E-TENDER SPECIFICATION

BHE/PW/PUR/BWT6-CVL/BAL-CHP-AHP/2468

Balance Civil, Structural & Architectural work of AHP MCC Cum Compressor Building, ERH, ERH Tunnel, CHP MCC-1, CHP MCC-2 & Ash Slurry Pump House at 1x660 MW Bhusawal Thermal Power Station, Unit-6, Maharashtra.

VOLUME I E– Technical Specifications and Plot Plan (Part-02 of 03)

THIS TENDER SPECIFICATION CONSISTS OF:

Notice Inviting Tender	
Volume-IA	**Technical Conditions of Contract**
Volume-IB	**Special conditions of Contract**
Volume-IC	**General conditions of Contract**
Volume-ID	**Forms & Procedures**
Volume-IE	**Technical Specifications and Plot Plan**
Volume II	**Price Bid**

Bharat Heavy Electricals Limited
(*A Government of India Undertaking*)
Power Sector - Western Region
345-Kingsway, Nagpur-440001

E-TENDER SPECIFICATION

BHE/PW/PUR/BWT6-CVL/BAL-CHP-AHP/2468

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For Bharat Heavy Electricals Limited

AGM (Purchase)

Place: Nagpur
Date:

GEOTECHNICAL INVESTIGATION REPORT

PROJECT-1x660 MW BHUSAWAL TPS EXTN. UNIT - 6

VOLUME-1

BTG & BOP AREA

DOCUMENT NO: PE-DC-415-602-C001, REV - 0

Customer

MAHARSHTRA STATE POWER GENERATION CO. LTD.

Submitted by

PROJECT ENGINEERING MANAGEMENT

POWER PROJECT ENGINEERING INSTITUTE

HRD & ESI COMPLEX

PLOT NO.: 25, SECTOR-16A

NOIDA (U.P.) - 201 301

REPORT ON
GEOTECHNICAL INVESTIGATION WORK
AT 1X660 MW BHUSAWAL TPS EXTN. UNIT - 6

VOLUME- 1
MAIN PLANT AREA
(BTG & BOP)

CLIENT : M/S. BHARAT HEAVY ELECTRICALS LIMITED

CONSULTANT : G S GEOENVIRONS PVT. LTD.

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1. INTRODUCTION

1.1. Project Description

M/s. Maharashtra State Power Generation Co. Ltd. (*Mahagenco*) is planning to construct a 1 x 660 MW Thermal Power Plant (Unit-6) at Bhusawal, Maharashtra.

G. S. Geo has carried out geotechnical investigation at the site in accordance with the LOA No. BHE/PW/PUR/BWT6-GEO/1777/LOA dated January 01st, 2018 on the behalf of BHEL. The work on site has been carried out as per the following drawings titled "GEOTECHNICAL INVESTIGATION LAYOUT".

1. PE-DG-415-602-C001-R2 dated 13.03.18
2. PE-DG-415-602-C002-R0 dated 13.03.18

The scope of work includes one hundred and forty two (142) boreholes, twenty (20) field permeability test, ten (10) trial pits, sixteen (16) dynamic cone penetration tests (DCPT), twenty (20) electrical resistivity tests (ERT's), seven (7) field California bearing ratio (FCBR), ten (10) plate load test, four (4) cyclic plate load tests, fifty four (54) pressuremeter tests, four (4) seismic refraction tests and six (6) cross-hole seismic tests (CHST) at the site.

Various facilities such as main power house, chimney, boiler foundation, turbo-generator foundation, deep pits, reservoir, ash pond, pipe supports etc. are planned at the project site. A layout plan illustrating the test locations covered in this report is presented on Plate 2.

1.2. Purpose & Scope

The current study has been carried out at the site in order to:

a) determine the general nature of the subsurface strata at the site;
b) retrieve the subsurface samples for determination of index and engineering properties; and
c) assess geotechnical parameters of the subsurface strata at the site for the foundation design and construction of the various facilities planned at the site.

The scope of work includes the following:

(i) Mobilization of men and equipment at site for carrying out the investigation including shifting at all test locations & demobilization after completion of work.
(ii) drilling one hundred and forty two (142) boreholes to the specified depth, in order to evaluate the stratigraphy at the site, and to collect soil, rock core and groundwater samples for laboratory testing;
(iii) conducting twenty (20) field permeability tests in selected boreholes to determine the in-situ permeability;
(iv) excavating ten (10) trial pits to provide additional information on the stratigraphy at shallow depths;
(v) conducting sixteen (16) dynamic cone penetration tests (DCPT) up to refusal, to obtain additional data for foundation analysis;
(vi) conducting twenty (20) electrical resistivity tests (ERT's) to provide data for the grounding systems;
(vii) conducting seven (7) field California bearing ratio (FCBR) tests to provide data for the design of internal plant roads;
(viii) performing ten (10) plate load tests and four (4) cyclic plate load tests at the specified locations and at specified depth to assess the load-settlement behaviour of soils under loading;
(ix) conducting four (4) seismic refraction tests in order to assess the seismic profile at the test

locations;
(x) conducting six (6) cross-hole seismic tests (CHST) to the specified depth, in order to determine the dynamic properties of the soil for the analysis of the vibrating machine foundations;
(xi) conducting fifty-four (54) pressuremeter tests at specified depths and locations;
(xii) Laboratory testing of retrieved samples to determine the index and engineering properties of the sub-surface strata;
(xiii) Geotechnical analysis using the available field and laboratory test data;
(xiv) Preparation of geotechnical recommendations for foundation design and construction; and
(xv) Preparation and submission of this geotechnical report

1.3. Report Volume Distribution

The reports submission is planned in two volumes. The content of each of these volumes is presented below:

Volume	Designed Structure	Scope of Work Covered
1	**BTG & BOP**	(69 Boreholes, 3 CPLT, 5 PLT, 5 DCPT, 14 ERT, 4 CHST, 4 PMT, 4 CBR, 4 SRT & 9 TP)
2	CHP & AHP	(73 Boreholes, 1 CPLT, 5 PLT, 11 DCPT, 6 ERT, 2 CHST, 2 PMT, 3 CBR, & 1 TP)

This report (Volume-1) presents the field and laboratory test results along with our foundation recommendations for planned facilities in the BTG & BOP Area.

1.4. Scope of Work included in this Report

Details of the field tests completed at the project site and presented in this report are tabulated below:

- **Exploratory Boreholes**

Facility	Location	Test Designation	Survey Co-ordinates, m		Reduced Level (RL), m	Final Explored Depth, m
			E	N		
1.8	ID FAN	BH-01*	1135 E	817 N	207.7	20
		BH-02	1169 E	817 N	207.5	20
		BH-03	1125 E	785 N	206.6	20
		BH-04	1178 E	785 N	207.5	20
1.6	ESP	BH-05	1178 E	747 N	207.2	15
		BH-06	1178 E	708 N	207.9	20
		BH-07	1125 E	708 N	207.5	20
1.4	FD & PA FAN	BH-08	1125 E	662 N	207.1	20
		BH-09	1178 E	662 N	208.0	15
1.3	BOILER	BH-10	1178 E	623 N	207.2	20
		BH-11	1125 E	623 N	206.4	20
		BH-12*	1125 E	584 N	207.3	20
		BH-13	1178 E	584 N	206.4	20

Facility	Location	Test Designation	Survey Co-ordinates, m		Reduced Level (RL), m	Final Explored Depth, m
			E	N		
2	MAIN POWER HOUSE AREA	BH-14	1217 E	540 N	208.9	15
		BH-15	1178 E	540 N	208.5	15
		BH-16	1070 E	538 N	206.3	20
		BH-17	1085 E	503 N	207.7	15
		BH-18	1120 E	503 N	207.9	20
		BH-19	1177 E	503 N	206.8	15
		BH-20	1217 E	503 N	207.6	15
2	TRANSFORMER YARD	BH-22*	1177 E	469 N	206.4	15
		BH-23	1125 E	469 N	207.5	15
		BH-24	1085 E	469 N	206.4	15
-	PIPE RACK	BH-21	1217 E	469 N	209.5	15
		BH-25	1217 E	428 N	209.6	15
9.14	PARKING SHEDS	BH-26	1017 E	451 N	206.0	15
9.8	CANTEEN	BH-27	1022 E	515 N	207.5	15
6.3	HFO & LDO PUMP HOUSE	BH-28	1016 E	758 N	204.7	15
1.10	FGD AREA	BH-29	1215 E	862 N	207.5	15
		BH-30	1262 E	862 N	207.3	20
3.19	RAIN WATER HARVESTING POND	BH-31	1369 E	710 N	207.4	15
1.12	AIR COMPRESSOR BUILDING	BH-32	1255 E	572 N	208.3	15
1.13	CONDENSATE STORAGE TANK	BH-33	1255 E	528 N	209.2	15
3.21	CHEMICAL LAB	BH-34	1327 E	528 N	209.6	15
3.15	DM WATER STORAGE TANK	BH-35	1255 E	491 N	209.3	15
3.18	ACID / ALKALI STORAGE AREA	BH-36	1327 E	491 N	209.8	15
8	SEWAGE TREATMENT PLANT	BH-37	1594 E	609 N	210.7	15
3.11	COOLING TOWER	BH-38	1665 E	478 N	212.3	20
		BH-39	1725 E	420 N	213.6	20
		BH-40*	1654 E	420 N	212.6	20
		BH-41	1607 E	420 N	211.1	20
		BH-45	1665 E	362 N	213.0	20
3.12	CW/ACW PUMP HOUSE	BH-42	1545 E	420 N	211.6	20
		BH-43	1482 E	420 N	211.5	15
3.13	OZONIZATION & CW TREATMENT AREA	BH-44	1545 E	388 N	212.0	15
3.8	FILTER WATER RESERVOIR	BH-46	1500 E	344 N	212.3	15
3.4	NON-DM WATER CLARIFIER (PT PLANT)	BH-47*	1522 E	231 N	214.4	15
3.7	GRAVITY FILTERS	BH-48	1473 E	223 N	213.4	15
3.1	RW & FW STORAGE TANK	BH-49	1623 E	195 N	215.6	15

Facility	Location	Test Designation	Survey Co-ordinates, m		Reduced Level (RL), m	Final Explored Depth, m
			E	N		
3.9	OZONIZATION PLANT (PRE TREATMENT AREA)	BH-50	1522 E	170 N	215.1	15
9.7	STORES	BH-51	1623 E	78 N	217.8	15
9.11	SECURITY CABIN	BH-52	1216 E	28 N	213.6	15
-	RAW WATER INTAKE PIPE LINE	BH-53	1006 E	48 N	212.4	10
		BH-54	500 E	48 N	214.6	10
		BH-55	427 E	400 N	211.0	10
		BH-56	342 E	1100 N	208.1	10
		BH-57	700 E	1578 N	202.8	10
		BH-58	1970 E	1922 N	210.9	10
		BH-59	2048 E	2232 N	204.6	10
9.13	WEIGH BRIDGE FOR DRY ASH SILO	BH-60	1481 E	1108 N	200.3	15
1.7	ESP CONTROL ROOM	BH-62	1260 E	748 N	208.4	20
6.1	FUEL OIL TRANSFER PUMP HOUSE	BH-61	1111 E	947 N	205.2	15
3.14	CW SIDE STREAM FILTRATION PLANT	BH-63	1540 E	467 N	210.9	15
7	EFFLUENT TREATMENT PLANT	BH-64	1632 E	277 N	214.2	15
-	WATCH TOWER	BH-65	1817 E	52 N	218.5	10
		BH-66	1771 E	492 N	213.2	10
1.9	CHIMNEY	BH-67	1194 E	817 N	207.8	20
		BH-68	1229 E	817 N	208.2	20
9.19	-	BH-69	1343 E	611 N	208.8	10

*Field permeability tests conducted at 1.5 & 5 m depth

- **Trial Pits (TP)**

Facility	Location	Test Designation	Survey Co-ordinates, m		Reduced Level (RL), m	Excavated Depth, m
			E	N		
1.8	ID FAN	TP-1	1144 E	847 N	207.3	4.0
-	INTERNAL ROAD	TP-2	1064 E	682 N	206.0	4.0
2	TRANSFORMER YARD	TP-3	1062 E	453 N	207.6	4.0
2	TRANSFORMER YARD	TP-4	1200 E	453 N	209.4	4.0
-	PIPE RACK	TP-5	1300 E	427 N	210.1	4.0
-	PIPE RACK	TP-6	1400 E	429 N	210.7	4.0
-	RAW WATER INTAKE PIPE LINE	TP-7	700 E	48 N	215.0	4.0
-	RAW WATER INTAKE PIPE LINE	TP-8	429 E	1300 N	208.6	4.0
-	RAW WATER INTAKE PIPE LINE	TP-9	1376 E	1829 N	208.2	4.0

- **Dynamic Cone Penetration Tests (DCPT)**

Facility	Location	Test Designation	Survey Co-ordinates, m		Reduced Level (RL), m	Termination Depth, m
			E	N		
1.6	ESP	DCPT-1	1125 E	730 N	206.6	0.43
1.6	ESP	DCPT-2	1178 E	729 N	207.7	1.00
1.4	FD & PA FAN	DCPT-3	1151 E	686 N	207.7	0.78
1.3	BOILER	DCPT-4	1148 E	612 N	207.0	0.75
2	MAIN POWER HOUSE AREA	DCPT-5	1103 E	525 N	207.8	0.83

- **Electrical Resistivity Tests (ERT)**

Facility	Location	Test Designation	Survey Co-ordinates, m		Reduced Level (RL), m
			E	N	
2	MAIN POWER HOUSE AREA	ERT-1	1060 E	500 N	207.2
2	TRANSFORMER YARD	ERT-2	1100 E	460 N	208.1
2	TRANSFORMER YARD	ERT-3	1110 E	490 N	208.4
2	TRANSFORMER YARD	ERT-4	1170 E	470 N	208.9
2	TRANSFORMER YARD	ERT-5	1180 E	487 N	209.0
1.3	BOILER	ERT-6	1192 E	581 N	208.2
2	TRANSFORMER YARD	ERT-7	1097 E	670 N	206.3
1.6	ESP	ERT-8	1220 E	734 N	208.5
3.4	NON-DM WATER CLARIFIER (PT PLANT)	ERT-9	1560 E	210 N	215.1
3.12	CW/ACW PUMP HOUSE	ERT-10	1507 E	407 N	211.6
4.3	CRUSHER HOUSE	ERT-11	1360 E	880 N	205.0
1.10	FGD AREA	ERT-12	1290 E	920 N	206.2
1.6	ESP	ERT-13	1087 E	704 N	206.2
5.1	HCSS SILO	ERT-14	1031 E	719 N	205.4

- **Field CBR Tests**

Test Designation	Survey Co-ordinates, m		Reduced Level (RL), m	Test Depth, m
	E	N		
CBR-1	1209 E	831 N	207.8	0.5
CBR-2	1321 E	600 N	209.2	0.5
CBR-3	1042 E	566 N	206.9	0.5
CBR-4	1145 E	410 N	209.3	0.5

- **Plate Load & Cyclic Plate Load Tests (PLT & CPLT)**

Facility	Location	Test Designation	Survey Co-ordinates, m		Reduced Level (RL), m	Test Depth, m
			E	N		
1.8	ID FAN	CPLT-1	1151 E	778 N	207.0	2.0
1.4	FD & PA FAN	CPLT-2	1151 E	664 N	207.5	2.0
2	MAIN POWER HOUSE AREA	CPLT-3	1138 E	536 N	208.1	2.0
1.6	ESP	PLT-1	1147 E	729 N	207.0	1.5
1.4	FD & PA FAN	PLT-2	1170 E	641 N	207.2	2.0
2	MAIN POWER HOUSE AREA	PLT-3	1067 E	528 N	207.2	2.0
3.21	CHEMICAL LAB	PLT-4	1306 E	534 N	206.4	1.5
9.15	PAY LOADER SHED	PLT-5	1436 E	770 N	208.3	1.5

- **Seismic Refraction Test (SRT)**

Location	Test Designation	Survey Co-ordinates, m		Spread Length, m
		From	To	
CHIMNEY TO MAIN POWER HOUSE AREA	SRT-1	835 N / 1186 E	505 N / 1186 E	345
ID FAN TO MAIN POWER HOUSE AREA	SRT-2	835 N / 1116 E	505 N / 1116 E	345
ESP	SRT-3	723 N / 1091 E	723 N / 1211 E	115
MAIN POWER HOUSE AREA	SRT-4	530 N / 1070 E	530 N / 1220 E	200

- **Cross Hole Seismic Test (CST)**

Facility	Location	Test Designation	Survey Co-ordinates, m		Reduced Level (RL), m	Final Test Depth*, m
			E	N		
1.8	ID FAN	CST-1	1152 E	794 N	207.0	20.0
1.3	BOILER	CST-2	1124 E	606 N	206.9	20.0
1.3	BOILER	CST-3	1179 E	604 N	207.9	20.0
2	MAIN POWER HOUSE AREA	CST-4	1154 E	523 N	208.4	20.0

*Cross Hole Seismic tests conducted at 2, 4, 6, 8, 10, 12, 14, 16, 18 & 20 m depth in the specified boreholes.

- **Pressuremeter Test (PMT)**

Facility	Location	Test Designation	Survey Co-ordinates, m		Reduced Level (RL), m	Final Test Depth*, m
			E	N		
1.8	ID FAN	PMT-1	1152 E	817 N	207.1	20.0
1.4	FD & PA FAN	PMT-2	1152 E	645 N	207.1	20.0
2	MAIN POWER HOUSE AREA	PMT-3	1121 E	540 N	207.9	20.0
3.11	COOLING TOWER	PMT-4	1682 E	400 N	213.2	20.0

*Pressuremeter tests conducted at 2, 4, 6, 8, 10, 12, 15, 18 & 20 m depth in the specified boreholes.

- A layout plan illustrating the test locations covered in this report is presented on Plate 2.
- The above information has been read off from the drawings titled "GEOTECHNICAL INVESTIGATION LAYOUT" (PE-DG-415-602-C001-R2 & PE-DG-415-602-C002-R0).

2. FIELD INVESTIGATIONS

2.1. Soil Boring

The soil boring of 150 mm diameter were progressed using a rotary drilling through soil formation was performed using heavy-duty, hydraulic skid–mounted rotary drill rig. Where caving of the borehole occurred, casing was used to keep the borehole stable. The work was performed in general accordance with IS: 1892-1979 RA-2007. Standard Penetration Test (SPT) was performed in the soil at regular intervals as described in Section 2.2.

2.2. Standard Penetration Tests (SPT)

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

The SPT 'N'-values are described as follows:-

1. The number of blows for each 15 cm of penetration of the split spoon sampler is recorded.
2. The blows required to penetrate the initial 15 cm of the split spoon for seating the sampler is ignored due to the possible presence of loose materials or cuttings from the drilling operation.
3. The cumulative number of blows required to penetrate the balance 30 cm of the 45 cm split spoon sampler is termed the SPT value or the 'N' value. For example, a SPT value reported as "20" means that 20 blows were imparted to penetrate the split spoon sampler by the last 30 cm.
4. Where the number of blows required to penetrate the balance 30 cm of the split spoon sampler exceeds 100, the number of blows is presented along with the corresponding penetration. For

example, an SPT value reported as “101 / 5 cm” means that 101 blows were imparted to penetrate the split spoon sampler by 5 cm after the first 15 cm initial (seating) penetration.

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

Disturbed samples were collected from the split spoon sampler after conducting SPT. The samples were preserved in transparent polythene bags, and transported to our NABL accredited laboratory in Noida for laboratory testing.

2.3. Rock Drilling

Rotary drilling through rock formation was performed using heavy-duty, hydraulic skid–mounted rotary drill rig. The drilling rig has a hydraulic feed and is driven by a bevel gear system run by a 28 HP Perkins engine. The drill chuck has four jaws to accommodate NW size drill rod.

Drilling and sampling of the rock was performed using an NX size double tube core barrel. A 32–carat diamond impregnated bit was used to drill through rock strata/refusal. The bit was attached to the end of a core barrel, which is connected to the machine by a string of NW drill rods and rotated by the drilling machine.

Water was circulated through the drill rods to the bottom of the hole. The water serves the purpose of lubrication, cooling and protection of the diamond drill bit in addition to flushing the cuttings out of the hole. A reciprocating pump was used to circulate the water. While drilling through soft rock that is likely to collapse, NX size casing was installed. The casing with a diamond shoe bit was used to assist the casing to advance.

The percent core recovery and Rock Quality Designation (RQD) was measured for each core run. The percent core recovery is defined as the percent ratio of the cumulative length of core sample recovered to the total length of the core run. The Rock Quality Designation (RQD) is defined as the ratio of the cumulative length of core pieces 10 cm or longer to the total length of the core run, expressed as percentage. The Rock mass Rating (RMR), an engineering parameter that assists in assessing the rock quality and behavior is also presented on the individual rock profiles.

Details of rock samples collected and their respective core recovery / RQD values are presented on the rock profiles at various depths. The color of return water and the extent of water loss while drilling the borehole recorded on the boring logs may be used for an assessment of the nature of rock, water-tightness of joints and possible presence of interconnected channels / cavities.

Standard Penetration Tests were also carried out in the weathered rock formation (where core recovery < 20%) as indicated in the technical specifications.

2.4. Groundwater

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

2.5. Trial Pits

Trial pits were excavated at the site to specified depth, so as to permit easy access for visual examination of walls of the pit and to facilitate sampling.

2.6. Field Permeability Test In Rock (Single Packer Method)

Permeability test in rock was conducted by double packer method. The procedure followed was as per IS 5529 (Part-II)-1985 RA 2006. A rubber packer was fixed at the test depth. The test was conducted in NX size hole.

Water was pumped into the test section under pressure. A water meter was used to measure the quantity of water pumped. The pressure was maintained until the reading of water intake was nearly constant with time. The pressure was increased and the test was repeated.

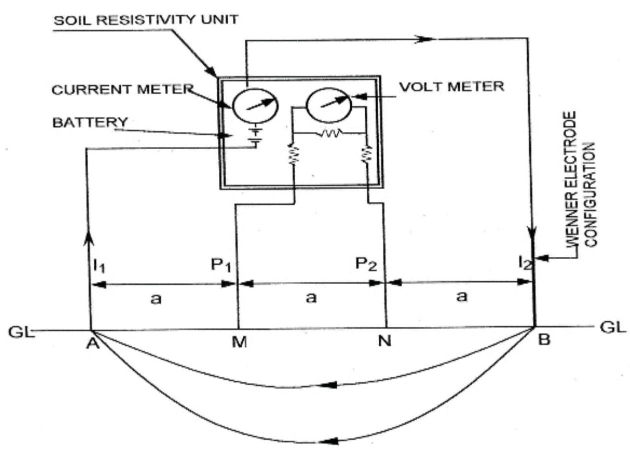
The coefficient of permeability is computed in units of cm/sec as well as in Lugeons. A Lugeon is defined as the water loss per minute per meter length of the hole under a pressure of 10 atmospheres (1 kg/cm^2).

2.7. Dynamic Cone Penetration Tests

The dynamic cone penetration tests were conducted using a 65 mm diameter cone in general accordance with IS: 4968 (Part-I)–1976 RA 2007. The cone was attached to 'A' rods and driven by means of 63.5 kg hammer falling freely from a height of 75 cm. The number of blows required for each 30 cm penetration of the cone is recorded. In order to limit the friction between the rods and the soil, the rods were rotated after every 1 to 1.5 m of cone penetration.

2.8. Electrical Resistivity Tests

Electrical resistivity of the substratum (soil) at the site was determined at specified locations. The electrical resistivity test is used for shallow subsurface exploration by means of electrical measures made at the ground surface. Resistivity measurements are made by driving four electrodes about 10 to 10 cm in to the ground at pre-selected electrode spacing. We used the Wenner electrode configuration for this study. The schematic arrangement of electrodes is shown below:



NOTE: I_1 AND I_2 ARE CURRENT ELECTRODES
P_1 AND P_2 ARE POTENTIAL ELECTRODES

The four electrodes were spaced at equal distance along a line. The test procedure is in accordance with IS: 3043:1987 RA 2006.

Measurements are made by causing a current, 'I', to pass through the earth and distribute within a relatively large hemispherical earth mass. The portion of the current that flows along the surface produces a voltage drop, 'V'. The resistance 'R', ratio of voltage drop 'V' to current 'I' is directly measured by Digital Earth Resistance Tester. The resistivity is determined from the following equation:

$$\rho = 2 \pi a R$$

where:

ρ = apparent resistivity, ohm-m
a = spacing between the electrodes, meter
R = resistance, ohms

Results are presented as semi-logarithmic plot of apparent resistivity versus electrode spacing, as well as in the form of polar curves, as specified by IS: 3043:1987 RA 2006.

2.9. Field California Bearing Ratio Test

The California Bearing Ratio (CBR) is defined as the ratio of force per unit area required to penetrate a soil mass with standard 50 mm diameter circular piston at the rate of 1.25 mm/min to that required for corresponding penetration of a standard material. The field CBR test shall be conducted in general accordance with IS: 2720 (Part-31)-1990 RA 2006.

For Field CBR test, a 0.5 m deep pit was prepared at the test location. A loaded vehicle or other suitable arrangement was used to provide the necessary reaction. A small capacity hydraulic jack was used to apply the load which is measured using a proving ring.

The standard 50 mm diameter piston was connected to the proving ring by means of extension rods. A surcharge load of 15 kg shall be placed over the surface to be tested in order to simulate laboratory conditions. The piston shall be advanced into the soil at an approximate rate of 1.25 mm/min. A dial gauge mounted on an independent datum shall measure the penetration of the piston.

2.10. Static & Cyclic Plate Load Tests

Plate load tests were performed at the site at given locations and at specified depths. The test procedure was in general accordance with IS: 1888-1982 RA 2002 and IS 5249-1992 RA 2006.

Dead load was used to provide the reaction. The plate was loaded by pushing up against the anchored ISMB using a hydraulic jack. Four dial gauges measured the plate settlement with reference to a stable reference bar.

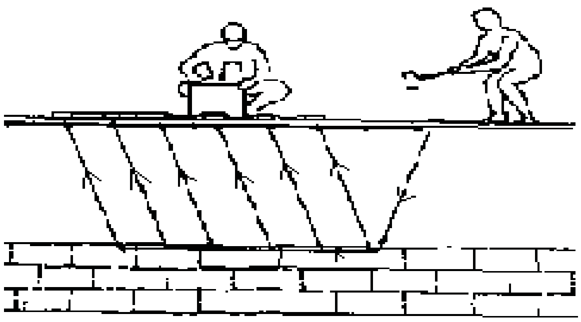
The load was applied in small increments upto a maximum loading intensity of 8 kg/cm^2 or 40 mm settlement of the plate, whichever occurs first. Each load was held until the time rate of settlement became negligible (less than 0.02 mm per minute) or until the total settlement exceeded 40 mm. The plate was then unloaded and the rebound was recorded.

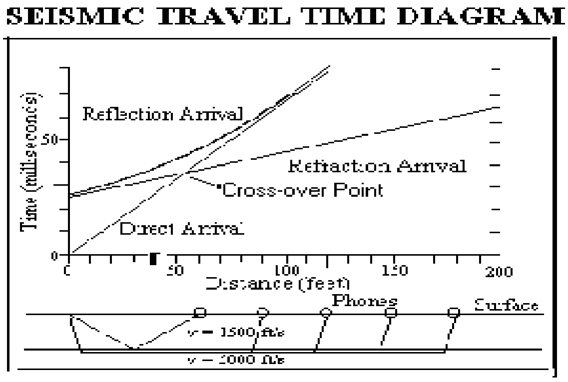
3. SEISMIC REFRACTION TEST

3.1. Basic Concept

A stress applied at the surface of an elastic medium creates conditions for the associated strains to propagate as elastic waves (P&S) in the subsurface material. The waves travel as a pattern of particle deformation, with velocities that are dependent on the elastic properties and densities of the media through which they travel.

The seismic refraction test involves the measurement of travel times of p-waves from an impulse source to a linear array of receiver geophones spread along the ground surface. The geophones are placed in line and connected to the seismograph via geophone cables. The seismograph registers these times and displays them as traces of time for individual geophones. Both normal and reverse profiles were considered during the field execution.





The test uses the travel times of the first arriving wave component only regardless of its travel path. Depending on the source-receiver distance, the first arriving component is either a direct wave or a refracted wave (refracted at the interface of two soil layers). Based on the position of the point where this qualitative change of the signal occurs the layer thickness and velocity can be calculated.

The success of the refraction test depends highly on the properties of the layer interfaces (refractors). An interface can only be found if the layer below the interface shows a significantly higher wave speed than the layer above the boundary.

3.2. Equipment Used

The seismic refraction test equipment used on site consists of the following basic components:

(i) Energy Source : 10 kg Sledge hammer with steel impact plate
(ii) Geophones : Twenty four (24) moving-coil type digital grade
(iii) Cables : NK2721C with single takeouts
(iv) Data Acquisition System : Lakkolit 24-M
(v) Processing Software : ZondST2D

The Recording System: Seisomograph

24 Channel Seismic Cable

Geophones

3.3. Data Acquisition

The equipment installation and data acquisition involves the following stages:

a) The seismic line to be surveyed is marked on the ground.

b) Low frequency (10Hz) geophones are used to record seismic signals. Depending on the length available along seismic lines, 24 channels were used for each spread. Care was taken to ensure that the pointed ends (spikes) of the geophones are fully embedded in the topsoil.

c) Each seismic spread typically consists of 7 shots. Line length is computed from first End-of-Line shot to the last End-of-Line shot with two off set shots.

d) For the seismic refraction survey work, a sledge hammer struck vertically on a steel plate was used as the energy source at each shot point to generate P-waves. A starter geophone is installed next to the shot location as "trigger".

e) A 24-channel seismograph was used to record the field data. The seismograph records the arrival of seismic waves through 24 channels. The seismic waves detected by each geophone are displayed simultaneously on the screen. The seismograph has the signal enhancement or stacking capability.

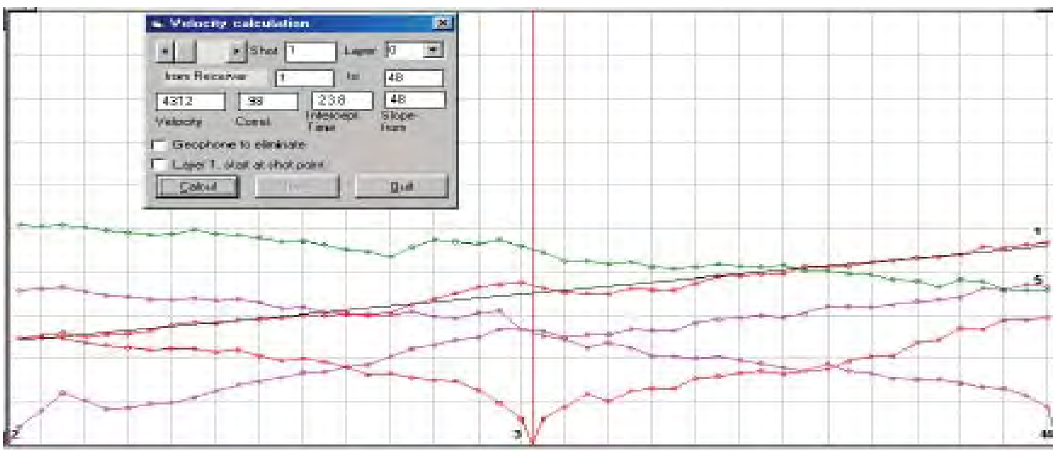
The field data is stored in a laptop attached to the seismograph in SEG-2 format data files. These files are later processed using commercial software's, as described in the following section.

3.4. Analysis of Data and Interpretation

Raw field data was processed as per the standard industry practice for background noise removal, application of filters and AGC.

After initial processing of raw records, the data were analyzed carefully, and velocities were computed from the travel time picks of P-wave at each measured point. The P-wave velocity hodographs were plotted after processing of all shot gathers. The records were processed and interpreted using ZondST2D software and subsurface models for all profiles were generated.

The near surface velocity models were interpreted as the presence of major stratigraphic layering, based on its characteristics velocity bands.



Typical Travel Time Curves

4. CROSS-HOLE SEISMIC TEST METHODOLOGY

4.1. Basic Concept

The cross-hole seismic test is a down-hole method for providing information on dynamic soil properties for earthquake design analyses for structures, liquefaction potential studies, site development, and dynamic machine foundation design. The investigation determines compression and shear wave velocity profiles versus depth. This data may be used as input into static/dynamic analyses; as a means for computing Shear modulus, Young's modulus, and Poisson's ratio.

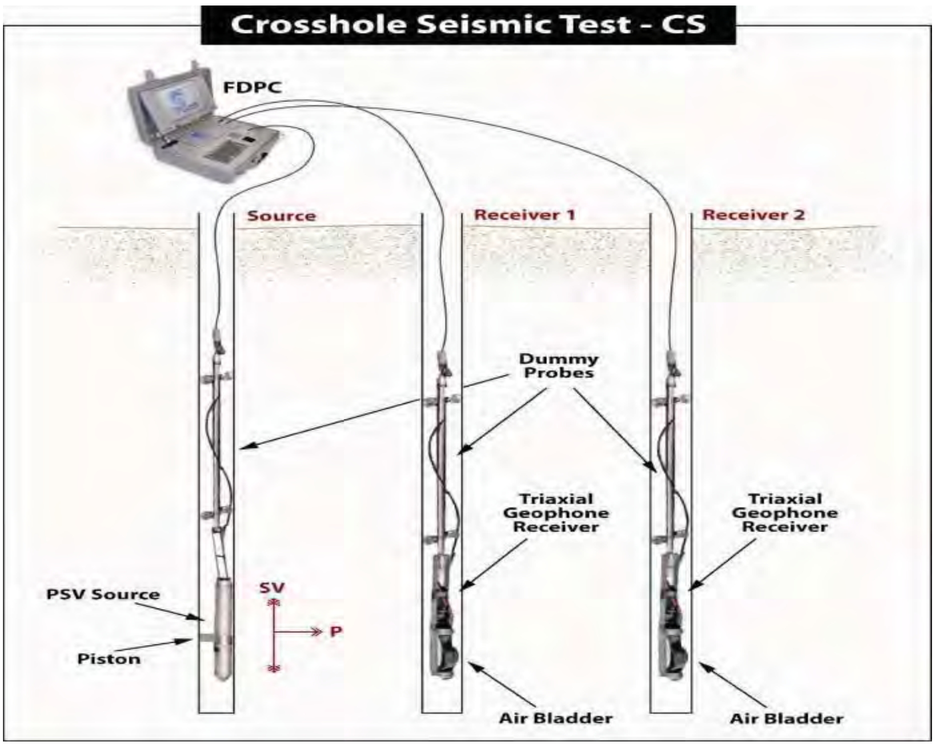
The cross-hole seismic test consists of generation of horizontally traveling P and S-waves at a particular depth/elevation in one borehole (source hole), and recording their arrivals at same level in one or two (preferred) nearby receiver boreholes.

The standard for the test technique is set forth in the ASTM D4428/D4428M-00[(1)].

4.2. Data Acquisition

Initially, three boreholes (NX size) were drilled to the specified depth of 20.0 m (1 borehole for the source at the centre and 2 boreholes for the receivers in the cardinal directions). The boreholes were progressed using rotary drilling through soil / rock formation was performed using heavy-duty, hydraulic skid–mounted rotary drill rig to the specified depth of 20 m each.

After drilling, all the boreholes were cased with PVC casing, and the annual space between the borehole wall and the casing was properly backfilled using cement-bentonite grout of appropriate density. A schematic diagram of the test arrangement is shown below:



Test Arrangement

1) American Society for Testing and Materials, "***Standard Test Methods for Cross-hole Seismic Testing***," ASTM D4428-D4428M-00.

The equipment installation and data acquisition involves following stages:

1. The electromagnetic P-SV source is lowered to the measurement depth, and clamped to the casing walls using a pneumatically-activated piston.

2. Orthogonal down-hole sensors (tri-axial geophones) are lowered to the same depth as the source. Dummy slope inclinometer probes are used to maintain correct receiver orientation throughout the investigation.

3. After the desired depth is reached, the bladders attached to each of the receiver geophones are inflated with air so that the geophones are properly clamped onto the casing.

4. All the communication cables in the source and receivers are connected to the Amplifier module of the Data PC, together with the trigger cable.

5. The source is triggered from the surface to generate shear and compression wave energy at depth. Both upward and downward polarized energy is generated for duplicity of data, and to measure shear arrival effectively.

6. The vertical component of the receiver is used to capture the vertically polarized shear waves (SV). The radial component senses the propagating compression waves (P), and the tangential component senses the horizontally-propagating shear waves (SH).

7. The acquisition system records the P-SV source input, as well as the receiver outputs. The seismic waves detected by each geophone are displayed simultaneously on the PC screen.

4.3. Data Processing

The data is stored in the hard disk of the seismograph at the time of data acquisition. The data is transferred to the computer for further processing. The processing involves picking the first arrivals. In case of noisy data, there are intermediate steps of data processing using filters, amplitude corrections, etc.

Velocity calculation is done based on the distance between the source and receiver boreholes. Once wave velocity is calculated, a graph can be assembled to show a velocity profile with depth.

4.4. Calculation of Parameters

The calculations are based on the relationships given in IS: 5249-1992-RA 2010.

The Poisson's Ratio is determined directly from the compression (P) wave and shear (S) wave data. It is expressed by the ratio of transverse strain to longitudinal strain.

$$\mu = \frac{m^2 - 2}{2\,(m^2 - 1)} \;, \; where \;\; m \; = \frac{V_P}{V_S}$$

Young's Modulus E is the uniaxial stress-strain ratio. Its dynamic value is expressed by the following equation:

$$E = \rho V p^2 \, \frac{(1+\mu)\,(1-2\mu)}{1-\mu}$$

where:

ρ	=	mass density of soil	= (γ/g)
γ	=	bulk density of soil	
V_p	=	P-wave velocity	
μ	=	Poisson's ratio	

The shear modulus G is the stress-strain ratio for simple shear. Its dynamic value is obtained by the following equation:

$$G = \frac{E}{2(1+\mu)} = \rho Vs^2$$

Coefficients of elastic uniform compression (cu), elastic uniform shear (cτ), elastic non-uniform compression (cϕ) and the coefficient of elastic non-uniform shear (cΨ) are given by the following relationships:

$c_u = 1.13 \dfrac{E}{1-\mu^2} \times \dfrac{1}{\sqrt{A}}$ [A = Standard foundation area, taken as 10 m^2]

c_τ = 0.67 to 0.5 c_u (for design purpose, c_τ may be taken equal to 0.6 c_u)

$c_\phi = 3.46\ c_\tau$

$c_\Psi = 1.5\ c_\tau$

5. PRESSUREMETER TESTS

5.1. The Probe

The probe consists of an inner membrane or measuring cell and an outer cover or guard cell. The outer cover shall be rubber for testing in soils and shall be reinforced with steel strips for testing in rock.

The probe was calibrated for stiffness and expansion prior to taking up the tests on site. In case the rubber membrane was changed on site, the calibration process had to be repeated.

5.2. Conducting The Test

The pressuremeter probe attached with drilled rod and co-axial cable is lowered in the borehole at the test section level.

The test was carried out by applying pressure in the measuring cell stage-wise in small increments. A pressure differential of 1 bar is maintained between the measuring cell and guard cell. The test was carried out by applying incremental pressure in stages until the limit pressure was reached or the capacity of the probe was reached.

The pressure versus volume curve was corrected for expansion in air and in the pipe to obtain the corrected curve. The limit pressure and modulus of deformation is computed from the corrected curve.

6. GENERALISED SUB-SURFACE CONDITIONS

6.1. Location & Surface Conditions

The project site for the proposed 1x660 MW Bhusawal TPS Unit 6 is located at Pimpri-Sakam Village, Bhusawal Taluk of Jalgaon district in Maharashtra. The site lies at the following location

Latitude : 21° 2'43.87"N
Longitude : 75°50'33.00"E

Based on the test locations, the reduced level across the main plant area ranges from RL 196.96 to RL 218.54 m indicating a level variation of about 21.5 m. The reduced level along the proposed Ash Corridor ranges from RL 261.34 to RL 209.11 m indicating a level variation of more than 50.0 m.

6.2. Regional Geology

Rocks of Satpura ranges are observed in most of the area of the Bhusawal. These are represented by Deccan traps. The Deccan traps are made up principally of the most rocks of basaltic and doleritic composition which are the results of out pouring of enormous lava flows which date back to the Mesozoic era. These are spread out in the form of horizontal sheets of beds. The hill ranges on the south of the Tapi are covered with dark basalt. A few strips of thick alluvium covered land on both sides of the Tapi and its tributaries which probably caused by faulting, it consists of brownish, yellowish, coloured clay and silt with pebbles, gravel, sand and fine drained sand.

The trap gives rise to deep black soil in the Bhusawal region. The sandstone and limestone are also found in the north western portion of Satpuda ranges.

The distinguishing feature is a wide depression of river Tapi and river Purna. The direction of flow of the Tapi has helped in creating as western aspect of the region. This is in contrast to other major rivers in Maharashtra which have created an eastern aspect. The combined rift valley of river Tapi and river Purna is well marked by a prominent scarp in the north of river. The southern face of this scrap shows signs of recession. It can be roughly identified by a line joining Kusumba, Janori and Onabdeo villages. The river Aner a right bank tributary of the Tapi occupies a line of weakness so that it has created an east - west valley. In contrast to this most of other right bank tributaries flow in north-south direction.

The main scarp of the rift valley to the south of the Tapi has been subdued by weathering and erosion, the face of the scarp which marks the southern limit of the Tapi rift can be identified by a line joining the settlement of Nandurbar, Dhule, Parola, Kasoda, Jalgaon and Bhusawal.

Deccan Trap covers almost the whole of Bhusawal and Jalgaon except a few strips of alluvium covered and on both sides of the major streams. These trap rocks are the result of outpouring of enormous Lava flows which spread over vast areas of western. Central and southern India at the end of Mesozoic Era. They came through long narrow fissures and cracks in the earth crust and spread out as nearly horizontal sheets. They are called plate basalt. They are formed by a flat topped plateau. A bore-hole at Bhusawal 1211 feet deep revealed 29 flows the average being 40 feet thick. In the high hills consisting of several flows the individual flows can easily be demarcate by their distinct flow lines during which a thin growth of grass is noticed.

- **JOINTS**

The basaltic rocks are highly weathered at surface and are characterised by few prominent joints. The details of joints are given in the following table:

No	Strike	Dip	Dip Direction	Remarks	Description of Continuties
1	N 325°- N 145°	88°	N 45°	Open joint with the gap of 2.3-3.5 cm filled with clay. Persist for 3-4.m apart.	smooth (planar)
2	N 30°-N 210°	86°	N 100°	Open joint with the gap of 0.5cm filled with clay and weathered material. Persist for 10 to 12m. 2 to 3 m apart.	Rough (Undulating)
3	N 110°-N 290°	73°	N 20°	Open joint with the gap of 1-1.5 cm filled with clay and weathered material. Persist for 7 to 8m, 2 to 3 m apart.	smooth (planar)
4	N 25°-N 205°	56°	N 75°	Open joint with the gap of 1-2 cm filled with clay. Persist for 15 to 18m. 0.5 to 2 m apart.	smooth (planar)
5	N 233°- N127°	44°	N55°	Open joint with the gap of 0.75cm filled with clay and weathered material. Persist for 5 to 7m. 2 to 3 m apart.	Slightly Rough (Planar)

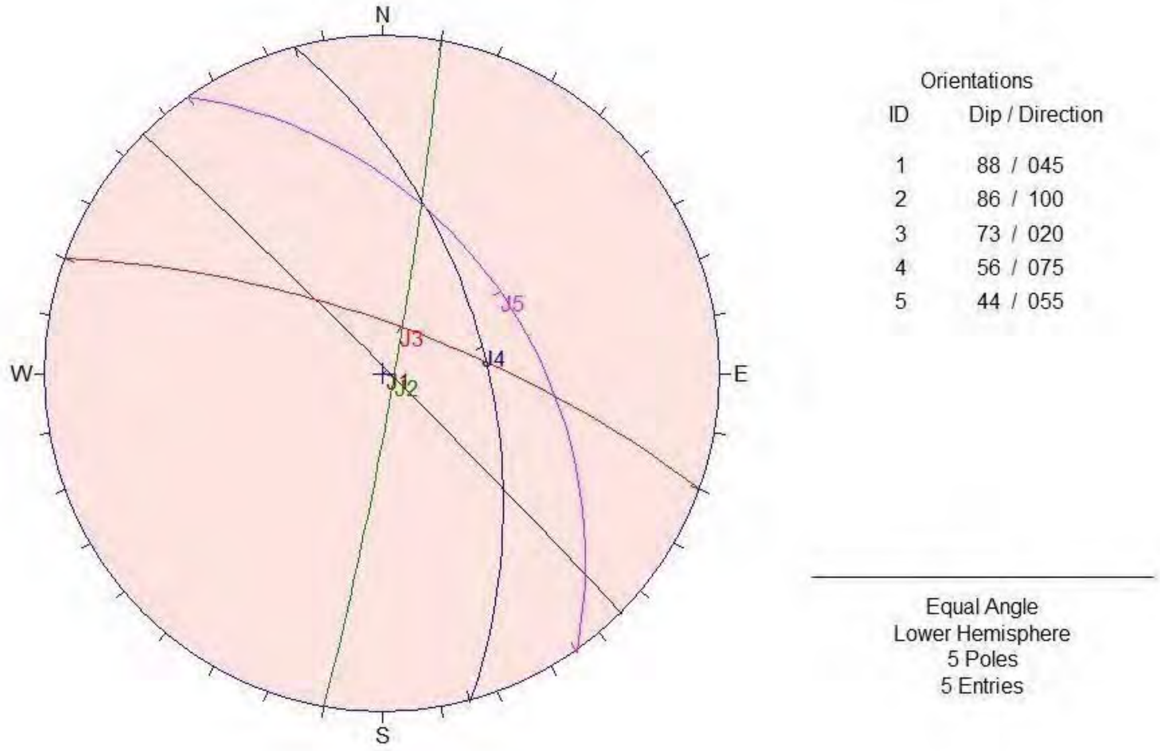


Fig 16: Stereonet plot of joint sets

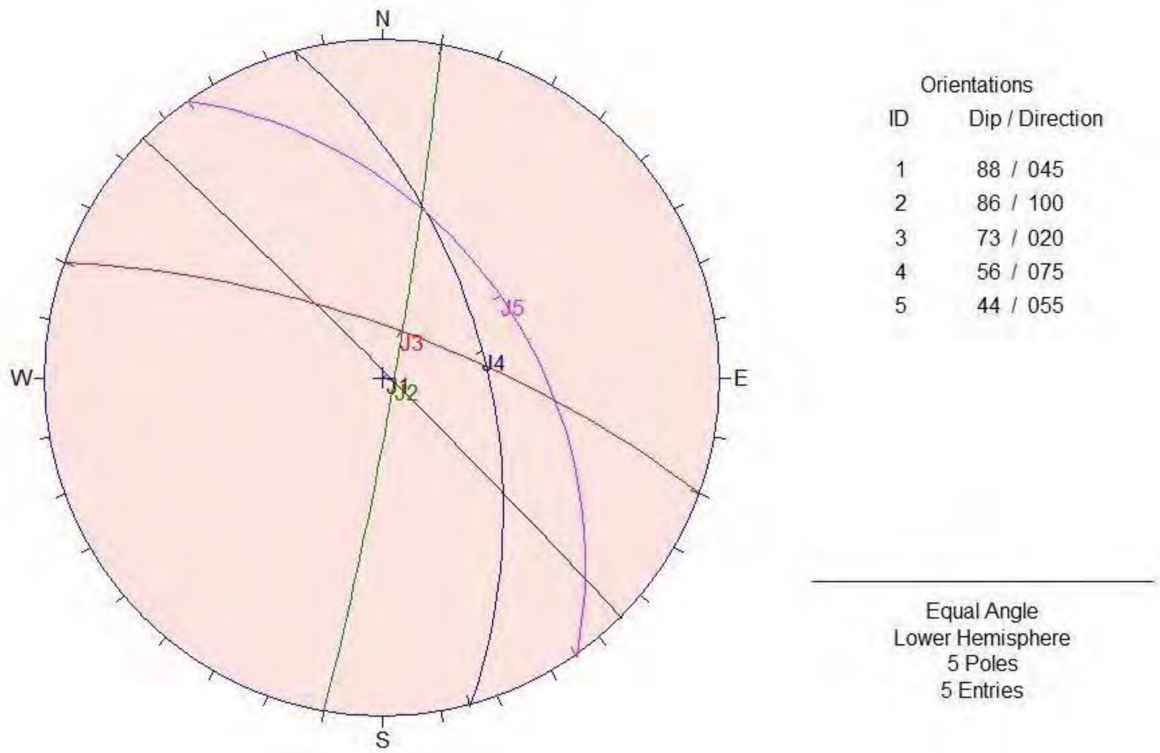


Fig 17: Rosette plot of joint sets

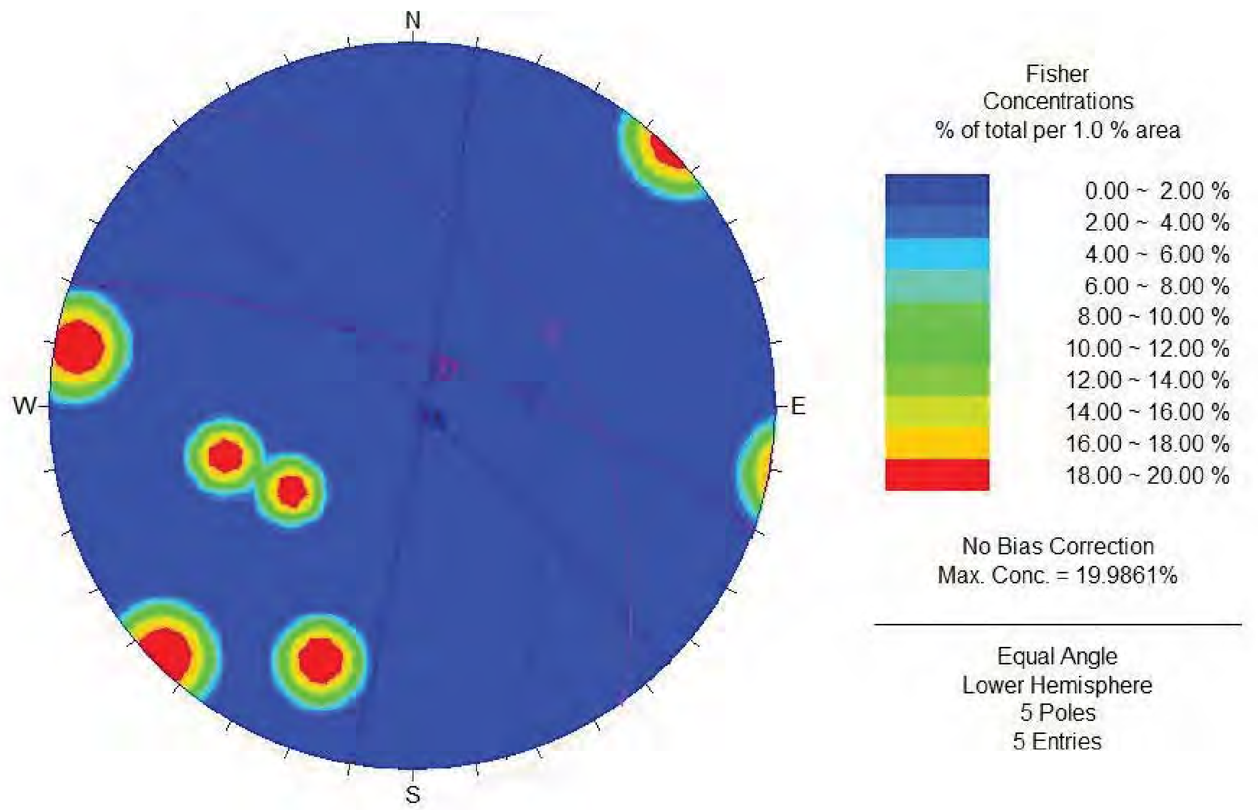


Fig 18: Fisher Concentration for Joint sets observed in rock

- **ASSESSMENT OF BASIC PARAMETERS**

Parameter	Rating (assessed on basis of visual observation at site)
UCS =65.92 MPa	7
RQD ~ 30% to 80 %	12
Spacing~0.5m	10
Condition of discontinuities	10
Ground water	0

Basic RMR = 40

Correction for discontinuity orientation	-20

Corrected RMR = 20

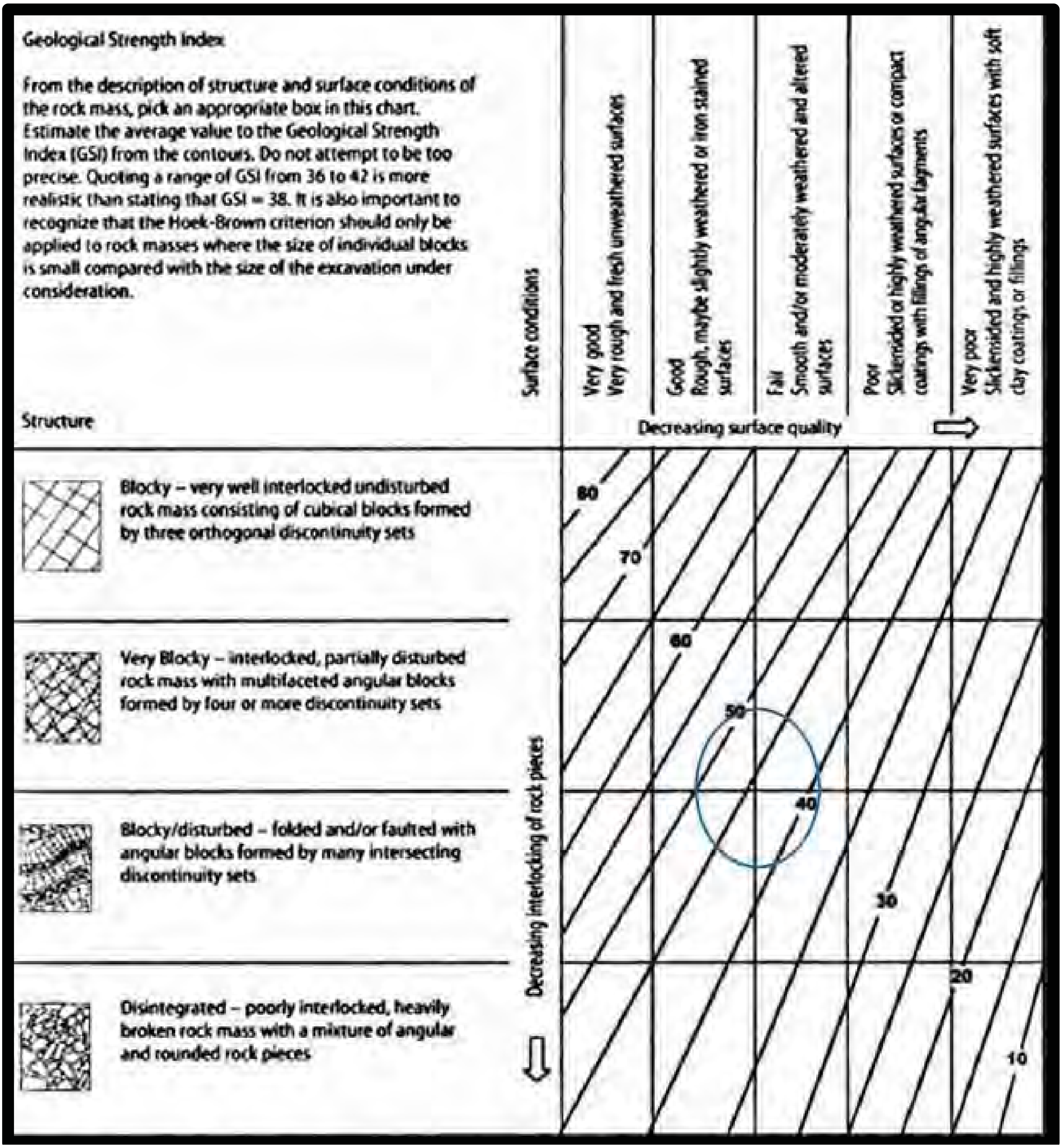


Fig 19: Hoek & Brown Criterion for GSI Index

6.3. Stratigraphy

In general, Black Silty clay (Black Cotton Soil) is encountered at the project site to about 0.2~0.3 m depth underlain by Basalt Rock formation. The liquid limit in soil is range from 41-64% and plasticity index values of 16-37%, indicating medium to high plasticity characteristics. Free swell index values range from 27-52%, indicating low to medium expansive characteristics.

The rock formation encountered at the site generally consists of very weak to strong, very intensely to slightly fractured, completely to slightly weathered Basalt to the maximum explored depth. **Refusal (N>100) was encountered in the shallow weathered rock formation.**

The rock core recovery is generally about 0-27% with 0-13% RQD (RMR 15~20) to about 4.5-6.0 m depth. Below this, core recovery values range from 43-100% with 25-98% RQD, (RMR 26~60) to the maximum explored depth of 25.0 m.

A summary of the borehole profiles is presented on Plates 4 to 24. Detailed description of the materials encountered at the borehole locations are presented on the individual borehole log profiles (*Refer Plates 26 to 153*). Trial Pit sections are presented on Plates 190 to 194.

6.4. Groundwater

Based on our measurements in the completed boreholes, groundwater ranges from 1.0-12.7 m depth (RL 225.8-191.0 m) during the period of our field investigation. The measured water levels are indicated in the individual borehole logs.

Fluctuations may occur in the measured water levels due to seasonal variations in rainfall and surface evaporation rates, as well as the level of water in the nearby River Tapi. The highest flood level (HFL) in the river may be considered as the design groundwater level for the purpose of analysis.

6.5. Seismicity

According to Fig.1 of IS: 1893 (Part1)-2016 showing seismic zones, the proposed site falls in earthquake Zone-III.

7. FIELD TEST RESULTS

7.1. Field Permeability Test Results

Ten (10) field permeability tests have been conducted at the site. The test results are summarized below:

S. No.	Location	Borehole Designation	Test Designation	Depth below EGL, m	Coefficient of Permeability ($k \times 10^{-7}$), m/s
1	ID FAN	BH-01	FPT-1	1.5	109.8
2			FPT-2	5.0	313.4
3	BOILER	BH-12	FPT-3	1.5	226.0
4			FPT-4	5.0	267.0
5	TRANSFORMER YARD	BH-22	FPT-5	1.5	108.8
6			FPT-6	5.0	279.8
7	COOLING TOWER	BH-40	FPT-7	1.5	71.0
8			FPT-8	5.0	323.1
9	NON-DM WATER CLARIFIER (PT PLANT)	BH-47	FPT-9	1.5	70.5
10			FPT-10	5.0	325.6

7.2. Dynamic Cone Penetration Test Results

Five (5) dynamic cone penetration tests were performed at the project site. Refusal (N>150) was encountered to about 0.11-0.88 m depth. However at DCPT-2, refusal was met at 1-1.68 m depth.

S. No.	Location	Test Designation	Depth below EGL, m		No. of Blows 30 cm Penetration
			From	To	
1	ESP	DCPT-1	0.00	0.30	16
			0.30	0.43	150+
2	ESP	DCPT-2	0.00	0.90	16-18
			0.90	1.00	150+
3	FD & PA FAN BOILER	DCPT-3	0.00	0.60	14-19
			0.60	0.78	150+
4	BOILER	DCPT-4	0.00	0.60	10-12
			0.60	0.75	150+
5	MAIN POWER HOUSE AREA	DCPT-5	0.00	0.60	14-40
			0.60	0.83	150+
			0.60	0.90	42
			0.90	1.14	150+

The DCPT tests confirm the presence of rock at shallow depth. The above data matches well with our available boreholes data also. Dynamic cone penetration test results are presented on Plates 196.

7.3. Electrical Resistivity Test Results

Fourteen (14) electrical resistivity tests were conducted at the project site as per IS: 3043-1987. The tests were conducted using the Wenner's configuration. Depth of electrodes was about 15 to 20 cm in to the ground.

At (ERT-11) locations, limited space was available for the spread of the electrodes. Therefore, the maximum electrode spacing was less than 10 m. Depending on space availability, the tests were performed in 4 directions only. Mean resistivity values at the electrical resistivity tests (ERT) location are presented on Plates 198 to 225 and summarized below for easy reference:

S. No.	Location	Test Designation	Survey Co-ordinates, m		Mean Resistivity, ohm-m
			E	W	
1	MAIN POWER HOUSE AREA	ERT-1	1060 E	500 N	7.2
2	TRANSFORMER YARD	ERT-2	1100 E	460 N	16.0
3	TRANSFORMER YARD	ERT-3	1110 E	490 N	13.0
4	TRANSFORMER YARD	ERT-4	1170 E	470 N	8.8
5	TRANSFORMER YARD	ERT-5	1180 E	487 N	13.1
6	BOILER	ERT-6	1192 E	581 N	10.9
7	TRANSFORMER YARD	ERT-7	1097 E	670 N	3.3

S. No.	Location	Test Designation	Survey Co-ordinates, m		Mean Resistivity, ohm-m
			E	W	
8	ESP	ERT-8	1220 E	734 N	17.9
9	NON-DM WATER CLARIFIER (PT PLANT)	ERT-9	1560 E	210 N	3.0
10	CW/ACW PUMP HOUSE	ERT-10	1507 E	407 N	6.8
11	CRUSHER HOUSE	ERT-11	1360 E	880 N	16.0
12	FGD AREA	ERT-12	1290 E	920 N	4.6
13	ESP	ERT-13	1087 E	704 N	5.6
14	HCSS SILO	ERT-14	1031 E	719 N	6.0

7.4. Field CBR Test Results

Four (4) field CBR tests have been conducted at project site. Details tabulated below:

Test Designation	Survey Co-ordinates, m		Test Depth, m	Field CBR Value, %
	E	N		
CBR-1	1209 E	831 N	0.5 (RL 207.3 m)	32.1
CBR-2	1321 E	600 N	0.5 (RL 208.7 m)	31.5
CBR-3	1042 E	566 N	0.5 (RL 206.4 m)	30.6
CBR-4	1145 E	410 N	0.5 (RL 208.8 m)	35.6

Laboratory CBR tests (soaked & unsoaked) were conducted as per IS: 2720 (Part 16) – 1987 on samples collected from the site. The samples were remoulded to 95% of the maximum dry density (determined in accordance with the Standard Proctor test, IS: 2720 Part VIII-1983 RA 2010).

A summary of the laboratory Proctor and CBR test results (soaked & unsoaked) is also tabulated below for easy reference:

Test Designation	Standard Proctor Test Results		Laboratory CBR Value	
	MDD*, g/cm^3	OMC**, %	Unsoaked, %	Soaked, %
LCBR-1	1.93	9.2	27.3	17.2
LCBR-2	1.95	8.9	29.5	18.6
LCBR-3	1.92	9.3	26.9	16.5
LCBR-4	1.90	10.2	27.9	16.8

* Maximum Dry Density ** Optimum Moisture Content

7.5. Plate Load Test Results

7.5.1. Test Results

Eight (8) plate load tests have been conducted at project site using a 45 cm size plate at specified depth (Please refer to Section 1.3 for test details). The following table summarizes the measured settlements of the plate under different loading intensities:

S. No.	Test Designation	Ultimate Bearing Capacity, q_{ult} (kg/cm^2)	Measured settlement (mm) under applied bearing pressure of			
			20 T/m^2	40 T/m^2	60 T/m^2	80 T/m^2
1	PLT-1	>8.0	0.35	0.64	1.00	1.52
2	PLT-2	>8.0	0.12	0.16	0.89	1.56
3	PLT-3	>8.0	0.23	0.53	1.03	1.35
4	PLT-4	>8.0	0.89	1.71	2.65	3.46
5	PLT-5	>8.0	0.62	0.96	1.44	1.97
6	CPLT-1	>8.0	0.45	0.82	1.12	1.42
7	CPLT-2	>8.0	0.41	0.71	0.95	1.31
8	CPLT-3	>8.0	0.38	0.90	1.44	2.23

7.5.2. Interpretation of Plate Load Test Results

The settlement for 5-6 m size foundations has been[2] extrapolated using the following equation as per Clause 8.3 of IS Code: 12070-1987 RA 2010:

$$\frac{S_f}{S_p} = \left[\frac{B_f (B_p + 0.3)}{B_p (B_f + 0.3)} \right]^2$$

where:

S_f = settlement of foundation in mm.
S_p = settlement of test plate in mm
B_f = width of the foundation in m
B_p = width of the plate in m

A multiplying factor of 1.5 has been applied to account for saturation. A multiplying factor of 1.5 has been applied to account for local variations in strata conditions. The following table summarizes the interpreted settlements for large-size foundations bearing at the test level:

---

(2) Narayan V. Nayak "***Foundation Design Manual***", Page no. 101, Sec-2.7.2.1

S. No.	Test Designation	Subgrade Modulus, kg/cm^3	Estimated Settlement (mm) of foundations under applied bearing pressure of			
			20 T/m^2	40 T/m^2	60 T/m^2	80 T/m^2
1	PLT-1	6.83	2.0	3.6	5.7	8.6
2	PLT-2	7.82	0.7	0.9	5.0	8.8
3	PLT-3	7.74	1.3	3.0	5.8	7.7
4	PLT-4	7.18	5.0	9.7	15.0	19.6
5	PLT-5	6.35	3.5	5.4	8.2	11.2
6	CPLT-1	7.87	2.6	4.6	6.3	8.0
7	CPLT-2	6.11	2.3	4.0	5.4	7.4
8	CPLT-3	6.19	2.2	5.1	8.2	12.6

The safe bearing capacity for design of foundations cannot be directly interpreted from the test results. The final values of safe bearing capacity for foundation design should be selected in conjunction with borehole and other field data.

It may be seen that for foundations on rock, the settlement is expected to be less than 5-10 mm under a bearing pressure of 40-60 T/m^2. The final values of safe bearing capacity for foundation design should be selected in conjunction with borehole and other field data.

7.6. Seismic Refraction Test Results

SRT test results are presented on Plates 243 to 257. This includes P-Wave First Arrival Times, Velocity Block Section and Velocity Contour Section. The following points are highlighted based on the seismic refraction tests carried out on the site:

1. The exploration site presents a maximum P-Wave velocity of 4200 m/s up to the depth of 30 m.

2. The site is underlain by a nearly flat bed below EL 198 m characterized by P-Wave velocities ranging from 2000 m/s to 3000 m/s and above. This section appears to be made of highly weathered to moderately weathered Deccan Trap Basalt. Further, this section presents lateral homogeneity devoid of little fracture or weak zone.

3. Above this layer is seen nearly 10-15 m thick section (between ground level to EL of about 198 m) characterized by velocities ranging between 900 m/s to 2000 m/s. This section consists mainly of soils at top derived from basaltic lava flows and granular zones of sand, gravel / fragmented silt stone.

4. The EL of the layer manifesting P-Wave velocity of 2800 m/s varies from profile to profile – EL 191 m on Profile-1, EL 188 m on Profile-2, EL 187 m on Profile-3, and EL 182 m on Profile-4. Presence of good rock can be anticipated at or below these levels.

5. Contour diagrams depicting subsurface variation of top of layer with velocity **2000 m/s (can be considered as Rock**) and **2800 m/s (can be considered as Hard Rock**) are also presented on Plates 243 & 257 respectively.

7.7. Cross-Hole Seismic Test Results

7.7.1. Presentation of Results

CHST test results are presented on Plates 259 to 274. This includes a table summarizing the test results and graphical plots of measured wave velocities and computed dynamic soil parameters. A pictorial summary of the borehole logs is illustrated next to the test results for easy reference.

7.7.2. Discussion of Test Results

Test Designation	Depth, m		Shear wave velocity (V_s), m/s		Compression wave velocity (V_p), m/s		Poisson's Ratio, μ	Dynamic Young Modulus, E (MPa)	Dynamic Shear Modulus, G (MPa)
	From	To	Measured	Design Value	Measured	Design Value			
CST-1	0	6	651-824	700	1292-1674	1350	0.33	3500	1400
	6	13.5	1022-1319	1100	1986-2564	2100	0.32	9000	3000
	13.5	20	1498-1836	1600	2855-3435	3000	0.31	18000	7000
CST-2	0	6	752-781	750	1493-1540	1450	0.33	4000	1600
	6	12	905-1264	1000	1759-2409	2000	0.31	8500	2800
	12	20	1510-1868	1600	2935-3631	3000	0.31	18000	7000
CST-3	0	6	742-1106	800	1473-2196	1450	0.33	4500	1700
	6	10	1235-1479	1300	2508-2875	2500	0.32	10000	4500
	10	20	1794-1897	1800	3419-3560	3300	0.3	20000	8000
CST-4	0	6	723-1105	800	1435-2194	1450	0.33	4500	1700
	6	10	1245-1339	1300	2529-2603	2500	0.32	10000	4500
	10	20	1694-1842	1800	3293-3497	3300	0.3	20000	8000

Since the cross-hole seismic tests completed on site are low-strain methods, the dynamic soil parameters computed here correspond to very low strains. However, actual design strains on the site are usually much higher (often in the range of 2~3%); particularly for earthquake conditions. Hence, the design dynamic parameters should be selected carefully as per the anticipated strain levels[(3)].

7.7.3. Selection of Dynamic Parameters

The selection of dynamic parameters must be done based on the project specifications, as well as the general guideline given in IS 5249:1992.

(3) Steven L. Kramer (1996), "***Geotechnical Earthquake Engineering***", Pearson Education, Inc., Section 6.4, pp. 232-238.

As per IS 5249:1992 (Clause 9.0), the value of dynamic shear modulus, G, is affected by a number of parameters; out of which confining pressure, shear strain amplitude, and relative density are most important. In the range of strains associated with properly designed machine foundations, the effect of variation in strain on shear modulus is small and the values of G for design purposes may be determined from the in-situ test values using the relation given below:

$$\frac{G_1}{G} = \left(\frac{\sigma_{01}}{\sigma_0}\right)^m$$

where:

G_1 and G	=	Dynamic shear modulus for the prototype and from field test, respectively
σ_{01} and σ_0	=	Mean effective confining pressure, associated with the prototype foundation and the in-situ test, respectively, and
m	=	Constant depending upon the type of soil/rock, shape of grains, etc.

IS: 5249 states that in situations where high strain levels are associated (as in the case of analysis for earthquake conditions), the effect of strain level shall be considered along with that of confining pressure. In such a case, the values of G from different field tests may first be reduced to the same confining pressure (expected below the footing) and their variation with strain levels may be studied to arrive at an appropriate value corresponding to the expected strain level (3).

The four parameters (C_u, C_τ , C_ϕ and C_Ψ) are highly dependent on strain levels. Keeping this in view, we suggest that a range of ± 20 percent of the above values be used for design. The higher values of these coefficients may be used for machines having an operating frequency higher than that of the machine-foundation-soil system. Similarly, the lower values of the coefficients may be used for machines operating at frequency that is lower than that of the system.

7.8. Pressuremeter Test Results

Pressuremeter test results are presented on Plates 276 to 311and also summarised below for easy reference:

Location	PMT Designation	Test Depth, m	Limit Pressure, P_L, kg/cm^2	Deformation Modulus E_m, MPa
ID Fan	PMT-1	2	47.3	89
		4	59.5	448
		6	71.6	1415
		8	79.6	2000
		10	75.6	1369
		12	79.6	2384
		15	69.6	1967
		18	75.6	2733
		20	79.6	2491

Location	PMT Designation	Test Depth, m	Limit Pressure, P_L, kg/cm^2	Deformation Modulus E_m, MPa
FD & PA FAN	PMT-2	2	49.3	96
		4	51.4	126
		6	64.5	608
		8	74.5	836
		10	74.6	1533
		12	79.6	2315
		15	79.6	2402
		18	79.6	2236
		20	79.6	2878
MAIN POWER HOUSE AREA	PMT-3	2	59.2	92
		4	49.2	129
		6	54.2	123
		8	71.4	1872
		10	79.4	2352
		12	79.4	2633
		15	79.4	2551
		18	79.4	2978
		20	79.4	3387
Cooling Tower	PMT-4	2	35.2	62
		4	43.3	87
		6	42.2	104
		8	45.3	191
		10	75.5	951
		12	77.4	1039
		15	75.4	1628
		18	79.4	1813
		20	79.4	2687

8. LIQUEFACTION SUSCEPTIBILITY ASSESSMENT

8.1. General

As per IS: 1893-2016, liquefaction is defined as a state in which the shear strength of primarily saturated cohesionless soils become negligible during earthquake shaking. In this condition, the soil tends to behave like a fluid mass.

Depending on the degree of susceptibility to liquefaction, of the subsoil at the site, in the event of an earthquake, the structure may either not be affected as no liquefaction occurs, or may undergo large settlements due to partial liquefaction, or else there may be a complete loss of the shear strength of the soil leading to a collapse of the super structure.

8.2. Assessment as per IS code

The following points are noted for the soils encountered at the site, with reference to the liquefaction susceptibility assessment:

1. According to Fig.1 of IS: 1893 (Part1)-2016 showing seismic zones the proposed site falls in earthquake Zone-III.

2. For project sites located in Zone-III, IV & V, saturated sands with corrected SPT (N') values less than 15 up to 5 m depth and less than 25 below 10 m depth may liquefy in the event of an earthquake.

3. **Since Basalt (Rock) is encountered at the site from EGL, the project site is not prone to liquefaction in the event of an earthquake.**

9. GEOTECHNICAL ANALYSIS

9.1. Foundation Type & Depth

Type of foundation to be adopted for a particular structure depends upon the loading intensity at the foundation level and the configuration of loading points. Following points are highlighted so that adequate steps can be taken during foundation planning and construction to ensure that the foundation performance on site is as per design.

- As discussed in Section 6.3, Black Cotton Soil was encountered at the site to about 0.2~0.3 m depth underlain by Basalt Rock. Reviewing the stratigraphy of the site, we are of opinion that **open foundations are a feasible foundation scheme to support the various facilities planned at the project site. Our suggested net allowable bearing pressures for open foundations bearing on rock formation at 1.0-6.0 m depth below EGL or FGL (*whichever is lower*) are presented in Section 9.3.**

- Since groundwater was met at 1.0-12.7 m depth (RL 225.8-191.0 m) depth below EGL, temporary excavations for foundation construction may require dewatering. Dewatering may be carried out on site by using a properly designed dewatering system.

9.2. Method of Analysis (Open Foundations)

Following criterion have been considered for evaluating the bearing capacity values:

i. **Based on Rock Mass Rating (RMR) value as per Clause 5.3 of IS: 12070**

Analysis has been carried out using the RMR also known as Geo-mechanics classification [4] by considering classification parameters and their ratings. Depending upon the quality of rock as assessed from the RMR values, the net allowable bearing pressures are specified in IS: 12070.

ii. **Based on Laboratory Core Strength Results as per Clause 6.2 of IS 12070.**

The average uniaxial compressive strength of rock core has to be multiplied by an empirical coefficient (as given in Table 4 and Fig. 1) summarized below:

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[4] Bieniawski, Z.T (1989). **"Engineering Rock Mass Classifications"**, *A Complete Manual for Engineers and Geologists in Mining, Civil & Petroleum Engineering*, John Wiley Publication, New York.

Spacing of Discontinuities, cm	N_j
300	0.4
100-300	0.25
30-100	0.1

Reduction factors are applied on the obtained net allowable bearing pressures for saturation and orientation of joints. The minimum value determined from the above two criterions, has been taken as the final net bearing pressure.

9.3. Recommended Net Allowable Bearing Pressures

The following table presents our recommended net allowable bearing pressures for the various facilities planned at the site:

Location	Borehole Designation	Average Ground Level, (RL) m	Finished Ground Level, (RL) m as per Dwg no. PE-DG-415-602-C001-R02	Foundation embedment depth, m		Founding Level (RL), m	Recommended Net Allowable Bearing Pressure, T/m² *(for Isolated, Strip & Raft)*
				Below EGL	Below FGL		
ID Fan	BH-01 to BH-04	207	208.5	1	2.5	206	25
				2	3.5	205	30
				3	4.5	204	35
				4	5.5	203	50
				5	6.5	202	60
ESP & ESP Control Room	BH-05 to BH-07 & BH-62	207.5	208.5	1	2	206.5	25
				2	3	205.5	30
				3	4	204.5	35
				4	5	203.5	50
				5	6	202.5	60
FD & FA Fan	BH-08 & BH-09	207.5	208.5	1	2	206.5	25
				2	3	205.5	30
				3	4	204.5	35
				4	5	203.5	50
				5	6	202.5	60
BOILER	BH-10 to BH-13	206.5	208.5	1	3	205.5	35
				1.5	3.5	205.0	38
				2	4	204.5	40
				3	5	203.5	45
				4	6	202.5	55
				5	7	201.5	65

Location	Borehole Designation	Average Ground Level, (RL) m	Finished Ground Level, (RL) m as per Dwg no. PE-DG-415-602-C001-R02	Foundation embedment depth, m		Founding Level (RL), m	Recommended Net Allowable Bearing Pressure, T/m^2 *(for Isolated, Strip & Raft)*
Main Power House Area	BH-14 to BH-20	207.6	208.5	1	1.9	206.6	25
				2	2.9	205.6	30
				3	3.9	204.6	40
				4	4.9	203.6	50
				5	5.9	202.6	60
Pipe Rack	BH-21 & BH-25	209.5	208.5	1.5	0.5	208	25
				2	1	207.5	30
				3	2	206.5	40
				4	3	205.5	45
				5	4	204.5	55
Transformer Yard	BH-22 to BH-24	206.7	208.5	1	2.8	205.7	25
				2	3.8	204.7	30
				3	4.8	203.7	35
				4	5.8	202.7	45
				5	6.8	201.7	60
Parking Shed	BH-26	206	206.5	1	1.5	205	25
				2	2.5	204	30
				3	3.5	203	35
				4	4.5	202	40
				5	5.5	201	50
Canteen	BH-27	207.5	206.5	1.5	0.5	206	25
				2	1	205.5	30
				3	2	204.5	40
				4	3	203.5	50
				5	4	202.5	60
HFO & LDO Pump House	BH-28	204.7	206.5	1	2.8	203.7	25
				2	3.8	202.7	30
				3	4.8	201.7	35
				4	5.8	200.7	40
				5	6.8	199.7	50

Location	Borehole Designation	Average Ground Level, (RL) m	Finished Ground Level, (RL) m as per Dwg no. PE-DG-415-602-C001-R02	Foundation embedment depth, m		Founding Level (RL), m	Recommended Net Allowable Bearing Pressure, T/m^2 *(for Isolated, Strip & Raft)*
FGD Area	BH-29 & BH-30	207	208.5	1	2.5	206	25
				2	3.5	205	30
				3	4.5	204	35
				4	5.5	203	45
				5	6.5	202	55
Rain Water Harvesting Pond	BH-31	207.4	208.5	1	2.1	206.4	30
				2	3.1	205.4	35
				3	4.1	204.4	40
				4	5.1	203.4	50
				5	6.1	202.4	60
Air Compressure Building	BH-32	208.3	208.5	1	1.2	207.3	25
				2	2.2	206.3	30
				3	3.2	205.3	35
				4	4.2	204.3	40
				5	5.2	203.3	55
Condensate Storage Tank	BH-33	209	208.5	1	0.5	208	25
				2	1.5	207	30
				3	2.5	206	35
				4	3.5	205	40
				5	4.5	204	50
Near Chemical Lab	BH-34	209.6	208.5	1.6	0.5	208.1	25
				2.1	1	207.6	30
				3.1	2	206.6	40
				4.1	3	205.6	50
				5.1	4	204.6	65
DM Water Stroage Tank	BH-35	209	210.5	1	2.5	208	30
				2	3.5	207	35
				3	4.5	206	40
				4	5.5	205	45
				5	6.5	204	55

Location	Borehole Designation	Average Ground Level, (RL) m	Finished Ground Level, (RL) m as per Dwg no. PE-DG-415-602-C001-R02	Foundation embedment depth, m		Founding Level (RL), m	Recommended Net Allowable Bearing Pressure, T/m² *(for Isolated, Strip & Raft)*
Acid / Alkali Stroage Tank	BH-36	209.8	210.5	1	1.7	208.8	25
				2	2.7	207.8	30
				3	3.7	206.8	35
				4	4.7	205.8	40
				5	5.7	204.8	50
Sewege Treatment Plant	BH-37	210.7	208.5	3	0.8	207.7	30
				4	1.8	206.7	40
				5	2.8	205.7	50
				6	3.8	204.7	60
				7	4.8	203.7	65
COOLING TOWER	BH-38 to BH-41 & BH-45	212.5	210.5	2.5	0.5	210	25
				3.5	1.5	209	30
				4.5	2.5	208	35
				5.5	3.5	207	45
				7	5	205.5	60
CW/ACW Pump House	BH-42 & BH-43	211.5	210.5	1.5	0.5	210	30
				2	1	209.5	35
				3	2	208.5	40
				4	3	207.5	50
				5	4	206.5	60
Ozonization & CW treatment Area	BH-44	212	210.5	2	0.5	210	25
				3	1.5	209	30
				4	2.5	208	35
				5	3.5	207	40
				6	4.5	206	50
Filter Water Reservoir & Pump House	BH-46	212	211	1.5	0.5	210.5	30
				2	1	210	35
				3	2	209	40
				4	3	208	45
				5	4	207	50

Location	Borehole Designation	Average Ground Level, (RL) m	Finished Ground Level, (RL) m as per Dwg no. PE-DG-415-602-C001-R02	Foundation embedment depth, m		Founding Level (RL), m	Recommended Net Allowable Bearing Pressure, T/m^2 *(for Isolated, Strip & Raft)*
				Below EGL	Below FGL		
Non-DM Water Clarifier (PT Plant)	BH-47	214.4	211	3.9	0.5	210.5	35
				4.4	1	210	40
				5.4	2	209	45
				6.4	3	208	55
				7.4	4	207	65
Filter Water Tank & PH For DM	BH-48	213	211	2.5	0.5	210.5	35
				3	1	210	40
				4	2	209	45
				5	3	208	55
				6	4	207	65
RW & FW Storage Tank	BH-49	215.6	211	5.1	0.5	210.5	40
				6.1	1.5	209.5	45
				7.1	2.5	208.5	55
				8.1	3.5	207.5	60
				9.1	4.5	206.5	70
Ozonization Plant	BH-50	215	211	4.5	0.5	210.5	40
				5	1	210	45
				6	2	209	50
				7	3	208	55
				8	4	207	65
Stores	BH-51	217.8	214	4.5	0.7	213.3	40
				5	1.2	212.8	45
				6	2.2	211.8	50
				7	3.2	210.8	55
				8	4.2	209.8	65

Location	Borehole Designation	Average Ground Level, (RL) m	Finished Ground Level, (RL) m as per Dwg no. PE-DG-415-602-C001-R02	Foundation embedment depth, m		Founding Level (RL), m	Recommended Net Allowable Bearing Pressure, T/m^2 *(for Isolated, Strip & Raft)*
				Below EGL	Below FGL		
Security Cabin	BH-52	213.6	214	1	1.4	212.6	25
				2	2.4	211.6	30
				3	3.4	210.6	35
				4	4.4	209.6	40
				5	5.4	208.6	50
Raw Water Intake Pipe Line	BH-53 to BH-59	-	-	1	-	-	25
				2			30
				3			35
				4			40
				5			45
Weigh Bridge For Dry Ash Silo	BH-60	200	-	1	-	199	25
				2		198	30
				3		197	35
				4		196	40
				5		195	45
Fuel Oil Transfer Pump House	BH-61	205.2	205	1	0.8	204.2	25
				2	1.8	203.2	30
				3	2.8	202.2	35
				4	3.8	201.2	45
				5	4.8	200.2	55
CW Side Stream Filtration Plant	BH-63	210.9	210.5	1	0.6	209.9	25
				2	1.6	208.9	30
				3	2.6	207.9	35
				4	3.6	206.9	45
				5	4.6	205.9	55

Location	Borehole Designation	Average Ground Level, (RL) m	Finished Ground Level, (RL) m as per Dwg no. PE-DG-415-602-C001-R02	Foundation embedment depth, m		Founding Level (RL), m	Recommended Net Allowable Bearing Pressure, T/m^2 *(for Isolated, Strip & Raft)*
				Below EGL	Below FGL		
ETP Plant	BH-64	214.2	210.5	4.5	0.8	209.7	35
				5	1.3	209.2	40
				6	2.3	208.2	50
				7	3.3	207.2	55
				8	4.3	206.2	65
Watch Tower	BH-65	218.5	214	5	0.5	213.5	40
				6	1.5	212.5	45
				7	2.5	211.5	55
				8	3.5	210.5	60
				9	4.5	209.5	70
Watch Tower	BH-66	213.2	214	1	1.8	212.2	35
				2	2.8	211.2	40
				3	3.8	210.2	45
				4	4.8	209.2	50
				5	5.8	208.2	60
Chimney	BH-67 & BH-68	208	208.5	1	1.5	207	25
				2	2.5	206	30
				3	3.5	205	45
				4	4.5	204	55
				5	5.5	203	65
Ammonia & Storage Area	BH-69	208.8	208	1.5	0.7	207.3	25
				2	1.2	206.8	30
				3	2.2	205.8	35
				4	3.2	204.8	45
				5	4.2	203.8	55

The following points are highlighted with reference to the recommended net bearing pressures:

1. The above net allowable bearing pressures include a bearing capacity safety factor of 3.0 and corresponds to a permissible settlement of 12 mm.

2. Net bearing pressures for foundations at intermediate depths may be interpolated linearly between the values given above.

3. For foundations resting on rock, the variation of SBC with the foundation size is insignificant. Hence, the above recommended net allowable bearing pressures may be used for the design of any open foundation (*Isolated, Strip or Raft*).

4. No foundations shall be placed on Black Cotton Soil.

5. Foundation bearing on rock shall be embedded at least 50 cm into rock formation to ensure adequate anchorage. We suggest as follows:

   a. In case loose soil or rock fragments are observed during excavation below the founding level, it should be replaced by lean concrete.
   b. All loose, disturbed, weathered or fragmented rock should be removed so that foundations may bear on the undisturbed natural rock.
   c. The rock surface should be roughened and scarified so as to ensure a proper bond between rock and concrete.

6. The net allowable bearing pressure given above are for foundations placed at minimum specified founding level subjected to seating of atleast 0.5 m in to rock formation.

7. Some foundations may be placed on backfill adjoining major foundations.
   a. Lightly-loaded footings of minor facilities may bear on the properly compacted backfill.
8. Modulus of sub grade reaction (k) as obtained from the plate load test are presented in Section 7.5.2.

9.4. Foundation Level Preparation

For foundations on rock, all loose, weathered or fragmented rock should be removed so that foundations may bear on the natural undisturbed rock formation. The rock surface should be roughened, scarified and watered thoroughly to ensure proper bond between rock and concrete. The foundations should be seated at least 0.5 m into the rock formation.

The surface should then be protected from disturbances due to construction activities so that the foundations may bear on the natural undisturbed ground. We recommend the placement of minimum 50 mm thick “blinding layer” of lean concrete to facilitate placement of reinforcing steel and to protect the soils from disturbance.

9.5. Suitability of soils encountered at site as Backfill Material

The soils encountered at the project site at shallow depths (*to about 0.3 m depth from NGL*) are not suitable for the purpose of backfilling as these are low to medium expansive in nature. Underlain soil / soft / weathered rock may be used for filling / backfilling after confirmation of its suitability on site by conducting relevant laboratory tests.

9.6. Chemical Attack

The results indicate that the soils contain 0.41-0.46 percent sulphates and 0.44-0.53 percent chlorides. The groundwater contains 111-132 mg / litre of sulphates and 12-15 mg / litre of chlorides. The pH value of soil is 7.2-7.9 and that of groundwater is 7.0-7.6.

IS: 456-2000 recommends that precautions should be taken against chemical degradation of concrete if

- sulphates content of the soils exceeds 0.2 percent, or
- groundwater contains more than 300 mg /litre of sulphates (SO_3).

Comparing the test results with these specified limits, the sulphate content of the groundwater is within the specified limit. Therefore, strata at the site may be treated in **Class-1** category as described on IS: 456-2000.

10. Summary of Principal Findings

M/s G S GEOENVIRONS PVT. LTD. has carried out the geotechnical investigation for the proposed 1x660 mw Bhusawal TPS Extn. Unit – 6. The following are our principal findings and recommendations:

- **Site Stratigraphy**: In general, low to medium expansive Black Silty clay (Black Cotton Soil) is encountered at the project site to about 0.2~0.3 m depth underlain by Basalt Rock formation. (*Refer to Section 6.3*)
- **Groundwater**: Groundwater ranges from 1.0-12.7 m depth (RL 225.8-191.0 m) during the period of our field investigation. The measured water levels are indicated in the individual borehole logs. (*Refer to Section 6.4*)
- **Field Permeability Test Results**: The coefficient of permeability (k) across the site ranges from 70.5 - 323.1 x 10^{-7} m/s in the fractured rock formation. (*Refer to Section 7.1*)
- **Dynamic Cone Penetration Test Results**: Refusal (N>150) was encountered to about 0.11-0.88 m depth. The DCPT tests confirm the presence of rock at shallow depth. The above data matches well with our available boreholes data also. (*Refer to Section 7.2*)
- **Electrical Resistivity Test Results**: The mean resistivity values ranges from 3.3-17.9 ohm-m (*Refer to Section 7.3*)
- **Field CBR Test Results**: The field CBR values ranges from 30.6-35.6 %. Corresponding Unsoaked and Soaked laboratory CBR values range from 26.9-29.5 % and 16.5-18.6 % respectively (*Refer to Section 7.4*).

- Reviewing the test results, we suggest that a soaked CBR value of 15% be used for design of internal plant roads placed on cutting soil.
- For roads placed on filling, soaked Laboratory CBR test should be carried out on selected samples in order to determine the appropriate CBR value for the design of internal plant roads.

- **Plate Load Test Results**: Based on the tests carried out on the site, the ultimate bearing capacity of plate exceeds 8.0 kg/cm^2. The evaluated modulus of subgrade reaction ranges from 6.11-7.87 kg/cm^3 (*Refer to Section 7.5*)

- **Seismic Refraction Test Results**: We highlight as follows:

  - Based on the tests carried out on the site, a 10-15 m thick section (from EGL to about RL 198 m) is characterized by velocities ranging between 900 m/s to 2000 m/s. This section may attribute to possibly overburden soils derived from basaltic lava flows and highly weathered rock.

  - This is underlain by a nearly flat bed characterized by P-Wave velocities ranging from 2000 m/s to 3000 m/s and above. This section appears to be made of moderately weathered to slightly weathered Deccan Trap Basalt. *(Refer to Section 7.6)*

- **Cross-Hole Seismic Test Results:** The CHST test results are discussed in Section 7.7.2 and presented on Plates 259 to 274. This includes a table summarizing the test results and graphical plots of measured wave velocities and computed dynamic soil parameters.

- **Pressure-meter Test Results**: The PMT results (limit pressure and deformation modulus) are tabulated in Section 7.8 and presented on Plates 276 to 311.

- **Foundation Recommendations**: Open foundations are a feasible foundation scheme to support the various facilities planned at the project site. Dewatering shall be required for foundation construction. Please refer to Section 9.3 for our recommended net allowable bearing pressures.


Satellite Image of the Site
Bhusawal Thermal Power Station
Bhusawal Rd
NH6
3 km
N
Google Earth
Image © 2018 DigitalGlobe
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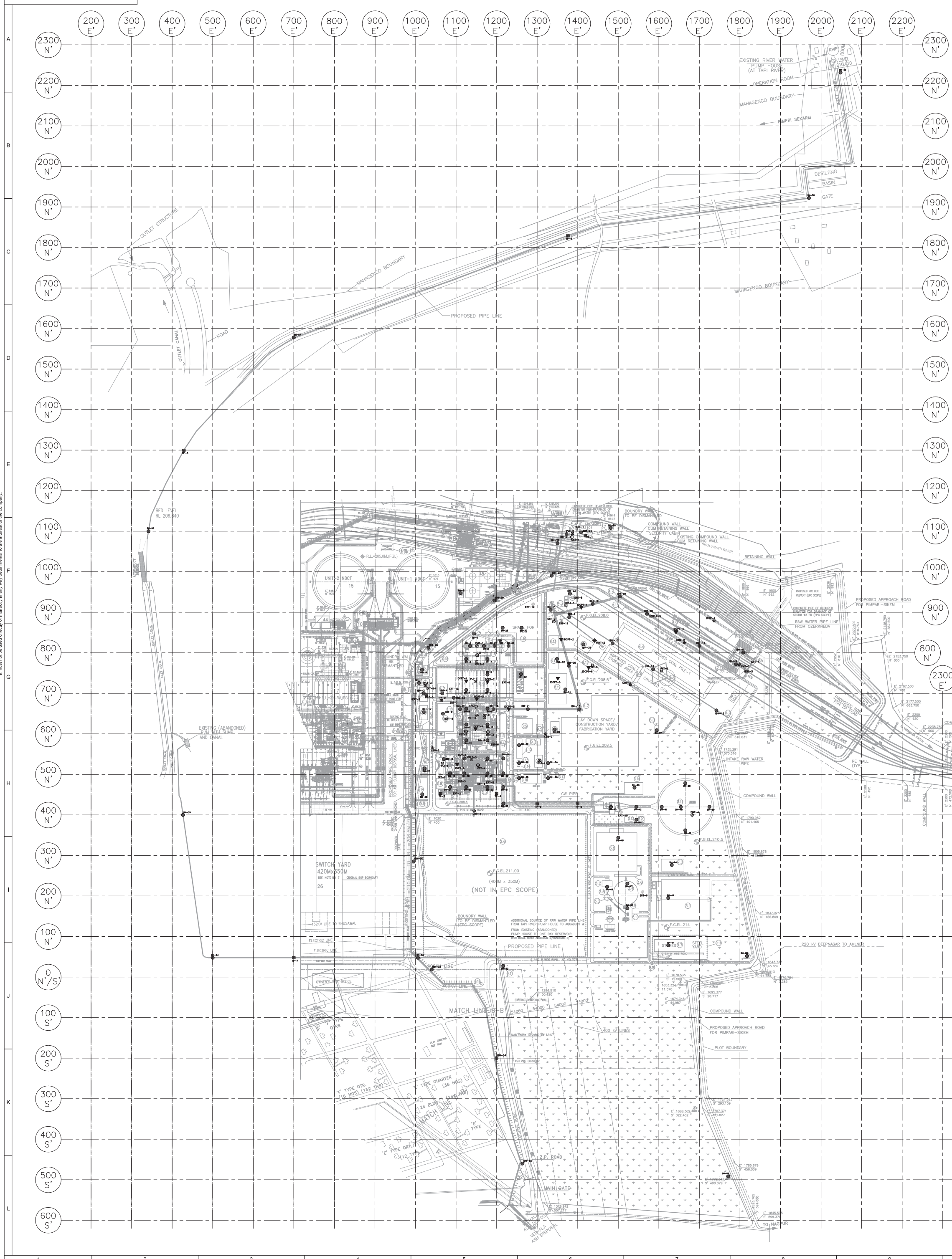


S.NO	PROFILE
	SEISMIC REFRACTION TEST (SRT)
1	835 N / 1186 E TO 505 N / 1186 E
2	835 N / 1116 E TO 505 N / 1116 E
3	723 N / 1091 E TO 723 N / 1211 E
4	530 N / 1070 E TO 530 N / 1220 E

TRUE NORTH

TRIAL PIT (ITP)			DEPTH BELOW EGL(M)
MARKING	CO-ORDINATES		
ITP-1	1418 E	1090 N	4.0

N O T E S:-

1. ALL DIMENSIONS ARE IN METERS UNLESS NOTED OTHERWISE.
2. BACKFILLING OF BORE HOLES AND PITS SHALL BE AS PER SPECIFICATION AND AS DIRECTED BY THE ENGINEER-IN-CHARGE.
3. STARTING DEPTH OF STANDARD PENETRATION TEST (SPT) SHALL BE 1.5M BELOW GROUND LEVEL AND THE TEST SHALL BE CONDUCTED AT EVERY 1M INTERVAL ALTERNATE TO COLLECTION OF UNDISTURBED SAMPLE (UDS) UPTO 10M DEPTH BELOW GROUND LEVEL AND AT EVERY 1.5M INTERVAL ALTERNATE TO COLLECTION OF UDS BEYOND 10M DEPTH, AT CHANGE OF STRATA & AT DEPTHS WHEREVER UDS COULD NOT BE COLLECTED.
4. STARTING DEPTH OF COLLECTION OF UDS SHALL BE 0.5M BELOW GROUND LEVEL AND UDS SHALL BE COLLECTED AT 1M INTERVAL ALTERNATE TO CONDUCTING SPT UPTO 10M DEPTH BELOW GROUND LEVEL & AT EVERY 1.5M INTERVAL ALTERNATE TO CONDUCTING SPT BEYOND 10M DEPTH.
5. CROSS HOLE SHEAR WAVE TEST SHALL BE CARRIED OUT AT 2M, 4M, 6M, 8M, 10M, 12M, 15M, 18M & 20M DEPTH BELOW GROUND LEVEL.
6. PUMP IN TYPE FIELD PERMEABILITY TEST SHALL BE CARRIED OUT AT DEPTH 1.5M AND 5M BELOW EXISTING GROUND LEVEL IN BH-1, BH-12, BH-22, BH-40, BH-47, IBH-10, IBH-11, IBH-12, IBH-29 & IBH-32.
7. ELECTRICAL RESISTIVITY TEST SHALL BE CARRIED OUT BY WENNER'S METHOD.
8. PRESSURE METER TEST SHALL BE CARRIED OUT AT 2M, 4M, 6M, 8M, 10M, 12M, 15M, 18M & 20M DEPTH BELOW GROUND LEVEL.
9. GROUND WATER SAMPLE SHALL BE COLLECTED FROM BH-7, BH-9, BH-15, BH-23, BH-30, BH-33, BH-41, BH-43, BH-50, IBH-03, IBH-10, IBH-13, IBH-27, IBH-28 AND IBH-31.
10. GEOTECHNICAL INVESTIGATION SHALL BE CARRIED OUT AS PER SPECIFICATION.
11. DO NOT SCALE THIS DRAWING.

REF DRG :

1. PE-DG-415-100-M001, REV-00 "PLOT PLAN".

GEOTECHNICAL INVESTIGATION LEGEND:

1. BOREHOLE (BH/IBH)
2. TRIAL PIT (TP/ITP)
3. DYNAMIC CONE PENETRATION TEST (DCPT/IDCPT)
4. PRESSURE METER TEST (PMT/IPMT)
5. CROSSHOLE SHEAR TEST (CST/ICST)
6. ELECTRICAL RESISTIVITY TEST (ERT/IERT)
7. PLATE LOAD TEST (IPLT)
8. FIELD CBR TEST (ICBR)
9. CYCLIC PLATE LOAD TEST (CPLT/ICPLT)
10. SEISMIC REFRACTION TEST (SRT/ISRT)

PLATE LOAD TEST (PLT)

MARKING	CO-ORDINATES		DEPTH (M)
PLT-1	1147 E	729 N	1.5
PLT-2	1170 E	641 N	2.0
PLT-3	1067 E	528 N	2.0
PLT-4	1306 E	534 N	1.5
PLT-5	1436 E	770 N	1.5

FIELD CBR TEST

MARKING	CO-ORDINATES		DEPTH (M)
CBR-1	1209 E	831 N	0.5
CBR-2	1321 E	600 N	0.5
CBR-3	1042 E	566 N	0.5
CBR-4	1145 E	410 N	0.5

BORE HOLE (IBH)

MARKING	CO-ORDINATES		DEPTH (M)
IBH-1	1009 E	725 N	15
IBH-2	1372 E	1093 N	15
IBH-3	1020 E	700 N	15
IBH-4	1065 E	700 N	15
IBH-5	1067 E	649 N	15
IBH-6	1379 E	888 N	15
IBH-7	1333 E	906 N	15
IBH-8	1808 E	800 N	25
IBH-9	1790 E	771 N	25
IBH-10	1504 E	938 N	20
IBH-11	1699 E	817 N	25
IBH-12	1742 E	658 N	15
IBH-13	1485 E	823 N	15
IBH-14	1586 E	759 N	15
IBH-15	1404 E	661 N	15
IBH-16	1192 E	661 N	15
IBH-17	1020 E	654 N	20
IBH-18	1570 E	896 N	15
IBH-19	1436 E	920 N	15
IBH-20	1378 E	768 N	15
IBH-21	1277 E	661 N	15
IBH-22	1110 E	661 N	15
IBH-23	1381 E	946 N	15
IBH-24	1408 E	1097 N	15
IBH-25	1031 E	812 N	15
IBH-26	1094 E	689 N	15
IBH-27	1350 E	1070 N	15
IBH-28	1335 E	990 N	15
IBH-29	1194 E	928 N	15
IBH-30	995 E	285 N	15
IBH-31	1414 E	821 N	15
IBH-32	1349 E	785 N	15
IBH-33	1040 E	18 S	15
IBH-34	1200 E	200 S	15
IBH-35	1263 E	460 S	15

FIELD CBR TEST (ICBR)

MARKING	CO-ORDINATES		DEPTH (M)
ICBR-1	1736 E	879 N	0.5
ICBR-2	1662 E	825 N	0.5
ICBR-3	1529 E	720 N	0.5

PLATE LOAD TEST (PLT)

MARKING	CO-ORDINATES		DEPTH (M)
IPLT-1	1606 E	755 N	2.0
IPLT-2	1387 E	1094 N	1.5
IPLT-3	1580 E	890 N	1.5
IPLT-4	1024 E	719 N	2.0
IPLT-5	1026 E	696 N	2.0

CYCLIC PLATE LOAD TEST (ICPLT)

MARKING	CO-ORDINATES		DEPTH (M)
ICPLT-1	1371 E	917 N	2.0

ELECTRICAL RESISTIVITY TEST (IERT)

MARKING	CO-ORDINATES	
IERT-1	1397 E	1103 N
IERT-2	1010 E	691 N
IERT-3	1813 E	760 N
IERT-4	1829 E	784 N
IERT-5	1387 E	936 N
IERT-6	1074 E	631 N

DYNAMIC CONE PENETRATION TEST (IDCPT)

MARKING	CO-ORDINATES	
IDCPT-1	1409 E	912 N
IDCPT-2	1359 E	833 N
IDCPT-3	1230 E	661 N
IDCPT-4	1642 E	852 N
IDCPT-5	1351 E	737 N
IDCPT-6	1426 E	764 N
IDCPT-7	1605 E	875 S
IDCPT-8	1930 E	1147 S
IDCPT-9	3796 E	2701 S
IDCPT-10	4905 E	3635 S
IDCPT-11	6138 E	5931 S

BORE HOLE (BH)

MARKING	CO-ORDINATES		DEPTH (M)
BH-1	1135 E	817 N	20
BH-2	1169 E	817 N	20
BH-3	1125 E	785 N	20
BH-4	1178 E	785 N	20
BH-5	1178 E	747 N	15
BH-6	1178 E	708 N	20
BH-7	1125 E	708 N	20
BH-8	1125 E	662 N	20
BH-9	1178 E	662 N	15
BH-10	1178 E	623 N	20
BH-11	1125 E	623 N	20
BH-12	1125 E	584 N	20
BH-13	1178 E	584 N	20
BH-14	1217 E	540 N	15
BH-15	1178 E	540 N	15
BH-16	1070 E	538 N	20
BH-17	1085 E	503 N	15
BH-18	1120 E	503 N	20
BH-19	1177 E	503 N	15
BH-20	1217 E	503 N	15
BH-21	1217 E	469 N	15
BH-22	1177 E	469 N	15
BH-23	1125 E	469 N	15
BH-24	1085 E	469 N	15
BH-25	1217 E	428 N	15
BH-26	1017 E	451 N	15
BH-27	1022 E	515 N	15
BH-28	1016 E	758 N	15
BH-29	1215 E	862 N	15
BH-30	1262 E	862 N	20
BH-31	1369 E	710 N	15
BH-32	1255 E	572 N	15
BH-33	1255 E	528 N	15
BH-34	1327 E	528 N	15
BH-35	1255 E	491 N	15
BH-36	1327 E	491 N	15
BH-37	1594 E	609 N	15
BH-38	1665 E	478 N	20
BH-39	1725 E	420 N	20
BH-40	1654 E	420 N	20
BH-41	1607 E	420 N	20
BH-42	1545 E	420 N	20
BH-43	1482 E	420 N	15
BH-44	1545 E	388 N	15
BH-45	1665 E	362 N	20
BH-46	1500 E	344 N	15
BH-47	1522 E	231 N	15
BH-48	1473 E	223 N	15
BH-49	1623 E	195 N	15
BH-50	1522 E	170 N	15
BH-51	1623 E	78 N	15
BH-52	1216 E	28 N	15
BH-53	1006 E	48 N	10
BH-54	500 E	48 N	10
BH-55	427 E	400 N	10
BH-56	342 E	1100 N	10
BH-57	700 E	1578 N	10
BH-58	1970 E	1922 N	10
BH-59	2048 E	2232 N	10
BH-60	1481 E	1108 N	15
BH-61	1111 E	947 N	15
BH-62	1260 E	748 N	20
BH-63	1540 E	467 N	15
BH-64	1632 E	277 N	15
BH-65	1817 E	52 N	10
BH-66	1771 E	492 N	10
BH-67	1194 E	817 N	20
BH-68	1229 E	817 N	20
BH-69	1343 E	611 N	10

TRIAL PIT (TP)

MARKING	CO-ORDINATES		DEPTH (M)
TP-1	1144 E	847 N	4
TP-2	1064 E	682 N	4
TP-3	1062 E	453 N	4
TP-4	1200 E	453 N	4
TP-5	1300 E	427 N	4
TP-6	1400 E	429 N	4
TP-7	700 E	48 N	4
TP-8	429 E	1300 N	4
TP-9	1376 E	1829 N	4

CYCLIC PLATE LOAD TEST (CPLT)

MARKING	CO-ORDINATES		DEPTH (M)
CPLT-1	1151 E	778 N	2.0
CPLT-2	1151 E	664 N	2.0
CPLT-3	1138 E	536 N	2.0

PRESSURE METER TEST (IPMT)

MARKING	CO-ORDINATES	
IPMT-1	1797 E	771 N
IPMT-2	1441 E	830 N

FACILITY	DESCRIPTION OF FACILITIES	SIZES (M)
1.0	**POWER BLOCK AREA**	
1.1	TG BUILDING	139.5x48
1.2	TG CONTROL EQUIPMENT ROOM/PCR	21x33.85
1.3	BOILER	82x53
1.4	FD/PA FANS	2 No Each
1.5	MILLS & BUNKERS	8 Bunkers
1.6	ESP	–
1.7	ESP CONTROL ROOM	56.7x18
1.8	ID FANS	–
1.9	CHIMNEY	–
1.10	SPACE FOR FGD	70x50
1.11	MILL REJECT SILO	7.5x5.0
1.12	AIR COMPRESSOR BUILDING/MILL REJECT COMPRESSOR & CONTROL ROOM	14x48
1.13	CONDENSATE STORAGE TANK	ø11
1.14	CONDENSATE STORAGE TANK PUMP HOUSE	15x7.5
1.15	AIR WASHER ROOM	16x18
1.16	DG BUILDING/AIR WASHER BLDG.	20x26/18x16
2.0	**ELECTRICAL FACILITIES**	
2.1	GENERATOR TRANSFORMER	–
2.2	STATION TRANSFORMER	–
2.3	UNIT TRANSFORMER	–
2.4	UNIT AUXILIARY TRANSFORMER	
2.5	STATION AUXILIARY TRANSFORMER	–
2.6	400kV SWITCH YARD (CUSTOMER SCOPE)	400x350
3.0	**WATER SYSTEM**	
3.1	RAW WATER & FIRE WATER STORAGE TANK	120x100
3.2	RAW & FIRE WATER PUMP HOUSE	90x12
3.3	DM WATER CLARIFIER (PT PLANT)	–
3.4	NON-DM WATER CLARIFIER (PT PLANT)	–
3.5	GRAVITY FILTERS(FOR DM WATER) (PT PLANT)	–
3.6	GRAVITY FILTERS(FOR NON DM WATER) (PT PLANT)	–
3.7	FILTER WATER TANK & PUMP HOUSE FOR DM	24x10
3.8	FILTER WATER RESERVOIR & PUMP HOUSE FOR NON DM	80x70
3.9	OZONIZATION PLANT(PRE-TREATMENT AREA)	19x16.5
3.10	CHEMICAL HOUSE/ELEC. & CONTROL ROOM	–
3.11	N.D. COOLING TOWER	ø132
3.12	CW/ ACW PUMP HOUSE	13.5x28.5
3.13	OZONIZATION & CW TREATMENT AREA (C.W.SYSTEM)	36x10
3.14	CW SIDE STREAM FILTRATION PLANT	46x30
3.15	DM WATER STORAGE TANKS(2 NOS.)	ø12
3.16	POST WATER TREATMENT PLANT AREA (DM PLANT)	55x35
3.17	NEUTRALISING PIT	12x10
3.18	ACID/ALKALI STORAGE AREA	20x8
3.19	RAIN WATER HARVESTING POND	–
3.20	SULPHURIC ACID STORAGE AREA FOR CW TREATMENT	14x14.5
3.21	CHEMICAL LAB (PCRI-HWR)	30X20
3.22	CPU REGENRATION BUILDING	40x38.5
4.0	**COAL HANDLING PLANT (ISG SCOPE)**	
4.1	WAGON TIPPLER	–
4.2	CONTROL ROOM FOR WAGON TIPPLER	–
4.3	CRUSHER HOUSE	36x30
4.4	CRUSHED COAL STORAGE AREA	270x50x11(2nos.)
4.5	CHP MCC/CONTROL ROOM	21x34
4.6	STACKER RECLAIMER	–
4.7	TRANSFER POINTS	12x12
4.8	PENT HOUSE	–
4.9	DRIVE HOUSE FOR STACKER RECLAIMER	–
4.10	COAL PILE RUN-OFF POND	30x40
4.11	CHP MAINTENANCE BUILDING	25x40
4.12	AREA FOR GROUND UNLOADING OF COAL	650 M^2
4.13	CHP PUMP HOUSE	30x25
5.0	**ASH HANDLING PLANT (ISG SCOPE)**	
5.1	HCSS SILO	–
5.2	H.C.S.D. PUMP HOUSE & MCC ROOM	20x35
5.3	DELETED	–
5.4	DRY ASH SILO	–
5.5	DRY ASH SILO UTILITY BUILDING	24x8
5.6	AHP CONTROL ROOM, ASH WATER TANK & ASH SLURRY PUMP HOUSE	40x69
5.7	AHP COMPRESSORS & BLOWERS	25x32
5.8	TUBE SETTLER PLANT	20x35
6.0	**FUEL OIL SYSTEM**	
6.1	FUEL OIL TRANSFER PUMP HOUSE	14x22
6.2	HFO & LDO DAY TANK AREA	32x20
6.3	HFO & LDO PRESSURIZING PUMP HOUSE	22x10
7.0	**EFFLUENT TREATMENT PLANT**	56x30
8.0	**SEWAGE TREATMENT PLANT**	20x10
9.0	**NON-PLANT BUILDING**	
9.1	SERVICE BUILDING	12x42
9.2	WORKSHOP-DELETED	65x30
9.3	LUBE OIL STORAGE SHED WITH STORAGE YARD	15x15
9.4	FIRE STATION-DELETED	10x25
9.5	GAS CYLINDER STORAGE AREA	15x25
9.6	FOPH FOAM SHED	10x13
9.7	STORES	75x30
9.8	CANTEEN	15x20
9.9	TIME OFFICE & SECURITY OFFICE	25x10
9.10	SECURITY OFFICE FOR STORES	10x5
9.11	SECURITY CABIN	10x5
9.12	COAL SAMPLING & PROCESSING ROOM	15x25
9.13	WEIGH BRIDGE FOR DRY ASH SILO	–
9.14	PARKING SHEDS	30x50
9.15	PAY LOADER SHED	12x66
9.16	STEEL YARD INCLUDING STORES & WEIGH BRIDGE	135x60
9.17	FIRE WATER BOOSTER PUMP HOUSE	9x6
9.18	AMBIENT AIR QUALITY MONITORING SYSTEM	4x5

PRESSURE METER TEST (PMT)

MARKING	CO-ORDINATES	
PMT-1	1152 E	817 N
PMT-2	1152 E	645 N
PMT-3	1121 E	540 N
PMT-4	1682 E	400 N

CROSSHOLE SHEAR TEST (CST)

MARKING	CO-ORDINATES	
CST-1	1152 E	794 N
CST-2	1124 E	606 N
CST-3	1179 E	604 N
CST-4	1154 E	523 N

ELECTRICAL RESISTIVITY TEST (ERT)

MARKING	CO-ORDINATES	
ERT-1	1060 E	500 N
ERT-2	1100 E	460 N
ERT-3	1110 E	490 N
ERT-4	1170 E	470 N
ERT-5	1180 E	487 N
ERT-6	1192 E	581 N
ERT-7	1097 E	670 N
ERT-8	1220 E	734 N
ERT-9	1560 E	210 N
ERT-10	1507 E	407 N
ERT-11	1360 E	880 N
ERT-12	1290 E	920 N
ERT-13	1087 E	704 N
ERT-14	1031 E	719 N

DYNAMIC CONE PENETRATION TEST (DCPT)

MARKING	CO-ORDINATES	
DCPT-1	1125 E	730 N
DCPT-2	1178 E	729 N
DCPT-3	1151 E	686 N
DCPT-4	1148 E	612 N
DCPT-5	1103 E	525 N

CROSSHOLE SHEAR TEST (ICST)

MARKING	CO-ORDINATES	
ICST-1	1385 E	1085 N
ICST-2	1341 E	877 N

REV.	DATE	ALTD	CHD	APPD
02	13.03.2018	S.ND -sd-	V.V. -sd-	TMSR -sd-
	DRAWING IS GENERALLY REVISED DUE TO CHANGE IN PLOT PLAN AND THUS MARKED.			
01	21.02.2018	V.V. -sd-	TMSR -sd-	CPK -sd-
	DRAWING IS GENERALLY REVISED DUE TO CHANGE IN PLOT PLAN AND THUS 1 MARKED.			

JOB NO. 415
STATUS CONTRACT
DISTRIBUTION

MAHAGENCO
MAHARASHTRA STATE POWER GENERATION CO.LTD.
BHUSAWAL T.P.S. UNIT-6 : 1 X 660 MW PROJECT

OWNER CONSULTANT:

1 X 660 MW BHUSAWAL T.P.S. UNIT-6 TPP

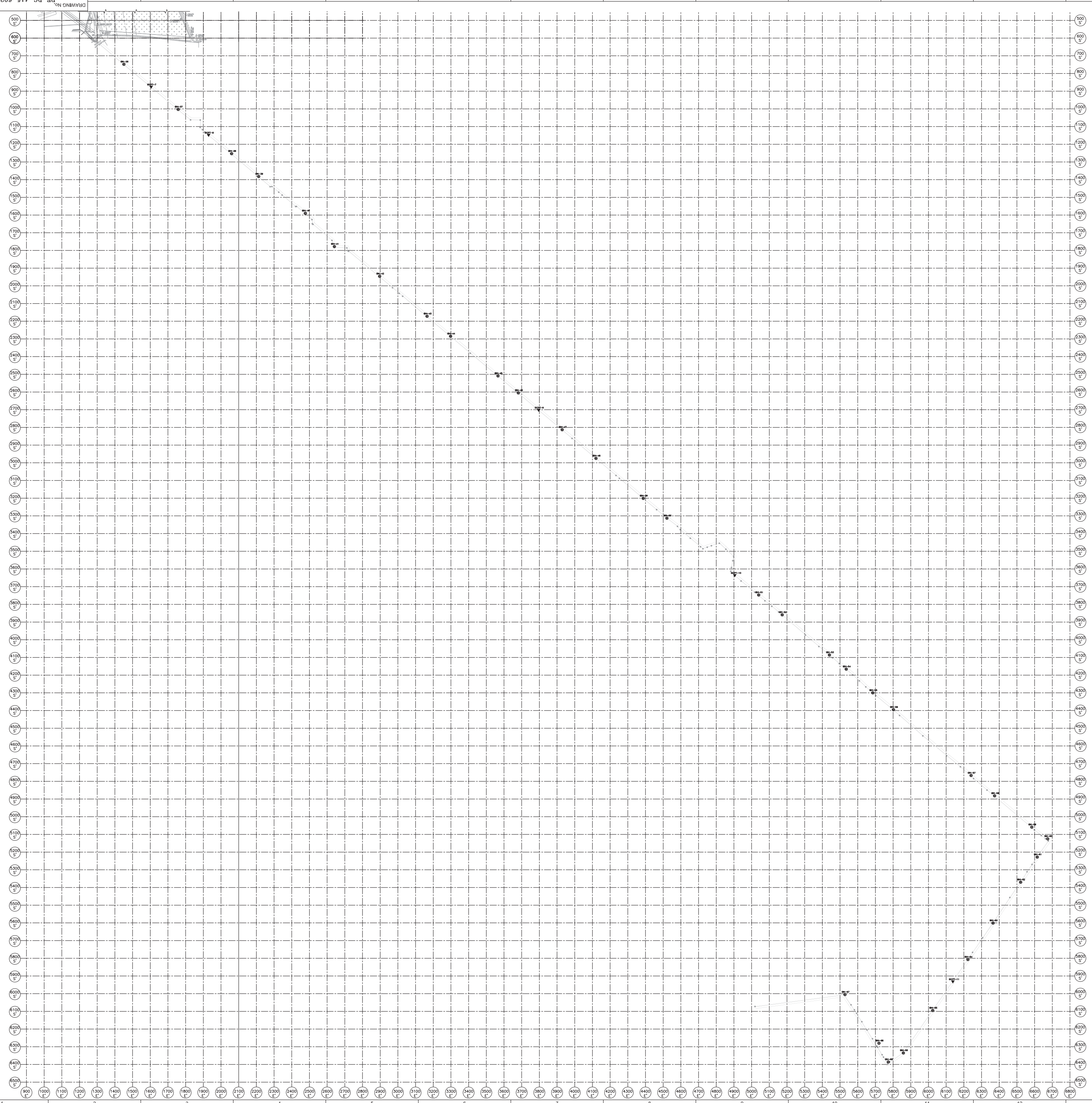
BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

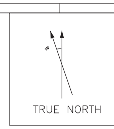
DEPT CODE		NAME	SIGN	DATE
C	DRN	S.ND	-SD-	30.01.2018
	DESN	V.V.	-SD-	30.01.2018
	CHD	TMSR	-SD-	30.01.2018
	APPD	CPK	-SD-	30.01.2018

TITLE
GEOTECHNICAL INVESTIGATION LAYOUT

DEPT. SIGN SCALE 1:125
DRAWING NO. PE-DG-415-602-C001
SHEET 1 OF 1 REV. 02
SIZE-A0

Mar 13, 2018 - 11:00am





BORE HOLE (IBH)			DEPTH (M)
MARKING	CO-ORDINATES		
IBH-35	1263 E	460 S	15
IBH-36	1451 E	748 S	10
IBH-37	1758 E	1003 S	10
IBH-38	2060 E	1253 S	10
IBH-39	2213 E	1382 S	10
IBH-40	2477 E	1590 S	10
IBH-41	2641 E	1778 S	10
IBH-42	2897 E	1946 S	10
IBH-43	3165 E	2172 S	10
IBH-44	3298 E	2285 S	10
IBH-45	3566 E	2509 S	10
IBH-46	3681 E	2605 S	10
IBH-47	3929 E	2813 S	10
IBH-48	4120 E	2975 S	10
IBH-49	4387 E	3201 S	10
IBH-50	4521 E	3313 S	10
IBH-51	5040 E	3747 S	10
IBH-52	5173 E	3859 S	10
IBH-53	5440 E	4086 S	10
IBH-54	5535 E	4166 S	10
IBH-55	5685 E	4300 S	10
IBH-56	5802 E	4395 S	10
IBH-57	6241 E	4767 S	10
IBH-58	6374 E	4882 S	10
IBH-59	6584 E	5059 S	10
IBH-60	6674 E	5125 S	10
IBH-61	6615 E	5228 S	10
IBH-62	6521 E	5370 S	10
IBH-63	6365 E	5601 S	10
IBH-64	6223 E	5807 S	10
IBH-65	6024 E	6095 S	10
IBH-66	5858 E	6335 S	10
IBH-67	5528 E	6005 S	10
IBH-68	5720 E	6280 S	10
IBH-69	5773 E	6386 S	10

DYNAMIC CONE PENETRATION TEST (IDCPT)		
MARKING	CO-ORDINATES	
IDCPT-7	1605 E	875 S
IDCPT-8	1930 E	1147 S
IDCPT-9	3796 E	2701 S
IDCPT-10	4905 E	3635 S
IDCPT-11	6138 E	5931 S

N O T E S:-

1. ALL DIMENSIONS ARE IN METERS UNLESS NOTED OTHERWISE.
2. BACKFILLING OF BORE HOLES AND PITS SHALL BE AS PER SPECIFICATION AND AS DIRECTED BY THE ENGINEER-IN-CHARGE.
3. STARTING DEPTH OF STANDARD PENETRATION TEST (SPT) SHALL BE 1.5M BELOW GROUND LEVEL AND THE TEST SHALL BE CONDUCTED AT EVERY 1M INTERVAL ALTERNATE TO COLLECTION OF UNDISTURBED SAMPLE (UDS) UPTO 10M DEPTH BELOW GROUND LEVEL AND AT EVERY 1.5M INTERVAL ALTERNATE TO COLLECTION OF UDS BEYOND 10M DEPTH, AT CHANGE OF STRATA & AT DEPTHS WHEREVER UDS COULD NOT BE COLLECTED.
4. STARTING DEPTH OF COLLECTION OF UDS SHALL BE 0.5M BELOW GROUND LEVEL AND UDS SHALL BE COLLECTED AT 1M INTERVAL ALTERNATE TO CONDUCTING SPT UPTO 10M DEPTH BELOW GROUND LEVEL & AT EVERY 1.5M INTERVAL ALTERNATE TO CONDUCTING SPT BEYOND 10M DEPTH.
5. GEOTECHNICAL INVESTIGATION SHALL BE CARRIED OUT AS PER SPECIFICATION.
6. DO NOT SCALE THIS DRAWING.

