



Report by :

**CENGRS GEOTECHNICA PVT. LTD.**  
**SOIL AND FOUNDATION EXPERTS**

**Final Factual Report on:**

**Geotechnical Investigation for  
Exhibition cum Convention Centre  
Dwarka, New Delhi**

Report Volume	Report Contents	Structures Covered	Number of Boreholes Covered
<b>Volume-2C</b>	<b>Field and Laboratory Test Data of Boreholes</b>	Exhibition Hall 2, Exhibition Hall 3, Exhibition Hall 4	<b>33</b>

Submitted to:

**M/s. Delhi-Mumbai Industrial Corridor Development Corporation Ltd.**

Room 341-B, 3<sup>rd</sup> Floor, Hotel Ashok, Diplomatic Enclave, 50-B, Chanakyapuri, New Delhi-110021

Project No. 217048

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21<sup>st</sup> July, 2017

Project No. 217048-2C

M/s. Delhi-Mumbai Industrial Corridor Development Corporation Ltd.  
Room 341-B 3<sup>rd</sup> Floor  
Hotel Ashok  
Diplomatic Enclave  
50-B, Chanakyapuri  
New Delhi-110021

Subject: **Geotechnical Investigation for Exhibition cum Convention Centre Dwarka, New Delhi**

We have carried out the captioned study in accordance with your work order dated 31<sup>st</sup> March, 2017. We thank you for your business, and hope that you are satisfied with our services rendered.

This Factual Report presents our findings based on the geotechnical investigations conducted by us at the project site. This report presents the field and laboratory test data based on the investigations completed on site.

We have prepared this report based on our findings on site, as well as our experience gained in over 5000 projects completed over the past 28 years. We are pleased to have been of service to you on this project and will be glad to consult further with you and your design team.

Yours faithfully,  
CENGRS GEOTECHNICA PVT. LTD.

Sanjay Gupta  
Managing Director

Ravi Sundaram  
Director



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## DEFINITION OF ACRONYMS

CENGRS	Cengrs Geotechnica Pvt. Ltd.
UTM	Universal Transverse Mercator coordinates system
NABL	National Accreditation Board for Testing and Calibration Laboratories
ISO	International Standards Organization
BIS	Bureau of Indian Standards
EGL	Existing Ground Level
NGL	Natural Ground Level
RL	Reduced Level
SPT	Standard Penetration Test
DS	Consolidated drained direct shear test

## BIS REFERENCES

- Compendium of Indian Standard on Soil Engineering (***Part-2, Field Testing of Soils for Civil Engineering Purposes***) ***SP36 (Part-2:1988) RA 2006***
- Compendium of Indian Standard on Soil Engineering (***Part-1, Laboratory Testing of Soils for Civil Engineering Purposes***) ***SP36 (Part-1:1987) RA 2006***



## 1.0 INTRODUCTION

### 1.1 Project Description

Government of India (GOI) is planning to develop an Exhibition cum Convention Center at Sector-25, Dwarka, New Delhi. GOI has envisaged M/s. Delhi-Mumbai Industrial Corridor Development Corporation (DMICDC) to establish, promote and facilitate the development of the overall project.

The various agencies involved in the design of the facility are as follows:

- |     |  |                              |
|-----|--|------------------------------|
| (a) | Government of India                                      | : Owner                      |
| (b) | Delhi-Mumbai Industrial Corridor Development Corporation | : Client                     |
| (c) | AECOM India Pvt. Ltd.                                    | : Detailed Design Consultant |
| (d) | Cengrs Geotechnica Pvt. Ltd.                             | : Geotechnical Consultant    |

Delhi-Mumbai Industrial Corridor Development Corporation (DMICDC) has awarded the work of detailed geotechnical investigation at the project site to Cengrs Geotechnica Pvt. Ltd (CENGRS). A layout plan indicating the locations of our field investigation is presented on Plates 1 to 5.

The scope of our investigations includes drilling of about one hundred and sixty two(162) boreholes (including 60 priority boreholes as specified by AECOM), conducting hundred (100) field California bearing ratio (FCBR), ten (10) trial pits, one (1) electrical resistivity test (ERT), ten (10) plate load test and installation of one (1) piezometer at the specified location.

**This report volume (Volume-2C) presents the field and laboratory results of thirty three (33) boreholes drilled at the site.**

### 1.2 Scope of Work

The overall purposes of this study are to investigate the stratigraphy at the site and submission of this factual report. To accomplish these purposes, the study is being conducted in the following phases:

- (a) drilling one hundred and sixty two (162) boreholes to 30 m depth or refusal (N>100), in order to determine the site stratigraphy and to collect soil and groundwater samples;
- (b) conducting hundred (100) field California bearing ratio (FCBR) tests to provide data for the design of internal roads;
- (c) excavating ten (10) trial pits to provide additional information on the stratigraphy at shallow depths;
- (d) conducting one (1) electrical resistivity tests (ERT's) to provide data for the grounding systems;
- (e) performing ten (10) plate load test at specified locations to assess the load-settlement behaviour of soils under loading;
- (f) installing one (1) piezometer for long-term monitoring of ground water level to aid in foundation construction;
- (g) testing selected soil and groundwater samples in the laboratory to determine pertinent index and engineering properties; and
- (h) compiling all field and laboratory data and submission of this factual report



### 1.3 Report Format

Our final report shall be presented in seven (7) volumes. The content of each of these report volumes is summarized below:

Report Volume	Report Content	Structures Covered	Number of Boreholes / Tests Covered
Volume I	Engineering Analysis & Recommendations	All structures	-
Volume 2A	Field and Laboratory Test Data of Boreholes	Exhibition Hall 1, Exhibition Hall 5, Convention 7, Retail 10	34
Volume 2B	Field and Laboratory Test Data of Boreholes	Arena 8, Five Star Hotel 11, Office 13, Office 14, Office 15, Retail 16, Office 17, Office 18, Four Star Hotel 21	35
<b>Volume 2C</b>	<b>Field and Laboratory Test Data of Boreholes</b>	<b>Exhibition Hall 2, Exhibition Hall 3, Exhibition Hall 4</b>	<b>33</b>
Volume 2D	Field and Laboratory Test Data of Boreholes	Five Star Hotel 9, Five Star Hotel 12, Four Star Hotel 19, Four Star Hotel 20, Service Apartment 22	31
Volume 2E	Field and Laboratory Test Data of Boreholes	Office 23, Office 24, Three Star Hotel 25, Office 26	29
Volume 2F	Field test results of FCBR, PLT, ERT, Trial pits etc.	-	-

This report volume (Volume-2C) presents the field and laboratory results of thirty three (33) boreholes drilled at the site.

### 1.4 Scope of Work Covered in this Report Volume

Details of boreholes drilled on site and presented in this report volume are as follows:

S.No.	Structure	Borehole No.	UTM Coordinates (Zone 43 R)		Ground Level (RL), m	Borehole Termination Depth (m)
			Easting	Northing		
1	-	BH-4R	699263	3159861	211.515	30.45
2	-	BH-8R	699403	3160128	211.465	30.45
3	-	BH-13R	699463	3160218	211.507	30.45
4	Exhibition Hall 4	BH-15	699424	3160070	211.443	30.45
5		BH-16	699486	3160024	212.000	30.45
6		BH-17	699548	3159979	212.133	30.45
7		PBH-18	699609	3159933	212.240	30.45
8		BH-19	699467	3160127	211.663	30.45
9		BH-20	699559	3160059	211.943	30.45
10		BH-21	699652	3159990	212.485	30.45
11		BH-22	699509	3160184	211.585	30.45
12		BH-23	699571	3160138	211.769	30.45
13		BH-24	699632	3160093	212.059	30.45
14		BH-25	699694	3160047	212.462	30.45



S.No.	Structure	Borehole No.	UTM Coordinates (Zone 43 R)		Ground Level (RL), m	Borehole Termination Depth (m)
			Easting	Northing		
15	Exhibition Hall 3	BH-26	699617	3160179	212.000	30.45
16		BH-27	699669	3160140	212.214	30.45
17		PBH-28	699721	3160101	212.458	30.45
18		BH-29	699659	3160236	212.000	30.45
19		BH-30	699711	3160197	212.231	30.45
20		BH-31	699763	3160159	212.902	30.45
21		BH-32	699701	3160293	212.291	30.45
22		BH-33	699753	3160254	212.614	30.45
23		BH-34	699806	3160216	212.940	30.45
24		BH-35	699737	3160341	212.451	30.45
25	Exhibition Hall 2	BH-36	699794	3160299	212.611	30.45
26		PBH-37	699850	3160258	212.030	30.45
27		BH-38	699789	3160391	212.451	30.45
28		BH-39	699878	3160325	212.575	30.45
29		BH-40	699797	3160473	212.571	30.45
30		BH-41	699843	3160439	212.221	30.45
31		BH-42	699889	3160406	212.457	30.45
32		BH-43	699934	3160372	212.524	30.45
33	-	BH-159	700481	3160326	214.150	35.0*

\* 5 m additional boring for piezometer installation

- A layout plan indicating the test locations of our field investigations is presented on Plates 1 to 5.
- The test locations were marked on the field by us in the presence of a client representative using a hand-held Global Positioning System (GPS). A satellite image indicating the test locations (as recorded by GPS) is presented on Plate 6.
- The reduced levels at the test locations were given to us by the client.

## 2.0 FIELD INVESTIGATION

### 2.1 Exploratory Boreholes

The boreholes were progressed using a mechanized calyx drilling rig to the specified depth. The diameter of the borehole was 150 mm. Where caving of the borehole occurred, casing was used to keep the borehole stable. The work was in general accordance with IS: 1892-1979 RA 2002.

Standard Penetration Tests (SPT) was conducted in the boreholes at specified depth intervals. The test was conducted by connecting a split spoon sampler to 'A' rods and driving it by 45 cm using a 63.5 kg hammer falling freely from a height of 75 cm. The tests were conducted in accordance with IS: 2131-1981 RA 2002. The SPT 'N'-values are described as follows:-

1. The number of blows for each 15 cm of penetration of the split spoon sampler is recorded.
2. The blows required to penetrate the initial 15 cm of the split spoon for seating the sampler is ignored due to the possible presence of loose materials or cuttings from the drilling operation.
3. The cumulative number of blows required to penetrate the balance 30 cm of the 45 cm split spoon sampler is termed the SPT value or the 'N' value. For example, a SPT value reported as "20" means that 20 blows were imparted to penetrate the split spoon sampler by the last 30 cm.



4. Where the number of blows required to penetrate the balance 30 cm of the split spoon sampler exceeds 100, the number of blows is presented along with the corresponding penetration. For example, an SPT value reported as "101 / 5 cm" means that 101 blows were imparted to penetrate the split spoon sampler by 5 cm after the first 15 cm initial (seating) penetration.
5. Where refusal ( $N > 100$ ) to further penetration of the split spoon sampler is encountered in the first 15 cm of seating penetration itself, SPT test could not be completed and "Ref" is indicated in the bore logs, along with the penetration achieved. For example, an SPT value reported as "Ref / 5 cm" means that more than 100 blows were imparted to penetrate the split spoon sampler by a total of 5 cm only, and the 15 cm seating penetration could not be achieved.

Disturbed samples were collected from the split spoon after conducting SPT. Undisturbed soil samples were collected by attaching a thin walled 'Shelby' tubes and driving the sampler by light-hammering using a 63.5 kg hammer in accordance with IS: 2132-1986 RA 2002. The tubes were sealed with wax at both ends. Wherever undisturbed samples were not available due to slippages, disturbed samples were collected. All samples were transported to our NABL-accredited laboratory at Noida for further examination and testing.

## 2.2 Groundwater

Groundwater level is measured in the boreholes after drilling and sampling is completed. The measured water levels are recorded on the individual soil profiles.

## 2.3 Piezometer Installation

Piezometer was installed at BH-159 for long term monitoring of the groundwater level. As per client instructions, the depth of the borehole was about 35 m below EGL. A porous element, Casagrande piezometer was lowered into the hole and connected using a 63 mm diameter PVC pipe. The piezometer was de-aired before lowering into the hole.

The annular space between borehole and the PVC pipe was filled with pea gravel from the bottom to a height of about 8 m depth below EGL. Above the pea gravel, a cement-bentonite mix of 6.5 m thickness was placed. Over this, a bentonite seal layer was placed (0.5 m thick). A sand-cement mixture was placed on top of the bentonite seal layer, up to the ground level. The piezometer was protected by a lockable box.

A typical schematic sketch of the piezometer installed in the project site is presented on Plate 80.

## 3.0 LABORATORY TEST

The laboratory testing was carried out in our NABL accredited laboratory. The quality procedure in our laboratory conforms to ISO/IEC-17025-2005.

Laboratory tests were conducted on selected soil and groundwater samples to determine their physical and engineering properties. The testing procedures are in accordance with current applicable IS specifications.

The following tests were conducted on selected soil and groundwater samples recovered from the boreholes:

Laboratory Test	IS Code Referred
Bulk Density	By calculations
Natural moisture content	IS : 2720 (Part-2)-1973, RA-2010
Specific Gravity	IS : 2720 (Part-3)-1980, RA-2007
Grain size analysis	IS : 2720 (Part-4)-1985, RA-2010





Laboratory Test		IS Code Referred
Liquid Limit and Plastic Limit		IS : 2720 (Part-5)-1985, RA-2010
Free Swell Index		IS : 2720 (Part-40) -1977, RA-2007
Consolidated drained direct shear test		IS : 2720 (Part-13)-1986, RA-2010
Chemical Analysis of water*	pH value	IS : 3025 (Part-11)-1983, RA-2006
	sulphates	IS : 3025 (Part-24)-1986, RA-2009
	chlorides	IS : 3025 (Part-32)-1988, RA-2009
Chemical Analysis of soil*	pH value	IS : 2720 (Part 26)-1987, RA-2007
	Sulphates	IS : 2720 (Part-27)-1977, RA-2010
	Chlorides	IS : 3025 (Part-32)-1988, RA-2009

\*Outside NABL Scope

Engineering terms used to describe soils are explained on Plate 7. A note on our NABL accreditation together with the uncertainty in laboratory measurements is presented on Plate 8.

#### 4.0 GENERAL SITE CONDITIONS

##### 4.1 Site Description

The site for the proposed Exhibition cum Convention center is located at Sec-25 Dwarka and lies at Latitude 28°33'7.76"N and Longitude 77° 2'35.31"E. The site is situated about 3.0 km west of Terminal-3, IGI Airport and about 1.5 km west of Dwarka Sec-21 Metro Station.

The site is bounded by roads on all the sides and covers about 221 acres on plan. Localized construction debris was observed at the site at the time of our field investigations.

##### 4.2 Regional Geology

The deposits in the project area belong to the "Indo Gangetic Alluvium" and are river deposits of the Yamuna, and its tributaries. The alluvial tract<sup>(1)</sup> is in the nature of a synclinal basin formed concomitantly with the elevation of the Himalayas to its north. It was formed during the later stages of the Himalayan Orogeny by the buckling down of the northern border of the peninsular shield beneath the sediments thrust over it from the north.

The Pleistocene and Recent Deposits of the Indo-Gangetic Basin are composed of gravels, sands, silts and clays with remains of animal and plants. A generalized description of geological formations encountered in Gurgaon and Delhi is as follows:

