BHARAT HEAVY ELECTRICALS LIMITED

PROJECT ENGINEERING MANAGEMENT, NOIDA

Date: 14 Aug 2020

CORRIGENDUM- 03

PROJECT	**:**	**2X250 MW NSPCL BHILAI-TPP-FGD**
PACKAGE	**:**	**ENGG & EXE OF FGD CIVIL INCLUDING CHIMNEY**
ENQUIRY NO	**:**	**E-6485/2020 Dated. 04.08.2020**
SUBJECT	**:**	**DUE DATE EXTENSION AND TECH AMENDMENT**

Type of Corrigendum			
Technical Corrigendum -	☑	Commercial Corrigendum -	☑

Please note the following:

1. **Due Date is being extended from 14.08.2020 to 24.08.2020 till 02:00 PM. Bid Opening shall be done at 03:00 PM on the due date.**
2. **Technical Amendment attached.**

All the other terms and conditions of the tender enquiry shall remain unchanged. All the bidders are requested to quote accordingly.

Corrigendum

Yours faithfully,

For and on behalf of BHEL

SHARAD CHANDRA

Digitally signed by SHARAD CHANDRA
DN: c=IN, o=BHARAT HEAVY ELECTRICALS LIMITED, ou=BHEL / PS-PEM- Noida, postalCode=201301, st=Uttar Pradesh, 2.5.4.20=089a16018da25cac45670e8f7d15d00fb0f21f752b7d5defc65e3d0da37894fd, cn=SHARAD CHANDRA
Date: 2020.08.14 19:33:06 +05'30'

Sharad Chandra
Manager/BOP

Engineering & Execution of FGD Civil including Chimney of 2 X 250 MW NSPCL BHILAI TPP-FGD

Amendment

Sl No.	Clause/Page no.	Description	Amendment	Remark
1	Cl 2.15.1/ Page no. 27, (Document No. PS: MSX: GCC, Rev 01)	All rectifications/modifications, revamping, and reworks required for any reasons not ……	This Clause 2.15.1 stands deleted.	
2	Cl 2.14/ Page no. 27, (Document No. PS: MSX: GCC, Rev 01)	QUANTITY VARIATION	This Clause 2.14 stands deleted.	
3	CL 1.2 (14) /Sheet no.-13, SPECIFICATION NO. PE-TS-468-600-C001, VOL- IIB, SEC-A, Rev.-0	It is the essence of contract that all documents and drawings shall be submitted and get approved for scheduled completion of project. The project schedule shall be discussed with the successful bidder during detailed engineering stage and the bidder shall adhere to the project L2 schedule.	It is the essence of contract that all documents and drawings shall be submitted and get approved for scheduled completion of project as specified in clause 6.0 of TCC. The engineering schedule shall be discussed with the successful bidder during detailed engineering stage and will be matched the requirement of project completion schedule. The L2 schedule attached with the tender document is for general reference purpose only.	
4	SPECIFICATION NO. PE-TS-468-600-C001, VOL-IIB, SEC-A, Rev.-0	Earthing mat	Wherever word “Earthing Mat “is specified shall be read as “Laying of Earthing Mat”.	
5	SPECIFICATION NO. PE-TS-468-600-C001, VOL-IIB, SEC-A, Rev.-0	RAIN WATER HARVESTING SCHEME	Wherever word “RAIN WATER HARVESTING SCHEME “is specified shall be read as “RAIN WATER HARVESTING SYSTEM”.	
6	CL 1.2 (9) /Sheet no.-10, SPECIFICATION NO. PE-TS-468-600-C001, VOL- IIB, SEC-A, Rev.-0	Any mismatch during fixing of tank/equipment with pedestal/foundation during erection stage shall be taken care by grouting, rebaring, chipping etc. as required.	Any mismatch during fixing of tank/equipment/structure with pedestal/foundation during erection stage shall be taken care by grouting, rebaring,	

			chipping etc. as required without any extra cost. All rectifications/modifications, revamping, and reworks required for any reasons or needed due to any change in deviation from drawings and design of equipments, operation/maintenance requirements, mismatching, or due to damages in transit, storage and erection/commissioning, and other allied works which are not very specifically indicated in the drawings, but are found essential for satisfactory completion of the work~~.~~ shall be done by the bidder without any extra cost.	
7	CL 1.9/Sheet no.19, SPECIFICATION NO. PE-TS-468-600-C001, VOL-IIB, SEC-A, Rev.-0	Notation: **V**-Quantity mentioned in Table-2A stands for volume **A**-Quantity mentioned in Table-2B stands for area **Le**-Quantity mentioned in Table-2C stands for total length **Y**-Quantity executed as per Civil Drawing in contract stage. The unit of measurement will be same that of 'V', 'A', 'Le' as applicable. **p**-Weightage percentage of an item (**Building/Facility/Structure)** in VOLUME- 3. **Q**=Total bid price quoted by successful bidder. **q-**Quoted price derived from weighted percentage of an item (**Building/Facility/Structure)** in VOLUME- 3, **q= Q*p/100**	Notation: **V**-Refer Table-2A **A**- Refer Table-2B **Le**- Refer Table-2C **Y**-Volume(V)/Area(A)/Total length (Le) as applicable as per approved input drawing provided to the contractor during detailed engineering. The unit of measurement will be same that of 'V', 'A', 'Le' as applicable. **p**-Weightage percentage of an item (**Building/Facility/Structure)** in Table-4. **Q**=Total bid price quoted by successful bidder in Volume-3. **q-**Quoted price derived from weighted percentage of an item (**Building/Facility/Structure)** in Table-4, **q= Q*p/100**	

8	CL 1.4 (15.1)/Sheet No.13, SPECIFICATION NO.PE-TS-468-600-C001,VOL-IIB,SEC-A,Rev.-0	Owner (NSPCL) had carried out geotechnical investigation in the vicinity of the proposed FGD area. The geotechnical data is attached as **Annexure-F** is solely for the purpose of guidance to the bidder. BHEL/Owner does not take any responsibility about the accuracy and applicability of the geo-technical data furnished herewith. The onus of correct assessment/interpretation and understanding of the existing sub-strata conditions is on the bidder. Any variation in the data between the one furnished and to that found during execution of the work at site shall not constitute a valid reason in affecting the terms & conditions of this bid and the bidder shall note that nothing extra will be payable on this account. The bidder shall fully satisfy himself about the nature of sub-strata expected to be encountered including the type of foundation, ground water table and construction methodology to be adopted etc. prior to the submission of the bid.	This clause along with annexure-F is deleted.	
9	CL 1.4 (15.2)/Sheet No.13, SPECIFICATION NO.PE-TS-468-600-C001,VOL-IIB,SEC-A,Rev.-0	BHEL is carrying out detailed geo-technical investigation in the proposed project site. Detailed geo-technical Investigation report shall be made available to the successful bidder. Any variation in the data between the one furnished and to that found during execution of the work at site shall not constitute a valid reason in affecting the terms & conditions of this bid and the bidder shall note that nothing extra will be payable on this account. The bidder shall ensure that the safe foundation system is adopted. If the bidder desires to carry out additional geo-technical investigation, he/she may do so with prior information/permission of BHEL/Owner at no extra cost to BHEL/Owner. No extension in time schedule shall be permitted on this account. The bidder shall obtain approval on the agency for conducting geo-technical investigation work if it desires to do so. Field and laboratory testing schedule	BHEL has carried out detailed geo-technical investigation in the proposed project site. Detailed geo-technical Investigation report is attached herewith as **Annexure- F1** for the reference to the bidder. BHEL/Owner does not take any responsibility about the accuracy and applicability of the geo-technical data furnished in the geotechnical investigation report herewith. Any variation in the data between the one furnished and to that found during execution of the work at site shall not constitute a valid reason in affecting the terms & conditions of this bid and the bidder shall note that nothing extra will be payable on this account. The bidder shall ensure that the safe foundation system is adopted. The bidder shall fully satisfy himself about the nature of sub-strata expected to be encountered including the type of foundation, ground water table and construction methodology to be adopted etc.	

		proposed by the bidder shall be got approved by BHEL /Owner before undertaking the geo-technical investigation work. Design of foundation system shall be as specified in **Annexure-F**. Bidder shall note that the net safe bearing capacity and foundation depth/ safe load carrying capacity of pile to be adopted for design during detailed engineering stage shall be got approved by BHEL/Owner.	prior to the submission of the bid. If the bidder desires to carry out additional geo-technical investigation, he/she may do so with prior information/permission of BHEL/Owner at no extra cost to BHEL/Owner. No extension in time schedule shall be permitted on this account. The bidder shall obtain approval on the agency for conducting geo-technical investigation work if it desires to do so. Design parameters/capacities for foundation shall be in accordance with annexure-F1 and specification. Bidder shall note that design parameters/capacities for foundation along with foundation system adopted shall be got approved from BHEL/Owner.	
10	CL 1.6 /Sheet No.14, SPECIFICATION NO.PE-TS-468-600-C001,VOL-IIB,SEC-A,Rev.-0	The terminal points for the chimney flue duct under this package shall be as per Annexure-G.	The terminal points for the chimney flue duct under this package shall be as per Annexure-G. Annexure-G is attached herewith.	
11	Technical PQR		Following para to be read along with Technical PQR. "The following documents in support of the completed works being referred for meeting the qualifying requirement are required to be submitted by the bidder for technical evaluation. 1. Work Order issued by the Client/Customer. 2. Completion certificate issued by the Client/Customer. 3. Any additional certificate/Document as required by BHEL/NTPC."	Addition of paragraph in PQR.
12	**Tender NIT Number :** NIT_54108; folder name (technical-specification-with-section-a-&-b-1596539823)	technical-specification-with-section-a-&-b-1596539823	Folder "technical-specification-with-section-a-&-b-1596539823" shall be read as "technical-specification-with-section-a & annexures a &-b-1596539823"	

ANNEXURE-F1

2x250 MW NSPCL BHILAI TPP-FGD

GEOTECHNICAL INVESTIGATION REPORT

BHEL DOCUMENT NO- PE-DC-468-602-C001

NTPC DOCUMENT NO-9993-109-PVC-B-200

Customer

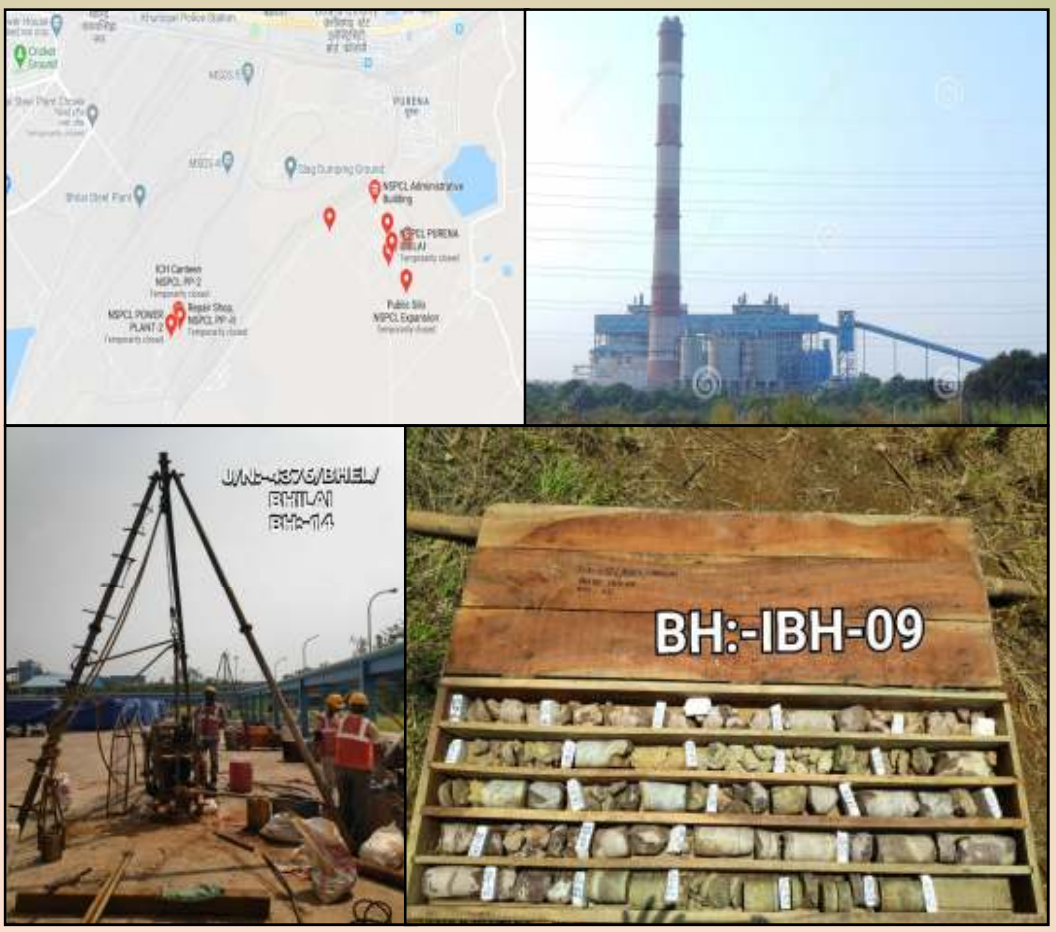
NTPC SAIL POWER COMPANY PVT. LIMITED

BHARAT HEAVY ELECTRICALS LIMITED

NEW DELHI

BHARAT HEAVY ELECTRICALS LIMITED

REPORT ON
GEOTECHNICAL INVESTIGATION WORK FOR FGD PACKAGE AT 2x250 MW NSPCL TPP IN BHILAI, CHHATTISGARH



Submitted To

M/s.Bharat Heavy Electricals Ltd.
Power Sector – Western Region,
Shreemohini Complex, 345 Kingsway,
Nagpur – 440 001

Geotechnical Consultants

C. E. Testing Company Pvt. Limited
An ISO 9001, 14001& OHSAS 18001
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NABL Accredited Laboratory
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Email: cetest@cetestindia.com

Job No.: 4376
Doc. No.: CETEST/4376/001/GTR/DR/V1/R1

30th July, 2020

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REPORT ON
GEOTECHNICAL INVESTIGATION WORK FOR
FGD PACKAGE AT 2x250 MW NSPCL TPP
IN BHILAI, CHHATTISGARH.

1. INTRODUCTION

M/s. NTPC-SAIL Power Company Limiterd has proposed the construction of FGD system at 2x250 MW TPP in Bhilai, Chhattisgah and the job was awarded to **M/s. Bharat Heavy Electricals Ltd**. For designing of various Foundation Structures coming under this project, it was necessary to conduct a topographical survey and detailed Geotechnical Investigation Work and **M/s. Bharat Heavy Electricals Ltd.** in turn awarded the job to **M/s. C. E. Testing Company Pvt. Ltd., Kolkata.**

The scope of the work comprised of sinking 43 nos. BH (Bore holes). The scope also includes FPT (Field Permeability Tests – 15 Nos in 3 BHs), PLT (Plate Load Tests – 3 Nos.), CPLT (Cyclic Plate Load Tests – 3 Nos.), DCPT (Dynamic Cone Penetration Tests – 8 Nos.) and ERT (Electrical Resistivity Tests – 11 Nos.).

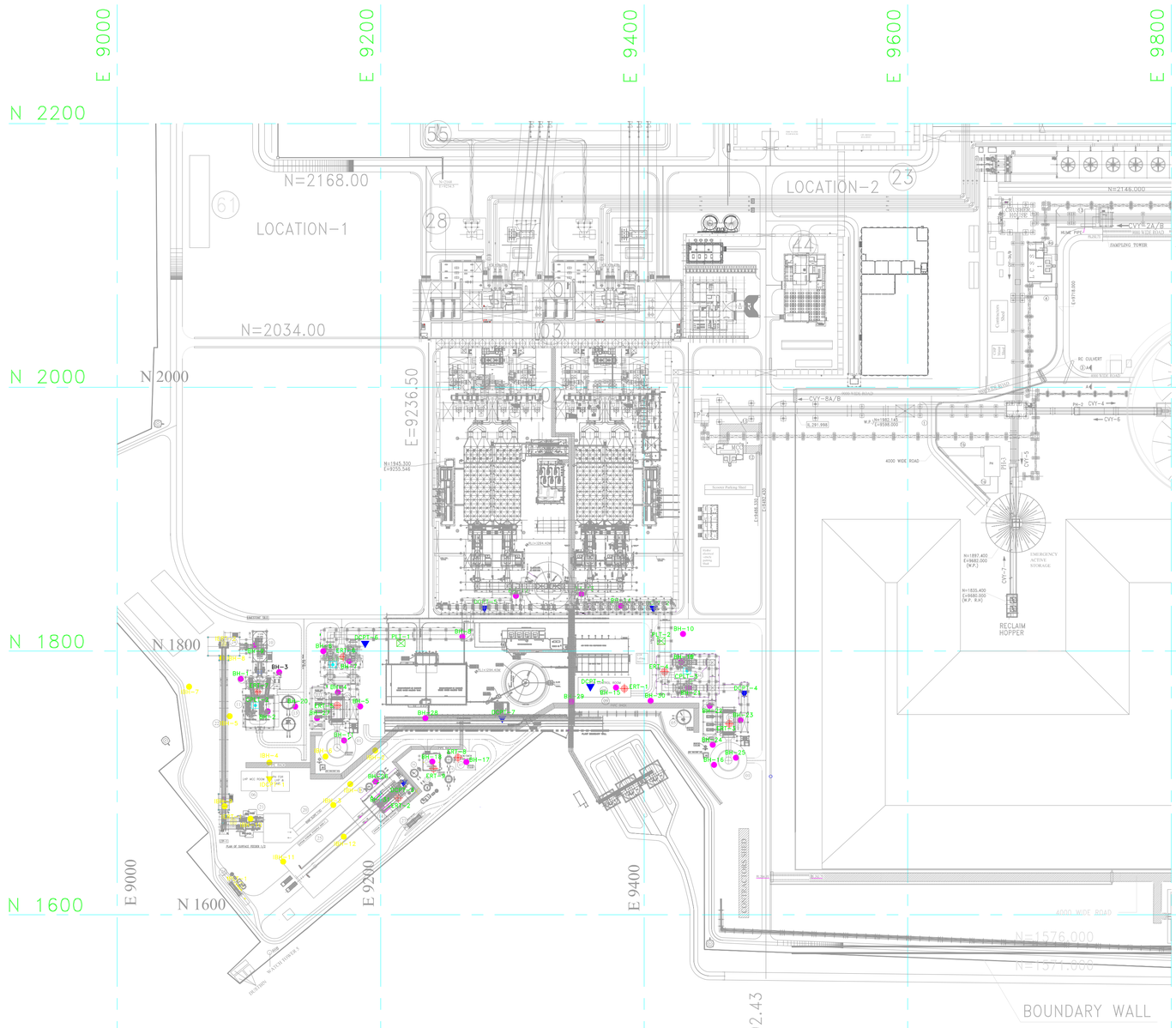
The boreholes of 150 mm in diameter in soil were advanced by Shell and Auger method. In rock, rotary core drilling of “NX” size was adopted. The scope also included conducting Standard Penetration Tests, collecting disturbed samples at regular intervals for identification and logging purposes, collecting undisturbed tube samples at suitable intervals or at change of strata whichever is earlier, collecting rock core samples and testing these in the laboratory.

Based on the above, this report presents the Bore Logs, soil profiles, laboratory and field test results. On the basis of field tests and laboratory test results and their analysis thereof, the most suitable type of foundation is suggested.

The subsoil is characterized by a thin layer of filled up soil / medium, silty clay / clayey silt layer at top, found at few places, followed by stiff to very stiff, silty clay / clayey silt layer. After that, hard, silty clay / clayey silt is encountered followed by weathered rock layer and that continues up to the terminating depth of all the boreholes.

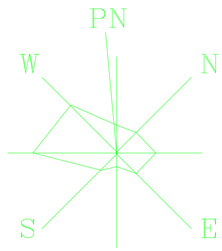
Considering the nature of the subsoil as revealed from field tests and laboratory tests open foundation is proposed. However, this is discussed in details later.

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it must not be used directly or indirectly in any way detrimental to the interest of the company



BORE HOLE (BH/IBH)			DEPTH (M)
MARKING	CO-ORDINATES		
BH-1	9094 E	1779 N	25
4 BH-2	9114 E	1754 N	24
BH-3	9123 E	1784 N	20
BH-4	9167 E	1769 N	30
BH-5	9184 E	1758 N	35
BH-6	9156 E	1800 N	25
BH-7	9176 E	1792 N	30
BH-8	9262 E	1811 N	25
3 BH-9	9104 E	1805 N	25
BH-10	9429 E	1813 N	20
3 BH-11	9172 E	1732 N	20
BH-12	9303 E	1842 N	20
BH-13	9352 E	1843 N	20
BH-14	9382 E	1834 N	20
3 BH-15	9379 E	1772 N	25
3 BH-16	9453 E	1713 N	20
3 BH-17	9265 E	1716 N	20
3 BH-18	9239 E	1716 N	20
BH-19	9428 E	1792 N	20
3 BH-20	9135 E	1758 N	20
BH-21	9435 E	1772 N	25
3 BH-22	9450 E	1758 N	25
3 BH-23	9473 E	1748 N	20
BH-24	9452 E	1729 N	30
BH-25	9470 E	1719 N	35
3 BH-26	9196 E	1701 N	20
BH-27	9152 E	1749 N	20
BH-28	9234 E	1749 N	20
BH-29	9345 E	1762 N	20
BH-30	9405 E	1762 N	20
3 BH-31	9199 E	1683 N	25
IBH-1	9177 E	1699 N	30
3 IBH-2	9196 E	1725 N	20
IBH-3	9164 E	1683 N	25
IBH-4	9116 E	1716 N	20
IBH-5	9085 E	1751 N	20
IBH-6	9158 E	1720 N	30
4 IBH-7	9055 E	1773 N	28.3
IBH-8	9080 E	1795 N	30
3 IBH-9	9081 E	1682 N	25
3 IBH-10	9101 E	1672 N	30
3 IBH-11	9126 E	1640 N	25
3 IBH-12	9172 E	1659 N	30

ELECTRICAL RESISTIVITY TEST (ERT/IERT)		
MARKING	COORDINATES	
3 ERT-1	9385 E	1774 N
3 ERT-2	9213 E	1689 N
3 ERT-3	9465 E	1745 N
ERT-4	9415 E	1784 N
3 ERT-5	9167 E	1759 N
3 ERT-6	9172 E	1796 N
ERT-7	9106 E	1769 N
3 ERT-8	9259 E	1719 N
3 ERT-9	9240 E	1711 N
3 IERT-1	9088 E	1670 N
3 IERT-2	9080 E	1805 N



WIND ROSE

NOTES:-

1. ALL DIMENSIONS ARE IN METERS UNLESS NOTED OTHERWISE.
2. BORE HOLE SHALL BE DRILLED UPTO THE DEPTH INDICATED AGAINST EACH BORE HOLE OR 5M CONTINUOUS IN ROCK WITH RQD >25% WHICH-EVER IS EARLIER.
3. BACKFILLING OF BORE HOLES AND PITS SHALL BE AS PER SPECIFICATION AND AS DIRECTED BY THE ENGINEER-IN-CHARGE.
4. STARTING DEPTH OF STANDARD PENETRATION TEST (SPT) SHALL BE 1M 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.
5. STARTING DEPTH OF COLLECTION OF UDS SHALL BE 2M BELOW GROUND LEVEL AND UDS SHALL BE COLLECTED AT 1M INTERVAL ALTERNATE TO CONDUCTING SPT UPTO 10M DEPTH BELOW GROUND LEVEL AND AT EVERY 1.5M INTERVAL ALTERNATE TO CONDUCTING SPT BEYOND 10M DEPTH.
6. PUMP IN TYPE FIELD PERMEABILITY TEST SHALL BE CARRIED OUT IN BH-1, BH-8 & BH-22 AT 1M, 3M, 5M, 8M & 12M BELOW LEVEL.
7. ELECTRICAL RESISTIVITY TEST SHALL BE CARRIED OUT BY WENNER'S METHOD.
8. GROUND WATER SAMPLE SHALL BE COLLECTED FROM BH-12, BH-15, BH-20, BH-25 & IBH-7.
9. GEOTECHNICAL INVESTIGATION SHALL BE CARRIED OUT AS PER SPECIFICATION.
10. DO NOT SCALE THIS DRAWING.