REF DRG :

1. PE-DG-415-100-M001, REV-00 "PLOT PLAN".

GEOTECHNICAL INVESTIGATION LEGEND:

1. BOREHOLE (BH/IBH) . . . . ●
2. DYNAMIC CONE PENETRATION TEST (DCPT/IDCPT) . . . . ▼

MAHAGENCO MAHARASHTRA STATE POWER GENERATION CO.LTD.
BHUSAWAL T.P.S. UNIT-6 : 1 X 660 MW PROJECT

OWNER CONSULTANT:

1 X 660 MW BHUSAWAL T.P.S. UNIT-6 TPP

JOB NO. 415
STATUS CONTRACT
DISTRIBUTION

REV.	DATE	ALTD	CHD	APPD	REV.	DATE	ALTD	CHD	APPD

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

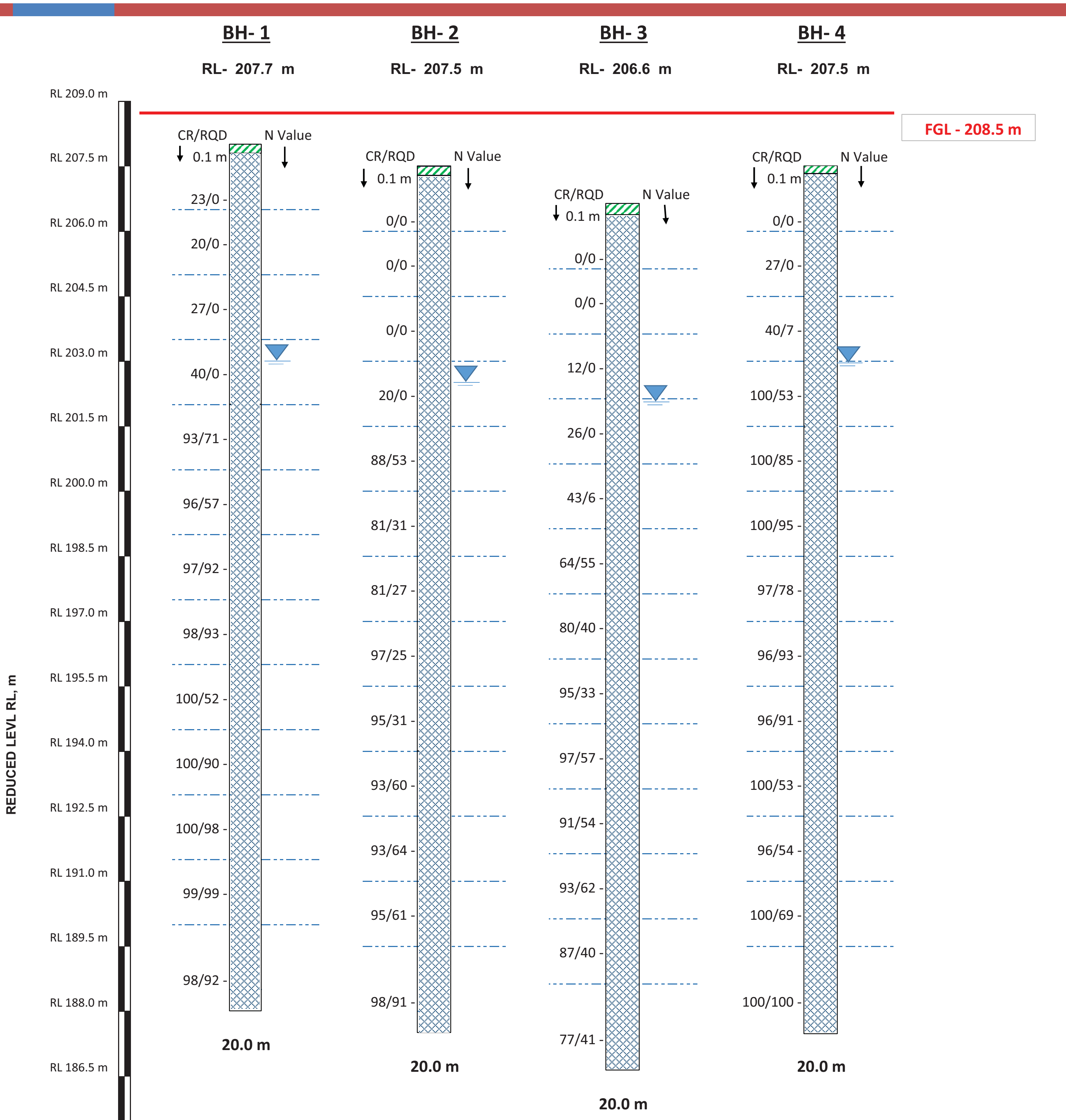
DEPT CODE		NAME	SIGN	DATE
C	DRN	S.ND	-SD-	13.03.2018
	DESN	V.V.	-SD-	13.03.2018
	CHD	TMSR	-SD-	13.03.2018
	APPD	TMSR	-SD-	13.03.2018

TITLE
GEOTECHNICAL INVESTIGATION LAYOUT (ASH CORRIDOR)

DEPT. SCALE 1:125
SIGN
DRAWING NO. PE-DG-415-602-C002
SHEET 1 OF 1 REV. 00
SIZE-A0

Plate No. 2b of 287
Mar 13, 2018 - 10:51am

SUMMARY OF BOREHOLE PROFILES

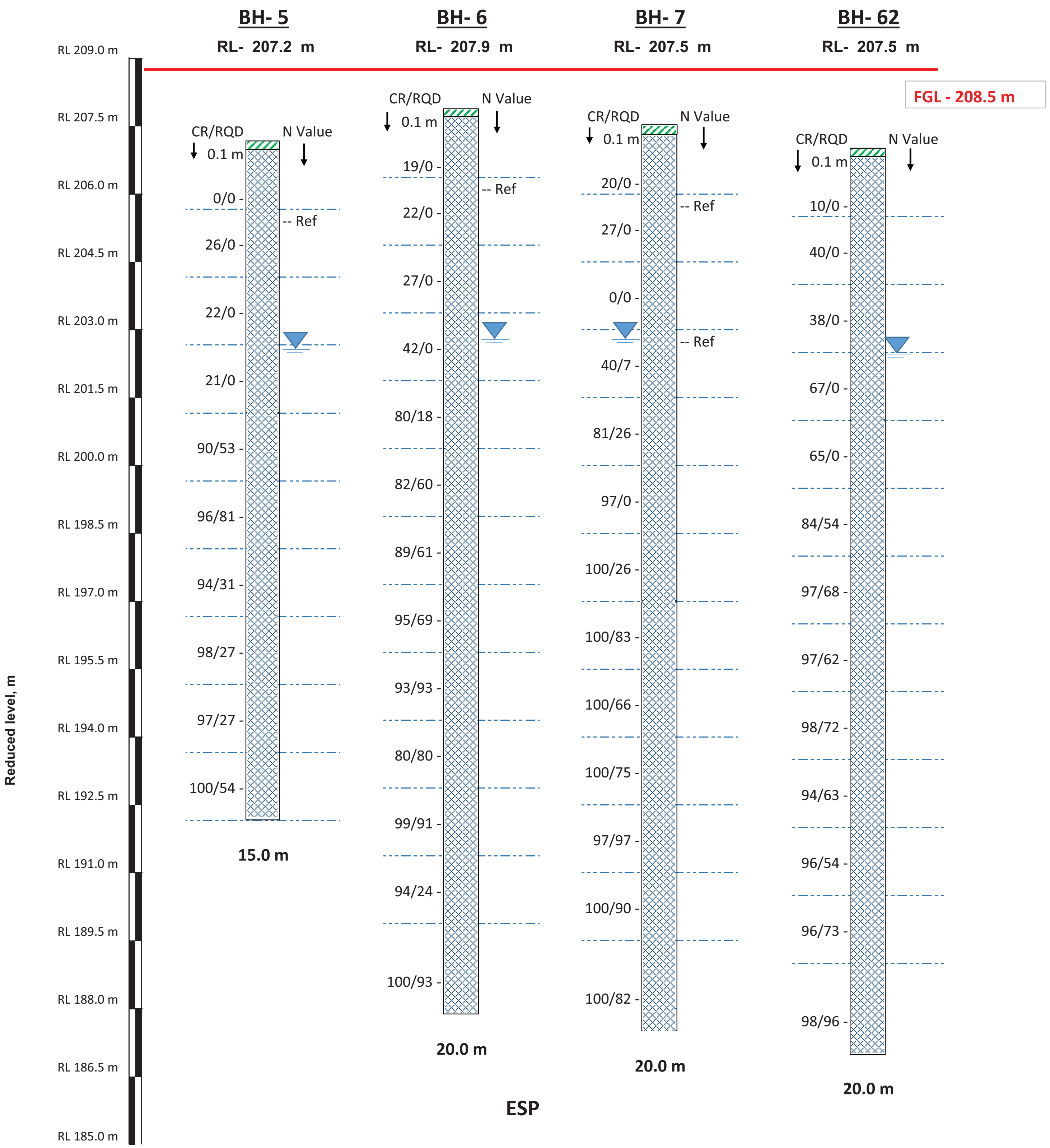


ID FAN

LEGEND	
SYMBOL	DESCRIPTION
	Black Silty Clay
	Basalt
	Water Table

Note: * Ref stands for Refusal where (SPT N Value >100) blows

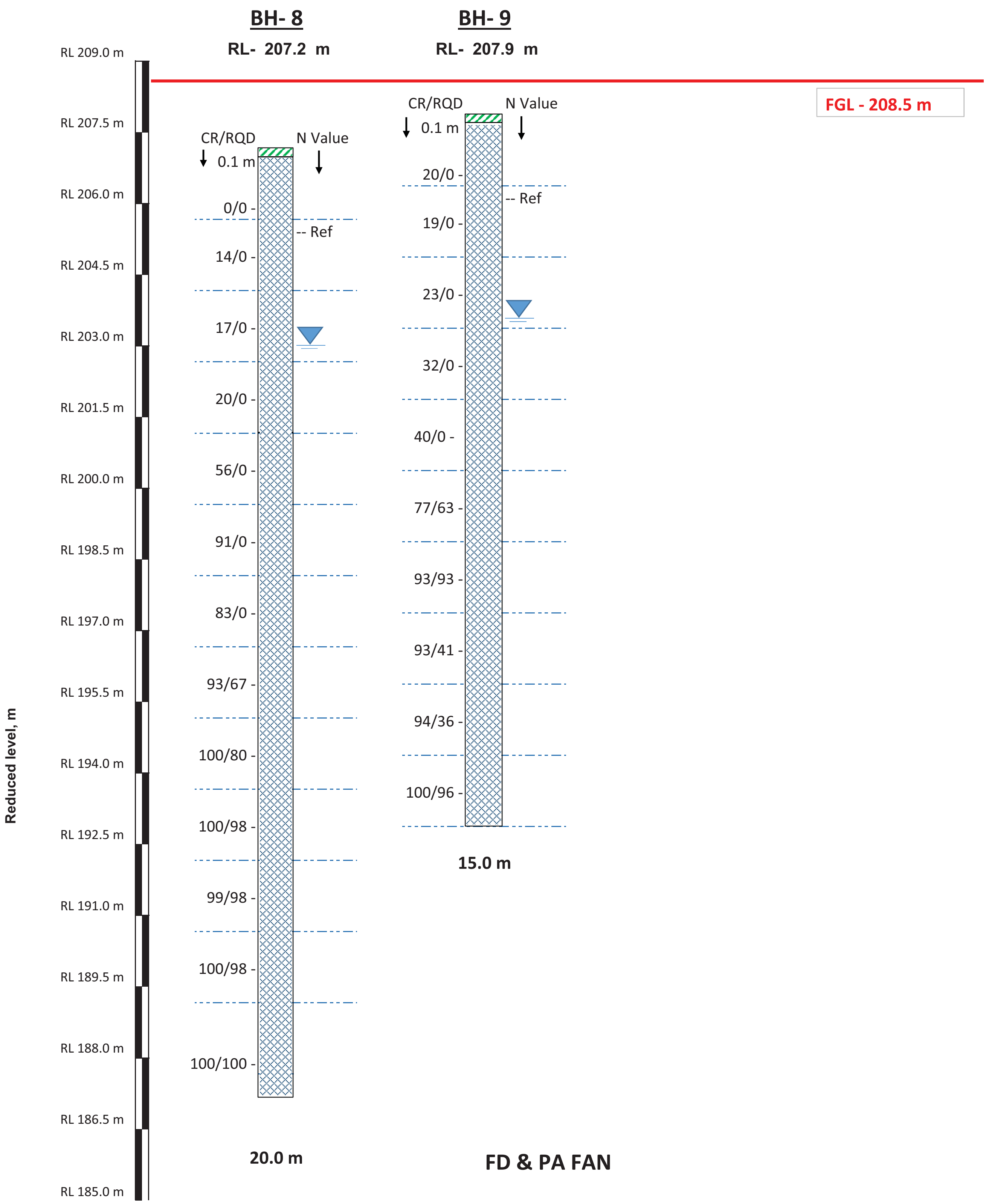
Summary of Borehole Profiles



LEGEND	
SYMBOL	DESCRIPTION
	Black Silty Clay
	Basalt
	Water Table

Note: * Ref stands for Refusal where (SPT N Value >100) blows

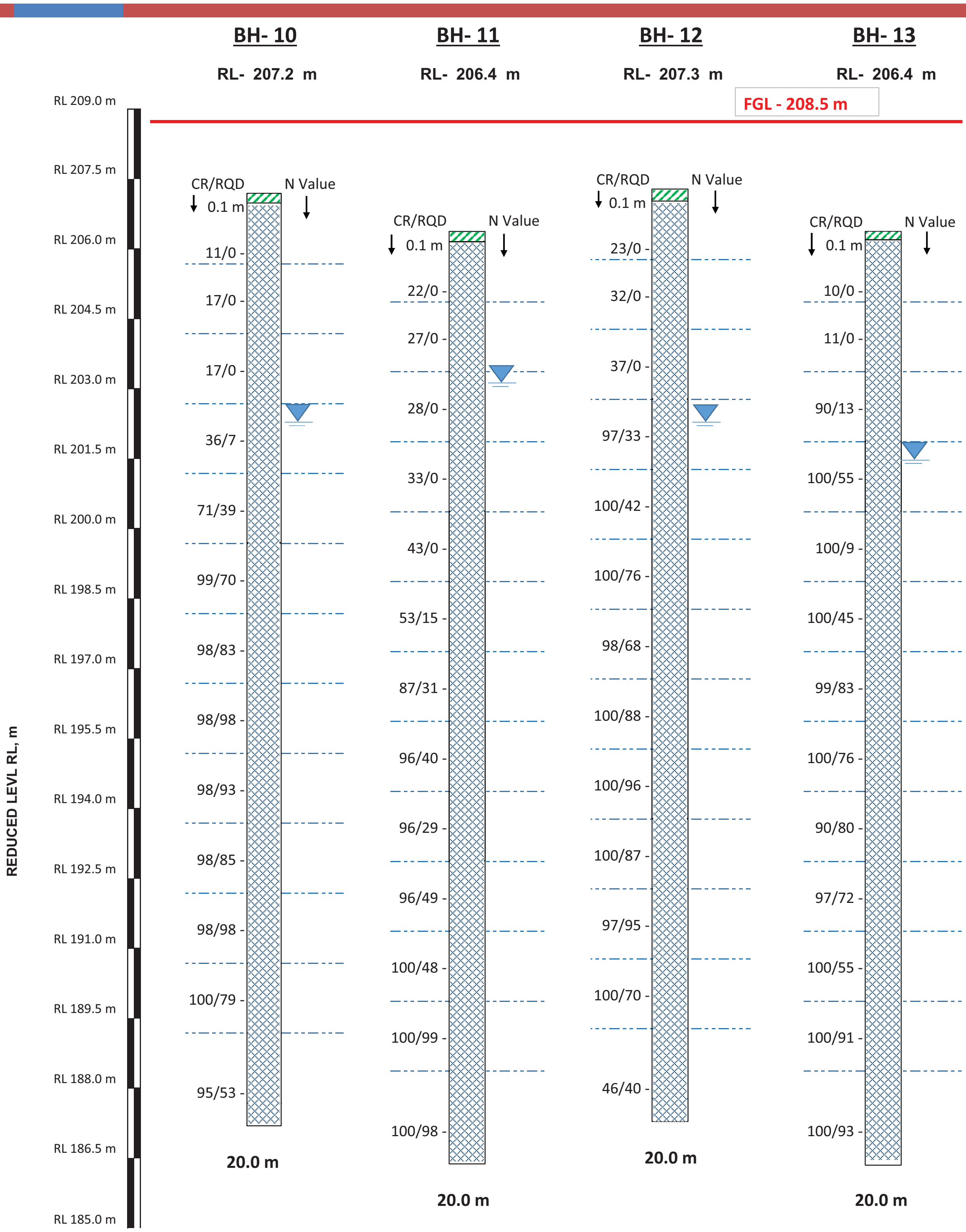
Summary of Borehole Profiles



LEGEND	
SYMBOL	DESCRIPTION
	Black Silty Clay
	Basalt
	Water Table

Note: * Ref stands for Refusal where (SPT N Value >100) blows

Summary of Borehole Profiles

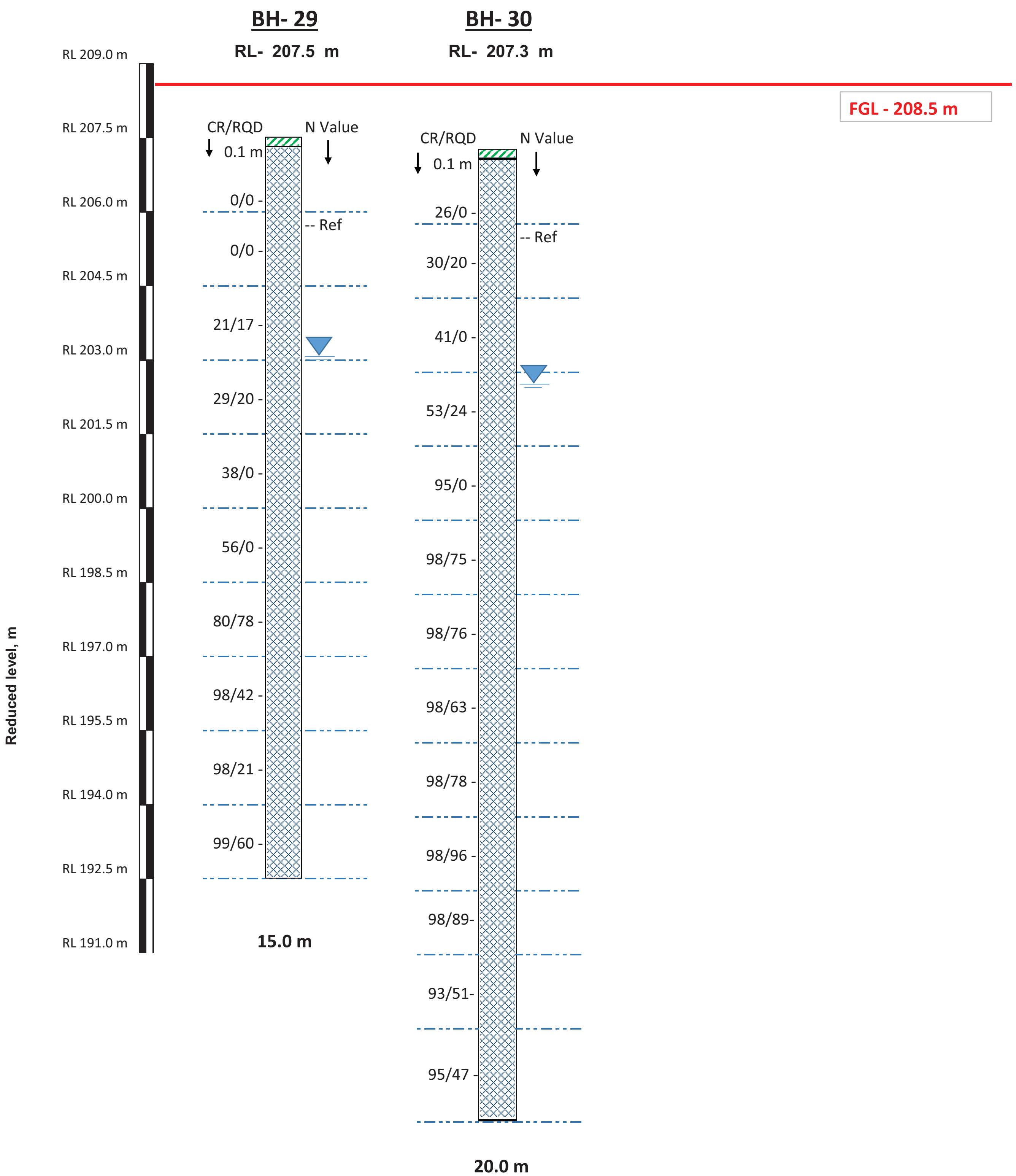


BOILER

LEGEND	
SYMBOL	DESCRIPTION
	Black Silty Clay
	Basalt
	Water Table

Note: * Ref stands for Refusal where (SPT N Value >100) blows

Summary of Borehole Profiles

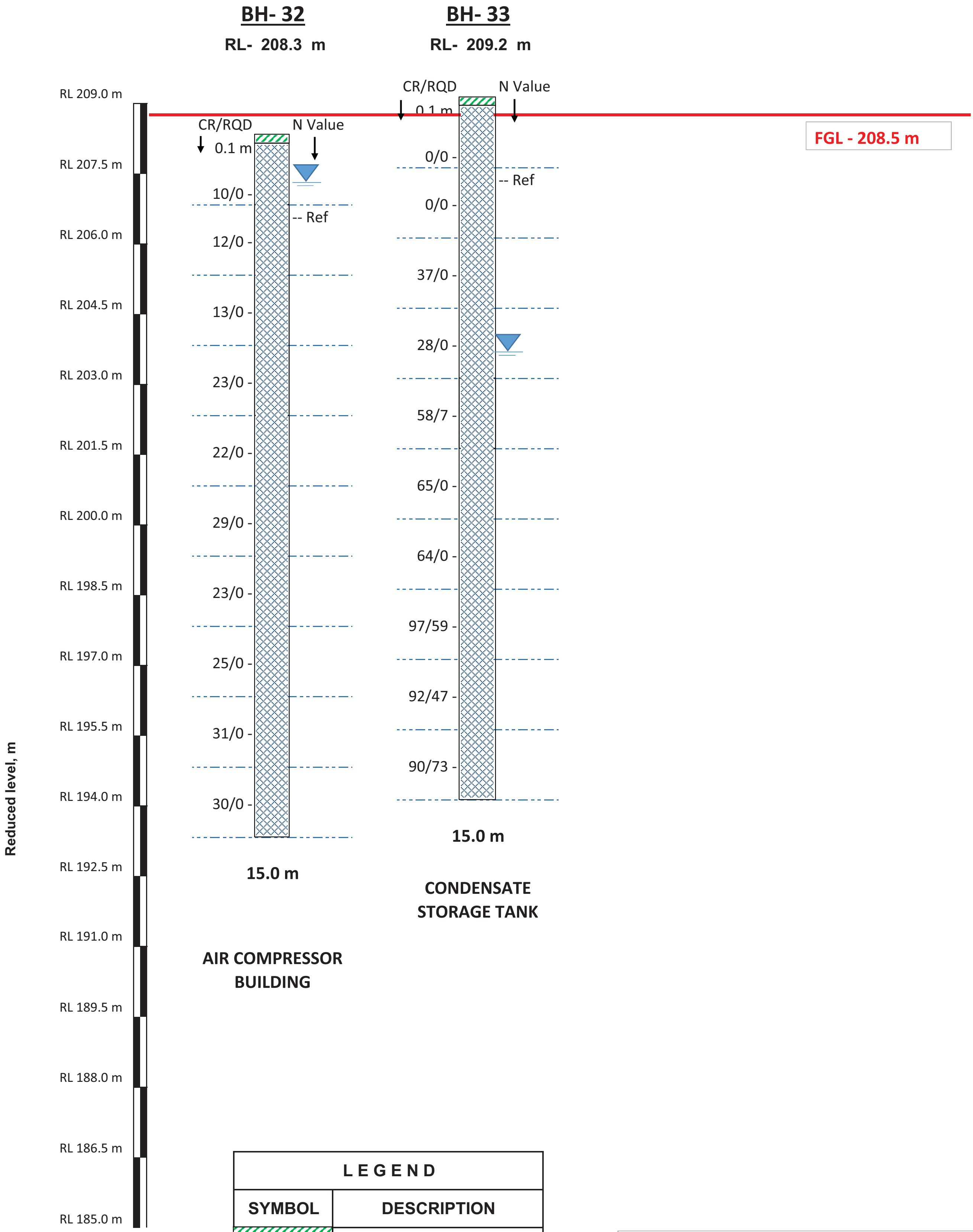


LEGEND	
SYMBOL	DESCRIPTION
	Black Silty Clay
	Basalt
	Water Table

FGD AREA

Note: * Ref stands for Refusal where (SPT N Value >100) blows

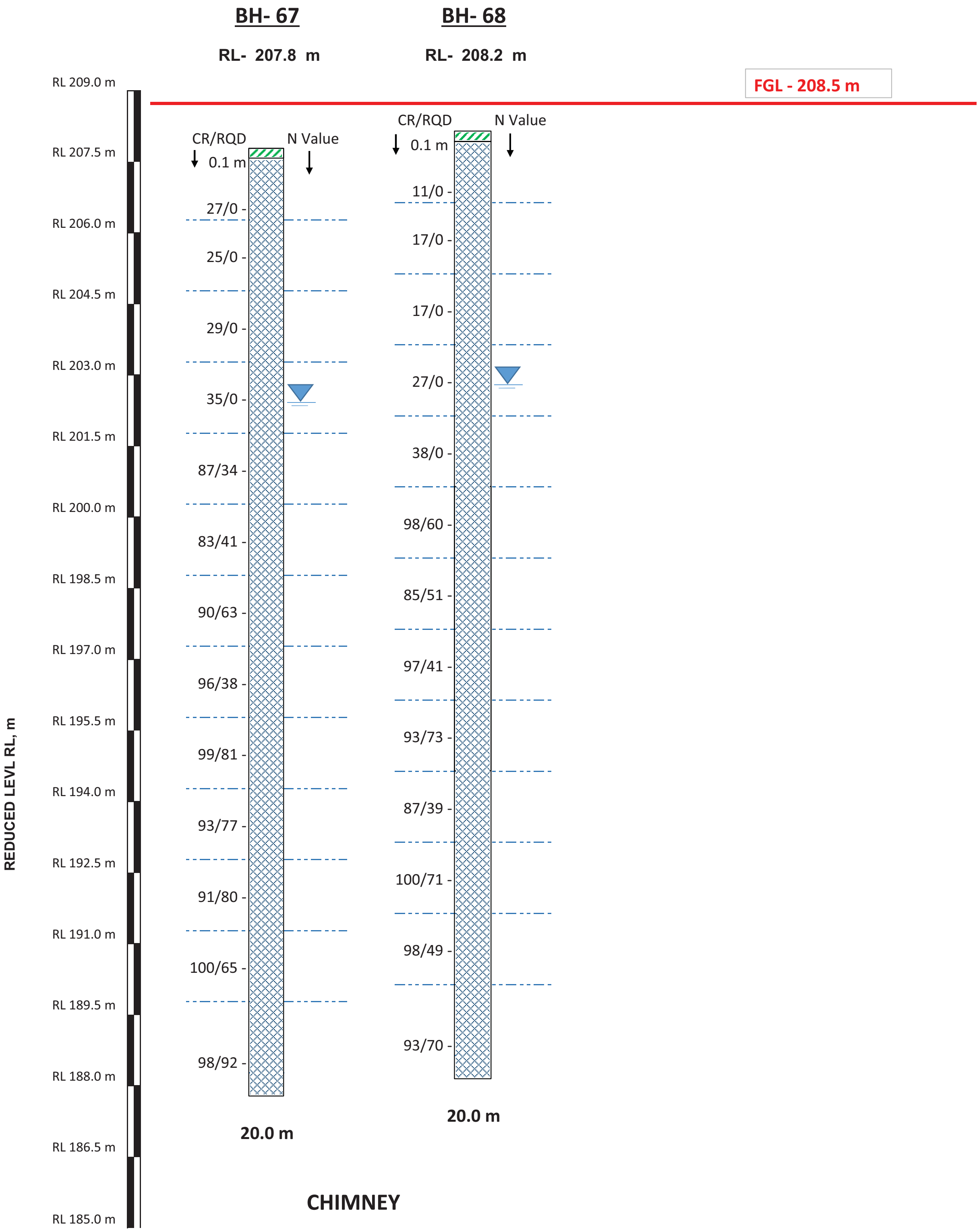
Summary of Borehole Profiles



LEGEND	
SYMBOL	DESCRIPTION
	Black Silty Clay
	Basalt
	Water Table

Note: * Ref stands for Refusal where (SPT N Value >100) blows

Summary of Borehole Profiles

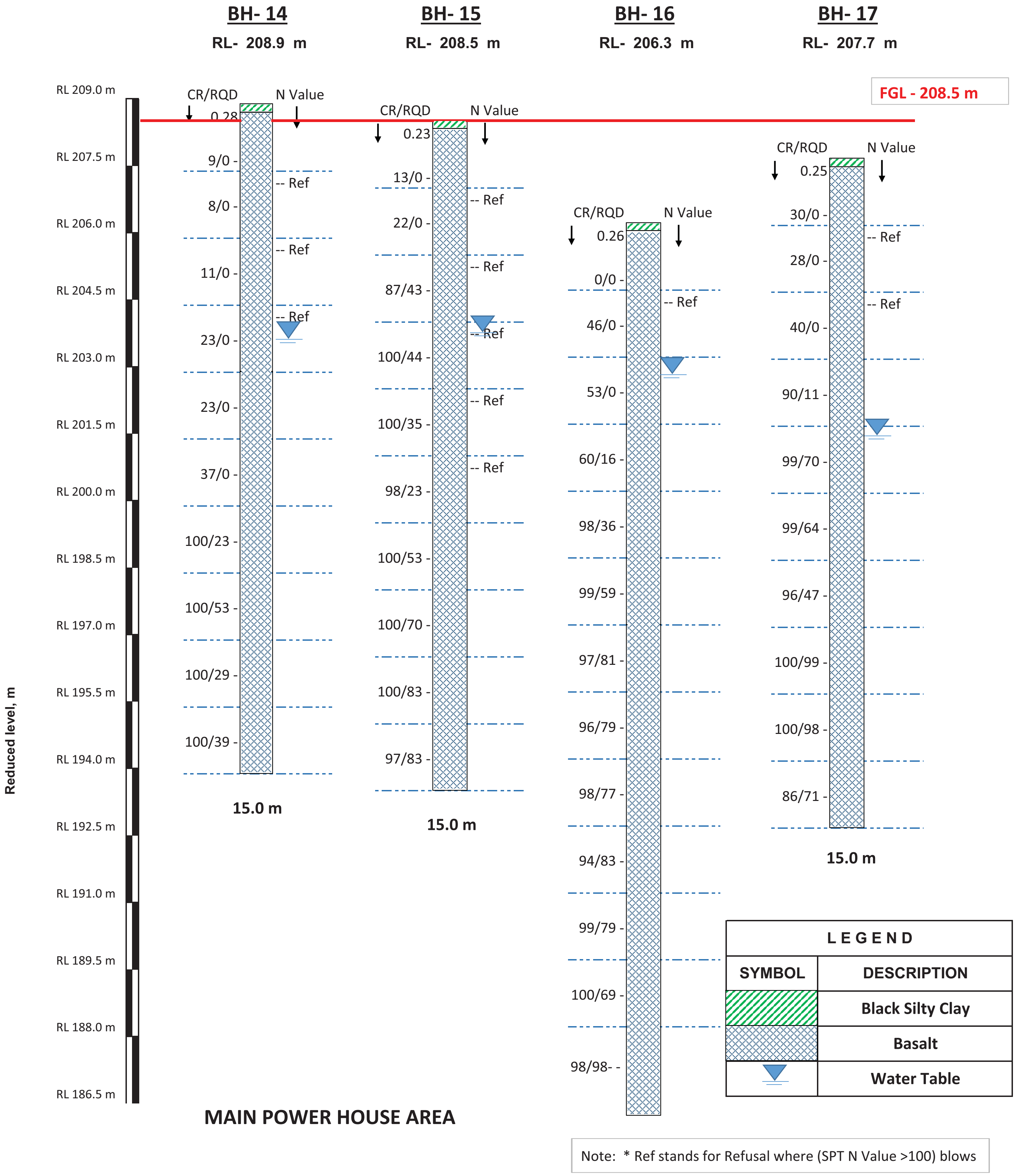


CHIMNEY

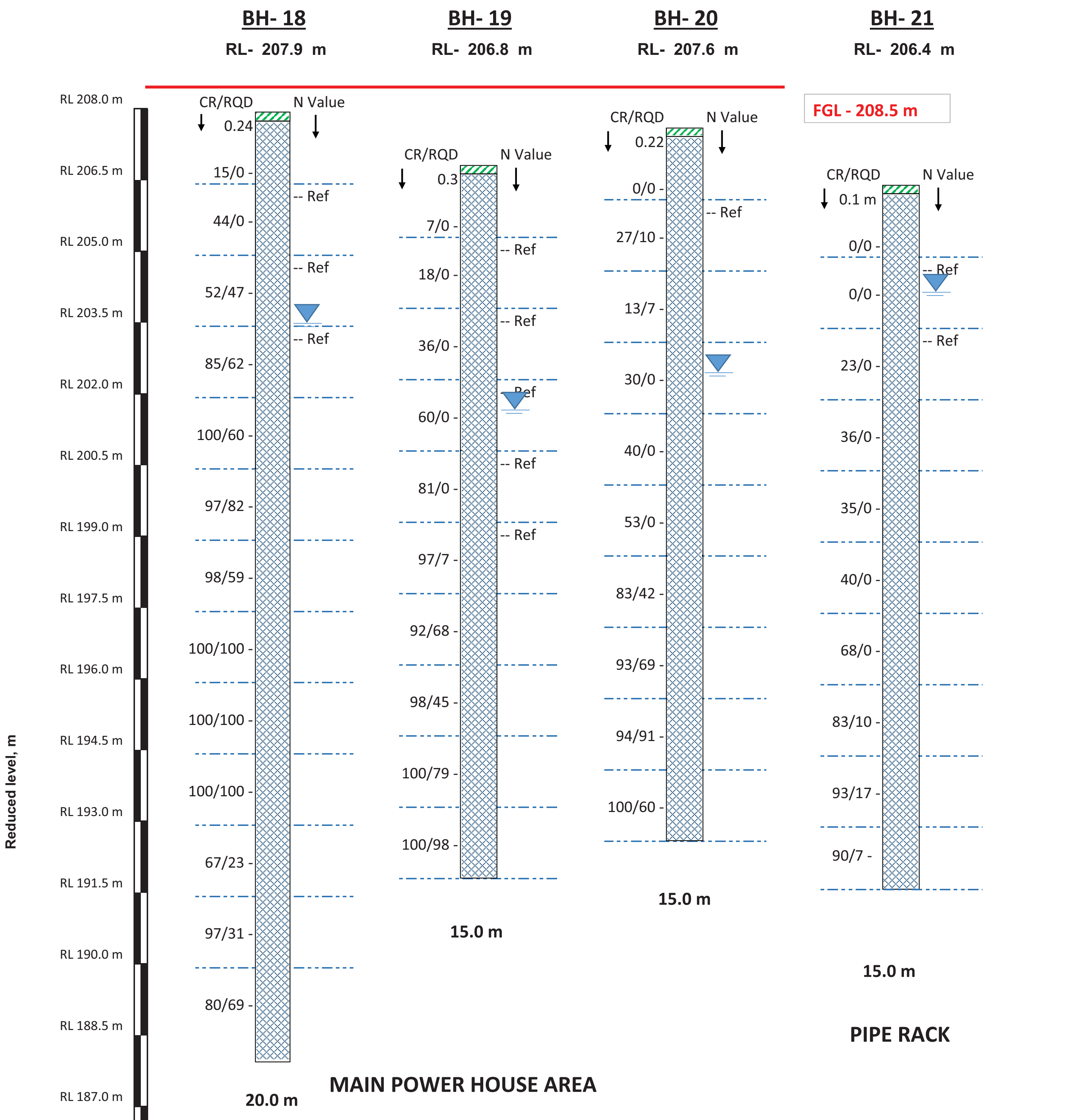
LEGEND	
SYMBOL	DESCRIPTION
	Black Silty Clay
	Basalt
	Water Table

Note: * Ref stands for Refusal where (SPT N Value >100) blows

Summary of Borehole Profiles



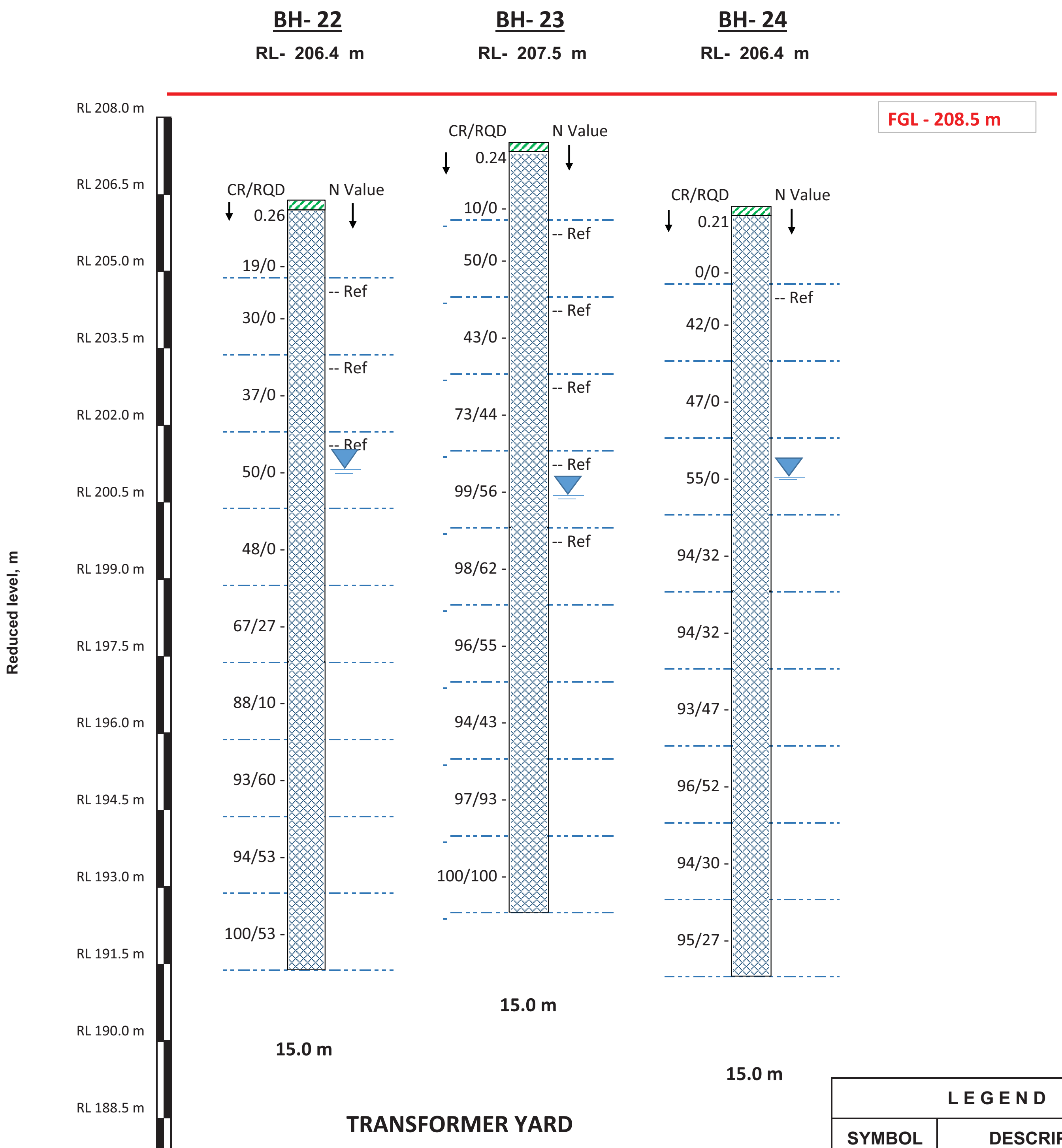
Summary of Borehole Profiles



Note: * Ref stands for Refusal where (SPT N Value >100) blows

LEGEND	
SYMBOL	DESCRIPTION
	Black Silty Clay
	Basalt
	Water Table

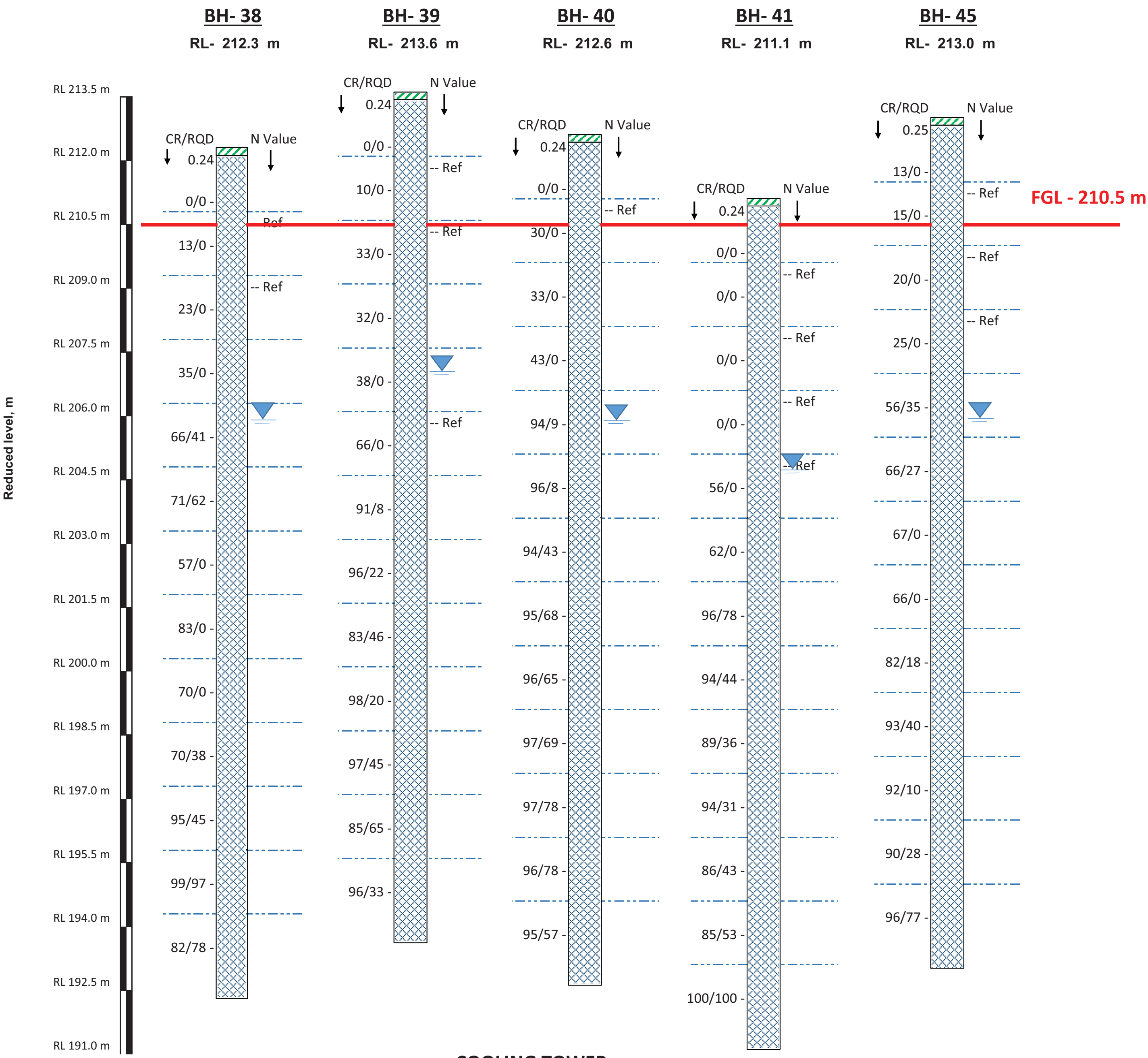
Summary of Borehole Profiles



LEGEND	
SYMBOL	DESCRIPTION
	Black Silty Clay
	Basalt
	Water Table

Note: * Ref stands for Refusal where (SPT N Value >100) blows

Summary of Borehole Profiles



COOLING TOWER

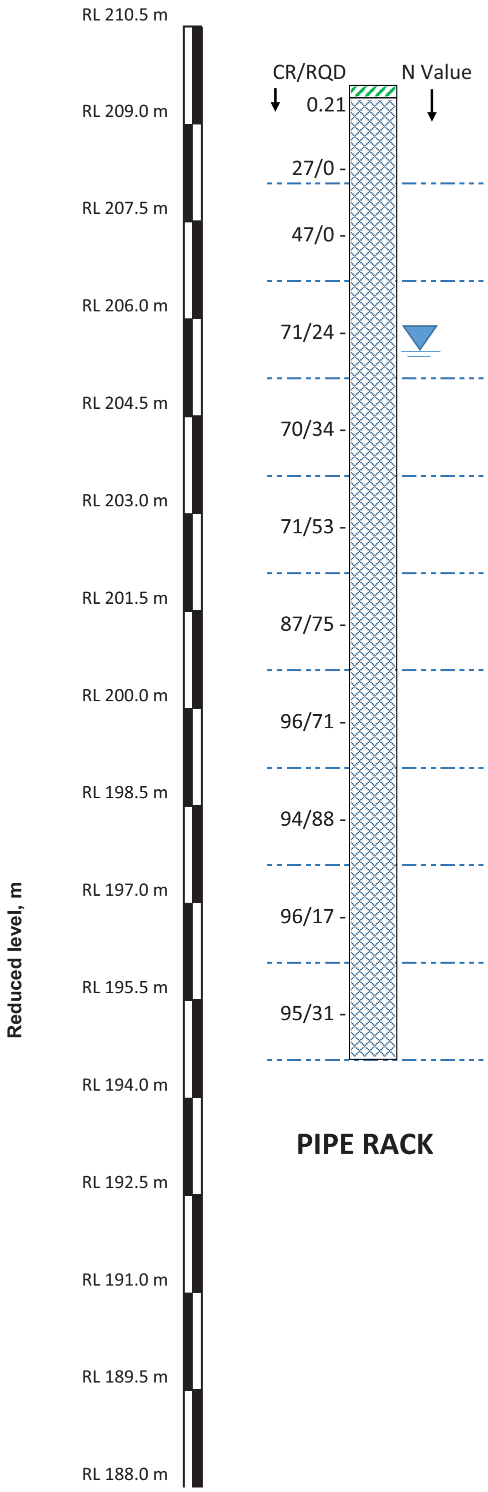
LEGEND	
SYMBOL	DESCRIPTION
	Black Silty Clay
	Basalt
	Water Table

Note: * Ref stands for Refusal where (SPT N Value >100) blows

Summary of Borehole Profiles

BH- 25

RL- 209.6 m

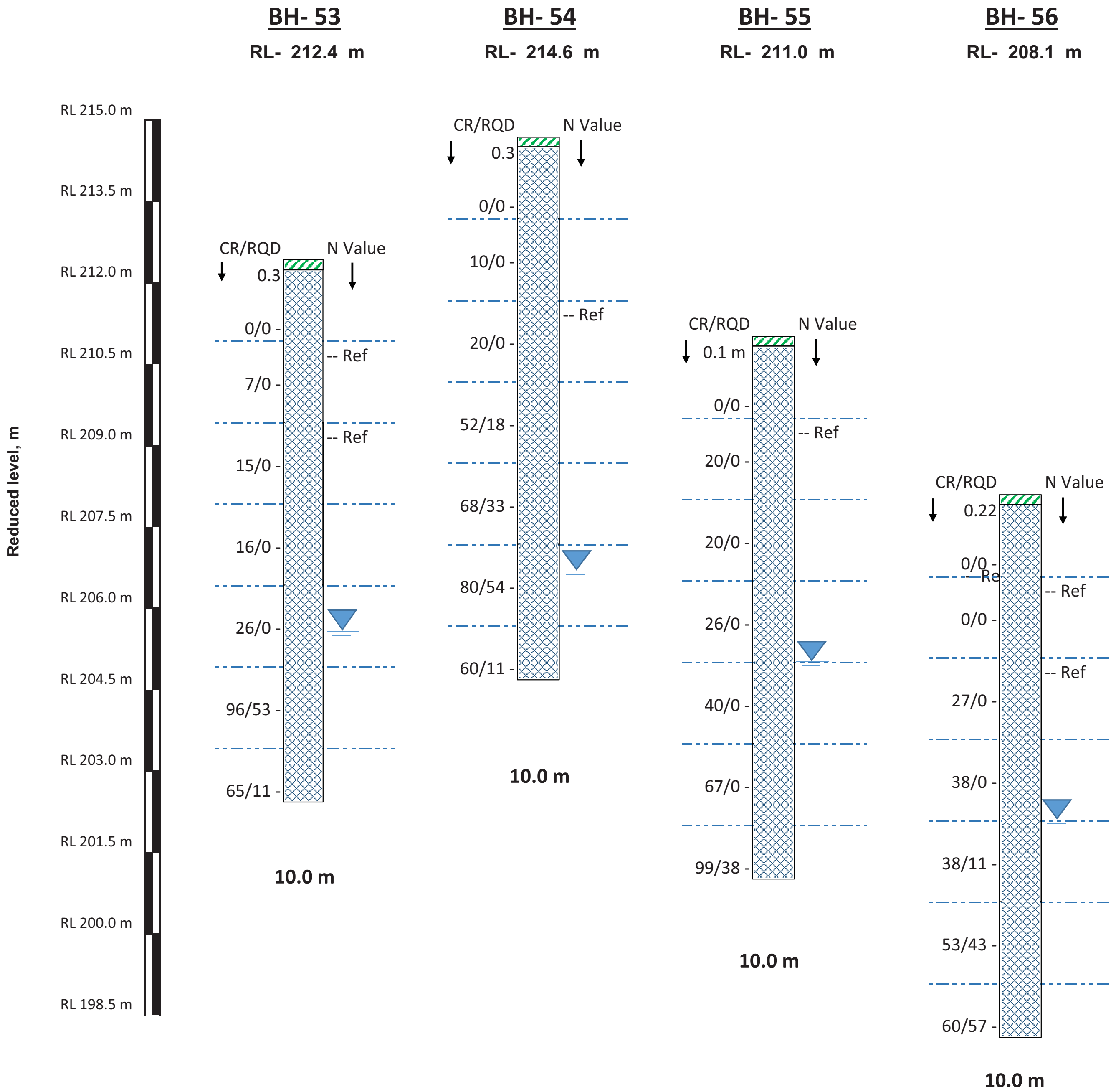


PIPE RACK

LEGEND	
SYMBOL	DESCRIPTION
	Black Silty Clay
	Basalt
	Water Table

Note: * Ref stands for Refusal where (SPT N Value >100) blows

Summary of Borehole Profiles

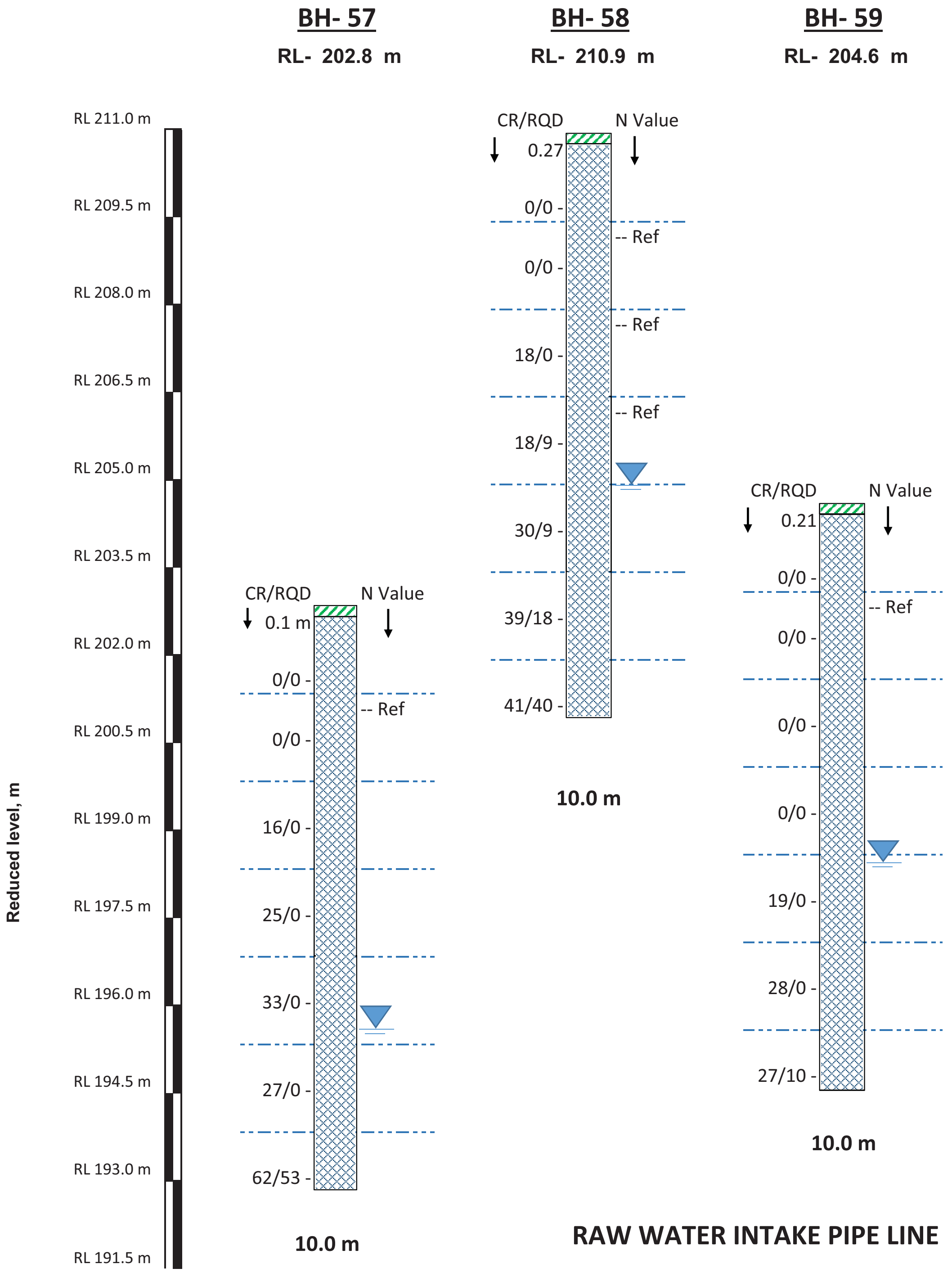


RAW WATER INTAKE PIPE LINE

LEGEND	
SYMBOL	DESCRIPTION
	Black Silty Clay
	Basalt
	Water Table

Note: * Ref stands for Refusal where (SPT N Value >100) blows

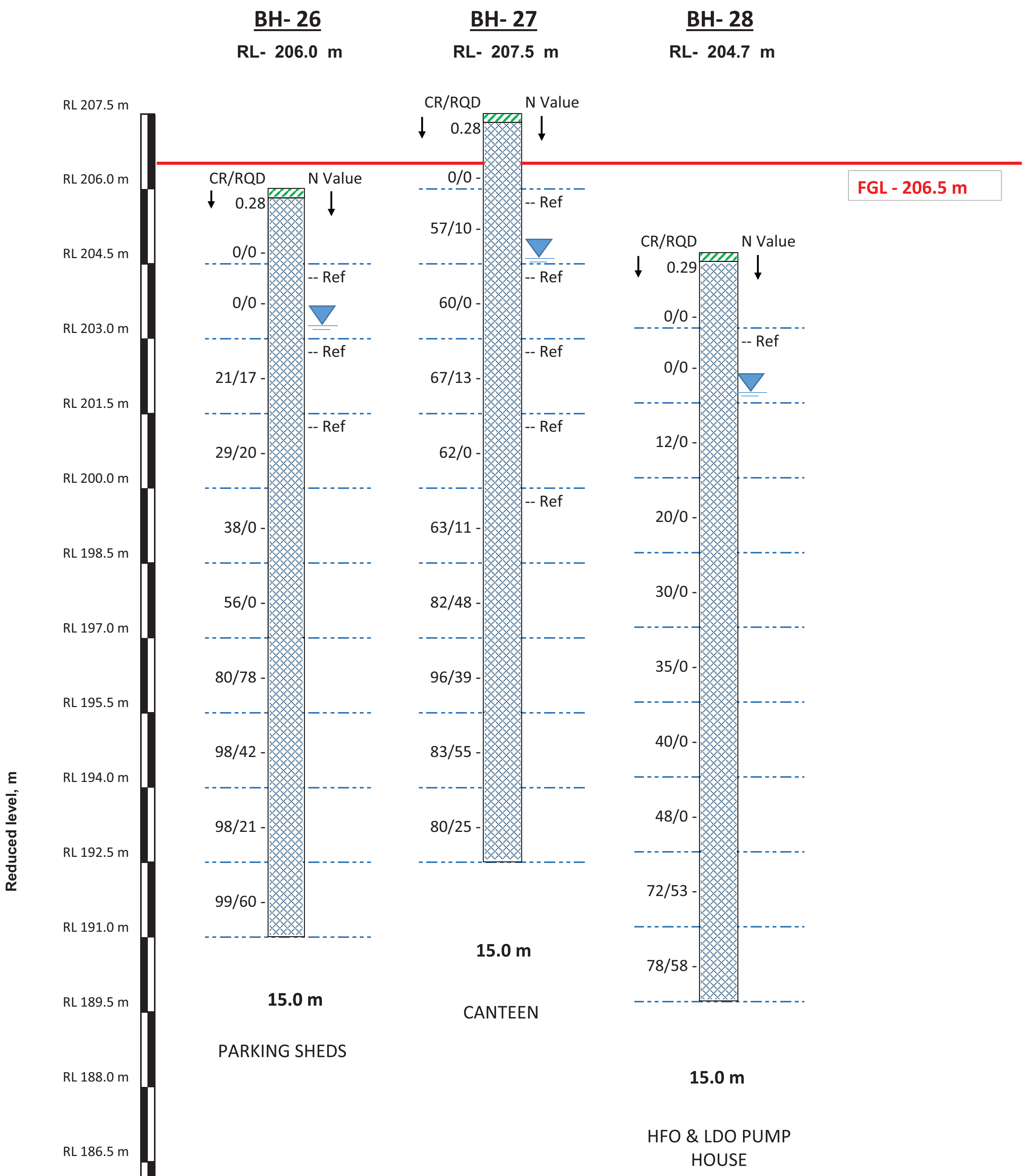
Summary of Borehole Profiles



LEGEND	
SYMBOL	DESCRIPTION
	Black Silty Clay
	Basalt
	Water Table

Note: * Ref stands for Refusal where (SPT N Value >100) blows

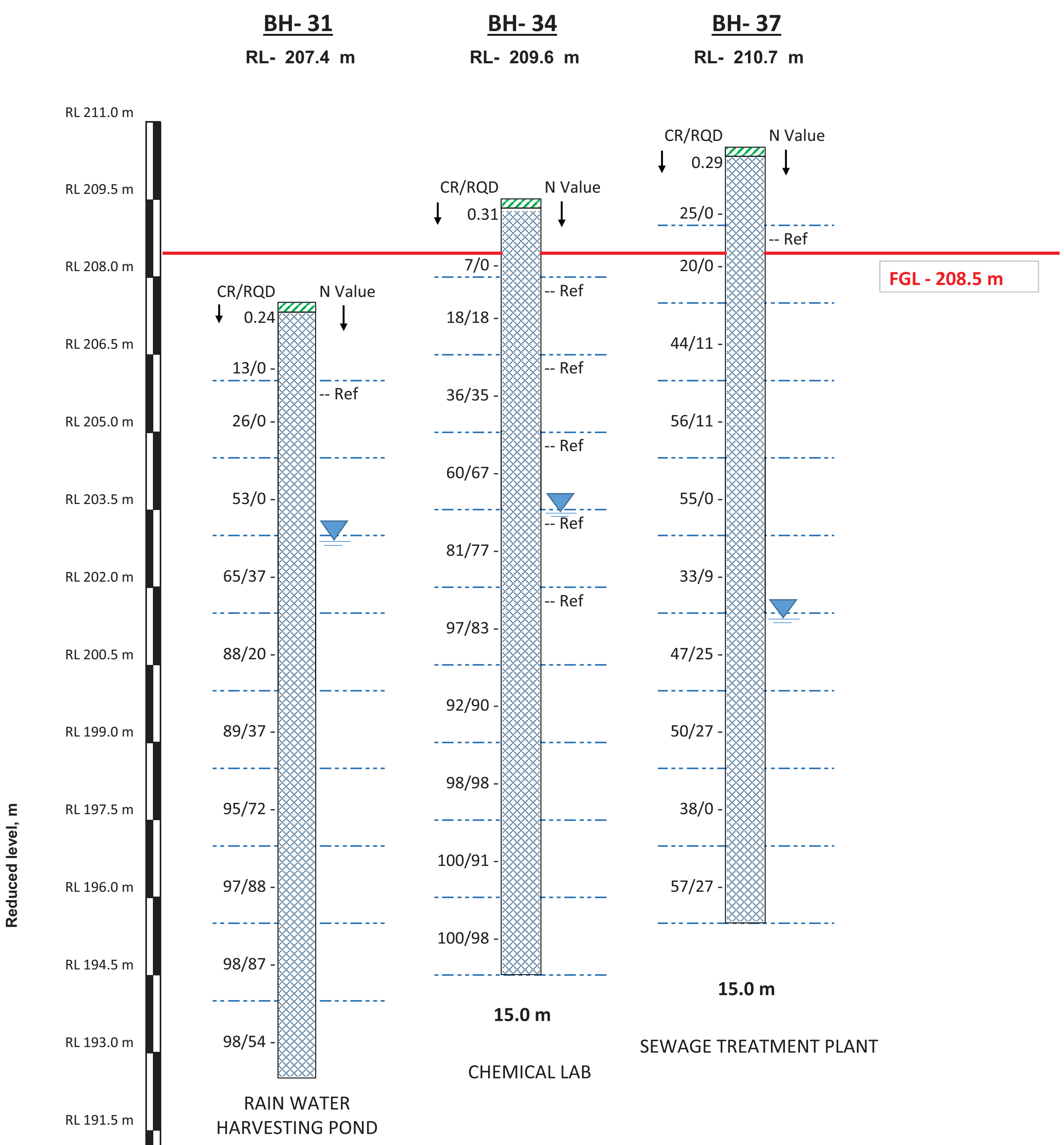
Summary of Borehole Profiles



LEGEND	
SYMBOL	DESCRIPTION
	Black Silty Clay
	Basalt
	Water Table

Note: * Ref stands for Refusal where (SPT N Value >100) blows

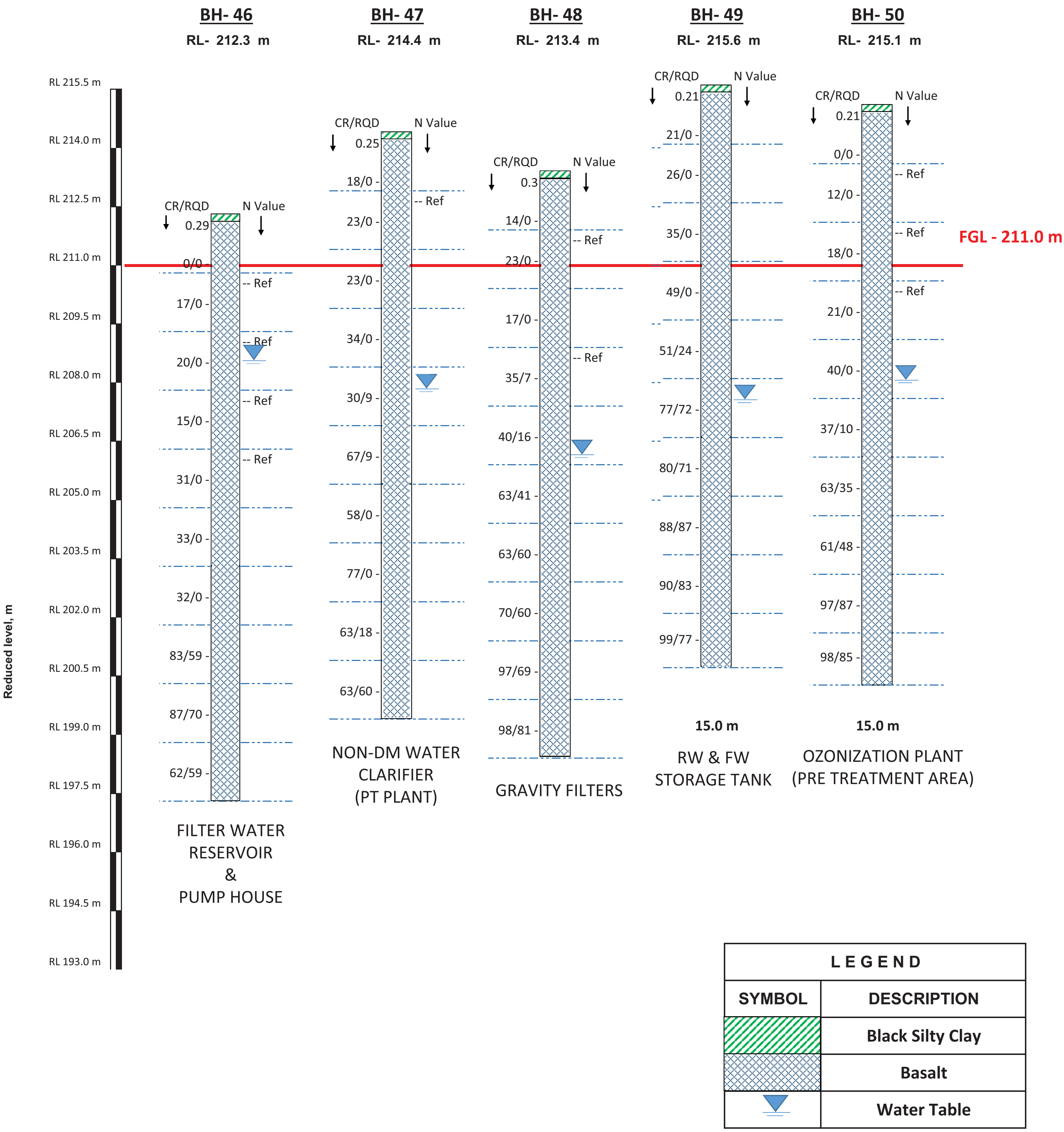
Summary of Borehole Profiles



LEGEND	
SYMBOL	**DESCRIPTION**
	Black Silty Clay
	Basalt
	Water Table

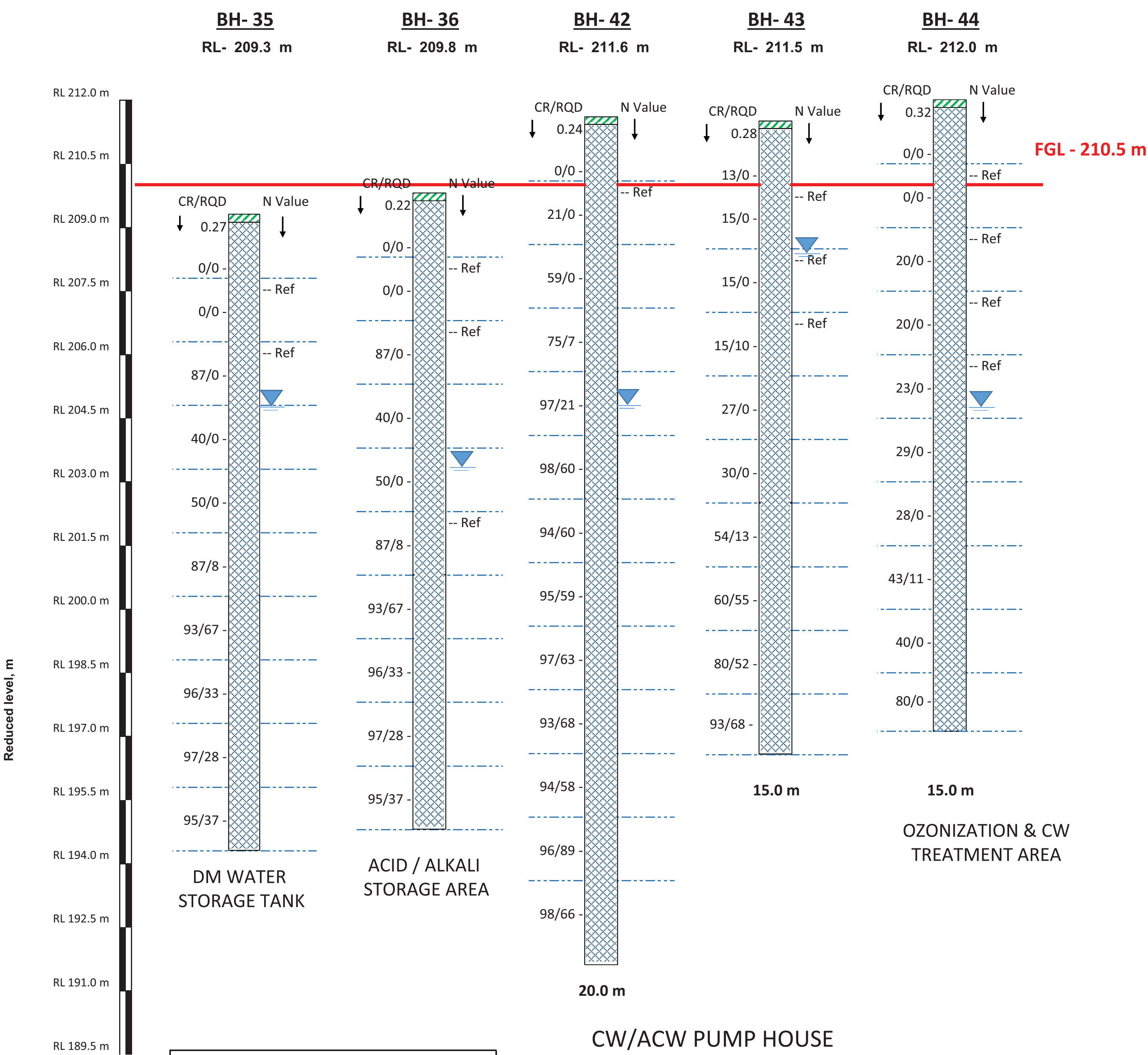
Note: * Ref stands for Refusal where (SPT N Value >100) blows

Summary of Borehole Profiles



Note: * Ref stands for Refusal where (SPT N Value >100) blows

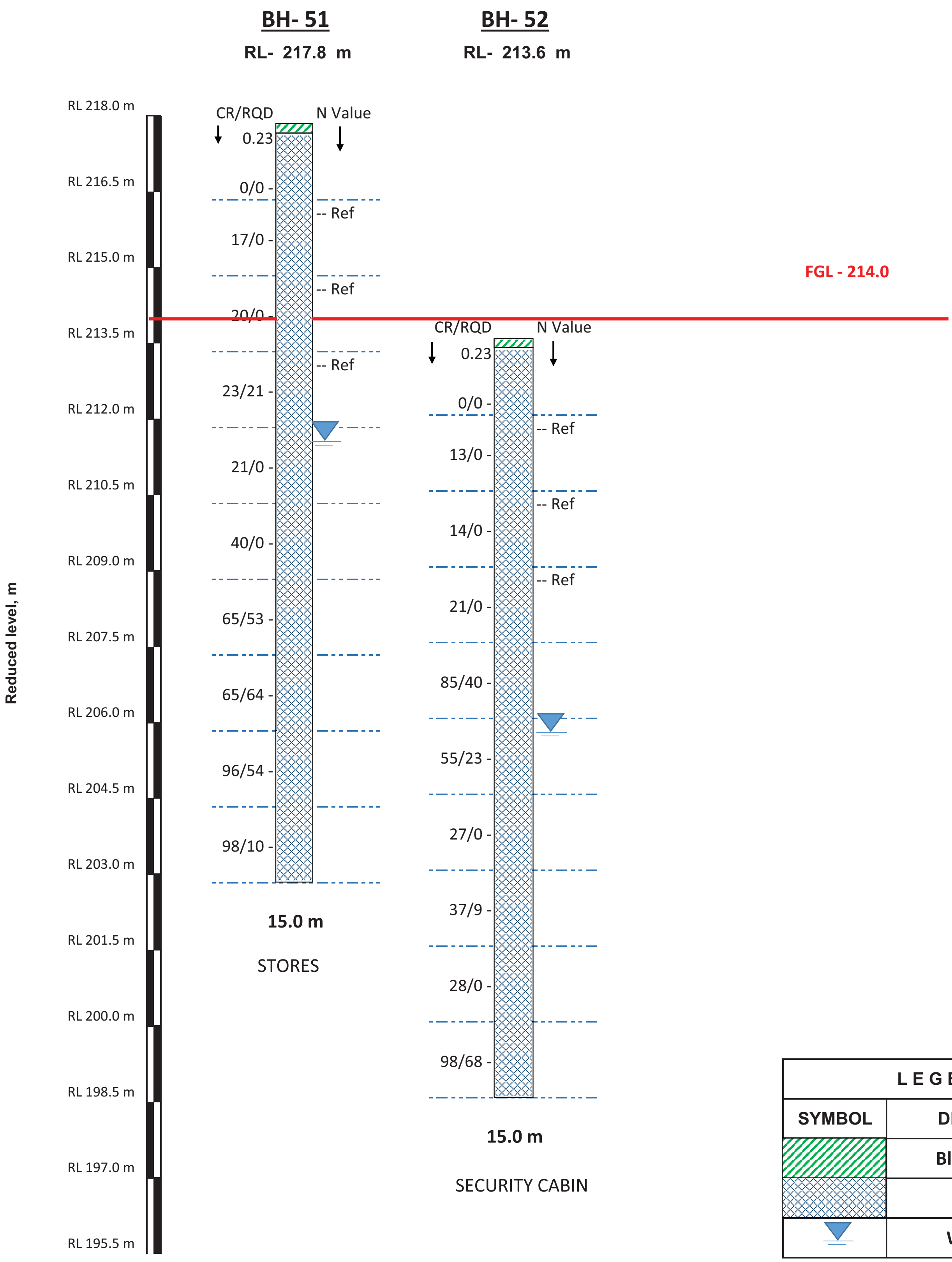
Summary of Borehole Profiles



LEGEND	
SYMBOL	DESCRIPTION
(green hatch)	Black Silty Clay
(blue cross-hatch)	Basalt
(triangle)	Water Table

Note: * Ref stands for Refusal where (SPT N Value >100) blows

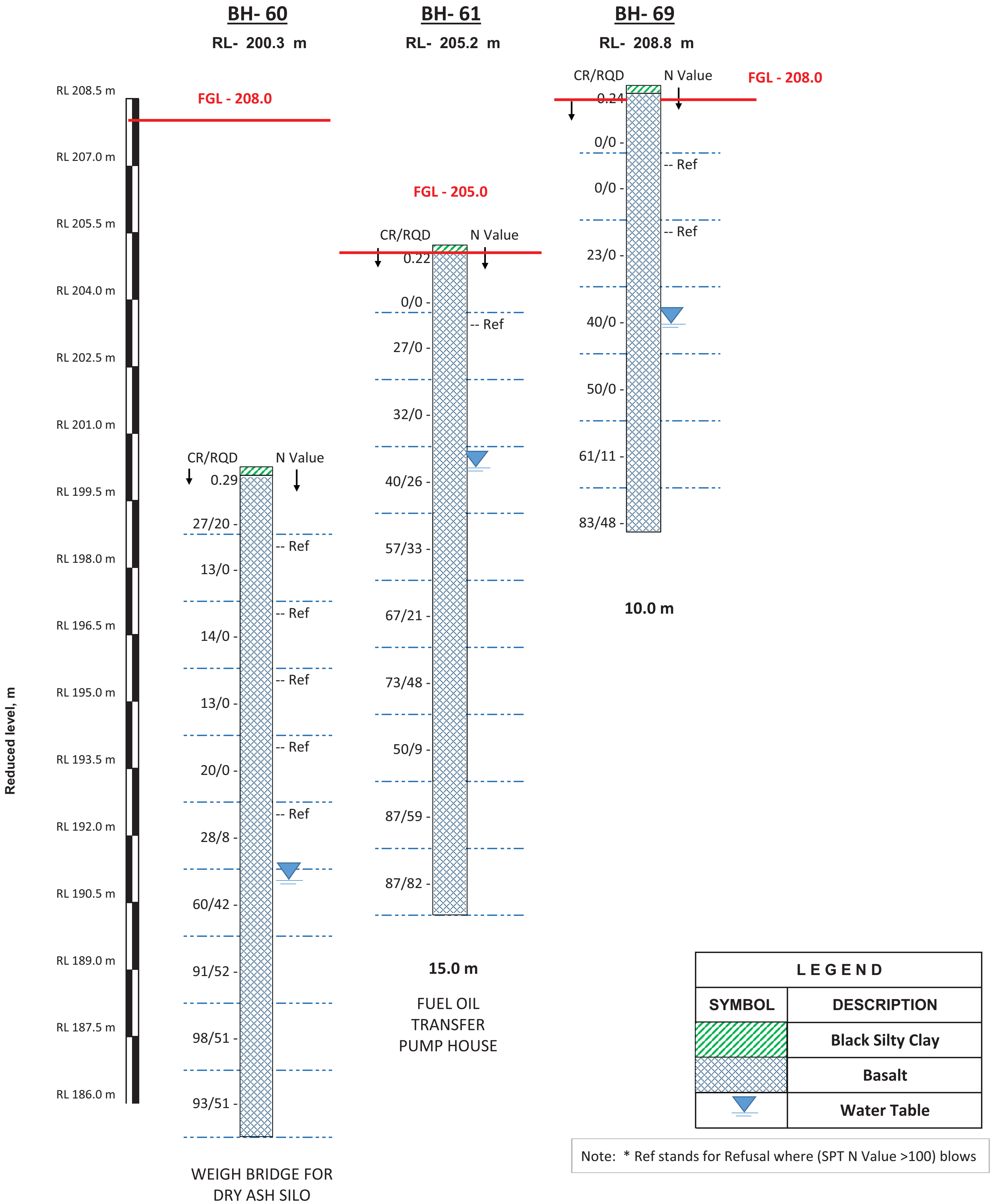
Summary of Borehole Profiles



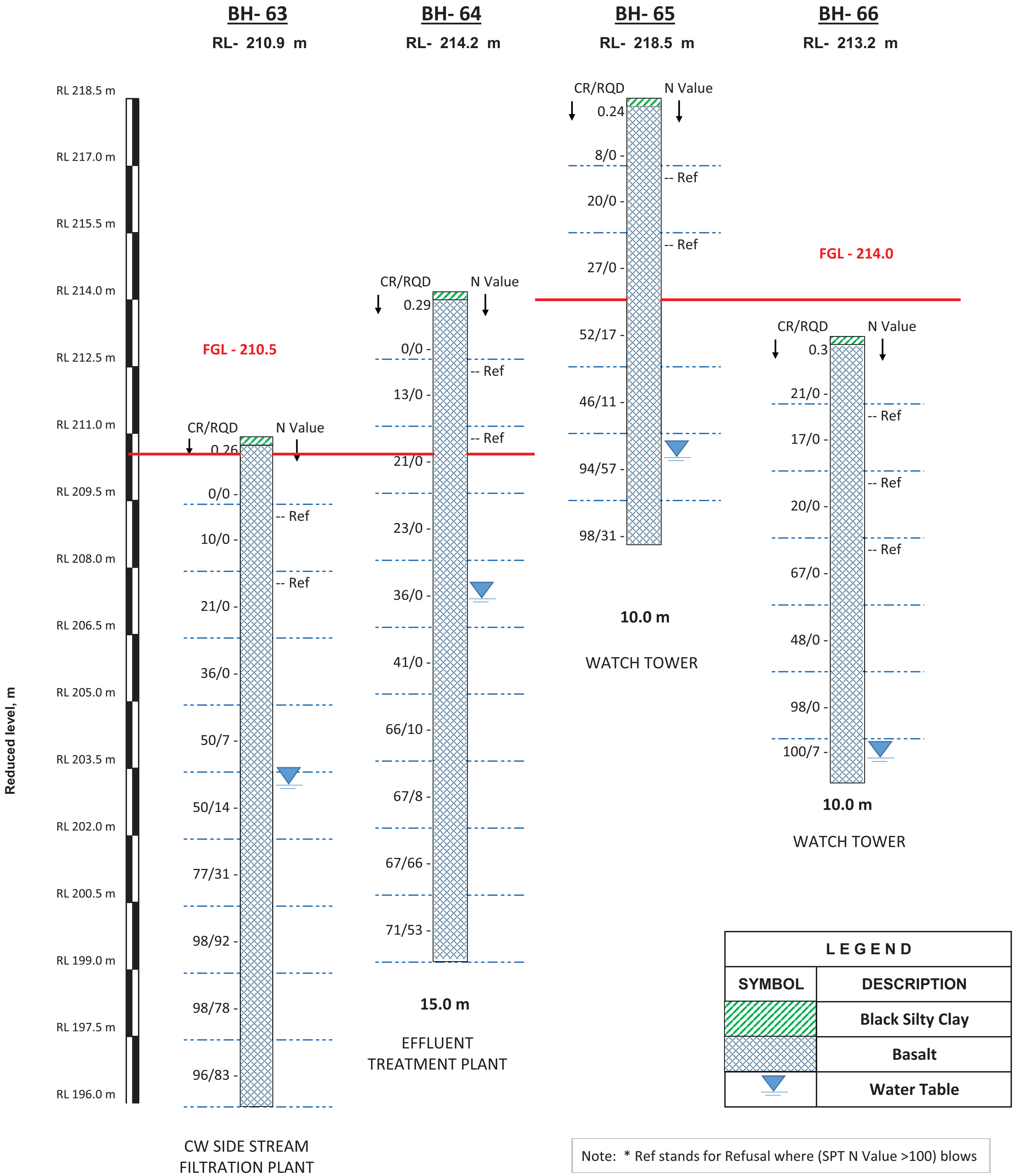
LEGEND	
SYMBOL	DESCRIPTION
	Black Silty Clay
	Basalt
	Water Table

Note: * Ref stands for Refusal where (SPT N Value >100) blows

Summary of Borehole Profiles



Summary of Borehole Profiles



Summary of Borehole Profiles

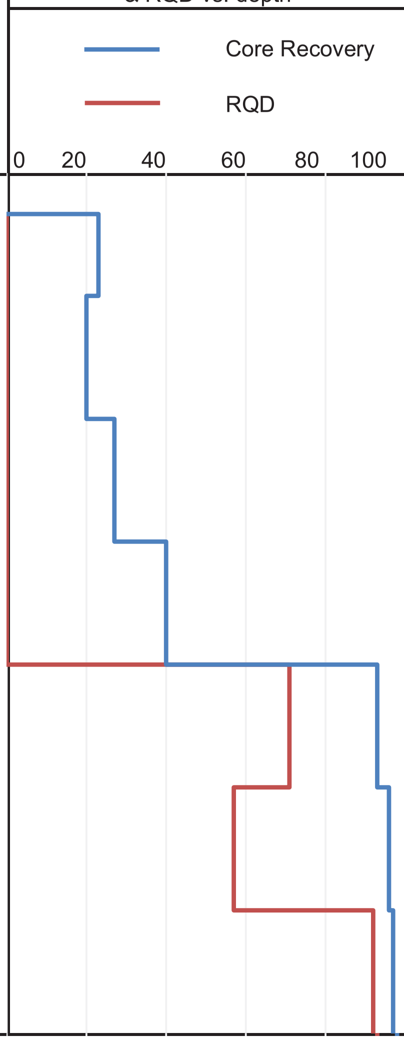
BOREHOLE LOGS

Borehole Log (BH01)

Location :	**ID FAN**	Ground Level (GL) :	RL(+) 207.7 m	Drilling :	Rotary Drilling
Co-ordinates :	**1135 E, 817 N**	Ground Water Level :	5 m (RL(+) 202.7 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 187.7 m)	Start Date :	29-Apr-18	Casing Depth :	2.0 m
		Finish Date :	03-May-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.1					HX
1.00, 1.50	1.50			Weak grey Basalt, very intensely fractured, highly weathered (0.1 to 1.5m)		23	0	Greyish	Partial	NX
2.00, 2.50, 3.00	3.00			Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		20	0			
3.50, 4.00, 4.50	4.50			Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		27	0			
5.00, 5.50, 6.00	6.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		40	0			
6.50, 7.00, 7.50	7.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (6 to 7.5m)		93	71			
8.00, 8.50, 9.00	9.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (7.5 to 9m)		96	57			
9.50, 10.00, 10.50	10.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		97	92			

Percentage Core Recovery & RQD vs. depth

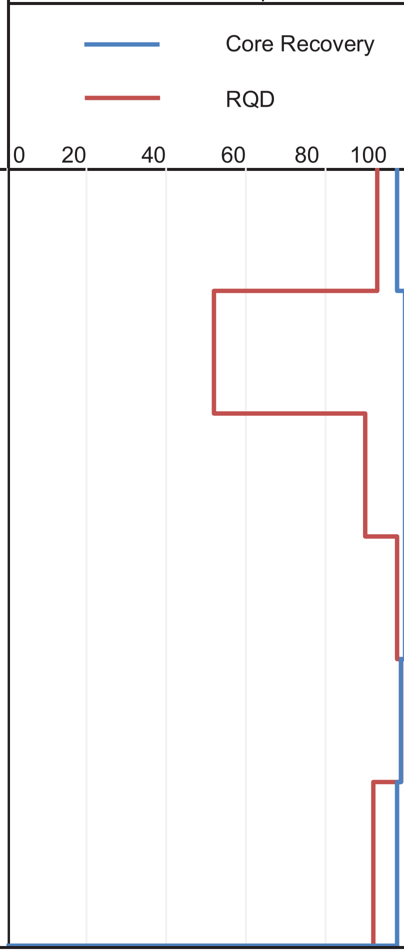


Borehole Log (BH01)

Location :	**ID FAN**	Ground Level (GL) :	RL(+) 207.7 m	Drilling :	Rotary Drilling
Co-ordinates :	**1135 E, 817 N**	Ground Water Level :	5 m (RL(+) 202.7 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 187.7 m)	Start Date :	29-Apr-18	Casing Depth :	2.0 m
		Finish Date :	03-May-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)
11.00 11.50 12.00	12.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		98	93
12.50 13.00 13.50	13.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (12 to 13.5m)		100	52
14.00 14.50 15.00	15.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		100	90
15.50 16.00 16.50	16.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (15 to 16.5m)		100	98
17.00 17.50 18.00	18.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (16.5 to 18m)		99	99
18.50 19.00 19.50 20.00	20.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (18 to 20m)	20.0	98	92

Percentage Core Recovery & RQD vs. depth



Return Water: Colour	Return Water: Loss	Size of Hole
Greyish	Partial	NX

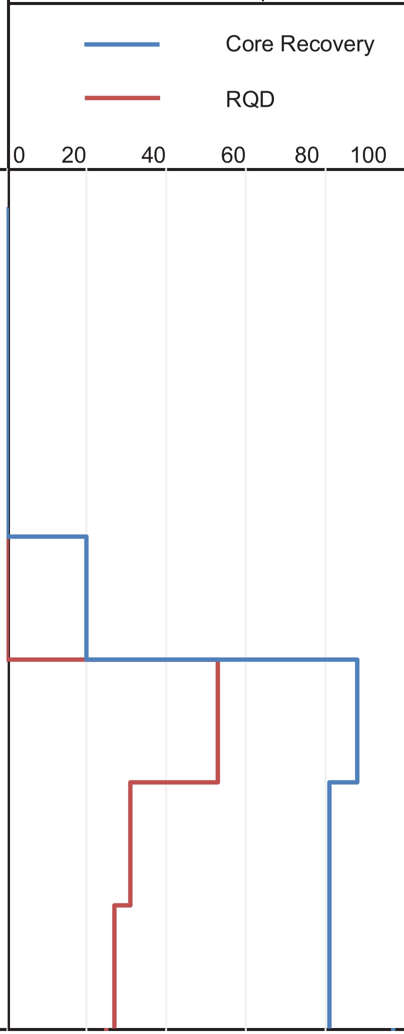
Scale

Borehole Log (BH02)

Location :	**ID FAN**	Ground Level (GL) :	RL(+) 207.5 m	Drilling :	Rotary Drilling
Co-ordinates :	**1169 E, 817 N**	Ground Water Level :	5 m (RL(+) 202.5 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 187.5 m)	Start Date :	19-Apr-18	Casing Depth :	2.0 m
		Finish Date :	23-Apr-18		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.1			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.1 to 1.5m)		0	0			NX
2.00, 2.50, 3.00	3.00	Ref.	Very weak grey Basalt, completely weathered, disintegrated (1.5 to 3m)		0	0			
3.50, 4.00, 4.50	4.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (3 to 4.5m)		0	0			
5.00, 5.50, 6.00	6.00		Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		20	0			
6.50, 7.00, 7.50	7.50		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (6 to 7.5m)		88	53			
8.00, 8.50, 9.00	9.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		81	31			
9.50, 10.00, 10.50	10.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		81	27			

Percentage Core Recovery & RQD vs. depth

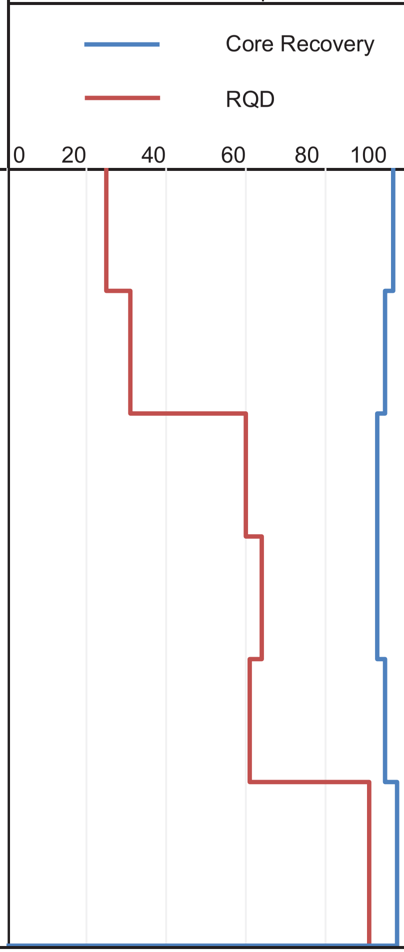


Borehole Log (BH02)

Location :	**ID FAN**	Ground Level (GL) :	RL(+) 207.5 m	Drilling :	Rotary Drilling
Co-ordinates :	**1169 E, 817 N**	Ground Water Level :	5 m (RL(+) 202.5 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 187.5 m)	Start Date :	19-Apr-18	Casing Depth :	2.0 m
		Finish Date :	23-Apr-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00, 11.50, 12.00	12.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		97	25	Greyish	Partial	NX
12.50, 13.00, 13.50	13.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		95	31			
14.00, 14.50, 15.00	15.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (13.5 to 15m)		93	60			
15.50, 16.00, 16.50	16.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (15 to 16.5m)		93	64			
17.00, 17.50, 18.00	18.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (16.5 to 18m)		95	61			
18.50, 19.00, 19.50, 20.00	20.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (18 to 20m)	20.0	98	91			

Percentage Core Recovery & RQD vs. depth



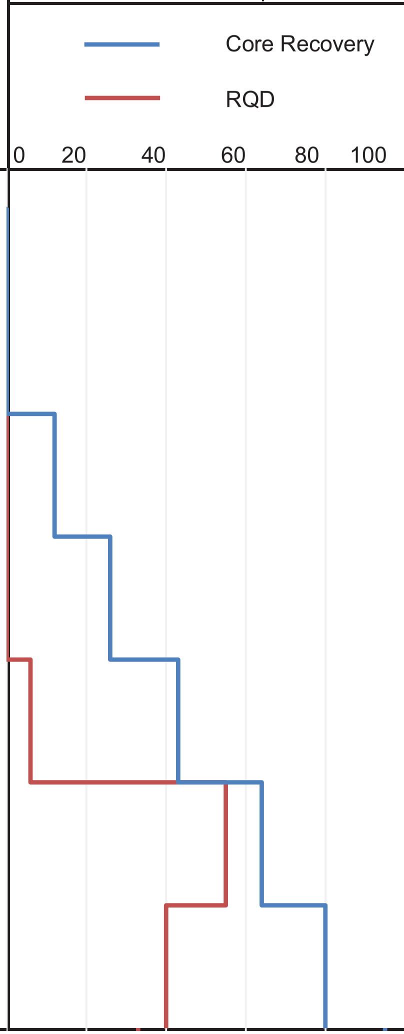
Borehole Log (BH03)

Location :	**ID FAN**	Ground Level (GL) :	RL(+) 206.6 m
Co-ordinates :	**1125 E, 785 N**	Ground Water Level :	4.6 m (RL(+) 202 m)
Termination Depth : (below GL)	20 m (RL(+) 186.6 m)	Start Date :	21-Jul-18
		Finish Date :	27-Jul-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.1					HX
1.00 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.1 to 1.5m)		0	0	Greyish	Partial	NX
2.00 2.50 3.00	3.00	Ref.	Very weak grey Basalt, completely weathered, disintegrated (1.5 to 3m)		0	0			
3.50 4.00 4.50	4.50	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		12	0			
5.00 5.50 6.00	6.00		Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		26	0			
6.50 7.00 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		43	6			
8.00 8.50 9.00	9.00		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (7.5 to 9m)		64	55			
9.50 10.00 10.50	10.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		80	40			

Percentage Core Recovery & RQD vs. depth

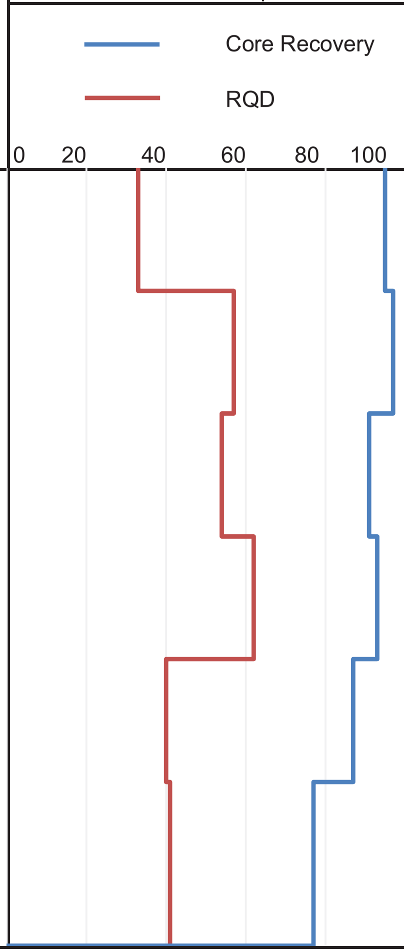


Borehole Log (BH03)

Location :	**ID FAN**	Ground Level (GL) :	RL(+) 206.6 m
Co-ordinates :	**1125 E, 785 N**	Ground Water Level :	4.6 m (RL(+) 202 m)
Termination Depth : (below GL)	20 m (RL(+) 186.6 m)	Start Date :	21-Jul-18
		Finish Date :	27-Jul-18
Drilling :	Rotary Drilling	Bit Type :	Diamond
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00, 11.50, 12.00	12.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		95	33	Greyish	Partial	NX
12.50, 13.00, 13.50	13.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (12 to 13.5m)		97	57			
14.00, 14.50, 15.00	15.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (13.5 to 15m)		91	54			
15.50, 16.00, 16.50	16.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (15 to 16.5m)		93	62			
17.00, 17.50, 18.00	18.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (16.5 to 18m)		87	40			
18.50, 19.00, 19.50, 20.00	20.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (18 to 20m)	20.0	77	41			

Percentage Core Recovery & RQD vs. depth

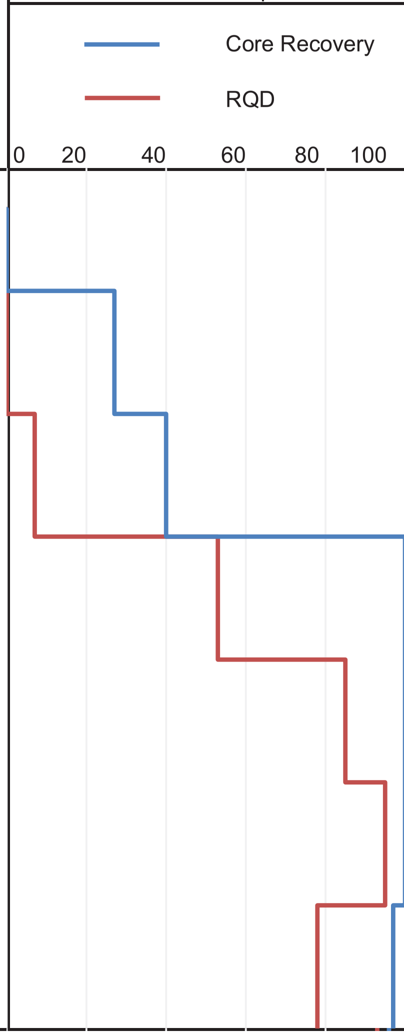


Borehole Log (BH04)

Location :	**ID FAN**	Ground Level (GL) :	RL(+) 207.5 m
Co-ordinates :	**1178 E, 785 N**	Ground Water Level :	5 m (RL(+) 202.5 m)
Termination Depth : (below GL)	20 m (RL(+) 187.5 m)	Start Date :	02-Apr-18
		Finish Date :	09-Apr-18
Drilling :	Rotary Drilling	Bit Type :	Diamond
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)
0.50			Black Silty Clay with rock fragments	0.1		
1.00			Very weak grey Basalt, completely weathered, disintegrated (0.1 to 1.5m)		0	0
1.50	1.50	Ref.				
2.00			Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		27	0
2.50						
3.00	3.00					
3.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		40	7
4.00						
4.50	4.50					
5.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (4.5 to 6m)		100	53
5.50						
6.00	6.00					
6.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (6 to 7.5m)		100	85
7.00						
7.50	7.50					
8.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (7.5 to 9m)		100	95
8.50						
9.00	9.00					
9.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		97	78
10.00						
10.50	10.50					

Percentage Core Recovery & RQD vs. depth



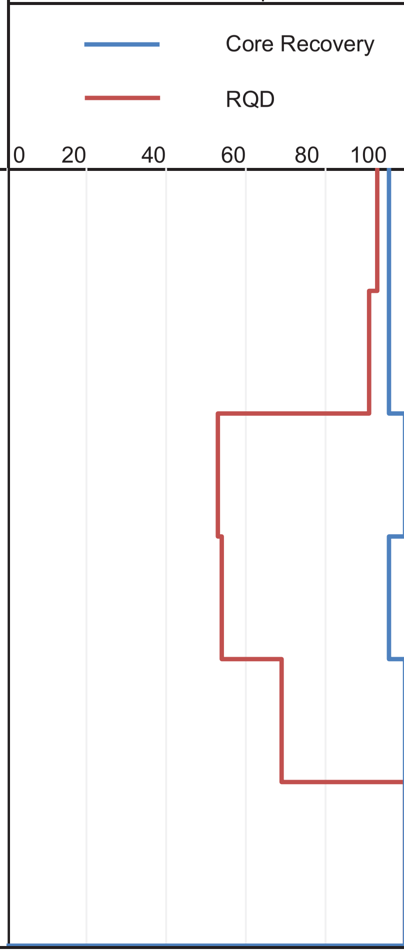
Return Water: Colour	Return Water: Loss	Size of Hole
Greyish	Partial	HX (to 0.1 m), NX

Borehole Log (BH04)

Location :	**ID FAN**	Ground Level (GL) :	RL(+) 207.5 m	Drilling :	Rotary Drilling
Co-ordinates :	**1178 E, 785 N**	Ground Water Level :	5 m (RL(+) 202.5 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 187.5 m)	Start Date :	02-Apr-18	Casing Depth :	2.0 m
		Finish Date :	09-Apr-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00 11.50 12.00	12.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		96	93	Greyish	Partial	NX
12.50 13.00 13.50	13.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		96	91			
14.00 14.50 15.00	15.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (13.5 to 15m)		100	53			
15.50 16.00 16.50	16.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (15 to 16.5m)		96	54			
17.00 17.50 18.00	18.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (16.5 to 18m)		100	69			
18.50 19.00 19.50 20.00	20.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (18 to 20m)	20.0	100	100			

Percentage Core Recovery & RQD vs. depth

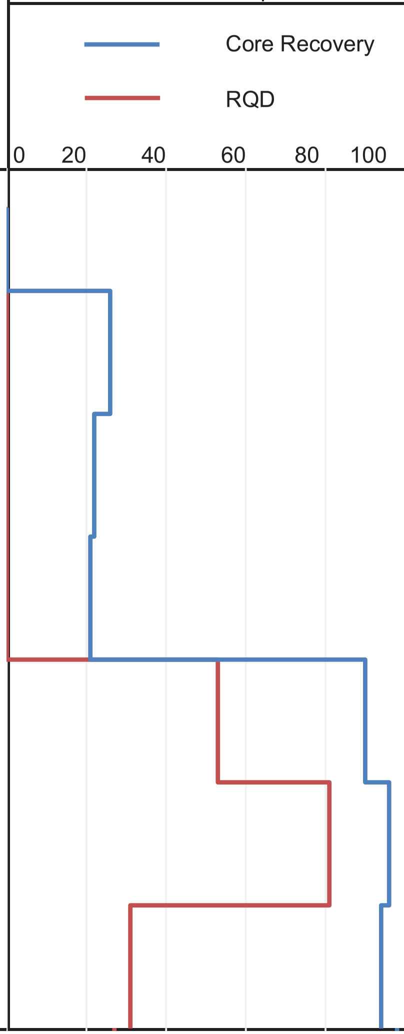


Borehole Log (BH05)

Location :	**ESP**	Ground Level (GL) :	RL(+) 207.2 m	Drilling :	Rotary Drilling
Co-ordinates :	**1178 E, 747 N**	Ground Water Level :	4.5 m (RL(+) 202.6 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 192.2 m)	Start Date :	11-Apr-18	Casing Depth :	2.0 m
		Finish Date :	13-Apr-18		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.1					HX
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.1 to 1.5m)		0	0	Greyish	Partial	NX
2.00, 2.50, 3.00	3.00		Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		26	0			
3.50, 4.00, 4.50	4.50		Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		22	0			
5.00, 5.50, 6.00	6.00		Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		21	0			
6.50, 7.00, 7.50	7.50		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (6 to 7.5m)		90	53			
8.00, 8.50, 9.00	9.00		Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (7.5 to 9m)		96	81			
9.50, 10.00, 10.50	10.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		94	31			

Percentage Core Recovery & RQD vs. depth

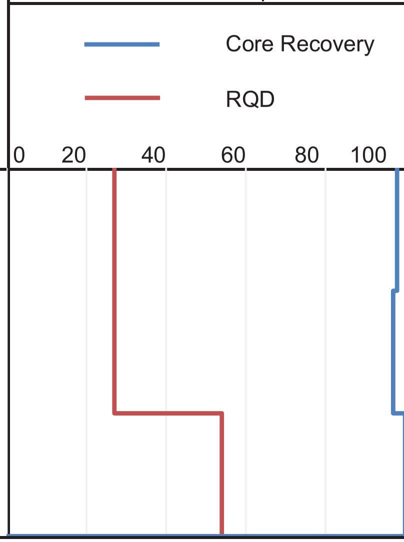


Borehole Log (BH05)

Location :	**ESP**	Ground Level (GL) :	RL(+) 207.2 m
Co-ordinates :	**1178 E, 747 N**	Ground Water Level :	4.5 m (RL(+) 202.6 m)
Termination Depth : (below GL)	15 m (RL(+) 192.2 m)	Start Date :	11-Apr-18
		Finish Date :	13-Apr-18
Drilling :	Rotary Drilling		
Bit Type :	Diamond		
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		98	27	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		97	27			
13.00										
13.50	13.50									
14.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (13.5 to 15m)		100	54			
14.50										
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth

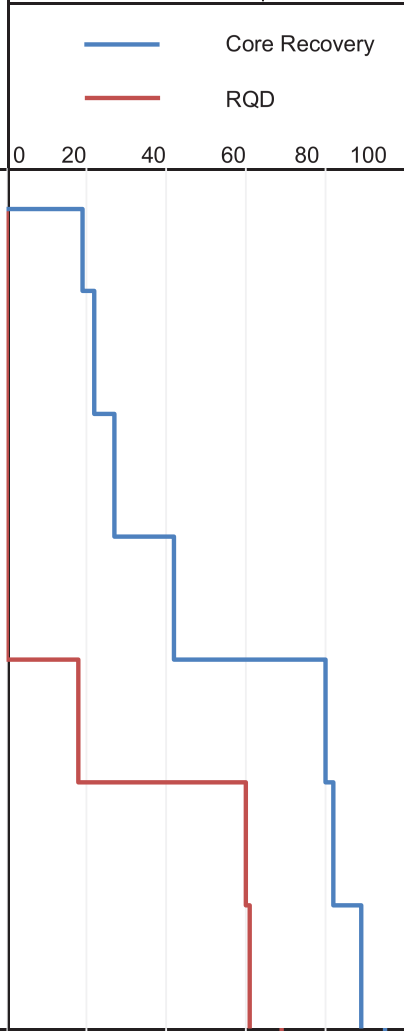


Borehole Log (BH06)

Location :	**ESP**	Ground Level (GL) :	RL(+) 207.9 m	Drilling :	Rotary Drilling
Co-ordinates :	**1178 E, 708 N**	Ground Water Level :	5 m (RL(+) 202.8 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 187.9 m)	Start Date :	14-Apr-18	Casing Depth :	2.0 m
		Finish Date :	17-Apr-18		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.1			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (0.1 to 1.5m)		19	0			NX
2.00, 2.50, 3.00	3.00		Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		22	0			
3.50, 4.00, 4.50	4.50		Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		27	0			
5.00, 5.50, 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		42	0			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		80	18			
8.00, 8.50, 9.00	9.00		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (7.5 to 9m)		82	60			
9.50, 10.00, 10.50	10.50		Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		89	61			

Percentage Core Recovery & RQD vs. depth

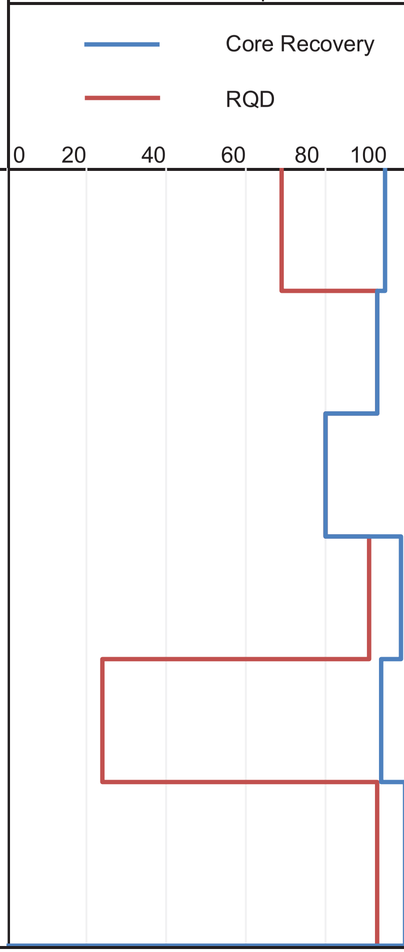


Borehole Log (BH06)

Location :	**ESP**	Ground Level (GL) :	RL(+) 207.9 m	Drilling :	Rotary Drilling
Co-ordinates :	**1178 E, 708 N**	Ground Water Level :	5 m (RL(+) 202.8 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 187.9 m)	Start Date :	14-Apr-18	Casing Depth :	2.0 m
		Finish Date :	17-Apr-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)
11.00, 11.50, 12.00	12.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		95	69
12.50, 13.00, 13.50	13.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		93	93
14.00, 14.50, 15.00	15.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		80	80
15.50, 16.00, 16.50	16.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (15 to 16.5m)		99	91
17.00, 17.50, 18.00	18.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (16.5 to 18m)		94	24
18.50, 19.00, 19.50, 20.00	20.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (18 to 20m)	20.0	100	93

Percentage Core Recovery & RQD vs. depth



Return Water: Colour	Return Water: Loss	Size of Hole
Greyish	Partial	NX

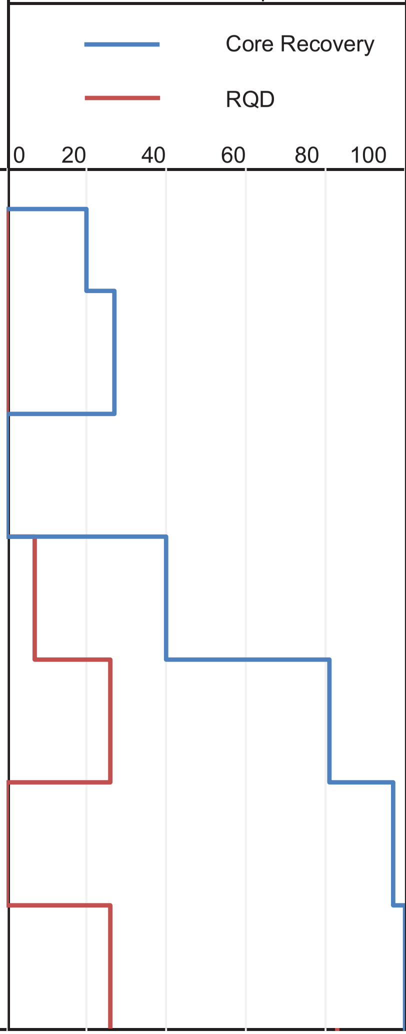
Borehole Log (BH07)

Location :	**ESP**	Ground Level (GL) :	RL(+) 207.5 m
Co-ordinates :	**1125 E, 708 N**	Ground Water Level :	4.8 m (RL(+) 202.7 m)
Termination Depth : (below GL)	20 m (RL(+) 187.5 m)	Start Date :	24-Apr-18
		Finish Date :	27-Apr-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.1					HX
1.00, 1.50	1.50		Weak grey Basalt, very intensely fractured, highly weathered (0.1 to 1.5m)		20	0	Greyish	Partial	NX
2.00, 2.50, 3.00	3.00		Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		27	0			
3.50, 4.00, 4.50	4.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (3 to 4.5m)		0	0			
5.00, 5.50, 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		40	7			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		81	26			
8.00, 8.50, 9.00	9.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		97	0			
9.50, 10.00, 10.50	10.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		100	26			

Percentage Core Recovery & RQD vs. depth

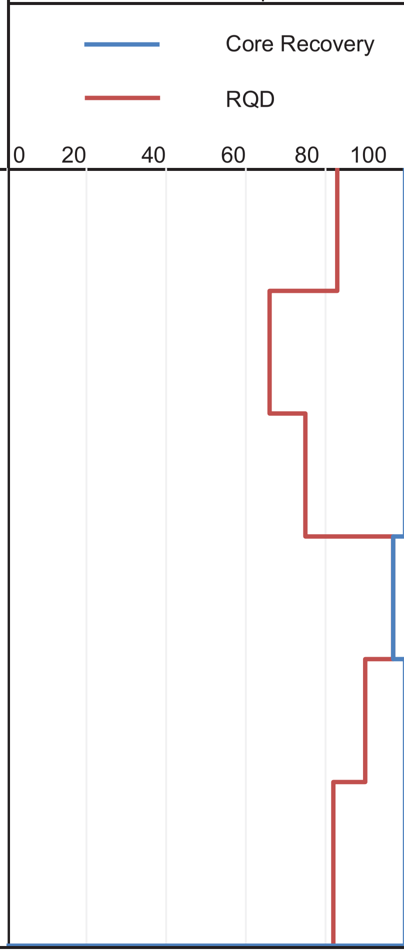


Borehole Log (BH07)

Location :	**ESP**	Ground Level (GL) :	RL(+) 207.5 m	Drilling :	Rotary Drilling
Co-ordinates :	**1125 E, 708 N**	Ground Water Level :	4.8 m (RL(+) 202.7 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 187.5 m)	Start Date :	24-Apr-18	Casing Depth :	2.0 m
		Finish Date :	27-Apr-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		100	83	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		100	66			
13.00										
13.50	13.50									
14.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		100	75			
14.50										
15.00	15.00									
15.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (15 to 16.5m)		97	97			
16.00										
16.50	16.50									
17.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (16.5 to 18m)		100	90			
17.50										
18.00	18.00									
18.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (18 to 20m)		100	82			
19.00										
19.50										
20.00	20.00				20.0					

Percentage Core Recovery & RQD vs. depth

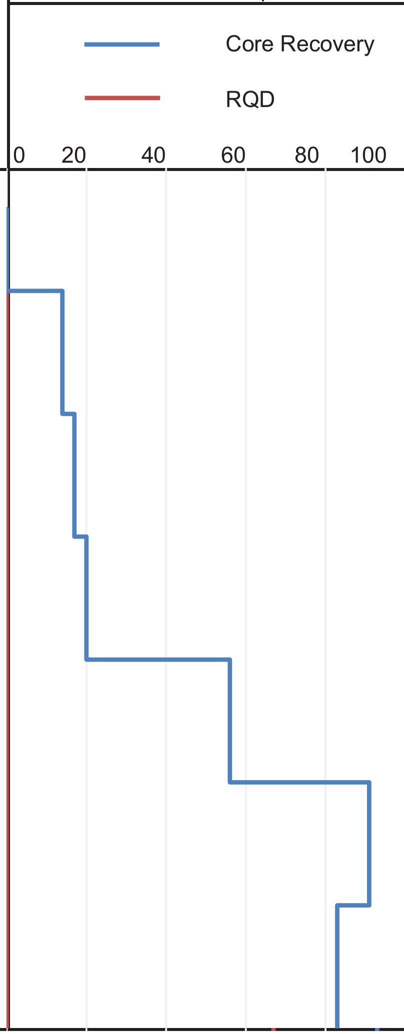


Borehole Log (BH08)

Location :	**FD & PA FAN**	Ground Level (GL) :	RL(+) 207.1 m
Co-ordinates :	**1125 E, 662 N**	Ground Water Level :	4.1 m (RL(+) 202.9 m)
Termination Depth : (below GL)	20 m (RL(+) 187.1 m)	Start Date :	10-May-18
		Finish Date :	14-May-18
Drilling :	Rotary Drilling		
Bit Type :	Diamond		
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)
0.50			Black Silty Clay with rock fragments	0.1		
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.1 to 1.5m)		0	0
2.00, 2.50, 3.00	3.00	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		14	0
3.50, 4.00, 4.50	4.50	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		17	0
5.00, 5.50, 6.00	6.00		Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		20	0
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		56	0
8.00, 8.50, 9.00	9.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		91	0
9.50, 10.00, 10.50	10.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		83	0

Percentage Core Recovery & RQD vs. depth



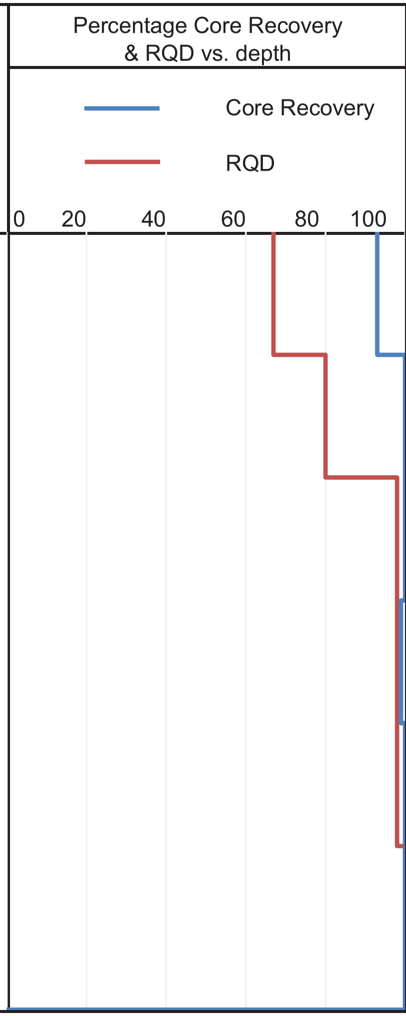
Return Water: Colour	Return Water: Loss	Size of Hole
Greyish	Partial	HX (0 to 0.5), NX

Borehole Log (BH08)

Location :	**FD & PA FAN**	Ground Level (GL) :	RL(+) 207.1 m	Drilling :	Rotary Drilling
Co-ordinates :	**1125 E, 662 N**	Ground Water Level :	4.1 m (RL(+) 202.9 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 187.1 m)	Start Date :	10-May-18	Casing Depth :	2.0 m
		Finish Date :	14-May-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00, 11.50, 12.00	12.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		93	67	Greyish	Partial	NX
12.50, 13.00, 13.50	13.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		100	80			
14.00, 14.50, 15.00	15.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		100	98			
15.50, 16.00, 16.50	16.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (15 to 16.5m)		99	98			
17.00, 17.50, 18.00	18.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (16.5 to 18m)		100	98			
18.50, 19.00, 19.50, 20.00	20.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (18 to 20m)	20.0	100	100			

Percentage Core Recovery & RQD vs. depth

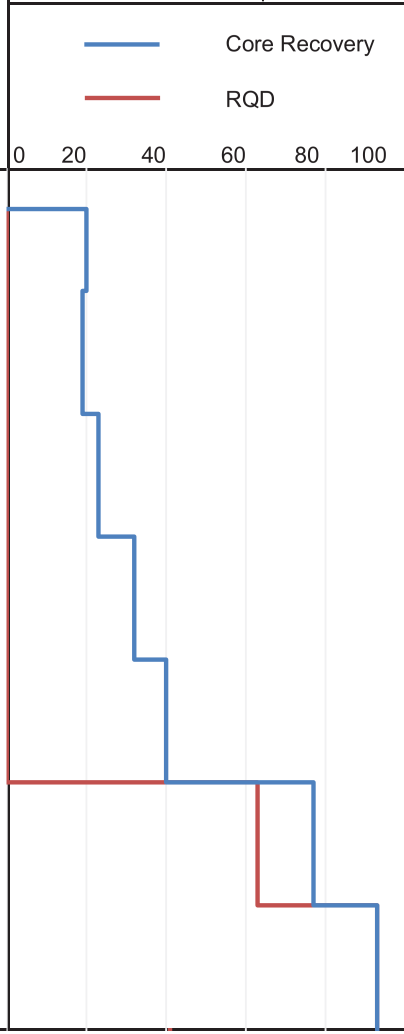


Borehole Log (BH09)

Location :	**FD & PA FAN**	Ground Level (GL) :	RL(+) 208.0 m
Co-ordinates :	**1178 E, 662 N**	Ground Water Level :	4.3 m (RL(+) 203.7 m)
Termination Depth : (below GL)	15 m (RL(+) 193 m)	Start Date :	12-May-18
		Finish Date :	14-May-18
Drilling :	Rotary Drilling		
Bit Type :	Diamond		
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.1			Greyish	Partial	HX
1.00, 1.50	1.50		Weak grey Basalt, very intensely fractured, highly weathered (0.1 to 1.5m)		20	0			NX
2.00, 2.50, 3.00	3.00	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		19	0			
3.50, 4.00, 4.50	4.50		Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		23	0			
5.00, 5.50, 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		32	0			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		40	0			
8.00, 8.50, 9.00	9.00		Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (7.5 to 9m)		77	63			
9.50, 10.00, 10.50	10.50		Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		93	93			

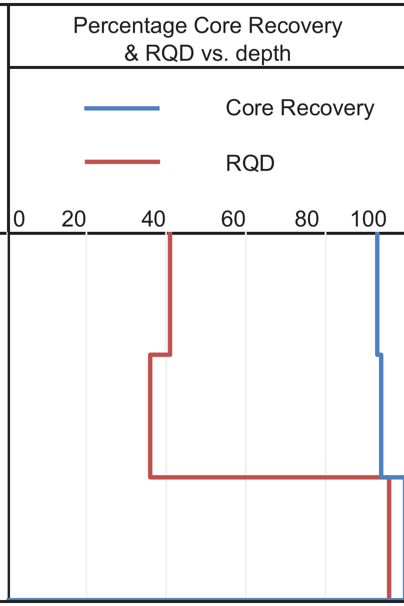
Percentage Core Recovery & RQD vs. depth



Borehole Log (BH09)

Location :	**FD & PA FAN**	Ground Level (GL) :	RL(+) 208.0 m
Co-ordinates :	**1178 E, 662 N**	Ground Water Level :	4.3 m (RL(+) 203.7 m)
Termination Depth : (below GL)	15 m (RL(+) 193 m)	Start Date :	12-May-18
		Finish Date :	14-May-18
Drilling :	Rotary Drilling	Bit Type :	Diamond
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (10.5 to 12m)		93	41	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		94	36			
13.00										
13.50	13.50									
14.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		100	96			
14.50										
15.00	15.00				15.0					



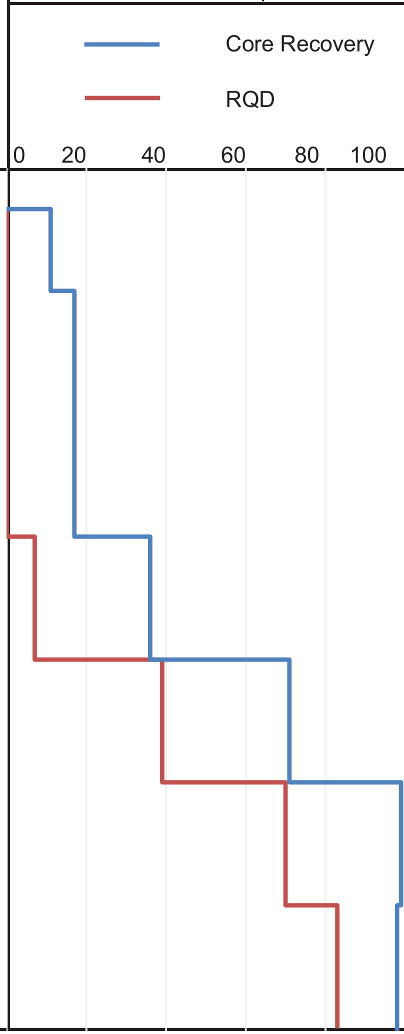
Borehole Log (BH10)

Location :	**BOILER**	Ground Level (GL) :	RL(+) 207.2 m
Co-ordinates :	**1178 E, 623 N**	Ground Water Level :	4.8 m (RL(+) 202.4 m)
Termination Depth : (below GL)	20 m (RL(+) 187.2 m)	Start Date :	28-Apr-18
		Finish Date :	05-May-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.1			Greyish	Partial	HX
1.00 / 1.50	1.50	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (0.1 to 1.5m)		11	0			NX
2.00 / 2.50 / 3.00	3.00	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		17	0			
3.50 / 4.00 / 4.50	4.50	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		17	0			
5.00 / 5.50 / 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		36	7			
6.50 / 7.00 / 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		71	39			
8.00 / 8.50 / 9.00	9.00		Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (7.5 to 9m)		99	70			
9.50 / 10.00 / 10.50	10.50		Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		98	83			

Percentage Core Recovery & RQD vs. depth

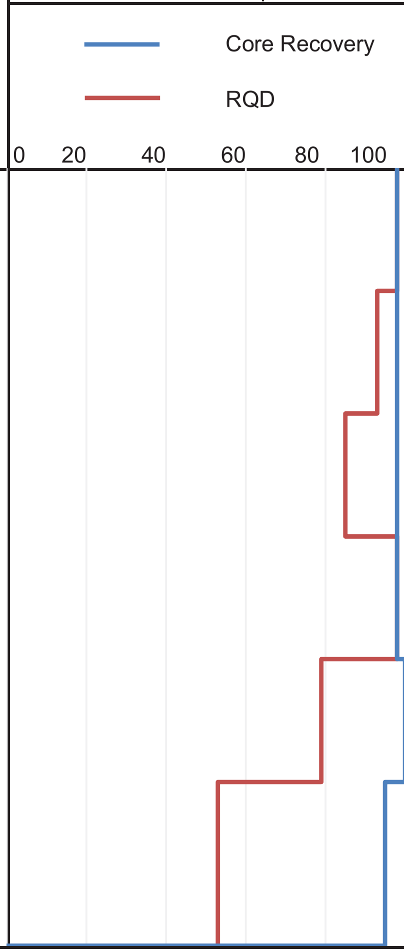


Borehole Log (BH10)

Location :	**BOILER**	Ground Level (GL) :	RL(+) 207.2 m	Drilling :	Rotary Drilling
Co-ordinates :	**1178 E, 623 N**	Ground Water Level :	4.8 m (RL(+) 202.4 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 187.2 m)	Start Date :	28-Apr-18	Casing Depth :	2.0 m
		Finish Date :	05-May-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00, 11.50, 12.00	12.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		98	98	Greyish	Partial	NX
12.50, 13.00, 13.50	13.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		98	93			
14.00, 14.50, 15.00	15.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		98	85			
15.50, 16.00, 16.50	16.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (15 to 16.5m)		98	98			
17.00, 17.50, 18.00	18.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (16.5 to 18m)		100	79			
18.50, 19.00, 19.50, 20.00	20.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (18 to 20m)	20.0	95	53			

Percentage Core Recovery & RQD vs. depth



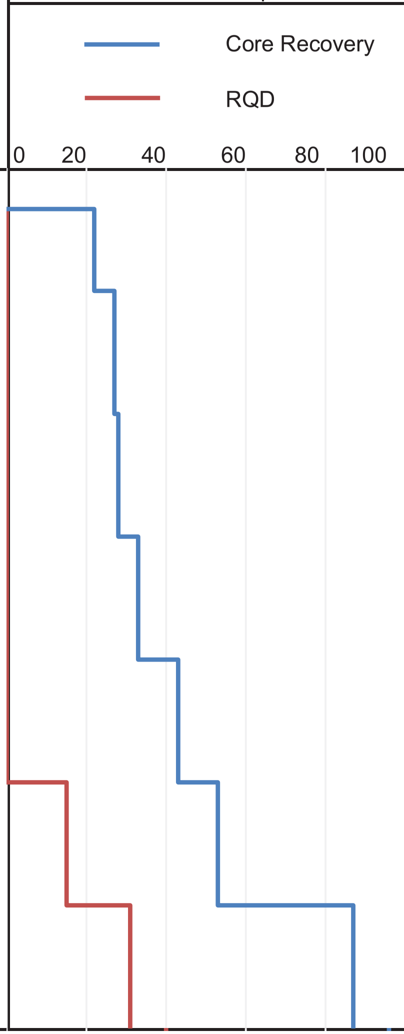
Borehole Log (BH11)

Location :	**BOILER**	Ground Level (GL) :	RL(+) 206.4 m
Co-ordinates :	**1125 E, 623 N**	Ground Water Level :	3.6 m (RL(+) 202.7 m)
Termination Depth : (below GL)	20 m (RL(+) 186.4 m)	Start Date :	04-May-18
		Finish Date :	11-May-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.1					HX
1.00				Weak grey Basalt, very intensely fractured, highly weathered (0.1 to 1.5m)		22	0	Greyish	Partial	NX
1.50	1.50									
2.00										
2.50				Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		27	0			
3.00	3.00									
3.50										
4.00				Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		28	0			
4.50	4.50									
5.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		33	0			
5.50										
6.00	6.00									
6.50										
7.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		43	0			
7.50	7.50									
8.00										
8.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		53	15			
9.00	9.00									
9.50										
10.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		87	31			
10.50	10.50									

Percentage Core Recovery & RQD vs. depth



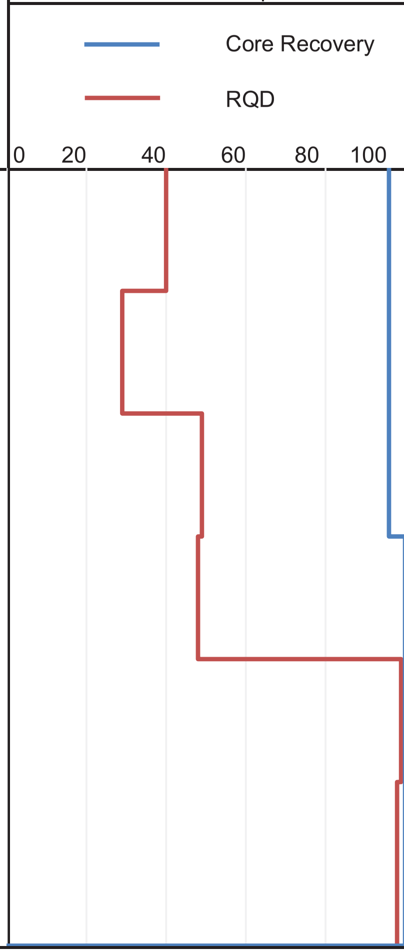
Borehole Log (BH11)

Location :	**BOILER**	Ground Level (GL) :	RL(+) 206.4 m
Co-ordinates :	**1125 E, 623 N**	Ground Water Level :	3.6 m (RL(+) 202.7 m)
Termination Depth : (below GL)	20 m (RL(+) 186.4 m)	Start Date :	04-May-18
		Finish Date :	11-May-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00, 11.50, 12.00	12.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		96	40	Greyish	Partial	NX
12.50, 13.00, 13.50	13.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		96	29			
14.00, 14.50, 15.00	15.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (13.5 to 15m)		96	49			
15.50, 16.00, 16.50	16.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (15 to 16.5m)		100	48			
17.00, 17.50, 18.00	18.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (16.5 to 18m)		100	99			
18.50, 19.00, 19.50, 20.00	20.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (18 to 20m)	20.0	100	98			

Percentage Core Recovery & RQD vs. depth



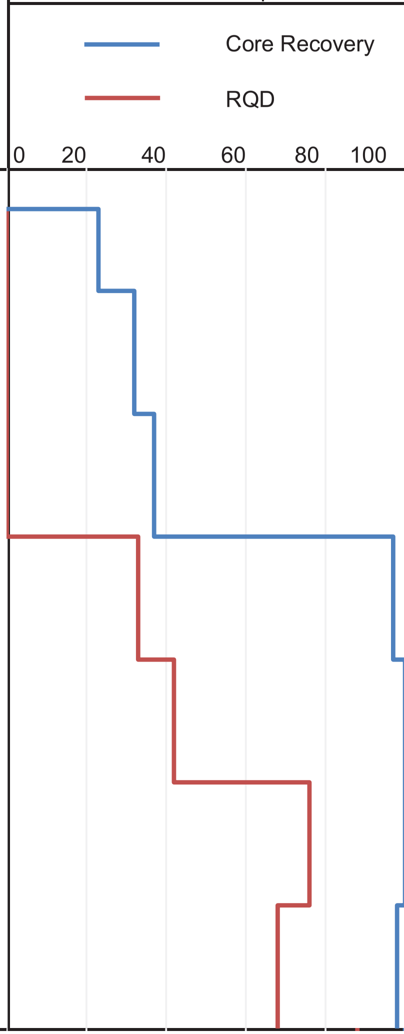
Borehole Log (BH12)

Location :	**BOILER**	Ground Level (GL) :	RL(+) 207.3 m
Co-ordinates :	**1125 E, 584 N**	Ground Water Level :	5 m (RL(+) 202.3 m)
Termination Depth : (below GL)	20 m (RL(+) 187.3 m)	Start Date :	07-May-18
		Finish Date :	10-May-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.1					HX
1.00, 1.50	1.50			Weak grey Basalt, very intensely fractured, highly weathered (0.1 to 1.5m)		23	0	Greyish	Partial	NX
2.00, 2.50, 3.00	3.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (1.5 to 3m)		32	0			
3.50, 4.00, 4.50	4.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		37	0			
5.00, 5.50, 6.00	6.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		97	33			
6.50, 7.00, 7.50	7.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (6 to 7.5m)		100	42			
8.00, 8.50, 9.00	9.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (7.5 to 9m)		100	76			
9.50, 10.00, 10.50	10.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		98	68			

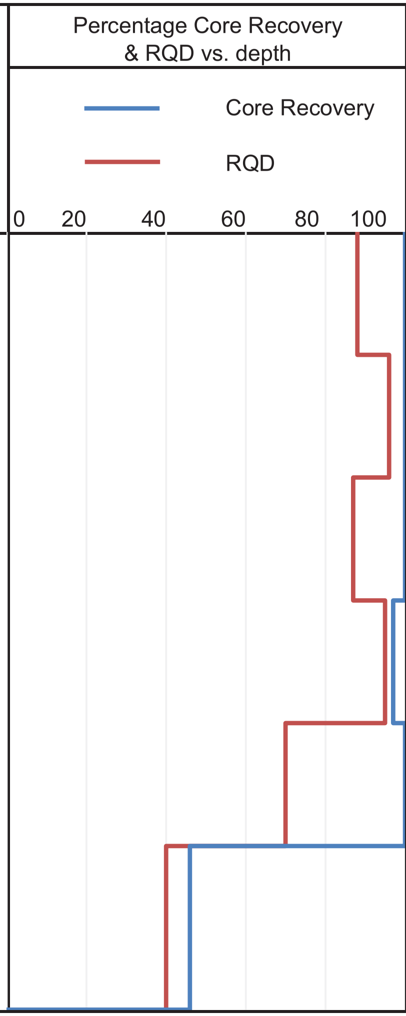
Percentage Core Recovery & RQD vs. depth



Borehole Log (BH12)

Location :	**BOILER**	Ground Level (GL) :	RL(+) 207.3 m	Drilling :	Rotary Drilling
Co-ordinates :	**1125 E, 584 N**	Ground Water Level :	5 m (RL(+) 202.3 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 187.3 m)	Start Date :	07-May-18	Casing Depth :	2.0 m
		Finish Date :	10-May-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		100	88	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		100	96			
13.00										
13.50	13.50									
14.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		100	87			
14.50										
15.00	15.00									
15.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (15 to 16.5m)		97	95			
16.00										
16.50	16.50									
17.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (16.5 to 18m)		100	70			
17.50										
18.00	18.00									
18.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (18 to 20m)		46	40			
19.00										
19.50										
20.00	20.00				20.0					

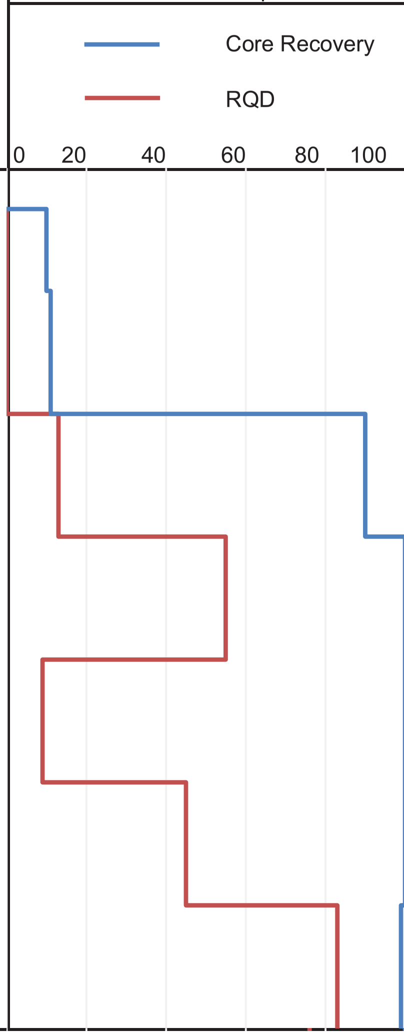


Borehole Log (BH13)