Period	Formation	Description
Recent	Newer Alluvium (Younger alluvium)	Unconsolidated, inter-bedded lenses of sand, silt gravel and clay confined to flood plains of Yamuna river.
Quaternary	Older Alluvium	Unconsolidated inter-bedded, inter-fingering deposit sand, clay and kankar, moderately sorted, thickness variable, at places more than 300 m.
~~~~~ Unconformity ~~~~~		
Pre-Cambrian	Pegmatite and Quartz Veins Quartzites and minor Schist Bands	Well stratified, thick-bedded brown to buff colour, hard and compact, intruded locally by pegmatite and quartz veins inter-bedded with mica schists.

<sup>(1)</sup> Krishnan, M.S. (1986), "**Geology of India & Burma**", CBS Publishers, New Delhi.

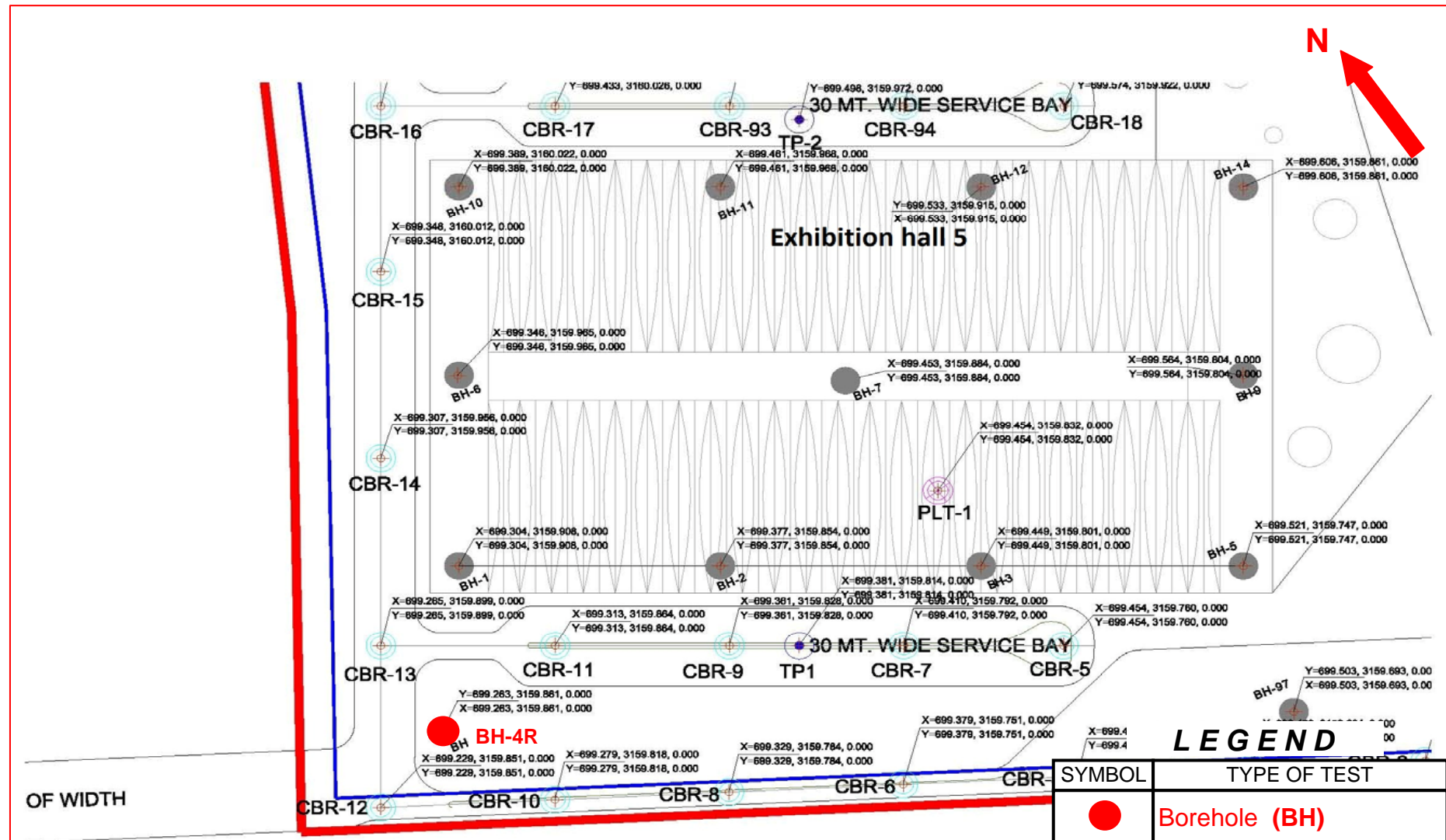


The older alluvium is rather dark colored (locally called “Bhanger”) and is generally, rich in concretions or nodules of impure calcium carbonate (kankars). The kankars are of all shapes and sizes, varying from small sand sized grains to big grains and big lumps. The age of the “Bhanger” alluvium is Middle to Upper Pleistocene.

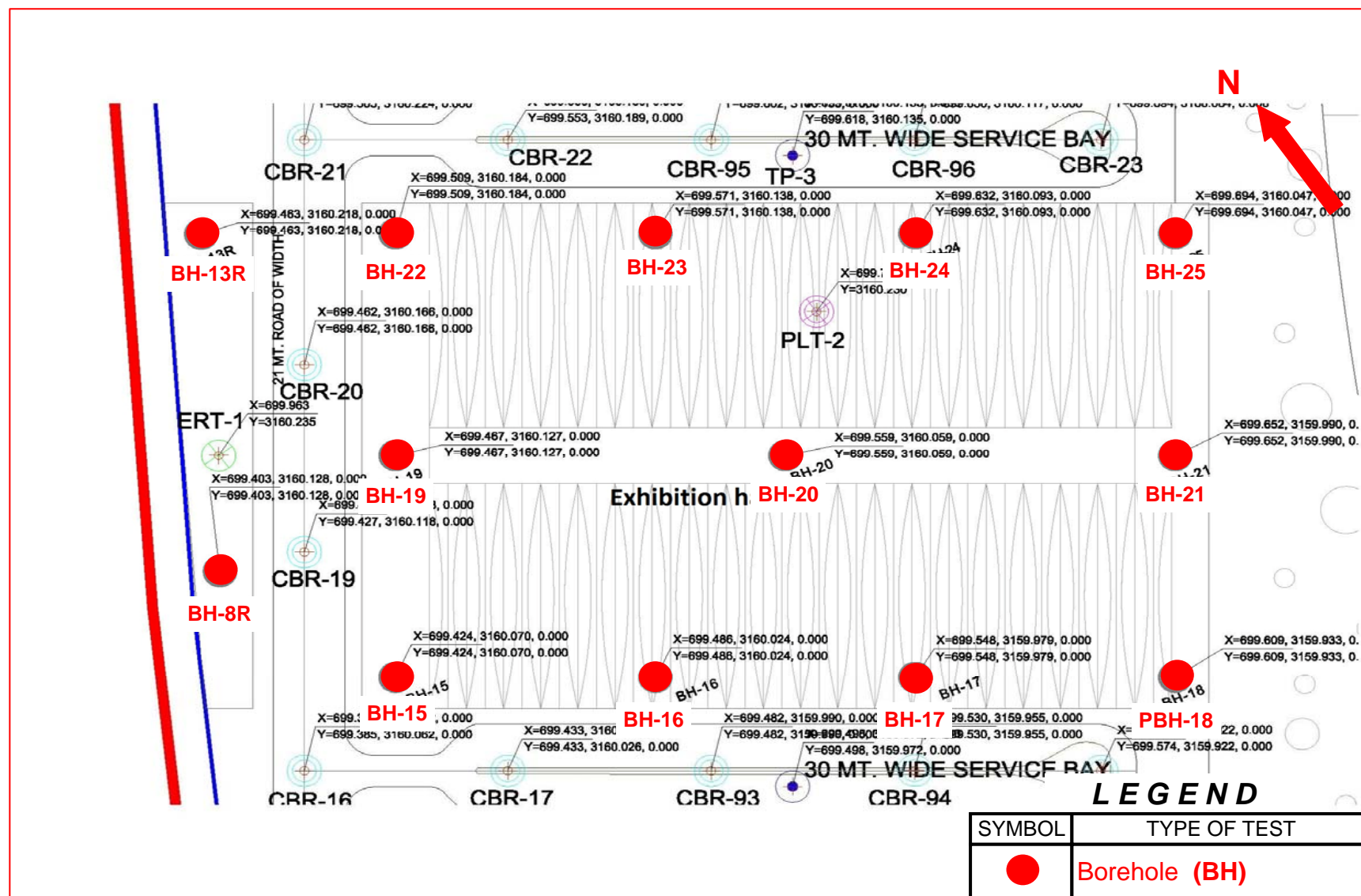
The newer alluvium (locally called “Khadar”) is light colored and poor in concretions. It contains lenticular beds of sand and gravel as well as peat beds. It is merged by insensible gradations into the Recent or deltaic alluvia and its age is Upper Pleistocene to Recent.

## 5.0 VARIABILITY IN SUBSURFACE CONDITIONS

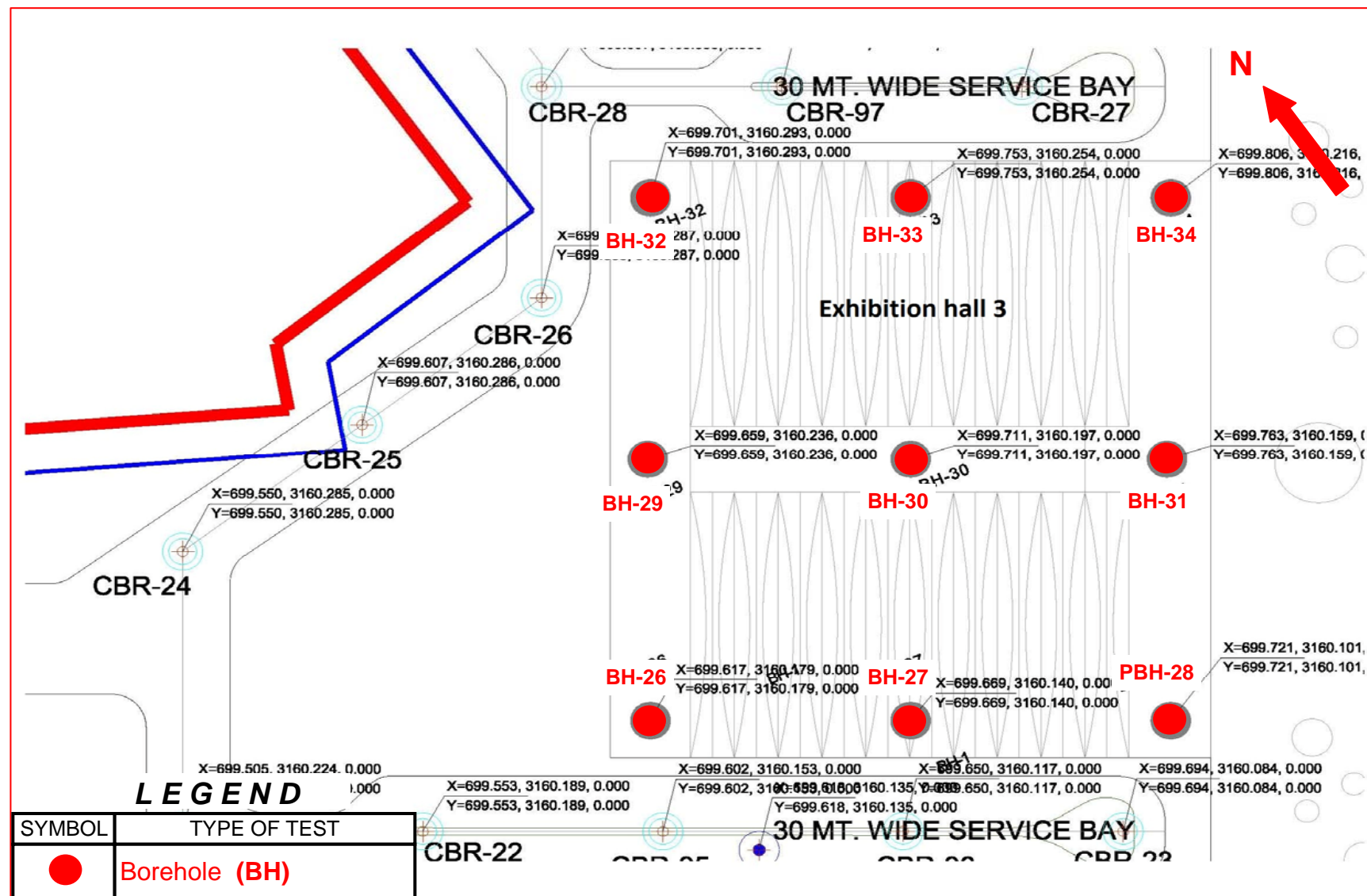
Subsurface conditions encountered during construction may vary somewhat from the conditions encountered during the site investigation. In case significant variations are encountered during construction, we request to be notified so that our engineers may review the recommendations in this report in light of these variations.



Plan of Field Investigations



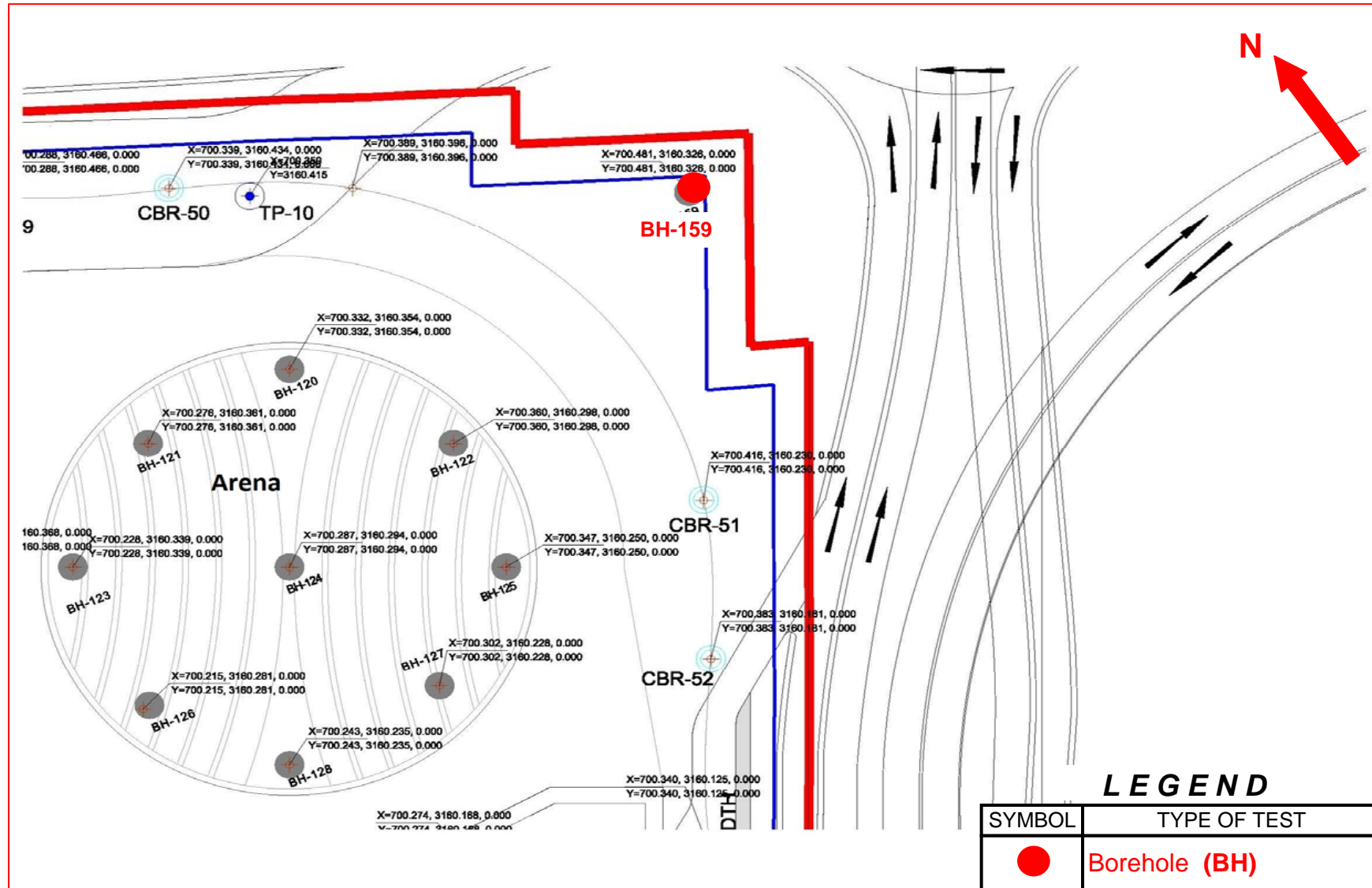
Plan of Field Investigations



Plan of Field Investigations

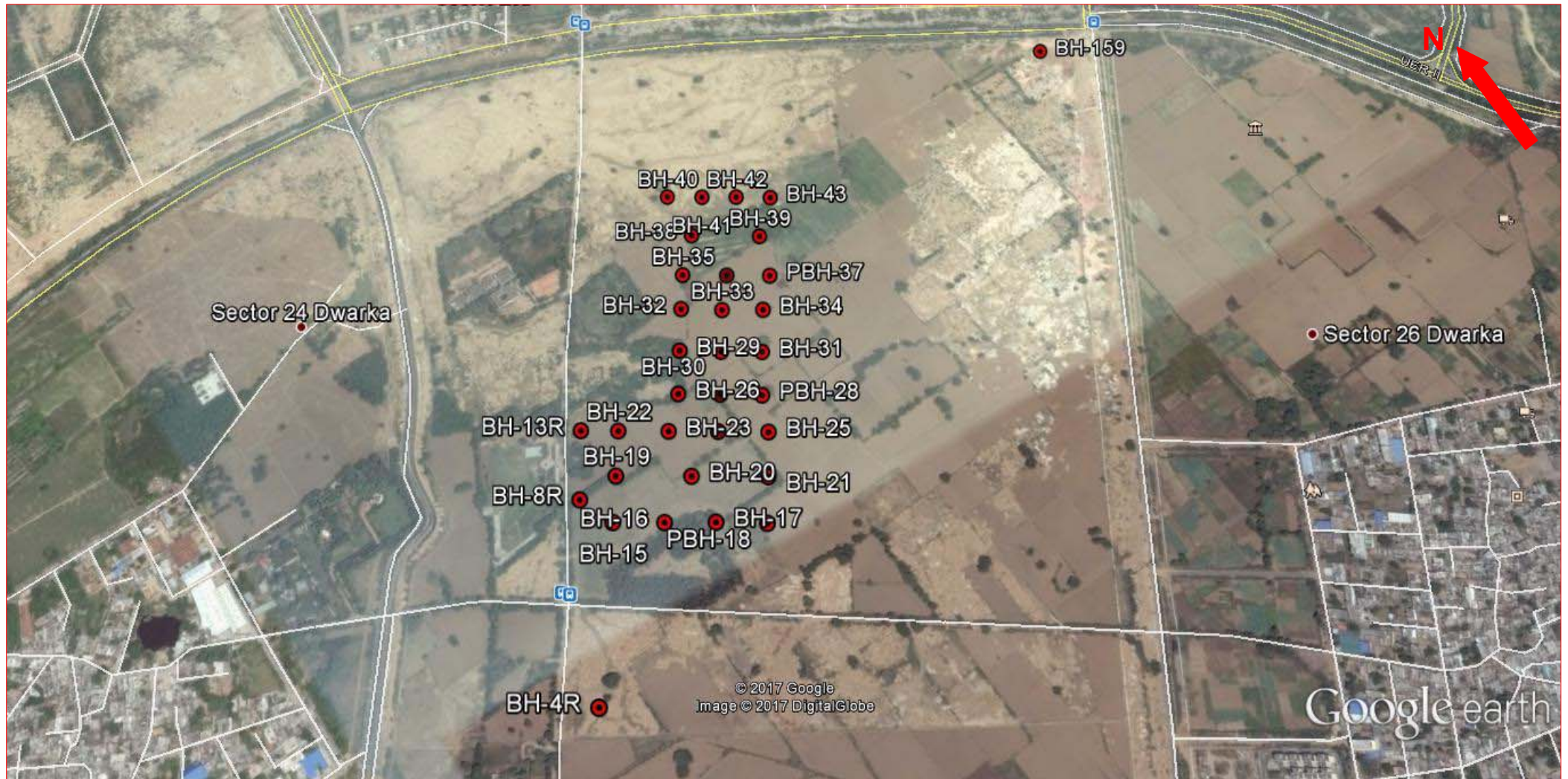






Plan of Field Investigations





- Satellite image taken from Google Earth®
- Test Locations marked as per GPS coordinates taken on site using hand-held Garmin® device
- Accuracy of hand-held GPS device generally ranges from 4-6m, and varies depending on the availability of satellite connection at the site

### Satellite Image of Site and Test Locations

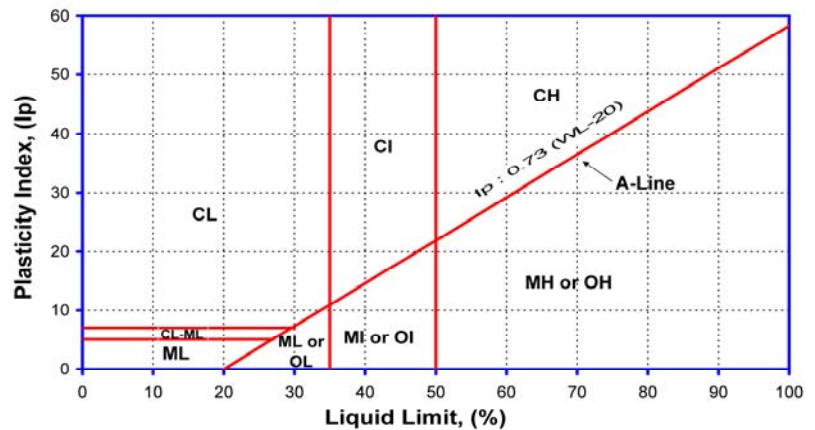




### Plasticity of Clay

Plasticity	Liquid Limit
Low Plastic	< 35
Medium Plastic	35 to 50
High Plastic	> 50

### Plasticity Chart



### Consistency of Cohesive Soils

Consistency	Cohesion Intercept, kg/sq.cm	SPT (N) Value
Very Soft	< 0.1	0 to 2
Soft	0.1 to 0.25	2 to 4
Firm/Medium	0.25 to 0.5	4 to 8
Stiff	0.5 to 1.0	8 to 15
Very Stiff	1.0 to 2.0	15 to 30
Hard	> 2.0	> 30

### Density Condition of Granular Soils

Density Descriptor	SPT (N) Value	Static Cone Tip Resistance kg/sq.cm
Very Loose	0 to 4	< 20
Loose	4 to 10	20 to 40
Medium Dense	10 to 30	40 to 120
Dense	30 to 50	120 to 200
Very dense	> 50	> 200

### Degree of Expansion of Fine Grained Soils

Liquid Limit	Plasticity Index	Shrinkage Index	Free Swell Percent	Degree of Expansion	Degree of Severity
20 - 35	< 12	< 15	< 50	Low	Non-critical
35 - 50	12 - 23	15 - 30	50 - 100	Medium	Marginal
50 - 70	23 - 32	30 - 60	100 - 200	High	Critical
70 - 90	> 32	> 60	> 200	Very High	Severe

## Engineering Description of Soils

### NABL Accredited Laboratory

Our laboratory is accredited to **National Accreditation Board for Testing and Calibration Laboratories (NABL)**, New Delhi. The quality procedures in our laboratory conform to the International Standard **ISO/IEC: 17025-2005**.

The accreditation assures our clients of work quality in conformance with international norms and practices. It authorizes us to use the NABL logo on test results.

To maintain the necessary level of quality and reliability in all measurements on a continual basis, we indulge in the following:

- Use of calibrated equipment, regular maintenance and good housekeeping are a part of our work culture.
- Inter-laboratory comparison, proficiency testing and replicate testing, continuing education - ensure uniform quality of results.
- Internal Audit of quality procedures is done by our qualified ISO 17025 auditors to maintain the requisite standards. NABL conducts external audit.

### Uncertainty

Every measurement entails an uncertainty. It is well known that no measuring instrument can determine the true value of any measurement. The cumulative effect of factors such as sensitivity of equipment, accuracy in calibration, human factors and environmental conditions will determine the overall uncertainty in the parameter determined from these measurements.

As a part of our commitment to our clients, we have worked out the uncertainty in the parameters reported by our laboratory. Although this does not form a part of our contract agreement, we present below our statistical estimate of uncertainty of various parameters based on our most recent evaluation (February, 2016).

Test / Parameter		Uncertainty*	Test / Parameter		Uncertainty*	
Moisture Content		± 0.29%	Free Swell Index, %		± 2.6%	
Bulk & Dry Density		± 0.01 g/cc	Swell Pressure		± 0.43 kg/cm <sup>2</sup>	
Specific Gravity		± 0.01	Consolidation	Pressure	± 0.03 kg/cm <sup>2</sup>	
Liquid Limit		± 0.29%		Void Ratio	±0.01	
Plastic Limit			Density Index (relative density) of cohesionless soils		± 5 %	
Shrinkage Limit						
Unconfined Compression	c	± 0.054 kg/cm <sup>2</sup>	CD Direct Shear Test	φ	± 0.29 degrees	
UU Triaxial Test	c	± 0.01 kg/cm <sup>2</sup>	Soil Gradation		± 0.5% of particle size	
	φ	± 0.48 degree				
Std/Mod Proctor Compaction	MDD	± 0.14 g/cc	Coefficient of Permeability		± 2.7 x 10 <sup>-5</sup> cm/s	
	OMC	± 0.29%	Rock		Crushing Strength	± 3.1 kg/cm <sup>2</sup>
Laboratory CBR		± 0.58%			Point Load Strength Index	± 8.89 kg/cm <sup>2</sup>

\* at 95 percent confidence level for coverage factor of 2

### **Uncertainty in Laboratory Measurements**

ISO/IEC 17025:2005  
Certified Laboratory  
(NABL)  
Certificate No. T-1741



Location : -  
UTM Coordinates : 699263 E, 3159861 N

### Soil Profile (BH-4R)

Termination Depth : 30.45 m (RL 181.065 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.40 m Casing Depth : -  
Surface Elevation : RL 211.515 m Boring Start : 27-May-17  
Ground Water Level : RL 191.1 m Boring Finish : 29-May-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Very stiff brown sandy silt, low plastic (CL)																		
1.00	1.45	SPT1	16	25				0	39	50	11												2	
2.00	2.30	UDS1											1.81	1.63	11.3								5	
3.00	3.45	SPT2	19	23																			6	
4.00	4.30	UDS2											1.82	1.60	13.6								4	
5.00	5.45	SPT3	21	22								25.5	17.5	8.0										
6.00	6.30	UDS3											1.82	1.59	14.6									
7.50	7.95	SPT4	24	22				0	40	50	10													
8.00	8.30	UDS4											1.83	1.58	15.5		DS	0.5 ,1, 1.5	0.0	31.2				
9.50	9.95	SPT5	22	18								28.7	17.2	11.5										
11.00	11.30	DS2																						
12.50	12.95	SPT6	27	20				0	34	53	13													


<sup>(1)</sup> SPT is outside NABL scope.

ISO/IEC 17025:2005  
Certified Laboratory  
(NABL)  
Certificate No. T-1741



### Soil Profile (BH-4R)

Location : - Termination Depth : 30.45 m (RL 181.065 m) Boring Method : Rotary Drilling  
UTM Coordinates : 699263 E, 3159861 N Ground Water Depth : 20.40 m Casing Depth : -  
Surface Elevation : RL 211.515 m Boring Start : 27-May-17  
Ground Water Level : RL 191.1 m Boring Finish : 29-May-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)				
From	To		Field Value, N <sub>f</sub>	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, $\phi$ (degrees)					
14.00	14.30	UDS5	35	23		Hard brown sandy silt with traces of gravels, low plastic (CL)										1.85	1.60	16.2										
15.50	15.95	SPT7																										
17.00	17.30	UDS6														1.87	1.54	21.0										
18.50	18.95	SPT8														37	22							26.5	17.4	9.2		
20.00	20.30	DS3																										
22.00	22.45	SPT9														41	19											
24.00	24.30	DS4																										
26.00	26.45	SPT10														45	19	1					32	54	13			
28.00	28.30	DS5																										
30.00	30.45	SPT11														48	20									26.1	17.8	8.3
							30.45																					

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-8R)

Location : - Termination Depth : 30.45 m (RL 181.015 m) Boring Method : Rotary Drilling  
UTM Coordinates : 699403 E, 3160128 N Ground Water Depth : 20.60 m Casing Depth : -  
Surface Elevation : RL 211.47 m Boring Start : 04-Jun-17  
Ground Water Level : RL 190.9 m Boring Finish : 06-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N <sub>r</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, $\phi$ (degrees)	
0.00	0.50	DS1				Firm to very stiff brown sandy silt, low plastic (CL)																		
1.00	1.45	SPT1	7	11		- firm, 0.0 to 3.0 m		0	24	65	11													3
2.00	2.30	UDS1										30.7	17.3	13.3										6
3.00	3.45	SPT2	12	14		- stiff, 3.0 to 7.0 m																		4
4.00	4.30	UDS2														1.80	1.62	11.0						4
5.00	5.45	SPT3	14	15																				
6.00	6.30	UDS3																		DS	0.5, 1, 1.5	0.0	30.0	
7.00	7.45	SPT4	15	14		- very stiff, 7.0 to 14.0 m		0	15	72	13													
8.00	8.30	UDS4														1.82	1.62	12.3						
9.50	9.95	SPT5	18	15																				
11.00	11.30	UDS5														1.85	1.64	12.8						
12.50	12.95	SPT6	24	18				0	18	66	16													

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-8R)

Location : - Termination Depth : 30.45 m (RL 181.015 m) Boring Method : Rotary Drilling  
UTM Coordinates : 699403 E, 3160128 N Ground Water Depth : 20.60 m Casing Depth : -  
Surface Elevation : RL 211.47 m Boring Start : 04-Jun-17  
Ground Water Level : RL 190.9 m Boring Finish : 06-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, $\phi$ (degrees)	
14.00	14.30	UDS6				Very stiff to hard brown sandy silt, low plastic (CL)						27.5	16.8	10.7		1.85	1.62	14.6						
15.50	15.95	SPT7	28	19		- very stiff, 14.0 to 18.5 m																		
17.00	17.30	UDS7														1.89	1.64	15.6						
18.50	18.95	SPT8	32	19		- hard, 18.5 to 30.45 m		0	21	61	18													
20.00	20.30	UDS8										28.6	16.5	12.1		1.91	1.57	21.2						
22.00	22.45	SPT9	35	17																				
24.00	24.30	DS2														1.93	1.58	22.3						
26.00	26.45	SPT10	36	17																				
28.00	28.30	UDS9										29.9	16.5	13.4		1.94	1.58	22.6						
30.00	30.45	SPT11	40	18			30.45																	

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-13R)

Location : - Termination Depth : 30.45 m (RL 181.057 m)  
UTM Coordinates : 699463 E, 3160218 N Ground Water Depth : 20.40 m  
Surface Elevation : RL 211.51 m Boring Start : 07-Jun-17  
Ground Water Level : RL 191.1 m Boring Finish : 08-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to very stiff brown sandy silt, low plastic (CL)																	
1.00	1.45	SPT1	8	12		- stiff, 0.0 to 9.5 m																	
2.00	2.30	UDS1				- with traces of gravels, 0.0 to 9.5 m		2	21	59	18				1.81	1.63	11.0						
3.00	3.45	SPT2	11	13								24.3	15.7	8.6									
4.00	4.30	UDS2													1.82	1.63	12.1						
5.00	5.45	SPT3	12	12								28.6	16.0	12.6									
6.00	6.30	UDS3													1.85	1.63	13.2		DS	0.5, 1, 1.5	0.0	30.7	
7.00	7.45	SPT4	13	12																			
8.00	8.30	UDS4													1.87	1.62	15.2						
9.50	9.95	SPT5	22	18		- very stiff, 9.5 to 14.0 m		0	21	63	16												
11.00	11.30	UDS5													1.89	1.62	16.5						
12.50	12.95	SPT6	28	21																			

<sup>(1)</sup> SPT is outside NABL scope.

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Location : -  
UTM Coordinates : 699463 E, 3160218 N

### Soil Profile (BH-13R)

Termination Depth : 30.45 m (RL 181.057 m)  
Ground Water Depth : 20.40 m  
Surface Elevation : RL 211.51 m  
Ground Water Level : RL 191.1 m  
Boring Method : Rotary Drilling  
Casing Depth : -  
Boring Start : 07-Jun-17  
Boring Finish : 08-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	DS2				Hard brown sandy silt with traces of gravels, low plastic (CL)																	
15.50	15.95	SPT7	36	24				3	16	66	15												
17.00	17.30	UDS6													1.91	1.61	18.2						
18.50	18.95	SPT8	41	25																			
20.00	20.30	UDS7													1.94	1.62	19.5						
22.00	22.45	SPT9	43	20																			
24.00	24.30	UDS8													1.95	1.61	21.2						
26.00	26.45	SPT10	46	20				4	15	67	14												
28.00	28.30	DS3																					
30.00	30.45	SPT11	55	21			30.45																

<sup>(1)</sup> SPT is outside NABL scope.



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### Soil Profile (BH-15)

Location : Exhibition hall 4  
UTM Coordinates : 699424 E, 3160070 N  
Termination Depth : 30.45 m (RL 180.993 m)  
Ground Water Depth : 20.60 m  
Surface Elevation : RL 211.44 m  
Ground Water Level : RL 190.8 m  
Boring Method : Rotary Drilling  
Casing Depth : -  
Boring Start : 02-Jun-17  
Boring Finish : 04-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Firm to very stiff brown sandy silt, low plastic (CL)																		
1.00	1.45	SPT1	7	11		- firm, 0.0 to 3.0 m																		5
2.00	2.30	UDS1						0	17	70	13					1.80	1.61	11.5						5
3.00	3.45	SPT2	9	11		- stiff, 3.0 to 7.0 m																		7
4.00	4.30	UDS2														1.81	1.61	12.2		DS	0.5, 1, 1.5	0.0	30.1	5
5.00	5.45	SPT3	12	12																				
6.00	6.30	UDS3														1.82	1.61	13.0						
7.00	7.45	SPT4	16	15		- very stiff, 7.0 to 14.0 m		0	40	51	9													
8.00	8.30	DS2										27.4	16.6	10.8										
9.50	9.95	SPT5	20	17																				
11.00	11.30	UDS4														1.83	1.60	14.5						
12.50	12.95	SPT6	23	17																				


<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-15)

Location :	Exhibition hall 4	Termination Depth :	30.45 m (RL 180.993 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	699424 E, 3160070 N	Ground Water Depth :	20.60 m	Casing Depth :	-
		Surface Elevation :	RL 211.44 m	Boring Start :	02-Jun-17
		Ground Water Level :	RL 190.8 m	Boring Finish :	04-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)						
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)							
14.00	14.30	UDS5	27	18		Very stiff to hard brown sandy silt, low plastic (CL)	30.45	3	20	61	16					1.85	1.58	16.5												
15.50	15.95	SPT7				- very stiff, 14.0 to 18.5 m																								
17.00	17.30	UDS6				- with traces of gravels, 14.0 to 22.0 m																								
18.50	18.95	SPT8				- hard, 18.5 to 30.4 m																								
20.00	20.30	DS3																												
22.00	22.45	SPT9	40	19		0		23	64	13																				
24.00	24.30	UDS7								30.0	16.6	13.3	1.90	1.56	22.2															
26.00	26.45	SPT10	47	20																										
28.00	28.30	DS4																												
30.00	30.45	SPT11	60	23																										

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-16)

Location : Exhibition hall 4  
UTM Coordinates : 699486 E, 3160024 N  
Termination Depth : 30.45 m (RL 181.55 m)  
Ground Water Depth : 20.50 m  
Surface Elevation : RL 212.00 m  
Ground Water Level : RL 191.5 m  
Boring Method : Rotary Drilling  
Casing Depth : -  
Boring Start : 02-Jun-17  
Boring Finish : 04-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N <sub>r</sub> <sup>1</sup>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, $\phi$ (degrees)	
0.00	0.50	DS1				Stiff to very stiff brown sandy silt, low plastic (CL)																		
1.00	1.45	SPT1	10	16		- stiff, 0.0 to 5.0 m		0	26	50	24													8
2.00	2.30	UDS1														1.80	1.62	11.0						4
3.00	3.45	SPT2	11	13																				11
4.00	4.30	UDS2														1.82	1.62	12.2						5
5.00	5.45	SPT3	17	18		- very stiff, 5.0 to 14.0 m																		
6.00	6.30	UDS3				- with gravels, 6.0 to 14.0 m		14	19	54	13					1.83	1.63	12.6		DS	0.5, 1, 1.5	0.0	30.4	
7.00	7.45	SPT4	19	18																				
8.00	8.30	UDS4														1.86	1.63	14.6						
9.50	9.95	SPT5	22	18																				
11.00	11.30	UDS5						9	20	55	16					1.88	1.62	15.9						
12.50	12.95	SPT6	20	15																				






<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-16)

Location :	Exhibition hall 4	Termination Depth :	30.45 m (RL 181.55 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	699486 E, 3160024 N	Ground Water Depth :	20.50 m	Casing Depth :	-
		Surface Elevation :	RL 212.00 m	Boring Start :	02-Jun-17
		Ground Water Level :	RL 191.5 m	Boring Finish :	04-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)	
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, $\phi$ (degrees)		