REFERENCE DRAWING:-

1. NTPC DRG. NO. 9993-109-PVM-F-020, TITLED "PLANT LAYOUT FOR FGD SYSTEM".

GEOTECHNICAL INVESTIGATION LEGEND:-

1. BOREHOLE (BH/IBH) . . . . . ●
2. DYNAMIC CONE PENETRATION TEST (DCPT/IDCPT) . . . ▼
3. ELECTRICAL RESISTIVITY TEST (ERT/IERT). . . . . ⊕
4. PLATE LOAD TEST (PLT) . . . . . ☒
5. TRIAL PIT (TP/ITP). . . . . ▨
6. CYCLIC PLATE LOAD TEST (CPLT). . . . . ◉

DYNAMIC CONE PENETRATION TEST (DCPT/IDCPT)		
MARKING	CO-ORDINATES	
3 DCPT-1	9359 E	1773 N
DCPT-2	9407 E	1833 N
3 DCPT-3	9217 E	1700 N
DCPT-4	9476 E	1768 N
3 DCPT-5	9279 E	1833 N
DCPT-6	9188 E	1806 N
DCPT-7	9291 E	1750 N
3 IDCPT-1	9115 E	1703 N

PLATE LOAD TEST (PLT/IPLT)			
MARKING	CO-ORDINATES		DEPTH (M)
PLT-1	9215 E	1806 N	3
PLT-2	9413 E	1808 N	3
4 IPLT-1	9092 E	1622 N	3

CYCLIC PLATE LOAD TEST (CPLT/ICPLT)			
MARKING	CO-ORDINATES		DEPTH (M)
3 CPLT-1	9164 E	1790 N	3
CPLT-2	9105 E	1759 N	3
CPLT-3	9432 E	1785 N	3

BHEL-PROJECT ENGINEERING MANAGEMENT(CIVIL)
THIS DRAWING MARKED(✓) IS RELEASED FOR
☑ COMMENTS/APPROVAL
☐ PLANNING/INFORMATION
☐ CONSTRUCTION
STAMP: ALL PREVIOUS REVISION AS SUPERSEDED
ISSUED BY
NAME V.V.
SIGNATURE -sd-
DATE 13.03.2020

REV	DATE	ALTD	CHD	APPD
04	10.07.2020	-sd-	-sd-	-sd-
	REVISED AS PER EXECUTION AT SITE TILL 10.07.2020 AND MKD. 4 THUS.			
03	13.03.2020	ALTD VDYA	CHD VV/AKV	APPD TMSR
	REVISED AS PER THE LAYOUT RECEIVED ON 07.03.2020 AND MKD. 3 THUS.			
02	21.01.2020	ALTD RK	CHD VV/AKV	APPD TMSR
	REVISED AS PER THE LAYOUT RECEIVED ON 20.01.2020 AND MKD. 3 THUS.			
01	14.01.2020	ALTD KAMALJEET	CHD VV/AKV	APPD TMSR
	REVISED AS PER THE LAYOUT RECEIVED ON 13.01.2020 AND MKD. 2 THUS.			

NTPC DRG. No. 9993-109-PVC-B-007

NTPC SAIL POWER COMPANY PVT. LIMITED

2x250MW NSPCL BHILAI TPP-FGD

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BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

DEPT CODE		NAME	SIGN	DATE
C	DRN	KAMALJEET	-sd-	03.01.2020
	DESN	VV	-sd-	03.01.2020
	CHD	AKV	-sd-	03.01.2020
	APPD	TMSR	-sd-	03.01.2020

TITLE
GEOTECHNICAL INVESTIGATION LAYOUT FOR FGD AREA

MPL	C	MSE	I	MAX	E	DEPT.
						SIGN
						DATE

SCALE

DRAWING No.
PE-DG-468-602-C001

SHEET 01 OF 01 REV 03

SIZE-A0

COMPUTER FILE NAME:

2. FIELD INVESTIGATIONS

2.01. GENERAL:

In an attempt for optimisation in the design of foundation for the proposed structures to be constructed at this site, Geotechnical Investigation was envisaged. The entire Investigation programme had been divided mainly into two parts, I) Field works & II) Laboratory tests.

I) Field works unfold the sub-surface deposit types and their characteristics and

II) Laboratory tests part would help determining the relevant physical and geotechnical properties of the sub-surface deposits leading to finalisation of foundation depths of the structures and the bearing capacity with particular reference to the sub-surface types and their strength parameters and settlement potentials at the site.

A list of the bore holes with location, ground level, terminating depth and standing water level etc. are presented in a tabular form below.

Name of Structure	Bore Hole No.	Co-ordinate (M)		E.G.L. (M)	Terminating Depth (M)	S. W. L. (M)	Depth of Top of Rock (M)
		Easting	Northing				
Ball Mill Building	BH-1	9094	1779	292.902	25.00	2.90	4.75
	BH-2	9114	1754	292.738	24.00	2.50	5.50
	BH-3	9123	1784	293.279	20.00	3.00	6.50
Absorber, RC Pump & Oxidation Blower house Unit-2	BH-4	9167	1769	293.500	30.00	2.85	5.60
	BH-5	9184	1758	293.502	35.00	3.00	6.00
Booster Fan Unit-2	BH-6	9156	1800	293.812	25.00	2.30	6.00
	BH-7	9176	1792	293.739	30.00	2.95	6.00
Duct	BH-8	9262	1811	293.942	25.00	2.80	11.50
Limestone Storage Silo	BH-9	9104	1805	293.681	25.00	2.95	6.00
Duct Unit-1	BH-10	9429	1813	294.267	20.00	3.60	9.00
Wet Stack Unit-2	BH-11	9172	1732	292.921	20.00	4.50	5.25
Duct near existing Chimney	BH-12	9303	1842	294.224	20.00	3.00	11.50
	BH-13	9352	1843	294.165	20.00	2.90	12.00
	BH-14	9382	1834	294.115	20.00	3.20	11.50
FGD Control Room	BH-15	9379	1772	294.436	25.00	4.90	8.50
Wet Stack Unit-1	BH-16	9453	1713	293.965	20.00	5.80	7.25
ACW Pump House	BH-17	9265	1716	291.025	20.00	1.90	6.25
Compressor House	BH-18	9239	1716	291.500	20.00	1.85	6.25
Booster Fan Unit-1	BH-19	9428	1792	294.120	20.00	3.10	9.00
Limestone Slurry Storage Tanks	BH-20	9135	1758	292.688	20.00	4.20	5.25
Booster Fan Unit-1	BH-21	9435	1772	294.415	25.00	2.90	6.75
Absorber, RC Pumps & Oxidation Blower House Unit-1	BH-22	9450	1758	293.685	25.00	4.30	8.50
	BH-23	9473	1748	293.660	20.00	4.80	8.50
Wet Stack Unit-1	BH-24	9452	1729	293.775	30.00	6.10	7.00
	BH-25	9470	1719	293.692	35.00	5.90	8.25

Name of Structure	Bore Hole No.	Co-ordinate (M)		E.G.L. (M)	Terminating Depth (M)	S. W. L. (M)	Depth of Top of Rock (M)
		Easting	Northing				
Waste Water Tank, Filtrate Water Tank	BH-26	9196	1701	292.642	20.00	3.10	6.00
Absorber, RC Pump & Oxidation Blower house Unit-2	BH-27	9152	1749	292.925	20.00	2.70	6.00
Pipe rack	BH-28	9234	1749	293.565	20.00	3.70	6.00
	BH-29	9345	1762	294.259	20.00	1.90	9.50
	BH-30	9405	1762	294.235	20.00	2.65	8.25
Gypsum Dewatering Building	BH-31	9199	1683	290.151	25.00	1.20	3.75
Lime stone unloading area	IBH-1	9177	1699	292.775	30.00	2.90	6.50
	IBH-2	9196	1725	293.252	20.00	3.30	5.75
	IBH-3	9164	1683	292.711	25.00	3.20	6.75
Pipe Rack	IBH-4	9116	1716	292.255	20.00	2.20	6.00
Limestone Belt Conveyor	IBH-5	9085	1751	292.625	20.00	2.70	6.00
Wet Stack Unit-2	IBH-6	9158	1720	293.062	30.00	1.90	5.75
Limestone Belt Conveyor	IBH-7	9055	1773	292.711	28.30	2.80	6.00
Limestone Crusher House	IBH-8	9080	1795	293.012	30.00	3.20	6.50
Limestone Belt Conveyor	IBH-9	9081	1682	291.321	25.00	2.70	7.25
Surface Feeder 1 / 2	IBH-10	9109	1672	291.312	30.00	2.50	7.50
Gypsum Storage Shed	IBH-11	9126	1640	291.089	25.00	2.80	5.75
	IBH-12	9172	1659	291.250	30.00	3.30	6.75

2.02. BORING:

Boring was carried out by Shell and Auger method to sink nominal 150mm diameter bore holes to depths envisaged by using a mechanical winch. Undisturbed soil samples were collected at suitable intervals or at change of strata whichever is earlier by open drive sampling method since it was intended to ascertain the sub-soil characteristics.

2.03. SAMPLING:

Nominal 100 mm diameter undisturbed samples were recovered. The sampling equipment used consists of a two-tier assembly of sample tubes 450 mm in length fitted at its lower end. The sampling assembly was driven by means of a jarring link to its full length or as far downs as was found practicable. As the soil is very stiff to hard and contains sand mixtures / calcareous nodules, cutting shoe was used with a area ratio < 20%. After withdrawal the ends of the tubes were sealed with wax and capped before onward transmission to the laboratory. At close intervals in depth disturbed samples were collected for identification and logging purpose. These were tagged and packed in polythene packets and transported to the laboratory.

2.04. STANDARD PENETRATION TESTS:

Standard Penetration Tests were conducted in the bore holes at intervals of 1.5M to 3.0M depth or at change of strata whichever is earlier using a split spoon sampler as per IS: 2131 - 1981. The split spoon sampler used is of a Standard design having an outer diameter of 50.8 mm and inner diameter of 35 mm, driving with a monkey weighing 63.5 kgs, falling freely through 75cms advances the spoon. A record of the number of blows required to penetrate every 7.5cms to a maximum depth of 45cms was made. The first 15cm of drive are considered to be seating drive and are neglected. The total blows required for the third, fourth, fifth and sixth 7.5cm of penetration is counted and termed as penetration resistance "N". On completion of a test, the split spoon sampler was opened and soil specimens were preserved in polythene bags for logging purpose, labeled and carefully transported to the laboratory for testing.

All the boreholes were sunk with winch. However, raising of hammer for SP Tests was done manually. Hence there will not be any inertia loss and the efficiency of hammer blows should be considered as 100%.

2.05. MEASUREMENT OF WATER TABLE:

Standing water level after 24 hours of removal of casing was noted and presented in a tabular form earlier.

2.06. ROTARY CORE DRILLING:

This drilling technique is regarded as the most satisfactory method of assessing the characteristics of rock formations, which lie at a depth below the ground surface. Specimens of rock in the form of cylindrical cores are recovered from the drill holes by means of a core barrel. Double barrel technique is adopted according to field condition. The core barrel is provided at its lower end with a detachable shoe or core bit, which is of diamond. All rotary core bits were of NX size.

2.07. FIELD PERMEABILITY TEST:

15 Nos. Field Permeability Test were conducted in three boreholes as per IS: 5529 (Part 1 & Part 2). The test locations are presented below.

Test Locations	Co-ordinates (M)		E.G.L. (M)	Type of Test	Depth of Test (M)
	Easting	Northing			
FPT-BH01	9094	1779	292.902	Falling Head	0.90 – 1.50
				Falling Head	2.70 – 3.50
				Single Packer	4.80 – 5.50
				Single Packer	7.90 – 8.50
				Single Packer	11.80 – 12.50

Test Locations	Co-ordinates (M)		E.G.L. (M)	Type of Test	Depth of Test (M)
	Easting	Northing			
FPT-BH08	9262	1811	293.942	Falling Head	0.70 – 1.50
				Falling Head	2.90 - 3.50
				Falling Head	4.80 – 5.50
				Falling Head	7.70 – 8.30
				Single Packer	11.50 – 12.50
FPT-BH22	9450	1758	293.685	Falling Head	0.80 – 1.50
				Falling Head	3.00 – 3.50
				Falling Head	4.80 – 5.50
				Falling Head	7.80 – 8.40
				Single Packer	11.80 – 12.50

2.8. PLATE LOAD TESTS:

Total six (06) sets of Plate Load Tests (03 nos. of Routine type & 03 nos. of cyclic type) were conducted **using a 600mm square plate.** Test is continued upto a maximum desired loading intensity or specified plate settlement which ever is earlier. The load is applied through a hydraulic jack. The reaction for applying the load on the plate is obtained by a loading platform with sandbags. After applying the load increments, settlement records are made at intervals of 1, 2.25, 4, 6.25, 9, 16, 25, 60, 90 & 120 minutes and thereafter at an interval of an hour. Next increment of load was applied only when the rate of plate settlement reduced to 0.02 mm per minute.

The applied load is then released and the plate allowed to rebound. When no further rebound occurs or the rate of rebound becomes negligible, the readings of the dial gauges are again noted. The load then is increased gradually till its magnitude acquires a value equal to the proposed next higher stage of loading which is to be maintained constantly and the final dial gauge readings are noted as earlier. The entire load is then reduced to zero and final dial gauge readings recorded when the rate of rebound becomes negligible. The coordinate, ground level and depth of test locations are given below.The coordinate of test locations are given below.

PLT No.	Type of Tests	Plate size (mm x mm)	Co-ordinates (M)		E.G.L. (M)	Depth (M)
			Easting	Northing		
PLT-01	Routine Type	600 x 600	9215	1806	294.311	3.00
PLT-02	Routine Type	600 x 600	9413	1808	293.785	3.00
IPLT-01	Routine Type	600 x 600	9092	1622	292.786	3.00
CPLT-01	Cyclic Type	600 x 600	9164	1790	293.832	3.00
CPLT-02	Cyclic Type	600 x 600	9105	1759	292.742	3.00
CPLT-03	Cyclic Type	600 x 600	9432	1785	294.112	3.00

2.9. DYNAMIC CONE PENETRATION TEST:

Total eight (08) nos. Dynamic Cone Penetration Tests were conducted at the following locations. The co-ordinates at each DCPT locations are presented below.

DCPT No.	Co-ordinate (M)			Depth (M)	
	Easting	Northing	E.G.L.	Starting depth	Ending Depth
DCPT-1	9359	1773	294.286	0.00	6.90
DCPT-2	9407	1833	294.159	0.00	7.20
DCPT-3	9217	1700	292.000	0.00	6.60
DCPT-4	9476	1768	293.714	0.00	7.20
DCPT-5	9279	1833	294.128	0.00	7.80
DCPT-6	9188	1806	294.000	0.00	5.10
DCPT-7	9291	1750	293.581	0.00	6.80
IDCPT-1	9115	1703	292.098	0.00	5.10

2.10. ELECTRICAL RESISTIVITY TESTS:

Total eleven (11) nos. Electrical Resistivity Tests are to be carried out at the following locations.

ERT No.	Co-ordinate (M)		R.L. (M)
	E	N	
ERT-1	9385	1774	
ERT-2	9213	1689	
ERT-3	9465	1745	
ERT-4	9415	1784	
ERT-5	9167	1759	
ERT-6	9172	1796	
ERT-7	9106	1769	
ERT-8	9259	1719	
ERT-9	9240	1711	
IERT-1	9088	1670	
IERT-2	9080	1805	

3. LABORATORY TESTING

For proper identification and classification of the sub-soil deposits and for deriving adequate information regarding its relevant physical and geotechnical properties at the site under investigation, the following laboratory tests were conducted on the soil / rock samples collected from the exploratory bore holes:

On Soil Samples:

1. **Grain size analysis (Sieve as well as Hydrometer).**
2. **Determination of Liquid Limit, Plastic Limit & Shrinkage Limit.**
3. **Determination of Natural Moisture Content.**
4. **Determination of Specific Gravity.**
5. **Determination of Bulk & Dry Unit Weight.**
6. **Strength determination by Triaxial Unconsolidated Undrained Test (UU).**
7. **Strength Determination of Unconfined Compression Test on "UDS" (UNCONFD).**
8. **Strength Determination of Unconfined Compression Test on REMOULDED samples.**
9. **One-dimensional Consolidation Test for determining settlement potentiality.**
10. **Standard Proctor Compaction Test to determine OMC & MDD.**
11. **Determination of California Bearing Ratio (4 days soaked) at 95% MDD.**
12. **Determination of Swelling Pressure and Free Swell Index.**
13. **Chemical tests on soil sample to determine pH value, Sulphate & Chloride.**
14. **Chemical tests on water sample to determine pH value, Sulphate, Chloride, Carbonate, Nitrate, Turbidity & Organic Matter.**

On Rock Samples:

1. **Determination of Bulk, Dry Density, Water Content and Porosity of Rock core samples.**
2. **Determination of Specific Gravity of Rock core samples.**
3. **Determination of Unconfined Compressive Strength of Rock samples (at In-situ water content & Saturated condition).**
4. **Determination of Point Load Strength Index.**
5. **Determination of Hardness, Soundness & Slake Durability Index**
6. **Determination of Deformability of Rock samples (at In-situ water content & Saturated condition).**

Laboratory test results are presented in a tabular form in the Appendix. The results are self explanatory excepting that of consolidation tests. The compressibility (m_v) for a pressure range has been separated into 2 components through the compression ratio (r).

As a first step dial gauge reading is plotted against square root of time and by extrapolation, dial reading at zero time is obtained.

The compression ratio (r) is given as $r = (d_i - d_s)/(d_i - d_f)$,

where,

d_i = *Initial reading of dial before load application*

d_s = *Dial reading corresponding to theoretical zero time*

d_f = *Final dial reading after 24 hrs.*

Now we write m_{vc} *(consolidation part of* m_v*) = (1- r) x* m_v

All the tests were conducted as per relevant Indian Standard Specifications.

4. SUBSOIL CONDITION, STRATIFICATION AND PROPERTIES

4.1. SUB-SOIL CONDITIONS:

The boring records showing the various soils met with are enclosed in Appendix. These are prepared from field logs after proper modifications in the light of the laboratory test results and observation of disturbed and penetrometer soil samples. The results of the Standard Penetration Tests are given as 'N' values in these boring records. The sub-soil profiles (as obtained from field and Laboratory test results) across the bore holes are shown under Figs. 2.01 to 2.16 giving description, consistency and colour of each stratum. The "N" values are shown in the profiles as well as presented in the borelogs in Appendix. The laboratory test results and the backup sheets are also presented there.

4.2. SUB-SOIL STRATIFICATIONS:

The subsoil is characterized by a thin layer of filled up soil / medium, silty clay / clayey silt layer at top, found at few places, followed by stiff to very stiff, silty clay / clayey silt layer. After that, hard, silty clay / clayey silt is encountered followed by weathered rock layer and that continues up to the terminating depth of all the boreholes. The description of each layer is presented below.

4.2.1. FILL:

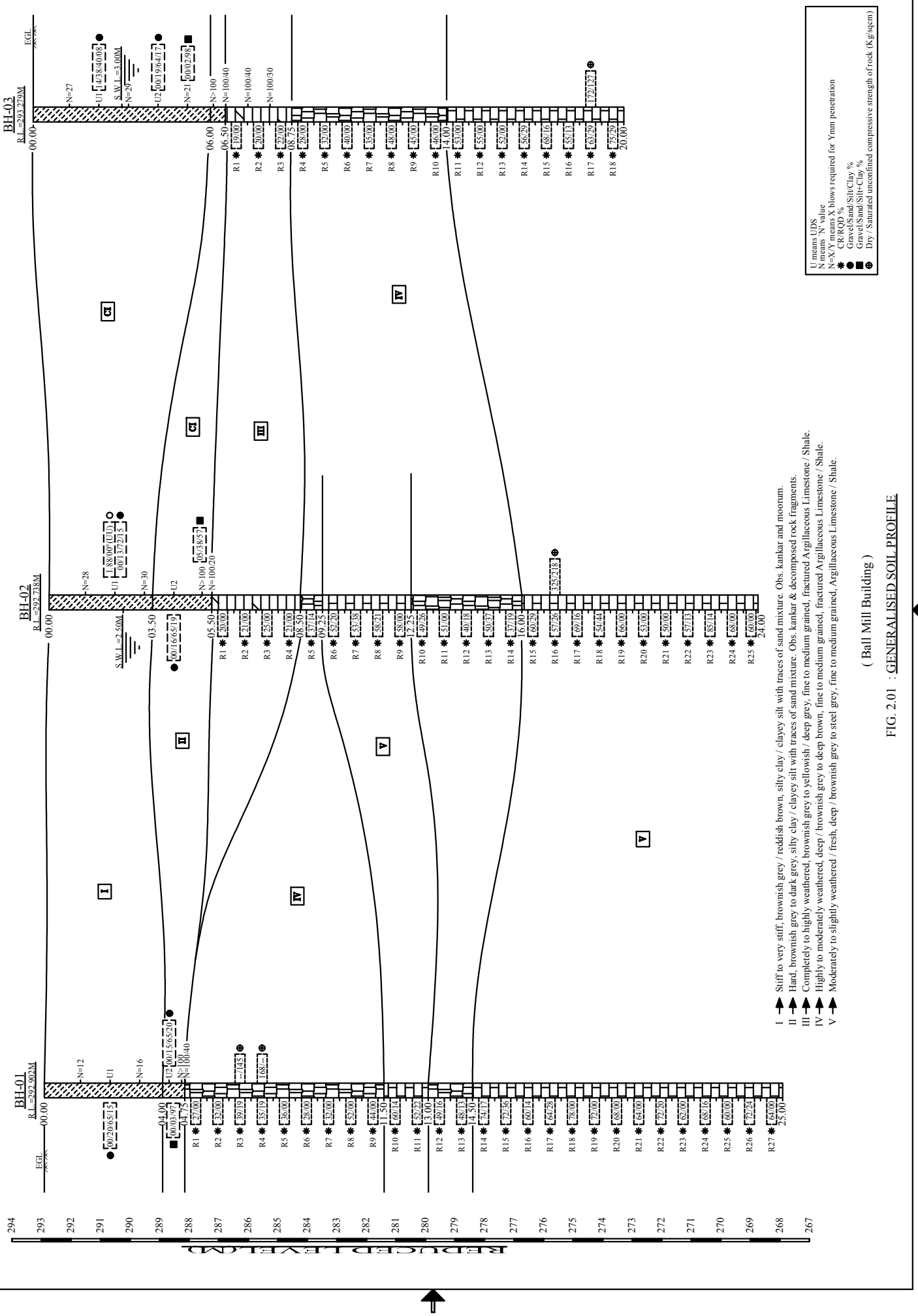
A thin layer of filled up soil has been observed at top around few boreholes. It consists of road materials, concrete & boulder pieces and clayey silt with moorum, ash, coal dust, brick bats etc.

4.2.2. STRATUM – I (CI):

The soil in this layer consists of stiff to very stiff, brownish grey / reddish brown, silty clay / clayey silt with traces of sand mixture. Kankar and moorum have been observed in this layer. Routine laboratory tests conducted on the "UDS" and few “SPT” samples that could be collected from this layer show the following average properties.

