



DESIGN AND CONSTRUCTION OF CIVIL, STRUCTURES AND TRACK WORKS, INVOLVING FORMATION IN EMBANKMENT /CUTTING, BALLAST ON FORMATION, TRACK WORKS, BRIDGES, STRUCTURES, BUILDINGS, YARDS & INTEGRATION WITH INDIAN RAILWAY'S EXISTING RAILWAY SYSTEM AND TESTING & COMMISSIONING ON DESIGN-BUILD LUMP SUM BASIS OF KHURJA-PILKHANI SECTION (APPROXIMATELY 222 ROUTE KM OF SINGLE LINE) OF EASTERN DEDICATED FREIGHT CORRIDOR

**CIVIL, STRUCTURES AND TRACK WORKS**

CONTRACT PACKAGE NO: 303

ICB No.: **HQ/EN/EC/D-B/Khurja-Pilkhani Section**

**PART-4 – REFERENCE DOCUMENT**

**GEOTECH DATA – VOLUME 3**

**KHURJA TO PILKHANI**

**From Km. 1367.0 (ALJN-GZB) to Km 187.5 (SRE-UMB)**

**GEO TECH DATA**

**(MEERUT DETOUR)**

**PART. 2/3  
(VOLUME B)**

**EMPLOYER: DEDICATED FREIGHT CORRIDOR CORPORATION OF INDIA LTD  
(A GOVERNMENT OF INDIA ENTERPRISE)  
MINISTRY OF RAILWAYS**

**COUNTRY: INDIA**

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# **ANNEXURE C –LAB TEST RESULTS**

**CHEMICAL TEST RESULTS**

**SOIL-WATER EXTRACT :**

Borehole No.	Depth, (m)	Sulphate Content (SO <sub>3</sub> ), %	Chloride Content, %	pH Value
1	2.50	0.08	0.06	7.9

**REQUIREMENTS FOR CONCRETE EXPOSED TO SULPHATE ATTACK AS  
PER IS : 456-2000, CLAUSES 8.2.2.4 AND 9.1.2, TABLE 4, PAGE-19**

Class	Concentration of Sulphates, expressed as SO <sub>3</sub>	
	In-Soil-Water Extract (Total) Percent	In Groundwater (mg/l)
1	Traces (<0.2)	Less than 300
2	0.2 to 0.5	300-1200
3	0.5 to 1.0	1200-2500
4	1.0 to 2.0	2500-5000
5	> 2.0	> 5000

**CLASSIFICATION OF CHLORIDE CONDITIONS IN GROUNDWATER\***

Classification	Chloride Limits	
	Temperate Climate	Tropical Climate
Negligible	0-2000 ppm	Not Applicable
Moderate	2000-10,000 ppm	0-2000 ppm
High	More than 10,000 ppm	2000-20,000 ppm
Very High	Generally not applicable	Only if considerably in excess of 20,000 ppm

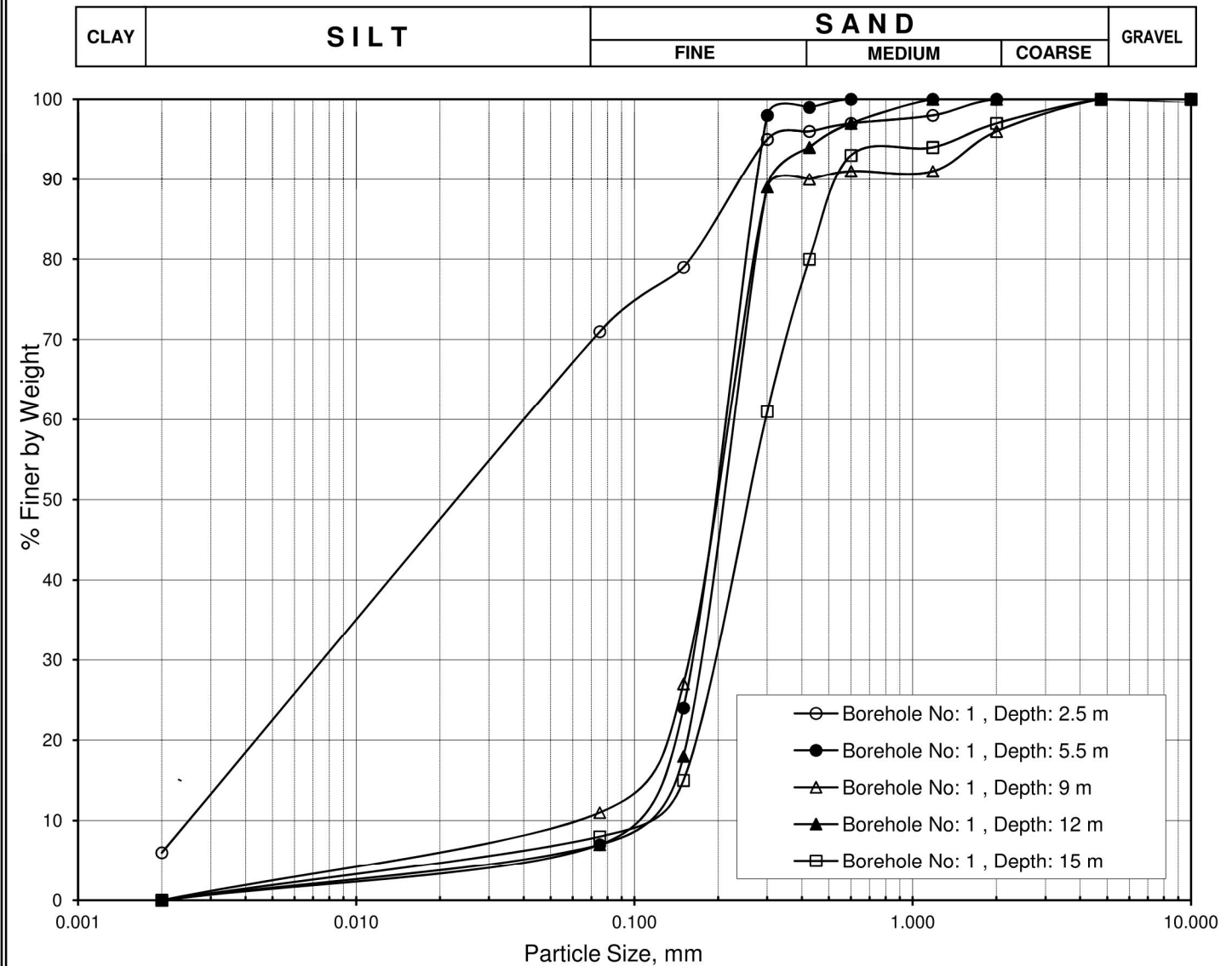
\*SOURCE : INSTITUTION OF CIVIL ENGINEERS, LONDON (1979)

Location: Village Road at Ch 0+650 km

**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS			
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay
BH-1	2.50	Sandy silt (ML-CL)	0	29	65	6
BH-1	5.50	Fine sand (SP-SM)	0	93	7	0
BH-1	9.00	Fine sand (SP-SM)	0	89	11	0
BH-1	12.00	Fine sand (SP-SM)	0	93	7	0
BH-1	15.00	Fine sand (SP-SM)	0	92	8	0



Location: Village Road at Ch. 0+650 km

**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**

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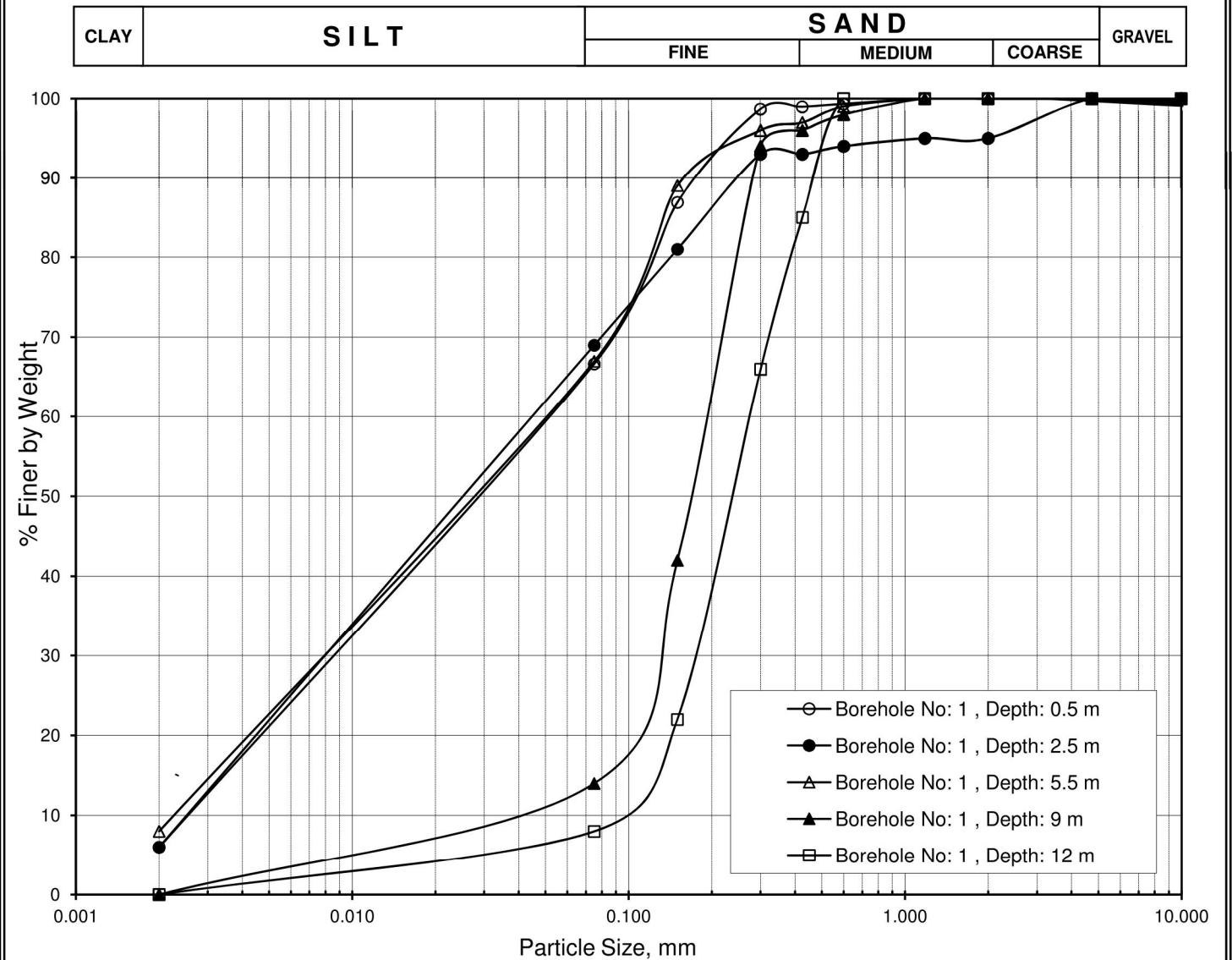
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Location: Major Bridge at Nala Ch. : 1+172 km

**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	0.50	Sandy silt (ML-CL)	0	33	61	6			
BH-1	2.50	Sandy silt (ML-CL)	0	31	63	6			
BH-1	5.50	Sandy silt (ML-CL)	0	33	59	8			
BH-1	9.00	Silty Fine sand (SM)	0	86	14	0			
BH-1	12.00	Fine sand (SP-SM)	0	92	8	0			

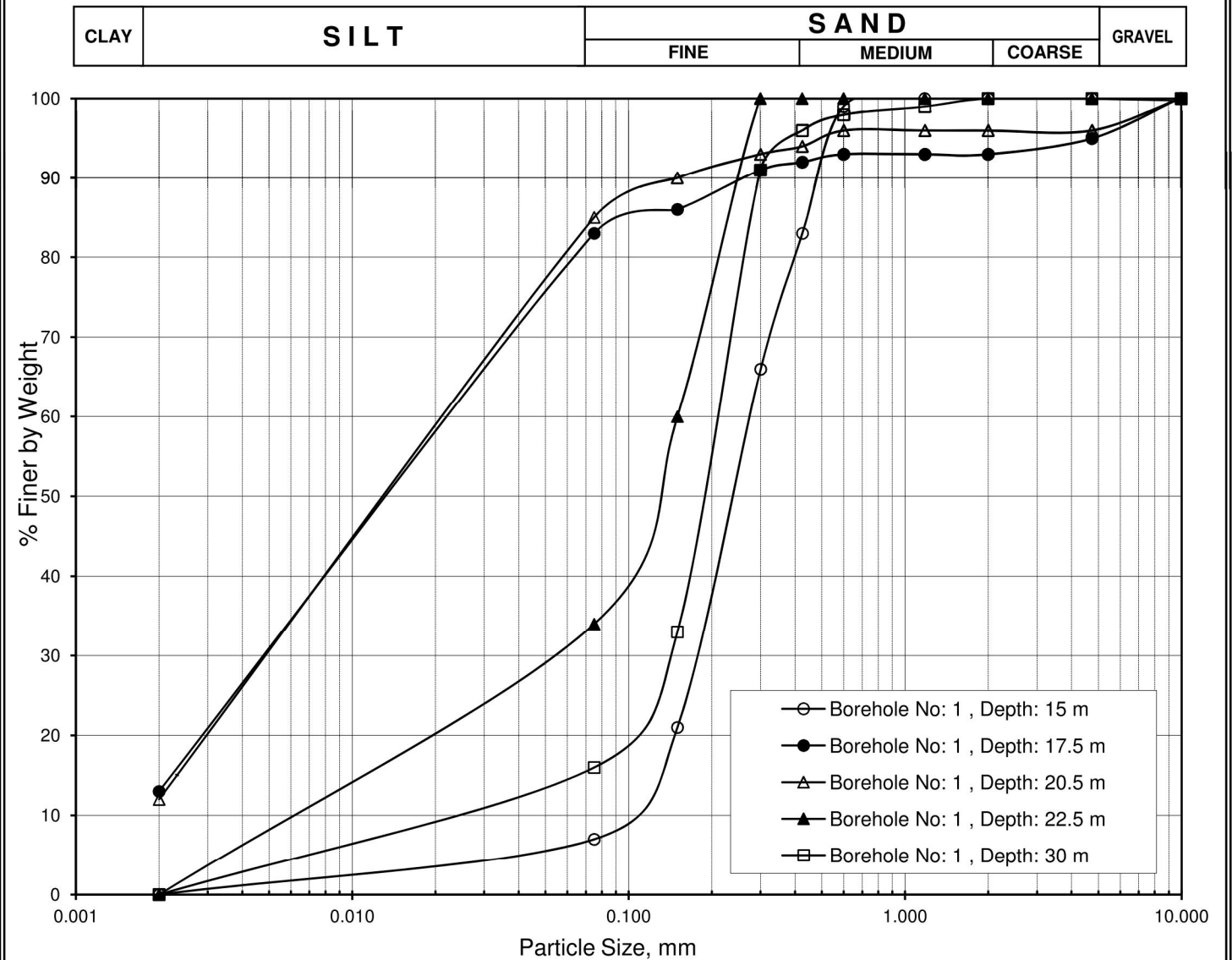


Location: Major Bridge at Nala Ch.: 1+172 km

**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	15.00	Fine sand (SP-SM)	0	93	7	0			
BH-1	17.50	Clayey silt (CL)	5	12	70	13			
BH-1	20.50	Clayey silt (CL)	4	11	73	12			
BH-1	22.50	Silty Fine sand (SM)	0	66	34	0			
BH-1	30.00	Silty Fine sand (SM)	0	84	16	0			



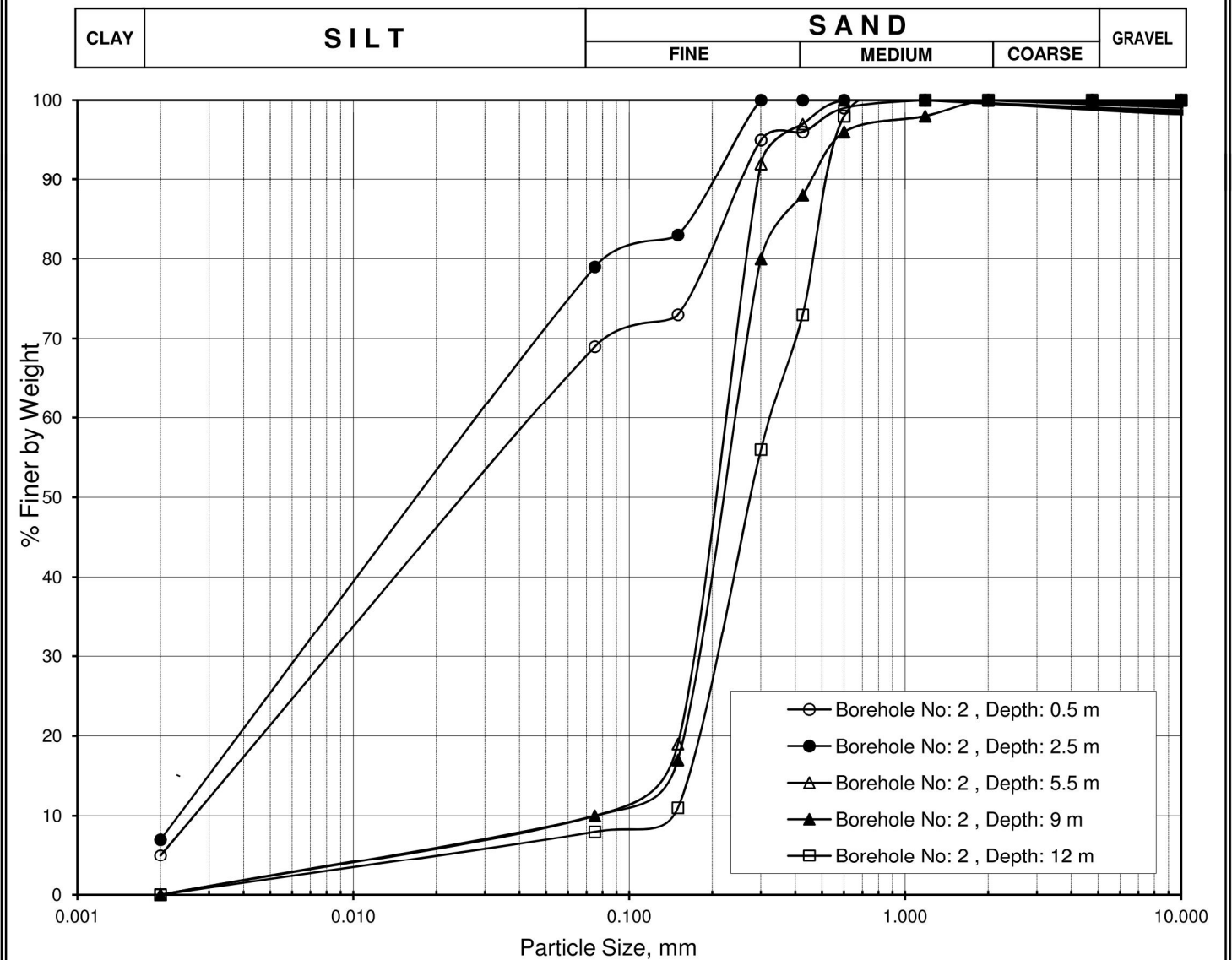
Location: Major Bridge at Nala Ch.: 1+172 km

**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**



**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-2	0.50	Sandy silt (ML-CL)	0	31	64	5			
BH-2	2.50	Sandy silt (ML-CL)	0	21	72	7			
BH-2	5.50	Fine sand (SP-SM)	0	90	10	0			
BH-2	9.00	Fine sand (SP-SM)	0	90	10	0			
BH-2	12.00	Fine sand (SP-SM)	0	92	8	0			

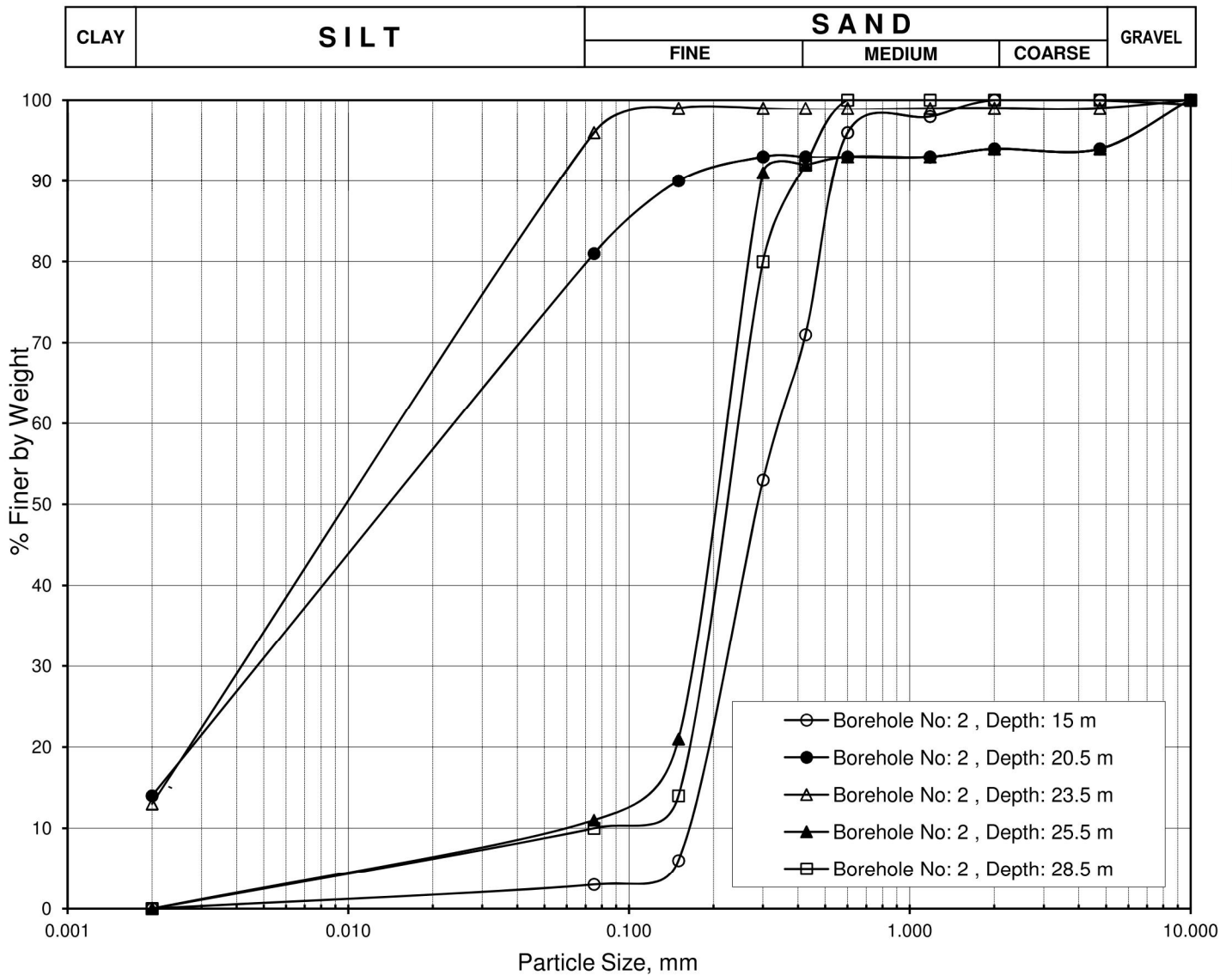


Location: Major Bridge at Nala Ch.: 1+172 km

**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-2	15.00	Fine sand (SP)	0	97	3	0			
BH-2	20.50	Clayey silt (CL)	6	13	67	14			
BH-2	23.50	Clayey silt (CL)	1	3	83	13			
BH-2	25.50	Fine sand (SP-SM)	6	83	11	0			
BH-2	28.50	Fine sand (SP-SM)	0	90	10	0			



