भारत हेवी इलेक्ट्रिकल्स लिमिटेड
(भारत सरकार का उपक्रम)
BHARAT HEAVY ELECTRICALS LIMITED
(A Govt. of India Undertaking)

TCN - 01

Ref: PSER:SCT:SDG-C1970:TCN-01 Date: 05-07-2019

Sub	Tender Change Notice (TCN)- 01.	
Job	Levelling grading, piling work including testing of piles and other associated works etc. of 1X660MW, UNIT-5, Sagardighi TPP Extension, West Bengal.	
Ref	1.0	Tender no PSER:SCT:SDG-C1970:19.
	2.0	BHEL's NIT, vide reference no: PSER:SCT:SDG-C1970:7610 Date: 28-06-2019.
	3.0	Other References, if any.

With reference to above, following points/documents, relevant to tender, may please be noted and complied with while submitting the offer.

1. Introduction of Geotechnical Investigation Report received from owner (WBPDCL)
2. The clarifications to bidder's queries are attached at Annexure-A.
3. Revised `No deviation certificate' is attached. Bidder to submit `No deviation certificate' as per attached format only.
4. All other terms & conditions shall remain unchanged.

Thanking you,

Yours faithfully,
for BHARAT HEAVY ELECTRICALS LTD

Dy. Mgr (SCT)

Encl: As Above.

पावर सेक्टर पूर्वी क्षेत्र (मुख्यालय)
POWER SECTOR EASTERN REGION, DJ-9/1, SALT LAKE CITY, KOLKATA - 700 091
फैक्स/Fax : (033) 23211960 फोन/Phone : बोर्ड/EPABX : (033) 2339 8000

JOB: LEVELLING GRADING, PILING WORK INCLUDING TESTING OF PILES AND OTHER ASSOCIATED WORKS OF 1 X 660 MW, UNIT-5, SAGARDIGHI TPP EXTENSION, WEST BENGAL				
Tender Number: PSER:SCT:SDG-C1970:19 TCN-01 (ANNEXURE-A)				
Sl. No	**Reference Clause of Tender Document**	**Existing Provision**	**Bidder's Query**	**BHEL's Clarification**
1			You are requested to provide us the soil investigation report for the piling area which is required to quote our rates to participate in tender	Geotechnical Investigation Report for the project site shall be generated after completion of Geotechnical Investigation work which is carrying out at site now. However, the attached Geotechnical Investigation Report received from owner(WBPDCL) during tendering stage issued along with this TCN-01 may be refered for basic idea of bidder regarding the job. Bidder is further advised to refer the other tender documents and visit the site to get the necessary information and submit offer accordingly.

MCNALLY BHARAT ENGINEERING COMPANY LIMITED

CHP-2 Site Office, Sagardighi Thermal Power Plant WBPDCL, Murshidabad

FINAL REPORT ON

SOIL INVESTIGATION WORK FOR CHP-2 PROJECT SAGARDIGHI THERMAL POWER PLANT, WEST BENGAL.

Volume -I

SARDIP CONSULTING ENGINEERS

KOLKATA

Job No. SAR/2011367

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C H A P T E R - I

1.0 PREFACE

Soil Investigation Work for CHP-2 project Sagardighi Thermal Power Plant, West Bengal was assigned to **Sardip Consulting Engineers,** CJ-147, Ground & 1st Floor, Sector-II, Kolkata 700091 by **Mcnally Bharat Engineering Company Limited,** CHP-2 Site Office, Sagardighi Thermal Power Plant WBPDCL, Murshidabad.

1.1 Scope of Investigation

First Phase

The scope of work as per the assignment consists of sinking twenty (20) nos. bore holes of varying depth of 24.00m to 30.00m from the E.G.L at the proposed site. It also included four (4) no Electrical Earth Resistivity Test at different location.

Second Phase

The scope of work as per the assignment consists of sinking five (05) nos. bore holes of depth of 30.00m from the E.G.L, conducting two(02) nos Routine Plat Load Test and one(01)Cyclic Plate Load Test at the proposed site.

The present sub-soil investigation work can be broadly divided into the following activities.

a) Sinking of bore holes

b) Carrying in-situ tests - Standard penetration tests

c) Collection of disturbed and undisturbed soil samples.

d) Carrying out laboratory tests.

e) Conducting Electrical Earth Resistivity Test

f) Preparation and Submission of report

The object of the present sub-soil investigation is:

i) Identification of the sub-soil profile.

ii) Determination of the soil design parameters.

iii) Recommendation for bearing capacity of foundations

1.2 **Presentation of Report**

First Phase

Volume –I	:	Chapter I, Chapter II, Chapter III and Chapter IV, Location Plan of bore holes. Sketches and Calculations
Volume –II	:	Bore Logs, Cross Sections, Plot of 'N' values, Laboratory Test Results, Grain Size Distribution Curves, Mohr-Diagram and e-logp Curves.
Volume –III	:	Electrical Earth Resistivity Test

Second Phase

Volume –IV	:	Report Containing BH-01 TP-15, BH-TP-16, BH-01 TP-17, BH-TP-18,BH-01TP-19, PLT-01 TP-19, PLT-02, CPLT-01

CHAPTER - II

2.0 METHOD OF INVESTIGATION

2.1 The Bore Hole No., Co-ordinates, depths of bore holes from existing ground level, ground elevation and date of commencement and completion are mentioned below. The locations, depth and number of bore holes are selected by the clients.

Bore Holes No.	Tentative Location	Co-ordinates	Termination Depth	Ground Elevation	Date of Commencement	Date of Completion
			(m) b.g.l.	(m)		
BH-1	Machinery Bay, MB-2 & Track Hopper	E:116.000 N:1415.500	24.00	+32.627	20.06.12	23.06.12
BH-2	Track Hopper	E:116.000 N:1283.000	24.00	+32.387	24.06.12	29.06.12
BH-3	Machinery Bay, MB-1 & Track Hopper, Wagon Tippler, TP-11 & 12, Tunnel for Conv. 11AB & 12AB	E:116.000 N:1090.830	30.00	+33.751	17.06.12	19.06.12
BH-4	Foundation for Conv. Gallery 12AB	E:243.700 N:1100.200	32.00	+32.641	28.05.12	29.05.12
BH-4A	Foundation for Conv. Gallery 12AB	E:371.700 N:1109.500	30.00	+33.067	10.07.12	13.07.12
BH-5	Crusher House CH-2, Stacker Reclaimer Fdn., Pump House, MCC Building, Trestle Foundation for Conv. Gallery 12AB, 13AB, 13C	E:500.000 N:1118.000	32.00	+33.469	30.05.12	02.06.12
BH-6	TP-13, Stacker Reclaimer Fdn., Trestle Fdn. for Conv. Gallery 13AB, 14AB	E:623.570 N:1118.000	30.00	+33.626	05.06.12	09.06.12
BH-6A	TP-13, Stacker Reclaimer Fdn., Trestle Fdn. for Conv. Gallery 13AB, 14AB	E:724.000 N:1118.000	27.00	+33.885	10.06.12	13.06.12

Bore Holes No.	Tentative Location	Co-ordinates	Termination Depth	Ground Elevation	Date of Commencement	Date of Completion
			(m) b.g.l.	(m)		
BH-7	TP-14, Trestle Fdn. for Conv. Gallery 14AB, 15AB	E:822.900 N:1118.000	32.00	+34.110	14.06.12	16.06.12
BH-8	Trestle Fdn. for Conv. Gallery 15AB	E:993.300 N:1118.000	30.00	+35.389	30.06.12	03.07.12
BH-11	TP-B, Trestle Fdn. for Conv. Gallery 13C	E:500.000 N:880.500	30.00	+33.380	25.05.12	27.05.12
BH-12	Stacker Reclaimer Fdn. for Conv. 22A	E:500.000 N:1296.000	30.00	+32.845	10.07.12	12.07.12
BH-12A	Stacker Reclaimer Fdn. for Conv. 22A	E:500.000 N:1473.000	30.00	+32.534	06.07.12	08.07.12
BH-13	Stacker Reclaimer Fdn. for Conv. 22A, Drive House DH-1	E:500.000 N:1650.000	30.00	+32.715	04.07.12	05.07.12
BH-14	Stacker Reclaimer Fdn. for Conv. 22B	E:623.570 N:1296.000	30.00	+32.997	07.07.12	08.07.12
BH-14A	Stacker Reclaimer Fdn. for Conv. 22B	E:623.570 N:1473.000	30.00	+33.059	03.07.12	05.07.12
BH-15	Stacker Reclaimer Fdn. for Conv. 22B, Drive House DH-2	E:623.570 N:1650.000	30.00	+33.049	30.06.12	03.07.12
BH-16	Tunnel for Conv. 8A, Foundation for Conv.Gallery 8A, Pent House near Tunnel for Conv. 8A	E:194.00 N:766.100	30.00	+33.426	10.05.12	24.05.12
BH-17	–	E:500.000 N:993.600	30.00	+33.124	14.07.12	16.07.12
BH-18	–	E:194.000 N:650.000	30.00	+33.136	12.07.12	15.07.12
ERT-1	–	E:133.500 N:1152.850	–	+33.267	11.05.12	11.05.12
ERT-2	–	E:571.500 N:1085.400	–	+33.382	16.05.12	16.05.12
ERT-3	–	E:1152.162 N:1108.260	–	+34.505	17.05.12	17.05.12
ERT-4	–	E:1151.500 N:1257.990	–	+35.131	17.05.12	17.05.12

Standing Water level during the period of field work

Bore Holes No.	Date	Water level (m) b.g.l.
BH-1	20.06.2012 to 23.06.2012	8.50
BH-2	24.06.2012 to 29.06.2012	7.00
BH-3	17.06.2012 to 19.06.2012	8.00
BH-4	28.05.2012 to 29.05.2012	15.00
BH-4A	10.07.2012 to 13.07.2012	3.00
BH-5	30.05.2012 to 02.06.2012	20.00
BH-6	05.06.2012 to 09.06.2012	10.00
BH-6A	10.06.2012 to 13.06.2012	3.60
BH-7	14.06.2012 to 16.06.2012	6.00
BH-8	30.06.2012 to 03.07.2012	4.00
BH-11	25.05.2012 to 27.05.2012	14.80
BH-12	10.07.12 to 12.07.12	1.60
BH-12A	06.07.12 to 08.07.12	2.50
BH-13	04.07.2012 to 05.07.2012	1.20
BH-14	07.07.12 to 08.07.12	1.81
BH-14A	03.07.12 to 05.07.12	2.00
BH-15	30.06.2012 to 03.07.2012	4.10
BH-16	10.05.2012 to 24.05.2012	6.00
BH-17	14.07.2012 to 16.07.2012	9.50
BH-18	12.07.2012 to 15.07.2012	7.20

The field investigation was started on 10.05.2012 and completed on 16.07.2012.

Note: Soil Report for all the above has been presented in Volume I, II & III (First Phase) Soil Report for Second Phase has been incorporated in Volume IV

2.2 The borehole is sunk in accordance with the provisions of I.S. 1892-1979. Bore hole is advanced using Shell and standard powered winch with tripod rig & tools held by wire rope. Rotary mud drilling has also been adopted to advance the bore hole further beyond shell boring. The diameter of the boreholes is 150mm. The sides of the bore

hole are supported using temporary casings in stages of advancement. The shell is used to bore and remove soil cuttings. Care is taken to minimize disturbance to the soil at the base of the bore hole. Adequate cleaning of bases is done before SPT or UDS collection.

2.3 During the execution of the field works, the disturbed soil samples are collected at regular intervals from the split spoon sampler after conducting the standard penetration tests. These samples are used in the preparation of bore hole logs, for identification & classification purpose and conducting some specific tests as per the provisions laid down in IS: 1498-1970.

2.4 The undisturbed samples (U 100) are collected from the bore holes, wherever possible with the help of a standard sampler (100 mm inner diameter and 450 mm long). Undisturbed soil sample tubes are fitted with cutting shoe, properly designed to minimize the sampling disturbance. After sampling operations, the sample tubes are marked for proper identification, sealed with molten wax on either ends, capped and despatched to the laboratory for testing.

2.5 The standard penetration tests (SPT) were conducted up to the refusal as per provisions laid down in IS: 2131-1981. The standard Split spoon sampler was used for conducting the above test by dropping a hammer of 63.5 kg falling freely from a height of 75 cm. The penetration resistances commonly known as ‘N’ value are recorded by counting the number of blows for middle 30 cm penetration of a total penetration of 45 cm. ‘N' values thus obtained are shown in bore log data sheet. SPT has also been conducted in fully decomposed/ highly weathered rocky strata also. The water table in the bore hole was recorded at the end of 24 hrs. After the completion of the respective bore hole and it was back filled.

2.6 **Laboratory Investigation**

The following laboratory tests are conducted to ascertain the properties of the sub-soil:

a) Natural moisture content

b) Bulk and dry density

c) Grain size analysis and Specific Gravity

d) Liquid and Plastic limits

e) Tri-axial Test (Un-consolidated Un-drained) and Unconfined Compression Test.

f) Consolidation Test

g) Permeability Test

h) Chemical Tests

The following tests are carried out on soil and water samples :

i) pH

ii) Chloride

iii) Sulphate

All these tests are conducted as per relevant I.S. Codes. For graphs etc reference may be made to Volume - II of the Report.

CHAPTER – III

3.0 BRIEF DISCUSSION ABOUT SOIL PROPERTIES

3.1 Subsoil Condition

Altogether twenty (20) nos. bore holes have been sunk at this project site. Five (5) different layers have been encountered depending upon physical properties, 'N' values etc. However, the soil environment is clayey in nature with varying plasticity, 'N' values and occurrence levels. In some bore holes appearance of sandy zone has also been detected. The properties of sub-soil have been indicated bore hole/ plant wise as per scope of the work and presentations have been done accordingly. Reader may go through the individual bore logs, laboratory test results, cross sections through different bore holes (as per scope) and plot of 'N' values for better understanding of the sub-soil conditions prevailing at this site.

The sub-soil properties along with layers/ strata have been supplied plant wise/ bore hole wise in Chapter IV along with NSBC and NABC values for 25mm, 40mm and 75mm settlement. The properties have been supplied after giving details of layers/ strata while computing NSBC and NABC for different sizes of shallow foundations as well as raft foundations at specified levels. Modules of subgrade reactions have also been calculated and suggested as per the scope of the work. For detailed physical properties etc. reader may go through the individual laboratory test results sheet, bore logs and different cross sections provided in this report.

Electrical Earth Resistivity Test data etc. have also been added in Volume –III of the Report.

CHAPTER – IV

4.0 DISCUSSION ON FOUNDATION ASPECTS

The reader may refer item No 4 of Volume I First Phase

4.1 Shallow foundations have been adopted at different depth below the e.g.l for varying sizes of foundations as per the scope. Net safe bearing capacity (NSBC) along with net allowable bearing capacities (NABC) with respect to shear and settlement (25, 40 and 75mm) have been tabulated bore hole /plant wise. For settlement more than 25 mm linear interpolation can be done. Designer can go through the tables provided in this chapter. Sample calculations for NSBC and NABC have also been supplied at the end of this Chapter. It is also advised to follow conservative approach in the context of clayey environment and adoption of shallow foundations.

4.2 General Notes for Shallow Foundation

i) It is to be noted that Fill has been avoided for seating of foundations.

ii) In case, after excavation upto the foundation level and till such time the foundation is constructed irregularities like cracks etc. at the foundation level are noticed **sand cushion of minimum thickness 0.50m below the founding level and extending at least 0.30m on all sides of foundation with proper confinement and compaction should be used.** Silver sand should not be used and fines should not be more than 15%. Any soft/ loose patches at foundation bed should be removed and replaced by compacted sand as above.

iii) Foundation bed should not be kept exposed to the atmosphere and it should be covered by properly compacted sand as above and thereafter compacted mud mat. Planning should be done accordingly.

iv) Backfilling should be done with compaction and addition of water, if required.

v) Side slope for excavation.

a. Excavation depth : ⊧ 2.00m

Use 2.25 vertical and 1 horizontal slope.

b. Excavation depth : ⊧ 4.00m

i) Use berm at 2.00m depth (0.40m to 0.50m wide depending upon requirement).

ii) Thereafter up to 4.00m depth

Use 2.00 vertical and 1 horizontal slope.

Due to clayey environment and its stiffer nature, presence of cracks, lenses/ partings of silt/ sand observations are to be made against the suggested slope (s). Proper drainage system around excavation should be planned. During rainy season the above slope may not be feasible due to ingress of water into the excavation area and proper shoring arrangement should be adopted with close supervision and outside/ inside drainage arrangement.

The above slope may change with the choice of type of fill material and its method of formation.

vi) Surcharge/ Backfilling of the Area

Jungles etc. should be uprooted and the exposed surface should be properly dressed. The fill should be developed with approved material and it should be engineering fill. Proper quality control arrangement should be arranged. Drainage system may properly be designed.

4.3 Chemical Action

As to the chemical action of ground water and subsoil use of any special cement is not envisaged. Ordinary Portland cement, Portland slag cement or Portland Pozzolona cement can be used with proper control on W/C ratio and the concrete should be dense.

4.4 Bearing Capacity and Settlement with Soil Properties for Bore Hole/ Plant

4.4.1 BH-1 (Machinery Bay, MB-2 & Track Hopper)

Layer/ Stratum	Description	GL=+32.627	
		Thickness (m)	'N' Value
Fill	Brownish grey silty clay (high silt content) with traces of brick pieces.	1.50 +31.127	39
I	Very stiff to hard brownish grey silty clay with traces of sand, bluish grey patches and moorum in traces.	0.80 +30.327	35
II	Very stiff / hard yellowish brown silty clay with traces of sand reddish brown patches.	2.70 +27.627	30 25
III	Very stiff yellowish brown/light reddish brown silty clay with traces of sand and bluish grey patches.	7.00 +20.627	31 27 24

Layer/ Stratum	Description	GL=+32.627	
		Thickness (m)	'N' Value
IV	Very stiff to hard yellowish brown sandy silty clay/ clayey sandy silt with traces of fine mica flakes.	2.00	26
		+18.627	54
IVA	Dense brown /yellowish sand with high percentage of fines, having cohesive touch and fine mica flakes.	2.50	58
		+16.127	
IV	Very stiff to hard yellowish brown/ brown silte clay (high silt content) with traces of sand / clayey silt with traces of kankars at 20.00m depth b.g.l.	≥7.50	27 55 52
		≤+8.627	>100

Standing Water level 8.50m b.g.l. during the period of field work (20.06.2012 to 23.06.2012).

A. Bearing Capacities of Shallow Foundation :

It is to be noted that Fill layer (thickness = 1.50m) has been avoided for seating of foundations.

Shallow foundations may be adopted with founding level at least 0.50m inside the layer I.

Refer layer I and cross section

EGL = +32.627m ‘N’ Value = 35

C = 10.00 t/m² ϕ = 5° (Suggested)

m_v = 0.0080 cm²/kg (Suggested) γ_{bulk} = 2.05 t/m³ (Suggested)

RL of foundation = +30.627m Thickness = 0.80 m

i) Depth of Foundation below existing ground level : (32.627 – 2.00) = RL +30.627m

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	41.1	25.0	–	–
3.00 x 3.00	38.7	25.0	–	–
4.00 x 4.00	37.4	18.0	25.0	–
3.00 x 2.00	35.8	25.0	–	–
4.50 x 3.00	33.7	20.0	–*	–
6.00 x 4.00	32.6	15.0	24.0	–
1.00m wide strip	38.0	25.0	–	–
1.50m wide strip	34.2	25.0	–	–
2.25m wide strip	31.6	19.0	–*	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.
* : High value not suggested

ii) Depth of Foundation : i.e. RL = 32.627 – 3.00 i.e. RL 29.627m or 3.00m below E.G.L.

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	44.8	25.0	–	–
3.00 x 3.00	14.1	25.0	–*	–
4.00 x 4.00	39.3	20.0	–*	–
3.00 x 2.00	39.0	25.0	–	–
4.50 x 3.00	35.8	20.0	–*	–
6.00 x 4.00	34.2	16.0	25.0	–
1.00m wide strip	43.8	25.0	–	–
1.50m wide strip	38.0	25.0	–	–

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.25m wide strip	34.2	20.0	–*	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.
* : High value not suggested

Note:

Suggested Properties of layer II

'N' Value = 27 C = 10.00t/m²

ϕ = 7° (use ϕ = 0° in computation)

m_v = 0.0080 cm²/kg γ_{bulk} = 2.050 t/m³

Thickness = 2.70m

B. Effect of Fill :

Overburden (Thickness = 1.37m) pressure should be deducted from the above net safe bearing capacity values.

It is to be noted that Fill layer has been avoided for seating of foundations.

FGL = +34.000m, Thickness of Fill =1.37m. Overburden pressure should be deducted from the net allowable bearing pressure.

C. Raft Foundation at RL = +21.627, i.e. 11.00 m below E.G.L. Refer Sheet No. 81

Raft width = 17.00m = B

Depth of foundation = 11.00m from E.G.L. i.e. at layer III.

Calculation of bearing capacity.

$q_u \approx CN_C$, neglect shape and depth factor

$q_u = 10.0 \times 5.14$ t/m²,

$q_{safe} = \frac{10.0 \times 5.14}{2.5}$ t/m²

$= 20.56$ t/m²

Adopt 20.00 t/m²

Check for settlement. Use 2V : 1H pressure distribution.

Layer III	0.008 x 100 x 0.943 x 2.0 cm	=	1.51 cm
Layer IV (Top part)	0.008 x 200 x 0.800 x 2.0 cm	=	2.56 cm
Layer IV(Bottom part)	0.006 x 750 x 0.419 x 2.0 cm	=	3.77 cm
			7.84 cm

Layer IVA Settlement $= \frac{(0.720 \times 20) \times 17 \times (1 - 0.38^2) \times 0.85}{6400} \times 100 \times \frac{2}{17}$. $\mu = 0.38$ say

$= 0.33$ cm

Note :

Thickness of Layer IVA = 2.00m E = 6400 t/m², say

Raft width = 17.00m

Accordingly settlement has been reduced to $\frac{2}{17}$ considering width of raft and available thickness of Layer IVA.

Total Settlement = 7.84 + 0.33 cm

= 8.17 cm

RF = 0.8

$\lambda = \frac{0.5 + 0.7}{2}$

= 0.6

Settlement = [7.84 x 0.8 x 0.6 + 0.33 x 0.8] x D_f Neglect Depth Factor

= 4.03 cm

For 25mm, q ≈ 12.40 t/m²

Utilizing results of BH-3 suggested k_s = 15.50 MN/m³

Check for depth of excavation

Weighted C = 10.00t/m²

Ref. Soil Mechanics and Foundation Engg., V. N. S. Murthy, Fig. 16.24. Page 514.

$N_s = \frac{C}{\gamma . H . F_C}$ $\phi = 0°$, $\beta = 66°$, $N_s = 0.20$

N_s = 0.20 for $\beta \approx 66°$

Assume γ = 2.00 t/m³

F_C = 1.50

$$H = \frac{9.74}{2 \times 0.20 \times 1.5}$$

= 16.66m ok. It may be noted that ϕ has been neglected. With $\phi = 5°$, $N_s = 0.175$, H = 19.00m.

D. Observations :

i) **Fill :** Provide slope 60° (1.73 V : 1 H). Thickness is 1.50m. Recorded 'N' value = 39. Flater slope has been provided on conservative ground. Provide berm at +31.127 RL (Min. width = 0.50m). Width of berm may be more depending upon requirement.

ii) **Layer I :** Slope 66° (2.25 V : 1 H). Construct berm at +30.327 RL (Min. width = 0.50m). Use this slope onward and provide berm at every (≈ 3.00m or so as shown) depth interval or interface of layers. Width of berm may be more depending upon requirement.

iii) Refer General Notes as applicable. Refer Sheet No. 77.

iv) **Soil Classifications :** In grace of water into the foundation bed will be managed by pump. The nature of soil is stiff/ very stiff/ hard considering its consistency. As such presence of cracks lenses/ partings of silt/ sand may cause instability of the slopes provided and width of berm may be increased. In such case precautionary measures along with provision of local shoring or sheet piling may be necessary. Provide side drainage at the berm level and adequate arrangement should be adopted so that

outside water from ground surface level may not enter into the action area including the entrance/ exit slope/ area/ ramp for construction equipment etc.

Layer	Classification
I	CI
II	CI
III	CH
IV	CI

v) **Dumping of Excavated Earth :** No excavated soil should be kept within (*1 x Depth of excavation) from the edge of the excavated area. Care is to be taken considering the presence of cracks (if any). Close supervision is essential in this context.

* It may be more depending upon cracks and management of surface water or subsurface water as mentioned.

vi) Experience in similar situation should be utilized along with engineering judgment.

vii) **Structures near by excavation :** Follow IS 1904-1986 and design accordingly.

4.4.2 **BH-2 (Track Hopper)**

Layer/ Stratum	Description	GL=+32.387	
		Thickness (m)	'N' Value
I	Very stiff/ stiff brownish grey silty clay with bluish grey patches in traces, sand and kankars (high silt content).	3.00 +29.387	16 14
II	Very stiff yellowish brown silty clay with traces of sand and dark grey moorum.	2.00 +27.387	17 22
III	Hard yellowish brown to light reddish brown silty clay with bluish grey patches and dark grey moorum in traces.	5.00 +22.387	44 30
IV	Hard reddish/ yellowish brown sandy silty clay with varying percentage of sand and presence of fine micaflakes at bottom region.	4.00 +18.387	33 36

Layer/ Stratum	Description	GL=+32.387	
		Thickness (m)	'N' Value
IVA	Dense brown/ yellowish brown sand with varying percentage of fines, little cohesive touch and fine micaflakes.	4.00	30 41
		+14.387	
IV	Hard yellowish brown clayey silt with varying percentage of sand and presence of occasional laminations at 22.00m depth b.g.l.; presence of kankars noticed from 22.00m depth b.g.l.	≥6.00	42 47 51
		≤+8.387	>100

Standing Water level 7.00m b.g.l. during the period of field work (24.06.2012 to 29.06.2012).

A. Raft Foundation at RL = +21.387, i.e. 11.00 m below E.G.L. Refer Sheet No. 82

Raft width = 15.00m = B

Depth of foundation = 11.00m from E.G.L. i.e. at layer IV.

Calculation of bearing capacity.

$q_u \approx CN_C$, neglect shape and depth factor

$q_u = 12.8 \times 5.14$ t/m²

$q_{safe} = \frac{12.8 \times 5.14}{2.5}$ t/m²

$= 26.31$ t/m²

Adopt 20.00 t/m²

Check for settlement. Use 2V : 1H pressure distribution.

Layer IV (top part) 0.008 x 300 x 0.826 x 2.0 cm = 3.96 cm

Layer IV (bottom part) 0.004 x 600 x 0.36 x 2.0 cm = 1.73 cm

5.69 cm

Layer IVA Settlement = $\frac{(0.694 \times 20) \times 15 \times (1 - 0.38^2) \times 0.85}{6400} \times 100 \times \frac{4}{15}$. $\mu = 0.38$ say

= 0.63 cm

Note :

Thickness of Layer IVA = 4.00m

Raft width = 15.00m

Accordingly settlement has been reduced to $\frac{4}{15}$ considering width of raft and available thickness of Layer IVA.

Total Settlement = 5.69 + 0.63 cm

= 6.32 cm

RF = 0.8

λ = $\frac{0.5 + 0.7}{2}$

= 0.6

Settlement = [5.69 x 0.8 x 0.6 + 0.63 x 0.8] x D_f Neglect Depth Factor

= 3.23 cm

For 25mm, q ≈ 15.48 t/m²

Utilizing results of BH-3 suggested K_s = 15.50 MN/m³

Check for depth of excavation

Weighted C = $\frac{6.20 \times 3.0 + 7.40 \times 2.0 + 12.80 \times 5.00}{10.00}$

= 9.74 t/m²

Ref. Soil Mechanics and Foundation Engg., V. N. S. Murthy, Fig. 16.24. Page 514.

$N_s = \frac{C}{\gamma . H . F_C}$ $\phi = 0°$, $\beta = 66°$, $N_s = 0.15$

N_s = 0.20 for $\beta \approx 66°$

Assume γ = 2.00 t/m³

F_C = 1.50

$H = \frac{9.74}{2 \times 0.20 \times 1.5}$

= 16.23m ok. It may be noted that ϕ has been neglected. With $\phi = 5°$, $N_s = 0.75$, H = 18.55m.

Check for Layer I

$H = \frac{6.20}{1.98 \times 0.20 \times 1.5}$

= 10.44 m ok

B. Observations :

i) **Layer I :** Slope 60° (1.73 V : 1 H). Construct berm at +29.387 RL (Min. width = 0.50m). Use 66° slope onward and provide berm at every (≈ 3.00m or so or as shown) depth interval or interface of layers. Width of berm may be more depending upon requirement.

ii) Refer General Notes as applicable. Refer Sheet No. 77.

iii) **Soil Classifications :** In grace of water into the foundation bed will be managed by pump. The nature of soil is stiff/ very stiff/ hard considering its consistency. As such presence of cracks lenses/ partings of silt/ sand may cause instability of the slopes provided and width of berm may be increased. In such case precautionary measures along with provision of local shoring or sheet piling may be necessary. Provide side drainage at the berm level and adequate arrangement should be adopted so that outside water from ground surface level may not enter into the action area including the entrance/ exit slope/ area/ ramp for construction equipment etc.

Layer/ Stratum	Classification
I	CI
II	CH/CI
III	CH
IV	CI

iv) **Dumping of Excavated Earth :** No excavated soil should be kept within (*1 x Depth of excavation) from the edge of the excavated area. Care is to be taken considering the presence of cracks (if any). Close supervision is essential in this context.

* It may be more depending upon cracks and management of surface water or subsurface water as mentioned.

v) Experience in similar situation should be utilized along with engineering judgment.

vi) **Structures near by excavation :** Follow IS 1904-1986 and design accordingly

4.4.3 **BH-3 (Machinery Bay, MB-1 & Track Hopper, Wagon Tippler, TP-11 & 12, Tunnel for Conv. 11AB & 12AB)**

Layer/ Stratum	Description	GL=+33.751	
		Thickness (m)	'N' Value
Fill	Stiff light grey to yellowish brown silty clay with traces of stone chips, brick pieces and sand.	2.50 +31.251	9 11
I	Stiff to very stiff yellowish brown silty clay with traces of sand, dark grey moorum and kankars/ nodules.	1.50 +29.751	14
II	Very stiff to hard (from 6.00m depth b.g.l.) yellowish/ reddish brown silty clay with bluish grey patches, dark grey moorum and sand in traces; sand content increases from 10.00m depth b.g.l. and presence of calcareous nodules also noticed at top.	9.70 +20.051	27 31 27 35 31
III	Very stiff/ hard light reddish to yellowish brown silty clay with rusty brown patches, traces of sand and fine micaflakes; high percentage of sand at 14.00m depth b.g.l. (SPT samples at 14.00m depth b.g.l.).	5.30 +14.751	58 25 29
IV	Hard light reddish to yellowish brown/ brown clayey silt with fine mica flakes, traces of sand, presence of gravels noticed from 28.00m depth b.g.l.	≥11.00 ≤+3.751	46 58 64 45 >100 >100

Standing Water level 8.00m b.g.l. during the period of field work (17.06.2012 to 19.06.2012).

A. Bearing Capacities of Shallow Foundation :

It is to be noted that Fill layer (thickness = 2.50m) has been avoided for seating of foundations.

Shallow foundations may be adopted with founding level at least 0.50m inside the layer I.

Refer layer I and cross section

EGL	=	+33.751m	'N' Value	=	14
C	=	6.20 t/m²	ϕ	=	5° (Suggested)
m_v	=	0.0200 cm²/kg (Suggested)	γ_{bulk}	=	1.98 t/m³
RL of foundation = +30.751m			Thickness	=	1.50 m

i) Depth of Foundation below existing ground level : (33.751 – 3.00) = RL +30.751m

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	27.80	23.0	–	–
3.00 x 3.00	25.50	16.0	25.0	–
4.00 x 4.00	24.30	13.0	20.0	–
3.00 x 2.00	24.20	19.0	–	–
4.50 x 3.00	22.20	14.0	22.0	–
6.00 x 4.00	21.20	11.0	17.0	–
1.00m wide strip	27.20	20.0	–	–
1.50m wide strip	23.60	16.0	–	–
2.25m wide strip	21.20	12.0	19.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

ii) Depth of Foundation : i.e. RL = 33.751 – 4.00 i.e. RL 29.751 or 4.00m below E.G.L.

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	47.90	25.0	–	–
3.00 x 3.00	43.30	25.0	–*	–
4.00 x 4.00	41.10	20.0	–*	–
3.00 x 2.00	41.40	25.0	–	–
4.50 x 3.00	37.80	20.0	–*	–
6.00 x 4.00	35.80	16.0	25.0	–
1.00m wide strip	48.30	25.0	–	–
1.50m wide strip	41.20	25.0	–*	–
2.25m wide strip	36.40	20.0	–*	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.
* : High value not suggested

B. Raft Foundation at RL = +22.751, i.e. 11.00 m below E.G.L. Refer Sheet No. 83

Raft width = 17.00m = B

Depth of foundation = 11.00m from E.G.L. i.e. at layer II.

Calculation of bearing capacity.

$q_u \approx CN_C$, neglect shape and depth factor

$q_u = 10.4 \times 5.14$ t/m², Refer Layer III for C value

$$q_{safe} = \frac{10.4 \times 5.14}{2.5} \text{ t/m}^2$$

$$= 21.38 \text{ t/m}^2$$

Adopt 20.00 t/m²

Check for settlement. Use 2V : 1H pressure distribution.

Layer II	0.008 x 270 x 0.858 x 2.0 cm	=	3.70 cm
Layer III	0.006 x 530 x 0.578 x 2.0 cm	=	3.67 cm
Layer IV	0.004 x 1100 x 0.031 x 2.0 cm	=	2.73 cm
			10.10 cm

RF = 0.8

$\lambda = \frac{0.5 + 0.7}{2}$

= 0.6

DF = 0.81

Settlement = 39.2 mm

$E_{av} = \frac{6400 \times 2.7 + 5200 \times 5.3 + 10000 \times 11.0}{19.00}$

= 8149 t/m²

For 25mm, q ≈ 12.75 t/m²

Computation for K_S. Ref. Foundation analysis and design J. E. Bowels, Fifth Edition. Page – 503

$E_s' = \frac{1-\mu^2}{Es}$

$= \frac{1-0.4^2}{8149} = 0.00010308\ m^2/ton.$ $\mu = 0.40$, say

Data available upto 30.00m depth b.g.l. computation has been done on the basis of 30.00m depth b.g.l.

For centre, $\frac{H}{B'} = \frac{19}{17 \times 0.5}$

$= 2.235$

$\frac{L}{B} = 1.0$

$I_s = I_1 + \frac{1-2\mu}{1-\mu} I_2$ $\mu = 0.40$, say

Ref. Table 5 – 2

$I_1 = 0.285 + \frac{0.363-0.285}{1} \times 0.235 = 0.3033$

$I_2 = 0.064 - \frac{0.064-0.048}{1} \times 0.235 = 0.0602$

$I_s = 0.3033 + \frac{1-2\times0.4}{1-0.4} \times 0.0602$

$= 0.32336$

For $\frac{D}{B} = \frac{11}{17} = 0.65$

And

$\frac{L}{B} = 1.0$

$I_F = 0.75$

Ref. Fig. 7

$K_s = \dfrac{1}{B.E'_S.I_S.I_F}$

$= \dfrac{1}{(0.5\times17)\times0.00010308\times(4\times0.32336)\times0.75}$

$= 1176.52\ t/m^3$

For corner. $\dfrac{H}{B'} = \dfrac{19}{17} = 1.117$ $\dfrac{L}{B} = 1.0$

$I_1 \approx 0.142,$ $I_2 \approx 0.083$, say

$I_s = 0.142 + \dfrac{1-2\times0.4}{1-0.4}$ x 0.083

$= 0.16966$

$I_F = 0.75$

$K_s = \dfrac{1}{17\times0.00010308\times0.16966\times0.75}$

$= 4486.31\ t/m^3$

K_s, average $= \dfrac{4\times1176.52+1\times4486.31}{5}$

$= 1838.48\ t/m^3 = 18.385\ MN/m^3$

Computed settlement for 20 t/m² is 39.2mm

For 25mm settlement, $q_a = \dfrac{25}{39.2}$ x 20 t/m² = 12.75 t/m²

Ref. Bowles Page – 503

K_s = 40 x (2.5 x 127.5) kN/m³ Factor of Safety = 2.50

= 12.75 MN/m³

Average value say = $\frac{18.385+12.75}{2}$ MN/m³

= 15.56 MN/m³

Suggested K_s = 15.50 MN/m³

C. Raft Foundation at RL = +13.751, i.e. 20.00 m below E.G.L. Refer Sheet No. 84

C = 20.0 t/m²

$q_u \approx CN_C$ = 20 x 5.14 t/m²

q_{safe} = $\frac{20\times5.14}{2.5}$ t/m²

= 41.20 t/m², say 25.00 t/m²

Settlement

Assume same soil to continue. Depth of influence has been considered upto 1B below foundation level. Using 2V : 1H pressure distribution,

$\Delta q \approx \frac{17\times17}{(17+8.5)\times(17+8.5)}q$

= 0.444q

Settlement ≈ 0.004 x 1700 x 0.444 x 2.5 cm

= 75.48 mm

RF = 0.8

λ = 0.6

DF = 0.73

Settlement = 26.44 mm

For 25mm settlement, q_a = $\frac{25}{26.44}$ x 25 t/m²

= 23.63 t/m² = 236.3 kN/m²

K_s = 40 x (2.5 x 236.3) kN/m³

= 23630 kN/m³

= 23.630 MN/m³

Suggested K_s = 23.50 MN/m³

D. Excavation (Refer Sheet No. 83 & 84) :

Depth = 11.00m and 20.00m from E.G.L.

Ref. Soil Mechanics and Foundation Engg., V. N. S. Murthy, Fig. 16.24. Page 514.

Weighted C = $\frac{1.50\text{m} \times 6.2\text{t/m}^2 + 9.70\text{m} \times 12.8\text{t/m}^2}{1.50\text{m} + 9.70\text{m}}$

= 11.91 t/m²

Neglecting ϕ, N_s = 0.15 for $\beta \approx 66°$ Assume γ_{bulk} = 1.90 t/m³ for Fill

$$\gamma_{weighted} = \frac{2.50m \times 1.90t/m^3 + 1.50m \times 1.98t/m^3 + 9.70m \times 2.06t/m^3}{13.70m}$$

$$= 2.022\ t/m^3$$

$$N_s = \frac{C}{\gamma . H . F_C}$$

C = Cohesion, H = Height
γ = Bulk Density, F_C = Factor of Safety = 1.5, say

$$0.15 = \frac{11.91}{2.022 \times H \times 1.5}, \quad H = 26.17m \text{ ok}$$

Check for Layer I,

$$0.15 = \frac{6.2}{1.98 \times H \times 1.5}, \quad H = 13.91m \text{ ok}$$

E. Observations :

i) **Fill :** Provide slope 60° (1.73 V : 1 H). Thickness is 2.50m. Recorded 'N' value = 9 to 11. Flater slope has been provided on conservative ground. Provide berm at +31.251 RL (Min. width = 0.50m). Width of berm may be more depending upon requirement.

ii) **Layer I :** Slope 66° (2.25 V : 1 H). Construct berm at +29.751 RL (Min. width = 0.50m). use this slope onward and provide berm at every (≈ 3.00m or so) depth interval or interface of layers. Width of berm may be more depending upon requirement.

iii) Refer General Notes as applicable. Refer Sheet No. 77.

iv) **Soil Classifications :** In grace of water into the foundation bed will be managed by pump. The nature of soil is stiff/ very stiff/ hard considering its consistency. As such

presence of cracks may cause instability of the slopes provided and width of berm may be increased. In such case precautionary measures along with provision of local shoring or sheet piling may be necessary. Provide side drainage at the berm level and adequate arrangement should be adopted so that outside water from ground surface level may not enter into the action area including the entrance/ exit slope/ area/ ramp for construction equipment etc.

Layer	Classification
I	CH
II	CH/CI
III	CI/CL
IV	CL/CI

v) **Dumping of Excavated Earth :** No excavated soil should be kept within (*1 x Depth of excavation) from the edge of the excavated area. Care is to be taken considering the presence of cracks (if any). Close supervision is essential in this context.

* It may be more depending upon cracks and management of surface water or subsurface water as mentioned.

vi) Experience in similar situation should be utilized along with engineering judgment.

vii) **Structures near by excavation :** Follow IS 1904-1986 and design accordingly.

4.4.4 **BH-4 (Foundation for Conv. Gallery 12AB)**

Layer	Description	GL=+32.641	
		Thickness (m)	'N' Value
I	Stiff grey silty caly with rusty brown spots and traces of sand and kankars	2.70	12
		+29.941	11
II	Very stiff brown silty clay with traces of kankars (at top) and deep brown /reddish brown spots/patches and sand in traces; high percentage of sand noticed at 12.00m depth (SPT Sample)	11.30	15 18
		+18.641	17
III	Very stiff to hard yellowish /reddish brown silty clay (high silt content) with rusty brown spots and patches.	10.00	29 27
		+8.641	25
IV	Hard brown /yellowish to reddish brown clayey silt /silty clay (high silt content) with fine mica flakes.	6.00	28 34
		+2.641	37
V	Dense to very dense grey sand with fines, fine mica flakes and occasional cohesive touch.	≥2.00	45
		≤+0.641	>100

Standing Water level 15.00m b.g.l. during the period of field work (28.05.2012 to 29.05.2012).

A. Bearing Capacities of Shallow Foundation :

Shallow foundations may be adopted with founding level at least 1.50m inside the layer I.

Refer layer I and cross section

EGL	=	+32.641m	'N' Value	=	11
C	=	6.30 t/m² (Suggested)	ϕ	=	5° (Suggested)
m_v	=	0.019 cm²/kg (Suggested)	γ_{bulk}	=	2.000t/m³ (Suggested)
RL of foundation = +31.141m			Thickness	=	2.70 m

i) Depth of Foundation below existing ground level : (32.641 – 1.50) = RL +31.141m

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	24.70	16.0	23.0	–
3.00 x 3.00	23.60	10.5	16.0	–
4.00 x 4.00	23.00	8.0	13.0	23.0
3.00 x 2.00	21.60	13.0	20.0	–
4.50 x 3.00	20.60	8.5	14.0	–
6.00 x 4.00	20.00	6.5	10.5	20.0
1.00m wide strip	22.10	16.0	20.0	–
1.50m wide strip	20.30	12.0	18.0	–
2.25m wide strip	19.10	8.0	13.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

ii) Depth of Foundation : i.e. RL = +29.191m, seating level of foundation

Top of layer II = +29.941m

Minimum embedment in layer II = 0.75m

'N' Value = 15 C = 7.70t/m²

ϕ = 8° (use ϕ = 0° in computation)

m_v = 0.013 cm²/kg γ_{bulk} = 2.040 t/m³

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	27.70	23.0	–	–
3.00 x 3.00	25.30	15.0	23.0	–

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
4.00 x 4.00	24.10	11.0	16.0	–
3.00 x 2.00	24.10	20.0	–	–
4.50 x 3.00	22.10	12.0	20.0	–
6.00 x 4.00	21.00	8.5	14.0	–
1.00m wide strip	27.30	20.0	–	–
1.50m wide strip	23.60	16.0	–	–
2.25m wide strip	21.10	11.0	16.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

B. Effect of Fill :

Overburden (Thickness = 1.36m) pressure should be deducted from the above net safe bearing capacity values.

4.4.5 **BH-4A (Foundation for Conv. Gallery 12AB)**

Layer	Description	GL=+33.067	
		Thickness (m)	'N' Value
I	Stiff brownish grey silty clay with traces of sand and occasional bluish grey spots and dark grey moorum.	2.50 +30.567	14
II	Very stiff light reddish to yellowish brown silty clay with varying sand content, occasional grey/ bluish grey patches and dark grey moorum/ kankars.	10.50 +20.067	21 26 22
III	Very stiff to hard light reddish yellow/ brown silty/ sandy clay with varying percentage of sand.	7.00 +13.067	29 27 48
IV	Hard light yellowish brown/ brown silty clay (high silt content) with traces of sand and fine micaflakes.	8.00 +5.067	50 59 67 50
V	Dense to very dense brown/ light grey sand with varying percentage of fines, cohesive touch and fine micaflakes.	≥2.00 ≤+3.067	75 >100

Standing Water level 3.00m b.g.l. during the period of field work (10.07.2012 to 13.07.2012).

A. Bearing Capacities of Shallow Foundation :

Shallow foundations may be adopted with founding level at least 1.50m inside the layer I.

Refer layer I and cross section

EGL =	+33.067m	'N' Value	=	14
C =	6.80 t/m²	ϕ	=	5° (Suggested)
m_v =	0.0180 cm²/kg	γ_{bulk}	=	2.009 t/m³
RL of foundation = +31.567m		Thickness	=	2.50 m

i) Depth of Foundation below existing ground level : (33.067 – 1.50) = RL +31.567m

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	26.70	18.0	–	–
3.00 x 3.00	25.40	12.0	19.0	–
4.00 x 4.00	24.80	9.0	14.0	–
3.00 x 2.00	23.30	15.0	23.0	–
4.50 x 3.00	22.20	10.0	16.0	–
6.00 x 4.00	21.60	7.5	12.0	–
1.00m wide strip	23.90	20.0	–	–
1.50m wide strip	21.90	13.0	20.0	–

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.25m wide strip	20.60	9.5	15.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

ii) Depth of Foundation : i.e. RL = 33.067 – 2.00 i.e. RL 31.067m or 2.00m below E.G.L.

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	28.00	20.0	–	–
3.00 x 3.00	26.30	14.0	22.0	–
4.00 x 4.00	25.40	10.5	17.0	–
3.00 x 2.00	24.40	18.0	–	–
4.50 x 3.00	22.90	12.0	19.0	–
6.00 x 4.00	22.20	8.5	14.0	–
1.00m wide strip	25.90	22.0	–	–
1.50m wide strip	23.20	14.0	22.0	–
2.25m wide strip	21.50	11.0	17.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

iii) Depth of Foundation : i.e. RL = 33.067 – 3.00 i.e. RL 30.067m or 3.00m below E.G.L.

Top of layer II = +30.567m

Embedment in layer II = 0.50 m

'N' Value = 23 C = 8.80 t/m²

ϕ = 7° (use ϕ = 0° in computation) γ_{bulk} = 2.050 t/m³

m_v = 0.0110 cm²/kg (Suggested) Thickness = 10.50 m

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	30.60	22.0	–	–
3.00 x 3.00	28.20	16.0	25.0	–
4.00 x 4.00	27.00	12.0	19.0	–
3.00 x 2.00	26.70	20.0	–	–
4.50 x 3.00	24.60	14.0	23.0	–
6.00 x 4.00	23.60	10.0	16.0	–
1.00m wide strip	29.50	25.0	–	–
1.50m wide strip	25.80	16.0	25.0	–
2.25m wide strip	23.40	12.0	20.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

Note:

Properties of layer III

'N' Value = 28 C = 11.50 t/m²

ϕ = 6° use ϕ = 0° in computation (Suggested)

m_v = 0.0070 cm²/kg γ_{bulk} = 2.060 t/m³

Thickness = 7.00 m

B. Effect of Fill :

Overburden (Thickness = 0.93 m) pressure should be deducted from the above net safe bearing capacity values.

4.4.6 **BH-5 (Crusher House CH-2, Stacker Reclaimer Fdn., Pump House, MCC Building, Trestle Foundation for Conv. Gallery 12AB, 13AB, 13C)**

Layer	Description	GL=+33.469	
		Thickness (m)	'N' Value
I	Stiff grey silty clay with rusty /yellowish brown patches in traces; sand and occasional kankars	2.80 +30.669	9
II	Very stiff yellowish brown silty clay with kankars and sand in traces; reddish brown spots /patches are also noted.	10.90 +19.769	16 29 27
III	Very stiff yellowish / reddish brown silty clay (generally high silt content) with varying percentage of sand, rusty brown spots in traces and fine mica flakes; high percentage of sand at 14.00m depth b.g.l (SPT Sample)	6.30 +13.469	40* 26
IV	Very stiff /hard yellowish brown clayey silt /silt clay (high silt content) with traces of sand, occasional laminations and fine mica flakes.	9.50 +3.969	31 28 33 37 41
V	Very dense brown sand with low percentage of fines and fine mica flakes.	≥2.50 ≤+1.469	>100 >100

Standing Water level 20.00m b.g.l. during the period of field work (30.05.2012 to 02.06.2012).

A. Bearing Capacities of Shallow Foundation :

Shallow foundations may be adopted with founding level at least 1.50m inside the layer I.

Refer layer I and cross section

EGL = +33.469m 'N' Value = 9

C = 5.30t/m² ϕ = 5° (Suggested)

m_v = 0.0220 cm²/kg (Suggested) γ_{bulk} = 1.970 t/m³

RL of foundation = +31.969m Thickness = 2.80m

i) Depth of Foundation below existing ground level : (33.469 – 1.50) = RL +31.969m

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	20.80	14.0	–	–
3.00 x 3.00	19.80	9.0	14.0	–
4.00 x 4.00	19.30	7.0	11.0	–
3.00 x 2.00	18.10	11.0	17.0	–
4.50 x 3.00	17.30	7.5	12.0	–
6.00 x 4.00	16.90	5.5	9.0	16.0
1.00m wide strip	18.60	16.0	–	–
1.50m wide strip	17.10	10.0	16.0	–
2.25m wide strip	15.80	7.0	11.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

ii) Depth of Foundation : i.e. RL = +29.919m, seating level of foundation

Top of layer II = +30.669m

Minimum embedment in layer II = 0.75 m.

Depth of foundation from E.G.L. = 3.55m

'N' Value = 16 C = 9.30 t/m²

ϕ = 8° (use ϕ = 0° in computation)

m_v = 0.0165 cm²/kg γ_{bulk} = 2.020 t/m³

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	33.70	20.0	–*	–
3.00 x 3.00	30.70	14.0	22.0	–
4.00 x 4.00	29.30	10.0	16.0	–
3.00 x 2.00	29.40	16.0	25.0	–
4.50 x 3.00	26.80	11.0	18.0	–
6.00 x 4.00	25.50	8.0	12.5	24.0
1.00m wide strip	32.60	16.0	25.0	–
1.50m wide strip	28.20	14.0	22.0	–
2.25m wide strip	24.80	10.0	16.0	–
5.00 x 40.00	22.40	–	10.10	–
6.00 x 40.00	22.00		9.10	17.10
7.00 x 40.00	21.80		–	15.90
8.00 x 40.00	21.70		–	15.10

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.
* : Very high value. Not suggested.

iii) Depth of Foundation : i.e. RL = +29.469m i.e. 4.00m from E.G.L.

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	34.80	20.0	–*	–
3.00 x 3.00	31.50	15.0	24.0	–
4.00 x 4.00	29.80	10.5	17.0	–
3.00 x 2.00	30.30	16.0	25.0	–
4.50 x 3.00	27.40	12.0	19.0	–
6.00 x 4.00	26.00	8.5	13.5	25.0
1.00m wide strip	35.10	20.0	–*	–
1.50m wide strip	29.90	16.0	25.0	–
2.25m wide strip	25.90	10.0	16.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.
* : Very high value. Not suggested.

Note :

Properties of Layer III :

'N' Value	=	40, 26	C	=	11.00 t/m²
ϕ	=	6° (use ϕ = 0° in computation)			
m_v	=	0.0060 cm²/kg (Suggested)	γ_{bulk}	=	2.040 t/m³

B. Effect of Fill :

Overburden (Thickness = 0.53m) pressure should be deducted from the above net safe bearing capacity values.

4.4.7 **BH-6 (TP-13, Stacker Reclaimer Fdn., Trestle Fdn. for Conv. Gallery 13AB, 14AB)**

Layer	Description	GL=+33.626	
		Thickness (m)	'N' Value
I	Very stiff greyish brown silty clay with rusty brown spots and traces of sand.	3.50	15
		+30.126	17
II	Very stiff to hard yellowish brown silt clay with traces of kankars, sand and occasional rusty brown patches.	10.50	27
		+19.626	34
III	Very stiff / hard yellowish brown / brown silty clay /clayey silt: high percentage of sand (at top), rusty brown patches, occasional fine mica flakes and traces of sand.	7.00	30 28
		+12.626	33
IV	Hard brown /yellowish brown clayey silt with fine mica flakes and sand in traces.	4.00	43
		+8.626	52
V	Very dense brown sand with fines fractions and fine mica flakes.	≥5.00	>100 >100
		≤+3.626	>100

Standing Water level 10.00m b.g.l. during the period of field work (05.06.2012 to 09.06.2012).

A. Bearing Capacities of Shallow Foundation :

Shallow foundations may be adopted with founding level at least 1.50m inside the layer I.

Refer layer I and cross section

EGL =	+33.626m		'N' Value	=	15
C =	6.30t/m²		ϕ	=	5° (Suggested)
m_v =	0.0170 cm²/kg (Suggested)		γ_{bulk}	=	2.000 t/m³
RL of foundation = +32.126m			Thickness	=	3.50 m

i) Depth of Foundation below existing ground level : (33.626 – 1.50) = RL +32.126m

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	24.70	13.5	22.0	–
3.00 x 3.00	23.60	9.0	14.0	–
4.00 x 4.00	23.00	6.5	11.0	20.0
3.00 x 2.00	21.60	11.0	17.0	–
4.50 x 3.00	20.60	7.5	12.0	–
6.00 x 4.00	20.00	5.5	9.0	16.5
1.00m wide strip	22.10	13.5	21.0	–
1.50m wide strip	20.30	10.5	16.0	–
2.25m wide strip	19.10	7.0	11.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

ii) Depth of Foundation : i.e. RL = 33.626 – 3.00 i.e. RL 30.626 or 3.00m below E.G.L.

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	28.20	20.0	–	–
3.00 x 3.00	25.90	14.5	23.0	–
4.00 x 4.00	24.7	10.5	16.0	–
3.00 x 2.00	24.6	18.0	–	–
4.50 x 3.00	22.60	12.0	19.0	–
6.00 x 4.00	21.60	8.5	13.5	–
1.00m wide strip	27.60	16.0	25.0	–
1.50m wide strip	24.00	15.0	24.0	–
2.25m wide strip	21.50	10.5	16.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

iii) Depth of Foundation : i.e. RL = +29.876, seating level of foundation i.e. 3.75m below E.G.L.

Top of layer II = +30.126m

'N' Value = 30 C = 12.20 t/m²

ϕ = 7° (use ϕ = 0° in computation)

m_v = 0.0115 cm²/kg γ_{bulk} = 2.030 t/m³

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	44.80	20.0	–*	–
3.00 x 3.00	40.80	16.0	25.0	–
4.00 x 4.00	38.70	12.0	19.0	–*
3.00 x 2.00	39.10	20.0	–*	–*
4.50 x 3.00	35.5	14.0	22.0	–
6.00 x 4.00	33.80	10.0	16.0	–*

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
1.00m wide strip	44.80	20.0	–*	–
1.50m wide strip	38.40	18.0	25.0	–
2.25m wide strip	34.10	12.0	19.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.
* : Very high value. Not suggested.

Note :

Properties of Layer III :

'N' Value = >30 C = 11.60 t/m²

ϕ = 9° (use ϕ = 0° in computation)

m_v = 0.0060 cm²/kg (Suggested) γ_{bulk} = 2.040 t/m³

B. Effect of Fill :

Overburden (Thickness = 0.37 m) pressure should be deducted from the above net safe bearing capacity values.

4.4.8 **BH-6A (TP-13, Stacker Reclaimer Fdn., Trestle Fdn. for Conv. Gallery 13AB, 14AB)**

Layer	Description	GL=+33.885	
		Thickness (m)	'N' Value
I	Stiff grey silty caly with brown patches, traces of kankars and sand.	3.00 +30.885	14
II	Very stiff to hard yellowish brown silty caly with traces of kankars, sand and occasional rusty brown patches.	9.00 +21.885	19 35
III	Very stiff/ hard yellowish brown/ brown silty caly/ clayey silt: fine mica flakes, traces of sand and occasional laminations. (Note : Intrusion of layer IIIA* from 17.00m to 19.00m depth b.g.l.).	12.50 +9.385	40 38 24 28 24
IV	Very stiff/ hard brown clayey silt with fine mica flakes.	≥2.50 ≤+6.885	29

Standing Water level 3.60m b.g.l. during the period of field work (10.06.2012 to 13.06.2012).

A. Bearing Capacities of Shallow Foundation :

Shallow foundations may be adopted with founding level at least 1.50m inside the layer I.

Refer layer I and cross section

EGL =	+33.885m		'N' Value	=	14
C	=	6.10 t/m²	ϕ	=	5° (Suggested)
m_v	=	0.0200 cm²/kg (Suggested)	γ_{bulk}	=	1.974 t/m³
RL of foundation = +32.385m			Thickness	=	3.00 m

i) Depth of Foundation below existing ground level : (33.885 – 1.50) = RL +32.385m

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	24.00	15.0	24.0	–
3.00 x 3.00	22.80	9.5	15.0	–
4.00 x 4.00	22.30	7.0	11.0	21.0
3.00 x 2.00	20.90	12.0	19.0	–
4.50 x 3.00	19.90	8.0	12.5	–
6.00 x 4.00	19.40	6.0	9.5	18.0
1.00m wide strip	21.40	17.5	–	–
1.50m wide strip	19.70	11.0	17.5	–
2.25m wide strip	18.50	7.5	12.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

ii) Depth of Foundation : i.e. RL = +30.885 m, seating level of foundation i.e. 3.00m depth from E.G.L.

Top of layer II = +30.885 m

'N' Value = 19 and 35 C = 10.20 t/m²

ϕ = 5° (use ϕ = 0° in computation)

m_v = 0.0165 cm²/kg(Suggested) γ_{bulk} = 2.040 t/m³

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	35.50	23.0	–	–
3.00 x 3.00	32.70	14.0	22.0	–

Size	NSBC	Suggested NABC		
		25.00mm	**40.00mm**	**75.00mm**
(m x m)	(t/m²)	(t/m²)		
4.00 x 4.00	31.40	9.5	15.0	25.0
3.00 x 2.00	30.90	17.0	25.0	–
4.50 x 3.00	28.50	11.0	18.0	–
6.00 x 4.00	27.30	8.0	12.0	–
1.00m wide strip	34.20	20.0	–*	–
1.50m wide strip	29.90	16.0	25.0	–
2.25m wide strip	27.10	10.0	16.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.
* : High value not suggested

iii) Depth of Foundation : i.e. RL = +29.885 m, i.e. 4.00m depth from E.G.L.

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	38.20	20.0	–*	–
3.00 x 3.00	34.50	15.0	24.0	–
4.00 x 4.00	32.70	10.0	16.0	–*
3.00 x 2.00	33.30	20.0	–*	–
4.50 x 3.00	30.10	12.0	19.0	–
6.00 x 4.00	28.50	8.5	13.5	25.0
1.00m wide strip	38.50	20.0	–*	–
1.50m wide strip	32.80	17.0	25.0	–
2.25m wide strip	29.00	10.5	16.5	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.
* : High value not suggested

Note :

Properties of Layer III :

'N' Value = 24 to 38 or more C = 10.10 t/m²

ϕ = 10° (use ϕ = 0° in computation)

m_v = 0.0060 cm²/kg (Suggested) γ_{bulk} = 2.010 t/m³

B. Effect of Fill :

Overburden (Thickness = 0.115m) pressure is nominal.

4.4.9 **BH-7 (TP-14, Trestle Fdn. for Conv. Gallery 14AB, 15AB)**

Layer	Description	GL=+34.110	
		Thickness (m)	'N' Value
I	Stiff to very stiff grey silty clay with yellowish /rusty brown patches, sand and kankars in traces.	5.00	16
		+29.110	18
II	Very stiff to hard yellowish brown silty clay with traces of sand, kankars and rusty/ reddish brown spots in occasional case.	8.50	30
		+20.610	31
IIIA	Dense yellowish brown sand with high percentage of fine and cohesive touch.	7.00	53 51 56
		+13.610	55
IV	Hard brown /yellowish brown silty caly (high silt content) /clayey silt and pockets of clayey sandy silt at 30.00m depth bgl; Varying percentage of sand /silt has been noticed along with presence of gravels from 30.00m depth.	≥11.50	48 63 54 60 93
		≤+2.110	>100

Standing Water level 6.00m b.g.l. during the period of field work (14.06.2012 to 16.06.2012).

A. Bearing Capacities of Shallow Foundation :

Shallow foundations may be adopted with founding level at least 1.50m inside the layer I.

Refer layer I and cross section

EGL =	+34.110m		'N' Value	=	16
C =	6.60 t/m²		ϕ	=	5° (Suggested)
m_v =	0.0200 cm²/kg (Suggested)		γ_{bulk}	=	1.990 t/m³
RL of foundation = +32.610m			Thickness	=	5.00 m

i) Depth of Foundation below existing ground level : (34.110 – 1.50) = RL +32.610m

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	25.90	16.0	25.0	–
3.00 x 3.00	24.70	9.5	15.0	–
4.00 x 4.00	24.10	7.0	11.0	21.0
3.00 x 2.00	22.60	12.5	20.0	–
4.50 x 3.00	21.50	7.5	12.0	–
6.00 x 4.00	21.00	6.0	9.5	18.0
1.00m wide strip	23.20	18.0	–	–
1.50m wide strip	21.30	12.0	19.0	–
2.25m wide strip	20.00	7.5	12.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

ii) Depth of Foundation : i.e. RL = +31.110m, seating level of foundation i.e. 3.00m depth below e.g.l.

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	29.60	18.0	–	–
3.00 x 3.00	27.10	12.5	20.0	–

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
4.00 x 4.00	25.90	10.0	16.0	–
3.00 x 2.00	22.60	8.5	13.5	–
4.50 x 3.00	25.80	15.0	24.0	–
6.00 x 4.00	23.70	10.5	16.5	–
1.00m wide strip	28.90	20.0	–	–
1.50m wide strip	25.10	14.0	22.0	–
2.25m wide strip	22.60	10.0	16.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

iii) Depth of Foundation : i.e. RL = +30.110m, seating level of foundation i.e. 4.00m depth below e.g.l.

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	32.00	20.0	25.0	–
3.00 x 3.00	28.80	18.0	25.0	–
4.00 x 4.00	27.10	15.0	23.0	–
3.00 x 2.00	27.90	20.0	–	–
4.50 x 3.00	25.10	15.0	24.0	–
6.00 x 4.00	23.70	12.5	20.0	–
1.00m wide strip	32.70	25.0	–	–
1.50m wide strip	27.60	18.0	–	–
2.25m wide strip	24.30	13.5	21.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

Note :

Properties of Layer II :

'N' Value = 30 C = 13.20 t/m²

ϕ = 6° (use ϕ = 0° in computation)

m_v = 0.0080 cm²/kg (Suggested) γ_{bulk} = 2.060 t/m³

4.4.10 **BH-8 (Trestle Fdn. for Conv. Gallery 15AB)**

Layer	Description	GL=+35.389	
		Thickness (m)	'N' Value
I	Very stiff light brownish grey to bluish grey silty clay with reddish brown spots and traces of sand. Note : 0.00m to 2.00m depth consistency is medium stiff/ soft.	6.50	4 17 22
		+28.889	21
II	Very stiff to hard yellowish to light reddish brown silty clay with bluish grey patches.	8.50	35
		+20.389	45
III	Hard yellowish to reddish brown sandy silty clay/ clayey sandy silt with fine micaflakes in traces, high plasticity has been observed at 24.00m depth b.g.l. (CH)	10.00	37 42 46 58
		+10.389	44
IV	Hard brown/ brownish yellow silty clay (high silt content)/ clayey silt with reddish brown spots and sand in traces.	≥5.00	60 58
		≤+5.389	68

Standing Water level 4.00m b.g.l. during the period of field work (30.06.2012 to 03.07.2012).

A. Bearing Capacities of Shallow Foundation :

Shallow foundations may be adopted with founding level at least 2.00m inside the layer I. It may be noted that 'N' value is low (4) at 1.00m depth b.g.l. As such depth of foundation at 1.00m m b.g.l has not been considered.

Refer layer I and cross section

EGL = +35.389m 'N' Value = 19

C = 7.80 t/m² ϕ = 5°

m_v = 0.0170 cm²/kg (Suggested) γ_{bulk} = 1.993 t/m³

RL of foundation = +33.389m Thickness = 6.50 m

i) Depth of Foundation below existing ground level : (35.389 – 2.00) = RL +33.389m

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	32.10	20.0	–*	–
3.00 x 3.00	30.10	12.0	19.0	–
4.00 x 4.00	29.20	8.5	13.5	25.0
3.00 x 2.00	28.00	16.0	25.0	–
4.50 x 3.00	26.30	9.0	14.0	–
6.00 x 4.00	25.40	6.5	10.0	19.0
1.00m wide strip	29.70	20.0	–	–
1.50m wide strip	26.70	14.0	22.0	–
2.25m wide strip	24.70	9.0	14.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.
* : Very high value. Not suggested.

ii) Depth of Foundation : i.e. RL = 35.389 – 3.00 i.e. RL 32.389 or 3.00m below E.G.L.

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	34.90	21.0	–*	–
3.00 x 3.00	32.10	12.5	20.0	–
4.00 x 4.00	30.60	9.0	14.0	–*
3.00 x 2.00	30.50	17.0	25.0	–
4.50 x 3.00	28.00	10.0	16.0	–
6.00 x 4.00	26.70	7.5	12.0	23.0

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
1.00m wide strip	34.20	21.0	–	–
1.50m wide strip	29.70	15.0	24.0	–
2.25m wide strip	26.70	9.5	15.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.
* : Very high value. Not suggested.

iii) Depth of Foundation : i.e. RL = +31.389, seating level of foundation i.e. 4.00m below E.G.L.

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	37.80	22.0	–*	–
3.00 x 3.00	34.00	14.0	22.0	–
4.00 x 4.00	32.10	11.0	17.0	–
3.00 x 2.00	33.00	18.0	25.0	–
4.50 x 3.00	29.60	11.0	17.0	–
6.00 x 4.00	28.00	9.0	14.0	–*
1.00m wide strip	38.70	22.0	–	–
1.50m wide strip	32.70	16.0	25.0	–
2.25m wide strip	28.70	10.5	17.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.
* : Very high value. Not suggested.

It is to be mentioned that presence of slicken sides at UDS (10.00m depth b.g.l) has been observed. As such low shear value (C = 5.70 t/m², ϕ = 9°) has been obtained at laboratory. For deep excavation this is to be taken care of. Observations are to be made and precautions are to be taken against any sudden collapse during excavation.

4.4.11 **BH-11 (TP-B, Trestle Fdn. for Conv. Gallery 13C)**

Layer	Description	GL=+33.380	
		Thickness (m)	'N' Value
I	Stiff grey silty clay with rusty brown spots, traces of sand and kankars	2.60 +30.780	8
II	Stiff to very stiff yellowish brown silty clay with rusty brown patches, occasional kankars and sand in traces (high silt content at bottom)	11.20 +19.580	9 11 19
*	Dense yellowish brown sand with fine mica flakes and fines	1.40 +18.180	40
III	Very stiff yellowish brown to light reddish brown silty clay with fine mica flakes and varying percentage of sand.	5.80 +12.380	28 19
IV	Hard yellowish brown silty clay (high silt content with some plasticity) with laminations of silt, traces of sand and fine micaflakes.	4.00 +8.380	30 39
V	Dense to very dense brown sand with fine mica flakes and fines (non plastic).	≥5.00 ≤+3.380	69 >100 54

Standing Water level 14.80m b.g.l. during the period of field work (25.05.2012 to 27.05.2012).

A. Bearing Capacities of Shallow Foundation :

Shallow foundations may be adopted with founding level at least 1.50m inside the layer I.

Refer layer I and cross section

EGL = +33.380m 'N' Value = 8

C = 4.30 t/m² ϕ = 5° (Suggested)

m_v = 0.029 cm²/kg (Suggested) γ_{bulk} = 1.986 t/m³

RL of founding level = +31.880m Thickness = 2.60 m

i) Depth of Foundation below existing ground level : (33.380 – 1.50) = RL +31.880m

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	16.90	11.5	–	–
3.00 x 3.00	16.10	7.5	12.0	–
4.00 x 4.00	15.70	6.0	9.5	–
3.00 x 2.00	14.70	9.5	14.0	–
4.50 x 3.00	14.00	6.5	10.0	–
6.00 x 4.00	13.70	5.0	8.0	–
1.00m wide strip	15.10	13.0	–	–
1.50m wide strip	13.90	8.5	13.0	–
2.25m wide strip	13.00	6.0	9.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

ii) Depth of Foundation : i.e. RL = +30.030 m, seating level of foundation

Top of layer II = +30.780m

Minimum embedment in layer II = 0.75 m

'N' Value = 13 C = 6.50 t/m²

ϕ = 8° (use ϕ = 0° in computation)

m_v = 0.0190 cm²/kg γ_{bulk} = 2.032 t/m³

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	23.20	20.0	–	–
3.00 x 3.00	21.30	12.5	20.0	–

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
4.00 x 4.00	20.30	8.5	14.0	–
3.00 x 2.00	20.20	15.0	–	–
4.50 x 3.00	18.50	10.0	16.0	–
6.00 x 4.00	17.70	7.0	11.0	–
1.00m wide strip	22.80	20.0	–	–
1.50m wide strip	19.70	14.0	–	–
2.25m wide strip	17.70	9.0	14.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

B. Effect of Fill :

Overburden (Average thickness 0.62m) pressure should be deducted from the above net safe bearing capacity values.

4.4.12 **BH-12, BH-12A, BH-14 and BH-14A**

Layer	Description	BH-12		BH-12A		BH-14		BH-14A	
		GL=+32.845		GL=+32.534		GL=+32.997		GL=+33.059	
		Thickness (m)	'N' Value	Thickness (m)	'N' Value	Thickness (m)	'N' Value	Thickness (m)	'N' Value
I	Stiff light grey/ yellowish/ reddish brown silty clay with occasional kankars, traces of sand and rusty brown spots.	2.50	15	2.80	16	3.00	12	3.00	11
		+30.345		+29.734		+29.997		+30.059	
II	Very stiff yellowish to reddish brown/ brown silty clay with traces of kankars/ moorums and sand in varying percentages.	11.00	18 23 28	8.20	19 30	14.00	20 36 21 27 25	11.00	22 29 36
		+19.345		+21.534		+15.997		+19.059	

Layer	Description	BH-12		BH-12A		BH-14		BH-14A	
		GL=+32.845		GL=+32.534		GL=+32.997		GL=+33.059	
		Thickness (m)	'N' Value	Thickness (m)	'N' Value	Thickness (m)	'N' Value	Thickness (m)	'N' Value
III	Very stiff to hard yellowish brown/ reddish brown silty clay to clayey silt with reddish brown spots/ patches, traces of kankars, fine micaflakes and sand.	10.50	32 39 44 36 40	3.00	34	4.00	30 53	11.00	23 28 27 36 36 32
		+8.845		+18.534		+11.997		+8.059	
IV	Hard brown/ grey/ rusty brown silty clay (generally high silt content) clayey sandy silt with/ without laminations, reddish brown spots/ patches, fine micaflakes and occasional high percentages of sand at bottom.	5.00	65 70 63	≥16.00	45 52 58 37 39 60 61 68 66	5.00	39 60 61	≥5.00	45 42 >100*
		+3.845		≤+2.534		+6.997		≤+3.059	
V	Dense to very dense yellowish brown sand with varying percentage of fines and cohesive touch.	≥1.00	78	–	–	≥4.00	63 85	–	–
		≤+2.845				≤+2.997			

BH-12 : Standing Water level 1.60m b.g.l. during the period of field work (10.07.2012 to 12.07.2012).

BH-12A : Standing Water level 2.50m b.g.l. during the period of field work (17.06.2012 to 19.06.2012).

BH-14 : Standing Water level 1.81m b.g.l. during the period of field work (07.07.2012 to 08.07.2012).

BH-14A : Standing Water level 2.00m b.g.l. during the period of field work (03.07.2012 to 05.07.2012).

A. Bearing Capacities of Shallow Foundation :

Shallow foundations may be adopted with founding level at least 1.50m inside the layer I for all these bore holes mentioned herein above.

BH-12 and BH-12A (Stacker Reclaimer Fdn. for Conv. 22A) :

Refer layer I and cross section (BH-12 and BH-12A).

FGL =	+34.000m	'N' Value	=	15 to 16
C =	6.3 t/m²	ϕ	=	5°
m_v =	0.020 cm²/kg	γ_{bulk}	=	2.00 t/m³
RL of top of layer I = +32.700m (Av.)		Average Thickness	=	2.65m

i) Depth of Foundation below existing ground level : (32.70 – 1.50) = RL +31.200m

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	24.70	16.0	20.0	–
3.00 x 3.00	23.60	11.0	16.0	–
4.00 x 4.00	23.00	8.5	13.0	–
3.00 x 2.00	21.60	13.0	20.0	–
4.50 x 3.00	20.60	9.0	14.0	–
6.00 x 4.00	20.00	7.0	11.0	–
1.00m wide strip	22.10	18.0	20.0	–

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
1.50m wide strip	20.30	12.0	18.0	–
2.25m wide strip	19.10	8.5	13.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

ii) Depth of Foundation : i.e. RL ≈ +29.300m, seating of foundation

Top of layer II = +30.050m (Av.)

Minimum embedment in layer II = 0.75m

'N' Value = 18 to 23 C = 9.21 t/m²

ϕ = 6° (use ϕ = 0° in computation)

m_v = 0.0165 cm²/kg γ_{bulk} = 2.028 t/m³ to 2.060 t/m³

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	33.00	20.0	25.0	–
3.00 x 3.00	30.20	17.0	25.0	–
4.00 x 4.00	28.80	12.0	19.0	–
3.00 x 2.00	28.80	20.0	–	–
4.50 x 3.00	26.30	14.0	20.0	–
6.00 x 4.00	25.10	10.0	16.0	–
1.00m wide strip	32.40	20.0	–*	–
1.50m wide strip	28.10	16.0	25.0	–
2.25m wide strip	25.20	12.5	20.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.
* : Very high value. Not suggested.

BH-14 and BH-14A (Stacker Reclaimer Fdn. for Conv. 22A) :

FGL = +34.000m

RL of top of layer I = +33.030m (Av.)

'N' Value = 11 to 12 C = 5.6 t/m²

ϕ = 5° m_v = 0.022 cm²/kg

γ_{bulk} = 1.987 t/m³

i) Depth of Foundation below existing ground level : (33.030 – 1.50) = RL +31.530m, seating of foundation

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	22.00	15.0	–	–
3.00 x 3.00	21.00	10.5	16.0	–
4.00 x 4.00	20.40	8.0	12.0	–
3.00 x 2.00	19.20	12.5	18.0	–
4.50 x 3.00	18.30	8.5	13.0	–
6.00 x 4.00	17.80	6.5	10.5	–
1.00m wide strip	19.70	16.0	–	–
1.50m wide strip	18.10	12.0	18.0	–
2.25m wide strip	17.00	8.0	12.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

ii) Depth of Foundation : Min. embedment 0.75m in Layer II

Top of layer II = +30.030m

RL = +29.280m, seating of foundation

'N' Value = 20 to 36 C = 10.50 t/m²

ϕ = 7° (use ϕ = 0° in computation)

m_v = 0.0160 cm²/kg γ_{bulk} = 2.030 t/m³

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	38.60	20.0	–*	–
3.00 x 3.00	35.10	18.0	–*	–
4.00 x 4.00	33.30	13.0	20.0	–
3.00 x 2.00	33.60	20.0	–*	–
4.50 x 3.00	30.60	15.0	20.0	–
6.00 x 4.00	29.10	10.5	15.0	–
1.00m wide strip	38.50	20.0	–*	–
1.50m wide strip	33.00	20.0	–*	–
2.25m wide strip	29.40	13.0	20.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.
* : Very high value. Not suggested.

B. Effect of Fill :

Overburden (Average thickness ≈ 1.15m) pressure should be deducted from the above net safe bearing capacity values.

4.4.13 **BH-13 (Stacker Reclaimer Fdn. for Conv. 22A, Drive House DH-1)**

Layer	Description	GL=+32.715	
		Thickness (m)	'N' Value
I	Very stiff brownish grey silty clay with traces of sand, bluish grey/ grey patches and presence of dark grey moorum/ kankars.	5.80	16 19
		+26.915	

Layer	Description	GL=+32.715	
		Thickness (m)	'N' Value
II	Hard yellowish/ reddish brown silty clay with traces of sand, bluish grey patches and occasional presence of moorum.	6.20	61
		+20.715	
III	Hard yellowish brown sandy silty clay with bluish grey patches in traces, sand content generally increases with depth/ clayey sand with fine micaflkes.	2.50	25 42
		+18.215	
IV	Hard reddish brown silty clay (generally high silt content) with varrying sand content, fine micaflkes, occasional laminations and deep/ rusty brown spots.	≥15.50	47 39 46 77 93 55 72
		≤+2.715	80

Standing Water level 1.20m b.g.l. during the period of field work (04.07.2012 to 05.07.2012).

A. Bearing Capacities of Shallow Foundation :

Shallow foundations may be adopted with founding level at least 1.50m inside the layer I.

Refer layer I and cross section

EGL = +32.715m 'N' Value = 18

C = 7.10 t/m² ϕ = 5° (Suggested)

m_v = 0.0150 cm²/kg (Suggested) γ_{bulk} = 2.040 t/m³

RL of foundation = +31.215m Thickness = 5.80 m

i) Depth of Foundation below existing ground level : (32.715 – 1.50) = RL +31.215m

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	27.90	20.0	–	–
3.00 x 3.00	26.60	12.5	20.0	–
4.00 x 4.00	25.90	8.5	13.0	20.0
3.00 x 2.00	24.30	17.0	–	–
4.50 x 3.00	23.20	9.5	15.0	–
6.00 x 4.00	22.60	7.0	11.0	20.0
1.00m wide strip	25.00	20.0	–	–
1.50m wide strip	22.90	15.0	–	–
2.25m wide strip	21.50	9.5	15.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

ii) Depth of Foundation : i.e. RL = +30.715m, seating level of foundation i.e. 2.00m depth below e.g.l.

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	29.20	21.0	–	–
3.00 x 3.00	27.40	13.0	20.0	–
4.00 x 4.00	26.60	10.0	16.0	–
3.00 x 2.00	25.40	18.0	–	–
4.50 x 3.00	23.90	10.0	16.0	–
6.00 x 4.00	23.20	7.0	11.0	20.0
1.00m wide strip	27.00	21.0	–	–
1.50m wide strip	24.30	16.0	–	–
2.25m wide strip	22.40	10.0	16.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

iii) Depth of Foundation : i.e. RL = +29.715m, seating level of foundation i.e. 3.00m depth below e.g.l.

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	31.80	22.0	–	–
3.00 x 3.00	29.20	14.0	22.0	–
4.00 x 4.00	27.90	10.0	16.0	–
3.00 x 2.00	27.70	18.0	–	–
4.50 x 3.00	25.40	11.0	17.0	–
6.00 x 4.00	24.30	9.0	14.0	–
1.00m wide strip	31.10	22.0	–	–
1.50m wide strip	27.00	17.0	25.0	–
2.25m wide strip	24.30	11.0	17.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

Note :

Properties of Layer II :

'N' Value	=	30 say,	C	=	13.60 t/m²
ϕ	=	6° (use ϕ = 0° in computation)	γ_{bulk}	=	2.060 t/m³
m_v	=	0.0080 cm²/kg (Suggested)	Thickness	=	6.20m

B. Effect of Fill :

Overburden (Thickness = 1.285 m) pressure should be deducted from the above net safe bearing capacity values.

4.4.14 **BH-15 (Stacker Reclaimer Fdn. for Conv. 22B, Drive House DH-2)**

Layer	Description	GL=+33.049	
		Thickness (m)	'N' Value
I	Very stiff yellowish to light reddish brown silty clay with light grey to bluish grey patches, traces of sand and moorum	3.50	20
		+29.549	
II	Very stiff to hard yellowish to light reddish brown silty clay with sand and bluish grey patches in traces	9.00	28
		+20.549	30
III	Hard yellowish brown/brown silty clay with traces of sand /sandy silty clay (varying percentage of sand from 14.00m to 18.50m depth b.g.l) with occasional bluish grey patches at the upper zone; high percentage of sand at 18.00m depth b.g.l and high percentage of silt from 20.00m depth b.g.l	14.00	33 50 43 39 27 34 32
		+6.549	35
IV	Hard yellowish brown /brownish grey sandy silty clay with rusty brown spots and patches	3.50	68
		≤+3.049	57

Standing Water level 4.10m b.g.l. during the period of field work (30.06.2012 to 03.07.2012).

A. Bearing Capacities of Shallow Foundation :

Shallow foundations may be adopted with founding level at least 1.50m inside the layer I.

Refer layer I and cross section

EGL = +33.049m 'N' Value = 20

C = 7.90 t/m² ϕ = 0°

m_v = 0.0180 cm²/kg γ_{bulk} = 1.996 t/m³

RL of foundation = +31.549m Thickness = 3.50m

i) Depth of Foundation below existing ground level : (33.049 – 1.50) = RL +31.549m

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	24.30	17.0	–	–
3.00 x 3.00	23.20	11.0	18.0	–
4.00 x 4.00	22.70	9.0	14.0	–
3.00 x 2.00	21.20	14.0	20.0	–
4.50 x 3.00	20.20	10.0	16.0	–
6.00 x 4.00	19.80	8.0	12.5	–
1.00m wide strip	21.50	18.0	–	–
1.50m wide strip	19.90	13.5	–	–
2.25m wide strip	18.80	9.5	15.5	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

ii) Depth of Foundation : i.e. RL = +31.049m, seating level of foundation i.e. 2.00m below e.g.l

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	25.3	18.0	–	–
3.00 x 3.00	23.9	13.5	21.0	–
4.00 x 4.00	23.2	11.0	17.0	–
3.00 x 2.00	22.1	16.0	–	–
4.50 x 3.00	20.9	11.5	18.0	–
6.00 x 4.00	20.2	9.0	14.0	–
1.00m wide strip	23.2	19.0	–	–
1.50m wide strip	21.0	14.0	–	–
2.25m wide strip	19.5	11.0	17.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

iii) Depth of Foundation : i.e. RL = +30.049m i.e. 3.00m from E.G.L.

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	27.4	20.0	–	–
3.00 x 3.00	25.3	20.0	–	–
4.00 x 4.00	24.3	16.0	–	–
3.00 x 2.00	23.9	20.0	–	–
4.50 x 3.00	22.1	18.0	–	–
6.00 x 4.00	21.2	13.0	20.0	–
1.00m wide strip	26.5	20.0	–	–
1.50m wide strip	23.2	20.0	–	–
2.25m wide strip	21.0	16.0	–	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

Note: Properties of layer II

'N' Value = 29 C = 12.50t/m²

ϕ = 6° (use ϕ = 0° in computation)

m_v = 0.0080 cm²/kg γ_{bulk} = 2.050 t/m³

Thickness = 9.00m

B. Effect of Fill :

Overburden (Thickness = 0.95m) pressure should be deducted from the above net safe bearing capacity values.

4.4.15 **BH-18 and BH-16**

Layer	Description	BH-18		BH-16	
		GL=+33.136		GL=+33.426	
		Thickness (m)	'N' Value	Thickness (m)	'N' Value
I	Medium stiff to stiff grey silty clay with traces of kankars, rusty brown/ yellow patches and sand.	3.00	12	2.70	5
		+30.136		+30.726	
II	Stiff to very stiff brown/ yellowish brown silty clay with rusty reddish brown patches, traces of kankars and sand.	5.00	16	8.30	9 8
		+25.136		+22.426	
III	Very stiff brown/ yellowish brown silty clay with traces of sand, fine micaflakes, kankars at lower region; varying percentage of silt is also noticed along with occasional laminations.	9.00	34 26 46 24 27	9.00	25 27
		+16.136		+13.426	
IV	Hard brown sandy silty clay/ clayey sandy silt with varying percentage of sand, fine micaflakes, occasional kankars and lamination of silt.	9.00	35 40 44 49	3.00	41 64
		+7.136		+10.426	
V	Dense to very dense brown sand with varying percentage of fines, gravels and little cohesive touch : presence of pocket / band of hard brown silty clay with traces of sand, gravels and rusty brown patches.	4.00	60 93 >100	7.00	83 70 >100 >100
		≤+3.136		≤+3.426	

BH-18 : Standing Water level 7.20m b.g.l. during the period of field work (12.07.2012 to 15.07.2012).

BH-16 : Standing Water level 6.00m b.g.l. during the period of field work (10.05.2012 to 24.05.2012).

A. Bearing Capacities of Shallow Foundation :

Shallow foundations may be adopted with founding level at least 1.50m inside the layer I for all these bore holes mentioned herein above.

BH-18 :

Refer layer I and cross section (BH-18 and BH-16).

FGL = +33.136m 'N' Value = 12

C = 5.50 t/m² ϕ = 5°

m_v = 0.020 cm²/kg γ_{bulk} = 1.99 t/m³

RL of top of layer I = +33.136m Thickness = 3.00m

i) Depth of Foundation below existing ground level : (33.136 – 1.50) = RL +31.636m

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	21.60	15.0	20.0	–
3.00 x 3.00	20.60	10.0	15.0	–
4.00 x 4.00	20.10	8.0	12.0	–
3.00 x 2.00	18.80	12.0	18.0	–
4.50 x 3.00	17.90	8.0	14.0	–
6.00 x 4.00	17.50	6.0	10.0	–
1.00m wide strip	19.30	16.0	18.0	–
1.50m wide strip	17.70	12.0	16.0	–
2.25m wide strip	16.70	8.0	12.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

ii) Depth of Foundation : i.e. RL ≈ +29.386m, seating level of foundation

Top of layer II = +30.136m (Av.)

Minimum embedment in layer II = 0.75m

'N' Value = 16 C = 8.00 t/m²

ϕ = 7° (use ϕ = 0° in computation)

m_v = 0.0160 cm²/kg γ_{bulk} = 2.020 t/m³

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	29.40	20.0	25.0	–
3.00 x 3.00	26.70	16.0	20.0	–
4.00 x 4.00	25.40	12.0	18.0	–
3.00 x 2.00	25.60	20.0	24.0	–
4.50 x 3.00	23.30	13.0	18.0	–
6.00 x 4.00	22.10	9.0	15.0	–
1.00m wide strip	29.40	20.0	25.0	–
1.50m wide strip	25.20	16.0	20.0	–
2.25m wide strip	22.40	12.0	18.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

B. Effect of Fill :

Overburden (Average thickness ≈ 0.86m) pressure should be deducted from the above net safe bearing capacity values.

C. Raft Foundation at RL = +23.136, i.e. 10.00 m below E.G.L. Refer Sheet No. 85

Raft width = 10.00m = B

Depth of foundation = 10.00m from E.G.L. i.e. at layer III.

Calculation of bearing capacity.

$q_u \approx CN_C$, neglect shape and depth factor

$q_u = 11.5 \times 5.14$ t/m²,

$q_{safe} = \frac{10.0 \times 5.14}{2.5}$ t/m²

$= 23.64$ t/m²

Adopt 20.00 t/m²

Check for settlement. Use 2V : 1H pressure distribution.

Layer III	0.006 x 700 x 0.548 x 2.0 cm	=	4.60 cm
Layer IV	0.005 x 900 x 0.216 x 2.0 cm	=	1.94 cm
			6.54 cm

RF = 0.8

$\lambda = \frac{0.5 + 0.7}{2}$

$= 0.6$

Settlement = [6.54 x 0.8 x 0.6] Neglect Depth Factor

= 3.139 cm

For 25mm, q = 15.93 t/m² ≈ 16.00 t/m² (Depth Factor Neglected)

Depth factor ≈ 0.74, if considered.

Settlement ≈ 2.30 cm

Suggested K_s = 15.50 MN/m³

q ≈ 20.00 t/m² Designer may choose q value accordingly

Check for depth of excavation

Weighted C = $\frac{5.50\times3.0+8.00\times5.0+2.00\times11.5}{10.0}$ t/m²

= 7.95 t/m²

Ref. Soil Mechanics and Foundation Engg., V. N. S. Murthy, Fig. 16.24. Page 514.

N_s = $\frac{C}{\gamma.H.F_c}$ $\phi = 0°$, $\beta = 66°$, $N_s = 0.20$

Assume γ = 2.00 t/m³

F_C = 1.50

H = $\frac{7.95}{2\times0.20\times1.5}$

= 13.25m, ok.

It may be noted that ϕ has been neglected. With $\phi = 5°$, $N_s = 0.175$, H ≈ 14.90m.

Check for layer I,

H = $\frac{5.50}{2\times0.19\times1.5}$ $N_s = 0.19$, $\beta = 60°$

= 9.65m ok.

D. Observations :

i) **Layer I :** Provide slope 60° (1.73 V : 1 H). Thickness is 3.00m. Recorded 'N' value = 12. Flater slope has been provided on conservative ground. Provide berm at +30.136 RL (Min. width = 0.50m). Width of berm may be more depending upon requirement.

ii) **Layer II :** Provide slope 66° (2.25 V : 1 H). Construct berm at +27.636 RL (Min. width = 0.50m). Use this slope onward and provide berm at every (≈ 3.00m or so as shown) depth interval or interface of layers. Width of berm may be more depending upon requirement.

iii) Refer General Notes as applicable. Refer Sheet No. 77.

iv) **Soil Classifications :** In grace of water into the foundation bed will be managed by pump. The nature of soil is stiff/ very stiff/ hard considering its consistency. As such presence of cracks, lenses/ partings of silt/ sand may cause instability of the slopes provided and width of berm may be increased. In such case precautionary measures along with provision of local shoring or sheet piling may be necessary. Provide side drainage at the berm level and adequate arrangement should be adopted so that outside water from ground surface level may not enter into the action area including the entrance/ exit slope/ area/ ramp for construction equipment etc.

Layer	Classification
I	CH
II	CH/CI
III	CH/CI
IV	CL

v) **Dumping of Excavated Earth :** No excavated soil should be kept within (*1 x Depth of excavation) from the edge of the excavated area. Care is to be taken considering the presence of cracks (if any). Close supervision is essential in this context.

* It may be more depending upon cracks and management of surface water or subsurface water as mentioned.

vi) Experience in similar situation should be utilized along with engineering judgment.

vii) **Structures near by Excavation :** Follow IS 1904-1986 and design accordingly.

<u>BH-16 (Tunnel for Conv. 8A, Foundation for Conv.Gallery 8A, Pent House near Tunnel for Conv. 8A) :</u>

FGL = +34.000m

RL of top of layer I = +33.426m

'N' Value = 5 C = 3.6 t/m²

ϕ = 5° m_v = 0.036 cm²/kg (suggested)

γ_{bulk} = 1.940 t/m³

i) Depth of Foundation below existing ground level : (33.426 – 1.50) = RL +31.926m, seating level of foundation

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	14.10	9.0	13.0	–
3.00 x 3.00	13.50	6.5	10.5	–
4.00 x 4.00	13.10	5.0	8.5	–
3.00 x 2.00	12.30	8.0	12.0	–
4.50 x 3.00	11.70	5.5	9.0	–
6.00 x 4.00	11.50	4.5	7.0	–
1.00m wide strip	12.70	10.5	12.0	–
1.50m wide strip	11.60	7.0	11.0	–
2.25m wide strip	10.90	5.0	8.5	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

ii) Depth of Foundation : Min. embedment 0.75m in Layer II

Top of layer II = +30.726m

RL = +29.976m, seating level of foundation

'N' Value = 9 C = 5.60 t/m²

ϕ = 7° (use ϕ = 0° in computation)

m_v = 0.0190 cm²/kg γ_{bulk} = 2.00 t/m³

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	20.10	16.0	18.0	–
3.00 x 3.00	18.40	12.0	16.0	–
4.00 x 4.00	17.50	9.0	12.0	–
3.00 x 2.00	17.60	15.0	16.0	–
4.50 x 3.00	16.00	10.0	15.0	–

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
6.00 x 4.00	15.30	7.0	10.0	–
1.00m wide strip	19.80	15.0	16.0	–
1.50m wide strip	17.10	14.0	15.0	–
2.25m wide strip	15.30	9.0	14.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

E. Effect of Fill :

Overburden (Average thickness ≈ 0.57m) pressure should be deducted from the above net safe bearing capacity values.

4.4.16 **BH-17**

Layer	Description	GL=+33.124	
		Thickness (m)	'N' Value
I	Medium stiff light grey to bluish grey sandy silty clay with brown spots and kankars/ moorum in traces.	5.00	6 11 13
		+28.124	19
II	Hard/ very stiff yellowish brown/ reddish brown silty clay with traces of sand, bluish grey/ grey patches, kankars in traces and laminations at bottom.	12.00	40 44 23
		+16.124	25
III	Hard yellowish brown/ reddish brown silty clay (high silt content) with traces of sand.	6.00	42 42
		+10.124	39
IV	Hard reddish brown/ brown clayey silt with fine micaflakes, traces of sand, kankars and fine micaflakes.	5.00	60
		+5.124	47
V	Dense to very dense brown to reddish brown sand with high percentage of fines and fine micaflakes; little cohesive touch is also present.	≥2.00	93 101
		≤+3.124	

Note : Low 'N' values of 6 and 11 at 1.00m and 2.00m depth b.g.l.

Standing Water level 9.50m b.g.l. during the period of field work (14.07.2012 to 16.07.2012).

A. Bearing Capacities of Shallow Foundation :

Shallow foundations may be adopted with founding level at least 2.00m inside the layer I. it may be noted that there are low 'N' values upto 2.00m depth b.g.l. (N = 6 at 1.00m depth b.g.l.and 11 at 2.00m depth b.g.l.).

FGL = +33.124m

RL of top of layer I = +33.124m

'N' Value = 14 (Average value beyond 2.00m depth b.g.l.)

C = 7.00 t/m² (Suggested)

ϕ = 5° (Suggested)

m_v = 0.0180 cm²/kg (suggested)

γ_{bulk} = 1.990 t/m³ (Suggested)

Thickness = 5.00 m

i) Depth of Foundation : i.e. RL = +31.124m, seating level of foundation i.e. 2.00m depth below e.g.l.

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	28.80	19.0	–	–
3.00 x 3.00	27.10	11.0	17.0	–
4.00 x 4.00	26.20	8.5	13.5	25.0
3.00 x 2.00	25.10	15.0	24.0	–
4.50 x 3.00	23.60	9.0	14.0	–

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
6.00 x 4.00	22.80	7.0	11.0	21.0
1.00m wide strip	26.60	16.0	25.0	–
1.50m wide strip	23.90	14.0	22.0	–
2.25m wide strip	22.10	9.0	14.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

ii) Depth of Foundation : i.e. RL = +30.124m, seating level of foundation i.e. 3.00m depth below e.g.l.

Size	NSBC	Suggested NABC		
		25.00mm	40.00mm	75.00mm
(m x m)	(t/m²)	(t/m²)		
2.00 x 2.00	31.40	20.0	–	–
3.00 x 3.00	28.80	12.0	19.0	–
4.00 x 4.00	27.50	10.0	16.0	–
3.00 x 2.00	27.30	17.0	25.0	–
4.50 x 3.00	25.10	11.0	17.0	–
6.00 x 4.00	24.00	9.0	14.0	–
1.00m wide strip	30.70	17.0	25.0	–
1.50m wide strip	26.60	15.0	24.0	–
2.25m wide strip	23.90	10.0	16.0	–

NSBC : Net Safe Bearing Capacity from Shear Consideration.
NABC : Net Allowable Bearing Capacity from Shear and Settlement Consideration.

B. Effect of Fill :

Overburden (Thickness = 0.87m) pressure should be deducted from the above net safe bearing capacity values.

for **SARDIP CONSULTING ENGINEERS**

(G. C. Das)
BE, M Tech

MCNALLY BHARAT ENGINEERING COMPANY LIMITED

CHP-2 Site Office, Sagardighi Thermal Power Plant WBPDCL, Murshidabad

FINAL REPORT ON

SOIL INVESTIGATION WORK FOR CHP-2 PROJECT SAGARDIGHI THERMAL POWER PLANT, WEST BENGAL.

Volume -II

SARDIP CONSULTING ENGINEERS

KOLKATA

Job No. SAR/2011367

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CHP-2 Site Office, Sagardighi Thermal Power Plant WBPDCL, Murshidabad

FINAL REPORT ON
SOIL INVESTIGATION WORK FOR CHP-2 PROJECT SAGARDIGHI THERMAL POWER PLANT, WEST BENGAL.

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BH-01 TP-15, BH-TP-16, BH-01 TP-17, BH-TP-18, BH-01 TP-19, PLT-01 TP-19, PLT-02, CPLT-01

SARDIP CONSULTING ENGINEERS
KOLKATA

Job No. SAR/2011367

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CHAPTER - I

1.0 PREFACE

Soil Investigation Work for CHP-2 project Sagardighi Thermal Power Plant, West Bengal was assigned to **Sardip Consulting Engineers,** CJ-147, Ground & 1st Floor, Sector-II, Kolkata 700091 by **Mcnally Bharat Engineering Company Limited,** CHP-2 Site Office, Sagardighi Thermal Power Plant WBPDCL, Murshidabad.

1.1 Scope of Investigation

Second Phase

The scope of work as per the assignment consists of sinking five (05) nos. bore holes of depth of 30.00m from the E.G.L, conducting two(02) nos Routine Plat Load Test and one(01)Cyclic Plate Load Test at the proposed site.

The present sub-soil investigation work can be broadly divided into the following activities.

a) Sinking of bore holes

b) Carrying in-situ tests - Standard penetration tests

c) Collection of disturbed and undisturbed soil samples.

d) Carrying out laboratory tests.

e) Conducting Routine and Cyclic Plat Load Tests

f) Preparation and Submission of report

The object of the present sub-soil investigation is:

i) Identification of the sub-soil profile.

ii) Determination of the soil design parameters.

iii) Recommendation for bearing capacity of foundations

1.2 **Presentation of Report**

Second Phase

Volume –IV : Report Containing BH-01 TP-15, BH-TP-16, BH-01 TP-17, BH-TP-18,BH-01TP-19, PLT-01 TP-19, PLT-02, CPLT-01

CHAPTER - II

2.0 METHOD OF INVESTIGATION

2.1 The Bore Hole No, Plate Load Tests, Co-ordinates, depths of bore holes / Tests from existing ground level, ground elevation and date of commencement and completion are mentioned below. The locations, depth and number of bore holes and Plate Load Tests are selected by the clients. .

Bore Holes No.	Tentative Location	Co-ordinates	Termination Depth / Depth of Test	Ground Elevation	Date of Commencement	Date of Completion
			(m) b.g.l.	(m)		
BH-01 TP-15	–	E:1163.800 N:1118.000	30.00	+34.500	13.10.12	15.10.12
BH-TP-16	–	E:1185.751 N:1163.822	30.00	+34.100	08.11.12	09.11.12
BH-01 TP-17	–	E:1163.800 N:1251.750	30.00	+33.750	11.10.12	13.10.12
BH-TP-18	–	E:1163.822 N:1304.251	30.00	+34.150	11.11.12	18.11.12
BH-01 TP-19	–	E:1179.953 N:1363.220	30.00	+34.168	04.10.12	05.10.12
PLT-01 TP-19	–	E:1157.394 N:1377.532	5.00	+29.325	09.10.12	09.10.12
PLT-02	Track Hopper	E:130.610 N: 1140.540	3.10	+33.125	23.11.12	23.11.12
CPLT-01	–	E:540.510 N: 1110.230	3.00	+34.230	13.11.12	13.11.12

Standing Water level during the period of field work

Bore Holes No.	Date	Water level (m) b.g.l.
BH-01 TP-15	13.10.2012 to 15.10.2012	7.50
BH-TP-16	08.11.2012 to 09.11.2012	10.35
BH-01 TP-17	11.10.2012 to 13.10.2012	7.30

Bore Holes No.	Date	Water level (m) b.g.l.
BH-TP-18	11.11.2012 to 18.11.2012	11.50
BH-01 TP-19	04.10.2012 to 05.10.2012	5.50

The field investigation was started on 04.10.2012 and completed on 23.11.2012.

2.2 Ref. Volume I

2.3 Ref. Volume I

2.4 Ref. Volume I

2.5 Plate Load Test

2.6 Laboratory Investigation

Ref. Volume I Item No 2.6

CHAPTER – III

3.0 BRIEF DISCUSSION ABOUT SOIL PROPERTIES

3.1 Subsoil Condition

Altogether five (05) nos. bore holes have been sunk at this project site. Two(02) nos Routine Plat Load Tests and one(01)Cyclic Plate Load Test have also been conducted at the proposed site Five (5) to six (06) nos different layers have been encountered depending upon physical properties, 'N' values etc. However, the soil environment is clayey in nature with varying plasticity, 'N' values and occurrence levels. In some bore holes appearance of sandy zone has also been detected. The properties of sub-soil have been indicated bore hole/ plant wise as per scope of the work and presentations have been done accordingly. Reader may go through the individual bore logs, laboratory test results, cross sections through different bore holes (as per scope) and plot of 'N' values for better understanding of the sub-soil conditions prevailing at this site.

The sub-soil properties along with layers/ strata have been supplied plant wise/ bore hole wise in Chapter IV along with NSBC and NABC values for 25mm, 40mm and 75mm settlement. The properties have been supplied after giving details of layers/ strata while computing NSBC and NABC for different sizes of shallow foundations. As well as raft foundations at specified levels. For detailed physical properties etc. reader may go through the individual laboratory test results sheet and bore logs provided in this report.

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CHAPTER – IV

4.0 DISCUSSION ON FOUNDATION ASPECTS

4.1 Shallow foundations have been adopted at different depth below the e.g.l for varying sizes of foundations as per the scope. Net safe bearing capacity (NSBC) along with net allowable bearing capacities (NABC) with respect to shear and settlement (25, 40 and 75mm) have been tabulated bore hole /plant wise. For settlement more than 25 mm linear interpolation can be done. Designer can go through the tables provided in this chapter. Sample calculations for NSBC and NABC have also been supplied at the end of this Chapter. It is also advised to follow conservative approach in the context of clayey environment and adoption of shallow foundations.

4.2 General Notes for Shallow Foundation

i) It is to be noted that Fill has been avoided for seating of foundations.

ii) In case, after excavation upto the foundation level and till such time the foundation is constructed irregularities like cracks etc. at the foundation level are noticed **sand cushion of minimum thickness 0.50m below the founding level and extending at least 0.30m on all sides of foundation with proper confinement and compaction should be used.** Silver sand should not be used and fines should not be more than 15%. Any soft/ loose patches at foundation bed should be removed and replaced by compacted sand as above.

iii) Foundation bed should not be kept exposed to the atmosphere and it should be covered by properly compacted sand as above and thereafter compacted mud mat. Planning should be done accordingly.

iv) Backfilling should be done with compaction and addition of water, if required.

v) Side slope for excavation.

a. Excavation depth : ⊧ 2.00m

Use 2.25 vertical and 1 horizontal slope.

b. Excavation depth : ⊧ 4.00m

i) Use berm at 2.00m depth (0.40m to 0.50m wide depending upon requirement).

ii) Thereafter up to 4.00m depth

Use 2.00 vertical and 1 horizontal slope.

Due to clayey environment and its stiffer nature, presence of cracks, lenses/ partings of silt/ sand observations are to be made against the suggested slope (s). Proper drainage system around excavation should be planned. During rainy season the above slope may not be feasible due to ingrace of water into the excavation area and proper shoring arrangement should be adopted with close supervision and outside/ inside drainage arrangement.

The above slope may change with the choice of type of fill material and its method of formation.

vi) Surcharge/ Backfilling of the Area

Jungles etc. should be uprooted and the exposed surface should be properly dressed. The fill should be developed with approved material and it should be engineering fill. Proper quality control arrangement should be arranged. Drainage system may properly be designed.

4.3 Chemical Action

Ref. Volume I

Bearing Capacity and Settlement with Soil Properties for Bore Hole/ Plant

4.4.1 BH-01 TP-15

Layer/ Stratum	Description	GL=+34.500	
		Thickness (m)	'N' Value
I	Medium stiff light yellowish grey to brownish grey silty clay with traces of kankars and bluish grey patches at bottom	2.00 +32.500	5
II	Stiff to very stiff brownish / yellowish silty clay with bluish grey patches, dark grey spots and traces of kankars / sand	10.00 +22.500	7,19 and 17
III	Hard yellowish brown sandy silty clay with bluish grey patches at top	7.00 +15.500	37,53and 40
IVA	Dense yellowish brown / brownish grey sand with varying percentage of fines	8.00 +7.500	61,82,79 and 91
V	Hard brownish grey sandy silty clay with occasional lamination and fine mica flakes	≥3.00 ≥+4.500	103, 73 and 79

Standing Water level 7.50m b.g.l during the period of field work (13.10.2012 to 15.10.2012)

Bearing Capacities of Shallow Foundation :

BH-01 TP-15:

Refer layer II (BH-01 TP-15). Depth of foundation +29.500RL

FGL	=	+34.000m	'N' Value	=	19 to 17
C	=	8.8 t/m²	ϕ	=	5°
m_v	=	0.014 cm²/kg	γ_{bulk}	≈	2.00 t/m³

Shallow foundations may be adopted with founding level at +29.500m RL.

i) Depth of Foundation below existing ground level : (34.500 – 5.00) = RL +29.500m

Size	Suggested Net Safe Bearing Capacity	Settlement
(m x m)	(t/m²)	(mm)
19.0 x 19.0	20.5	75.00

4.4.2 BH-TP-16:

Layer/ Stratum	Description	GL=+34.100	
		Thickness (m)	'N' Value
I	Medium stiff to stiff brownish grey silty clay with rusty brown / bluish grey patches and sand in traces	1.80 +32.300	7
II	Very stiff to hard light reddish / yellowish brown silty clay with traces of sand, bluish grey spots and traces of kankars	12.20 +20.100	15,21 and 43
III	Very stiff to hard reddish to yellowish brown sandy silty clay with bluish grey spots	2.00 +18.100	23
IV	Very stiff to hard reddish brown / brown sandy silty clay (high percentage of sand) / silty clayey sand	6.00 +12.100	29 and 69
IVA	Medium dense to dense brown / reddish brown sand with varying percentage of fines and fine mica flakes in abundance	≥8.00 ≥+4.100	33,51,78, 82 and 87

Standing Water level 10.35m b.g.l during the period of field work (08.11.2012 to 09.11.2012)

Bearing Capacities of Shallow Foundation :

BH-TP-16:

Refer layer II and cross section (BH-TP-16).

C	=	8.0 t/m²	ϕ	=	5°, say

m_v = 0.0137 cm²/kg γ_{bulk} = 2.00 t/m³

Shallow foundations may be adopted with founding level at +29.500m RL.

i) Depth of Foundation below existing ground level : (34.100 – 4.60) = RL +29.500m

Size	Suggested Net Safe Bearing Capacity	Settlement
(m x m)	(t/m²)	(mm)
19.0 x 19.0	20.5	75.00

4.4.3 BH-01(One) TP-17:

Layer/ Stratum	Description	GL=+33.750	
		Thickness (m)	'N' Value
I	Medium stiff to stiff yellowish grey / brown silty clay with traces of kankars	2.00 +31.750	4
II	Stiff to very stiff yellowish brown silty clay with traces of kankars / sand and bluish grey patches at top	10.00 +21.750	8,13,11 and 21
III	Very stiff to hard yellowish / reddish brown sandy silty clay with bluish grey patches	2.00 +19.750	—
IV	Hard reddish yellow / brownish grey sandy silty clay (high percentage of sand)	7.50 +12.250	38,41, 41 and 45
IVA	Medium dense brown / reddish brown sand with fines and fine mica flakes	3.00 +9.250	54 and 61
V	Hard brownish grey / grey silty clay with high silt content	≥5.50 ≥+3.750	64,72,75 and 81

Standing Water level 7.30m b.g.l during the period of field work (11.10.2012 to 13.10.2012)

Bearing Capacities of Shallow Foundation :

BH- BH-01(One) TP-17:

Refer layer II (BH- BH-01(One) TP-17).

C = 8.0 t/m² ϕ = 5°

m_v = 0.015 cm²/kg γ_{bulk} = 2.00 t/m³

Shallow foundations may be adopted with founding level at +28.250m RL.

i) Depth of Foundation below existing ground level : (33.750 – 5.50) = RL +28.250m

Size	Suggested Net Safe Bearing Capacity	Settlement
(m x m)	(t/m²)	(mm)
19.0 x 19.0	20.5	75.00

4.4.4 BH-TP-18

Layer/ Stratum	Description	GL=+34.150	
		Thickness (m)	'N' Value
I	Medium stiff brownish yellow silty clay with traces of sand / kankars and bluish grey patches at bottom	2.50 +31.650	5 and 7
II	Very stiff to hard reddish to yellowish brown silty clay with traces of kankars / sand and bluish grey patches	9.50 +22.150	17, 22 and 33
III	Very stiff / hard reddish to yellowish brown sandy silty clay with traces of kankars	4.50 +17.650	25
IV	Hard yellowish brown sandy silty clay (high percentage of sand)	9.50 +8.150	32,49,36 and 46
V	Hard brownish grey / yellowish brown silty clay (high silt content) with sand	≥4.00 ≥+4.150	72,77 and 82

Standing Water level 11.50m b.g.l during the period of field work (11.11.2012 to 18.11.2012)

Bearing Capacities of Shallow Foundation :

<u>BH-TP-18:</u>

Refer layer II (BH-TP-18). Depth of foundation +29.500RL

C = 9.8 t/m² ϕ = 0°

m_v = 0.0135 cm²/kg γ_{bulk} ≈ 2.01 t/m³

Shallow foundations may be adopted with founding level at +29.500m RL.

i) Depth of Foundation below existing ground level : (34.150 – 4.65) = RL +29.500m

Size	Suggested Net Safe Bearing Capacity	Settlement
(m x m)	(t/m²)	(mm)
19.0 x 19.0	20.5	75.00

4.4.5 BH-01 (One)TP-19

Layer	Description	BH-01 (One)TP-19	
		GL=+34.168	
		Thickness (m)	'N' Value
I	Medium stiff / stiff light bluish grey silty clay with traces of sand, rusty brown spots and moorums	1.80 +32.368	7
II	Stiff to very stiff light reddish brown silty clay with traces of sand, occasional bluish grey spots and kankars	9.70 +22.668	8, 14 16, 17
III	Very stiff to hard light reddish brown sandy silty clay with bluish grey spots (varying percentage of sand)	4.00 +18.668	42, 31
IV	Hard yellowish brown silty clay high silt content / clayey silt with traces of sand and fine mica flakes	6.00 +12.668	32 37 35
V	Hard yellowish grey silty clay with varying percentage of sand and fine mica flakes	8.50 ≤+4.168	51, 47 50, 67, >100

Standing Water level 5.50m b.g.l during the period of field work (04.10.2012 to 05.10.2012)

Bearing Capacities of Shallow Foundation :

Shallow foundations may be adopted with founding level at +29.50m RL.

BH-01 (One)TP-19

Refer layer II

FGL = +34.168m 'N' Value = 16 & 17

c = 8.0 t/m² ϕ = 8°

m_v = 0.014cm²/kg γ_{bulk} = 1.980 t/m³

i) Depth of Foundation below existing ground level : (34.168 – 4.668) = RL +29.500m

Size	Suggested Net safe bearing capacity	Computed Settlement
(m x m)	(t/m²)	(mm)
19.00 x 19.00	20.5	≈ 75.0

Calculation is enclosed.

4.4.6 PLT-01 TP-19

From the Load Settlement Curve (log-log), the yield stress is found to be 29.60 t/m² and corresponding settlement of the plate is 6.50 mm.

$\therefore$ Safe Bearing Capacity of the Plate, $q_{plate} = \frac{29.60}{1.5} =$ 19.73 t/m²

Where, Factor of Safety = 1.5

Considering the presence of clayey soil below the test level

Safe Bearing Capacity of the footing = q_{plate}

= 19.73 t/m² ≈ 20.0t/m², say

Considering logarithmic plot of the load-settlement curve, the net safe bearing capacity may be considered as 20.0t/m².

Ref. Foundation Analysis And Design (5th Edition) by J.E. Bowles.

$\frac{B_{foundation}}{B_{Plate}} \nmid 3.0$, $B_{foundation}$ = 3 x 0.6 = 1.80m say 2.0m

Settlement of footing

Plate settlement (q = 2.0 kg/cm²) = 4.90mm

Footing settlement (B= 2.0m) = $\frac{2}{0.6} x 4.9mm = 16.3mm$

4.4.7 PLT-02

From the Load Settlement Curve (log-log), the yield stress is found to be 32.90 t/m² and corresponding settlement of the plate is 6.19 mm.

$\therefore$ Safe Bearing Capacity of the Plate, $q_{plate} = \frac{32.9}{1.5} =$ 21.9 t/m²

Where, Factor of Safety = 1.5

Considering the presence of clayey soil below the test level

Safe Bearing Capacity of the footing = q_{plate}

= 21.90 t/m² ≈ 21.0t/m², say

Considering logarithmic plot of the load-settlement curve, the net safe bearing capacity may be considered as 21.0t/m².

Ref. Foundation Analysis And Design (5th Edition) by J.E. Bowles.

$\frac{B_{foundation}}{B_{Plate}} \nless 3.0$, $B_{foundation}$ = 3 x 0.6 = 1.80m say 2.0m

Settlement of footing

Plate settlement (q = 2.1 kg/cm²) = 4.28mm

Footing settlement (B= 2.0m) = $\frac{2}{0.6} x 4.28mm = 14.27mm$

4.4.8 CPLT-01

Cyclic plate load test was conducted upto maximum load of 49.0t/m² in different stages. At each stage of cycles of loading and unloading settlement(s) were recorded from which elastic rebound(s) have been found out.

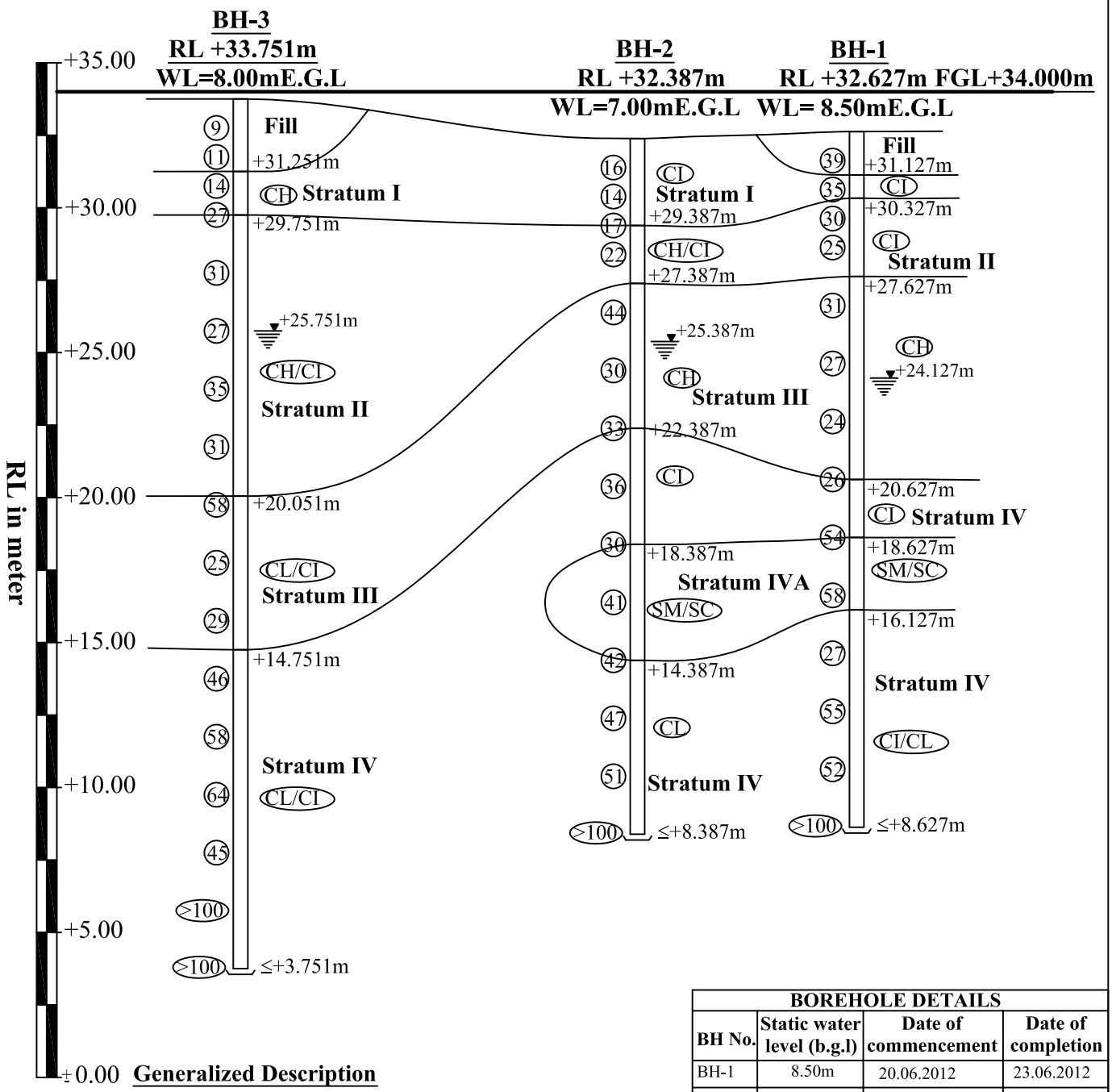
c_u value from elastic curve = 7.77kg/cm³

For 10m² area, c_u value = 7.77 x $\sqrt{\frac{0.6x0.6}{10}}$ kg/cm³ = 1.475 kg/cm³

Load-settlement and elastic rebound curve an enclosed herewith.

for **SARDIP CONSULTING ENGINEERS**

(G. C. Das)
BE, M Tech



BOREHOLE DETAILS			
BH No.	Static water level (b.g.l)	Date of commencement	Date of completion
BH-1	8.50m	20.06.2012	23.06.2012
BH-2	7.00m	24.06.2012	29.06.2012
BH-3	8.00m	17.06.2012	19.06.2012

Generalized Description

Fill : Stiff light grey to yellowish brown silty clay with traces of stone chips, brick pieces and sand.

Stratum I : Stiff to very stiff yellowish brown silty clay with traces of sand, dark grey moorum and kankars/ nodules.

Stratum II : Very stiff to hard (from 6.00m depth b.g.l.) yellowish/ reddish brown silty clay with bluish grey patches, dark grey moorum and sand in traces; sand content increases from 10.00m depth b.g.l. and presence of calcareous nodules also noticed at top.

Stratum III : Very stiff/ hard light reddish to yellowish brown silty clay with rusty brown patches, traces of sand and fine micaflakes; high percentage of sand at 14.00m depth b.g.l. (SPT samples at 14.00m depth b.g.l.).

Stratum IV : Hard light reddish to yellowish brown/ brown clayey silt with fine mica flakes, traces of sand, presence of gravels noticed from 28.00m depth b.g.l.

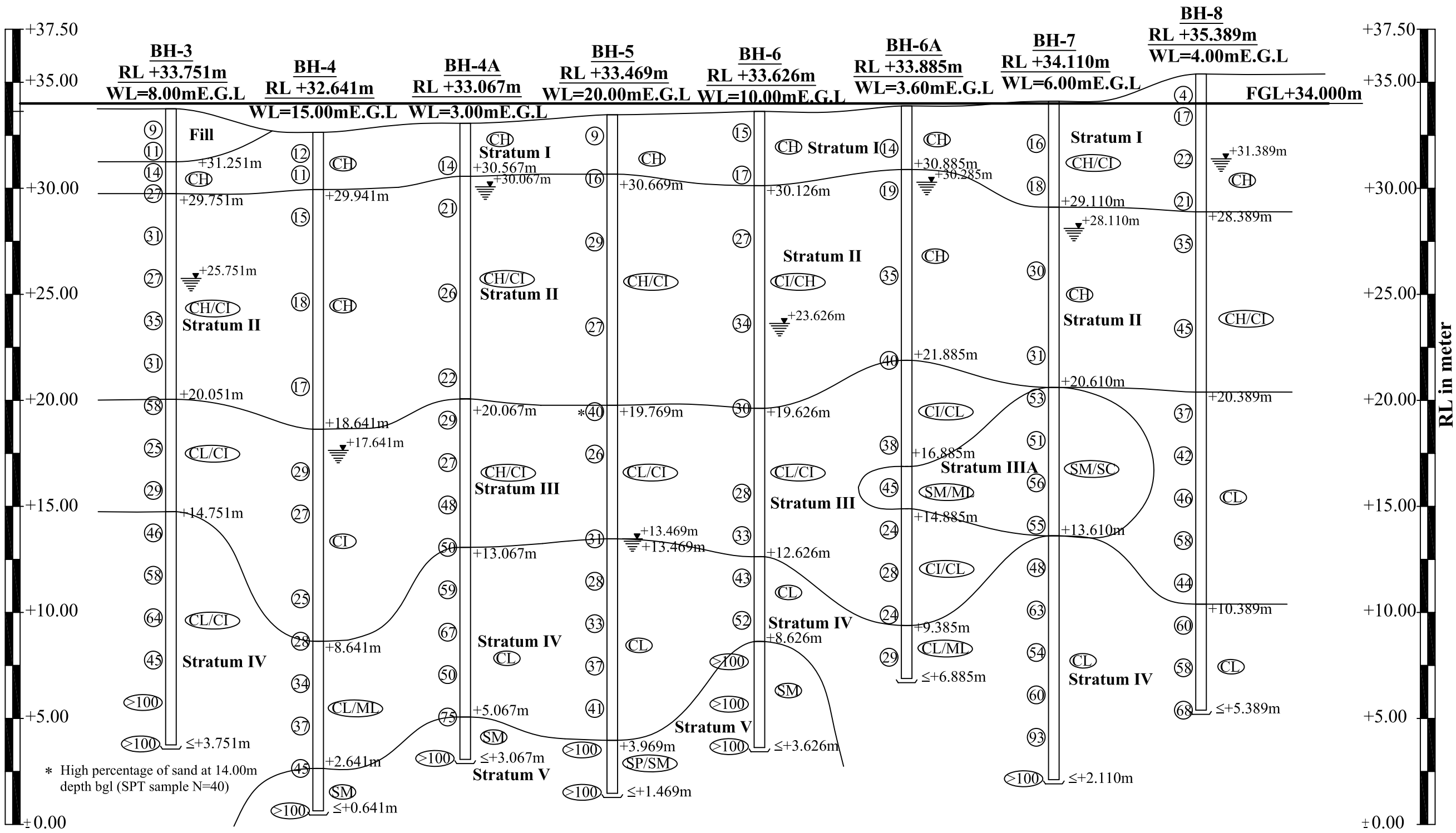
Note : For detailed descriptions etc refer individual bore log and laboratory test results.

Cross section : BH-3, BH-2 & BH-1

Project :Proposed Extension Unit No. 3 and 4 at Sagardighi Thermal Power Project
Phase-2, Sagardighi, West Bengal

Scale: *Not to scale*

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* High percentage of sand at 14.00m depth bgl (SPT sample N=40)

Generalized Description

Fill	:	Stiff light grey to yellowish brown silty clay with traces of stone chips, brick pieces and sand.
Stratum I	:	Stiff grey silty caly with rusty brown spots and traces of sand and kankars
Stratum II	:	Very stiff brown silty clay with traces of kankars (at top) and deep brown /reddish brown spots/patches and sand in traces; high percentage of sand noticed at 12.00m depth (SPT Sample)
Stratum III	:	Very stiff to hard yellowish /reddish brown silty clay (high silt content) with rusty brown spots and patches.
Stratum IIIA	:	Dense yellowish brown sand with high percentage of fine and cohesive touch
Stratum IV	:	Hard brown /yellowish to reddish brown clayey silt /silty clay (high silt content) with fine mica flakes
Stratum V	:	Dense to very dense grey sand with fines, fine mica flakes and occasional cohesive touch.

BOREHOLE DETAILS

BH No.	Static water level (b.g.l)	Date of commencement	Date of completion
BH-3	8.00m	17.06.2012	19.06.2012
BH-4	15.00m	28.05.2012	29.05.2012
BH-4A	3.00m	10.07.2012	13.07.2012
BH-5	20.00m	30.05.2012	02.06.2012
BH-6	10.00m	05.06.2012	09.06.2012
BH-6A	3.60m	10.06.2012	13.06.2012
BH-7	6.00m	14.06.2012	16.06.2012
BH-8	4.00m	30.6.2012	03.07.2012

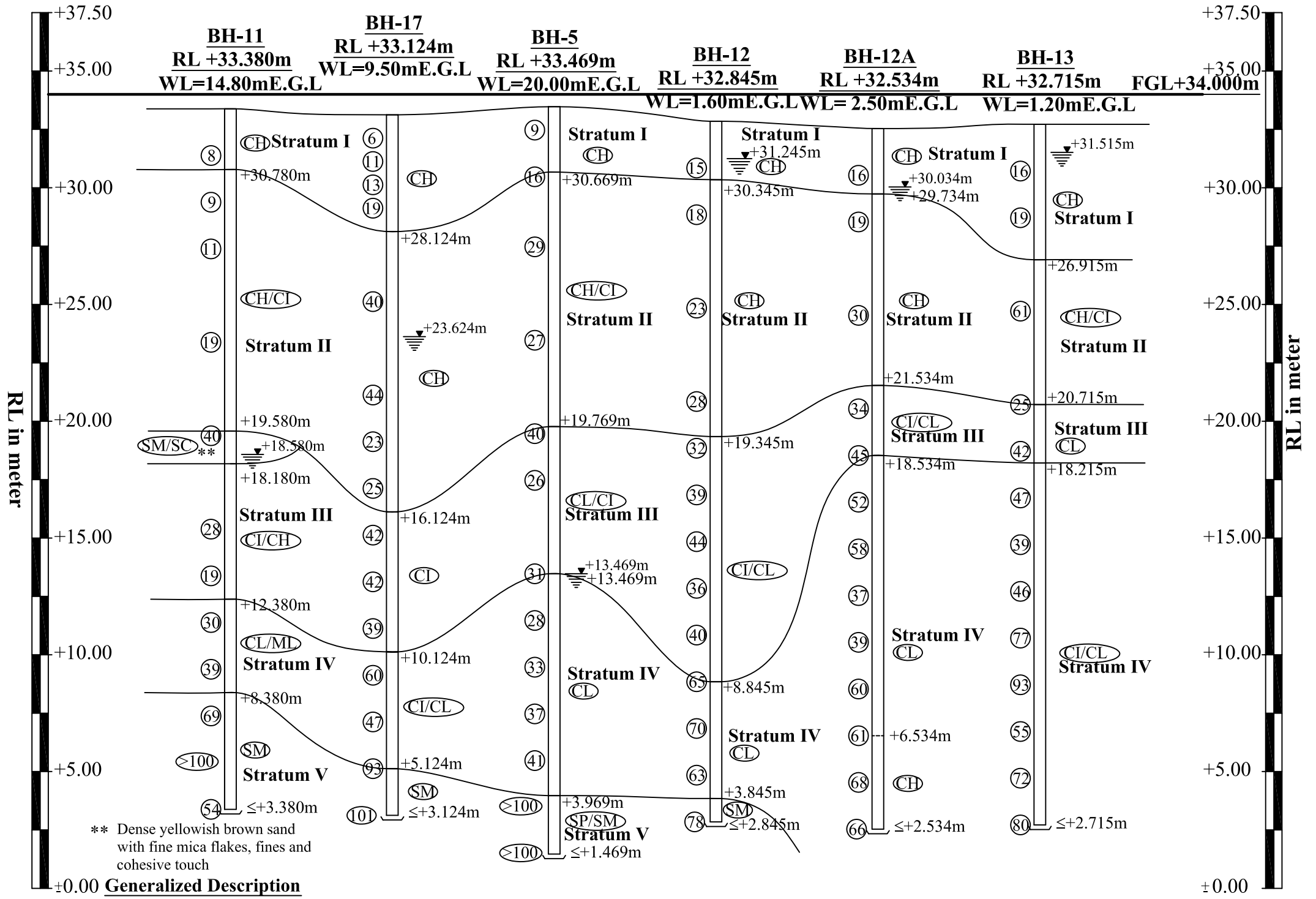
Note : For detailed descriptions etc refer individual bore log and laboratory test results.

Cross section : BH-3, BH-4, BH-4A, BH-5, BH-6, BH-6A, BH-7 & BH-8

Project :Proposed Extension Unit No. 3 and 4 at Sagardighi Thermal Power Project Phase-2, Sagardighi, West Bengal

Scale: *Not to scale*

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Generalized Description

Stratum I : Stiff grey silty clay with rusty /yellowish brown patches in traces; sand and occasional kankars

Stratum II : Very stiff yellowish brown silty clay with kankars and sand in traces; reddish brown spots /patches are also noted.

Stratum III : Very stiff yellowish / reddish brown silty clay generally high silt content with varying percentage of sand, reddish brown spots in traces and fine mica flakes; high percentage of sand at 14.00m depth b.g.l (SPT Sample)

Stratum IV : Very stiff /hard yellowish brown clayey silt /silt clay (high silt content) with traces of sand, occasional laminations and fine mica flakes.

Stratum V : Very dense brown sand with low percentage of fines and fine mica flakes.

BOREHOLE DETAILS

BH No.	Static water level (b.g.l)	Date of commencement	Date of completion
BH-11	14.80m	25.05.2012	27.05.2012
BH-17	9.50m	14.07.2012	16.07.2012
BH-5	20.00m	30.05.2012	02.06.2012
BH-12	1.60m	10.07.2012	12.07.2012
BH-12A	2.50m	06.07.2012	08.07.2012
BH-13	1.20m	04.07.2012	05.07.2012

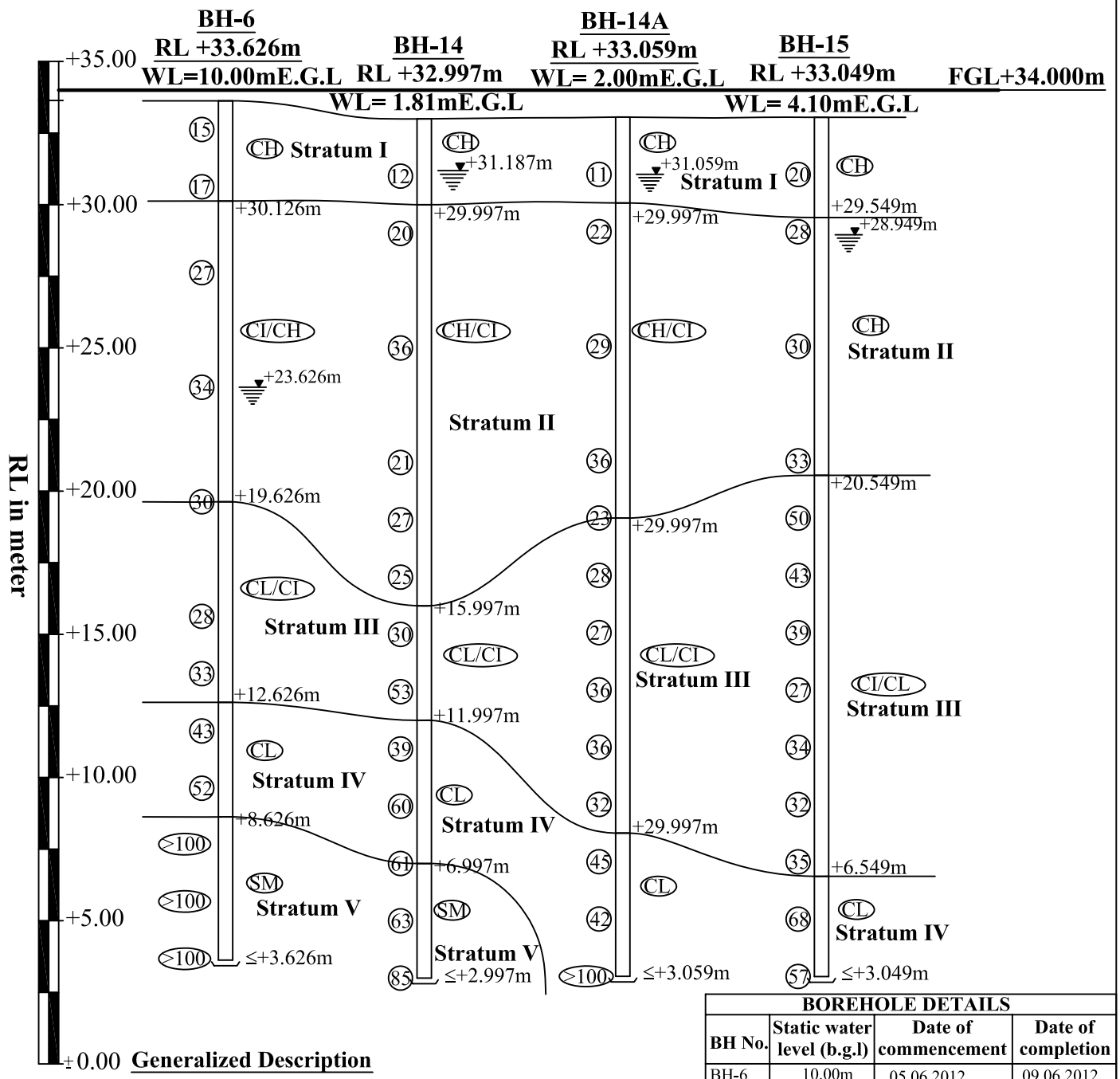
Note : For detailed descriptions etc refer individual bore log and laboratory test results.

Cross section : BH-11, BH-17, BH-5, BH-12, BH-12A & BH-13

Project :Proposed Extension Unit No. 3 and 4 at Sagardighi Thermal Power Project Phase-2, Sagardighi, West Bengal

Scale: *Not to scale*

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Generalized Description

BOREHOLE DETAILS			
BH No.	**Static water level (b.g.l)**	**Date of commencement**	**Date of completion**
BH-6	10.00m	05.06.2012	09.06.2012
BH-14	1.81m	07.07.2012	08.07.2012
BH-14A	2.00m	03.07.2012	05.07.2012
BH-15	4.10m	30.06.2012	03.07.2012

Stratum I : Very stiff greyish brown silty clay with rusty brown spots and traces of sand.

Stratum II : Very stiff to hard yellowish brown silt clay with traces of kankars, sand and occasional rusty brown patches.

Stratum III : Very stiff / hard yellowish brown / brown silty clay /clayey silt: high percentage of sand (at top), rusty brown patches, occasional fine mica flakes and traces of sand.

Stratum IV : Hard brown /yellowish brown clayey silt with fine mica flakes and sand in traces.

Stratum V : Very dense brown sand with fines fractions and fine mica flakes.

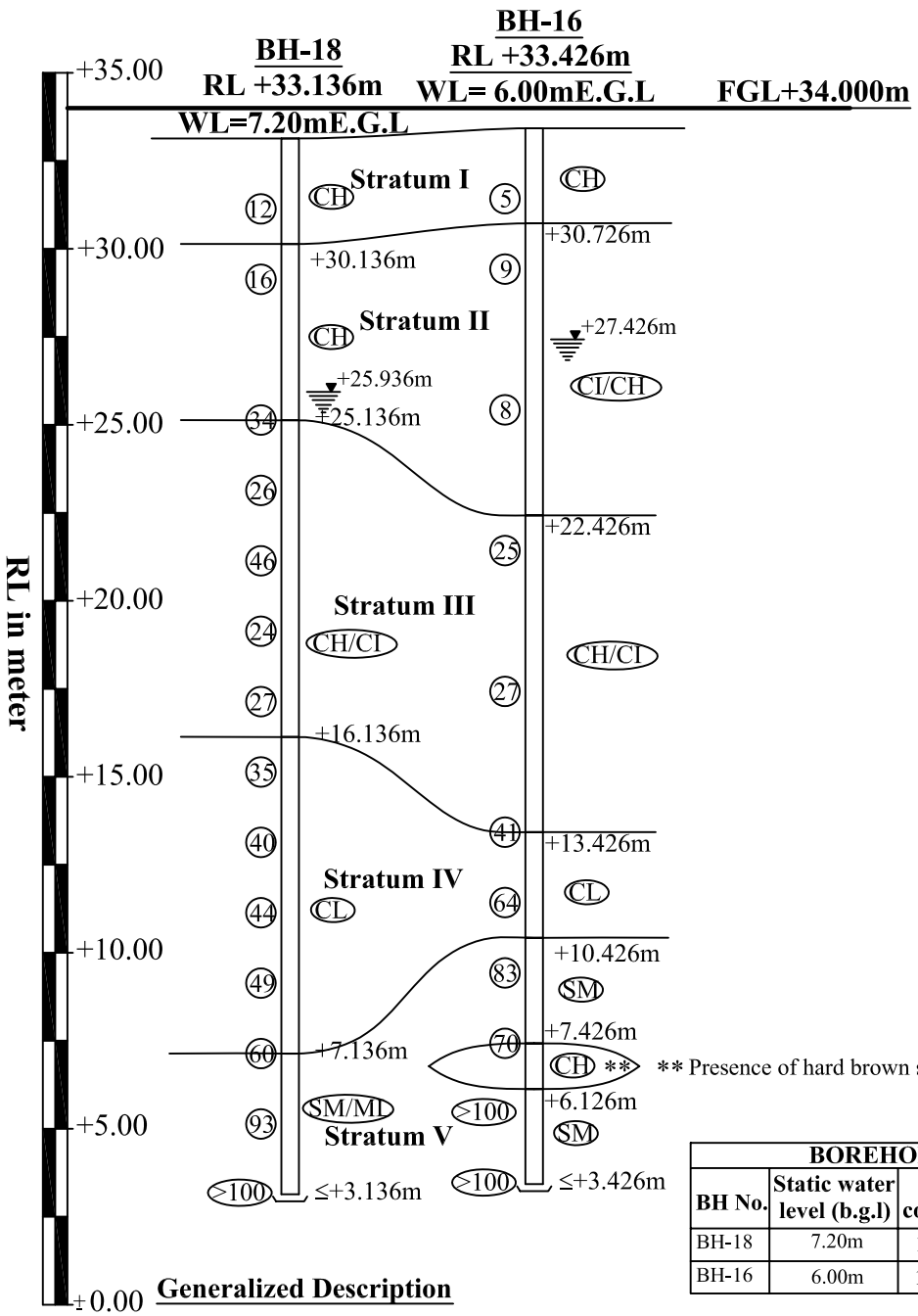
Note : For detailed descriptions etc refer individual bore log and laboratory test results.

Cross section : BH-6, BH-14, BH-14A & BH-15

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Phase-2, Sagardighi, West Bengal

Scale: *Not to scale*

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BOREHOLE DETAILS			
BH No.	Static water level (b.g.l)	Date of commencement	Date of completion
BH-18	7.20m	12.07.2012	15.07.2012
BH-16	6.00m	10.05.2012	24.05.2012

Generalized Description

Stratum I : Medium stiff to stiff grey /bluish grey silty clay with traces of kankars, rusty brown/ yellow patches and sand.

Stratum II : Stiff to very stiff brown/ yellowish brown silty clay with rusty / reddish brown patches, traces of kankars and sand.

Stratum III : Very stiff brown/ yellowish brown silty clay with traces of sand, fine micaflakes, kankars at lower region; varying percentage of silt is also noticed along with occasional laminations.

Stratum IV : Hard brown sandy silty clay/ clayey sandy silt with varying percentage of sand, fine micaflakes, occasional kankars and lamination of silt.

Stratum V : Dense to very dense brown sand with varying percentage of fines, gravels and little cohesive touch : presence of pocket / band of hard brown silty clay with traces of sand, gravels and rusty brown patches.

Note : For detailed descriptions etc refer individual bore log and laboratory test results.

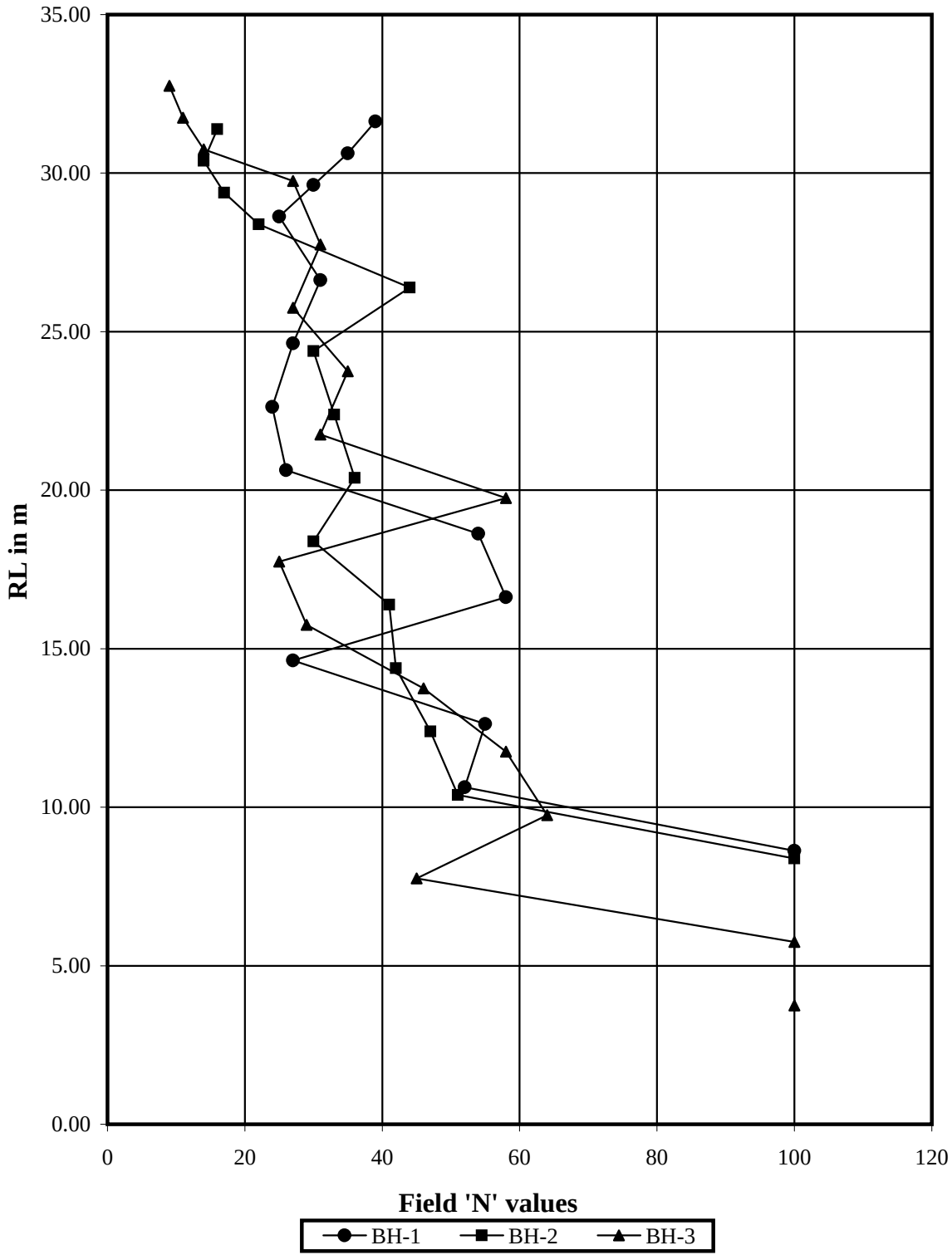
Cross section : BH-18 & BH-16

Project :Proposed Extension Unit No. 3 and 4 at Sagardighi Thermal Power Project Phase-2, Sagardighi, West Bengal

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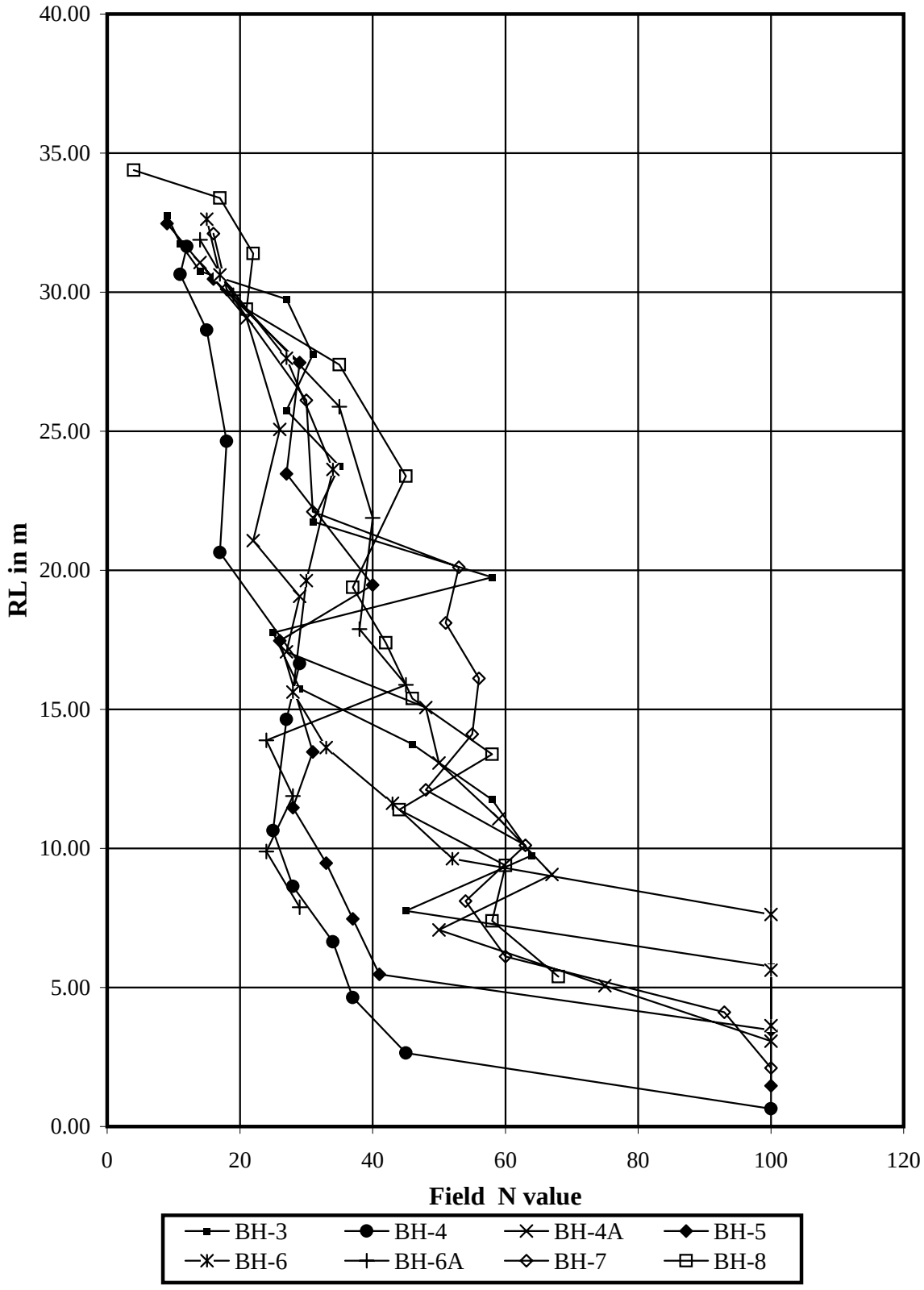
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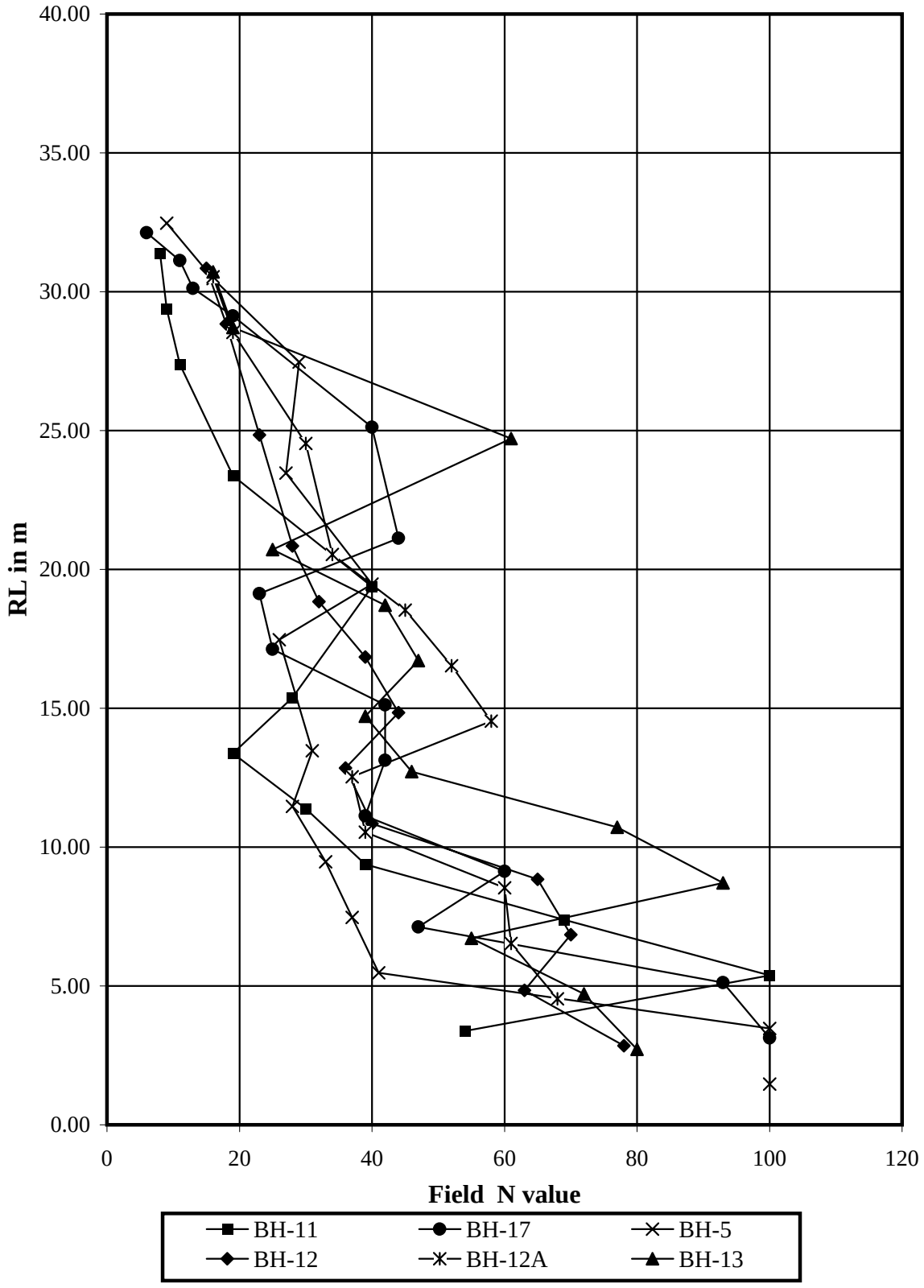
Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, West Bengal.