Bulk Density, gms/cc	1.97	Specific gravity	2.68
Dry Density, gms/cc	1.63	Void Ratio	0.554
Natural Water Content %	21	Liquid limit %	46
TRSH-UU:		Plastic Limit %	18
Cohesion kg/sqcm	0.92	Shrinkage Limit %	09
Friction angle °	03	**GRAIN SIZE**	
		Gravel %	03
Unconfined cohesion, kg/sqcm	**0.90**	Sand %	17
Remoulded cohesion, kg/sqcm	**0.67**	Silt %	66
SENSITIVITY, S_t	**1.33**	Clay %	14

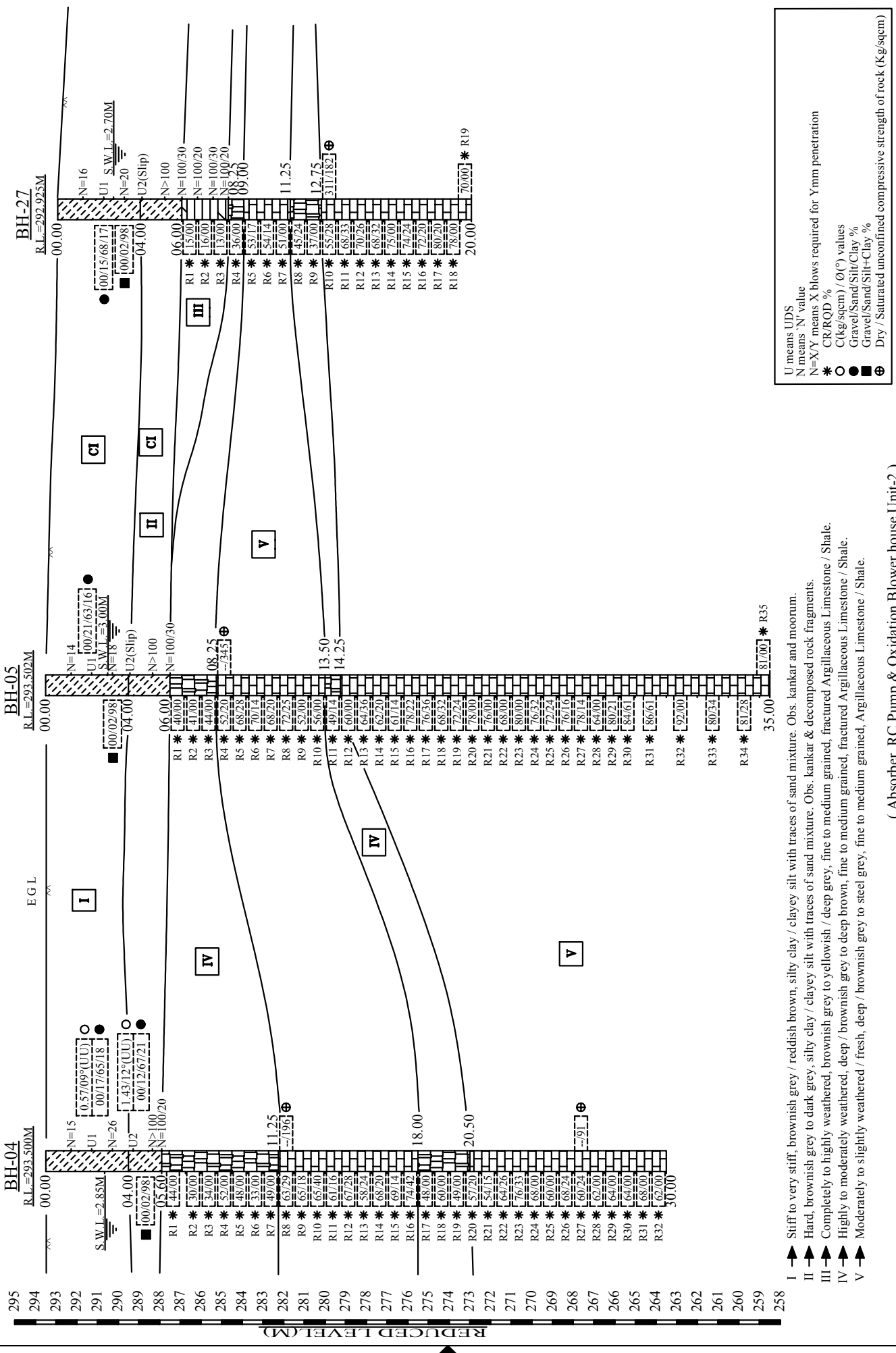
Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai			
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(Ball Mill Building)

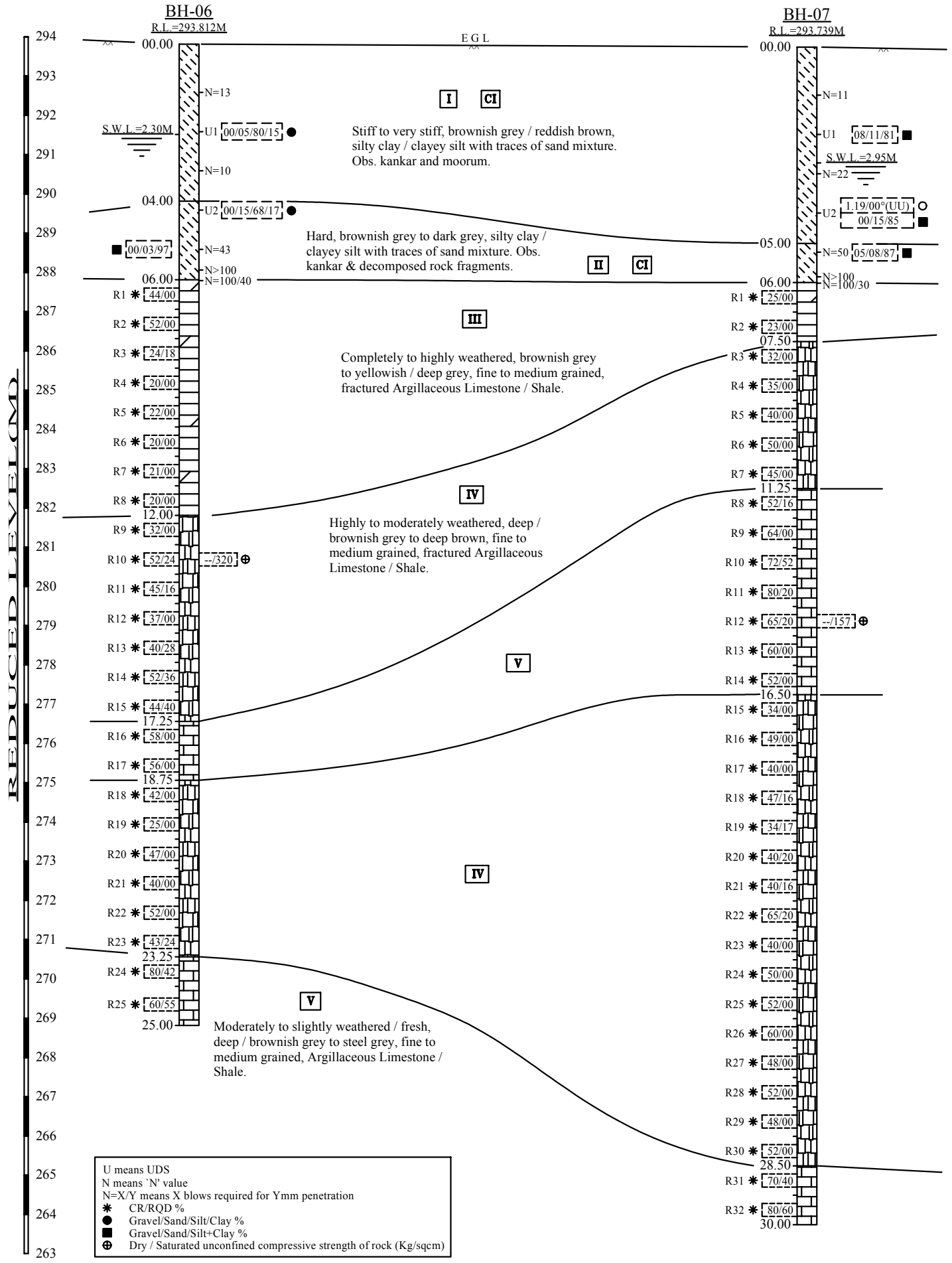
FIG. 2.01 : GENERALISED SOIL PROFILE

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(Absorber, RC Pump & Oxidation Blower house Unit-2)

FIG. 2.02 : GENERALISED SOIL PROFILE



(Booster Fan Unit-2)

FIG. 2.03 : GENERALISED SOIL PROFILE

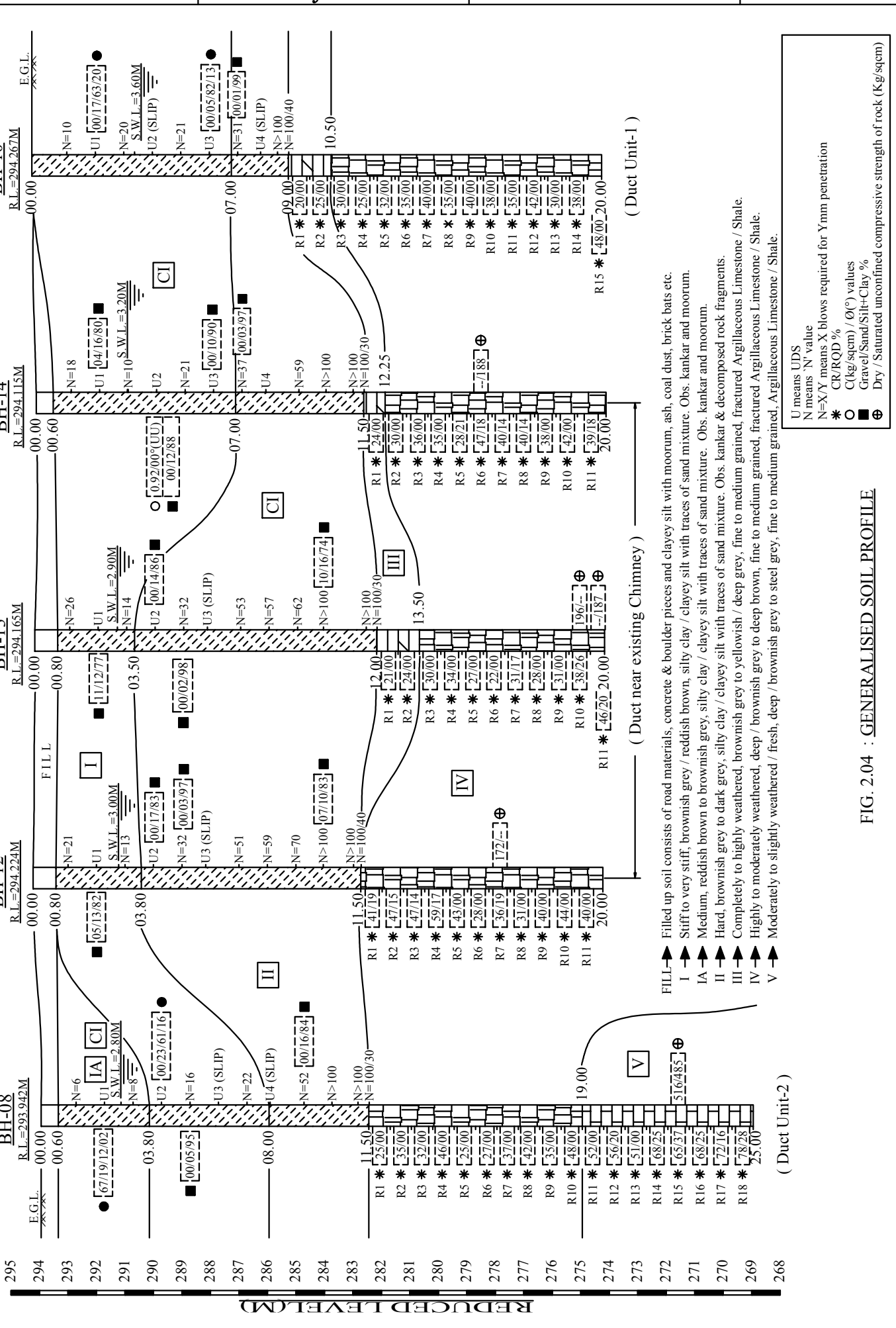


FIG. 2.04 : GENERALISED SOIL PROFILE

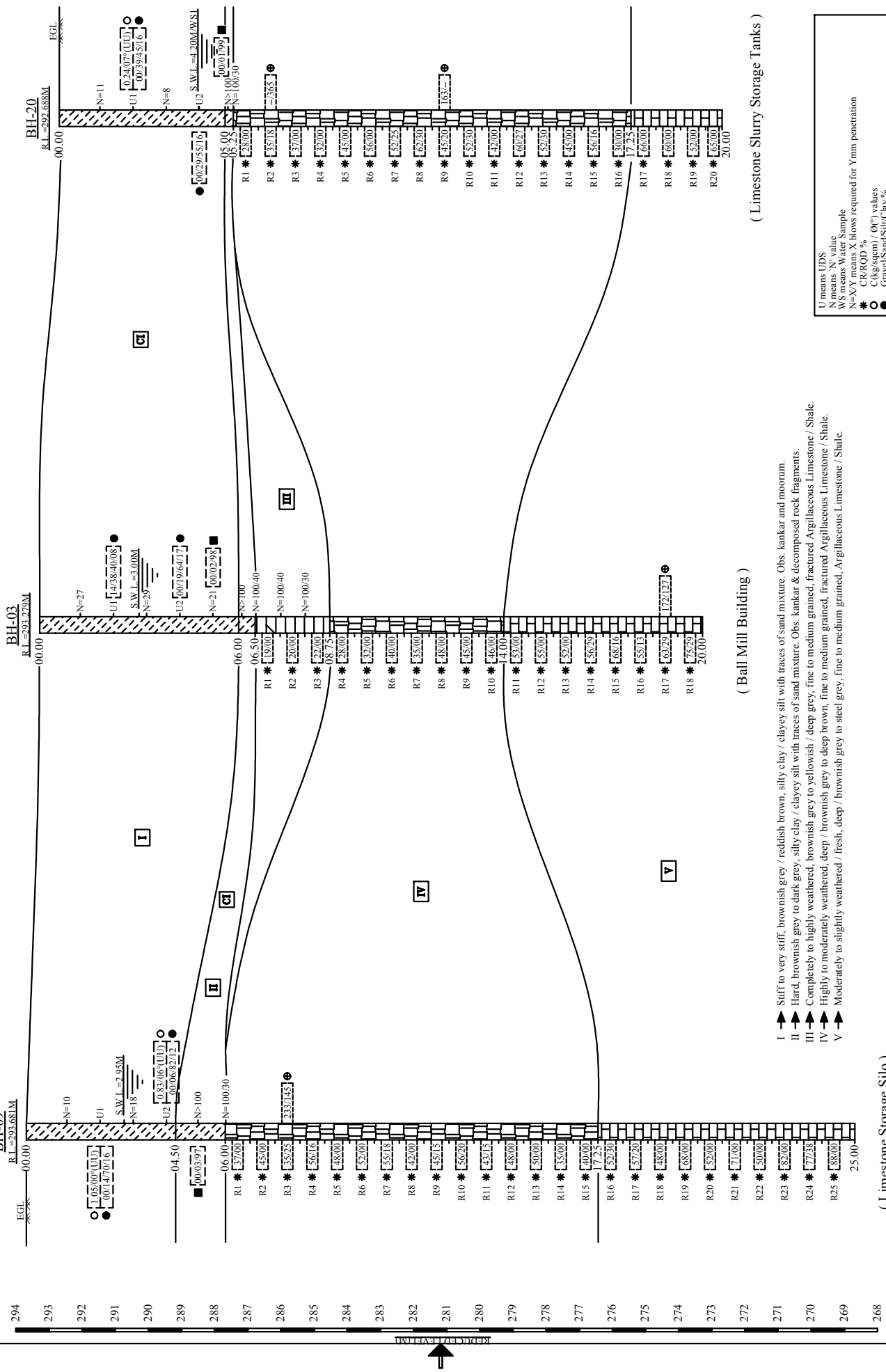
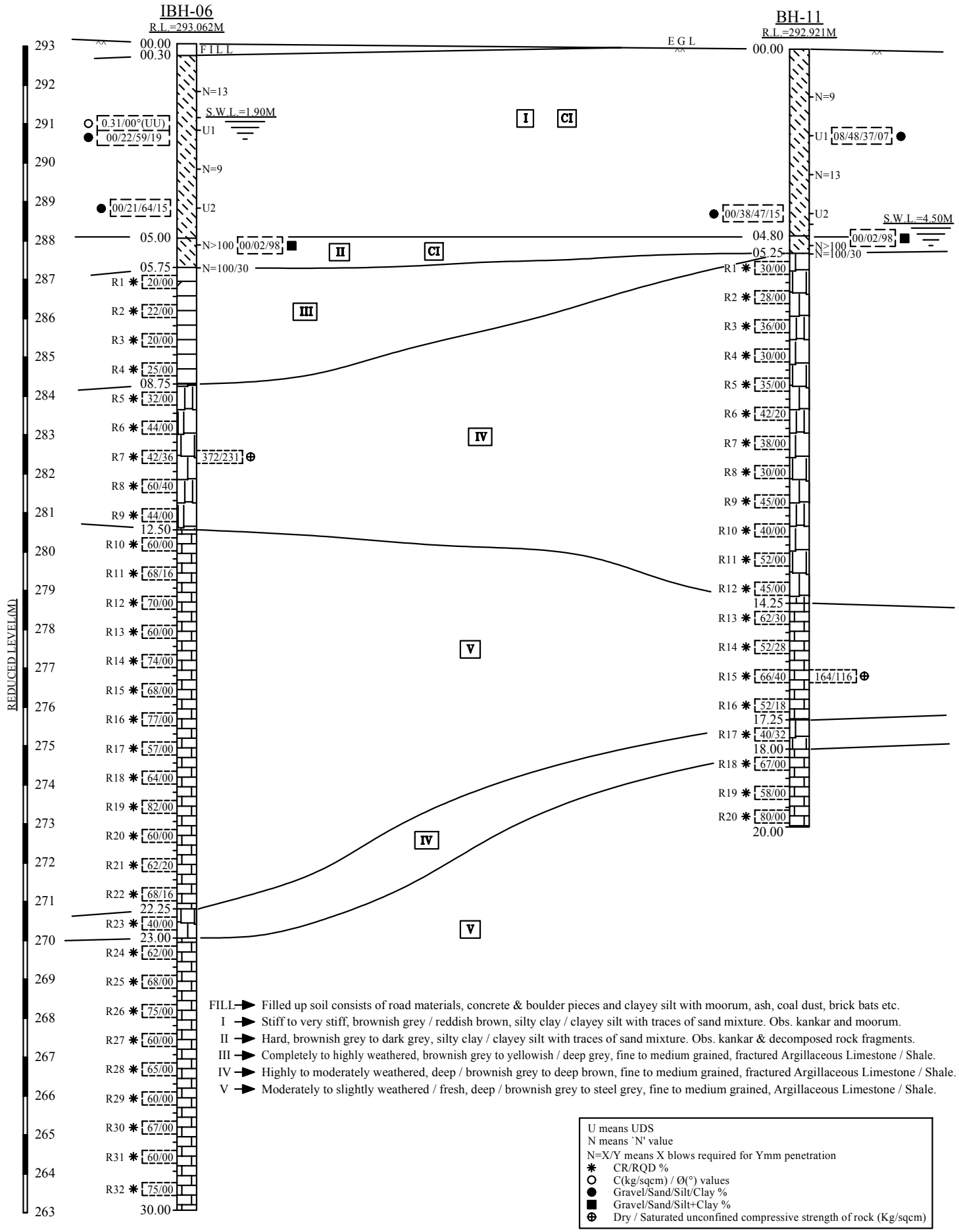


FIG. 2.05 : GENERALISED SOIL PROFILE

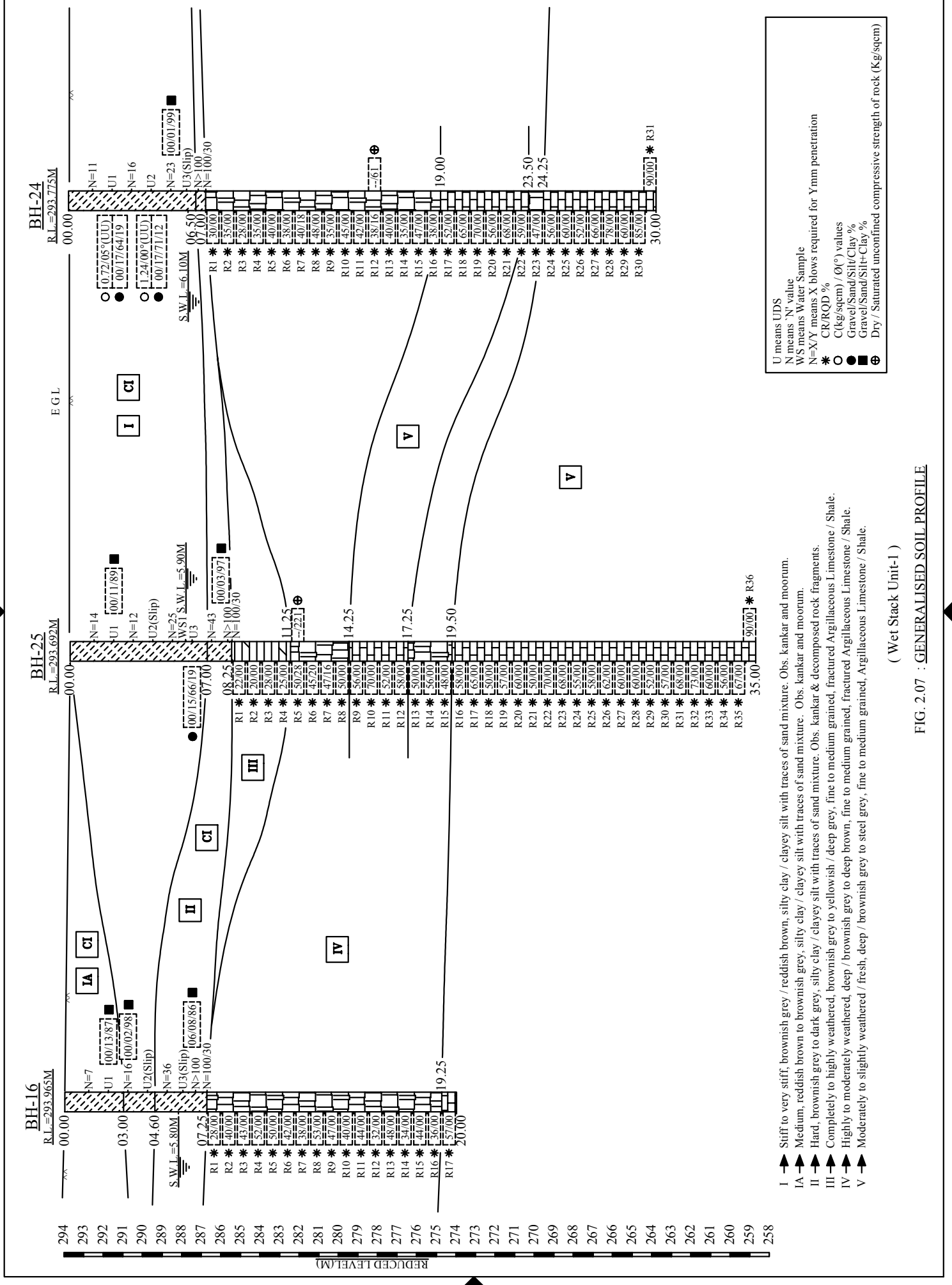


FILL → Filled up soil consists of road materials, concrete & boulder pieces and clayey silt with moorum, ash, coal dust, brick bats etc.
I → Stiff to very stiff, brownish grey / reddish brown, silty clay / clayey silt with traces of sand mixture. Obs. kankar and moorum.
II → Hard, brownish grey to dark grey, silty clay / clayey silt with traces of sand mixture. Obs. kankar & decomposed rock fragments.
III → Completely to highly weathered, brownish grey to yellowish / deep grey, fine to medium grained, fractured Argillaceous Limestone / Shale.
IV → Highly to moderately weathered, deep / brownish grey to deep brown, fine to medium grained, fractured Argillaceous Limestone / Shale.
V → Moderately to slightly weathered / fresh, deep / brownish grey to steel grey, fine to medium grained, Argillaceous Limestone / Shale.