Location: Major Bridge at Nala Ch.: 1+172 km

**CHEMICAL TEST RESULTS**

**SOIL-WATER EXTRACT :**

Borehole No.	Depth, (m)	Sulphate Content (SO <sub>3</sub> ), %	Chloride Content, %	pH Value
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**CLASSIFICATION OF CHLORIDE CONDITIONS IN GROUNDWATER\***

Classification	Chloride Limits	
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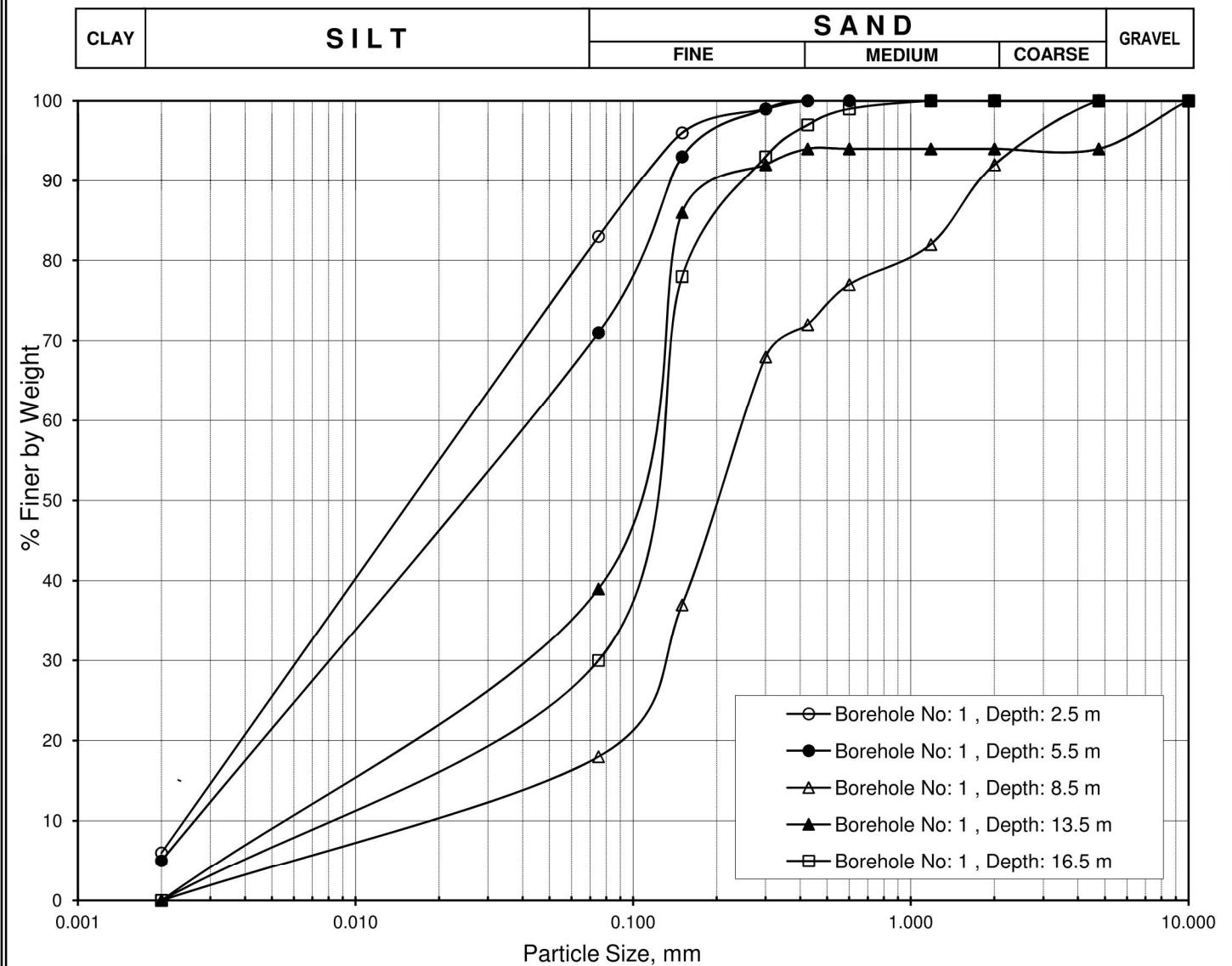
\*SOURCE : INSTITUTION OF CIVIL ENGINEERS, LONDON (1979)

Location: Major Bridge at State Highway Ch. : 2+109 km

**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	2.50	Sandy silt (ML-CL)	0	17	77	6			
BH-1	5.50	Sandy silt (ML-CL)	0	29	66	5			
BH-1	8.50	Silty Fine sand (SM)	0	82	18	0			
BH-1	13.50	Silty Fine sand (SM)	6	55	39	0			
BH-1	16.50	Silty Fine sand (SM)	0	70	30	0			

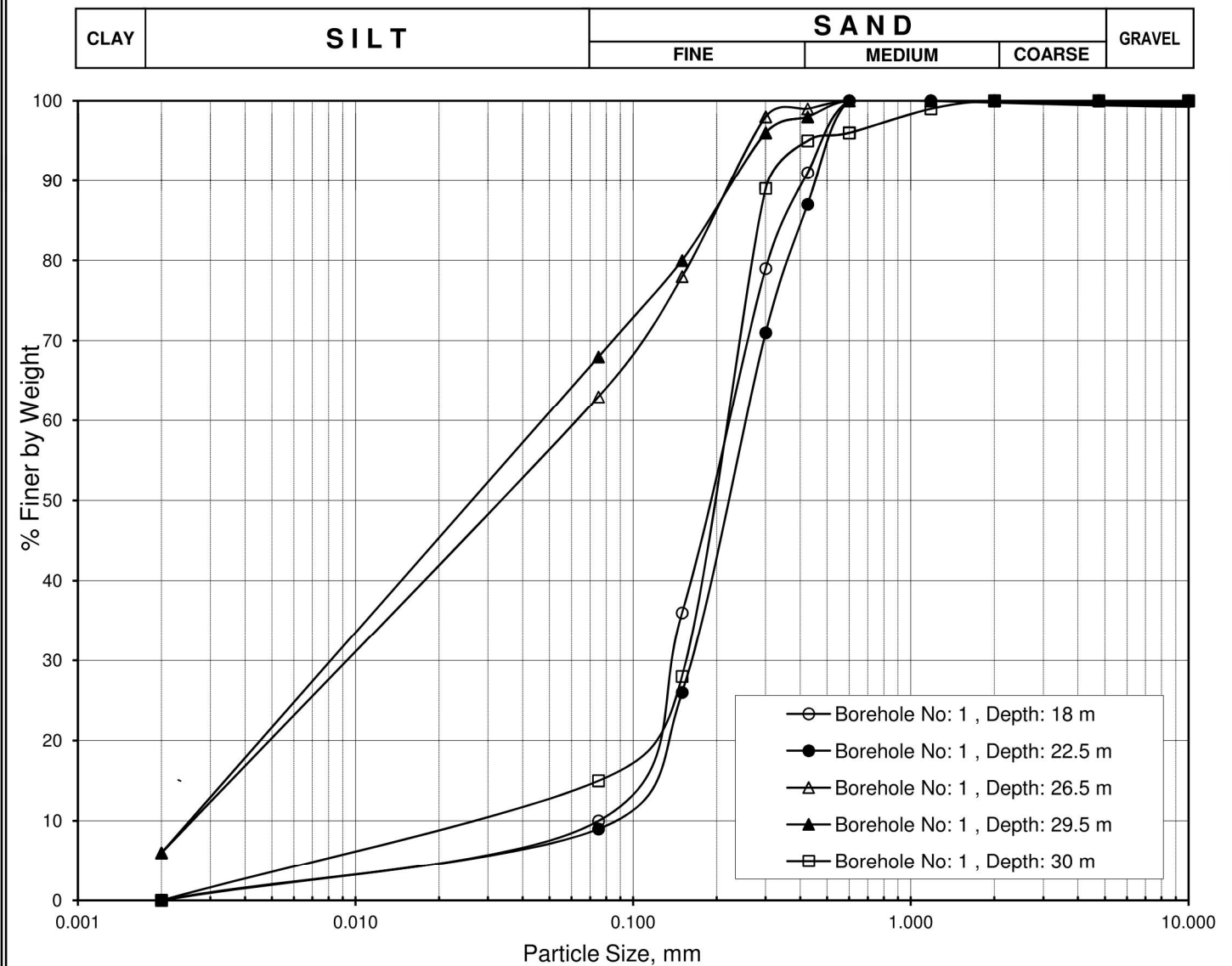


Location: Major Bridge at Nala Ch.: 2+109 km

**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	18.00	Fine sand (SP-SM)	0	90	10	0			
BH-1	22.50	Fine sand (SP-SM)	0	91	9	0			
BH-1	26.50	Sandy silt (ML-CL)	0	37	57	6			
BH-1	29.50	Sandy silt (ML-CL)	0	32	62	6			
BH-1	30.00	Silty Fine sand (SM)	0	85	15	0			

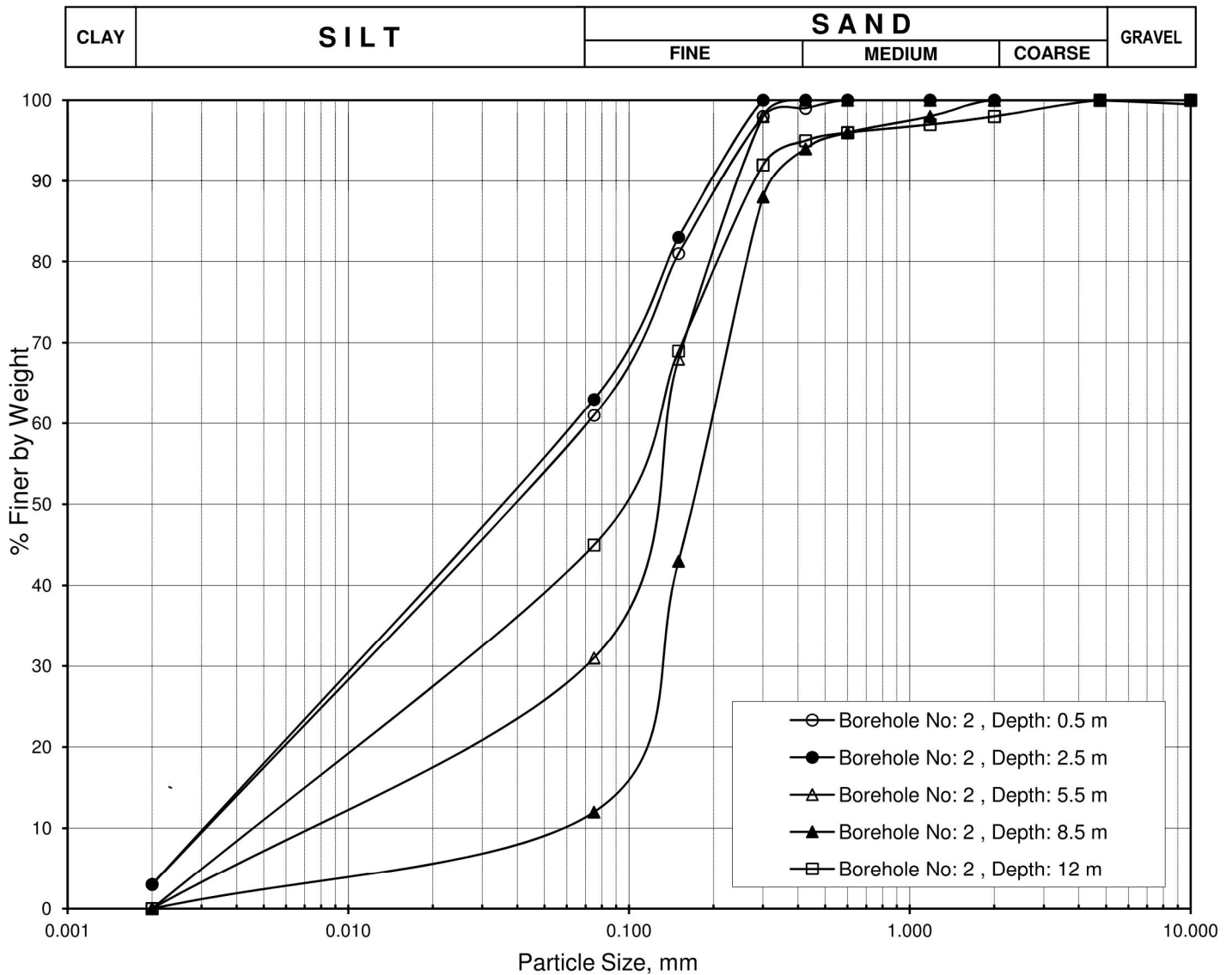


Location: Major Bridge at Nala Ch.: 2+109 km

**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-2	0.50	Sandy Silt (ML)	0	39	58	3			
BH-2	2.50	Sandy Silt (ML)	0	37	60	3			
BH-2	5.50	Silty Fine sand (SM)	0	69	31	0			
BH-2	8.50	Fine sand (SP-SM)	0	88	12	0			
BH-2	12.00	Silty Fine sand (SM)	0	55	45	0			



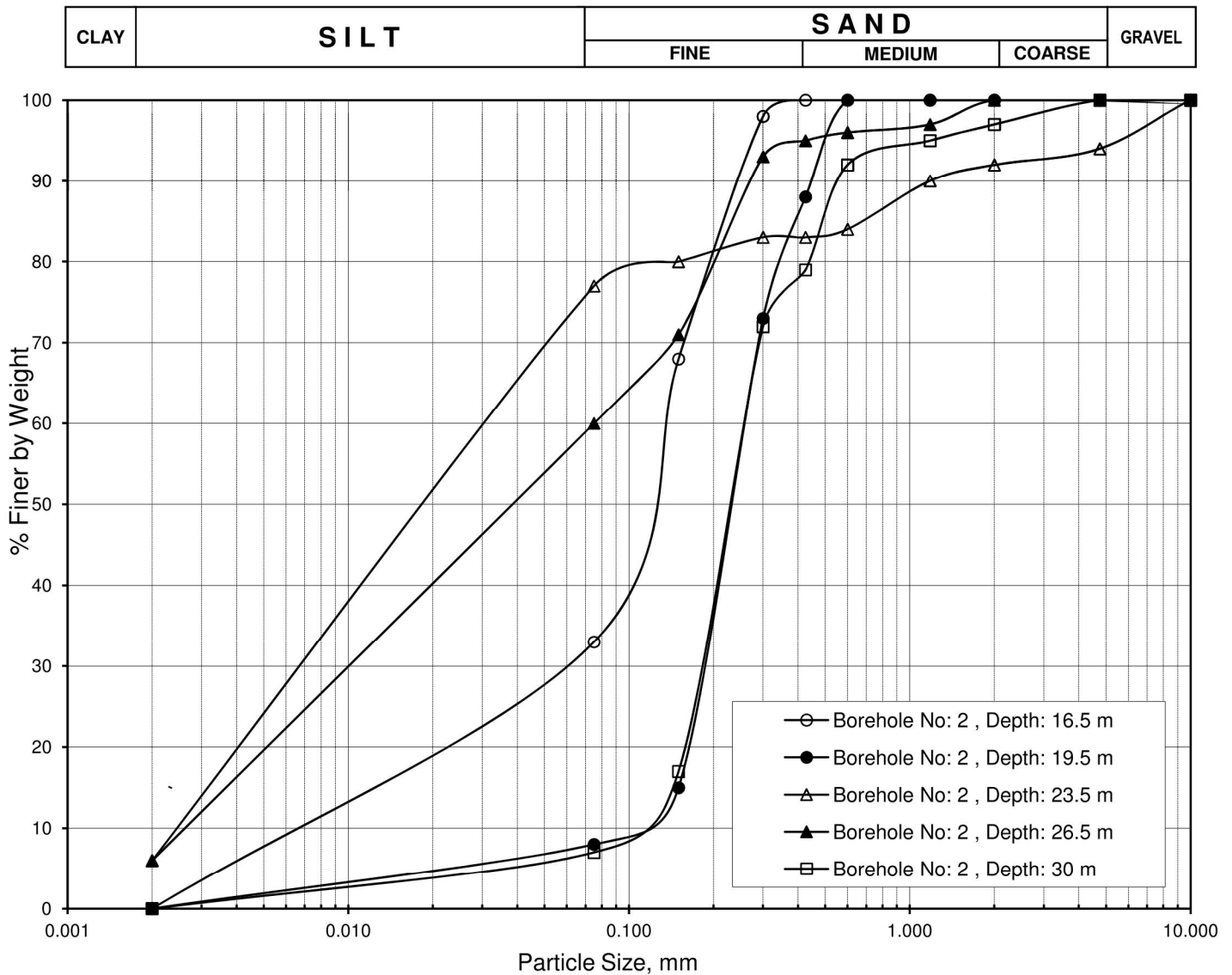
Location: Major Bridge at Nala Ch.: 2+109 km

**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**



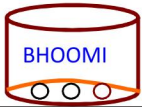
**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-2	16.50	Silty Fine sand (SM)	0	67	33	0			
BH-2	19.50	Fine sand (SP-SM)	0	92	8	0			
BH-2	23.50	Sandy silt (ML-CL)	6	17	71	6			
BH-2	26.50	Sandy silt (ML-CL)	0	40	54	6			
BH-2	30.00	Fine sand (SP-SM)	0	93	7	0			



Location: Major Bridge at Nala Ch.: 2+109 km

**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**



**CHEMICAL TEST RESULTS**

**SOIL-WATER EXTRACT :**

Borehole No.	Depth, (m)	Sulphate Content (SO <sub>3</sub> ), %	Chloride Content, %	pH Value
1	2.50	0.10	0.04	7.6
2	5.50	0.08	0.04	7.6
3	2.50	0.10	0.06	7.5

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 PER IS : 456-2000, CLAUSES 8.2.2.4 AND 9.1.2, TABLE 4, PAGE-19**

Class	Concentration of Sulphates, expressed as SO <sub>3</sub> In-Soil-Water Extract (Total) Percent	In Groundwater (mg/l)
	1	Traces (<0.2)
2	0.2 to 0.5	300-1200
3	0.5 to 1.0	1200-2500
4	1.0 to 2.0	2500-5000
5	> 2.0	> 5000

**CLASSIFICATION OF CHLORIDE CONDITIONS IN GROUNDWATER\***

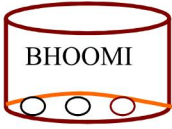
Classification	Chloride Limits	
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Negligible	0-2000 ppm	Not Applicable
Moderate	2000-10,000 ppm	0-2000 ppm
High	More than 10,000 ppm	2000-20,000 ppm
Very High	Generally not applicable	Only if considerably in excess of 20,000 ppm

\*SOURCE : INSTITUTION OF CIVIL ENGINEERS, LONDON (1979)