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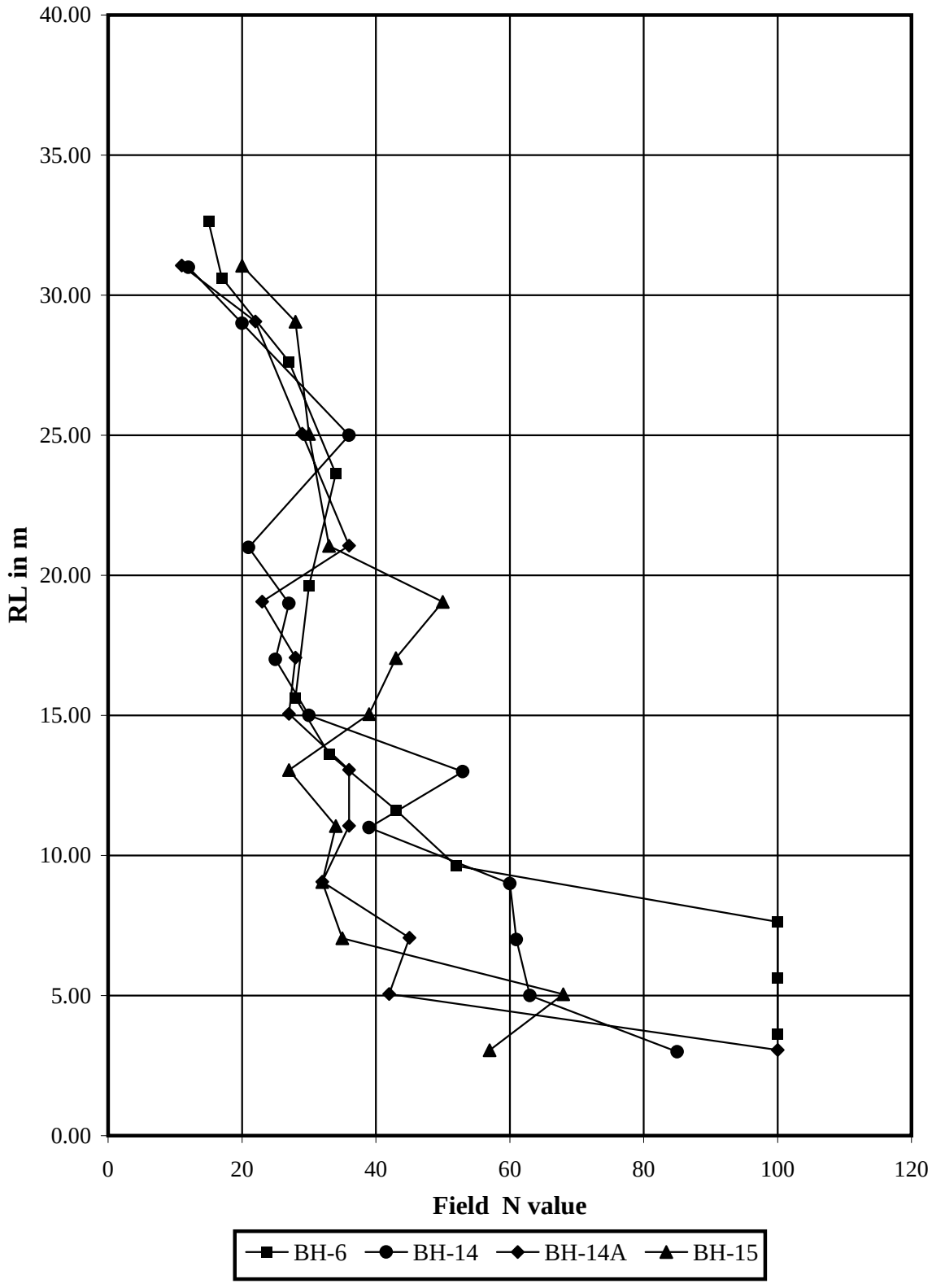
Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

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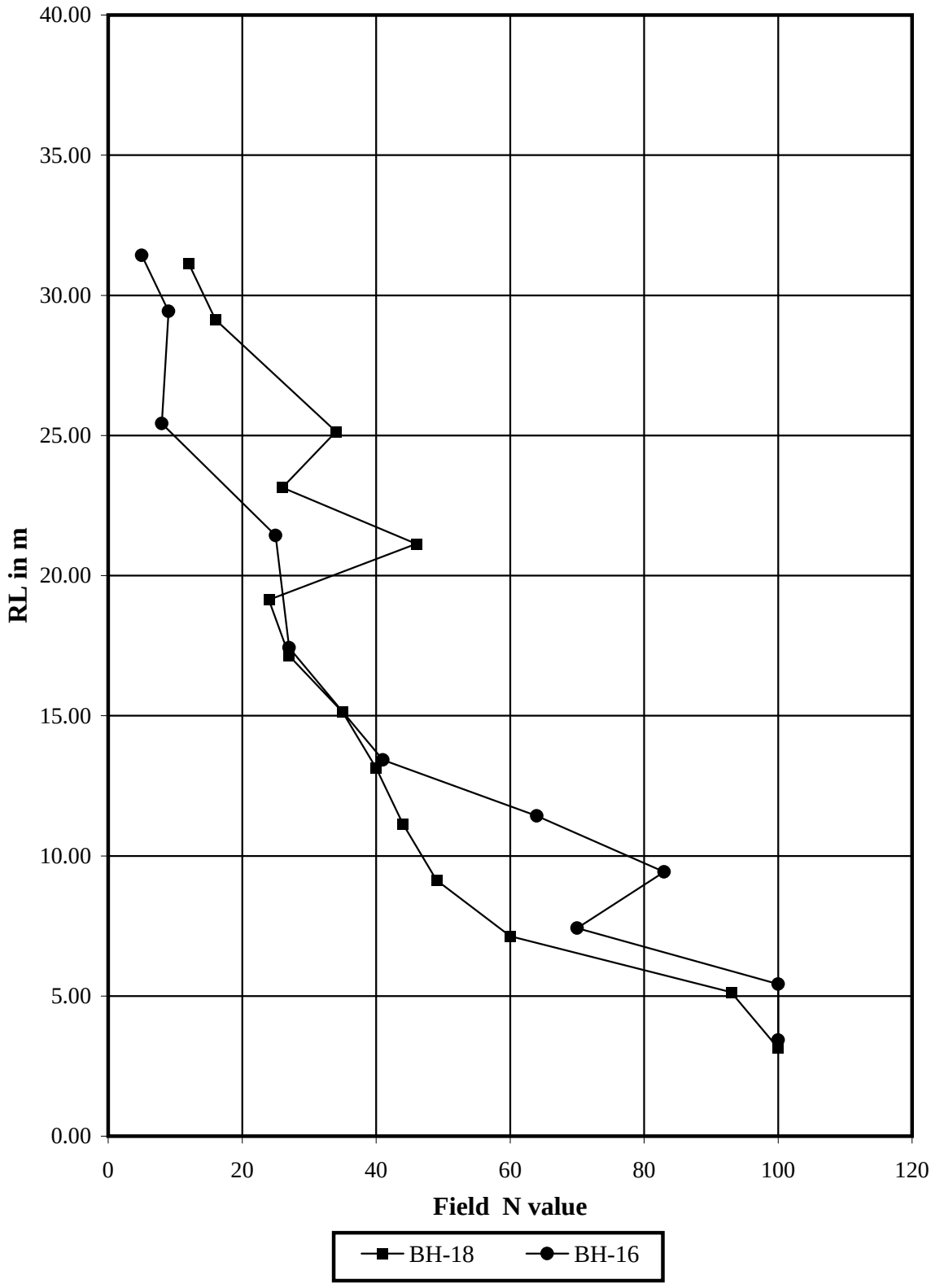
Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

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Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

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Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

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LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-1	P	1.00	Brownish grey silty clay (high silt content) with traces of brick pieces	39	-	4.0	81.0	15.0	-	-	-	34.9	20.6	14.3	-	-	-	-	-	-
			1.50m																	
	P	2.00	Very stiff to hard brownish grey silty clay with traces of sand, bluish grey patches and moorum in traces.	35																
			2.30m																	
	P	3.00	Very stiff / hard yellowish brown silty clay with traces of sand reddish brown patches.	30	-	3.0	79.0	18.0	-	-	-	37.4	19.9	17.5	-	-	-	-	-	-
	P	4.00		25																
			5.00m																	
	P	6.00	Very stiff yellowish brown/light reddish brown of sand and bluish grey patches.	31	-	3.0	69.0	28.0	-	-	-	58.3	22.0	36.3	-	-	-	-	-	-
	P	8.00		27	-	-	-	-	-	-	-	51.3	21.2	30.1	-	-	-	-	-	-
	P	10.00		24																
			12.00m																	
	P	12.00	Very stiff to hard yellowish brown sandy silty clay/ clayey sandy silt with traces of fine mica flakes.	26	-	8.0	73.0	19.0	-	-	-	38.1	17.6	20.5	-	-	-	-	-	-
			14.00m																	
	P	14.00	Dense brown /yellowish sand with high percentage of fines, having cohesive touch and fine mica flakes.	54	-	50.0	47.0	3.0	-	-	-	Non Plastic			-	-	-	-	-	-

Sheet No. : 117

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

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LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-1	P	16.00	Dense brown /yellowish sand with high percentage of fines, having cohesive touch and fine mica flakes.	58	-	43.0	47.0	10.0	-	-	-	26.6	19.9	6.7	-	-	-	-	-	-
			16.50m																	
	P	18.00	Very stiff to hard yellowish brown/ brown silte clay (high silt content) with traces of sand / clayey silt with traces of kankars at 20.00m depth b.g.l.	27																
	P	20.00		55	2.0	6.0	73.0	19.0	-	-	-	39.8	23.4	16.4	-	-	-	-	-	-
	P	22.00		52	-	1.0	85.0	14.0	-	-	-	32.0	23.5	8.5	-	-	-	-	-	-
	P	24.00		>100																

Sheet No. : 118

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

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LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-2	P	1.00	Very stiff /stiff brownish grey silty clay with bluish grey patches in traces, sand and kankars.(high silt content)	16																
	P	2.00		14	-	3.0	80.0	17.0	-	-	-	37.0	20.7	16.3	-	-	-	-	-	-
			3.00m																	
	P	3.00	Very stiff yellowish brown silty clay with traces of sand and dark grey moorum	17																
	P	4.00		22	-	4.0	74.0	22.0	-	-	-	50.2	21.0	29.2	-	-	-	-	-	-
			5.00m																	
	P	6.00	Hard yellowish brown to light reddish brown silty clay with bluish grey patches and dark dark grey moorum in traces	44																
	P	8.00		30	-	4.0	69.0	27.0	-	-	-	56.7	21.5	35.2	-	-	-	-	-	-
			10.00m																	
	P	10.00	Hard reddish /yellowish brown sandy silty clay with varying percentage of sand and presence of fine mica flakes at to sum region	33	-	7.0	74.0	19.0	-	-	-	45.5	20.8	24.7	-	-	-	-	-	-
	P	12.00		36	-	37.0	45.0	18.0	-	-	-	35.8	17.6	18.2	-	-	-	-	-	-
			14.00m																	
	P	14.00	Dense brown /yellowish brown sand with varying percentage of fines, little cohesive touch and fine mica flakes	30	-	51.0	41.0	8.0	-	-	-	25.3	22.4	2.9	-	-	-	-	-	-
	P	16.00		41	-	78.0	*22.0		-	-	-	Non-Plastic			-	-	-	-	-	-

Sheet No. : 119

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-2			18.00m																	
	P	18.00	Hard yellowish brown clayey silt with varying percentage of sand and presence of occasional laminations at 22.00m depth bgl; presence of kankars mixed from 20.00m depth bgl.	42	-	9.0	75.0	16.0	-	-	-	30.3	23.3	7.0	-	-	-	-	-	-
	P	20.00		47	-	15.0	73.0	12.0	-	-	-	29.8	20.7	9.1	-	-	-	-	-	-
	P	22.00		51	5.0	9.0	77.0	9.0	-	-	-	27.6	21.5	6.1	-	-	-	-	-	-
	P	24.00		>100	7.0	8.0	81.0	4.0	-	-	-	Non-Plastic			-	-	-	-	-	-

Sheet No. : 120

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-3	P	1.00	Fill : Stiff light grey to yellowish brown silty clay with traces of stone chips, brick pieces and sand.	9	-	3.0	71.0	26.0	-	-	-	54.8	20.6	34.2	-	-	-	-	-	-
	P	2.00		11																
			2.50m																	
	P	3.00	Stiff to very stiff yellowish brown silty clay with traces of sand, dark grey moorum and kankars/ nodules.	14	3.0	2.0	70.0	25.0	-	-	-	53.0	19.9	33.1	-	-	-	-	-	-
			4.00m																	
	P	4.00	Very stiff to hard (from 6.00m depth b.g.l.) yellowish/ reddish brown silty clay with bluish grey patches, dark grey moorum and sand in traces; sand content increases from 10.00m depth b.g.l. and presence of calcareous nodules also noticed at top.	27																
	P	6.00		31	-	4.0	70.0	26.0	-	-	-	51.9	19.2	32.7	-	-	-	-	-	-
	P	8.00		27																
	P	10.00		35	-	7.0	68.0	25.0	-	-	-	51.1	18.7	32.4	-	-	-	-	-	-
	P	12.00		31	-	13.0	63.0	24.0	-	-	-	46.9	18.1	28.8	-	-	-	-	-	-
			13.70m																	
	P	14.00	Very stiff/ hard light reddish to yellowish brown silty clay with rusty brown patches, traces of sand and fine micaflakes; high percentage of sand at 14.00m depth b.g.l. (SPT samples at 14.00m depth b.g.l.).	58	-	48.0	42.0	10.0	-	-	-	29.6	24.1	5.5	-	-	-	-	-	-
	P	16.00		25																

Sheet No. : 121

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-3	P	18.00	Very stiff/ hard light reddish to yellowish brown silty clay with rusty brown patches, traces of sand and fine micaflakes; high percentage of sand at 14.00m depth b.g.l. (SPT samples at 14.00m depth b.g.l.).	29	-	1.0	80.0	19.0	-	-	-	35.3	18.9	16.4	-	-	-	-	-	-
			19.00m																	
	P	20.00	Hard light reddish to yellowish brown/ brown clayey silt with fine mica flakes, traces of sand, presence of gravels noticed from 28.00m depth b.g.l.	46	-	4.0	82.0	14.0	-	-	-	33.1	20.4	12.7	-	-	-	-	-	-
	P	22.00		58	-	2.0	80.0	18.0	-	-	-	41.1	21.6	19.5	-	-	-	-	-	-
	P	24.00		64	-	3.0	78.0	19.0	-	-	-	42.9	23.0	19.9	-	-	-	-	-	-
	P	26.00		45																
	P	28.00		>100	2.0	9.0	81.0	8.0	-	-	-	-	-	-	-	-	-	-	-	-
	P	30.00		>100																

Sheet No. : 122

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-4	P	1.00	Stiff grey silty caly with rusty brown spots and traces of sand and kankars	12																
	P	2.00		11	3.0	5.0	66.0	26.0	-	-	-	54.7	19.7	35.0	-	-	-	-	-	-
			2.70m																	
	U	3.00	Very stiff brown silty clay with traces of kankars (at top) and deep brown /reddish brown spots/patches and sand in traces; high percentage of sand noticed at	-	2.0	3.0	68.0	27.0	19.2	1.967	1.651	54.1	18.9	35.2	UU	0.67	8.0	2.68	0.25-0.50 0.50-1.00 1.00-2.00 2.00-4.00 4.00-8.00	0.0218 0.0183 0.0151 0.0130 0.0074
	P	4.00	12.00m depth (SPT Sample)	15																
	U	6.00		-	-	6.0	68.0	26.0	19.3	2.040	1.710	53.8	18.3	35.5	UU	0.79	7.0	2.68	-	-
	P	8.00		18																
	U	10.00		-	-	7.0	69.0	24.0	19.4	2.044	1.712	50.7	17.9	32.8	UU	0.86	9.0	2.69	-	-
	P	12.00		17	-	22.0	56.0	22.0	-	-	-	40.7	17.8	22.9	-	-	-	-	-	-
			14.00m																	
	U	14.00	Very stiff to hard yellowish /reddish brown silty clay (high silt content) with rusty brown spots and patches.	-	-	2.0	81.0	17.0	21.8	2.034	1.670	38.5	21.6	16.9	UU	0.93	6.0	2.67	-	-
	P	16.00		29																
	P	18.00		27	-	-	81.0	19.0	-	-	-	-	-	-	-	-	-	-	-	-
	U	20.00		-	-	1.0	78.0	21.0	22.0	2.020	1.656	48.2	20.9	27.3	UU	0.98	6.0	2.67	-	-

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-4	P	22.00	Very stiff to hard yellowish /reddish brown silty clay (high silt content) with rusty brown spots and patches.	25																
			24.00m																	
	P	24.00	Hard brown /yellowish to reddish brown clayey silt /silty clay (high silt content) with fine mica flakes.	28	-	4.0	85.0	11.0	-	-	-	-	-	-	-	-	-	-	-	-
	P	26.00		34	-	-	-	-	-	-	-	34.0	23.5	10.5						
	P	28.00		37	-	5.0	88.0	7.0	-	-	-	Non Plastic			-	-	-	-	-	-
			30.00m																	
	P	30.00	Dense to very dense grey sand with fines, fine mica flakes and occasional cohesive touch.	45	3.0	81.0	*16.0		-	-	-	Non Plastic			-	-	-	-	-	-
	P	32.00		>100																

Sheet No. : 124

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-4A	U	1.00	Stiff brownish grey silty clay with traces of sand and occasional bluish grey spots and dark grey moorum.	-	-	3.0	65.0	32.0	19.7	2.009	1.678	62.2	19.0	43.2	UU	0.68	8.0	2.68	0.25-0.50 0.50-1.00 1.00-2.00 2.00-4.00 4.00-8.00	0.0190 0.0203 0.0180 0.0117 0.0067
	P	2.00	2.50m	14																
	U	3.00	Very stiff light reddish to yellowish brown silty clay with varying sand content, occasional grey/ bluish grey patches and dark grey moorum/ kankars.	-	-	2.0	72.0	26.0	20.6	2.052	1.701	51.5	19.4	32.1	UU	0.80	7.0	2.68	-	-
	P	4.00		21																
	U	6.00		-	-	4.0	71.0	25.0	20.7	2.053	1.701	51.1	18.9	32.2	UU	0.87	8.0	2.68	-	-
	P	8.00		26																
	U	10.00		-	-	13.0	63.0	24.0	20.5	2.060	1.710	46.7	18.2	28.5	UU	0.98	7.0	2.68	-	-
	P	12.00	13.00m	22	-	5.0	69.0	26.0	-	-	-	52.8	19.0	33.8	-	-	-	-	-	-
	P	14.00	Very stiff to hard light reddish yellow/ brown silty/ sandy clay with varying percentage of sand.	29																
	P	16.00		27	-	1.0	71.0	28.0	-	-	-	57.3	21.2	36.1	-	-	-	-	-	-
	P	18.00		48	-	14.0	62.0	24.0	-	-	-	47.4	17.7	29.7	-	-	-	-	-	-

Sheet No. : 125

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-4A			20.00m																	
	P	20.00	Hard light yellowish brown/ brown silty clay (high silt content) with traces of sand and fine micaflakes.	50	-	3.0	82.0	15.0	-	-	-	34.0	21.1	12.9	-	-	-	-	-	-
	P	22.00		59																
	P	24.00		67																
	P	26.00		50	-	2.0	86.0	12.0	-	-	-	33.0	22.7	10.3	-	-	-	-	-	-
			28.00m																	
	P	28.00		75	-	57.0	38.0	5.0	-	-	-	Non Plastic			-	-	-	-	-	-
	P	30.00	Dense to very dense brown/ light grey sand with varying percentage of fines, cohesive touch and fine micaflakes.	>100	-	78.0	*22.0		-	-	-	-	-	-	-	-	-	-	-	-

Sheet No. : 126

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-5	P	1.00	Stiff grey silty clay with rusty /yellowish brown patches in traces; sand and occasional kankars	9																
	U	2.00		-	1.0	1.0	67.0	31.0	19.6	1.970	1.647	60.8	19.2	41.6	UU	0.53	9.0	2.68	-	-
			2.80m																	
	P	3.00	Very stiff yellowish brown silty clay with kankars and sand in traces; reddish brown spots /patches are also noted.	16																
	U	4.00		-	-	2.0	69.0	29.0	19.5	2.008	1.680	53.3	19.4	33.9	UU	0.73	9.0	2.68	-	-
	P	6.00		29																
	U	8.00		-	2.0	2.0	68.0	28.0	19.7	2.036	1.701	54.5	19.1	35.4	UU	1.13	8.0	2.69	0.25-0.50 0.50-1.00 1.00-2.00 2.00-4.00 4.00-8.00	0.0207 0.0191 0.0148 0.0118 0.0070
	P	10.00		27																
	U	12.00		-	-	4.0	72.0	24.0	19.6	2.043	1.708	47.5	19.2	28.3	UU	1.18	7.0	2.68	-	-
			13.70m																	
	P	14.00	Very stiff yellowish / reddish brown silty clay generally high silt content with varying percentage of sand, reddish brown spots in traces and fine mica flakes; high percentage of sand at 14.00m depth b.g.l (SPT Sample)	40	-	40.0	47.0	13.0	-	-	-	25.1	14.3	10.8	-	-	-	-	-	-
	P	16.00		26	-	5.0	72.0	23.0	-	-	-	43.3	20.7	22.6	-	-	-	-	-	-
	U	18.00		-	-	4.0	78.0	18.0	20.8	2.041	1.690	41.6	19.8	21.8	UU	1.10	6.0	2.67	-	-

Sheet No. : 127

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-5			20.00m																	
	P	20.00	Very stiff /hard yellowish brown clayey silt /silt clay (high silt content) with traces of sand, occasional laminations and fine mica flakes.	31																
	P	22.00		28	-	18.0	71.0	11.0	-	-	-	30.5	20.9	9.6	-	-	-	-	-	-
	P	24.00		33																
	P	26.00		37	-	3.0	81.0	16.0	-	-	-	34.1	22.3	11.8	-	-	-	-	-	-
	P	28.00		41																
			29.50m																	
	P	30.00	Very dense brown sand with low percentage of fines and fine mica flakes.	>100	-	91.0	*9.0		-	-	-	Non Plastic			-	-	-	-	-	-
	P	32.00		>100	-	95.0	*5.0		-	-	-	Non Plastic			-	-	-	-	-	-

Sheet No. : 128

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-6	P	1.00	Very stiff greyish brown silty clay with rusty brown spots and traces of sand.	15																
	U	2.00		-	-	6.0	68.0	26.0	19.8	2.007	1.675	54.1	19.0	35.1	UU	0.62	10.0	2.68	-	-
	P	3.00		17																
			3.50m																	
	U	4.00	Very stiff to hard yellowish brown silt clay with traces of kankars, sand and occasional rusty brown patches.	-	-	3.0	74.0	23.0	19.9	2.025	1.689	47.6	18.5	29.1	UU	1.11	8.0	2.68	-	-
	P	6.00		27																
	U	8.00		-	-	3.0	70.0	27.0	19.8	2.055	1.715	55.3	18.7	36.6	UU	1.25	7.0	2.70	-	-
	P	10.00		34																
	U	12.00		-	-	4.0	72.0	24.0	19.9	2.072	1.728	47.6	18.2	29.4	UU	1.30	6.0	2.70	0.25-0.50 0.50-1.00 1.00-2.00 2.00-4.00 4.00-8.00	0.0131 0.0119 0.0131 0.0108 0.0063
			14.00m																	
	P	14.00	Very stiff / hard yellowish brown / brown silty clay /clayey silt: high percentage of sand (at top), rusty brown patches, occasional fine mica flakes and traces of sand.	30																
	U	16.00		-	-	34.0	53.0	13.0	20.7	2.046	1.695	29.8	19.6	10.2	UU	1.16	9.0	2.67	-	-
	P	18.00		28																

Sheet No. : 129

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-6	P	20.00	Very stiff / hard yellowish brown / brown silty clay /clayey silt: high percentage of sand (at top), rusty brown patches, occasional fine mica flakes and traces of sand.	33	-	1.0	75.0	24.0	-	-	-	48.7	19.1	29.6	-	-	-	-	-	-
			21.00m																	
	P	22.00	Hard brown /yellowish brown clayey silt with fine mica flakes and sand in traces.	43																
	P	24.00		52	-	7.0	81.0	12.0	-	-	-	28.5	21.8	6.7	-	-	-	-	-	-
			25.00m																	
	P	26.00	Very dense brown sand with fines fractions and fine mica flakes.	>100	-	83.0	*17.0		-	-	-	Non Plastic			-	-	-	-	-	-
	P	28.00		>100																
	P	30.00		>100	-	85.0	*15.0		-	-	-	Non Plastic			-	-	-	-	-	-

Sheet No. : 130

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-6A	U	1.00	Stiff grey silty caly with brown patches, traces of kankars and sand.	-	-	4.0	70.0	26.0	21.2	1.974	1.629	55.8	20.3	35.5	UU	0.61	7.0	2.68	-	-
	P	2.00		14																
			3.00m																	
	U	3.00	Very stiff to hard yellowish brown silty caly with traces of kankars, sand and occasional rusty brown patches.	-	-	2.0	76.0	24.0	21.5	2.025	1.667	50.8	19.2	31.6	UU	0.69	6.0	2.68	-	-
	P	4.00		19																
	U	6.00		-	-	3.0	72.0	25.0	21.6	2.048	1.684	53.1	19.5	33.6	UU	1.02	5.0	2.70	0.25-0.50 0.50-1.00 1.00-2.00 2.00-4.00 4.00-8.00	0.0092 0.0133 0.0165 0.0126 0.0073
	P	8.00		35																
	U	10.00		-	-	1.0	75.0	24.0	21.7	2.057	1.690	50.4	19.8	30.6	UU	1.38	5.0	2.70	-	-
			12.00m																	
	P	12.00	Very stiff /hard yellowish brown/brown silty caly/clayey silt: high percentage of sand/silt from 17.00m to 19.00m depth b.g.l, fine mica flakes, traces of sand occasional laminations.	40																
	U	14.00		-	-	1.0	77.0	22.0	22.0	2.010	1.648	46.6	21.3	25.3	UU	1.01	10.0	2.67	-	-
	P	16.00		38																
	P	18.00		45	-	56.0	31.0	13.0	-	-	-	Non Plasitc			-	-	-	-	-	-
	P	20.00		24																

Sheet No. : 131

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-6A	P	22.00	Very stiff /hard yellowish brown/brown silty caly/clayey silt: high percentage of sand/silt from 17.00m to 19.00m depth b.g.l, fine mica flakes, traces of sand occasional laminations.	28	-	3.0	81.0	16.0	-	-	-	35.0	21.7	13.3	-	-	-	-	-	-
	P	24.00		24																
			24.50m																	
	P	26.00	Very stiff /hard brown clayey silt with fine mica flakes.	29	-	1.0	88.0	11.0	-	-	-	30.3	23.9	6.4	-	-	-	-	-	-

Sheet No. : 132

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
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6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-7	U	1.00	Stiff to very stiff grey silty clay with yellowish /rusty brown patches, sand kankars in traces.	-	2.0	5.0	68.0	25.0	20.4	1.954	1.623	50.8	19.9	30.9	UU	0.61	11.0	2.68	-	-
	P	2.00		16																
	U	3.00		-	1.0	4.0	71.0	24.0	20.3	2.027	1.685	49.5	19.8	29.7	UU	0.72	9.0	2.68	-	-
	P	4.00		18																
			5.00m																	
	U	6.00	Very stiff to hard yellowish brown silty clay with traces of sand, kankars and rusty/ reddish brown spots in occasional case.	-	1.0	2.0	73.0	24.0	20.4	2.053	1.705	50.7	19.3	31.4	UU	1.09	7.0	2.69	-	-
	P	8.00		30																
	U	10.00		-	-	1.0	73.0	26.0	20.1	2.066	1.720	54.6	19.1	35.5	UU	1.32	6.0	2.70	0.25-0.50 0.50-1.00 1.00-2.00 2.00-4.00 4.00-8.00	0.0159 0.0151 0.0128 0.0088 0.0055
	P	12.00		31																
			13.50m																	
	P	14.00	Dense yellowish brown sand with high percentage of fine and cohesive touch.	53	-	65.0	28.0	7.0	-	-	-	23.9	18.0	5.9	-	-	-	-	-	-
	P	16.00		51	-	69.0	23.0	8.0	-	-	-	22.9	18.1	4.8	-	-	-	-	-	-
	P	18.00		56	-	79.0	19.0	2.0	-	-	-	Non-Plastic			-	-	-	-	-	-

Sheet No. : 133

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-7	P	20.00	Dense yellowish brown sand with high percentage of fine and cohesive touch	55																
			20.50m																	
	P	22.00	Hard brown /yellowish brown silty caly (high silt content) /clayey silt nd pockets of clayey sandy silt at 30.00m depth bgl; Varying percentage of sand /silt has been noticed along with presence of gravels from 30.00m depth.	48	-	4.0	91.0	5.0	-	-	-	29.1	20.6	8.5	-	-	-	-	-	-
	P	24.00		63																
	P	26.00		54	-	18.0	74.0	8.0	-	-	-	28.7	20.3	8.4	-	-	-	-	-	-
	P	28.00		60																
	P	30.00		93	2.0	41.0	48.0	9.0	-	-	-	26.8	19.6	7.2	-	-	-	-	-	-
	P	32.00		>100	9.0	7.0	70.0	14.0	-	-	-	33.9	23.8	10.1	-	-	-	-	-	-

Sheet No. :134

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
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6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
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9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-8	P	1.00	Very stiff light brownish grey to bluish grey silty clay with reddish brown spots and traces of sand. Note : 0.00m to 2.00m depth consistency is medium stiff/ soft.	4	-	4.0	67.0	29.0	-	-	-	60.5	21.2	39.3	-	-	-	-	-	-
	P	2.00		17																
	U	3.00		-	-	5.0	68.0	27.0	22.4	1.993	1.628	58.0	21.3	36.7	UU	0.78	7.0	2.68	0.25-0.50 0.50-1.00 1.00-2.00 2.00-4.00 4.00-8.00	0.0216 0.0214 0.0197 0.0159 0.0095
	P	4.00		22																
	P	6.00	6.50m	21	-	1.0	69.0	30.0	-	-	-	60.6	22.0	38.6	-	-	-	-	-	-
	P	8.00	Very stiff to hard yellowish to light reddish brown silty clay with bluish grey patches and presence of slicken sides at UDS (10.00m depth b.g.l.) Note : Low shear value for slicken sides.	35																
	U	10.00		-	-	4.0	67.0	29.0	21.1	2.056	1.698	56.1	20.8	35.3	UU	0.57	9.0	2.69	-	-
	P	12.00		45																
	U	14.00	15.00m	-	-	11.0	61.0	28.0	21.2	2.059	1.699	46.7	19.6	27.1	UU	1.46	6.0	2.69	-	-
	P	16.00	Hard yellowish to reddish brown sandy silty clay/ clayey sandy silt with fine micaflakes in traces, high plasticity has been observed at 24.00m depth b.g.l. (CH)	37																
	P	18.00		42	-	24.0	62.0	14.0	-	-	-	29.1	18.7	10.4	-	-	-	-	-	-

Sheet No. : 135

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
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6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
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9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-8	P	20.00	Hard yellowish to reddish brown sandy silty clay/ clayey sandy silt with fine micaflakes in traces, high plasticity has been observed at 24.00m depth b.g.l. (CH)	46	-	-	-	-	-	-	-	27.1	19.3	7.8	-	-	-	-	-	-
	P	22.00		58																
	P	24.00		44	-	1.0	75.0	24.0	-	-	-	53.3	22.6	30.7	-	-	-	-	-	-
			25.00m																	
	P	26.00	Hard brown/ brownish yellow silty clay (high silt content)/ clayey silt with reddish brown spots and sand in traces.	60																
	P	28.00		58	-	1.0	87.0	12.0	-	-	-	32.7	23.4	9.3	-	-	-	-	-	-
	P	30.00		68																

Sheet No. : 136

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
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7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-11	U	1.00	Stiff grey silty clay with rusty brown spots, traces of sand and kankars	-	3.0	2.0	71.0	24.0	20.6	1.986	1.647	52.6	20.0	32.6	UU	0.43	9.0	2.68	-	-
	P	2.00		8																
			2.60m																	
	U	3.00	Stiff to very stiff yellowish brown silty clay with rusty brown patches, occasional kankars and sand in traces (high silt content at bottom)	-	-	4.0	69.0	27.0	20.7	2.017	1.671	57.1	20.4	36.7	UU	0.55	8.0	2.69	0.25-0.50 0.50-1.00 1.00-2.00 2.00-4.00 4.00-8.00	0.0184 0.0207 0.0190 0.0130 0.0070
	P	4.00		9																
	P	6.00		11	-	2.0	72.0	26.0	-	-	-	54.5	21.7	32.8	-	-	-	-	-	-
	U	8.00		-	2.0	4.0	68.0	26.0	20.8	2.035	1.685	54.1	20.0	34.1	UU	0.63	11.0	2.70	0.25-0.50 0.50-1.00 1.00-2.00 2.00-4.00 4.00-8.00	0.0233 0.0217 0.0190 0.0162 0.0097
	P	10.00		19																
	U	12.00		-	-	2.0	76.0	22.0	20.7	2.047	1.696	48.8	20.5	28.3	UU	0.76	9.0	2.70	-	-
			13.80m																	
	P	14.00	Dense yellowish brown sand with fine mica flakes and fines cohesive touch	40	-	67.0	28.0	5.0	-	-	-	20.1	15.7	4.4	-	-	-	-	-	-
			15.20m																	
	U	16.00	Very stiff yellowish brown to light reddish brown silty clay with fine mica flakes and varying percentage of sand.	-	-	7.0	75.0	18.0	21.4	2.024	1.667	41.4	17.2	24.2	UU	0.96	7.0	2.67	-	-
	P	18.00		28																

Sheet No. :137

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
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6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-11	P	20.00	Very stiff yellowish brown to light reddish brown silty clay with fine mica flakes and varying percentage of sand.	19	-	5.0	73.0	22.0	-	-	-	49.7	21.6	28.1	-	-	-	-	-	-
			21.00m																	
	P	22.00	Hard yellowish brown silty clay (high silt content with some plasticity) with laminations of silt, traces of sand and fine micaflakes.	30																
	P	24.00		39	-	5.0	89.0	6.0	-	-	-	Non-Plastic			-	-	-	-	-	-
			25.00m																	
	P	26.00	Dense to very dense brown sand with fine mica flakes and fines (Non plastic)	69	-	76.0	*24.0		-	-	-	Non-Plastic			-	-	-	-	-	-
	P	28.00		>100																
	P	30.00		54	-	81.0	*19.0		-	-	-	Non-Plastic			-	-	-	-	-	-

Sheet No. :138

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-12	U	1.00	Stiff light grey/ yellowish/ reddish brown silty clay with occasional kankars, traces of sand and rusty brown spots.	-	-	3.0	71.0	26.0	21.7	2.001	1.644	54.5	19.8	34.7	UU	0.68	8.0	2.68	-	-
	P	2.00	2.50m	15																
	U	3.00	Very stiff yellowish to reddish brown/ brown silty clay with traces of kankars/ moorums and sand in varying percentages.	-	-	5.0	68.0	27.0	22.0	2.029	1.663	56.7	20.2	36.5	UU	0.71	7.0	2.68	-	-
	P	4.00		18																
	U	6.00		-	-	2.0	70.0	28.0	22.0	2.037	1.670	59.6	21.0	38.6	UU	0.87	6.0	2.68	-	-
	P	8.00		23																
	U	10.00		-	-	4.0	68.0	28.0	21.6	2.043	1.680	58.0	21.2	36.8	UU	0.98	8.0	2.69	-	-
	P	12.00	13.50m	28																
	P	14.00	Very stiff to hard yellowish brown/ reddish brown silty clay to clayey silt with reddish brown spots/ patches, traces of kankars, fine micaflakes and sand.	32	-	9.0	74.0	17.0	-	-	-	36.9	20.5	16.4	-	-	-	-	-	-
	P	16.00		39																
	P	18.00		44	-	52.0	42.0	6.0	-	-	-	22.6	17.8	4.8	-	-	-	-	-	-
	P	20.00		36																
	P	22.00		40	-	3.0	80.0	17.0	-	-	-	35.6	21.9	13.7	-	-	-	-	-	-

Sheet No. :139

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
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SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-12			24.00m																	
	P	24.00	Hard brown/ grey/ rusty brown silty clay (high silt content) clayey sandy silt with/ without laminations, reddish brown spots/ patches, fine micaflakes and occasional high percentages of sand at bottom.	65	-	8.0	76.0	16.0	-	-	-	33.8	22.4	11.4	-	-	-	-	-	-
	P	26.00		70	-	6.0	84.0	10.0	-	-	-	25.5	19.0	6.5	-	-	-	-	-	-
	P	28.00		63																
			29.00m																	
	P	30.00	Dense to very dense grey/ yellowish brown sand with fines and little cohesive touch.	78	-	66.0	29.0	5.0	-	-	-	Non-Plastic			-	-	-	-	-	-

Sheet No. :140

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-12A	U	1.00	Stiff light grey/ yellowish/ reddish brown silty clay with occasional kankars, traces of sand and rusty brown spots.	-	-	1.0	75.0	24.0	21.2	2.001	1.651	51.0	20.5	30.5	UU	0.59	8.0	2.68	-	-
	P	2.00		16																
			2.80m																	
	U	3.00	Very stiff yellowish to reddish brown/ brown silty clay with traces of kankars/ moorums and sand in varying percentages.	-	-	1.0	71.0	28.0	21.4	2.028	1.671	58.9	21.0	37.9	UU	0.74	5.0	2.68	-	-
	P	4.00		19																
	U	6.00		-	-	2.0	74.0	24.0	21.4	2.056	1.694	50.8	18.7	32.1	UU	1.00	6.0	2.69	-	-
	P	8.00		30																
	U	10.00		-	-	-	-	-	21.3	2.062	1.700	54.0	19.8	34.2	UU	1.23	5.0	2.70	-	-
			11.00m																	
	P	12.00	Very stiff to hard yellowish brown/ reddish brown silty clay to clayey silt with reddish brown spots/ patches, traces of kankars, fine micaflakes and sand.	34	-	-	-	-	-	-	-	36.0	21.0	15.0	-	-	-	-	-	-
			14.00m																	
	P	14.00	Hard brown/ grey/ rusty brown silty clay (high silt content) clayey sandy silt with/ without laminations, reddish brown spots/ patches, fine micaflakes and occasional high percentages of sand at bottom.	45	-	61.0	34.0	5.0	-	-	-	Non-Plastic			-	-	-	-	-	-
	P	16.00		52	-	-	-	-	-	-	-	24.5	18.7	5.8	-	-	-	-	-	-
	P	18.00		58	-	55.0	39.0	6.0	-	-	-	-	-	-	-	-	-	-	-	-
	P	20.00		37	-	-	93.0	7.0	-	-	-	Non-Plastic			-	-	-	-	-	-
	P	22.00		39																

Sheet No. :141

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-12A	P	24.00	Hard brown/ grey/ rusty brown silty clay (high silt content) clayey sandy silt with/ without laminations, reddish brown spots/ patches, fine micaflakes and occasional high percentages of sand at bottom.	60	-	2.0	86.0	12.0	-	-	-	28.9	19.4	9.5	-	-	-	-	-	-
	P	26.00		61																
	P	28.00		68	-	1.0	75.0	24.0	-	-	-	51.0	20.8	30.2	-	-	-	-	-	-
	P	30.00		66	-	-	-	-	-	-	-	39.1	23.7	15.4	-	-	-	-	-	-

Sheet No. : 142

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-13	U	1.00	Very stiff brownish grey silty clay with traces of sand, bluish grey/ grey patches and presence of dark grey moorum/ kankars.	-	-	2.0	71.0	27.0	21.0	2.037	1.683	56.6	19.8	36.8	UU	0.69	8.0	2.68	-	-
	P	2.00		16																
	U	3.00		-	-	2.0	73.0	25.0	20.9	2.050	1.696	51.9	19.9	32.0	UU	0.74	7.0	2.68	-	-
	P	4.00		19																
			5.80m																	
	U	6.00	Hard yellowish/ reddish brown silty clay with traces of sand, bluish grey patches and occassional presence of moorum.	-	-	5.0	69.0	26.0	21.0	2.058	1.701	52.5	18.6	33.9	UU	1.35	6.0	2.69	-	-
	P	8.00		61																
	U	10.00		-	-	6.0	73.0	21.0	21.0	2.059	1.702	46.6	18.8	27.8	UU	1.37	6.0	2.69	-	-
			12.00m																	
	P	12.00	Hard yellowish brown sandy silty clay with bluish grey patches in traces, sand content generally increases with depth/ clayey sand with fine micaflkes.	25	-	28.0	55.0	17.0	-	-	-	32.6	16.9	15.7	-	-	-	-	-	-
	P	14.00		42	-	35.0	50.0	15.0	-	-	-	29.4	20.9	8.5	-	-	-	-	-	-
			14.50m																	
	P	16.00	Hard reddish brown silty clay (generally high silt content) with varrying sand content, fine micaflkes, occassional laminations and deep/ rusty brown spots.	47																
	P	18.00		39	-	-	82.0	18.0	-	-	-	37.3	23.0	14.3	-	-	-	-	-	-
	P	20.00		46																

Sheet No. :143

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-13	P	22.00	Hard reddish brown silty clay (generally high silt content) with varrying sand content, fine micaflkes, occassional laminations and deep/ rusty brown spots.	77	-	27.0	60.0	13.0	-	-	-	29.7	20.6	9.1	-	-	-	-	-	-
	P	24.00		93																
	P	26.00		55	-	14.0	73.0	13.0	-	-	-	25.0	20.6	4.4	-	-	-	-	-	-
	P	28.00		72																
	P	30.00		80	-	-	81.0	19.0	-	-	-	38.6	22.7	15.9	-	-	-	-	-	-

Sheet No. :144

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
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7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-14	U	1.00	Stiff light grey/ yellowish/ reddish brown silty clay with occasional kankars, traces of sand and rusty brown spots.	-	-	2.0	72.0	26.0	10.8	1.978	1.785	55.3	21.0	34.3	UU	0.57	8.0	2.68	-	-
	P	2.00		12																
			3.00m																	
	U	3.00	Very stiff yellowish to reddish brown/ brown silty clay with traces of kankars/ moorums and sand in varying percentages.	-	-	4.0	68.0	28.0	20.8	2.046	1.694	59.1	20.8	38.3	UU	0.70	10.0	2.69	-	-
	P	4.00		20																
	U	6.00		-	-	2.0	67.0	31.0	20.7	2.054	1.702	61.8	19.7	42.1	UU	1.24	6.0	2.69	-	-
	P	8.00		36																
	U	10.00		-	-	2.0	68.0	30.0	20.8	2.058	1.704	58.3	20.9	37.4	UU	1.28	7.0	2.69	-	-
	P	12.00		21																
	P	14.00		27	-	21.0	65.0	14.0	-	-	-	-	-	-	-	-	-	-	-	-
	P	16.00		25	-	6.0	72.0	22.0	-	-	-	46.2	19.2	27.0	-	-	-	-	-	-
			17.00m																	
	P	18.00	Very stiff to hard yellowish brown/ reddish brown silty clay to clayey silt with reddish brown spots/ patches, traces of kankars, fine micaflakes and sand.	30	-	6.0	79.0	15.0	-	-	-	33.5	23.2	10.3	-	-	-	-	-	-

Sheet No. :145

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
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7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-14	P	20.00	Very stiff to hard yellowish brown/ reddish brown silty clay to clayey silt with reddish brown spots/ patches, traces of kankars, fine micaflakes and sand.	53	1.0	1.0	73.0	25.0	-	-	-	48.4	20.7	27.7	-	-	-	-	-	-
			21.00m																	
	P	22.00	Hard brown/ grey/ rusty brown silty clay (high silt content) clayey sandy silt with/ without laminations, reddish brown spots/ patches, fine micaflakes and occasional high percentages of sand at bottom.	39	-	2.0	82.0	16.0	-	-	-	34.8	23.9	10.9	-	-	-	-	-	-
	P	24.00		60																
			26.00m																	
	P	26.00	Dense to very dense yellowish brown sand with varrying percentage of fines and cohesive touch, high percentage of fines having high silt percentage with low plasticity (CL) at 28.00m depth b.g.l.	61	-	71.0	25.0	4.0	-	-	-	Non-Plastic			-	-	-	-	-	-
	P	28.00		63	-	8.0	79.0	13.0	-	-	-	30.7	22.9	7.8	-	-	-	-	-	-
	P	30.00		85	-	55.0	38.0	7.0	-	-	-	23.4	16.7	6.7	-	-	-	-	-	-

Sheet No. :146

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-14A	U	1.00	Stiff light grey/ yellowish/ reddish brown silty clay with occasional kankars, traces of sand and rusty brown spots.	-	-	1.0	75.0	24.0	21.0	1.996	1.650	51.3	21.2	30.1	UU	0.56	10.0	2.68	-	-
	P	2.00		11																
			3.00m																	
	U	3.00	Very stiff yellowish to reddish brown/ brown silty clay with traces of kankars/ moorums and sand in varying percentages.	-	-	3.0	67.0	30.0	21.2	2.036	1.680	63.0	22.2	40.8	UU	0.68	8.0	2.69	-	-
	P	4.00		22																
	U	6.00		-	-	3.0	66.0	31.0	21.1	2.056	1.698	55.9	21.9	34.0	UU	1.18	7.0	2.69	-	-
	P	8.00		29																
	U	10.00		-	-	6.0	70.0	24.0	21.1	2.061	1.702	49.4	20.6	28.8	UU	1.23	6.0	2.69		
	P	12.00		36																
			14.00m																	
	P	14.00	Very stiff to hard yellowish brown/ reddish brown silty clay to clayey silt with reddish brown spots/ patches, traces of kankars, fine micaflakes and sand.	23	-	9.0	76.0	15.0	-	-	-	33.7	20.6	13.1	-	-	-	-	-	-
	P	16.00		28																
	P	18.00		27	-	29.0	51.0	20.0	-	-	-	33.5	19.8	13.7	-	-	-	-	-	-
	P	20.00		36	-	2.0	80.0	18.0	-	-	-	38.5	22.7	15.8	-	-	-	-	-	-
	P	22.00		36																

Sheet No. :147

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
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6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-14A	P	24.00	Very stiff to hard yellowish brown/ reddish brown silty clay to clayey silt with reddish brown spots/ patches, traces of kankars, fine micaflakes and sand.	32																
			25.00m																	
	P	26.00	Hard brown/ grey/ rusty brown silty clay (high silt content) clayey sandy silt with/ without laminations, reddish brown spots/ patches, fine micaflakes and occasional high percentages of sand at bottom.	45	-	1.0	85.0	14.0	-	-	-	32.9	22.8	10.1	-	-	-	-	-	-
	P	28.00		42	-	13.0	*87.0		-	-	-	30.5	19.6	10.9	-	-	-	-	-	-
	P	30.00		>100																

Sheet No. :147

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-15	U	1.00	Very stiff yellowish to light reddish brown silty clay with light grey to bluish grey patches, traces of sand and moorum	-	2.0	5.0	69.0	24.0	20.1	1.983	1.651	51.3	19.4	31.9	UC	0.68	-	2.68	0.25-0.50 0.50-1.00 1.00-2.00 2.00-4.00 4.00-8.00	0.0123 0.0157 0.0180 0.0152 0.0085
	P	2.00		20																
	U	3.00	3.50m	-	1.0	4.0	68.0	27.0	21.3	1.996	1.646	55.6	19.7	35.9	UC	0.79	-	2.68	-	-
	P	4.00	Very stiff to hard yellowish to light reddish brown silty clay with sand and bluish grey patches in traces	28																
	U	6.00		-	-	5.0	66.0	29.0	21.2	2.048	1.690	59.7	20.6	39.1	UU	1.18	7.0	2.69	-	-
	P	8.00		30																
	U	10.00		-	-	7.0	67.0	26.0	20.9	2.051	1.696	52.8	19.9	32.9	UU	1.32	6.0	2.69	-	-
	P	12.00	12.50m	33	-	5.0	74.0	21.0	-	-	-	44.7	18.0	26.7	-	-	-	-	-	-
	P	14.00	Hard yellowish brown/brown silty clay with traces of sand /sandy silty clay (varying percentage of sand from 14.00m to 18.50m depth b.g.l) with occasional bluish grey patches at the upper zone; high percentage of sand, at 18.00m depth b.g.l and high percentage of silt from 20.00m depth b.g.l	50	-	29.0	60.0	11.0	-	-	-	26.3	23.3	3.0	-	-	-	-	-	-
	P	16.00		43	-	25.0	65.0	10.0	-	-	-	28.6	21.8	6.8	-	-	-	-	-	-
	P	18.00		39	-	35.0	51.0	14.0	-	-	-	27.4	22.0	5.4	-	-	-	-	-	-
	P	20.00		27	-	2.0	85.0	13.0	-	-	-	30.7	20.1	10.6	-	-	-	-	-	-

Sheet No. : 148

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-15	P	22.00	Hard yellowish brown/brown silty clay with traces of sand /sandy silty clay (varying percentage of sand from 14.00m to 18.50m depth b.g.l) with occasional bluish grey patches at the upper zone; high percentage of sand, at 18.00m depth b.g.l and high percentage of silt from 20.00m depth b.g.l	34	-	-	-	-	-	-	-	35.1	20.7	14.4	-	-	-	-	-	-
	P	24.00		32																
	P	26.00		35	-	1.0	81.0	18.0	-	-	-	38.6	23.2	15.4	-	-	-	-	-	-
			26.50m																	
	P	28.00	Hard yellowish brown /brownish grey sandy silty clay with rusty brown spots and patches	68	-	41.0	50.0	9.0	-	-	-	29.1	17.9	11.2	-	-	-	-	-	-
	P	30.00		57	-	34.0	59.0	7.0	-	-	-	Non-Plastic			-	-	-	-	-	-

Sheet No. : 149

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-16	U	1.00	Medium stiff to stiff grey silty clay with rusty brown sptots and traces of kankars at bottom.	-	-	1.0	75.0	24.0	19.6	1.939	1.621	52.1	19.2	32.9	UU	0.36	8.0	2.68	-	-
	P	2.00		5																
			2.70m																	
	U	3.00	Stiff to very stiff brown/ light reddish brown silty clay with traces of sand, grey patches and rusty brown patches.	-	-	2.0	80.0	18.0	19.6	1.946	1.627	36.7	18.6	18.1	UU	0.41	8.0	2.68	0.25-0.50 0.50-1.00 1.00-2.00 2.00-4.00 4.00-8.00	0.0326 0.0354 0.0365 0.0236 0.0135
	P	4.00		9																
	U	6.00		-	-	3.0	80.0	17.0	21.6	2.028	1.668	35.8	18.2	17.6	UU	0.56	6.0	2.69	0.25-0.50 0.50-1.00 1.00-2.00 2.00-4.00 4.00-8.00	0.0114 0.0147 0.0190 0.0179 0.0105
	P	8.00		8																
	U	10.00		-	-	2.0	72.0	26.0	21.8	2.043	1.677	56.4	21.0	35.4	UU	0.72	7.0	2.69	-	-
			11.00m																	
	P	12.00	Very stiff brown/ yellowish brown silty clay with traces of sand, fine micaflakes, kankars at lower region; varying percentage of silt is also noticed along with occasional laminations.	25																
	U	14.00		-	-	1.0	84.0	15.0	22.2	2.026	1.658	35.2	21.7	13.5	UU	0.97	8.0	2.67	-	-
	P	16.00		27																
	U	18.00		-	1.0	2.0	74.0	23.0	20.8	2.056	1.702	51.9	20.6	31.3	UU	1.18	10.0	2.69	-	-

Sheet No. : 150

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
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6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-16	P	20.00	20.00m Hard brown sandy silty clay/ clayey sandy silt with varying percentage of sand, fine micaflakes, occasional kankars and lamination of silt.	41																
	P	22.00		64	15.0	16.0	64.0	5.0	-	-	-	26.1	19.5	6.6	-	-	-	-	-	-
	P	24.00	23.00m Dense to very dense brown sand with varying percentage of fines.	83	-	83.0	*17.0		-	-	-	Non-Plastic			-	-	-	-	-	-
	P	26.00	26.00m Hard brown silty clay with traces of sand, gravels and rusty brown patches.	70	9.0	6.0	56.0	29.0	-	-	-	60.4	22.2	38.2	-	-	-	-	-	-
	P	28.00	27.30m Very dense brown sand mixed with gravels, fines, fine micaflakes and little cohesive touch at bottom.	>100	24.0	59.0	*17.0		-	-	-	Non-Plastic			-	-	-	-	-	-
	P	30.00		>100	24.0	10.0	55.0	11.0	-	-	-	Non-Plastic			-	-	-	-	-	-

Sheet No. : 151

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-17	P	1.00	Medium stiff light grey to bluish grey sandy silty clay with brown spots and kankars/ moorum in traces.	6	-	9.0	59.0	32.0	-	-	-	65.2	22.0	43.2	-	-	-	-	-	-
	P	2.00		11																
	P	3.00		13	-	7.0	59.0	34.0	-	-	-	67.4	22.4	45.0	-	-	-	-	-	-
	P	4.00	5.00m	19																
	U	6.00	Hard/ very stiff yellowish brown/ reddish brown silty clay with traces of sand, bluish grey/ grey patches, kankars in traces and laminations at bottom.	-	-	5.0	68.0	27.0	20.0	1.993	1.661	55.3	19.3	36.0	UU	0.98	10.0	2.68	0.25-0.50 0.50-1.00 1.00-2.00 2.00-4.00 4.00-8.00	0.0142 0.0173 0.0148 0.0080 0.0046
	P	8.00		40																
	U	10.00		-	-	-	-	-	20.6	2.050	1.700	52.1	18.4	33.7	UU	1.23	6.0	2.69	-	-
	P	12.00		44																
	P	14.00		23	-	4.0	67.0	29.0	-	-	-	57.3	18.3	39.0	-	-	-	-	-	-
	P	16.00	17.00m	25																
	P	18.00	Hard yellowish brown/ reddish brown silty clay (high silt content) with traces of sand.	42	-	3.0	79.0	18.0	-	-	-	38.9	23.2	15.7	-	-	-	-	-	-
	P	20.00		42																

Sheet No. : 152

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-17	P	22.00	Hard yellowish brown/ reddish brown silty clay (high silt content) with traces of sand.	39	-	4.0	79.0	17.0	-	-		36.9	23.7	13.2	-	-	-	-	-	-
			23.00m																	
	P	24.00	Hard reddish brown/ brown clayey silt with fine micaflakes, traces of sand, kqankars and fine micaflakes.	60	-	5.0	74.0	21.0	-	-	-	38.7	19.3	19.4	-	-	-	-	-	-
	P	26.00		47	3.0	4.0	82.0	11.0	-	-	-	-	-	-	-	-	-	-	-	-
	P	28.00	28.00m	93																
	P	30.00	Dense to very dense brown to reddish brown sand with high percentage of fines and fine micaflakes; little cohesive touch is also present.	101	-	54.0	40.0	6.0	-	-	-	Non-Plastic			-	-	-	-	-	-

Sheet No. : 153

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-18	U	1.00	Stiff grey /bluish grey silty clay with traces of kankars, rusty brown/ yellow patches and sand.	-	3.0	2.0	67.0	28.0	22.1	1.990	1.630	59.3	21.7	37.6	UU	5.50	10.0	2.68	-	-
	P	2.00		12																
			3.00m																	
	U	3.00	Very stiff brown/ yellowish brown silty clay with rusty / reddish brown patches, traces of kankars and sand.	-	1.0	3.0	71.0	25.0	21.1	2.023	1.671	53.8	20.6	33.2	UC	0.80	-	2.68	-	-
	P	4.00		16																
	U	6.00		-	-	5.0	66.0	29.0	21.2	2.031	1.676	58.5	21.0	37.5	UU	0.93	7.0	2.68	-	-
			8.00m																	
	P	8.00	Very stiff brown/ yellowish brown silty clay with traces of sand, fine micaflakes, kankars at lower region; varying percentage of silt is also noticed along with occasional laminations.	34																
	P	10.00		26	-	-	-	-	-	-	-	59.8	21.2	38.6	-	-	-	-	-	-
	P	12.00		46	-	9.0	72.0	19.0	-	-	-	45.0	19.9	25.1	-	-	-	-	-	-
	P	14.00		24																
	P	16.00		27	1.0	2.0	81.0	16.0	-	-	-	35.2	22.3	12.9	-	-	-	-	-	-
			17.00m																	
	P	18.00	Hard brown sandy silty clay/ clayey sandy silt with varying percentage of sand, fine micaflakes, occasional kankars and lamination of silt.	35																
	P	20.00		40	9.0	14.0	65.0	12.0	-	-	-	-	-	-	-	-	-	-	-	-
	P	22.00		44	-	-	-	-	-	-	-	32.5	23.3	9.2	-	-	-	-	-	-

Sheet No. : 154

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-18	P	24.00	Hard brown sandy silty clay/ clayey sandy silt with varying percentage of sand, fine micaflakes, occasional kankars and lamination of silt.	49	-	12.0	75.0	13.0	-	-	-	32.0	21.5	10.5	-	-	-	-	-	-
			26.00m																	
	P	26.00	Hard brown clayey silt with rusty brown patches /dense to very dense sand with high percentage of fines; cohesive touch and gravels an also present.	60	-	18.0	76.0	6.0	-	-	-	Non Plasitc			-	-	-	-	-	-
	P	28.00		93	8.0	40.0	48.0	4.0	-	-	-	Non Plasitc			-	-	-	-	-	-
	P	30.00		>100																

Sheet No. : 155

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.



PLT-02

CPLT-01

BOREHOLE,ERT, PLT&CPLT LOCATIONS SECOND PHASE			
BH NO.	EASTING	NORTHING	ELEVATION & LEVELS
BH-01(TP-15)	1163.800	1118.000	(+) 34.500m
BH-(TP-16)	1185.751	1163.822	(+) 34.100m
BH-01(TP-17)	1163.800	1251.750	(+) 33.750m
BH-(TP-18)	1163.822	1304.251	(+) 34.150m
BH-01(TP-19)	1179.953	1363.220	(+) 34.168m
PLT-01(TP-19)	1157.394	1377.532	(+) 29.325m
PLT-02	130.610	1140.540	(+) 33.125m
CPLT-01	540.510	1110.230	(+) 34.230m

BH(TP-18)
PLT-01(TP-19)
BH-01(TP-15)
BH-01(TP-17)
BH(TP-16)
BH-01(TP-19)

Location Plan of Bore holes, PLT & CPLT

Project :Proposed Extension Unit No. 3 and 4 at Sagardighi Thermal Power Project Phase-2, Sagardighi, West Bengal

1. Bore Hole shown thus
2. PLT shown thus
3. CPLT shown thus
4. SCALE: Not to Scale
5. Ref DWG No:-1/PM07/DS00/6/0001/Sheet No-1/date :25.05.12

SARDIP CONSULTING ENGINEERS

CHEMICAL TEST RESULTS OF WATER SAMPLES

Bore Hole No.	**pH** Value	**Chloride** *mg/L*	**Sulphate** *mg/L*
BH-1	7.20	28.30	106.00
BH-2	7.40	39.50	98.00
BH-3	7.10	49.00	75.00
BH-4	7.60	48.30	85.00
BH-4A	7.20	61.90	92.00
BH-5	7.80	67.30	115.00
BH-6	7.60	87.30	179.00
BH-6A	7.50	39.00	85.00
BH-7	7.20	61.20	119.00
BH-8	7.40	88.10	166.00
BH-11	7.80	66.30	103.00
BH-12	7.20	76.40	112.00
BH-12A	7.60	92.30	176.00
BH-13	7.40	69.70	188.00
BH-14	7.20	66.10	160.00
BH-14A	7.60	86.20	198.00
BH-15	7.30	51.30	95.00
BH-16	7.60	165.60	118.00
BH-17	7.50	90.00	166.00
BH-18	7.30	110.00	189.00

CHEMICAL TEST RESULTS OF SOIL SAMPLES

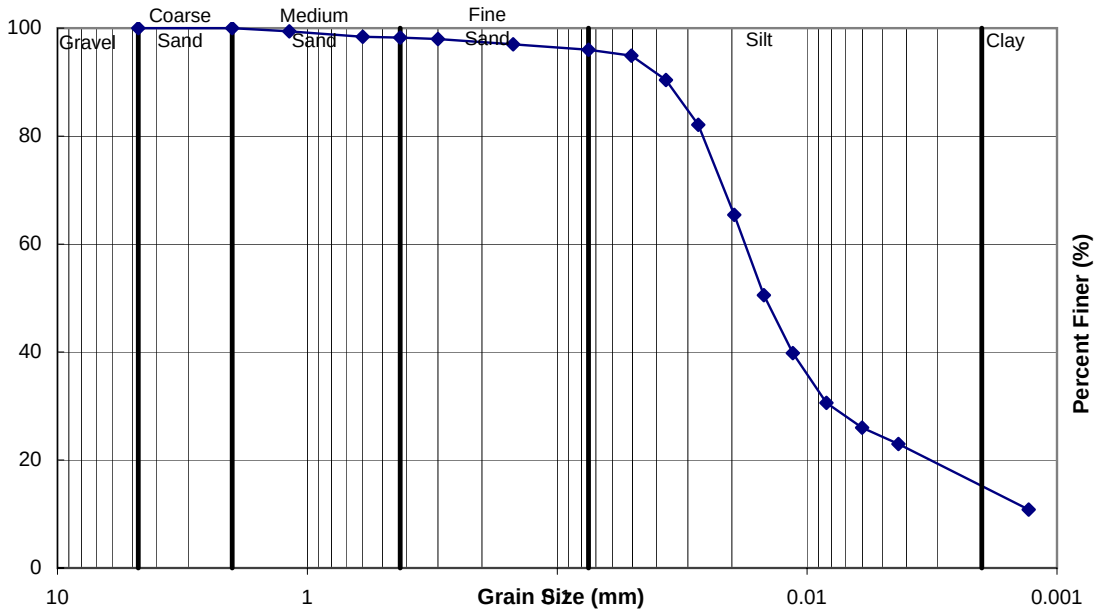
Bore Hole No.	**Depth (m)**	**pH** Value	**Chloride** *(%)*	**Sulphate** *(%)*
BH-1	SPT-1.00	7.00	0.0068	0.068
	SPT-3.00	6.98	0.0054	0.057
BH-2	SPT-2.00	7.10	0.0077	0.085
	SPT-4.00	7.00	0.0061	0.064
BH-3	SPT-3.00	7.00	0.0066	0.042
	SPT-4.00	7.00	0.0048	0.033
BH-4	UDS-3.00	7.20	0.0064	0.079
BH-4A	UDS-1.00	7.00	0.0075	0.052
BH-5	UDS-2.00	7.00	0.0085	0.064
	UDS-4.00	7.00	0.0064	0.051
BH-6	UDS-2.00	7.10	0.0095	0.069
	UDS-4.00	7.00	0.0061	0.052
BH-6A	UDS-1.00	7.10	0.0056	0.049
BH-7	UDS-1.00	7.00	0.0078	0.056
	UDS-3.00	7.00	0.0061	0.048
BH-8	UDS-3.00	7.10	0.0098	0.045
	UDS-10.00	7.00	0.0028	0.009
BH-11	UDS-1.00	7.30	0.0072	0.067
	UDS-3.00	7.10	0.0042	0.059
BH-12	UDS-1.00	7.00	0.0096	0.071
	UDS-3.00	7.00	0.0062	0.050
BH-12A	UDS-1.00	7.30	0.0098	0.043
BH-13	UDS-1.00	7.20	0.0088	0.053
	UDS-3.00	7.10	0.0061	0.042
BH-14	UDS-1.00	7.00	0.0079	0.062
	UDS-3.00	6.98	0.0064	0.042
BH-14A	UDS-1.00	7.10	0.0099	0.062
BH-15	UDS-1.00	7.00	0.0068	0.065
	UDS-3.00	7.00	0.0041	0.050
BH-16	UDS-1.00	7.30	0.0090	0.072
	UDS-3.00	7.10	0.0061	0.053
BH-17	SPT-2.00	7.20	0.0100	0.080
	UDS-6.00	7.00	0.0080	0.012
BH-18	UDS-3.00	7.00	0.0140	0.089
	UDS-6.00	7.00	0.0110	0.062

Permeability (k cm/sec) Values

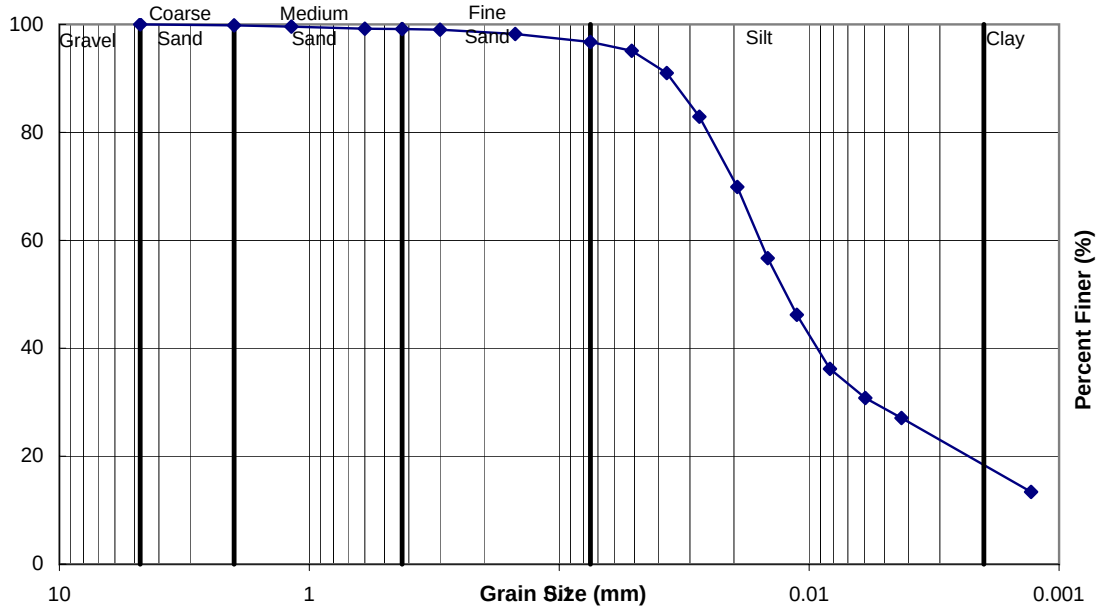
Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Sl. No.	Bore Hole No.	Depth (m)	k cm/sec
1	BH- 4	3.00	2.10×10^{-7}
2	BH- 4A	1.00	1.00×10^{-8}
3	BH- 5	8.00	1.60×10^{-8}
4	BH- 6	12.00	1.50×10^{-7}
5	BH- 6A	6.00	1.38×10^{-7}
6	BH- 7	10.00	2.00×10^{-7}
7	BH- 8	3.00	2.60×10^{-7}
8	BH- 11	3.00	2.50×10^{-7}
9	BH- 11	8.00	2.60×10^{-7}
10	BH- 15	1.00	3.20×10^{-7}
11	BH- 16	3.00	5.60×10^{-7}
12	BH- 16	6.00	2.50×10^{-7}
13	BH- 17	6.00	1.70×10^{-7}

GRAIN SIZE DISTRIBUTION CURVE

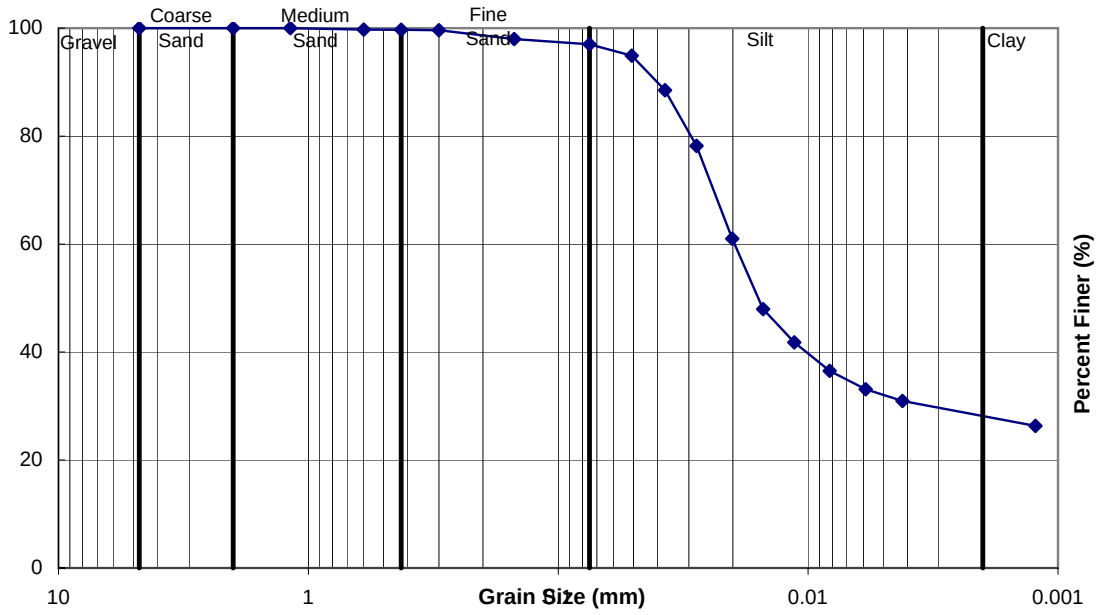


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-1:1m	0.0	0.0	2.0	2.0	81.0	15.0	-	-

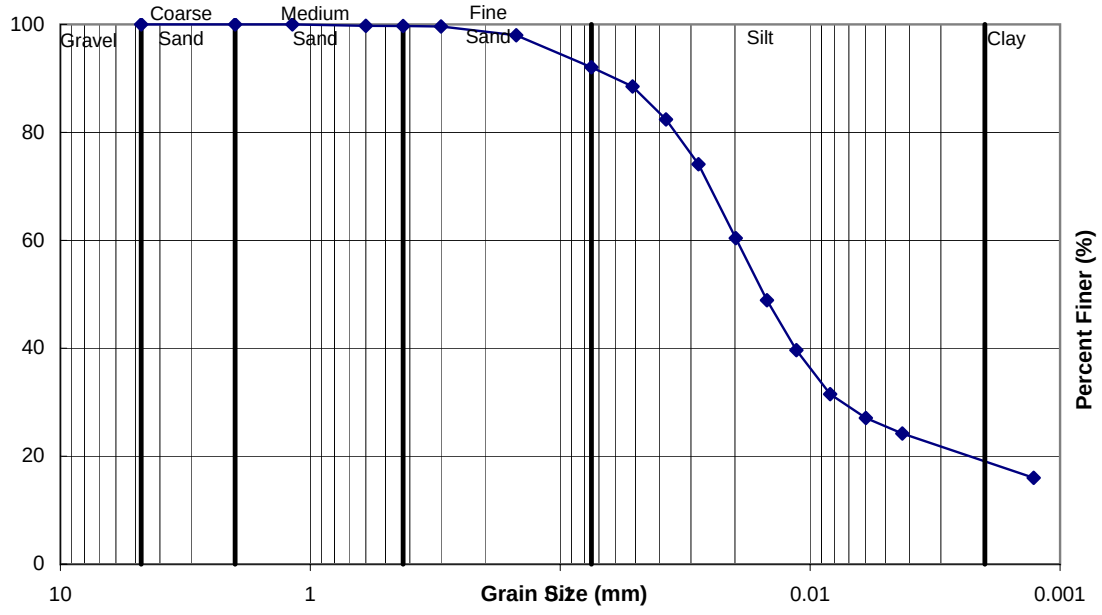


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-1:3m	0.0	0.0	1.0	2.0	79.0	18.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

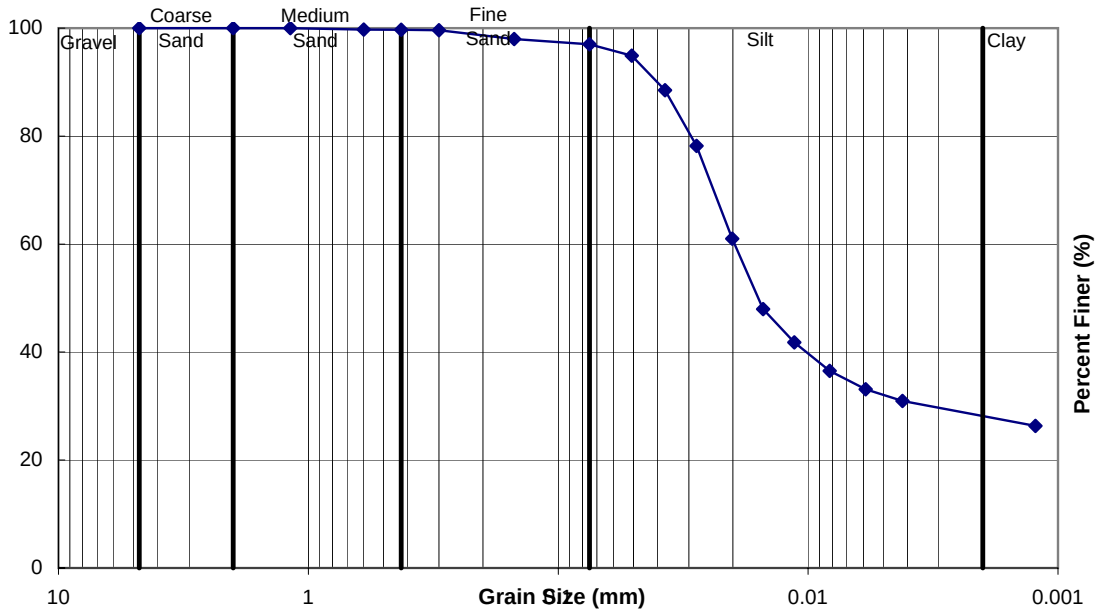


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-1:12m	0.0	0.0	0.0	3.0	69.0	28.0	-	-

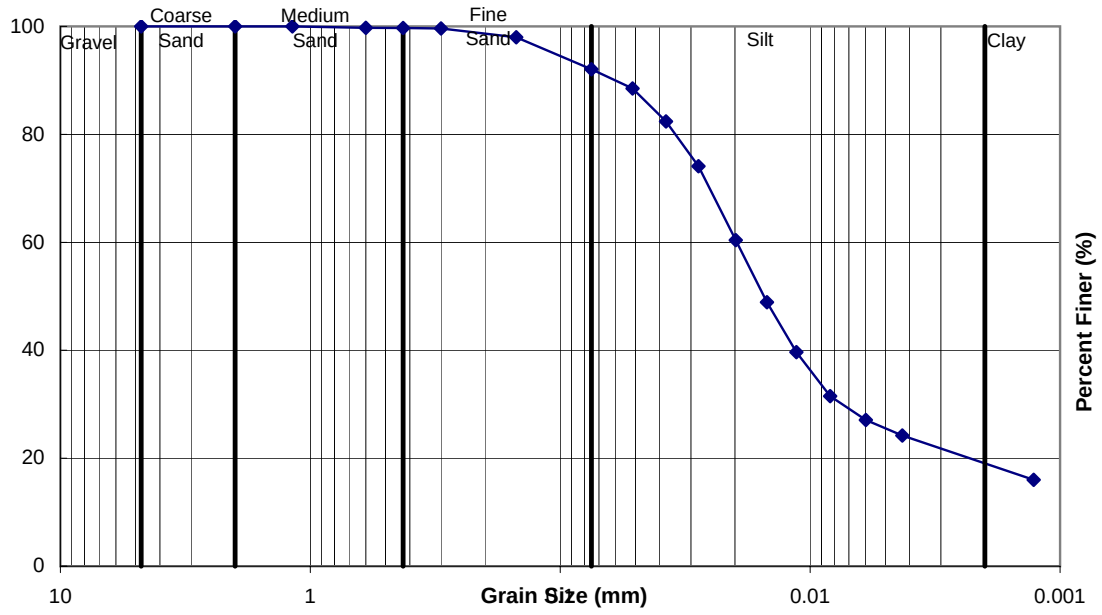


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-1:12m	0.0	0.0	0.0	8.0	73.0	19.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

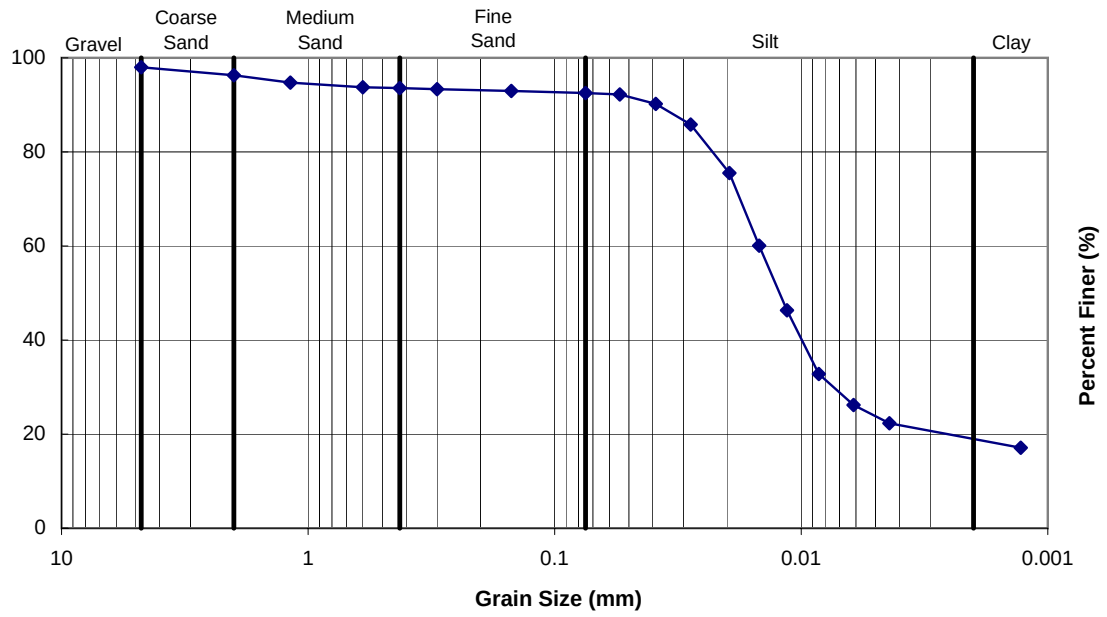


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-1:12m	0.0	0.0	0.0	3.0	69.0	28.0	-	-

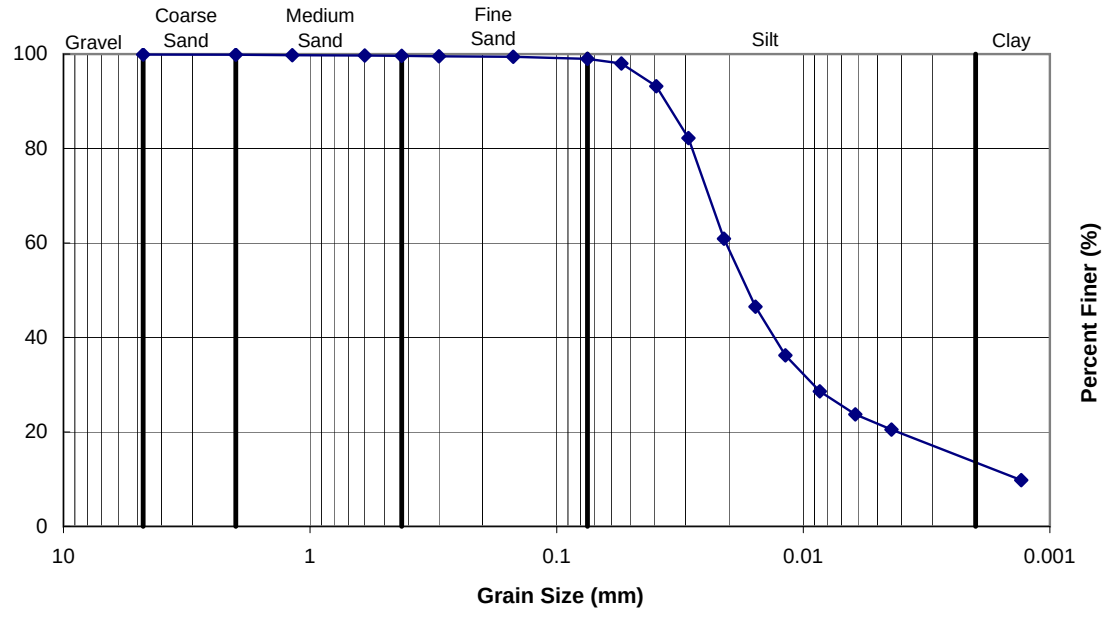


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-1:12m	0.0	0.0	0.0	8.0	73.0	19.0	-	-

GRAIN SIZE DISTRIBUTION CURVE



Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-1:20m	2.0	2.0	3.0	1.0	73.0	19.0	-	-



Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-1:22m	0.0	0.0	0.0	1.0	85.0	14.0	15.4	0.3

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-01 (One)TP-15

Location : E : 1163.800, N : 1118.000

Ground Elevation : +34.500m

Method of Boring/ Drilling : Shell

Water Level (Static) : 7.50m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : SX-27.00m

Date : From 13.10.12 To 15.10.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
13.10.12 0.00															
	+34.000	0.50	-	-	D	-	-	-	-	-	-	-	-	-	Medium stiff light yellowish grey to brownish grey silty clay with traces of kankars and bluish grey patches at bottom
	+33.500	1.00	1.45	0.45	P	2	2	3	-	5	-	-	-	-	
															2.00m
	+32.500	2.00	2.45	0.45	U	-	-	-	-	-	-	-	-	-	Stiff to very stiff brownish / yellowish silty clay with bluish grey patches, dark grey spots and traces of kankars / sand
	+31.500	3.00	3.45	0.45	P	2	3	4	-	7	-	-	-	-	
	+30.500	4.00	4.45	0.45	U	-	-	-	-	-	-	-	-	-	
14.10.12 5.00	+29.500	5.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+28.500	6.00	6.45	0.45	P	2	9	10	-	19	-	-	-	-	
	+27.500	7.00	7.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+26.500	8.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+25.500	9.00	9.45	0.45	P	5	7	10	-	17	-	-	-	-	
	+24.500	10.00	10.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+23.500	11.00	-	-	D	-	-	-	-	-	-	-	-	-	
															12.00m
	+22.500	12.00	12.45	0.45	P	9	14	23	-	37	-	-	-	-	Hard yellowish brown sandy silty clay with bluish grey patches at top
	+21.500	13.00	13.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+20.500	14.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+19.500	15.00	15.45	0.45	P	12	20	33	-	53	-	-	-	-	
	+18.500	16.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+17.500	17.00	17.45	0.45	P	9	14	26	-	40	-	-	-	-	

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project	: Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB	Bore Hole No.	: BH-01 (One)TP-15
Location	: E : 1163.800, N : 1118.000	Ground Elevation	: +34.500m
Method of Boring/ Drilling	: Shell	Water Level (Static)	: 7.50m b.g.l.
Boring/ Drilling Equipment	: Mechanical Winch	Dia. of Boring/ Drilling	: 150mm
Casing Lowered	: SX-27.00m	Date : From 13.10.12	To 15.10.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
	+16.500	18.00	-	-	D	-	-	-	-	-	-	-	-	-	
															19.00m
	+15.500	19.00	19.45	0.45	P	13	27	34	-	61	-	-	-	-	Dense yellowish brown / brownish grey sandy with varying percentage of fines
	+13.500	21.00	21.45	0.45	P	15	34	48	-	82	-	-	-	-	
15.10.12															
23.00	+11.500	23.00	23.45	0.45	P	19	26	53	-	79	-	-	-	-	
	+9.500	25.00	25.45	0.45	P	16	29	62	-	91	-	-	-	-	
															27.00m
	+7.500	27.00	27.45	0.45	P	19	35	68	-	>100	-	-	-	-	Hard brownish grey sandy silty clay with occasional lamination and fine mica flakes
	+6.000	28.50	28.95	0.45	P	17	28	45	-	73	-	-	-	-	
	+4.500	30.00	30.45	0.45	P	21	31	48	-	79	-	-	-	-	
	+4.500	30.00		(Termination Depth)											

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-(TP-16)

Location : E : 1185.751, N : 1163.822

Ground Elevation : +34.100m

Method of Boring/ Drilling : Shell

Water Level (Static) : 10.35m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : SX-27.00m

Date : From 08.11.12 To 09.11.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
08.11.12															
0.00															
	+33.600	0.50	-	-	D	-	-	-	-	-	-	-	-	-	Medium stiff to stiff brownish grey silty clay with rusty brown / bluish grey patches and sand in traces
	+33.100	1.00	1.45	0.45	P	2	2	3	-	5	-	-	-	-	
															1.80m
	+32.100	2.00	2.45	0.45	U	-	-	-	-	-	-	-	-	-	Very stiff to hard light reddish / yellowish brown silty clay with traces of sand, bluish grey spots and traces of kankars
	+31.100	3.00	3.45	0.45	P	2	3	4	-	7	-	-	-	-	
	+30.100	4.00	4.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+29.100	5.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+28.100	6.00	6.45	0.45	P	2	9	10	-	19	-	-	-	-	
	+27.100	7.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+26.100	8.00	8.50	0.50	U	-	-	-	-	-	-	-	-	-	
	+25.100	9.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+24.100	10.00	10.45	0.45	P	9	17	26	-	43	-	-	-	-	
	+23.100	11.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+22.100	12.00	12.45	0.45	U	-	-	-	-	-	-	-	-	-	
09.11.12															
13.50	+20.600	13.50	-	-	D	-	-	-	-	-	-	-	-	-	
															14.00m
	+20.100	14.00	14.45	0.45	P	6	9	14	-	23	-	-	-	-	Very stiff to hard reddish to yellowish brown sandy silty clay with bluish grey spots
	+19.100	15.00	-	-	D	-	-	-	-	-	-	-	-	-	
															16.00m
	+18.100	16.00	16.50	0.50	U	-	-	-	-	-	-	-	-	-	Very stiff to hard reddish brown / brown sandy silty clay (high percentage of sand) / silty clayey sand
	+16.600	17.50	-	-	D	-	-	-	-	-	-	-	-	-	

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project	: Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB	Bore Hole No.	: BH-(TP-16)
Location	: E : 1185.751, N : 1163.822	Ground Elevation	: +34.100m
Method of Boring/ Drilling	: Shell	Water Level (Static)	: 10.35m b.g.l.
Boring/ Drilling Equipment	: Mechanical Winch	Dia. of Boring/ Drilling	: 150mm
Casing Lowered	: SX-27.00m	Date : From	08.11.12 To 09.11.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
	+16.100	18.00	18.45	0.45	P	6	11	18	-	29	-	-	-	-	Very stiff to hard reddish brown / brown sandy silty clay (high percentage of sand) / silty clayey sand
	+14.600	19.50	-	-	D	-	-	-	-	-	-	-	-	-	
	+14.100	20.00	20.45	0.45	P	20	30	39	-	69	-	-	-	-	
	+12.600	21.50	-	-	D	-	-	-	-	-	-	-	-	-	
	+12.100	22.00	22.45	0.45	P	11	15	18	-	33	-	-	-	-	16.00m Medium dense to dense brown / reddish brown sand with varying percentage of fines and fine mica flakes in abundance
	+10.100	24.00	24.45	0.45	P	14	23	28	-	51	-	-	-	-	
	+8.100	26.00	26.45	0.45	P	21	36	42	-	78	-	-	-	-	
	+6.100	28.00	28.45	0.45	P	27	37	45	-	82	-	-	-	-	
	+4.100	30.00	30.45	0.45	P	25	36	51	-	87	-	-	-	-	
	+4.100	30.00	(Termination Depth)												

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-01 (One)TP-17

Location : E : 1163.800, N : 1251.750

Ground Elevation : +33.750m

Method of Boring/ Drilling : Shell

Water Level (Static) : 7.30m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : SX-27.00m

Date : From 11.10.12 To 13.10.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
11.10.12															
0.00															
	+33.250	0.50	-	-	D	-	-	-	-	-	-	-	-	-	Medium stiff to stiff yellowish grey / brown silty clay with traces of kankars
	+32.750	1.00	1.45	0.45	P	2	2	2	-	4	-	-	-	-	
															2.00m
	+31.750	2.00	2.45	0.45	U	-	-	-	-	-	-	-	-	-	Stiff to very stiff yellowish brown silty clay with traces of kankars / sand and bluish grey patches at top
	+30.750	3.00	3.45	0.45	P	2	3	5	-	8	-	-	-	-	
	+29.750	4.00	4.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+28.750	5.00	5.45	0.45	P	3	5	8	-	13	-	-	-	-	
12.10.12															
6.50	+27.250	6.50	6.95	0.45	U	-	-	-	-	-	-	-	-	-	
	+25.750	8.00	8.45	0.45	P	3	5	6	-	11	-	-	-	-	
	+24.750	9.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+24.250	9.50	9.95	0.45	U	-	-	-	-	-	-	-	-	-	
	+22.750	11.00	11.45	0.45	P	7	9	12	-	21	-	-	-	-	
															12.00m
	+21.750	12.00	-	-	D	-	-	-	-	-	-	-	-	-	Very stiff to hard yellowish / reddish brown sandy silty clay with bluish grey patches
	+21.250	12.50	12.95	0.45	U	-	-	-	-	-	-	-	-	-	
															14.00m
	+19.750	14.00	14.45	0.45	P	8	14	24	-	38	-	-	-	-	Hard reddish yellow / brownish grey sandy silty clay (high percentage of sand)
	+18.750	15.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+17.750	16.00	16.45	0.45	P	15	18	23	-	41	-	-	-	-	
	+16.750	17.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+15.750	18.00	18.45	0.45	P	13	17	24	-	41	-	-	-	-	

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project	: Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB	Bore Hole No.	: BH-01 (One)TP-17
Location	: E : 1163.800, N : 1251.750	Ground Elevation	: +33.750m
Method of Boring/ Drilling	: Shell	Water Level (Static)	: 7.30m b.g.l.
Boring/ Drilling Equipment	: Mechanical Winch	Dia. of Boring/ Drilling	: 150mm
Casing Lowered	: SX-27.00m	Date : From	11.10.12 To 13.10.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
	+14.250	19.50	-	-	D	-	-	-	-	-	-	-	-	-	Hard reddish yellow / brownish grey sandy silty clay (high percentage of sand)
	+13.750	20.00	20.45	0.45	P	15	19	26	-	45	-	-	-	-	
	+12.750	21.00	-	-	D	-	-	-	-	-	-	-	-	-	21.50m
	+12.250	21.50	21.95	0.45	P	13	25	29	-	54	-	-	-	-	Medium dense brown / reddish brown sand with fines and fine mica flakes
	+11.250	22.50	-	-	D	-	-	-	-	-	-	-	-	-	
	+10.250	23.50	23.95	0.45	P	12	23	38	-	61	-	-	-	-	
13.10.12															24.00m
24.50	+9.250	24.50	-	-	D	-	-	-	-	-	-	-	-	-	Hard brownish grey / grey silty clay with high silt content
	+8.250	25.50	25.95	0.45	P	11	21	43	-	64	-	-	-	-	
	+6.750	27.00	27.45	0.45	P	14	27	45	-	72	-	-	-	-	
	+5.750	28.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+5.250	28.50	28.95	0.45	P	13	29	46	-	75	-	-	-	-	
	+3.750	30.00	30.45	0.45	P	16	33	48	-	81	-	-	-	-	
	+3.750	30.00		(Termination Depth)											

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-TP-18

Location : E : 1163.822, N : 1304.251

Ground Elevation : +34.150m

Method of Boring/ Drilling : Shell

Water Level (Static) : 11.50m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : SX-27.00m

Date : From 11.11.12 To 18.11.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
11.11.12															
0.00															
	+33.650	0.50	-	-	D	-	-	-	-	-	-	-	-	-	Medium stiff brownish yellow silty clay with traces of sand / kankars and bluish grey patches at bottom
	+33.150	1.00	1.45	0.45	P	1	2	3	-	5	-	-	-	-	
	+32.150	2.00	2.45	0.45	P	2	3	4	-	7	-	-	-	-	
															2.50m
	+31.150	3.00	3.45	0.45	U	-	-	-	-	-	-	-	-	-	Very stiff to hard reddish to yellowish brown silty clay with traces of kankars / sand and bluish grey patches
	+30.150	4.00	4.45	0.45	P	4	7	10	-	17	-	-	-	-	
	+29.150	5.00	5.45	0.45	U	-	-	-	-	-	-	-	-	-	
16.11.12															
6.00	+28.150	6.00	6.45	0.45	P	5	8	14	-	22	-	-	-	-	
															12.00m
	+27.150	7.00	-	-	D	-	-	-	-	-	-	-	-	-	Very stiff / hard reddish to yellowish brown sandy silty clay with traces of kankars
	+26.150	8.00	8.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+25.150	9.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+24.150	10.00	10.45	0.45	P	8	13	20	-	33	-	-	-	-	
	+23.150	11.00	-	-	D	-	-	-	-	-	-	-	-	-	
17.11.12															
12.00	+22.150	12.00	12.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+21.150	13.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+20.150	14.00	14.45	0.45	P	7	10	15	-	25	-	-	-	-	
	+19.150	15.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+18.150	16.00	16.45	0.45	U	-	-	-	-	-	-	-	-	-	
															16.50m
	+17.150	17.00	-	-	D	-	-	-	-	-	-	-	-	-	Hard yellowish brown sandy silty clay (high percentage of sand)

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-TP-18

Location : E : 1163.822, N : 1304.251

Ground Elevation : +34.150m

Method of Boring/ Drilling : Shell

Water Level (Static) : 11.50m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : SX-27.00m

Date : From 11.11.12 To 18.11.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
	+16.150	18.00	18.45	0.45	P	8	12	20	-	32	-	-	-	-	Hard yellowish brown sandy silty clay (high percentage of sand)
	+15.150	19.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+14.150	20.00	20.45	0.45	P	12	20	29	-	49	-	-	-	-	
	+13.150	21.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+12.150	22.00	22.45	0.45	P	10	16	20	-	36	-	-	-	-	
	+10.150	24.00	24.45	0.45	P	12	21	25	-	46	-	-	-	-	
	+8.150	26.00	26.45	0.45	P	18	32	40	-	72	-	-	-	-	26.00m Hard brownish grey / yellowish brown silty clay (high silt content) with sand
18.11.12 28.00	+6.150	28.00	28.45	0.45	P	25	35	42	-	77	-	-	-	-	
	+4.150	30.00	30.45	0.45	P	25	37	45	-	82	-	-	-	-	
	+4.150	30.00	(Termination Depth)												

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-01 (One)TP-19

Location : Sagardighi PDCL

Ground Elevation : +34.168m

Method of Boring/ Drilling : Shell/ Rotary

Water Level (Static) : 5.5m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

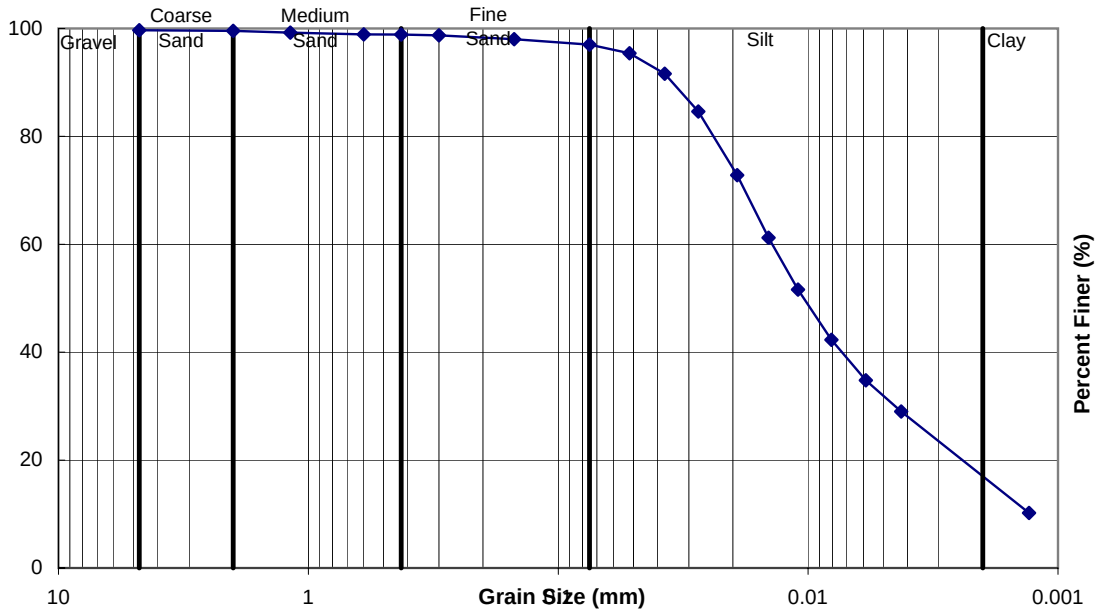
Casing Lowered : 26.50m

Date : From 04.10.12 To 05.10.12

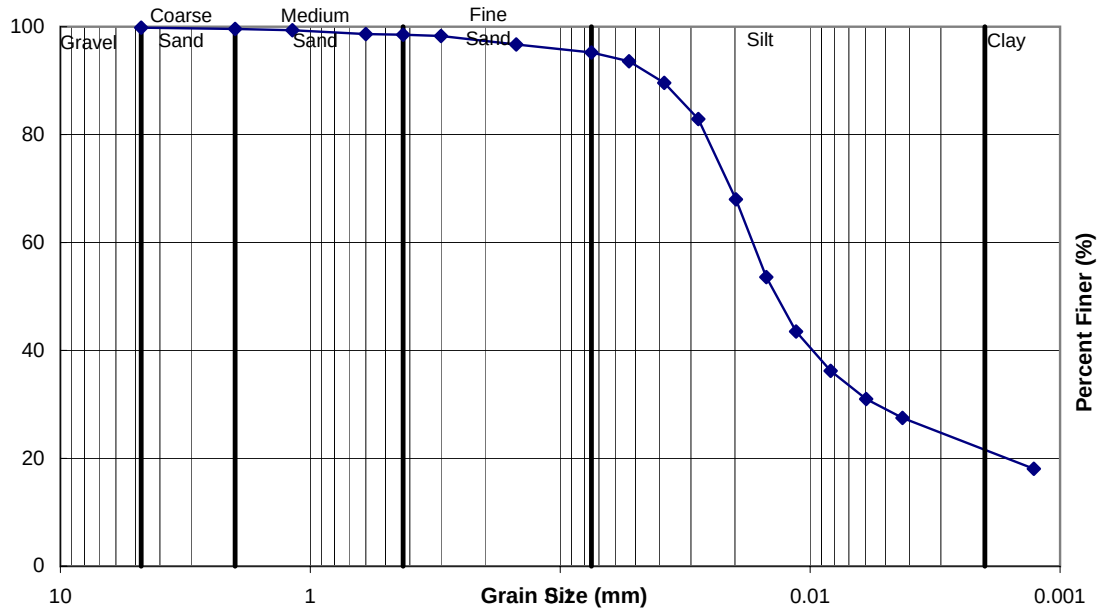
Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
04.10.12															
0.00															Medium stiff / stiff light bluish grey silty clay with traces of sand, rusty brown spots and moorums
	+33.668	0.50	-	-	D				-	-	-	-	-	-	
	+33.168	1.00	1.45	0.45	P	1	3	4	-	7	-	-	-	-	
															1.80m
	+32.168	2.00	2.45	0.45	P	2	3	5	-	8	-	-	-	-	Stiff to very stiff light reddish brown silty clay with traces of sand, occasional bluish grey spots and kankars
	+31.168	3.00	3.50	0.50	U	-	-	-	-	-	-	-	-	-	
	+30.168	4.00	4.45	0.45	P	4	6	8	-	14	-	-	-	-	
21.06.12	+28.668	5.50	5.95	0.45	U	-	-	-	-	-	-	-	-	-	
4.00	+27.668	6.50	-	-	D	-	-	-	-	-	-	-	-	-	
	+27.168	7.00	7.45	0.45	P	4	7	9	-	16	-	-	-	-	
	+26.168	8.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+25.668	8.50	8.95	0.45	U	-	-	-	-	-	-	-	-	-	
	+24.668	9.50	-	-	D	-	-	-	-	-	-	-	-	-	
	+24.168	10.00	10.45	0.45	P	3	7	10	-	17	-	-	-	-	
	+23.168	11.00	-	-	D	-	-	-	-	-	-	-	-	-	
															11.50m
	+22.668	11.50	11.95	0.45	U	-	-	-	-	-	-	-	-	-	Very stiff to hard light reddish brown sandy silty clay with bluish grey spots (varying percentage of sand)
	+22.218	11.95	12.40	0.45	P	9	17	25	-	42	-	-	-	-	
	+21.168	13.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+20.668	13.50	13.95	0.45	P	9	12	19	-	31	-	-	-	-	
	+19.668	14.50	-	-	D	-	-	-	-	-	-	-	-	-	
	+19.168	15.00	-	-	D	-	-	-	-	-	-	-	-	-	
															15.50m
	+18.668	15.50	15.95	0.45	P	12	14	18	-	32	-	-	-	-	
	+17.668	16.50	-	-	D	-	-	-	-	-	-	-	-	-	Hard yellowish brown silty clay high silt content / clayey silt with traces of sand and fine mica flakes
22.06.12	+16.668	17.50	17.95	0.45	P	8	16	21	-	37	-	-	-	-	
20.00	+15.668	18.50	-	-	D	-	-	-	-	-	-	-	-	-	
	+14.668	19.50	19.95	0.45	P	9	13	22	-	35	-	-	-	-	
	+13.668	20.50	-	-	D	-	-	-	-	-	-	-	-	-	
															21.50m
	+12.668	21.50	-	-	D	-	-	-	-	-	-	-	-	-	
	+12.168	22.00	22.45	0.45	P	11	22	29	-	51	-	-	-	-	Hard yellowish grey silty clay with varying percentage of sand and fine mica flakes
	+11.168	23.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+10.168	24.00	24.45	0.45	P	8	19	28	-	47	-	-	-	-	
	+9.168	25.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+8.168	26.00	26.45	0.45	P	9	21	29	-	50	-	-	-	-	
	+7.168	27.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+6.168	28.00	28.45	0.45	P	12	28	39	-	67	-	-	-	-	
	+5.168	29.00	-	-	D	-	-	-	-	-	-	-	-	-	
	+4.168	30.00	30.20	0.20	P	35	50 (5cm)	-	-	>100	-	-	-	-	
	+4.168	30.00	(Termination Depth)												

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

GRAIN SIZE DISTRIBUTION CURVE

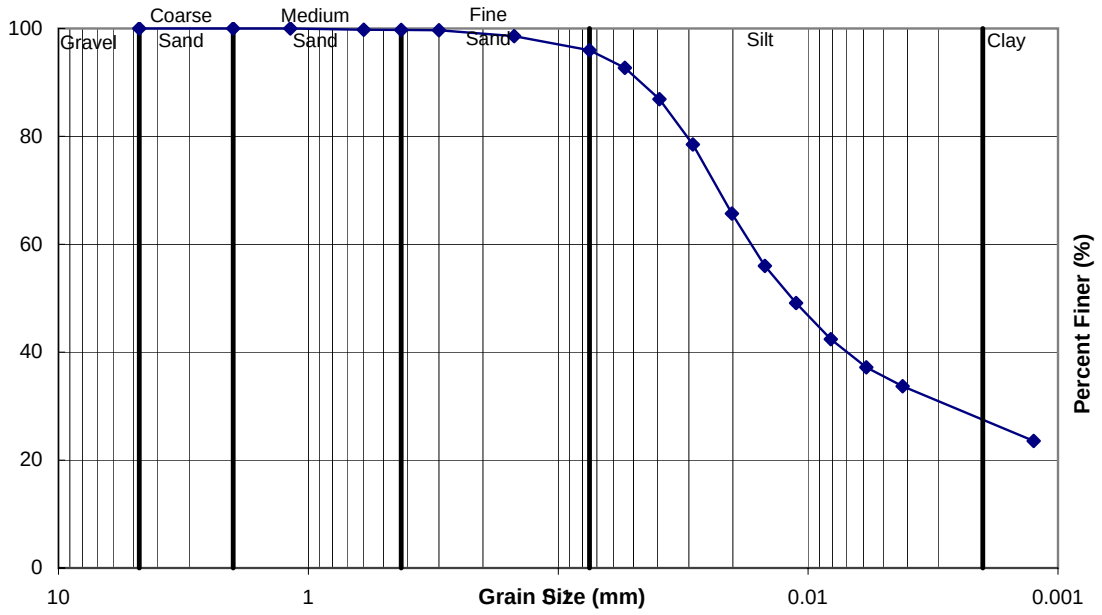


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-2:2m	0.0	0.0	1.0	2.0	80.0	17.0	-	-

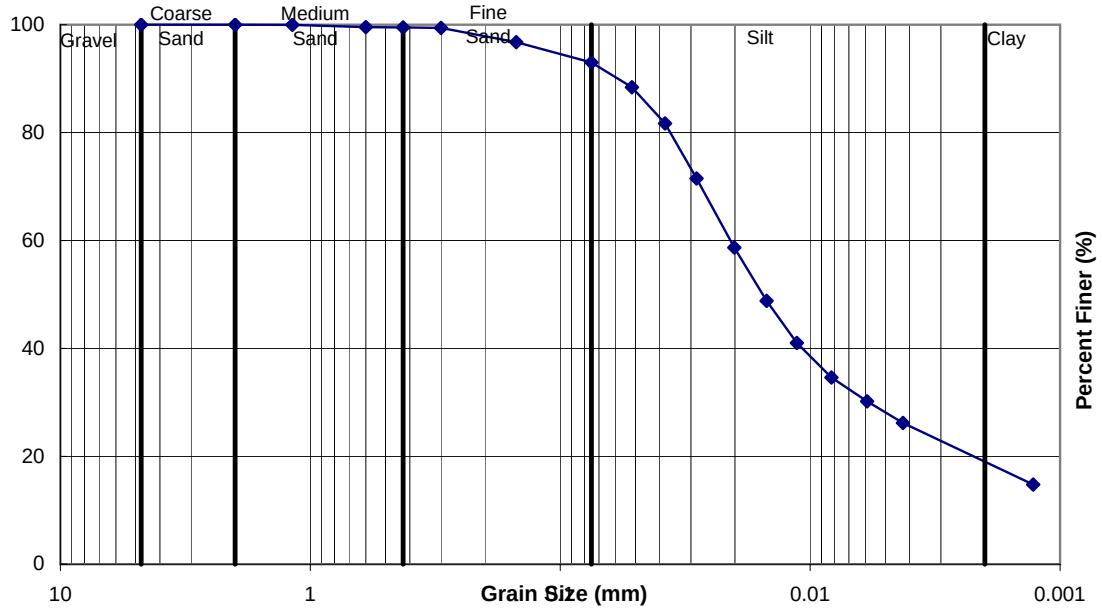


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-2:4m	0.0	0.0	1.0	3.0	74.0	22.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

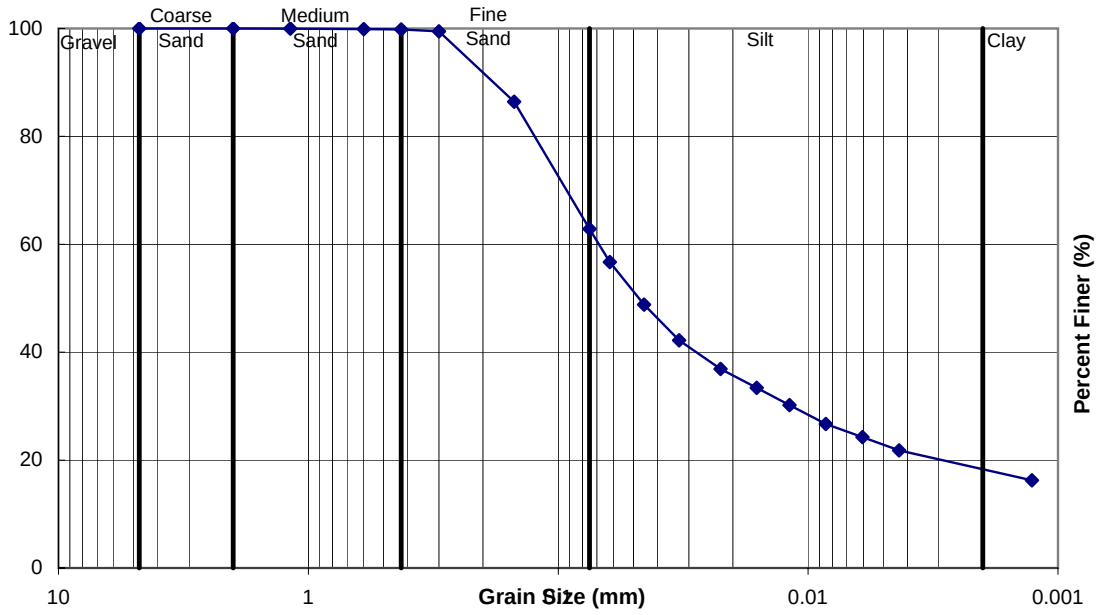


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-2:8m	0.0	0.0	0.0	4.0	69.0	27.0	-	-

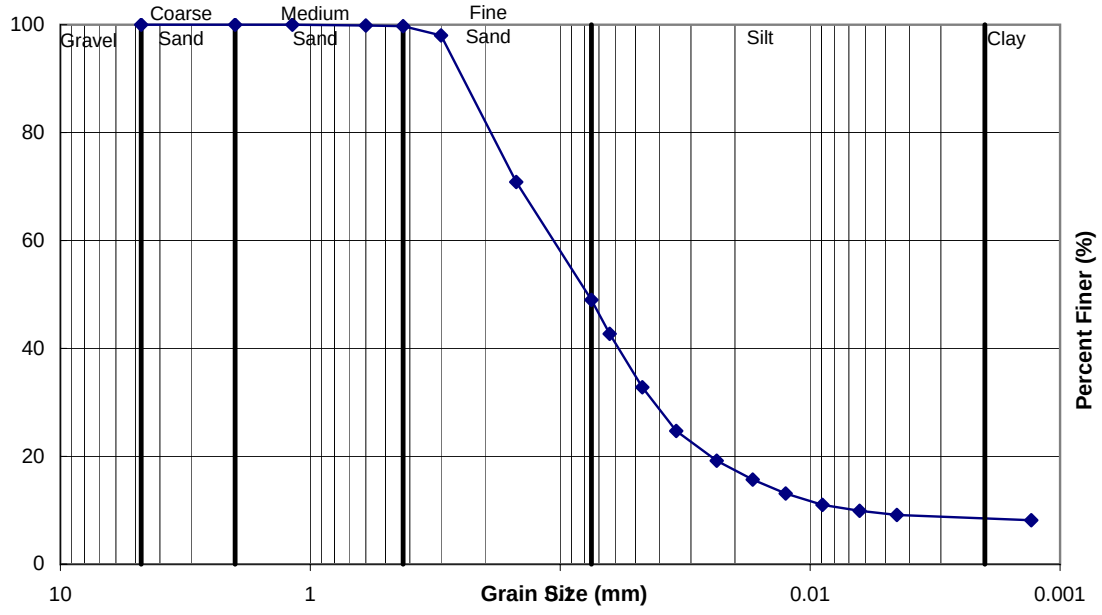


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-2:10m	0.0	0.0	0.0	7.0	74.0	19.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

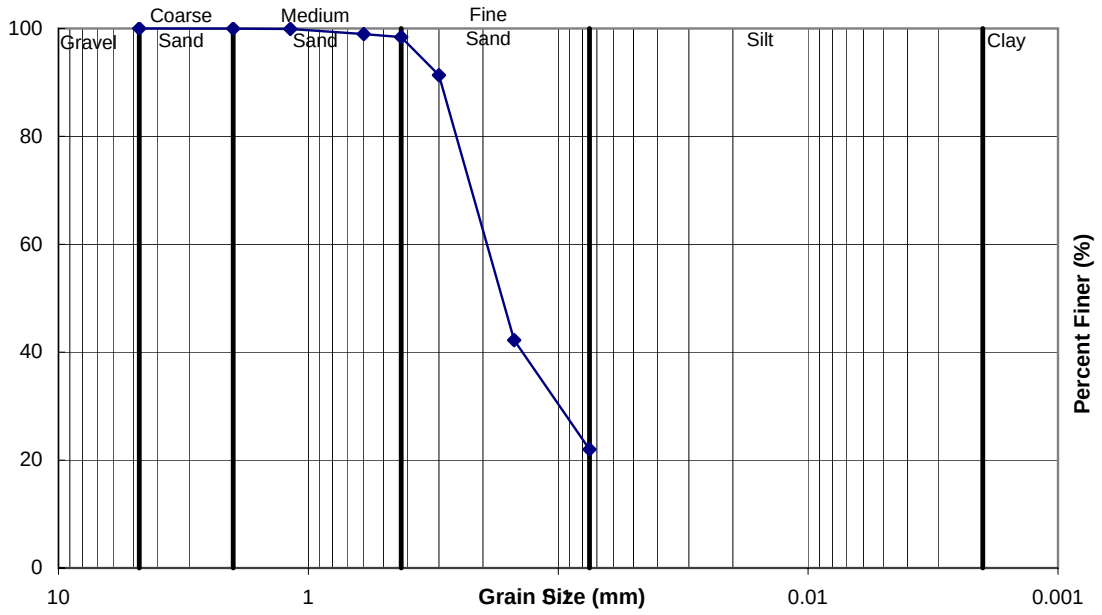


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-2:12m	0.0	0.0	0.0	37.0	45.0	18.0	-	-

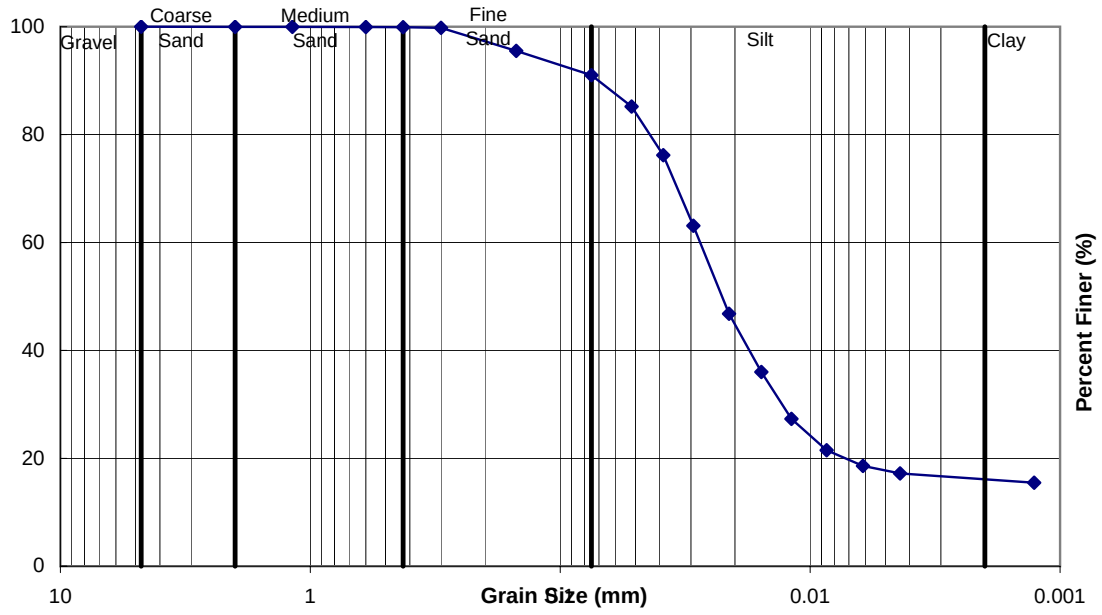


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-2:14m	0.0	0.0	0.0	51.0	41.0	8.0	16.2	0.4

GRAIN SIZE DISTRIBUTION CURVE

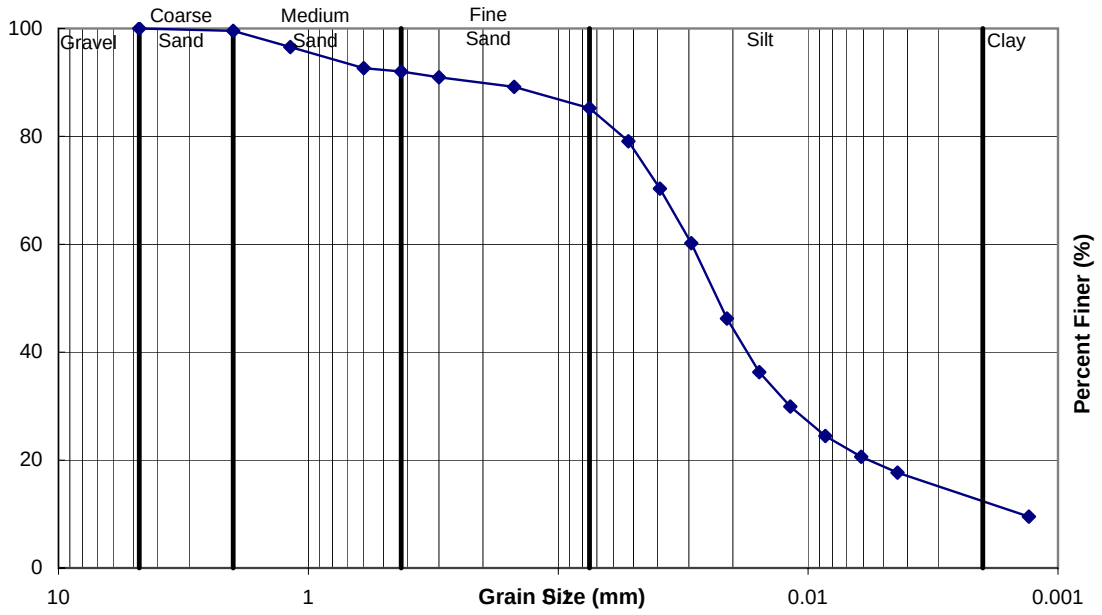


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
BH-2:16m	0.0	0.0	2.0	76.0	22.0		-	-

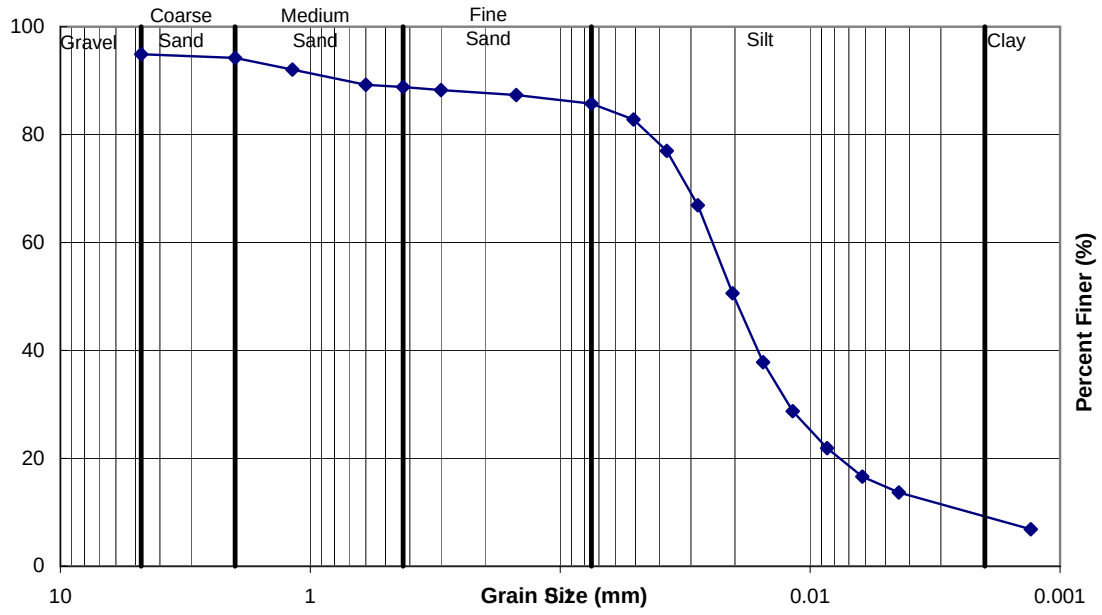


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-2:18m	0.0	0.0	0.0	9.0	75.0	16.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

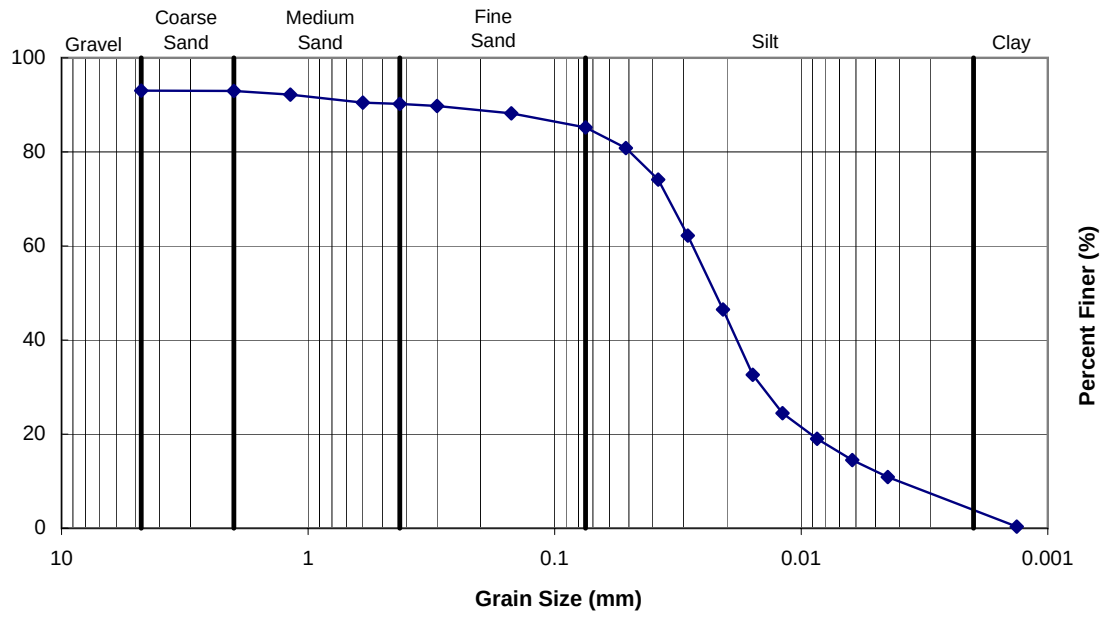


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-2:20m	0.0	0.0	8.0	7.0	73.0	12.0	20.8	0.3

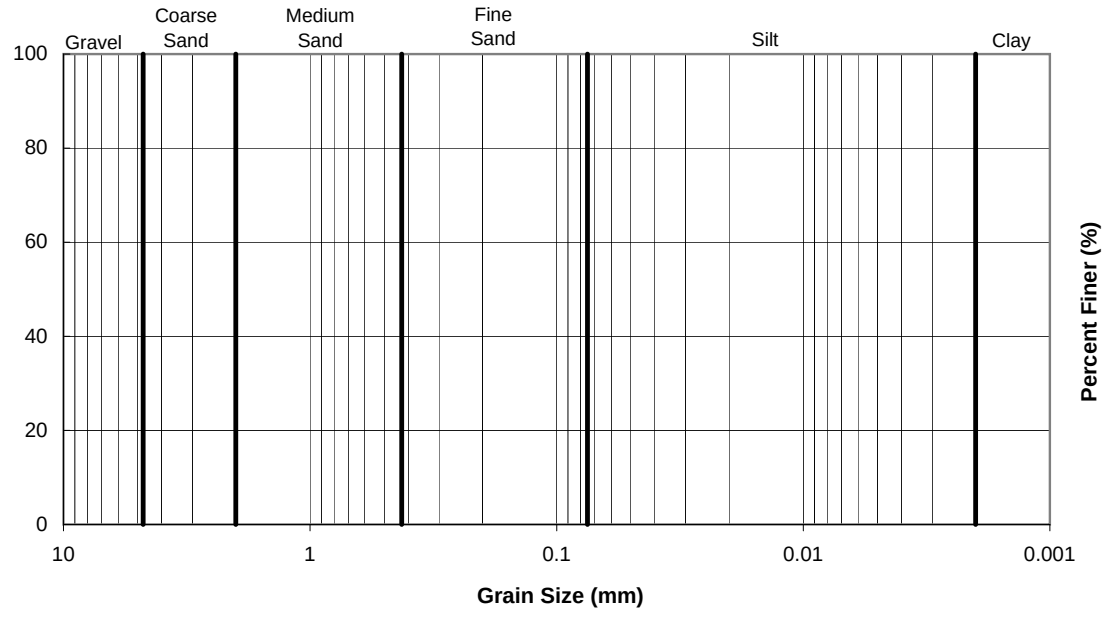


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-2:22m	5.0	1.0	5.0	3.0	77.0	9.0	10.7	0.4

GRAIN SIZE DISTRIBUTION CURVE

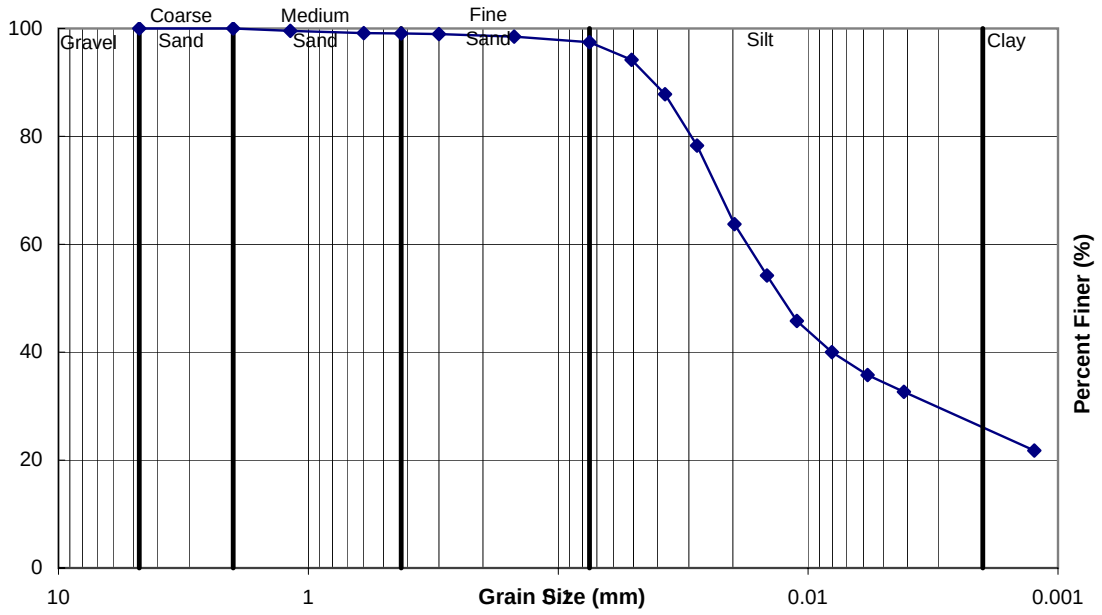


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-2:24m	7.0	0.0	3.0	5.0	81.0	4.0	6.8	0.5

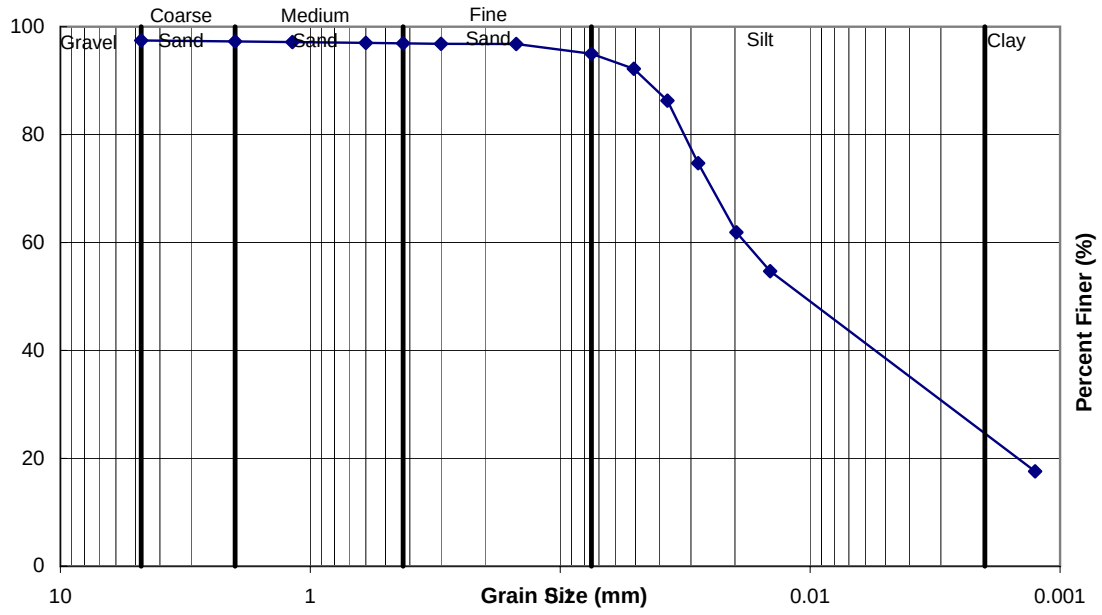


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
FALSE								

GRAIN SIZE DISTRIBUTION CURVE

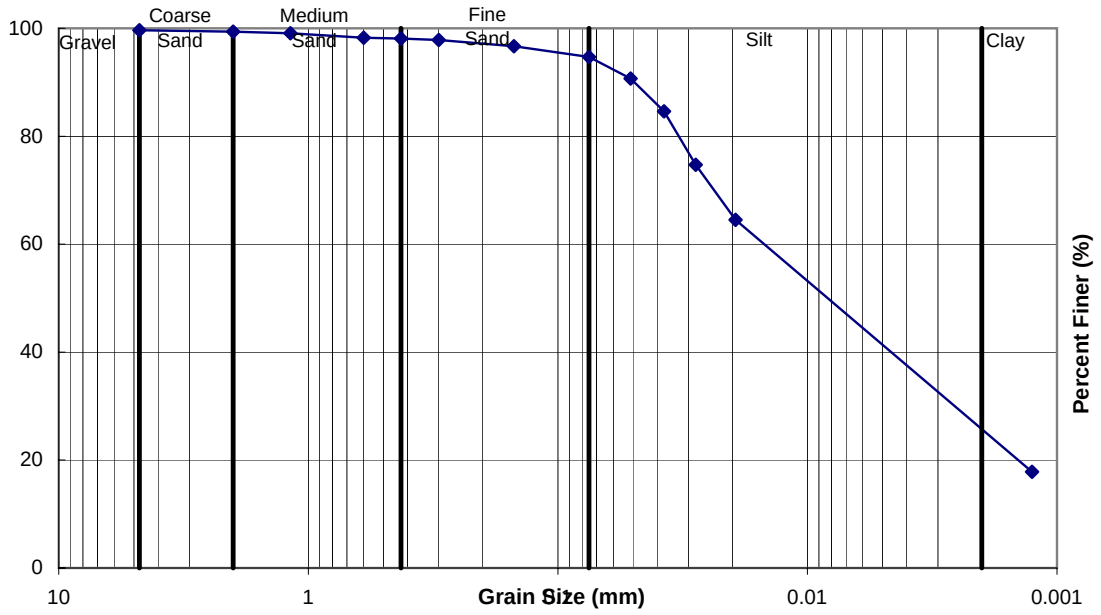


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-3:1m	0.0	0.0	1.0	2.0	71.0	26.0	-	-

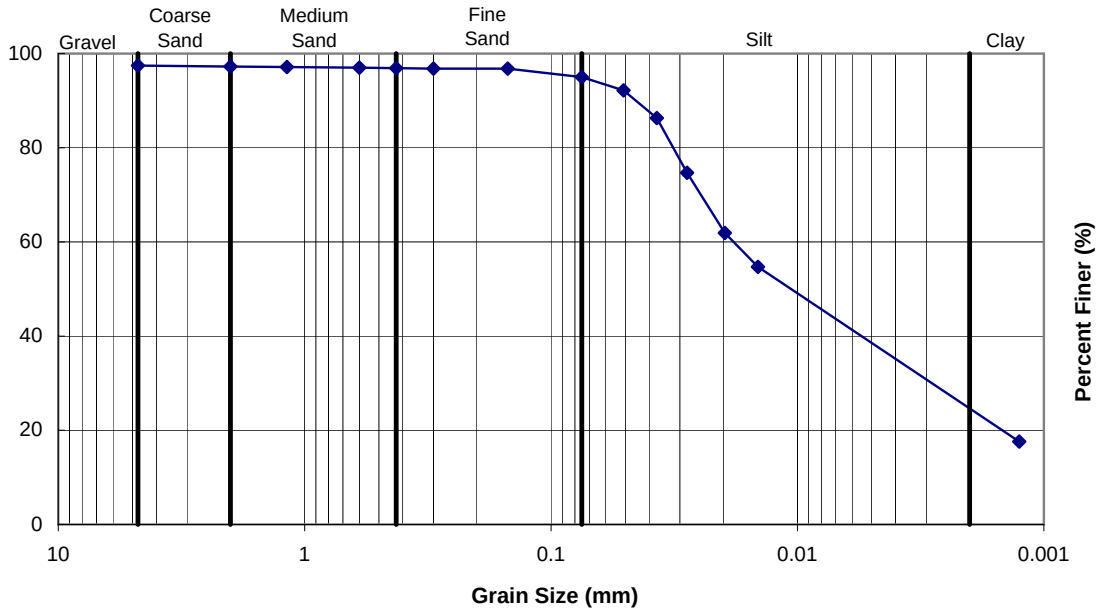


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-3:3m	3.0	0.0	0.0	2.0	70.0	25.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

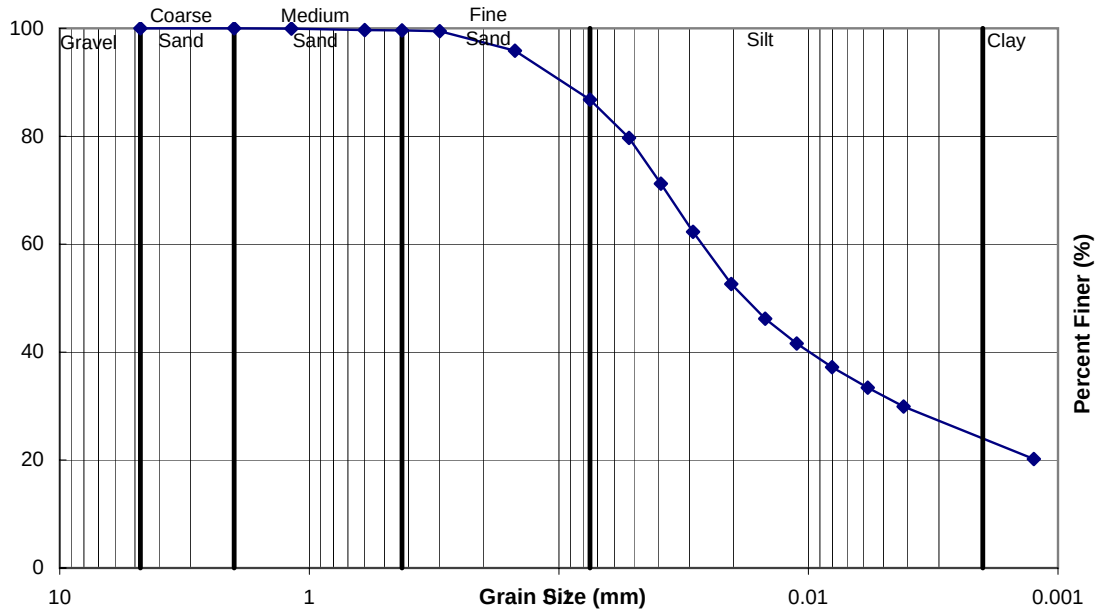


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-3:6m	0.0	0.0	1.0	3.0	70.0	26.0	-	-

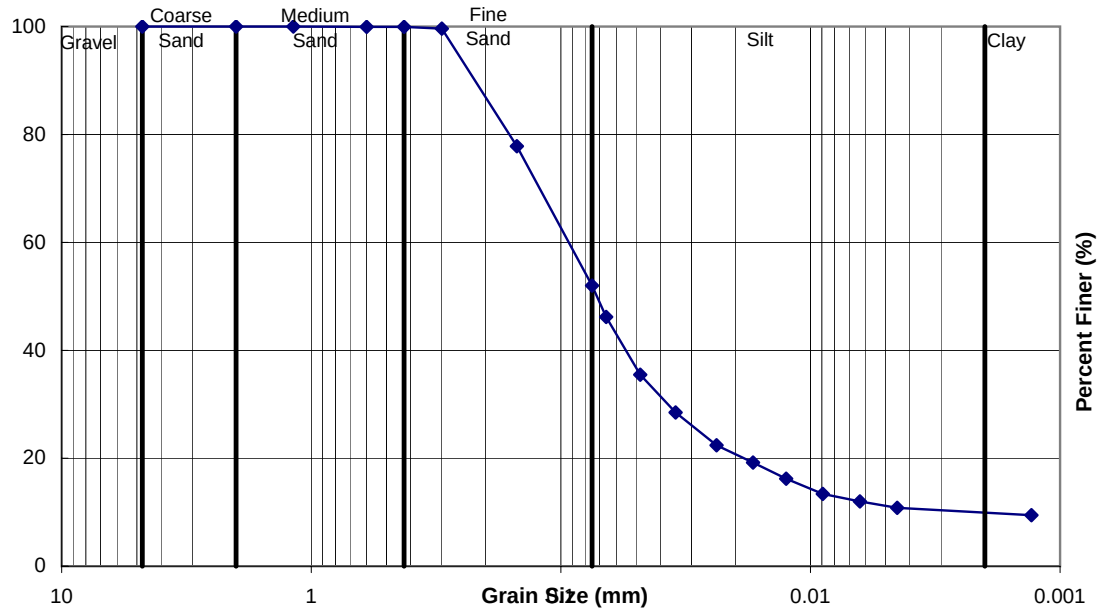


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-3:3m	3.0	0.0	0.0	2.0	70.0	25.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

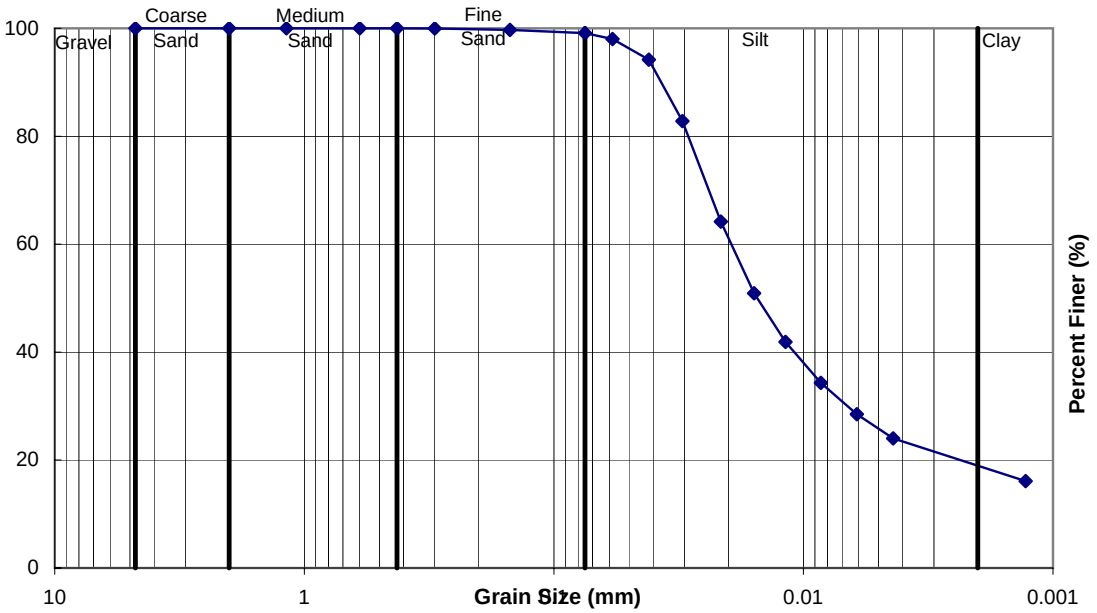


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-3:12m	0.0	0.0	0.0	13.0	63.0	24.0	-	-

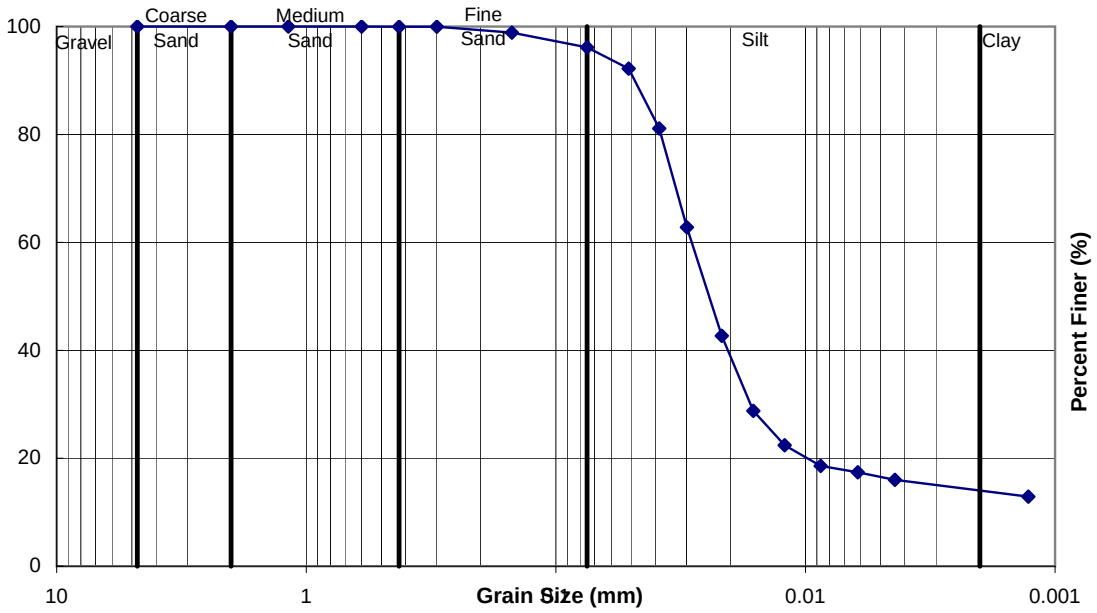


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-3:14m	0.0	0.0	0.0	48.0	42.0	10.0	43.8	0.1

GRAIN SIZE DISTRIBUTION CURVE

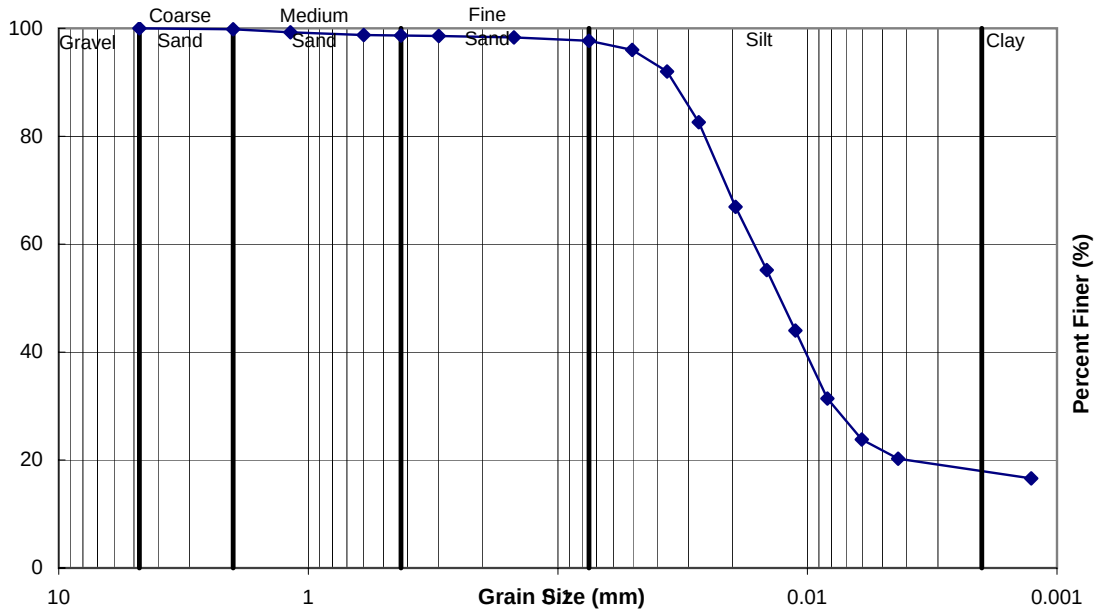


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-3:18m	0.0	0.0	0.0	1.0	80.0	19.0	-	-