U means UDS
N means `N' value
N=X/Y means X blows required for Ymm penetration
✱ CR/RQD %
○ C(kg/sqcm) / Ø(°) values
● Gravel/Sand/Silt/Clay %
■ Gravel/Sand/Silt+Clay %
⊕ Dry / Saturated unconfined compressive strength of rock (Kg/sqcm)

(Wet Stack Unit-2)

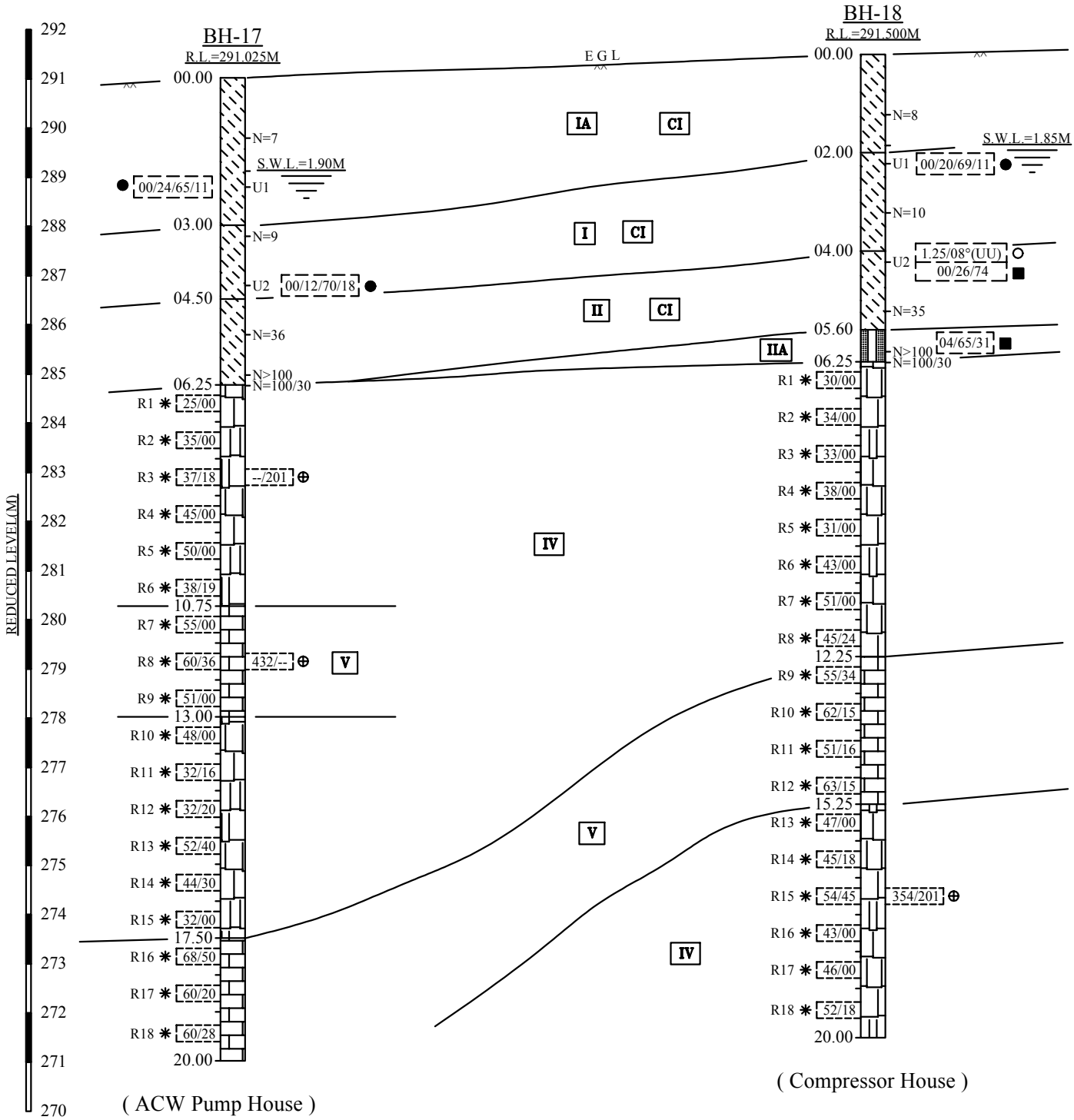
FIG. 2.06 : GENERALISED SOIL PROFILE



(Wet Stack Unit-1)

FIG. 2.07 : GENERALISED SOIL PROFILE

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(ACW Pump House)

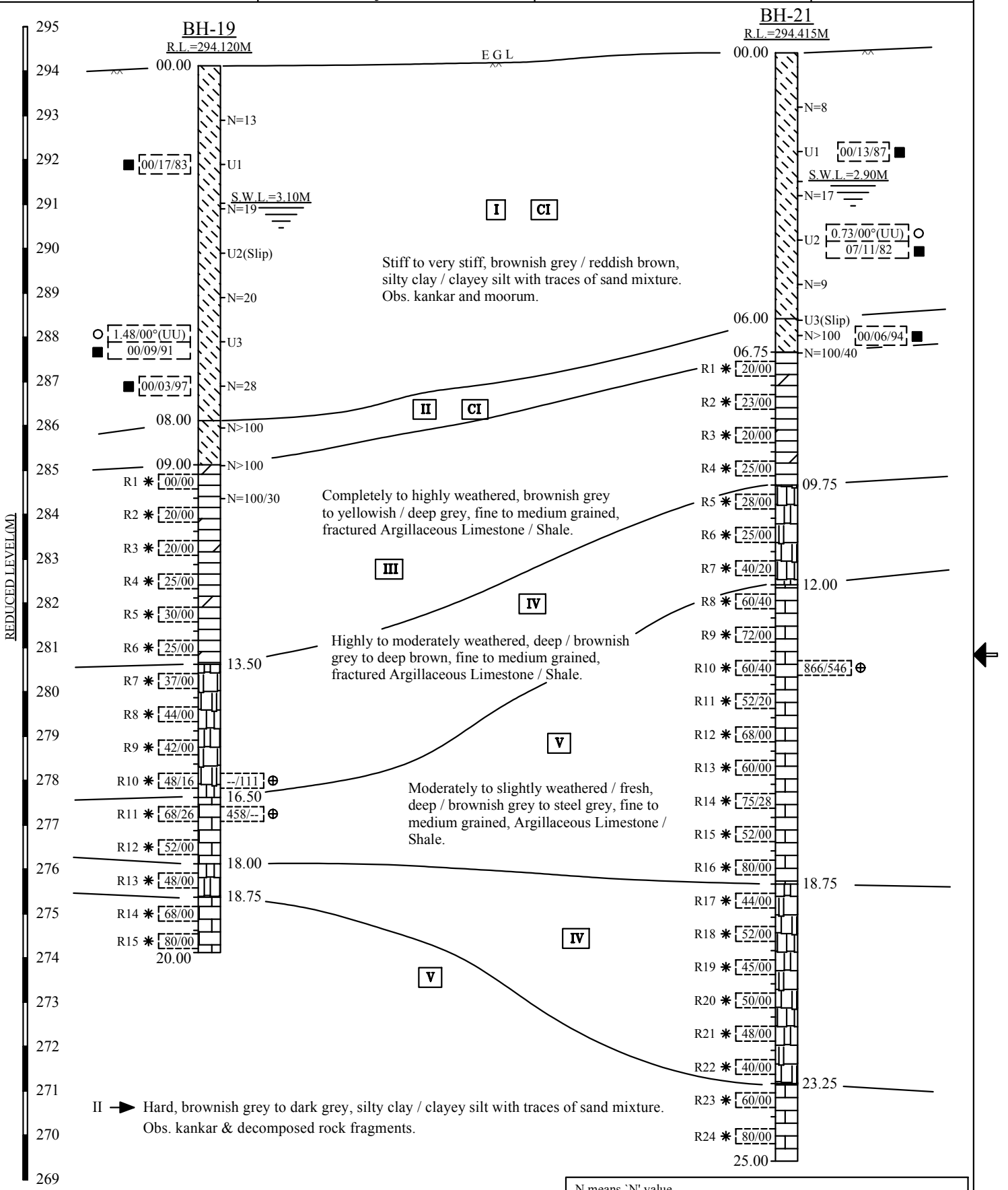
(Compressor House)

I → Stiff to very stiff, brownish grey / reddish brown, silty clay / clayey silt with traces of sand mixture. Obs. kankar and moorum.
IA → Medium, reddish brown to brownish grey, silty clay / clayey silt with traces of sand mixture. Obs. kankar and moorum.
II → Hard, brownish grey to dark grey, silty clay / clayey silt with traces of sand mixture. Obs. kankar & decomposed rock fragments.
IIA → Very dense, brownish grey, clayey silty sand with decomposed rock fragments.
IV → Highly to moderately weathered, deep / brownish grey to deep brown, fine to medium grained, fractured Argillaceous Limestone / Shale.
V → Moderately to slightly weathered / fresh, deep / brownish grey to steel grey, fine to medium grained, Argillaceous Limestone / Shale.

U means UDS
N means `N' value
N=X/Y means X blows required for Ymm penetration
✱ CR/RQD %
○ C(kg/sqcm) / Ø(°) values
● Gravel/Sand/Silt/Clay %
■ Gravel/Sand/Silt+Clay %
⊕ Dry / Saturated unconfined compressive strength of rock (Kg/sqcm)

FIG. 2.08 : GENERALISED SOIL PROFILE

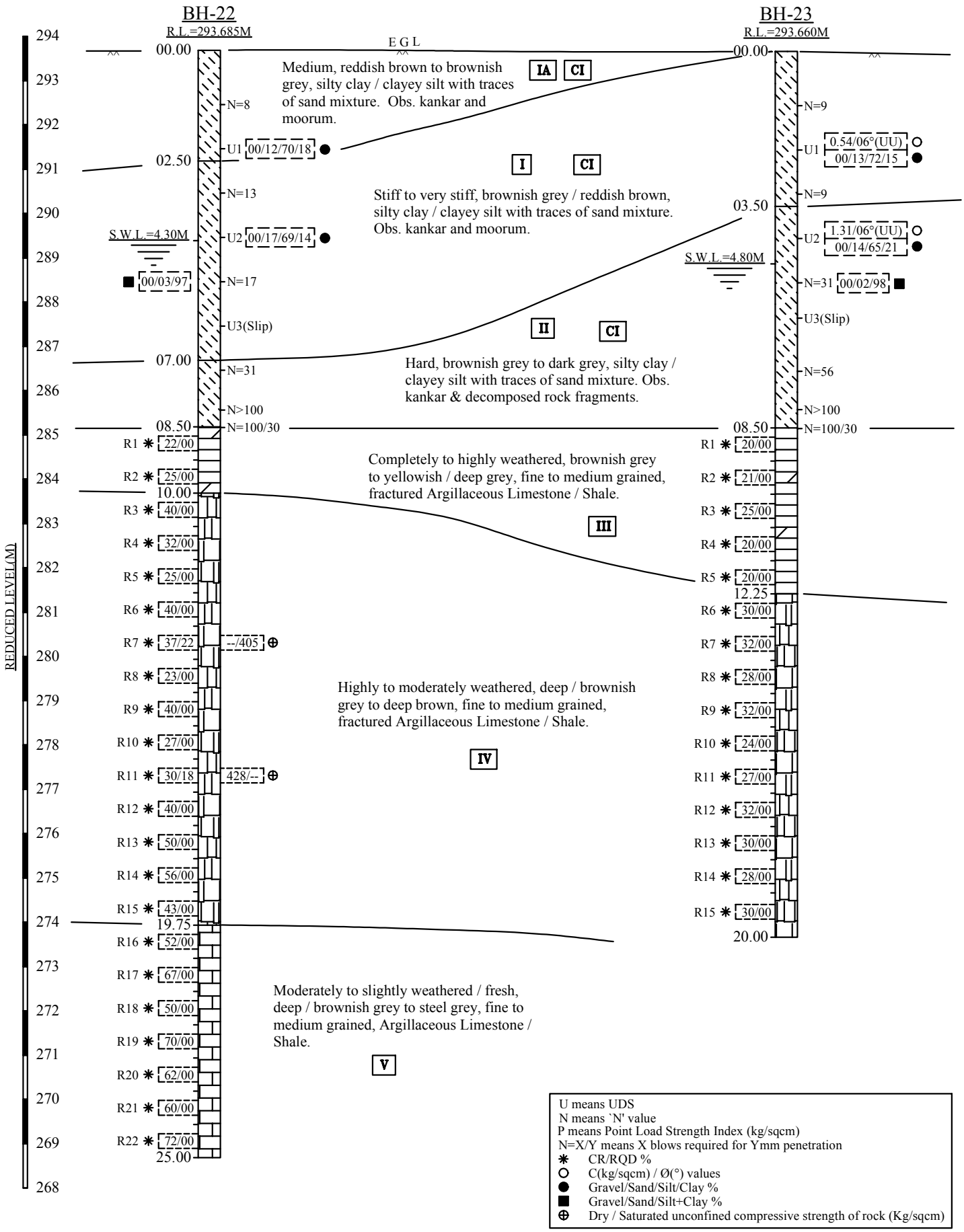
Project :	G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai			CETEST
Job No : 4376	Created by : SKD	Created on : 08 / 6 / 2020	Sheet No:	



(Booster Fan Unit-1)

FIG. 2.09 : GENERALISED SOIL PROFILE

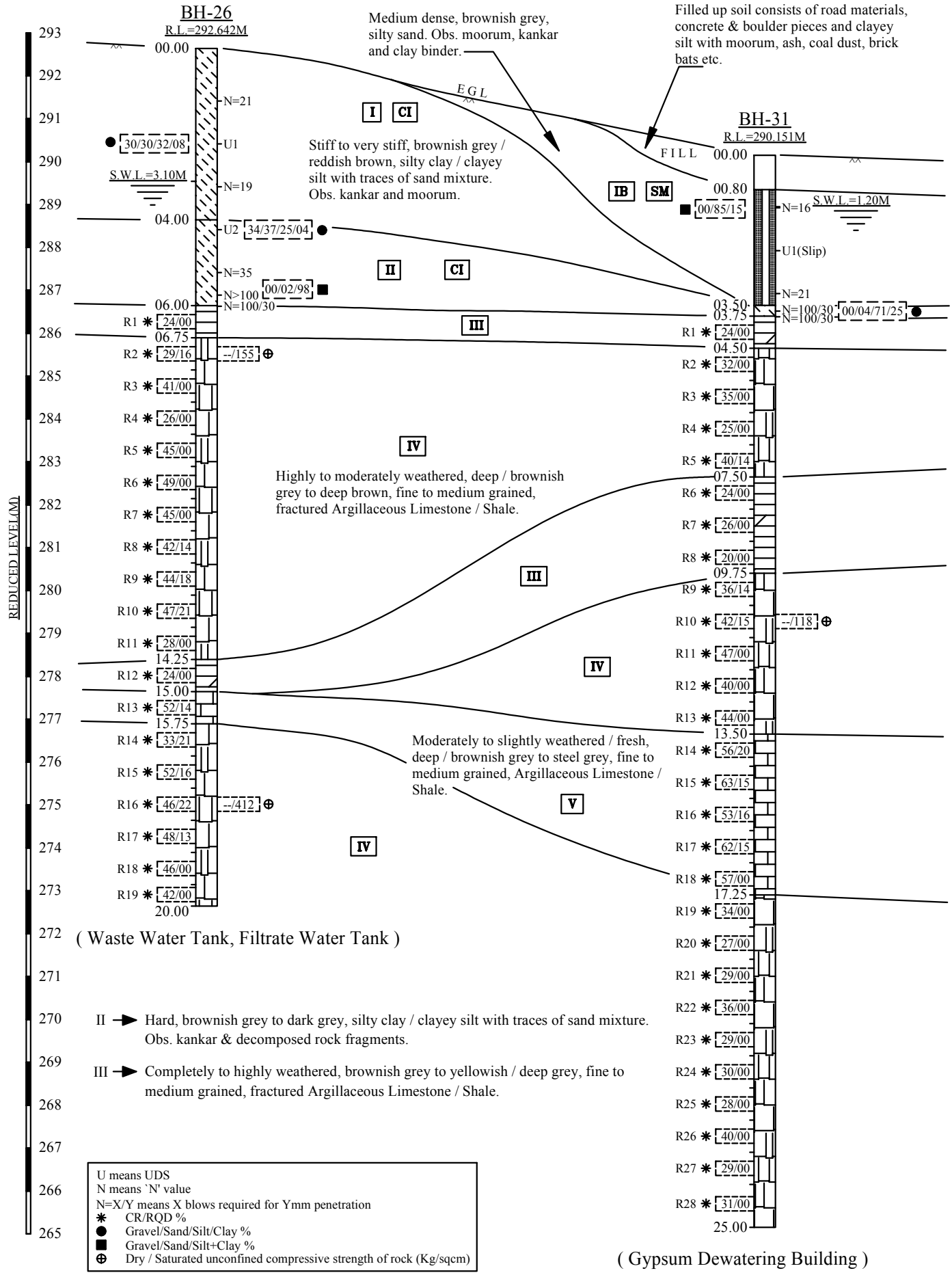
Project :	G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai			CETEST
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U means UDS
N means `N' value
P means Point Load Strength Index (kg/sqcm)
N=X/Y means X blows required for Ymm penetration
✱ CR/RQD %
○ C(kg/sqcm) / Ø(°) values
● Gravel/Sand/Silt/Clay %
■ Gravel/Sand/Silt+Clay %
⊕ Dry / Saturated unconfined compressive strength of rock (Kg/sqcm)

(Absorber, RC Pumps & Oxidation Blower House Unit-1)

FIG. 2.10 : GENERALISED SOIL PROFILE



II → Hard, brownish grey to dark grey, silty clay / clayey silt with traces of sand mixture. Obs. kankar & decomposed rock fragments.

III → Completely to highly weathered, brownish grey to yellowish / deep grey, fine to medium grained, fractured Argillaceous Limestone / Shale.

U means UDS
N means `N' value
N=X/Y means X blows required for Ymm penetration
✱ CR/RQD %
● Gravel/Sand/Silt/Clay %
■ Gravel/Sand/Silt+Clay %
⊕ Dry / Saturated unconfined compressive strength of rock (Kg/sqcm)

FIG. 2.11 : GENERALISED SOIL PROFILE

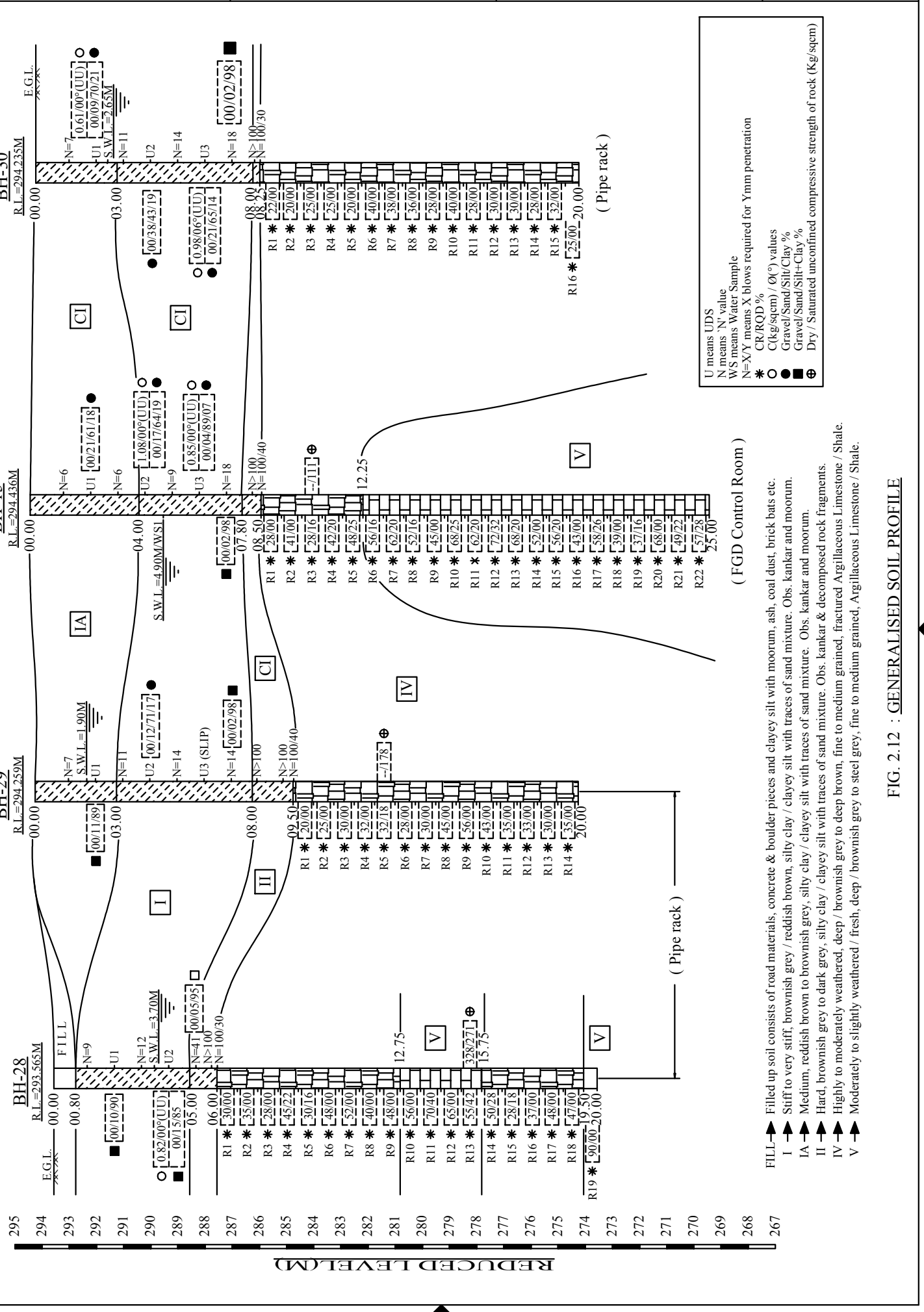
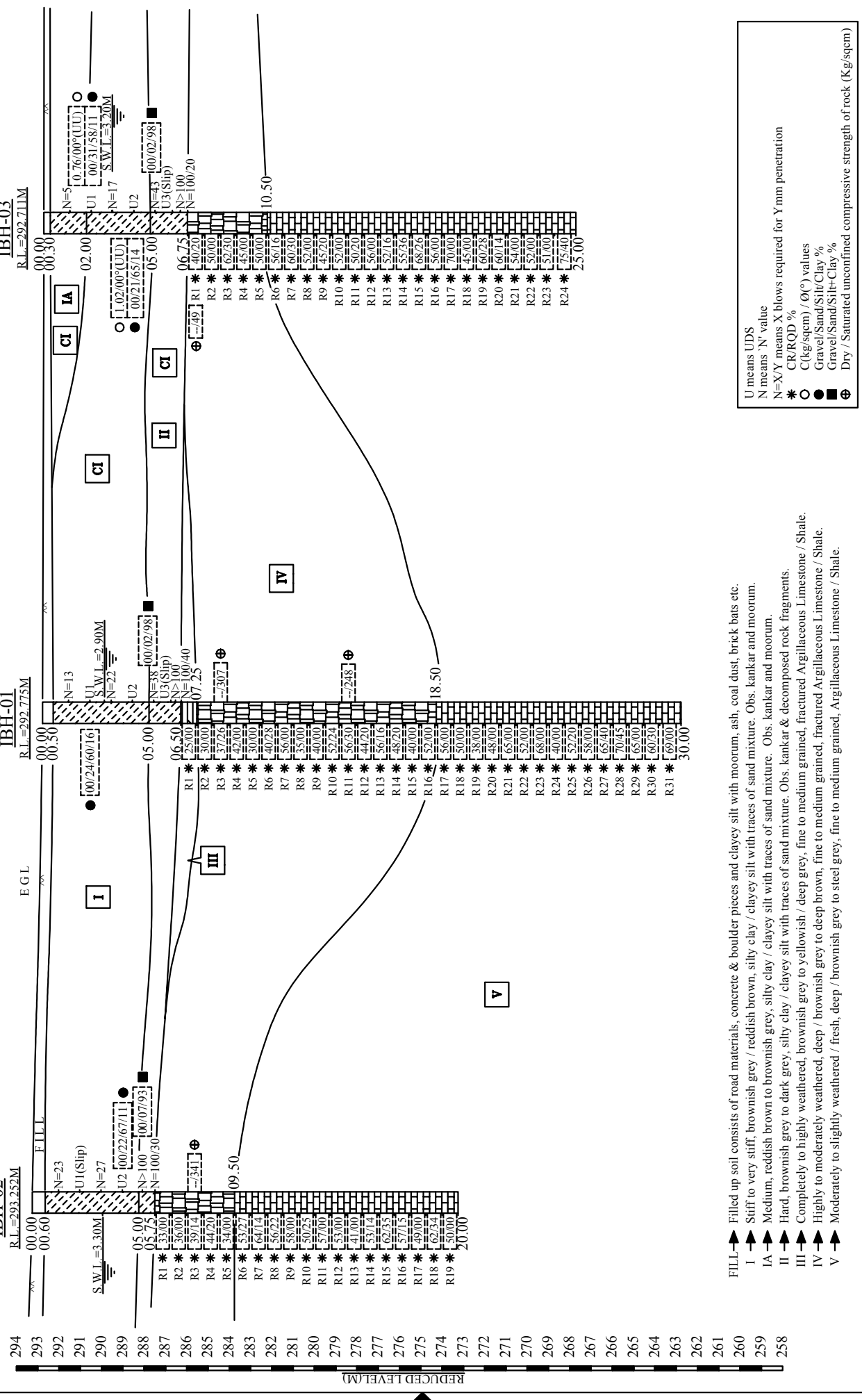