Location :	**BOILER**	Ground Level (GL) :	RL(+) 206.4 m	Drilling :	Rotary Drilling
Co-ordinates :	**1178 E, 584 N**	Ground Water Level :	4.8 m (RL(+) 201.6 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 186.4 m)	Start Date :	23-May-18	Casing Depth :	2.0 m
		Finish Date :	26-May-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.1			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.		Weak grey Basalt, very intensely fractured, highly weathered (0.1 to 1.5m)		10	0			NX
2.00, 2.50, 3.00	3.00	Ref.		Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		11	0			
3.50, 4.00, 4.50	4.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		90	13			
5.00, 5.50, 6.00	6.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (4.5 to 6m)		100	55			
6.50, 7.00, 7.50	7.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		100	9			
8.00, 8.50, 9.00	9.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (7.5 to 9m)		100	45			
9.50, 10.00, 10.50	10.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		99	83			

Percentage Core Recovery & RQD vs. depth

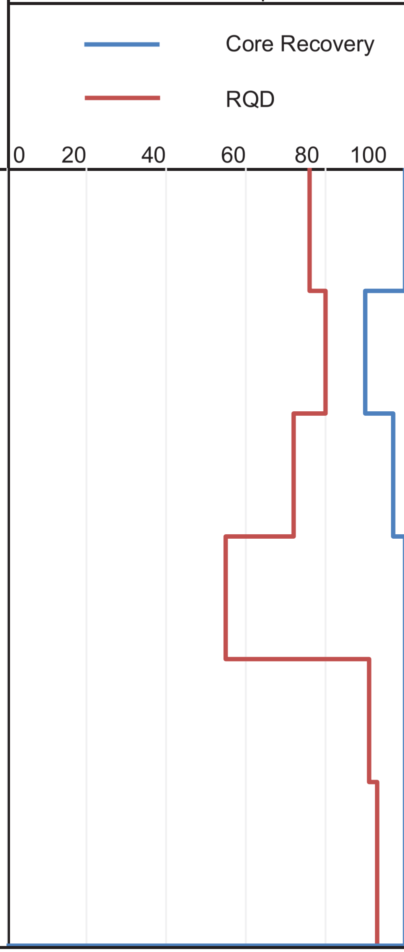


Borehole Log (BH13)

Location :	**BOILER**	Ground Level (GL) :	RL(+) 206.4 m	Drilling :	Rotary Drilling
Co-ordinates :	**1178 E, 584 N**	Ground Water Level :	4.8 m (RL(+) 201.6 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 186.4 m)	Start Date :	23-May-18	Casing Depth :	2.0 m
		Finish Date :	26-May-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00, 11.50, 12.00	12.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		100	76	Greyish	Partial	NX
12.50, 13.00, 13.50	13.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		90	80			
14.00, 14.50, 15.00	15.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		97	72			
15.50, 16.00, 16.50	16.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (15 to 16.5m)		100	55			
17.00, 17.50, 18.00	18.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (16.5 to 18m)		100	91			
18.50, 19.00, 19.50, 20.00	20.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (18 to 20m)	20.0	100	93			

Percentage Core Recovery & RQD vs. depth



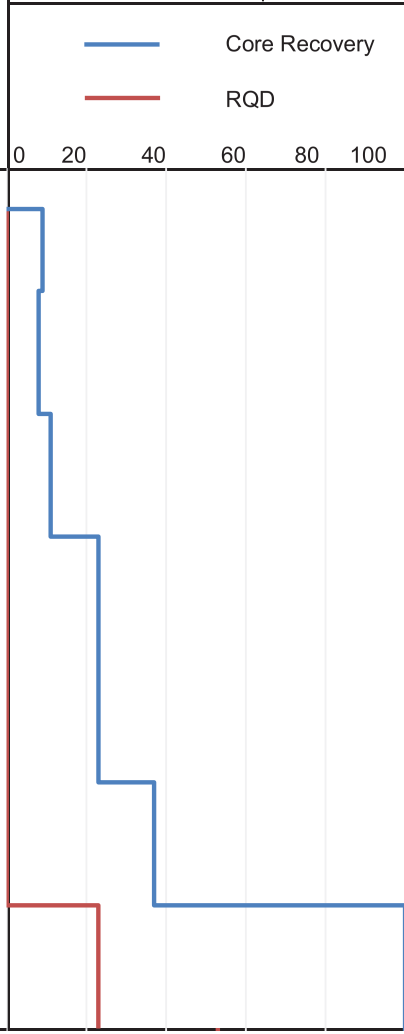
Borehole Log (BH14)

Location :	**MAIN POWER HOUSE AREA**	Ground Level (GL) :	RL(+) 208.9 m
Co-ordinates :	**1217 E, 540 N**	Ground Water Level :	5.2 m (RL(+) 203.6 m)
Termination Depth : (below GL)	15 m (RL(+) 193.9 m)	Start Date :	30-May-18
		Finish Date :	03-Jun-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.3			Greyish	Partial	HX
1.00			Weak grey Basalt, very intensely fractured, highly weathered (0.28 to 1.5m)		9	0			NX
1.50	1.50	Ref.							
2.00									
2.50			Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		8	0			
3.00	3.00	Ref.							
3.50									
4.00			Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		11	0			
4.50	4.50	Ref.							
5.00									
5.50			Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		23	0			
6.00	6.00								
6.50									
7.00			Weak grey Basalt, very intensely fractured, highly weathered (6 to 7.5m)		23	0			
7.50	7.50								
8.00									
8.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		37	0			
9.00	9.00								
9.50									
10.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		100	23			
10.50	10.50								

Percentage Core Recovery & RQD vs. depth



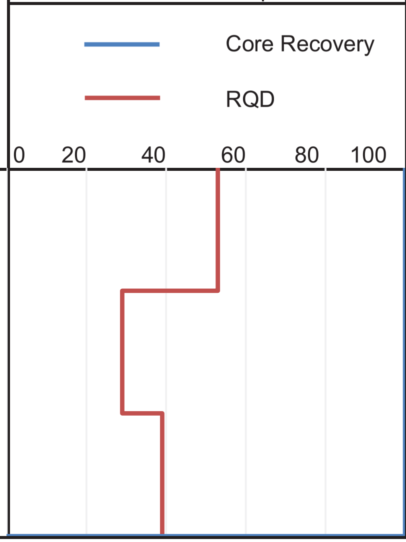
Borehole Log (BH14)

Location :	**MAIN POWER HOUSE AREA**	Ground Level (GL) :	RL(+) 208.9 m
Co-ordinates :	**1217 E, 540 N**	Ground Water Level :	5.2 m (RL(+) 203.6 m)
Termination Depth : (below GL)	15 m (RL(+) 193.9 m)	Start Date :	30-May-18
		Finish Date :	03-Jun-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (10.5 to 12m)		100	53	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		100	29			
13.00										
13.50	13.50									
14.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (13.5 to 15m)		100	39			
14.50										
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth

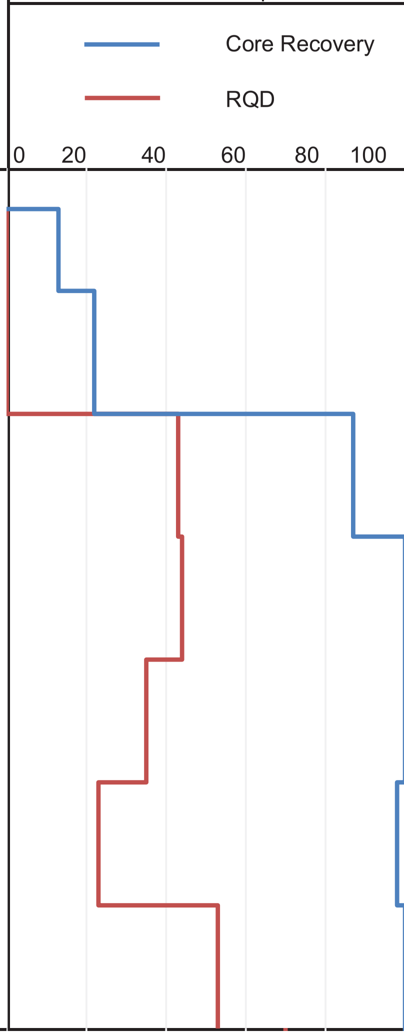


Borehole Log (BH15)

Location :	**MAIN POWER HOUSE AREA**	Ground Level (GL) :	RL(+) 208.5 m	Drilling :	Rotary Drilling
Co-ordinates :	**1178 E, 540 N**	Ground Water Level :	4.6 m (RL(+) 203.8 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 193.5 m)	Start Date :	25-May-18	Casing Depth :	2.0 m
		Finish Date :	28-May-18		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.2			Greyish	Partial	HX
1.00			Weak grey Basalt, very intensely fractured, highly weathered (0.23 to 1.5m)		13	0			NX
1.50	1.50	Ref.							
2.00			Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		22	0			
2.50									
3.00	3.00								
3.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (3 to 4.5m)		87	43			
4.00									
4.50	4.50								
5.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (4.5 to 6m)		100	44			
5.50									
6.00	6.00								
6.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		100	35			
7.00									
7.50	7.50								
8.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		98	23			
8.50									
9.00	9.00								
9.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (9 to 10.5m)		100	53			
10.00									
10.50	10.50								

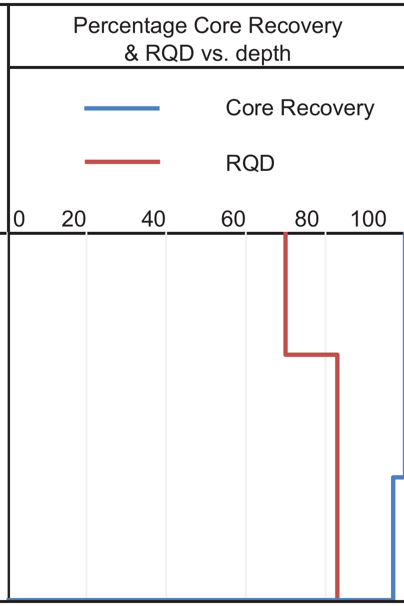
Percentage Core Recovery & RQD vs. depth



Borehole Log (BH15)

Location :	**MAIN POWER HOUSE AREA**	Ground Level (GL) :	RL(+) 208.5 m	Drilling :	Rotary Drilling
Co-ordinates :	**1178 E, 540 N**	Ground Water Level :	4.6 m (RL(+) 203.8 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 193.5 m)	Start Date :	25-May-18	Casing Depth :	2.0 m
		Finish Date :	28-May-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		100	70	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		100	83			
13.00										
13.50	13.50									
14.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		97	83			
14.50										
15.00	15.00				15.0					

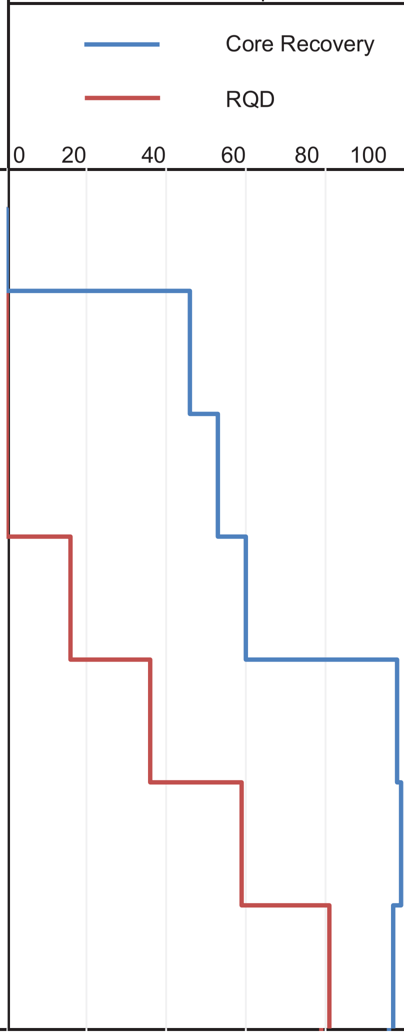


Borehole Log (BH16)

Location :	**MAIN POWER HOUSE AREA**	Ground Level (GL) :	RL(+) 206.3 m	Drilling :	Rotary Drilling
Co-ordinates :	**1070 E, 538 N**	Ground Water Level :	3.4 m (RL(+) 202.9 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 186.3 m)	Start Date :	07-Jul-18	Casing Depth :	2.0 m
		Finish Date :	14-Jul-18		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.3					HX
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.26 to 1.5m)		0	0			
2.00, 2.50, 3.00	3.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (1.5 to 3m)		46	0			
3.50, 4.00, 4.50	4.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		53	0			
5.00, 5.50, 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		60	16	Greyish	Partial	NX
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		98	36			
8.00, 8.50, 9.00	9.00		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (7.5 to 9m)		99	59			
9.50, 10.00, 10.50	10.50		Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		97	81			

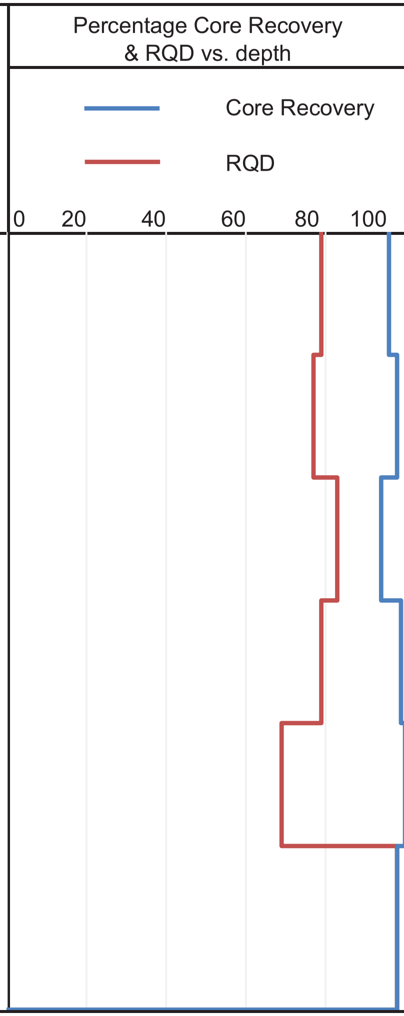
Percentage Core Recovery & RQD vs. depth



Borehole Log (BH16)

Location :	**MAIN POWER HOUSE AREA**	Ground Level (GL) :	RL(+) 206.3 m	Drilling :	Rotary Drilling
Co-ordinates :	**1070 E, 538 N**	Ground Water Level :	3.4 m (RL(+) 202.9 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 186.3 m)	Start Date :	07-Jul-18	Casing Depth :	2.0 m
		Finish Date :	14-Jul-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00 11.50 12.00	12.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		96	79	Greyish	Partial	NX
12.50 13.00 13.50	13.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		98	77			
14.00 14.50 15.00	15.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		94	83			
15.50 16.00 16.50	16.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (15 to 16.5m)		99	79			
17.00 17.50 18.00	18.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (16.5 to 18m)		100	69			
18.50 19.00 19.50 20.00	20.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (18 to 20m)	20.0	98	98			



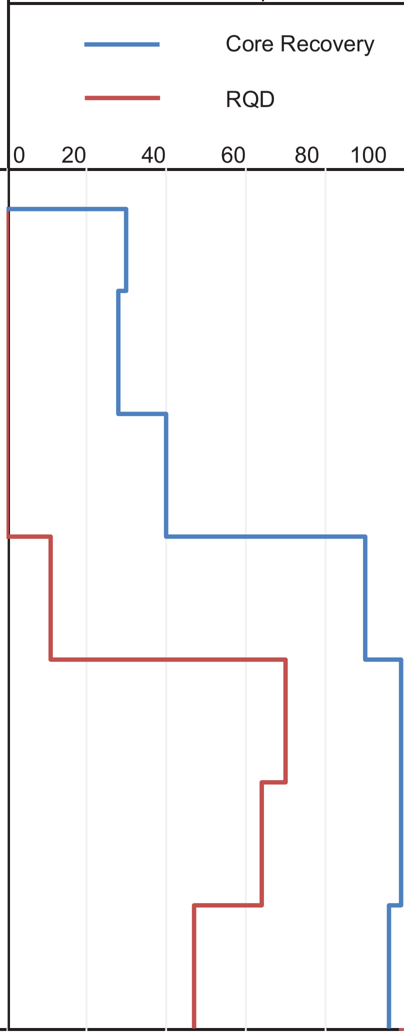
Borehole Log (BH17)

Location :	**MAIN POWER HOUSE AREA**	Ground Level (GL) :	RL(+) 207.7 m
Co-ordinates :	**1085 E, 503 N**	Ground Water Level :	6.4 m (RL(+) 201.3 m)
Termination Depth : (below GL)	15 m (RL(+) 192.7 m)	Start Date :	04-Jun-18
		Finish Date :	04-Jul-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.3					HX
1.00, 1.50	1.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (0.25 to 1.5m)		30	0	Greyish	Partial	NX
2.00, 2.50, 3.00	3.00			Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		28	0			
3.50, 4.00, 4.50	4.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		40	0			
5.00, 5.50, 6.00	6.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		90	11			
6.50, 7.00, 7.50	7.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (6 to 7.5m)		99	70			
8.00, 8.50, 9.00	9.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (7.5 to 9m)		99	64			
9.50, 10.00, 10.50	10.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (9 to 10.5m)		96	47			

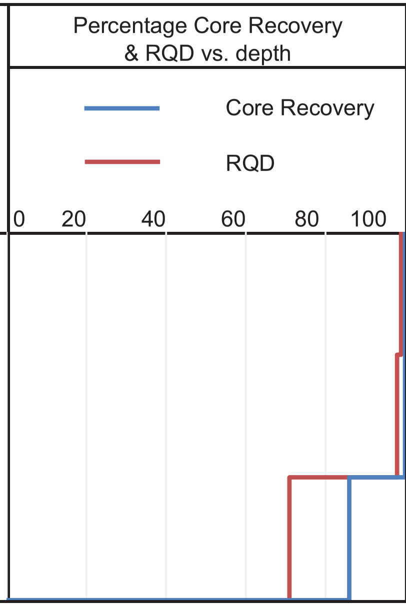
Percentage Core Recovery & RQD vs. depth



Borehole Log (BH17)

Location :	**MAIN POWER HOUSE AREA**	Ground Level (GL) :	RL(+) 207.7 m	Drilling :	Rotary Drilling
Co-ordinates :	**1085 E, 503 N**	Ground Water Level :	6.4 m (RL(+) 201.3 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 192.7 m)	Start Date :	04-Jun-18	Casing Depth :	2.0 m
		Finish Date :	04-Jul-18		

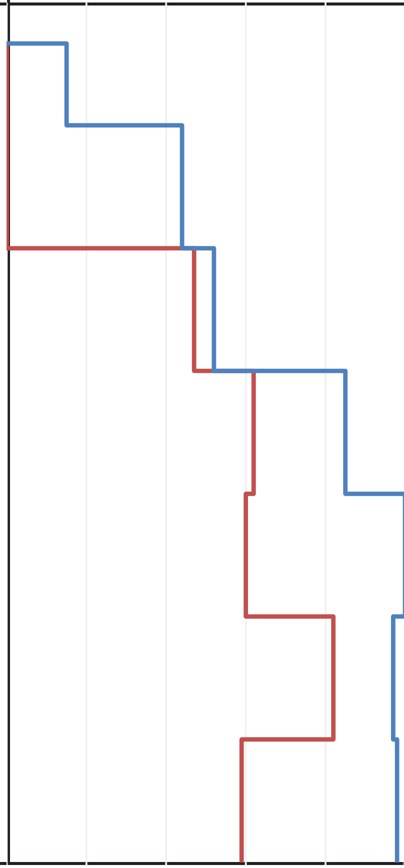
Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		100	99	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		100	98			
13.00										
13.50	13.50									
14.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		86	71			
14.50										
15.00	15.00				15.0					



Borehole Log (BH18)

Location :	**MAIN POWER HOUSE AREA**	Ground Level (GL) : RL(+) 207.9 m	Drilling : Rotary Drilling
Co-ordinates :	**1120 E, 503 N**	Ground Water Level : 0 m (RL(+) 207.9 m)	Bit Type : Diamond
Termination Depth : (below GL)	20 m (RL(+) 187.9 m)	Start Date : 03-Jun-18	Casing Depth : 2.0 m
		Finish Date : 11-Jun-18	

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.2			Greyish	Partial	HX
1.00–1.50	1.50	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (0.24 to 1.5m)		15	0			NX
2.00–3.00	3.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (1.5 to 3m)		44	0			
3.50–4.50	4.50		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (3 to 4.5m)		52	47			
5.00–6.00	6.00		Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (4.5 to 6m)		85	62			
6.50–7.50	7.50		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (6 to 7.5m)		100	60			
8.00–9.00	9.00		Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (7.5 to 9m)		97	82			
9.50–10.50	10.50		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (9 to 10.5m)		98	59			



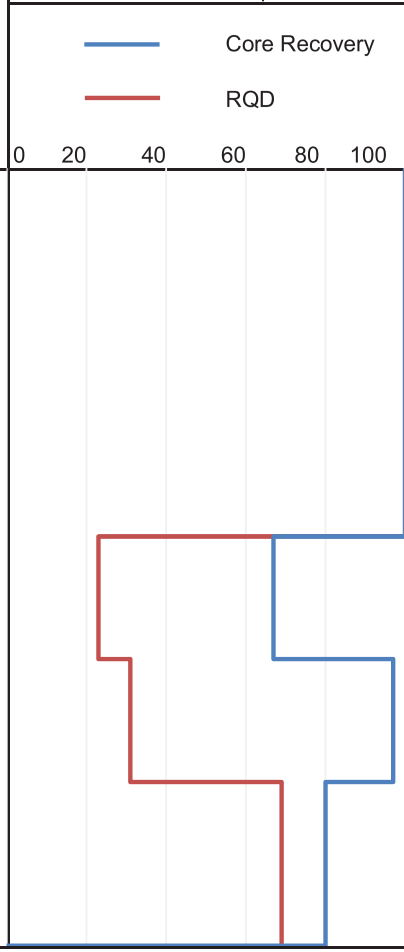
Borehole Log (BH18)

Location :	**MAIN POWER HOUSE AREA**	Ground Level (GL) :	RL(+) 207.9 m
Co-ordinates :	**1120 E, 503 N**	Ground Water Level :	0 m (RL(+) 207.9 m)
Termination Depth : (below GL)	20 m (RL(+) 187.9 m)	Start Date :	03-Jun-18
		Finish Date :	11-Jun-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00, 11.50, 12.00	12.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		100	100	Greyish	Partial	NX
12.50, 13.00, 13.50	13.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		100	100			
14.00, 14.50, 15.00	15.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		100	100			
15.50, 16.00, 16.50	16.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (15 to 16.5m)		67	23			
17.00, 17.50, 18.00	18.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (16.5 to 18m)		97	31			
18.50, 19.00, 19.50, 20.00	20.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (18 to 20m)	20.0	80	69			

Percentage Core Recovery & RQD vs. depth



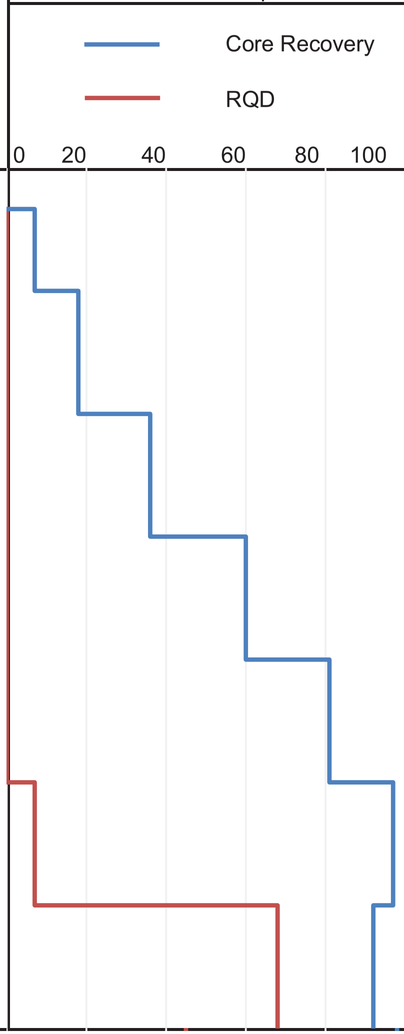
Borehole Log (BH19)

Location :	**MAIN POWER HOUSE AREA**	Ground Level (GL) :	RL(+) 206.8 m
Co-ordinates :	**1177 E, 503 N**	Ground Water Level :	5.2 m (RL(+) 201.6 m)
Termination Depth : (below GL)	15 m (RL(+) 191.8 m)	Start Date :	31-May-18
		Finish Date :	02-Jun-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.3			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (0.3 to 1.5m)		7	0			NX
2.00, 2.50, 3.00	3.00	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		18	0			
3.50, 4.00, 4.50	4.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		36	0			
5.00, 5.50, 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		60	0			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		81	0			
8.00, 8.50, 9.00	9.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		97	7			
9.50, 10.00, 10.50	10.50		Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		92	68			

Percentage Core Recovery & RQD vs. depth

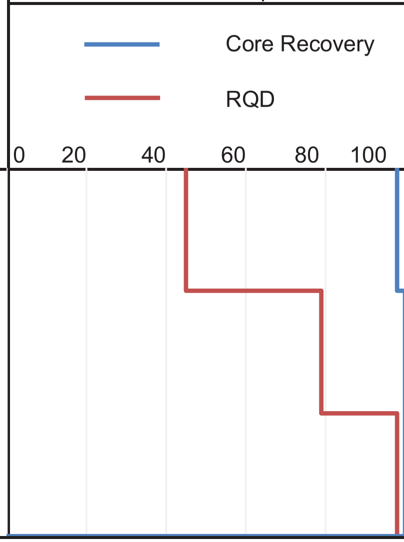


Borehole Log (BH19)

Location :	**MAIN POWER HOUSE AREA**	Ground Level (GL) :	RL(+) 206.8 m	Drilling :	Rotary Drilling
Co-ordinates :	**1177 E, 503 N**	Ground Water Level :	5.2 m (RL(+) 201.6 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 191.8 m)	Start Date :	31-May-18	Casing Depth :	2.0 m
		Finish Date :	02-Jun-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (10.5 to 12m)		98	45	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		100	79			
13.00										
13.50	13.50									
14.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		100	98			
14.50										
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth

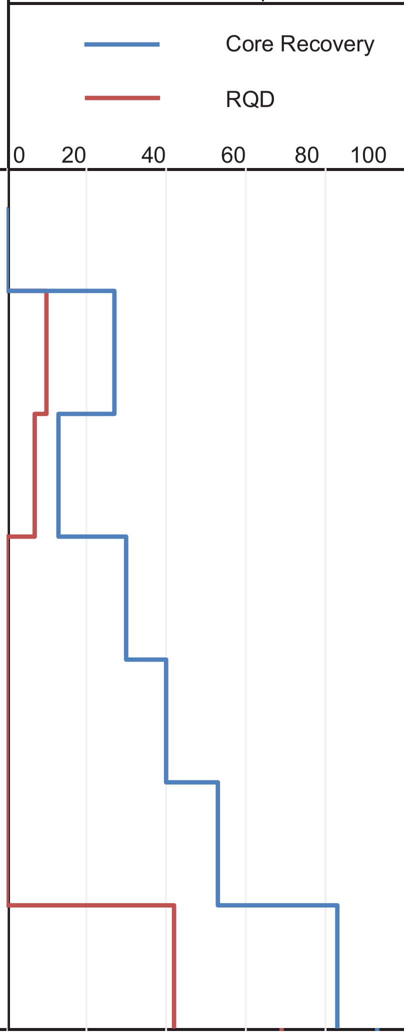


Borehole Log (BH20)

Location :	**MAIN POWER HOUSE AREA**	Ground Level (GL) :	RL(+) 207.6 m	Drilling :	Rotary Drilling
Co-ordinates :	**1217 E, 503 N**	Ground Water Level :	5.2 m (RL(+) 202.4 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 192.6 m)	Start Date :	23-Jul-18	Casing Depth :	2.0 m
		Finish Date :	25-Jul-18		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.2					HX
1.00			Very weak grey Basalt, completely weathered, disintegrated (0.22 to 1.5m)		0	0	Greyish	Partial	NX
1.50	1.50	Ref.							
2.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (1.5 to 3m)		27	10			
2.50									
3.00	3.00								
3.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		13	7			
4.00									
4.50	4.50	Ref.							
5.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		30	0			
5.50									
6.00	6.00								
6.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		40	0			
7.00									
7.50	7.50								
8.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		53	0			
8.50									
9.00	9.00								
9.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (9 to 10.5m)		83	42			
10.00									
10.50	10.50								

Percentage Core Recovery & RQD vs. depth



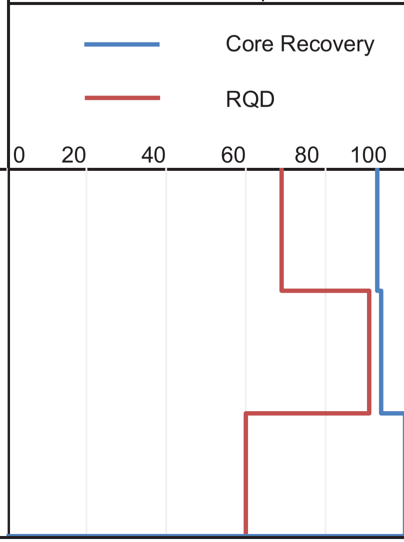
Borehole Log (BH20)

Location :	**MAIN POWER HOUSE AREA**	Ground Level (GL) :	RL(+) 207.6 m
Co-ordinates :	**1217 E, 503 N**	Ground Water Level :	5.2 m (RL(+) 202.4 m)
Termination Depth : (below GL)	15 m (RL(+) 192.6 m)	Start Date :	23-Jul-18
		Finish Date :	25-Jul-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		93	69	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		94	91			
13.00										
13.50	13.50									
14.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (13.5 to 15m)		100	60			
14.50										
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth

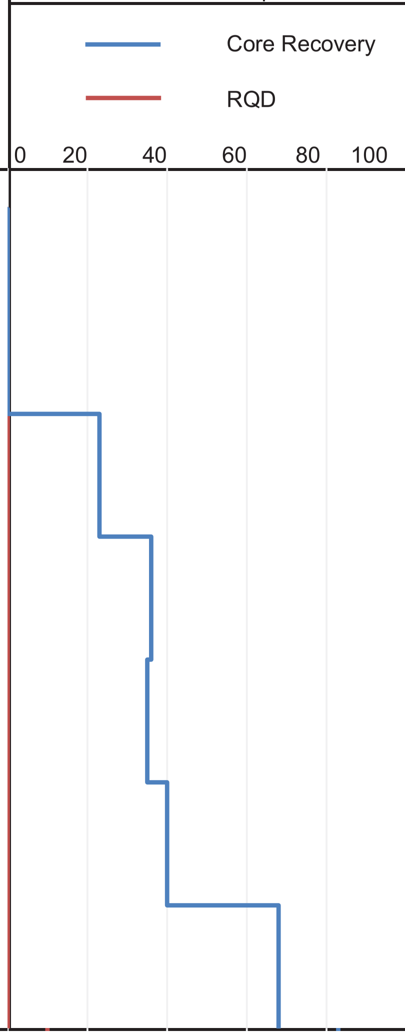


Borehole Log (BH21)

Location :	**PIPE RACK**	Ground Level (GL) :	RL(+) 209.5 m	Drilling :	Rotary Drilling
Co-ordinates :	**1217 E, 469 N**	Ground Water Level :	4.2 m (RL(+) 205.3 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 194.5 m)	Start Date :	20-Jul-18	Casing Depth :	2.0 m
		Finish Date :	22-Jul-18		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.1					HX
1.00			Very weak grey Basalt, completely weathered, disintegrated (0.1 to 1.5m)		0	0	Greyish	Partial	NX
1.50	1.50	Ref.							
2.00									
2.50			Very weak grey Basalt, completely weathered, disintegrated (1.5 to 3m)		0	0			
3.00	3.00	Ref.							
3.50									
4.00			Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		23	0			
4.50	4.50								
5.00									
5.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		36	0			
6.00	6.00								
6.50									
7.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		35	0			
7.50	7.50								
8.00									
8.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		40	0			
9.00	9.00								
9.50									
10.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		68	0			
10.50	10.50								

Percentage Core Recovery & RQD vs. depth



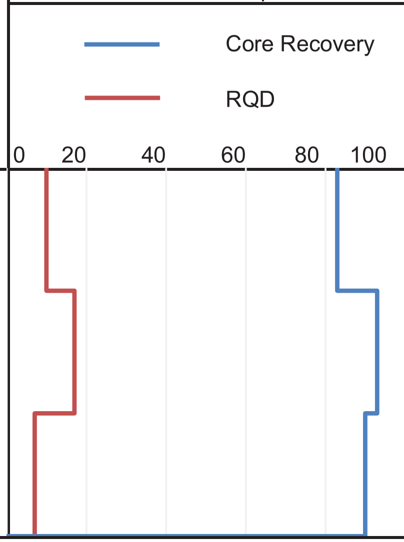
Borehole Log (BH21)

Location :	**PIPE RACK**	Ground Level (GL) :	RL(+) 209.5 m
Co-ordinates :	**1217 E, 469 N**	Ground Water Level :	4.2 m (RL(+) 205.3 m)
Termination Depth : (below GL)	15 m (RL(+) 194.5 m)	Start Date :	20-Jul-18
		Finish Date :	22-Jul-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		83	10	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		93	17			
13.00										
13.50	13.50									
14.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (13.5 to 15m)		90	7			
14.50										
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth

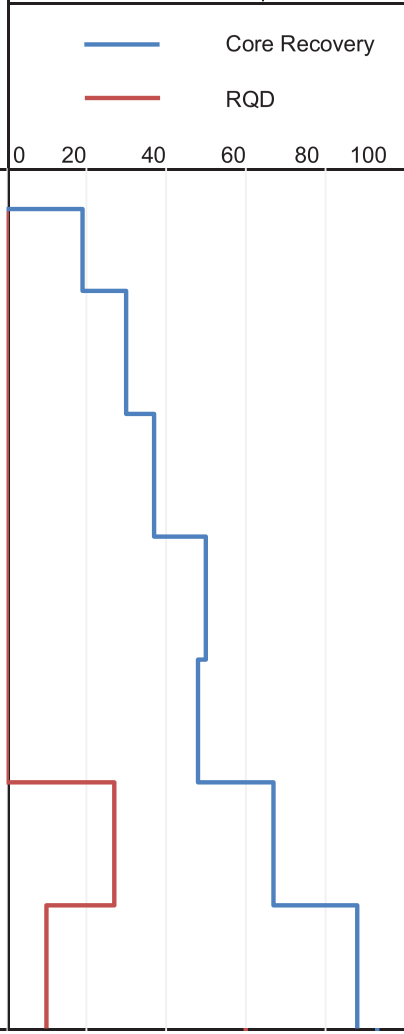


Borehole Log (BH22)

Location :	**TRANSFORMER YARD**	Ground Level (GL) :	RL(+) 206.4 m
Co-ordinates :	**1177 E, 469 N**	Ground Water Level :	5.3 m (RL(+) 201.1 m)
Termination Depth : (below GL)	15 m (RL(+) 191.4 m)	Start Date :	10-Jul-18
		Finish Date :	14-Jul-18
Drilling :	Rotary Drilling	Bit Type :	Diamond
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.3			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (0.26 to 1.5m)		19	0			NX
2.00, 2.50, 3.00	3.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (1.5 to 3m)		30	0			
3.50, 4.00, 4.50	4.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		37	0			
5.00, 5.50, 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		50	0			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		48	0			
8.00, 8.50, 9.00	9.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		67	27			
9.50, 10.00, 10.50	10.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		88	10			

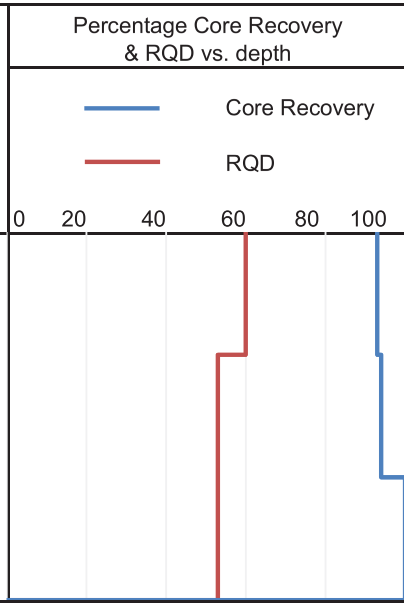
Percentage Core Recovery & RQD vs. depth



Borehole Log (BH22)

Location :	**TRANSFORMER YARD**	Ground Level (GL) :	RL(+) 206.4 m
Co-ordinates :	**1177 E, 469 N**	Ground Water Level :	5.3 m (RL(+) 201.1 m)
Termination Depth : (below GL)	15 m (RL(+) 191.4 m)	Start Date :	10-Jul-18
		Finish Date :	14-Jul-18
Drilling :	Rotary Drilling		
Bit Type :	Diamond		
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (10.5 to 12m)		93	60	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (12 to 13.5m)		94	53			
13.00										
13.50	13.50									
14.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (13.5 to 15m)		100	53			
14.50										
15.00	15.00				15.0					

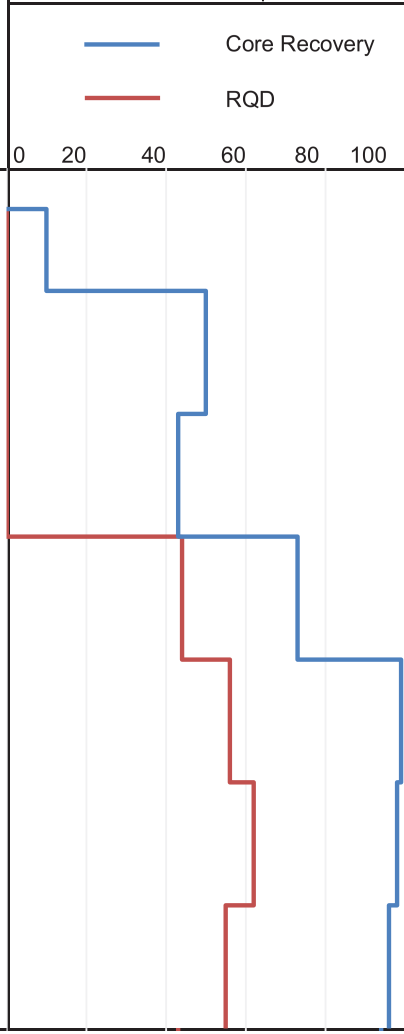


Borehole Log (BH23)

Location :	**TRANSFORMER YARD**	Ground Level (GL) :	RL(+) 207.5 m
Co-ordinates :	**1125 E, 469 N**	Ground Water Level :	6.9 m (RL(+) 200.6 m)
Termination Depth : (below GL)	15 m (RL(+) 192.5 m)	Start Date :	29-Jun-18
		Finish Date :	04-Jul-18
Drilling :	Rotary Drilling		
Bit Type :	Diamond		
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.2			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.		Weak grey Basalt, very intensely fractured, highly weathered (0.24 to 1.5m)		10	0			NX
2.00, 2.50, 3.00	3.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (1.5 to 3m)		50	0			
3.50, 4.00, 4.50	4.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		43	0			
5.00, 5.50, 6.00	6.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (4.5 to 6m)		73	44			
6.50, 7.00, 7.50	7.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (6 to 7.5m)		99	56			
8.00, 8.50, 9.00	9.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (7.5 to 9m)		98	62			
9.50, 10.00, 10.50	10.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (9 to 10.5m)		96	55			

Percentage Core Recovery & RQD vs. depth



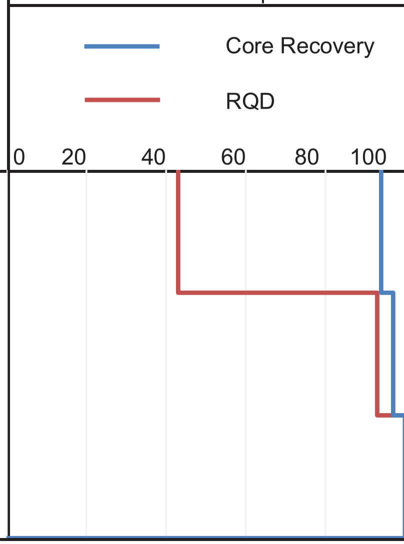
Borehole Log (BH23)

Location :	**TRANSFORMER YARD**	Ground Level (GL) :	RL(+) 207.5 m
Co-ordinates :	**1125 E, 469 N**	Ground Water Level :	6.9 m (RL(+) 200.6 m)
Termination Depth : (below GL)	15 m (RL(+) 192.5 m)	Start Date :	29-Jun-18
		Finish Date :	04-Jul-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (10.5 to 12m)		94	43	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		97	93			
13.00										
13.50	13.50									
14.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		100	100			
14.50										
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth

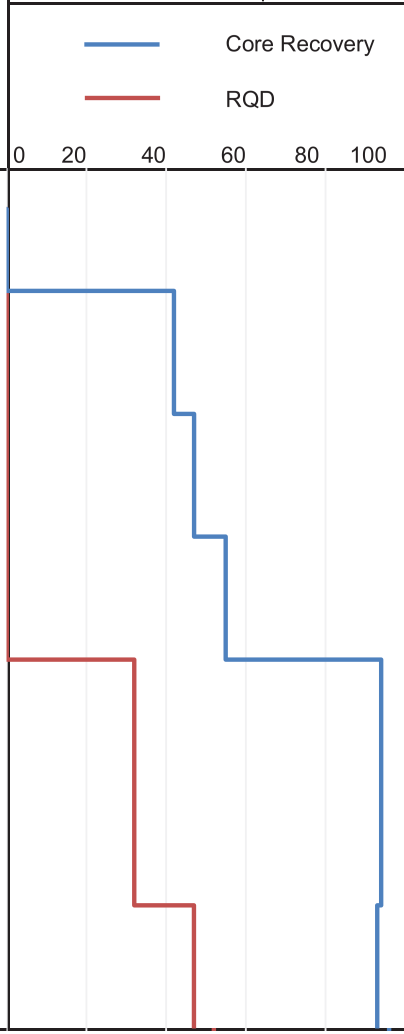


Borehole Log (BH24)

Location :	**TRANSFORMER YARD**	Ground Level (GL) :	RL(+) 206.4 m	Drilling :	Rotary Drilling
Co-ordinates :	**1085 E, 469 N**	Ground Water Level :	5.4 m (RL(+) 201 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 191.4 m)	Start Date :	05-Jul-18	Casing Depth :	2.0 m
		Finish Date :	08-Jul-18		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.2					HX
1.00			Very weak grey Basalt, completely weathered, disintegrated (0.21 to 1.5m)		0	0	Greyish	Partial	NX
1.50	1.50	Ref.							
2.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (1.5 to 3m)		42	0			
2.50									
3.00	3.00								
3.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		47	0			
4.00									
4.50	4.50								
5.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		55	0			
5.50									
6.00	6.00								
6.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		94	32			
7.00									
7.50	7.50								
8.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		94	32			
8.50									
9.00	9.00								
9.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (9 to 10.5m)		93	47			
10.00									
10.50	10.50								

Percentage Core Recovery & RQD vs. depth



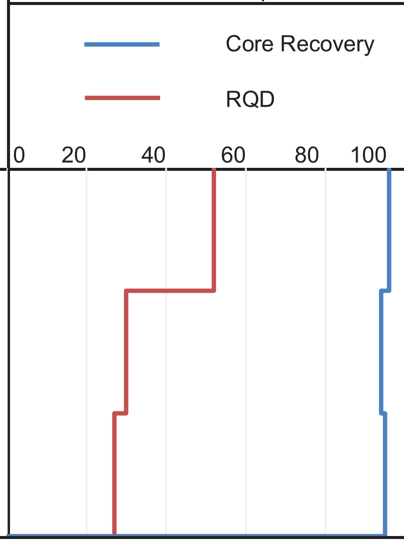
Borehole Log (BH24)

Location :	**TRANSFORMER YARD**	Ground Level (GL) :	RL(+) 206.4 m
Co-ordinates :	**1085 E, 469 N**	Ground Water Level :	5.4 m (RL(+) 201 m)
Termination Depth : (below GL)	15 m (RL(+) 191.4 m)	Start Date :	05-Jul-18
		Finish Date :	08-Jul-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00 11.50 12.00	12.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (10.5 to 12m)		96	52	Greyish	Partial	NX
12.50 13.00 13.50	13.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		94	30			
14.00 14.50 15.00	15.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (13.5 to 15m)	15.0	95	27			

Percentage Core Recovery & RQD vs. depth

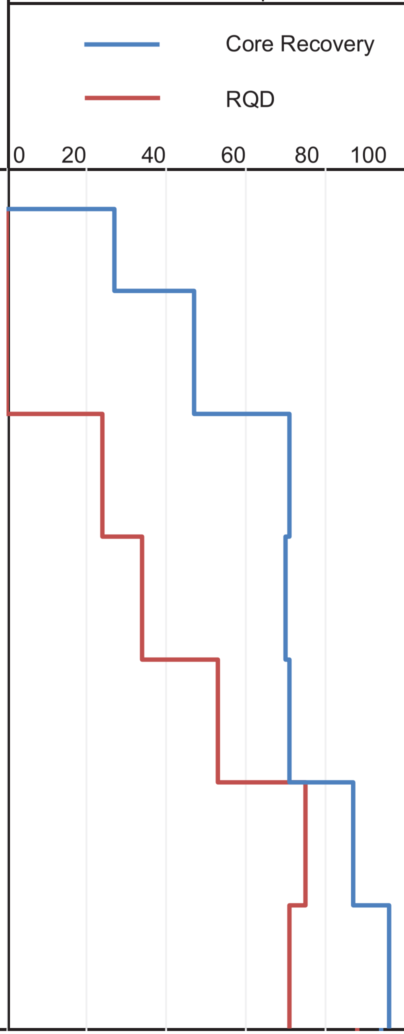


Borehole Log (BH25)

Location :	**PIPE RACK**	Ground Level (GL) :	RL(+) 209.6 m	Drilling :	Rotary Drilling
Co-ordinates :	**1217 E, 428 N**	Ground Water Level :	4.5 m (RL(+) 205.1 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 194.6 m)	Start Date :	20-Jul-18	Casing Depth :	2.0 m
		Finish Date :	25-Jul-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.2					HX
1.00, 1.50	1.50			Weak grey Basalt, very intensely fractured, highly weathered (0.21 to 1.5m)		27	0	Greyish	Partial	NX
2.00, 2.50, 3.00	3.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (1.5 to 3m)		47	0			
3.50, 4.00, 4.50	4.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		71	24			
5.00, 5.50, 6.00	6.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		70	34			
6.50, 7.00, 7.50	7.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (6 to 7.5m)		71	53			
8.00, 8.50, 9.00	9.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (7.5 to 9m)		87	75			
9.50, 10.00, 10.50	10.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		96	71			

Percentage Core Recovery & RQD vs. depth

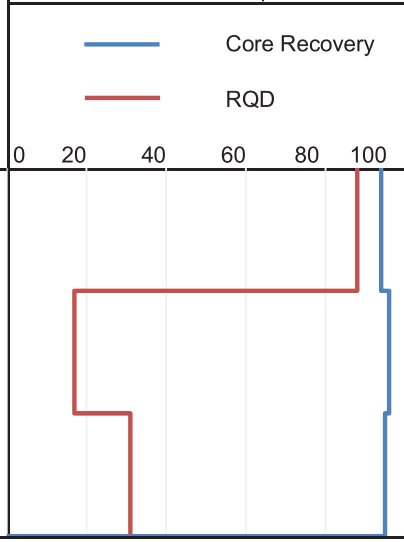


Borehole Log (BH25)

Location :	**PIPE RACK**	Ground Level (GL) :	RL(+) 209.6 m
Co-ordinates :	**1217 E, 428 N**	Ground Water Level :	4.5 m (RL(+) 205.1 m)
Termination Depth : (below GL)	15 m (RL(+) 194.6 m)	Start Date :	20-Jul-18
		Finish Date :	25-Jul-18
Drilling :	Rotary Drilling		
Bit Type :	Diamond		
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		94	88	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		96	17			
13.00										
13.50	13.50									
14.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (13.5 to 15m)		95	31			
14.50										
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth



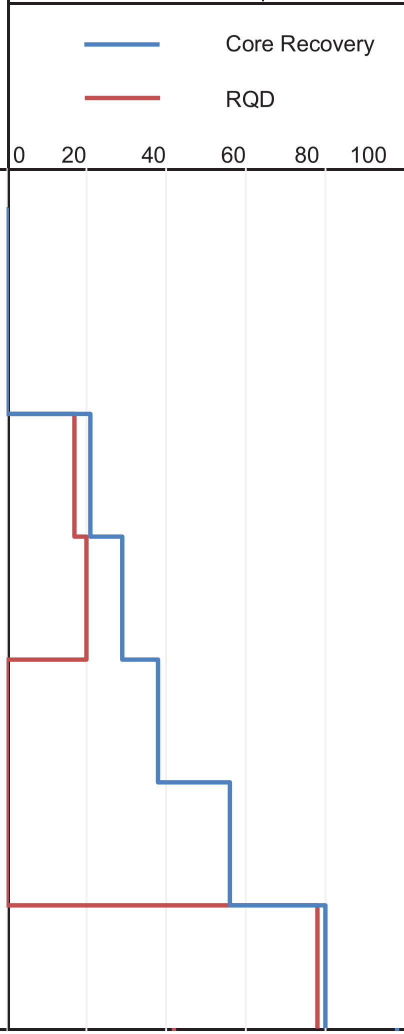
Borehole Log (BH26)

Location :	**PARKING SHEDS**	Ground Level (GL) :	RL(+) 206.0 m
Co-ordinates :	**1017 E, 451 N**	Ground Water Level :	2.7 m (RL(+) 203.3 m)
Termination Depth : (below GL)	15 m (RL(+) 191 m)	Start Date :	15-Jul-18
		Finish Date :	18-Jul-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)
0.50			Black Silty Clay with rock fragments	0.3		
1.00 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.28 to 1.5m)		0	0
2.00 2.50 3.00	3.00	Ref.	Very weak grey Basalt, completely weathered, disintegrated (1.5 to 3m)		0	0
3.50 4.00 4.50	4.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		21	17
5.00 5.50 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		29	20
6.50 7.00 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		38	0
8.00 8.50 9.00	9.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		56	0
9.50 10.00 10.50	10.50		Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		80	78

Percentage Core Recovery & RQD vs. depth



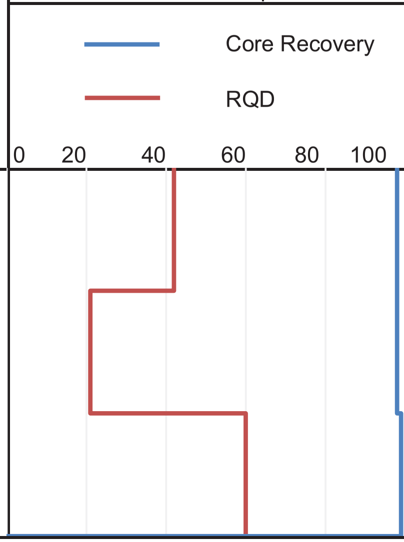
Return Water Colour	Return Water Loss	Size of Hole
Greyish	Partial	HX (to 0.3 m), NX

Borehole Log (BH26)

Location :	**PARKING SHEDS**	Ground Level (GL) :	RL(+) 206.0 m
Co-ordinates :	**1017 E, 451 N**	Ground Water Level :	2.7 m (RL(+) 203.3 m)
Termination Depth : (below GL)	15 m (RL(+) 191 m)	Start Date :	15-Jul-18
		Finish Date :	18-Jul-18
Drilling :	Rotary Drilling		
Bit Type :	Diamond		
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (10.5 to 12m)		98	42	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		98	21			
13.00										
13.50	13.50									
14.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (13.5 to 15m)		99	60			
14.50										
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth

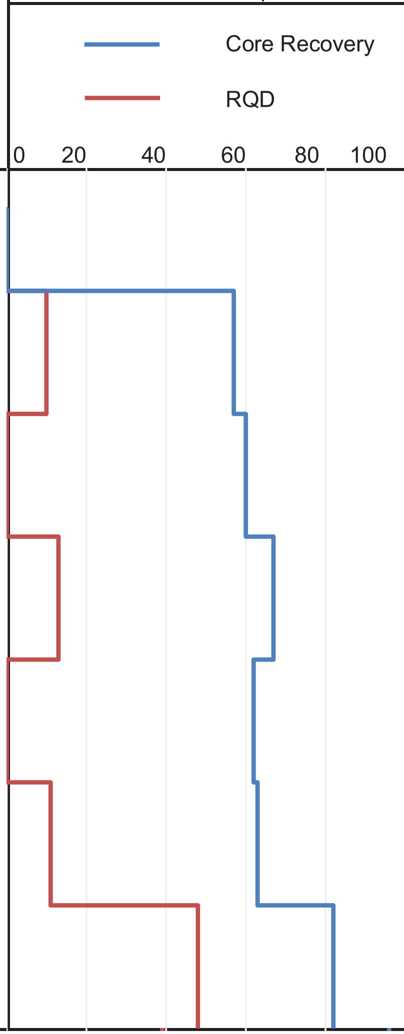


Borehole Log (BH27)

Location :	**CANTEEN**	Ground Level (GL) :	RL(+) 207.5 m	Drilling :	Rotary Drilling
Co-ordinates :	**1022 E, 515 N**	Ground Water Level :	2.9 m (RL(+) 204.6 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 192.5 m)	Start Date :	15-Jul-18	Casing Depth :	2.0 m
		Finish Date :	19-Jul-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.3			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.		Very weak grey Basalt, completely weathered, disintegrated (0.28 to 1.5m)		0	0			NX
2.00, 2.50, 3.00	3.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (1.5 to 3m)		57	10			
3.50, 4.00, 4.50	4.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		60	0			
5.00, 5.50, 6.00	6.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		67	13			
6.50, 7.00, 7.50	7.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		62	0			
8.00, 8.50, 9.00	9.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		63	11			
9.50, 10.00, 10.50	10.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (9 to 10.5m)		82	48			

Percentage Core Recovery & RQD vs. depth

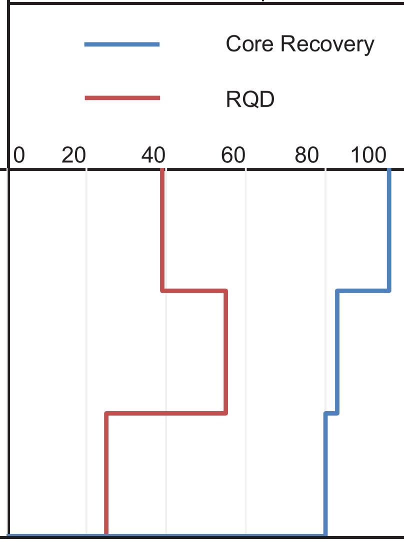


Borehole Log (BH27)

Location :	**CANTEEN**	Ground Level (GL) :	RL(+) 207.5 m	Drilling :	Rotary Drilling
Co-ordinates :	**1022 E, 515 N**	Ground Water Level :	2.9 m (RL(+) 204.6 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 192.5 m)	Start Date :	15-Jul-18	Casing Depth :	2.0 m
		Finish Date :	19-Jul-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		96	39	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (12 to 13.5m)		83	55			
13.00										
13.50	13.50									
14.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (13.5 to 15m)		80	25			
14.50										
15.00	15.00				15.0					

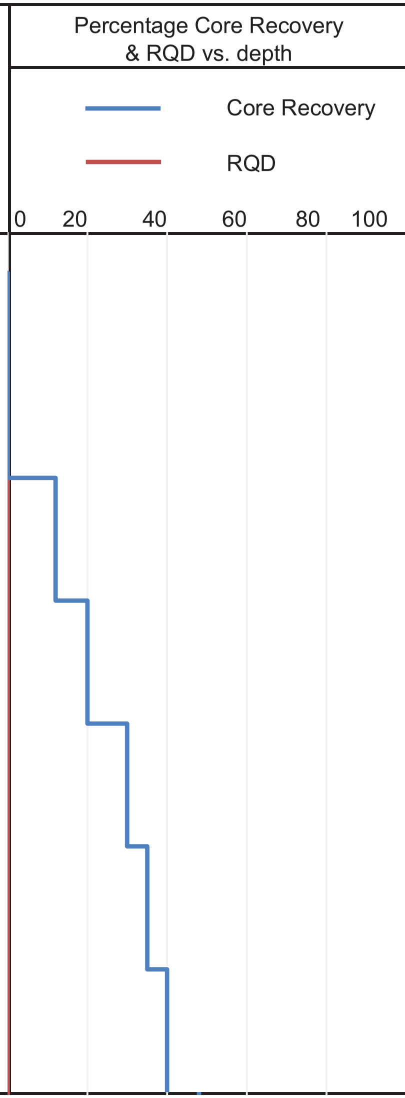
Percentage Core Recovery & RQD vs. depth



Borehole Log (BH28)

Location :	**HFO & LDO PUMP HOUSE**	Ground Level (GL) :	RL(+) 204.7 m
Co-ordinates :	**1016 E, 758 N**	Ground Water Level :	2.8 m (RL(+) 201.9 m)
Termination Depth : (below GL)	15 m (RL(+) 189.7 m)	Start Date :	19-Jul-18
		Finish Date :	24-Jul-18
Drilling :	Rotary Drilling	Bit Type :	Diamond
Casing Depth :	2.0 m		

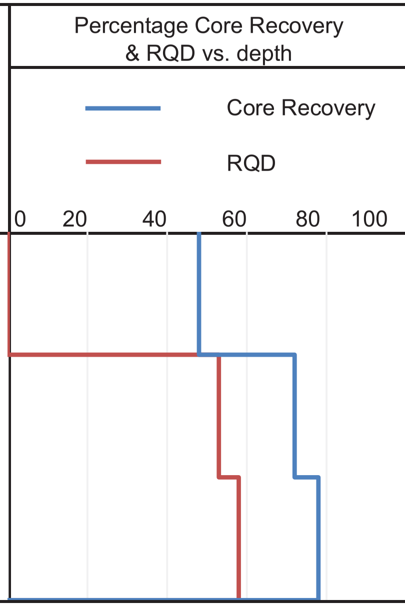
Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.3			Greyish	Partial	HX
1.00			Very weak grey Basalt, completely weathered, disintegrated (0.29 to 1.5m)		0	0			NX
1.50	1.50	Ref.							
2.00									
2.50			Very weak grey Basalt, completely weathered, disintegrated (1.5 to 3m)		0	0			
3.00	3.00	Ref.							
3.50									
4.00			Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		12	0			
4.50	4.50	Ref.							
5.00									
5.50			Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		20	0			
6.00	6.00								
6.50									
7.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		30	0			
7.50	7.50								
8.00									
8.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		35	0			
9.00	9.00								
9.50									
10.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		40	0			
10.50	10.50								



Borehole Log (BH28)

Location :	**HFO & LDO PUMP HOUSE**	Ground Level (GL) :	RL(+) 204.7 m	Drilling :	Rotary Drilling
Co-ordinates :	**1016 E, 758 N**	Ground Water Level :	2.8 m (RL(+) 201.9 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 189.7 m)	Start Date :	19-Jul-18	Casing Depth :	2.0 m
		Finish Date :	24-Jul-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		48	0	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (12 to 13.5m)		72	53			
13.00										
13.50	13.50									
14.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (13.5 to 15m)		78	58			
14.50										
15.00	15.00				15.0					

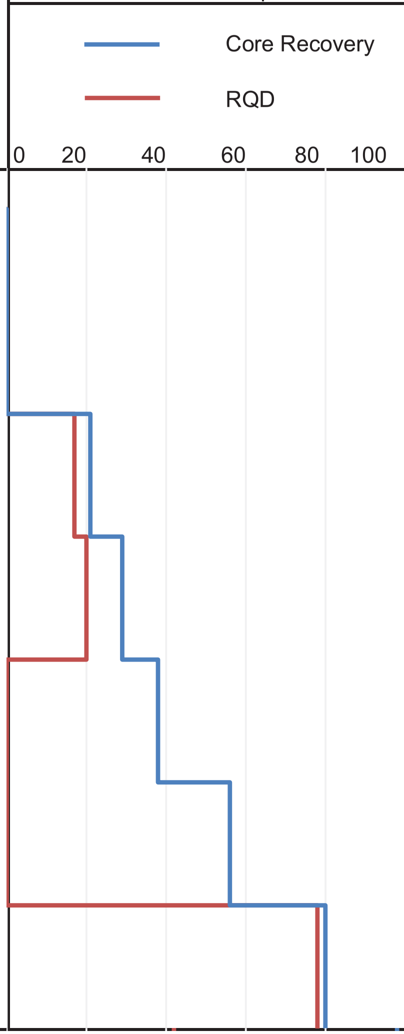


Borehole Log (BH29)

Location :	**FGD AREA**	Ground Level (GL) :	RL(+) 207.5 m
Co-ordinates :	**1215 E, 862 N**	Ground Water Level :	4.4 m (RL(+) 203.1 m)
Termination Depth : (below GL)	15 m (RL(+) 192.5 m)	Start Date :	15-Jul-18
		Finish Date :	21-Jul-18
Drilling :	Rotary Drilling	Bit Type :	Diamond
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.1			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.1 to 1.5m)		0	0			NX
2.00, 2.50, 3.00	3.00	Ref.	Very weak grey Basalt, completely weathered, disintegrated (1.5 to 3m)		0	0			
3.50, 4.00, 4.50	4.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		21	17			
5.00, 5.50, 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		29	20			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		38	0			
8.00, 8.50, 9.00	9.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		56	0			
9.50, 10.00, 10.50	10.50		Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		80	78			

Percentage Core Recovery & RQD vs. depth

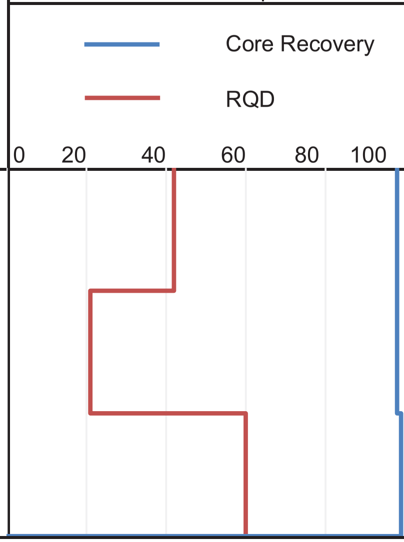


Borehole Log (BH29)

Location :	**FGD AREA**	Ground Level (GL) :	RL(+) 207.5 m	Drilling :	Rotary Drilling
Co-ordinates :	**1215 E, 862 N**	Ground Water Level :	4.4 m (RL(+) 203.1 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 192.5 m)	Start Date :	15-Jul-18	Casing Depth :	2.0 m
		Finish Date :	21-Jul-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (10.5 to 12m)		98	42	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		98	21			
13.00										
13.50	13.50									
14.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (13.5 to 15m)		99	60			
14.50										
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth



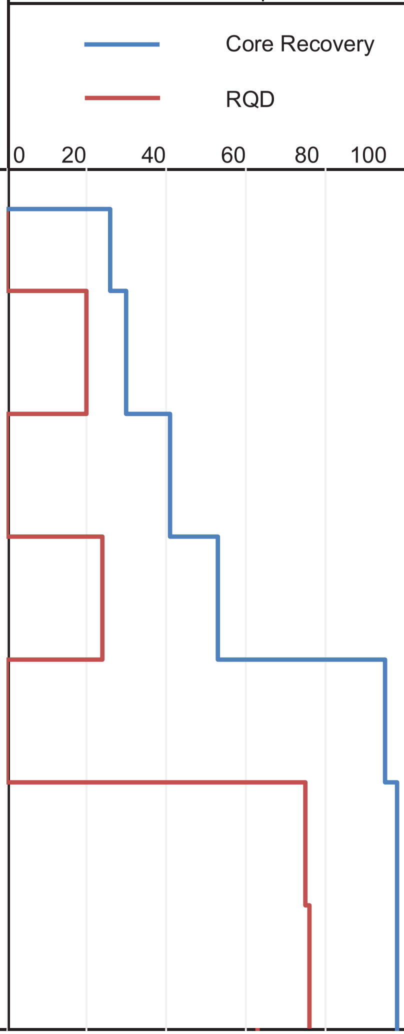
Borehole Log (BH30)

Location :	**FGD AREA**	Ground Level (GL) :	RL(+) 207.3 m
Co-ordinates :	**1262 E, 862 N**	Ground Water Level :	4.6 m (RL(+) 202.6 m)
Termination Depth : (below GL)	20 m (RL(+) 187.3 m)	Start Date :	28-Jul-18
		Finish Date :	01-Aug-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.1			Greyish	Partial	HX
1.00, 1.50	1.50			Weak grey Basalt, very intensely fractured, highly weathered (0.1 to 1.5m)		26	0			NX
2.00, 2.50, 3.00	3.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (1.5 to 3m)		30	20			
3.50, 4.00, 4.50	4.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		41	0			
5.00, 5.50, 6.00	6.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		53	24			
6.50, 7.00, 7.50	7.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		95	0			
8.00, 8.50, 9.00	9.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (7.5 to 9m)		98	75			
9.50, 10.00, 10.50	10.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		98	76			

Percentage Core Recovery & RQD vs. depth



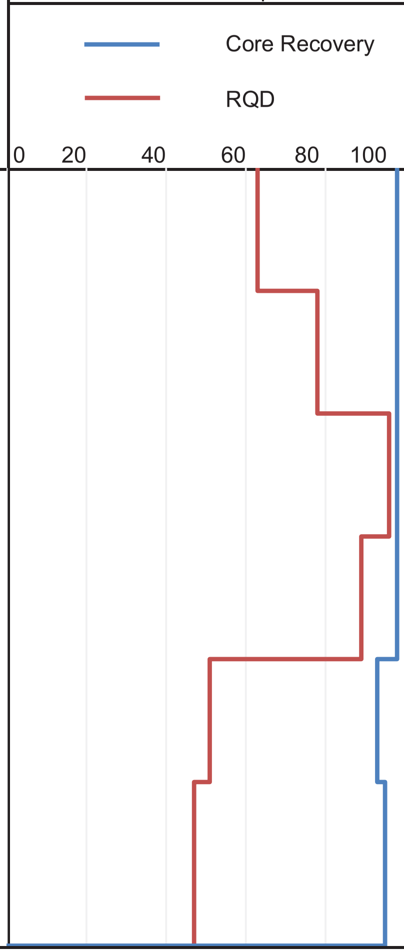
Borehole Log (BH30)

Location :	**FGD AREA**	Ground Level (GL) :	RL(+) 207.3 m
Co-ordinates :	**1262 E, 862 N**	Ground Water Level :	4.6 m (RL(+) 202.6 m)
Termination Depth : (below GL)	20 m (RL(+) 187.3 m)	Start Date :	28-Jul-18
		Finish Date :	01-Aug-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Colour (Return Water)	Loss (Return Water)	Size of Hole
11.00, 11.50, 12.00	12.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		98	63	Greyish	Partial	NX
12.50, 13.00, 13.50	13.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		98	78			
14.00, 14.50, 15.00	15.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		98	96			
15.50, 16.00, 16.50	16.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (15 to 16.5m)		98	89			
17.00, 17.50, 18.00	18.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (16.5 to 18m)		93	51			
18.50, 19.00, 19.50, 20.00	20.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (18 to 20m)	20.0	95	47			

Percentage Core Recovery & RQD vs. depth

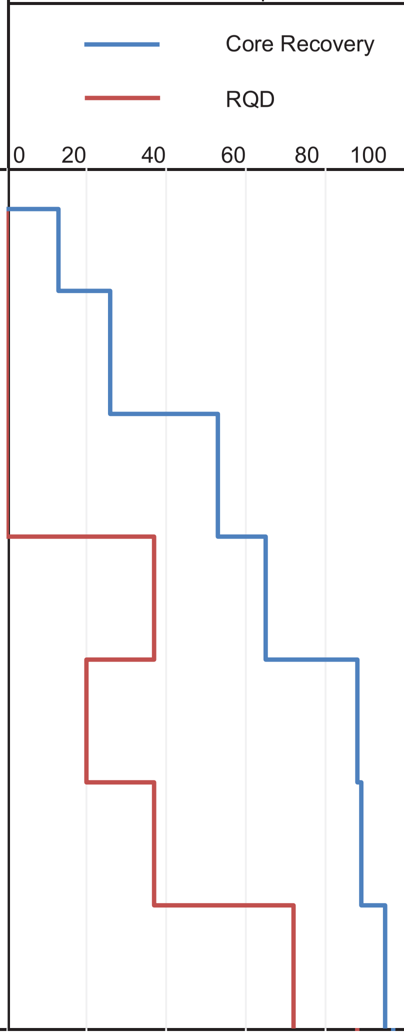


Borehole Log (BH31)

Location :	**RAIN WATER HARVESTING POND**	Ground Level (GL) :	RL(+) 207.4 m
Co-ordinates :	**1369 E, 710 N**	Ground Water Level :	4.6 m (RL(+) 202.7 m)
Termination Depth : (below GL)	15 m (RL(+) 192.4 m)	Start Date :	18-Aug-18
		Finish Date :	19-Aug-18
Drilling :	Rotary Drilling		
Bit Type :	Diamond		
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.2			Greyish	Partial	HX
1.00				Weak grey Basalt, very intensely fractured, highly weathered (0.24 to 1.5m)		13	0			NX
1.50	1.50	Ref.								
2.00				Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		26	0			
2.50										
3.00	3.00									
3.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		53	0			
4.00										
4.50	4.50									
5.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		65	37			
5.50										
6.00	6.00									
6.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		88	20			
7.00										
7.50	7.50									
8.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		89	37			
8.50										
9.00	9.00									
9.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		95	72			
10.00										
10.50	10.50									

Percentage Core Recovery & RQD vs. depth

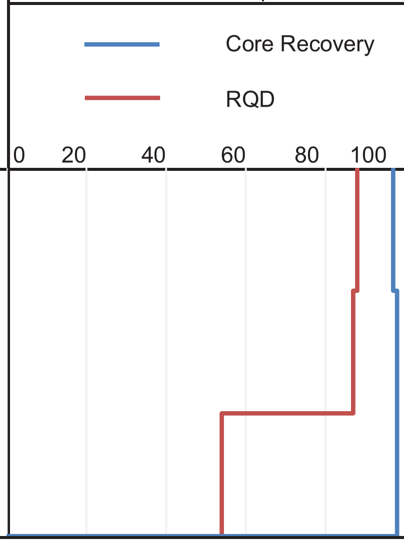


Borehole Log (BH31)

Location :	**RAIN WATER HARVESTING POND**	Ground Level (GL) :	RL(+) 207.4 m	Drilling :	Rotary Drilling
Co-ordinates :	**1369 E, 710 N**	Ground Water Level :	4.6 m (RL(+) 202.7 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 192.4 m)	Start Date :	18-Aug-18	Casing Depth :	2.0 m
		Finish Date :	19-Aug-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		97	88	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		98	87			
13.00										
13.50	13.50									
14.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (13.5 to 15m)		98	54			
14.50										
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth



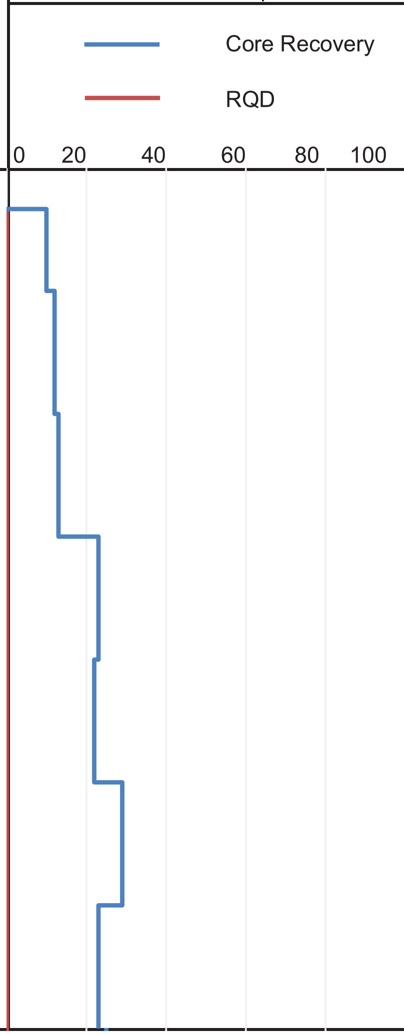
Borehole Log (BH32)

Location :	**AIR COMPRESSOR BUILDING**	Ground Level (GL) :	RL(+) 208.3 m
Co-ordinates :	**1255 E, 572 N**	Ground Water Level :	1 m (RL(+) 207.3 m)
Termination Depth : (below GL)	15 m (RL(+) 193.3 m)	Start Date :	07-Aug-18
		Finish Date :	09-Sep-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

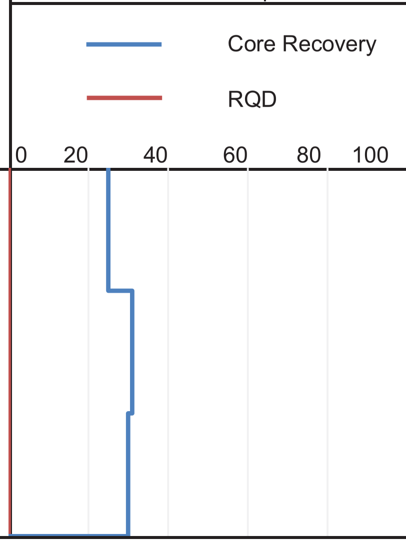
Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.1			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (0.1 to 1.5m)		10	0			NX
2.00, 2.50, 3.00	3.00	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		12	0			
3.50, 4.00, 4.50	4.50	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		13	0			
5.00, 5.50, 6.00	6.00		Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		23	0			
6.50, 7.00, 7.50	7.50		Weak grey Basalt, very intensely fractured, highly weathered (6 to 7.5m)		22	0			
8.00, 8.50, 9.00	9.00		Weak grey Basalt, very intensely fractured, highly weathered (7.5 to 9m)		29	0			
9.50, 10.00, 10.50	10.50		Weak grey Basalt, very intensely fractured, highly weathered (9 to 10.5m)		23	0			

Percentage Core Recovery & RQD vs. depth



Borehole Log (BH32)

Location :	**AIR COMPRESSOR BUILDING**	Ground Level (GL) : RL(+) 208.3 m	Drilling : Rotary Drilling
Co-ordinates :	**1255 E, 572 N**	Ground Water Level : 1 m (RL(+) 207.3 m)	Bit Type : Diamond
Termination Depth : (below GL)	15 m (RL(+) 193.3 m)	Start Date : 07-Aug-18	Casing Depth : 2.0 m
		Finish Date : 09-Sep-18	

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Percentage Core Recovery & RQD vs. depth	Return Water: Colour	Return Water: Loss	Size of Hole
11.00									Greyish	Partial	NX
11.50				Weak grey Basalt, very intensely fractured, highly weathered (10.5 to 12m)		25	0				
12.00	12.00										
12.50											
13.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		31	0				
13.50	13.50										
14.00											
14.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (13.5 to 15m)		30	0				
15.00	15.00				15.0						

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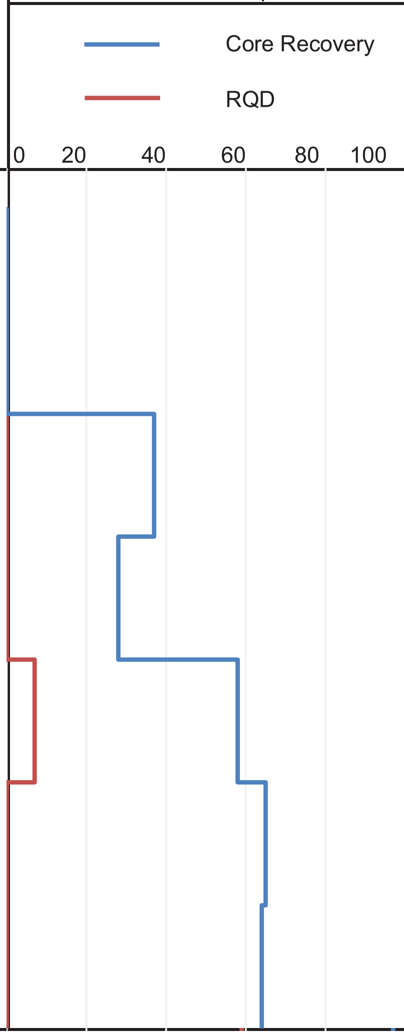
Borehole Log (BH33)

Location :	**CONDENSATE STORAGE TANK**	Ground Level (GL) :	RL(+) 209.2 m
Co-ordinates :	**1255 E, 528 N**	Ground Water Level :	5.9 m (RL(+) 203.3 m)
Termination Depth : (below GL)	15 m (RL(+) 194.2 m)	Start Date :	25-Jul-18
		Finish Date :	27-Jul-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.1					HX
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.1 to 1.5m)		0	0	Greyish	Partial	NX
2.00, 2.50, 3.00	3.00	Ref.	Very weak grey Basalt, completely weathered, disintegrated (1.5 to 3m)		0	0			
3.50, 4.00, 4.50	4.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		37	0			
5.00, 5.50, 6.00	6.00		Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		28	0			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		58	7			
8.00, 8.50, 9.00	9.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		65	0			
9.50, 10.00, 10.50	10.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		64	0			

Percentage Core Recovery & RQD vs. depth

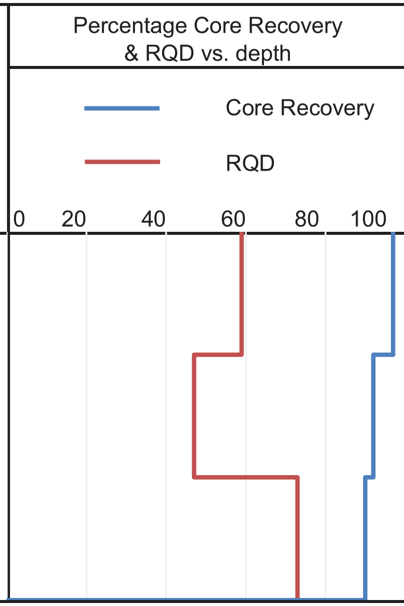


Borehole Log (BH33)

Location :	**CONDENSATE STORAGE TANK**	Ground Level (GL) :	RL(+) 209.2 m
Co-ordinates :	**1255 E, 528 N**	Ground Water Level :	5.9 m (RL(+) 203.3 m)
Termination Depth : (below GL)	15 m (RL(+) 194.2 m)	Start Date :	25-Jul-18
		Finish Date :	27-Jul-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (10.5 to 12m)		97	59	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (12 to 13.5m)		92	47			
13.00										
13.50	13.50									
14.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		90	73			
14.50										
15.00	15.00				15.0					



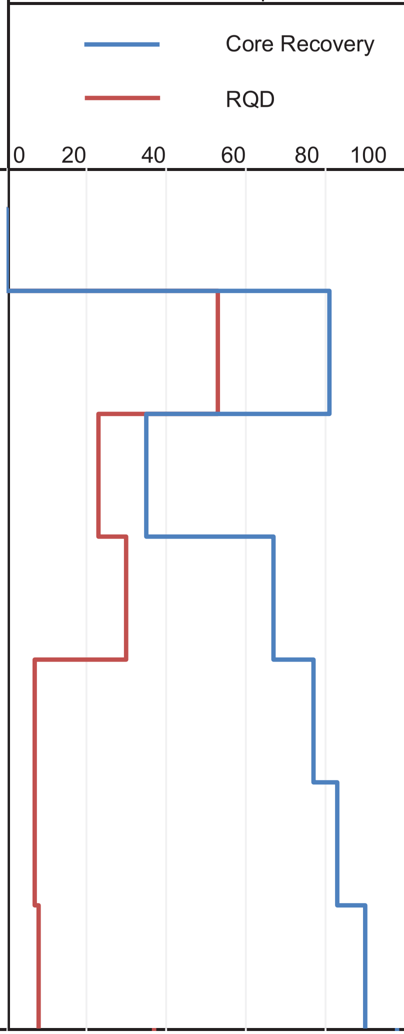
Borehole Log (BH34)

Location :	**CHEMICAL LAB**	Ground Level (GL) :	RL(+) 209.6 m
Co-ordinates :	**1327 E, 528 N**	Ground Water Level :	6 m (RL(+) 203.5 m)
Termination Depth : (below GL)	15 m (RL(+) 194.6 m)	Start Date :	28-Jul-18
		Finish Date :	01-Aug-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.3			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.31 to 1.5m)		0	0			NX
2.00, 2.50, 3.00	3.00		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (1.5 to 3m)		81	53			
3.50, 4.00, 4.50	4.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		35	23			
5.00, 5.50, 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		67	30			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		77	7			
8.00, 8.50, 9.00	9.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		83	7			
9.50, 10.00, 10.50	10.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		90	8			

Percentage Core Recovery & RQD vs. depth

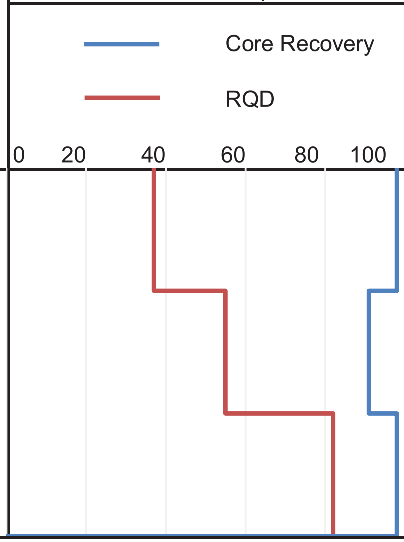


Borehole Log (BH34)

Location :	**CHEMICAL LAB**	Ground Level (GL) :	RL(+) 209.6 m	Drilling :	Rotary Drilling
Co-ordinates :	**1327 E, 528 N**	Ground Water Level :	6 m (RL(+) 203.5 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 194.6 m)	Start Date :	28-Jul-18	Casing Depth :	2.0 m
		Finish Date :	01-Aug-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00 – 12.00	12.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		98	37	Greyish	Partial	NX
12.50 – 13.50	13.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (12 to 13.5m)		91	55			
14.00 – 15.00	15.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)	15.0	98	82			

Percentage Core Recovery & RQD vs. depth



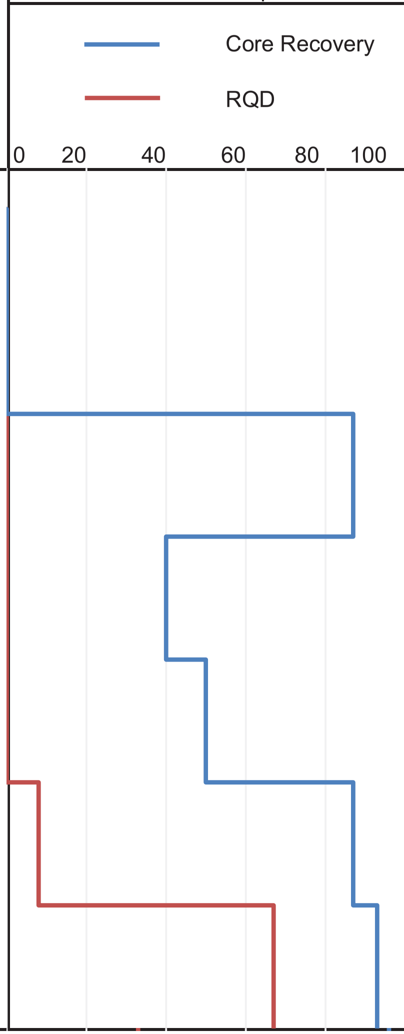
Borehole Log (BH35)

Location :	**DM WATER STORAGE TANK**	Ground Level (GL) :	RL(+) 209.3 m
Co-ordinates :	**1255 E, 491 N**	Ground Water Level :	6.1 m (RL(+) 203.2 m)
Termination Depth : (below GL)	15 m (RL(+) 194.3 m)	Start Date :	25-Jul-18
		Finish Date :	27-Jul-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.3			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.27 to 1.5m)		0	0			NX
2.00, 2.50, 3.00	3.00	Ref.	Very weak grey Basalt, completely weathered, disintegrated (1.5 to 3m)		0	0			
3.50, 4.00, 4.50	4.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		87	0			
5.00, 5.50, 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		40	0			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		50	0			
8.00, 8.50, 9.00	9.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		87	8			
9.50, 10.00, 10.50	10.50		Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		93	67			

Percentage Core Recovery & RQD vs. depth



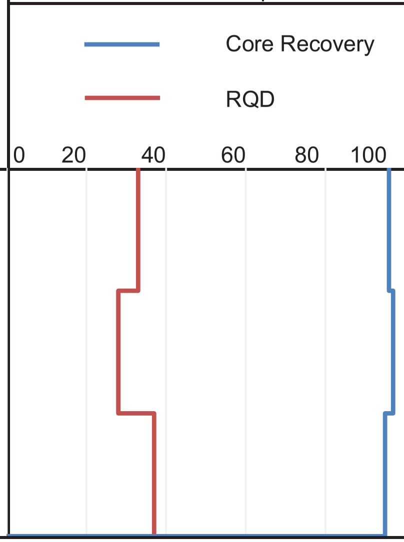
Borehole Log (BH35)

Location :	**DM WATER STORAGE TANK**	Ground Level (GL) :	RL(+) 209.3 m
Co-ordinates :	**1255 E, 491 N**	Ground Water Level :	6.1 m (RL(+) 203.2 m)
Termination Depth : (below GL)	15 m (RL(+) 194.3 m)	Start Date :	25-Jul-18
		Finish Date :	27-Jul-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		96	33	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		97	28			
13.00										
13.50	13.50									
14.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (13.5 to 15m)		95	37			
14.50										
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth

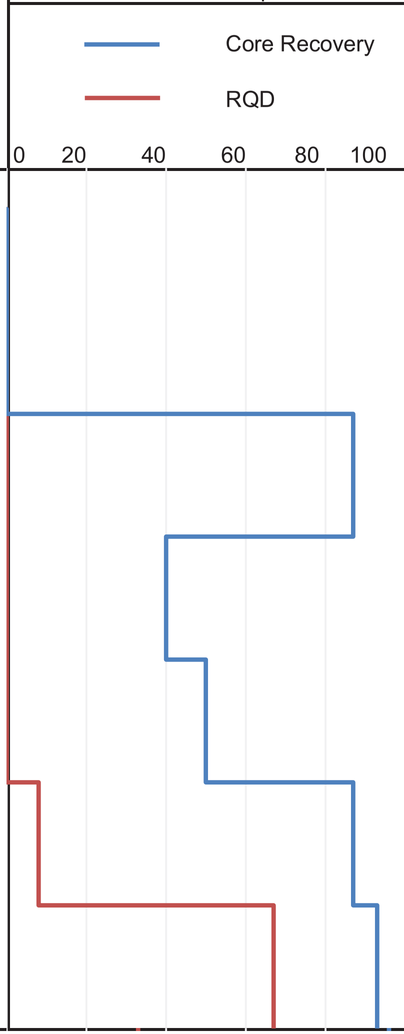


Borehole Log (BH36)

Location :	**ACID / ALKALI STORAGE AREA**	Ground Level (GL) :	RL(+) 209.8 m	Drilling :	Rotary Drilling
Co-ordinates :	**1327 E, 491 N**	Ground Water Level :	6.5 m (RL(+) 203.3 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 194.8 m)	Start Date :	28-Jul-18	Casing Depth :	2.0 m
		Finish Date :	31-Jul-18		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.2					HX
1.00 – 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.22 to 1.5m)		0	0	Greyish	Partial	NX
2.00 – 3.00	3.00	Ref.	Very weak grey Basalt, completely weathered, disintegrated (1.5 to 3m)		0	0			
3.50 – 4.50	4.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		87	0			
5.00 – 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		40	0			
6.50 – 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		50	0			
8.00 – 9.00	9.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		87	8			
9.50 – 10.50	10.50		Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		93	67			

Percentage Core Recovery & RQD vs. depth



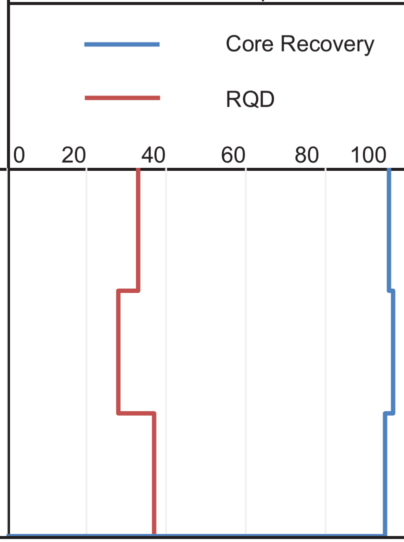
Borehole Log (BH36)

Location :	**ACID / ALKALI STORAGE AREA**	Ground Level (GL) :	RL(+) 209.8 m
Co-ordinates :	**1327 E, 491 N**	Ground Water Level :	6.5 m (RL(+) 203.3 m)
Termination Depth : (below GL)	15 m (RL(+) 194.8 m)	Start Date :	28-Jul-18
		Finish Date :	31-Jul-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		96	33	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		97	28			
13.00										
13.50	13.50									
14.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (13.5 to 15m)		95	37			
14.50										
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth



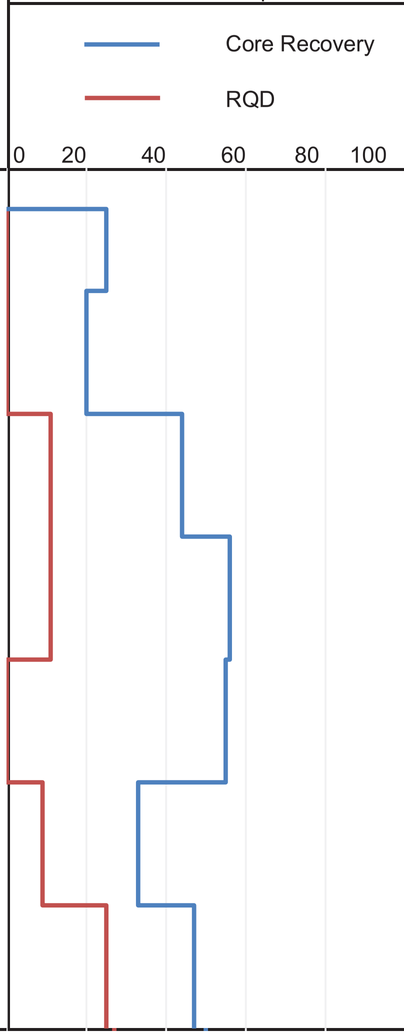
Borehole Log (BH37)

Location :	**SEWAGE TREATMENT PLANT**	Ground Level (GL) :	RL(+) 210.7 m
Co-ordinates :	**1594 E, 609 N**	Ground Water Level :	9.1 m (RL(+) 201.5 m)
Termination Depth : (below GL)	15 m (RL(+) 195.7 m)	Start Date :	07-Sep-18
		Finish Date :	11-Sep-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.3					HX
1.00, 1.50	1.50			Weak grey Basalt, very intensely fractured, highly weathered (0.29 to 1.5m)		25	0	Greyish	Partial	NX
2.00, 2.50, 3.00	3.00			Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		20	0			
3.50, 4.00, 4.50	4.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		44	11			
5.00, 5.50, 6.00	6.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		56	11			
6.50, 7.00, 7.50	7.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		55	0			
8.00, 8.50, 9.00	9.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		33	9			
9.50, 10.00, 10.50	10.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		47	25			

Percentage Core Recovery & RQD vs. depth

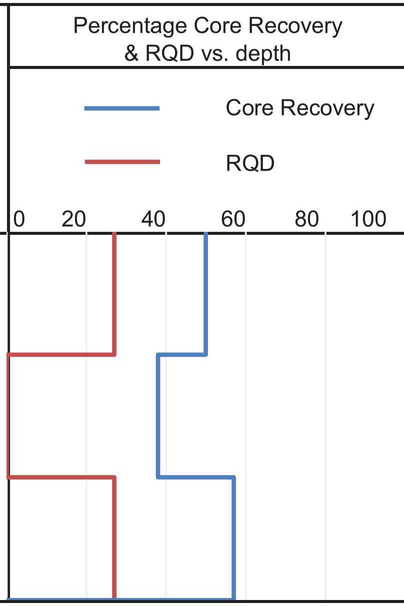


Borehole Log (BH37)

Location :	**SEWAGE TREATMENT PLANT**	Ground Level (GL) :	RL(+) 210.7 m
Co-ordinates :	**1594 E, 609 N**	Ground Water Level :	9.1 m (RL(+) 201.5 m)
Termination Depth : (below GL)	15 m (RL(+) 195.7 m)	Start Date :	07-Sep-18
		Finish Date :	11-Sep-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		50	27	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		38	0			
13.00										
13.50	13.50									
14.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (13.5 to 15m)		57	27			
14.50										
15.00	15.00				15.0					



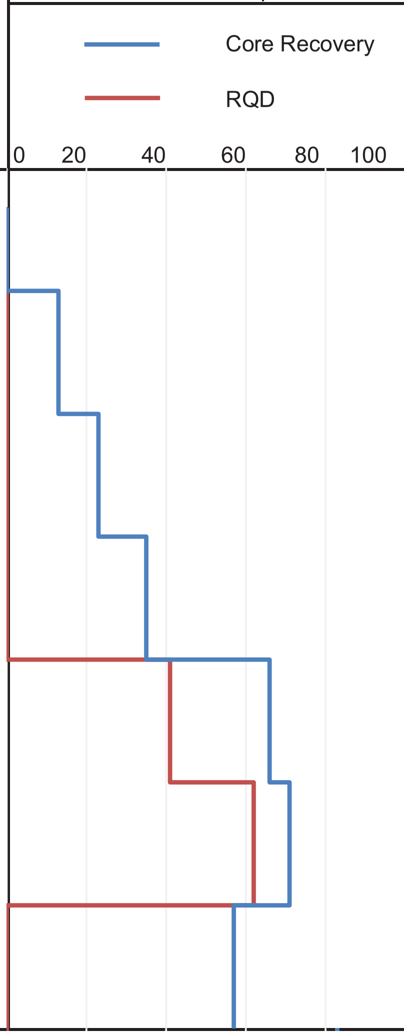
Borehole Log (BH38)

Location :	**COOLING TOWER**	Ground Level (GL) :	RL(+) 212.3 m
Co-ordinates :	**1665 E, 478 N**	Ground Water Level :	6.4 m (RL(+) 205.9 m)
Termination Depth : (below GL)	20 m (RL(+) 192.3 m)	Start Date :	14-Aug-18
		Finish Date :	23-Aug-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

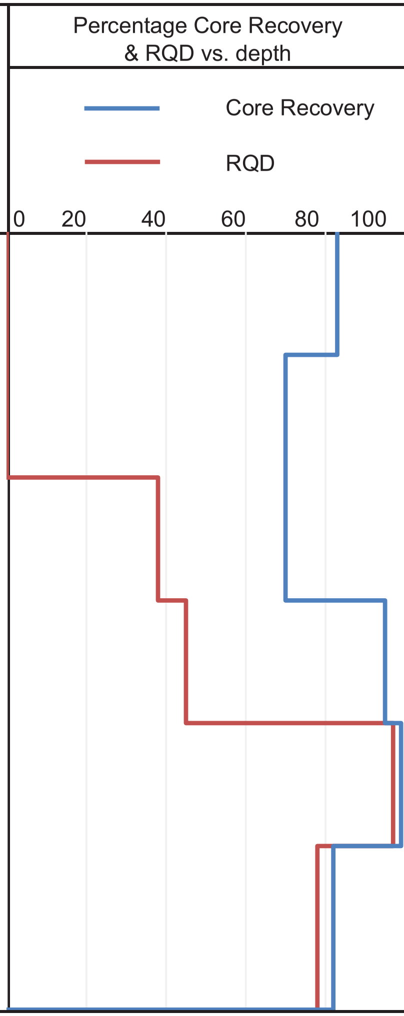
Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.2			Greyish	Partial	HX
1.00			Very weak grey Basalt, completely weathered, disintegrated (0.24 to 1.5m)		0	0			NX
1.50	1.50	Ref.							
2.00			Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		13	0			
2.50									
3.00	3.00	Ref.							
3.50			Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		23	0			
4.00									
4.50	4.50								
5.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		35	0			
5.50									
6.00	6.00								
6.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (6 to 7.5m)		66	41			
7.00									
7.50	7.50								
8.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (7.5 to 9m)		71	62			
8.50									
9.00	9.00								
9.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		57	0			
10.00									
10.50	10.50								

Percentage Core Recovery & RQD vs. depth



Borehole Log (BH38)

Location :	**COOLING TOWER**	Ground Level (GL) :	RL(+) 212.3 m
Co-ordinates :	**1665 E, 478 N**	Ground Water Level :	6.4 m (RL(+) 205.9 m)
Termination Depth : (below GL)	20 m (RL(+) 192.3 m)	Start Date :	14-Aug-18
		Finish Date :	23-Aug-18
Drilling :	Rotary Drilling	Bit Type :	Diamond
Casing Depth :	2.0 m		



Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00, 11.50, 12.00	12.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		83	0	Greyish	Partial	NX
12.50, 13.00, 13.50	13.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		70	0			
14.00, 14.50, 15.00	15.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (13.5 to 15m)		70	38			
15.50, 16.00, 16.50	16.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (15 to 16.5m)		95	45			
17.00, 17.50, 18.00	18.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (16.5 to 18m)		99	97			
18.50, 19.00, 19.50, 20.00	20.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (18 to 20m)	20.0	82	78			

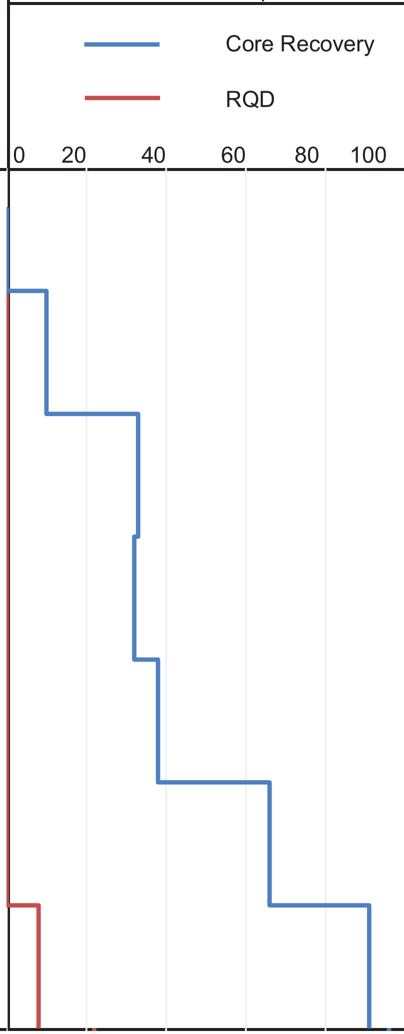
Scale

Borehole Log (BH39)

Location :	**COOLING TOWER**	Ground Level (GL) :	RL(+) 213.6 m
Co-ordinates :	**1725 E, 420 N**	Ground Water Level :	6.5 m (RL(+) 207 m)
Termination Depth : (below GL)	20 m (RL(+) 193.6 m)	Start Date :	09-Aug-18
		Finish Date :	13-Aug-18
Drilling :	Rotary Drilling	Bit Type :	Diamond
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.2					HX
1.00, 1.50	1.50	Ref.		Very weak grey Basalt, completely weathered, disintegrated (0.24 to 1.5m)		0	0	Greyish	Partial	NX
2.00, 2.50, 3.00	3.00	Ref.		Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		10	0			
3.50, 4.00, 4.50	4.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		33	0			
5.00, 5.50, 6.00	6.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		32	0			
6.50, 7.00, 7.50	7.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		38	0			
8.00, 8.50, 9.00	9.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		66	0			
9.50, 10.00, 10.50	10.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		91	8			

Percentage Core Recovery & RQD vs. depth



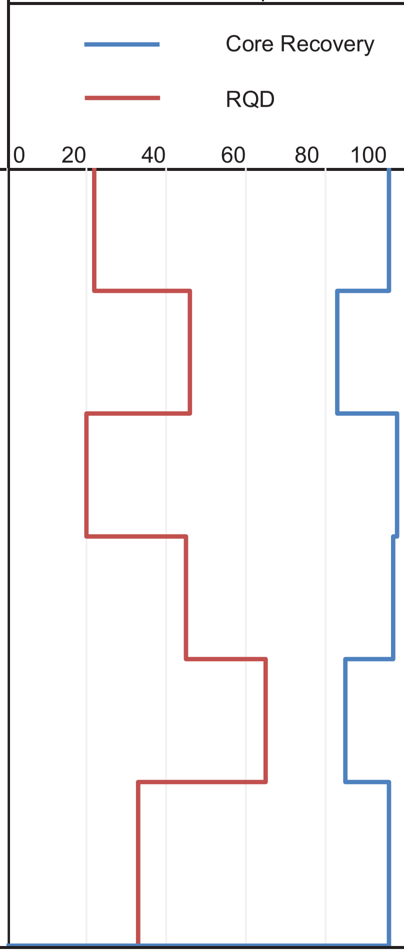
Borehole Log (BH39)

Location :	**COOLING TOWER**	Ground Level (GL) :	RL(+) 213.6 m
Co-ordinates :	**1725 E, 420 N**	Ground Water Level :	6.5 m (RL(+) 207 m)
Termination Depth : (below GL)	20 m (RL(+) 193.6 m)	Start Date :	09-Aug-18
		Finish Date :	13-Aug-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00 11.50 12.00	12.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		96	22	Greyish	Partial	NX
12.50 13.00 13.50	13.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (12 to 13.5m)		83	46			
14.00 14.50 15.00	15.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (13.5 to 15m)		98	20			
15.50 16.00 16.50	16.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (15 to 16.5m)		97	45			
17.00 17.50 18.00	18.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (16.5 to 18m)		85	65			
18.50 19.00 19.50 20.00	20.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (18 to 20m)	20.0	96	33			

Percentage Core Recovery & RQD vs. depth



Scale

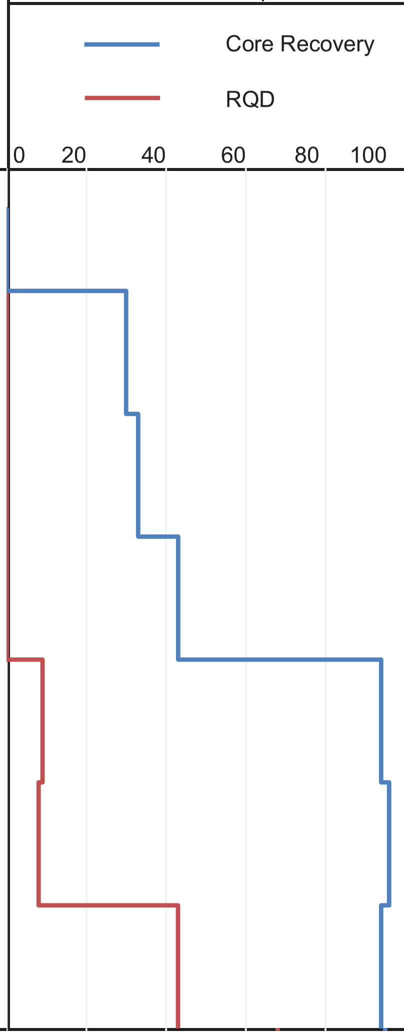
Borehole Log (BH40)

Location :	**COOLING TOWER**	Ground Level (GL) :	RL(+) 212.6 m
Co-ordinates :	**1654 E, 420 N**	Ground Water Level :	6.6 m (RL(+) 205.9 m)
Termination Depth : (below GL)	20 m (RL(+) 192.6 m)	Start Date :	07-Aug-18
		Finish Date :	12-Aug-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.2			Greyish	Partial	HX
1.00			Very weak grey Basalt, completely weathered, disintegrated (0.24 to 1.5m)		0	0			NX
1.50	1.50	Ref.							
2.00									
2.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (1.5 to 3m)		30	0			
3.00	3.00								
3.50									
4.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		33	0			
4.50	4.50								
5.00									
5.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		43	0			
6.00	6.00								
6.50									
7.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		94	9			
7.50	7.50								
8.00									
8.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		96	8			
9.00	9.00								
9.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (9 to 10.5m)		94	43			
10.00									
10.50	10.50								

Percentage Core Recovery & RQD vs. depth

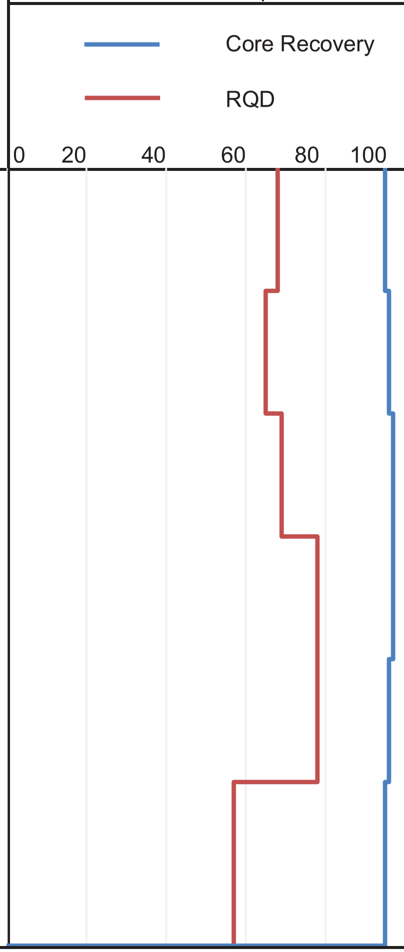


Borehole Log (BH40)

Location :	**COOLING TOWER**	Ground Level (GL) :	RL(+) 212.6 m	Drilling :	Rotary Drilling
Co-ordinates :	**1654 E, 420 N**	Ground Water Level :	6.6 m (RL(+) 205.9 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 192.6 m)	Start Date :	07-Aug-18	Casing Depth :	2.0 m
		Finish Date :	12-Aug-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00, 11.50, 12.00	12.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		95	68	Greyish	Partial	NX
12.50, 13.00, 13.50	13.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		96	65			
14.00, 14.50, 15.00	15.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		97	69			
15.50, 16.00, 16.50	16.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (15 to 16.5m)		97	78			
17.00, 17.50, 18.00	18.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (16.5 to 18m)		96	78			
18.50, 19.00, 19.50, 20.00	20.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (18 to 20m)	20.0	95	57			

Percentage Core Recovery & RQD vs. depth

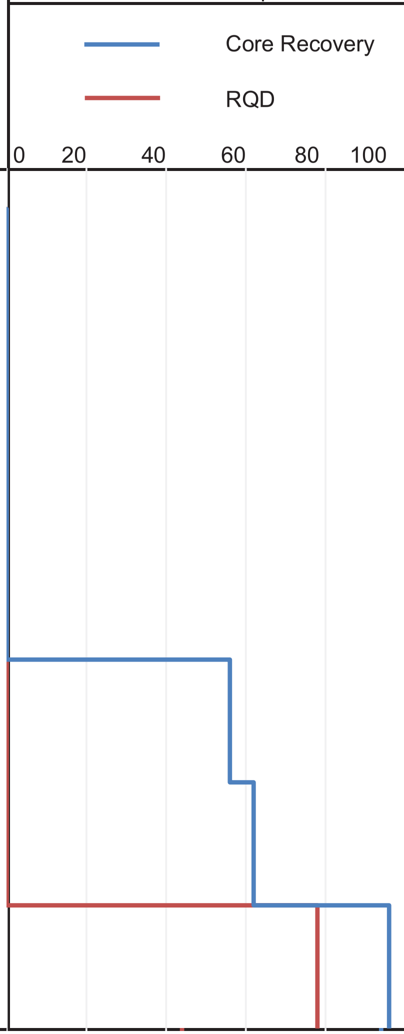


Borehole Log (BH41)

Location :	**COOLING TOWER**	Ground Level (GL) :	RL(+) 211.1 m	Drilling :	Rotary Drilling
Co-ordinates :	**1607 E, 420 N**	Ground Water Level :	6.4 m (RL(+) 204.7 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 191.1 m)	Start Date :	02-Aug-18	Casing Depth :	2.0 m
		Finish Date :	09-Aug-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)
0.50				Black Silty Clay with rock fragments	0.2		
1.00				Very weak grey Basalt, completely weathered, disintegrated (0.24 to 1.5m)		0	0
1.50	1.50	Ref.					
2.00							
2.50				Very weak grey Basalt, completely weathered, disintegrated (1.5 to 3m)		0	0
3.00	3.00	Ref.					
3.50							
4.00				Very weak grey Basalt, completely weathered, disintegrated (3 to 4.5m)		0	0
4.50	4.50	Ref.					
5.00							
5.50				Very weak grey Basalt, completely weathered, disintegrated (4.5 to 6m)		0	0
6.00	6.00	Ref.					
6.50							
7.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		56	0
7.50	7.50						
8.00							
8.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		62	0
9.00	9.00						
9.50							
10.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		96	78
10.50	10.50						

Percentage Core Recovery & RQD vs. depth



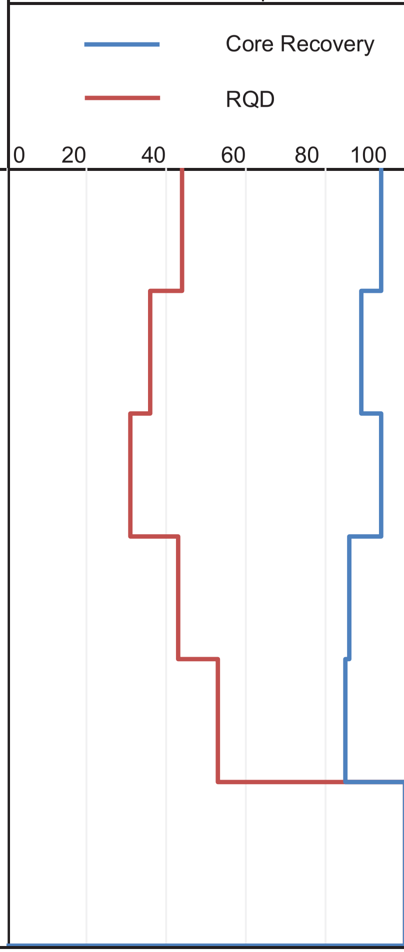
Return Water: Colour	Return Water: Loss	Size of Hole
Greyish	Partial	HX (to 0.2 m), NX

Borehole Log (BH41)

Location :	**COOLING TOWER**	Ground Level (GL) :	RL(+) 211.1 m	Drilling :	Rotary Drilling
Co-ordinates :	**1607 E, 420 N**	Ground Water Level :	6.4 m (RL(+) 204.7 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 191.1 m)	Start Date :	02-Aug-18	Casing Depth :	2.0 m
		Finish Date :	09-Aug-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00, 11.50, 12.00	12.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (10.5 to 12m)		94	44	Greyish	Partial	NX
12.50, 13.00, 13.50	13.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		89	36			
14.00, 14.50, 15.00	15.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (13.5 to 15m)		94	31			
15.50, 16.00, 16.50	16.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (15 to 16.5m)		86	43			
17.00, 17.50, 18.00	18.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (16.5 to 18m)		85	53			
18.50, 19.00, 19.50, 20.00	20.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (18 to 20m)	20.0	100	100			

Percentage Core Recovery & RQD vs. depth



Scale

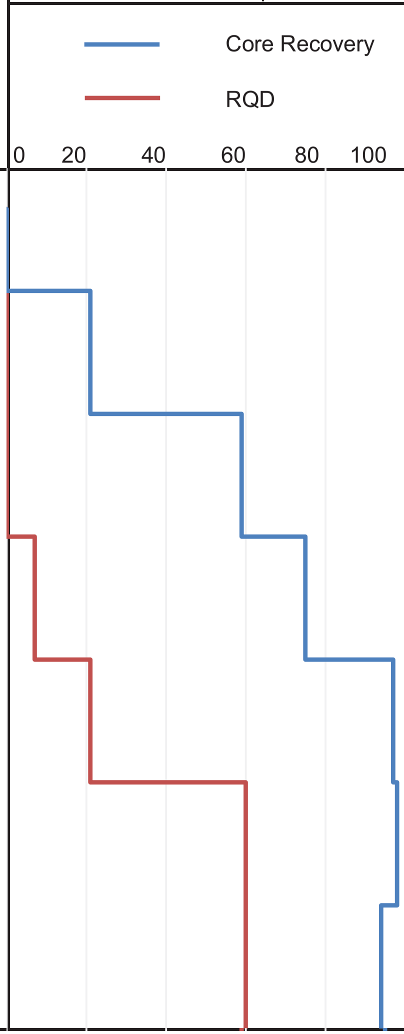
Borehole Log (BH42)

Location :	**CW/ACW PUMP HOUSE**	Ground Level (GL) :	RL(+) 211.6 m
Co-ordinates :	**1545 E, 420 N**	Ground Water Level :	6.8 m (RL(+) 204.8 m)
Termination Depth : (below GL)	20 m (RL(+) 191.6 m)	Start Date :	02-Aug-18
		Finish Date :	06-Aug-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.2			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.24 to 1.5m)		0	0			NX
2.00, 2.50, 3.00	3.00		Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		21	0			
3.50, 4.00, 4.50	4.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		59	0			
5.00, 5.50, 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		75	7			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		97	21			
8.00, 8.50, 9.00	9.00		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (7.5 to 9m)		98	60			
9.50, 10.00, 10.50	10.50		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (9 to 10.5m)		94	60			

Percentage Core Recovery & RQD vs. depth



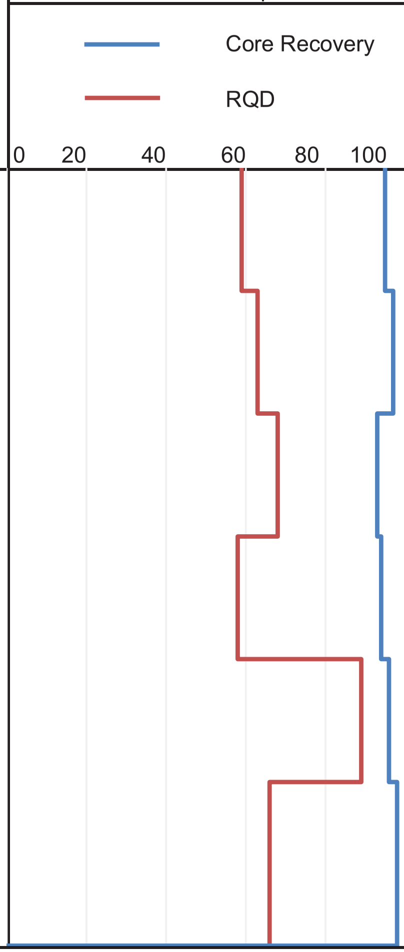
Borehole Log (BH42)

Location :	**CW/ACW PUMP HOUSE**	Ground Level (GL) :	RL(+) 211.6 m
Co-ordinates :	**1545 E, 420 N**	Ground Water Level :	6.8 m (RL(+) 204.8 m)
Termination Depth : (below GL)	20 m (RL(+) 191.6 m)	Start Date :	02-Aug-18
		Finish Date :	06-Aug-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)
11.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (10.5 to 12m)		95	59
11.50							
12.00	12.00						
12.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		97	63
13.00							
13.50	13.50						
14.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		93	68
14.50							
15.00	15.00						
15.50				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (15 to 16.5m)		94	58
16.00							
16.50	16.50						
17.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (16.5 to 18m)		96	89
17.50							
18.00	18.00						
18.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (18 to 20m)		98	66
19.00							
19.50							
20.00	20.00				20.0		

Percentage Core Recovery & RQD vs. depth



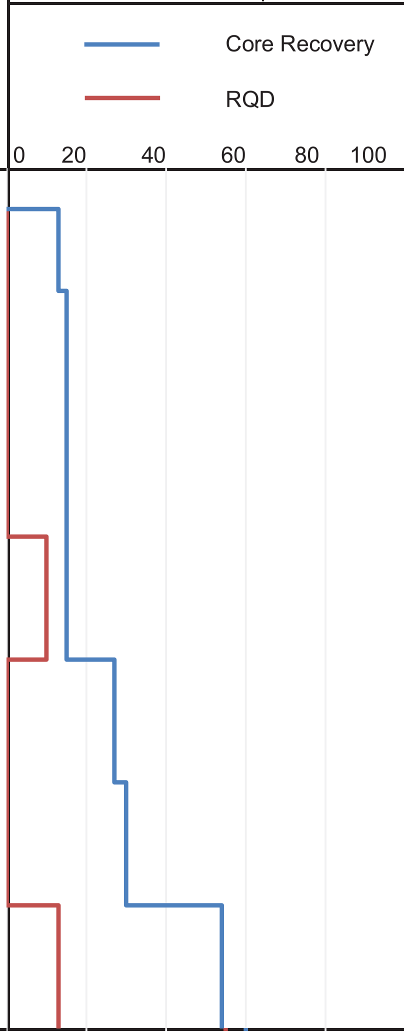
Return Water: Colour	Return Water: Loss	Size of Hole
Greyish	Partial	NX

Borehole Log (BH43)

Location :	**CW/ACW PUMP HOUSE**	Ground Level (GL) :	RL(+) 211.5 m
Co-ordinates :	**1482 E, 420 N**	Ground Water Level :	3.2 m (RL(+) 208.3 m)
Termination Depth : (below GL)	15 m (RL(+) 196.5 m)	Start Date :	19-Jul-18
		Finish Date :	29-Jul-18
Drilling :	Rotary Drilling	Bit Type :	Diamond
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.3			Greyish	Partial	HX
1.00			Weak grey Basalt, very intensely fractured, highly weathered (0.28 to 1.5m)		13	0			NX
1.50	1.50	Ref.							
2.00			Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		15	0			
2.50									
3.00	3.00	Ref.							
3.50			Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		15	0			
4.00									
4.50	4.50	Ref.							
5.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		15	10			
5.50									
6.00	6.00	Ref.							
6.50			Weak grey Basalt, very intensely fractured, highly weathered (6 to 7.5m)		27	0			
7.00									
7.50	7.50								
8.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		30	0			
8.50									
9.00	9.00								
9.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		54	13			
10.00									
10.50	10.50								

Percentage Core Recovery & RQD vs. depth



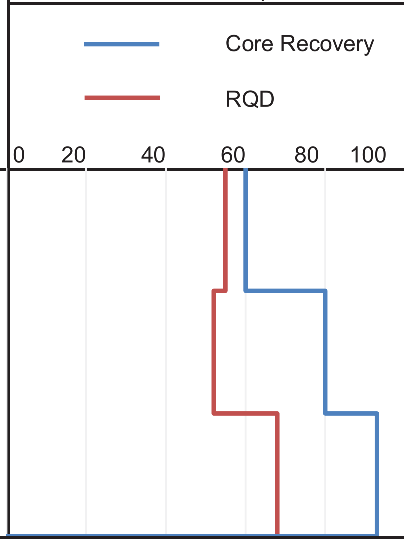
Borehole Log (BH43)

Location :	**CW/ACW PUMP HOUSE**	Ground Level (GL) :	RL(+) 211.5 m
Co-ordinates :	**1482 E, 420 N**	Ground Water Level :	3.2 m (RL(+) 208.3 m)
Termination Depth : (below GL)	15 m (RL(+) 196.5 m)	Start Date :	19-Jul-18
		Finish Date :	29-Jul-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (10.5 to 12m)		60	55	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (12 to 13.5m)		80	52			
13.00										
13.50	13.50									
14.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		93	68			
14.50										
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth

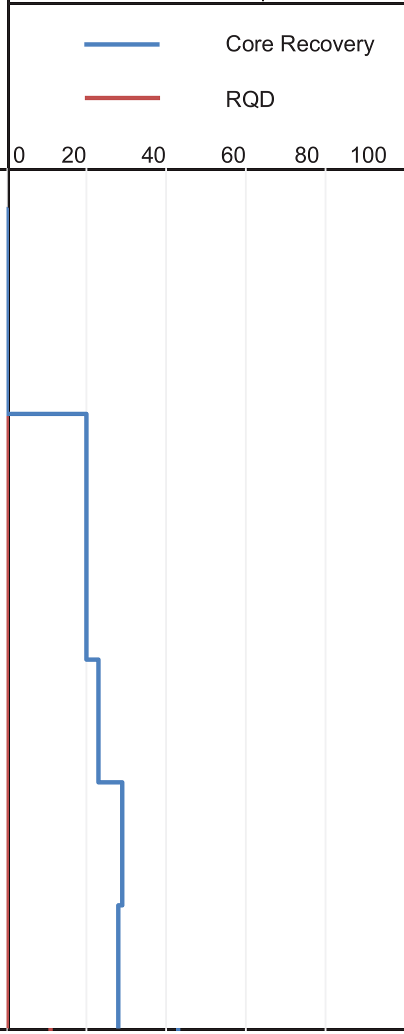


Borehole Log (BH44)

Location :	**OZONIZATION & CW TREATMENT AREA**	Ground Level (GL) :	RL(+) 212.0 m
Co-ordinates :	**1545 E, 388 N**	Ground Water Level :	7.3 m (RL(+) 204.7 m)
Termination Depth : (below GL)	15 m (RL(+) 197 m)	Start Date :	09-Jul-18
		Finish Date :	17-Jul-18
Drilling :	Rotary Drilling		
Bit Type :	Diamond		
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.3			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.32 to 1.5m)		0	0			NX
2.00, 2.50, 3.00	3.00	Ref.	Very weak grey Basalt, completely weathered, disintegrated (1.5 to 3m)		0	0			
3.50, 4.00, 4.50	4.50		Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		20	0			
5.00, 5.50, 6.00	6.00		Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		20	0			
6.50, 7.00, 7.50	7.50		Weak grey Basalt, very intensely fractured, highly weathered (6 to 7.5m)		23	0			
8.00, 8.50, 9.00	9.00		Weak grey Basalt, very intensely fractured, highly weathered (7.5 to 9m)		29	0			
9.50, 10.00, 10.50	10.50		Weak grey Basalt, very intensely fractured, highly weathered (9 to 10.5m)		28	0			

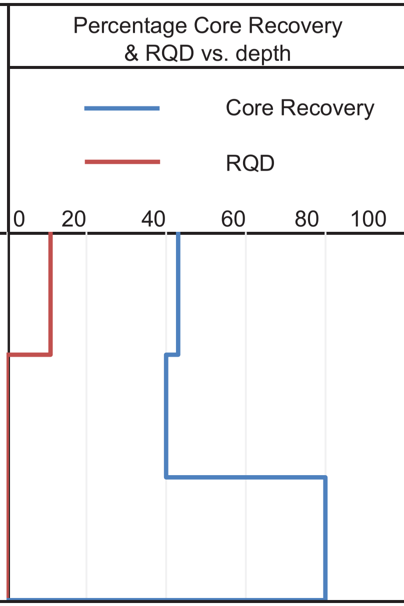
Percentage Core Recovery & RQD vs. depth



Borehole Log (BH44)

Location :	**OZONIZATION & CW TREATMENT ARE/**	Ground Level (GL) :	RL(+) 212.0 m
Co-ordinates :	**1545 E, 388 N**	Ground Water Level :	7.3 m (RL(+) 204.7 m)
Termination Depth : (below GL)	15 m (RL(+) 197 m)	Start Date :	09-Jul-18
		Finish Date :	17-Jul-18
Drilling :	Rotary Drilling		
Bit Type :	Diamond		
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		43	11	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		40	0			
13.00										
13.50	13.50									
14.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (13.5 to 15m)		80	0			
14.50										
15.00	15.00				15.0					



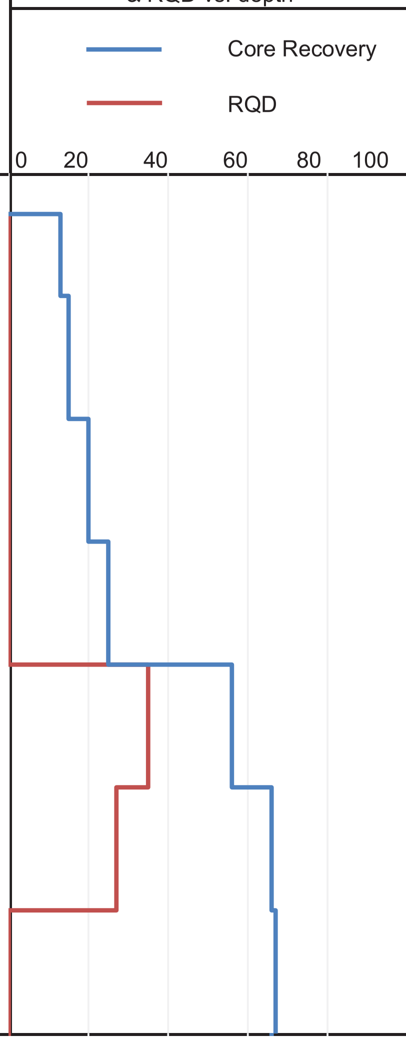
Borehole Log (BH45)

Location :	**COOLING TOWER**	Ground Level (GL) :	RL(+) 213.0 m
Co-ordinates :	**1665 E, 362 N**	Ground Water Level :	7 m (RL(+) 205.9 m)
Termination Depth : (below GL)	20 m (RL(+) 193 m)	Start Date :	07-Aug-18
		Finish Date :	12-Aug-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.2					HX
1.00			Weak grey Basalt, very intensely fractured, highly weathered (0.24 to 1.5m)		13	0	Greyish	Partial	NX
1.50	1.50	Ref.							
2.00			Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		15	0			
2.50									
3.00	3.00	Ref.							
3.50			Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		20	0			
4.00									
4.50	4.50								
5.00			Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		25	0			
5.50									
6.00	6.00								
6.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		56	35			
7.00									
7.50	7.50								
8.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		66	27			
8.50									
9.00	9.00								
9.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		67	0			
10.00									
10.50	10.50								

Percentage Core Recovery & RQD vs. depth

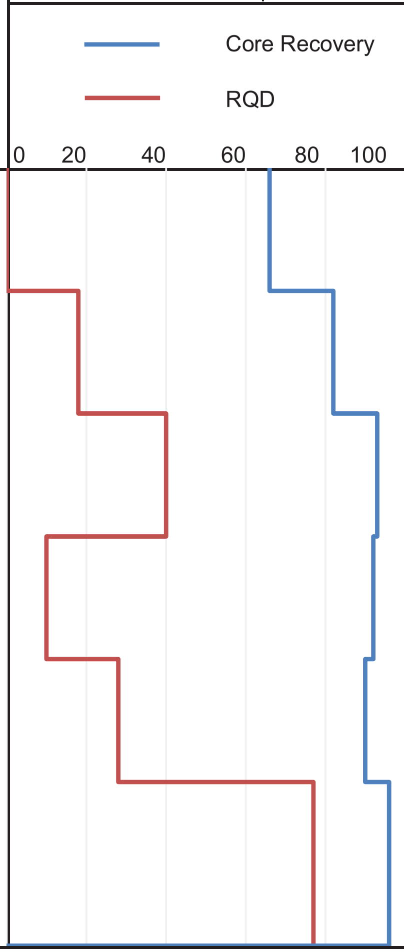


Borehole Log (BH45)

Location :	**COOLING TOWER**	Ground Level (GL) :	RL(+) 213.0 m	Drilling :	Rotary Drilling
Co-ordinates :	**1665 E, 362 N**	Ground Water Level :	7 m (RL(+) 205.9 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 193 m)	Start Date :	07-Aug-18	Casing Depth :	2.0 m
		Finish Date :	12-Aug-18		

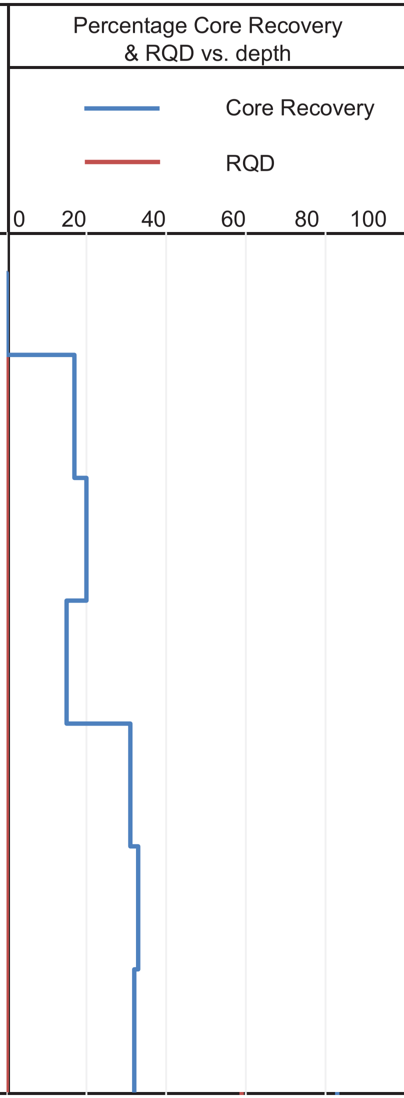
Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		66	0	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		82	18			
13.00										
13.50	13.50									
14.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (13.5 to 15m)		93	40			
14.50										
15.00	15.00									
15.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (15 to 16.5m)		92	10			
16.00										
16.50	16.50									
17.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (16.5 to 18m)		90	28			
17.50										
18.00	18.00									
18.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (18 to 20m)		96	77			
19.00										
19.50										
20.00	20.00				20.0					

