	13.5								2.05	22.8			
	14.2	**Change of the strata**											
21	14.4	Yellowish brown silty sand	0	67	33	0	Non	Plastic					
	15.7	**Change of the strata**											
16	15.9	Yellowish brown clayey sandy silt with gravel	14	22	54	10	27	17					
	16.5								2.03	18.2	CD	0.09	25
15	17.4	Yellowish brown clayey sandy silt with gravel	3	27	60	10	27	18					
	18.7	**Change of the strata**											
27	18.9	Yellowish brown silty sand with gravel	2	61	37	0	Non	Plastic					
	19.5								2.02	17.4			

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Job No. : G(D)4556

Sheet No. : 62

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.80m | Term. Depth : 30m | B.H. No.: 21

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
57	20.4	Yellowish brown clayey silty sand	0	51	41	8	Low	Plastic					
	22.5								1.93	23.6			
	23.0	**Change of the strata**											
66	23.4	Yellowish brown clayey sandy silt with gravel	2	33	57	8	27	19					
	25.5								2.11	25.9	CD	0.09	29
	27.2	**Change of the strata**											
N>100	27.4	Yellowish brown sand with silt	0	84	16	0	Non	Plastic					
	29.5	**Change of the strata**							2.08	22.4			
46	30.0	Yellowish brown clayey sandy silt with gravel	4	17	70	9	28	18					

Observed 'N' values

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Job No. : G(D)4556

Sheet No. : 63

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.90m | Term. Depth : 30m | B.H. No.: 22

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	ϕ (°)
	0.0												
6	1.0	Yellowish brown silty sand	0	65	35	0	Non	Plastic					
	2.0								1.82	6.5			
11	2.5	Yellowish brown silty sand	0	73	27	0	Non	Plastic					
13	3.0	Yellowish brown silty sand with gravel	2	65	33	0	Non	Plastic					
18	4.0	Yellowish brown sand with silt and gravel	2	82	16	0	Non	Plastic					
		Change of the strata											
16	5.0	Yellowish brown clayey silty sand	0	61	37	2	Low	Plastic					
	5.5								2.03	22.8			
		Change of the strata											
7	6.0	Yellowish brown clayey sandy silt	0	33	62	5	26	17					
		Change of the strata											
9	7.0	Yellowish brown clayey silty sand	0	54	43	3	Low	Plastic					
		Change of the strata											
13	8.0	Yellowish brown clayey sandy silt with gravel	8	35	49	8	24	15					
	8.5								2.04	19.3			

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Job No. : G(D)4556

Sheet No. : 64

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.9m | Term. Depth : 30m | B.H. No.: 22

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
14	9.0	Yellowish brown clayey sandy silt	0	38	54	8	27	18					
16	10.0	Yellowish brown clayey sandy silt	0	12	78	10	32	22					
	11.4								2.05	25.3			
35	12.0	Yellowish brown sandy clayey silt	0	5	62	33	40	26					
41	13.5	Yellowish brown sandy clayey silt	0	14	68	18	31	22					
	14.4								2.08	16.4	CD	0.16	26
15	15.0	Yellowish brown clayey sandy silt with gravel	3	25	59	13	28	18					
30	16.5	Yellowish brown clayey sandy silt with gravel	2	17	64	17	32	21					
	17.4								2.04	18.0			
21	18.0	Yellowish brown clayey sandy silt with gravel	3	28	57	12	27	18					
	19.0	**Change of the strata**											
24	19.5	Yellowish brown silty sand with gravel	2	71	27	0	Non	Plastic					

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Job No. : G(D)4556

Sheet No. : 65

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.90m | Term. Depth : 30m | B.H. No.: 22

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	ϕ (°)
	20.4								1.97	20.2			
39	21.0	Yellowish brown silty sand	0	74	26	0	Non	Plastic					
	23.4								2.04	27.5			
68	24.0	Yellowish brown clayey silty sand	0	53	43	4	Low	Plastic					
	26.4								1.99	22.2	CD	0.08	30
96	27.0	Yellowish brown clayey silty sand	0	50	44	6	Low	Plastic					
	29.0	**Change of the strata**											
	29.4								2.08	22.5			
N>100	30.0	Yellowish brown clayey sandy silt with gravel	2	17	69	12	32	21					

Observed 'N' Values

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Job No. : G(D)4556

Sheet No. : 66

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5m | Term. Depth : 30m | B.H. No.: 23

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	ϕ (°)
	0.0												
8	1.0	Yellowish brown clayey silty sand	0	53	37	10	Low	Plastic					
	1.5								1.81	9.5			
11	2.0	Yellowish brown silty sand with gravel	2	66	32	0	Non	Plastic					
		Change of the strata											
19	3.0	Yellowish brown clayey sandy silt with gravel	8	35	45	12	25	15					
	3.5	**Change of the strata**											
19	4.0	Yellowish brown silty sand with gravel	5	69	26	0	Non	Plastic					
	4.5								2.00	15.6	CD	0.05	22
		Change of the strata											
20	5.0	Yellowish brown sand with silt	0	85	15	0	Non	Plastic					
		Change of the strata											
7	6.0	Yellowish brown clayey sandy silt with gravel	4	32	56	8	26	17					
8	7.0	Yellowish brown clayey sandy silt with gravel	3	34	56	7	26	16					
	7.5								2.05	19.3			
8	8.0	Yellowish brown clayey sandy silt with gravel	6	37	48	9	25	15					

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Sheet No. : 67

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5m | Term. Depth : 30m | B.H. No.: 23

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
11	9.0	Yellowish brown clayey sandy silt with gravel	3	39	49	10	25	15					
		Change of the strata											
17	10.0	Yellowish brown silty sand	0	73	27	0	Non	Plastic					
	10.5								2.04	19.2			
	11.0	**Change of the strata**											
33	11.4	Yellowish brown sandy clayey silt	0	10	75	15	36	23					
27	12.9	Yellowish brown clayey sandy silt with gravel	5	34	45	16	29	20					
	13.5								2.05	21.8	CD	0.12	25
28	14.4	Yellowish brown clayey sandy silt	0	25	58	17	30	20					
21	15.9	Yellowish brown clayey sandy silt	0	23	63	14	29	20					
	16.5								2.01	18.1			
23	17.4	Yellowish brown clayey sandy silt with gravel	2	27	56	15	28	18					
30	18.9	Yellowish brown clayey sandy silt with gravel	7	38	42	13	26	17					
	19.5								2.06	16.7			

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Job No. : G(D)4556

Sheet No. : 68

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5m | Term. Depth : 30m | B.H. No.: 23

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm^3)	Water Cont (%)	Triaxial Test: Type	c (kg/cm^2)	Φ (°)
38	20.4	Yellowish brown clayey sandy silt	0	46	49	5	24	15					
	22.5								2.04	22.5			
86	23.4	Yellowish brown clayey sandy silt with gravel	13	40	42	5	Low	Plastic					
	25.5								2.03	26.5	CD	0.07	30
	26.0	**Change of the strata**											
60	26.4	Yellowish brown silty sand	0	61	39	0	Non	Plastic					
	28.5								2.03	23.3			
69	30.0	Yellowish brown clayey silty sand	0	51	36	13	Low	Plastic					

Observed 'N' values

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Job No. : G(D)4556

Sheet No. : 69

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5.1m | Term. Depth : 30m | B.H. No.: 24

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	Φ (°)
	0.0												
6	1.0	Yellowish brown clayey silty sand	0	49	45	6	Low	Plastic					
8	2.0	Yellowish brown clayey silty sand with gravel	4	55	32	9	Low	Plastic					
	2.5								1.96	24.8			
		Change of the strata											
10	3.0	Yellowish brown clayey sandy silt with gravel	20	21	46	13	27	18					
15	4.0	Yellowish brown clayey sandy silt with gravel	3	32	45	20	28	18					
		Change of the strata											
22	5.0	Yellowish brown silty sand	0	70	30	0	Non	Plastic					
	5.5								2.04	19.8			
10	6.0	Yellowish brown silty sand with gravel	2	66	32	0	Non	Plastic					
5	7.0	Yellowish brown silty sand with gravel	3	60	37	0	Non	Plastic					
9	8.0	Yellowish brown clayey silty sand with gravel	2	48	41	9	Low	Plastic					
	8.5								2.07	22.7			

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Job No. : G(D)4556

Sheet No. : 70

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5.1m | Term. Depth : 30m | B.H. No.: 24

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
		Change of the strata											
13	9.0	Yellowish brown clayey sandy silt	0	43	48	9	24	15					
		Change of the strata											
25	10.0	Yellowish brown clayey silty sand	2	57	38	3	Low	Plastic					
	11.2	**Change of the strata**											
	11.4								2.12	25.8	CD	0.23	20
32	12.0	Yellowish brown sandy clayey silt	0	3	51	46	48	35					
27	13.5	Yellowish brown sandy clayey silt	0	3	65	32	41	28					
	14.4								2.08	19.0			
18	15.0	Yellowish brown clayey sandy silt with gravel	2	26	60	12	28	18					
19	16.5	Yellowish brown clayey sandy silt with gravel	2	26	58	14	28	19					
	17.4								2.07	19.4	CD	0.11	25
22	18.0	Yellowish brown clayey sandy silt with gravel	2	29	55	14	27	17					
27	19.5	Yellowish brown clayey sandy silt with gravel	3	33	51	13	27	18					
	19.8	**Change of the strata**											
	20.4								1.96	10.6			

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Job No. : G(D)4556

Sheet No. : 71

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 5.1m | Term. Depth : 30m | B.H. No.: 24

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	Φ (°)
33	21.0	Yellowish brown clayey silty sand	0	49	44	7	Low	Plastic					
	23.4								1.95	18.3	CD	0.05	29
55	24.0	Yellowish brown silty sand	0	71	29	0	Non	Plastic					
	26.4								2.06	25.2			
	26.7	**Change of the strata**											
56	27.0	Yellowish brow clayey sandy silt	0	26	70	4	26	16					
	29.4								2.08	22.0			
60	30.0	Yellowish brown clayey sandy silt	0	17	73	10	27	18					

Observed 'N' values

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Job No. : G(D)4556

Sheet No. : 72

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.9m | Term. Depth : 30m | B.H. No.: 25

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	ϕ (°)
	0.0	Filled-up soil											
		Change of the strata											
7	1.0	Yellowish brown silty sand	0	71	29	0	Non	Plastic					
	1.5								1.74	7.3			
11	2.0	Yellowish brown clayey silty sand with gravel	15	54	31	10	Low	Plastic					
		Change of the strata											
14	3.0	Yellowish brown clayey sandy silt with gravel	5	39	42	4	23	14					
		Change of the strata											
12	4.0	Yellowish brown silty sand	0	78	22	0	Non	Plastic					
	4.5								1.87	12.9			
		Change of the strata											
19	5.0	Yellowish brown sand with silt	0	88	12	0	Non	Plastic					
		Change of the strata											
8	6.0	Yellowish brown clayey silty sand	0	59	36	5	Low	Plastic					
		Change of the strata											
9	7.0	Yellowish brown clayey sandy silt	0	30	61	9	27	18					
	7.5								1.94	18.9			
7	8.0	Yellowish brown clayey sandy silt with gravel	7	28	55	10	27	17					

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Job No. : G(D)4556

Sheet No. : 73

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.9m | Term. Depth : 30m | B.H. No.: 25

N - Value	Depth (m)	Soil Description	Grain Size Analysis				Atterberg		In-situ		Triaxial Test		
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Density (g/cm^3)	Water Cont (%)	Type	c (kg/cm^2)	ϕ (°)
9	9.0	Yellowish brown clayey sandy silt with gravel	2	35	51	12	28	18					
		Change of the strata											
13	10.0	Yellowish brown clayey silty sand	0	51	41	8	Low	Plastic					
	10.5								2.00	17.1			
	11.0	**Change of the strata**											
21	11.4	Yellowish brown sandy clayey silt	0	8	75	17	33	21					
35	12.9	Yellowish brown clayey sandy silt	0	29	61	10	30	21					
	13.5								2.07	25.7	CD	0.11	24
22	14.4	Yellowish brown clayey sandy silt with gravel	2	21	63	14	31	20					
36	15.9	Yellowish brown clayey sandy silt with gravel	2	16	67	15	32	22					
	16.5								2.05	18.3			
26	17.4	Yellowish brown clayey sandy silt	0	20	63	17	31	20					
45	18.9	Yellowish brown clayey sandy silt with gravel	7	34	53	6	25	15					
	19.5								2.11	18.3	CD	0.09	28

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Job No. : G(D)4556

Sheet No. : 74

SOIL PROFILE

Project : Proposed Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

B.H. Location : | Water Table : 4.90m | Term. Depth : 30m | B.H. No.: 25

N - Value	Depth (m)	Soil Description	Grain Size Analysis: Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Atterberg: Liquid (%)	Plastic (%)	In-situ: Density (g/cm³)	Water Cont (%)	Triaxial Test: Type	c (kg/cm²)	ϕ (°)
	20.2	**Change of the strata**											
89	20.4	Yellowish brown silty sand	0	68	32	0	Non	Plastic					
	22.5								1.99	19.1			
53	23.4	Yellowish brown silty sand	0	71	29	0	Non	Plastic					
	25.5								2.03	25.6			
66	26.4	Yellowish brown clayey silty sand with gravel	8	50	38	4	Low	Plastic					
	28.5								1.99	20.0	CD	0.08	30
76	30.0	Yellowish brown clayey silty sand	0	51	44	5	Low	Plastic					

Observed 'N' values

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Job No. : G(D)4556

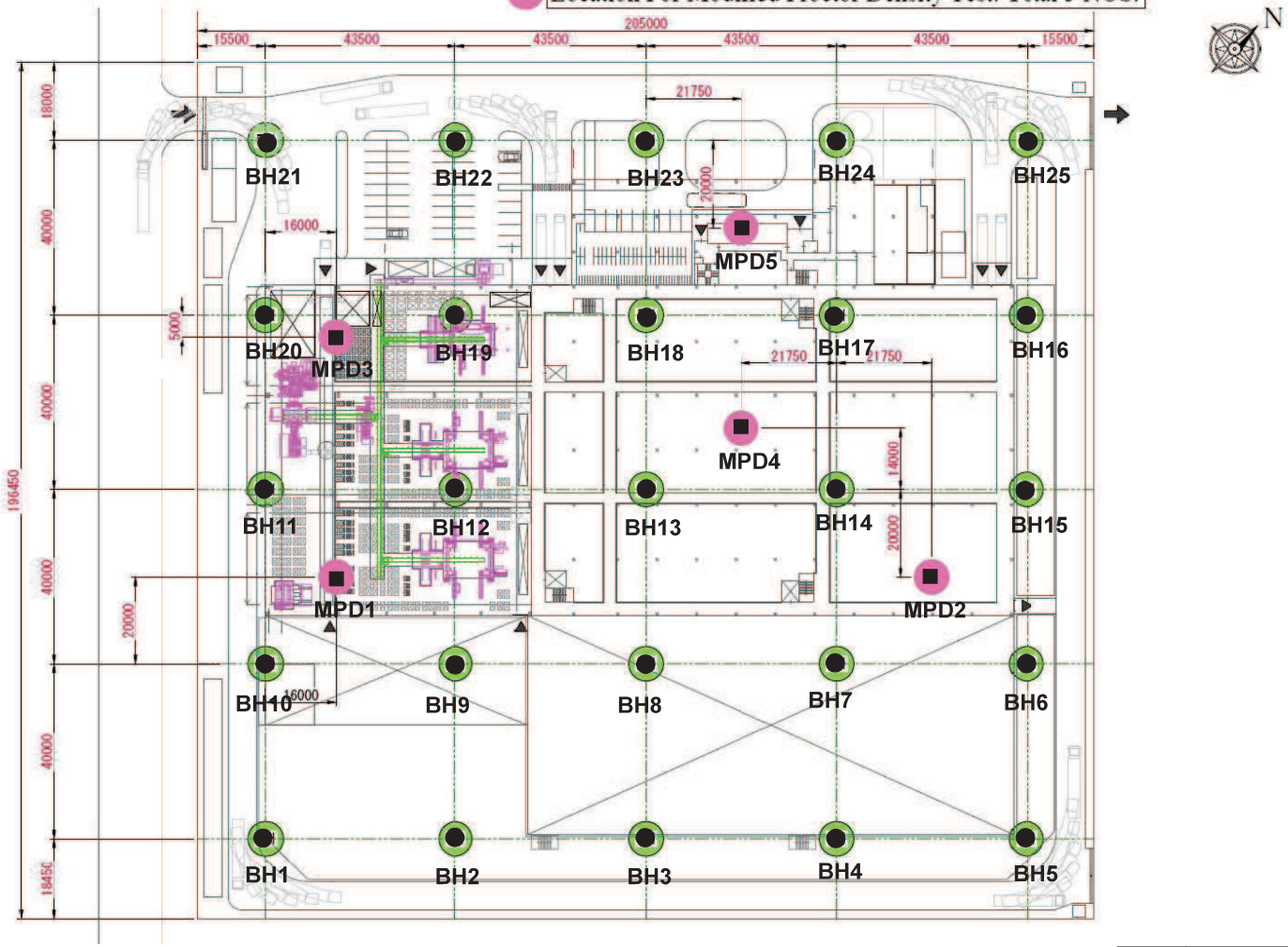
Sheet No. : 75

BX Project-Geological Survey Test Bore Holes Position

BH Bore Hole Location:Total 25 NOS.

Location For Modified Proctor Density Test: Total 5 NOS.

01, June 2023



Legend	Description
●	Borehole (BH)
■	Modified Proctor Density (MPD)

SCHEMATIC SITE PLAN

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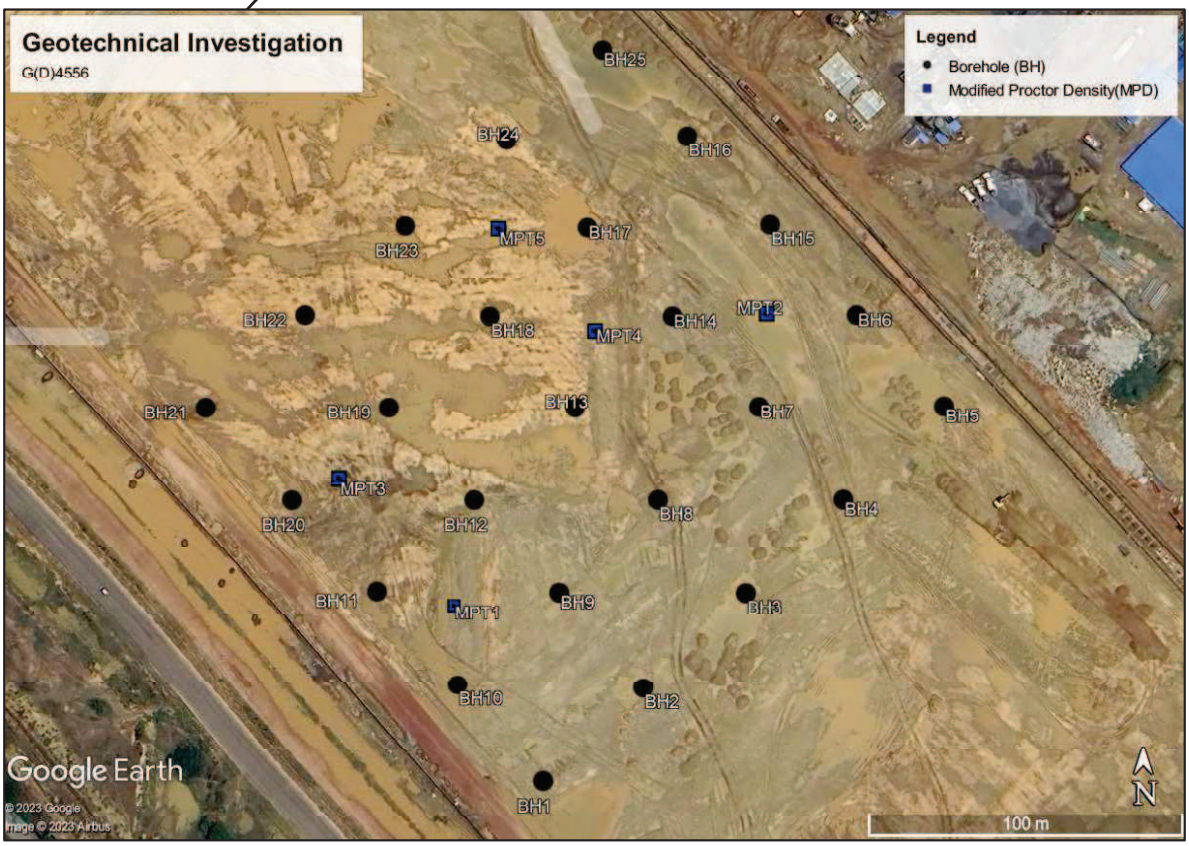
PROJECT : Geotechnical Investigations for the Proposed Factory of Bellsonica Auto Component India Pvt Ltd., at Kharkhoda, Haryana

Job No. : G(D) 4556

Sheet No. : 1a



GOOGLE IMAGE SHOWING THE TEST LOCATIONS

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Job No. : G(D)4556

Sheet No. : 1b

PHOTOGRAPH SHOWING
VIEW OF THE SITE AND BOREHOLE UNDER PROGRESS

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Job No. : G(D)4556

Sheet No. : 1c

PHOTOGRAPH SHOWING
VIEW OF THE SITE AND BOREHOLE UNDER PROGRESS

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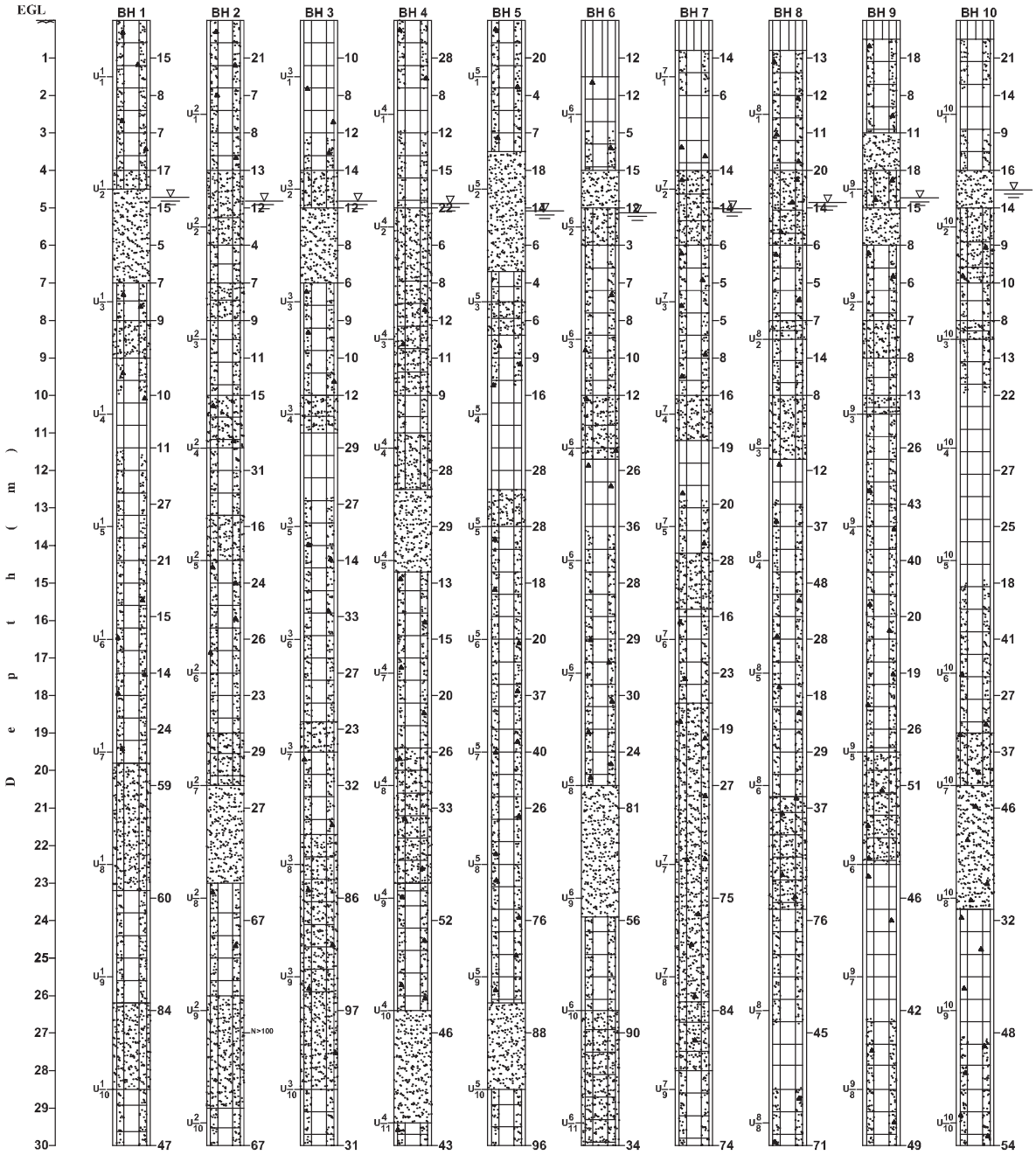
Job No. : G(D)4556

Sheet No. : 1d



LEGEND

Filled-up soil

Yellowish brown clayey sandy silt with occasional gravel / sandy clayey silt
(3-46)% (3-62)% (37-78)% (0-26)%

Yellowish brown silty sand with occasional clay and gravel
(20-50)% (42-79)% (0-13)% (0-15)%

Yellowish brown sand with silt and occasional gravel/ sand with silt
(80-95)% (2-20)% (0-2)%

-74 Observed 'N' Values

U_2^1 2nd undisturbed soil sample of BH 1

Ground Water table has been encountered as on May - June 2023

COMPILED SOIL PROFILE

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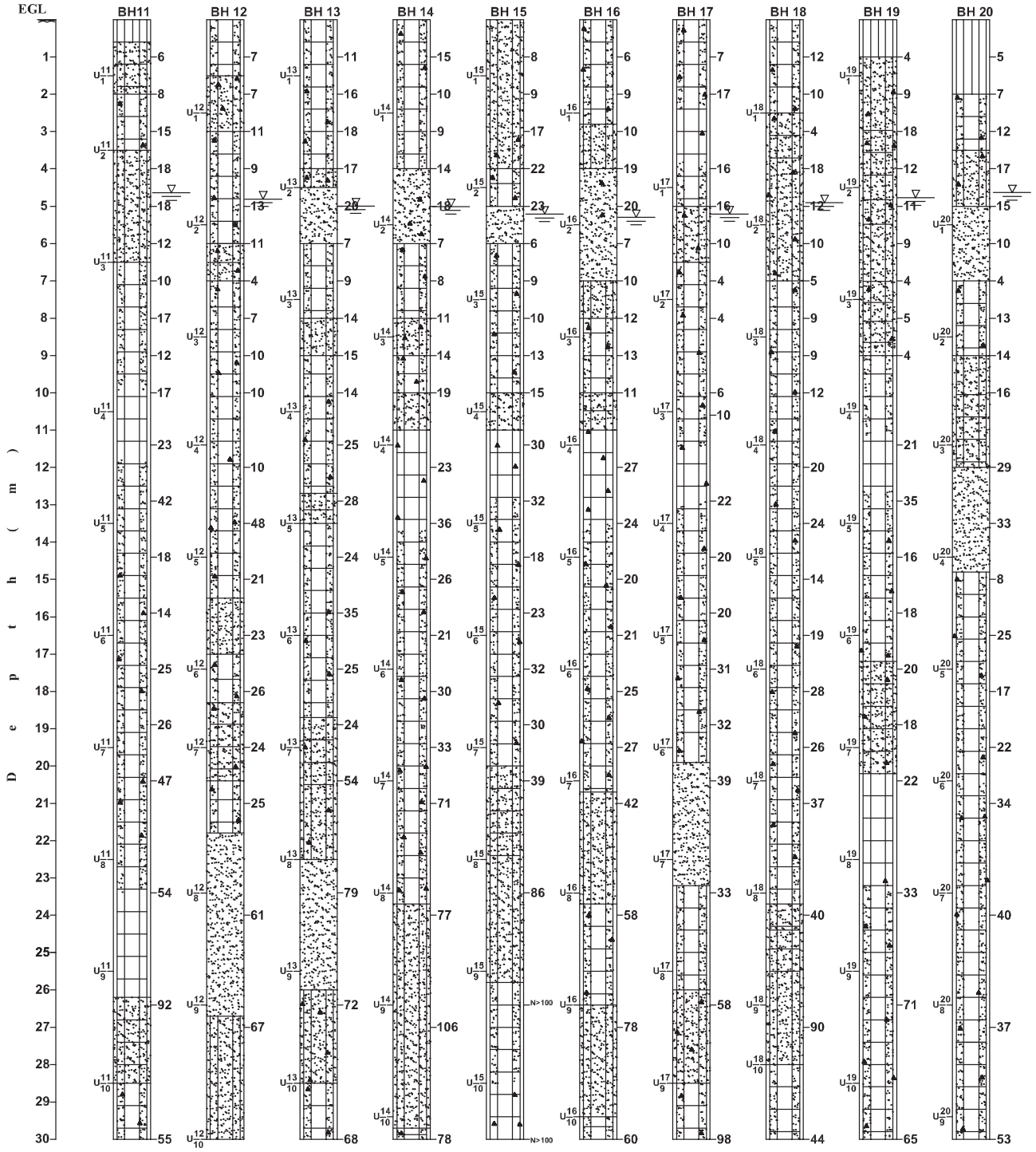
GEOTECHNICAL INVESTIGATION FOR THE PROPOSED FACTORY BUILDINGS AT KHARKHODA, HARYANA

Job No: G(D) 4556

Sheet No: 2a

TRIAL MODE - Click here for more information



For Legend Refer Sheet 2a

COMPILED SOIL PROFILE

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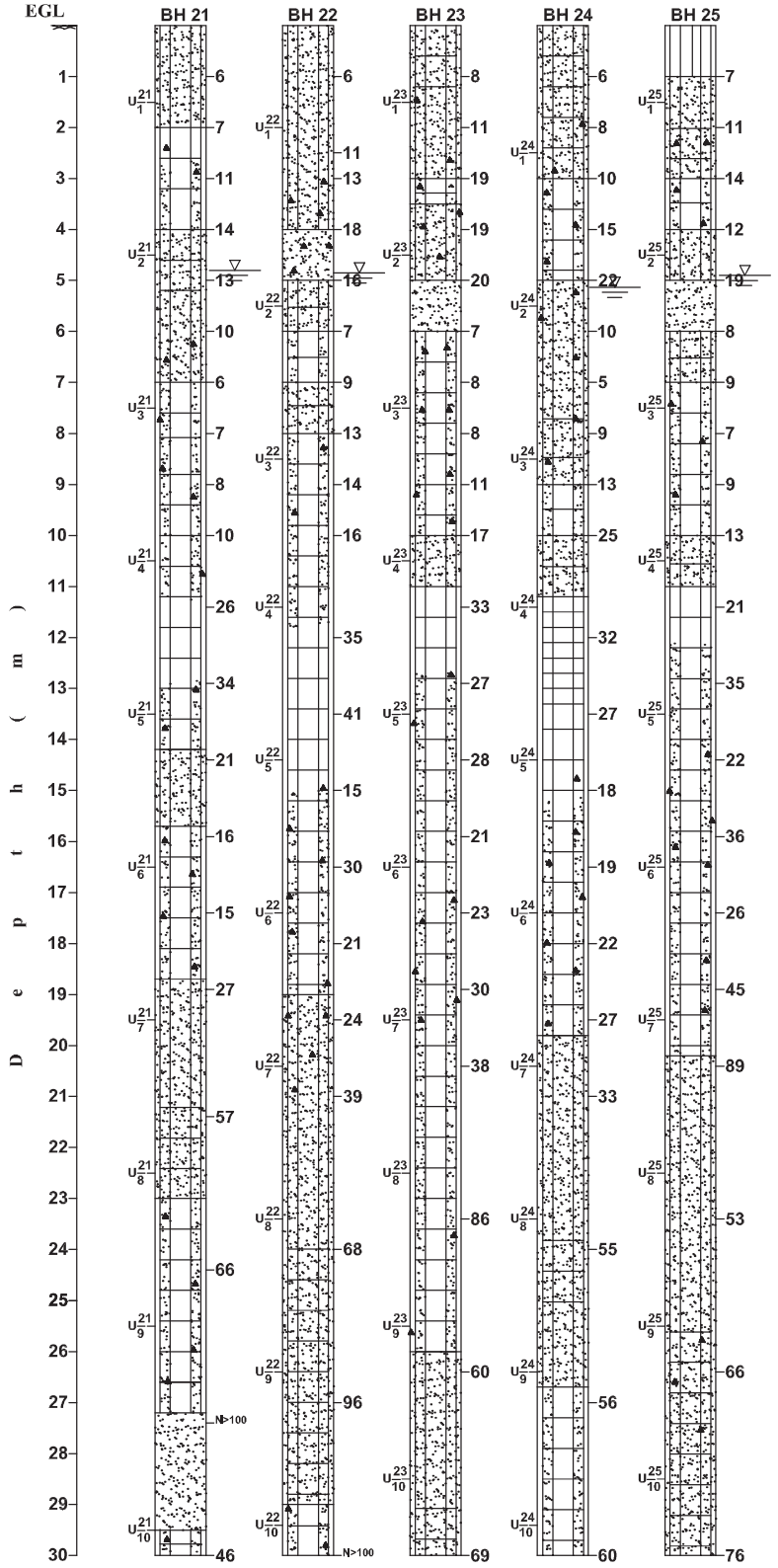
GEOTECHNICAL INVESTIGATION FOR THE PROPOSED FACTORY BUILDINGS
AT KHARKHODA, HARYANA

Job No: G(D) 4556

Sheet No: 2b

TRIAL MODE - Click here for more information



For Legend Refer Sheet 2a

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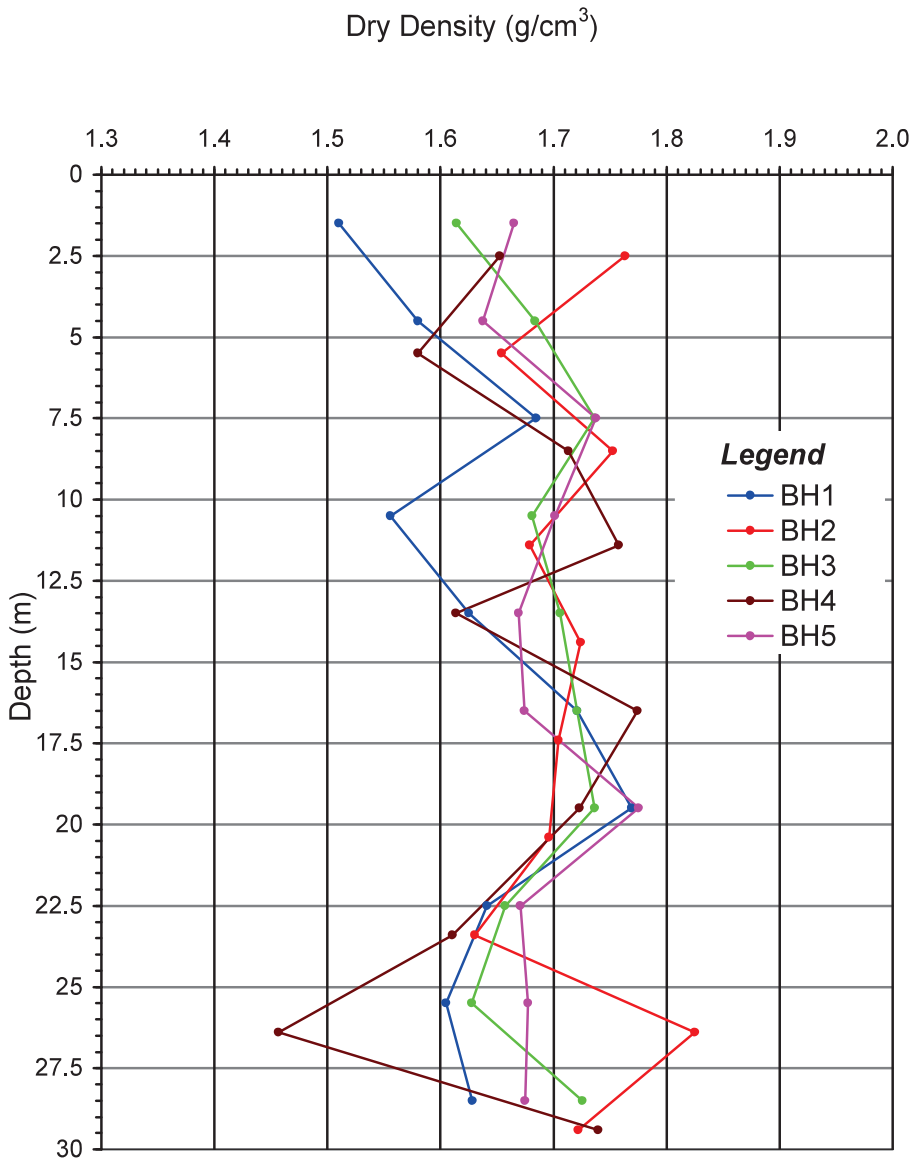
Proposed Factory Building at Kharkhoda

Job No: G(D) 4556

Sheet No: 2c

TRIAL MODE - Click here for more information



Dry Density vs Depth Curves

(Refer paragraph no. 7.5.2)

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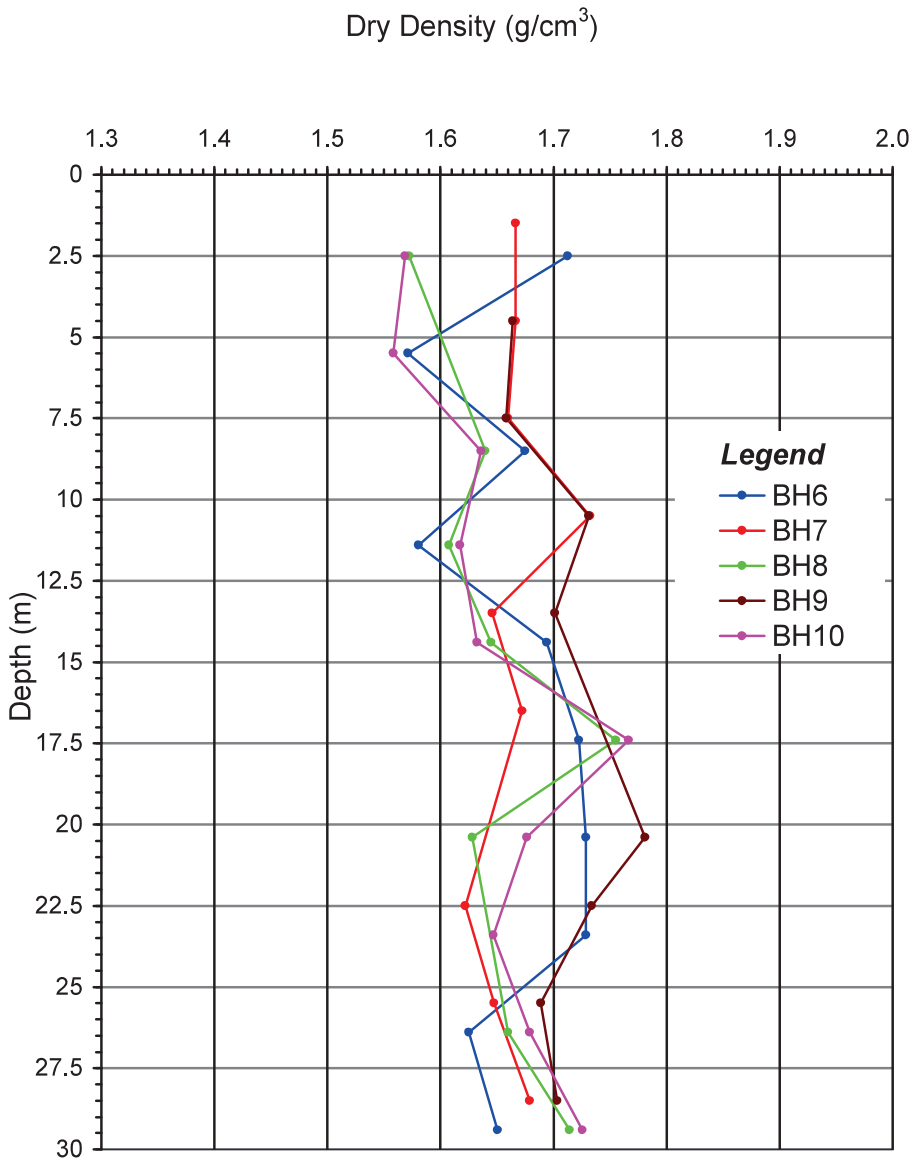
Job No. G(D)4556

Sheet No. : 3a



Dry Density vs Depth Curves

(Refer paragraph no. 7.5.2)

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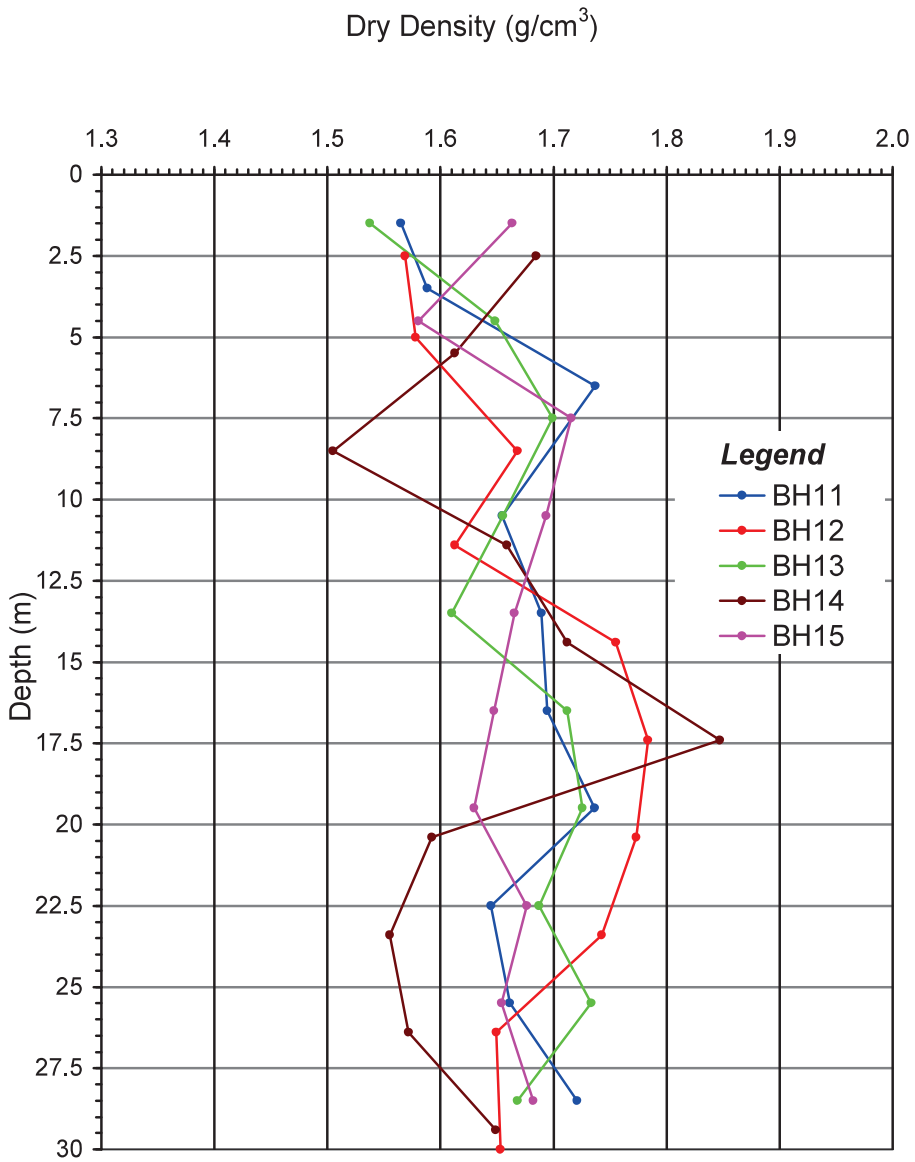
Job No. G(D)4556

Sheet No. : 3b



Dry Density vs Depth Curves

(Refer paragraph no. 7.5.2)