14.00	14.30	UDS6	26	17		Very stiff to hard brown sandy silt, low plastic (CL)	30.45								1.92	1.62	18.6								
15.50	15.95	SPT7				- very stiff, 14.0 to 18.5 m																			
17.00	17.30	UDS7	37	22		- hard, 18.5 to 30.4 m									25.6	15.8	9.9						1.93	1.62	19.5
18.50	18.95	SPT8																							
20.00	20.30	UDS8	44	20																					
22.00	22.45	SPT9																							
24.00	24.30	UDS9	48	20		27.6									16.1	11.4									
26.00	26.45	SPT10																							
28.00	28.30	UDS10	55	21																					
30.00	30.45	SPT11																							

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-17)

Location : Exhibition hall 4  
UTM Coordinates : 699548 E, 3159979 N  
Termination Depth : 30.45 m (RL 181.683 m)  
Ground Water Depth : 20.60 m  
Surface Elevation : RL 212.13 m  
Ground Water Level : RL 191.5 m  
Boring Method : Rotary Drilling  
Casing Depth : -  
Boring Start : 02-Jun-17  
Boring Finish : 04-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)				
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)					
0.00	0.50	DS1				Stiff to very stiff brown sandy silt, low plastic (CL)  - stiff, 0.0 to 7.0 m										1.79	1.61	11.2						3				
1.00	1.45	SPT1	9	14				0	40	50	10																	
2.00	2.30	UDS1																							6			
3.00	3.45	SPT2	12	14																					4			
4.00	4.30	UDS2																1.80	1.61	11.8					8			
5.00	5.45	SPT3	12	12		- very stiff, 7.0 to 14.0 m											1.82	1.62	12.8	DS	0.5 ,1, 1.5	0.0	30.2					
6.00	6.30	UDS3																										
7.00	7.45	SPT4	17	16				0	40	47	13							1.85	1.62					14.0				
8.00	8.30	UDS4																										
9.50	9.95	SPT5	20	17																								
11.00	11.30	UDS5						0	38	48	14							1.86	1.61					15.2				
12.50	12.95	SPT6	23	17								23.8	17.5	6.4														

<sup>(1)</sup> SPT is outside NABL scope.

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Location : Exhibition hall 4  
UTM Coordinates : 699548 E, 3159979 N

### Soil Profile (BH-17)

Termination Depth : 30.45 m (RL 181.683 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.60 m Casing Depth : -  
Surface Elevation : RL 212.13 m Boring Start : 02-Jun-17  
Ground Water Level : RL 191.5 m Boring Finish : 04-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	DS2				Very stiff to hard brown sandy silt, low plastic (CL)		0	22	60	18	24.8	17.3	7.5		1.89	1.60	18.5						
15.50	15.95	SPT7	29	19																				- very stiff, 14.0 to 18.5 m
17.00	17.30	UDS6				- hard, 18.5 to 30.45 m										1.92	1.57	22.3						
18.50	18.95	SPT8	32	19																				
20.00	20.30	DS3																						
22.00	22.45	SPT9	39	18																				
24.00	24.30	UDS7																						
26.00	26.45	SPT10	41	18																				
28.00	28.30	DS4																						
30.00	30.45	SPT11	94	31																				
							30.45																	

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (PBH-18)

Location : Exhibition hall 4  
UTM Coordinates : 699609 E, 3159933 N  
Termination Depth : 30.45 m (RL 181.79 m)  
Ground Water Depth : 20.40 m  
Surface Elevation : RL 212.24 m  
Ground Water Level : RL 191.8 m  
Boring Method : Rotary Drilling  
Casing Depth : -  
Boring Start : 24-May-17  
Boring Finish : 26-May-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to very stiff brown sandy silt, low plastic (CL)																		
1.00	1.45	SPT1	8	12		- stiff, 0.0 to 5.0 m		0	44	48	8													4
2.00	2.30	UDS1														1.80	1.60	12.3						6
3.00	3.45	SPT2	15	18								21.4	17.3	4.1										9
4.00	4.30	UDS2														1.81	1.59	14.0	2.74	DS	0.5, 1, 1.5	0.0	30.4	12
5.00	5.45	SPT3	17	18		- very stiff, 5.0 to 14.0 m		0	43	49	8													
6.00	6.30	UDS3														1.79	1.54	16.0						
7.00	7.45	SPT4	19	18																				
8.00	8.30	UDS4														1.86	1.52	22.0						
9.50	9.95	SPT5	21	17				0	47	40	13													
11.00	11.30	DS2																						
12.50	12.95	SPT6	25	18		- with traces of gravels, 12.5 to 14.0 m		1	44	44	11													

<sup>(1)</sup> SPT is outside NABL scope.


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Location : Exhibition hall 4  
UTM Coordinates : 699609 E, 3159933 N

### Soil Profile (PBH-18)

Termination Depth : 30.45 m (RL 181.79 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.40 m Casing Depth : -  
Surface Elevation : RL 212.24 m Boring Start : 24-May-17  
Ground Water Level : RL 191.8 m Boring Finish : 26-May-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	UDS5	27	18		Very stiff to hard brown sandy silt, low plastic (CL)		1	43	48	8				1.84	1.59	15.6	2.71						
15.50	15.95	SPT7				- very stiff, 14.0 to 18.5 m																		
17.00	17.30	DS3																						
18.50	18.95	SPT8				- hard, 18.5 to 30.45 m																		
20.00	20.30	DS4				- with traces of gravels, 18.5 to 26.0 m																		
22.00	22.45	SPT9																						
24.00	24.30	DS5																						
26.00	26.45	SPT10																						
28.00	28.30	DS6																						
30.00	30.45	SPT11																						
							30.45																	

<sup>(1)</sup> SPT is outside NABL scope.



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### Soil Profile (BH-19)

Location : Exhibition hall 4  
UTM Coordinates : 699467 E, 3160127 N  
Termination Depth : 30.45 m (RL 181.213 m)  
Ground Water Depth : 20.60 m  
Surface Elevation : RL 211.66 m  
Ground Water Level : RL 191.1 m  
Boring Method : Rotary Drilling  
Casing Depth : -  
Boring Start : 04-Jun-17  
Boring Finish : 06-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to hard brown sandy silt, low plastic (CL)																		
1.00	1.45	SPT1	10	16		- stiff, 0.0 to 3.0 m																		9
2.00	2.30	UDS1				- with gravels, 0.0 to 6.0 m		5	26	66	3					1.75	1.49	17.1						10
3.00	3.45	SPT2	19	23		- very stiff, 3.0 to 7.0 m																		12
4.00	4.30	UDS2										30.2	15.5	14.8		1.78	1.54	15.5		DS	0.5, 1, 1.5	0.0	30.7	4
5.00	5.45	SPT3	24	25																				
6.00	6.30	UDS3				- with traces of gravels, 6.0 to 14.0 m		2	22	73	3					1.80	1.61	11.8						
7.00	7.45	SPT4	30	28		- hard, 7.0 to 14.0 m																		
8.00	8.30	UDS4										31.6	18.4	13.2		1.83	1.59	14.8						
9.50	9.95	SPT5	35	29																				
11.00	11.30	UDS5														1.84	1.60	14.9	2.66					
12.50	12.95	SPT6	40	29																				

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-19)

Location : Exhibition hall 4 Termination Depth : 30.45 m (RL 181.213 m) Boring Method : Rotary Drilling  
UTM Coordinates : 699467 E, 3160127 N Ground Water Depth : 20.60 m Casing Depth : -  
Surface Elevation : RL 211.66 m Boring Start : 04-Jun-17  
Ground Water Level : RL 191.1 m Boring Finish : 06-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, $\phi$ (degrees)	
14.00	14.30	DS2				Hard brown sandy silt with traces of gravels, low plastic (CL)		3	27	67	3													
15.50	15.95	SPT7	48	32								30.5	17.4	13.1										
17.00	17.30	UDS6														1.85	1.59	16.7						
18.50	18.95	SPT8	61	37																				
20.00	20.30	UDS7														1.92	1.60	19.7						
22.00	22.45	SPT9	67	26																				
24.00	24.30	UDS8														1.92	1.54	24.8						
26.00	26.45	SPT10	89	31																				
28.00	28.30	DS3						3	33	61	3													
30.00	30.45	SPT11	82	28			30.45																	

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-20)

Location :	Exhibition hall 4	Termination Depth :	30.45 m (RL 181.493 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	699559 E, 3160059 N	Ground Water Depth :	20.70 m	Casing Depth :	-
		Surface Elevation :	RL 211.94 m	Boring Start :	04-Jun-17
		Ground Water Level :	RL 191.2 m	Boring Finish :	06-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)														
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)															
0.00	0.50	DS1				Stiff to very stiff brown sandy silt with traces of gravels, low plastic (CL)																																
1.00	1.45	SPT1	8	12																			2	20	60	18												7
2.00	2.30	UDS1																									23.8	16.9	6.9		1.80	1.62	11.0					9
3.00	3.45	SPT2	11	13																																		15
4.00	4.30	UDS2				- very stiff, 5.0 to 14.0 m																																
5.00	5.45	SPT3	15	16																																		
6.00	6.30	UDS3																										1.80	1.61	12.2								11
7.00	7.45	SPT4	20	19																																		
8.00	8.30	DS2																																				
9.50	9.95	SPT5	24	20				4	23	55	18																											
11.00	11.30	UDS4										24.2	16.7	7.5		1.84	1.61	14.2																				
12.50	12.95	SPT6	28	21																																		

<sup>(1)</sup> SPT is outside NABL scope.


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Location : Exhibition hall 4  
UTM Coordinates : 699559 E, 3160059 N

### Soil Profile (BH-20)

Termination Depth : 30.45 m (RL 181.493 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.70 m Casing Depth : -  
Surface Elevation : RL 211.94 m Boring Start : 04-Jun-17  
Ground Water Level : RL 191.2 m Boring Finish : 06-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, $\phi$ (degrees)	
14.00	14.30	UDS5	37	25		Hard brown sandy silt, low plastic (CL)	30.45	1	15	65	19	28.5	16.7	11.9	1.85	1.60	16.2							
15.50	15.95	SPT7				- with traces of gravels, 14.0 to 24.0 m																		
17.00	17.30	UDS6																						
18.50	18.95	SPT8	41	25																				
20.00	20.30	DS3																						
22.00	22.45	SPT9	39	18																				
24.00	24.30	UDS7																						
26.00	26.45	SPT10	44	19																				
28.00	28.30	DS4																						
30.00	30.45	SPT11	51	20																				

<sup>(1)</sup> SPT is outside NABL scope.

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Location : Exhibition hall 4  
UTM Coordinates : 699652 E, 3159990 N

### Soil Profile (BH-21)

Termination Depth : 30.45 m (RL 182.035 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.40 m Casing Depth : -  
Surface Elevation : RL 212.49 m Boring Start : 07-Jun-17  
Ground Water Level : RL 192.1 m Boring Finish : 08-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to very stiff brown sandy silt with traces of gravels, low plastic (CL)																	
1.00	1.45	SPT1	9	14		- stiff, 0.0 to 7.0 m																	5
2.00	2.30	UDS1						4	16	77	3				1.72	1.50	14.8						9
3.00	3.45	SPT2	12	14								33.3	14.4	18.9									4
4.00	4.30	UDS2													1.75	1.50	16.7						10
5.00	5.45	SPT3	13	13																			
6.00	6.30	UDS3													1.83	1.65	10.9		DS	0.5, 1, 1.5	0.0	30.0	
7.00	7.45	SPT4	17	16		- very stiff, 7.0 to 14.0 m																	
8.00	8.30	DS2																					
9.50	9.95	SPT5	18	15				3	30	64	3												
11.00	11.30	UDS4										32.0	15.5	16.5	1.86	1.62	14.9	2.62					
12.50	12.95	SPT6	22	16																			

<sup>(1)</sup> SPT is outside NABL scope.












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Location : Exhibition hall 4  
UTM Coordinates : 699652 E, 3159990 N

### Soil Profile (BH-21)

Termination Depth : 30.45 m (RL 182.035 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.40 m Casing Depth : -  
Surface Elevation : RL 212.49 m Boring Start : 07-Jun-17  
Ground Water Level : RL 192.1 m Boring Finish : 08-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits		Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )		Moisture Content (%)	Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	
14.00	14.30	UDS5	28	19		Very stiff to hard brown sandy silt, low plastic (CL)  - very stiff, 14.0 to 18.5 m  - with traces of gravels, 14.0 to 22.0 m  - hard, 18.5 to 30.45 m  - with gravels, 22.0 to 30.45 m	30.45	2	43	53	2	32.3	14.9	17.4	1.86	1.61	15.3					
15.50	15.95	SPT7																				
17.00	17.30	DS3																				
18.50	18.95	SPT8																				
20.00	20.30	DS4																				
22.00	22.45	SPT9																				
24.00	24.30	UDS6																				
26.00	26.45	SPT10																				
28.00	28.30	DS5																				
30.00	30.45	SPT11	43	18																		
																						

<sup>(1)</sup> SPT is outside NABL scope.

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Location : Exhibition hall 4  
UTM Coordinates : 699509 E, 3160184 N

### Soil Profile (BH-22)

Termination Depth : 30.45 m (RL 181.135 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.60 m Casing Depth : -  
Surface Elevation : RL 211.59 m Boring Start : 09-Jun-17  
Ground Water Level : RL 191 m Boring Finish : 10-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to very stiff brown sandy silt, low plastic (CL)																	
1.00	1.45	SPT1	9	14		- stiff, 0.0 to 7.0 m																	5
2.00	2.30	UDS1				- with traces of gravels, 0.0 to 6.0 m		3	20	74	3				1.79	1.55	15.3						9
3.00	3.45	SPT2	12	14																			4
4.00	4.30	UDS2										30.2	15.3	14.9	1.82	1.59	14.3		DS	0.5, 1, 1.5	0.0	30.9	7
5.00	5.45	SPT3	14	15																			
6.00	6.30	UDS3				- with gravels, 6.0 to 14.0 m		5	21	71	3				1.88	1.61	16.7						
7.00	7.45	SPT4	18	17		- very stiff, 7.0 to 14.0 m																	
8.00	8.30	UDS4										31.2	17.3	13.9	1.83	1.59	15.3						
9.50	9.95	SPT5	26	22																			
11.00	11.30	UDS5													1.85	1.58	16.9	2.66					
12.50	12.95	SPT6	30	22																			

<sup>(1)</sup> SPT is outside NABL scope.

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Location : Exhibition hall 4  
UTM Coordinates : 699509 E, 3160184 N

### Soil Profile (BH-22)

Termination Depth : 30.45 m (RL 181.135 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.60 m Casing Depth : -  
Surface Elevation : RL 211.59 m Boring Start : 09-Jun-17  
Ground Water Level : RL 191 m Boring Finish : 10-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	UDS6				Hard brown sandy silt, low plastic (CL)		7	34	57	2				1.84	1.57	17.5						
15.50	15.95	SPT7	36	24		- with gravels, 14.0 to 28.0 m						33.2	18.3	14.9									
17.00	17.30	DS2																					
18.50	18.95	SPT8	39	24																			
20.00	20.30	UDS7													1.94	1.65	17.8						
22.00	22.45	SPT9	41	19																			
24.00	24.30	DS3																					
26.00	26.45	SPT10	53	22																			
28.00	28.30	UDS8				- with traces of gravels, 28.0 to 30.45 m		2	20	75	3				2.04	1.64	24.3						
30.00	30.45	SPT11	59	22			30.45																

<sup>(1)</sup> SPT is outside NABL scope.



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Location : Exhibition hall 4  
UTM Coordinates : 699571 E, 3160138 N

### Soil Profile (BH-23)

Termination Depth : 30.45 m (RL 181.319 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.50 m Casing Depth : -  
Surface Elevation : RL 211.77 m Boring Start : 07-Jun-17  
Ground Water Level : RL 191.3 m Boring Finish : 09-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to hard brown sandy silt with gravels, low plastic (CL)																	
1.00	1.45	SPT1	10	16		- stiff, 0.0 to 3.0 m																	7
2.00	2.30	UDS1						7	39	52	2				1.77	1.55	13.9						12
3.00	3.45	SPT2	15	18		- very stiff, 3.0 to 9.5 m																	4
4.00	4.30	UDS2										34.3	17.3	16.9	1.80	1.59	13.5		DS	0.5, 1, 1.5	0.0	30.8	7
5.00	5.45	SPT3	20	21																			
6.00	6.30	UDS3						7	26	64	3				1.86	1.63	13.8						
7.00	7.45	SPT4	23	21																			
8.00	8.30	UDS4										31.3	16.3	14.9	1.84	1.61	14.3						
9.50	9.95	SPT5	31	26		- hard, 9.5 to 14.0 m																	
11.00	11.30	UDS5													1.89	1.64	14.9	2.64					
12.50	12.95	SPT6	35	26																			

<sup>(1)</sup> SPT is outside NABL scope.

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Location : Exhibition hall 4  
UTM Coordinates : 699571 E, 3160138 N

### Soil Profile (BH-23)

Termination Depth : 30.45 m (RL 181.319 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.50 m Casing Depth : -  
Surface Elevation : RL 211.77 m Boring Start : 07-Jun-17  
Ground Water Level : RL 191.3 m Boring Finish : 09-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	DS2				Hard brown sandy silt, low plastic (CL)		6	14	77	3												
15.50	15.95	SPT7	39	26		- with gravels, 14.0 to 28.0 m						30.2	16.3	13.9									
17.00	17.30	DS3																					
18.50	18.95	SPT8	46	28																			
20.00	20.30	UDS6													1.89	1.61	17.7						
22.00	22.45	SPT9	59	24																			
24.00	24.30	UDS7													1.88	1.51	24.9						
26.00	26.45	SPT10	70	26																			
28.00	28.30	UDS8				- with traces of gravels, 28.0 to 30.45 m		4	41	53	2				2.03	1.64	23.5						
30.00	30.45	SPT11	86	29			30.45																

<sup>(1)</sup> SPT is outside NABL scope.

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Location : Exhibition hall 4  
UTM Coordinates : 699632 E, 3160093 N