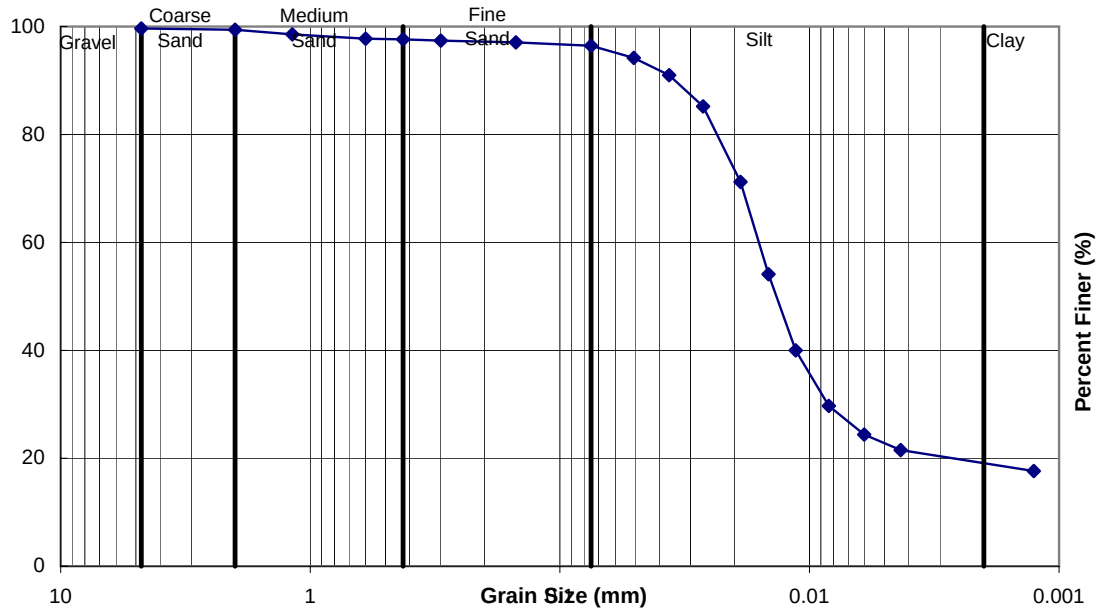


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-3:20m	0.0	0.0	0.0	4.0	82.0	14.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

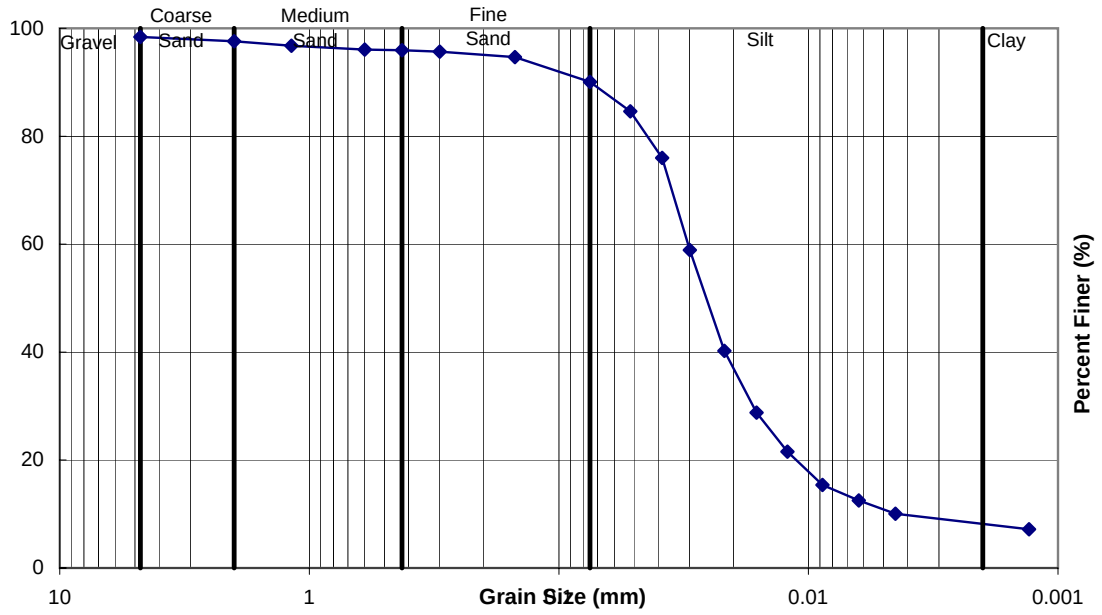


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-3:22m	0.0	0.0	1.0	1.0	80.0	18.0	-	-

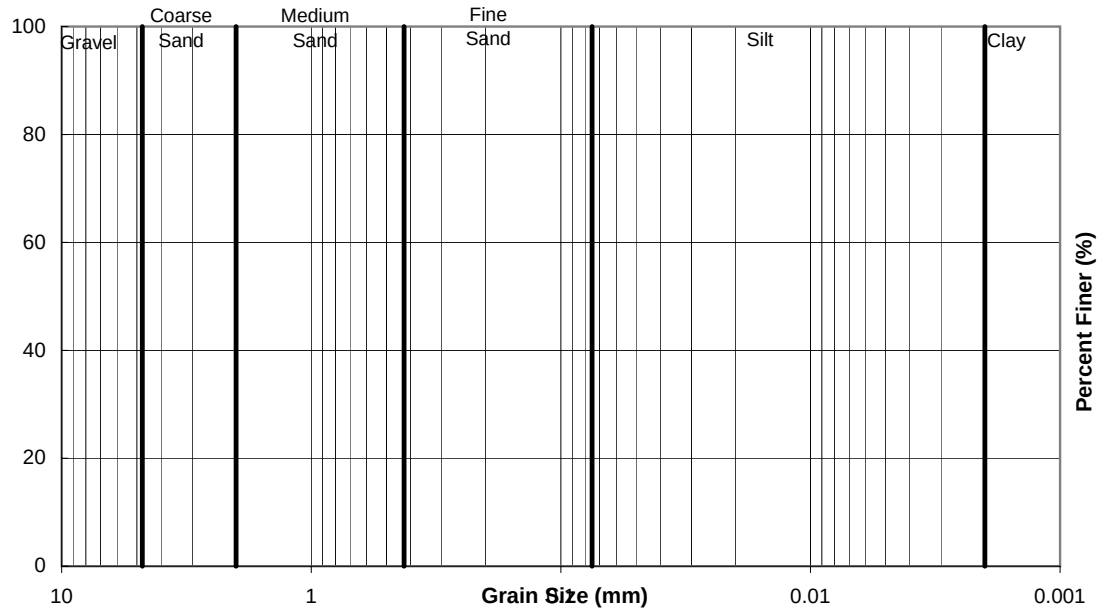


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-3:24m	0.0	0.0	2.0	1.0	78.0	19.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

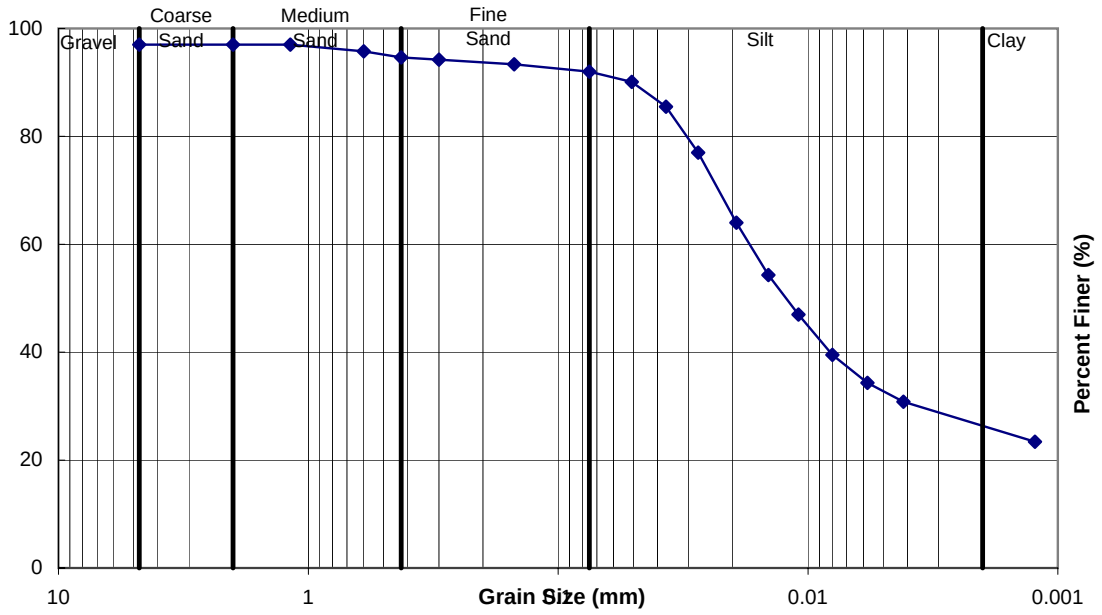


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-3:28m	2.0	1.0	2.0	6.0	81.0	8.0	6.9	0.5

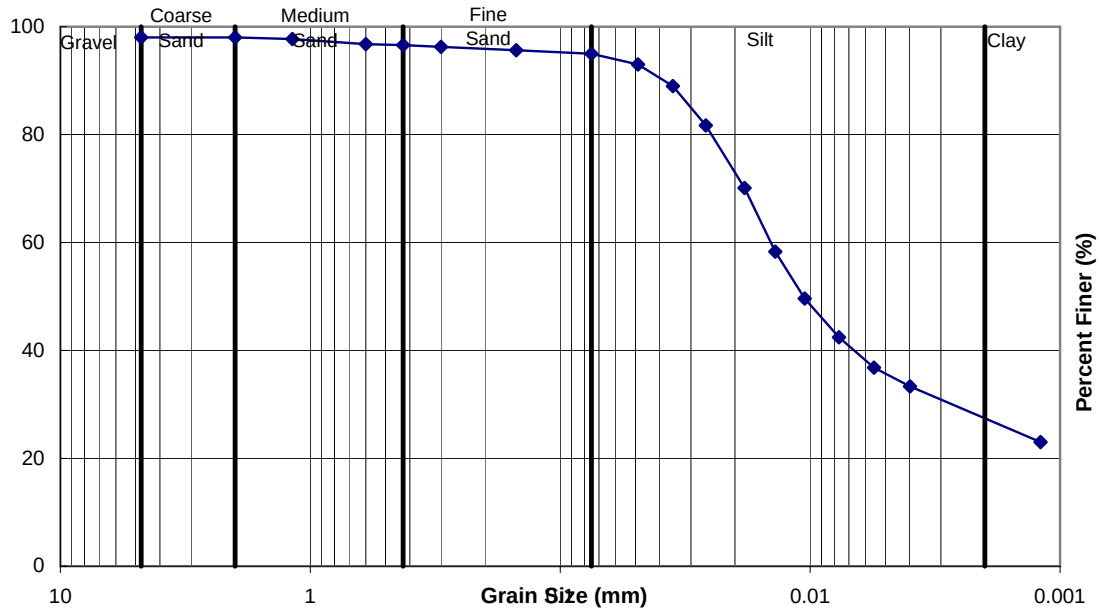


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
FALSE								

GRAIN SIZE DISTRIBUTION CURVE

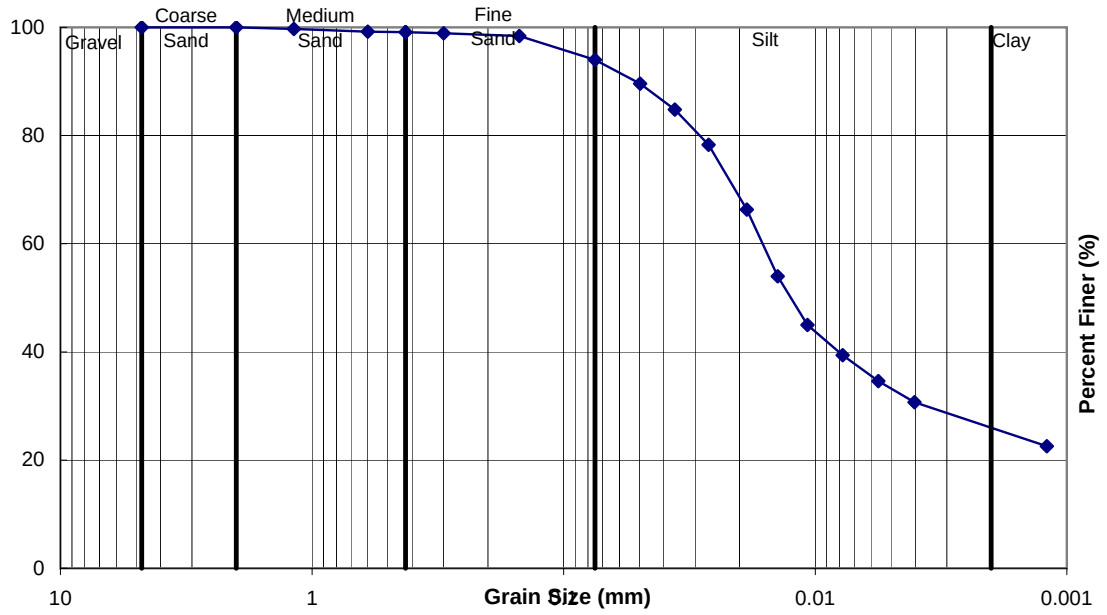


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4:2m	3.0	0.0	2.0	3.0	66.0	26.0	-	-

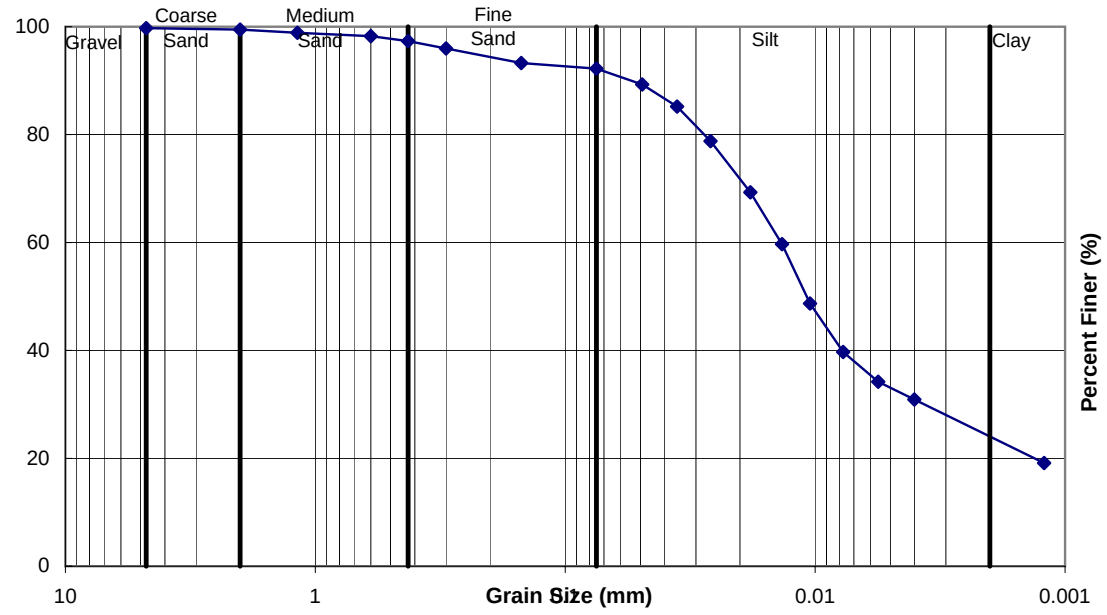


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4:3m	2.0	0.0	1.0	2.0	68.0	27.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

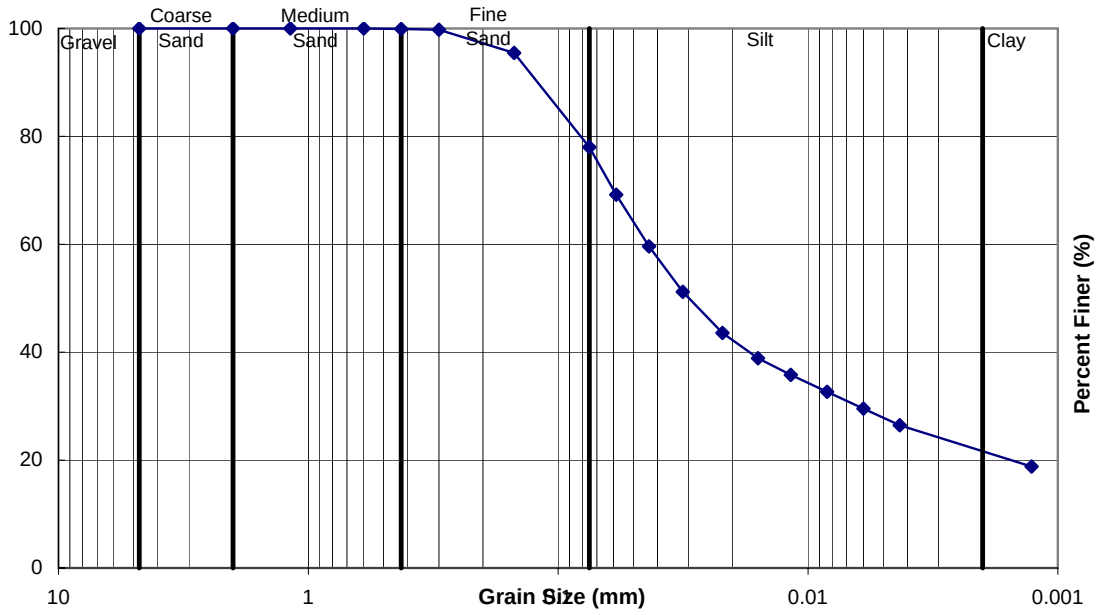


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4:6m	0.0	0.0	1.0	5.0	68.0	26.0	-	-

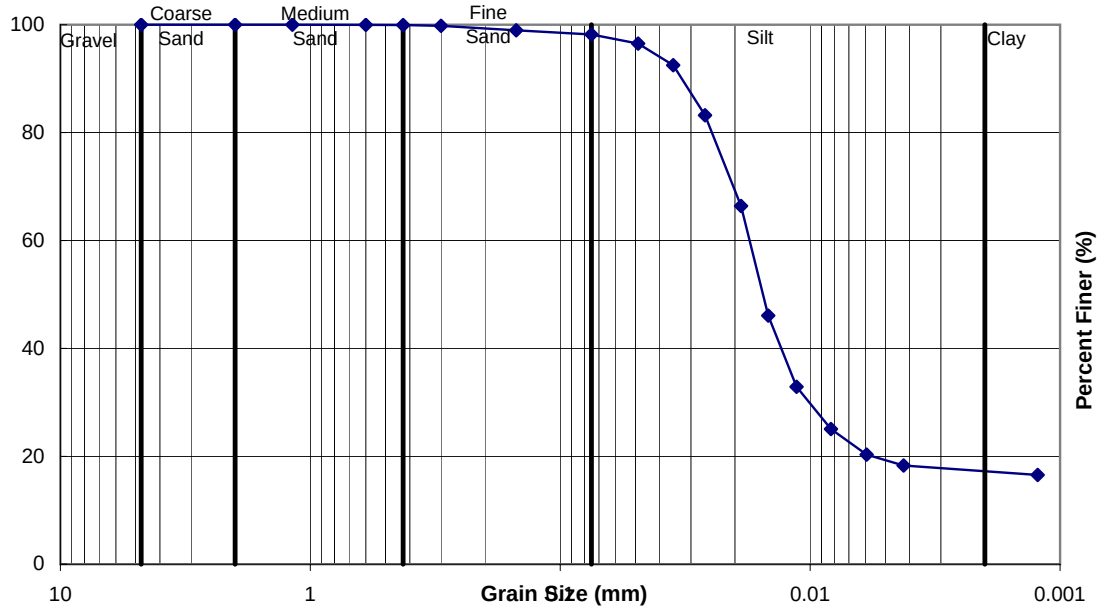


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4:10m	0.0	0.0	2.0	5.0	69.0	24.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

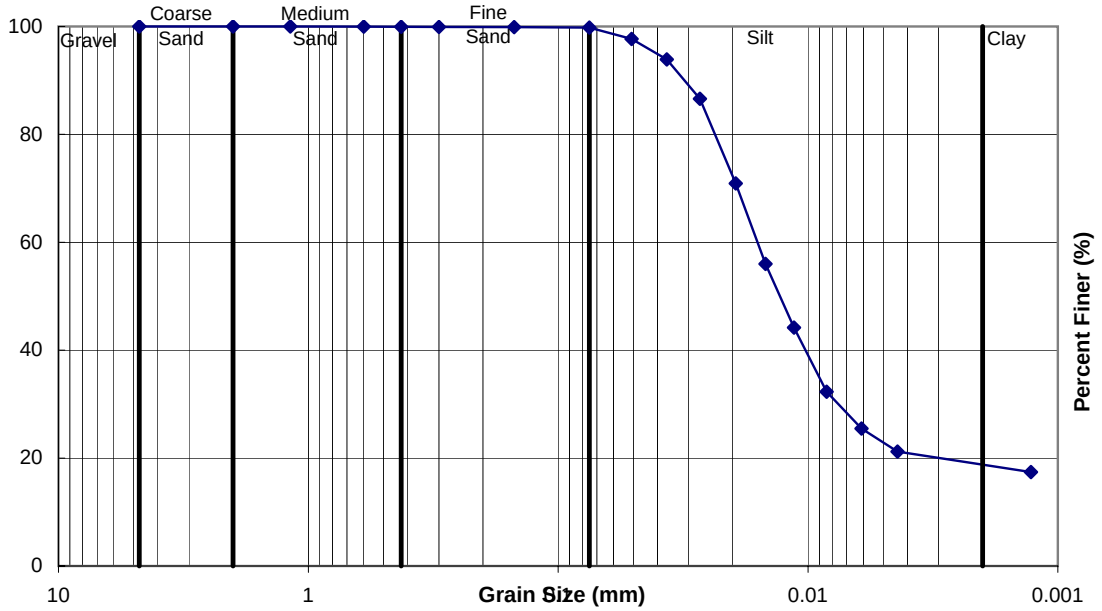


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4:12m	0.0	0.0	0.0	22.0	56.0	22.0	-	-

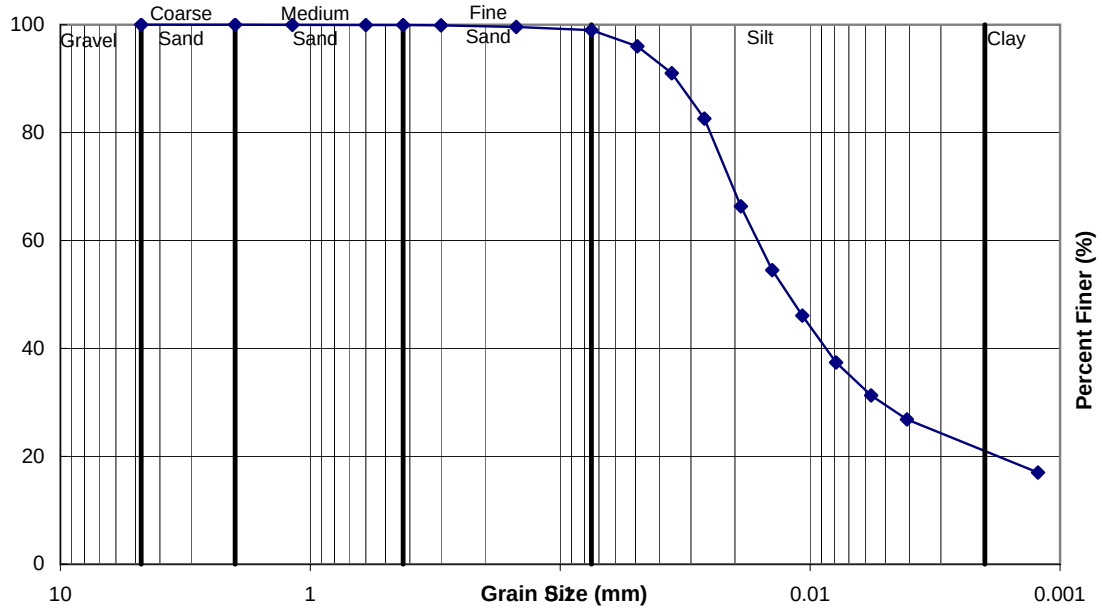


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4:14m	0.0	0.0	0.0	2.0	81.0	17.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

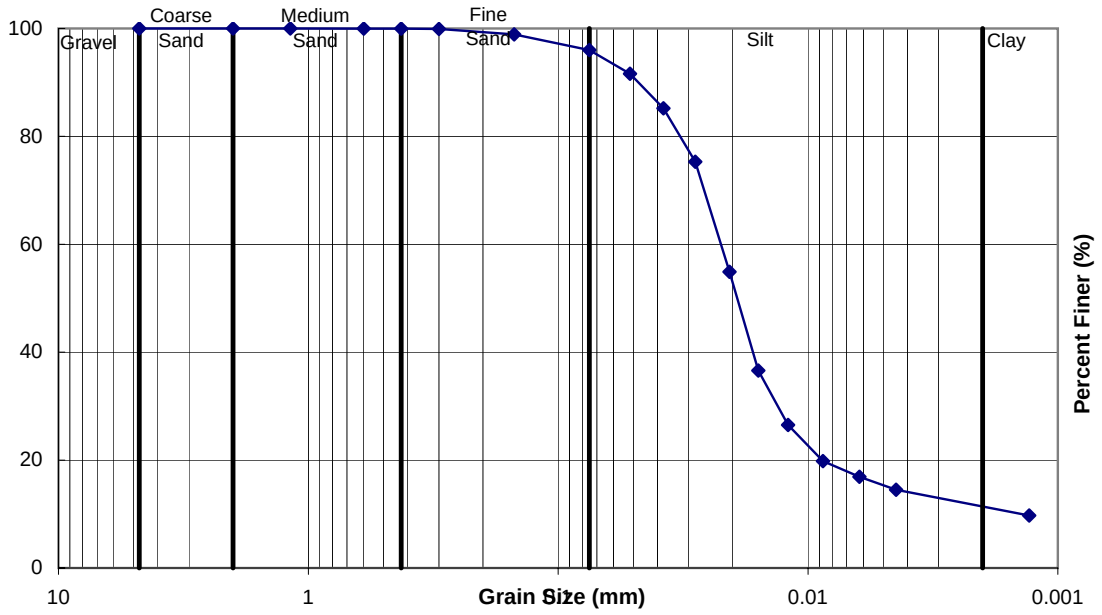


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4:18m	0.0	0.0	0.0	0.0	81.0	19.0	-	-

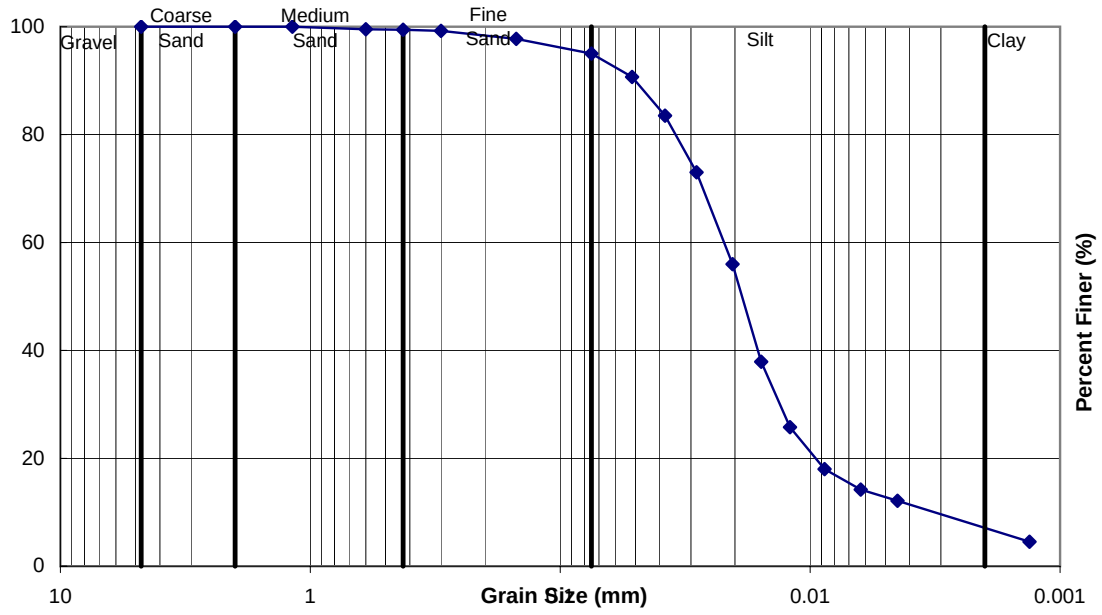


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4:20m	0.0	0.0	0.0	1.0	78.0	21.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

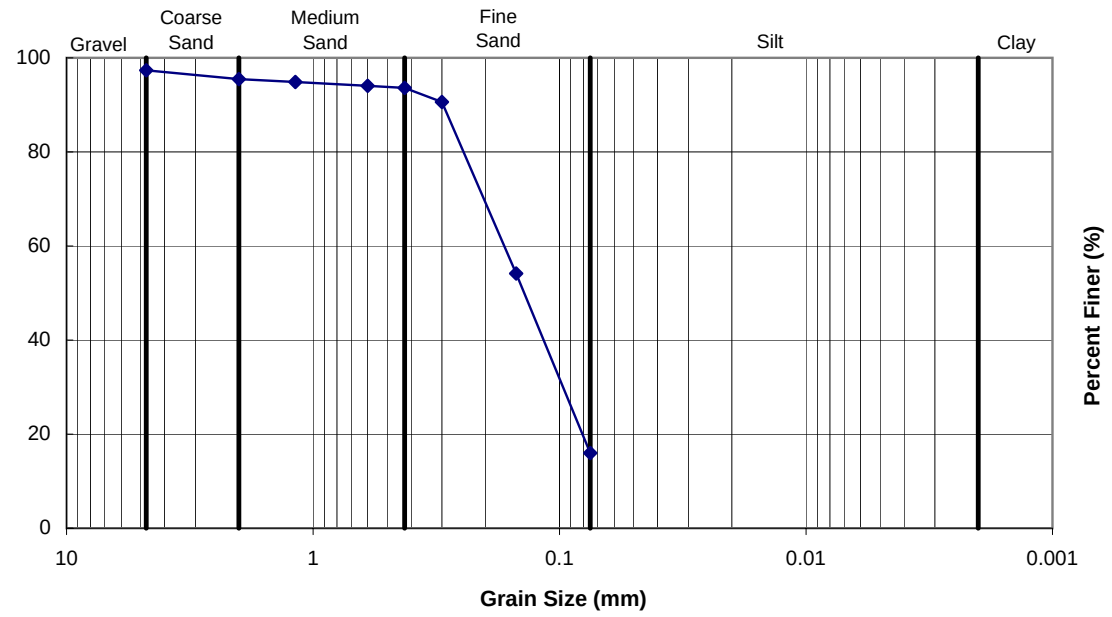


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4:24m	0.0	0.0	0.0	4.0	85.0	11.0	16.0	0.2

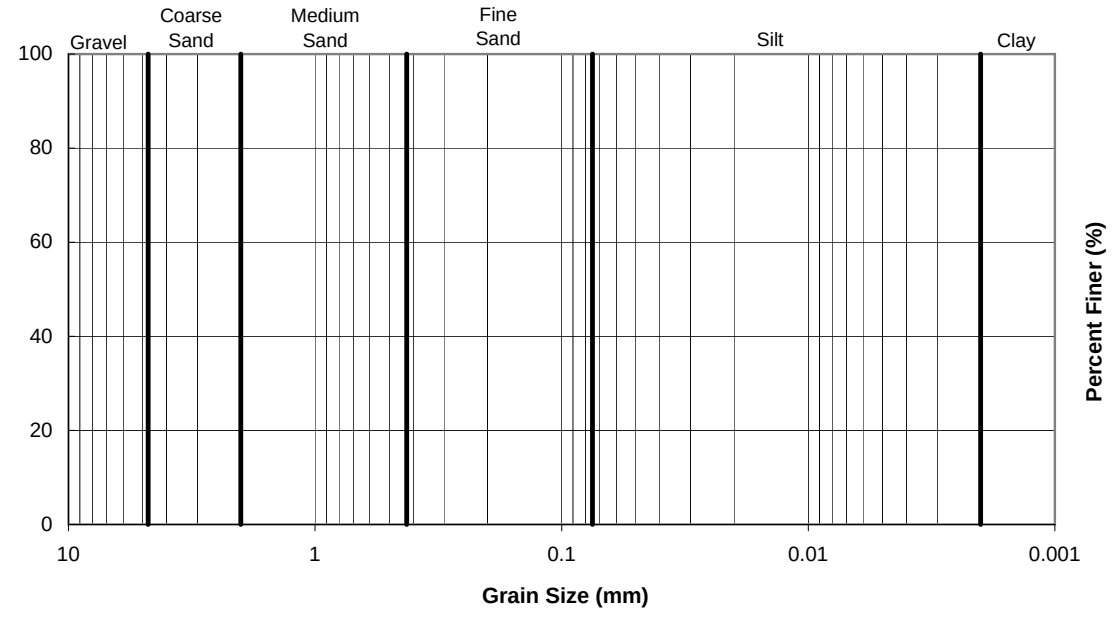


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4:28m	0.0	0.0	1.0	4.0	88.0	7.0	7.0	0.4

GRAIN SIZE DISTRIBUTION CURVE

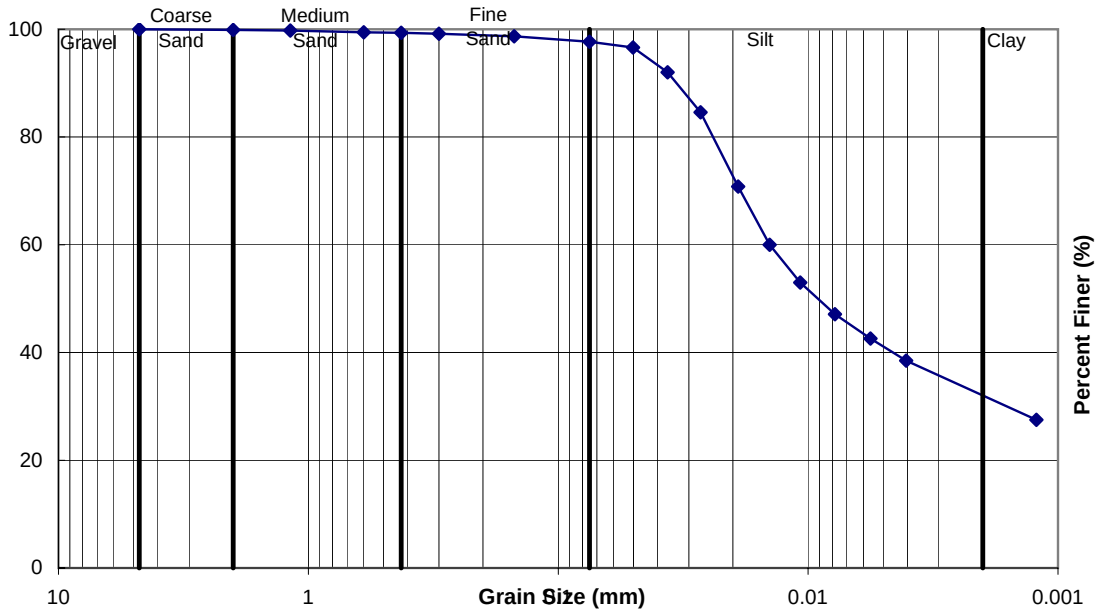


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
BH-4:30m	3.0	2.0	2.0	77.0	16.0		-	-

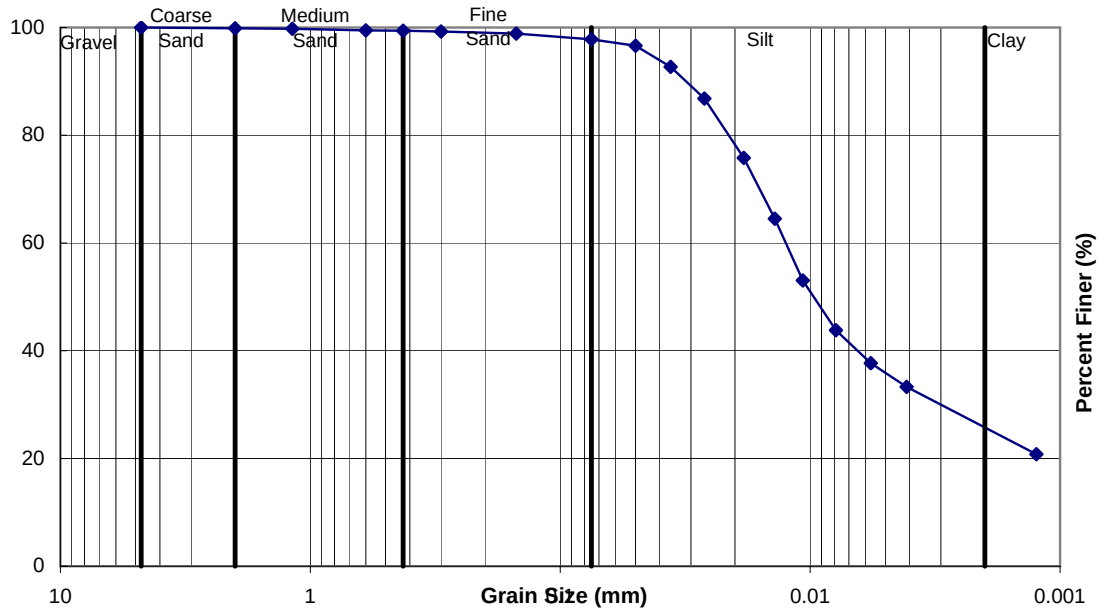


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
FALSE								

GRAIN SIZE DISTRIBUTION CURVE

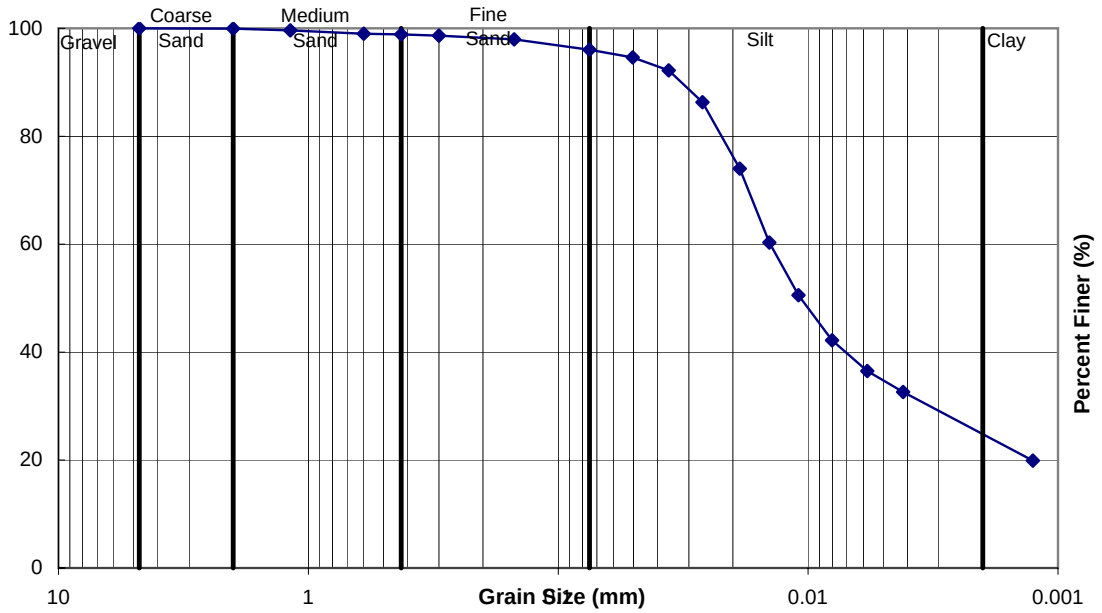


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4A:1m	0.0	0.0	1.0	2.0	65.0	32.0	-	-

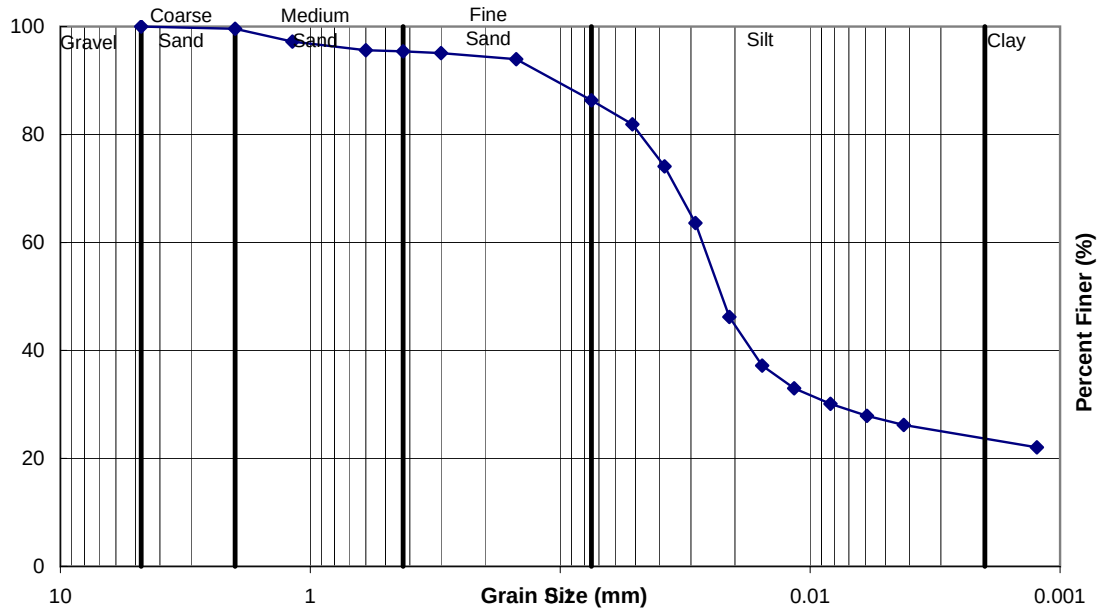


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4A:3m	0.0	0.0	0.0	2.0	72.0	26.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

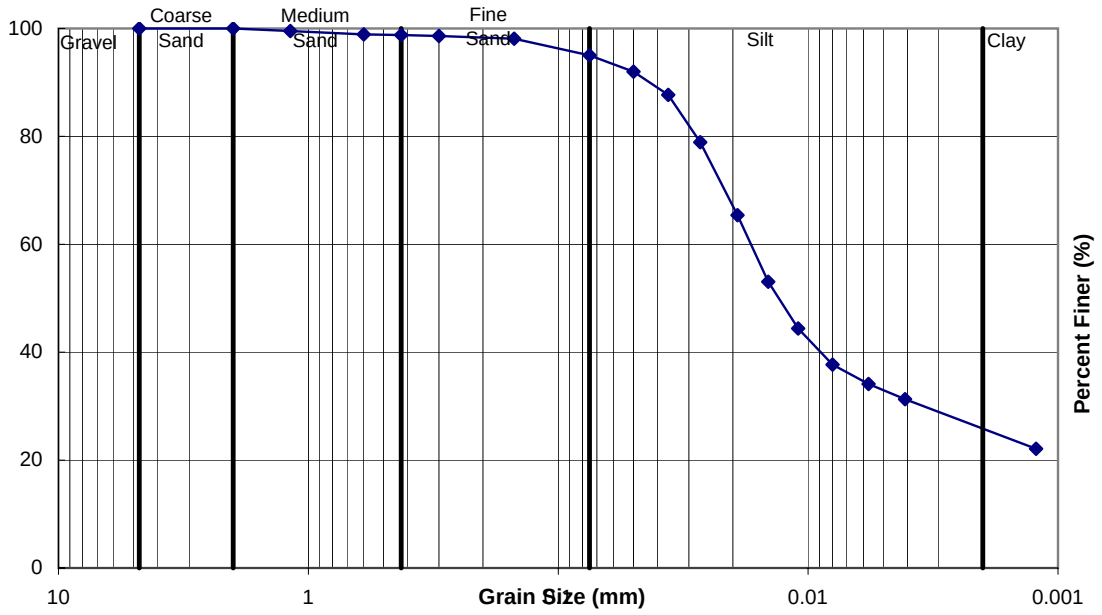


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4A:6m	0.0	0.0	1.0	3.0	71.0	25.0	-	-

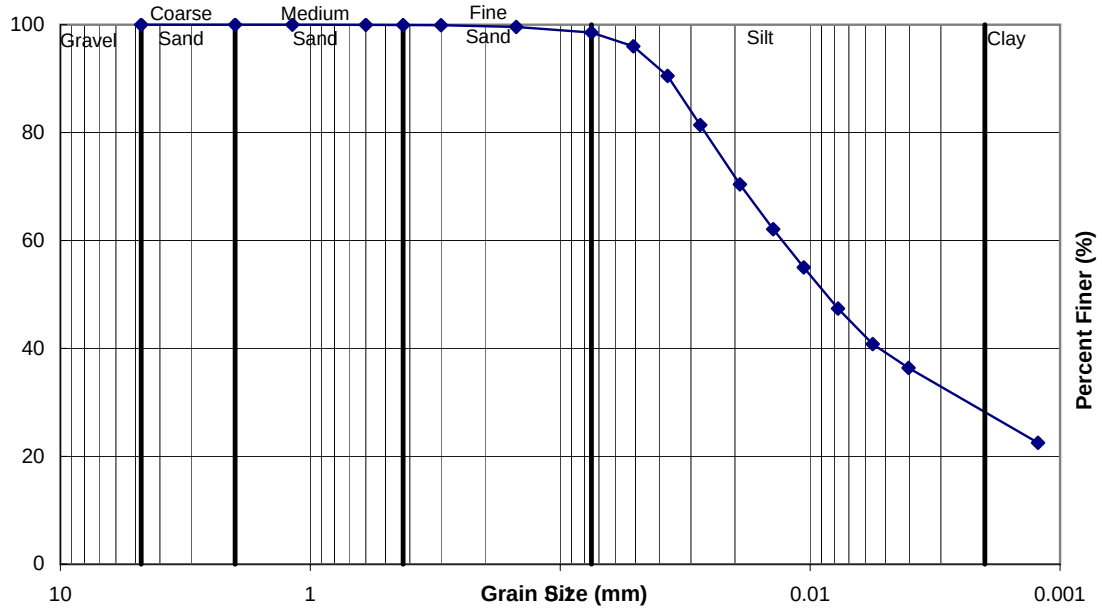


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4A:10m	0.0	0.0	4.0	9.0	63.0	24.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

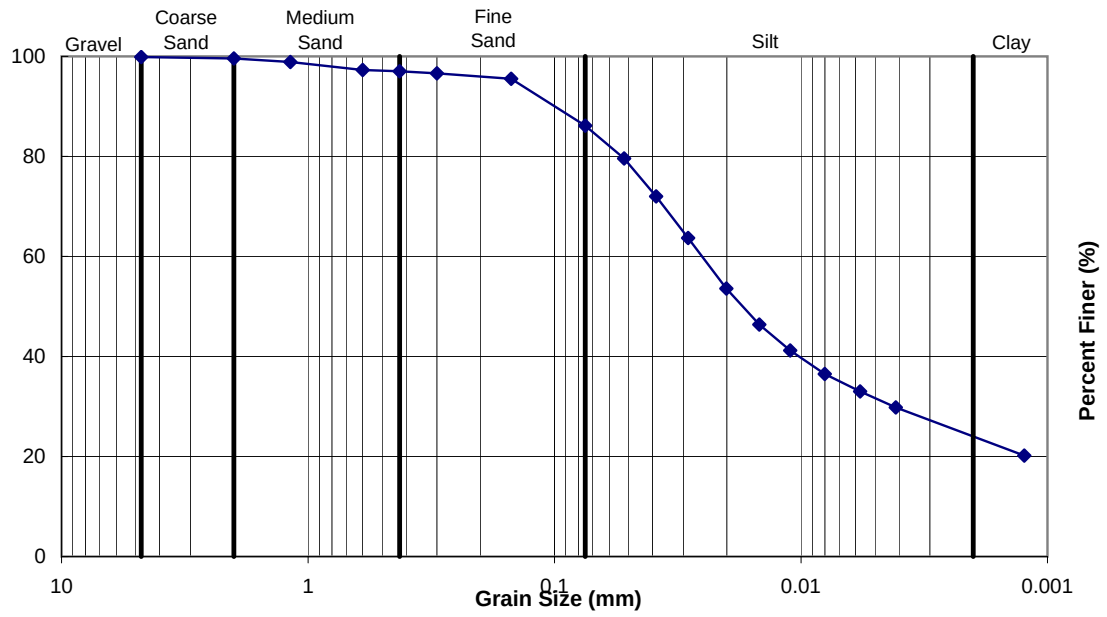


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4A:12m	0.0	0.0	1.0	4.0	69.0	26.0	-	-

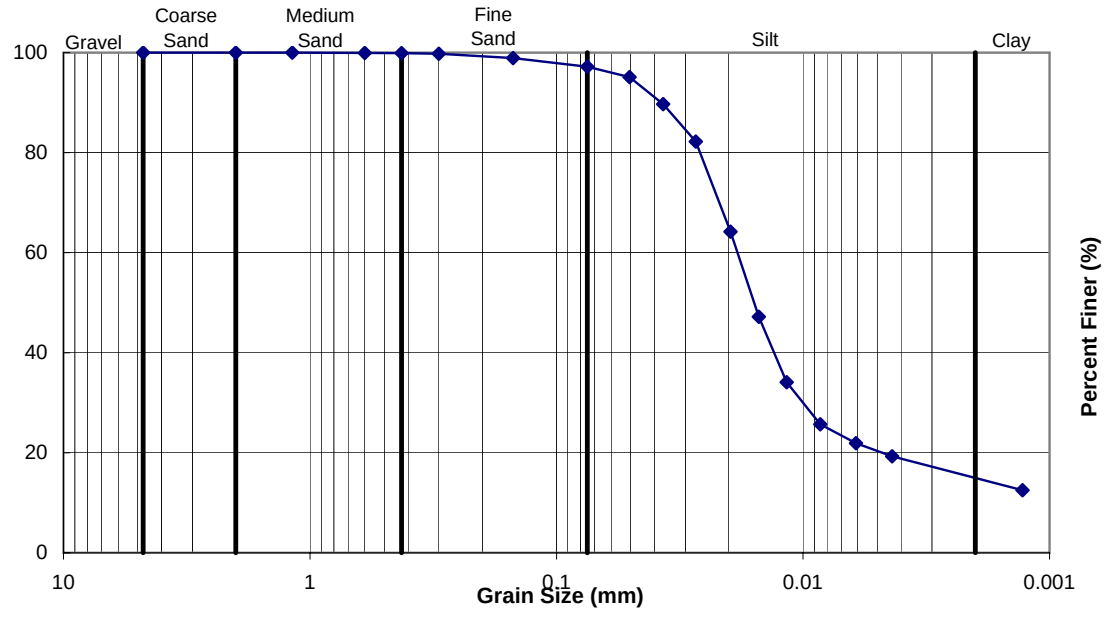


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4A:16m	0.0	0.0	0.0	1.0	71.0	28.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

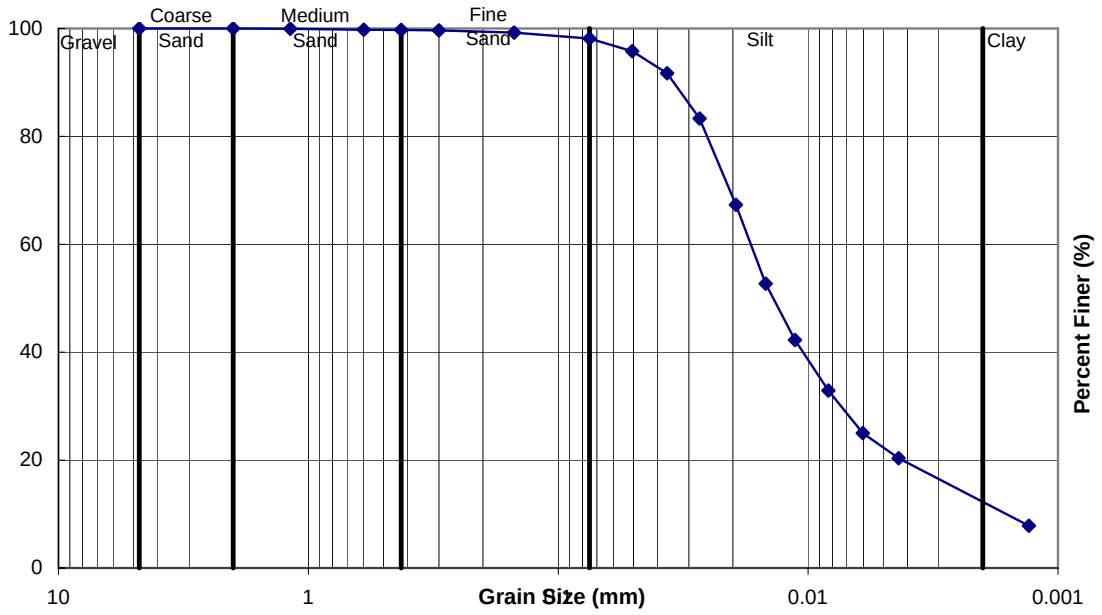


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4A:18m	0.0	0.0	3.0	11.0	62.0	24.0	-	-

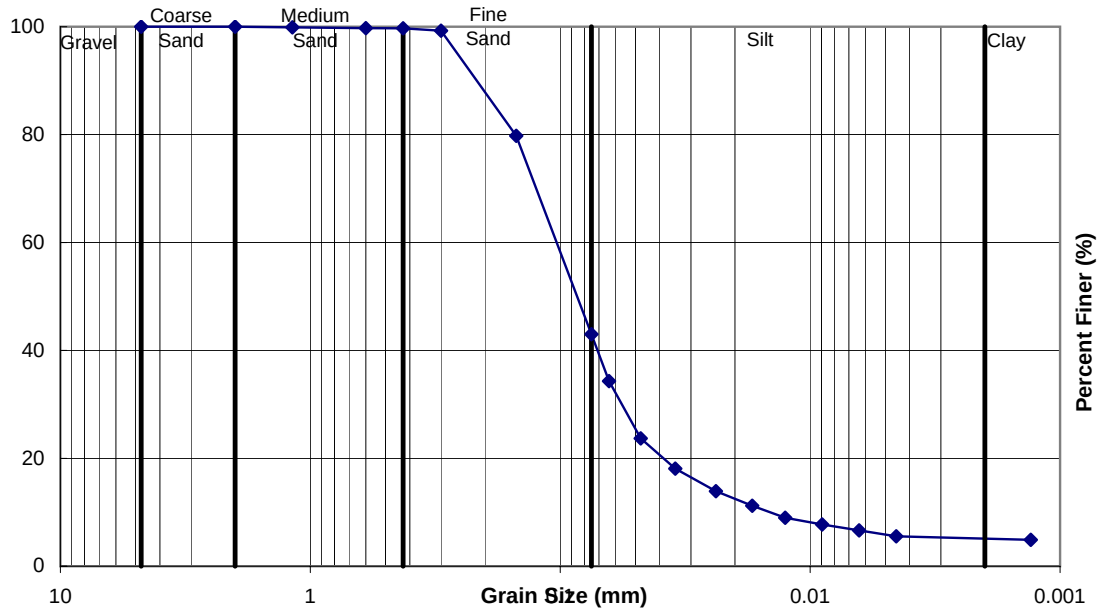


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4A:20m	0.0	0.0	0.0	3.0	82.0	15.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

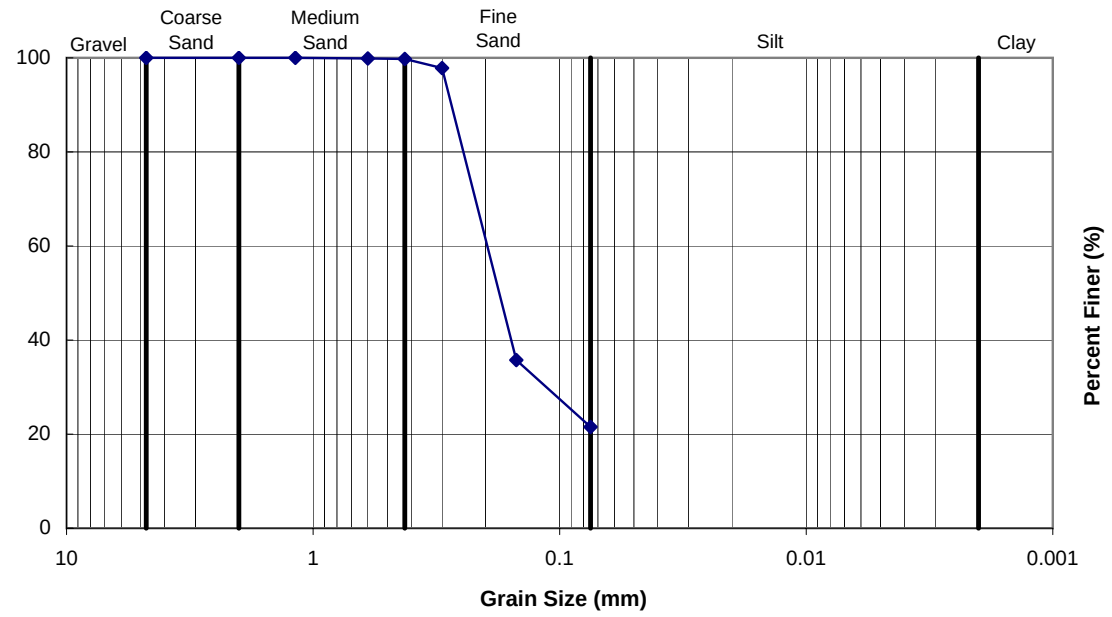


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4A:26m	0.0	0.0	0.0	2.0	86.0	12.0	10.5	0.5

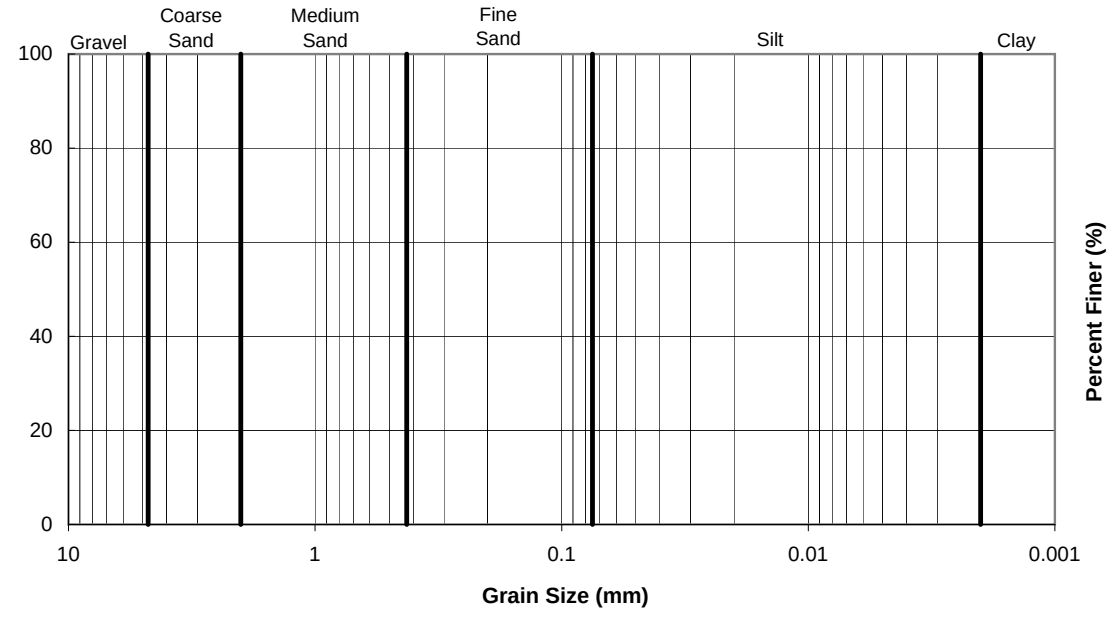


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-4A:28m	0.0	0.0	0.0	57.0	38.0	5.0	7.1	0.5

GRAIN SIZE DISTRIBUTION CURVE

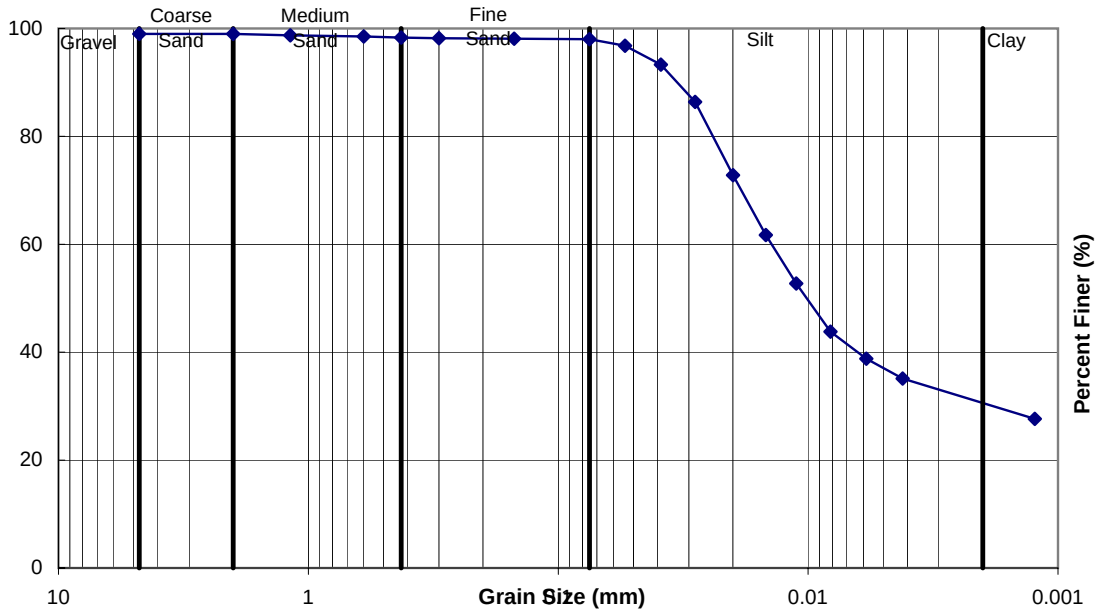


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
BH-4A:30m	0.0	0.0	0.0	78.0	22.0		-	-

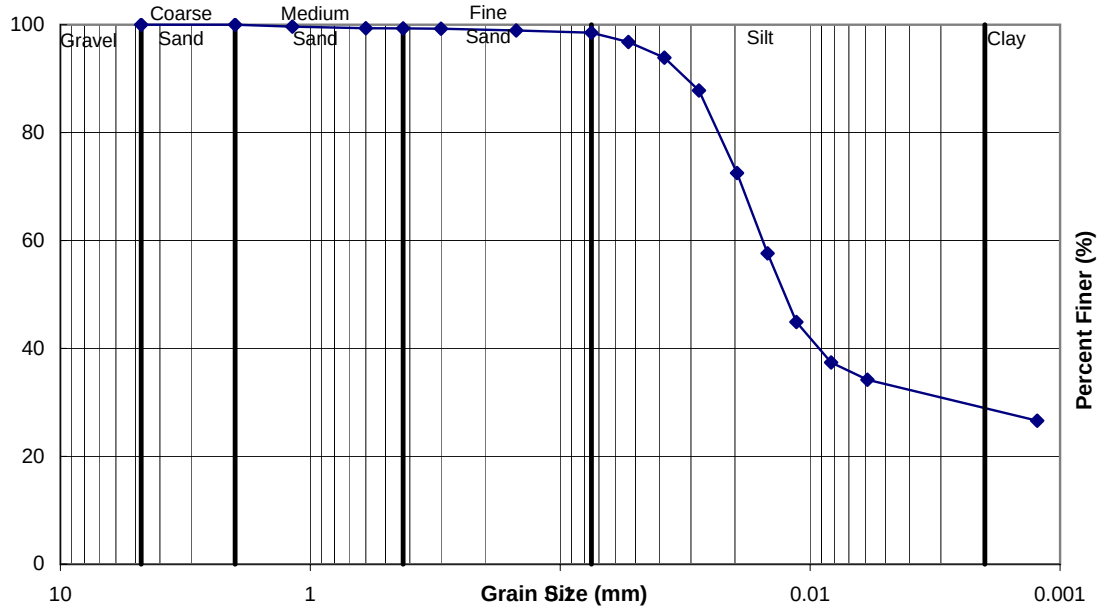


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
FALSE								

GRAIN SIZE DISTRIBUTION CURVE

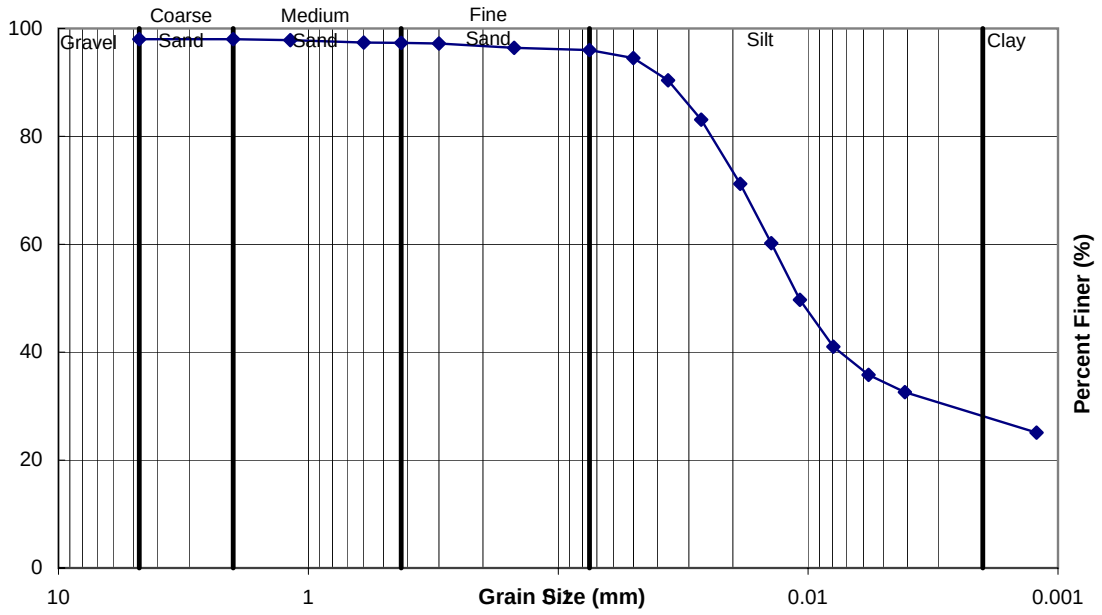


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-5:2m	1.0	0.0	1.0	0.0	67.0	31.0	-	-

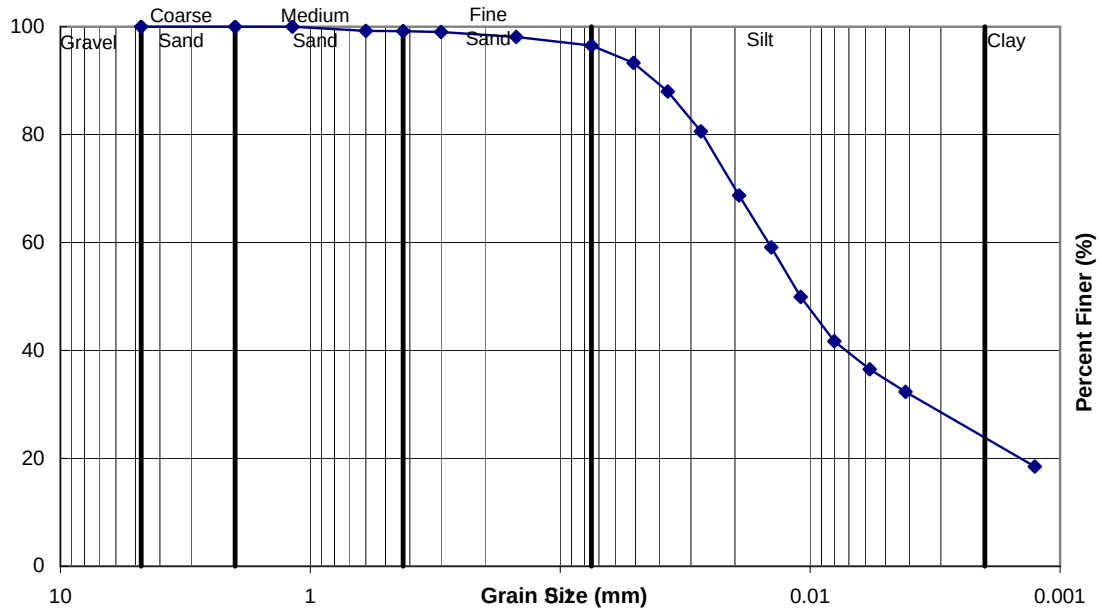


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-5:4m	0.0	0.0	1.0	1.0	69.0	29.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

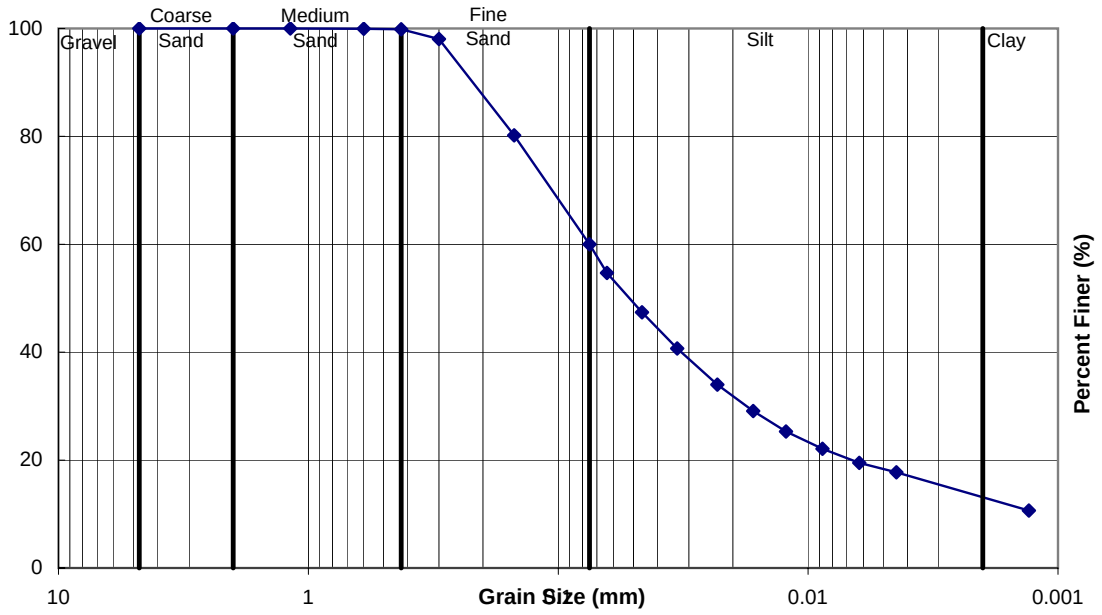


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-5:8m	2.0	0.0	1.0	1.0	68.0	28.0	-	-

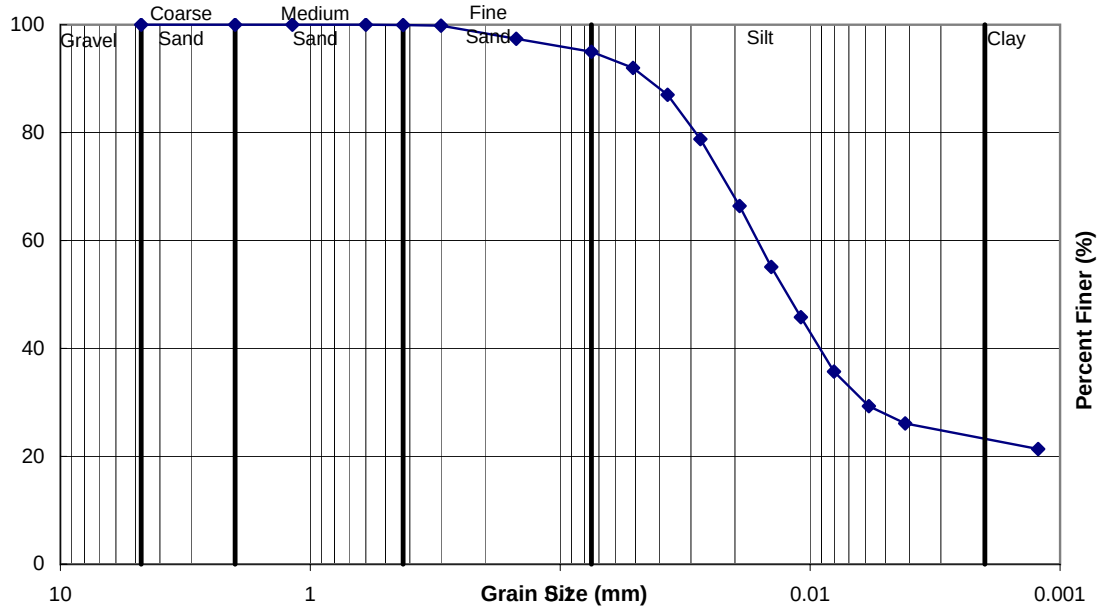


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-5:12m	0.0	0.0	1.0	3.0	72.0	24.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

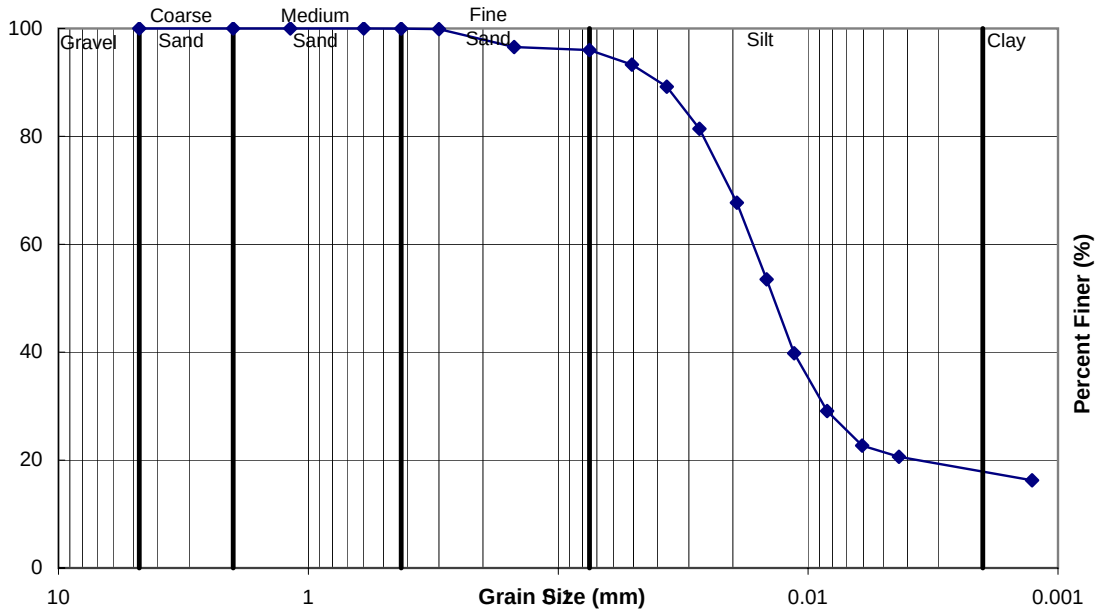


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-5:14m	0.0	0.0	0.0	40.0	47.0	13.0	-	-

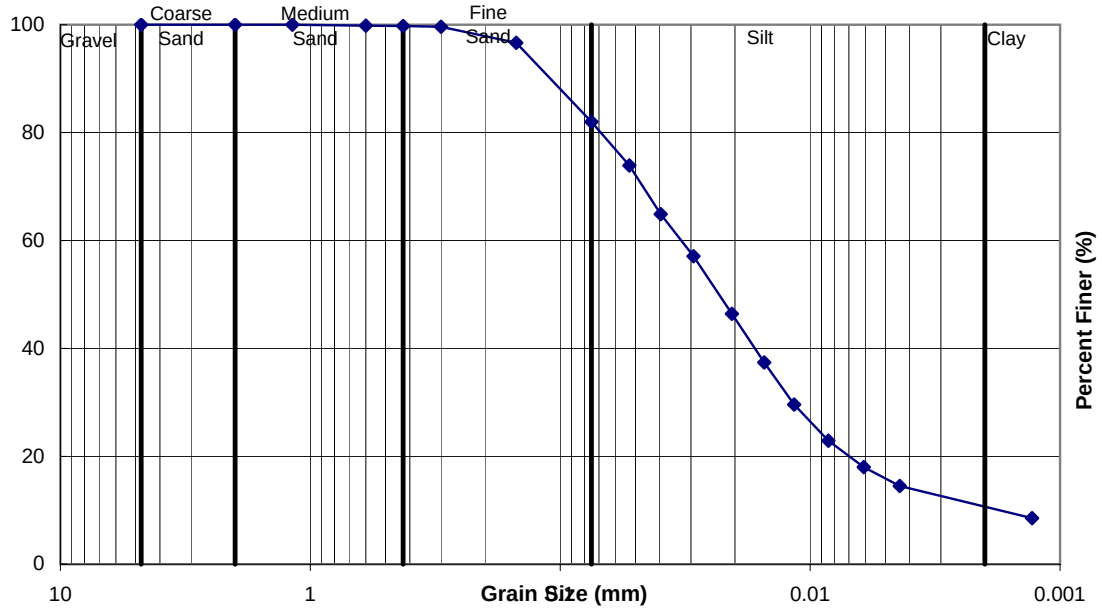


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-5:16m	0.0	0.0	0.0	5.0	72.0	23.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

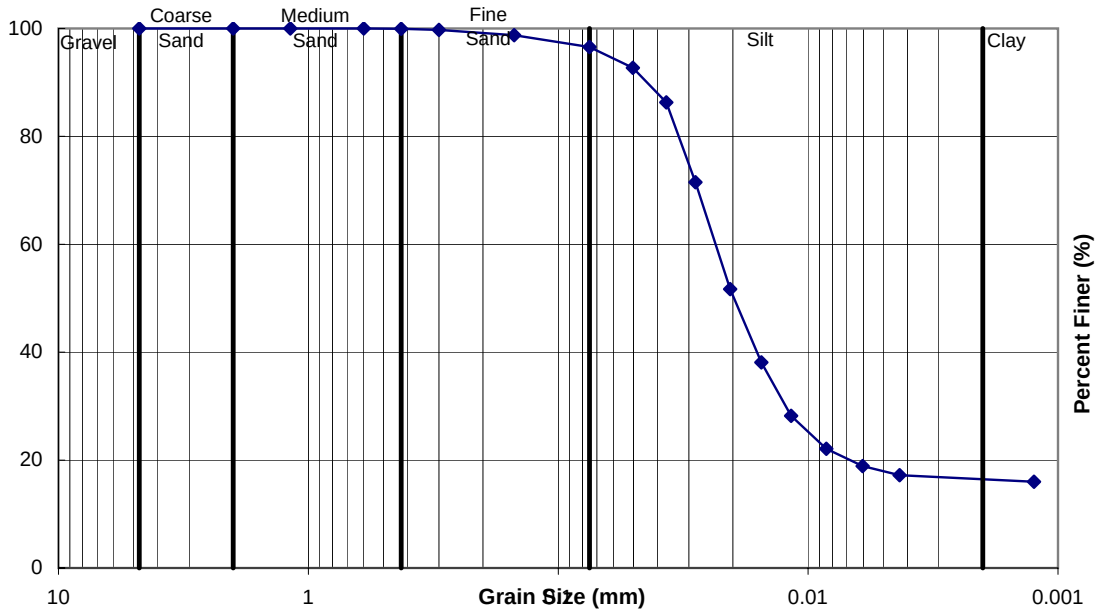


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-5:18m	0.0	0.0	0.0	4.0	78.0	18.0	-	-

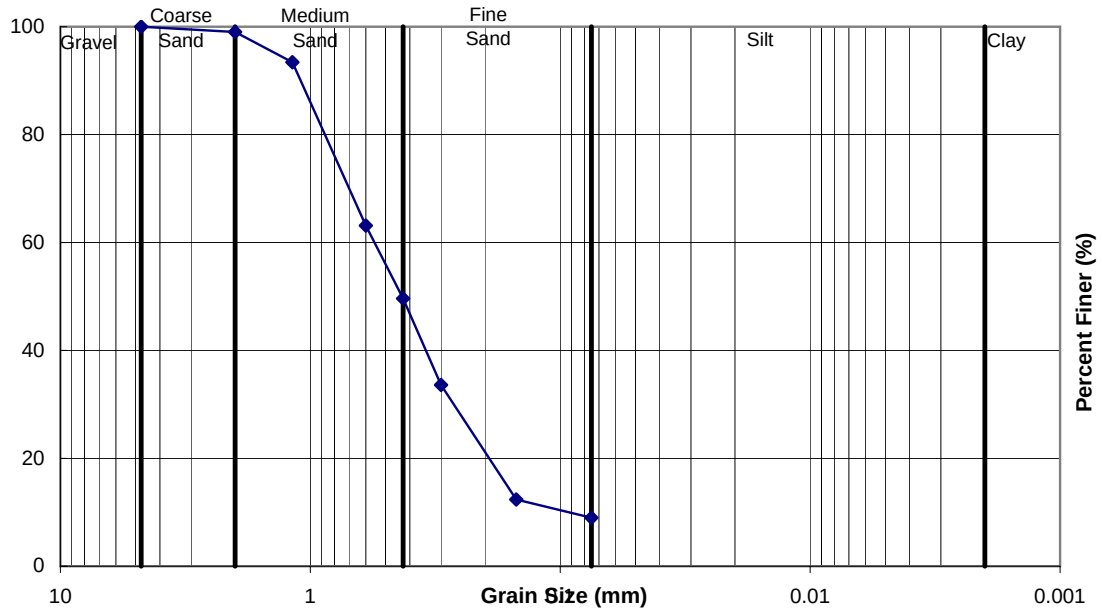


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-5:22m	0.0	0.0	0.0	18.0	71.0	11.0	18.8	0.4

GRAIN SIZE DISTRIBUTION CURVE

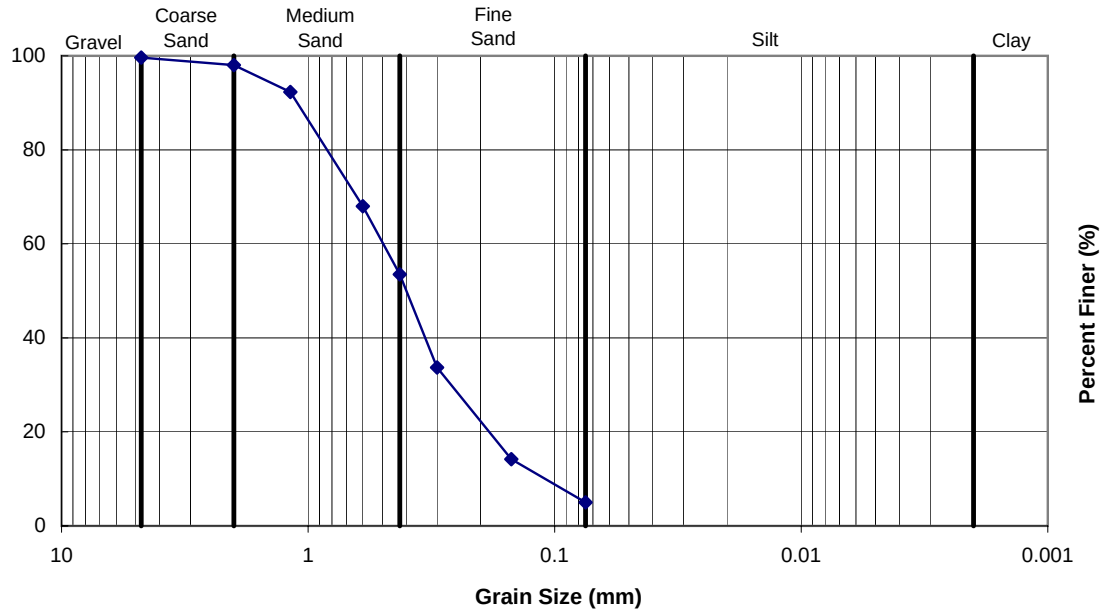


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-5:26m	0.0	0.0	0.0	3.0	81.0	16.0	-	-

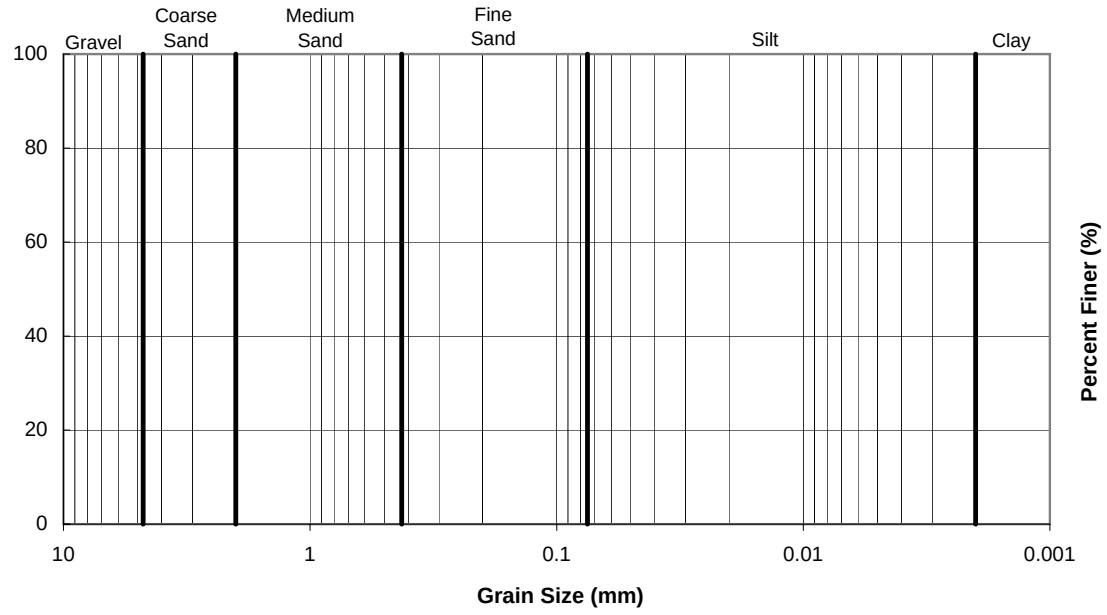


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
BH-5:30m	0.0	1.0	49.0	41.0	9.0		6.0	0.7

GRAIN SIZE DISTRIBUTION CURVE

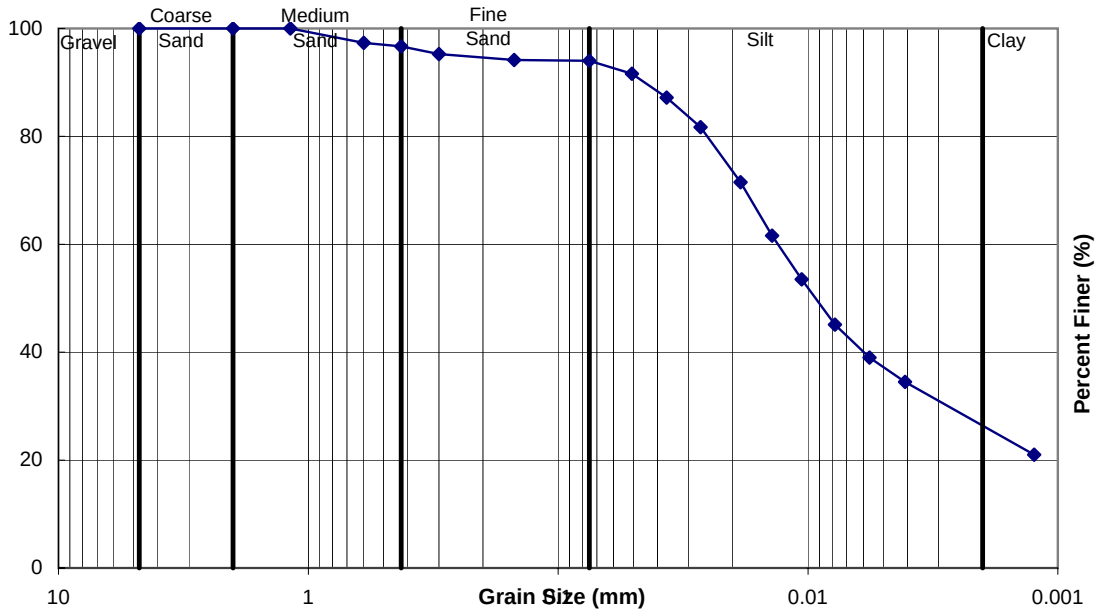


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
BH-5:32m	0.0	2.0	45.0	48.0	5.0		4.5	0.8

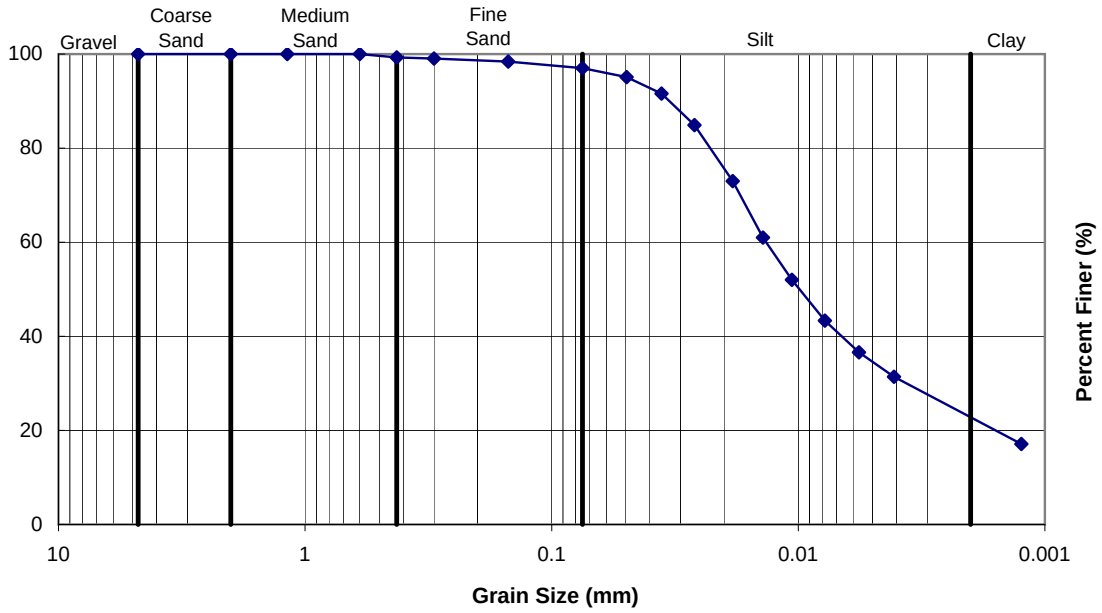


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
FALSE								

GRAIN SIZE DISTRIBUTION CURVE

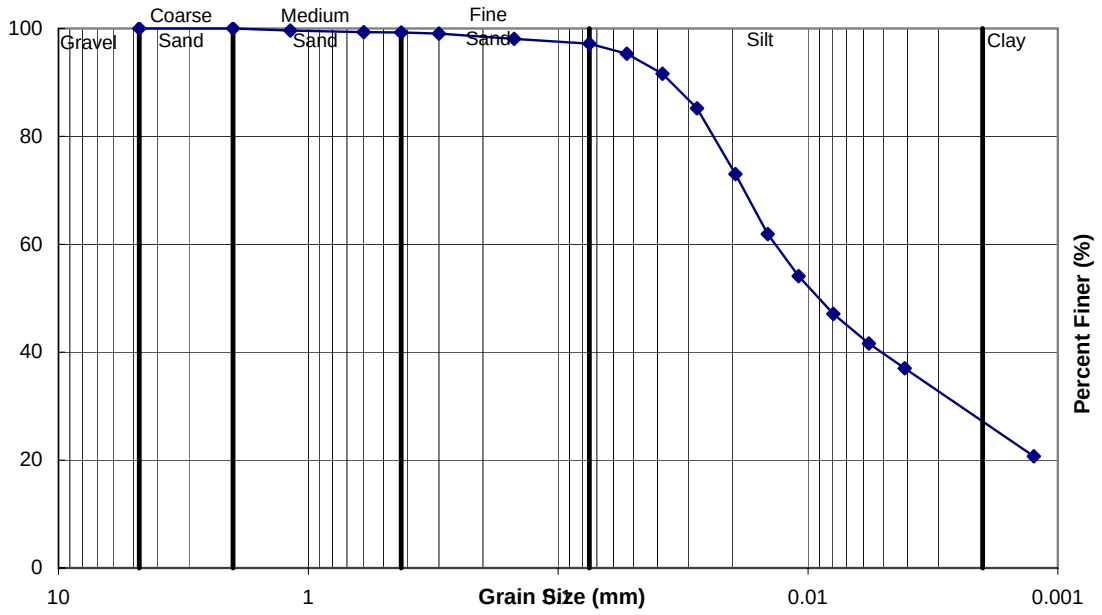


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-6:2m	0.0	0.0	3.0	3.0	68.0	26.0	-	-

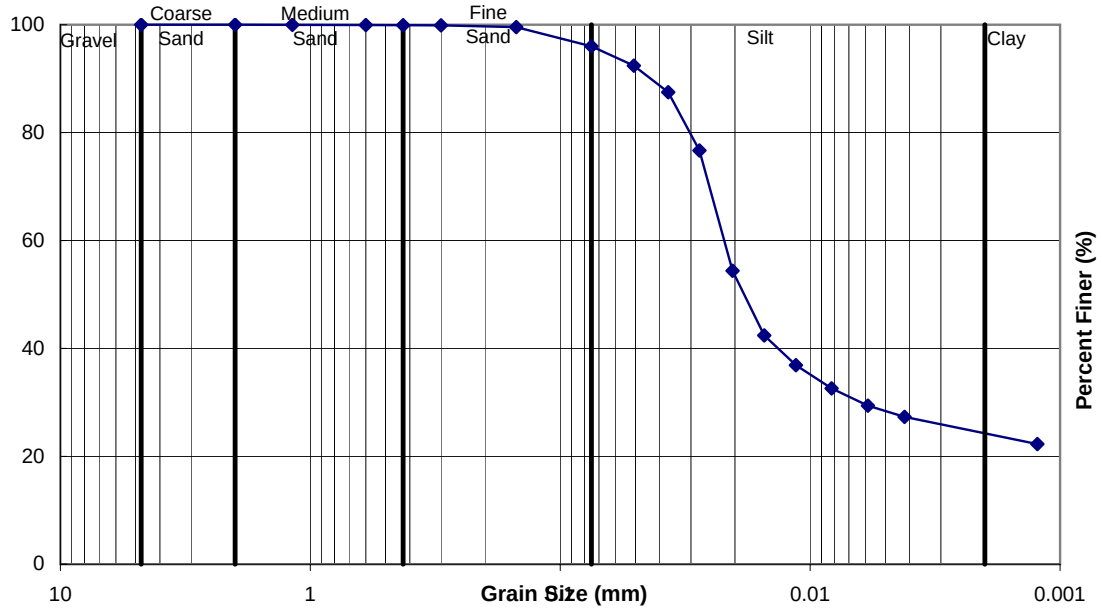


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-6:4m	0.0	0.0	1.0	2.0	74.0	23.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

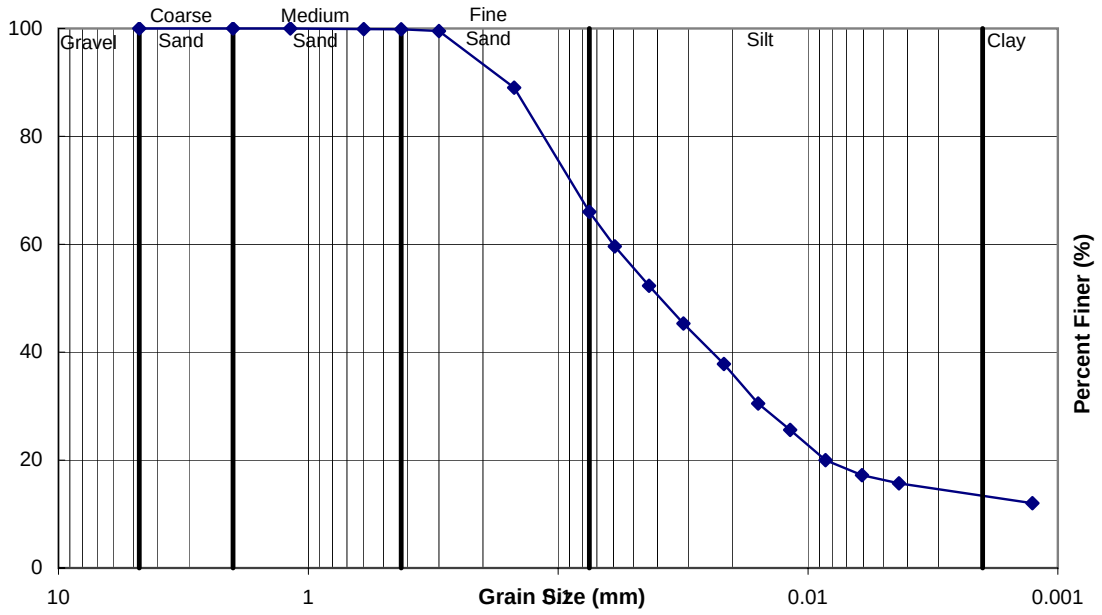


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-6:8m	0.0	0.0	1.0	2.0	70.0	27.0	-	-

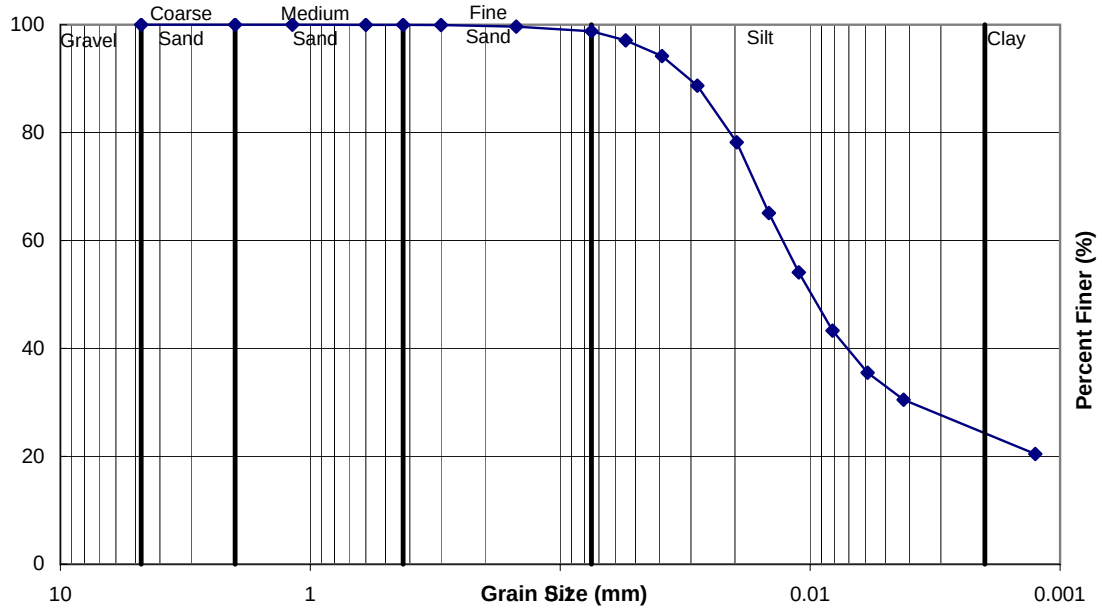


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-6:12m	0.0	0.0	0.0	4.0	72.0	24.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

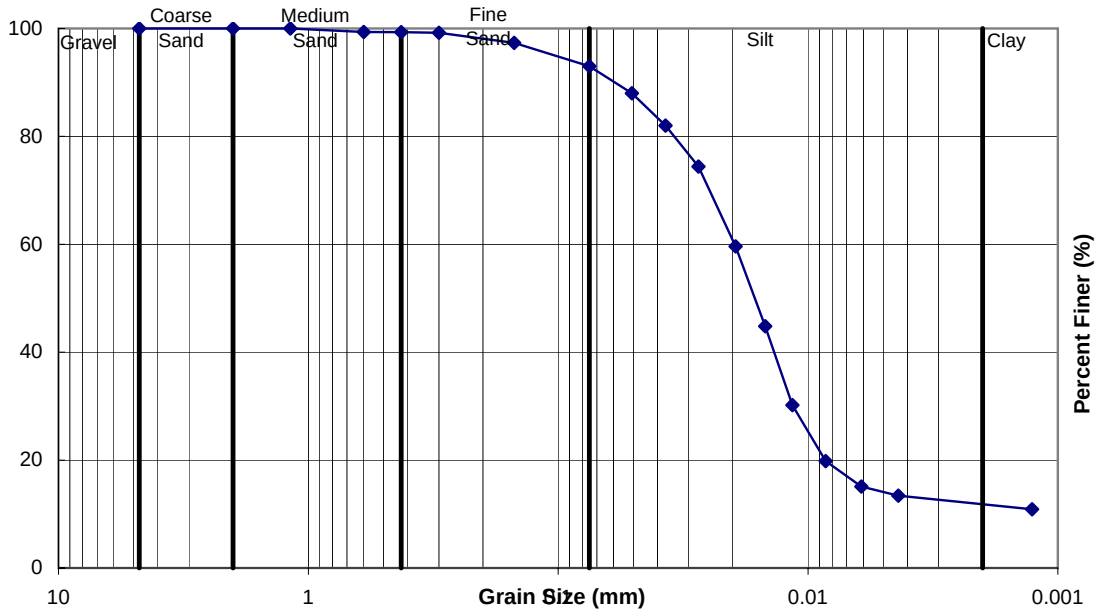


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-6:16m	0.0	0.0	0.0	34.0	53.0	13.0	-	-

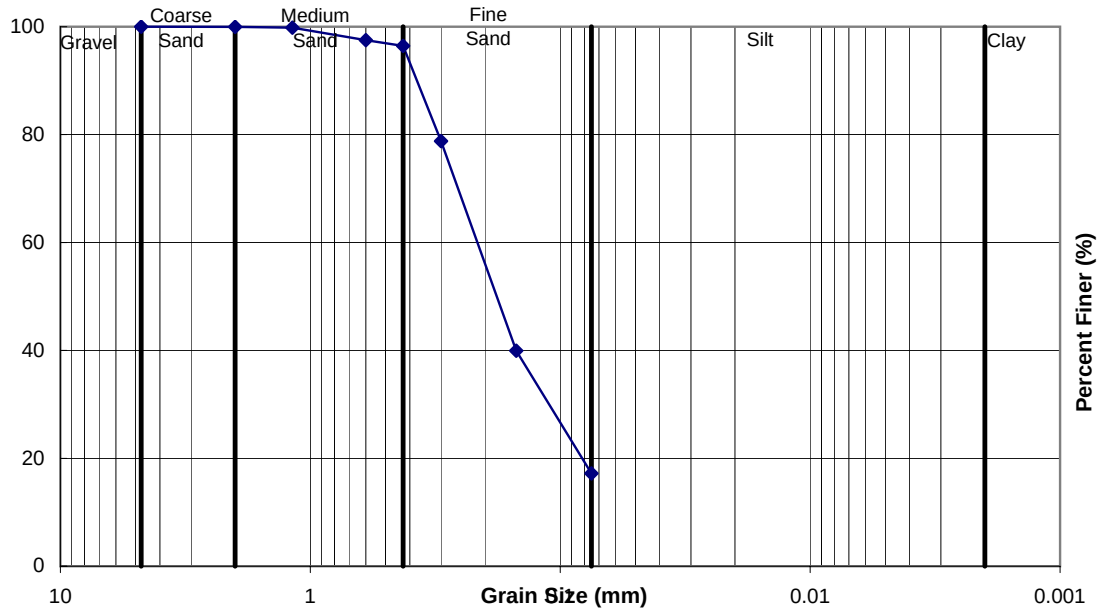


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-6:20m	0.0	0.0	0.0	1.0	75.0	24.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

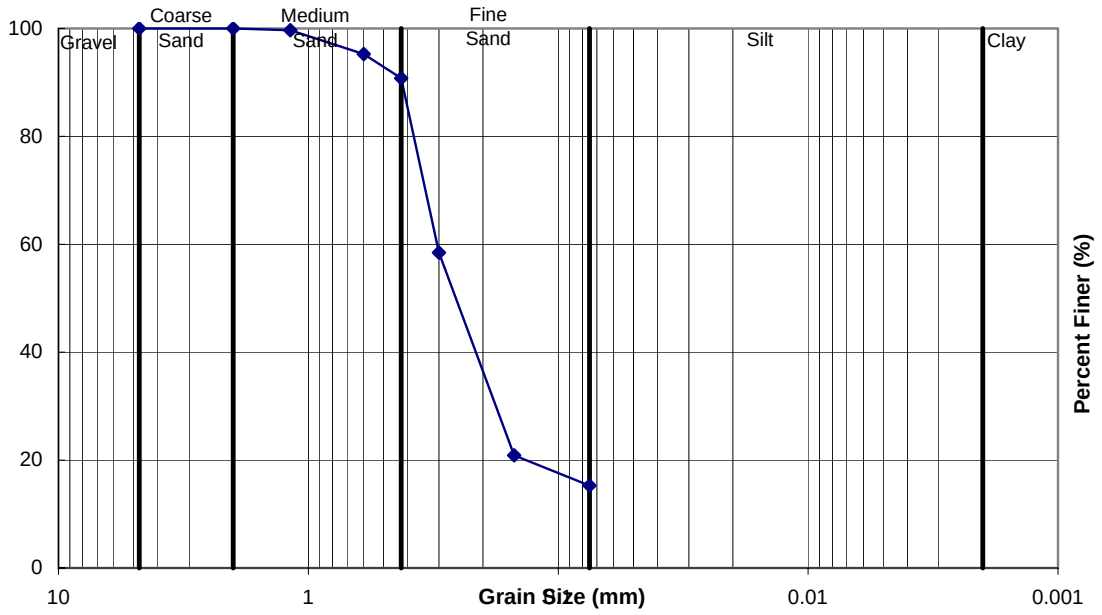


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-6:24m	0.0	0.0	1.0	6.0	81.0	12.0	-	-

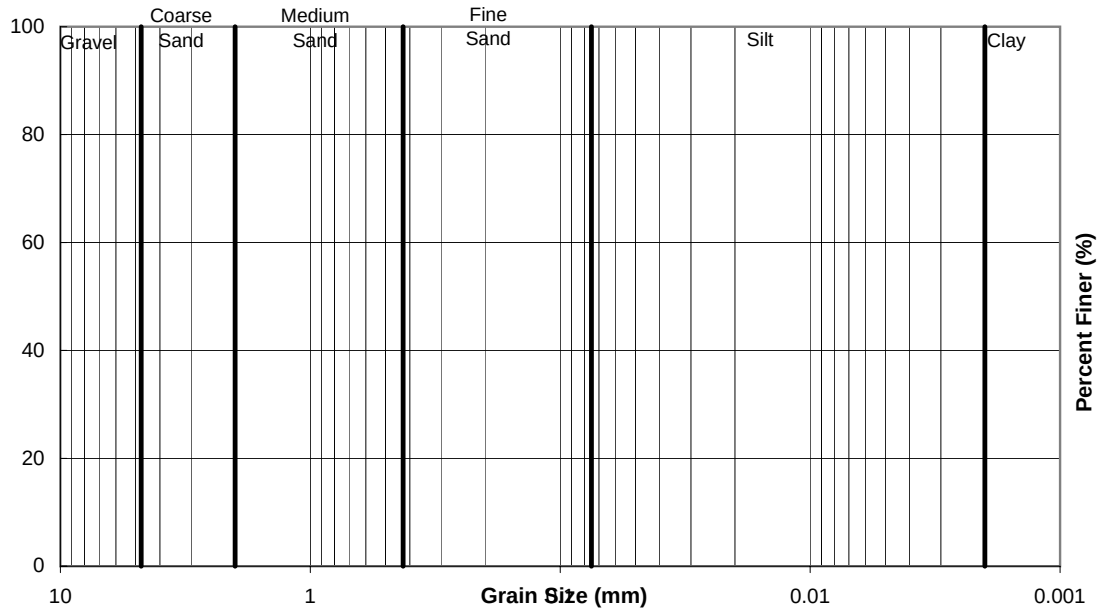


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
BH-6:26m	0.0	0.0	4.0	79.0	17.0		-	-

GRAIN SIZE DISTRIBUTION CURVE

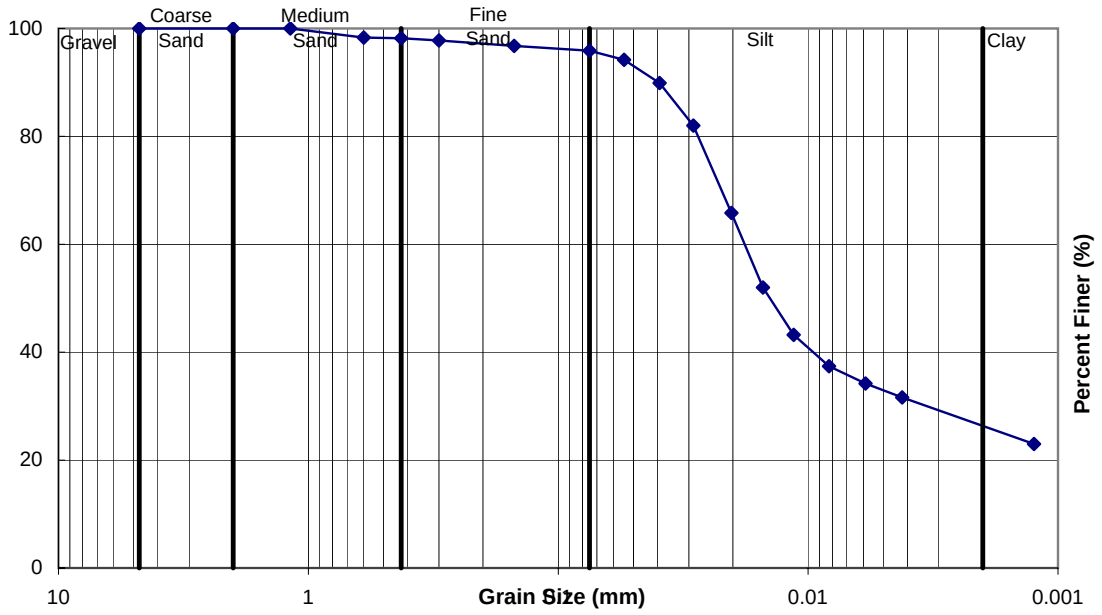


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
BH-6:30m	0.0	0.0	9.0	76.0	15.0		-	-

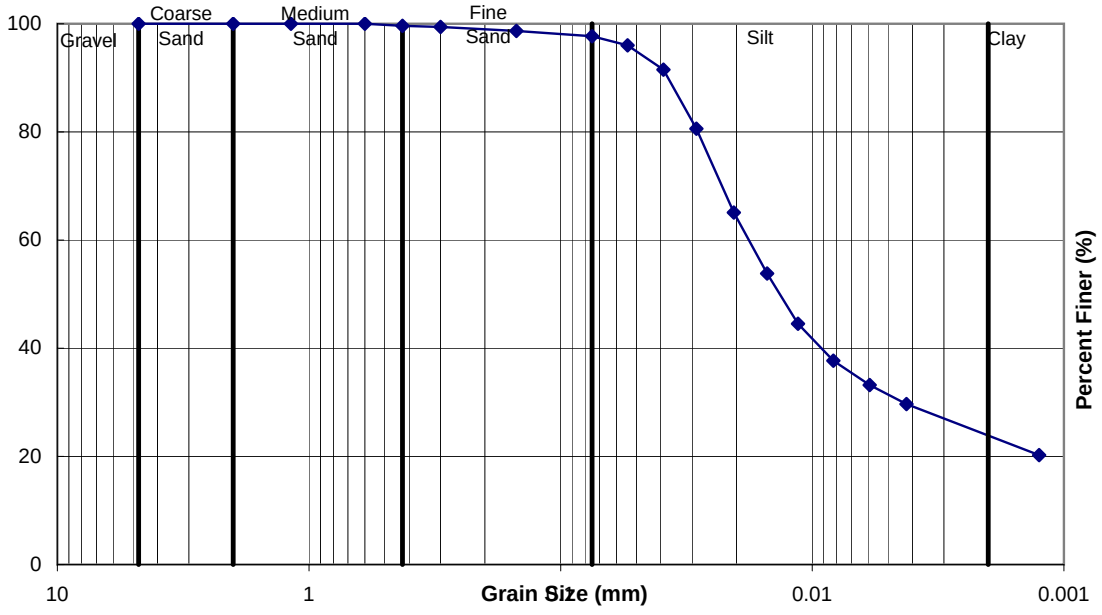


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
FALSE								

GRAIN SIZE DISTRIBUTION CURVE

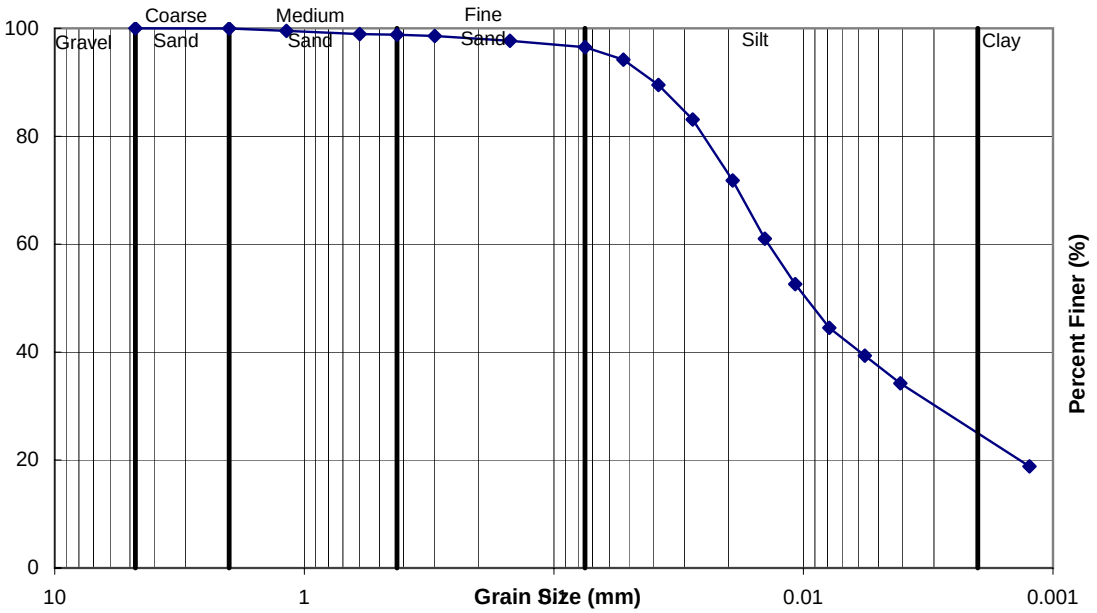


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-6A:1m	0.0	0.0	2.0	2.0	70.0	26.0	-	-

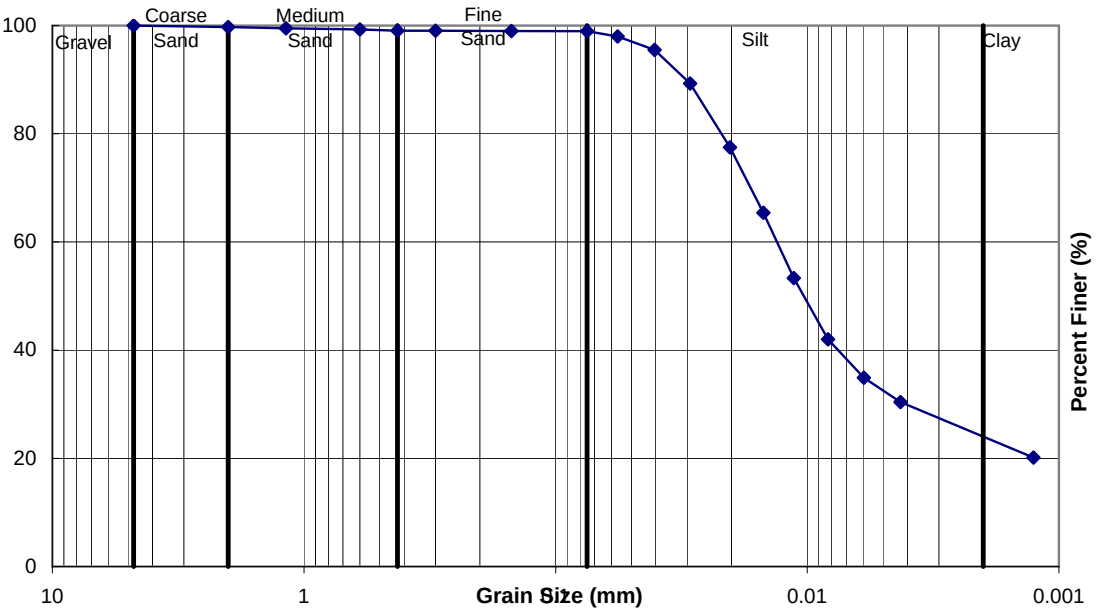


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-6A:3m	0.0	0.0	0.0	2.0	74.0	24.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

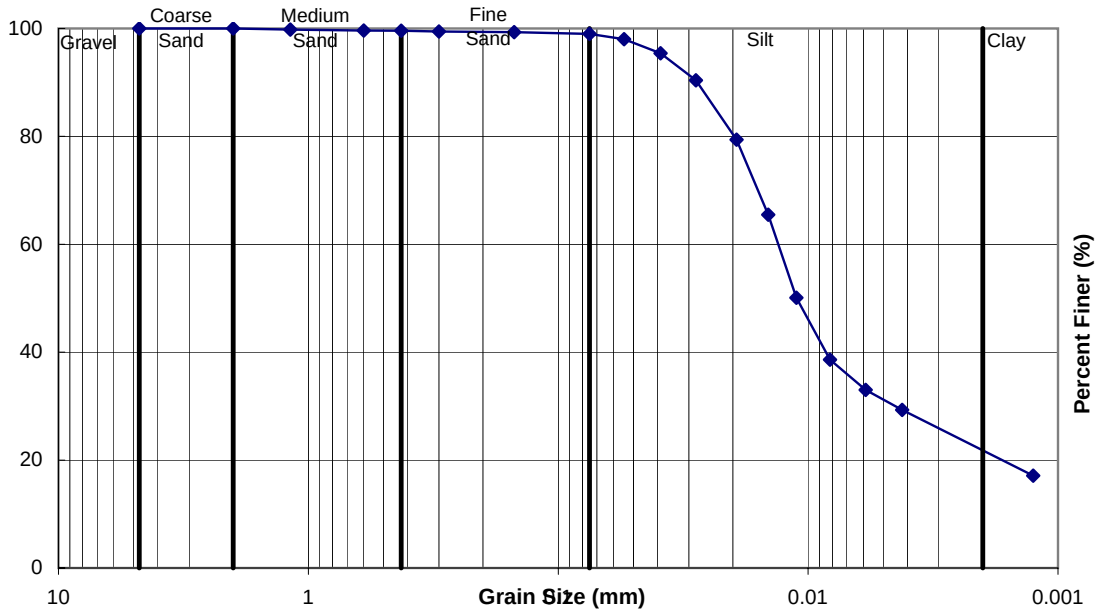


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-6A:6m	0.0	0.0	1.0	2.0	72.0	25.0	-	-

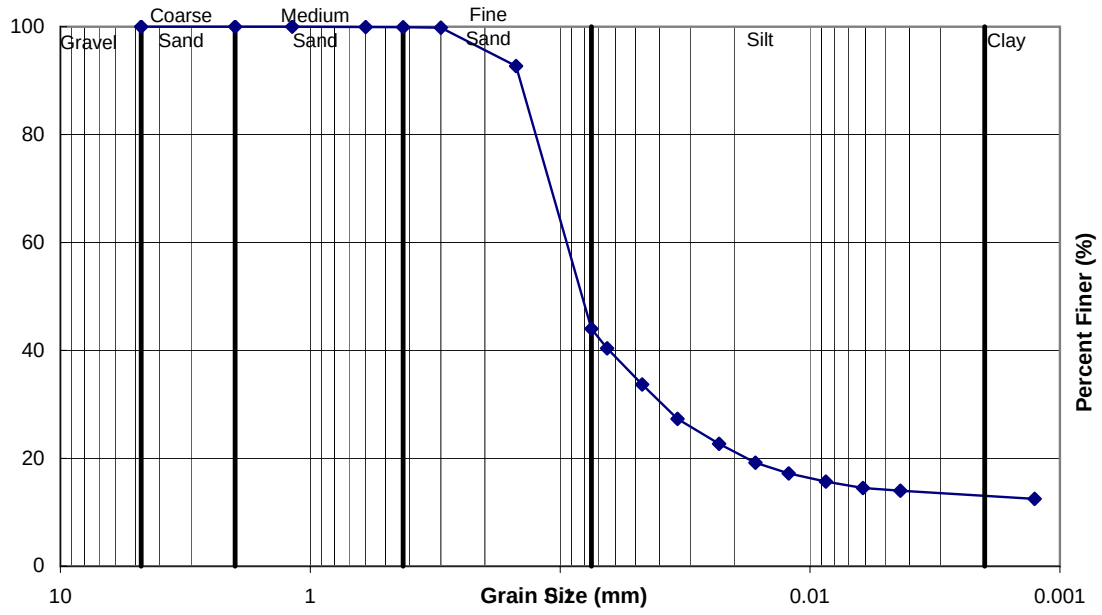


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-6A:10m	0.0	0.0	1.0	0.0	75.0	24.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

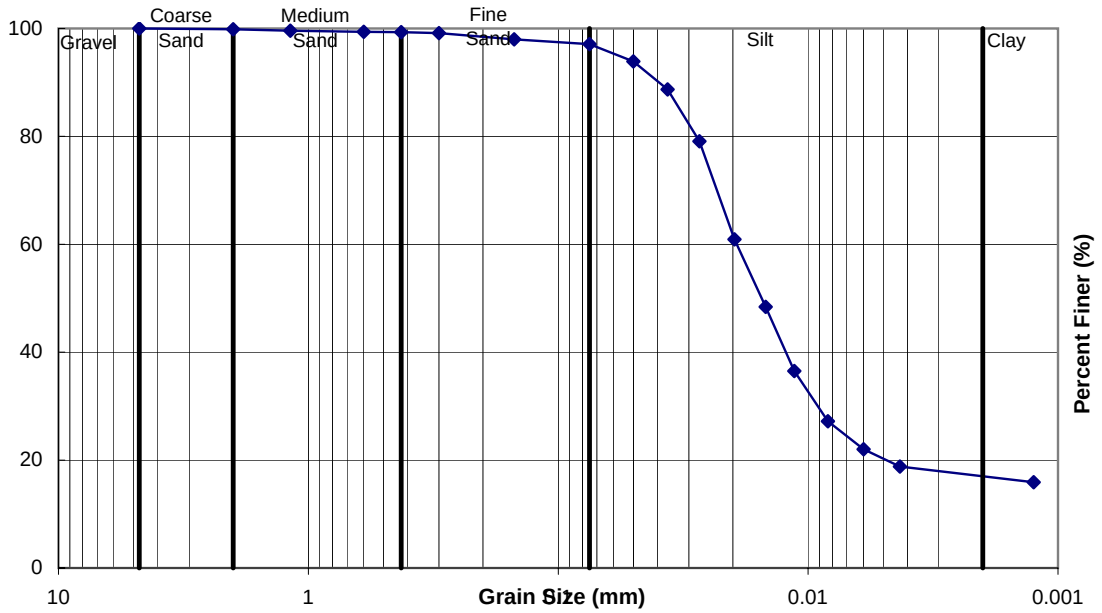


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-6A:14m	0.0	0.0	0.0	1.0	77.0	22.0	-	-

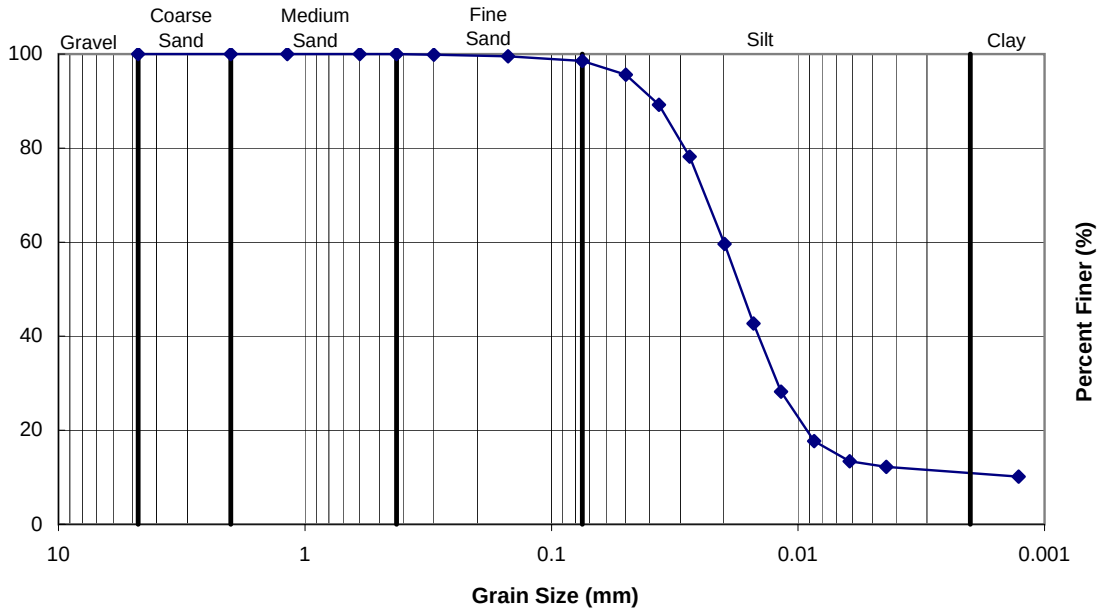


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-6A:18m	0.0	0.0	0.0	56.0	31.0	13.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

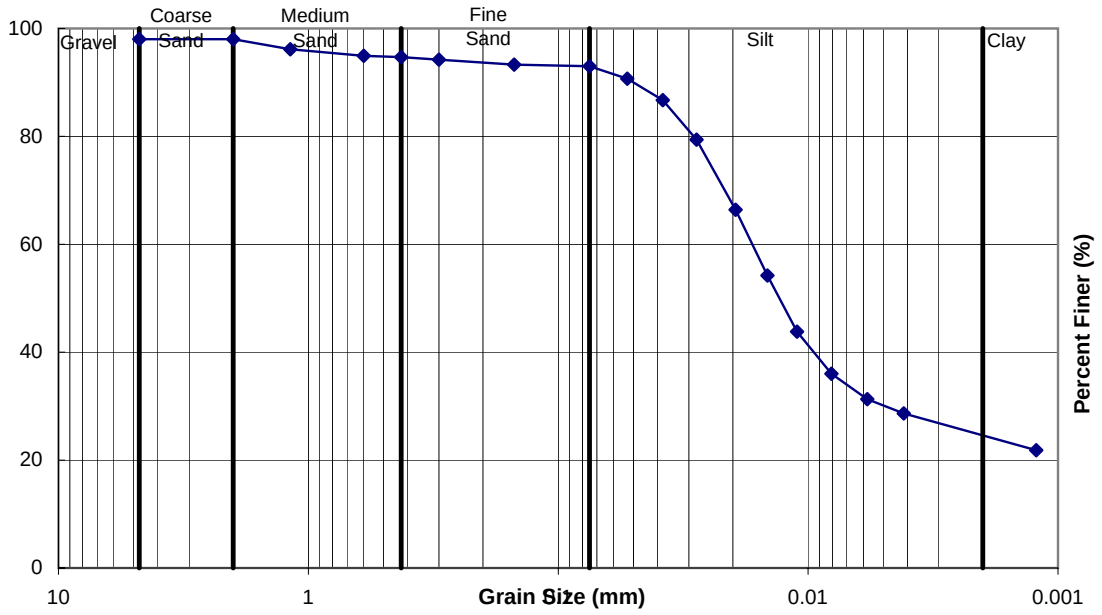


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-6A:22m	0.0	0.0	1.0	2.0	80.0	17.0	-	-

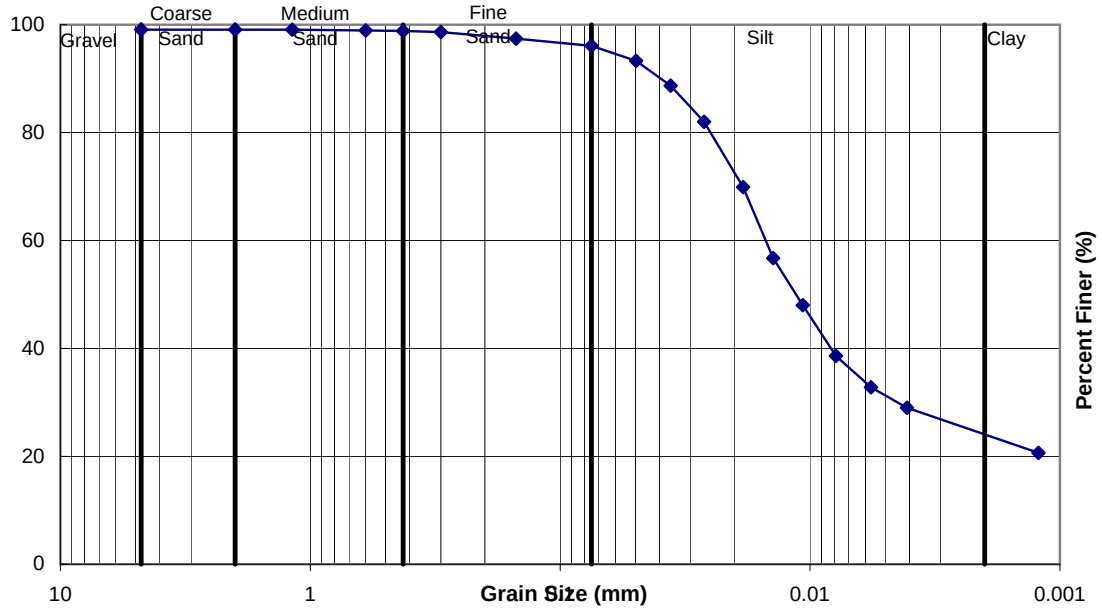


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-6A:26m	0.0	0.0	0.0	1.0	88.0	11.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

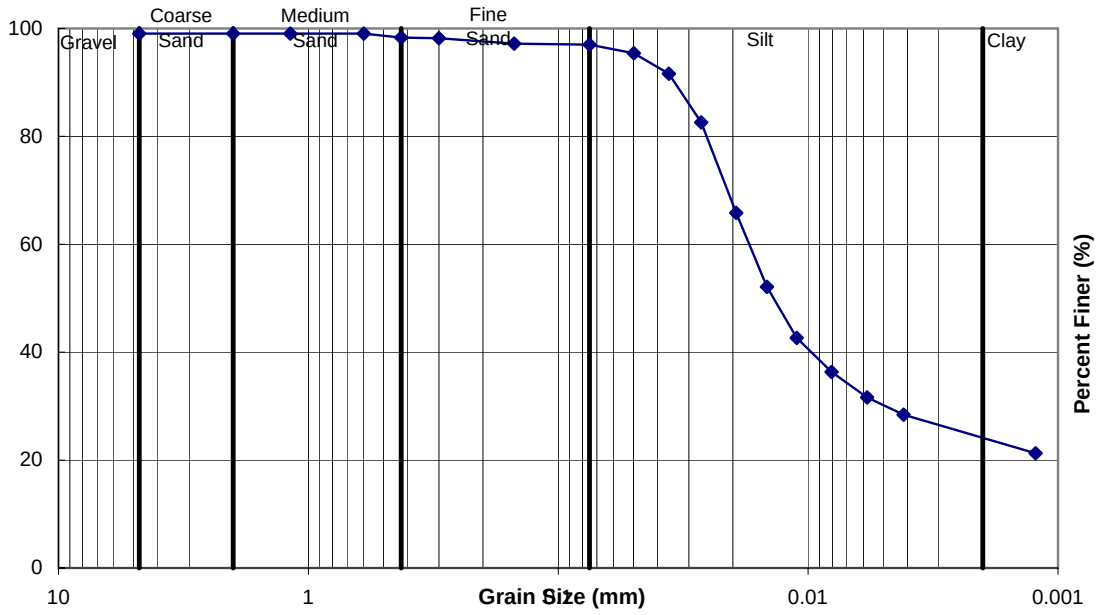


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-7:1m	2.0	0.0	3.0	2.0	68.0	25.0	-	-

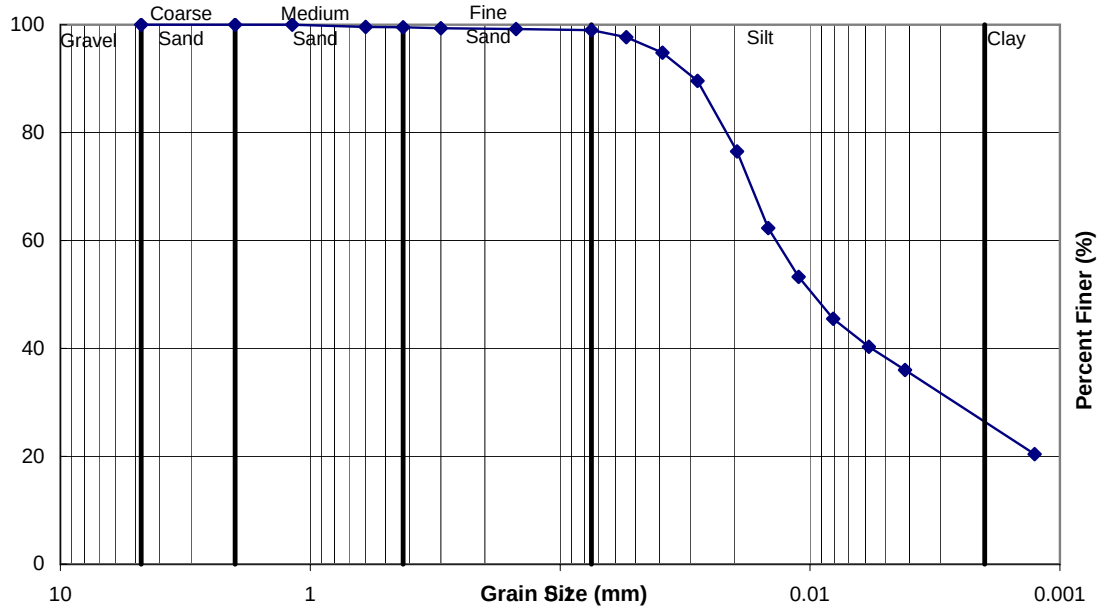


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-7:3m	1.0	0.0	0.0	3.0	72.0	24.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

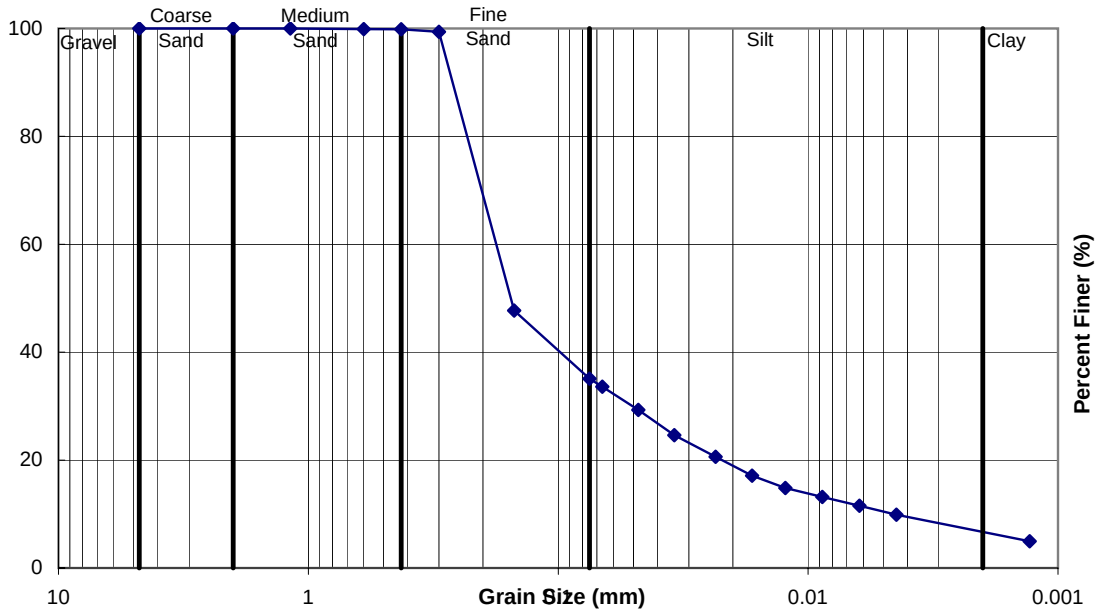


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-7:6m	1.0	0.0	1.0	1.0	73.0	24.0	-	-

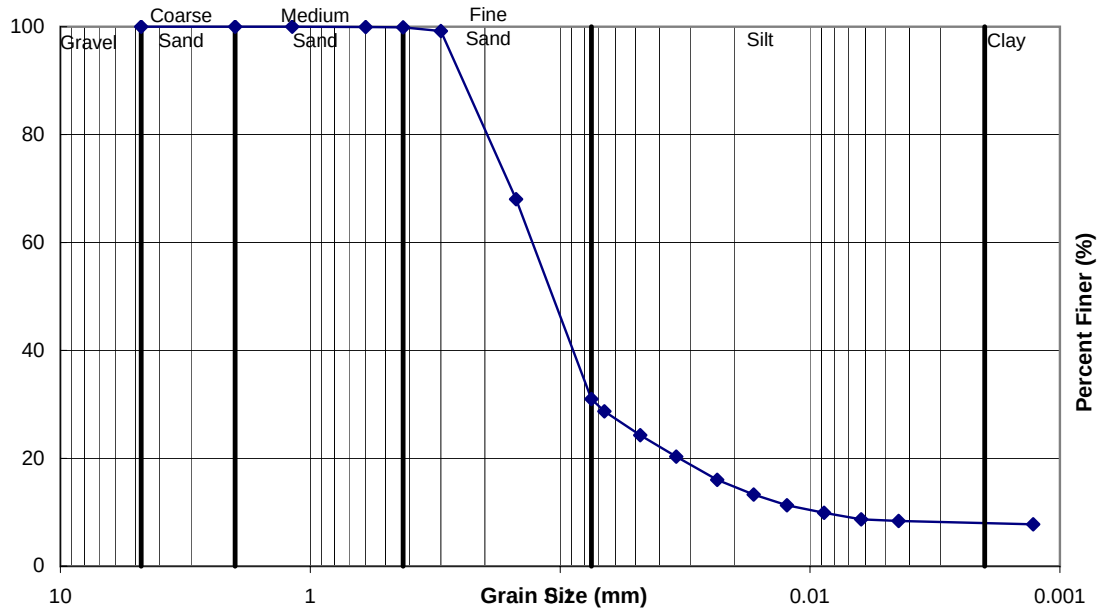


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-7:10m	0.0	0.0	0.0	1.0	73.0	26.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

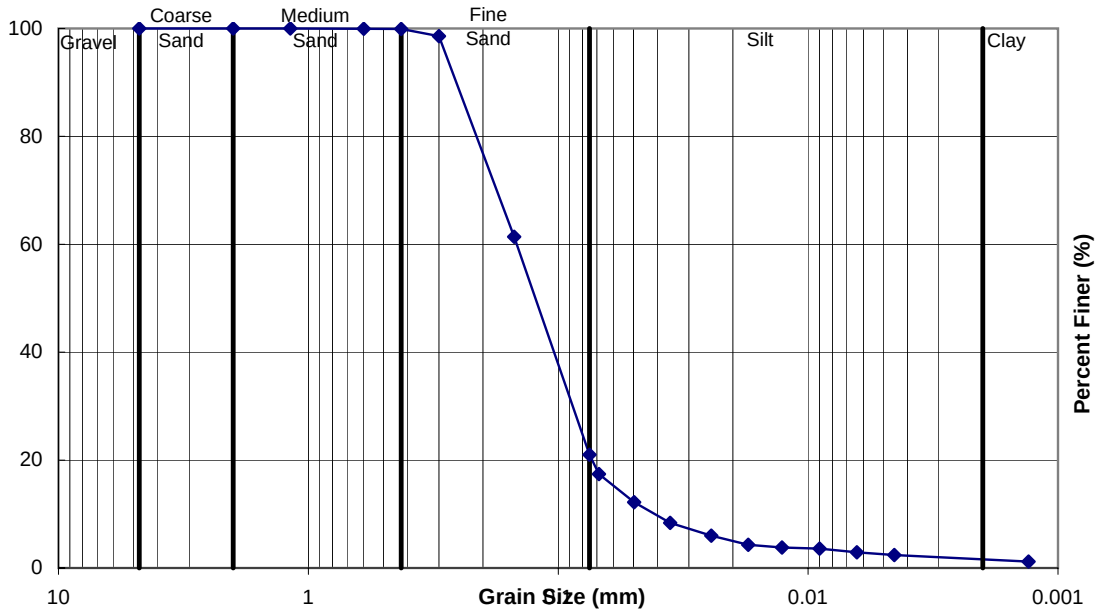


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-7:14m	0.0	0.0	0.0	65.0	28.0	7.0	38.9	0.3

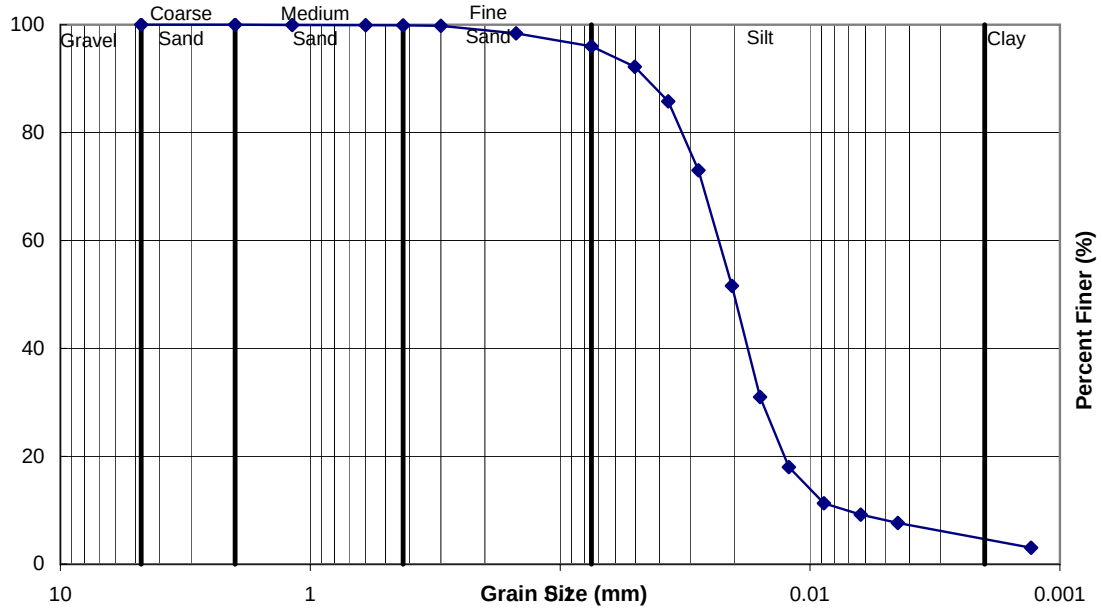


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-7:16m	0.0	0.0	0.0	69.0	23.0	8.0	14.3	0.2

GRAIN SIZE DISTRIBUTION CURVE

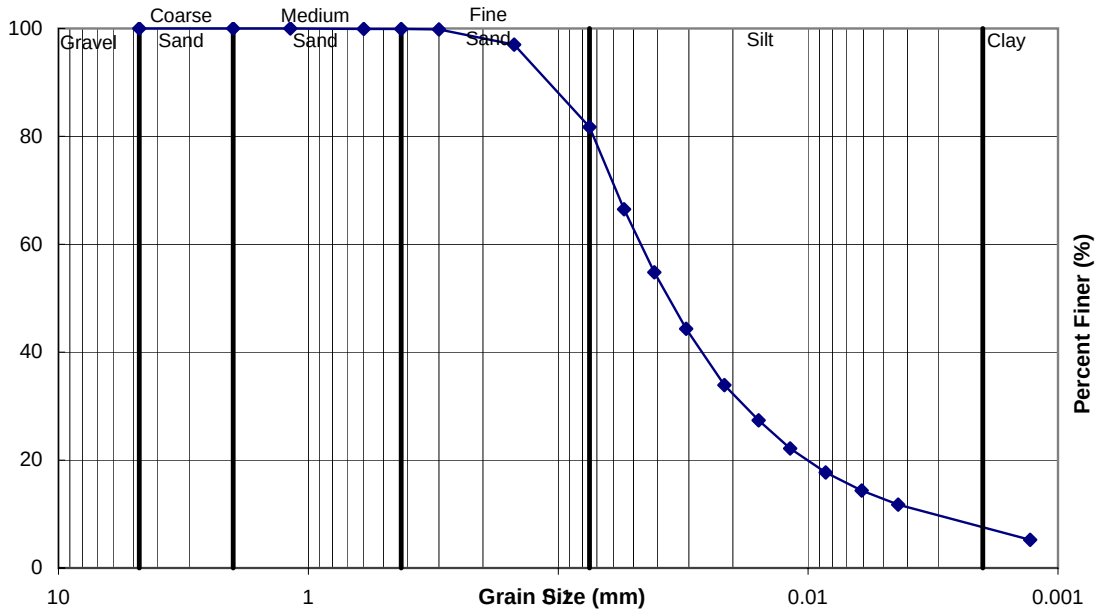


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-7:18m	0.0	0.0	0.0	79.0	19.0	2.0	3.6	0.8

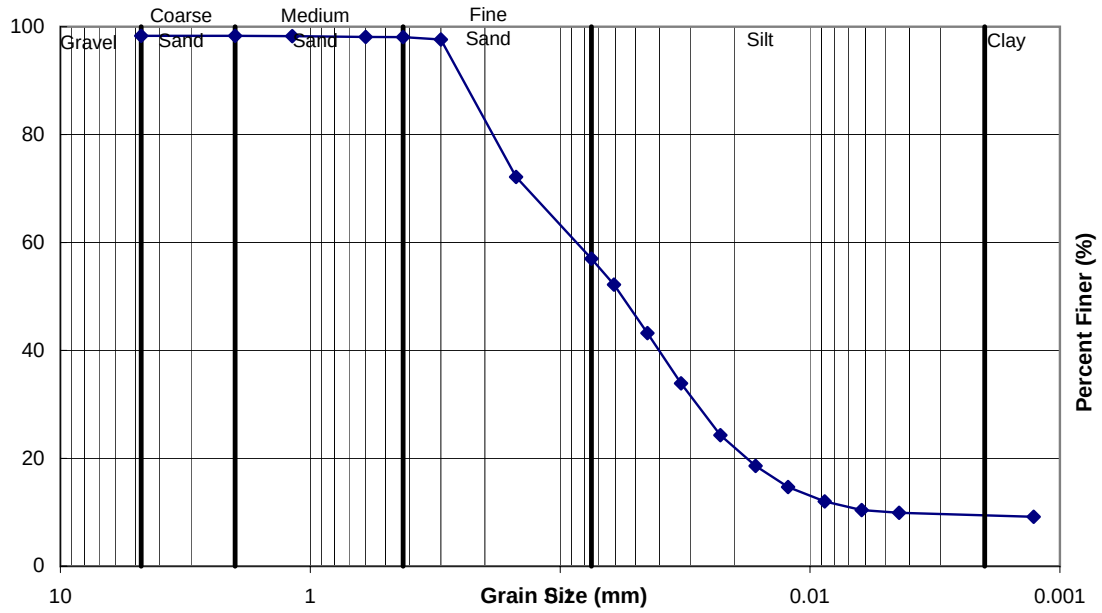


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-7:22m	0.0	0.0	0.0	4.0	91.0	5.0	3.2	0.7