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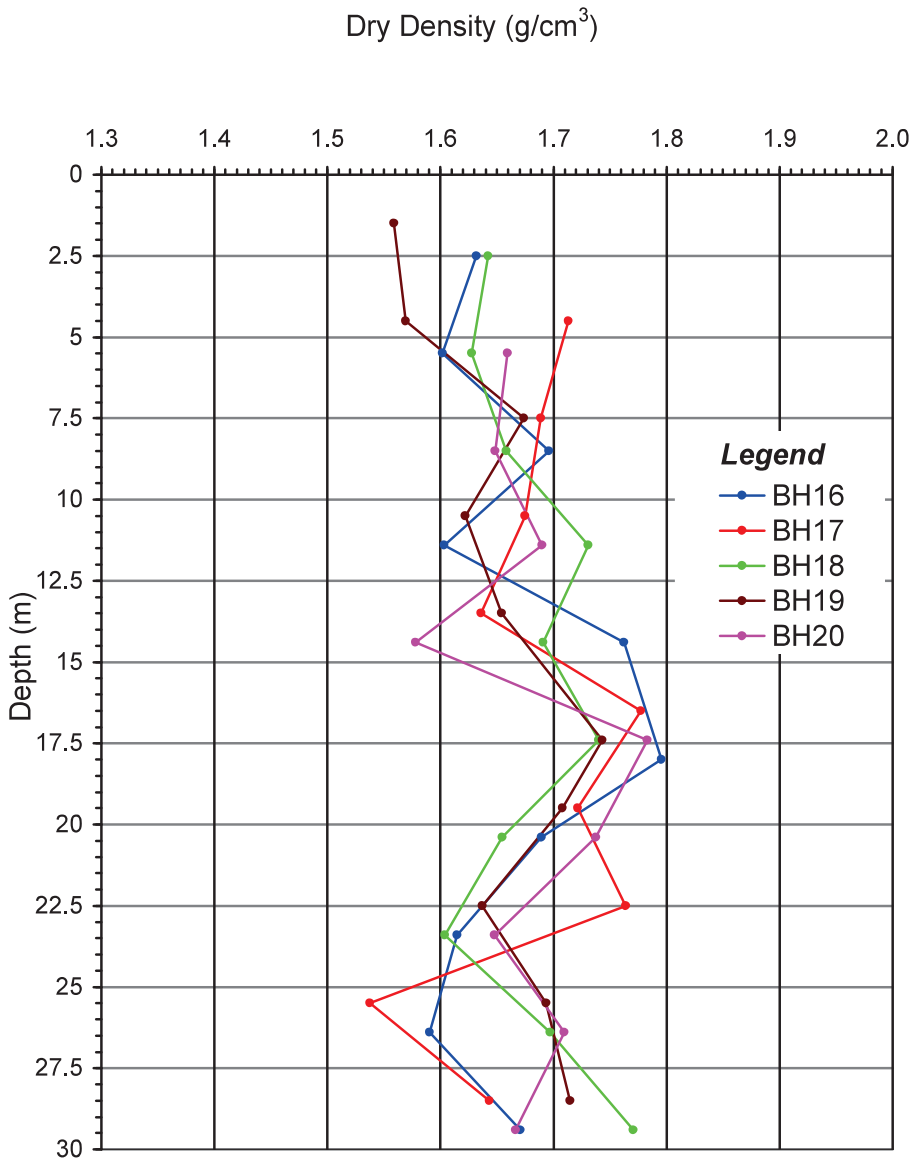
Job No. G(D)4556

Sheet No. : 3c



Dry Density vs Depth Curves

(Refer paragraph no. 7.5.2)

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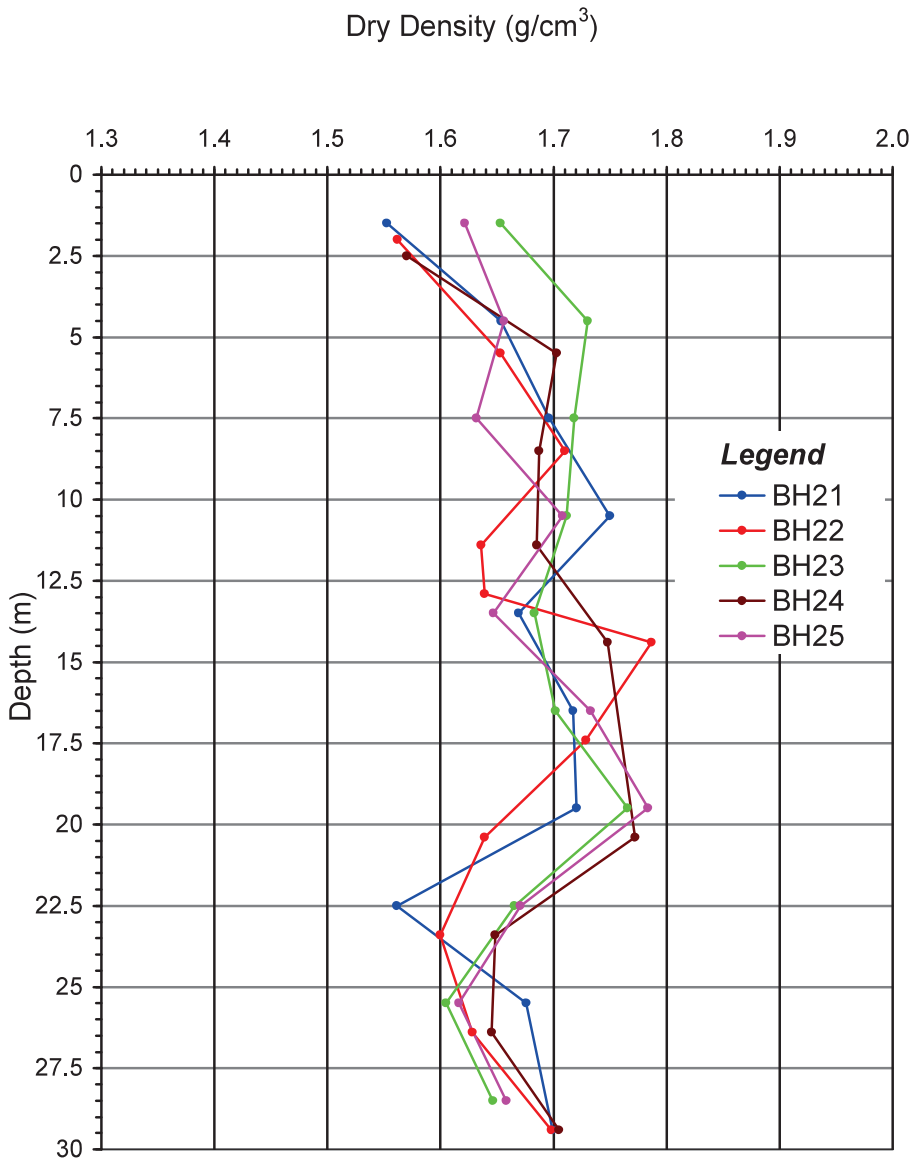
Job No. G(D)4556

Sheet No. : 3d



Dry Density vs Depth Curves

(Refer paragraph no. 7.5.2)

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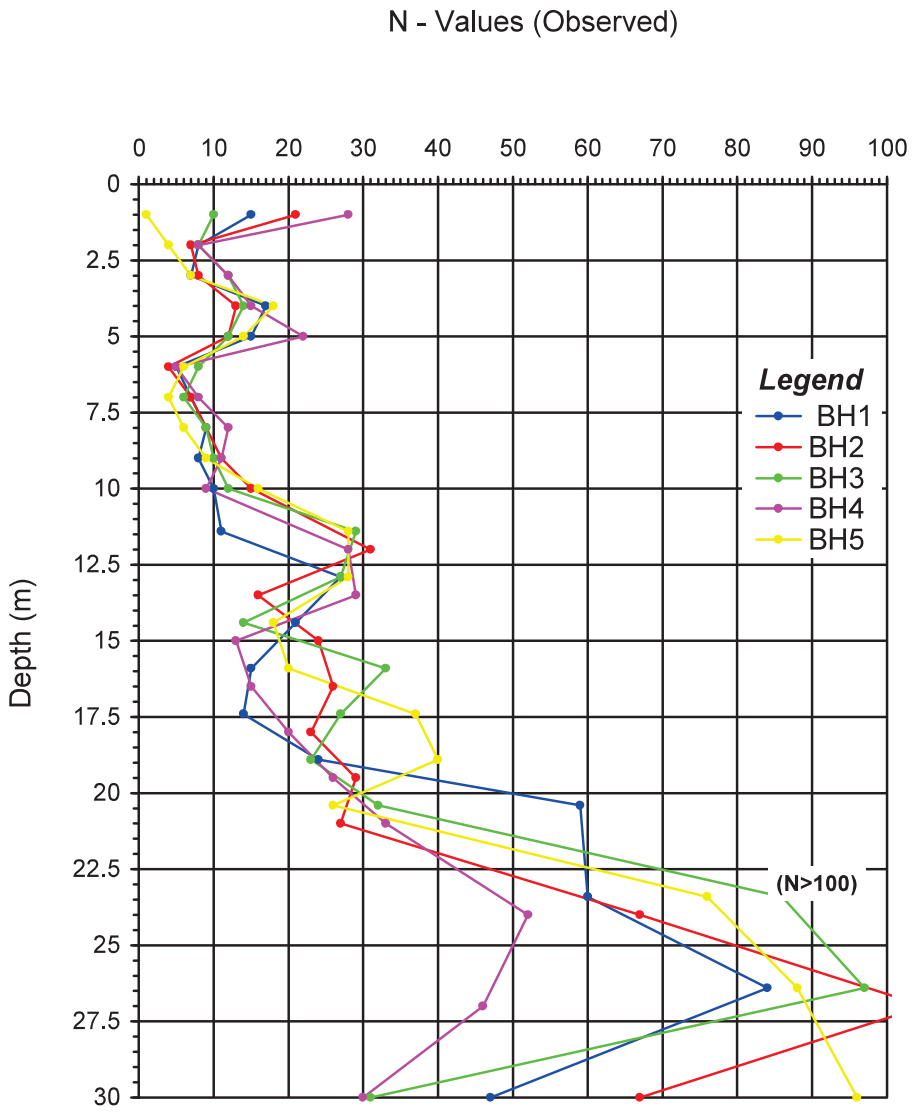
Job No. G(D)4556

Sheet No. : 3e



N - Values vs Depth Curves

(Refer paragraph no. 7.7.1)

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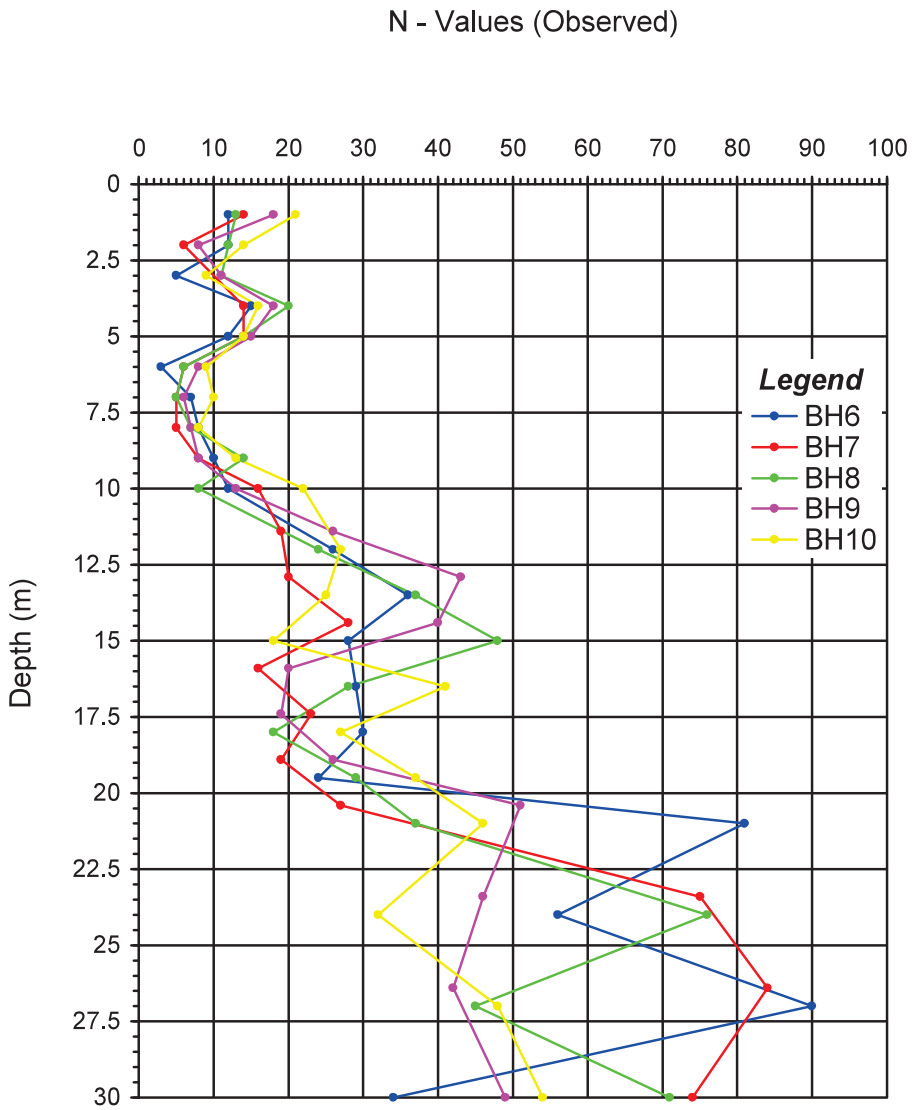
Job No. : G(D)4556

Sheet No. : 4a



N - Values vs Depth Curves

(Refer paragraph no. 7.7.1)

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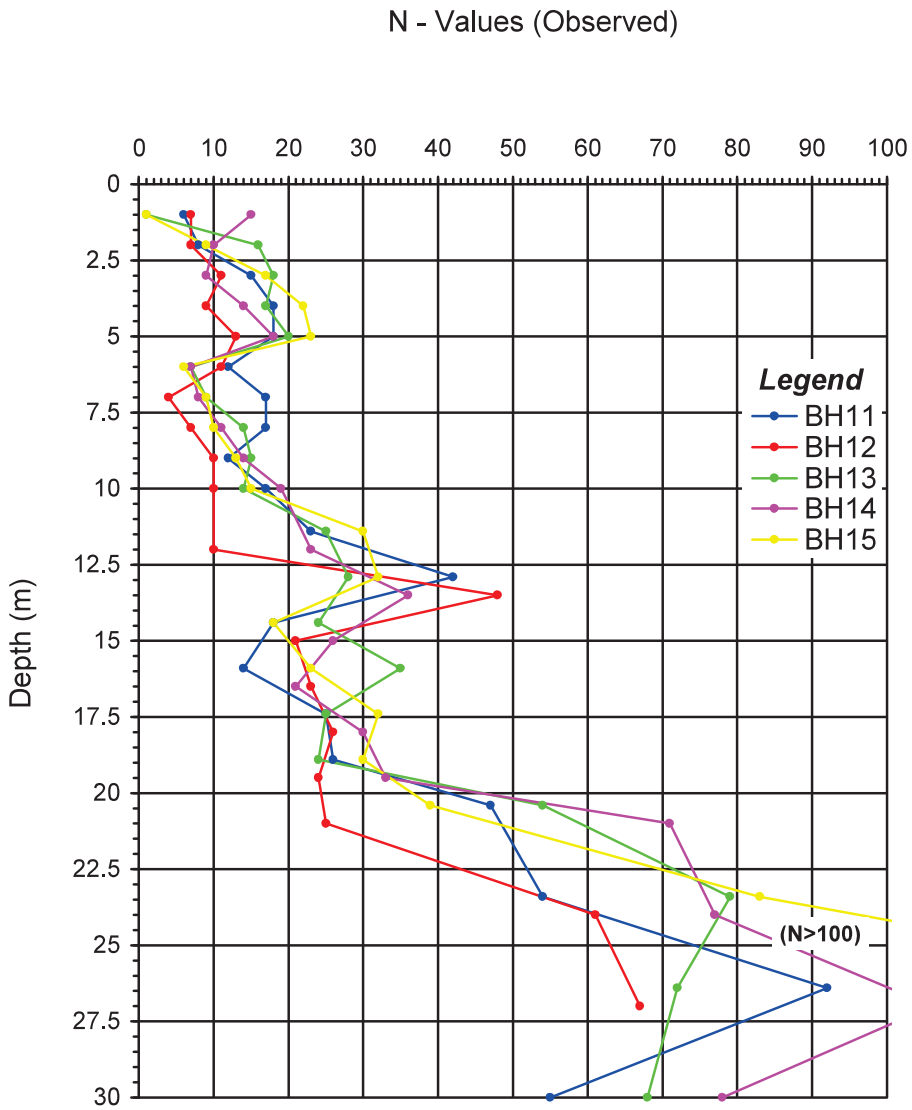
Sheet No. : 4b



N - Values vs Depth Curves

(Refer paragraph no. 7.7.1)

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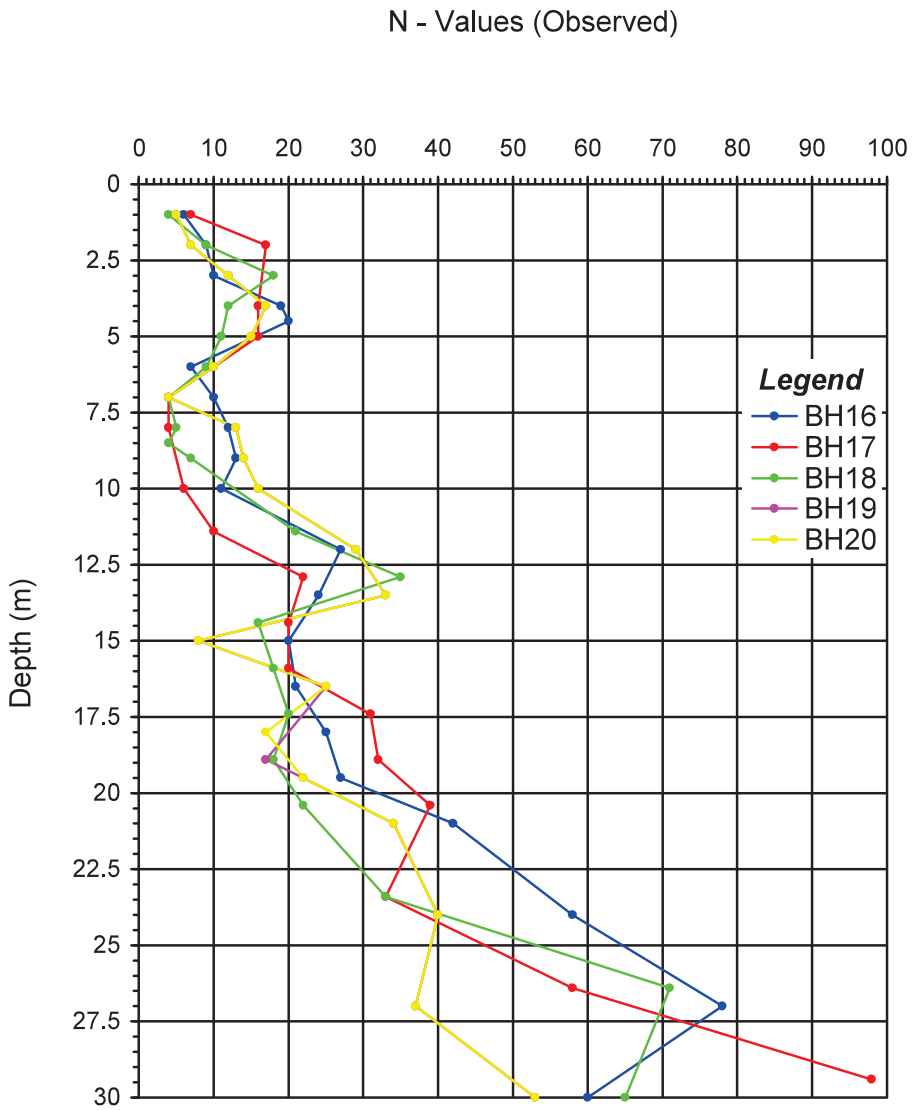
Job No. : G(D)4556

Sheet No. : 4c



N - Values vs Depth Curves

(Refer paragraph no. 7.7.1)

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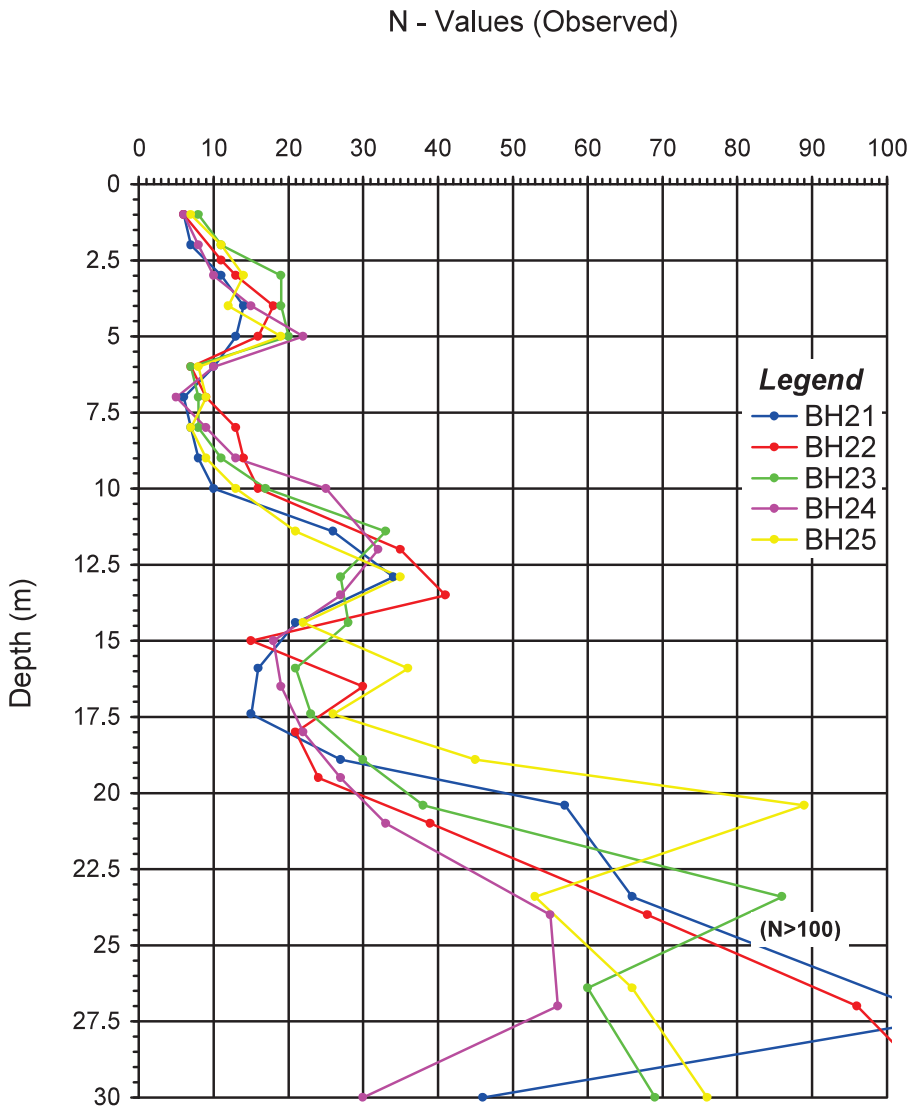
Job No. : G(D)4556

Sheet No. : 4d



N - Values vs Depth Curves

(Refer paragraph no. 7.7.1)

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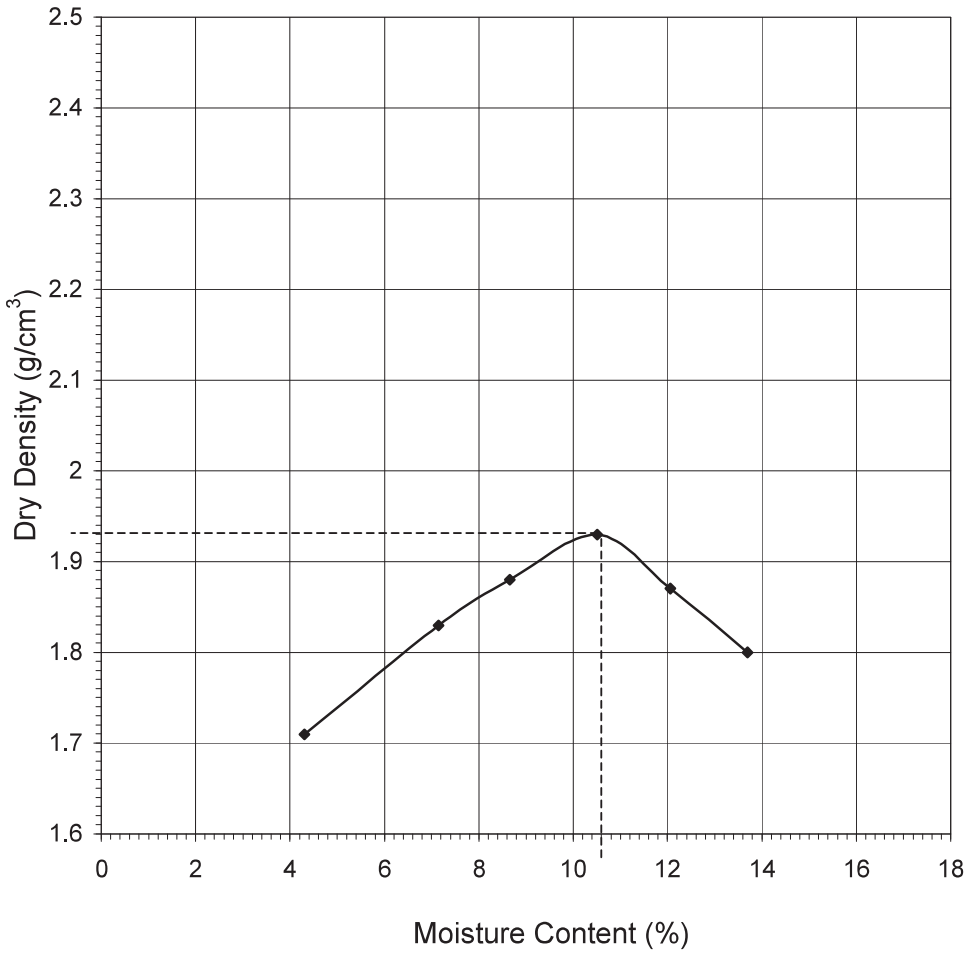
Job No. : G(D)4556

Sheet No. : 4e



Maximum Dry Density = 1.93 g/cm^3
Optimum Moisture Content = 10.6 %

Modified Proctor Density Test - 1

(Refer paragraph no. 7.9.2)

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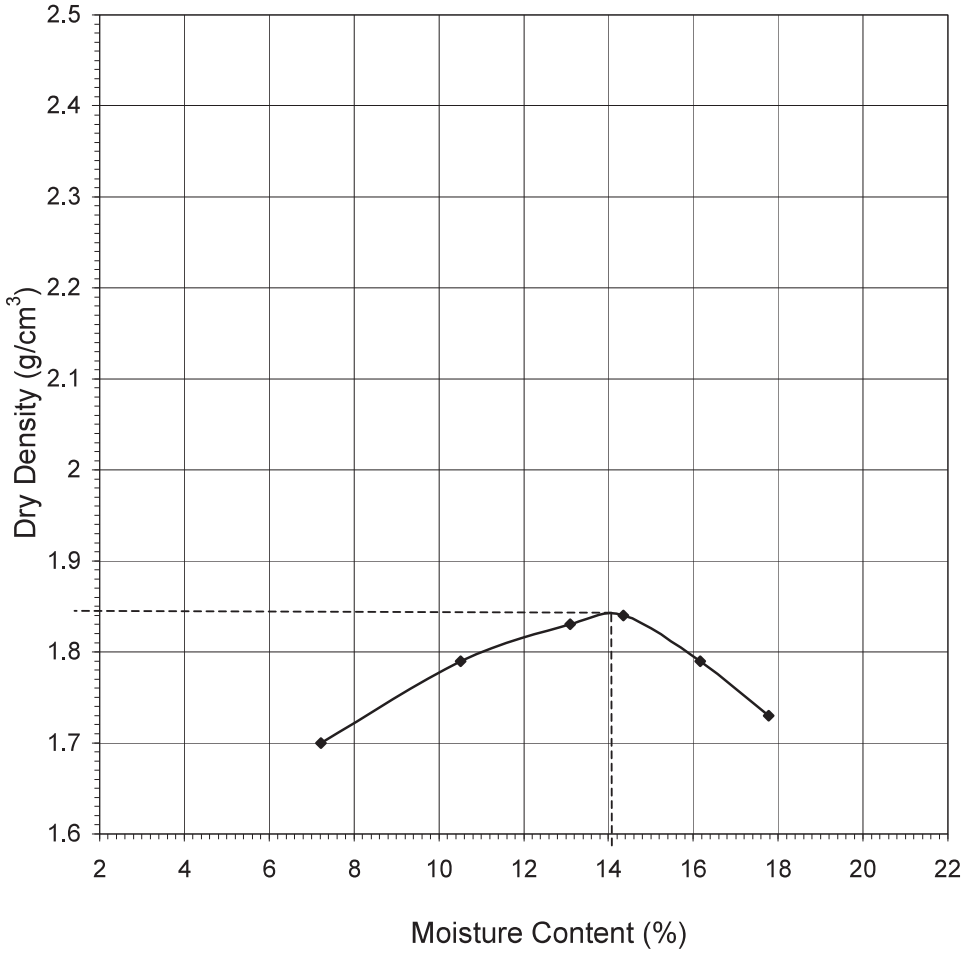
Job No. : G(D)4556

Sheet No. : 5a



Maximum Dry Density = 1.84 g/cm^3
Optimum Moisture Content = 14 %

Modified Proctor Density Test - 2

(Refer paragraph no. 7.9.2)

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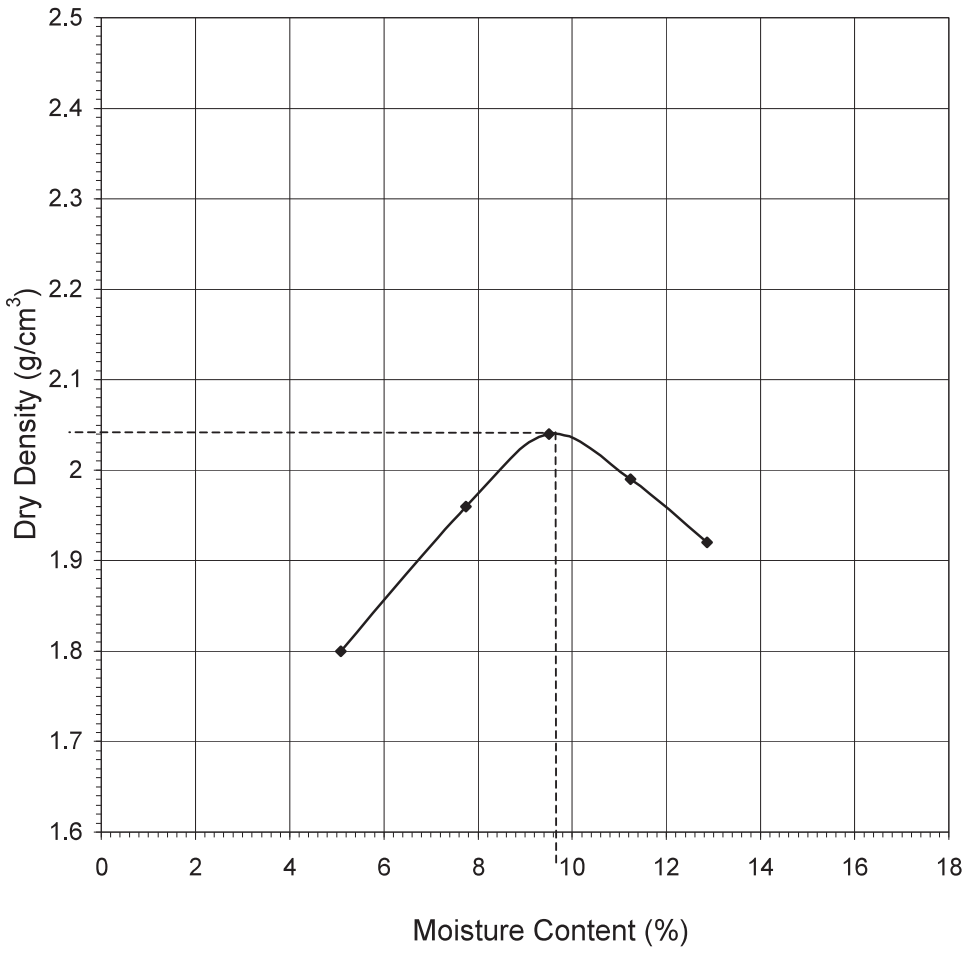
Job No. : G(D)4556

Sheet No. : 5b



Maximum Dry Density = 2.04 g/cm^3
Optimum Moisture Content = 9.6 %

Modified Proctor Density Test - 3

(Refer paragraph no. 7.9.2)

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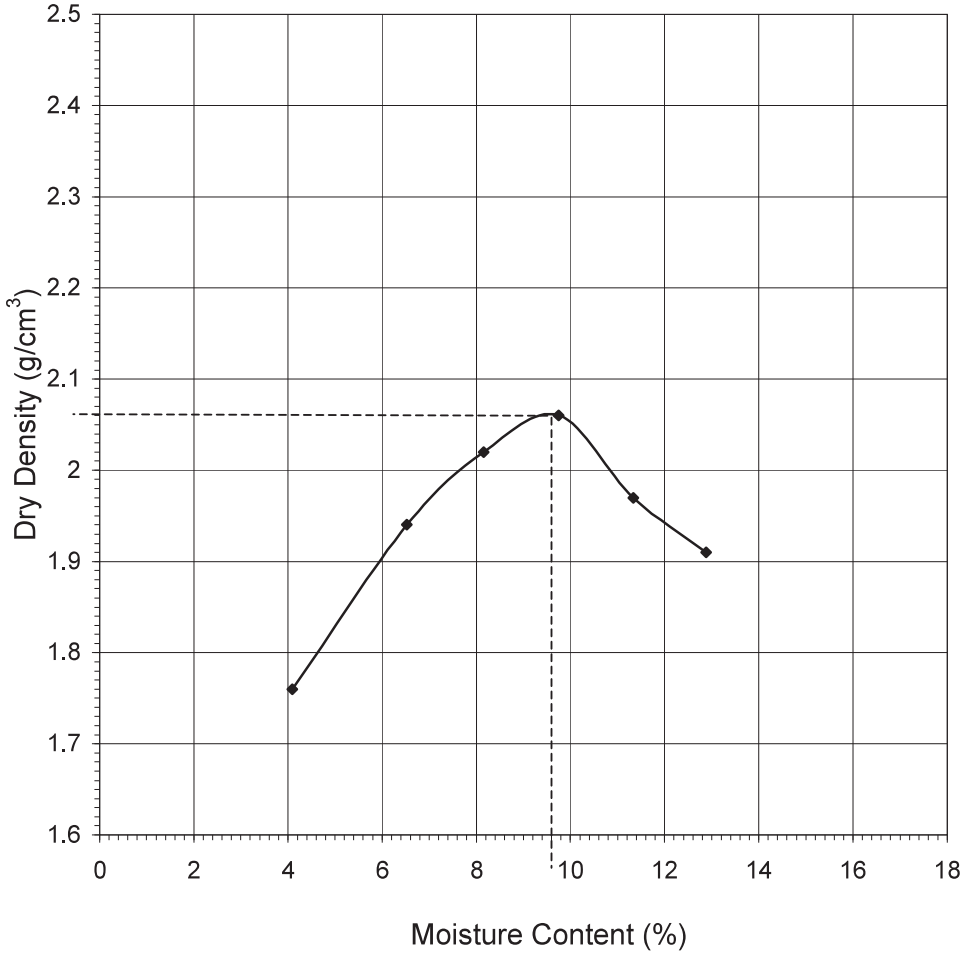
Job No. : G(D)4556

Sheet No. : 5c



Maximum Dry Density = 2.06 g/cm^3
Optimum Moisture Content = 9.6 %

Modified Proctor Density Test - 4

(Refer paragraph no. 7.9.2)

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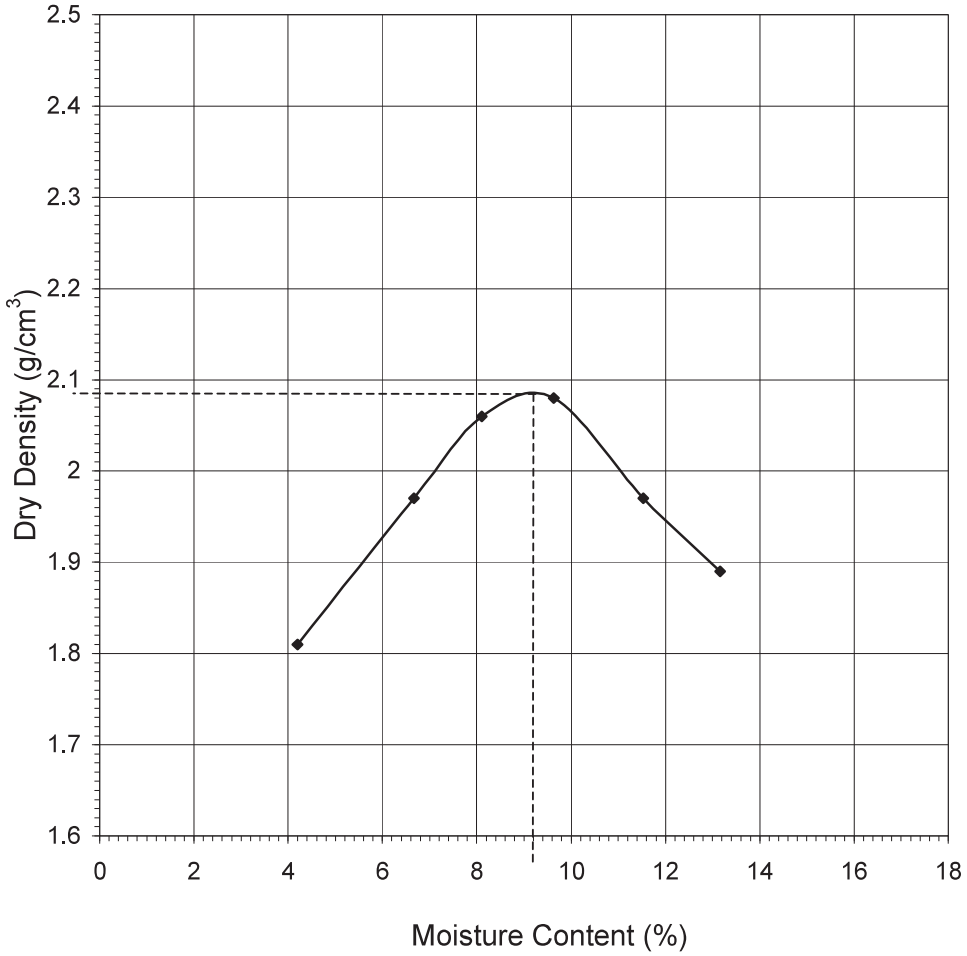
Job No. : G(D)4556

Sheet No. : 5d



Maximum Dry Density = 2.09 g/cm^3
Optimum Moisture Content = 9.2 %

Modified Proctor Density Test - 5

(Refer paragraph no. 7.9.2)

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Job No. : G(D)4556

Sheet No. : 5e

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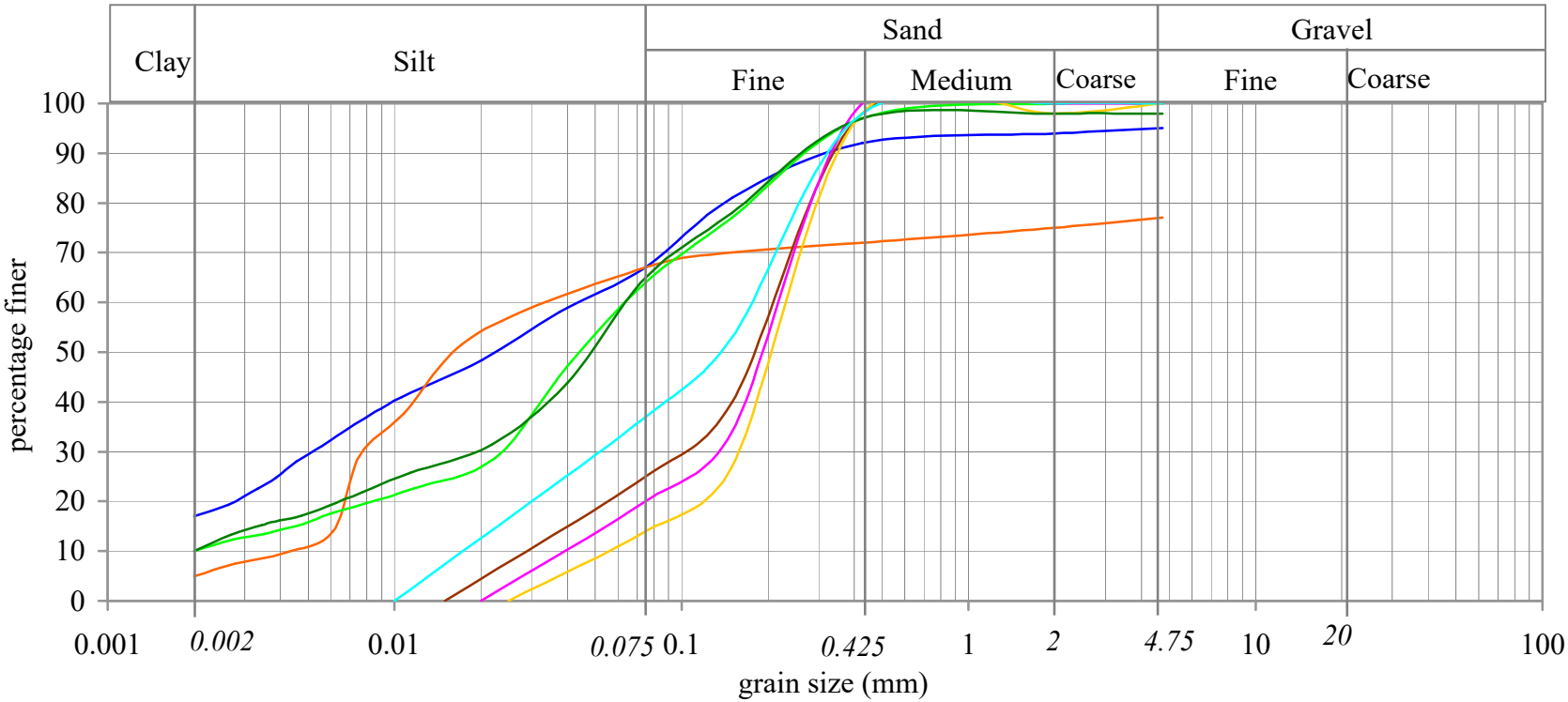
Job No. : G(D)4556

Sheet No. : 6a

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	1	1	Clayey sandy silt with gravel	5	28	50	17	0.041	-	-
	1	2	Clayey sandy silt with gravel	23	10	62	5	0.032	0.0041	7.8
	1	3	Clayey sandy silt	0	36	54	10	0.062	0.002	31.0
	1	4	Silty sand	0	75	25	0	0.21	0.029	7.2
	1	5	Sand with silt	0	80	20	0	0.21	0.039	5.4
	1	6	Sand with silt	0	86	14	0	0.22	0.055	4.0
	1	7	Clayey sandy silt with gravel	2	33	55	10	0.062	0.002	31.0
	1	8	Silty sand	0	63	37	0	0.17	0.017	10.0