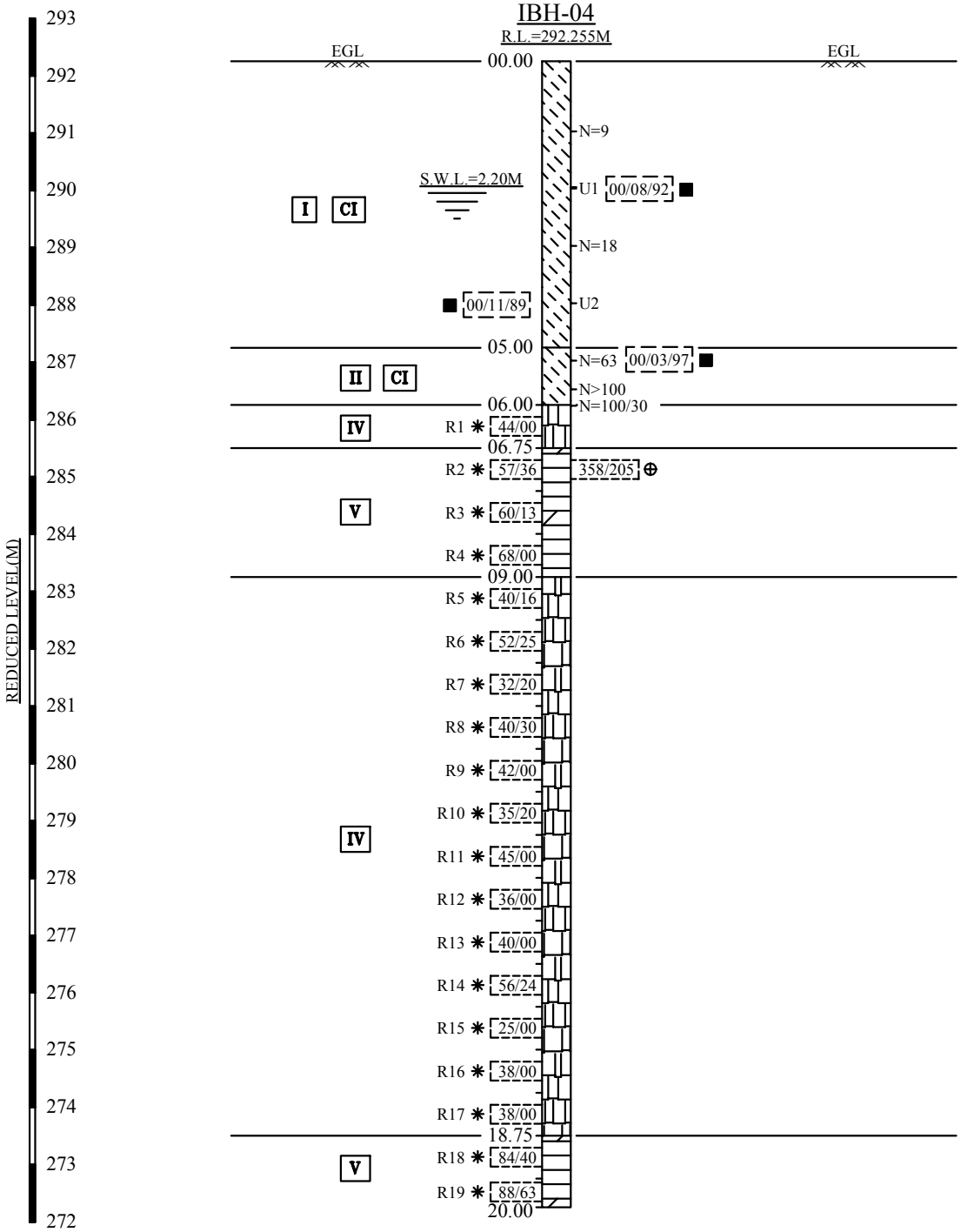
FIG. 2.12 : GENERALISED SOIL PROFILE

Project :	G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai		
Job No : 4376	Created by : S K D	Created on : 09 / 6 / 2020	Sheet No:



(Lime stone unloading area)

FIG. 2.13 : GENERALISED SOIL PROFILE



I → Stiff to very stiff, brownish grey / reddish brown, silty clay / clayey silt with traces of sand mixture. Obs. kankar and moorum.
II → Hard, brownish grey to dark grey, silty clay / clayey silt with traces of sand mixture. Obs. kankar & decomposed rock fragments.
III → Completely to highly weathered, brownish grey to yellowish / deep grey, fine to medium grained, fractured Argillaceous Limestone / Shale.
IV → Highly to moderately weathered, deep / brownish grey to deep brown, fine to medium grained, fractured Argillaceous Limestone / Shale.
V → Moderately to slightly weathered / fresh, deep / brownish grey to steel grey, fine to medium grained, Argillaceous Limestone / Shale.

U means UDS
N means `N' value
N=X/Y means X blows required for Ymm penetration
✱ CR/RQD %
● Gravel/Sand/Silt/Clay %
■ Gravel/Sand/Silt+Clay %

(Pipe Rack)

FIG. 2.14 : GENERALISED SOIL PROFILE

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai			CETEST
Job No : 4376	Created by : SKD	Created on : 10 / 4 / 2020	Sheet No:

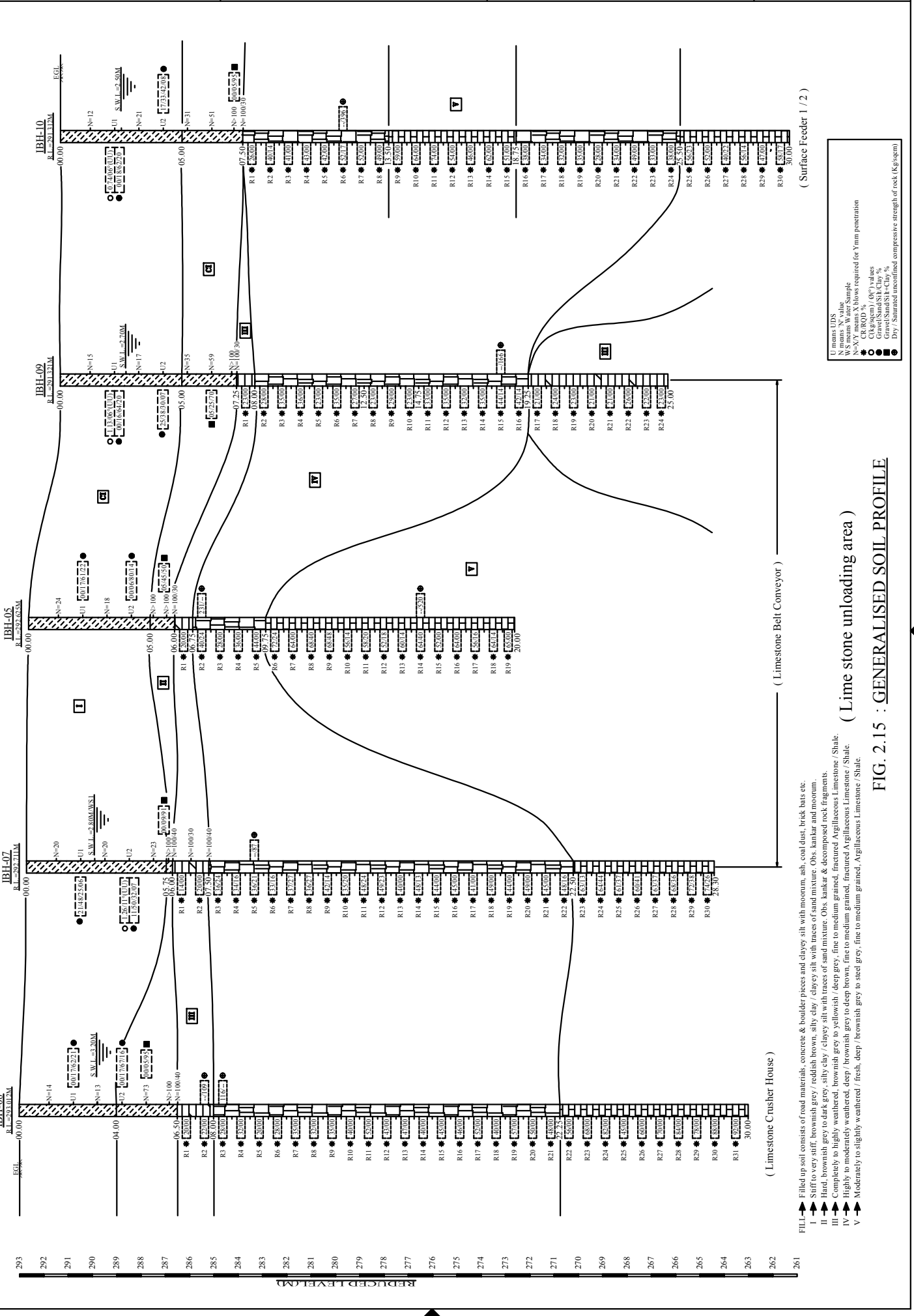
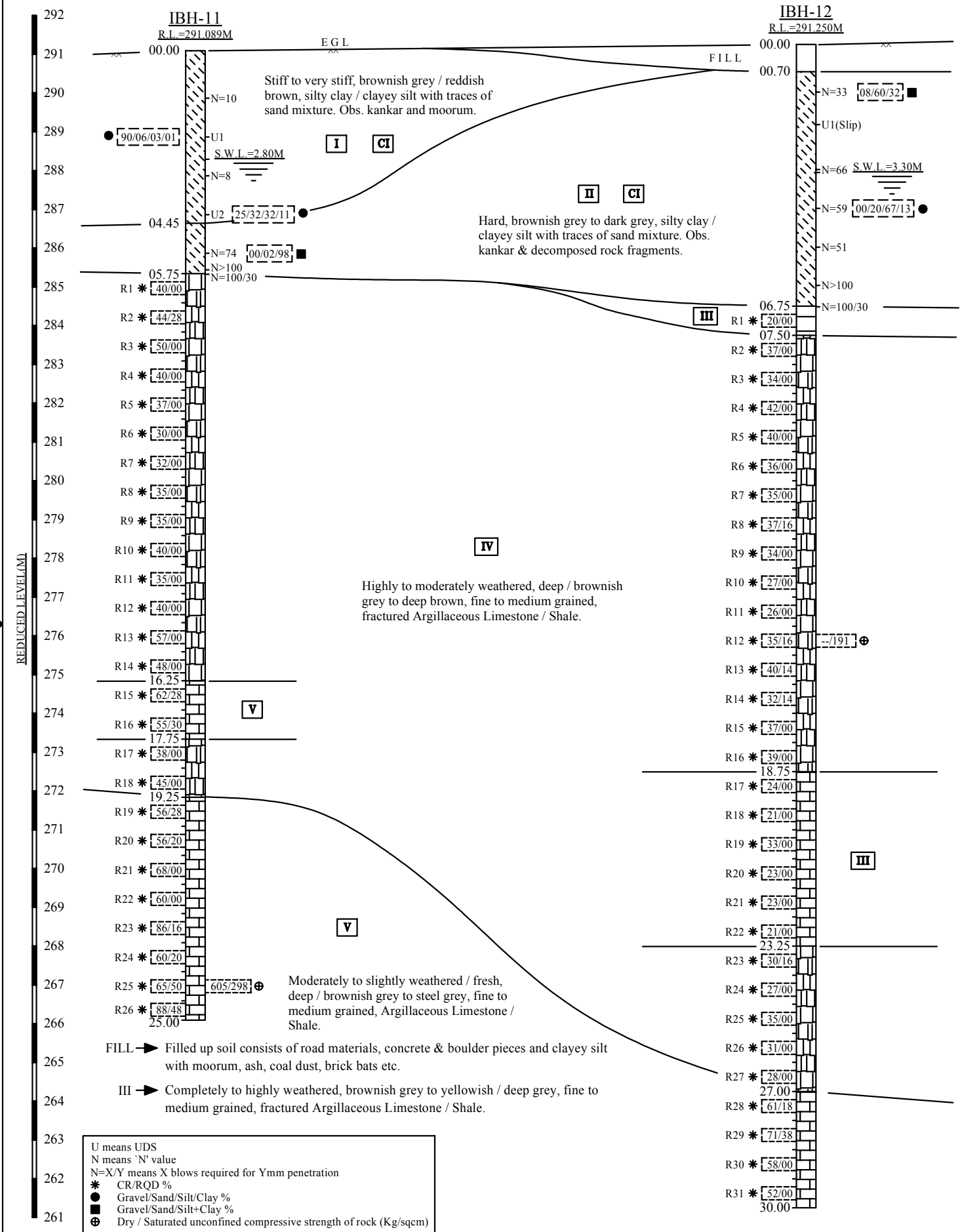


FIG. 2.15 : GENERALISED SOIL PROFILE

Project :	G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai					CETEST
Job No :	4376	Created by :	SKD	Created on :	09 / 6 / 2020	Sheet No:



FILL → Filled up soil consists of road materials, concrete & boulder pieces and clayey silt with moorum, ash, coal dust, brick bats etc.

III → Completely to highly weathered, brownish grey to yellowish / deep grey, fine to medium grained, fractured Argillaceous Limestone / Shale.

U means UDS
N means `N' value
N=X/Y means X blows required for Ymm penetration
✱ CR/RQD %
● Gravel/Sand/Silt/Clay %
■ Gravel/Sand/Silt+Clay %
⊕ Dry / Saturated unconfined compressive strength of rock (Kg/sqcm)

(Gypsum Storage Shed)

FIG. 2.16 : GENERALISED SOIL PROFILE

4.2.3. STRATUM – IA (CI):

This layer has been observed at top in few boreholes. The soil in this layer consists of medium, reddish brown to brownish grey, silty clay / clayey silt with traces of sand mixture. Kankar and moorum have been observed in this layer. Routine laboratory tests conducted on the "UDS" and few "SPT" samples collected from this layer show the following average properties.

Bulk Density, gms/cc	1.92	Specific gravity	2.67
Dry Density, gms/cc	1.54	Void Ratio	0.603
Natural Water Content %	25	Liquid limit %	46
TRSH-UU:		Plastic Limit %	19
Cohesion kg/sqcm	0.61	Shrinkage Limit %	11
Friction angle °	0	**GRAIN SIZE**	
Unconfined cohesion, kg/sqcm	**0.53**	Sand %	15
Remoulded cohesion, kg/sqcm	**0.39**	Silt %	68
SENSITIVITY, S_t	**1.35**	Clay %	17

4.2.4. STRATUM – IB (SM):

This sand layer is observed around BH-31 only. It consists of medium dense, brownish grey, silty sand. Moorum, kankar and clay binder have been observed in this layer. Routine laboratory tests conducted on the "SPT" sample collected from this layer show the following soil properties.

Specific gravity	2.65
GRAIN SIZE	
Sand %	85
(Silt + Clay) %	15

4.2.5. STRATUM – II (CI):

The soil in this layer consists of hard, brownish grey to dark grey, silty clay / clayey silt with traces of sand mixture. Kankar & decomposed rock fragments have been observed in this layer. Routine laboratory tests conducted on the "UDS" and few "SPT" samples collected from this layer show the following average properties.

Bulk Density, gms/cc	2.02	Specific gravity	2.69
Dry Density, gms/cc	1.70	Void Ratio	0.524
Natural Water Content %	19	Liquid limit %	42
TRSH-UU:		Plastic Limit %	20
Cohesion kg/sqcm	1.33	Shrinkage Limit %	10
Friction angle °	09	**GRAIN SIZE**	
		Gravel %	02
Unconfined cohesion, kg/sqcm	**1.58**	Sand %	12
Remoulded cohesion, kg/sqcm	**1.22**	Silt %	69
SENSITIVITY, S_t	**1.29**	Clay %	17

4.2.6. STRATUM – IIA (SM):

This is sand layer, struck only around BH-18. It consists of very dense, brownish grey, clayey silty sand with decomposed rock fragments. Routine laboratory tests conducted on the only "SPT" sample that could be collected from this layer show the following properties.

Specific gravity	2.68
GRAIN SIZE	
Gravel %	04
Sand %	65
(Silt + Clay) %	31

4.2.7. STRATUM – III:

This is a rock layer. It consists of completely to highly weathered, brownish grey to yellowish / deep grey, fine to medium grained, fractured Argillaceous Limestone / Shale. The core recovery of this layer ranges from 00% to 25% and RQD varies from 00% to 18%.

The following tests were carried out on the rock samples viz.

1. Determination of Point Load Strength Index.

The average properties of this layer as revealed from the routine laboratory tests on the rock core samples collected from this layer are as follows.

Bulk Density, gms/cc	2.741	Specific Gravity	2.780
Dry Density, gms/cc	2.731	Point Load Strength Index, kg/sqcm	14.24
Water Content %	0.381	Slake Durability Index (%)	84.97
Porosity %	1.766	Soundness (% Loss)	19.24

4.2.8. STRATUM – IV:

This rock layer consists of highly to moderately weathered, deep / brownish grey to deep brown, fine to medium grained, fractured Argillaceous Limestone / Shale. The core recovery of this layer varies from 26% to 50% and RQD varies from 00% to 40%.

The following tests were carried out on the rock samples viz.

1. Determination of Point Load Strength Index.
2. Unconfined Compressive Strength determination of the rock core samples as collected from site (i.e. in-situ condition).
3. Unconfined Compressive Strength determination of the rock core samples after 24 hours full submergence and thereafter air drying before testing (i.e. saturated condition).

The average properties of this layer as revealed from the routine laboratory tests on the rock core samples collected from this layer are as follows.

Bulk Density, gms/cc	2.731	UCS (in-situ), kg/sqcm	257
Dry Density, gms/cc	2.721	UCS (saturated), kg/sqcm	206
Water Content %	0.383	Point Load Strength Index, kg/sqcm	19.51
Porosity %	1.748	Slake Durability Index (%)	87.28
Specific Gravity	2.771	Soundness (% Loss)	18.85

4.2.9. STRATUM – V:

This rock layer consists of moderately to slightly weathered / fresh, deep / brownish grey to steel grey, fine to medium grained, Argillaceous Limestone / Shale. The core recovery of this layer varies from 51% to 92% and RQD varies from 00% to 63%.

The following tests were carried out on the rock samples viz.

1. Unconfined Compressive Strength determination of the rock core samples as collected from site (i.e. in-situ condition).
2. Unconfined Compressive Strength determination of the rock core samples after 24 hours full submergence and thereafter air drying before testing (i.e. saturated condition).

The average properties of this layer as revealed from the routine laboratory tests on the rock core samples collected from this layer are as follows.

Bulk Density, gms/cc	2.750	UCS (in-situ), kg/sqcm	412
Dry Density, gms/cc	2.740	UCS (saturated), kg/sqcm	277
Water Content %	0.352		
Porosity %	1.672	Slake Durability Index (%)	94.04
Specific Gravity	2.786	Soundness (% Loss)	19.84

4.3. GRAPHICAL PRESENTATION:

The detailed Laboratory Test Results in tabular form are given in the Appendix. The backup sheets are also presented there as given in below:

1. ***Strength envelopes from Triaxial Tests.***
2. ***Standard Proctor Compaction Curves.***
3. ***CBR Curves.***
4. ***e-log p curves from Consolidation Tests.***
5. ***Grain size distribution curves for sieve and hydrometer tests.***

The consolidation test results are analysed by numerical methods and only the final output in a tabular form is given. The m_{vc} indicates the time dependent component of m_v and c_v is the co- efficient of consolidation.

5. DISCUSSION

5.1. PLATE LOAD TEST:

Six (06) nos. Plate Load Tests were conducted in the site (3 nos. are of routine type & the rest 3 nos. are of cyclic type) at specified depths using 600mm square plate Load (vs.) settlement plots is made to calculate Allowable Bearing Capacity. The calculations are presented below separately.

5.1.1. DETERMINATION OF SAFE BEARING CAPACITY:

PLT – 01:

B_f = Width of footing = 2m (say), B_p = Size of test plate = 0.60m

S_f = Limiting Settlement of footing = 40mm and S_p = Settlement of test plate.

We know, in case of clayey soil, we can write, $(S_p/S_f) = (B_p/B_f)$

Hence, S_p = 12.0mm

So, from load-settlement curve, safe load = 16.0 t/sqm

Based on the above data, the safe bearing capacity value for different footing size is presented below.

Test Location	Depth (M)	Recommended Safe Bearing Capacity, T/M^2	
		Foundation width = 2m	Foundation width = 3m
		S= 40mm	S= 40mm
PLT-01	3.00	16	10
PLT-02	3.00	20	13
IPLT-01	3.00	13	9

Where S = limiting settlement

5.1.2. SUBGRADE MODULUS:

Subgrade Modulus is obtained from Plate Load Tests as K = P/S. Where P = Plate Load corresponding to settlement S (1.25mm) under working load. The final results along with Young's Modulus values are presented in a tabular form below.

Test No.	Depth (M)	Subgrade Modulus for Plate as per IS 9214, Kg/cm^3	Corrected Subgrade Modulus as per IS:9214 Kg/cm^3
PLT-01	3.00	1.88	1.47
PLT-02	3.00	2.96	2.68
IPLT-01	3.00	1.72	1.34

PLATE LOAD TEST NO. 01

Commenced on: 22/05/2020
Completed on: 22/05/2020
Pit size: 3.00mX3.00mX3.00m(depth)
Load on pr.guage/divn.=10Kg/sq.cm
Load on jack/divn. = 0.7081t
Plate size: 0.60mX0.60m
Load on plate/divn.= 1.96t/sq.m.
Test Type: Routine PLT

Co-ordinates:-
E = 9215 M.
N = 1806 M.
RL = 294.311 M.

S.W.L.= 2.40 m.

Description of Soil :-

(EGL-1.10)m:- Brownish grey, silty clay with moourm.

(1.10-4.00)m:- Deep grey, silty clay. Obs. kankars.