GRAIN SIZE DISTRIBUTION CURVE

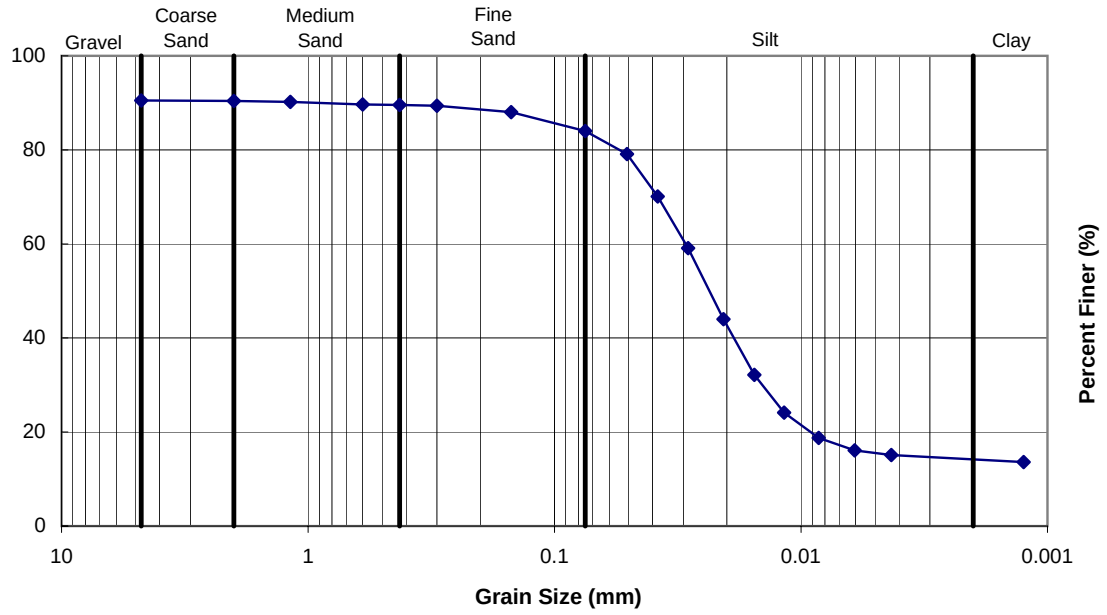


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-7:26m	0.0	0.0	0.0	18.0	74.0	8.0	14.8	0.5

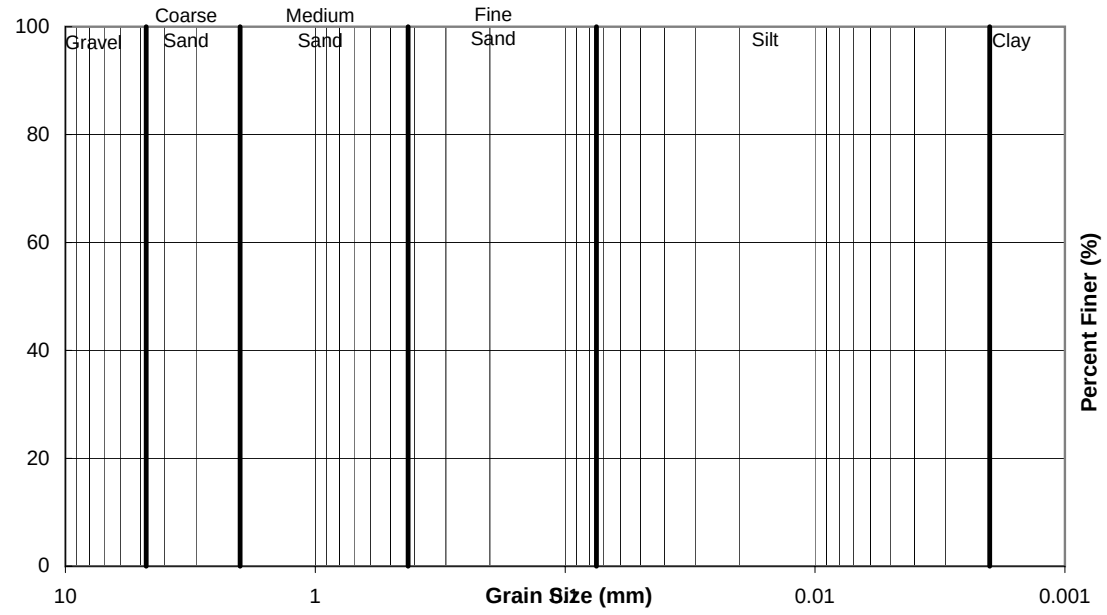


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-7:30m	2.0	0.0	0.0	41.0	48.0	9.0	18.2	0.5

GRAIN SIZE DISTRIBUTION CURVE

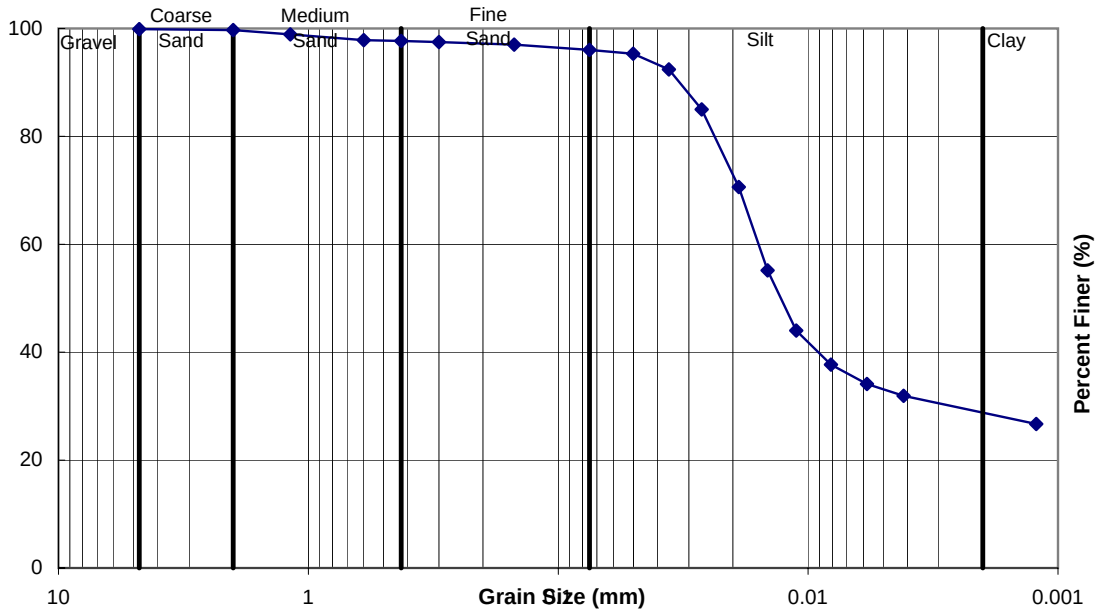


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-7:32m	9.0	0.0	1.0	6.0	70.0	14.0	-	-

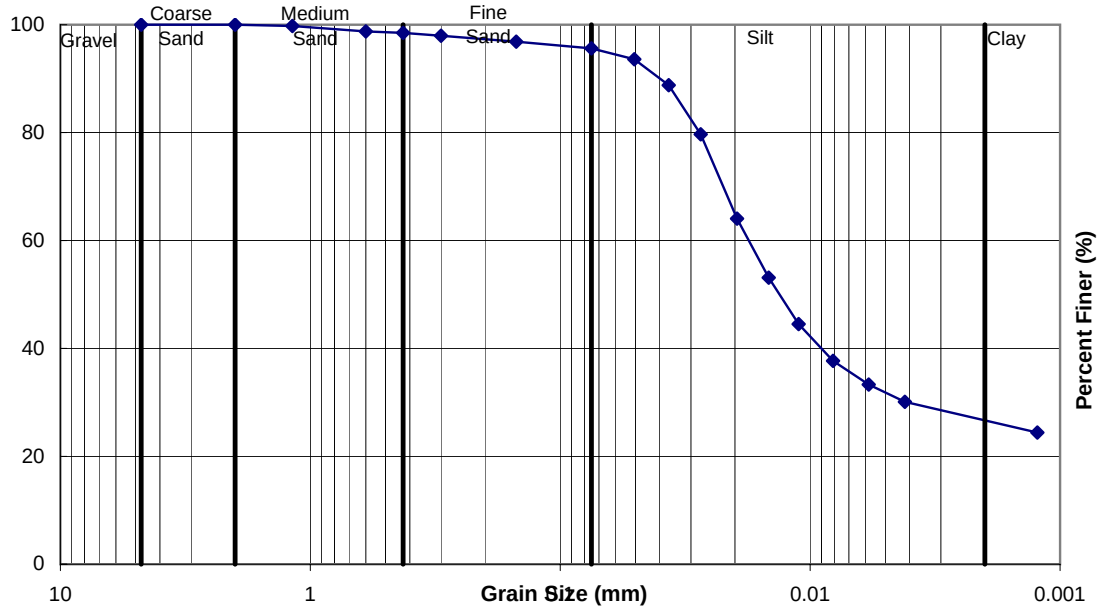


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
FALSE								

GRAIN SIZE DISTRIBUTION CURVE

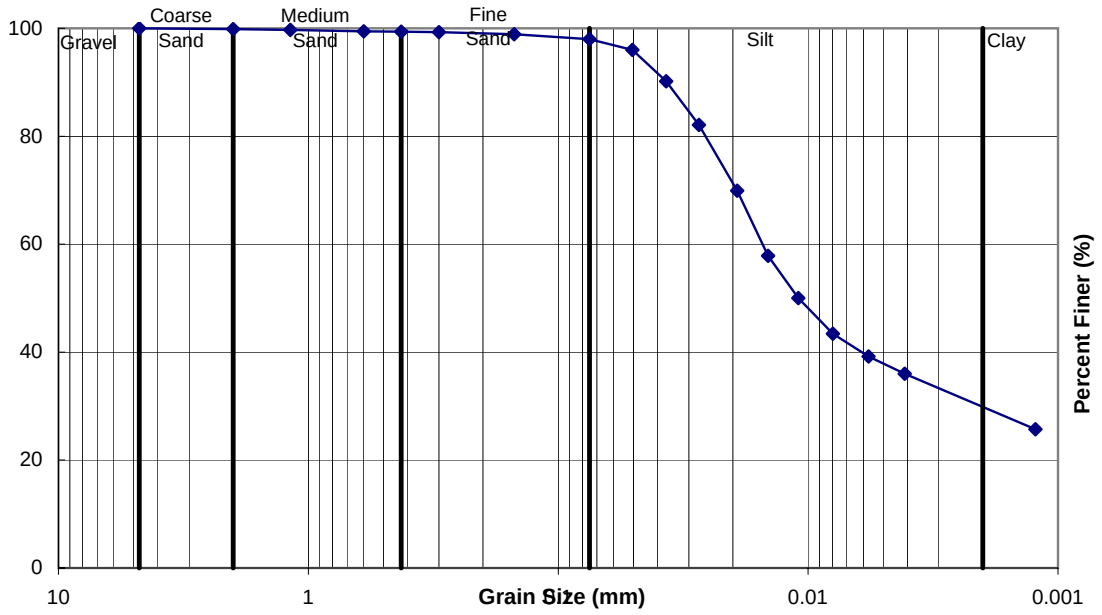


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-8:1m	0.0	0.0	2.0	2.0	67.0	29.0	-	-

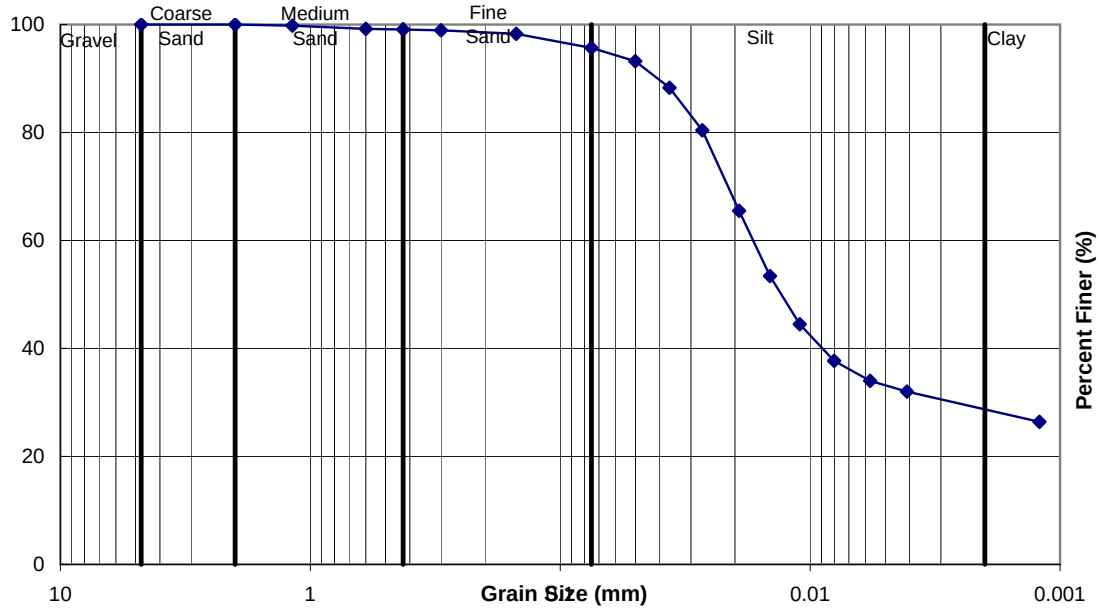


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-8:3m	0.0	0.0	2.0	3.0	68.0	27.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

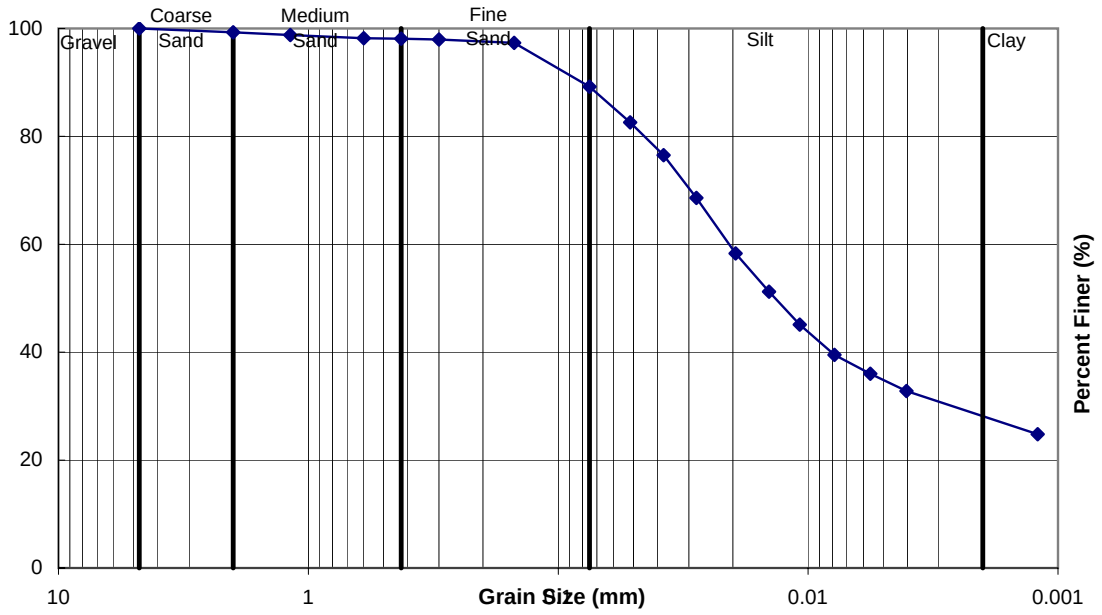


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-8:6m	0.0	0.0	0.0	1.0	69.0	30.0	-	-

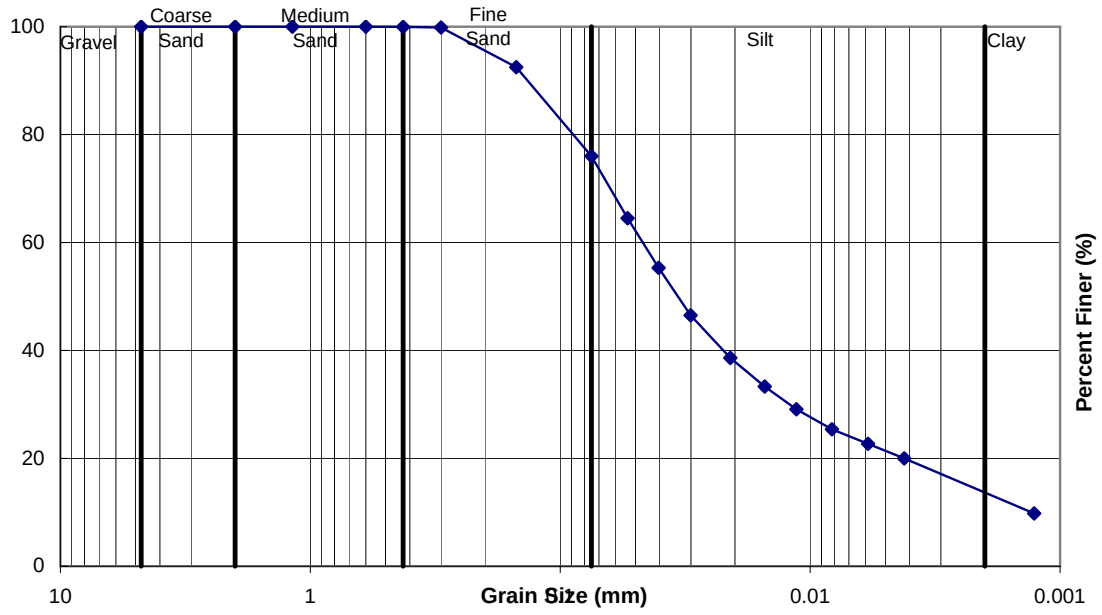


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-8:10m	0.0	0.0	1.0	3.0	67.0	29.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

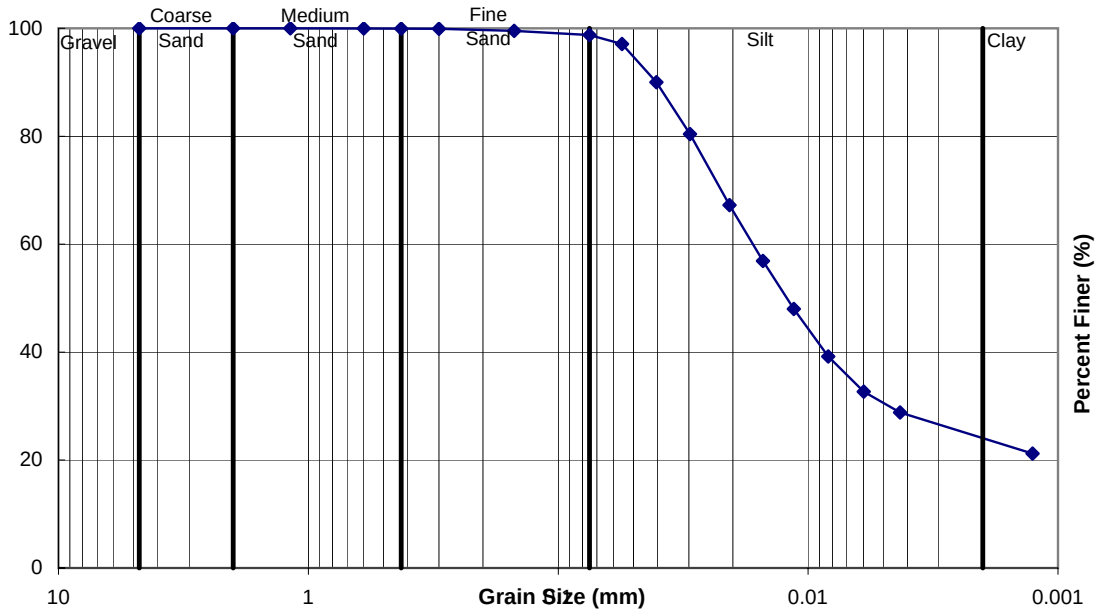


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-8:14m	0.0	1.0	1.0	9.0	61.0	28.0	-	-

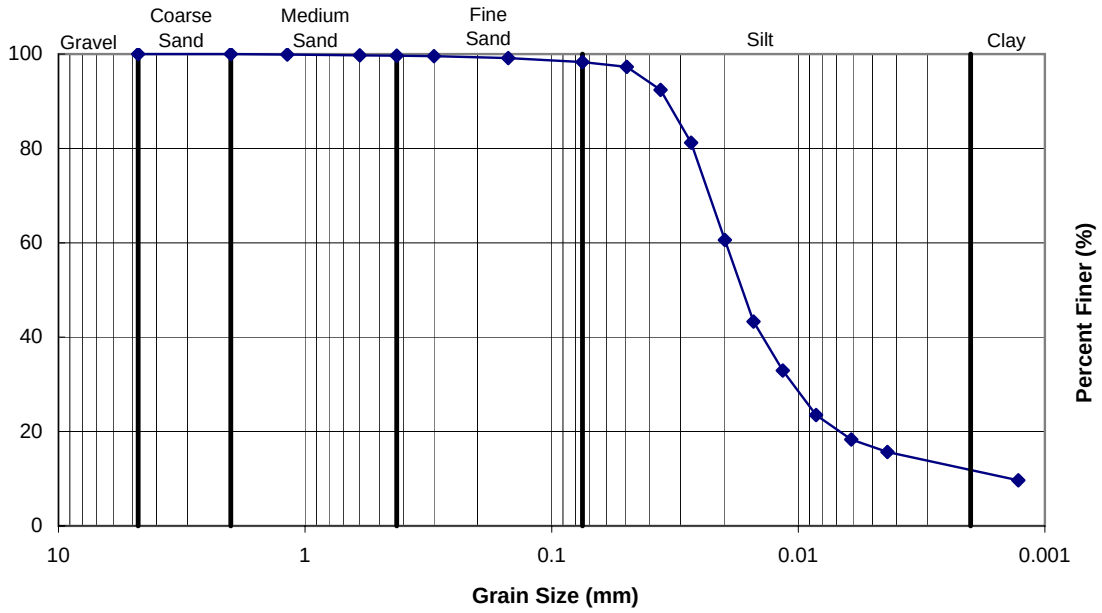


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-8:18m	0.0	0.0	0.0	24.0	62.0	14.0	36.0	0.4

GRAIN SIZE DISTRIBUTION CURVE

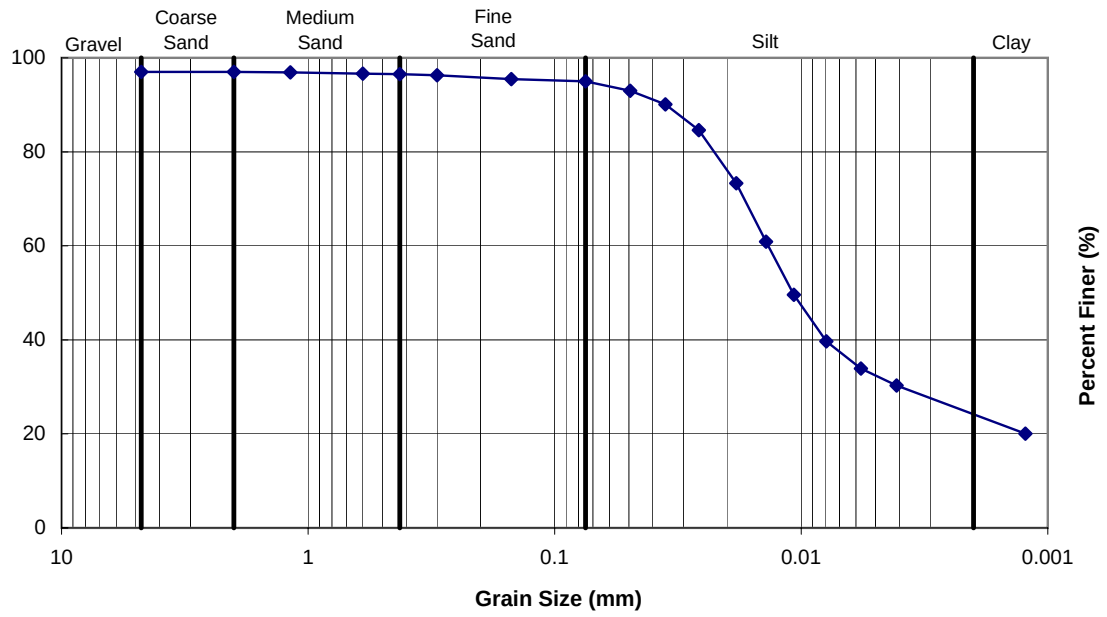


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-8:24m	0.0	0.0	0.0	1.0	75.0	24.0	-	-

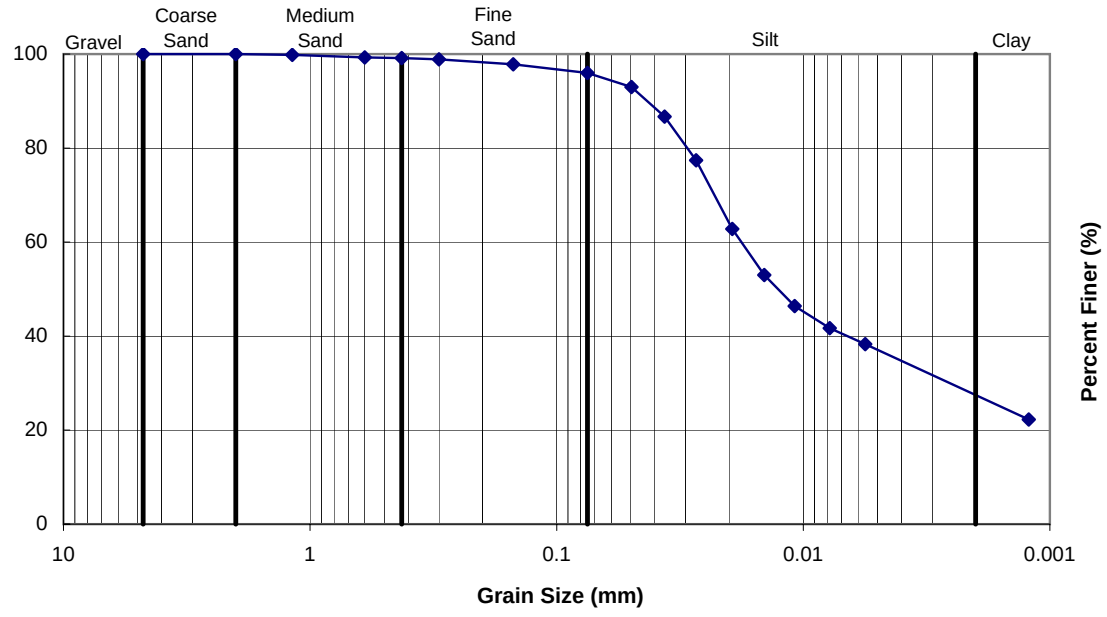


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-8:28m	0.0	0.0	0.0	1.0	87.0	12.0	14.3	0.2

GRAIN SIZE DISTRIBUTION CURVE

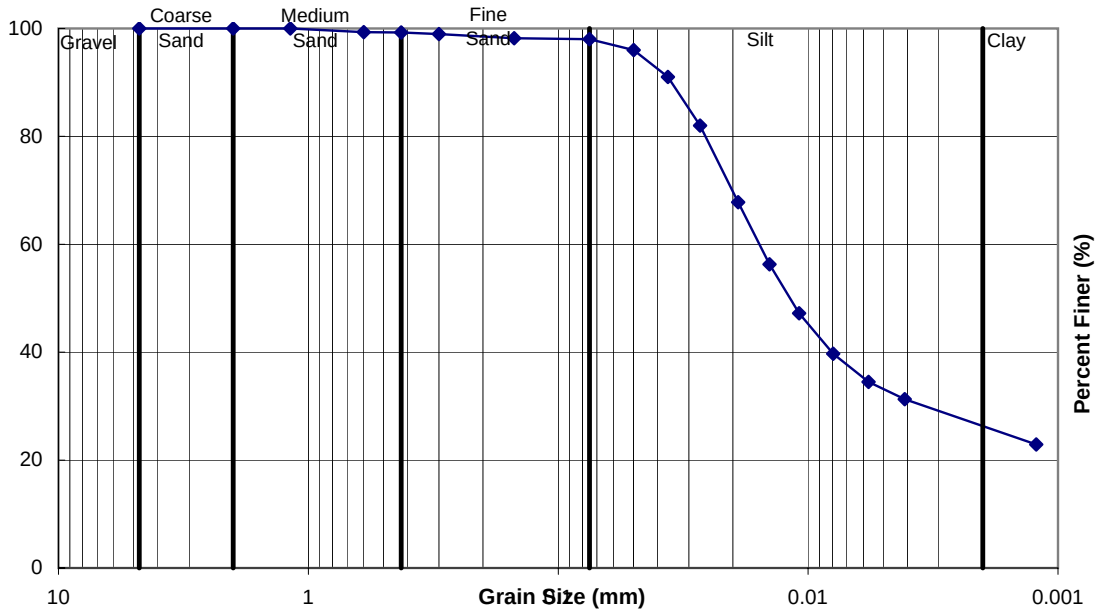


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-11:1m	3.0	0.0	0.0	2.0	71.0	24.0	-	-

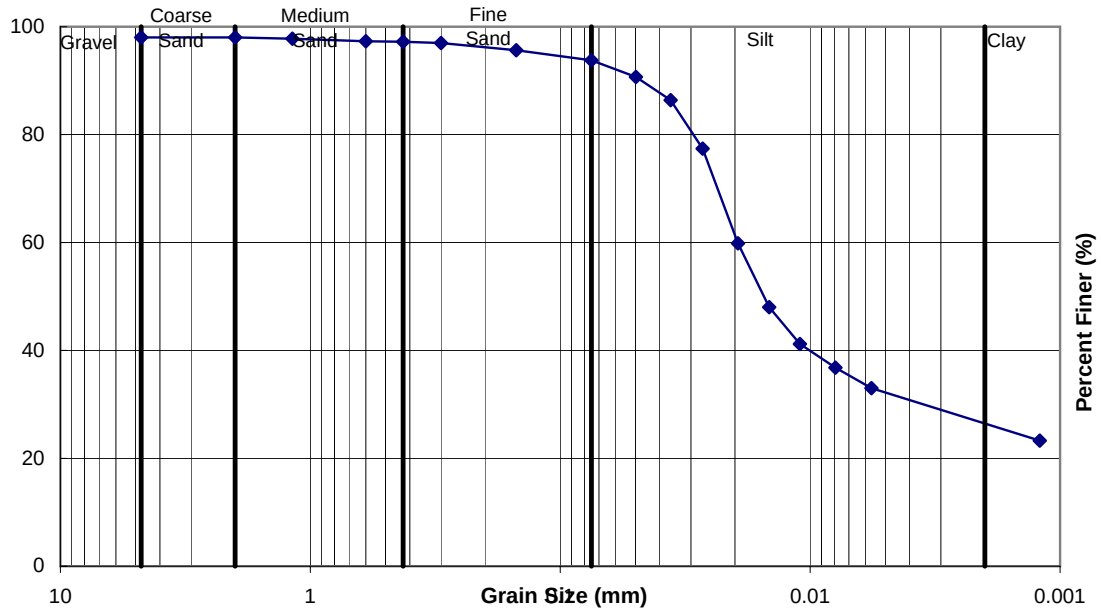


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-11:3m	0.0	0.0	1.0	3.0	69.0	27.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

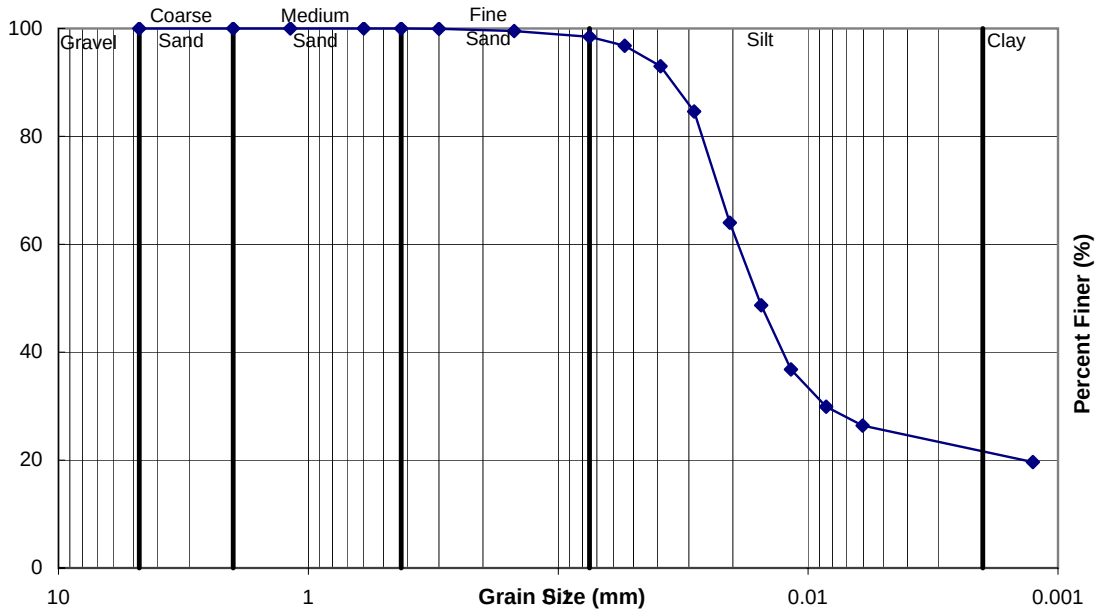


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-11:3m	0.0	0.0	1.0	1.0	72.0	26.0	-	-

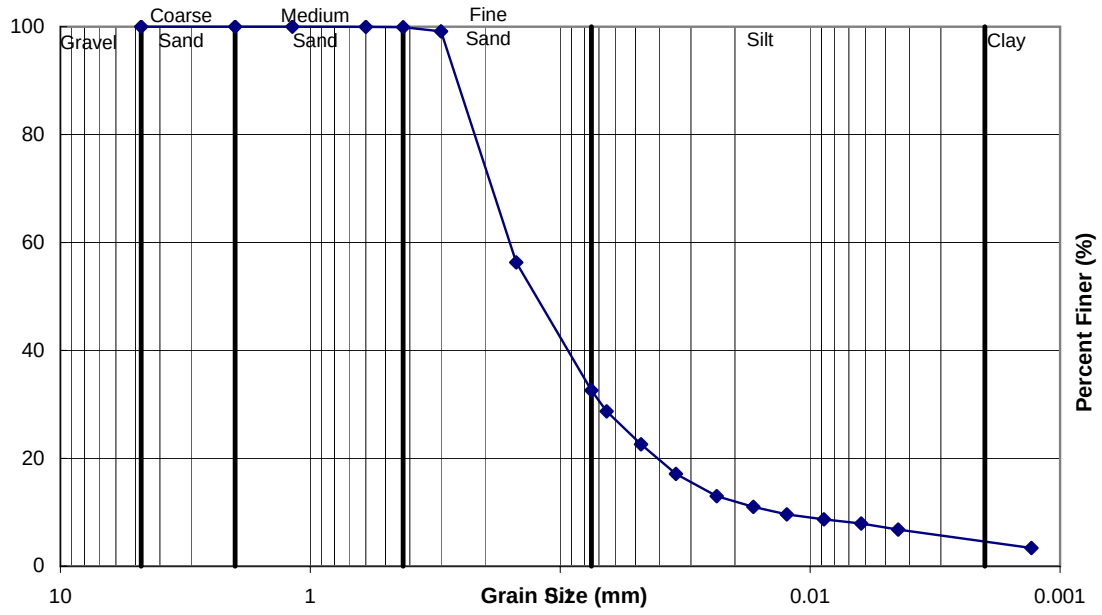


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-11:8m	2.0	0.0	1.0	3.0	68.0	26.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

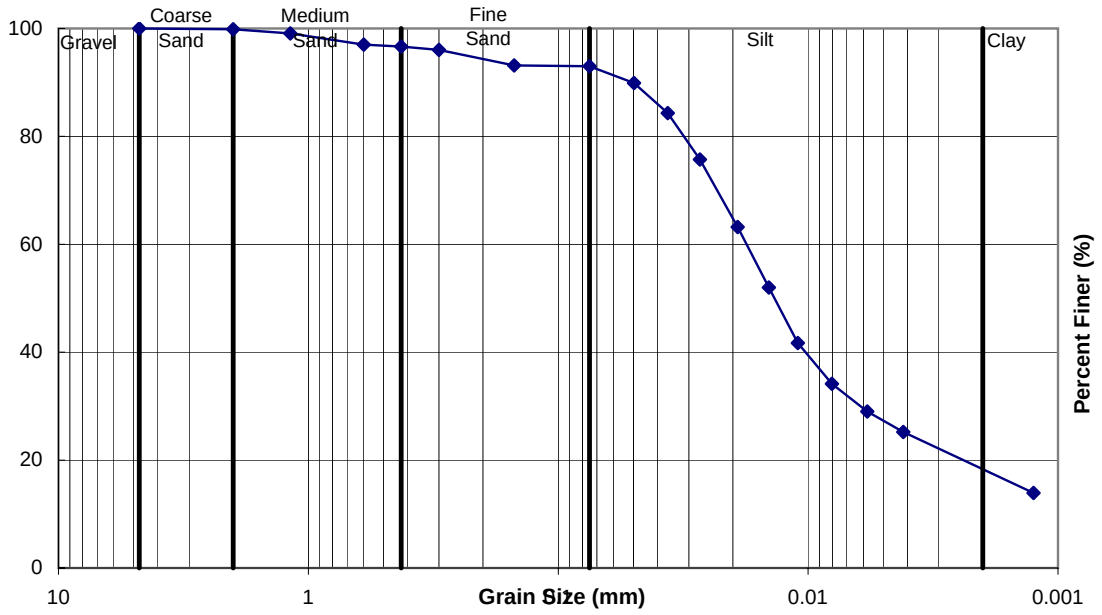


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-11:12m	0.0	0.0	0.0	2.0	76.0	22.0	-	-

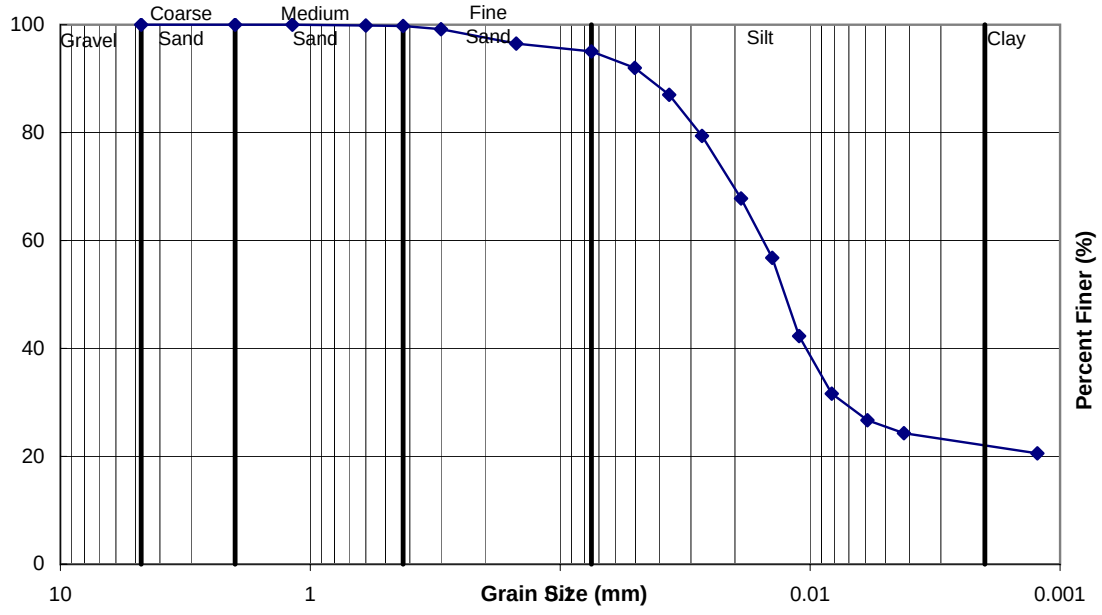


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-11:14m	0.0	0.0	0.0	67.0	28.0	5.0	11.7	0.5

GRAIN SIZE DISTRIBUTION CURVE

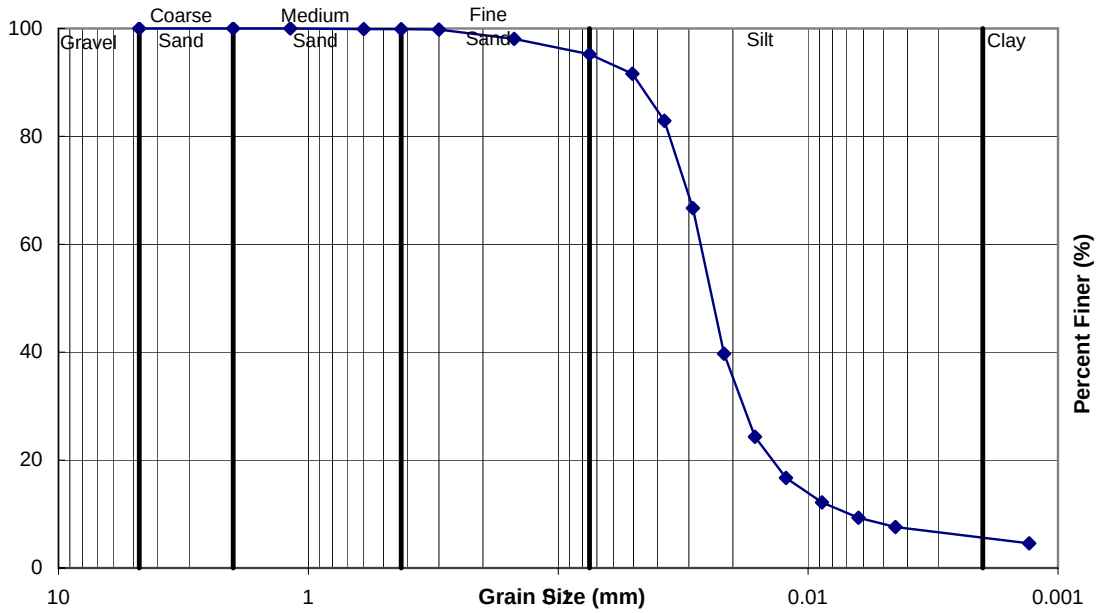


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-11:16m	0.0	0.0	3.0	4.0	75.0	18.0	-	-

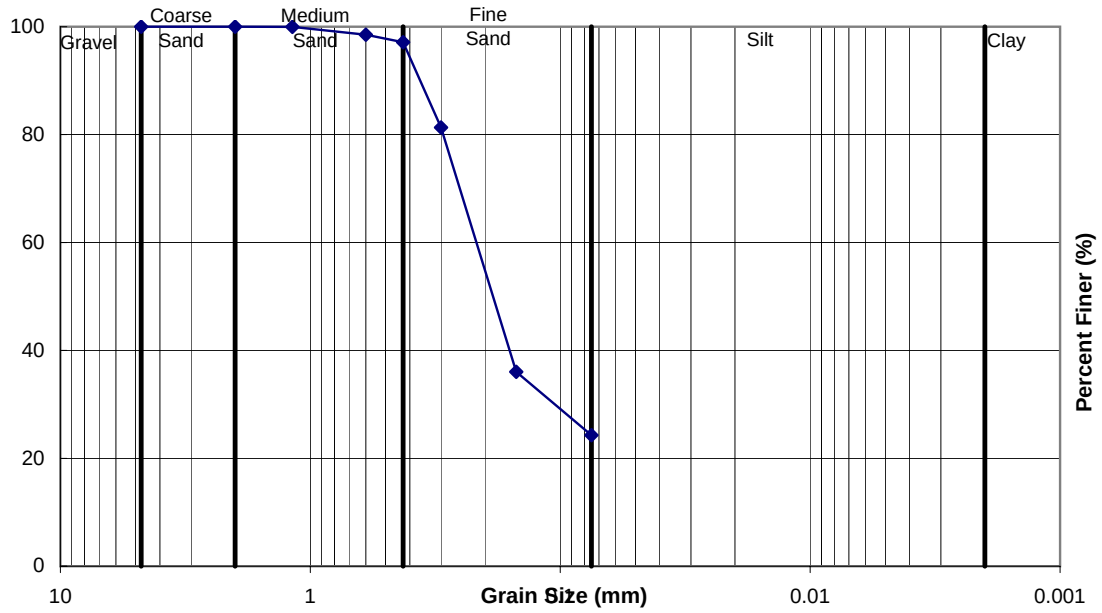


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-11:20m	0.0	0.0	0.0	5.0	73.0	22.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

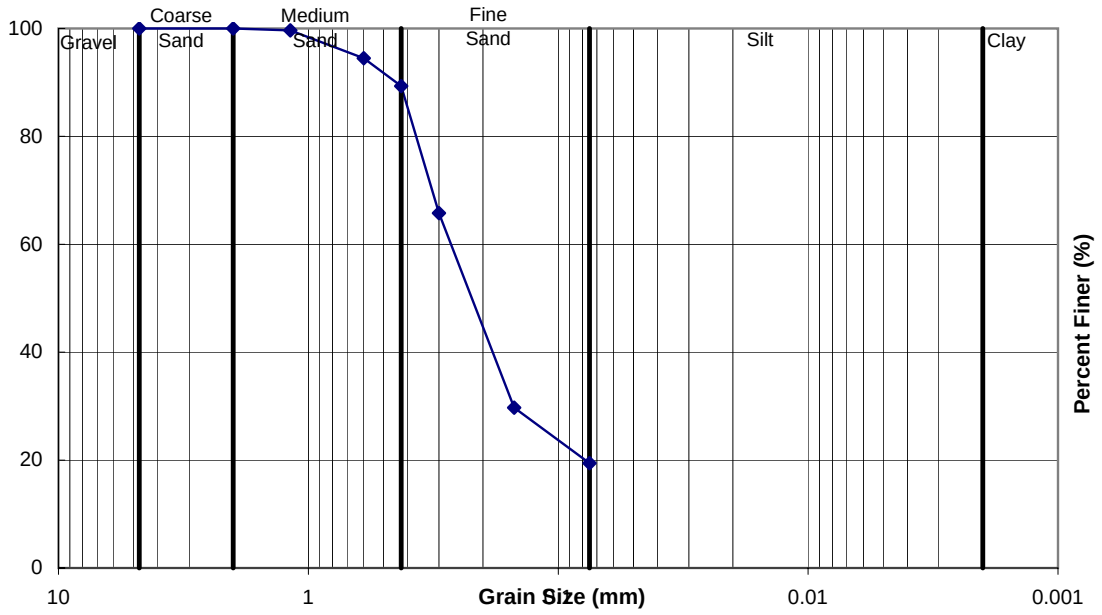


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-11:24m	0.0	0.0	0.0	5.0	89.0	6.0	3.9	0.6

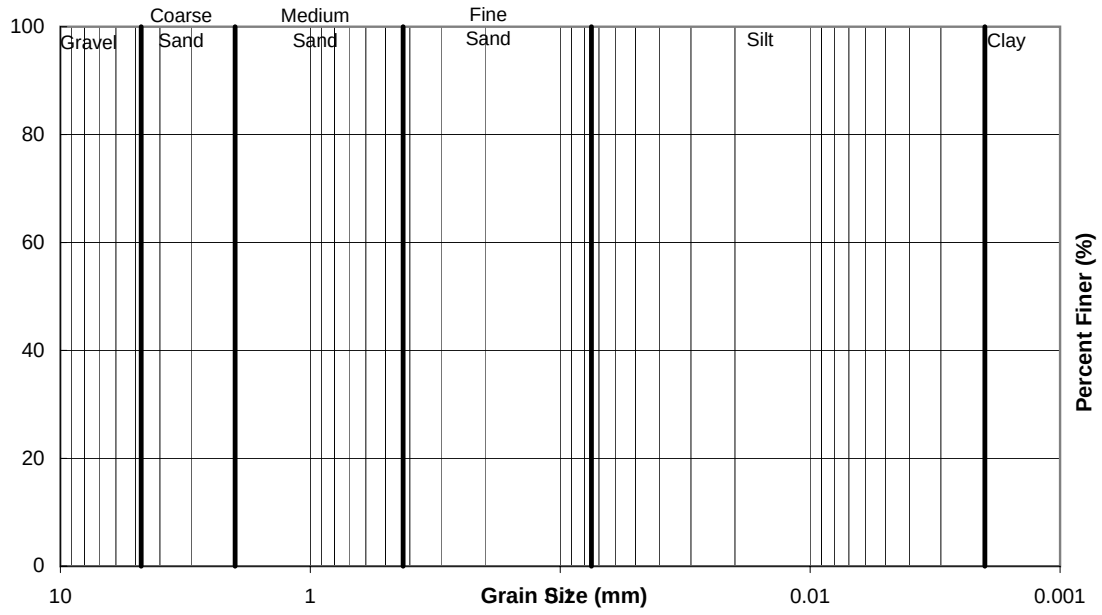


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
BH-11:26m	0.0	0.0	3.0	73.0	24.0		-	-

GRAIN SIZE DISTRIBUTION CURVE

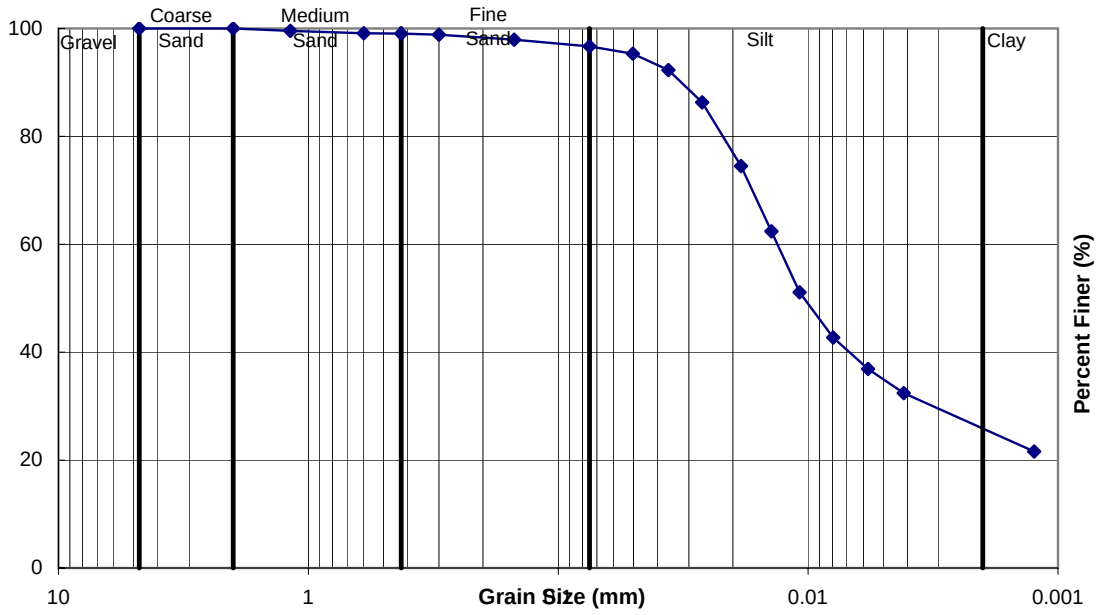


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
BH-11:30m	0.0	0.0	11.0	70.0	19.0		-	-

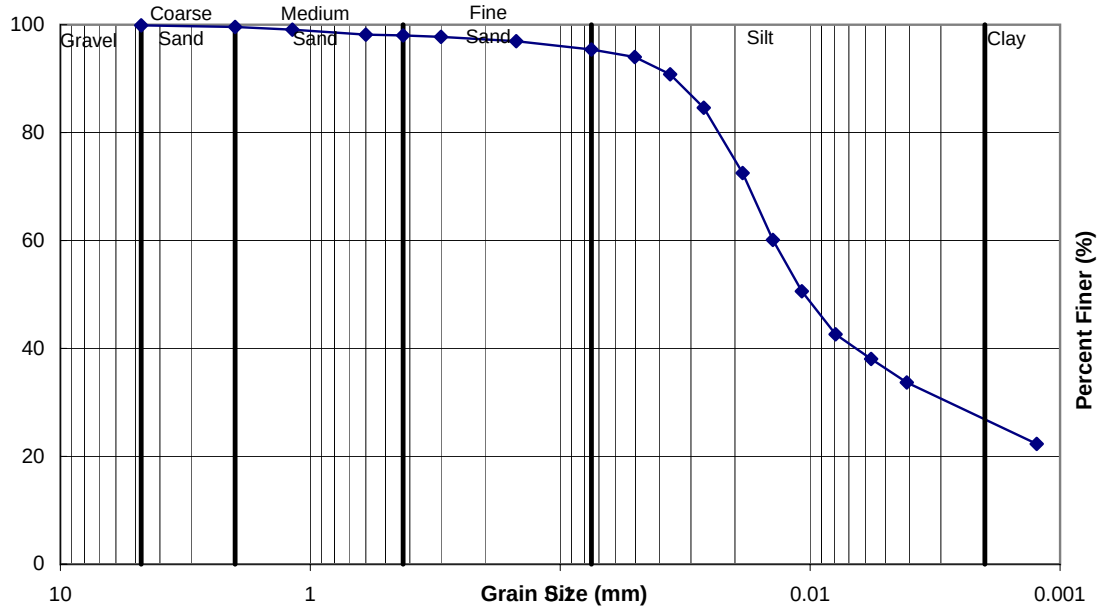


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
FALSE								

GRAIN SIZE DISTRIBUTION CURVE

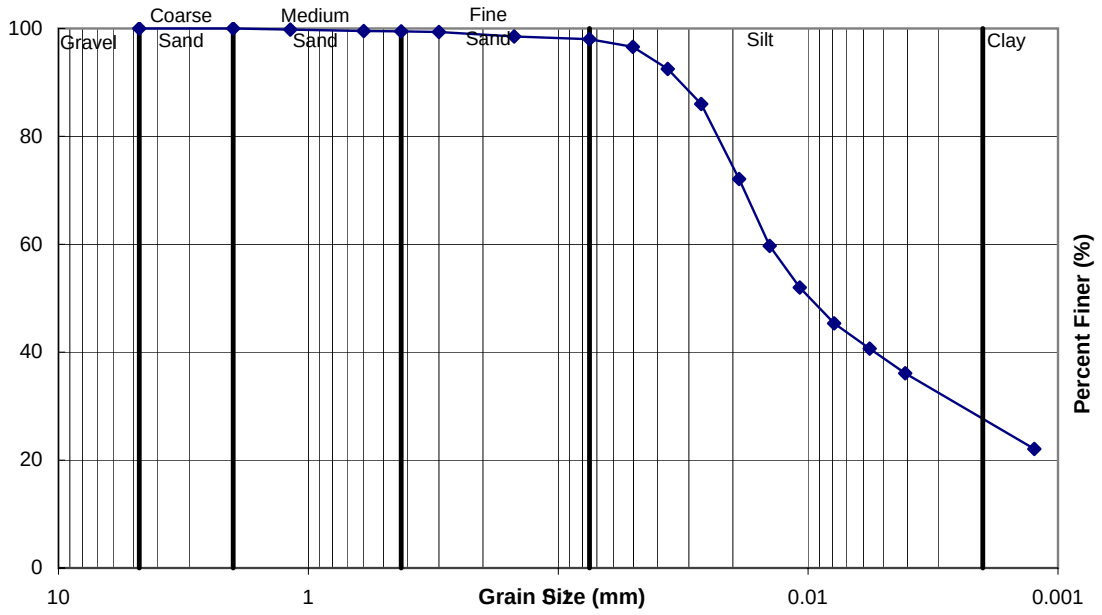


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-12:1m	0.0	0.0	1.0	2.0	71.0	26.0	-	-

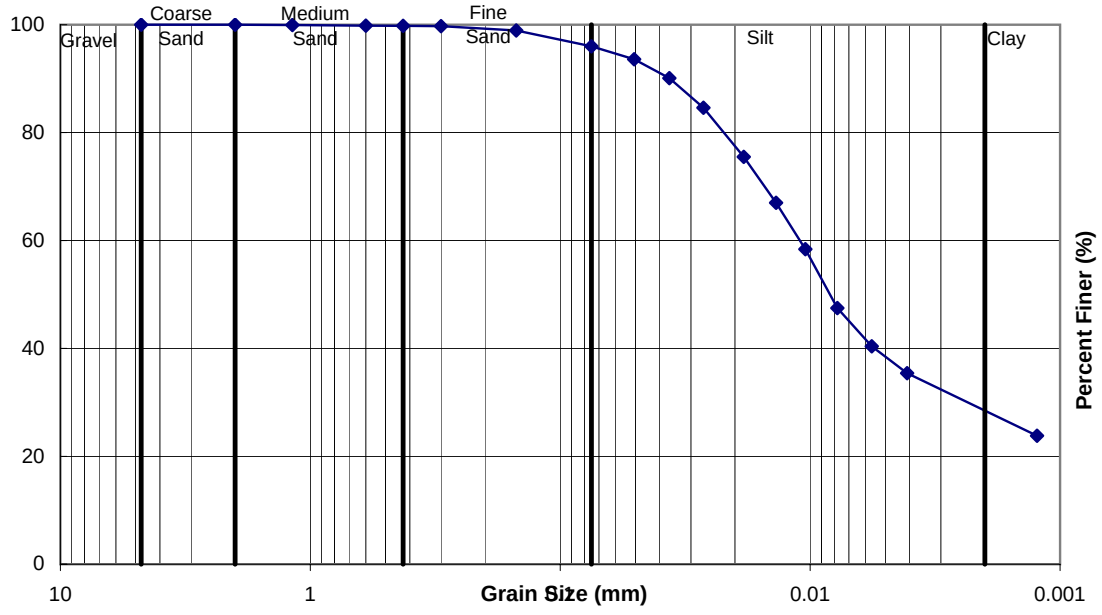


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-12:3m	0.0	0.0	2.0	3.0	68.0	27.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

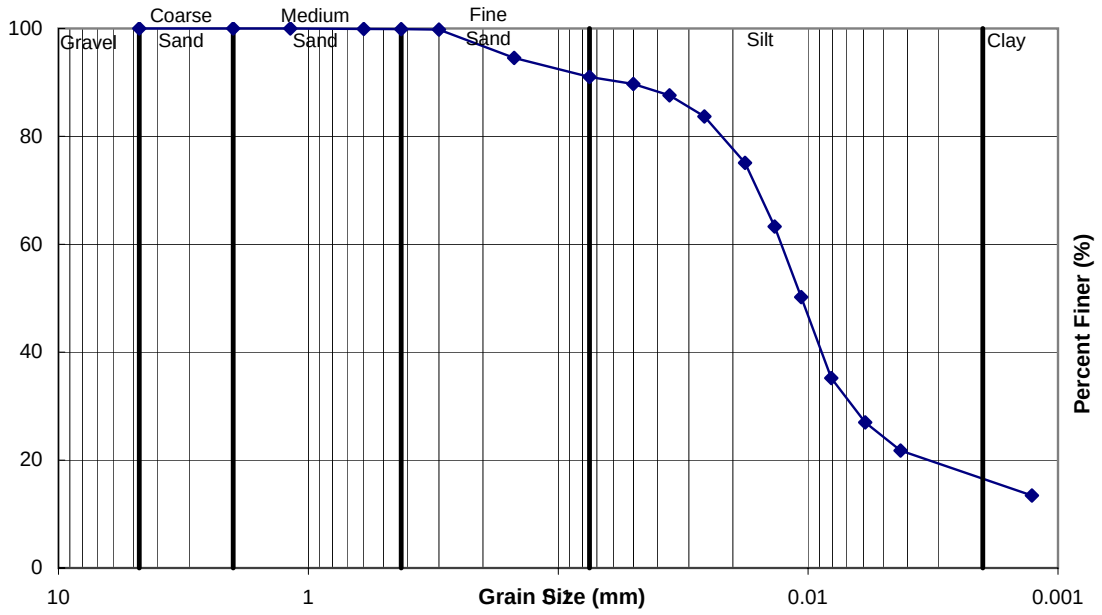


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-12:6m	0.0	0.0	1.0	1.0	70.0	28.0	-	-

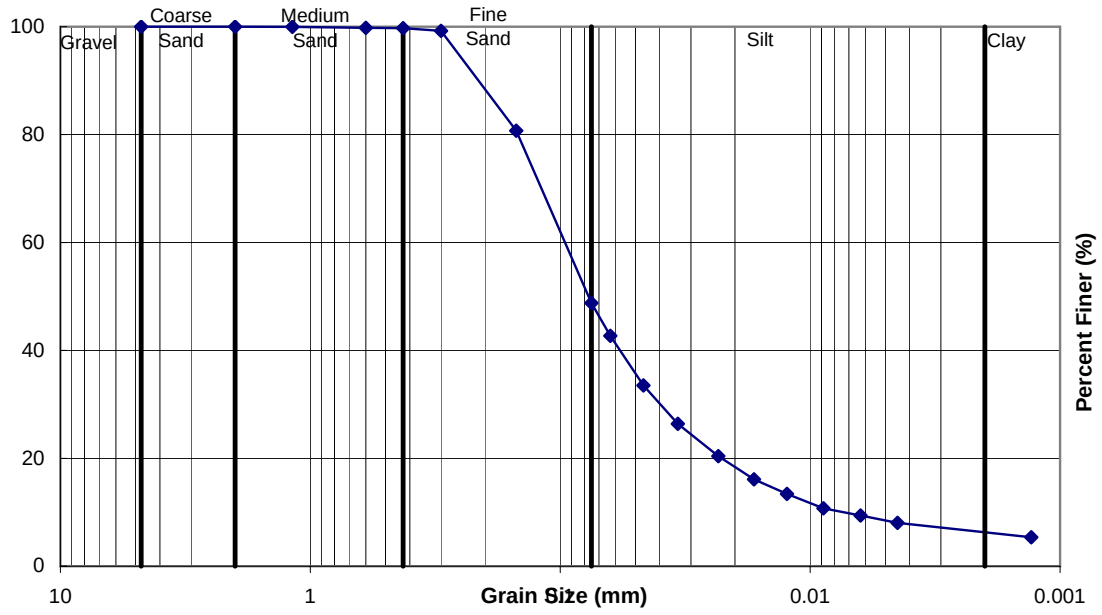


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-12:10m	0.0	0.0	0.0	4.0	68.0	28.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

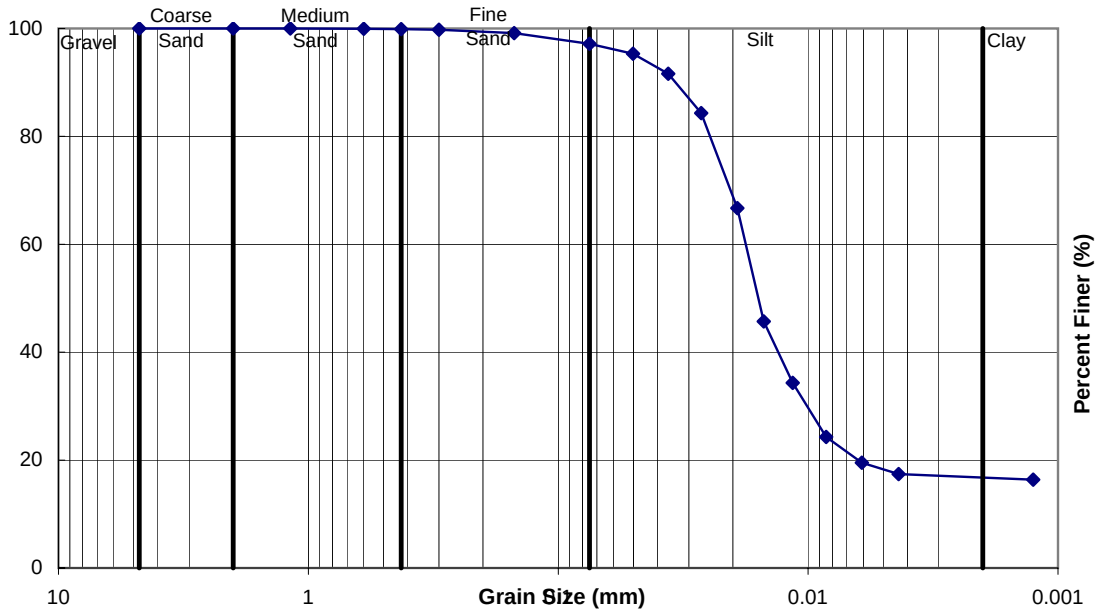


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-12:14m	0.0	0.0	0.0	9.0	74.0	17.0	-	-

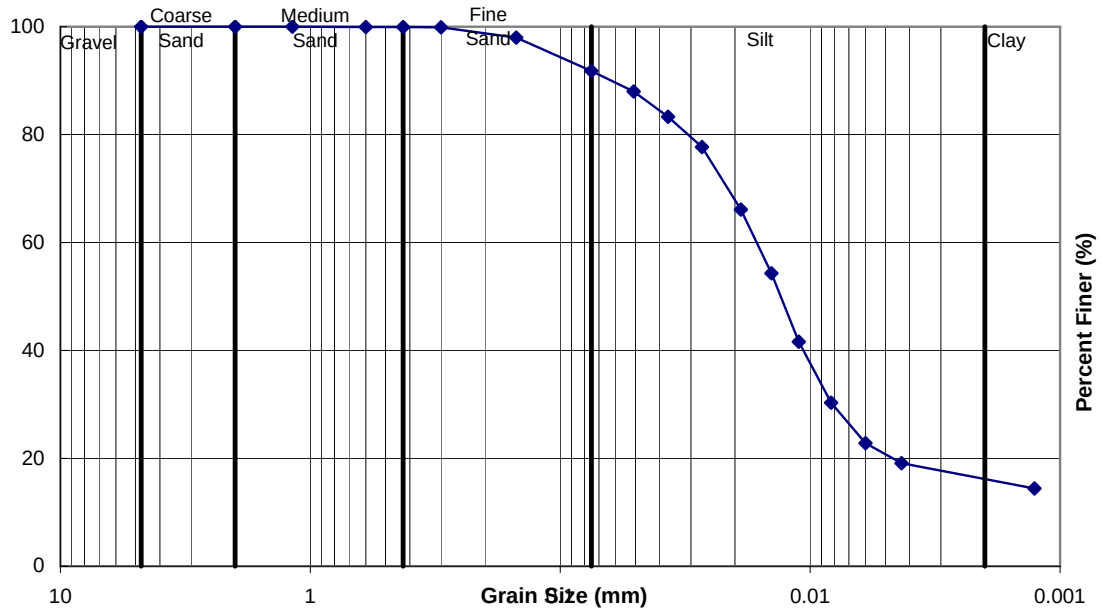


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-12:18m	0.0	0.0	0.0	52.0	42.0	6.0	13.0	0.4

GRAIN SIZE DISTRIBUTION CURVE

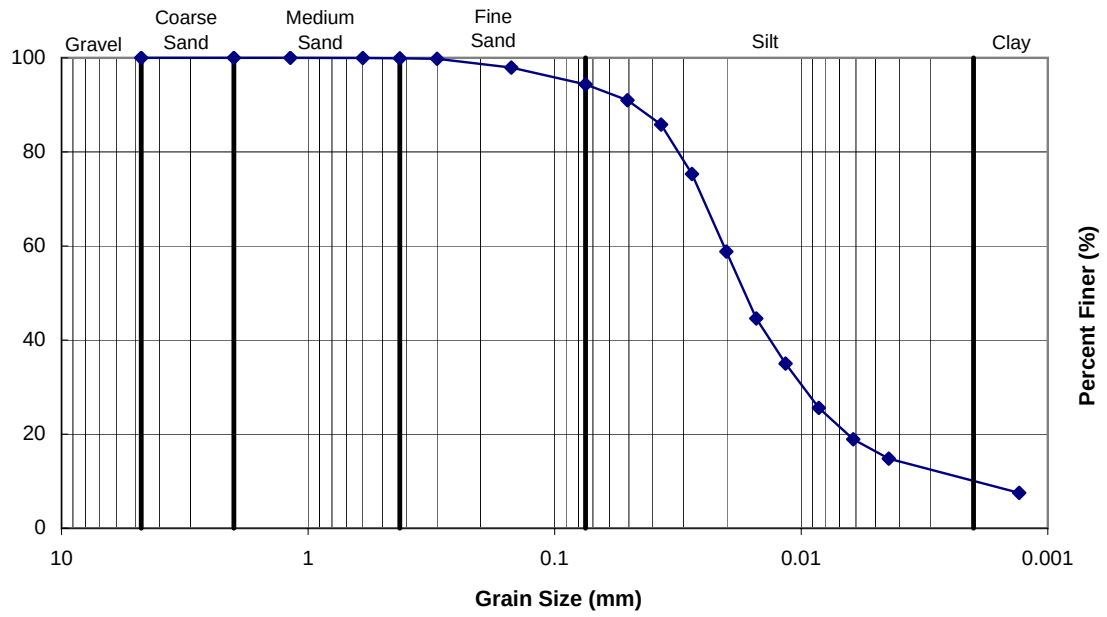


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-12:22m	0.0	0.0	0.0	3.0	80.0	17.0	-	-

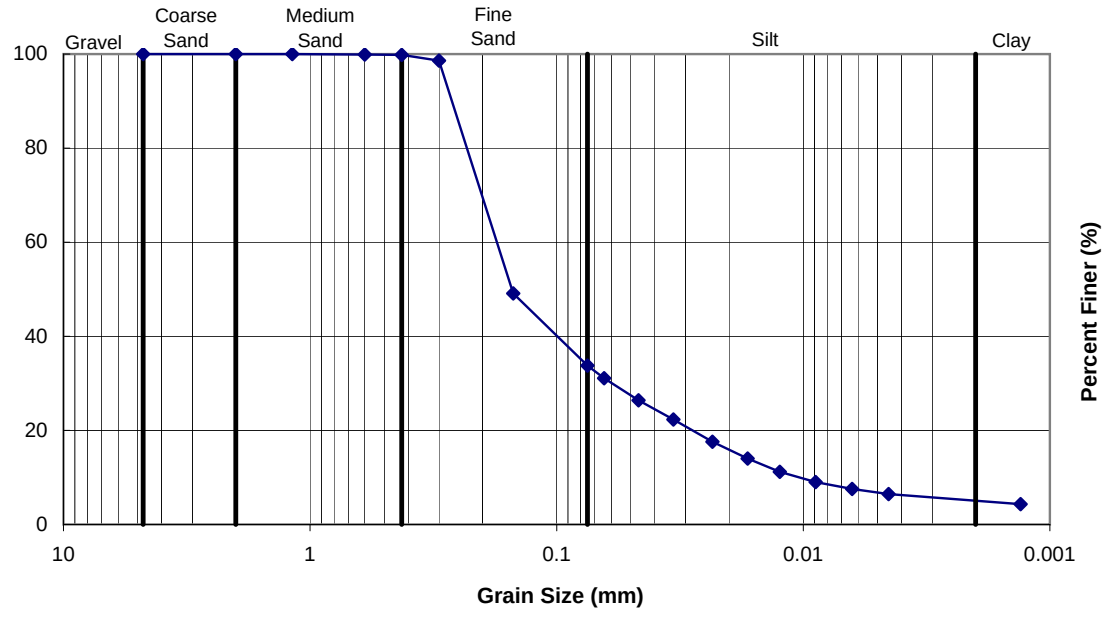


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-12:24m	0.0	0.0	0.0	8.0	76.0	16.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

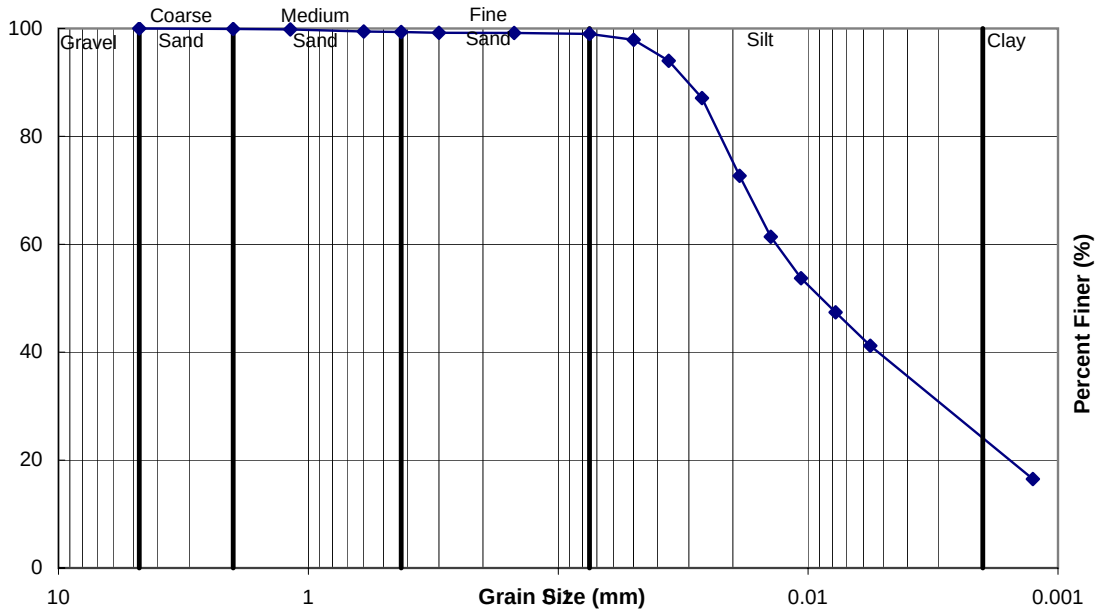


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-12:26m	0.0	0.0	0.0	6.0	84.0	10.0	10.4	0.4

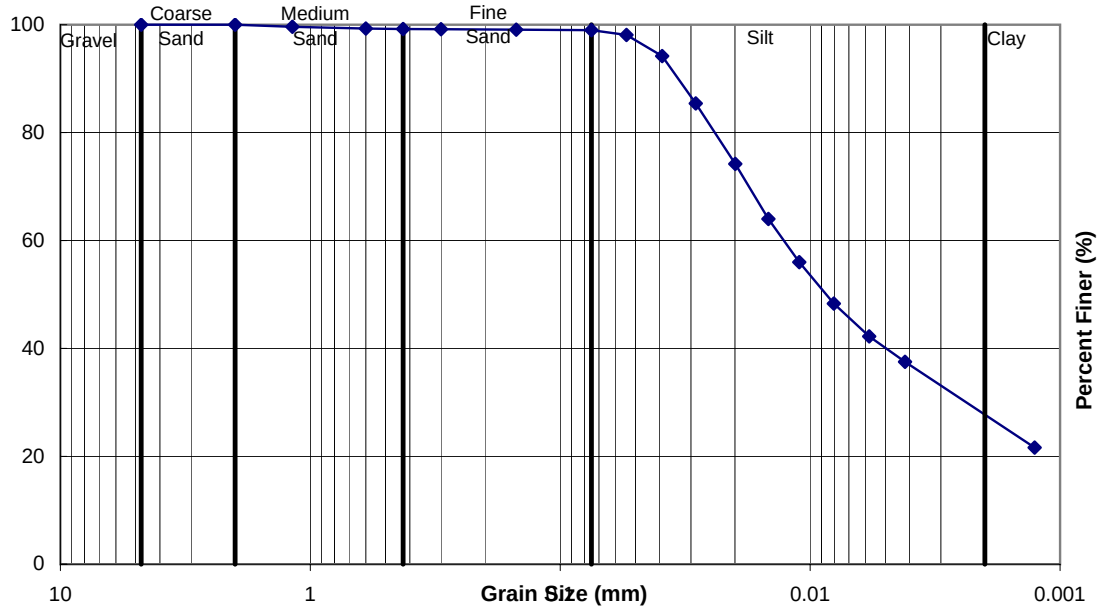


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-12:30m	0.0	0.0	0.0	66.0	29.0	5.0	16.8	0.5

GRAIN SIZE DISTRIBUTION CURVE

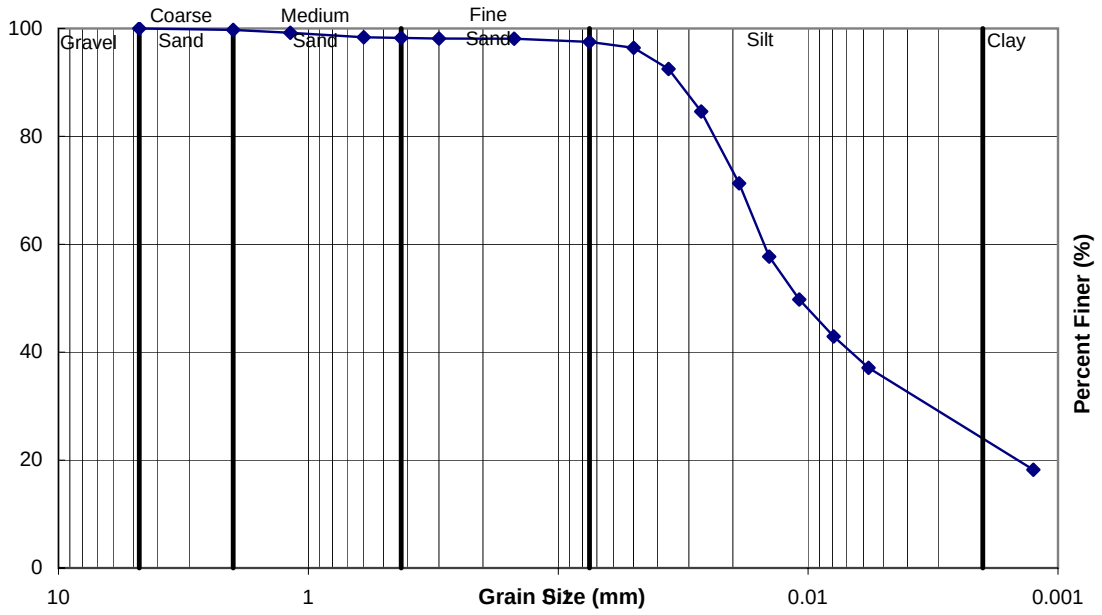


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-12A:1m	0.0	0.0	1.0	0.0	75.0	24.0	-	-

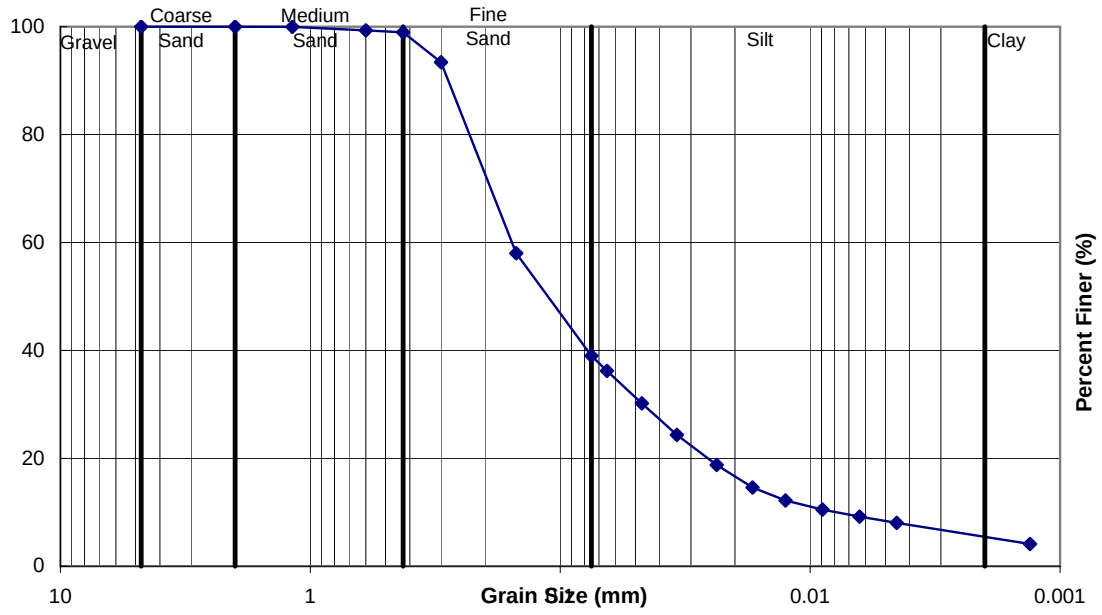


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-12A:3m	0.0	0.0	1.0	0.0	71.0	28.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

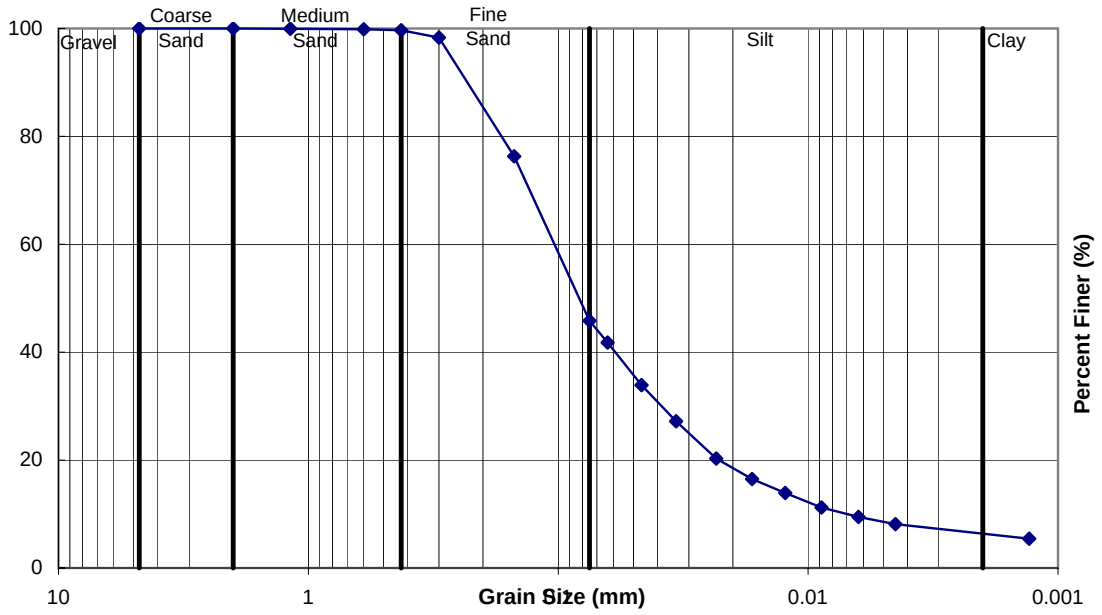


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-12A:6m	0.0	0.0	1.0	1.0	74.0	24.0	-	-

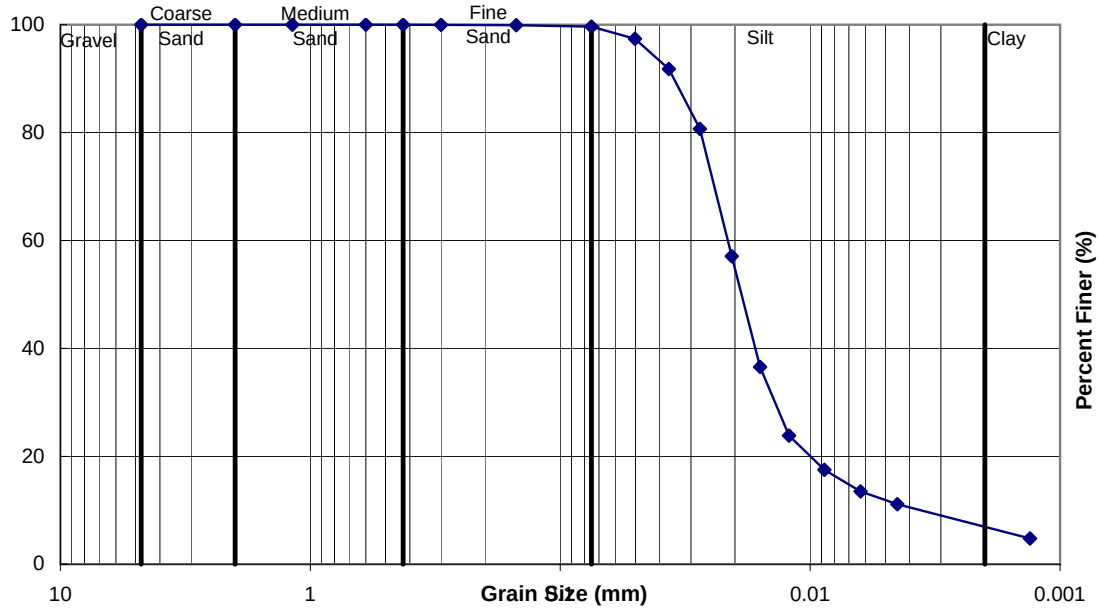


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-12A:14m	0.0	0.0	1.0	60.0	34.0	5.0	19.9	0.6

GRAIN SIZE DISTRIBUTION CURVE

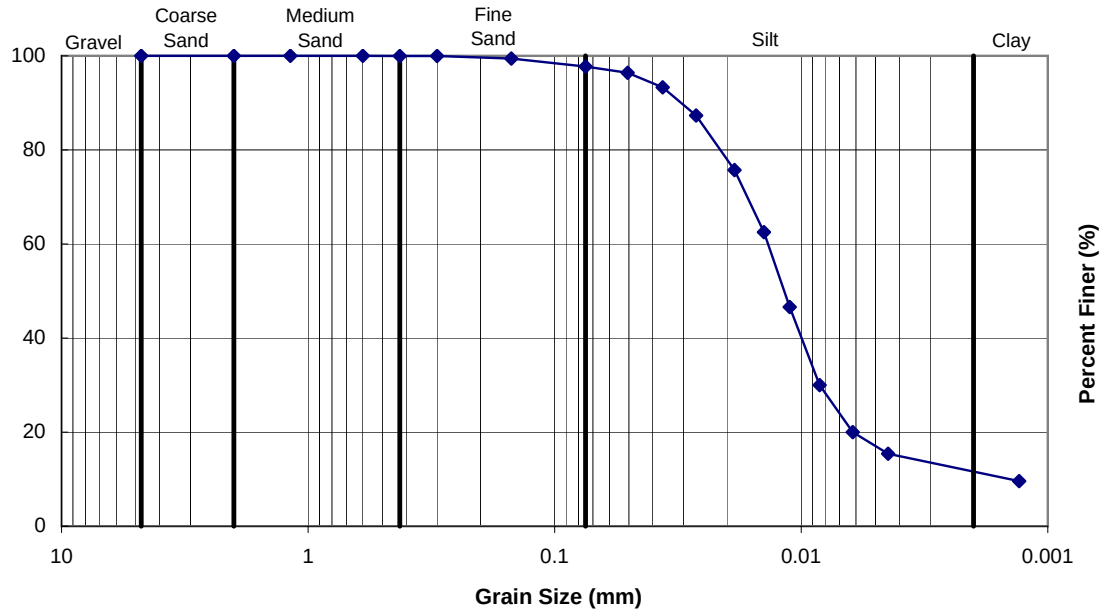


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-12A:18m	0.0	0.0	0.0	55.0	39.0	6.0	14.8	0.5

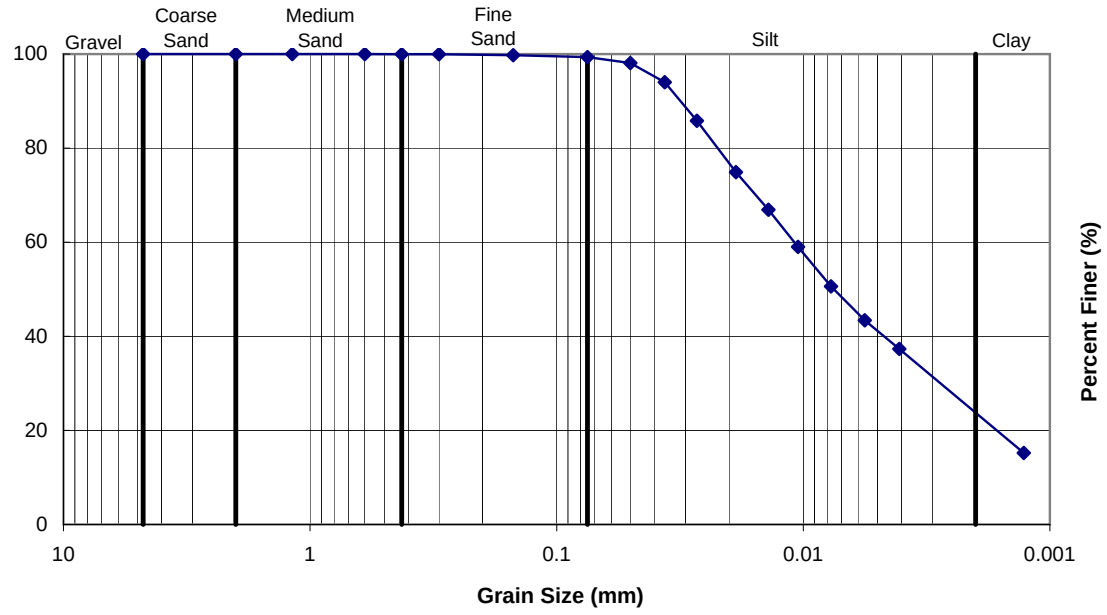


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-12A:20m	0.0	0.0	0.0	0.0	93.0	7.0	5.9	0.4

GRAIN SIZE DISTRIBUTION CURVE

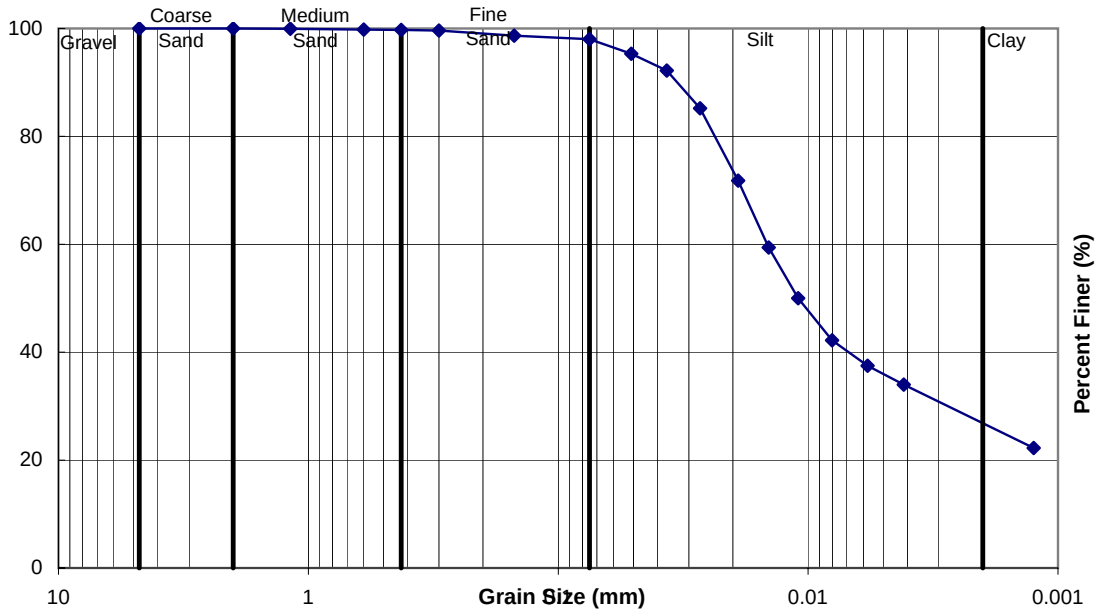


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-12A:24m	0.0	0.0	0.0	2.0	86.0	12.0	9.6	0.3

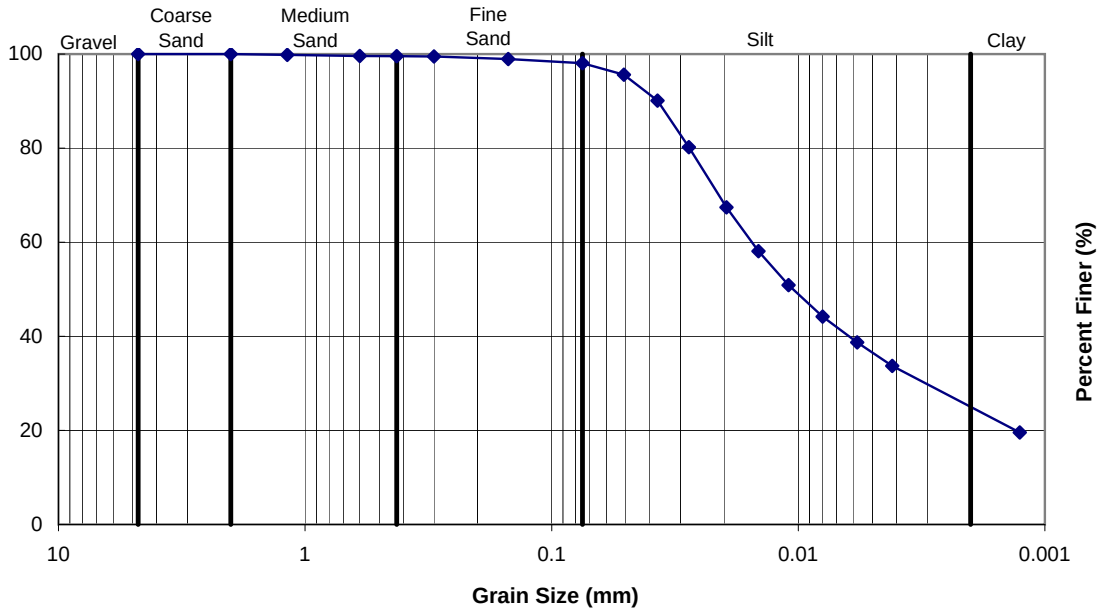


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-12A:28m	0.0	0.0	0.0	1.0	75.0	24.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

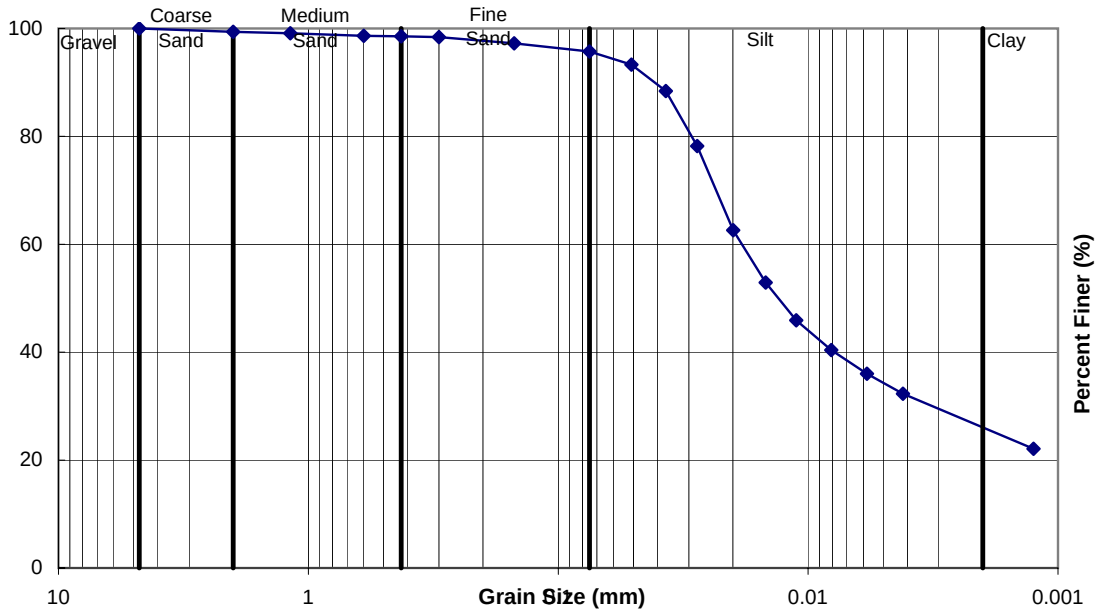


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-13:1m	0.0	0.0	0.0	2.0	71.0	27.0	-	-

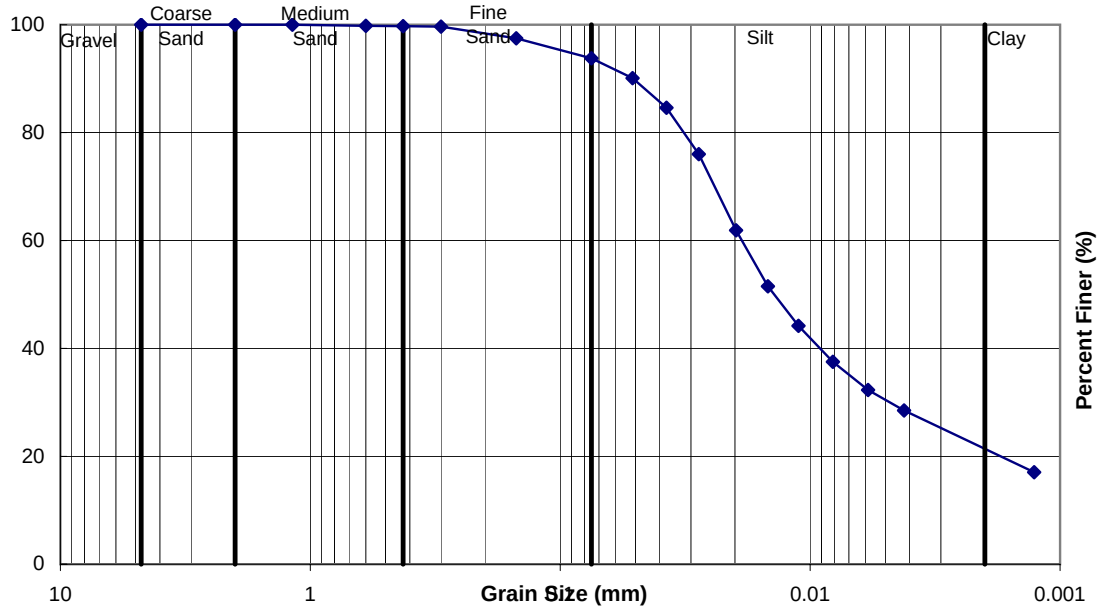


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-13:3m	0.0	0.0	0.0	2.0	73.0	25.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

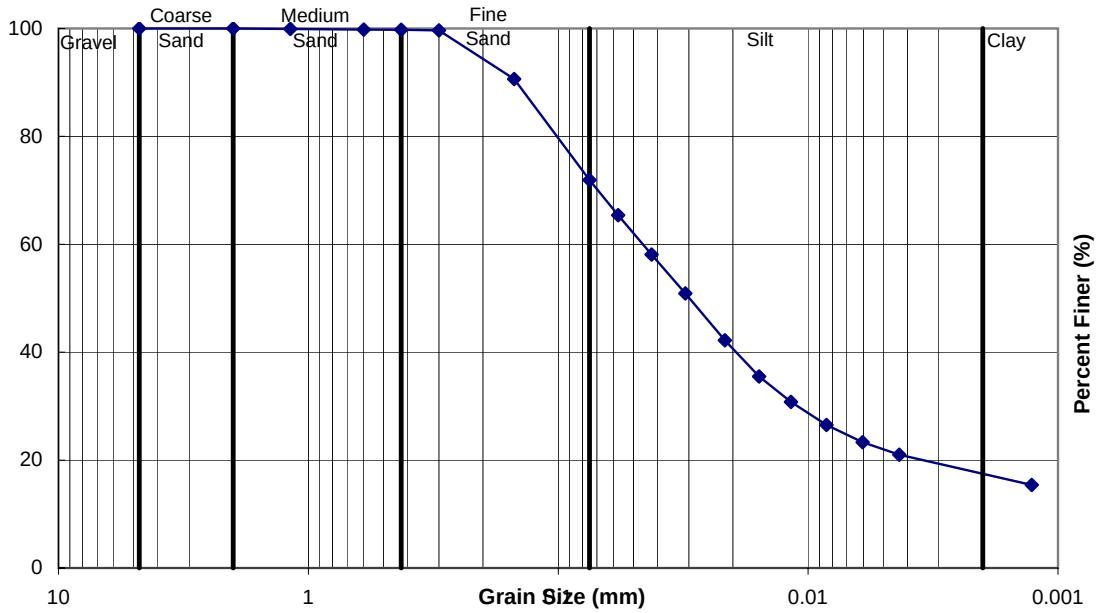


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-13:6m	0.0	1.0	1.0	3.0	69.0	26.0	-	-

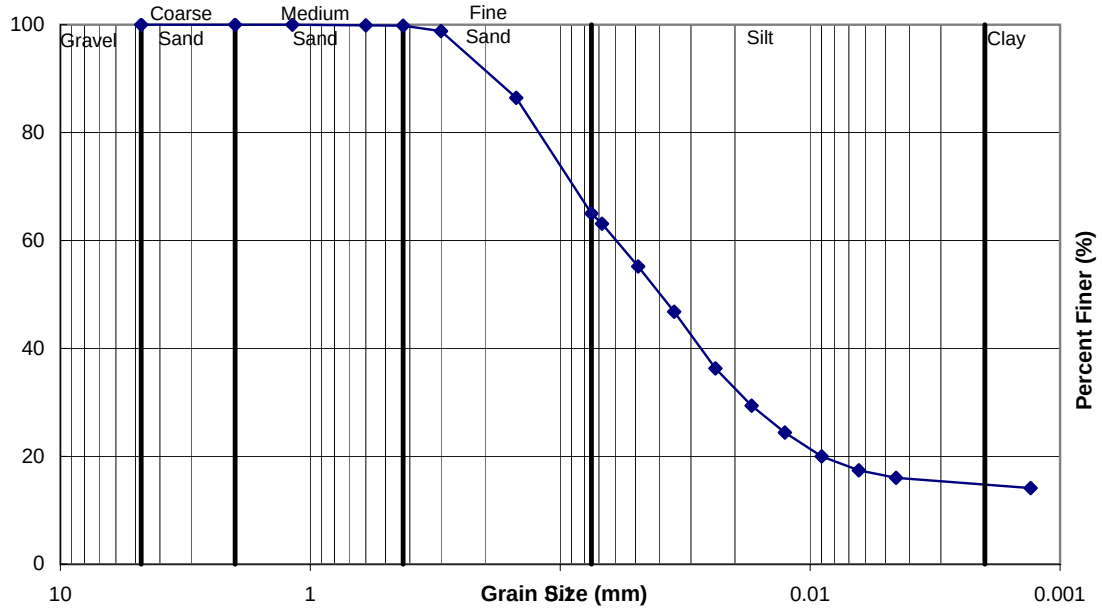


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-13:10m	0.0	0.0	0.0	6.0	73.0	21.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

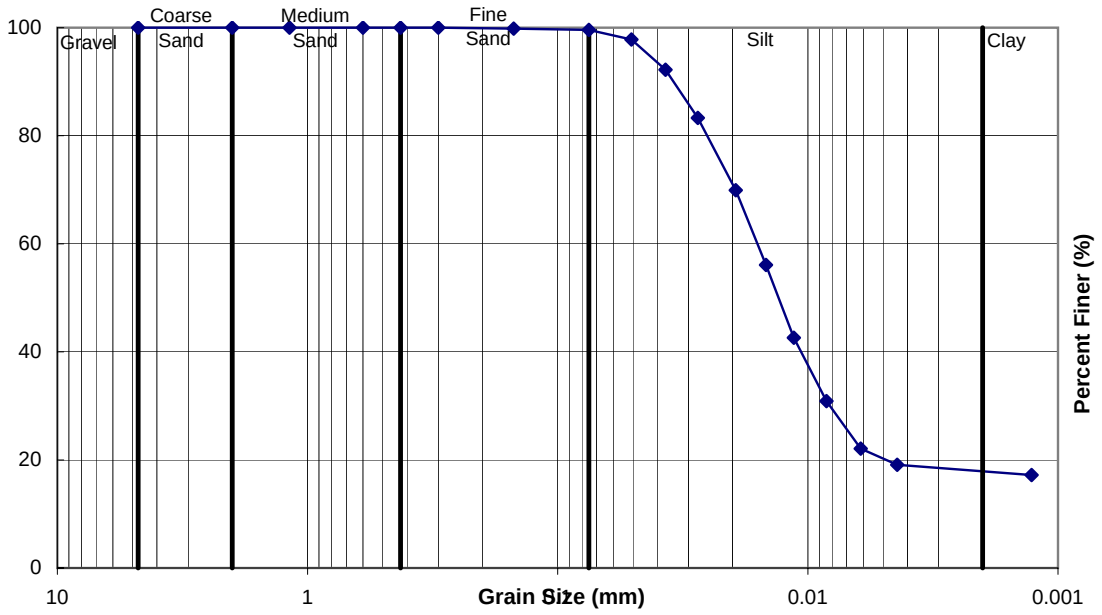


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-13:12m	0.0	0.0	0.0	28.0	55.0	17.0	-	-

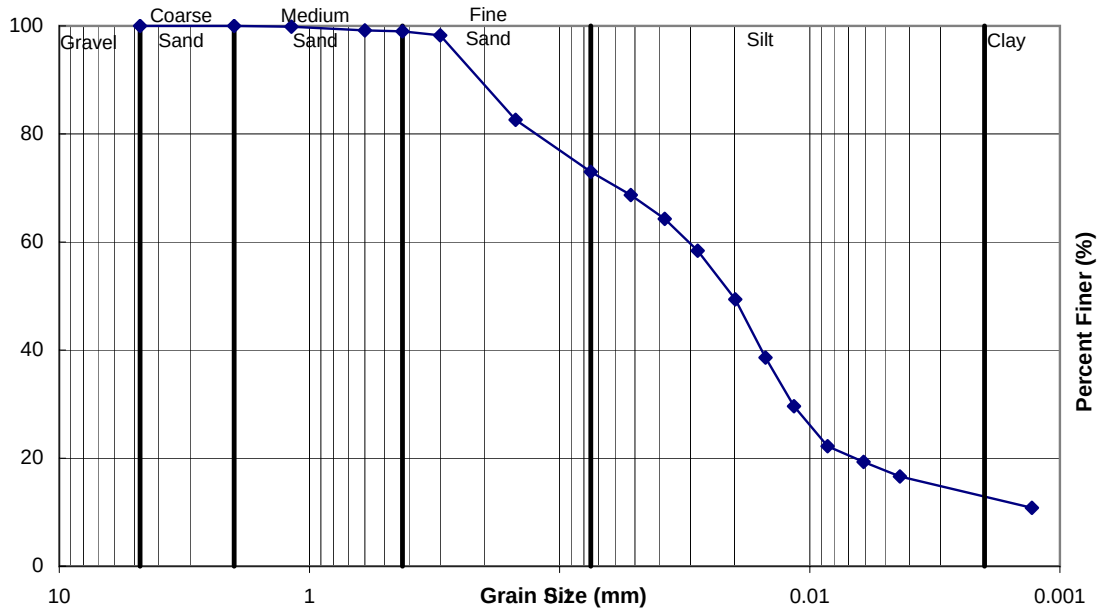


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-13:14m	0.0	0.0	0.0	35.0	50.0	15.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

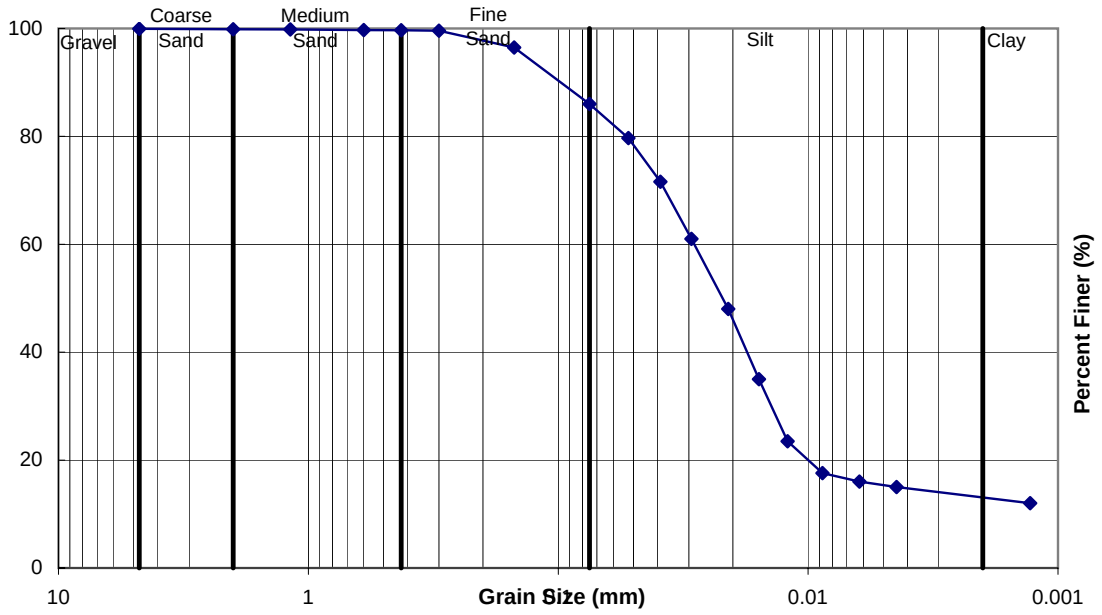


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-13:18m	0.0	0.0	0.0	0.0	82.0	18.0	-	-

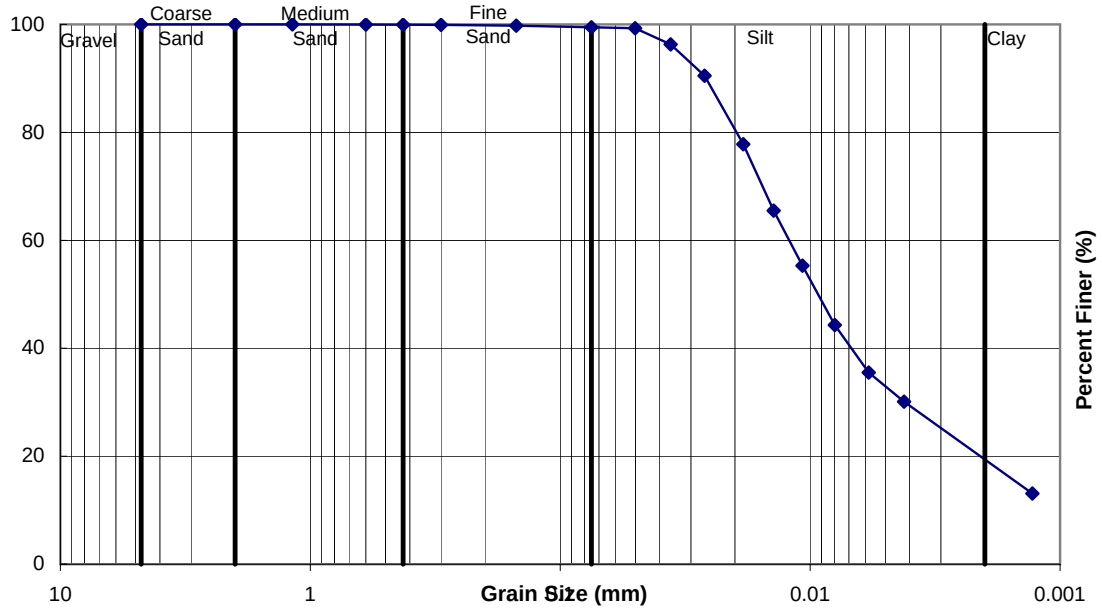


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-13:22m	0.0	0.0	1.0	26.0	60.0	13.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

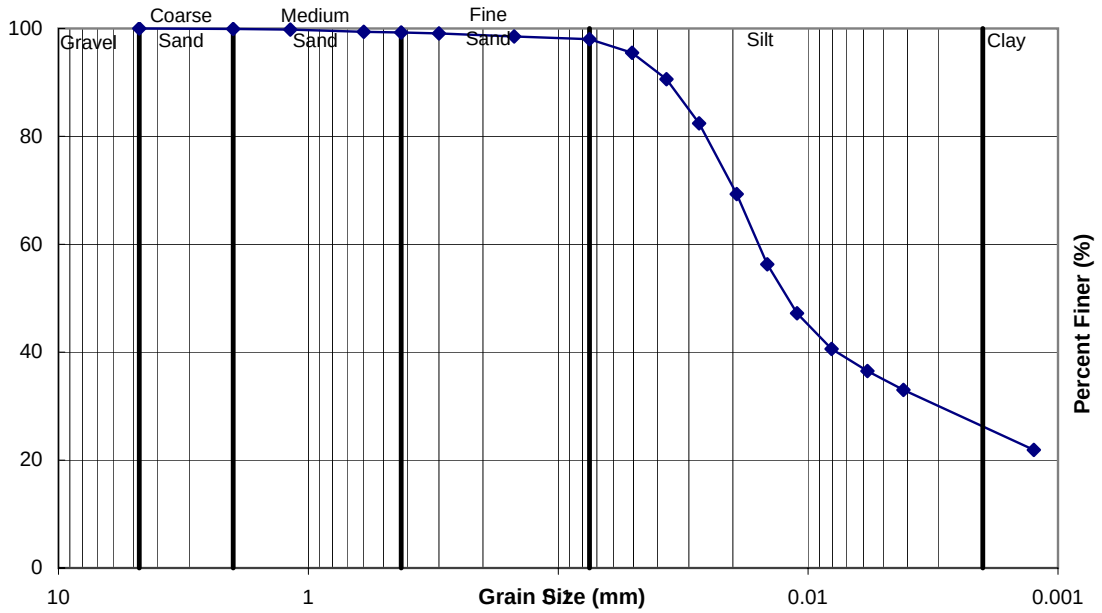


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-13:26m	0.0	0.0	0.0	14.0	73.0	13.0	-	-

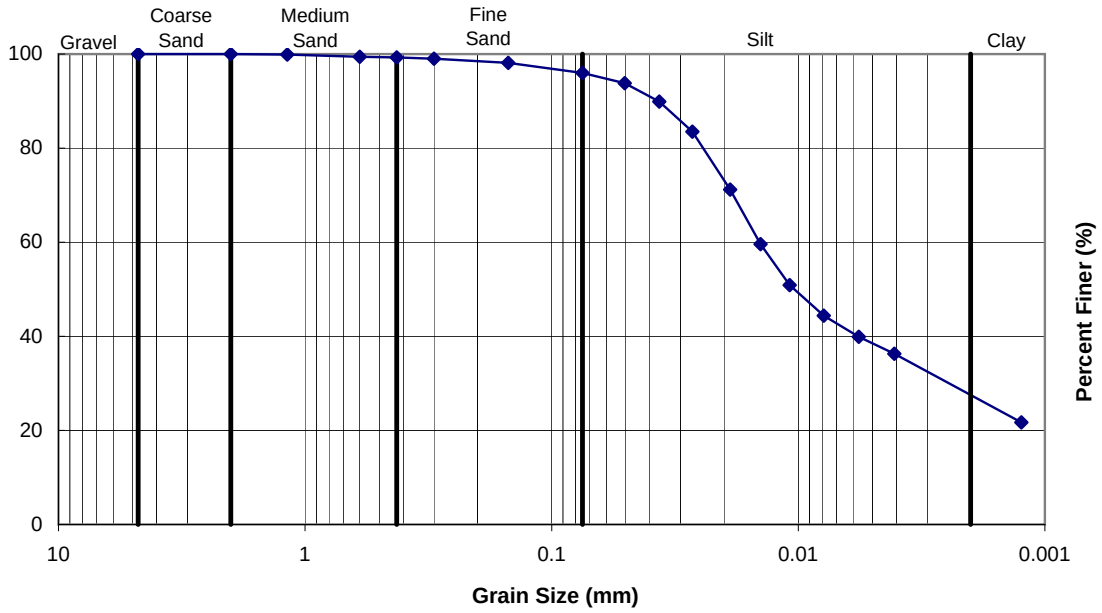


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-13:30m	0.0	0.0	0.0	0.0	81.0	19.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

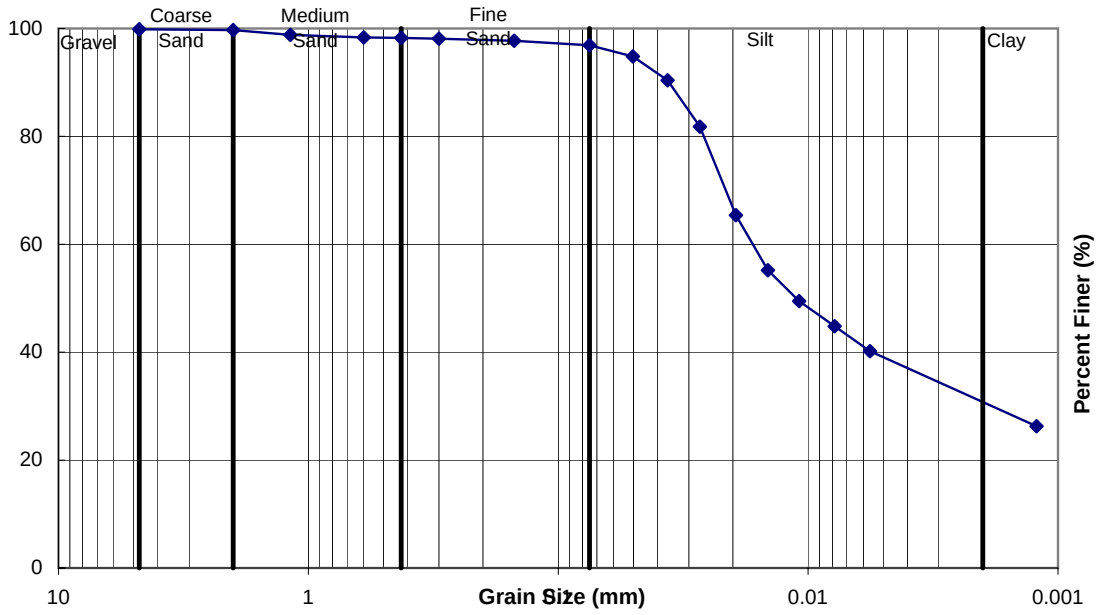


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14:1m	0.0	0.0	1.0	1.0	72.0	26.0	-	-

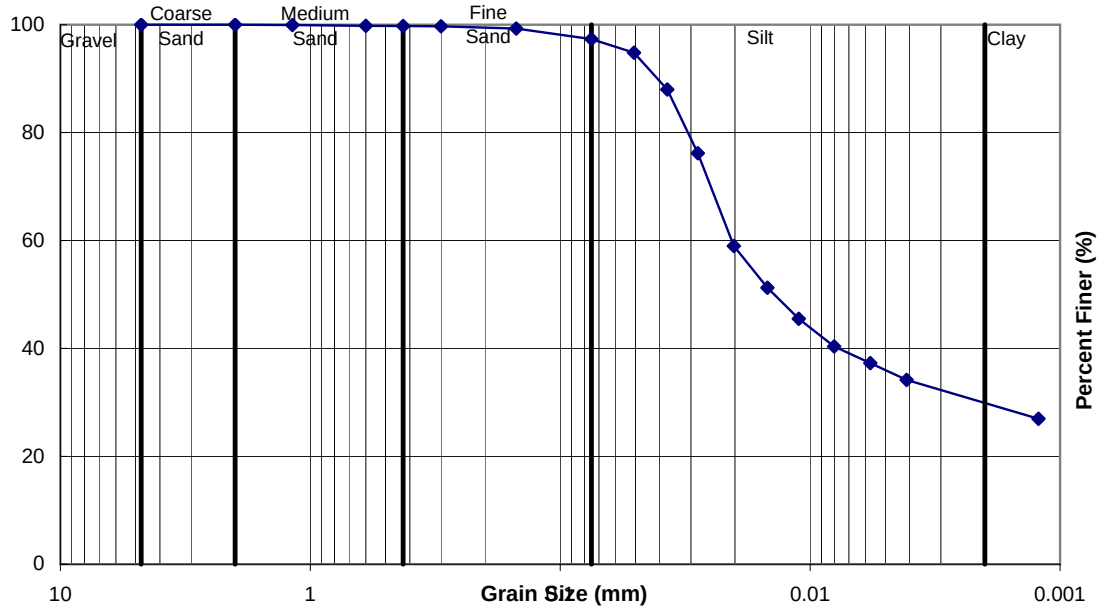


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14:3m	0.0	0.0	1.0	3.0	68.0	28.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

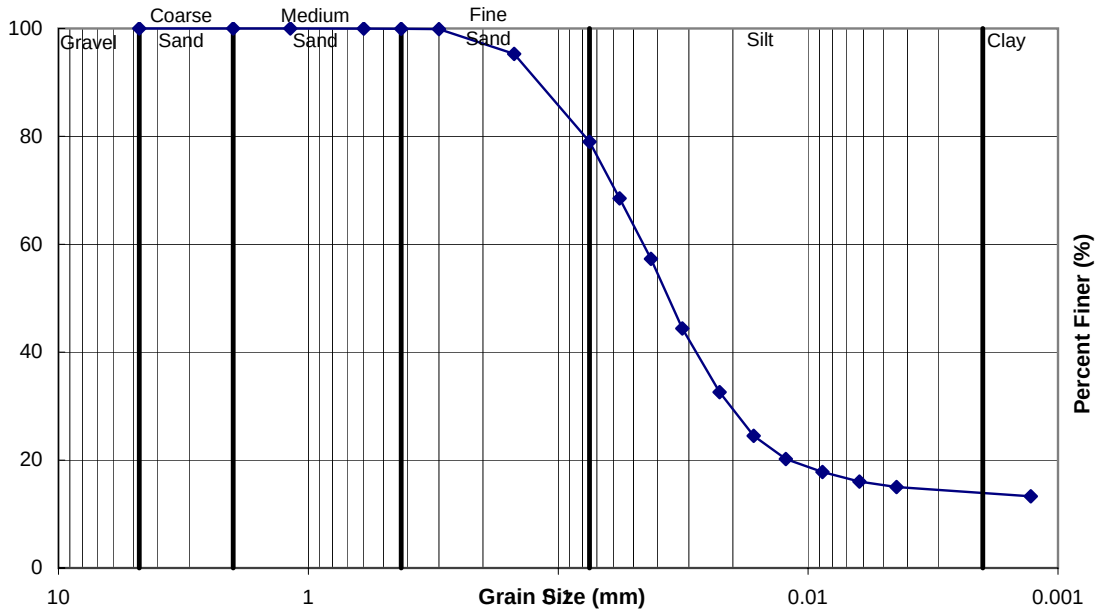


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14:6m	0.0	0.0	1.0	1.0	67.0	31.0	-	-

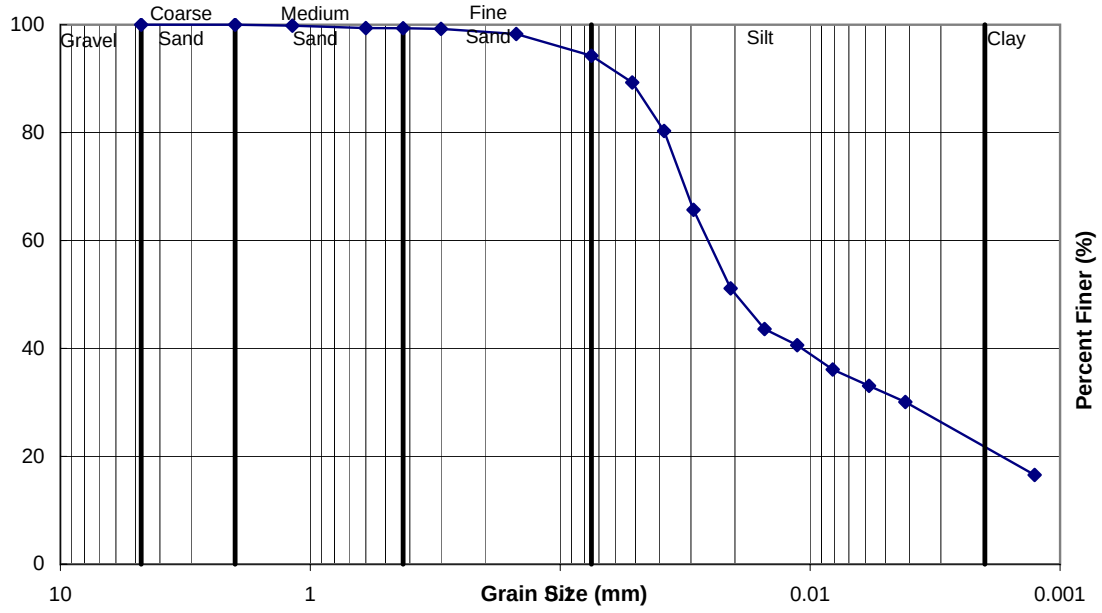


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14:10m	0.0	0.0	0.0	2.0	68.0	30.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

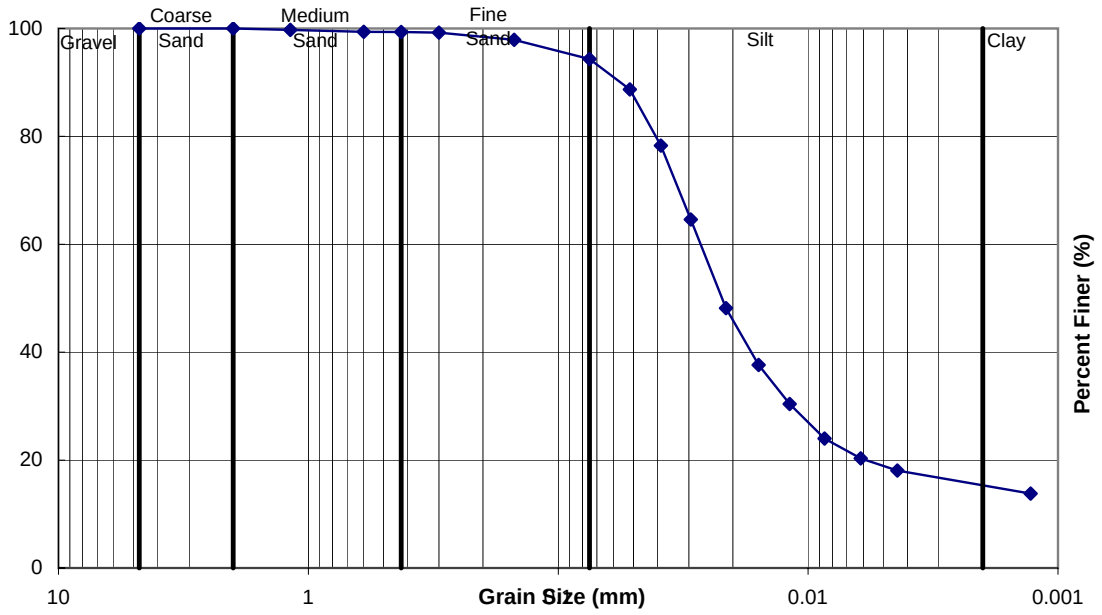


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14:14m	0.0	0.0	0.0	21.0	65.0	14.0	-	-

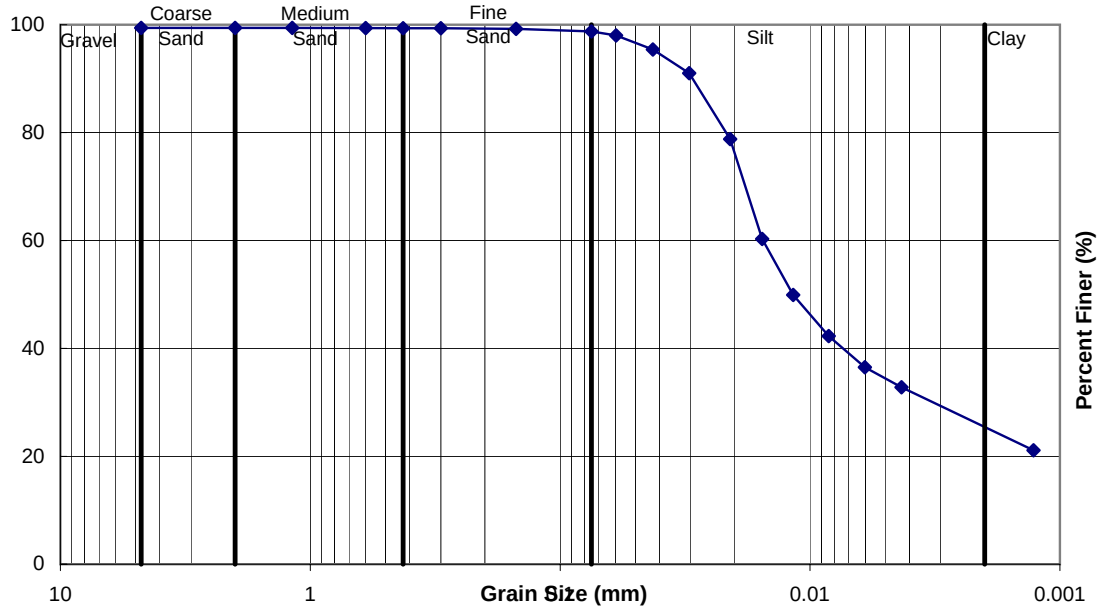


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14:16m	0.0	0.0	1.0	5.0	72.0	22.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

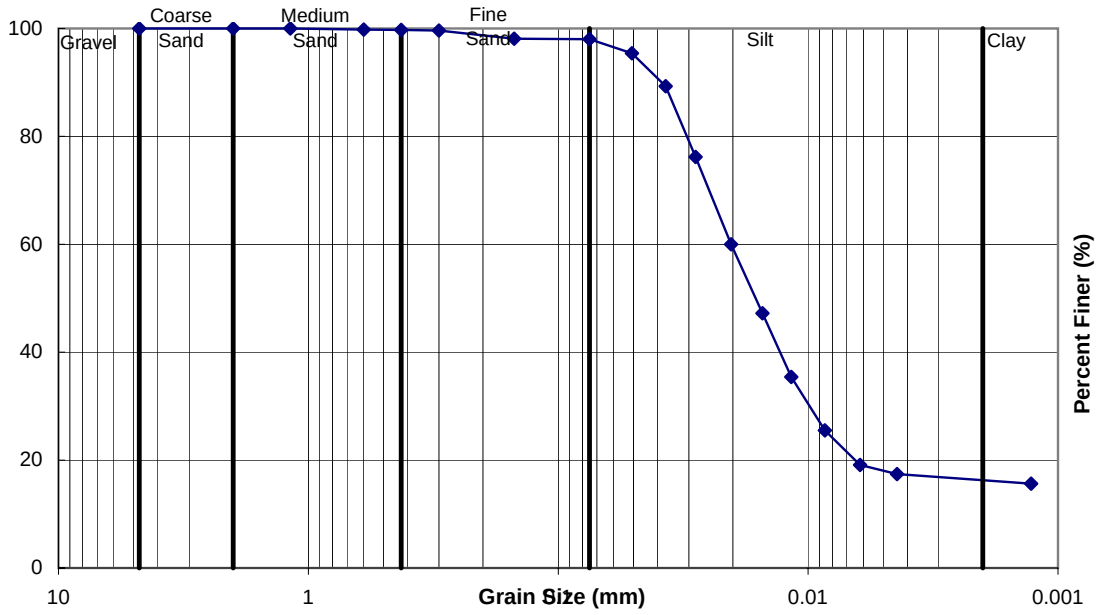


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14:18m	0.0	0.0	1.0	5.0	79.0	15.0	-	-

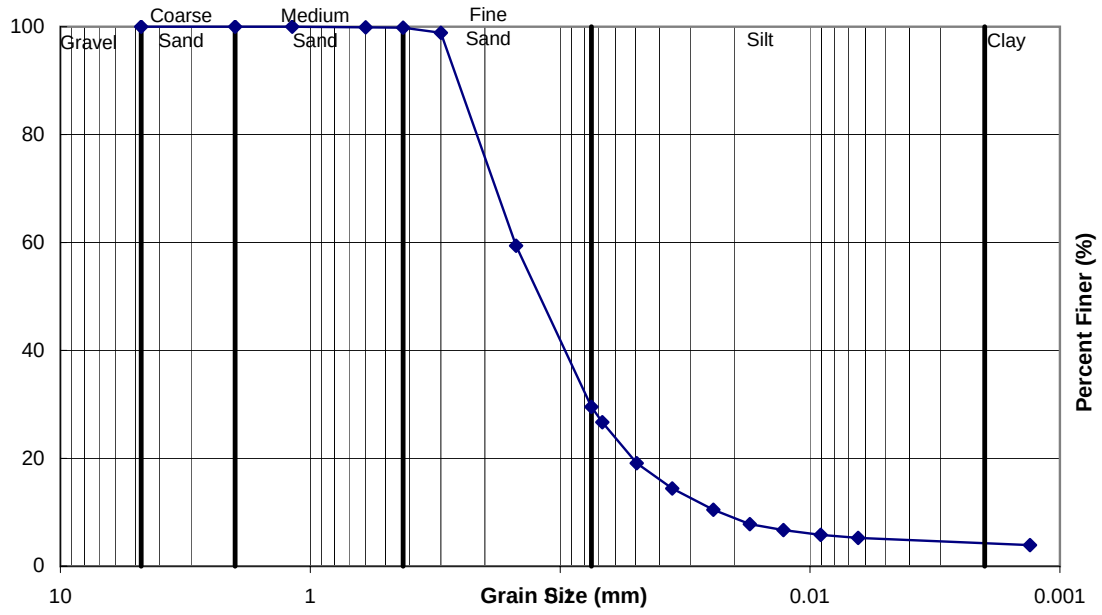


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14:20m	1.0	0.0	0.0	1.0	73.0	25.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

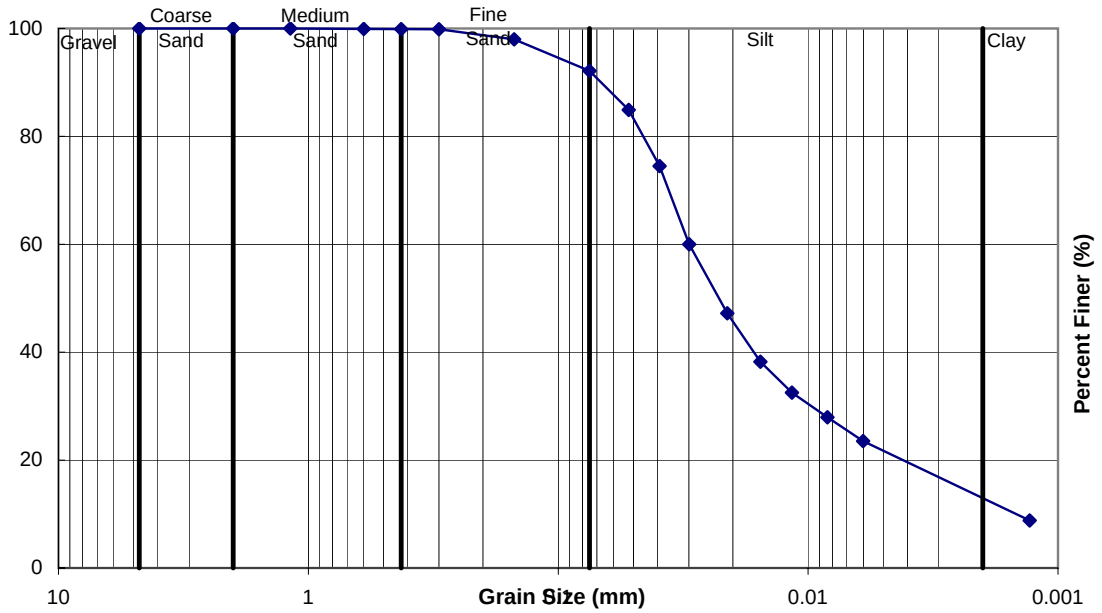


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14:22m	0.0	0.0	0.0	2.0	82.0	16.0	-	-

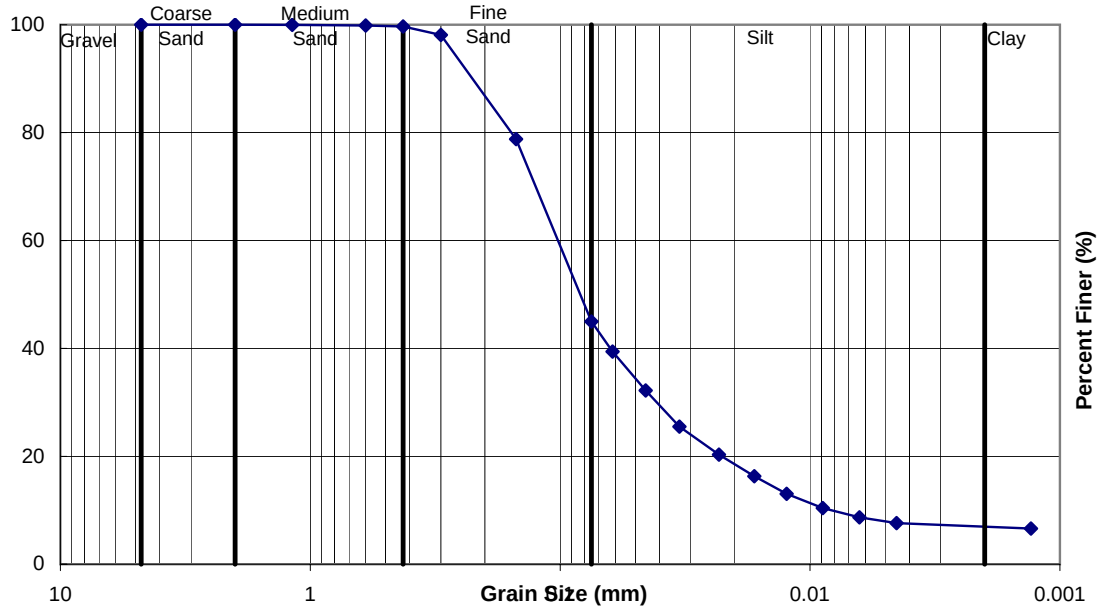


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14:26m	0.0	0.0	0.0	71.0	25.0	4.0	6.6	0.6

GRAIN SIZE DISTRIBUTION CURVE

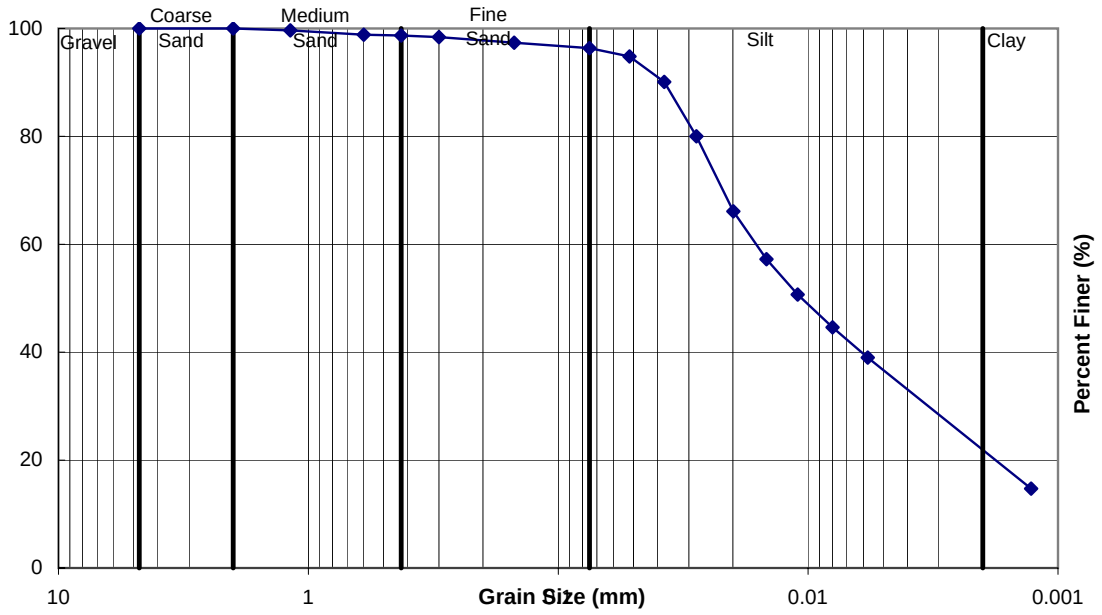


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14:28m	0.0	0.0	0.0	8.0	79.0	13.0	20.4	0.5

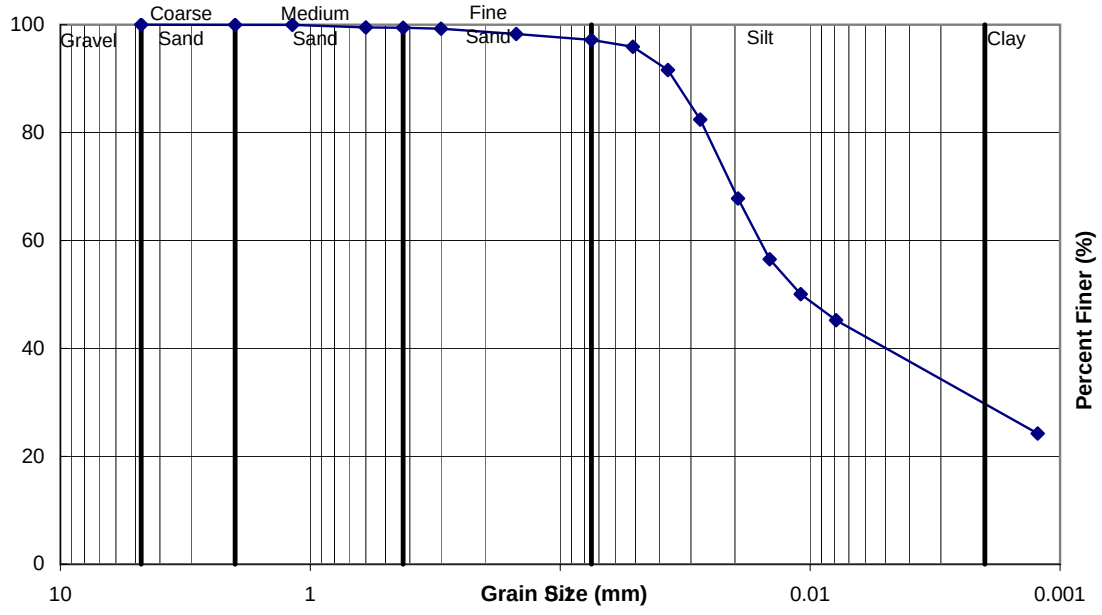


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14:30m	0.0	0.0	0.0	55.0	38.0	7.0	12.4	0.5

GRAIN SIZE DISTRIBUTION CURVE

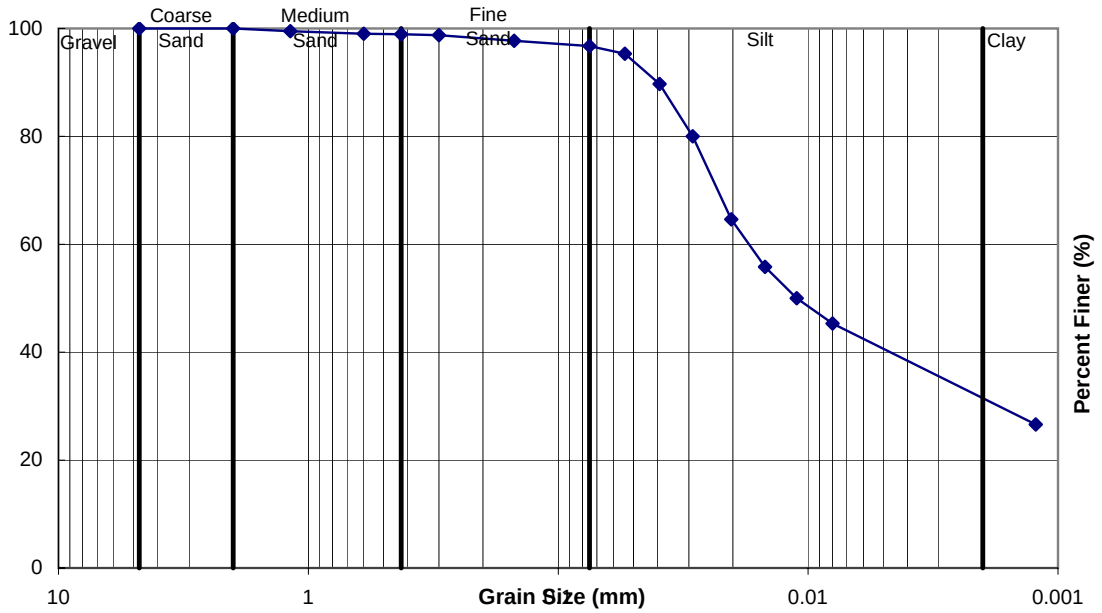


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14A:1m	0.0	0.0	1.0	2.0	75.0	22.0	-	-

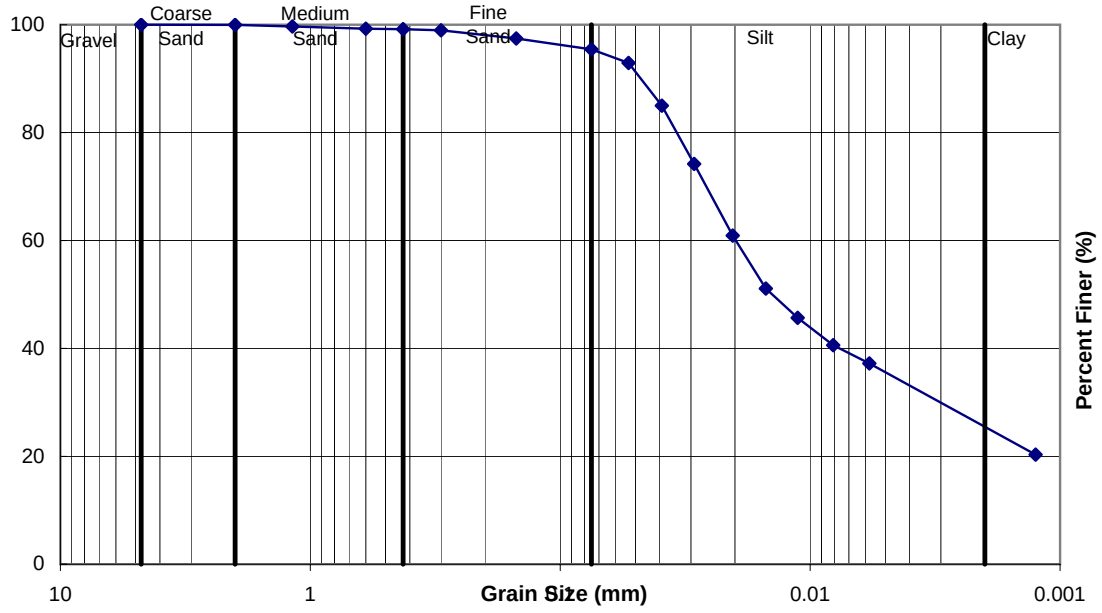


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14A:3m	0.0	0.0	1.0	2.0	67.0	30.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