Percentage Core Recovery & RQD vs. depth



Borehole Log (BH46)

Location :	FILTER WATER RESERVOIR & PUMP H	Ground Level (GL) :	RL(+) 212.3 m
Co-ordinates :	**1500 E, 344 N**	Ground Water Level :	3.6 m (RL(+) 208.6 m)
Termination Depth : (below GL)	15 m (RL(+) 197.3 m)	Start Date :	10-Jul-18
		Finish Date :	18-Jul-18
Drilling :	Rotary Drilling		
Bit Type :	Diamond		
Casing Depth :	2.0 m		



Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.3			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.29 to 1.5m)		0	0			NX
2.00, 2.50, 3.00	3.00	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		17	0			
3.50, 4.00, 4.50	4.50		Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		20	0			
5.00, 5.50, 6.00	6.00	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		15	0			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		31	0			
8.00, 8.50, 9.00	9.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		33	0			
9.50, 10.00, 10.50	10.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		32	0			

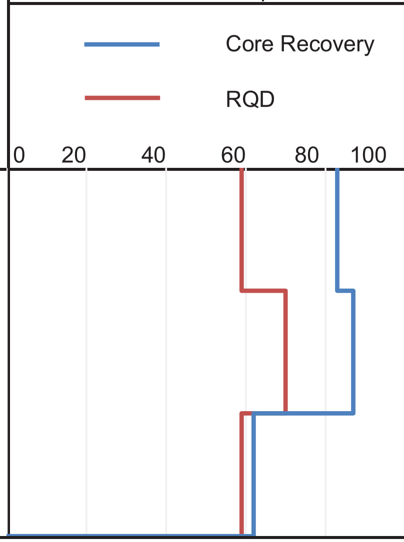
Borehole Log (BH46)

Location :	**FILTER WATER RESERVOIR & PUMP H**	Ground Level (GL) :	RL(+) 212.3 m
Co-ordinates :	**1500 E, 344 N**	Ground Water Level :	3.6 m (RL(+) 208.6 m)
Termination Depth : (below GL)	15 m (RL(+) 197.3 m)	Start Date :	10-Jul-18
		Finish Date :	18-Jul-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (10.5 to 12m)				Greyish	Partial	NX
11.50						83	59			
12.00	12.00									
12.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)						
13.00						87	70			
13.50	13.50									
14.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (13.5 to 15m)						
14.50						62	59			
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth

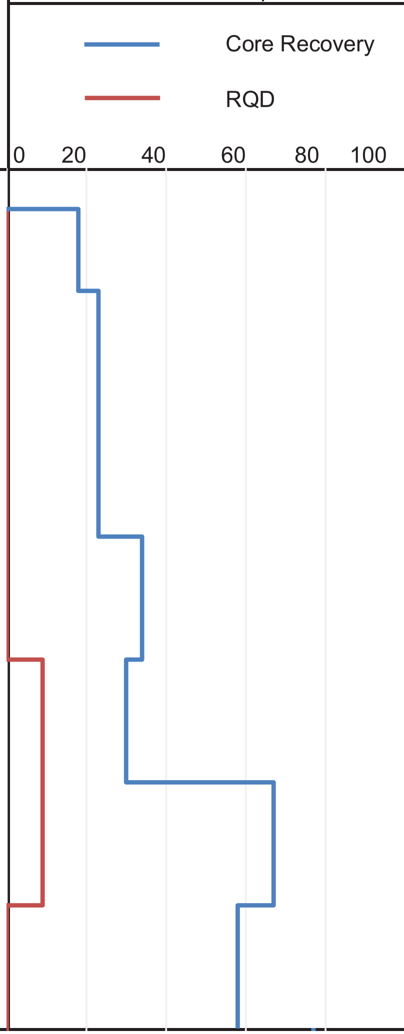


Borehole Log (BH47)

Location :	**NON-DM WATER CLARIFIER (PT PLANT**	Ground Level (GL) : RL(+) 214.4 m	Drilling : Rotary Drilling
Co-ordinates :	**1522 E, 231 N**	Ground Water Level : 6.6 m (RL(+) 207.8 m)	Bit Type : Diamond
Termination Depth : (below GL)	15 m (RL(+) 199.4 m)	Start Date : 19-Jul-18	Casing Depth : 2.0 m
		Finish Date : 30-Jul-18	

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.3			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.		Weak grey Basalt, very intensely fractured, highly weathered (0.25 to 1.5m)		18	0			NX
2.00, 2.50, 3.00	3.00			Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		23	0			
3.50, 4.00, 4.50	4.50			Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		23	0			
5.00, 5.50, 6.00	6.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		34	0			
6.50, 7.00, 7.50	7.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		30	9			
8.00, 8.50, 9.00	9.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		67	9			
9.50, 10.00, 10.50	10.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		58	0			

Percentage Core Recovery & RQD vs. depth

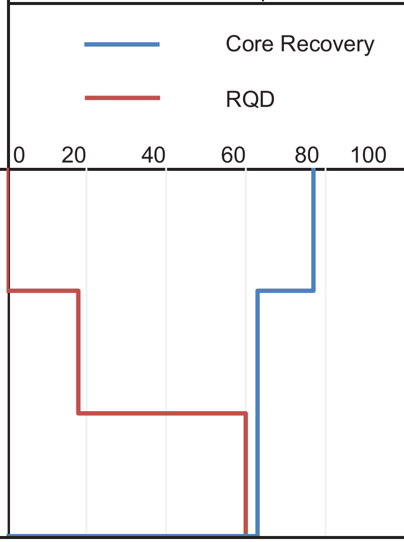


Borehole Log (BH47)

Location :	**NON-DM WATER CLARIFIER (PT PLANT**	Ground Level (GL) :	RL(+) 214.4 m	Drilling :	Rotary Drilling
Co-ordinates :	**1522 E, 231 N**	Ground Water Level :	6.6 m (RL(+) 207.8 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 199.4 m)	Start Date :	19-Jul-18	Casing Depth :	2.0 m
		Finish Date :	30-Jul-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		77	0	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (12 to 13.5m)		63	18			
13.00										
13.50	13.50									
14.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (13.5 to 15m)		63	60			
14.50										
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth



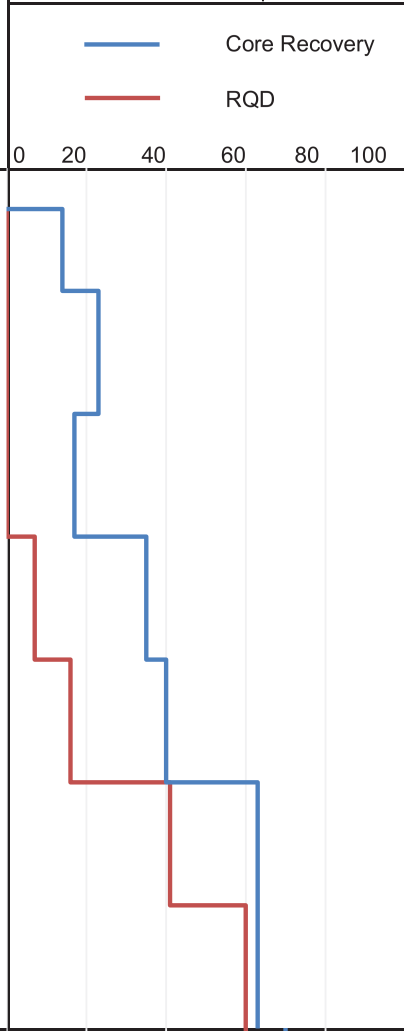
Borehole Log (BH48)

Location :	**GRAVITY FILTERS**	Ground Level (GL) :	RL(+) 213.4 m
Co-ordinates :	**1473 E, 223 N**	Ground Water Level :	7.3 m (RL(+) 206.1 m)
Termination Depth : (below GL)	15 m (RL(+) 198.4 m)	Start Date :	01-Aug-18
		Finish Date :	04-Aug-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.3			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (0.3 to 1.5m)		14	0			NX
2.00, 2.50, 3.00	3.00		Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		23	0			
3.50, 4.00, 4.50	4.50	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		17	0			
5.00, 5.50, 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		35	7			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		40	16			
8.00, 8.50, 9.00	9.00		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (7.5 to 9m)		63	41			
9.50, 10.00, 10.50	10.50		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (9 to 10.5m)		63	60			

Percentage Core Recovery & RQD vs. depth

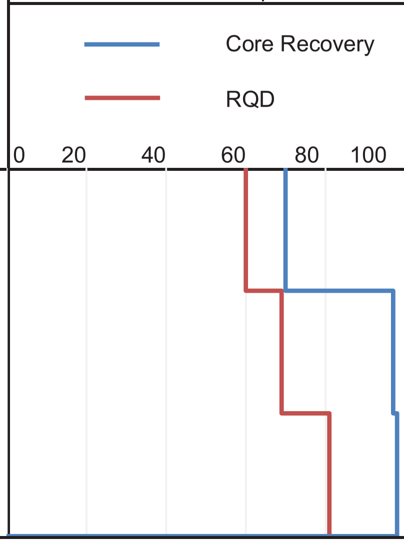


Borehole Log (BH48)

Location :	**GRAVITY FILTERS**	Ground Level (GL) :	RL(+) 213.4 m	Drilling :	Rotary Drilling
Co-ordinates :	**1473 E, 223 N**	Ground Water Level :	7.3 m (RL(+) 206.1 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 198.4 m)	Start Date :	01-Aug-18	Casing Depth :	2.0 m
		Finish Date :	04-Aug-18		

Scale	Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
	11.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (10.5 to 12m)		70	60	Greyish	Partial	NX
	11.50										
	12.00	12.00									
	12.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		97	69			
	13.00										
	13.50	13.50									
	14.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		98	81			
	14.50										
	15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth

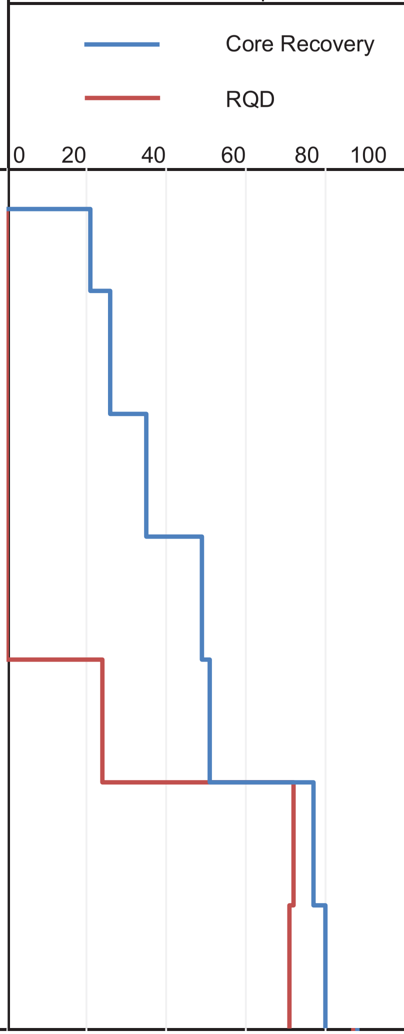


Borehole Log (BH49)

Location :	**RW & FW STORAGE TANK**	Ground Level (GL) :	RL(+) 215.6 m
Co-ordinates :	**1623 E, 195 N**	Ground Water Level :	8.1 m (RL(+) 207.5 m)
Termination Depth : (below GL)	15 m (RL(+) 200.6 m)	Start Date :	07-Aug-18
		Finish Date :	14-Aug-18
Drilling :	Rotary Drilling	Bit Type :	Diamond
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.2					HX
1.00, 1.50	1.50			Weak grey Basalt, very intensely fractured, highly weathered (0.21 to 1.5m)		21	0	Greyish	Partial	NX
2.00, 2.50, 3.00	3.00			Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		26	0			
3.50, 4.00, 4.50	4.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		35	0			
5.00, 5.50, 6.00	6.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		49	0			
6.50, 7.00, 7.50	7.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		51	24			
8.00, 8.50, 9.00	9.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (7.5 to 9m)		77	72			
9.50, 10.00, 10.50	10.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		80	71			

Percentage Core Recovery & RQD vs. depth



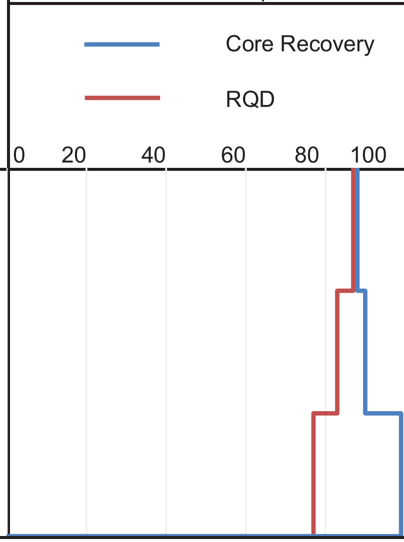
Borehole Log (BH49)

Location :	**RW & FW STORAGE TANK**	Ground Level (GL) :	RL(+) 215.6 m
Co-ordinates :	**1623 E, 195 N**	Ground Water Level :	8.1 m (RL(+) 207.5 m)
Termination Depth : (below GL)	15 m (RL(+) 200.6 m)	Start Date :	07-Aug-18
		Finish Date :	14-Aug-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		88	87	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		90	83			
13.00										
13.50	13.50									
14.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		99	77			
14.50										
15.00	15.00				15.0					

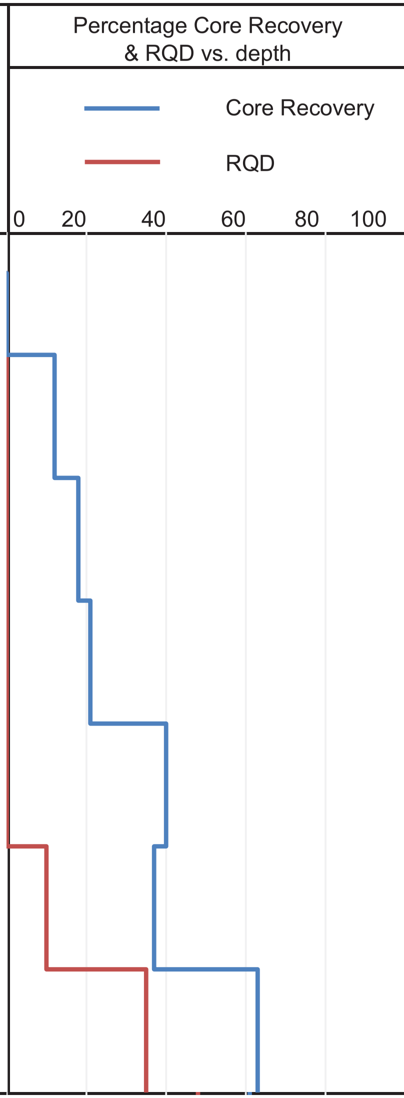
Percentage Core Recovery & RQD vs. depth



Borehole Log (BH50)

Location : **OZONIZATION PLANT (PRE TREATMEN**
Co-ordinates : **1522 E, 170 N**
Termination Depth : (below GL) 15 m (RL(+) 200.1 m)
Ground Level (GL) : RL(+) 215.1 m
Ground Water Level : 7 m (RL(+) 208 m)
Start Date : 06-Aug-18
Finish Date : 10-Aug-18
Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.2			Greyish	Partial	HX
1.00			Very weak grey Basalt, completely weathered, disintegrated (0.21 to 1.5m)		0	0			NX
1.50	1.50	Ref.							
2.00									
2.50			Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		12	0			
3.00	3.00	Ref.							
3.50									
4.00			Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		18	0			
4.50	4.50	Ref.							
5.00									
5.50			Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		21	0			
6.00	6.00								
6.50									
7.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		40	0			
7.50	7.50								
8.00									
8.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		37	10			
9.00	9.00								
9.50									
10.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		63	35			
10.50	10.50								



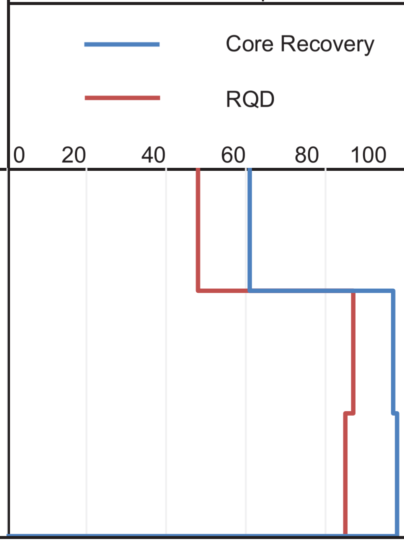
Borehole Log (BH50)

Location :	**OZONIZATION PLANT (PRE TREATMEN**	Ground Level (GL) :	RL(+) 215.1 m
Co-ordinates :	**1522 E, 170 N**	Ground Water Level :	7 m (RL(+) 208 m)
Termination Depth : (below GL)	15 m (RL(+) 200.1 m)	Start Date :	06-Aug-18
		Finish Date :	10-Aug-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (10.5 to 12m)		61	48	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		97	87			
13.00										
13.50	13.50									
14.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		98	85			
14.50										
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth



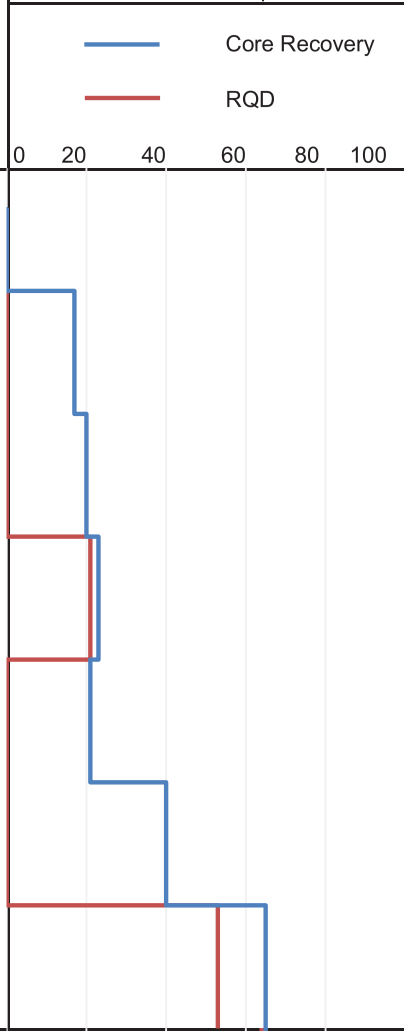
Borehole Log (BH51)

Location :	**STORES**	Ground Level (GL) :	RL(+) 217.8 m
Co-ordinates :	**1623 E, 78 N**	Ground Water Level :	6.3 m (RL(+) 211.5 m)
Termination Depth : (below GL)	15 m (RL(+) 202.8 m)	Start Date :	13-Aug-18
		Finish Date :	22-Aug-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.2					HX
1.00, 1.50	1.50	Ref.		Very weak grey Basalt, completely weathered, disintegrated (0.23 to 1.5m)		0	0	Greyish	Partial	NX
2.00, 2.50, 3.00	3.00	Ref.		Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		17	0			
3.50, 4.00, 4.50	4.50			Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		20	0			
5.00, 5.50, 6.00	6.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		23	21			
6.50, 7.00, 7.50	7.50			Weak grey Basalt, very intensely fractured, highly weathered (6 to 7.5m)		21	0			
8.00, 8.50, 9.00	9.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		40	0			
9.50, 10.00, 10.50	10.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (9 to 10.5m)		65	53			

Percentage Core Recovery & RQD vs. depth

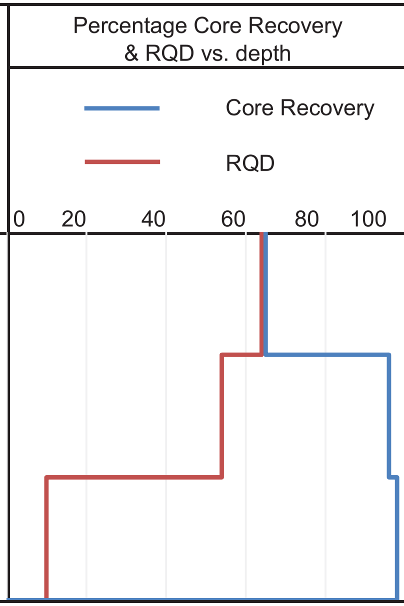


Borehole Log (BH51)

Location :	**STORES**	Ground Level (GL) :	RL(+) 217.8 m
Co-ordinates :	**1623 E, 78 N**	Ground Water Level :	6.3 m (RL(+) 211.5 m)
Termination Depth : (below GL)	15 m (RL(+) 202.8 m)	Start Date :	13-Aug-18
		Finish Date :	22-Aug-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (10.5 to 12m)		65	64	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (12 to 13.5m)		96	54			
13.00										
13.50	13.50									
14.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (13.5 to 15m)		98	10			
14.50										
15.00	15.00				15.0					



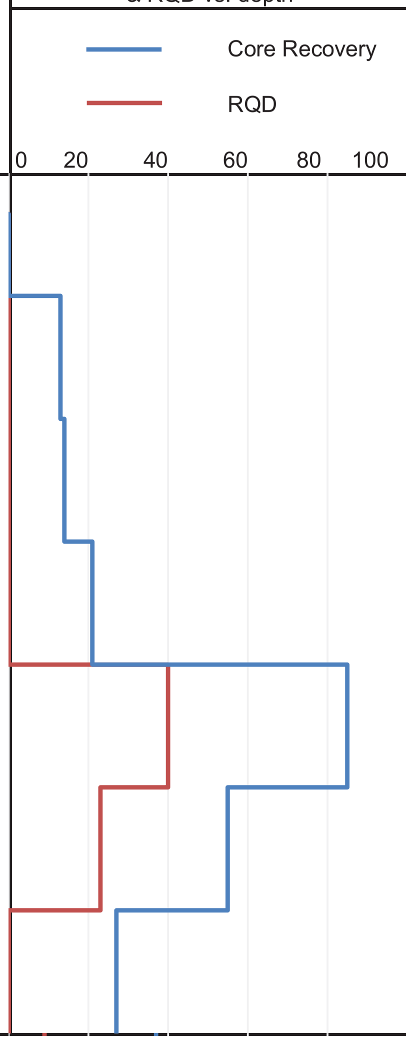
Borehole Log (BH52)

Location :	**SECURITY CABIN**	Ground Level (GL) :	RL(+) 213.6 m
Co-ordinates :	**1216 E, 28 N**	Ground Water Level :	7.8 m (RL(+) 205.8 m)
Termination Depth : (below GL)	15 m (RL(+) 198.6 m)	Start Date :	20-Jul-18
		Finish Date :	23-Jul-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.2			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.		Very weak grey Basalt, completely weathered, disintegrated (0.23 to 1.5m)		0	0			NX
2.00, 2.50, 3.00	3.00	Ref.		Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		13	0			
3.50, 4.00, 4.50	4.50	Ref.		Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		14	0			
5.00, 5.50, 6.00	6.00			Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		21	0			
6.50, 7.00, 7.50	7.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		85	40			
8.00, 8.50, 9.00	9.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		55	23			
9.50, 10.00, 10.50	10.50			Weak grey Basalt, very intensely fractured, highly weathered (9 to 10.5m)		27	0			

Percentage Core Recovery & RQD vs. depth



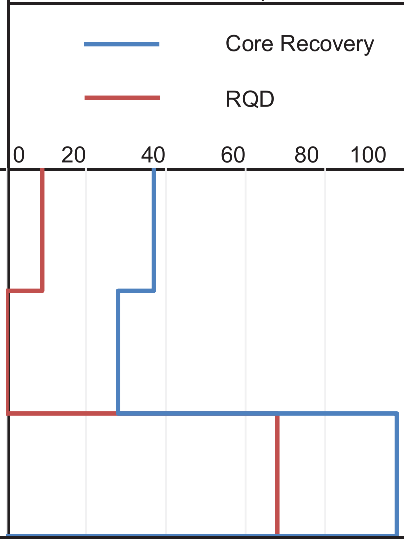
Borehole Log (BH52)

Location :	**SECURITY CABIN**	Ground Level (GL) :	RL(+) 213.6 m
Co-ordinates :	**1216 E, 28 N**	Ground Water Level :	7.8 m (RL(+) 205.8 m)
Termination Depth : (below GL)	15 m (RL(+) 198.6 m)	Start Date :	20-Jul-18
		Finish Date :	23-Jul-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00, 11.50, 12.00	12.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		37	9	Greyish	Partial	NX
12.50, 13.00, 13.50	13.50			Weak grey Basalt, very intensely fractured, highly weathered (12 to 13.5m)		28	0			
14.00, 14.50, 15.00	15.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)	15.0	98	68			

Percentage Core Recovery & RQD vs. depth

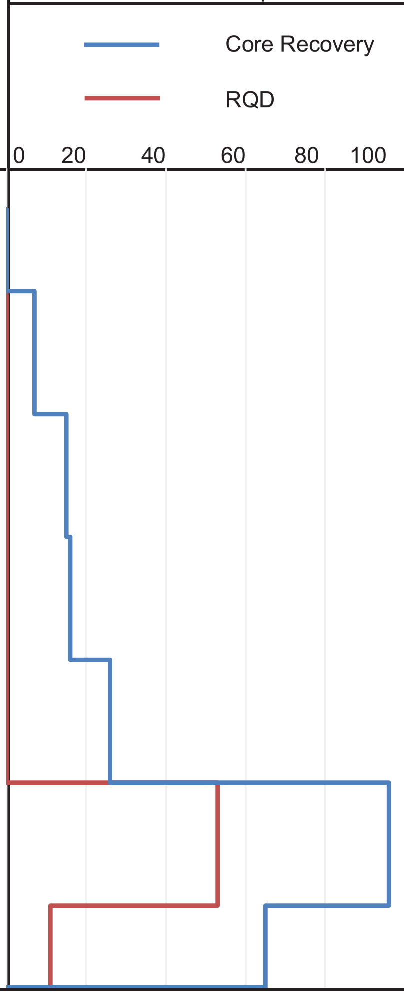


Borehole Log (BH53)

Location :	**RAW WATER INTAKE PIPE LINE**	Ground Level (GL) :	RL(+) 212.4 m	Drilling :	Rotary Drilling
Co-ordinates :	**1006 E, 48 N**	Ground Water Level :	6.8 m (RL(+) 205.6 m)	Bit Type :	Diamond
Termination Depth : (below GL)	10 m (RL(+) 202.4 m)	Start Date :	27-Jul-18	Casing Depth :	2.0 m
		Finish Date :	28-Jul-18		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.3			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.3 to 1.5m)		0	0			NX
2.00, 2.50, 3.00	3.00	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		7	0			
3.50, 4.00, 4.50	4.50	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		15	0			
5.00, 5.50, 6.00	6.00	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		16	0			
6.50, 7.00, 7.50	7.50		Weak grey Basalt, very intensely fractured, highly weathered (6 to 7.5m)		26	0			
8.00, 8.50, 9.00	9.00		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (7.5 to 9m)		96	53			
9.50, 10.00	10.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10m)	10.0	65	11			

Percentage Core Recovery & RQD vs. depth



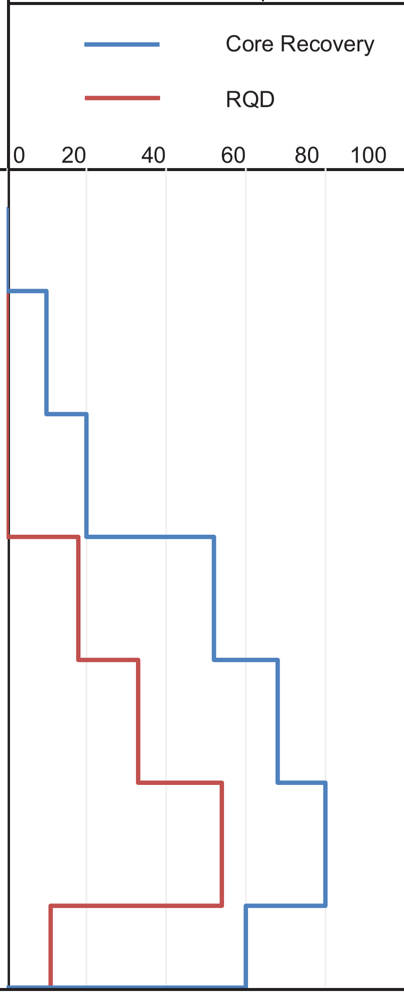
Borehole Log (BH54)

Location :	**RAW WATER INTAKE PIPE LINE**	Ground Level (GL) :	RL(+) 214.6 m
Co-ordinates :	**500 E, 48 N**	Ground Water Level :	0 m (RL(+) 214.6 m)
Termination Depth : (below GL)	10 m (RL(+) 204.6 m)	Start Date :	30-Jul-18
		Finish Date :	31-Jul-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.3			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.3 to 1.5m)		0	0			NX
2.00, 2.50, 3.00	3.00	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		10	0			
3.50, 4.00, 4.50	4.50		Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		20	0			
5.00, 5.50, 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		52	18			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		68	33			
8.00, 8.50, 9.00	9.00		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (7.5 to 9m)		80	54			
9.50, 10.00	10.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10m)	10.0	60	11			

Percentage Core Recovery & RQD vs. depth



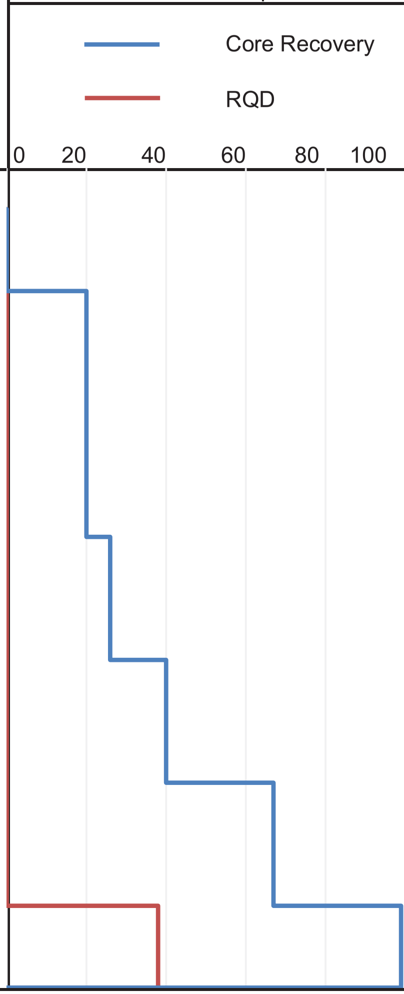
Borehole Log (BH55)

Location :	**RAW WATER INTAKE PIPE LINE**	Ground Level (GL) :	RL(+) 211.0 m
Co-ordinates :	**427 E, 400 N**	Ground Water Level :	6 m (RL(+) 205 m)
Termination Depth : (below GL)	10 m (RL(+) 201 m)	Start Date :	04-Aug-18
		Finish Date :	05-Aug-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)
0.50				Black Silty Clay with rock fragments	0.1		
1.00, 1.50	1.50	Ref.		Very weak grey Basalt, completely weathered, disintegrated (0.1 to 1.5m)		0	0
2.00, 2.50, 3.00	3.00			Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		20	0
3.50, 4.00, 4.50	4.50			Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		20	0
5.00, 5.50, 6.00	6.00			Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		26	0
6.50, 7.00, 7.50	7.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		40	0
8.00, 8.50, 9.00	9.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		67	0
9.50, 10.00	10.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10m)	10.0	99	38

Percentage Core Recovery & RQD vs. depth



Return Water: Colour	Return Water: Loss	Size of Hole
Greyish	Partial	HX (to 0.1 m), NX

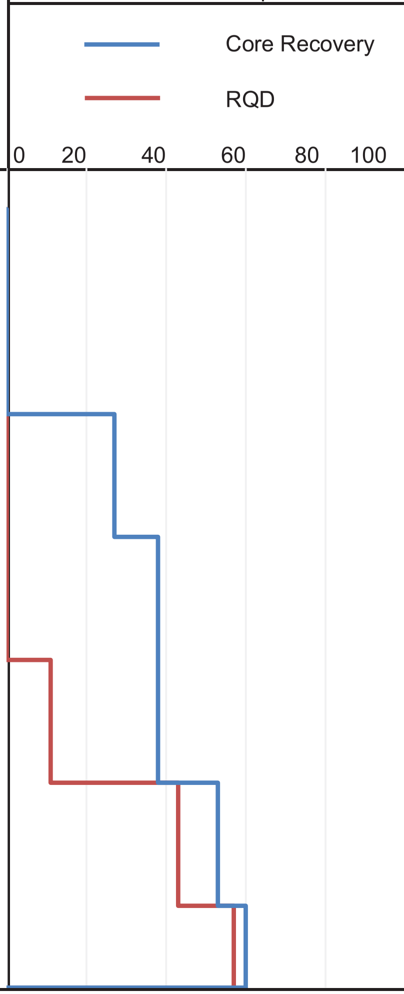
Plate No. 132 of 384

Borehole Log (BH56)

Location :	**RAW WATER INTAKE PIPE LINE**	Ground Level (GL) :	RL(+) 208.1 m
Co-ordinates :	**342 E, 1100 N**	Ground Water Level :	6 m (RL(+) 202.1 m)
Termination Depth : (below GL)	10 m (RL(+) 198.1 m)	Start Date :	13-Sep-18
		Finish Date :	14-Sep-18
Drilling :	Rotary Drilling		
Bit Type :	Diamond		
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.2			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.22 to 1.5m)		0	0			NX
2.00, 2.50, 3.00	3.00	Ref.	Very weak grey Basalt, completely weathered, disintegrated (1.5 to 3m)		0	0			
3.50, 4.00, 4.50	4.50		Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		27	0			
5.00, 5.50, 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		38	0			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		38	11			
8.00, 8.50, 9.00	9.00		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (7.5 to 9m)		53	43			
9.50, 10.00	10.00		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (9 to 10m)	10.0	60	57			

Percentage Core Recovery & RQD vs. depth

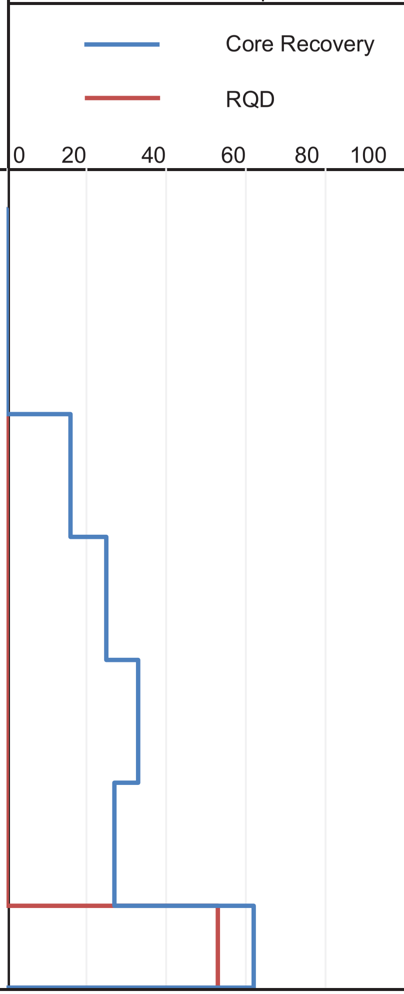


Borehole Log (BH57)

Location :	**RAW WATER INTAKE PIPE LINE**	Ground Level (GL) :	RL(+) 202.8 m	Drilling :	Rotary Drilling
Co-ordinates :	**700 E, 1578 N**	Ground Water Level :	7.2 m (RL(+) 195.5 m)	Bit Type :	Diamond
Termination Depth : (below GL)	10 m (RL(+) 192.8 m)	Start Date :	13-Sep-18	Casing Depth :	2.0 m
		Finish Date :	14-Sep-18		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.1			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.1 to 1.5m)		0	0			NX
2.00, 2.50, 3.00	3.00	Ref.	Very weak grey Basalt, completely weathered, disintegrated (1.5 to 3m)		0	0			
3.50, 4.00, 4.50	4.50	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		16	0			
5.00, 5.50, 6.00	6.00		Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		25	0			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		33	0			
8.00, 8.50, 9.00	9.00		Weak grey Basalt, very intensely fractured, highly weathered (7.5 to 9m)		27	0			
9.50, 10.00	10.00		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (9 to 10m)	10.0	62	53			

Percentage Core Recovery & RQD vs. depth



Borehole Log (BH58)

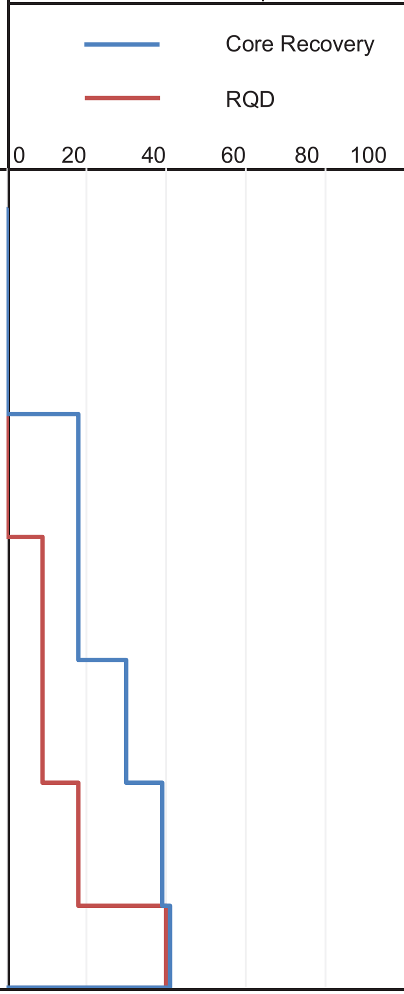
Location :	**RAW WATER INTAKE PIPE LINE**	Ground Level (GL) :	RL(+) 210.9 m
Co-ordinates :	**1970 E, 1922 N**	Ground Water Level :	6 m (RL(+) 204.9 m)
Termination Depth : (below GL)	10 m (RL(+) 200.9 m)	Start Date :	16-Sep-18
		Finish Date :	16-Sep-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Colour	Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.3					HX
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.27 to 1.5m)		0	0	Greyish	Partial	NX
2.00, 2.50, 3.00	3.00	Ref.	Very weak grey Basalt, completely weathered, disintegrated (1.5 to 3m)		0	0			
3.50, 4.00, 4.50	4.50	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		18	0			
5.00, 5.50, 6.00	6.00	Ref.	Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		18	9			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		30	9			
8.00, 8.50, 9.00	9.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		39	18			
9.50, 10.00	10.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10m)	10.0	41	40			

Return Water

Percentage Core Recovery & RQD vs. depth

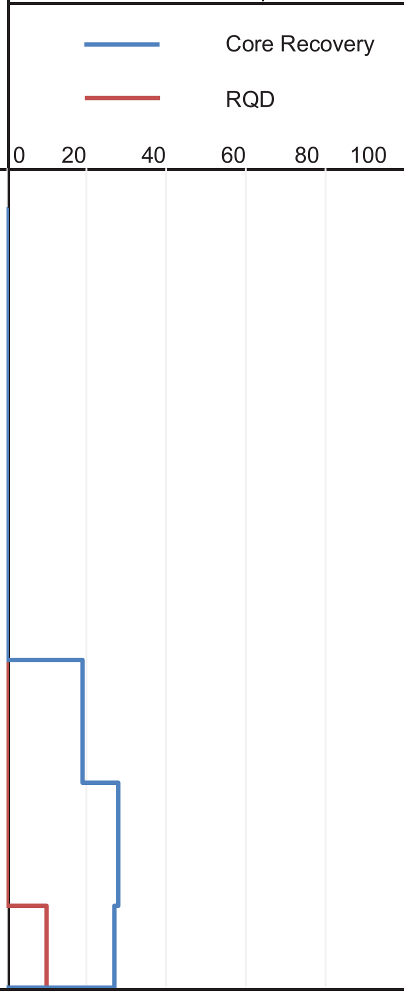


Borehole Log (BH59)

Location :	**RAW WATER INTAKE PIPE LINE**	Ground Level (GL) :	RL(+) 204.6 m	Drilling :	Rotary Drilling
Co-ordinates :	**2048 E, 2232 N**	Ground Water Level :	6.1 m (RL(+) 198.5 m)	Bit Type :	Diamond
Termination Depth : (below GL)	10 m (RL(+) 194.6 m)	Start Date :	16-Sep-18	Casing Depth :	2.0 m
		Finish Date :	16-Sep-18		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.2			Greyish	Partial	HX
1.00 – 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.21 to 1.5m)		0	0			NX
2.00 – 3.00	3.00	Ref.	Very weak grey Basalt, completely weathered, disintegrated (1.5 to 3m)		0	0			
3.50 – 4.50	4.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (3 to 4.5m)		0	0			
5.00 – 6.00	6.00	Ref.	Very weak grey Basalt, completely weathered, disintegrated (4.5 to 6m)		0	0			
6.50 – 7.50	7.50	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (6 to 7.5m)		19	0			
8.00 – 9.00	9.00		Weak grey Basalt, very intensely fractured, highly weathered (7.5 to 9m)		28	0			
9.50 – 10.00	10.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10m)	10.0	27	10			

Percentage Core Recovery & RQD vs. depth

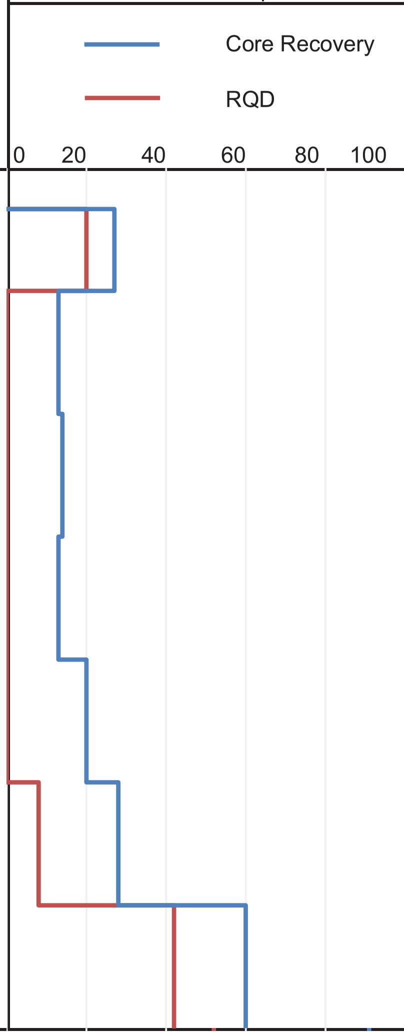


Borehole Log (BH60)

Location :	**WEIGH BRIDGE FOR DRY ASH SILO**	Ground Level (GL) :	RL(+) 200.3 m
Co-ordinates :	**1481 E, 1108 N**	Ground Water Level :	9.3 m (RL(+) 191 m)
Termination Depth : (below GL)	15 m (RL(+) 185.3 m)	Start Date :	17-Sep-18
		Finish Date :	20-Sep-18
Drilling :	Rotary Drilling		
Bit Type :	Diamond		
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.3					HX
1.00, 1.50	1.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (0.29 to 1.5m)		27	20	Greyish	Partial	NX
2.00, 2.50, 3.00	3.00	Ref.		Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		13	0			
3.50, 4.00, 4.50	4.50	Ref.		Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		14	0			
5.00, 5.50, 6.00	6.00	Ref.		Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		13	0			
6.50, 7.00, 7.50	7.50			Weak grey Basalt, very intensely fractured, highly weathered (6 to 7.5m)		20	0			
8.00, 8.50, 9.00	9.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		28	8			
9.50, 10.00, 10.50	10.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (9 to 10.5m)		60	42			

Percentage Core Recovery & RQD vs. depth



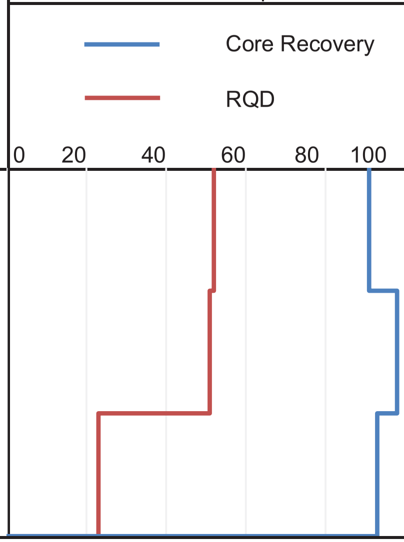
Borehole Log (BH60)

Location :	**WEIGH BRIDGE FOR DRY ASH SILO**	Ground Level (GL) :	RL(+) 200.3 m
Co-ordinates :	**1481 E, 1108 N**	Ground Water Level :	9.3 m (RL(+) 191 m)
Termination Depth : (below GL)	15 m (RL(+) 185.3 m)	Start Date :	17-Sep-18
		Finish Date :	20-Sep-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (10.5 to 12m)		91	52	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (12 to 13.5m)		98	51			
13.00										
13.50	13.50									
14.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (13.5 to 15m)		93	23			
14.50										
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth

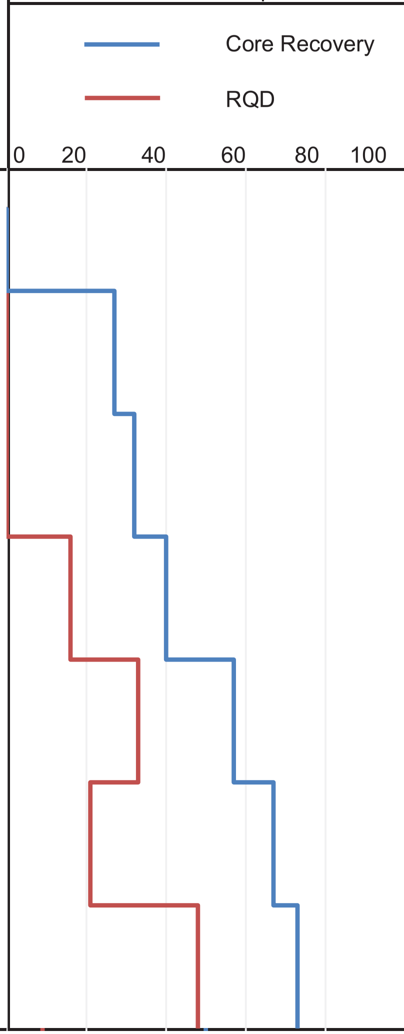


Borehole Log (BH61)

Location :	**FUEL OIL TRANSFER PUMP HOUSE**	Ground Level (GL) :	RL(+) 205.2 m	Drilling :	Rotary Drilling
Co-ordinates :	**1111 E, 947 N**	Ground Water Level :	5 m (RL(+) 200.2 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 190.2 m)	Start Date :	20-Sep-18	Casing Depth :	2.0 m
		Finish Date :	21-Sep-18		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.2			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.22 to 1.5m)		0	0			NX
2.00, 2.50, 3.00	3.00		Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		27	0			
3.50, 4.00, 4.50	4.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		32	0			
5.00, 5.50, 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		40	16			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		57	33			
8.00, 8.50, 9.00	9.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		67	21			
9.50, 10.00, 10.50	10.50		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (9 to 10.5m)		73	48			

Percentage Core Recovery & RQD vs. depth

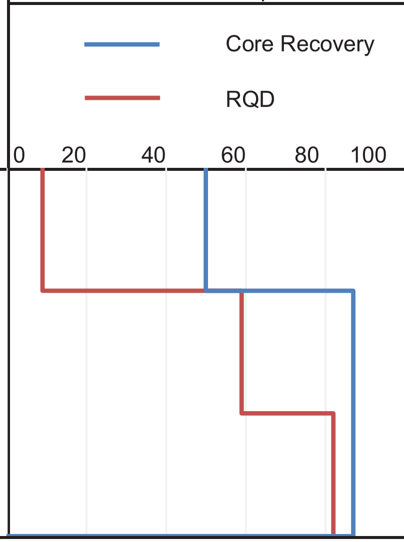


Borehole Log (BH61)

Location :	**FUEL OIL TRANSFER PUMP HOUSE**	Ground Level (GL) :	RL(+) 205.2 m
Co-ordinates :	**1111 E, 947 N**	Ground Water Level :	5 m (RL(+) 200.2 m)
Termination Depth : (below GL)	15 m (RL(+) 190.2 m)	Start Date :	20-Sep-18
		Finish Date :	21-Sep-18
Drilling :	Rotary Drilling		
Bit Type :	Diamond		
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		50	9	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (12 to 13.5m)		87	59			
13.00										
13.50	13.50									
14.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		87	82			
14.50										
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth

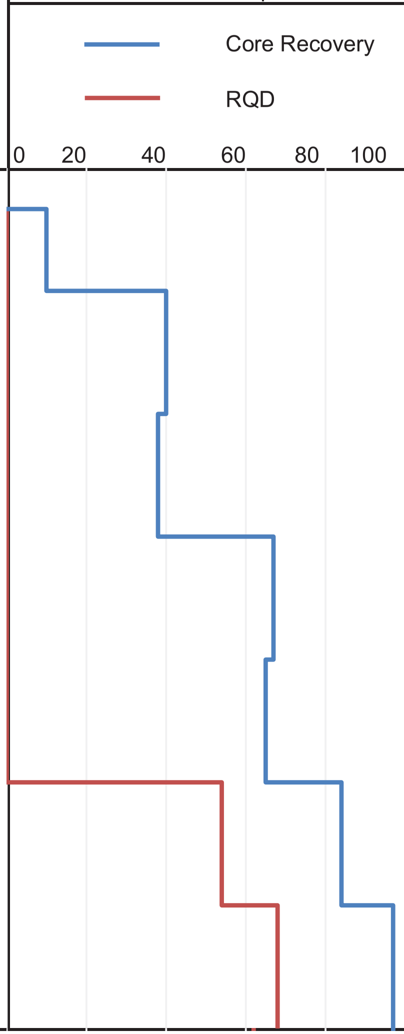


Borehole Log (BH62)

Location :	**ESP CONTROL ROOM**	Ground Level (GL) :	RL(+) 208.4 m
Co-ordinates :	**1260 E, 748 N**	Ground Water Level :	5.2 m (RL(+) 203.2 m)
Termination Depth : (below GL)	20 m (RL(+) 188.4 m)	Start Date :	24-Aug-18
		Finish Date :	30-Aug-18
Drilling :	Rotary Drilling	Bit Type :	Diamond
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.1			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.		Weak grey Basalt, very intensely fractured, highly weathered (0.1 to 1.5m)		10	0			NX
2.00, 2.50, 3.00	3.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (1.5 to 3m)		40	0			
3.50, 4.00, 4.50	4.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (3 to 4.5m)		38	0			
5.00, 5.50, 6.00	6.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		67	0			
6.50, 7.00, 7.50	7.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		65	0			
8.00, 8.50, 9.00	9.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (7.5 to 9m)		84	54			
9.50, 10.00, 10.50	10.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		97	68			

Percentage Core Recovery & RQD vs. depth



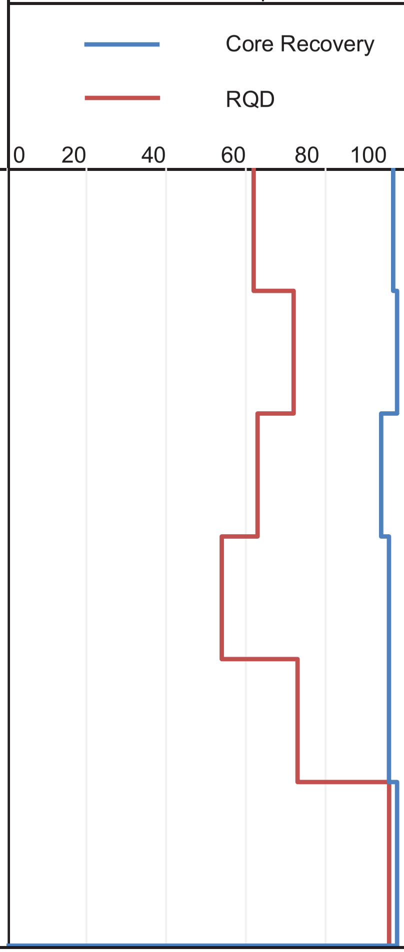
Borehole Log (BH62)

Location :	**ESP CONTROL ROOM**	Ground Level (GL) :	RL(+) 208.4 m
Co-ordinates :	**1260 E, 748 N**	Ground Water Level :	5.2 m (RL(+) 203.2 m)
Termination Depth : (below GL)	20 m (RL(+) 188.4 m)	Start Date :	24-Aug-18
		Finish Date :	30-Aug-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00, 11.50, 12.00	12.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		97	62	Greyish	Partial	NX
12.50, 13.00, 13.50	13.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		98	72			
14.00, 14.50, 15.00	15.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		94	63			
15.50, 16.00, 16.50	16.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (15 to 16.5m)		96	54			
17.00, 17.50, 18.00	18.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (16.5 to 18m)		96	73			
18.50, 19.00, 19.50, 20.00	20.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (18 to 20m)	20.0	98	96			

Percentage Core Recovery & RQD vs. depth

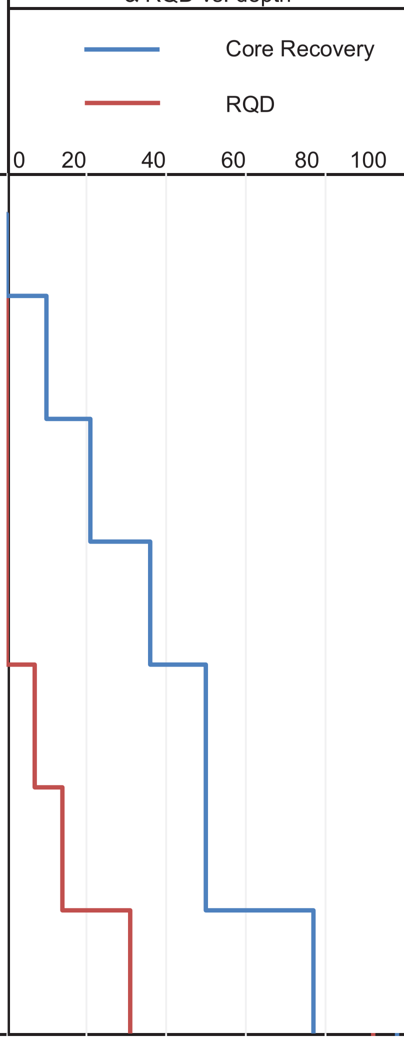


Borehole Log (BH63)

Location :	**CW SIDE STREAM FILTRATION PLANT**	Ground Level (GL) :	RL(+) 210.9 m	Drilling :	Rotary Drilling
Co-ordinates :	**1540 E, 467 N**	Ground Water Level :	7.8 m (RL(+) 203.1 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 195.9 m)	Start Date :	31-Jul-18	Casing Depth :	2.0 m
		Finish Date :	05-Aug-18		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.3			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.26 to 1.5m)		0	0			NX
2.00, 2.50, 3.00	3.00	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		10	0			
3.50, 4.00, 4.50	4.50		Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		21	0			
5.00, 5.50, 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		36	0			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		50	7			
8.00, 8.50, 9.00	9.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		50	14			
9.50, 10.00, 10.50	10.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		77	31			

Percentage Core Recovery & RQD vs. depth



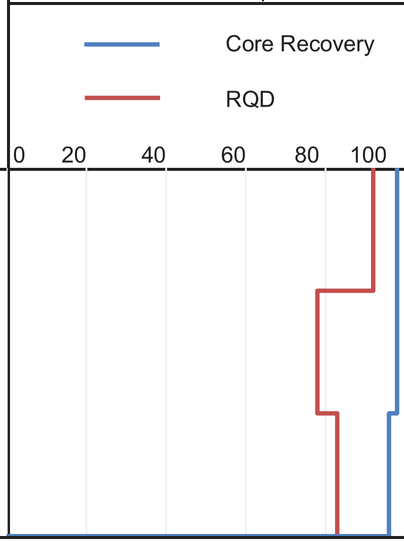
Borehole Log (BH63)

Location :	**CW SIDE STREAM FILTRATION PLANT**	Ground Level (GL) :	RL(+) 210.9 m
Co-ordinates :	**1540 E, 467 N**	Ground Water Level :	7.8 m (RL(+) 203.1 m)
Termination Depth : (below GL)	15 m (RL(+) 195.9 m)	Start Date :	31-Jul-18
		Finish Date :	05-Aug-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
11.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (10.5 to 12m)		98	92	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		98	78			
13.00										
13.50	13.50									
14.00				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		96	83			
14.50										
15.00	15.00				15.0					

Percentage Core Recovery & RQD vs. depth

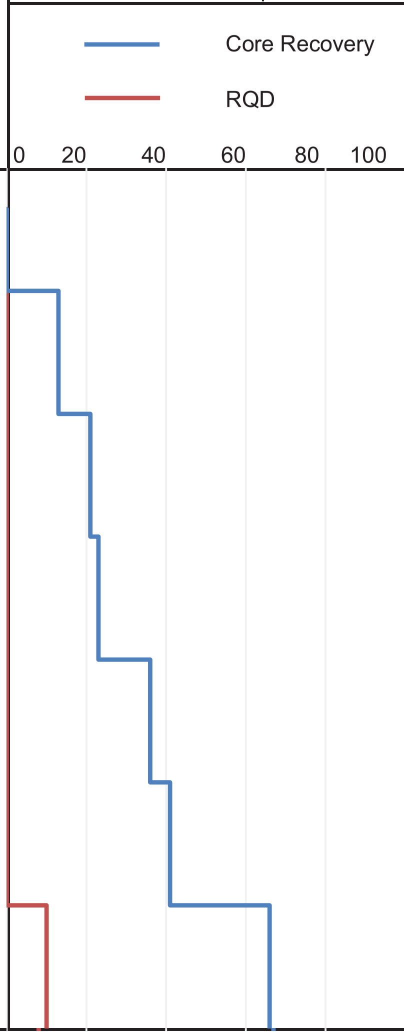


Borehole Log (BH64)

Location :	**EFFLUENT TREATMENT PLANT**	Ground Level (GL) :	RL(+) 214.2 m	Drilling :	Rotary Drilling
Co-ordinates :	**1632 E, 277 N**	Ground Water Level :	6.8 m (RL(+) 207.4 m)	Bit Type :	Diamond
Termination Depth : (below GL)	15 m (RL(+) 199.2 m)	Start Date :	12-Aug-18	Casing Depth :	2.0 m
		Finish Date :	14-Aug-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.3					HX
1.00				Very weak grey Basalt, completely weathered, disintegrated (0.29 to 1.5m)		0	0			
1.50	1.50	Ref.								
2.00				Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		13	0			
2.50										
3.00	3.00	Ref.								
3.50				Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		21	0			
4.00										
4.50	4.50									
5.00				Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		23	0	Greyish	Partial	NX
5.50										
6.00	6.00									
6.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		36	0			
7.00										
7.50	7.50									
8.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		41	0			
8.50										
9.00	9.00									
9.50				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10.5m)		66	10			
10.00										
10.50	10.50									

Percentage Core Recovery & RQD vs. depth



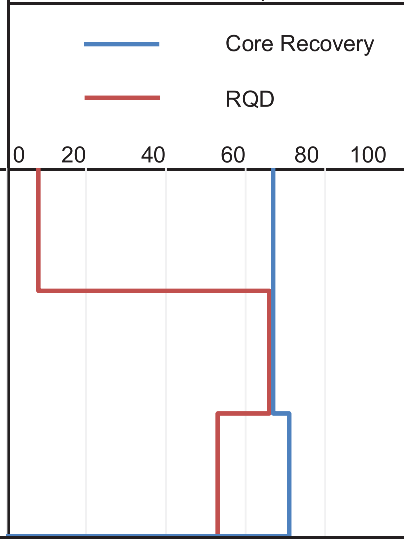
Scale

Borehole Log (BH64)

Location :	**EFFLUENT TREATMENT PLANT**	Ground Level (GL) :	RL(+) 214.2 m
Co-ordinates :	**1632 E, 277 N**	Ground Water Level :	6.8 m (RL(+) 207.4 m)
Termination Depth : (below GL)	15 m (RL(+) 199.2 m)	Start Date :	12-Aug-18
		Finish Date :	14-Aug-18
Drilling :	Rotary Drilling		
Bit Type :	Diamond		
Casing Depth :	2.0 m		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00 / 11.50 / 12.00	12.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		67	8	Greyish	Partial	NX
12.50 / 13.00 / 13.50	13.50			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (12 to 13.5m)		67	66			
14.00 / 14.50 / 15.00	15.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (13.5 to 15m)	15.0	71	53			

Percentage Core Recovery & RQD vs. depth



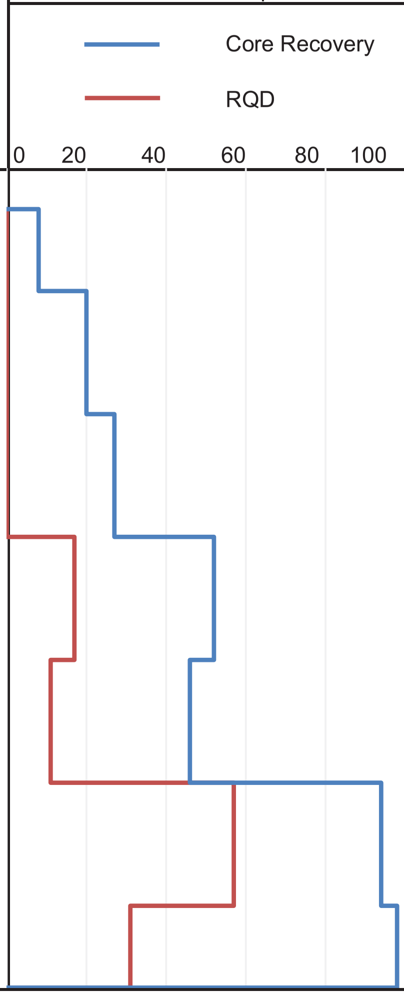
Borehole Log (BH65)

Location :	**WATCH TOWER**	Ground Level (GL) :	RL(+) 218.5 m
Co-ordinates :	**1817 E, 52 N**	Ground Water Level :	8.1 m (RL(+) 210.4 m)
Termination Depth : (below GL)	10 m (RL(+) 208.5 m)	Start Date :	18-Aug-18
		Finish Date :	23-Aug-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.2					HX
1.00			Weak grey Basalt, very intensely fractured, highly weathered (0.24 to 1.5m)		8	0			
1.50	1.50	Ref.							
2.00			Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		20	0			
2.50									
3.00	3.00								
3.50			Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		27	0			
4.00									
4.50	4.50								
5.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		52	17	Greyish	Partial	NX
5.50									
6.00	6.00								
6.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		46	11			
7.00									
7.50	7.50								
8.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (7.5 to 9m)		94	57			
8.50									
9.00	9.00								
9.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10m)		98	31			
10.00	10.00			10.0					

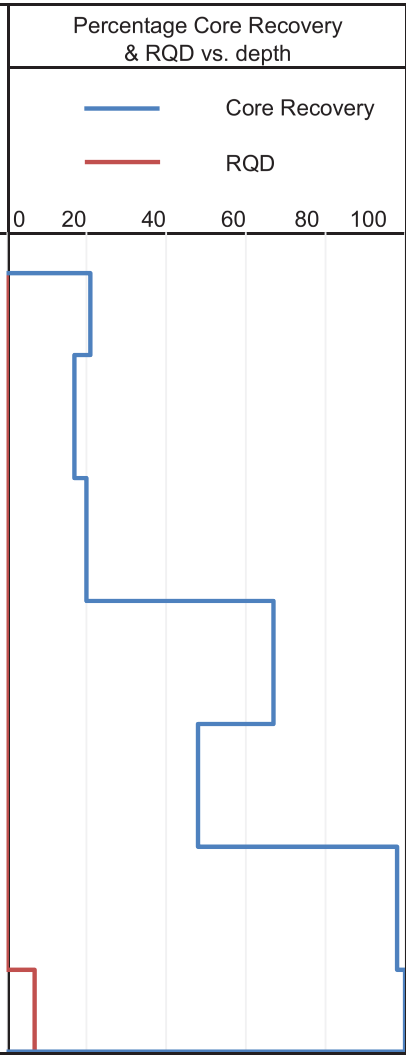
Percentage Core Recovery & RQD vs. depth



Borehole Log (BH66)

Location :	**WATCH TOWER**	Ground Level (GL) :	RL(+) 213.2 m	Drilling :	Rotary Drilling
Co-ordinates :	**1771 E, 492 N**	Ground Water Level :	9.4 m (RL(+) 203.8 m)	Bit Type :	Diamond
Termination Depth : (below GL)	10 m (RL(+) 203.2 m)	Start Date :	13-Sep-18	Casing Depth :	2.0 m
		Finish Date :	14-Sep-18		

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.3			Greyish	Partial	HX
1.00			Weak grey Basalt, very intensely fractured, highly weathered (0.3 to 1.5m)		21	0			NX
1.50	1.50								
2.00			Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		17	0			
2.50									
3.00	3.00	Ref.							
3.50			Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		20	0			
4.00									
4.50	4.50								
5.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		67	0			
5.50									
6.00	6.00								
6.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		48	0			
7.00									
7.50	7.50								
8.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		98	0			
8.50									
9.00	9.00								
9.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (9 to 10m)		100	7			
10.00	10.00			10.0					



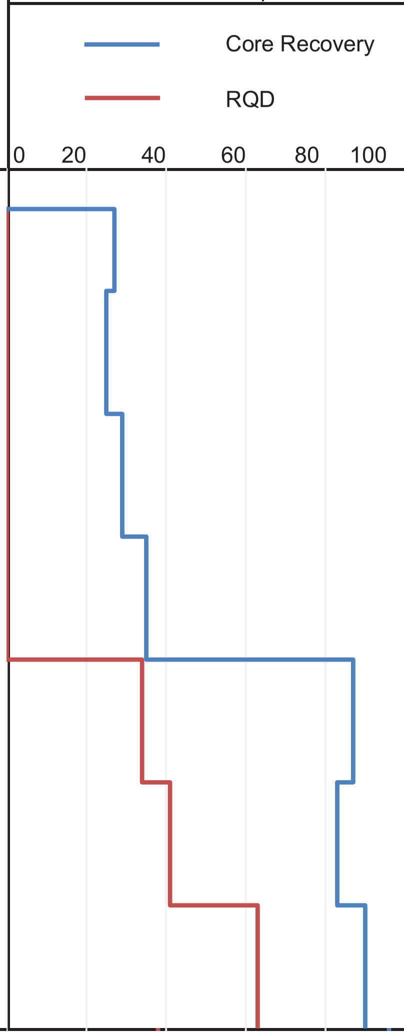
Borehole Log (BH67)

Location :	**CHIMNEY**	Ground Level (GL) :	RL(+) 207.8 m
Co-ordinates :	**1194 E, 817 N**	Ground Water Level :	5.1 m (RL(+) 202.6 m)
Termination Depth : (below GL)	20 m (RL(+) 187.8 m)	Start Date :	26-Apr-18
		Finish Date :	29-Apr-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water: Colour	Return Water: Loss	Size of Hole
0.50				Black Silty Clay with rock fragments	0.1					HX
1.00, 1.50	1.50			Weak grey Basalt, very intensely fractured, highly weathered (0.1 to 1.5m)		27	0	Greyish	Partial	NX
2.00, 2.50, 3.00	3.00			Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		25	0			
3.50, 4.00, 4.50	4.50			Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		29	0			
5.00, 5.50, 6.00	6.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		35	0			
6.50, 7.00, 7.50	7.50			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		87	34			
8.00, 8.50, 9.00	9.00			Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (7.5 to 9m)		83	41			
9.50, 10.00, 10.50	10.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (9 to 10.5m)		90	63			

Percentage Core Recovery & RQD vs. depth



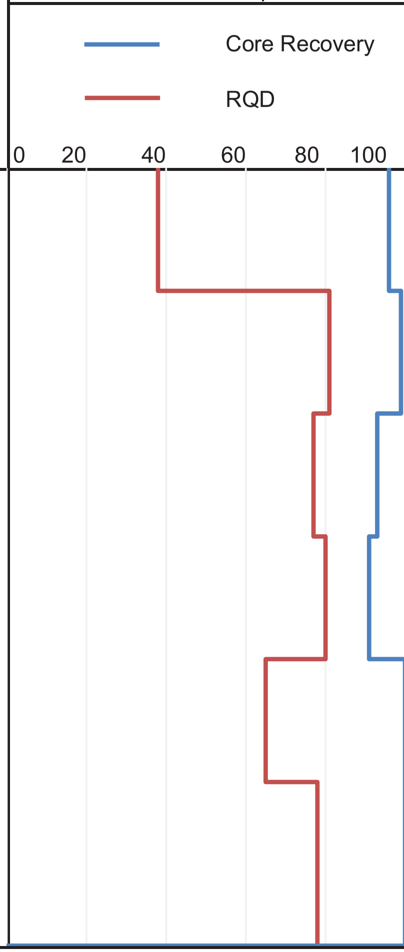
Borehole Log (BH67)

Location :	**CHIMNEY**	Ground Level (GL) :	RL(+) 207.8 m
Co-ordinates :	**1194 E, 817 N**	Ground Water Level :	5.1 m (RL(+) 202.6 m)
Termination Depth : (below GL)	20 m (RL(+) 187.8 m)	Start Date :	26-Apr-18
		Finish Date :	29-Apr-18

Drilling : Rotary Drilling
Bit Type : Diamond
Casing Depth : 2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00, 11.50, 12.00	12.00			Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (10.5 to 12m)		96	38	Greyish	Partial	NX
12.50, 13.00, 13.50	13.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		99	81			
14.00, 14.50, 15.00	15.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (13.5 to 15m)		93	77			
15.50, 16.00, 16.50	16.50			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (15 to 16.5m)		91	80			
17.00, 17.50, 18.00	18.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (16.5 to 18m)		100	65			
18.50, 19.00, 19.50, 20.00	20.00			Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (18 to 20m)	20.0	100	78			

Percentage Core Recovery & RQD vs. depth

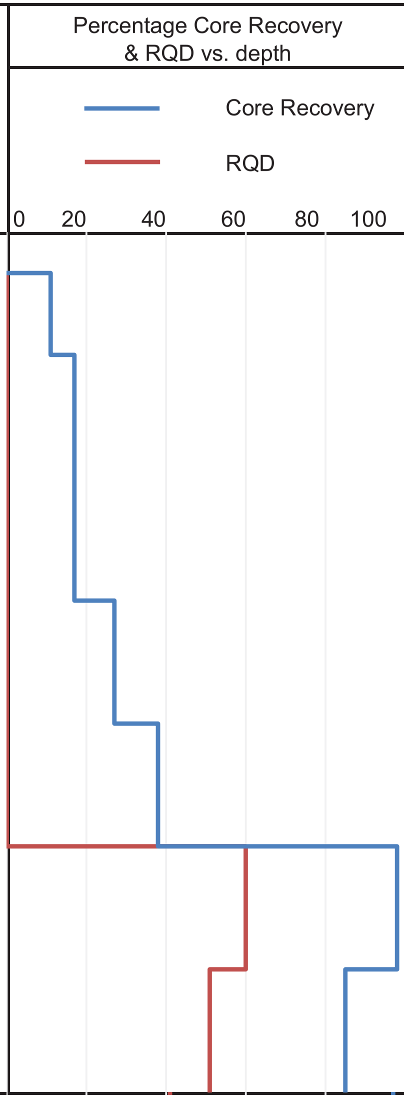


Borehole Log (BH68)

Location :	**CHIMNEY**	Ground Level (GL) :	RL(+) 208.2 m
Co-ordinates :	**1229 E, 817 N**	Ground Water Level :	5.4 m (RL(+) 202.8 m)
Termination Depth : (below GL)	20 m (RL(+) 188.2 m)	Start Date :	20-Apr-18
		Finish Date :	24-Apr-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.1			Greyish	Partial	HX
1.00 – 1.50	1.50	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (0.1 to 1.5m)		11	0			NX
2.00 – 3.00	3.00	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (1.5 to 3m)		17	0			
3.50 – 4.50	4.50	Ref.	Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		17	0			
5.00 – 6.00	6.00		Weak grey Basalt, very intensely fractured, highly weathered (4.5 to 6m)		27	0			
6.50 – 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		38	0			
8.00 – 9.00	9.00		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (7.5 to 9m)		98	60			
9.50 – 10.50	10.50		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (9 to 10.5m)		85	51			

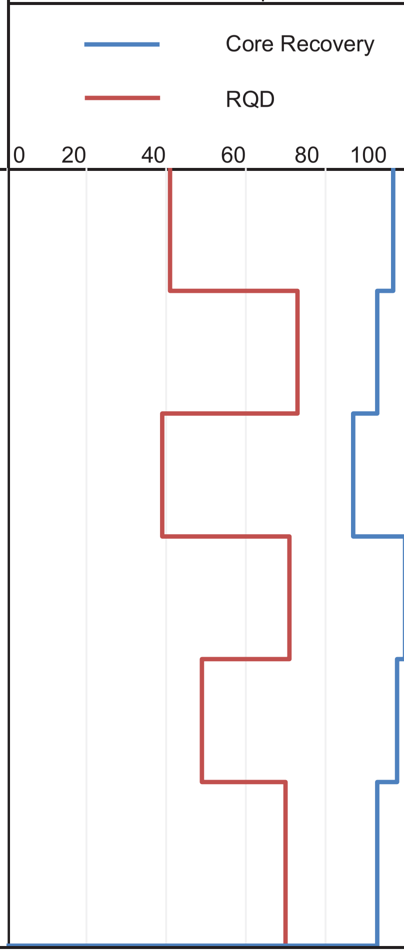


Borehole Log (BH68)

Location :	**CHIMNEY**	Ground Level (GL) :	RL(+) 208.2 m	Drilling :	Rotary Drilling
Co-ordinates :	**1229 E, 817 N**	Ground Water Level :	5.4 m (RL(+) 202.8 m)	Bit Type :	Diamond
Termination Depth : (below GL)	20 m (RL(+) 188.2 m)	Start Date :	20-Apr-18	Casing Depth :	2.0 m
		Finish Date :	24-Apr-18		

Depth, m	Drill Run (m)	Field SPT-N value	Symbol	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
11.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (10.5 to 12m)		97	41	Greyish	Partial	NX
11.50										
12.00	12.00									
12.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (12 to 13.5m)		93	73			
13.00										
13.50	13.50									
14.00				Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (13.5 to 15m)		87	39			
14.50										
15.00	15.00									
15.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (15 to 16.5m)		100	71			
16.00										
16.50	16.50									
17.00				Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (16.5 to 18m)		98	49			
17.50										
18.00	18.00									
18.50				Strong to very strong grey Basalt, moderately to slightly fractured, slightly weathered to fresh (18 to 20m)		93	70			
19.00										
19.50										
20.00	20.00				20.0					

Percentage Core Recovery & RQD vs. depth



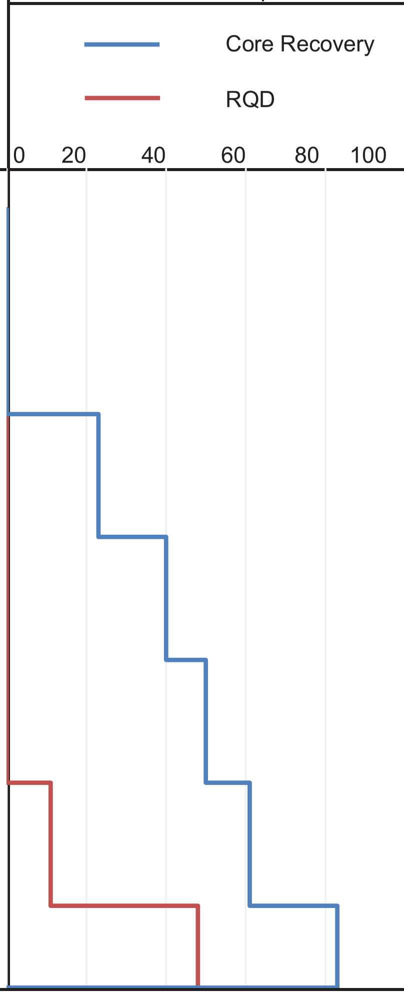
Borehole Log (BH69)

Location :	-	Ground Level (GL) :	RL(+) 208.8 m
Co-ordinates :	**1343 E, 611 N**	Ground Water Level :	5.4 m (RL(+) 203.4 m)
Termination Depth : (below GL)	10 m (RL(+) 198.8 m)	Start Date :	28-Aug-18
		Finish Date :	29-Aug-18

Drilling :	Rotary Drilling
Bit Type :	Diamond
Casing Depth :	2.0 m

Depth, m	Drill Run (m)	Field SPT-N value	DESCRIPTION	Depth of Strata, m	Core Recovery (%)	Rock Quality Designation (RQD) (%)	Return Water Colour	Return Water Loss	Size of Hole
0.50			Black Silty Clay with rock fragments	0.2			Greyish	Partial	HX
1.00, 1.50	1.50	Ref.	Very weak grey Basalt, completely weathered, disintegrated (0.24 to 1.5m)		0	0			NX
2.00, 2.50, 3.00	3.00	Ref.	Very weak grey Basalt, completely weathered, disintegrated (1.5 to 3m)		0	0			
3.50, 4.00, 4.50	4.50		Weak grey Basalt, very intensely fractured, highly weathered (3 to 4.5m)		23	0			
5.00, 5.50, 6.00	6.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (4.5 to 6m)		40	0			
6.50, 7.00, 7.50	7.50		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (6 to 7.5m)		50	0			
8.00, 8.50, 9.00	9.00		Moderately weak to moderately strong grey Basalt, intensely fractured, moderately weathered (7.5 to 9m)		61	11			
9.50, 10.00	10.00		Moderately strong to strong grey Basalt, moderately fractured, moderately weathered (9 to 10m)	10.0	83	48			

Percentage Core Recovery & RQD vs. depth



LABORATORY TEST RESULTS ON SELECTED SOIL SAMPLES

LOCATION	BORE HOLE No.	DEPTH (m)	DESCRIPTION	IS CLASSIFI CATION	Grain size analysis				Attetberg Limits			Shrinkage limit (%)	DFS (%)	Specific gravity
					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	LL	PL	PI			
AIR COMPRESSOR BUILDING	BH-32	0.0-0.1	Light grey silty clayey with rock fragment	CH	21	26	35	18	56.2	25.6	30.6	9.8	45.5	2.71
BOILER	BH-10	0.0-0.1	Light grey silty clayey with rock fragment	CH	17	22	40	21	58.1	25.2	32.9	9.5	41.7	2.72
BOILER	BH-11	0.0-0.1	Light grey silty clayey with rock fragment	CI	8	32	43	17	43.5	23.7	19.8	11.1	30.8	2.69
BOILER	BH-12	0.0-0.1	Light grey silty clayey with rock fragment	CH	16	19	40	25	61.2	26.8	34.4	9.2	41.7	2.70
BOILER	BH-13	0.0-0.1	Light grey silty clayey with rock fragment	CI	11	31	42	16	43.6	23.4	20.2	11.5	27.3	2.70
CHIMNEY	BH-67	0.0-0.1	Light grey silty clayey with rock fragment	CH	17	19	39	25	57.2	26.5	30.7	9.3	36.4	2.71
CHIMNEY	BH-68	0.0-0.1	Light grey silty clayey with rock fragment	CH	7	9	55	29	61.2	27.1	34.1	9.0	50.0	2.72
CONDENSATE STORAGE TANK	BH-33	0.0-0.1	Light grey silty clayey with rock fragment	CI	13	21	51	15	42.5	23.1	19.4	11.1	27.3	2.69
ESP	BH-5	0.0-0.1	Light grey silty clayey with rock fragment	CH	18	26	31	25	56.8	25.4	31.4	9.5	36.4	2.70
ESP	BH-6	0.0-0.1	Light grey silty clayey with rock fragment	CH	14	22	36	28	63.1	28.4	34.7	9.4	53.8	2.71
ESP	BH-7	0.0-0.1	Light grey silty clayey with rock fragment	CH	13	18	43	26	54.5	25.7	28.8	9.5	50.0	2.70

LOCATION	BORE HOLE No.	DEPTH (m)	DESCRIPTION	IS CLASSIFICATION	Grain size analysis				Attetberg Limits			Shrinkage limit (%)	DFS (%)	Specific gravity
					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	LL	PL	PI			
ESP CONTROL ROOM	BH-62	0.0-0.1	Light grey silty clayey with rock fragment	CI	7	18	59	16	43.1	24.2	18.9	11.2	30.0	2.69
FD & PA FAN	BH-8	0.0-0.1	Light grey silty clayey with rock fragment	CH	19	23	31	27	56.6	27.2	29.4	9.6	54.5	2.71
FD & PA FAN	BH-9	0.0-0.1	Light grey silty clayey with rock fragment	CH	8	15	45	32	63.5	28.4	35.1	9.0	50.0	2.72
FGD AREA	BH-29	0.0-0.1	Light grey silty clayey with rock fragment	CH	7	23	39	31	61.2	27.6	33.6	9.0	58.3	2.72
FGD AREA	BH-30	0.0-0.1	Light grey silty clayey with rock fragment	CH	6	18	52	24	54.5	26.8	27.7	9.7	45.5	2.69
ID FAN	BH-1	0.0-0.1	Light grey silty clayey with rock fragment	CH	14	21	37	28	55.7	26.1	29.6	9.1	41.7	2.71
ID FAN	BH-2	0.0-0.1	Light grey silty clayey with rock fragment	CI	12	23	49	16	41.2	23.5	17.7	12.2	27.3	2.68
ID FAN	BH-3	0.0-0.1	Light grey silty clayey with rock fragment	CH	18	12	44	26	56.3	27.1	29.2	9.6	45.5	2.70
ID FAN	BH-4	0.0-0.1	Light grey silty clayey with rock fragment	CH	17	18	40	25	52.5	25.6	26.9	9.5	46.2	2.70
MAIN POWER HOUSE AREA	BH-14	0.0-0.1	Light grey silty clayey with rock fragment	CH	15	20	39	26	54.9	24.6	30.3	8.9	45.6	2.78
MAIN POWER HOUSE AREA	BH-15	0.0-0.1	Light grey silty clayey with rock fragment	CH	13	22	50	15	55.3	25.2	30.1	9.1	42.7	2.79

LOCATION	BORE HOLE No.	DEPTH (m)	DESCRIPTION	IS CLASSIFI CATION	Grain size analysis				Attetberg Limits			Shrinkage limit (%)	DFS (%)	Specific gravity
					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	LL	PL	PI			
MAIN POWER HOUSE AREA	BH-16	0.0-0.1	Light grey silty clayey with rock fragment	CH	17	12	46	25	50.2	24.8	25.4	10.5	31.7	2.68
MAIN POWER HOUSE AREA	BH-17	0.0-0.1	Light grey silty clayey with rock fragment	CH	16	19	39	26	59.3	27.8	31.5	9.9	40.3	2.70
MAIN POWER HOUSE AREA	BH-18	0.0-0.1	Light grey silty clayey with rock fragment	CI	17	27	30	26	44.8	25.7	19.1	11.3	28.9	2.73
MAIN POWER HOUSE AREA	BH-19	0.0-0.1	Light grey silty clayey with rock fragment	CH	14	22	34	30	56.2	24.6	31.6	10.3	35.4	2.74
MAIN POWER HOUSE AREA	BH-20	0.0-0.1	Light grey silty clayey with rock fragment	CH	12	19	42	27	57.4	27.1	30.3	9.2	49.2	2.71
PIPE RACK	BH-21	0.0-0.1	Light grey silty clayey with rock fragment	CH	13	29	29	29	60.3	26.5	33.8	12.2	29.0	2.66
PIPE RACK	BH-25	0.0-0.1	Light grey silty clayey with rock fragment	CI	8	15	44	33	44.3	24.9	19.4	10.1	33.5	2.68
TRANSFORMER YARD	BH-22	0.0-0.1	Light grey silty clayey with rock fragment	CH	16	28	30	26	53.8	25.8	28.0	9.2	35.6	2.69
TRANSFORMER YARD	BH-23	0.0-0.1	Light grey silty clayey with rock fragment	CH	11	25	34	30	64.9	27.1	37.8	9.3	52.4	2.72
TRANSFORMER YARD	BH-24	0.0-0.1	Light grey silty clayey with rock fragment	CH	7	24	39	30	55.3	26.5	28.8	9.2	52.3	2.71
COOLING TOWER	BH-38	0.0-0.1	Light grey silty clayey with rock fragment	CH	14	25	37	24	53.5	27.7	25.8	9.9	47.9	2.68

LOCATION	BORE HOLE No.	DEPTH (m)	DESCRIPTION	IS CLASSIFI CATION	Grain size analysis				Attetberg Limits			Shrinkage limit (%)	DFS (%)	Specific gravity
					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	LL	PL	PI			
COOLING TOWER	BH-39	0.0-0.1	Light grey silty clayey with rock fragment	CH	5	35	38	22	53.9	27.1	26.8	11.4	49.5	2.72
COOLING TOWER	BH-40	0.0-0.1	Light grey silty clayey with rock fragment	CH	6	29	38	27	59.3	26.4	32.9	10.5	48.6	2.71
COOLING TOWER	BH-41	0.0-0.1	Light grey silty clayey with rock fragment	CI	10	32	37	21	44.2	27.5	16.7	12.0	33.9	2.69
COOLING TOWER	BH-45	0.0-0.1	Light grey silty clayey with rock fragment	CH	8	34	38	20	64.2	27.1	37.1	9.1	51.7	2.73
RAW WATER INTAKE PIPE LINE	BH-53	0.0-0.1	Light grey silty clayey with rock fragment	CH	12	23	39	26	64.3	27.6	36.7	11.2	57.4	2.71
RAW WATER INTAKE PIPE LINE	BH-54	0.0-0.1	Light grey silty clayey with rock fragment	CH	10	25	48	17	51.4	26.8	24.6	10.5	46.8	2.69
RAW WATER INTAKE PIPE LINE	BH-55	0.0-0.1	Light grey silty clayey with rock fragment	CH	8	22	47	23	56.3	26.5	29.8	10.1	47.2	2.70
RAW WATER INTAKE PIPE LINE	BH-56	0.0-0.1	Light grey silty clayey with rock fragment	CI	9	26	42	23	42.4	25.3	17.1	11.6	39.2	2.69
RAW WATER INTAKE PIPE LINE	BH-57	0.0-0.1	Light grey silty clayey with rock fragment	CH	16	26	30	28	55.3	26.1	29.2	9.8	48.6	2.71
RAW WATER INTAKE PIPE LINE	BH-58	0.0-0.1	Light grey silty clayey with rock fragment	CH	10	13	44	33	54.9	25.1	29.8	9.7	47.9	2.70
CW/ACW PUMP HOUSE	BH-42	0.0-0.1	Light grey silty clayey with rock fragment	CH	12	30	28	30	65.3	26.8	38.5	9.4	46.2	2.73

LABORATORY TEST RESULTS ON SELECTED ROCK SAMPLES

Structure	Borehole Designation	Sample No.	Depth, m	Specific Gravity	Density (gm/cc)	Water Absorption (%)	Porosity	Point Load Index, kg/cm^2	Unconfined Compressive Strength, kg/cm^2
ID FAN	BH-01	54	20.00	2.81	2.86	0.28	0.61	8.6	84.8
ID FAN	BH-02	29	20.00	2.84	2.91	0.34	0.68	7.6	71.1
ID FAN	BH-02	55	20.00	2.88	2.90	0.32	0.72	9.3	78.8
ID FAN	BH-03	60	12.00-13.50	3.00	2.93	0.63	0.91	10.0	127.2
ID FAN	BH-04	85	20.00	2.81	2.79	0.26	1.87	11.2	102.1
ESP	BH-05	20	20.00	2.82	2.84	0.26	0.47	10.4	94.3
ESP	BH-06	91	20.00	2.85	2.92	0.36	0.61	7.7	75.5
ESP	BH-07	76	20.00	2.85	2.90	0.28	0.64	7.9	81.6
FD & PA FAN	BH-08	33	9.00-10.5	2.97	2.99	0.12	0.19	5.9	137.3
FD & PA FAN	BH-08	45	10.5-12.0	2.99	2.95	0.10	0.24	7.9	182.3
FD & PA FAN	BH-08	59	15.0-16.5	2.97	2.93	0.07	0.19	11.3	141.2
FD & PA FAN	BH-09	34	12.0-13.5	3.05	3.01	0.27	0.19	8.4	100.0

Structure	Borehole Designation	Sample No.	Depth, m	Specific Gravity	Density (gm/cc)	Water Absorption (%)	Porosity	Point Load Index, kg/cm^2	Unconfined Compressive Strength, kg/cm^2
BOILER	BH-10	32	7.5-9.0	3.01	2.96	0.21	0.19	7.2	85.4
BOILER	BH-10	44	10.5-12.0	3.01	3.04	0.41	0.19	9.9	131.6
BOILER	BH-11	79	15.0-16.5	3.02	2.93	0.11	0.19	6.6	125.6
BOILER	BH-12	75	10.5-12.0	3.02	2.98	0.14	0.19	9.3	102.8
BOILER	BH-12	84	12.0-13.5	3.04	2.91	0.15	0.20	9.8	124.3
BOILER	BH-13	22	7.5-9.0	3.22	3.00	0.50	0.19	10.5	131.6
BOILER	BH-13	38	7.5-9.0	3.07	2.87	0.22	0.19	10.3	127.6
BOILER	BH-13	61	15.0-16.5	3.02	2.93	0.15	0.19	5.5	119.4
MAIN POWER HOUSE AREA	BH-14	30	10.5-12.0	3.09	2.99	0.23	0.19	9.4	121.8
MAIN POWER HOUSE AREA	BH-14	49	12.0-13.5	3.09	3.03	0.14	0.19	4.2	128.0
MAIN POWER HOUSE AREA	BH-14	59	13.5-15.0	3.08	2.96	0.76	0.19	8.8	123.5
MAIN POWER HOUSE AREA	BH-15	26	6.0-7.5	3.04	3.07	0.12	0.19	5.1	72.7

Structure	Borehole Designation	Sample No.	Depth, m	Specific Gravity	Density (gm/cc)	Water Absorption (%)	Porosity	Point Load Index, kg/cm^2	Unconfined Compressive Strength, kg/cm^2
MAIN POWER HOUSE AREA	BH-15	44	9.0-10.5	3.24	2.93	0.54	0.19	9.0	117.5
MAIN POWER HOUSE AREA	BH-15	72	15.0	2.95	2.92	0.27	0.19	6.1	77.5
MAIN POWER HOUSE AREA	BH-17	33	6.00-7.50	3.12	2.94	0.28	0.66	7.0	80.0
MAIN POWER HOUSE AREA	BH-17	67	13.50-15.00	3.10	2.89	0.35	0.86	6.3	116.8
MAIN POWER HOUSE AREA	BH-18	30	6.0-7.5	2.99	2.95	0.10	0.37	11.6	90.8
MAIN POWER HOUSE AREA	BH-18	61	9.0-10.5	2.97	2.93	0.24	0.78	9.1	98.6
MAIN POWER HOUSE AREA	BH-18	69	12.0-13.5	2.95	2.88	0.13	0.19	10.2	104.9
MAIN POWER HOUSE AREA	BH-19	38	6.0-7.5	2.24	2.92	0.76	0.92	6.3	74.7
TRANSFORMER YARD	BH-22	57	12.0-13.5	2.96	2.98	0.09	0.20	3.7	84.0
TRANSFORMER YARD	BH-22	67	15.0	2.96	2.94	0.16	0.20	7.6	96.9
TRANSFORMER YARD	BH-23	24	4.50-6.00	3.61	2.97	0.29	0.22	6.5	79.4
TRANSFORMER YARD	BH-23	49	7.50-9.00	3.33	2.95	0.18	0.21	10.4	154.7

Structure	Borehole Designation	Sample No.	Depth, m	Specific Gravity	Density (gm/cc)	Water Absorption (%)	Porosity	Point Load Index, kg/cm^2	Unconfined Compressive Strength, kg/cm^2
TRANSFORMER YARD	BH-23	74	10.50-12.00	3.35	2.93	0.40	0.23	6.4	89.6
TRANSFORMER YARD	BH-24	45	9.00-10.50	3.59	2.93	0.31	0.21	6.0	79.1
PARKING SHEDS	BH-26	20	6.0-7.5	2.99	2.95	0.30	0.38	8.9	99.1
PARKING SHEDS	BH-26	66	13.5-15.0	2.24	2.93	0.21	0.56	6.7	91.1
FGD AREA	BH-29	48	10.50-12.00	2.94	2.90	0.47	0.69	9.5	134.0
RAIN WATER HARVESTING POND	BH-31	48	12.0-13.5	2.84	2.87	0.27	0.48	9.0	99.6
CHEMICAL LAB	BH-34	71	13.5-15.0	2.99	2.90	0.26	0.32	11.3	127.9
DM WATER STORAGE TANK	BH-35	44	9.00-10.50	2.97	2.92	0.15	0.22	9.5	142.9
COOLING TOWER	BH-40	115	16.50-18.00	2.99	2.93	0.41	0.45	6.4	118.3
COOLING TOWER	BH-41	72	15.00-16.50	3.02	2.93	0.30	0.22	10.4	104.0
CW/ACW PUMP HOUSE	BH-42	126	18.00-20.00	3.01	2.95	0.25	0.22	7.5	121.6
ONIZATION & CW TREATMENT AR	BH-44	34	10.50-12.00	3.03	2.96	0.22	0.22	7.6	72.9

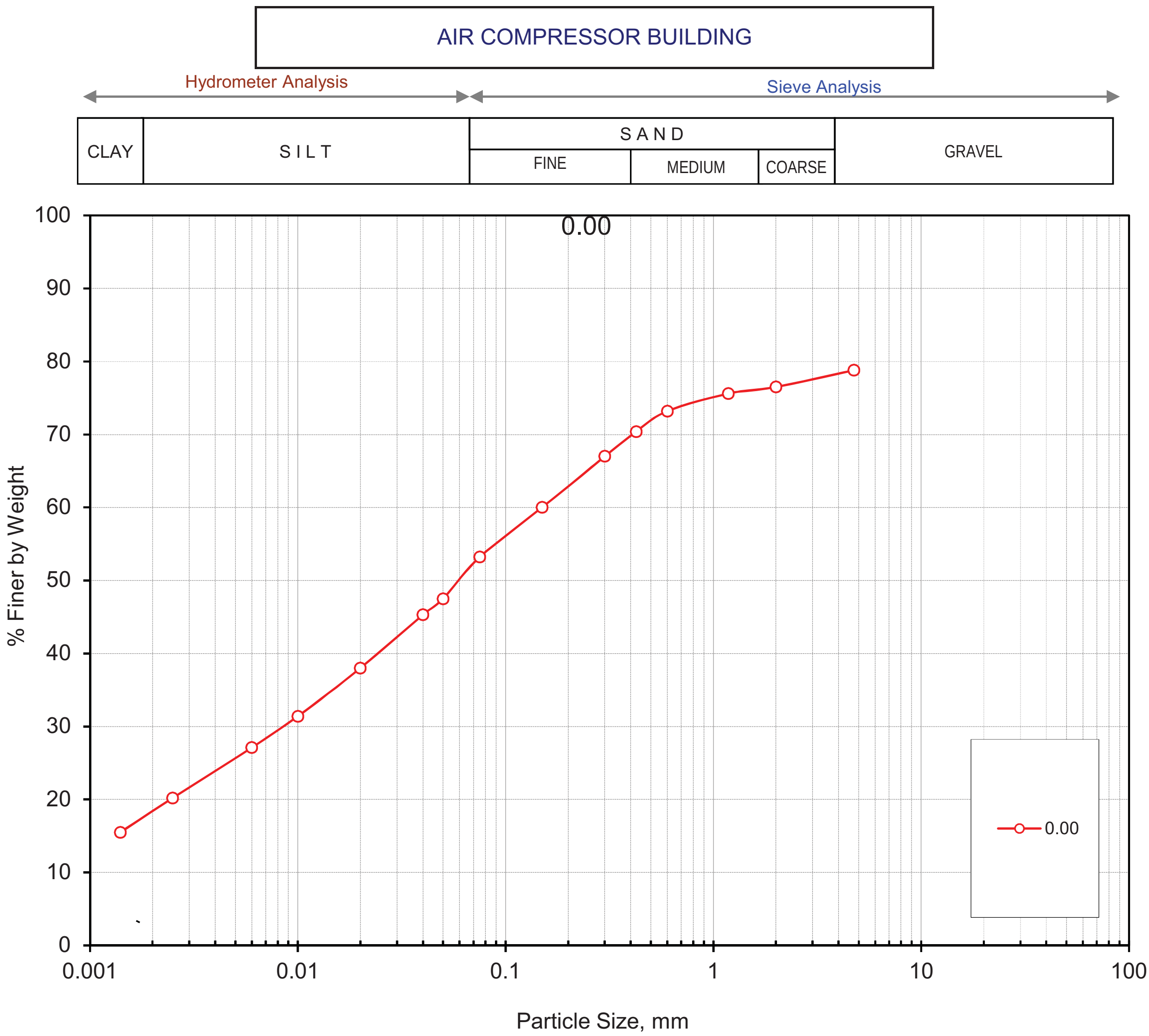
Structure	Borehole Designation	Sample No.	Depth, m	Specific Gravity	Density (gm/cc)	Water Absorption (%)	Porosity	Point Load Index, kg/cm^2	Unconfined Compressive Strength, kg/cm^2
COOLING TOWER	BH-45	116	18.0-20.0	2.82	2.93	0.84	0.87	12.1	155.5
RW & FW STORAGE TANK	BH-49	33	7.50-9.0	2.95	2.89	0.37	0.45	7.6	86.9
RAW WATER INTAKE PIPE LINE	BH-53	26	7.50-9.00	2.93	2.90	0.94	1.05	6.5	76.2
RAW WATER INTAKE PIPE LINE	BH-55	37	9.50-10.50	3.03	2.90	0.22	0.22	7.3	79.4
RAW WATER INTAKE PIPE LINE	BH-57	37	9.00-10.0	-	2.96	-	-	-	72.9
RAW WATER INTAKE PIPE LINE	BH-58	19	7.50-6.00	-	2.93	-	-	10.8	104.0
WEIGH BRIDGE FOR DRY ASH SILO	BH-60	42	12.0-13.5	-	2.90	-	-	6.7	79.4
ESP CONTROL ROOM	BH-62	45	7.50-9.00	2.94	2.88	0.37	0.47	9.5	102.1
W SIDE STREAM FILTRATION PLAN	BH-63	34	7.50-9.01	2.67	2.72	0.57	0.69	10.0	112.9
CHIMNEY	BH-67	13	20.0	2.79	2.87	0.31	0.96	6.8	72.8
CHIMNEY	BH-67	65	20.0	2.83	2.85	0.42	0.68	8.3	78.9
CHIMNEY	BH-68	102	20.0	2.77	2.89	0.29	0.62	10.2	91.3

GRAIN SIZE ANALYSIS

Grain Size Analysis

as per IS : 2720 (Part 4) - 1985

Sample Details			Test Results			
Borehole Number	Sample Depth, m	Sample Description	Gravel %	Sand %	Silt %	Clay %
BH-32	0.00	Light grey silty clay of high plasticity (CH)	21	26	35	18

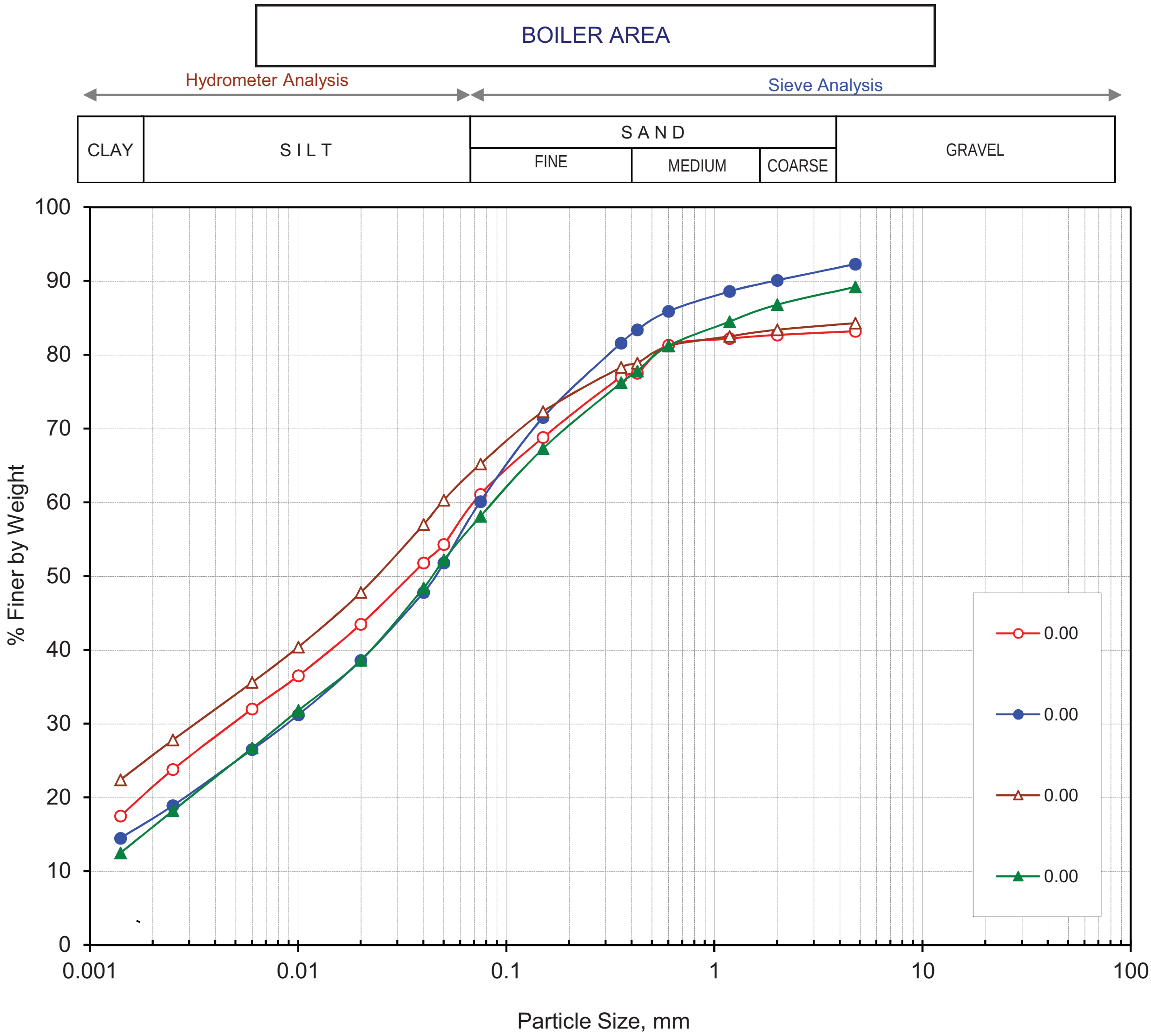


Grain Size Distribution Curve

Grain Size Analysis

as per IS : 2720 (Part 4) - 1985

Sample Details			Test Results			
Borehole Number	Sample Depth, m	Sample Description	Gravel %	Sand %	Silt %	Clay %
BH-10	0.00	Light grey silty clay with rock fragment (CH)	17	22	40	21
BH-11	0.00	Light grey silty clay with rock fragment (CI)	8	32	43	17
BH-12	0.00	Light grey silty clay with rock fragment (CH)	16	19	40	25
BH-13	0.00	Light grey silty clay with rock fragment (CH)	11	31	42	16

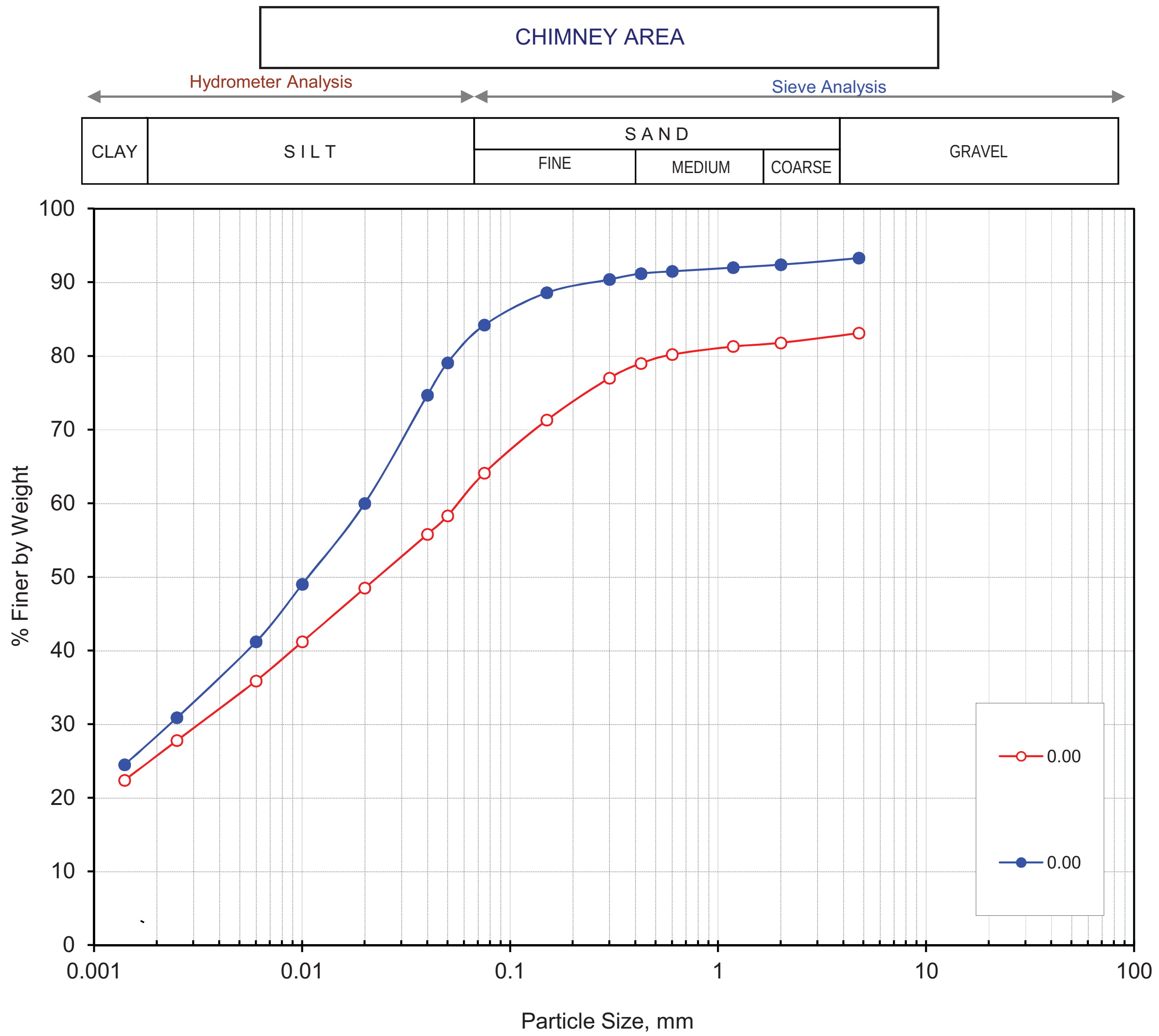


Grain Size Distribution Curve

Grain Size Analysis

as per IS : 2720 (Part 4) - 1985

Sample Details			Test Results			
Borehole Number	Sample Depth, m	Sample Description	Gravel %	Sand %	Silt %	Clay %
BH-67	0.00	Light grey silty clay with rock fragment (CH)	17	19	39	25
BH-68	0.00	Light grey silty clay with rock fragment (CH)	7	9	56	28

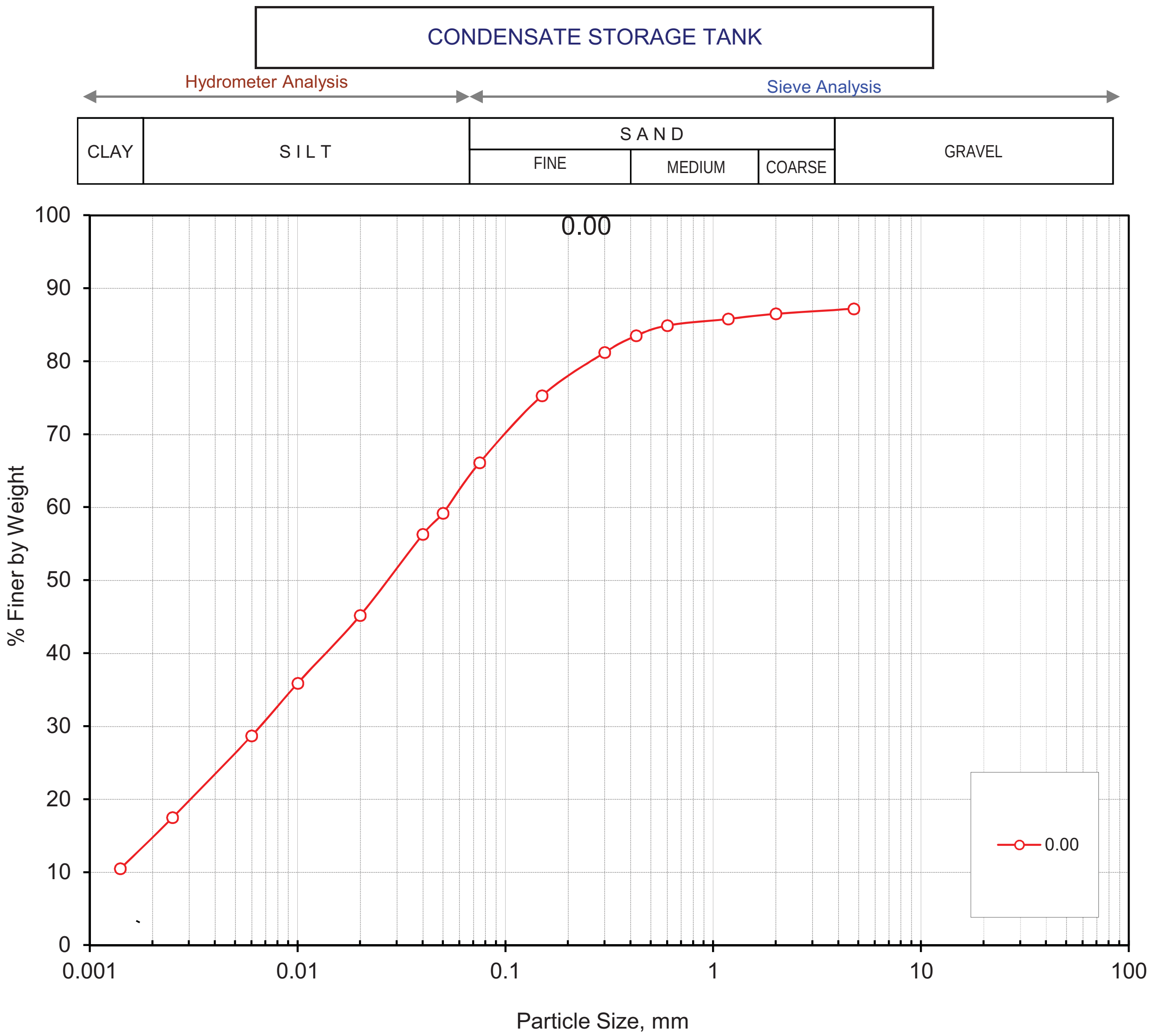


Grain Size Distribution Curve

Grain Size Analysis

as per IS : 2720 (Part 4) - 1985

Sample Details			Test Results			
Borehole Number	Sample Depth, m	Sample Description	Gravel %	Sand %	Silt %	Clay %
BH-33	0.00	Light grey silty clay with rock fragment (CI)	13	21	52	14

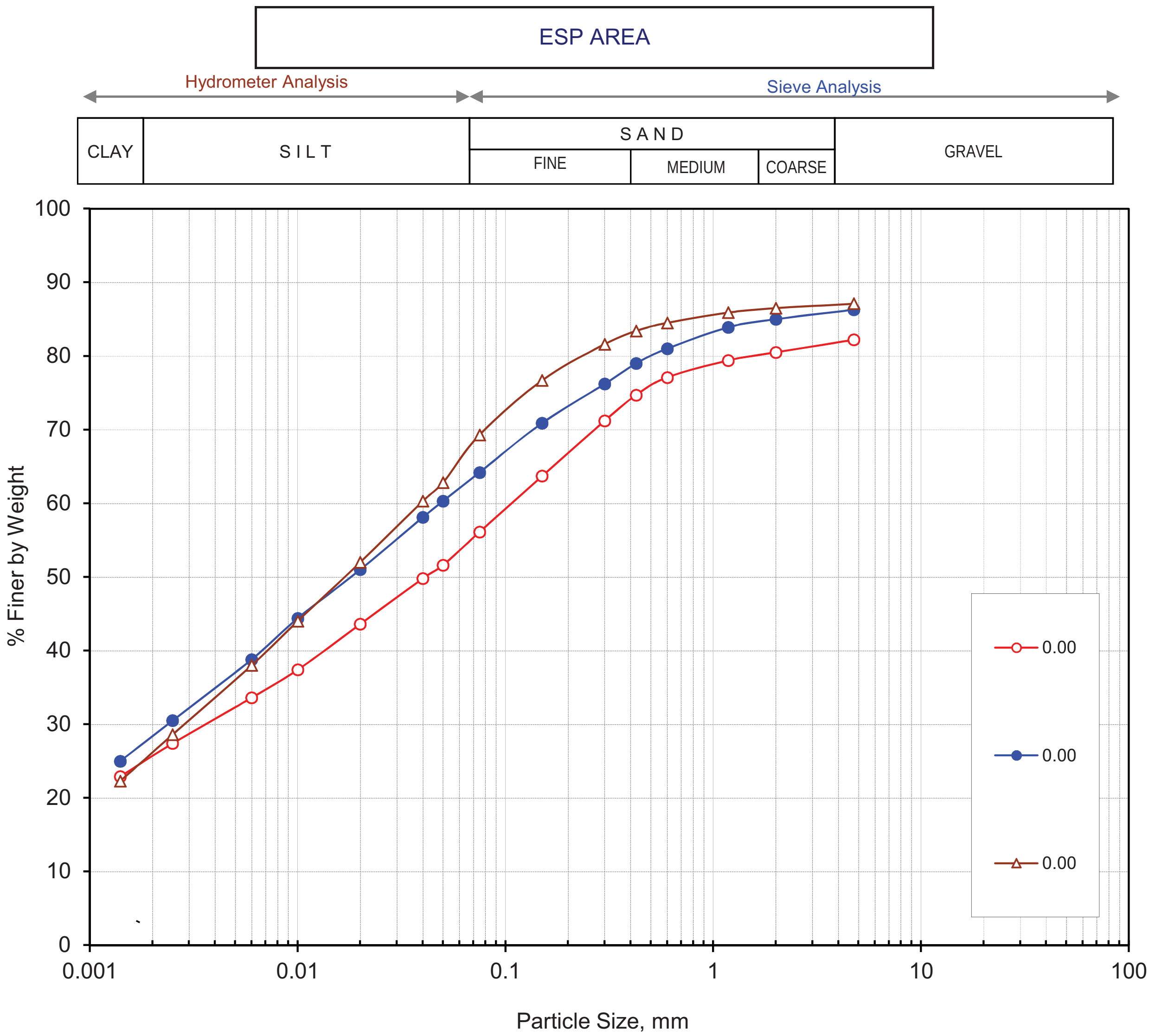


Grain Size Distribution Curve

Grain Size Analysis

as per IS : 2720 (Part 4) - 1985

Sample Details			Test Results			
Borehole Number	Sample Depth, m	Sample Description	Gravel %	Sand %	Silt %	Clay %
BH-5	0.00	Light grey silty clay with rock fragment (CH)	18	26	31	25
BH-6	0.00	Light grey silty clay with rock fragment (CH)	14	22	36	28
BH-7	0.00	Light grey silty clay with rock fragment (CH)	13	18	43	26

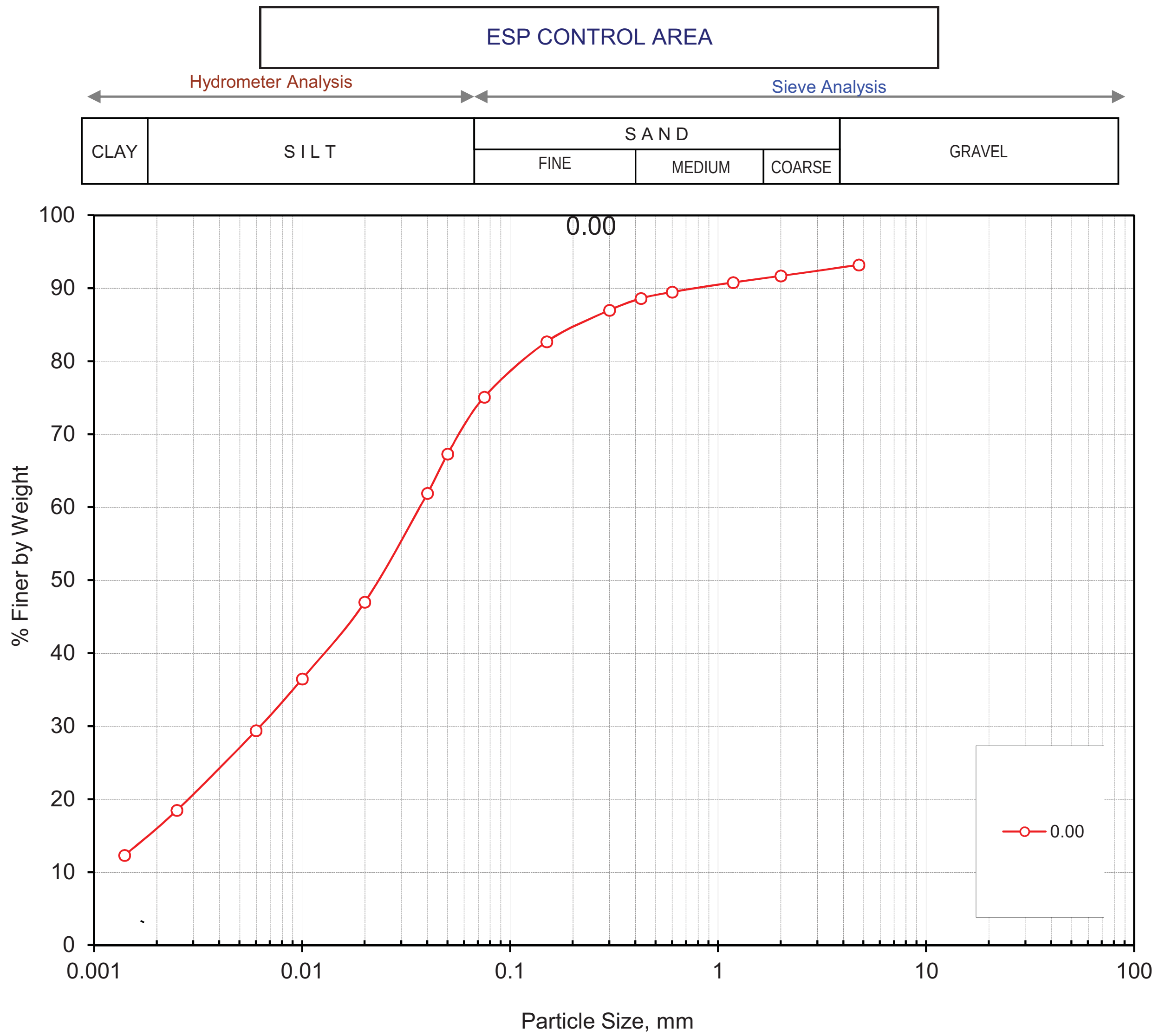


Grain Size Distribution Curve

Grain Size Analysis

as per IS : 2720 (Part 4) - 1985

Sample Details			Test Results			
Borehole Number	Sample Depth, m	Sample Description	Gravel %	Sand %	Silt %	Clay %
BH-62	0.00	Light grey silty clay with rock fragment (CI)	7	18	59	16

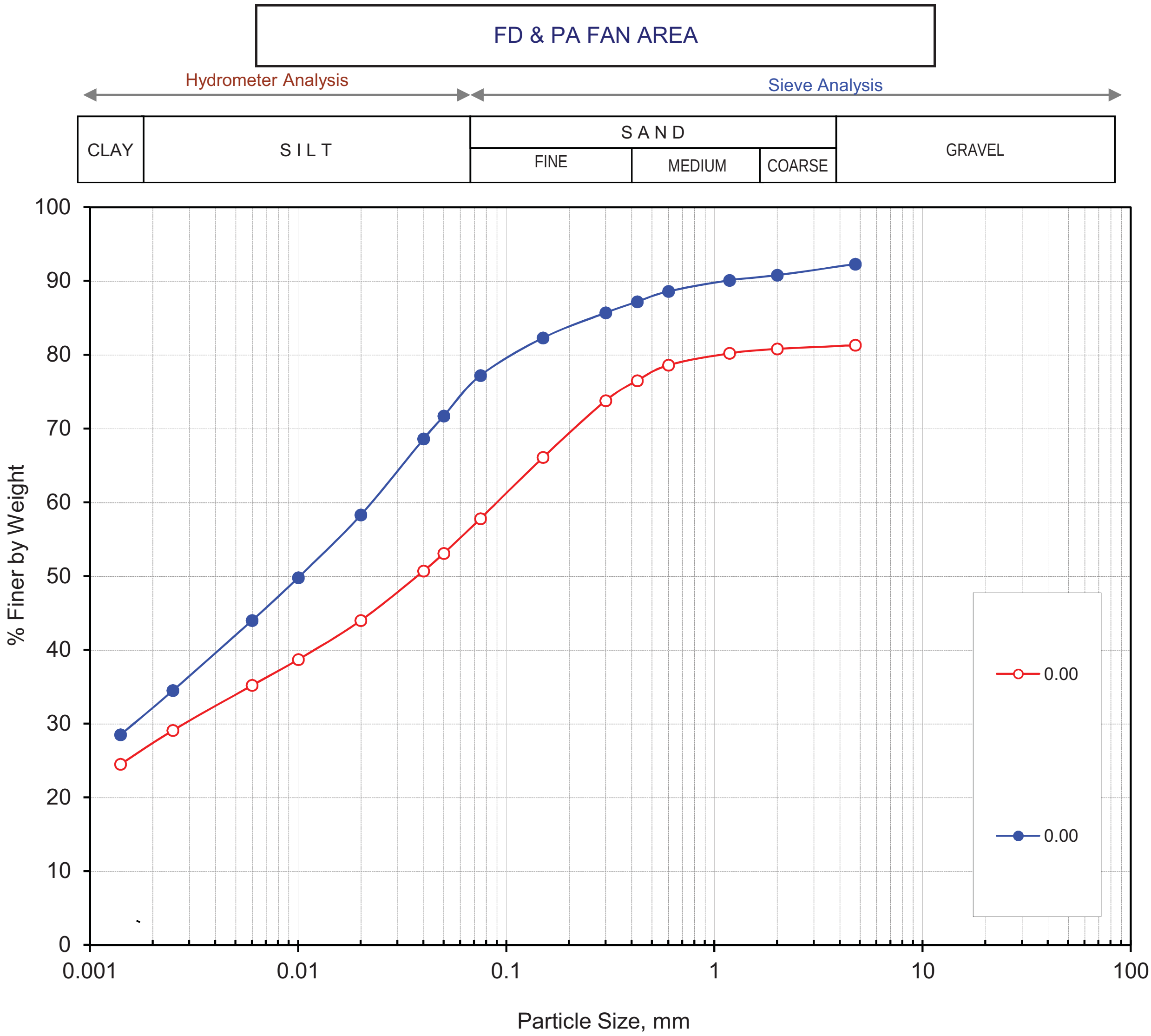


Grain Size Distribution Curve

Grain Size Analysis

as per IS : 2720 (Part 4) - 1985

Sample Details			Test Results			
Borehole Number	Sample Depth, m	Sample Description	Gravel %	Sand %	Silt %	Clay %
BH-8	0.00	Light grey silty clay with rock fragment (CH)	19	24	30	27
BH-9	0.00	Light grey silty clay with rock fragment (CH)	8	15	45	32

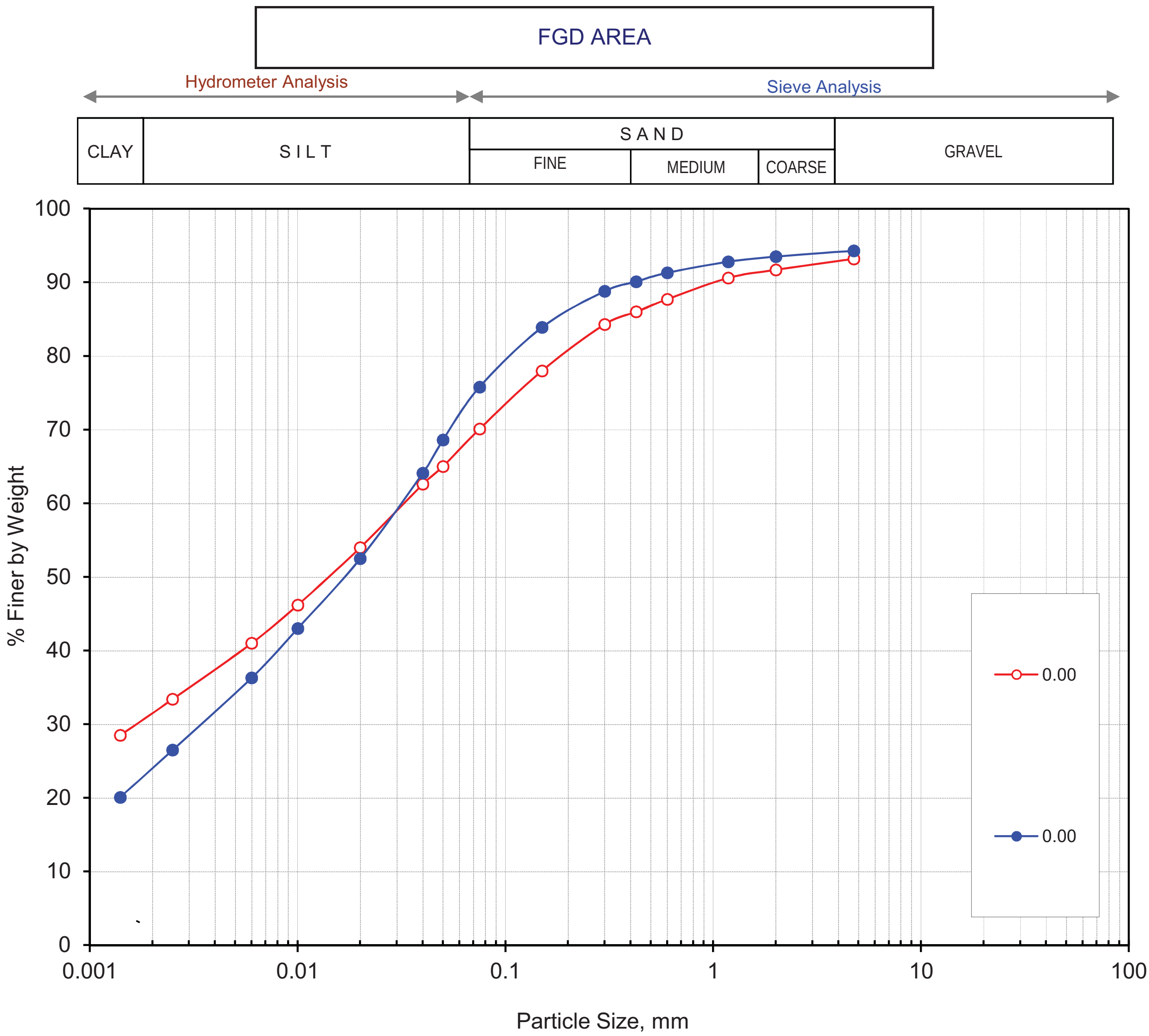


Grain Size Distribution Curve

Grain Size Analysis

as per IS : 2720 (Part 4) - 1985

Sample Details			Test Results			
Borehole Number	Sample Depth, m	Sample Description	Gravel %	Sand %	Silt %	Clay %
BH-29	0.00	Light grey silty clay with rock fragment (CH)	7	23	39	31
BH-30	0.00	Light grey silty clay with rock fragment (CH)	6	19	51	24