### Soil Profile (BH-24)

Termination Depth : 30.45 m (RL 181.609 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.70 m Casing Depth : -  
Surface Elevation : RL 212.06 m Boring Start : 10-Jun-17  
Ground Water Level : RL 191.4 m Boring Finish : 11-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to hard brown sandy silt, low plastic (CL)																	
1.00	1.45	SPT1	11	17		- stiff, 0.0 to 3.0 m																	10
2.00	2.30	UDS1													1.80	1.57	14.6						12
3.00	3.45	SPT2	18	22		- very stiff, 3.0 to 7.0 m																	5
4.00	4.30	UDS2				- with traces of gravels, 0.0 to 11.0 m		4	31	62	3				1.82	1.58	15.5						10
5.00	5.45	SPT3	27	28								32.2	14.3	17.9									
6.00	6.30	UDS3													1.85	1.61	14.9		DS	0.5, 1, 1.5	0.0	31.0	
7.00	7.45	SPT4	30	28		- hard, 7.0 to 14.0 m																	
8.00	8.30	UDS4															10.9						
9.50	9.95	SPT5	36	30																			
11.00	11.30	UDS5				- with gravels, 11.0 to 14.0 m		5	27	65	3				1.88	1.64	14.9	2.63					
12.50	12.95	SPT6	51	38								30.1	14.2	15.9									

<sup>(1)</sup> SPT is outside NABL scope.



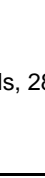

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Location : Exhibition hall 4  
UTM Coordinates : 699632 E, 3160093 N

### Soil Profile (BH-24)

Termination Depth : 30.45 m (RL 181.609 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.70 m Casing Depth : -  
Surface Elevation : RL 212.06 m Boring Start : 10-Jun-17  
Ground Water Level : RL 191.4 m Boring Finish : 11-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	UDS6	56	37		Hard brown sandy silt, low plastic (CL)		3	41	52	4	33.1	18.2	14.9	1.87	1.61	15.8						
15.50	15.95	SPT7																					
17.00	17.30	DS2																					
18.50	18.95	SPT8																					
20.00	20.30	UDS7	66	26		- with traces of gravels, 14.0 to 28.0 m		12	26	58	4	32.1	17.2	14.9	1.96	1.68	16.9						
22.00	22.45	SPT9																					
24.00	24.30	DS3																					
26.00	26.45	SPT10																					
28.00	28.30	UDS8	81	29		- with gravels, 28.0 to 30.45 m		30.45							2.00	1.63	22.9						
30.00	30.45	SPT11				92									31								

<sup>(1)</sup> SPT is outside NABL scope.

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Location : Exhibition hall 4  
UTM Coordinates : 699694 E, 3160047 N

### Soil Profile (BH-25)

Termination Depth : 30.45 m (RL 182.012 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.60 m Casing Depth : -  
Surface Elevation : RL 212.46 m Boring Start : 09-Jun-17  
Ground Water Level : RL 191.9 m Boring Finish : 10-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to very stiff brown sandy silt with traces of gravels, low plastic (CL)																	
1.00	1.45	SPT1	8	12		- stiff, 0.0 to 5.0 m		3	15	70	12												7
2.00	2.30	UDS1										28.0	16.8	11.2									10
3.00	3.45	SPT2	11	13																			8
4.00	4.30	UDS2													1.79	1.59	12.5						13
5.00	5.45	SPT3	16	17		- very stiff, 5.0 to 14.0 m																	
6.00	6.30	UDS3													1.83	1.60	14.5		DS	0.5, 1, 1.5	0.0	30.4	
7.00	7.45	SPT4	19	18																			
8.00	8.30	UDS4						1	38	45	16				1.87	1.62	15.6						
9.50	9.95	SPT5	23	19																			
11.00	11.30	DS2																					
12.50	12.95	SPT6	27	20																			

<sup>(1)</sup> SPT is outside NABL scope.

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Location : Exhibition hall 4  
UTM Coordinates : 699694 E, 3160047 N

### Soil Profile (BH-25)

Termination Depth : 30.45 m (RL 182.012 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.60 m Casing Depth : -  
Surface Elevation : RL 212.46 m Boring Start : 09-Jun-17  
Ground Water Level : RL 191.9 m Boring Finish : 10-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	UDS5				Hard brown sandy silt, low plastic (CL)		0	21	61	18				1.90	1.63	16.5						
15.50	15.95	SPT7	30	20																			
17.00	17.30	DS3													1.93	1.63	18.5						
18.50	18.95	SPT8	37	22																			
20.00	20.30	DS4													1.97	1.62	21.5						
22.00	22.45	SPT9	38	18																			
24.00	24.30	UDS6				- with gravels, 24.0 to 30.45 m		5	22	58	15				2.00	1.63	22.6						
26.00	26.45	SPT10	41	18								28.4	17.6	10.8									
28.00	28.30	DS5													2.00	1.63	22.9						
30.00	30.45	SPT11	46	19			30.45																

<sup>(1)</sup> SPT is outside NABL scope.



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Location : Exhibition hall 3  
UTM Coordinates : 699617 E, 3160179 N

### Soil Profile (BH-26)

Termination Depth : 30.45 m (RL 181.55 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.20 m Casing Depth : -  
Surface Elevation : RL 212.00 m Boring Start : 13-Jun-17  
Ground Water Level : RL 191.8 m Boring Finish : 14-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to very stiff brown sandy silt, low plastic (CL)																	
1.00	1.45	SPT1	9	14		- stiff, 0.0 to 5.0 m																	4
2.00	2.30	UDS1				- with traces of gravels, 0.0 to 6.0 m		2	17	75	6				1.76	1.51	16.8						6
3.00	3.45	SPT2	11	13																			7
4.00	4.30	UDS2										31.0	15.5	15.5	1.79	1.55	15.5		DS	0.5, 1, 1.5	0.0	31.0	4
5.00	5.45	SPT3	16	17		- very stiff, 5.0 to 14.0 m																	
6.00	6.30	UDS3				- with gravels, 6.0 to 14.0 m		6	15	72	7				1.87	1.64	13.8						
7.00	7.45	SPT4	19	18																			
8.00	8.30	UDS4										31.2	16.5	14.7	1.83	1.58	15.5						
9.50	9.95	SPT5	21	17																			
11.00	11.30	UDS5													1.82	1.60	13.7	2.62					
12.50	12.95	SPT6	23	17																			

<sup>(1)</sup> SPT is outside NABL scope.






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Location : Exhibition hall 3  
UTM Coordinates : 699617 E, 3160179 N

### Soil Profile (BH-26)

Termination Depth : 30.45 m (RL 181.55 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.20 m Casing Depth : -  
Surface Elevation : RL 212.00 m Boring Start : 13-Jun-17  
Ground Water Level : RL 191.8 m Boring Finish : 14-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	UDS6	28	19		Very stiff to hard brown sandy silt with gravels, low plastic (CL)	30.45	7	43	48	2	32.6	18.6	14.0	1.84	1.61	14.6						
15.50	15.95	SPT7				- very stiff, 14.0 to 18.5 m																	
17.00	17.30	UDS7																					
18.50	18.95	SPT8	32	19		- hard, 18.5 to 30.45 m		7	30	59	4	1.92	1.61	18.9									
20.00	20.30	UDS8																					
22.00	22.45	SPT9																					
24.00	24.30	DS2	47	20				7	30	59	4	1.92	1.61	18.9									
26.00	26.45	SPT10																					
28.00	28.30	DS3																					
30.00	30.45	SPT11	41	18																			
																							

<sup>(1)</sup> SPT is outside NABL scope.

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Location : Exhibition hall 3  
UTM Coordinates : 699669 E, 3160140 N

### Soil Profile (BH-27)

Termination Depth : 30.45 m (RL 181.764 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.10 m Casing Depth : -  
Surface Elevation : RL 212.21 m Boring Start : 13-Jun-17  
Ground Water Level : RL 192.1 m Boring Finish : 14-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to very stiff brown sandy silt, low plastic (CL)																	
1.00	1.45	SPT1	6	9		- stiff, 0.0 to 5.0 m																	8
2.00	2.30	UDS1				- with traces of gravels, 0.0 to 6.0 m		4	39	54	3				1.72	1.48	16.0						10
3.00	3.45	SPT2	13	16																			4
4.00	4.30	UDS2										33.5	16.0	17.5	1.75	1.52	15.3		DS	0.5, 1, 1.5	0.0	32.1	12
5.00	5.45	SPT3	18	19		- very stiff, 5.0 to 14.0 m																	
6.00	6.30	UDS3				- with gravels, 6.0 to 14.0 m		7	32	59	2				1.88	1.64	14.9						
7.00	7.45	SPT4	22	20																			
8.00	8.30	UDS4										34.6	14.6	20.0	1.84	1.63	13.2						
9.50	9.95	SPT5	25	21																			
11.00	11.30	DS2																2.69					
12.50	12.95	SPT6	27	20																			

<sup>(1)</sup> SPT is outside NABL scope.

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Location : Exhibition hall 3  
UTM Coordinates : 699669 E, 3160140 N

### Soil Profile (BH-27)

Termination Depth : 30.45 m (RL 181.764 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.10 m Casing Depth : -  
Surface Elevation : RL 212.21 m Boring Start : 13-Jun-17  
Ground Water Level : RL 192.1 m Boring Finish : 14-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	UDS5				Very stiff to hard brown sandy silt with traces of gravels, low plastic (CL)		2	46	50	2				1.86	1.60	16.1						
15.50	15.95	SPT7	29	19		- very stiff, 14.0 to 18.5 m						31.5	15.0	16.5									
17.00	17.30	DS3																					
18.50	18.95	SPT8	33	20		- hard, 18.5 to 30.45 m																	
20.00	20.30	UDS6													1.90	1.59	19.5						
22.00	22.45	SPT9	37	18																			
24.00	24.30	UDS7						3	22	72	3				1.95	1.59	22.5						
26.00	26.45	SPT10	44	19																			
28.00	28.30	DS4																					
30.00	30.45	SPT11	54	21			30.45																

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (PBH-28)

Location : Exhibition hall 3  
UTM Coordinates : 699721 E, 3160101 N  
Termination Depth : 30.45 m (RL 182.008 m)  
Ground Water Depth : 20.10 m  
Surface Elevation : RL 212.458 m  
Ground Water Level : RL 192.4 m  
Boring Method : Rotary Drilling  
Casing Depth : -  
Boring Start : 06-May-17  
Boring Finish : 07-May-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N <sub>r</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, $\phi$ (degrees)	
0.00	0.50	DS1				Stiff to hard brown sandy silt, low plastic (CL)																		
1.00	1.45	SPT1	8	12		- stiff, 0.0 to 5.0 m		0	33	51	16													0
2.00	2.30	UDS1														1.79	1.50	19.4						2
3.00	3.45	SPT2	13	15																				5
4.00	4.30	UDS2														1.81	1.52	19.0						5
5.00	5.45	SPT3	16	16		- very stiff, 5.0 to 9.5 m						30.5	17.0	13.5										
6.00	6.45	DS2																						
7.00	7.45	SPT4	25	19				0	30	53	17													
8.00	8.30	DS3																						
9.50	9.95	SPT5	35	22		- hard, 9.5 to 14.0 m																		
11.00	11.30	UDS3														1.85	1.58	17.2		DS	0.5, 1, 1.5	0.0	33.1	
12.50	12.95	SPT6	36	21			14.00					31.8	17.5	14.3										

<sup>(1)</sup> SPT is outside NABL scope.



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Location : Exhibition hall 3  
UTM Coordinates : 699721 E, 3160101 N

### Soil Profile (PBH-28)

Termination Depth : 30.45 m (RL 182.008 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.10 m Casing Depth : -  
Surface Elevation : RL 212.458 m Boring Start : 06-May-17  
Ground Water Level : RL 192.4 m Boring Finish : 07-May-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	UDS4	33	18		Hard to very stiff brown sandy silt, low plastic (CL-ML)		0	45	43	12			6.2	1.86	1.60	16.5							
15.50	15.95	SPT7				- hard, 14.0 to 18.5 m																		
17.00	17.30	UDS5																						
18.50	18.95	SPT8				- very stiff, 18.5 to 30.0 m																		
20.00	20.30	UDS6																						
22.00	22.45	SPT9																						
24.00	24.30	UDS7																						
26.00	26.45	SPT10																						
28.00	28.30	UDS8																						
30.00	30.45	SPT11	28	28		Very stiff brown clayey silt with gravel, medium plastic (CI)	30.00	5	9	61	25				1.84	1.67	10.4							
						30.45																		

<sup>(1)</sup> SPT is outside NABL scope.

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Location : Exhibition hall 3  
UTM Coordinates : 699659 E, 3160236 N

### Soil Profile (BH-29)

Termination Depth : 30.45 m (RL 181.55 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.50 m Casing Depth : -  
Surface Elevation : RL 212.00 m Boring Start : 13-Jun-17  
Ground Water Level : RL 191.5 m Boring Finish : 15-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N <sub>r</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to hard brown sandy silt with traces of gravels, low plastic (CL)																	
1.00	1.45	SPT1	9	14		- stiff, 0.0 to 3.0 m																	10
2.00	2.30	UDS1					2	40	54	4					1.75	1.53	14.5						8
3.00	3.45	SPT2	16	19		- very stiff, 3.0 to 9.5 m																	9
4.00	4.30	UDS2										30.5	15.3	15.2	1.76	1.55	13.5		DS	0.5, 1, 1.5	0.0	32.8	9
5.00	5.45	SPT3	22	23																			
6.00	6.30	DS2					2	37	58	3													
7.00	7.45	SPT4	26	24																			
8.00	8.30	UDS3										34.5	14.0	20.5	1.87	1.66	12.8						
9.50	9.95	SPT5	31	26		- hard, 9.5 to 14.0 m																	
11.00	11.30	UDS4													1.86	1.61	15.3	2.68					
12.50	12.95	SPT6	39	29																			

<sup>(1)</sup> SPT is outside NABL scope.






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Location : Exhibition hall 3  
UTM Coordinates : 699659 E, 3160236 N

### Soil Profile (BH-29)

Termination Depth : 30.45 m (RL 181.55 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.50 m Casing Depth : -  
Surface Elevation : RL 212.00 m Boring Start : 13-Jun-17  
Ground Water Level : RL 191.5 m Boring Finish : 15-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits		Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )		Moisture Content (%)	Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	
14.00	14.30	UDS5	42	28		Hard brown sandy silt, low plastic (CL)  - with gravels, 14.0 to 28.0 m		5	33	60	2	31.5	15.5	16.0	1.87	1.63	14.7					
15.50	15.95	SPT7																				
17.00	17.30	DS3																				
18.50	18.95	SPT8																				
20.00	20.30	DS4																				
22.00	22.45	SPT9	54	23											1.97	1.62	21.8					
24.00	24.30	UDS6																				
26.00	26.45	SPT10																				
28.00	28.30	DS5																				
30.00	30.45	SPT11																				
			56	22		- with traces of gravels, 28.0 to 30.45 m	30.45	4	43	48	5											

<sup>(1)</sup> SPT is outside NABL scope.

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Location : Exhibition hall 3  
UTM Coordinates : 699711 E, 3160197 N

### Soil Profile (BH-30)

Termination Depth : 30.45 m (RL 181.781 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.40 m Casing Depth : -  
Surface Elevation : RL 212.23 m Boring Start : 13-Jun-17  
Ground Water Level : RL 191.8 m Boring Finish : 15-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to very stiff brown sandy silt with gravels, low plastic (CL)																	
1.00	1.45	SPT1	10	16		- stiff, 0.0 to 5.0 m																	5
2.00	2.30	UDS1						7	26	64	3				1.73	1.52	14.0						4
3.00	3.45	SPT2	13	16																			11
4.00	4.30	UDS2										31.5	14.5	17.0	1.75	1.52	14.9						8
5.00	5.45	SPT3	15	16		- very stiff, 5.0 to 14.0 m																	
6.00	6.30	UDS3						5	38	55	2				1.79	1.55	15.3		DS	0.5, 1, 1.5	0.0	32.4	
7.00	7.45	SPT4	17	16																			
8.00	8.30	UDS4										32.5	17.5	15.0	1.82	1.60	14.0						
9.50	9.95	SPT5	19	16																			
11.00	11.30	DS2																					
12.50	12.95	SPT6	26	19																			

<sup>(1)</sup> SPT is outside NABL scope.

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Location : Exhibition hall 3  
UTM Coordinates : 699711 E, 3160197 N

### Soil Profile (BH-30)

Termination Depth : 30.45 m (RL 181.781 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.40 m Casing Depth : -  
Surface Elevation : RL 212.23 m Boring Start : 13-Jun-17  
Ground Water Level : RL 191.8 m Boring Finish : 15-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	UDS5				Very stiff to hard brown sandy silt with traces of gravels, low plastic (CL)		3	43	52	2				1.90	1.64	15.8						
15.50	15.95	SPT7	29	19		- very stiff, 14.0 to 22.0 m						30.5	17.5	13.0									
17.00	17.30	DS3																					
18.50	18.95	SPT8	26	16																			
20.00	20.30	UDS6													1.98	1.67	18.4						
22.00	22.45	SPT9	36	18		- hard, 22.0 to 30.45 m																	
24.00	24.30	DS4																					
26.00	26.45	SPT10	42	19																			
28.00	28.30	DS5						4	27	66	3												
30.00	30.45	SPT11	49	20			30.45																

<sup>(1)</sup> SPT is outside NABL scope.

### Soil Profile (BH-31)

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Location : Exhibition hall 3  
UTM Coordinates : 699763 E, 3160159 N

Termination Depth : 30.45 m (RL 182.452 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.50 m Casing Depth : -  
Surface Elevation : RL 212.90 m Boring Start : 13-Jun-17  
Ground Water Level : RL 192.4 m Boring Finish : 15-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to hard brown sandy silt, low plastic (CL)																	
1.00	1.45	SPT1	10	16		- stiff, 0.0 to 5.0 m															10		
2.00	2.30	UDS1				- with traces of gravel, 2.0 to 4.0 m		4	35	59	2				1.77	1.54	14.6				5		
3.00	3.45	SPT2	14	17																	7		
4.00	4.30	DS2										30.4	14.5	16.0							6		
5.00	5.45	SPT3	20	21		- very stiff, 5.0 to 12.5 m																	