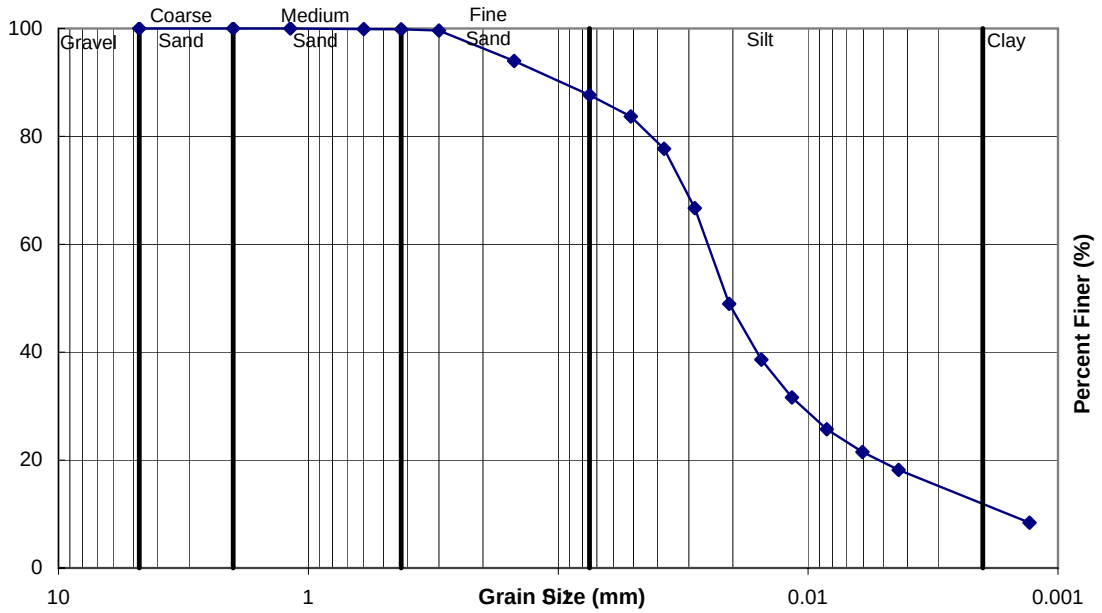


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14A:6m	0.0	0.0	1.0	2.0	66.0	31.0	-	-

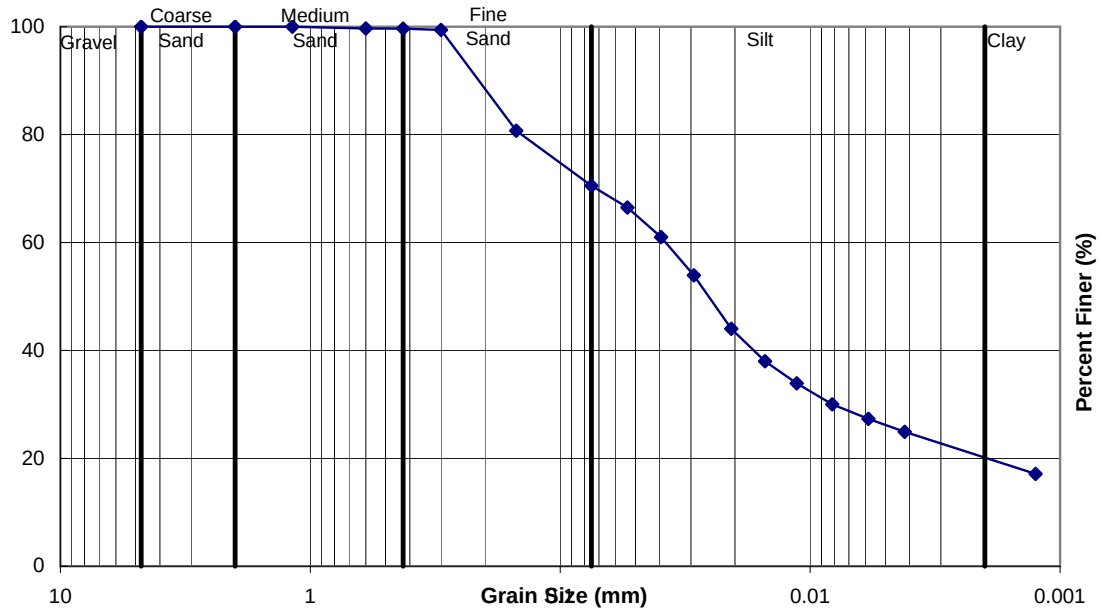


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14A:10m	0.0	0.0	1.0	4.0	70.0	25.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

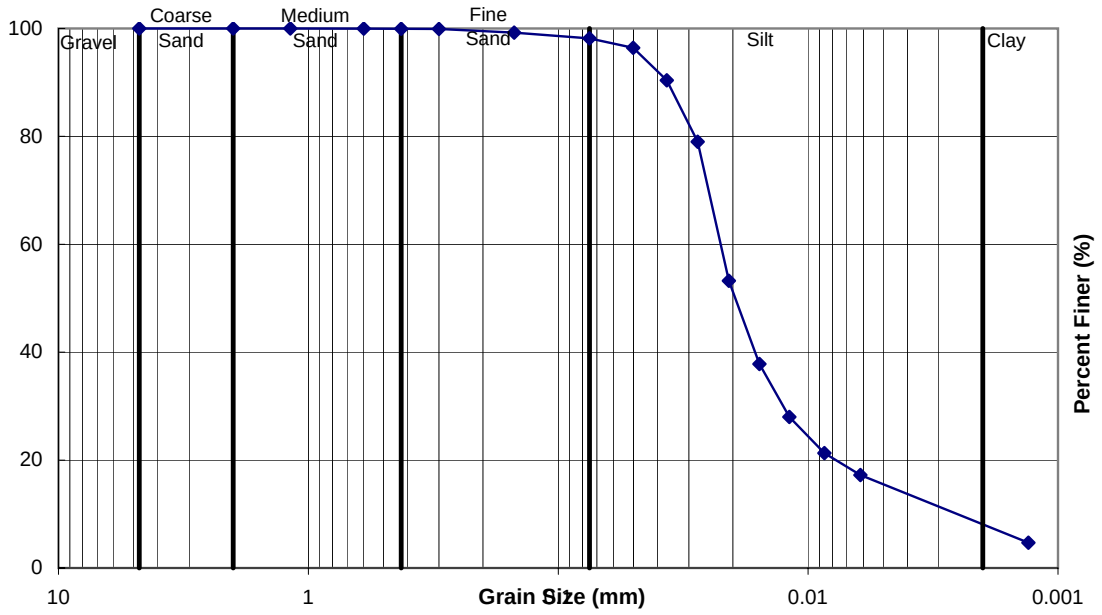


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14A:14m	0.0	0.0	0.0	12.0	76.0	12.0	15.9	0.4

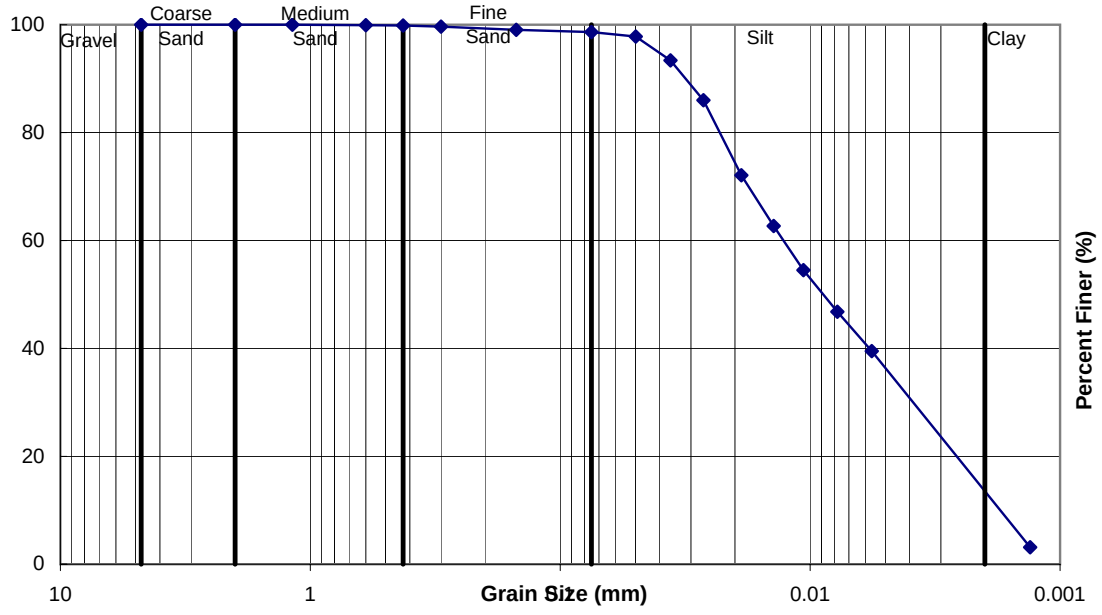


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14A:18m	0.0	0.0	0.0	29.0	51.0	20.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

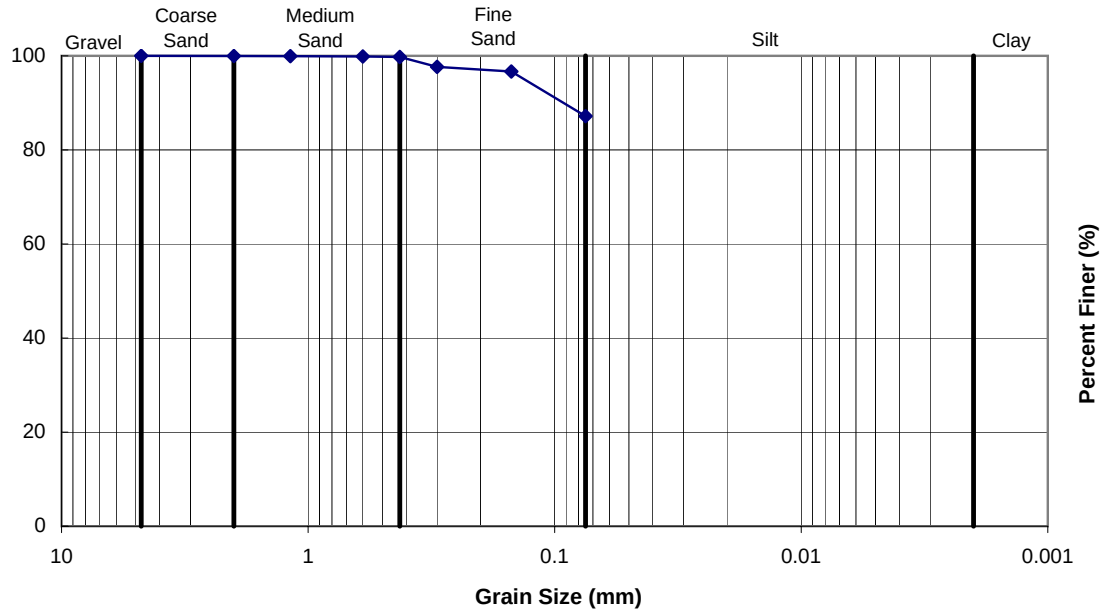


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14A:20m	0.0	0.0	0.0	2.0	90.0	8.0	8.8	0.4

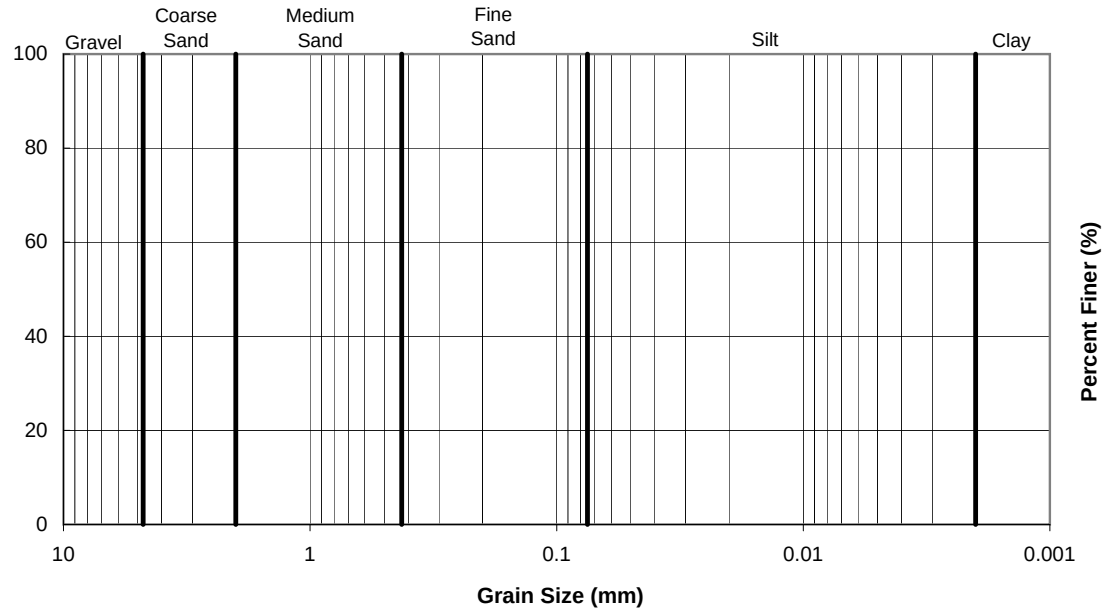


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-14A:24m	0.0	0.0	0.0	1.0	85.0	14.0	7.4	1.5

GRAIN SIZE DISTRIBUTION CURVE

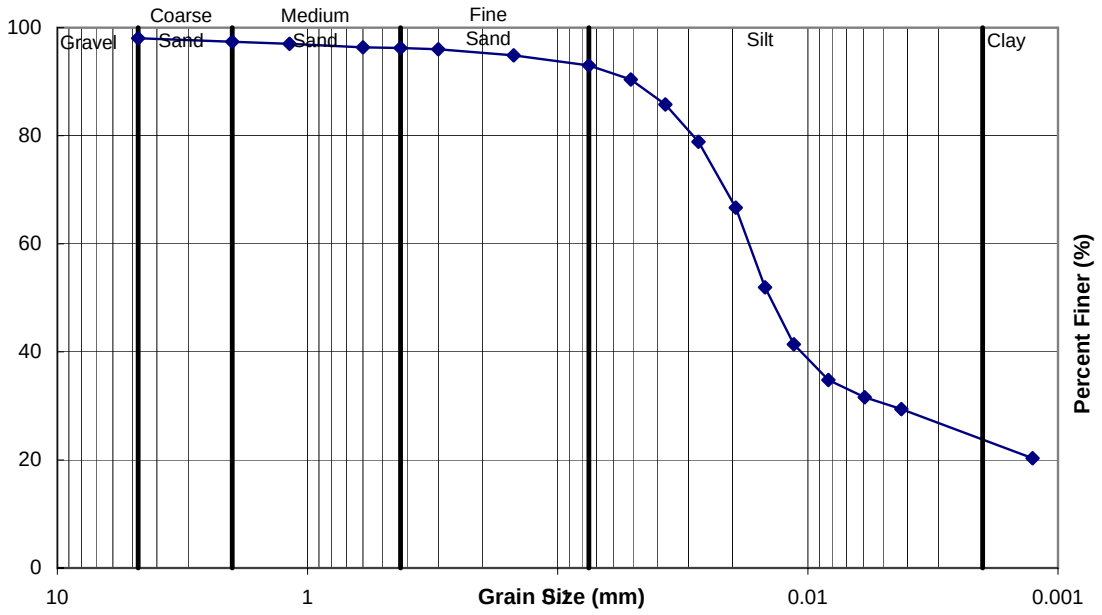


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
BH-14A:28m	0.0	0.0	0.0	13.0	87.0		-	-

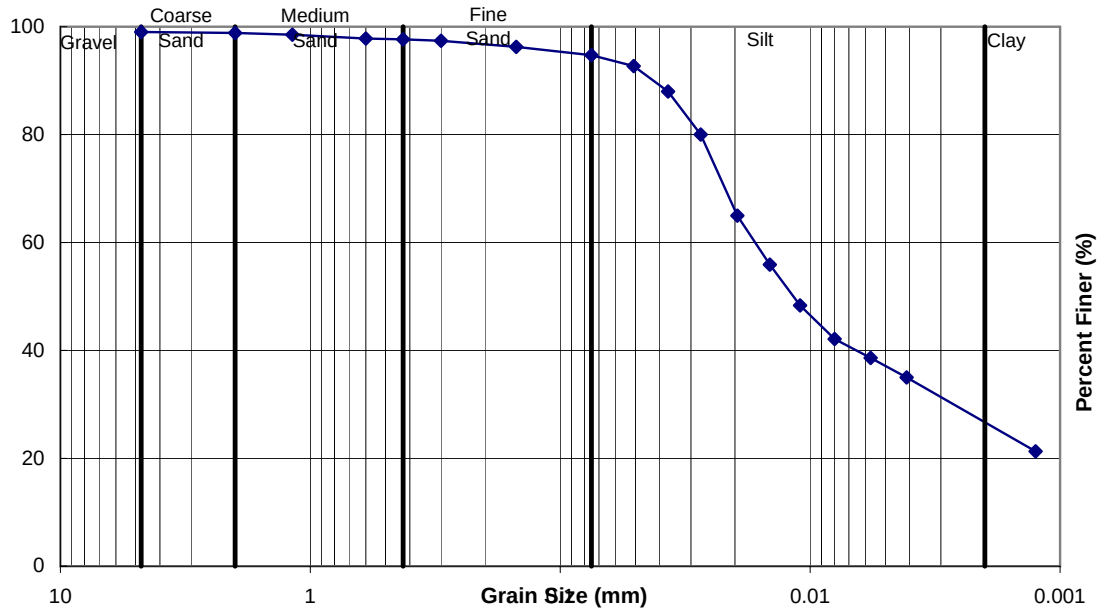


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
FALSE								

GRAIN SIZE DISTRIBUTION CURVE

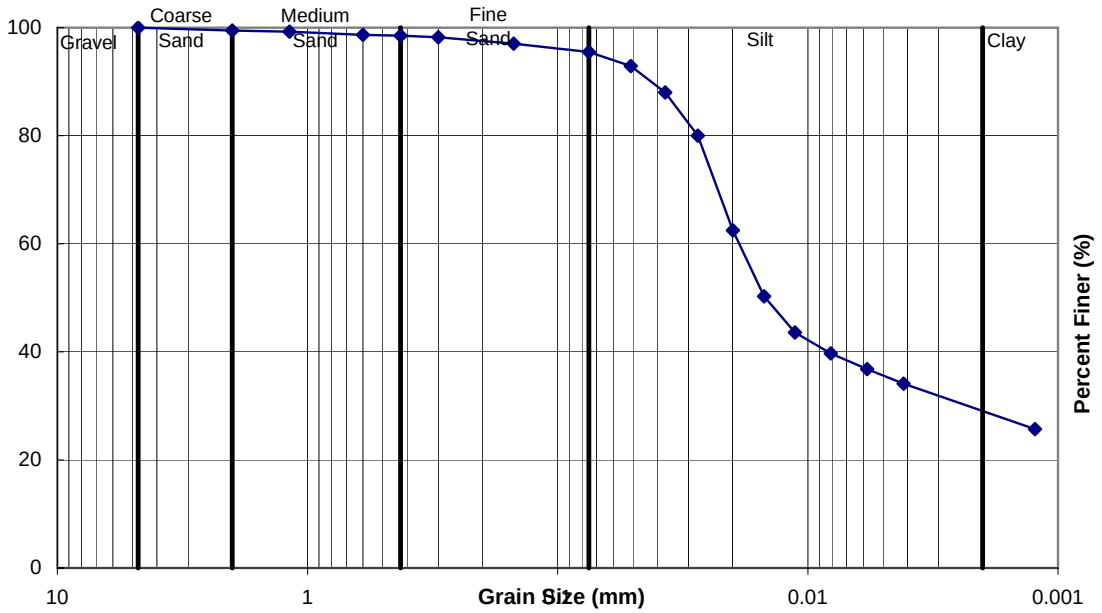


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-15:1m	2.0	1.0	1.0	3.0	69.0	24.0	-	-

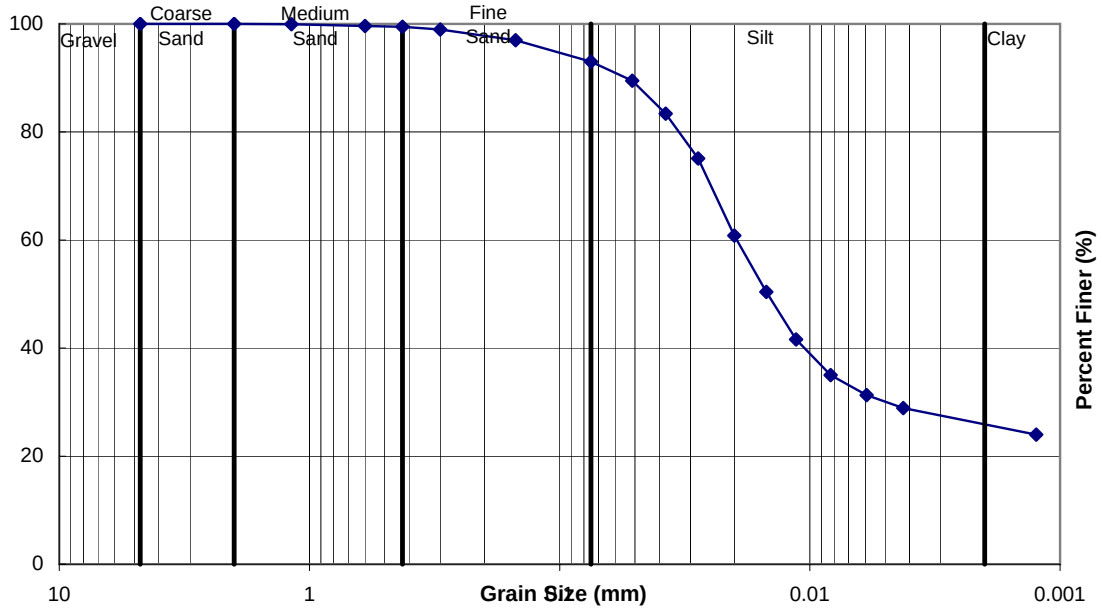


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-15:3m	1.0	0.0	1.0	3.0	68.0	27.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

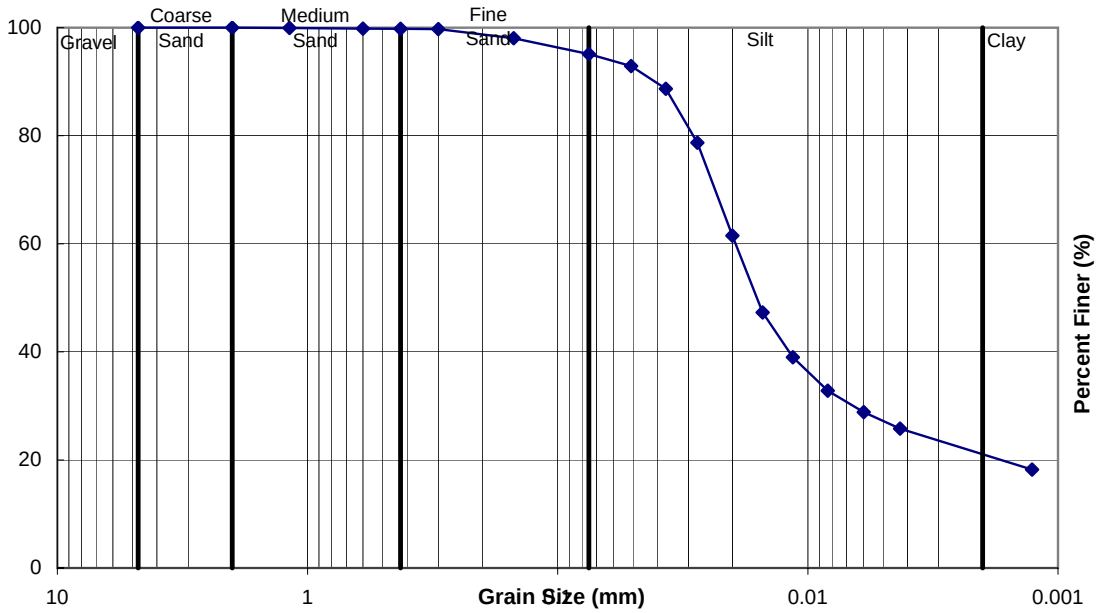


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-15:6m	0.0	1.0	1.0	3.0	66.0	29.0	-	-

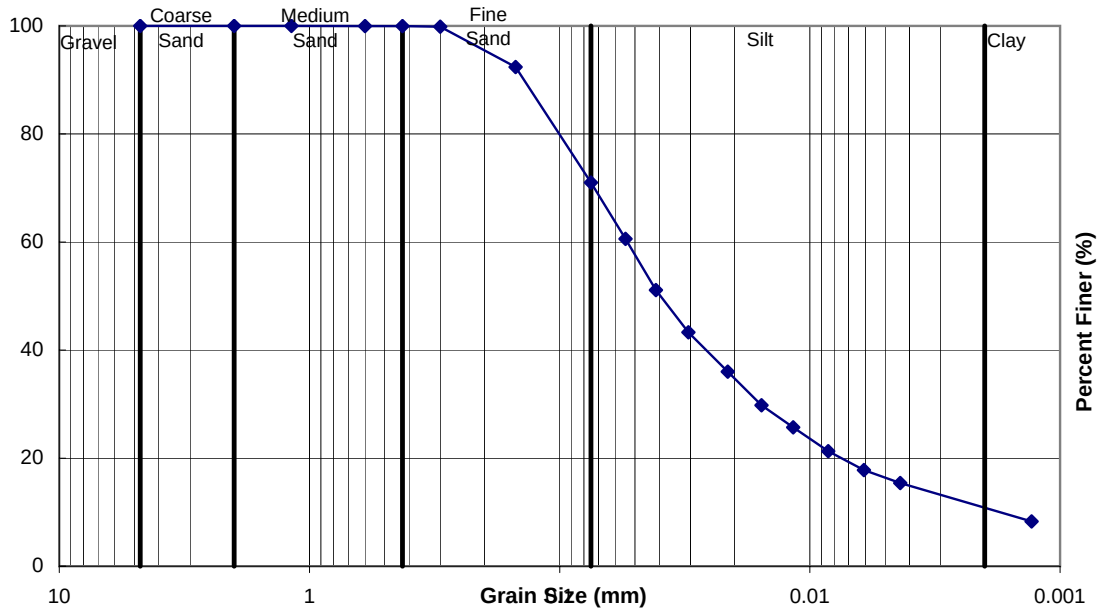


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-15:10m	0.0	0.0	1.0	6.0	67.0	26.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

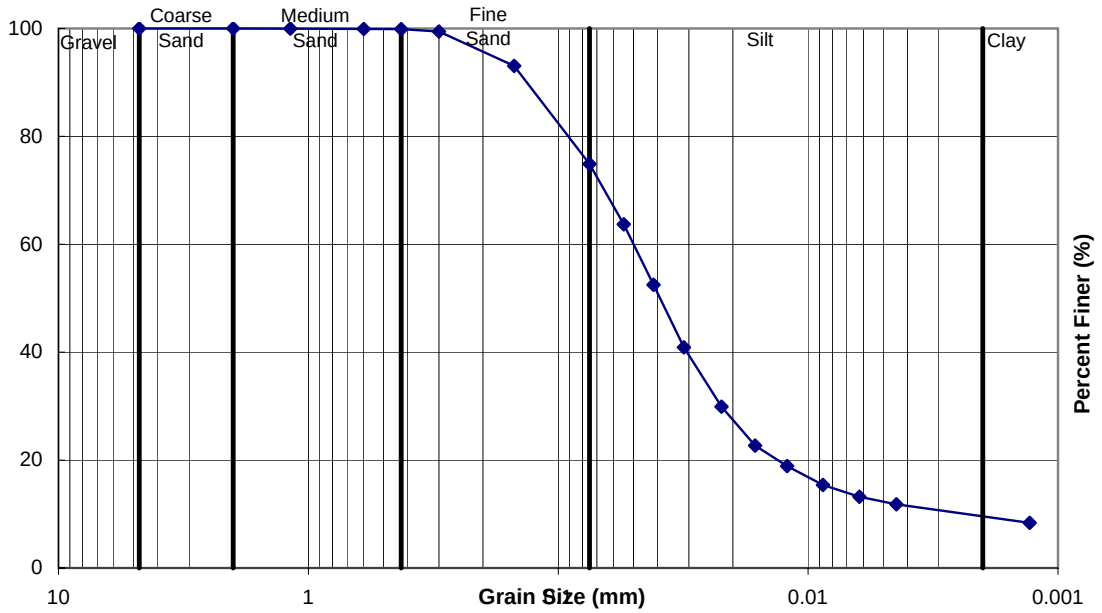


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-15:12m	0.0	0.0	0.0	5.0	74.0	21.0	-	-

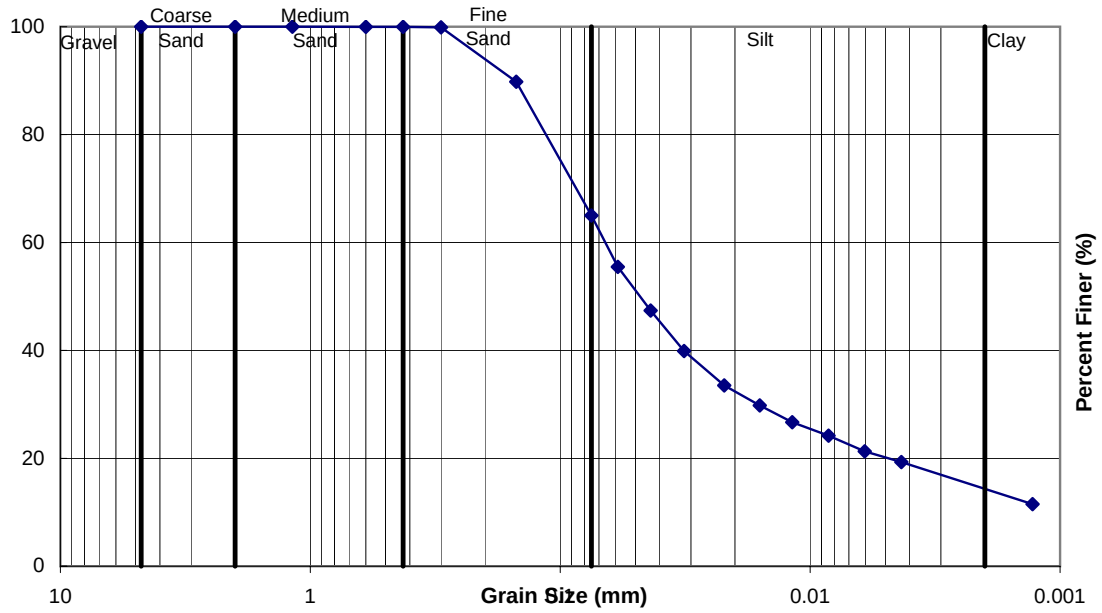


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-15:14m	0.0	0.0	0.0	29.0	60.0	11.0	30.9	0.4

GRAIN SIZE DISTRIBUTION CURVE

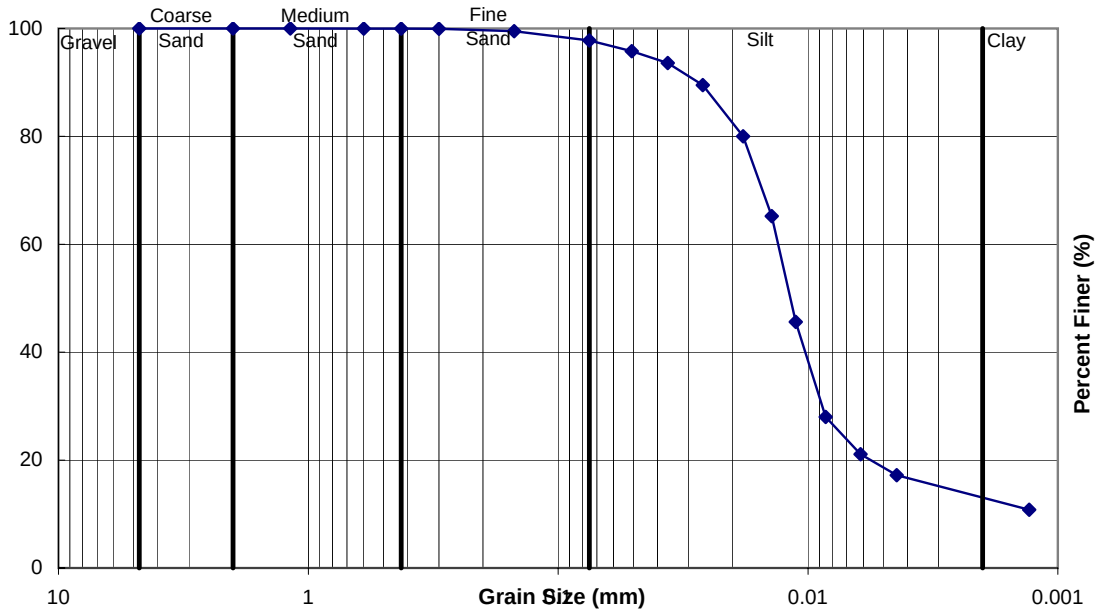


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-15:16m	0.0	0.0	0.0	25.0	65.0	10.0	21.4	0.2

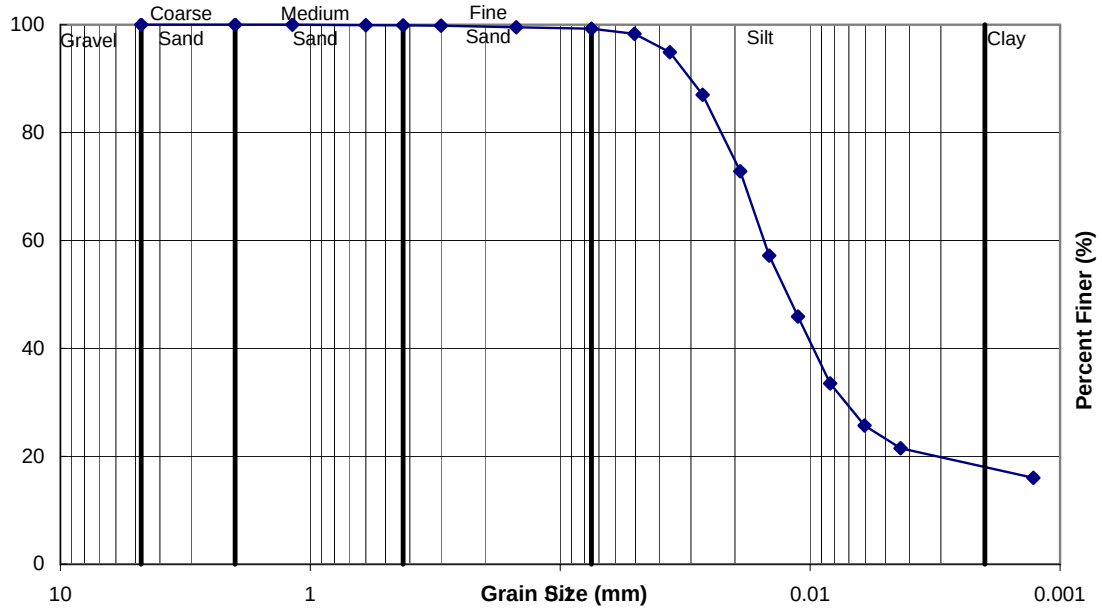


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-15:18m	0.0	0.0	0.0	35.0	51.0	14.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

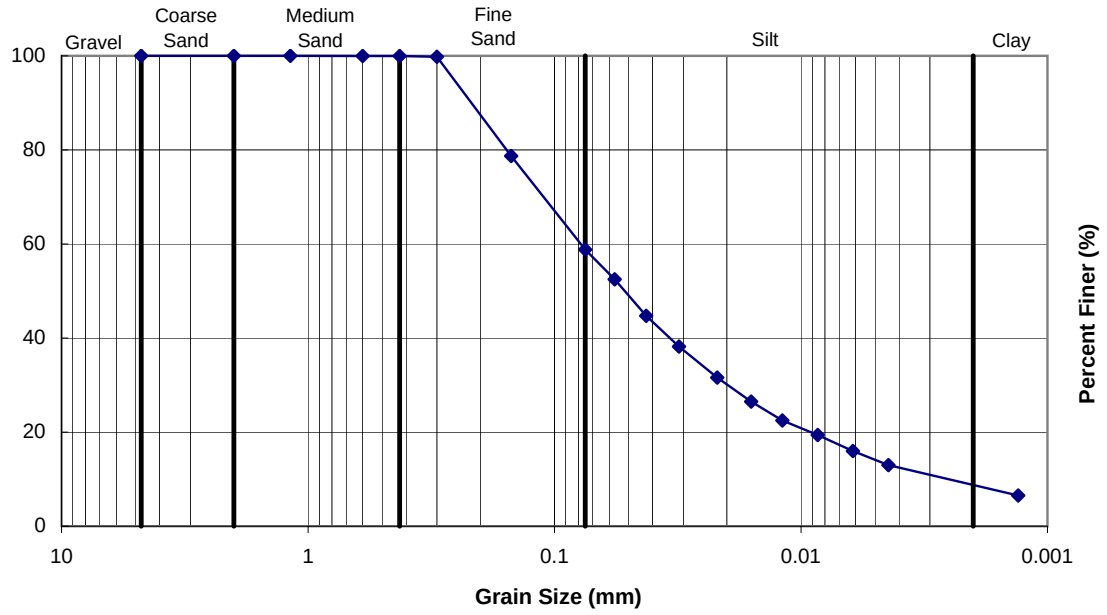


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-15:20m	0.0	0.0	0.0	2.0	85.0	13.0	-	-

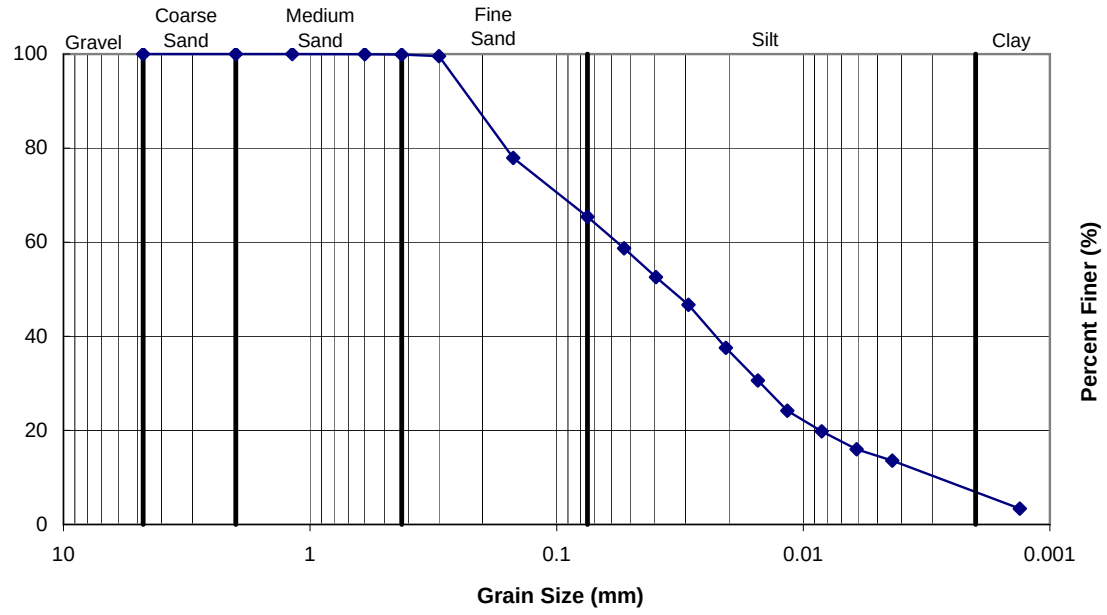


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-15:26m	0.0	0.0	0.0	1.0	81.0	18.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

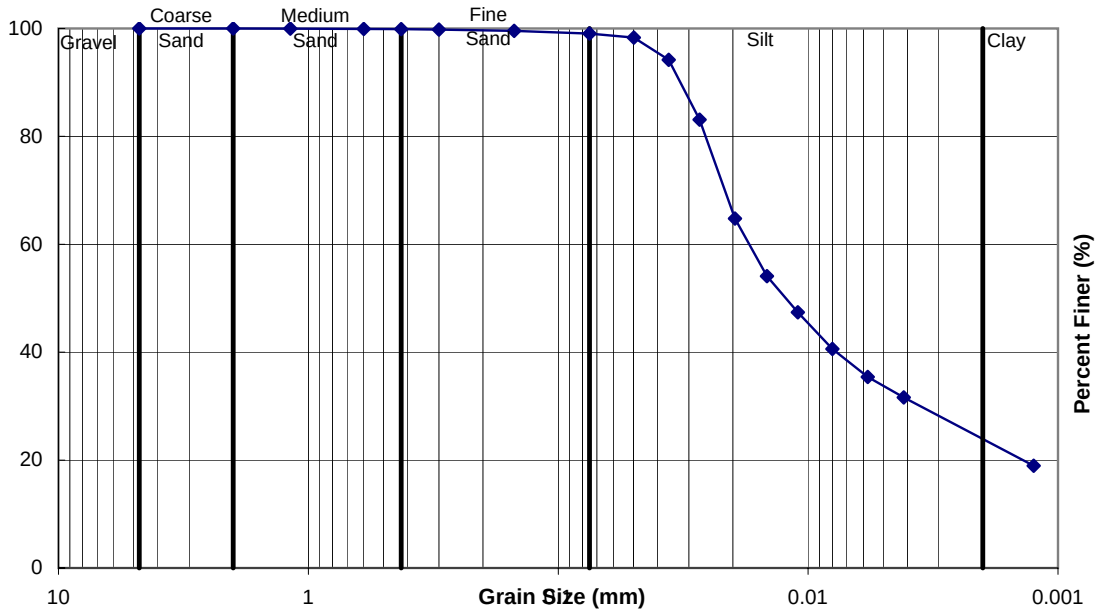


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-15:28m	0.0	0.0	0.0	41.0	50.0	9.0	31.1	0.5

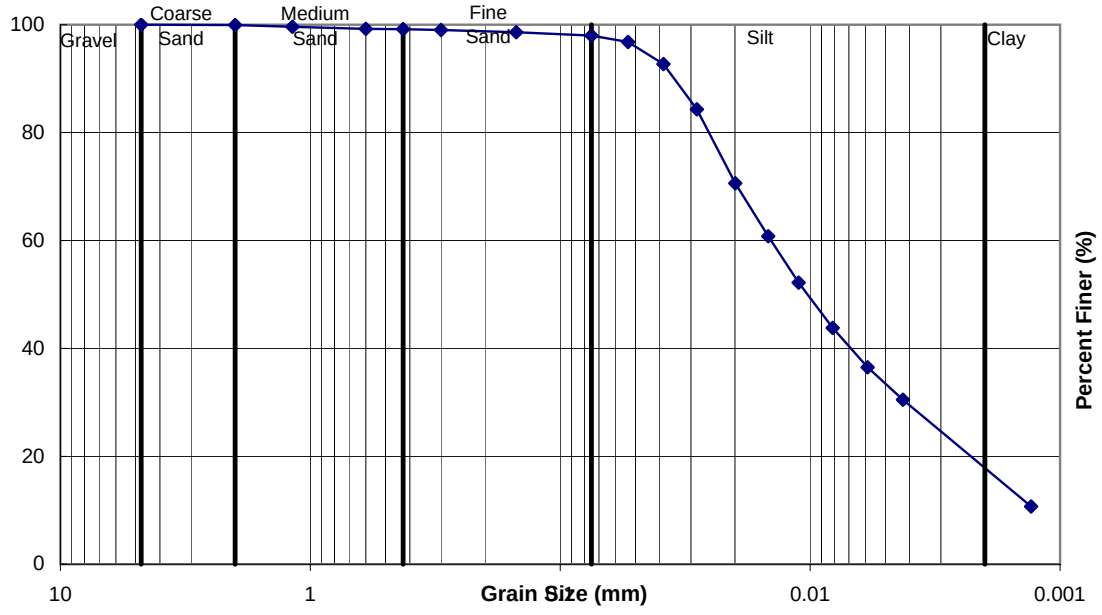


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-15:30m	0.0	0.0	0.0	34.0	59.0	7.0	19.8	0.7

GRAIN SIZE DISTRIBUTION CURVE

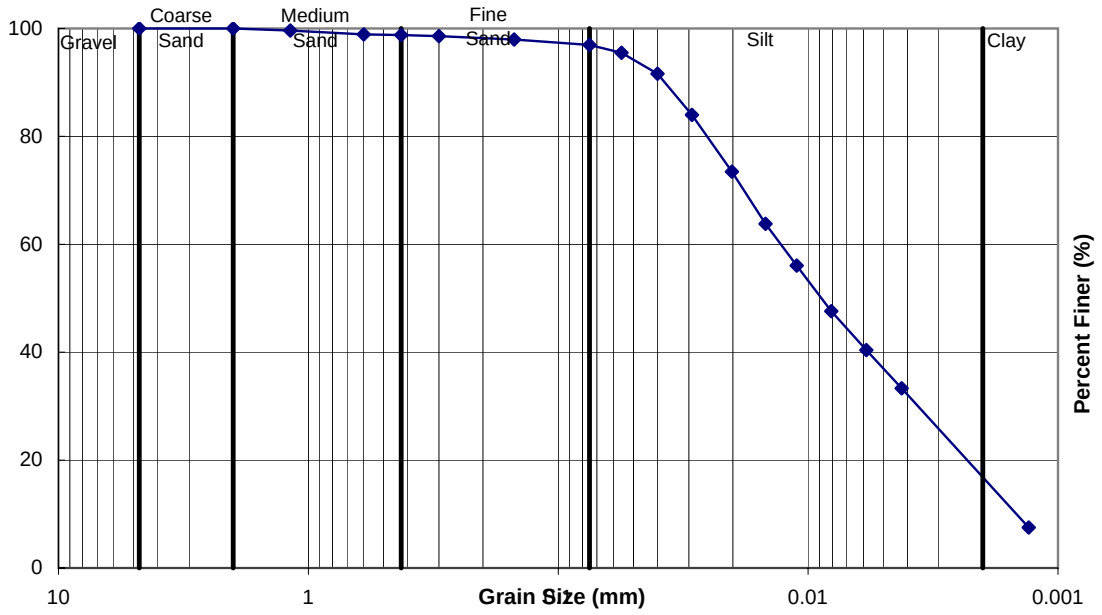


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-16:1m	0.0	0.0	0.0	1.0	75.0	24.0	-	-

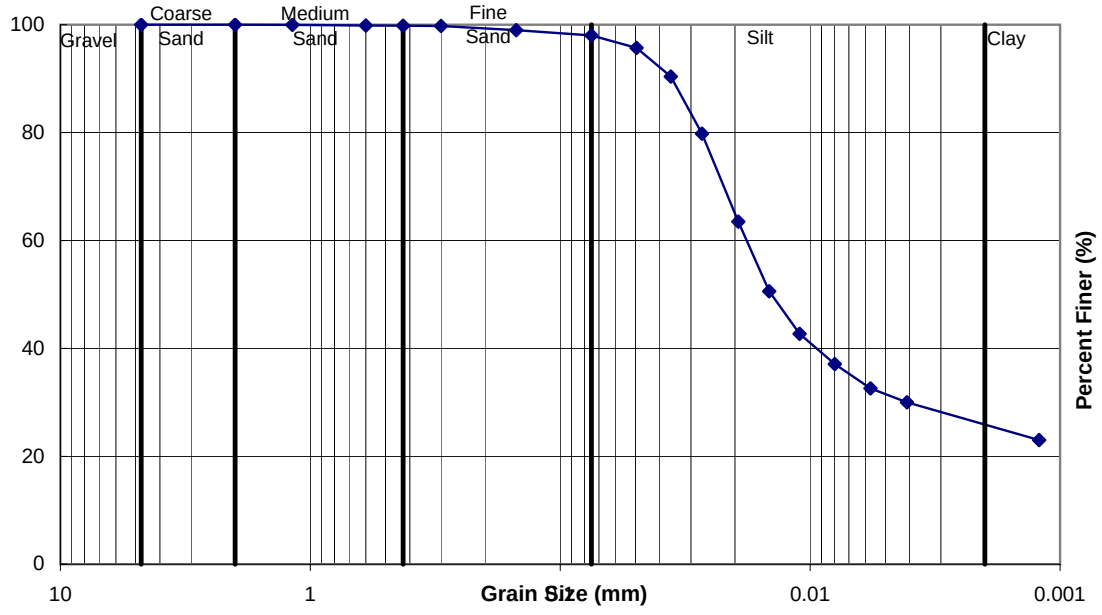


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-16:3m	0.0	0.0	1.0	1.0	80.0	18.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

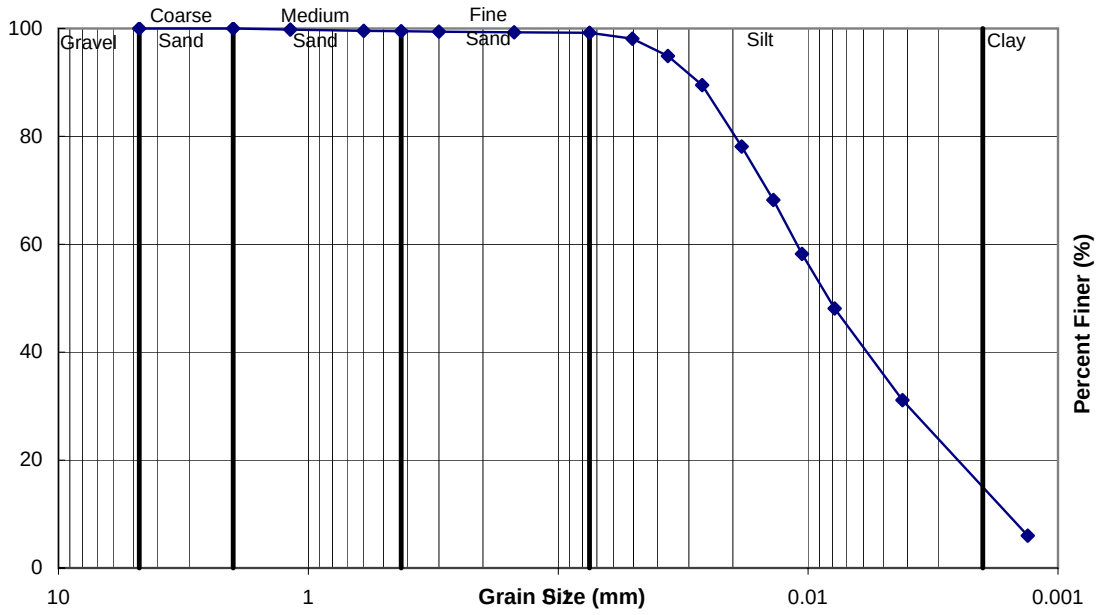


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-16:6m	0.0	0.0	1.0	2.0	80.0	17.0	8.8	1.4

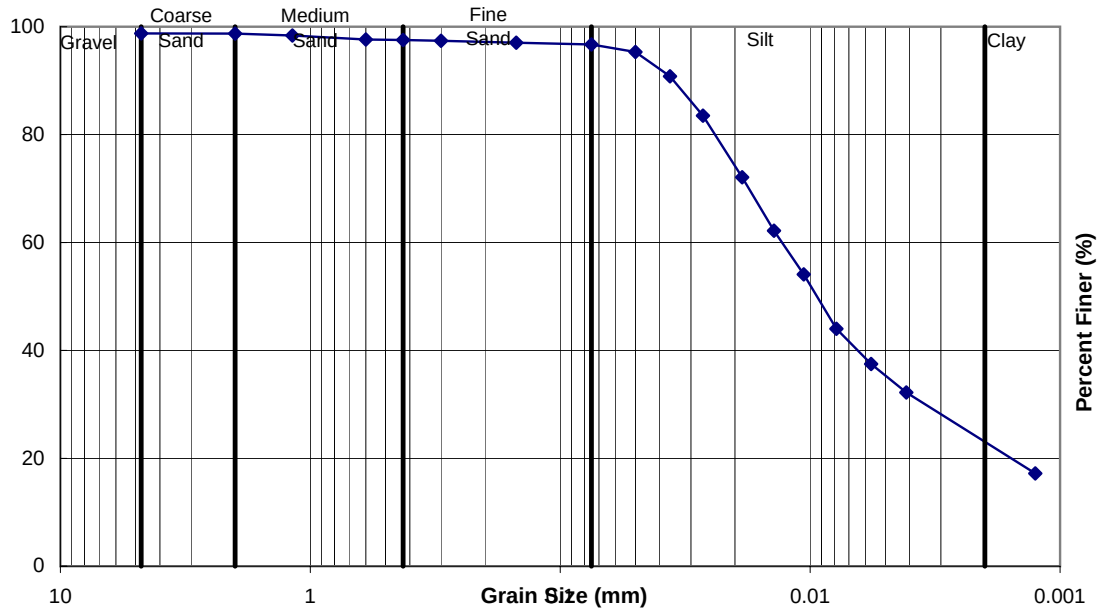


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-16:10m	0.0	0.0	0.0	2.0	72.0	26.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

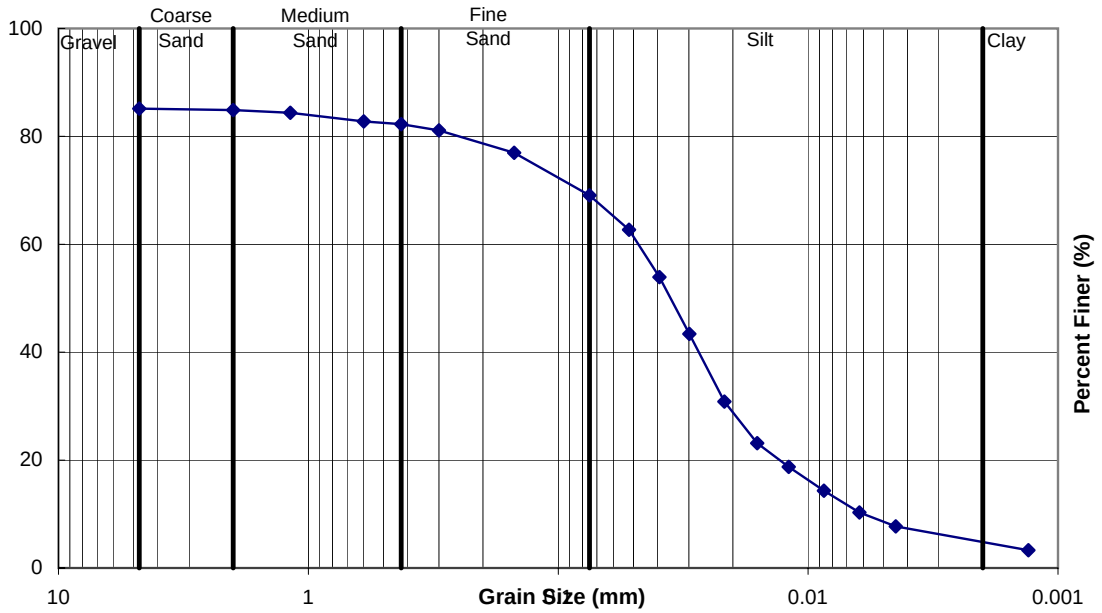


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-16:14m	0.0	0.0	1.0	0.0	84.0	15.0	7.0	1.1

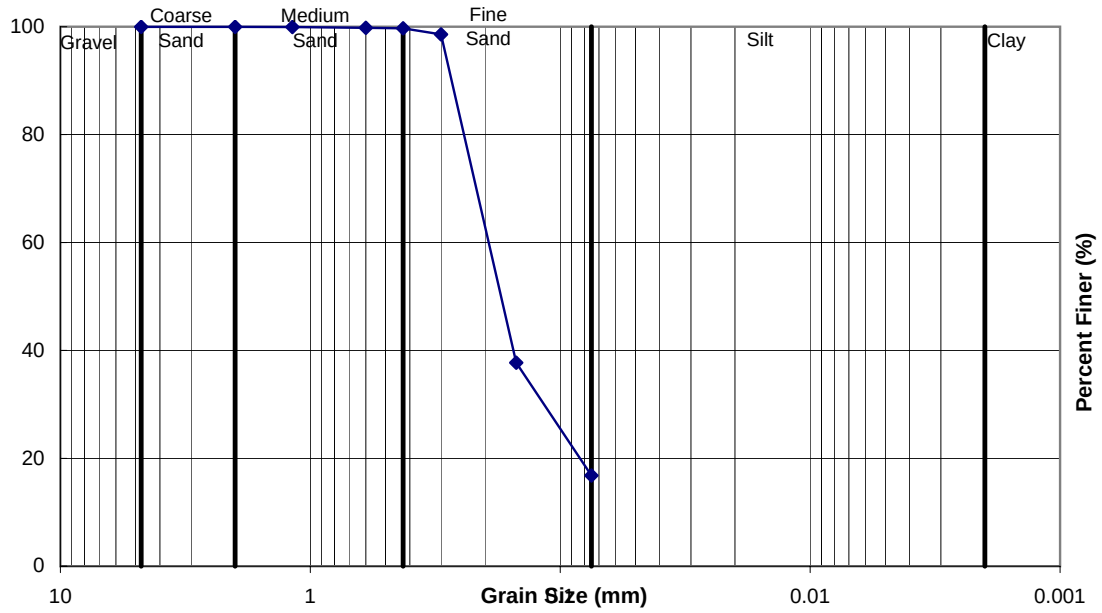


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-16:18m	1.0	0.0	1.0	1.0	74.0	23.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

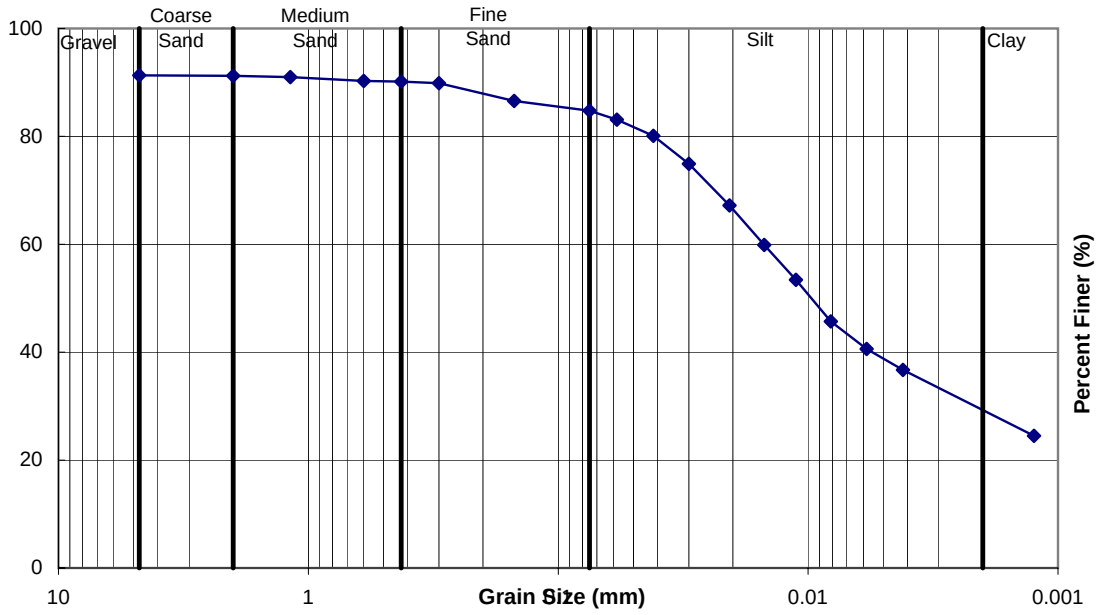


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-16:22m	15.0	0.0	3.0	13.0	64.0	5.0	8.0	0.7

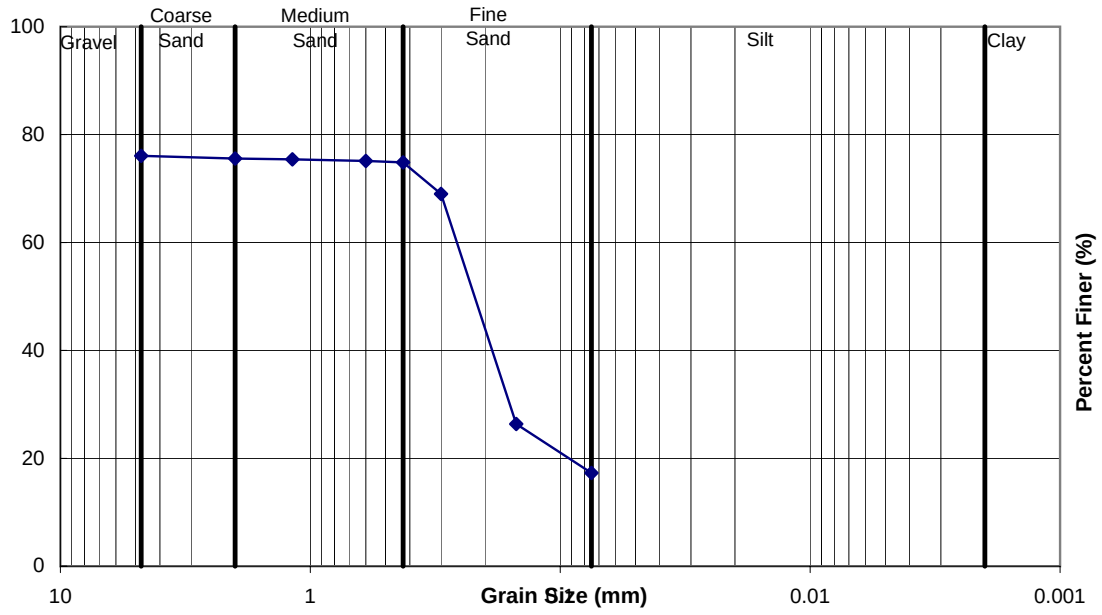


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
BH-16:24m	0.0	0.0	0.0	83.0	17.0		-	-

GRAIN SIZE DISTRIBUTION CURVE

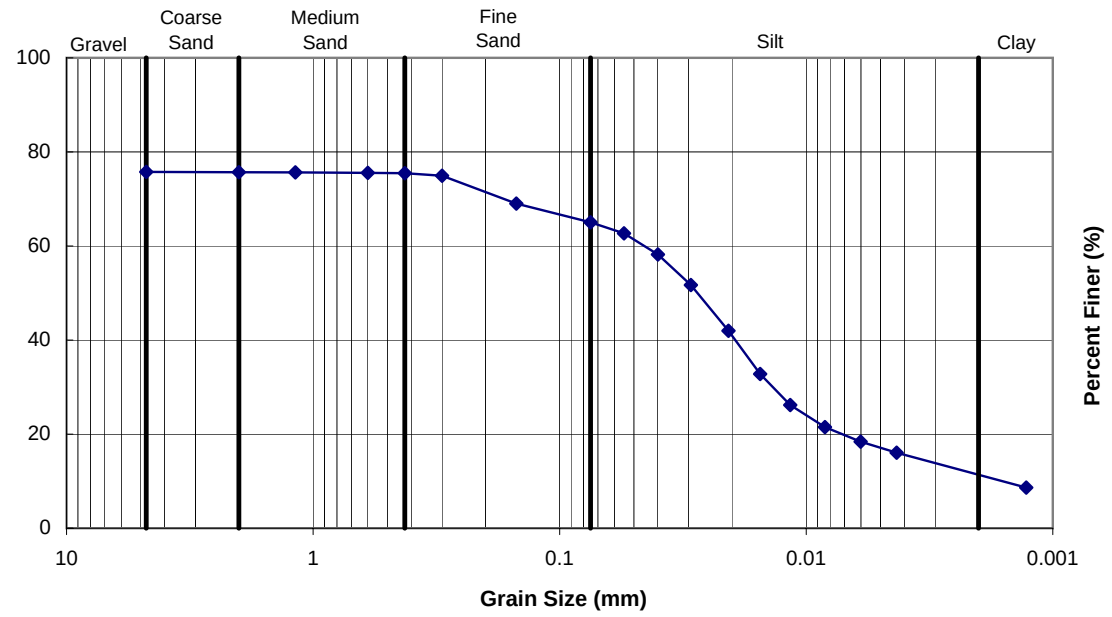


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-16:26m	9.0	0.0	1.0	5.0	56.0	29.0	-	-

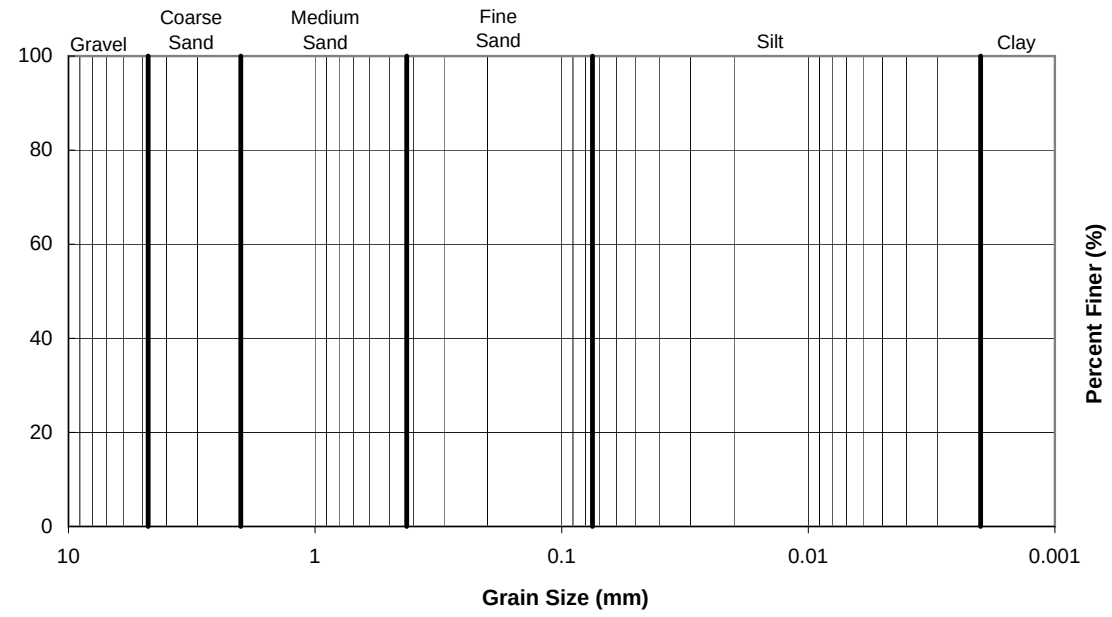


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
BH-16:28m	24.0	1.0	1.0	57.0	17.0		-	-

GRAIN SIZE DISTRIBUTION CURVE

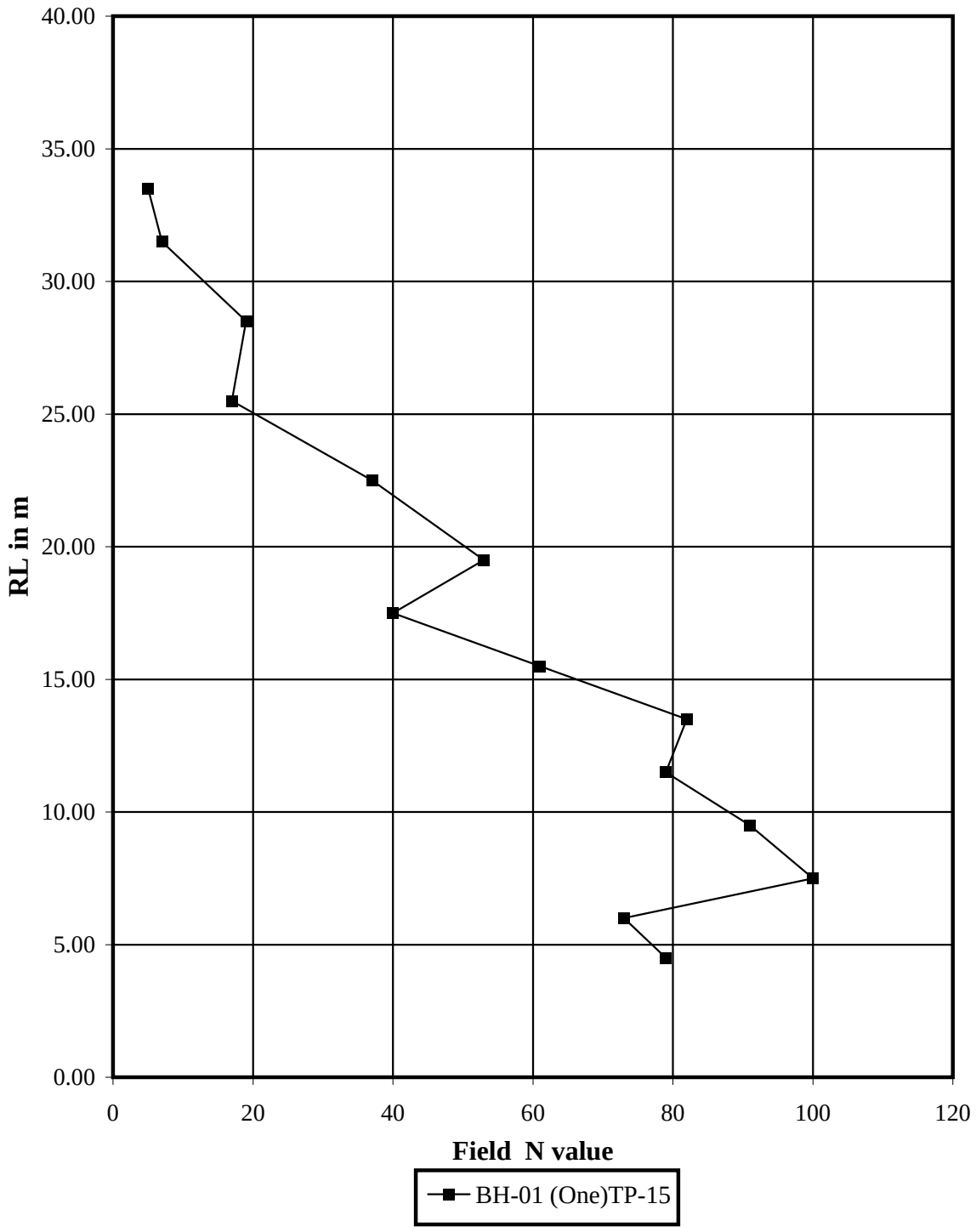


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-16:30.15m	24.0	0.0	0.0	10.0	55.0	11.0	28.3	0.4



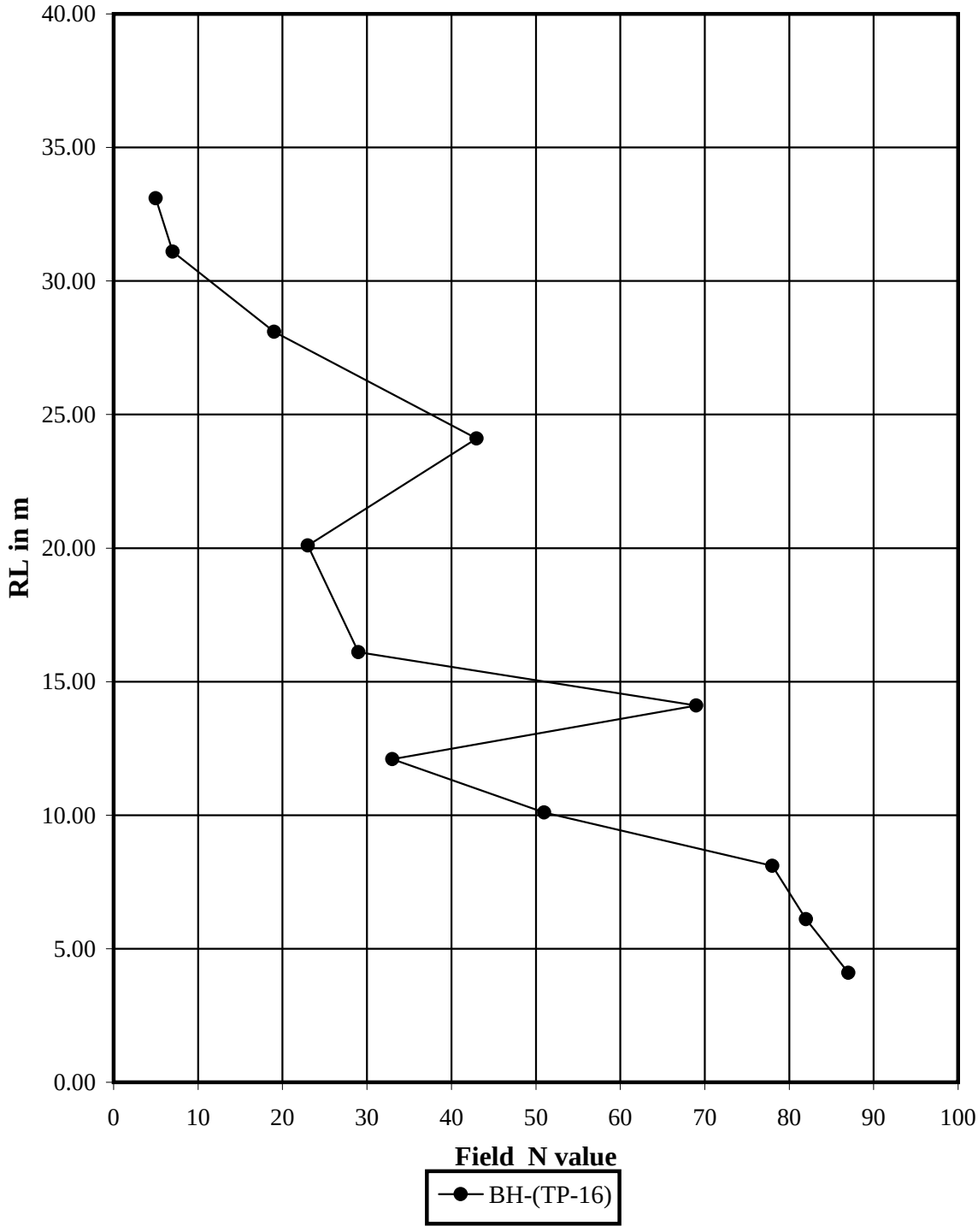
Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
FALSE								

SARDIP CONSULTING ENGINEERS



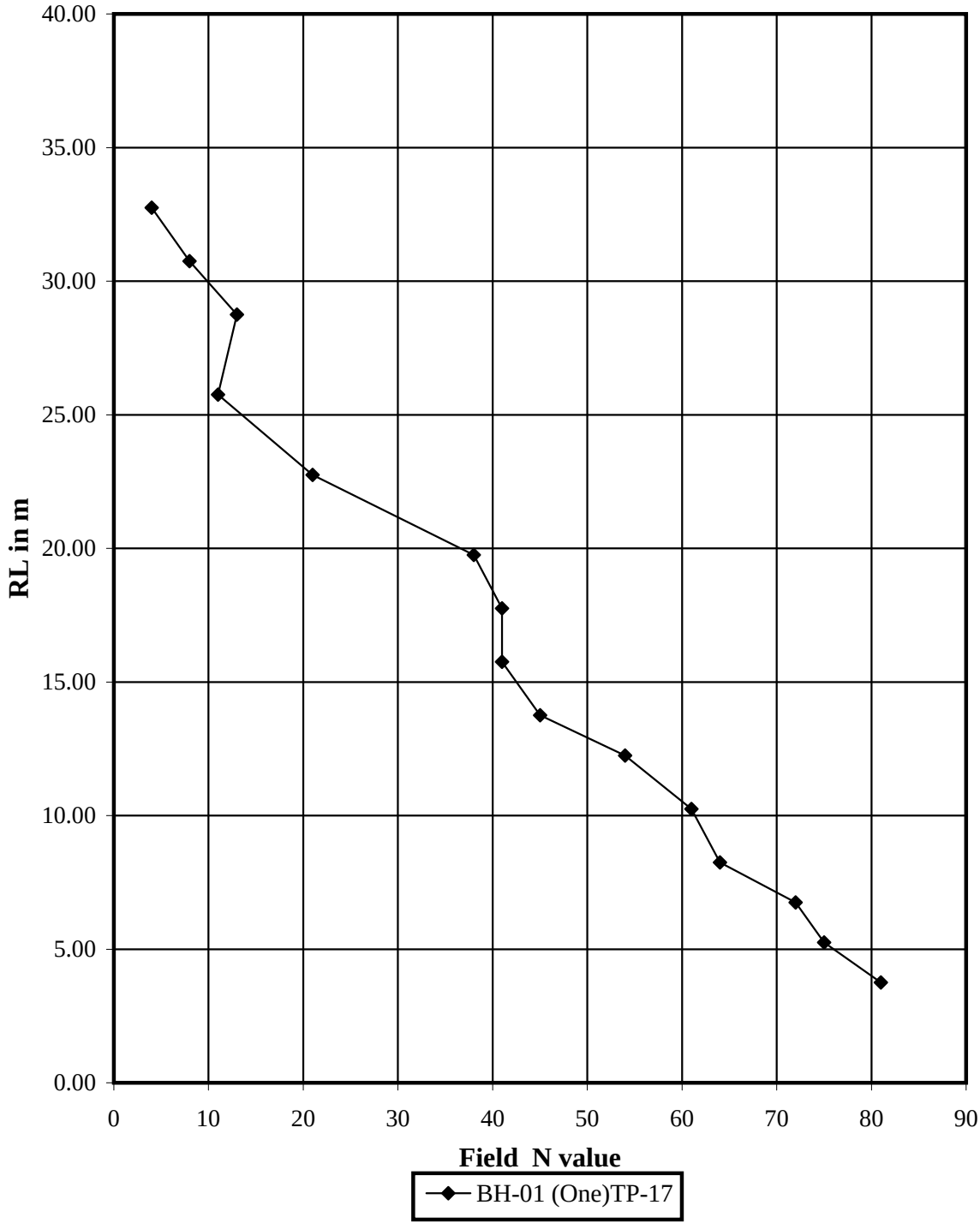
Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

SARDIP CONSULTING ENGINEERS



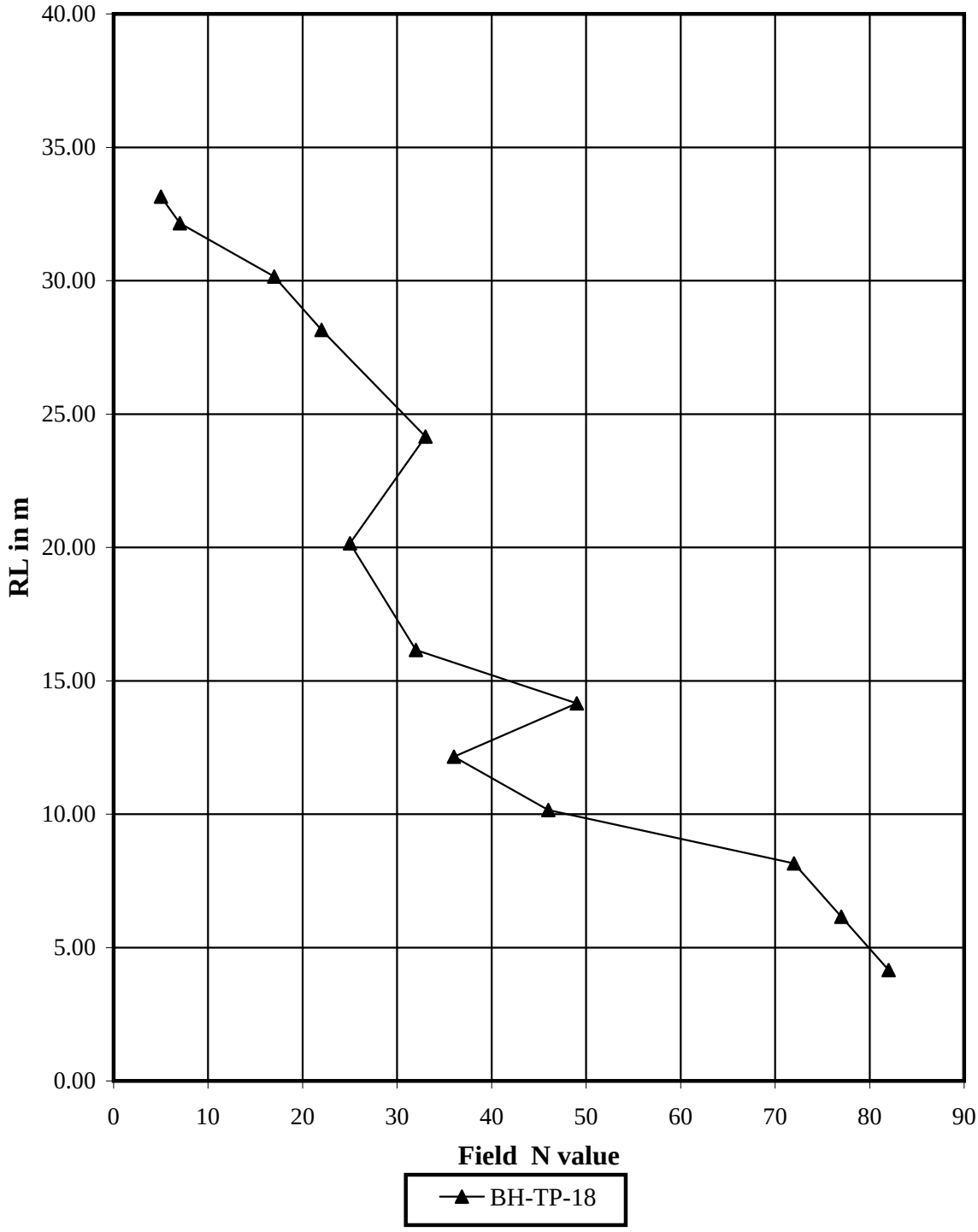
Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

SARDIP CONSULTING ENGINEERS



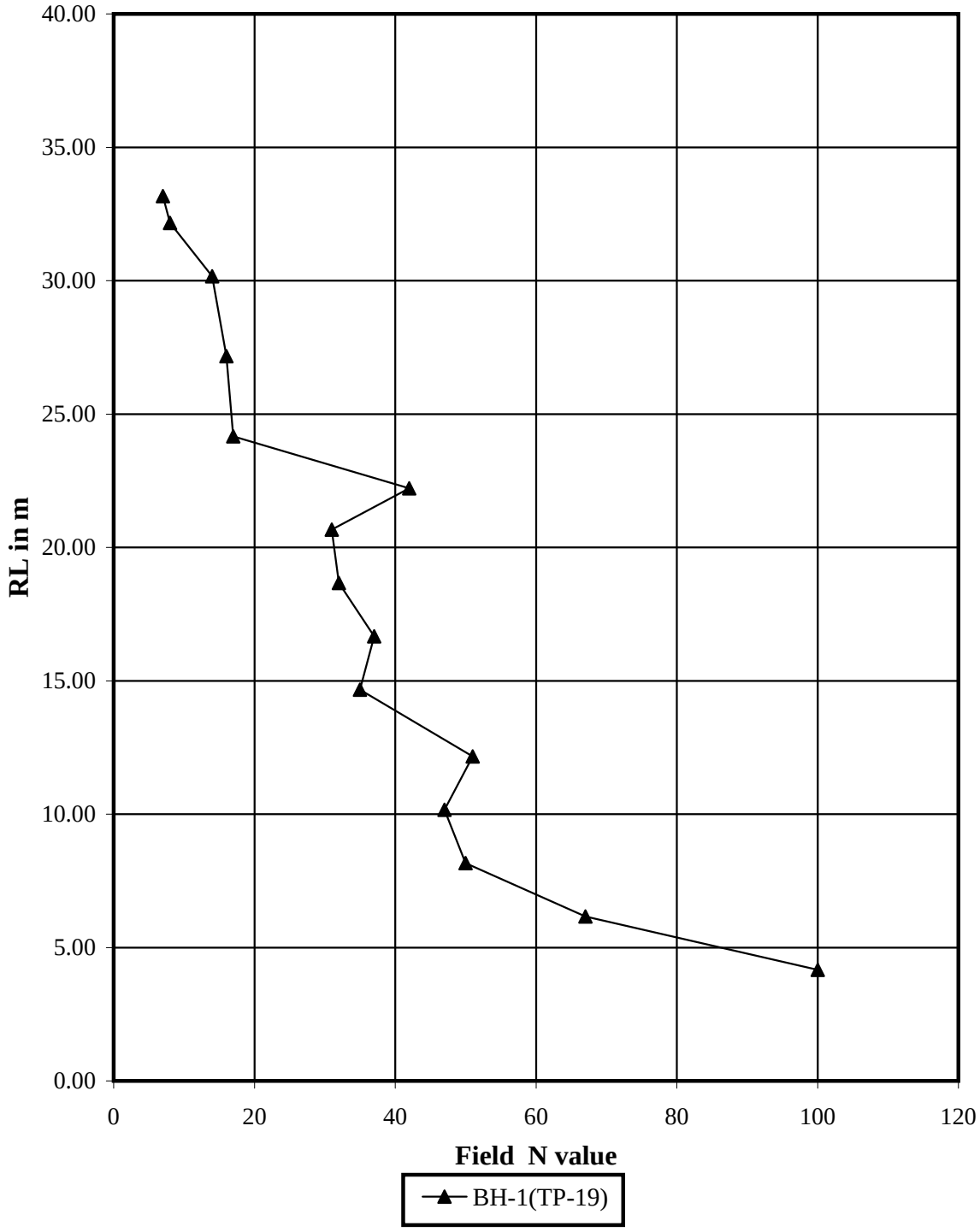
Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

SARDIP CONSULTING ENGINEERS



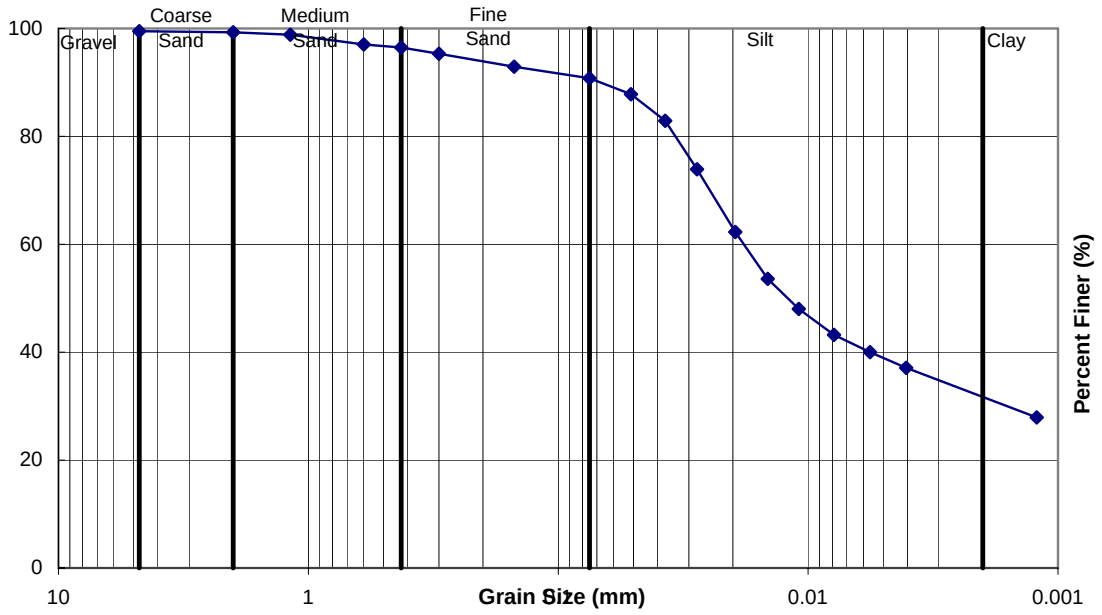
Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

SARDIP CONSULTING ENGINEERS

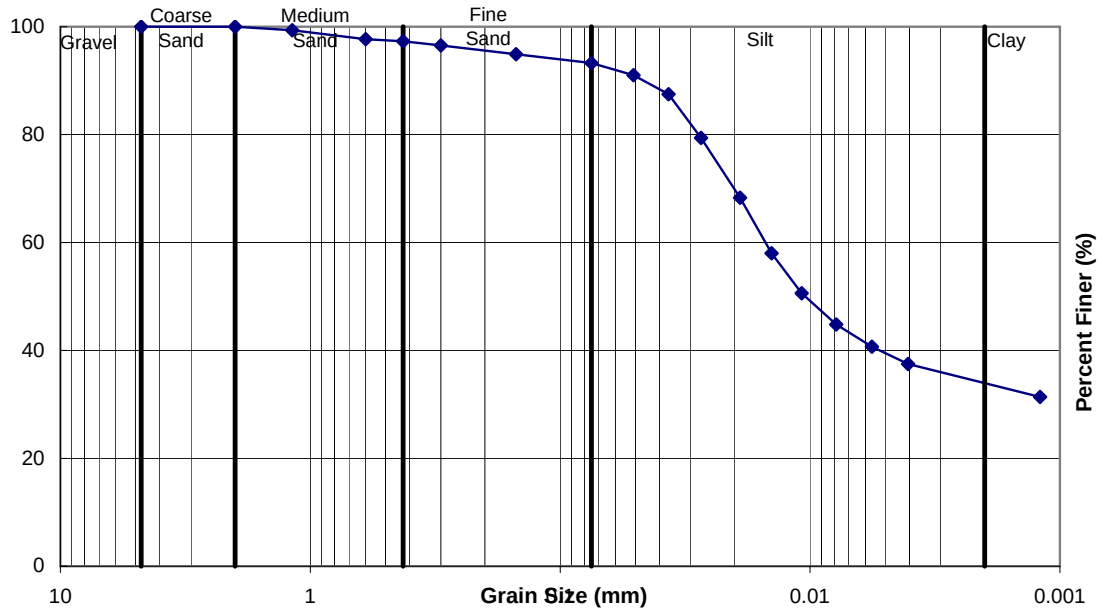


Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

GRAIN SIZE DISTRIBUTION CURVE

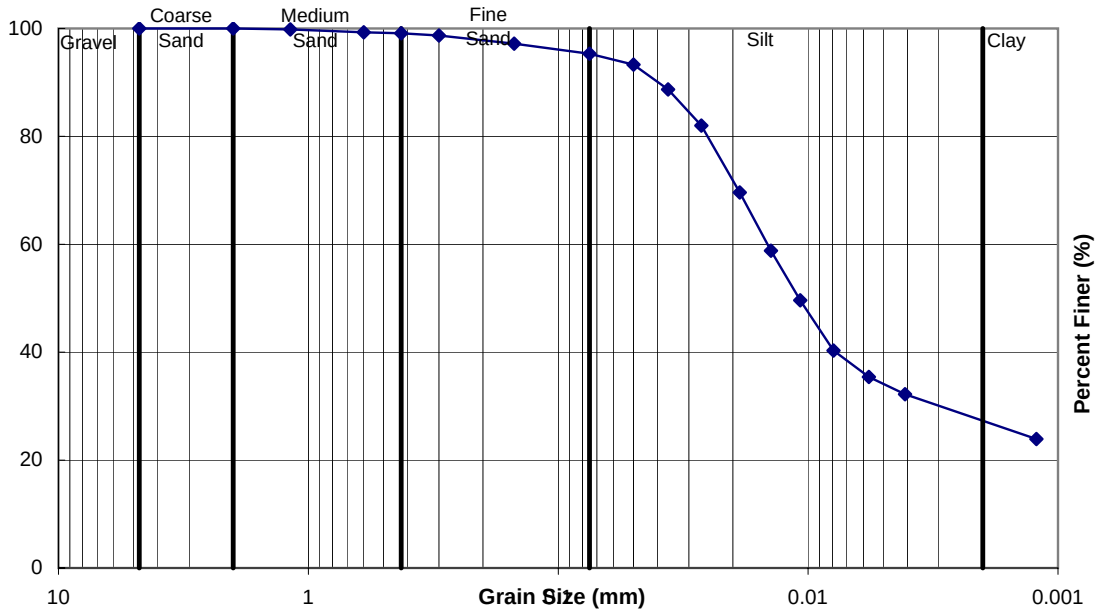


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-17:1m	0.0	0.0	3.0	6.0	59.0	32.0	-	-

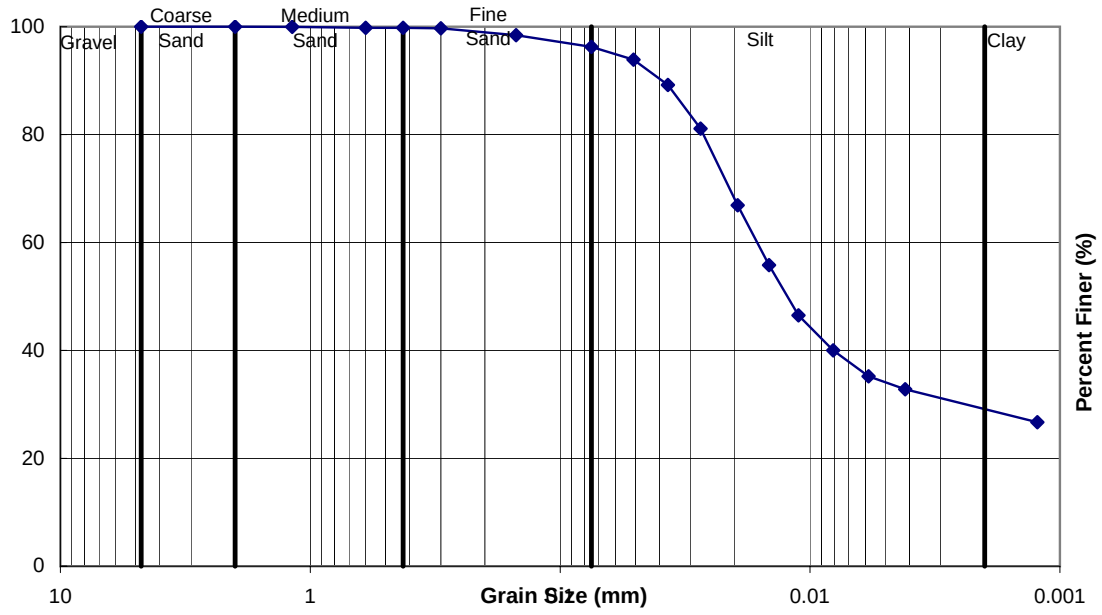


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-17:3m	0.0	0.0	3.0	4.0	59.0	34.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

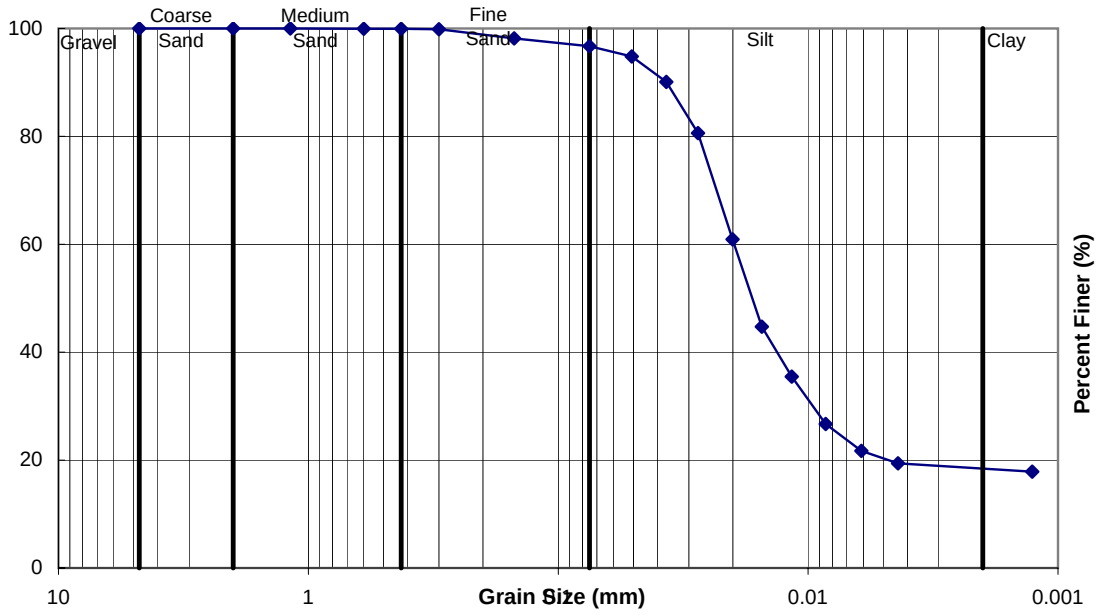


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-17:6m	0.0	0.0	1.0	4.0	68.0	27.0	-	-

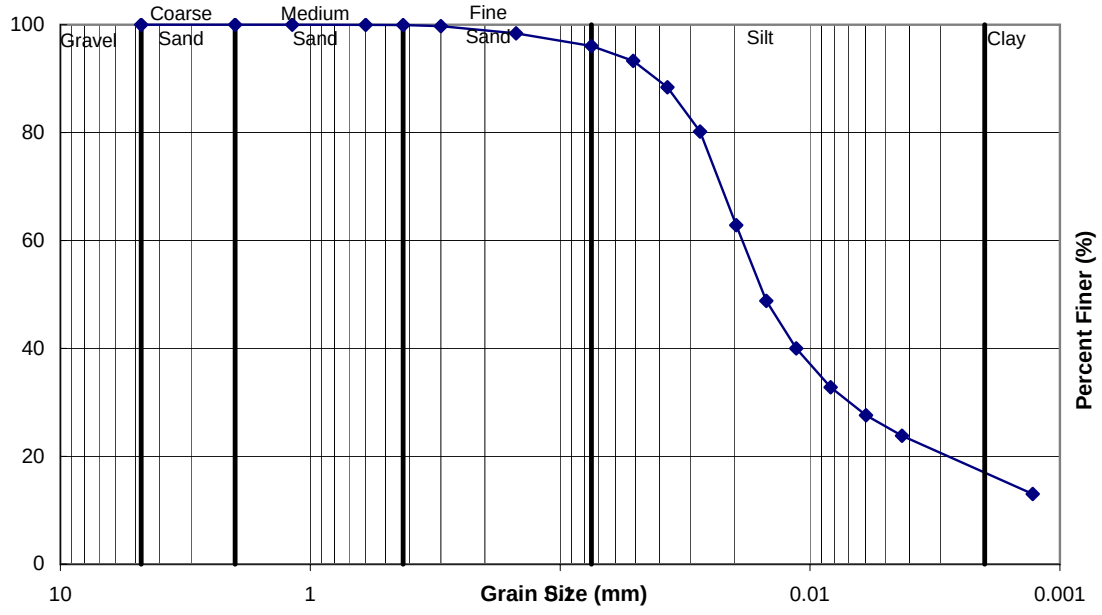


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-17:14m	0.0	0.0	0.0	4.0	67.0	29.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

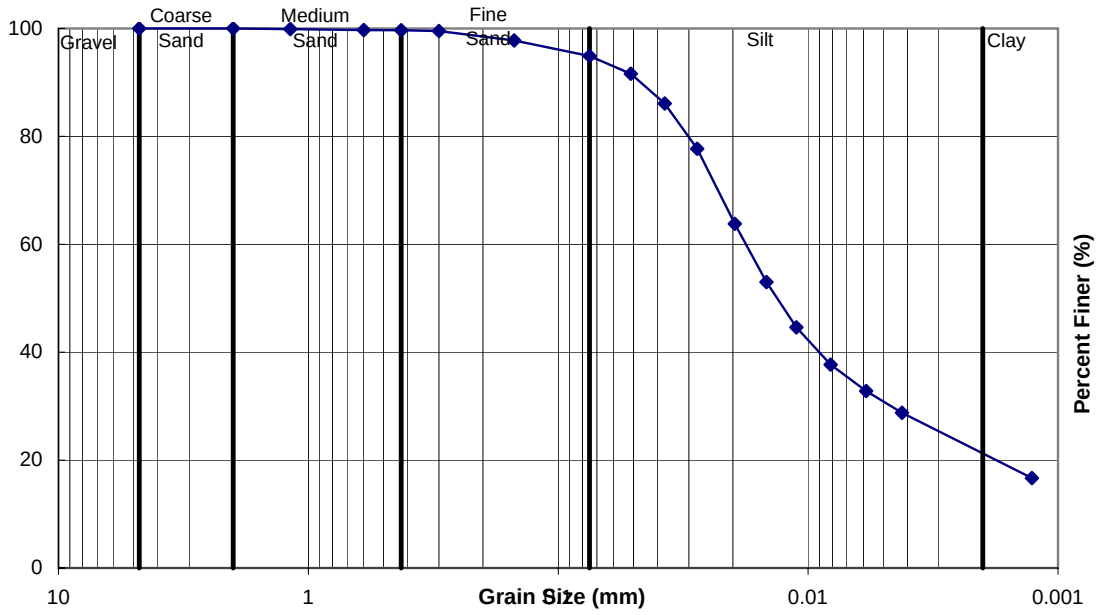


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-17:18m	0.0	0.0	0.0	3.0	79.0	18.0	-	-

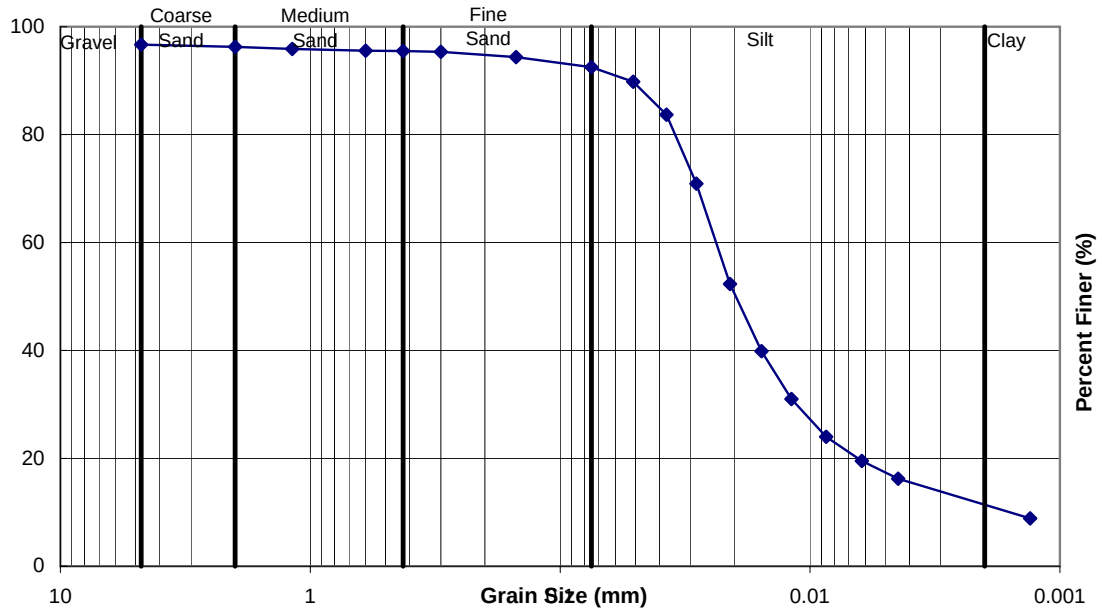


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-17:22m	0.0	0.0	0.0	4.0	79.0	17.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

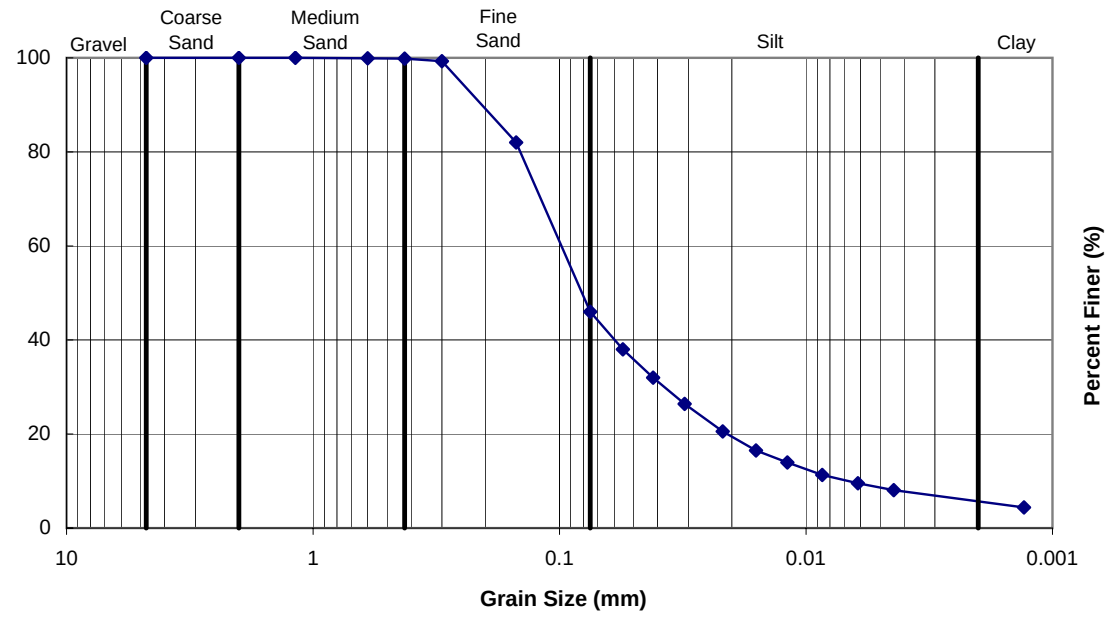


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-17:24m	0.0	0.0	0.0	5.0	74.0	21.0	-	-



Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-17:26m	3.0	0.0	1.0	3.0	82.0	11.0	15.0	0.3

GRAIN SIZE DISTRIBUTION CURVE

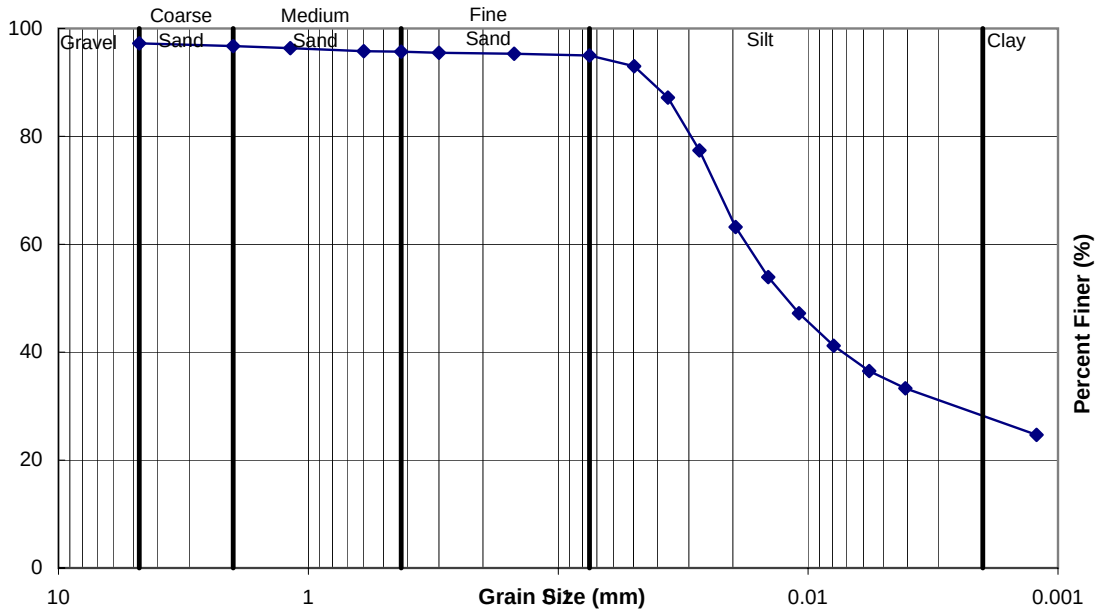


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-17:30m	0.0	0.0	0.0	54.0	40.0	6.0	14.6	0.5

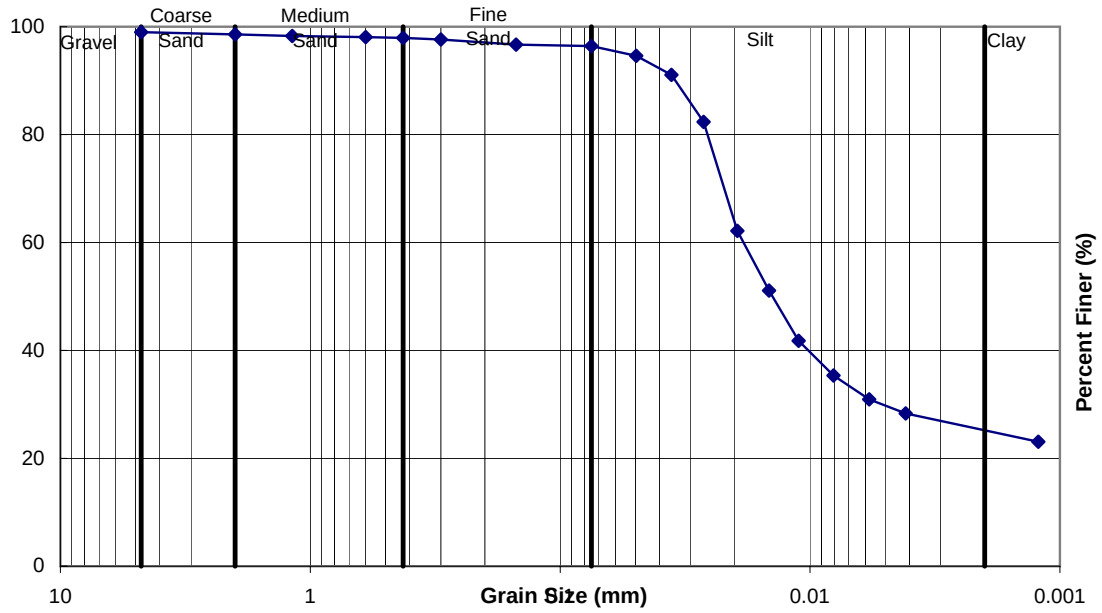


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
FALSE								

GRAIN SIZE DISTRIBUTION CURVE

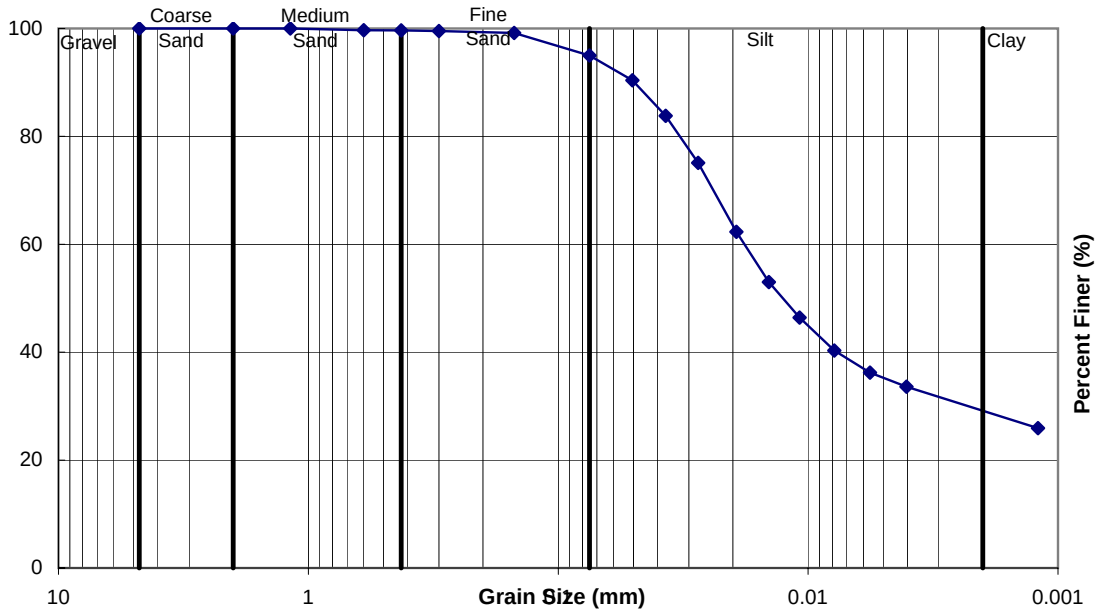


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-18:1m	3.0	0.0	1.0	1.0	67.0	28.0	-	-

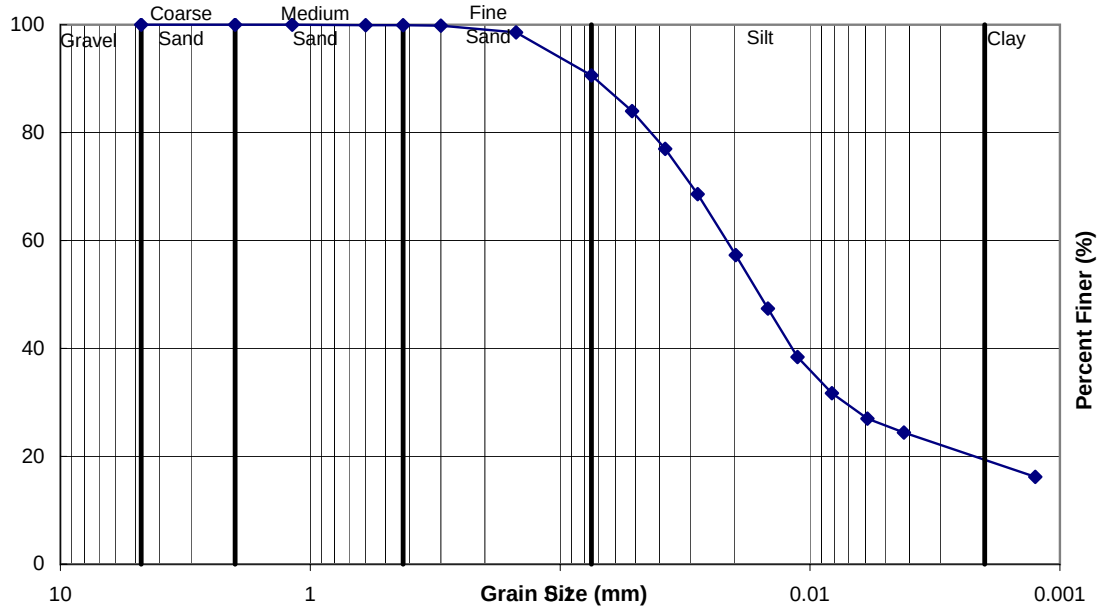


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-18:3m	1.0	0.0	1.0	2.0	71.0	25.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

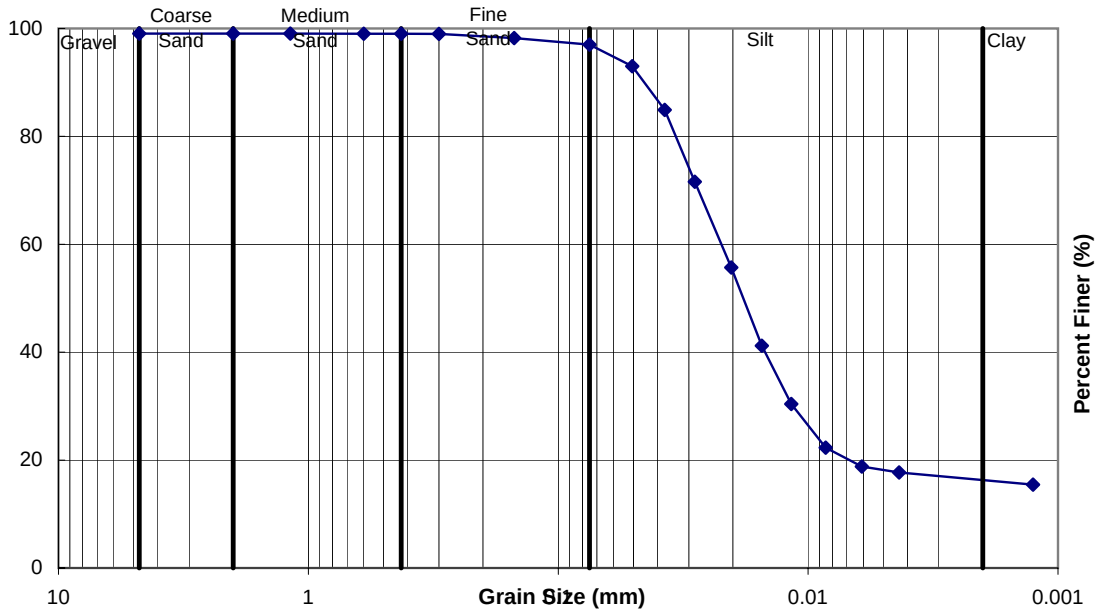


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-18:6m	0.0	0.0	0.0	5.0	66.0	29.0	-	-

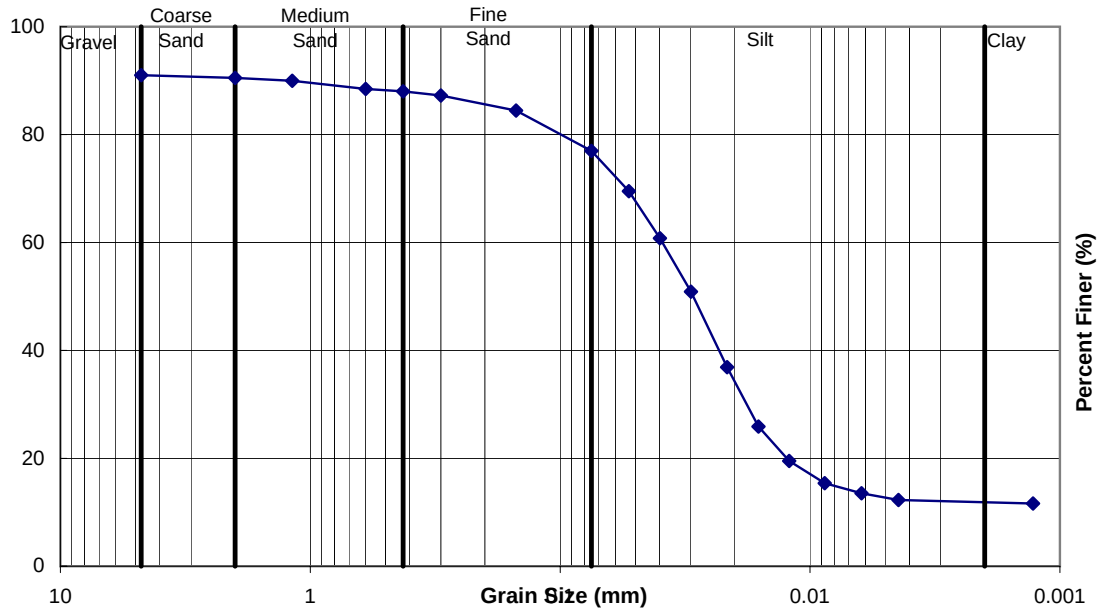


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-18:12m	0.0	0.0	0.0	9.0	72.0	19.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

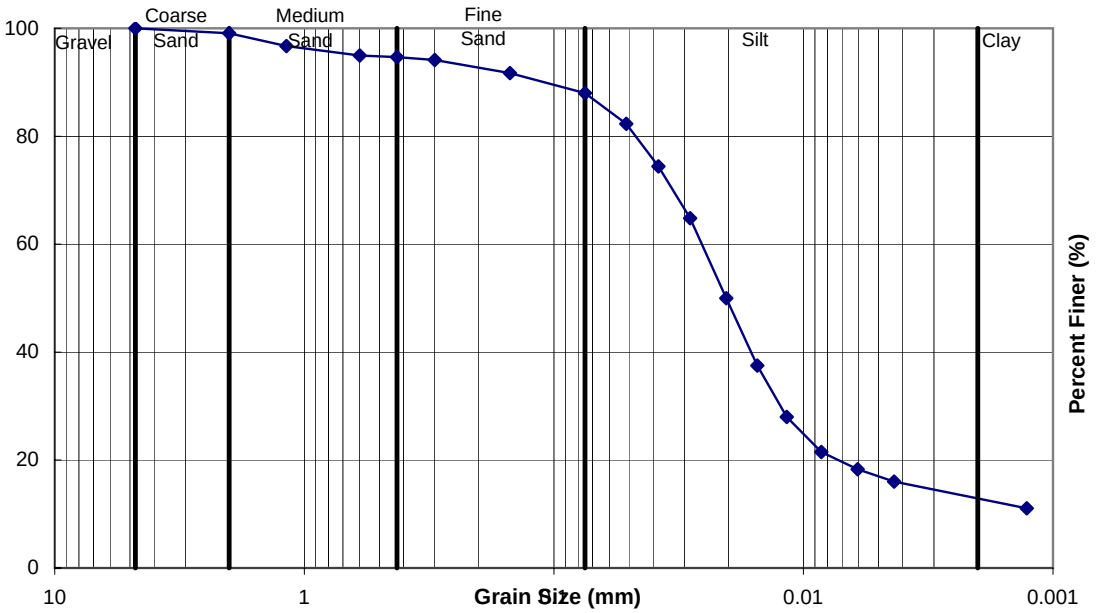


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-18:16m	1.0	0.0	0.0	2.0	81.0	16.0	-	-

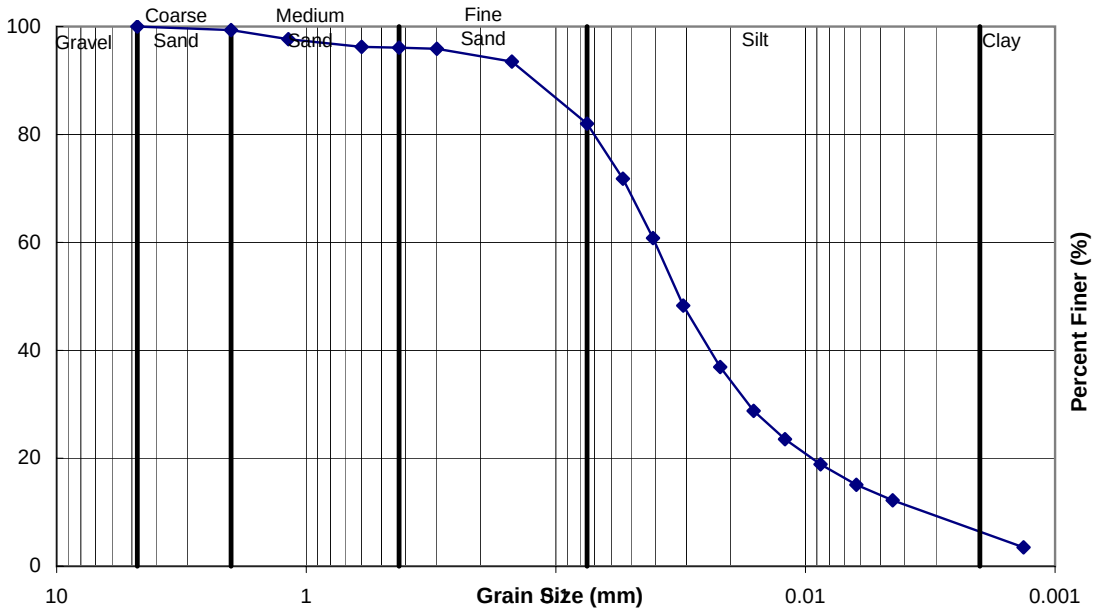


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-18:20m	9.0	1.0	2.0	11.0	65.0	12.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

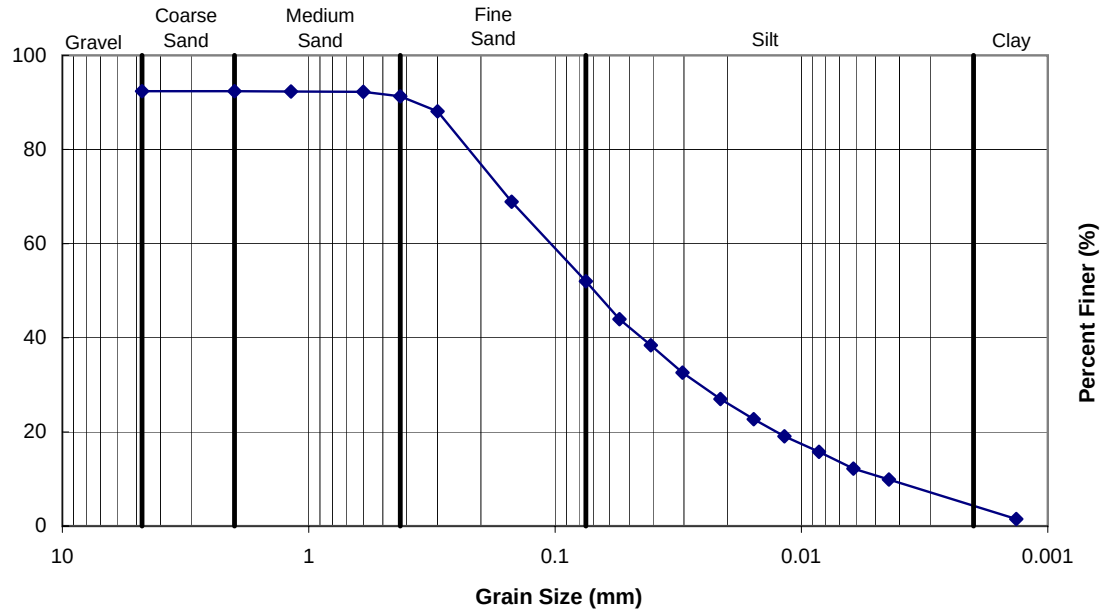


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-18:24m	0.0	1.0	4.0	7.0	75.0	13.0	-	-

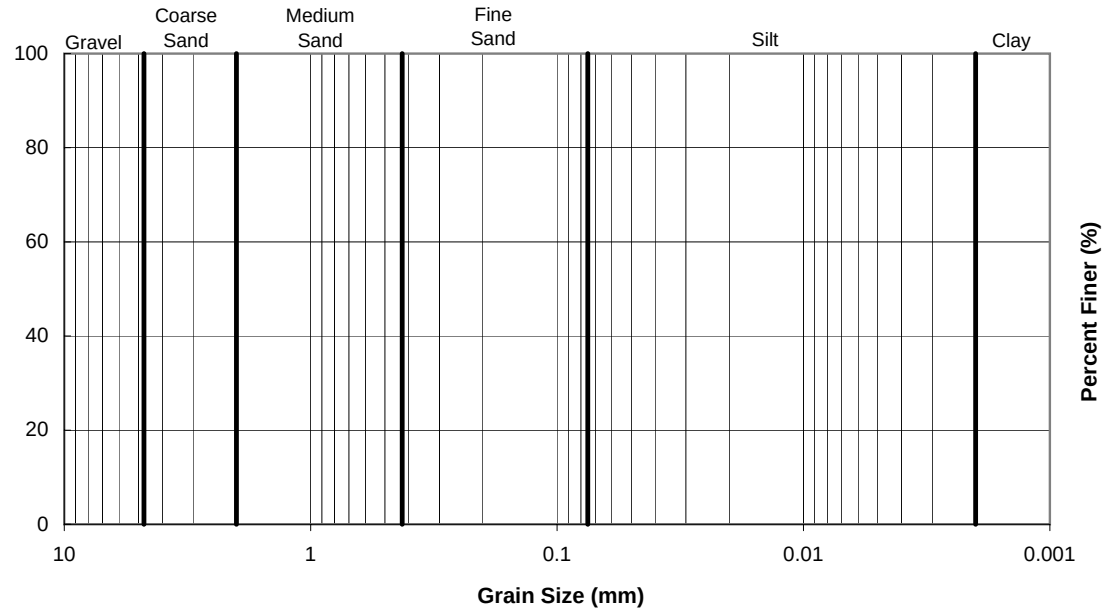


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-18:26m	0.0	1.0	3.0	14.0	76.0	6.0	12.2	0.5

GRAIN SIZE DISTRIBUTION CURVE

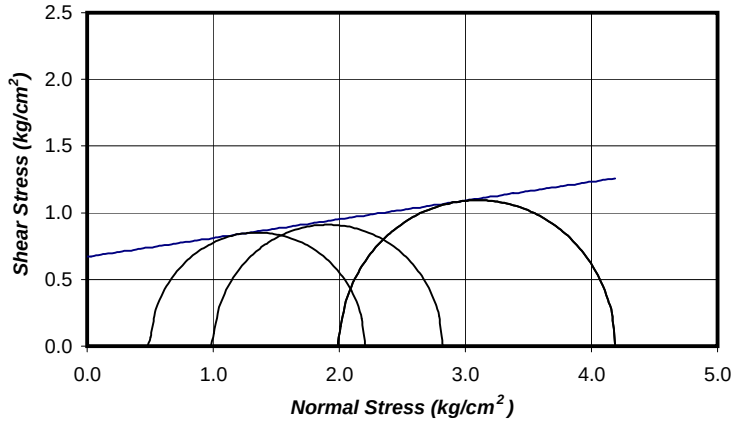


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-18:28m	8.0	0.0	1.0	39.0	48.0	4.0	23.2	0.7



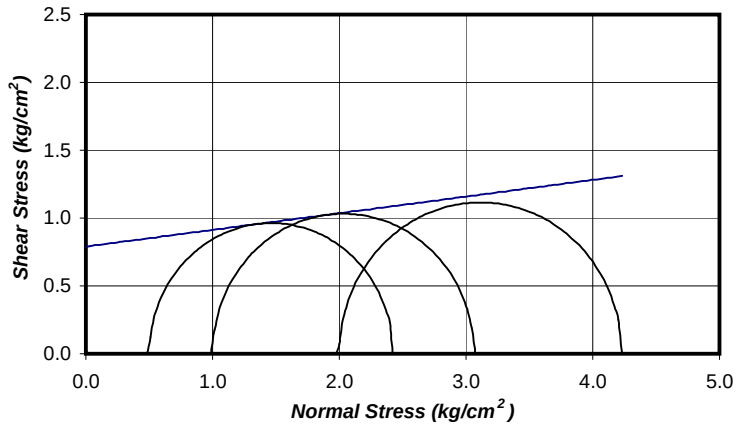
Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
FALSE								

Mohr-Diagram



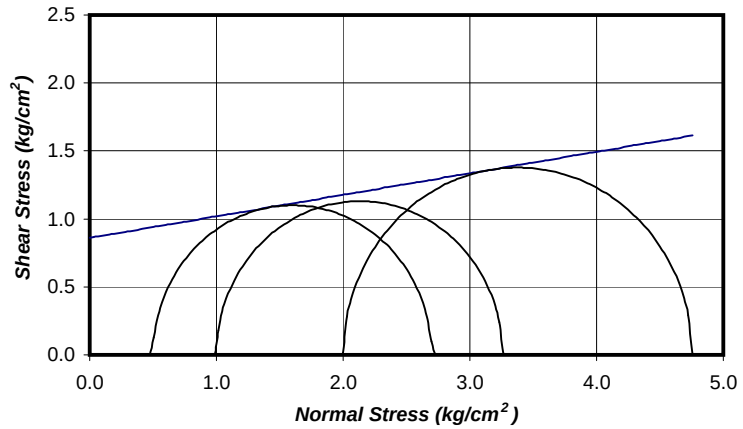
BH No.:	BH-4	**Test Type: UU**	c : 0.67 kg/sq. cm
Depth:	3.00 m		ϕ : 8 degree

Mohr-Diagram



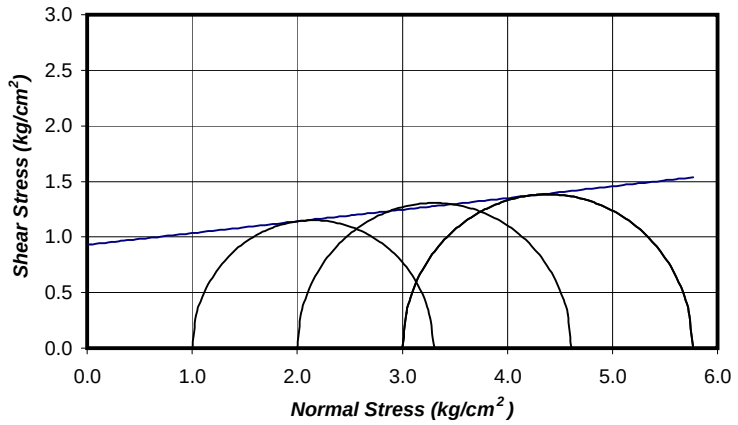
BH No.:	BH-4	**Test Type: UU**	c : 0.79 kg/sq. cm
Depth:	6.00 m		ϕ : 7 degree

Mohr-Diagram



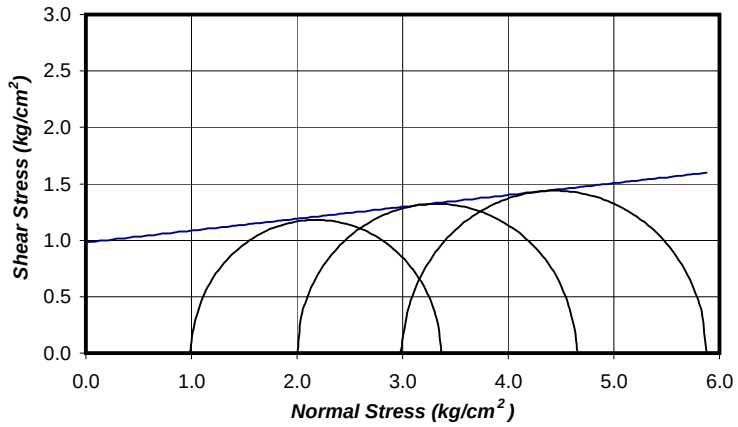
BH No.:	BH-4	**Test Type: UU**	c : 0.86 kg/sq. cm
Depth:	10.00 m		ϕ : 9 degree

Mohr-Diagram



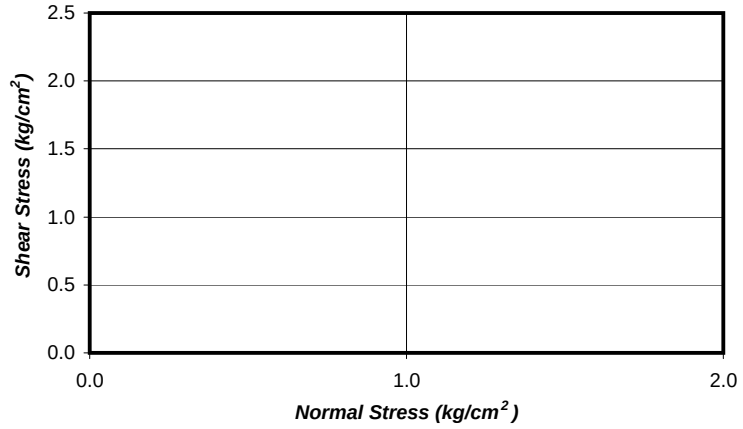
BH No.:	BH-4	**Test Type: UU**	c : 0.93 kg/sq. cm
Depth:	14.00 m		ϕ : 6 degree

Mohr-Diagram



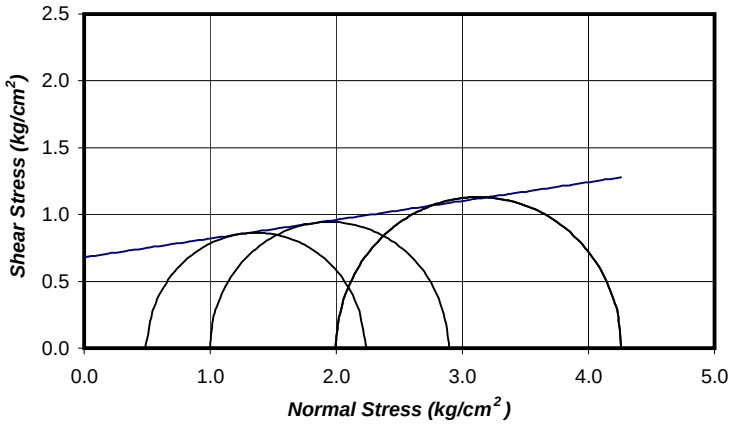
BH No.:	BH-4	**Test Type: UU**	c : 0.98 kg/sq. cm
Depth:	20.00 m		ϕ : 6 degree

Mohr-Diagram



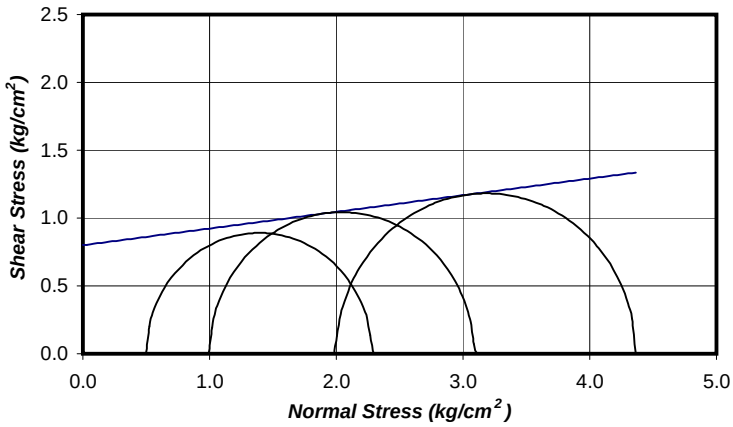
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



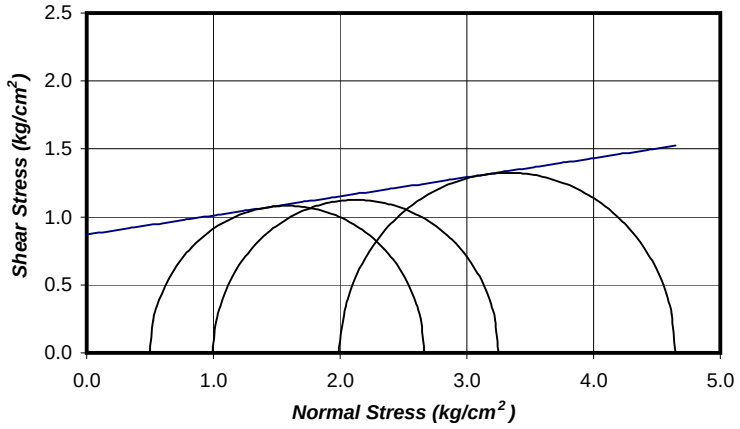
BH No.:	BH-4A	**Test Type: UU**	c : 0.68 kg/sq. cm
Depth:	1.00 m		ϕ : 8 degree

Mohr-Diagram



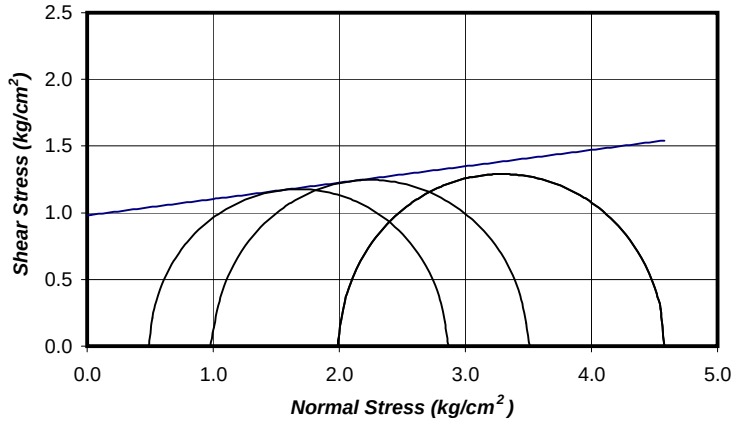
BH No.:	BH-4A	**Test Type: UU**	c : 0.80 kg/sq. cm
Depth:	3.00 m		ϕ : 7 degree

Mohr-Diagram



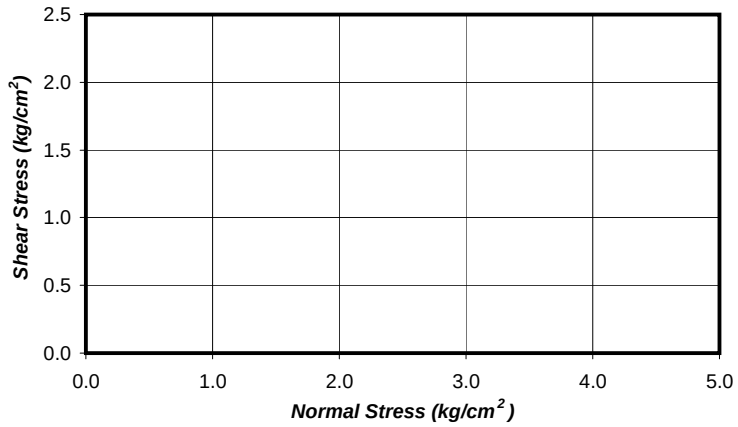
BH No.:	BH-4A	**Test Type: UU**	c : 0.87 kg/sq. cm
Depth:	6.00 m		ϕ : 8 degree

Mohr-Diagram



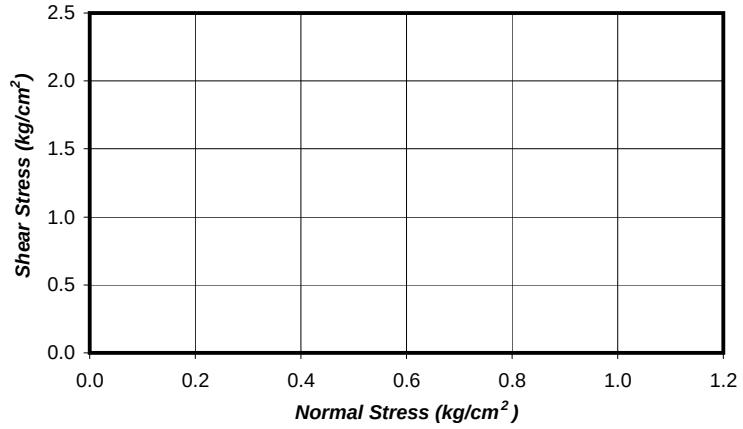
BH No.:	BH-4A	**Test Type: UU**	c : 0.98 kg/sq. cm
Depth:	10.00 m		ϕ : 7 degree

Mohr-Diagram



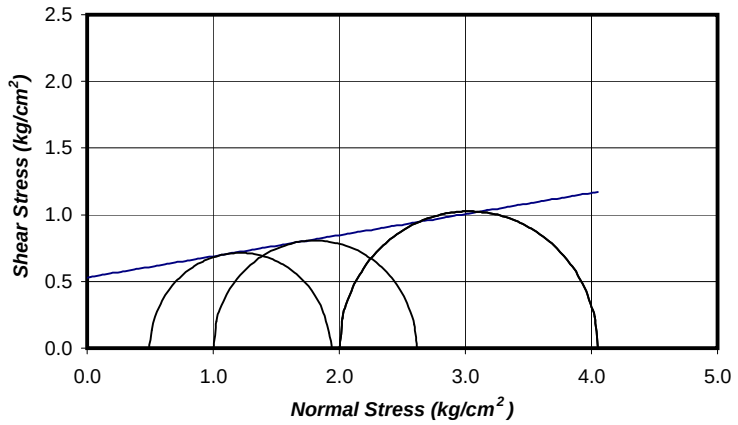
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



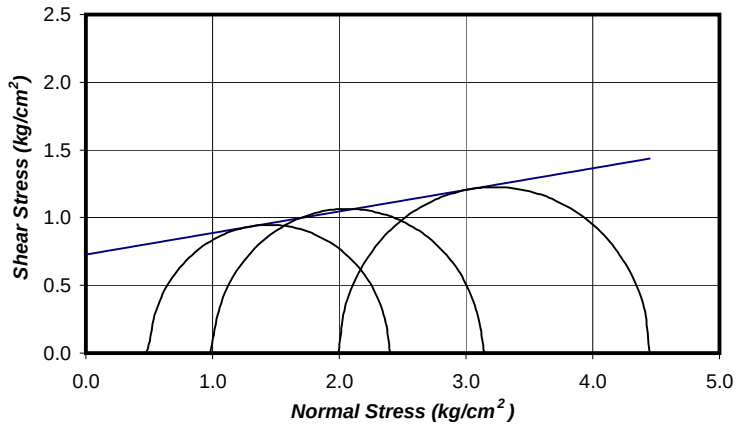
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



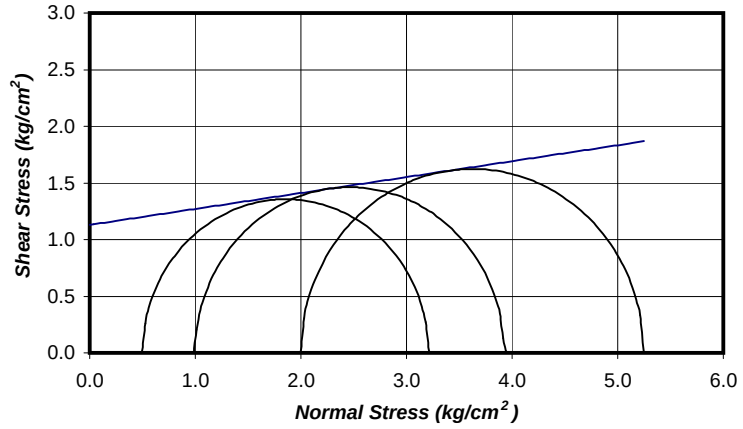
BH No.:	BH-5	**Test Type: UU**	c : 0.53 kg/sq. cm
Depth:	2.00 m		ϕ : 9 degree

Mohr-Diagram



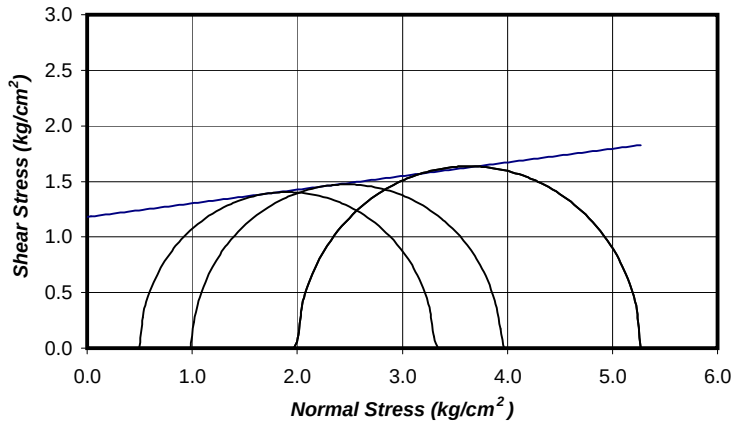
BH No.:	BH-5	**Test Type: UU**	c : 0.73 kg/sq. cm
Depth:	4.00 m		ϕ : 9 degree

Mohr-Diagram



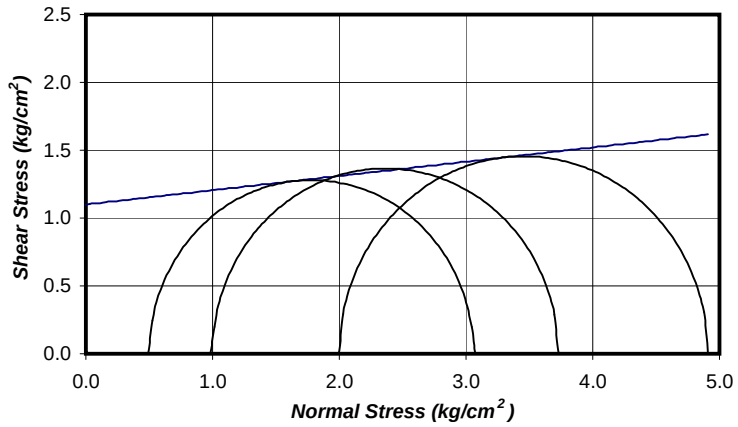
BH No.:	BH-5	**Test Type: UU**	c : 1.13 kg/sq. cm
Depth:	8.00 m		ϕ : 8 degree