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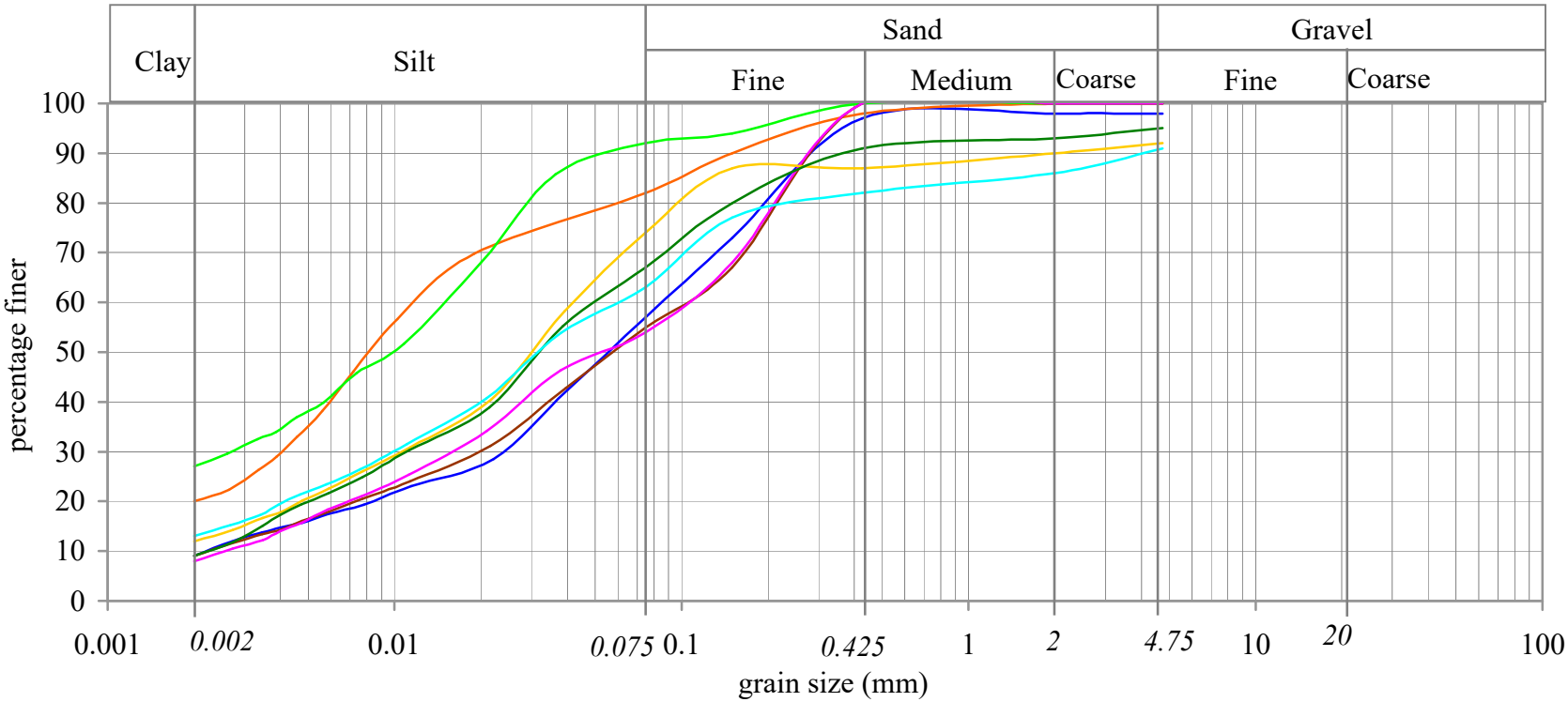
Job No. : G(D)4556

Sheet No. : 6b

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	1	9	Clayey sandy silt with gravel	2	41	48	9	0.095	0.0022	43.2
	1	10	Sandy clayey silt	0	18	62	20	0.012	-	-
	1	11.4	Sandy clayey silt	0	8	65	27	0.015	-	-
	1	12.9	Clayey sandy silt	0	45	46	9	0.11	0.0022	50.0
	1	14.4	Clayey sandy silt	0	46	46	8	0.11	0.0023	47.8
	1	15.9	Clayey sandy silt with gravel	8	18	62	12	0.041	-	-
	1	17.4	Clayey sandy silt with gravel	5	28	58	9	0.051	0.023	2.2
	1	18.9	Clayey sandy silt with gravel	9	28	50	13	0.061	-	-

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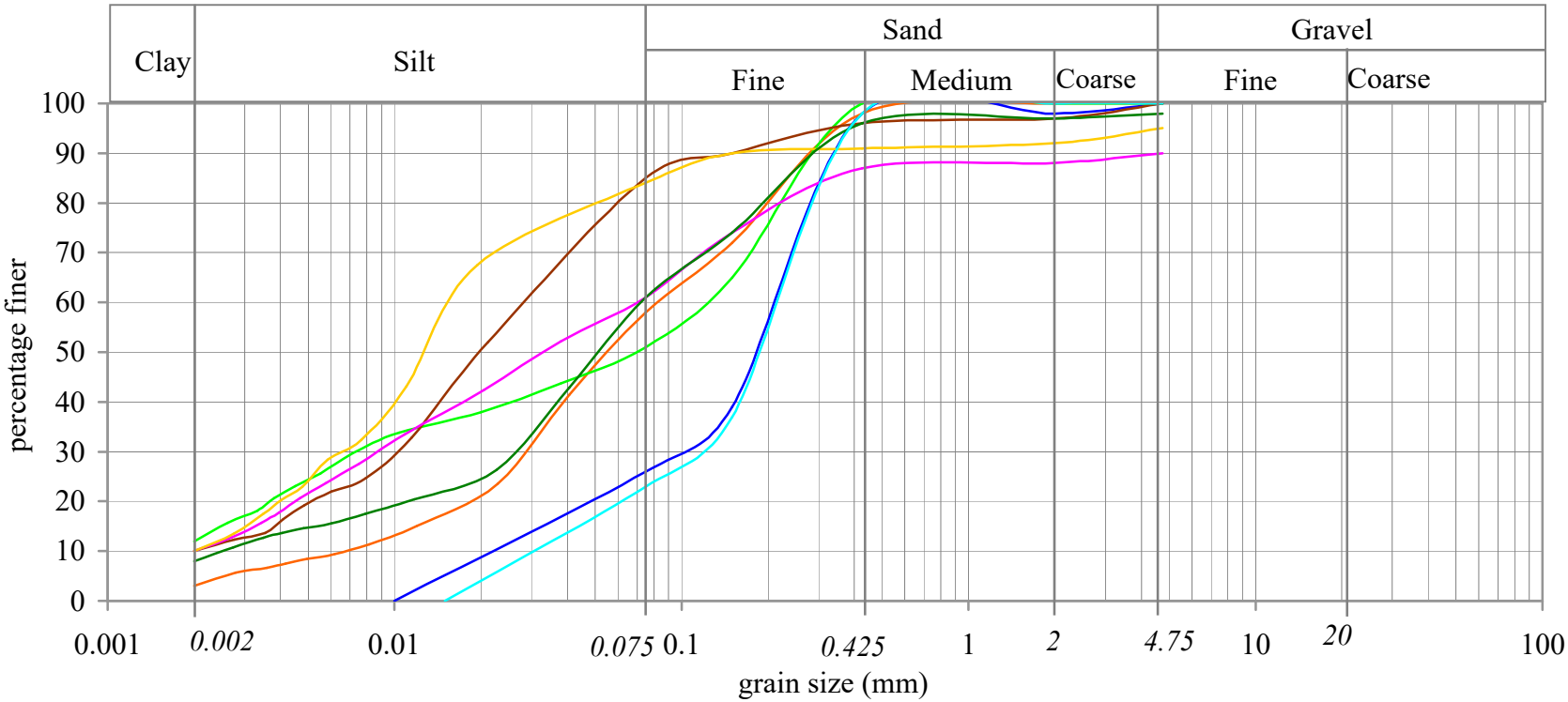
Sheet No. : 6c

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	1	20.4	Silty sand	0	74	26	0	0.21	0.021	10.0
	1	23.4	Clayey sandy silt	0	42	55	3	0.081	0.0061	13.3
	1	26.4	Clayey silty sand	0	49	39	12	0.12	-	-
	1	30	Clayey sandy silt	0	15	75	10	0.07	0.002	35.0
	2	1	Clayey sandy silt with gravel	10	29	51	10	0.069	0.002	34.5
	2	2	Clayey sandy silt with gravel	5	11	74	10	0.015	0.002	7.5
	2	3	Clayey sandy silt with gravel	2	37	53	8	0.06	0.0023	26.1
	2	4	Silty sand	0	77	23	0	0.21	0.03	7.0

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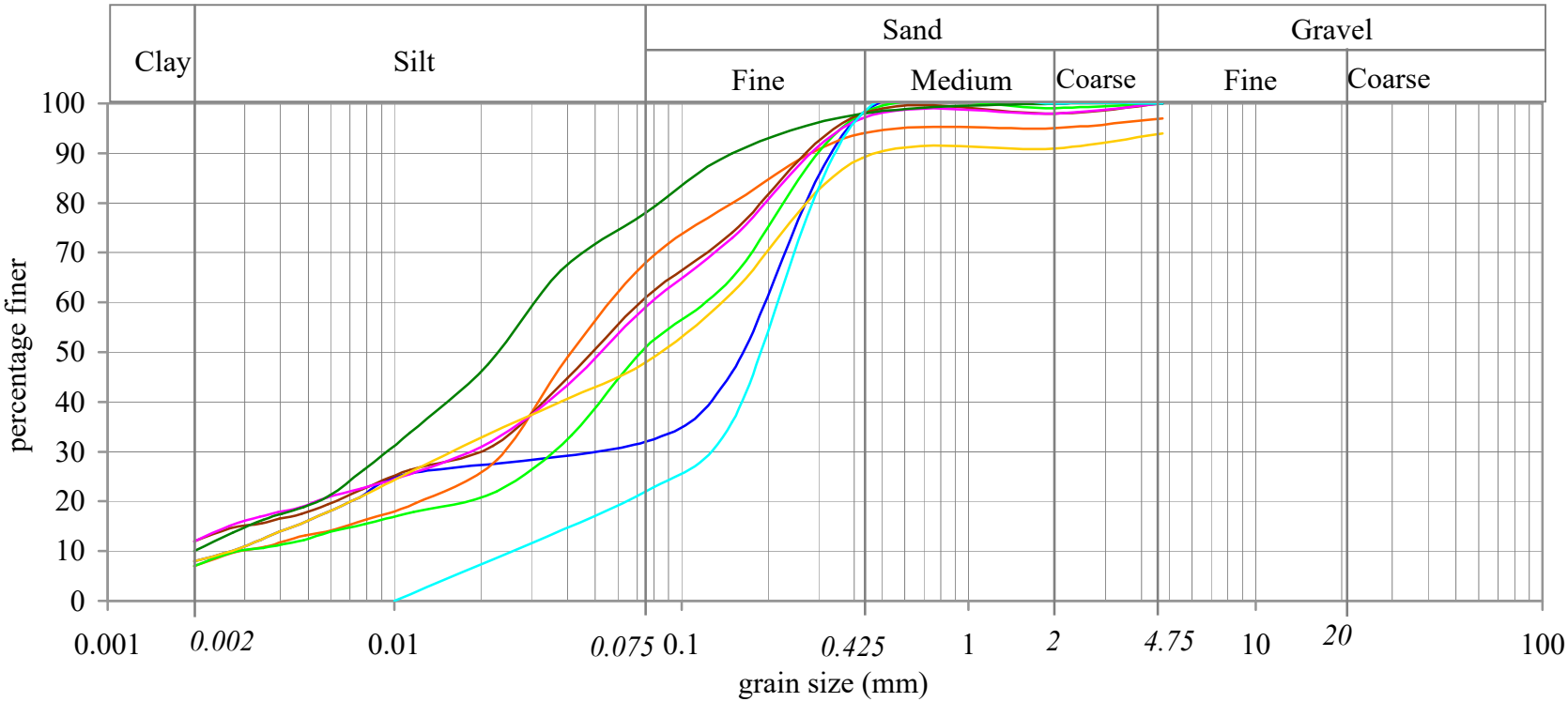
Sheet No. : 6d

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	2	5	Clayey silty sand	0	68	24	8	0.19	0.002	95.0
	2	6	Clayey sandy silt with gravel	3	29	61	7	0.058	0.0028	20.7
	2	7	Clayey silty sand	0	49	44	7	0.13	0.0028	46.4
	2	8	Clayey sandy silt	0	39	49	12	0.071	-	-
	2	9	Clayey sandy silt	0	41	47	12	0.081	-	-
	2	10	Clayey silty sand with gravel	6	46	40	8	0.15	0.0027	55.6
	2	12	Clayey sandy silt	0	22	68	10	0.031	0.002	15.5
	2	13.5	Silty sand	0	78	22	0	0.21	0.025	8.4

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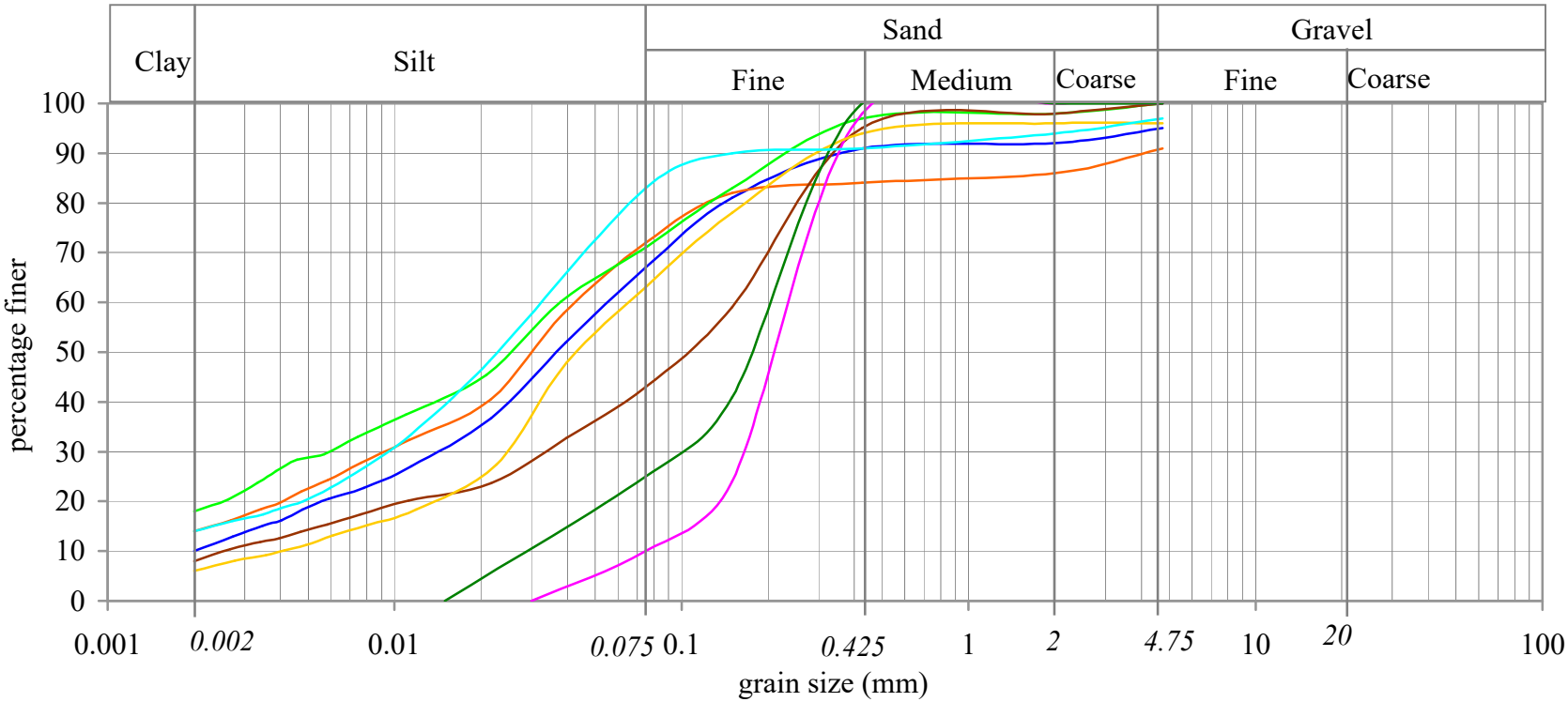
Job No. : G(D)4556

Sheet No. : 6e

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	2	15	Clayey sandy silt with gravel	5	28	57	10	0.055	0.002	27.5
	2	16.5	Clayey sandy silt with gravel	9	19	58	14	0.042	-	-
	2	18	Clayey sandy silt	0	29	53	18	0.038	-	-
	2	19.5	Clayey silty sand	0	57	35	8	0.15	0.0026	57.7
	2	21	Sand with traces of silt	0	90	10	0	0.23	0.075	3.1
	2	24	Clayey sandy silt with gravel	4	33	57	6	0.066	0.0038	17.4
	2	27	Silty sand	0	75	25	0	0.21	0.029	7.2
	2	30	Clayey sandy silt with gravel	3	14	69	14	0.031	-	-

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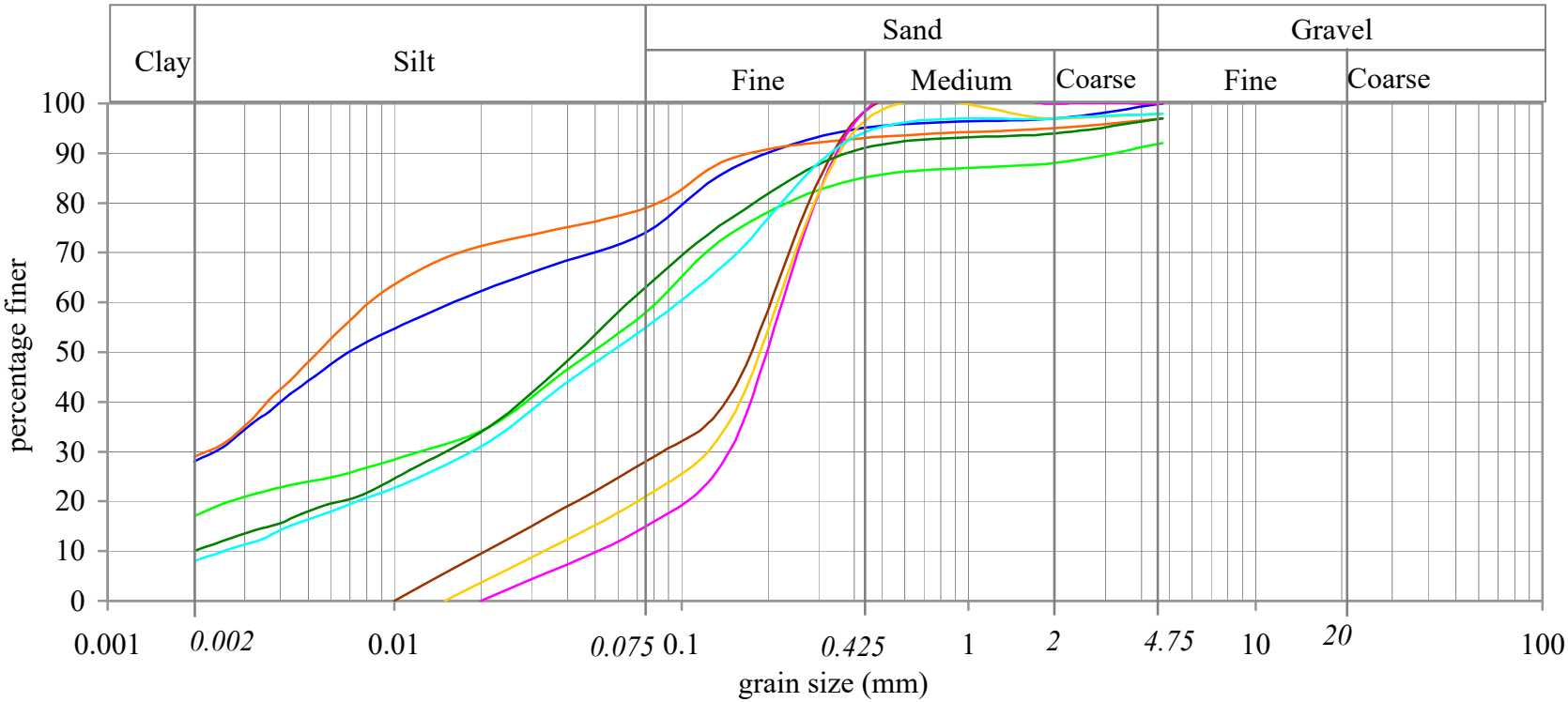
Job No. : G(D)4556

Sheet No. : 6f

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	3	1	Sandy clayey silt	0	26	46	28	0.018	-	-
	3	2	Sandy clayey silt with gravel	3	18	50	29	0.008	-	-
	3	3	Clayey sandy silt with gravel	8	34	41	17	0.0091	-	-
	3	4	Silty sand	0	72	28	0	0.21	0.021	10.0
	3	5	Sand with silt	0	85	15	0	0.22	0.051	4.3
	3	6	Silty sand with gravel	2	77	21	0	0.21	0.032	6.6
	3	7	Clayey sandy silt with gravel	3	34	53	10	0.068	0.002	34.0
	3	8	Clayey sandy silt with gravel	2	43	47	8	0.095	0.0022	43.2

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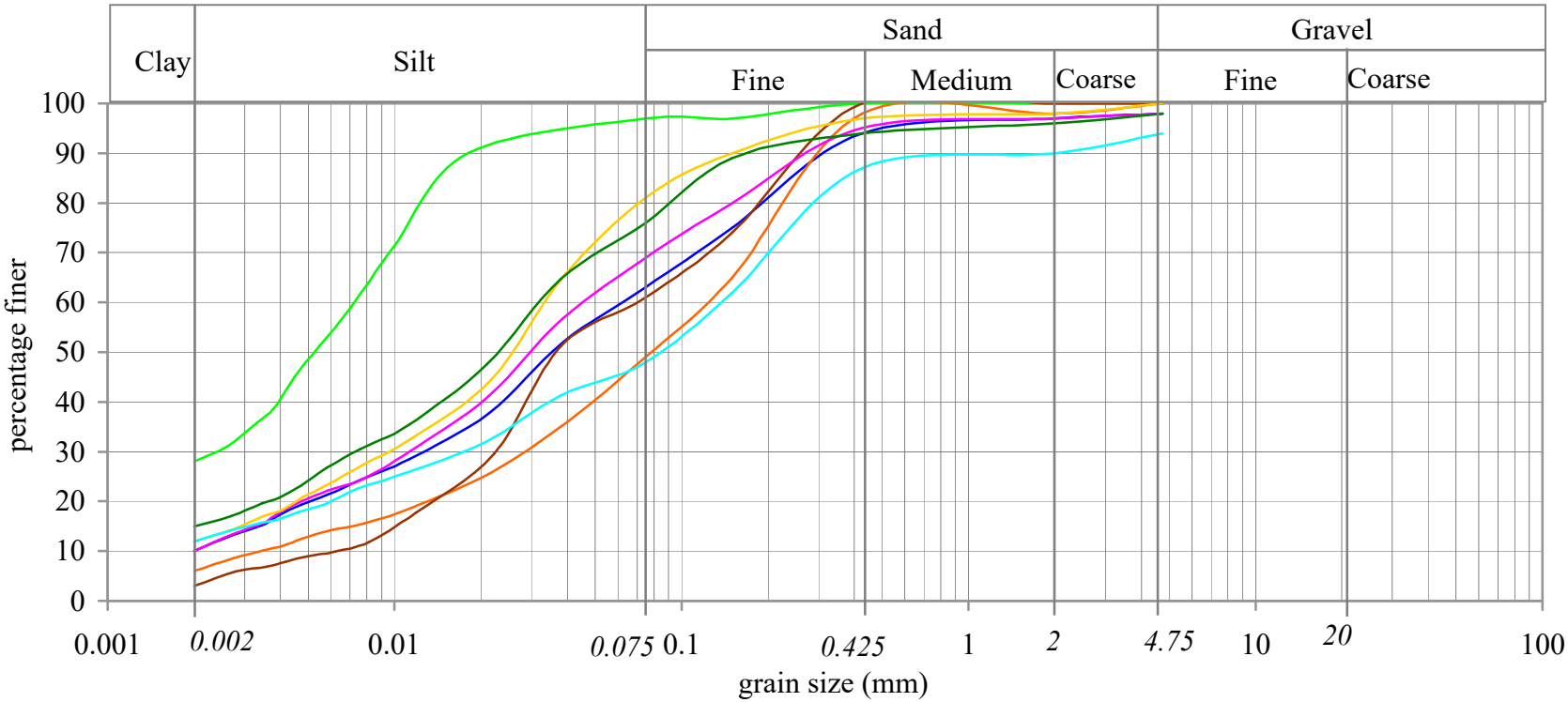
Job No. : G(D)4556

Sheet No. : 6g

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	3	9	Clayey sandy silt with gravel	2	35	53	10	0.061	0.002	30.5
	3	10	Clayey silty sand	0	51	43	6	0.13	0.0031	41.9
	3	11.4	Sandy clayey silt	0	3	69	28	0.0071	-	-
	3	12.9	Clayey sandy silt	0	39	58	3	0.071	0.0061	11.6
	3	14.4	Clayey sandy silt with gravel	2	29	59	10	0.045	0.002	22.5
	3	15.9	Clayey sandy silt	0	19	69	12	0.032	-	-
	3	17.4	Clayey sandy silt with gravel	2	22	61	15	0.032	-	-
	3	18.9	Clayey silty sand with gravel	6	46	36	12	0.15	-	-

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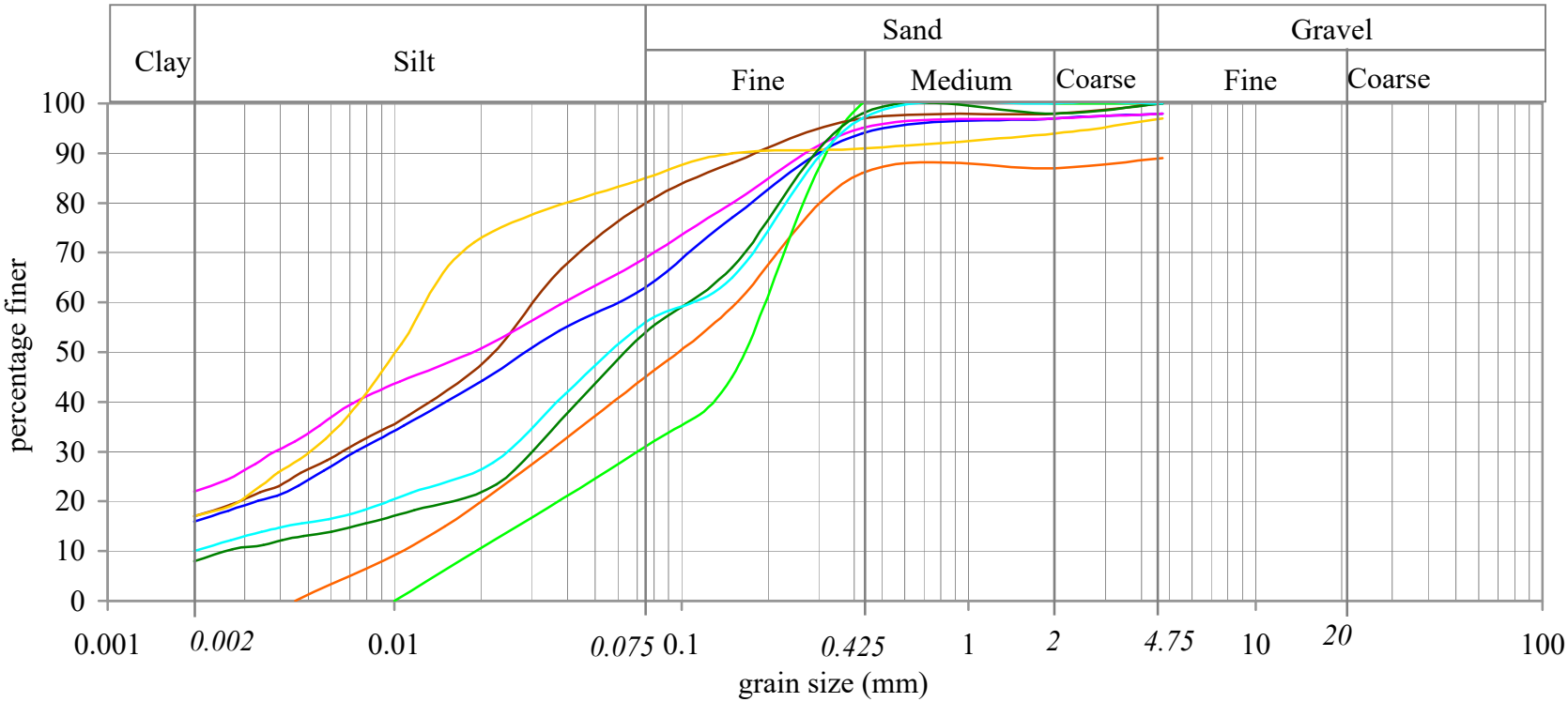
Job No. : G(D)4556

Sheet No. : 6h

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	3	20.4	Clayey sandy silt with gravel	2	35	47	16	0.061	-	-
	3	23.4	Sandy silt with gravel	11	44	45	0	0.16	0.011	14.5
	3	26.4	Silty sand	0	69	31	0	0.19	0.019	10.0
	3	30	Clayey sandy silt	0	20	63	17	0.03	-	-
	4	1	Clayey sandy silt with gravel	2	29	47	22	0.039	-	-
	4	2	Sandy claeyy silt with gravel	3	12	68	17	0.013	-	-
	4	3	Clayey sandy silt	0	46	46	8	0.11	0.0026	42.3
	4	4	Clayey silty sand	0	44	46	10	0.12	0.002	60.0

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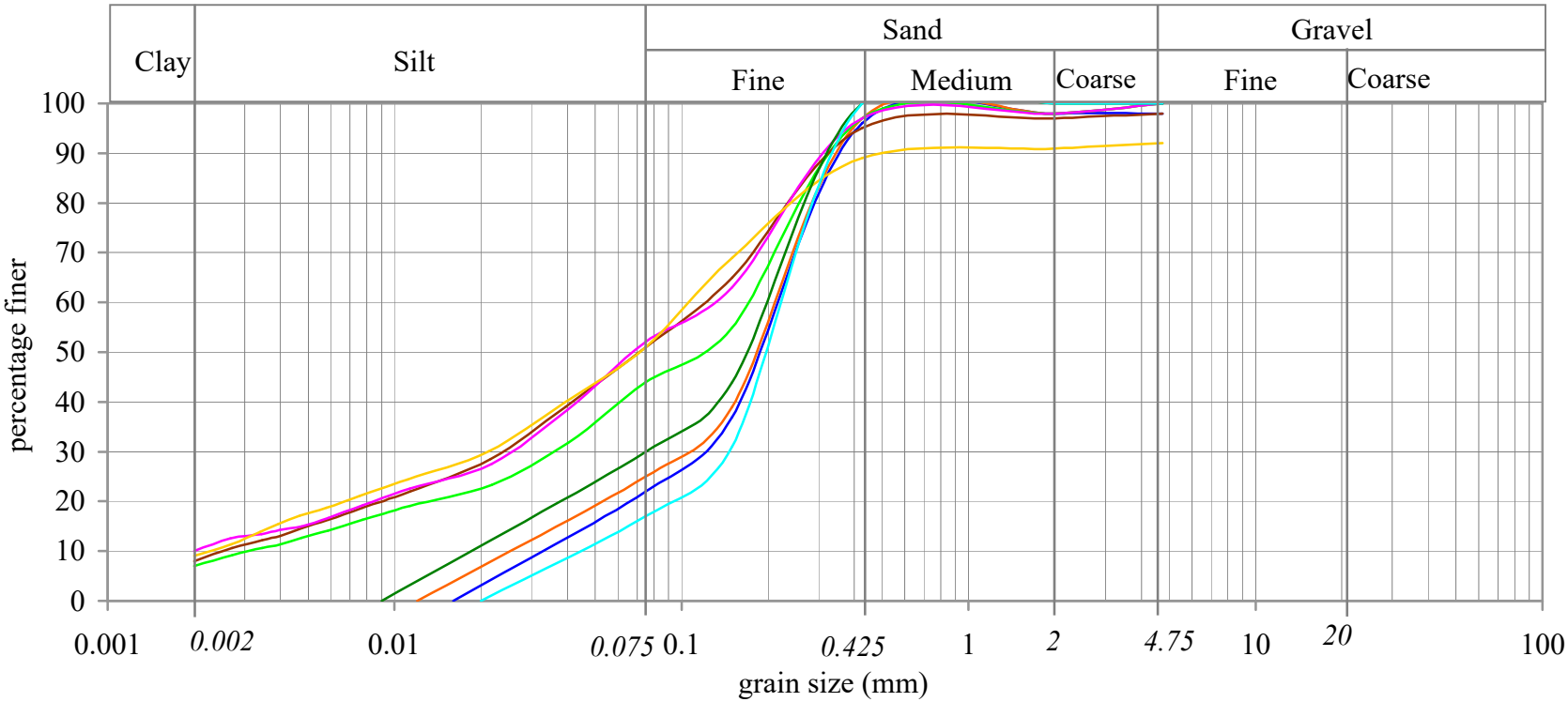
Job No. : G(D)4556

Sheet No. : 6i

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	4	5	Silty sand with gravel	2	76	22	0	0.21	0.031	6.8
	4	6	Silty sand	0	75	25	0	0.21	0.025	8.4
	4	7	Clayey silty sand	0	56	37	7	0.17	0.0029	58.6
	4	8	Clayey silty sand with gravel	2	47	43	8	0.13	0.0025	52.0
	4	9	Clayey silty sand	0	48	42	10	0.21	0.002	105.0
	4	10	Clayey sandy silt with gravel	8	41	42	9	0.11	0.0023	47.8
	4	12	Silty sand	0	70	30	0	0.2	0.019	10.5
	4	13.5	Sand with silt	0	83	17	0	0.22	0.045	4.9

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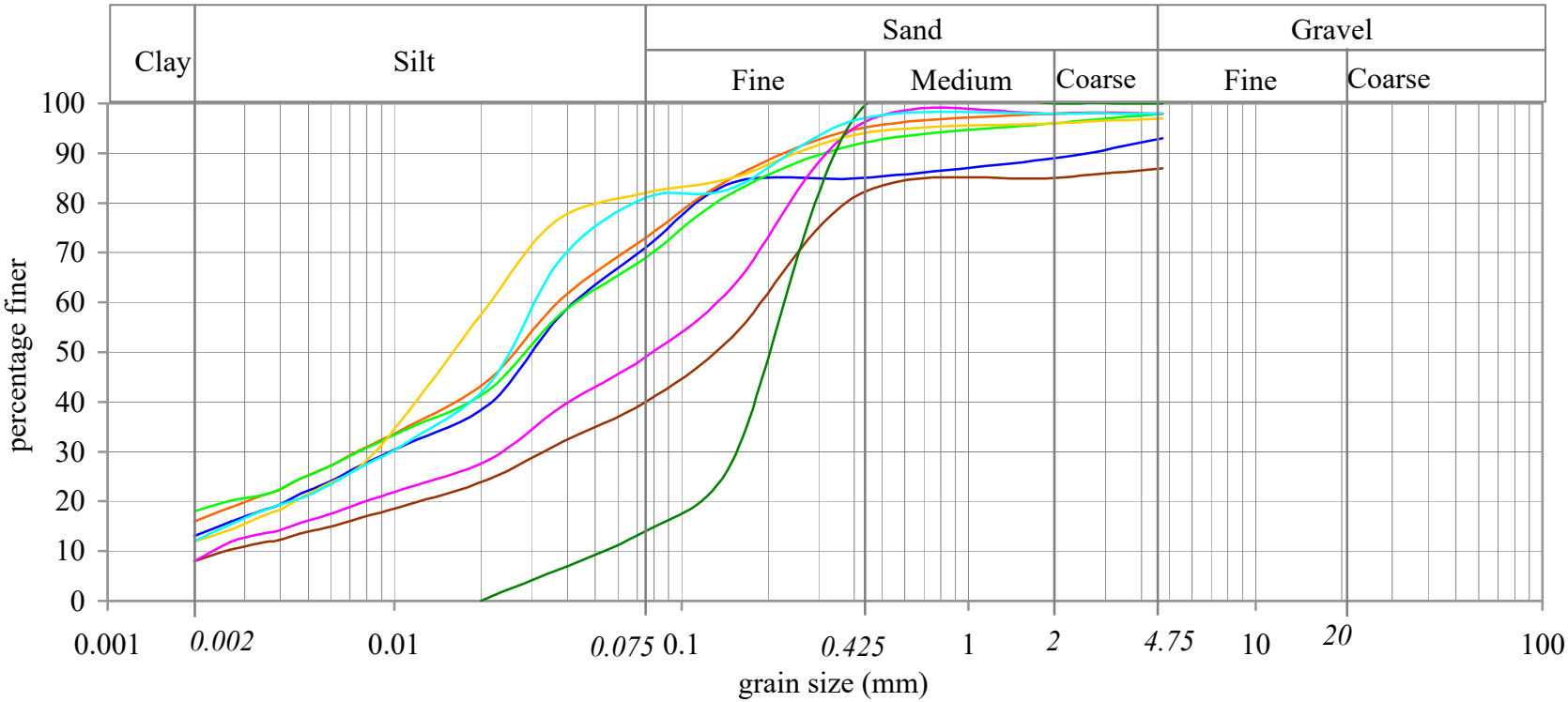
Job No. : G(D)4556

Sheet No. : 6j

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	4	15	Clayey sandy silt with gravel	7	22	58	13	0.041	-	-
	4	16.5	Clayey sandy silt with gravel	2	25	57	16	0.038	-	-
	4	18	Clayey sandy silt with gravel	2	29	51	18	0.042	-	-
	4	19.5	Clayey silty sand with gravel	13	47	32	8	0.19	0.0025	76.0
	4	21	Clayey silty sand with gravel	2	49	41	8	0.14	0.0023	60.9
	4	24	Clayey sandy silt with gravel	3	15	70	12	0.021	-	-
	4	27	Sand with silt	0	86	14	0	0.22	0.051	4.3
	4	30	Clayey sandy silt with gravel	2	17	69	12	0.03	-	-

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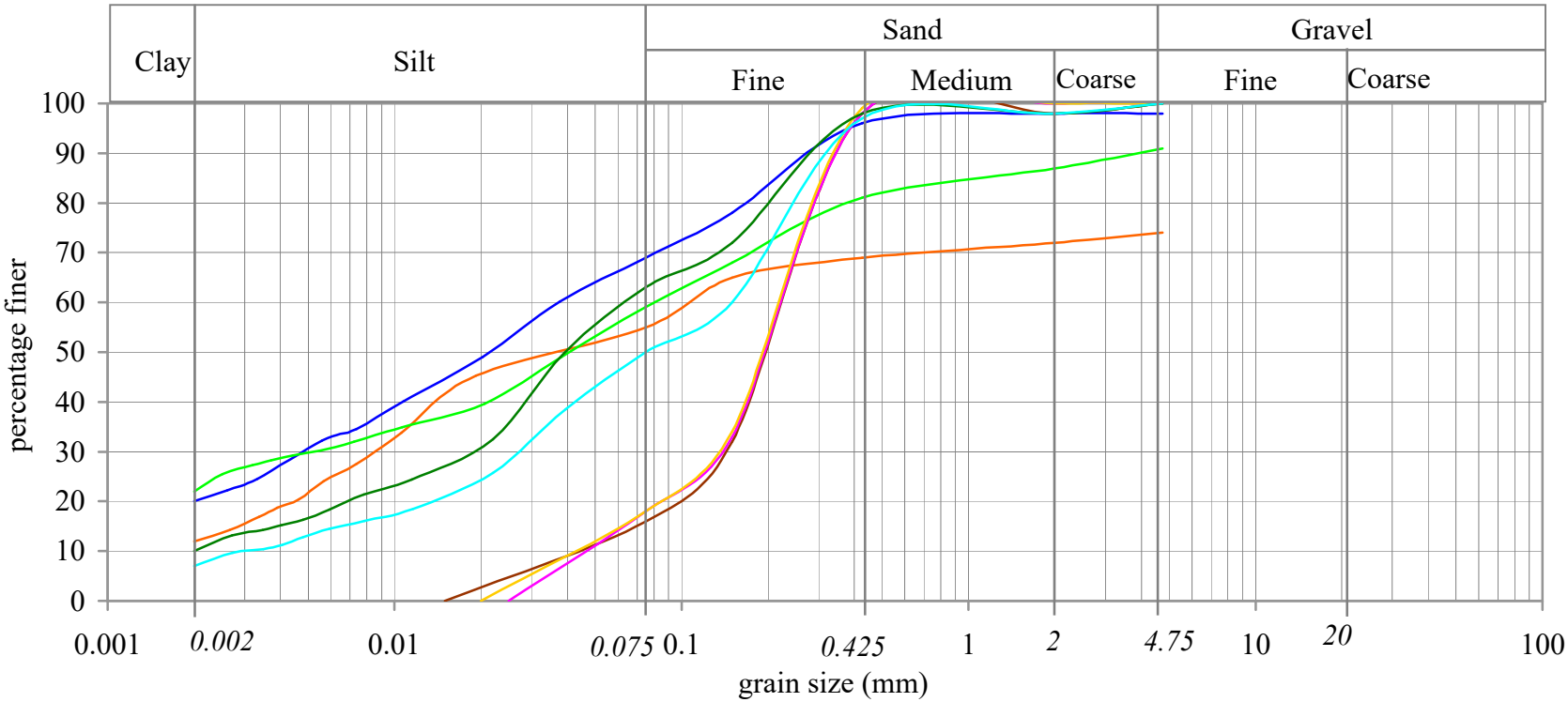
Job No. : G(D)4556

Sheet No. : 6k

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	5	1	Clayey sandy silt with gravel	2	29	49	20	0.035	-	-
	5	2	Clayey sandy silt with gravel	26	19	43	12	0.11	-	-
	5	3	Clayey sandy silt with gravel	9	32	37	22	0.081	-	-
	5	4	Sand with silt	0	84	16	0	0.22	0.042	5.2
	5	5	Sand with silt	0	82	18	0	0.23	0.045	5.1
	5	6	Sand with silt	0	82	18	0	0.23	0.042	5.5
	5	7	Clayey sandy silt	0	37	53	10	0.065	0.002	32.5
	5	8	Clayey silty sand	0	50	43	7	0.15	0.0029	51.7

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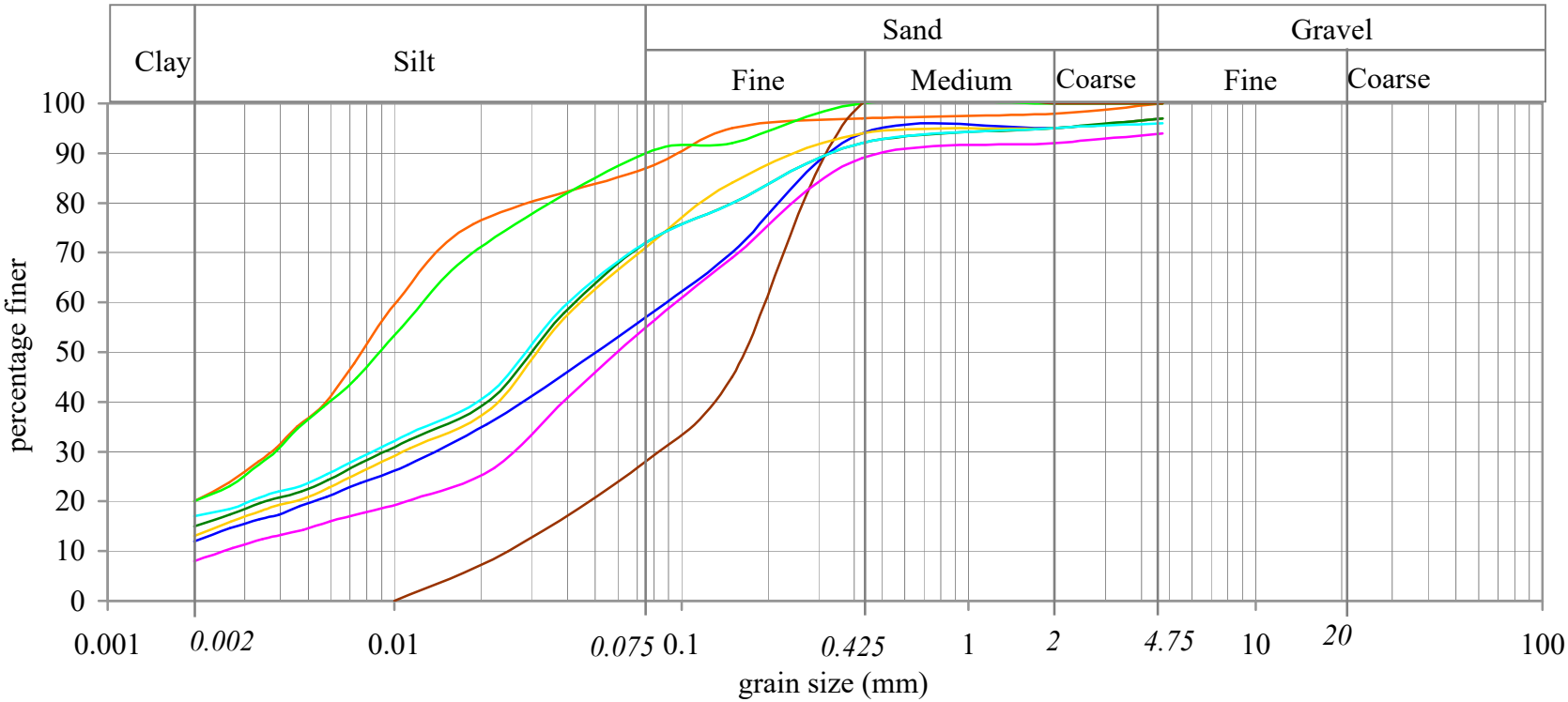
Job No. : G(D)4556