6.00	6.30	UDS2				- with gravel, 6.0 to 7.0 m		7	26	64	3				1.76	1.55	13.5	DS	0.5 ,1, 1.5	0.0	31.2		
7.00	7.45	SPT4	29	27																			
8.00	8.30	UDS3										32.4	17.5	14.9	1.79	1.59	12.8						
9.50	9.95	SPT5	27	22																			
11.00	11.30	UDS4													1.82	1.60	13.8	2.67					
12.50	12.95	SPT6	40	29		- hard, 12.5 to 14.0 m																	

<sup>(1)</sup> SPT is outside NABL scope.

### Soil Profile (BH-31)

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Location : Exhibition hall 3  
UTM Coordinates : 699763 E, 3160159 N

Termination Depth : 30.45 m (RL 182.452 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.50 m Casing Depth : -  
Surface Elevation : RL 212.90 m Boring Start : 13-Jun-17  
Ground Water Level : RL 192.4 m Boring Finish : 15-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	UDS5				Hard brown sandy silt, low plastic (CL)  - with gravel, 14.0 to 28.0 m		5	32	60	3				1.83	1.57	16.8						
15.50	15.95	SPT7	38	25																			
17.00	17.30	DS3																					
18.50	18.95	SPT8	38	23																			
20.00	20.30	UDS6														1.95	1.63	19.4					
22.00	22.45	SPT9	41	19		- with traces of gravel, 28.0 to 30.45 m																	
24.00	24.30	UDS7														1.94	1.57	23.8					
26.00	26.45	SPT10	73	27																			
28.00	28.30	DS4																					
30.00	30.45	SPT11	77	27				30.45															

<sup>(1)</sup> SPT is outside NABL scope.

### Soil Profile (BH-32)

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Location : Exhibition hall 3  
UTM Coordinates : 699701 E, 3160293 N

Termination Depth : 30.45 m (RL 181.841 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.50 m Casing Depth : -  
Surface Elevation : RL 212.29 m Boring Start : 10-Jun-17  
Ground Water Level : RL 191.8 m Boring Finish : 11-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests					Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)		
0.00	0.50	DS1				Stiff to very stiff brown sandy silt with gravels, low plastic (CL)																		
1.00	1.45	SPT1	9	14		- stiff, 0.0 to 5.0 m																5		
2.00	2.30	DS2																				4		
3.00	3.45	SPT2	14	17				7	35	54	4											5		
4.00	4.30	UDS1										34.8	18.8	16.0	1.79	1.55	15.7		DS	0.5 , 1, 1.5	0.0	30.5	10	
5.00	5.45	SPT3	16	17		- very stiff, 5.0 to 14.0 m																		
6.00	6.30	UDS2													1.83	1.60	14.3							
7.00	7.45	SPT4	21	19																				
8.00	8.30	UDS3													1.84	1.58	16.7							
9.50	9.95	SPT5	25	21																				
11.00	11.30	UDS4						7	22	66	5				1.84	1.60	14.8	2.62						
12.50	12.95	SPT6	27	20								30.8	15.8	15.0										

<sup>(1)</sup> SPT is outside NABL scope.





### Soil Profile (BH-32)

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Location : Exhibition hall 3  
UTM Coordinates : 699701 E, 3160293 N

Termination Depth : 30.45 m (RL 181.841 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.50 m Casing Depth : -  
Surface Elevation : RL 212.29 m Boring Start : 10-Jun-17  
Ground Water Level : RL 191.8 m Boring Finish : 11-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests					Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)		
14.00	14.30	DS3	31	21		Hard brown sandy silt, low plastic (CL)																		
15.50	15.95	SPT7																						
17.00	17.30	UDS5																						
18.50	18.95	SPT8	32	19		- with traces of gravel, 18.5 to 22.0 m		3	21	70	6		31.8	16.8	15.0									
20.00	20.30	DS4																						
22.00	22.45	SPT9																						
24.00	24.30	UDS6	35	17											1.87	1.54	21.6							
26.00	26.45	SPT10																						
28.00	28.30	DS5																						
30.00	30.45	SPT11	51	20		- with gravel, 28.0 to 30.4 m	30.45																	

<sup>(1)</sup> SPT is outside NABL scope.



### Soil Profile (BH-33)

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Location : Exhibition hall 3  
UTM Coordinates : 699753 E, 3160254 N

Termination Depth : 30.45 m (RL 182.164 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.20 m Casing Depth : -  
Surface Elevation : RL 212.61 m Boring Start : 10-Jun-17  
Ground Water Level : RL 192.4 m Boring Finish : 12-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests					Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)		
0.00	0.50	DS1				Very stiff to hard brown sandy silt, low plastic (CL)																		
1.00	1.45	SPT1	16	25		- very stiff, 0.0 to 3.0 m																12		
2.00	2.30	UDS1				- with traces of gravels, 2.0 to 3.0 m		4	23	67	6				1.77	1.54	14.7					7		
3.00	3.45	SPT2	10	12		- stiff, 3.0 to 5.0 m						34.0	15.0	19.0								10		
4.00	4.30	UDS2													1.78	1.57	13.5					8		
5.00	5.45	SPT3	24	25		- very stiff, 5.0 to 7.0 m																		
6.00	6.30	UDS3				- with gravels, 6.0 to 7.0 m		5	21	68	6				1.86	1.59	17.1	DS	0.5 ,1, 1.5	0.0	31.4			
7.00	7.45	SPT4	32	30		- hard, 7.0 to 9.5 m						34.8	15.5	19.3										
8.00	8.30	UDS4													1.83	1.60	14.5							
9.50	9.95	SPT5	29	24		- very stiff, 9.5 to 12.5 m																		
11.00	11.30	DS2																2.67						
12.50	12.95	SPT6	50	37		- hard, 12.5 to 14.0 m																		

<sup>(1)</sup> SPT is outside NABL scope.


### Soil Profile (BH-33)

ISO/IEC 17025:2005  
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Location : Exhibition hall 3  
UTM Coordinates : 699753 E, 3160254 N

Termination Depth : 30.45 m (RL 182.164 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.20 m Casing Depth : -  
Surface Elevation : RL 212.61 m Boring Start : 10-Jun-17  
Ground Water Level : RL 192.4 m Boring Finish : 12-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	UDS5	44	29		Hard brown sandy silt with gravels, low plastic (CL)	30.45	7	23	65	5	34.7	16.0	18.7	1.86	1.61	15.3						
15.50	15.95	SPT7																					
17.00	17.30	UDS6																					
18.50	18.95	SPT8																					
20.00	20.30	UDS7																					
22.00	22.45	SPT9																					
24.00	24.30	DS3																					
26.00	26.45	SPT10																					
28.00	28.30	DS4																					
30.00	30.45	SPT11																					

<sup>(1)</sup> SPT is outside NABL scope.

### Soil Profile (BH-34)

ISO/IEC 17025:2005  
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Location : Exhibition hall 3  
UTM Coordinates : 699806 E, 3160216 N

Termination Depth : 30.45 m (RL 182.49 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.60 m Casing Depth : -  
Surface Elevation : RL 212.94 m Boring Start : 08-Jun-17  
Ground Water Level : RL 192.3 m Boring Finish : 10-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests					Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)		
0.00	0.50	DS1				Firm to very stiff brown sandy silt, low plastic (CL)																		
1.00	1.45	SPT1	7	11		- firm, 0.0 to 3.0 m																8		
2.00	2.30	UDS1				- with traces of gravels, 0.0 to 7.0 m		2	24	67	7				1.75	1.51	15.7					6		
3.00	3.45	SPT2	13	16		- stiff, 3.0 to 5.0 m						33.9	14.9	19.0								5		
4.00	4.30	UDS2													1.81	1.58	14.3					4		
5.00	5.45	SPT3	21	22		- very stiff, 5.0 to 14.0 m																		
6.00	6.30	UDS3													1.79	1.55	15.5		DS	0.5 , 1, 1.5	0.0	30.6		
7.00	7.45	SPT4	23	21		- with gravels, 7.0 to 14.0 m		7	33	54	6													
8.00	8.30	DS2										31.8	14.8	17.0										
9.50	9.95	SPT5	25	21																				
11.00	11.30	UDS4													1.89	1.62	16.7							
12.50	12.95	SPT6	28	21																				

<sup>(1)</sup> SPT is outside NABL scope.

### Soil Profile (BH-34)

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Location : Exhibition hall 3  
UTM Coordinates : 699806 E, 3160216 N

Termination Depth : 30.45 m (RL 182.49 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.60 m Casing Depth : -  
Surface Elevation : RL 212.94 m Boring Start : 08-Jun-17  
Ground Water Level : RL 192.3 m Boring Finish : 10-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)	Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	UDS5				Hard brown sandy silt, low plastic (CL)									1.88	1.64	14.3						
15.50	15.95	SPT7	31	21		- with traces of gravels, 15.5 to 22.0 m		3	15	74	8												
17.00	17.30	DS3											32.8	18.8	14.0								
18.50	18.95	SPT8	35	21																			
20.00	20.30	UDS6																					
22.00	22.45	SPT9	39	18			- with gravels, 22.0 to 30.45 m		7	36	53	4											
24.00	24.30	UDS7											32.8	16.8	16.0	1.90	1.53	24.3					
26.00	26.45	SPT10	42	19																			
28.00	28.30	DS4																					
30.00	30.45	SPT11	49	20				30.45															

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-35)

Location : Exhibition hall 2  
Termination Depth : 30.45 m (RL 182.001 m)  
Boring Method : Rotary Drilling  
UTM Coordinates : 699737 E, 3160341 N  
Ground Water Depth : 20.50 m  
Casing Depth : -  
Surface Elevation : RL 212.45 m  
Boring Start : 30-May-17  
Ground Water Level : RL 192 m  
Boring Finish : 01-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N <sub>r</sub> <sup>1</sup>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Very stiff to hard brown sandy silt, low plastic (CL)																		
1.00	1.45	SPT1	16	25		- very stiff, 0.0 to 12.5 m		6	17	59	18													6
2.00	2.30	UDS1				- with gravels, 0.0 to 3.0 m										1.81	1.64	10.3						9
3.00	3.45	SPT2	18	22				0	25	66	9													11
4.00	4.30	UDS2														1.82	1.62	12.2						8
5.00	5.45	SPT3	22	23															2.73					
6.00	6.30	UDS3						0	20	62	18					1.83	1.61	13.5						
7.00	7.45	SPT4	25	23																				
8.00	8.30	DS2																		DS	0.5, 1, 1.5	0.0	32.6	
9.50	9.95	SPT5	28	23				0	45	43	12	24.1	16.2	8.0										
11.00	11.30	UDS4														1.85	1.65	12.3						
12.50	12.95	SPT6	33	24		- hard, 12.5 to 14.0 m						22.1	16.6	5.6										


<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-35)

Location : Exhibition hall 2 Termination Depth : 30.45 m (RL 182.001 m) Boring Method : Rotary Drilling  
UTM Coordinates : 699737 E, 3160341 N Ground Water Depth : 20.50 m Casing Depth : -  
Surface Elevation : RL 212.45 m Boring Start : 30-May-17  
Ground Water Level : RL 192 m Boring Finish : 01-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	DS3	36	24		Hard brown sandy silt, low plastic (CL)	30.45	0	18	66	16	20.8	16.7	4.1	1.87	1.57	19.2	2.71						
15.50	15.95	SPT7																						
17.00	17.30	UDS5																						
18.50	18.95	SPT8																						
20.00	20.30	UDS6																						
22.00	22.45	SPT9																						
24.00	24.30	UDS7																						
26.00	26.45	SPT10																						
28.00	28.30	UDS8																						
30.00	30.45	SPT11																						

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-36)

Location : Exhibition hall 2  
UTM Coordinates : 699794 E, 3160299 N  
Termination Depth : 30.45 m (RL 182.161 m)  
Ground Water Depth : 20.40 m  
Surface Elevation : RL 212.61 m  
Ground Water Level : RL 192.2 m  
Boring Method : Rotary Drilling  
Casing Depth : -  
Boring Start : 30-May-17  
Boring Finish : 01-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N <sub>r</sub> <sup>1</sup>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to very stiff brown sandy silt, low plastic (CL)																		
1.00	1.45	SPT1	9	14		- stiff, 0.0 to 3.0 m		0	27	61	12													5
2.00	2.30	UDS1														1.80	1.62	11.5						8
3.00	3.45	SPT2	15	18		- very stiff, 3.0 to 14.0 m						22.3	16.0	6.3										4
4.00	4.30	UDS2														1.81	1.63	11.0		DS	0.5, 1, 1.5	0.0	32.2	7
5.00	5.45	SPT3	20	21				0	46	47	7								2.75					
6.00	6.30	UDS3														1.82	1.62	12.3						
7.00	7.45	SPT4	22	20				0	38	54	8													
8.00	8.30	DS2																						
9.50	9.95	SPT5	25	21								24.0	16.6	7.5										
11.00	11.30	UDS4														1.84	1.61	14.2						
12.50	12.95	SPT6	28	21		- with gravels, 12.5 to 14.0 m		7	36	47	10													

<sup>(1)</sup> SPT is outside NABL scope.








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Location : Exhibition hall 2  
UTM Coordinates : 699794 E, 3160299 N

### Soil Profile (BH-36)

Termination Depth : 30.45 m (RL 182.161 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.40 m Casing Depth : -  
Surface Elevation : RL 212.61 m Boring Start : 30-May-17  
Ground Water Level : RL 192.2 m Boring Finish : 01-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)			
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>r</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)				
14.00	14.30	UDS5	32	21		Hard to very stiff brown sandy silt, low plastic (CL)		0	28	60	12					1.85	1.60	15.2	2.73								
15.50	15.95	SPT7				- hard, 14.0 to 18.5 m																					
17.00	17.30	UDS6				- with gravels, 17.0 to 22.0 m		18	21	53	8													1.85	1.57	18.0	
18.50	18.95	SPT8				- very stiff, 18.5 to 22.0 m																					
20.00	20.30	UDS7																						1.85	1.53	20.6	
22.00	22.45	SPT9	36	18		- hard, 22.0 to 30.4 m		0	26	64	10	23.8	15.6	8.2													
24.00	24.30	DS3	32	16		- with gravels, 26.0 to 30.0 m	19	13	57	11																	
26.00	26.45	SPT10																									
28.00	28.30	DS4																									
30.00	30.45	SPT11	41	18		- with traces of gravels, 30.0 to 30.45 m	30.45	4	17	68	11																
																											

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (PBH-37)

Location : Exhibition hall 2  
UTM Coordinates : 699850 E, 3160258 N  
Termination Depth : 30.45 m (RL 181.58 m)  
Ground Water Depth : 20.60 m  
Surface Elevation : RL 212.030 m  
Ground Water Level : RL 191.4 m  
Boring Method : Rotary Drilling  
Casing Depth : -  
Boring Start : 11-May-17  
Boring Finish : 12-May-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N <sub>r</sub> <sup>1</sup>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Medium dense brown silty fine sand with traces of gravels (SM)		1	49	42	8													
1.00	1.45	SPT1	12	17																				0
2.00	2.30	UDS1														1.81	1.63	10.5						0
3.00	3.45	SPT2	18	18																				0
4.50	4.80	UDS2					5.00									1.81	1.63	11.6	2.70					0
5.00	5.45	SPT3	19	17		Very stiff to hard brown sandy silt, low plastic (CL)		1	42	47	10													
6.00	6.30	UDS3				- very stiff, 5.0 to 9.5 m										1.81	1.61	12.6						
7.00	7.45	SPT4	24	19		- with traces of gravels, 5.0 to 9.5 m																		
8.00	8.30	UDS4										29.4	15.5	13.9		1.85	1.67	10.8						
9.50	9.95	SPT5	32	21		- hard, 9.5 to 14.0 m		5	32	52	11													
11.00	11.30	UDS5				- with gravels, 9.5 to 14.0 m										1.86	1.63	14.2						
12.50	12.95	SPT6	36	21																				

<sup>(1)</sup> SPT is outside NABL scope.





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Location : Exhibition hall 2  
UTM Coordinates : 699850 E, 3160258 N

### Soil Profile (PBH-37)

Termination Depth : 30.45 m (RL 181.58 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.60 m Casing Depth : -  
Surface Elevation : RL 212.030 m Boring Start : 11-May-17  
Ground Water Level : RL 191.4 m Boring Finish : 12-May-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, $\phi$ (degrees)	
14.00	14.30	UDS6	45	22		Hard brown sandy silt, low plastic (CL)		3	24	59	14	23.3	14.5	8.8		1.88	1.70	10.4		DS	1 ,2, 3	0.0	32.2	
15.50	15.95	SPT7																						
17.00	17.30	UDS7																						
18.50	18.95	SPT8	52	23		- with traces of gravels, 14.0 to 30.0 m										1.90	1.63	16.2						
20.00	20.50	UDS8	51	20								25.4	16.2	9.1		1.90	1.59	20.0						
22.00	22.45	SPT9																						
24.00	24.30	UDS9																						
26.00	26.45	SPT10	45	18			30.45	15	23	53	9					1.91	1.57	21.6						
28.00	28.30	UDS10																						
30.00	30.45	SPT11																						

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-38)

Location : Exhibition hall 2  
UTM Coordinates : 699789 E, 3160391 N  
Termination Depth : 30.45 m (RL 182.001 m)  
Ground Water Depth : 20.20 m  
Surface Elevation : RL 212.45 m  
Ground Water Level : RL 192.3 m  
Boring Method : Rotary Drilling  
Casing Depth : -  
Boring Start : 01-Jun-17  
Boring Finish : 03-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N <sub>r</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to very stiff brown sandy silt, low plastic (CL)																		
1.00	1.45	SPT1	8	12		- stiff, 0.0 to 5.0 m																		6
2.00	2.30	UDS1						0	25	62	13					1.80	1.61	11.2		DS	0.5, 1, 1.5	0.0	32.7	4
3.00	3.45	SPT2	13	16								25.0	16.9	8.1										8
4.00	4.30	UDS2														1.80	1.61	12.3						6
5.00	5.45	SPT3	16	17		- very stiff, 5.0 to 14.0 m													2.69					
6.00	6.30	UDS3						0	22	64	14					1.81	1.59	14.2						
7.00	7.45	SPT4	21	19				0	43	47	10													