Mohr-Diagram



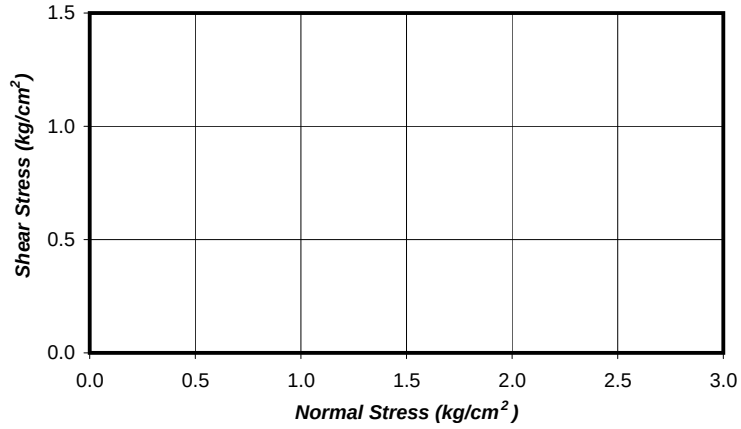
BH No.:	BH-5	**Test Type: UU**	c : 1.18 kg/sq. cm
Depth:	12.00 m		ϕ : 7 degree

Mohr-Diagram



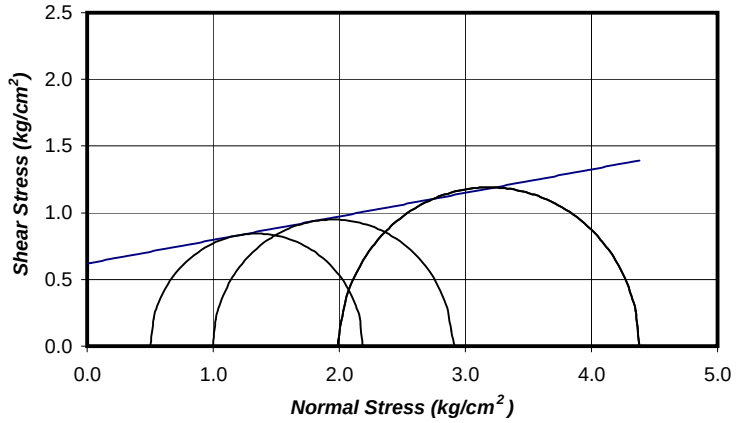
BH No.:	BH-5	**Test Type: UU**	c : 1.10 kg/sq. cm
Depth:	18.00 m		ϕ : 6 degree

Mohr-Diagram



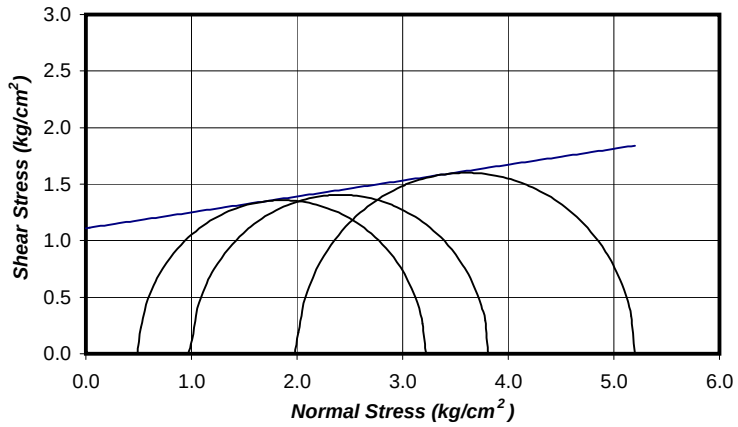
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



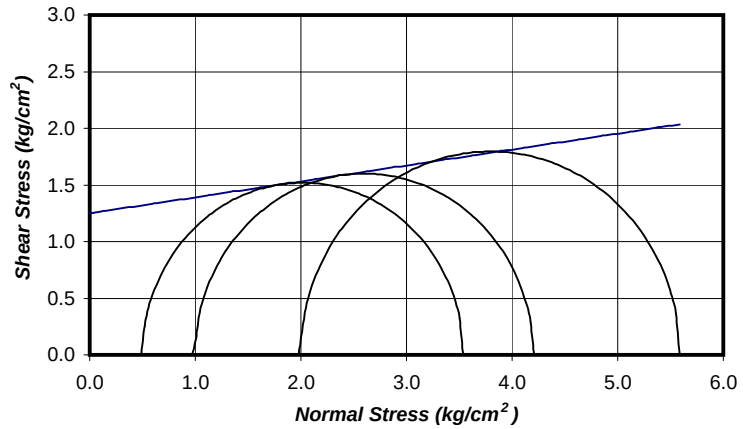
BH No.:	BH-6	**Test Type: UU**	c : 0.62 kg/sq. cm
Depth:	2.00 m		ϕ : 10 degree

Mohr-Diagram



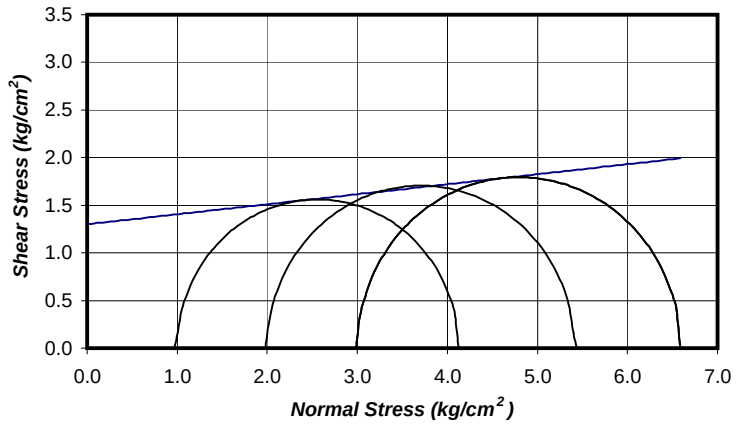
BH No.:	BH-6	**Test Type: UU**	c : 1.11 kg/sq. cm
Depth:	4.00 m		ϕ : 8 degree

Mohr-Diagram



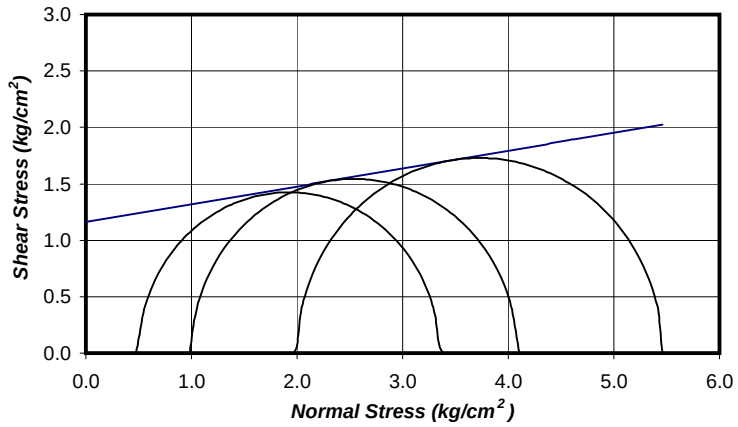
BH No.:	BH-6	**Test Type: UU**	c : 1.25 kg/sq. cm
Depth:	8.00 m		ϕ : 8 degree

Mohr-Diagram



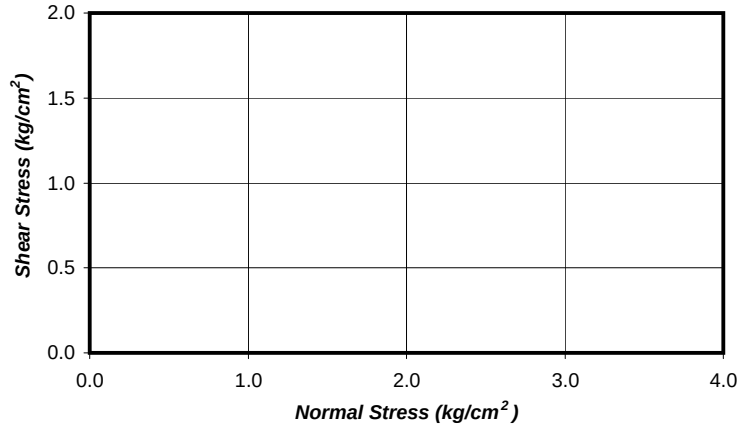
BH No.:	BH-6	**Test Type: UU**	c : 1.30 kg/sq. cm
Depth:	12.00 m		ϕ : 6 degree

Mohr-Diagram



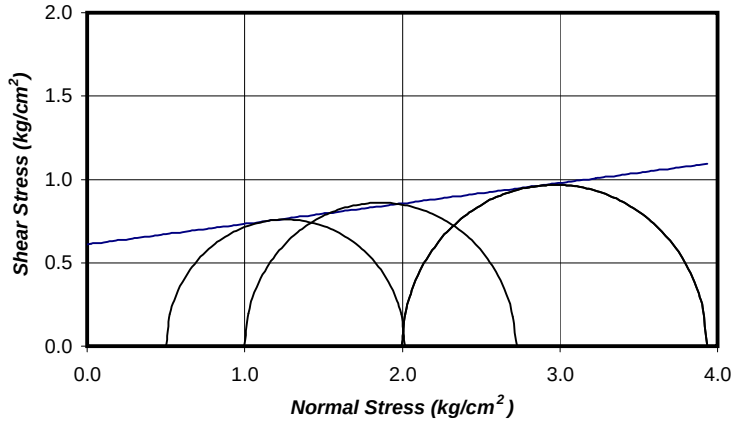
BH No.:	BH-6	**Test Type: UU**	c : 1.16 kg/sq. cm
Depth:	16.00 m		ϕ : 9 degree

Mohr-Diagram



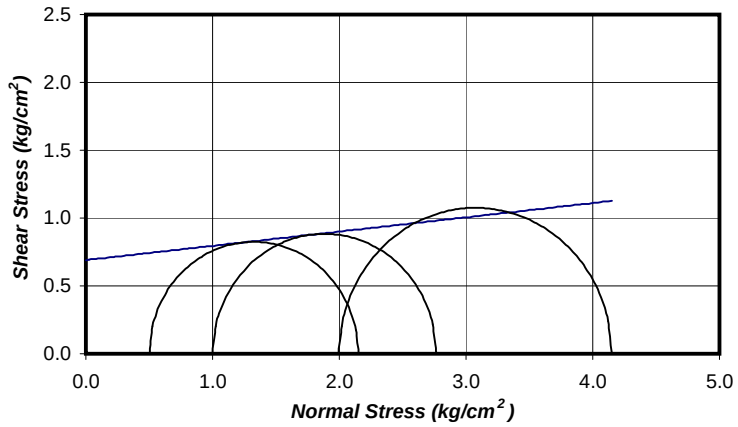
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



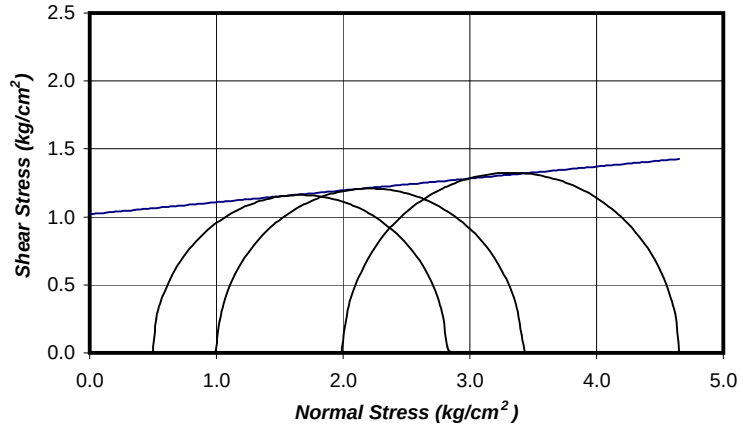
BH No.:	BH-6A	**Test Type: UU**	c : 0.61 kg/sq. cm
Depth:	1.00 m		ϕ : 7 degree

Mohr-Diagram



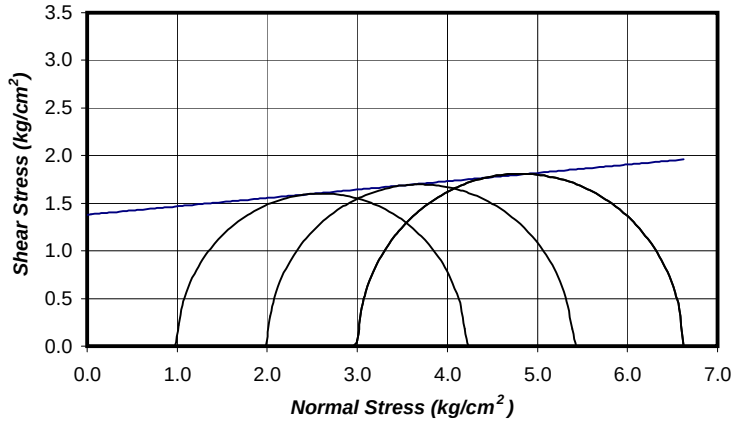
BH No.:	BH-6A	**Test Type: UU**	c : 0.69 kg/sq. cm
Depth:	3.00 m		ϕ : 6 degree

Mohr-Diagram



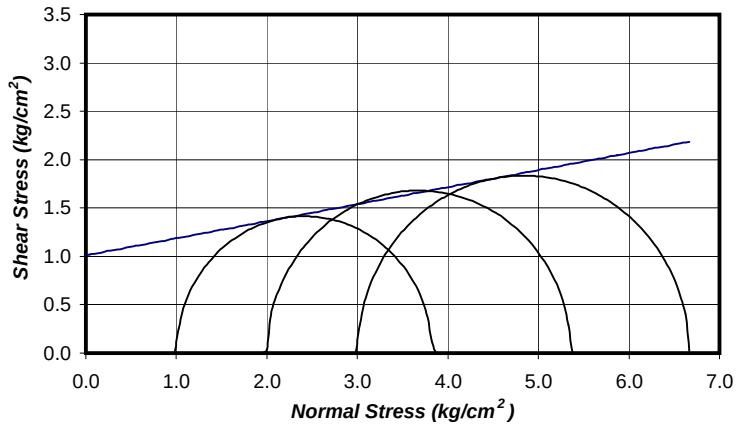
BH No.:	BH-6A	**Test Type: UU**	c : 1.02 kg/sq. cm
Depth:	6.00 m		ϕ : 5 degree

Mohr-Diagram



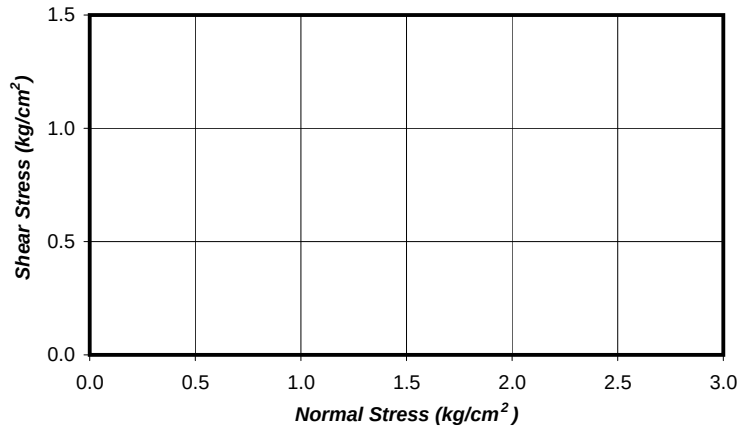
BH No.:	BH-6A	**Test Type: UU**	c : 1.38 kg/sq. cm
Depth:	10.00 m		ϕ : 5 degree

Mohr-Diagram



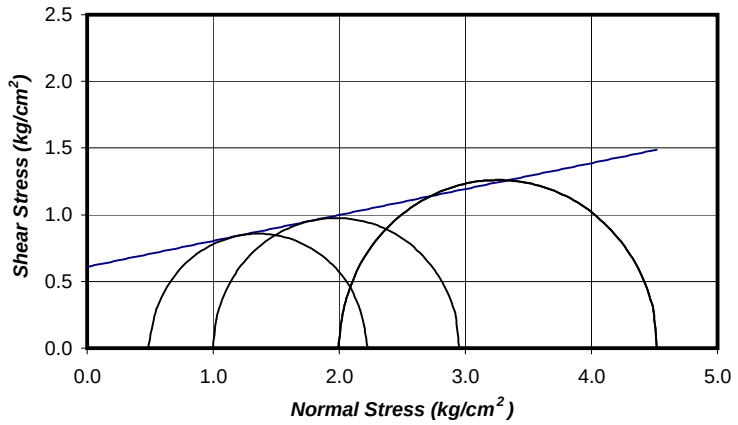
BH No.:	BH-6A	**Test Type: UU**	c : 1.01 kg/sq. cm
Depth:	14.00 m		ϕ : 10 degree

Mohr-Diagram



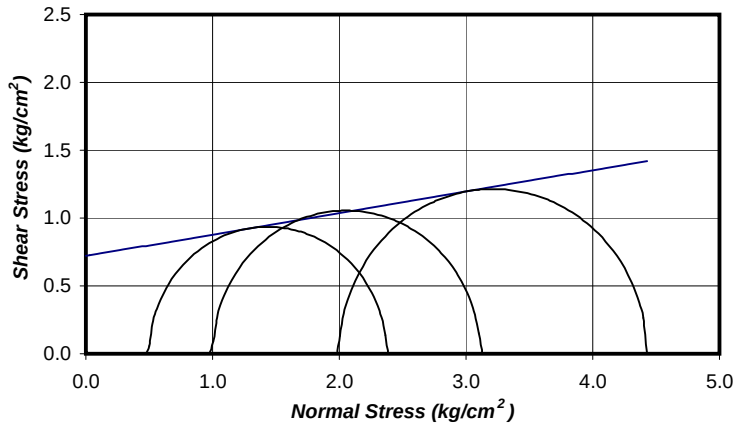
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



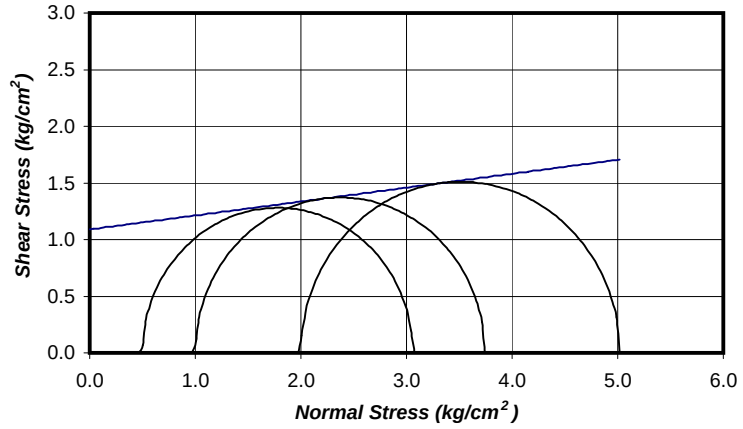
BH No.:	BH-7	**Test Type: UU**	c : 0.61 kg/sq. cm
Depth:	1.00 m		ϕ : 11 degree

Mohr-Diagram



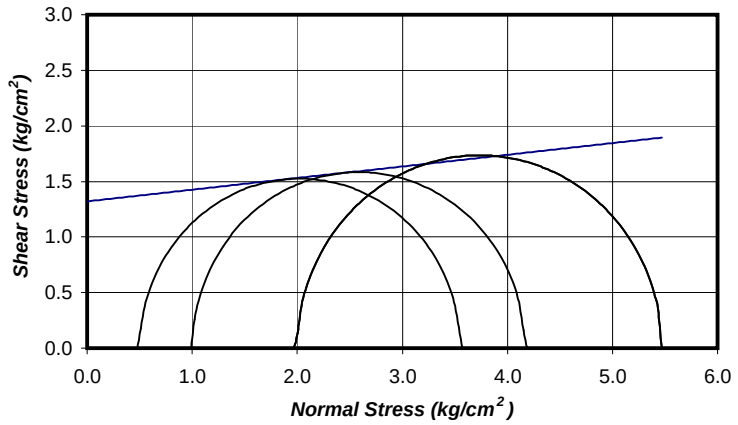
BH No.:	BH-7	**Test Type: UU**	c : 0.72 kg/sq. cm
Depth:	3.00 m		ϕ : 9 degree

Mohr-Diagram



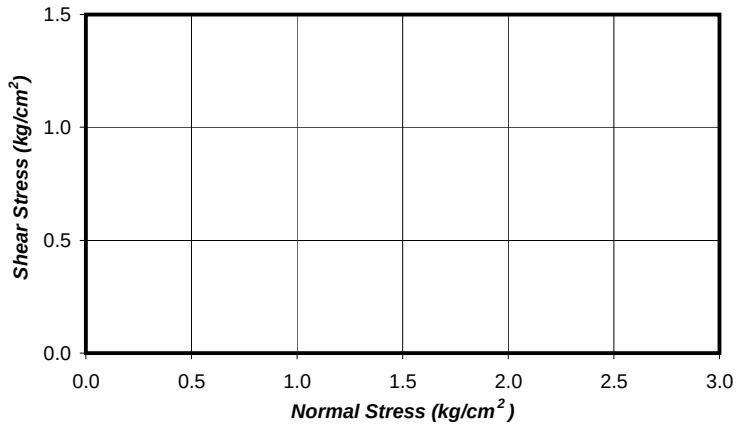
BH No.:	BH-7	**Test Type: UU**	c : 1.09 kg/sq. cm
Depth:	6.00 m		ϕ : 7 degree

Mohr-Diagram



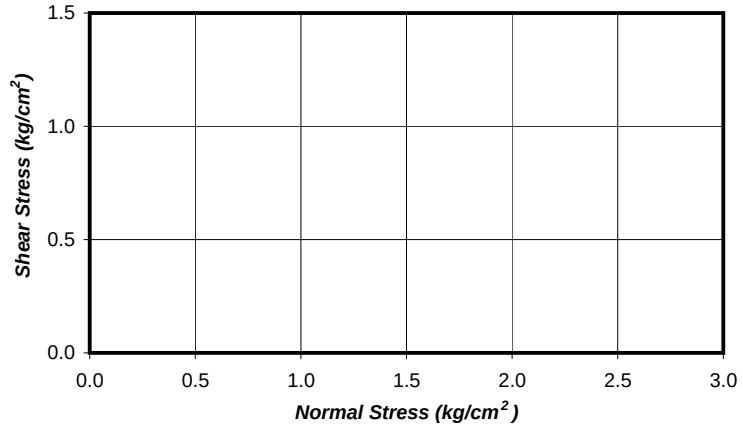
BH No.:	BH-7	**Test Type: UU**	c : 1.32 kg/sq. cm
Depth:	10.00 m		ϕ : 6 degree

Mohr-Diagram



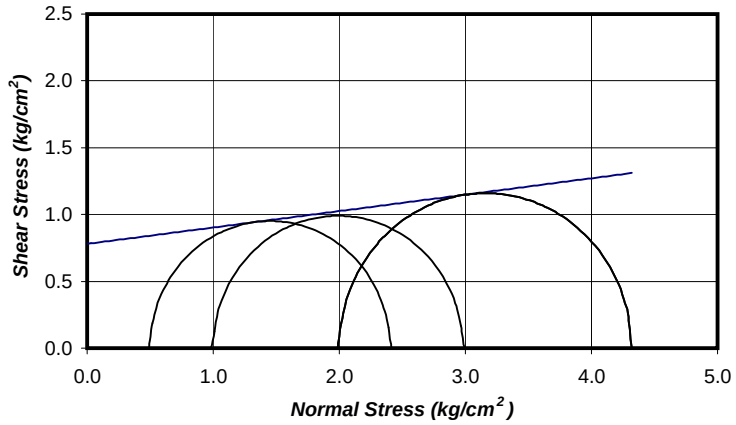
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



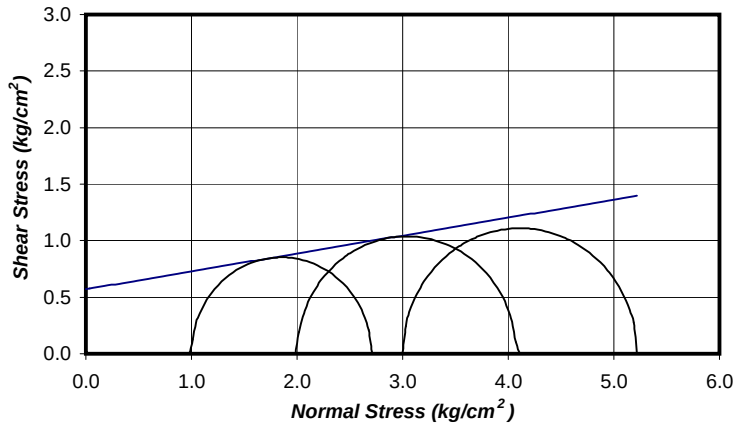
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



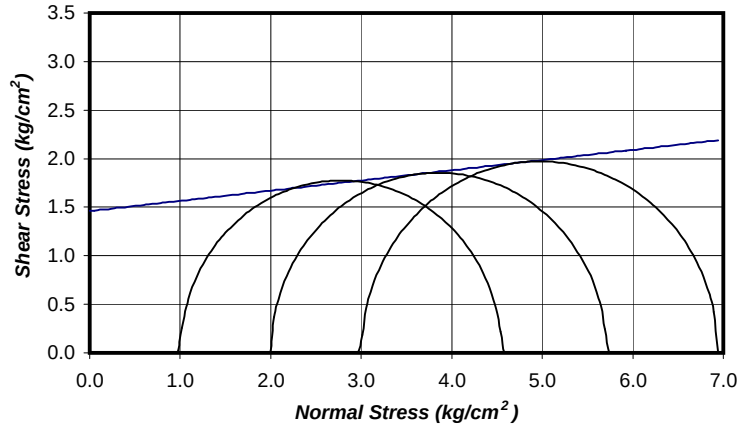
BH No.:	BH-8	**Test Type: UU**	c : 0.78 kg/sq. cm
Depth:	3.00 m		ϕ : 7 degree

Mohr-Diagram



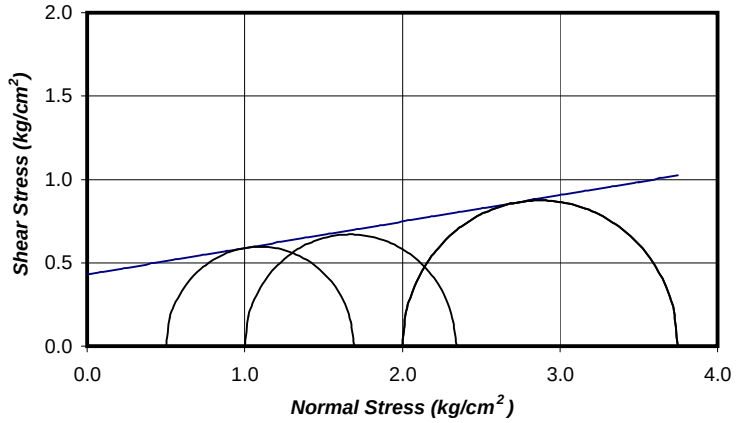
BH No.:	BH-8	**Test Type: UU**	c : 0.57 kg/sq. cm
Depth:	10.00 m		ϕ : 9 degree

Mohr-Diagram



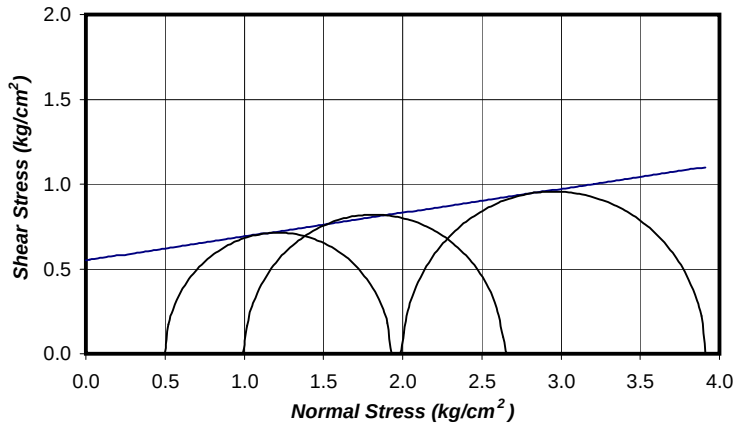
BH No.:	BH-8	**Test Type: UU**	c : 1.46 kg/sq. cm
Depth:	14.00 m		ϕ : 6 degree

Mohr-Diagram



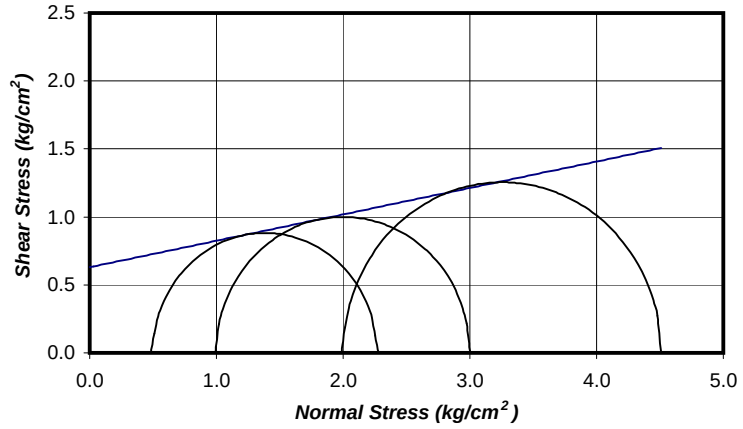
BH No.:	BH-11	**Test Type: UU**	c : 0.43 kg/sq. cm
Depth:	1.00 m		ϕ : 9 degree

Mohr-Diagram



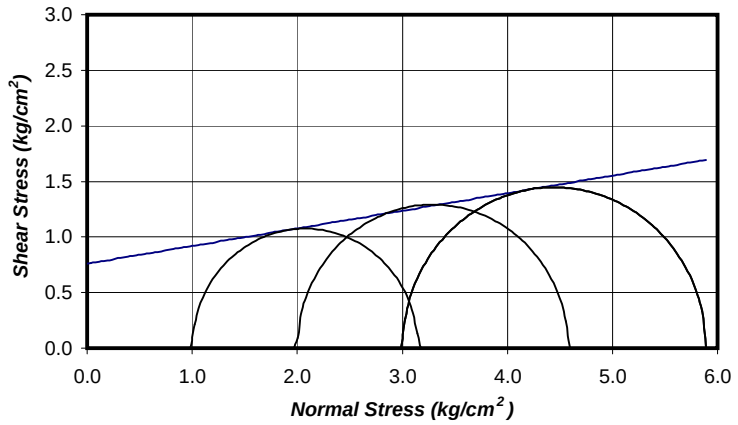
BH No.:	BH-11	**Test Type: UU**	c : 0.55 kg/sq. cm
Depth:	3.00 m		ϕ : 8 degree

Mohr-Diagram



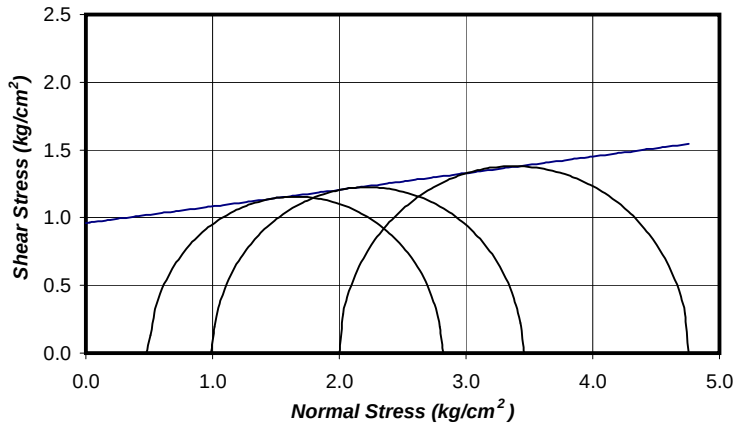
BH No.:	BH-11	**Test Type: UU**	c : 0.63 kg/sq. cm
Depth:	8.00 m		ϕ : 11 degree

Mohr-Diagram



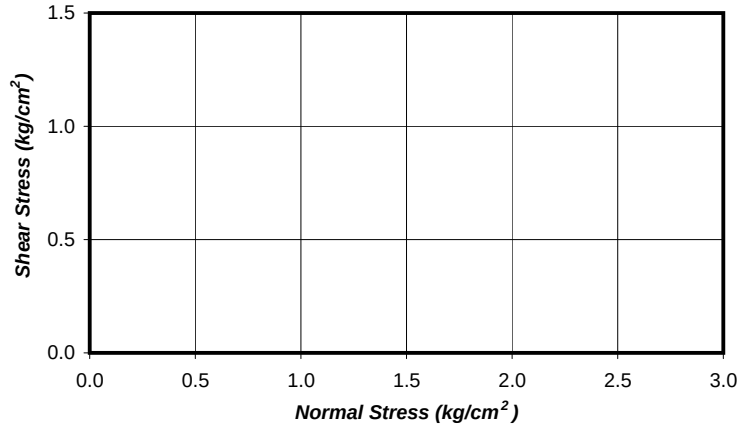
BH No.:	BH-11	**Test Type: UU**	c : 0.76 kg/sq. cm
Depth:	12.00 m		ϕ : 9 degree

Mohr-Diagram



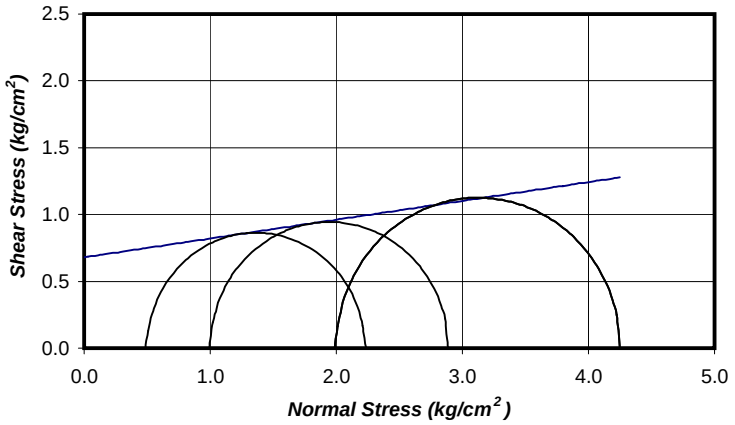
BH No.:	BH-11	**Test Type: UU**	c : 0.96 kg/sq. cm
Depth:	16.00 m		ϕ : 7 degree

Mohr-Diagram



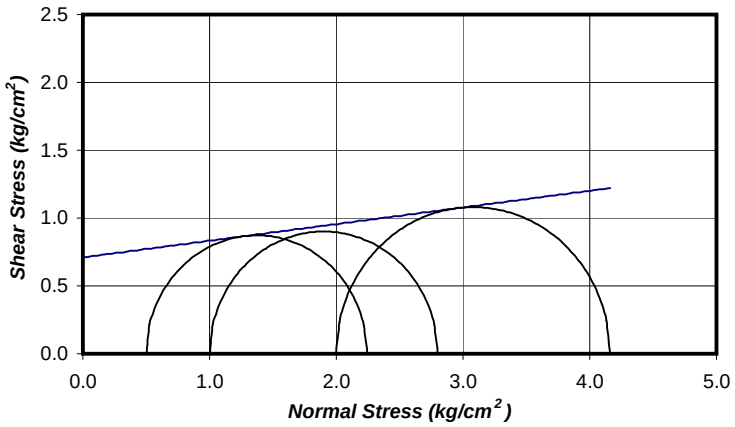
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



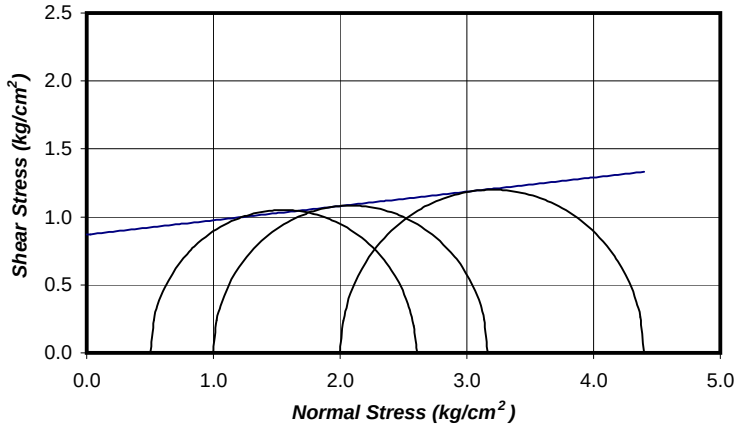
BH No.:	BH-12	**Test Type: UU**	c : 0.68 kg/sq. cm
Depth:	1.00 m		ϕ : 8 degree

Mohr-Diagram



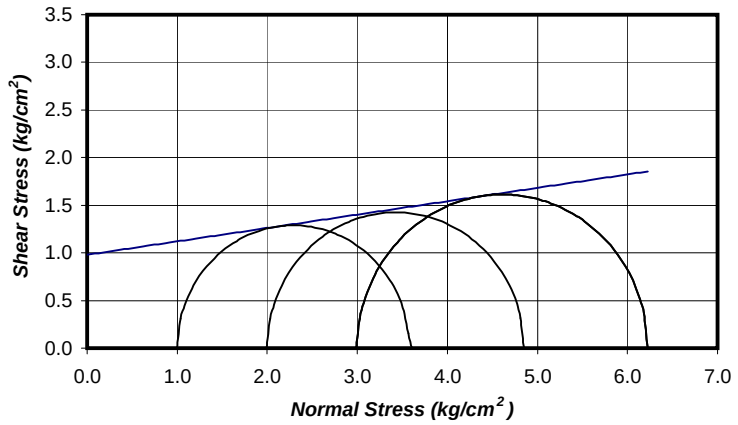
BH No.:	BH-12	**Test Type: UU**	c : 0.71 kg/sq. cm
Depth:	3.00 m		ϕ : 7 degree

Mohr-Diagram



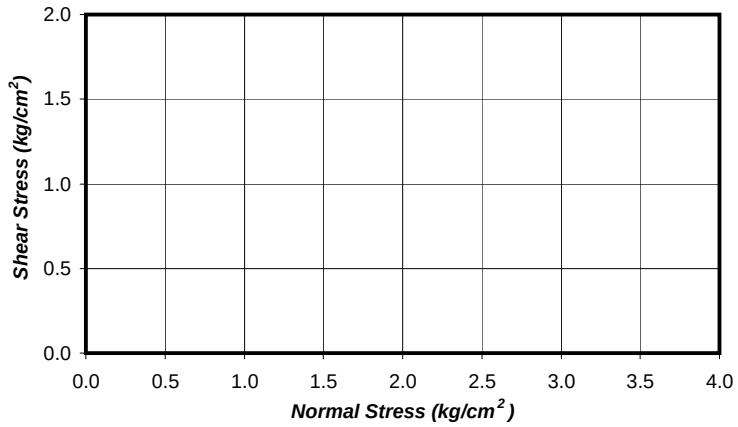
BH No.:	BH-12	**Test Type: UU**	c : 0.87 kg/sq. cm
Depth:	6.00 m		ϕ : 6 degree

Mohr-Diagram



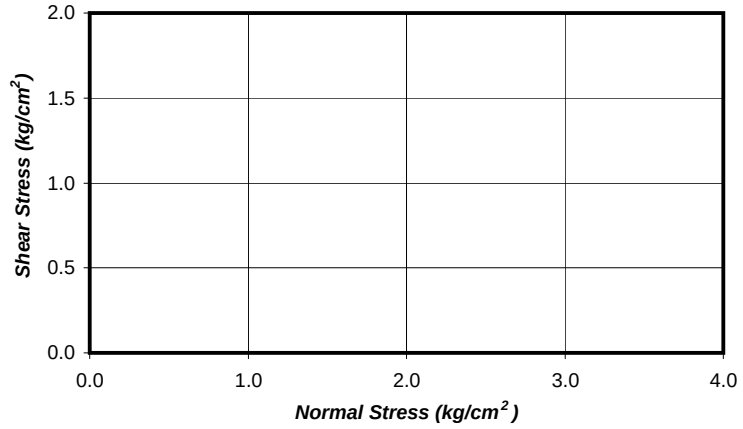
BH No.:	BH-12	**Test Type: UU**	c : 0.98 kg/sq. cm
Depth:	10.00 m		ϕ : 8 degree

Mohr-Diagram



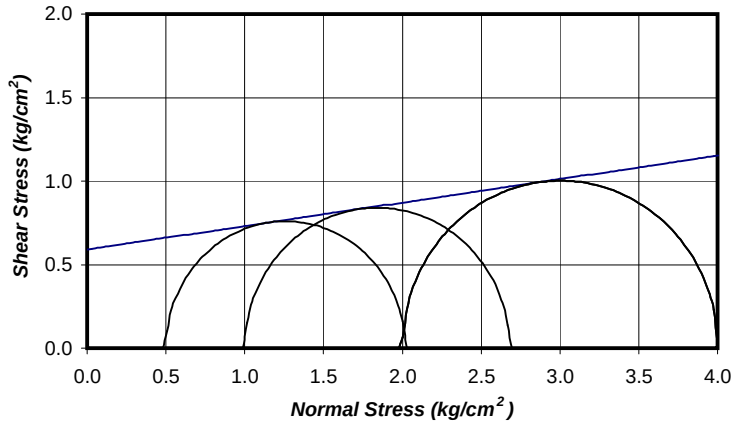
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



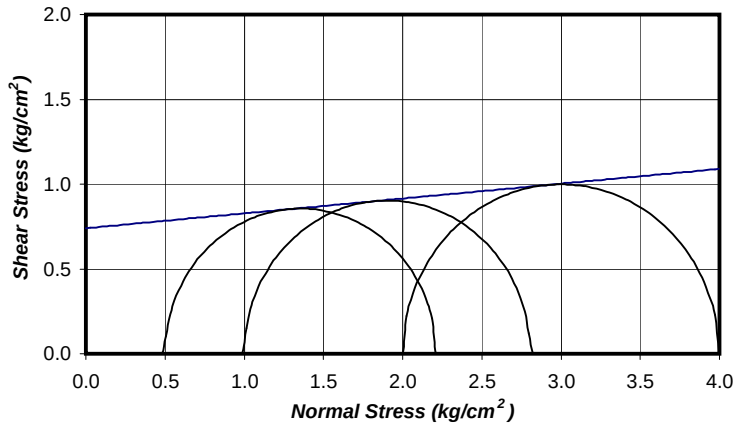
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



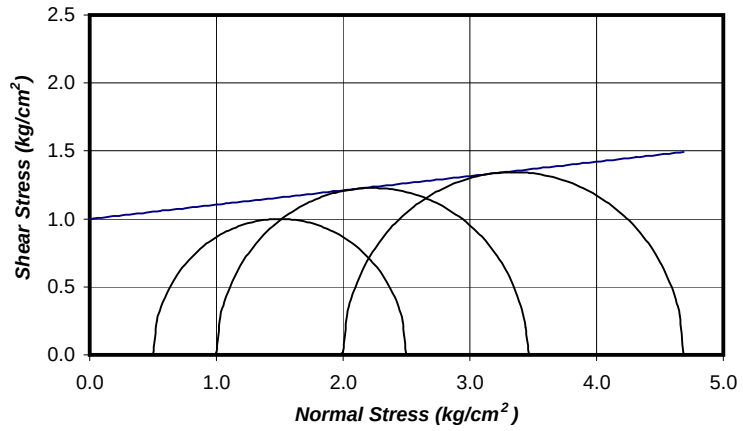
BH No.:	BH-12A	**Test Type: UU**	c : 0.59 kg/sq. cm
Depth:	1.00 m		ϕ : 8 degree

Mohr-Diagram



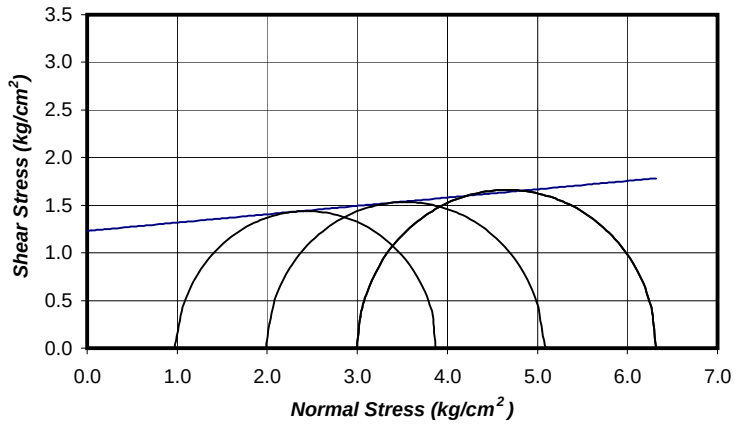
BH No.:	BH-12A	**Test Type: UU**	c : 0.74 kg/sq. cm
Depth:	3.00 m		ϕ : 5 degree

Mohr-Diagram



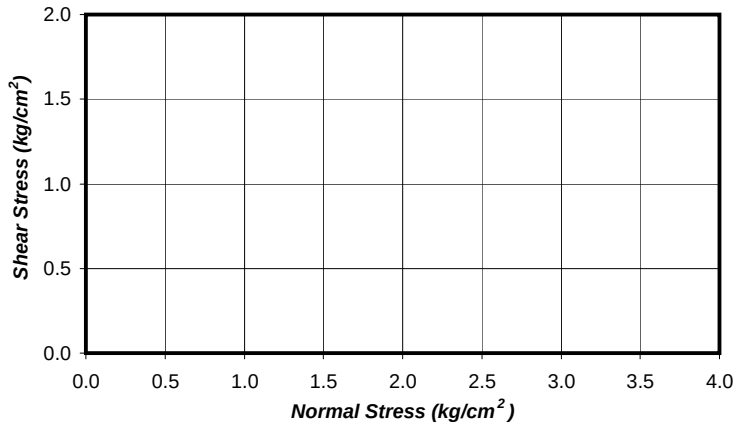
BH No.:	BH-12A	**Test Type: UU**	c : 1.00 kg/sq. cm
Depth:	6.00 m		ϕ : 6 degree

Mohr-Diagram



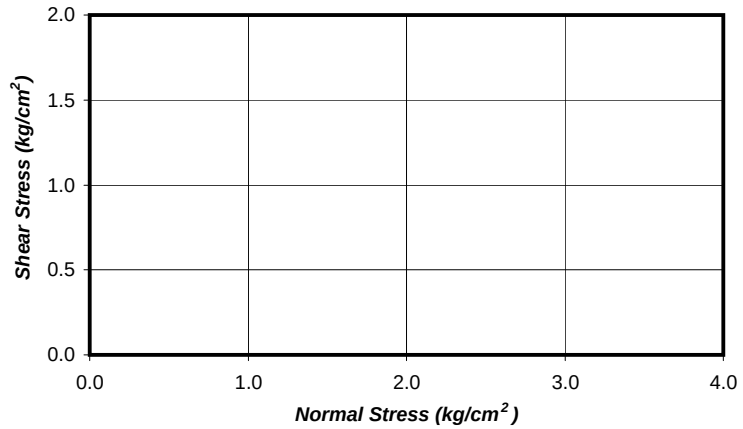
BH No.:	BH-12A	**Test Type: UU**	c : 1.23 kg/sq. cm
Depth:	10.00 m		ϕ : 5 degree

Mohr-Diagram



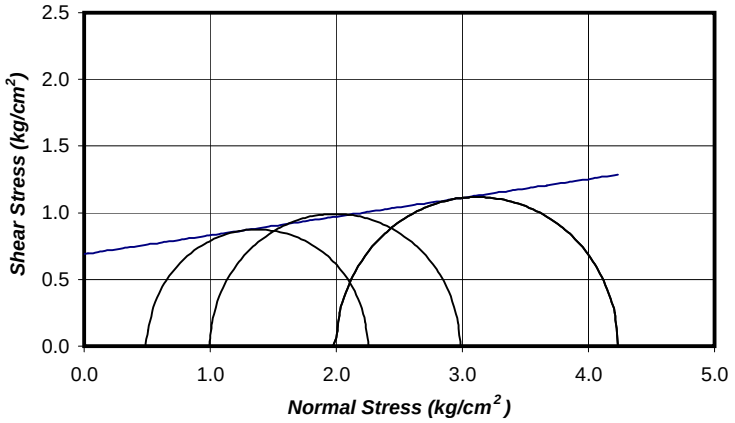
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



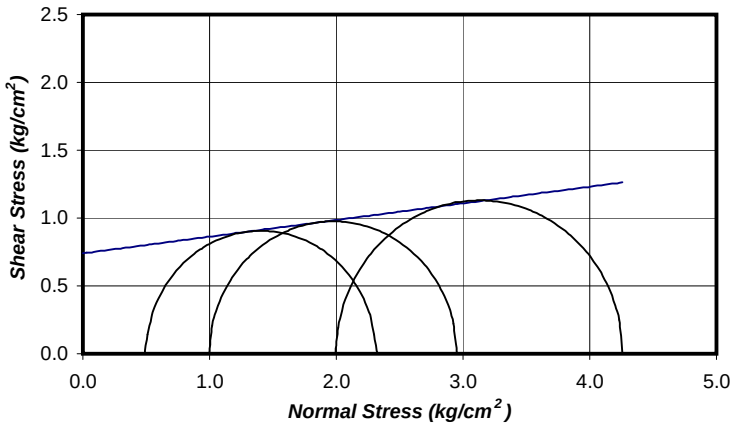
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



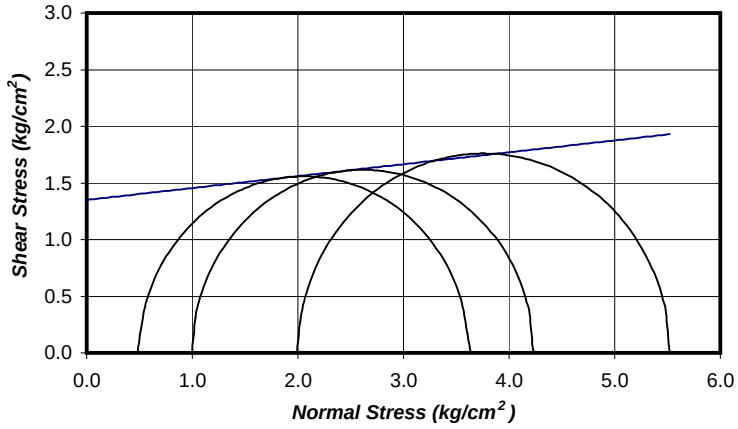
BH No.:	BH-13	**Test Type: UU**	c : 0.69 kg/sq. cm
Depth:	1.00 m		ϕ : 8 degree

Mohr-Diagram



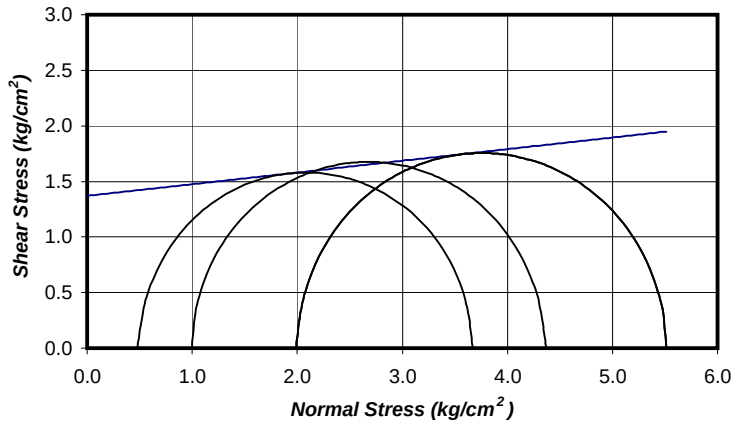
BH No.:	BH-13	**Test Type: UU**	c : 0.74 kg/sq. cm
Depth:	3.00 m		ϕ : 7 degree

Mohr-Diagram



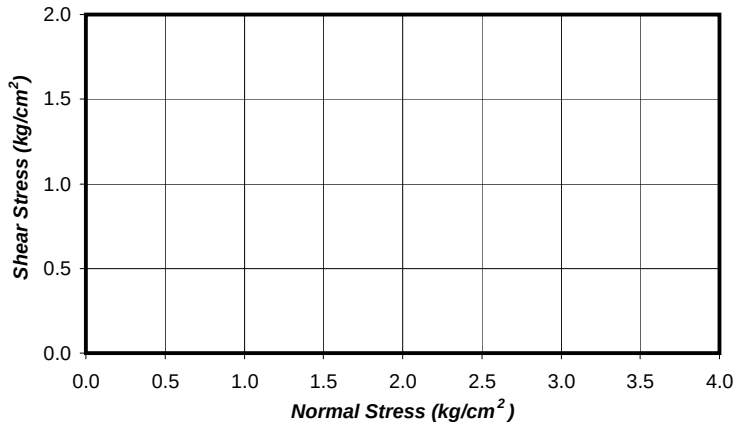
BH No.:	BH-13	**Test Type: UU**	c : 1.35 kg/sq. cm
Depth:	6.00 m		ϕ : 6 degree

Mohr-Diagram



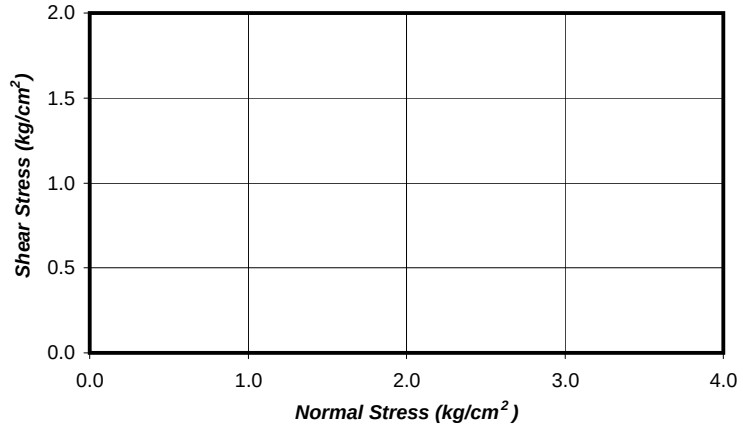
BH No.:	BH-13	**Test Type: UU**	c : 1.37 kg/sq. cm
Depth:	10.00 m		ϕ : 6 degree

Mohr-Diagram



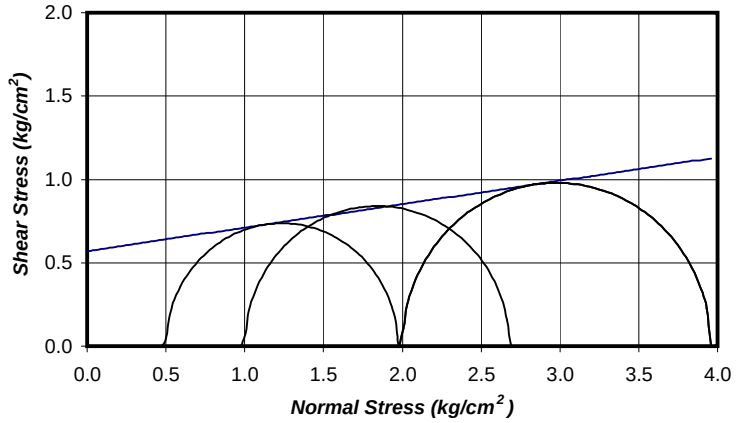
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



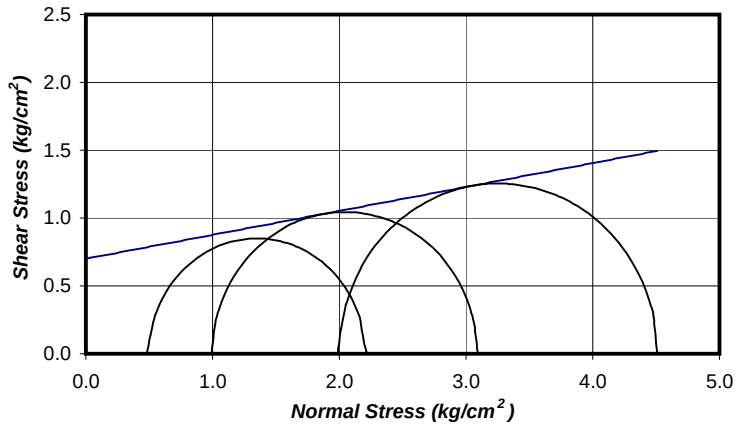
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



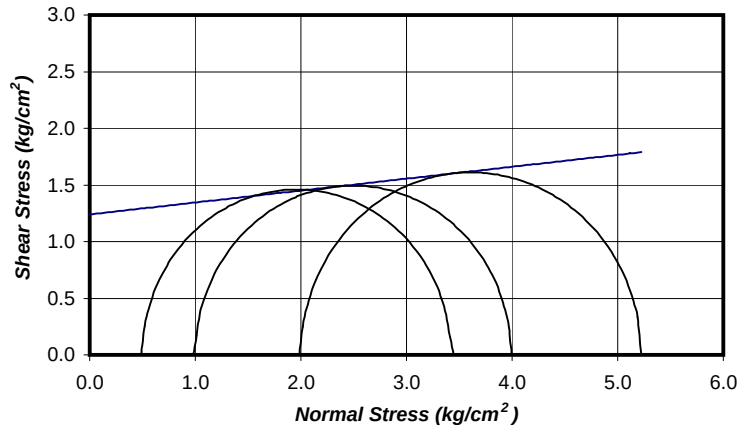
BH No.:	BH-14	**Test Type: UU**	c : 0.57 kg/sq. cm
Depth:	1.00 m		ϕ : 8 degree

Mohr-Diagram



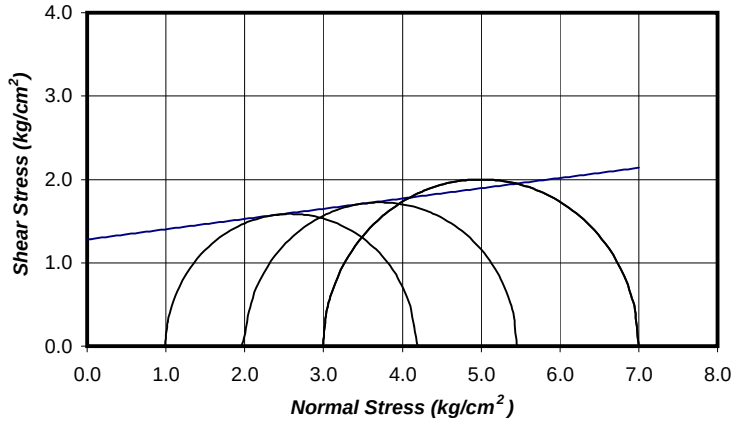
BH No.:	BH-14	**Test Type: UU**	c : 0.70 kg/sq. cm
Depth:	3.00 m		ϕ : 10 degree

Mohr-Diagram



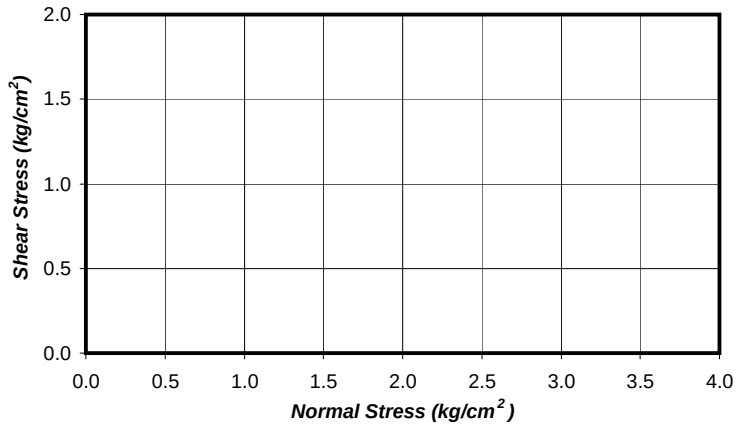
BH No.:	BH-14	**Test Type: UU**	c : 1.24 kg/sq. cm
Depth:	6.00 m		ϕ : 6 degree

Mohr-Diagram



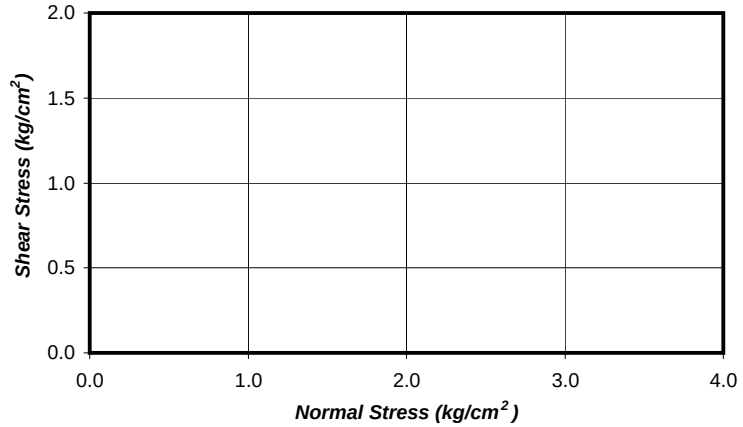
BH No.:	BH-14	**Test Type: UU**	c : 1.28 kg/sq. cm
Depth:	10.00 m		ϕ : 7 degree

Mohr-Diagram



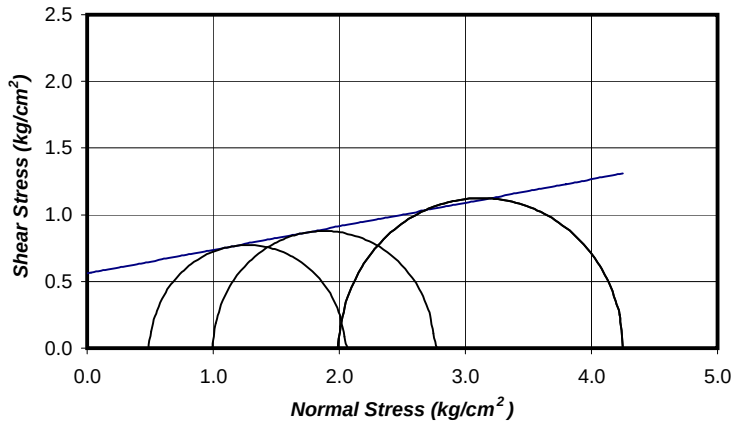
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



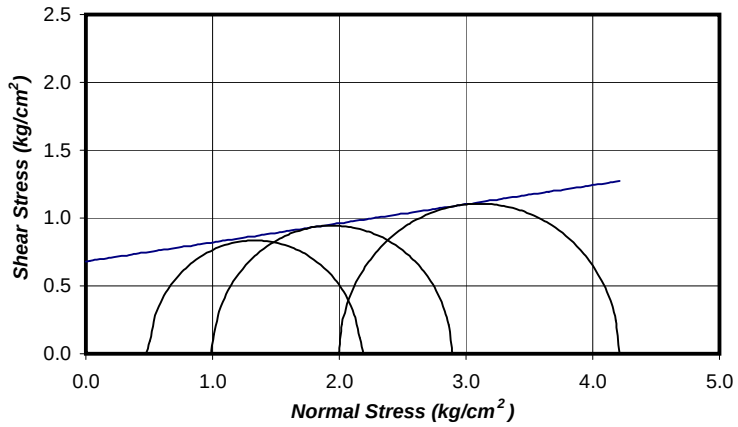
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



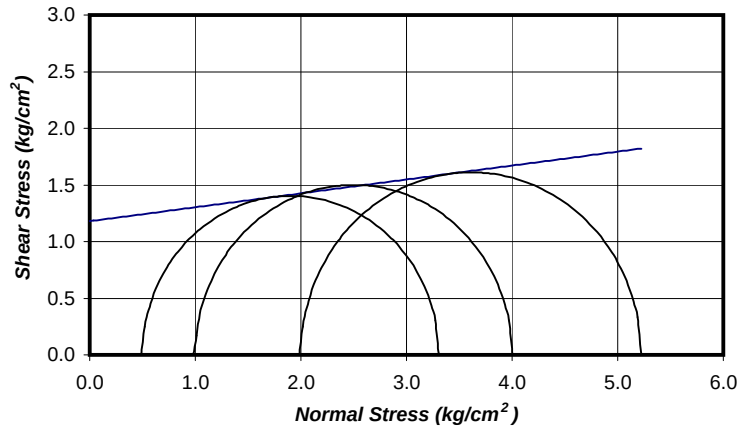
BH No.:	BH-14A	**Test Type: UU**	c : 0.56 kg/sq. cm
Depth:	1.00 m		ϕ : 10 degree

Mohr-Diagram



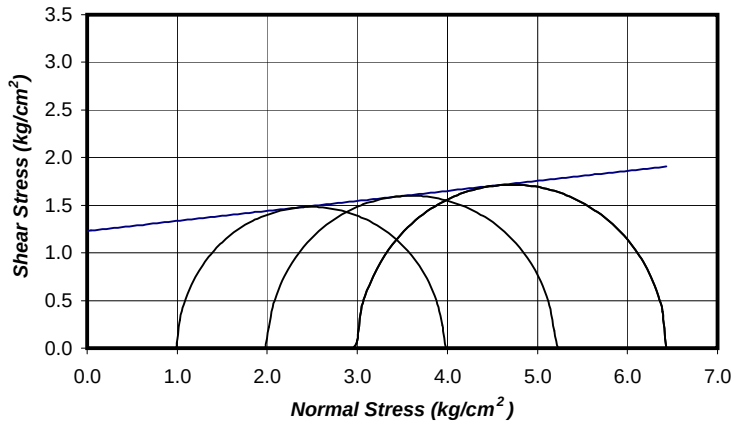
BH No.:	BH-14A	**Test Type: UU**	c : 0.68 kg/sq. cm
Depth:	3.00 m		ϕ : 8 degree

Mohr-Diagram



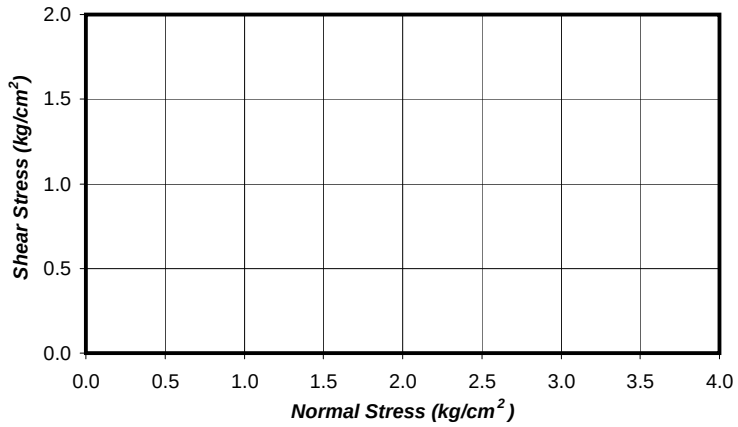
BH No.:	BH-14A	**Test Type: UU**	c : 1.18 kg/sq. cm
Depth:	6.00 m		ϕ : 7 degree

Mohr-Diagram



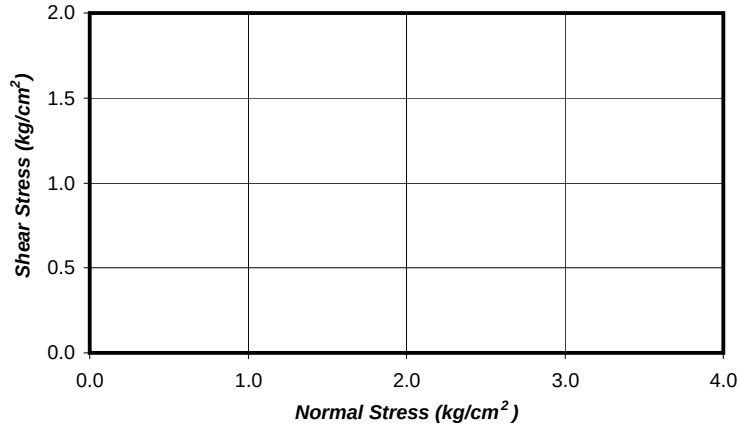
BH No.:	BH-14A	**Test Type: UU**	c : 1.23 kg/sq. cm
Depth:	10.00 m		ϕ : 6 degree

Mohr-Diagram



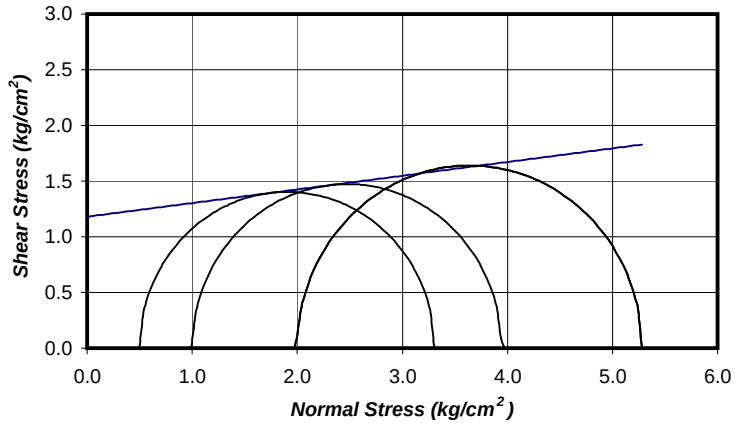
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



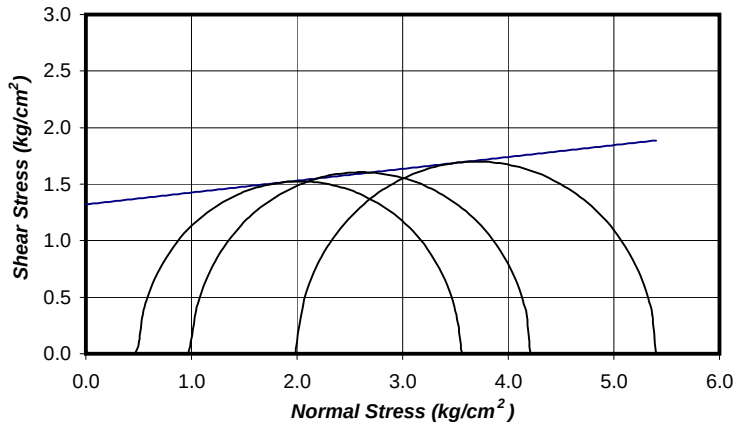
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



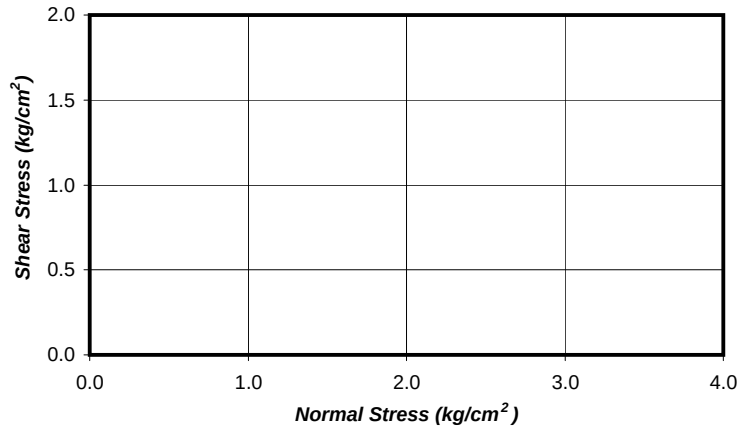
BH No.:	BH-15	**Test Type: UU**	c : 1.18 kg/sq. cm
Depth:	6.00 m		ϕ : 7 degree

Mohr-Diagram



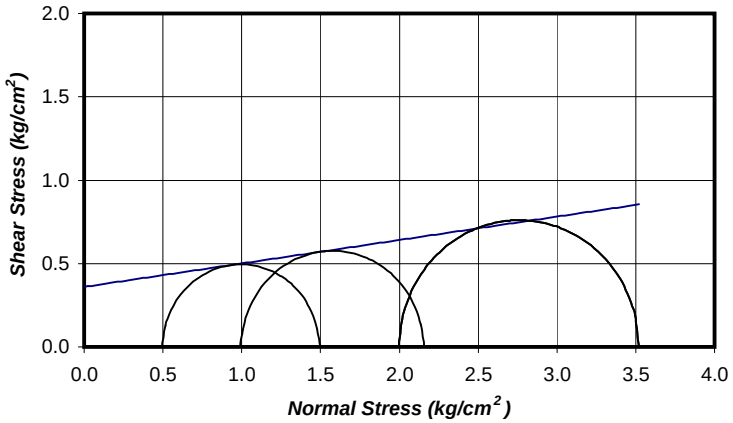
BH No.:	BH-15	**Test Type: UU**	c : 1.32 kg/sq. cm
Depth:	10.00 m		ϕ : 6 degree

Mohr-Diagram



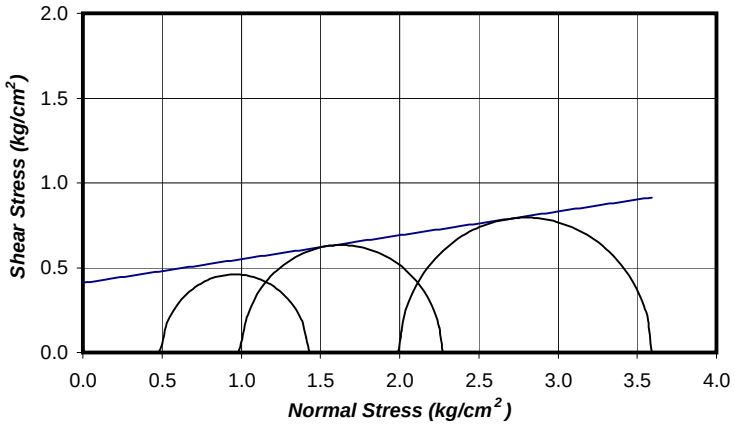
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



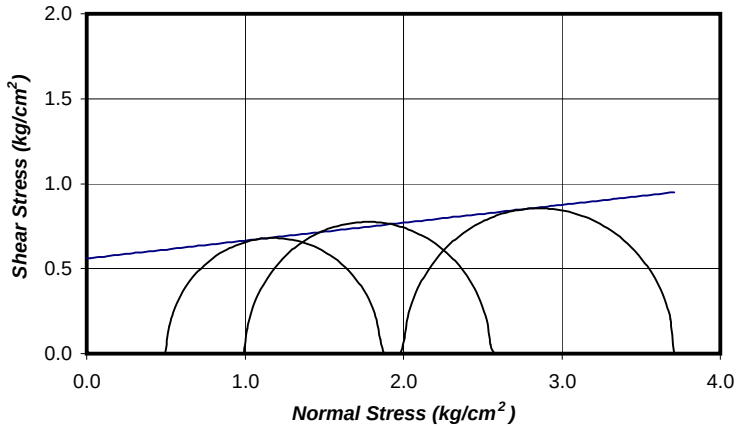
BH No.:	BH-16	**Test Type: UU**	c : 0.36 kg/sq. cm
Depth:	1.00 m		ϕ : 8 degree

Mohr-Diagram



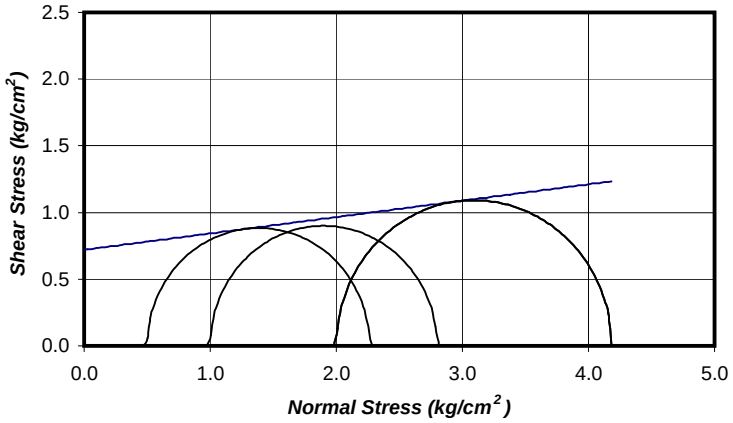
BH No.:	BH-16	**Test Type: UU**	c : 0.41 kg/sq. cm
Depth:	3.00 m		ϕ : 8 degree

Mohr-Diagram



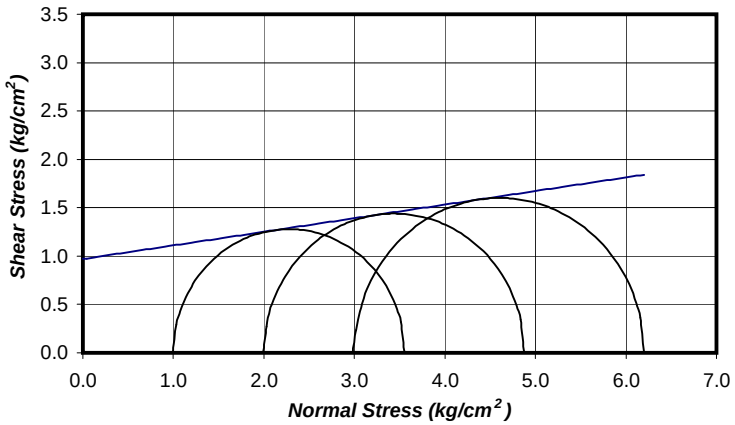
BH No.:	BH-16	**Test Type: UU**	c : 0.56 kg/sq. cm
Depth:	6.00 m		ϕ : 6 degree

Mohr-Diagram



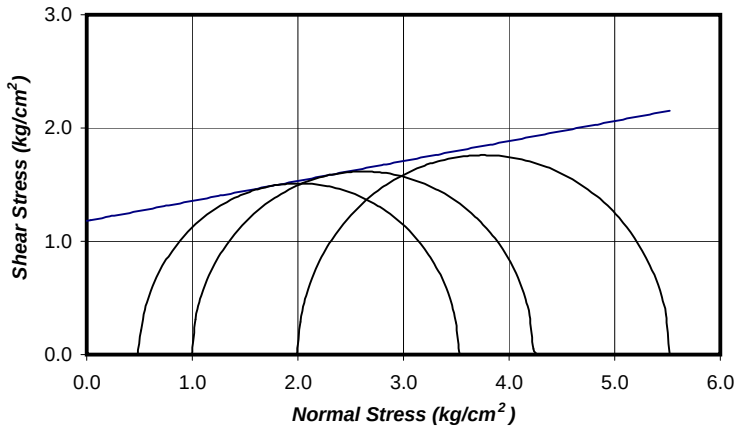
BH No.:	BH-16	**Test Type: UU**	c : 0.72 kg/sq. cm
Depth:	10.00 m		ϕ : 7 degree

Mohr-Diagram



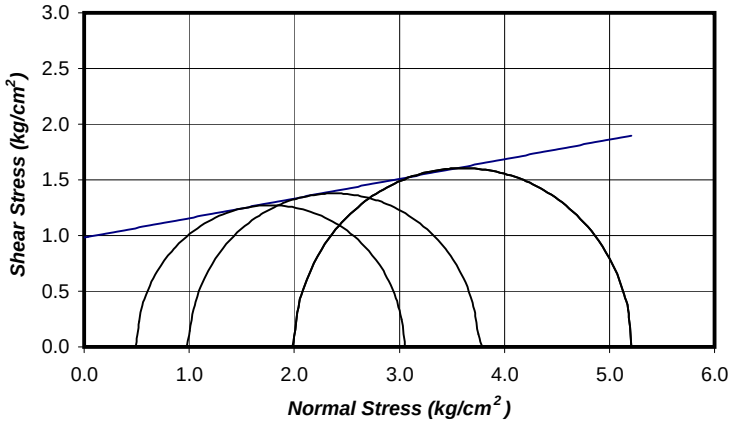
BH No.:	BH-16	**Test Type: UU**	c : 0.97 kg/sq. cm
Depth:	14.00 m		ϕ : 8 degree

Mohr-Diagram



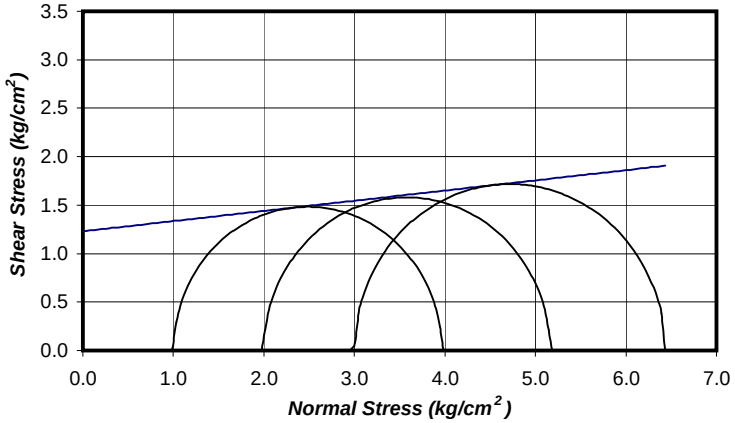
BH No.:	BH-16	**Test Type: UU**	c : 1.18 kg/sq. cm
Depth:	18.00 m		ϕ : 10 degree

Mohr-Diagram



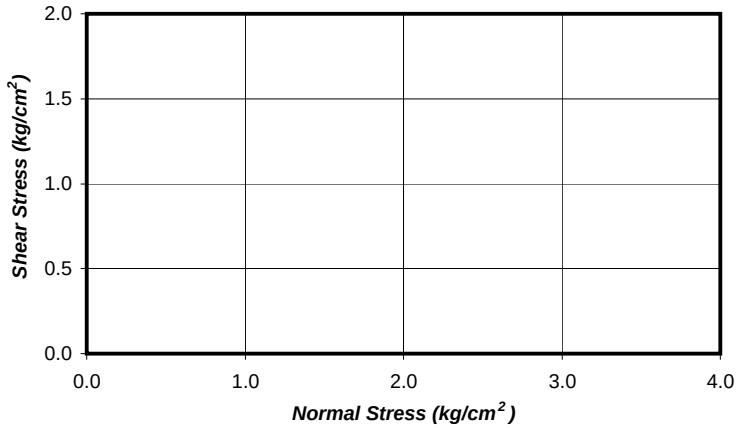
BH No.:	BH-17	**Test Type: UU**	c : 0.98 kg/sq. cm
Depth:	6.00 m		ϕ : 10 degree

Mohr-Diagram



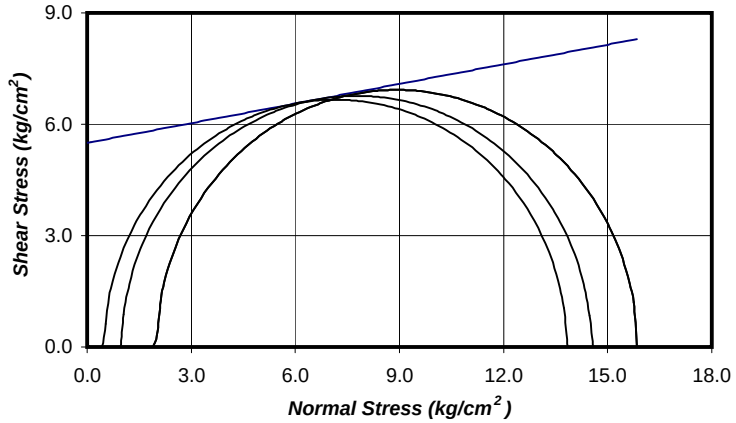
BH No.:	BH-17	**Test Type: UU**	c : 1.23 kg/sq. cm
Depth:	10.00 m		ϕ : 6 degree

Mohr-Diagram



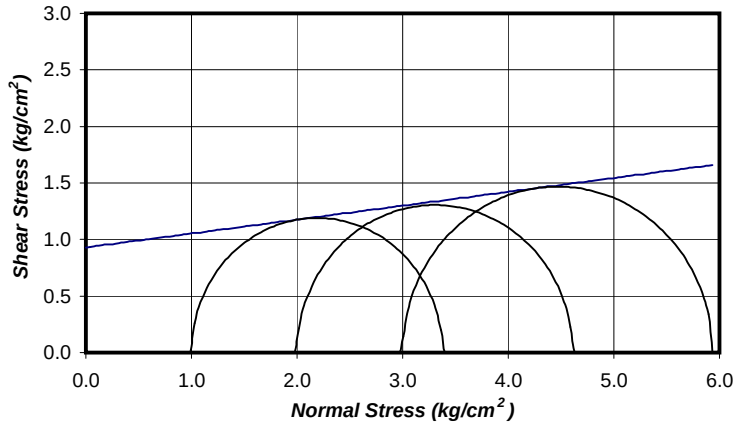
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



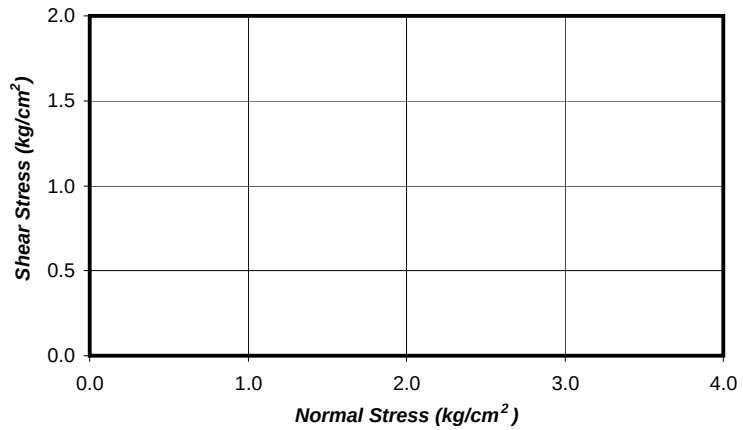
BH No.:	BH-18	**Test Type: UU**	c : 5.50 kg/sq. cm
Depth:	1.00 m		ϕ : 10 degree

Mohr-Diagram



BH No.:	BH-18	**Test Type: UU**	c : 0.93 kg/sq. cm
Depth:	6.00 m		ϕ : 7 degree

Mohr-Diagram



BH No.:		**Test Type:**	c :
Depth:			ϕ :

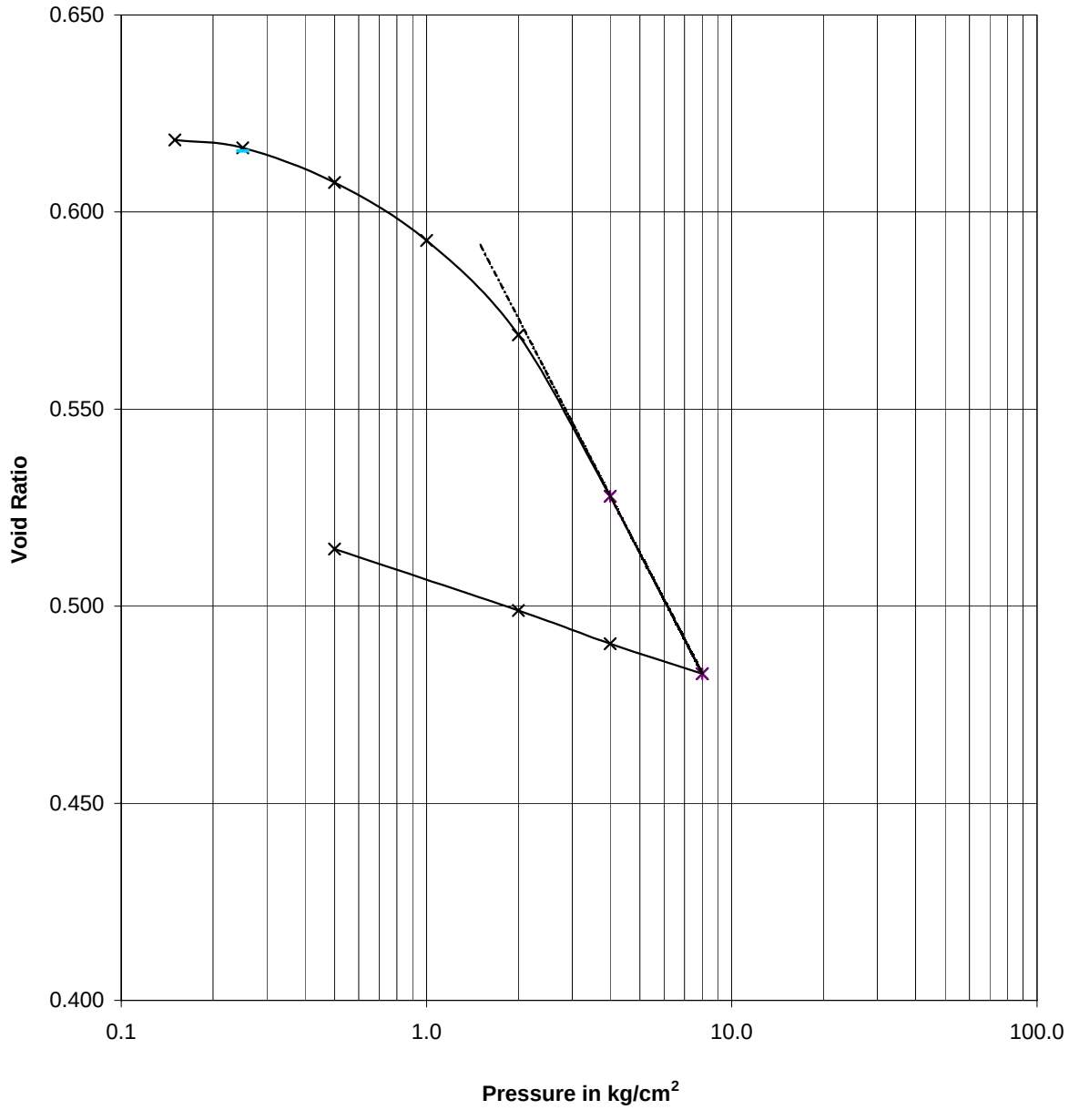
e-logp curve

BH-No. : BH-4 C_c = 0.1495

Depth : 3.0m $C_c/(1+e_0)$ = 0.0924

e_0 = 0.6183

Pressure range (kg/sq. cm)		m_v (Lab) (sq. cm/kg)
0.25 - 0.50	:	0.0218
0.50 - 1.00	:	0.0183
1.00 - 2.00	:	0.0151
2.00 - 4.00	:	0.0130
4.00 - 8.00	:	0.0074



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e-logp curve

BH-No. : BH-4A

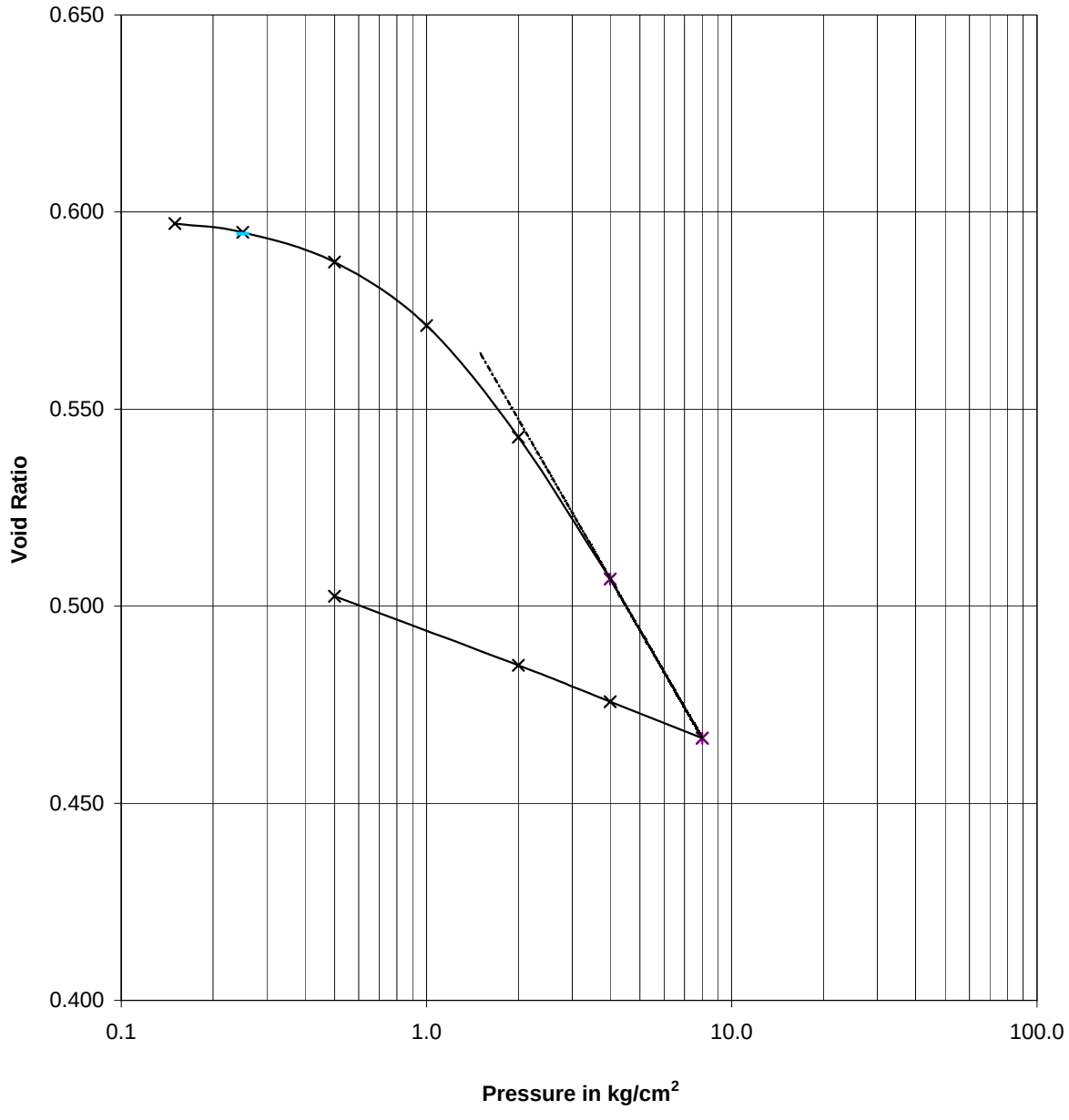
Depth : 1.0m

e_0 = 0.5968

C_c = 0.1342

$C_c/(1+e_0)$ = 0.0840

Pressure range (kg/sq. cm)		m_v (Lab) (sq. cm/kg)
0.25 - 0.50	:	0.0190
0.50 - 1.00	:	0.0203
1.00 - 2.00	:	0.0180
2.00 - 4.00	:	0.0117
4.00 - 8.00	:	0.0067



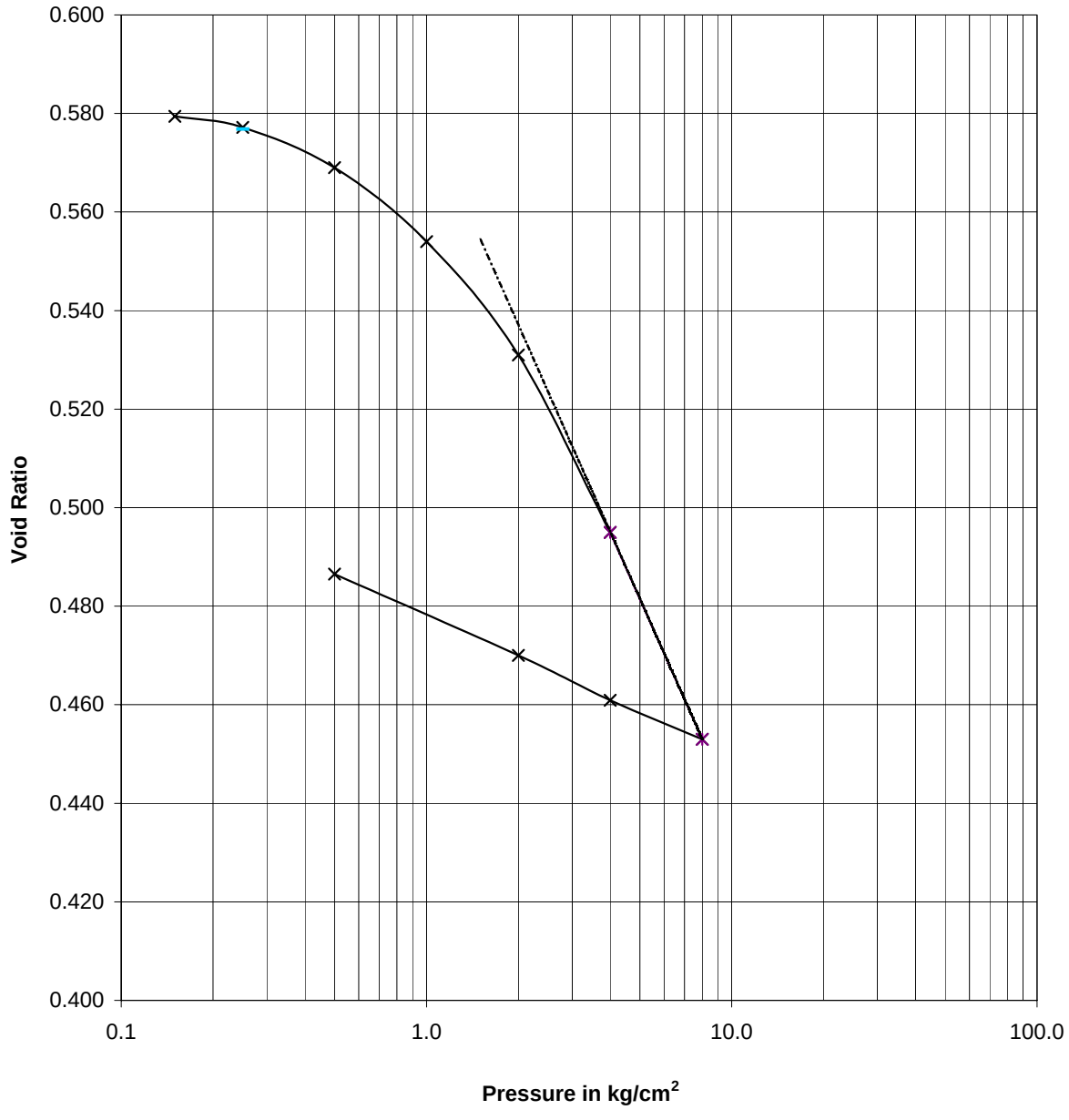
e-logp curve

BH-No. : BH-5 C_c = 0.1395

Depth : 8.0m $C_c/(1+e_0)$ = 0.0882

e_0 = 0.5815

Pressure range (kg/sq. cm)		m_v (Lab) (sq. cm/kg)
0.25 - 0.50	:	0.0207
0.50 - 1.00	:	0.0191
1.00 - 2.00	:	0.0148
2.00 - 4.00	:	0.0118
4.00 - 8.00	:	0.0070



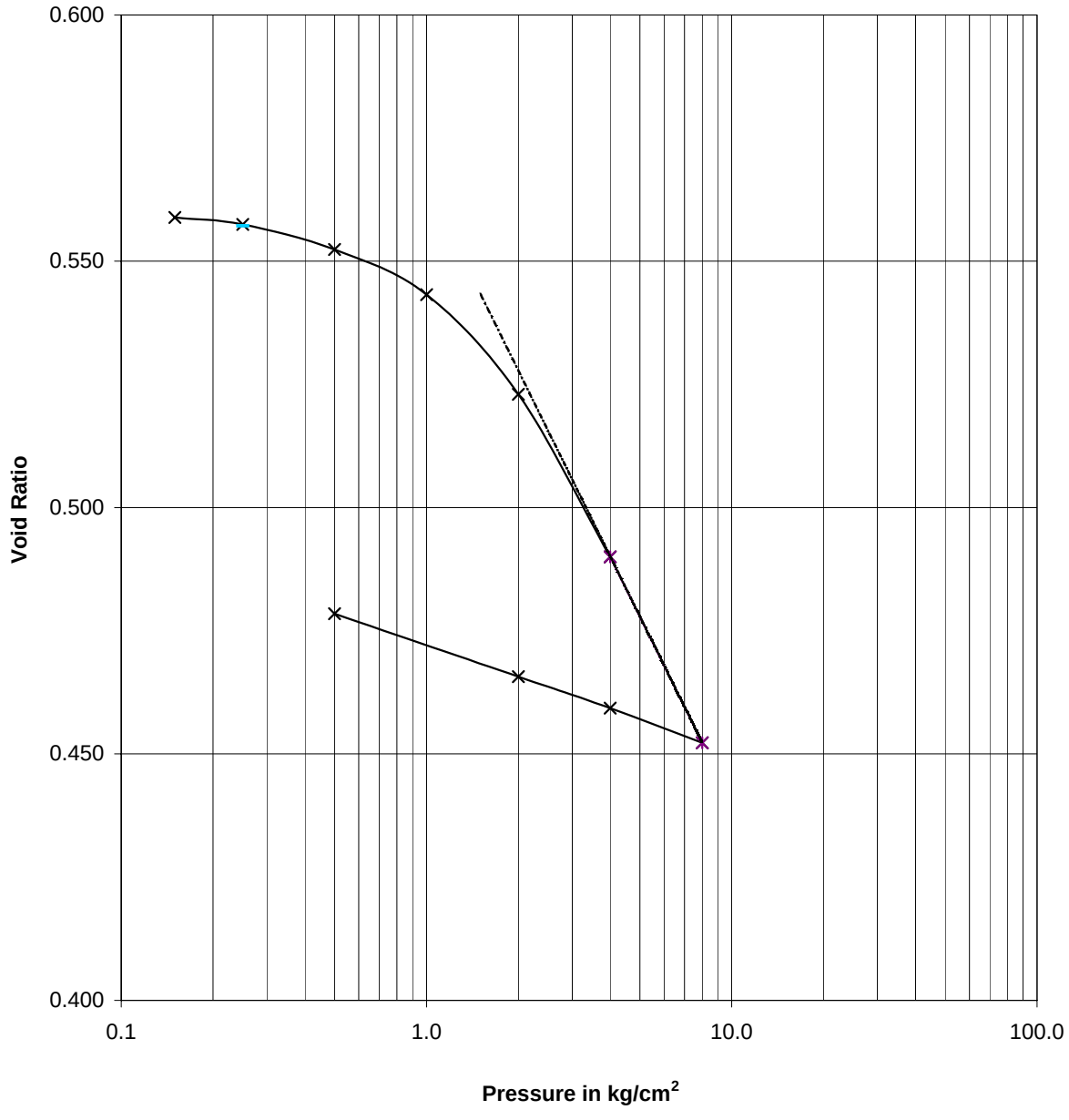
e-logp curve

BH-No. : BH-6 C_c = 0.1252

Depth : 12.0m $C_c/(1+e_0)$ = 0.0802

e_0 = 0.5624

Pressure range (kg/sq. cm)		m_v (Lab) (sq. cm/kg)
0.25 - 0.50	:	0.0131
0.50 - 1.00	:	0.0119
1.00 - 2.00	:	0.0131
2.00 - 4.00	:	0.0108
4.00 - 8.00	:	0.0063



e-logp curve

BH-No. : BH-6A

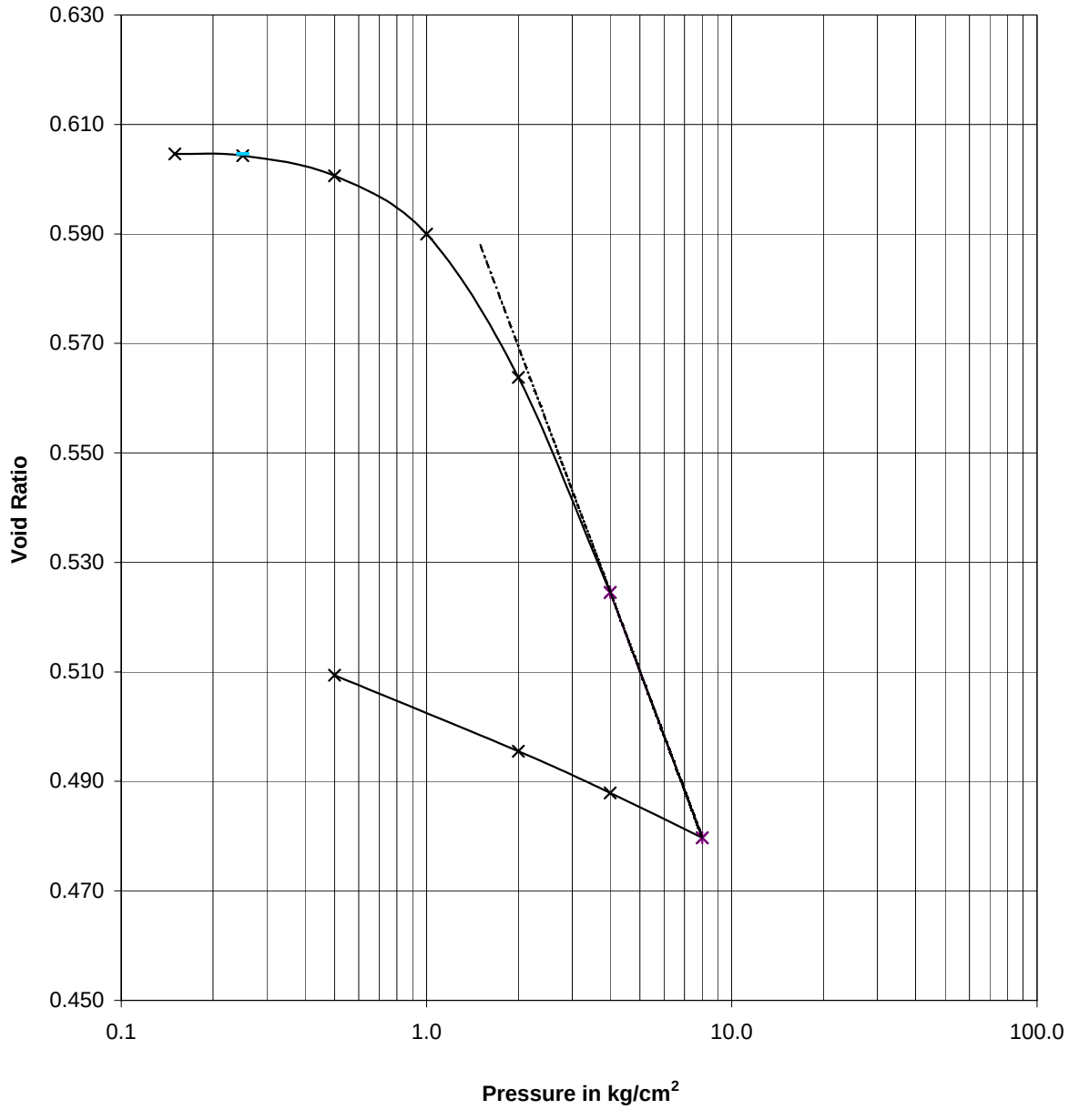
Depth : 6.0m

e_0 = 0.6070

C_c = 0.1488

$C_c/(1+e_0)$ = 0.0926

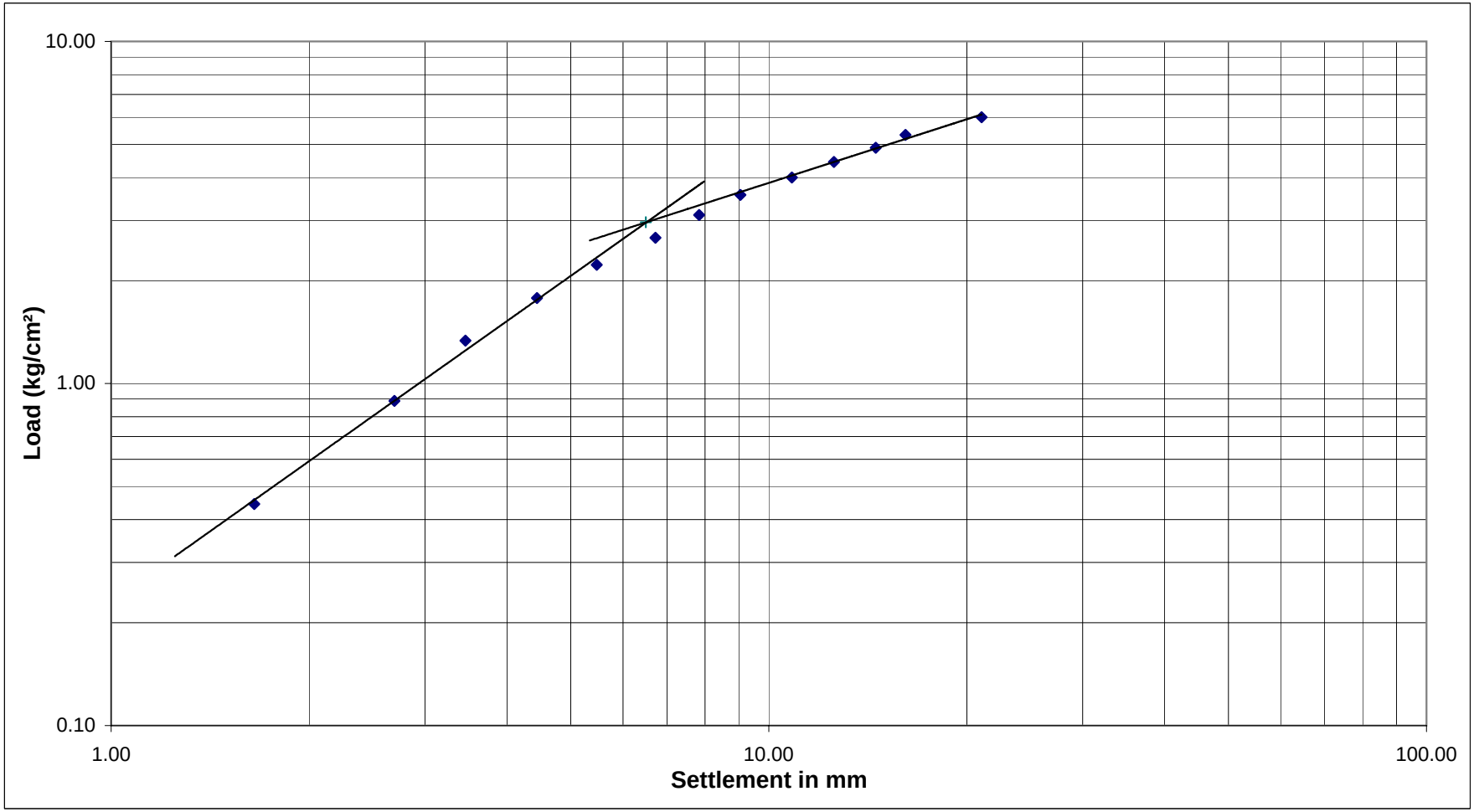
Pressure range (kg/sq. cm)		m_v (Lab) (sq. cm/kg)
0.25 - 0.50	:	0.0092
0.50 - 1.00	:	0.0133
1.00 - 2.00	:	0.0165
2.00 - 4.00	:	0.0126
4.00 - 8.00	:	0.0073



Load Settlement Curve

Project	:	SSI work Sagardighi Thermal Power Project Phase-2 extension Unit # 3 & 4 at Sagardighi, West Bengal.			
Location	:	N=1377.532, E = 1157.394	Ground RL	:	(+)29.325m
Test No.	:	PLT-01(TP-19)	Plate Size	:	60.0 cm x 60.0 cm
Method of Loading	:	Reaction	Depth	:	5.00 m
Dial Gauge Constant		0.01 mm	SWL	:	N. E.
			Date of Test	:	09-10-12

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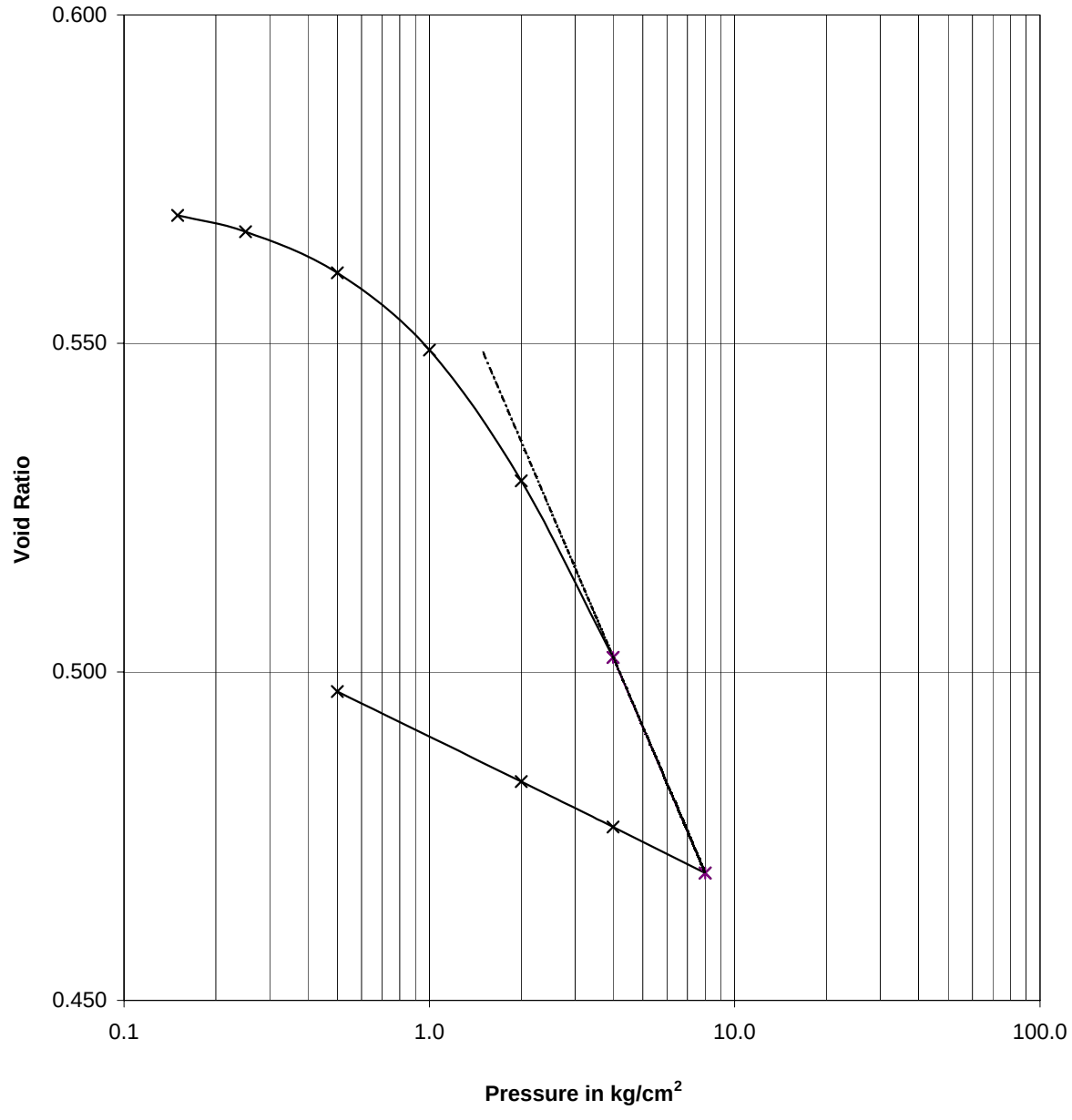
e-logp curve

BH-No. : BH-7 C_c = 0.1089

Depth : 10.0m $C_c/(1+e_0)$ = 0.0694

e_0 = 0.5696

Pressure range (kg/sq. cm)		m_v (Lab) (sq. cm/kg)
0.25 - 0.50	:	0.0159
0.50 - 1.00	:	0.0151
1.00 - 2.00	:	0.0128
2.00 - 4.00	:	0.0088
4.00 - 8.00	:	0.0055



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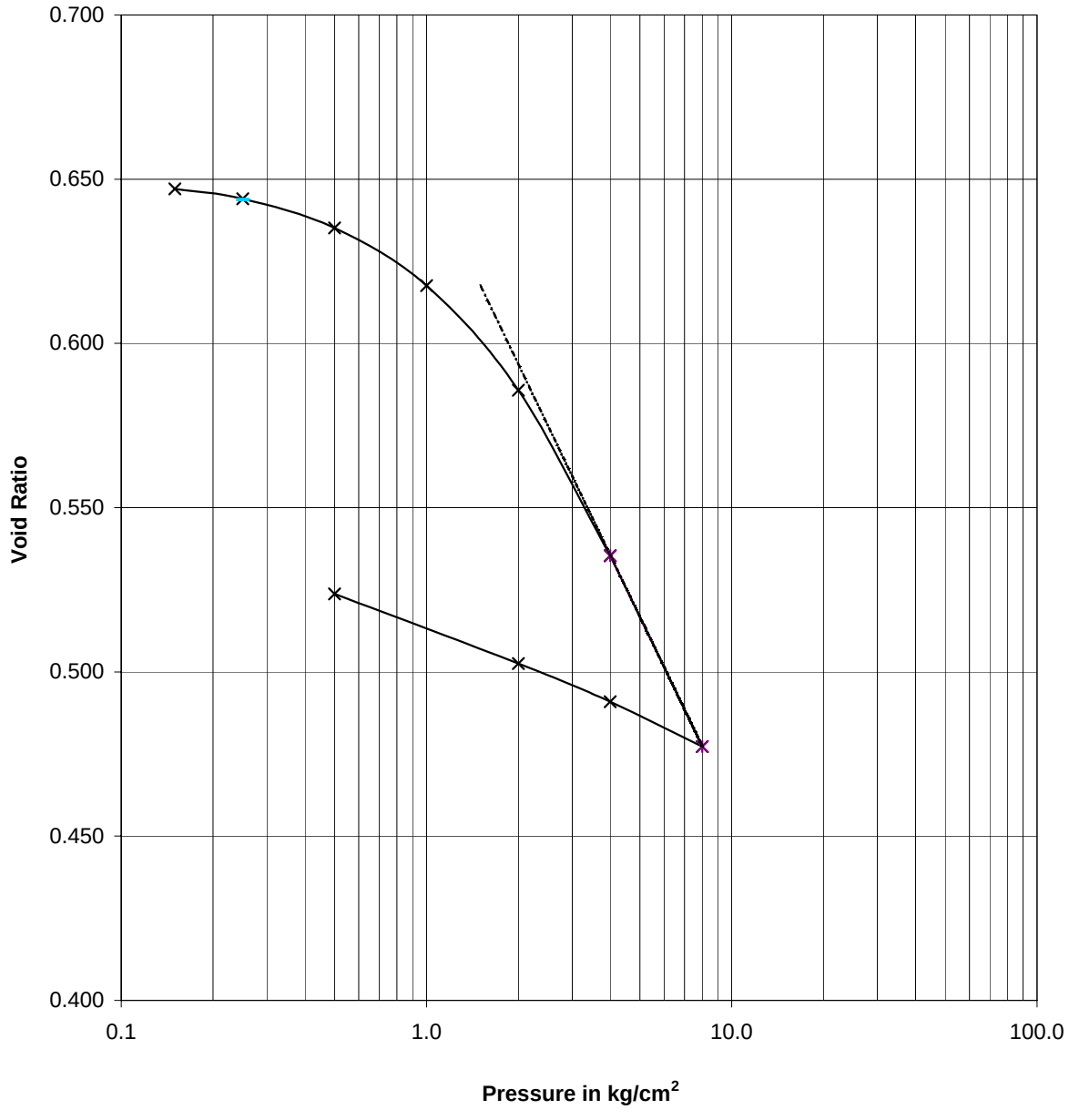
e-logp curve

BH-No. : BH-8 C_c = 0.1930

Depth : 3.0m $C_c/(1+e_0)$ = 0.1173

e_0 = 0.6459

Pressure range (kg/sq. cm)		m_v (Lab) (sq. cm/kg)
0.25 - 0.50	:	0.0216
0.50 - 1.00	:	0.0214
1.00 - 2.00	:	0.0197
2.00 - 4.00	:	0.0159
4.00 - 8.00	:	0.0095



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e-logp curve

BH-No. : BH-11

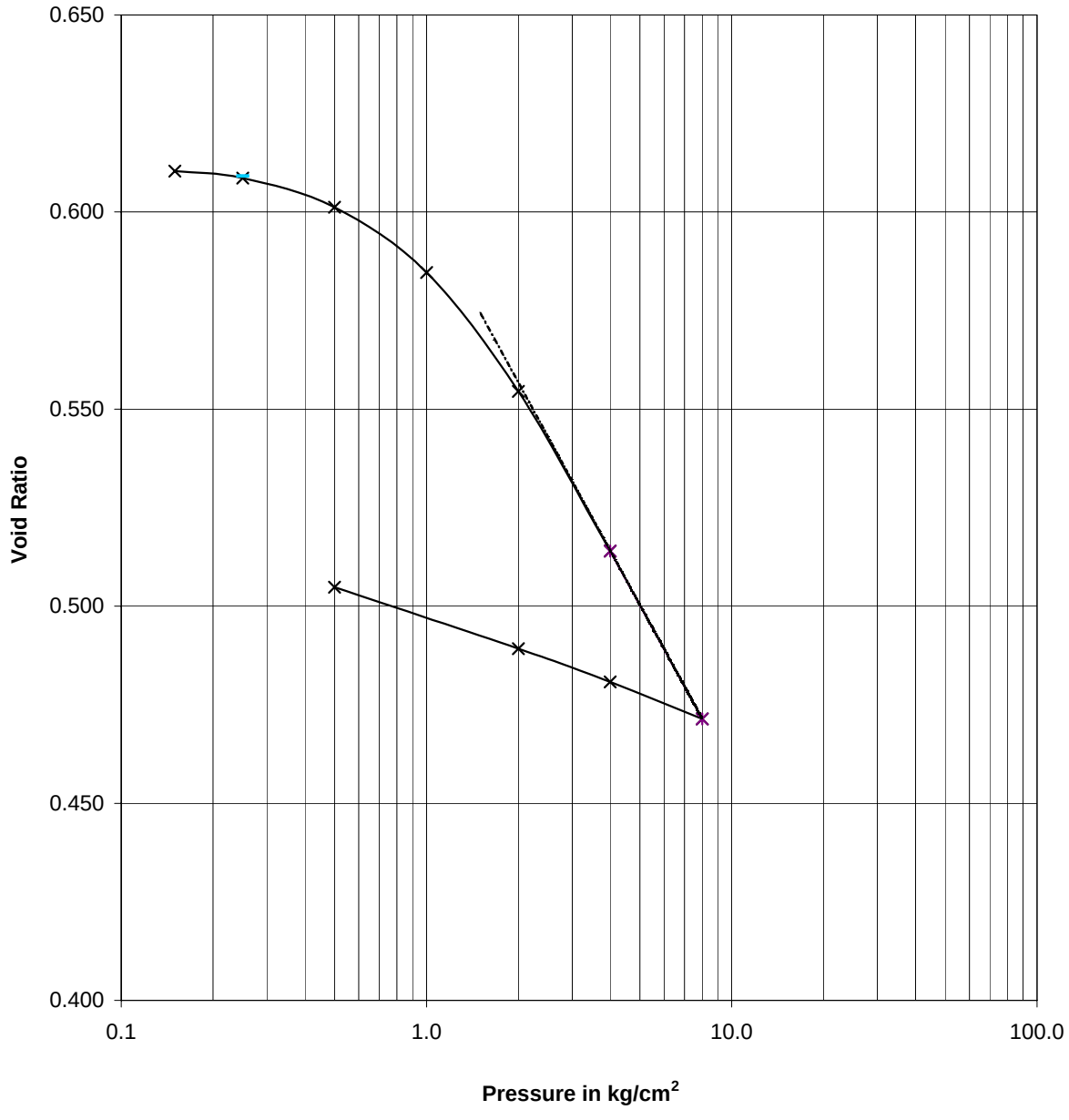
Depth : 3.0m

e_0 = 0.6097

C_c = 0.1416

$C_c/(1+e_0)$ = 0.0880

Pressure range (kg/sq. cm)		m_v (Lab) (sq. cm/kg)
0.25 - 0.50	:	0.0184
0.50 - 1.00	:	0.0207
1.00 - 2.00	:	0.0190
2.00 - 4.00	:	0.0130
4.00 - 8.00	:	0.0070



e-logp curve

BH-No. : BH-11

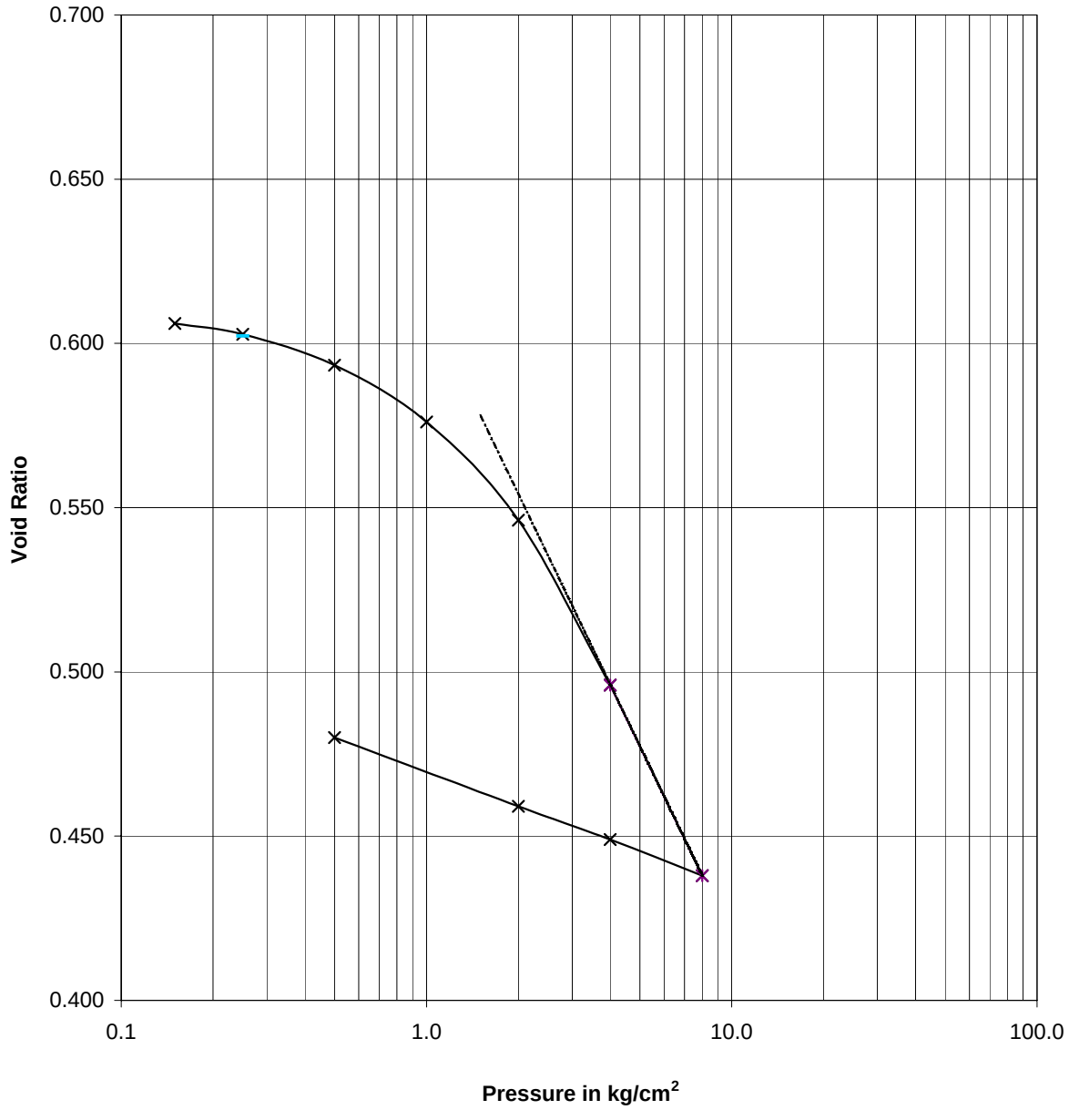
Depth : 8.0m

e_0 = 0.6028

C_c = 0.1927

$C_c/(1+e_0)$ = 0.1202

Pressure range (kg/sq. cm)		m_v (Lab) (sq. cm/kg)
0.25 - 0.50	:	0.0233
0.50 - 1.00	:	0.0217
1.00 - 2.00	:	0.0190
2.00 - 4.00	:	0.0162
4.00 - 8.00	:	0.0097



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e-logp curve

BH-No. : BH-15

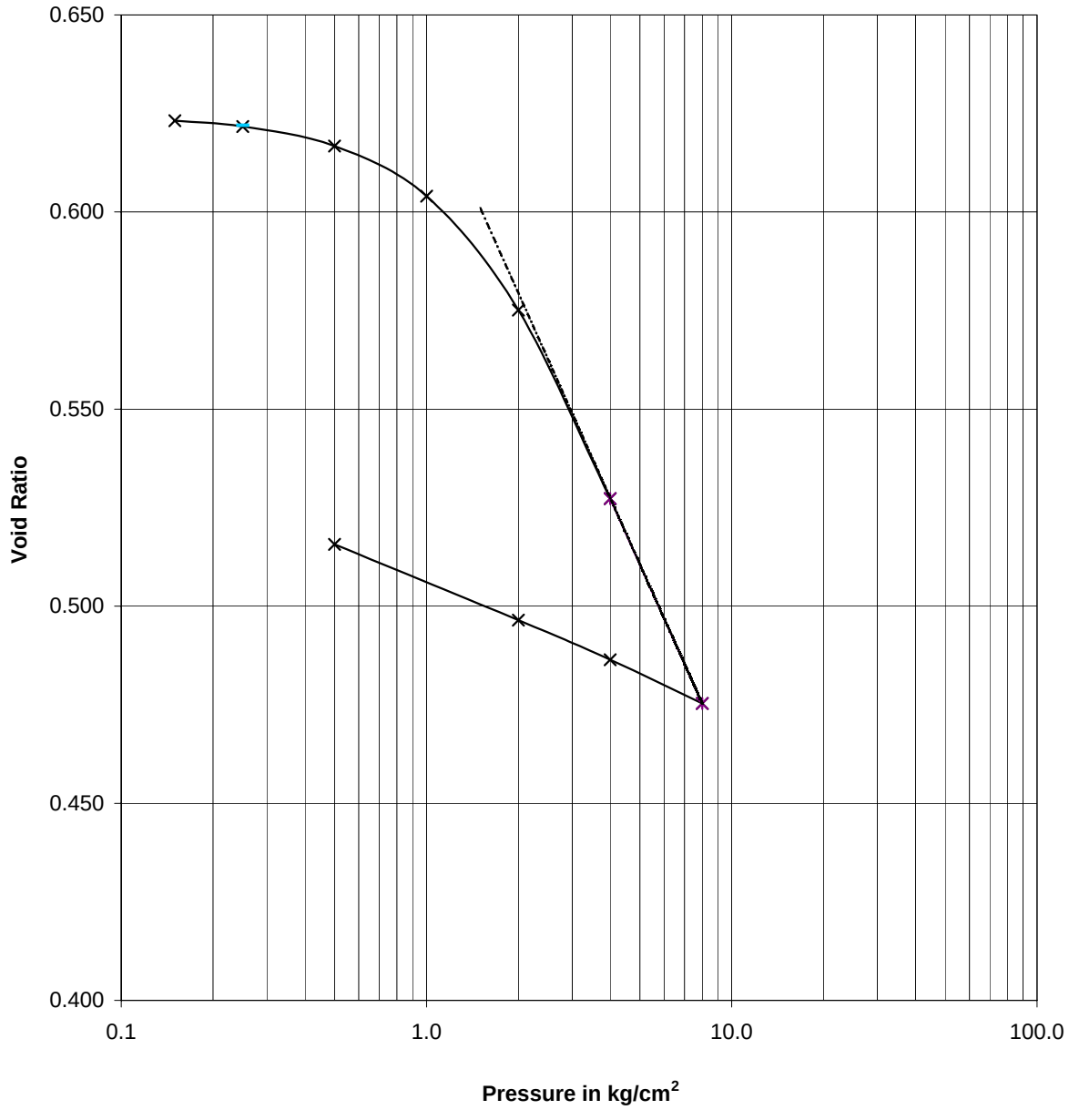
Depth : 1.0m

e_0 = 0.6231

C_c = 0.1727

$C_c/(1+e_0)$ = 0.1064

Pressure range (kg/sq. cm)		m_v (Lab) (sq. cm/kg)
0.25 - 0.50	:	0.0123
0.50 - 1.00	:	0.0157
1.00 - 2.00	:	0.0180
2.00 - 4.00	:	0.0152
4.00 - 8.00	:	0.0085



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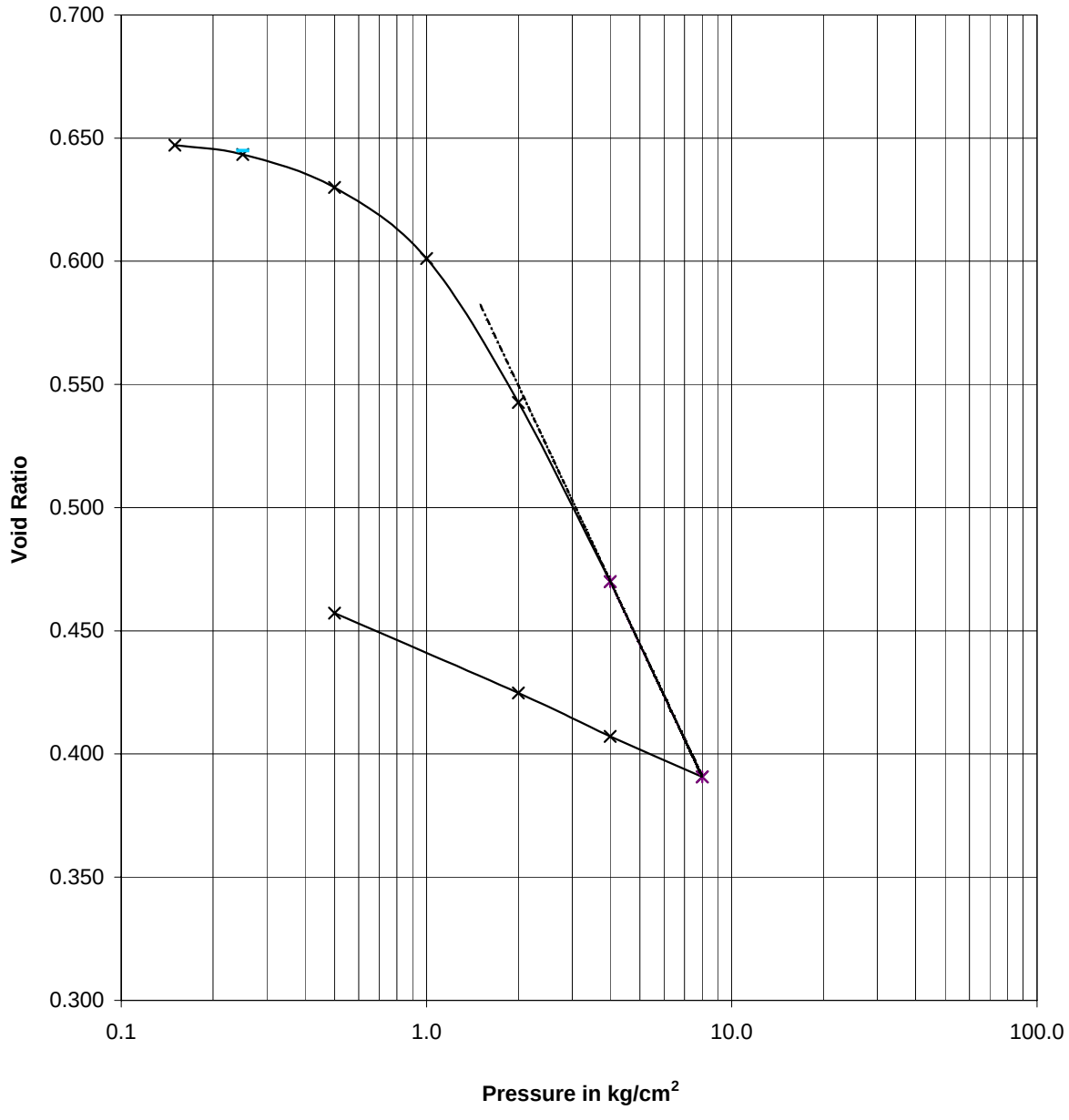
e-logp curve

BH-No. : BH-16 C_c = 0.2634

Depth : 3.0m $C_c/(1+e_0)$ = 0.1599

e_0 = 0.6471

Pressure range (kg/sq. cm)		m_v (Lab) (sq. cm/kg)
0.25 - 0.50	:	0.0326
0.50 - 1.00	:	0.0354
1.00 - 2.00	:	0.0365
2.00 - 4.00	:	0.0236
4.00 - 8.00	:	0.0135



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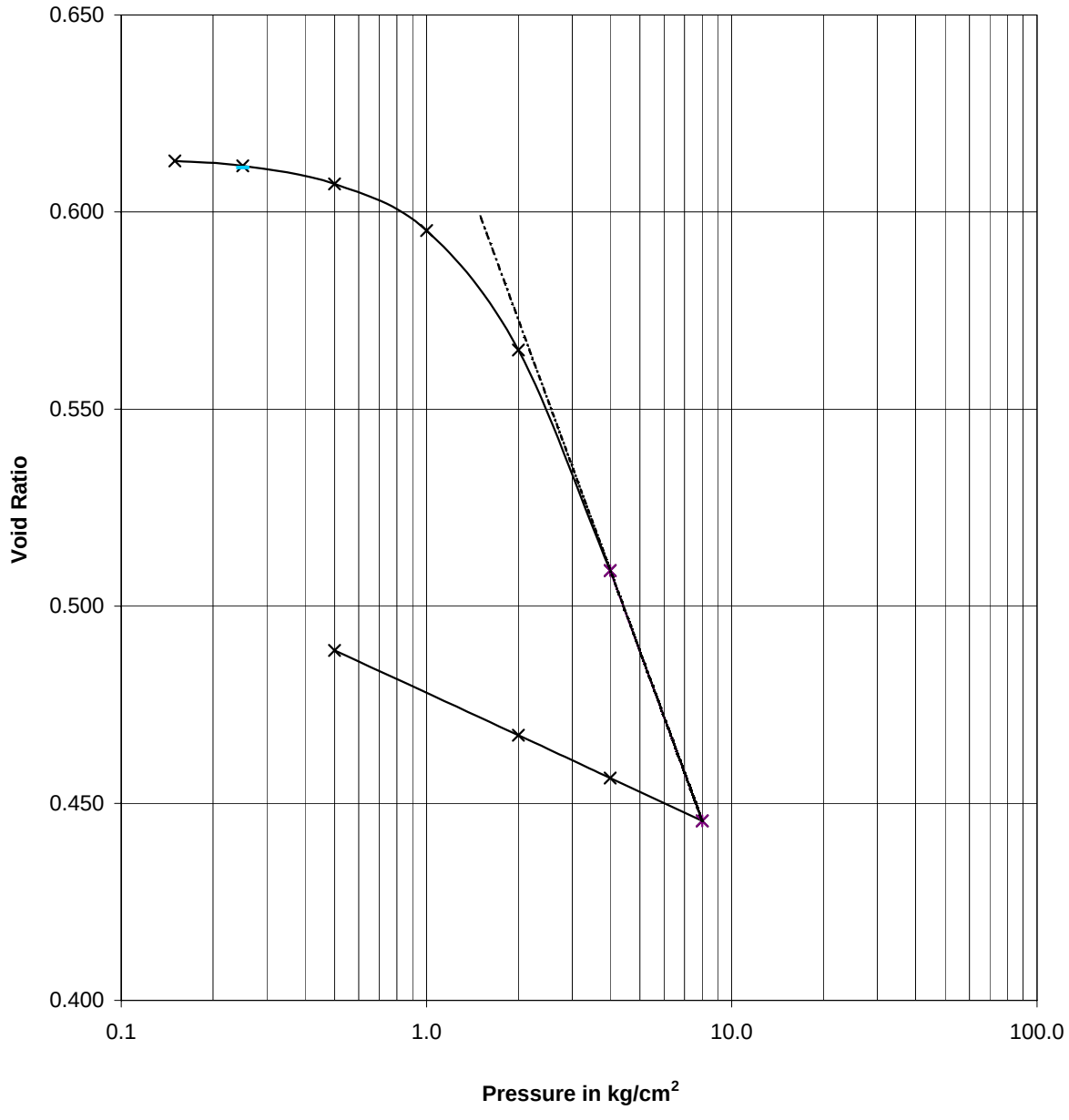
e-logp curve

BH-No. : BH-16 C_c = 0.2109

Depth : 6.0m $C_c/(1+e_0)$ = 0.1308

e_0 = 0.6129

Pressure range (kg/sq. cm)		m_v (Lab) (sq. cm/kg)
0.25 - 0.50	:	0.0114
0.50 - 1.00	:	0.0147
1.00 - 2.00	:	0.0190
2.00 - 4.00	:	0.0179
4.00 - 8.00	:	0.0105



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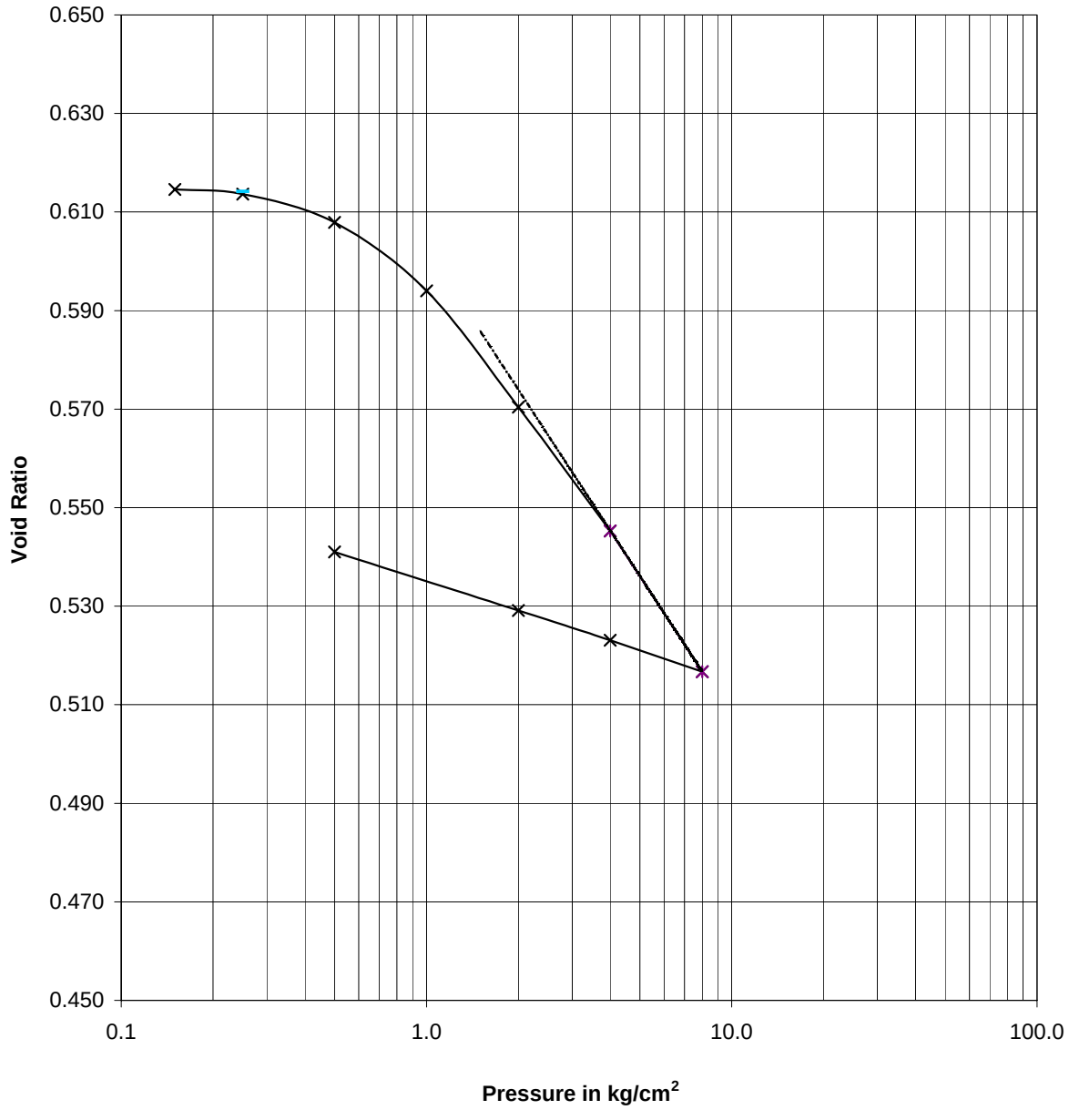
e-logp curve

BH-No. : BH-17 C_c = 0.0949

Depth : 6.0m $C_c/(1+e_0)$ = 0.0588

e_0 = 0.6136

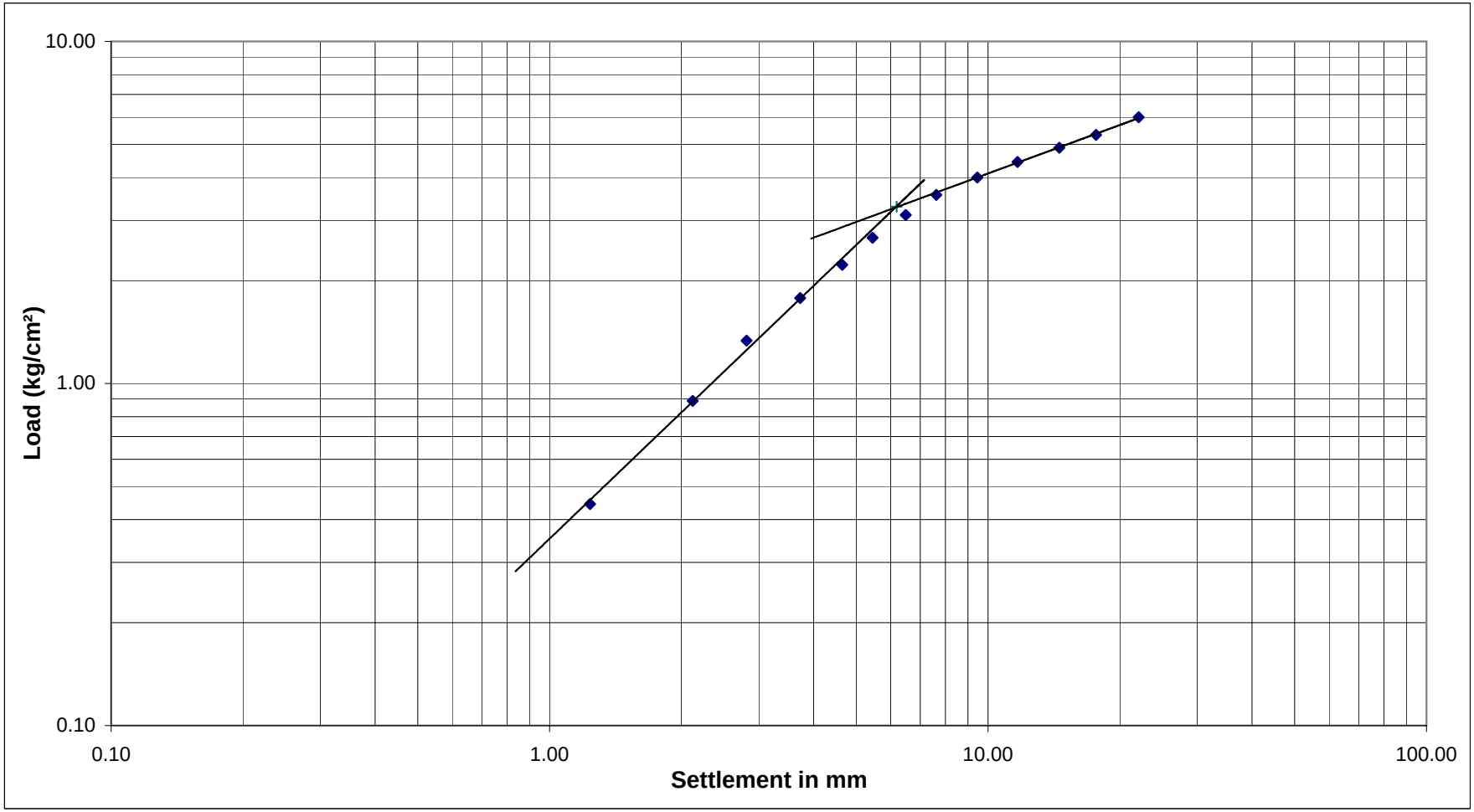
Pressure range (kg/sq. cm)		m_v (Lab) (sq. cm/kg)
0.25 - 0.50	:	0.0142
0.50 - 1.00	:	0.0173
1.00 - 2.00	:	0.0148
2.00 - 4.00	:	0.0080
4.00 - 8.00	:	0.0046