Location: Ch. : 2+306 km

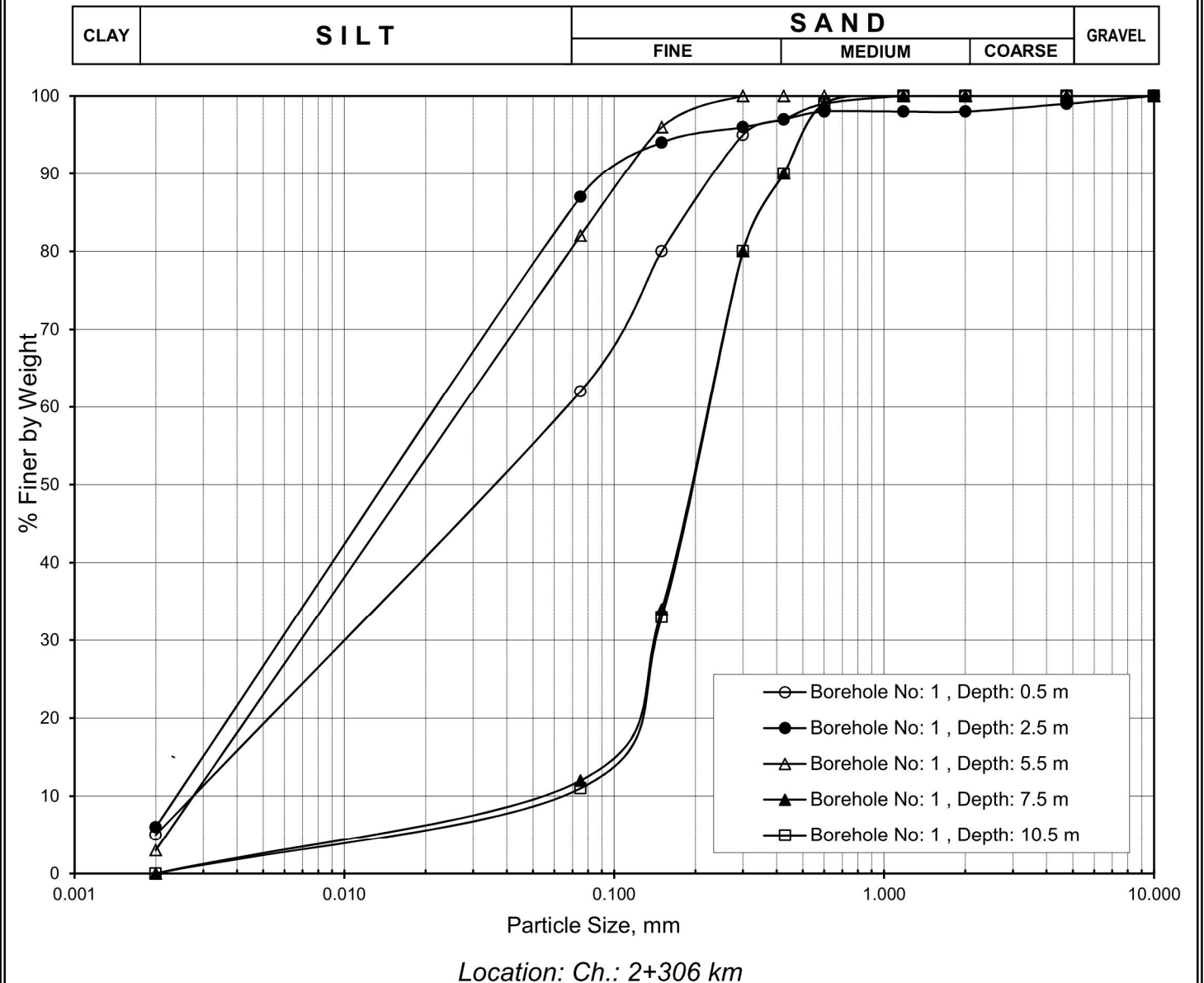
**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**

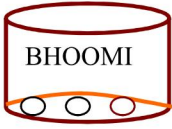




**Grain Size Analysis**

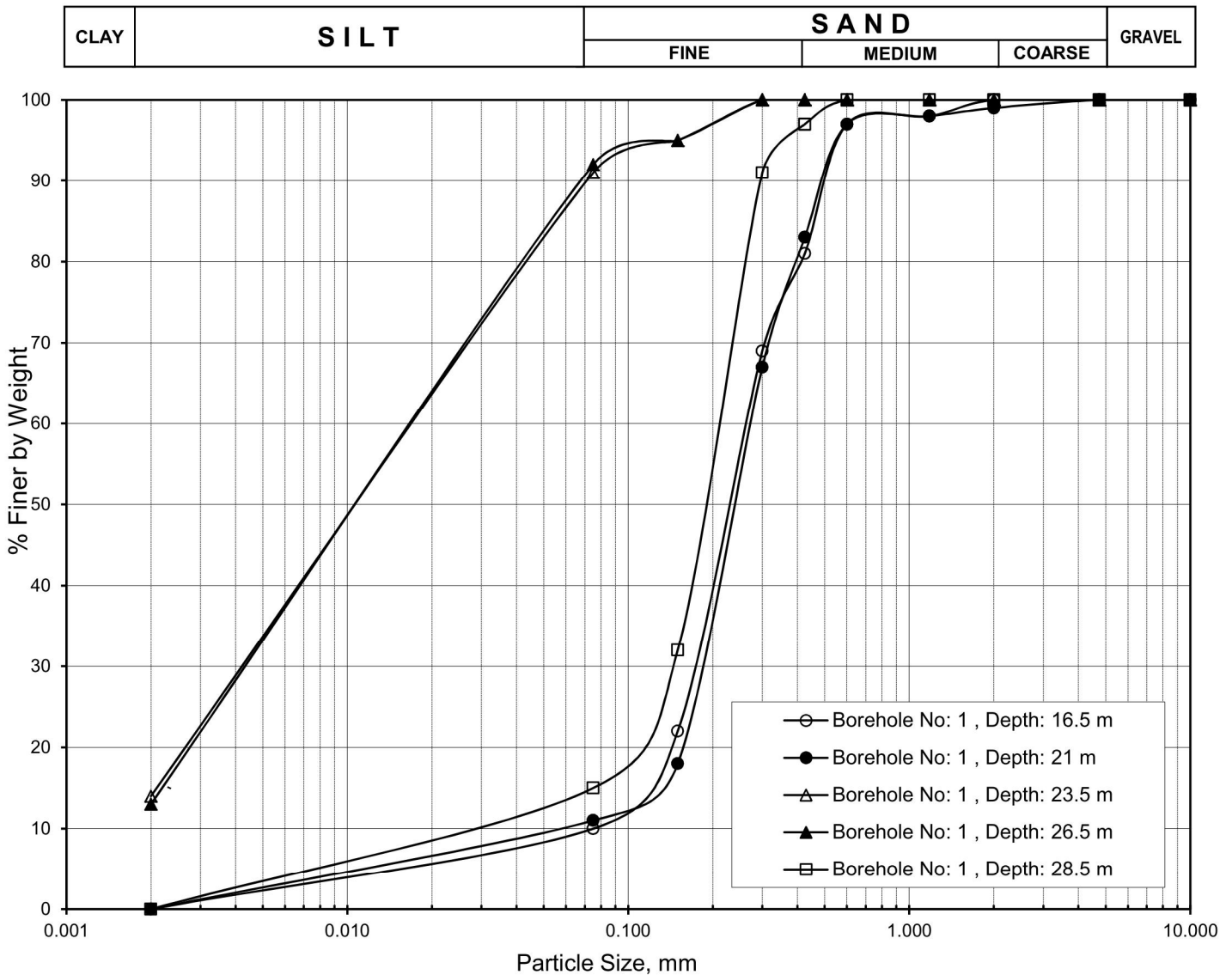
SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	0.50	Sandy silt (ML-CL)	0	38	57	5			
BH-1	2.50	Sandy silt (ML-CL)	1	12	81	6			
BH-1	5.50	Sandy Silt (ML)	0	18	79	3			
BH-1	7.50	Fine sand (SP-SM)	0	88	12	0			
BH-1	10.50	Fine sand (SP-SM)	0	89	11	0			





**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	16.50	Fine sand (SP-SM)	0	90	10	0			
BH-1	21.00	Fine sand (SP-SM)	0	89	11	0			
BH-1	23.50	Clayey silt (CL)	0	9	77	14			
BH-1	26.50	Clayey silt (CL)	0	8	79	13			
BH-1	28.50	Silty Fine sand (SM)	0	85	15	0			

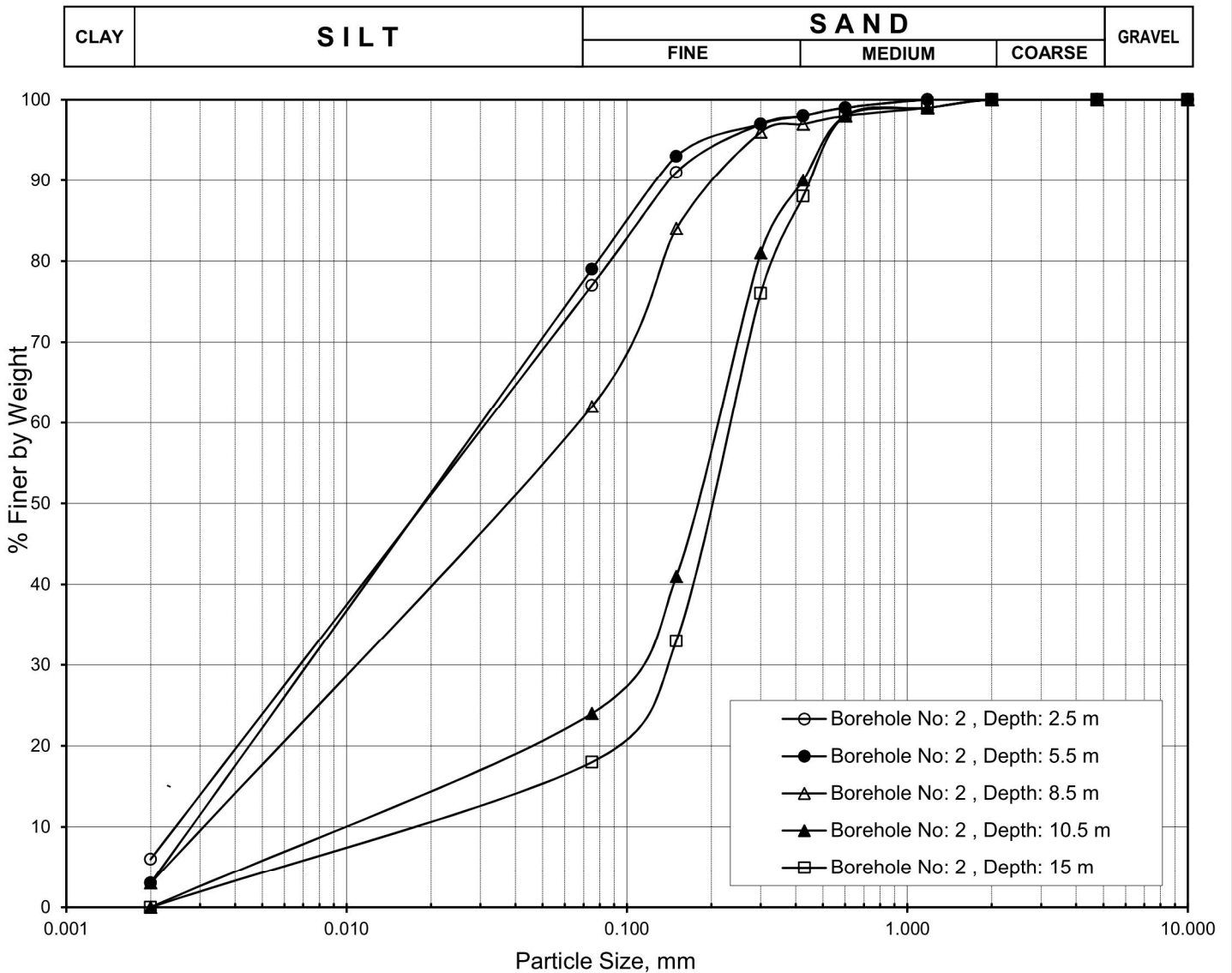


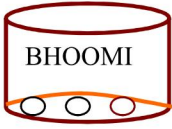
Location: Ch.: 2+306 km



**Grain Size Analysis**

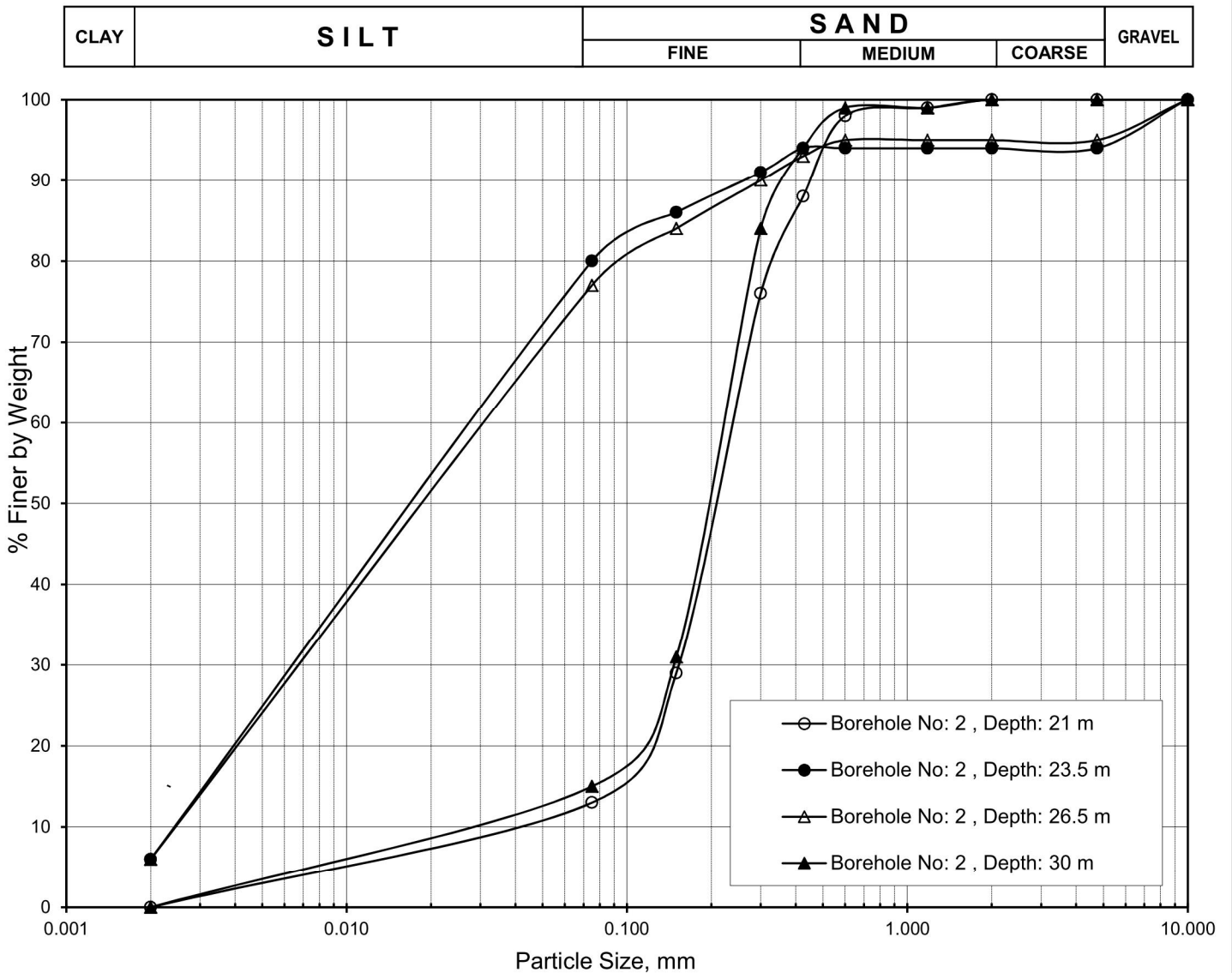
SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-2	2.50	Sandy silt (ML-CL)	0	23	71	6			
BH-2	5.50	Sandy Silt (ML)	0	21	76	3			
BH-2	8.50	Sandy Silt (ML)	0	38	59	3			
BH-2	10.50	Fine sand (SP-SM)	0	76	24	0			
BH-2	15.00	Fine sand (SP-SM)	0	82	18	0			





**Grain Size Analysis**

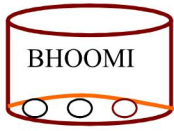
SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-2	21.00	Fine sand (SP-SM)	0	87	13	0			
BH-2	23.50	Sandy silt (ML-CL)	6	14	74	6			
BH-2	26.50	Sandy silt (ML-CL)	5	18	71	6			
BH-2	30.00	Silty Fine sand (SM)	0	85	15	0			



Location: Ch.: 2+306 km

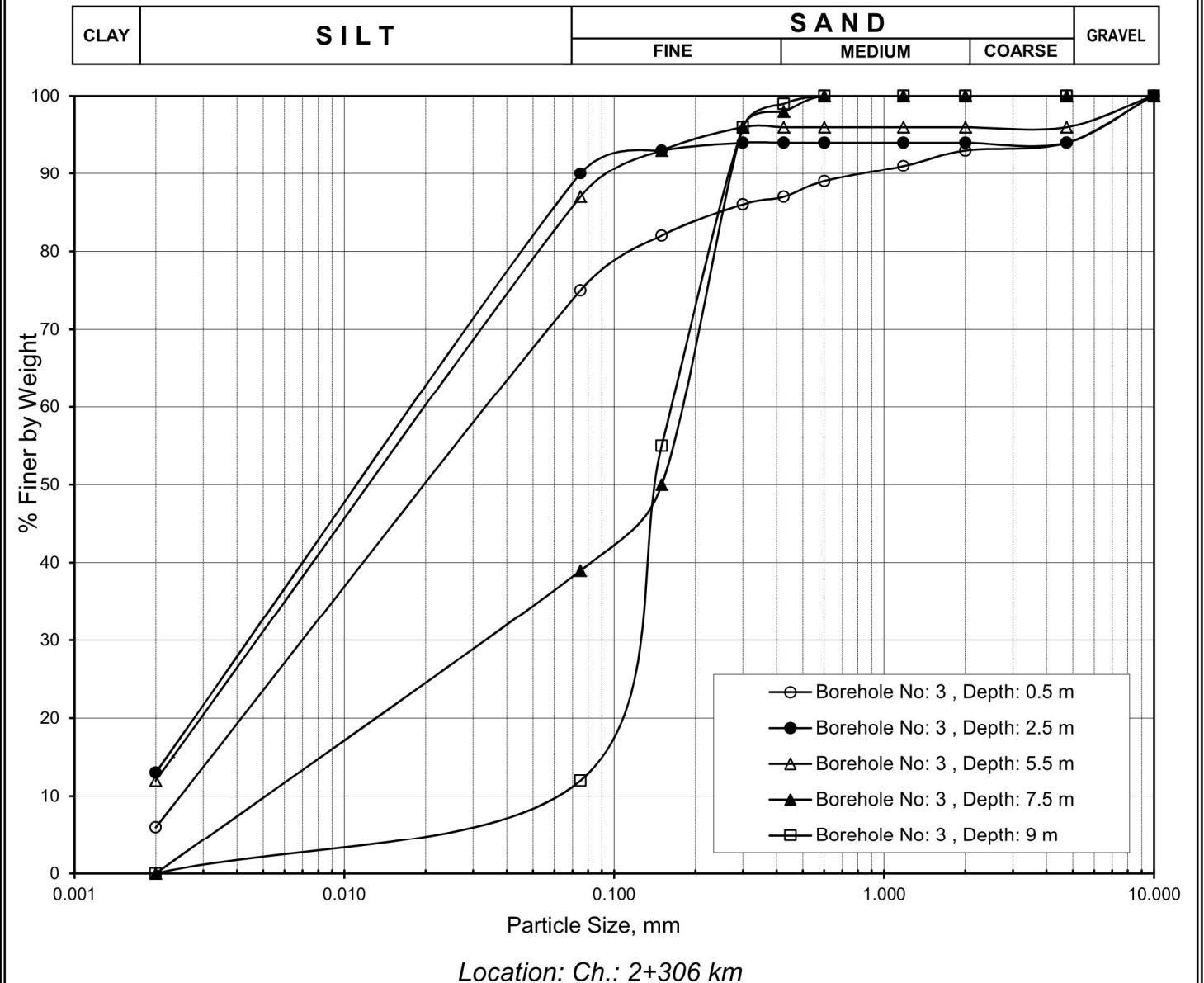
**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**