8.00	8.30	UDS4														1.82	1.61	13.2						
9.50	9.95	SPT5	22	18								29.7	18.9	10.8										
11.00	11.30	DS2																						
12.50	12.95	SPT6	29	21																				

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-38)

Location : Exhibition hall 2 Termination Depth : 30.45 m (RL 182.001 m) Boring Method : Rotary Drilling  
UTM Coordinates : 699789 E, 3160391 N Ground Water Depth : 20.20 m Casing Depth : -  
Surface Elevation : RL 212.45 m Boring Start : 01-Jun-17  
Ground Water Level : RL 192.3 m Boring Finish : 03-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N <sub>r</sub> <sup>1</sup>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	UDS5				Hard brown sandy silt, low plastic (CL)		0	33	55	12					1.85	1.64	12.9						
15.50	15.95	SPT7	35	23		- with gravels, 22.0 to 30.45 m																		
17.00	17.30	UDS6																						
18.50	18.95	SPT8	53	32								29.0	16.3	12.7										
20.00	20.30	UDS7														1.92	1.60	20.0						
22.00	22.45	SPT9	37	18				8	34	46	12													
24.00	24.30	UDS8																						
26.00	26.45	SPT10	42	19								25.1	15.7	9.4										
28.00	28.30	UDS9						0	24	61	15					1.90	1.52	25.2						
30.00	30.45	SPT11	54	21			30.45																	

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-39)

Location : Exhibition hall 2  
UTM Coordinates : 699878 E, 3160325 N  
Termination Depth : 30.45 m (RL 182.125 m)  
Ground Water Depth : 20.50 m  
Surface Elevation : RL 212.58 m  
Ground Water Level : RL 192.1 m  
Boring Method : Rotary Drilling  
Casing Depth : -  
Boring Start : 02-Jun-17  
Boring Finish : 05-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N <sub>r</sub> <sup>1</sup>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Firm to hard brown sandy silt, low plastic (CL)																		
1.00	1.45	SPT1	7	11		- firm, 0.0 to 3.0 m		7	17	61	15													3
2.00	2.30	UDS1				- with gravels, 0.0 to 12.5 m						23.7	15.4	8.3		1.79	1.59	12.1						2
3.00	3.45	SPT2	12	14		- stiff, 3.0 to 7.0 m																		4
4.00	4.30	UDS2														1.80	1.62	11.2		DS	0.5, 1, 1.5	0.0	32.4	7
5.00	5.45	SPT3	21	22																				
6.00	6.30	UDS3														1.82	1.64	11.5						
7.00	7.45	SPT4	36	33		- hard, 7.0 to 14.0 m		8	32	45	15													
8.00	8.30	UDS4										25.6	16.4	9.3		1.85	1.63	13.5						
9.50	9.95	SPT5	38	31																				
11.00	11.30	DS2																						
12.50	12.95	SPT6	41	30				0	26	57	17													


<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-39)

Location : Exhibition hall 2  
UTM Coordinates : 699878 E, 3160325 N  
Termination Depth : 30.45 m (RL 182.125 m)  
Ground Water Depth : 20.50 m  
Surface Elevation : RL 212.58 m  
Ground Water Level : RL 192.1 m  
Boring Method : Rotary Drilling  
Casing Depth : -  
Boring Start : 02-Jun-17  
Boring Finish : 05-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	UDS5	42	28		Hard brown sandy silt, low plastic (CL)	30.45	0	34	48	18	27.6	16.7	10.9		1.86	1.64	13.0						
15.50	15.95	SPT7																						
17.00	17.30	UDS6																						
18.50	18.95	SPT8																						
20.00	20.30	UDS7																						
22.00	22.45	SPT9																						
24.00	24.30	DS3																						
26.00	26.45	SPT10																						
28.00	28.30	DS4																						
30.00	30.45	SPT11	56	22				27.4	16.6	10.8														

<sup>(1)</sup> SPT is outside NABL scope.



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### Soil Profile (BH-40)

Location : Exhibition hall 2  
UTM Coordinates : 699797 E, 3160473 N  
Termination Depth : 30.45 m (RL 182.121 m)  
Ground Water Depth : 20.70 m  
Surface Elevation : RL 212.57 m  
Ground Water Level : RL 191.9 m  
Boring Method : Rotary Drilling  
Casing Depth : -  
Boring Start : 03-Jun-17  
Boring Finish : 05-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N <sub>r</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to very stiff brown sandy silt, low plastic (CL)																		
1.00	1.45	SPT1	8	12		- stiff, 0.0 to 5.0 m		6	24	63	7													5
2.00	2.30	UDS1				- with gravels, 0.0 to 6.0 m						31.0	17.0	14.0		1.73	1.52	14.0						5
3.00	3.45	SPT2	11	13																				7
4.00	4.30	UDS2														1.79	1.56	14.5						9
5.00	5.45	SPT3	17	18		- very stiff, 5.0 to 14.0 m																		
6.00	6.30	UDS3				- with traces of gravels, 6.0 to 12.5 m		2	29	62	7					1.78	1.57	13.5		DS	0.5, 1, 1.5	0.0	32.6	
7.00	7.45	SPT4	18	17								34.0	16.0	18.0										
8.00	8.30	DS2																						
9.50	9.95	SPT5	22	18																				
11.00	11.30	UDS4														1.84	1.59	15.7	2.62					
12.50	12.95	SPT6	26	19		- with gravels, 12.5 to 14.0 m		5	37	52	6													

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-40)

Location :	Exhibition hall 2	Termination Depth :	30.45 m (RL 182.121 m)	Boring Method :	Rotary Drilling
UTM Coordinates :	699797 E, 3160473 N	Ground Water Depth :	20.70 m	Casing Depth :	-
		Surface Elevation :	RL 212.57 m	Boring Start :	03-Jun-17
		Ground Water Level :	RL 191.9 m	Boring Finish :	05-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, $\phi$ (degrees)	
14.00	14.30	UDS5				Very stiff to hard brown sandy silt with traces of gravels, low plastic (CL)						31.0	16.9	14.0		1.86	1.59	17.3						
15.50	15.95	SPT7	29	19		- very stiff, 14.0 to 18.5 m																		
17.00	17.30	UDS6														1.89	1.62	16.4						
18.50	18.95	SPT8	33	20		- hard, 18.5 to 30.45 m																		
20.00	20.30	DS3					4	36	54	6														
22.00	22.45	SPT9	38	18								33.9	16.9	17.0										
24.00	24.30	UDS7														1.87	1.55	20.8						
26.00	26.45	SPT10	41	18																				
28.00	28.30	DS4																						
30.00	30.45	SPT11	45	19			30.45																	

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-41)

Location : Exhibition hall 2 Termination Depth : 30.45 m (RL 181.771 m) Boring Method : Rotary Drilling  
UTM Coordinates : 699843 E, 3160439 N Ground Water Depth : 20.96 m Casing Depth : -  
Surface Elevation : RL 212.22 m Boring Start : 03-Jun-17  
Ground Water Level : RL 191.3 m Boring Finish : 06-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N <sub>r</sub> <sup>1</sup>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to very stiff brown sandy silt, low plastic (CL)																		
1.00	1.95	SPT1	9	14		- stiff, 0.0 to 5.0 m		0	16	70	14													6
2.00	2.30	UDS1										23.1	16.8	6.3		1.80	1.61	11.6						4
3.00	3.45	SPT2	13	16																				8
4.00	4.30	UDS2														1.81	1.62	11.9		DS	0.5, 1, 1.5	0.0	31.8	5
5.00	5.45	SPT3	18	19		- very stiff, 5.0 to 14.0 m																		
6.00	6.30	UDS3														1.83	1.63	12.6						
7.00	7.45	SPT4	21	19																				
8.00	8.30	DS2																						
9.50	9.95	SPT5	25	21				0	18	67	15													
11.00	11.30	UDS4										25.2	15.4	9.8		1.87	1.64	14.2						
12.50	12.95	SPT6	26	19																				

<sup>(1)</sup> SPT is outside NABL scope.


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Location : Exhibition hall 2  
UTM Coordinates : 699843 E, 3160439 N

### Soil Profile (BH-41)

Termination Depth : 30.45 m (RL 181.771 m) Boring Method : Rotary Drilling  
Ground Water Depth : 20.96 m Casing Depth : -  
Surface Elevation : RL 212.22 m Boring Start : 03-Jun-17  
Ground Water Level : RL 191.3 m Boring Finish : 06-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	UDS5	32	21		Hard brown sandy silt, low plastic (CL)	30.45	0	21	63	16	25.7	16.5	9.1		1.89	1.64	15.0						
15.50	15.95	SPT7																						
17.00	17.30	DS3																						
18.50	18.95	SPT8																						
20.00	20.30	UDS6																						
22.00	22.45	SPT9																						
24.00	24.30	UDS7																						
26.00	26.45	SPT10																						
28.00	28.30	DS4																						
30.00	30.45	SPT11																						

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-42)

Location : Exhibition hall 2  
UTM Coordinates : 699889 E, 3160406 N  
Termination Depth : 30.45 m (RL 182.007 m)  
Ground Water Depth : 20.86 m  
Surface Elevation : RL 212.46 m  
Ground Water Level : RL 191.6 m  
Boring Method : Rotary Drilling  
Casing Depth : -  
Boring Start : 06-Jun-17  
Boring Finish : 08-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Firm to very stiff brown sandy silt, low plastic (CL)																		
1.00	1.45	SPT1	7	11		- firm, 0.0 to 3.0 m																		11
2.00	2.30	UDS1				- with traces of gravels, 0.0 to 11.0 m		2	18	72	8					1.78	1.56	13.9						6
3.00	3.45	SPT2	10	12		- stiff, 3.0 to 7.0 m						33.9	17.9	16.0										12
4.00	4.30	UDS2														1.80	1.60	12.5						6
5.00	5.45	SPT3	13	13																				
6.00	6.80	UDS3														1.82	1.59	14.5		DS	0.5, 1, 1.5	0.0	32.0	
7.00	7.45	SPT4	16	15		- very sitff, 7.0 to 14.0 m																		
8.00	8.30	DS2																						
9.50	9.95	SPT5	17	14																				
11.00	11.30	UDS4				- with gravels, 11.0 to 14.0 m		6	33	55	6					1.85	1.57	17.5	2.65					
12.50	12.95	SPT6	22	16								34.0	15.5	18.5										

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-42)

Location : Exhibition hall 2  
UTM Coordinates : 699889 E, 3160406 N  
Termination Depth : 30.45 m (RL 182.007 m)  
Ground Water Depth : 20.86 m  
Surface Elevation : RL 212.46 m  
Ground Water Level : RL 191.6 m  
Boring Method : Rotary Drilling  
Casing Depth : -  
Boring Start : 06-Jun-17  
Boring Finish : 08-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N <sub>c</sub>				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	UDS5				Very stiff to hard brown sandy silt, low plastic (CL)									1.88	1.64	14.3							
15.50	15.95	SPT7	26	17		- very stiff, 14.0 to 18.5 m																		
17.00	17.30	UDS6													1.87	1.62	15.6							
18.50	18.95	SPT8	31	19		- hard, 18.5 to 30.45 m		3	26	64	7													
20.00	20.30	DS3				- with traces of gravels, 14.0 to 24.0 m						34.3	15.0	19.3										
22.00	22.45	SPT9	37	18																				
24.00	24.30	UDS7				- with gravels, 24.0 to 30.45 m		6	15	71	8				1.88	1.55	21.5							
26.00	26.45	SPT10	44	19								33.9	18.9	15.0										
28.00	28.30	DS4																						
30.00	30.45	SPT11	75	26			30.45																	

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-43)

Location : Exhibition hall 2  
UTM Coordinates : 699934 E, 3160372 N  
Termination Depth : 30.45 m (RL 182.074 m)  
Ground Water Depth : 21.00 m  
Surface Elevation : RL 212.52 m  
Ground Water Level : RL 191.5 m  
Boring Method : Rotary Drilling  
Casing Depth : -  
Boring Start : 05-Jun-17  
Boring Finish : 07-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to hard brown sandy silt, low plastic (CL)																		
1.00	1.45	SPT1	9	14		- stiff, 0.0 to 5.0 m		1	24	59	16													4
2.00	2.30	UDS1										27.6	17.5	10.2		1.80	1.62	11.2						6
3.00	3.45	SPT2	12	14																				8
4.00	4.30	UDS2				- with traces of gravels, 0.0 to 8.0 m		1	25	62	12					1.81	1.61	12.5		DS	0.5, 1, 1.5	0.0	33.0	4
5.00	5.45	SPT3	29	30		- very stiff, 5.0 to 7.0 m																		
6.00	6.30	UDS3														1.82	1.61	13.5						
7.00	7.45	SPT4	31	29		- hard, 7.0 to 14.0 m																		
8.00	8.30	DS2						0	20	62	18													
9.50	9.95	SPT5	35	29								28.1	16.7	11.4										
11.00	11.30	DS3																						
12.50	12.95	SPT6	39	29																				

<sup>(1)</sup> SPT is outside NABL scope.




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### Soil Profile (BH-43)

Location : Exhibition hall 2  
UTM Coordinates : 699934 E, 3160372 N  
Termination Depth : 30.45 m (RL 182.074 m)  
Ground Water Depth : 21.00 m  
Surface Elevation : RL 212.52 m  
Ground Water Level : RL 191.5 m  
Boring Method : Rotary Drilling  
Casing Depth : -  
Boring Start : 05-Jun-17  
Boring Finish : 07-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
14.00	14.30	UDS4	40	27		Hard brown sandy silt, low plastic (CL)	30.45	0	28	56	16	25.0	18.0	6.9	1.86	1.62	15.2							
15.50	15.95	SPT7																						
17.00	17.30	UDS5																						
18.50	18.95	SPT8																						
20.00	20.30	UDS6																						
22.00	22.45	SPT9																						
24.00	24.30	UDS7																						
26.00	26.45	SPT10																						
28.00	28.30	DS4																						
30.00	30.45	SPT11	61	23																				

<sup>(1)</sup> SPT is outside NABL scope.

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### Soil Profile (BH-159)

Location : - Termination Depth : 30.45 m (RL 183.700 m) Boring Method : Rotary Drilling  
UTM Coordinates : 700481 E, 3160326 N Ground Water Depth : 23.26 m Casing Depth : -  
Surface Elevation : RL 214.15 m Boring Start : 31-May-17  
Ground Water Level : RL 190.9 m Boring Finish : 01-Jun-17

Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>r</sub>	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, φ (degrees)	
0.00	0.50	DS1				Stiff to hard brown sandy silt, low plastic (CL)																		
1.00	1.45	SPT1	8	12		- stiff, 0.0 to 5.0 m		0	41	44	15													7
2.00	2.30	UDS1														1.80	1.60	12.2		DS	0.5, 1, 1.5	0.0	30.9	2
3.00	3.45	SPT2	13	16								34.8	18.4	16.4					2.69					5
4.00	4.30	UDS2														1.81	1.61	12.6						8
5.00	5.45	SPT3	30	31		- very stiff, 5.0 to 7.0 m		0	35	54	11													
6.00	6.30	UDS3				- with gravels, 7.0 to 8.0 m										1.85	1.66	12.0						
7.00	7.45	SPT4	37	34		- hard, 7.0 to 14.0 m		14	29	40	17													
8.00	8.30	UDS4				- with traces of gravels, 8.0 to 14.0 m		3	20	62	15	32.4	16.0	16.4		1.85	1.60	15.6						
9.50	9.95	SPT5	30	25																				
11.00	11.30	UDS5																						
12.50	12.95	SPT6	44	32								32.5	17.0	15.5										


<sup>(1)</sup> SPT is outside NABL scope.

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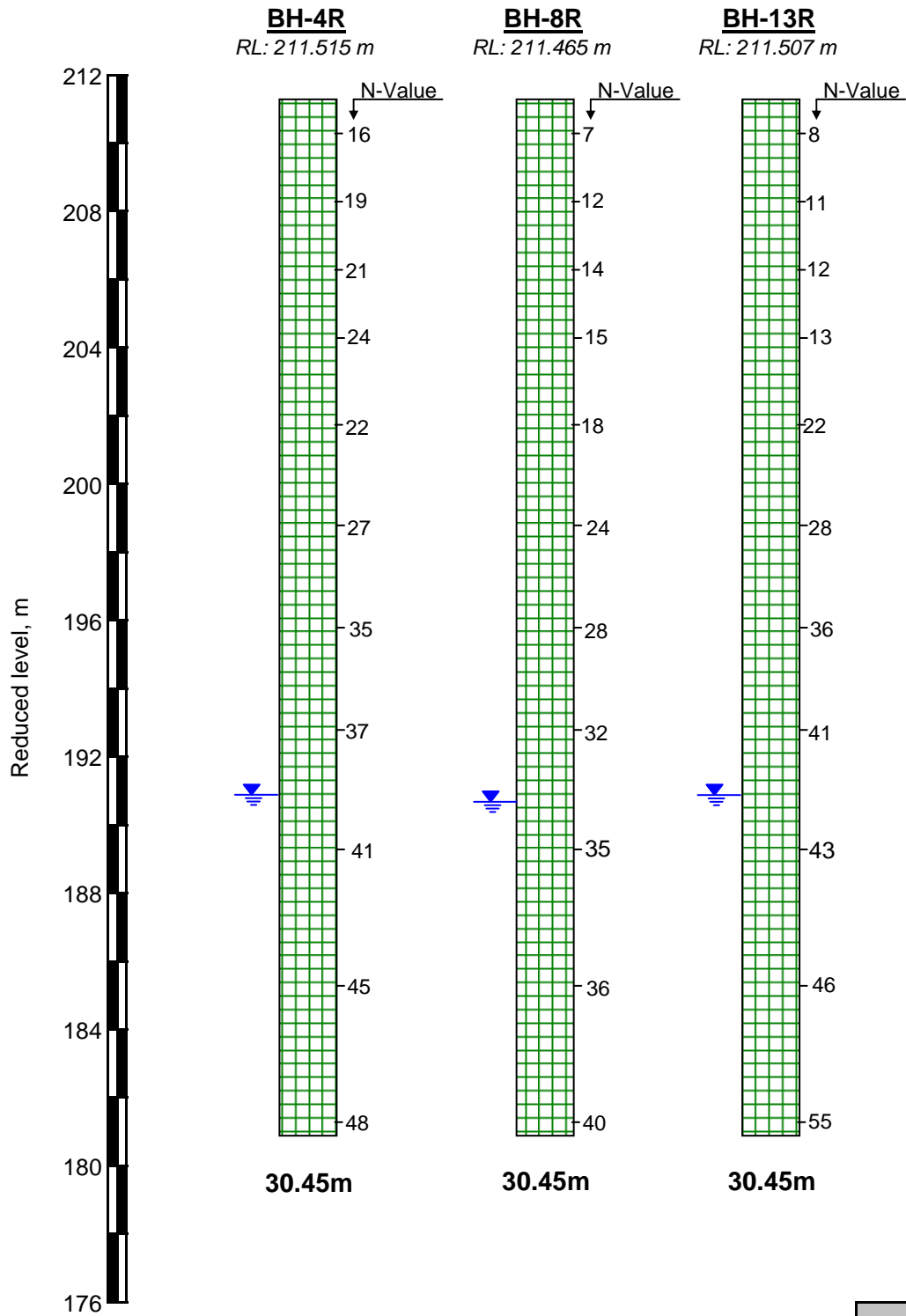


### Soil Profile (BH-159)

Location : - Termination Depth : 30.45 m (RL 183.700 m) Boring Method : Rotary Drilling  
UTM Coordinates : 700481 E, 3160326 N Ground Water Depth : 23.26 m Casing Depth : -  
Surface Elevation : RL 214.15 m Boring Start : 31-May-17  
Ground Water Level : RL 190.9 m Boring Finish : 01-Jun-17

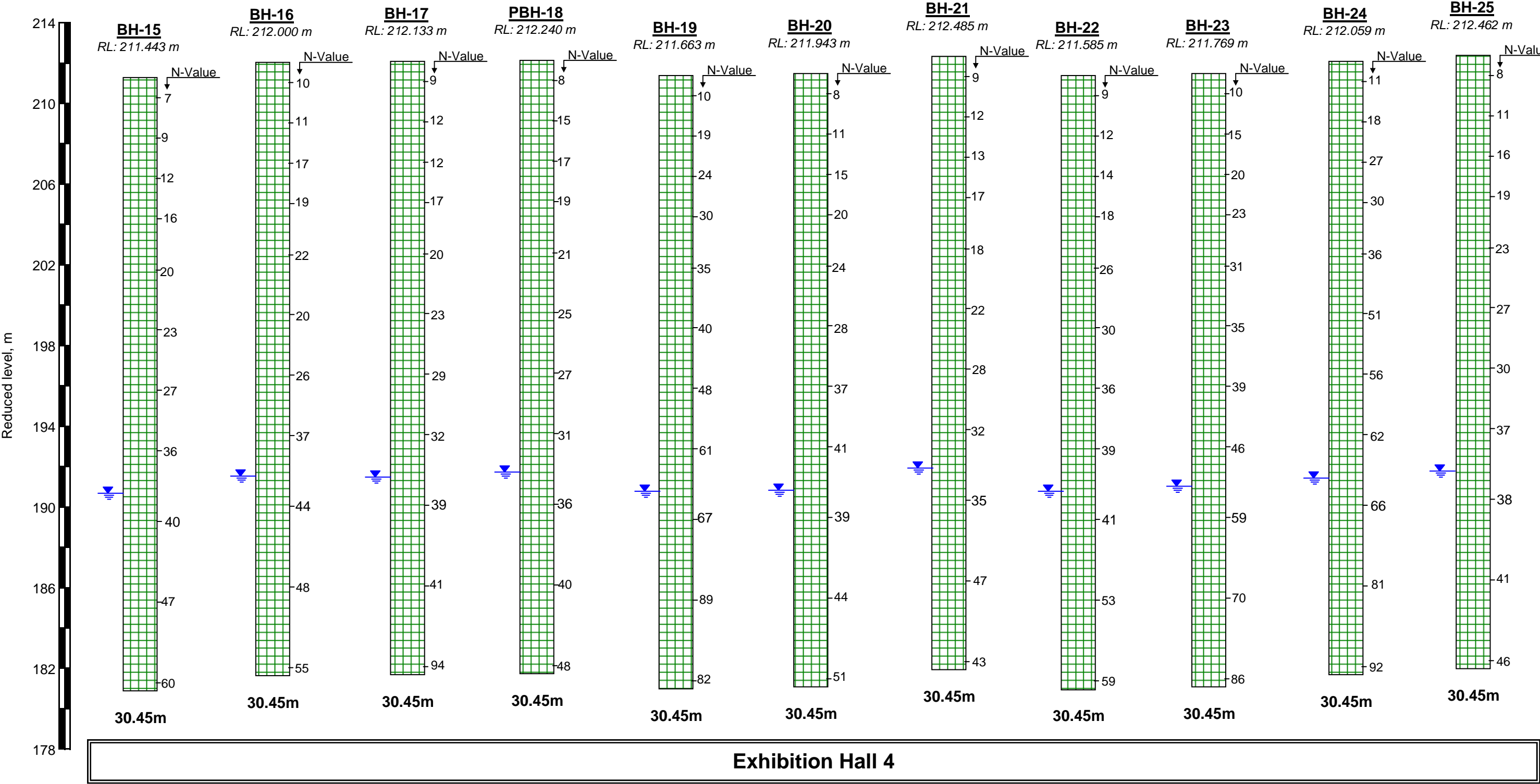
Depth, m		Sample No.	SPT <sup>(1)</sup>		Symbol	SOIL DESCRIPTION	Depth of Strata (m)	Grain Size Analysis				Atterberg Limits			Shrinkage Limit, (%)	Density and Moisture			Specific Gravity	Shear Tests				Free Swell Index, (%)
From	To		Field Value, N <sub>f</sub>	Corrected Value, N"				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid (%)	Plastic (%)	Plasticity Index (%)		Bulk Density (gms/cm <sup>3</sup> )	Dry Density (gms/cm <sup>3</sup> )	Moisture Content (%)		Type of Test	Confining Pressures (kg/cm <sup>2</sup> )	Cohesion Intercept, 'c' (kg/cm <sup>2</sup> )	Angle of Internal Friction, $\phi$ (degrees)	
14.00	14.30	UDS6	54	36		Hard brown sandy silt with traces of gravels, low plastic (CL)	30.45	2	28	51	19	28.3	17.4	10.8		1.90	1.64	16.2	2.71					
15.50	15.95	SPT7																						
17.00	17.30	UDS7																						
18.50	18.95	SPT8														62	37							
20.00	20.30	UDS8																						
22.00	22.45	SPT9														71	27							
24.00	24.30	DS2																						
26.00	26.45	SPT10														83	29							
28.00	28.30	UDS9																						
30.00	30.45	SPT11														60	22							

<sup>(1)</sup> SPT is outside NABL scope.



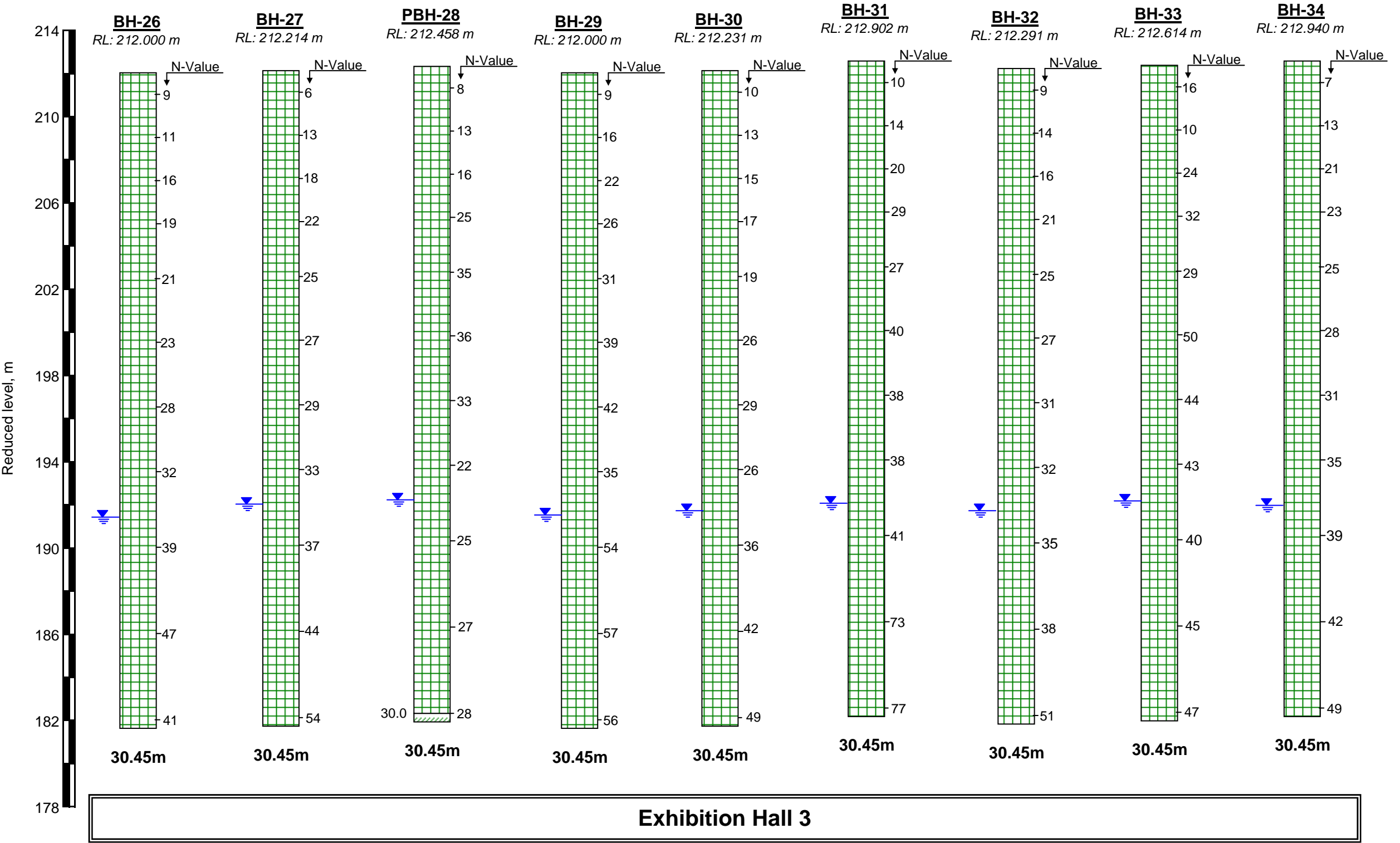
LEGEND	
SYMBOL	DESCRIPTION
	Sandy silt (CL)
	Water table

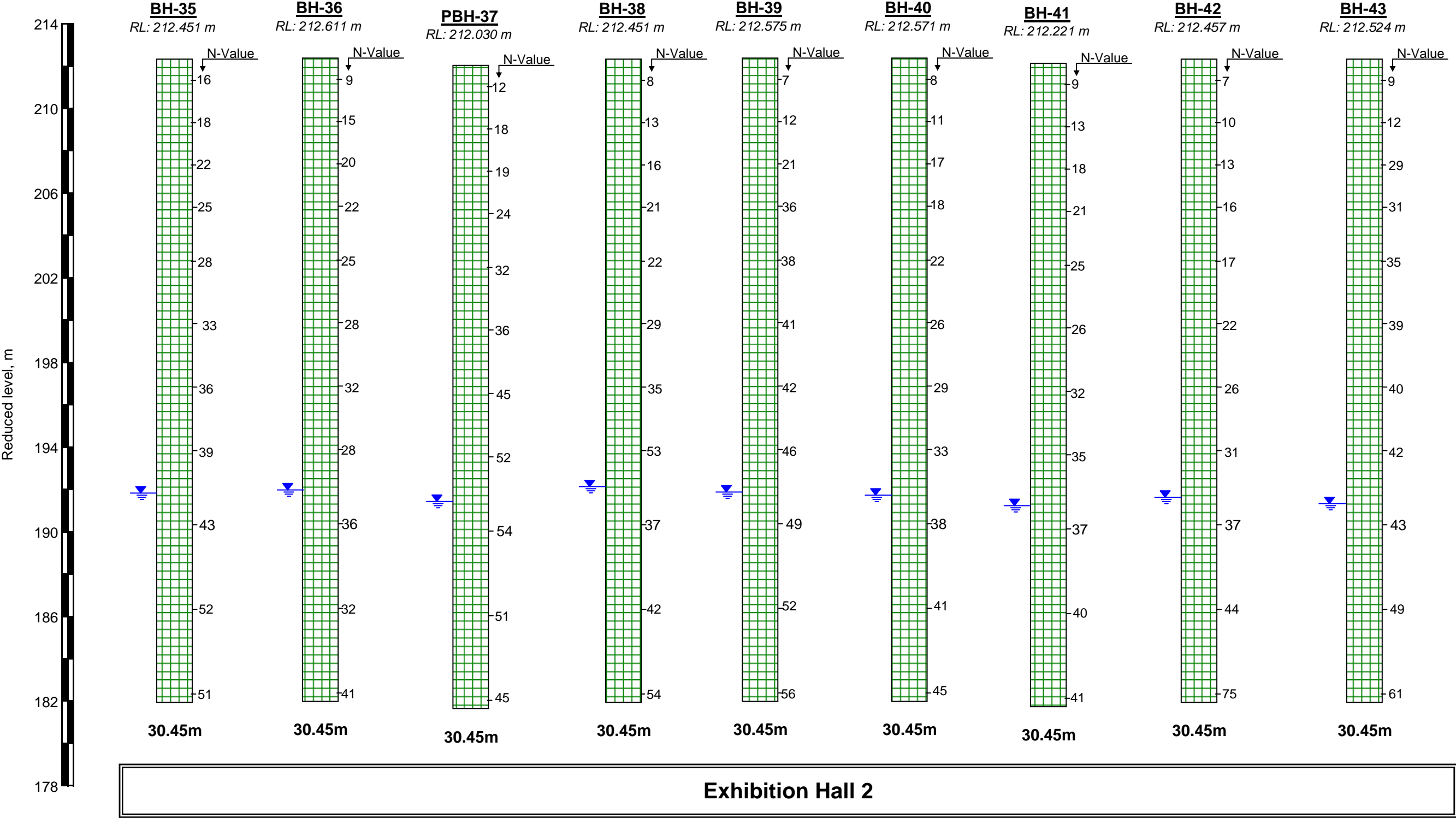
Summary of Borehole Profiles



LEGEND	
SYMBOL	DESCRIPTION
	Sandy silt (CL)
	Water table

Summary of Borehole Profiles

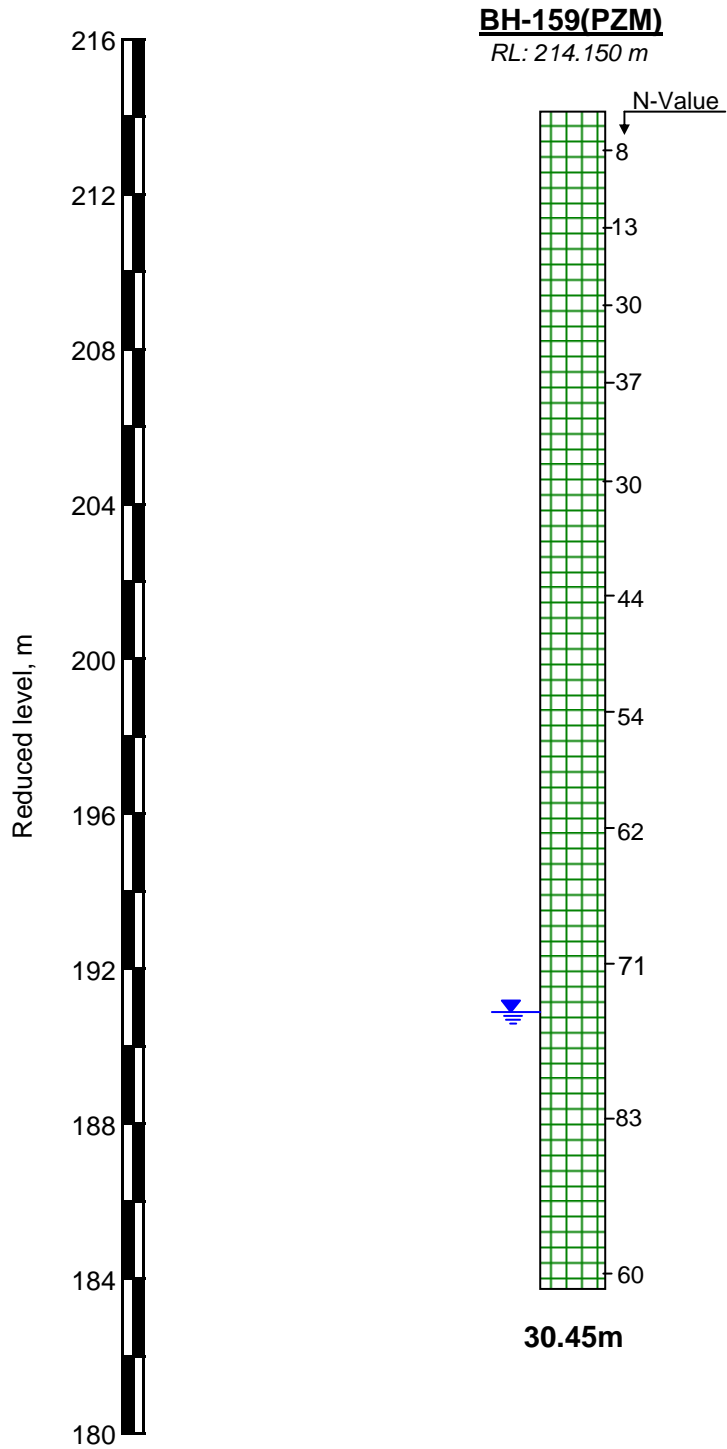




LEGEND	
SYMBOL	DESCRIPTION
	Sandy silt (CL)
	Water table

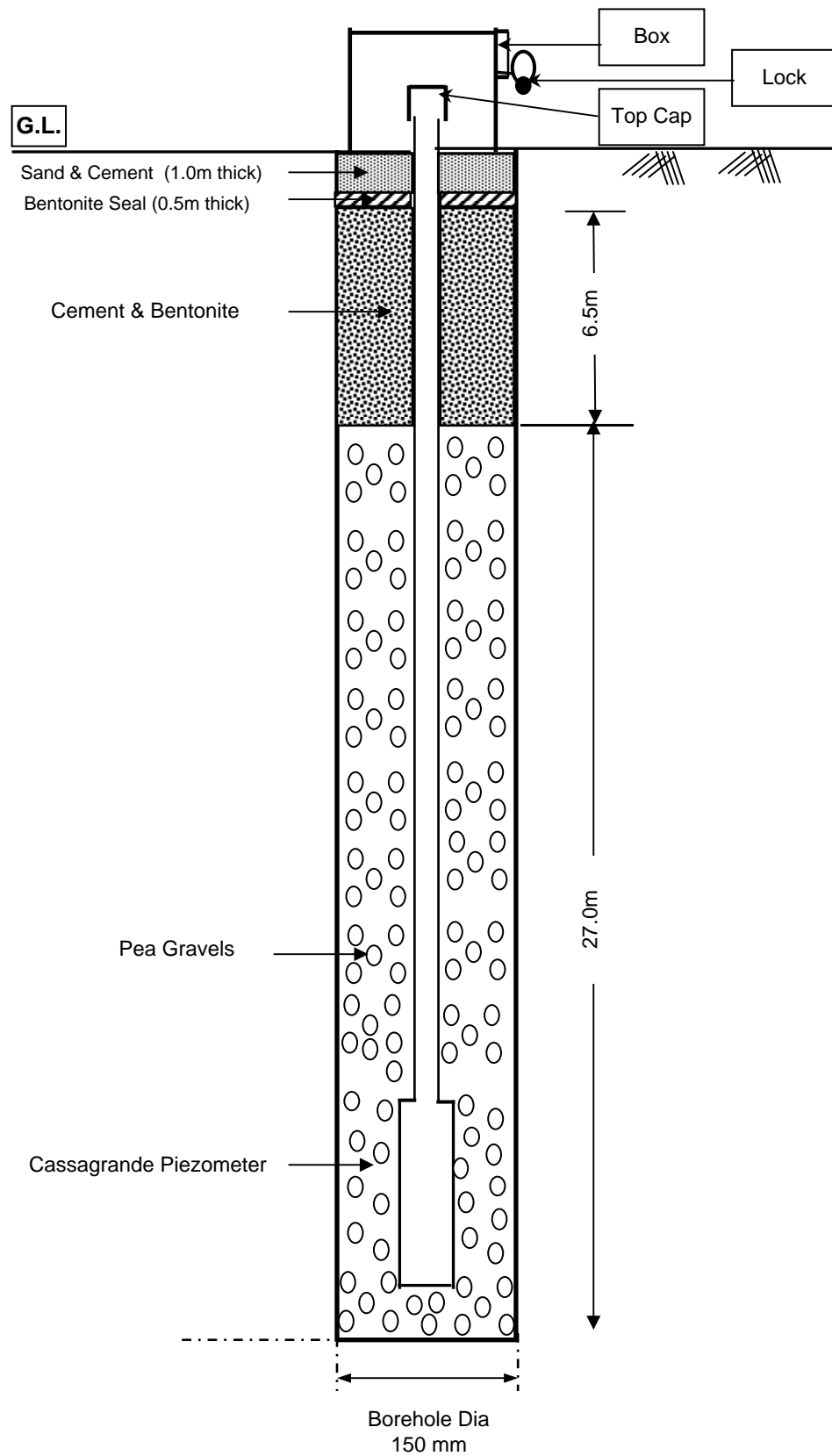
Summary of Borehole Profiles





LEGEND	
SYMBOL	DESCRIPTION
	Sandy silt (CL)
	Water table

### Summary of Borehole Profiles




**Typical Schematic Sketch For Cassagrande Piezometer**



### Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
	BH-4R	211.515	Refer Plate 1




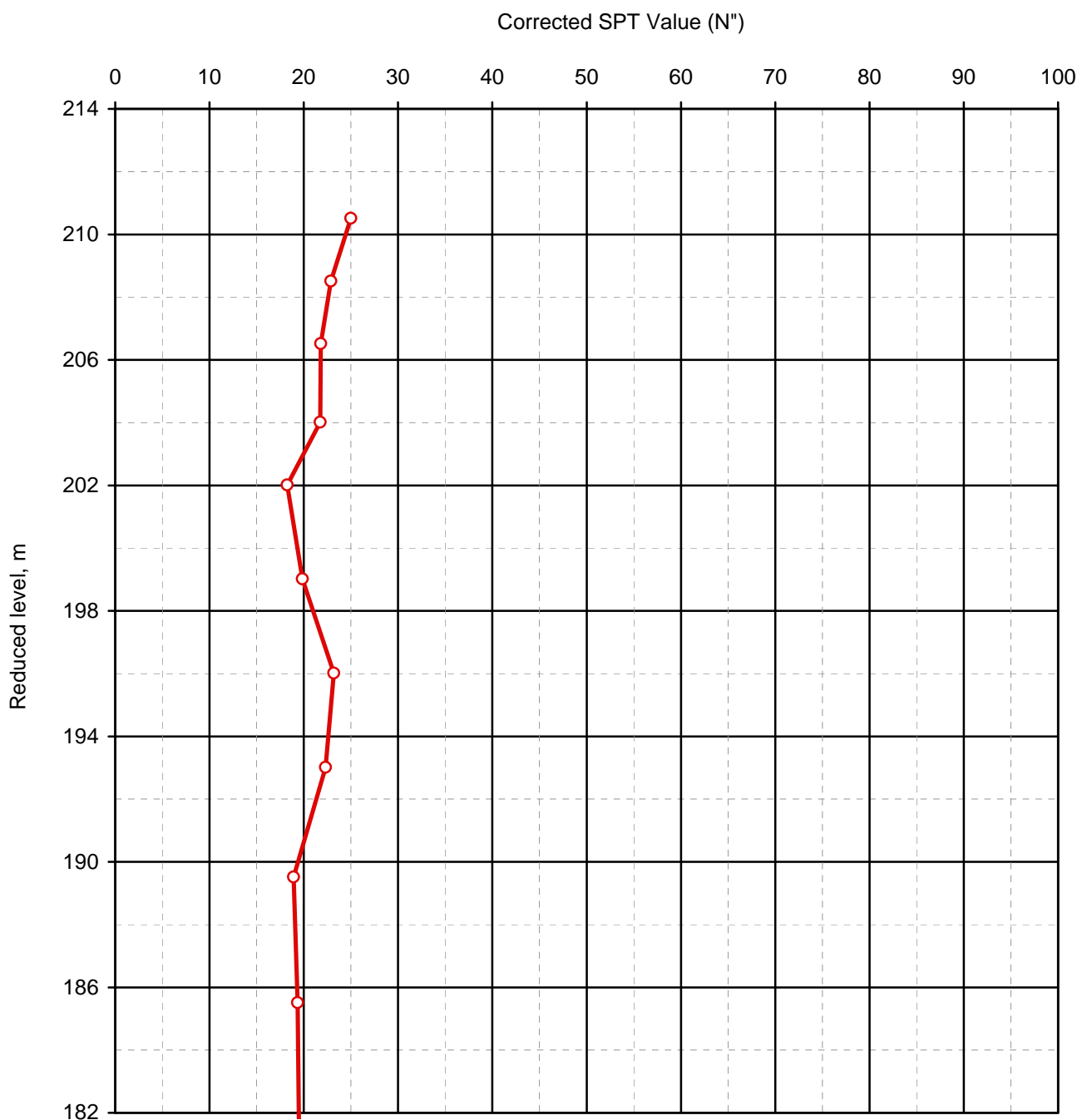
Field SPT Values vs. Reduced level



### Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
	BH-4R	211.515	Refer Plate 1




Corrected SPT Values vs. Reduced level



### Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
	BH-8R	211.465	Refer Plate 1




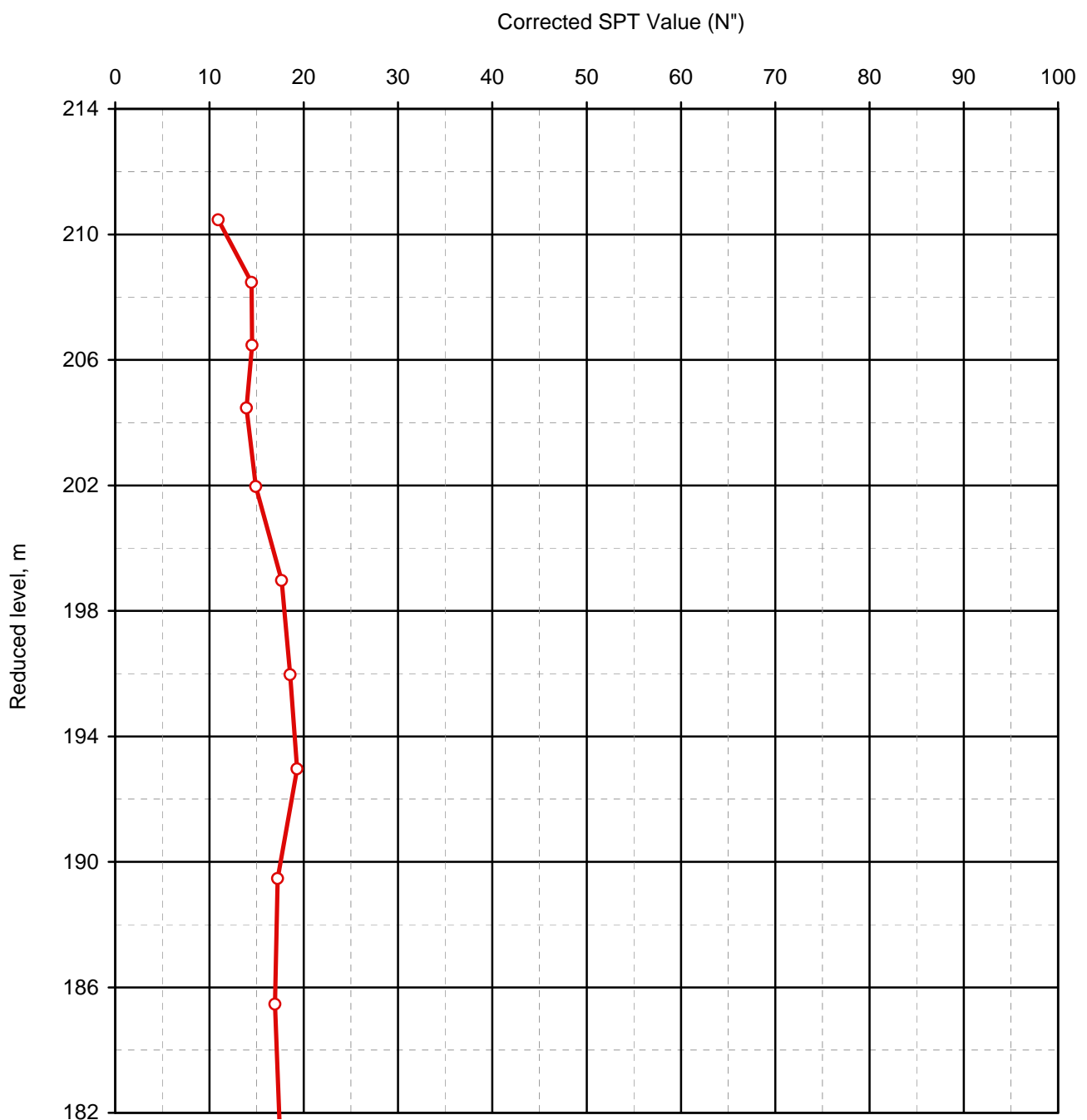
Field SPT Values vs. Reduced level



### Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
	BH-8R	211.465	Refer Plate 1




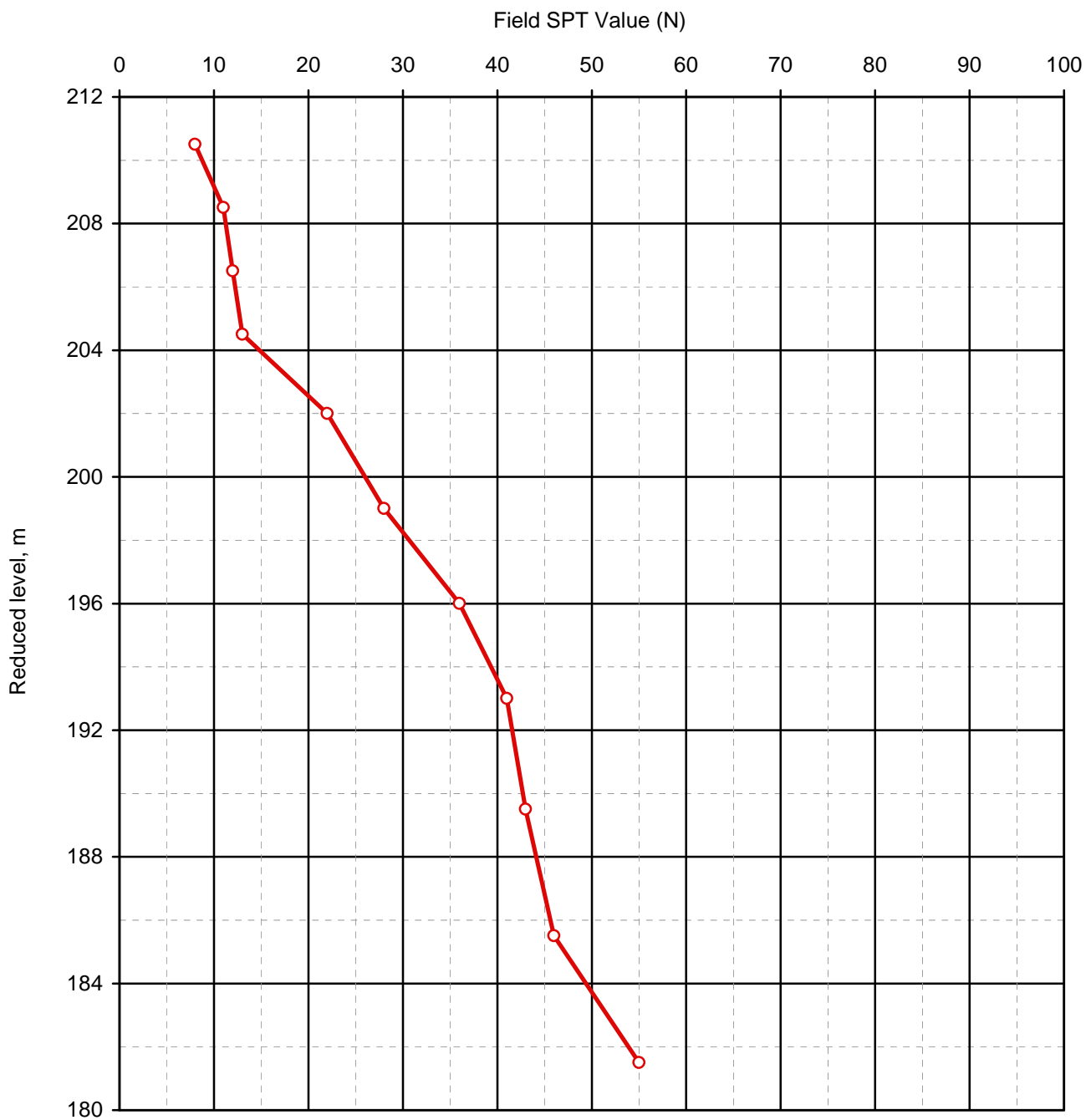
Corrected SPT Values vs. Reduced level



### Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
	BH-13R	211.507	Refer Plate 1