Sheet No. : 61

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	5	9	Clayey sandy silt with gravel	3	40	45	12	0.089	-	-
	5	10	Sandy clayey silt	0	13	67	20	0.011	-	-
	5	11.4	Sandy clayey silt	0	10	70	20	0.013	-	-
	5	12.9	Silty sand	0	72	28	0	0.19	0.025	7.6
	5	14.4	Clayey sandy silt with gravel	6	39	47	8	0.091	0.0024	37.9
	5	15.9	Clayey sandy silt with gravel	3	26	58	13	0.041	-	-
	5	17.4	Clayey sandy silt with gravel	3	25	57	15	0.041	-	-
	5	18.9	Clayey sandy silt with gravel	4	24	55	17	0.041	-	-

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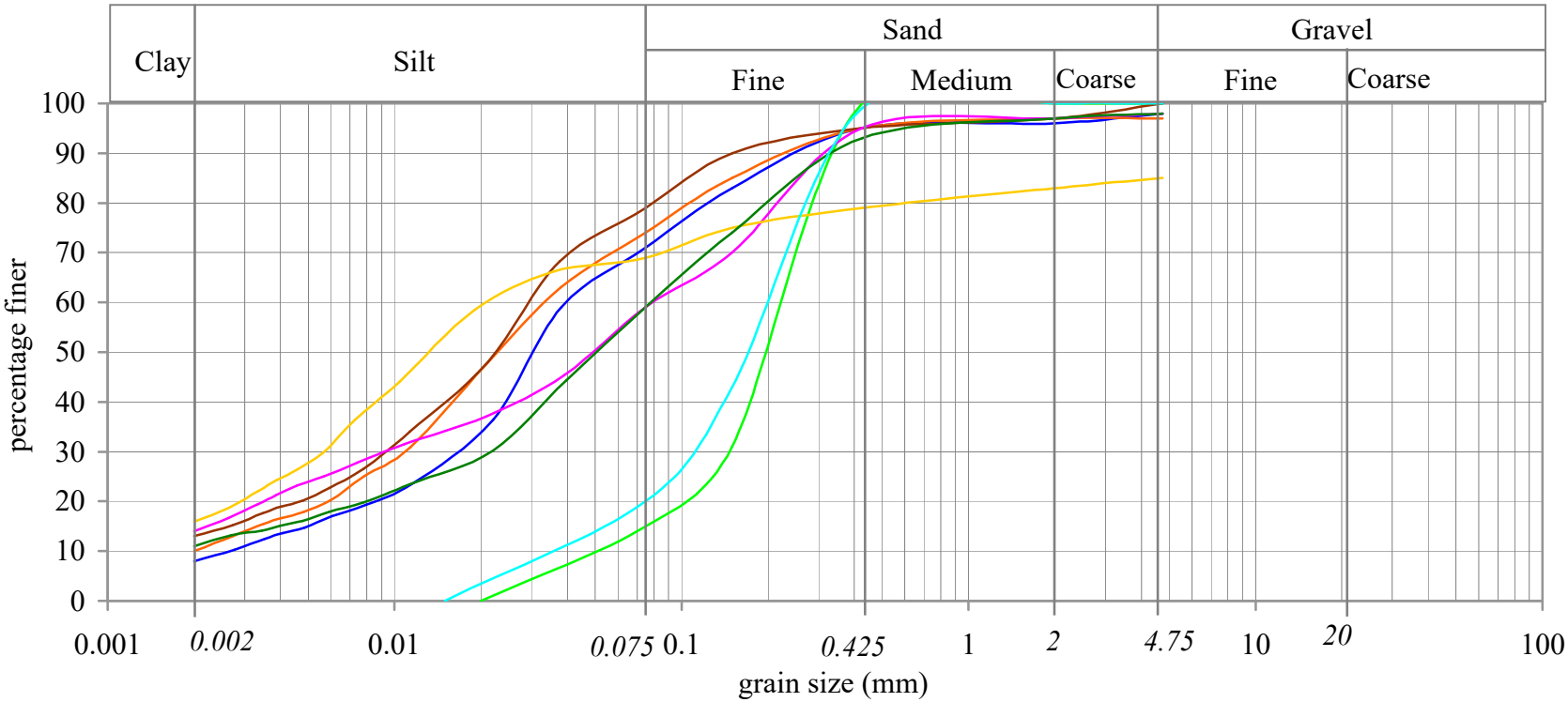
Job No. : G(D)4556

Sheet No. : 6m

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	5	20.4	Clayey sandy silt with gravel	2	27	63	8	0.039	0.0026	15.0
	5	23.4	Clayey sandy silt with gravel	3	23	64	10	0.032	0.002	16.0
	5	26.4	Sand with silt	0	85	15	0	0.22	0.05	4.4
	5	30	Clayey sandy silt	0	21	66	13	0.029	-	-
	6	1	Clayey sandy silt with gravel	2	39	45	14	0.081	-	-
	6	2	Clayey sandy silt with gravel	15	16	53	16	0.021	-	-
	6	3	Clayey sandy silt with gravel	2	39	48	11	0.081	-	-
	6	4	Sand with silt	0	80	20	0	0.2	0.038	5.3

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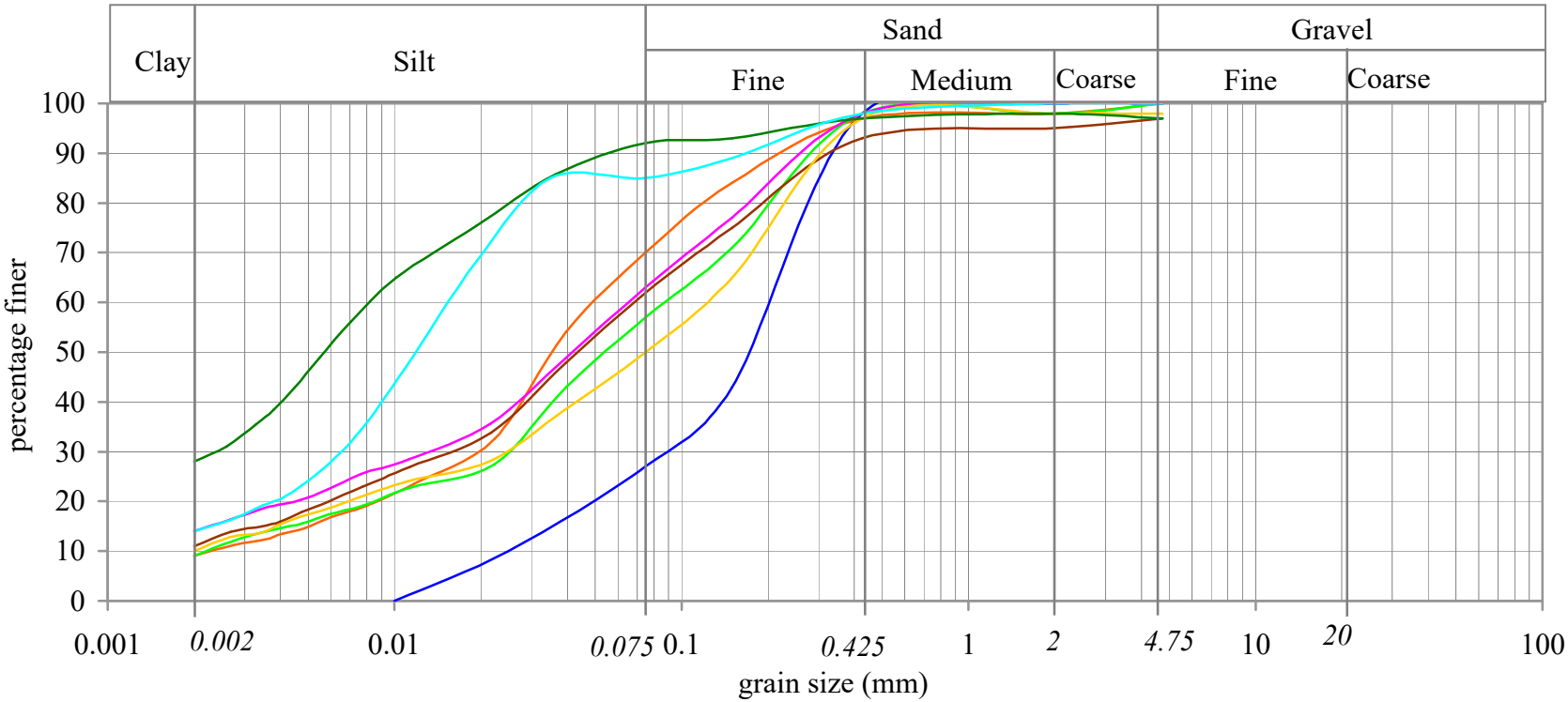
Job No. : G(D)4556

Sheet No. : 6n

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	6	5	Silty sand	0	73	27	0	0.21	0.025	8.4
	6	6	Clayey sandy silt	0	30	61	9	0.049	0.0022	22.3
	6	7	Clayey sandy silt	0	43	48	9	0.09	0.0022	40.9
	6	8	Clayey sandy silt with gravel	3	35	51	11	0.069	-	-
	6	9	Clayey sandy silt	0	37	49	14	0.068	-	-
	6	10	Clayey silty sand with gravel	2	48	40	10	0.13	0.002	65.0
	6	12	Sandy clayey silt with gravel	3	5	64	28	0.008	-	-
	6	13.5	Clayey sandy silt	0	15	71	14	0.017	-	-

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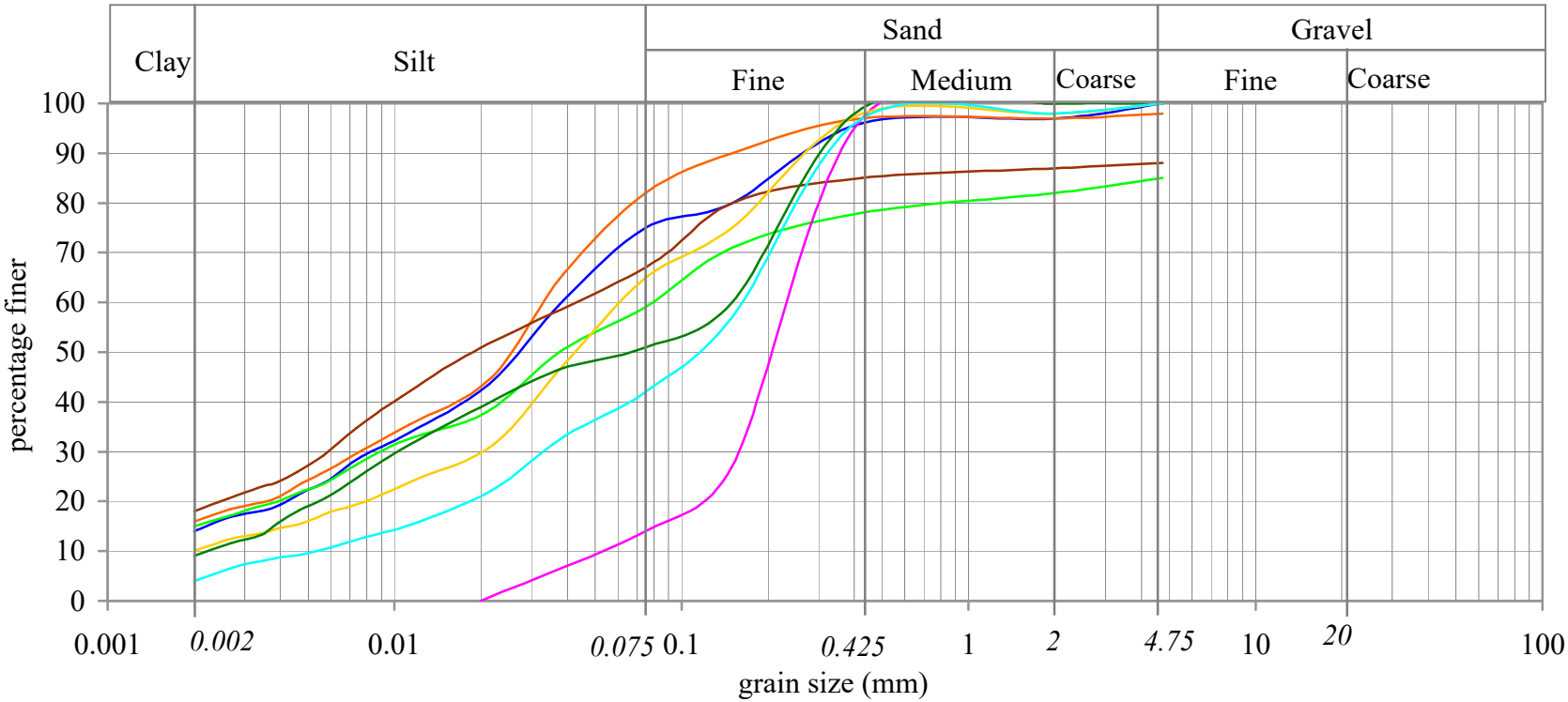
Job No. : G(D)4556

Sheet No. : 60

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	6	15	Clayey sandy silt	0	25	61	14	0.039	-	-
	6	16.5	Clayey sandy silt with gravel	2	16	66	16	0.022	-	-
	6	18	Clayey sandy silt with gravel	15	26	44	15	0.081	-	-
	6	19.5	Clayey sandy silt with gravel	12	21	49	18	0.042	-	-
	6	21	Sand with silt	0	86	14	0	0.22	0.051	4.3
	6	24	Clayey sandy silt	0	35	55	10	0.061	0.002	30.5
	6	27	Clayey silty sand	0	49	42	9	0.15	0.0022	68.2
	6	30	Clayey silty sand	0	58	38	4	0.16	0.0045	35.6

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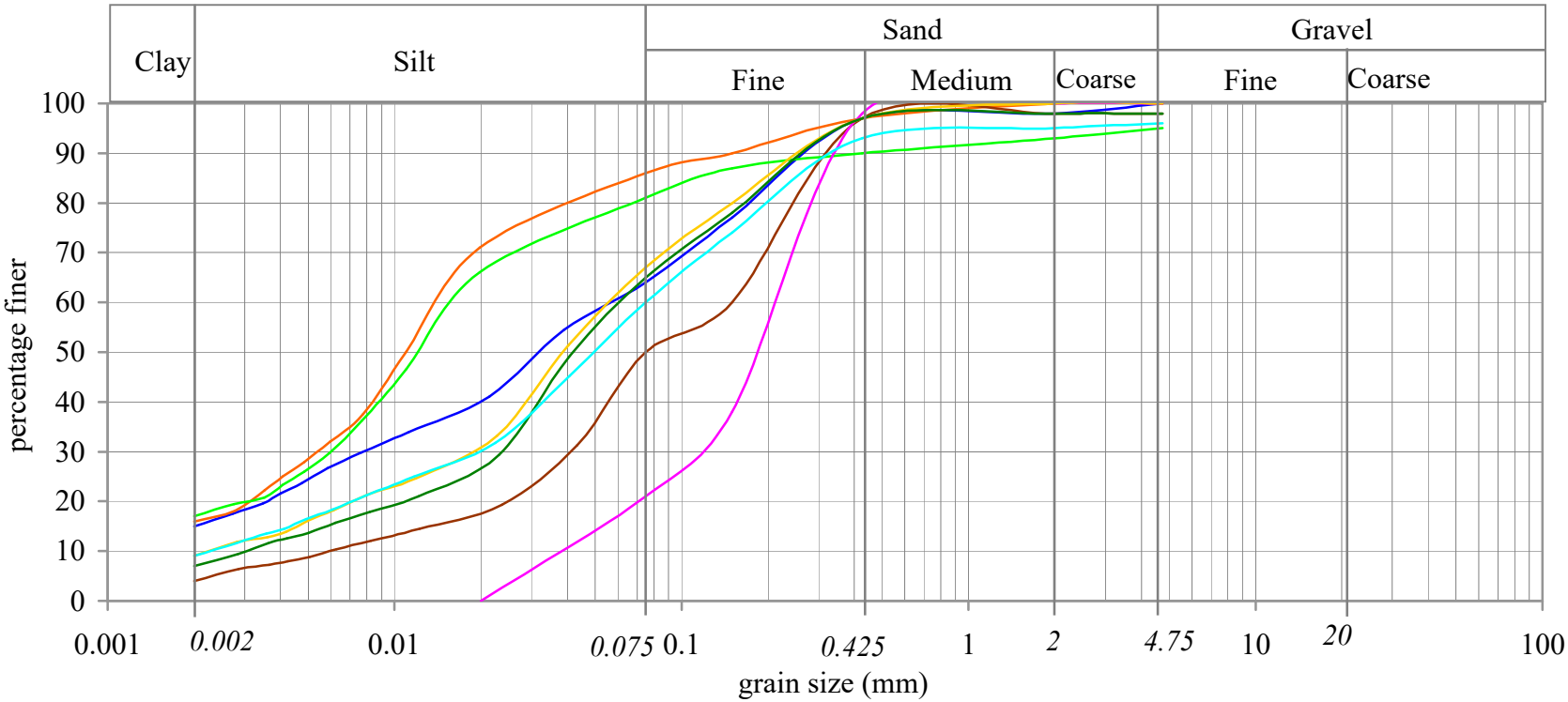
Job No. : G(D)4556

Sheet No. : 6p

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	7	1	Clayey sandy silt	0	36	49	15	0.058	-	-
	7	2	Sandy clayey silt	0	14	70	16	0.015	-	-
	7	3	Sandy clayey silt with gravel	5	14	64	17	0.016	-	-
	7	4	Clayey silty sand with gravel	2	48	46	4	0.061	0.0059	10.3
	7	5	Silty sand	0	79	21	0	0.21	0.039	5.4
	7	6	Clayey sandy silt	0	33	58	9	0.057	0.0023	24.8
	7	7	Clayey sandy silt with gravel	2	33	58	7	0.059	0.0029	20.3
	7	8	Clayey sandy silt with gravel	4	36	51	9	0.075	0.0022	34.1

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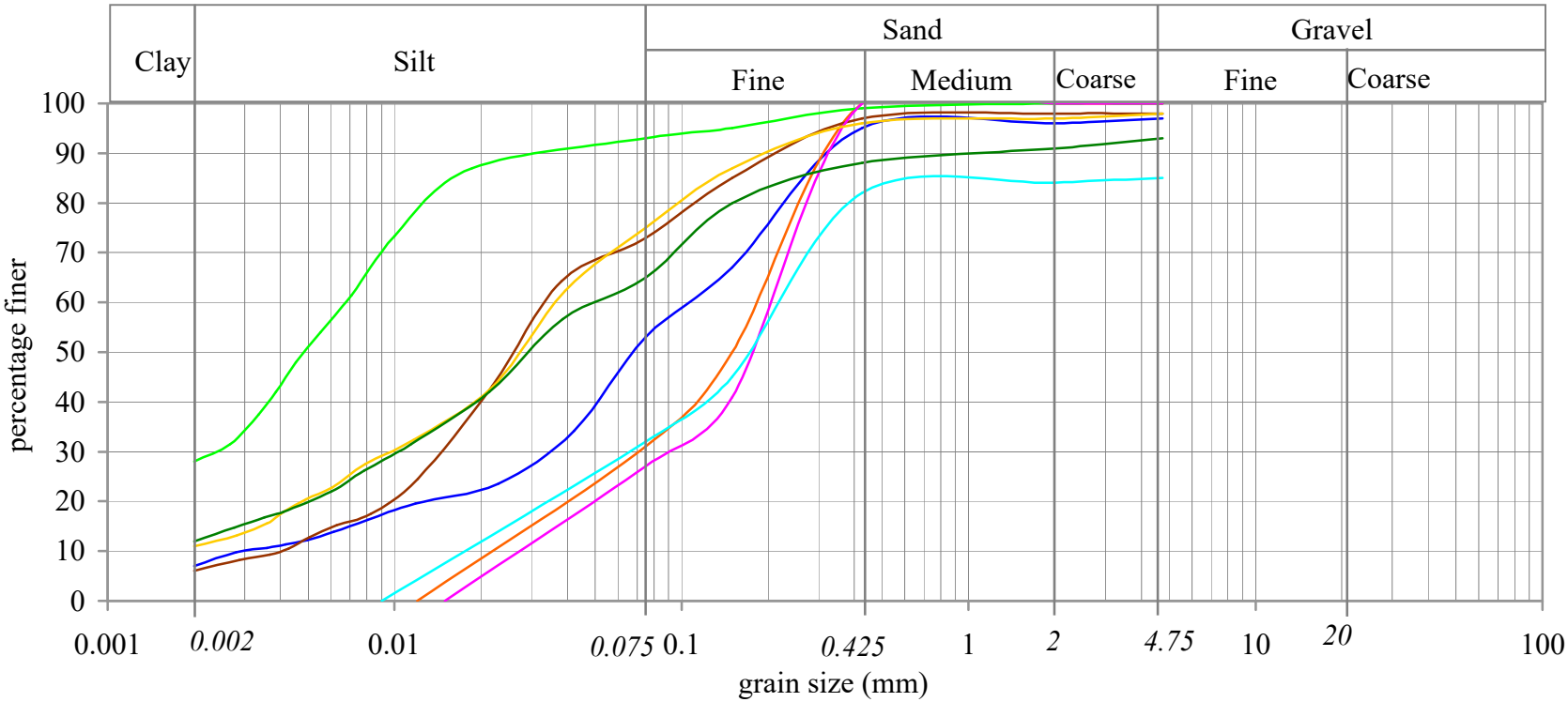
Job No. : G(D)4556

Sheet No. : 6q

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	7	9	Clayey silty sand with gravel	3	44	46	7	0.12	0.0029	41.4
	7	10	Sily sand	0	69	31	0	0.18	0.021	8.6
	7	11.4	Sandy clayey silt	0	7	65	28	0.0065	-	-
	7	12.9	Clayey sandy silt with gravel	2	25	67	6	0.032	0.0039	8.2
	7	14.4	Silty sand	0	73	27	0	0.2	0.028	7.1
	7	15.9	Clayey sandy silt with gravel	2	23	64	11	0.035	-	-
	7	17.4	Clayey sandy sit	7	28	53	12	0.049	-	-
	7	18.9	Silty sand with gravel	15	53	32	0	0.22	0.018	12.2

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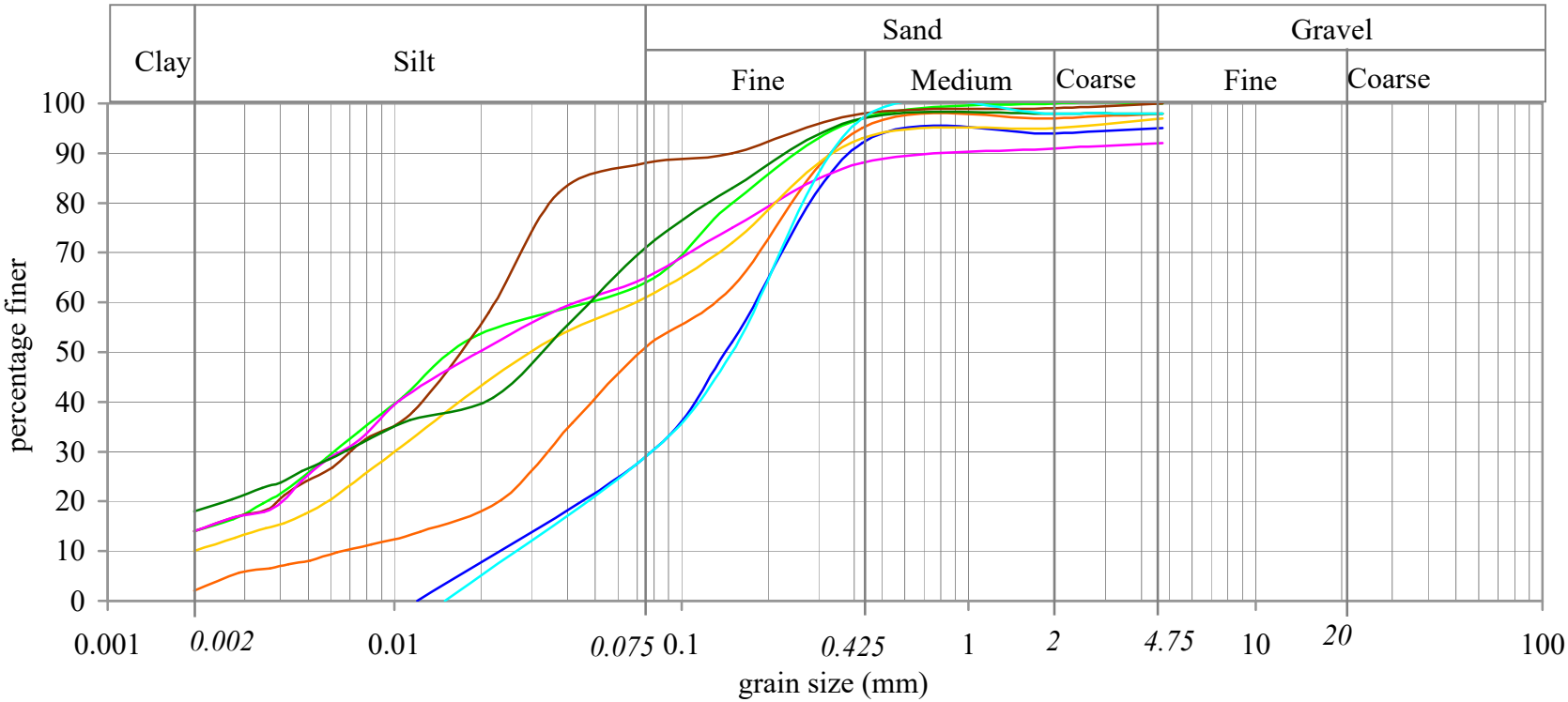
Job No. : G(D)4556

Sheet No. : 6r

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	7	20.4	Silty sand with gravel	5	66	29	0	0.19	0.023	8.3
	7	23.4	Clayey sandy silt with gravel	2	47	49	2	0.14	0.0061	23.0
	7	26.4	Clayey sandy silt	0	36	50	14	0.045	-	-
	7	30	Sandy clayey silt	0	12	74	14	0.022	-	-
	8	1	Clayey sandy silt with gravel	8	27	51	14	0.045	-	-
	8	2	Clayey sandy silt with gravel	3	36	51	10	0.07	0.002	35.0
	8	3	Clayey sandy silt with gravel	2	27	53	18	0.049	-	-
	8	4	Silty sand with gravel	2	69	29	0	0.18	0.026	6.9

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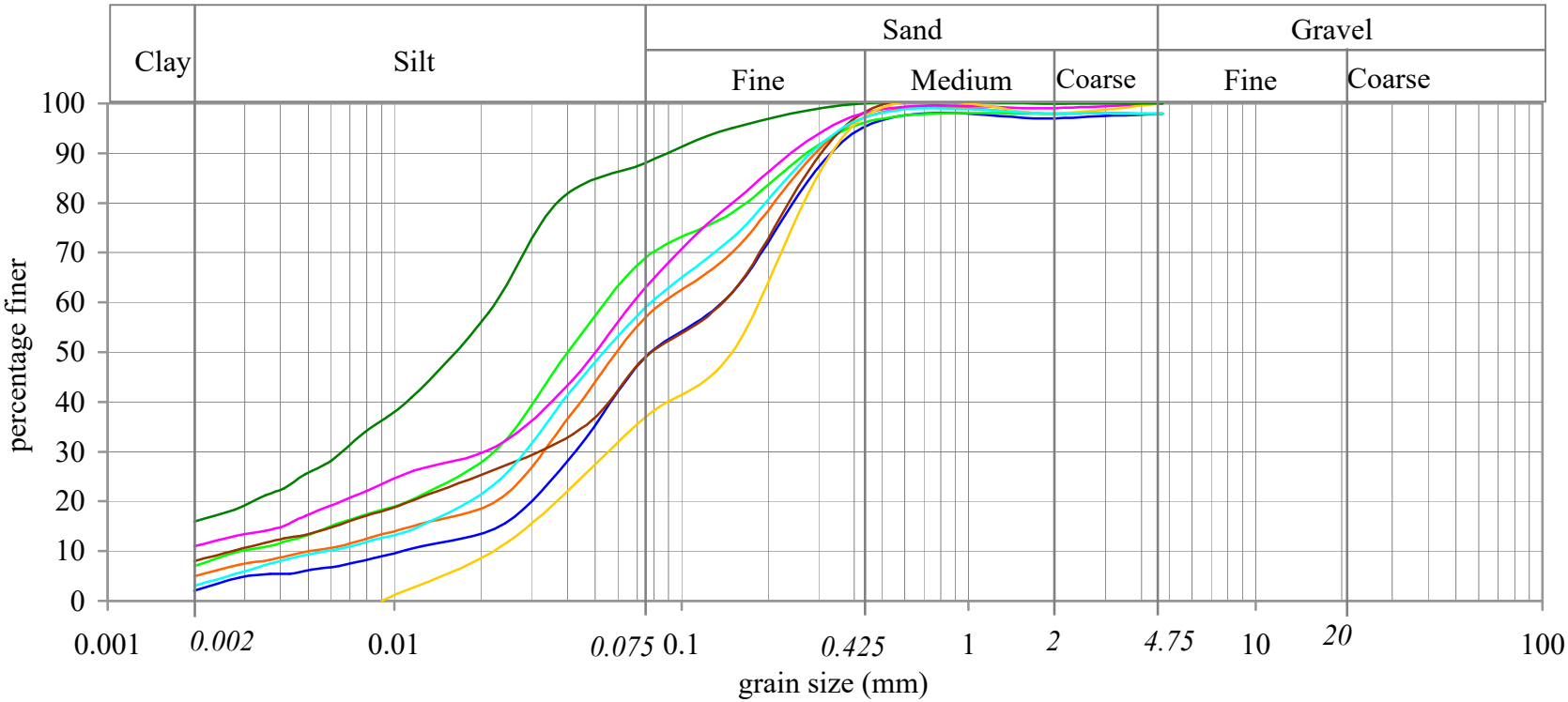
Job No. : G(D)4556

Sheet No. : 6s

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	8	5	Clayey silty sand with gravel	2	49	47	2	0.15	0.011	13.6
	8	6	Clayey sandy silt with gravel	2	41	52	5	0.085	0.0045	18.9
	8	7	Clayey sandy silt with gravel	2	29	62	7	0.055	0.0029	19.0
	8	8	Clayey silty sand	0	51	41	8	0.14	0.0026	53.8
	8	9	Clayey sandy silt	0	37	52	11	0.069	-	-
	8	10	Silty sand	0	63	37	0	0.19	0.022	8.6
	8	12	Sandy clayey silt	0	12	72	16	0.022	-	-
	8	13.5	Clayey sandy silt with gravel	2	39	56	3	0.081	0.0051	15.9

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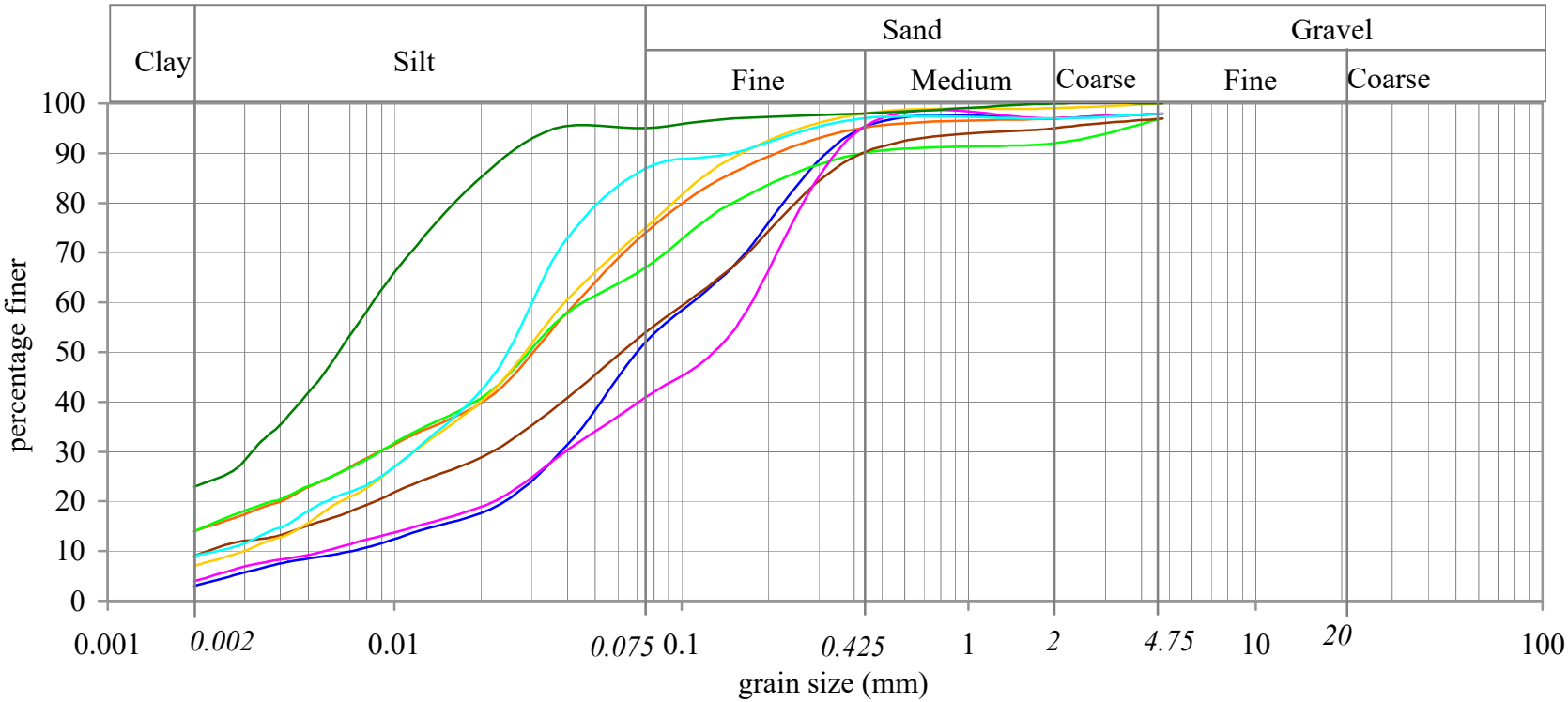
Job No. : G(D)4556

Sheet No. : 6t

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	8	15	Clayey sandy silt with gravel	2	46	49	3	0.13	0.0065	20.0
	8	16.5	Clayey sandy silt with gravel	2	24	60	14	0.042	-	-
	8	18	Clayey sandy silt with gravel	3	30	53	14	0.045	-	-
	8	19.5	Clayey sandy silt with gravel	3	43	45	9	0.11	0.0022	50.0
	8	21	Clayey silty sand with gravel	2	57	37	4	0.19	0.0055	34.5
	8	24	Clayey sandy silt	0	25	68	7	0.039	0.0028	13.9
	8	27	Sandy clayey silt	0	5	72	23	0.0081	-	-
	8	30	Clayey sandy silt with gravel	2	11	78	9	0.03	0.0022	13.6

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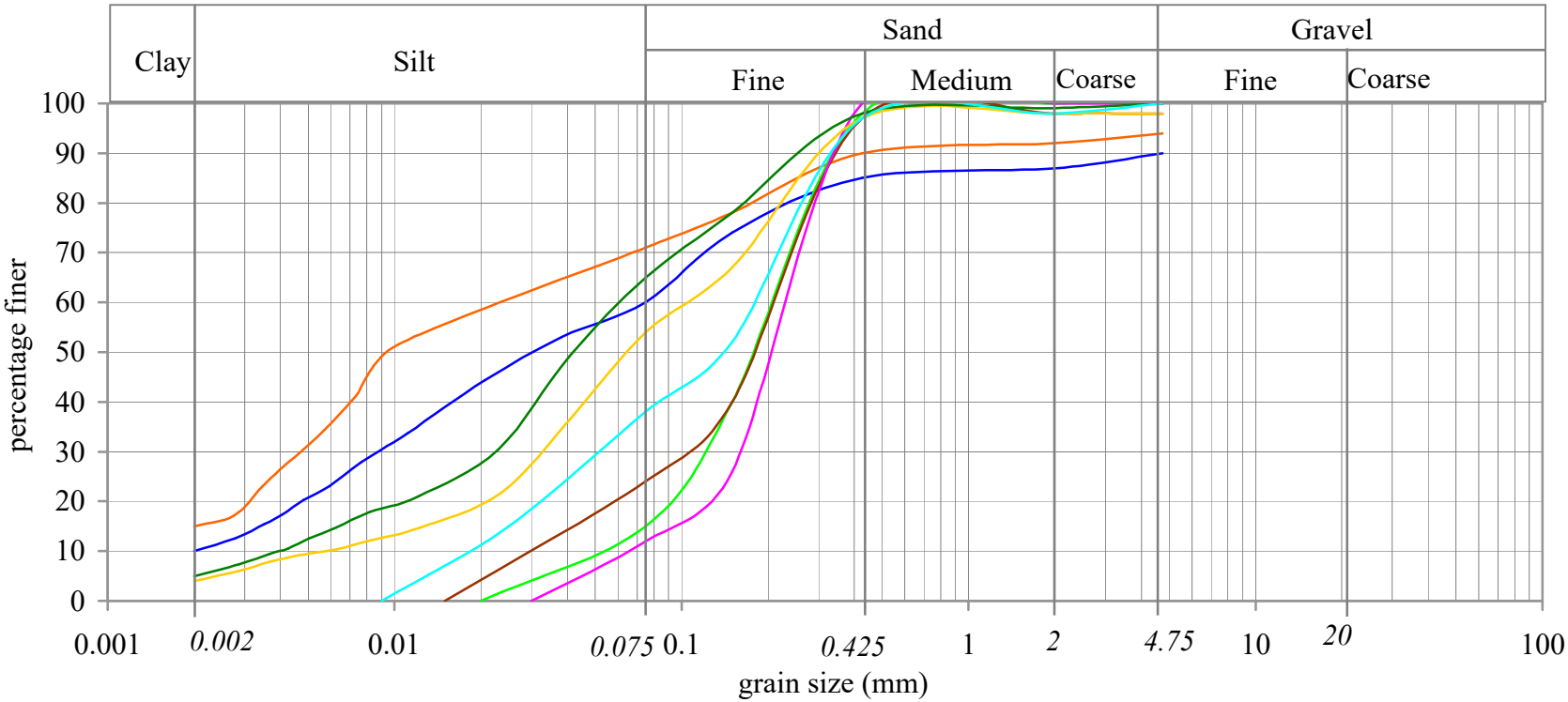
Job No. : G(D)4556

Sheet No. : 6u

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	9	1	Clayey sandy silt with gravel	10	30	50	10	0.075	0.002	37.5
	9	2	Clayey sandy silt with gravel	6	23	56	15	0.022	-	-
	9	3	Sand with silt	0	85	15	0	0.21	0.051	4.1
	9	4	Silty sand with gravel	2	74	24	0	0.21	0.029	7.2
	9	5	Sand with silt	0	88	12	0	0.22	0.065	3.4
	9	6	Clayey sandy silt with gravel	2	44	50	4	0.11	0.0051	21.6
	9	7	Clayey sandy silt	0	35	60	5	0.061	0.0039	15.6
	9	8	Silty sand	0	62	38	0	0.18	0.018	10.0

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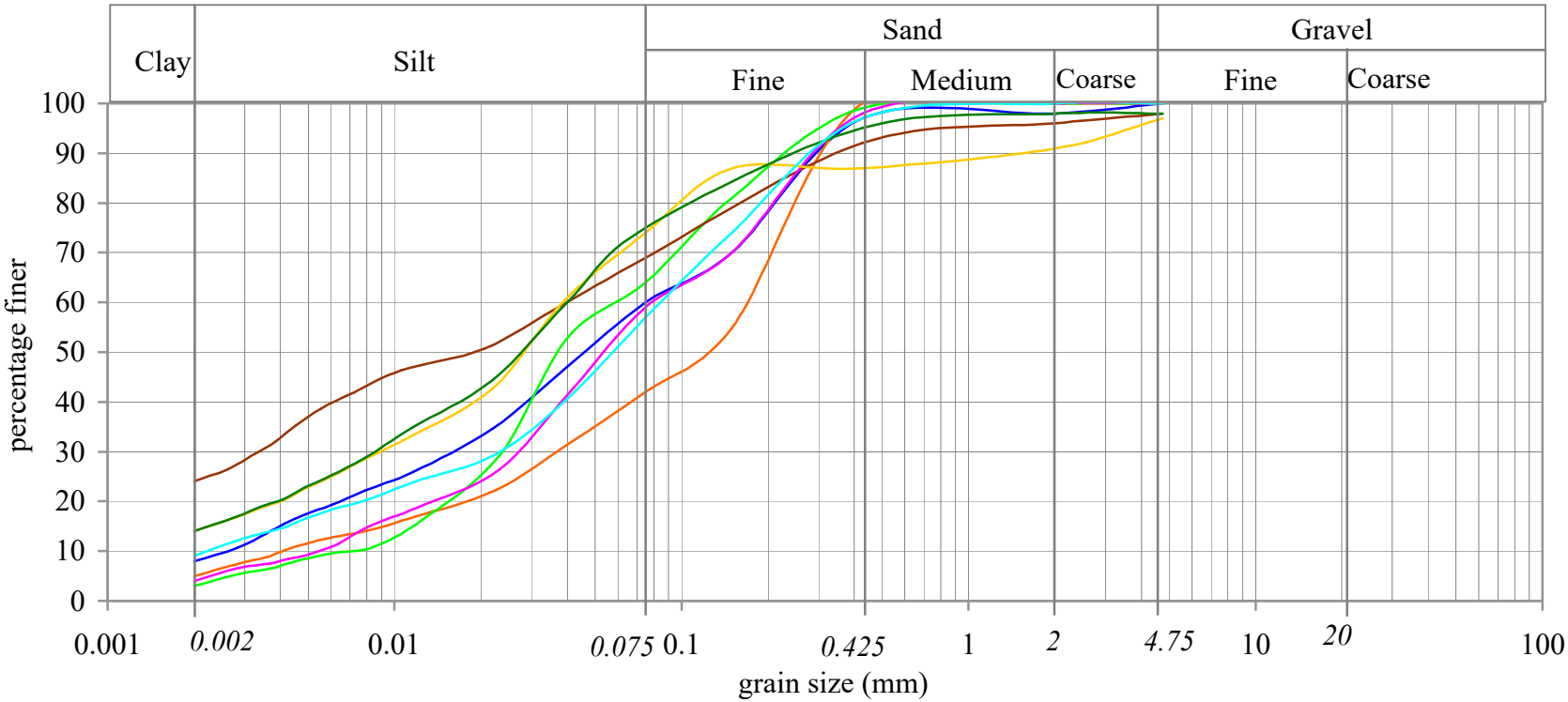
Job No. : G(D)4556

Sheet No. : 6v

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	9	9	Clayey sandy silt	0	40	52	8	0.075	0.0025	30.0
	9	10	Clayey silty sand	0	58	37	5	0.18	0.0039	46.2
	9	11.4	Clayey sandy silt	0	36	61	3	0.06	0.0065	9.2
	9	12.9	Clayey sandy silt with gravel	2	29	45	24	0.039	-	-
	9	14.4	Clayey sandy silt	0	41	55	4	0.081	0.0039	20.8
	9	15.9	Clayey sandy silt with gravel	3	23	60	14	0.039	-	-
	9	17.4	Clayey sandy silt with gravel	2	23	61	14	0.039	-	-
	9	18.9	Clayey sandy silt	0	43	48	9	0.078	0.0022	35.5