**Grain Size Analysis**

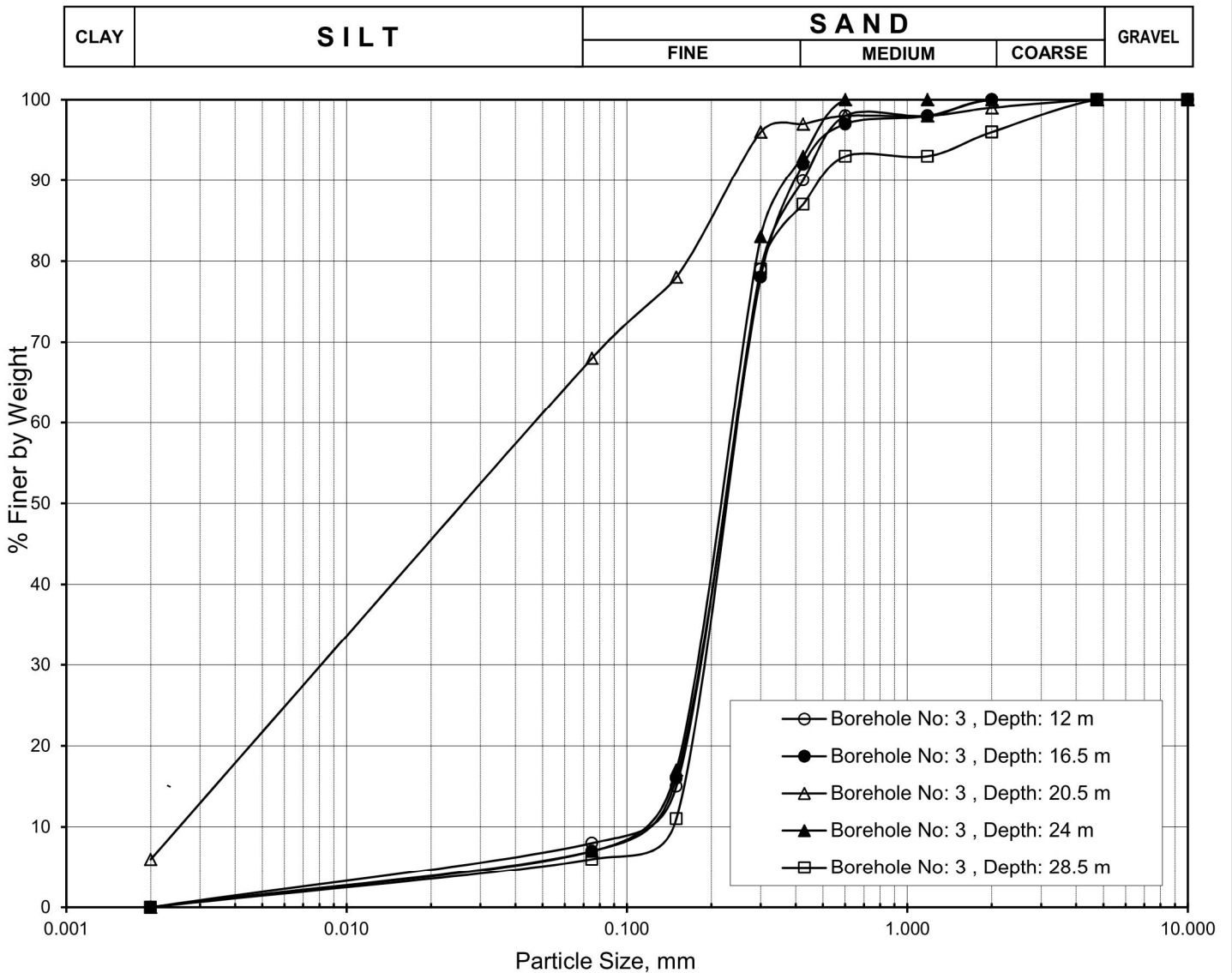
SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-3	0.50	Sandy silt (ML-CL)	6	19	69	6			
BH-3	2.50	Clayey silt (CL)	6	4	77	13			
BH-3	5.50	Clayey silt (CL)	4	9	75	12			
BH-3	7.50	Silty Fine sand (SM)	0	61	39	0			
BH-3	9.00	Fine sand (SP-SM)	0	88	12	0			





**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-3	12.00	Fine sand (SP-SM)	0	92	8	0			
BH-3	16.50	Fine sand (SP-SM)	0	93	7	0			
BH-3	20.50	Sandy silt (ML-CL)	0	32	62	6			
BH-3	24.00	Fine sand (SP-SM)	0	93	7	0			
BH-3	28.50	Fine sand (SP-SM)	0	94	6	0			



Location: Ch.: 2+306 km

**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**

**CHEMICAL TEST RESULTS**

**SOIL-WATER EXTRACT :**

Borehole No.	Depth, (m)	Sulphate Content (SO <sub>3</sub> ), %	Chloride Content, %	pH Value
1	2.50	0.06	0.04	7.6

**REQUIREMENTS FOR CONCRETE EXPOSED TO SULPHATE ATTACK AS  
PER IS : 456-2000, CLAUSES 8.2.2.4 AND 9.1.2, TABLE 4, PAGE-19**

Class	Concentration of Sulphates, expressed as SO <sub>3</sub>	
	In-Soil-Water Extract (Total) Percent	In Groundwater (mg/l)
1	Traces (<0.2)	Less than 300
2	0.2 to 0.5	300-1200
3	0.5 to 1.0	1200-2500
4	1.0 to 2.0	2500-5000
5	> 2.0	> 5000

**CLASSIFICATION OF CHLORIDE CONDITIONS IN GROUNDWATER\***

Classification	Chloride Limits	
	Temperate Climate	Tropical Climate
Negligible	0-2000 ppm	Not Applicable
Moderate	2000-10,000 ppm	0-2000 ppm
High	More than 10,000 ppm	2000-20,000 ppm
Very High	Generally not applicable	Only if considerably in excess of 20,000 ppm

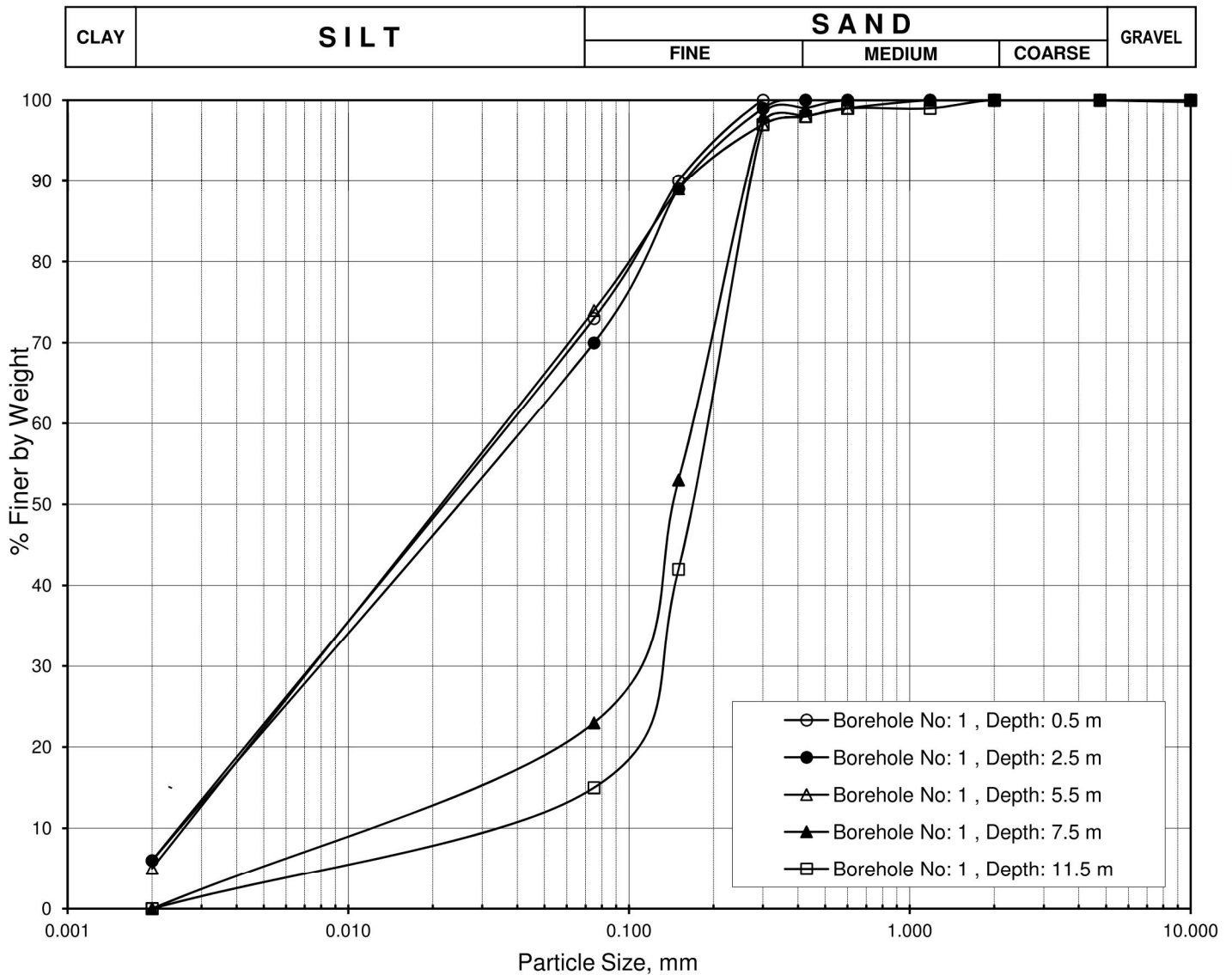
\*SOURCE : INSTITUTION OF CIVIL ENGINEERS, LONDON (1979)

Location: Minor Bridge at Ch 2+873 km

**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	0.50	Sandy silt (ML-CL)	0	27	67	6			
BH-1	2.50	Sandy silt (ML-CL)	0	30	64	6			
BH-1	5.50	Sandy silt (ML-CL)	0	26	69	5			
BH-1	7.50	Silty Fine sand (SM)	0	77	23	0			
BH-1	11.50	Silty Fine sand (SM)	0	85	15	0			



Location: Minor Bridge at Ch. 2+873 Km

**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**



**CHEMICAL TEST RESULTS**

**SOIL-WATER EXTRACT :**

Borehole No.	Depth, (m)	Sulphate Content (SO <sub>3</sub> ), %	Chloride Content, %	pH Value
1	2.50	0.08	0.06	7.8

**REQUIREMENTS FOR CONCRETE EXPOSED TO SULPHATE ATTACK AS  
PER IS : 456-2000, CLAUSES 8.2.2.4 AND 9.1.2, TABLE 4, PAGE-19**

Class	Concentration of Sulphates, expressed as SO <sub>3</sub>	
	In-Soil-Water Extract (Total) Percent	In Groundwater (mg/l)
1	Traces (<0.2)	Less than 300
2	0.2 to 0.5	300-1200
3	0.5 to 1.0	1200-2500
4	1.0 to 2.0	2500-5000
5	> 2.0	> 5000

**CLASSIFICATION OF CHLORIDE CONDITIONS IN GROUNDWATER\***

Classification	Chloride Limits	
	Temperate Climate	Tropical Climate
Negligible	0-2000 ppm	Not Applicable
Moderate	2000-10,000 ppm	0-2000 ppm
High	More than 10,000 ppm	2000-20,000 ppm
Very High	Generally not applicable	Only if considerably in excess of 20,000 ppm

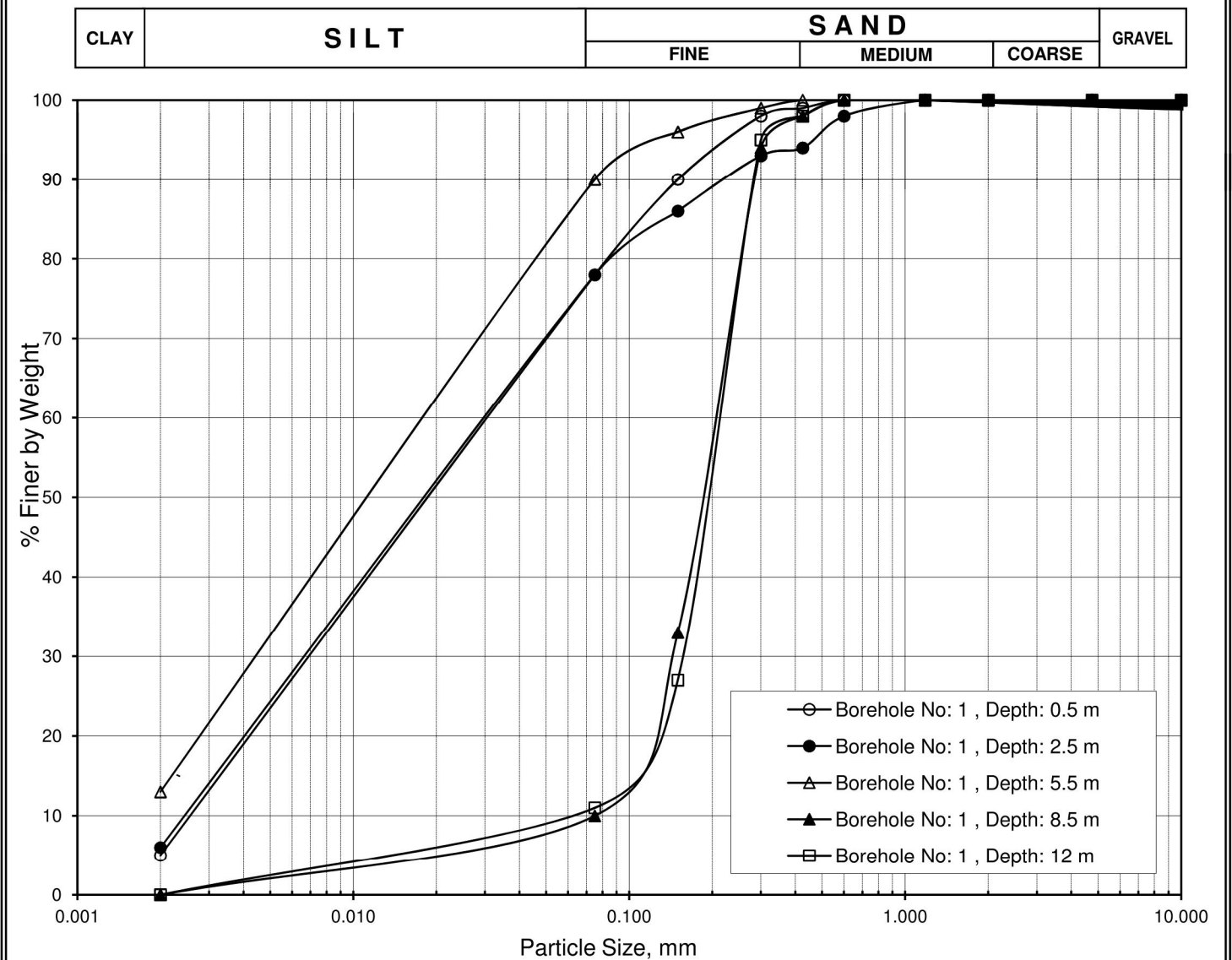
\*SOURCE : INSTITUTION OF CIVIL ENGINEERS, LONDON (1979)

Location: Minor Bridge at Ch 3+490 km

**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	0.50	Sandy silt (ML-CL)	0	22	73	5			
BH-1	2.50	Sandy silt (ML-CL)	0	22	72	6			
BH-1	5.50	Clayey silt (CL)	0	10	77	13			
BH-1	8.50	Fine sand (SP-SM)	0	90	10	0			
BH-1	12.00	Fine sand (SP-SM)	0	89	11	0			



Location: Minor Bridge at Ch. 3+490 Km

**CHEMICAL TEST RESULTS**

**SOIL-WATER EXTRACT :**

Borehole No.	Depth, (m)	Sulphate Content (SO <sub>3</sub> ), %	Chloride Content, %	pH Value
1	2.50	0.10	0.06	7.6

**REQUIREMENTS FOR CONCRETE EXPOSED TO SULPHATE ATTACK AS PER IS : 456-2000, CLAUSES 8.2.2.4 AND 9.1.2, TABLE 4, PAGE-19**

Class	Concentration of Sulphates, expressed as SO <sub>3</sub>	
	In-Soil-Water Extract (Total) Percent	In Groundwater (mg/l)
1	Traces (<0.2)	Less than 300
2	0.2 to 0.5	300-1200
3	0.5 to 1.0	1200-2500
4	1.0 to 2.0	2500-5000
5	> 2.0	> 5000

**CLASSIFICATION OF CHLORIDE CONDITIONS IN GROUNDWATER\***

Classification	Chloride Limits	
	Temperate Climate	Tropical Climate
Negligible	0-2000 ppm	Not Applicable
Moderate	2000-10,000 ppm	0-2000 ppm
High	More than 10,000 ppm	2000-20,000 ppm
Very High	Generally not applicable	Only if considerably in excess of 20,000 ppm

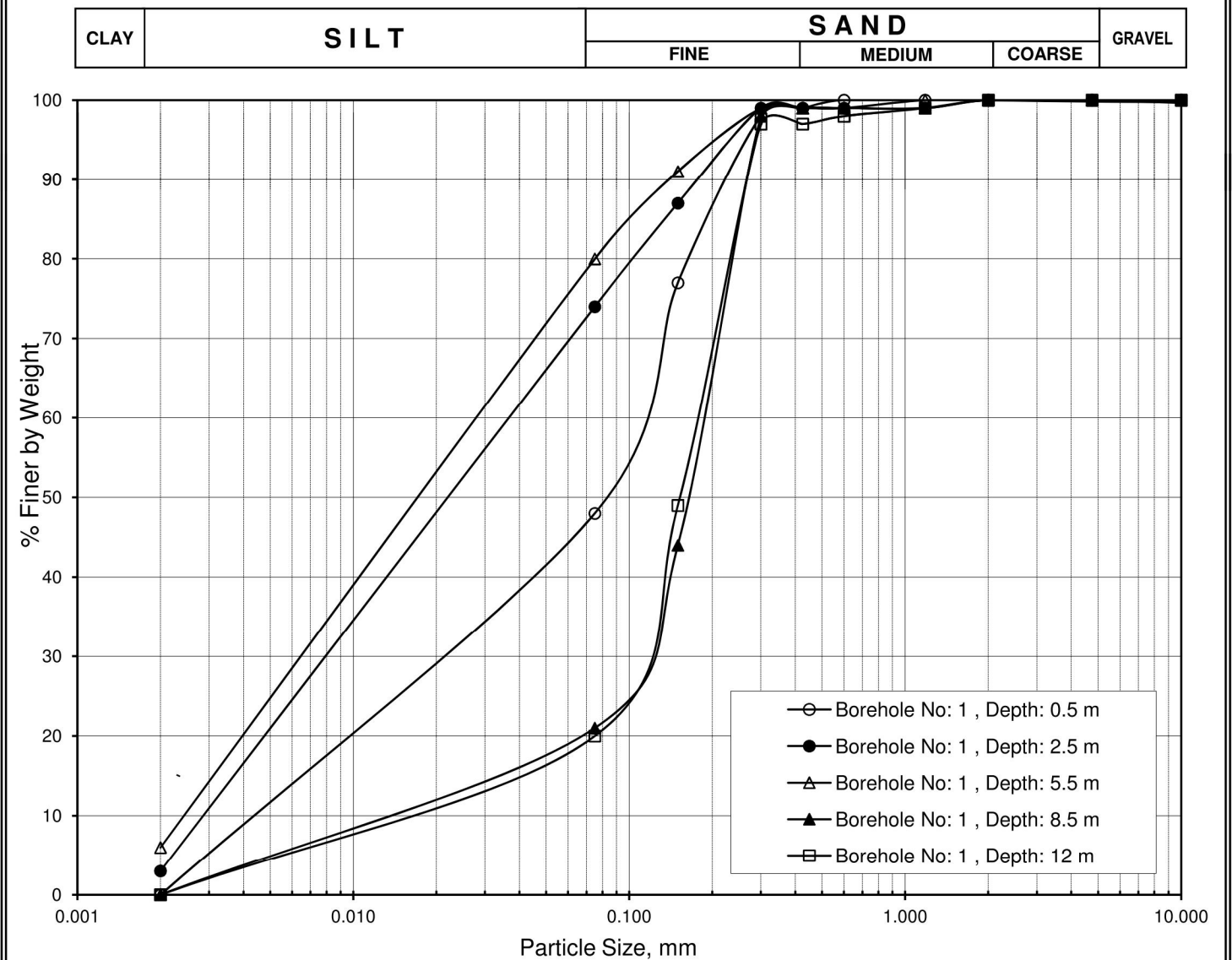
\*SOURCE : INSTITUTION OF CIVIL ENGINEERS, LONDON (1979)

Location: Minor Bridge at Ch 4+252 km

**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	0.50	Silty Fine sand (SM)	0	52	48	0			
BH-1	2.50	Sandy Silt (ML)	0	26	71	3			
BH-1	5.50	Sandy silt (ML-CL)	0	20	74	6			
BH-1	8.50	Silty Fine sand (SM)	0	79	21	0			
BH-1	12.00	Silty Fine sand (SM)	0	80	20	0			



Location: Minor Bridge at Ch. 4+252 Km

**CHEMICAL TEST RESULTS**

**SOIL-WATER EXTRACT :**

Borehole No.	Depth, (m)	Sulphate Content (SO <sub>3</sub> ), %	Chloride Content, %	pH Value
1	2.50	0.08	0.04	7.4

**REQUIREMENTS FOR CONCRETE EXPOSED TO SULPHATE ATTACK AS  
PER IS : 456-2000, CLAUSES 8.2.2.4 AND 9.1.2, TABLE 4, PAGE-19**

Class	Concentration of Sulphates, expressed as SO <sub>3</sub>	
	In-Soil-Water Extract (Total) Percent	In Groundwater (mg/l)
1	Traces (<0.2)	Less than 300
2	0.2 to 0.5	300-1200
3	0.5 to 1.0	1200-2500
4	1.0 to 2.0	2500-5000
5	> 2.0	> 5000

**CLASSIFICATION OF CHLORIDE CONDITIONS IN GROUNDWATER\***

Classification	Chloride Limits	
	Temperate Climate	Tropical Climate
Negligible	0-2000 ppm	Not Applicable
Moderate	2000-10,000 ppm	0-2000 ppm
High	More than 10,000 ppm	2000-20,000 ppm
Very High	Generally not applicable	Only if considerably in excess of 20,000 ppm