Load Settlement Curve

Project	:	SSI work Sagardighi Thermal Power Project Phase-2 extension Unit # 3 & 4 at Sagardighi, West Bengal.			
Location	:	Track Hopper; N=1140.540, E = 130.610	Ground RL	:	(+)33.125
Test No.	:	PLT-02	Plate Size	:	60.0 cm x 60.0 cm
Method of Loading	:	Reaction	Depth	:	3.10 m
Dial Gauge Constant		0.01 mm	SWL	:	N. E.
			Date of Test	:	23-11-12

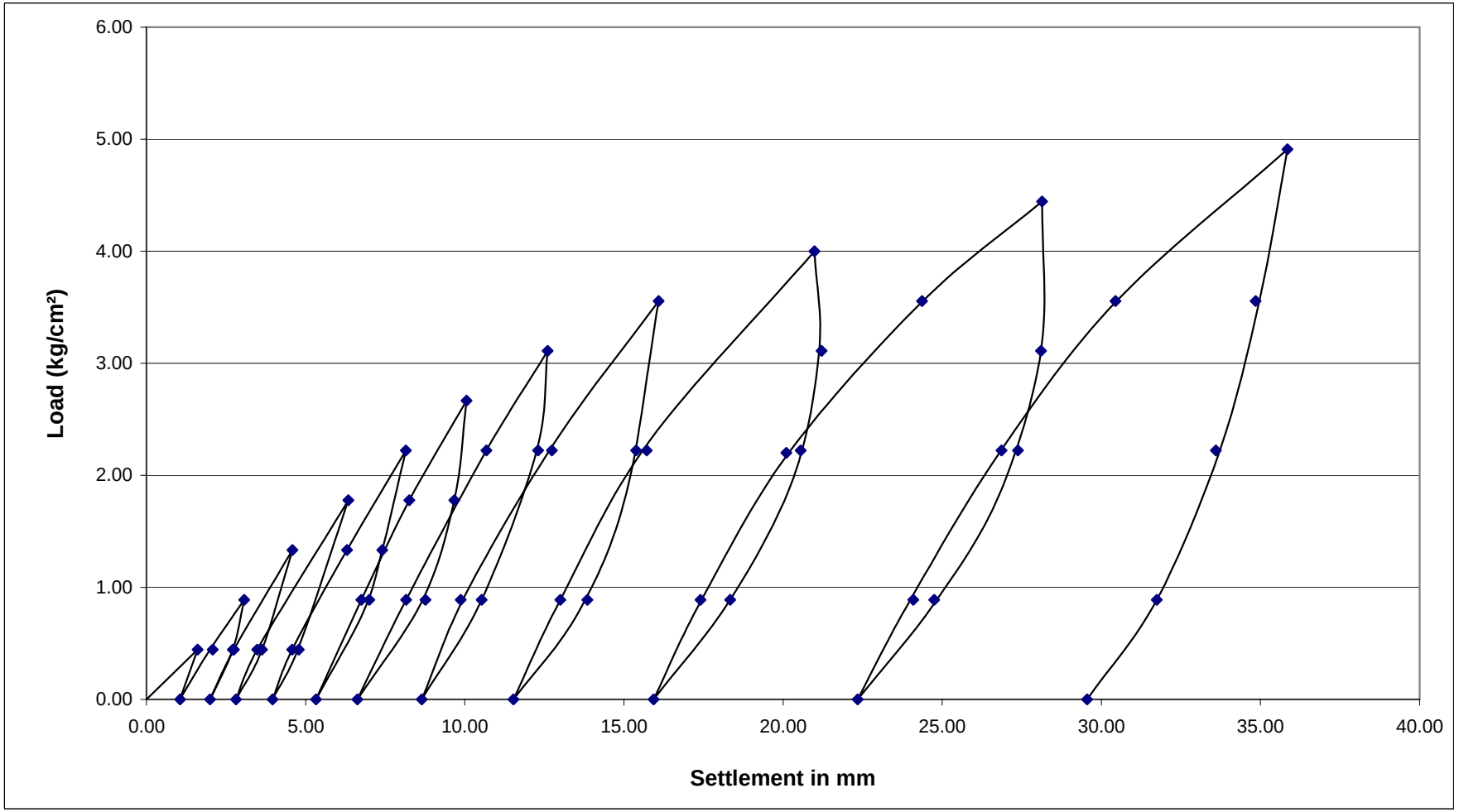
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Load Settlement Curve (Cyclic Plate Load Test)

Project	:	SSI work Sagardighi Thermal Power Project Phase-2 extension Unit # 3 & 4 at Sagardighi, West Bengal.			
Location	:	N: 1110.230; E: 540.510	Ground RL	:	+34.230 m
Test No.	:	CPLT-01	Plate Size	:	60.0 cm x 60.0 cm
Method of Loading	:	Reaction	Depth	:	3.00 m
Pit Size	:	2.50 x 2.50m	SWL	:	N. E.
Dial Gauge Constant		0.01 mm	Date of Test	:	13-11-12

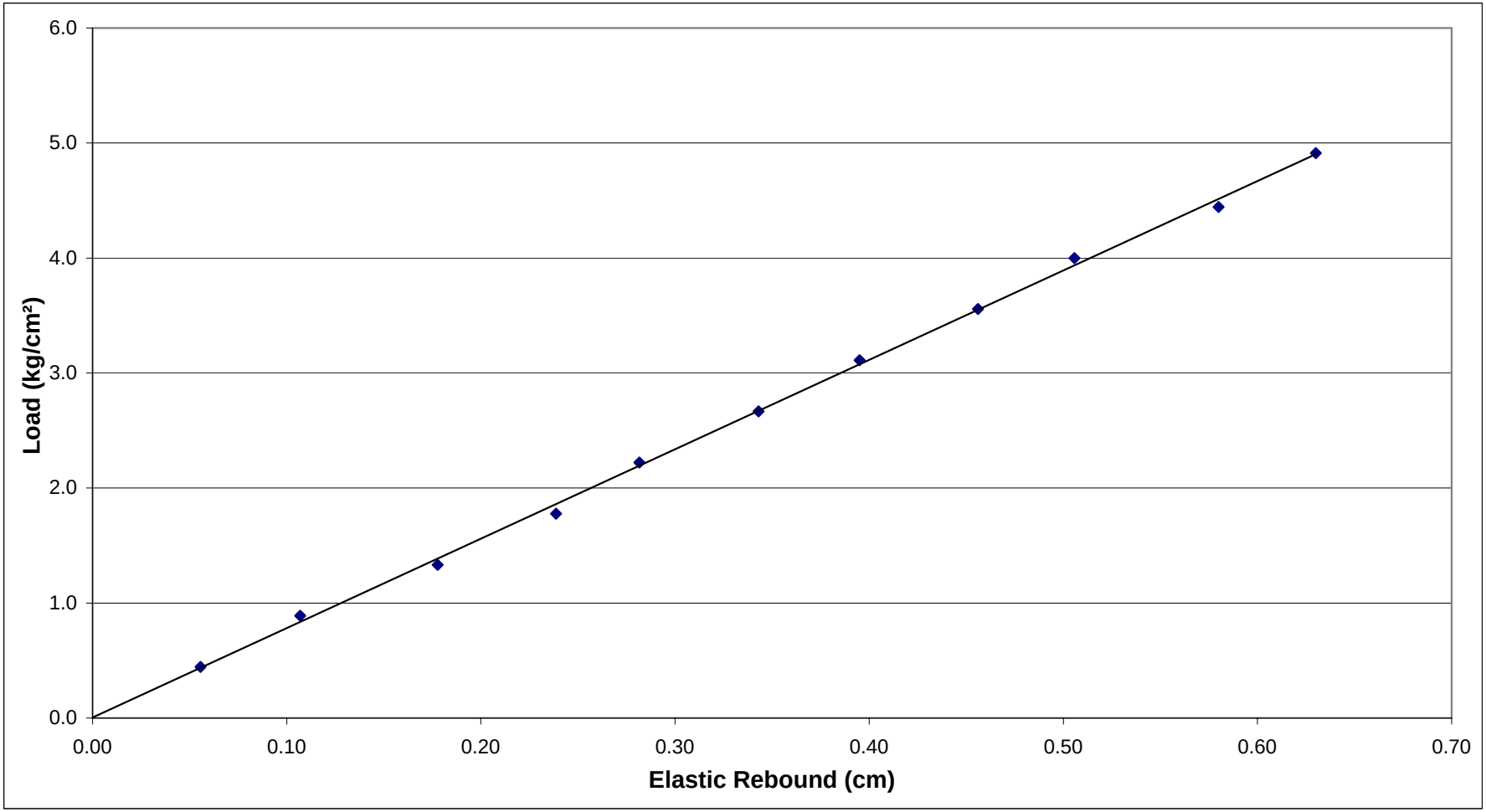
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Elastic Rebound Curve

Project	:	SSI work Sagardighi Thermal Power Project Phase-2 extension Unit # 3 & 4 at Sagardighi, West Bengal.			
Location	:	N: 1110.230; E: 540.510	Ground RL	:	+34.230 m
Test No.	:	CPLT-01	Plate Size	:	60.0 cm x 60.0 cm
Method of Loading	:	Reaction	Depth	:	3.00 m
Pit Size	:	2.50 x 2.50m	SWL	:	N. E.
Dial Gauge Constant		0.01 mm	Date of Test	:	13-11-12

SARDIP CONSULTING ENGINEERS



Sheet No.:33

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-01 (One)TP-15	P	1.00	Medium stiff light yellowish grey to brownish grey silty clay with traces of kankars and bluish grey patches at bottom	5																
			2.00m																	
	U	2.00	Stiff to very stiff brownish / yellowish silty clay with bluish grey patches, dark grey spots and traces of kankars / sand	-	5.0	5.0	60.0	30.0	22.4	1.984	1.621	57.7	20.2	37.5	UU	0.76	6.0	2.68	-	-
	P	3.00		7																
	U	4.00		-	-	5.0	68.0	27.0	20.9	1.994	1.649	54.4	20.8	33.6	UU	0.68	4.0	2.68	-	-
	P	6.00		19																
	U	7.00		-	-	7.0	63.0	30.0	20.6	2.050	1.700	58.7	20.4	38.3	UU	1.09	6.0	2.68	0.25-0.50	0.0211
																			0.50-1.00	0.0180
																			1.00-2.00	0.0140
																			2.00-4.00	0.0128
																			4.00-8.00	0.0071
	P	9.00		17																
	U	10.00		-	-	6.0	68.0	26.0	19.1	2.083	1.749	51.2	19.0	32.2	UU	1.13	5.0	2.68	-	-
			12.00m																	
	P	12.00	Hard yellowish brown sandy silty clay with bluish grey patches at top	37																
	U	13.00		-	-	20.0	63.0	17.0	18.1	2.112	1.789	35.6	18.0	17.6	UU	1.20	7.0	2.68	-	-
	P	15.00		53	-	36.0	51.0	13.0	-	-	-	31.9	21.6	10.3	-	-	-	-	-	-
	P	17.00		40	-	30.0	54.0	16.0	-	-	-	-	-	-	-	-	-	-	-	-
			19.00m																	
	P	19.00	Dense yellowish brown / brownish grey sand with varying percentage of fines	61	-	75.0	*25.0		-	-	-	Non-plastic			-	-	-	-	-	-
	P	21.00		82																
	P	23.00		79	-	77.0	*23.0		-	-	-	Non-plastic			-	-	-	-	-	-
	P	25.00		91																
			27.00m																	
	P	27.00	Hard brownish grey sandy silty clay with occasional lamination and fine mica flakes	103															-	-
	P	28.50		73	-	6.0	75.0	19.0	-	-	-	43.7	22.0	21.7	-	-	-	-	-	-
	P	30.00		79	-	16.0	70.0	14.0	-	-	-	38.6	25.2	13.4	-	-	-	-	-	-

Sheet No. :34

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-TP-16	P	1.00	Medium stiff to stiff brownish grey silty clay with rusty brown / bluish grey patches and sand in traces	7																
			1.80m																	
	U	2.00	Very stiff to hard light reddish / yellowish brown silty clay with traces of sand, bluish grey spots and traces of kankars	-	-	5.0	67.0	28.0	20.8	1.994	1.651	54.0	18.9	35.1	UU	0.68	10.0	2.68	-	-
	P	3.00		15																
	U	4.00		-	-	4.0	71.0	25.0	20.4	1.998	1.659	48.8	18.9	29.9	UU	0.80	8.0	2.68	0.25-0.50 0.50-1.00 1.00-2.00 2.00-4.00 4.00-8.00	0.0216 0.0192 0.0149 0.0122 0.0076
	P	6.00		21																
	U	8.00		-	-	8.0	68.0	24.0	20.5	2.005	1.664	49.7	20.3	29.4	UU	1.12	8.0	2.68	-	-
	P	10.00		43																
	U	12.00		-	-	13.0	64.0	23.0	17.7	2.113	1.795	45.3	17.0	28.3	UU	1.36	7.0	2.68	-	-
			14.00m																	
	P	14.00	Very stiff to hard reddish to yellowish brown sandy silty clay with bluish grey spots	23	-	20.0	64.0	16.0	-	-	-	37.7	20.4	17.3	-	-	-	2.68	-	-

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
5. UC: Unconfined Compression Test
6. CU : Consolidated Un-drained Test
7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-TP-16			16.00m																	
	U	16.00	Very stiff to hard reddish brown / brown sandy silty clay (high percentage of sand) / silty clayey sand	-	-	61.0	29.0	10.0	22.3	2.024	1.655	23.8	18.7	5.1	UU	1.10	12.0	2.68	-	-
	P	18.00		29	-	47.0	46.0	7.0	-	-	-	24.9	20.5	4.4	-	-	-	2.68	-	-
	P	20.00		69																
	P	22.00	22.00m	33	-	77.0	*23.0		-	-	-	Non-plastic			-	-	-	2.67	-	-
	P	24.00	Medium dense to dense brown / reddish brown sand with varying percentage of fines and fine mica flakes in abundance	51																
	P	26.00		78	-	85.0	*15.0		-	-	-	Non-plastic			-	-	-	2.67	-	-
	P	28.00		82																
	P	30.00		87	-	80.0	*20.0		-	-	-	Non-plastic			-	-	-	2.67	-	-

Sheet No. :36

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
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SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-01 (One)TP-17	P	1.00	Medium stiff to stiff yellowish grey / brown silty clay with traces of kankars	4																
			2.00m																	
	U	2.00	Stiff to very stiff yellowish brown silty clay with traces of kankars / sand and bluish grey patches at top	-	-	9.0	63.0	28.0	21.8	1.988	1.632	54.7	21.0	33.7	UU	0.68	7.0	2.68	-	-
	P	3.00		8																
	U	4.00		-	-	6.0	67.0	29.0	21.2	2.006	1.655	57.2	20.6	36.6	UC	0.88	-	2.68	-	-
	P	5.00		13																
	U	6.50		-	-	7.0	63.0	30.0	20.6	2.001	1.659	56.5	20.1	36.4	UU	0.80	5.0	2.68	-	-
	P	8.00		11																
	U	9.50		-	-	8.0	64.0	28.0	22.5	2.009	1.640	55.3	20.3	35.0	UC	1.11	-	2.68	-	-
	P	11.00		21																
			12.00m																	
	U	12.50	Very stiff to hard yellowish / reddish brown sandy silty clay with bluish grey patches	-	-	36.0	47.0	17.0	18.1	2.110	1.787	35.8	18.0	17.8	UU	1.25	7.0	2.68	-	-
			14.00m																	
	P	14.00	Hard reddish yellow / brownish grey sandy silty clay (high percentage of sand)	38															-	-
	P	16.00		41	-	32.0	61.0	7.0	-	-	-	25.8	20.9	4.9	-	-	-	-	-	-
	P	18.00		41	-	18.0	68.0	14.0	-	-	-	28.5	21.0	7.5	-	-	-	-	-	-
	P	20.00		45																
			21.50m																	
	P	21.50	Medium dense brown / reddish brown sand with fines and fine mica flakes	54	-	78.0	*22.0		-	-	-	-	-	-	-	-	-	-	-	-
	P	23.50		61																
			24.50m																	
	P	25.50	Hard brownish grey / grey silty clay with high silt content	64	-	22.0	69.0	9.0	-	-	-	35.9	23.1	12.8	-	-	-	-	-	-
	P	27.00		72																
	P	28.50		75	-	2.0	86.0	12.0	-	-	-	36.3	23.3	13.0	-	-	-	-	-	-
	P	30.00		81																

Sheet No. :37

Note :

1. U-Undisturbed Sample
2. D-Disturbed Sample
3. P-Standard Penetration Test
4. UU: Unconsolidated Undrained Triaxial Test
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7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-TP-18	P	1.00	Medium stiff brownish yellow silty clay with traces of sand / kankars and bluish grey patches at bottom	5	-	3.0	67.0	30.0	-	-	-	58.8	22.2	36.6	-	-	-	-	-	-
	P	2.00		7																
			2.50m																	
	U	3.00	Very stiff to hard reddish to yellowish brown silty clay with traces of kankars / sand and bluish grey patches	-	1.0	4.0	64.0	31.0	21.1	1.984	1.639	57.4	20.3	37.1	UU	0.71	6.0	2.68	-	-
	P	4.00		17																
	U	5.00		-	-	4.0	69.0	27.0	21.4	2.010	1.656	55.4	21.1	34.3	UU	0.98	8.0	2.68	-	-
	P	6.00		22																
	U	8.00		-	2.0	6.0	66.0	26.0	20.1	2.030	1.690	52.7	19.9	32.8	UU	1.13	10.0	2.68	-	-
	P	10.00		33																
			12.00m																	
	U	12.00	Very stiff / hard reddish to yellowish brown sandy silty clay with traces of kankars	-	1.0	14.0	60.0	25.0	20.1	2.067	1.721	47.9	20.0	27.9	UU	1.28	8.0	2.68	-	-
	P	14.00		25																
	U	16.00		-	-	6.0	79.0	15.0	20.0	2.072	1.727	35.7	19.8	15.9	UU	1.35	6.0	2.68	-	-
			16.50m																	
	P	18.00	Hard yellowish brown sandy silty clay (high percentage of sand)	32	-	31.0	59.0	10.0	-	-	-	31.2	20.2	11.0	-	-	-	-	-	-
	P	20.00		49																
	P	22.00		36	-	38.0	53.0	9.0	-	-	-	29.1	20.6	8.5	-	-	-	-	-	-
	P	24.00		46																
			26.00m																	
	P	26.00	Hard brownish grey / yellowish brown silty clay (high silt content) with sand	72	-	26.0	61.0	13.0	-	-	-	38.9	23.9	15.0	-	-	-	-	-	-
	P	28.00		77																
	P	30.00		82	-	20.0	72.0	8.0	-	-	-	31.3	22.4	8.9	-	-	-	-	-	-

Sheet No. :38

Note :

1. U-Undisturbed Sample
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SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-01 (One)TP-19	P	1.00	Medium stiff / stiff light bluish grey silty clay with traces of sand, rusty brown spots and moorums	7	-	2.0	71.0	27.0	-	-	-	57.0	21.6	35.4	-	-	-	-	-	-
			1.80m																	
	P	2.00	Stiff to very stiff light reddish brown silty clay with traces of sand, occasional bluish grey spots and kankars	8																
	U	3.00		-	-	2.0	73.0	25.0	20.7	2.040	1.690	51.0	19.0	32.0	UU	0.80	8.0	2.68	0.25-0.50 0.50-1.00 1.00-2.00 2.00-4.00 4.00-8.00	0.0190 0.0198 0.0140 0.0128 0.0071
	P	4.00		14																
	U	5.50		-	1.0	2.0	75.0	22.0	21.0	2.033	1.680	48.0	20.3	27.7	UU	0.79	6.0	2.68	-	-
	P	7.00		16	-	2.0	70.0	28.0	-	-	-	55.1	19.2	35.9	-	-	-	-	-	-
	U	8.50		-	1.0	5.0	67.0	27.0	20.9	2.043	1.690	54.0	19.0	35.0	UU	0.90	5.0	2.68	-	-
	P	10.00		17																
			11.50m																	
	U	11.50	Very stiff to hard light reddish brown sandy silty clay with bluish grey spots (varying percentage of sand)	-	-	15.0	66.0	19.0	20.6	2.062	1.710	41.3	19.7	21.6	UU	1.29	7.0	2.70	-	-
	P	11.95		42																
	P	13.50		31	-	8.0	70.0	22.0	-	-	-	48.3	19.4	28.9	-	-	-	-	-	-

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7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

SARDIP CONSULTING ENGINEERS

LABORATORY TEST RESULTS

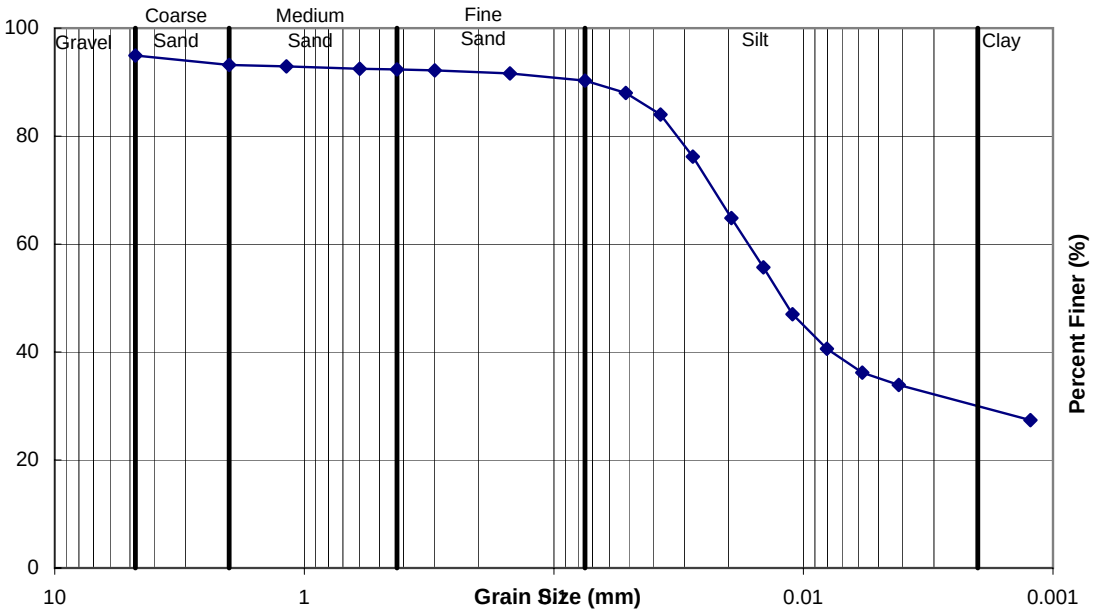
Bore Hole No.	Type	Depth (m)	Description	Standard Penetration Resistance 'N' value	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry density(gm/c.c.)	Liquid Limit(%)	Plastic Limit (%)	Plasticity Index (%)	Type of Test	Co-hesion (kg/cm^2)	Angle of Friction (degree)	Sp.Gravity	Pressure Range (kg/cm^2)	m_v (cm^2/kg)
BH-01 (One)TP-19			15.50m																	
	P	15.50	Hard yellowish brown silty clay high silt content / clayey silt with traces of sand and fine mica flakes	32	-	5.0	89.0	6.0	-	-	-	Non-plastic			-	-	-	-	-	-
	P	17.50		37	-	4.0	86.0	10.0	-	-	-	33.0	22.0	11.0	-	-	-	2.68	-	-
	P	19.50		35																
			21.50m																	
	P	22.00	Hard yellowish grey silty clay with varying percentage of sand and fine mica flakes	51	-	7.0	77.0	16.0	-	-	-	31.8	22.0	9.8	-	-	-	2.69	-	-
	P	24.00		47	-	14.0	74.0	12.0	-	-	-	30.0	21.0	9.0	-	-	-	-	-	-
	P	26.00		50	-	16.0	75.0	9.0	-	-	-	28.0	21.4	6.6	-		-	2.69	-	-
	P	28.00		67	-	18.0	74.0	8.0	-	-	-	27.0	21.1	5.9	-	-	-	-	-	-
	P	30.00		>100																

Sheet No.:40

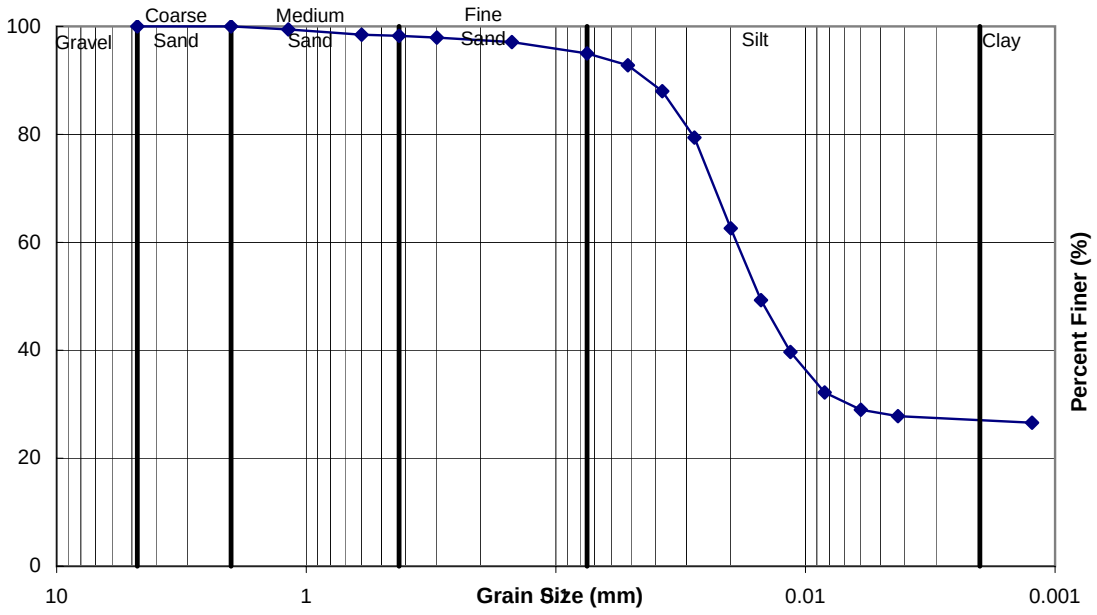
Note :

1. U-Undisturbed Sample
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7. CU : Consolidated Un-drained Test
8. DS : Direct Shear Test
9. * Combined % of Silt & Clay.

GRAIN SIZE DISTRIBUTION CURVE

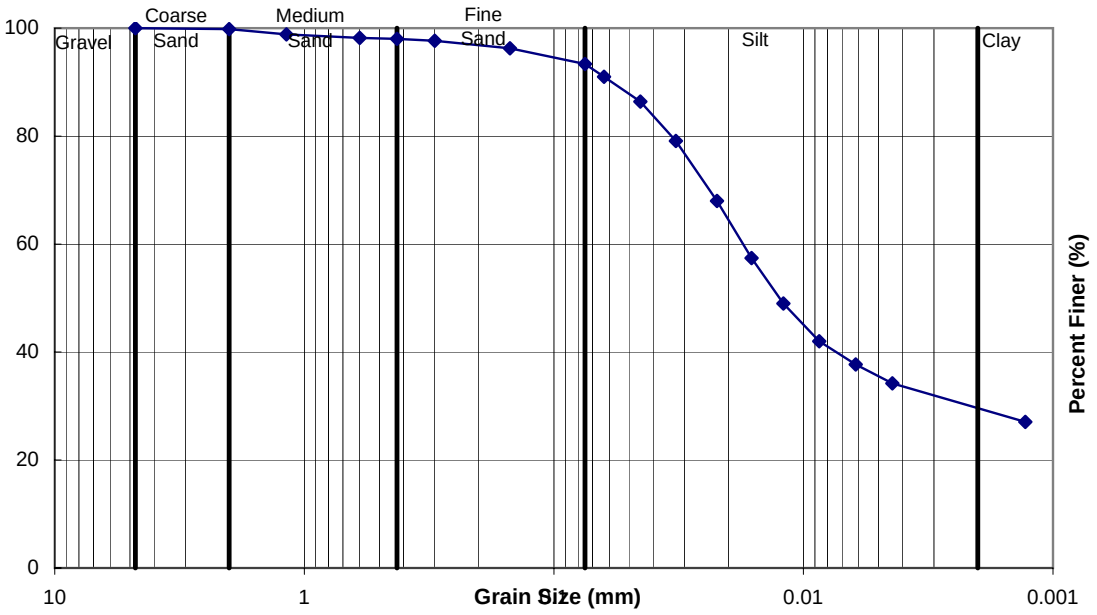


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-15:2m	5.0	2.0	1.0	2.0	60.0	30.0	-	-

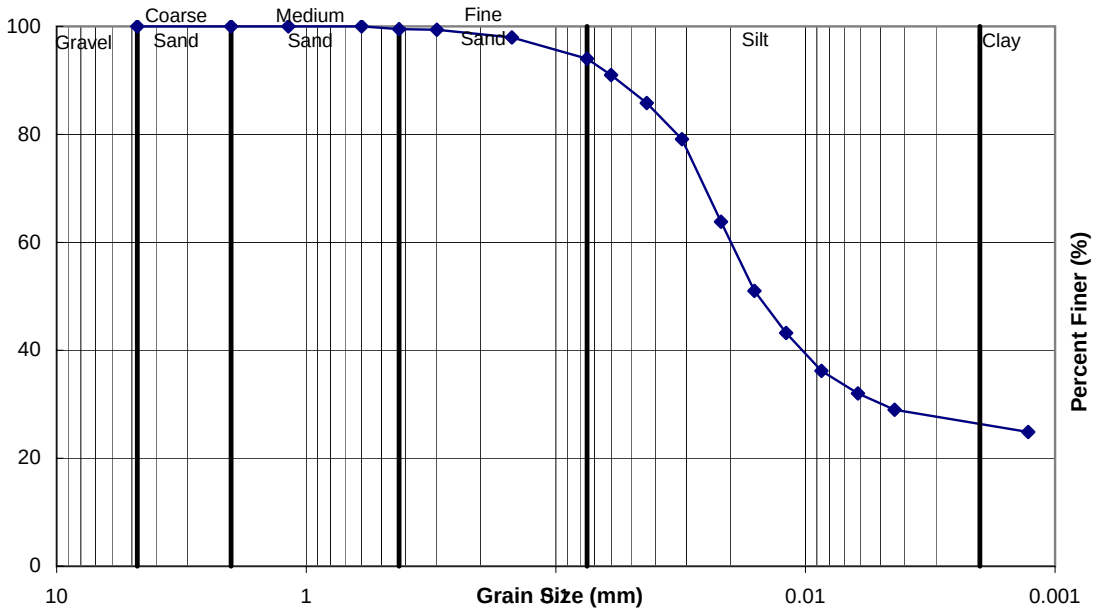


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-15:4m	0.0	0.0	2.0	3.0	68.0	27.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

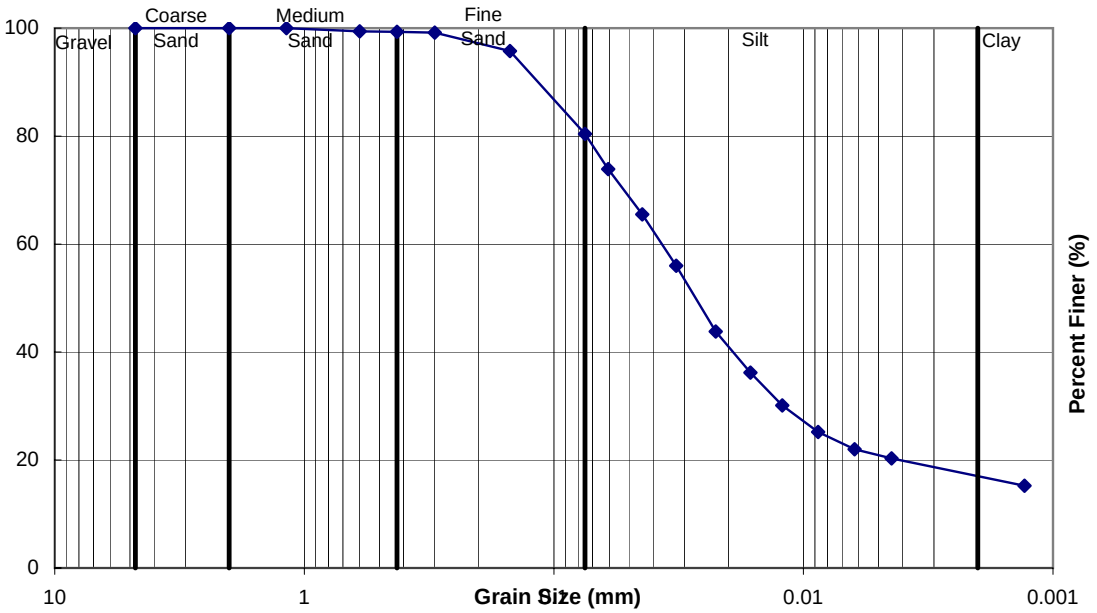


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-15:7m	0.0	0.0	2.0	5.0	63.0	30.0	-	-

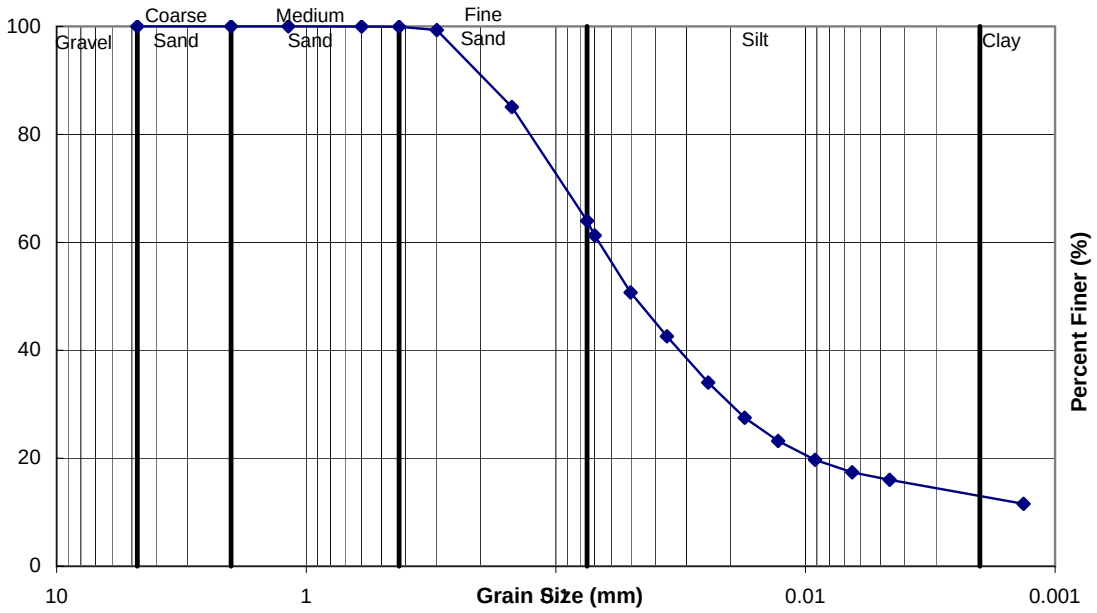


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-15:10m	0.0	0.0	1.0	5.0	68.0	26.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

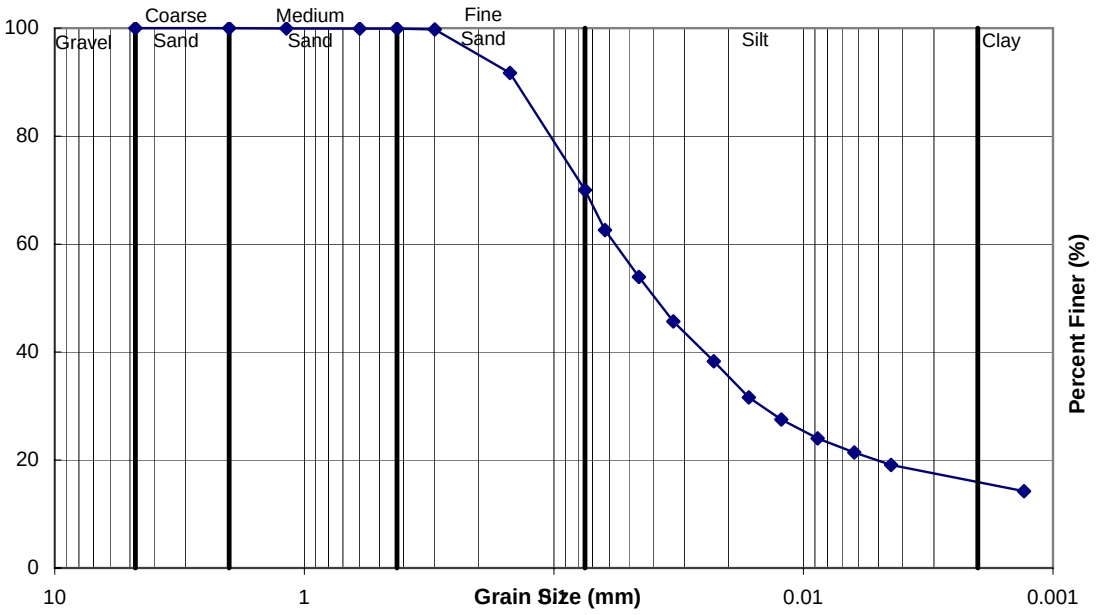


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-15:13m	0.0	0.0	1.0	19.0	63.0	17.0	-	-

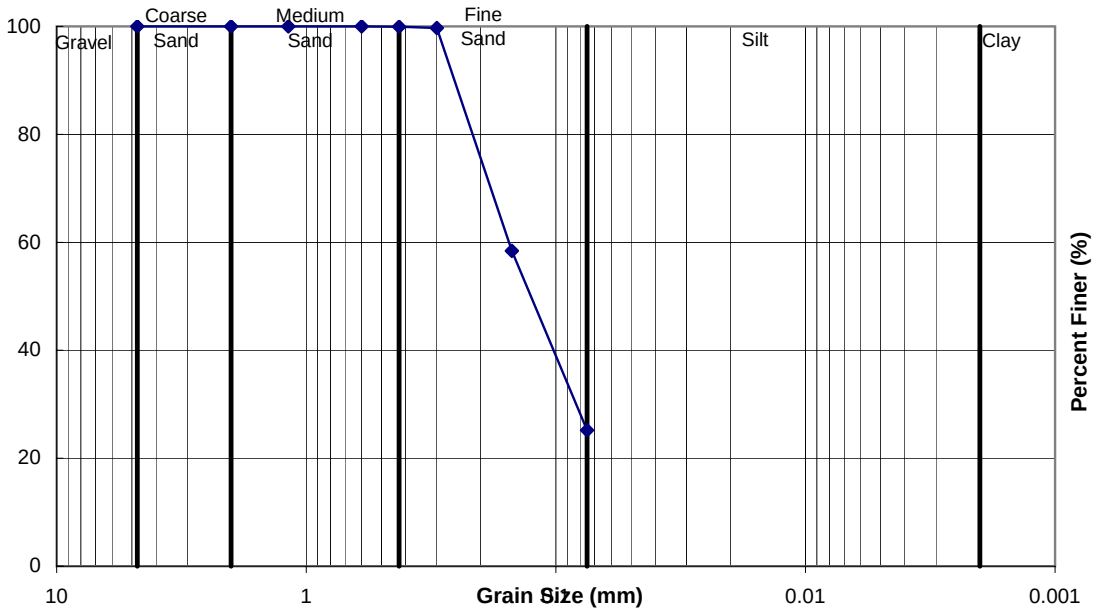


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-15:15m	0.0	0.0	0.0	36.0	51.0	13.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

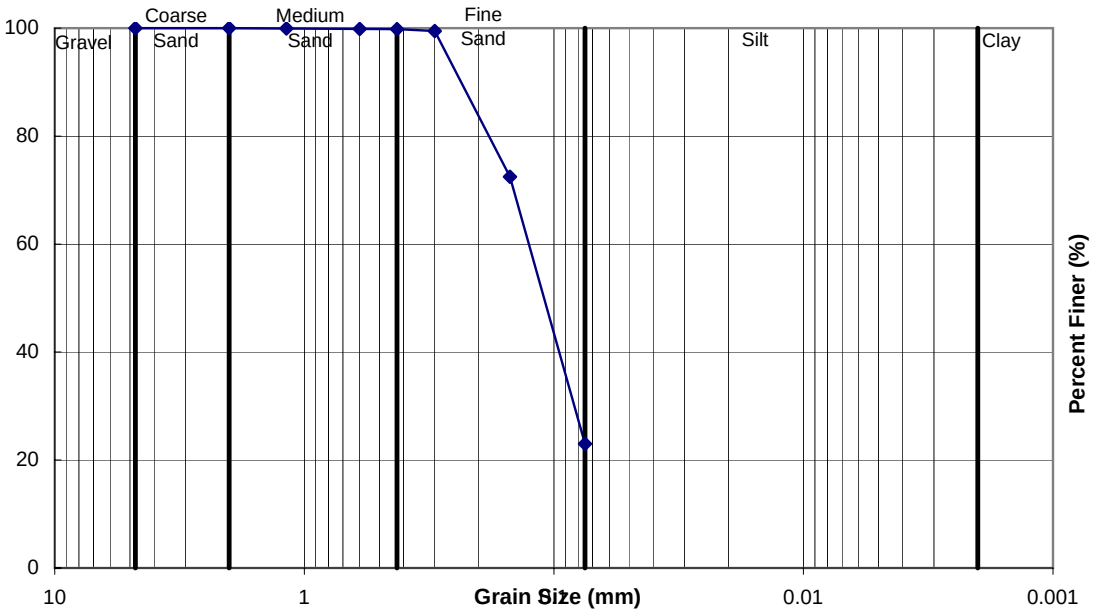


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-15:17m	0.0	0.0	0.0	30.0	54.0	16.0	-	-

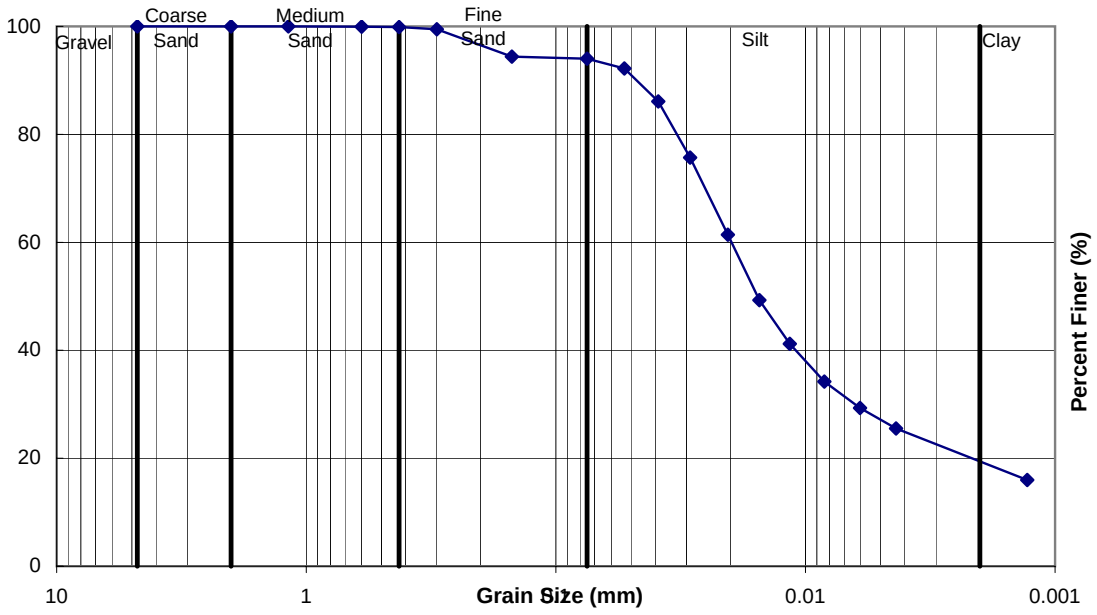


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
BH-01 (One)TP-15:19m	0.0	0.0	0.0	75.0	25.0		-	-

GRAIN SIZE DISTRIBUTION CURVE

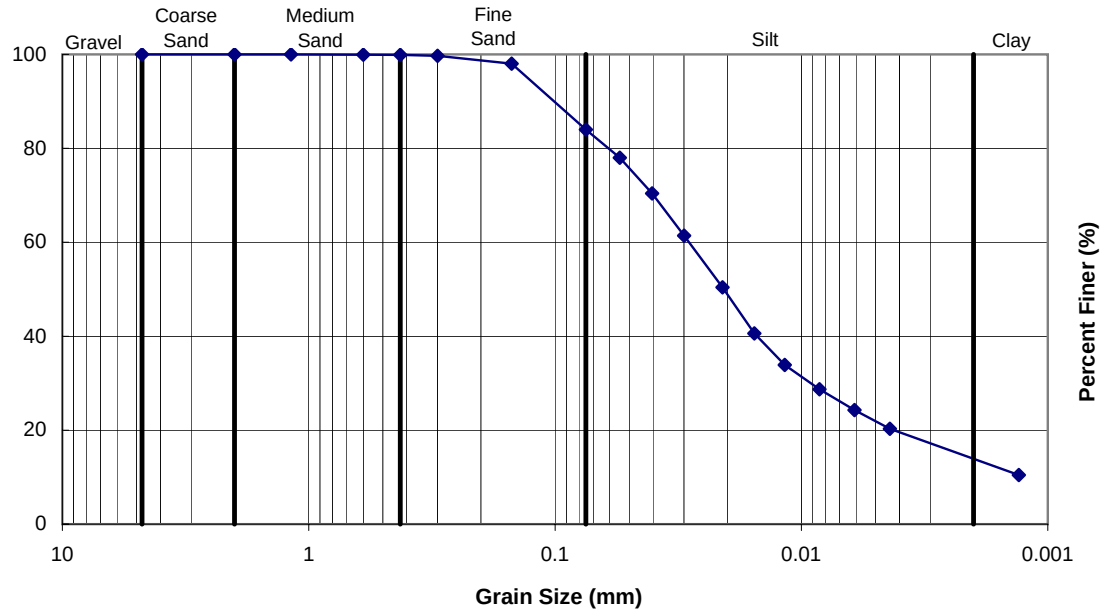


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
BH-01 (One)TP-15:23m	0.0	0.0	0.0	77.0	23.0		-	-

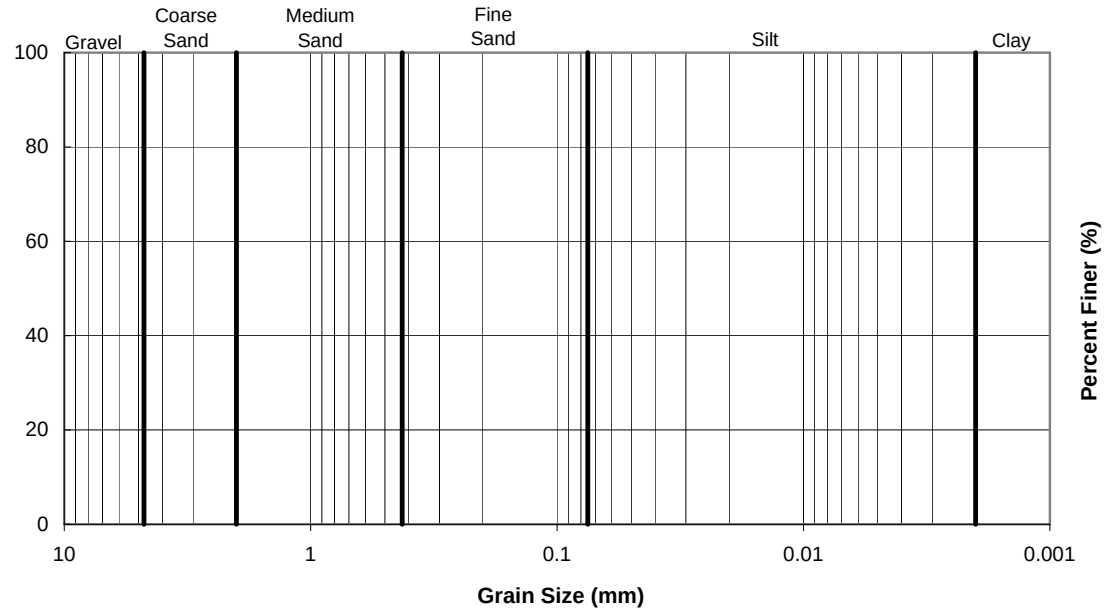


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-15:28.5r	0.0	0.0	0.0	6.0	75.0	19.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

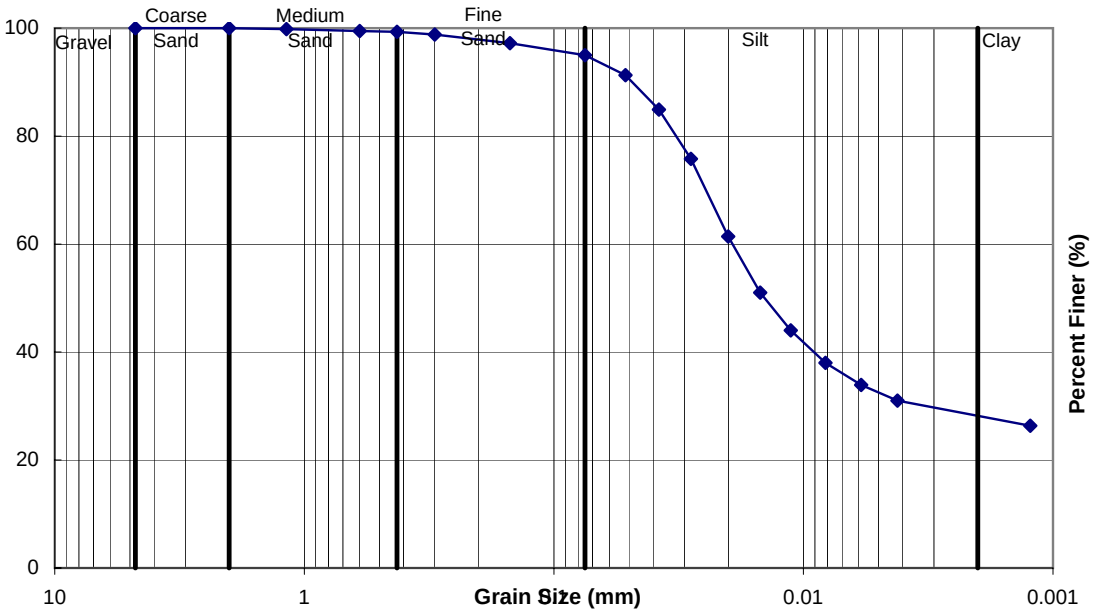


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-15:30m	0.0	0.0	0.0	16.0	70.0	14.0	-	-

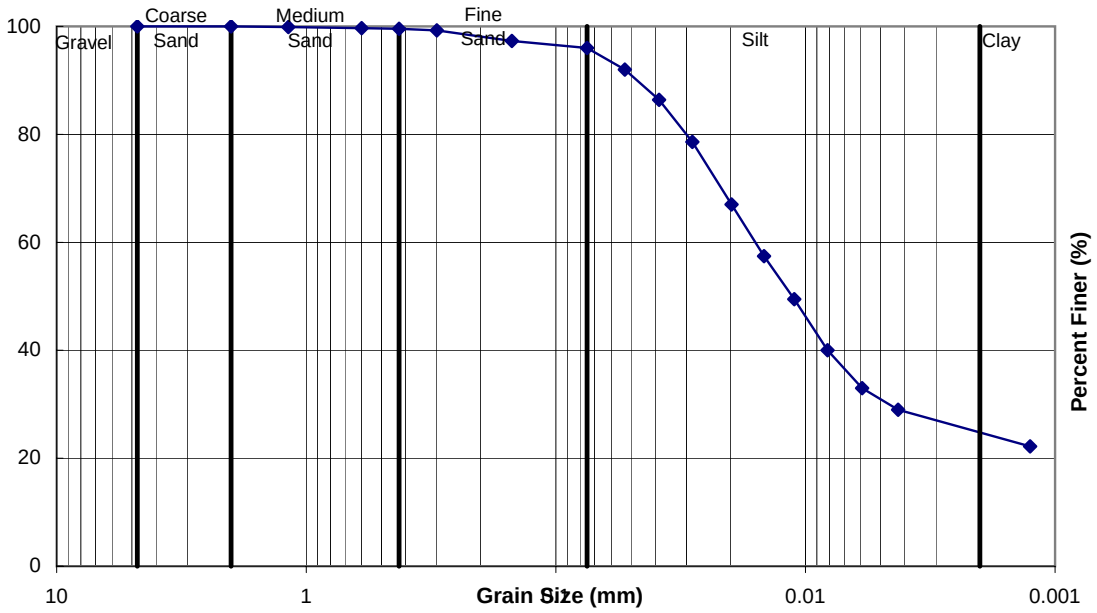


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
FALSE								

GRAIN SIZE DISTRIBUTION CURVE

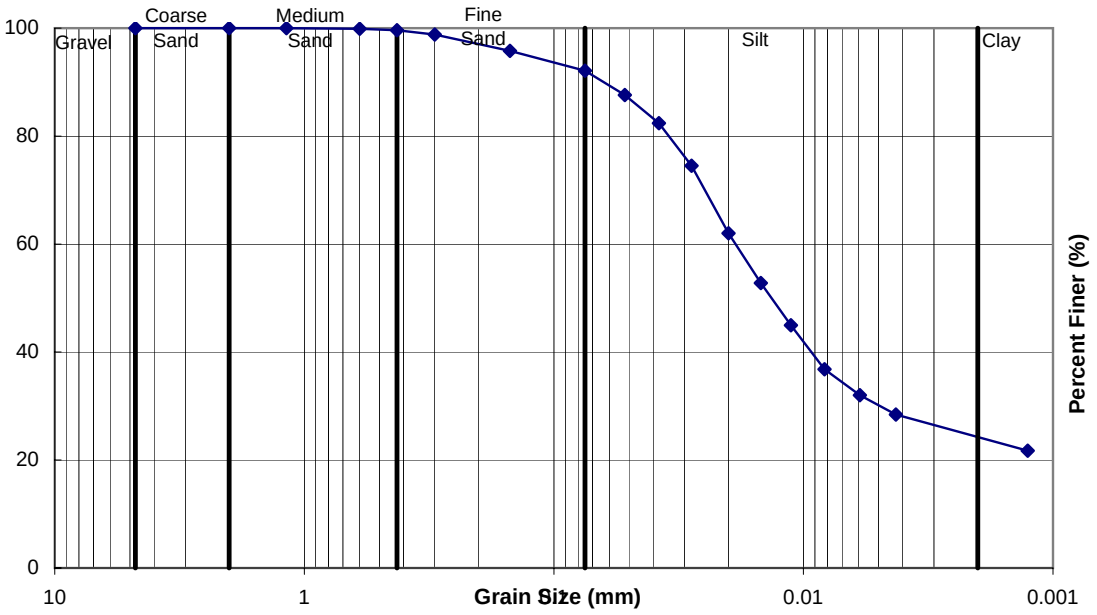


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-(TP-16):2m	0.0	0.0	1.0	4.0	67.0	28.0	-	-

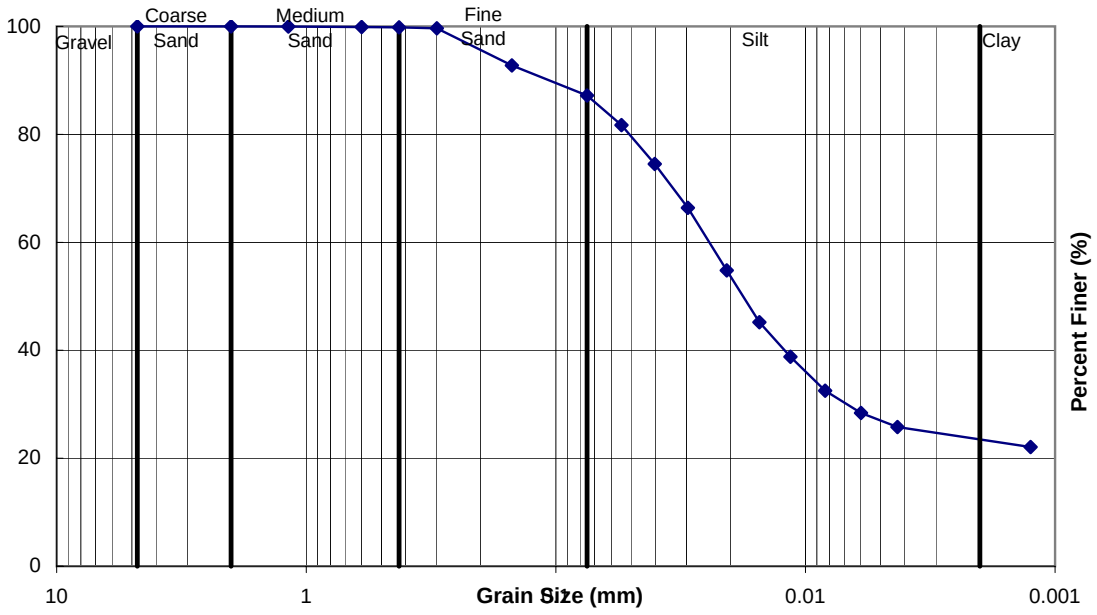


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-(TP-16):4m	0.0	0.0	0.0	4.0	71.0	25.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

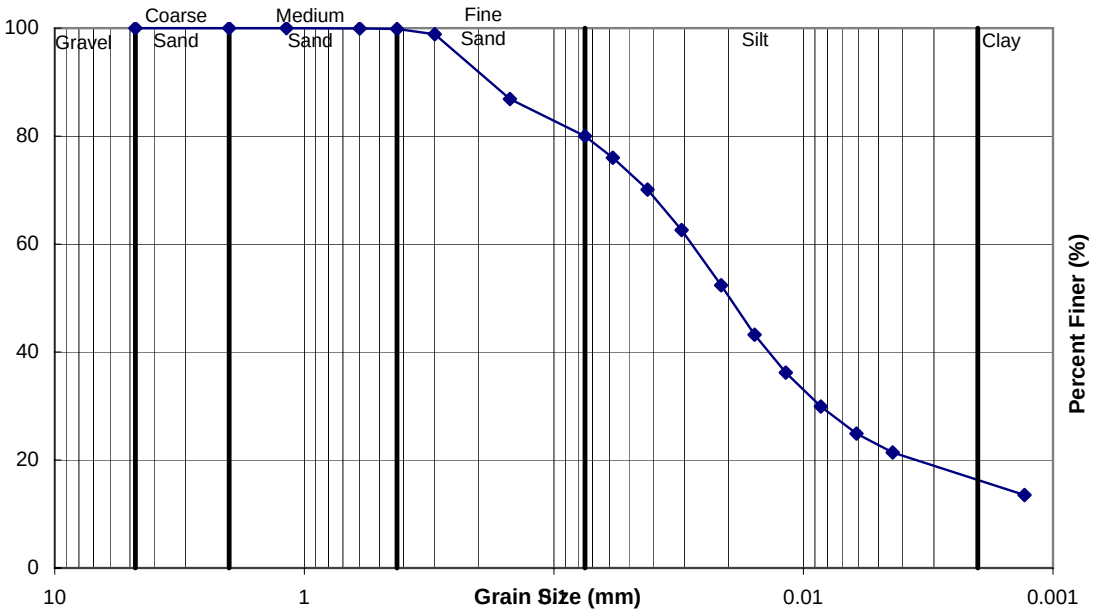


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-(TP-16):8m	0.0	0.0	0.0	8.0	68.0	24.0	-	-

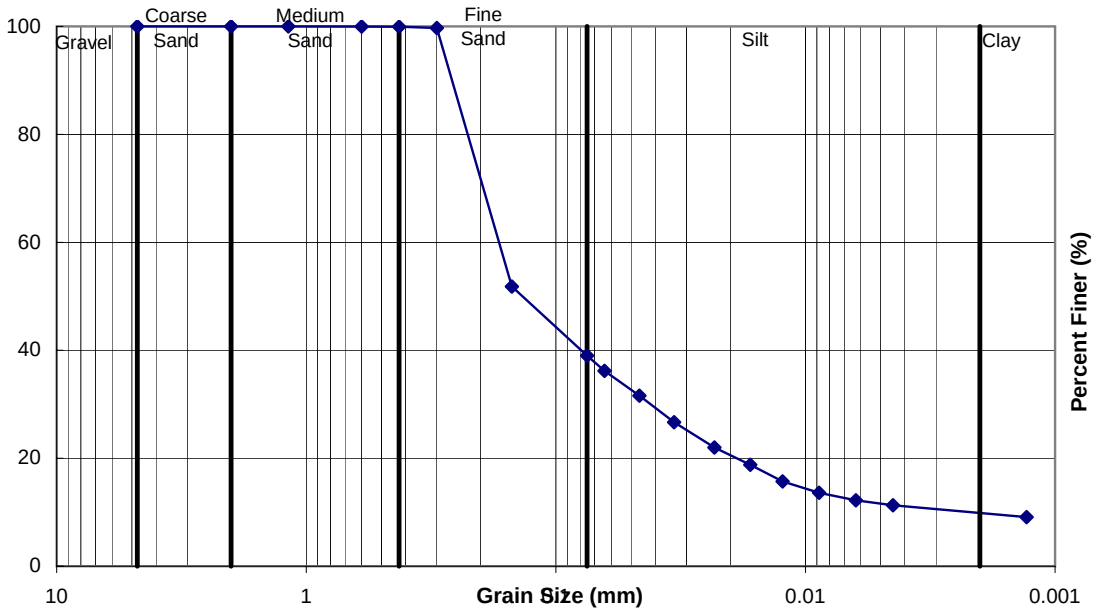


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-(TP-16):12m	0.0	0.0	0.0	13.0	64.0	23.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

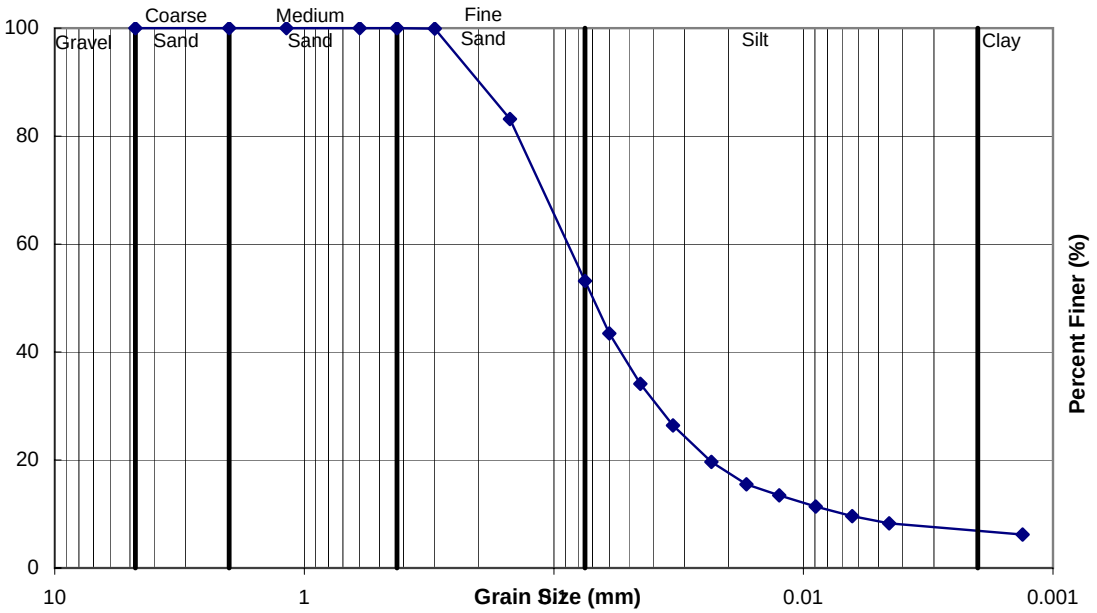


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-(TP-16):14m	0.0	0.0	0.0	20.0	64.0	16.0	-	-

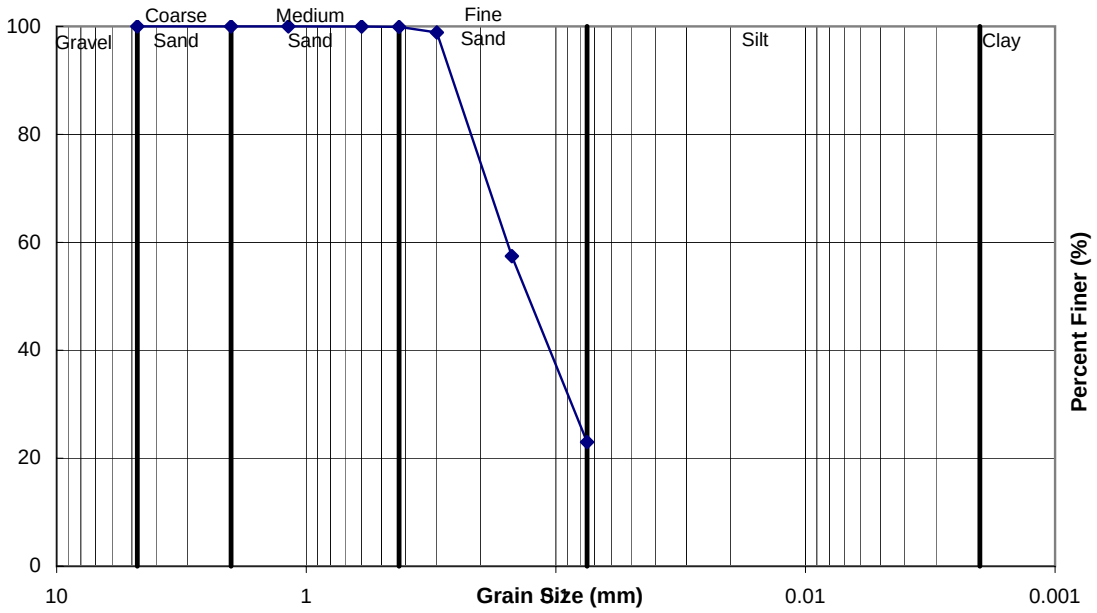


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-(TP-16):16m	0.0	0.0	0.0	61.0	29.0	10.0	78.0	0.2

GRAIN SIZE DISTRIBUTION CURVE

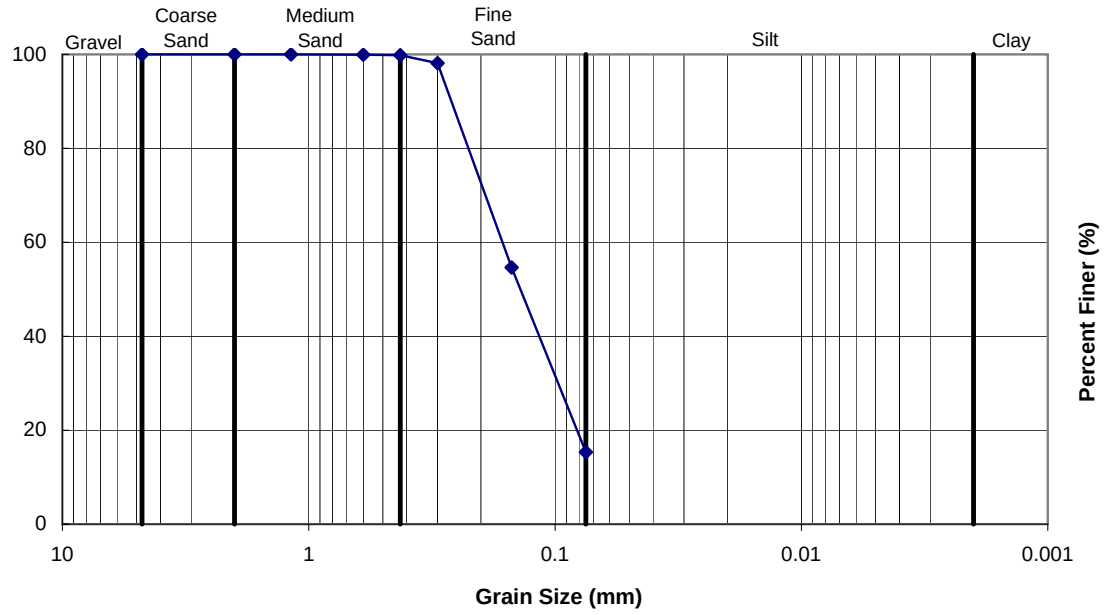


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-(TP-16):18m	0.0	0.0	0.0	47.0	46.0	7.0	12.8	0.4

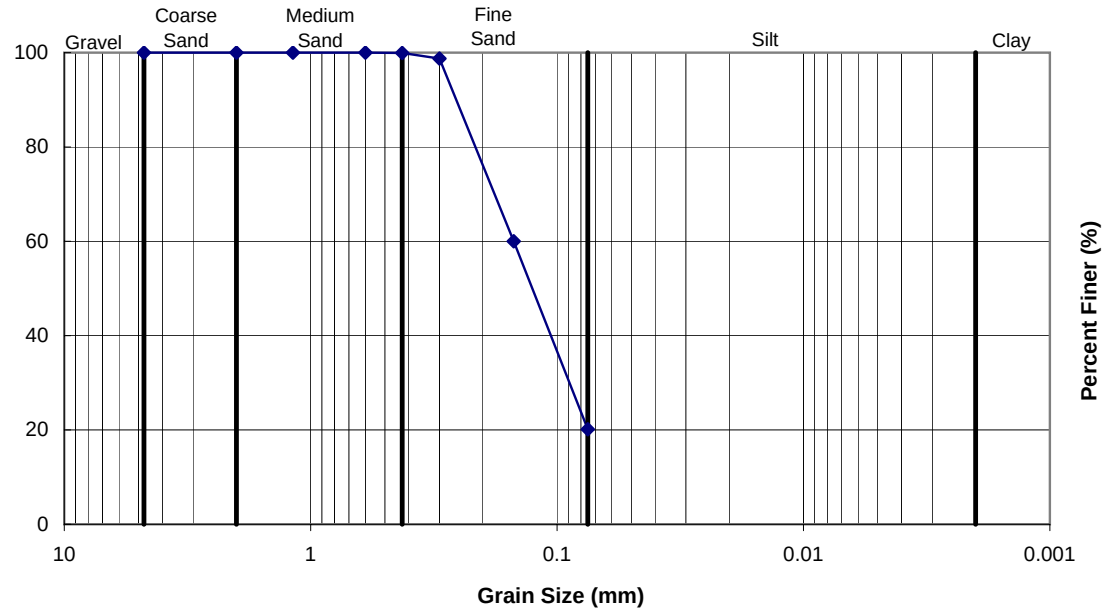


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
BH-(TP-16):22m	0.0	0.0	0.0	77.0	23.0		-	-

GRAIN SIZE DISTRIBUTION CURVE

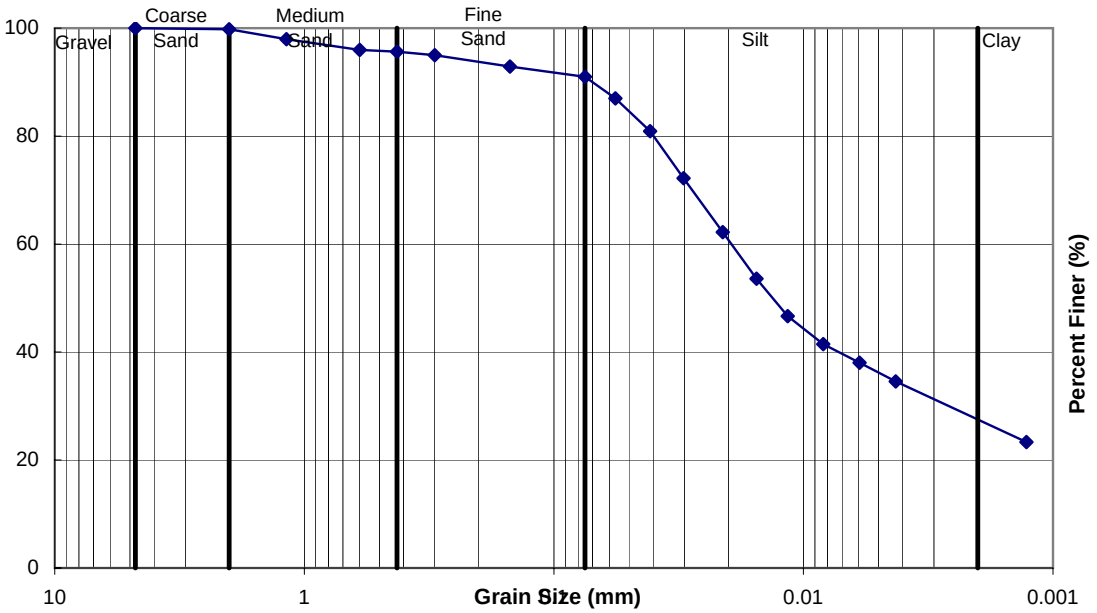


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
BH-(TP-16):26m	0.0	0.0	0.0	85.0	15.0		-	-

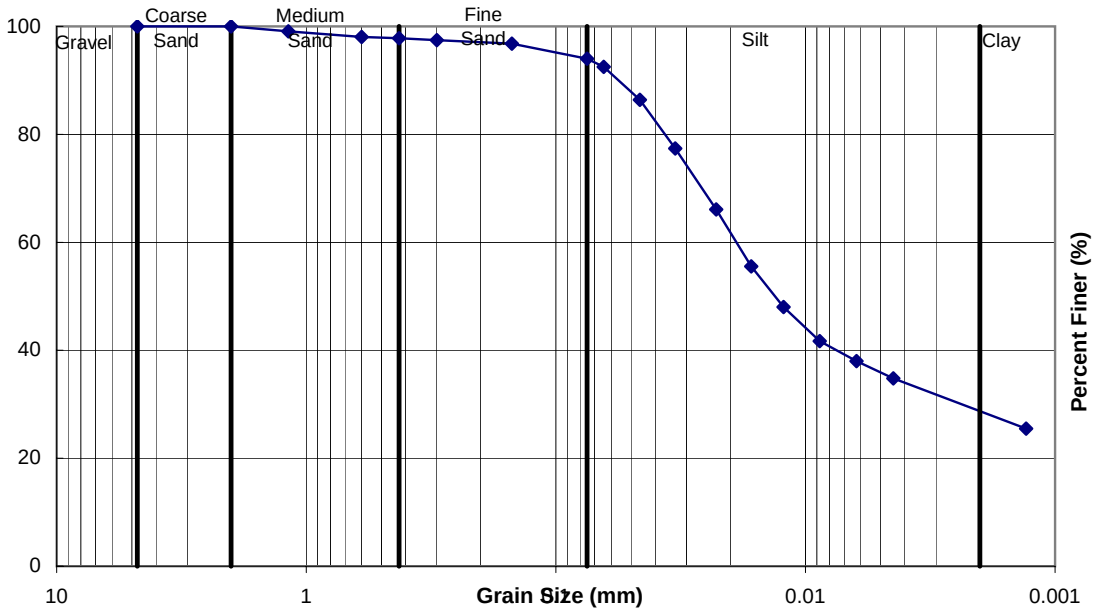


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
BH-(TP-16):30m	0.0	0.0	0.0	80.0	20.0		-	-

GRAIN SIZE DISTRIBUTION CURVE

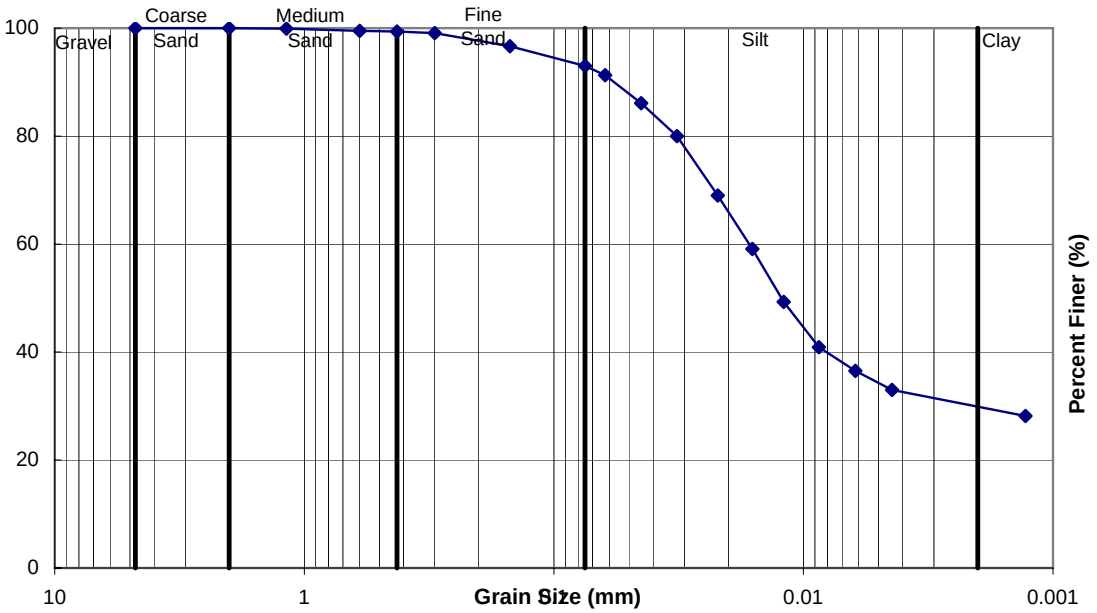


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-17:2m	0.0	0.0	4.0	5.0	63.0	28.0	-	-

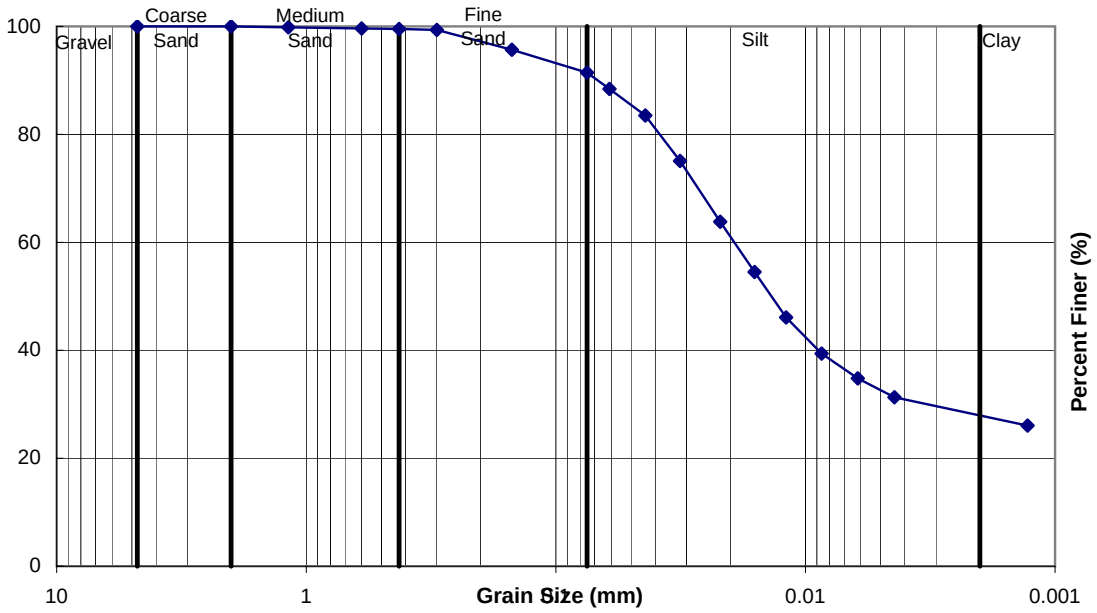


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-17:4m	0.0	0.0	2.0	4.0	65.0	29.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

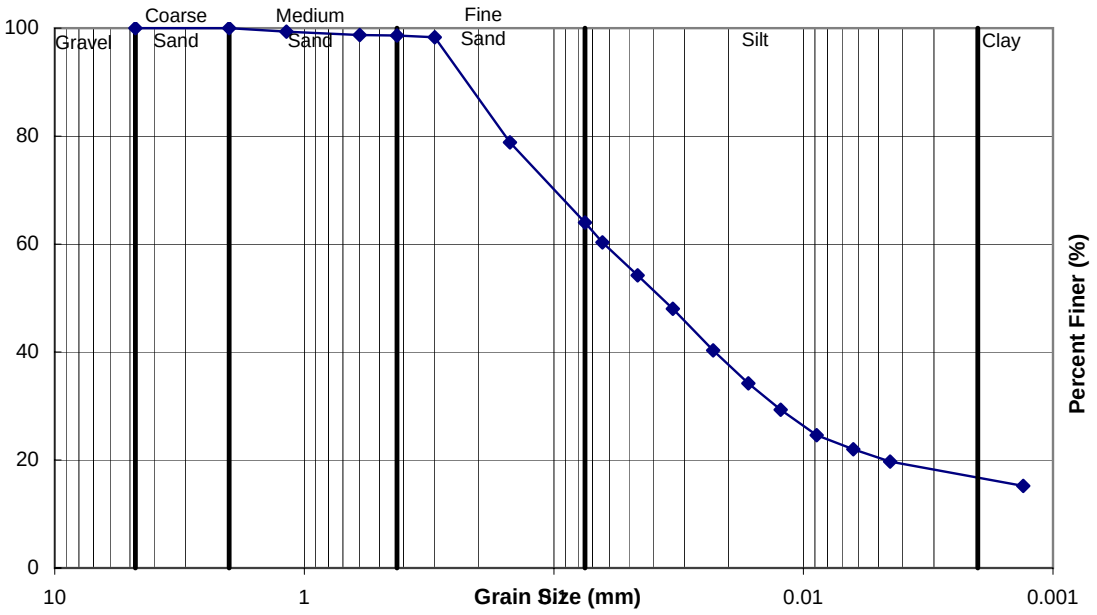


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-17:6.5m	0.0	0.0	1.0	6.0	63.0	30.0	-	-

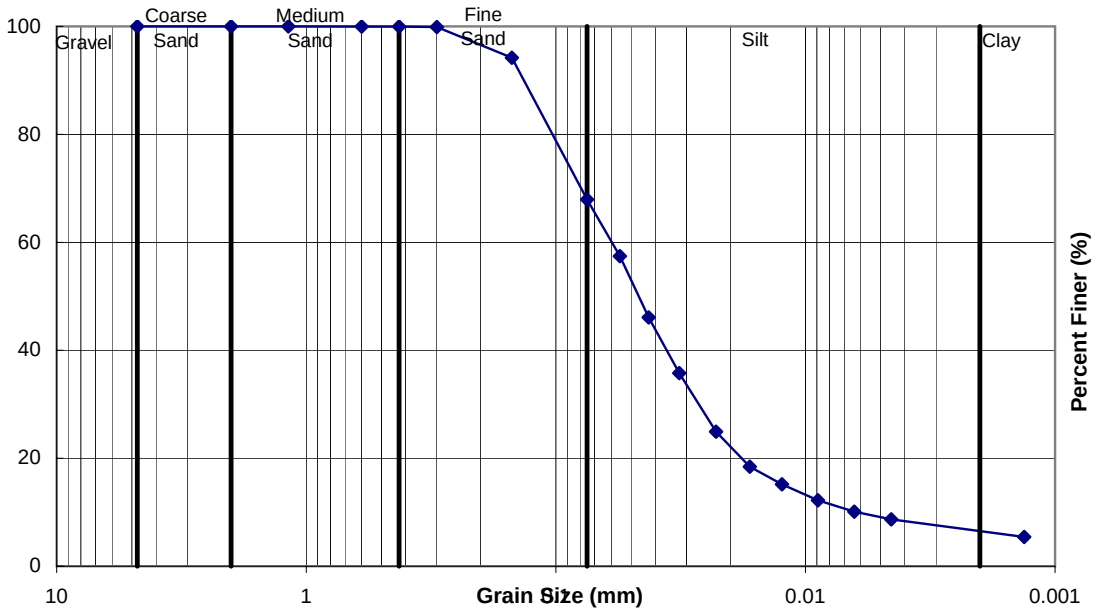


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-17:9.5m	0.0	0.0	0.0	8.0	64.0	28.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

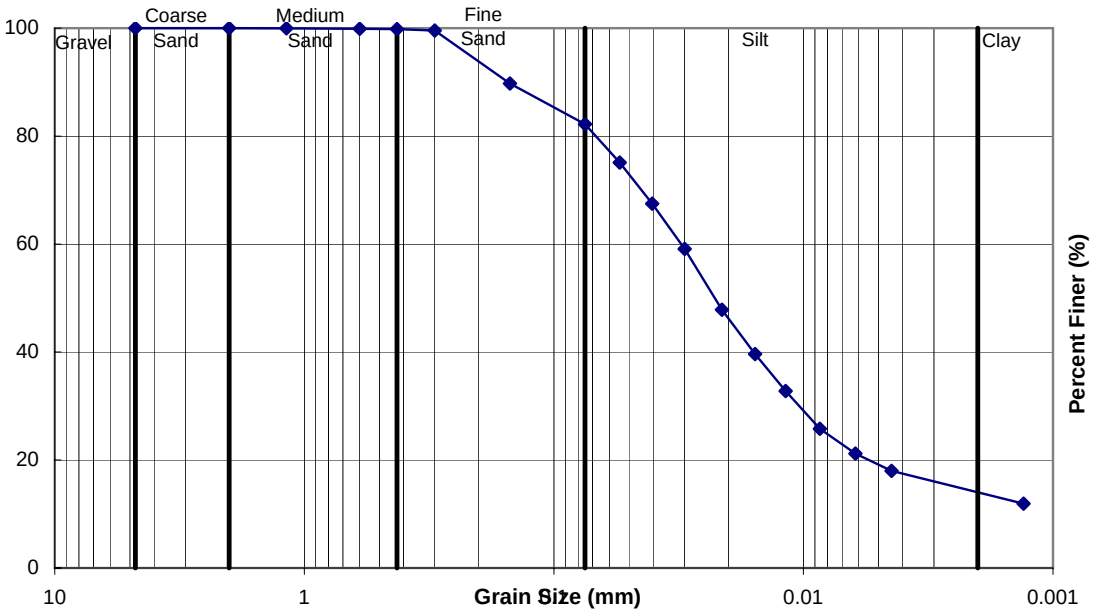


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-17:12.5m	0.0	0.0	1.0	35.0	47.0	17.0	-	-

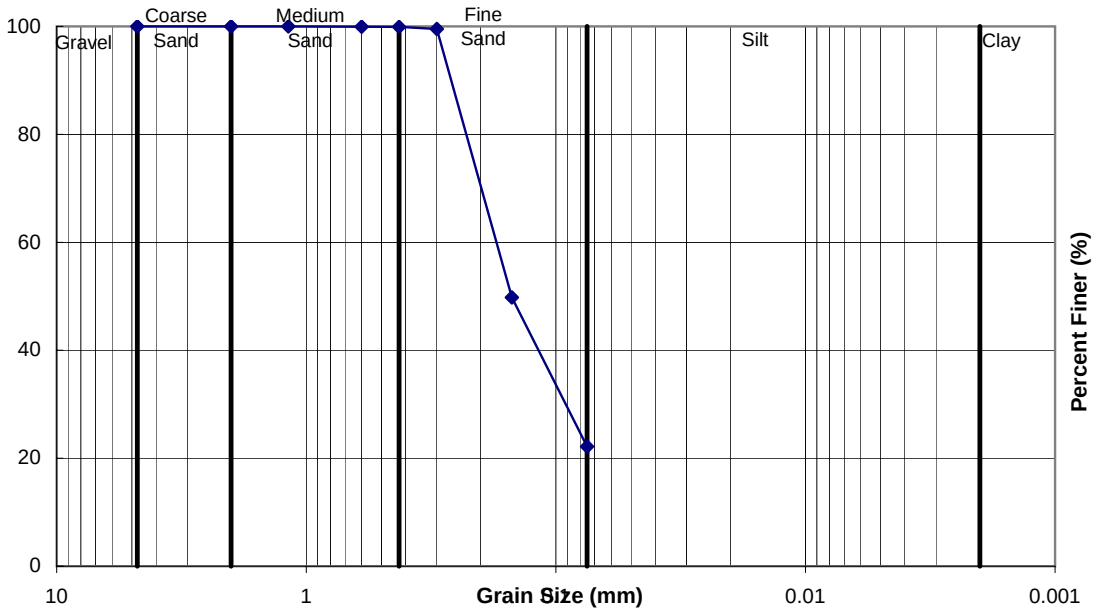


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-17:16m	0.0	0.0	0.0	32.0	61.0	7.0	9.6	0.5

GRAIN SIZE DISTRIBUTION CURVE

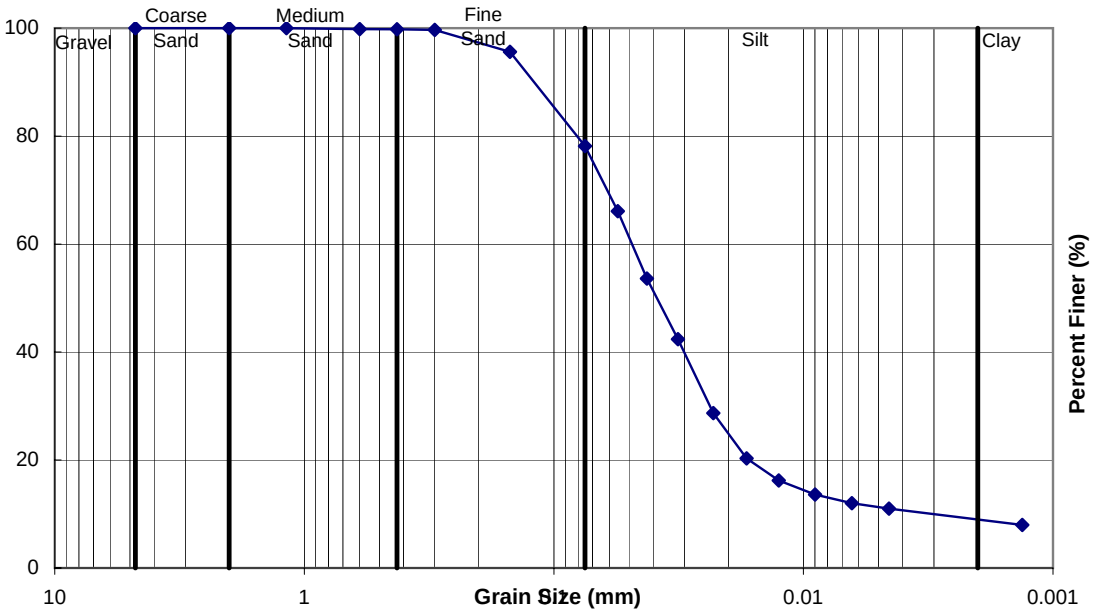


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-17:18m	0.0	0.0	0.0	18.0	68.0	14.0	-	-

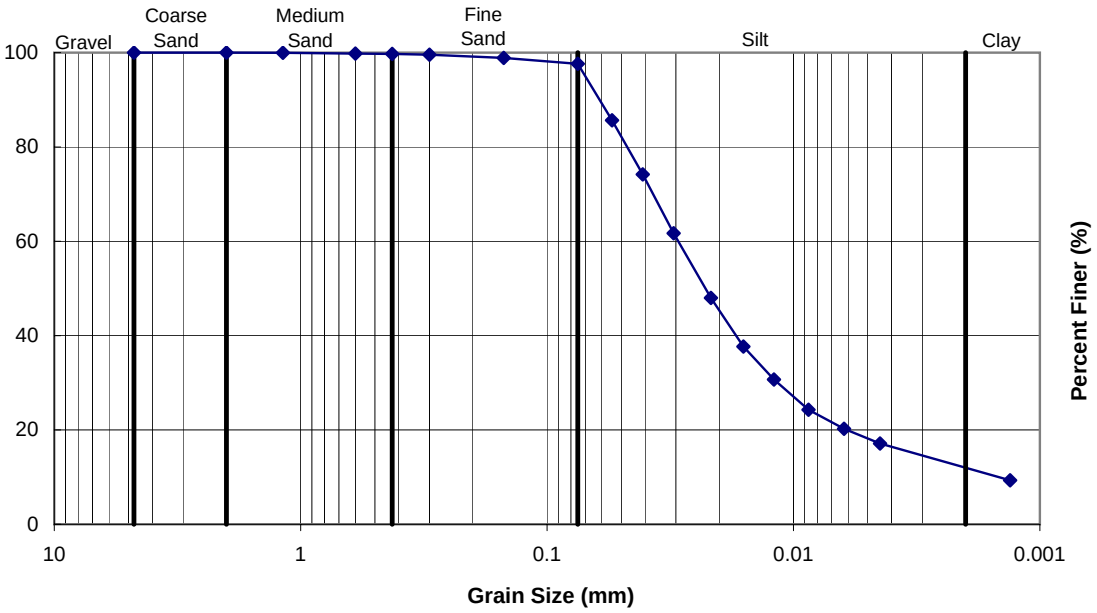


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
BH-01 (One)TP-17:21.5m	0.0	0.0	0.0	78.0	22.0		-	-

GRAIN SIZE DISTRIBUTION CURVE

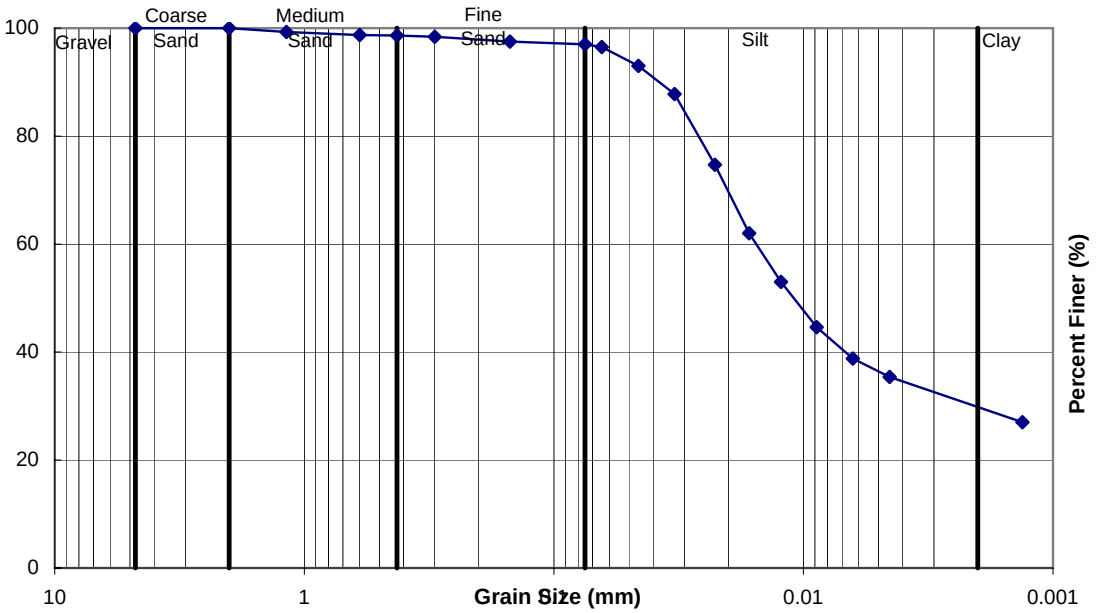


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-17:25.5m	0.0	0.0	0.0	22.0	69.0	9.0	16.1	0.3

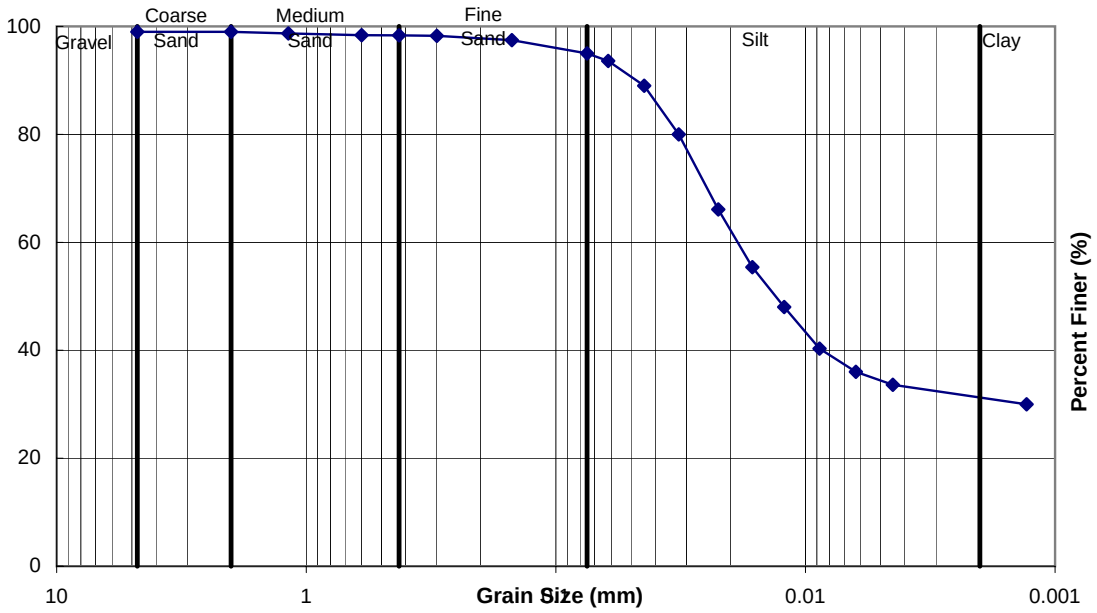


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-17:28.5m	0.0	0.0	0.0	2.0	86.0	12.0	20.1	0.3

GRAIN SIZE DISTRIBUTION CURVE

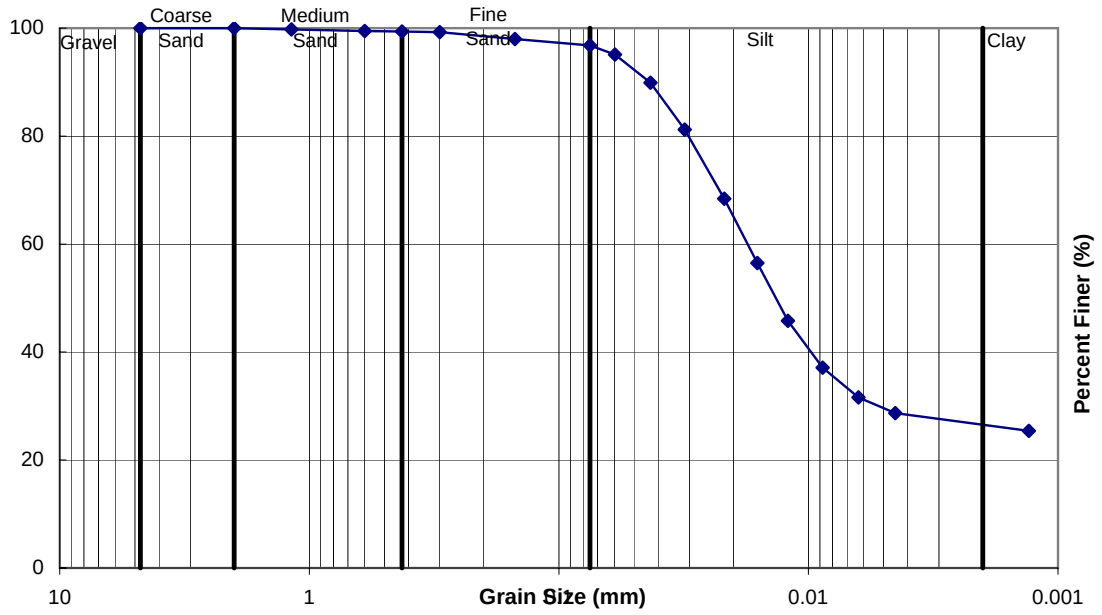


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-TP-18:1m	0.0	0.0	1.0	2.0	67.0	30.0	-	-

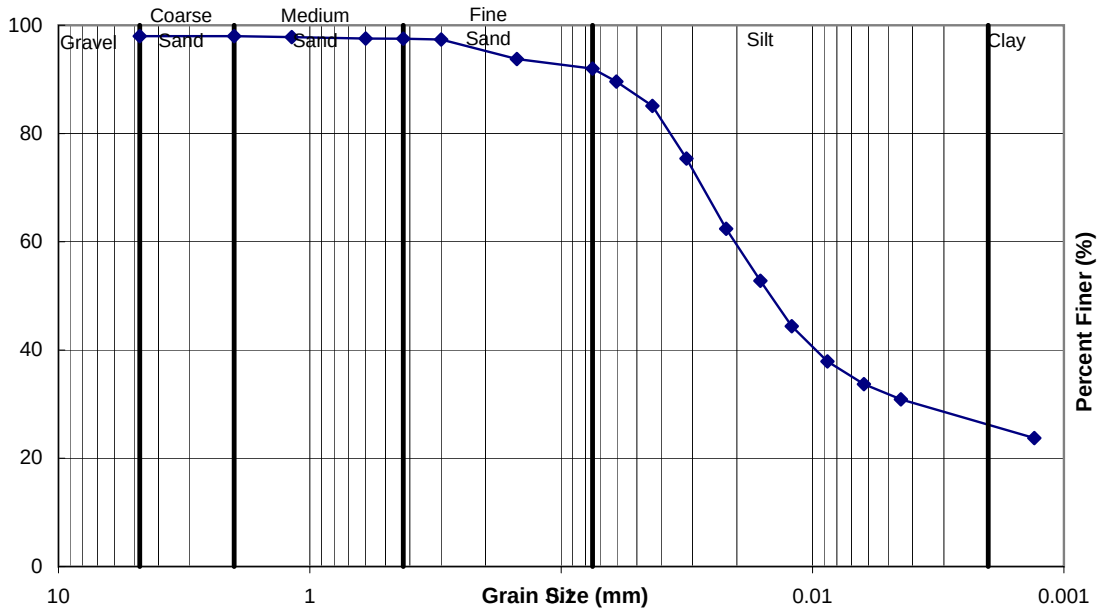


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-TP-18:3m	1.0	0.0	1.0	3.0	64.0	31.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

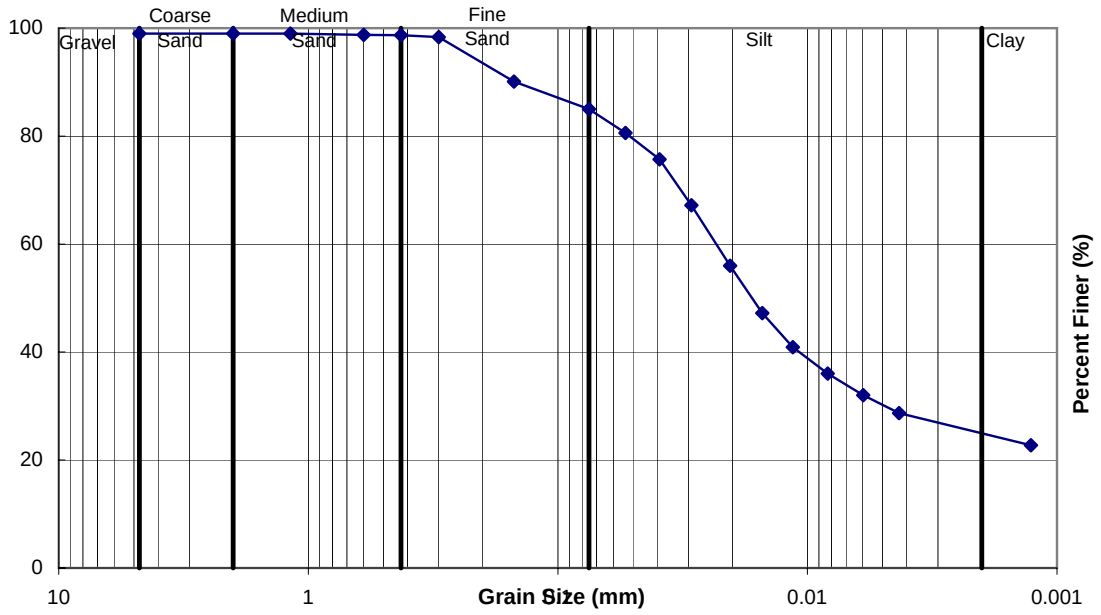


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-TP-18:5m	0.0	0.0	1.0	3.0	69.0	27.0	-	-

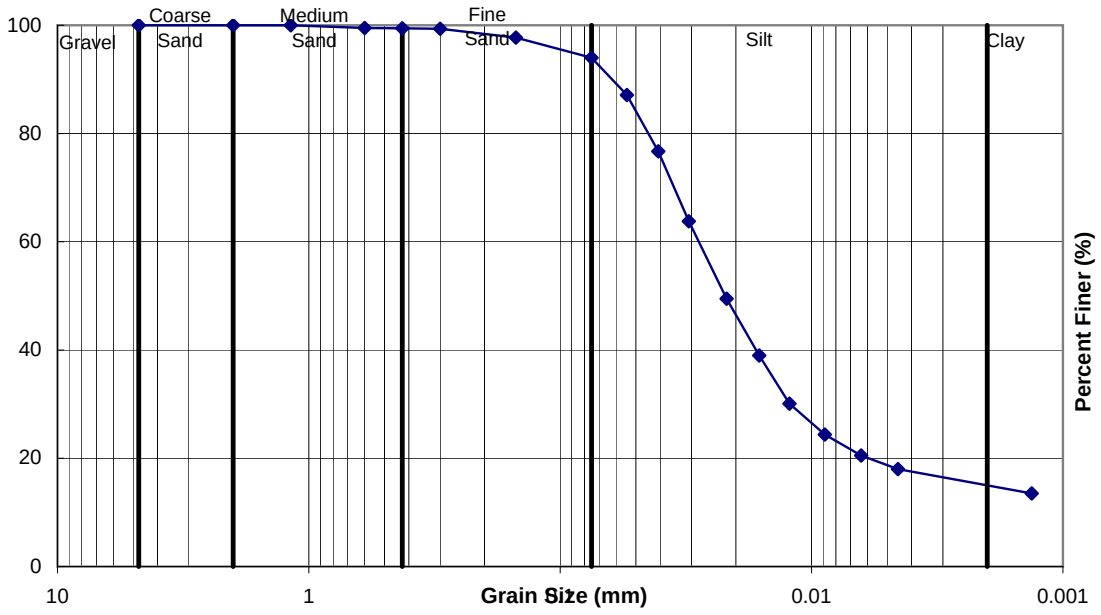


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-TP-18:8m	2.0	0.0	0.0	6.0	66.0	26.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

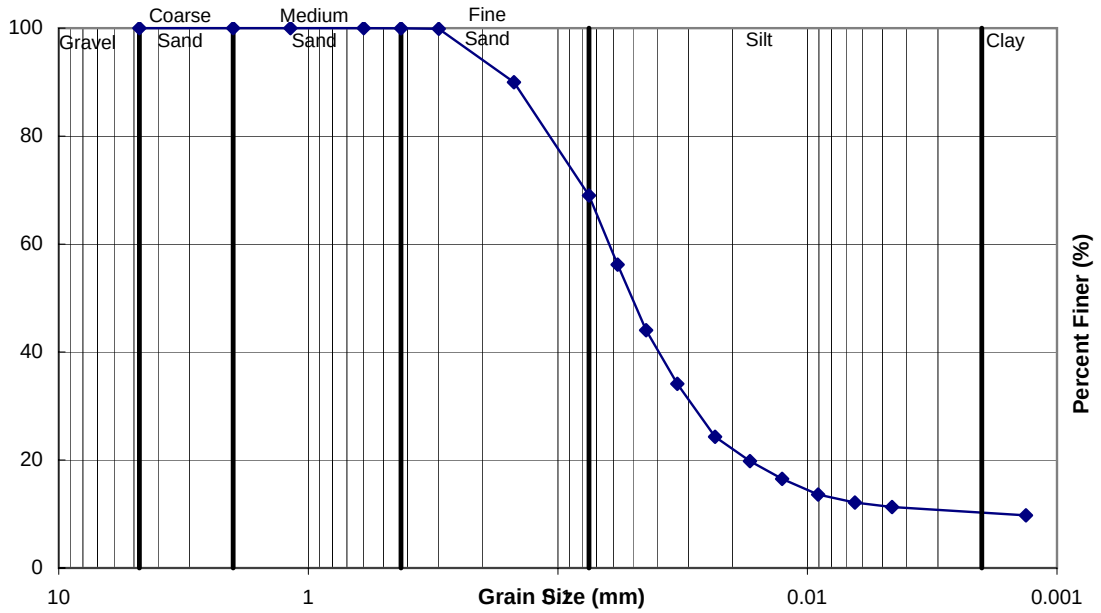


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-TP-18:12m	1.0	0.0	0.0	14.0	60.0	25.0	-	-

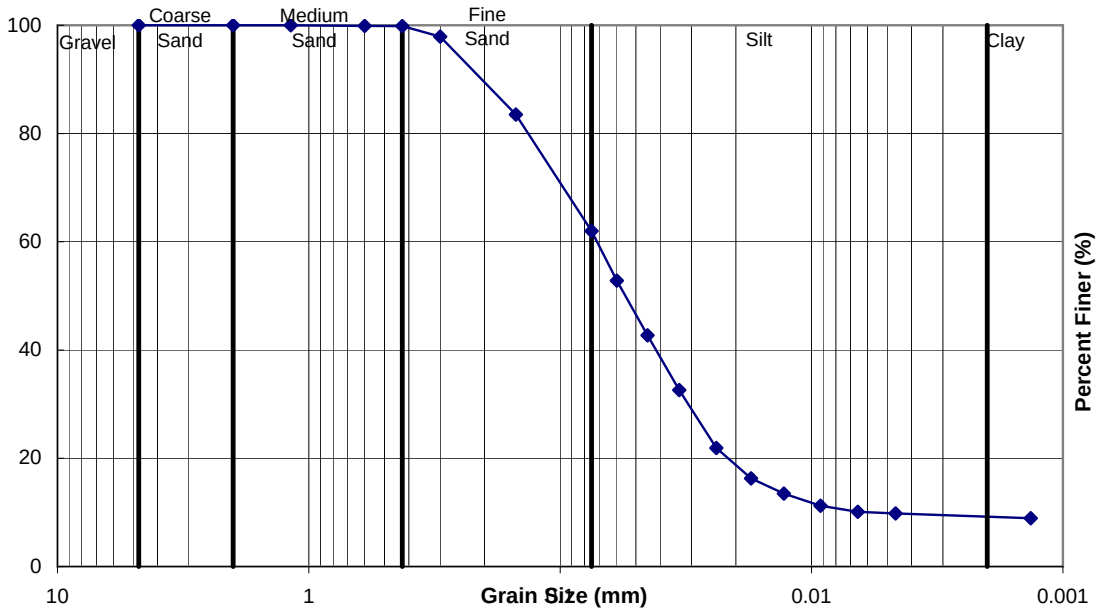


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-TP-18:16m	0.0	0.0	1.0	5.0	79.0	15.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

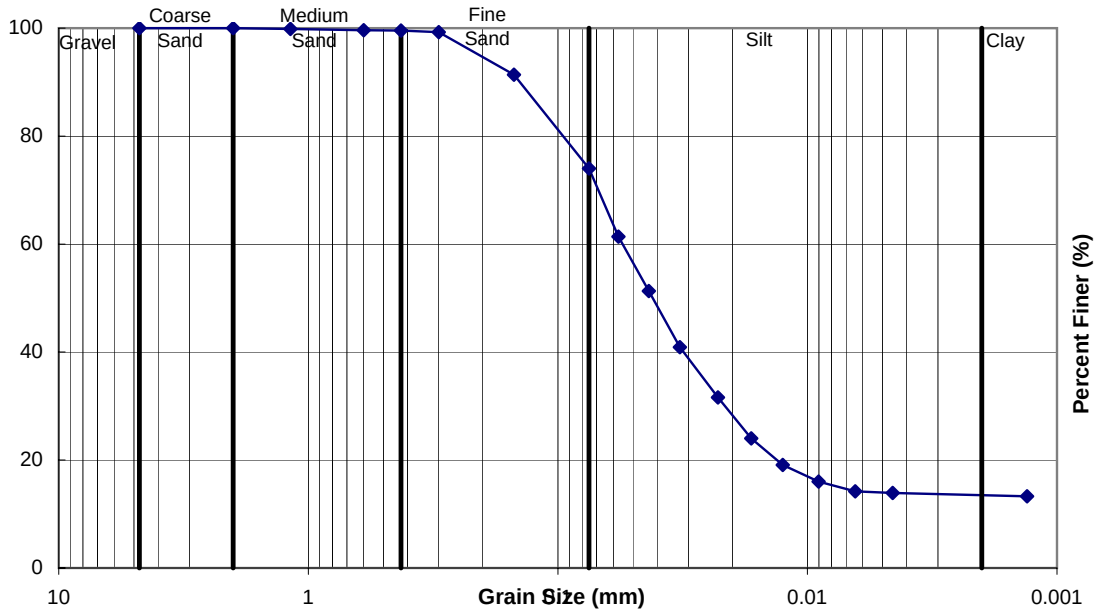


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-TP-18:18m	0.0	0.0	0.0	31.0	59.0	10.0	38.5	0.1

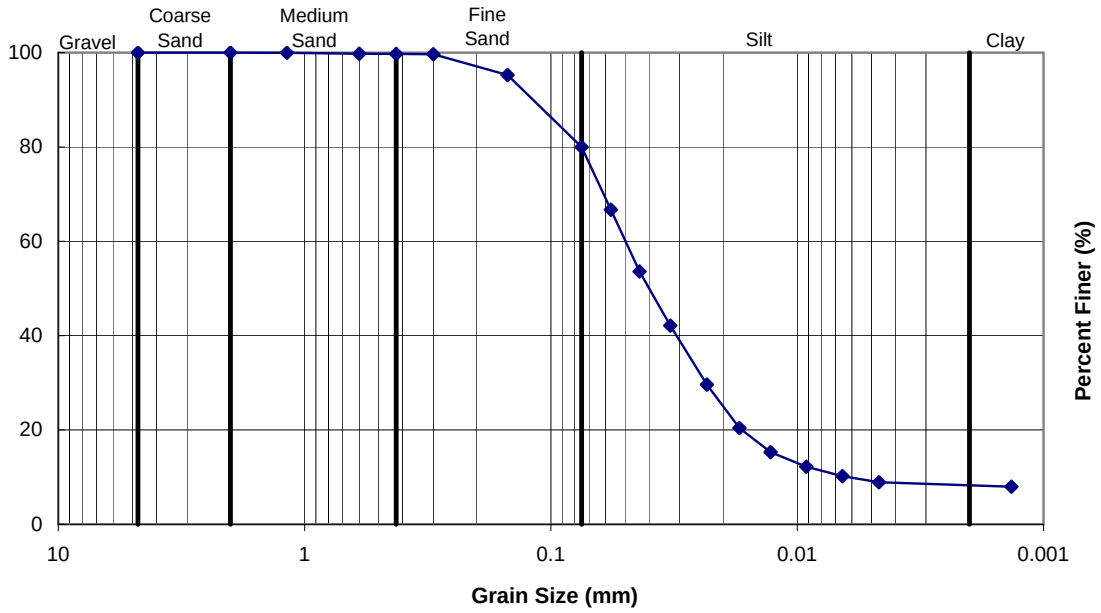


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-TP-18:22m	0.0	0.0	0.0	38.0	53.0	9.0	12.4	0.4

GRAIN SIZE DISTRIBUTION CURVE

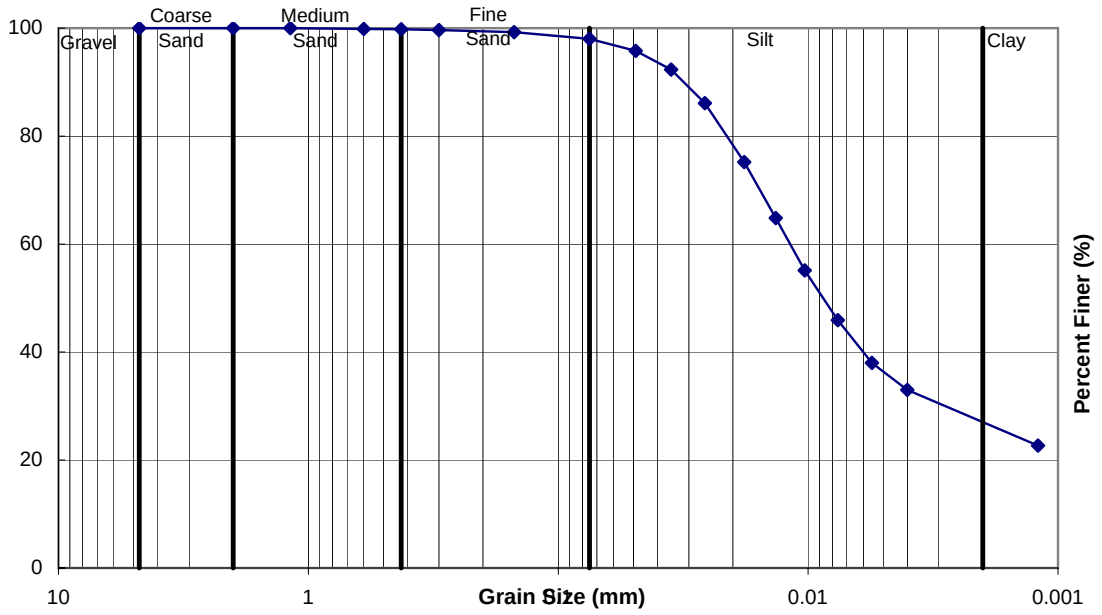


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-TP-18:26m	0.0	0.0	0.0	26.0	61.0	13.0	-	-

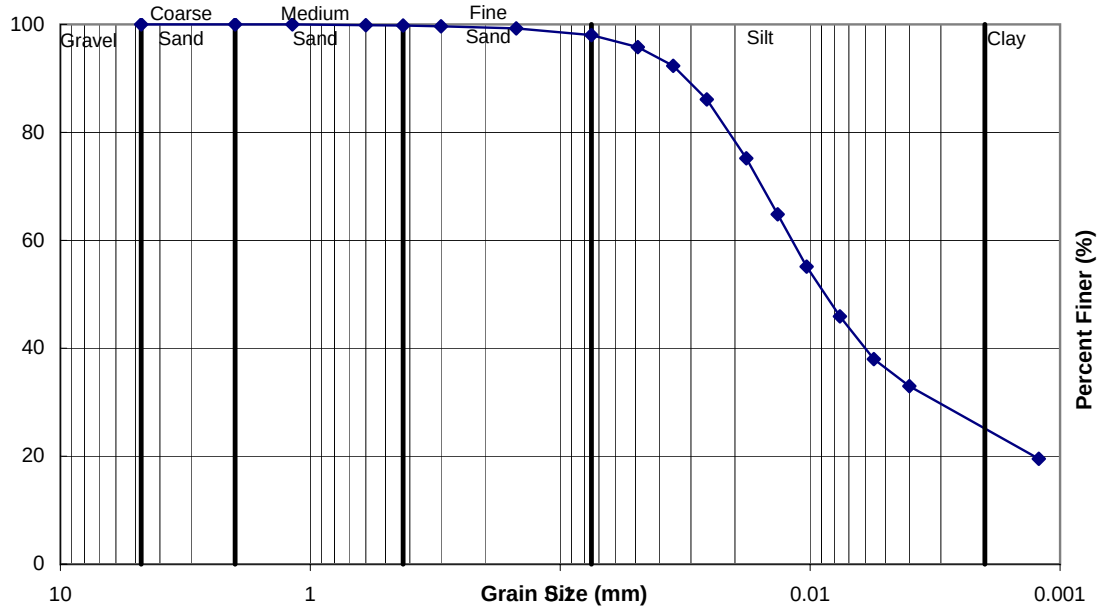


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-TP-18:30m	0.0	0.0	0.0	20.0	72.0	8.0	8.0	0.6

GRAIN SIZE DISTRIBUTION CURVE

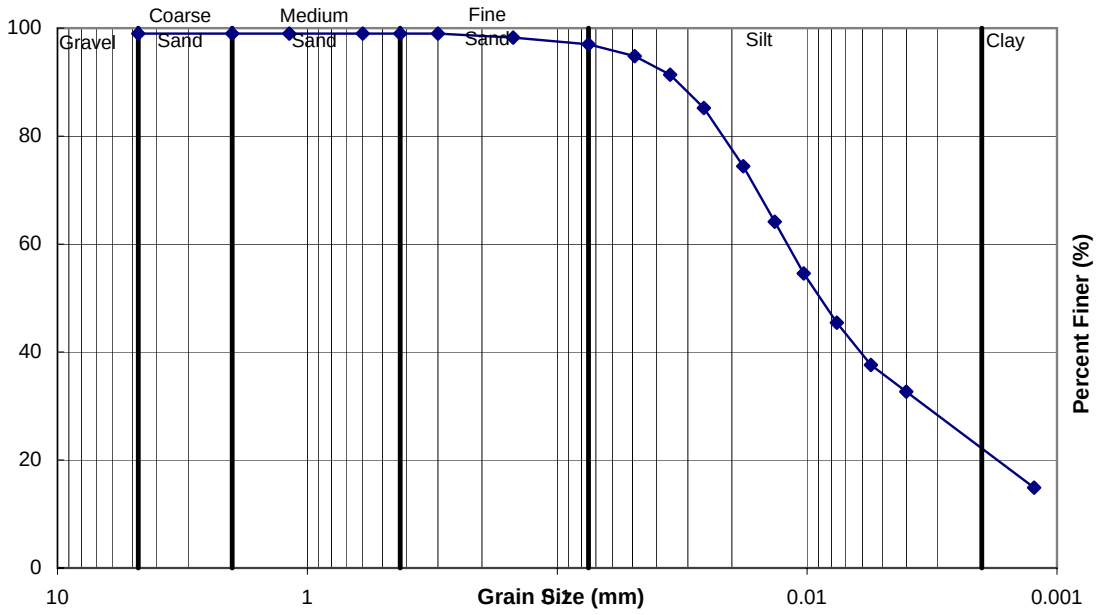


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-19:1m	0.0	0.0	0.0	2.0	71.0	27.0	-	-

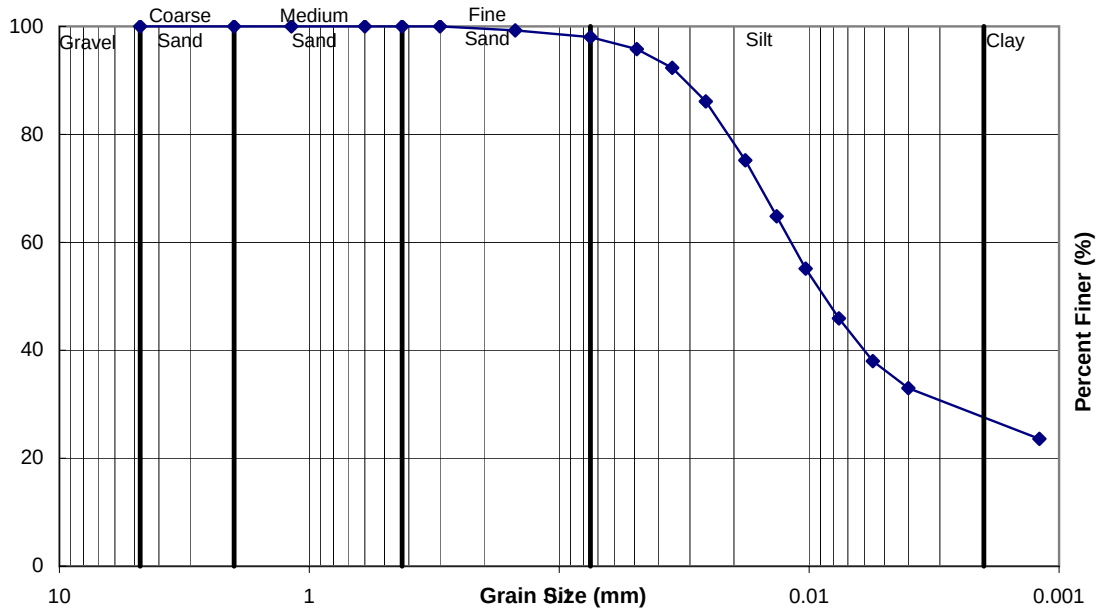


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-19:3m	0.0	0.0	0.0	2.0	73.0	25.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

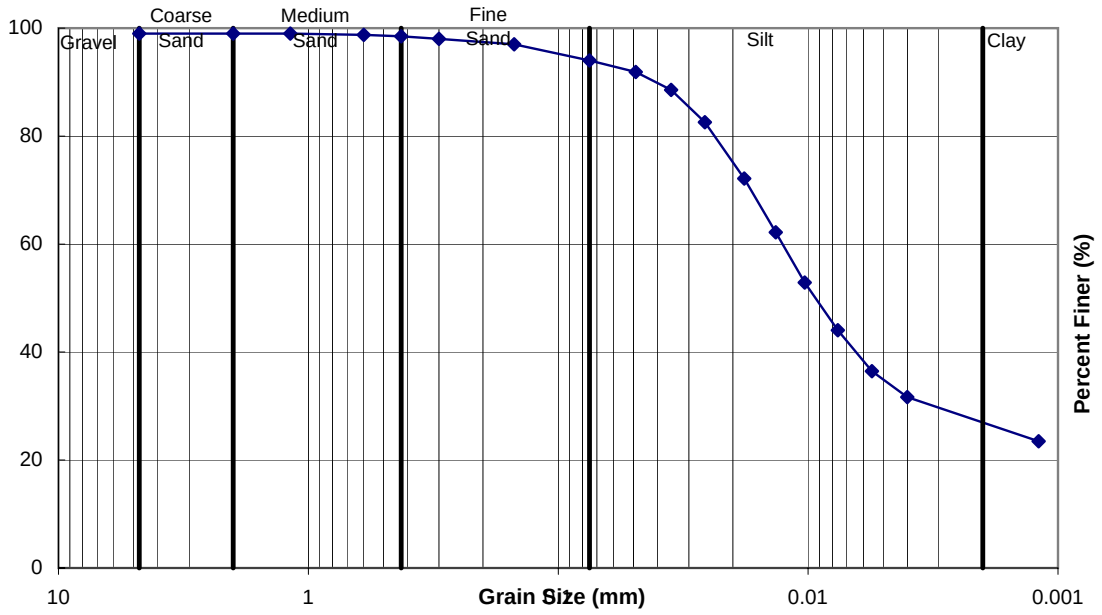


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-19:5.5m	1.0	0.0	0.0	2.0	75.0	22.0	-	-

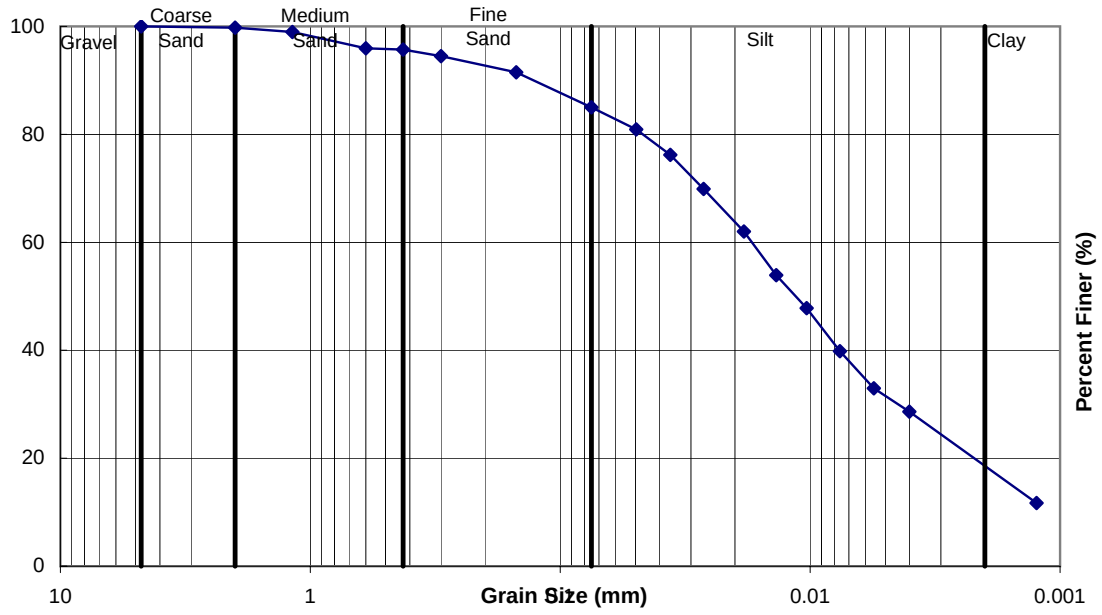


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-19:7m	0.0	0.0	0.0	2.0	70.0	28.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

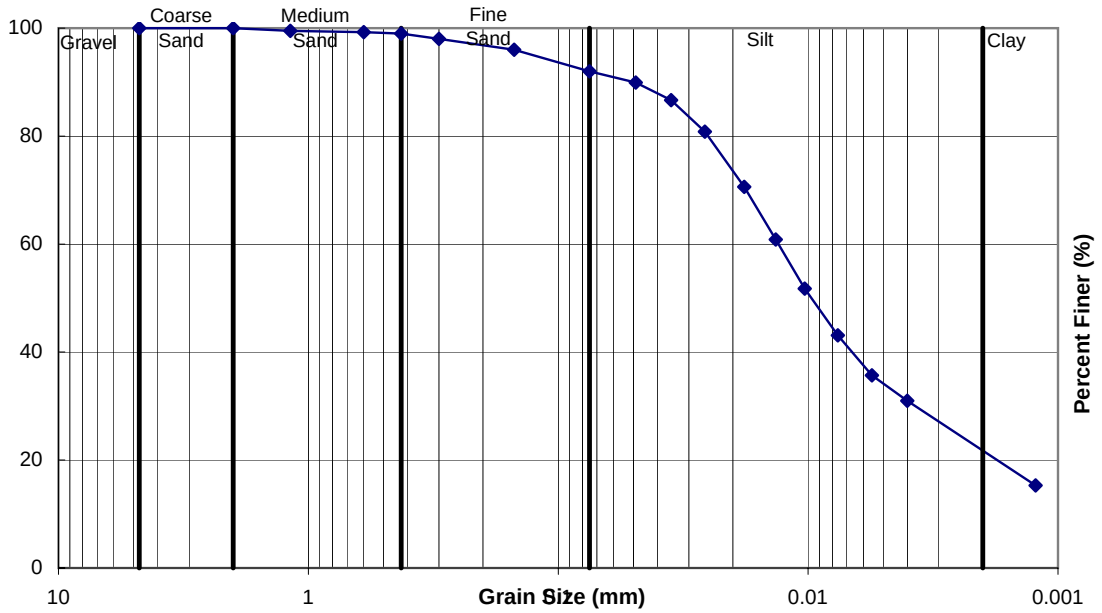


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-19:8.5m	1.0	0.0	1.0	5.0	66.0	27.0	-	-

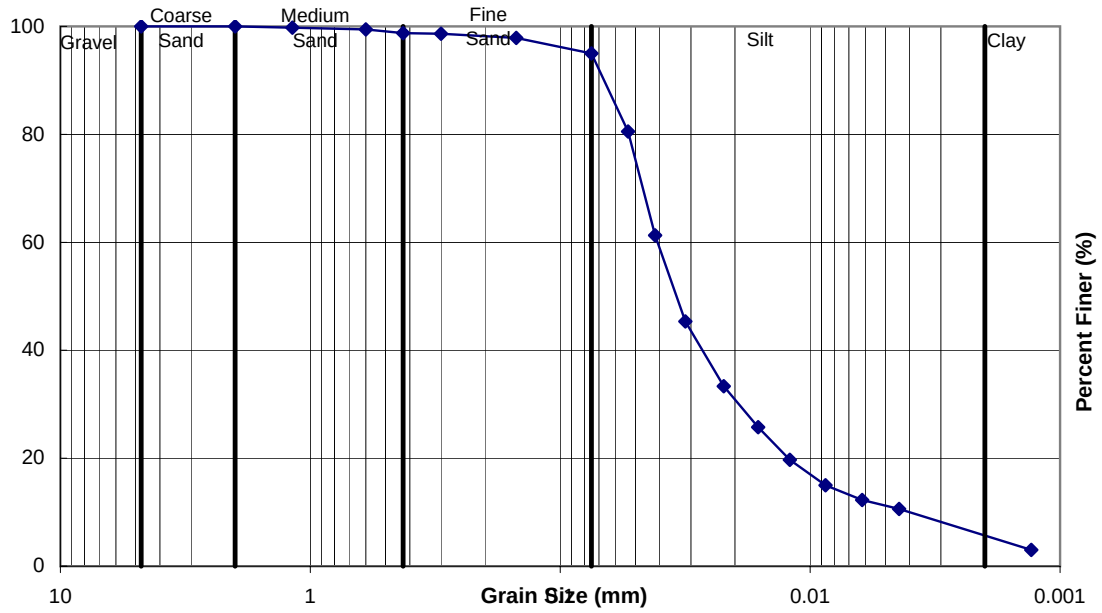


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-19:11.5m	0.0	0.0	4.0	11.0	66.0	19.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

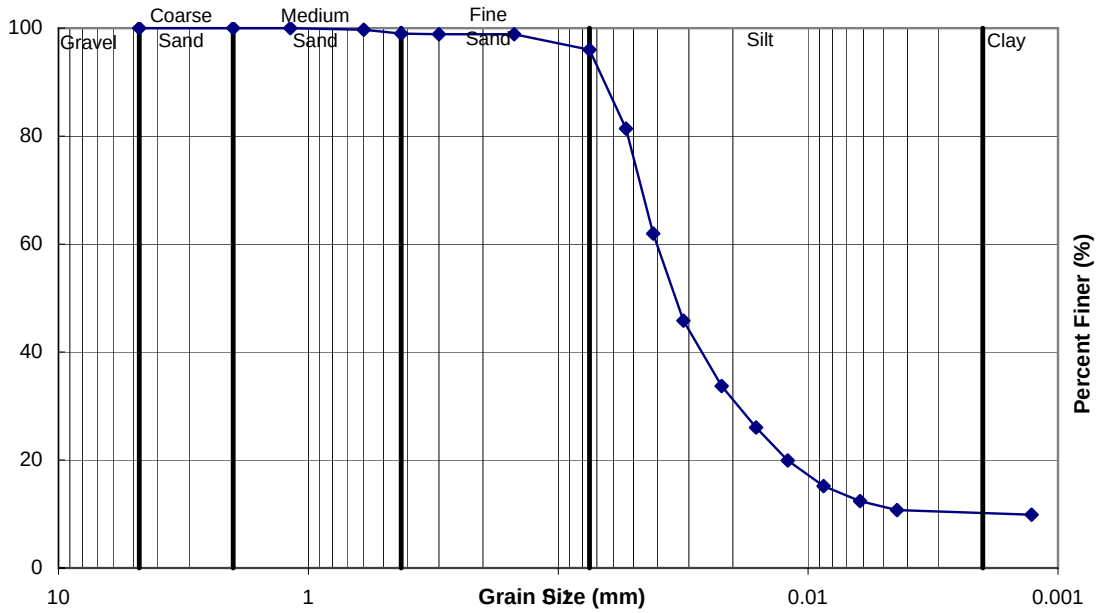


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-19:13.5m	0.0	0.0	1.0	7.0	70.0	22.0	-	-

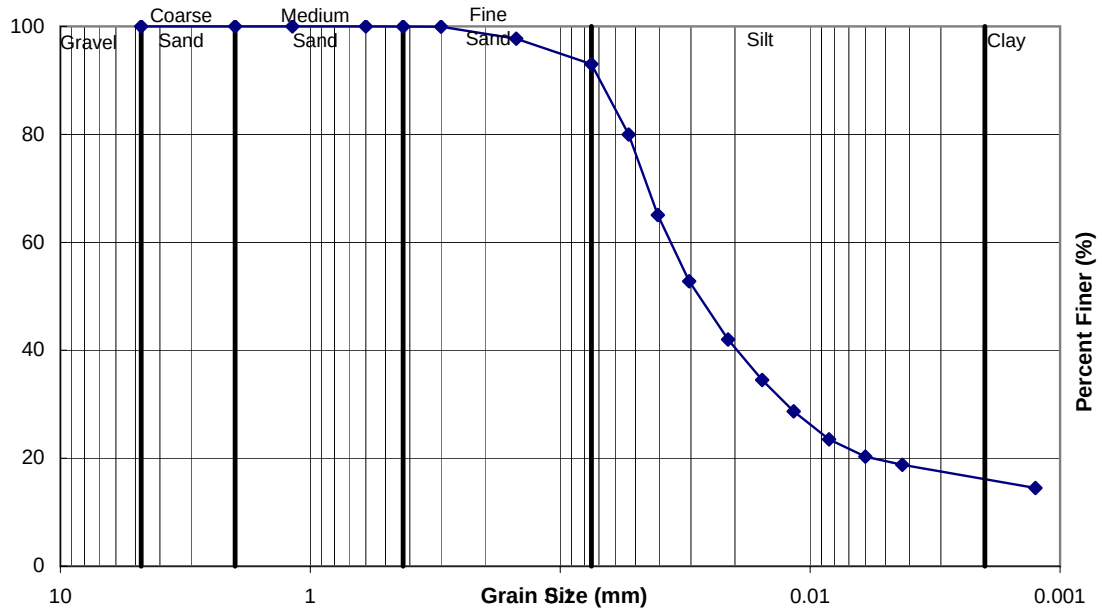


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-19:15.5m	0.0	0.0	1.0	4.0	89.0	6.0	10.2	0.4

GRAIN SIZE DISTRIBUTION CURVE

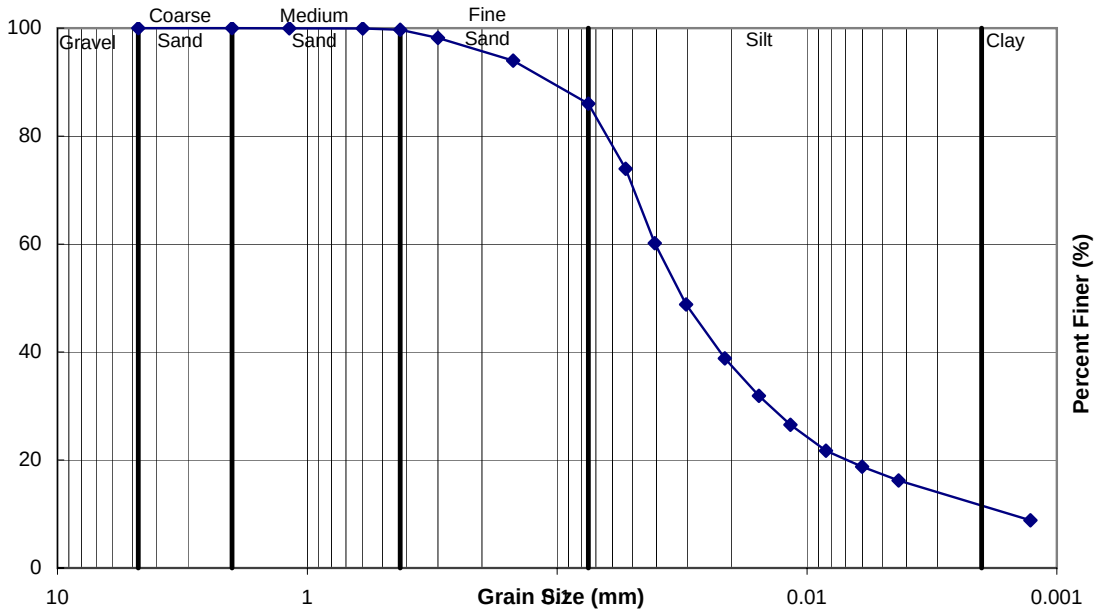


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-19:17.5m	0.0	0.0	1.0	3.0	86.0	10.0	26.0	0.2

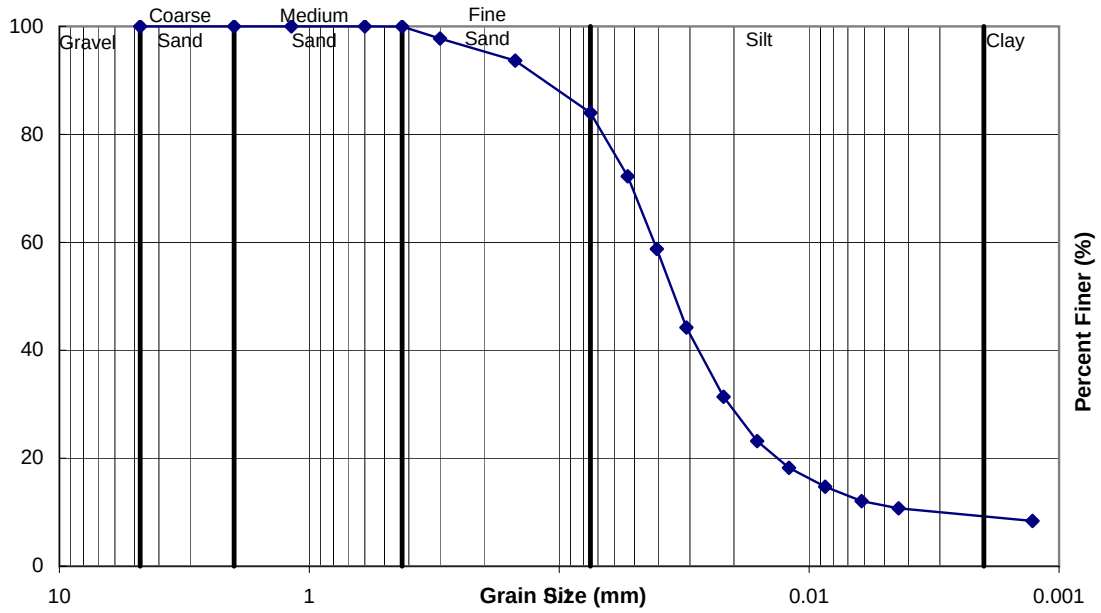


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-19:22m	0.0	0.0	0.0	7.0	77.0	16.0	-	-

GRAIN SIZE DISTRIBUTION CURVE

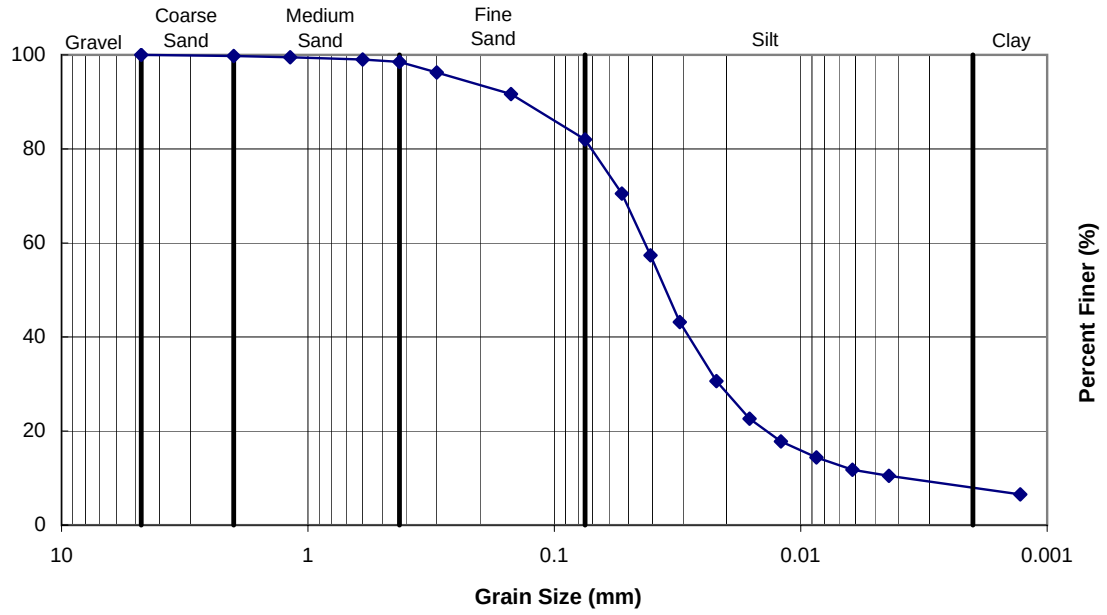


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-19:24m	0.0	0.0	0.0	14.0	74.0	12.0	26.1	0.3

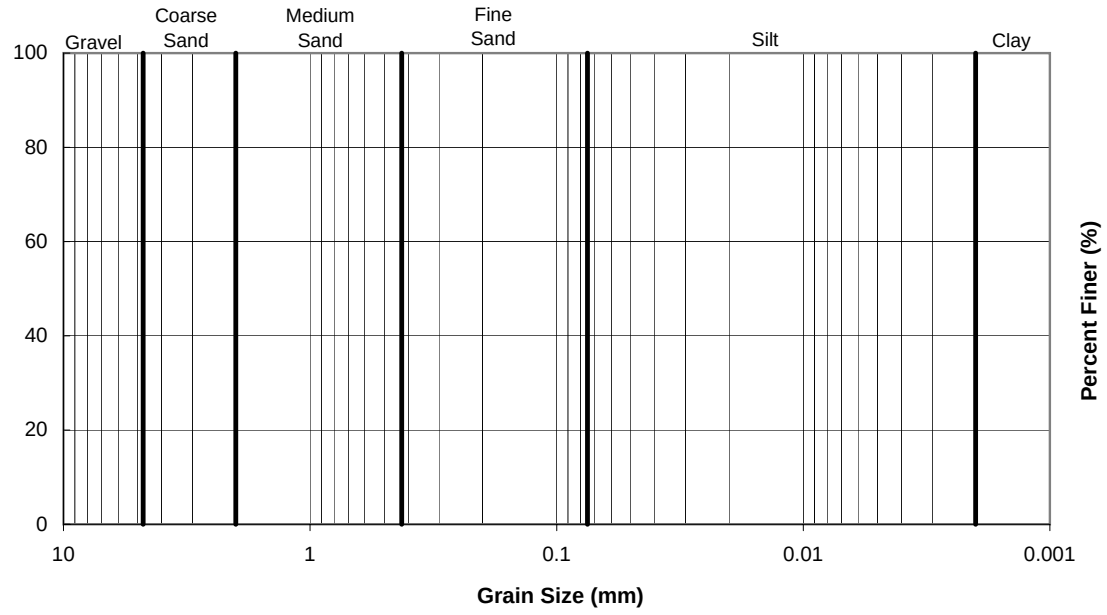


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-19:26m	0.0	0.0	0.0	16.0	75.0	9.0	13.9	0.3

GRAIN SIZE DISTRIBUTION CURVE

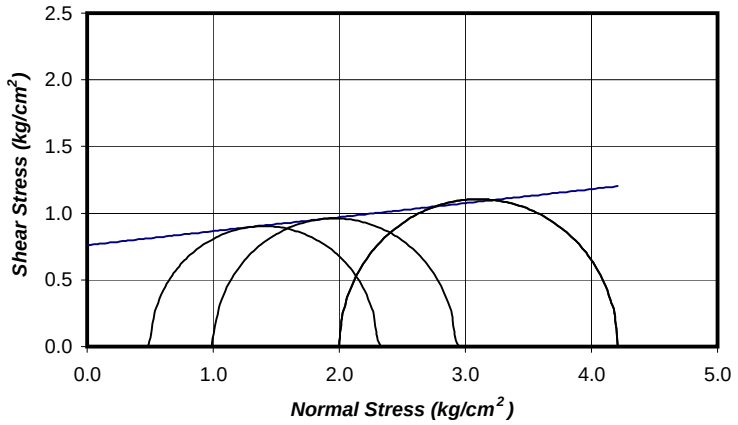


Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	C_u	C_c
BH-01 (One)TP-19:28m	0.0	0.0	1.0	17.0	74.0	8.0	11.3	0.4