Field SPT Values vs. Reduced level

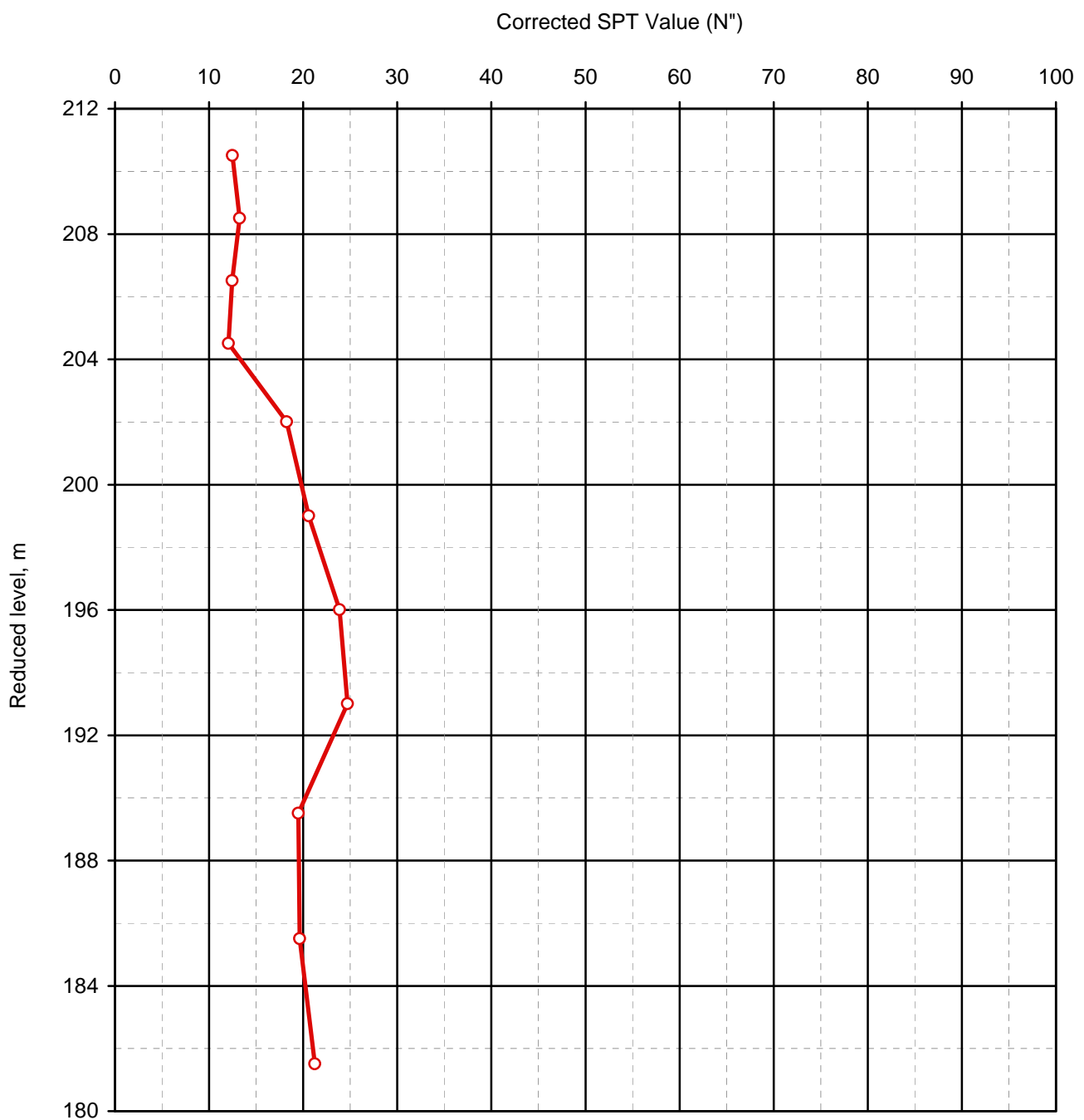




### Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
	BH-13R	211.507	Refer Plate 1



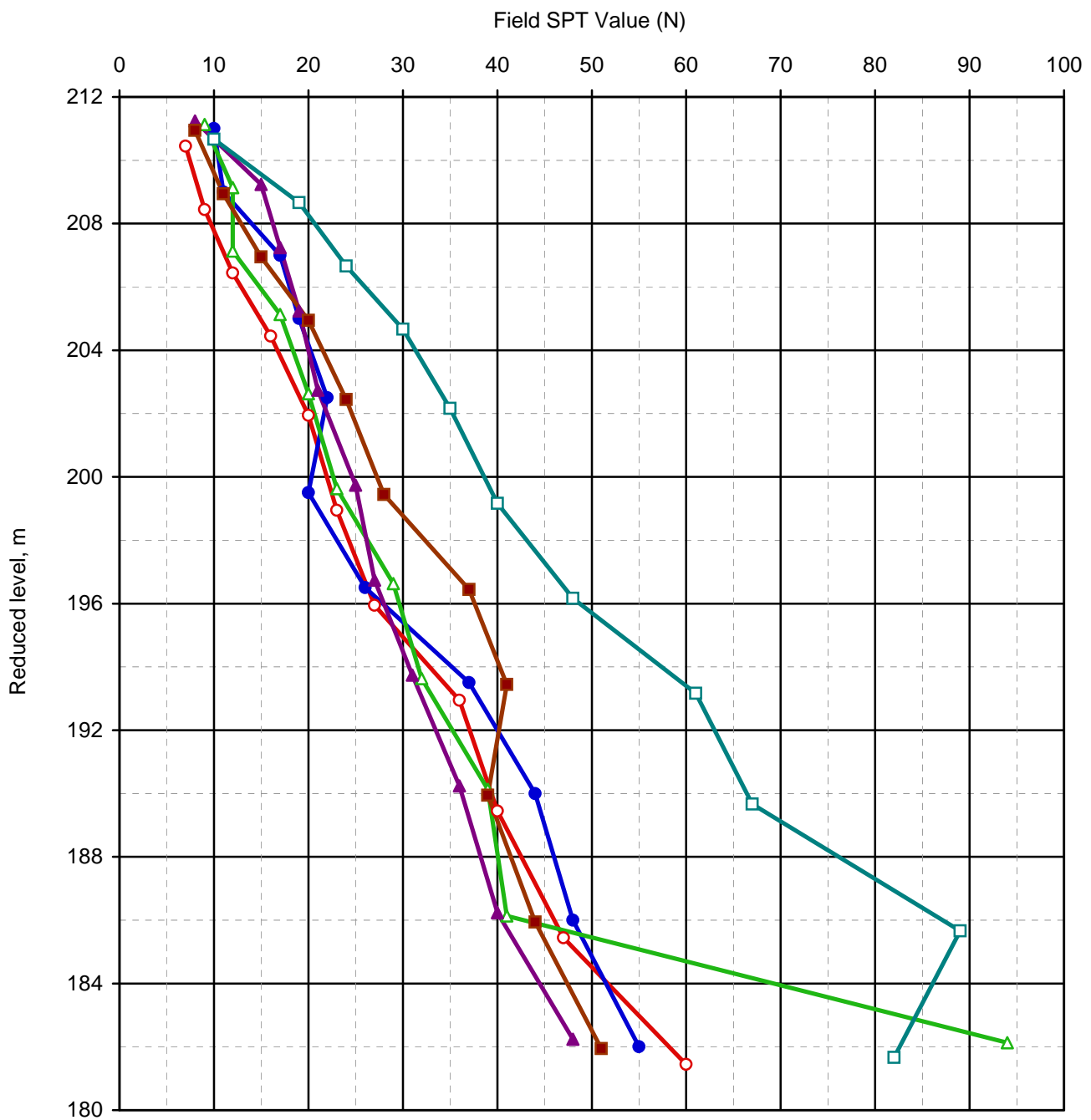
Corrected SPT Values vs. Reduced level



## Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
○	BH-15	211.443	Exhibition hall 4
●	BH-16	212.000	
△	BH-17	212.133	
▲	PBH-18	212.240	
□	BH-19	211.663	
■	BH-20	211.943	



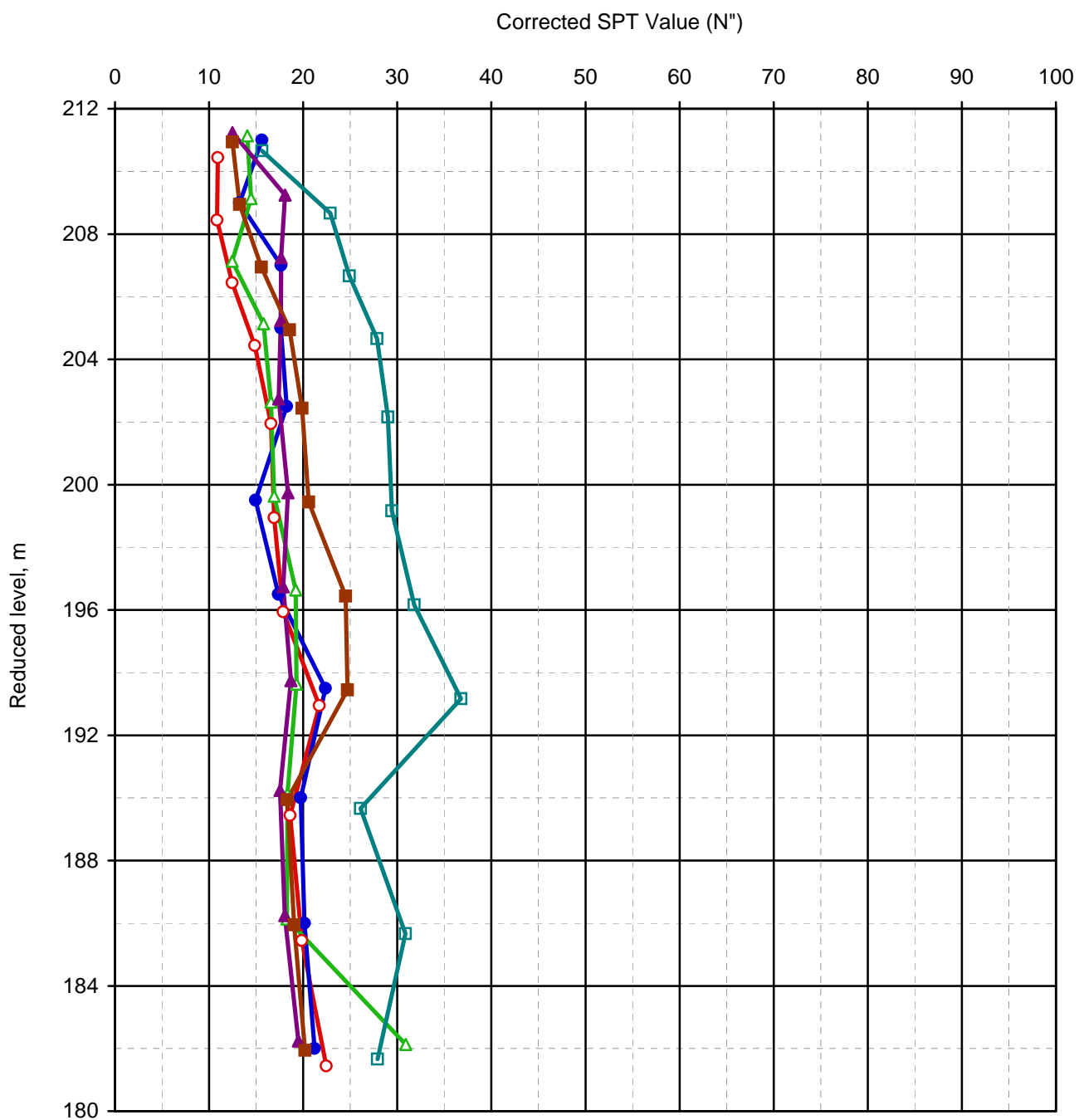
Field SPT Values vs. Reduced level



## Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
○	BH-15	211.443	Exhibition hall 4
●	BH-16	212.000	
△	BH-17	212.133	
▲	PBH-18	212.240	
□	BH-19	211.663	
■	BH-20	211.943	

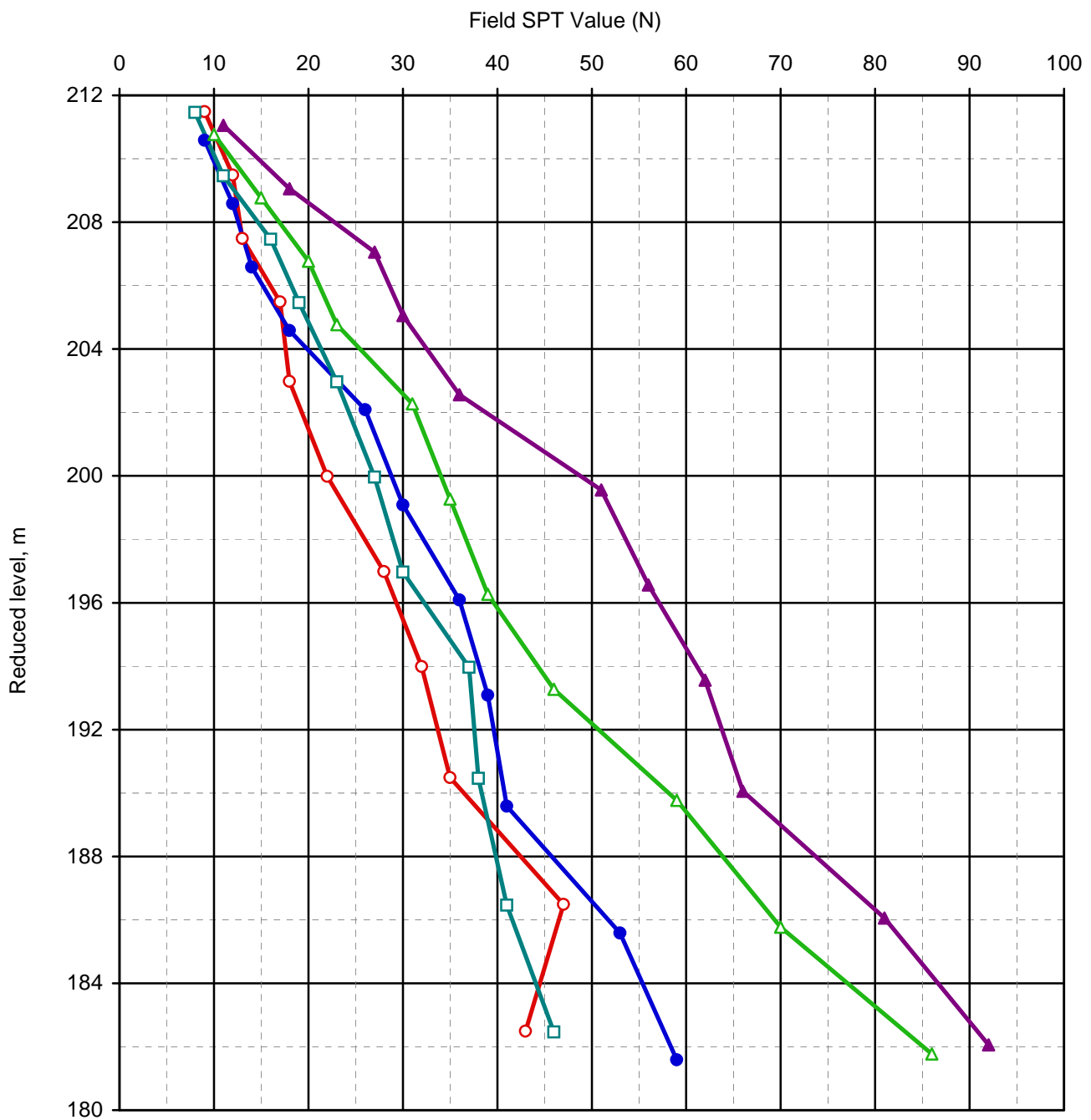




## Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
○	BH-21	212.485	Exhibition Hall 4
●	BH-22	211.585	
△	BH-23	211.769	
▲	BH-24	212.059	
□	BH-25	212.462	



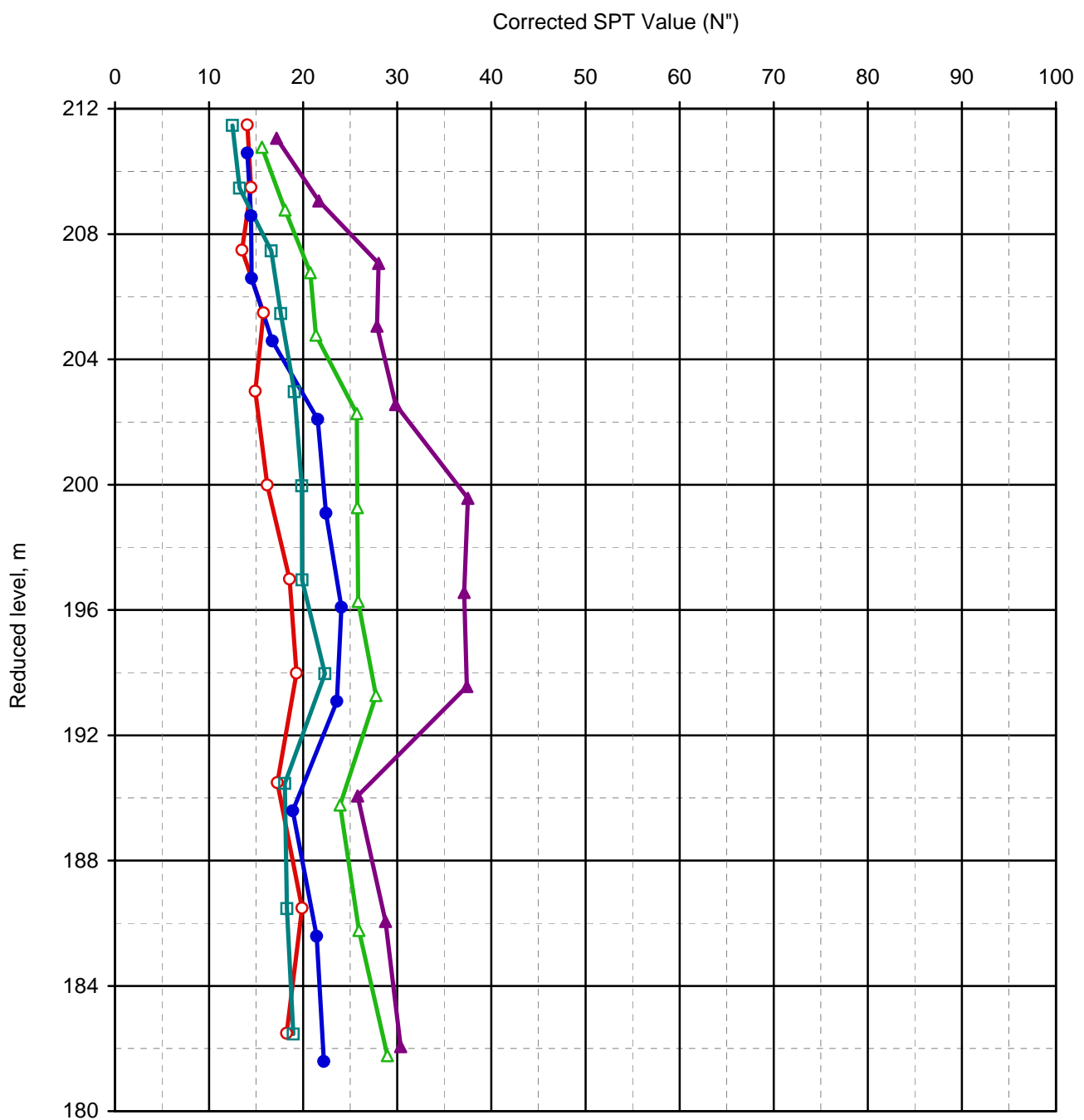
Field SPT Values vs. Reduced level



### Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
○	BH-21	212.485	Exhibition Hall 4
●	BH-22	211.585	
△	BH-23	211.769	
▲	BH-24	212.059	
□	BH-25	212.462	



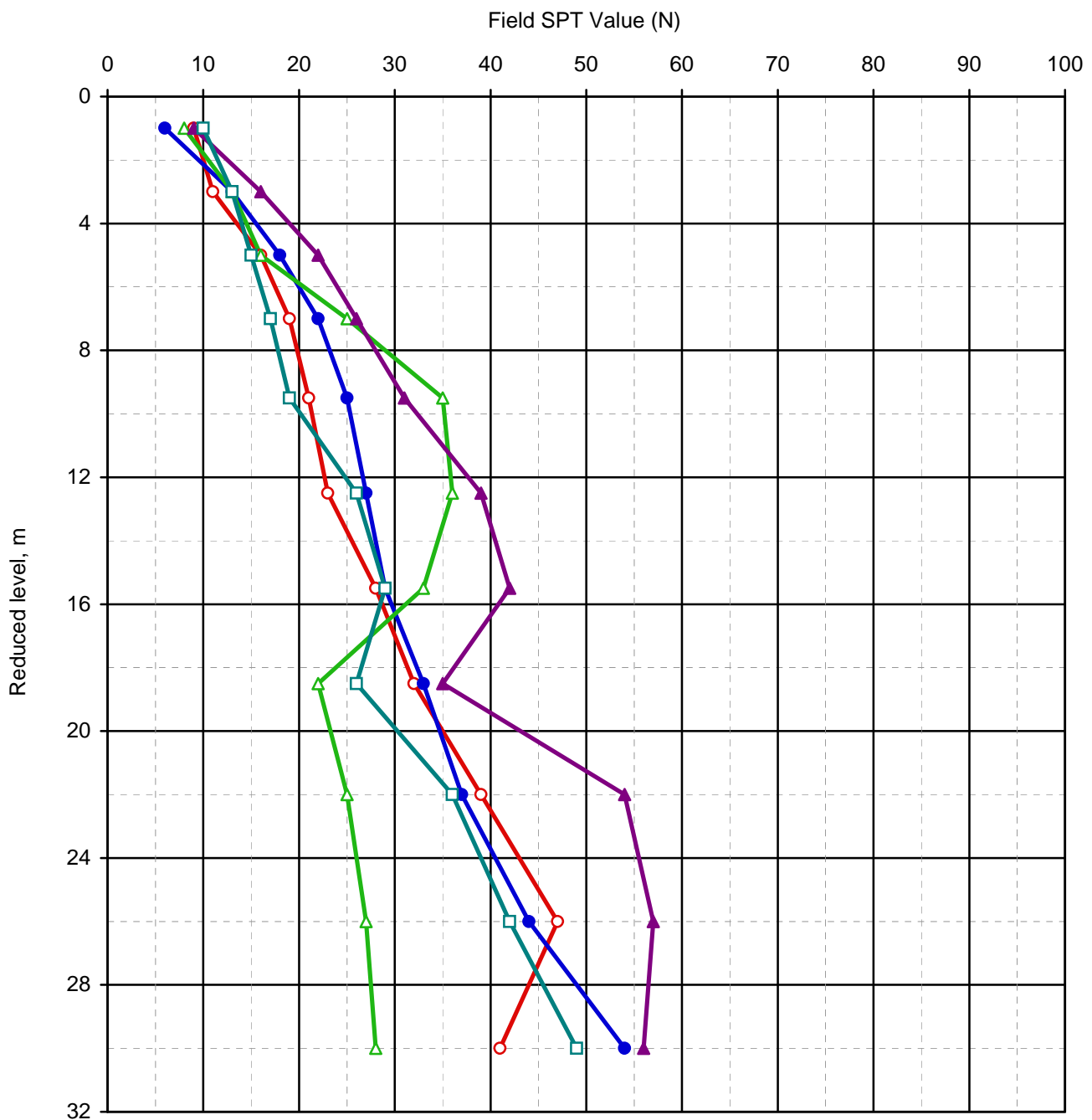
Corrected SPT Values vs. Reduced level



## Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number		Location
○	BH-26	212.000	Exhibition Hall 3
●	BH-27	212.214	
△	PBH-28	212.458	
▲	BH-29	212.000	
□	BH-30	212.231	



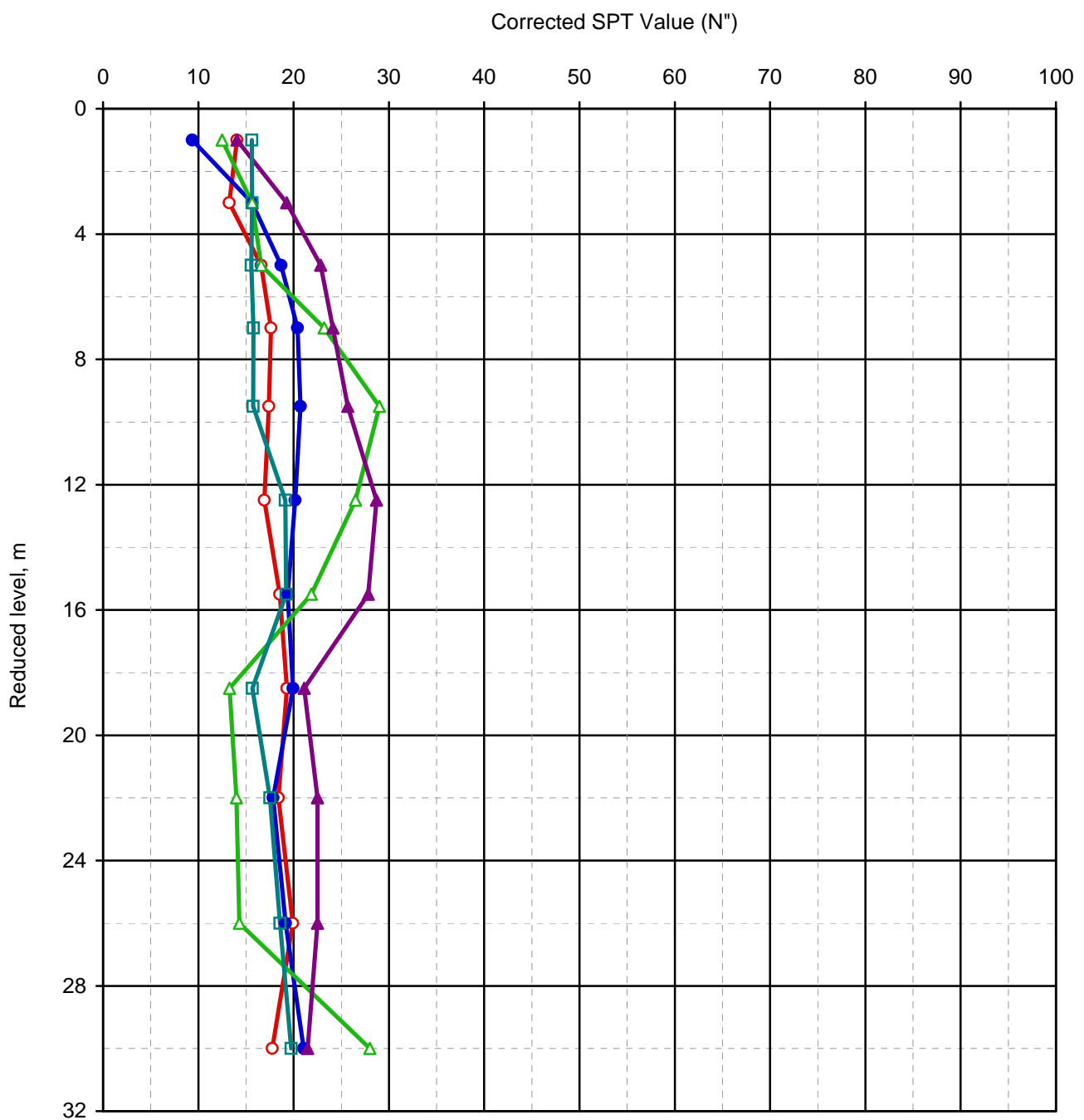
Field SPT Values vs. Reduced level



## Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number		Location
○	BH-26	212.000	Exhibition Hall 3
●	BH-27	212.214	
△	PBH-28	212.458	
▲	BH-29	212.000	
□	BH-30	212.231	



Corrected SPT Values vs. Reduced level

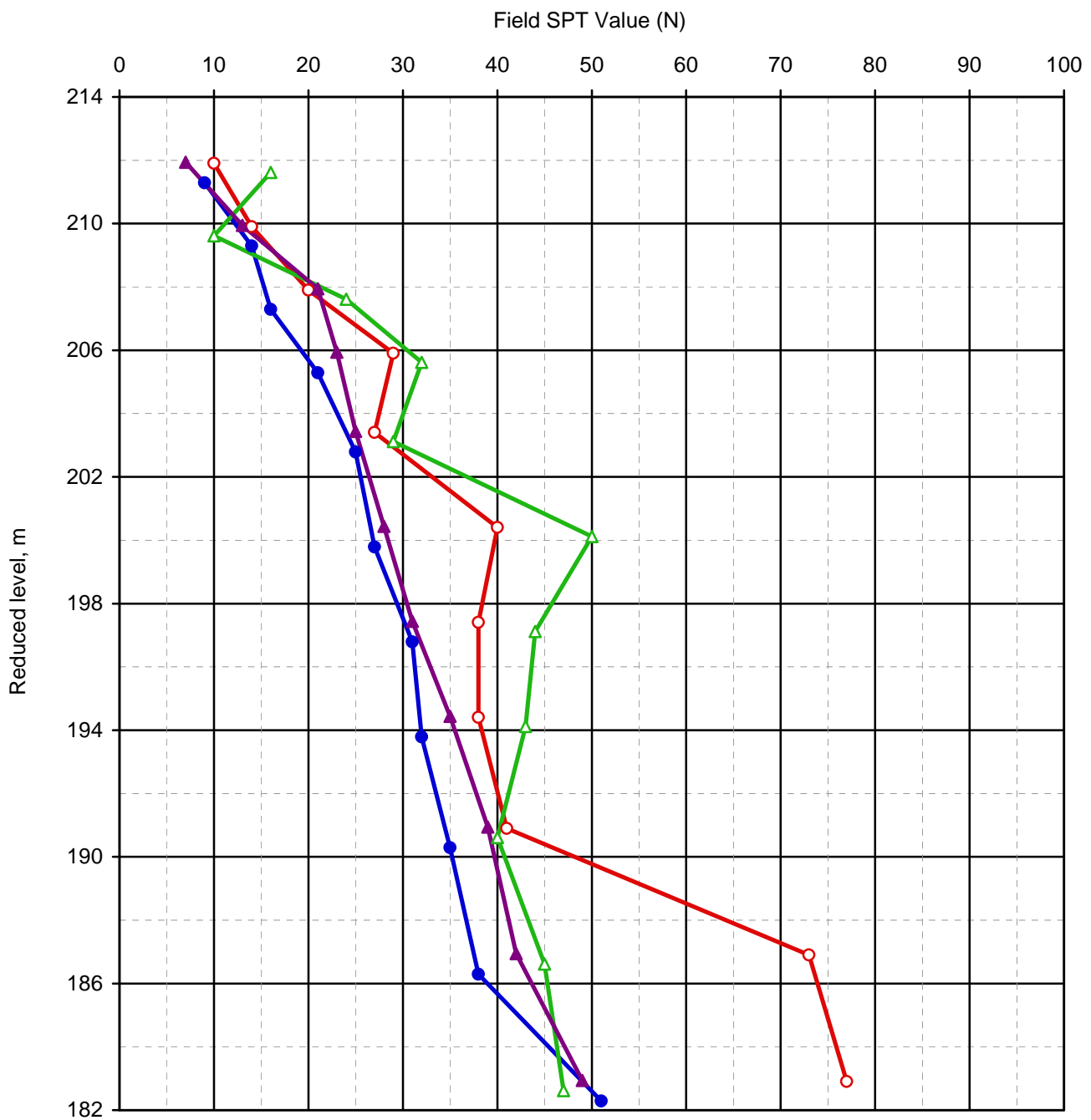




### Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
○	BH-31	212.902	Exhibition Hall 3
●	BH-32	212.291	
△	BH-33	212.614	
▲	BH-34	212.940	



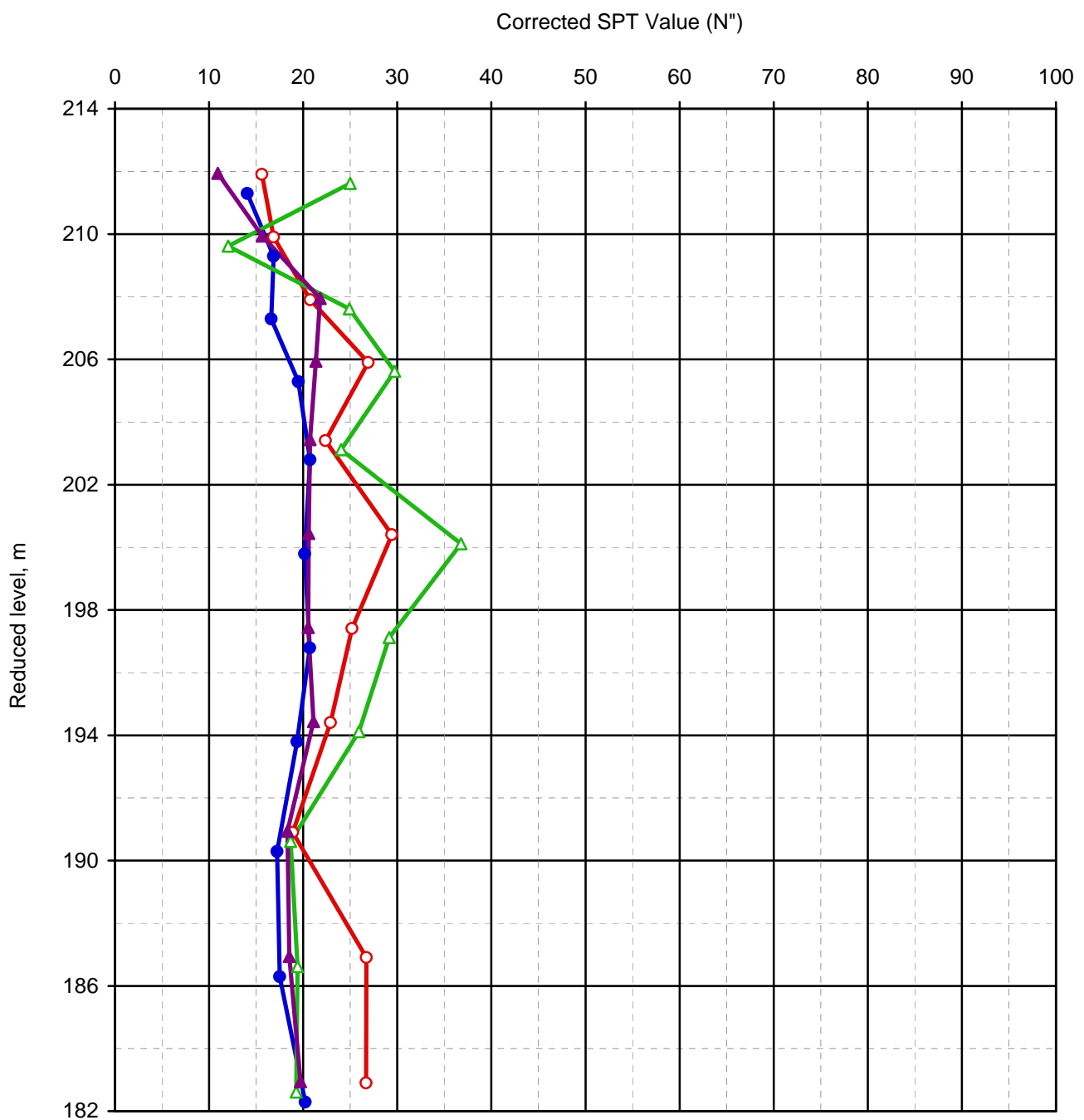
Field SPT Values vs. Reduced level



## Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
○	BH-31	212.902	Exhibition Hall 3
●	BH-32	212.291	
△	BH-33	212.614	
▲	BH-34	212.940	



Corrected SPT Values vs. Reduced level



## Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
○	BH-35	212.451	Exhibition Hall 2
●	BH-36	212.611	
△	PBH-37	212.030	
▲	BH-38	212.451	
□	BH-39	212.575	
■	BH-40	212.571	

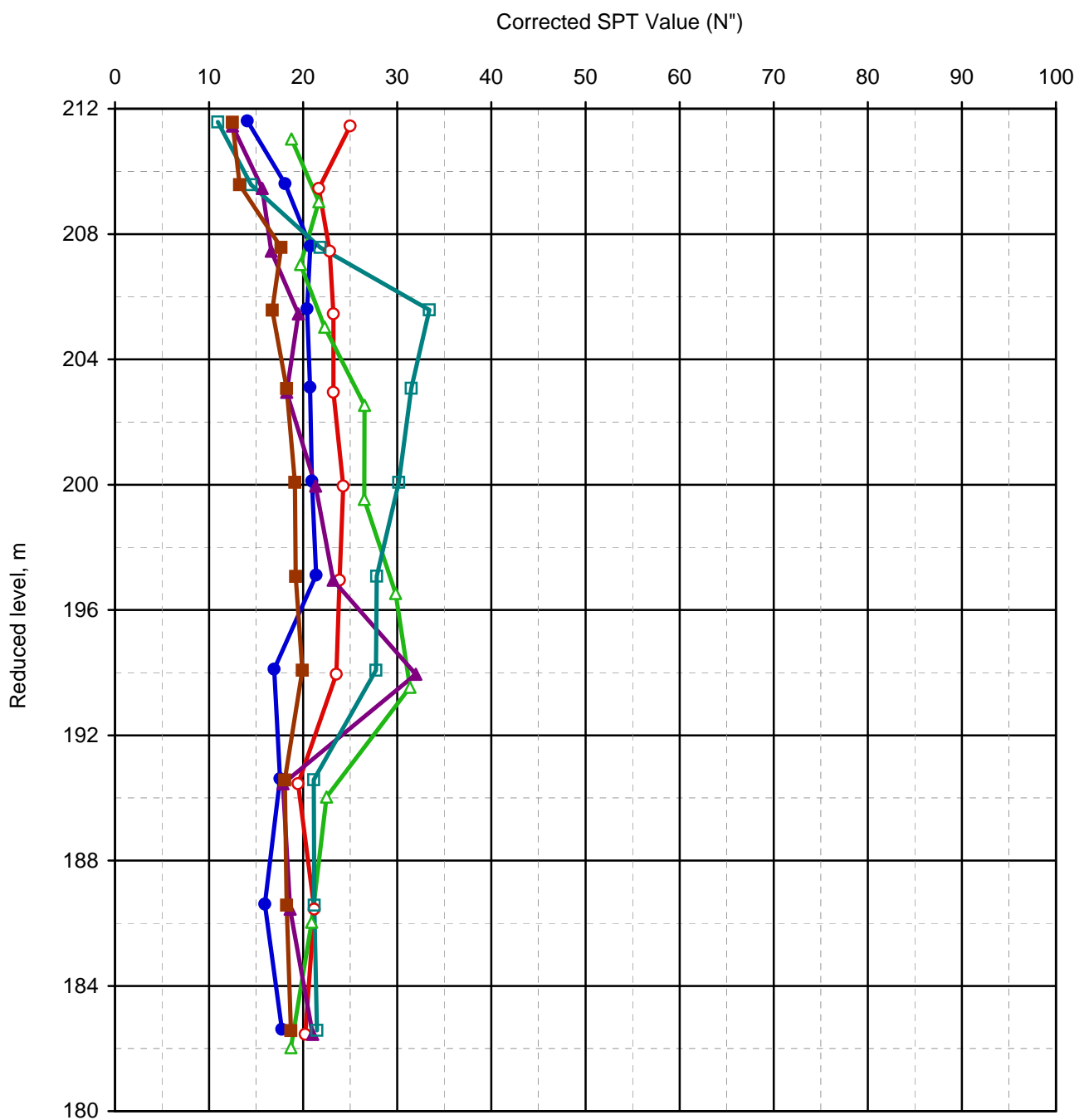




### Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
	BH-35	212.451	Exhibition Hall 2
	BH-36	212.611	
	PBH-37	212.030	
	BH-38	212.451	
	BH-39	212.575	
	BH-40	212.571	



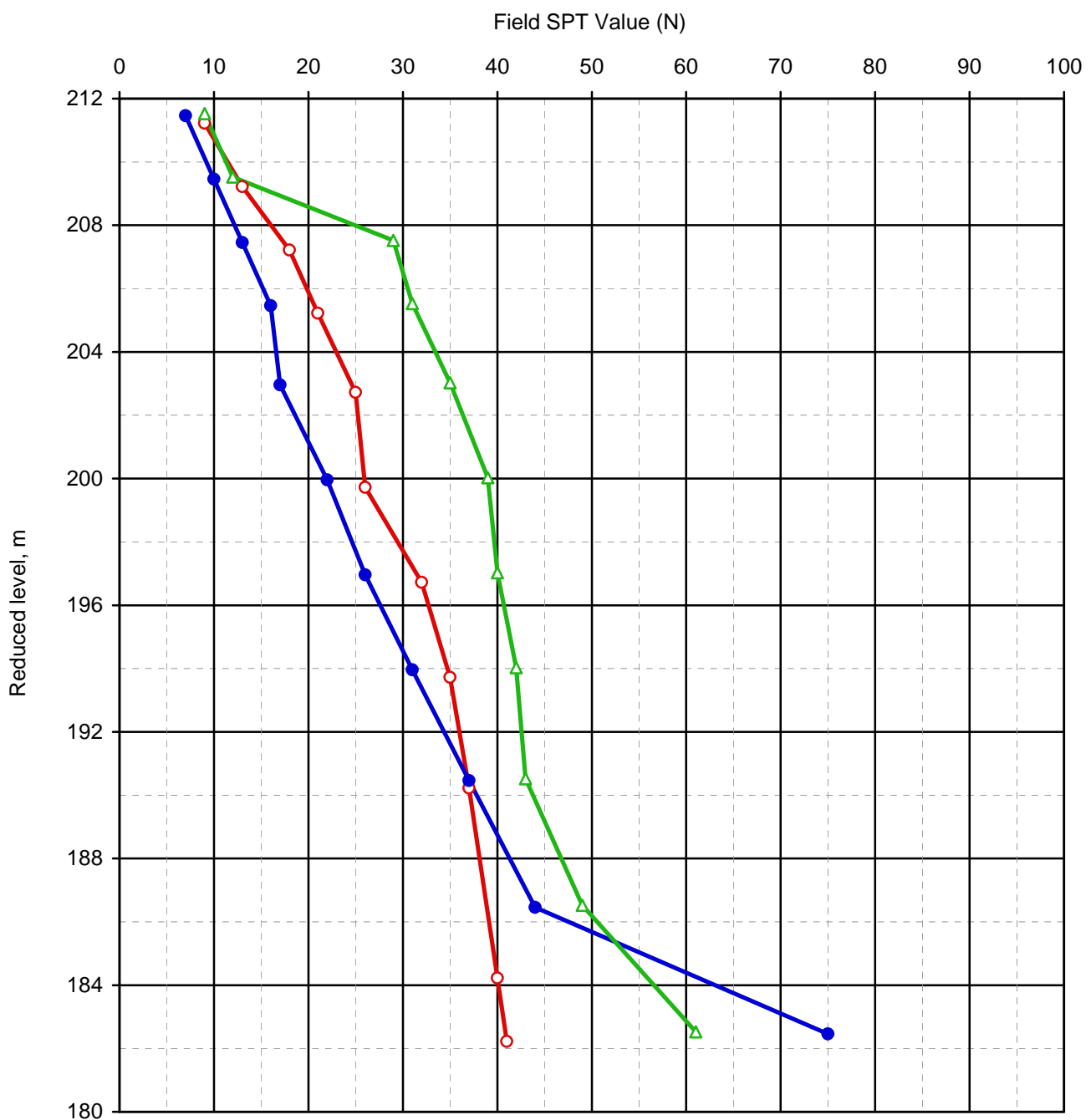
Corrected SPT Values vs. Reduced level



### Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
○	BH-41	212.221	Exhibition Hall 2
●	BH-42	212.457	
△	BH-43	212.524	



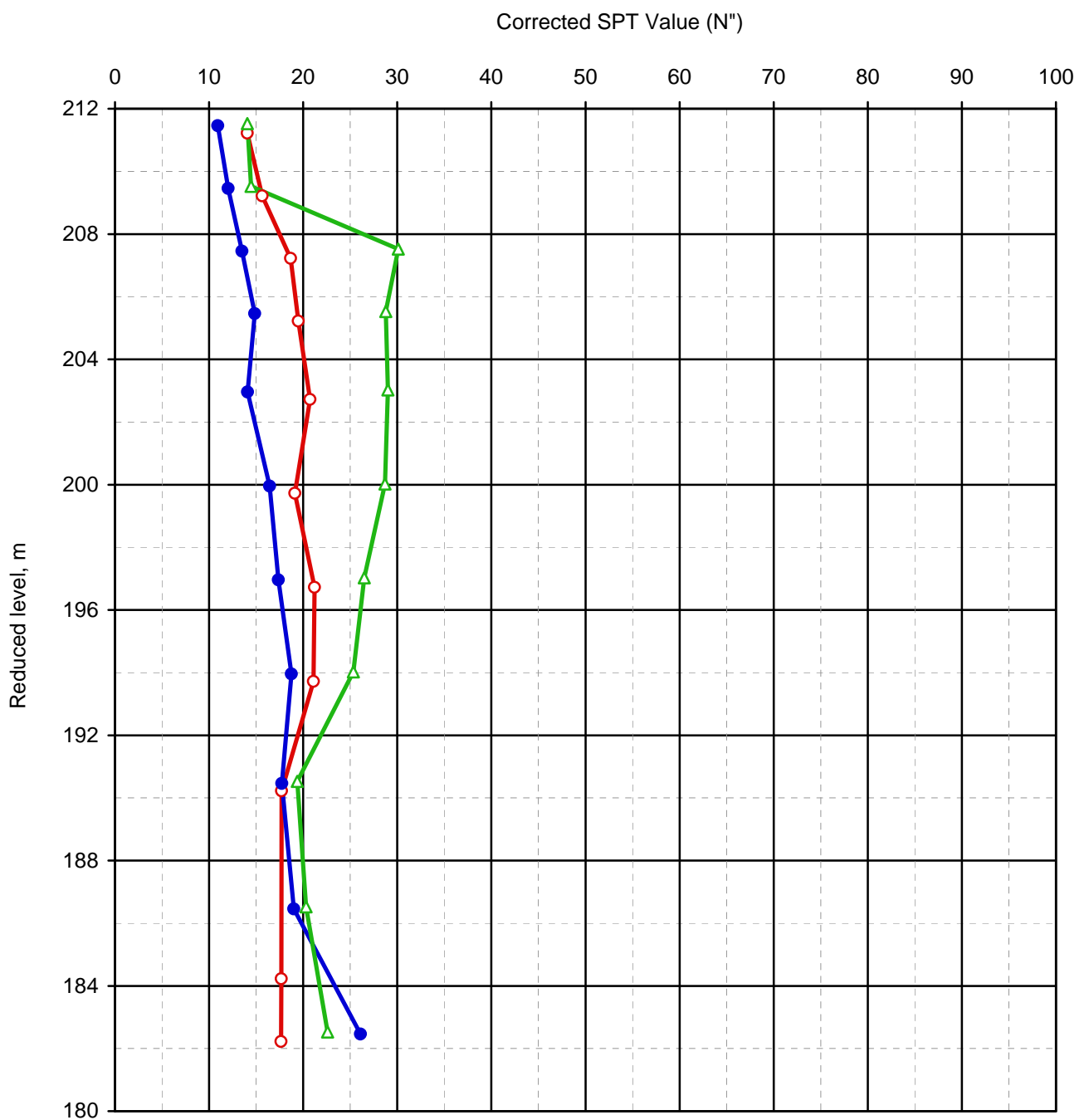
Field SPT Values vs. Reduced level



## Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
○	BH-41	212.221	Exhibition Hall 2
●	BH-42	212.457	
△	BH-43	212.524	




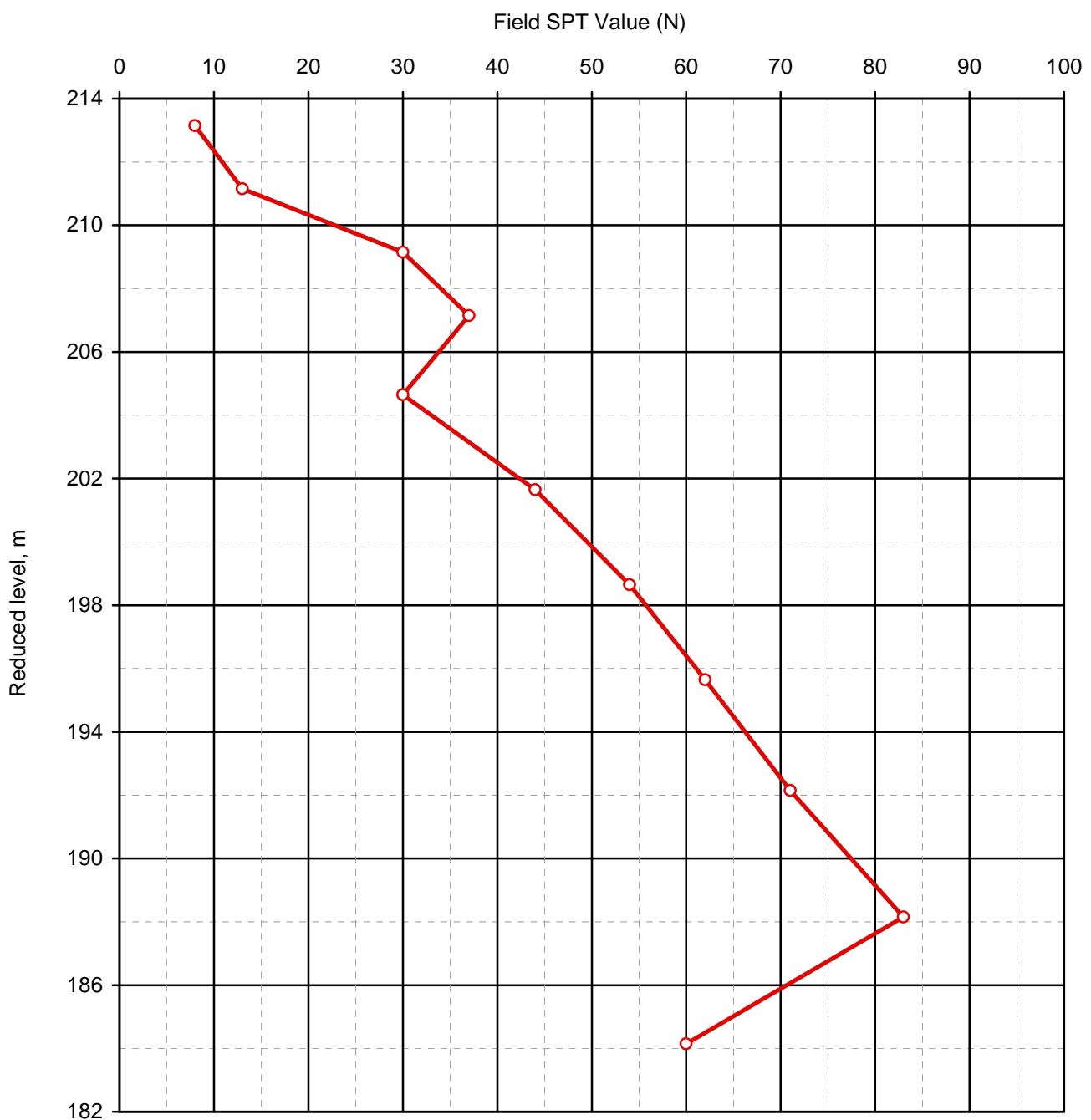
Corrected SPT Values vs. Reduced level



## Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
	BH-159	214.150	Refer Plate 1




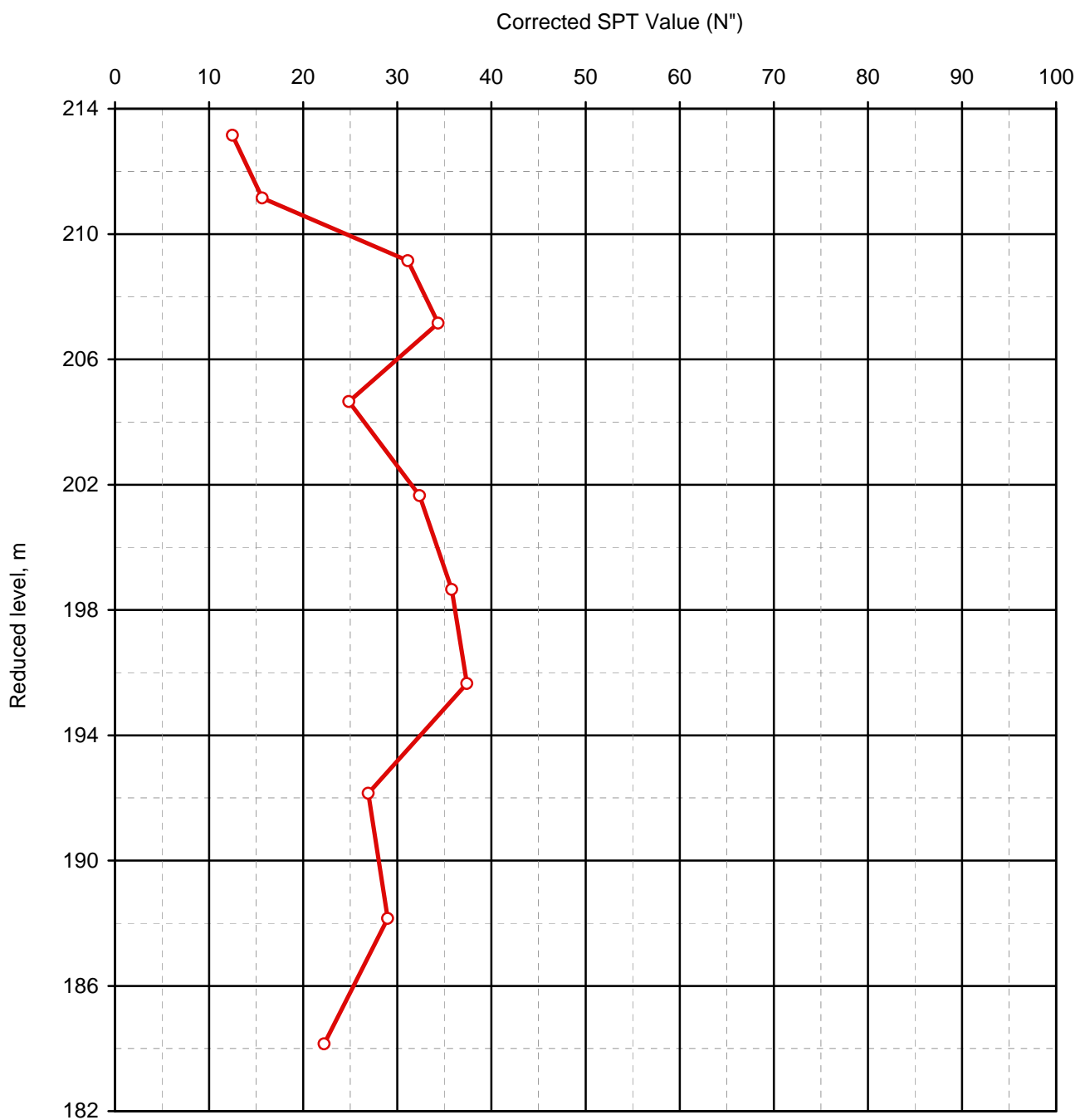
Field SPT Values vs. Reduced level



### Standard Penetration Test

IS : 2131-1981, RA-2007

Borehole Details			
Symbol	Borehole Number	Reduced Level,m	Location
	BH-159	214.150	Refer Plate 1

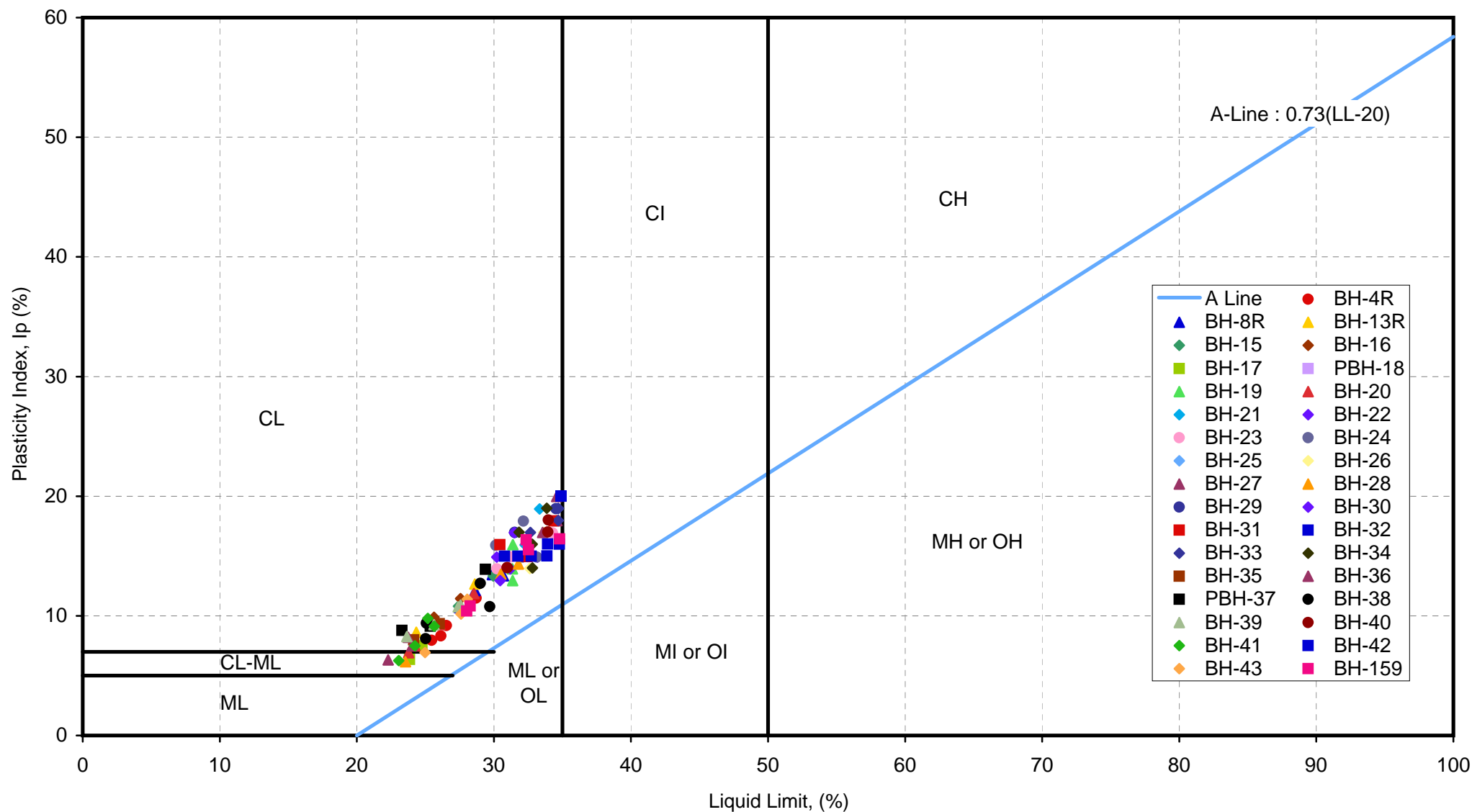


Corrected SPT Values vs. Reduced level



# Atterberg Test

IS : 2720 (Part-5)-1985, RA-2010



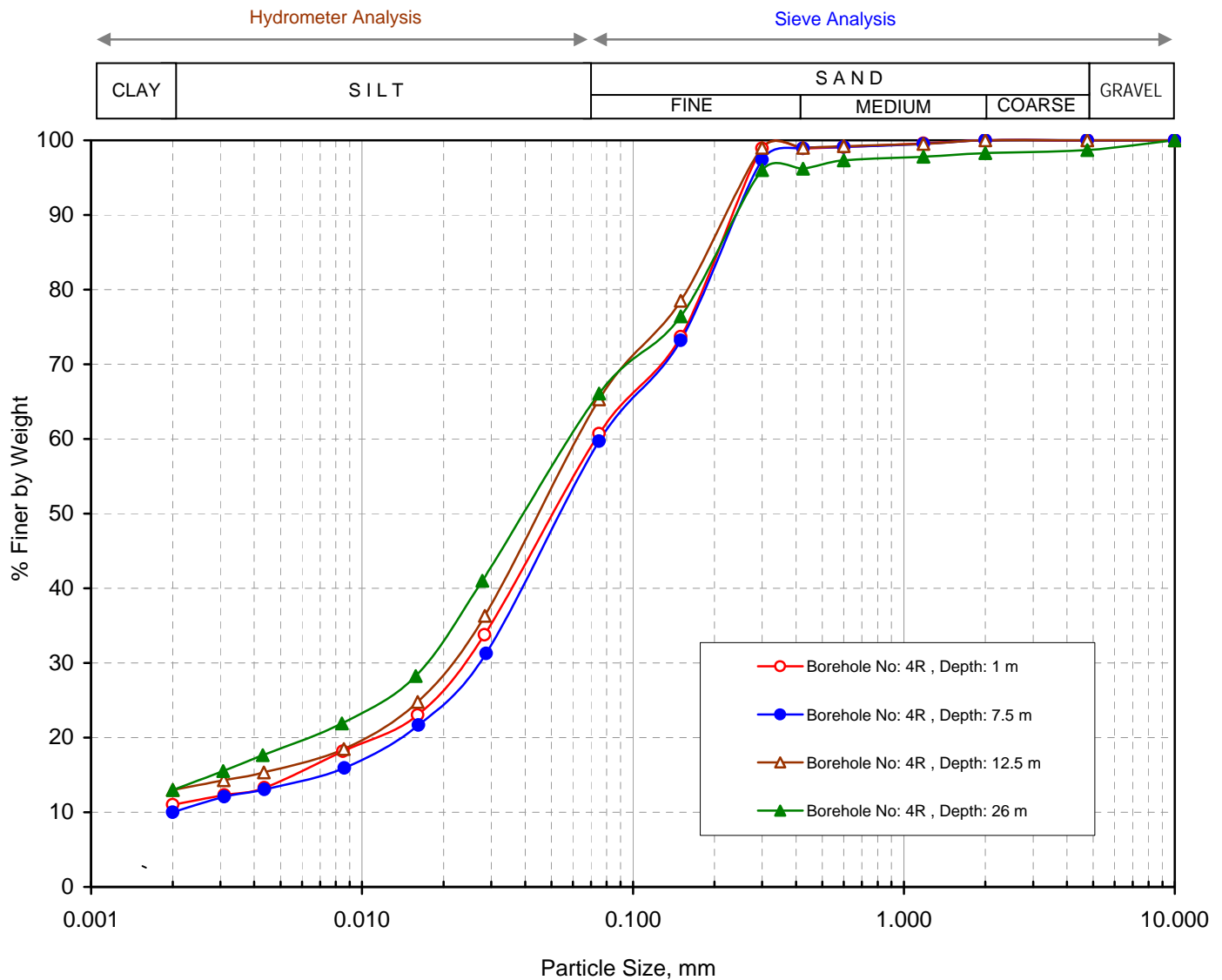
Plasticity Chart



## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-4R	1.00	Sandy silt (CL)	0	39	50	11	0.074	0.024			
BH-4R	7.50	Sandy silt (CL)	0	40	50	10	0.077	0.027	0.002	38.5	4.73
BH-4R	12.50	Sandy silt (CL)	0	34	53	13	0.066	0.022			
BH-4R	26.00	Sandy silt with traces of gravels (CL)	1	32	54	13	0.064	0.017			

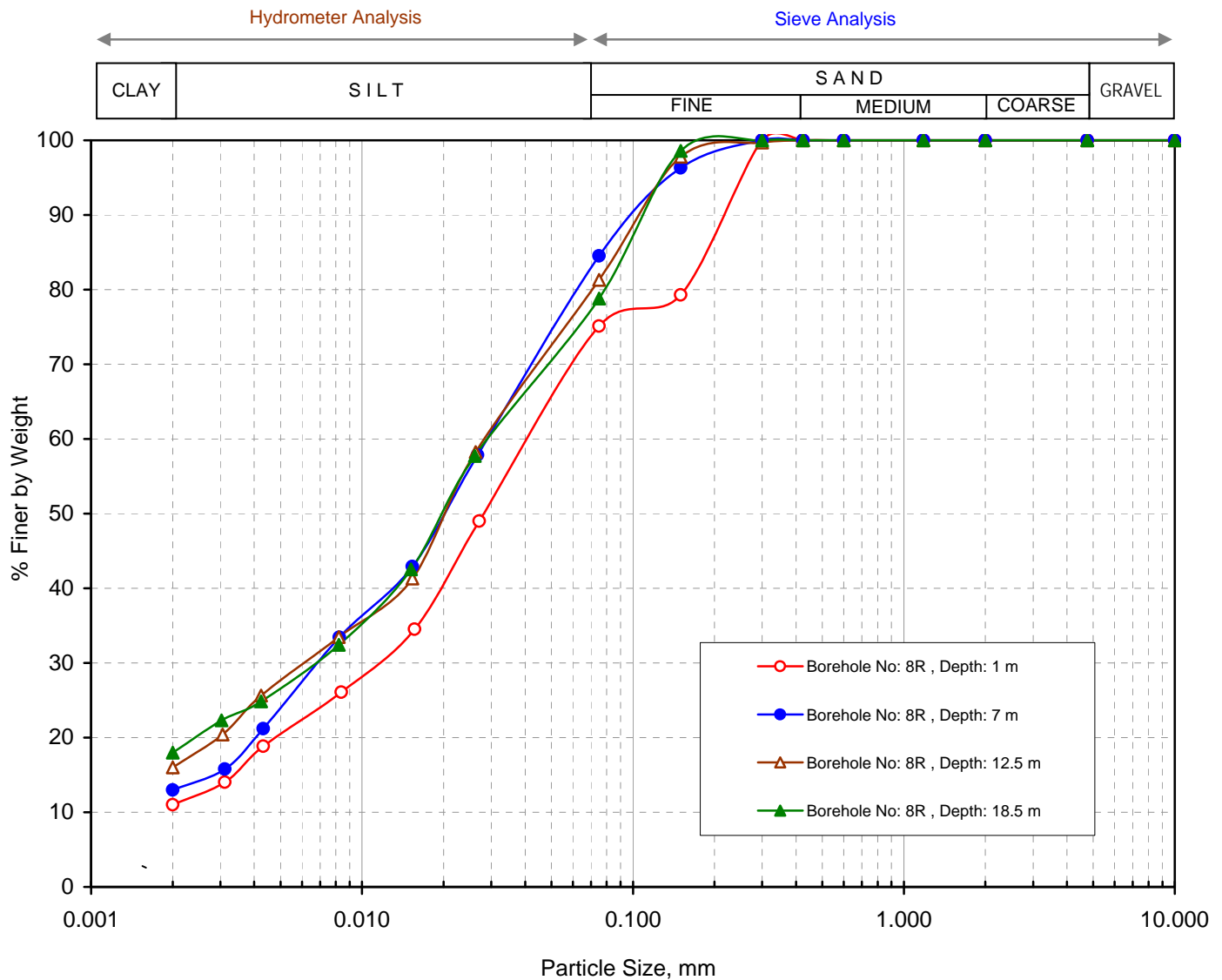




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-8R	1.00	Sandy silt (CL)	0	24	65	11	0.047	0.012			
BH-8R	7.00	Sandy silt (CL)	0	15	72	13	0.031	0.007			
BH-8R	12.50	Sandy silt (CL)	0	18	66	16	0.030	0.006			
BH-8R	18.50	Sandy silt (CL)	0	21	61	18	0.031	0.007			



Grain Size Distribution Curve

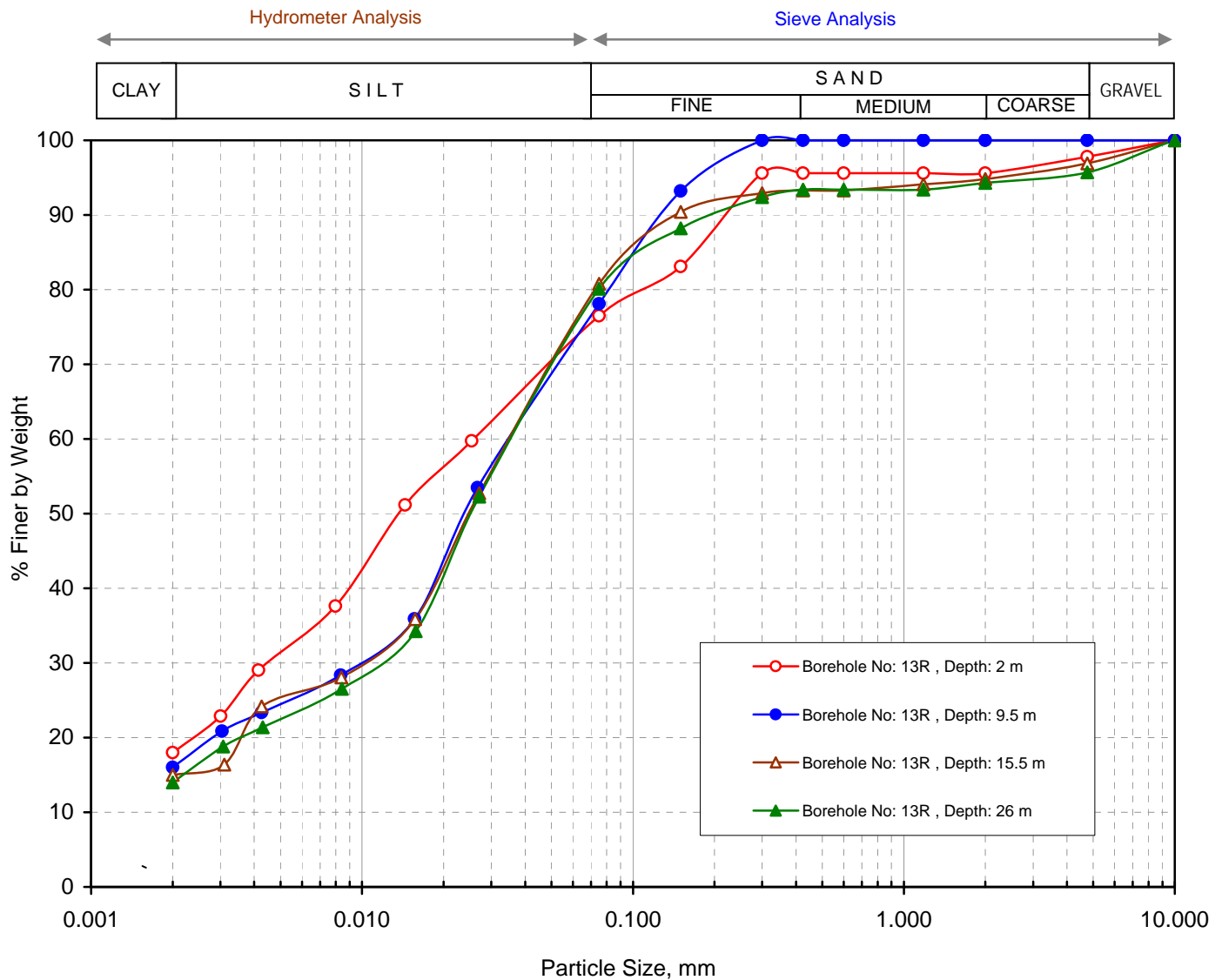




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-13R	2.00	Sandy silt with traces of gravels (CL)	2	21	59	18	0.026	0.005			
BH-13R	9.50	Sandy silt (CL)	0	21	63	16	0.040	0.010			
BH-13R	15.50	Sandy silt with traces of gravels (CL)	3	16	66	15	0.040	0.010			
BH-13R	26.00	Sandy silt with traces of gravels (CL)	4	15	67	14	0.040	0.012			



Grain Size Distribution Curve

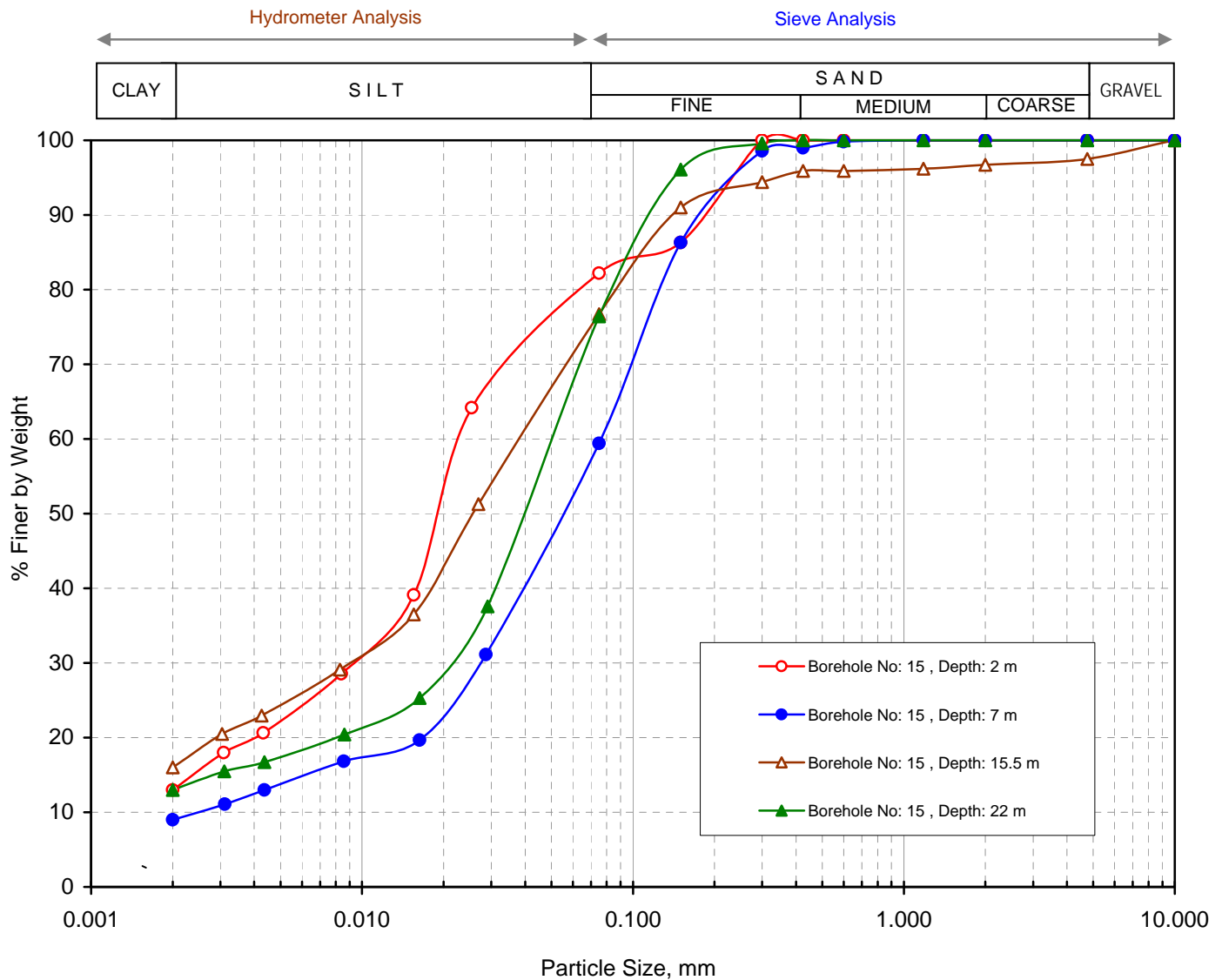




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-15	2.00	Sandy silt (CL)	0	17	70	13	0.024	0.009			
BH-15	7.00	Sandy silt (CL)	0	40	51	9	0.077	0.027	0.003	25.7	3.16
BH-15	15.50	Sandy silt with traces of gravels (CL)	3	20	61	16	0.043	0.009			
BH-15	22.00	Sandy silt (CL)	0	23	64	13	0.056	0.021			

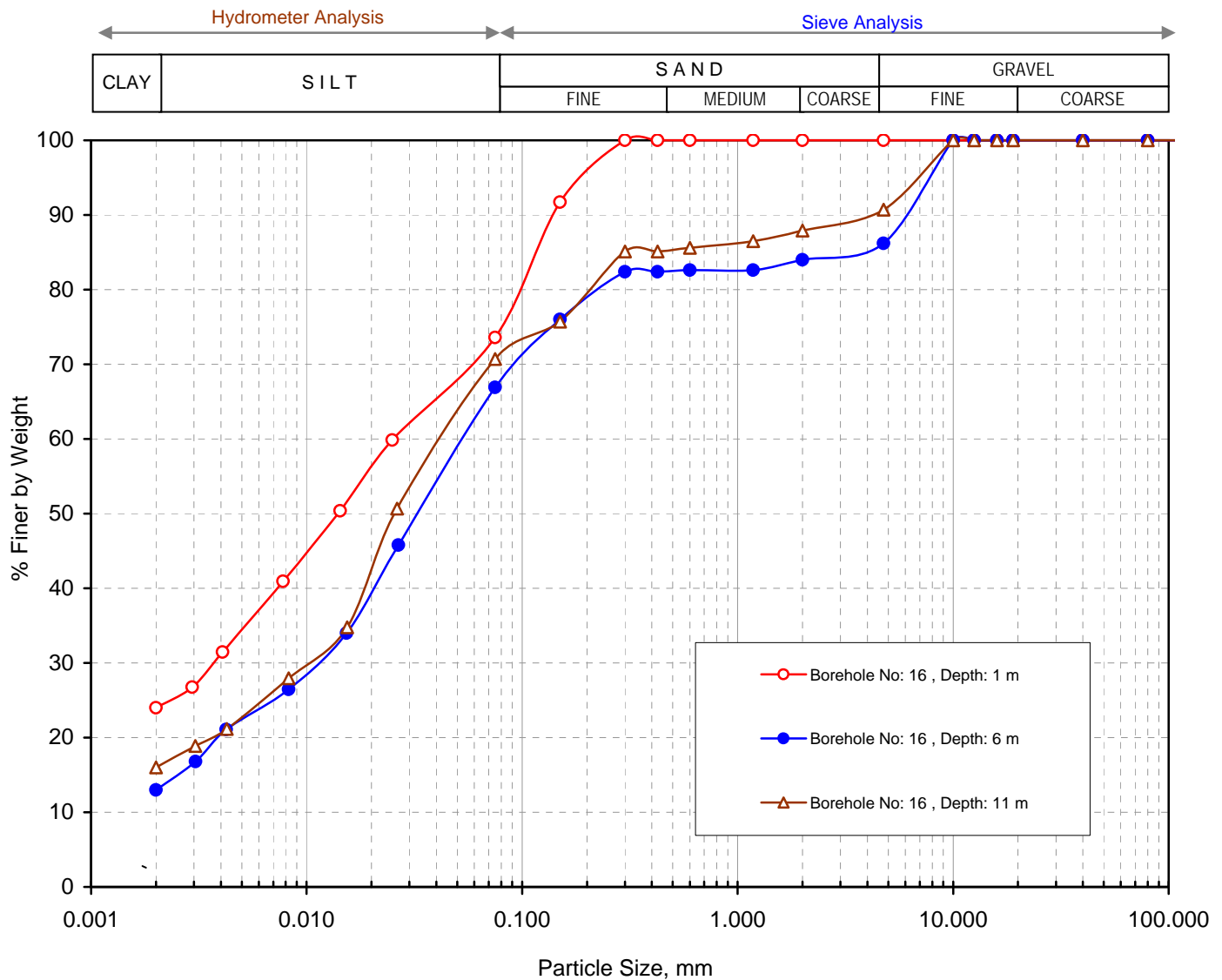




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-16	1.00	Sandy silt (CL)	0	26	50	24	0.026	0.004			
BH-16	6.00	Sandy silt with gravels (CL)	14	19	54	13	0.059	0.012			
BH-16	11.00	Sandy silt with gravels (CL)	9	20	55	16	0.049	0.010			



Grain Size Distribution Curve

ISO/IEC 17025:2005  
Certified Laboratory  
(NABL)  
Certificate No. T-1741

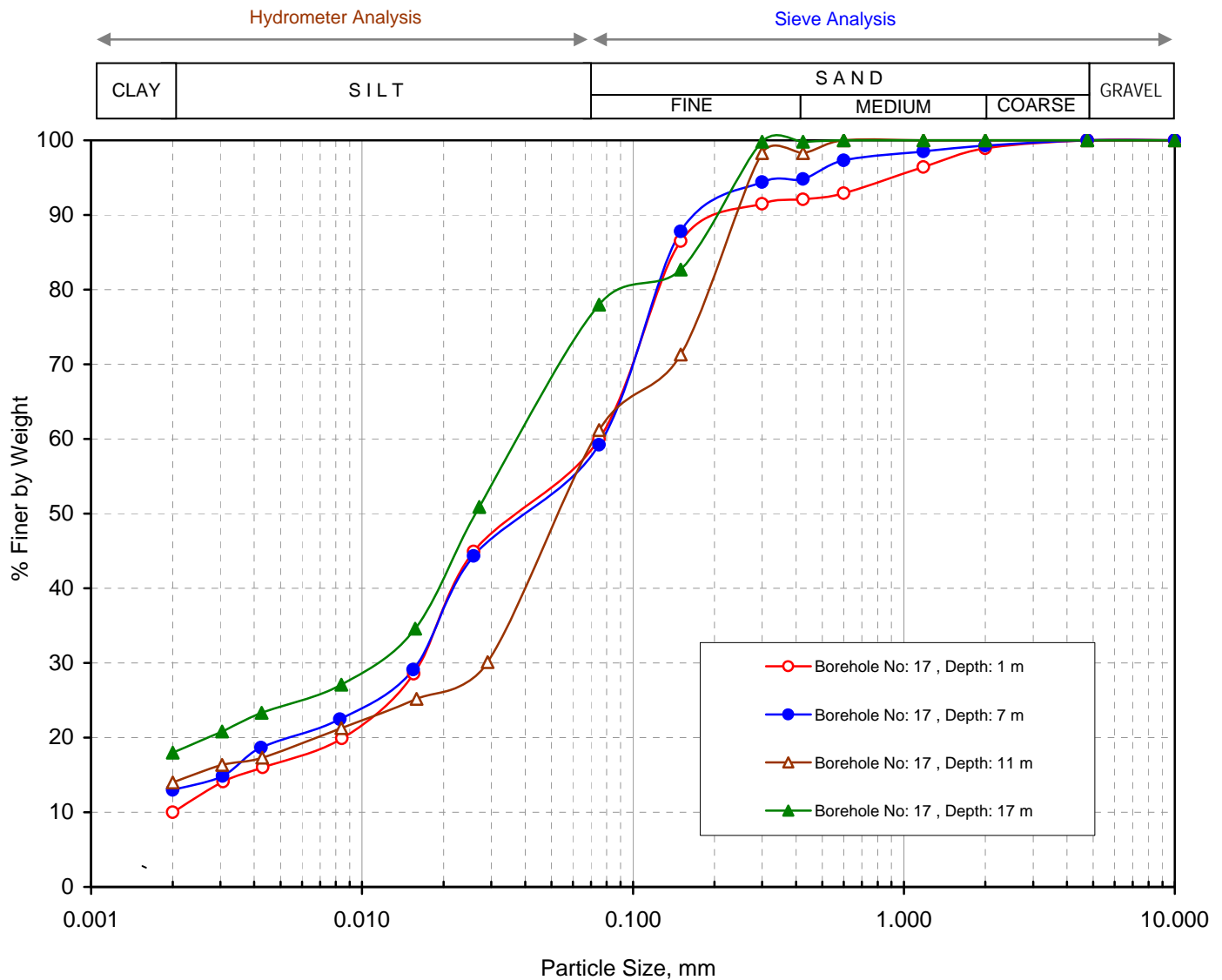




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-17	1.00	Sandy silt (CL)	0	40	50	10	0.075	0.016	0.002	37.5	1.71
BH-17	7.00	Sandy silt (CL)	0	40	47	13	0.077	0.016			
BH-17	11.00	Sandy silt (CL)	0	38	48	14	0.073	0.029			
BH-17	17.00	Sandy silt (CL)	0	22	60	18	0.043	0.011			



ISO/IEC 17025:2005  
Certified Laboratory  
(NABL)  
Certificate No. T-1741



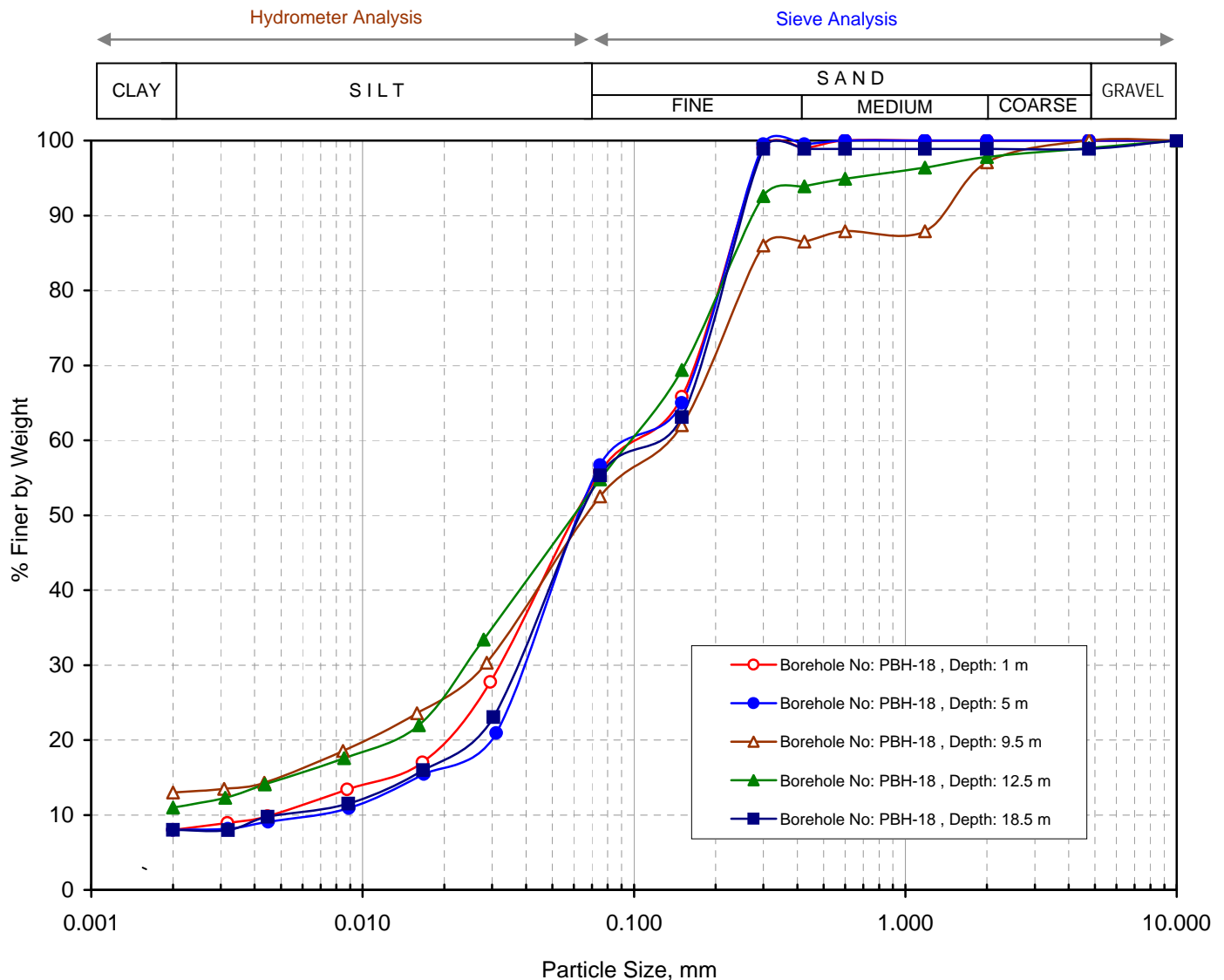
## Grain Size Distribution Curve



## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
PBH-18	1.00	Sandy silt (CL)	0	44	48	8	0.107	0.033	0.005	21.4	2.04
PBH-18	5.00	Sandy silt (CL)	0	43	49	8	0.105	0.042	0.007	15.0	2.40
PBH-18	9.50	Sandy silt (CL)	0	47	40	13	0.134	0.028			
PBH-18	12.50	Sandy silt with traces of gravels (CL)	1	44	44	11	0.102	0.024			
PBH-18	18.50	Sandy silt with traces of gravels (CL)	1	43	48	8	0.120	0.040	0.005	24.0	2.67



ISO/IEC 17025:2005  
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(NABL)  
Certificate No. T-1741



## Grain Size Distribution Curve

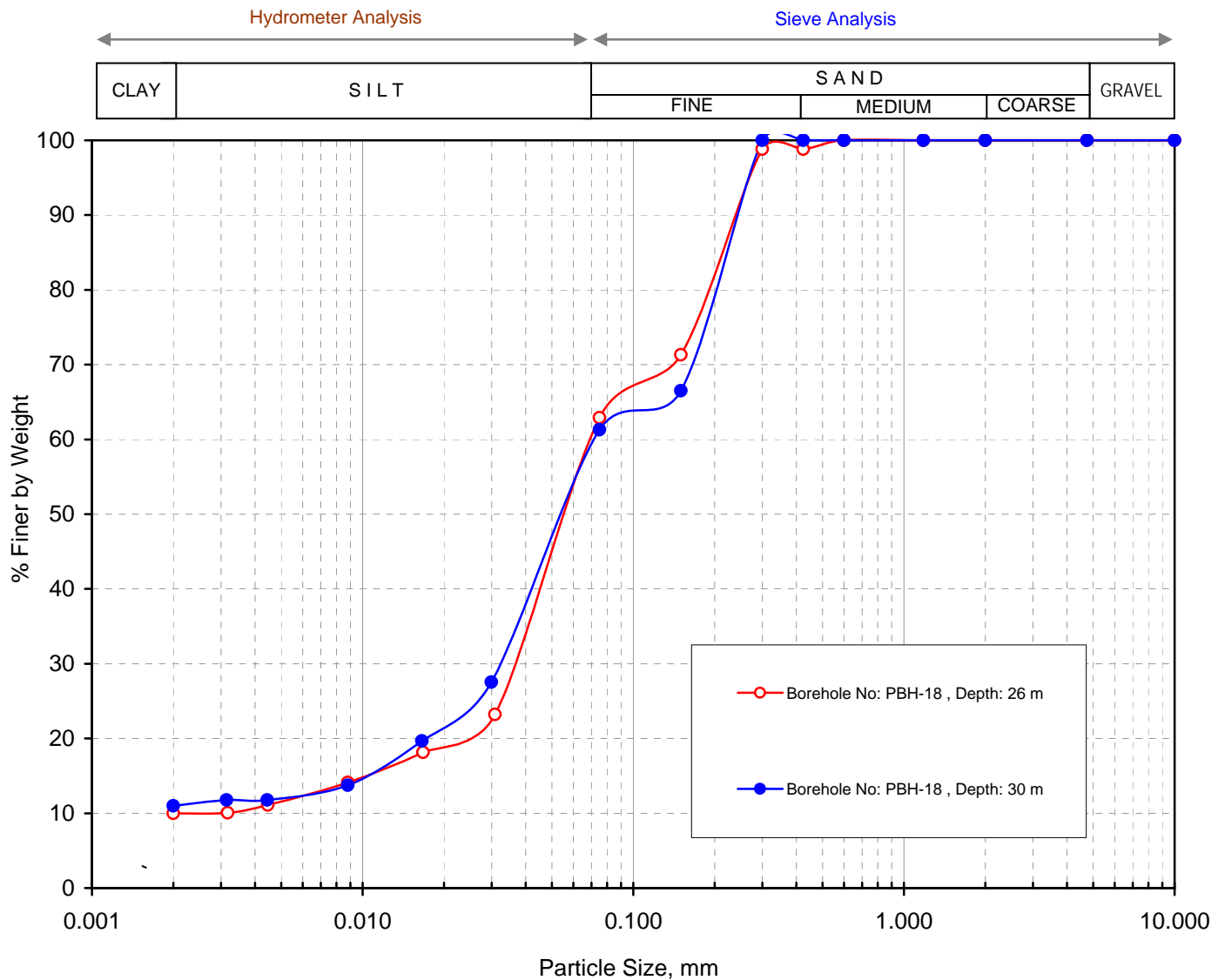




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
PBH-18	26.00	Sandy silt (CL)	0	37	53	10	0.072	0.038	0.002	36.0	10.0
PBH-18	30.00	Sandy silt (CL)	0	38	51	11	0.073	0.033			



Grain Size Distribution Curve

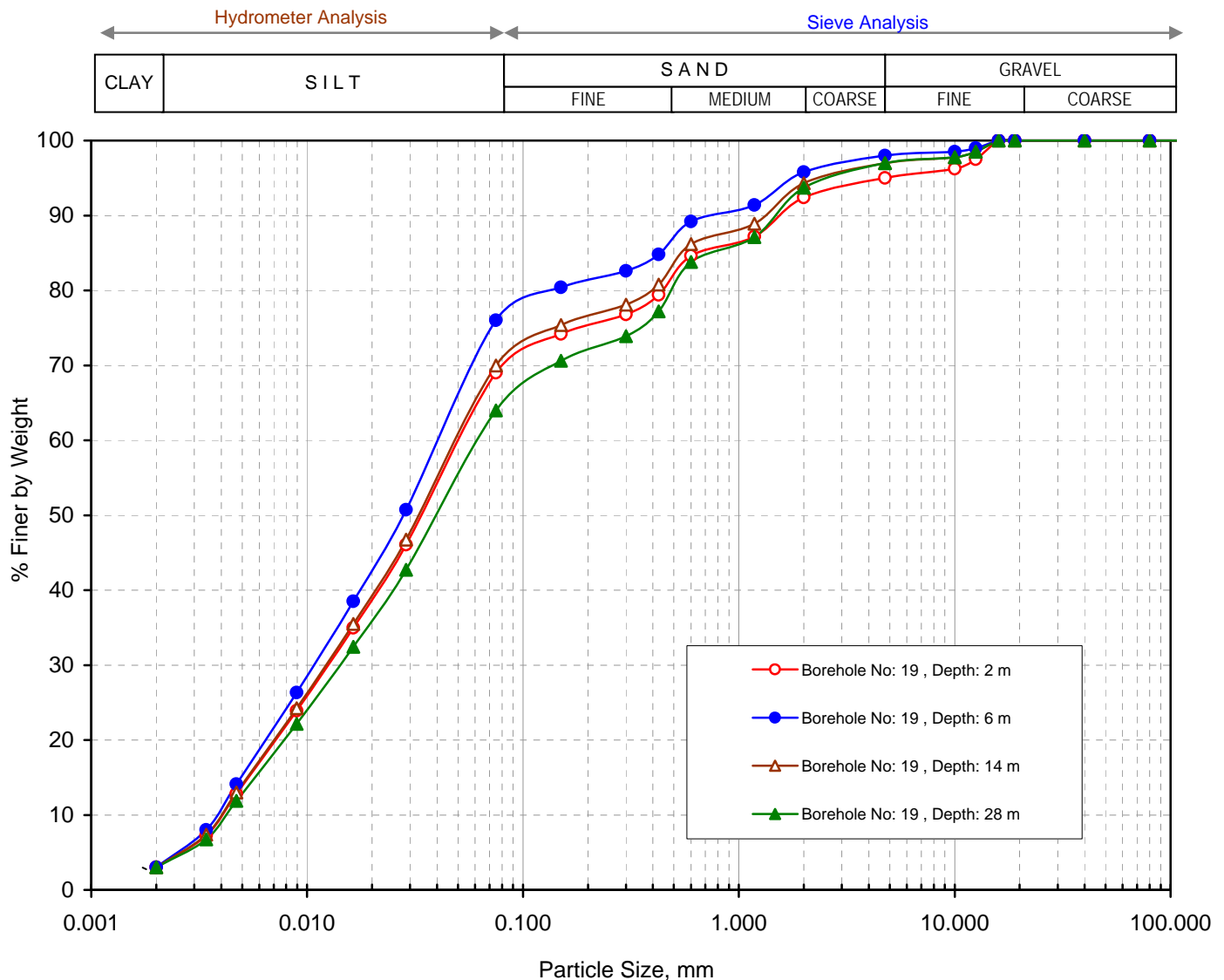




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-19	2.00	Sandy silt with gravels (CL)	5	26	66	3	0.057	0.013	0.004	14.3	0.74
BH-19	6.00	Sandy silt with traces of gravels (CL)	2	22	73	3	0.046	0.011	0.004	11.5	0.66
BH-19	14.00	Sandy silt with traces of gravels (CL)	3	27	67	3	0.055	0.013	0.004	13.8	0.77
BH-19	28.00	Sandy silt with traces of gravels (CL)	3	33	61	3	0.066	0.015	0.004	16.5	0.85



Grain Size Distribution Curve

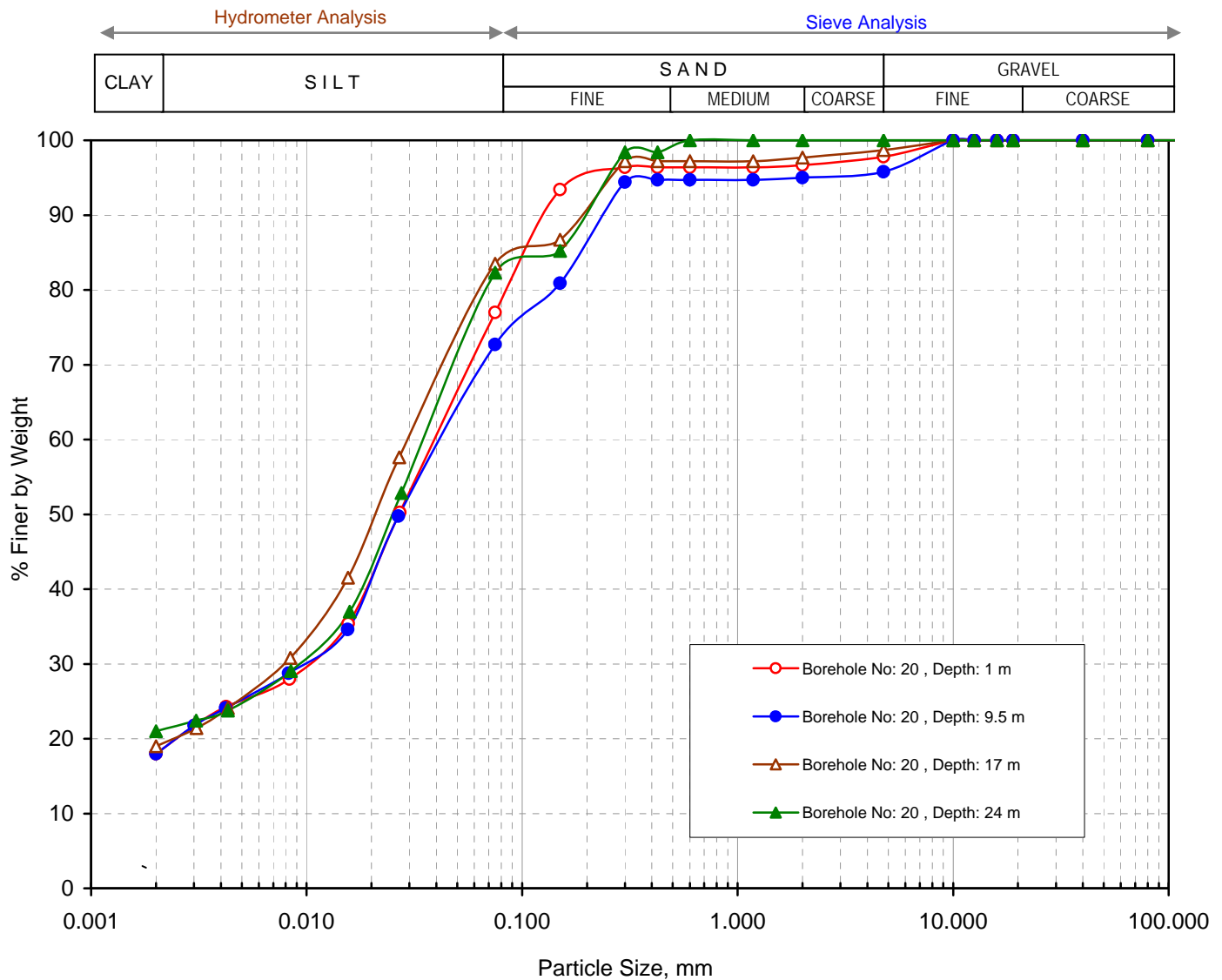




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-20	1.00	Sandy silt with traces of gravels (CL)	2	20	60	18	0.045	0.010			
BH-20	9.50	Sandy silt with traces of gravels (CL)	4	23	55	18	0.048	0.010			
BH-20	17.00	Sandy silt with traces of gravels (CL)	1	15	65	19	0.031	0.008			
BH-20	24.00	Sandy silt (CL)	0	17	62	21	0.039	0.009			



Grain Size Distribution Curve

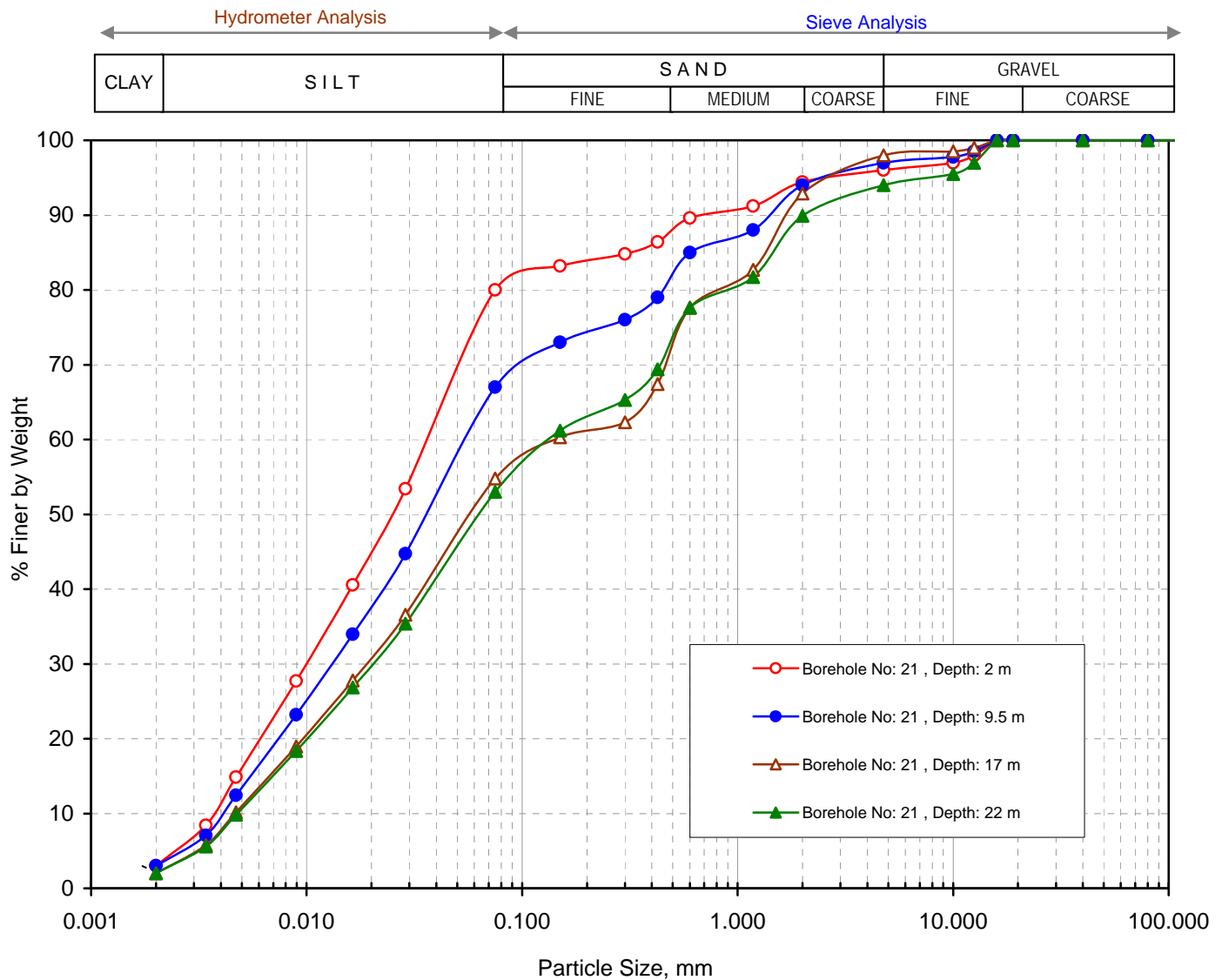




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-21	2.00	Sandy silt with traces of gravels (CL)	4	16	77	3	0.040	0.010	0.004	10.0	0.63
BH-21	9.50	Sandy silt with traces of gravels (CL)	3	30	64	3	0.060	0.014	0.004	15.0	0.82
BH-21	17.00	Sandy silt with traces of gravels (CL)	2	43	53	2	0.146	0.020	0.005	29.2	0.55
BH-21	22.00	Sandy silt with gravels (CL)	6	41	51	2	0.139	0.021	0.005	27.8	0.63



Grain Size Distribution Curve

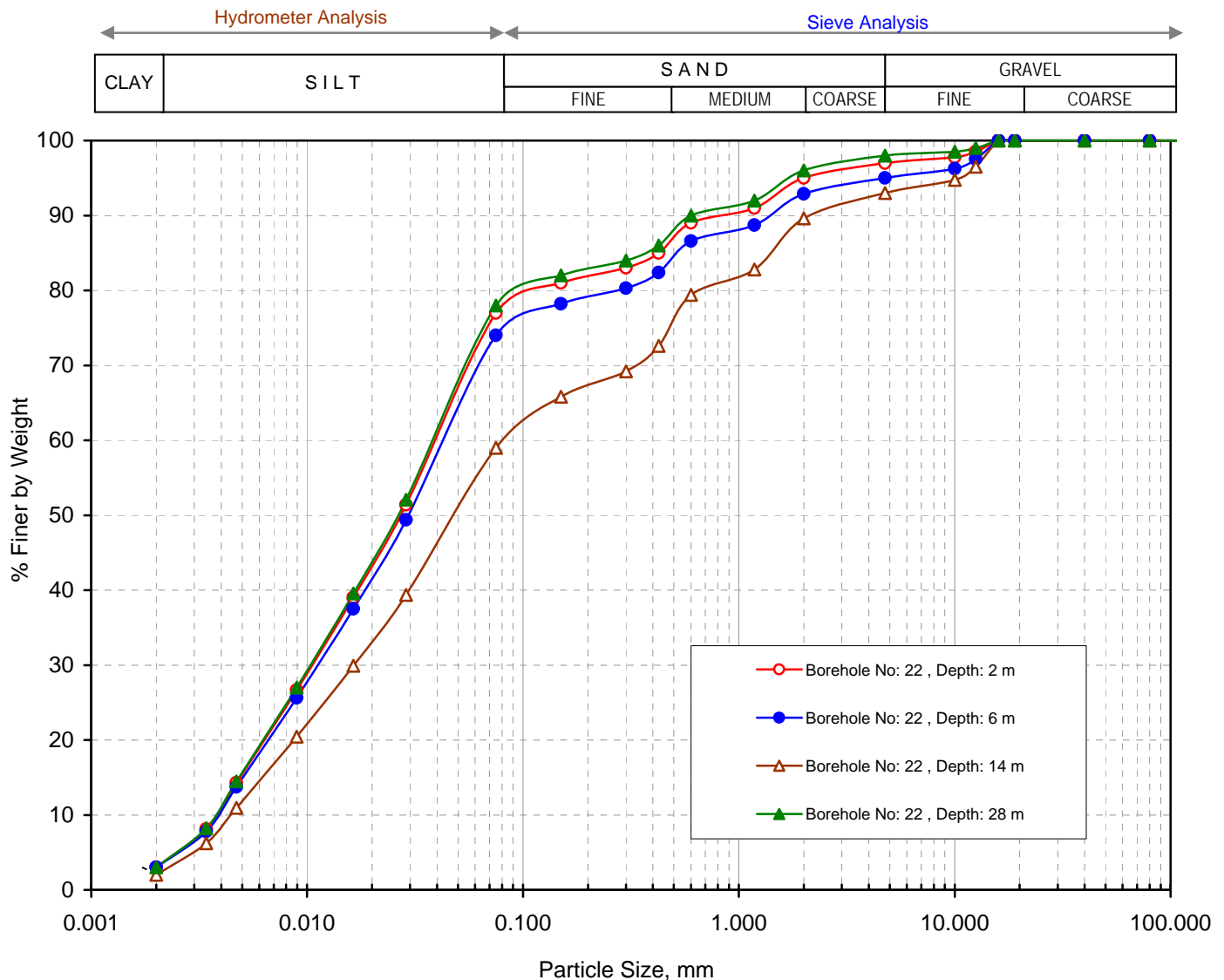




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-22	2.00	Sandy silt with traces of gravels (CL)	3	20	74	3	0.044	0.011	0.004	11.0	0.69
BH-22	6.00	Sandy silt with gravels (CL)	5	21	71	3	0.049	0.012	0.004	12.3	0.73
BH-22	14.00	Sandy silt with gravels (CL)	7	34	57	2	0.086	0.017	0.004	21.5	0.84
BH-22	28.00	Sandy silt with traces of gravels (CL)	2	20	75	3	0.043	0.011	0.004	10.8	0.70



Grain Size Distribution Curve

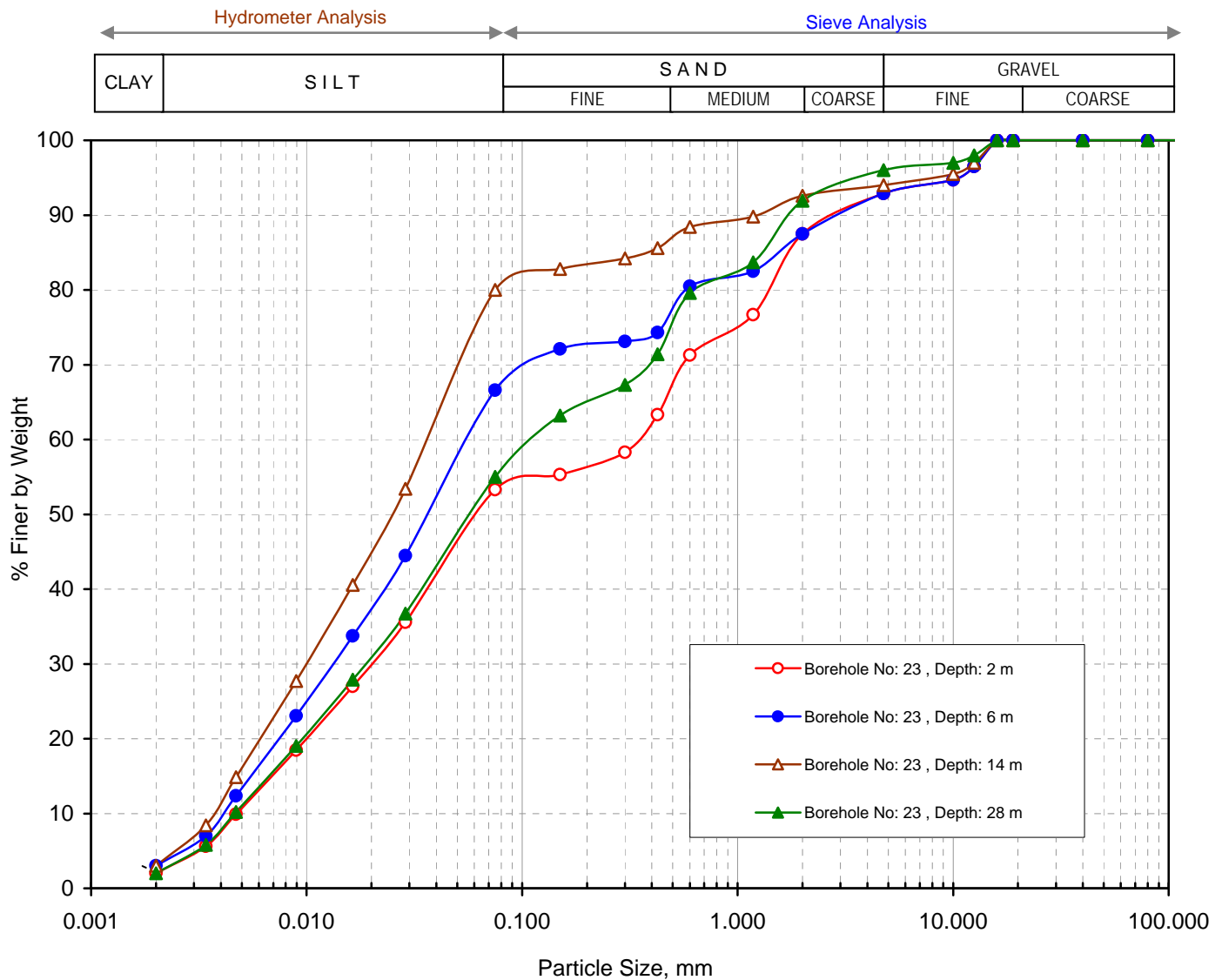




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-23	2.00	Sandy silt with gravels (CL)	7	39	52	2	0.343	0.021	0.005	68.6	0.26
BH-23	6.00	Sandy silt with gravels (CL)	7	26	64	3	0.061	0.014	0.004	15.3	0.80
BH-23	14.00	Sandy silt with gravels (CL)	6	14	77	3	0.040	0.010	0.004	10.0	0.63
BH-23	28.00	Sandy silt with traces of gravels (CL)	4	41	53	2	0.121	0.019	0.005	24.2	0.60



Grain Size Distribution Curve

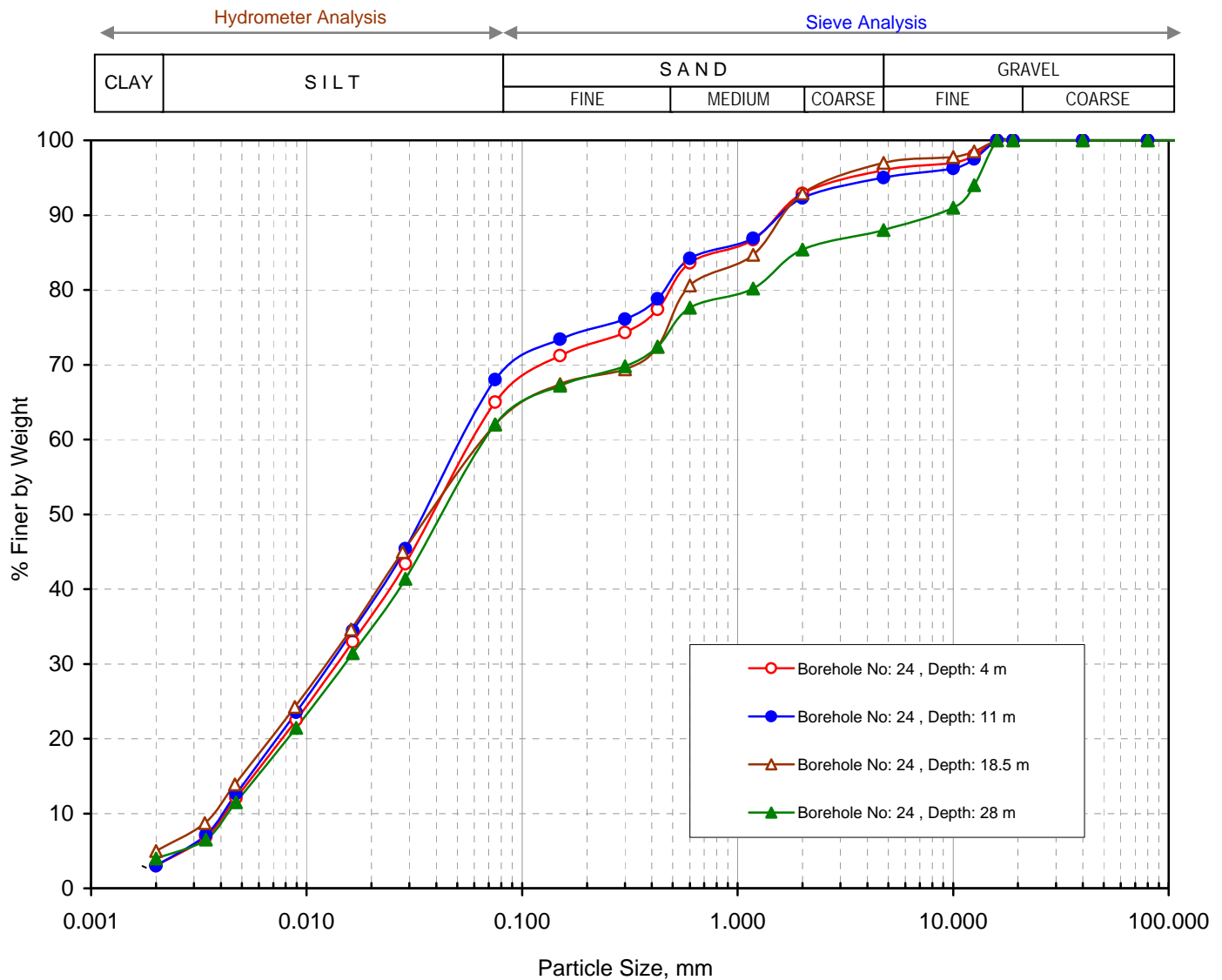




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-24	4.00	Sandy silt with traces of gravels (CL)	4	31	62	3	0.064	0.014	0.004	16.0	0.77
BH-24	11.00	Sandy silt with traces of gravels (CL)	5	27	65	3	0.059	0.013	0.004	14.8	0.72
BH-24	18.50	Sandy silt with traces of gravels (CL)	3	35	57	5	0.069	0.013	0.004	17.3	0.61
BH-24	28.00	Sandy silt with gravels (CL)	12	26	58	4	0.071	0.015	0.004	17.8	0.79



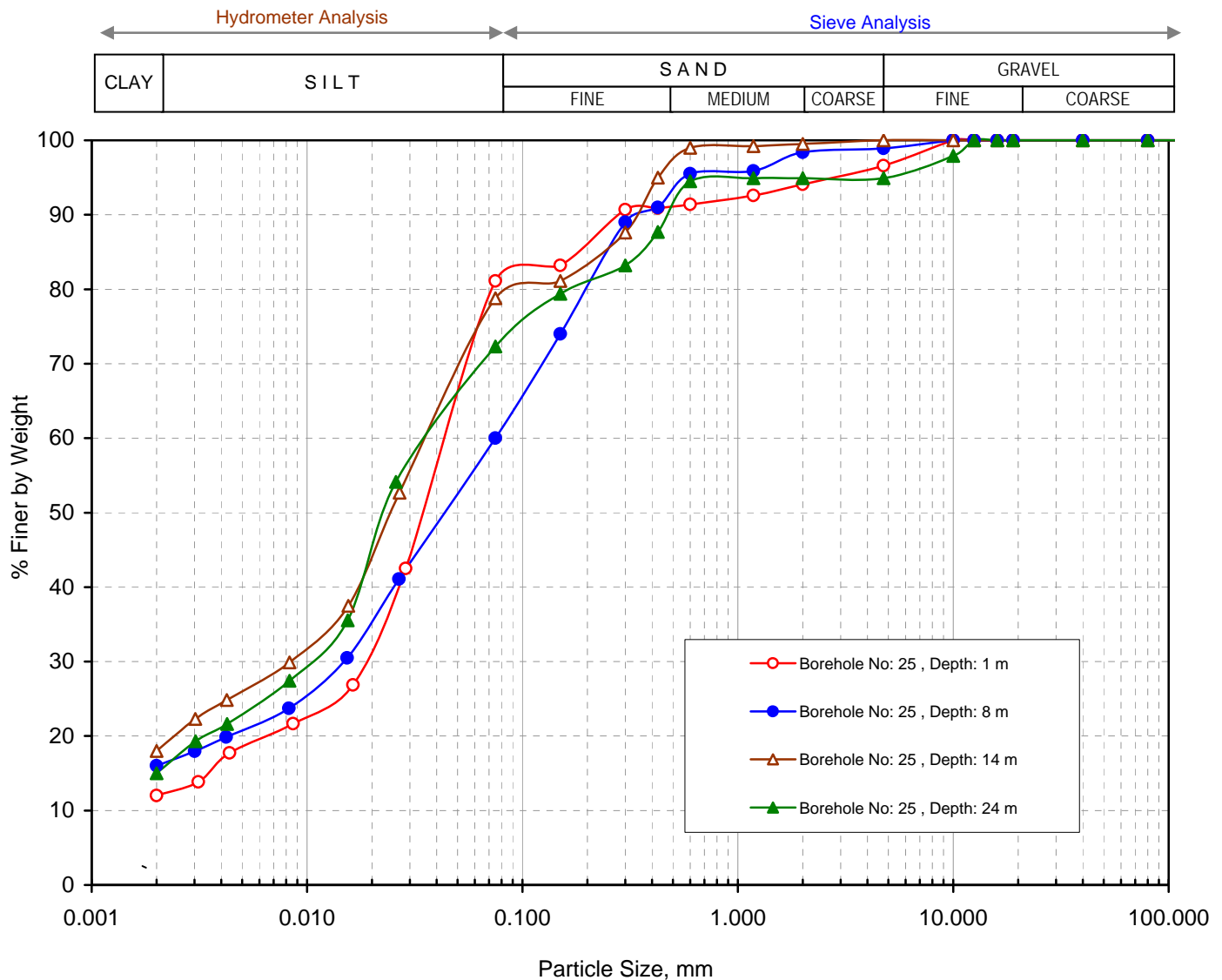
## Grain Size Distribution Curve



## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-25	1.00	Sandy silt with traces of gravels (CL)	3	15	70	12	0.050	0.019			
BH-25	8.00	Sandy silt with traces of gravels (CL)	1	38	45	16	0.075	0.015			
BH-25	14.00	Sandy silt (CL)	0	21	61	18	0.040	0.008			
BH-25	24.00	Sandy silt with gravels (CL)	5	22	58	15	0.042	0.011			



Grain Size Distribution Curve

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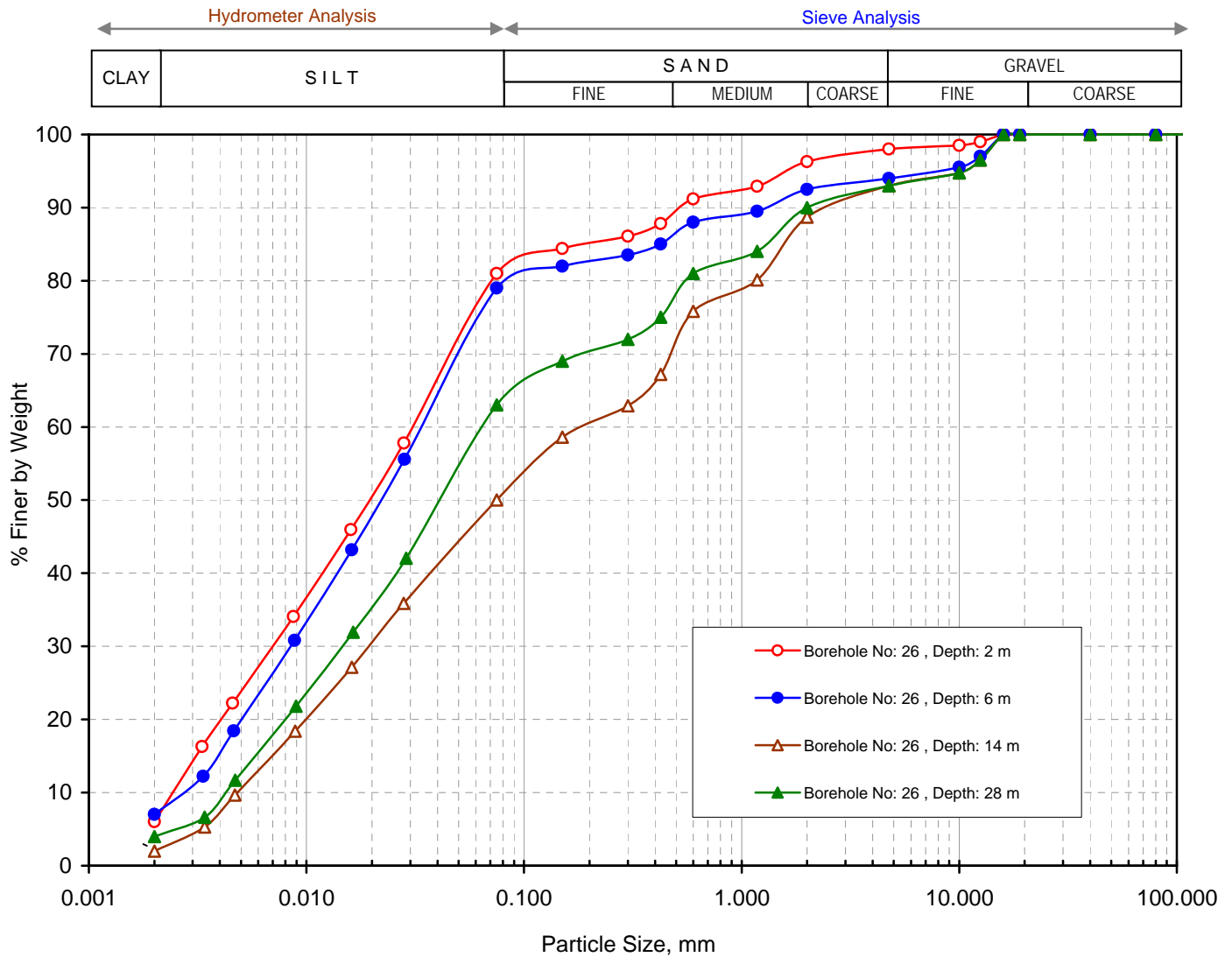




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-26	2.00	Sandy silt with traces of gravels (CL)	2	17	75	6	0.032	0.007	0.003	10.7	0.51
BH-26	6.00	Sandy silt with gravels (CL)	6	15	72	7	0.037	0.009	0.003	12.3	0.73
BH-26	14.00	Sandy silt with gravels (CL)	7	43	48	2	0.199	0.020	0.005	39.8	0.40
BH-26	28.00	Sandy silt with gravels (CL)	7	30	59	4	0.068	0.015	0.004	17.0	0.83



Grain Size Distribution Curve

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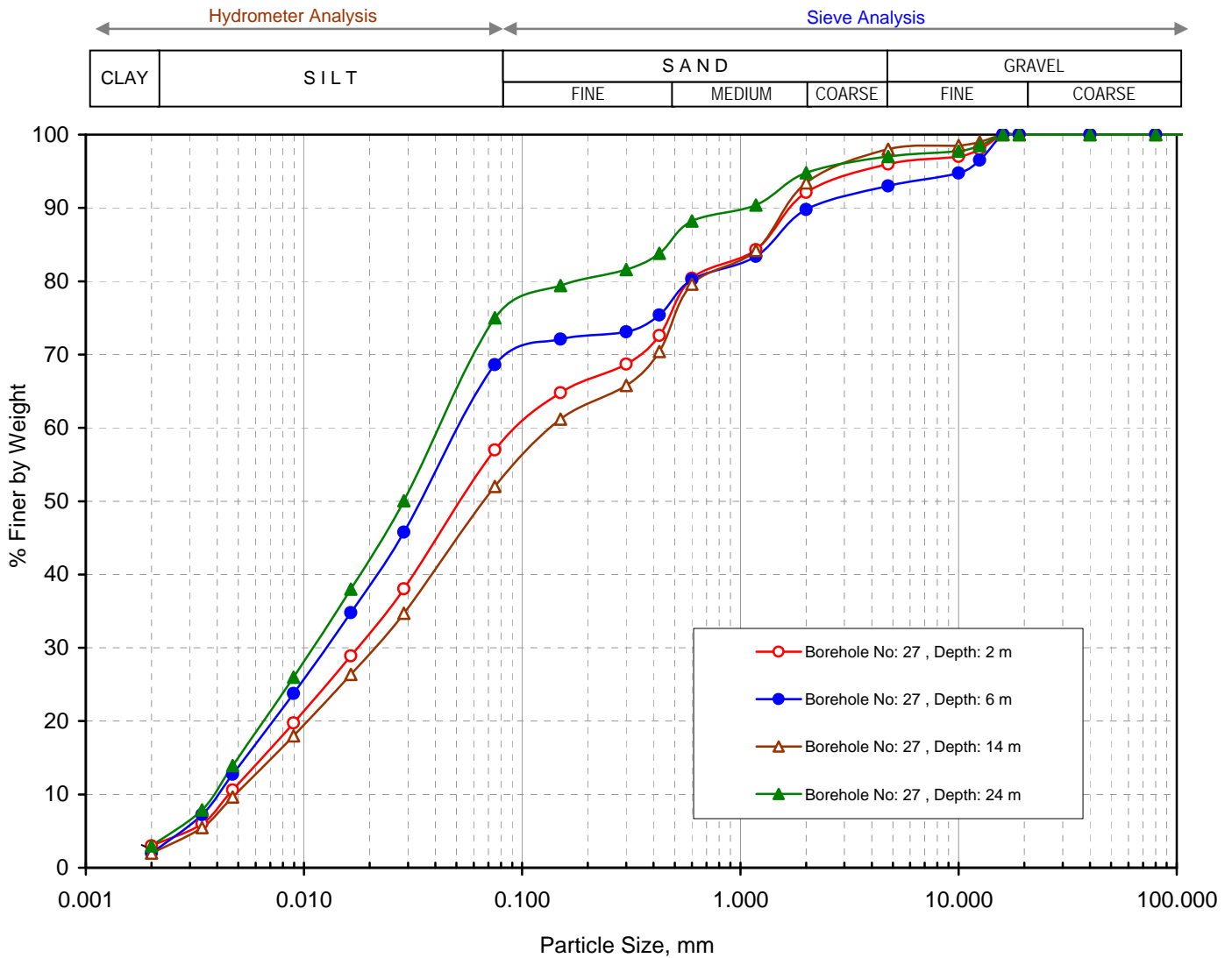




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-27	2.00	Sandy silt with traces of gravels (CL)	4	39	54	3	0.104	0.018	0.005	20.8	0.62
BH-27	6.00	Sandy silt with gravels (CL)	7	24	67	2	0.058	0.013	0.004	14.5	0.73
BH-27	14.00	Sandy silt with traces of gravels (CL)	2	46	50	2	0.140	0.022	0.005	28.0	0.69
BH-27	24.00	Sandy silt with traces of gravels (CL)	3	22	72	3	0.047	0.011	0.004	11.8	0.64



## Grain Size Distribution Curve

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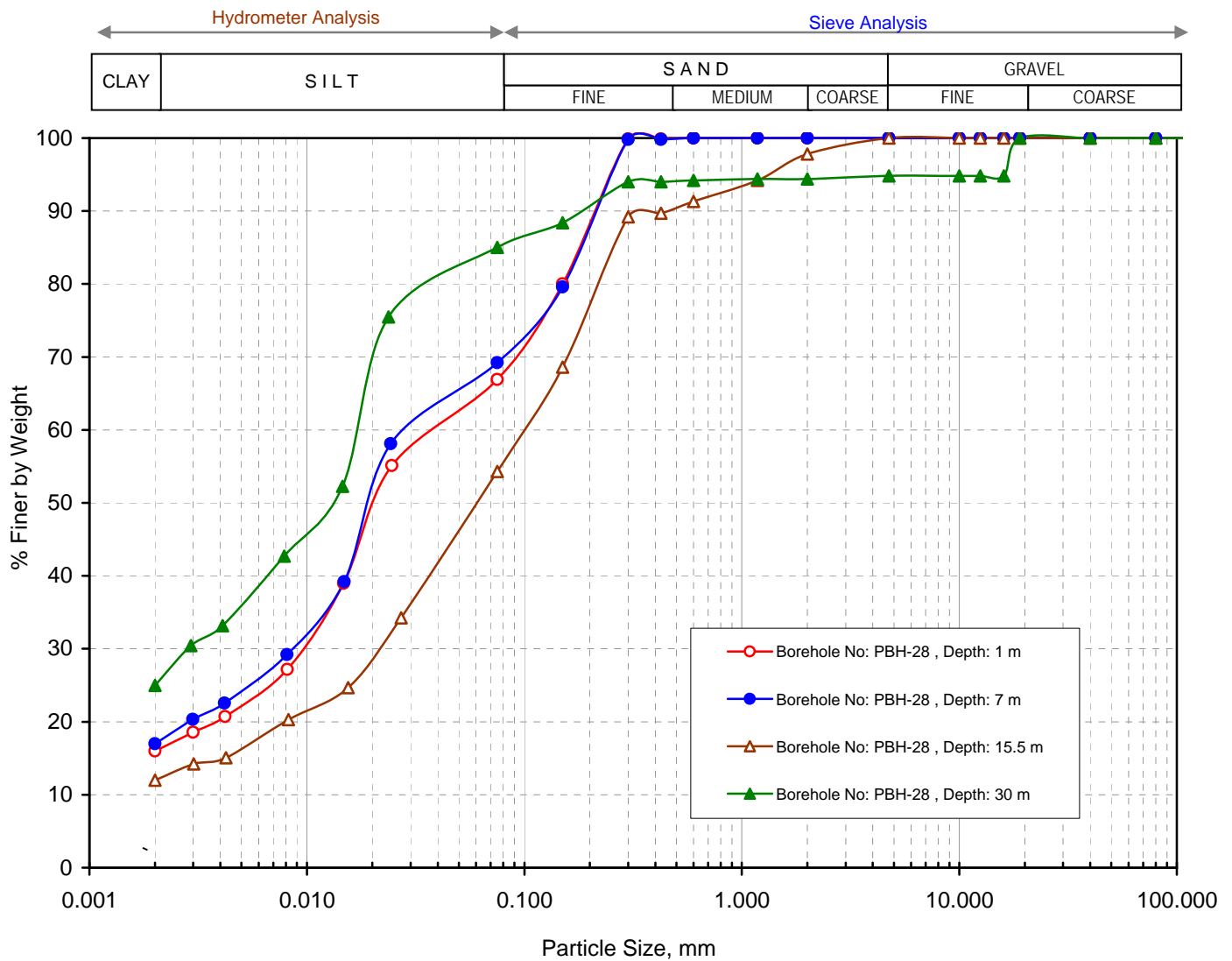




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
PBH-28	1.00	Sandy silt (CL)	0	33	51	16	0.046	0.010			
PBH-28	7.00	Sandy silt (CL)	0	30	53	17	0.033	0.009			
PBH-28	15.50	Sandy silt (CL-ML)	0	45	43	12	0.105	0.022			
PBH-28	30.00	Clayey silt with gravels (CI)	5	9	61	25	0.018	0.003			



## Grain Size Distribution Curve

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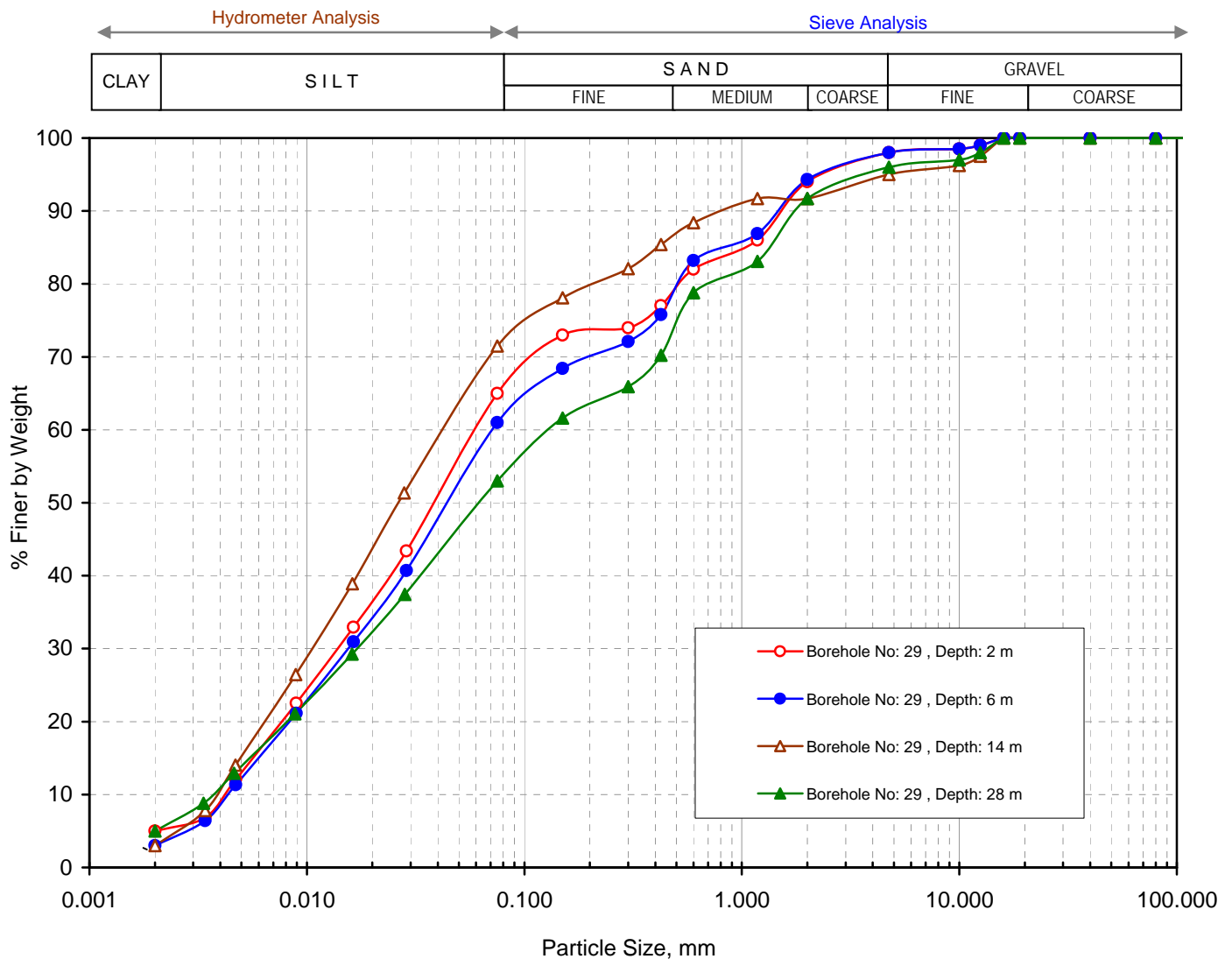




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-29	2.00	Sandy silt with traces of gravels (CL)	2	33	60	5	0.064	0.014	0.004	16.0	0.77
BH-29	6.00	Sandy silt with traces of gravels (CL)	2	37	58	3	0.073	0.016	0.004	18.3	0.88
BH-29	14.00	Sandy silt with gravels (CL)	5	23	69	3	0.048	0.011	0.004	12.0	0.63
BH-29	28.00	Sandy silt with traces of gravels (CL)	4	43	48	5	0.136	0.017	0.004	34.0	0.53



Grain Size Distribution Curve

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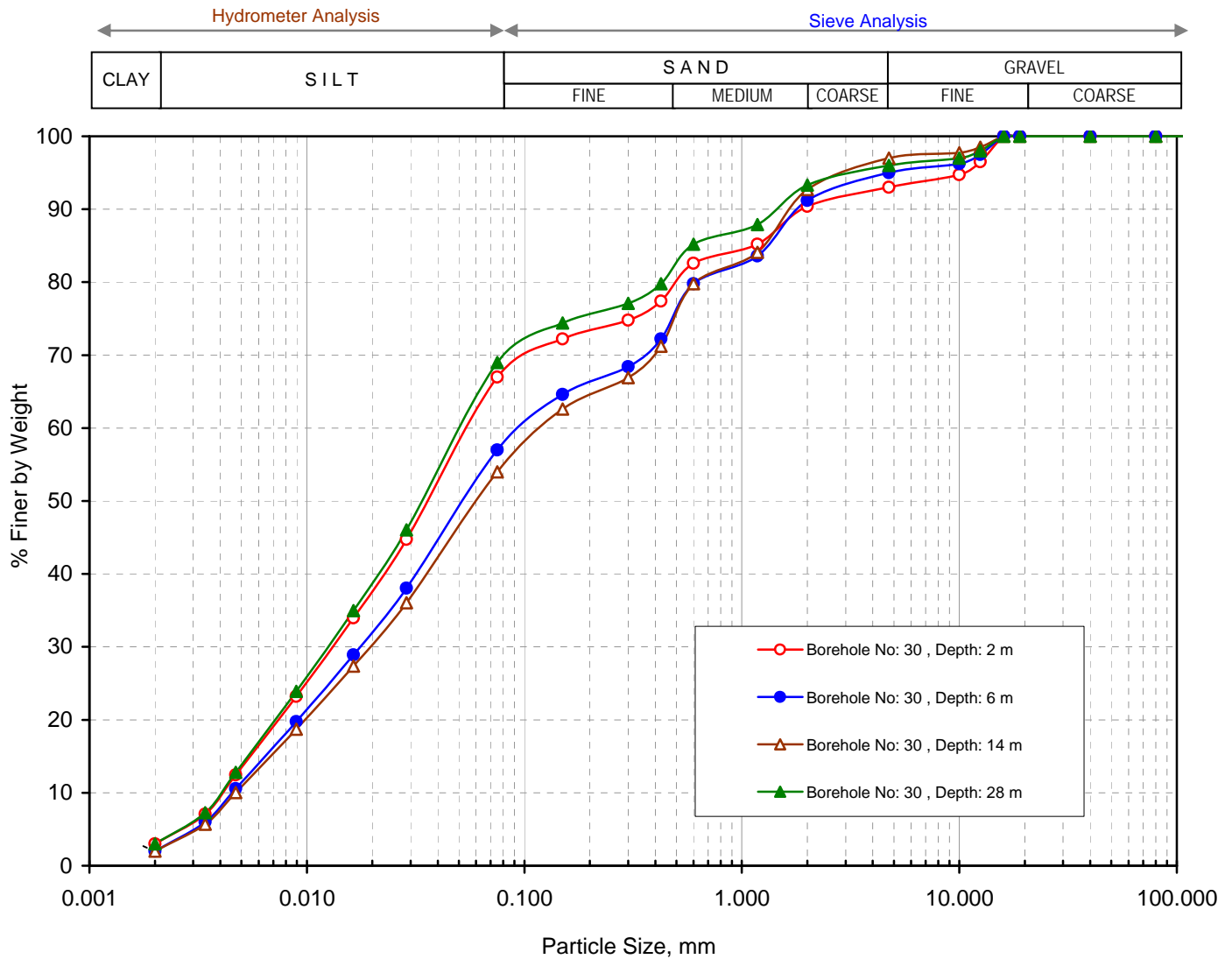




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-30	2.00	Sandy silt with gravels (CL)	7	26	64	3	0.060	0.014	0.004	15.0	0.82
BH-30	6.00	Sandy silt with gravels (CL)	5	38	55	2	0.105	0.018	0.005	21.0	0.62
BH-30	14.00	Sandy silt with traces of gravels (CL)	3	43	52	2	0.127	0.020	0.005	25.4	0.63
BH-30	28.00	Sandy silt with traces of gravels (CL)	4	27	66	3	0.057	0.013	0.004	14.3	0.74



## Grain Size Distribution Curve

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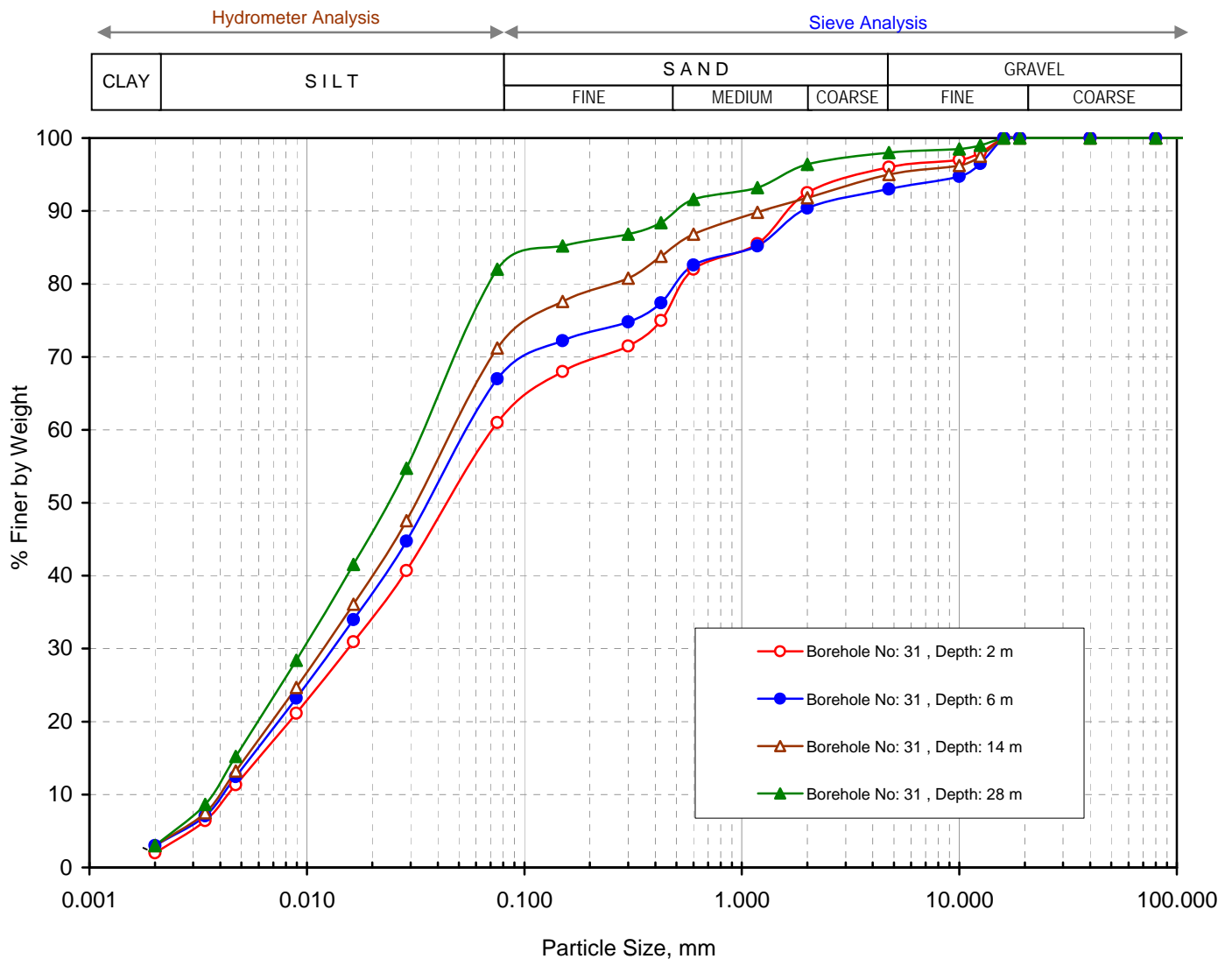




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-31	2.00	Sandy silt with traces of gravels (CL)	4	35	59	2	0.073	0.016	0.004	18.3	0.88
BH-31	6.00	Sandy silt with gravels (CL)	7	26	64	3	0.060	0.014	0.004	15.0	0.82
BH-31	14.00	Sandy silt with gravels (CL)	5	23	69	3	0.053	0.012	0.004	13.3	0.68
BH-31	28.00	Sandy silt with traces of gravels (CL)	2	16	79	3	0.038	0.010	0.004	9.5	0.66



## Grain Size Distribution Curve

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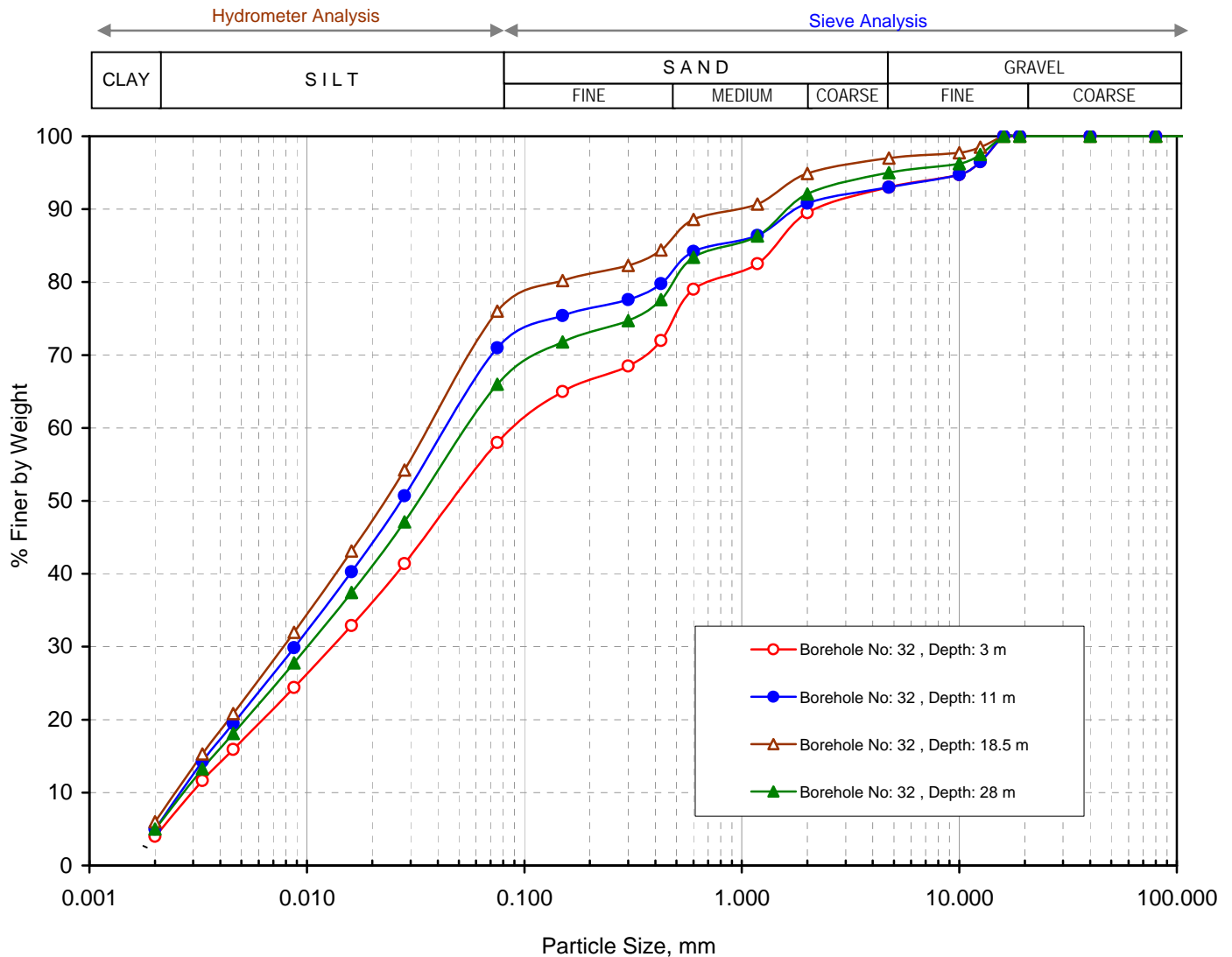




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-32	3.00	Sandy silt with gravels (CL)	7	35	54	4	0.096	0.014	0.003	32.0	0.68
BH-32	11.00	Sandy silt with gravels (CL)	7	22	66	5	0.050	0.009	0.003	16.7	0.54
BH-32	18.50	Sandy silt with traces of gravels (CL)	3	21	70	6	0.040	0.008	0.003	13.3	0.53
BH-32	28.00	Sandy silt with gravels (CL)	5	29	61	5	0.060	0.010	0.003	20.0	0.56



## Grain Size Distribution Curve

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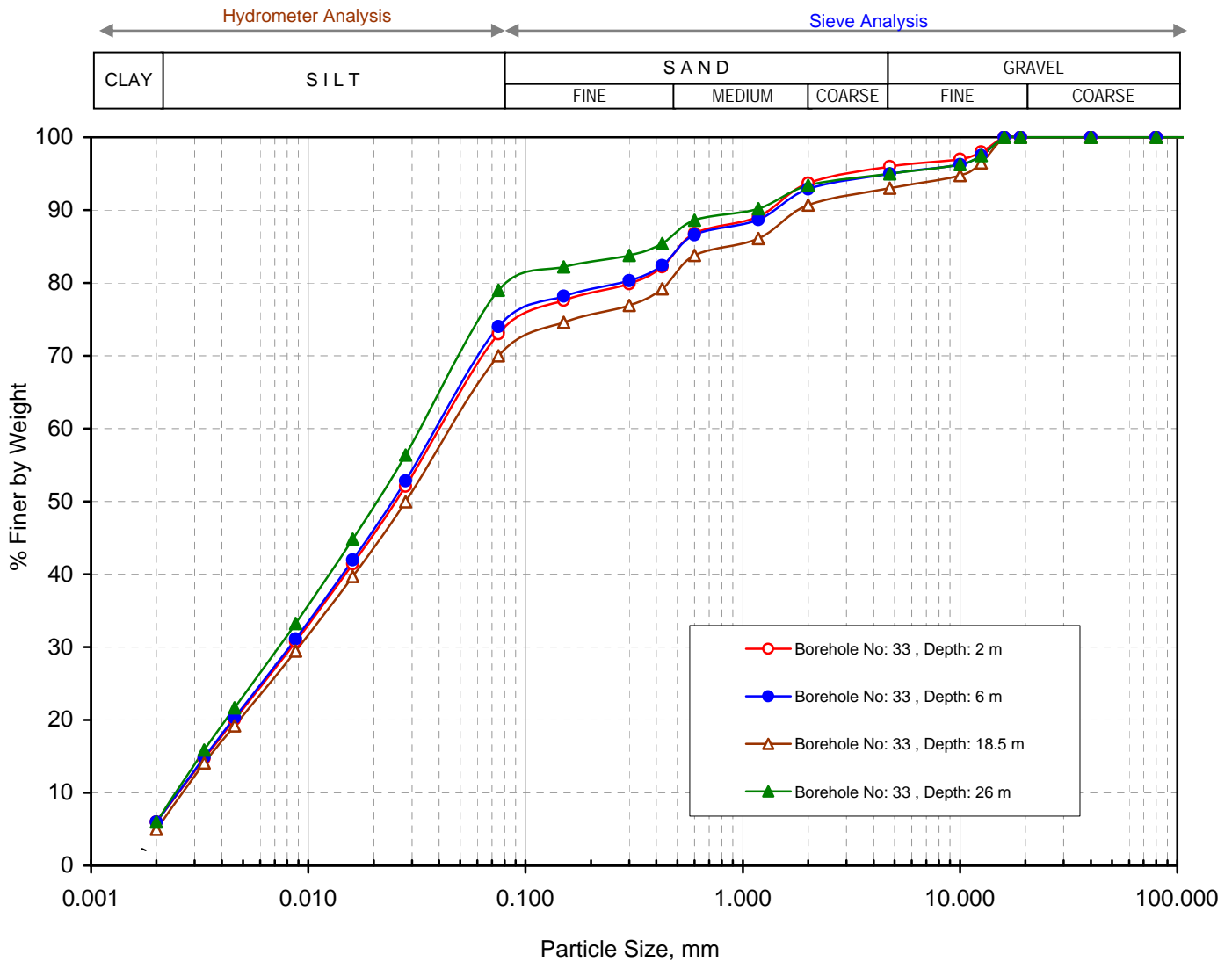




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-33	2.00	Sandy silt with traces of gravels (CL)	4	23	67	6	0.046	0.008	0.003	15.3	0.46
BH-33	6.00	Sandy silt with gravels (CL)	5	21	68	6	0.044	0.008	0.003	14.7	0.48
BH-33	18.50	Sandy silt with gravels (CL)	7	23	65	5	0.052	0.009	0.003	17.3	0.52
BH-33	26.00	Sandy silt with gravels (CL)	5	16	73	6	0.036	0.008	0.003	12.0	0.59



## Grain Size Distribution Curve

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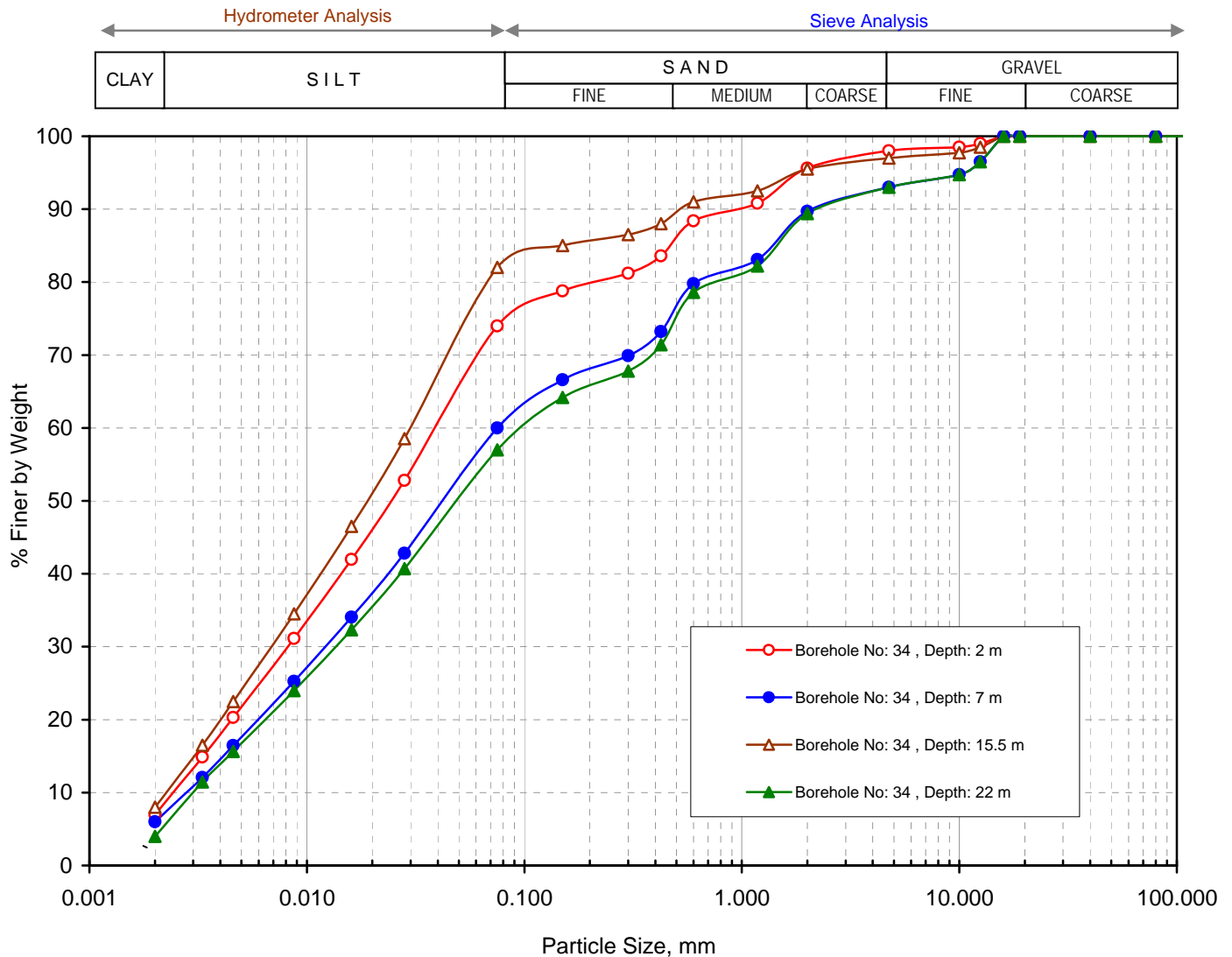






## Grain Size Analysis

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[illegible]

### Grain Size Distribution Curve

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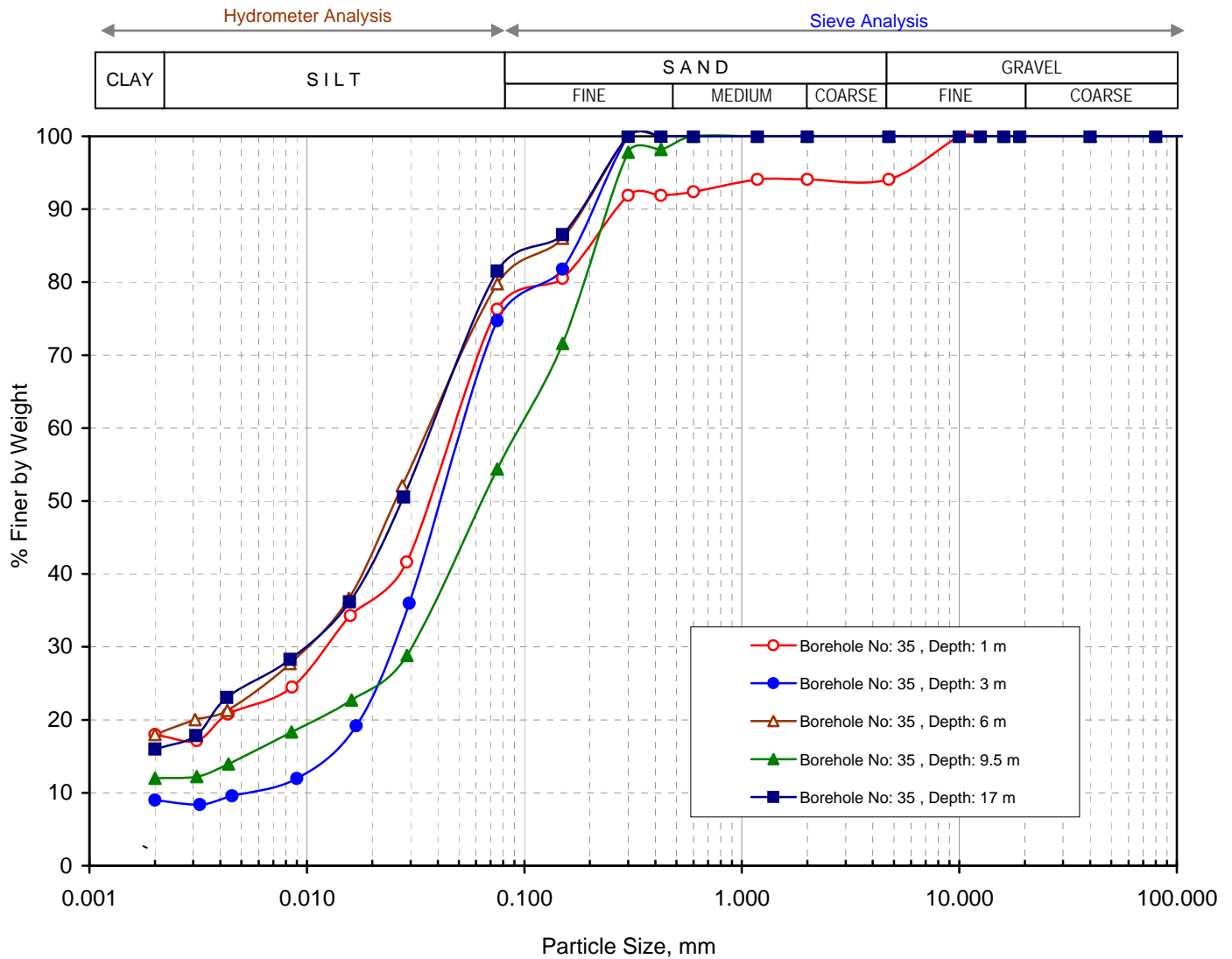




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-35	1.00	Sandy silt with gravels (CL)	6	17	59	18	0.053	0.013			
BH-35	3.00	Sandy silt (CL)	0	25	66	9	0.058	0.025	0.005	11.6	2.16
BH-35	6.00	Sandy silt (CL)	0	20	62	18	0.041	0.010			
BH-35	9.50	Sandy silt (CL)	0	45	43	12	0.099	0.031			
BH-35	17.00	Sandy silt (CL)	0	18	66	16	0.042	0.010			



## Grain Size Distribution Curve

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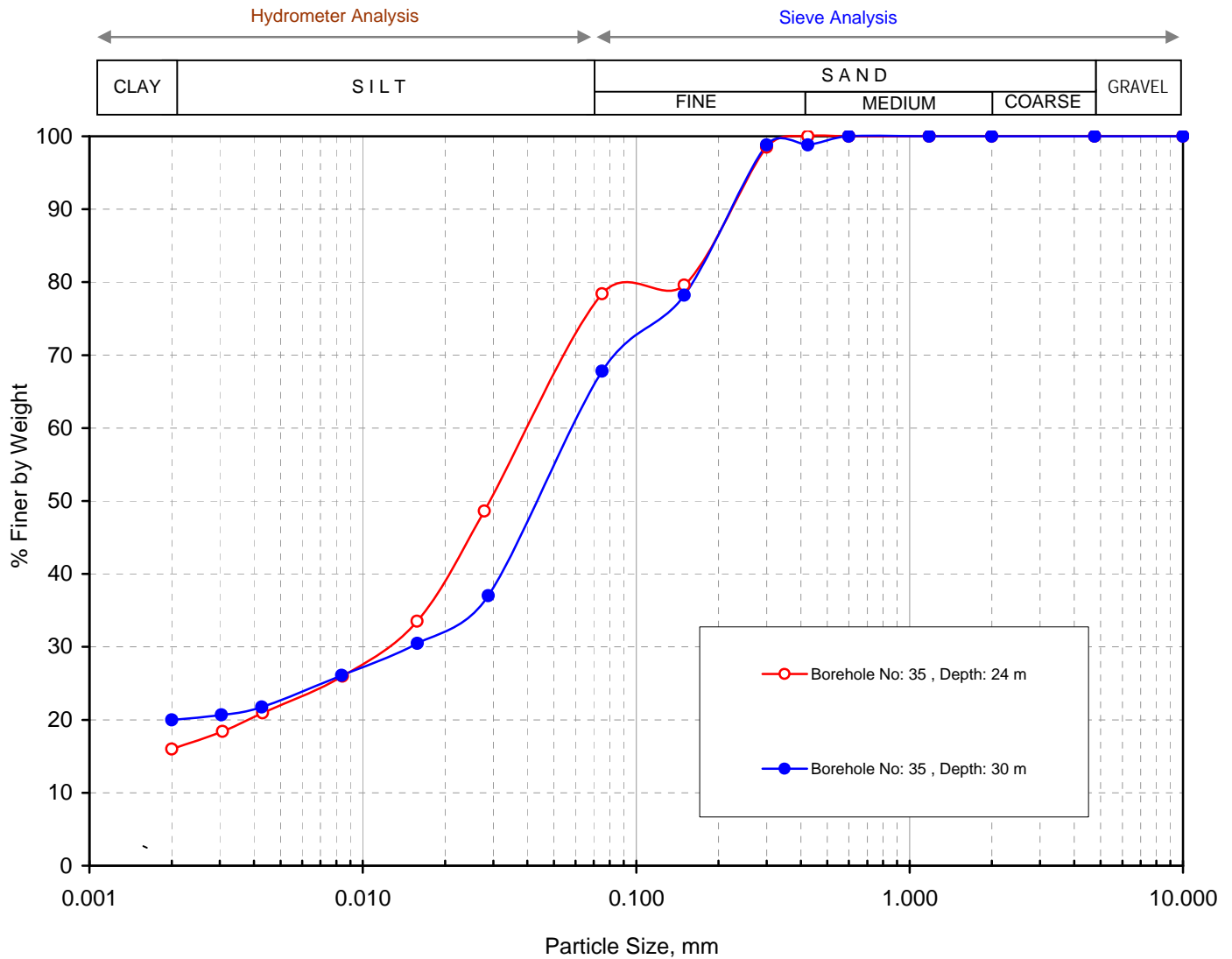




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-35	24.00	Sandy silt (CL)	0	21	63	16	0.046	0.012			
BH-35	30.00	Sandy silt (CL)	0	32	48	20	0.063	0.015			



Grain Size Distribution Curve

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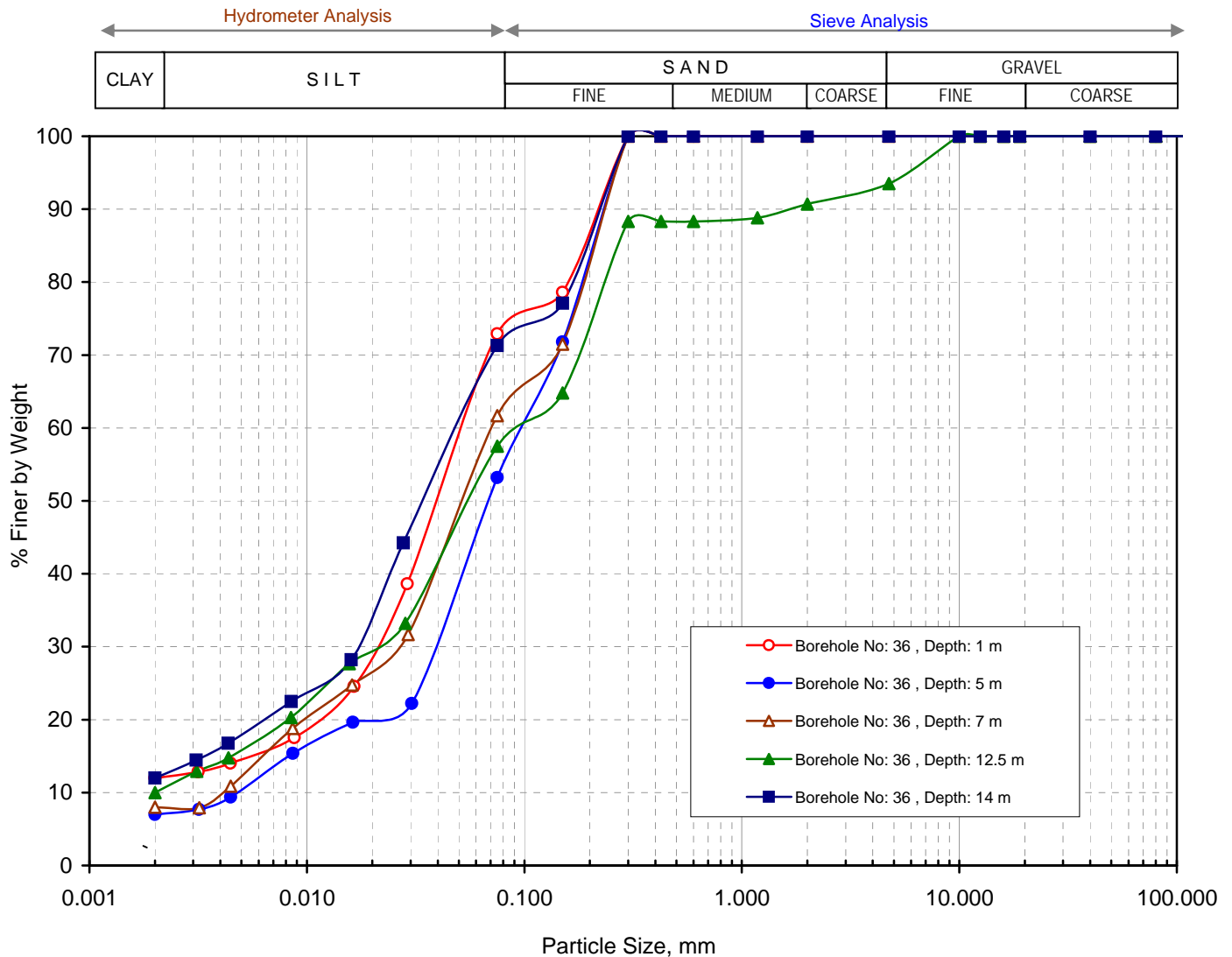




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-36	1.00	Sandy silt (CL)	0	27	61	12	0.058	0.021			
BH-36	5.00	Sandy silt (CL)	0	46	47	7	0.102	0.042	0.005	20.4	3.46
BH-36	7.00	Sandy silt (CL)	0	38	54	8	0.072	0.026	0.004	18.0	2.35
BH-36	12.50	Sandy silt with gravels (CL)	7	36	47	10	0.101	0.021	0.002	50.5	2.18
BH-36	14.00	Sandy silt (CL)	0	28	60	12	0.055	0.017			



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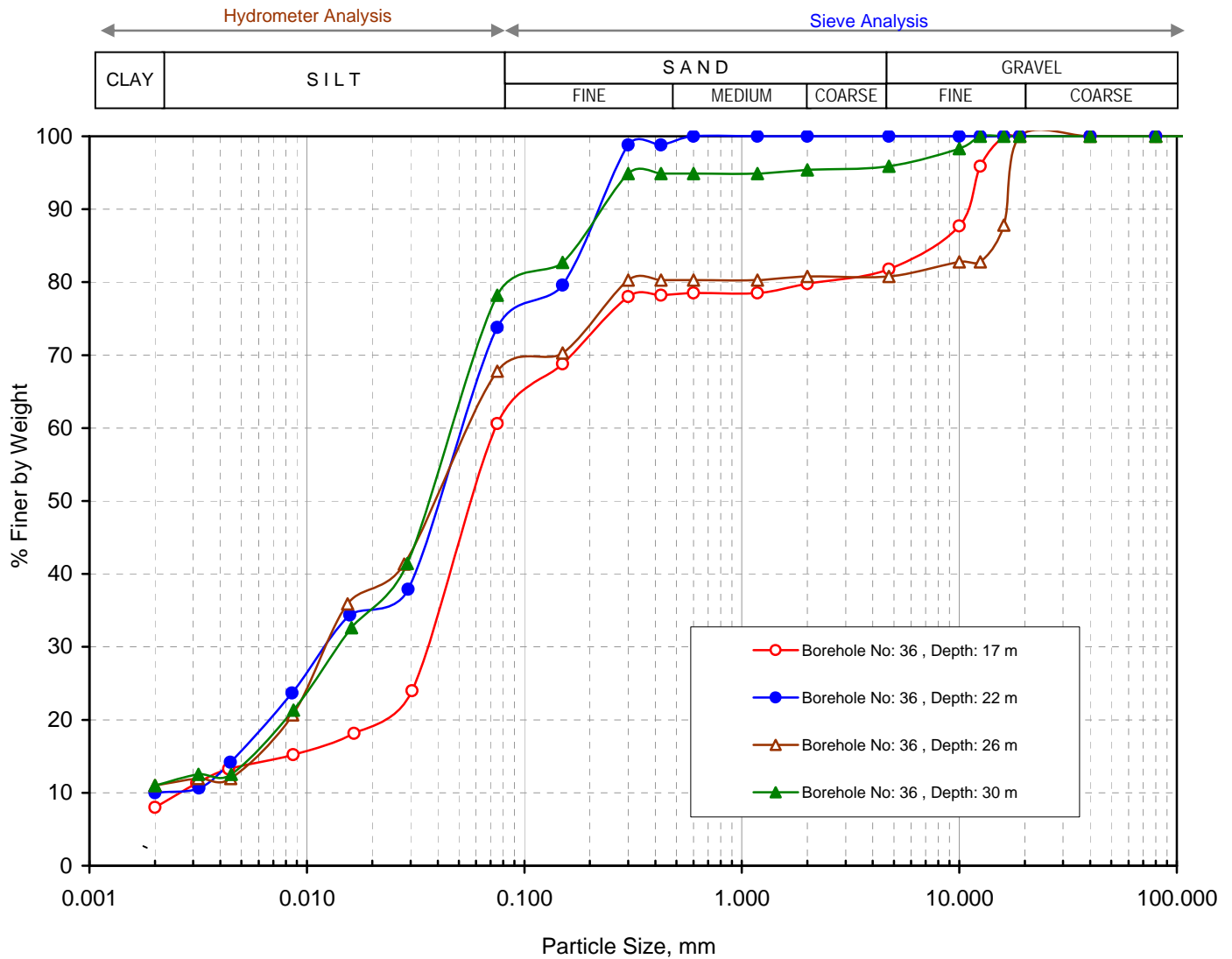




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-36	17.00	Sandy silt with gravels (CL)	18	21	53	8	0.074	0.038	0.003	24.7	6.50
BH-36	22.00	Sandy silt (CL)	0	26	64	10	0.057	0.013	0.002	28.5	1.48
BH-36	26.00	Sandy silt with gravels (CL)	19	13	57	11	0.061	0.013			
BH-36	30.00	Sandy silt with traces of gravels (CL)	4	17	68	11	0.052	0.014			



## Grain Size Distribution Curve

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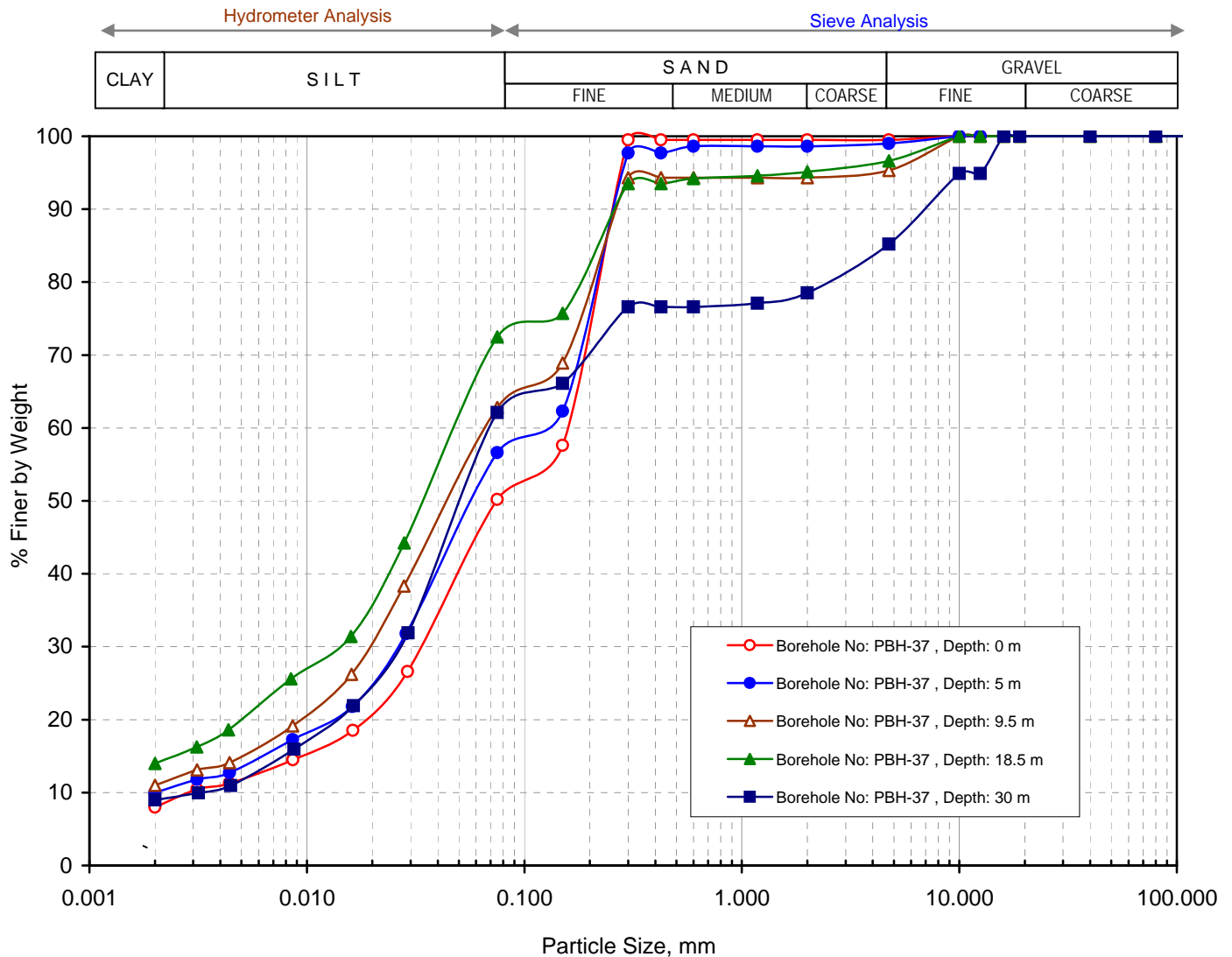




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
PBH-37	0.00	Sandy silt with traces of gravels (CL)	1	49	42	8	0.159	0.036	0.003	53.0	2.72
PBH-37	5.00	Sandy silt with traces of gravels (CL)	1	42	47	10	0.120	0.026	0.002	60.0	2.82
PBH-37	9.50	Sandy silt with gravels (CL)	5	32	52	11	0.070	0.020			
PBH-37	18.50	Sandy silt with traces of gravels (CL)	3	24	59	14	0.054	0.014			
PBH-37	30.00	Sandy silt with gravels (CL)	15	23	53	9	0.072	0.027	0.003	24.0	3.38



### Grain Size Distribution Curve

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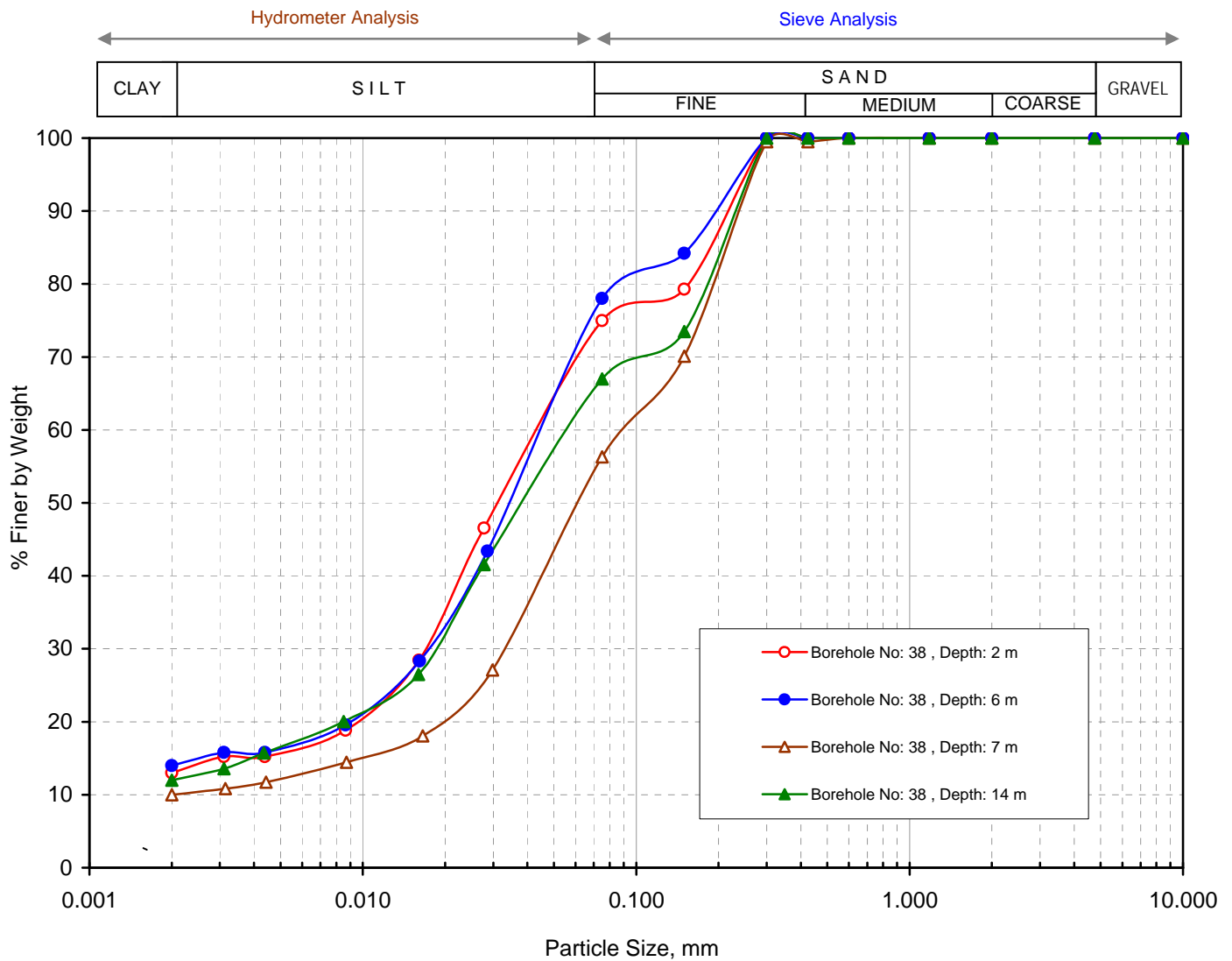