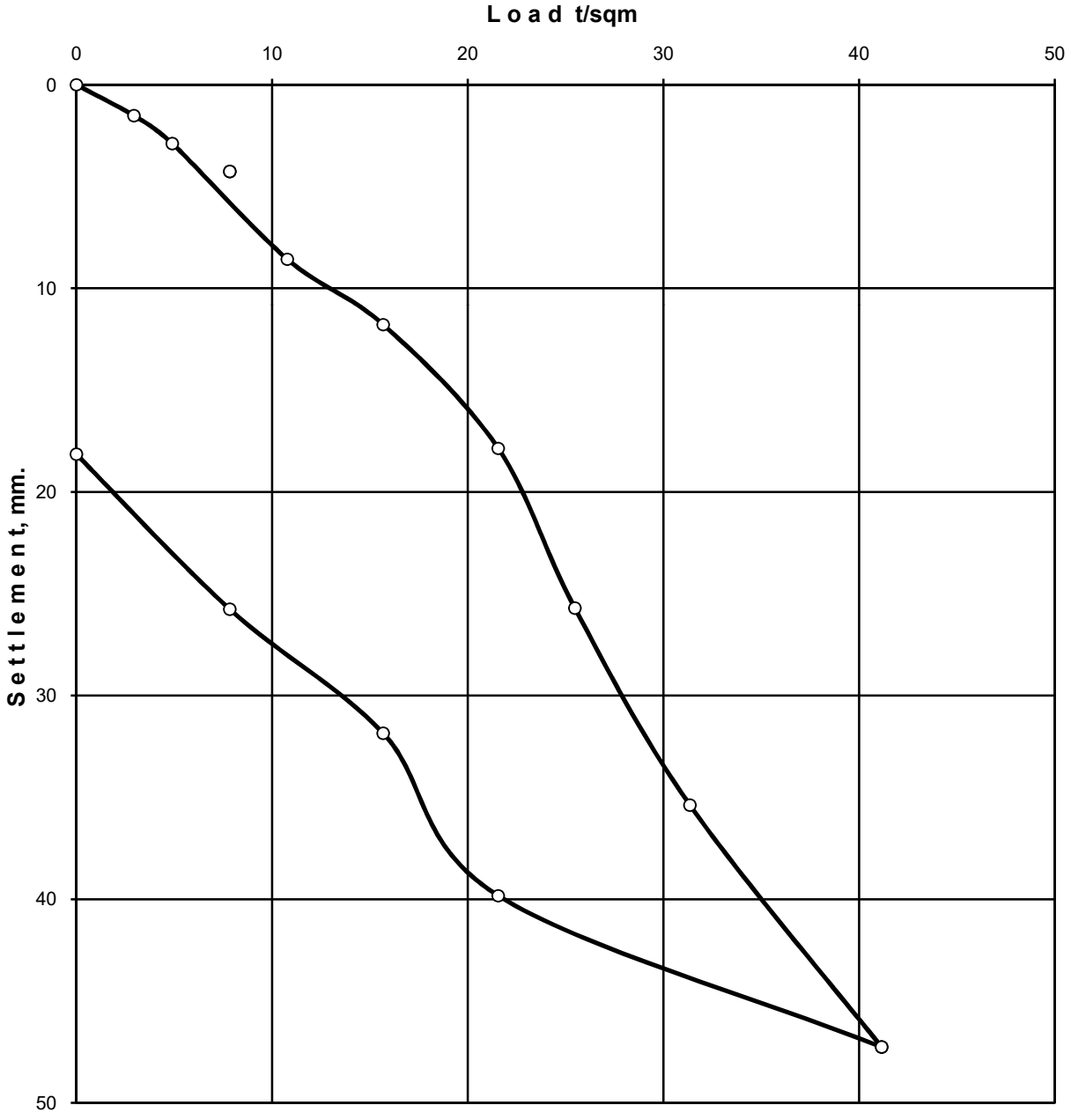


FIG. 3.1. LOAD VS SETTLEMENT GRAPH FOR PLT-01

PLATE LOAD TEST NO. 02

Commenced on: 15/05/2020
Completed on: 15/05/2020
Pit size: 3.00mX3.00mX3.00m(depth)
Load on pr.guage/divn.=10Kg/sq.cm
Load on jack/divn. = 0.7081t
Plate size: 0.60mX0.60m
Load on plate/divn.= 1.96t/sq.m.
Test Type: Routine PLT

Co-ordinates:-
E = 9413 M.
N = 1808 M.
RL = 293.785 M.

S.W.L.= Not found.

Description of Soil :-

(EGL-0.80)m:- Brownish grey, silty clay with moourm.

(0.80-4.00)m:- Deep grey, silty clay. Obs. kankars.

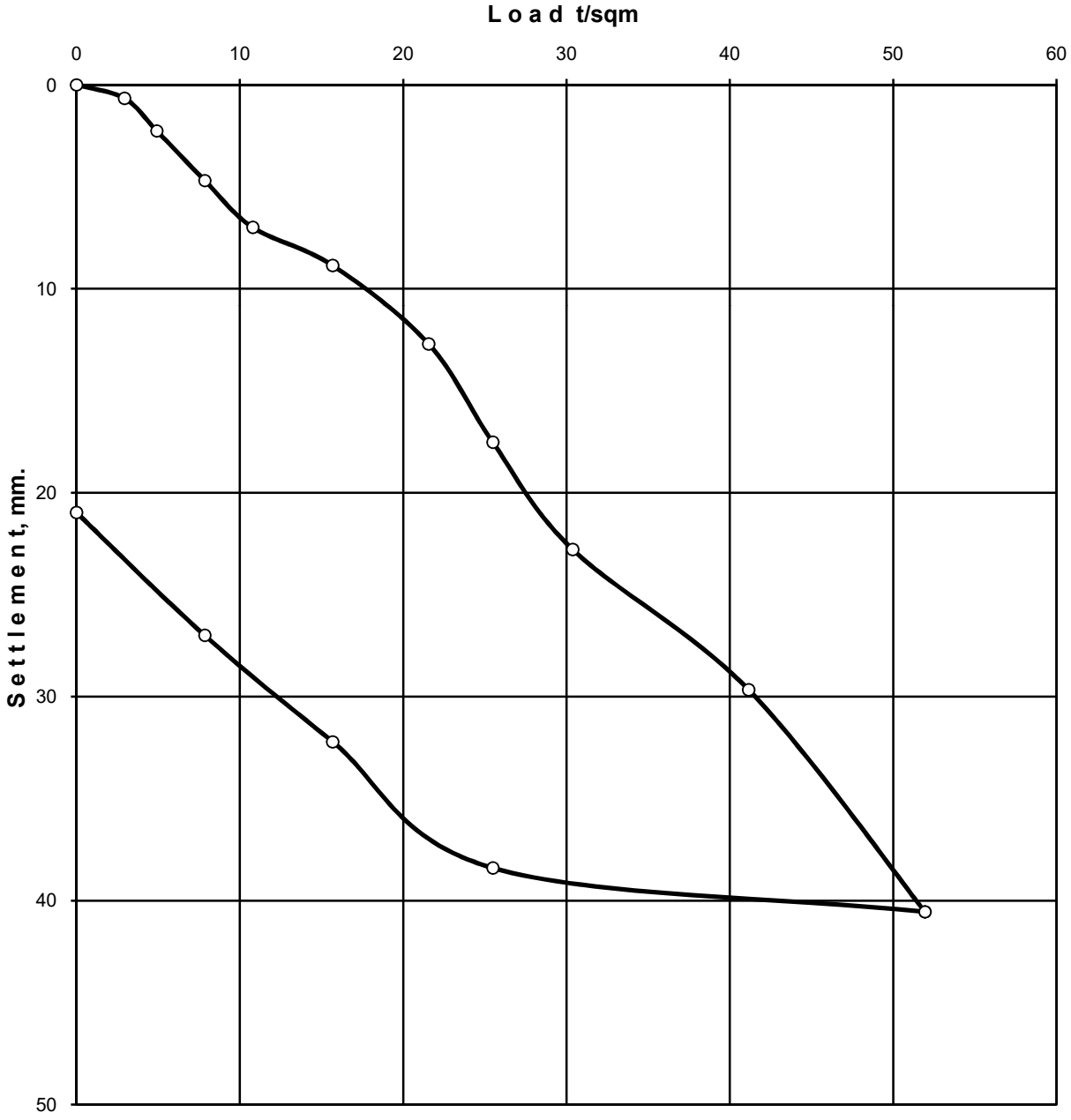


FIG. 3.2. LOAD VS SETTLEMENT GRAPH FOR PLT-02

PLATE LOAD TEST NO. IPLT-01

Commenced on: 23/05/2020
Completed on: 23/05/2020
Pit size: 3.00mX3.00mX3.00m(depth)
Load on pr.guage/divn.=10Kg/sq.cm
Load on jack/divn. = 0.7081t
Plate size: 0.60mX0.60m
Load on plate/divn.= 1.96t/sq.m.
Test Type: Routine PLT

Co-ordinates:-
E = 9092 M.
N = 1622 M.
RL = 292.786 M.

S.W.L.= 2.30 m.

Description of Soil :-

(EGL-0.40)m:- Brownish grey, silty clay with moourm.

(0.40-4.00)m:- Deep grey, silty clay. Obs. kankars.

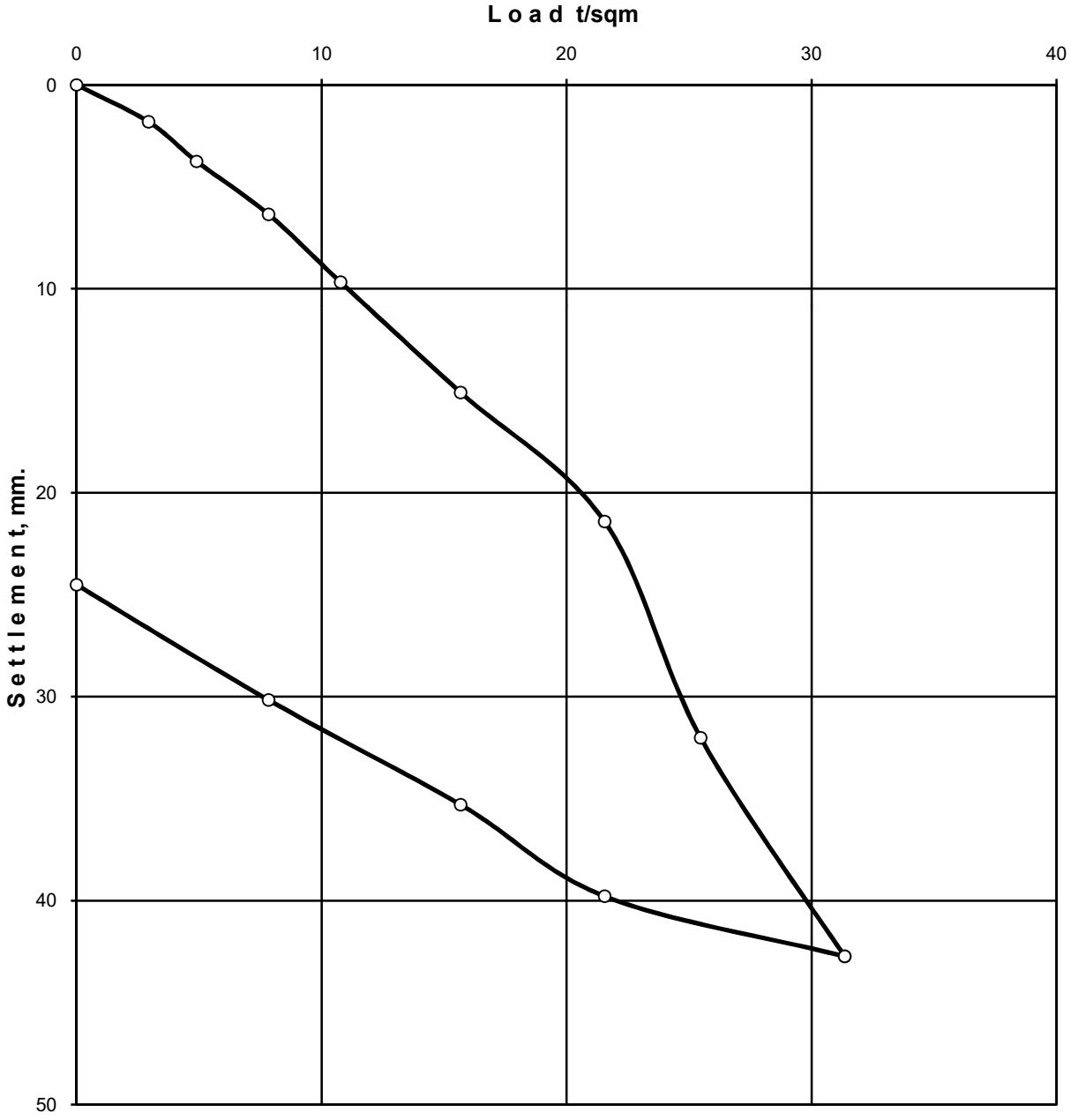


FIG. 3.3. LOAD VS SETTLEMENT GRAPH FOR IPLT-01

CYCLIC PLATE LOAD TEST NO. 01

Commenced on: 20/05/2020
Completed on: 20/05/2020
Pit size: 3.00mX3.00mX3.00m (depth)
Load on pr.guage/divn. = 10Kg/sq.cm
Load on jack/divn. = 0.708t
Plate size: 0.60m X 0.60m
Load on plate/divn. = 1.96t/sq.m.
Test Type: Cyclic PLT

Co-ordinates:
E = 9164 m.
N = 1790 m.
RL = 293.832 m.

S.W.L. = 2.50 m.

Description of Soil :-

(EGL-0.70)m:- Brownish grey, silty clay with moourm.

(0.70-4.00)m:- Deep grey, silty clay. Obs. kankars..

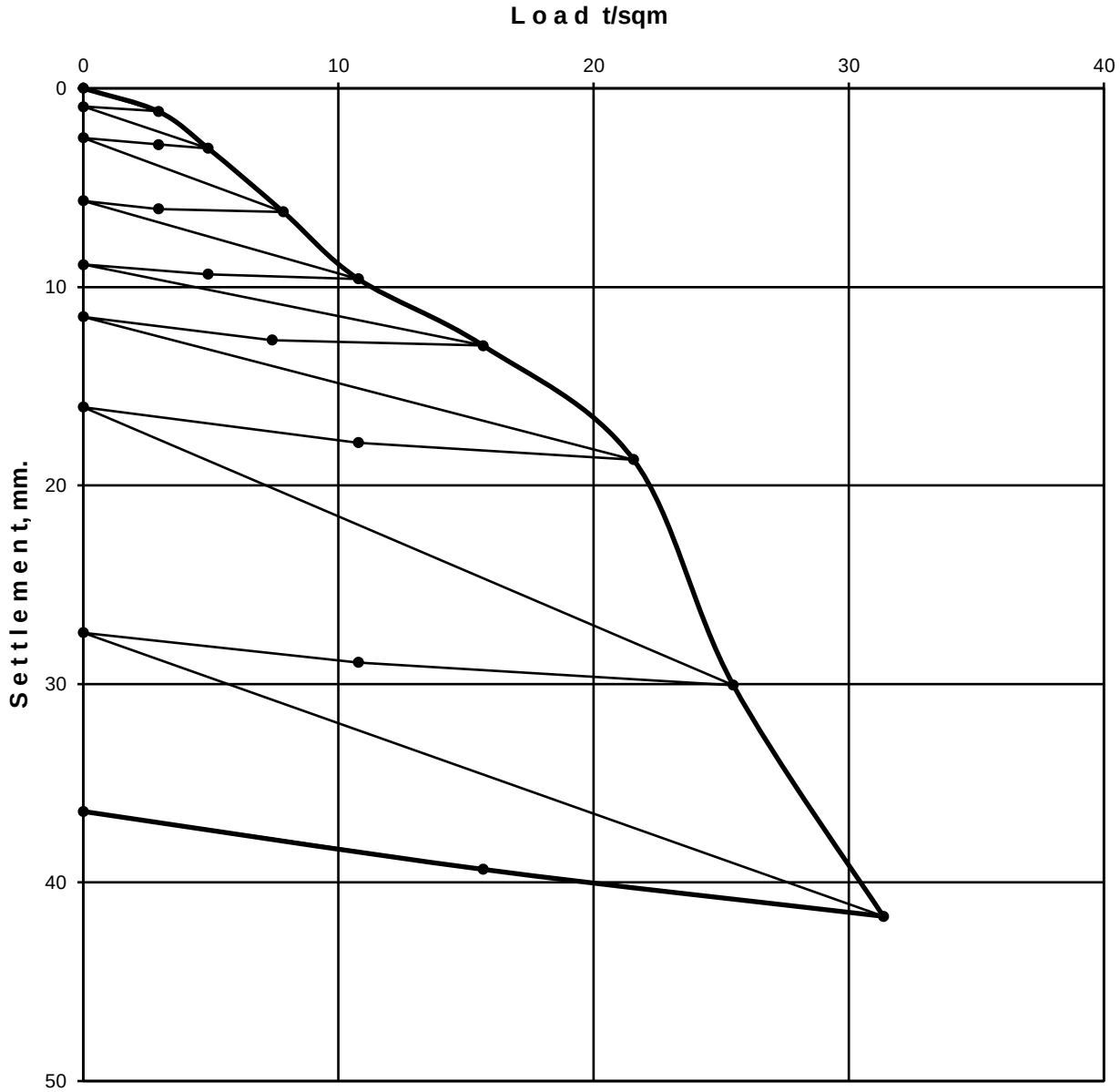


FIG.3.4. LOAD VS SETTLEMENT GRAPH FOR CPLT-01

CYCLIC PLATE LOAD TEST NO. 02

Commenced on: 21/03/2020
Completed on: 22/03/2020
Pit size: 3.00mX3.00mX3.00m (depth)
Load on pr.guage/divn. = 10Kg/sq.cm
Load on jack/divn. = 0.708t
Plate size: 0.60m X 0.60m
Load on plate/divn. = 1.96t/sq.m.
Test Type: Cyclic PLT

Co-ordinates:
E = 9105 m.
N = 1759 m.
RL = 292.742 m.

S.W.L. = 2.90 m.

Description of Soil :-

(EGL-1.30)m:- Brownish grey, silty clay with moorum & kankars.

(1.30-2.70)m:- Deep brown, clayey silt with sand mixture.

(2.70-4.00)m:-Deep grey, silty clay / clayey silt.

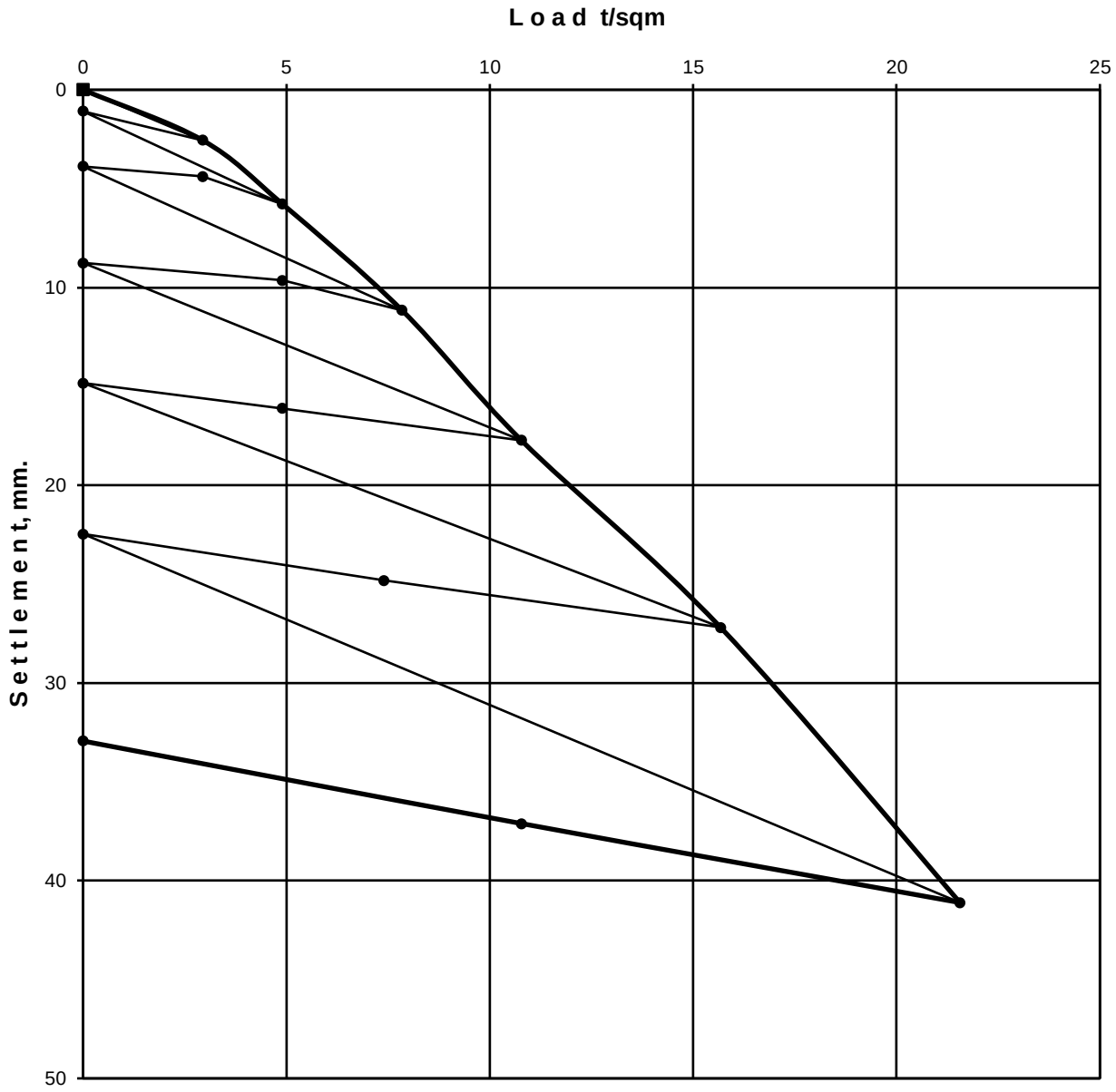


FIG.3.5. LOAD VS SETTLEMENT GRAPH FOR CPLT-02

CYCLIC PLATE LOAD TEST NO. 03

Commenced on: 13/05/2020
Completed on: 13/05/2020
Pit size: 3.00mX3.00mX3.00m (depth)
Load on pr.guage/divn. = 10Kg/sq.cm
Load on jack/divn. = 0.708t
Plate size: 0.60m X 0.60m
Load on plate/divn. = 1.96t/sq.m.
Test Type: Cyclic PLT

Co-ordinates:
E = 9432 m.
N = 1785 m.
RL = 294.112 m.

S.W.L. = Not Found

Description of Soil :-

(EGL-1.80)m:- Brownish grey, silty clay.

(1.80-3.50)m:- Yellowish grey, silty clay / clayey silt. Obs. kankars.

(3.50-4.00)m:-Brownish grey, silty clay.

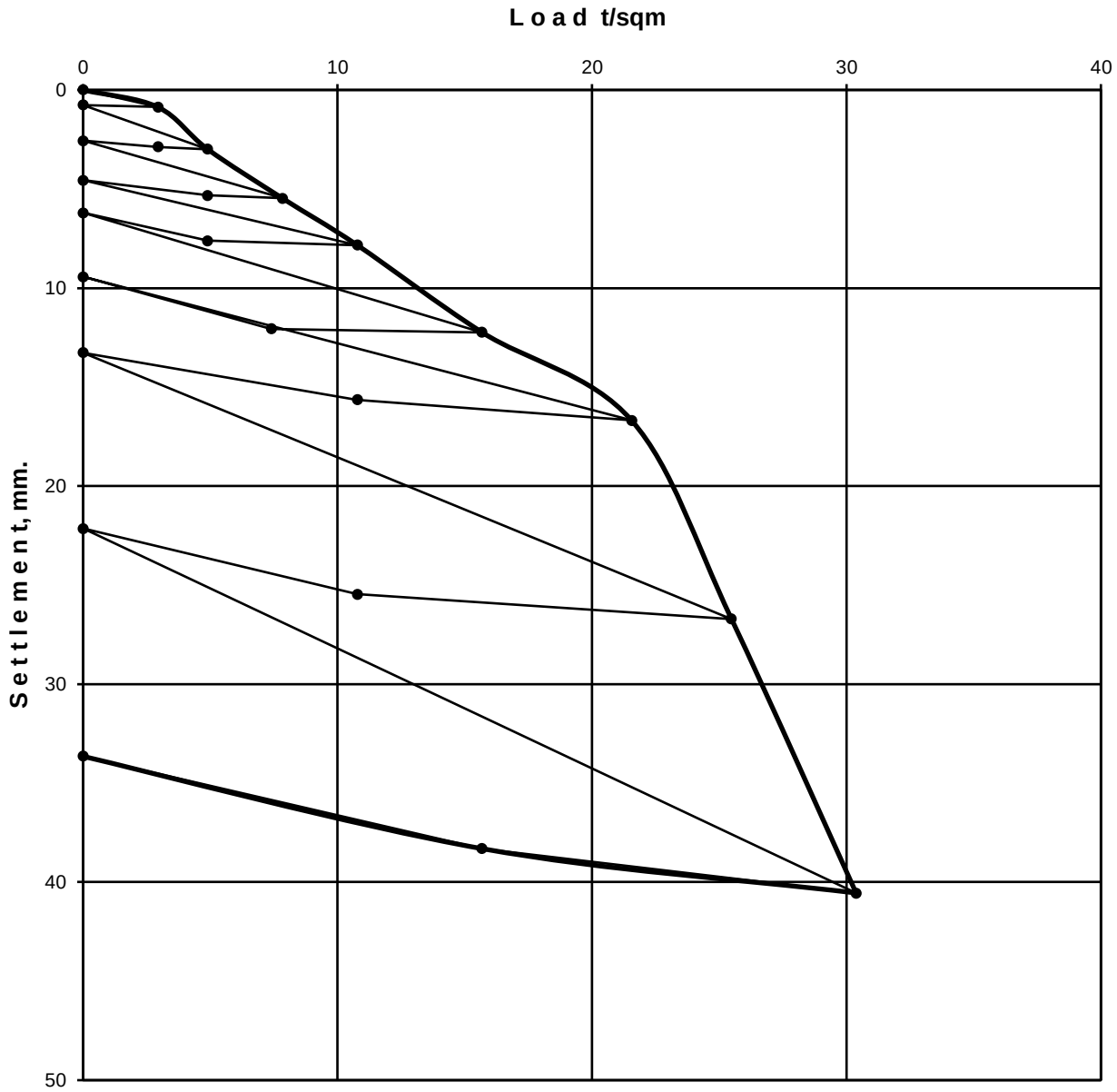


FIG. 3.6. LOAD VS SETTLEMENT GRAPH FOR CPLT-03

The Subgrade modulus value is inversely proportional to the square root of the foundation area up to a base area of 10 sqm and then remains constant. The calculated subgrade modulus values for different foundation sizes are presented below.