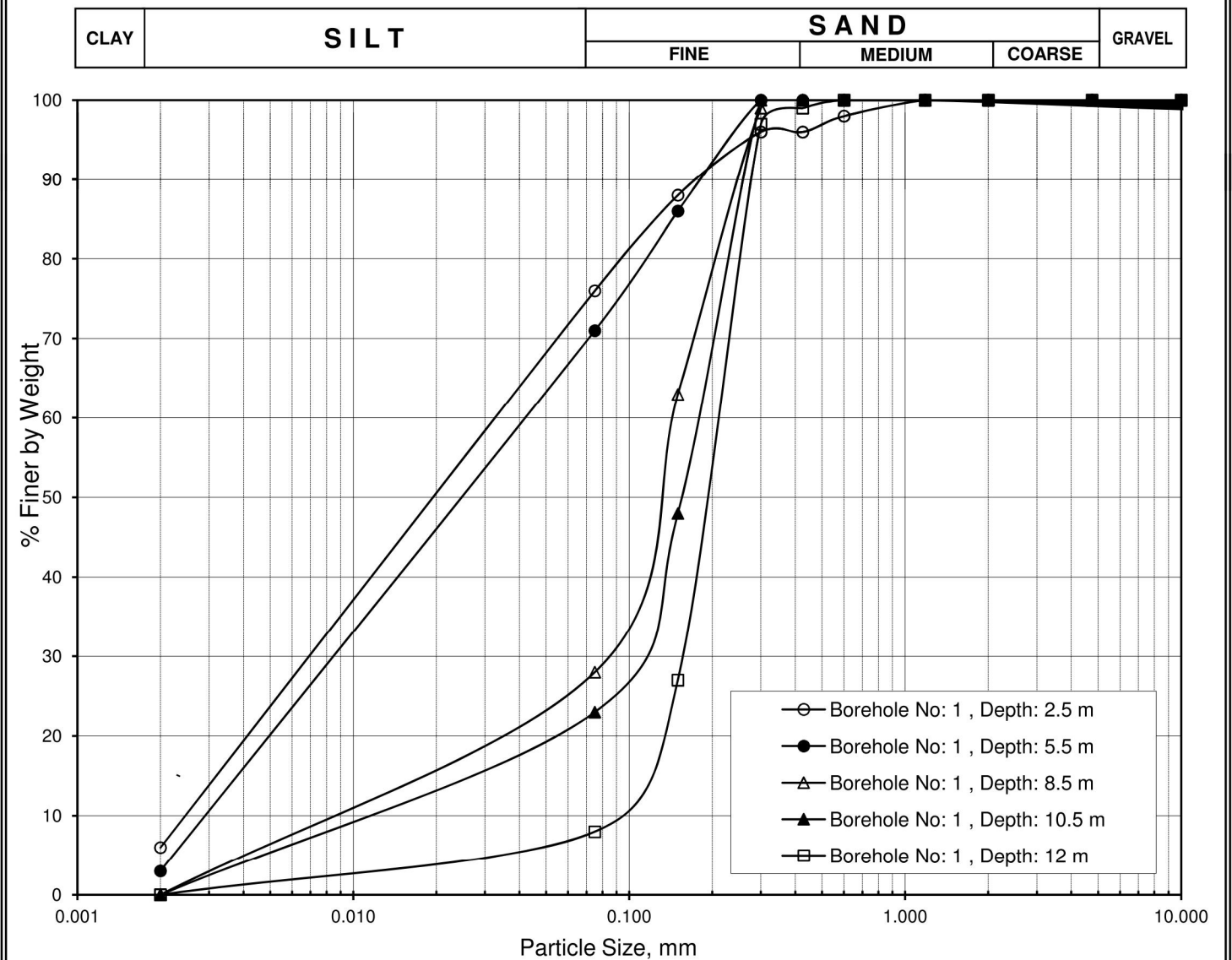
\*SOURCE : INSTITUTION OF CIVIL ENGINEERS, LONDON (1979)

Location: Minor Bridge at Ch 5+163 km

**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**

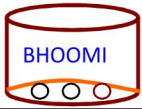
**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	2.50	Sandy silt (ML-CL)	0	24	70	6			
BH-1	5.50	Sandy Silt (ML)	0	29	68	3			
BH-1	8.50	Silty Fine sand (SM)	0	72	28	0			
BH-1	10.50	Silty Fine sand (SM)	0	77	23	0			
BH-1	12.00	Fine sand (SP-SM)	0	92	8	0			



Location: Minor Bridge at Ch. 5+163 Km

**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**



**CHEMICAL TEST RESULTS**

**SOIL-WATER EXTRACT :**

Borehole No.	Depth, (m)	Sulphate Content (SO <sub>3</sub> ), %	Chloride Content, %	pH Value
1	4.50	0.10	0.06	7.6

**REQUIREMENTS FOR CONCRETE EXPOSED TO SULPHATE ATTACK AS  
 PER IS : 456-2000, CLAUSES 8.2.2.4 AND 9.1.2, TABLE 4, PAGE-19**

Class	Concentration of Sulphates, expressed as SO <sub>3</sub>	
	In-Soil-Water Extract (Total) Percent	In Groundwater (mg/l)
1	Traces (<0.2)	Less than 300
2	0.2 to 0.5	300-1200
3	0.5 to 1.0	1200-2500
4	1.0 to 2.0	2500-5000
5	> 2.0	> 5000

**CLASSIFICATION OF CHLORIDE CONDITIONS IN GROUNDWATER\***

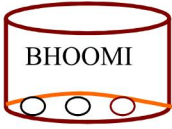
Classification	Chloride Limits	
	Temperate Climate	Tropical Climate
Negligible	0-2000 ppm	Not Applicable
Moderate	2000-10,000 ppm	0-2000 ppm
High	More than 10,000 ppm	2000-20,000 ppm
Very High	Generally not applicable	Only if considerably in excess of 20,000 ppm

\*SOURCE : INSTITUTION OF CIVIL ENGINEERS, LONDON (1979)

Location: Ch 6+099 km

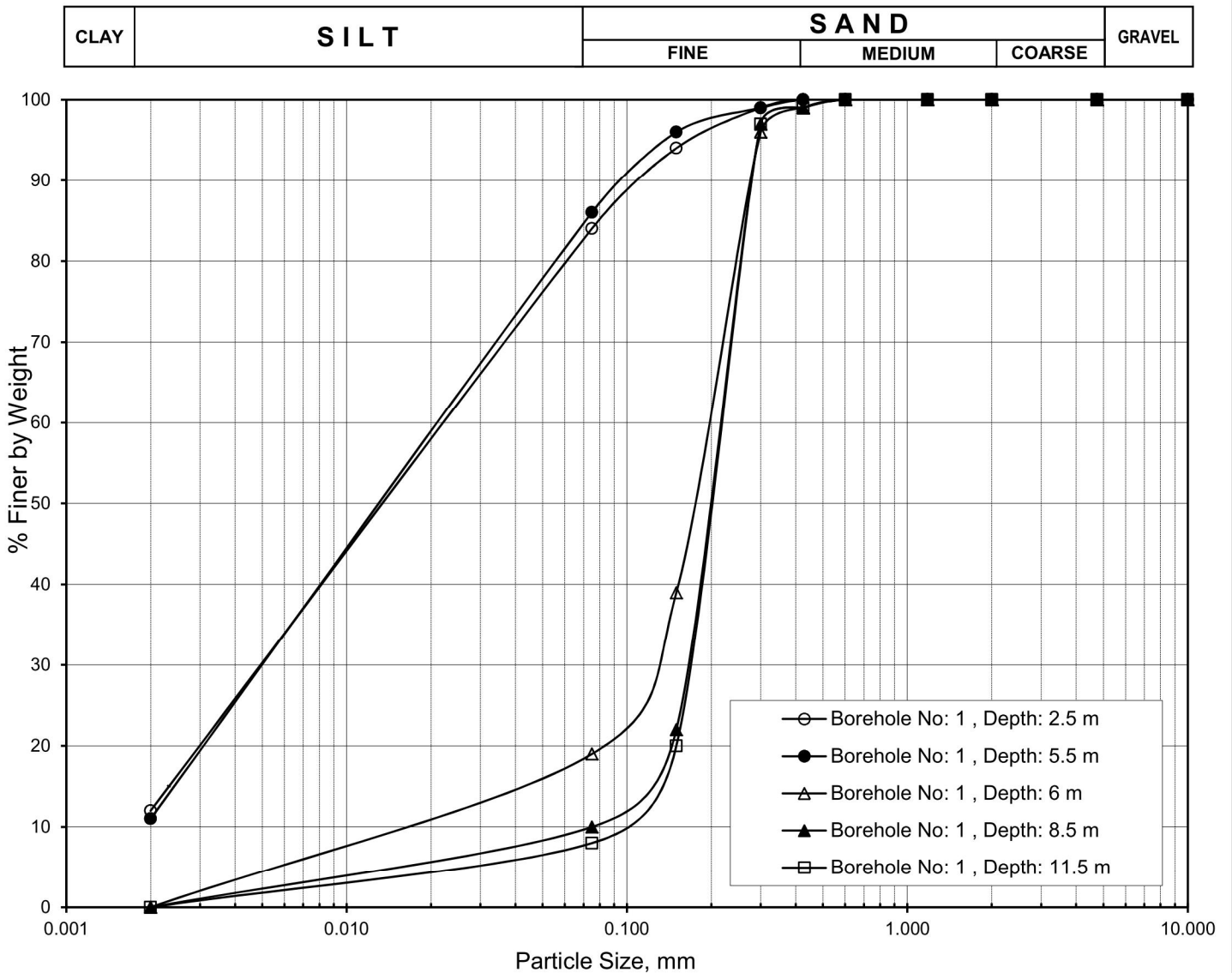
**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**





**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	2.50	Clayey silt (CL)	0	16	72	12			
BH-1	5.50	Clayey silt (CL)	0	14	75	11			
BH-1	6.00	Silty Fine sand (SM)	0	81	19	0			
BH-1	8.50	Fine sand (SP-SM)	0	90	10	0			
BH-1	11.50	Fine sand (SP-SM)	0	92	8	0			



Location: Ch. 6+099 Km



**CHEMICAL TEST RESULTS**

**SOIL-WATER EXTRACT :**

Borehole No.	Depth, (m)	Sulphate Content (SO <sub>3</sub> ), %	Chloride Content, %	pH Value
1	5.50	0.08	0.06	7.5

**REQUIREMENTS FOR CONCRETE EXPOSED TO SULPHATE ATTACK AS  
PER IS : 456-2000, CLAUSES 8.2.2.4 AND 9.1.2, TABLE 4, PAGE-19**

Class	Concentration of Sulphates, expressed as SO <sub>3</sub>	
	In-Soil-Water Extract (Total) Percent	In Groundwater (mg/l)
1	Traces (<0.2)	Less than 300
2	0.2 to 0.5	300-1200
3	0.5 to 1.0	1200-2500
4	1.0 to 2.0	2500-5000
5	> 2.0	> 5000

**CLASSIFICATION OF CHLORIDE CONDITIONS IN GROUNDWATER\***

Classification	Chloride Limits	
	Temperate Climate	Tropical Climate
Negligible	0-2000 ppm	Not Applicable
Moderate	2000-10,000 ppm	0-2000 ppm
High	More than 10,000 ppm	2000-20,000 ppm
Very High	Generally not applicable	Only if considerably in excess of 20,000 ppm

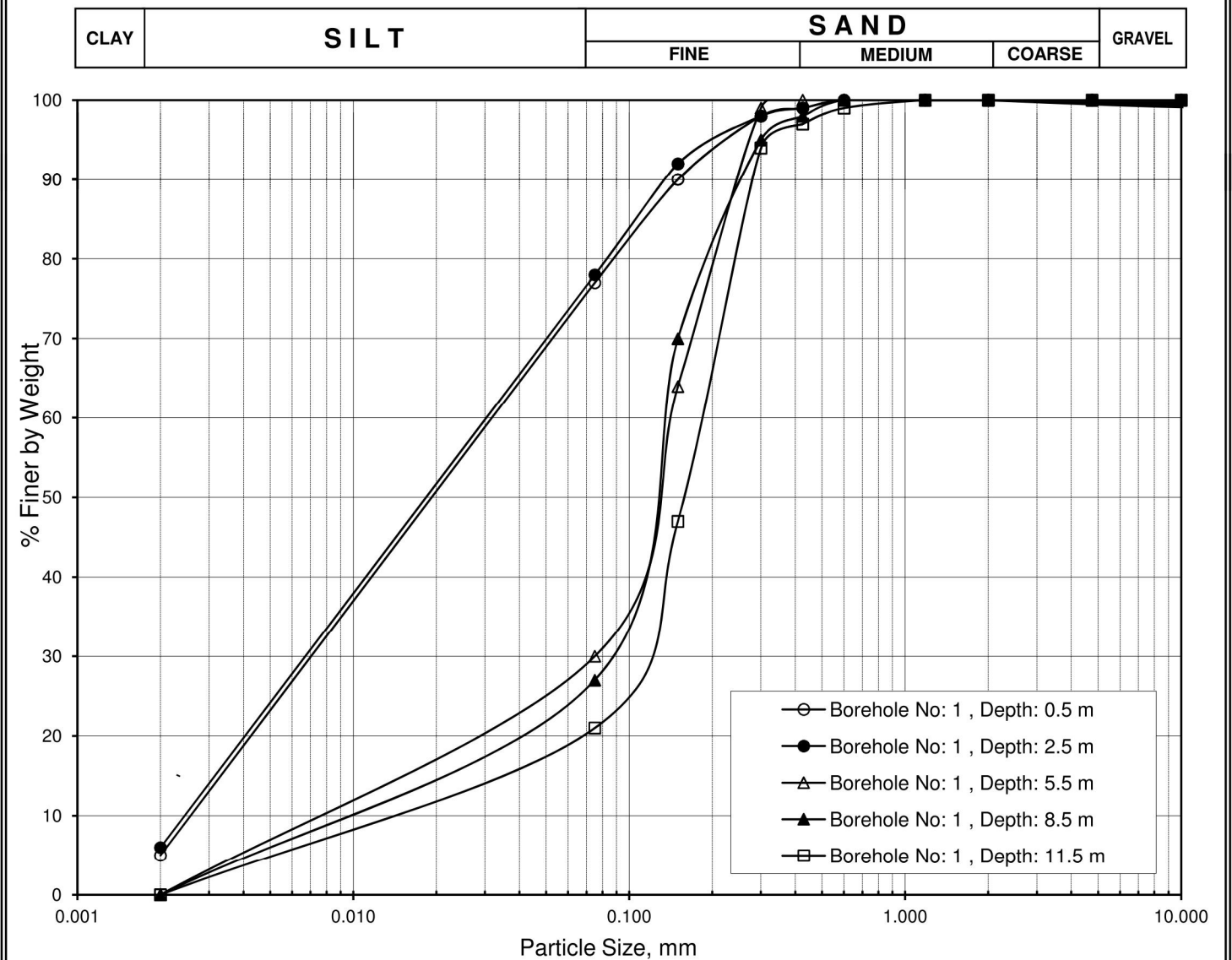
\*SOURCE : INSTITUTION OF CIVIL ENGINEERS, LONDON (1979)

Location: Minor Bridge at Ch 7+064 km

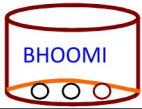
**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	0.50	Sandy silt (ML-CL)	0	23	72	5			
BH-1	2.50	Sandy silt (ML-CL)	0	22	72	6			
BH-1	5.50	Silty Fine sand (SM)	0	70	30	0			
BH-1	8.50	Silty Fine sand (SM)	0	73	27	0			
BH-1	11.50	Silty Fine sand (SM)	0	79	21	0			



Location: Minor Bridge at Ch. 7+064 Km



**CHEMICAL TEST RESULTS**

**SOIL-WATER EXTRACT :**

Borehole No.	Depth, (m)	Sulphate Content (SO <sub>3</sub> ), %	Chloride Content, %	pH Value
1	2.50	0.08	0.06	7.8

**REQUIREMENTS FOR CONCRETE EXPOSED TO SULPHATE ATTACK AS  
 PER IS : 456-2000, CLAUSES 8.2.2.4 AND 9.1.2, TABLE 4, PAGE-19**

Class	Concentration of Sulphates, expressed as SO <sub>3</sub>	
	In-Soil-Water Extract (Total) Percent	In Groundwater (mg/l)
1	Traces (<0.2)	Less than 300
2	0.2 to 0.5	300-1200
3	0.5 to 1.0	1200-2500
4	1.0 to 2.0	2500-5000
5	> 2.0	> 5000

**CLASSIFICATION OF CHLORIDE CONDITIONS IN GROUNDWATER\***

Classification	Chloride Limits	
	Temperate Climate	Tropical Climate
Negligible	0-2000 ppm	Not Applicable
Moderate	2000-10,000 ppm	0-2000 ppm
High	More than 10,000 ppm	2000-20,000 ppm
Very High	Generally not applicable	Only if considerably in excess of 20,000 ppm

\*SOURCE : INSTITUTION OF CIVIL ENGINEERS, LONDON (1979)

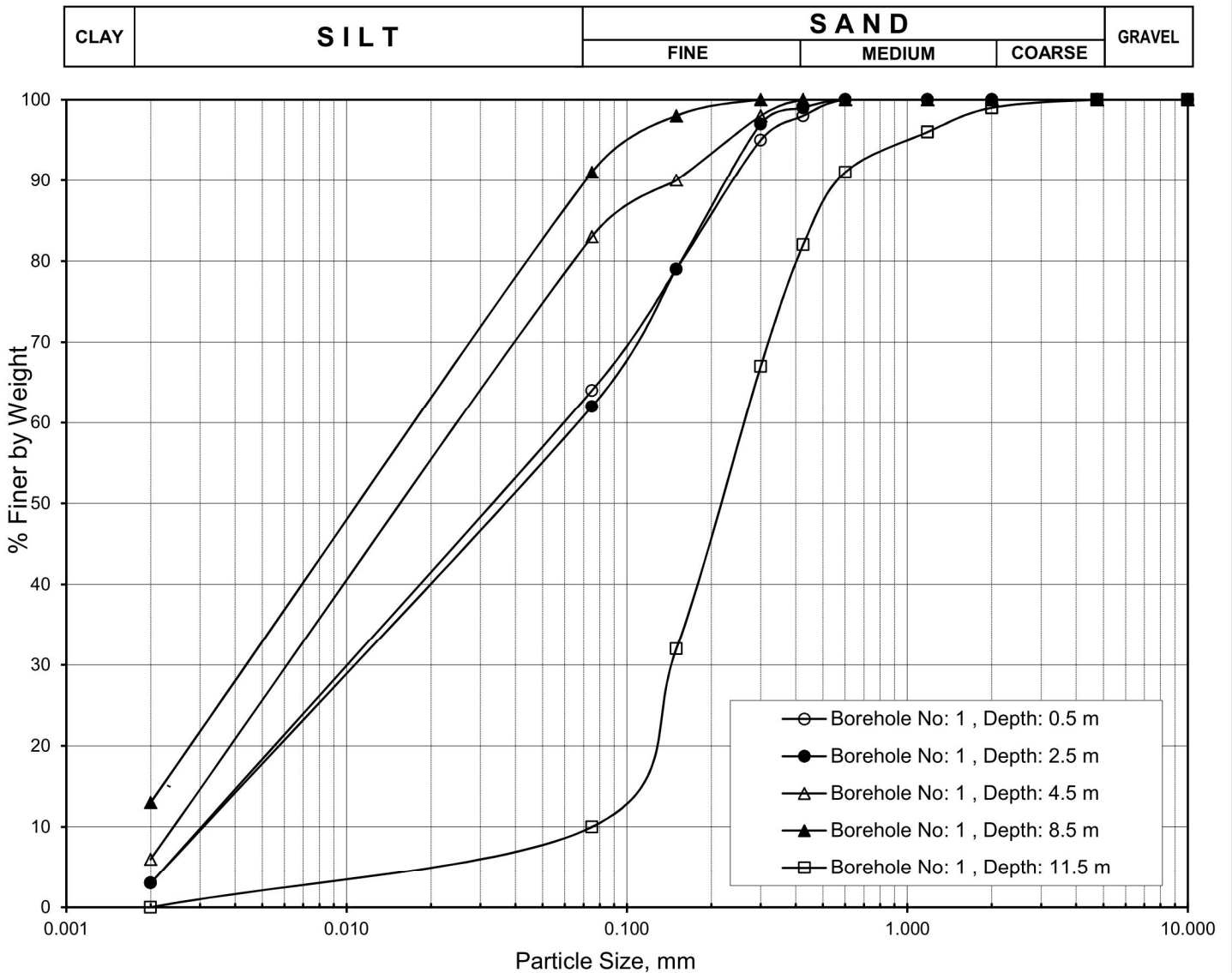
Location: Ch 8+060 km

**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**



**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	0.50	Sandy Silt (ML)	0	36	61	3			
BH-1	2.50	Sandy silt (ML-CL)	0	38	59	3			
BH-1	4.50	Clayey silt (CL)	0	17	77	6			
BH-1	8.50	Clayey silt (CI)	0	9	78	13			
BH-1	11.50	Fine sand (SP-SM)	0	90	10	0			



Location: Ch. 8+060 Km

**CHEMICAL TEST RESULTS**

**SOIL-WATER EXTRACT :**

Borehole No.	Depth, (m)	Sulphate Content (SO <sub>3</sub> ), %	Chloride Content, %	pH Value
1	5.50	0.10	0.06	7.6

**REQUIREMENTS FOR CONCRETE EXPOSED TO SULPHATE ATTACK AS  
PER IS : 456-2000, CLAUSES 8.2.2.4 AND 9.1.2, TABLE 4, PAGE-19**

Class	Concentration of Sulphates, expressed as SO <sub>3</sub> In-Soil-Water Extract (Total) Percent	In Groundwater (mg/l)
1	Traces (<0.2)	Less than 300
2	0.2 to 0.5	300-1200
3	0.5 to 1.0	1200-2500
4	1.0 to 2.0	2500-5000
5	> 2.0	> 5000

**CLASSIFICATION OF CHLORIDE CONDITIONS IN GROUNDWATER\***

Classification	Chloride Limits	
	Temperate Climate	Tropical Climate
Negligible	0-2000 ppm	Not Applicable
Moderate	2000-10,000 ppm	0-2000 ppm
High	More than 10,000 ppm	2000-20,000 ppm
Very High	Generally not applicable	Only if considerably in excess of 20,000 ppm

\*SOURCE : INSTITUTION OF CIVIL ENGINEERS, LONDON (1979)