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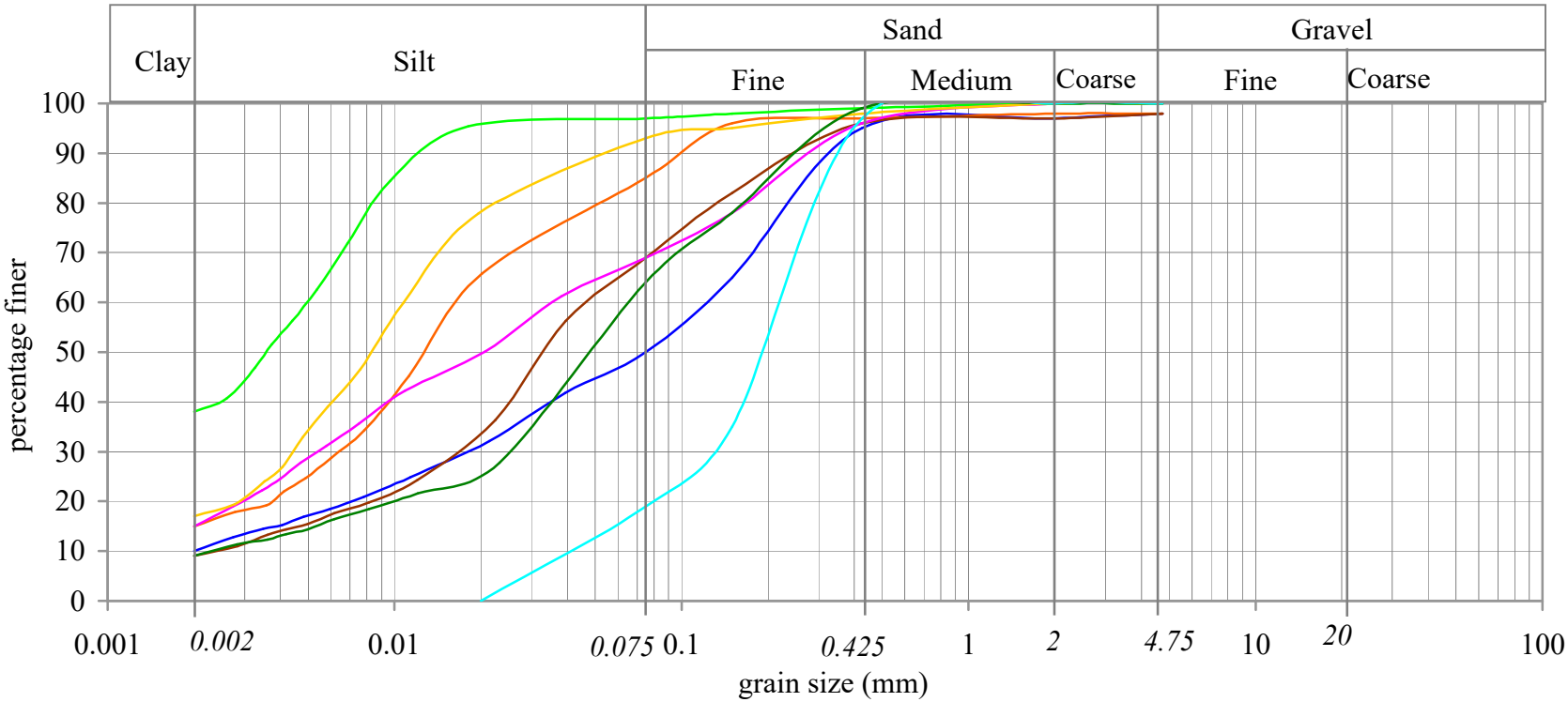
Job No. : G(D)4556

Sheet No. : 6w

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	9	20.4	Clayey silty sand with gravel	2	48	40	10	0.12	0.002	60.0
	9	23.4	Sandy clayey silt with gravel	2	13	70	15	0.017	-	-
	9	26.4	Sandy clayey silt	0	3	59	38	0.0051	-	-
	9	30	Clayey sandy silt with gravel	2	29	60	9	0.045	0.0022	20.5
	10	1	Clayey sandy silt with gravel	0	31	54	15	0.035	-	-
	10	2	Sandy clayey silt	0	7	76	17	0.011	-	-
	10	3	Clayey sandy silt	0	36	55	9	0.065	0.0022	29.5
	10	4	Sand with silt	0	81	19	0	0.21	0.039	5.4

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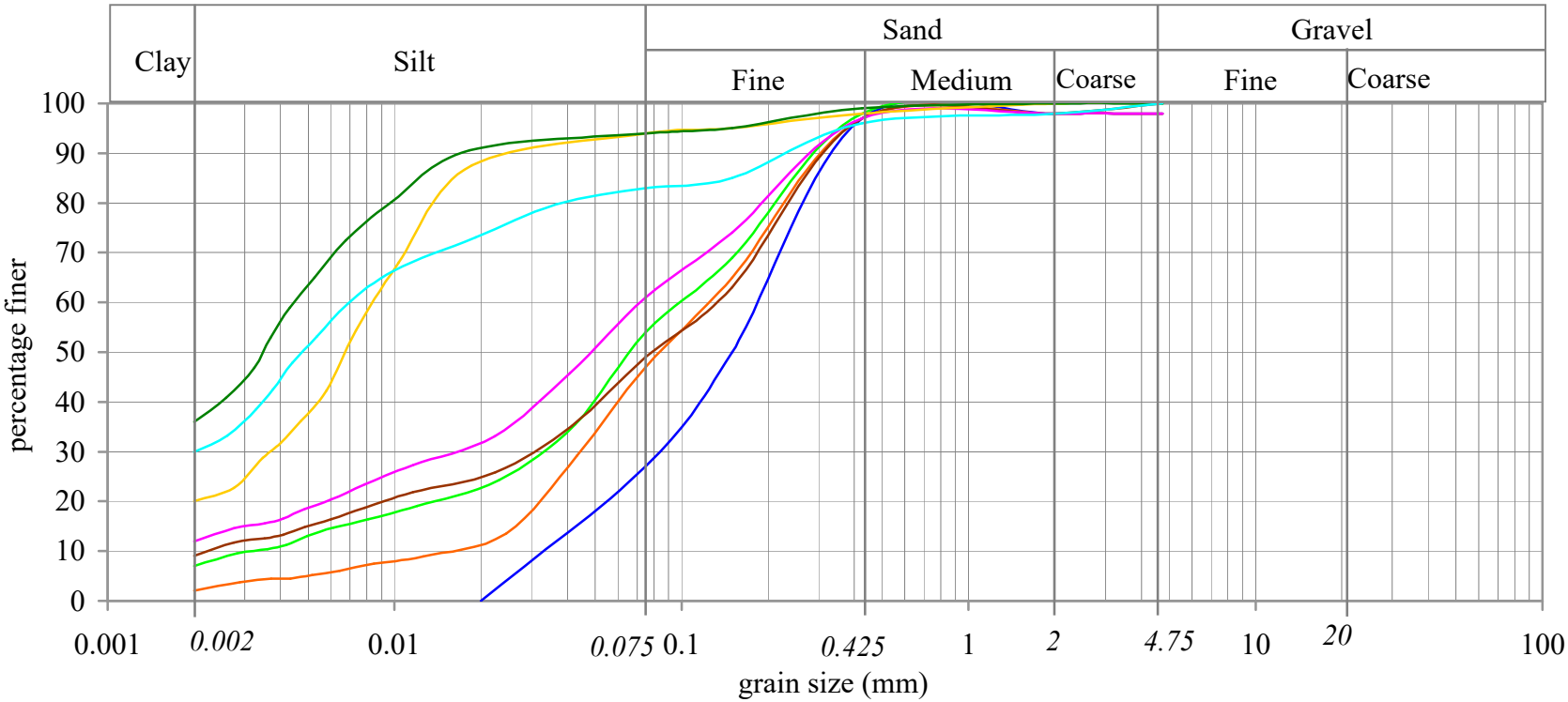
Job No. : G(D)4556

Sheet No. : 6x

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	10	5	Silty sand with gravel	2	71	27	0	0.19	0.031	6.1
	10	6	Clayey silty sand with gravel	2	51	45	2	0.12	0.018	6.7
	10	7	Clayey sandy silt	0	46	47	7	0.099	0.0032	30.9
	10	8	Clayey silty sand	0	51	40	9	0.14	0.0022	63.6
	10	9	Clayey sandy silt with gravel	2	37	49	12	0.075	-	-
	10	10	Sandy clayey silt	0	6	74	20	0.0085	-	-
	10	12	Sandy clayey silt	0	6	58	36	0.0045	-	-
	10	13.5	Sandy clayey silt	0	17	53	30	0.0069	-	-

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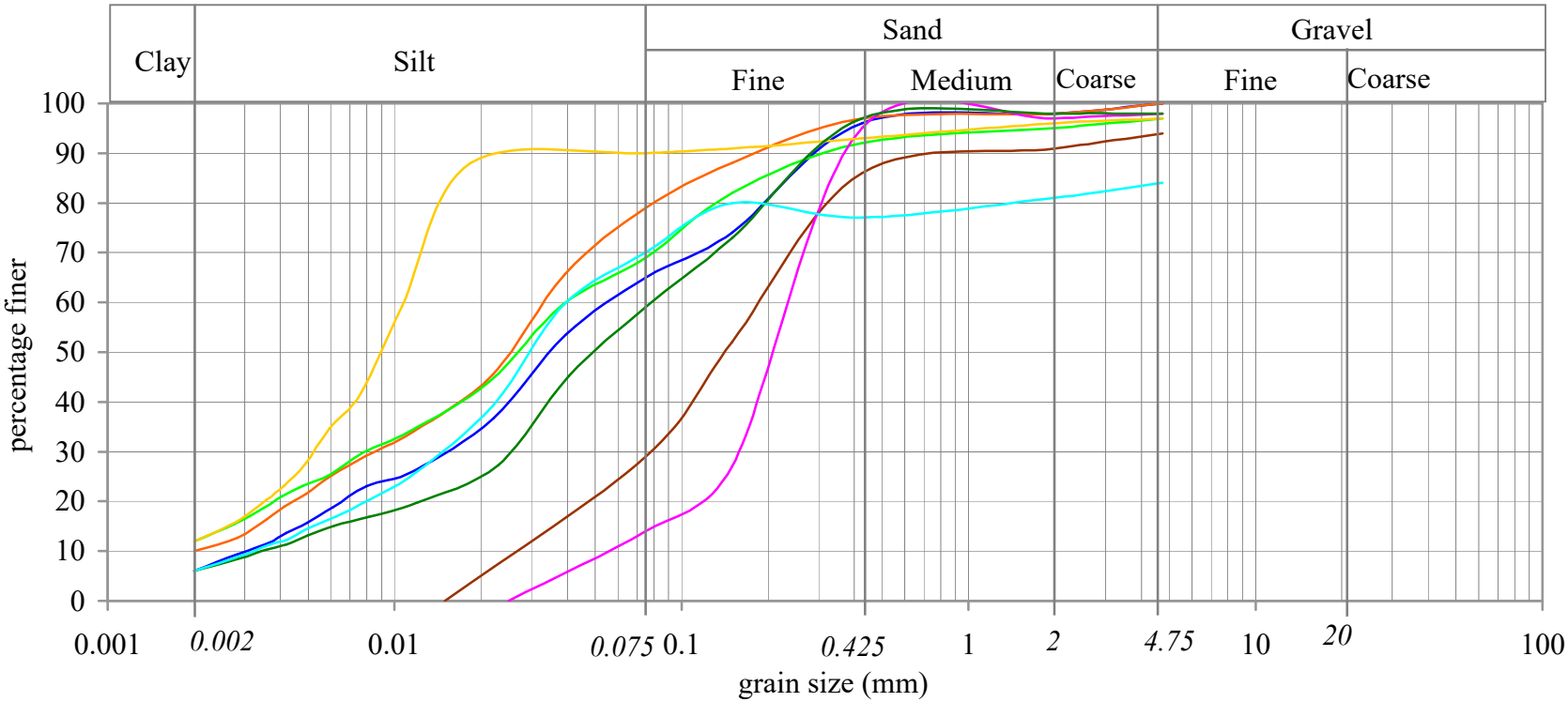
Job No. : G(D)4556

Sheet No. : 6y

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	10	15	Clayey sandy silt	0	35	59	6	0.051	0.0029	17.6
	10	16.5	Clayey sandy silt	0	21	69	10	0.032	0.002	16.0
	10	18	Clayey sandy silt with gravel	3	28	57	12	0.039	-	-
	10	19.5	Silty sand with gravel	6	65	29	0	0.19	0.025	7.6
	10	21	Sand with silt and gravel	2	84	14	0	0.23	0.055	4.2
	10	24	Sandy clayey silt with gravel	3	7	78	12	0.011	-	-
	10	27	Clayey sandy silt with gravel	2	39	53	6	0.081	0.0028	28.9
	10	30	Clayey sandy silt with gravel	16	14	64	6	0.039	0.0027	14.4

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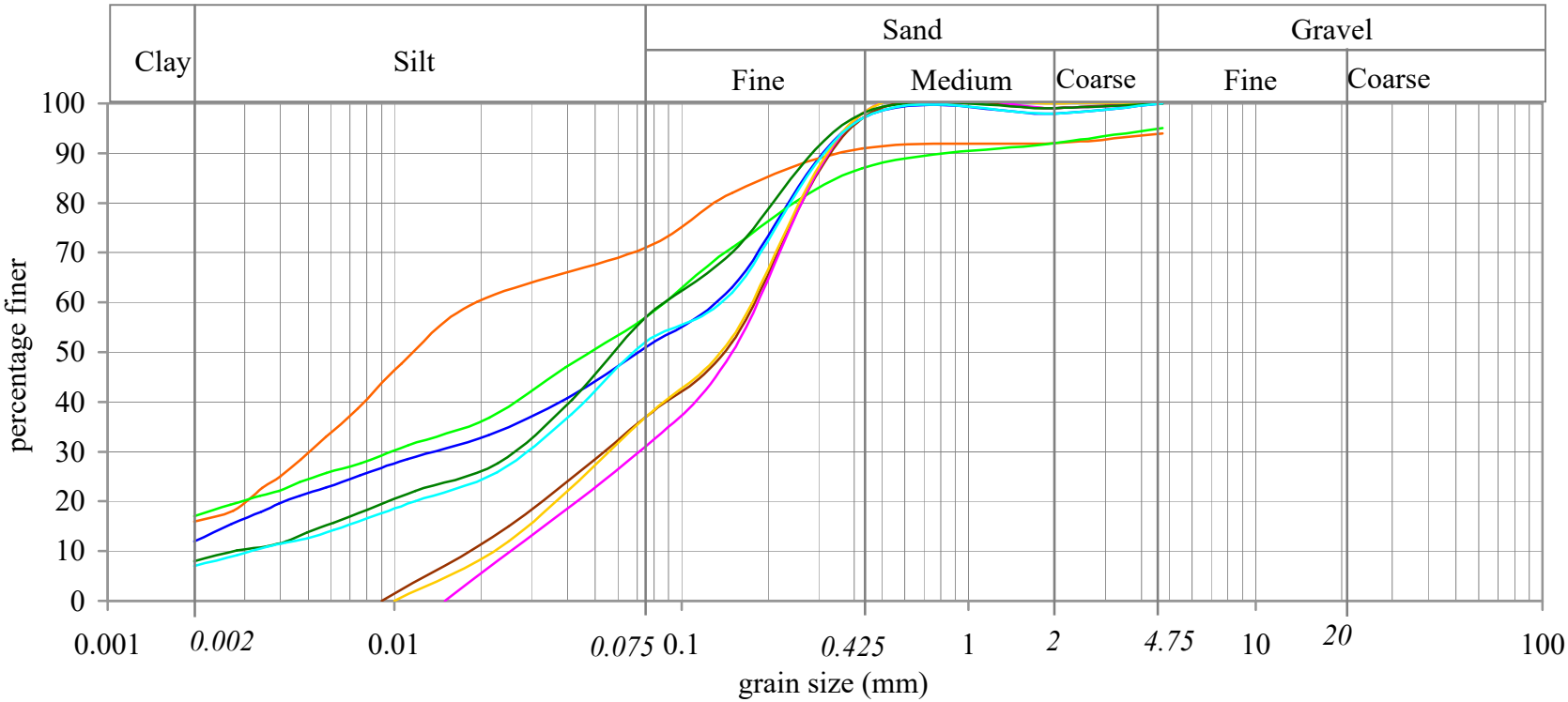
Job No. : G(D)4556

Sheet No. : 6z

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	11	1	Clayey silty sand	0	49	39	12	0.14	-	-
	11	2	Clayey sandy silt with gravel	6	23	55	16	0.019	-	-
	11	3	Clayey sandy silt with gravel	5	38	40	17	0.085	-	-
	11	4	Sily sand	0	63	37	0	0.17	0.019	8.9
	11	5	Sily sand	0	69	31	0	0.17	0.025	6.8
	11	6	Sily sand	0	63	37	0	0.17	0.021	8.1
	11	7	Clayey sandy silt	0	43	49	8	0.085	0.0029	29.3
	11	8	Clayey silty sand	0	48	45	7	0.15	0.0032	46.9

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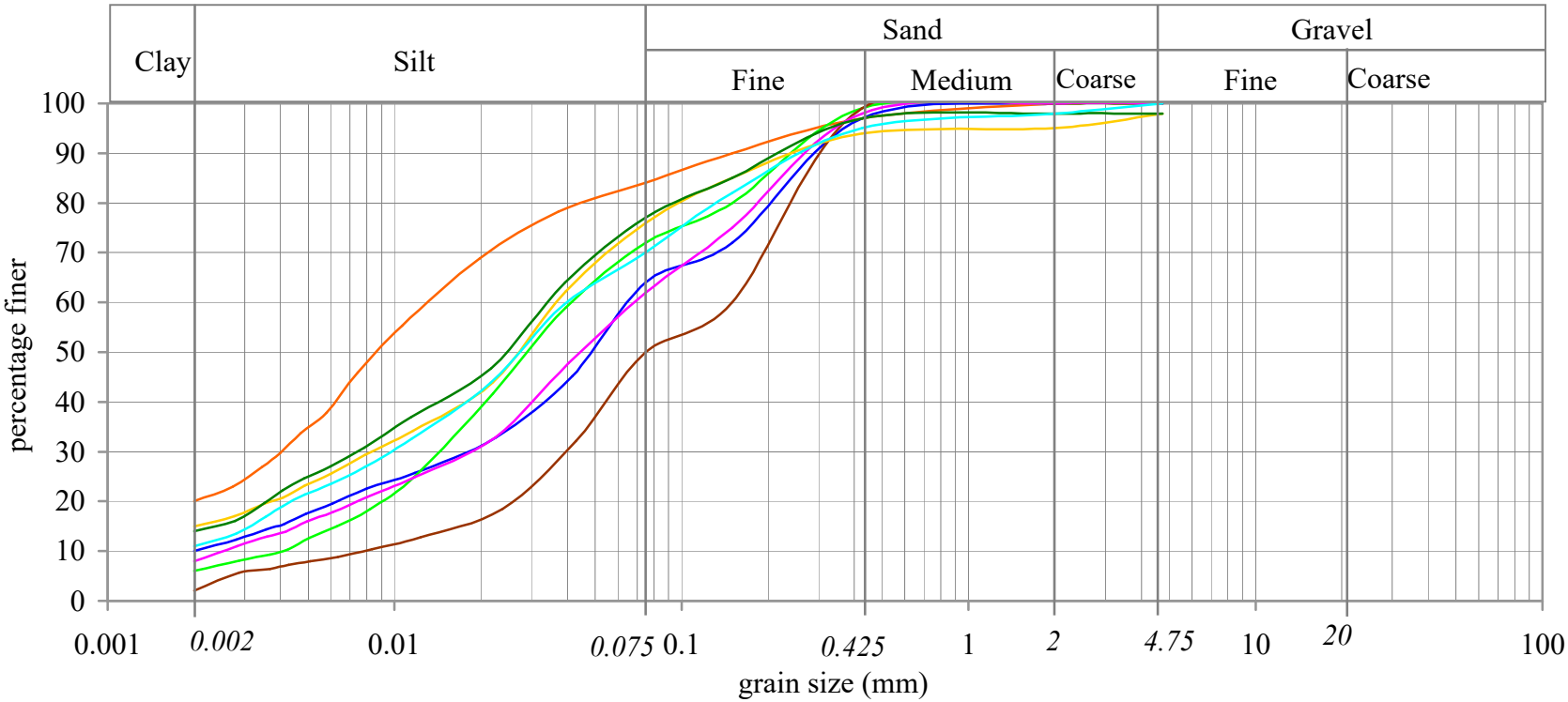
Job No. : G(D)4556

Sheet No. : 6aa

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	11	9	Clayey sandy silt	0	36	54	10	0.062	0.002	31.0
	11	10	Sandy clayey silt	0	16	64	20	0.013	-	-
	11	11.4	Clayey sandy silt	0	28	66	6	0.04	0.0039	10.3
	11	12.9	Clayey silty sand	0	50	48	2	0.17	0.0078	21.8
	11	14.4	Clayey sandy silt	0	38	54	8	0.069	0.0023	30.0
	11	15.9	Clayey sandy silt with gravel	2	22	61	15	0.036	-	-
	11	17.4	Clayey sandy silt with gravel	2	21	63	14	0.034	-	-
	11	18.9	Clayey sandy silt	0	30	59	11	0.04	-	-

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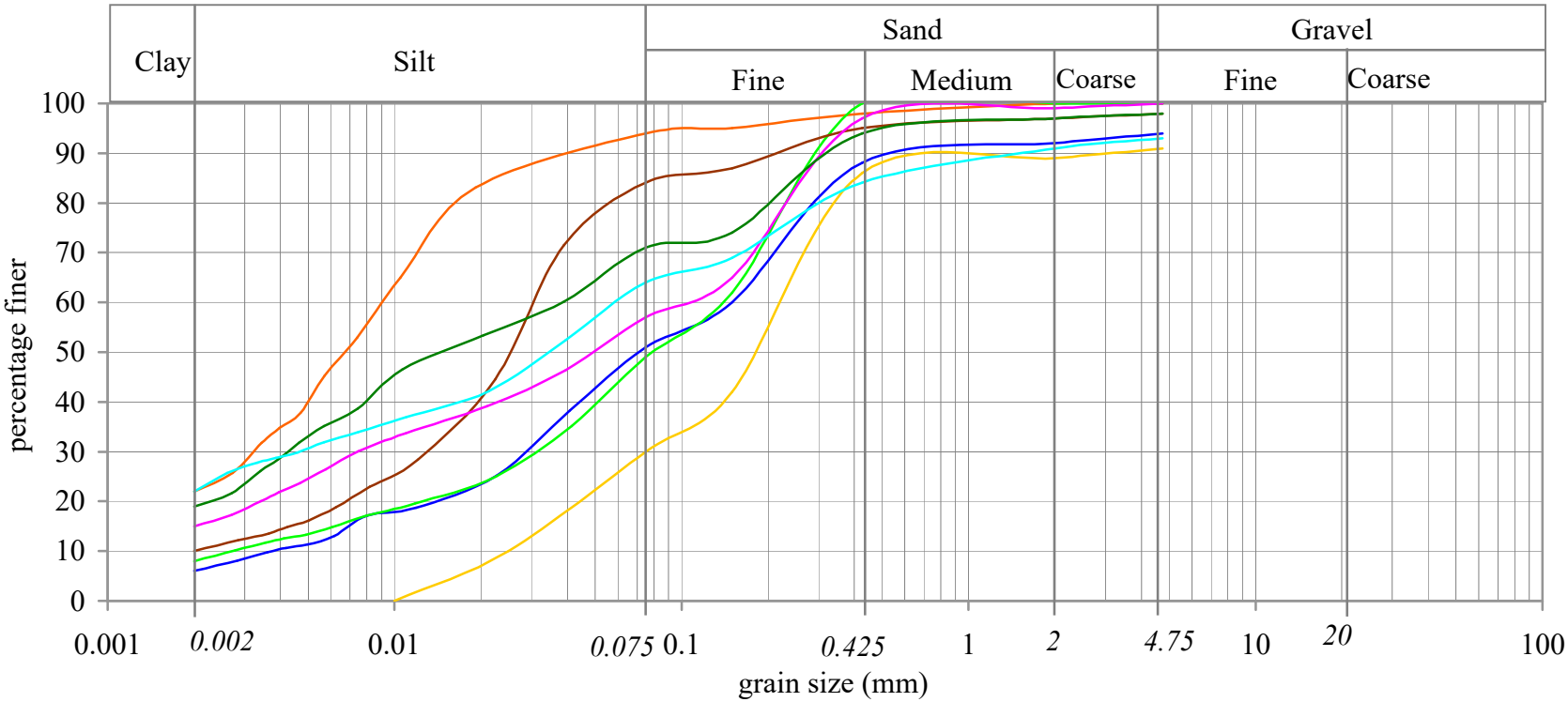
Job No. : G(D)4556

Sheet No. : 6ab

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	11	20.4	Clayey sandy silt with gravel	6	43	45	6	0.15	0.0028	53.6
	11	23.4	Sandy clayey silt	0	6	72	22	0.0091	-	-
	11	26.4	Clayey silty sand	0	51	41	8	0.14	0.0026	53.8
	11	30	Clayey sandy silt with gravel	2	14	74	10	0.031	0.002	15.5
	12	1	Clayey silty sand	0	43	42	15	0.11	-	-
	12	2	Silty sand with gravel	9	61	30	0	0.22	0.025	8.8
	12	3	Clayey sandy silt with gravel	2	27	52	19	0.038	-	-
	12	4	Clayey sandy silt with gravel	7	29	42	22	0.06	-	-

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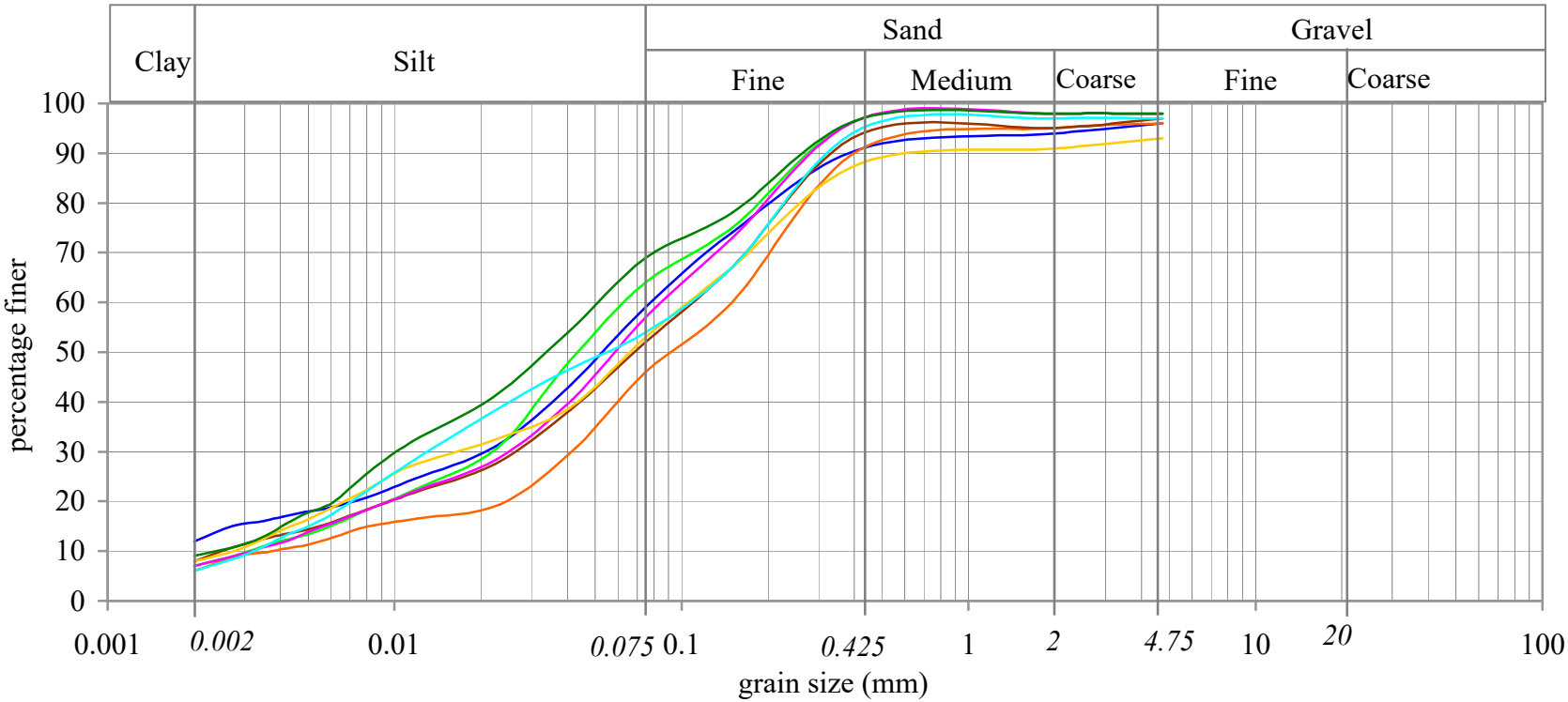
Job No. : G(D)4556

Sheet No. : 6ac

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	12	5	Clayey sandy silt with gravel	4	37	47	12	0.08	-	-
	12	6	Clayey silty sand with gravel	4	50	40	6	0.16	0.0032	50.0
	12	7	Clayey sandy silt with gravel	2	34	57	7	0.051	0.0032	15.9
	12	8	Clayey silty sand with gravel	3	45	44	8	0.12	0.0025	48.0
	12	9	Clayey sandy silt with gravel	2	41	50	7	0.071	0.0025	28.4
	12	10	Clayey sandy silt with gravel	7	40	45	8	0.11	0.0026	42.3
	12	12	Clayey sandy silt with gravel	2	29	60	9	0.051	0.0025	20.4
	12	13.5	Clayey sandy silt with gravel	3	43	48	6	0.12	0.0029	41.4

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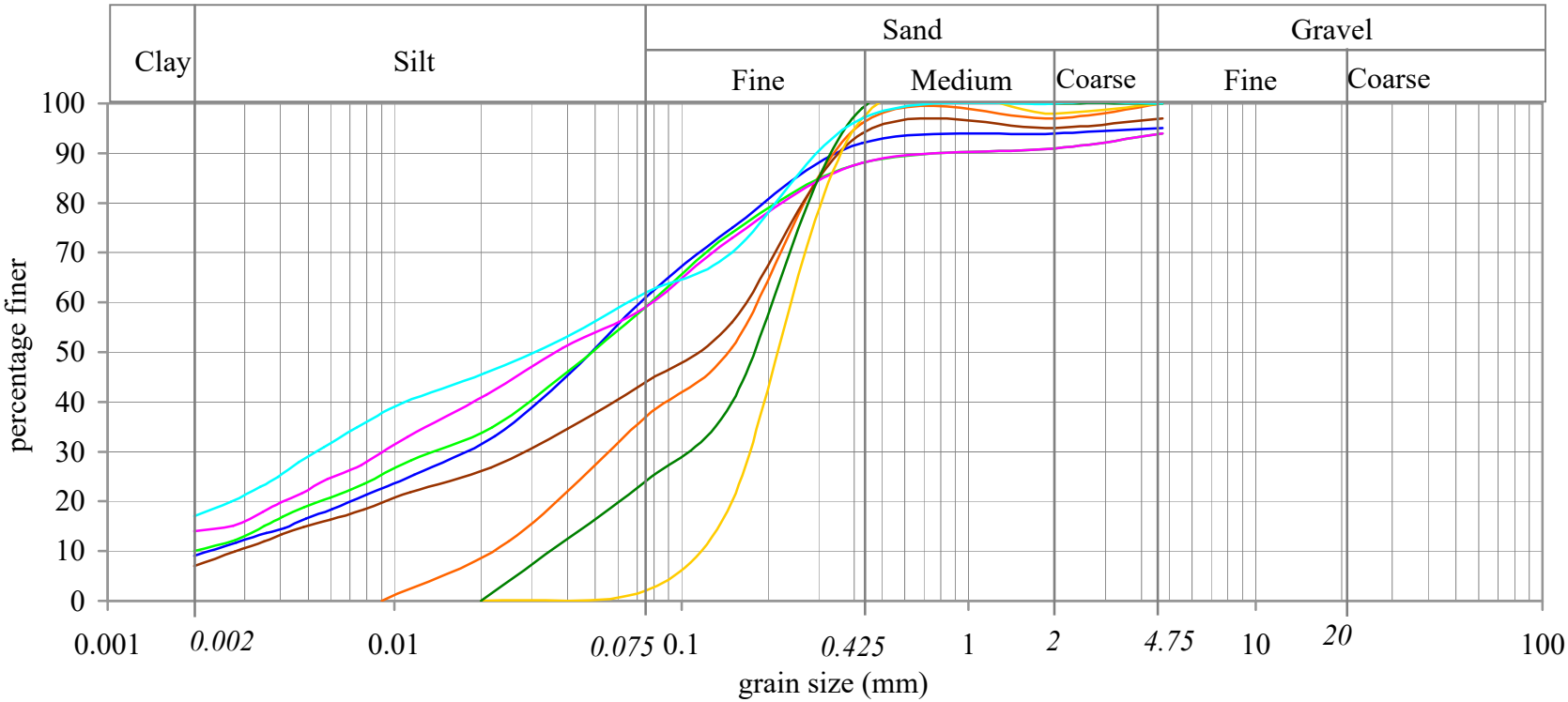
Job No. : G(D)4556

Sheet No. : 6ad

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	12	15	Clayey sandy silt with gravel	5	34	52	9	0.071	0.0023	30.9
	12	16.5	Silty sand	0	63	37	0	0.19	0.021	9.0
	12	18	Clayey sandy silt with gravel	6	35	49	10	0.075	0.002	37.5
	12	19.5	Clayey silty sand with gravel	3	53	37	7	0.17	0.0028	60.7
	12	21	Clayey sandy silt with gravel	6	35	45	14	0.081	-	-
	12	24	Sand with traces of silt	0	98	2	0	0.25	0.12	2.1
	12	27	Silty sand	0	76	24	0	0.21	0.032	6.6
	13	1	Clayey sandy silt	0	38	45	17	0.075	-	-

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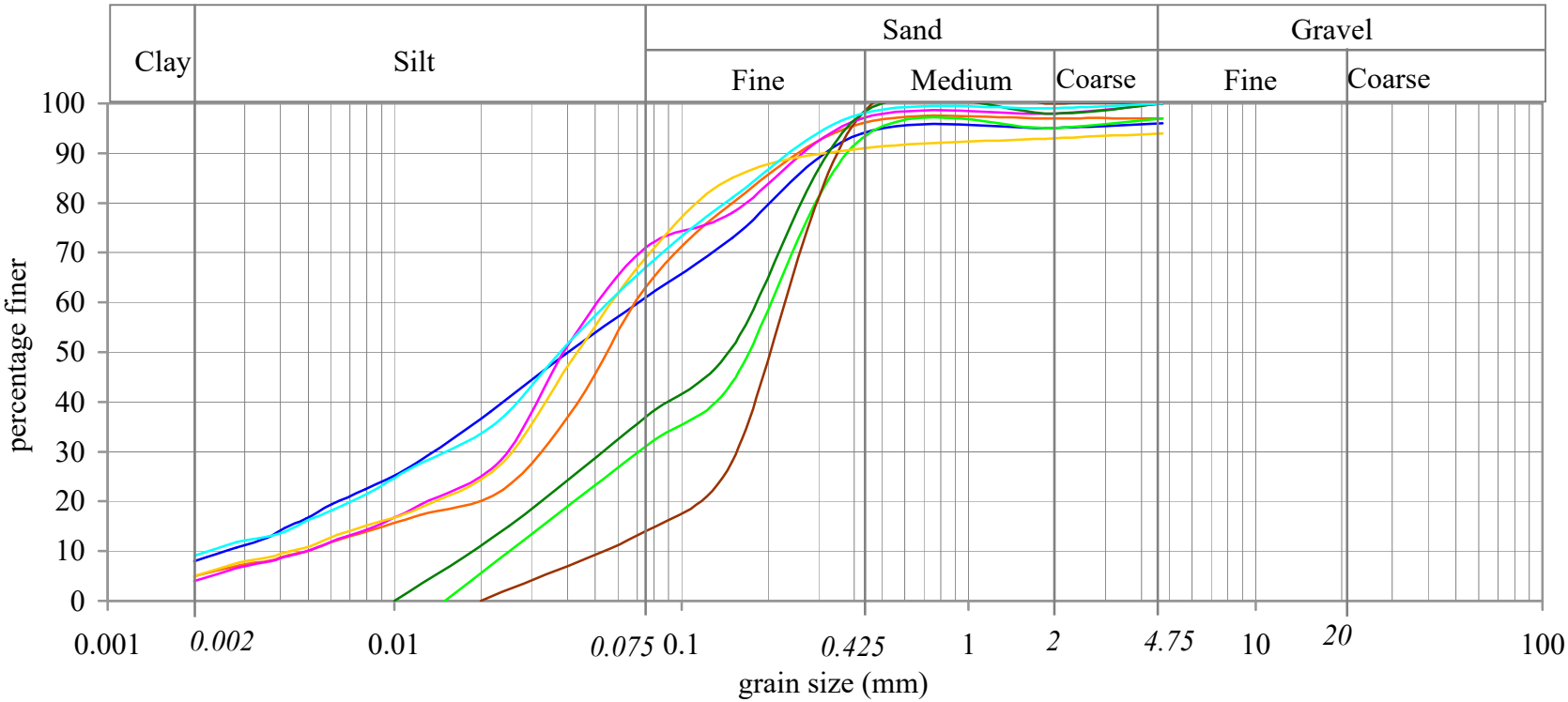
Job No. : G(D)4556

Sheet No. : 6ae

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	13	2	Clayey sandy silt with gravel	4	35	53	8	0.071	0.0023	30.9
	13	3	Clayey sandy silt with gravel	3	34	58	5	0.071	0.0048	14.8
	13	4	Silty sand with gravel	3	66	31	0	0.21	0.025	8.4
	13	5	Sand with silt	0	86	14	0	0.22	0.051	4.3
	13	6	Clayey sandy silt	0	29	67	4	0.051	0.0045	11.3
	13	7	Clayey sandy silt with gravel	6	25	64	5	0.058	0.0046	12.6
	13	8	Silty sand	0	63	37	0	0.18	0.019	9.5
	13	9	Clayey sandy silt	0	33	58	9	0.0023	0.0022	1.0

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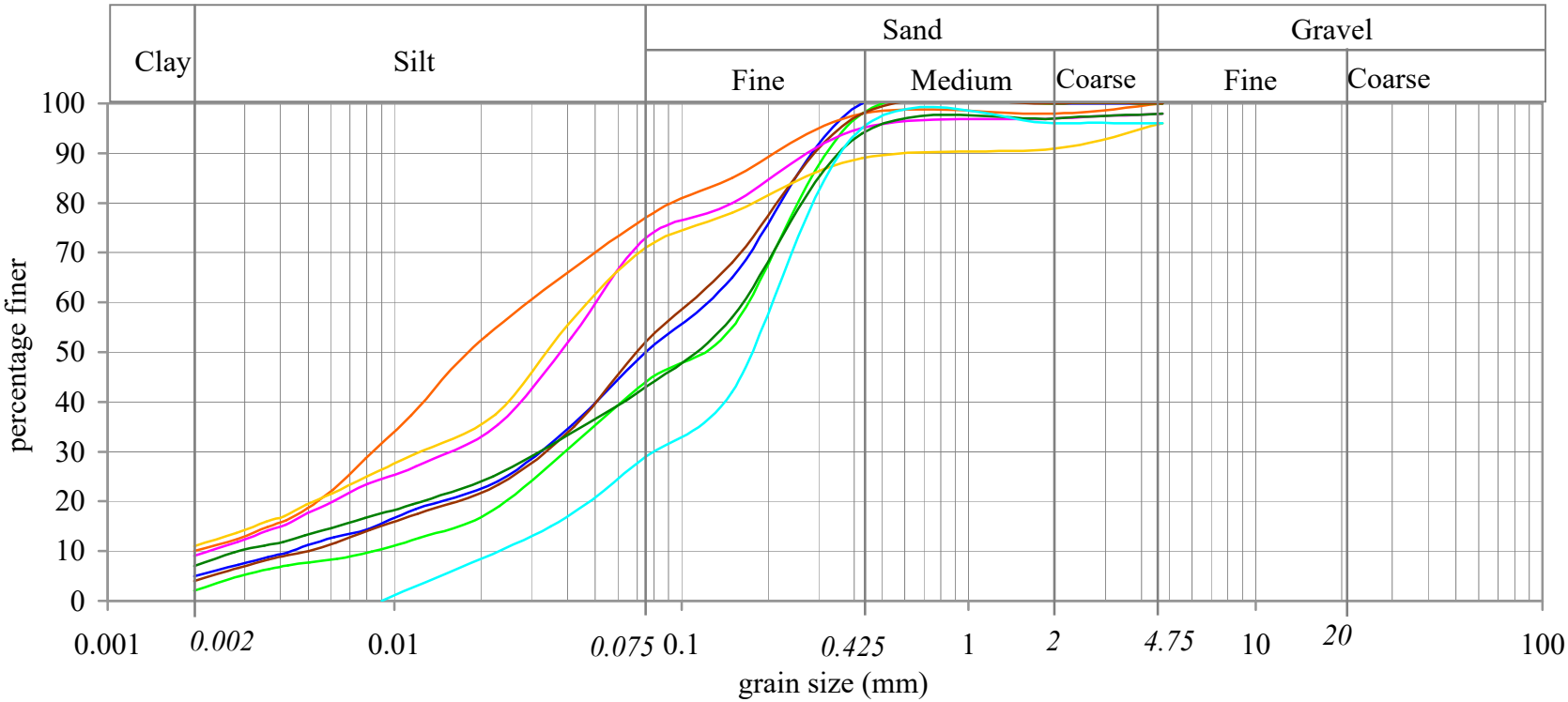
Job No. : G(D)4556

Sheet No. : 6af

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	13	10	Clayey silty sand	0	50	45	5	0.13	0.0042	31.0
	13	11.4	Clayey sandy silt	0	23	67	10	0.029	0.002	14.5
	13	12.9	Clayey silty sand	0	56	42	2	0.17	0.008	21.3
	13	14.4	Clayey silty sand	0	48	48	4	0.11	0.0045	24.4
	13	15.9	Clayey sandy silt with gravel	2	25	64	9	0.051	0.0023	22.2
	13	17.4	Clayey sandy silt with gravel	4	25	60	11	0.048	-	-
	13	18.9	Clayey silty sand with gravel	2	55	36	7	0.17	0.0029	58.6
	13	20.4	Silty sand with gravel	4	67	29	0	0.21	0.022	9.5

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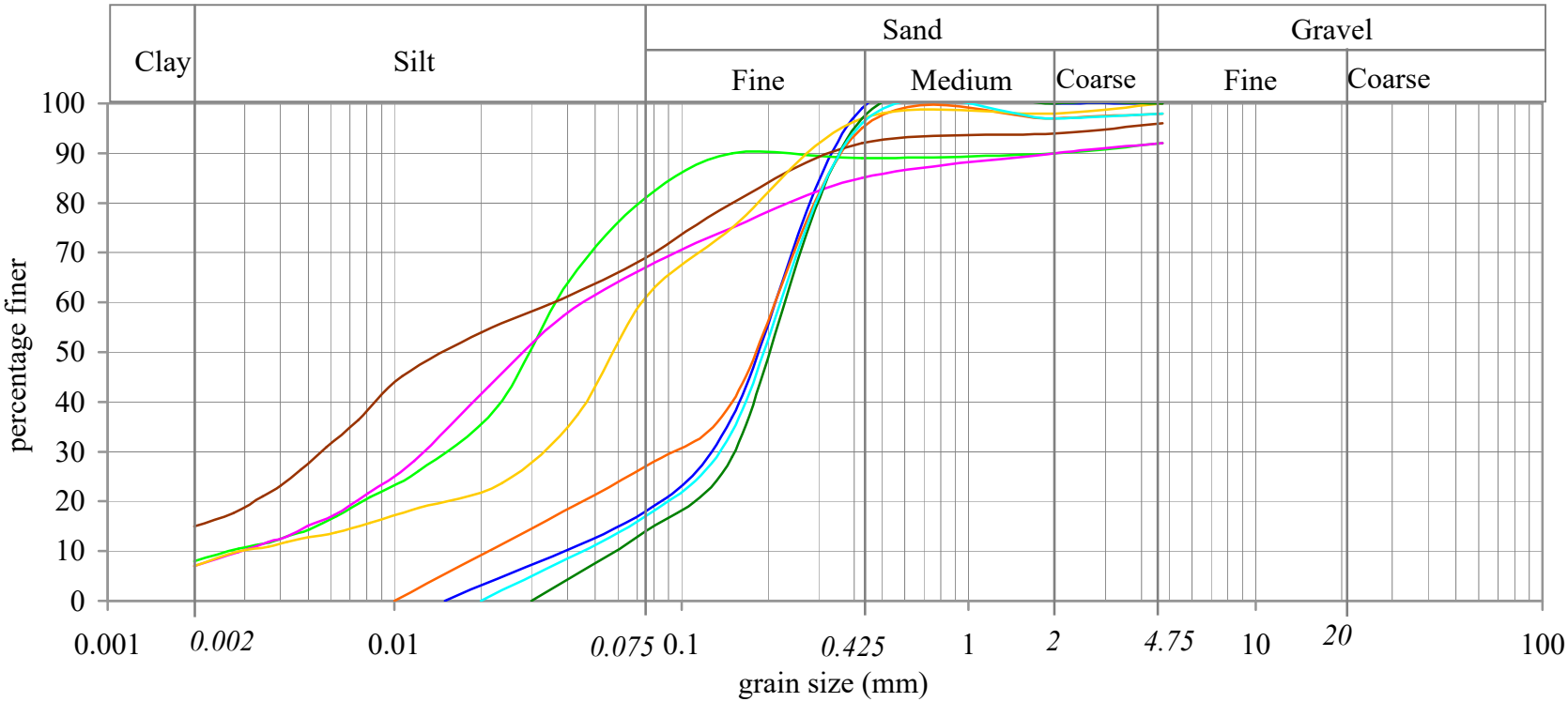
Job No. : G(D)4556