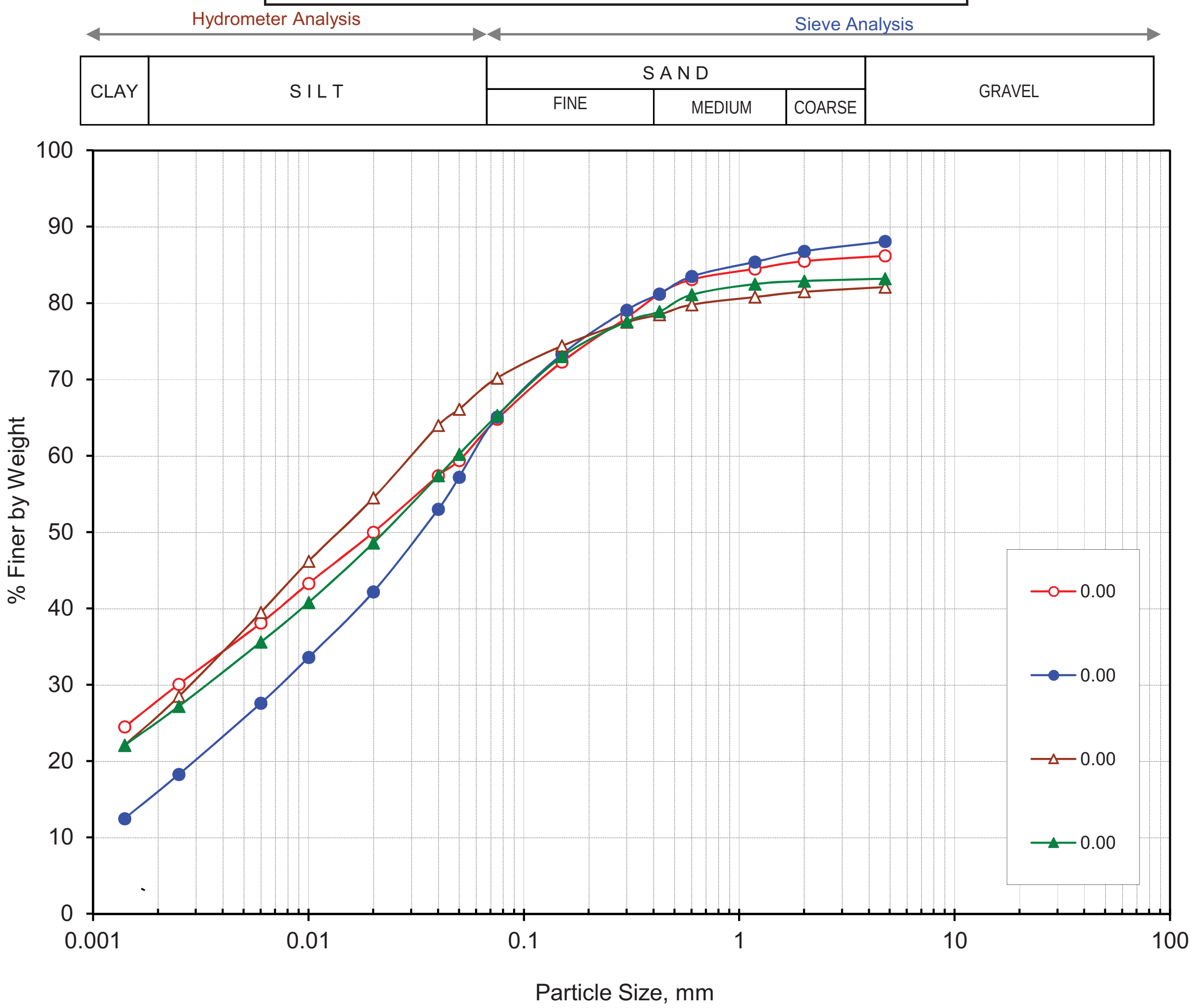
Grain Size Distribution Curve

Grain Size Analysis

as per IS : 2720 (Part 4) - 1985

Sample Details			Test Results			
Borehole Number	Sample Depth, m	Sample Description	Gravel %	Sand %	Silt %	Clay %
BH-1	0.00	Light grey silty clay with rock fragment (CH)	14	21	37	28
BH-2	0.00	Light grey silty clay with rock fragment (CI)	12	23	49	16
BH-3	0.00	Light grey silty clay with rock fragment (CH)	18	12	44	26
BH-4	0.00	Light grey silty clay with rock fragment (CH)	17	18	40	25

ID FAN AREA

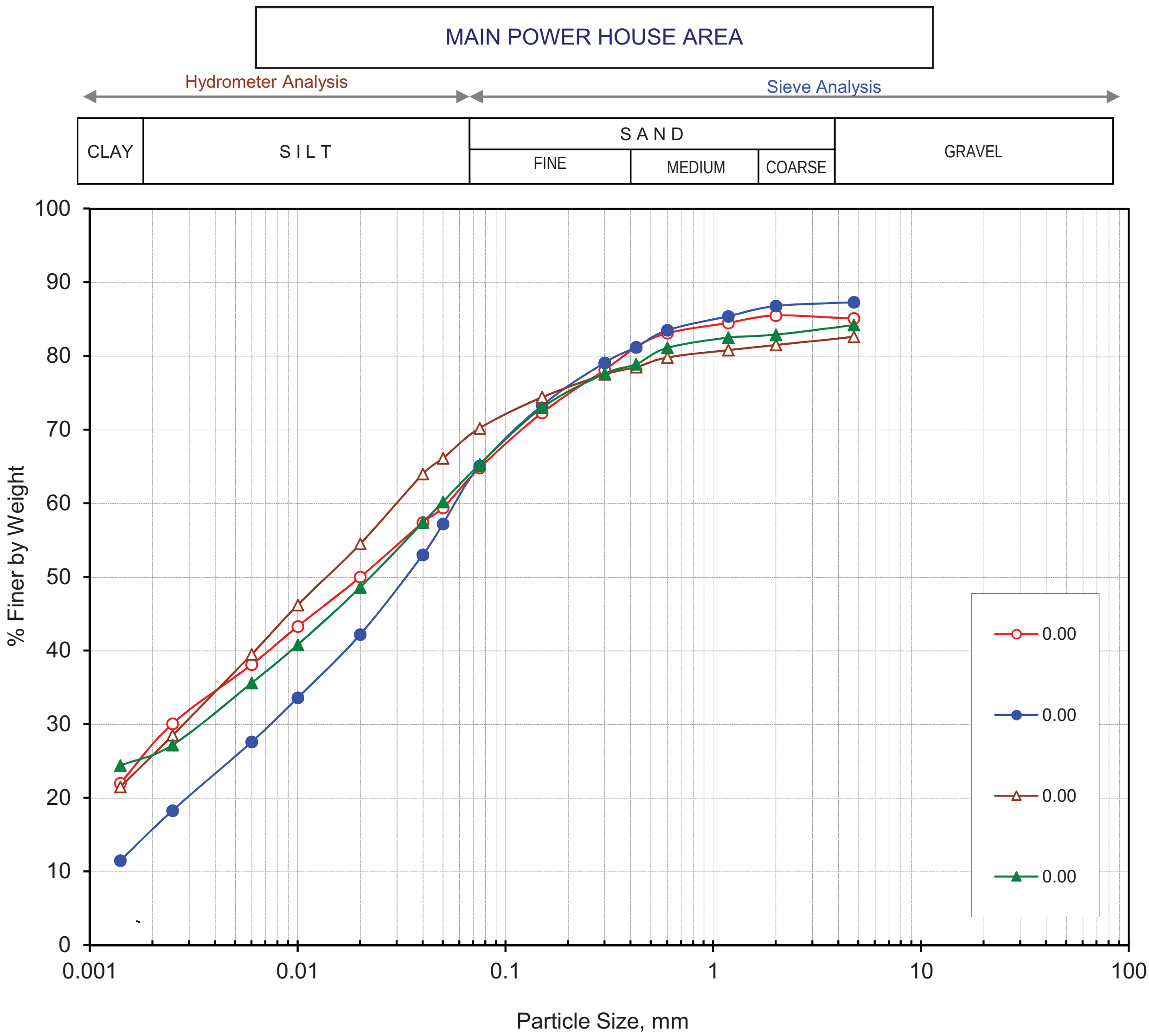


Grain Size Distribution Curve

Grain Size Analysis

as per IS : 2720 (Part 4) - 1985

Sample Details			Test Results			
Borehole Number	Sample Depth, m	Sample Description	Gravel %	Sand %	Silt %	Clay %
BH-14	0.00	Light grey silty clay with rock fragment (CH)	15	20	39	26
BH-15	0.00	Light grey silty clay with rock fragment (CI)	13	22	50	15
BH-16	0.00	Light grey silty clay with rock fragment (CH)	17	12	46	25
BH-17	0.00	Light grey silty clay with rock fragment (CH)	16	19	39	26

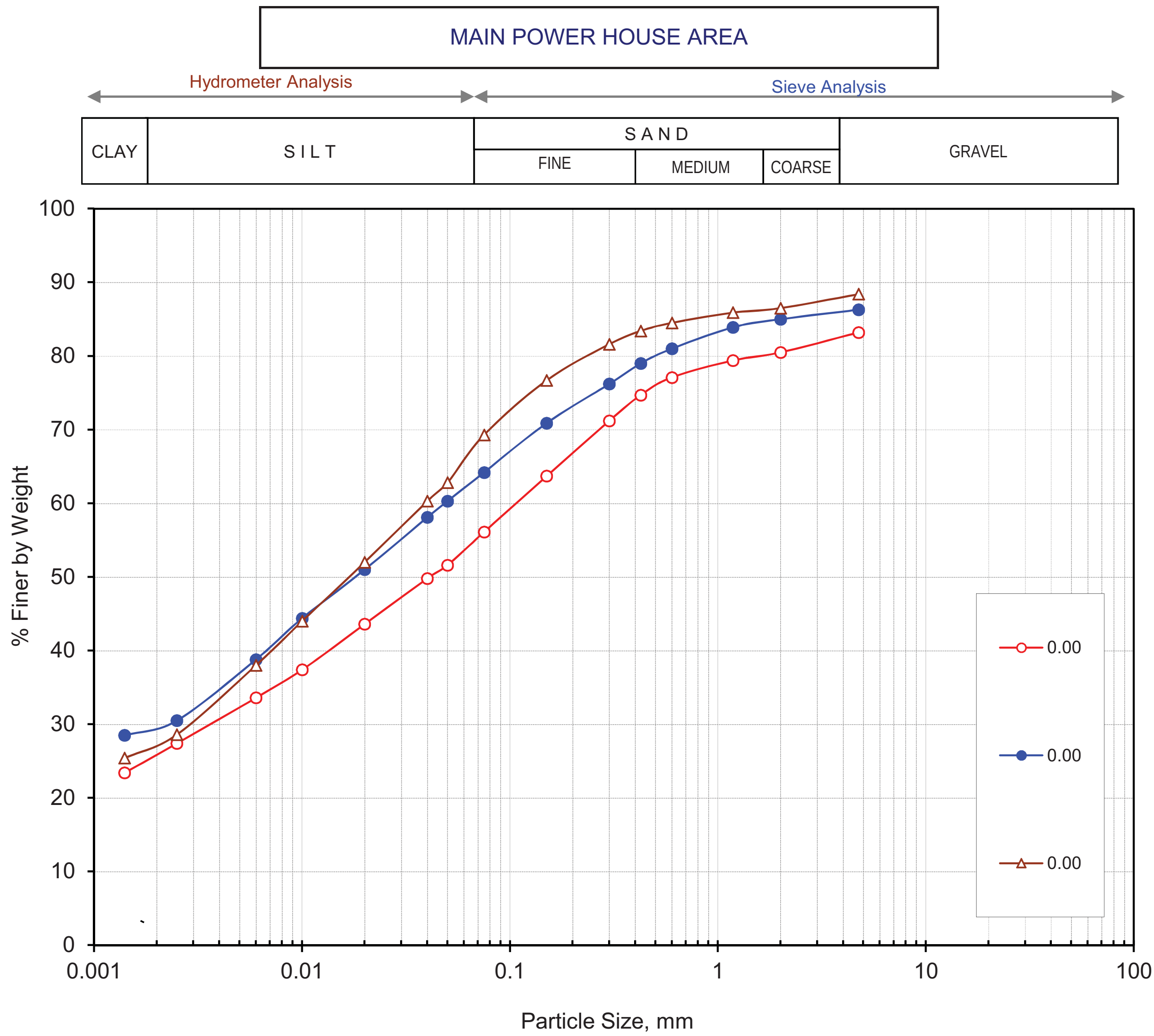


Grain Size Distribution Curve

Grain Size Analysis

as per IS : 2720 (Part 4) - 1985

Sample Details			Test Results			
Borehole Number	Sample Depth, m	Sample Description	Gravel %	Sand %	Silt %	Clay %
BH-18	0.00	Light grey silty clay with rock fragment (CH)	17	27	30	26
BH-19	0.00	Light grey silty clay with rock fragment (CH)	14	22	34	30
BH-20	0.00	Light grey silty clay with rock fragment (CH)	12	19	42	27

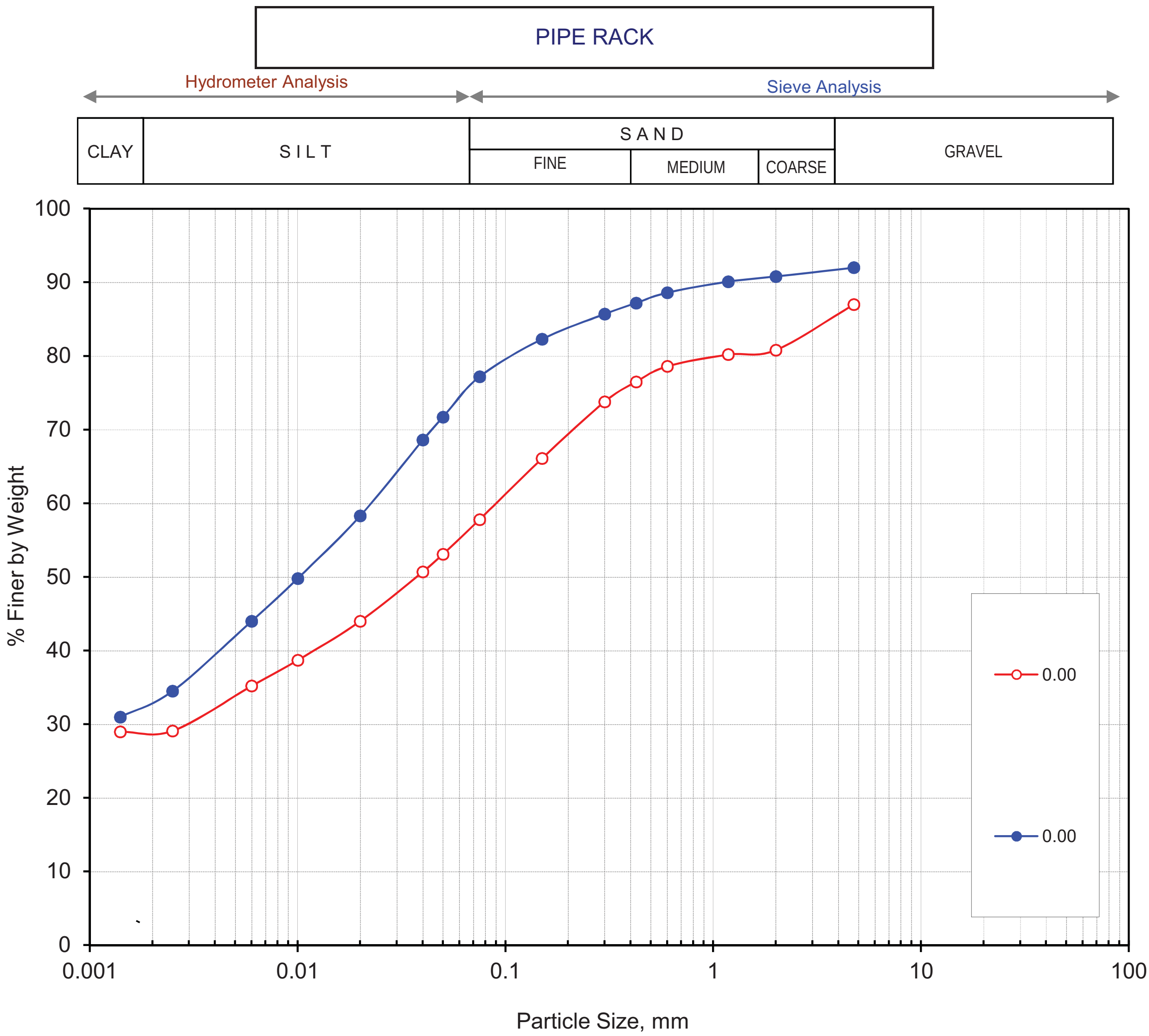


Grain Size Distribution Curve

Grain Size Analysis

as per IS : 2720 (Part 4) - 1985

Sample Details			Test Results			
Borehole Number	Sample Depth, m	Sample Description	Gravel %	Sand %	Silt %	Clay %
BH-21	0.00	Light grey silty clay with rock fragment (CH)	13	29	29	29
BH-25	0.00	Light grey silty clay with rock fragment (CH)	8	15	44	33

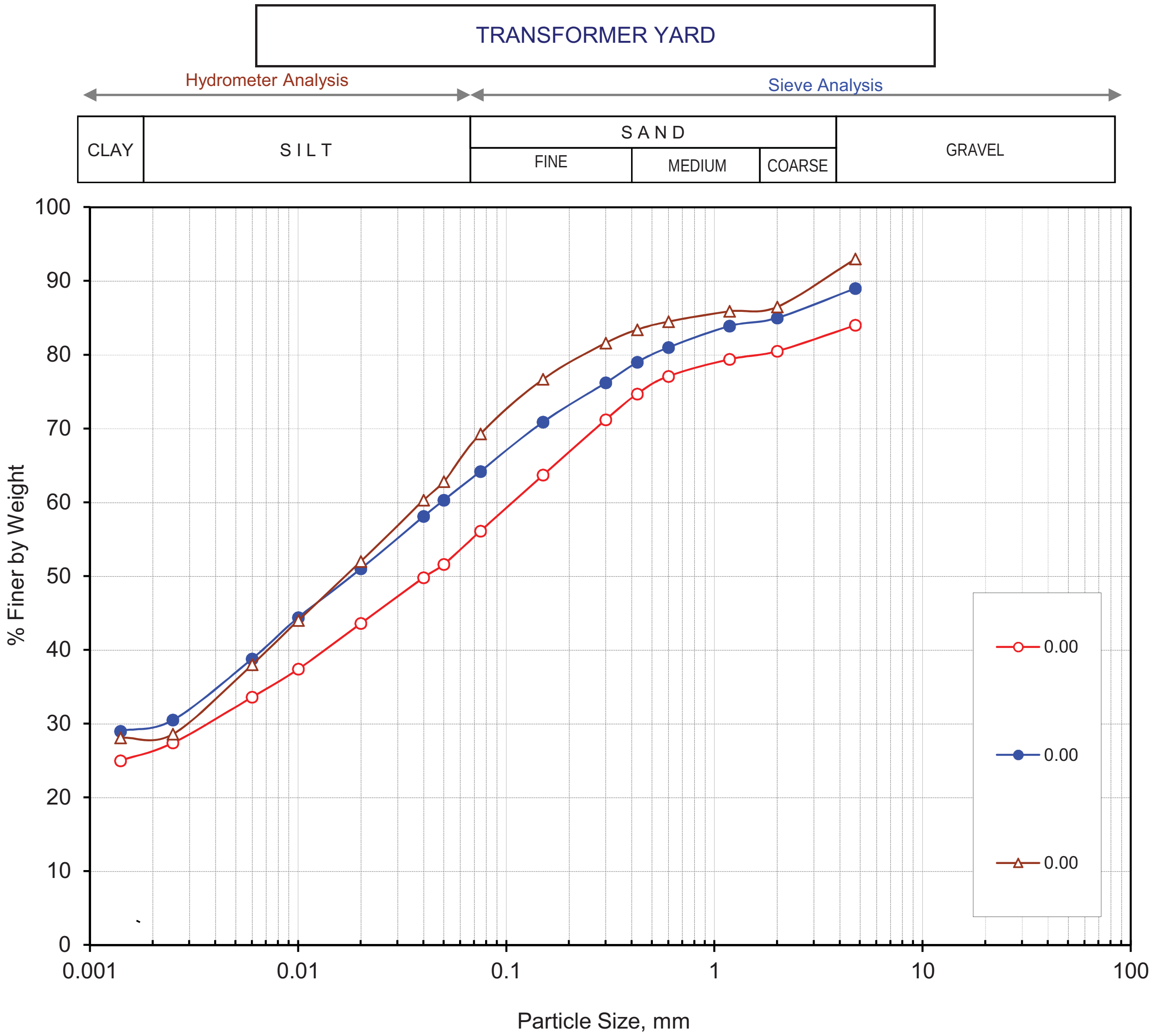


Grain Size Distribution Curve

Grain Size Analysis

as per IS : 2720 (Part 4) - 1985

Sample Details			Test Results			
Borehole Number	Sample Depth, m	Sample Description	Gravel %	Sand %	Silt %	Clay %
BH-22	0.00	Light grey silty clay with rock fragment (CH)	16	28	30	26
BH-23	0.00	Light grey silty clay with rock fragment (CH)	11	25	34	30
BH-24	0.00	Light grey silty clay with rock fragment (CH)	7	24	41	28



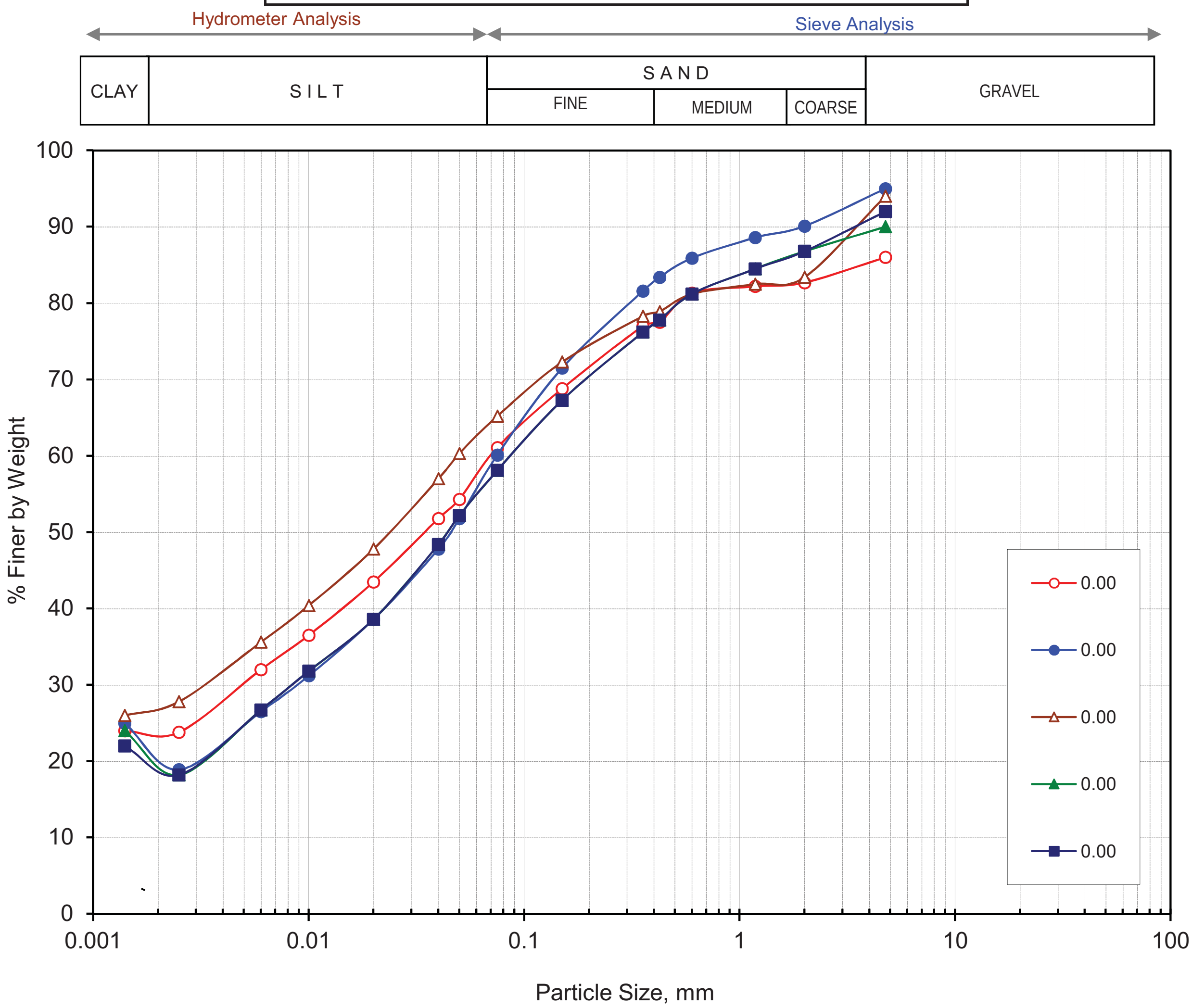
Grain Size Distribution Curve

Grain Size Analysis

as per IS : 2720 (Part 4) - 1985

Sample Details			Test Results			
Borehole Number	Sample Depth, m	Sample Description	Gravel %	Sand %	Silt %	Clay %
BH-38	0.00	Light grey silty clay with rock fragment (CH)	14	25	37	24
BH-39	0.00	Light grey silty clay with rock fragment (CI)	5	35	38	22
BH-40	0.00	Light grey silty clay with rock fragment (CH)	6	29	38	27
BH-41	0.00	Light grey silty clay with rock fragment (CH)	10	32	37	21
BH-45	0.00	Light grey silty clay with rock fragment (CH)	8	34	38	20

COOLING TOWER



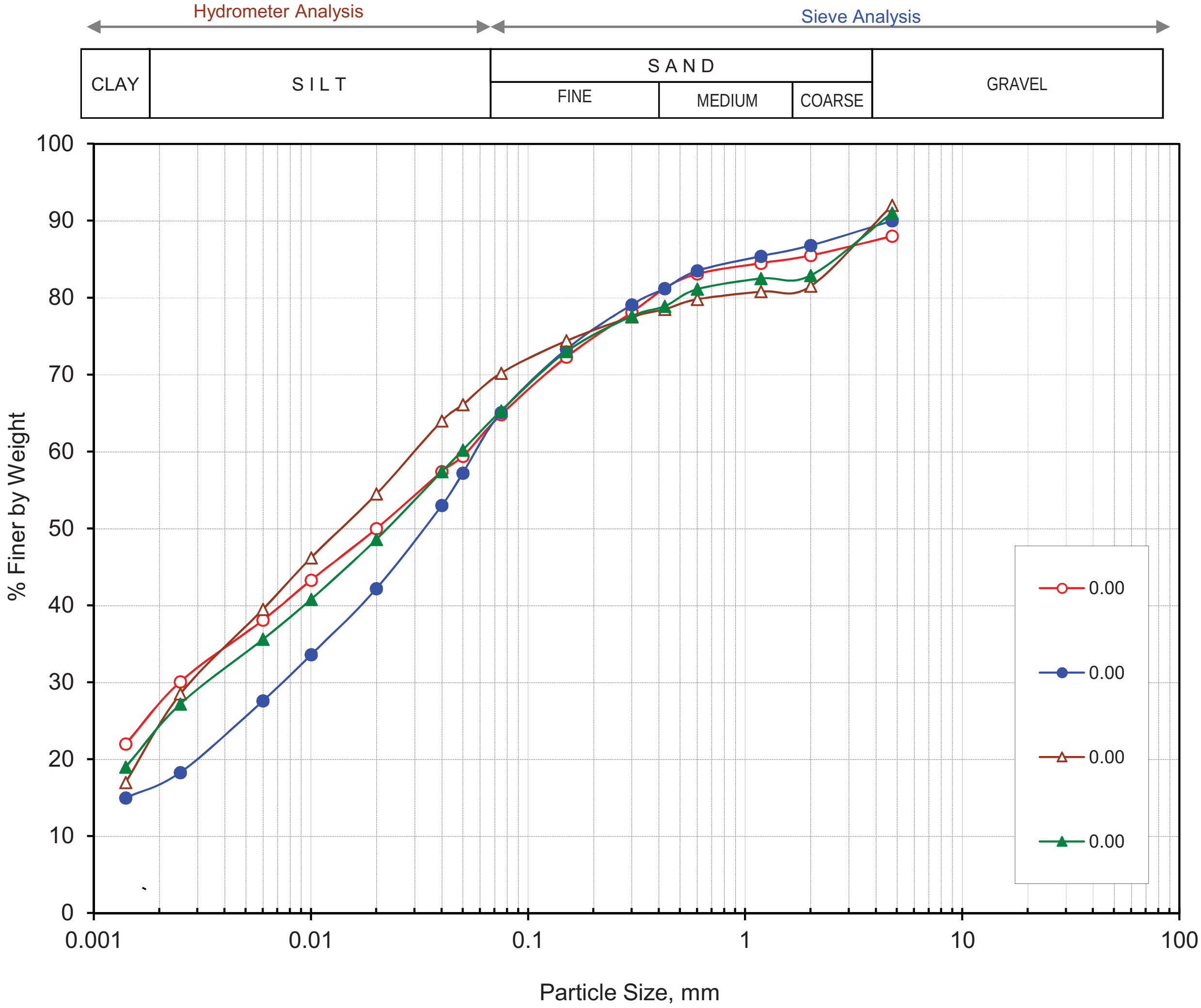
Grain Size Distribution Curve

Grain Size Analysis

as per IS : 2720 (Part 4) - 1985

Sample Details			Test Results			
Borehole Number	Sample Depth, m	Sample Description	Gravel %	Sand %	Silt %	Clay %
BH-53	0.00	Light grey silty clay with rock fragment (CH)	12	23	39	26
BH-54	0.00	Light grey silty clay with rock fragment (CI)	10	25	48	17
BH-55	0.00	Light grey silty clay with rock fragment (CH)	8	22	47	23
BH-56	0.00	Light grey silty clay with rock fragment (CH)	9	26	42	23

RAW WATER INTAKE PIPE LINE

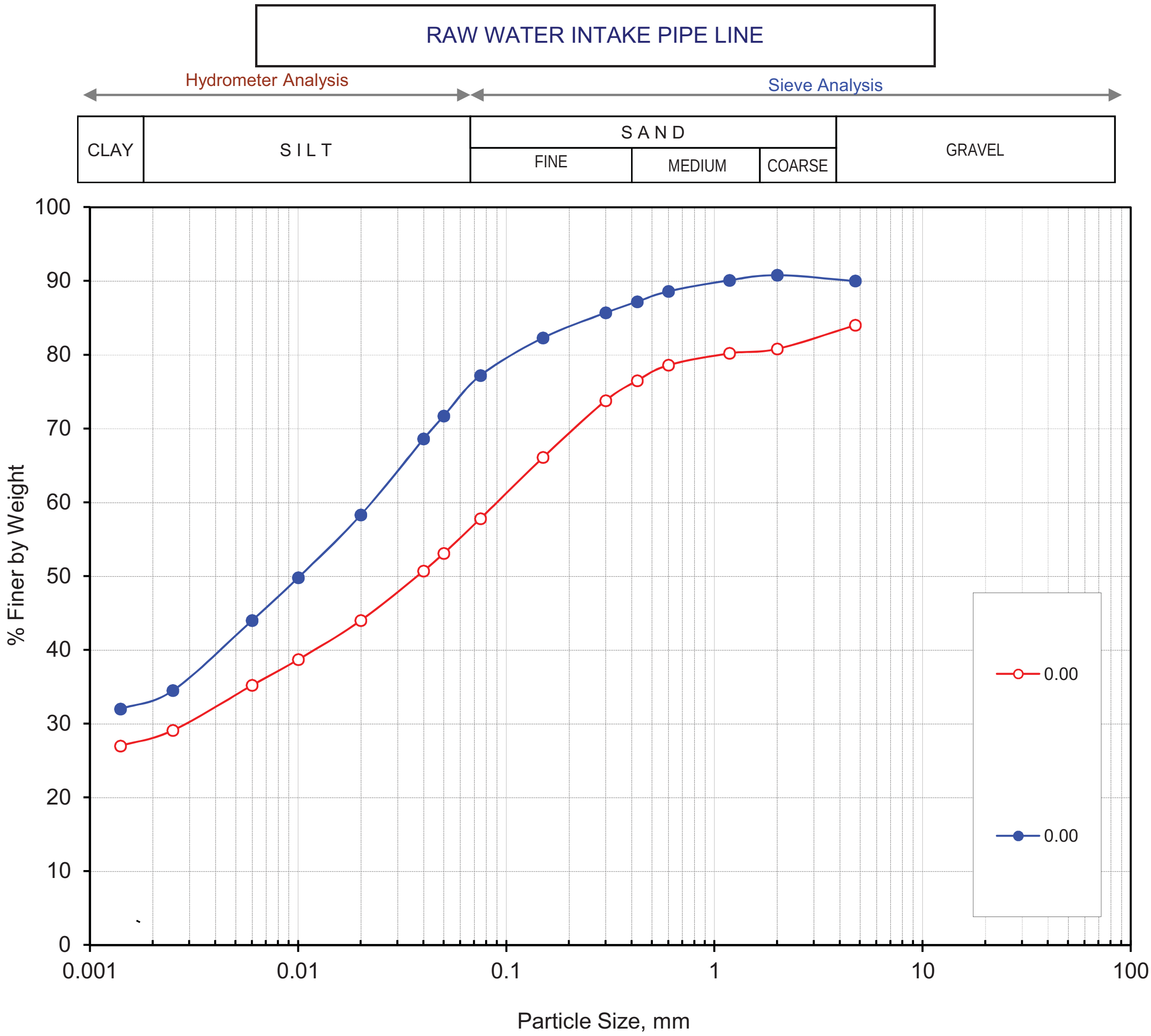


Grain Size Distribution Curve

Grain Size Analysis

as per IS : 2720 (Part 4) - 1985

Sample Details			Test Results			
Borehole Number	Sample Depth, m	Sample Description	Gravel %	Sand %	Silt %	Clay %
BH-57	0.00	Light grey silty clay with rock fragment (CH)	16	26	30	28
BH-58	0.00	Light grey silty clay with rock fragment (CH)	10	13	44	33

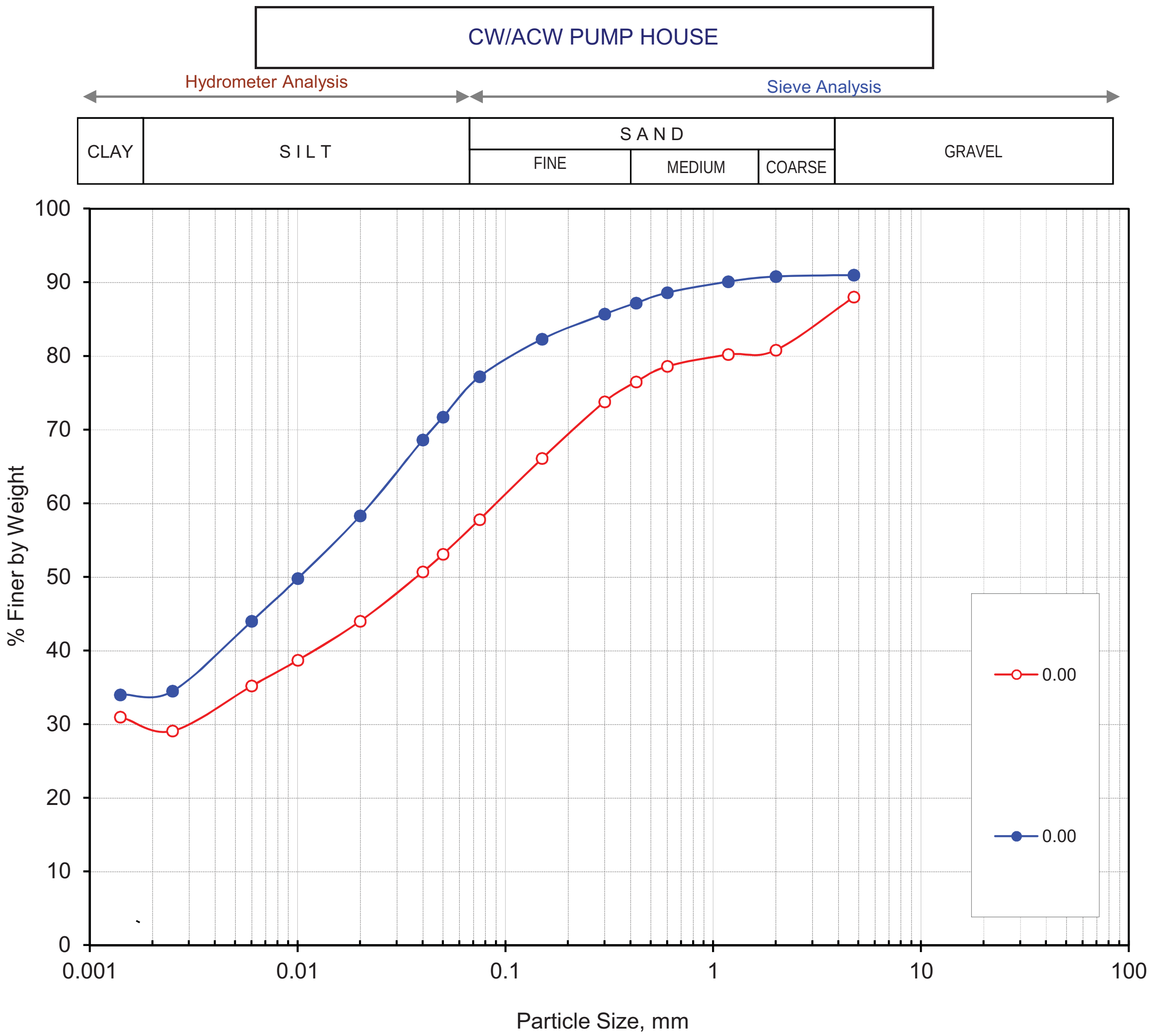


Grain Size Distribution Curve

Grain Size Analysis

as per IS : 2720 (Part 4) - 1985

Sample Details			Test Results			
Borehole Number	Sample Depth, m	Sample Description	Gravel %	Sand %	Silt %	Clay %
BH-42	0.00	Light grey silty clay with rock fragment (CH)	12	30	28	30
BH-43	0.00	Light grey silty clay with rock fragment (CH)	9	14	43	34



Grain Size Distribution Curve

FIELD PERMEABILITY TEST CALCULATIONS

FIELD PERMEABILITY TEST of BH 1

Elevation: 187.747m (FGL)
Coordinates: 817 N, 1135 E
Inclination: 90^0

Depth of Borehole, m: 20 m
Diameter of Borehole, mm: NX
Water Table below EGL, m: 5.0 m

Test Section: 1.50 m – 3.00 m
Length of Test Section: 1.50 m
Type of Test: Double Packer

H1, m: 0.50m
H2, m: 2.30m
Type of Strata: Weathered Basalt

S. No.	L m	H_1 m	H_2 m	P_o Kg/cm^2	P Kg/cm^2	T min	Q_1 lit	Q_o lit/min	Q Lit/min/m	Lugeon	Average Lugeon	K (K x 10^{-7}) m/sec
1	1.5	0.5	2.3	0.5	0.775	30	370	12.33	8.22	108.11	84.45	109.79
2	1.5	0.5	2.3	1.0	1.275	30	445	14.83	9.89	79.03		
3	1.5	0.5	2.3	1.5	1.775	30	519	17.30	11.53	66.21		

Sample Calculation

Q_o : Q_1 / t = 12.33 lit./min

P : $P_o + (H_1 + H_2)/10 =$ 0.775 Kg/cm^2

Q : Q_o / L = 8.22 lit./min/m

Lugeon = $\frac{Q \; * 1 \text{ MPa (or } 10.19 \text{ kg/cm}^2)}{\text{Test Pressure (P)}}$

Permeability = 109.79 x 10^{-7} m/s

= 108.11 lit./min/m

Test Section: 4.50 m – 6.00 m
Length of Test Section: 1.50 m
Type of Test: Double Packer

H1, m: 0.50m
H2, m: 5.00m
Type of Strata: Fractured Basalt

S. No.	L m	H_1 m	H_2 m	P_o Kg/cm^2	P Kg/cm^2	T min	Q_1 lit	Q_o lit/min	Q Lit/min/m	Lugeon	Average Lugeon	K (K x 10^{-7}) m/sec
1	1.5	0.5	5.0	0.5	1.05	30	745	24.83	16.56	160.67	241.08	313.40
2	1.5	0.5	5.0	1.0	1.55	30	840	84.00	56.00	368.15		
3	1.5	0.5	5.0	1.5	2.05	30	880	58.67	39.11	194.41		

Sample Calculation

Q_o : Q_1 /t = 24.83 lit./min

P : $P_o + (H_1 + H_2)/10 =$ 1.05 Kg/cm^2

Q : Q_o/L = 16.56 lit./min/m

Lugeon = $\frac{Q \; * 1 \text{ MPa (or } 10.19 \text{ kg/cm}^2)}{\text{Test Pressure (P)}}$

Permeability = 313.40 x 10^{-7} m/s

= 160.67 lit./min/m

FIELD PERMEABILITY TEST of BH 12

Elevation: 187.324m (FGL)
Coordinates: 584 N, 1125 E
Inclination: 90^0

Depth of Borehole, m: 20 m
Diameter of Borehole, mm: NX
Water Table below EGL, m: 5.0 m

Test Section: 1.50 m – 3.00 m
Length of Test Section: 1.50 m
Type of Test: Double Packer

H1, m: 0.50m
H2, m: 2.30m
Type of Strata: Weathered Basalt

S. No.	L m	H_1 m	H_2 m	P_o Kg/cm^2	P Kg/cm^2	T min	Q_1 lit	Q_o lit/min	Q Lit/min/m	Lugeon	Average Lugeon	K (K x 10^{-7}) m/sec
1	1.5	0.5	2.3	0.5	0.775	30	830	27.67	18.44	242.51	173.84	226.00
2	1.5	0.5	2.3	1.0	1.275	30	885	29.50	19.67	157.18		
3	1.5	0.5	2.3	1.5	1.775	30	955	31.83	21.22	121.83		

Sample Calculation

Q_o : Q_1 / t = 27.67lit./min

P : $P_o + (H_1 + H_2)/10 =$ 0.775 Kg/cm^2

Q : Q_o / L = 18.44lit./min/m

Lugeon = $\frac{Q \ * 1 \text{ MPa (or } 10.19 \text{ kg/cm}^2)}{\text{Test Pressure (P)}}$

Permeability = 226.00 x 10^{-7} m/s

= 242.51 lit./min/m

Test Section: 4.50 m – 6.00 m
Length of Test Section: 1.50 m
Type of Test: Double Packer

H1, m: 0.50m
H2, m: 5.00m
Type of Strata: Fractured Basalt

S. No.	L m	H_1 m	H_2 m	P_o Kg/cm^2	P Kg/cm^2	T min	Q_1 lit	Q_o lit/min	Q Lit/min/m	Lugeon	Average Lugeon	K (K x 10^{-7}) m/sec
1	1.5	0.5	5.0	0.5	1.05	30	610	20.33	13.56	131.55	205.39	267.00
2	1.5	0.5	5.0	1.0	1.55	30	710	71.00	47.33	311.18		
3	1.5	0.5	5.0	1.5	2.05	30	785	52.33	34.89	173.42		

Sample Calculation

Q_o : Q_1 /t = 20.33 lit./min

P : $P_o + (H_1 + H_2)/10 =$ 1.05 Kg/cm^2

Q : Q_o/L = 13.56 lit./min/m

Lugeon = $\frac{Q \ * 1 \text{ MPa (or } 10.19 \text{ kg/cm}^2)}{\text{Test Pressure (P)}}$

Permeability = 267.00 x 10^{-7} m/s

= 131.55 lit./min/m

FIELD PERMEABILITY TEST of BH 22

Elevation: 192.515m (FGL)
Coordinates: 469 N, 1177 E
Inclination: 90^0

Depth of Borehole, m: 15 m
Diameter of Borehole, mm: NX
Water Table below EGL, m: 5.30 m

Test Section: 1.50 m – 3.00 m
Length of Test Section: 1.50 m
Type of Test: Double Packer

H1, m: 0.50m
H2, m: 2.30m
Type of Strata: Weathered Basalt

S. No.	L m	H_1 m	H_2 m	P_o Kg/cm^2	P Kg/cm^2	T min	Q_1 lit	Q_o lit/min	Q Lit/min/m	Lugeon	Average Lugeon	K (K x 10^{-7}) m/sec
1	1.5	0.5	2.3	0.5	0.775	30	345	11.50	7.67	100.80	83.67	108.77
2	1.5	0.5	2.3	1.0	1.275	30	465	15.50	10.33	82.59		
3	1.5	0.5	2.3	1.5	1.775	30	530	17.67	11.78	67.61		

Sample Calculation

Q_o : Q_1 / t = 11.50 lit./min

P : $P_o + (H_1 + H_2)/10 =$ 0.775 Kg/cm^2

Q : Q_o / L = 7.67 lit./min/m

Lugeon = Q * 1 MPa (or 10.19 kg/cm^2) / Test Pressure (P)

Permeability = 108.77 x 10^{-7} m/s

= 100.80 lit./min/m

Test Section: 4.50 m – 6.00 m
Length of Test Section: 1.50 m
Type of Test: Double Packer

H1, m: 0.50m
H2, m: 5.30m
Type of Strata: Fractured Basalt

S. No.	L m	H_1 m	H_2 m	P_o Kg/cm^2	P Kg/cm^2	T min	Q_1 lit	Q_o lit/min	Q Lit/min/m	Lugeon	Average Lugeon	K (K x 10^{-7}) m/sec
1	1.5	0.5	5.3	0.5	1.08	30	675	22.50	15.00	141.53	215.25	279.82
2	1.5	0.5	5.3	1.0	1.58	30	760	76.00	50.67	326.77		
3	1.5	0.5	5.3	1.5	2.08	30	815	54.33	36.22	177.45		

Sample Calculation

Q_o : Q_1 /t = 22.50 lit./min

P : $P_o + (H_1 + H_2)/10 =$ 1.08 Kg/cm^2

Q : Q_o/L = 15.00 lit./min/m

Lugeon = Q * 1 MPa (or 10.19 kg/cm^2) / Test Pressure (P)

Permeability = 279.82 x 10^{-7} m/s

= 141.53 lit./min/m

FIELD PERMEABILITY TEST of BH 40

Elevation: 192.563m (FGL)
Coordinates: 420 N, 1654 E
Inclination: 90^0

Depth of Borehole, m: 20 m
Diameter of Borehole, mm: NX
Water Table below EGL, m: 6.70 m

Test Section: 1.50 m – 3.00 m
Length of Test Section: 1.50 m
Type of Test: Double Packer

H1, m: 0.50m
H2, m: 2.30m
Type of Strata: Weathered Basalt

S. No.	L m	H_1 m	H_2 m	P_o Kg/cm^2	P Kg/cm^2	T min	Q_1 lit	Q_o lit/min	Q Lit/min/m	Lugeon	Average Lugeon	K (K x 10^{-7}) m/sec
1	1.5	0.5	2.3	0.5	0.78	30	230	7.67	5.11	66.77	54.25	70.52
2	1.5	0.5	2.3	1.0	1.28	30	280	9.33	6.22	49.53		
3	1.5	0.5	2.3	1.5	1.78	30	365	12.17	8.11	46.43		

Sample Calculation

Q_o : Q_1 / t = 7.67 lit./min

P : $P_o + (H_1 + H_2)/10$ = 0.78 Kg/cm^2

Q : Q_o / L = 5.11 lit./min/m

Lugeon = $\frac{Q \; * \; 1 \text{ MPa (or } 10.19 \text{ kg/cm}^2)}{\text{Test Pressure (P)}}$

= 66.77 lit./min/m

Permeability = 70.52 x 10^{-7} m/s

Test Section: 4.50 m – 6.00 m
Length of Test Section: 1.50 m
Type of Test: Double Packer

H1, m: 0.50m
H2, m: 5.30m
Type of Strata: Fractured Basalt

S. No.	L m	H_1 m	H_2 m	P_o Kg/cm^2	P Kg/cm^2	T min	Q_1 lit	Q_o lit/min	Q Lit/min/m	Lugeon	Average Lugeon	K (K x 10^{-7}) m/sec
1	1.5	0.5	5.3	0.5	1.08	30	510	17.00	11.33	106.93	185.78	241.51
2	1.5	0.5	5.3	1.0	1.58	30	650	65.00	43.33	279.47		
3	1.5	0.5	5.3	1.5	2.08	30	785	52.33	34.89	170.92		

Sample Calculation

Q_o : Q_1 /t = 17.00 lit./min

P : $P_o + (H_1 + H_2)/10$ = 1.08 Kg/cm^2

Q : Q_o/L = 11.33 lit./min/m

Lugeon = $\frac{Q \; * \; 1 \text{ MPa (or } 10.19 \text{ kg/cm}^2)}{\text{Test Pressure (P)}}$

= 106.93 lit./min/m

Permeability = 241.51 x 10^{-7} m/s

FIELD PERMEABILITY TEST of BH 47

Elevation: 199.377m (FGL)
Coordinates: 231 N, 1522 E
Inclination: 90^0

Depth of Borehole, m: 15 m
Diameter of Borehole, mm: NX
Water Table below EGL, m: 6.60 m

Test Section: 1.50 m – 3.00 m
Length of Test Section: 1.50 m
Type of Test: Double Packer

H1, m: 0.50m
H2, m: 2.30m
Type of Strata: Weathered Basalt

S. No.	L m	H_1 m	H_2 m	P_o Kg/cm^2	P Kg/cm^2	T min	Q_1 lit	Q_o lit/min	Q Lit/min/m	Lugeon	Average Lugeon	K (K x 10^{-7}) m/sec
1	1.5	0.5	2.3	0.5	0.775	30	235	7.83	5.22	68.66	54.60	70.98
2	1.5	0.5	2.3	1.0	1.275	30	295	9.83	6.56	52.39		
3	1.5	0.5	2.3	1.5	1.775	30	335	11.17	7.44	42.74		

Sample Calculation

Q_o : Q_1 / t = 7.83 lit./min

P : $P_o + (H_1 + H_2)/10 =$ 0.775 Kg/cm^2

Q : Q_o / L = 5.22 lit./min/m

Lugeon = $\frac{Q \ * 1 \text{ MPa (or } 10.19 \text{ kg/cm}^2)}{\text{Test Pressure (P)}}$

= 68.66 lit./min/m

Permeability = 70.98 x 10^{-7} m/s

Test Section: 4.50 m – 6.00 m
Length of Test Section: 1.50 m
Type of Test: Double Packer

H1, m: 0.50m
H2, m: 5.30m
Type of Strata: Fractured Basalt

S. No.	L m	H_1 m	H_2 m	P_o Kg/cm^2	P Kg/cm^2	T min	Q_1 lit	Q_o lit/min	Q Lit/min/m	Lugeon	Average Lugeon	K (K x 10^{-7}) m/sec
1	1.5	0.5	5.3	0.5	1.08	30	775	25.83	17.22	162.49	248.53	323.09
2	1.5	0.5	5.3	1.0	1.58	30	870	87.00	58.00	374.06		
3	1.5	0.5	5.3	1.5	2.08	30	960	64.00	42.67	209.03		

Sample Calculation

Q_o : Q_1 /t = 25.83 lit./min

P : $P_o + (H_1 + H_2)/10 =$ 1.08 Kg/cm^2

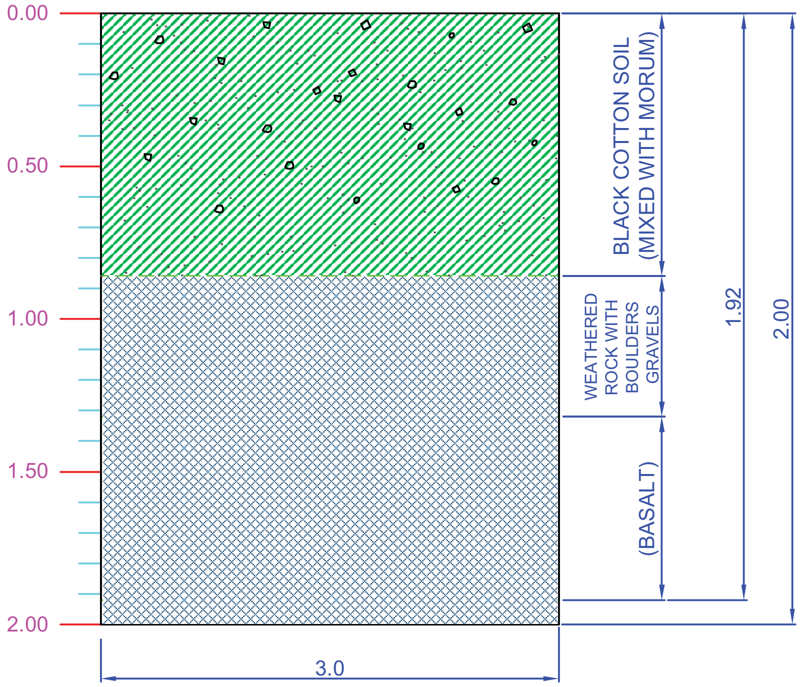
Q : Q_o/L = 17.22 lit./min/m

Lugeon = $\frac{Q \ * 1 \text{ MPa (or } 10.19 \text{ kg/cm}^2)}{\text{Test Pressure (P)}}$

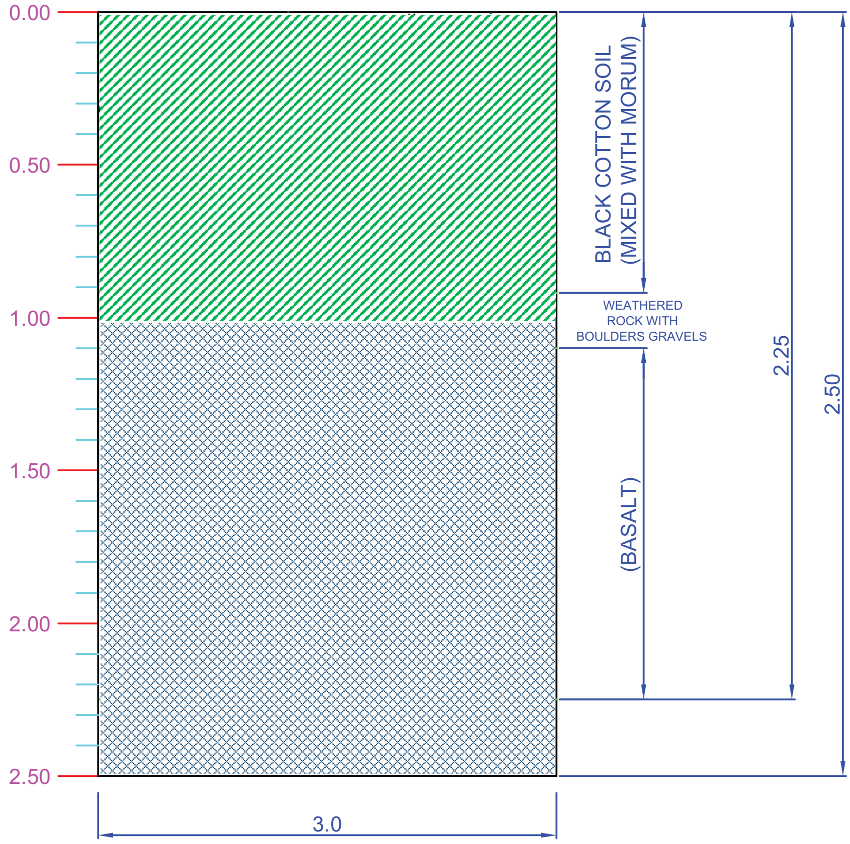
= 162.49 lit./min/m

Permeability = 323.09 x 10^{-7} m/s

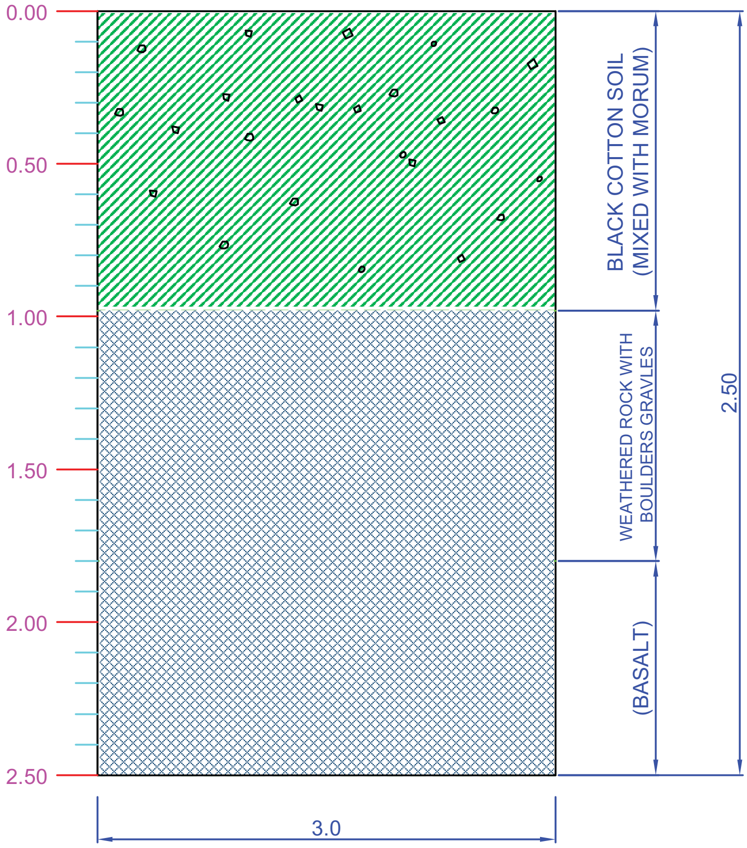
TRIAL PIT SECTIONS



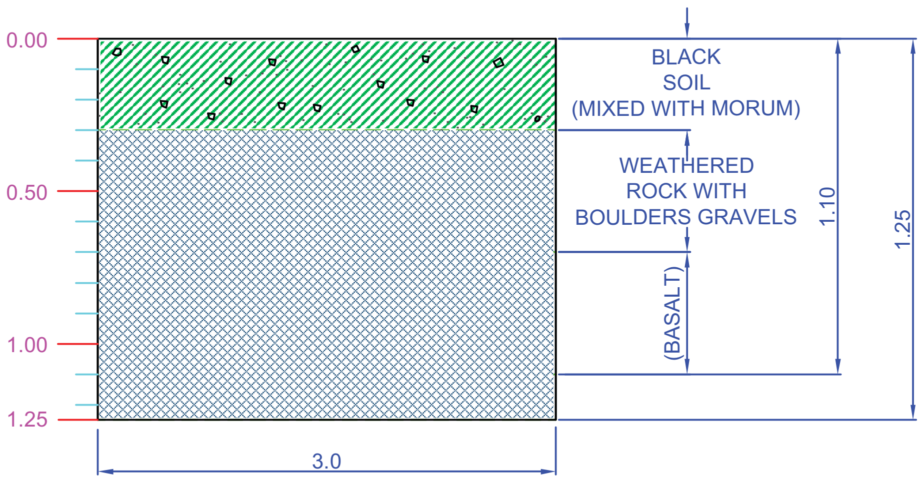
SUB SURFACE LOG OF T.P.-1



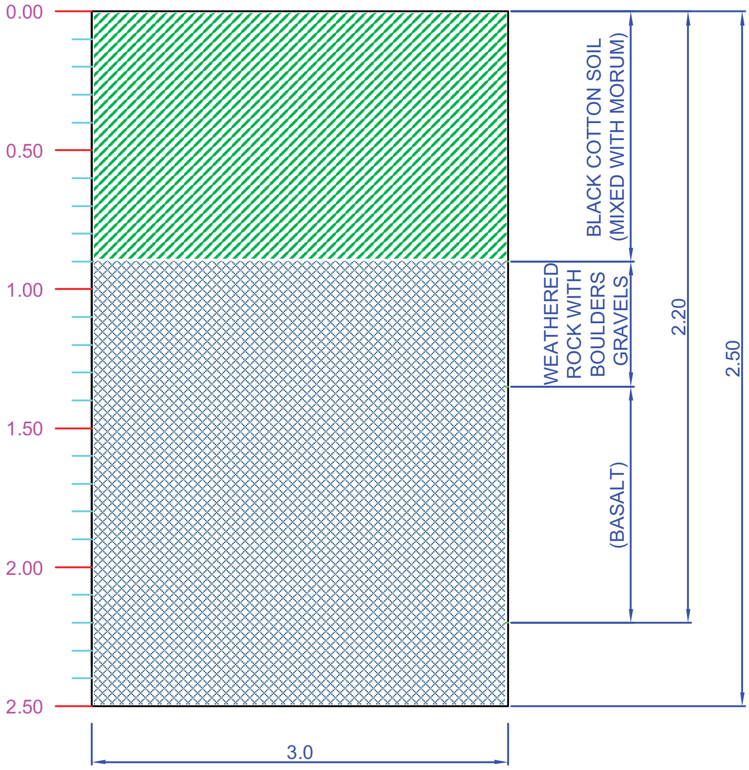
SUB SURFACE LOG OF T.P.-2



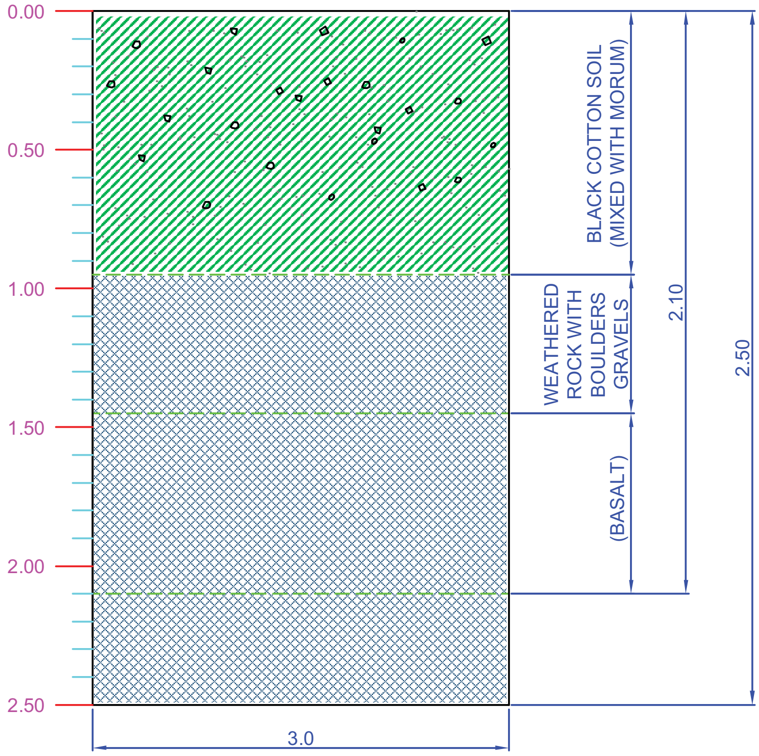
SUB SURFACE LOG OF T.P.-3



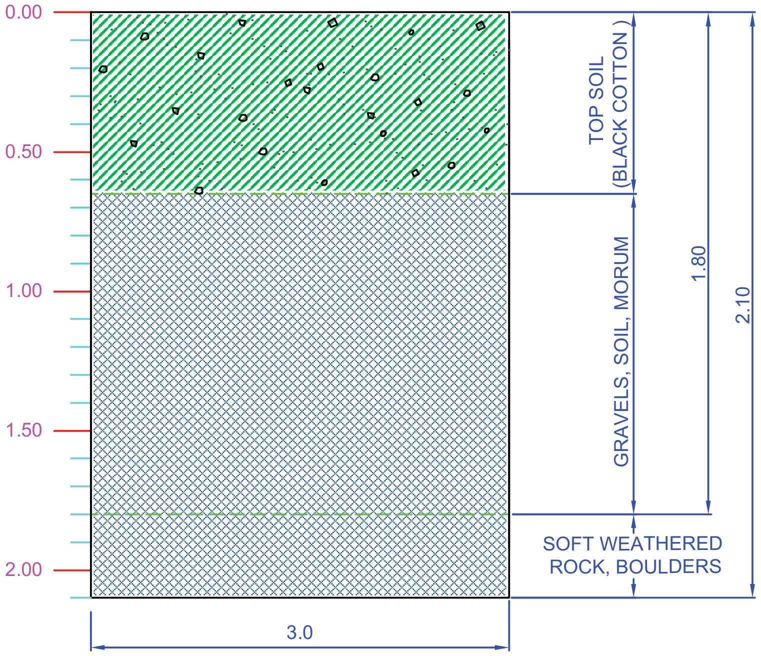
SUB SURFACE LOG OF T.P.-4



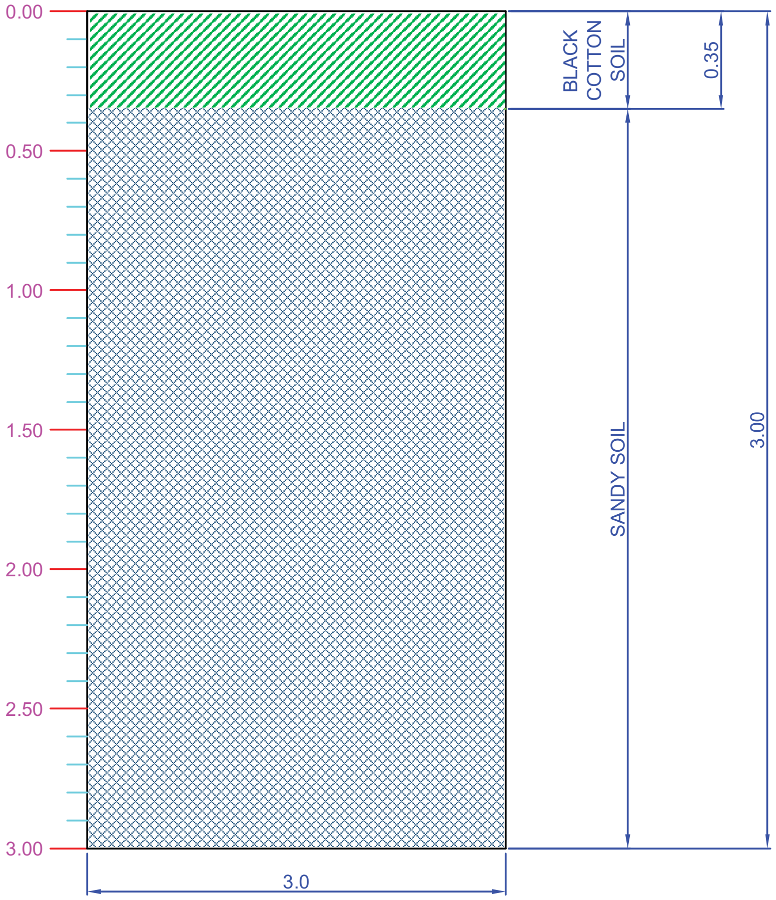
SUB SURFACE LOG OF T.P.-5



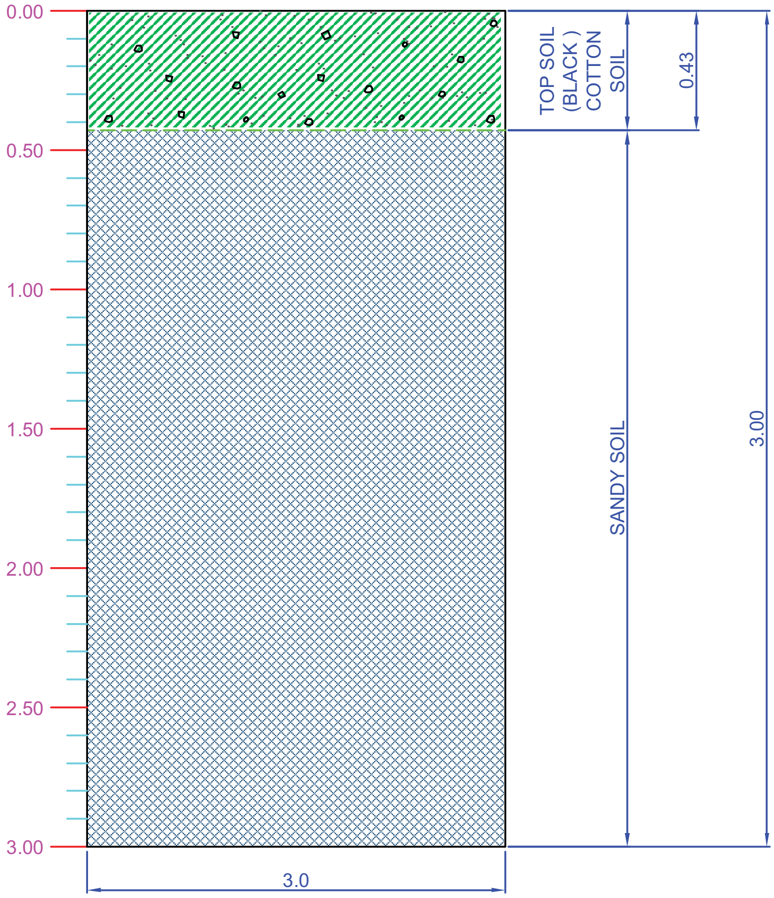
SUB SURFACE LOG OF T.P.-6



SUB SURFACE LOG OF T.P.-7



SUB SURFACE LOG OF T.P.-8

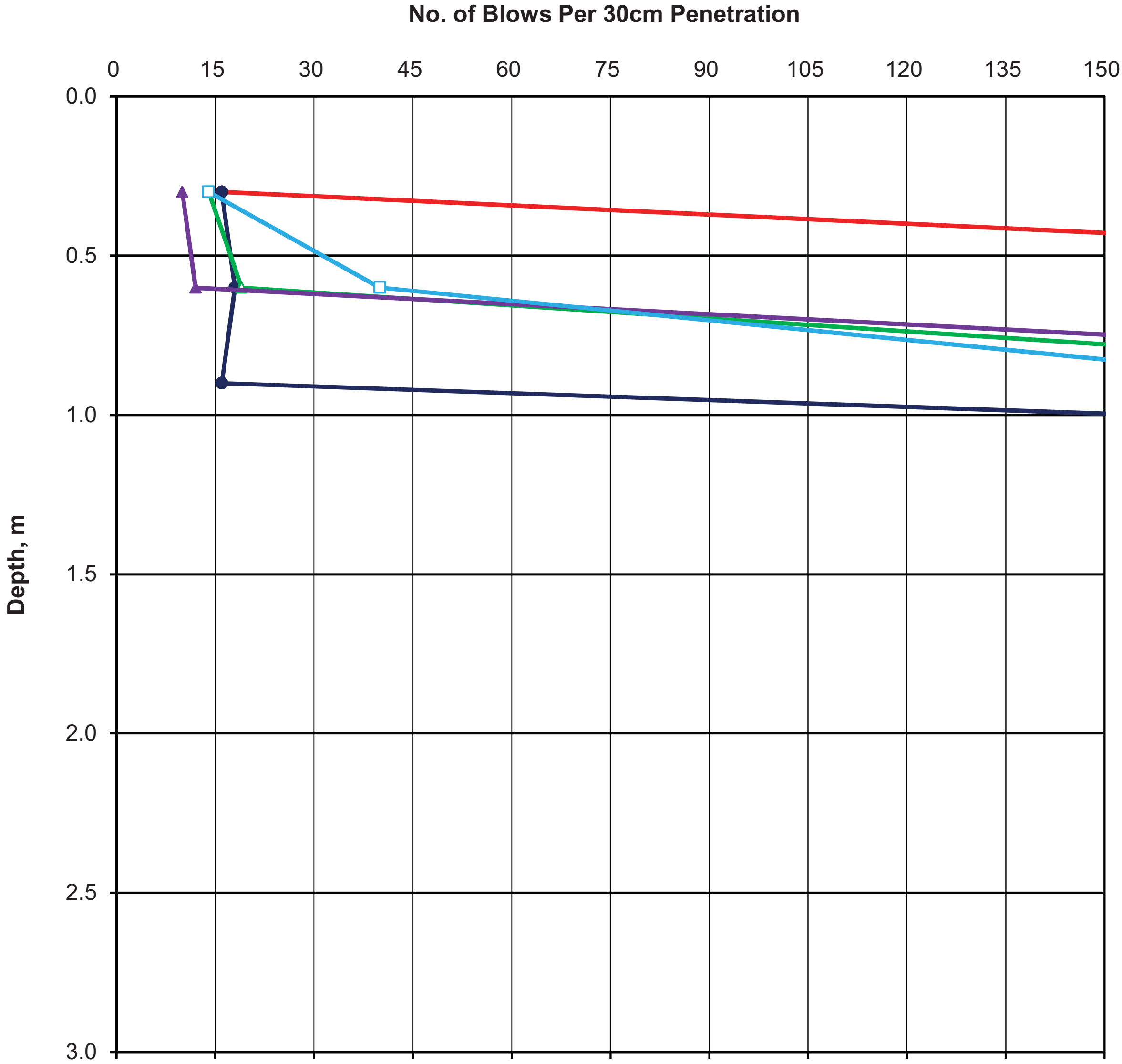


SUB SURFACE LOG OF T.P.-9

DYNAMIC CONE PENETRATION TEST RESULTS

DYNAMIC CONE PENETRATION TESTS

IS: 4968-Part-2-1976, RA-2007



TESTS DETAILS	
Symbol	DCPT Number
	DCPT-1
	DCPT-2
	DCPT-3
	DCPT-4
	DCPT-5

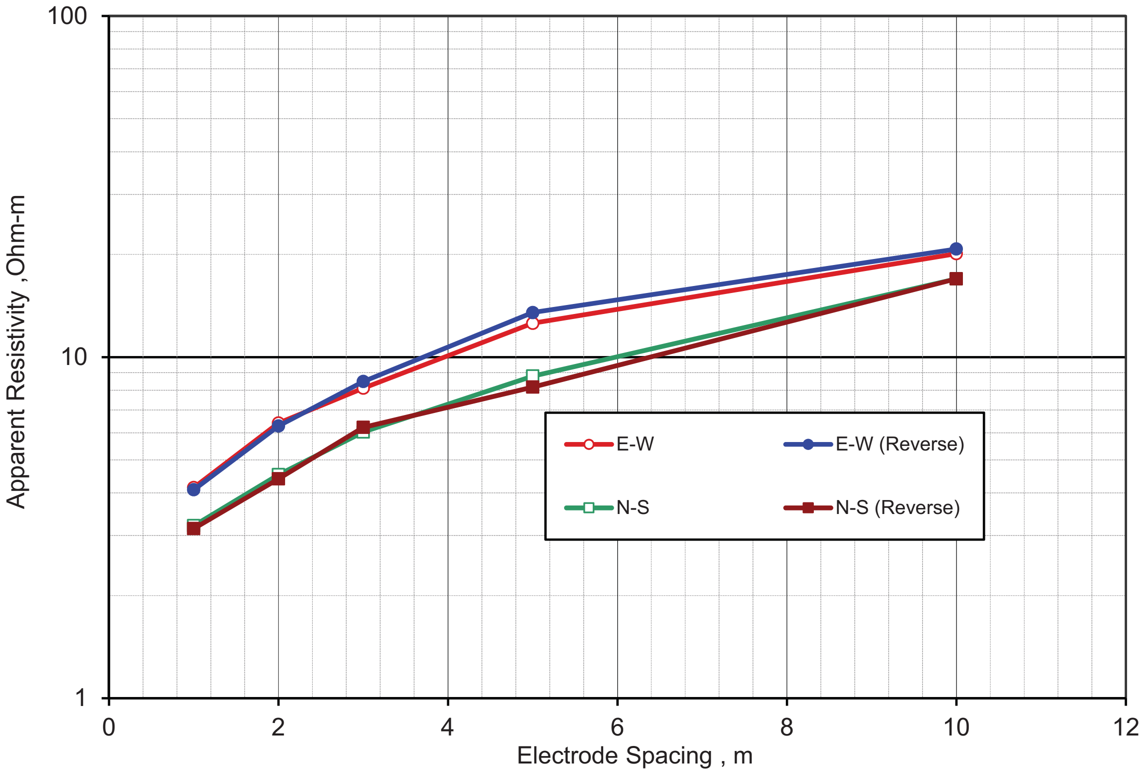
DEPTH vs. BLOWS

ELECTRICAL RESISTIVITY TEST RESULS

Electrical Resistivity Test No.: ERT-1

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-1
Co-ordinate : 2327640N, 588767E



Electrode Spacing, m	Apparent Resistivity, Ohm-m			
	E-W	E-W (Reverse)	N-S	N-S (Reverse)
1.0	4.1	4.1	3.2	3.1
2.0	6.4	6.3	4.5	4.4
3.0	8.1	8.5	6.0	6.2
5.0	12.6	13.5	8.8	8.2
10.0	20.1	20.7	17.0	17.0
Mean Resistivity	10.3	10.6	7.9	7.8

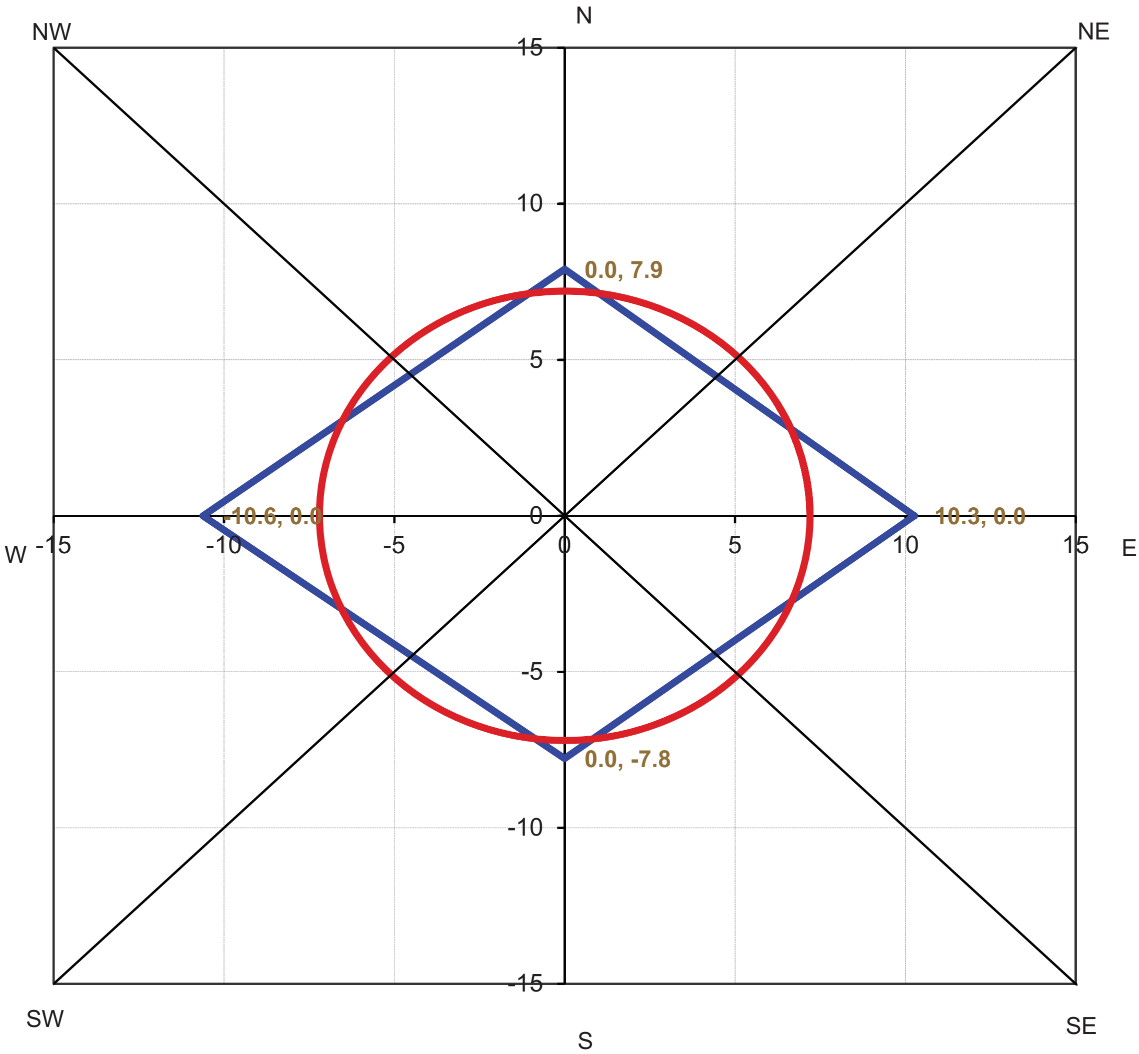
Mean Resistivity Value, ohm-m : 7.2 ohm-m

Apparent Resistivity Values (ERT-1)

Electrical Resistivity Test No.: ERT-1

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-1
Co-ordinate : 2327640N, 588767E



Total Area of Polygon : 164

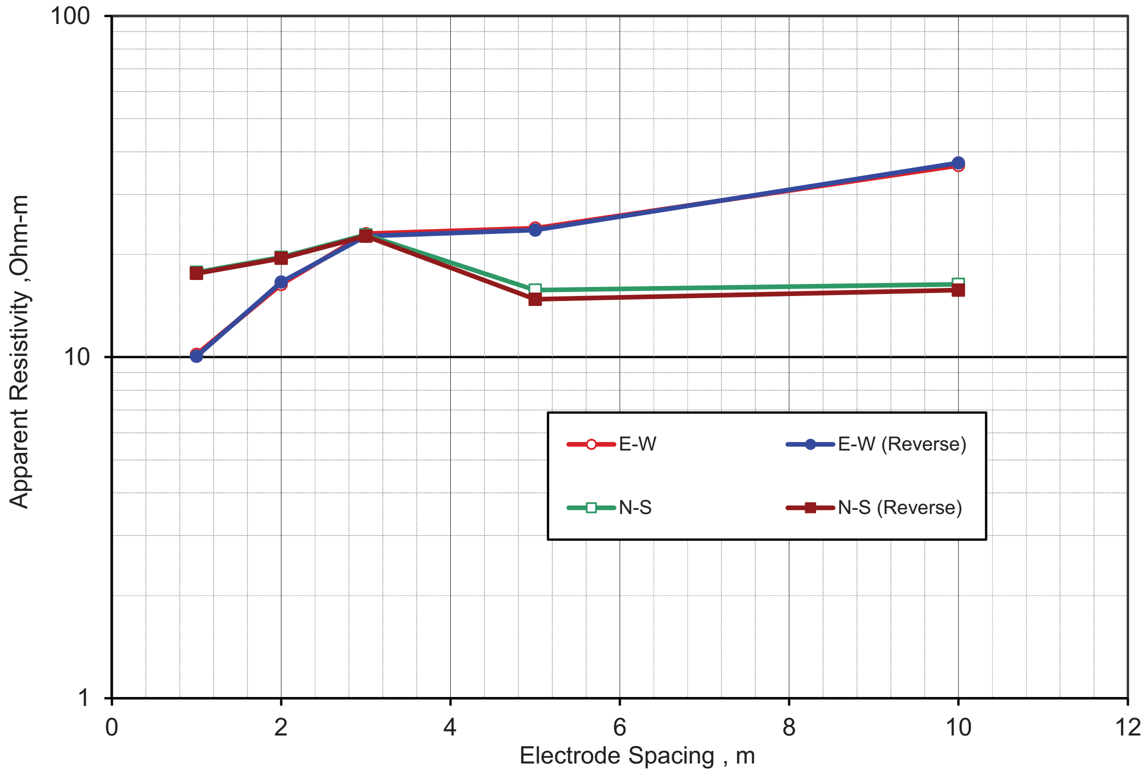
Radius of Equivalent Circle=Mean Resistivity : 7.2 ohm-m

Polar Resistivity Curves (ERT-1)

Electrical Resistivity Test No.: ERT-2

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-2
Co-ordinate : 2327594N, 588803E



Electrode Spacing, m	Apparent Resistivity, Ohm-m			
	E-W	E-W (Revers e)	N-S	N-S (Revers e)
1.0	10.2	10.1	17.7	17.6
2.0	16.3	16.6	19.6	19.5
3.0	23.0	22.6	22.8	22.6
5.0	23.9	23.6	15.7	14.8
10.0	36.4	37.1	16.3	15.7
Mean Resistivity	22.0	22.0	18.4	18.0

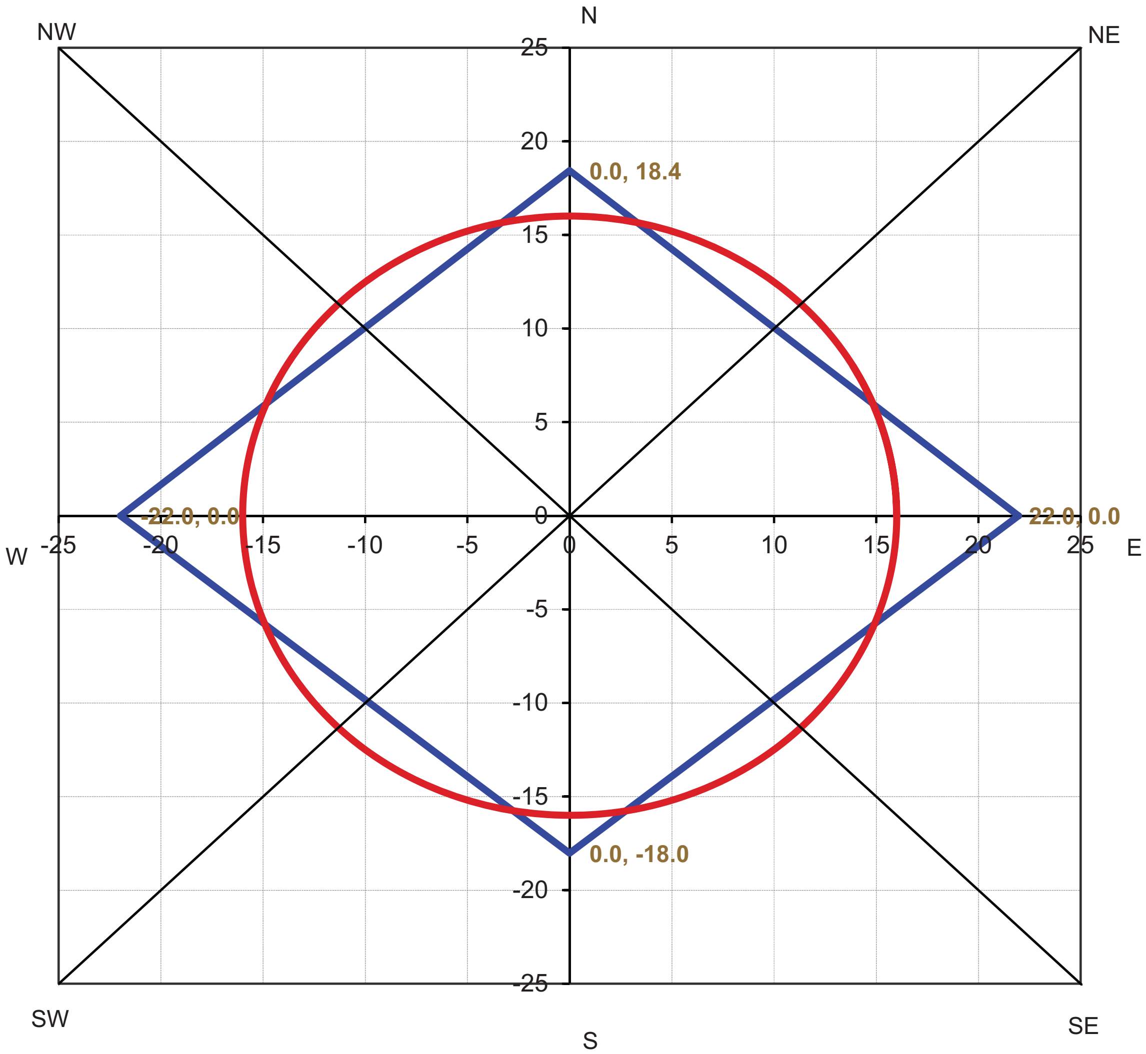
Mean Resistivity Value, ohm-m : 16 ohm-m

Apparent Resistivity Values (ERT-2)

Electrical Resistivity Test No.: ERT-2

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-2
Co-ordinate : 2327594N, 588803E



Total Area of Polygon : 801

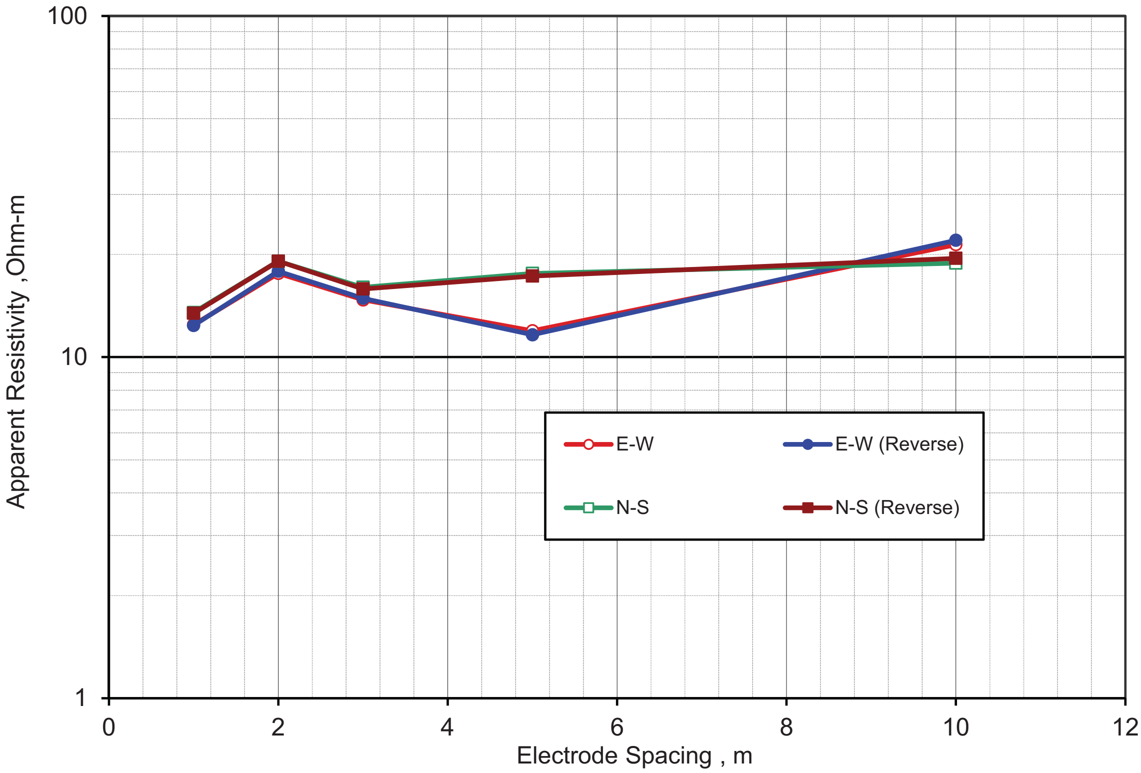
Radius of Equivalent Circle=Mean Resistivity : 16.0 ohm-m

Polar Resistivity Curves (ERT-2)

Electrical Resistivity Test No.: ERT-3

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-3
Co-ordinate : 2327617N, 588827E



Electrode Spacing, m	Apparent Resistivity, Ohm-m			
	E-W	E-W (Reverse)	N-S	N-S (Reverse)
1.0	12.4	12.4	13.5	13.4
2.0	17.6	17.8	19.1	19.1
3.0	14.7	14.9	16.0	15.8
5.0	11.9	11.6	17.6	17.3
10.0	21.4	22.0	18.8	19.5
Mean Resistivity	15.6	15.7	17.0	17.0

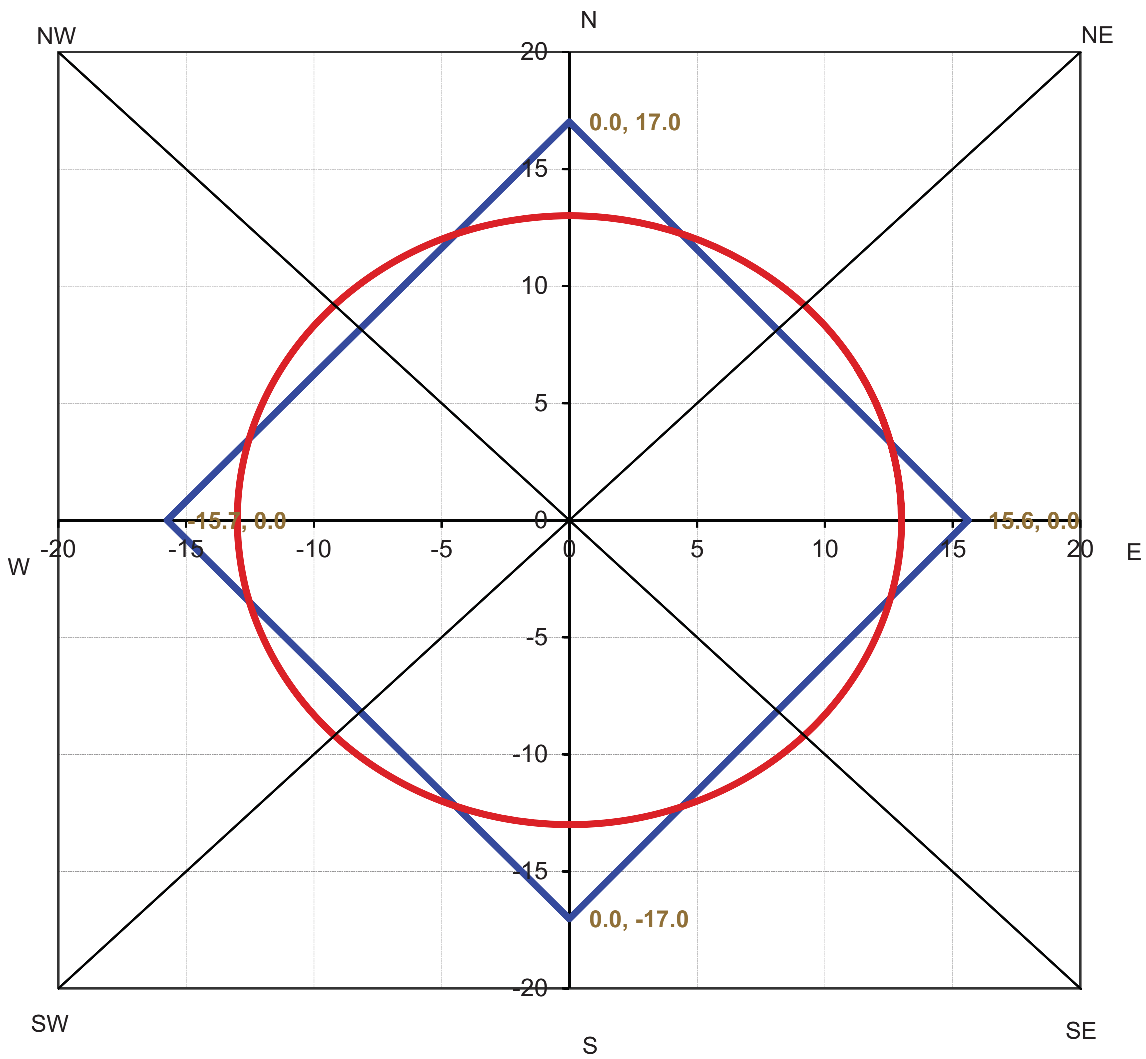
Mean Resistivity Value, ohm-m : 13 ohm-m

Apparent Resistivity Values (ERT-3)

Electrical Resistivity Test No.: ERT-3

IS: 3043-1987, RA-2006

Test Details	
Test Designation :	ERT-3
Co-ordinate :	2327617N, 588827E



Total Area of Polygon : 534

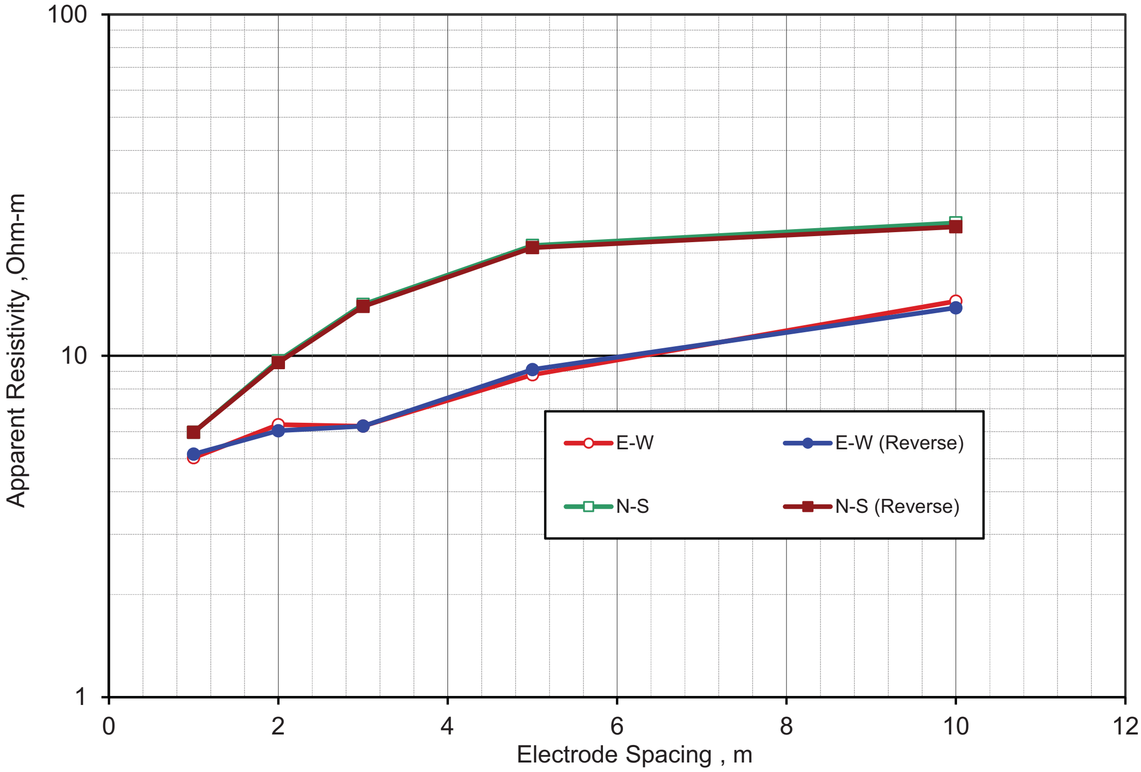
Radius of Equivalent Circle=Mean Resistivity : 13.0 ohm-m

Polar Resistivity Curves (ERT-3)

Electrical Resistivity Test No.: ERT-4

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-4
Co-ordinate : 2327576N, 588870E



Electrode Spacing, m	Apparent Resistivity, Ohm-m			
	E-W	E-W (Reverse)	N-S	N-S (Reverse)
1.0	5.0	5.2	6.0	6.0
2.0	6.3	6.0	9.7	9.6
3.0	6.2	6.2	14.1	13.9
5.0	8.8	9.1	21.0	20.7
10.0	14.5	13.8	24.5	23.9
Mean Resistivity	8.2	8.1	15.1	14.8

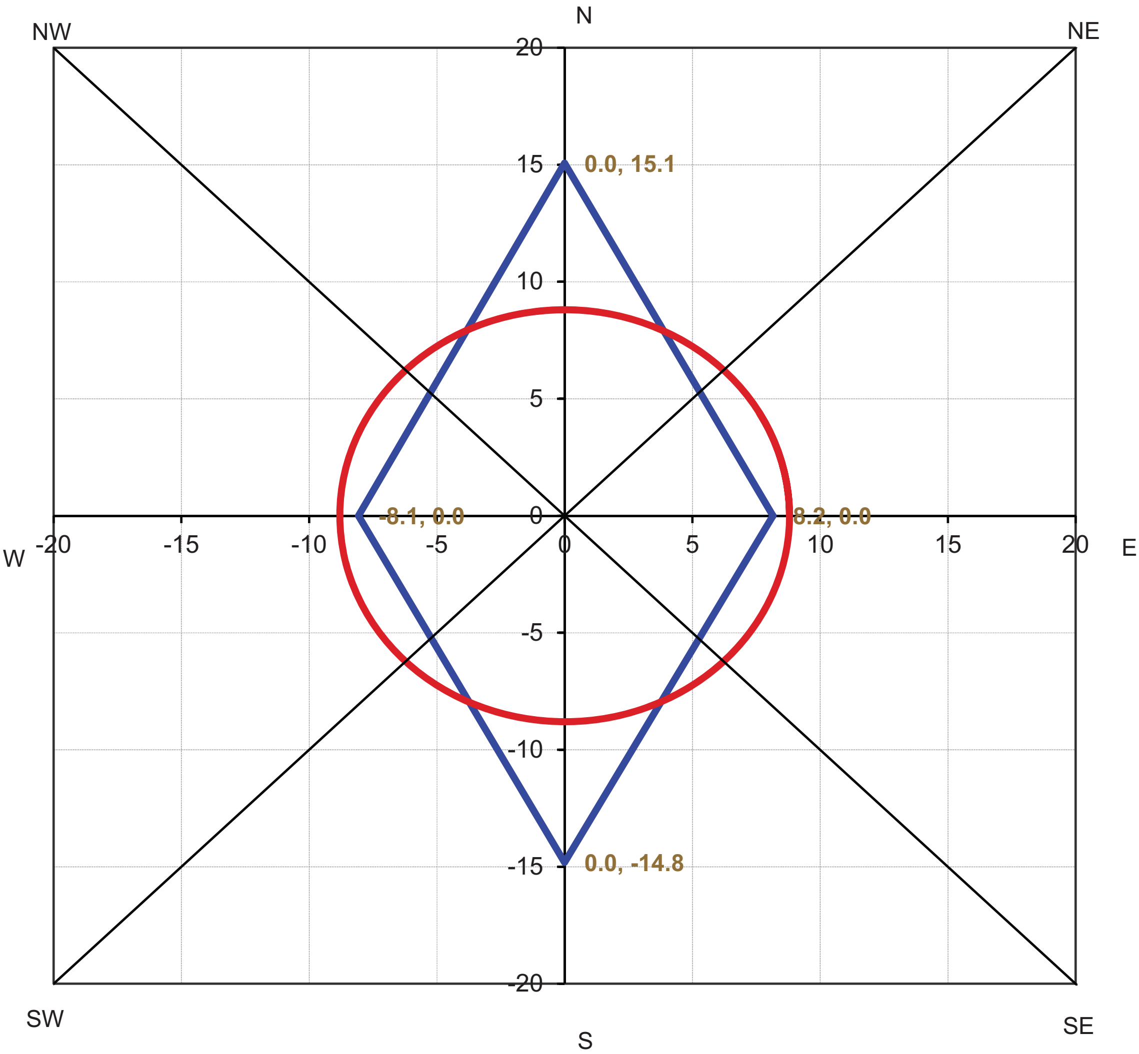
Mean Resistivity Value, ohm-m : 8.8 ohm-m

Apparent Resistivity Values (ERT-4)

Electrical Resistivity Test No.: ERT-4

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-4
Co-ordinate : 2327576N, 588870E



Total Area of Polygon : 242

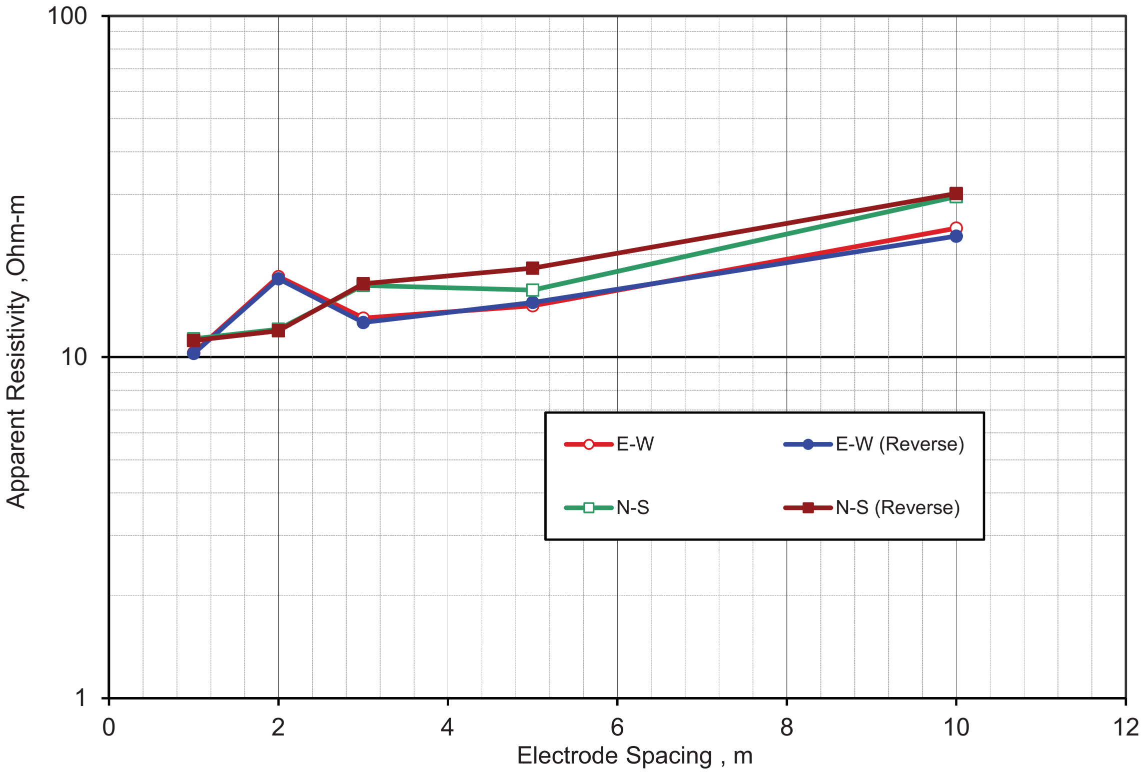
Radius of Equivalent Circle=Mean Resistivity : 8.8 ohm-m

Polar Resistivity Curves (ERT-4)

Electrical Resistivity Test No.: ERT-5

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-5
Co-ordinate : 2327594N, 588884E



Electrode Spacing, m	Apparent Resistivity, Ohm-m			
	E-W	E-W (Reverse)	N-S	N-S (Reverse)
1.0	10.3	10.2	11.3	11.2
2.0	17.2	17.0	12.1	11.9
3.0	13.0	12.6	16.2	16.4
5.0	14.1	14.5	15.7	18.2
10.0	23.9	22.6	29.5	30.2
Mean Resistivity	15.7	15.4	17.0	17.6

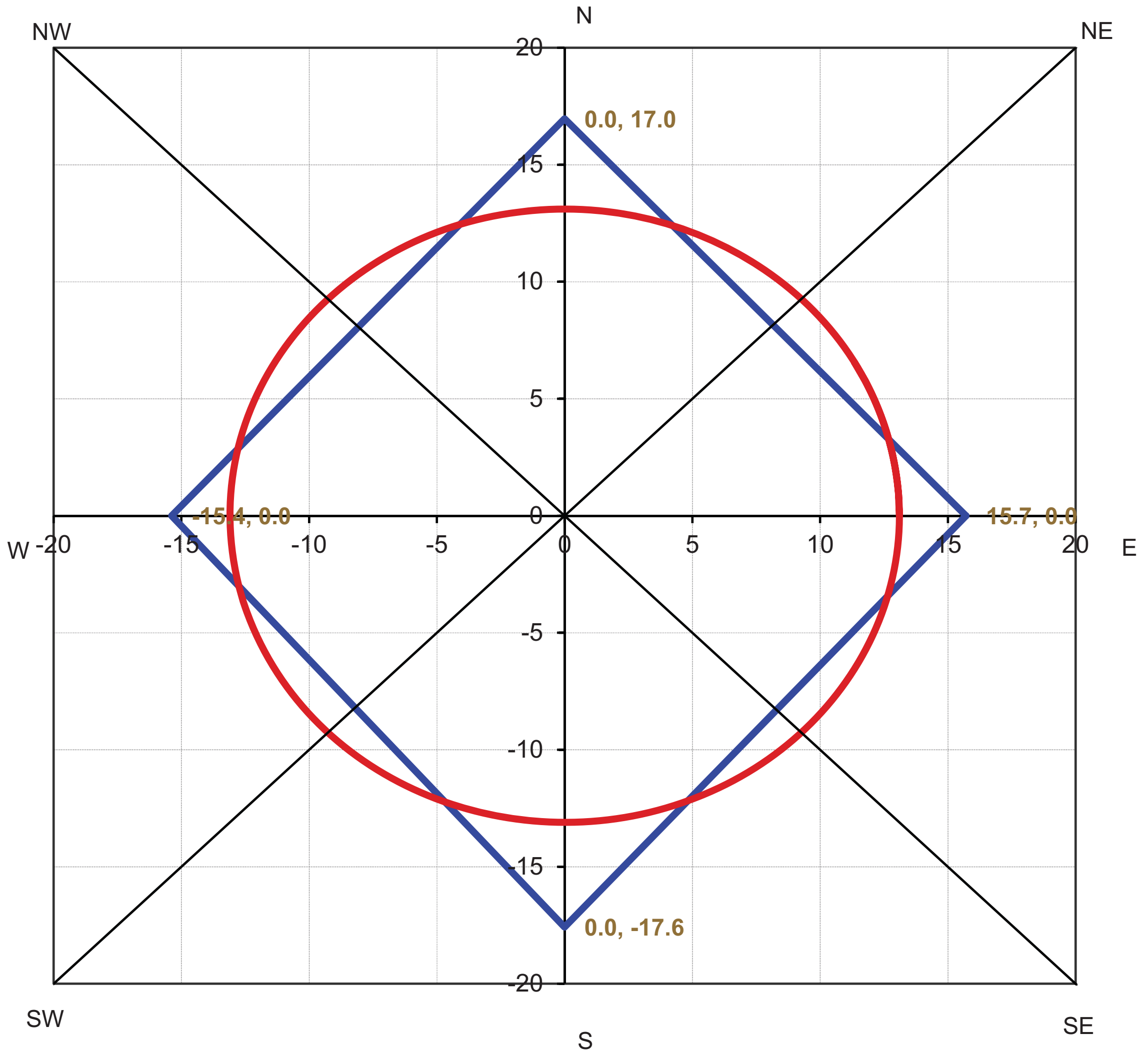
Mean Resistivity Value, ohm-m : 13.1 ohm-m

Apparent Resistivity Values (ERT-5)

Electrical Resistivity Test No.: ERT-5

IS: 3043-1987, RA-2006

Test Details	
Test Designation :	ERT-5
Co-ordinate :	2327594N, 588884E



Total Area of Polygon : 537

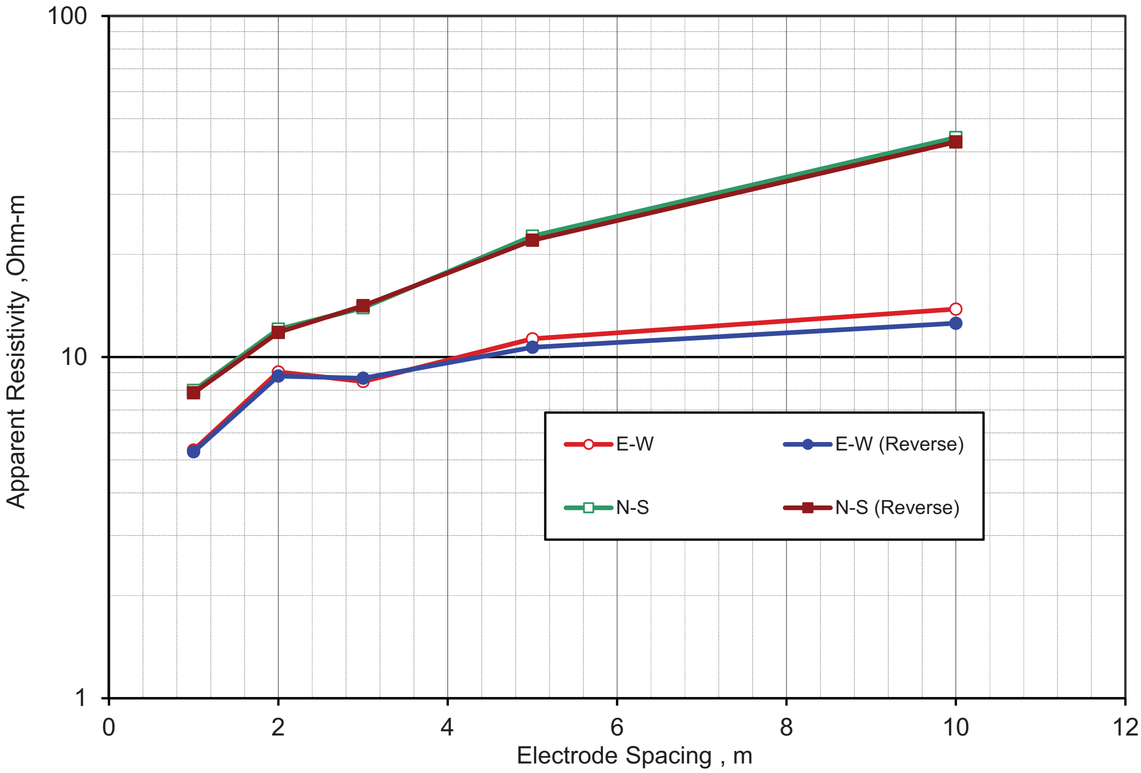
Radius of Equivalent Circle=Mean Resistivity : 13.1 ohm-m

Polar Resistivity Curves (ERT-5)

Electrical Resistivity Test No.: ERT-6

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-6
Co-ordinate : 2327739N, 589175E



Electrode Spacing, m	Apparent Resistivity, Ohm-m			
	E-W	E-W (Reverse)	N-S	N-S (Reverse)
1.0	5.3	5.3	8.0	7.9
2.0	9.0	8.8	12.1	11.8
3.0	8.5	8.7	13.9	14.1
5.0	11.3	10.7	22.6	22.0
10.0	13.8	12.6	44.0	42.7
Mean Resistivity	9.6	9.2	20.1	19.7

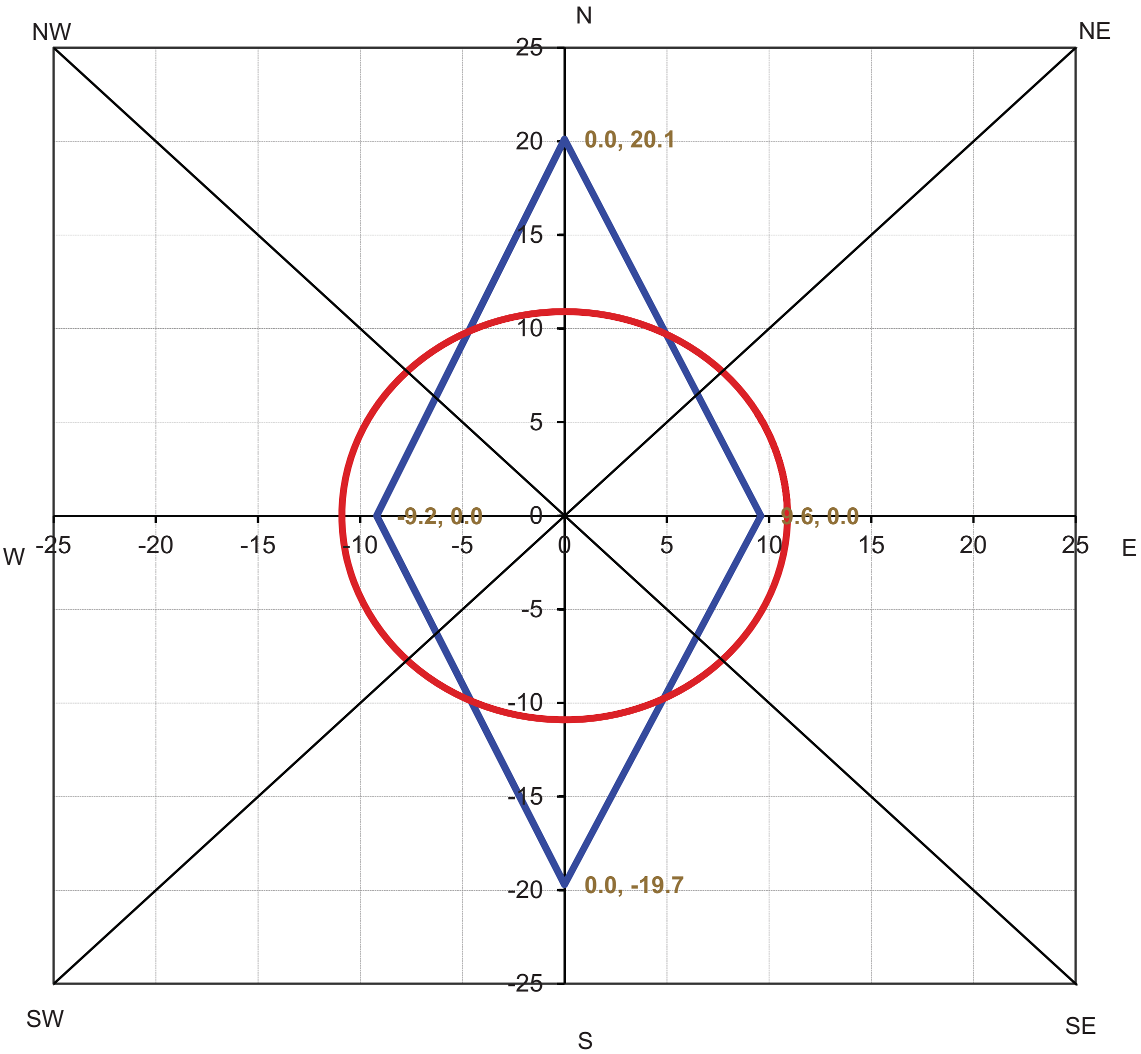
Mean Resistivity Value, ohm-m : 10.9 ohm-m

Apparent Resistivity Values (ERT-6)

Electrical Resistivity Test No.: ERT-6

IS: 3043-1987, RA-2006

Test Details	
Test Designation :	ERT-6
Co-ordinate :	2327739N, 589175E



Total Area of Polygon : 374

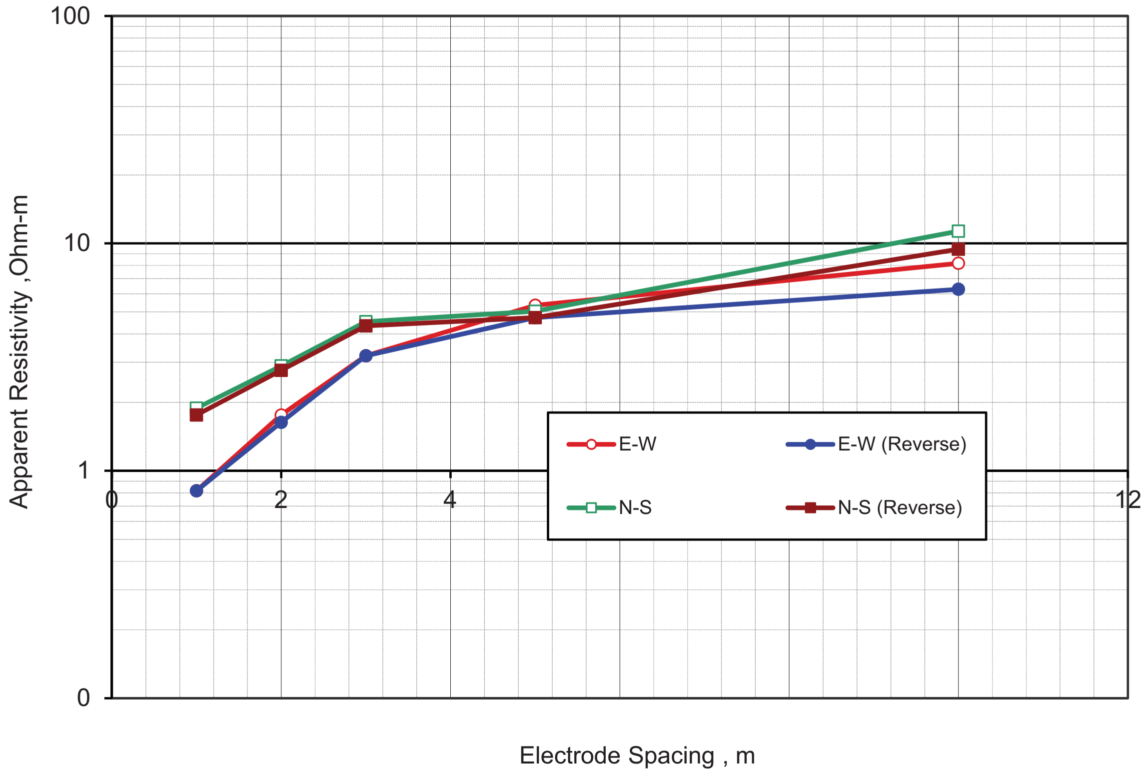
Radius of Equivalent Circle=Mean Resistivity : 10.9 ohm-m

Polar Resistivity Curves (ERT-6)

Electrical Resistivity Test No.: ERT-7

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-7
Co-ordinate : 2327784N, 588876E



Electrode Spacing, m	Apparent Resistivity, Ohm-m			
	E-W	E-W (Reverse)	N-S	N-S (Reverse)
1.0	0.8	0.8	1.9	1.8
2.0	1.8	1.6	2.9	2.8
3.0	3.2	3.2	4.5	4.3
5.0	5.3	4.7	5.0	4.7
10.0	8.2	6.3	11.3	9.4
Mean Resistivity	3.9	3.3	5.1	4.6

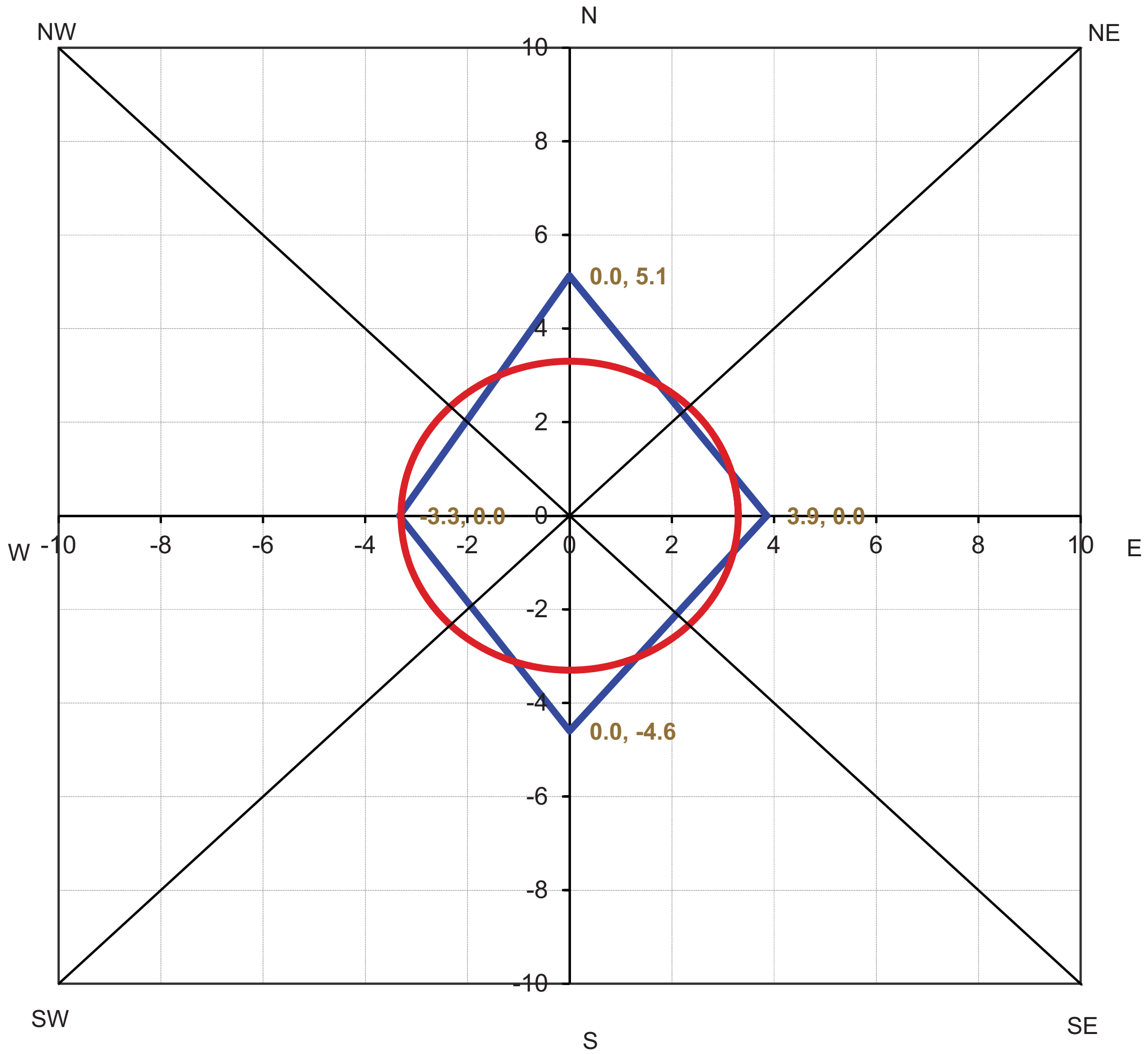
Mean Resistivity Value, ohm-m : 3.3 ohm-m

Apparent Resistivity Values (ERT-7)

Electrical Resistivity Test No.: ERT-7

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-7
Co-ordinate : 2327784N, 588876E



Total Area of Polygon : 35

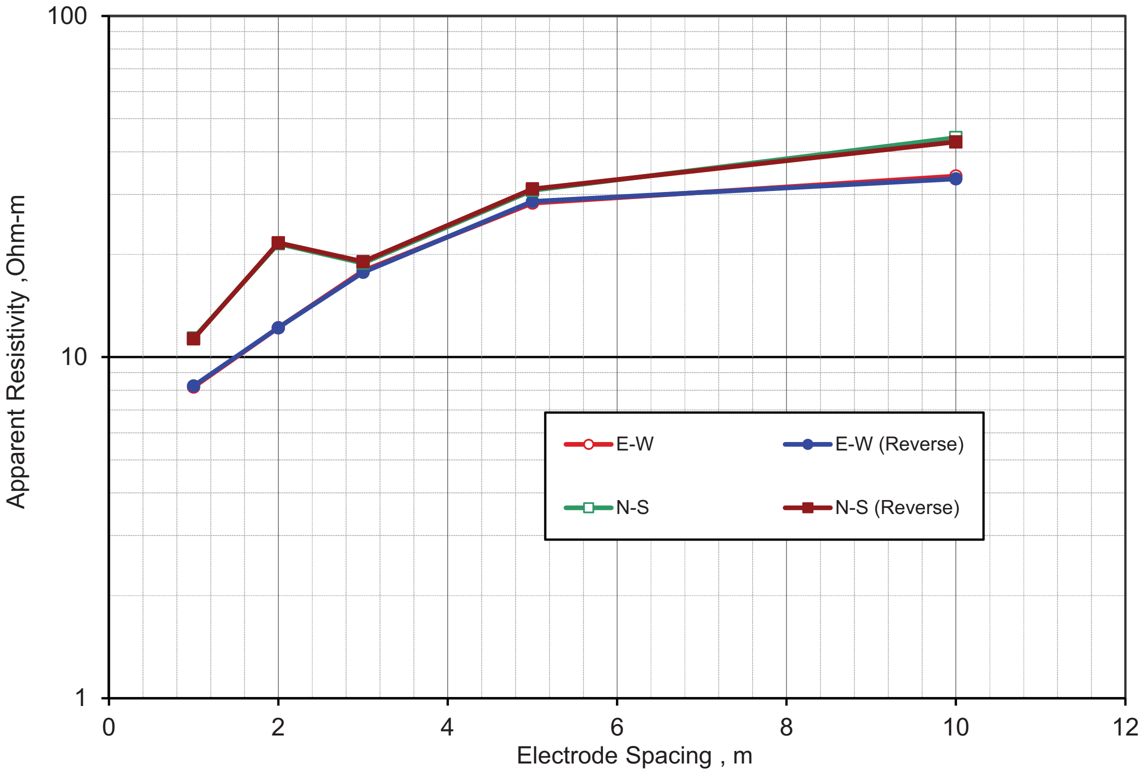
Radius of Equivalent Circle=Mean Resistivity : 3.3 ohm-m

Polar Resistivity Curves (ERT-7)

Electrical Resistivity Test No.: ERT-8

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-8
Co-ordinate : 2327796N, 589019E



Electrode Spacing, m	Apparent Resistivity, Ohm-m			
	E-W	E-W (Reverse)	N-S	N-S (Reverse)
1.0	8.2	8.2	11.4	11.3
2.0	12.2	12.2	21.5	21.6
3.0	17.9	17.7	18.8	19.0
5.0	28.3	28.6	30.8	31.1
10.0	33.9	33.3	44.0	42.7
Mean Resistivity	20.1	20.0	25.3	25.2