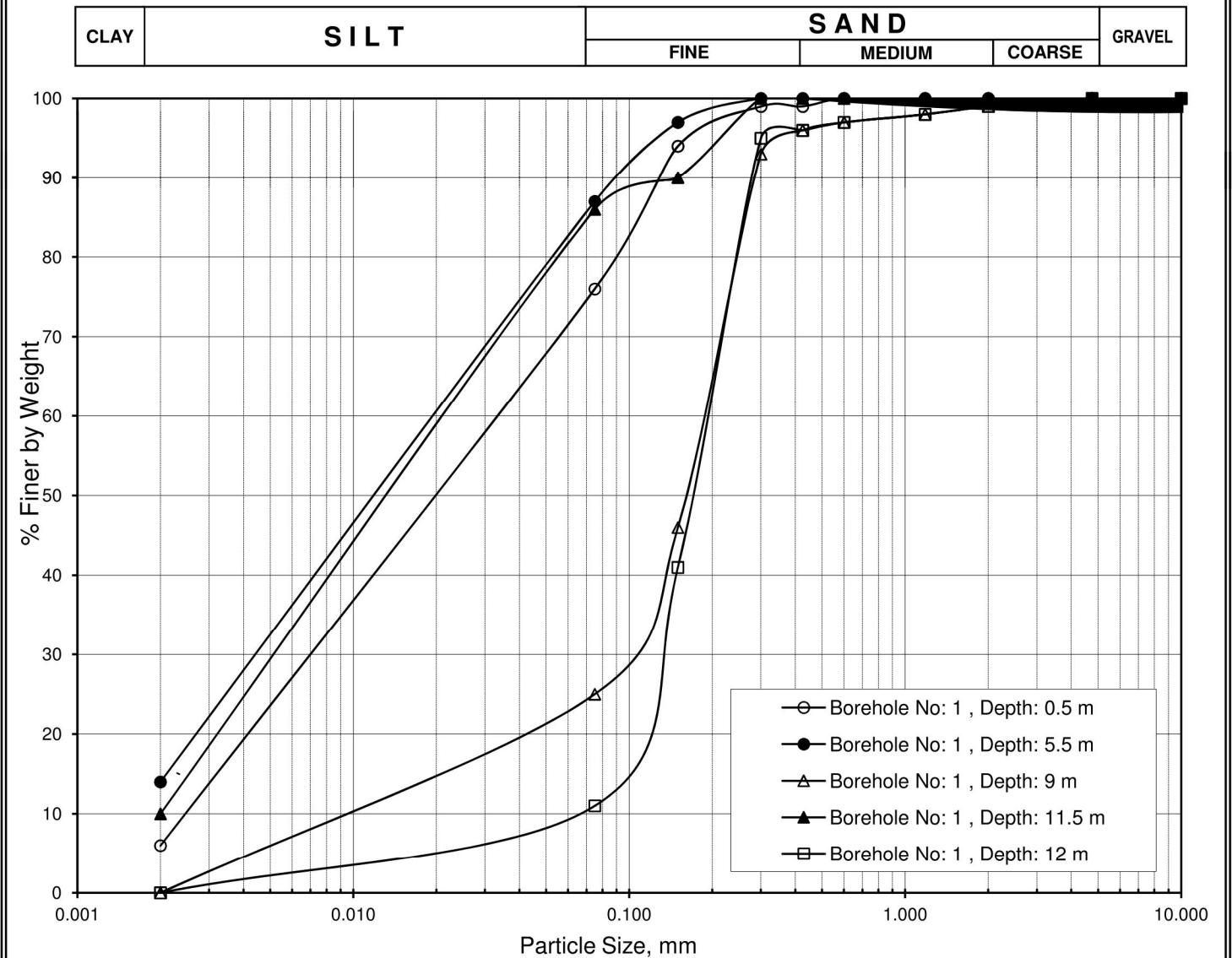
Location: Minor Bridge at Ch 8+977 km

**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**



**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	0.50	Sandy silt (ML-CL)	0	24	70	6			
BH-1	5.50	Clayey silt (CL)	0	13	73	14			
BH-1	9.00	Silty Fine sand (SM)	0	75	25	0			
BH-1	11.50	Clayey silt (CL)	0	14	76	10			
BH-1	12.00	Fine sand (SP-SM)	0	89	11	0			



Location: Minor Bridge at Ch. 8+977 Km



**CHEMICAL TEST RESULTS**

**SOIL-WATER EXTRACT :**

Borehole No.	Depth, (m)	Sulphate Content (SO <sub>3</sub> ), %	Chloride Content, %	pH Value
1	2.50	0.08	0.06	7.8

**REQUIREMENTS FOR CONCRETE EXPOSED TO SULPHATE ATTACK AS  
PER IS : 456-2000, CLAUSES 8.2.2.4 AND 9.1.2, TABLE 4, PAGE-19**

Class	Concentration of Sulphates, expressed as SO <sub>3</sub>	
	In-Soil-Water Extract (Total) Percent	In Groundwater (mg/l)
1	Traces (<0.2)	Less than 300
2	0.2 to 0.5	300-1200
3	0.5 to 1.0	1200-2500
4	1.0 to 2.0	2500-5000
5	> 2.0	> 5000

**CLASSIFICATION OF CHLORIDE CONDITIONS IN GROUNDWATER\***

Classification	Chloride Limits	
	Temperate Climate	Tropical Climate
Negligible	0-2000 ppm	Not Applicable
Moderate	2000-10,000 ppm	0-2000 ppm
High	More than 10,000 ppm	2000-20,000 ppm
Very High	Generally not applicable	Only if considerably in excess of 20,000 ppm

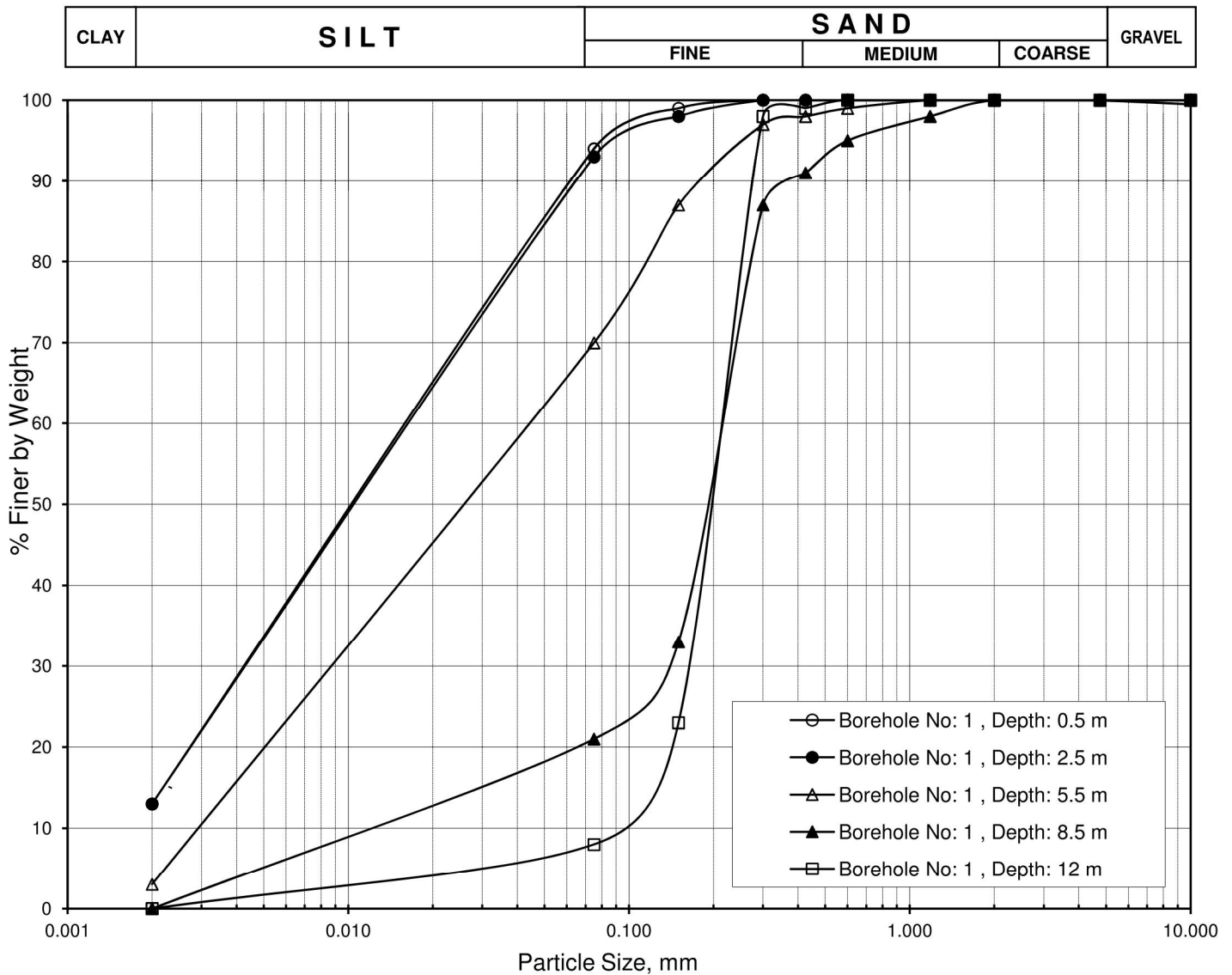
\*SOURCE : INSTITUTION OF CIVIL ENGINEERS, LONDON (1979)

Location: Minor Bridge at Ch 10+030 km

**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	0.50	Clayey silt (CL)	0	6	81	13			
BH-1	2.50	Clayey silt (CL)	0	7	80	13			
BH-1	5.50	Sandy Silt (ML)	0	30	67	3			
BH-1	8.50	Silty Fine sand (SM)	0	79	21	0			
BH-1	12.00	Fine sand (SP-SM)	0	92	8	0			



Location: Minor Bridge at Ch. 10+030 Km

**CHEMICAL TEST RESULTS**

**SOIL-WATER EXTRACT :**

Borehole No.	Depth, (m)	Sulphate Content (SO <sub>3</sub> ), %	Chloride Content, %	pH Value
1	5.50	0.08	0.06	7.8

**REQUIREMENTS FOR CONCRETE EXPOSED TO SULPHATE ATTACK AS  
PER IS : 456-2000, CLAUSES 8.2.2.4 AND 9.1.2, TABLE 4, PAGE-19**

Class	Concentration of Sulphates, expressed as SO <sub>3</sub> In-Soil-Water Extract (Total) Percent	In Groundwater (mg/l)
1	Traces (<0.2)	Less than 300
2	0.2 to 0.5	300-1200
3	0.5 to 1.0	1200-2500
4	1.0 to 2.0	2500-5000
5	> 2.0	> 5000

**CLASSIFICATION OF CHLORIDE CONDITIONS IN GROUNDWATER\***

Classification	Chloride Limits	
	Temperate Climate	Tropical Climate
Negligible	0-2000 ppm	Not Applicable
Moderate	2000-10,000 ppm	0-2000 ppm
High	More than 10,000 ppm	2000-20,000 ppm
Very High	Generally not applicable	Only if considerably in excess of 20,000 ppm

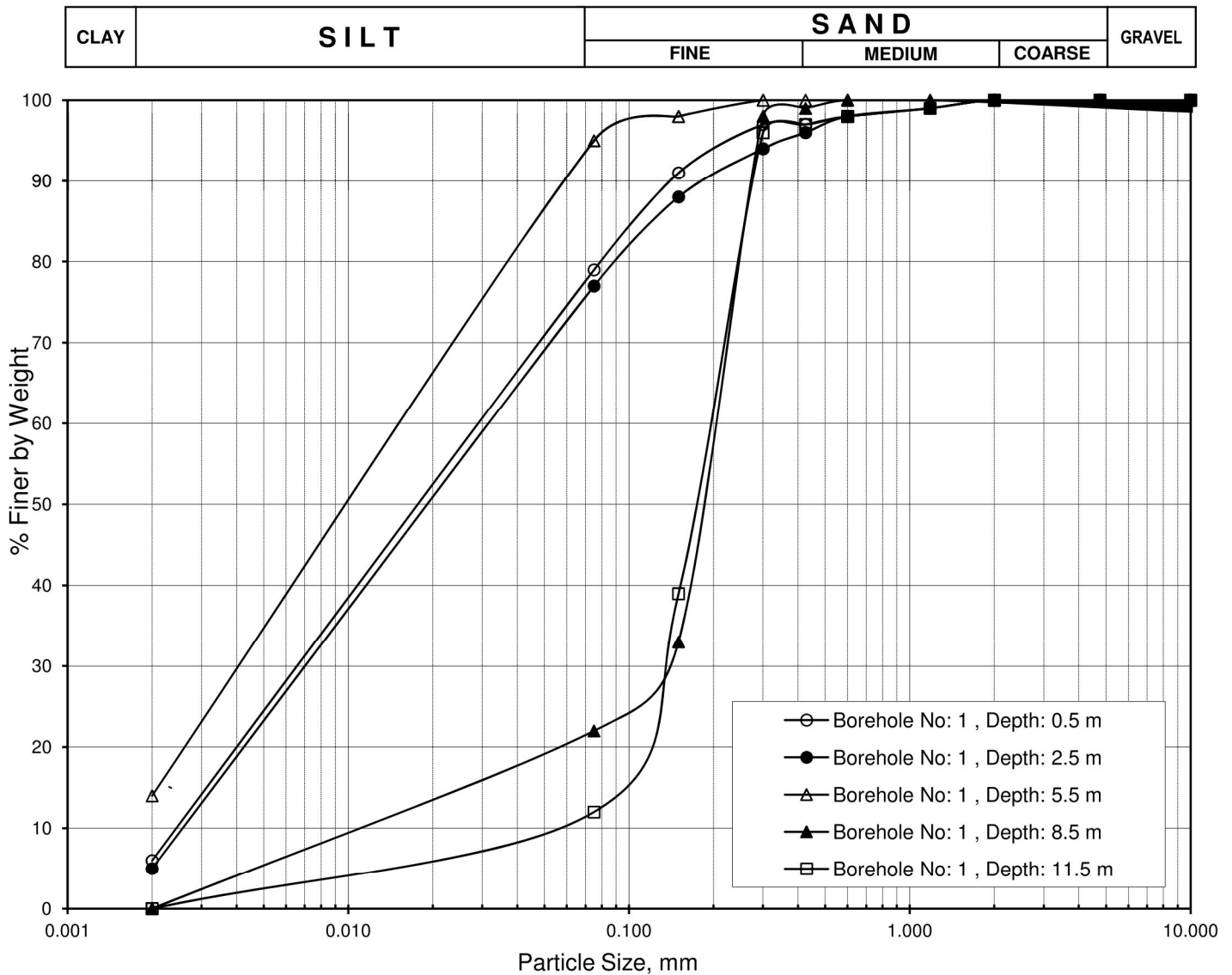
\*SOURCE : INSTITUTION OF CIVIL ENGINEERS, LONDON (1979)

Location: Minor Bridge at Ch 10+973 km

**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**

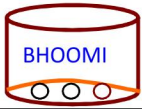
**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	0.50	Sandy silt (ML-CL)	0	21	73	6			
BH-1	2.50	Sandy silt (ML-CL)	0	23	72	5			
BH-1	5.50	Clayey silt (CL)	0	5	81	14			
BH-1	8.50	Silty Fine sand (SM)	0	78	22	0			
BH-1	11.50	Fine sand (SP-SM)	0	88	12	0			



Location: Minor Bridge at Ch. 10+973 Km

**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**



**CHEMICAL TEST RESULTS**

**SOIL-WATER EXTRACT :**

Borehole No.	Depth, (m)	Sulphate Content (SO <sub>3</sub> ), %	Chloride Content, %	pH Value
1	2.50	0.06	0.04	7.4

**REQUIREMENTS FOR CONCRETE EXPOSED TO SULPHATE ATTACK AS  
 PER IS : 456-2000, CLAUSES 8.2.2.4 AND 9.1.2, TABLE 4, PAGE-19**

Class	Concentration of Sulphates, expressed as SO <sub>3</sub>	
	In-Soil-Water Extract (Total) Percent	In Groundwater (mg/l)
1	Traces (<0.2)	Less than 300
2	0.2 to 0.5	300-1200
3	0.5 to 1.0	1200-2500
4	1.0 to 2.0	2500-5000
5	> 2.0	> 5000

**CLASSIFICATION OF CHLORIDE CONDITIONS IN GROUNDWATER\***

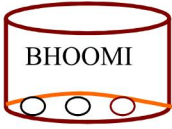
Classification	Chloride Limits	
	Temperate Climate	Tropical Climate
Negligible	0-2000 ppm	Not Applicable
Moderate	2000-10,000 ppm	0-2000 ppm
High	More than 10,000 ppm	2000-20,000 ppm
Very High	Generally not applicable	Only if considerably in excess of 20,000 ppm

\*SOURCE : INSTITUTION OF CIVIL ENGINEERS, LONDON (1979)

Location: Ch 11+987 km

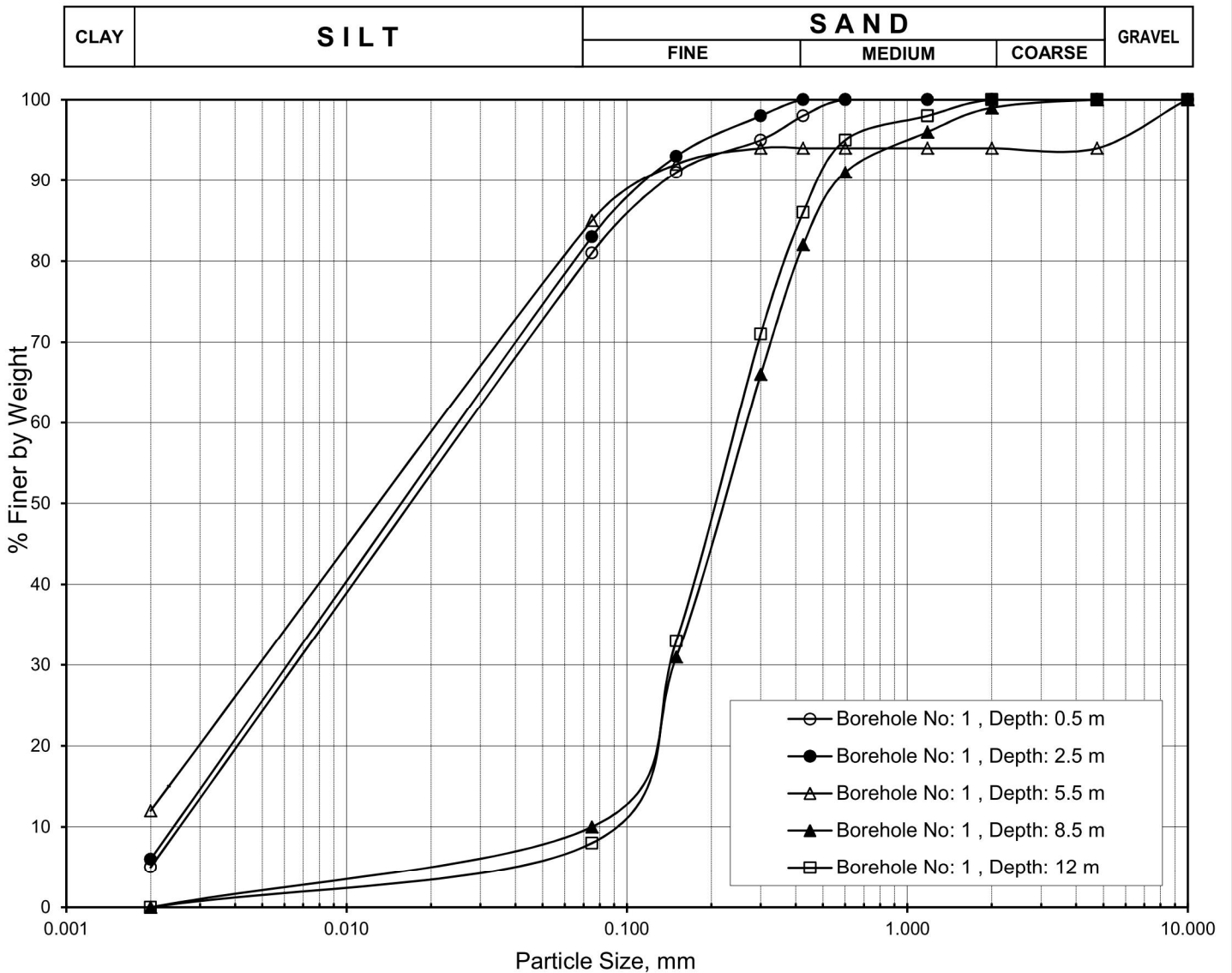
**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**





**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	0.50	Sandy silt (ML-CL)	0	19	76	5			
BH-1	2.50	Sandy silt (ML-CL)	0	17	77	6			
BH-1	5.50	Clayey silt (CL)	6	9	73	12			
BH-1	8.50	Fine sand (SP-SM)	0	90	10	0			
BH-1	12.00	Fine sand (SP-SM)	0	92	8	0			



Location: Ch. 11+987 Km



**CHEMICAL TEST RESULTS**

**SOIL-WATER EXTRACT :**

Borehole No.	Depth, (m)	Sulphate Content (SO <sub>3</sub> ), %	Chloride Content, %	pH Value
1	2.50	0.08	0.04	7.6
2	5.50	0.10	0.06	7.5
3	2.50	0.10	0.06	7.5

**REQUIREMENTS FOR CONCRETE EXPOSED TO SULPHATE ATTACK AS  
PER IS : 456-2000, CLAUSES 8.2.2.4 AND 9.1.2, TABLE 4, PAGE-19**

Class	Concentration of Sulphates, expressed as SO <sub>3</sub> In-Soil-Water Extract (Total) Percent	In Groundwater (mg/l)
1	Traces (<0.2)	Less than 300
2	0.2 to 0.5	300-1200
3	0.5 to 1.0	1200-2500
4	1.0 to 2.0	2500-5000
5	> 2.0	> 5000