Sheet No. : 6ag

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	13	23.4	Sand with silt	0	82	18	0	0.21	0.039	5.4
	13	26.4	Silty sand with gravel	2	71	27	0	0.22	0.021	10.5
	13	30	Clayey sandy silt with gravel	8	11	73	8	0.035	0.0028	12.5
	14	1	Clayey sandy silt with gravel	4	27	54	15	0.035	-	-
	14	2	Clayey sandy silt with gravel	8	25	60	7	0.045	0.0028	16.1
	14	3	Clayey sandy silt	0	39	54	7	0.071	0.0029	24.5
	14	4	Sand with silt	0	86	14	0	0.23	0.061	3.8
	14	5	Sand with silt with gravel	2	81	17	0	0.23	0.045	5.1

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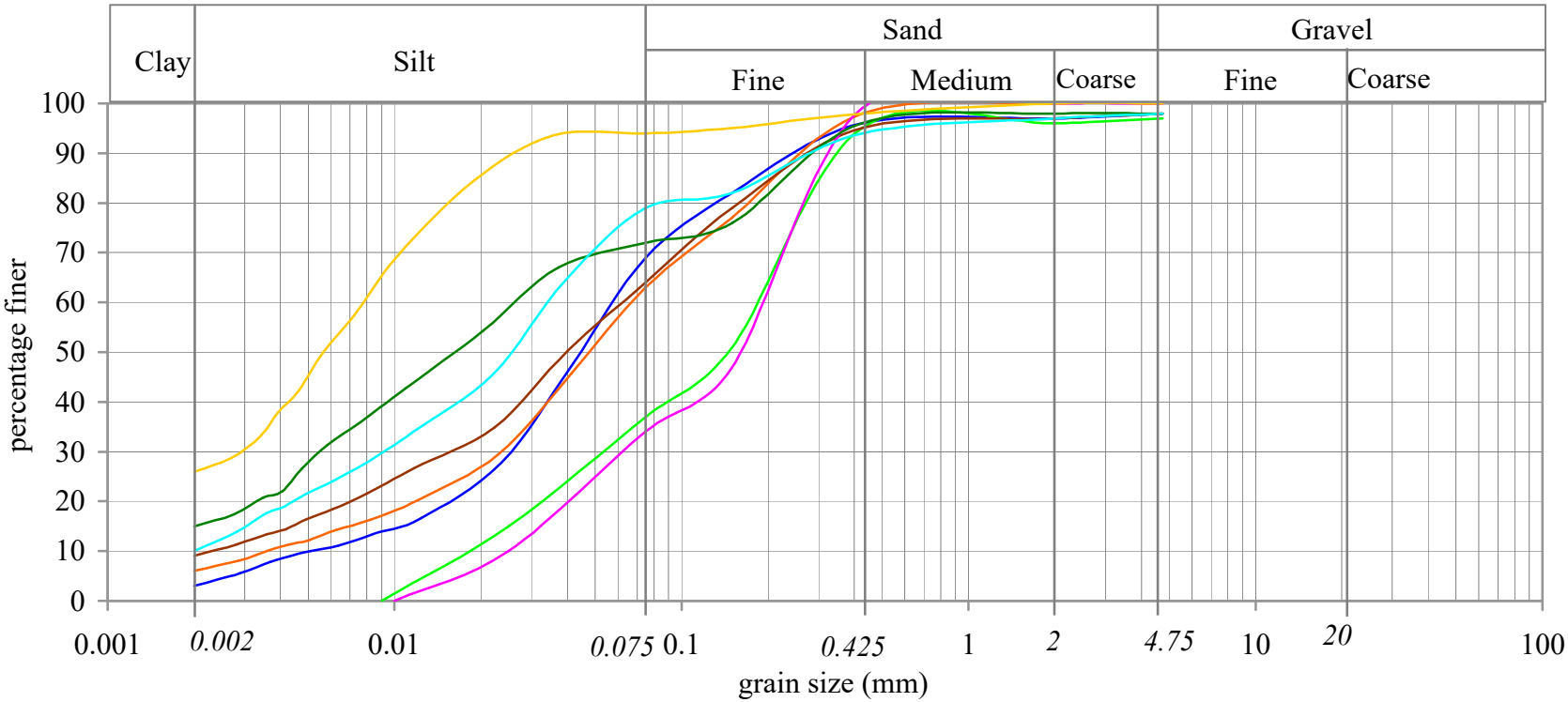
Job No. : G(D)4556

Sheet No. : 6ah

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	14	6	Clayey sandy silt with gravel	2	29	66	3	0.059	0.0049	12.0
	14	7	Clayey sandy silt	0	37	57	6	0.069	0.0036	19.2
	14	8	Silty sand with gravel	3	60	37	0	0.18	0.019	9.5
	14	9	Clayey sandy silt with gravel	2	34	55	9	0.061	0.0022	27.7
	14	10	Silty sand	0	66	34	0	0.19	0.025	7.6
	14	12	Sandy clayey silt	0	6	68	26	0.008	-	-
	14	13.5	Clayey sandy silt with gravel	2	26	57	15	0.025	-	-
	14	15	Clayey sandy silt with gravel	2	19	69	10	0.032	0.002	16.0

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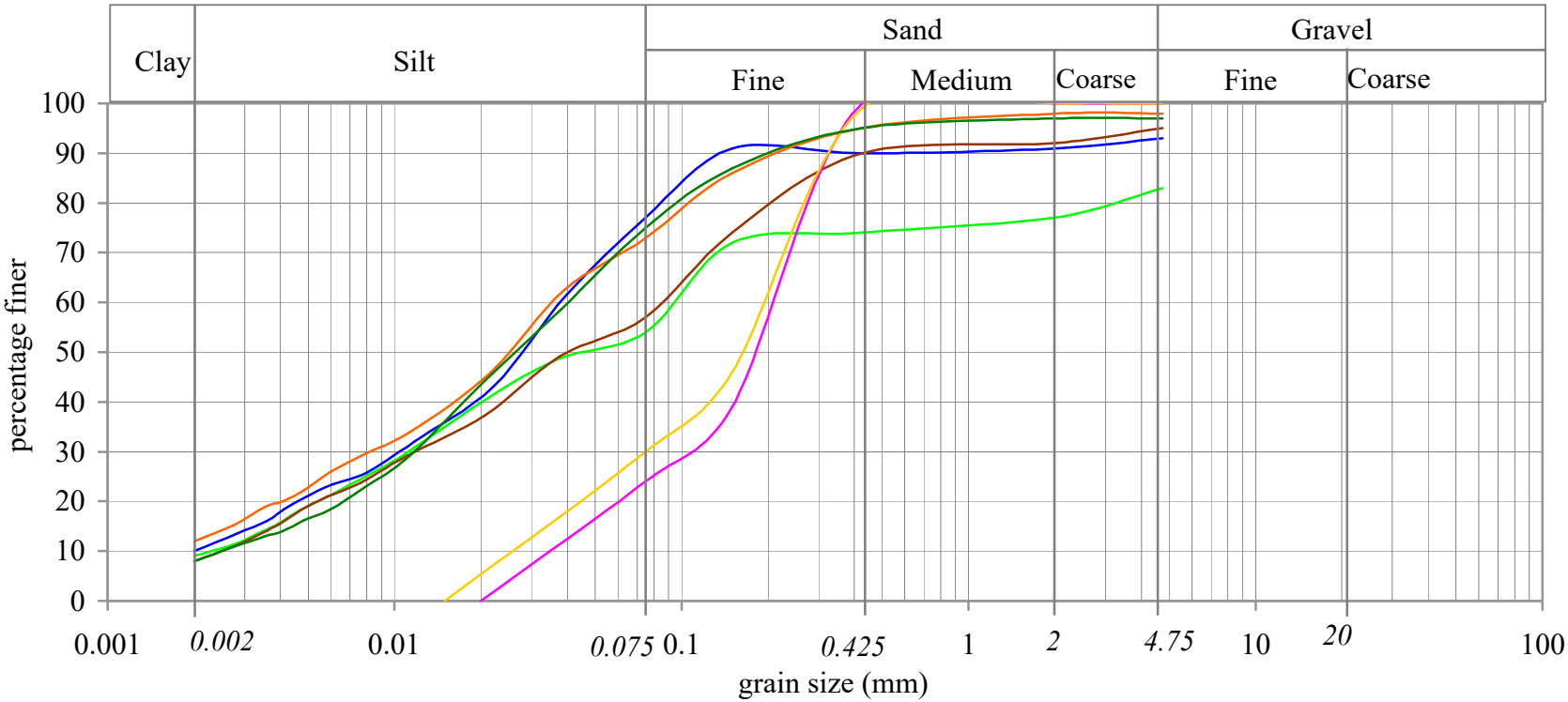
Job No. : G(D)4556

Sheet No. : 6ai

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	14	16.5	Clayey sandy silt with gravel	7	16	67	10	0.039	0.002	19.5
	14	18	Clayey sandy silt with gravel	2	25	61	12	0.025	-	-
	14	19.5	Clayey sandy silt with gravel	17	29	45	9	0.091	0.022	4.1
	14	21	Clayey sandy silt with gravel	5	38	49	8	0.085	0.0025	34.0
	14	24	Silty sand	0	76	24	0	0.21	0.035	6.0
	14	27	Silty sand	0	70	30	0	0.025	0.025	1.0
	14	30	Clayey sandy silt with gravel	3	22	67	8	0.041	0.0023	17.8

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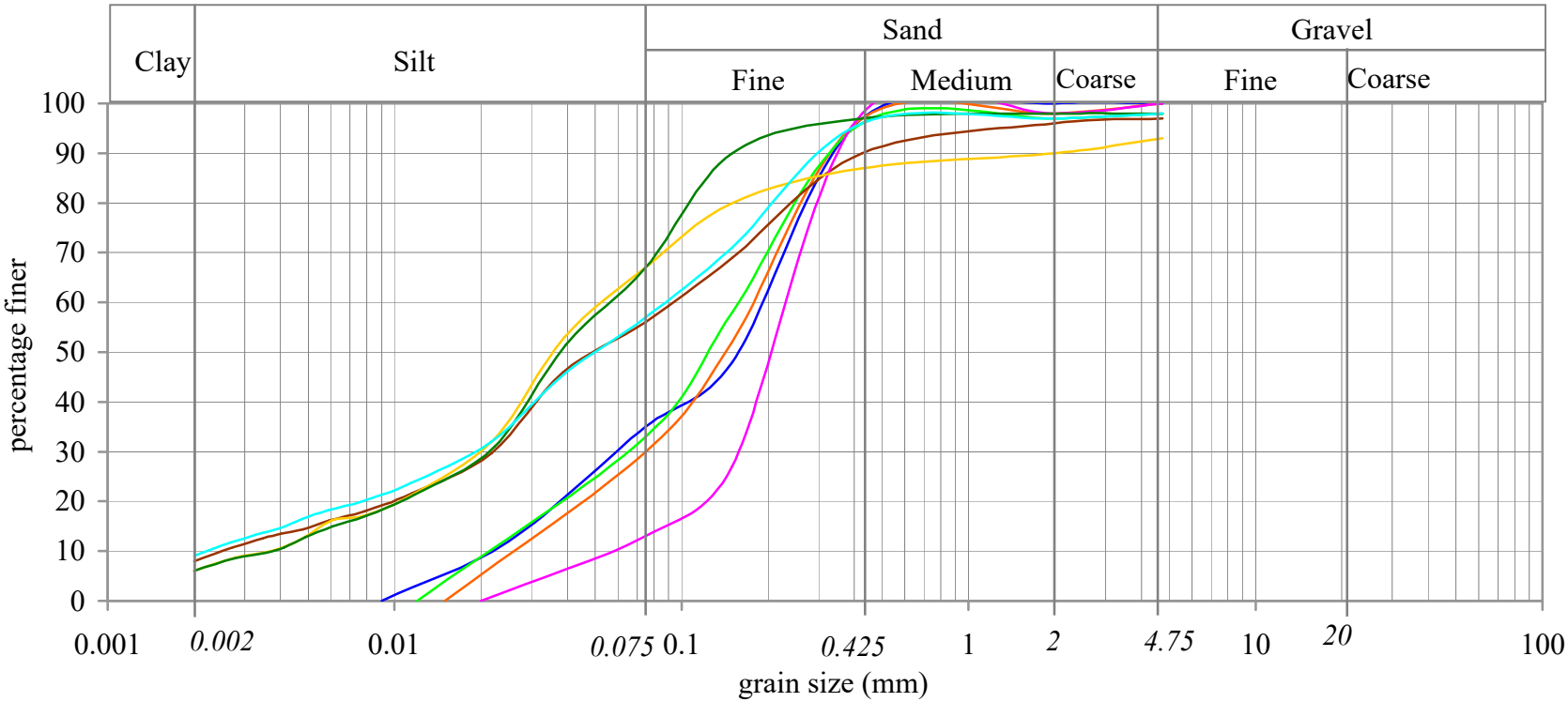
Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	15	1	Silty sand	0	65	35	0	0.19	0.021	9.0
	15	2	Silty sand	0	70	30	0	0.18	0.025	7.2
	15	3	Silty sand with gravel	2	65	33	0	0.16	0.021	7.6
	15	4	Clayey sandy silt with gravel	3	41	48	8	0.091	0.0025	36.4
	15	5	Sand with silt	0	87	13	0	0.23	0.059	3.9
	15	6	Clayey sandy silt with gravel	7	26	61	6	0.052	0.0032	16.3
	15	7	Clayey sandy silt with gravel	2	31	61	6	0.053	0.0035	15.1
	15	8	Clayey sandy silt with gravel	2	41	48	9	0.08	0.0023	34.8

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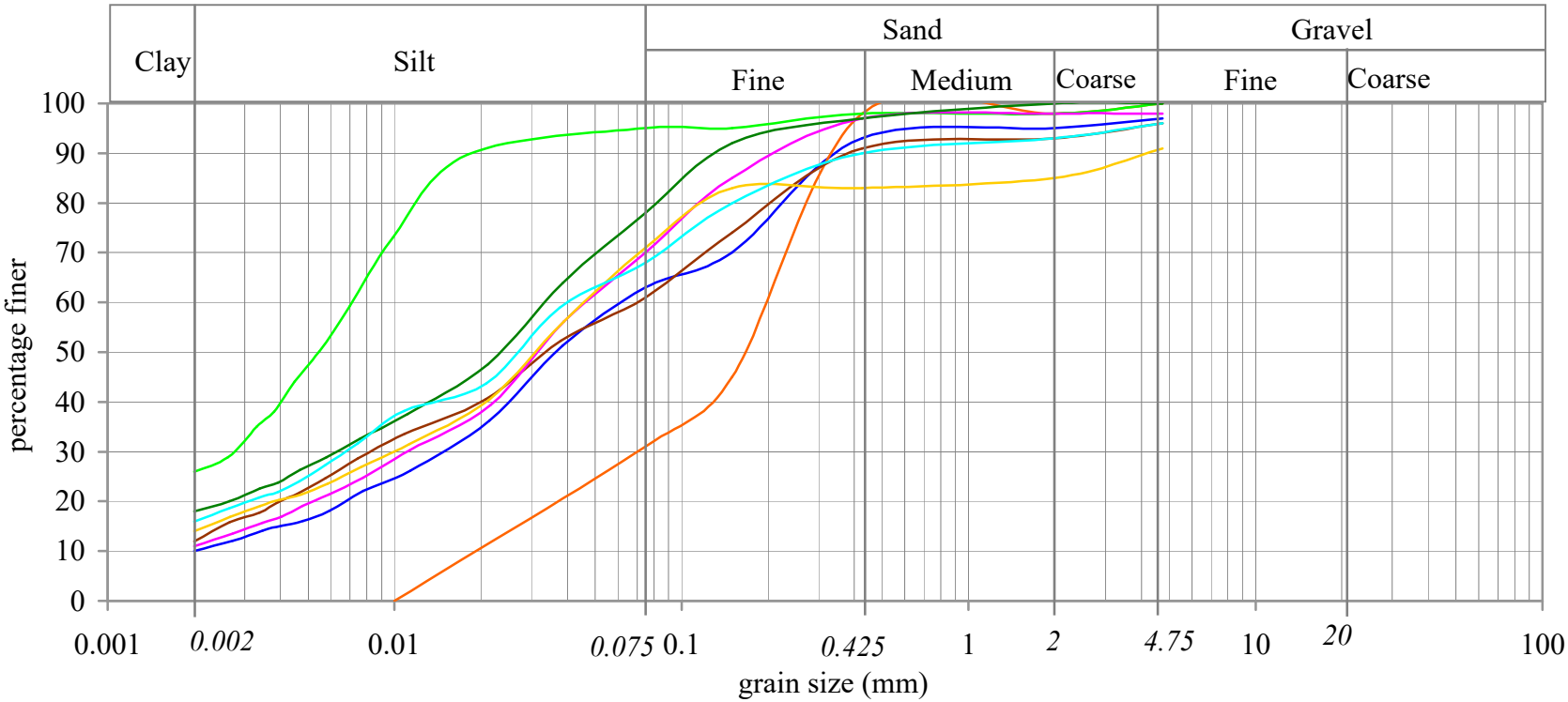
Job No. : G(D)4556

Sheet No. : 6ak

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	15	9	Clayey sandy silt with gravel	3	34	53	10	0.061	0.002	30.5
	15	10	Silty sand	0	69	31	0	0.19	0.019	10.0
	15	11.4	Sandy clayey silt	0	5	69	26	0.0071	-	-
	15	12.9	Clayey sandy silt with gravel	4	35	49	12	0.07	-	-
	15	14.4	Clayey sandy silt with gravel	2	28	59	11	0.045	-	-
	15	15.9	Clayey sandy silt with gravel	9	20	57	14	0.045	-	-
	15	17.4	Clayey sandy silt	0	22	60	18	0.032	-	-
	15	18.9	Clayey sandy silt with gravel	4	28	52	16	0.039	-	-

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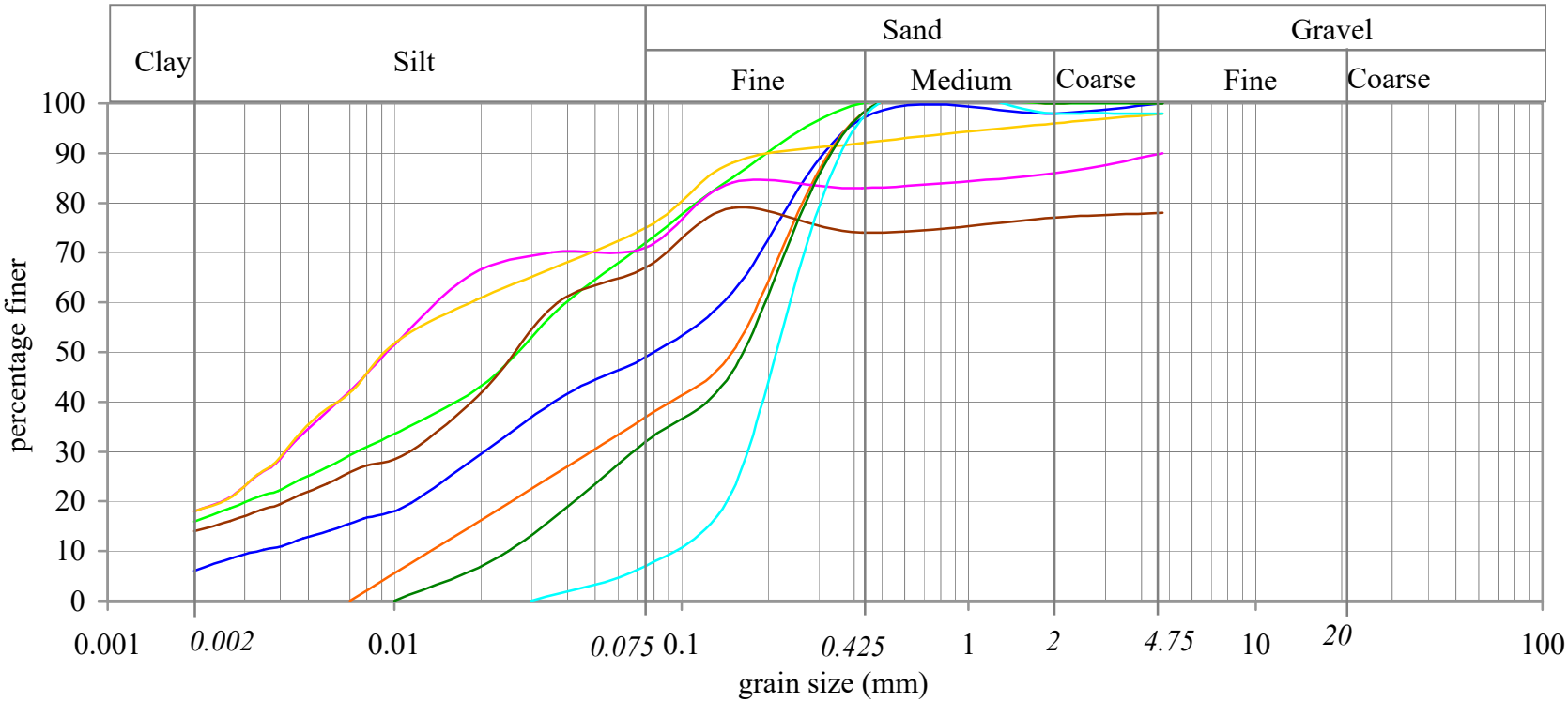
Job No. : G(D)4556

Sheet No. : 6al

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	15	20.4	Clayey silty sand	0	51	43	6	0.15	0.0032	46.9
	15	23.4	Silty sand	0	63	37	0	0.19	0.014	13.6
	15	26.4	Clayey sandy silt	0	28	56	16	0.039	-	-
	15	30	Sandy clayey silt	22	11	53	14	0.039	-	-
	16	1	Clayey sandy silt with gravel	10	19	53	18	0.014	-	-
	16	2	Clayey sandy silt with gravel	2	23	57	18	0.018	-	-
	16	3	Silty sand	0	68	32	0	0.19	0.023	8.3
	16	4	Sand with traces of silt and gravel	2	91	7	0	0.23	0.091	2.5

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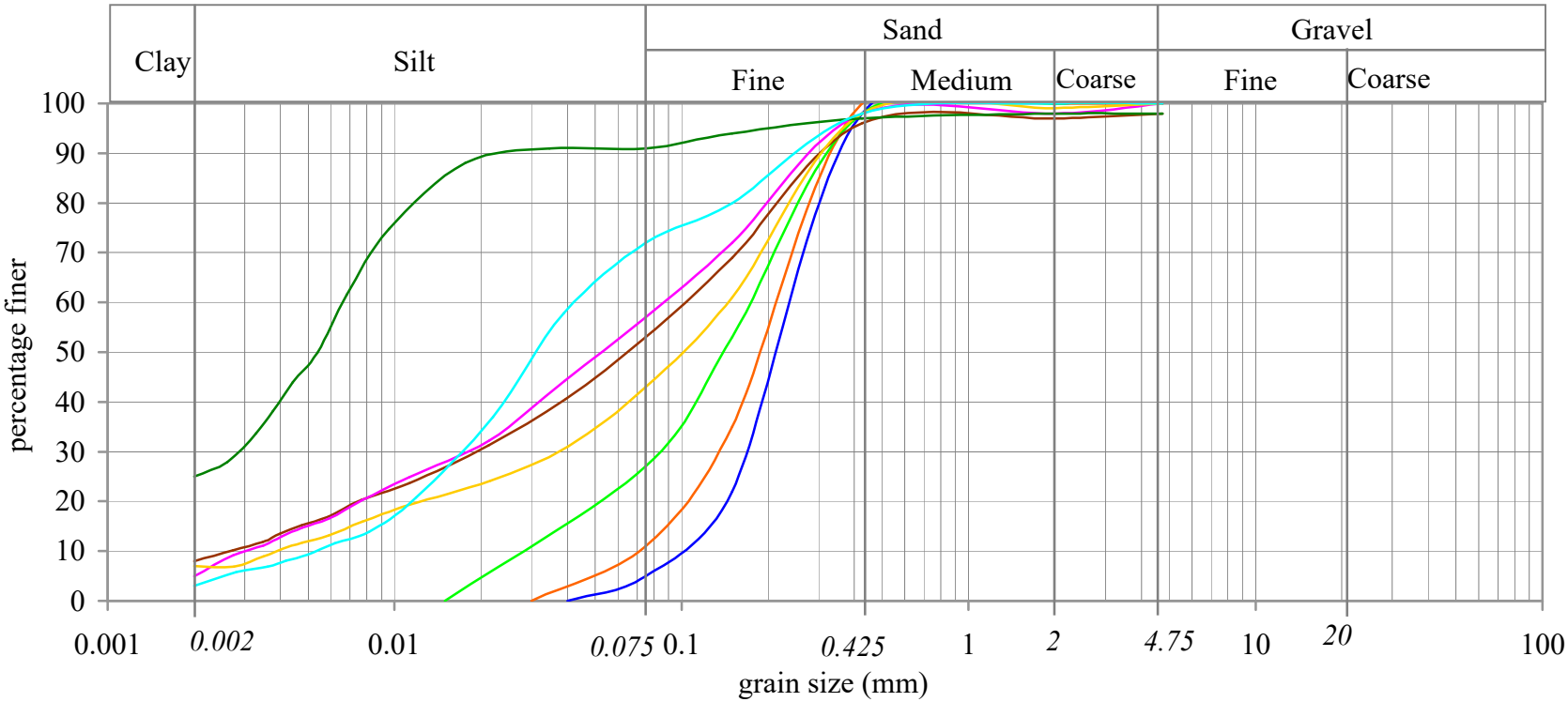
Job No. : G(D)4556

Sheet No. : 6am

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	16	5	Sand with traces of silt	0	95	5	0	0.23	0.1	2.3
	16	6	Sand with traces of silt	0	89	11	0	0.21	0.071	3.0
	16	7	Silty sand	0	73	27	0	0.19	0.029	6.6
	16	8	Clayey sandy silt with gravel	2	45	45	8	0.11	0.0025	44.0
	16	9	Clayey sandy silt	0	43	52	5	0.085	0.0029	29.3
	16	10	Clayey silty sand	0	57	36	7	0.14	0.0039	35.9
	16	12	Sandy clayey silt with gravel	2	7	66	25	0.0065	-	-
	16	13.5	Clayey sandy silt	0	28	69	3	0.041	0.0051	8.0

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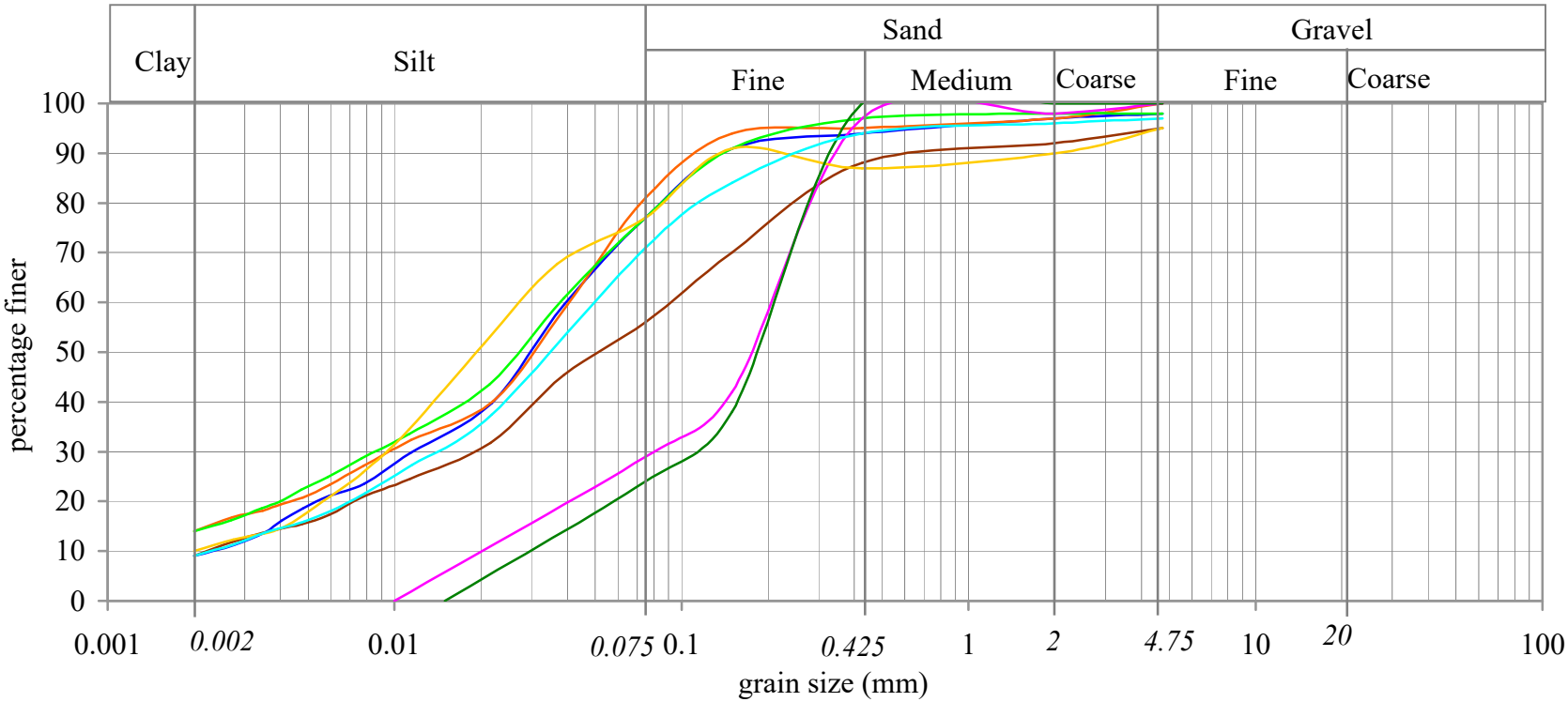
Sheet No. : 6an

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	16	15	Clayey sandy silt with gravel	2	21	68	9	0.04	0.0022	18.2
	16	16.5	Clayey sandy silt	0	19	67	14	0.04	-	-
	16	18	Clayey sandy silt with gravel	2	21	63	14	0.038	-	-
	16	19.5	Clayey sandy silt with gravel	5	39	47	9	0.091	0.0022	41.4
	16	21	Silty sand	0	71	29	0	0.21	0.021	10.0
	16	24	Clayey sandy silt with gravel	5	18	67	10	0.026	0.002	13.0
	16	27	Silty sand	0	76	24	0	0.21	0.029	7.2
	16	30	Clayey sandy silt with gravel	3	26	62	9	0.05	0.0022	22.7

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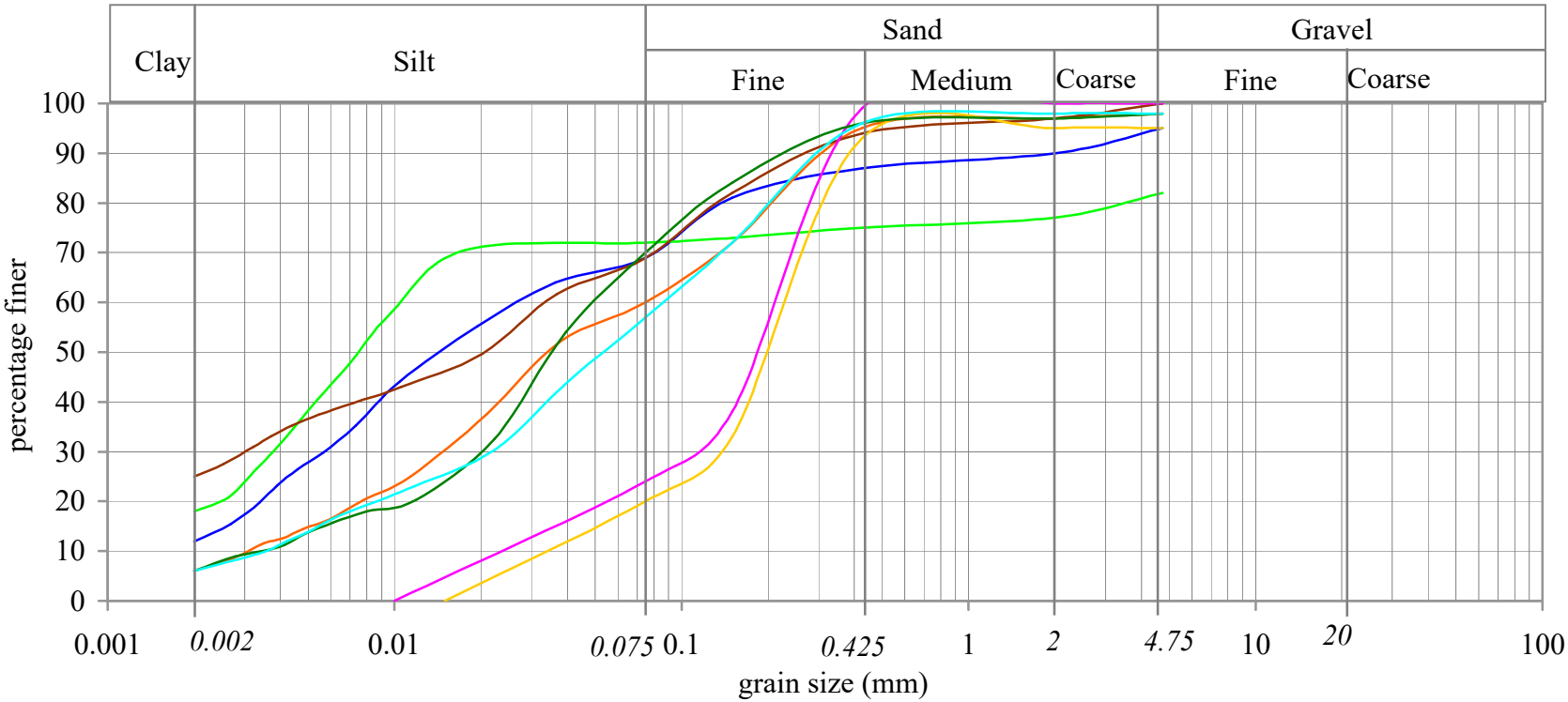
Job No. : G(D)4556

Sheet No. : 6ao

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	17	1	Clayey sandy silt with gravel	5	26	57	12	0.027	-	-
	17	2	Clayey sandy silt with gravel	2	38	54	6	0.076	0.0031	24.5
	17	3	Sandy clayey silt with gravel	18	10	54	18	0.011	-	-
	17	4	Clayey sandy silt	0	31	44	25	0.032	-	-
	17	5	Silty sand	0	76	24	0	0.21	0.023	9.1
	17	6	Silty sand with gravel	5	75	20	0	0.22	0.032	6.9
	17	7	Clayey sandy silt with gravel	2	28	64	6	0.049	0.0022	22.3
	17	8	Clayey sandy silt with gravel	2	41	51	6	0.085	0.0022	38.6

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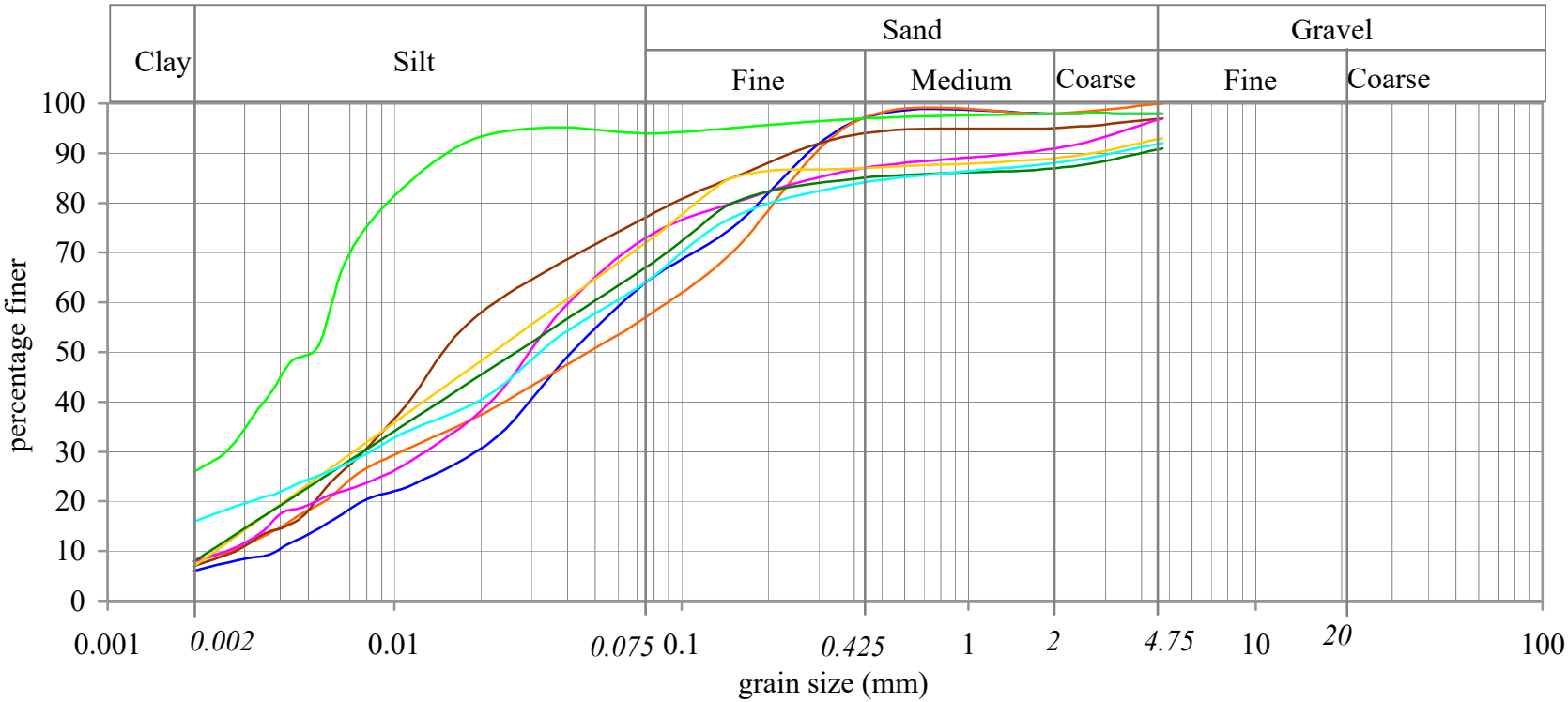
Job No. : G(D)4556

Sheet No. : 6ap

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	17	9	Clayey sandy silt with gravel	2	34	58	6	0.061	0.0039	15.6
	17	10	Clayey sandy silt	0	43	49	8	0.091	0.0023	39.6
	17	11.4	Sandy claeyy silt with gravel	2	4	68	26	0.0061	-	-
	17	12.9	Clayey sandy silt with gravel	3	20	70	7	0.021	0.0021	10.0
	17	14.4	Clayey sandy silt with gravel	3	24	65	8	0.041	0.0026	15.8
	17	15.9	Clayey sandy silt with gravel	7	21	65	7	0.039	0.0023	17.0
	17	17.4	Clayey sandy silt with gravel	9	24	59	8	0.051	0.0022	23.2
	17	18.9	Clayey sandy silt with gravel	8	28	48	16	0.06	-	-

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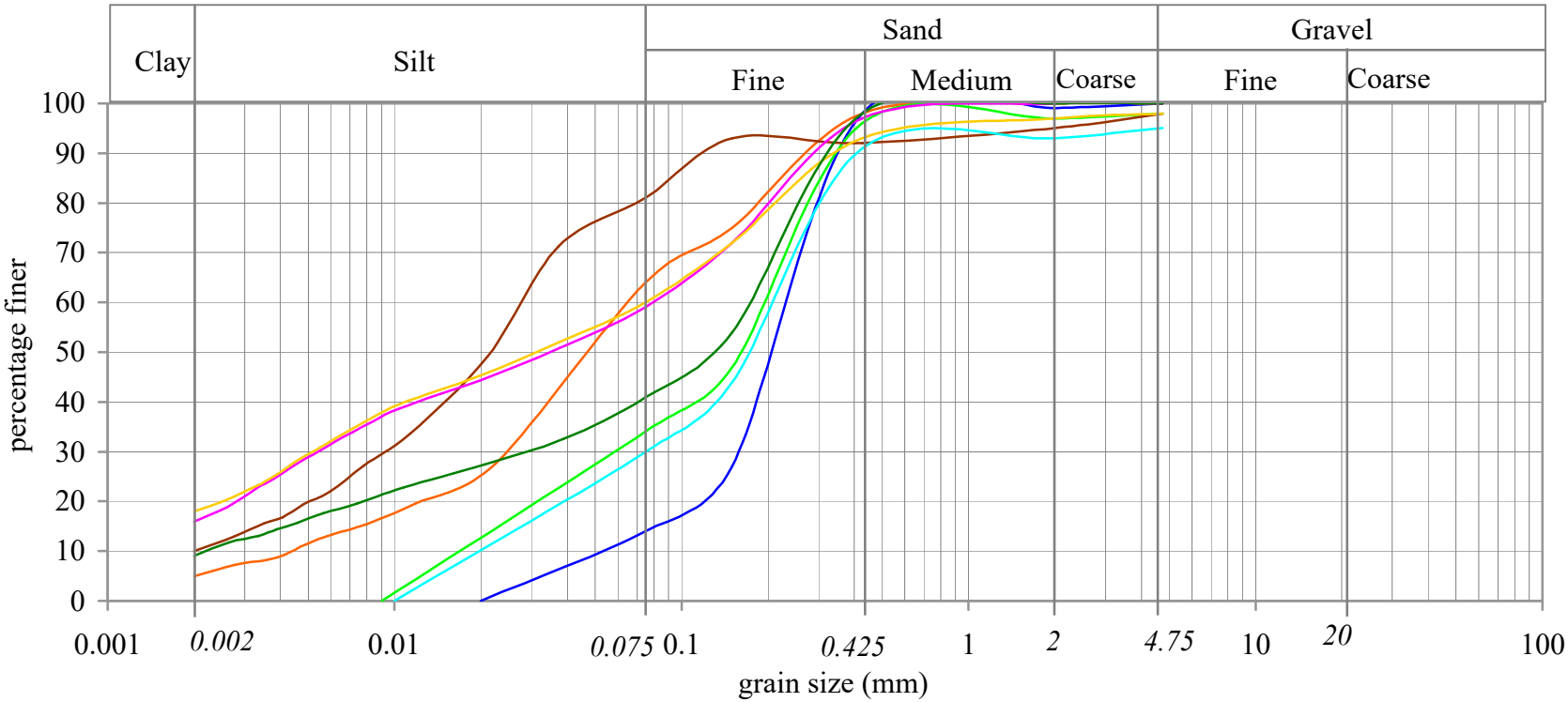
Job No. : G(D)4556

Sheet No. : 6aq

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	17	20.4	Sand with silt	0	86	14	0	0.23	0.051	4.5
	17	23.4	Clayey sandy silt	0	36	59	5	0.064	0.0042	15.2
	17	26.4	Silty sand with gravel	2	64	34	0	0.19	0.018	10.6
	17	30	Clayey sandy silt with gravel	2	17	71	10	0.027	0.002	13.5
	18	1	Clayey silty sand	0	41	43	16	0.067	-	-
	18	2	Clayey sandy silt with gravel	2	38	42	18	0.079	-	-
	18	3	Clayey silty sand	0	59	32	9	0.19	0.0022	86.4
	18	4	Silty sand with gravel	5	65	30	0	0.21	0.019	11.1