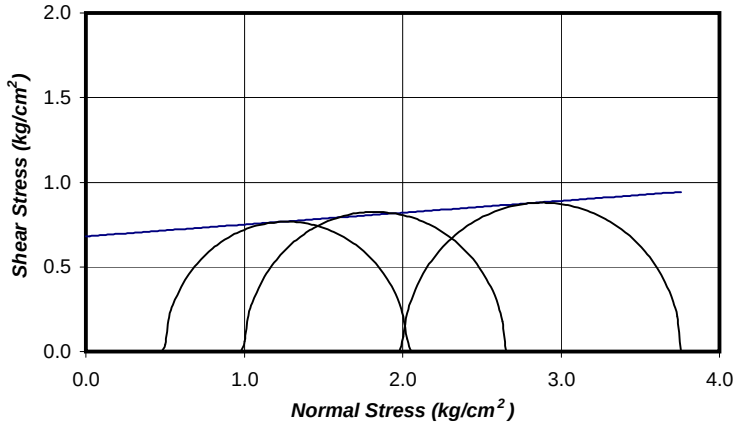
Sample ID	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt & Clay		C_u	C_c
FALSE								

Mohr-Diagram



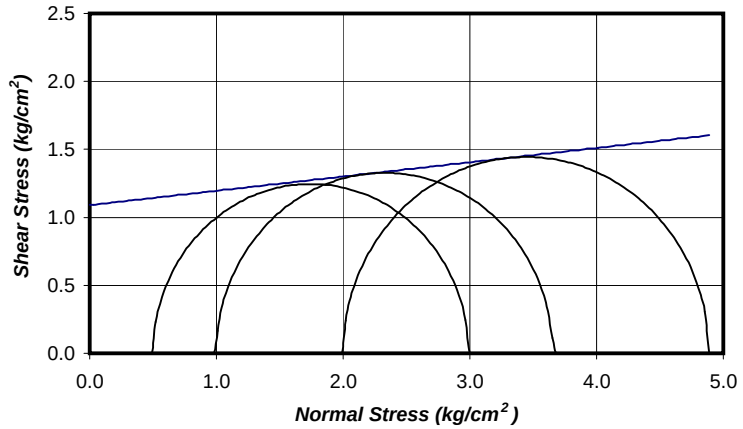
BH No.:	BH-01 (One)TP-15	**Test Type: UU**	c : 0.76 kg/sq. cm
Depth:	2.00 m		ϕ : 6 degree

Mohr-Diagram



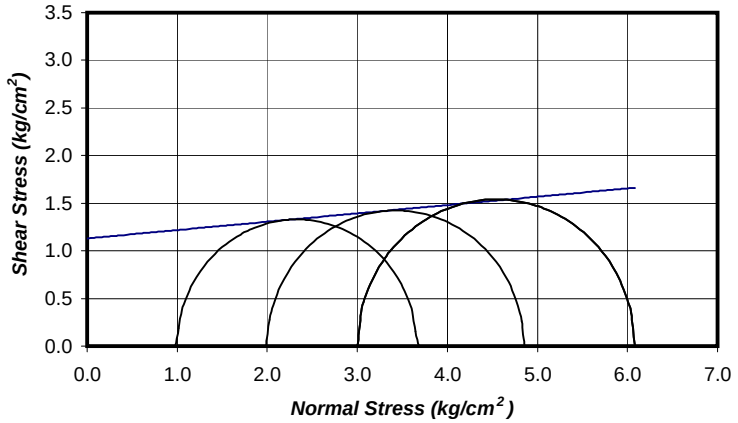
BH No.:	BH-01 (One)TP-15	**Test Type: UU**	c : 0.68 kg/sq. cm
Depth:	4.00 m		ϕ : 4 degree

Mohr-Diagram



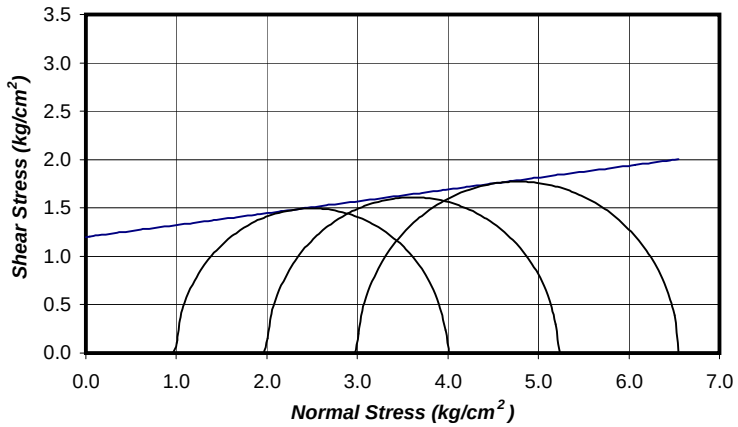
BH No.:	BH-01 (One)TP-15	**Test Type: UU**	c : 1.09 kg/sq. cm
Depth:	7.00 m		ϕ : 6 degree

Mohr-Diagram



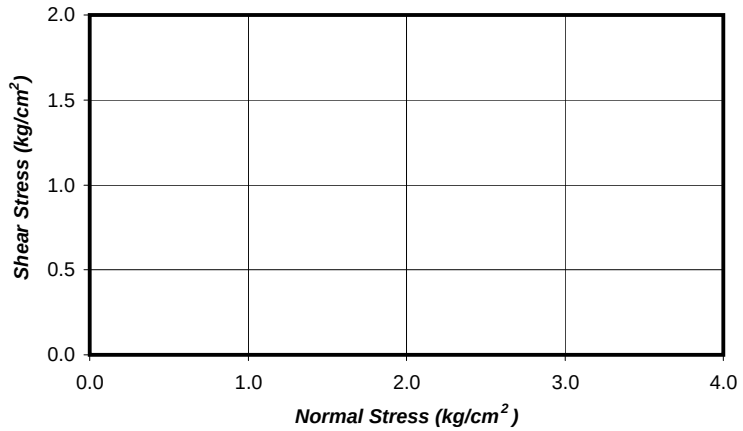
BH No.:	BH-01 (One)TP-15	**Test Type: UU**	c : 1.13 kg/sq. cm
Depth:	10.00 m		ϕ : 5 degree

Mohr-Diagram



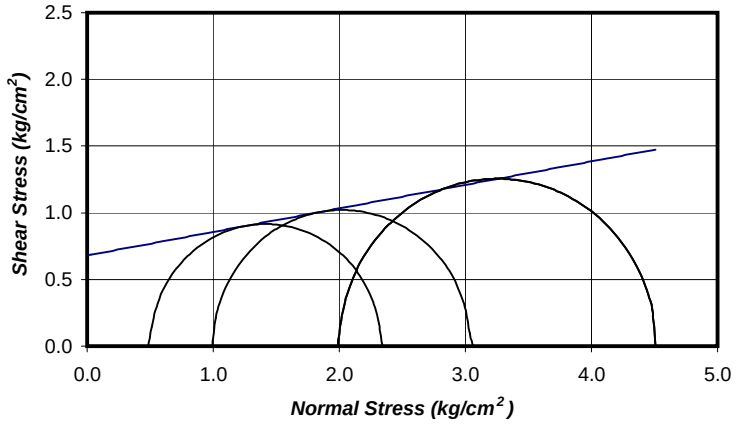
BH No.:	BH-01 (One)TP-15	**Test Type: UU**	c : 1.20 kg/sq. cm
Depth:	13.00 m		ϕ : 7 degree

Mohr-Diagram



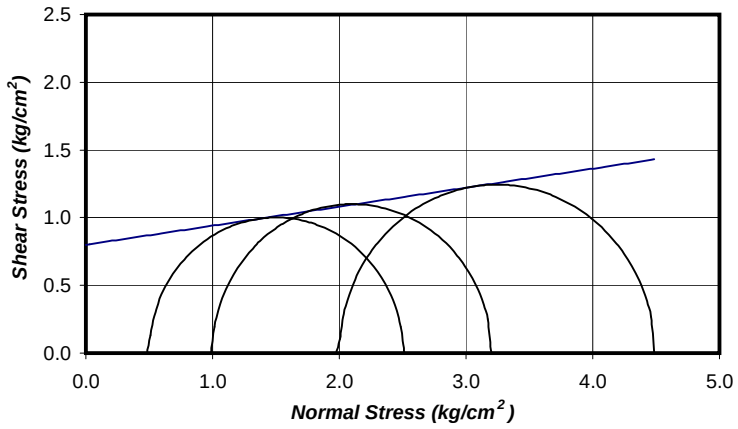
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



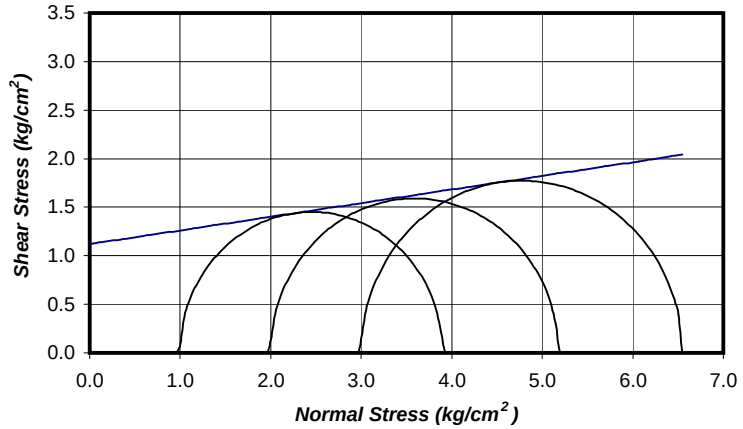
BH No.:	BH-(TP-16)	**Test Type: UU**	c : 0.68 kg/sq. cm
Depth:	2.00 m		ϕ : 10 degree

Mohr-Diagram



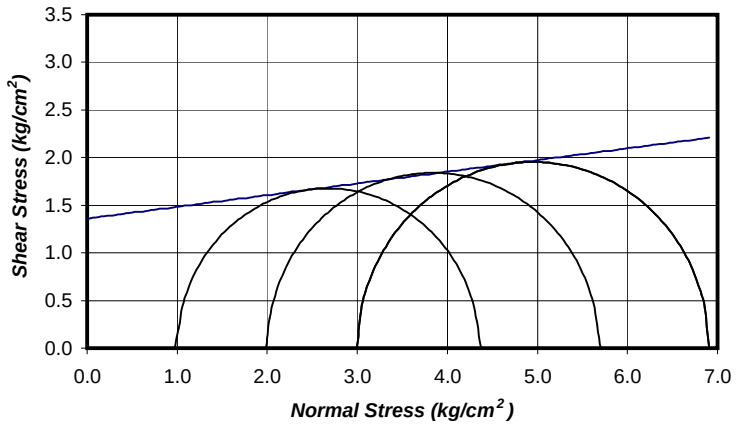
BH No.:	BH-(TP-16)	**Test Type: UU**	c : 0.80 kg/sq. cm
Depth:	4.00 m		ϕ : 8 degree

Mohr-Diagram



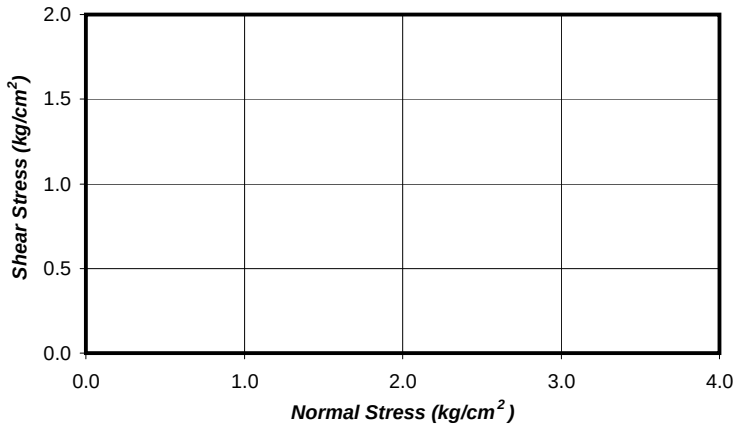
BH No.:	BH-(TP-16)	**Test Type: UU**	c : 1.12 kg/sq. cm
Depth:	8.00 m		ϕ : 8 degree

Mohr-Diagram



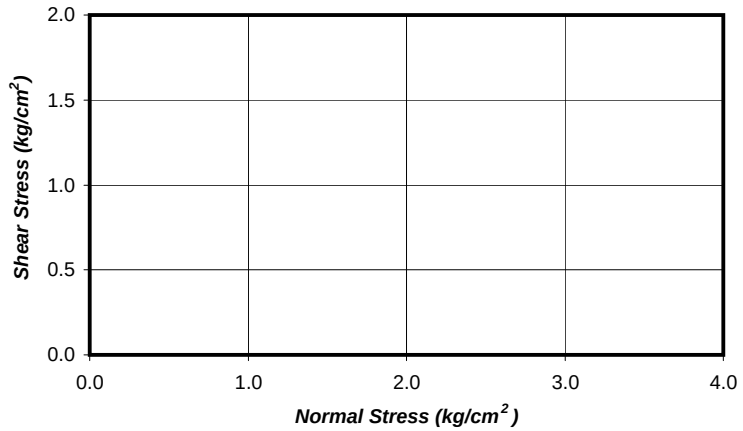
BH No.:	BH-(TP-16)	**Test Type: UU**	c : 1.36 kg/sq. cm
Depth:	12.00 m		ϕ : 7 degree

Mohr-Diagram



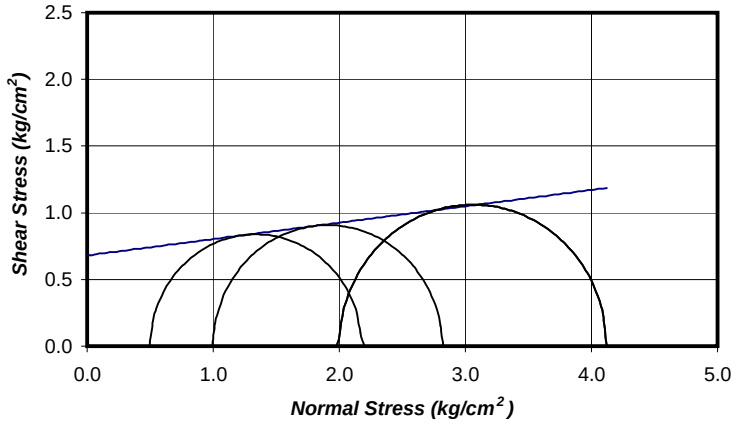
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



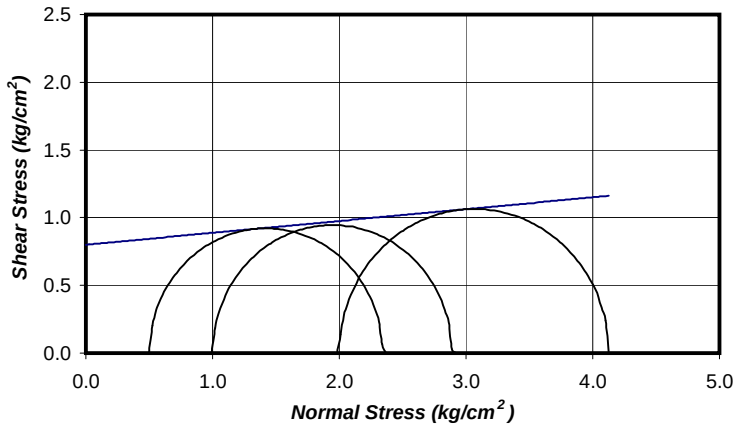
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



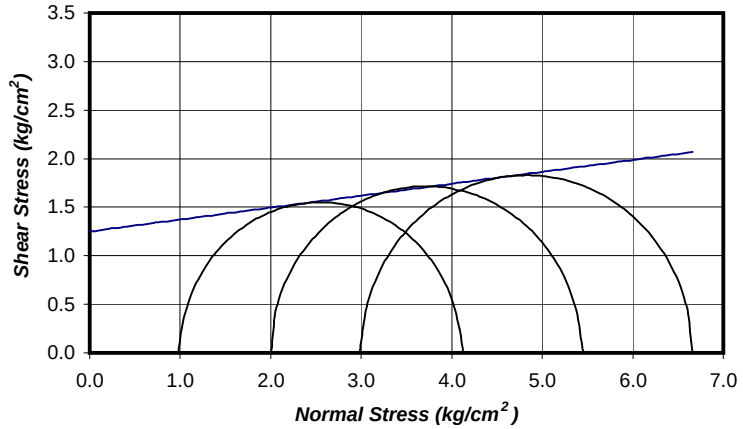
BH No.:	BH-01(TP-17)	**Test Type: UU**	c : 0.68 kg/sq. cm
Depth:	2.00 m		ϕ : 7 degree

Mohr-Diagram



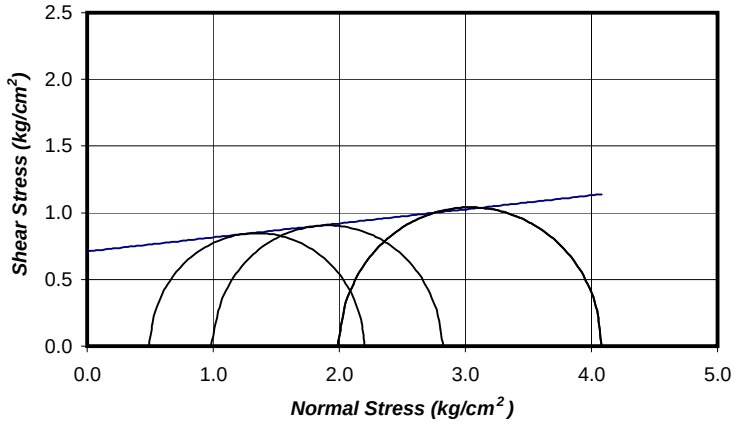
BH No.:	BH-01(TP-17)	**Test Type: UU**	c : 0.80 kg/sq. cm
Depth:	6.50 m		ϕ : 5 degree

Mohr-Diagram



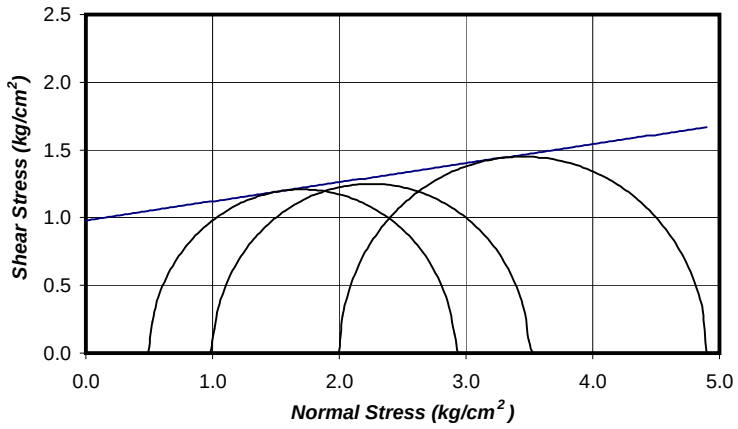
BH No.:	BH-01(TP-17)	**Test Type: UU**	c : 1.25 kg/sq. cm
Depth:	12.50 m		ϕ : 7 degree

Mohr-Diagram



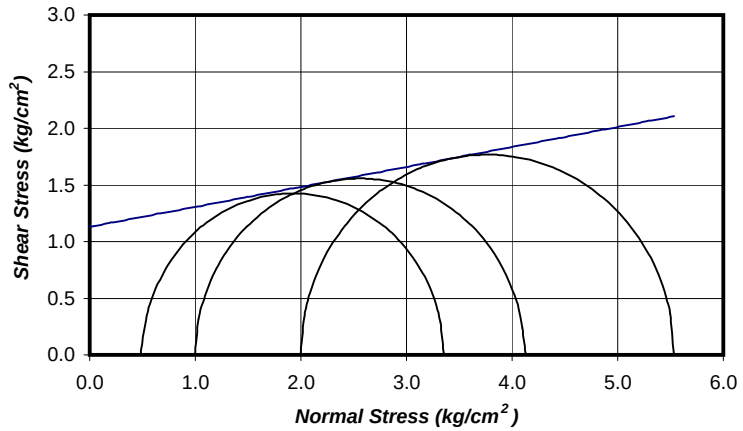
BH No.:	BH-TP-18	**Test Type: UU**	c : 0.71 kg/sq. cm
Depth:	3.00 m		ϕ : 6 degree

Mohr-Diagram



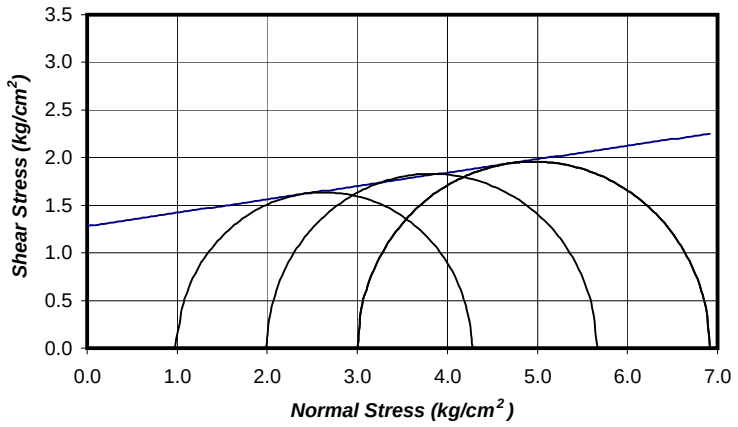
BH No.:	BH-TP-18	**Test Type: UU**	c : 0.98 kg/sq. cm
Depth:	5.00 m		ϕ : 8 degree

Mohr-Diagram



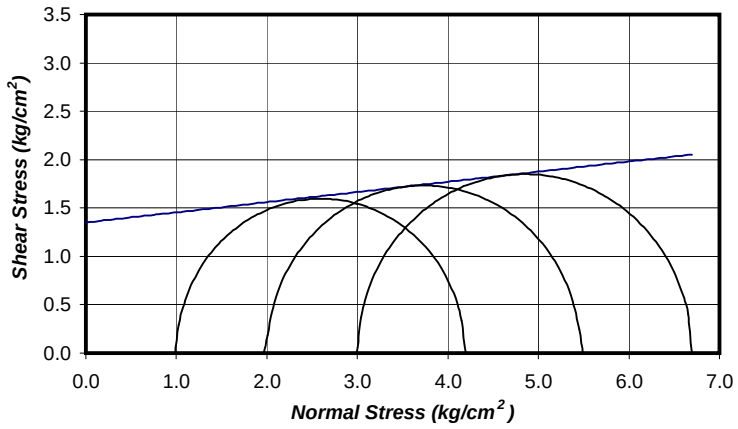
BH No.:	BH-TP-18	**Test Type: UU**	c : 1.13 kg/sq. cm
Depth:	8.00 m		ϕ : 10 degree

Mohr-Diagram



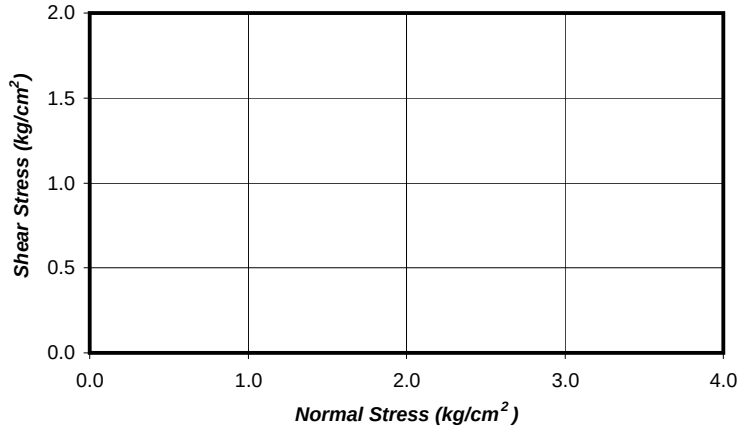
BH No.:	BH-TP-18	**Test Type: UU**	c : 1.28 kg/sq. cm
Depth:	12.00 m		ϕ : 8 degree

Mohr-Diagram



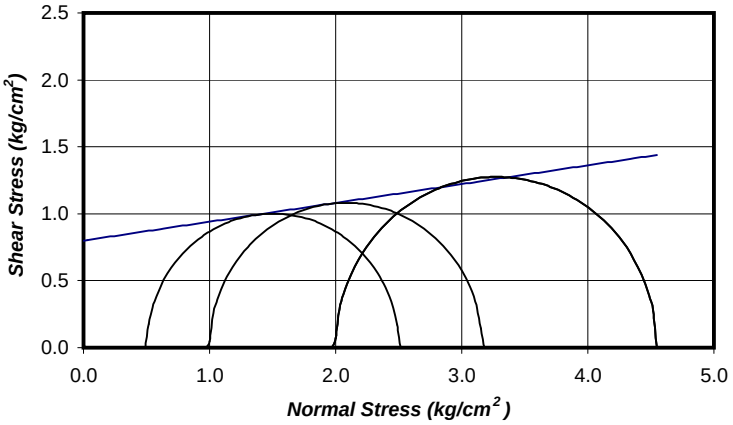
BH No.:	BH-TP-18	**Test Type: UU**	c : 1.35 kg/sq. cm
Depth:	16.00 m		ϕ : 6 degree

Mohr-Diagram



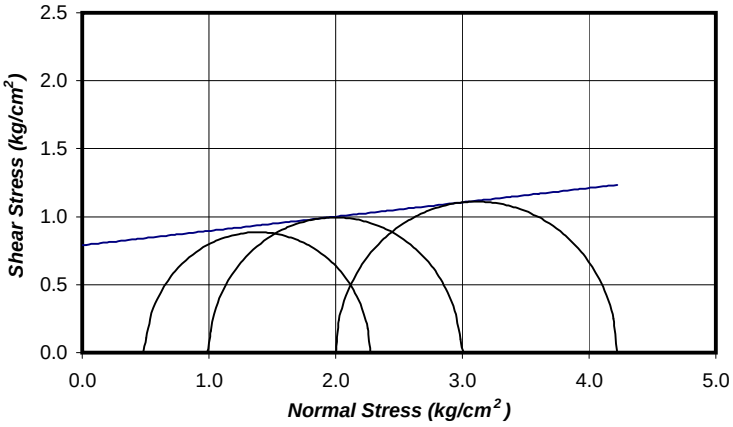
BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



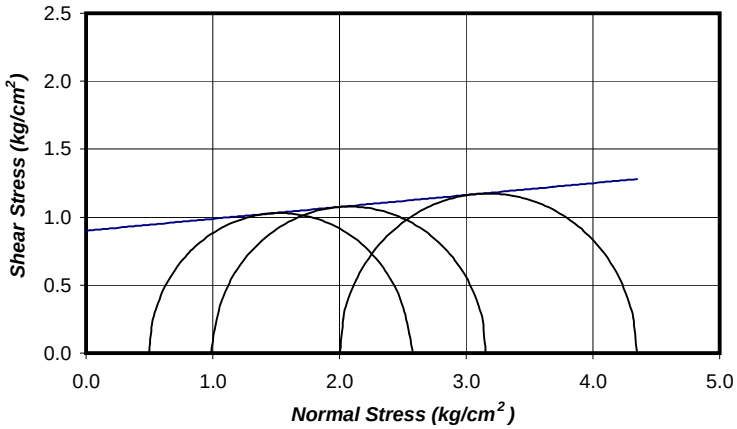
BH No.:	BH-01 (One)TP-19	**Test Type: UU**	c : 0.80 kg/sq. cm
Depth:	3.00 m		ϕ : 8 degree

Mohr-Diagram



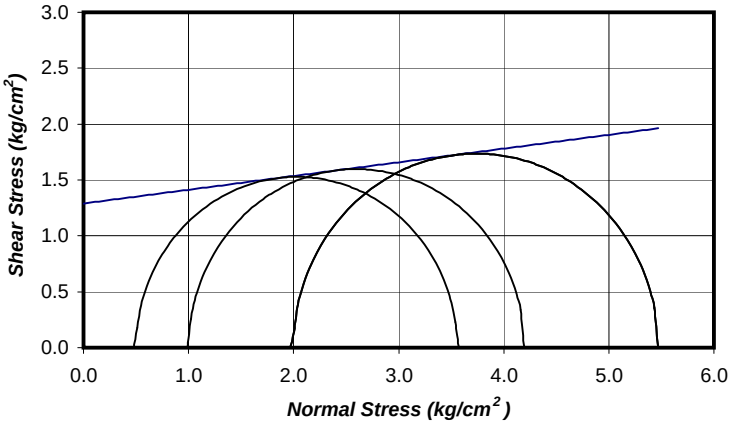
BH No.:	BH-01 (One)TP-19	**Test Type: UU**	c : 0.79 kg/sq. cm
Depth:	5.50 m		ϕ : 6 degree

Mohr-Diagram



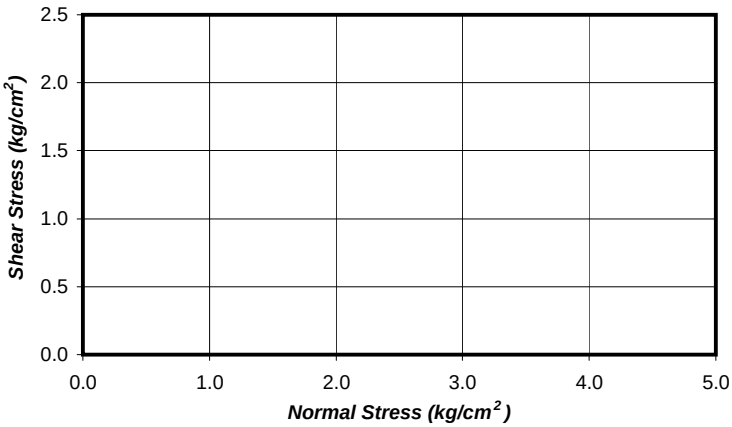
BH No.:	BH-01 (One)TP-19	**Test Type: UU**	c : 0.90 kg/sq. cm
Depth:	8.50 m		ϕ : 5 degree

Mohr-Diagram



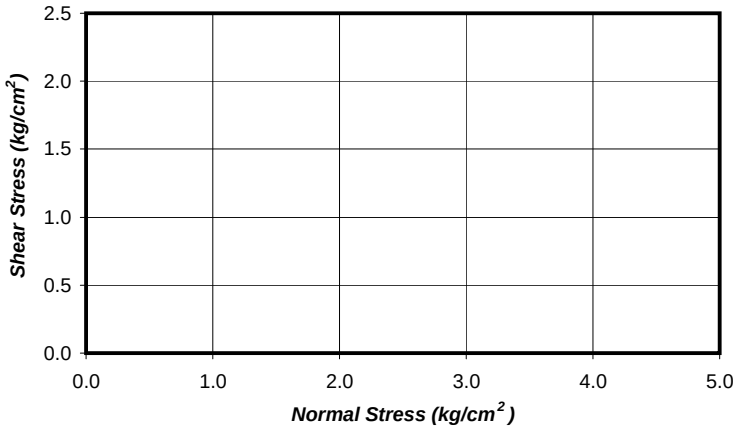
BH No.:	BH-01 (One)TP-19	**Test Type: UU**	c : 1.29 kg/sq. cm
Depth:	11.50 m		ϕ : 7 degree

Mohr-Diagram



BH No.:		**Test Type:**	c :
Depth:			ϕ :

Mohr-Diagram



BH No.:		**Test Type:**	c :
Depth:			ϕ :

e-logp curve

BH-No. : TP-15

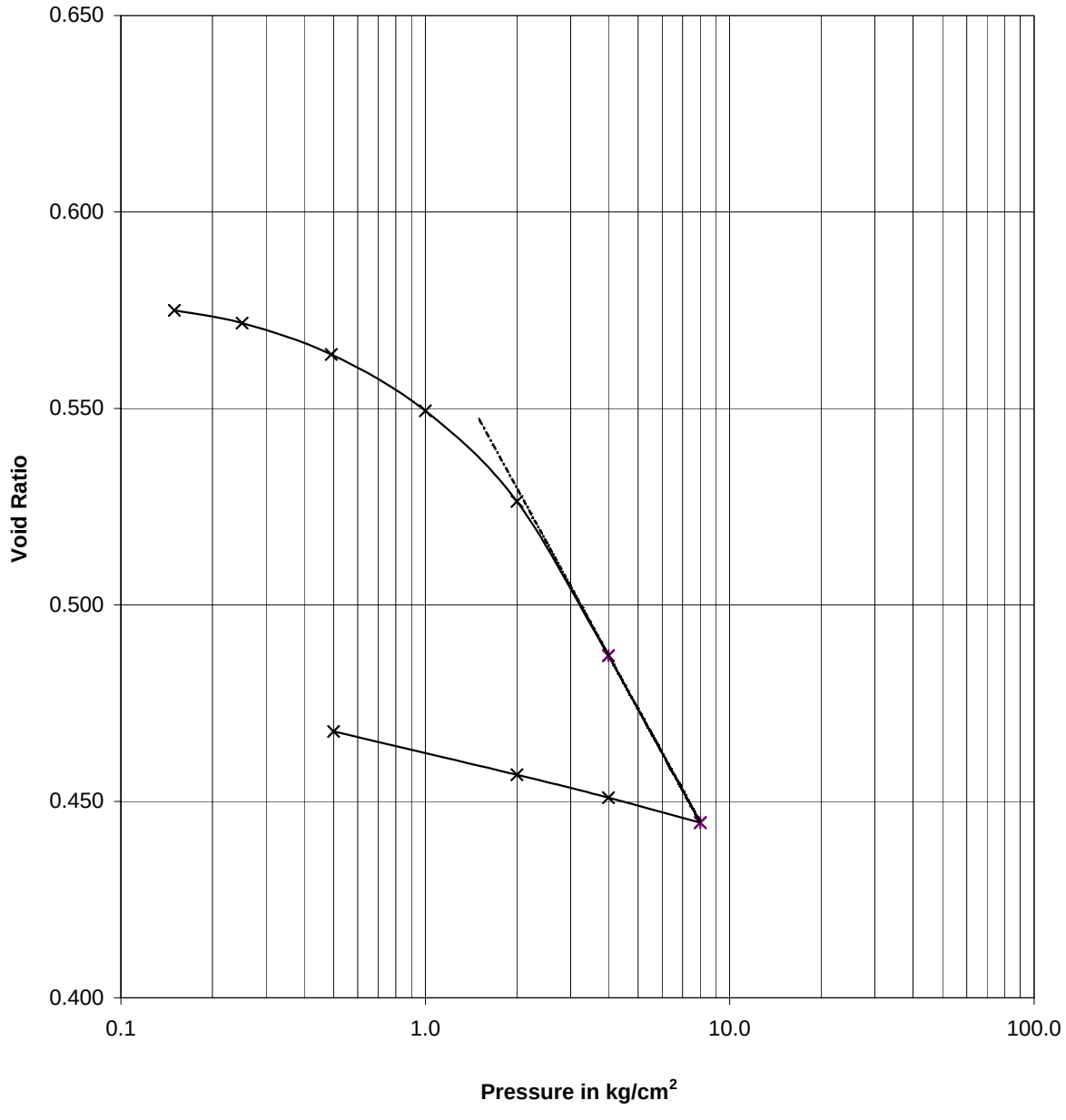
Depth : 7.0m

e_0 = 0.5766

C_c = 0.1412

$C_c/(1+e_0)$ = 0.0895

Pressure range (kg/sq. cm)		m_v (Lab) (sq. cm/kg)
0.25 - 0.50	:	0.0211
0.50 - 1.00	:	0.0180
1.00 - 2.00	:	0.0140
2.00 - 4.00	:	0.0128
4.00 - 8.00	:	0.0071



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e-logp curve

BH-No. : TP-16

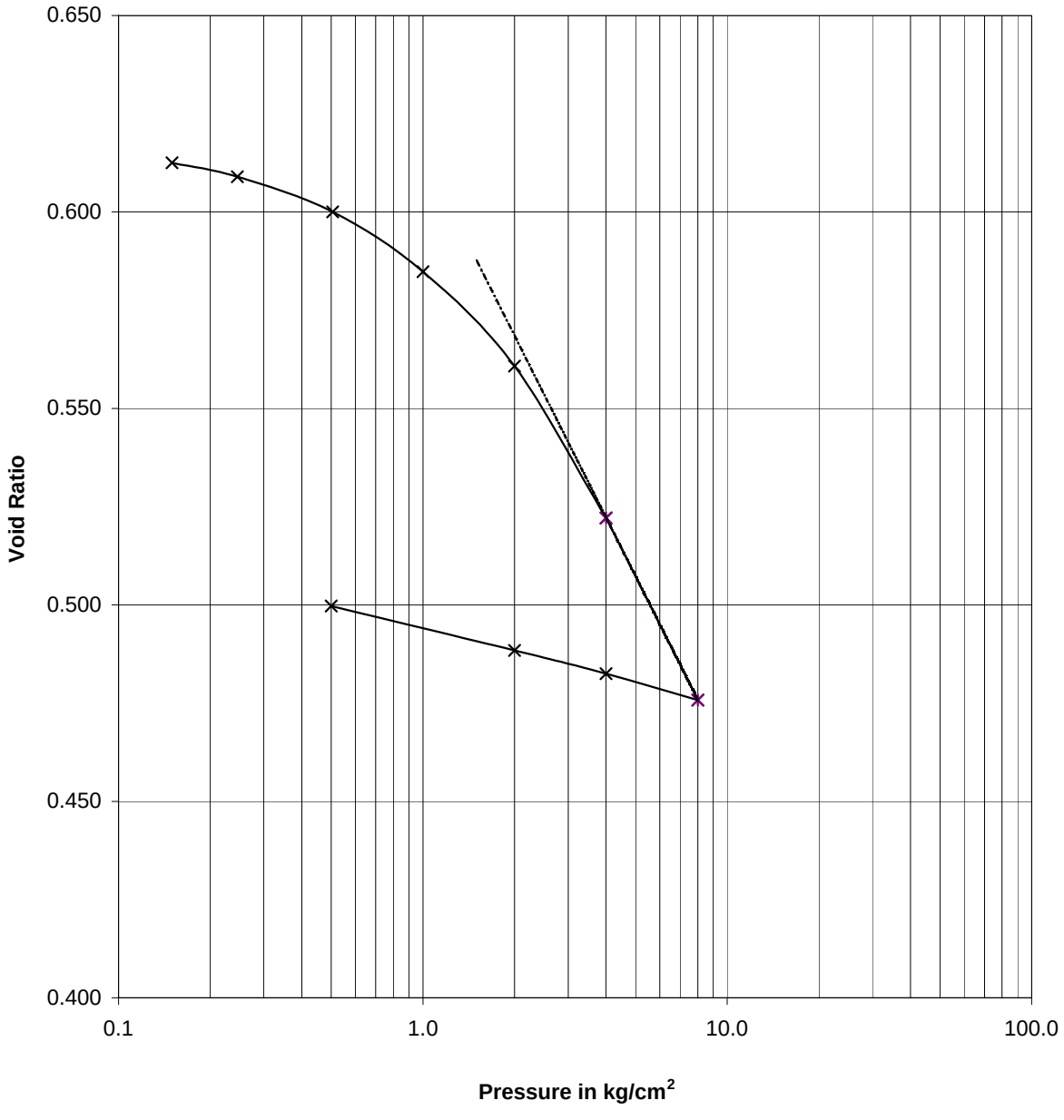
Depth : 4.0m

e_0 = 0.6150

C_c = 0.1538

$C_c/(1+e_0)$ = 0.0952

Pressure range (kg/sq. cm)		m_v (Lab) (sq. cm/kg)
0.25 - 0.50	:	0.0216
0.50 - 1.00	:	0.0192
1.00 - 2.00	:	0.0149
2.00 - 4.00	:	0.0122
4.00 - 8.00	:	0.0076



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e-logp curve

BH-No. : BH-01
(One)TP-19

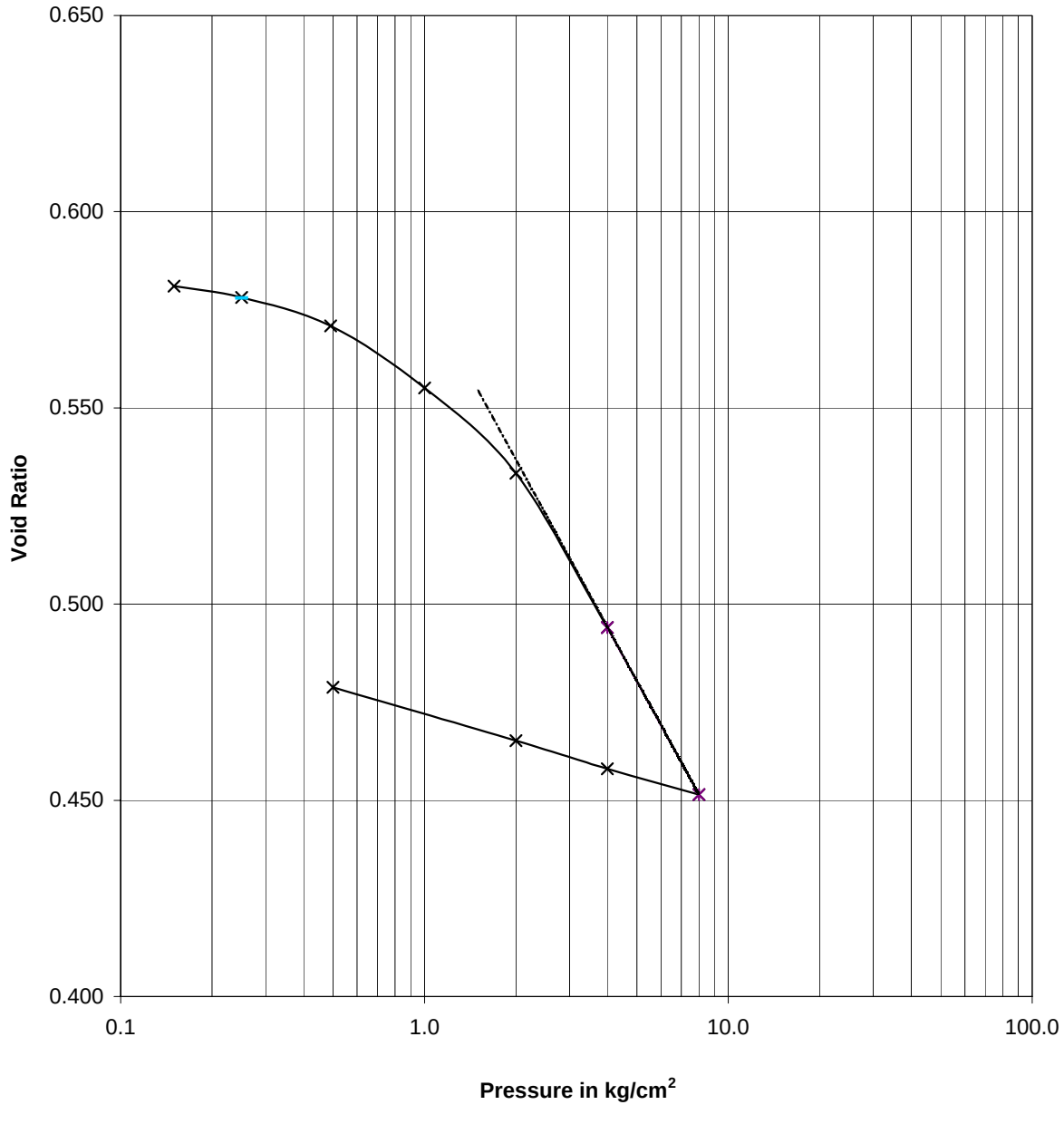
Depth : 3.0m

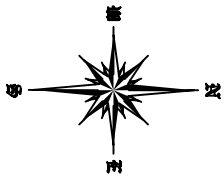
e_0 = 0.5857

C_c = 0.1416

$C_c/(1+e_0)$ = 0.0893

Pressure range (kg/sq. cm)		m_v (Lab) (sq. cm/kg)
0.25 - 0.50	:	0.0190
0.50 - 1.00	:	0.0198
1.00 - 2.00	:	0.0140
2.00 - 4.00	:	0.0128
4.00 - 8.00	:	0.0071





BH-3 ERT-1 BH-2 BH-1

BH-18 BH-16

BH-4

BH-4A

BH-11 BH-17 BH-5 BH-12 BH-12A BH-13

ERT-2

BH-6 BH-14 BH-14A BH-15

BH-6A

BH-7

BH-8

ERT-3 ERT-4

BOREHOLE & ERT LOCATIONS (FIRST PHASE)

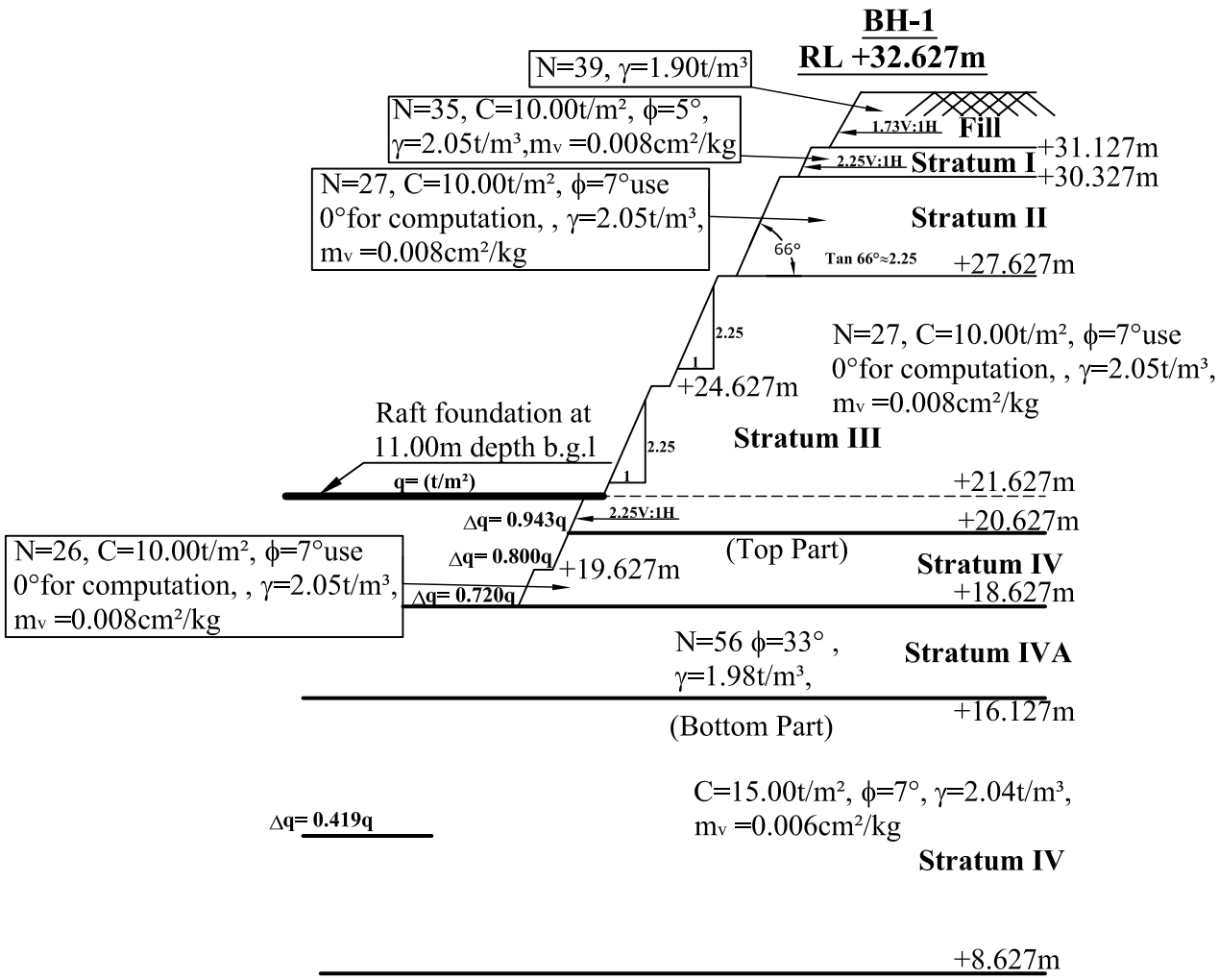
BH NO.	EASTING	NORTHING	ELEVATION & LEVELS
BH-1	116.000	1415.500	(+) 32.627m
BH-2	116.000	1283.000	(+) 32.387m
BH-3	116.000	1090.830	(+) 33.751m
BH-4	243.700	1100.200	(+) 32.641m
BH-4A	371.700	1109.500	(+) 33.067m
BH-5	500.000	1118.000	(+) 33.469m
BH-6	623.570	1118.000	(+) 33.626m
BH-6A	724.000	1118.000	(+) 33.885m
BH-7	822.900	1118.000	(+) 34.110m
BH-8	993.300	1118.000	(+) 35.389m
BH-11	500.000	880.500	(+) 33.380m
BH-12	500.000	1296.000	(+) 32.845m
BH-12A	500.000	1473.000	(+) 32.534m
BH-13	500.000	1650.000	(+) 32.715m
BH-14	623.570	1296.000	(+) 32.997m
BH-14A	623.570	1473.000	(+) 33.059m
BH-15	623.570	1650.000	(+) 33.049m
BH-16	194.000	766.100	(+) 33.426m
BH-17	500.000	993.600	(+) 33.124m
BH-18	194.000	650.000	(+) 33.136m
ERT-1	133.500	1152.850	(+) 33.267m
ERT-2	571.500	1085.400	(+) 33.382m
ERT-3	1152.162	1108.260	(+) 34.505m
ERT-4	1151.500	1257.990	(+) 35.131m

Location Plan of Bore holes and ERT

Project :Proposed Extension Unit No. 3 and 4 at Sagardighi Thermal Power Project Phase-2, Sagardighi, West Bengal

1. Bore Hole shown thus
2. ERT shown thus
3. SCALE: Not to Scale
4. Ref DWG No:-1/PM07/DS00/6/0001/Sheet No-1/date :25.05.12

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Note: Depth of Bore hole =24.00m b.g.l.

Δq has been calculated using 2V : 1H pressure distribution
Width of raft =17.00m (B). Refer Calculation

Raft foundation at 11.00m depth b.g.l, BH-1

Project :Proposed Extension Unit No. 3 and 4 at Sagardighi Thermal Power Project Phase-2, Sagardighi, West Bengal

Scale: *Not to scale*

Calculations of Bearing Capacity and Settlement

Borehole No.:	BH-01 (One)TP-15	Width :	19.00 m
Depth of Water:	0.00 m	Length:	19.00 m
Factor of Safety:	2.5	Depth of Foundation:	5.00 m
Allowable Settlement:	75 mm	Founding RL = 34.50-5.00 = 29.50m	

SOIL DATA FOR CAPACITY CALCULATIONS

Layer ID	Starting Depth (m)	Ending Depth (m)	SPT value	Bulk Density (t/m^3)	c (t/m^2)	ϕ (degrees)
1	0.0	2.0	5	1.880	2.5	-
2	2.0	12.0	16	2.000	8.8	5

SOIL DATA FOR SETTLEMENT CALCULATIONS

Layer ID	m_v (cm^2/kg)
2	0.1400

Approx $q_u \approx C N_c$

$q_u = cN_c$
= 8.8 x 6.5
= 57.2t/m²

Hence, Net Safe Bearing capacity, q_{net} = (57.2/2.5)= 22.9t/m²

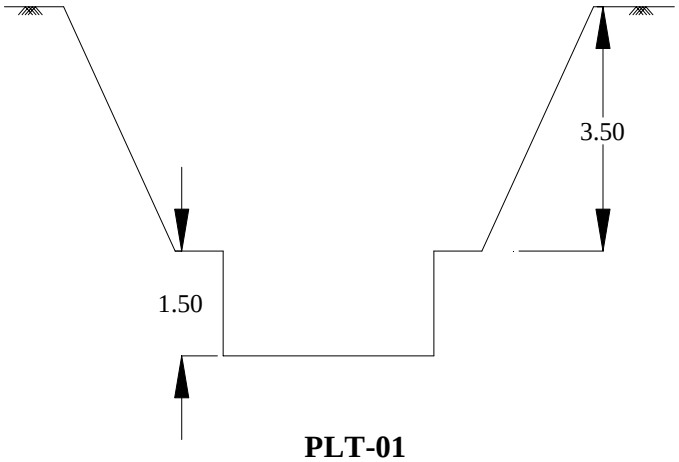
Settlement calculations
Assume 2V : 1H pressure distribution for the Raft. Δp is at the mid height of RL 29.500 and 22.500m.
Thickness of compressible layer = 7.00m
Δp = (19.0 x 19.0 x p) / (19 + 3.500) x (19+3.500) = 0.713 p kg/cm²

Rigidity Factor = 0.80 ; Pore Pressure Factor =0.70 ; Depth Factor = 0.93
After applying correction factors estimated net safe bearing capacity
p = 7.5 / (0.014 x 700 x 0.713 x 0.8 x 0.7 x 0.93) = 2.06kg/cm²
≈ 20.5 t/m²

Suggested net safe bearing capacity = 20.5t/m²

PIT LOG

Project	:	SSI work Sagardighi Thermal Power Project Phase-2 extension Unit # 3 & 4 at Sagardighi, West Bengal.			
Location	:	N=1377.532, E = 1157.394	Ground Elevation (m)	:	+29.325m
Test No	:	PLT-01 TP-19	Depth	:	5.00m
Date of Starting	:	09.10.2012	Date of Ending	:	09.10.2012



PLT-01

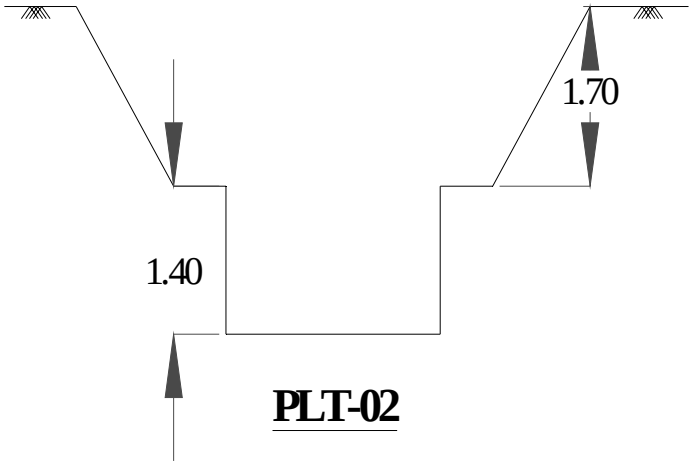
Soil Description :

i) (0.00m -3.50m) Grey silty clay with kankars.

ii) (3.50m - 5.00m) Hard Brownish grey to grey silty clay with kankars.

PIT LOG

Project	:	SSI work Sagardighi Thermal Power Project Phase-2 extension Unit # 3 & 4 at Sagardighi, West Bengal.			
Location	:	N=1140.540, E = 13.0.610	Ground Elevation (m)	:	+33.125m
Test No	:	PLT-02 Track Hopper area	Depth	:	3.10m
Date of Starting	:	23.11.2012	Date of Ending	:	23.11.2012



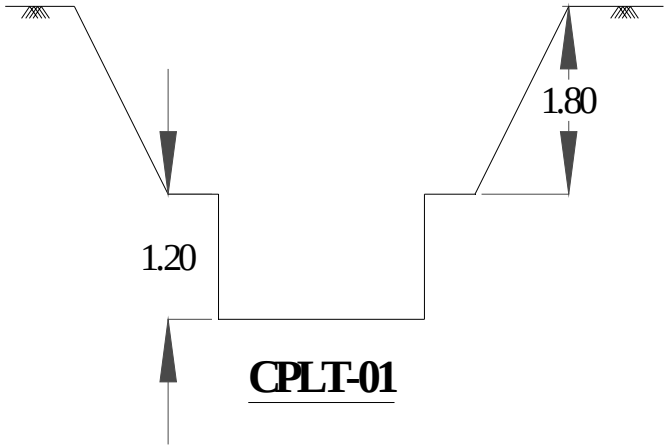
Soil Description :

i) (0.00m -2.10m) Grey silty clay with kankars and dark grey patches.

ii) (2.10m – 3.10m) Brownish grey silty clay with calcareous nodules and kankars.

PIT LOG

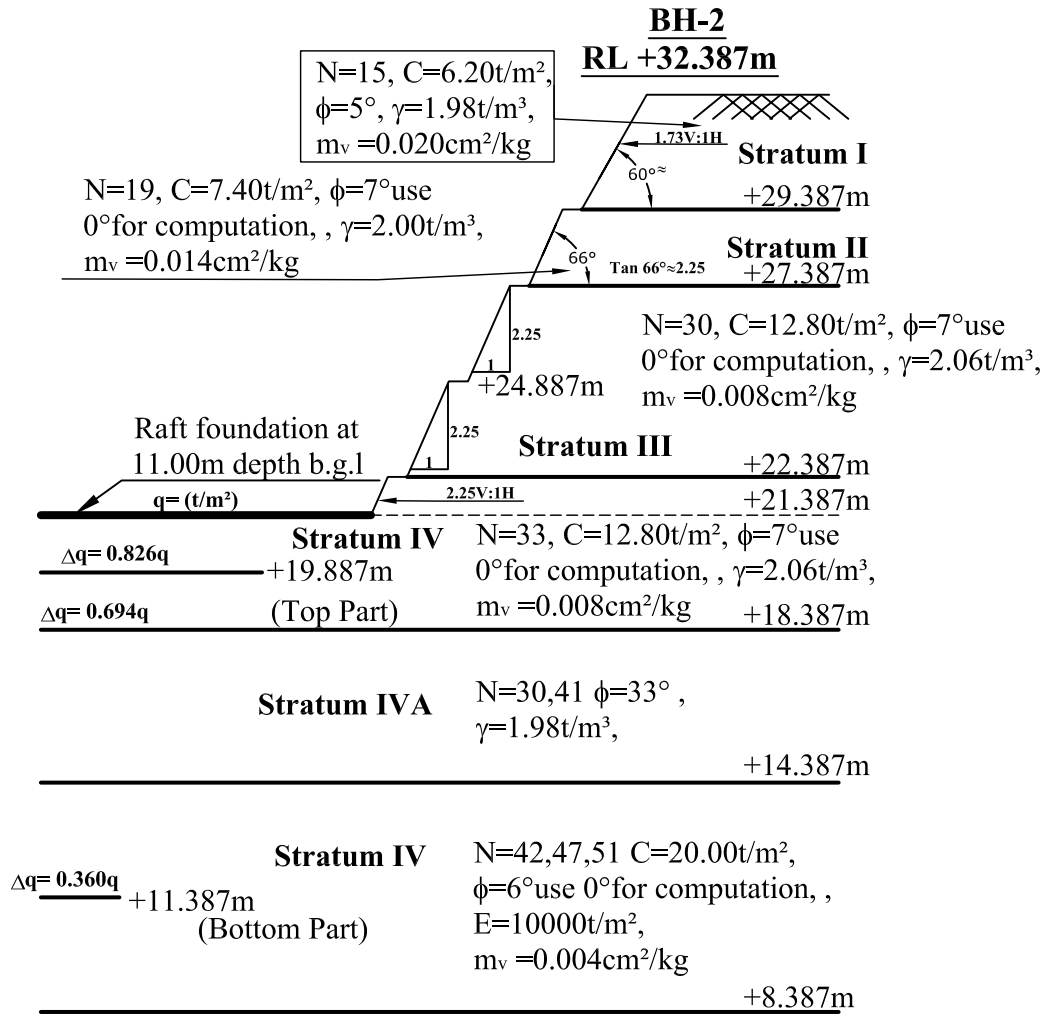
Project	:	SSI work Sagardighi Thermal Power Project Phase-2 extension Unit # 3 & 4 at Sagardighi, West Bengal.			
Location	:	N=1110.230, E =540.510	Ground Elevation (m)	:	+34.230m
Test No	:	CPLT-01	Depth	:	3.00m
Date of Starting	:	13.11.2012	Date of Ending	:	14.11.2012



Soil Description :

i) (0.00m -1.70m) Greyish silty clay with kankars .

ii) (1.70m – 3.00m) Brownish grey silty clay with calcareous nodules, and sand in traces.



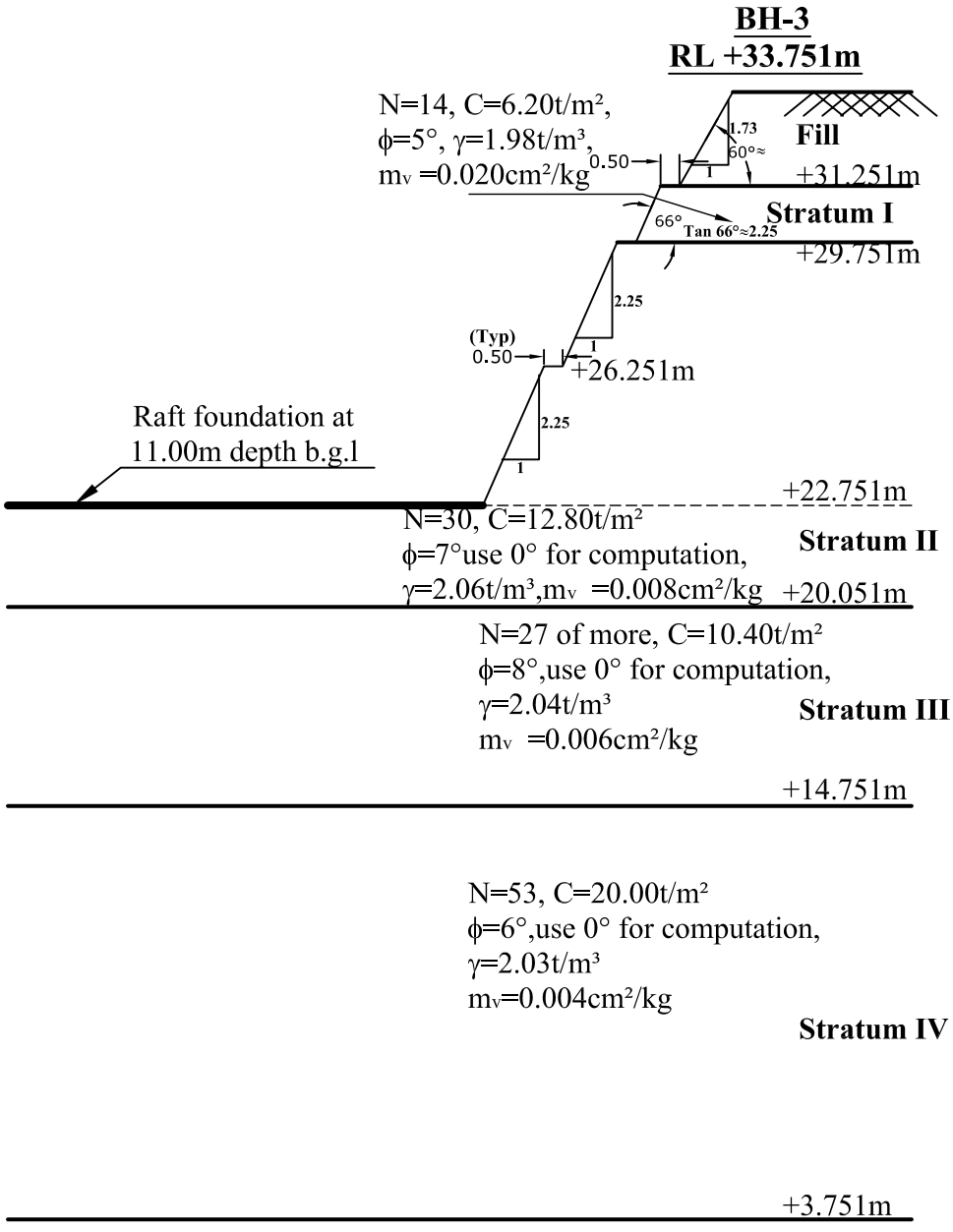
Note: Depth of Bore hole =24.00m b.g.l.

Adopt 2V : 1H pressure distribution from Raft (B = 15.00m)

Raft foundation at 11.00m depth b.g.l, BH-2

Project :Proposed Extension Unit No. 3 and 4 at Sagardighi Thermal Power Project Phase-2, Sagardighi, West Bengal

Scale: *Not to scale*

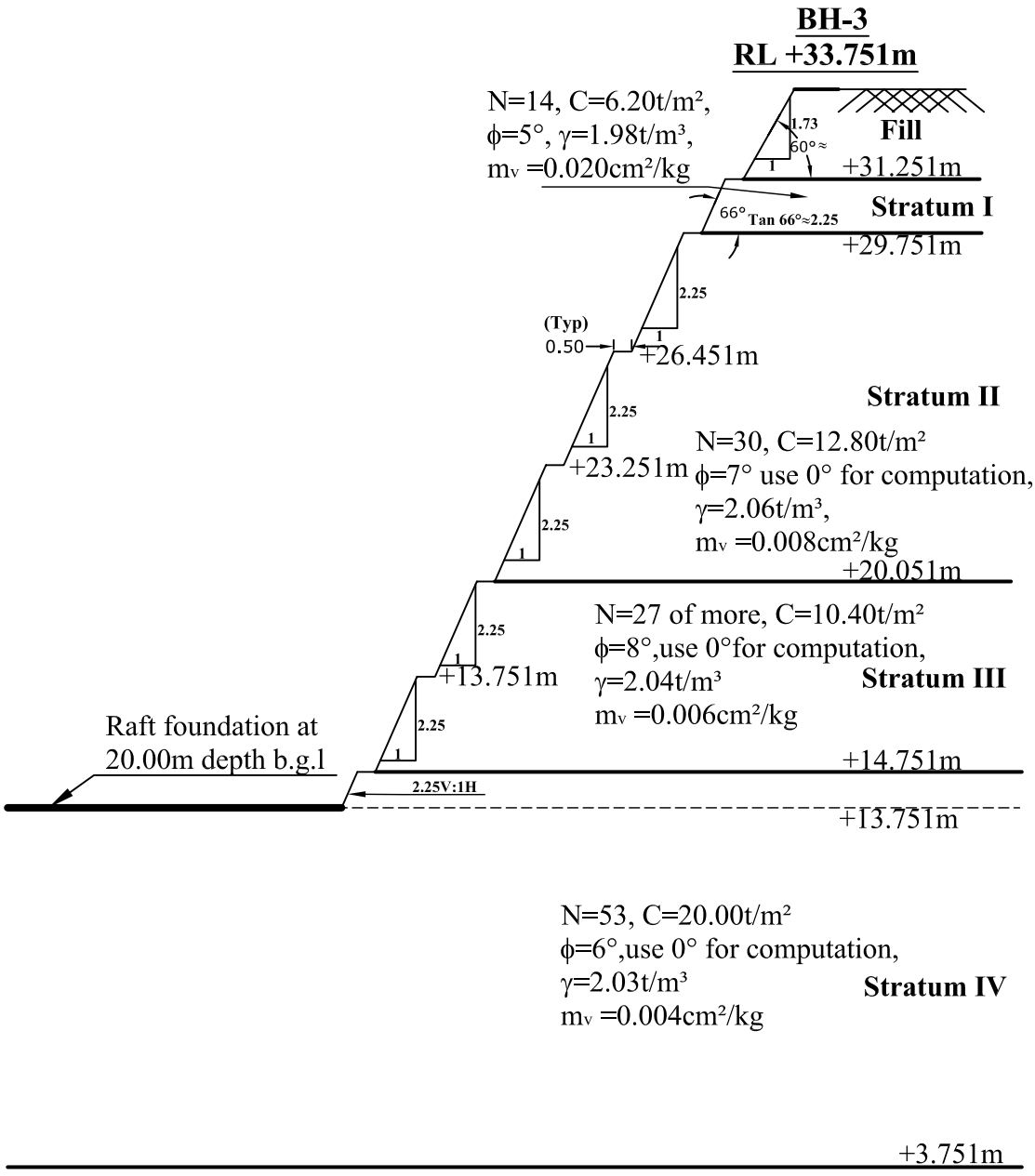


Note: Depth of Bore hole =30.00m b.g.l. Data beyond this is not available. Assume same soil (stratum IV) to continue.

Raft foundation at 11.00m depth b.g.l

Project :Proposed Extension Unit No. 3 and 4 at Sagardighi Thermal Power Project Phase-2, Sagardighi, West Bengal

Scale: *Not to scale*

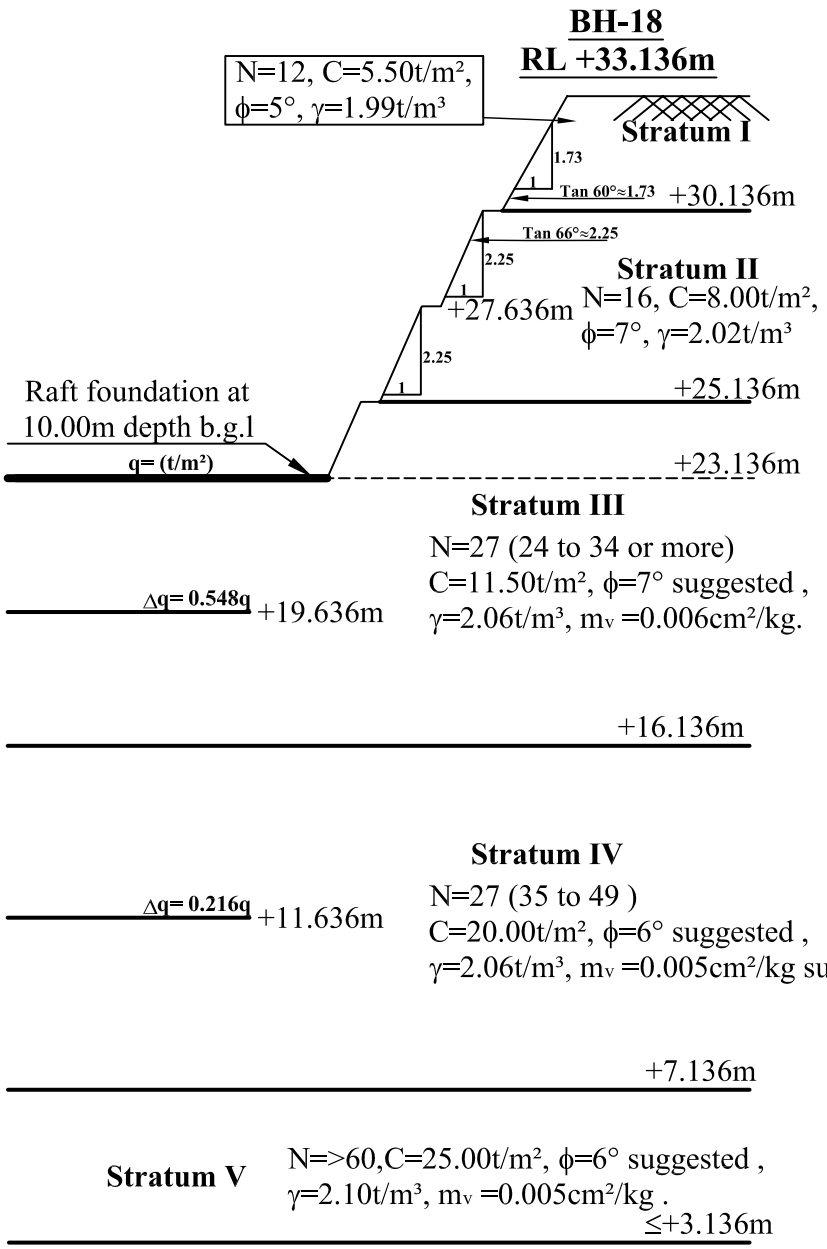


Note: Depth of Bore hole =30.00m b.g.l. Data beyond this is not available. Assume same soil (stratum IV) to continue.

Raft foundation at 20.00m depth b.g.l

Project :Proposed Extension Unit No. 3 and 4 at Sagardighi Thermal Power Project Phase-2, Sagardighi, West Bengal

Scale: *Not to scale*



Note: Depth of Bore hole =30.00m b.g.l.

Δq has been calculated using 2V : 1H pressure distribution
Width of raft =10.00m (B×B). Refer Calculation

Raft foundation at 10.00m depth b.g.l, BH-18

Project :Proposed Extension Unit No. 3 and 4 at Sagardighi Thermal Power Project Phase-2, Sagardighi, West Bengal

Scale: *Not to scale*

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-1

Location : Sagardighi PDCL

Ground Elevation : +32.627m

Method of Boring/ Drilling : Shell/ Rotary

Water Level (Static) : 8.50m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : 6.00m

Date : From 20.06.12 To 23.06.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
20.06.12															
0.00															Brownish grey silty clay (high silt content) with traces of brick pieces
	+31.627	1.00	1.45	0.45	P	9	14	25	-	39	-	-	-	-	
															1.50m
	+30.627	2.00	2.45	0.45	P	6	12	23	-	35	-	-	-	-	Very stiff to hard brownish grey silty clay with traces of sand, bluish grey patches and moorum in traces.
															2.30m
	+29.627	3.00	3.45	0.45	P	7	12	18	-	30	-	-	-	-	Very stiff / hard yellowish brown silty clay with traces of sand reddish brown patches.
21.06.12															
4.00	+28.627	4.00	4.45	0.45	P	6	10	15	-	25	-	-	-	-	
															5.00m
	+26.627	6.00	6.45	0.45	P	7	13	18	-	31	-	-	-	-	Very stiff yellowish brown/light reddish brown of sand and bluish grey patches.
	+24.627	8.00	8.45	0.45	P	5	10	17	-	27	-	-	-	-	
	+22.627	10.00	10.45	0.45	P	6	8	16	-	24	-	-	-	-	
															12.00m
	+20.627	12.00	12.45	0.45	P	6	9	17	-	26	-	-	-	-	Very stiff to hard yellowish brown sandy silty clay/ clayey sandy silt with traces of fine mica flakes.
															14.00m
	+18.627	14.00	14.45	0.45	P	9	23	31	-	54	-	-	-	-	Dense brown /yellowish sand with high percentage of fines, having cohesive touch and fine mica flakes.
	+16.627	16.00	16.45	0.45	P	10	20	38	-	58	-	-	-	-	
															16.50m
	+14.627	18.00	18.45	0.45	P	8	13	14	-	27	-	-	-	-	Very stiff to hard yellowish brown/ brown silte clay (high silt content) with traces of sand / clayey silt with traces of kankars at 20.00m depth b.g.l.
22.06.12															
20.00	+12.627	20.00	20.45	0.45	P	11	20	35	-	55	-	-	-	-	
	+10.627	22.00	22.45	0.45	P	18	19	33	-	52	-	-	-	-	
	+8.627	24.00	24.17	0.17	P	53	50 (2cm)	-	-	>100	-	-	-	-	
	+8.627	24.00		(Termination Depth)											

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-2

Location : Sagardighi PDCL

Ground Elevation : +32.387m

Method of Boring/ Drilling : Shell/ Rotary

Water Level (Static) : 7.00m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : 6.00m

Date : From 24.06.12 To 29.06.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
24.06.12															
0.00															Very stiff /stiff brownish grey silty clay with bluish grey patches in traces, sand and kankars.(high silt content)
	+31.387	1.00	1.45	0.45	P	5	7	9	-	16	-	-	-	-	
	+30.387	2.00	2.45	0.45	P	4	5	9	-	14	-	-	-	-	
27.06.12															3.00m
3.00	+29.387	3.00	3.45	0.45	P	6	7	10	-	17	-	-	-	-	Very stiff yellowish brown silty clay with traces of sand and dark grey moorum
	+28.387	4.00	4.45	0.45	P	6	8	14	-	22	-	-	-	-	
															5.00m
	+26.387	6.00	6.45	0.45	P	13	19	25	-	44	-	-	-	-	Hard yellowish brown to light reddish brown silty clay with bluish grey patches and dark dark grey moorum in traces
	+24.387	8.00	8.45	0.45	P	7	12	18	-	30	-	-	-	-	
															10.00m
	+22.387	10.00	10.45	0.45	P	7	10	23	-	33	-	-	-	-	Hard reddish /yellowish brown sandy silty clay with varying percentage of sand and presence of fine mica flakes at to sum region
	+20.387	12.00	12.45	0.45	P	8	12	24	-	36	-	-	-	-	
28.06.12															14.00m
14.00	+18.387	14.00	14.45	0.45	P	8	12	18	-	30	-	-	-	-	Dense brown /yellowish brown sand with varying percentage of fines, little cohesive touch and fine mica flakes
	+16.387	16.00	16.45	0.45	P	7	17	24	-	41	-	-	-	-	
															18.00m
	+14.387	18.00	18.45	0.45	P	14	19	23	-	42	-	-	-	-	Hard yellowish brown clayey silt with varying percentage of sand and presence of occasional laminations at 22.00m depth bgl; presence of kankars mixed from 20.00m depth bgl.
	+12.387	20.00	20.45	0.45	P	17	21	26	-	47	-	-	-	-	
29.06.12															
29.00	+10.387	22.00	22.45	0.45	P	15	20	31	-	51	-	-	-	-	
	+8.387	24.00	24.17	0.17	P	40	50 (2cm)	-	-	>100	-	-	-	-	
	+8.387	24.00	(Termination Depth)												

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-3

Location : Sagardighi PDCL

Ground Elevation : +33.751m

Method of Boring/ Drilling : Shell/ Rotary

Water Level (Static) : 8.00m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : 6.00m

Date : From 17.06.12 To 19.06.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
17.06.12															
0.00															
	+32.751	1.00	1.45	0.45	P	3	4	5	-	9	-	-	-	-	Stiff light grey to yellowish brown silty clay with traces of stone chips, brick pieces and sand.
	+31.751	2.00	2.45	0.45	P	4	5	6	-	11	-	-	-	-	2.50m
	+30.751	3.00	3.45	0.45	P	5	6	8	-	14	-	-	-	-	Stiff to very stiff yellowish brown silty clay with traces of sand, dark grey moorum and kankars/ nodules.
	+29.751	4.00	4.45	0.45	P	8	12	15	-	27	-	-	-	-	4.00m
	+27.751	6.00	6.45	0.45	P	10	13	18	-	31	-	-	-	-	Very stiff to hard (from 6.00m depth b.g.l.) yellowish/ reddish brown silty clay with bluish grey patches, dark grey moorum and sand in traces; sand content increases from 10.00m depth b.g.l. and presence of calcareous nodules also noticed at top.
	+25.751	8.00	8.45	0.45	P	8	10	17	-	27	-	-	-	-	
	+23.751	10.00	10.45	0.45	P	5	13	22	-	35	-	-	-	-	
	+21.751	12.00	12.45	0.45	P	7	14	17	-	31	-	-	-	-	
18.06.12															13.70m
14.00	+19.751	14.00	14.45	0.45	P	12	26	32	-	58	-	-	-	-	Very stiff/ hard light reddish to yellowish brown silty clay with rusty brown patches, traces of sand and fine micaflakes; high percentage of sand at 14.00m depth b.g.l. (SPT samples at 14.00m depth b.g.l.).
	+17.751	16.00	16.45	0.45	P	7	10	15	-	25	-	-	-	-	
	+15.751	18.00	18.45	0.45	P	8	12	17	-	29	-	-	-	-	
															19.00m
	+13.751	20.00	20.45	0.45	P	9	16	30	-	46	-	-	-	-	Very stiff/ hard light reddish to yellowish brown silty clay with rusty brown patches, traces of sand and fine micaflakes; high percentage of sand at 14.00m depth b.g.l. (SPT samples at 14.00m depth b.g.l.).
	+11.751	22.00	22.45	0.45	P	12	20	38	-	58	-	-	-	-	
	+9.751	24.00	24.45	0.45	P	14	24	40	-	64	-	-	-	-	
	+7.751	26.00	26.45	0.45	P	14	22	23	-	45	-	-	-	-	
19.06.12															
28.00	+5.751	28.00	28.32	0.32	P	28	50	50 (2cm)	-	>100	-	-	-	-	
	+3.751	30.00	30.40	0.40	P	23	32	50 (10cm)	-	>100	-	-	-	-	
	+3.751	30.00	(Termination Depth)												

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-4

Location : Sagardighi PDCL

Ground Elevation : +32.641m

Method of Boring/ Drilling : Shell

Water Level (Static) : 15.00m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : 18.00m

Date : From 28.05.12 To 29.05.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
28.05.12															
0.00															
	+31.641	1.00	1.45	0.45	P	4	5	7	-	12	-	-	-	-	Stiff grey silty caly with rusty brown spots and traces of sand and kankars
	+30.641	2.00	2.45	0.45	P	3	5	6	-	11	-	-	-	-	
															2.70m
	+29.641	3.00	3.45	0.45	U	-	-	-	-	-	-	-	-	-	Very stiff brown silty clay with traces of kankars (at top) and deep brown /reddish brown spots/patches and sand in traces; high percentage of sand noticed at 12.00m depth (SPT Sample)
	+28.641	4.00	4.45	0.45	P	6	7	8	-	15	-	-	-	-	
	+26.641	6.00	6.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+24.641	8.00	8.45	0.45	P	5	8	10	-	18	-	-	-	-	
	+22.641	10.00	10.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+20.641	12.00	12.45	0.45	P	6	7	10	-	17	-	-	-	-	
29.05.12															
14.00															14.00m
	+18.641	14.00	14.45	0.45	U	-	-	-	-	-	-	-	-	-	Very stiff to hard yellowish /reddish brown silty clay (high silt content) with rusty brown spots and patches.
	+16.641	16.00	16.45	0.45	P	7	11	18	-	29	-	-	-	-	
	+14.641	18.00	18.45	0.45	P	9	11	16	-	27	-	-	-	-	
	+12.641	20.00	20.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+10.641	22.00	22.45	0.45	P	7	11	14	-	25	-	-	-	-	
															24.00m
	+8.641	24.00	24.45	0.45	P	8	12	16	-	28	-	-	-	-	Hard brown /yellowish to reddish brown clayey silt /silty clay (high silt content) with fine mica flakes.
	+6.641	26.00	26.45	0.45	P	8	15	19	-	34	-	-	-	-	
	+4.641	28.00	28.45	0.45	P	10	17	20	-	37	-	-	-	-	
															30.00m
	+2.641	30.00	30.45	0.45	P	17	20	25	-	45	-	-	-	-	Dense to very dense grey sand with fines, fine mica flakes and occasional cohesive touch.
	+0.641	32.00		-	P	-	-	-	-	>100	-	-	-	-	
	+0.641	32.00		(Termination Depth)											

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-4A

Location : Sagardighi PDCL

Ground Elevation : +33.067m

Method of Boring/ Drilling : Shell

Water Level (Static) : 3.00m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : 6.00m

Date : From 10.07.12 To 13.07.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
10.07.12 0.00															Stiff brownish grey silty clay with traces of sand and occasional bluish grey spots and dark grey moorum.
	+32.067	1.00	1.50	0.50	U	-	-	-	-	-	-	-	-	-	
	+31.067	2.00	2.45	0.45	P	4	6	8	-	14	-	-	-	-	
															2.50m
	+30.067	3.00	3.45	0.45	U	-	-	-	-	-	-	-	-	-	Very stiff light reddish to yellowish brown silty clay with varying sand content, occasional grey/ bluish grey patches and dark grey moorum/ kankars.
	+29.067	4.00	4.45	0.45	P	6	9	12	-	21	-	-	-	-	
	+27.067	6.00	6.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+25.067	8.00	8.45	0.45	P	7	12	14	-	26	-	-	-	-	
11.07.12 10.00	+23.067	10.00	10.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+21.067	12.00	12.45	0.45	P	7	10	12	-	22	-	-	-	-	
															13.00m
	+19.067	14.00	14.45	0.45	P	10	13	16	-	29	-	-	-	-	Very stiff to hard light reddish yellow/ brown silty/ sandy clay with varying percentage of sand.
13.07.12 16.00	+17.067	16.00	16.45	0.45	P	7	12	15	-	27	-	-	-	-	
	+15.067	18.00	18.45	0.45	P	11	21	27	-	48	-	-	-	-	
															20.00m
	+13.067	20.00	20.45	0.45	P	13	19	31	-	50	-	-	-	-	Hard light yellowish brown/ brown silty clay (high silt content) with traces of sand and fine micaflakes.
	+11.067	22.00	22.45	0.45	P	15	24	35	-	59	-	-	-	-	
	+9.067	24.00	24.45	0.45	P	17	29	38	-	67	-	-	-	-	
	+7.067	26.00	26.45	0.45	P	16	21	29	-	50	-	-	-	-	
															28.00m
	+5.067	28.00	28.45	0.45	P	25	31	44	-	75	-	-	-	-	Dense to very dense brown/ light grey sand with varying percentage of fines, cohesive touch and fine micaflakes.
	+3.067	30.00	30.20	0.20	P	27	50 (5cm)	-	-	>100	-	-	-	-	
	+3.067	30.00		(Termination Depth)											

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-5

Location : Sagardighi PDCL

Ground Elevation : +33.469m

Method of Boring/ Drilling : Shell

Water Level (Static) : 20.00m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : 20.00m

Date : From 30.05.12 To 02.06.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
30.05.12															
0.00															
	+32.469	1.00	1.45	0.45	P	3	4	5	-	9	-	-	-	-	Stiff grey silty clay with rusty /yellowish brown patches in traces; sand and occasional kankars
	+31.469	2.00	2.50	0.50	U	-	-	-	-	-	-	-	-	-	
															2.80m
	+30.469	3.00	3.45	0.45	P	6	7	9	-	16	-	-	-	-	Very stiff yellowish brown silty clay with kankars and sand in traces; reddish brown spots /patches are also noted.
	+29.469	4.00	4.45	0.45	U	-	-	-	-	-	-	-	-	-	
31.05.12															
6.00	+27.469	6.00	6.45	0.45	P	7	11	18	-	29	-	-	-	-	
	+25.469	8.00	8.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+23.469	10.00	10.45	0.45	P	6	13	14	-	27	-	-	-	-	
	+21.469	12.00	12.45	0.45	U	-	-	-	-	-	-	-	-	-	
															13.70m
	+19.469	14.00	14.45	0.45	P	9	18	22	-	40	-	-	-	-	Very stiff yellowish / reddish brown silty clay generally high silt content with varying percentage of sand, reddish brown spots in traces and fine mica flakes; high percentage of sand at 14.00m depth b.g.l (SPT Sample)
	+17.469	16.00	16.45	0.45	P	8	12	14	-	26	-	-	-	-	
	+15.469	18.00	18.45	0.45	U	-	-	-	-	-	-	-	-	-	
															20.00m
	+13.469	20.00	20.45	0.45	P	11	13	18	-	31	-	-	-	-	
01.06.12															Very stiff /hard yellowish brown clayey silt /silt clay (high silt content) with traces of sand, occasional laminations and fine mica flakes.
22.00	+11.469	22.00	22.45	0.45	P	9	11	17	-	28	-	-	-	-	
	+9.469	24.00	24.45	0.45	P	7	12	21	-	33	-	-	-	-	
02.06.12															
26.00	+7.469	26.00	26.45	0.45	P	9	15	22	-	37	-	-	-	-	
	+5.469	28.00	28.45	0.45	P	11	19	22	-	41	-	-	-	-	
															29.50m
	+3.469	30.00	30.37	0.37	P	32	40	50 (7cm)	-	>100	-	-	-	-	Very dense brown sand with low percentage of fines and fine mica flakes.
	+1.469	32.00	32.32	0.32	P	30	35	50 (2cm)	-	>100	-	-	-	-	
	+1.469	32.00		(Termination Depth)											

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-6

Location : Sagardighi PDCL

Ground Elevation : +33.626m

Method of Boring/ Drilling : Shell

Water Level (Static) : 10.00m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : 9.00m

Date : From 05.06.12 To 09.06.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
05.06.12															
0.00															
	+32.626	1.00	1.45	0.45	P	4	7	8	-	15	-	-	-	-	Very stiff greyish brown silty clay with rusty brown spots and traces of sand.
	+31.626	2.00	2.50	0.50	U	-	-	-	-	-	-	-	-	-	
	+30.626	3.00	3.45	0.45	P	5	8	9	-	17	-	-	-	-	
															3.50m
06.06.12															
4.00	+29.626	4.00	4.45	0.45	U	-	-	-	-	-	-	-	-	-	Very stiff to hard yellowish brown silt clay with traces of kankars, sand and occasional rusty brown patches.
	+27.626	6.00	6.45	0.45	P	9	12	15	-	27	-	-	-	-	
	+25.626	8.00	8.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+23.626	10.00	10.45	0.45	P	7	11	23	-	34	-	-	-	-	
07.06.12															
12.00	+21.626	12.00	12.45	0.45	U	-	-	-	-	-	-	-	-	-	
															14.00m
	+19.626	14.00	14.45	0.45	P	6	12	18	-	30	-	-	-	-	Very stiff / hard yellowish brown / brown silty clay /clayey silt: high percentage of sand (at top), rusty brown patches, occasional fine mica flakes and traces of sand.
	+17.626	16.00	16.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+15.626	18.00	18.45	0.45	P	9	11	17	-	28	-	-	-	-	
	+13.626	20.00	20.45	0.45	P	9	15	18	-	33	-	-	-	-	
															21.00m
08.06.12															
22.00	+11.626	22.00	22.45	0.45	P	12	18	25	-	43	-	-	-	-	Hard brown /yellowish brown clayey silt with fine mica flakes and sand in traces.
	+9.626	24.00	24.45	0.45	P	14	22	30	-	52	-	-	-	-	
															25.00m
09.06.12															
26.00	+7.626	26.00	26.35	0.35	P	30	52 (5cm)	50	-	>100	-	-	-	-	Very dense brown sand with fines fractions and fine mica flakes.
	+5.626	28.00	28.25	0.25	P	35	50 (10cm)	-	-	>100	-	-	-	-	
	+3.626	30.00	30.20	0.20	P	38	50 (5cm)	-	-	>100	-	-	-	-	
	+3.626	30.00	(Termination Depth)												

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-6A

Location : Sagardighi PDCL

Ground Elevation : +33.885m

Method of Boring/ Drilling : Shell

Water Level (Static) : m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : 9.00m

Date : From 10.06.12 To 13.06.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
10.06.12															
0.00															Stiff grey silty caly with brown patches, traces of kankars and sand.
	+32.885	1.00	1.50	0.50	U	-	-	-	-	-	-	-	-	-	
	+31.885	2.00	2.45	0.45	P	4	6	8	-	14	-	-	-	-	
															3.00m
	+30.885	3.00	3.50	0.50	U	-	-	-	-	-	-	-	-	-	
	+29.885	4.00	4.45	0.45	P	6	7	12	-	19	-	-	-	-	Very stiff to hard yellowish brown silty caly with traces of kankars, sand and occasional rusty brown patches.
	+27.885	6.00	6.50	0.50	U	-	-	-	-	-	-	-	-	-	
	+25.885	8.00	8.45	0.45	P	7	15	20	-	35	-	-	-	-	
	+23.885	10.00	10.50	0.50	U	-	-	-	-	-	-	-	-	-	
11.06.12															
12.00	+21.885	12.00	12.45	0.45	P	7	15	25	-	40	-	-	-	-	
															12.00m
	+19.885	14.00	14.50	0.50	U	-	-	-	-	-	-	-	-	-	Very stiff/ hard yellowish brown/ brown silty caly/ clayey silt: fine mica flakes, traces of sand and occasional laminations.
12.06.12															
16.00	+17.885	16.00	16.45	0.45	P	14	18	20	-	38	-	-	-	-	From 17.00m to 19.00m depth b.g.l, Medium dense yellowish brown/ brown clayey silty sand/ sandy silt with cohesive touch and fine mica flakes (non-plastic)
	+15.885	18.00	18.45	0.45	P	16	20	25	-	45	-	-	-	-	
	+13.885	20.00	20.45	0.45	P	7	9	15	-	24	-	-	-	-	
	+11.885	22.00	22.45	0.45	P	8	11	17	-	28	-	-	-	-	
	+9.885	24.00	24.45	0.45	P	8	9	15	-	24	-	-	-	-	
															24.50m
	+7.885	26.00	26.45	0.45	P	8	12	17	-	29	-	-	-	-	Very stiff/ hard brown clayey silt with fine mica flakes.
13.06.12															
27.00	+6.885	27.00	27.50	0.50	U	Slipped					-	-	-	-	
	+6.885	27.00	(Termination Depth)												

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-7

Location : Sagardighi PDCL

Ground Elevation : +34.110m

Method of Boring/ Drilling : Shell/ Rotary

Water Level (Static) : 6.00m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : 6.00m

Date : From 14.06.12 To 16.06.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
14.06.12															
0.00															Stiff to very stiff grey silty clay with yellowish /rusty brown patches, sand kankars in traces.
	+33.110	1.00	1.50	0.50	U	-	-	-	-	-	-	-	-	-	
	+32.110	2.00	2.45	0.45	P	3	7	9	-	16	-	-	-	-	
	+31.110	3.00	3.50	0.50	U	-	-	-	-	-	-	-	-	-	
	+30.110	4.00	4.45	0.45	P	4	7	11	-	18	-	-	-	-	
															5.00m
	+28.110	6.00	6.50	0.50	U	-	-	-	-	-	-	-	-	-	Very stiff to hard yellowish brown silty clay with traces of sand, kankars and rusty/ reddish brown spots in occasional case.
	+26.110	8.00	8.45	0.45	P	7	13	17	-	30	-	-	-	-	
	+24.110	10.00	10.50	0.50	U	-	-	-	-	-	-	-	-	-	
	+22.110	12.00	12.45	0.45	P	8	13	18	-	31	-	-	-	-	
15.06.12															13.50m
14.00	+20.110	14.00	14.45	0.45	P	15	25	28	-	53	-	-	-	-	Dense yellowish brown sand with high percentage of fine and cohesive touch.
	+18.110	16.00	16.45	0.45	P	13	25	26	-	51	-	-	-	-	
	+16.110	18.00	18.45	0.45	P	15	27	29	-	56	-	-	-	-	
	+14.110	20.00	20.45	0.45	P	18	25	30	-	55	-	-	-	-	
															20.50m
	+12.110	22.00	22.45	0.45	P	18	22	26	-	48	-	-	-	-	Hard brown /yellowish brown silty caly (high silt content) /clayey silt nd pockets of clayey sandy silt at 30.00m depth bgl; Varying percentage of sand /silt has been noticed along with presence of gravels from 30.00m depth.
16.06.12															
24.00	+10.110	24.00	24.45	0.45	P	15	27	36	-	63	-	-	-	-	
	+8.110	26.00	26.45	0.45	P	12	24	30	-	54	-	-	-	-	
	+6.110	28.00	28.45	0.45	P	14	26	34	-	60	-	-	-	-	
	+4.110	30.00	30.45	0.45	P	23	42	51	-	93	-	-	-	-	
	+2.110	32.00	32.40	0.40	P	26	52	50	-	>100	-	-	-	-	
								(10cm)							
	+2.110	32.00		(Termination Depth)											

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-8

Location : Sagardighi PDCL

Ground Elevation : +35.389m

Method of Boring/ Drilling : Shell/ Rotary

Water Level (Static) : m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : 6.00m

Date : From 30.06.12 To 03.07.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
30.06.12															
0.00															
	+34.389	1.00	1.45	0.45	P	1	2	2	-	4	-	-	-	-	Very stiff light brownish grey to bluish grey silty clay with reddish brown spots and traces of sand.
	+33.389	2.00	2.45	0.45	P	5	7	10	-	17	-	-	-	-	
	+32.389	3.00	3.50	0.50	U	-	-	-	-	-	-	-	-	-	Note : 0.00m to 2.00m depth consistency is medium stiff/ soft.
	+31.389	4.00	4.45	0.45	P	6	7	15	-	22	-	-	-	-	
	+29.389	6.00	6.45	0.45	P	5	8	13	-	21	-	-	-	-	
															6.50m
01.07.12															
8.00	+27.389	8.00	8.45	0.45	P	7	15	20	-	35	-	-	-	-	Very stiff to hard yellowish to light reddish brown silty clay with bluish grey patches and presence of slicken sides at UDS (10.00m depth b.g.l.)
	+25.389	10.00	10.50	0.50	U	-	-	-	-	-	-	-	-	-	Note : Low shear value for slicken sides.
	+23.389	12.00	12.45	0.45	P	15	18	27	-	45	-	-	-	-	
	+21.389	14.00	14.50	0.50	U	-	-	-	-	-	-	-	-	-	
															15.00m
	+19.389	16.00	16.45	0.45	P	9	17	20	-	37	-	-	-	-	Hard yellowish to reddish brown sandy silty clay/ clayey sandy silt with fine micaflakes in traces, high plasticity has been observed at 24.00m depth b.g.l. (CH)
	+17.389	18.00	18.45	0.45	P	9	20	22	-	42	-	-	-	-	
	+15.389	20.00	20.45	0.45	P	10	19	27	-	46	-	-	-	-	
02.07.12															
22.00	+13.389	22.00	22.45	0.45	P	7	24	34	-	58	-	-	-	-	
	+11.389	24.00	24.45	0.45	P	15	21	23	-	44	-	-	-	-	
															25.00m
03.07.12															
26.00	+9.389	26.00	26.45	0.45	P	12	25	35	-	60	-	-	-	-	Hard brown/ brownish yellow silty clay (high silt content)/ clayey silt with reddish brown spots and sand in traces.
	+7.389	28.00	28.45	0.45	P	14	28	30	-	58	-	-	-	-	
	+5.389	30.00	30.45	0.45	P	15	33	35	-	68	-	-	-	-	
	+5.389	30.00	(Termination Depth)												

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-11

Location : Sagardighi PDCL

Ground Elevation : +33.380m

Method of Boring/ Drilling : Shell

Water Level (Static) : 14.80m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : 18.00m

Date : From 25.05.12 To 27.05.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
25.05.12															
0.00															
	+32.380	1.00	1.45	0.45	U	-	-	-	-	-	-	-	-	-	Stiff grey silty clay with rusty brown spots, traces of sand and kankars
	+31.380	2.00	2.45	0.45	P	2	4	4	-	8	-	-	-	-	
															2.60m
	+30.380	3.00	3.45	0.45	U	-	-	-	-	-	-	-	-	-	Stiff to very stiff yellowish brown silty clay with rusty brown patches, occasional kankars and sand in traces (high silt content at bottom)
	+29.380	4.00	4.45	0.45	P	3	4	5	-	9	-	-	-	-	
	+27.380	6.00	6.45	0.45	P	4	5	6	-	11	-	-	-	-	
	+25.380	8.00	8.45	0.45	U	-	-	-	-	-	-	-	-	-	
26.05.12															
10.00	+23.380	10.00	10.45	0.45	P	6	7	12	-	19	-	-	-	-	
	+21.380	12.00	12.45	0.45	U	-	-	-	-	-	-	-	-	-	
															13.80m
	+19.380	14.00	14.45	0.45	P	17	19	21	-	40	-	-	-	-	Dense yellowish brown sand with fine mica flakes and fines
															15.20m
	+17.380	16.00	16.45	0.45	U	-	-	-	-	-	-	-	-	-	Very stiff yellowish brown to light reddish brown silty clay with fine mica flakes and varying percentage of sand.
	+15.380	18.00	18.45	0.45	P	12	13	15	-	28	-	-	-	-	
	+13.380	20.00	20.45	0.45	P	8	8	11	-	19	-	-	-	-	
															21.00m
27.05.12															
22.00	+11.380	22.00	22.45	0.45	P	9	12	18	-	30	-	-	-	-	Hard yellowish brown silty clay (high silt content with some plasticity) with laminations of silt, traces of sand and fine micaflakes.
	+9.380	24.00	24.45	0.45	P	11	14	25	-	39	-	-	-	-	
															25.00m
	+7.380	26.00	26.45	0.45	P	13	34	35	-	69	-	-	-	-	Hard yellowish brown silty clay (high silt content with some plasticity) with laminations of silt, traces of sand and fine micaflakes.
	+5.380	28.00	28.38	0.38	P	16	32	50 (8cm)	-	>100	-	-	-	-	
	+3.380	30.00	30.45	0.45	P	10	23	31	-	54	-	-	-	-	
	+3.380	30.00		(Termination Depth)											

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-12

Location : Sagardighi PDCL

Ground Elevation : +32.845m

Method of Boring/ Drilling : Shell/ Rotary

Water Level (Static) : 1.60m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : 6.00m

Date : From 10.07.12 To 12.07.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
10.07.12 0.00															Stiff light grey/ yellowish/ reddish brown silty clay with occasional kankars, traces of sand and rusty brown spots.
	+31.845	1.00	1.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+30.845	2.00	2.45	0.45	P	4	6	9	-	15	-	-	-	-	
															2.50m
	+29.845	3.00	3.45	0.45	U	-	-	-	-	-	-	-	-	-	Very stiff yellowish to reddish brown/ brown silty clay with traces of kankars/ moorums and sand in varying percentages.
	+28.845	4.00	4.45	0.45	P	6	7	11	-	18	-	-	-	-	
	+26.845	6.00	6.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+24.845	8.00	8.45	0.45	P	6	9	14	-	23	-	-	-	-	
	+22.845	10.00	10.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+20.845	12.00	12.45	0.45	P	8	12	16	-	28	-	-	-	-	
															13.50m
11.07.12 14.00	+18.845	14.00	14.45	0.45	P	10	14	18	-	32	-	-	-	-	Very stiff to hard yellowish brown/ reddish brown silty clay to clayey silt with reddish brown spots/ patches, traces of kankars, fine micaflakes and sand.
	+16.845	16.00	16.45	0.45	P	10	16	23	-	39	-	-	-	-	
	+14.845	18.00	18.45	0.45	P	10	18	26	-	44	-	-	-	-	
	+12.845	20.00	20.45	0.45	P	12	17	19	-	36	-	-	-	-	
	+10.845	22.00	22.45	0.45	P	13	19	21	-	40	-	-	-	-	
															24.00m
	+8.845	24.00	24.45	0.45	P	15	30	35	-	65	-	-	-	-	Hard brown/ grey/ rusty brown silty clay (high silt content) clayey sandy silt with/ without laminations, reddish brown spots/ patches, fine micaflakes and occasional high percentages of sand at bottom.
	+6.845	26.00	26.45	0.45	P	18	32	38	-	70	-	-	-	-	
	+4.845	28.00	28.45	0.45	P	20	23	40	-	63	-	-	-	-	
															29.00m
	+2.845	30.00	30.45	0.45	P	24	34	44	-	78	-	-	-	-	Dense to very dense grey/ yellowish brown sand with fines and little cohesive touch.
	+2.845	30.00	(Termination Depth)												

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project	: Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB	Bore Hole No.	: BH-12A
Location	: Sagardighi PDCL	Ground Elevation	: +32.534m
Method of Boring/ Drilling	: Shell/ Rotary	Water Level (Static)	: 2.50m b.g.l.
Boring/ Drilling Equipment	: Mechanical Winch	Dia. of Boring/ Drilling	: 150mm
Casing Lowered	: 6.00m	Date : From	06.07.12 To 08.07.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
06.07.12															
0.00															Stiff light grey/ yellowish/ reddish brown silty clay with occasional kankars, traces of sand and rusty brown spots.
	+31.534	1.00	1.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+30.534	2.00	2.45	0.45	P	5	7	9	-	16	-	-	-	-	
															2.80m
	+29.534	3.00	3.45	0.45	U	-	-	-	-	-	-	-	-	-	Very stiff yellowish to reddish brown/ brown silty clay with traces of kankars/ moorums and sand in varying percentages.
	+28.534	4.00	4.45	0.45	P	6	7	12	-	19	-	-	-	-	
	+26.534	6.00	6.45	0.45	U	-	-	-	-	-	-	-	-	-	
07.07.12															
8.00	+24.534	8.00	8.45	0.45	P	6	12	18	-	30	-	-	-	-	
	+22.534	10.00	10.45	0.45	U	-	-	-	-	-	-	-	-	-	
															11.00m
	+20.534	12.00	12.45	0.45	P	7	13	21	-	34	-	-	-	-	Very stiff to hard yellowish brown/ reddish brown silty clay to clayey silt with reddish brown spots/ patches, traces of kankars, fine micaflakes and sand.
															14.00m
	+18.534	14.00	14.45	0.45	P	14	23	22	-	45	-	-	-	-	
	+16.534	16.00	16.45	0.45	P	14	17	35	-	52	-	-	-	-	Hard brown/ grey/ rusty brown silty clay (high silt content) clayey sandy silt with/ without laminations, reddish brown spots/ patches, fine micaflakes and occasional high percentages of sand at bottom.
	+14.534	18.00	18.45	0.45	P	12	19	39	-	58	-	-	-	-	
08.07.12															
20.00	+12.534	20.00	20.45	0.45	P	11	15	22	-	37	-	-	-	-	
	+10.534	22.00	22.45	0.45	P	10	14	25	-	39	-	-	-	-	
	+8.534	24.00	24.45	0.45	P	15	20	40	-	60	-	-	-	-	
	+6.534	26.00	26.45	0.45	P	21	25	36	-	61	-	-	-	-	
	+4.534	28.00	28.45	0.45	P	22	28	40	-	68	-	-	-	-	
	+2.534	30.00	30.45	0.45	P	19	31	35	-	66	-	-	-	-	
	+2.534	30.00	(Termination Depth)												

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-13

Location : Sagardighi PDCL

Ground Elevation : +32.715m

Method of Boring/ Drilling : Shell/ Rotary

Water Level (Static) : 1.20m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : 6.00m

Date : From 04.07.12 To 05.07.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
04.07.12															
0.00	+31.715	1.00	1.45	0.45	U	-	-	-	-	-	-	-	-	-	Very stiff brownish grey silty clay with traces of sand, bluish grey/ grey patches and presence of dark grey moorum/ kankars.
	+30.715	2.00	2.45	0.45	P	5	6	10	-	16	-	-	-	-	
	+29.715	3.00	3.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+28.715	4.00	4.45	0.45	P	6	7	12	-	19	-	-	-	-	
															5.80m
	+26.715	6.00	6.45	0.45	U	-	-	-	-	-	-	-	-	-	Hard yellowish/ reddish brown silty clay with traces of sand, bluish grey patches and occassional presence of moorum.
	+24.715	8.00	8.45	0.45	P	15	27	34	-	61	-	-	-	-	
	+22.715	10.00	10.45	0.45	U	-	-	-	-	-	-	-	-	-	
															12.00m
	+20.715	12.00	12.45	0.45	P	5	10	15	-	25	-	-	-	-	Hard yellowish brown sandy silty clay with bluish grey patches in traces, sand content generally increases with depth/ clayey sand with fine micaflkes.
	+18.715	14.00	14.45	0.45	P	12	19	23	-	42	-	-	-	-	
															14.50m
	+16.715	16.00	16.45	0.45	P	15	23	24	-	47	-	-	-	-	Hard reddish brown silty clay (generally high silt content) with varrying sand content, fine micaflkes, occassional laminations and deep/ rusty brown spots.
05.07.12															
18.00	+14.715	18.00	18.45	0.45	P	9	18	21	-	39	-	-	-	-	
	+12.715	20.00	20.45	0.45	P	10	22	24	-	46	-	-	-	-	
	+10.715	22.00	22.45	0.45	P	25	32	45	-	77	-	-	-	-	
	+8.715	24.00	24.45	0.45	P	29	38	55	-	93	-	-	-	-	
	+6.715	26.00	26.45	0.45	P	17	19	36	-	55	-	-	-	-	
	+4.715	28.00	28.45	0.45	P	28	32	40	-	72	-	-	-	-	
	+2.715	30.00	30.45	0.45	P	30	35	45	-	80	-	-	-	-	
	+2.715	30.00	(Termination Depth)												

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-14

Location : Sagardighi PDCL

Ground Elevation : +32.997m

Method of Boring/ Drilling : Shell/ Rotary

Water Level (Static) : 1.81m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : 6.00m

Date : From 07.07.12 To 08.07.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
07.07.12 0.00															
	+31.997	1.00	1.45	0.45	U	-	-	-	-	-	-	-	-	-	Stiff light grey/ yellowish/ reddish brown silty clay with occasional kankars, traces of sand and rusty brown spots.
	+30.997	2.00	2.45	0.45	P	4	5	7	-	12	-	-	-	-	
															300m
	+29.997	3.00	3.45	0.45	U	-	-	-	-	-	-	-	-	-	Very stiff yellowish to reddish brown/ brown silty clay with traces of kankars/ moorums and sand in varying percentages.
	+28.997	4.00	4.45	0.45	P	6	8	12	-	20	-	-	-	-	
	+26.997	6.00	6.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+24.997	8.00	8.45	0.45	P	6	15	21	-	36	-	-	-	-	
	+22.997	10.00	10.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+20.997	12.00	12.45	0.45	P	6	9	12	-	21	-	-	-	-	
08.07.12 14.00	+18.997	14.00	14.45	0.45	P	6	13	14	-	27	-	-	-	-	
	+16.997	16.00	16.45	0.45	P	8	11	14	-	25	-	-	-	-	
															17.00m
	+14.997	18.00	18.45	0.45	P	10	12	18	-	30	-	-	-	-	Very stiff to hard yellowish brown/ reddish brown silty clay to clayey silt with reddish brown spots/ patches, traces of kankars, fine micaflakes and sand.
	+12.997	20.00	20.45	0.45	P	18	21	32	-	53	-	-	-	-	
															21.00m
	+10.997	22.00	22.45	0.45	P	11	15	24	-	39	-	-	-	-	Hard brown/ grey/ rusty brown silty clay (high silt content) clayey sandy silt with/ without laminations, reddish brown spots/ patches, fine micaflakes and occasional high percentages of sand at bottom.
	+8.997	24.00	24.45	0.45	P	14	28	32	-	60	-	-	-	-	
															26.00m
	+6.997	26.00	26.45	0.45	P	18	25	36	-	61	-	-	-	-	Dense to very dense yellowish brown sand with varrying percentage of fines and cohesive touch, high percentage of fines having high silt percentage with low plasticity (CL) at 28.00m depth b.g.l.
	+4.997	28.00	28.45	0.45	P	20	29	34	-	63	-	-	-	-	
	+2.997	30.00	30.45	0.45	P	28	40	45	-	85	-	-	-	-	
	+2.997	30.00		(Termination Depth)											

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project	: Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB	Bore Hole No.	: BH-14A
Location	: Sagardighi PDCL	Ground Elevation	: +33.059m
Method of Boring/ Drilling	: Shell/ Rotary	Water Level (Static)	: 2.00m b.g.l.
Boring/ Drilling Equipment	: Mechanical Winch	Dia. of Boring/ Drilling	: 150mm
Casing Lowered	: 6.00m	Date : From 03.07.12	To 05.07.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
03.07.12															
0.00															
	+32.059	1.00	1.45	0.45	U	-	-	-	-	-	-	-	-	-	Stiff light grey/ yellowish/ reddish brown silty clay with occasional kankars, traces of sand and rusty brown spots.
	+31.059	2.00	2.45	0.45	P	4	5	6	-	11	-	-	-	-	
															3.00m
	+30.059	3.00	3.45	0.45	U	-	-	-	-	-	-	-	-	-	Very stiff yellowish to reddish brown/ brown silty clay with traces of kankars/ moorums and sand in varying percentages.
	+29.059	4.00	4.45	0.45	P	7	9	13	-	22	-	-	-	-	
	+27.059	6.00	6.45	0.45	U	-	-	-	-	-	-	-	-	-	
04.07.12															
8.00	+25.059	8.00	8.45	0.45	P	6	11	18	-	29	-	-	-	-	
	+23.059	10.00	10.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+21.059	12.00	12.45	0.45	P	7	15	21	-	36	-	-	-	-	
															14.00m
	+19.059	14.00	14.45	0.45	P	7	9	14	-	23	-	-	-	-	Very stiff to hard yellowish brown/ reddish brown silty clay to clayey silt with reddish brown spots/ patches, traces of kankars, fine micaflakes and sand.
	+17.059	16.00	16.45	0.45	P	5	11	17	-	28	-	-	-	-	
05.07.12															
18.00	+15.059	18.00	18.45	0.45	P	10	9	18	-	27	-	-	-	-	
	+13.059	20.00	20.45	0.45	P	12	15	21	-	36	-	-	-	-	
	+11.059	22.00	22.45	0.45	P	9	14	22	-	36	-	-	-	-	
	+9.059	24.00	24.45	0.45	P	14	15	17	-	32	-	-	-	-	
															25.00m
	+7.059	26.00	26.45	0.45	P	13	16	29	-	45	-	-	-	-	Hard brown/ grey/ rusty brown silty clay (high silt content) clayey sandy silt with/ without laminations, reddish brown spots/ patches, fine micaflakes and occasional high percentages of sand at bottom.
	+5.059	28.00	28.45	0.45	P	12	18	24	-	42	-	-	-	-	
	+3.059	30.00	30.20	0.20	P	24	50 (5cm)	-	-	>100	-	-	-	-	
	+3.059	30.00	(Termination Depth)												

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-15

Location : Sagardighi PDCL

Ground Elevation : +33.049m

Method of Boring/ Drilling : Shell/ Rotary

Water Level (Static) : 4.10m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : 6.00m

Date : From 30.06.12 To 03.07.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
30.06.12															
0.00															Very stiff yellowish to light reddish brown silty clay with light grey to bluish grey patches, traces of sand and moorum
	+32.049	1.00	1.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+31.049	2.00	2.45	0.45	P	4	9	11	-	20	-	-	-	-	
	+30.049	3.00	3.45	0.45	U	-	-	-	-	-	-	-	-	-	
															3.50m
	+29.049	4.00	4.45	0.45	P	10	13	15	-	28	-	-	-	-	Very stiff to hard yellowish to light reddish brown silty clay with sand and bluish grey patches in traces
01.07.12															
6.00	+27.049	6.00	6.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+25.049	8.00	8.45	0.45	P	9	14	16	-	30	-	-	-	-	
	+23.049	10.00	10.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+21.049	12.00	12.45	0.45	P	7	15	18	-	33	-	-	-	-	
															12.50m
	+19.049	14.00	14.45	0.45	P	13	22	28	-	50	-	-	-	-	Hard yellowish brown/brown silty clay with traces of sand /sandy silty clay (varying percentage of sand from 14.00m to 18.50m depth b.g.l) with occasional bluish grey patches at the upper zone; high percentage of sand, at 18.00m depth b.g.l and high percentage of silt from 20.00m depth b.g.l
	+17.049	16.00	16.45	0.45	P	10	17	26	-	43	-	-	-	-	
	+15.049	18.00	18.45	0.45	P	12	18	21	-	39	-	-	-	-	
02.07.12															
20.00	+13.049	20.00	20.45	0.45	P	7	12	15	-	27	-	-	-	-	
	+11.049	22.00	22.45	0.45	P	10	14	20	-	34	-	-	-	-	
	+9.049	24.00	24.45	0.45	P	7	13	19	-	32	-	-	-	-	
	+7.049	26.00	26.45	0.45	P	10	14	21	-	35	-	-	-	-	
															26.50m
	+5.049	28.00	28.45	0.45	P	15	30	38	-	68	-	-	-	-	Hard yellowish brown /brownish grey sandy silty clay with rusty brown spots and patches
03.07.12															
30.00	+3.049	30.00	30.45	0.45	P	16	27	30	-	57	-	-	-	-	
	+3.049	30.00	(Termination Depth)												

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-16

Location : Sagardighi PDCL

Ground Elevation : +33.426m

Method of Boring/ Drilling : Shell

Water Level (Static) : 6.00m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : 15.00m

Date : From 10.05.12 To 24.05.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
10.05.12															
0.00															Medium stiff to stiff grey silty clay with rusty brown sptots and kankars at bottom.
	+32.426	1.00	1.50	0.50	U	-	-	-	-	-	-	-	-	-	
	+31.426	2.00	2.45	0.45	P	2	2	3	-	5	-	-	-	-	
															2.70m
	+30.426	3.00	3.45	0.45	U	-	-	-	-	-	-	-	-	-	Stiff to very stiff brown/ light reddish brown silty clay with traces of sand, grey patches and rusty brown patches.
	+29.426	4.00	4.45	0.45	P	2	4	5	-	9	-	-	-	-	
	+27.426	6.00	6.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+25.426	8.00	8.45	0.45	P	3	4	4	-	8	-	-	-	-	
11.05.12															
10.00	+23.426	10.00	10.45	0.45	U	-	-	-	-	-	-	-	-	-	
22.05.12															11.00m
12.00	+21.426	12.00	12.45	0.45	P	8	11	14	-	25	-	-	-	-	Very stiff brown/ yellowish brown silty clay with traces of sand, fine micaflakes, kankars at lower region; varying percentage of silt is also noticed along with occasional laminations.
	+19.426	14.00	14.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+17.426	16.00	16.45	0.45	P	8	13	14	-	27	-	-	-	-	
	+15.426	18.00	18.45	0.45	U	-	-	-	-	-	-	-	-	-	
23.05.12															20.00m
20.00	+13.426	20.00	20.45	0.45	P	10	18	23	-	41	-	-	-	-	Hard brown sandy silty clay/ clayey sandy silt with varying percentage of sand, fine micaflakes, occasional kankars and lamination of silt.
	+11.426	22.00	22.45	0.45	P	16	26	38	-	64	-	-	-	-	
															23.00m
	+9.426	24.00	24.45	0.45	P	11	37	46	-	83	-	-	-	-	Dense to very dense brown sand with varying percentage of fines.
24.05.12															26.00m
26.00	+7.426	26.00	26.45	0.45	P	19	31	39	-	70	-	-	-	-	Hard brown silty clay with traces of sand, gravels and rusty brown patches.
															27.30m
	+5.426	28.00	28.35	0.35	P	60 (20cm)	50	-	-	>100	-	-	-	-	Very dense brown sand mixed with gravels, fines, fine micaflakes and little cohesive touch at bottom.
	+3.426	30.00	30.25	0.25	P	30 (10cm)	50	-	-	>100	-	-	-	-	
	+3.426	30.00		(Termination Depth)											

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-17

Location : Sagardighi PDCL

Ground Elevation : +33.124m

Method of Boring/ Drilling : Shell/ Rotary

Water Level (Static) : 9.50m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : 6.00m

Date : From 14.07.12 To 16.07.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
14.07.12															
0.00															
	+32.124	1.00	1.45	0.45	P	2	3	3	-	6	-	-	-	-	Medium stiff light grey to bluish grey sandy silty clay with brown spots and kankars/ moorum in traces.
	+31.124	2.00	2.45	0.45	P	2	4	7	-	11	-	-	-	-	
	+30.124	3.00	3.45	0.45	P	3	5	8	-	13	-	-	-	-	
	+29.124	4.00	4.45	0.45	P	4	7	12	-	19	-	-	-	-	
															5.00m
	+27.124	6.00	6.45	0.45	U	-	-	-	-	-	-	-	-	-	Hard/ very stiff yellowish brown/ reddish brown silty clay with traces of sand, bluish grey/ grey patches, kankars in traces and laminations at bottom.
	+25.124	8.00	8.45	0.45	P	12	16	24	-	40	-	-	-	-	
	+23.124	10.00	10.45	0.45	U	-	-	-	-	-	-	-	-	-	
	+21.124	12.00	12.45	0.45	P	15	19	25	-	44	-	-	-	-	
	+19.124	14.00	14.45	0.45	P	7	10	13	-	23	-	-	-	-	
	+17.124	16.00	16.45	0.45	P	8	11	14	-	25	-	-	-	-	
															17.00m
	+15.124	18.00	18.45	0.45	P	11	14	28	-	42	-	-	-	-	Hard yellowish brown/ reddish brown silty clay (high silt content) with traces of sand.
	+13.124	20.00	20.45	0.45	P	13	16	26	-	42	-	-	-	-	
	+11.124	22.00	22.45	0.45	P	15	18	21	-	39	-	-	-	-	
															23.00m
	+9.124	24.00	24.45	0.45	P	14	28	32	-	60	-	-	-	-	Hard reddish brown/ brown clayey silt with fine micaflakes, traces of sand, kqankars and fine micaflakes.
	+7.124	26.00	26.45	0.45	P	13	21	26	-	47	-	-	-	-	
															28.00m
	+5.124	28.00	28.45	0.45	P	24	38	55	-	93	-	-	-	-	Dense to very dense brown to reddish brown sand with high percentage of fines and fine micaflakes; little cohesive touch is also present.
	+3.124	30.00	30.45	0.45	P	26	41	60	-	101	-	-	-	-	
	+3.124	30.00	(Termination Depth)												

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

SARDIP CONSULTING ENGINEERS

FIELD BORE LOG DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Bore Hole No. : BH-18

Location : Sagardighi PDCL

Ground Elevation : +33.136m

Method of Boring/ Drilling : Shell/ Rotary

Water Level (Static) : 7.20m b.g.l.

Boring/ Drilling Equipment : Mechanical Winch

Dia. of Boring/ Drilling : 150mm

Casing Lowered : 6.00m

Date : From 12.07.12 To 15.07.12

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Piece (m)	Core Recovery (%)	R.Q.D. (%)	Description
12.07.12															
0.00															Stiff grey /bluish grey silty clay with traces of kankars, rusty brown/ yellow patches and sand.
	+32.136	1.00	1.50	0.50	U	-	-	-	-	-	-	-	-	-	
	+31.136	2.00	2.45	0.45	P	4	5	7	-	12	-	-	-	-	
															3.00m
	+30.136	3.00	3.45	0.45	U	-	-	-	-	-	-	-	-	-	Very stiff brown/ yellowish brown silty clay with rusty / reddish brown patches, traces of kankars and sand.
	+29.136	4.00	4.45	0.45	P	5	6	10	-	16	-	-	-	-	
	+27.136	6.00	6.45	0.45	U	-	-	-	-	-	-	-	-	-	
															8.00m
	+25.136	8.00	8.45	0.45	P	6	10	24	-	34	-	-	-	-	Very stiff brown/ yellowish brown silty clay with traces of sand, fine micaflakes, kankars at lower region; varying percentage of silt is also noticed along with occasional laminations.
	+23.136	10.00	10.45	0.45	P	5	8	18	-	26	-	-	-	-	
	+21.136	12.00	12.45	0.45	P	10	20	26	-	46	-	-	-	-	
	+19.136	14.00	14.45	0.45	P	5	9	15	-	24	-	-	-	-	
	+17.136	16.00	16.45	0.45	P	6	10	17	-	27	-	-	-	-	
															17.00m
	+15.136	18.00	18.45	0.45	P	10	13	22	-	35	-	-	-	-	Hard brown sandy silty clay/ clayey sandy silt with varying percentage of sand, fine micaflakes, occasional kankars and lamination of silt.
	+13.136	20.00	20.45	0.45	P	12	16	24	-	40	-	-	-	-	
	+11.136	22.00	22.45	0.45	P	12	19	25	-	44	-	-	-	-	
	+9.136	24.00	24.45	0.45	P	15	21	28	-	49	-	-	-	-	
															26.00m
	+7.136	26.00	26.45	0.45	P	15	20	40	-	60	-	-	-	-	Hard brown clayey silt with rusty brown patches /dense to very dense sand with high percentage of fines; cohesive touch and gravels an also present.
	+5.136	28.00	28.45	0.45	P	24	38	55	-	93	-	-	-	-	
	+3.136	30.00	30.20	0.20	P	37	50 (5cm)	-	-	>100	-	-	-	-	
	+3.136	30.00		(Termination Depth)											

NOTE Abbreviation Used U-Undisturbed Sample C-Core Sample D- Disturbed Sample P-Standard Penetration Test

REPORT ON EARTH RESISTIVITY TEST AT SAGARDIGHI T.P.P

SARDIP CONSULTING ENGINEERS

KOLKATA

C O N T E N T S

CHAPTER – I

Scope of work.....*1*

CHAPTER – II

Methodology.....*2*

CHAPTER – III

Instrument used.....5

CHAPTER – IV

Data obtained .and discussions.....*6*

ANNEXURE A

Annexure -A.....A-7 to A-10

C H A P T E R – I

1.0 SCOPE OF WORK

1.1 The scope of work covers conducting Earth Resistivity Tests at four (4) pre-selected locations, designated as ERT-1, 2, 3 and 4 for Sagardighi Thermal Power Project at Sagardighi, West Bengal so as to determine apparent resistivity values in two directions (IS:3043-1987), namely N-S and E-W, for 5 different Electrode Separations (S) viz. S = 10.0, 11.0, 12.0, 13.0 and 14.0 metres respectively. To meet the above-mentioned objectives, field measurements have been carried out between 11.5.2012 and 17.5.2012

C H A P T E R – I I

2.0 METHODOLOGY

2.1 For determining Earth resistivity values at the selected locations, Wenner's four electrode configuration (Fig.A) is employed. In this method, four Copper electrodes are driven into the earth along a straight line at equal intervals. A current (I) is then injected into the ground by the outermost electrode pair and the intermediate electrode pair is used for measuring the resultant potential difference (V) which is found to be proportional to the electric field. Consequently, the resistivity value is found to be proportional to the ratio of the voltage to current as represented by the following equation.

$$\rho = \frac{\frac{4 S \pi V}{I}}{1 + \frac{2S}{\sqrt{S^2 + 4e^2}} - \frac{2S}{\sqrt{4S^2 + 4e^2}}} \quad \text{..... (1)}$$

where,

ρ = resistivity of soil in Ohm-metre

S = distance between two successive electrodes in metres

V = voltage difference between the two inner electrodes in volts

I = current flowing through the two outer electrodes in amperes

e = depth of burial of electrodes in metres

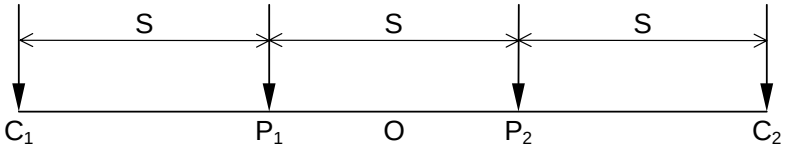


Figure A: Wenner Electrode Configuration

where

O is the point of measurement

C_1 and C_2 are the Current Electrodes

P_1 and P_2 are the Potential Electrodes

2.2 If the depth of burial of the electrodes in the ground is negligible (1/20th. or less) compared to the spacing between the electrodes, then

$$\rho = \frac{2 \pi SV}{I} \qquad \text{..... (2)}$$

In case the instrument being used has the facility to record resistance (R) values directly, then

$$\rho = 2 \pi S \times R \qquad \text{..... (3)}$$

where,

ρ = resistivity of soil in Ohm-metres

S = distance between successive electrodes in metres

R = earth tester reading in Ohms.

During the course of present survey at each test location, measurements have been carried out employing 100 Cm Copper rods as electrodes. At each location measurements have been taken along two (2) mutually perpendicular directions, viz. North-South and East-West with five (5) different electrode separations, S = 10.0, 11.0, 12.0, 13.0 and 14.0 metre respectively. The depth of burial (e) of the electrodes was

kept at 70 cm in all test locations as specified by the Project authorities. Layout employed during the course of present survey is given below.

Sl. No.	**Electrode Separation 'S'** *(m)*	**Depth of electrode burial 'e'** *(m)*	**Geometric Factor** *(m)*
1	10.0	0.70	63.37
2	11.0	0.70	69.60
3	12.0	0.70	75.84
4	13.0	0.70	82.09
5	14.0	0.70	88.35

C H A P T E R – I I I

3.0 INSTRUMENT USED

3.1 In The Present Survey, A Digital A.C. Resistivity Meter Has Been Used. It Consisted Of Two Separate Units (I) Generating And (Ii) Measuring Unit.

Generator works on 24V rechargeable Gel type cell and delivers constant current in the form of square wave at a frequency of 2.5 Hz. The maximum output possible is 100 Watts with current values reaching a maximum of 500 mA.

Measuring unit has the facility for accurate measurement of potential differences across the potential electrodes and converting them into resistance values through a divider circuit. The instrument is microprocessor based and has the facility for near total elimination of cultural noise as well as cable induction effects through a notch filter. This unit works on a 12V rechargeable Gel type cell and has the provision for three and half digit LC display to indicate the resistance values. It can measure resistance from 0.0002 to 19,999 Ohms.

C H A P T E R - I V

4.0 DATA OBTAINED AND DISCUSSIONS

4.1 To meet the objectives envisaged, soil resistivity measurements have been carried out at four (4) locations. Data obtained and Graph showing variations in apparent resistivity with electrode spacing for all four test locations, namely ERT-1, ERT-2, ERT-3 and ERT-4 are given in the following pages. Range of variations in apparent resistivity corresponding to ERT-1, 2, 3 and 4 is given below.

Test No.	Range of Resistivity observed in Ohm m
ERT-1	8.33 to 9.37
ERT-2	9.66 to 11.84
ERT-3	6.36 to 10.03
ERT-4	4.11 to 9.85

4.2 On the basis of foregoing discussions, it is found that in the entire area investigated, variation in resistivity is negligible and is in agreement with the regional hydro-geological set up of the area. As such minor variations in resistivity is attributable to changes in the grain size and moisture content of surface and near surface layers.

Earth Resistivity Test in Sagardighi T.P.P

SOIL RESISTIVITY DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Test Number : ERT-4

Location : As Per Drawing

:

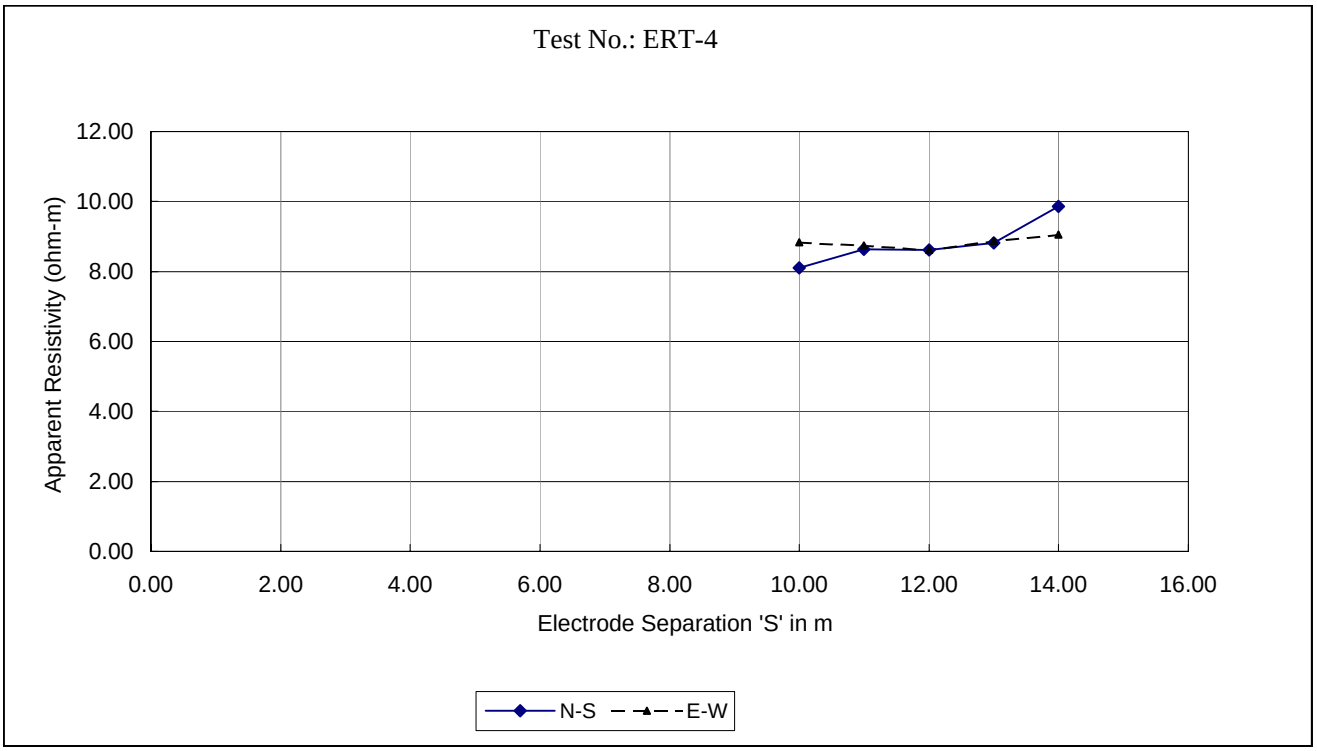
Co-ordinate : E=1151.500, N=1257.990

Ground condition : + 35.131m

Date of measurement : 17.05.2012

Temperature [°C] : 32

Sl. No.	Electrode spacing ' S' *[metres]*	Depth of Burial 'e' *[metres]*	Geometric factor *[metres]*	Resistance		Average Resistance		Average Apparent Resistivity	
				N-S Direction *[Ohms]*	E-W Direction *[Ohms]*	N-S Direction *[Ohms]*	E-W Direction *[Ohms]*	N-S Direction *[Ohm-m]*	E-W Direction *[Ohm-*
1.	10.00	0.70	63.37	0.127 0.129	0.139 0.140	0.1280	0.1395	8.11	8.84
2.	11.00	0.70	69.60	0.125 0.123	0.125 0.126	0.1240	0.1255	8.63	8.73
3.	12.00	0.70	75.84	0.113 0.114	0.113 0.114	0.1135	0.1135	8.61	8.61
4.	13.00	0.70	82.09	0.107 0.108	0.107 0.109	0.1075	0.1080	8.82	8.87
5.	14.00	0.70	88.35	0.111 0.112	0.103 0.102	0.1115	0.1025	9.85	9.06



Earth Resistivity Test in Sagardighi T.P.P

SOIL RESISTIVITY DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Test Number : ERT-1

Location : As Per Drawing

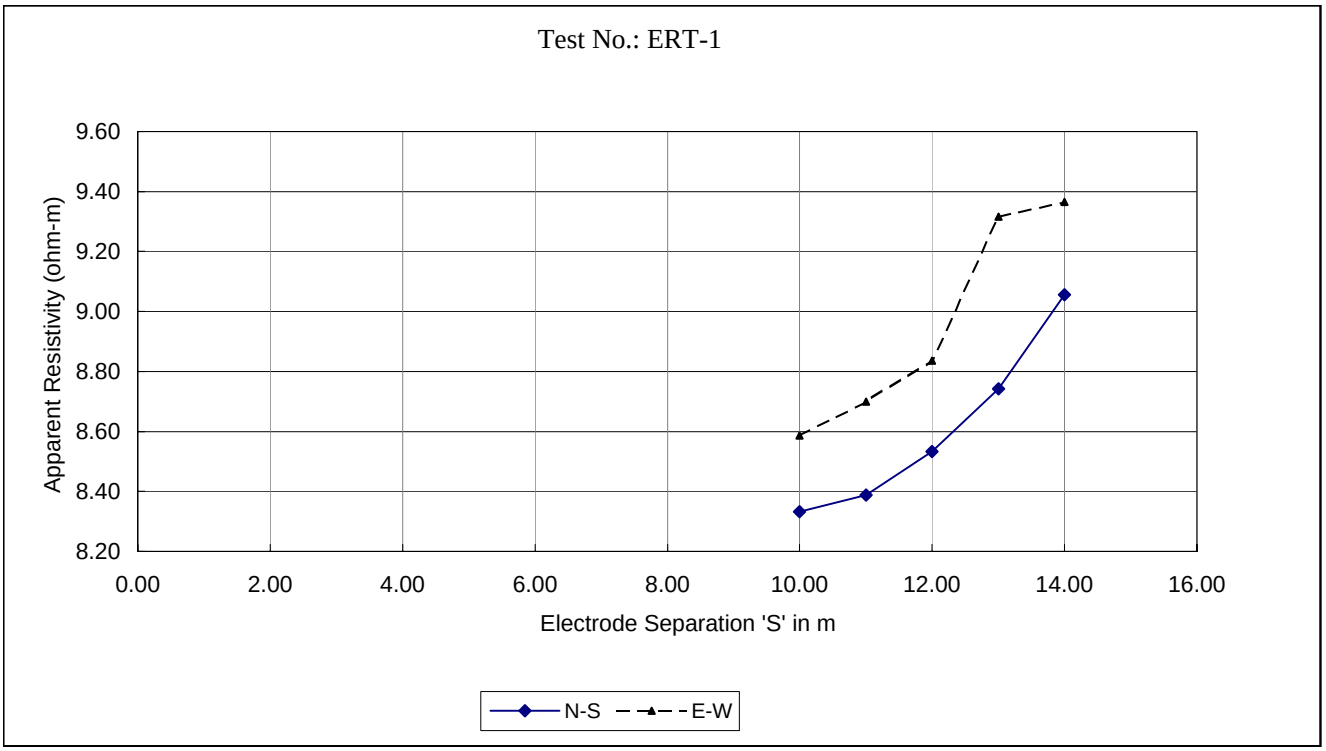
Co-ordinate : E=133.500, N=1152.850

Ground Elavation : + 33.267m

Date of measurement : 11.05.2012

Temperature [°C] : 40

Sl. No.	Electrode spacing ' S' *[metres]*	Depth of Burial 'e' *[metres]*	Geometric factor *[metres]*	Resistance		Average Resistance		Average Apparent Resistivity	
				N-S Direction *[Ohms]*	E-W Direction *[Ohms]*	N-S Direction *[Ohms]*	E-W Direction *[Ohms]*	N-S Direction *[Ohm-m]*	E-W Direction *[Ohm-m]*
1.	10.00	0.70	63.37	0.132 0.131	0.135 0.136	0.1315	0.1355	8.33	8.59
2.	11.00	0.70	69.60	0.120 0.121	0.124 0.126	0.1205	0.1250	8.39	8.70
3.	12.00	0.70	75.84	0.113 0.112	0.116 0.117	0.1125	0.1165	8.53	8.84
4.	13.00	0.70	82.09	0.106 0.107	0.114 0.113	0.1065	0.1135	8.74	9.32
5.	14.00	0.70	88.35	0.102 0.103	0.105 0.107	0.1025	0.1060	9.06	9.37



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Earth Resistivity Test in Sagardighi T.P.P

SOIL RESISTIVITY DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Test Number : ERT-2

Location : As Per Drawing

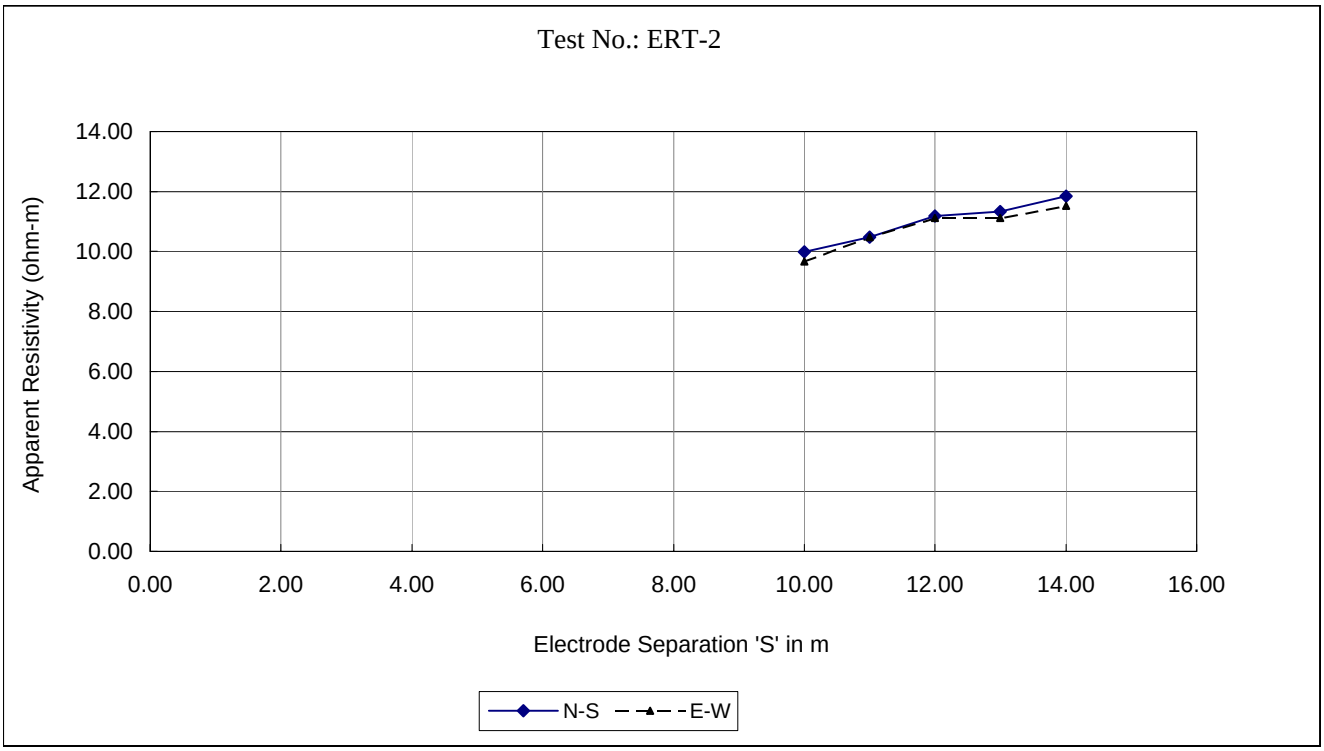
Co-ordinate : E=571.500, N=1085.400

Ground condition : +33.382m

Date of measurement : 16.05.2012

Temperature [°C] : 33

Sl. No.	Electrode spacing ' S' *[metres]*	Depth of Burial 'e' *[metres]*	Geometric factor *[metres]*	Resistance		Average Resistance		Average Apparent Resistivity	
				N-S Direction *[Ohms]*	E-W Direction *[Ohms]*	N-S Direction *[Ohms]*	E-W Direction *[Ohms]*	N-S Direction *[Ohm-m]*	E-W Direction
1.	10.00	0.70	63.37	0.158 0.157	0.152 0.153	0.1575	0.1525	9.98	9.66
2.	11.00	0.70	69.60	0.150 0.151	0.151 0.150	0.1505	0.1505	10.47	10.47
3.	12.00	0.70	75.84	0.147 0.148	0.146 0.147	0.1475	0.1465	11.19	11.11
4.	13.00	0.70	82.09	0.137 0.139	0.135 0.136	0.1380	0.1355	11.33	11.12
5.	14.00	0.70	88.35	0.135 0.133	0.130 0.131	0.1340	0.1305	11.84	11.53



Earth Resistivity Test in Sagardighi T.P.P

SOIL RESISTIVITY DATA SHEET

Project : Sagardighi Thermal Power Project Phase - 2 Extension UNIT # 3 & 4 job at Sagardighi, WB

Test Number : ERT-3

Location : As Per Drawing

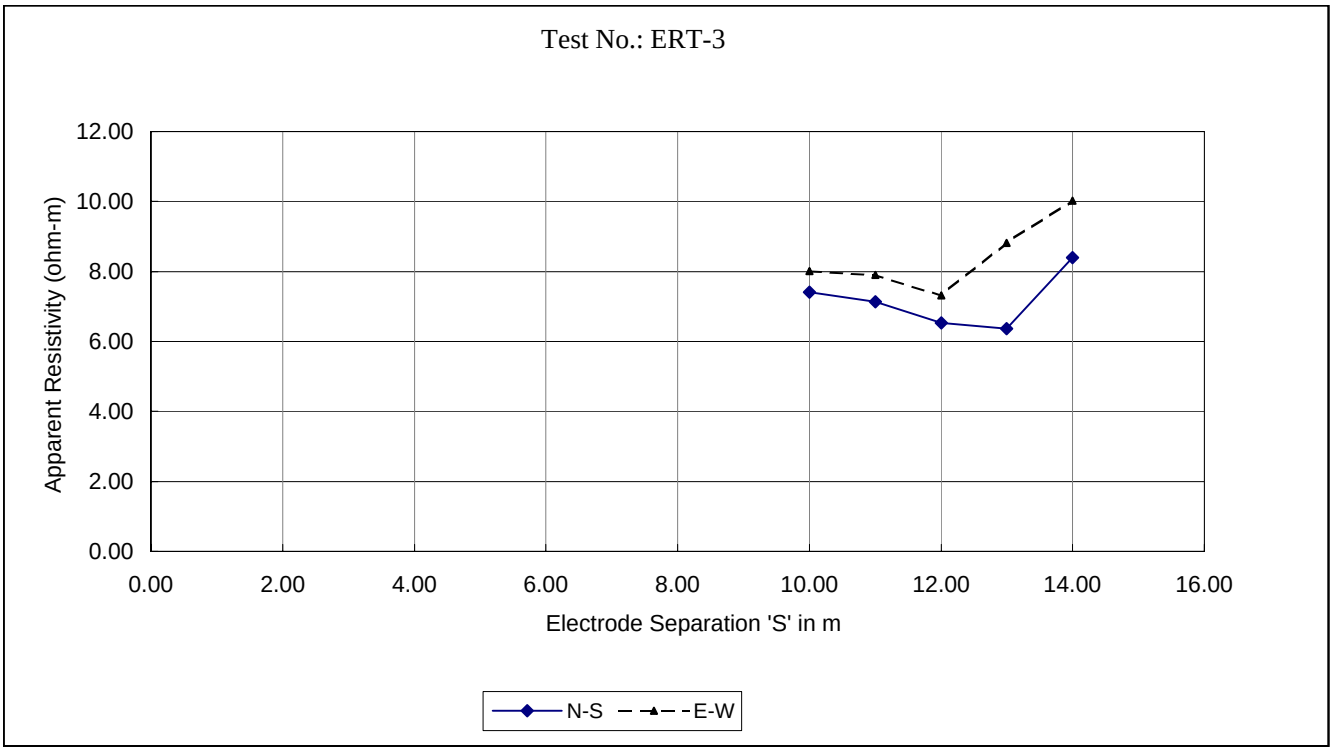
Co-ordinate : E=1152.162, N=1108.260

Ground condition : + 34.505m

Date of measurement : 17.05.2012

Temperature [°C] : 30

Sl. No.	Electrode spacing ' S' *[metres]*	Depth of Burial 'e' *[metres]*	Geometric factor *[metres]*	Resistance		Average Resistance		Average Apparent Resistivity	
				N-S Direction *[Ohms]*	E-W Direction *[Ohms]*	N-S Direction *[Ohms]*	E-W Direction *[Ohms]*	N-S Direction *[Ohm-m]*	E-W Direction *[Ohm-m]*
1.	10.00	0.70	63.37	0.116 0.118	0.126 0.127	0.1170	0.1265	7.41	8.02
2.	11.00	0.70	69.60	0.103 0.102	0.113 0.114	0.1025	0.1135	7.13	7.90
3.	12.00	0.70	75.84	0.085 0.087	0.097 0.096	0.0860	0.0965	6.52	7.32
4.	13.00	0.70	82.09	0.077 0.078	0.107 0.108	0.0775	0.1075	6.36	8.82
5.	14.00	0.70	88.35	0.094 0.096	0.113 0.114	0.0950	0.1135	8.39	10.03



ANNEXURE - 2

FORMAT FOR NO DEVIATION CERTIFICATE
(To be submitted in the bidder's letter head)

BHARAT HEAVY ELECTRICALS LIMITED,
Power Sector - Eastern Region,
Plot no 9/1, DJ Block, Sector – II, Salt Lake City,
Kolkata – 700 091

Sub	No Deviation Certificate.	
Job	Levelling grading, piling work including testing of piles and other associated works etc. of 1X660MW, UNIT-5, Sagardighi TPP Extension, West Bengal.	
Ref	1.0	Tender no PSER:SCT:SDG-C1970:19.
	2.0	BHEL's NIT, vide reference no: PSER:SCT:SDG-C1970:7610 Date: 28-06-2019.
	3.0	BHEL's TCN-01, vide reference no PSER:SCT:SDG-C1970:19 Date: 05-07-2019
	4.0	All other pertinent issues till date.

Dear Sirs,

With reference to above, this is to confirm that as per tender conditions, we have visited site before submission of our offer and noted the job content & site conditions etc. We also confirm that we have not changed/ modified the tender documents as appeared in the website/ issued by you and in case of such observance at any stage, it shall be treated as null and void.

We hereby confirm that we have not taken any deviation from tender clauses together with other references as enumerated in the above referred NIT. We hereby confirm our unqualified acceptance to all terms & conditions, unqualified compliance to technical specification, integrity pact (if applicable) and acceptance to reverse auctioning process.

In the event of observance of any deviation in any part of our offer at a later date whether implicit or explicit, the deviations shall stand null & void.

We confirm to have submitted/uploaded offer/documents in accordance with tender instructions with acceptance of the terms & conditions of the tender by us and as per aforesaid references.

Thanking you,

Yours faithfully,

(Signature, date & seal of authorized
representative of the bidder)