**CLASSIFICATION OF CHLORIDE CONDITIONS IN GROUNDWATER\***

Classification	Chloride Limits	
	Temperate Climate	Tropical Climate
Negligible	0-2000 ppm	Not Applicable
Moderate	2000-10,000 ppm	0-2000 ppm
High	More than 10,000 ppm	2000-20,000 ppm
Very High	Generally not applicable	Only if considerably in excess of 20,000 ppm

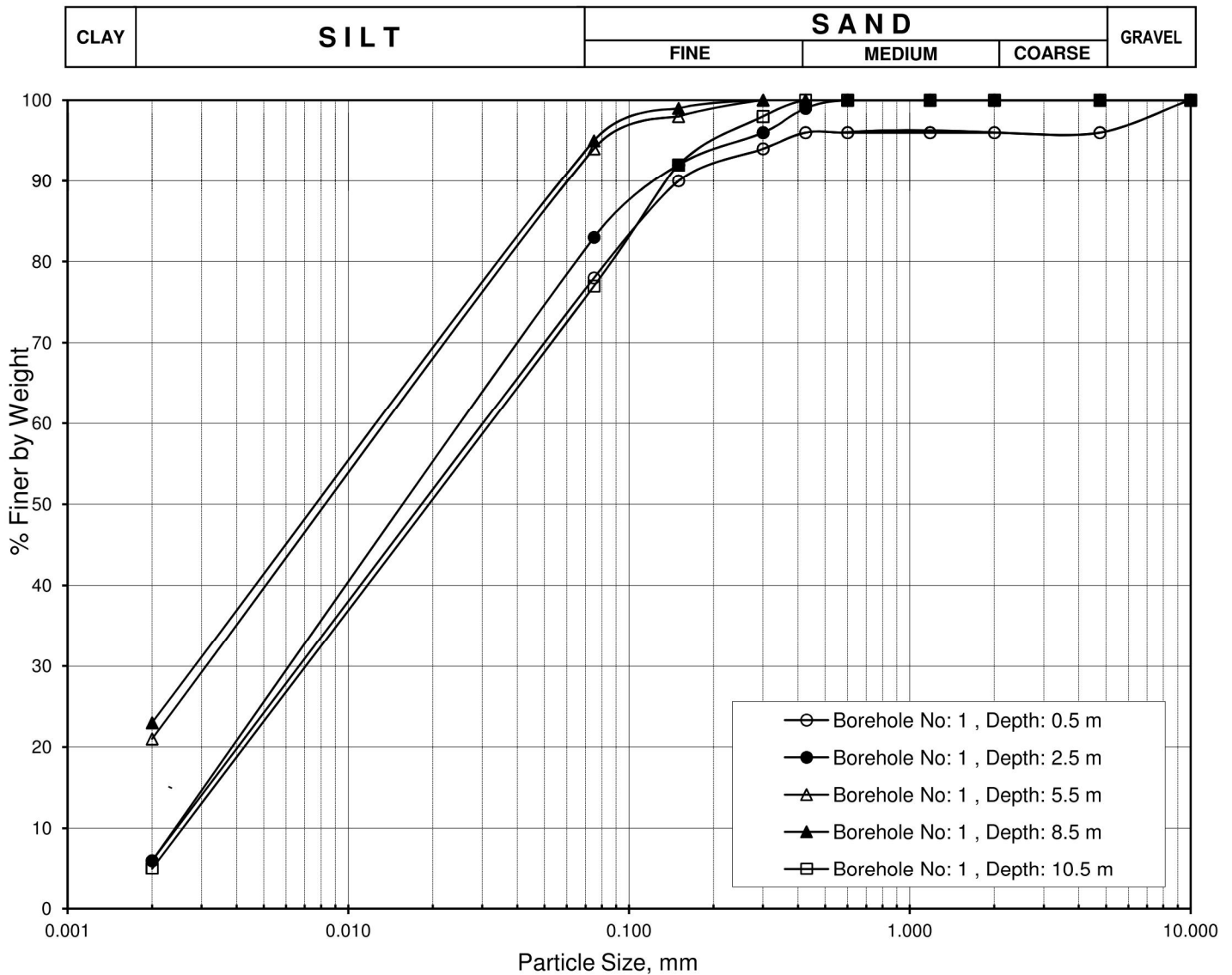
\*SOURCE : INSTITUTION OF CIVIL ENGINEERS, LONDON (1979)

Location: Major Bridge at NH - 24 Ch. : 13+841 km

**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	0.50	Sandy silt (ML-CL)	4	18	72	6			
BH-1	2.50	Sandy silt (ML-CL)	0	17	77	6			
BH-1	5.50	Clayey silt (CI)	0	6	73	21			
BH-1	8.50	Clayey silt (CI)	0	5	72	23			
BH-1	10.50	Sandy silt (ML-CL)	0	23	72	5			

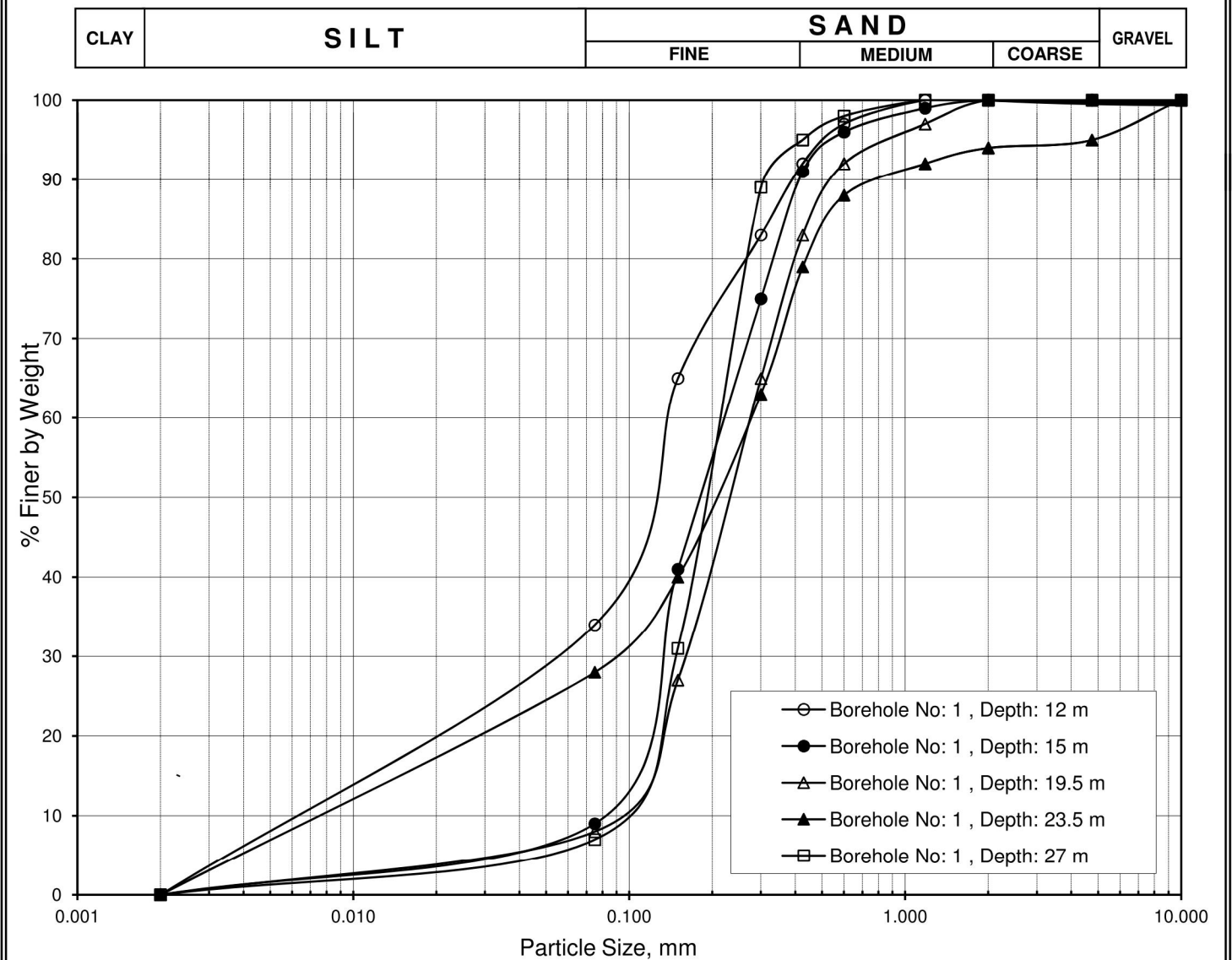


Location: Major Bridge at NH -24 Ch.: 13+841 km

**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	12.00	Silty Fine sand (SM)	0	66	34	0			
BH-1	15.00	Fine sand (SP-SM)	0	91	9	0			
BH-1	19.50	Fine sand (SP-SM)	0	92	8	0			
BH-1	23.50	Silty Fine sand (SM)	5	67	28	0			
BH-1	27.00	Fine sand (SP-SM)	0	93	7	0			

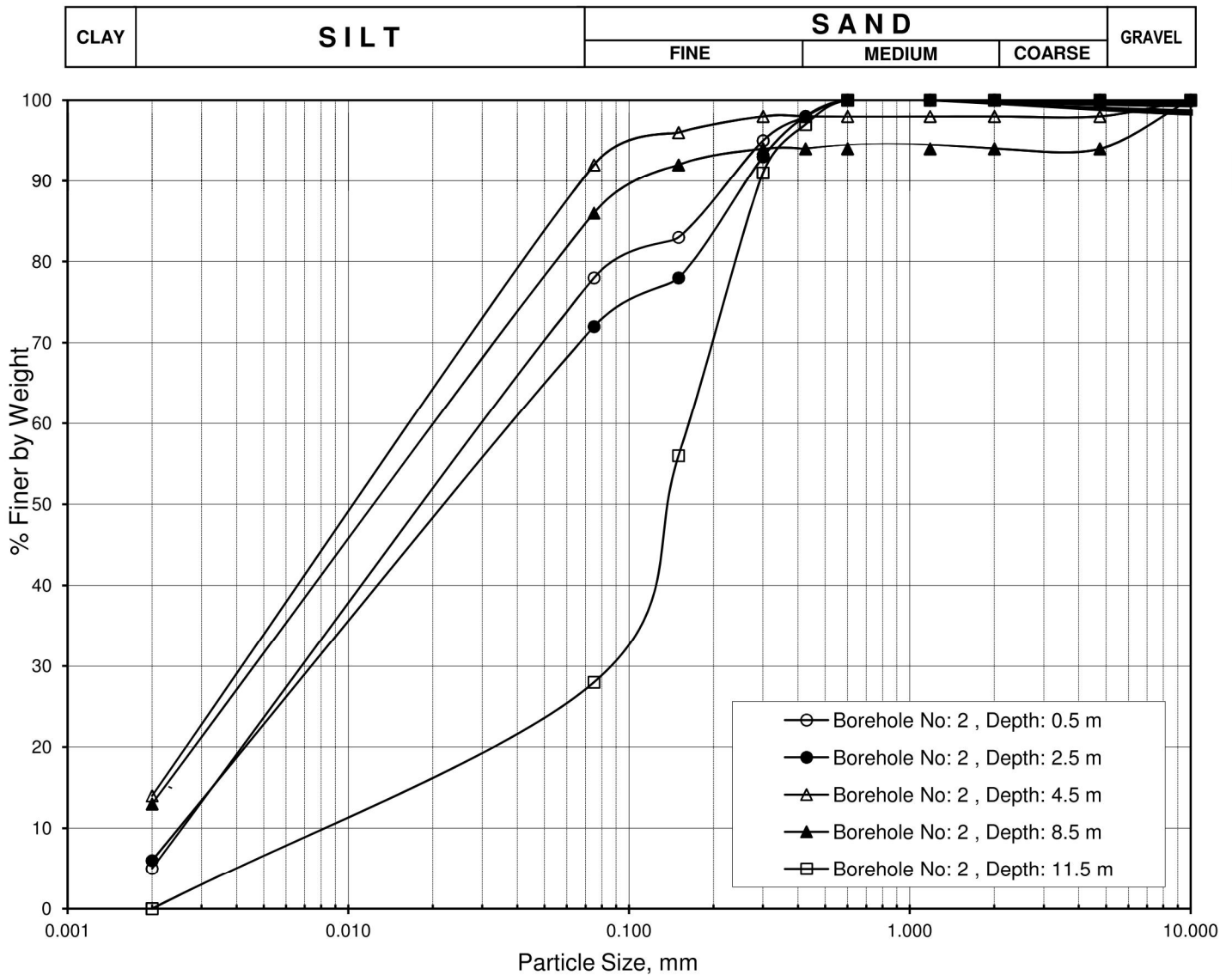


Location: Major Bridge at NH -24 Ch.: 13+841 km

**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-2	0.50	Sandy silt (ML-CL)	0	22	73	5			
BH-2	2.50	Sandy silt (ML-CL)	0	28	66	6			
BH-2	4.50	Clayey silt (CL)	2	6	78	14			
BH-2	8.50	Clayey silt (CL)	6	8	73	13			
BH-2	11.50	Silty Fine sand (SM)	0	72	28	0			

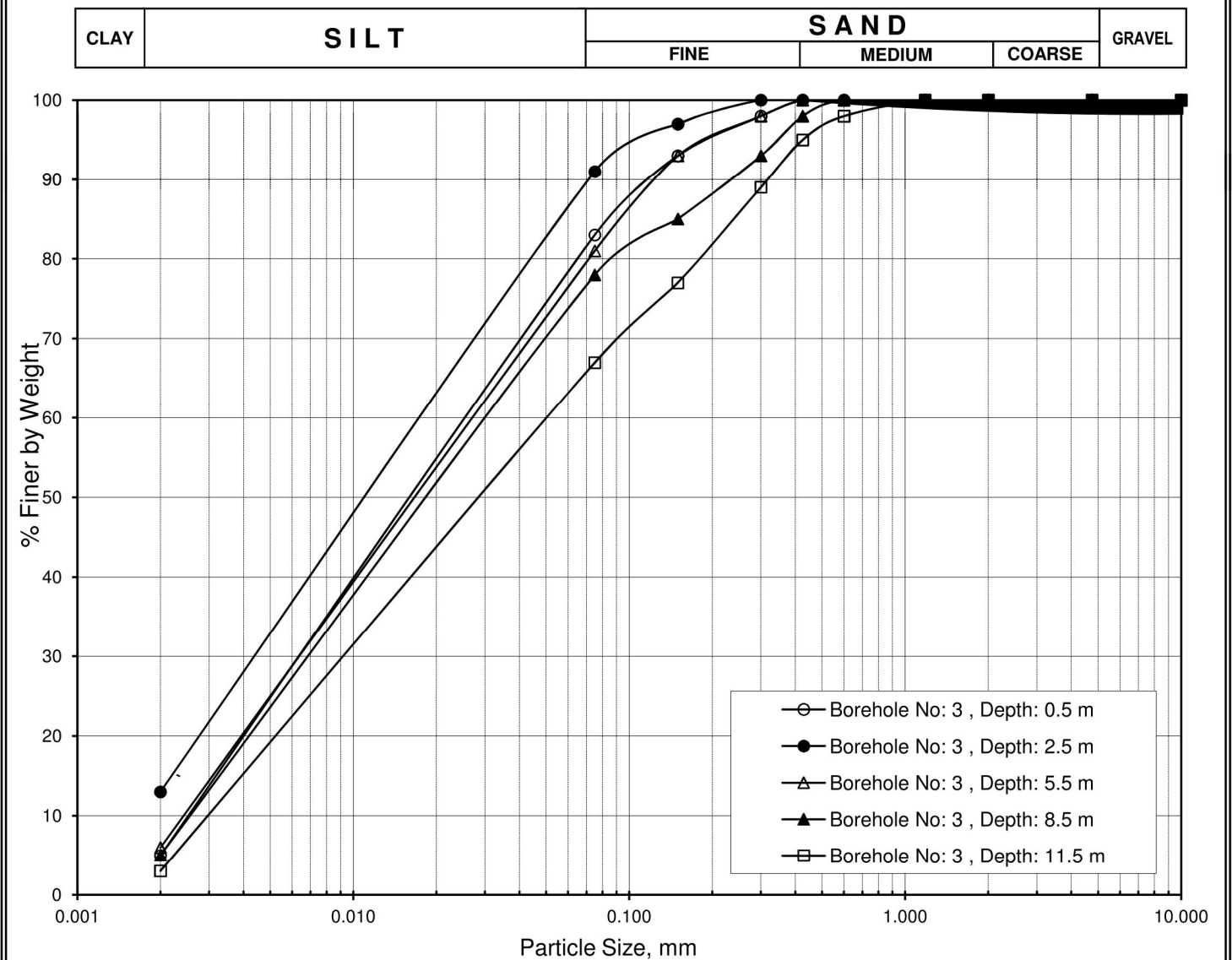


Location: Major Bridge at NH -24 Ch.: 13+841 km

**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-3	0.50	Sandy silt (ML-CL)	0	17	78	5			
BH-3	2.50	Clayey silt (CL)	0	9	78	13			
BH-3	5.50	Sandy silt (ML-CL)	0	19	75	6			
BH-3	8.50	Sandy silt (ML-CL)	0	22	73	5			
BH-3	11.50	Sandy Silt (ML)	0	33	64	3			

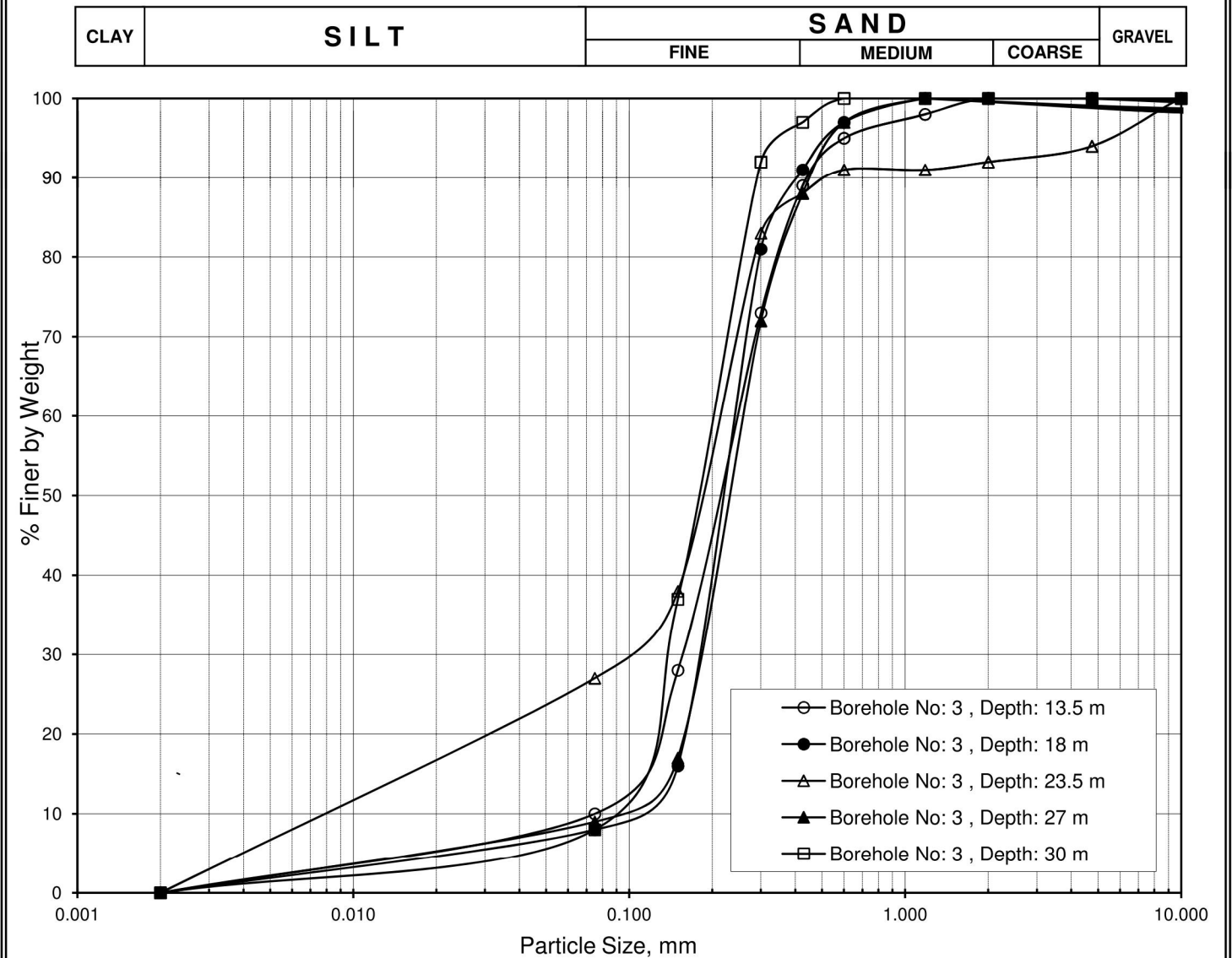


Location: Major Bridge at NH -24 Ch.: 13+841 km

**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-3	13.50	Fine sand (SP-SM)	0	90	10	0			
BH-3	18.00	Fine sand (SP-SM)	0	92	8	0			
BH-3	23.50	Silty Fine sand (SM)	6	67	27	0			
BH-3	27.00	Fine sand (SP-SM)	0	91	9	0			
BH-3	30.00	Fine sand (SP-SM)	0	92	8	0			



Location: Major Bridge at NH -24 Ch.: 13+841 km

**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**



**CHEMICAL TEST RESULTS**

**SOIL-WATER EXTRACT :**

Borehole No.	Depth, (m)	Sulphate Content (SO <sub>3</sub> ), %	Chloride Content, %	pH Value
1	2.50	0.10	0.04	7.6
2	5.50	0.08	0.04	7.6

**REQUIREMENTS FOR CONCRETE EXPOSED TO SULPHATE ATTACK AS  
PER IS : 456-2000, CLAUSES 8.2.2.4 AND 9.1.2, TABLE 4, PAGE-19**