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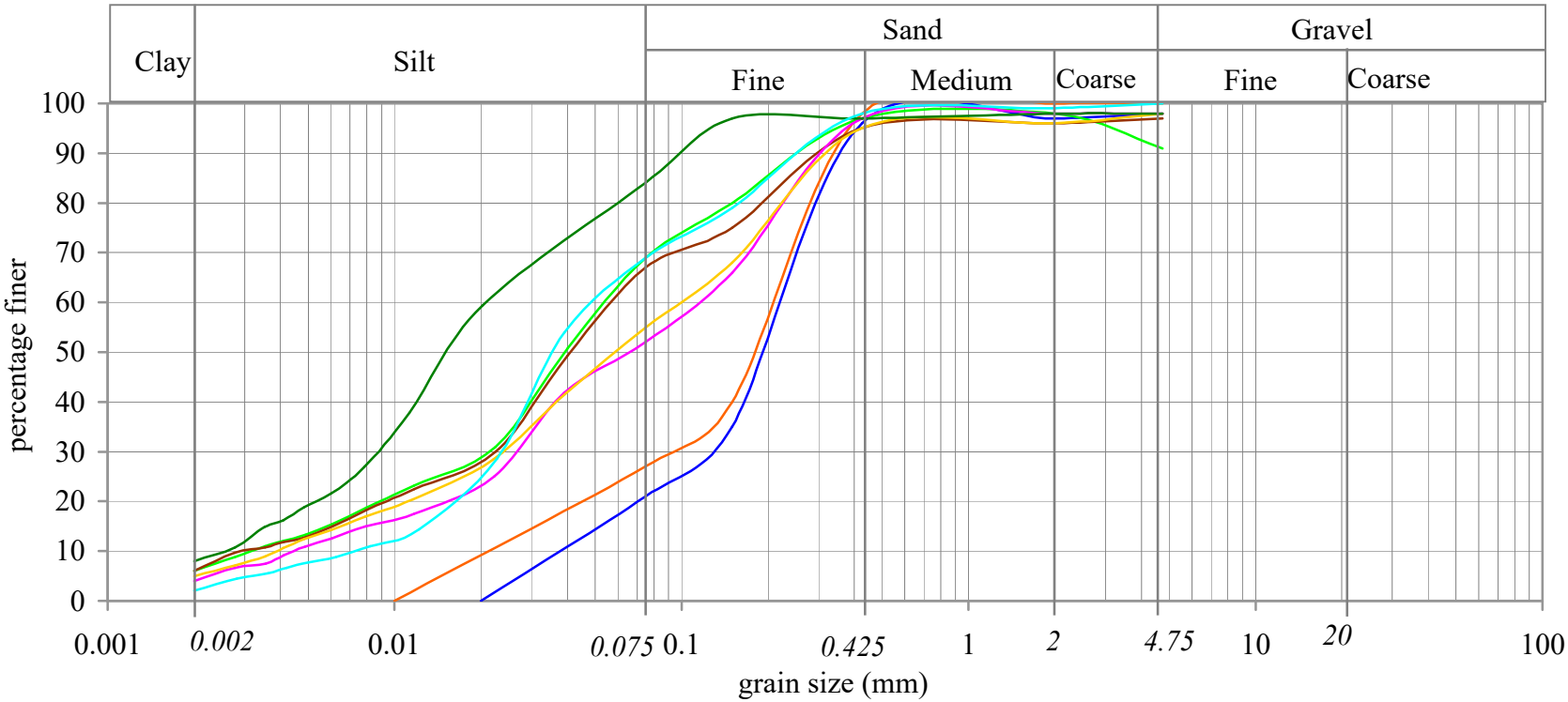
Sheet No. : 6ar

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	18	5	Silty sand with gravel	2	77	21	0	0.22	0.038	5.8
	18	6	Silty sand	0	73	27	0	0.21	0.021	10.0
	18	7	Clayey sandy silt with gravel	9	22	63	6	0.051	0.0032	15.9
	18	8	Clayey sandy silt with gravel	3	30	61	6	0.058	0.0028	20.7
	18	9	Clayey sandy silt with gravel	2	46	48	4	0.13	0.0042	31.0
	18	10	Clayey sandy silt with gravel	2	43	50	5	0.099	0.0038	26.1
	18	12	Clayey sandy silt with gravel	2	14	76	8	0.021	0.0026	8.1
	18	13.5	Clayey sandy silt	0	31	67	2	0.048	0.0069	7.0

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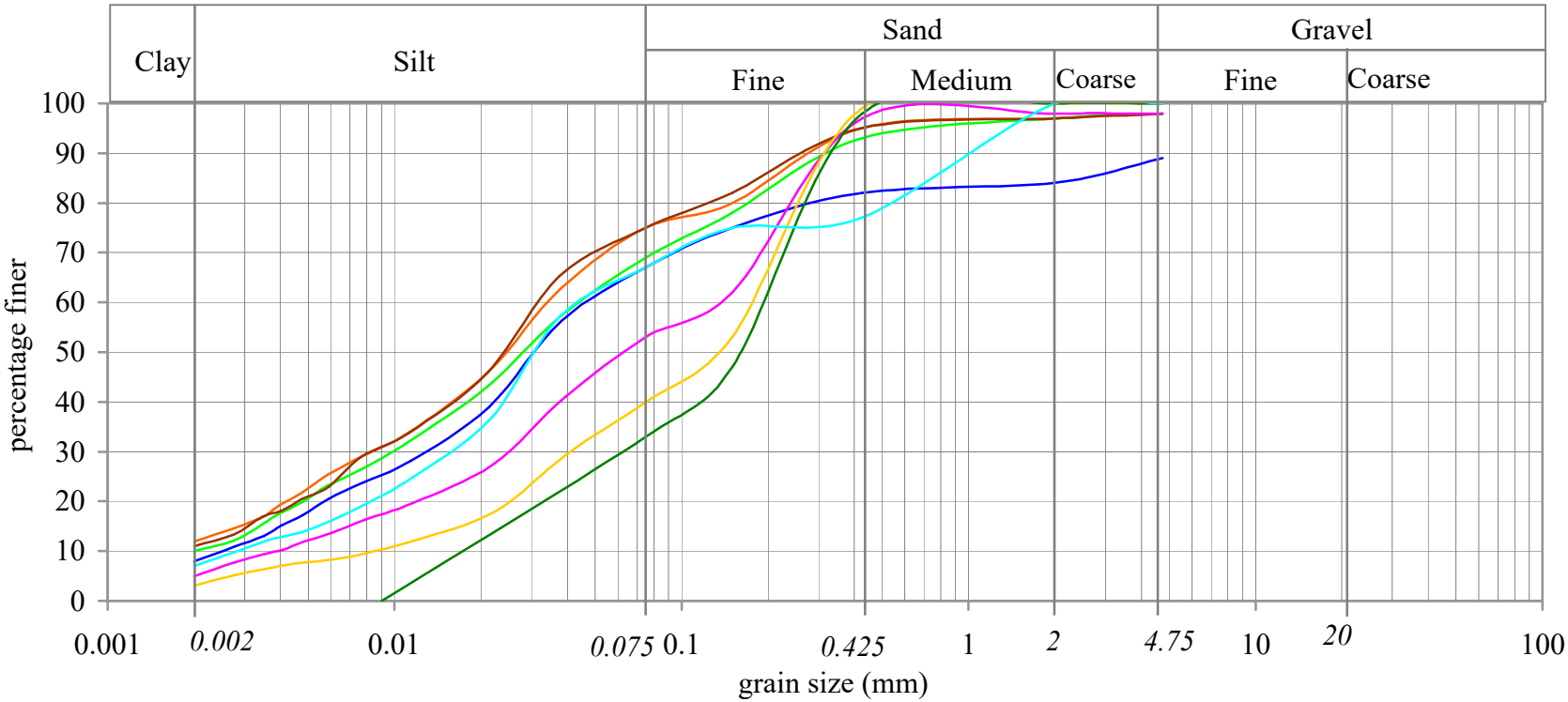
Job No. : G(D)4556

Sheet No. : 6as

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	18	15	Clayey sandy silt with gravel	11	22	59	8	0.042	0.0025	16.8
	18	16.5	Clayey sandy silt with gravel	2	23	63	12	0.032	-	-
	18	18	Clayey sandy silt with gravel	2	29	59	10	0.041	0.002	20.5
	18	19.5	Clayey sandy silt with gravel	2	23	64	11	0.031	-	-
	18	21	Clayey sandy silt with gravel	2	45	48	5	0.14	0.0035	40.0
	18	24	Clayey silty sand	0	60	37	3	0.18	0.0085	21.2
	18	27	Silty sand	0	67	33	0	0.19	0.017	11.2
	18	30	Clayey sandy silt	0	33	60	7	0.042	0.0029	14.5

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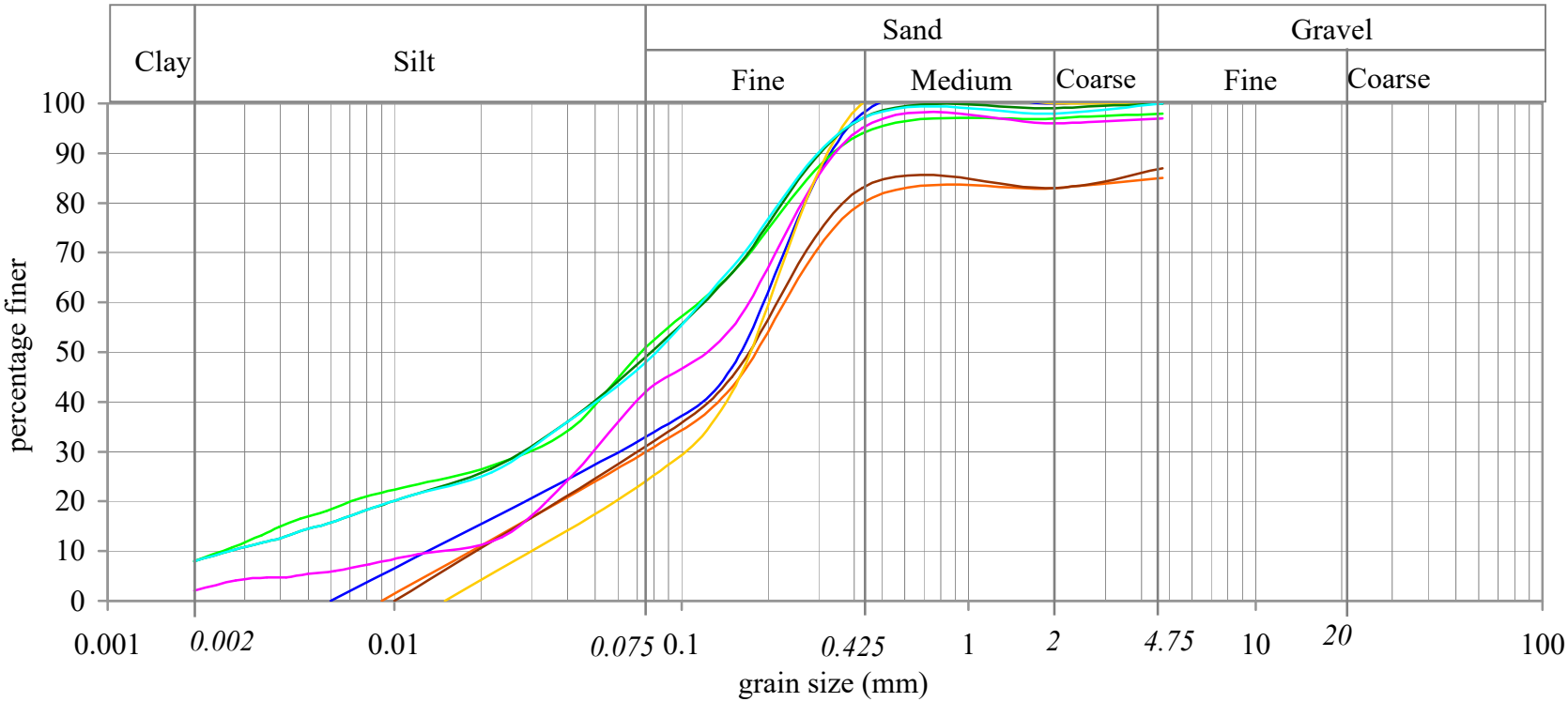
Job No. : G(D)4556

Sheet No. : 6at

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	19	1	Silty sand	0	67	33	0	0.19	0.13	1.5
	19	2	Silty sand with gravel	15	55	30	0	0.22	0.019	11.6
	19	3	Clayey silty sand with gravel	2	47	43	8	0.12	0.0022	54.5
	19	4	Silty sand with gravel	13	56	31	0	0.22	0.019	11.6
	19	5	Clayey silty sand with gravel	3	55	40	2	0.17	0.015	11.3
	19	6	Silty sand	0	76	24	0	0.21	0.029	7.2
	19	7	Clayey silty sand	0	51	41	8	0.13	0.0025	52.0
	19	8	Clayey silty sand	0	52	40	8	0.13	0.0025	52.0

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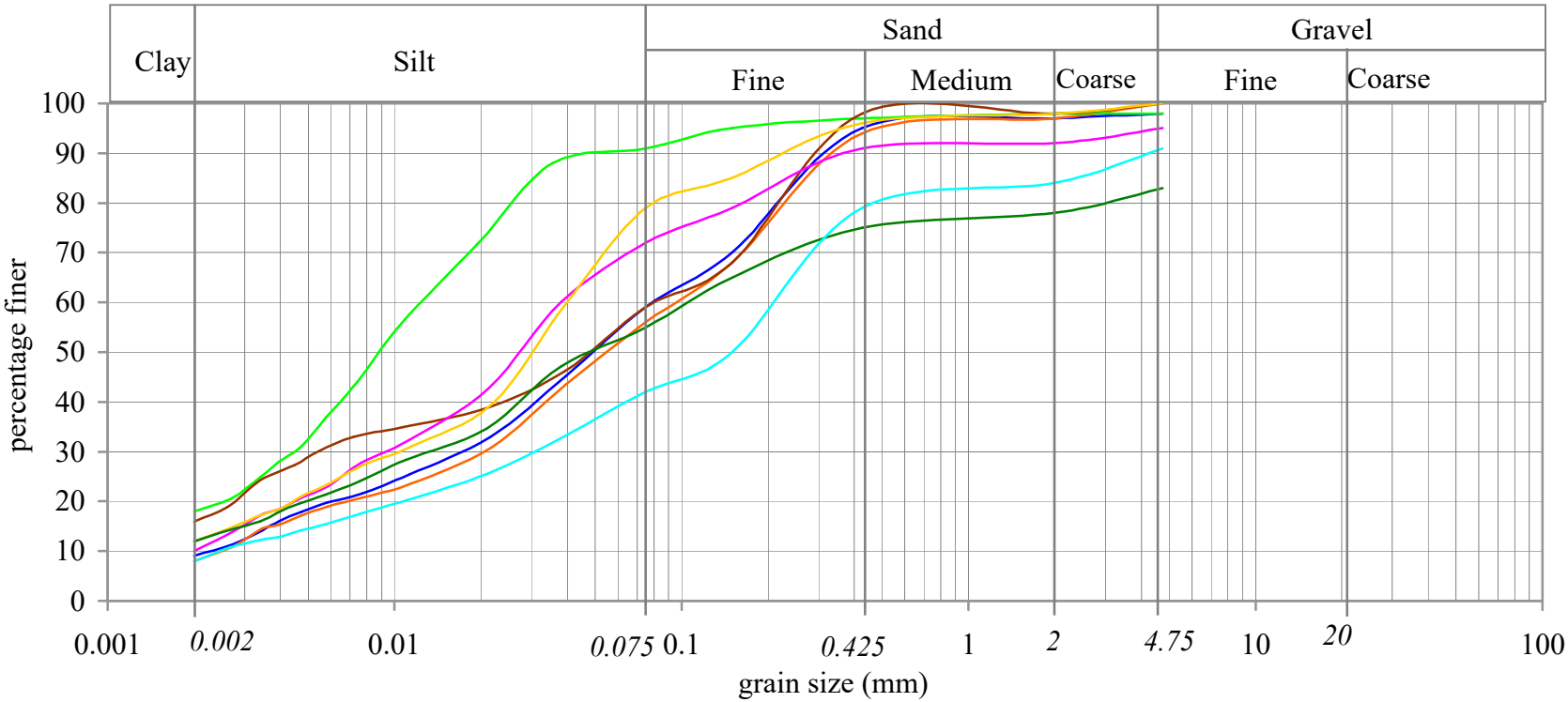
Job No. : G(D)4556

Sheet No. : 6au

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	19	9	Clayey sandy silt with gravel	2	39	50	9	0.081	0.0022	36.8
	19	10	Clayey sandy silt	0	44	48	8	0.099	0.0025	39.6
	19	11.4	Sandy clayey silt with gravel	2	7	73	18	0.013	-	-
	19	12.9	Clayey sandy silt	0	41	43	16	0.075	-	-
	19	14.4	Clayey sandy silt with gravel	5	23	62	10	0.038	0.002	19.0
	19	15.9	Clayey sandy silt	0	21	67	12	0.041	-	-
	19	17.4	Clayey sandy silt with gravel	17	28	43	12	0.11	-	-
	19	18.9	Clayey silty sand with gravel	9	49	34	8	0.21	0.0022	95.5

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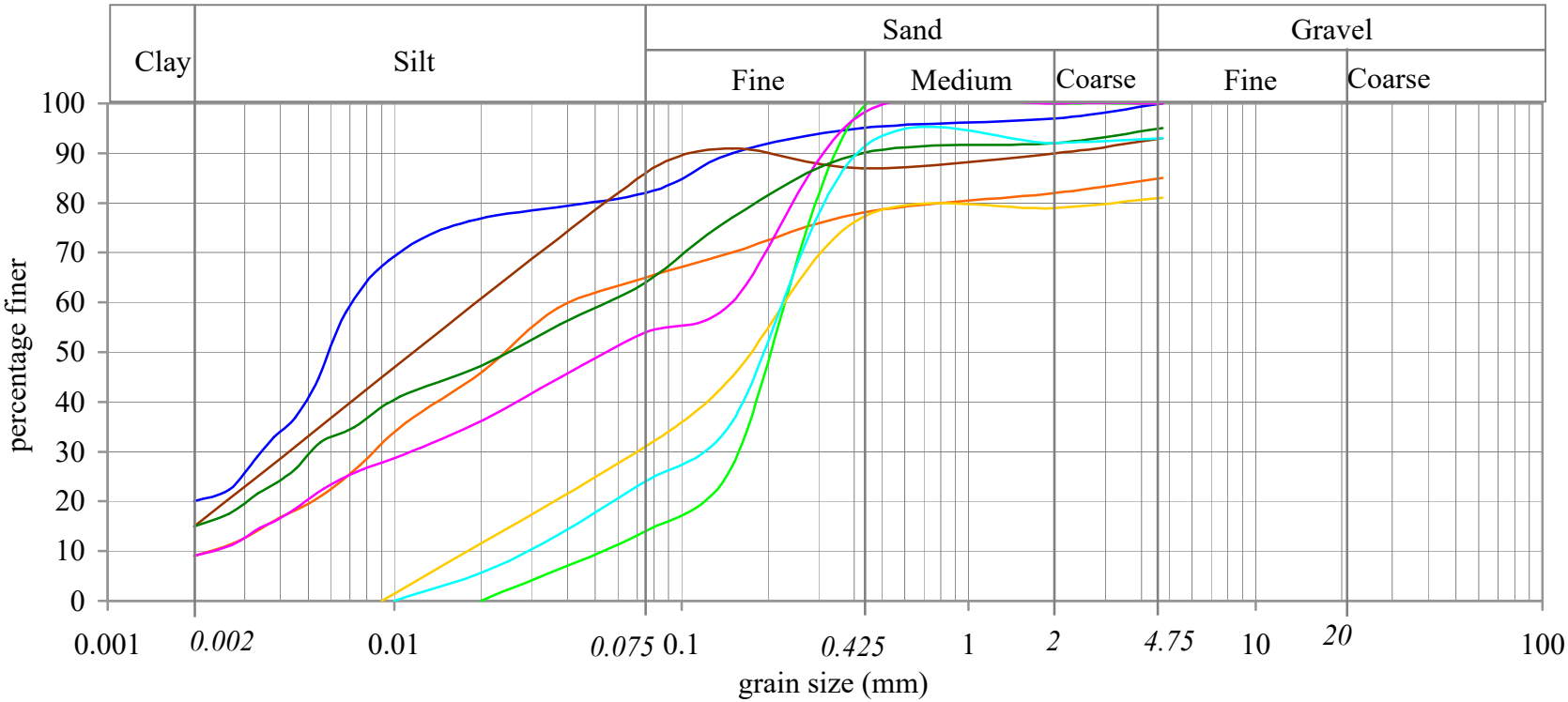
Job No. : G(D)4556

Sheet No. : 6av

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	19	20.4	Sandy clayey silt	0	18	62	20	0.0071	-	-
	19	23.4	Clayey sandy silt with gravel	15	20	56	9	0.039	0.0022	17.7
	19	26.4	Sand with silt	0	86	14	0	0.23	0.051	4.5
	19	30	Sandy clayey silt with gravel	7	7	71	15	0.019	-	-
	20	1	Clayey silty sand	0	46	45	9	0.15	0.0022	68.2
	20	2	Silty sand with gravel	19	50	31	0	0.22	0.019	11.6
	20	3	Clayey sandy silt with gravel	5	31	49	15	0.055	-	-
	20	4	Silty sand with gravel	7	69	24	0	0.23	0.029	7.9

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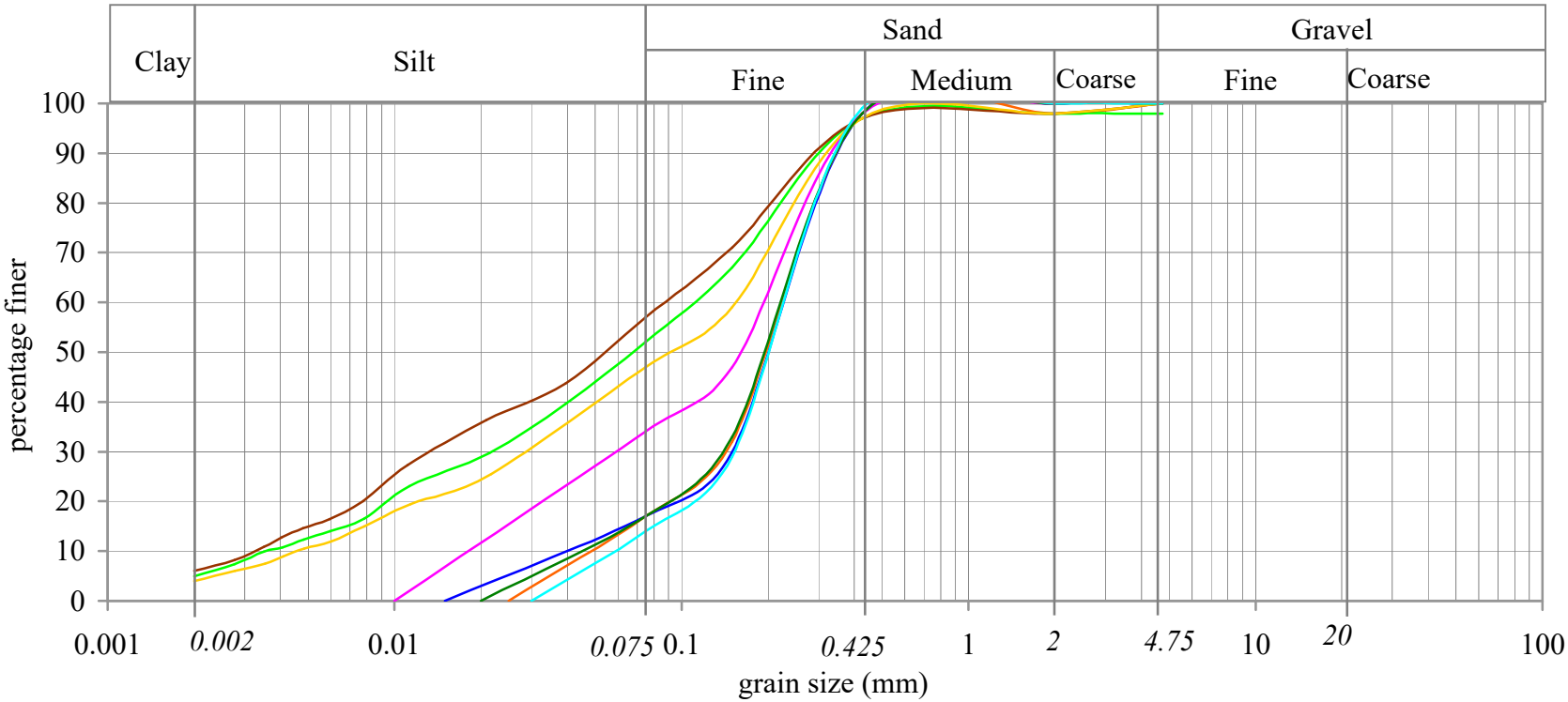
Job No. : G(D)4556

Sheet No. : 6aw

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	20	5	Sand with silt	0	83	17	0	0.22	0.039	5.6
	20	6	Sand with silt	0	83	17	0	0.23	0.045	5.1
	20	7	Clayey sandy silt and gravel	2	46	47	5	0.12	0.0035	34.3
	20	8	Clayey sandy silt	0	43	51	6	0.085	0.0031	27.4
	20	9	Silty sand	0	66	34	0	0.19	0.019	10.0
	20	10	Clayey silty sand	0	53	43	4	0.15	0.044	3.4
	20	12	Sand with silt	0	83	17	0	0.22	0.045	4.9
	20	13.5	Sand with silt	0	86	14	0	0.22	0.061	3.6

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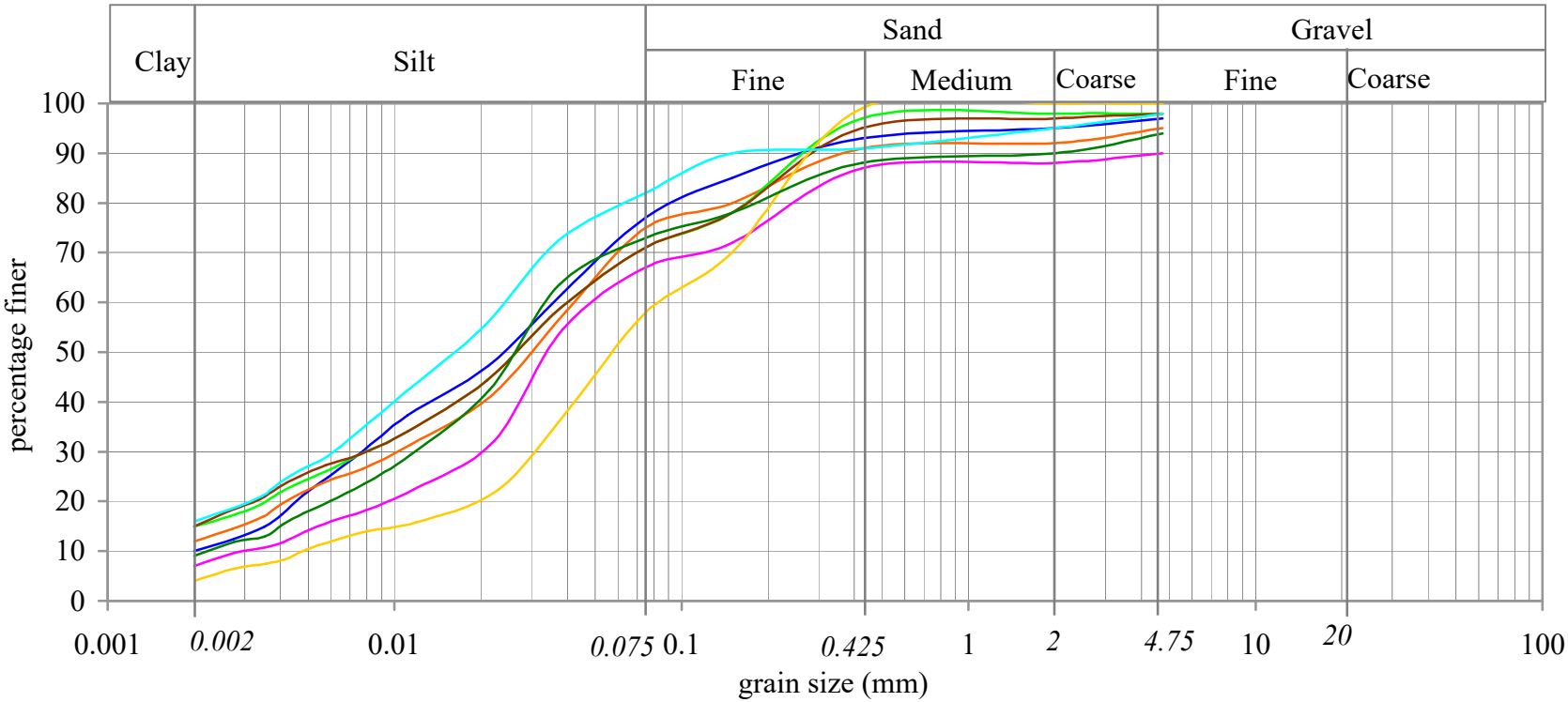
Job No. : G(D)4556

Sheet No. : 6ax

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	20	15	Clayey sandy silt with gravel	3	20	67	10	0.035	0.002	17.5
	20	16.5	Clayey sandy silt with gravel	5	20	63	12	0.041	-	-
	20	18	Clayey sandy silt with gravel	2	27	56	15	0.035	-	-
	20	19.5	Clayey sandy silt with gravel	2	27	56	15	0.035	-	-
	20	21	Clayey sandy silt with gravel	10	23	60	7	0.049	0.0028	17.5
	20	24	Clayey sandy silt	0	42	54	4	0.081	0.0048	16.9
	20	27	Clayey sandy silt with gravel	6	21	64	9	0.035	0.0022	15.9
	20	30	Clayey sandy silt with gravel	2	16	66	16	0.025	-	-

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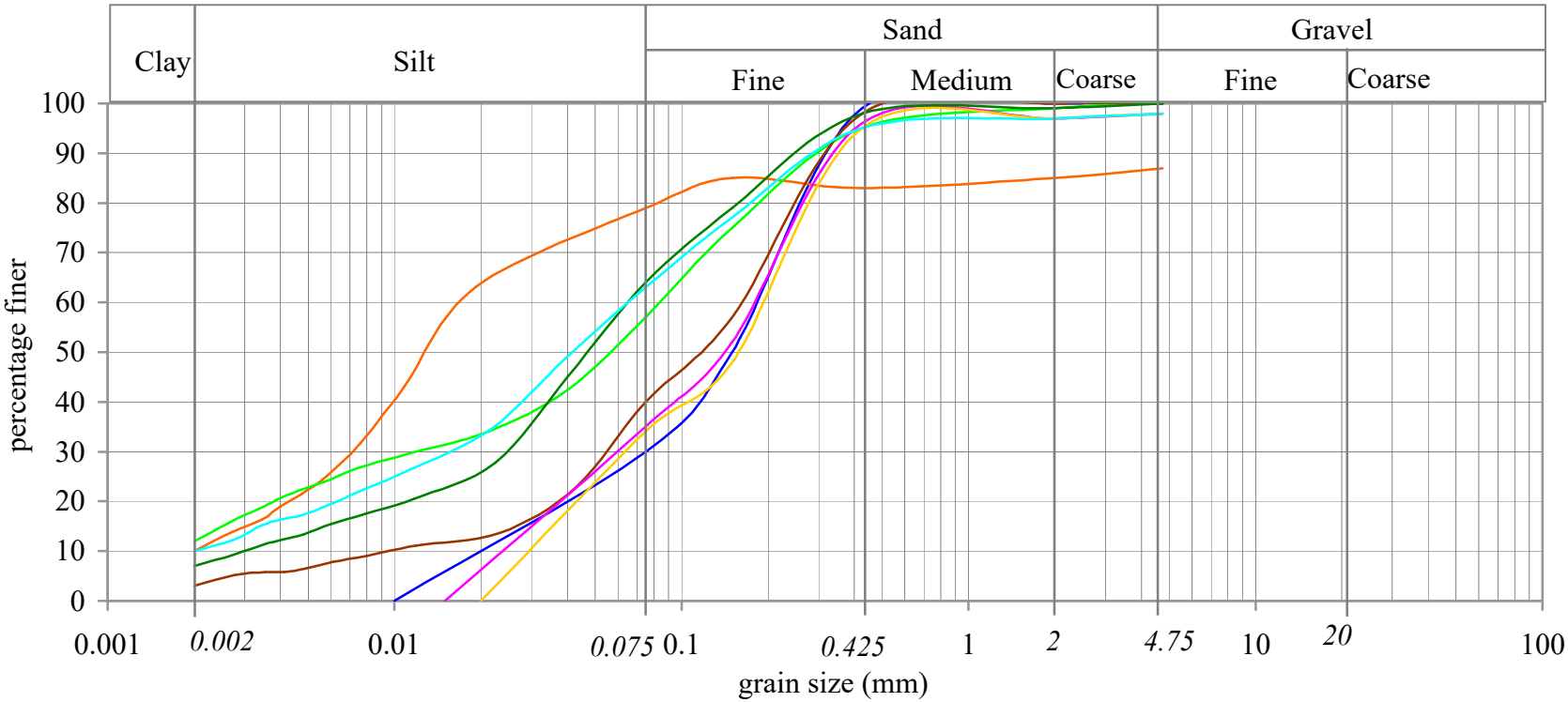
Job No. : G(D)4556

Sheet No. : 6axy

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	21	1	Silty sand	0	70	30	0	0.18	0.021	8.6
	21	2	Sandy clayey silt with gravel	13	8	69	10	0.018	0.002	9.0
	21	3	Clayey sandy silt	0	43	45	12	0.091	-	-
	21	4	Clayey silty sand	0	60	37	3	0.16	0.0095	16.8
	21	5	Silty sand with gravel	2	63	35	0	0.17	0.023	7.4
	21	6	Silty sand with gravel	2	64	34	0	0.19	0.029	6.6
	21	7	Clayey sandy silt	0	36	57	7	0.18	0.0029	62.1
	21	8	Clayey sandy silt with gravel	2	35	53	10	0.062	0.002	31.0

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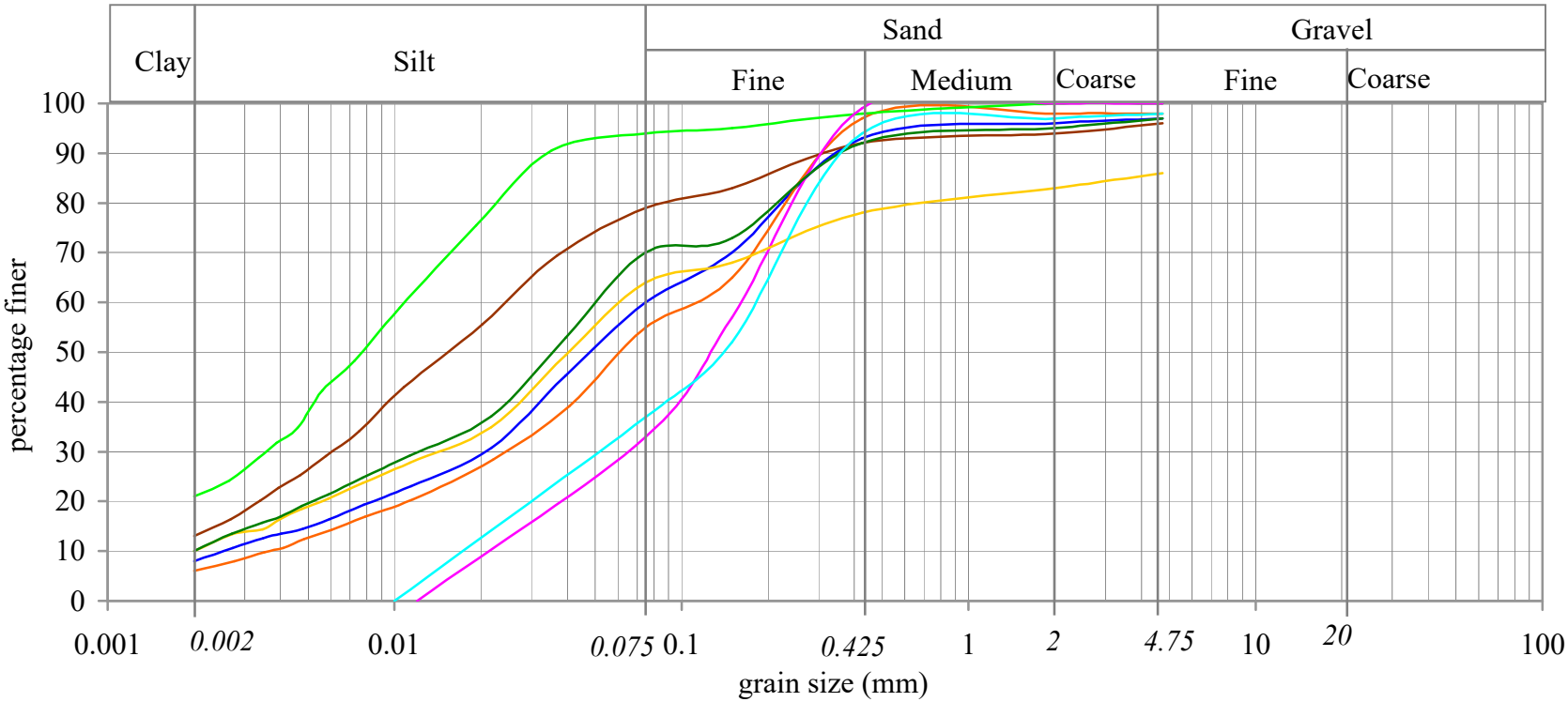
Job No. : G(D)4556

Sheet No. : 6az

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	21	9	Clayey sandy silt with gravel	3	37	52	8	0.075	0.0023	32.6
	21	10	Clayey sandy silt with gravel	2	43	49	6	0.12	0.0035	34.3
	21	11.4	Sandy clayey silt	0	6	73	21	0.012	-	-
	21	12.9	Clayey sandy silt with gravel	4	17	66	13	0.024	-	-
	21	14.4	Silty sand	0	67	33	0	0.17	0.021	8.1
	21	15.9	Clayey sandy silt with gravel	14	22	54	10	0.061	0.002	30.5
	21	17.4	Clayey sandy silt with gravel	3	27	60	10	0.051	0.002	25.5
	21	18.9	Silty sand with gravel	2	61	37	0	0.17	0.017	10.0

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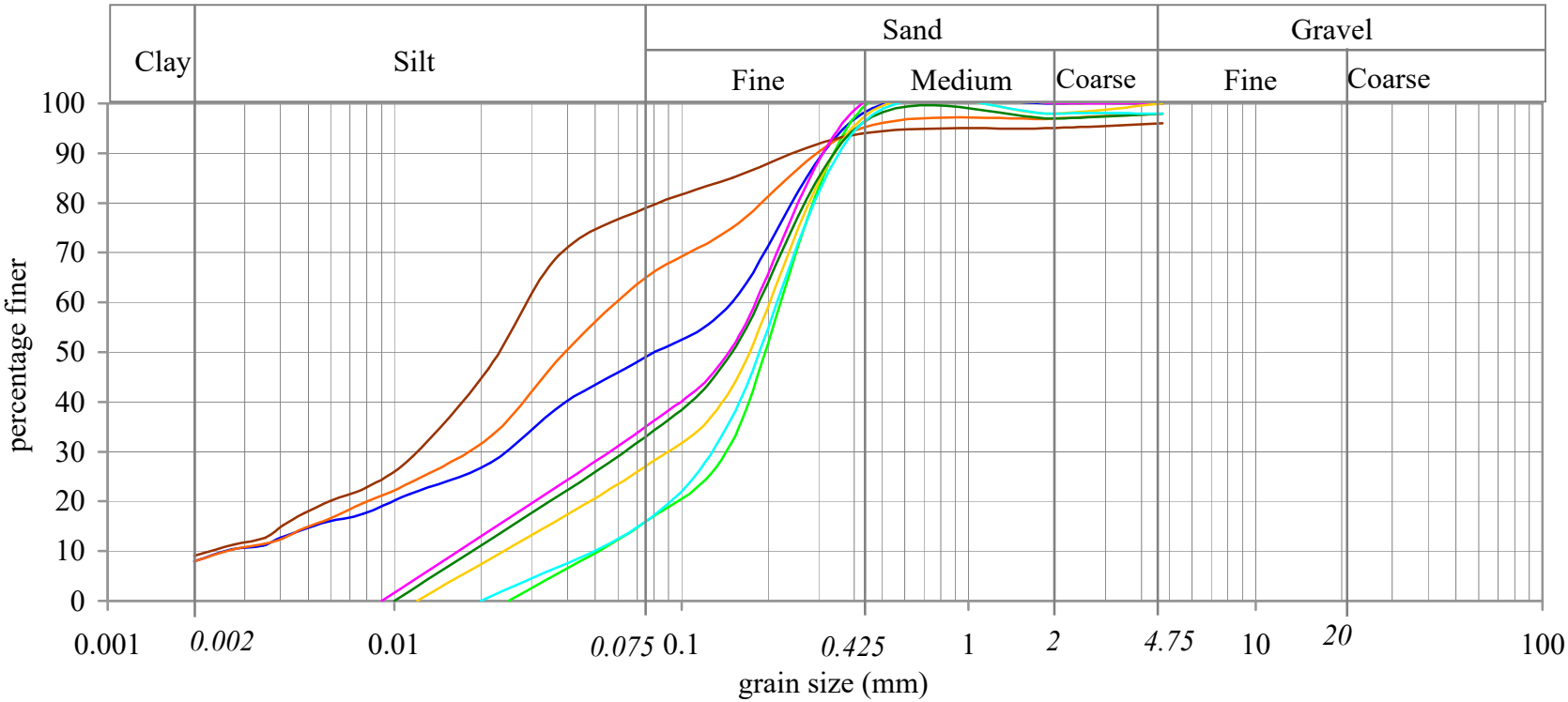
Job No. : G(D)4556

Sheet No. : 6ba

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	21	20.4	Clayey silty sand	0	51	41	8	0.15	0.0025	60.0
	21	23.4	Clayey sandy silt with gravel	2	33	57	8	0.06	0.0026	23.1
	21	26.4	Sand with silt	0	84	16	0	0.23	0.051	4.5
	21	30	Clayey sandy silt with gravel	4	17	70	9	0.029	0.0022	13.2
	22	1	Silty sand	0	65	35	0	0.19	0.017	11.2
	22	2	Silty sand	0	73	27	0	0.21	0.023	9.1
	22	3	Silty sand witih gravel	2	65	33	0	0.18	0.019	9.5
	22	4	Sand with silt and gravel	2	82	16	0	0.21	0.051	4.1