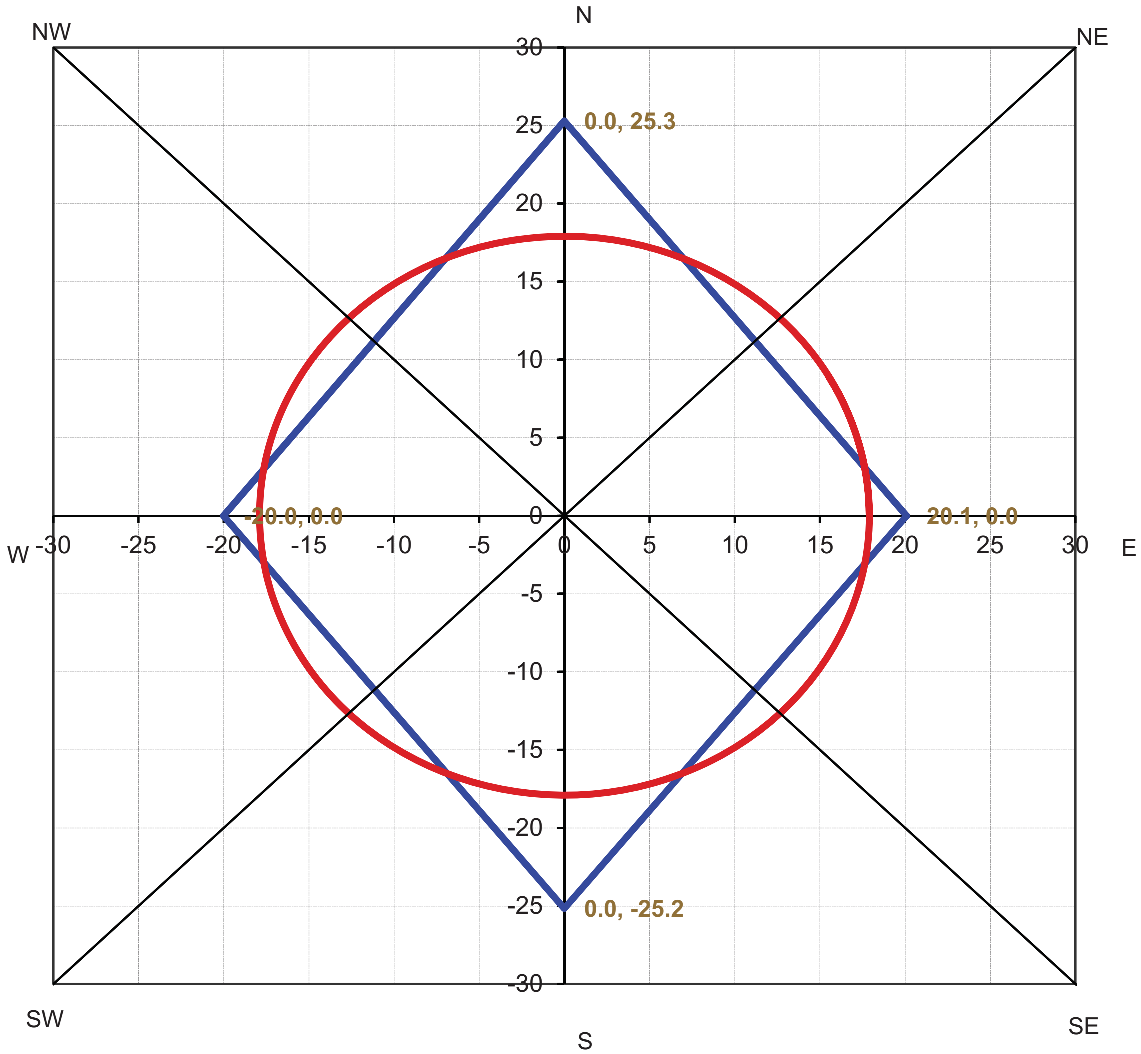
Mean Resistivity Value, ohm-m : 17.9 ohm-m

Apparent Resistivity Values (ERT-8)

Electrical Resistivity Test No.: ERT-8

IS: 3043-1987, RA-2006

Test Details	
Test Designation :	ERT-8
Co-ordinate :	2327796N, 589019E



Total Area of Polygon : 1012

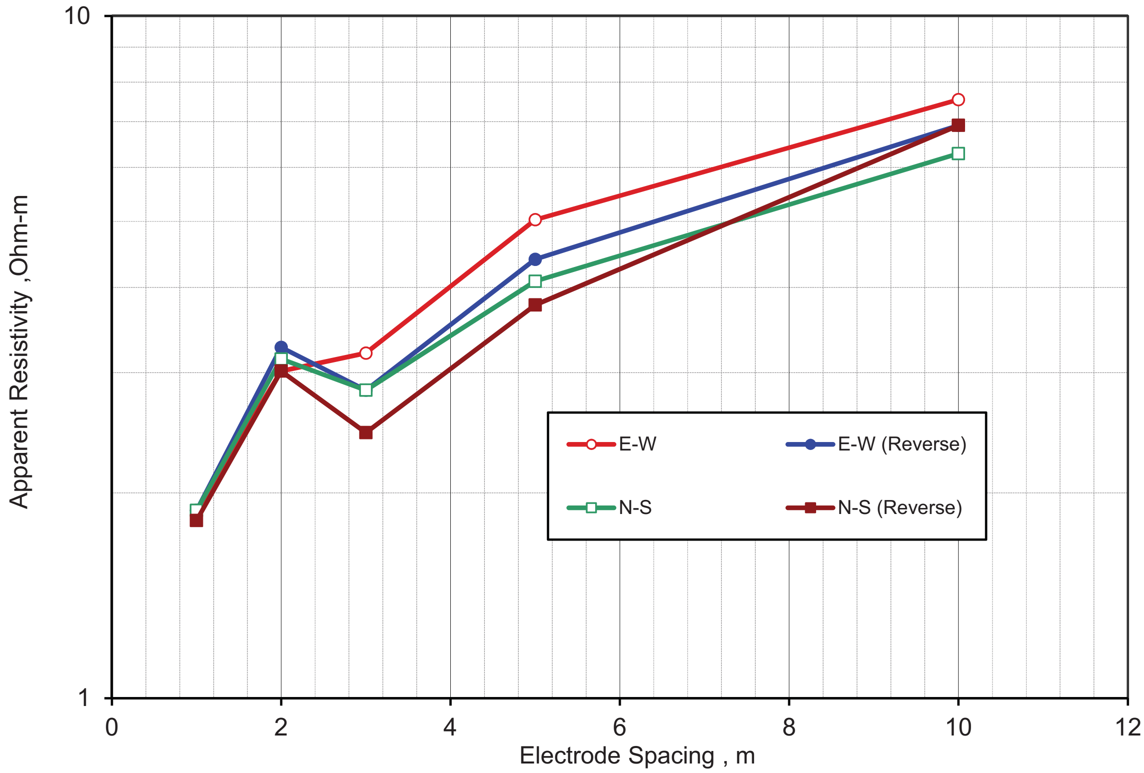
Radius of Equivalent Circle=Mean Resistivity : 17.9 ohm-m

Polar Resistivity Curves (ERT-8)

Electrical Resistivity Test No.: ERT-9

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-9
Co-ordinate : 2327382N, 589123E



Electrode Spacing, m	Apparent Resistivity, Ohm-m			
	E-W	E-W (Reverse)	N-S	N-S (Reverse)
1.0	1.9	1.9	1.9	1.8
2.0	3.0	3.3	3.1	3.0
3.0	3.2	2.8	2.8	2.5
5.0	5.0	4.4	4.1	3.8
10.0	7.5	6.9	6.3	6.9
Mean Resistivity	4.1	3.9	3.6	3.6

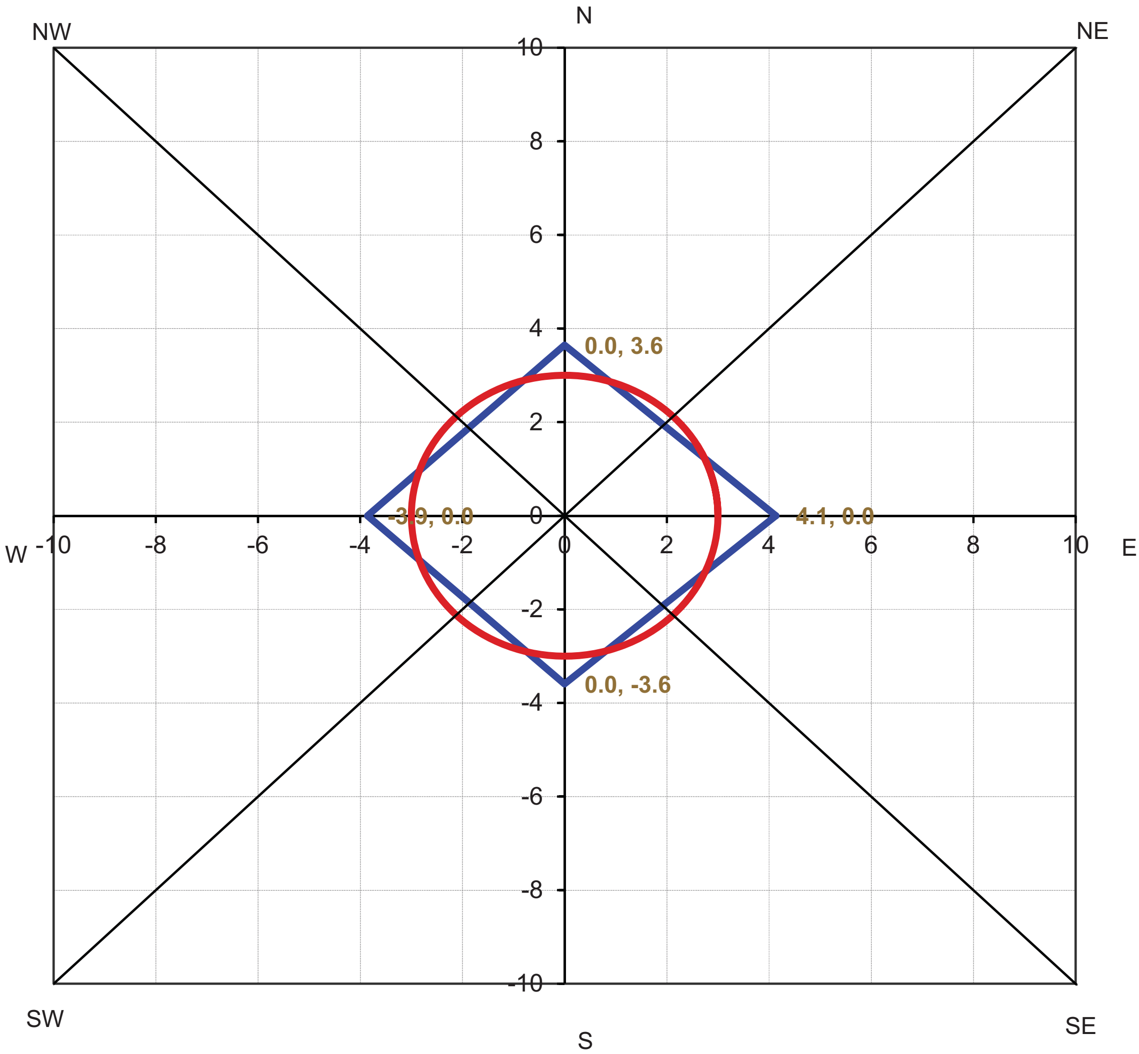
Mean Resistivity Value, ohm-m : 3 ohm-m

Apparent Resistivity Values (ERT-9)

Electrical Resistivity Test No.: ERT-9

IS: 3043-1987, RA-2006

Test Details	
Test Designation :	ERT-9
Co-ordinate :	2327382N, 589123E



Total Area of Polygon : 29

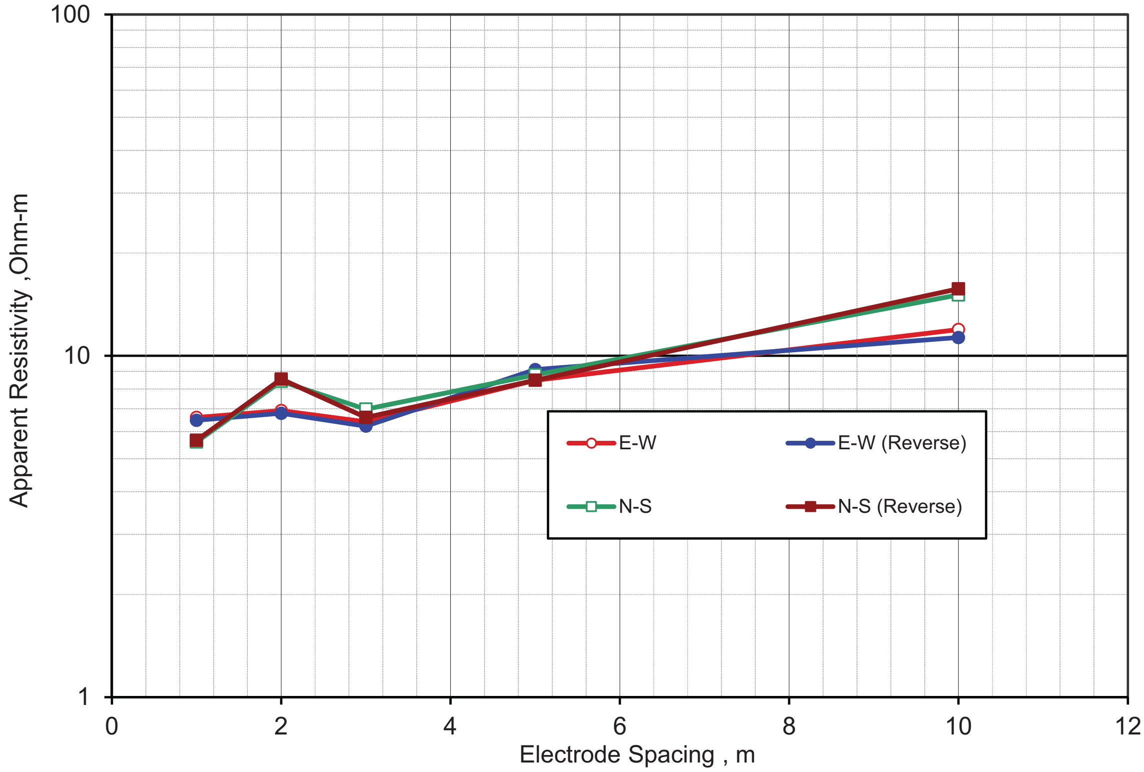
Radius of Equivalent Circle=Mean Resistivity : 3.0 ohm-m

Polar Resistivity Curves (ERT-9)

Electrical Resistivity Test No.: ERT-10

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-10
Co-ordinate : 2327382N, 589152E



Electrode Spacing, m	Apparent Resistivity, Ohm-m			
	E-W	E-W (Reverse)	N-S	N-S (Reverse)
1.0	6.6	6.5	5.6	5.7
2.0	6.9	6.8	8.4	8.5
3.0	6.4	6.2	7.0	6.6
5.0	8.5	9.1	8.8	8.5
10.0	11.9	11.3	15.1	15.7
Mean Resistivity	8.1	8.0	9.0	9.0

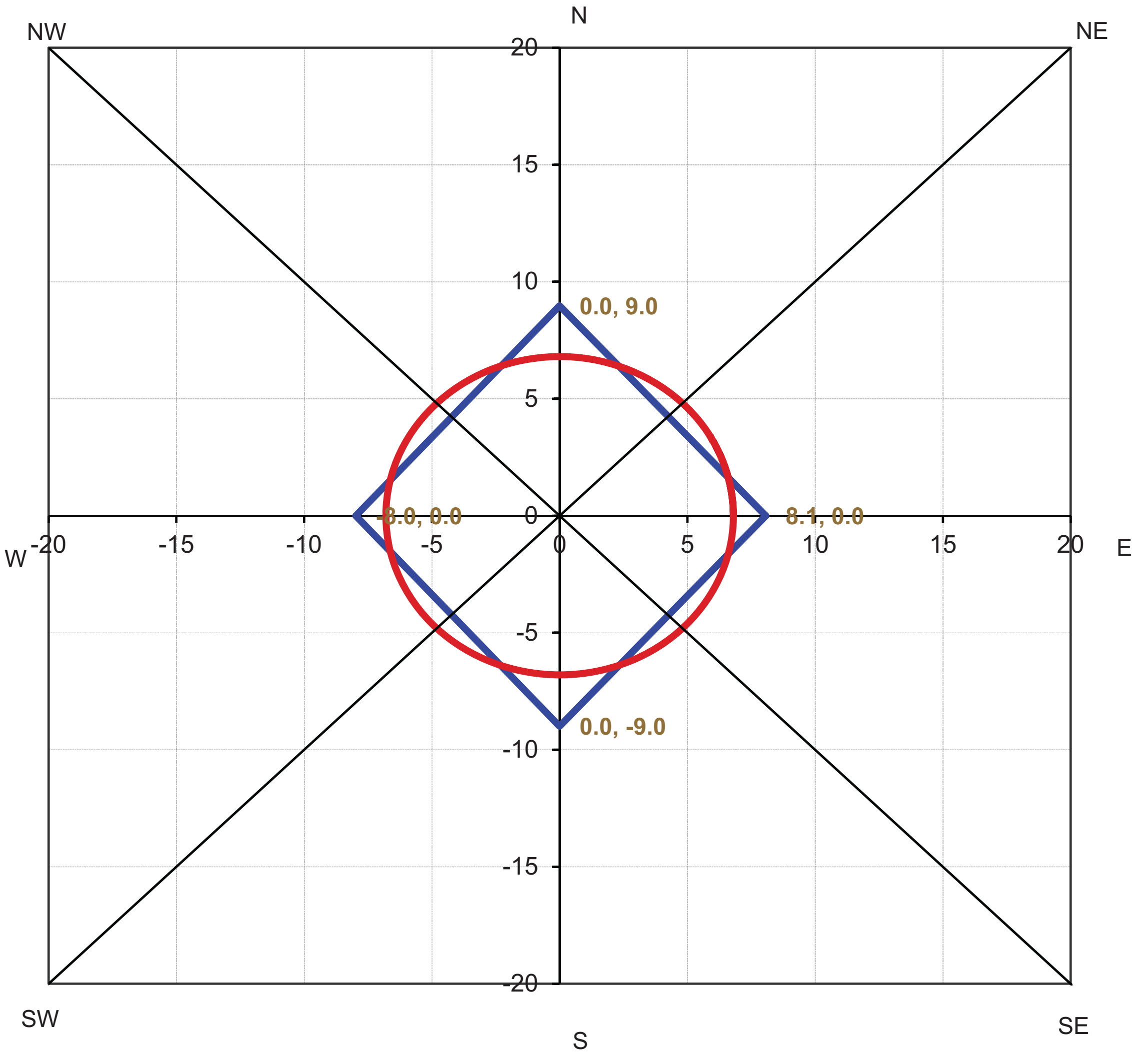
Mean Resistivity Value, ohm-m : 6.8 ohm-m

Apparent Resistivity Values (ERT-10)

Electrical Resistivity Test No.: ERT-10

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-10
Co-ordinate : 2327382N, 589152E



Total Area of Polygon : 144

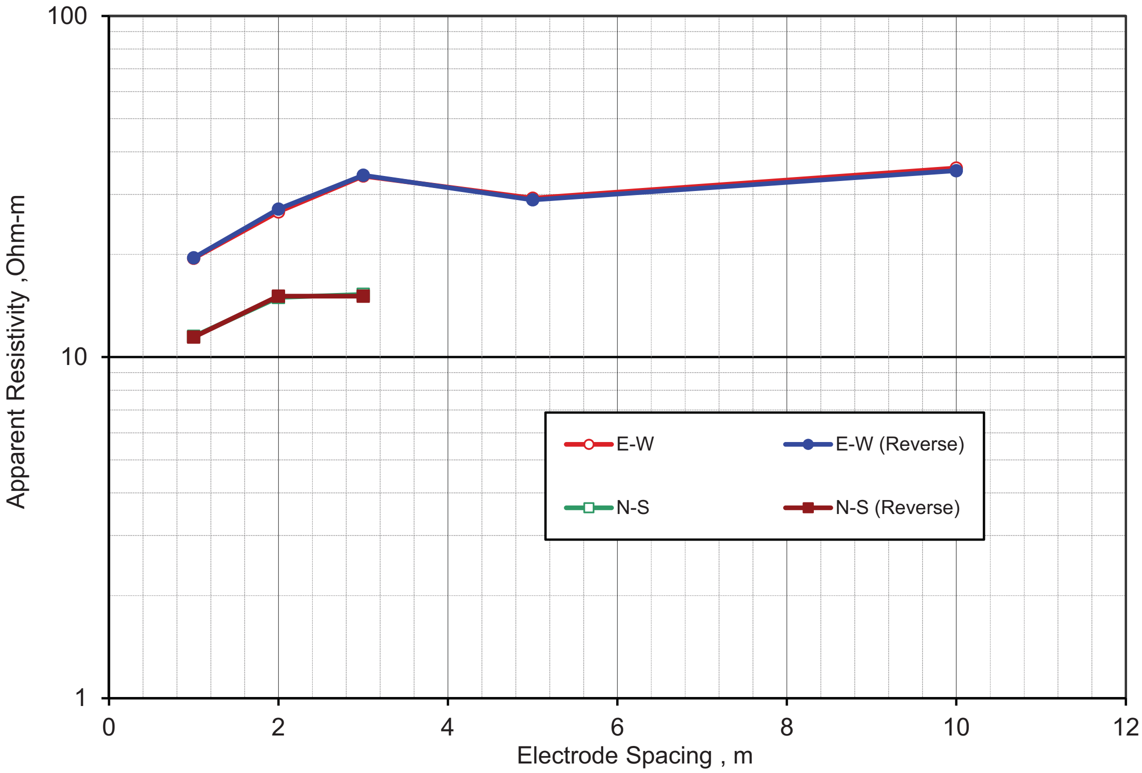
Radius of Equivalent Circle=Mean Resistivity : 6.8 ohm-m

Polar Resistivity Curves (ERT-10)

Electrical Resistivity Test No.: ERT-11

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-11
Co-ordinate : 2327884N, 589222E



Electrode Spacing, m	Apparent Resistivity, Ohm-m			
	E-W	E-W (Reverse)	N-S	N-S (Reverse)
1.0	19.5	19.5	11.5	11.4
2.0	26.6	27.1	15.0	15.1
3.0	33.9	34.1	15.3	15.1
5.0	29.2	28.9	*Space not Available*	
10.0	35.8	35.2		
Mean Resistivity	29.0	29.0	13.9	13.9

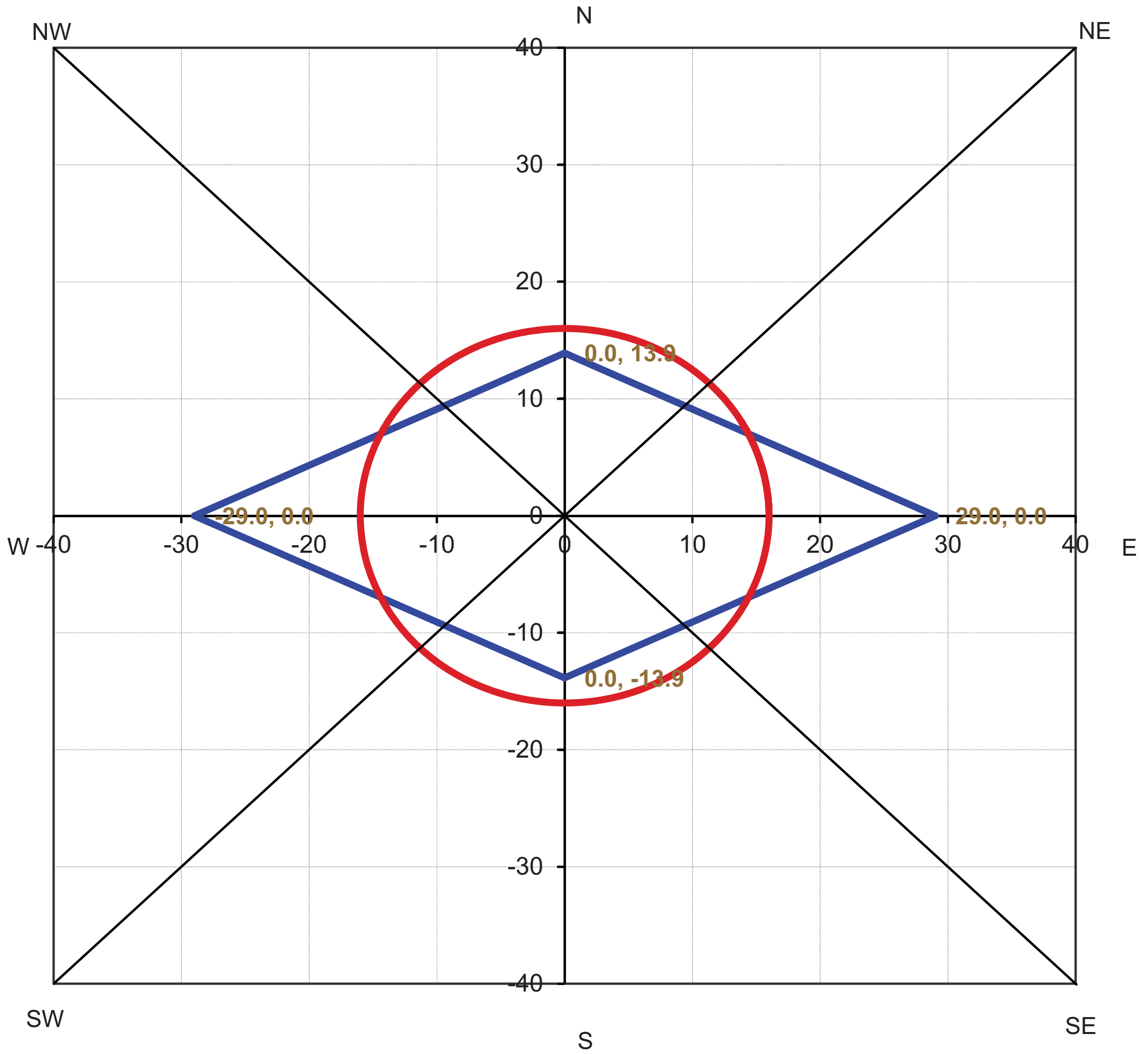
Mean Resistivity Value, ohm-m : 16 ohm-m

Apparent Resistivity Values (ERT-11)

Electrical Resistivity Test No.: ERT-11

IS: 3043-1987, RA-2006

Test Details	
Test Designation :	ERT-11
Co-ordinate :	2327884N, 589222E



Total Area of Polygon : 805

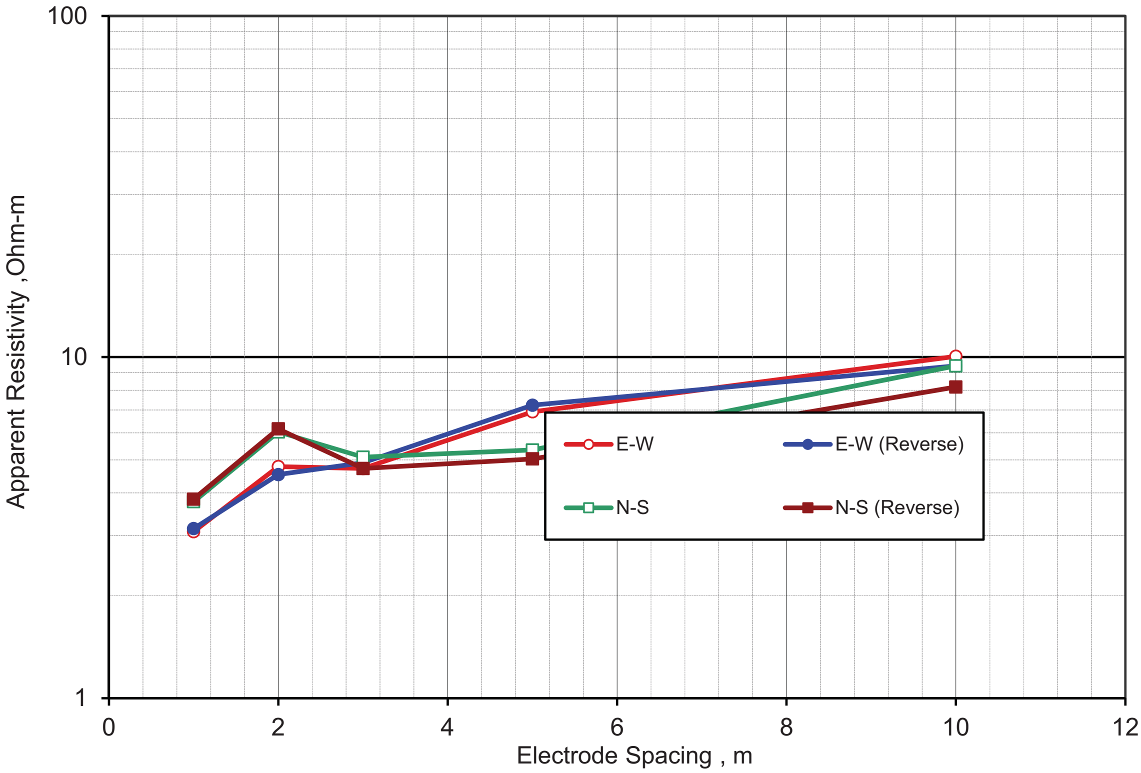
Radius of Equivalent Circle=Mean Resistivity : 16.0 ohm-m

Polar Resistivity Curves (ERT-11)

Electrical Resistivity Test No.: ERT-12

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-12
Co-ordinate : 2327940N, 589156E



Electrode Spacing, m	Apparent Resistivity, Ohm-m			
	E-W	E-W (Reverse)	N-S	N-S (Reverse)
1.0	3.1	3.1	3.8	3.8
2.0	4.8	4.5	6.0	6.2
3.0	4.7	4.9	5.1	4.7
5.0	6.9	7.2	5.3	5.0
10.0	10.1	9.4	9.4	8.2
Mean Resistivity	5.9	5.8	5.9	5.6

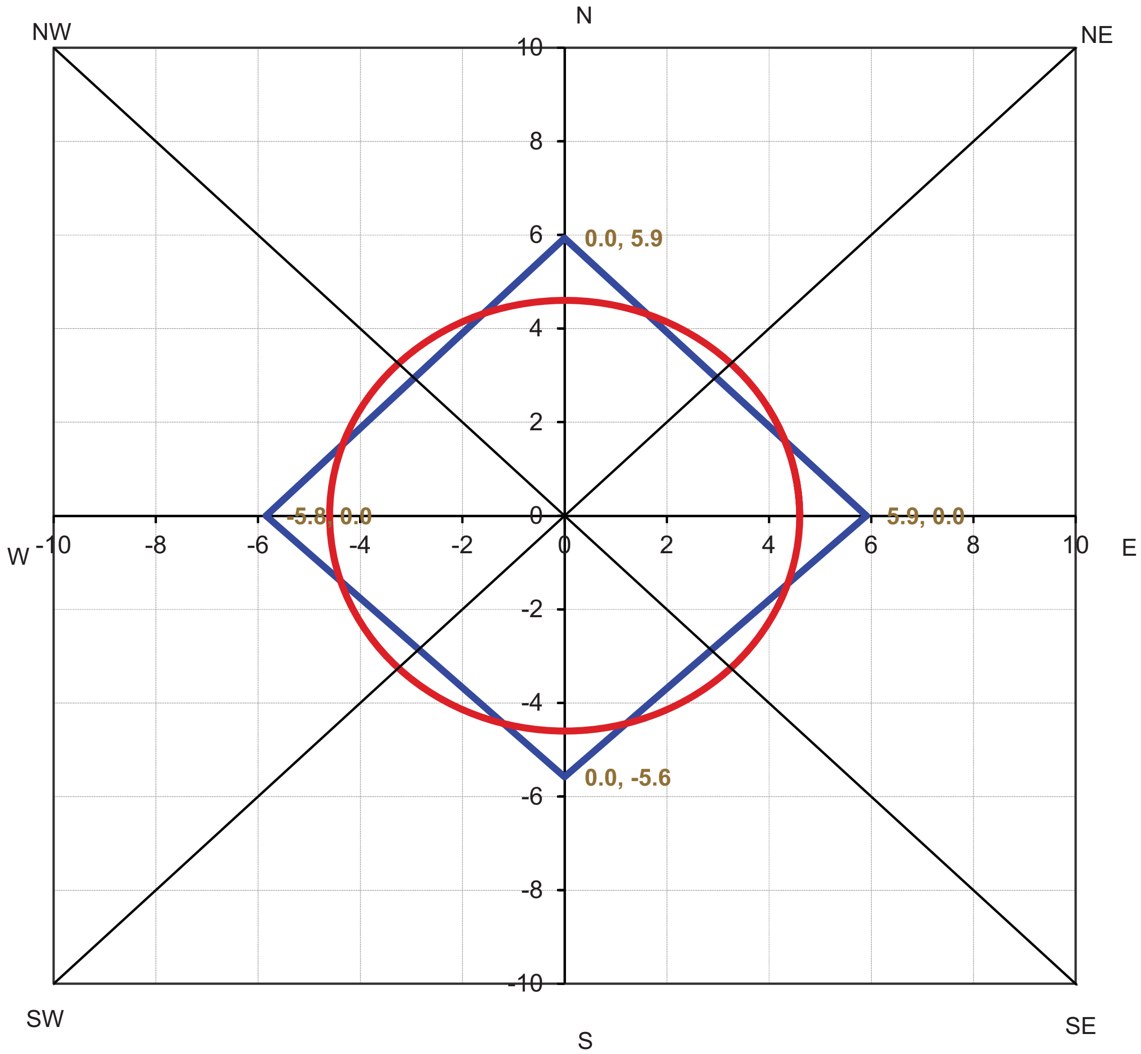
Mean Resistivity Value, ohm-m : 4.6 ohm-m

Apparent Resistivity Values (ERT-12)

Electrical Resistivity Test No.: ERT-12

IS: 3043-1987, RA-2006

Test Details	
Test Designation :	ERT-12
Co-ordinate :	2327940N, 589156E



Total Area of Polygon : 68

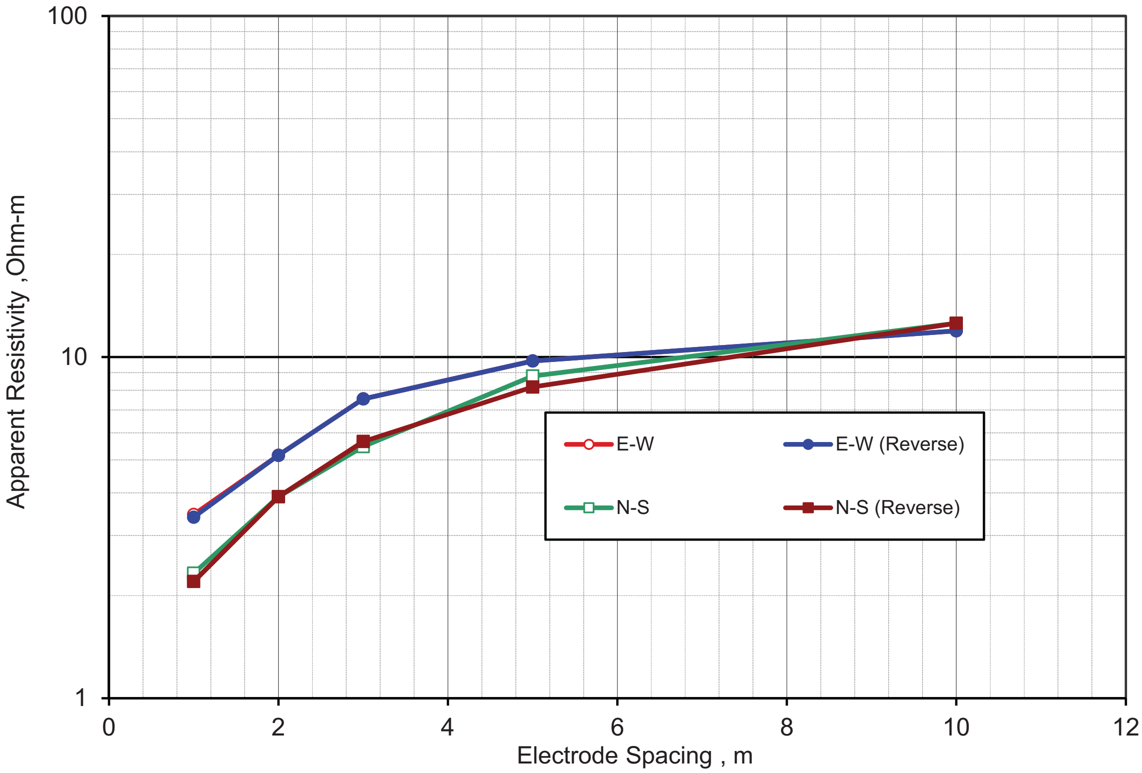
Radius of Equivalent Circle=Mean Resistivity : 4.6 ohm-m

Polar Resistivity Curves (ERT-12)

Electrical Resistivity Test No.: ERT-13

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-13
Co-ordinate : 2327821N, 588886E



Electrode Spacing, m	Apparent Resistivity, Ohm-m			
	E-W	E-W (Reverse)	N-S	N-S (Reverse)
1.0	3.5	3.4	2.3	2.2
2.0	5.2	5.2	3.9	3.9
3.0	7.5	7.5	5.5	5.7
5.0	9.7	9.7	8.8	8.2
10.0	11.9	11.9	12.6	12.6
Mean Resistivity	7.6	7.6	6.6	6.5

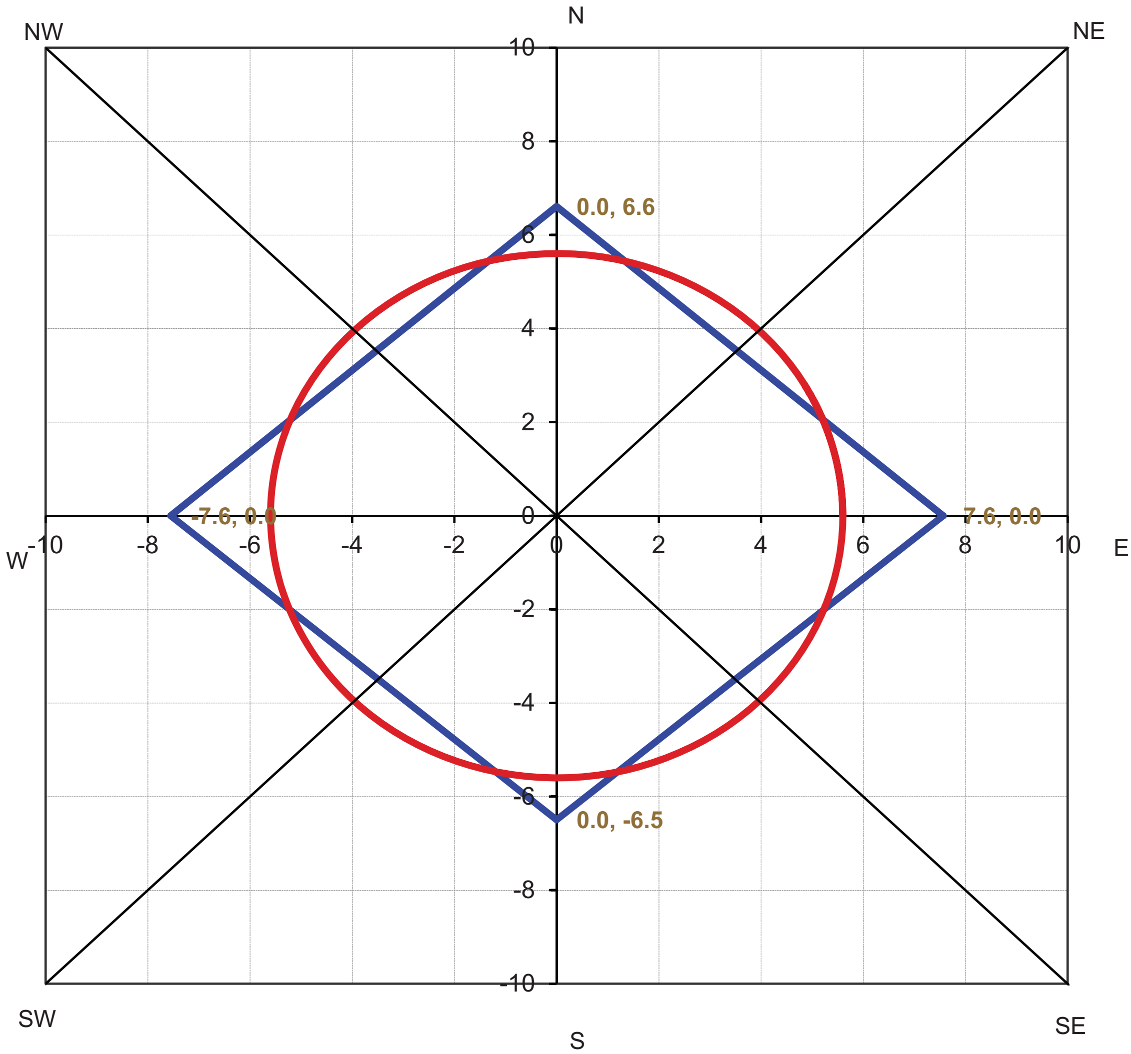
Mean Resistivity Value, ohm-m : 5.6 ohm-m

Apparent Resistivity Values (ERT-13)

Electrical Resistivity Test No.: ERT-13

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-13
Co-ordinate : 2327821N, 588886E



Total Area of Polygon : 99

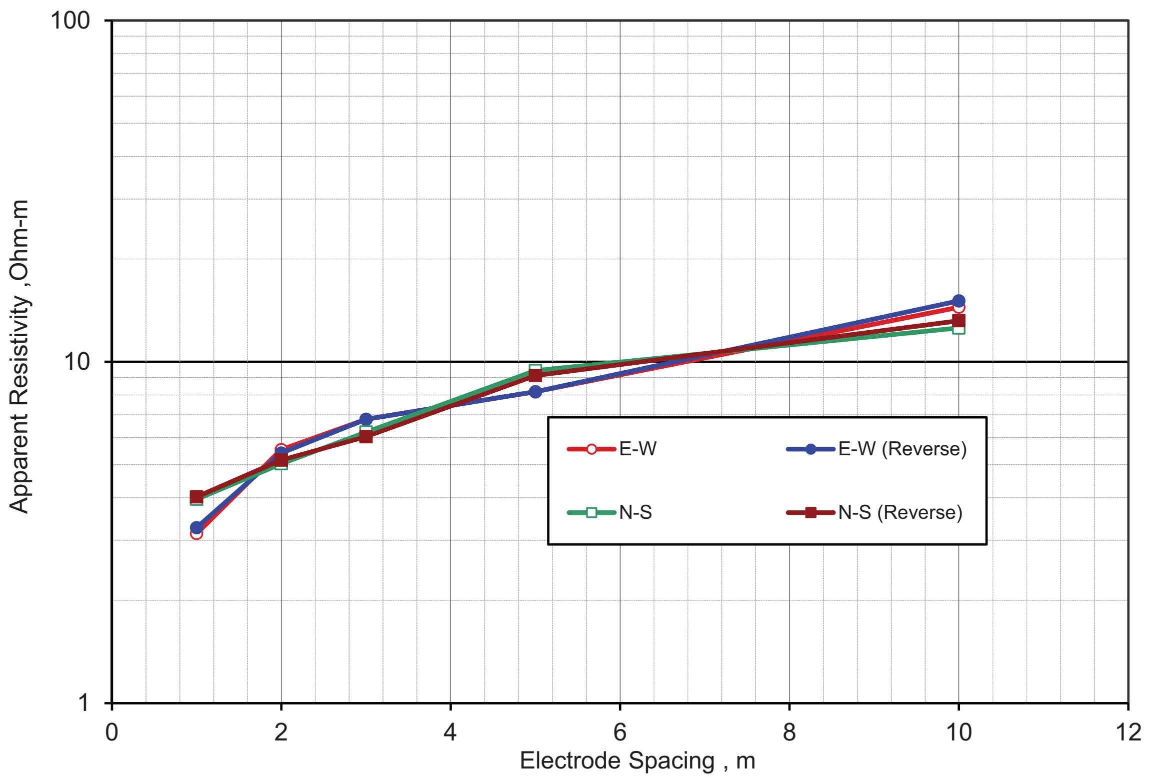
Radius of Equivalent Circle=Mean Resistivity : 5.6 ohm-m

Polar Resistivity Curves (ERT-13)

Electrical Resistivity Test No.: ERT-14

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-14
Co-ordinate : 2327854N, 588824E



Electrode Spacing, m	Apparent Resistivity, Ohm-m			
	E-W	E-W (Reverse)	N-S	N-S (Reverse)
1.0	3.1	3.3	4.0	4.0
2.0	5.5	5.4	5.0	5.2
3.0	6.8	6.8	6.2	6.0
5.0	8.2	8.2	9.4	9.1
10.0	14.5	15.1	12.6	13.2
Mean Resistivity	7.6	7.7	7.4	7.5

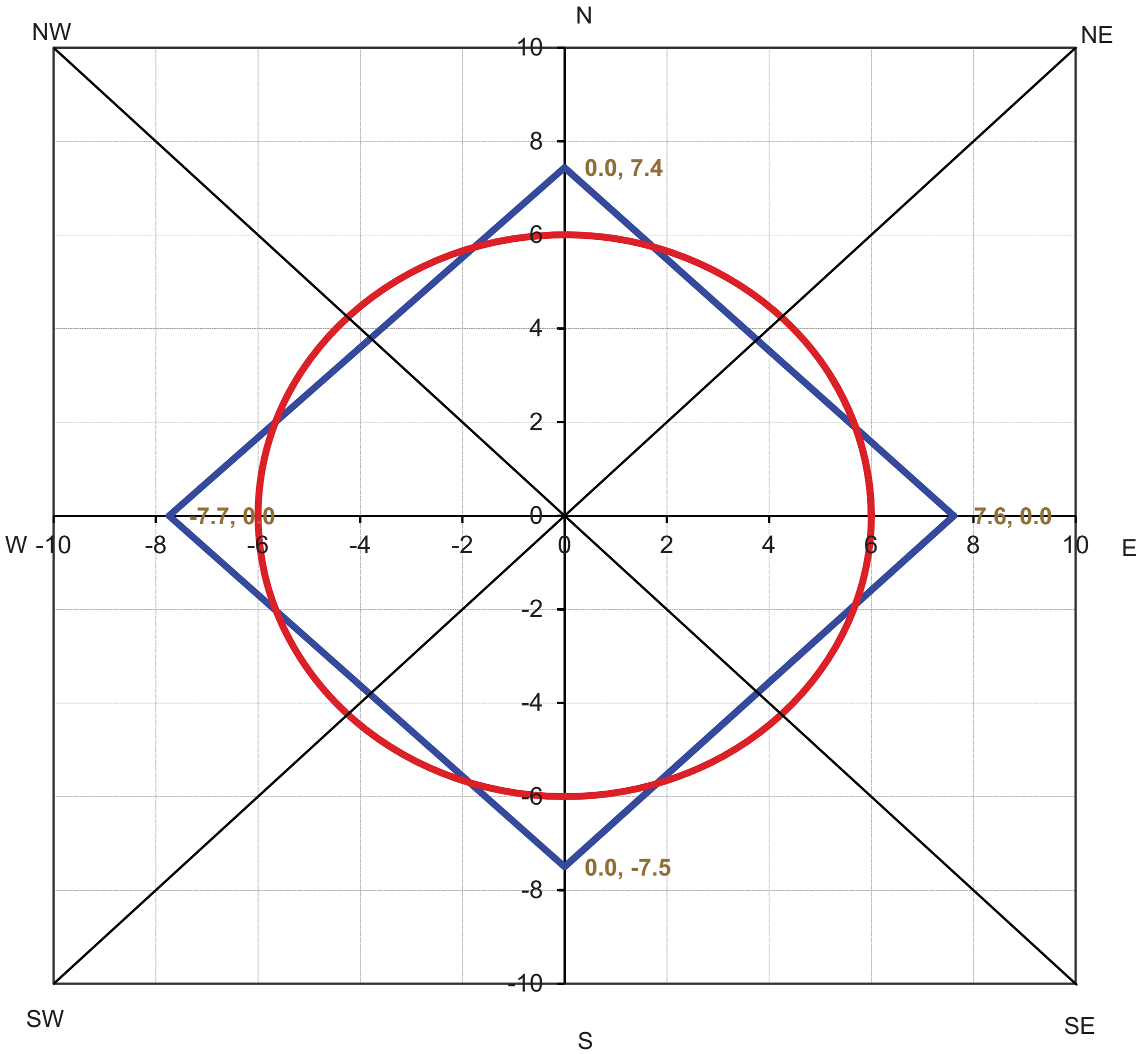
Mean Resistivity Value, ohm-m : 6 ohm-m

Apparent Resistivity Values (ERT-14)

Electrical Resistivity Test No.: ERT-14

IS: 3043-1987, RA-2006

Test Details
Test Designation : ERT-14
Co-ordinate : 2327854N, 588824E



Total Area of Polygon : 115

Radius of Equivalent Circle=Mean Resistivity : 6.0 ohm-m

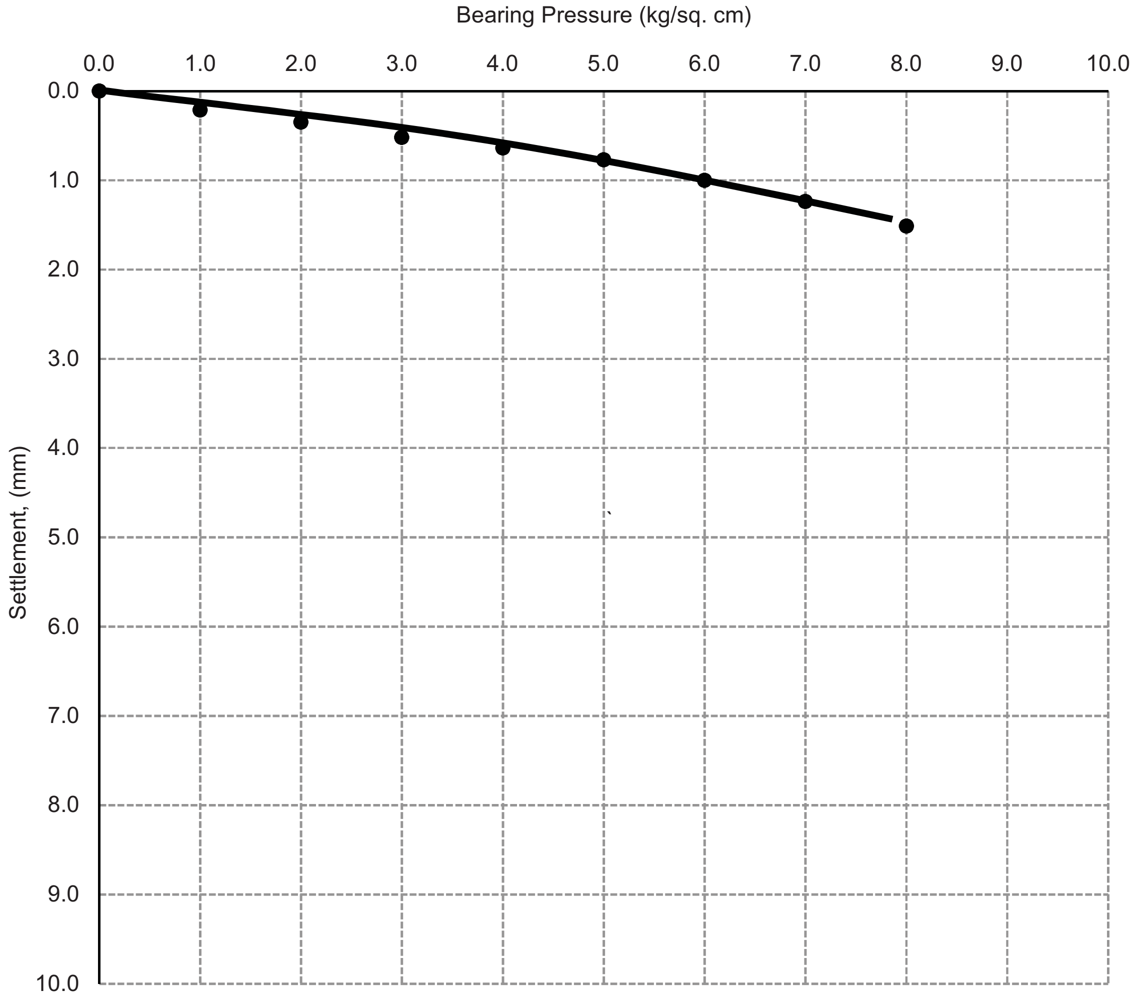
Polar Resistivity Curves (ERT-14)

PLATE LOAD TEST RESULTS

Plate Load Test (PLT)

IS: 1888-1982, RA-2007

Test Details	
Test No.:	PLT_1
Location:	ESP
Size of Plate :	45 cm x 45 cm
Size of Pit :	2 m x 2 m x 1.5 m
Test Depth below EGL :	1.5 m
Test Level (RL) :	205.5 m
Survey Co-ordinates :	1147 E , 729 N



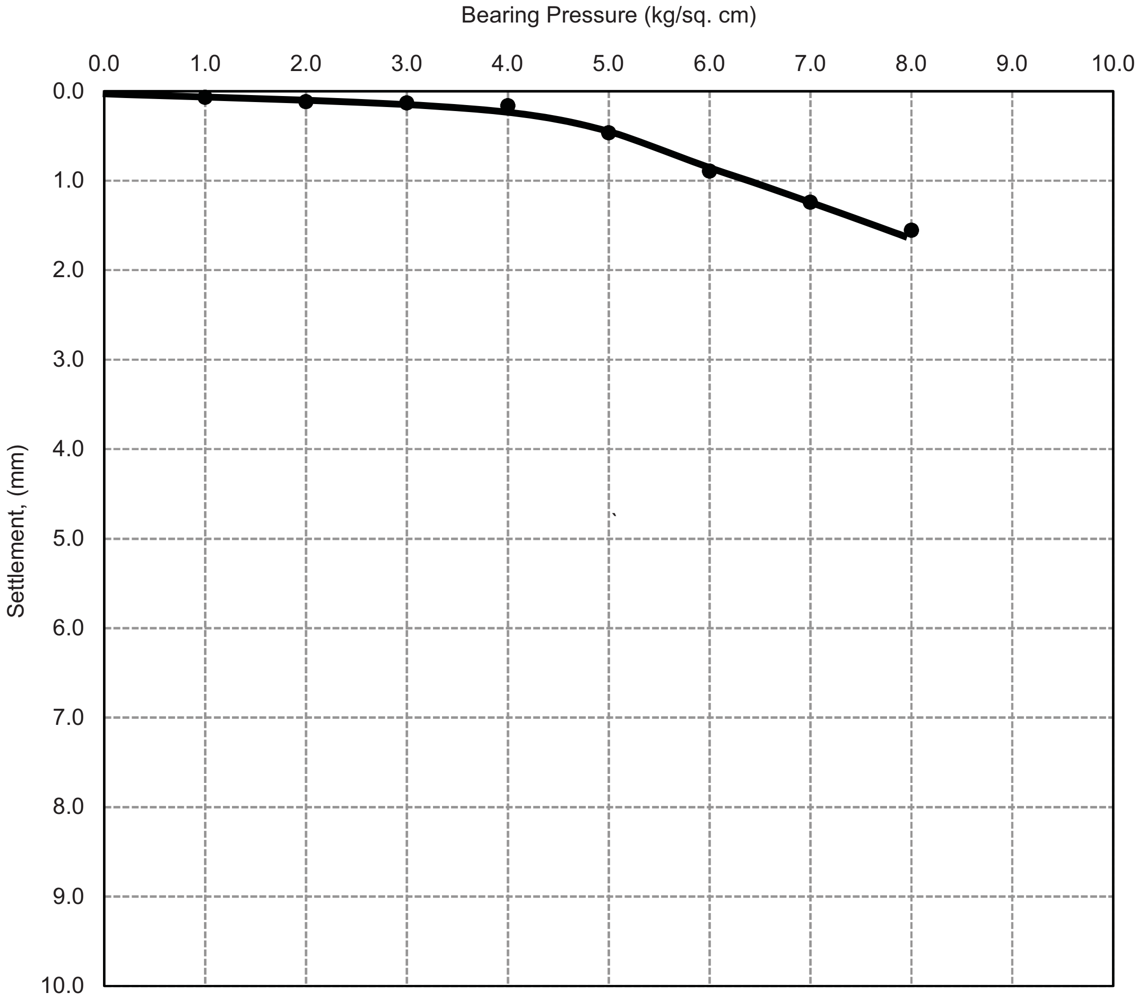
Ultimate Bearing Capacity of Test Plate (q_{ult}) : > 8.0 kg/cm^2

Bearing Pressure vs. Settlement

Plate Load Test (PLT)

IS: 1888-1982, RA-2007

Test Details	
Test No.:	PLT_2
Location:	FD & PA FAN
Size of Plate :	45 cm x 45 cm
Size of Pit :	2 m x 2 m x 2 m
Test Depth below EGL :	2.0 m
Test Level (RL) :	205.2 m
Survey Co-ordinates :	1170 E , 641 N



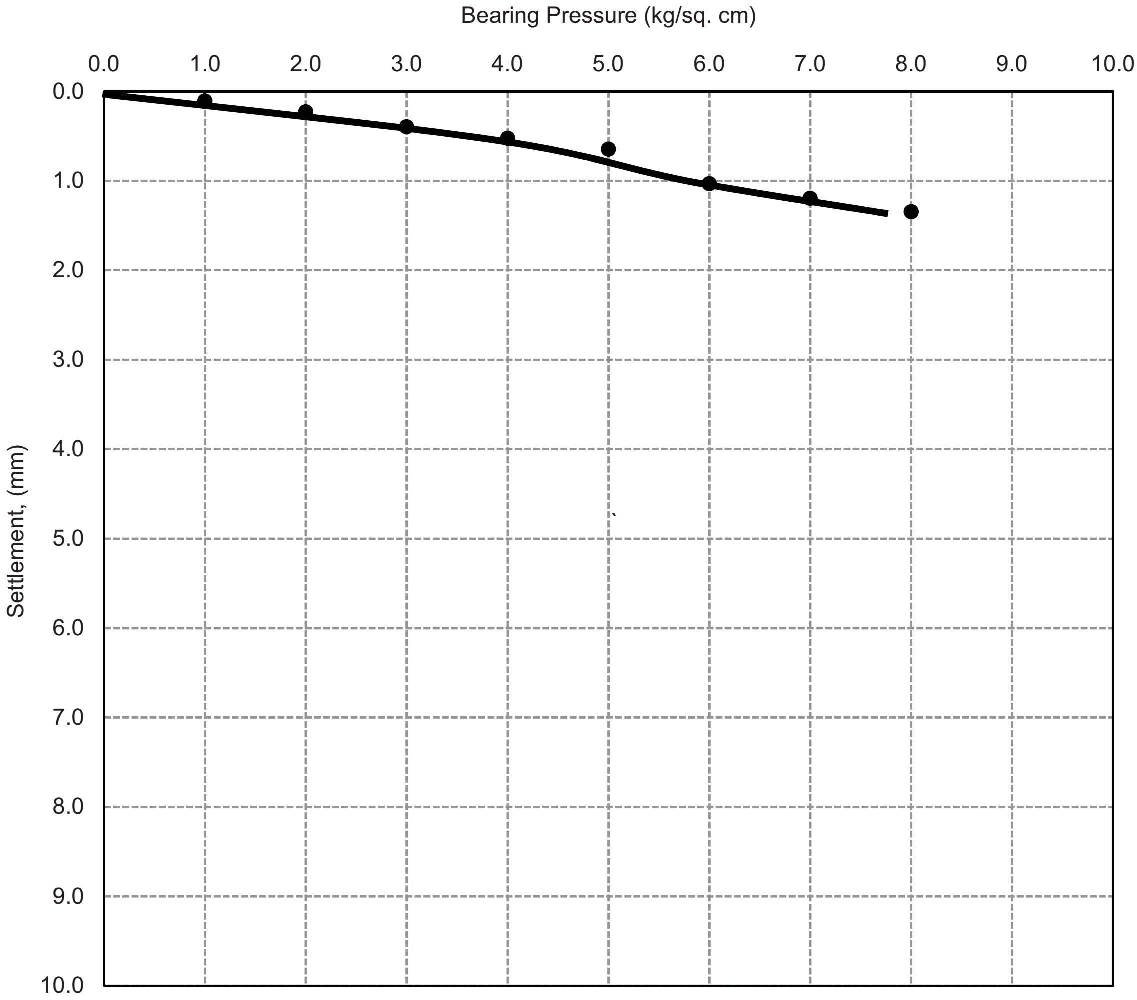
Ultimate Bearing Capacity of Test Plate (q_{ult}) : > 8.0 kg/cm^2

Bearing Pressure vs. Settlement

Plate Load Test (PLT)

IS: 1888-1982, RA-2007

Test Details	
Test No.:	PLT_3
Location:	MAIN POWER HOUSE AREA
Size of Plate :	45 cm x 45 cm
Size of Pit :	2 m x 2 m x 2 m
Test Depth below EGL :	2.0 m
Test Level (RL) :	205.2 m
Survey Co-ordinates :	1067 E , 528 N



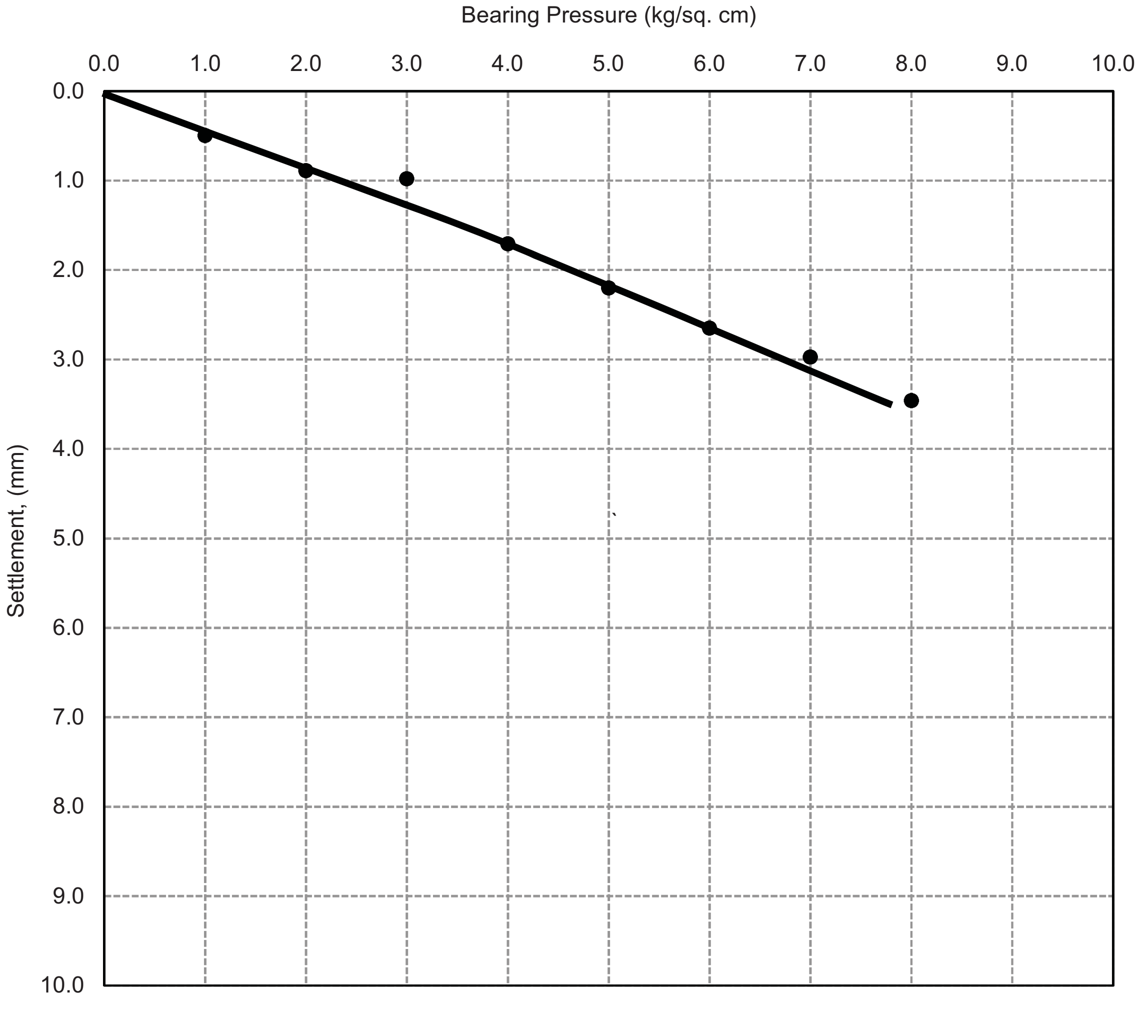
Ultimate Bearing Capacity of Test Plate (q_{ult}) : > 8.0 kg/cm^2

Bearing Pressure vs. Settlement

Plate Load Test (PLT)

IS: 1888-1982, RA-2007

Test Details	
Test No.:	PLT_4
Location:	CHEMICAL LAB
Size of Plate :	45 cm x 45 cm
Size of Pit :	2 m x 2 m x 1.5 m
Test Depth below EGL :	1.5 m
Test Level (RL) :	204.9 m
Survey Co-ordinates :	1306 E , 534 N



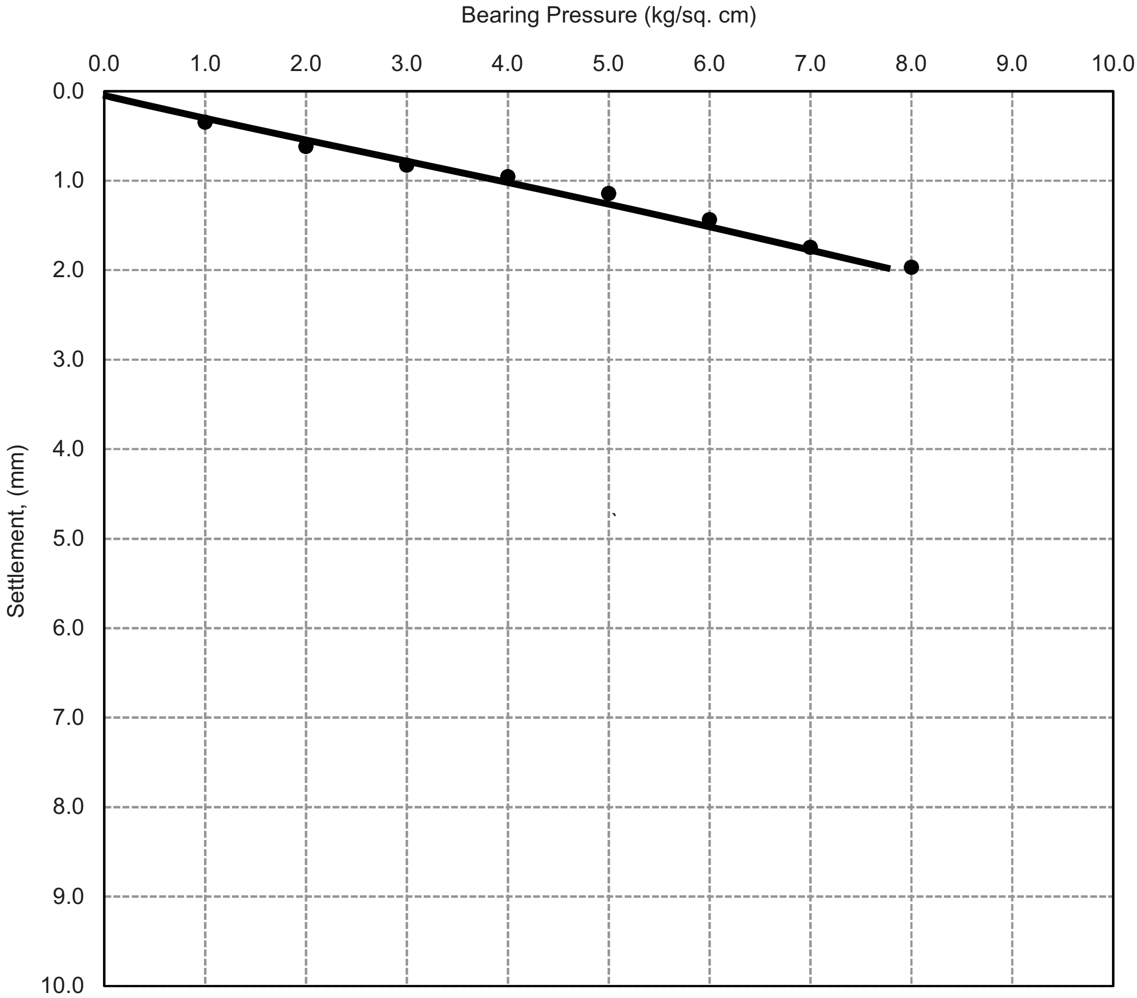
Ultimate Bearing Capacity of Test Plate (q_{ult}) : > 8.0 kg/cm^2

Bearing Pressure vs. Settlement

Plate Load Test (PLT)

IS: 1888-1982, RA-2007

Test Details	
Test No.:	PLT_5
Location:	PAY LOADER SHED
Size of Plate :	45 cm x 45 cm
Size of Pit :	2 m x 2 m x 1.5 m
Test Depth below EGL :	1.5 m
Test Level (RL) :	206.8 m
Survey Co-ordinates :	1436 E , 770 N



Ultimate Bearing Capacity of Test Plate (q_{ult}) : > 8.0 kg/cm^2

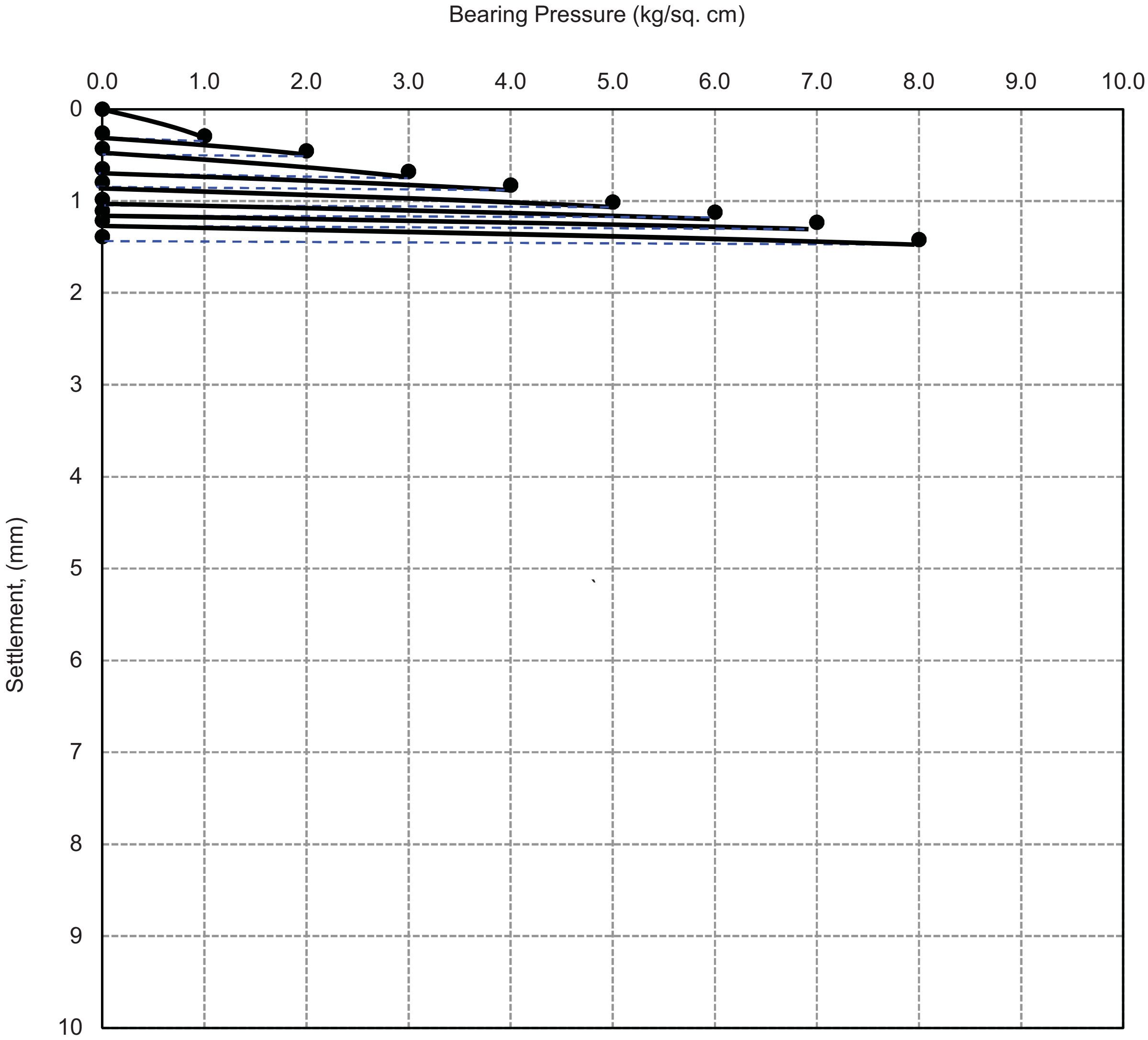
Bearing Pressure vs. Settlement

CYCLIC PLATE LOAD TEST RESULTS

Cyclic Plate Load Test No.: CPLT-1

IS: 1888-1982, RA-2007

Test Details	
Size of Plate :	45cm x 45cm
Size of Pit :	2 m x 2 m x 2m
Test Depth :	2.0 m
Test Level (RL) :	205.0 m
Co-ordinates :	1151 E , 778 N



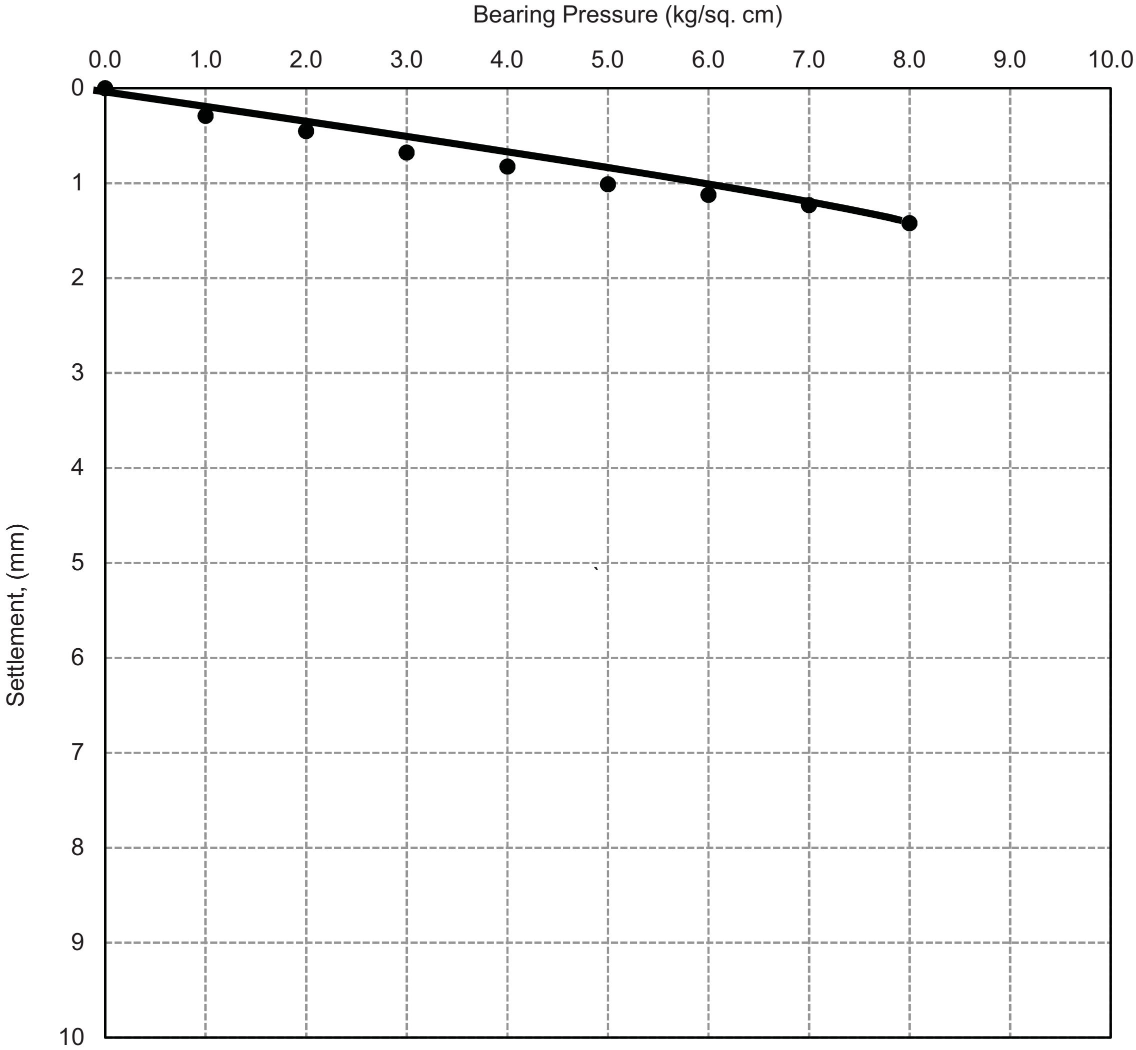
Ultimate Bearing Capacity (q_{ult}) : > 8.0 kg/cm^2

Bearing Pressure vs. Settlement (CPLT-1)

Cyclic Plate Load Test No.: CPLT-1

IS: 1888-1982, RA-2007

Test Details	
Size of Plate :	45cm x 45cm
Size of Pit :	2 m x 2 m x 2m
Test Depth :	2.0 m
Test Level (RL) :	205.0 m
Co-ordinates :	1151 E , 778 N



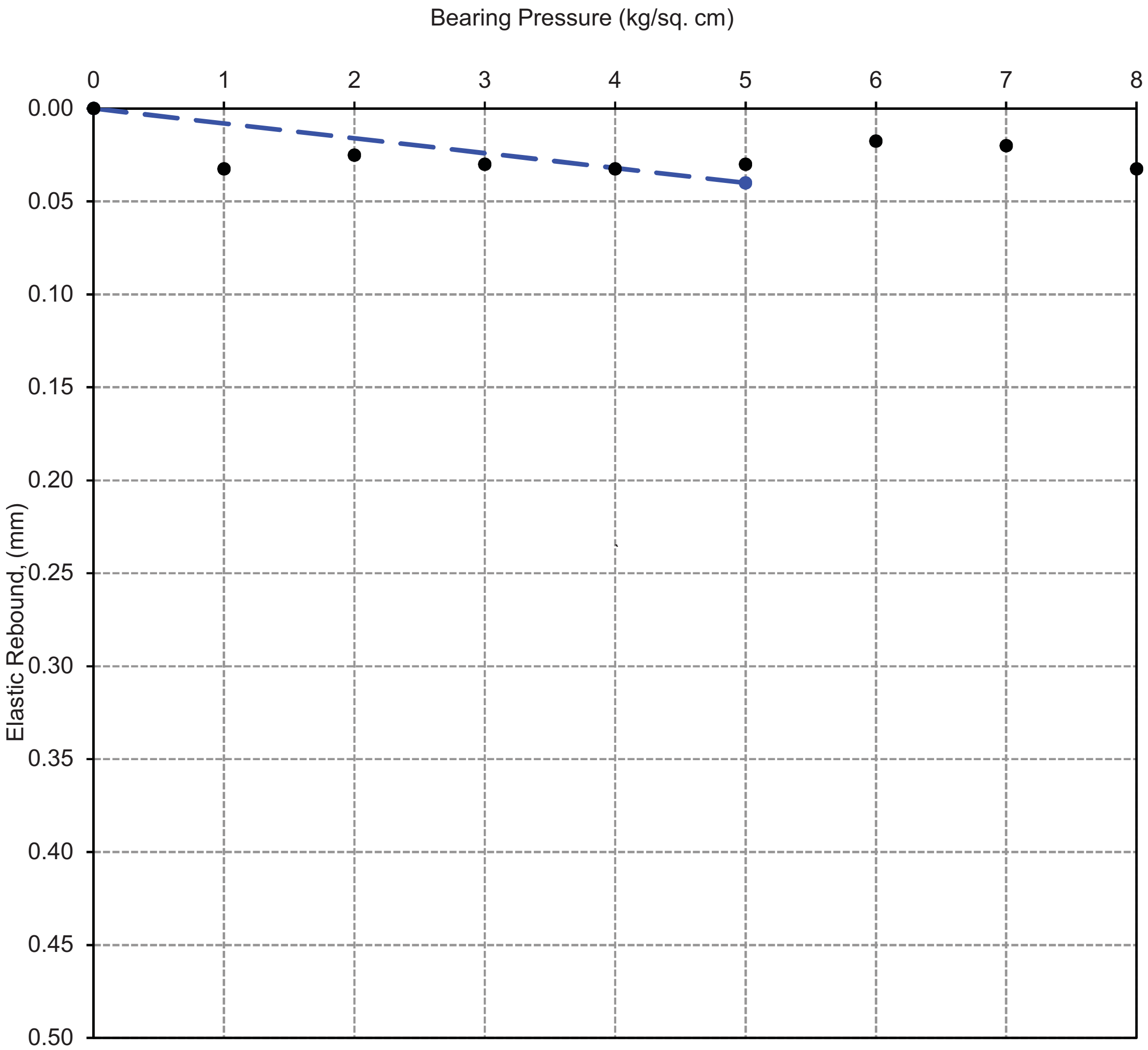
Ultimate Bearing Capacity (q_{ult}) : > 8.0 kg/cm^2

Bearing Pressure vs. Settlement (CPLT-1)

Cyclic Plate Load Test No.: CPLT-1

IS: 1888-1982, RA-2007

Test Details
Size of Plate : 45cm x 45cm
Size of Pit : 2 m x 2 m x 2m
Test Depth : 2.0 m
Test Level (RL) : 205.0 m
Co-ordinates : 1151 E , 778 N



Ultimate Bearing Capacity (q_{ult}) : > 8.0 kg/cm^2

Coefficient of uniform elastic compression for test plate C_u : 1250 kg/cm^3

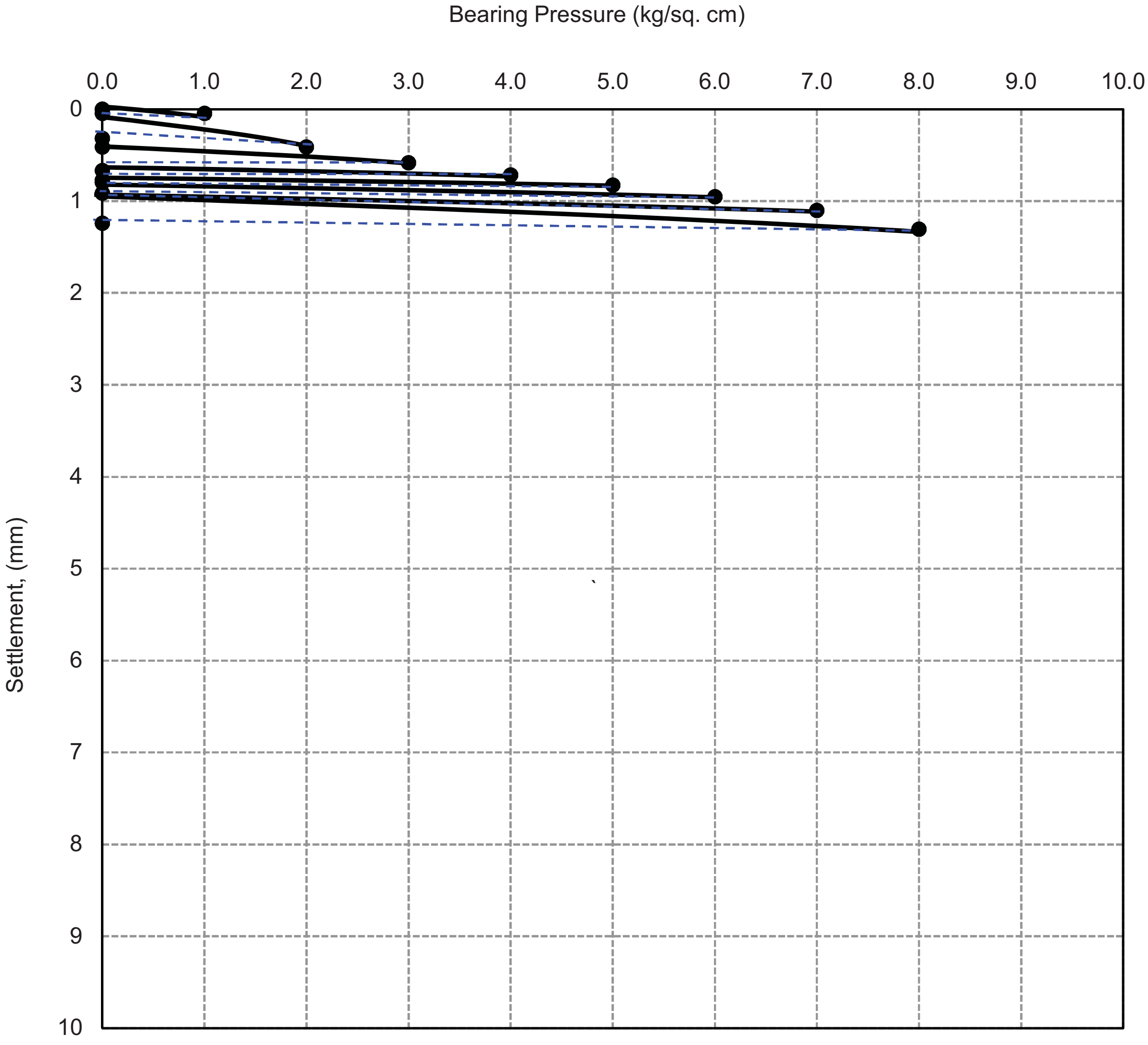
Coefficient of uniform elastic compression for 10m^2 area C_u : 237.1 kg/cm^3

Determination of Coefficient of Uniform Elastic Compression (CPLT-1)

Cyclic Plate Load Test No.: CPLT-2

IS: 1888-1982, RA-2007

Test Details	
Size of Plate :	45cm x 45cm
Size of Pit :	2 m x 2 m x 2m
Test Depth :	2.0 m
Test Level (RL) :	205.5 m
Co-ordinates :	1151 E , 664 N



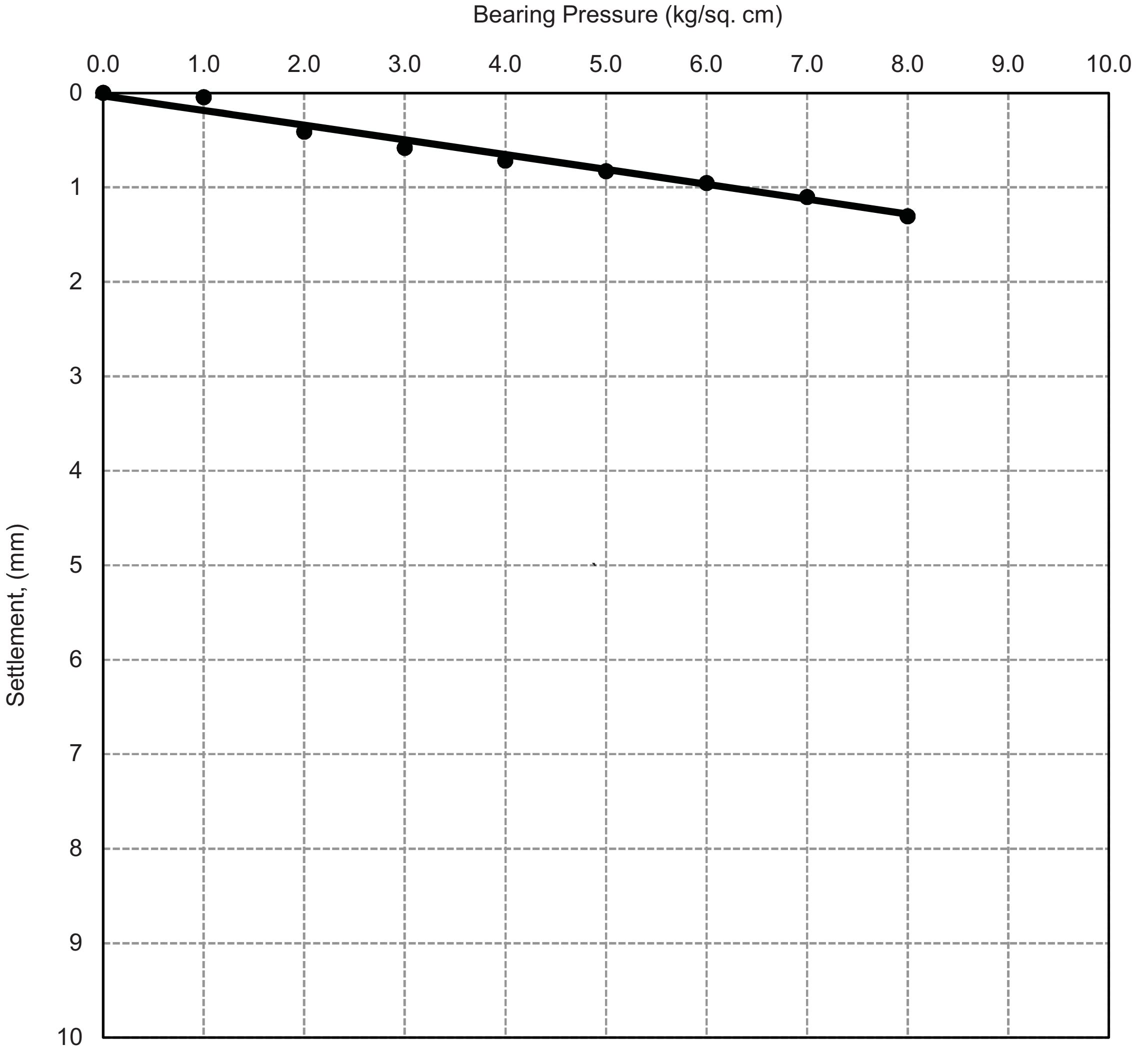
Ultimate Bearing Capacity (q_{ult}) : > 8.0 kg/cm^2

Bearing Pressure vs. Settlement (CPLT-2)

Cyclic Plate Load Test No.: CPLT-2

IS: 1888-1982, RA-2007

Test Details	
Size of Plate :	45cm x 45cm
Size of Pit :	2 m x 2 m x 2m
Test Depth :	2.0 m
Test Level (RL) :	205.5 m
Co-ordinates :	1151 E , 664 N



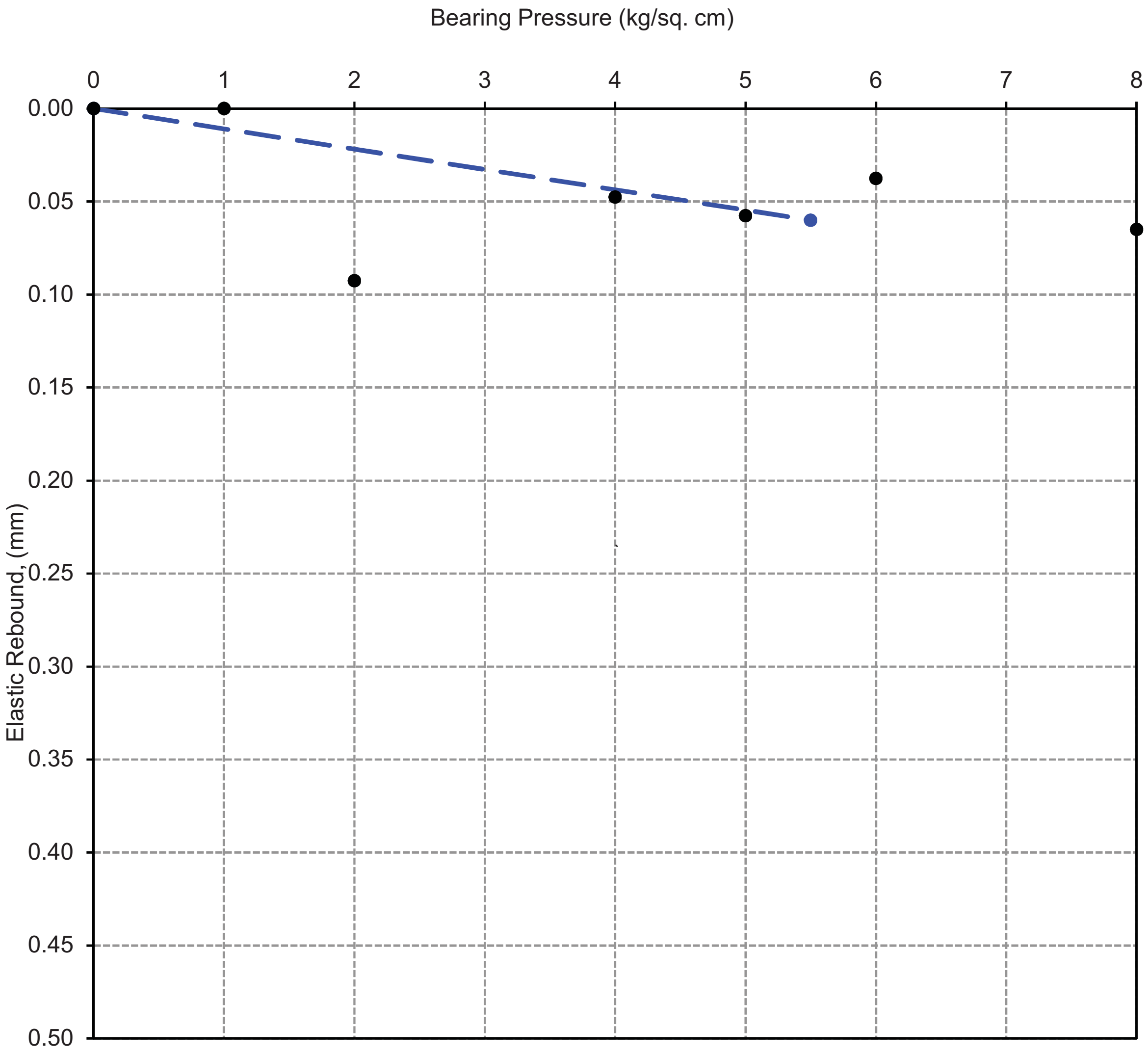
Ultimate Bearing Capacity (q_{ult}) : > 8.0 kg/cm^2

Bearing Pressure vs. Settlement (CPLT-2)

Cyclic Plate Load Test No.: CPLT-2

IS: 1888-1982, RA-2007

Test Details	
Size of Plate :	45cm x 45cm
Size of Pit :	2 m x 2 m x 2m
Test Depth :	2.0 m
Test Level (RL) :	205.5 m
Co-ordinates :	1151 E , 664 N



Ultimate Bearing Capacity (q_{ult}) : > 8.0 kg/cm^2

Coefficient of uniform elastic compression for test plate C_u : 916.7 kg/cm^3

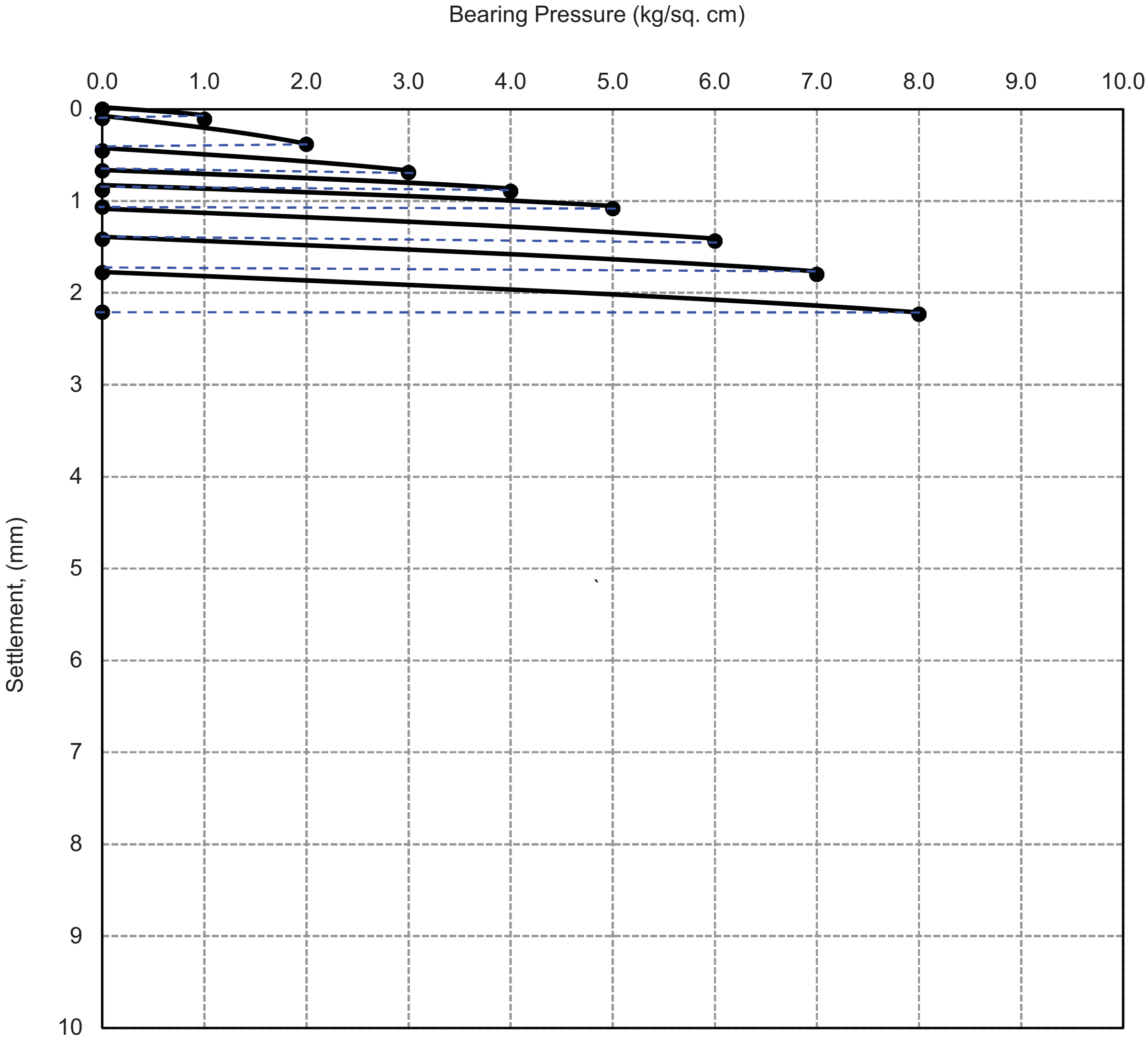
Coefficient of uniform elastic compression for $10m^2$ area C_u : 173.9 kg/cm^3

Determination of Coefficient of Uniform Elastic Compression (CPLT-2)

Cyclic Plate Load Test No.: CPLT-3

IS: 1888-1982, RA-2007

Test Details	
Size of Plate :	45cm x 45cm
Size of Pit :	2 m x 2 m x 2m
Test Depth :	2.0 m
Test Level (RL) :	206.1 m
Co-ordinates :	1138 E , 536 N



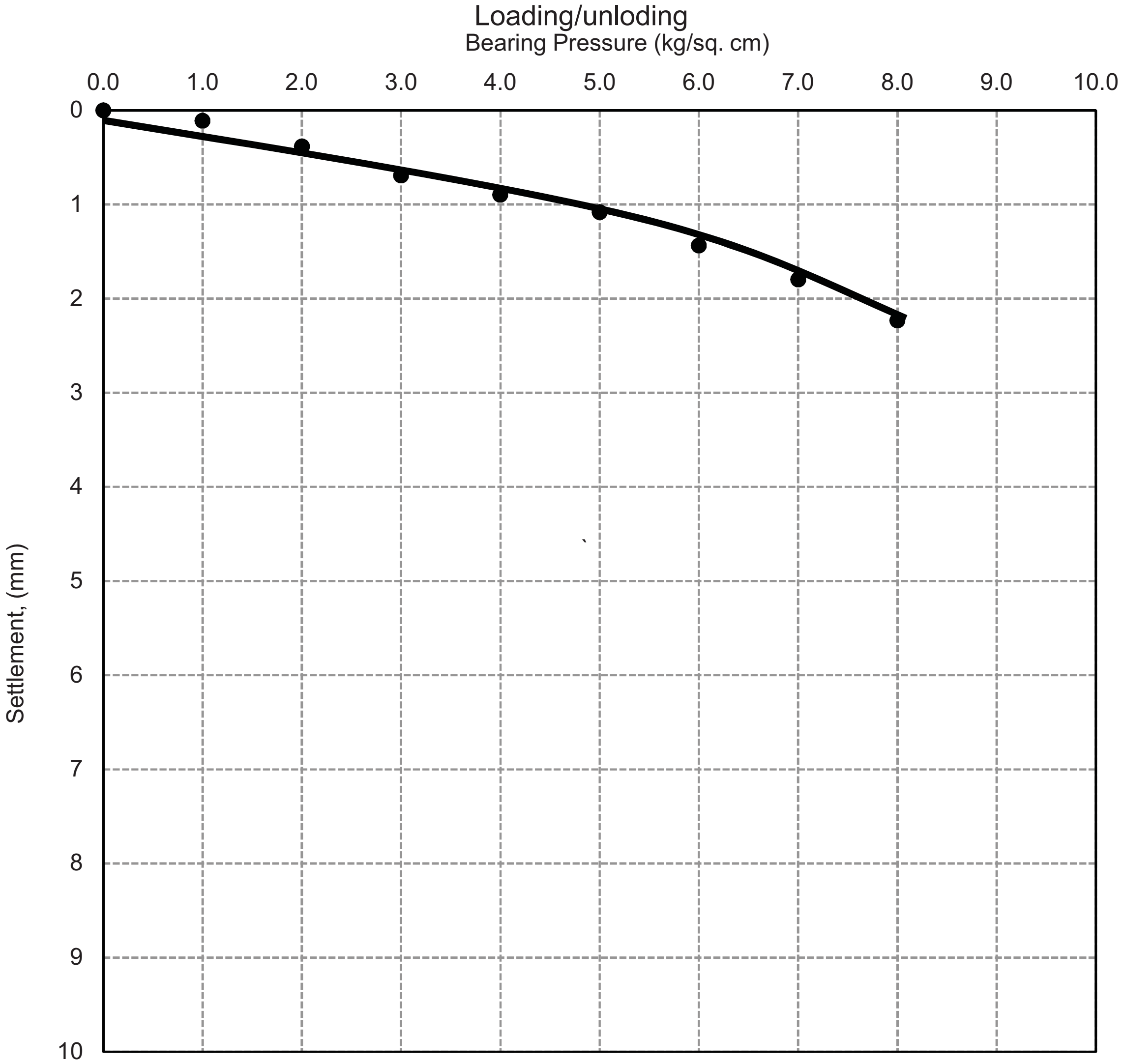
Ultimate Bearing Capacity (q_{ult}) : > 8.0 kg/cm^2

Bearing Pressure vs. Settlement (CPLT-3)

Cyclic Plate Load Test No.: CPLT-3

IS: 1888-1982, RA-2007

Test Details	
Size of Plate :	45cm x 45cm
Size of Pit :	2 m x 2 m x 2m
Test Depth :	2.0 m
Test Level (RL) :	206.1 m
Co-ordinates :	1138 E , 536 N



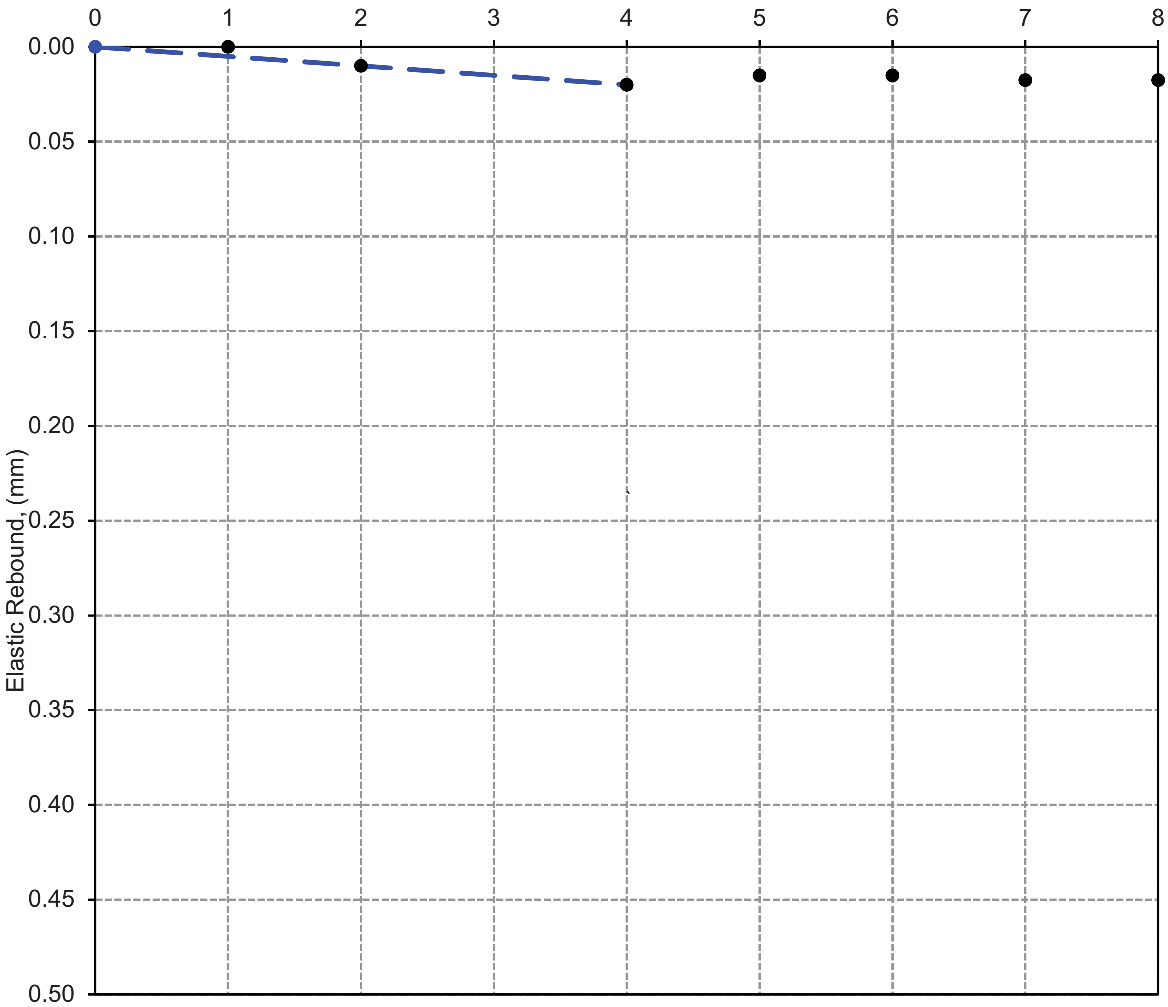
Ultimate Bearing Capacity (q_{ult}) : > 8.0 kg/cm^2

Bearing Pressure vs. Settlement (CPLT-3)

Cyclic Plate Load Test No.: CPLT-3

IS: 1888-1982, RA-2007

Test Details
Size of Plate : 45cm x 45cm
Size of Pit : 2 m x 2 m x 2m
Test Depth : 2.0 m
Test Level (RL) : 206.1 m
Co-ordinates : 1138 E , 536 N



Ultimate Bearing Capacity (q_{ult}) : > 8.0 kg/cm^2

Coefficient of uniform elastic compression for test plate C_u : 2000 kg/cm^3

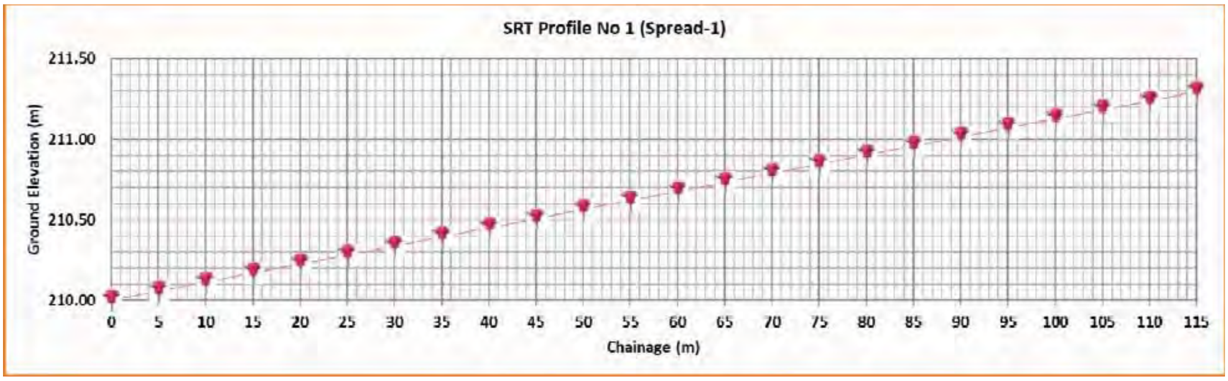
Coefficient of uniform elastic compression for $10m^2$ area C_u : 379.4 kg/cm^3

Determination of Coefficient of Uniform Elastic Compression (CPLT-3)

SEISMIC REFRACTION TEST RESULTS

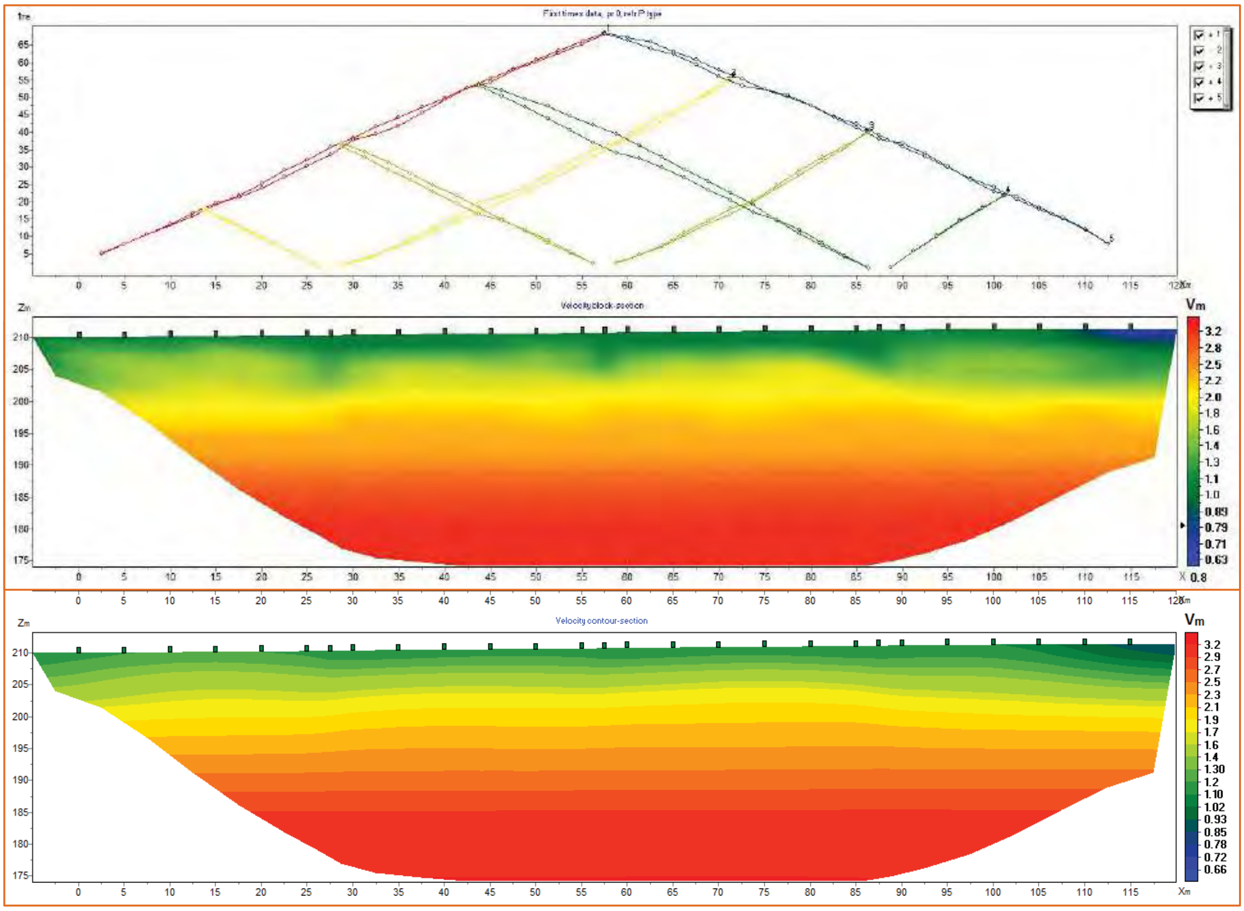
Spread-1 of SRT Profile No.1:

The Spread - 1 was laid from CH 0 to CH 115 m. The ground elevation profile of the spread varies from 210 m to 211.3 m as shown below:



Ground Elevation of Spread-1 / Profile-1

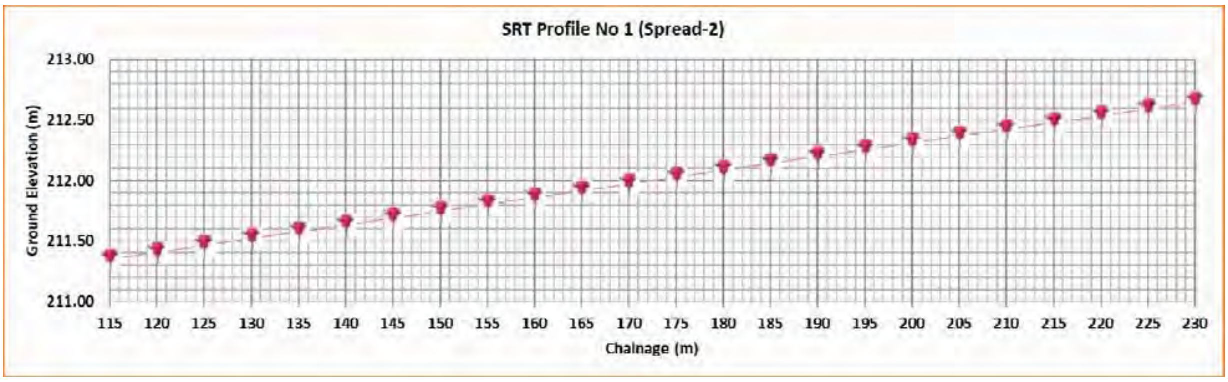
The P-Wave First Arrival Times, Velocity Block Section, and Velocity Contour Section of Spread-1 are presented below.



P-Wave Velocity Model of Spread -1 / Profile-1

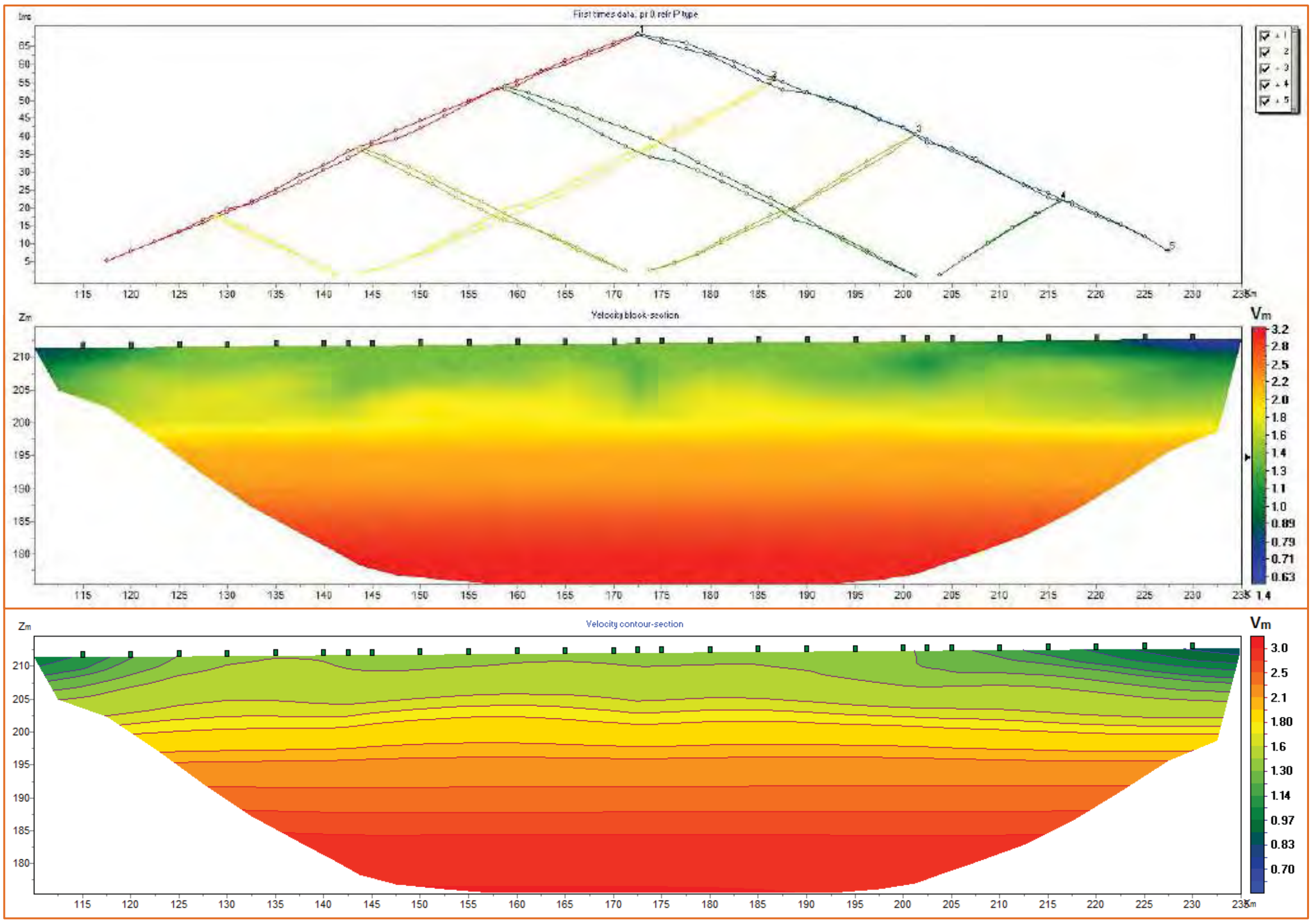
Spread-2 of SRT Profile No.1:

The Spread - 2 was laid from CH 115 to CH 230 m. The ground elevation profile of the spread varies from 211.3 m to 212.6 m as shown below:



Ground Elevation of Spread-2 / Profile-1

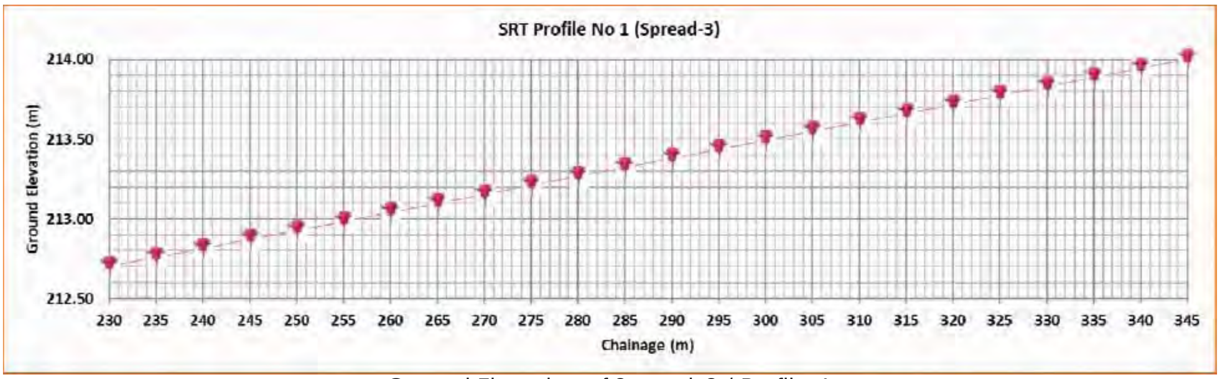
The P-Wave First Arrival Times, Velocity Block Section, and Velocity Contour Section of Spread-2 are presented below.



P-Wave Velocity Model of Spread -2 / Profile-1

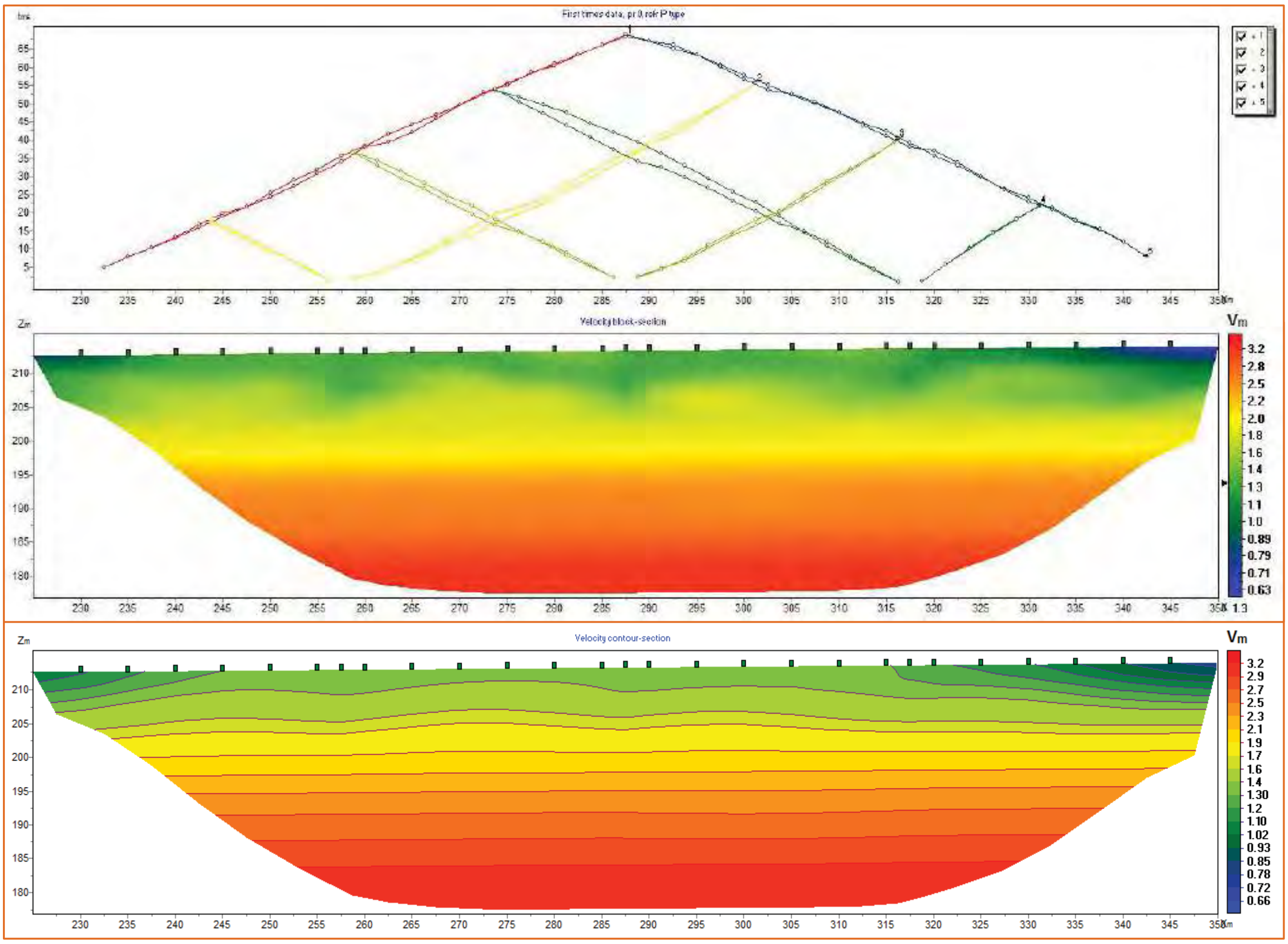
Spread-3 of SRT Profile No.1:

The Spread - 3 was laid from CH 230 to CH 345 m. The ground elevation profile of the spread varies from 212.6 m to 214 m as shown below:



Ground Elevation of Spread-3 / Profile-1

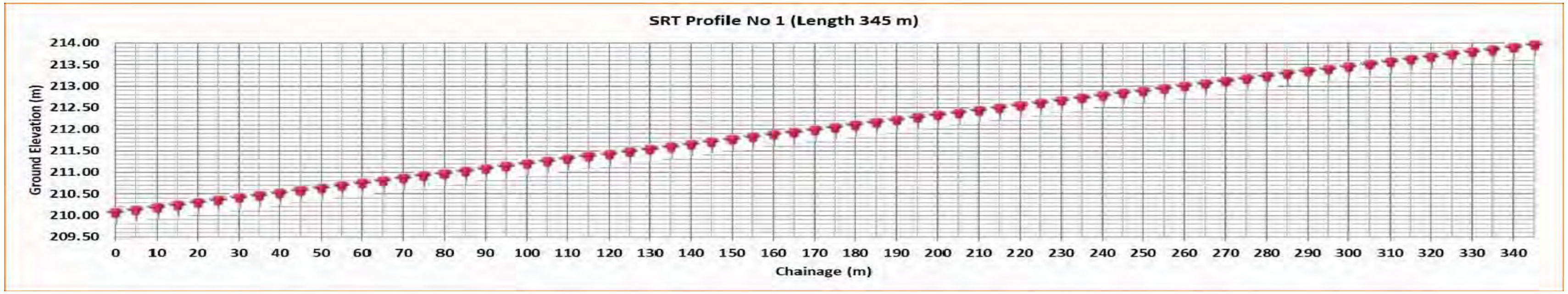
The P-Wave First Arrival Times, Velocity Block Section, and Velocity Contour Section of Spread-3 are presented below.