Test No.	Depth (M)	Subgrade Modulus, (kg/cucm)			
		Foundation Area = 1 sqm	Foundation Area = 4 sqm	Foundation Area = 5 sqm	Foundation Area = 10 sqm or above
PLT-01	3.00	0.88	0.44	0.39	0.28
PLT-02	3.00	1.61	0.80	0.72	0.51
IPLT-01	3.00	0.80	0.40	0.36	0.25

Sample Calculation of Subgrade Modulus for Plate & foundation area 5 Sq.m of PLT-02

For Plate

Safe Load, corresponding to 1.25mm settlement = 3.70 t/sqm
Subgrade Modulus for Plate, K = P/S = 3.70/1.25 = 2.96 Kg/cm^3
Applying correction for plate bending, as per Clause 5.1.3 & Fig.5 of IS:9214,
Subgrade Modulus = 3.43 Kg/cm^3
Since the test was conducted on 600mm square plate (i.e. smaller than 75cm dia,), corrected Subgrade Modulus as per Clause 5.1.1 & Fig.3 of IS:9214 = 3.43 / 1.28 = 2.68 Kg/cm^3

For foundation area 5 Sq.m

Corrected Subgrade Modulus of plate = 2.68 Kg/cm^3
Area of plate = 60x 60 sq.cm = 0.60 x 0.60 sq.m
Area of footing = 5 sq.m
Subgrade Modulus of foundation = 2.68 x $\sqrt{(0.60x0.60)/5}$ Kg/cm^3 = 0.72 Kg/cm^3

5.1.3. ELASTIC COMPRESSION:

For Cyclic Plate Load Tests, after application of each load increment and full stabilisation of plate settlement, the applied load was reduced to zero and the settlement records were noted till full stabilisation. Thereafter, the next load increment was applied.

The elastic rebounds at these load intensities are calculated from the field data and are graphically presented in graph (Ref. fig. no. 3.7 – 3.9). The coefficient of elastic uniform compression, C_u is obtained as $C_u = P / S_e$ (kg/cucm).

CPLT- 01:

From the load vs elastic rebound plot, the slope of the trend line =

C_u = (20 – 10)/(2.07 – 1.03) = 9.62 kg/cucm

Now, for a foundation size of 10 sqm (3m x 3.33m, say), the corresponding value will be,

C_{u10sqm} = 9.62 x √[(0.600 x 0.600) / 10] = 1.82 kg/cucm

Test No.	Depth (M)	C_u (kg/cucm)	$C_{u\ (10sqm\ fdn.size)}$ (kg/cucm)
CPLT-01	3.00	9.62	1.82
CPLT-02	3.00	2.94	0.56
CPLT-03	3.00	5.99	1.14

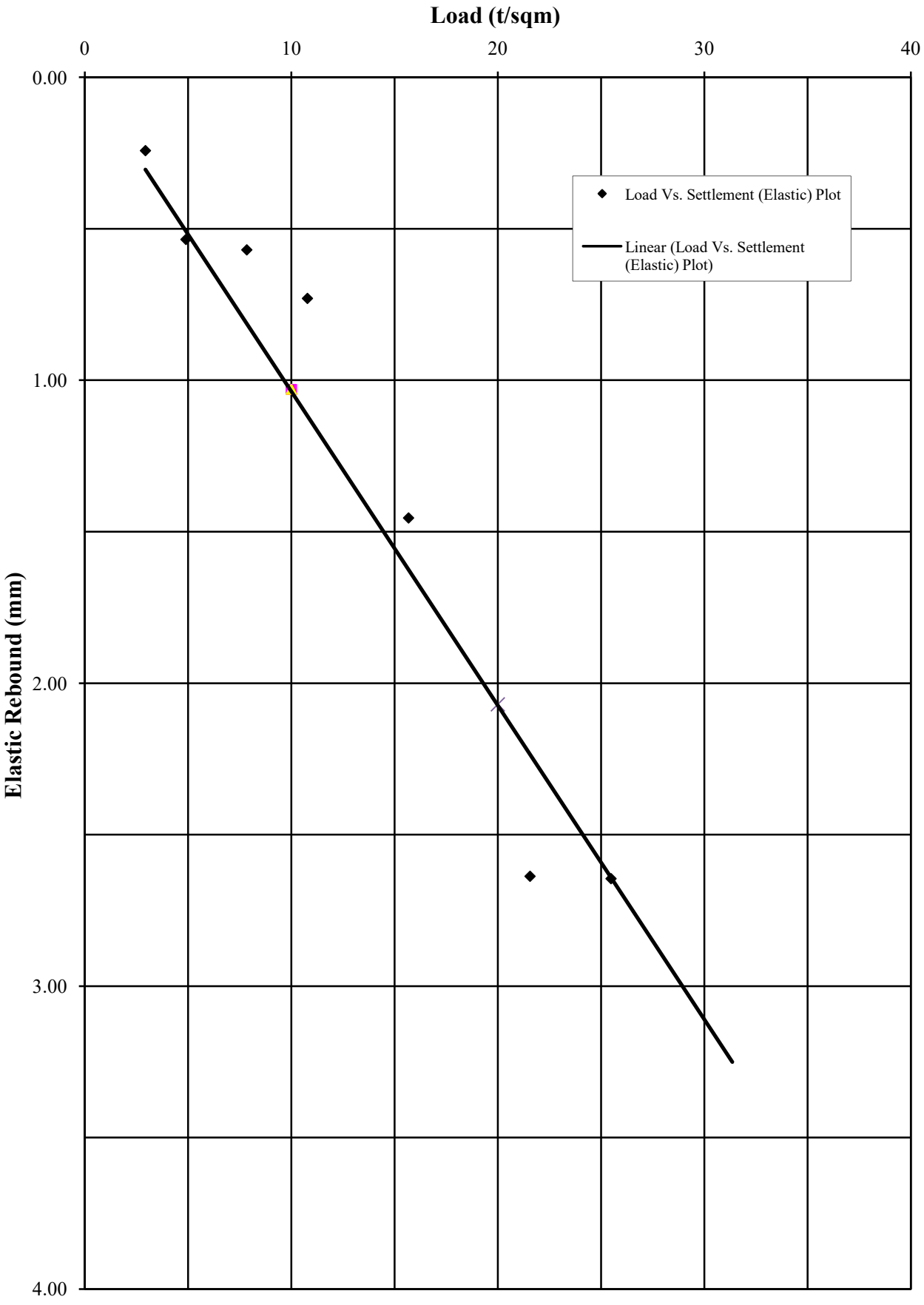


Fig. 3.7. Load vs. Elastic Rebound Plot (CPLT-01)
as per IS 5249 : 1992, Pg - 6

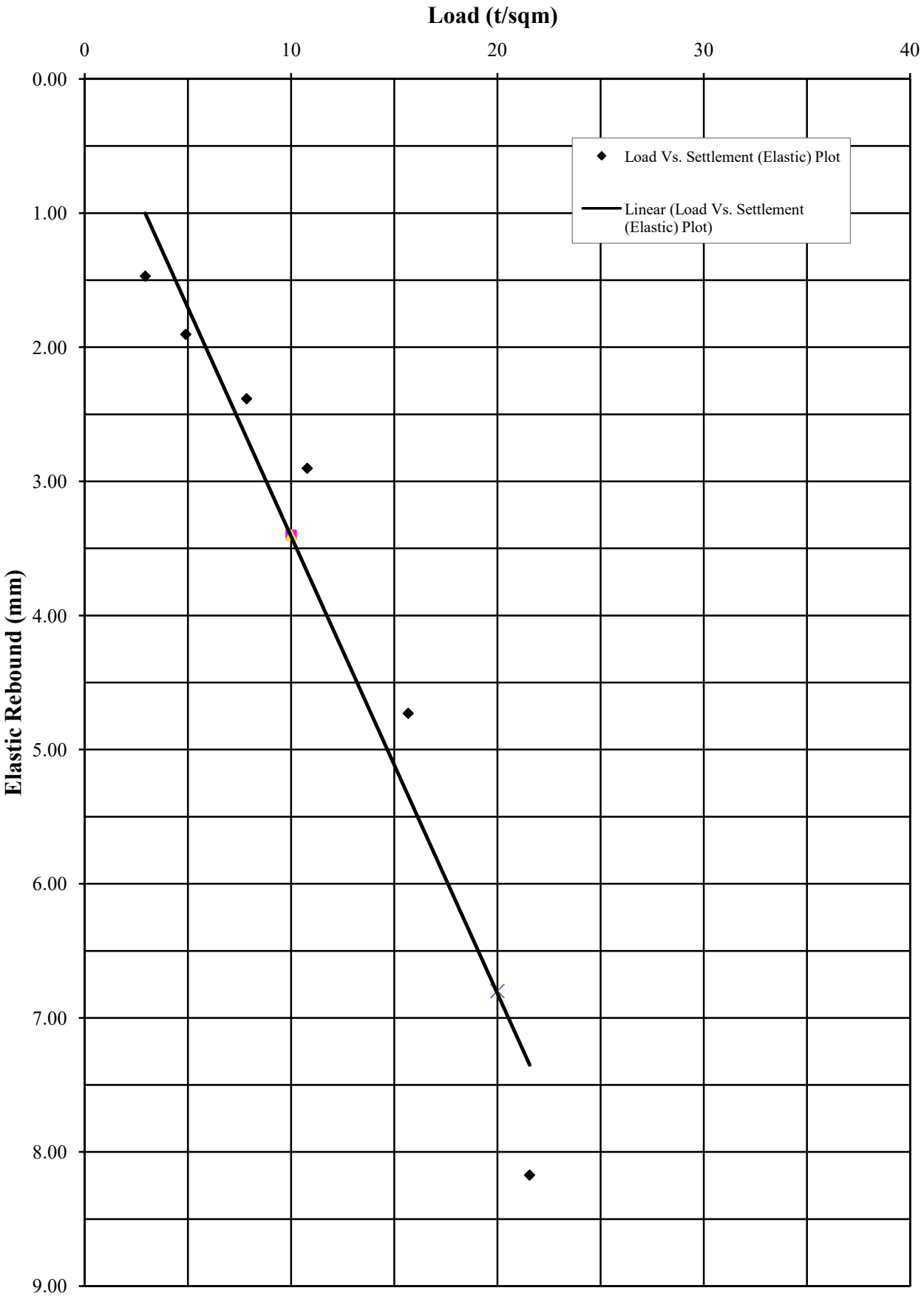


Fig. 3.8. Load vs. Elastic Rebound Plot (CPLT-02)

as per IS 5249 : 1992, Pg - 6

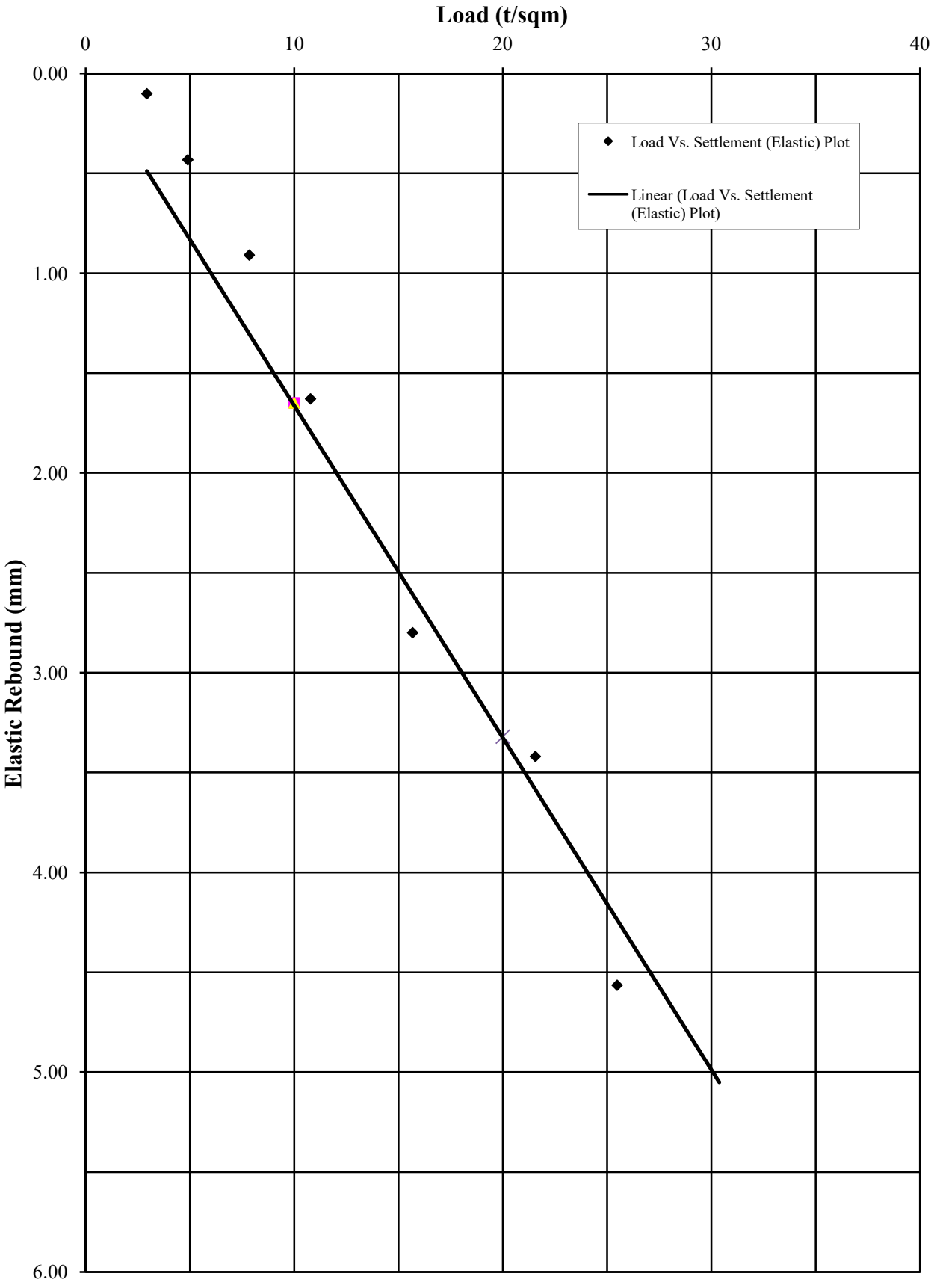


Fig. 3.9. Load vs. Elastic Rebound Plot (CPLT-03)
as per IS 5249 : 1992, Pg - 6

5.2. CHOICE OF FOUNDATION:

Considering the nature of the subsoil and the type of structures to be constructed at the present site, it is suggested to go for open foundation.

5.3. SHALLOW FOUNDATION:

Shallow foundations can be placed at a minimum depth of 2.00m below the Natural Ground Level (NGL) / Finished Ground Level (FGL), whichever is lower. The determination of bearing capacity for different structures is presented as follows.

5.3.1. AROUND BALL MILL BUILDING (BH-01, 02 & 03):

Let us place the foundation at 2.00m below NGL i.e. 3.35m below FGL (where, FGL = 294M and NGL around Ball Mill Building = 292.650 M)

Founding level falls inside Stratum –I, consisting of stiff to very stiff, silty clay / clayey silt.

A) Design Strength and Deformation Parameters:

For Stratum I

Use design "N" = 23, corresponding estimated cohesion = 1.04 kg/sqcm[1].

From laboratory TRSH-UU test result, we have C = 1.26 kg/sqcm & Φ = 0°

Thus, average Cohesion = 1.15 kg/sqcm & Φ = 0°

[1] **Relation between SPT "N" and Shear Strength:** Widely used relationship is due to Terzaghi and Peck recommending C = N/16 **However, it has been seen over the years with stiffness in clay the shear strength does not increase as rapidly as proposed by Terzaghi.**

Our experience also shows that for clays at medium to higher depth, the above relation does not hold good.

For Static Cone Penetration Tests, the recommendations for cone factor N_k generally are

$C = q_c/N_k$ where C = Cohesion in kg/sqcm and q_c = Cone resistance in Static Cone and

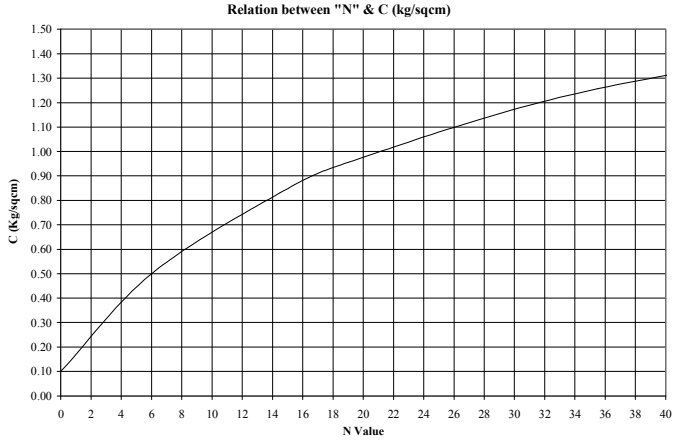
N_k = 17 , 21 & 27 for normally consolidated clay, partly over consolidated clay and heavily over consolidated clay respectively

[Ref. Meigh, A.C (1987) : Cone Penetration Testing Methods and Interpretation, Butterworths, London, pp-43-47]

Taveres, A.X [Penetration Testing 1988, ISOPT-1, Volume-I, J.De Ruiter Editor, pp-375-379] has shown very clearly that a better correlation can be obtained with stiffness of the clay. From his experimental results he obtained,

Range of SPT 'N'	K = N/C
N < 10	12.50
10 < N < 20	14.20
20 < N < 30	16.25
30 < N < 40	20.00

Over the years on the basis of the laboratory test results we have been using the following relations. However, for "N" value greater than 40, we use C = N/27



Let us use, design C = 1.10 kg/sqcm & Φ = 0° for bearing capacity calculation.

So, Undrained Young's modulus, E_u = K x C = 500 x 1.10 = 550 kg/sqcm

We know, E_s = 4.4 x N = 101.2 kg/sqcm

[Ref. to "History of Soil penetration testing" by B. B. Broms & N. Flodin in "Penetration Testing 1988", ISPOT-1: vol.1, pp – 185]

Again, $1/E_s = 1/E_u + 1/E_d$ giving drained Young's modulus, E_d = 124.02 kg/sqcm

Now, we have, $E_d = E_u/3$ = 183.33 kg/sqcm

[Refer to "Cone Penetration Testing" by A.C.Meigh, pp. No. – 53]

Considering the above, let us use E_d = 153 kg/sqcm

From E_d, $m_{vc} = 1/G.E_d$ = 0.0109 sqcm/kg [Geological Factor, G = 0.60 & μ = 0.35]

Again from SPT "N", m_{vc} = 1/5N = 0.0087 sqcm/kg

[Refer to "Standard Penetration Test, State-of-the-art-Report" by Ivan K. Nixon in "Penetration testing 1" Edited by A.Verrujt, F.L.beringen & E.H.De Leeuw, pp. No. 11]

Now, let us consider the m_{vc} value for the pressure range between 0.50 to 2.00 kg/sqcm

Sample No.	0.50 – 1.00kg/sqcm	1.00 – 2.00kg/sqcm
BH-01 / UDS01	0.0119	0.0075
Average weighted m_{vc}over entire pressure range	**0.0090**	

Giving more weightage to the laboratory test results,

Thus average m_{vc} = [2 X 0.0090 + 0.0087 + 0.0109]/4 = 0.0094 sqcm/kg

For Stratum II

Use average "N" = 100, corresponding estimated cohesion = 3.70 kg/sqcm.

To be in conservative side, use design C = 2.00 kg/sqcm for bearing capacity calculation.

So, Undrained Young's modulus, E_u = K x C = 500 x 2.00 = 1000 kg/sqcm

We know, E_s = 4.4 x N = 440 kg/sqcm

Again, $1/E_s = 1/E_u + 1/E_d$ giving drained Young's modulus, E_d = 785.71 kg/sqcm

Now, we have, $E_d = E_u/3$ = 333.33 kg/sqcm

Considering the above, let us use E_d = 559 kg/sqcm

From E_d, $m_{vc} = 1/G.E_d$ = 0.0036 sqcm/kg [Geological Factor, G = 0.50 & μ = 0.35]

Again from SPT "N", m_{vc} = 1/5N = 0.0020 sqcm/kg

Now, let us consider the m_{vc} value for the pressure range between 1.00 to 2.00 kg/sqcm

Sample No.	1.00 – 2.00kg/sqcm
BH-02 / UDS02	0.0109
Average weighted m_{vc}over entire pressure range	**0.0109**

Giving more weightage to the laboratory test results,

Thus average m_{vc} = [2 X 0.0109 + 0.0020 + 0.0036]/4 = 0.0068 sqcm/kg

For Stratum III, IV & V:

After that rock layer was encountered. Settlement of rock may be neglected. However, to be in the conservative side, use a lowest probable Young's modulus, E_s = 1000 kg/sqcm, 2000 kg/sqcm & 4000 kg/sqcm for layer-III, IV & V respectively.

[Refer to "Soil Mechanics and Foundation Engineering" 4th Edition by Prof. V. N. S. Murthy, pp – 271]

B) Calculation of Net Safe Bearing Capacity:

The Net Ultimate Bearing Capacity is given as per Hansen Equation:

$$q_{nu} = C.N_c.S_c.D_c + q.N_q.S_q.D_q + 0.5\gamma.B.N_\gamma.S_\gamma.D_\gamma - q$$

Where, N_c, N_q and N_γ are bearing capacity factors,
S_c, S_q and S_γ are shape factors,
D_c, D_q and D_γ are depth factors,
And C = Cohesion
q = Overburden pressure,
B = Width of foundation,
γ = Effective density below foundation.

For 6m x 12m Isolated Foundation

Cohesion, C = 11.00 t/sqm
Using ϕ = 0 degree, the bearing capacity factors are:
N_c = 5.14
N_q = 1.00
N_γ = 0.00
Use,
Depth of Foundation = D_f = 2.00 M (below NGL)
Width of Foundation = B = 6.00 M
Length of Foundation = L = 12.00 M
Overburden Pressure = q =2.000 (Depth) x 0.90 (Submerged density) = 1.80 t/sqm (assuming the ground water table is flushing with the ground level)
The Shape factors are [IS:6403 - 1981]
S_c = 1.10 S_q = 1.10 S_γ = 0.80
The Depth factors are [IS:6403 - 1981]
D_c = 1.07 D_q = 1.00 D_γ = 1.00
Computed Net Ultimate Bearing Capacity = 66.57 t/sqm
Using a factor of safety of 2.5, Net Safe Bearing Capacity = 26.63 t/sqm

The above bearing capacity should be checked against settlement criteria and this is shown below.