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-38	2.00	Sandy silt (CL)	0	25	62	13	0.050	0.017			
BH-38	6.00	Sandy silt (CL)	0	22	64	14	0.051	0.018			
BH-38	7.00	Sandy silt (CL)	0	43	47	10	0.095	0.034	0.002	47.5	6.08
BH-38	14.00	Sandy silt (CL)	0	33	55	12	0.062	0.019			



## Grain Size Distribution Curve

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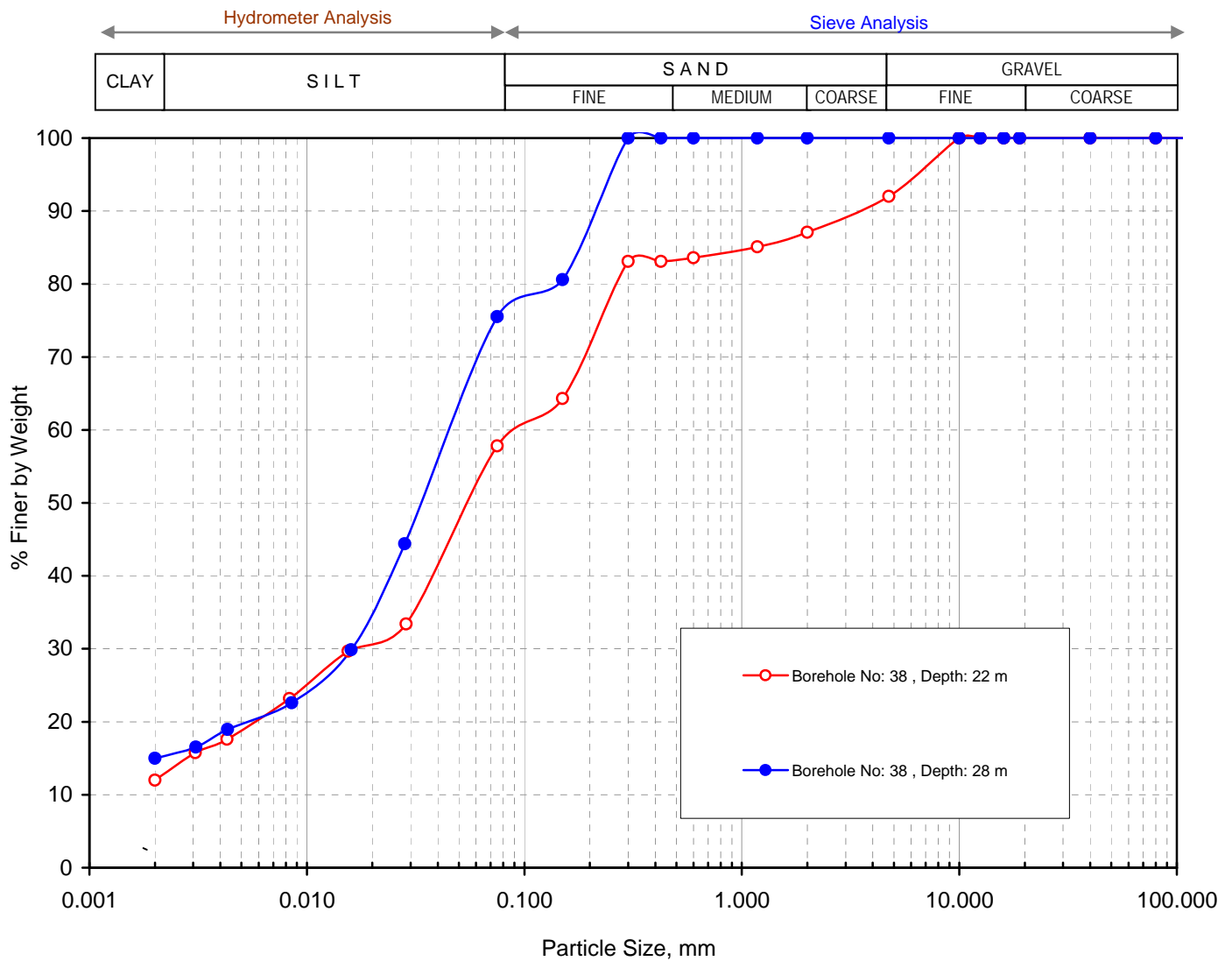




### Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-38	22.00	Sandy silt with gravels (CL)	8	34	46	12	0.100	0.017			
BH-38	28.00	Sandy silt (CL)	0	24	61	15	0.052	0.016			



Grain Size Distribution Curve

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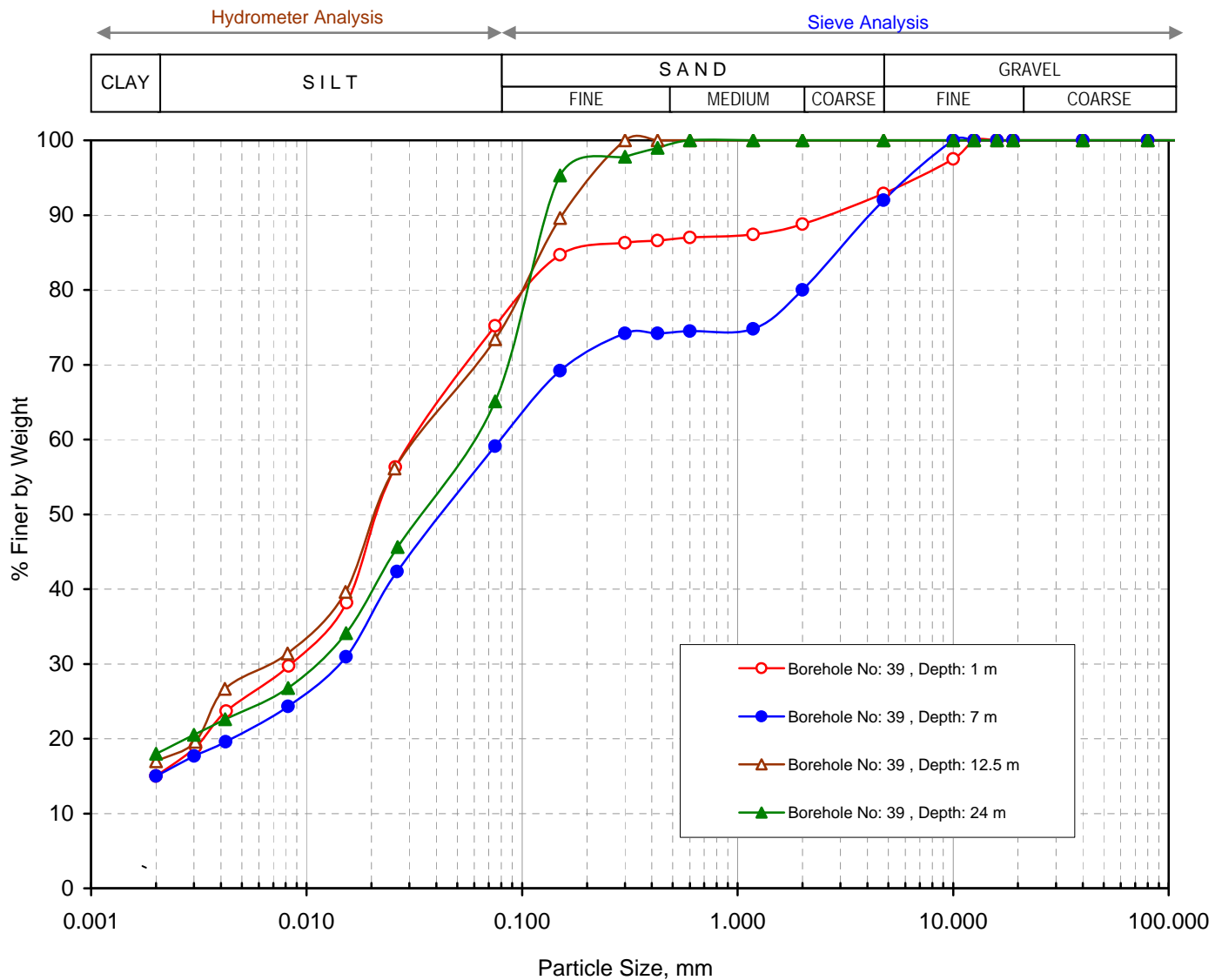




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-39	1.00	Sandy silt with gravels (CL)	7	17	61	15	0.035	0.008			
BH-39	7.00	Sandy silt with gravels (CL)	8	32	45	15	0.082	0.014			
BH-39	12.50	Sandy silt (CL)	0	26	57	17	0.037	0.007			
BH-39	24.00	Sandy silt (CL)	0	34	48	18	0.062	0.011			



Grain Size Distribution Curve

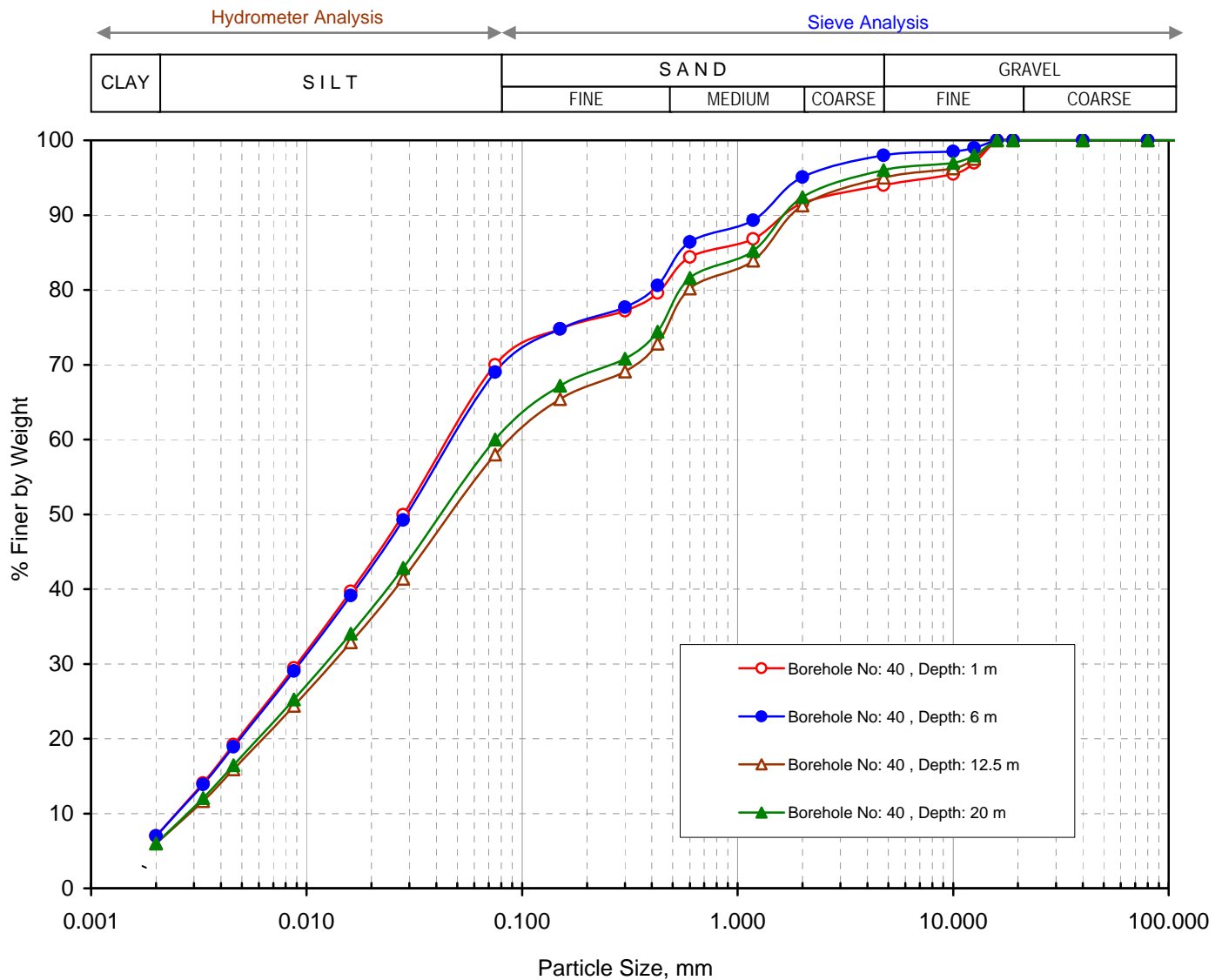




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-40	1.00	Sandy silt with gravels (CL)	6	24	63	7	0.052	0.009	0.003	17.3	0.52
BH-40	6.00	Sandy silt with traces of gravels (CL)	2	29	62	7	0.054	0.009	0.003	18.0	0.50
BH-40	12.50	Sandy silt with gravels (CL)	5	37	52	6	0.095	0.014	0.003	31.7	0.69
BH-40	20.00	Sandy silt with traces of gravels (CL)	4	36	54	6	0.075	0.013	0.003	25.0	0.75



Grain Size Distribution Curve

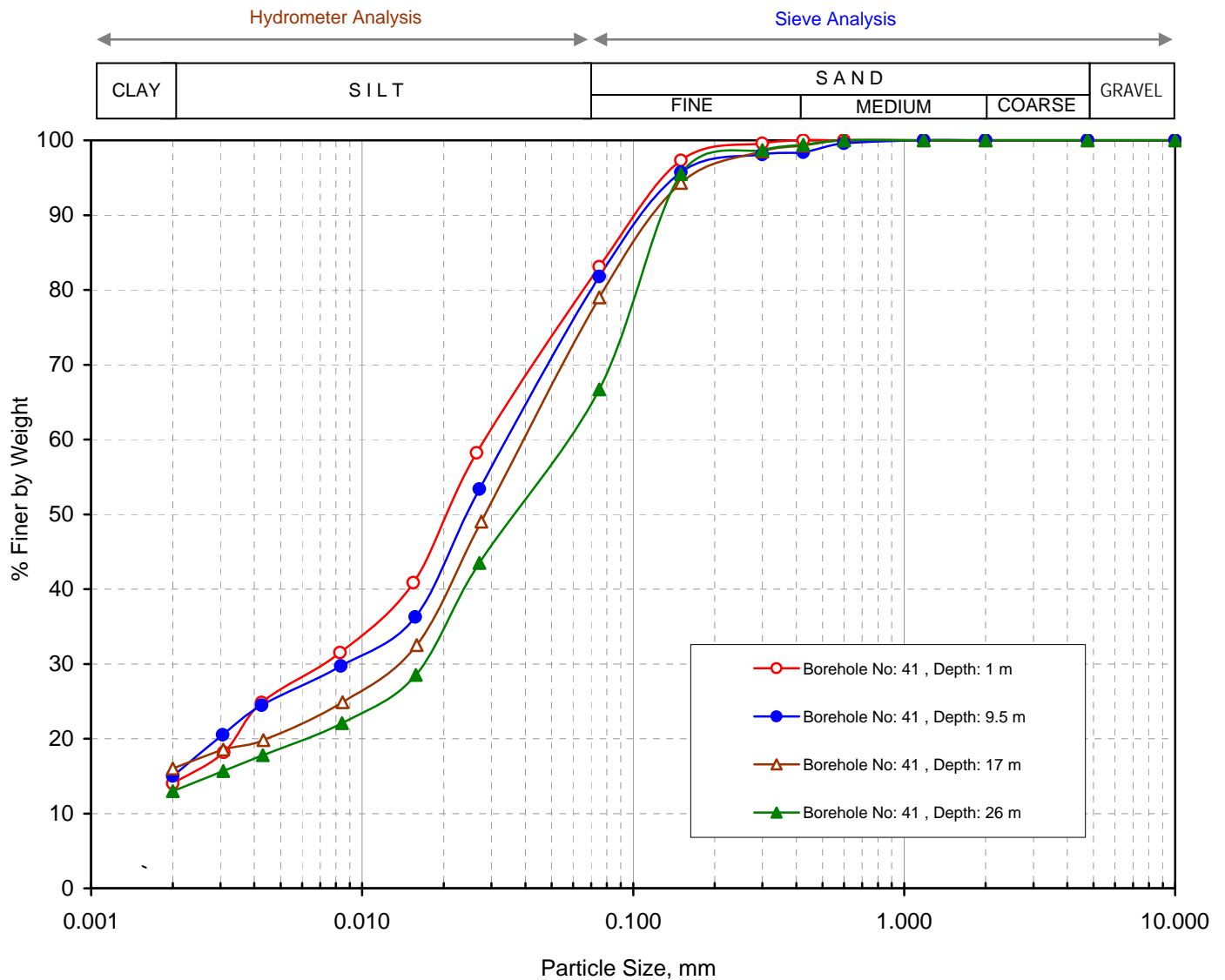




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-41	1.00	Sandy silt (CL)	0	16	70	14	0.030	0.007			
BH-41	9.50	Sandy silt (CL)	0	18	67	15	0.038	0.009			
BH-41	17.00	Sandy silt (CL)	0	21	63	16	0.045	0.013			
BH-41	26.00	Sandy silt (CL)	0	33	54	13	0.061	0.017			



Grain Size Distribution Curve

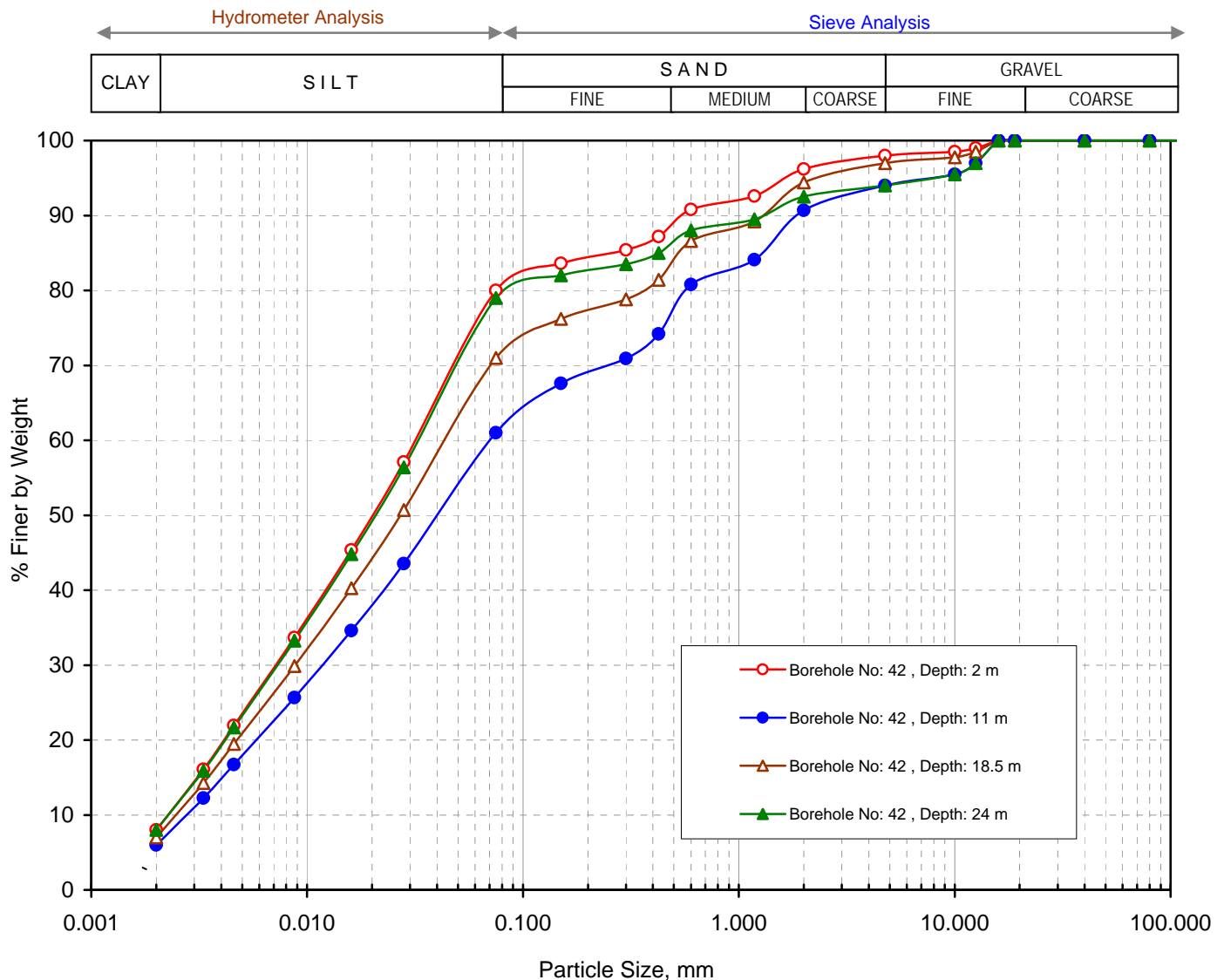




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-42	2.00	Sandy silt with traces of gravels (CL)	2	18	72	8	0.034	0.007	0.002	17.0	0.72
BH-42	11.00	Sandy silt with gravels (CL)	6	33	55	6	0.072	0.012	0.003	24.0	0.67
BH-42	18.50	Sandy silt with traces of gravels (CL)	3	26	64	7	0.050	0.009	0.003	16.7	0.54
BH-42	24.00	Sandy silt with gravels (CL)	6	15	71	8	0.036	0.008	0.002	18.0	0.89



Grain Size Distribution Curve

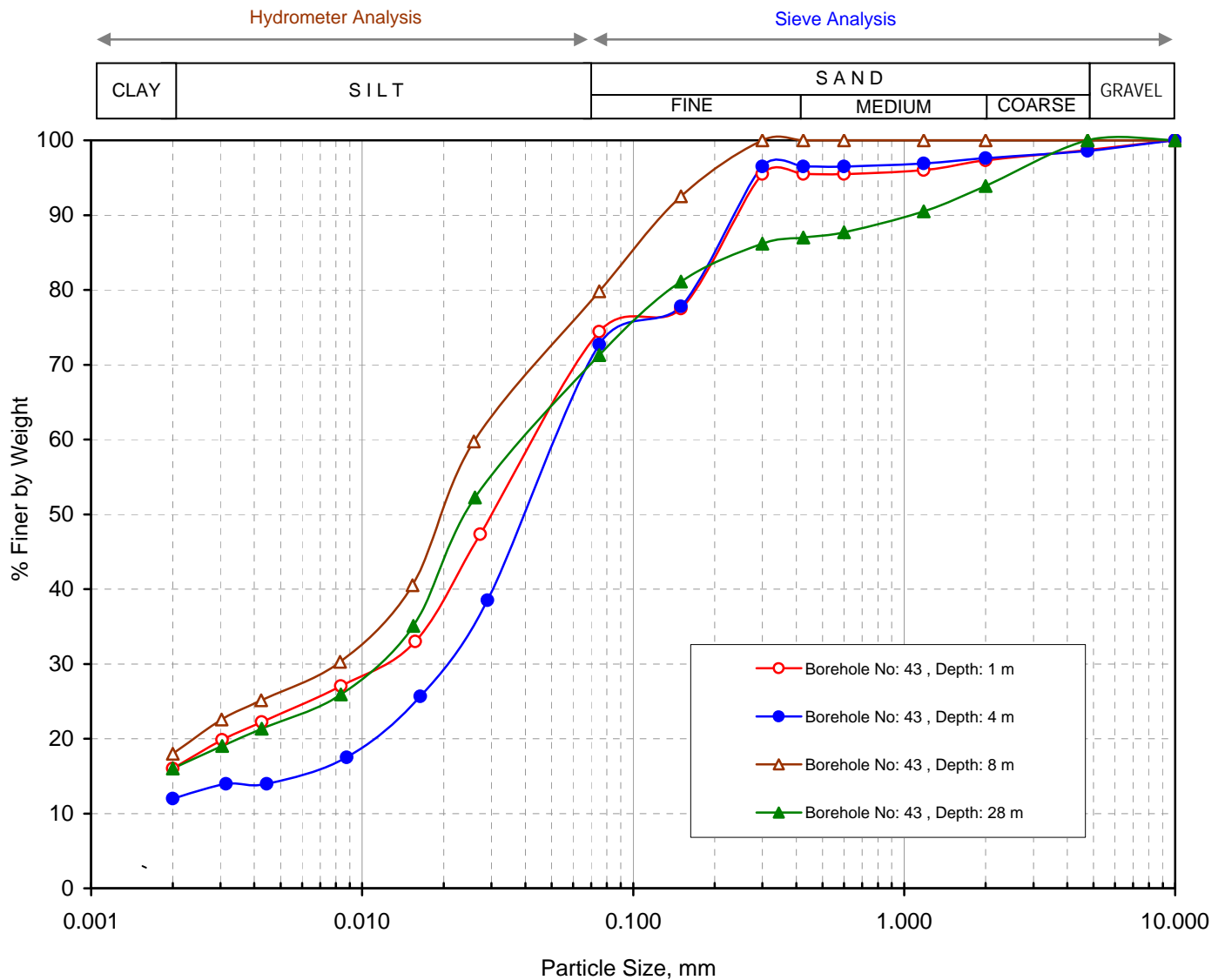




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-43	1.00	Sandy silt with traces of gravels (CL)	1	24	59	16	0.050	0.012			
BH-43	4.00	Sandy silt with traces of gravels (CL)	1	25	62	12	0.058	0.021			
BH-43	8.00	Sandy silt (CL)	0	20	62	18	0.026	0.008			
BH-43	28.00	Sandy silt (CL)	0	28	56	16	0.046	0.012			



Grain Size Distribution Curve

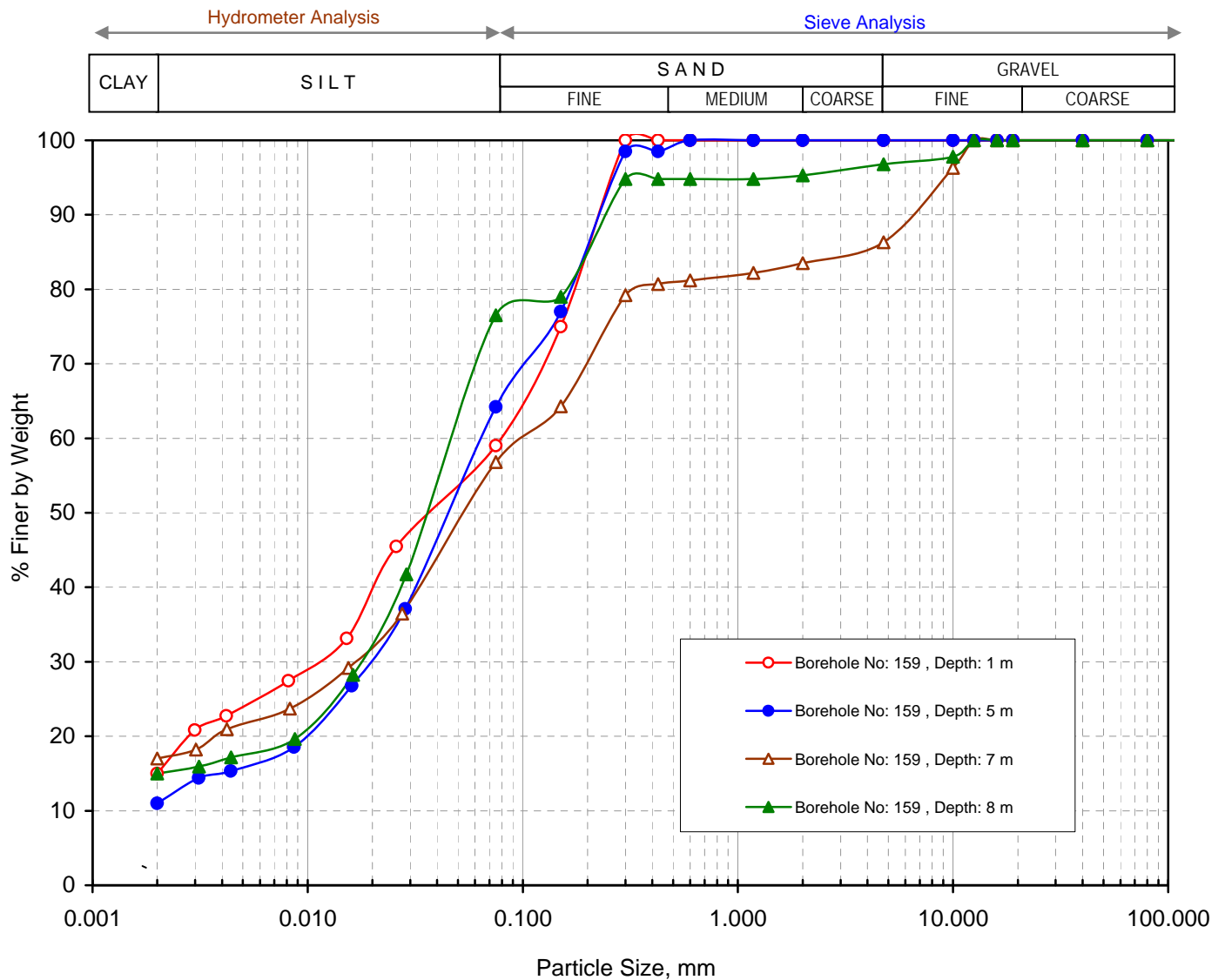




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-159	1.00	Sandy silt (CL)	0	41	44	15	0.080	0.011			
BH-159	5.00	Sandy silt (CL)	0	35	54	11	0.068	0.020			
BH-159	7.00	Sandy silt with gravels (CL)	14	29	40	17	0.107	0.017			
BH-159	8.00	Sandy silt with traces of gravels (CL)	3	20	62	15	0.053	0.018			



Grain Size Distribution Curve

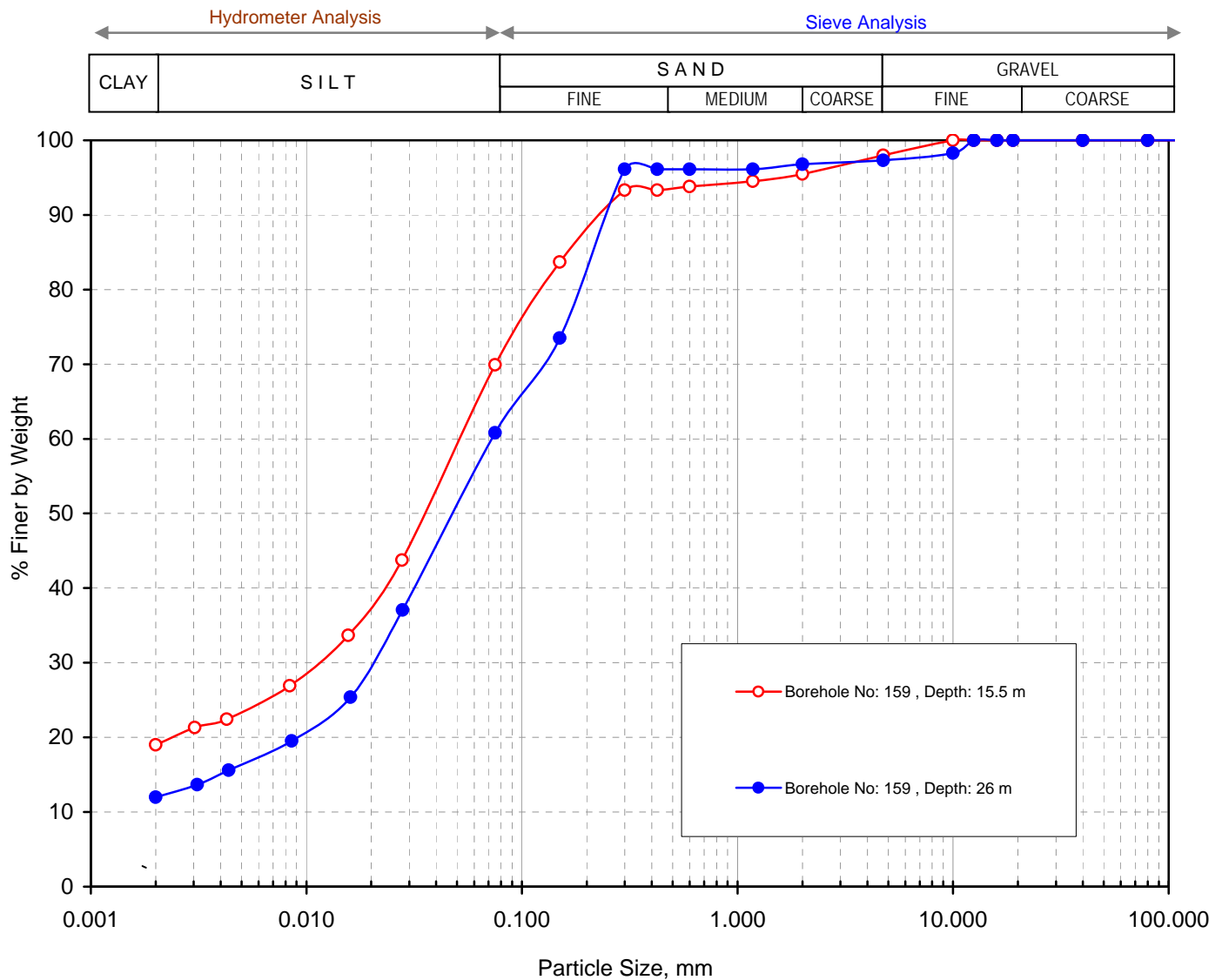




## Grain Size Analysis

IS : 2720 (Part 4) - 1985, RA-2010

Sample Details			Test Results								
Borehole Number	Sample Depth, m	Sample Description	% Gravel	% Sand	% Silt	% Clay	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>	C <sub>u</sub>	C <sub>c</sub>
BH-159	15.50	Sandy silt with traces of gravels (CL)	2	28	51	19	0.057	0.012			
BH-159	26.00	Sandy silt with traces of gravels (CL)	3	36	49	12	0.073	0.021			



Grain Size Distribution Curve

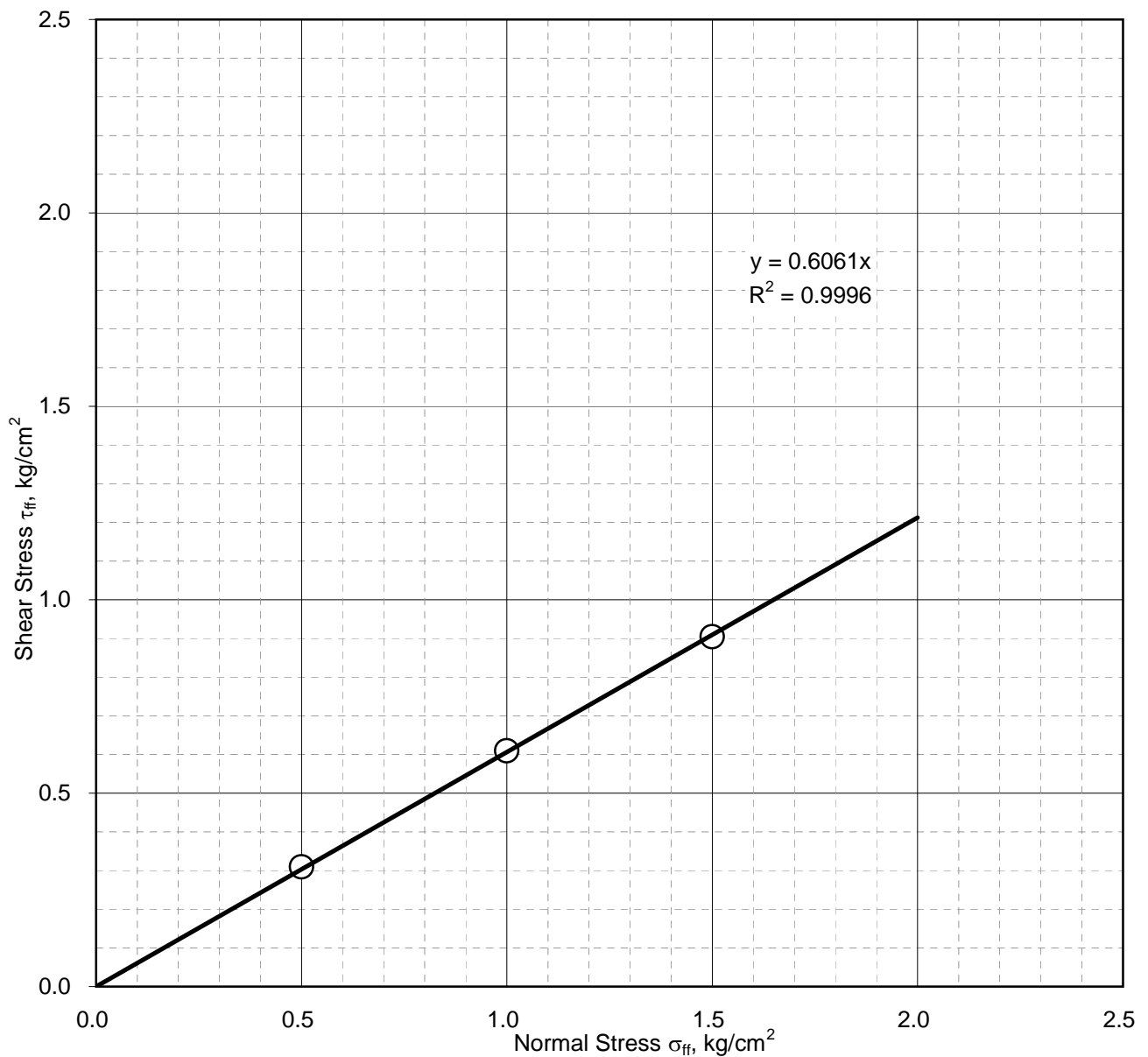




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-4R	Sample Depth: 8 m
	Sample No.: UDS-4	Sample Description: Sandy silt
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.58
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	31.2 degrees



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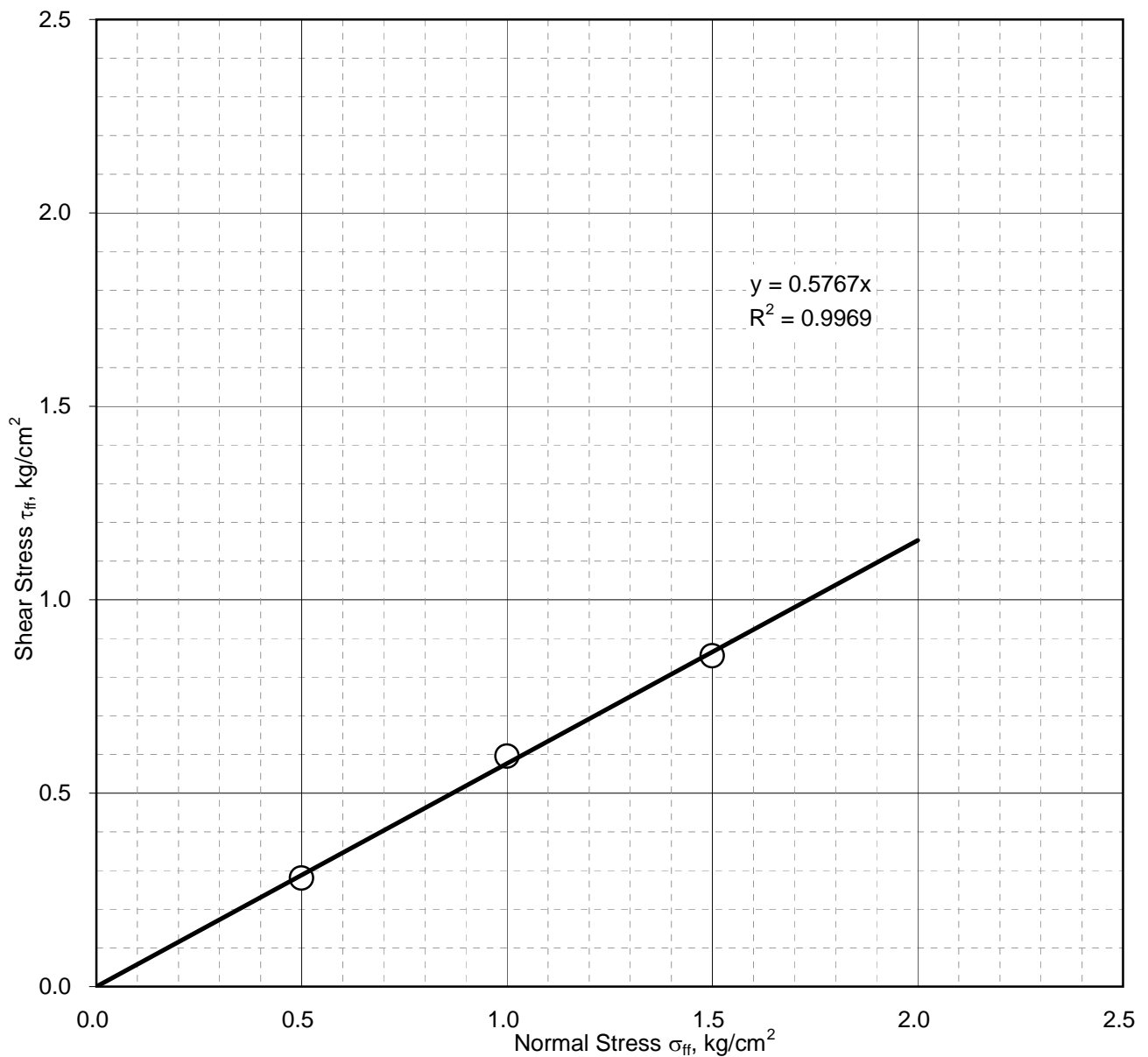




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-8R	Sample Depth: 6 m
	Sample No.: UDS-3	Sample Description: Sandy silt
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.62
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	30.0 degrees



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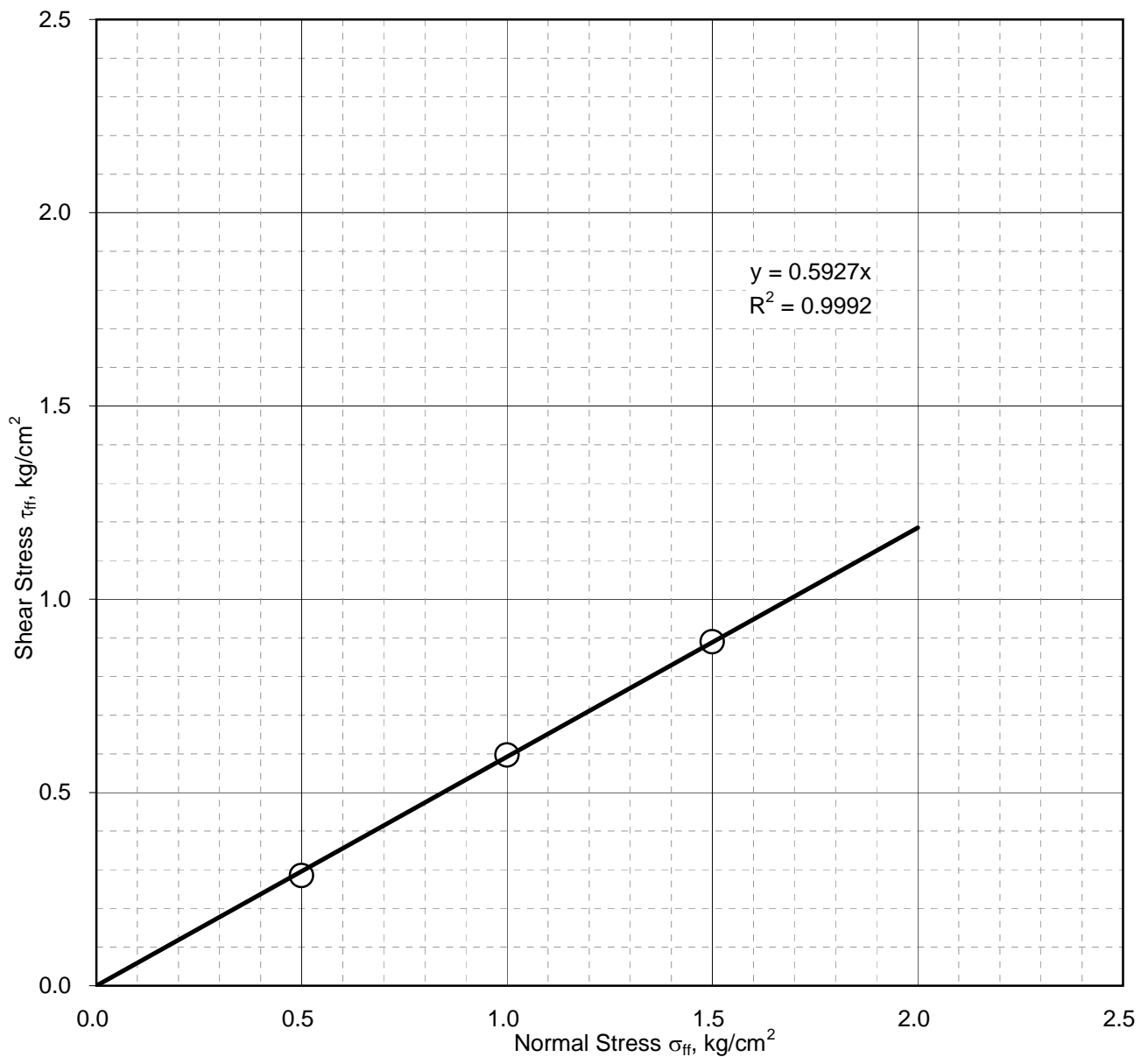




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Test Results	Borehole No.: BH-13R		Sample Depth: 6 m	
	Sample No.: UDS-3		Sample Description: Sandy silt	
	Dry Density of Soil ( $\text{g/cm}^3$ ):		1.63	
	Moisture Content (%):		Saturated	
	Cohesion Intercept, $c$ :		0.00	$\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :		30.7	degrees



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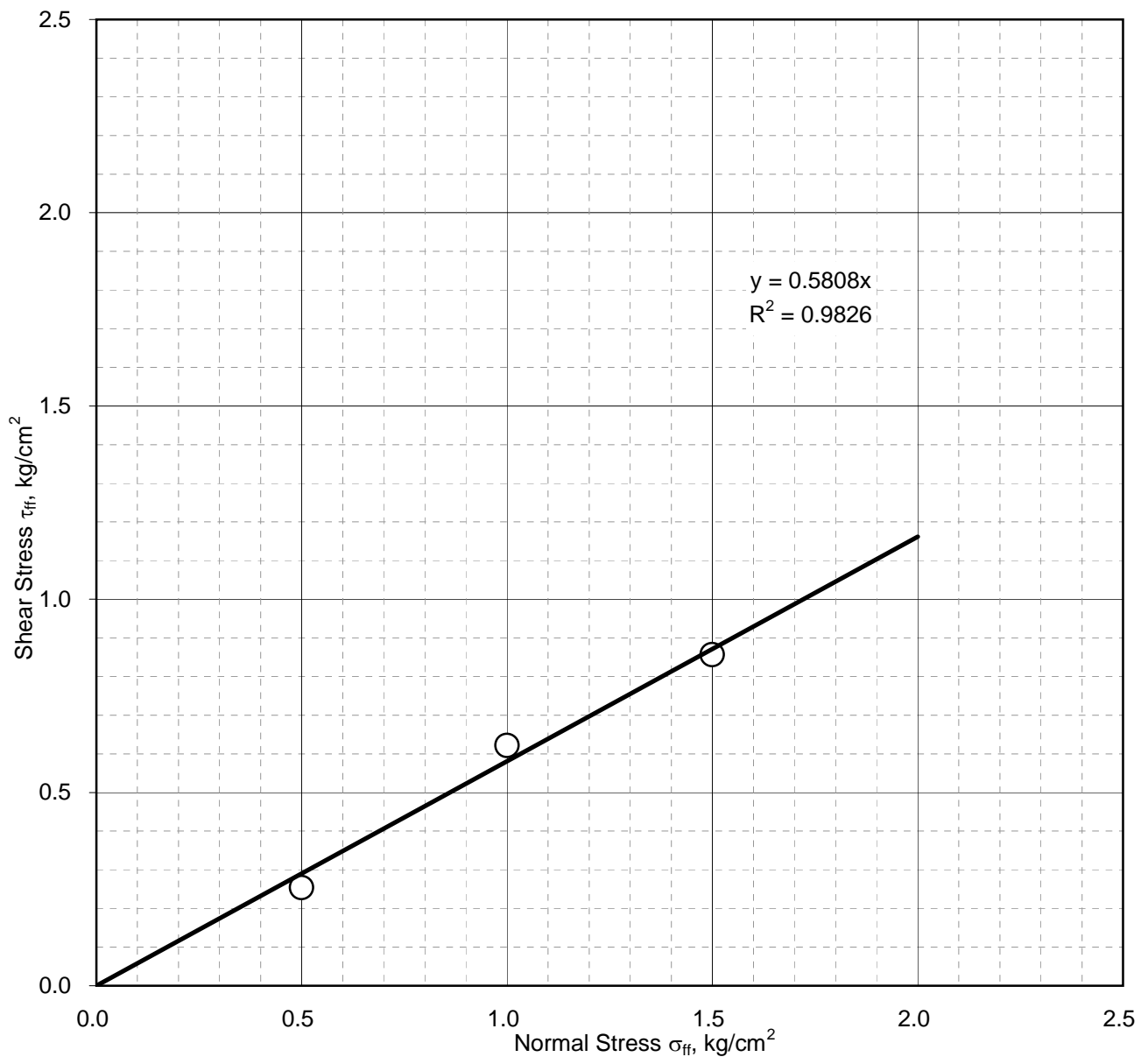




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-15	Sample Depth: 4 m
	Sample No.: UDS-2	Sample Description: Sandy silt
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.61
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	30.1 degrees



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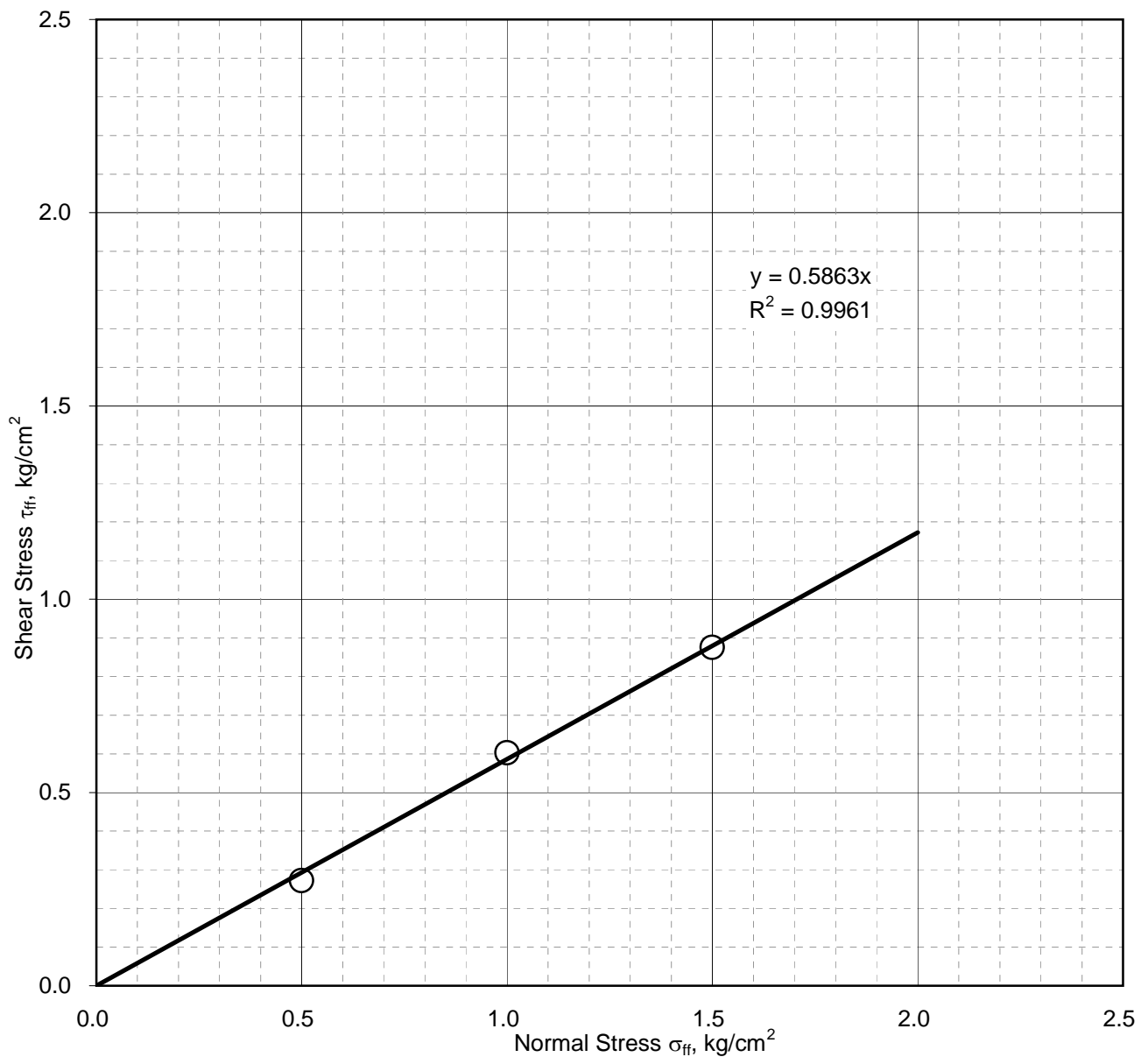




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-16	Sample Depth: 6 m
	Sample No.: UDS-3	Sample Description: Sandy silt
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.63
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	30.4 degrees



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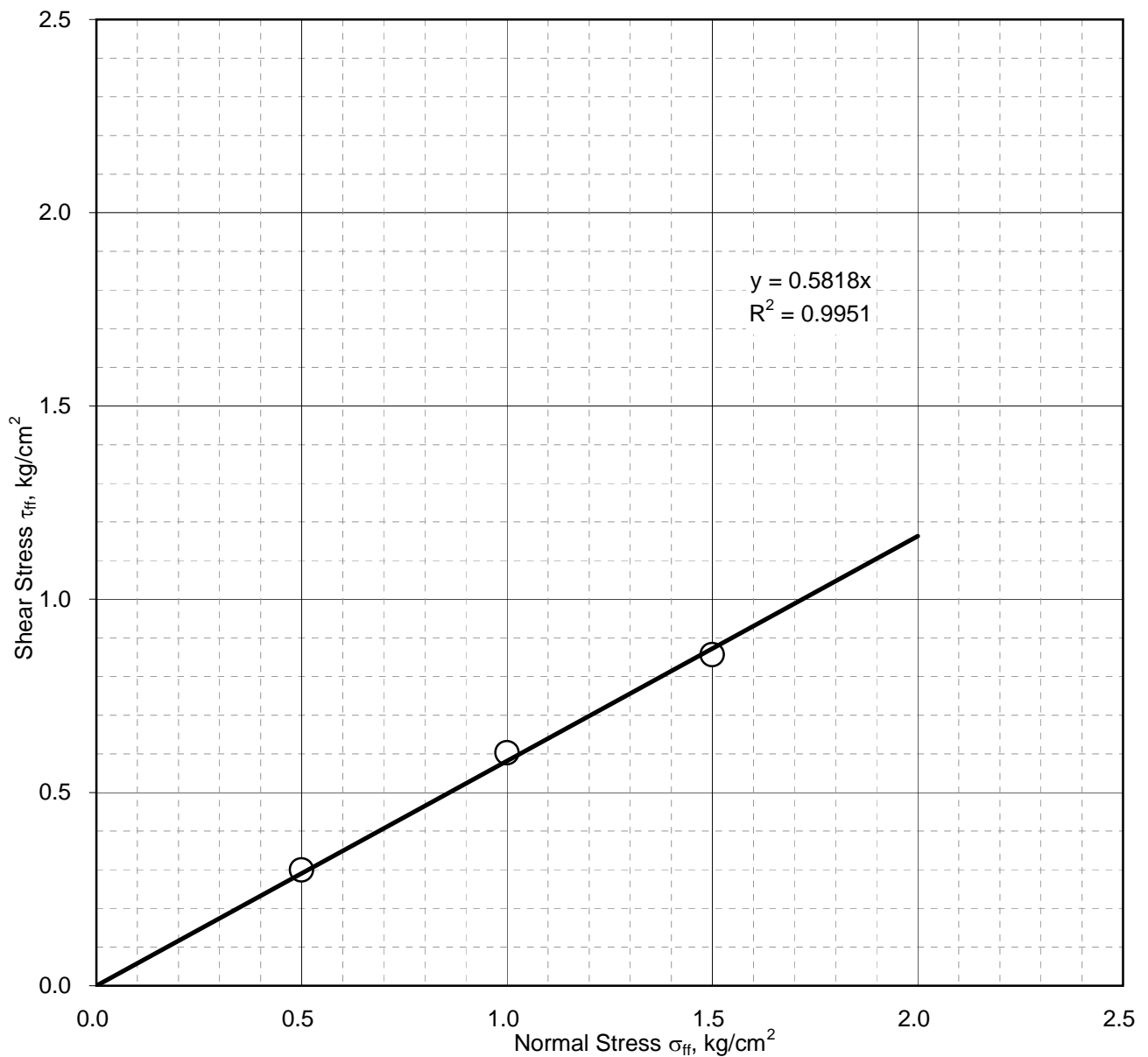




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Test Results	Borehole No.: BH-17		Sample Depth: 6 m	
	Sample No.: UDS-3		Sample Description: Sandy silt	
	Dry Density of Soil ( $\text{g/cm}^3$ ):		1.62	
	Moisture Content (%):		Saturated	
	Cohesion Intercept, $c$ :		0.00	$\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :		30.2	degrees



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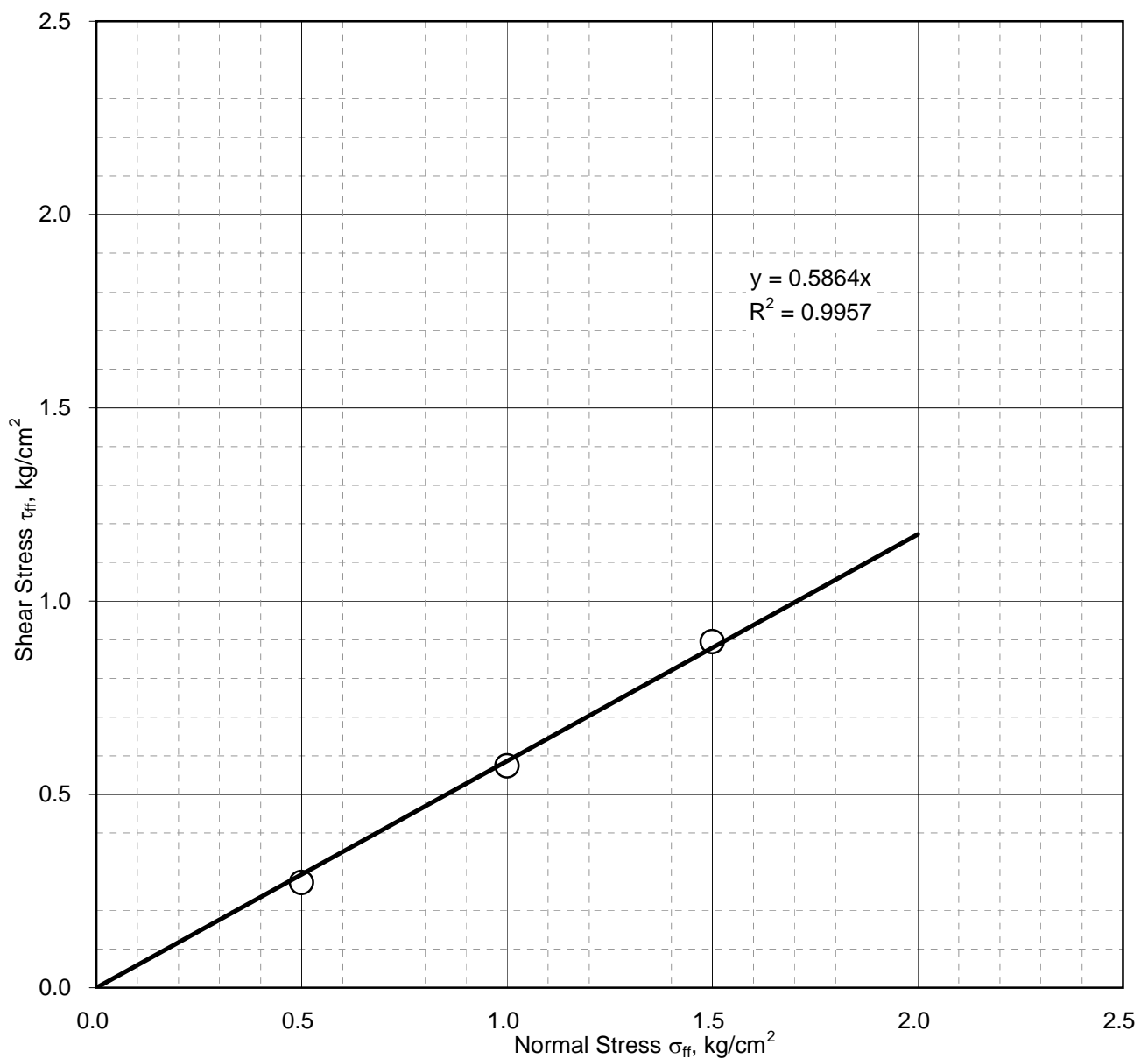




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-PBH-18	Sample Depth: 4 m
	Sample No.: UDS-2	Sample Description: Sandy silt
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.59
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	30.4 degrees



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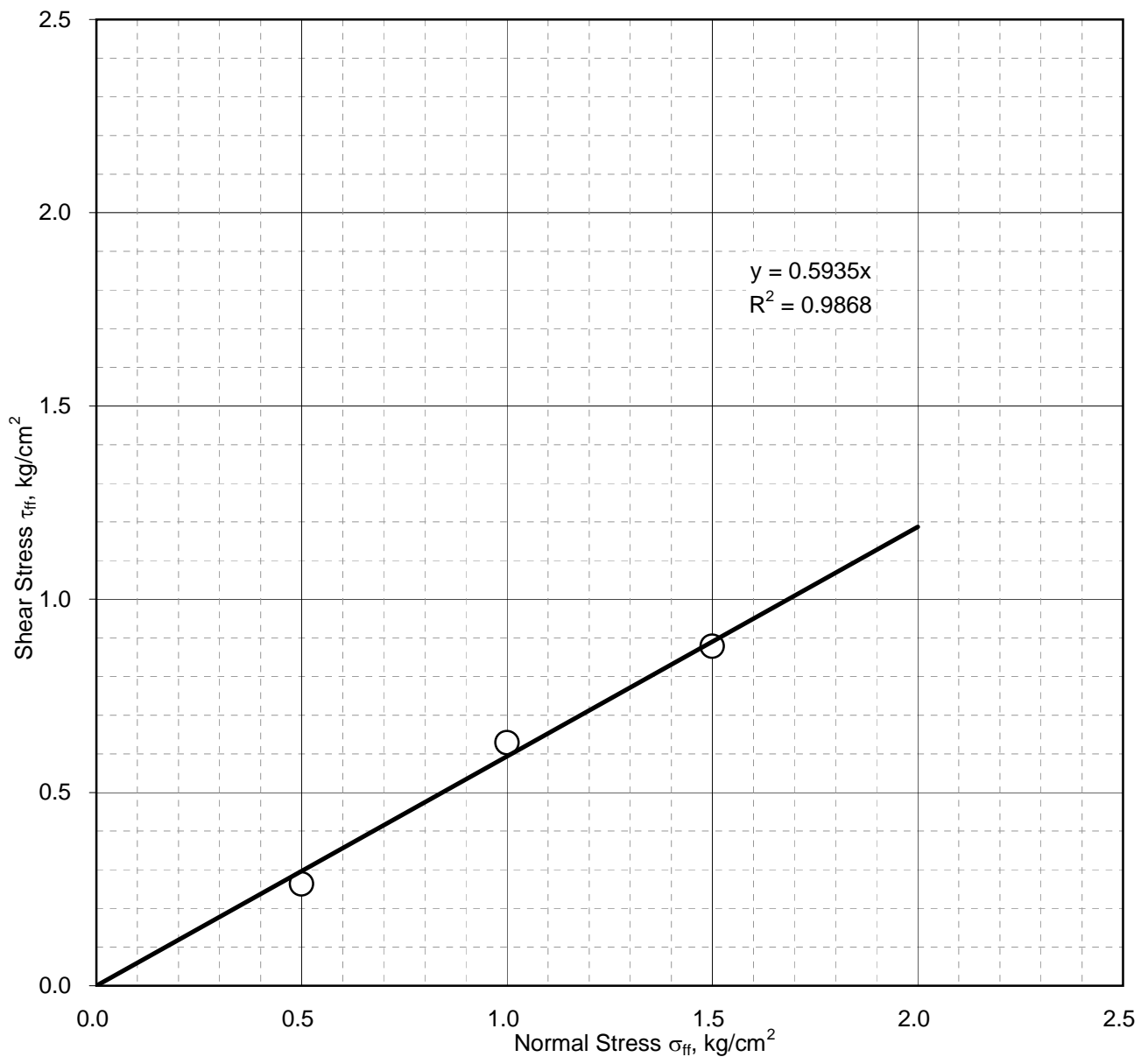




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-19	Sample Depth: 4 m
	Sample No.: UDS-2	
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.54
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	30.7 degrees



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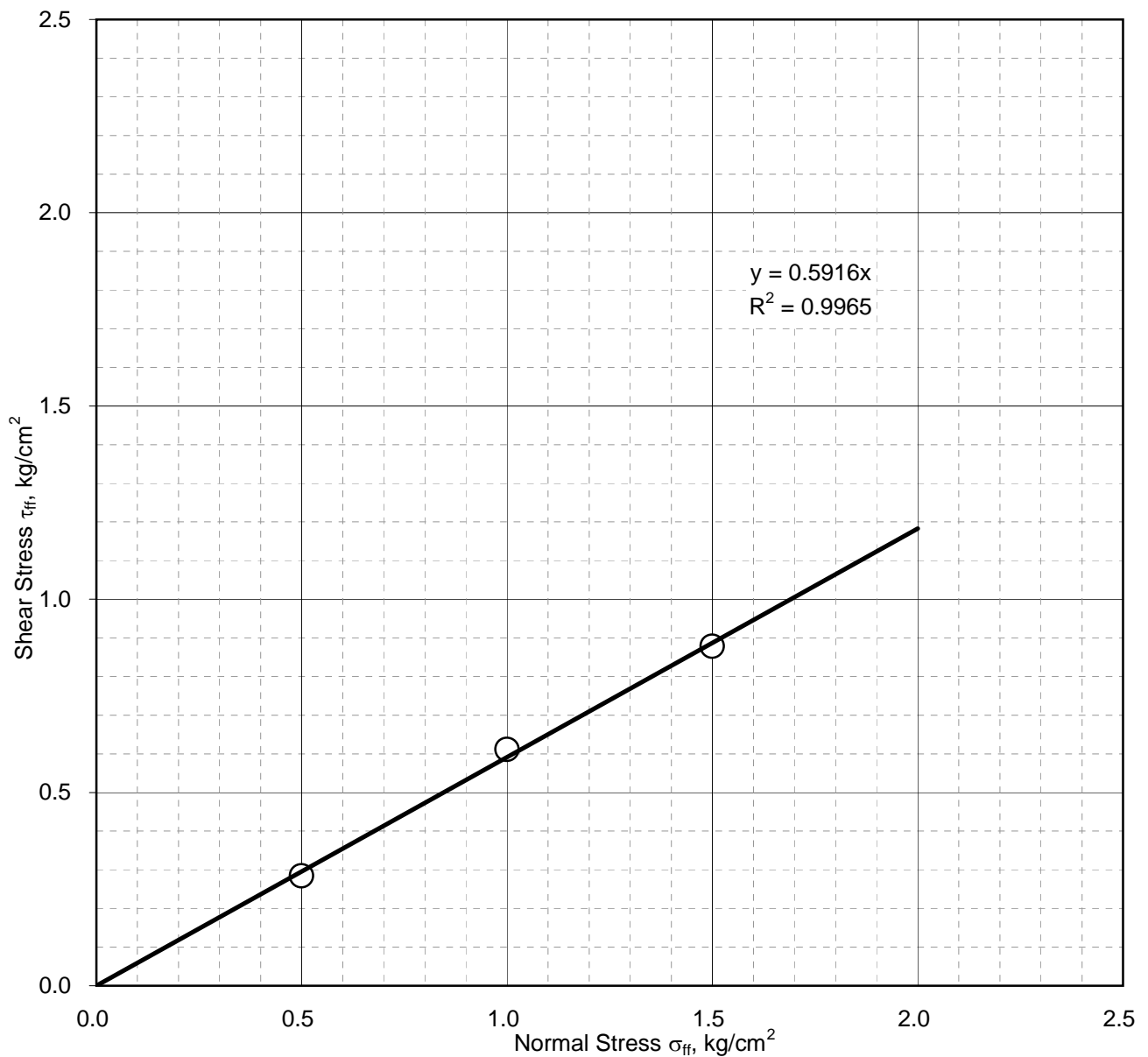




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-20	Sample Depth: 4 m
	Sample No.: UDS-2	Sample Description: Sandy silt
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.61
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	30.6 degrees



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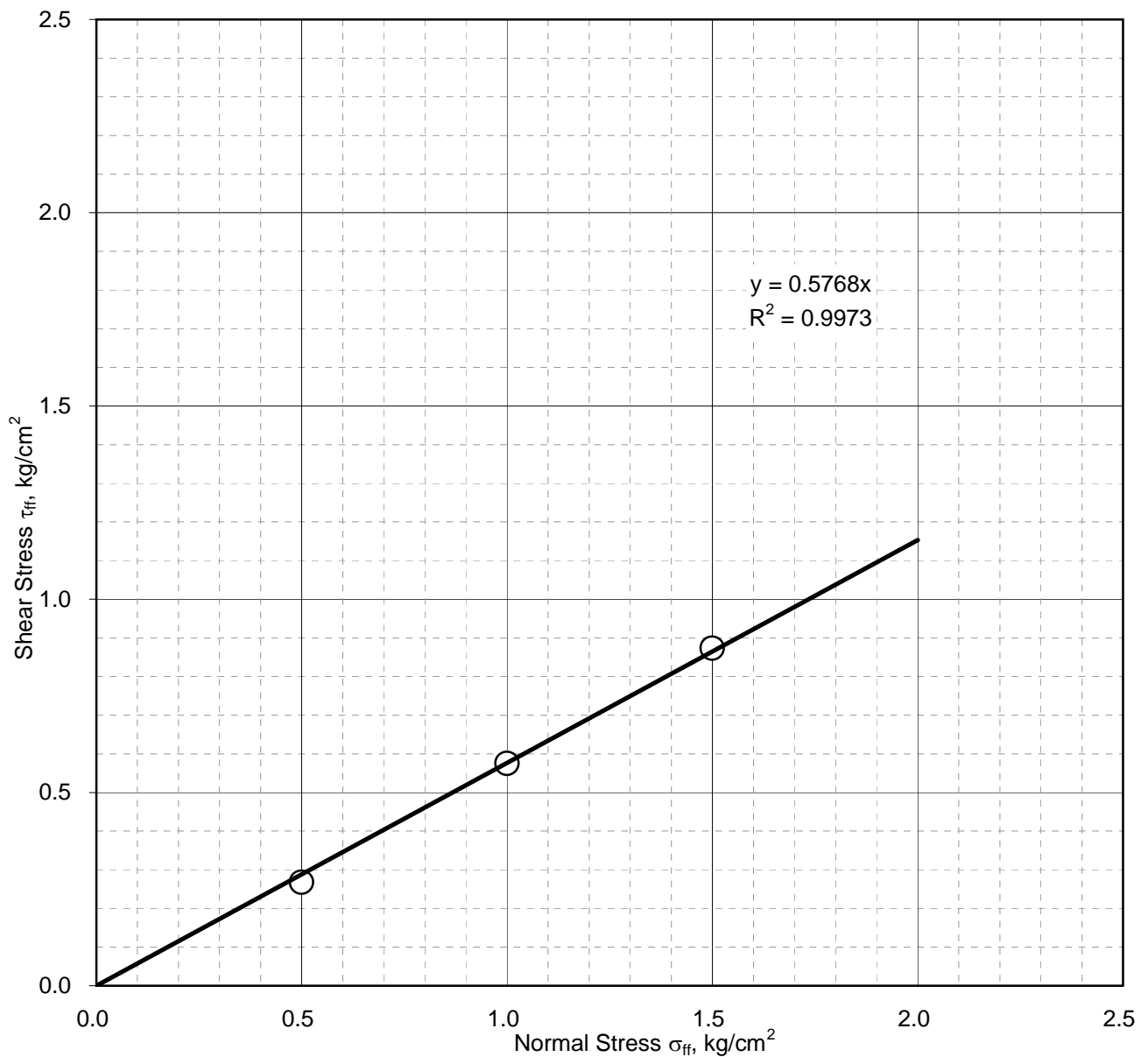




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-21	Sample Depth: 6 m	
	Sample No.: UDS-3		
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.65	
	Moisture Content (%):	Saturated	
	Cohesion Intercept, $c$ :	0.00	$\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	30.0	degrees



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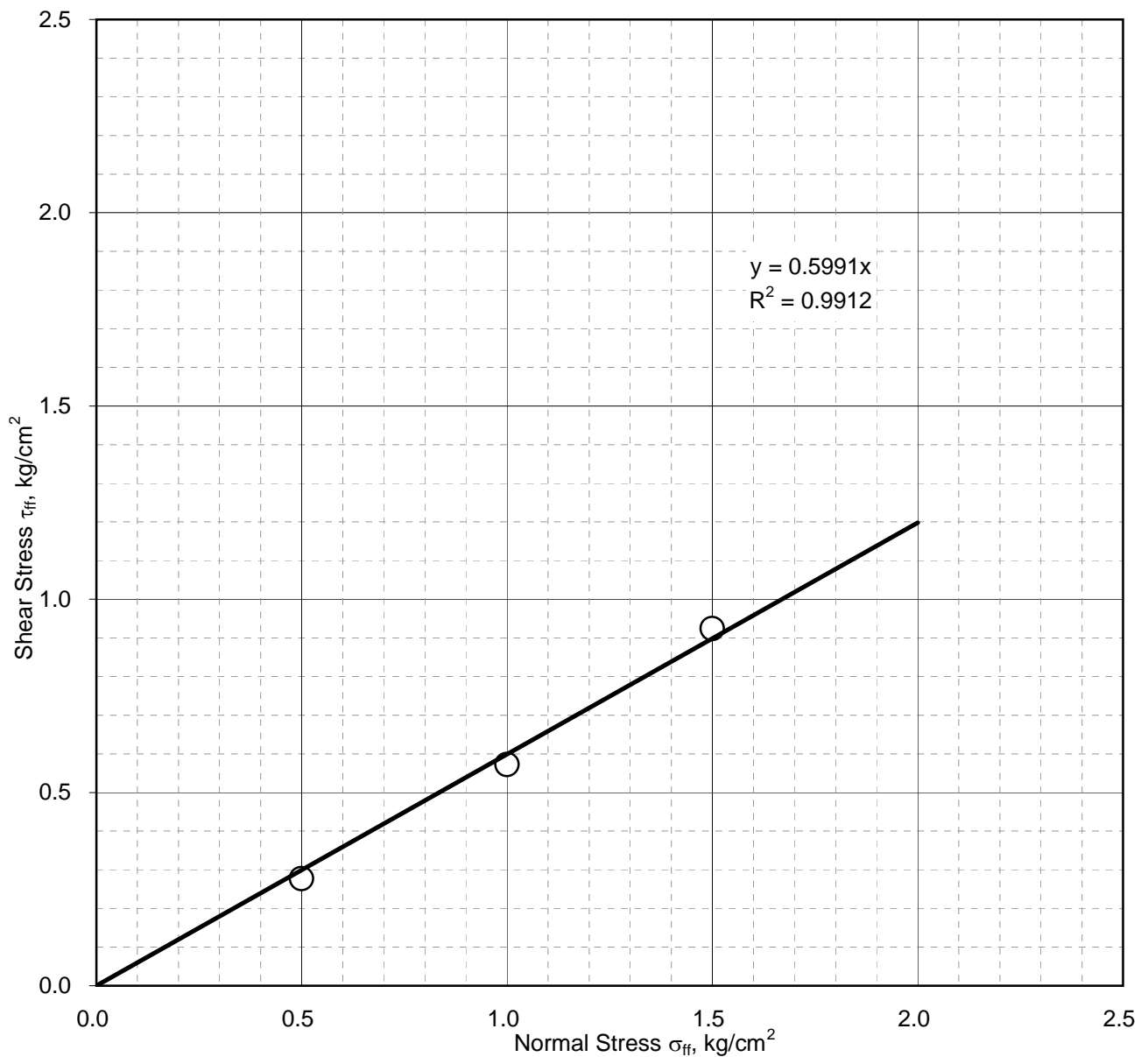




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-22	Sample Depth: 4 m	
	Sample No.: UDS-2		
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.59	
	Moisture Content (%):	Saturated	
	Cohesion Intercept, $c$ :	0.00	$\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	30.9	degrees



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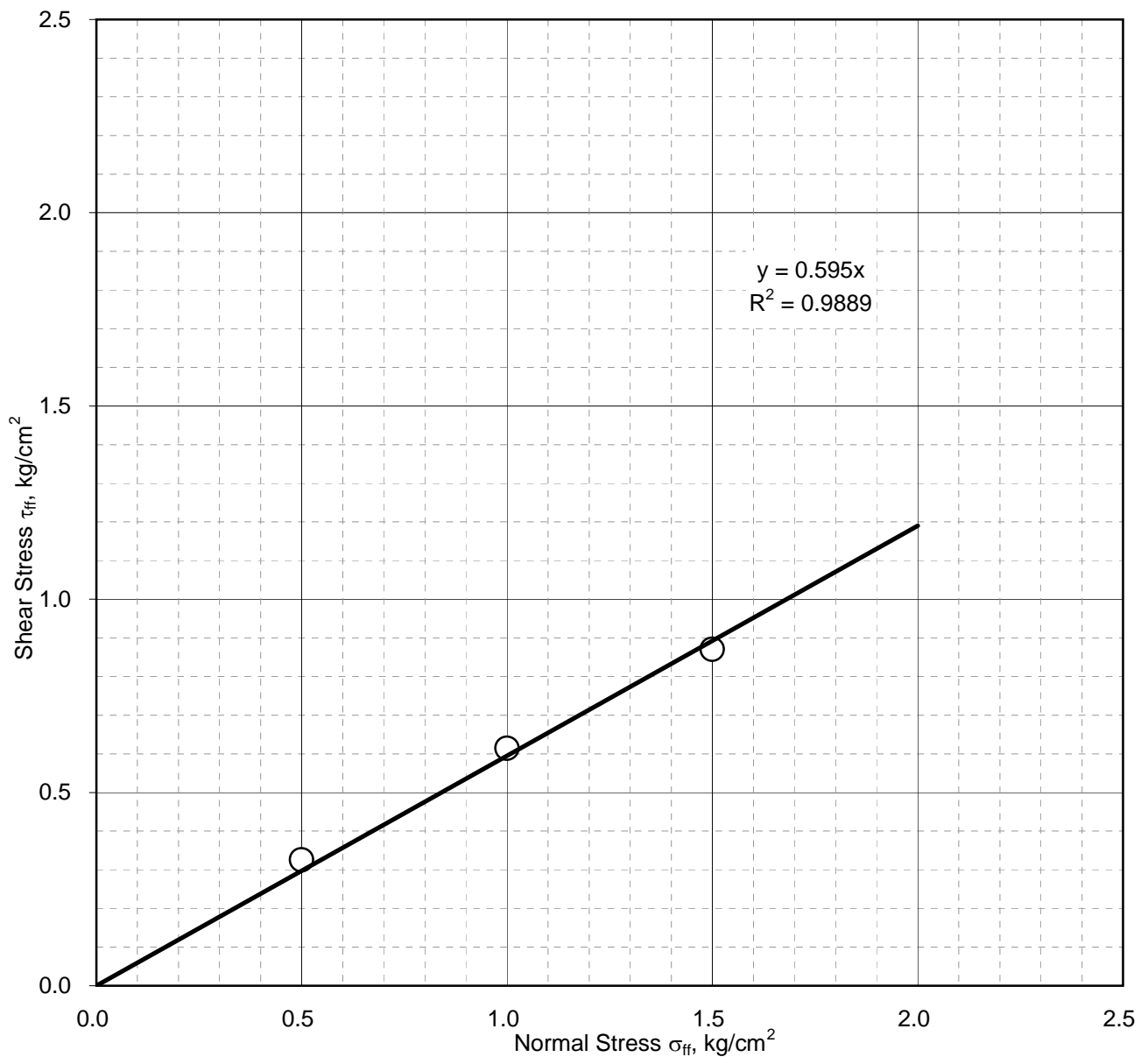




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-23	Sample Depth: 4 m
	Sample No.: UDS-2	
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.59
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	30.8 degrees



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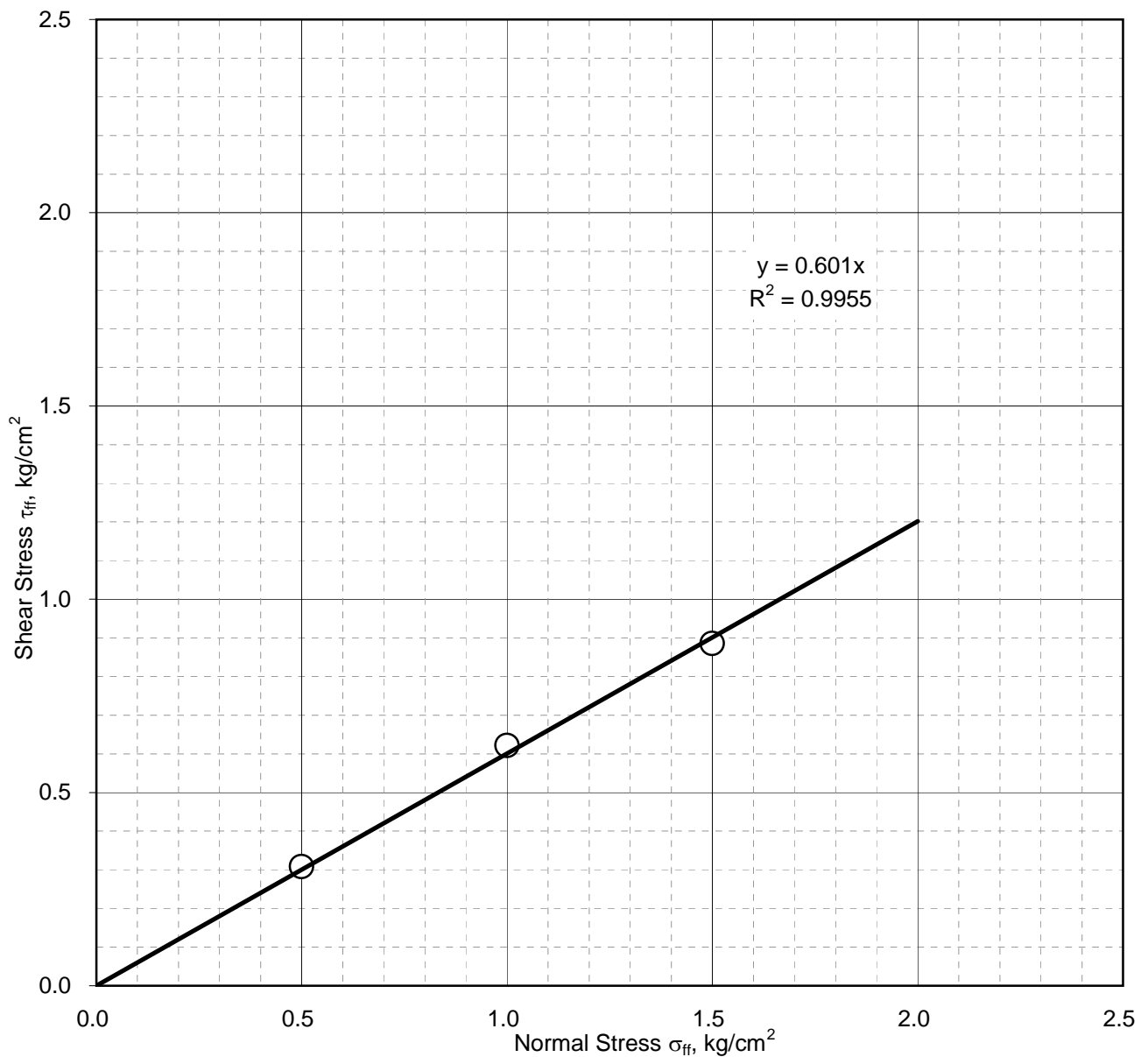




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-24	Sample Depth: 6 m
	Sample No.: UDS-3	
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.61
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	31.0 degrees



### Mohr-Coulomb Failure Envelope

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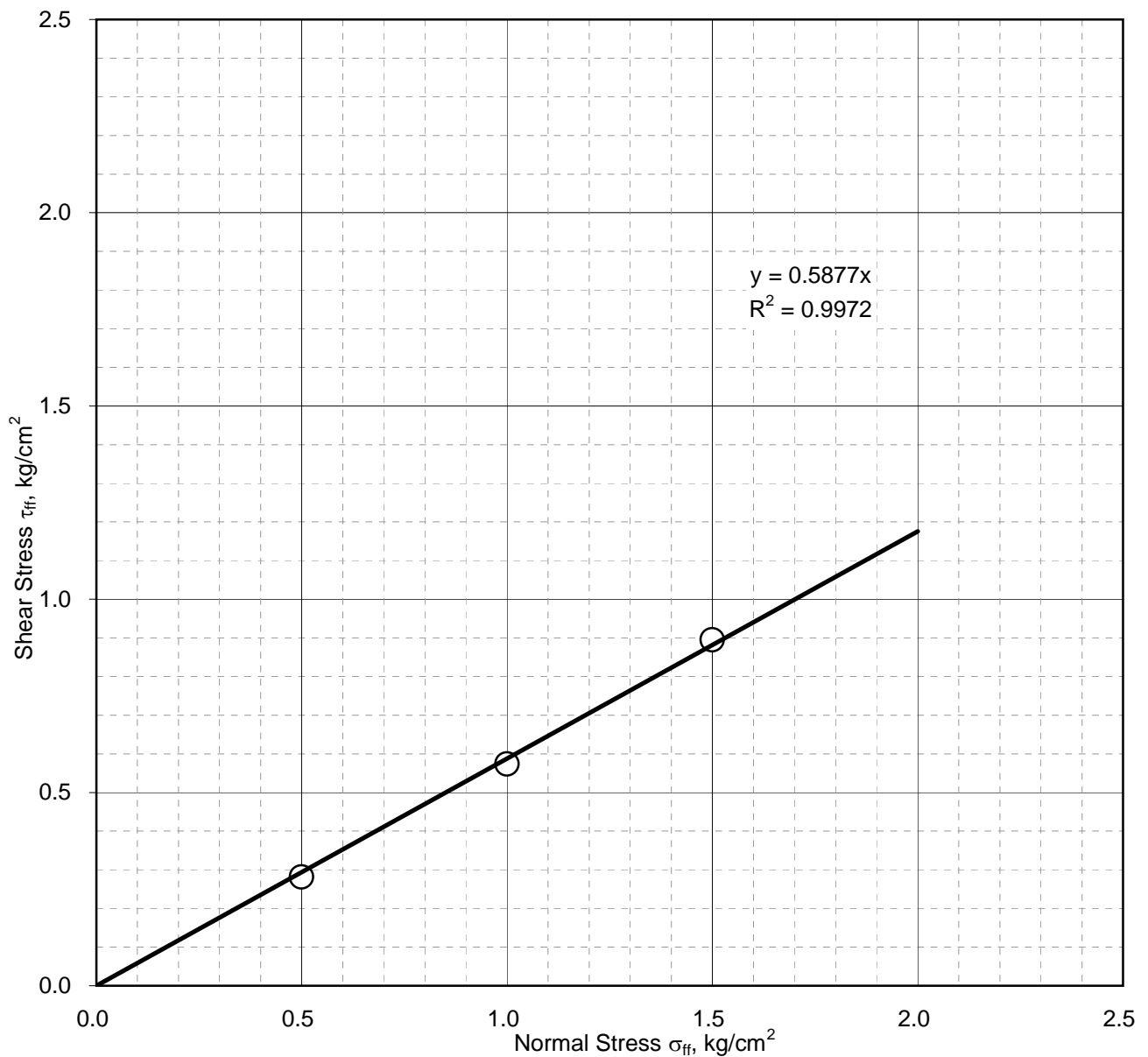




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Test Results	Borehole No.: BH-25		Sample Depth: 6 m	
	Sample No.: UDS-3		Sample Description: Sandy silt	
	Dry Density of Soil ( $\text{g/cm}^3$ ):		1.60	
	Moisture Content (%):		Saturated	
	Cohesion Intercept, $c$ :		0.00	$\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :		30.4	degrees



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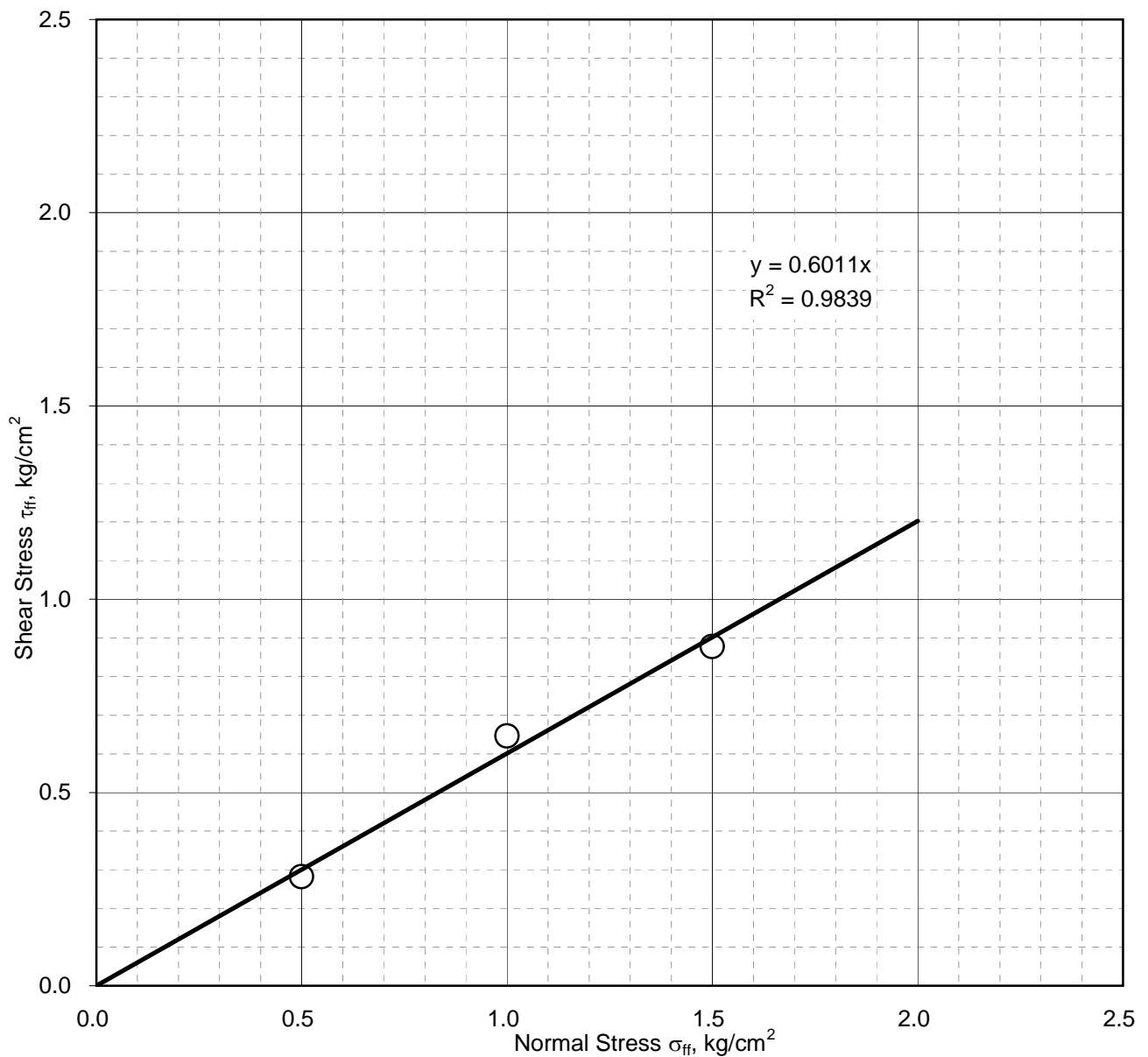




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-26	Sample Depth: 4 m
	Sample No.: UDS-2	
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.55
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	31.0 degrees



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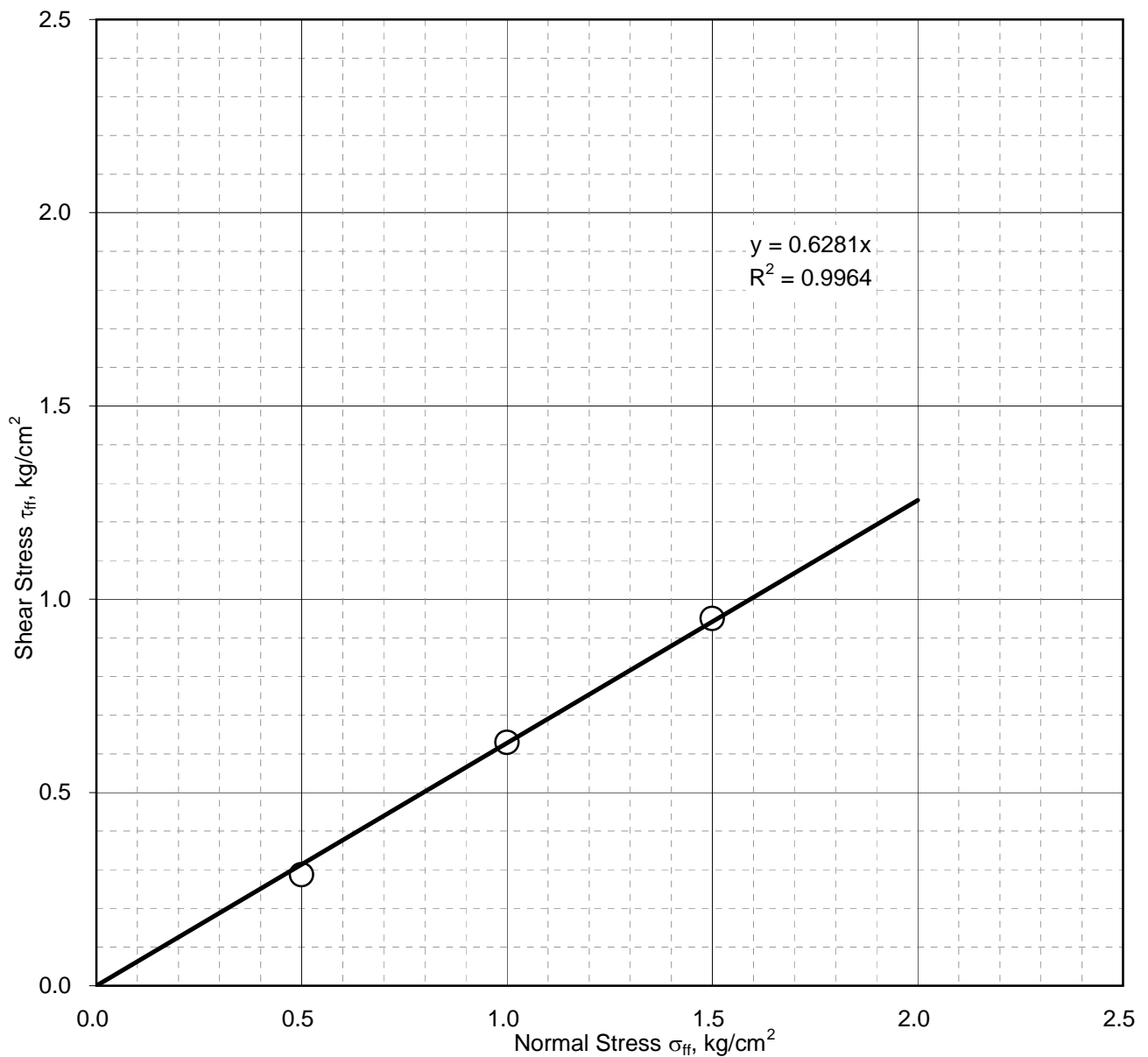




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-27	Sample Depth: 4 m
	Sample No.: UDS-2	
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.52
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	32.1 degrees



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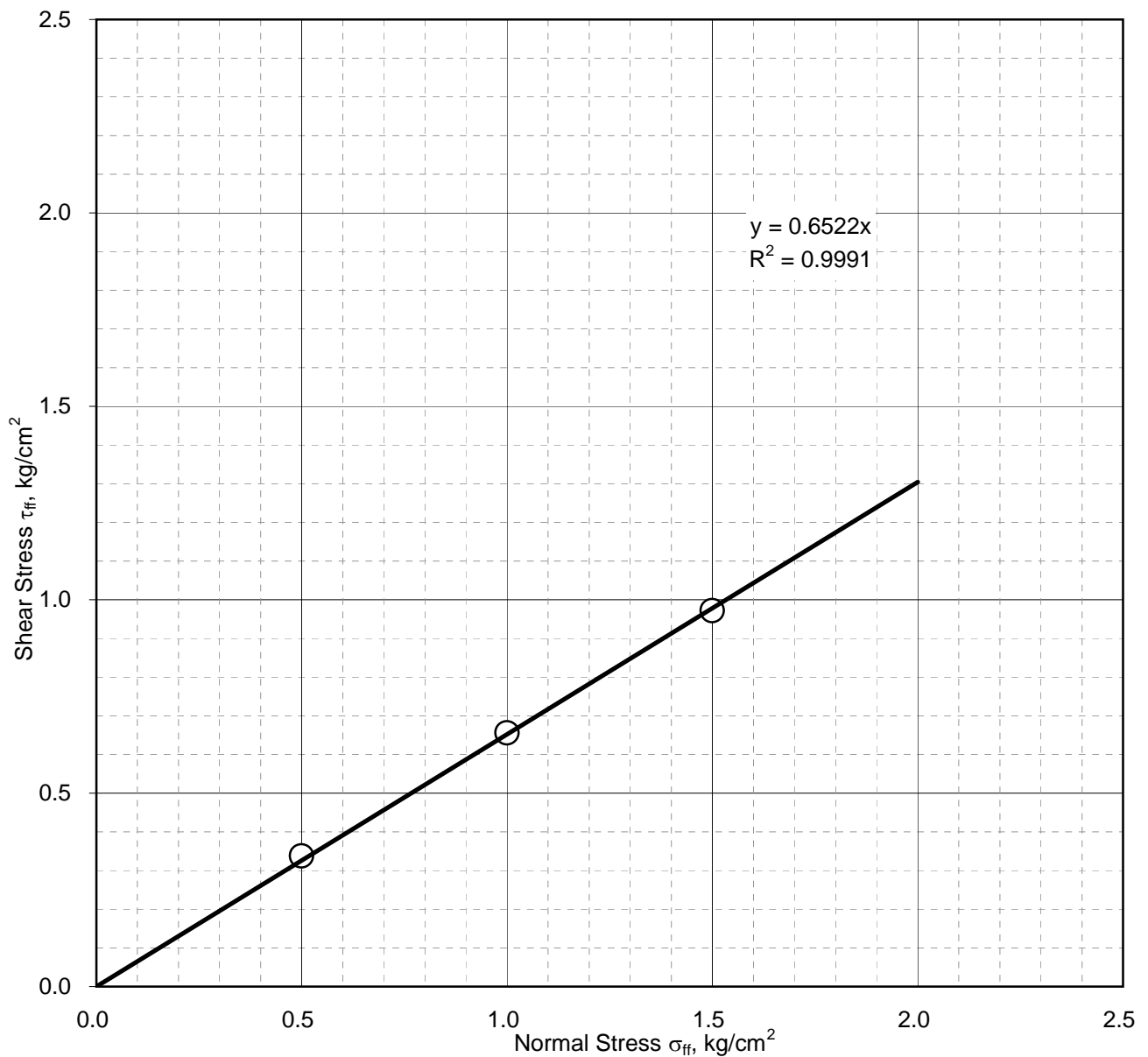




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: PBH-28	Sample Depth: 11 m
	Sample No.: UDS-3	Sample Description: Sandy silt
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.74
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	33.1 degrees



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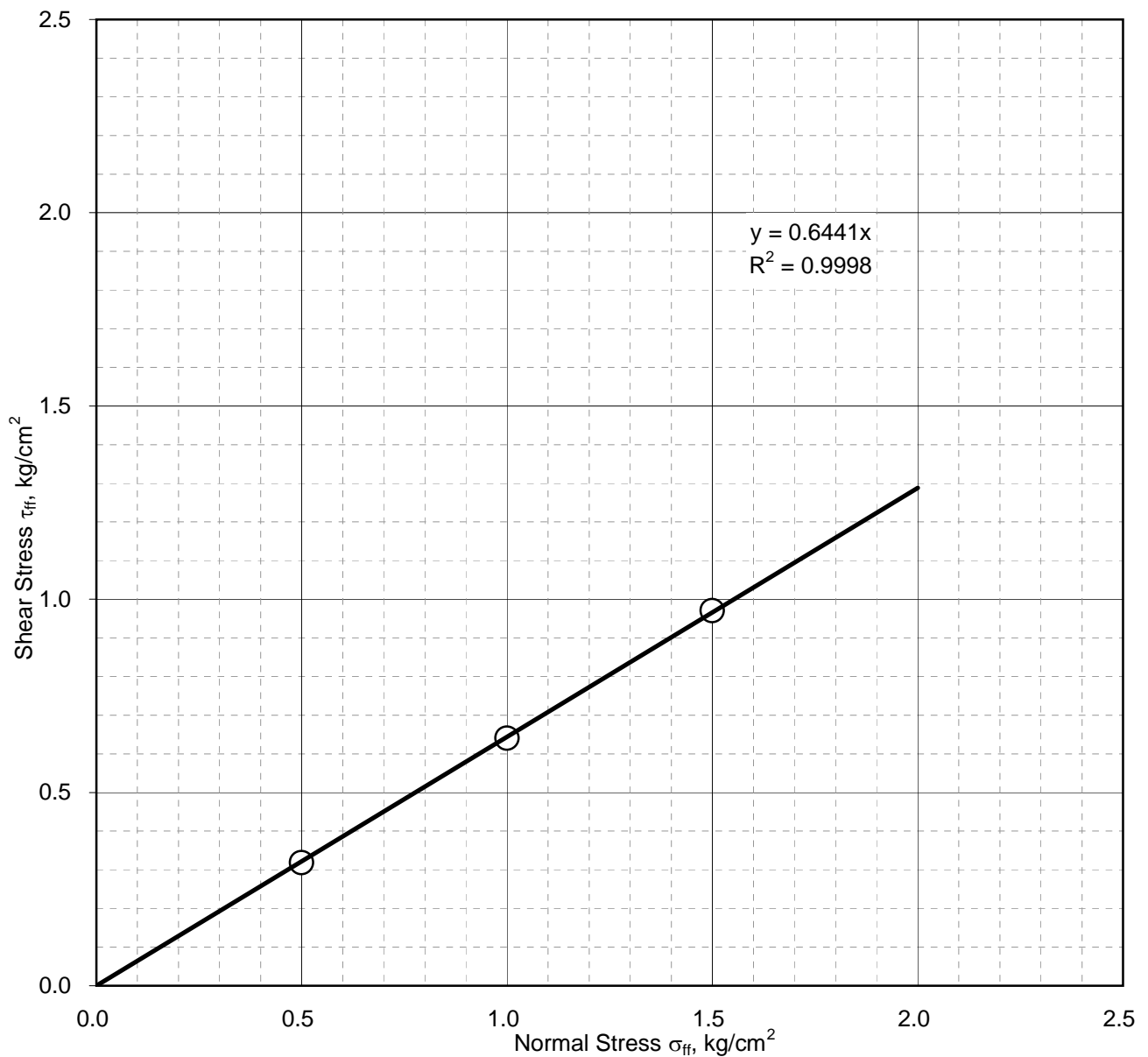




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-29	Sample Depth: 4 m	
	Sample No.: UDS-2		
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.55	
	Moisture Content (%):	Saturated	
	Cohesion Intercept, $c$ :	0.00	$\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	32.8	degrees



### Mohr-Coulomb Failure Envelope

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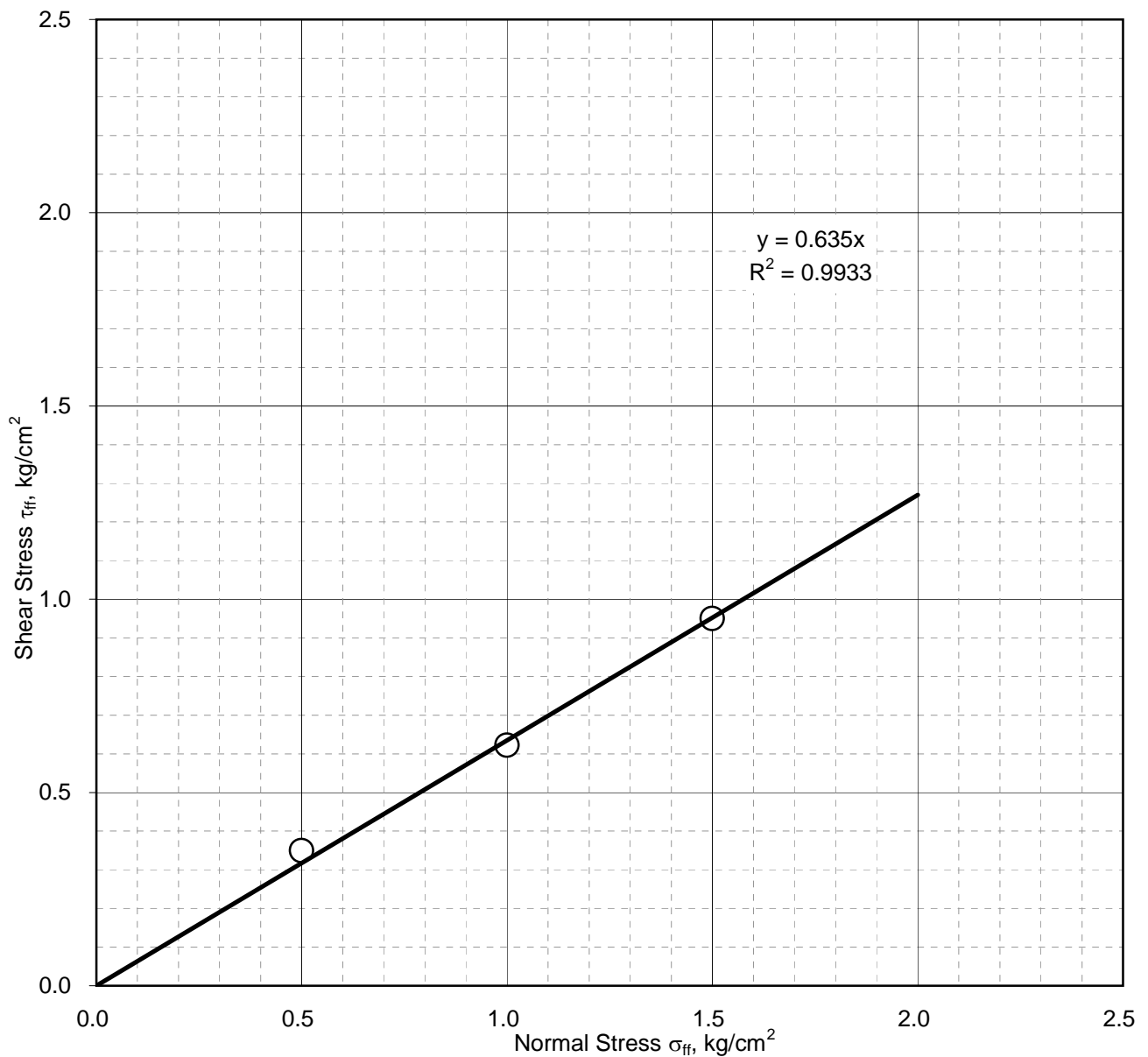




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-30	Sample Depth: 6 m
	Sample No.: UDS-2	
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.55
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	32.4 degrees



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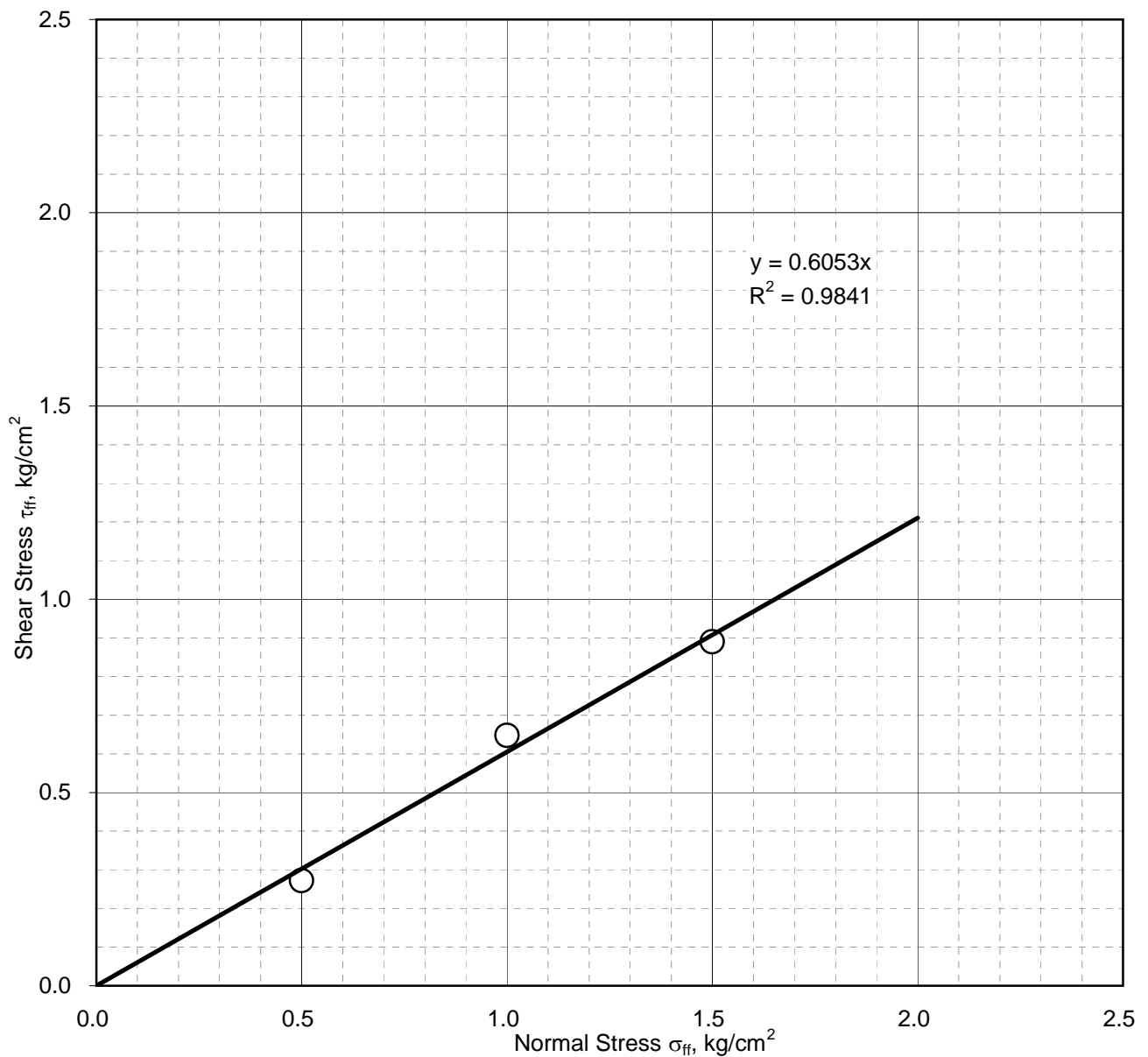




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-31	Sample Depth: 6 m
	Sample No.: DS-2	
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.55
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	31.2 degrees



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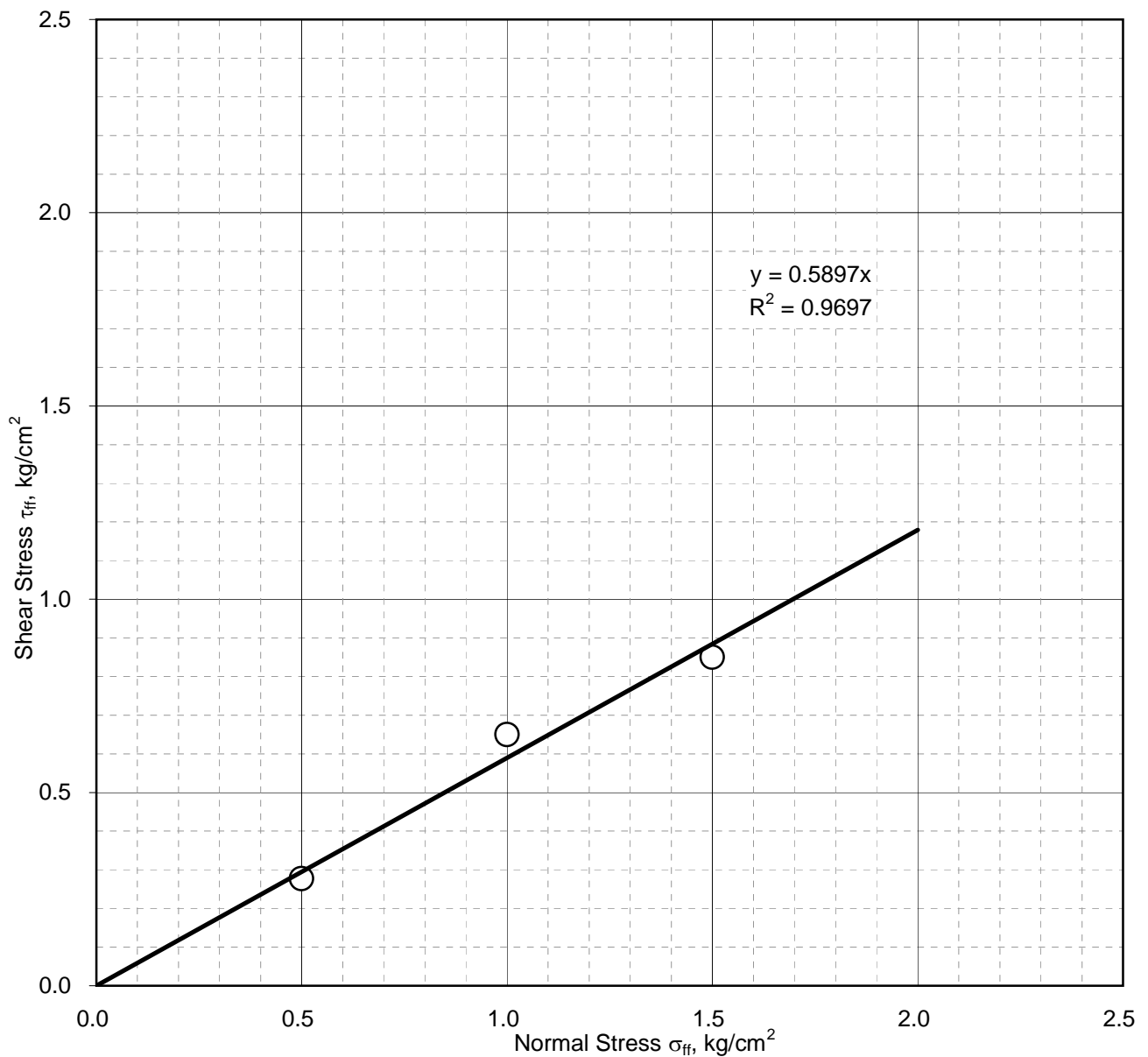




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-32	Sample Depth: 4 m
	Sample No.: UDS-3	
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.59
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	30.5 degrees



### Mohr-Coulomb Failure Envelope

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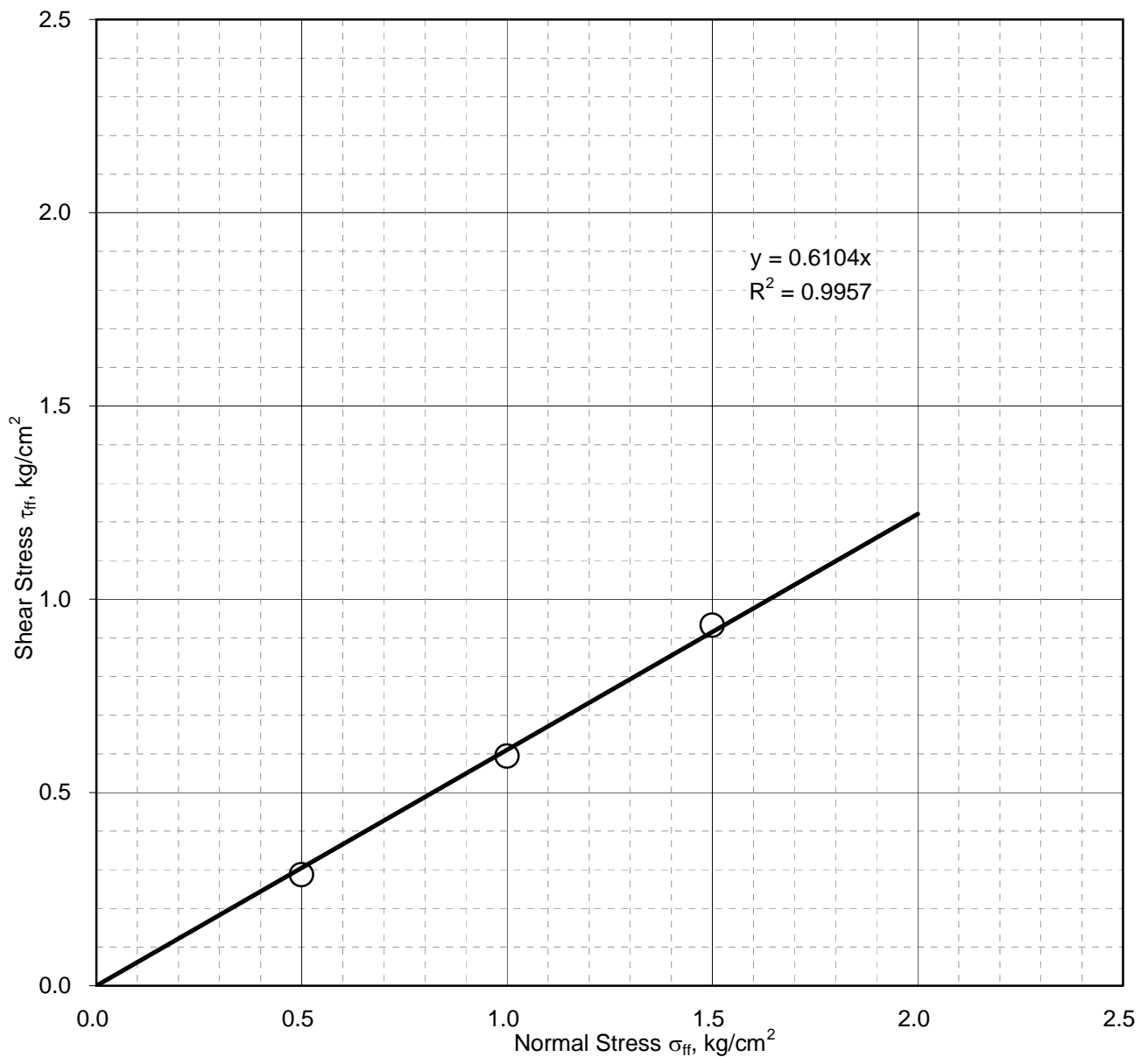




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-33	Sample Depth: 6 m
	Sample No.: UDS-3	
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.59
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	31.4 degrees



### Mohr-Coulomb Failure Envelope

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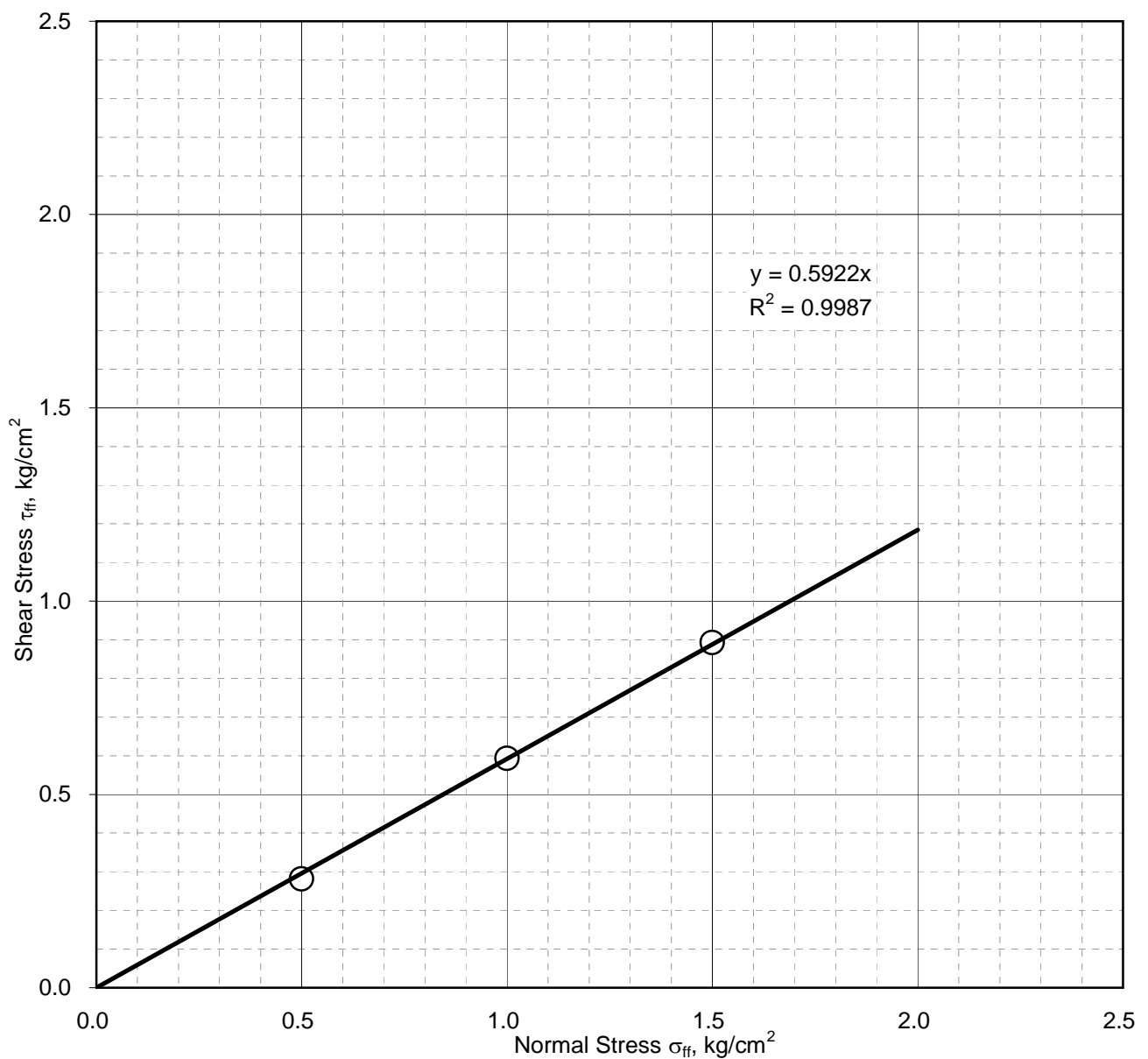




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-34	Sample Depth: 6 m	
	Sample No.: UDS-3		
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.58	
	Moisture Content (%):	Saturated	
	Cohesion Intercept, $c$ :	0.00	$\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	30.6	degrees



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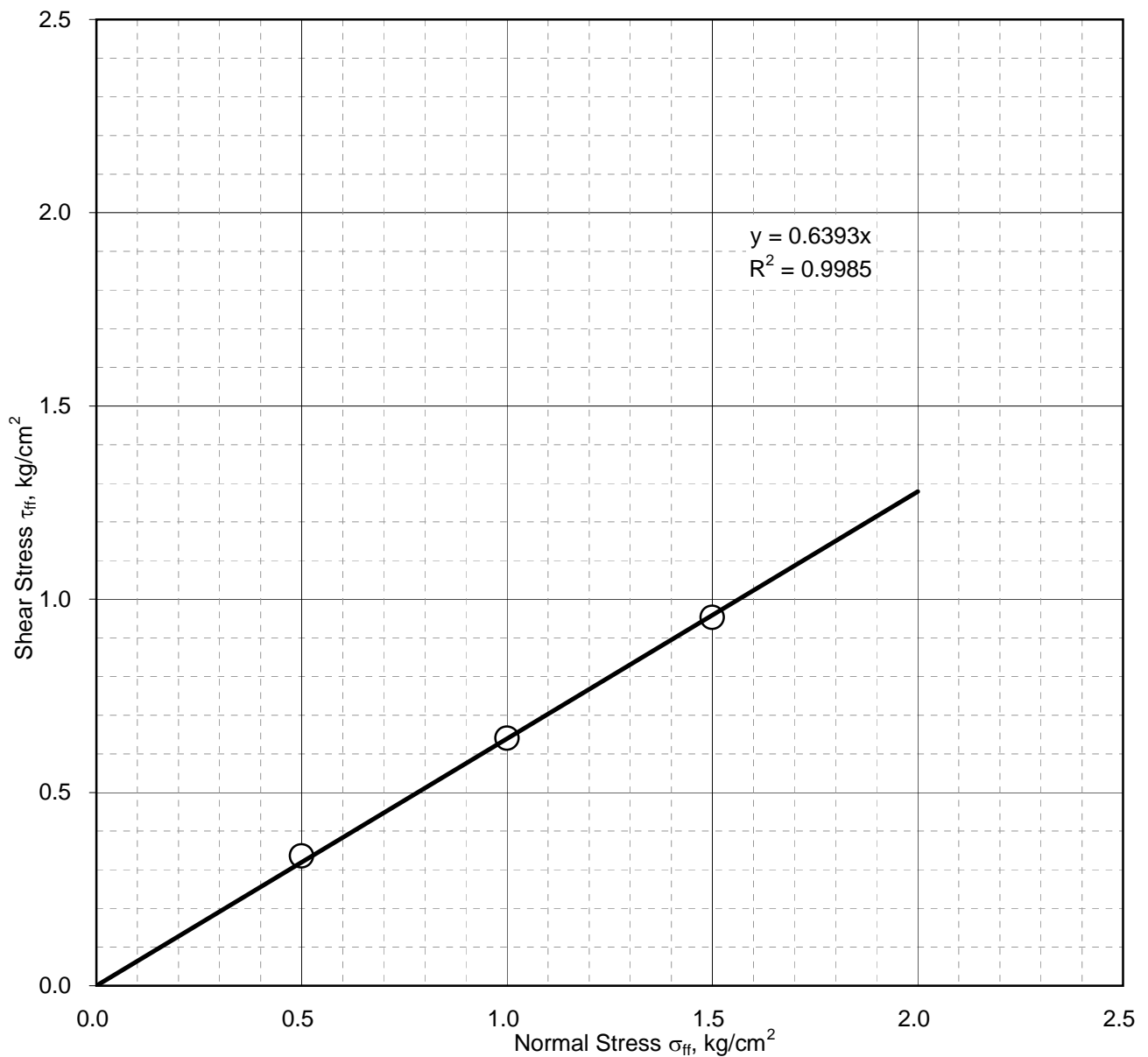




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-35	Sample Depth: 8 m
	Sample No.: UDS-4	Sample Description: Sandy silt
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.63
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	32.6 degrees



### Mohr-Coulomb Failure Envelope

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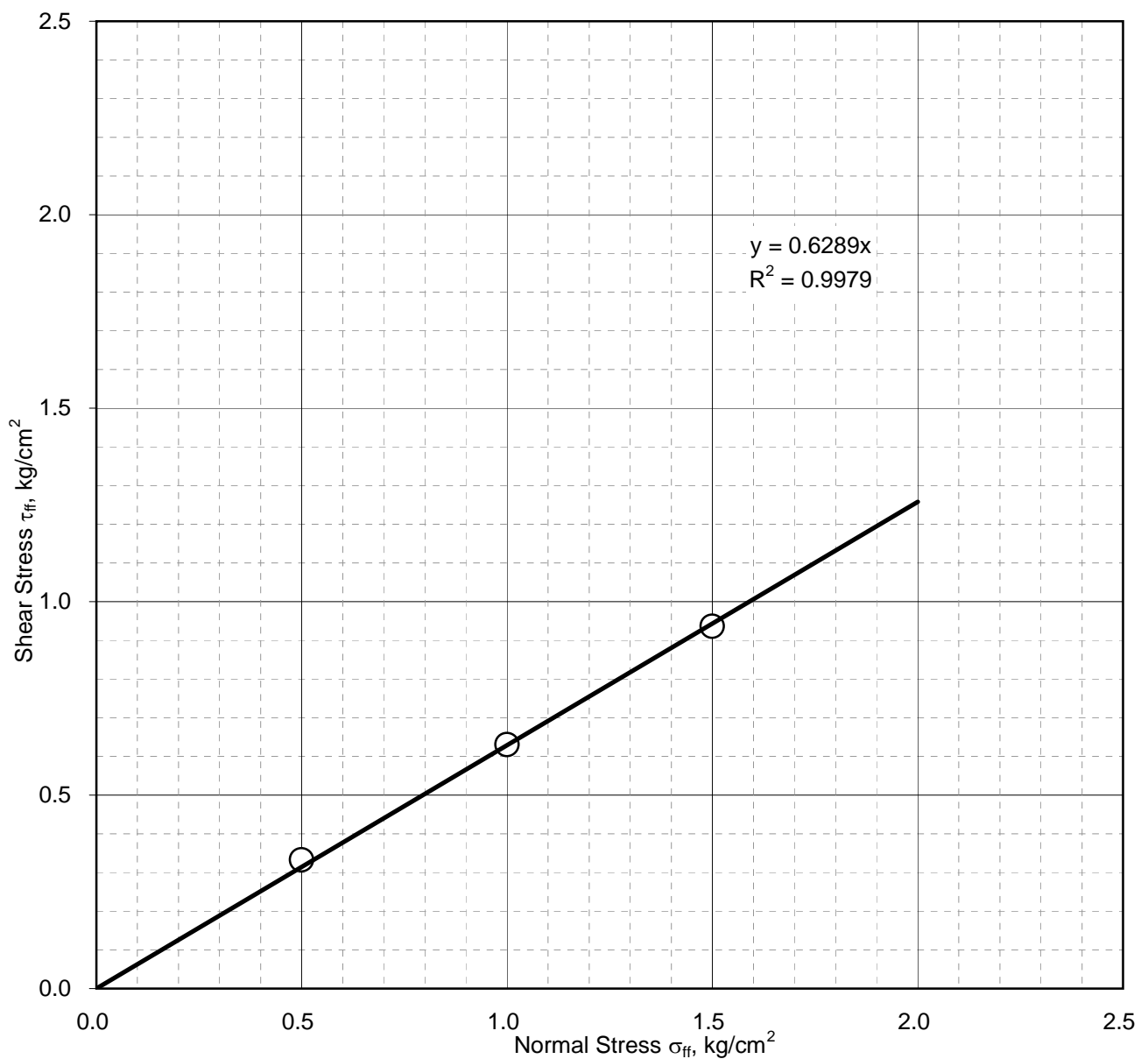




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-36	Sample Depth: 4 m
	Sample No.: UDS-2	Sample Description: Sandy silt
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.62
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	32.2 degrees



### Mohr-Coulomb Failure Envelope

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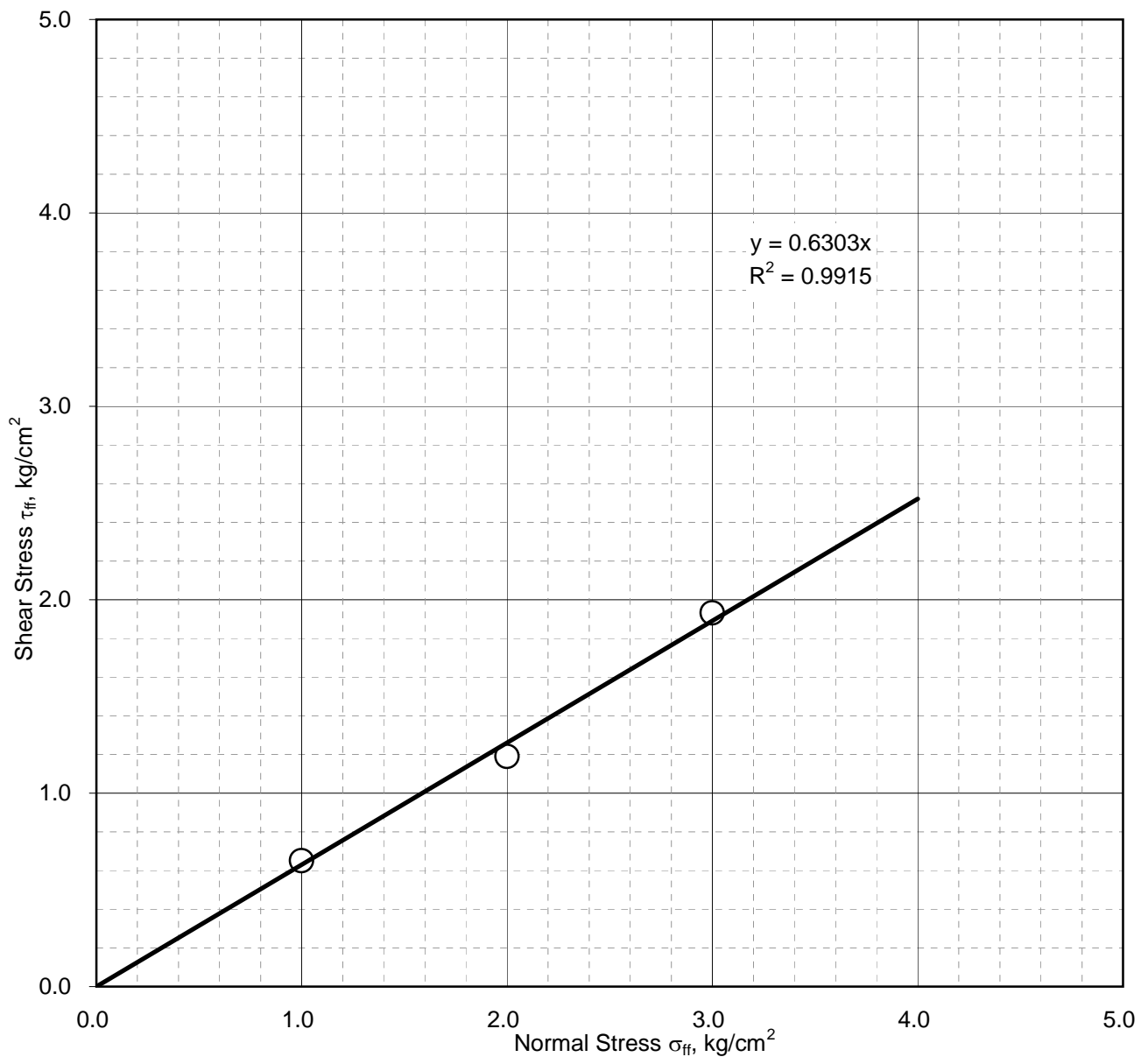




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: PBH-37	Sample Depth: 20 m
	Sample No.: UDS-8	Sample Description: Sandy silt
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.59
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	32.2 degrees



### Mohr-Coulomb Failure Envelope

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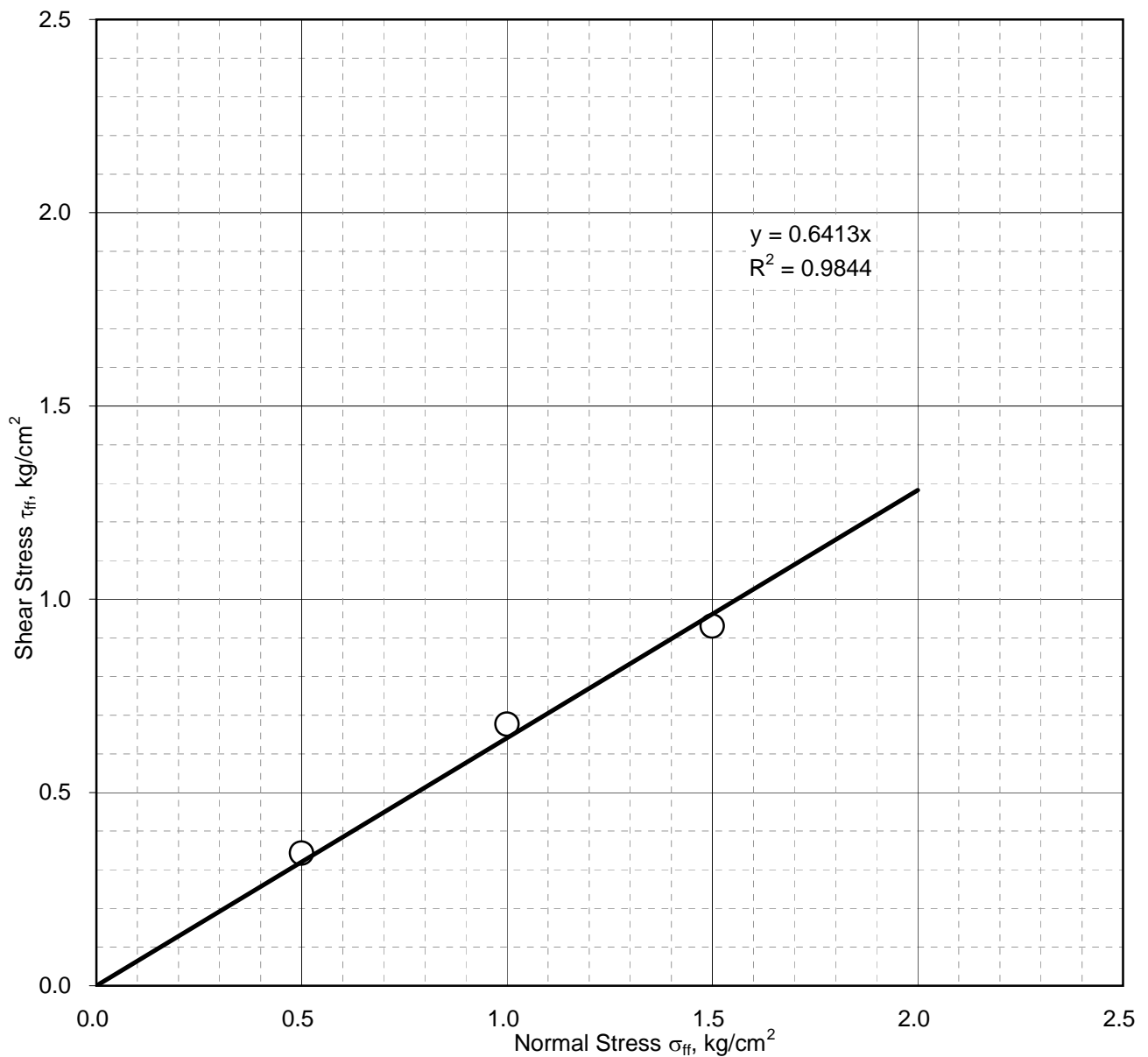




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-38	Sample Depth: 2 m
	Sample No.: UDS-1	Sample Description: Sandy silt
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.61
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	32.7 degrees



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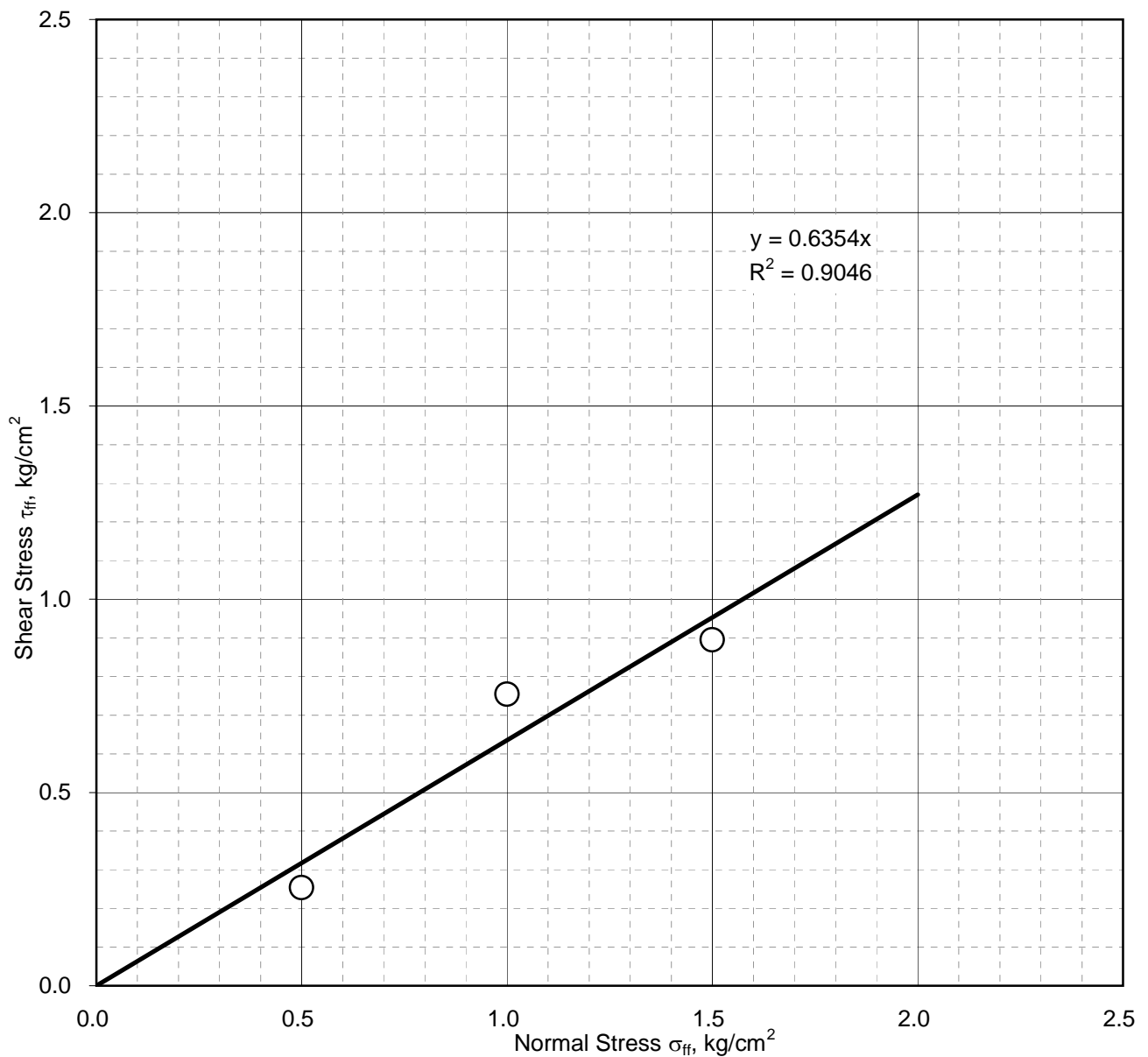




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-39	Sample Depth: 4 m
	Sample No.: UDS-2	Sample Description: Sandy silt
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.62
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	32.4 degrees



### Mohr-Coulomb Failure Envelope

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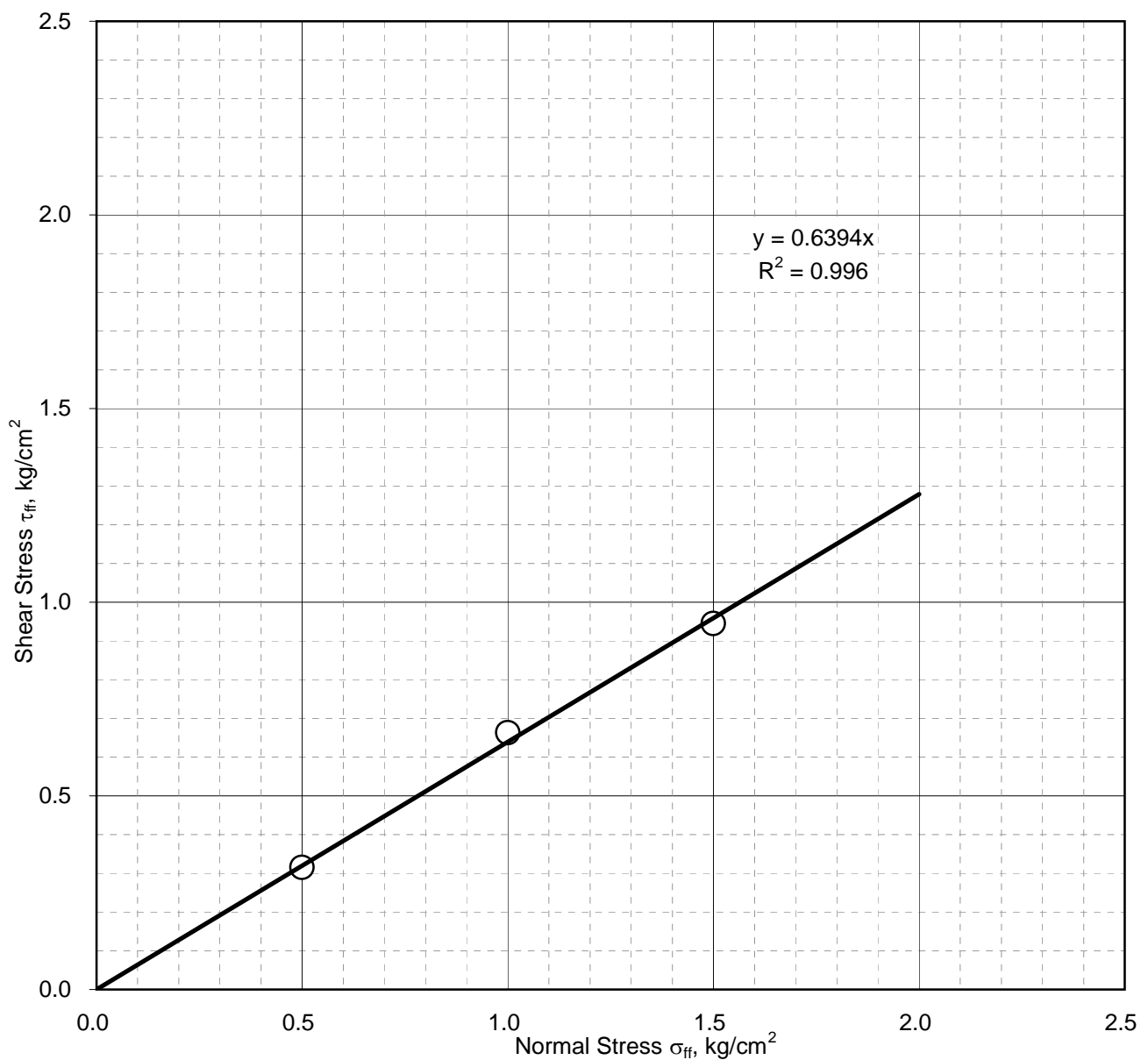




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-40	Sample Depth: 6 m
	Sample No.: UDS-3	
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.57
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	32.6 degrees



### Mohr-Coulomb Failure Envelope

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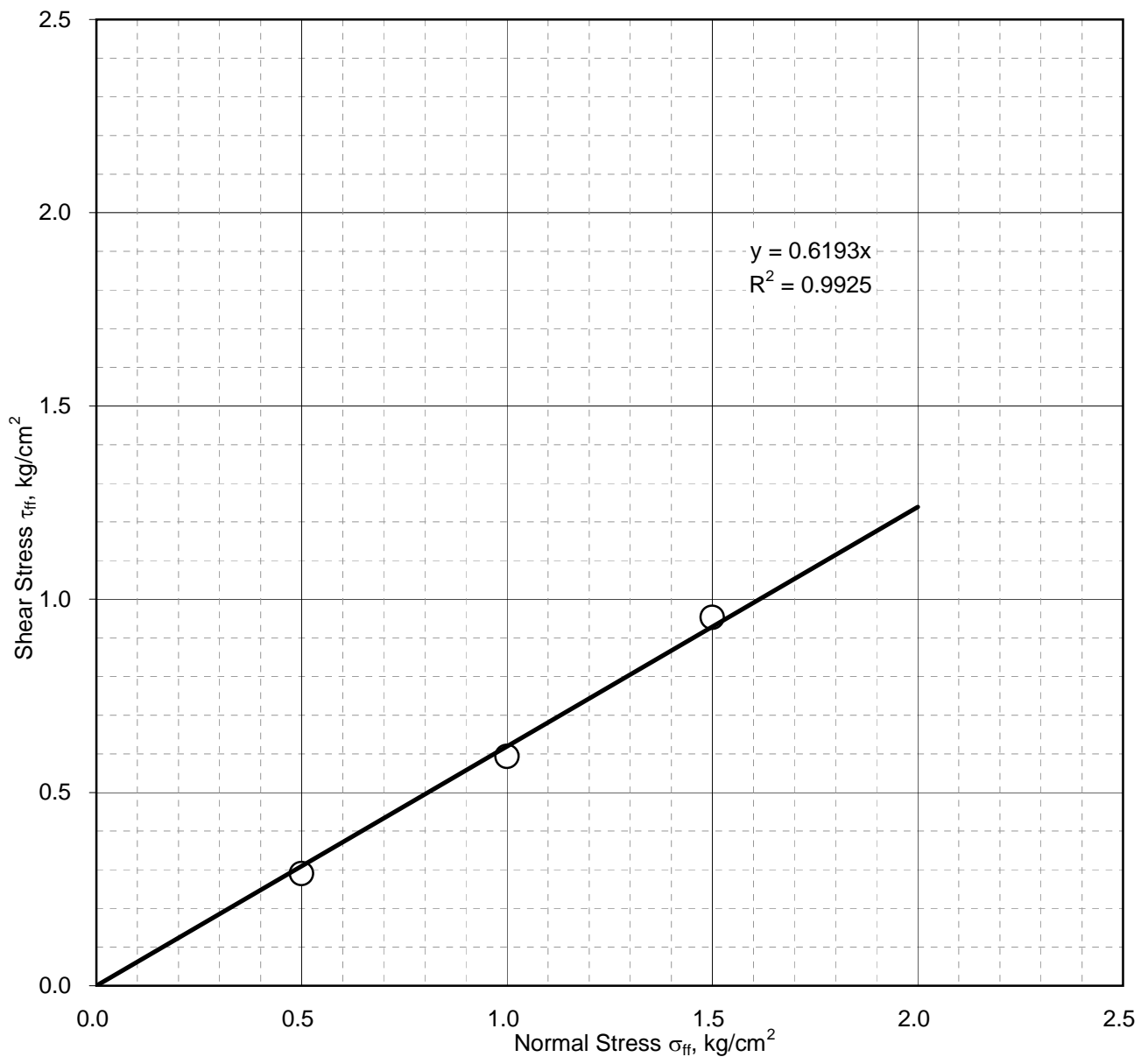




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-41	Sample Depth: 4 m
	Sample No.: UDS-2	Sample Description: Sandy silt
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.62
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	31.8 degrees



### Mohr-Coulomb Failure Envelope

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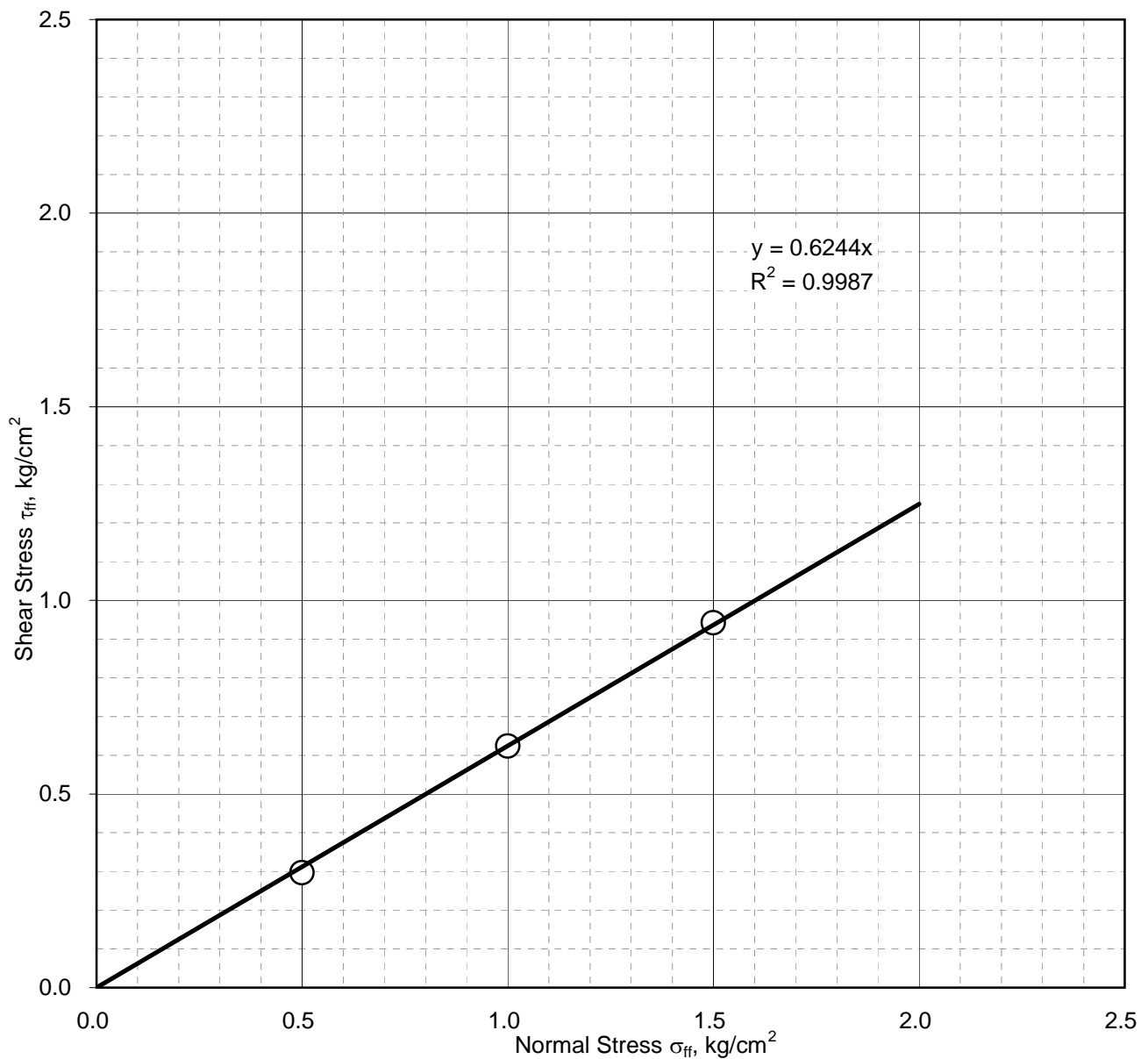




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Test Results	Sample Details		Borehole No.: BH-42		Sample Depth: 6 m	
			Sample No.: UDS-3			
			Dry Density of Soil (g/cm³):		1.59	
			Moisture Content (%):		Saturated	
			Cohesion Intercept, c :		0.00	kg/cm²
			Angle of Internal Friction, φ :		32.0	degrees



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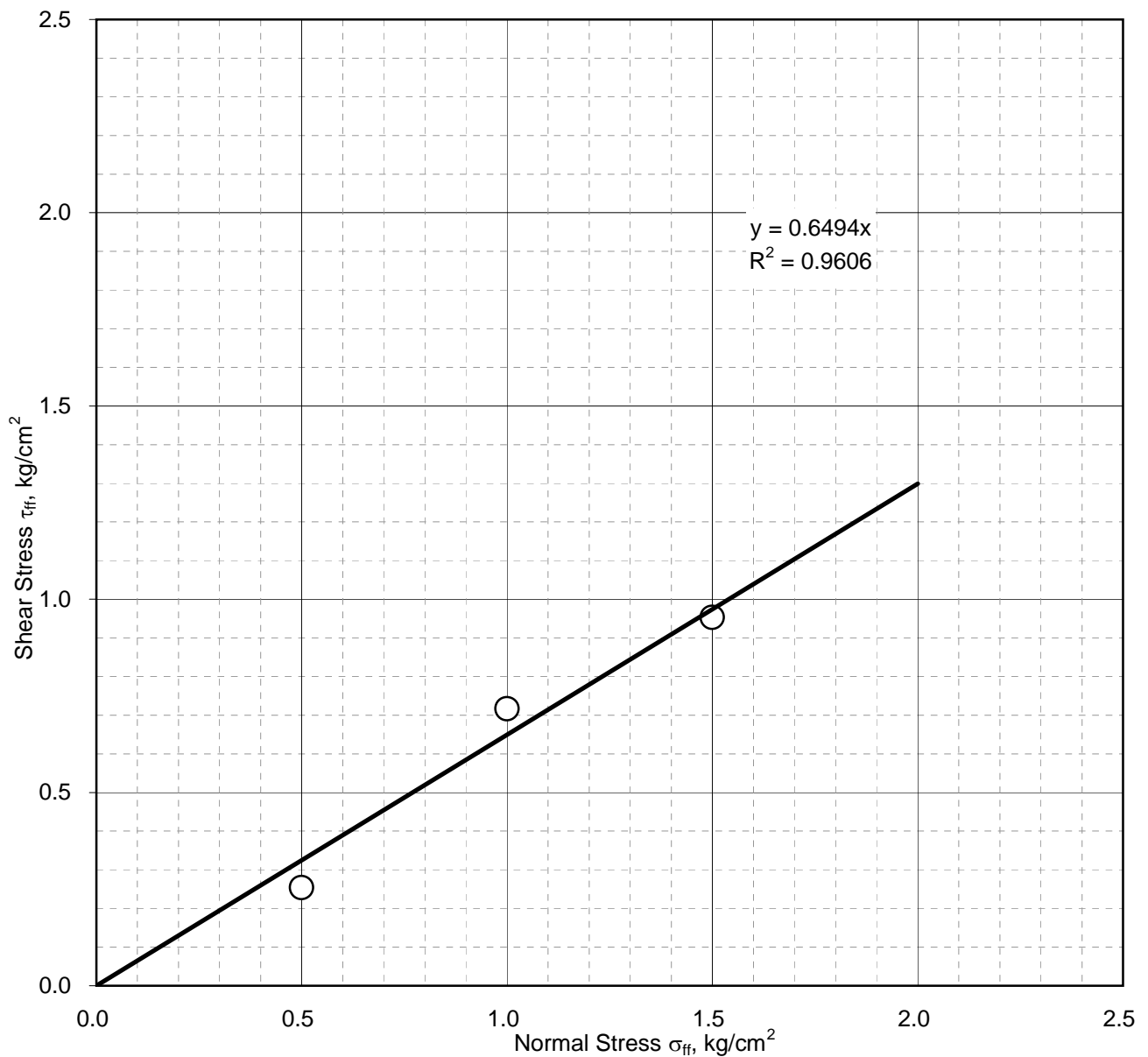




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-43	Sample Depth: 4 m
	Sample No.: UDS-2	Sample Description: Sandy silt
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.61
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	33.0 degrees



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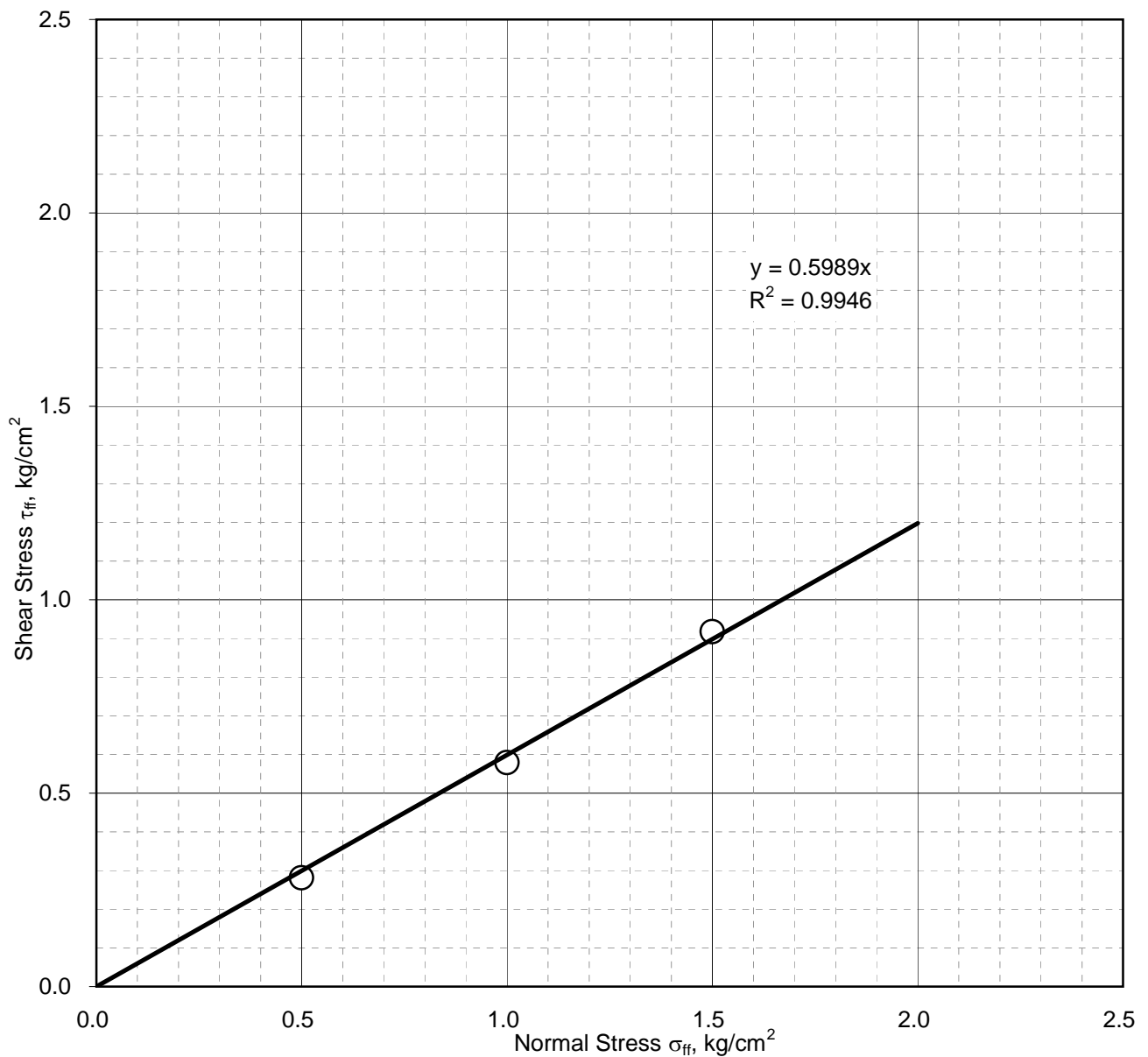




### Drained Direct Shear Test

IS : 2720 (Part-13)-1986, RA-2010

Sample Details	Borehole No.: BH-159	Sample Depth: 2 m
	Sample No.: UDS-1	Sample Description: Sandy silt
Test Results	Dry Density of Soil ( $\text{g/cm}^3$ ):	1.60
	Moisture Content (%):	Saturated
	Cohesion Intercept, $c$ :	0.00 $\text{kg/cm}^2$
	Angle of Internal Friction, $\phi$ :	30.9 degrees



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### TEST RESULTS

Soil-Water Extract Test Results				
Borehole No.	Depth, (m)	Sulphate Content (SO <sub>3</sub> ), %	Chloride Content (Cl), %	pH Value
PBH-28	7.0	0.09	below detectable limit	8.4

Groundwater Test Results			
Borehole No.	Sulphate Content (SO <sub>3</sub> ), mg/l	Chloride Content (Cl), mg/l	pH Value
BH-21	347	293	7.9
BH-25	323	235	8.0

### IS : 456-2000, SPECIFICATIONS

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

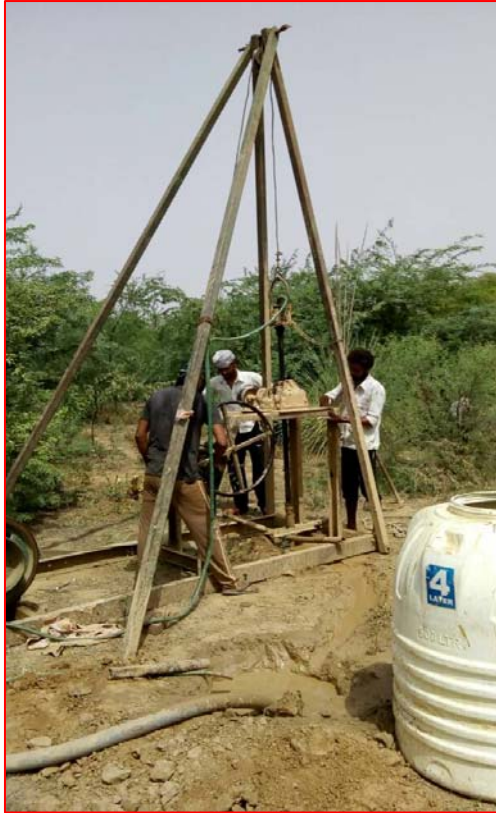
#### Classification of Chloride Conditions in Groundwater\*

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)

### **Chemical Test Results**

**APPENDIX-A**  
**SITE PHOTOGRAPHS**



Borehole No. 20



Borehole No. 27



Borehole No.39



Borehole No. 42

### Site Photographs