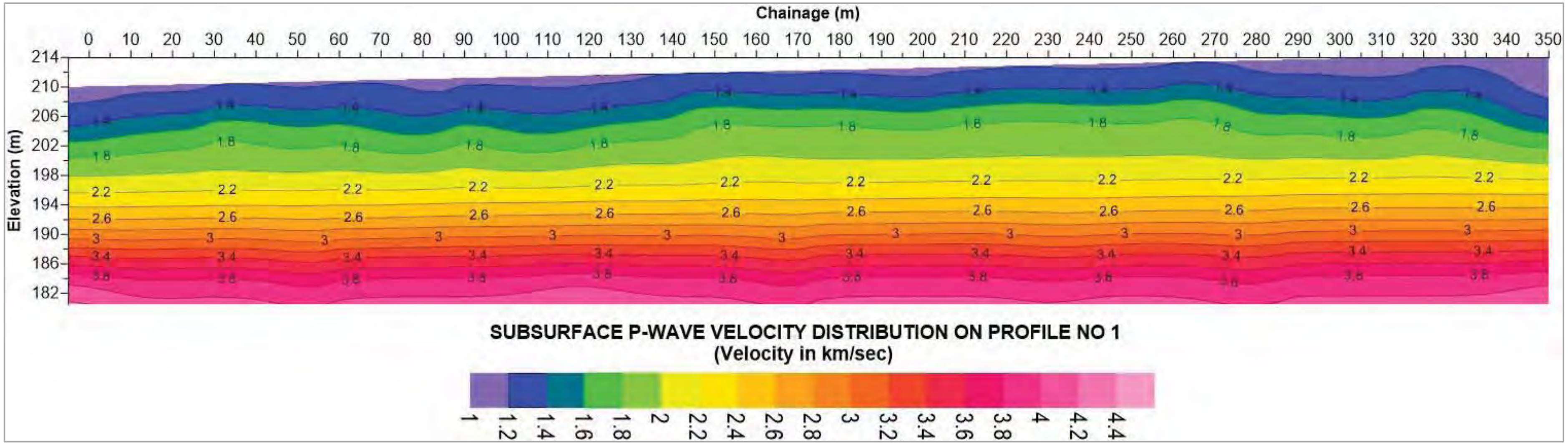
P-Wave Velocity Model of Spread -3 / Profile-1

INTEGRATED MODEL OF SRT PROFILE No 1

The results obtained from the velocity models generated for individual seismic spreads-1 to 3 are integrated to generate one continuous subsurface velocity model of SRT Profile No 1 as shown below:

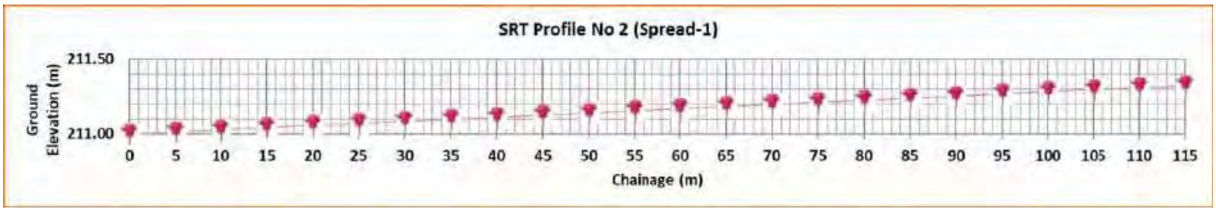


Ground Elevation of SRT Profile No 1



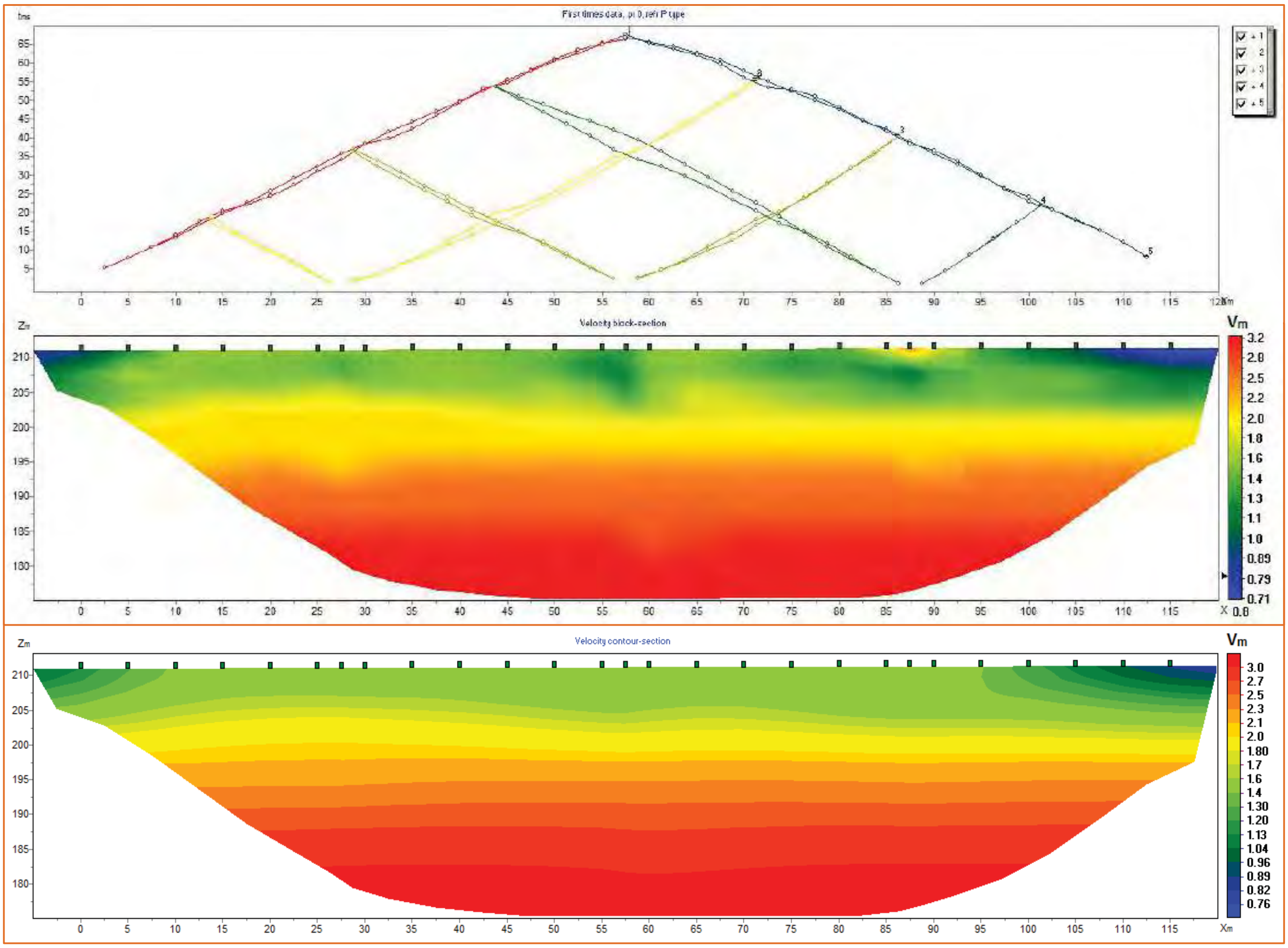
Spread-1 of SRT Profile No.2:

The Spread - 1 was laid from CH 0 to CH 115 m. The ground elevation profile of the spread varies from 211 m to 211.3 m as shown below:



Ground Elevation of Spread-1 / Profile-2

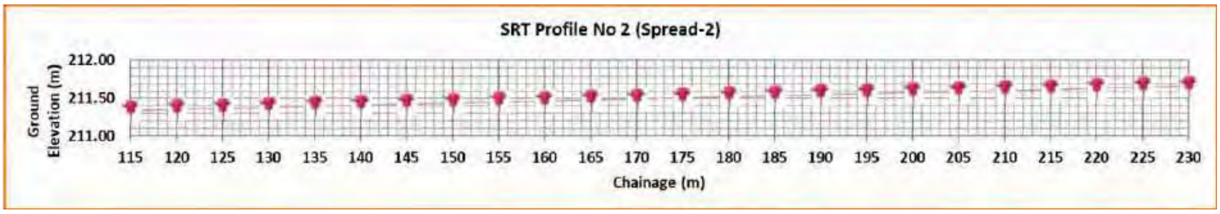
The P-Wave First Arrival Times, Velocity Block Section, and Velocity Contour Section of Spread-1 are presented below.



P-Wave Velocity Model of Spread -1 / Profile-2

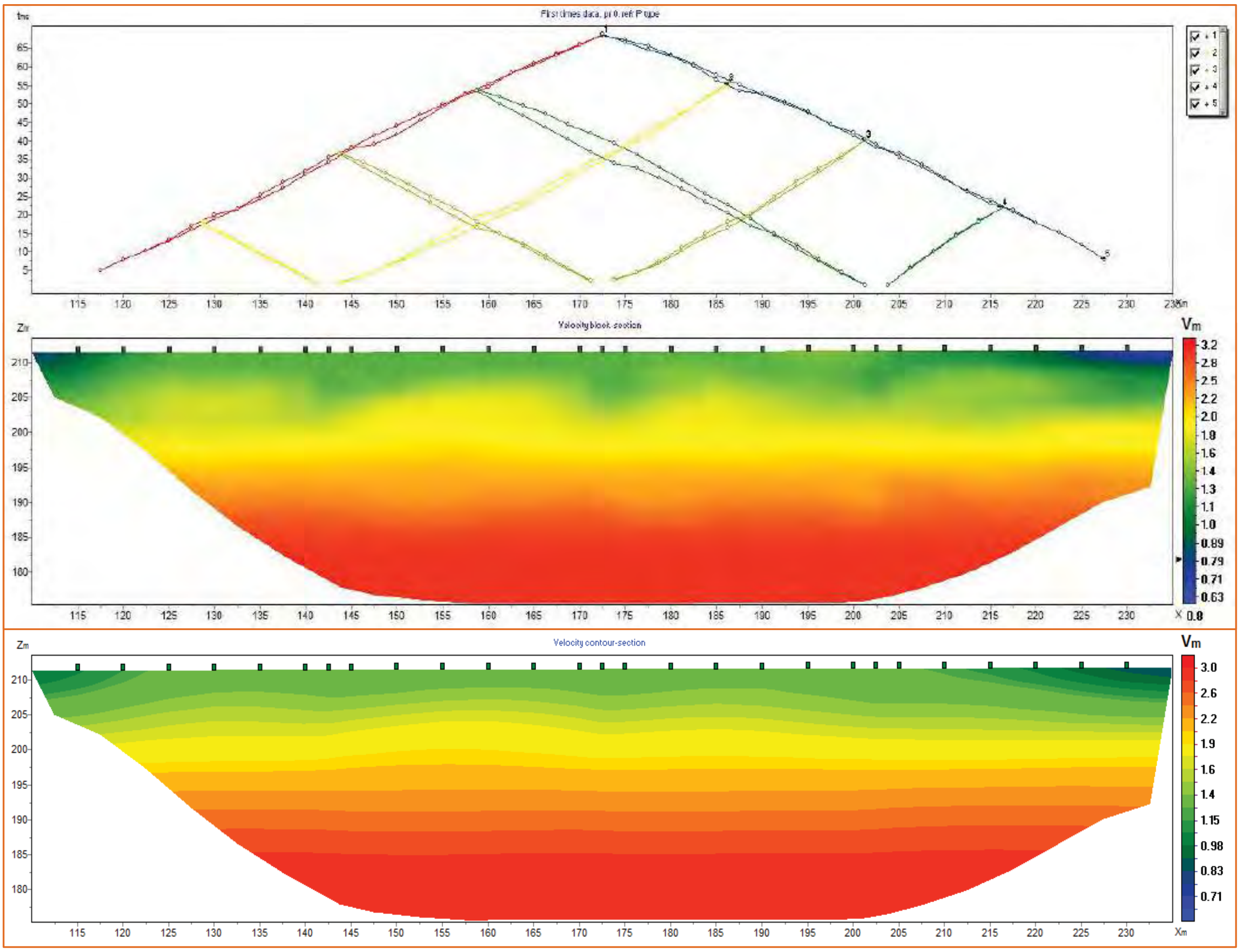
Spread-2 of SRT Profile No.2:

The Spread - 2 was laid from CH 115 to CH 230 m. The ground elevation profile of the spread varies from 211.3 m to 211.7 m as shown below:



Ground Elevation of Spread-2 / Profile-2

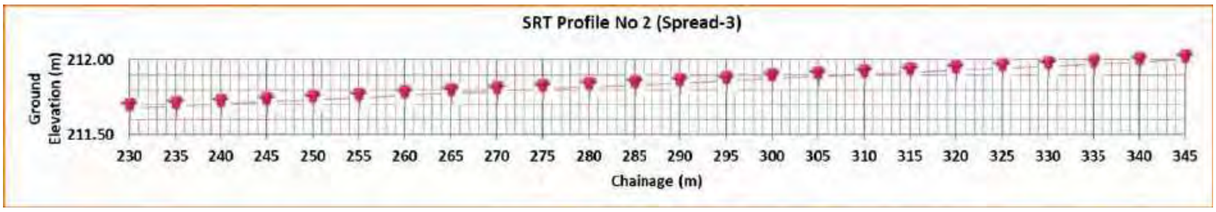
The P-Wave First Arrival Times, Velocity Block Section, and Velocity Contour Section of Spread-2 are presented below.



P-Wave Velocity Model of Spread -2 / Profile-2

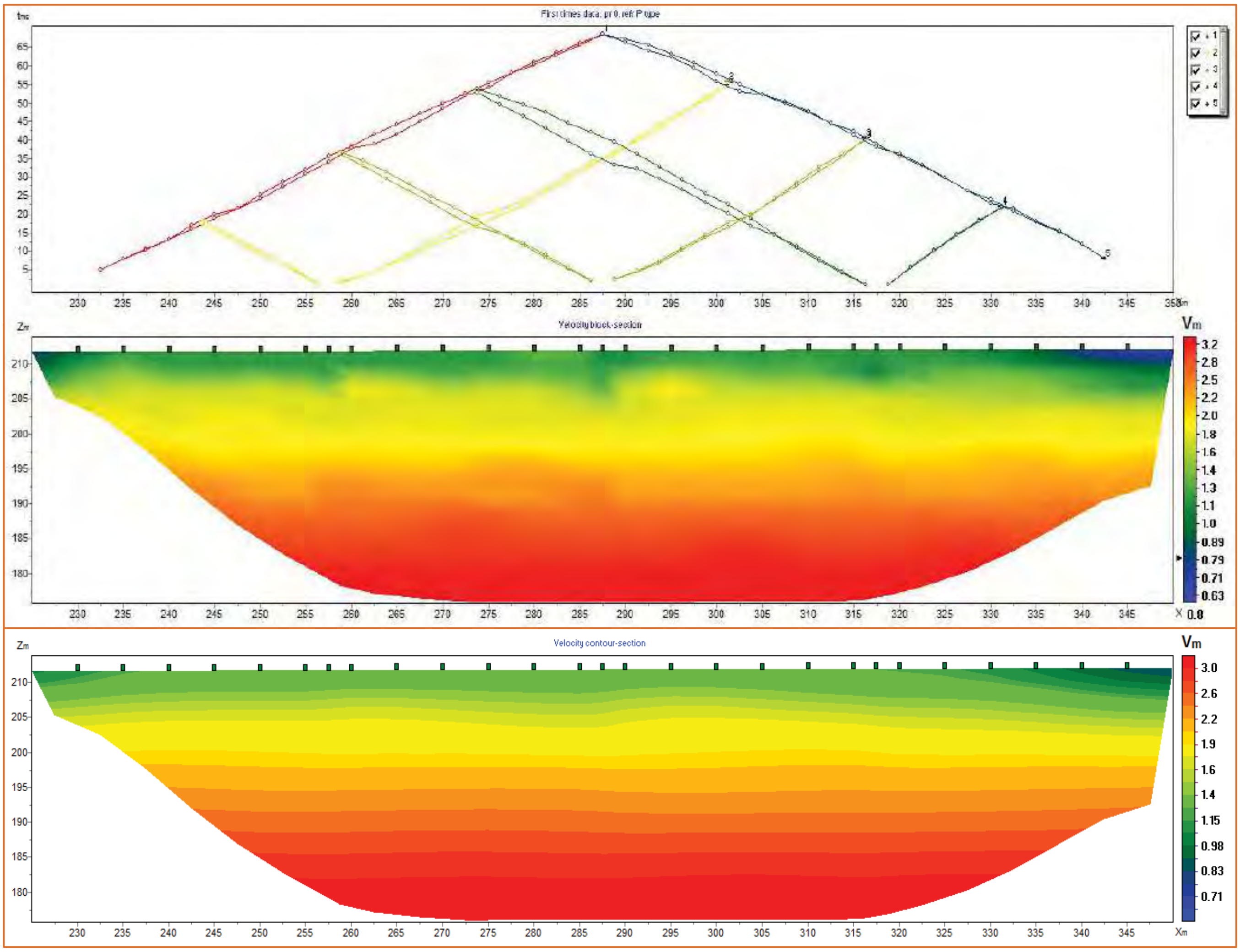
Spread-3 of SRT Profile No.2:

The Spread - 3 was laid from CH 230 to CH 345 m. The ground elevation profile of the spread varies from 211.7 m to 212 m as shown below:



Ground Elevation of Spread-3 / Profile-2

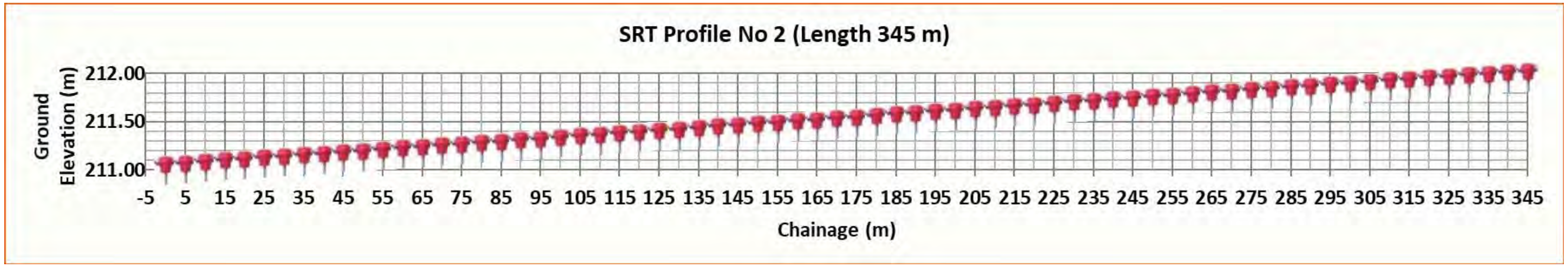
The P-Wave First Arrival Times, Velocity Block Section, and Velocity Contour Section of Spread-3 are presented below.



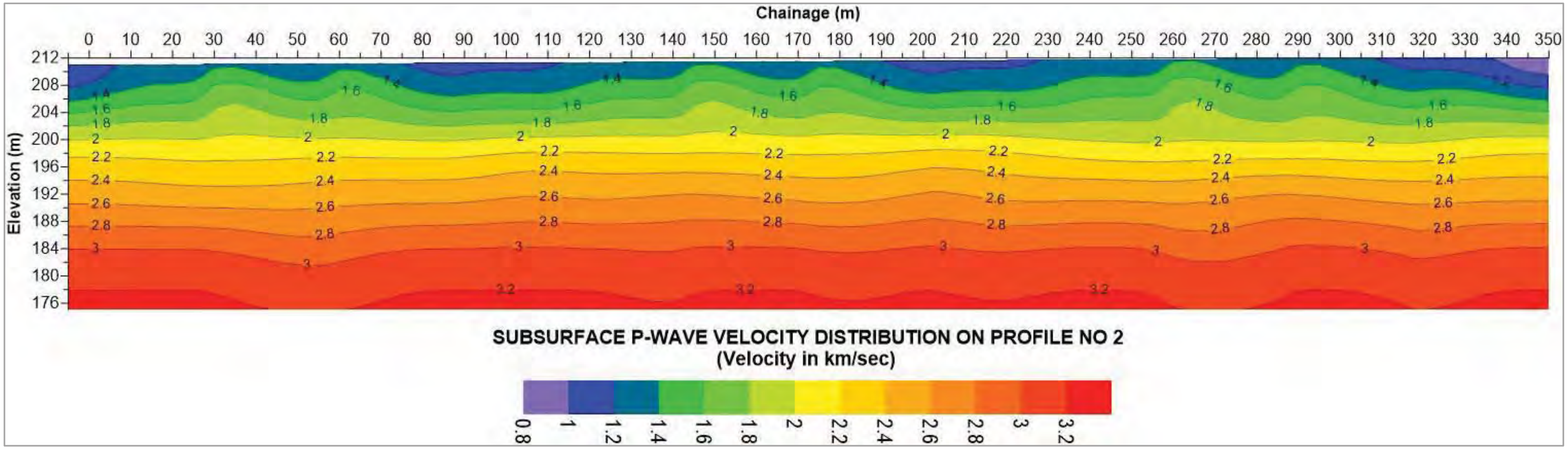
P-Wave Velocity Model of Spread -3 / Profile-2

INTEGRATED MODEL OF SRT PROFILE No 2

The results obtained from the velocity models generated for individual seismic spreads-1 to 3 are integrated to generate one continuous subsurface velocity model of SRT Profile No 2 as shown below:

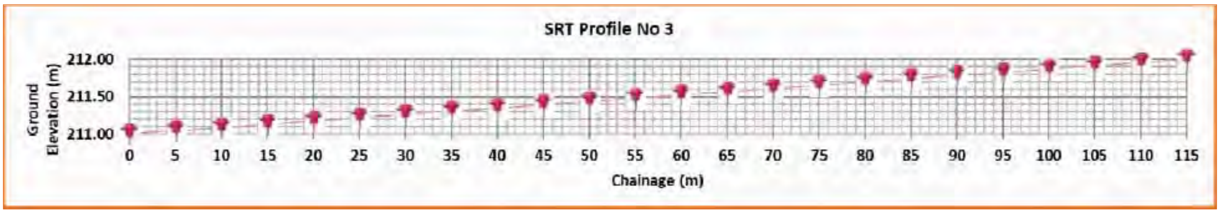


Ground Elevation of SRT Profile No 2



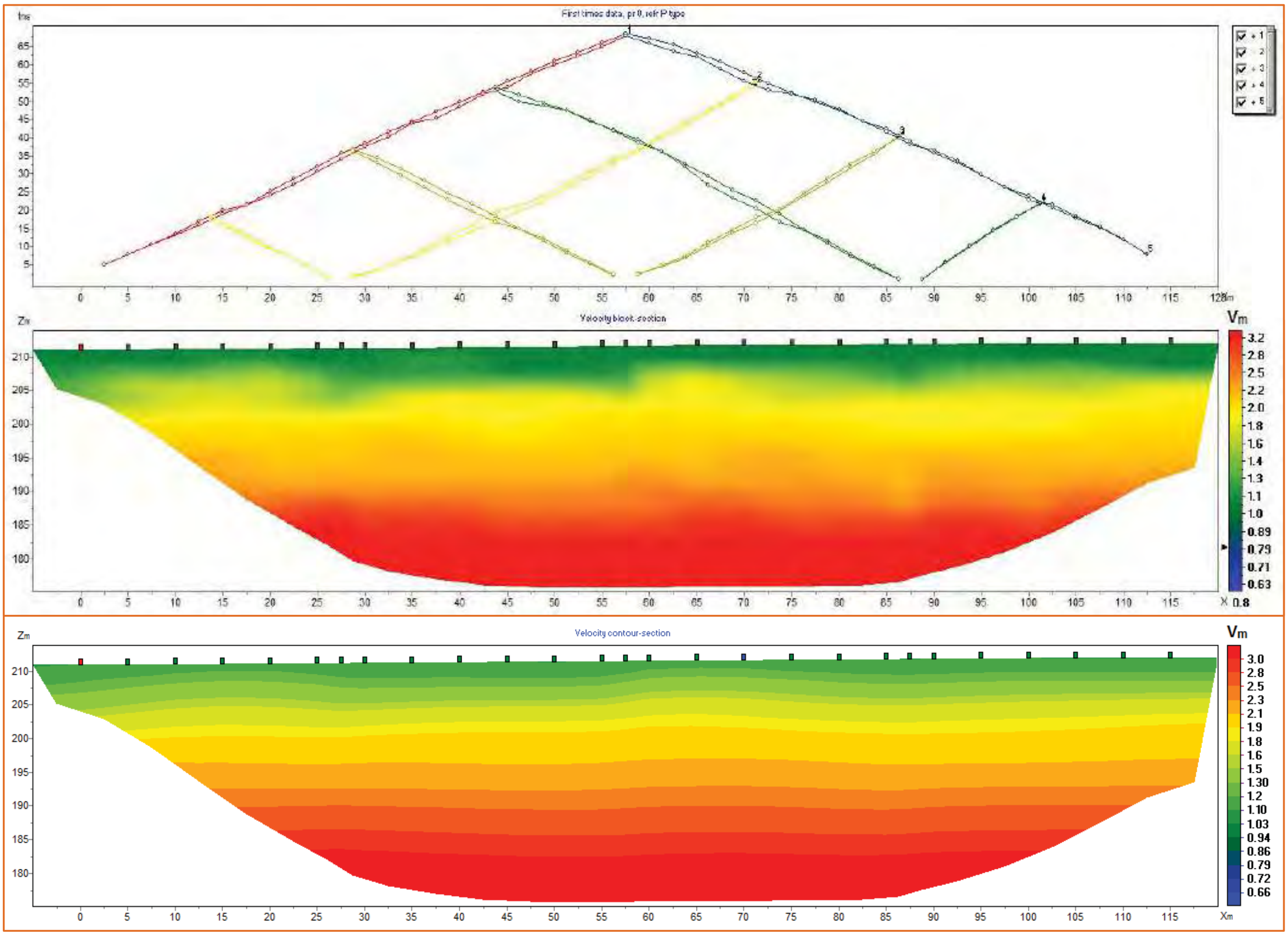
SRT PROFILE NO. 3:

The SRT Profile No 3 is 115 m long. The near-surface models showing variation of P wave velocity with depth for the spread length are discussed hereunder. The ground elevations of this profile vary from 211 m to 212 m as shown below:

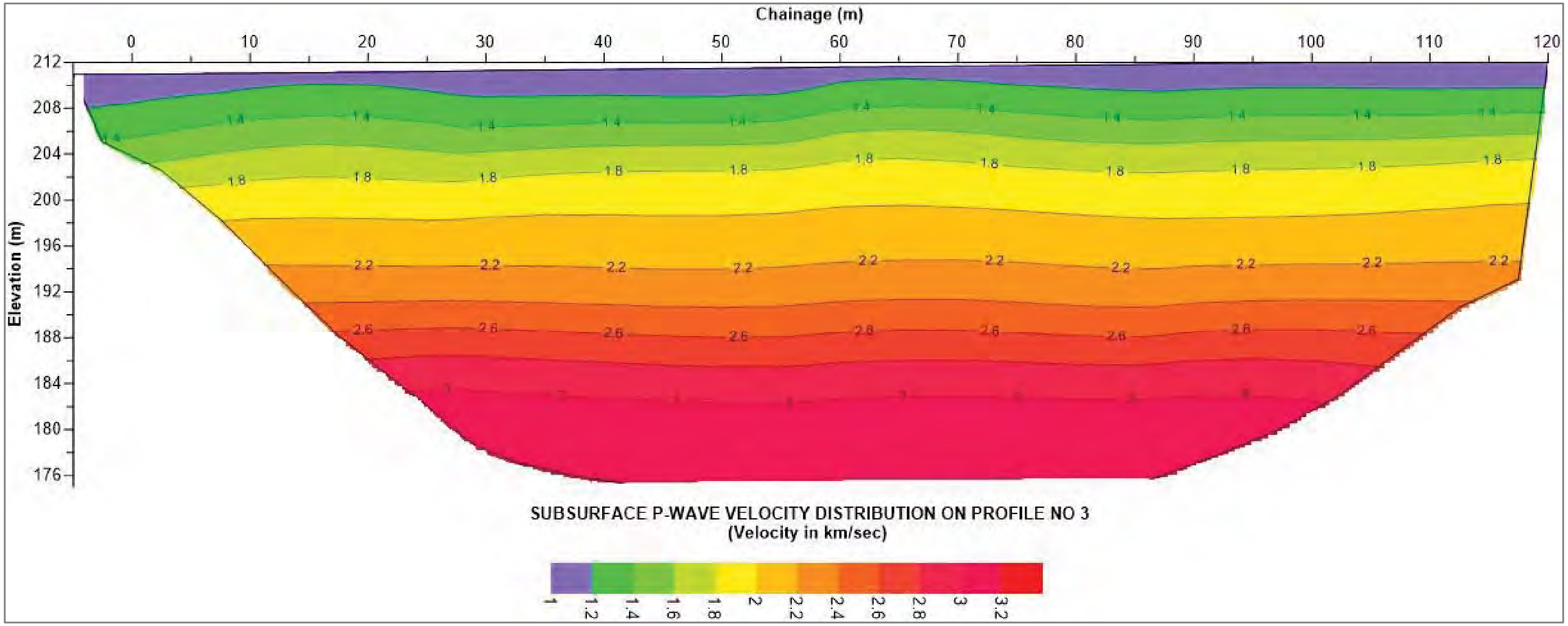


Ground Elevation of SRT Profile No 3

The P-Wave First Arrival Times, Velocity Block Section, and Velocity Contour Section of the Profile-3 are presented below.

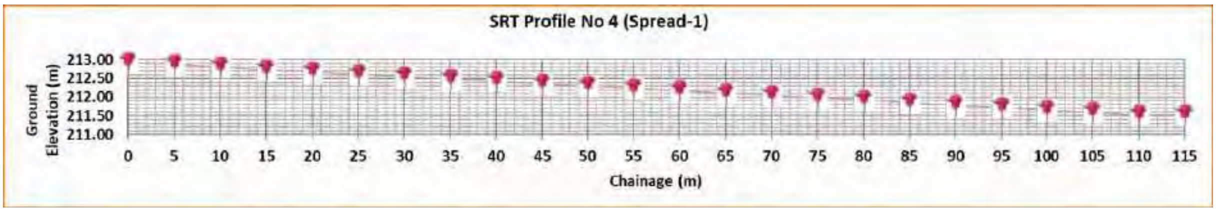


P-Wave Velocity Model of Profile-3


Chainage (m)
Elevation (m)
SUBSURFACE P-WAVE VELOCITY DISTRIBUTION ON PROFILE NO 3
(Velocity in km/sec)

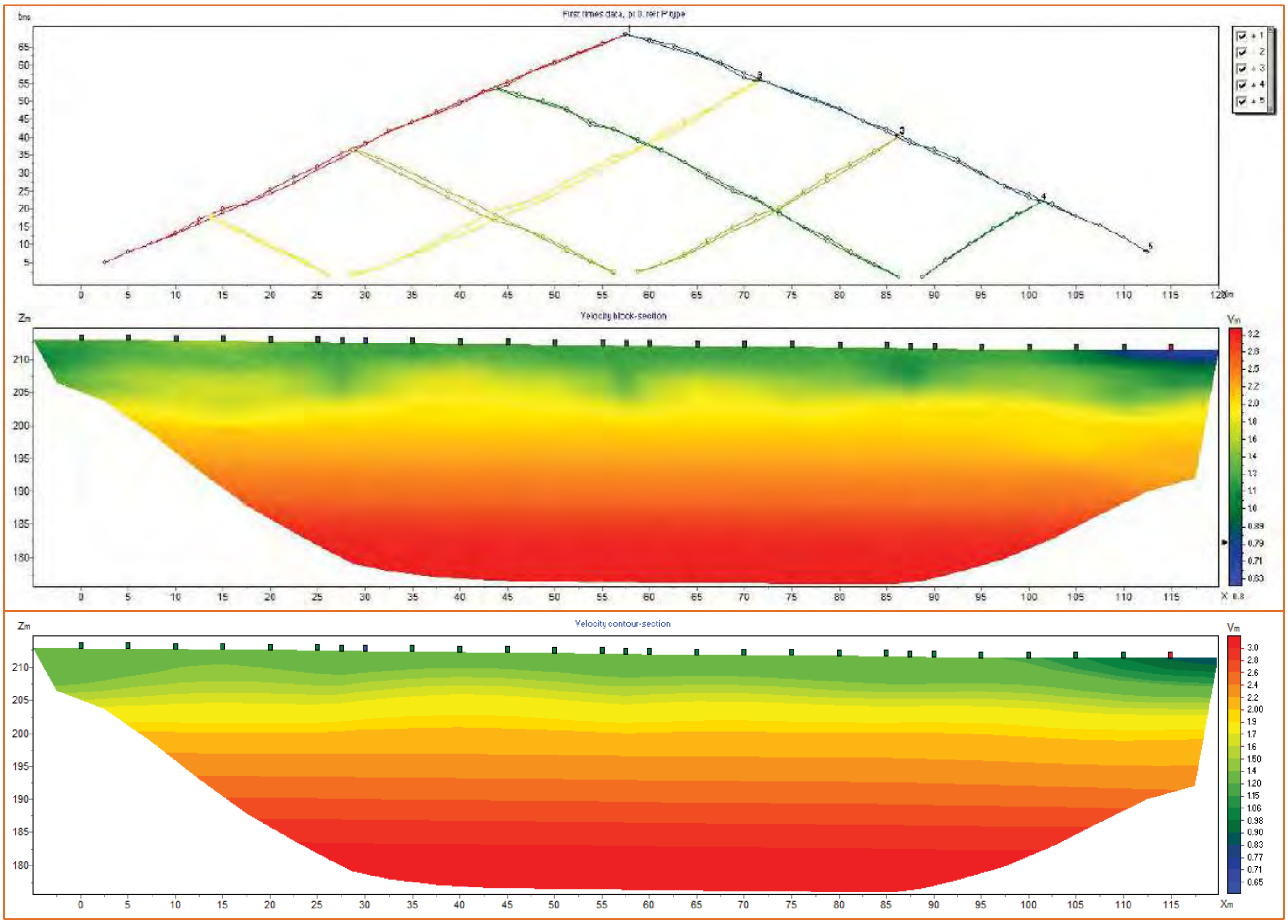
Spread-1 of SRT Profile No.4:

The Spread - 1 was laid from CH 0 to CH 115 m. The ground elevation profile of the spread varies from 211.5 m to 213 m as shown below:



Ground Elevation of Spread-1 / Profile-4

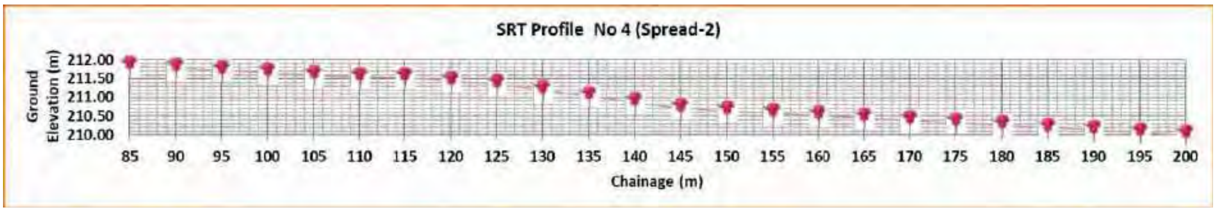
The P-Wave First Arrival Times, Velocity Block Section, and Velocity Contour Section of Spread-3 are presented below.



P-Wave Velocity Model of Spread -1 / Profile-4

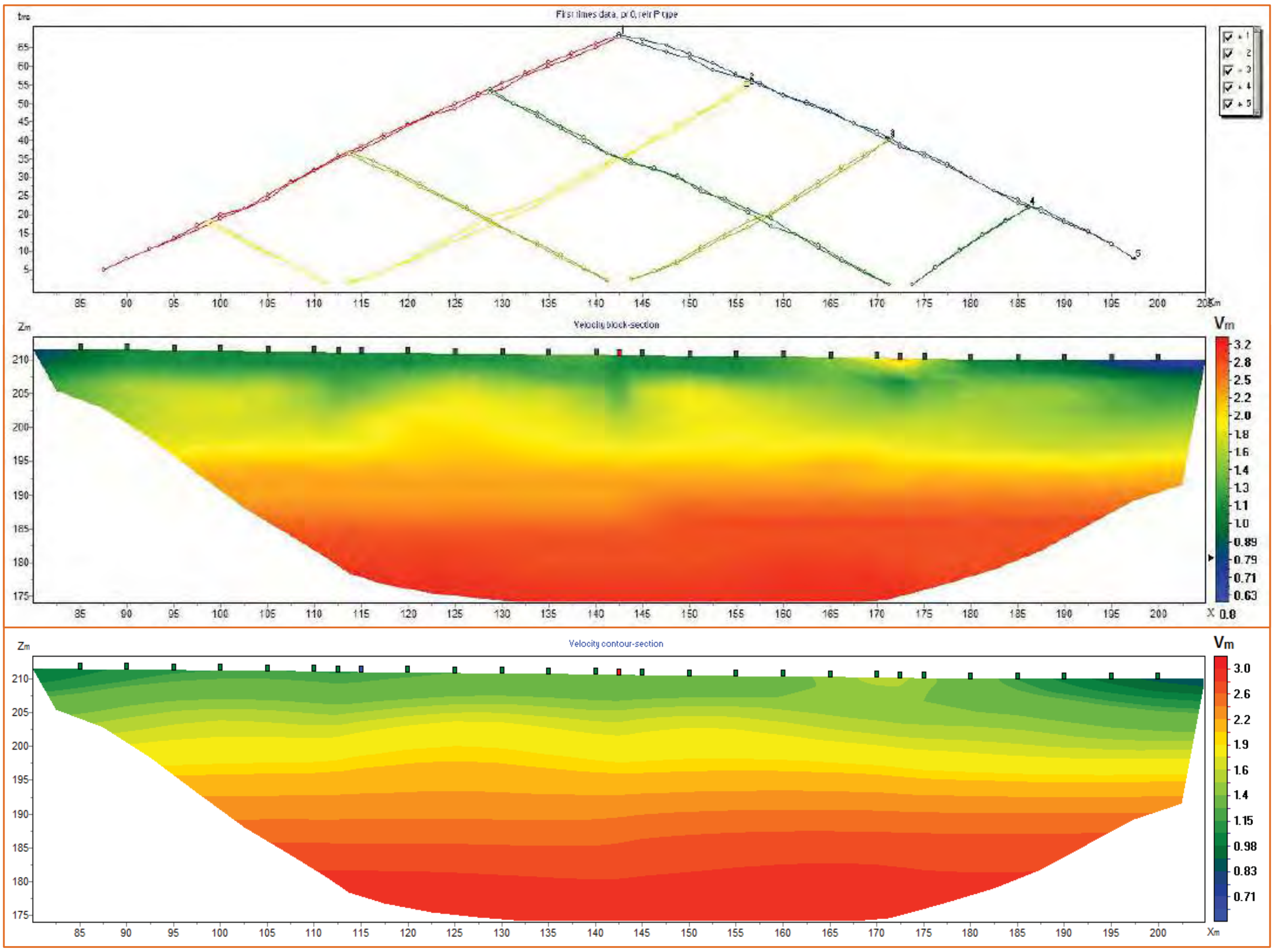
Spread-2 of SRT Profile No.4:

The Spread - 2 was laid from CH 85 to CH 200 m. The ground elevation profile of the spread varies from 212 m to 210 m as shown below:



Ground Elevation of Spread-2 / Profile-4

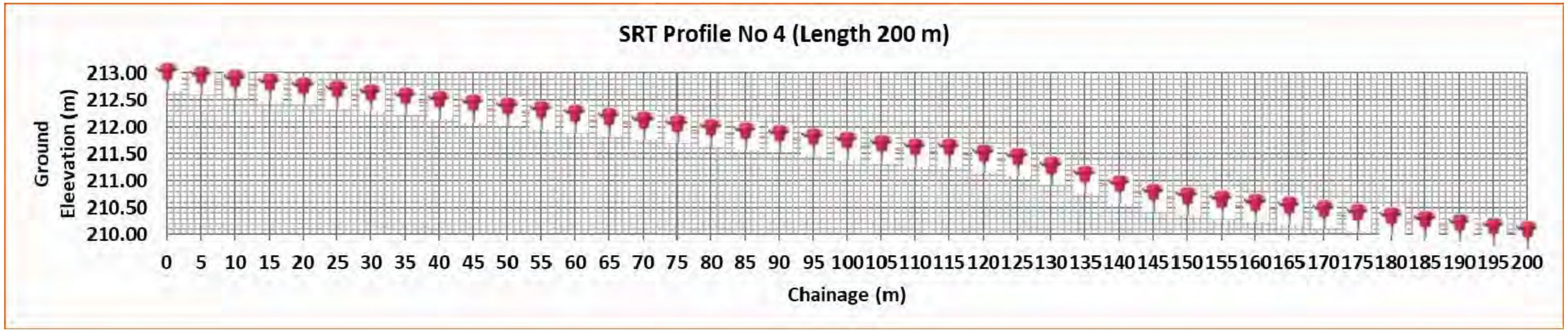
The P-Wave First Arrival Times, Velocity Block Section, and Velocity Contour Section of Spread-3 are presented below.



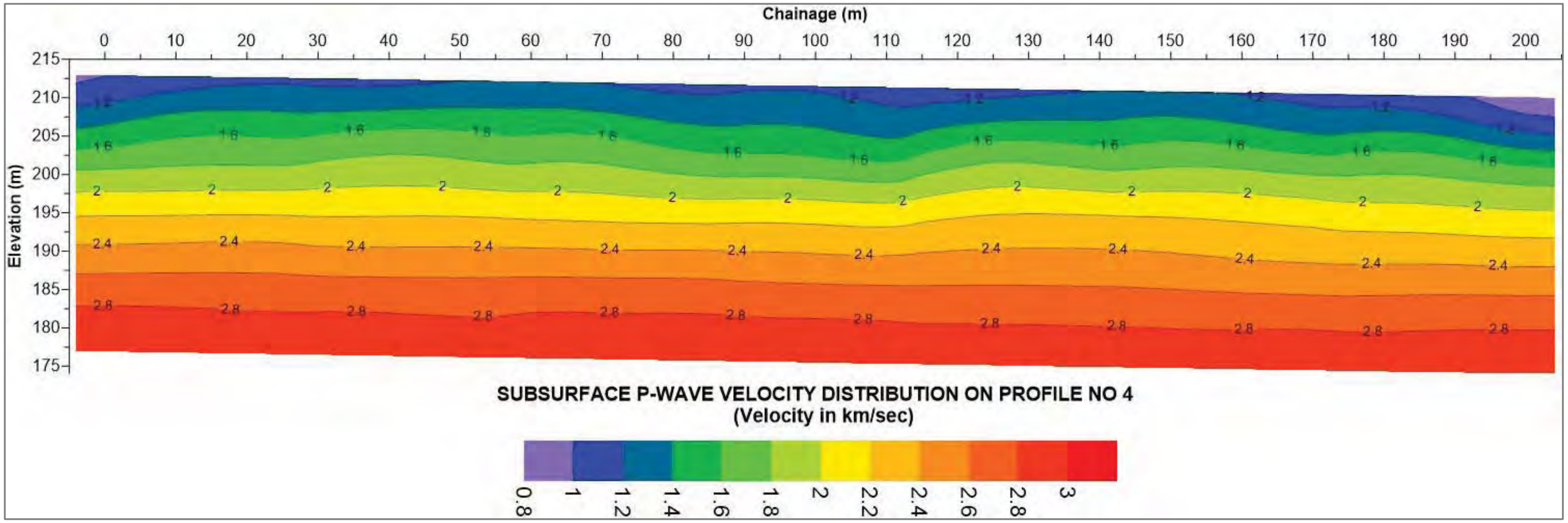
P-Wave Velocity Model of Spread -2 / Profile-4

INTEGRATED MODEL OF SRT PROFILE No 4

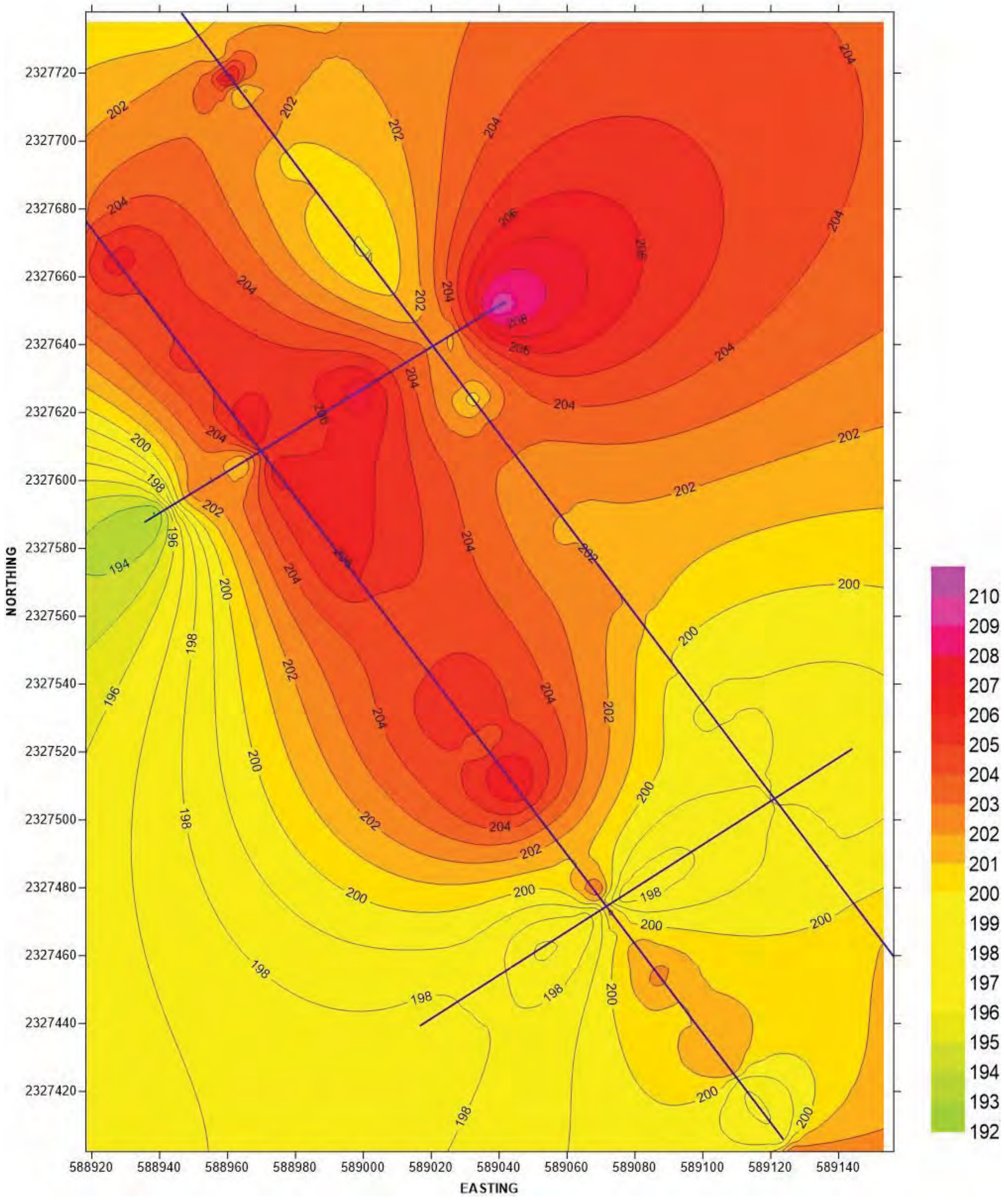
The results obtained from the velocity models generated for individual seismic spreads-1 and 2 are integrated to generate one continuous subsurface velocity model of SRT Profile No 4 as shown below:



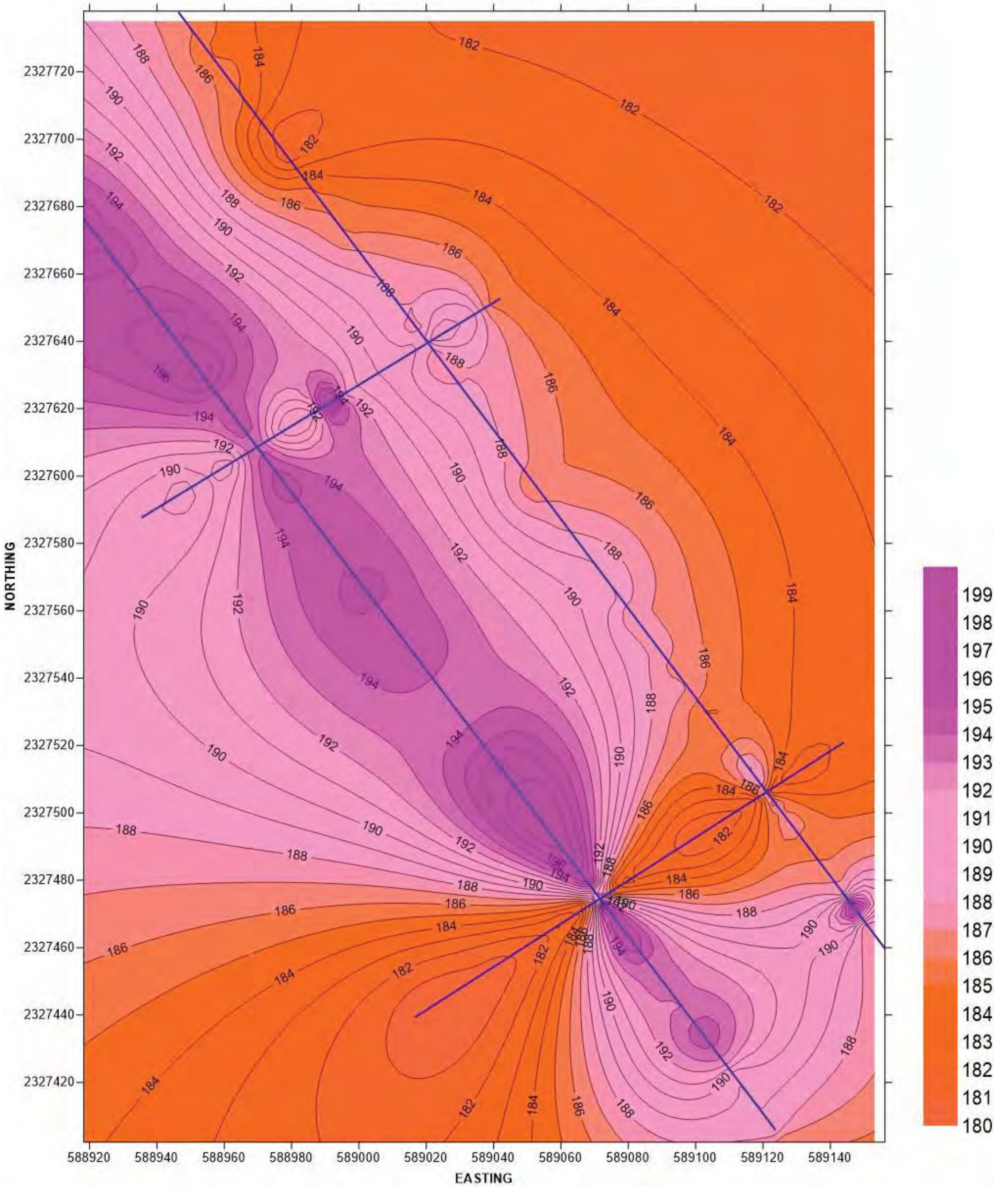
Ground Elevation of SRT Profile No 4



SUBSURFACE VARIATION OF TOP OF LAYER WITH VELOCITY 2000 M/S
(Contour Elevation Level in m)



SUBSURFACE VARIATION OF TOP OF LAYER WITH VELOCITY 2800 M/S
(Contour Elevation Level in m)



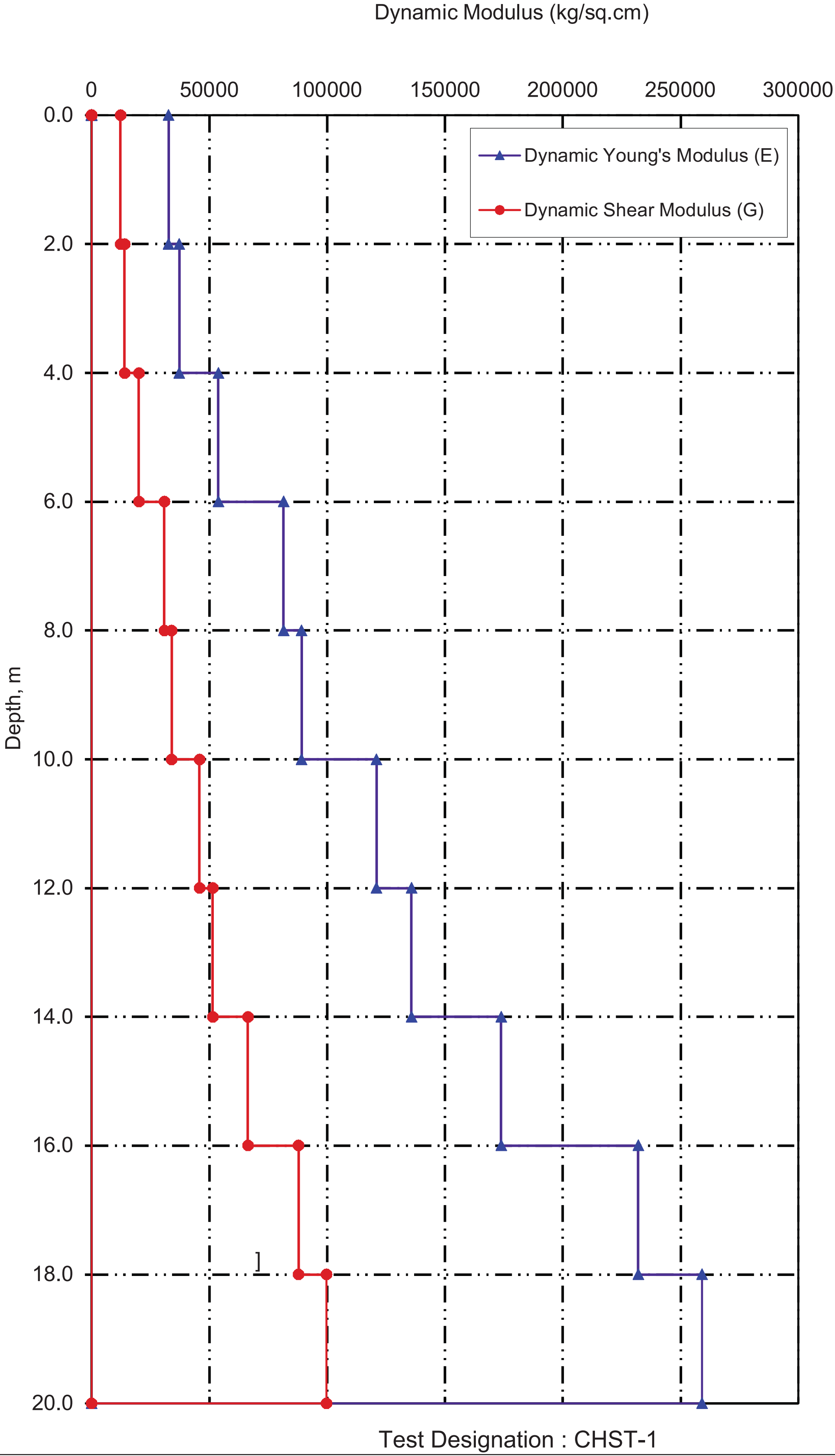
CROSS-HOLE SEISMIC TEST RESULTS

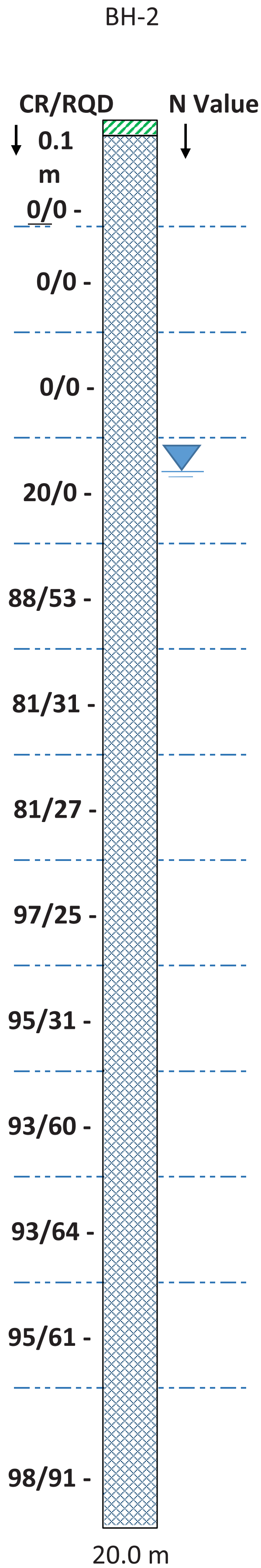
Depth, m	Stratigraphy (as per borelogs)	Measured Compression Wave Velocity, V_p (m/s)	Measured Shear Wave Velocity, V_s (m/s)	Bulk Density, γ (kg/m^3)	Poisson's Ratio, m	Dynamic Young's Modulus, E_{dyn} (MPa)	Dynamic Shear Modulus, G_{max} (MPa)	Coefficient of Elastic Uniform Compression, c_u (kg/cm^3)	Coefficient of Elastic Uniform Shear, c_τ (kg/cm^3)	Coefficient of Elastic Non-Uniform Compression, c_φ (kg/cm^3)	Coefficient of Elastic non-uniform Shear, c_ψ (kg/cm^3)
2.0	Basalt	1292	651	2850	0.33	3213	1208	131	79	273	118
4.0	Basalt	1378	694	2850	0.33	3651	1373	149	90	310	134
6.0	Basalt	1674	824	2900	0.34	5277	1969	217	130	451	196
8.0	Basalt	1986	1022	2900	0.32	7997	3029	325	195	674	292
10.0	Basalt	2045	1073	2900	0.31	8748	3339	353	212	732	317
12.0	Basalt	2420	1245	2900	0.32	11867	4495	482	289	1000	433
14.0	Basalt	2564	1319	2900	0.32	13320	5045	541	324	1122	486
16.0	Basalt	2855	1498	2900	0.31	17050	6508	687	412	1426	618
18.0	Basalt	3351	1724	2900	0.32	22755	8619	923	554	1917	831
20.0	Basalt	3435	1836	2900	0.30	25417	9776	1017	610	2112	916

Test Designation : CHST-1

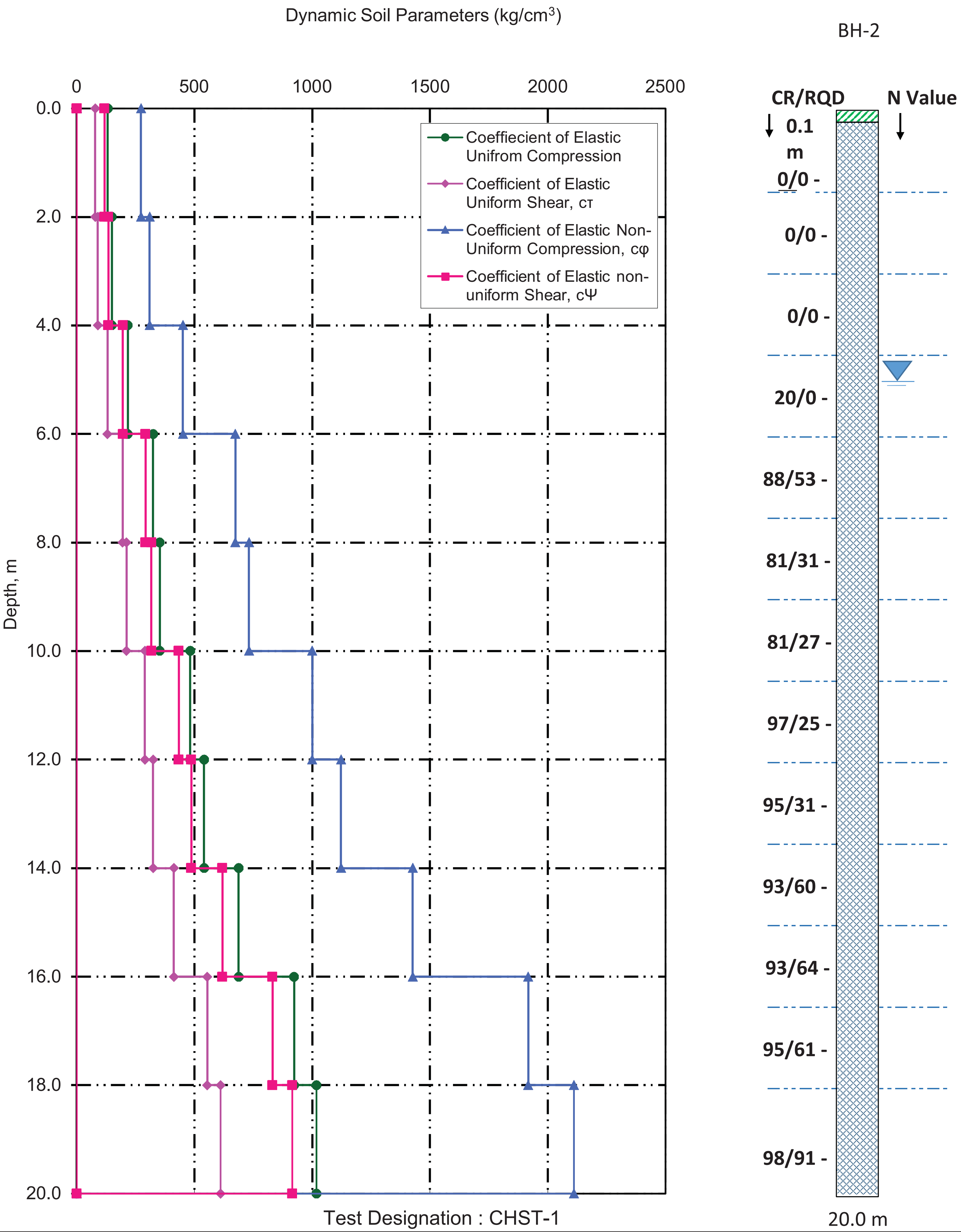
Measured Wave Velocities and Computed Dynamic Parameters

Wave Velocity vs Depth





Dynamic Shear and Young's Modulus vs Depth



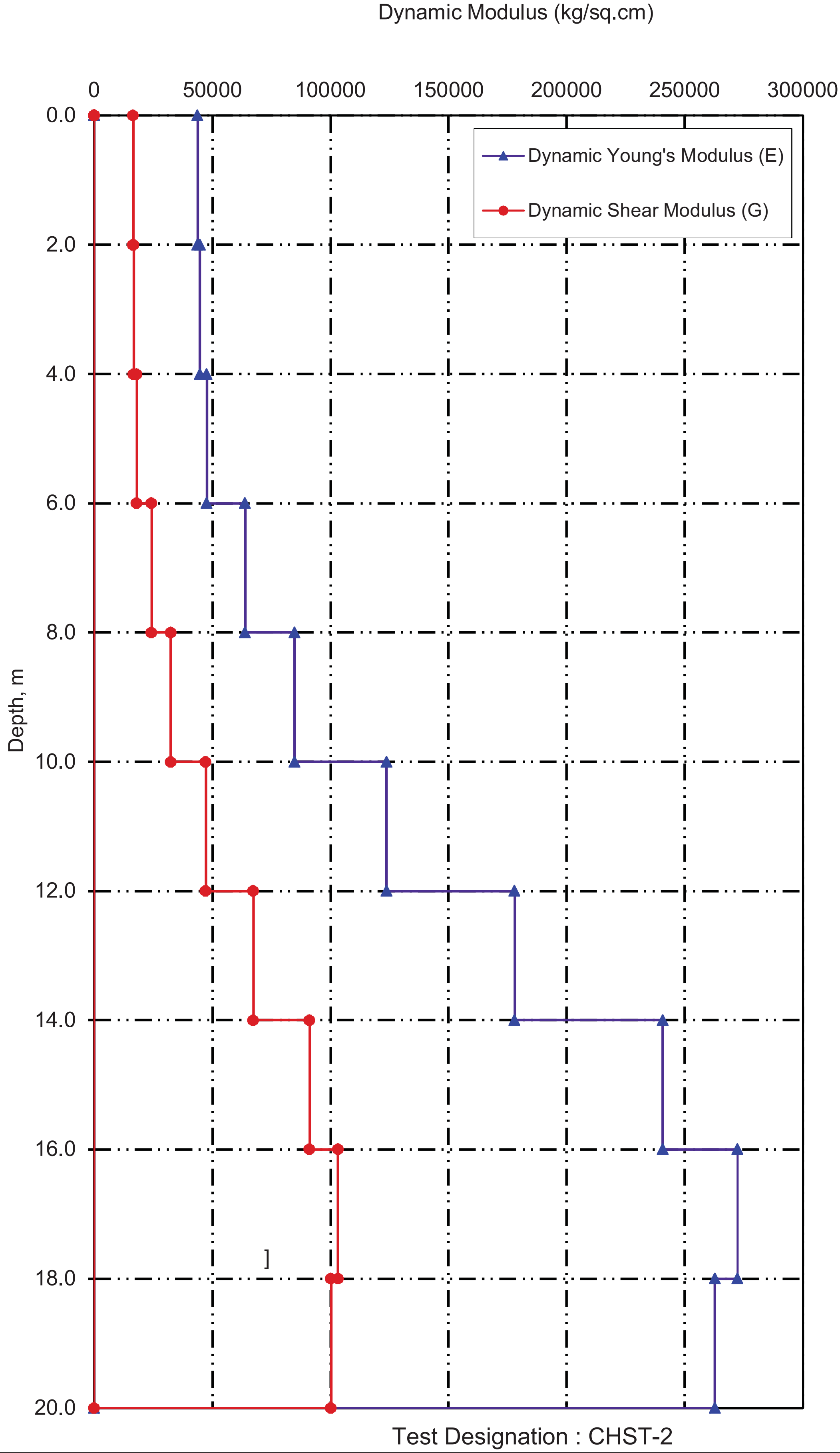
Dynamic Soil Parameters vs Depth

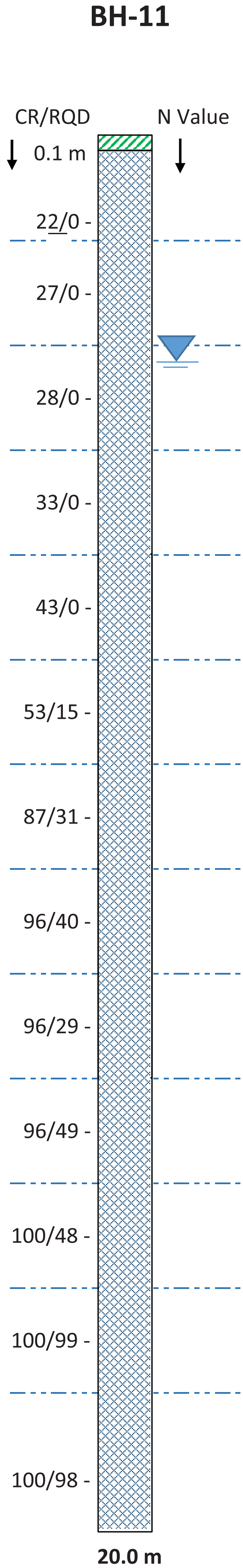
Depth, m	Stratigraphy (as per borelogs)	Measured Compression Wave Velocity, V_p (m/s)	Measured Shear Wave Velocity, V_s (m/s)	Bulk Density, γ (kg/m^3)	Poisson's Ratio, m	Dynamic Young's Modulus, E_{dyn} (MPa)	Dynamic Shear Modulus, G_{max} (MPa)	Coefficient of Elastic Uniform Compression, c_u (kg/cm^3)	Coefficient of Elastic Uniform Shear, c_τ (kg/cm^3)	Coefficient of Elastic Non-Uniform Compression, c_φ (kg/cm^3)	Coefficient of Elastic non-uniform Shear, c_Ψ (kg/cm^3)
2.0	Basalt	1493	752	2850	0.33	4287	1612	175	105	364	158
4.0	Basalt	1540	758	2850	0.34	4389	1638	181	108	375	163
6.0	Basalt	1518	781	2900	0.32	4670	1769	190	114	393	171
8.0	Basalt	1759	905	2900	0.32	6270	2375	254	153	528	229
10.0	Basalt	1993	1046	2900	0.31	8313	3173	335	201	695	302
12.0	Basalt	2409	1264	2900	0.31	12139	4633	489	294	1016	440
14.0	Basalt	2935	1510	2900	0.32	17456	6612	708	425	1471	638
16.0	Basalt	3413	1756	2900	0.32	23608	8942	958	575	1989	862
18.0	Basalt	3631	1868	2900	0.32	26715	10119	1084	650	2251	976
20.0	Basalt	3510	1842	2900	0.31	25780	9840	1039	623	2157	935

Test Designation : CHST-2

Measured Wave Velocities and Computed Dynamic Parameters

Wave Velocity vs Depth

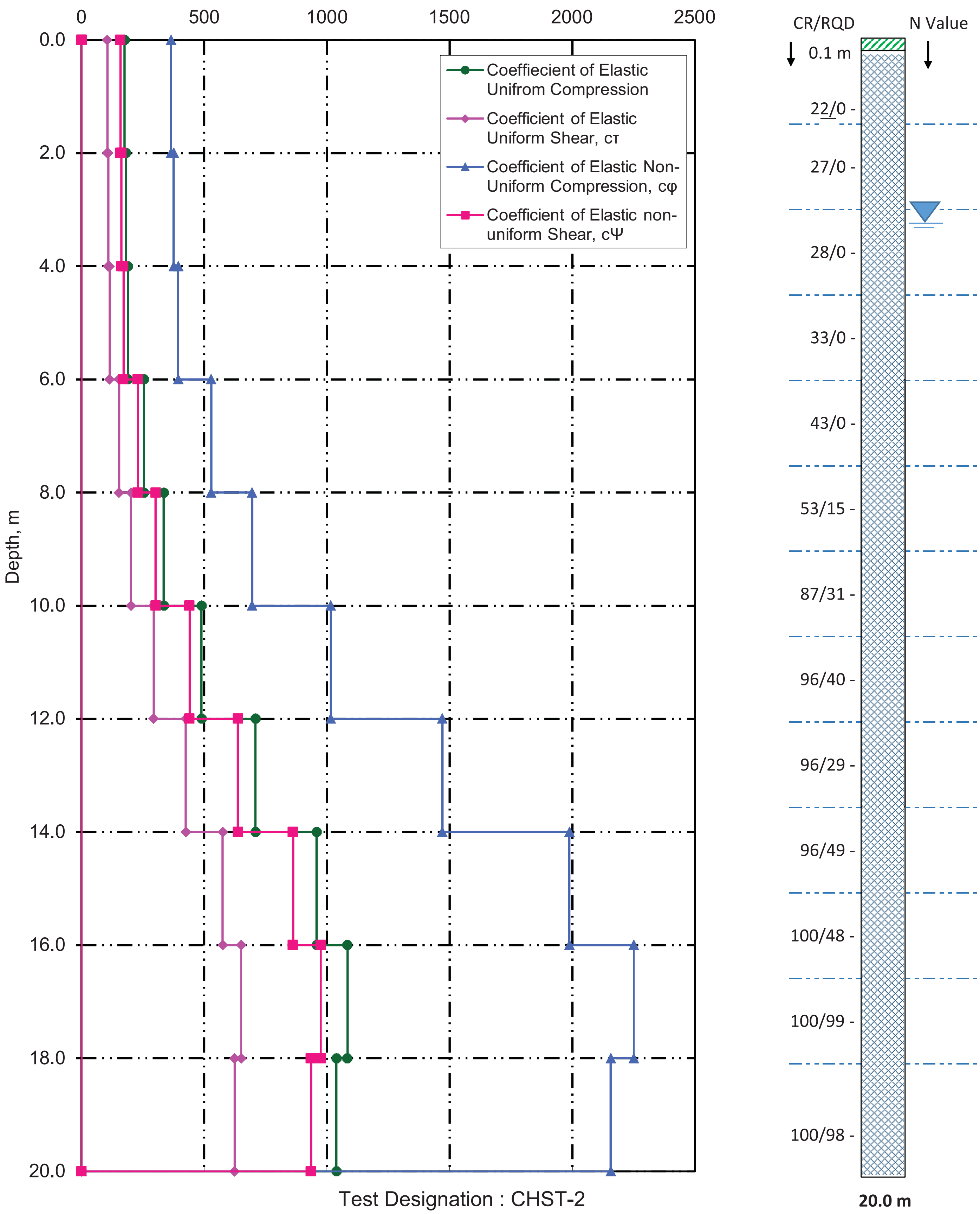




Dynamic Shear and Young's Modulus vs Depth

Dynamic Soil Parameters (kg/cm³)

BH-11



Test Designation : CHST-2

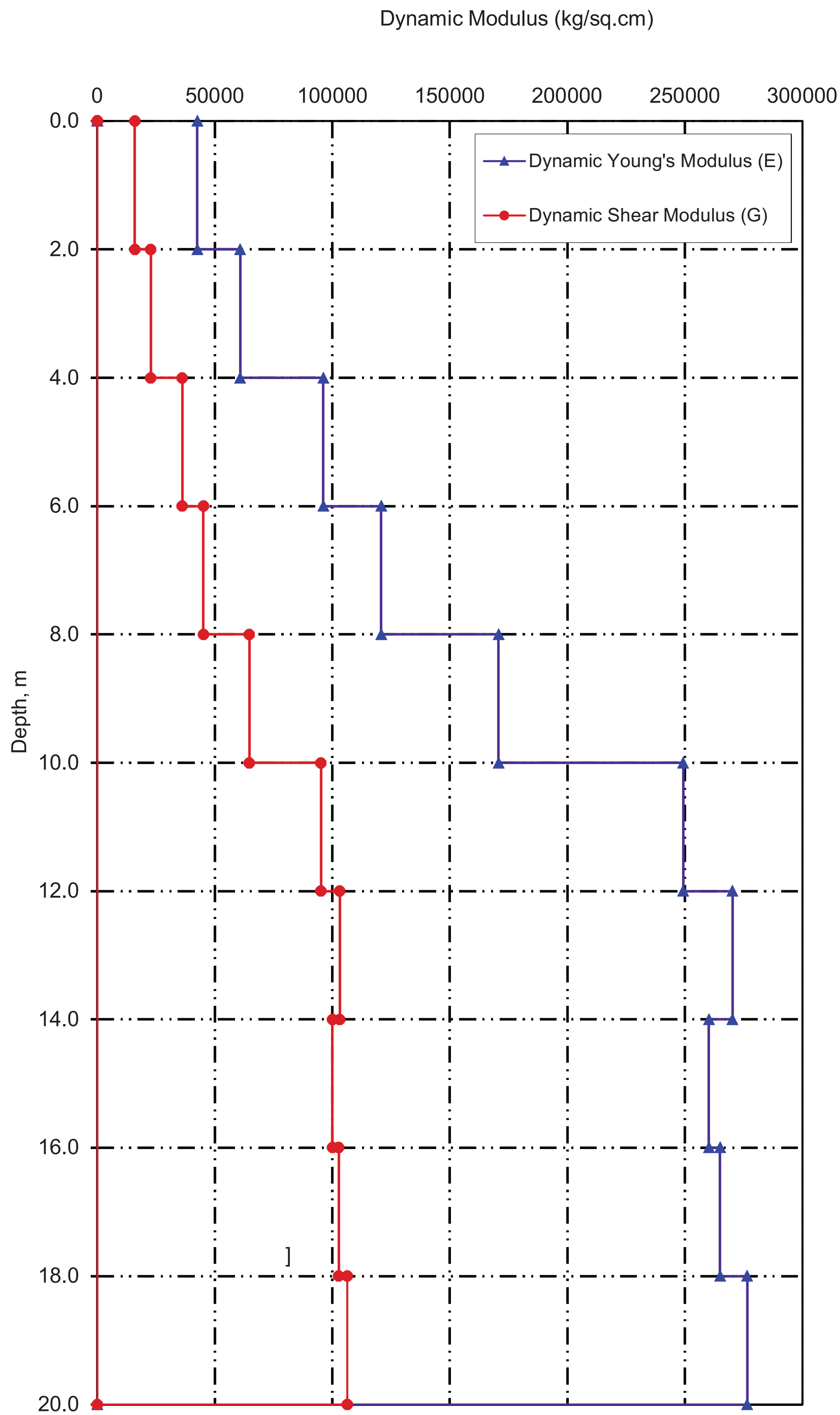
Dynamic Soil Parameters vs Depth

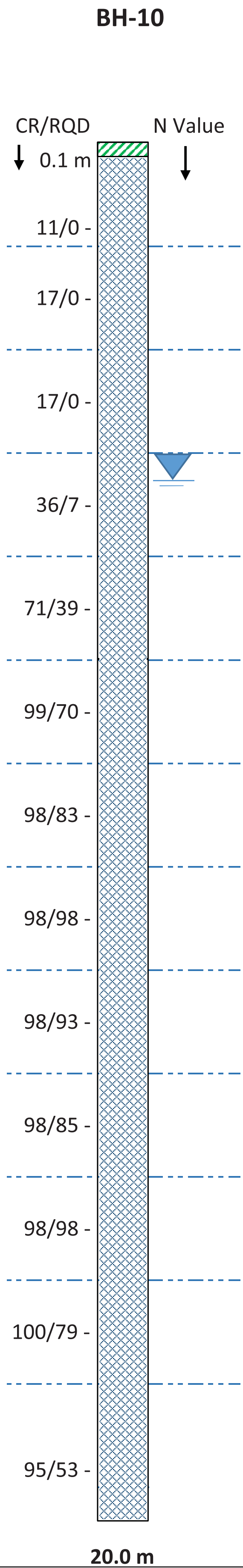
Depth, m	Stratigraphy (as per borelogs)	Measured Compression Wave Velocity, V_p (m/s)	Measured Shear Wave Velocity, V_s (m/s)	Bulk Density, γ (kg/m^3)	Poisson's Ratio, m	Dynamic Young's Modulus, E_{dyn} (MPa)	Dynamic Shear Modulus, G_{max} (MPa)	Coefficient of Elastic Uniform Compression, c_u (kg/cm^3)	Coefficient of Elastic Uniform Shear, c_τ (kg/cm^3)	Coefficient of Elastic Non-Uniform Compression, c_φ (kg/cm^3)	Coefficient of Elastic non-uniform Shear, c_ψ (kg/cm^3)
2.0	Basalt	1473	742	2850	0.33	4174	1569	171	102	354	154
4.0	Basalt	1795	884	2850	0.34	5969	2227	246	148	510	221
6.0	Basalt	2196	1106	2900	0.33	9436	3547	386	231	801	347
8.0	Basalt	2508	1235	2900	0.34	11854	4423	488	293	1014	439
10.0	Basalt	2875	1479	2900	0.32	16747	6344	680	408	1411	612
12.0	Basalt	3419	1794	2900	0.31	24454	9333	985	591	2046	887
14.0	Basalt	3560	1868	2900	0.31	26513	10119	1068	641	2218	962
16.0	Basalt	3442	1840	2900	0.30	25527	9818	1022	613	2121	920
18.0	Basalt	3427	1864	2900	0.29	25996	10076	1034	620	2146	930
20.0	Basalt	3549	1897	2900	0.30	27134	10436	1086	652	2255	977

Test Designation : CHST-3

Measured Wave Velocities and Computed Dynamic Parameters

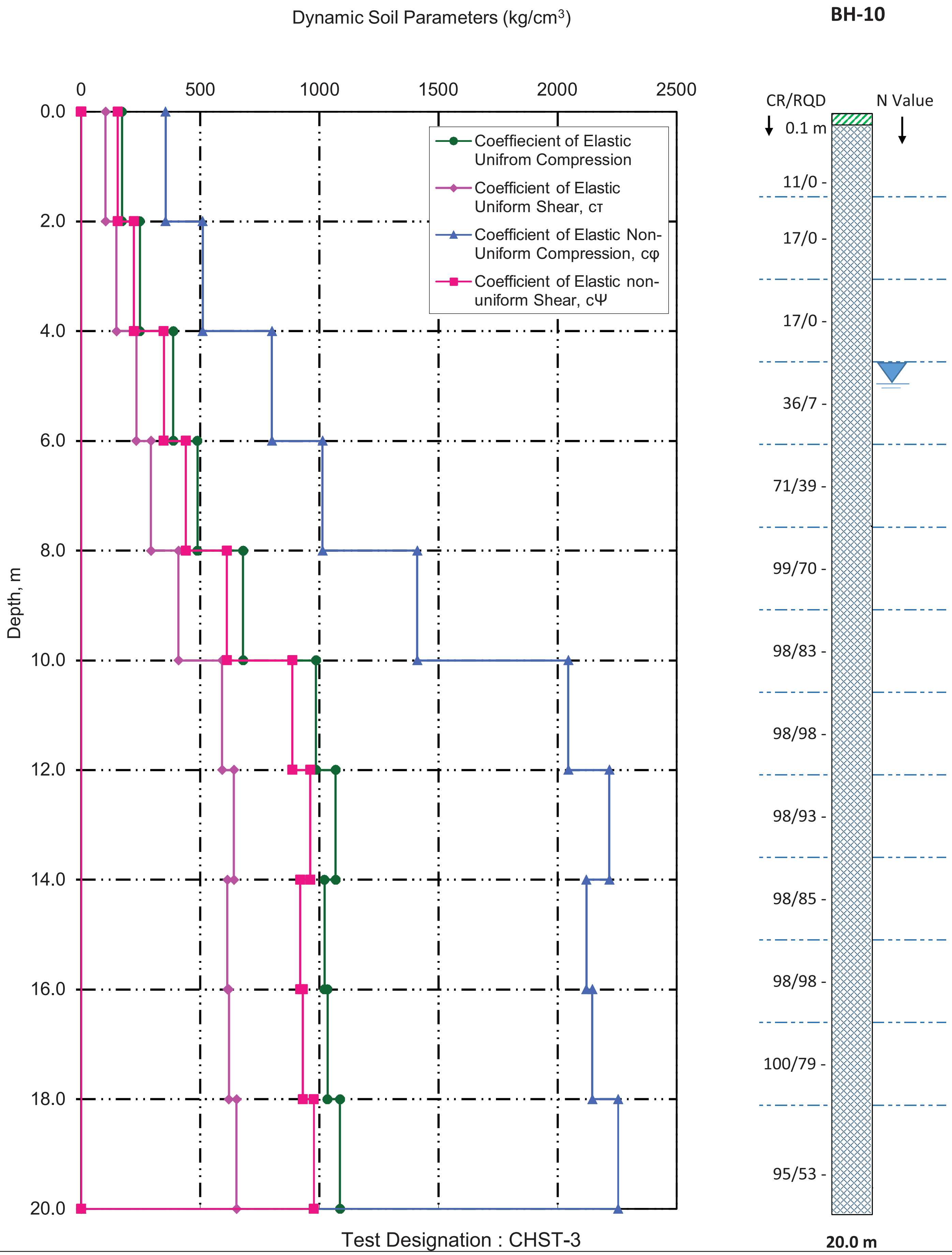
Wave Velocity vs Depth





Test Designation : CHST-3

Dynamic Shear and Young's Modulus vs Depth



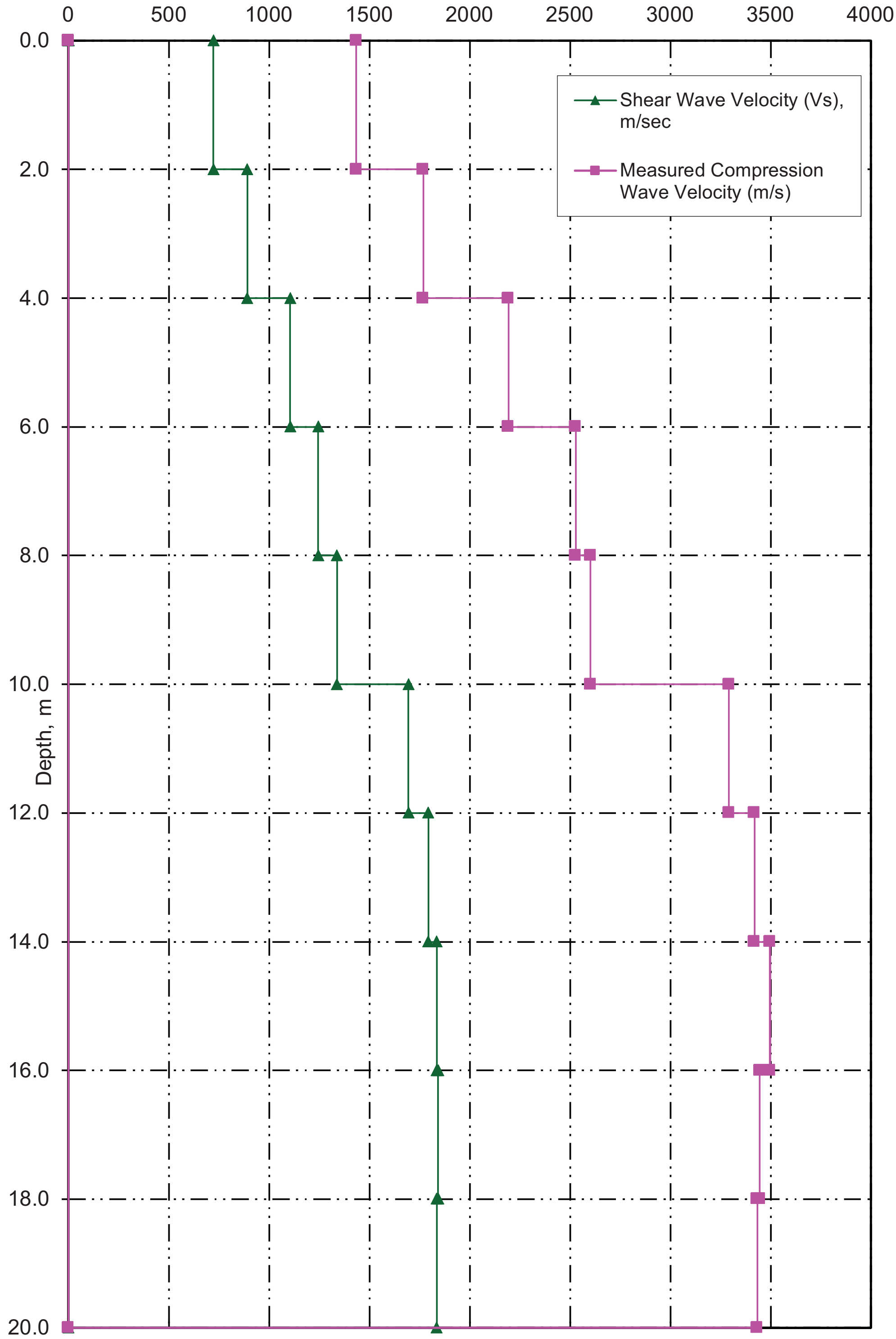
Dynamic Soil Parameters vs Depth

Depth, m	Stratigraphy (as per borelogs)	Measured Compression Wave Velocity, V_p (m/s)	Measured Shear Wave Velocity, V_s (m/s)	Bulk Density, γ (kg/m^3)	Poisson's Ratio, m	Dynamic Young's Modulus, E_{dyn} (MPa)	Dynamic Shear Modulus, G_{max} (MPa)	Coefficient of Elastic Uniform Compression, c_u (kg/cm^3)	Coefficient of Elastic Uniform Shear, c_τ (kg/cm^3)	Coefficient of Elastic Non-Uniform Compression, c_φ (kg/cm^3)	Coefficient of Elastic non-uniform Shear, c_Ψ (kg/cm^3)
2.0	Basalt	1435	723	2850	0.33	3963	1490	162	97	336	146
4.0	Basalt	1769	891	2850	0.33	6018	2263	246	148	511	221
6.0	Basalt	2194	1105	2900	0.33	9419	3541	385	231	799	347
8.0	Basalt	2529	1245	2900	0.34	12047	4495	496	298	1030	447
10.0	Basalt	2603	1339	2900	0.32	13727	5199	557	334	1156	501
12.0	Basalt	3293	1694	2900	0.32	21970	8322	892	535	1851	802
14.0	Basalt	3419	1794	2900	0.31	24454	9333	985	591	2046	887
16.0	Basalt	3497	1835	2900	0.31	25584	9765	1031	619	2140	928
18.0	Basalt	3446	1842	2900	0.30	25583	9840	1024	614	2126	922
20.0	Basalt	3433	1835	2900	0.30	25389	9765	1016	610	2110	915

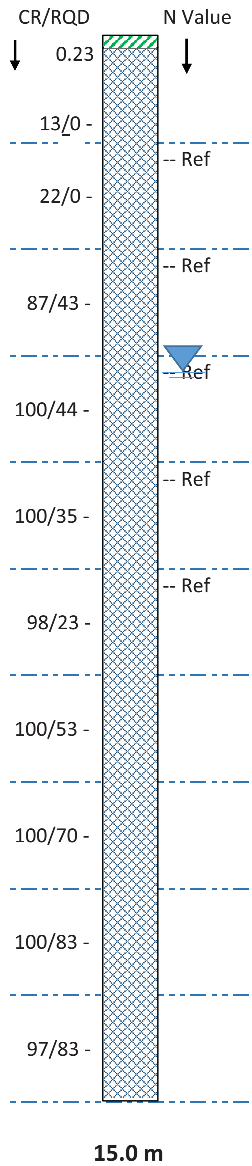
Test Designation : CHST-4

Measured Wave Velocities and Computed Dynamic Parameters

Wave Velocity (m/s)

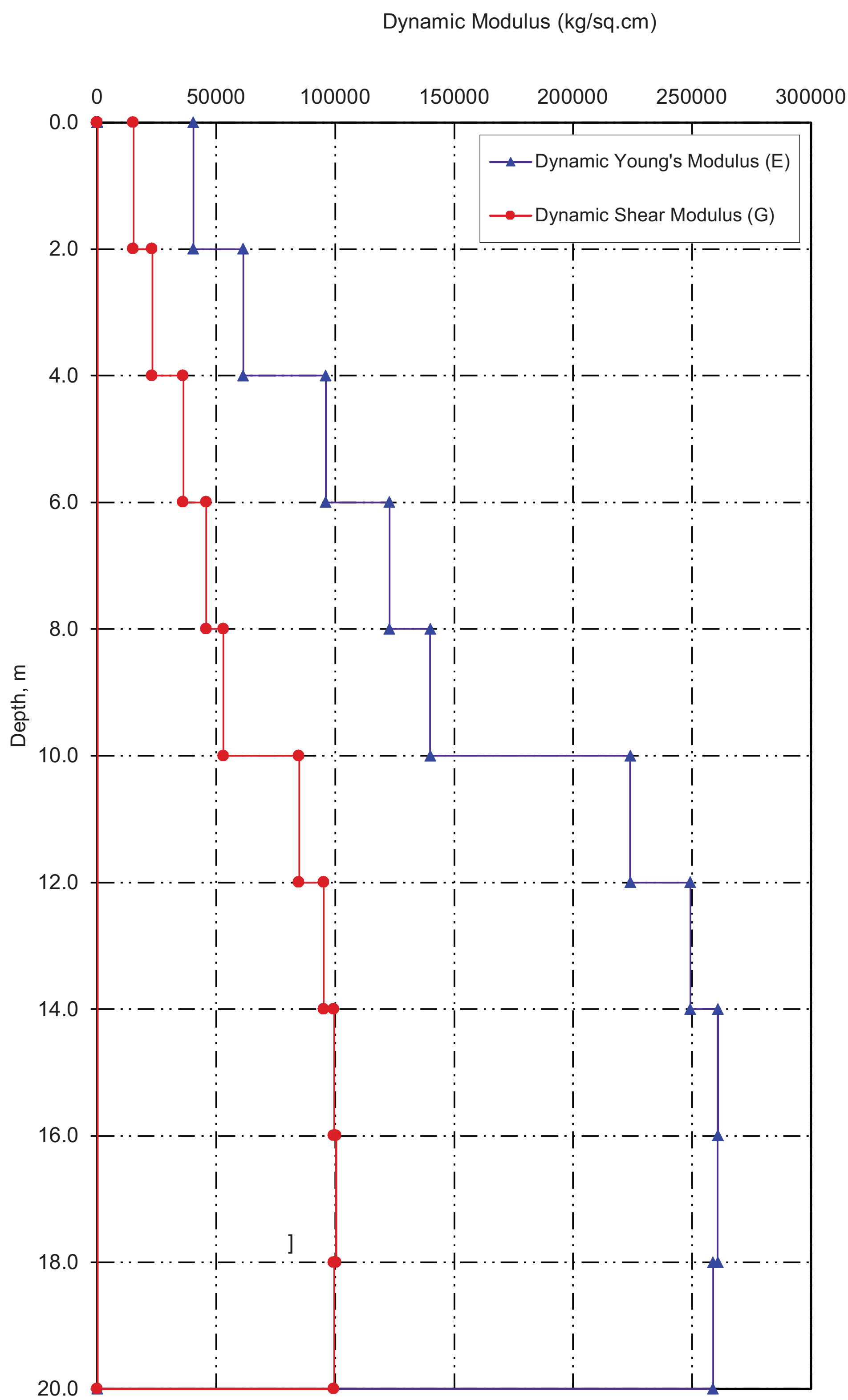


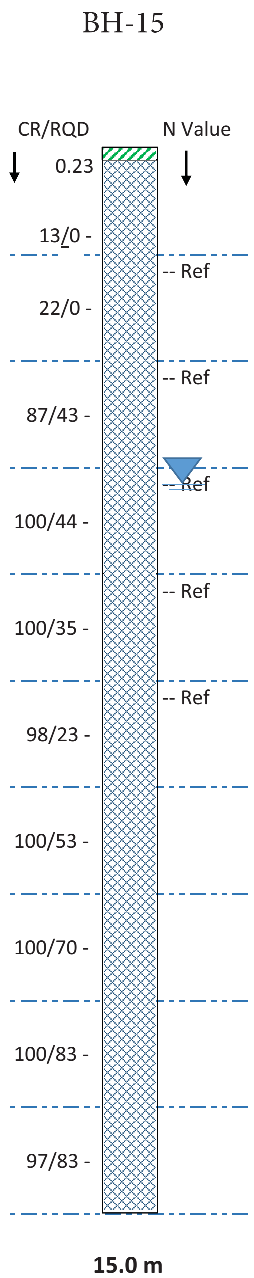
BH-15



Test Designation : CHST-4

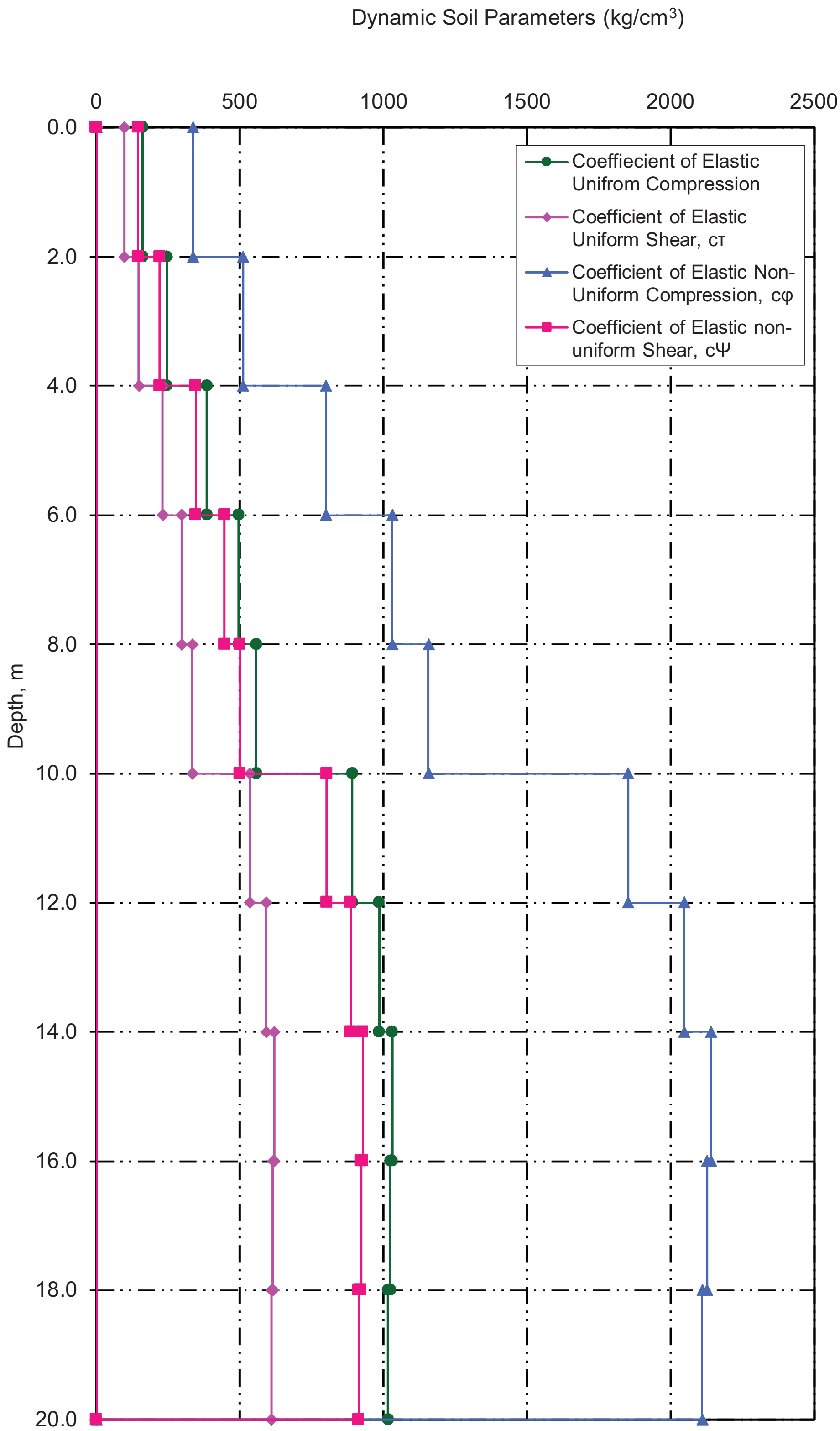
Wave Velocity vs Depth

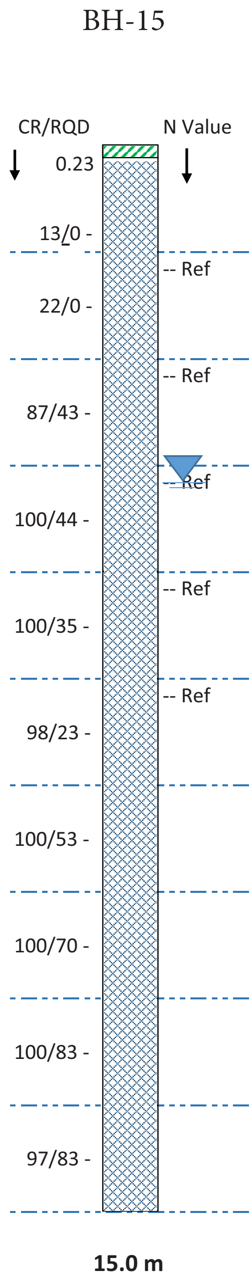




Test Designation : CHST-4

Dynamic Shear and Young's Modulus vs Depth





Test Designation : CHST-4

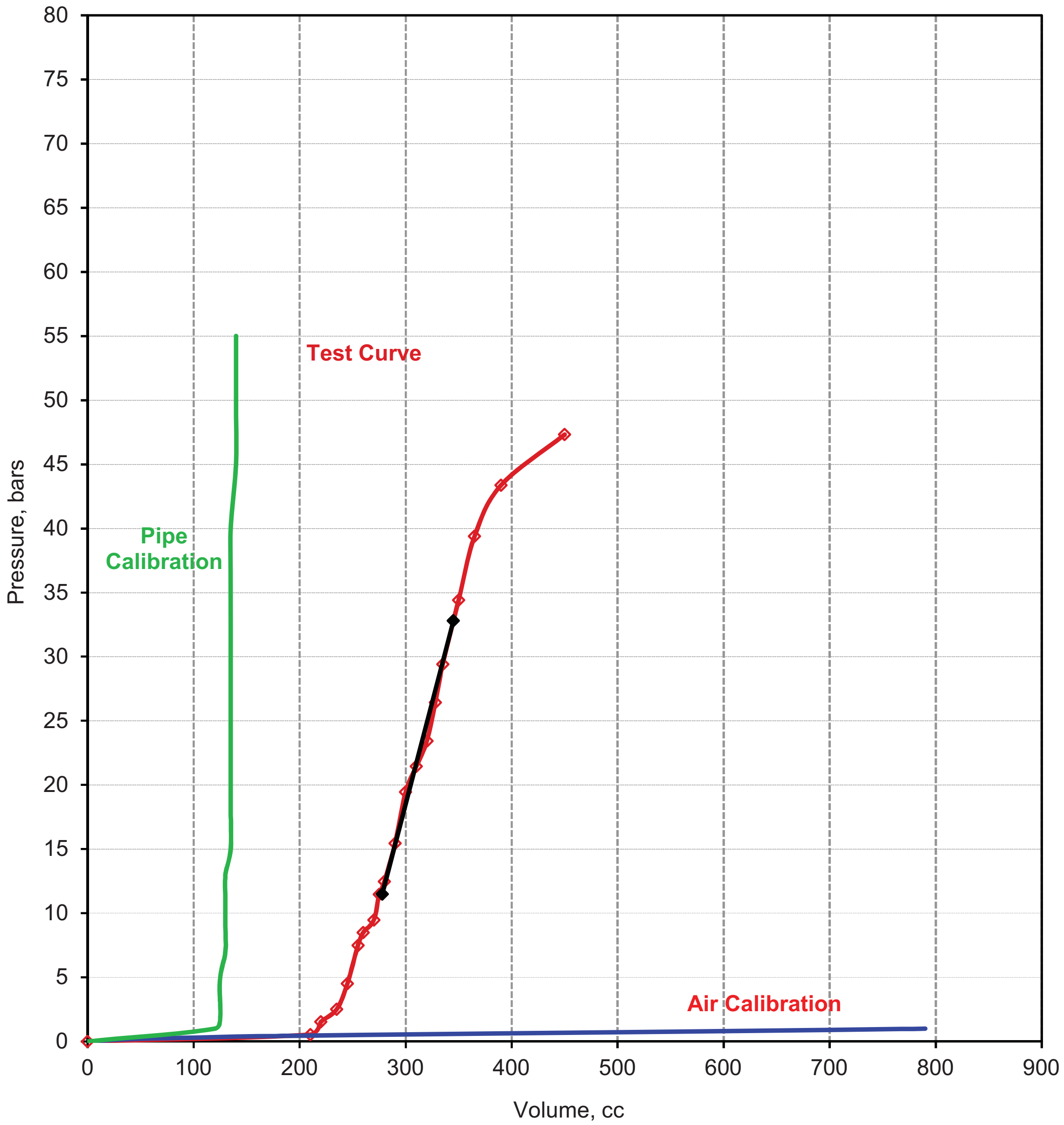
Dynamic Soil Parameters vs Depth

PRESSUREMETER TEST RESULTS

Pressuremeter Test : 1

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-1	Limit Pressure, p_L :	47.4 bar
PMT Location.:	1		
Test Depth :	2.00 m	Deformation Modulus, E_m :	890.1 kg/sq.cm

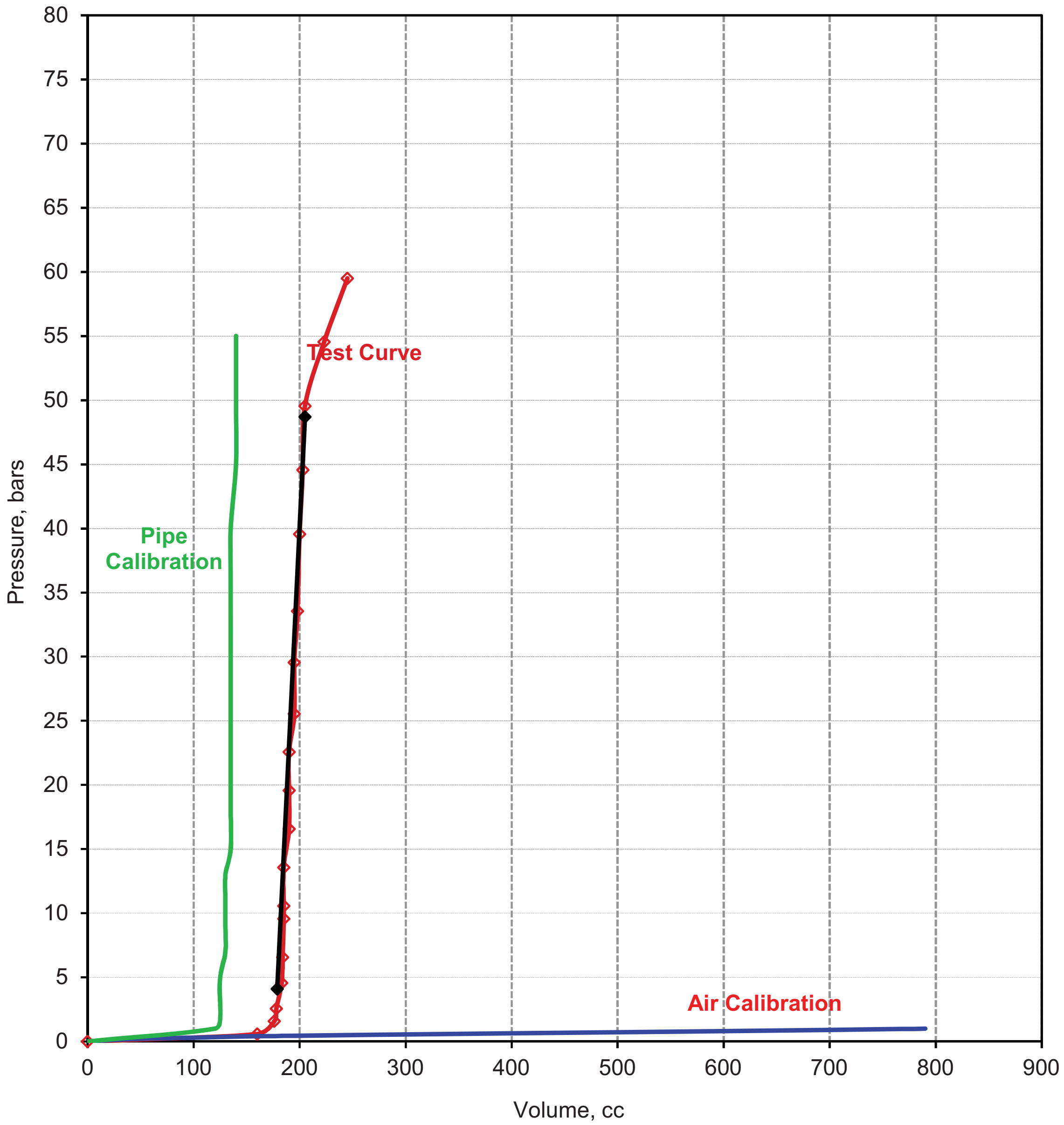


Applied Pressure vs. Volume

Pressuremeter Test : 1

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-2	Limit Pressure, p_L :	59.6 bar
PMT Location.:	1		
Test Depth :	4.00 m	Deformation Modulus, E_m :	4480.8 kg/sq.cm

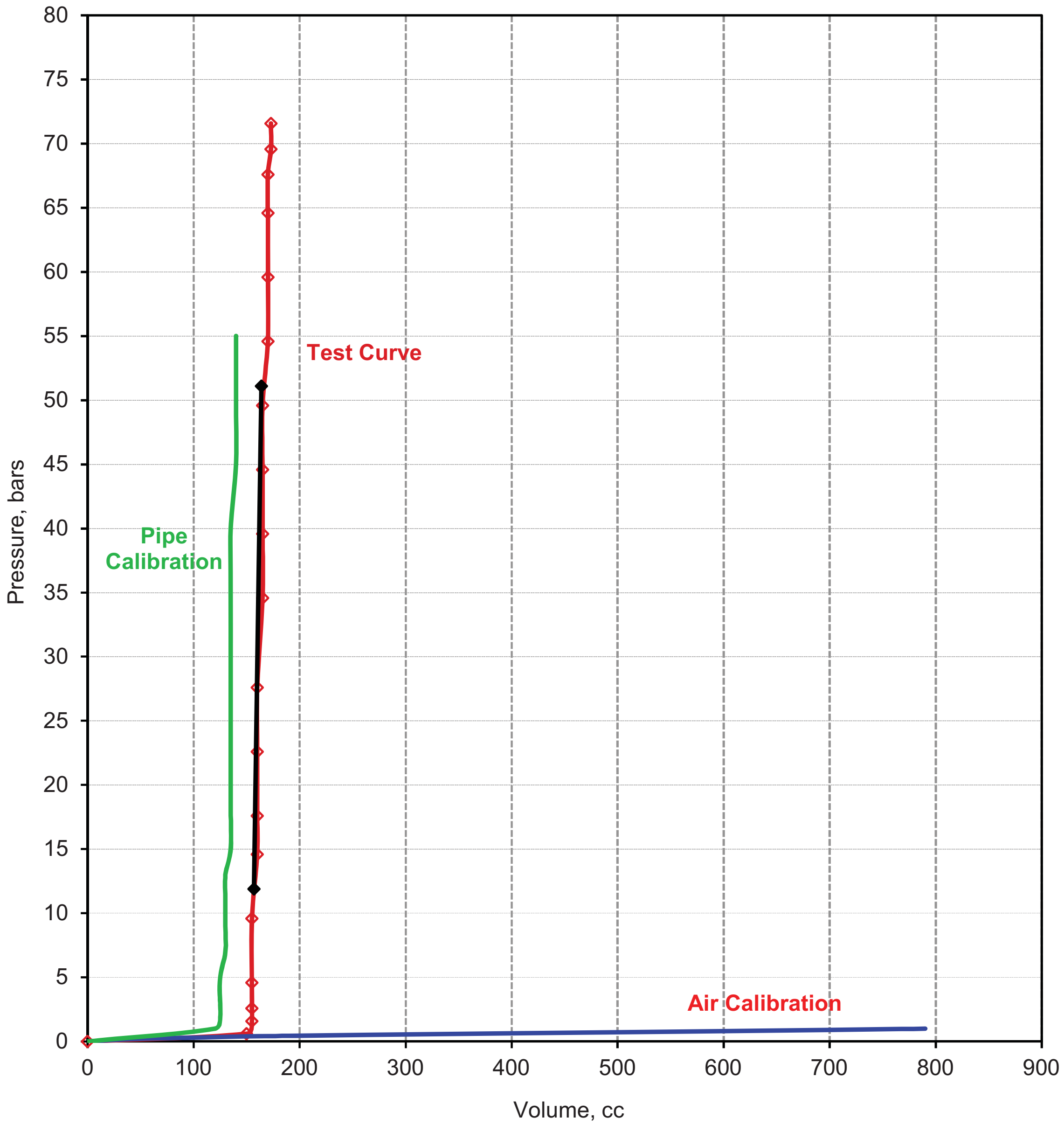


Applied Pressure vs. Volume

Pressuremeter Test : 1

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-3	Limit Pressure, p_L :	>80 Bar
PMT Location.:	1		
Test Depth :	6.00 m	Deformation Modulus, E_m :	14158.6 kg/sq.cm

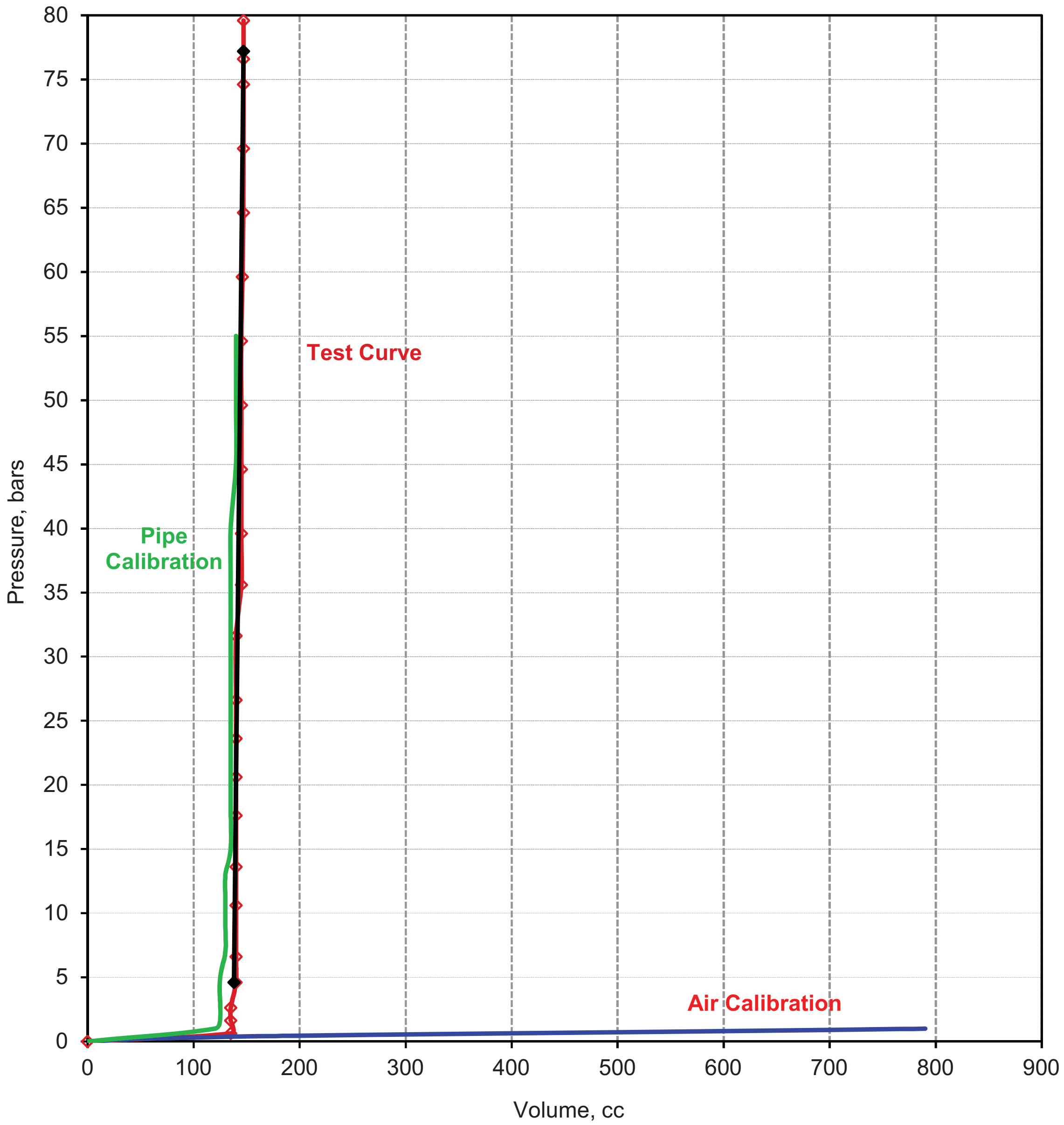


Applied Pressure vs. Volume

Pressuremeter Test : 1

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-4	Limit Pressure, p_L :	>80 Bar
PMT Location.:	1		
Test Depth :	8.00 m	Deformation Modulus, E_m :	20009 kg/sq.cm

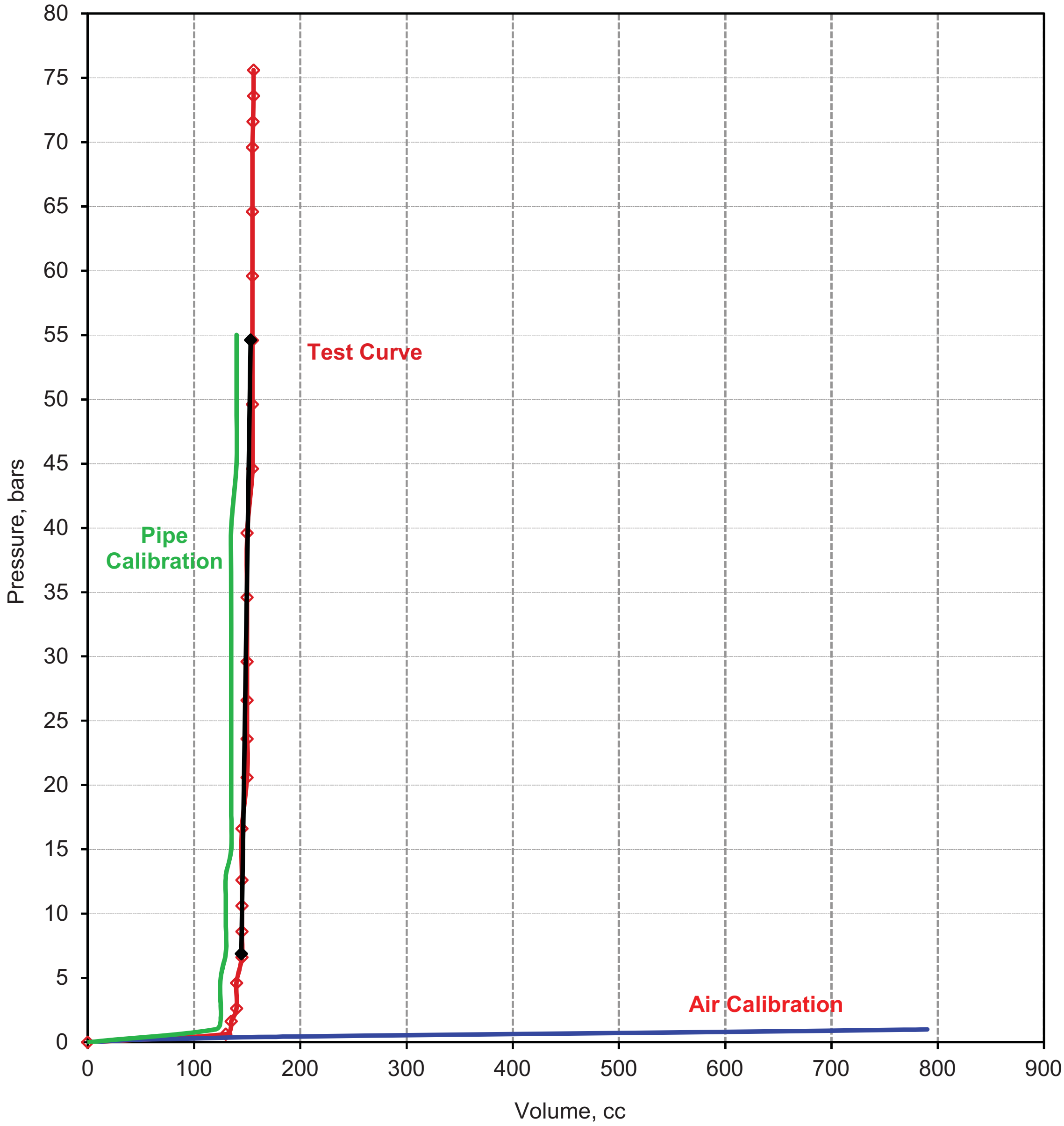


Applied Pressure vs. Volume

Pressuremeter Test : 1

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-5	Limit Pressure, p_L :	>80 Bar
PMT Location.:	1		
Test Depth :	10.00 m	Deformation Modulus, E_m :	13693.8 kg/sq.cm

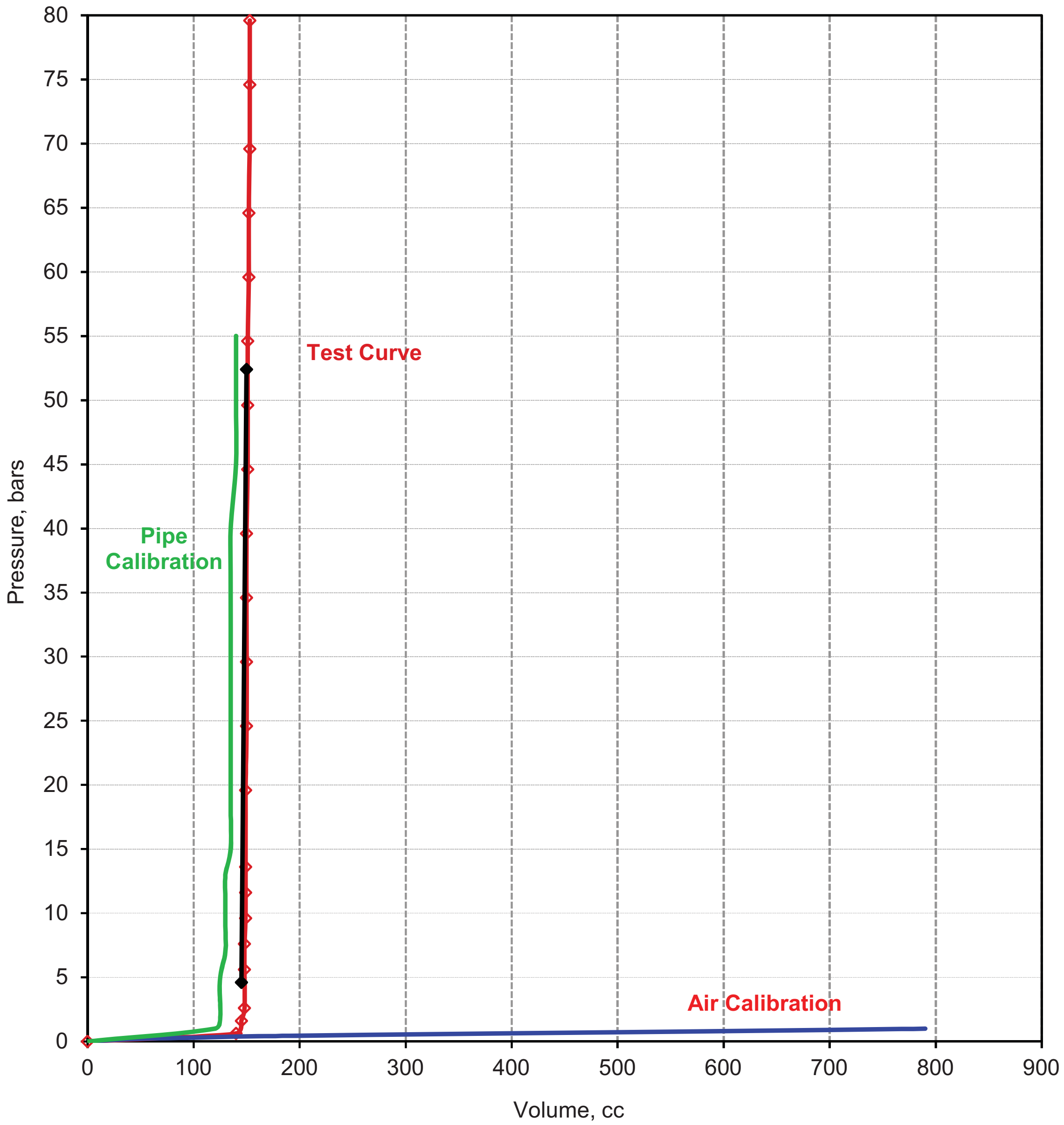


Applied Pressure vs. Volume

Pressuremeter Test : 1

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-6	Limit Pressure, p_L :	>80 Bar
PMT Location.:	1		
Test Depth :	12.00 m	Deformation Modulus, E_m :	23840.3 kg/sq.cm

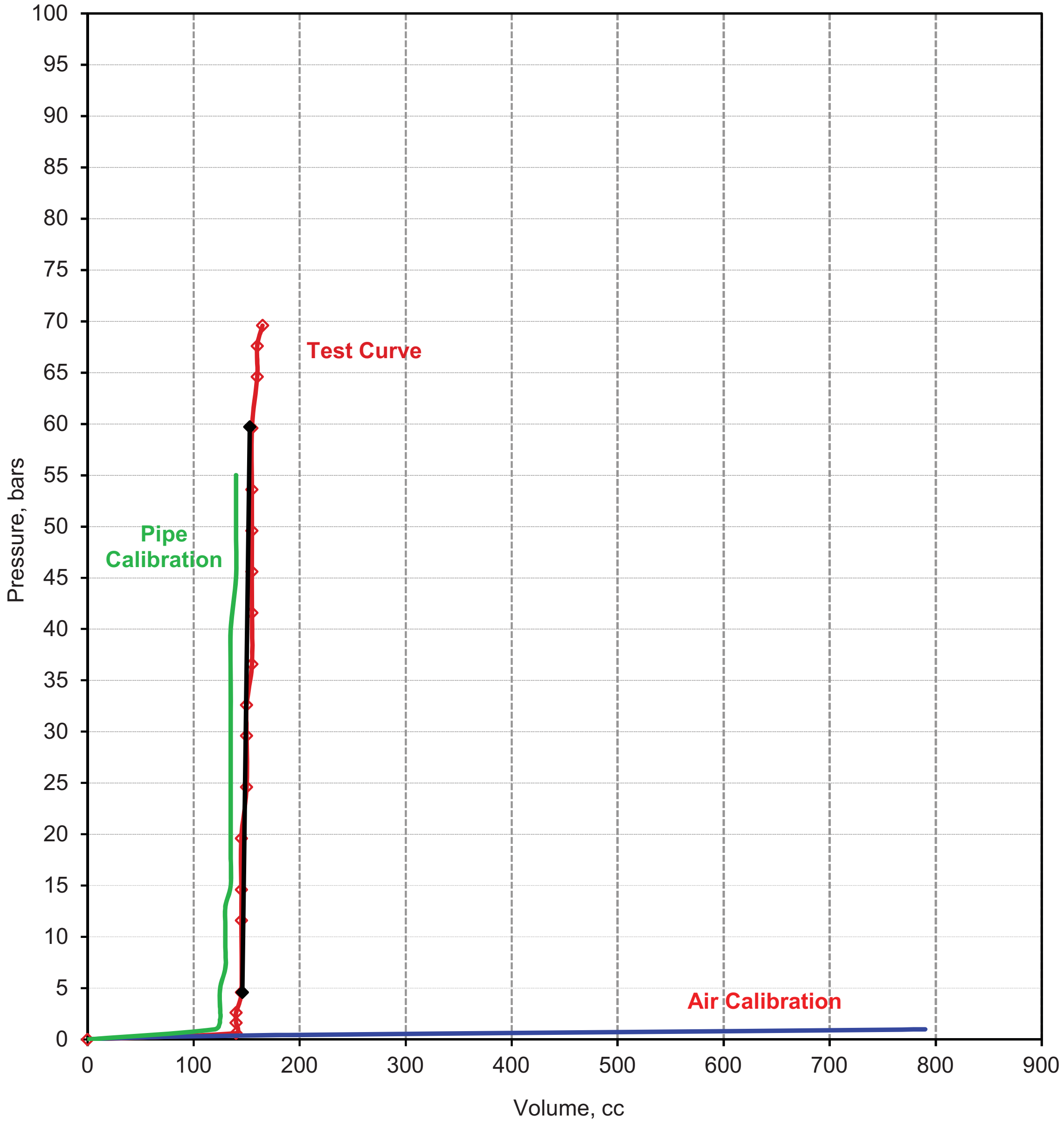


Applied Pressure vs. Volume

Pressuremeter Test : 1

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-7	Limit Pressure, p_L :	>80 Bar
PMT Location.:	1		
Test Depth :	15.00 m	Deformation Modulus, E_m :	19671.3 kg/sq.cm

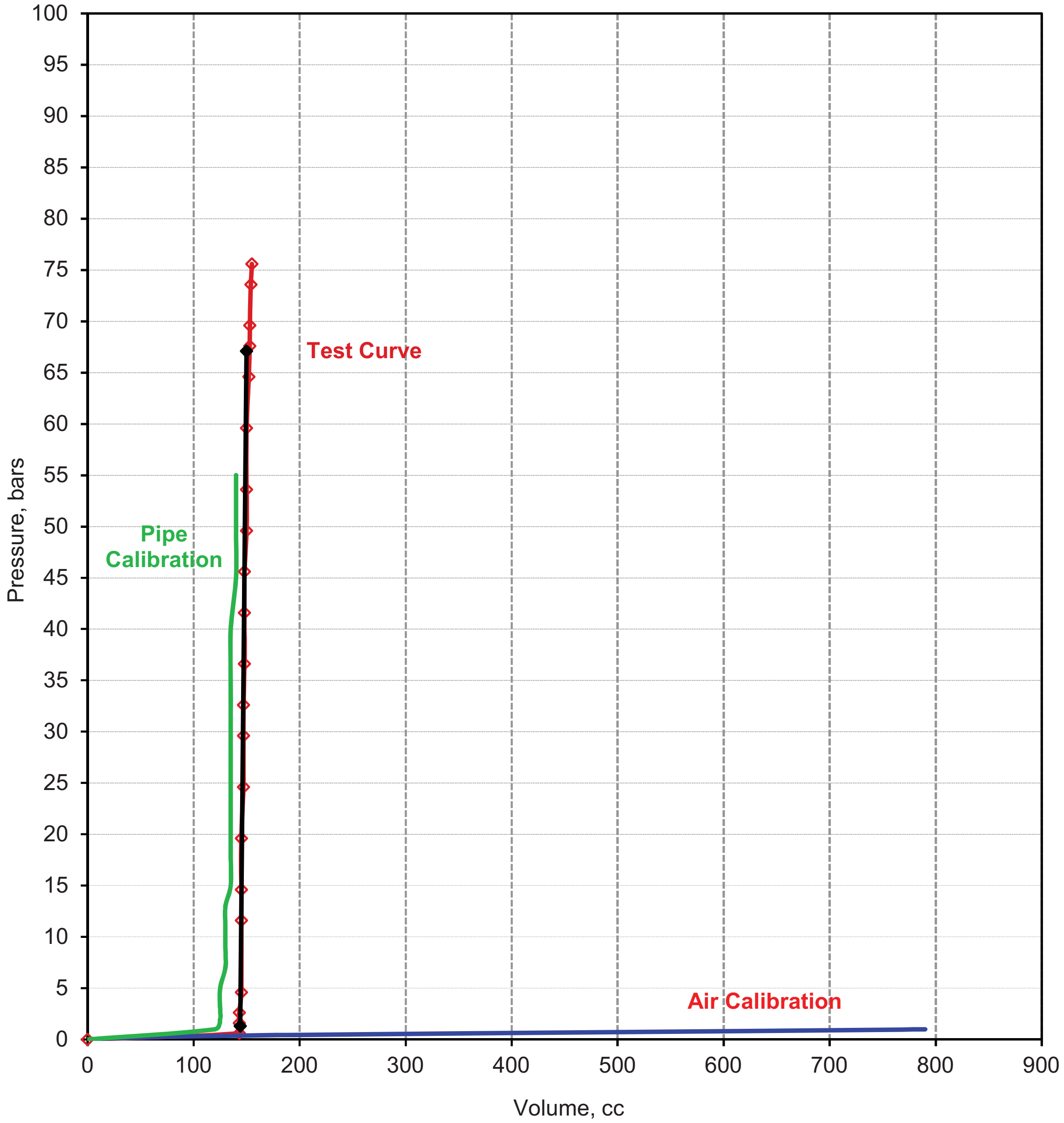


Applied Pressure vs. Volume

Pressuremeter Test : 1

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-8	Limit Pressure, p_L :	>80 Bar
PMT Location.:	1		
Test Depth :	18.00 m	Deformation Modulus, E_m :	27333.5 kg/sq.cm