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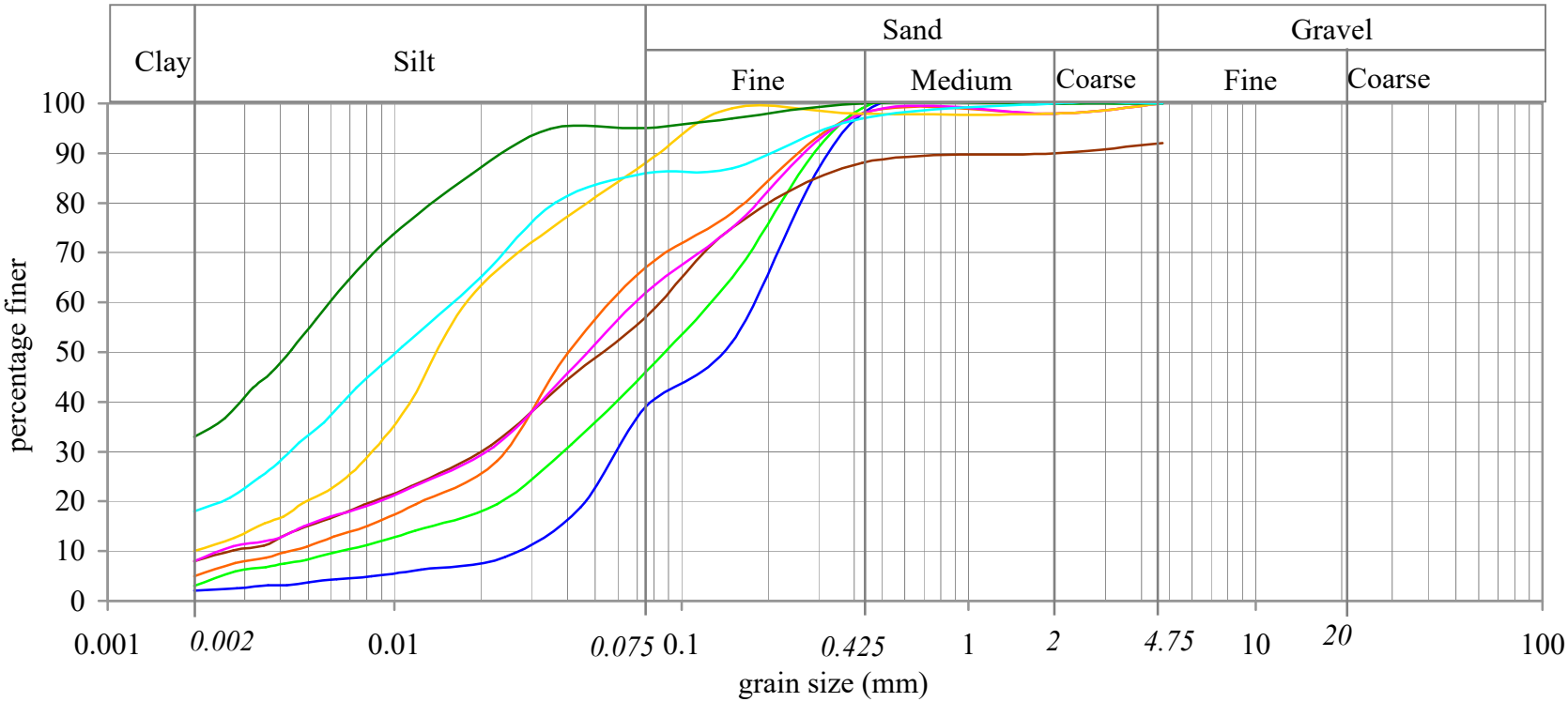
Job No. : G(D)4556

Sheet No. : 6bb

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	22	5	Clayey silty sand	0	61	37	2	0.19	0.025	7.6
	22	6	Clayey sandy silt	0	33	62	5	0.055	0.0045	12.2
	22	7	Clayey silty sand	0	54	43	3	0.13	0.0065	20.0
	22	8	Clayey sandy silt with gravel	8	35	49	8	0.081	0.0025	32.4
	22	9	Clayey sandy silt	0	38	54	8	0.071	0.0022	32.3
	22	10	Clayey sandy silt	0	12	78	10	0.017	0.002	8.5
	22	12	Sandy clayey silt	0	5	62	33	0.0059	-	-
	22	13.5	Sandy clayey silt	0	14	68	18	0.017	-	-

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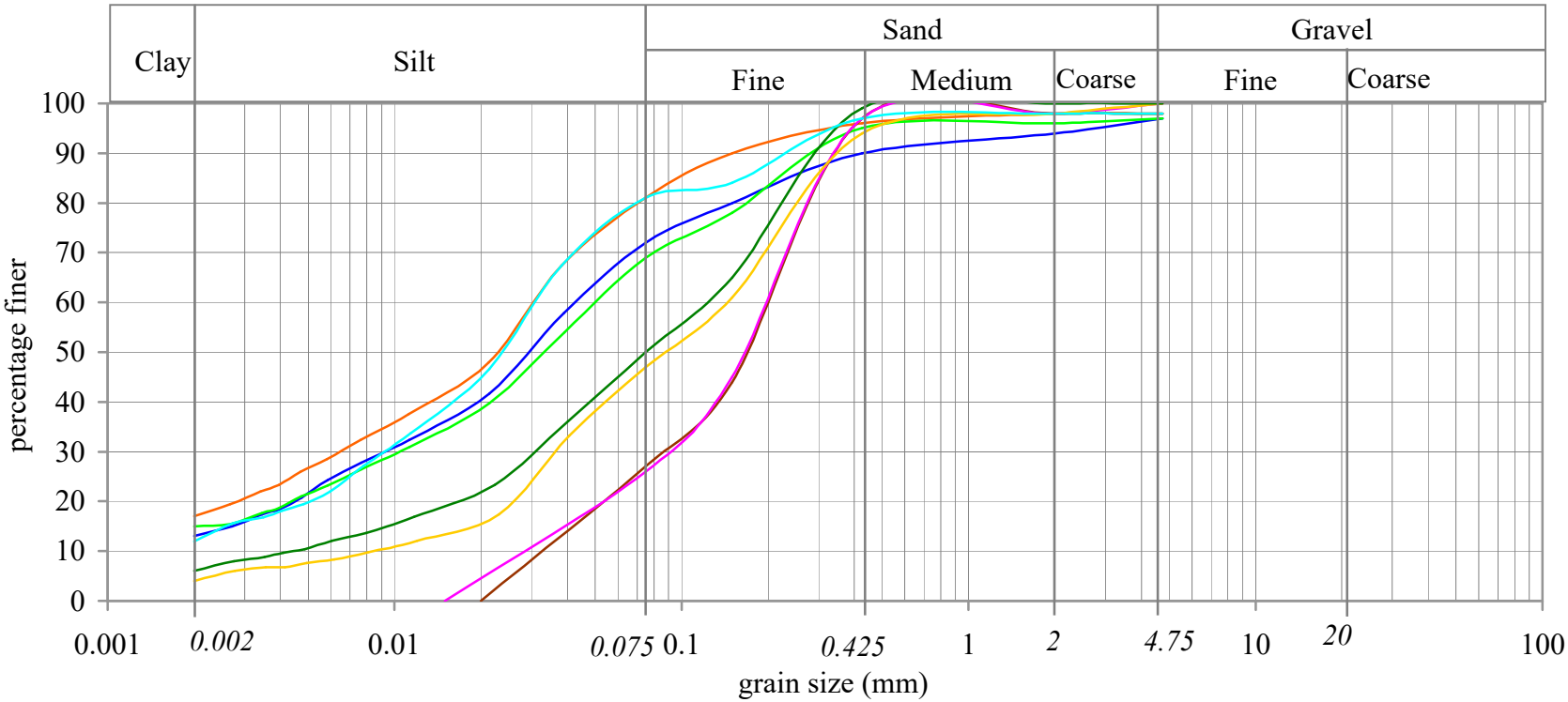
Job No. : G(D)4556

Sheet No. : 6bc

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	22	15	Clayey sandy silt with gravel	3	25	59	13	0.041	-	-
	22	16.5	Clayey sandy silt with gravel	2	17	64	17	0.041	-	-
	22	18	Clayey sandy silt with gravel	3	28	54	15	0.05	-	-
	22	19.5	Silty sand with gravel	2	71	27	0	0.2	0.032	6.3
	22	21	Silty sand	0	74	26	0	0.2	0.028	7.1
	22	24	Clayey silty sand	0	53	43	4	0.15	0.0081	18.5
	22	27	Clayey silty sand	0	50	44	6	0.13	0.0041	31.7
	22	30	Clayey sandy silt with gravel	2	17	69	12	0.03	-	-

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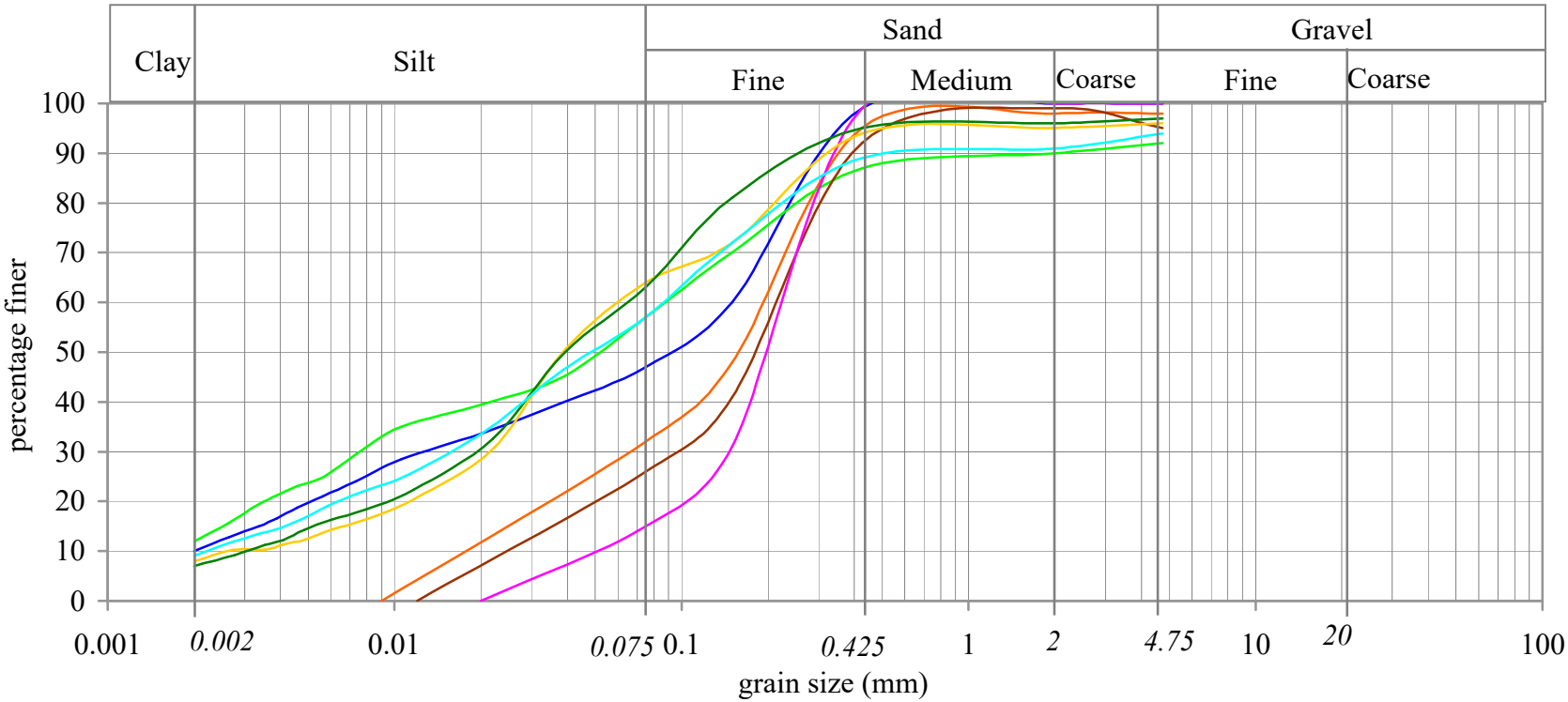
Job No. : G(D)4556

Sheet No. : 6bd

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	23	1	Clayey silty sand	0	53	37	10	0.15	0.002	75.0
	23	2	Silty sand with gravel	2	66	32	0	0.19	0.019	10.0
	23	3	Clayey sandy silt witih gravel	8	35	45	12	0.089	-	-
	23	4	Silty sand with gravel	5	69	26	0	0.21	0.025	8.4
	23	5	Sand with silt	0	85	15	0	0.22	0.051	4.3
	23	6	Clayey sandy silt witih gravel	4	32	56	8	0.061	0.0025	24.4
	23	7	Clayey sandy silt witih gravel	3	34	56	7	0.065	0.0029	22.4
	23	8	Clayey sandy silt witih gravel	6	37	48	9	0.085	0.0022	38.6

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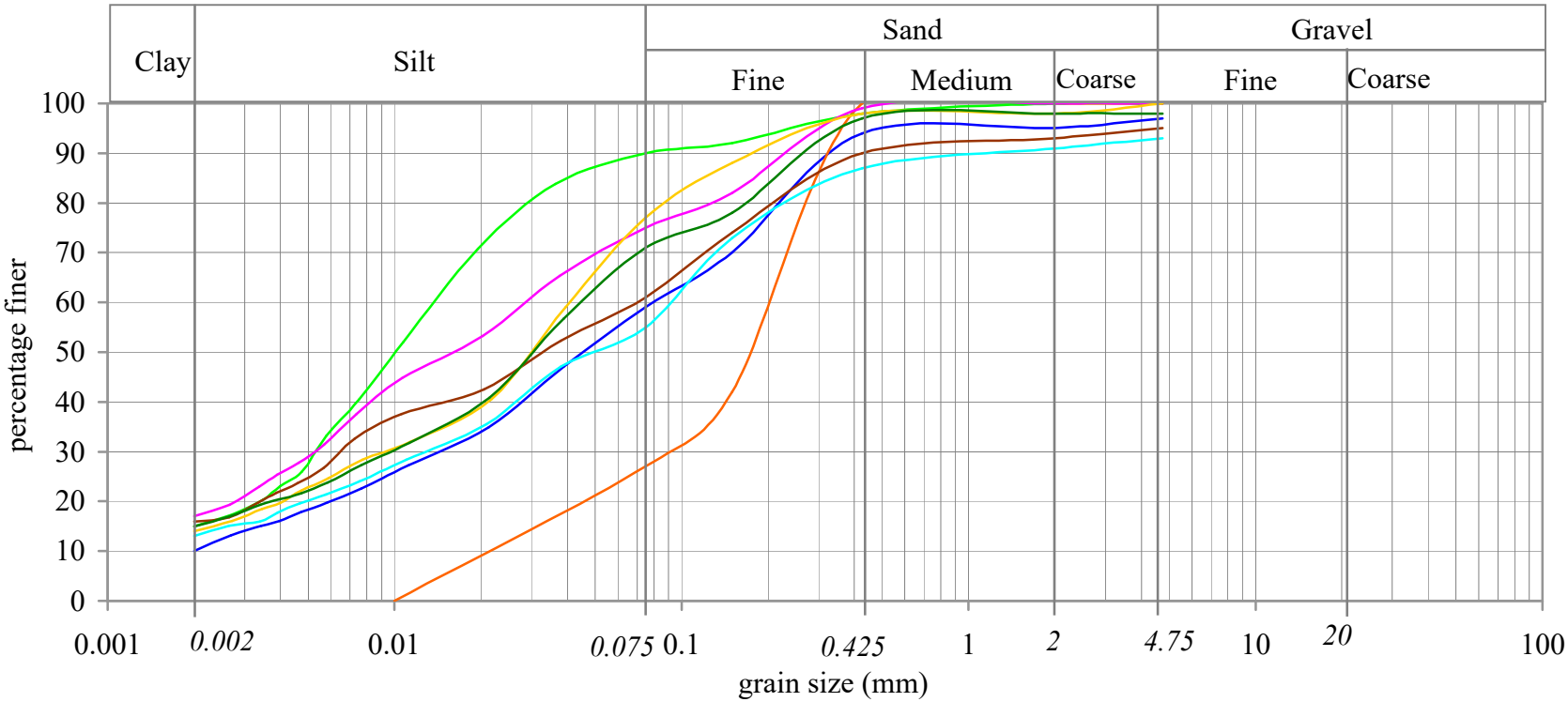
Job No. : G(D)4556

Sheet No. : 6be

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	23	9	Clayey sandy silt with gravel	3	38	49	10	0.081	0.002	40.5
	23	10	Silty sand	0	73	27	0	0.21	0.021	10.0
	23	11.4	Sandy clayey silt	0	10	75	15	0.014	-	-
	23	12.9	Clayey sandy silt with gravel	5	34	45	16	0.071	-	-
	23	14.4	Clayey sandy silt	0	25	58	17	0.028	-	-
	23	15.9	Clayey sandy silt	0	23	63	14	0.041	-	-
	23	17.4	Clayey sandy silt with gravel	2	27	56	15	0.045	-	-
	23	18.9	Clayey sandy silt with gravel	7	38	42	13	0.09	-	-

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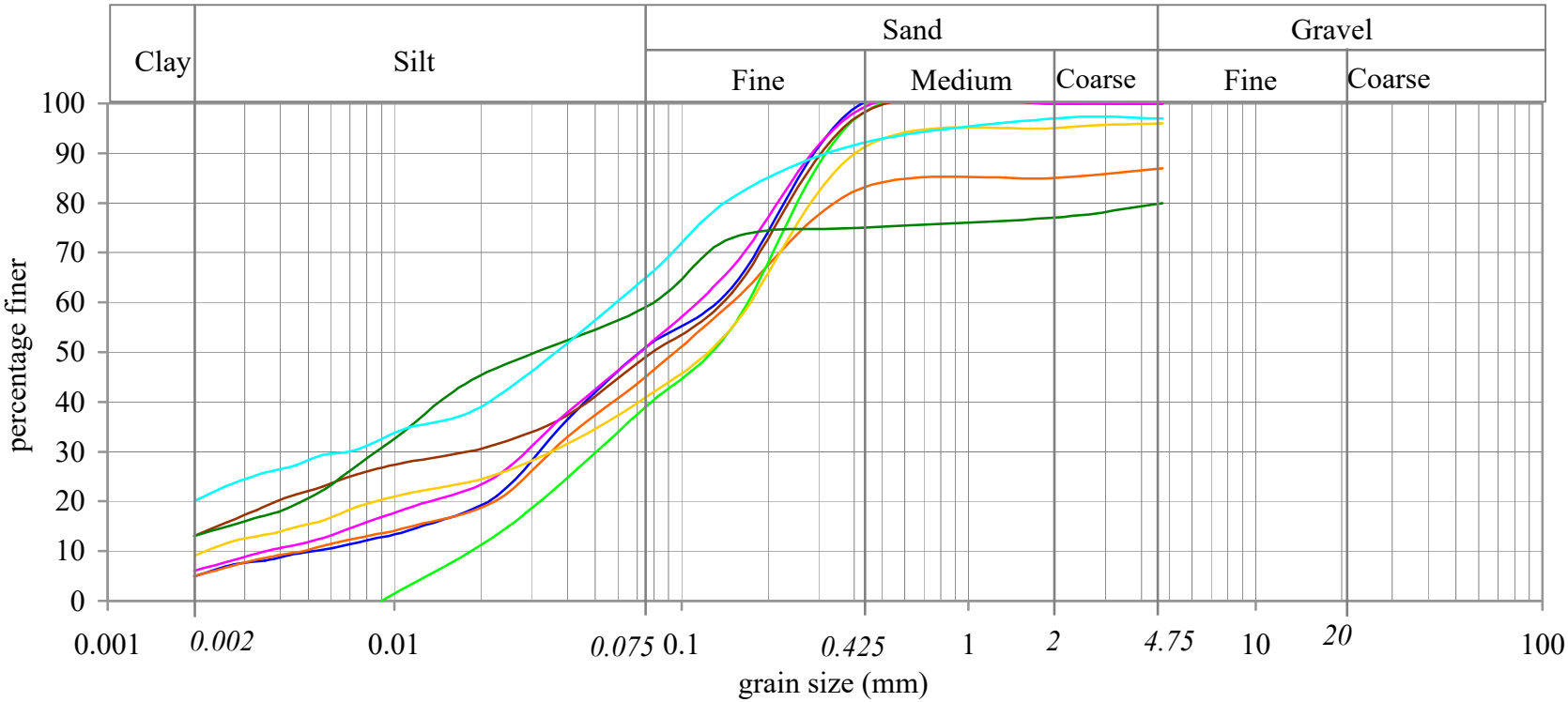
Job No. : G(D)4556

Sheet No. : 6bf

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	23	20.4	Clayey silty sand	0	49	46	5	0.15	0.0045	33.3
	23	23.4	Clayey silty sand with gravel	13	42	40	5	0.15	0.0032	46.9
	23	26.4	Silty sand	0	61	39	0	0.17	0.019	8.9
	23	30	Clayey silty sand	0	51	36	13	0.15	-	-
	24	1	Clayey silty sand	0	49	45	6	0.12	0.12	1.0
	24	2	Clayey silty sand	4	55	32	9	0.17	0.0022	77.3
	24	3	Clayey sandy silt with gravel	20	21	46	13	0.081	-	-
	24	4	Clayey sandy silt with gravel	3	32	45	20	0.06	-	-

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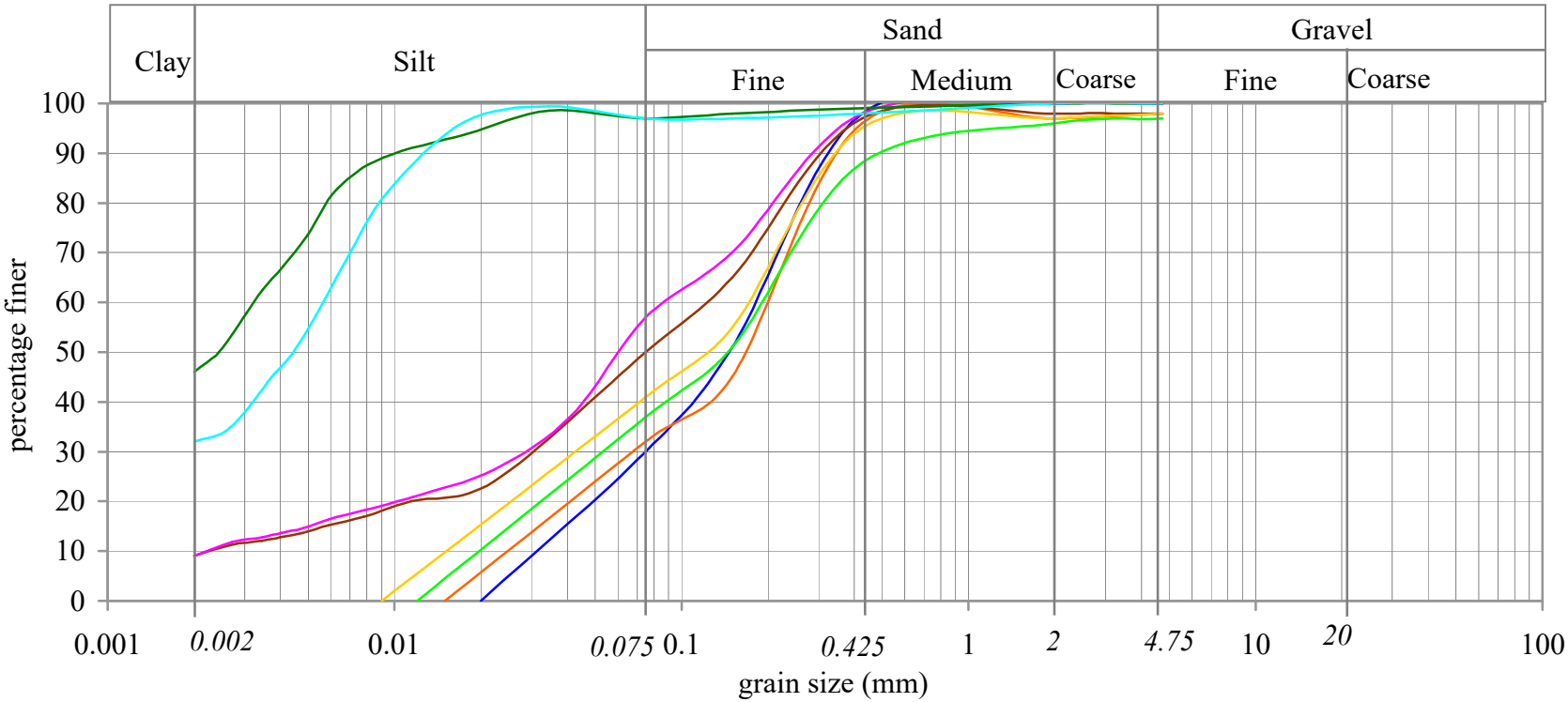
Job No. : G(D)4556

Sheet No. : 6bg

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	24	5	Silty sand	0	70	30	0	0.18	0.031	5.8
	24	6	Silty sand with gravel	2	66	32	0	0.2	0.025	8.0
	24	7	Silty sand with gravel	3	60	37	0	0.19	0.02	9.5
	24	8	Clayey silty sand with gravel	2	48	41	9	0.12	0.0022	54.5
	24	9	Clayey sandy silt	0	43	48	9	0.085	0.0022	38.6
	24	10	Silty sand with gravel	2	57	41	0	0.17	0.015	11.3
	24	12	Sandy clayey silt	0	3	51	46	0.0031	-	-
	24	13.5	Sandy clayey silt	0	3	65	32	0.0055	-	-

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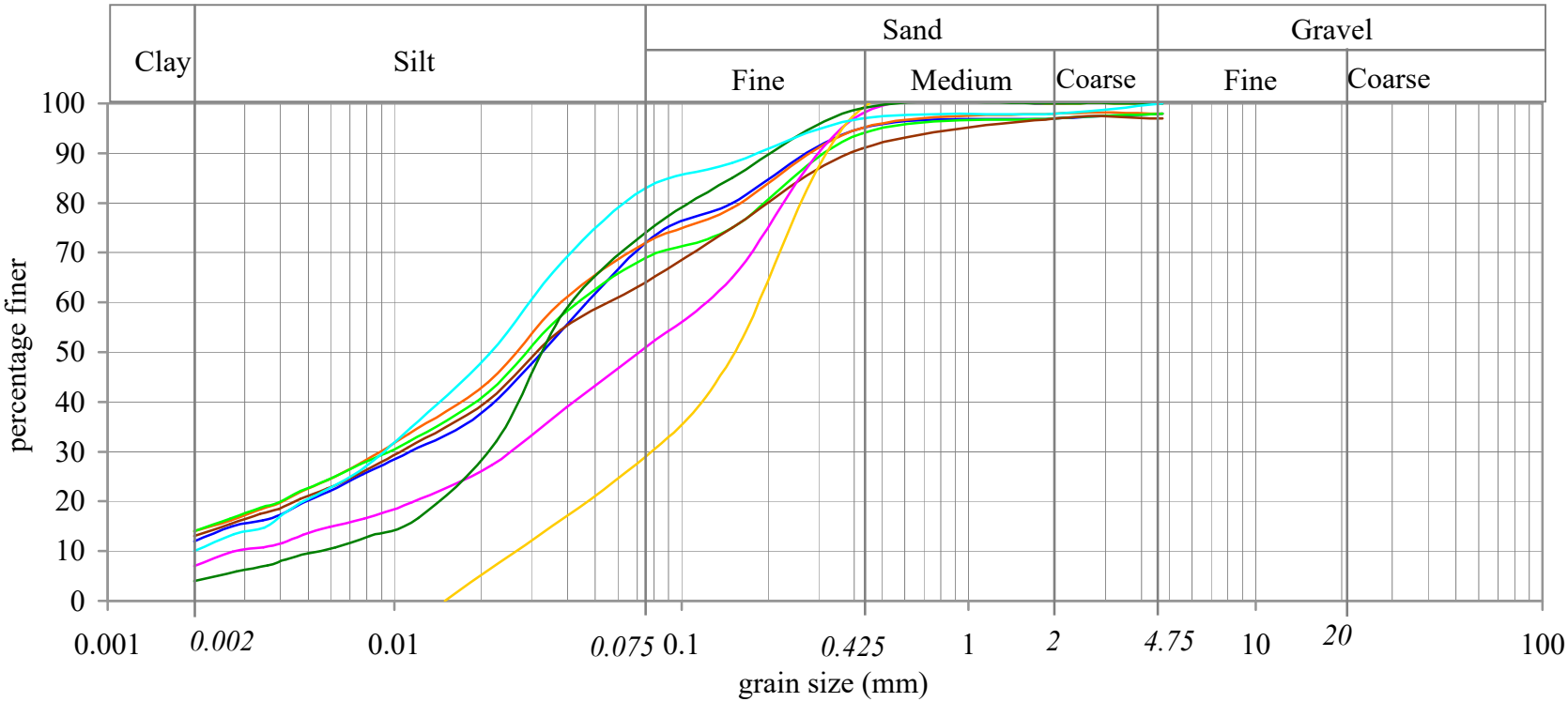
Job No. : G(D)4556

Sheet No. : 6bh

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	24	15	Clayey sandy silt with gravel	2	26	60	12	0.041	-	-
	24	16.5	Clayey sandy silt with gravel	2	26	58	14	0.038	-	-
	24	18	Clayey sandy silt with gravel	2	29	55	14	0.042	-	-
	24	19.5	Clayey sandy silt with gravel	3	33	51	13	0.055	-	-
	24	21	Clayey silty sand	0	49	44	7	0.12	0.0028	42.9
	24	24	Silty sand	0	71	29	0	0.19	0.026	7.3
	24	27	Clayey sandy silt	0	26	70	4	0.041	0.0051	8.0
	24	30	Clayey sandy silt	0	17	73	10	0.019	0.002	9.5

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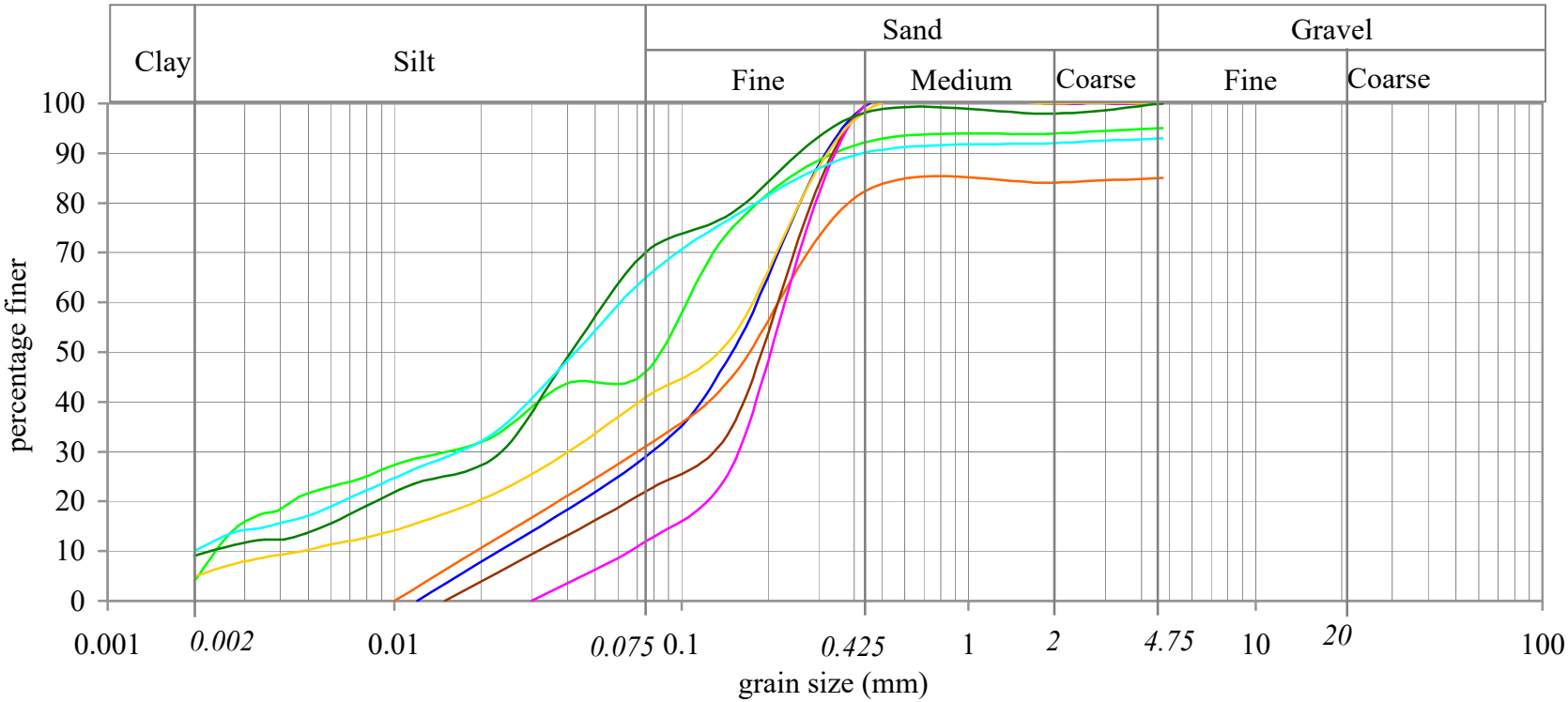
Job No. : G(D)4556

Sheet No. : 6bi

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	25	1	Silty sand	0	71	29	0	0.18	0.021	8.6
	25	2	Silty sand with gravel	15	54	31	0	0.23	0.019	12.1
	25	3	Clayey sandy silt with gravel	5	49	42	4	0.089	0.002	44.5
	25	4	Silty sand	0	78	22	0	0.22	0.031	7.1
	25	5	Sand with silt	0	88	12	0	0.23	0.065	3.5
	25	6	Clayey silty sand	0	59	36	5	0.17	0.0045	37.8
	25	7	Clayey sandy silt	0	30	61	9	0.042	0.0022	19.1
	25	8	Clayey sandy silt with gravel	7	28	55	10	0.061	0.002	30.5

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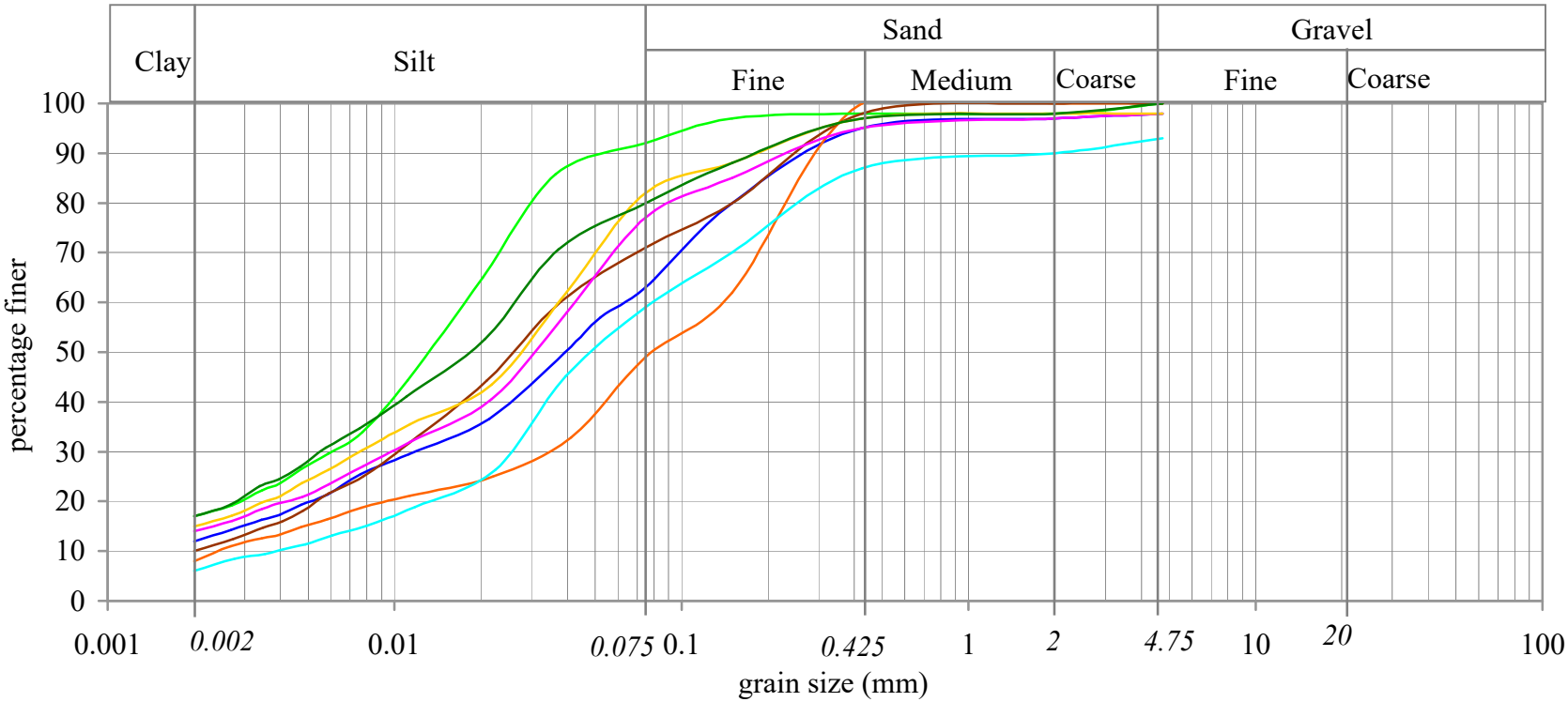
Job No. : G(D)4556

Sheet No. : 6bj

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	25	9	Clayey sandy silt with gravel	2	35	51	12	0.065	-	-
	25	10	Clayey silty sand	0	51	41	8	0.15	0.0022	68.2
	25	11.4	Sandy clayey silt	0	8	75	17	0.018	-	-
	25	12.9	Clayey sandy silt	0	29	61	10	0.036	0.002	18.0
	25	14.4	Clayey sandy silt with gravel	2	21	63	14	0.038	-	-
	25	15.9	Clayey sandy silt with gravel	2	16	67	15	0.038	-	-
	25	17.4	Clayey sandy silt	0	20	63	17	0.026	-	-
	25	18.9	Clayey sandy silt with gravel	7	34	53	6	0.078	0.0038	20.5

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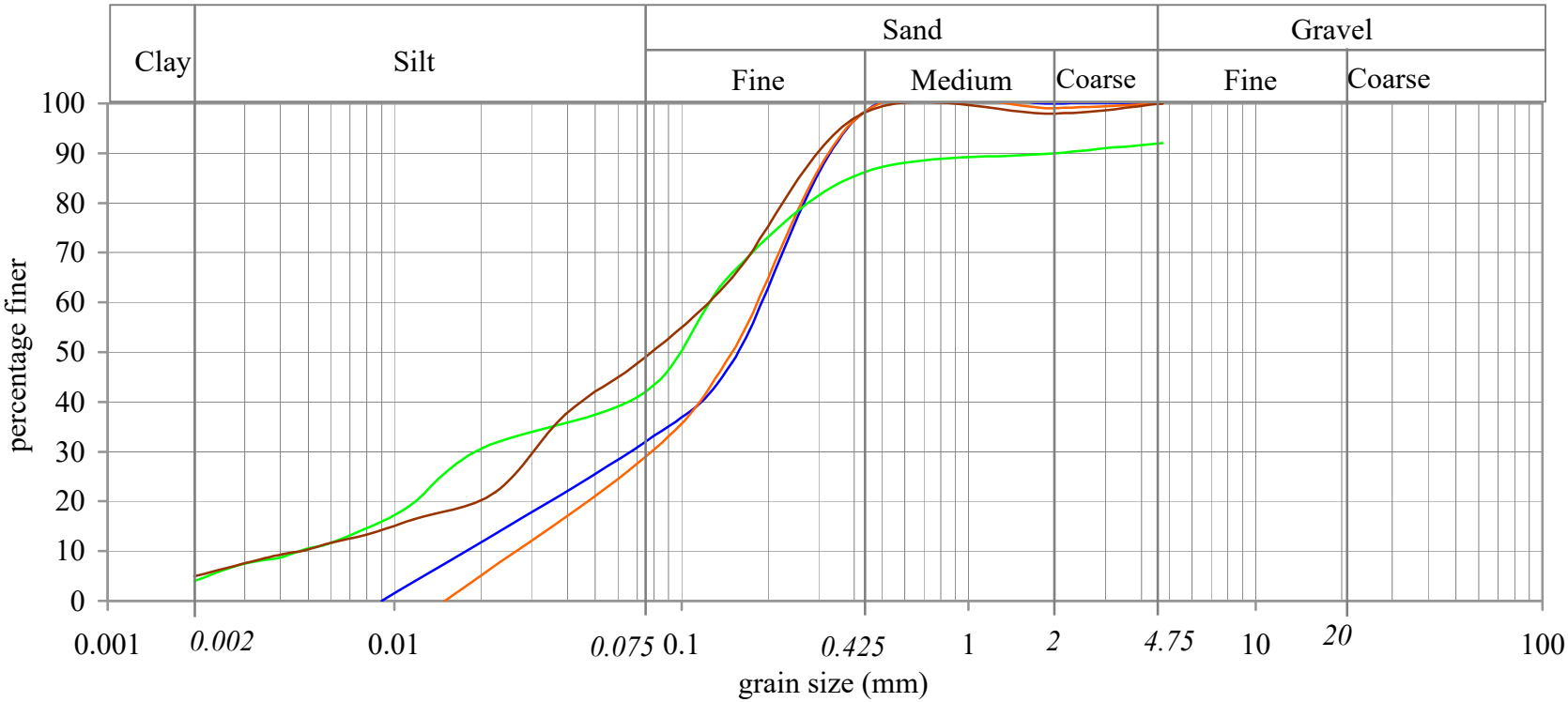
Sheet No. : 6bk

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Bore hole	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	25	20.4	Silty sand	0	68	32	0	0.19	0.018	10.6
	25	23.4	Silty sand	0	71	29	0	0.18	0.026	6.9
	25	26.4	Clayey silty sand with gravel	8	50	38	4	0.13	0.0045	28.9
	25	30	Clayey silty sand	0	51	44	5	0.13	0.0045	28.9

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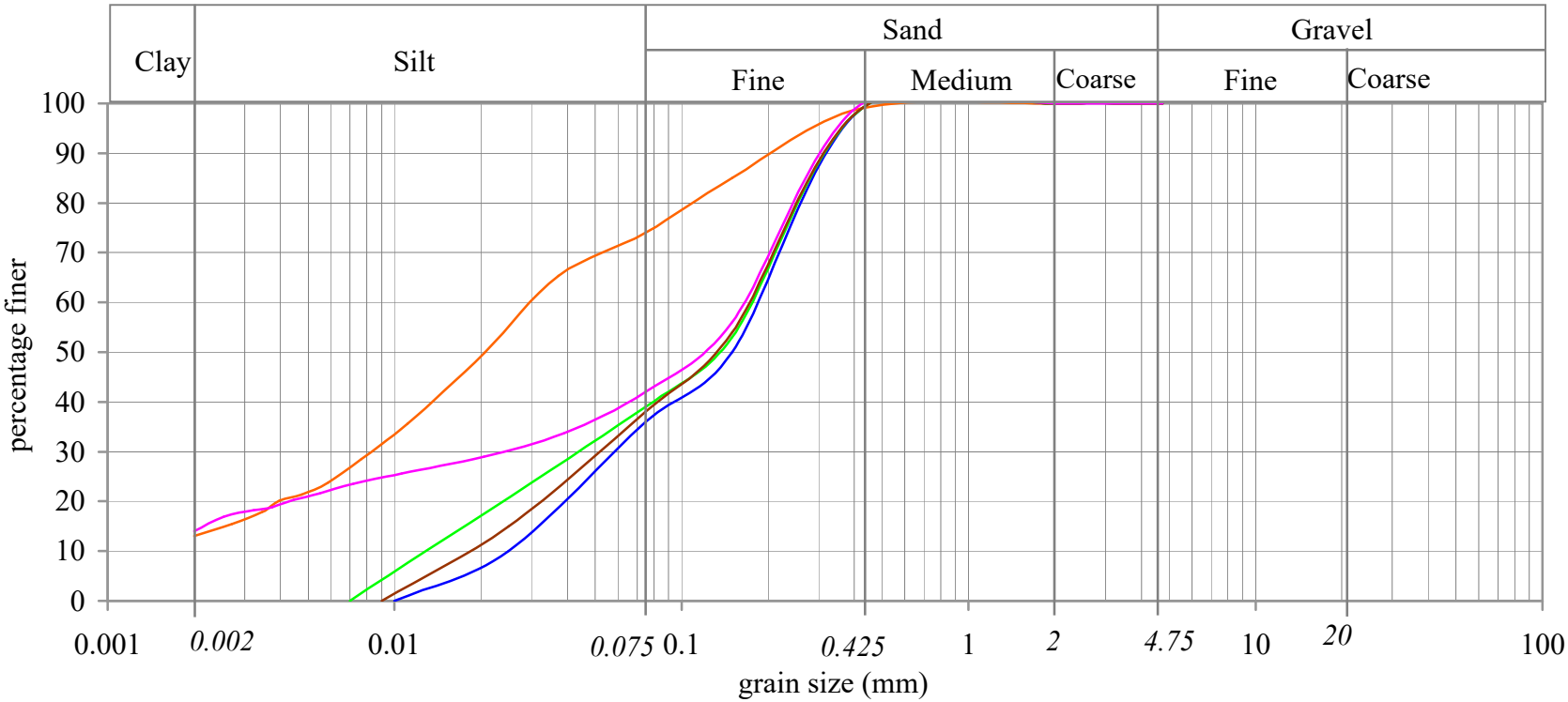
Sheet No. : 6bl

Grain Size Analysis Curves *(refer paragraph no. 7.3.1)*



Line Style	Proctor	Depth (m)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	d_{60}	d_{10}	C_u
	1		Silty sand	0	64	36	0	0.18	0.024	7.5
	2		Clayey sandy silt	0	26	61	13	0.029	-	-
	3		Silty sand	0	61	39	0	0.17	0.013	13.1
	4		Silty sand	0	62	38	0	0.17	0.018	9.4
	5		Clayey silty sand	0	58	28	14	0.16	-	-