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2	0.2 to 0.5	300-1200
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4	1.0 to 2.0	2500-5000
5	> 2.0	> 5000

**CLASSIFICATION OF CHLORIDE CONDITIONS IN GROUNDWATER\***

Classification	Chloride Limits	
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High	More than 10,000 ppm	2000-20,000 ppm
Very High	Generally not applicable	Only if considerably in excess of 20,000 ppm

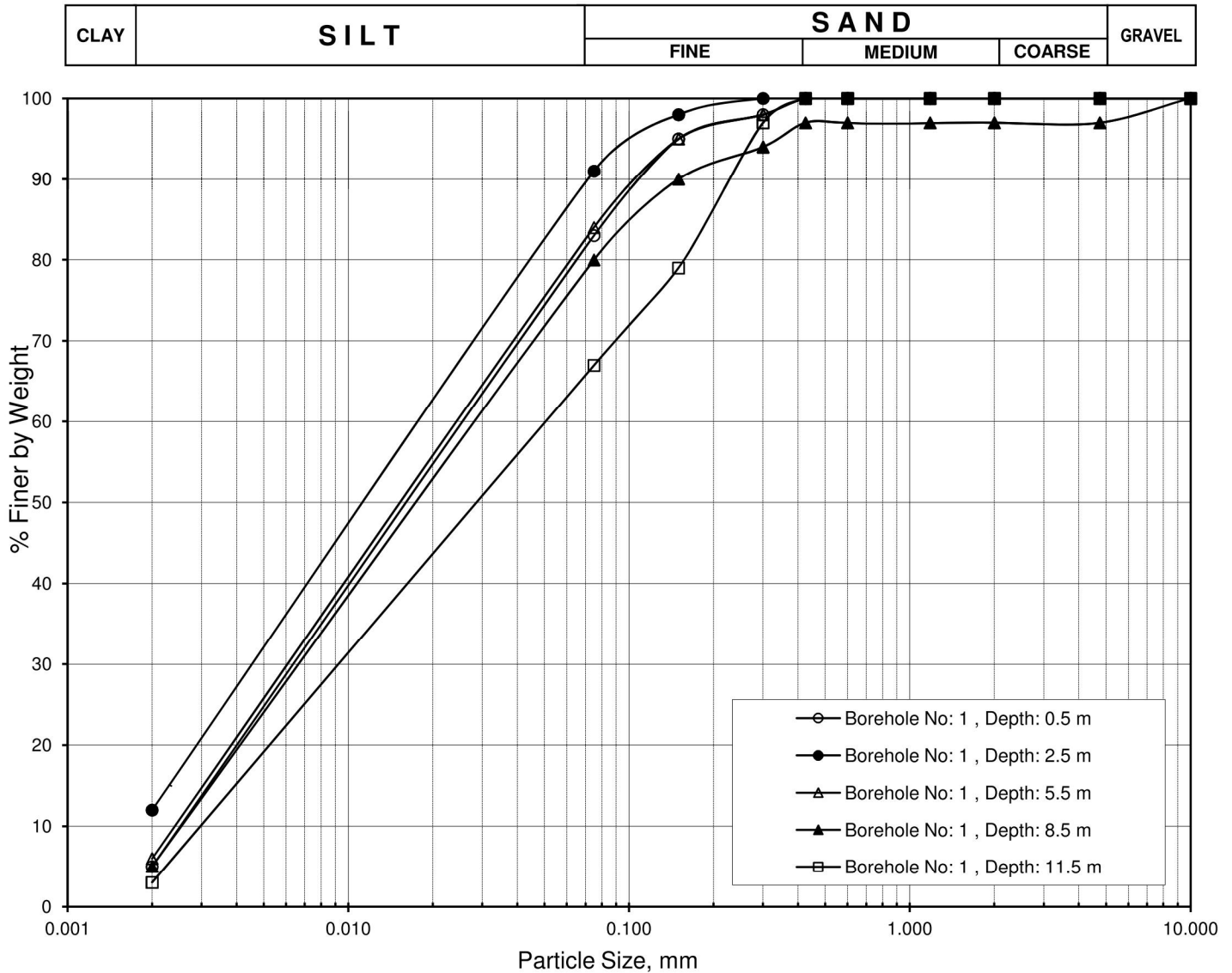
\*SOURCE : INSTITUTION OF CIVIL ENGINEERS, LONDON (1979)

Location: Major Bridge at INR Ch. : 14+069 km

**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	0.50	Sandy silt (ML-CL)	0	17	78	5			
BH-1	2.50	Clayey silt (CL)	0	9	79	12			
BH-1	5.50	Sandy silt (ML-CL)	0	16	78	6			
BH-1	8.50	Sandy silt (ML-CL)	3	17	75	5			
BH-1	11.50	Sandy Silt (ML)	0	33	64	3			

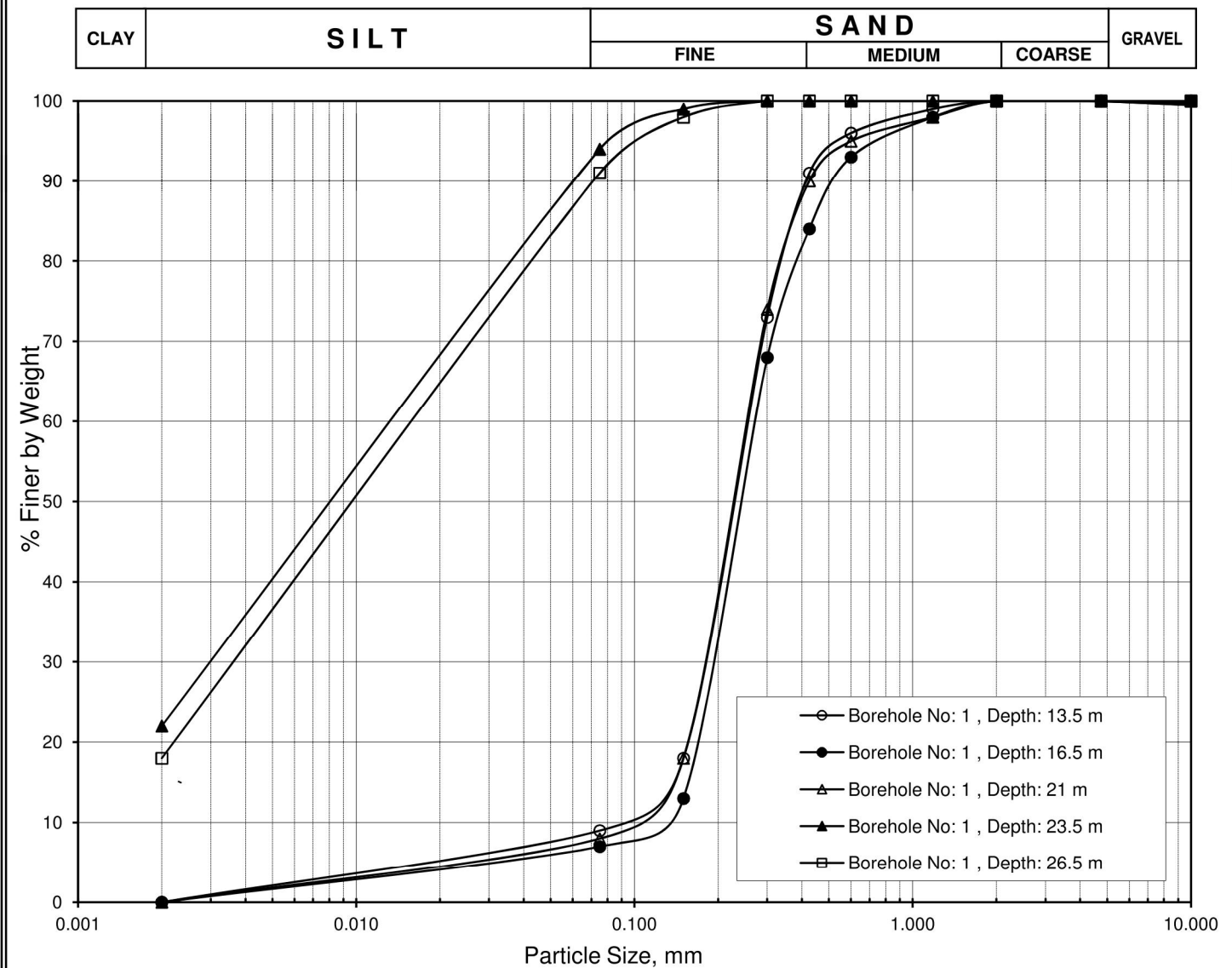


Location: Major Bridge at INR Ch.: 14+069 km

**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	13.50	Fine sand (SP-SM)	0	91	9	0			
BH-1	16.50	Fine sand (SP-SM)	0	93	7	0			
BH-1	21.00	Fine sand (SP-SM)	0	92	8	0			
BH-1	23.50	Clayey silt (CI)	0	6	72	22			
BH-1	26.50	Clayey silt (CI)	0	9	73	18			

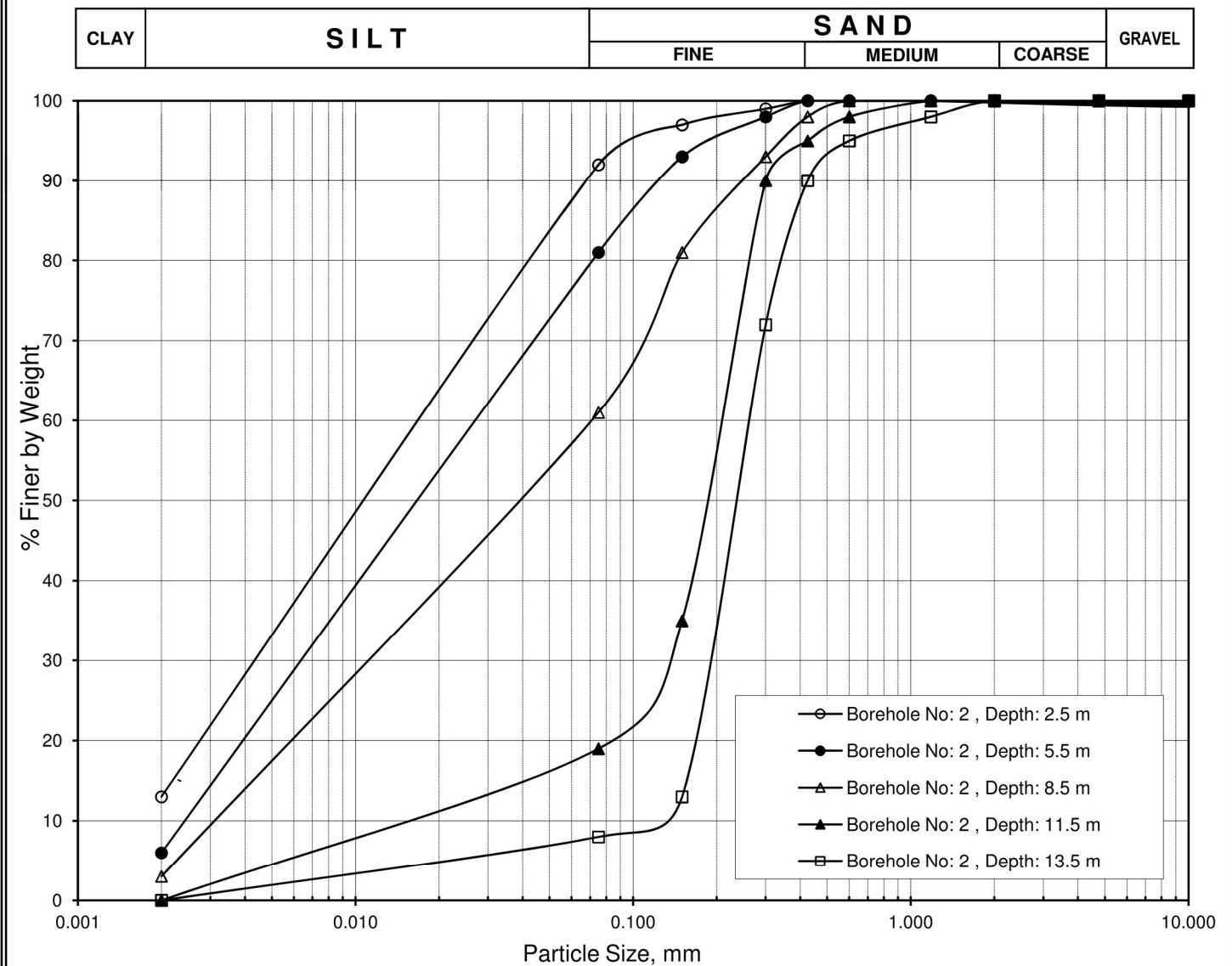


Location: Major Bridge at INR Ch.: 14+069 km

**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-2	2.50	Clayey silt (CL)	0	8	79	13			
BH-2	5.50	Sandy silt (ML-CL)	0	19	75	6			
BH-2	8.50	Sandy Silt (ML)	0	39	58	3			
BH-2	11.50	Silty Fine sand (SM)	0	81	19	0			
BH-2	13.50	Fine sand (SP-SM)	0	92	8	0			

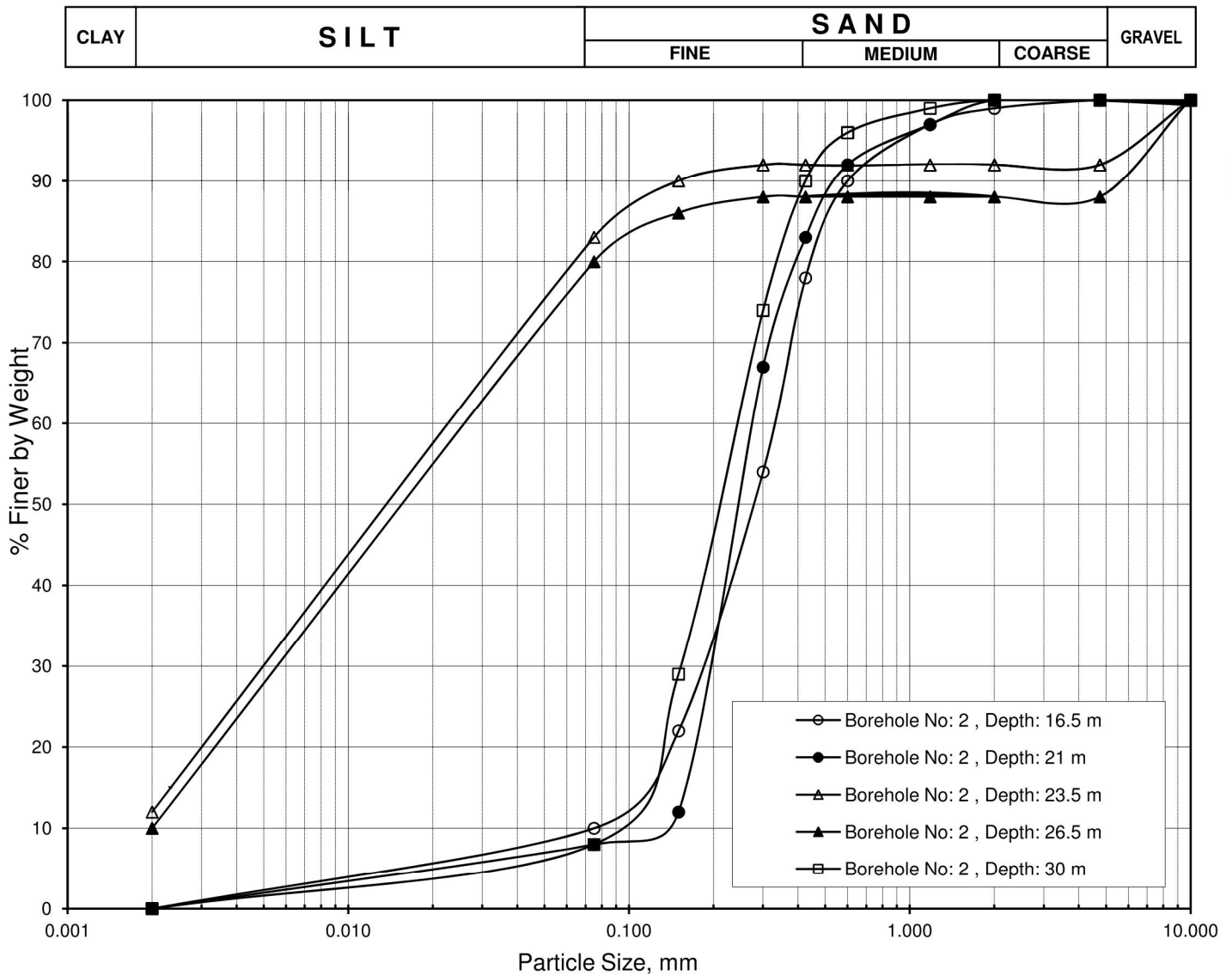


Location: Major Bridge at INR Ch.: 14+069 km

**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-2	16.50	Fine sand (SP-SM)	0	90	10	0			
BH-2	21.00	Fine sand (SP-SM)	0	92	8	0			
BH-2	23.50	Clayey silt (CL)	8	9	71	12			
BH-2	26.50	Clayey silt (CL)	12	8	70	10			
BH-2	30.00	Fine sand (SP-SM)	0	92	8	0			

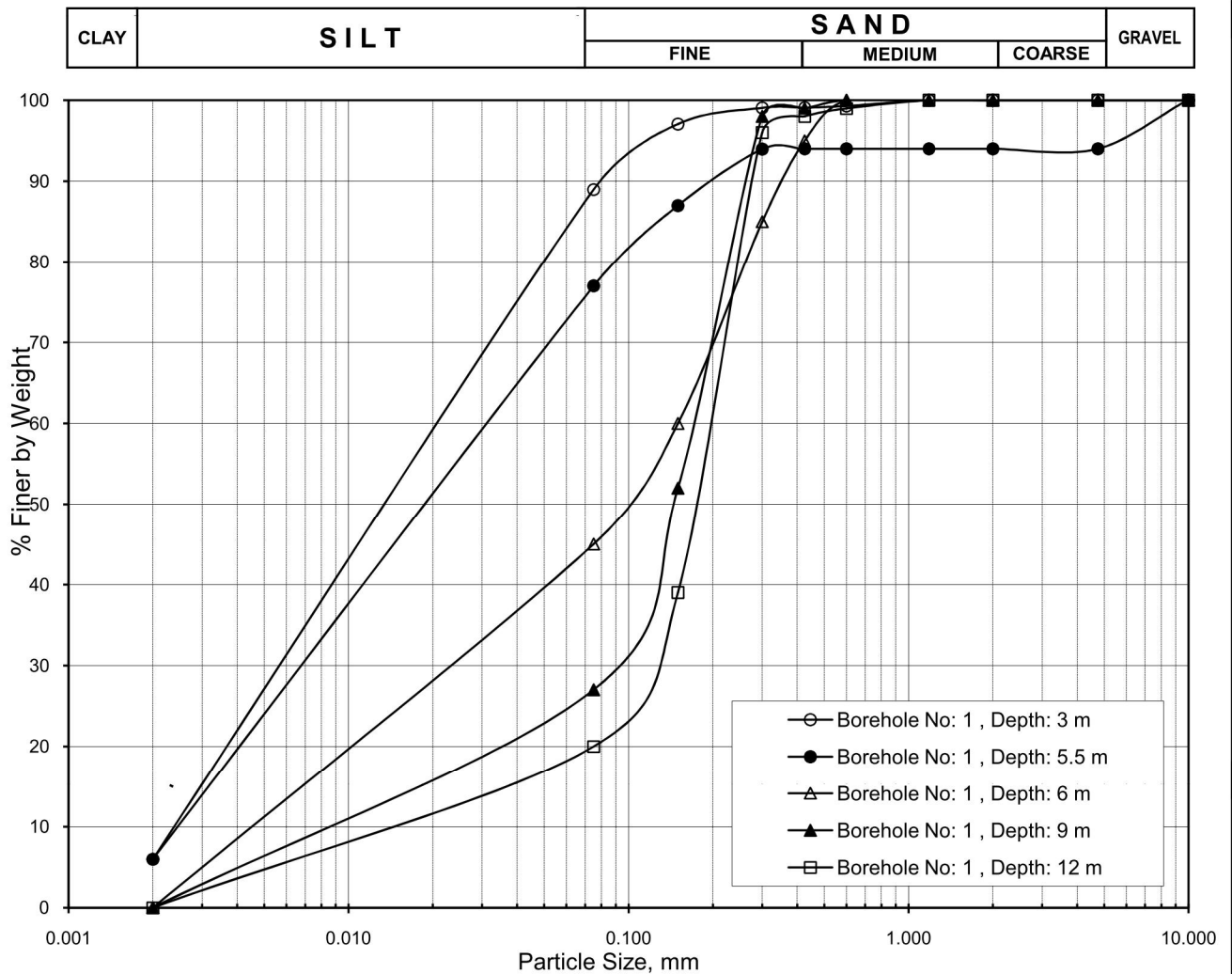


Location: Major Bridge at INR Ch.: 14+069 km

**Geotechnical Investigation for Hapur - Meerut Section of DFCC Meerut**

**Grain Size Analysis**

SAMPLE DETAILS			TEST RESULTS						
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay			
BH-1	3.00	Sandy silt (ML-CL)	0	11	83	6			
BH-1	5.50	Sandy silt (ML-CL)	6	17	71	6			
BH-1	6.00	Silty Fine sand (SM)	0	55	45	0			
BH-1	9.00	Silty Fine sand (SM)	0	73	27	0			
BH-1	12.00	Silty Fine sand (SM)	0	80	20	0			



Location: Minor Bridge at Ch. 13+136 Km

**Geotechnical Investigation for Hapur - Muzaffarnagar Section of DFCC Meerut**