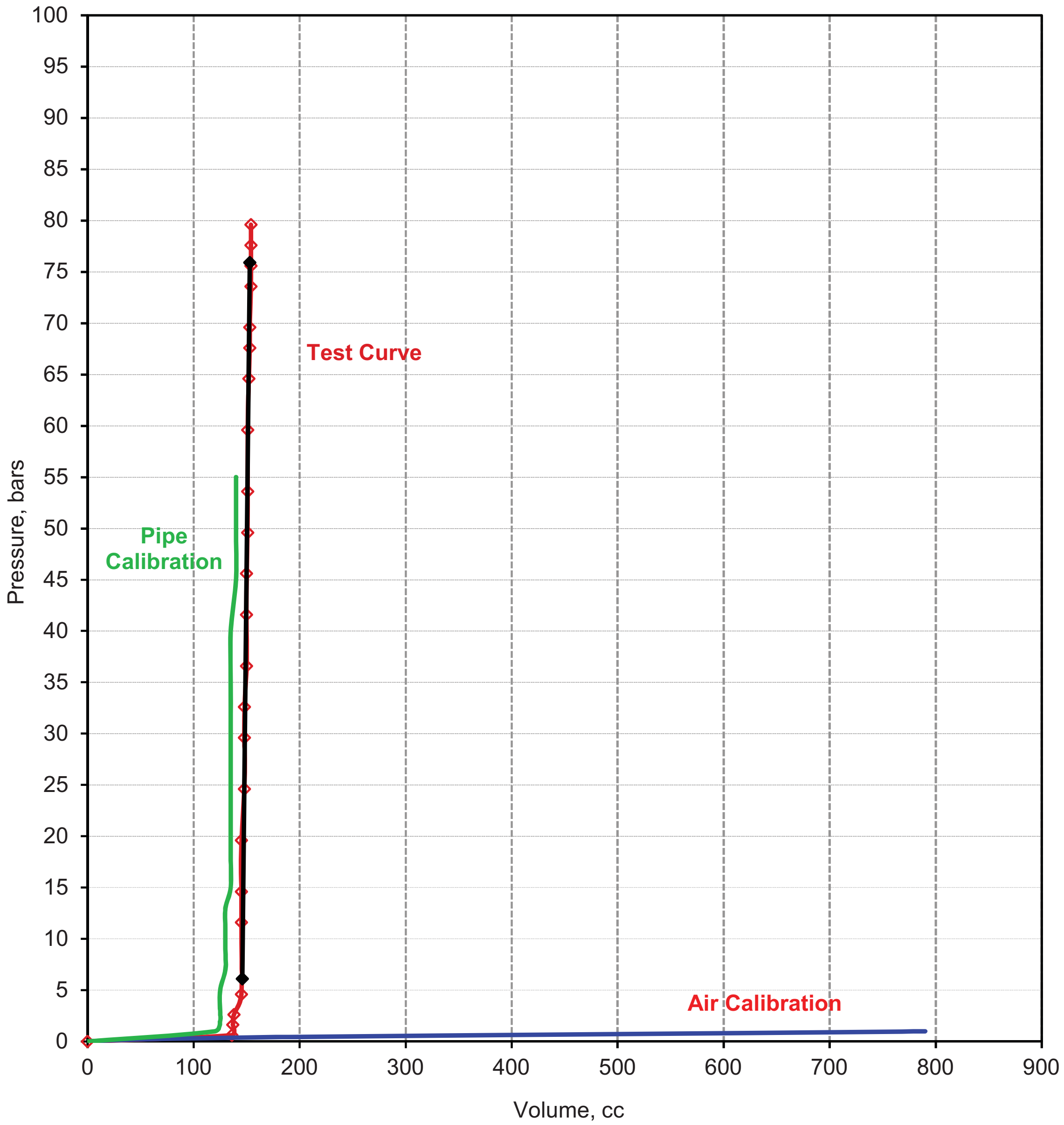


Applied Pressure vs. Volume

Pressuremeter Test : 1

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-9	Limit Pressure, p_L :	>80 Bar
PMT Location.:	1		
Test Depth :	20.00 m	Deformation Modulus, E_m :	24919.3 kg/sq.cm

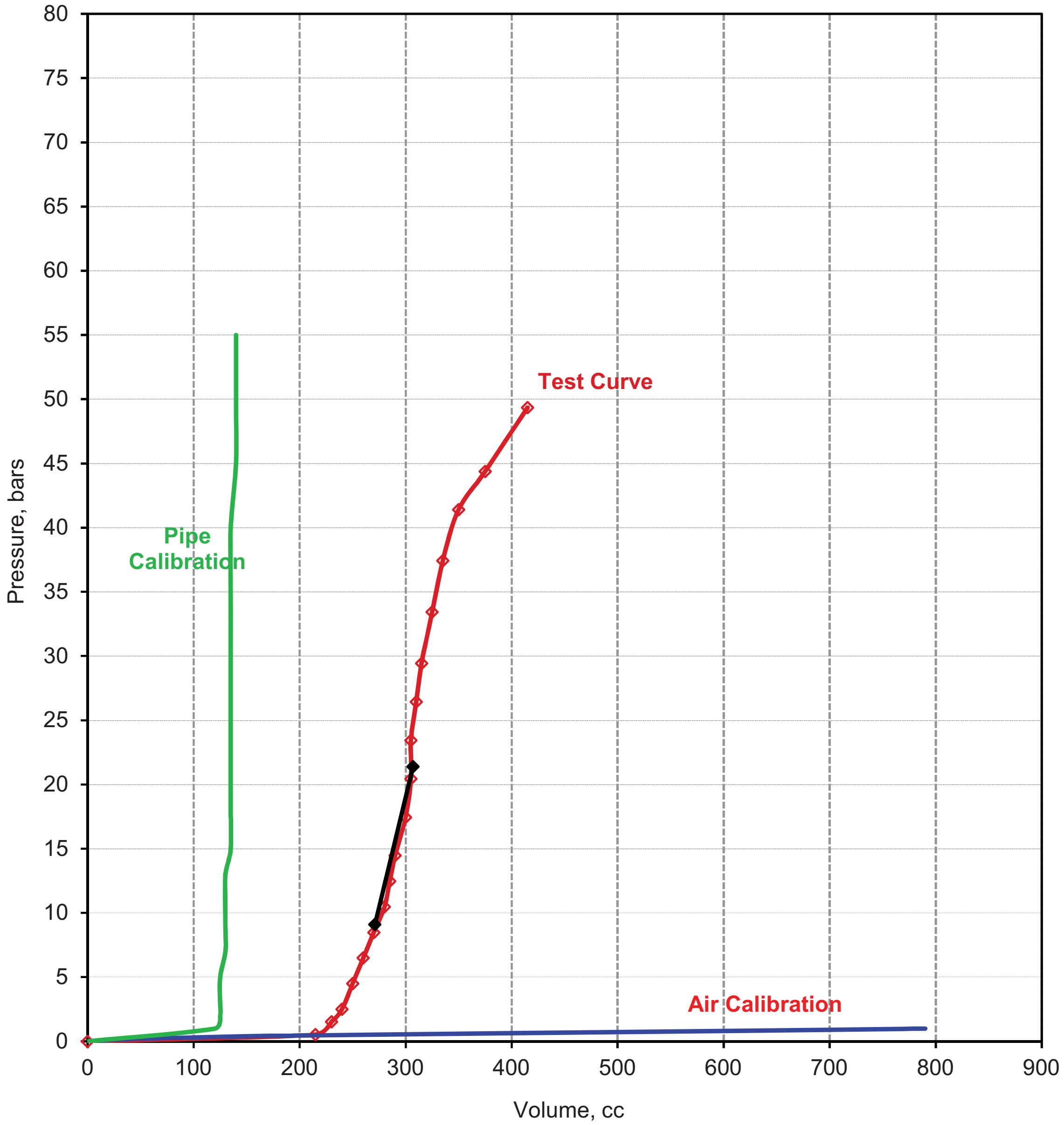


Applied Pressure vs. Volume

Pressuremeter Test : 2

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-10	Limit Pressure, p_L :	49.4 bar
PMT Location.:	2		
Test Depth :	2.00 m	Deformation Modulus, E_m :	956.7 kg/sq.cm

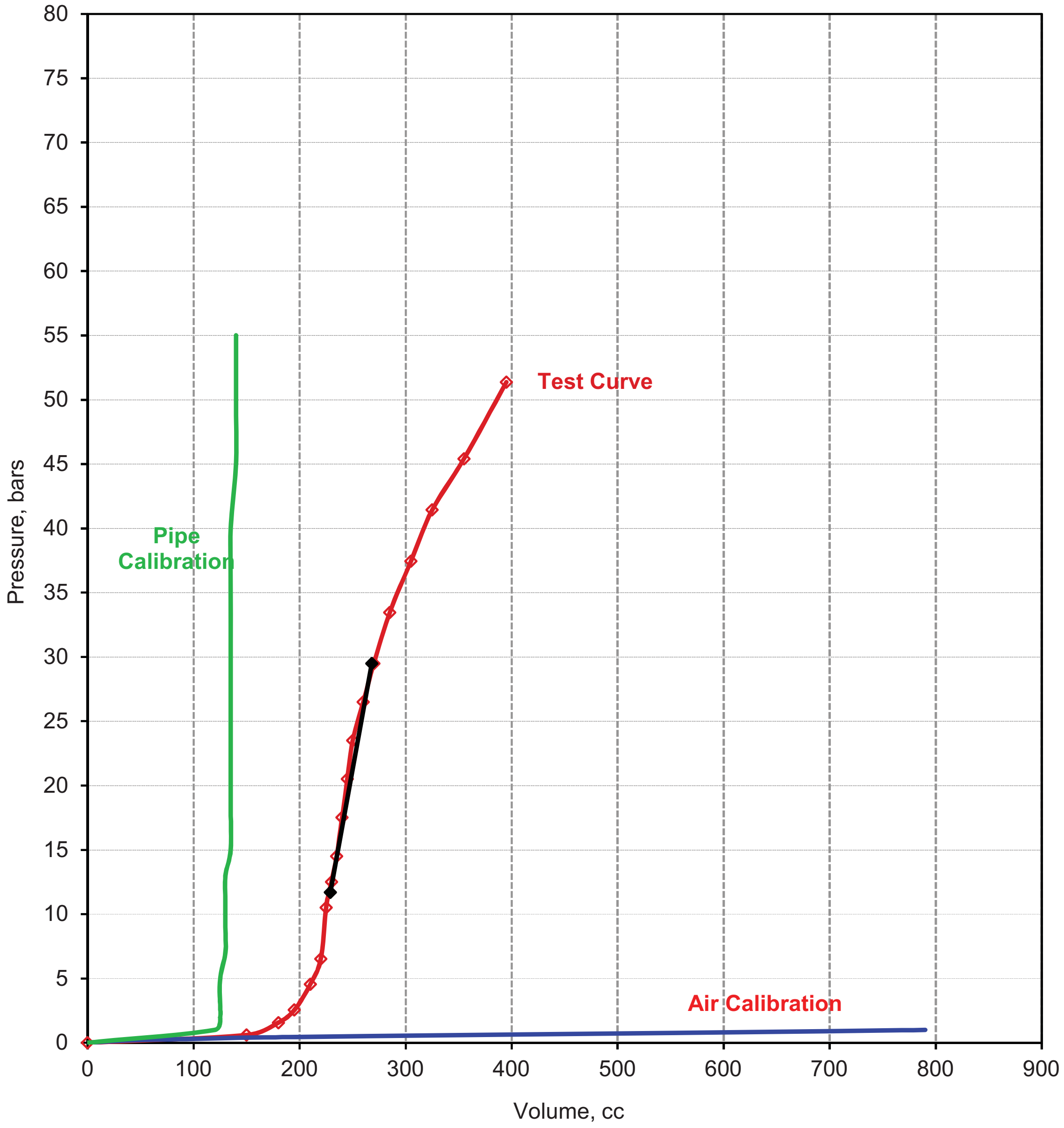


Applied Pressure vs. Volume

Pressuremeter Test : 2

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-11	Limit Pressure, p_L :	51.4 bar
PMT Location.:	2		
Test Depth :	4.00 m	Deformation Modulus, E_m :	1260.8 kg/sq.cm

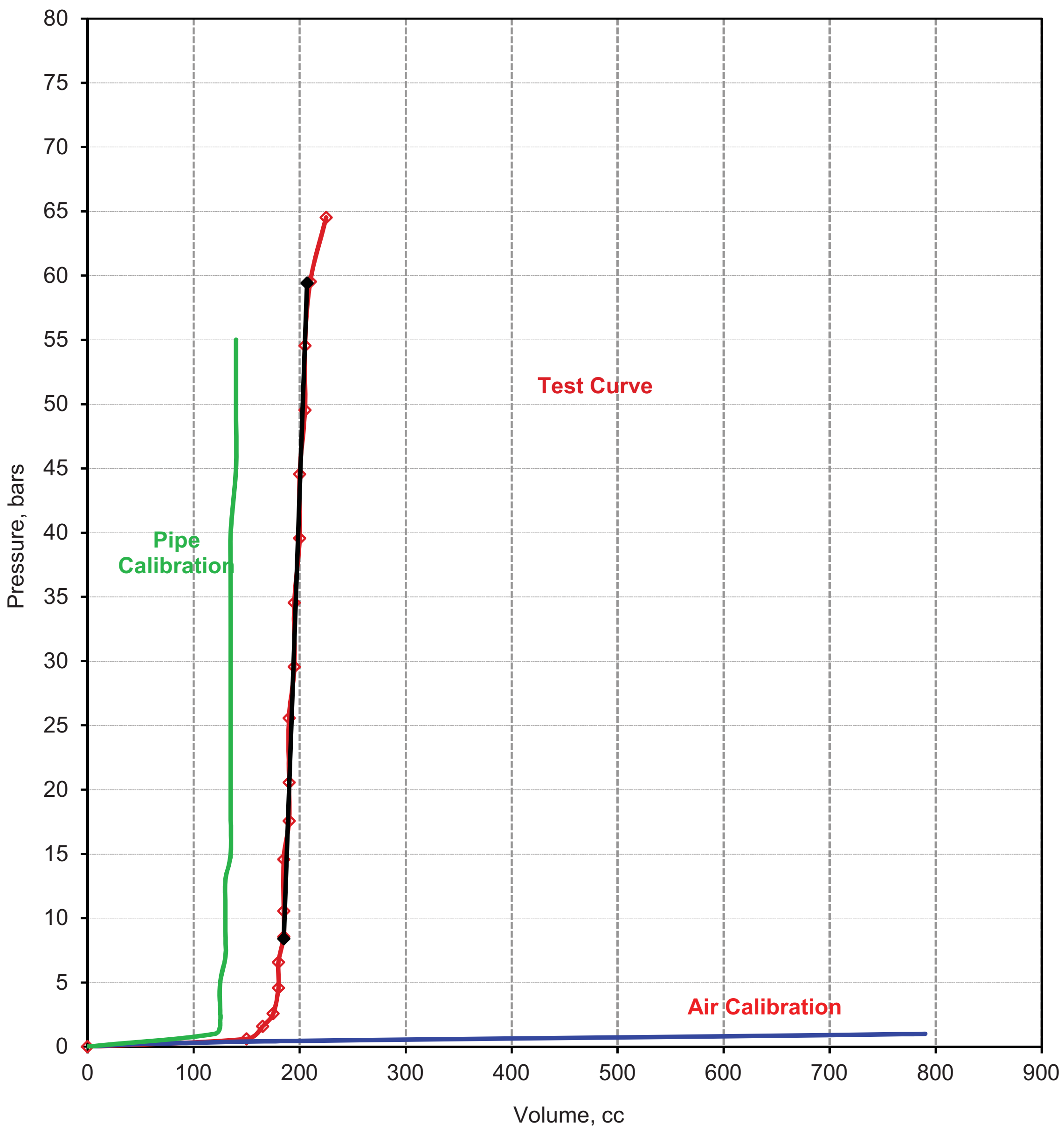


Applied Pressure vs. Volume

Pressuremeter Test : 2

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-12	Limit Pressure, p_L :	>80 Bar
PMT Location.:	2		
Test Depth :	6.00 m	Deformation Modulus, E_m :	6082.4 kg/sq.cm

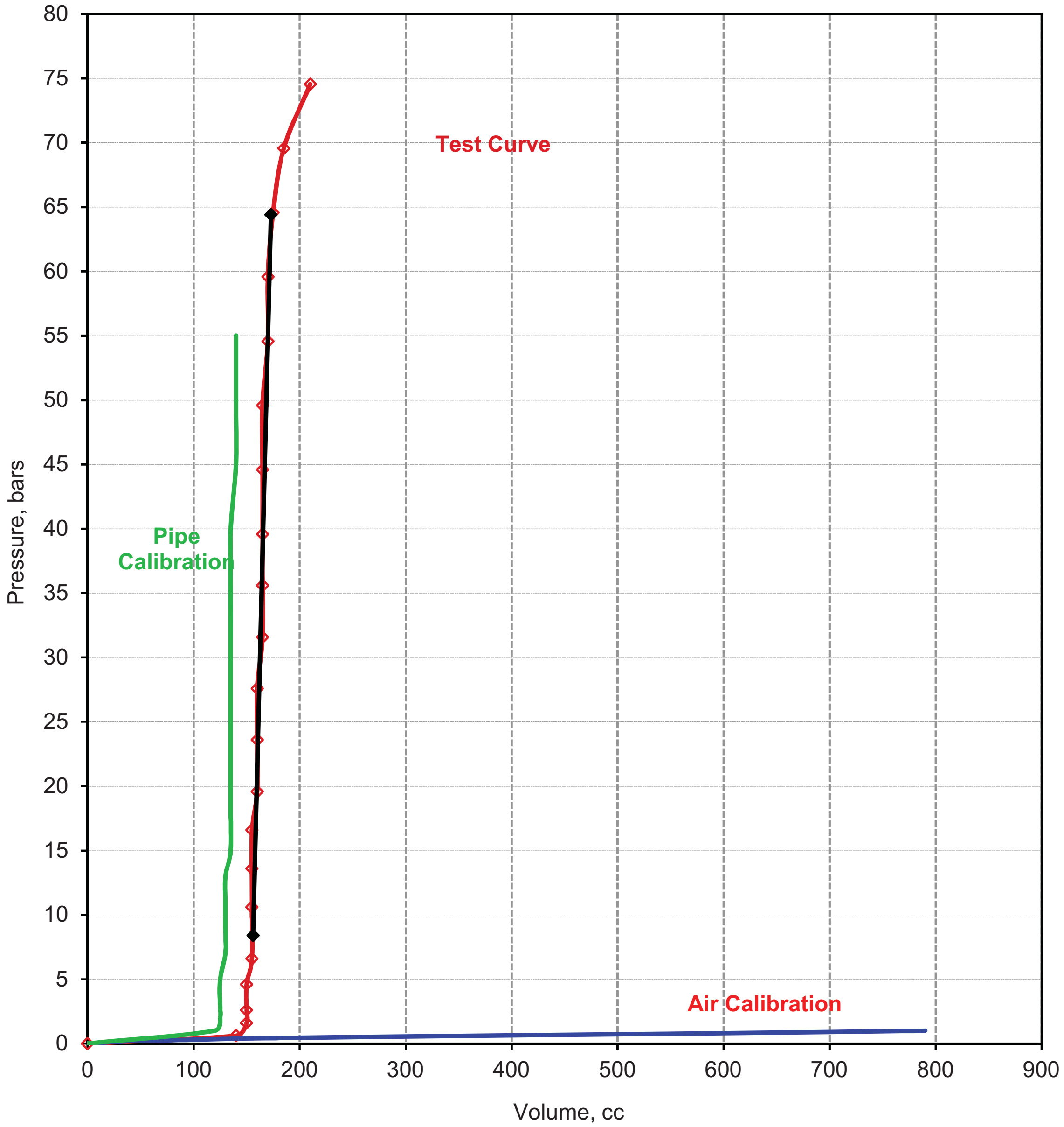


Applied Pressure vs. Volume

Pressuremeter Test : 2

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-13	Limit Pressure, p_L :	>80 Bar
PMT Location.:	2		
Test Depth :	8.00 m	Deformation Modulus, E_m :	8363.7 kg/sq.cm

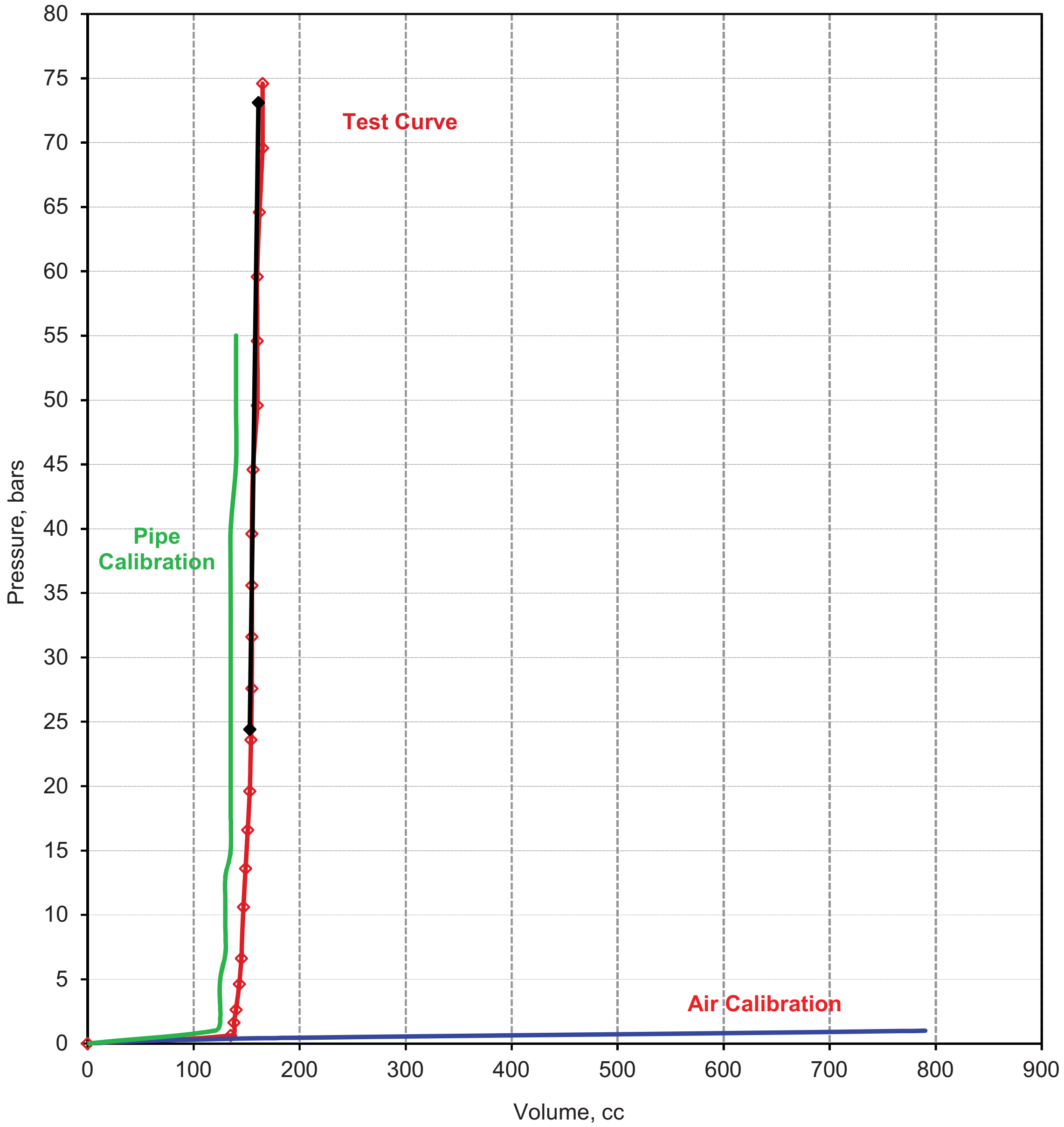


Applied Pressure vs. Volume

Pressuremeter Test : 2

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-14	Limit Pressure, p_L :	>80 Bar
PMT Location.:	2		
Test Depth :	10.00 m	Deformation Modulus, E_m :	15334.5 kg/sq.cm

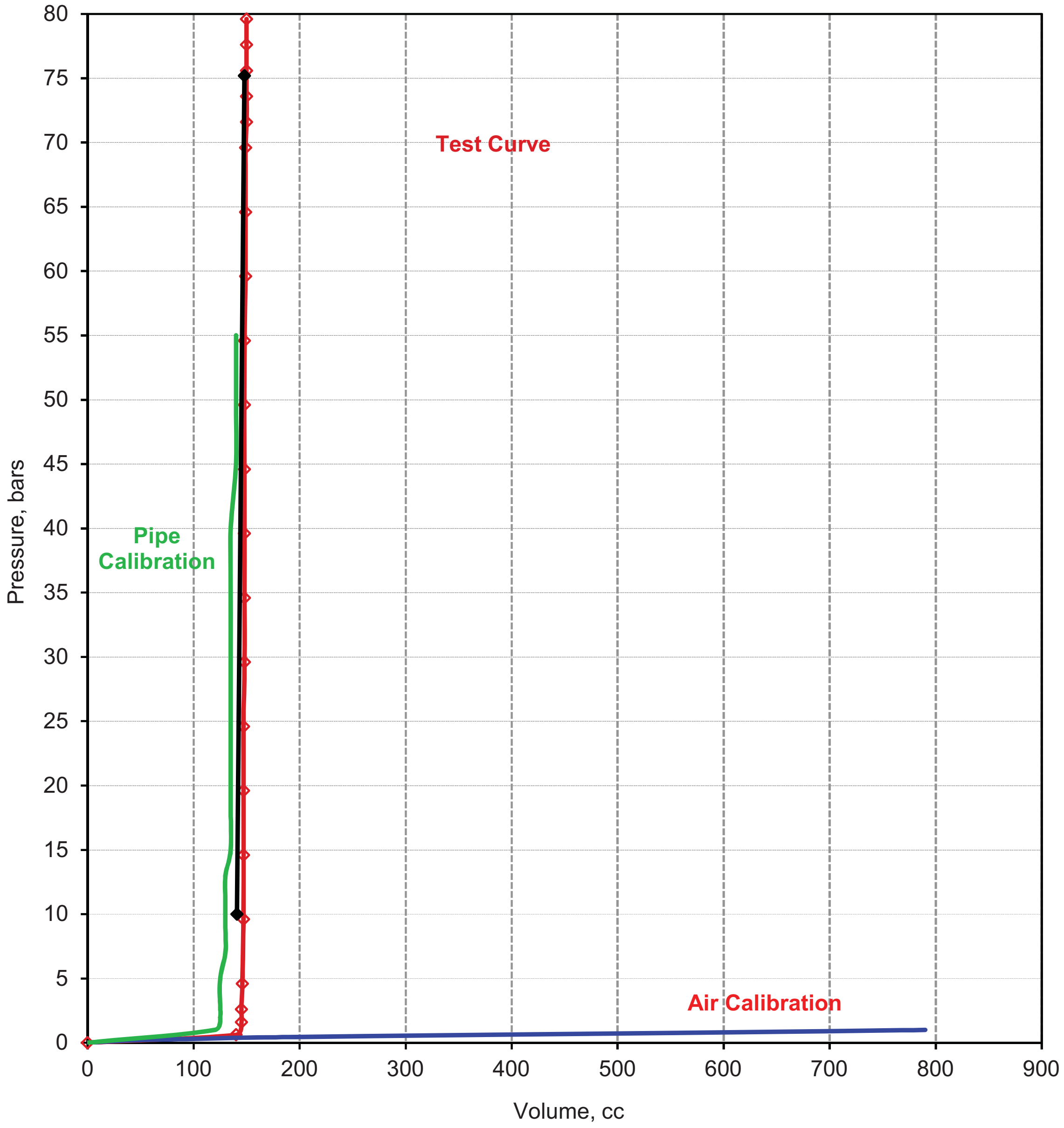


Applied Pressure vs. Volume

Pressuremeter Test : 2

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-15	Limit Pressure, p_L :	>80 Bar
PMT Location.:	2		
Test Depth :	12.00 m	Deformation Modulus, E_m :	23153.2 kg/sq.cm

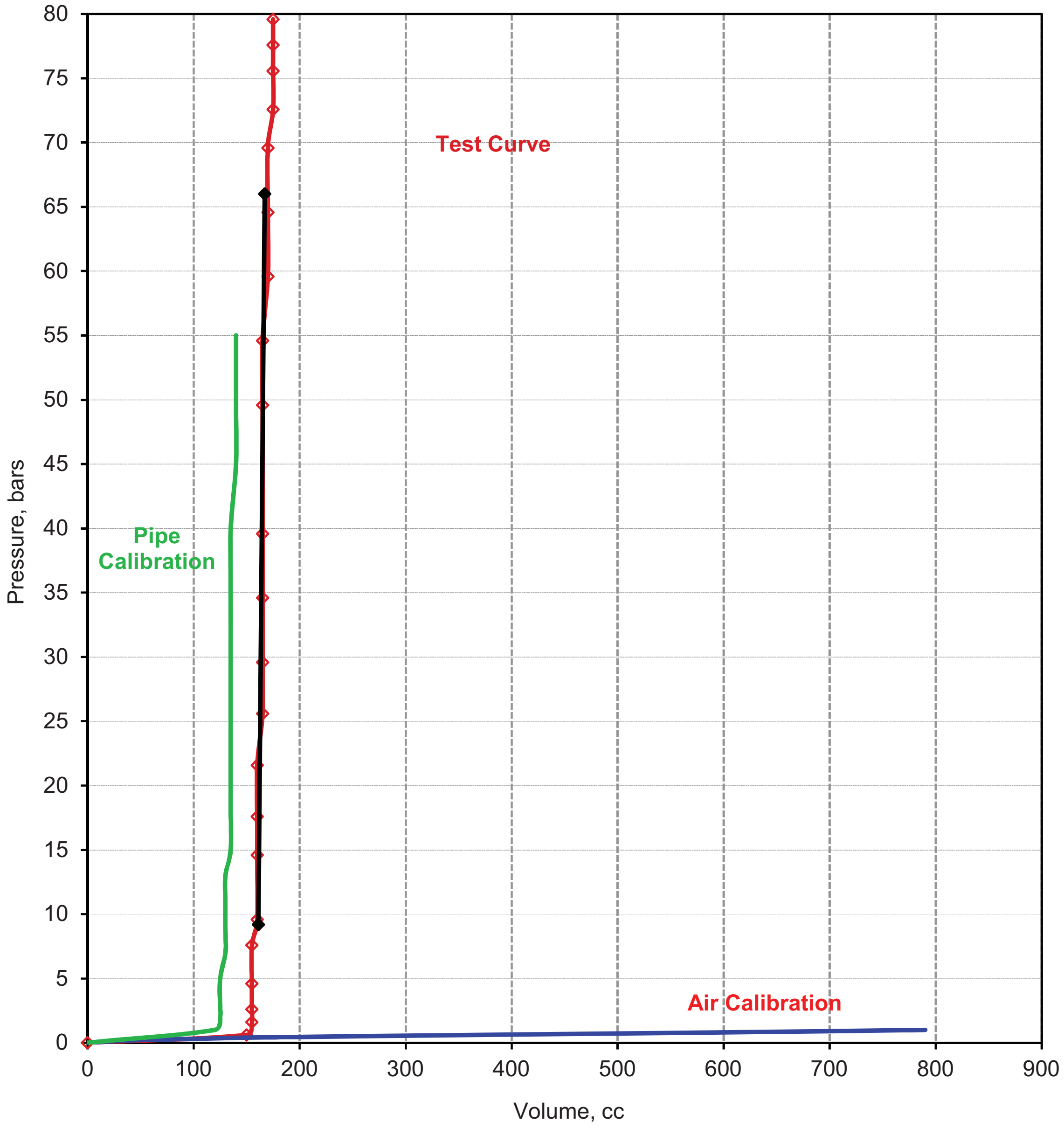


Applied Pressure vs. Volume

Pressuremeter Test : 2

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-16	Limit Pressure, p_L :	>80 Bar
PMT Location.:	2		
Test Depth :	15.00 m	Deformation Modulus, E_m :	24023 kg/sq.cm

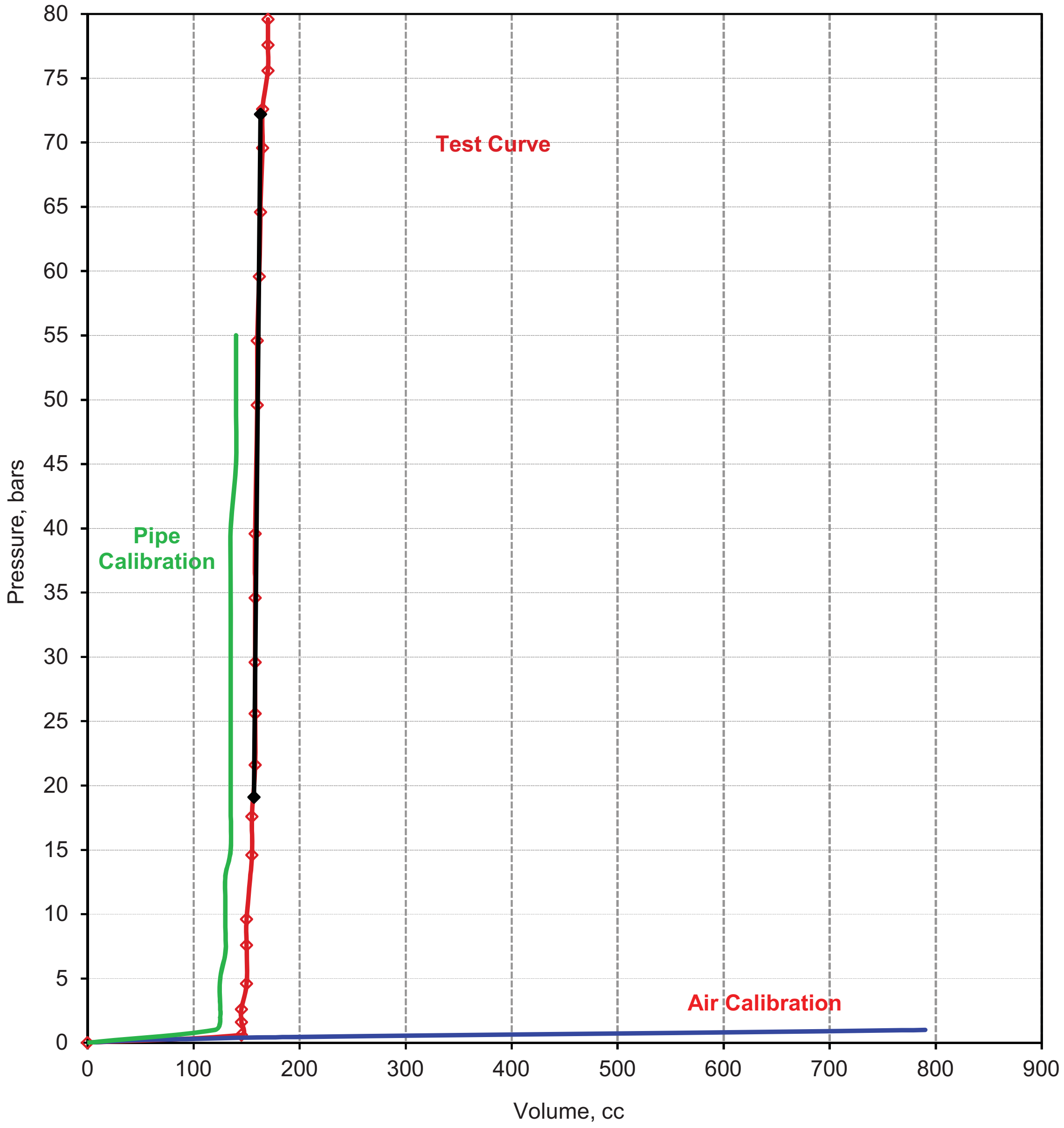


Applied Pressure vs. Volume

Pressuremeter Test : 2

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-17	Limit Pressure, p_L :	>80 Bar
PMT Location.:	2		
Test Depth :	18.00 m	Deformation Modulus, E_m :	22364 kg/sq.cm

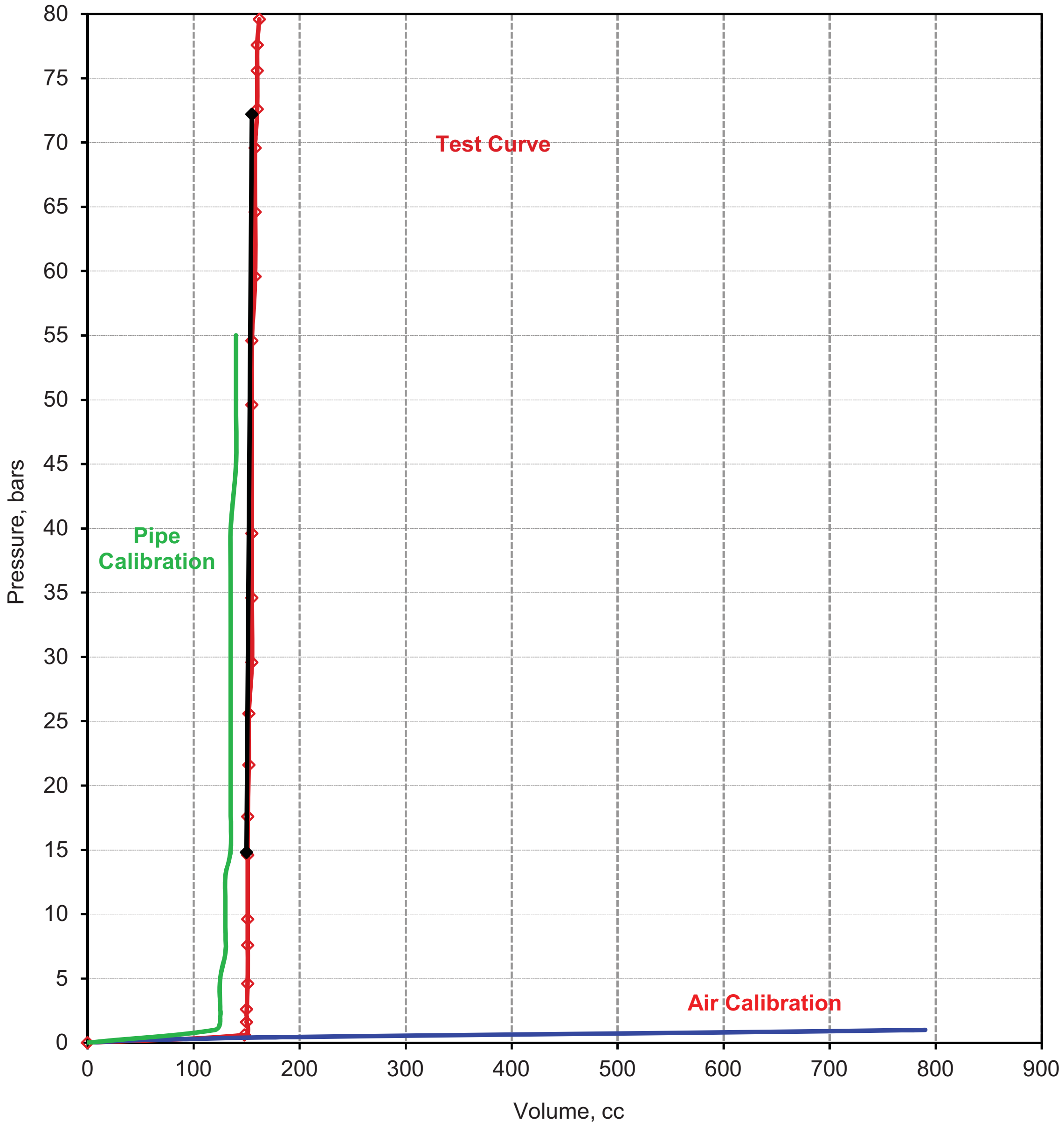


Applied Pressure vs. Volume

Pressuremeter Test : 2

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-18	Limit Pressure, p_L :	>80 Bar
PMT Location.:	2		
Test Depth :	20.00 m	Deformation Modulus, E_m :	28780.9 kg/sq.cm

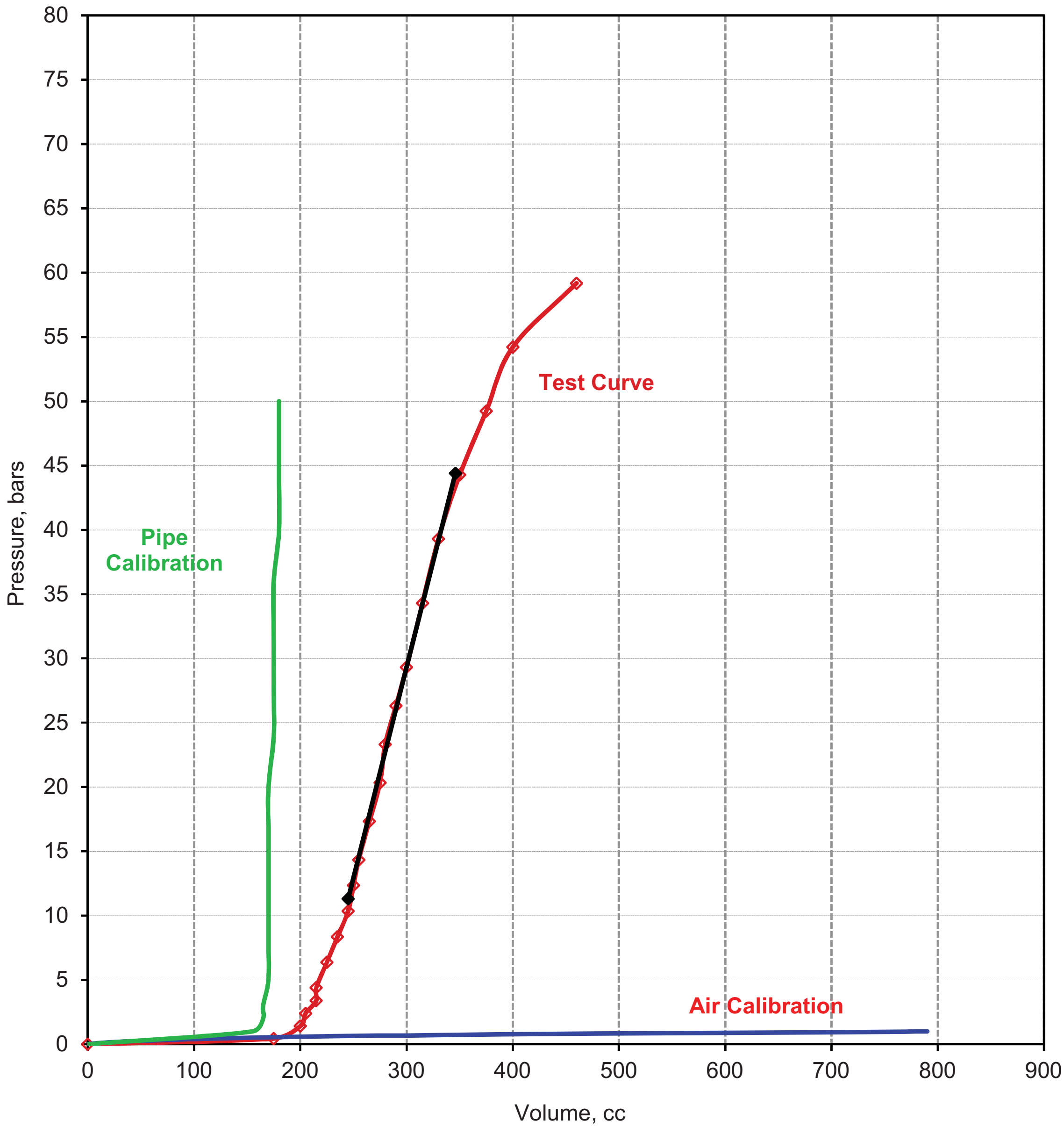


Applied Pressure vs. Volume

Pressuremeter Test : 3

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-19	Limit Pressure, p_L :	59.2 bar
PMT Location.:	3		
Test Depth :	2.00 m	Deformation Modulus, E_m :	917.6 kg/sq.cm

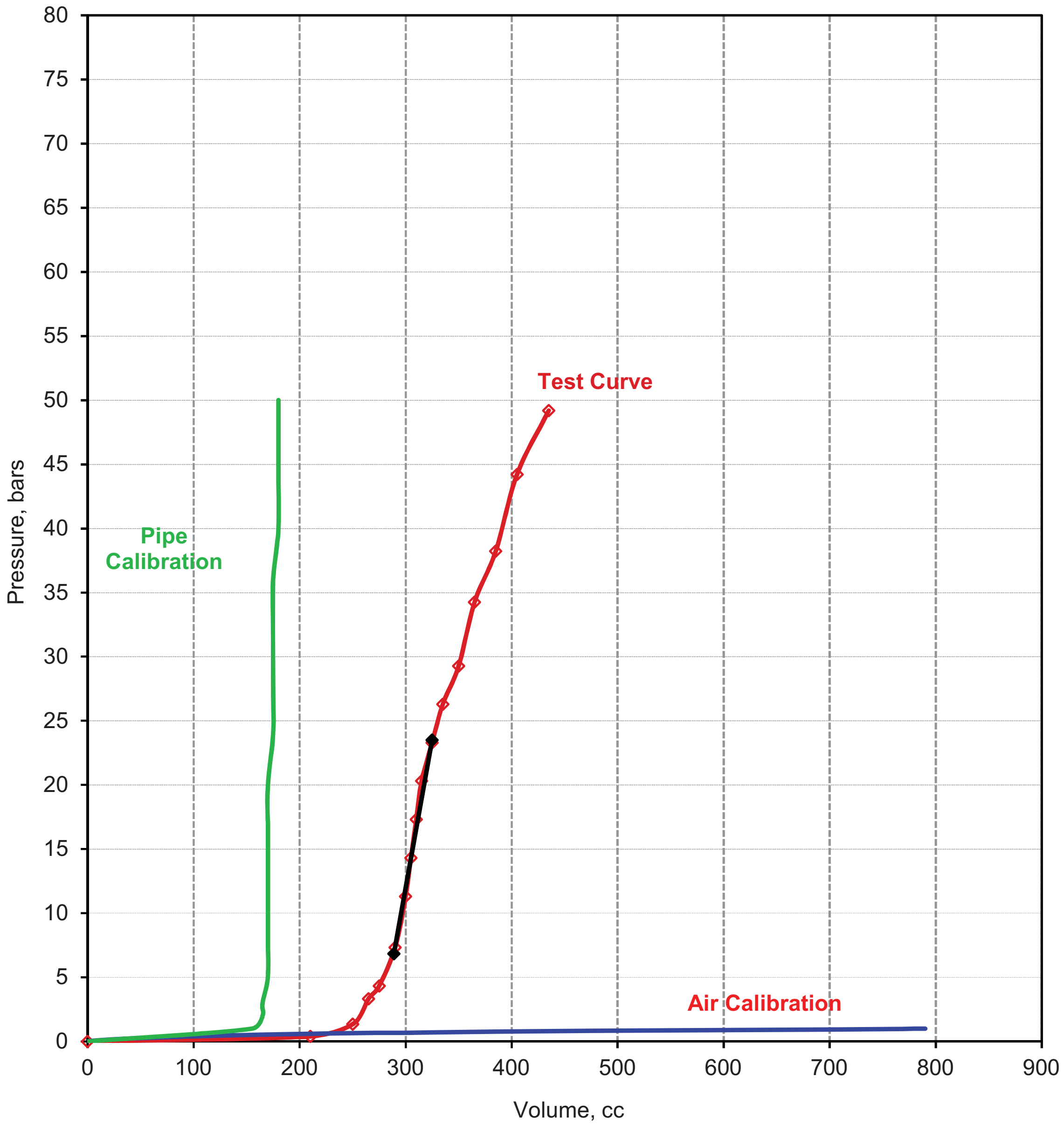


Applied Pressure vs. Volume

Pressuremeter Test : 3

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-20	Limit Pressure, p_L :	49.2 bar
PMT Location.:	3		
Test Depth :	4.00 m	Deformation Modulus, E_m :	1295.8 kg/sq.cm

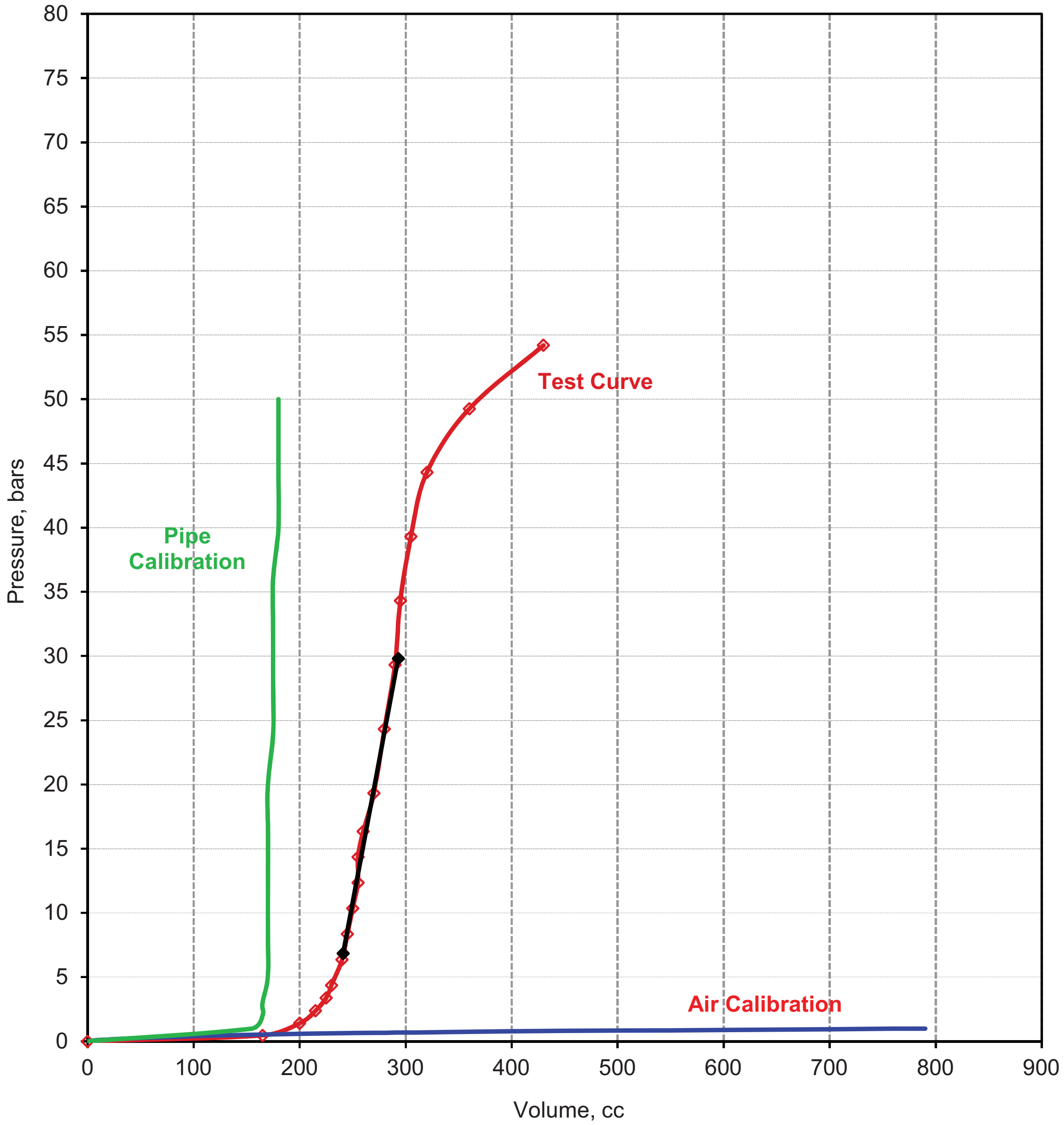


Applied Pressure vs. Volume

Pressuremeter Test : 3

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-21	Limit Pressure, p_L :	54.2 bar
PMT Location.:	3		
Test Depth :	6.00 m	Deformation Modulus, E_m :	1236.3 kg/sq.cm

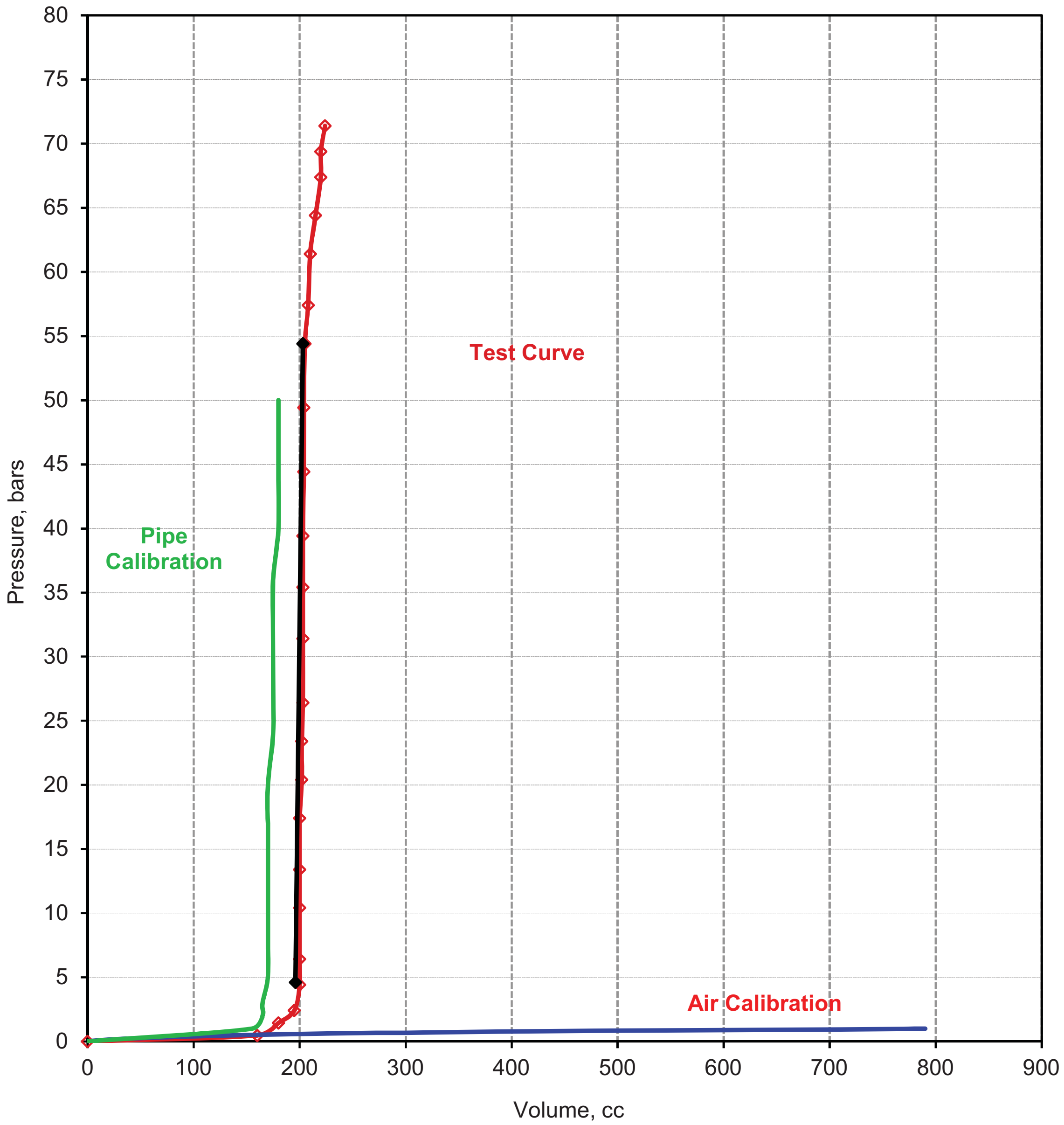


Applied Pressure vs. Volume

Pressuremeter Test : 3

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-22	Limit Pressure, p_L :	>80 Bar
PMT Location.:	3		
Test Depth :	8.00 m	Deformation Modulus, E_m :	18725.3 kg/sq.cm

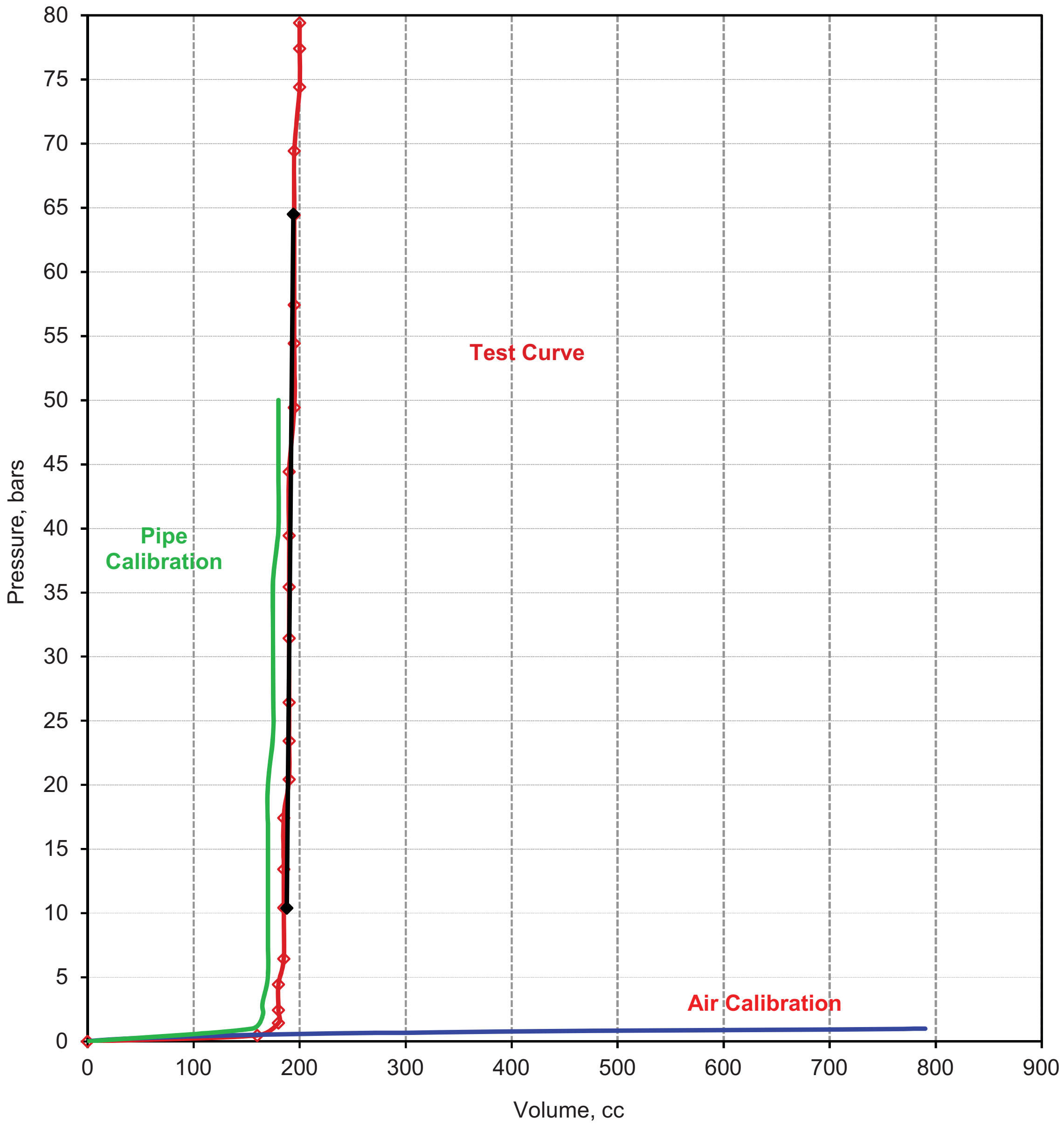


Applied Pressure vs. Volume

Pressuremeter Test : 3

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-23	Limit Pressure, p_L :	>80 Bar
PMT Location.:	3		
Test Depth :	10.00 m	Deformation Modulus, E_m :	23528.6 kg/sq.cm

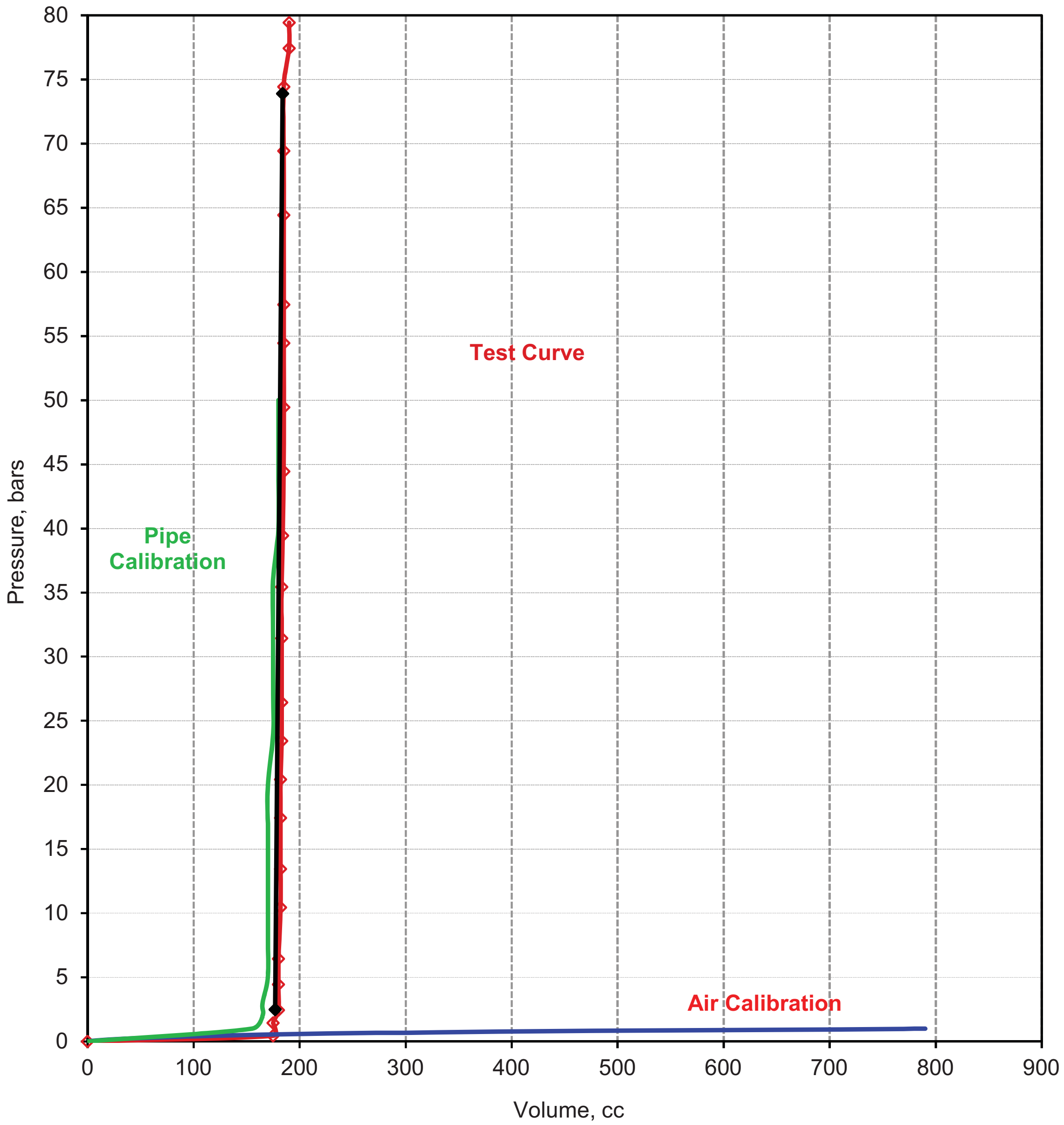


Applied Pressure vs. Volume

Pressuremeter Test : 3

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-24	Limit Pressure, p_L :	>80 Bar
PMT Location.:	3		
Test Depth :	12.00 m	Deformation Modulus, E_m :	26331.6 kg/sq.cm

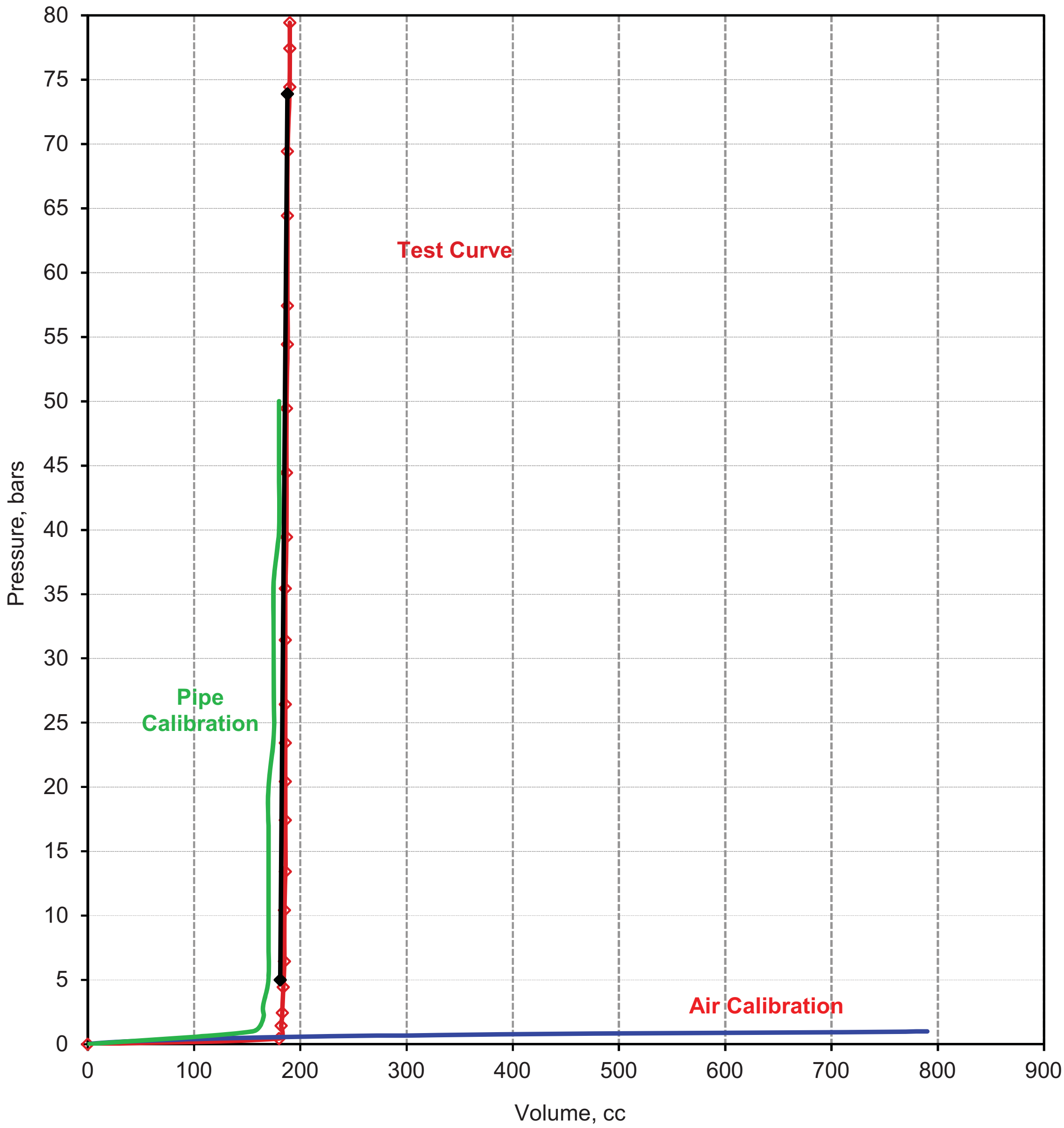


Applied Pressure vs. Volume

Pressuremeter Test : 3

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-25	Limit Pressure, p_L :	>80 Bar
PMT Location.:	3		
Test Depth :	15.00 m	Deformation Modulus, E_m :	25514.4 kg/sq.cm

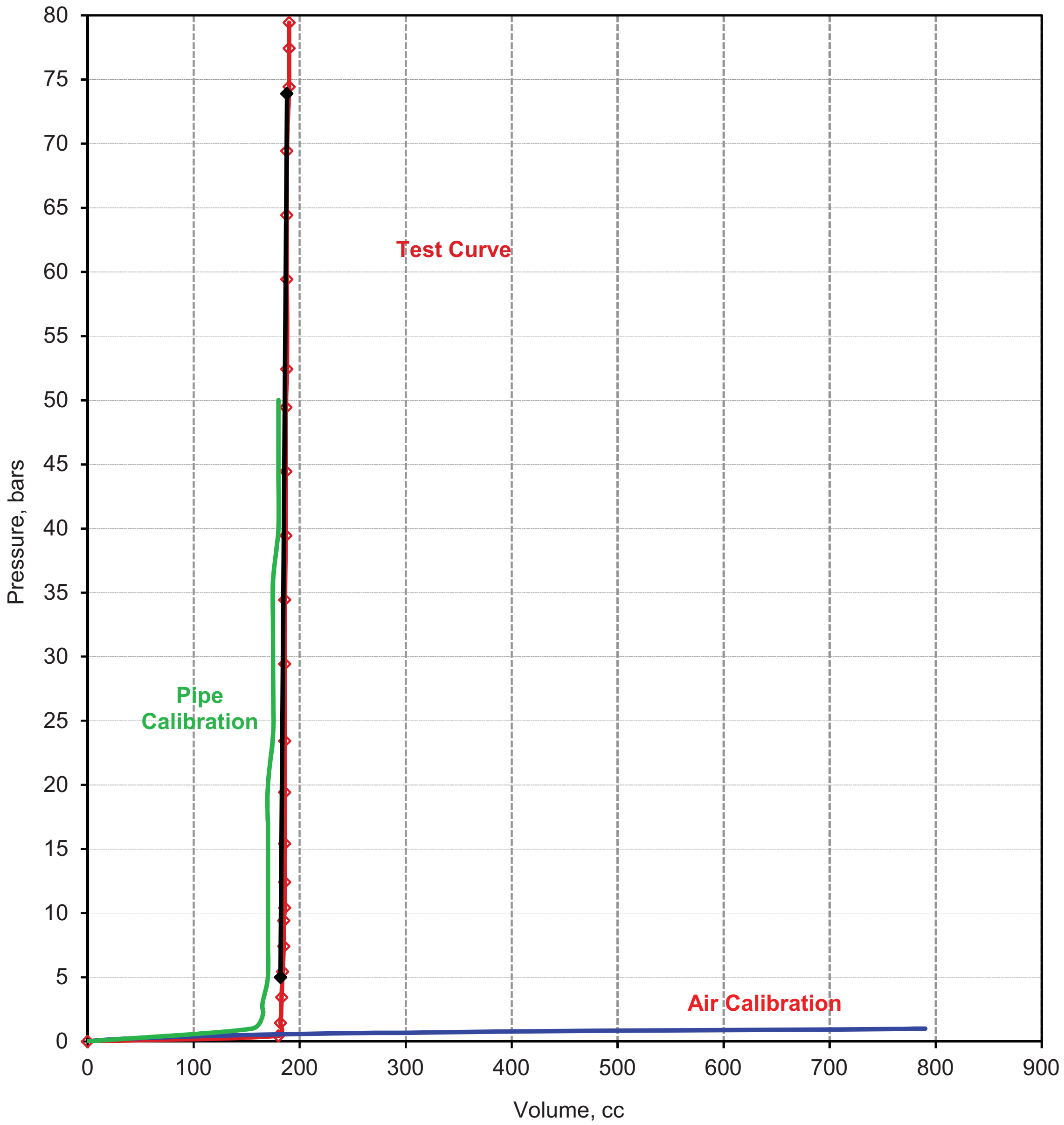


Applied Pressure vs. Volume

Pressuremeter Test : 3

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-26	Limit Pressure, p_L :	>80 Bar
PMT Location.:	3		
Test Depth :	18.00 m	Deformation Modulus, E_m :	29782 kg/sq.cm

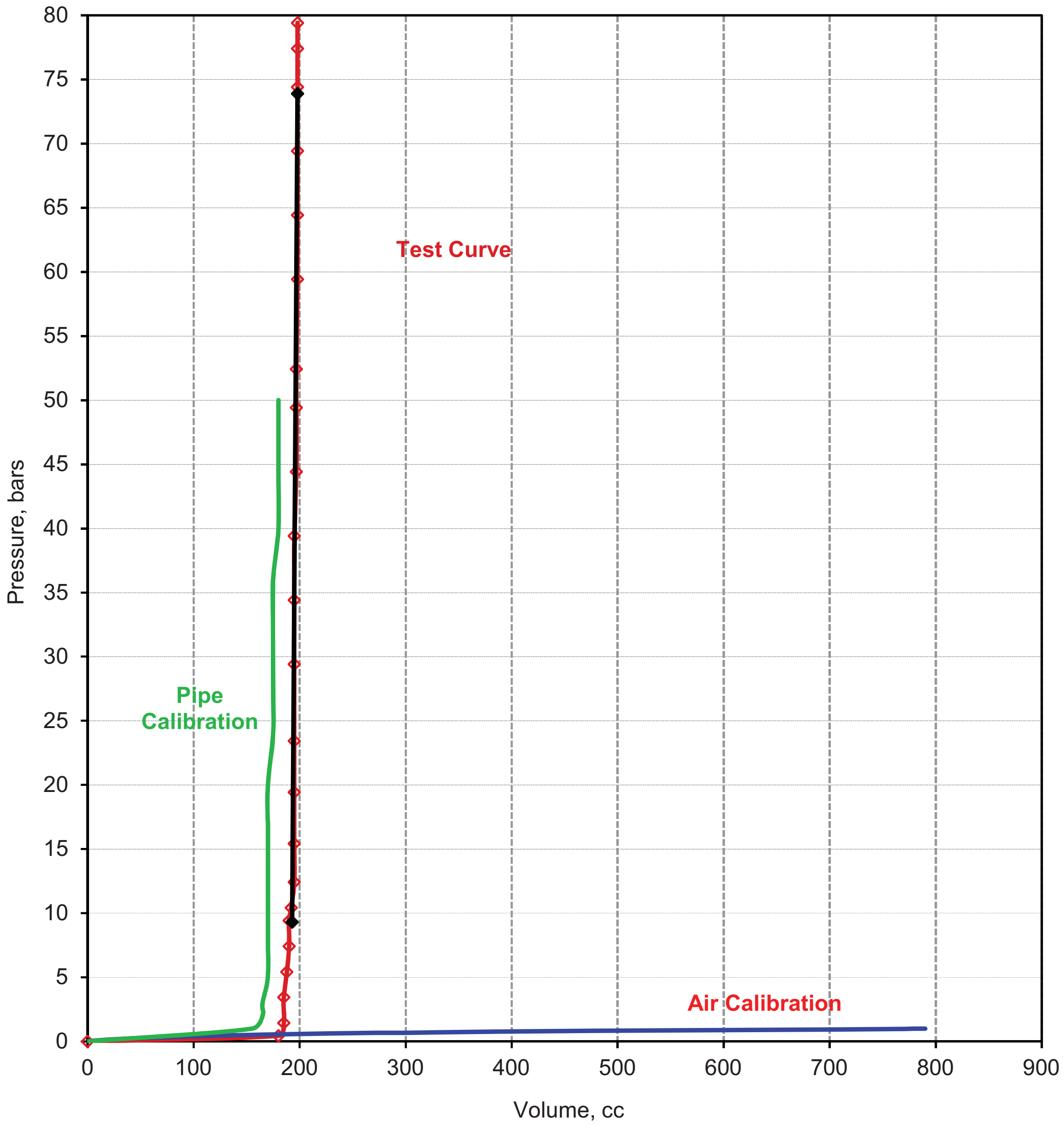


Applied Pressure vs. Volume

Pressuremeter Test : 3

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-27	Limit Pressure, p_L :	>80 Bar
PMT Location.:	3		
Test Depth :	20.00 m	Deformation Modulus, E_m :	33868.9 kg/sq.cm

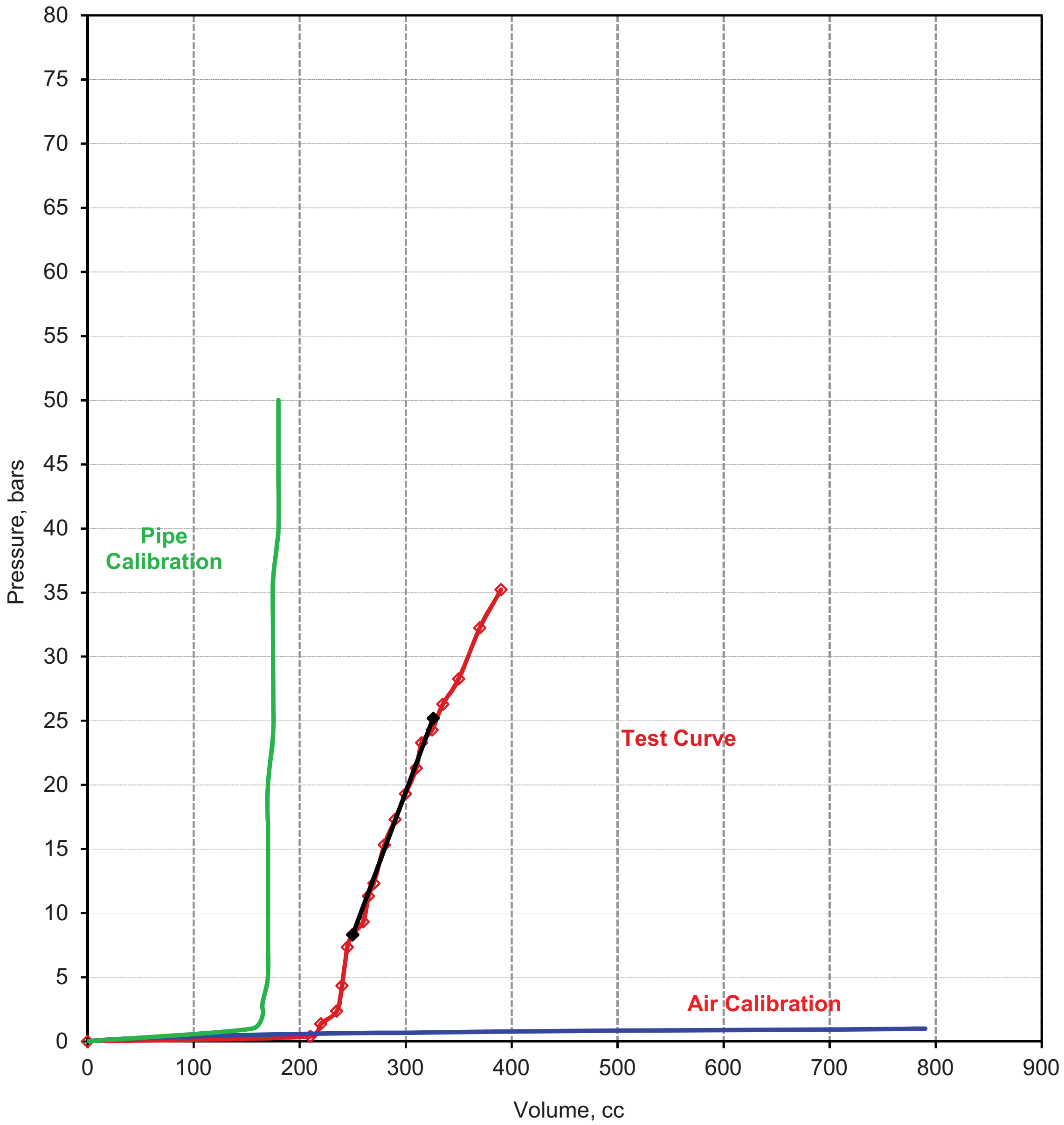


Applied Pressure vs. Volume

Pressuremeter Test : 4

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-28	Limit Pressure, p_L :	35.3 bar
PMT Location.:	4		
Test Depth :	2.00 m	Deformation Modulus, E_m :	622.6 kg/sq.cm

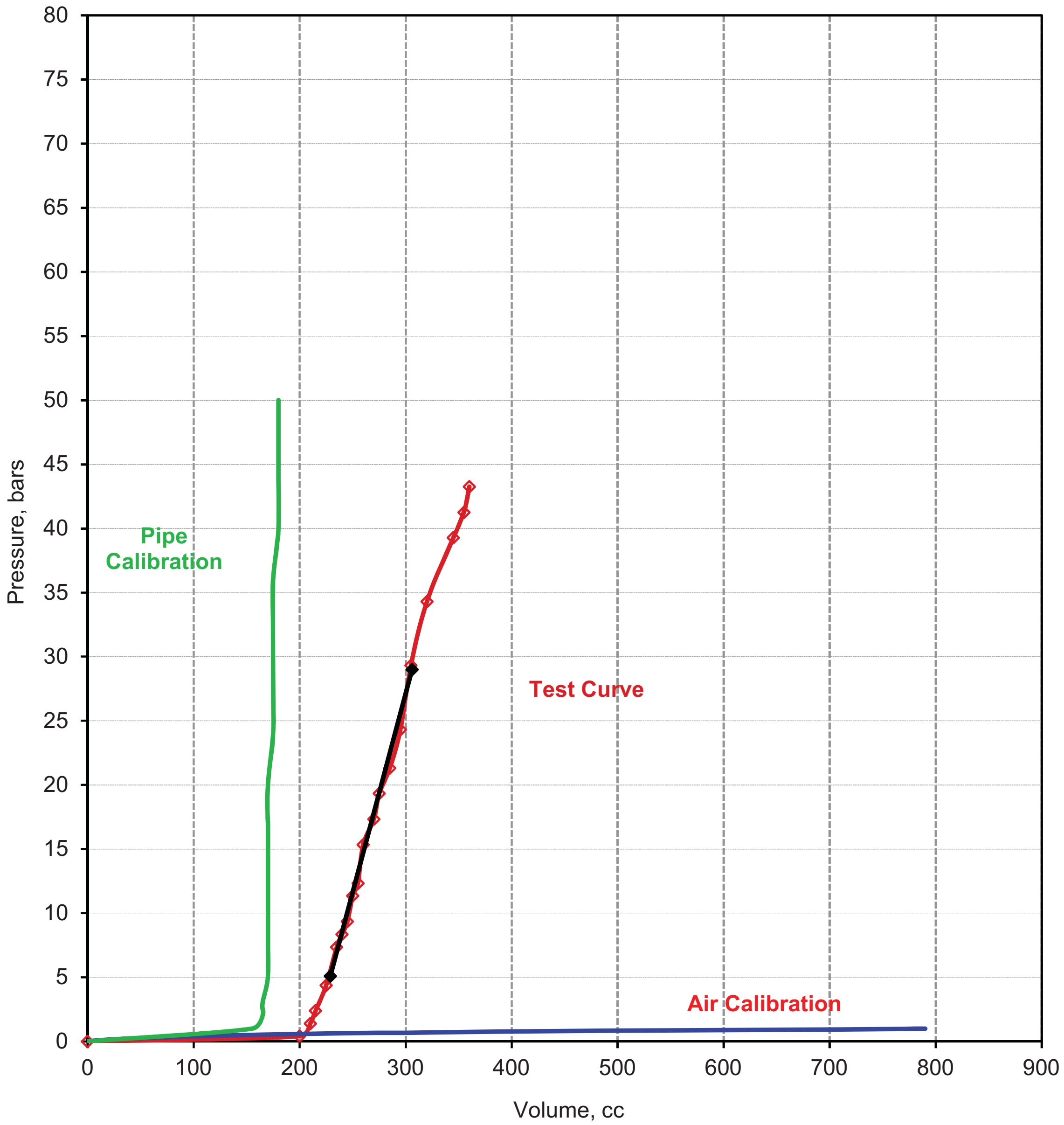


Applied Pressure vs. Volume

Pressuremeter Test : 4

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-29	Limit Pressure, p_L :	43.3 bar
PMT Location.:	4		
Test Depth :	4.00 m	Deformation Modulus, E_m :	869.1 kg/sq.cm

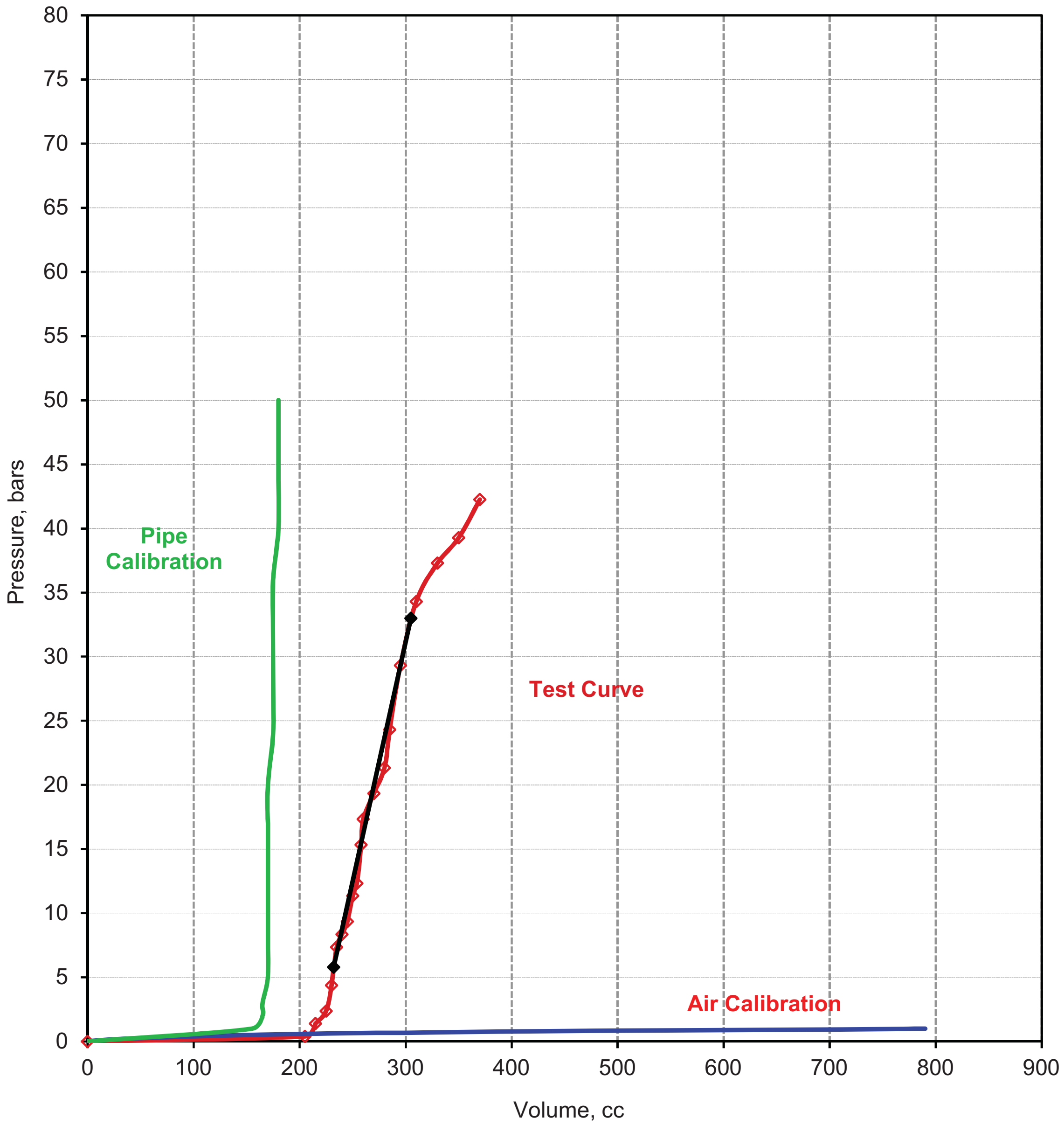


Applied Pressure vs. Volume

Pressuremeter Test : 4

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-30	Limit Pressure, p_L :	42.3 bar
PMT Location.:	4		
Test Depth :	6.00 m	Deformation Modulus, E_m :	1043.3 kg/sq.cm

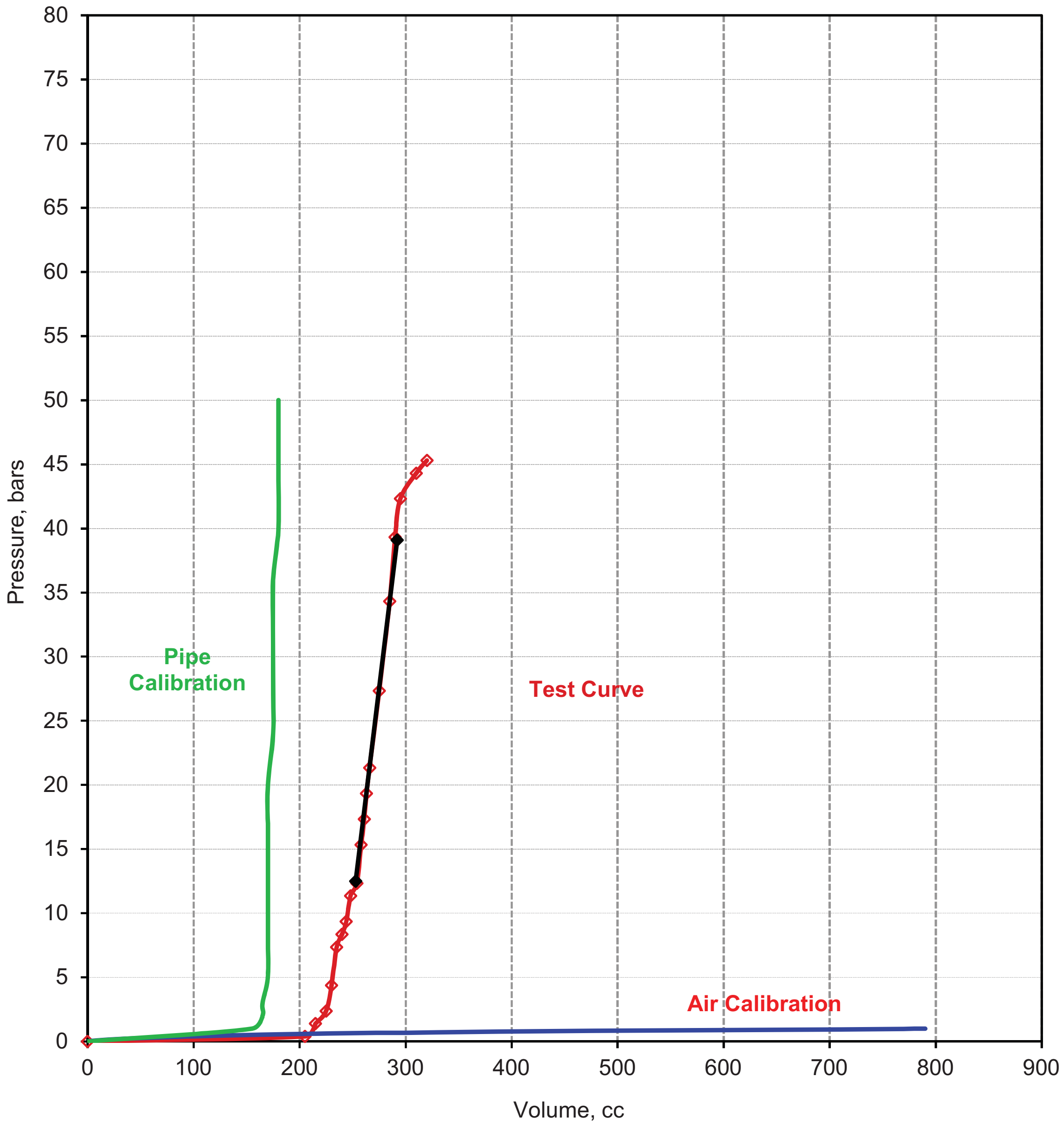


Applied Pressure vs. Volume

Pressuremeter Test : 4

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-31	Limit Pressure, p_L :	45.3 bar
PMT.:	4		
Test Depth :	8.00 m	Deformation Modulus, E_m :	1909.7 kg/sq.cm

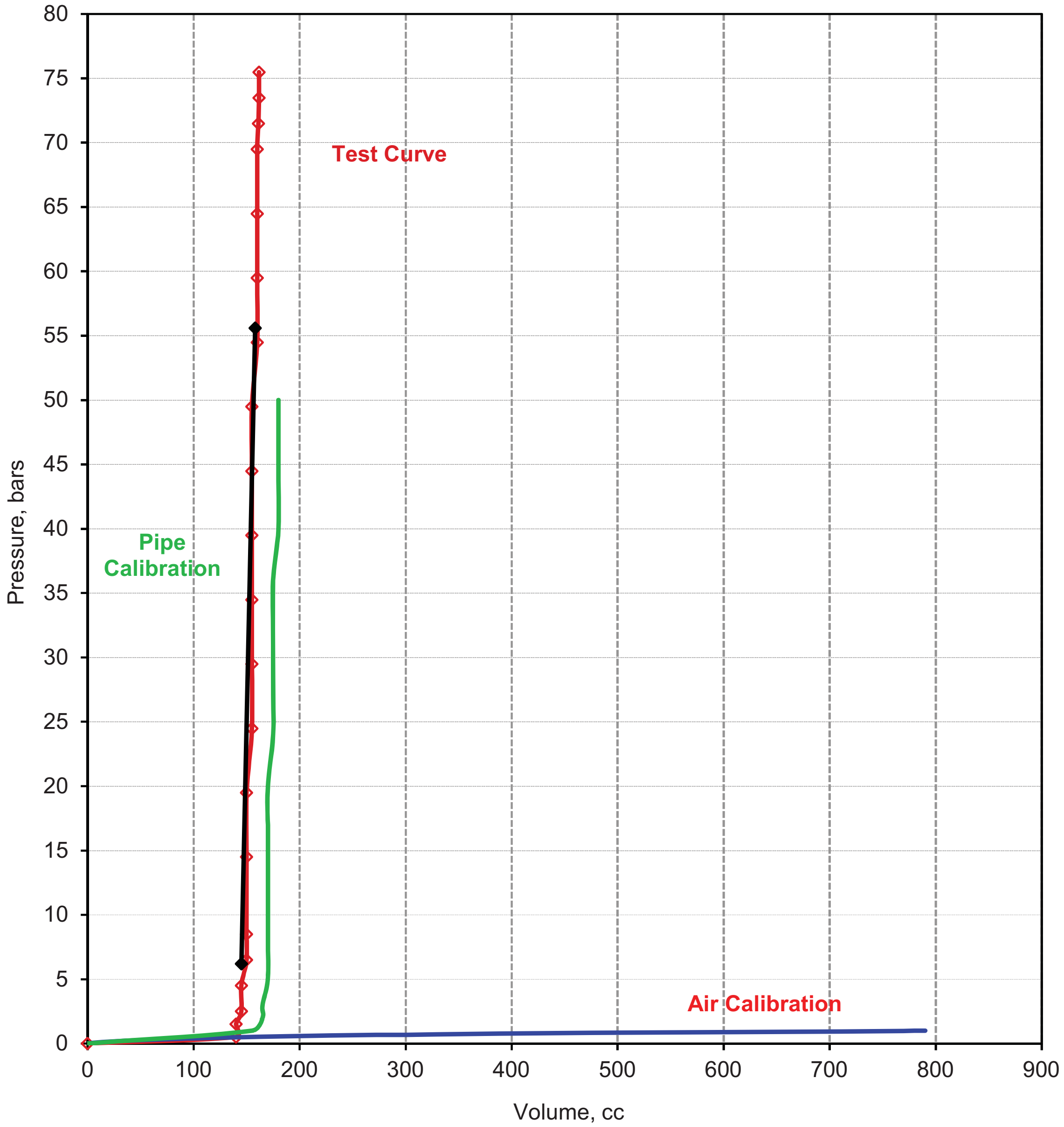


Applied Pressure vs. Volume

Pressuremeter Test : 4

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-32	Limit Pressure, p_L :	>80 Bar
PMT.:	4		
Test Depth :	10.00 m	Deformation Modulus, E_m :	9516.7 kg/sq.cm

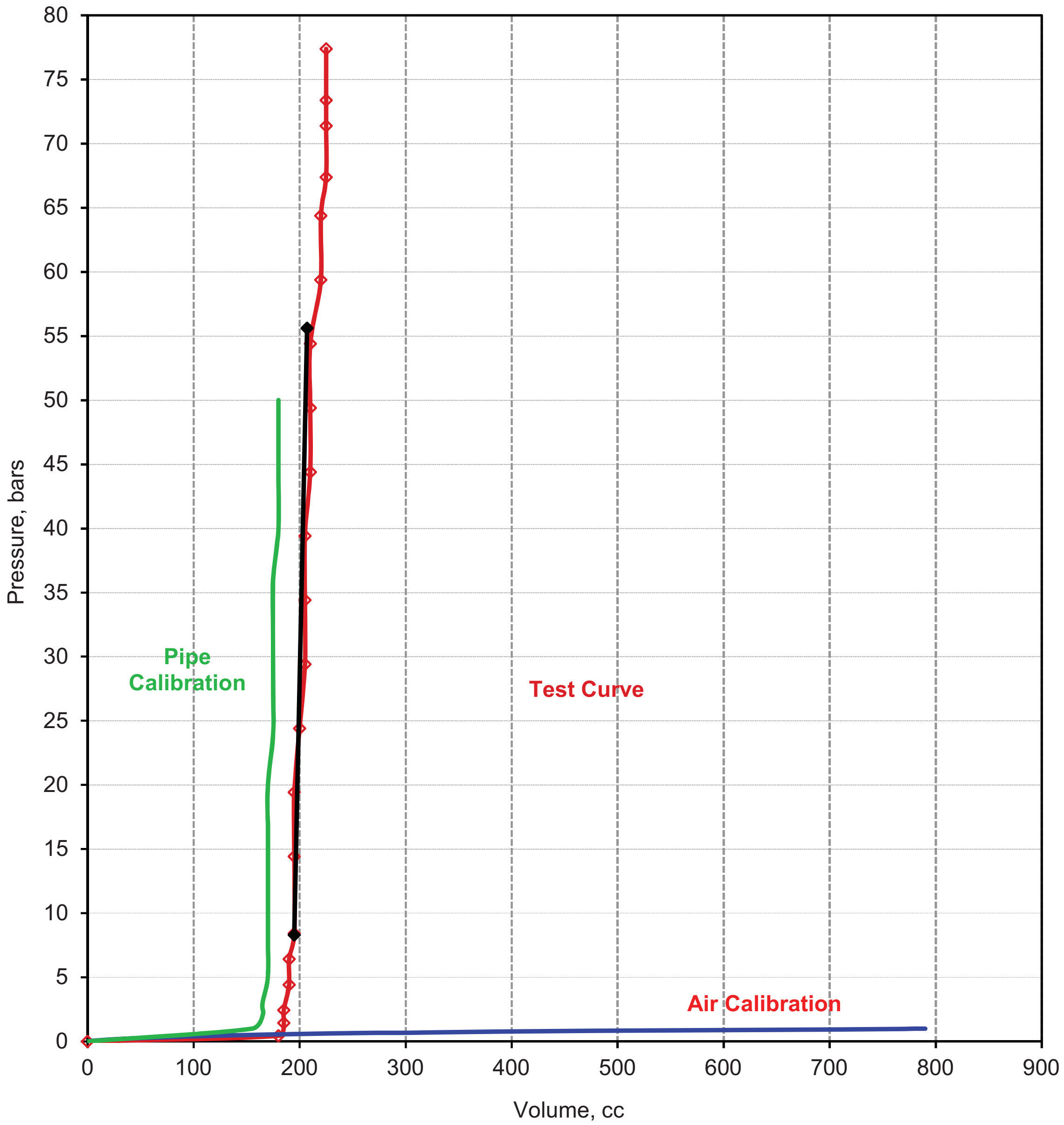


Applied Pressure vs. Volume

Pressuremeter Test : 4

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-33	Limit Pressure, p_L :	>80 Bar
PMT.:	4		
Test Depth :	12.00 m	Deformation Modulus, E_m :	10390.5 kg/sq.cm

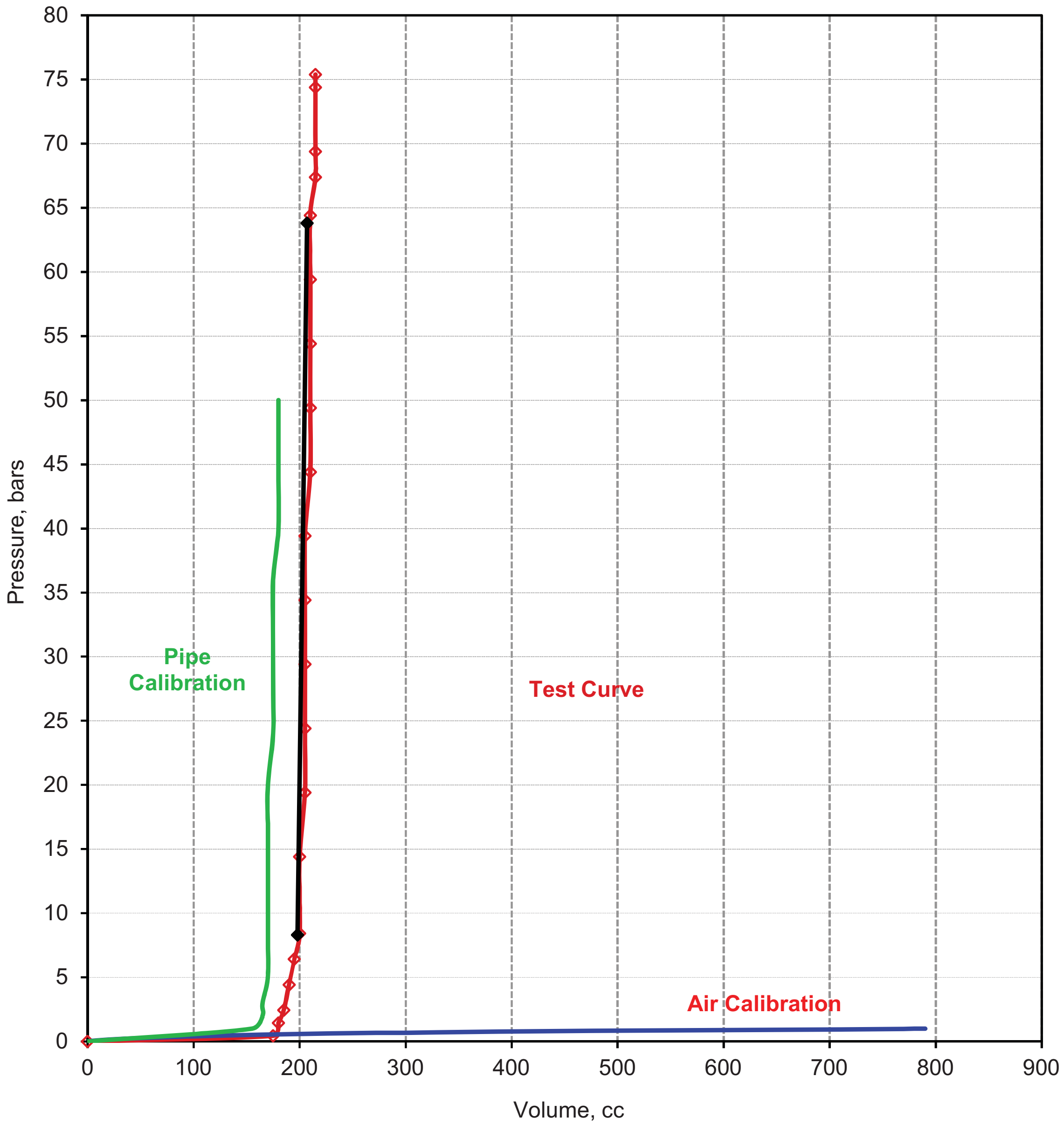


Applied Pressure vs. Volume

Pressuremeter Test : 4

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-34	Limit Pressure, p_L :	>80 Bar
PMT.:	4		
Test Depth :	15.00 m	Deformation Modulus, E_m :	16280.3 kg/sq.cm

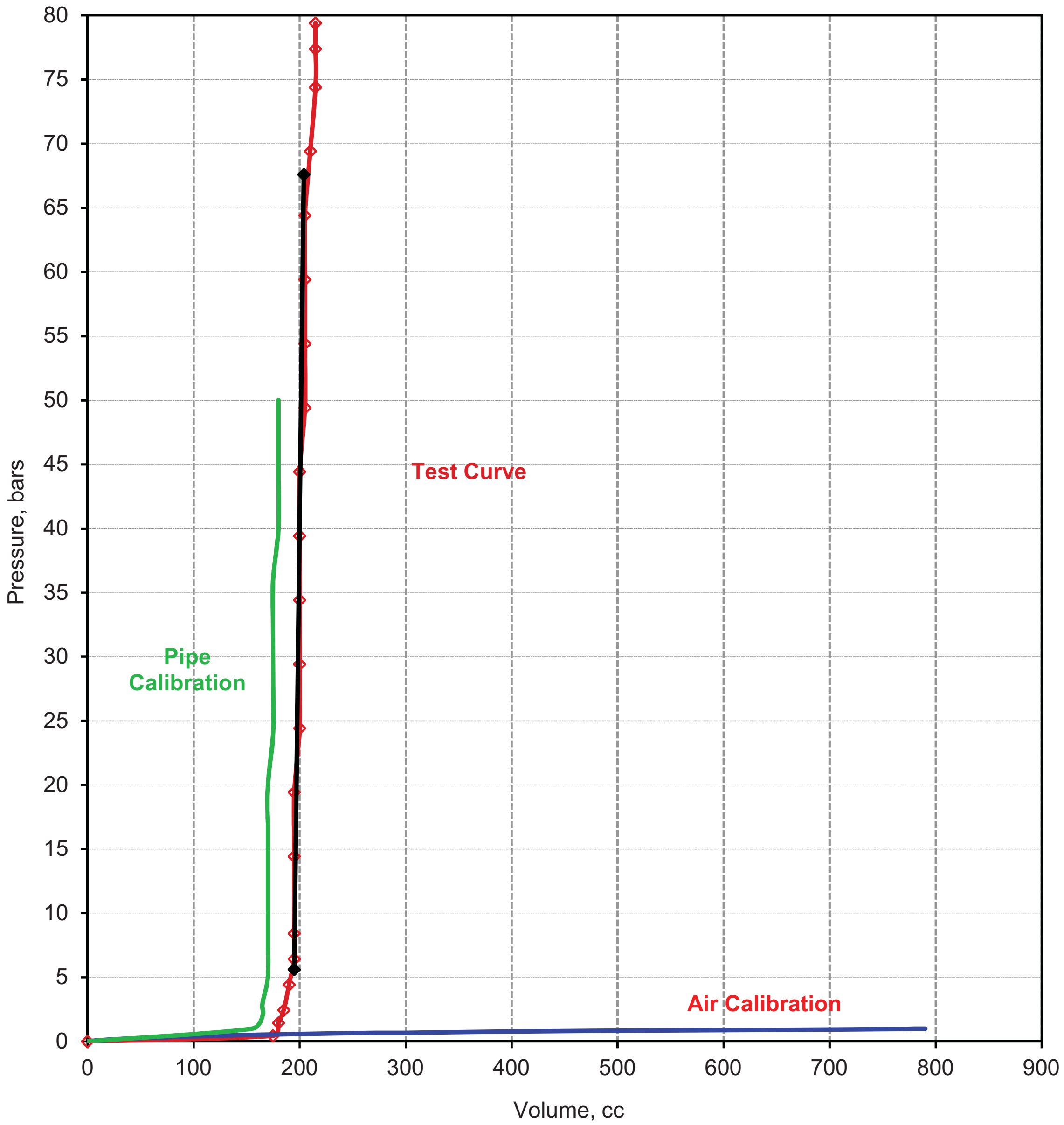


Applied Pressure vs. Volume

Pressuremeter Test : 4

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-35	Limit Pressure, p_L :	>80 Bar
PMT.:	4		
Test Depth :	18.00 m	Deformation Modulus, E_m :	18132 kg/sq.cm

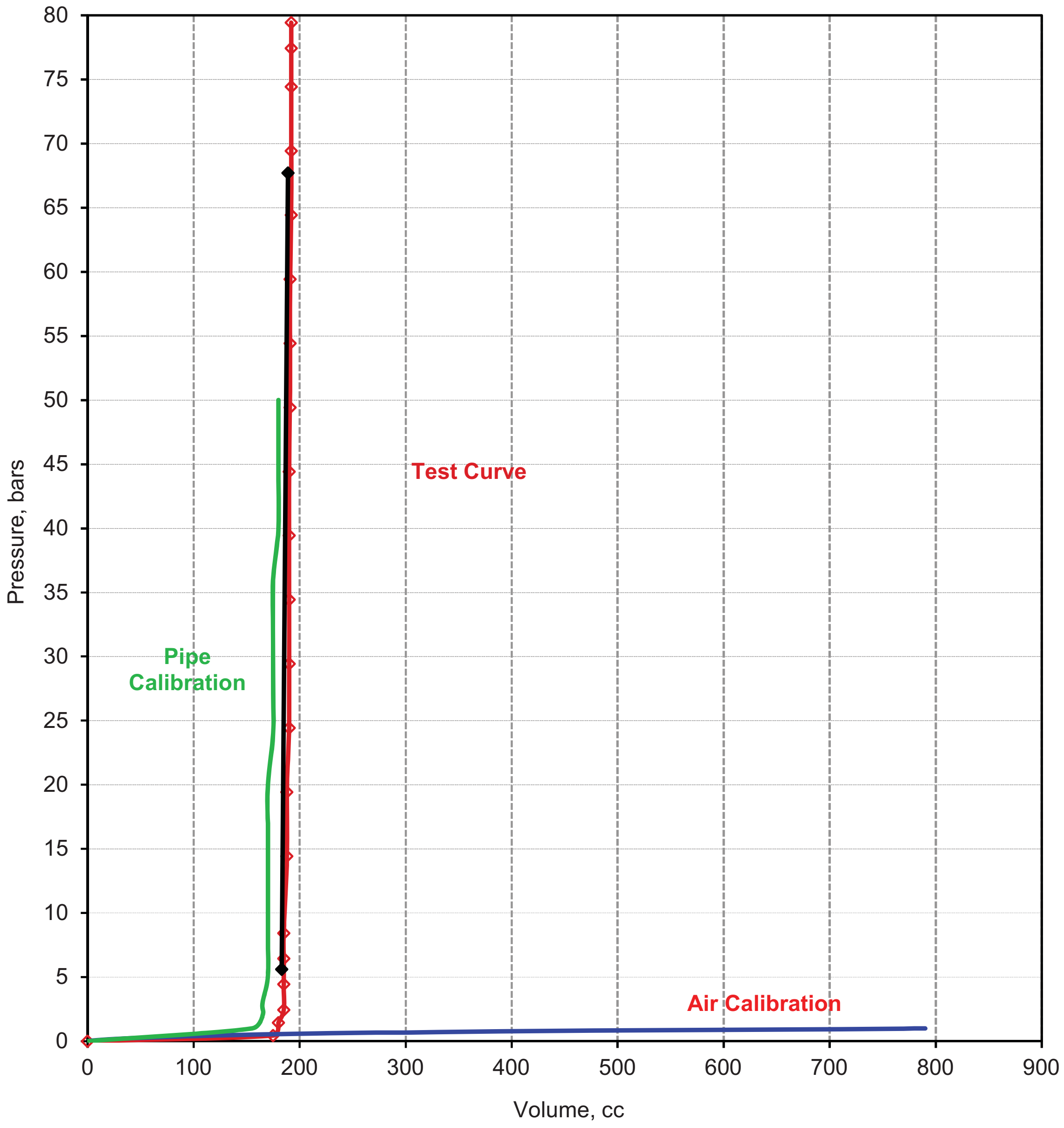


Applied Pressure vs. Volume

Pressuremeter Test : 4

IS: 1892-1979, RA-2007

Test Details		Test Results	
Test Designation. :	PMT-36	Limit Pressure, p_L :	>80 Bar
PMT.:	4		
Test Depth :	20.00 m	Deformation Modulus, E_m :	26870.3 kg/sq.cm



Applied Pressure vs. Volume

COREBOX PHOTOGRAPHS

BH1

BH2

BH3

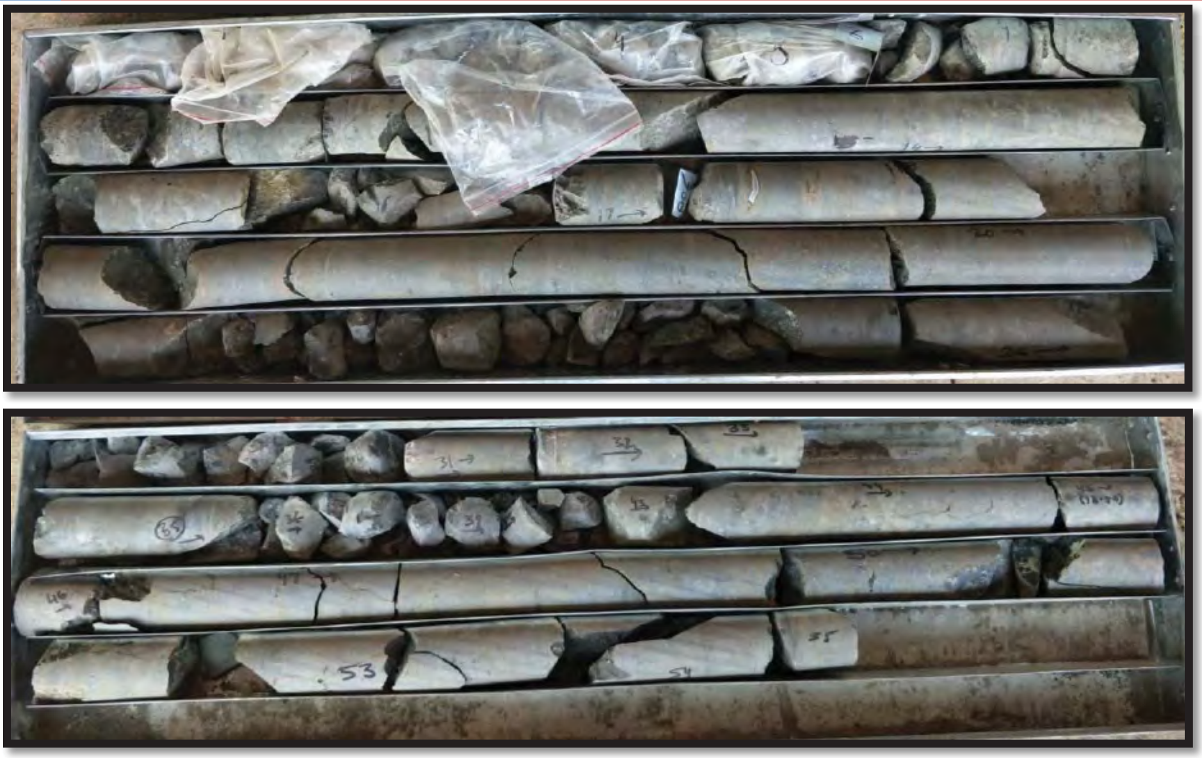
BH-4

BH5

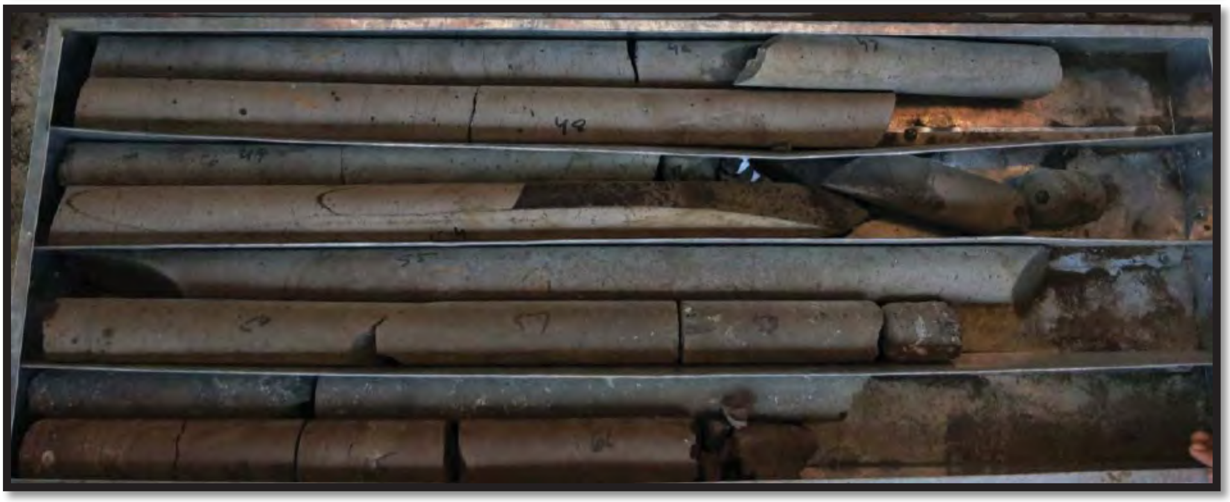
BH6

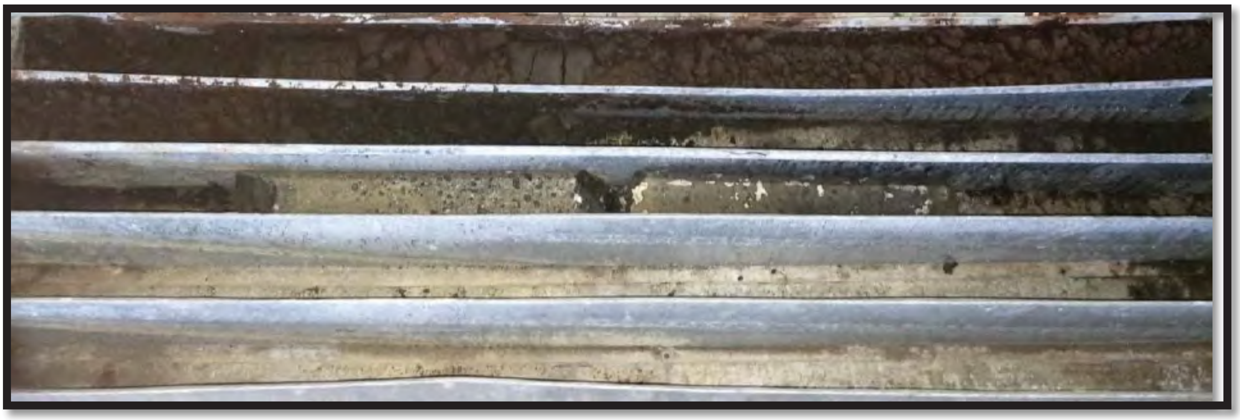
BH-7

BH8



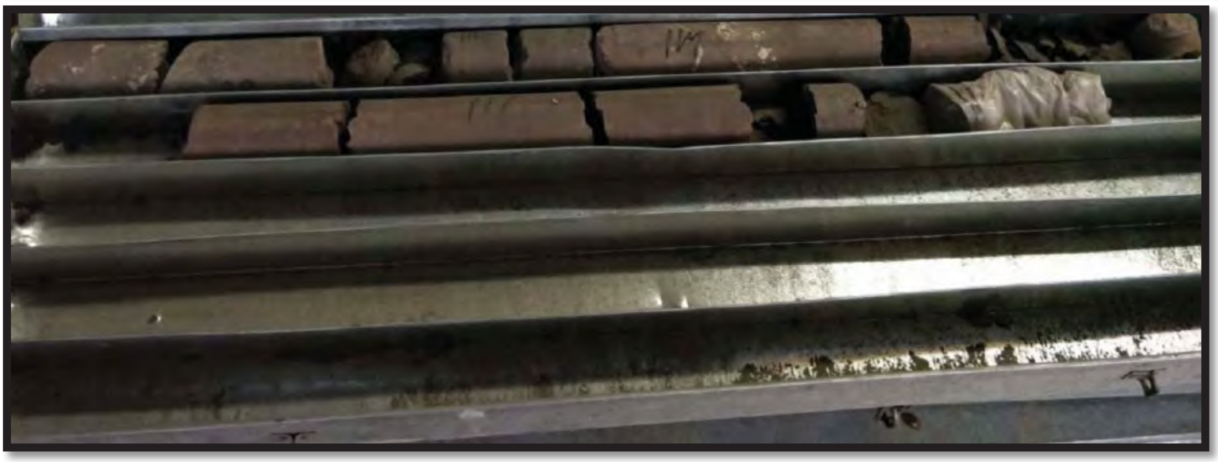
BH9





BH10

BH11



BH12

BH13

BH14

BH15

BH16

BH17

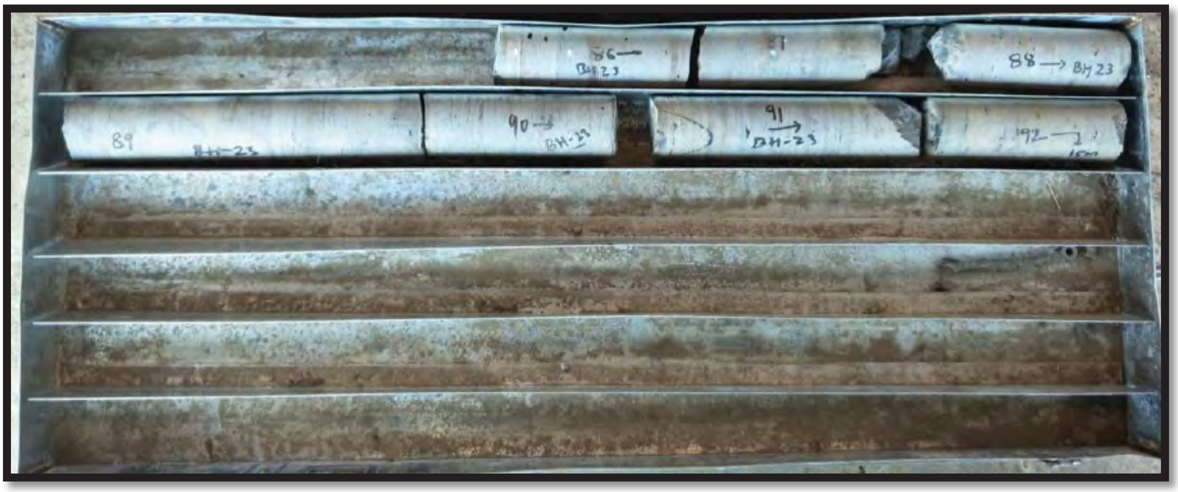
BH18

BH19

BH20

BH21

BH22



BH23

BH24

BH25

BH26

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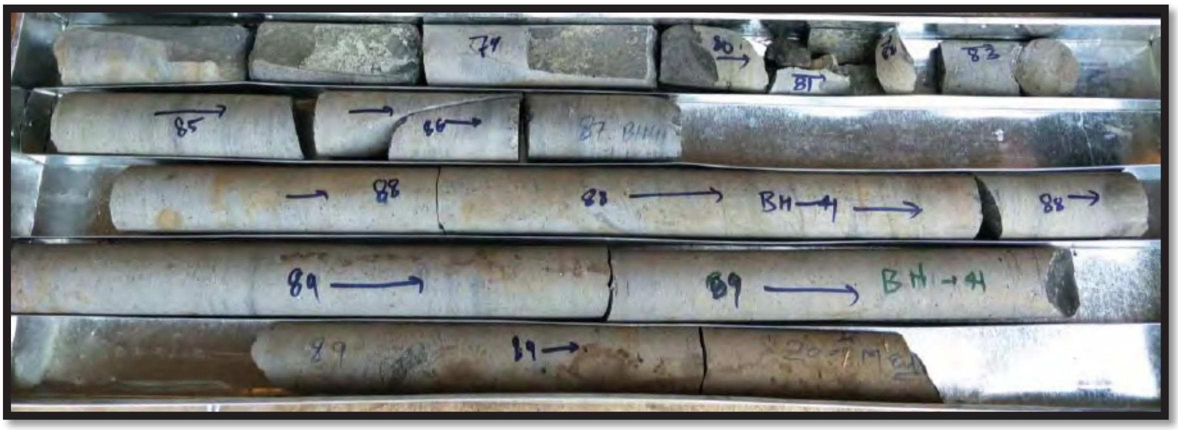
BH40



BH41

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BH56

BH57

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BH60

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BH62

BH63

BH64

BH65

BH66

BH-67

BH-68

BH-69

Sample Calculations

BEARING CAPACITY ANALYSIS FOR FOUNDATIONS ON ROCK

Analysis as per IS 12070-1987

Structure : Boiler (BH-10 to BH-13)
Foundation Depth: 5.0 m below NGL (RL 201.5 m)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Based on Core Strength as per Clause 6.0 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987

Rock Type: Fractured Basalt
Foundation Depth: 5.0 m
Below Founding Level : Rock Core Recovery: 33 **%** RQD value 0 %

1) Core Strength: Clause 6.0 of IS 12070-1987

$$q_{net\ safe} = q_o * N_j * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ =	safe net bearing capacity	c_s =	correction for orientation of joints
q_o =	average unixial compressive strength	c_c =	correction for solution cavities (in limestone)
N_j =	empirical coefficient	c_{sub} =	correction for saturation

Empirical Coefficient depending on the spacing of discontinuities (as Table 4 and Fig. 1) :

Spacing of Discontinuities, cm	N_j
300	0.4
100-300	0.25
30-100	0.1

Average Unixial Compressive Strength q_0 = 700 T/m^2

Coefficient (spacing of discontinuities):	N_j=	0.25
Correction for saturation/submergence:	c_{sub}=	0.50
Correction for orientation of joints	c_s =	0.75
Correction for solution cavities (in limestone)	c_c =	1.00

$q_{net\ safe}$ = 65.6 T/m^2

2) Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 26 Class of Rock: V Rock Description: Very Poor

$q_{net\ safe}$ = 70.9 T/m^2

Recommended value of Net Safe Bearing Pressure for Design: **65** **T/m^2**

BEARING CAPACITY ANALYSIS FOR FOUNDATIONS ON ROCK

Analysis as per IS 12070-1987

Structure : Main Power House Area (BH-14 to BH-20)
Foundation Depth: 5.0 m below NGL (RL 202.6 m)

BEARING CAPACITY ANALYSIS FOR OPEN FOUNDATIONS BEARING ON ROCK HAS BEEN DONE BY TWO DIFFERENT METHODS AS GIVEN BELOW:

1) Based on Core Strength as per Clause 6.0 of IS 12070-1987
2) Based on RMR value as per Clause 5.3 of IS 12070-1987

Rock Type: Fractured Basalt
Foundation Depth: 5 m
Below Founding Level : Rock Core Recovery: 25 **%** RQD value 0 %

1) Core Strength: Clause 6.0 of IS 12070-1987

$$q_{net\ safe} = q_o * N_j * c_{sub} * c_c * c_s$$

where:

$q_{net\ safe}$ =	safe net bearing capacity	c_s =	correction for orientation of joints
q_o =	average unixial compressive strength	c_c =	correction for solution cavities (in limestone)
N_j =	empirical coefficient	c_{sub} =	correction for saturation

Empirical Coefficient depending on the spacing of discontinuities (as Table 4 and Fig. 1) :

Spacing of Discontinuities, cm	N_j
300	0.4
100-300	0.25
30-100	0.1

Average Unixial Compressive Strength q_0 = 700 T/m^2
Coefficient (spacing of discontinuities): N_j= 0.25
Correction for saturation/submergence: c_{sub}= 0.50
Correction for orientation of joints c_s = 0.75
Correction for solution cavities (in limestone) c_c = 1.00

$q_{net\ safe}$ = 65.6 T/m^2

2) Based on RMR value: Clause 5.3 of IS 12070-1987

Class of rock	I	II	III	IV	V
Description of rock	Very Good	Good	Fair	Poor	Very Poor
RMR	100-81	80-61	60-41	40-21	20-0
$q_{net\ safe}$ (T/m^2)	600-448	440-288	280-141	135-48	45-30

RMR value for design = 24 Class of Rock: IV Rock Description: Poor

$q_{net\ safe}$ = 61.7 T/m^2

Recommended value of Net Safe Bearing Pressure for Design: **60** **T/m^2**

PRESSUREMETER : CORRECTED LIMIT PRESSURE Typical Calculations

Test Designation : PMT-1
Test Depth : 2 m
Limit Pressure (p_l) : 48 bar

Volume Correction = $P_1 + (P_2 - P_1) * (V - V_1) / (V_2 - L_1)$
= 0.60 + (0.70-0.60) * (450-355) / (470-355)
= 0.68

Corrected Limit Pressure = 48 - 0.68
= **47.32 bars**

Pipe Calibration		Air Calibration		Field Data		Correction	
Pressure (Bar)	Volume (cc)	Pressure (Bar)	Volume (cc)	Pressure (Bar)	Volume (cc)	Pressure (Bar)	Volume (cc)
0.00	0	0.00	0	0.00	0.0	0.00	0.0
1.00	120	0.10	20	1.00	210.0	0.54	210.0
2.00	125	0.20	45	2.00	220.0	1.53	220.0
3.00	125	0.30	100	3.00	235.0	2.52	235.0
5.00	125	0.40	150	5.00	245.0	4.51	245.0
7.00	130	0.50	250	8.00	255.0	7.50	255.0
9.00	130	**0.60**	**355**	9.00	260.0	8.49	260.0
11.00	130	**0.70**	**470**	10.00	270.0	9.48	270.0
13.00	130	0.80	590	12.00	275.0	11.48	275.0
15.00	135	0.90	700	13.00	280.0	12.47	280.0
18.00	135	1.00	790	16.00	290.0	15.46	290.0
21.00	135			20.00	300.0	19.45	300.0
24.00	135			22.00	310.0	21.44	310.0
30.00	135			24.00	320.0	23.43	320.0
35.00	135			27.00	328.0	26.43	328.0
40.00	135			30.00	335.0	29.42	335.0
45.00	140			35.00	350.0	34.40	350.0
50.00	140			40.00	365.0	39.39	365.0
55.00	140			44.00	390.0	43.37	390.0
				48.00	**450.0**	**47.32**	**450.0**