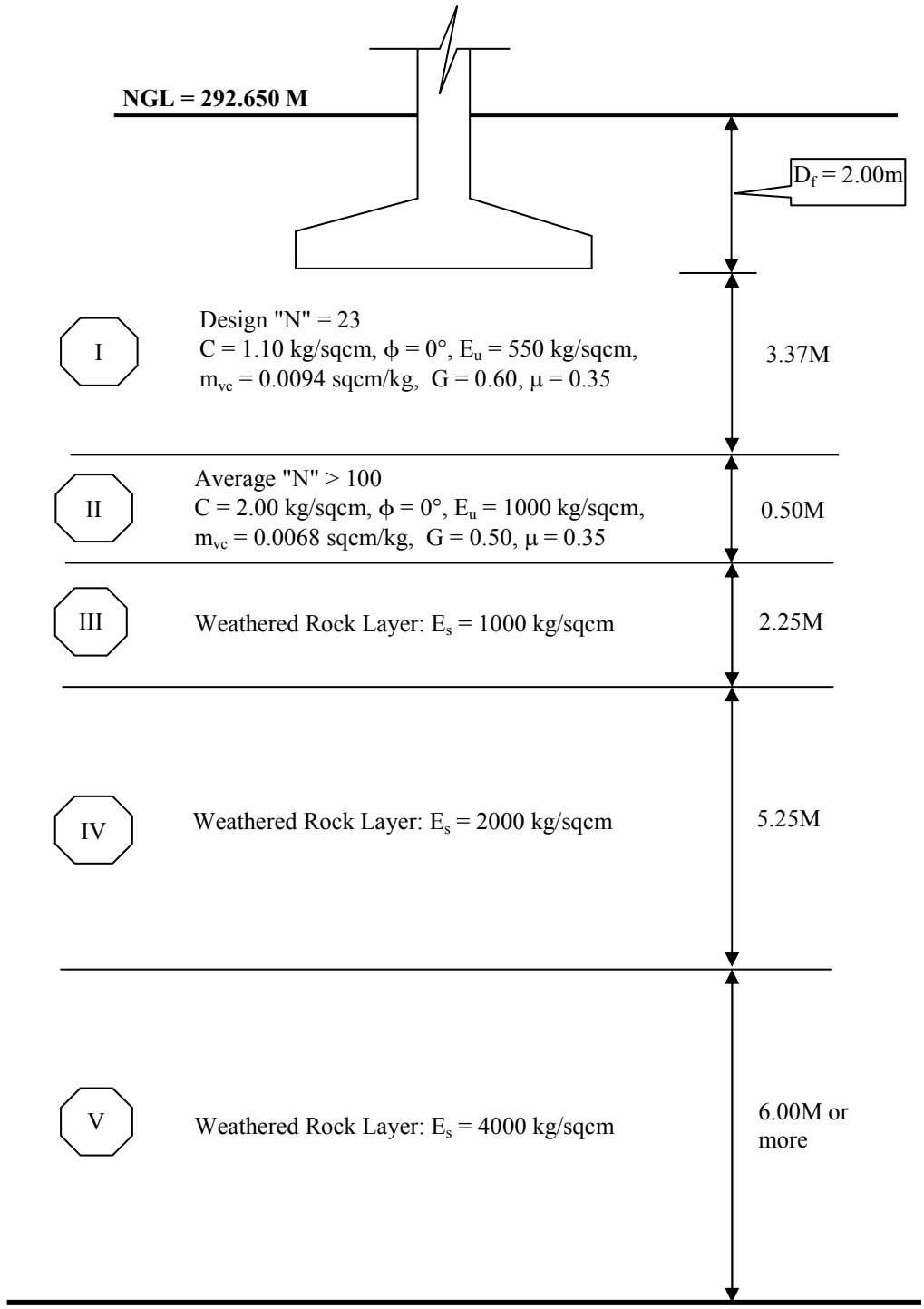


FIG. 4.1. SHALLOW FOUNDATION DESIGN MODEL FOR BALL MILL BUILDING [BH-01, 02 & 03]

(Not to Scale)

C) Settlement Calculations:

With reference to the above, the settlement is calculated and presented below.

A) General Data:

Width of foundation =	6.0	m
Length of foundation =	12.0	m
Depth of foundation =	2.0	m
Net Base Pressure =	1.5	kg/sqcm

B) Subsoil Properties:

Layer - I

Young's Modulus =	550	kg/sqcm
Poisson Ratio, μ =	0.35	
Top of Stratum =	2.00	m
End of Stratum =	5.37	m
Geological factor, G =	0.60	
m_{vc} =	0.0094	sqcm/kg

Layer - II

Young's Modulus =	1000	kg/sqcm
Poisson Ratio, μ =	0.35	
Top of Stratum =	5.37	m
End of Stratum =	5.87	m
Geological factor, G =	0.5	
m_{vc} =	0.0068	sqcm/kg

C) Calculation of Immediate Settlement:

Settlement at center

M = L' / B' =	2.0000		
N = H / B' =	1.1233		
I_1 =	0.1474		
I_2 =	0.1106		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.198	
Immediate settlement S_i =		0.570	cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$			

Settlement at corner

M = L' / B' =	2.0000		
N = H / B' =	0.5617		
I_1 =	0.0491		
I_2 =	0.0891		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0902	
Immediate settlement S_i =		0.130	cm

Average S_i for Stratum I= 3.50 mm

Settlement at center

M = L' / B' =	1.6403		
N = H / B' =	0.1067		
I_1 =	0.0021		
I_2 =	0.0246		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0134	
Immediate settlement S_i =		0.0166	cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$			

Settlement at corner

M = L' / B' =	1.6403		
N = H / B' =	0.0534		
I_1 =	0.0005		
I_2 =	0.0128		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0064	
Immediate settlement S_i =		0.004	cm

Average S_i for Stratum II= 0.10 mm

Layer - III

Young's Modulus =	1000	kg/sqcm
Poisson Ratio, μ =	0.25	
Top of Stratum =	5.87	m
End of Stratum =	8.12	m
Geological factor, G =	1	
m_{vc} =	0	sqcm/kg

Settlement at center

M = L' / B' =	1.6079		
N = H / B' =	0.4559		
I_1 =	0.0355		
I_2 =	0.0774		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0871	
Immediate settlement S_i =		0.111	cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$			

Settlement at corner

M = L' / B' =	1.608		
N = H / B' =	0.228		
I_1 =	0.010		
I_2 =	0.047		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0411	
Immediate settlement S_i =		0.026	cm

Average S_i for Stratum III= 0.69 mm

Layer - IV

Young's Modulus =	2000	kg/sqcm
Poisson Ratio, μ =	0.25	
Top of Stratum =	8.12	m
End of Stratum =	13.37	m
Geological factor, G =	1	
m_{vc} =	0	sqcm/kg

Settlement at center

M = L' / B' =	1.4950		
N = H / B' =	0.8663		
I_1 =	0.1070		
I_2 =	0.0983		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.1725	
Immediate settlement S_i =		0.096	cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$			

Settlement at corner

M = L' / B' =	1.495		
N = H / B' =	0.433		
I_1 =	0.033		
I_2 =	0.074		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0825	
Immediate settlement S_i =		0.023	cm

Average S_i for Stratum IV= 0.597 mm

Layer - V

Young's Modulus =	4000	kg/sqcm
Poisson Ratio, μ =	0.25	
Top of Stratum =	13.37	m
End of Stratum =	14	m
Geological factor, G =	1	
m_{vc} =	0	sqcm/kg

Settlement at center

M = L' / B' = 1.3454
N = H / B' = 0.0725
I_1 = 0.0010
I_2 = 0.0171
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ = 0.0124
Immediate settlement S_i = 0.003 cm
$[q_o \times B' \times (1- \mu^2) \times m \times I_s] / E_s$

Settlement at corner

M = L' / B' = 1.3454
N = H / B' = 0.0363
I_1 = 0.0003
I_2 = 0.0088
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ = 0.0061
Immediate settlement S_i = 0.001 cm

Average S_i for Stratum V= 0.02 mm

Total immediate settlement = 4.90 mm

D) Calculation of Consolidation Settlement:

Strata	From (M)	To (M)	Thickness (M)	Mid depth (M)	Δ P (kg/sqcm)	m_{vc}, sqcm/kg	G	S_c (cm)
Layer - I	2.00	3.69	1.69	0.84	1.23	0.0094	0.60	1.17
	3.69	5.37	1.69	2.53	0.87	0.0094	0.60	0.83
Layer - II	5.37	5.62	0.25	3.50	0.73	0.0068	0.50	0.06
	5.62	5.87	0.25	3.75	0.70	0.0068	0.50	0.06

Hence, Total Consolidation Settlement = 21.19 mm

So, Total Settlement = 26.09 mm
Foxe's Depth correction Factor = 0.94
Corrected total settlement = 24.49 mm

The calculated settlement is well within permissible limit. However as per technical specification, let us restrict the net allowable bearing capacity to 12 t/sqm at 2.00m below NGL for 25mm limiting settlement.

5.3.2. AROUND WET STACK UNIT-2 (BH-11, IBH-06):

Considering the nature of the subsoil and the type of structures to be constructed at the present site, let us place the foundation at 1.00m or more inside the weathered rock layer.

A) Bearing Capacity Based on RMR Method:

Calculated RMR = 08 as per IS: 13365(Part1)-1998, Annex B

a) The minimum UCS value for Layer-III & IV is taken as 49 kg/sqcm, corresponding rating = 1.
b) RQD value, a minimum of 10% is considered as per codal provision (IS 13365, Part 1), corresponding rating = 3.
c) Spacing of discontinuity taken as very close (<0.06m), corresponding rating = 5.
d) Condition of discontinuity based on persistence, aperture, roughness, infilling & weathering, corresponding rating = (2+1+1+2+1) = 7.
e) Ground water condition taken as Wet, corresponding rating = 7.
f) Dip Angle Joint Orientation taken as unfavourable, corresponding rating = -15.

So, RMR = 1+3+5+7+7+(-)15 = 08

So, from Table-3 of IS: 12070: 1987 (Amendment No. 1, 2008), q_{ns} = 36 t/sqm

B) Based on C-Φ Value:

Let us place the foundation at 1.00m inside rock layer, i.e. about 6.3m below NGL (where, NGL = 292.590 M). The suggested founding level falls inside Layer-III.

This is a weathered rock layer with low to moderate CR value and nil RQD. Now from literature we know that the c and φ values of a rock specimen is in the range of c = 35 to 175 kg/sqcm and Φ is seldom less than 40 degree [Bowles, J. E., Foundation Analysis and Design, pp-278, 5th Edition]. Neglecting the cohesion value, use Φ = 35° for bearing capacity calculation.

EVALUATION OF STRENGTH AND DEFORMATION PARAMETERS:

Rock layer (Layer III, IV & V)

Use, Young's modulus for layer-III, IV & V = 1000 kg/sqcm, 2000 kg/sqcm & 4000 kg/sqcm.

CALCULATION OF SAFE BEARING CAPACITY:

The Net Ultimate Bearing Capacity is given as:

$$q_{nu} = C.N_c.S_c.D_c + q.N_q.S_q.D_q + 0.5\gamma.B.N_\gamma.S_\gamma.D_\gamma - q$$

Where,

N_c, N_q and N_γ are bearing capacity factors,
S_c, S_q and S_γ are shape factors,
D_c, D_q and D_γ are depth factors,
And C = Cohesion
q = Overburden pressure,
B = Width of foundation,
γ = Effective density below foundation.

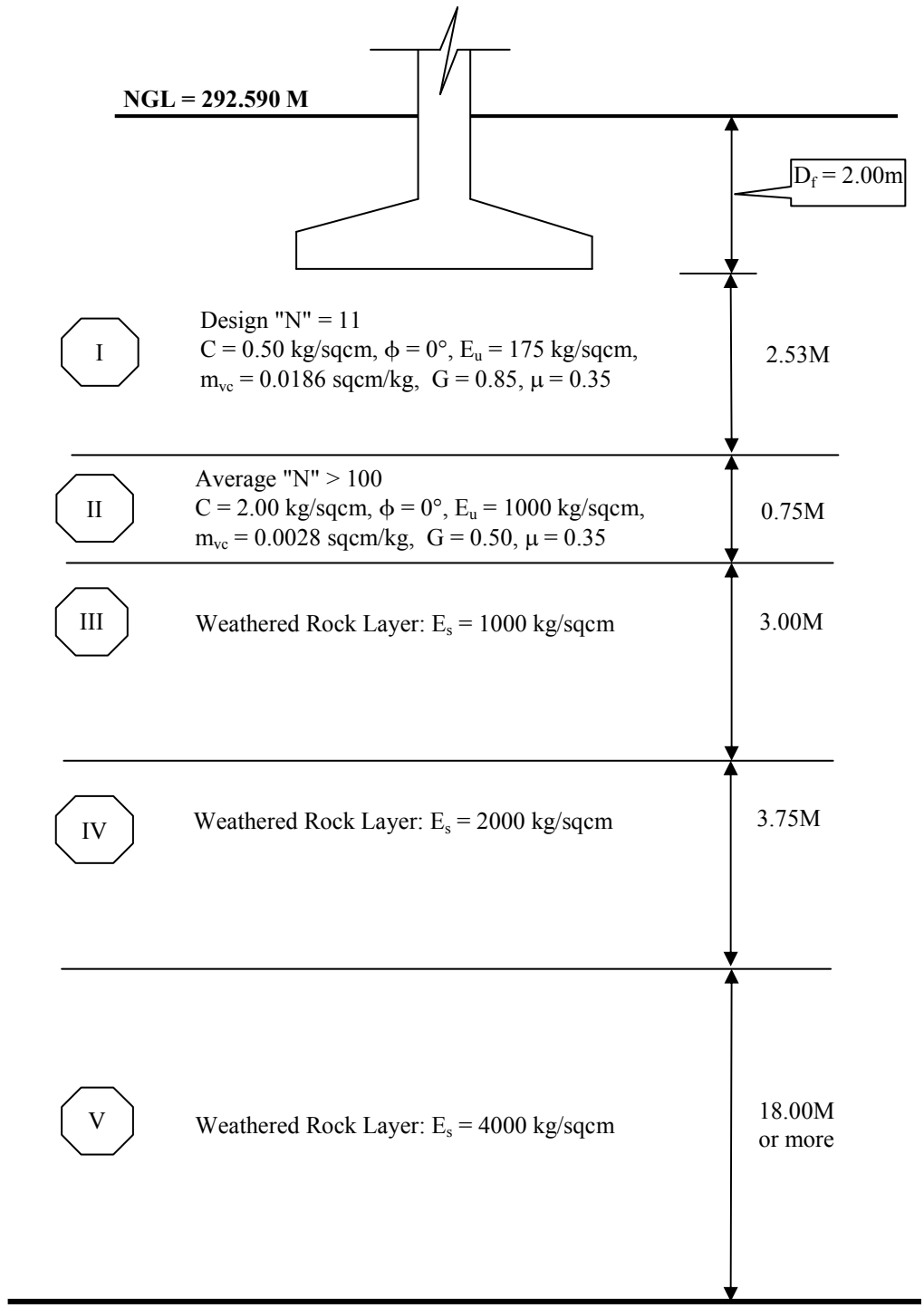


FIG. 4.2. SHALLOW FOUNDATION DESIGN MODEL FOR WET STACK UNIT-2 [BH-11 & IBH-06]

(Not to Scale)

For 30m dia. Raft Foundation

Cohesion, C = 0.00 t/sqm

Using ϕ = 35 degree, the bearing capacity factors are:

N_c = 46.12, N_q = 33.30, N_γ = 48.03

Use,

Depth of Foundation = D_f = 6.34 M (below NGL)

Diameter of Foundation = B = 30 M

Overburden Pressure = q =6.340 (Depth) x 0.90 (Submerged density) = 5.71 t/sqm (assuming the ground water table is flushing with the ground level)

The Shape factors are [IS:6403 - 1981]

S_c = 1.30 S_q = 1.20 S_γ = 0.60

The Depth factors are [IS:6403 - 1981]

D_c = 1.08 D_q = 1.04 D_γ = 1.04

Computed Net Ultimate Bearing Capacity = 636.36 t/sqm

Using a factor of safety of 2.5, Net Safe Bearing Capacity = 254.54 t/sqm

This is to be checked with respect to settlement as shown below.

SETTLEMENT CALCULATION:

Assumed size of foundation = 30m dia. So, size of equivalent square = 26.6m.

A) General Data:

Width of foundation =	26.6	m
Length of foundation =	26.6	m
Depth of foundation =	6.3	m
Net Base Pressure =	3.6	kg/sqcm

B) Subsoil Properties:

Layer - III			Layer - IV			Layer - V		
Young's Modulus =	1000	kg/sqcm	Young's Modulus =	2000	kg/sqcm	Young's Modulus =	4000	kg/sqcm
Poisson Ratio, μ =	0.25		Poisson Ratio, μ =	0.35		Poisson Ratio, μ =	0.25	
Top of Stratum =	6.3	m	Top of Stratum =	8.3	m	Top of Stratum =	13.0	m
End of Stratum =	8.3	m	End of Stratum =	13.0	m	End of Stratum =	59.5	m
Geological factor, G =	1.00		Geological factor, G =	1.00		Geological factor, G =	1	
m_{vc} =	0.0000	sqcm/kg	m_{vc} =	0.0000	sqcm/kg	m_{vc} =	0.0000	sqcm/kg

C) Calculation of Immediate Settlement:

Settlement at center			*Settlement at center*			*Settlement at center*		
M = L' / B' =	1.000		M = L' / B' =	1.000		M = L' / B' =	1.000	
N = H / B' =	0.147		N = H / B' =	0.329		N = H / B' =	2.798	
I_1 =	0.005		I_1 =	0.023		I_1 =	0.351	
I_2 =	0.032		I_2 =	0.059		I_2 =	0.051	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.026	$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.050	$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.384
Immediate settlement S_i =		0.470 cm	Immediate settlement S_i =		0.392 cm	Immediate settlement S_i =		1.379 cm
$[q_o \times B \times (1-\mu^2) \times m \times I_s] / E_s$			$[q_o \times B \times (1-\mu^2) \times m \times I_s] / E_s$			$[q_o \times B \times (1-\mu^2) \times m \times I_s] / E_s$		

Settlement at corner			*Settlement at corner*			*Settlement at corner*		
M = L' / B' =	1.00		M = L' / B' =	1.00		M = L' / B' =	1.000	
N = H / B' =	0.074		N = H / B' =	0.165		N = H / B' =	1.399	
I_1 =	0.001219		I_1 =	0.006		I_1 =	0.209	
I_2 =	0.017210		I_2 =	0.035		I_2 =	0.077	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.013	$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.022	$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.260
Immediate settlement S_i =		0.114 cm	Immediate settlement S_i =		0.087 cm	Immediate settlement S_i =		0.467 cm

Average Si for Layer - III = 2.92 mm

Total immediate settlement = 14.54 mm

Average Si for Layer - IV = 2.39 mm (for all the three layers)

Average Si for Layer - V = 9.23 mm

D) Calculation of Consolidation Settlement:

Strata	From (M)	To (M)	Thickness (M)	Mid depth (M)	Δ P (kg/sqcm)	m_{vc}, sqcm/kg	G	S_c (cm)
Layer - III	6.34	7.32	0.98	0.49	3.47	0.0000	1.00	0.00
	7.32	8.30	0.98	1.47	3.23	0.0000	1.00	0.00
Layer - IV	8.30	10.65	2.35	3.14	2.88	0.0000	1.00	0.00
	10.65	13.00	2.35	5.49	2.47	0.0000	1.00	0.00
Layer - V	13.00	36.26	23.26	18.29	1.26	0.0000	1.00	0.00
	36.26	59.51	23.26	41.55	0.55	0.0000	1.00	0.00

Hence, Total Consolidation Settlement = 0.00 mm

So, Total Settlement = 14.54 mm

Fox's Depth correction Factor = 0.94

Applying Rigidity correction Factor : 0.80

Corrected total settlement = 10.95 mm

However, let us restrict the net allowable bearing capacity to 35 t/sqm.

5.3.3. AROUND BOOSTER FAN UNIT-2 (BH-06 & 07):

Let us place the foundation at 2.00m below NGL i.e. 2.39m below FGL (where, FGL = 294M and NGL around Booster Fan Unit-2 = 293.610 M)

Founding level falls inside Stratum –I, consisting of stiff to very stiff, silty clay / clayey silt.

A) Design Strength and Deformation Parameters:

For Stratum I

Use design "N" = 16, corresponding estimated cohesion = 0.88 kg/sqcm.

From laboratory TRSH-UU test result, we have C = 1.19 kg/sqcm & $\Phi = 0°$

Thus, average Cohesion = 1.04 kg/sqcm & $\Phi = 0°$

Let us use, design C = 1.00 kg/sqcm & $\Phi = 0°$ for bearing capacity calculation.

So, Undrained Young's modulus, $E_u = K \times C = 500 \times 1.00 = 500$ kg/sqcm

We know, $E_s = 4.4 \times N = 70.4$ kg/sqcm

Again, $1/E_s = 1/E_u + 1/E_d$ giving drained Young's modulus, $E_d = 81.94$ kg/sqcm

Now, we have, $E_d = E_u/3 = 166.67$ kg/sqcm

Considering the above, let us use $E_d = 124$ kg/sqcm

From E_d, $m_{vc} = 1/G.E_d = 0.0134$ sqcm/kg [Geological Factor, G = 0.60 & $\mu = 0.35$]

Again from SPT "N", $m_{vc} = 1/5N = 0.0125$ sqcm/kg

Now, let us consider the m_{vc} value for the pressure range between 0.50 to 2.00 kg/sqcm

Sample No.	0.50 – 1.00kg/sqcm	1.00 – 2.00kg/sqcm
BH-06 / UDS01	0.0271	0.0205
Average weighted m_{vc}over entire pressure range	**0.0227**	

Giving more weightage to the laboratory test results,

Thus average $m_{vc} = [2 \times 0.0227 + 0.0125 + 0.0134]/4 = 0.0178$ sqcm/kg

For Stratum II

Use average "N" = 46, corresponding estimated cohesion = 1.70 kg/sqcm.

To be in conservative side, use design C = 1.50 kg/sqcm for bearing capacity calculation.

So, Undrained Young's modulus, $E_u = K \times C = 500 \times 1.50 = 750$ kg/sqcm

We know, $E_s = 4.4 \times N = 202.4$ kg/sqcm

Again, $1/E_s = 1/E_u + 1/E_d$ giving drained Young's modulus, $E_d = 277.21$ kg/sqcm

Now, we have, $E_d = E_u/3 = 250$ kg/sqcm

Considering the above, let us use $E_d = 263$ kg/sqcm

From E_d, $m_{vc} = 1/G.E_d = 0.0069$ sqcm/kg [Geological Factor, G = 0.55 & $\mu = 0.35$]

Again from SPT "N", $m_{vc} = 1/5N = 0.0043$ sqcm/kg

Thus average $m_{vc} = [0.0043 + 0.0069]/2 = 0.0056$ sqcm/kg

For Stratum III, IV & V:

After that rock layer was encountered. Settlement of rock may be neglected. However, to be in the conservative side, use a lowest probable Young's modulus, E_s = 1000 kg/sqcm, 2000 kg/sqcm & 4000 kg/sqcm for layer-III, IV & V respectively.

B) Calculation of Net Safe Bearing Capacity:

The Net Ultimate Bearing Capacity is given as per Hansen Equation:

$$q_{nu} = C.N_c.S_c.D_c + q.N_q.S_q.D_q + 0.5\gamma.B.N_\gamma.S_\gamma.D_\gamma - q$$

Where, N_c, N_q and N_γ are bearing capacity factors,
S_c, S_q and S_γ are shape factors,
D_c, D_q and D_γ are depth factors,
And C = Cohesion
q = Overburden pressure,
B = Width of foundation,
γ = Effective density below foundation.

For 6m x 12m Isolated Foundation

Cohesion, C = 10.00 t/sqm
Using ϕ = 0 degree, the bearing capacity factors are:
N_c = 5.14
N_q = 1.00
N_γ = 0.00
Use,
Depth of Foundation = D_f = 2.00 M (below NGL)
Width of Foundation = B = 6.00 M
Length of Foundation = L = 12.00 M
Overburden Pressure = q =2.000 (Depth) x 0.90 (Submerged density) = 1.80 t/sqm (assuming the ground water table is flushing with the ground level)
The Shape factors are [IS:6403 - 1981]
S_c = 1.10 S_q = 1.10 S_γ = 0.80
The Depth factors are [IS:6403 - 1981]
D_c = 1.07 D_q = 1.00 D_γ = 1.00
Computed Net Ultimate Bearing Capacity = 60.54 t/sqm
Using a factor of safety of 2.5, Net Safe Bearing Capacity = 24.22 t/sqm

The above bearing capacity should be checked against settlement criteria and this is shown below.

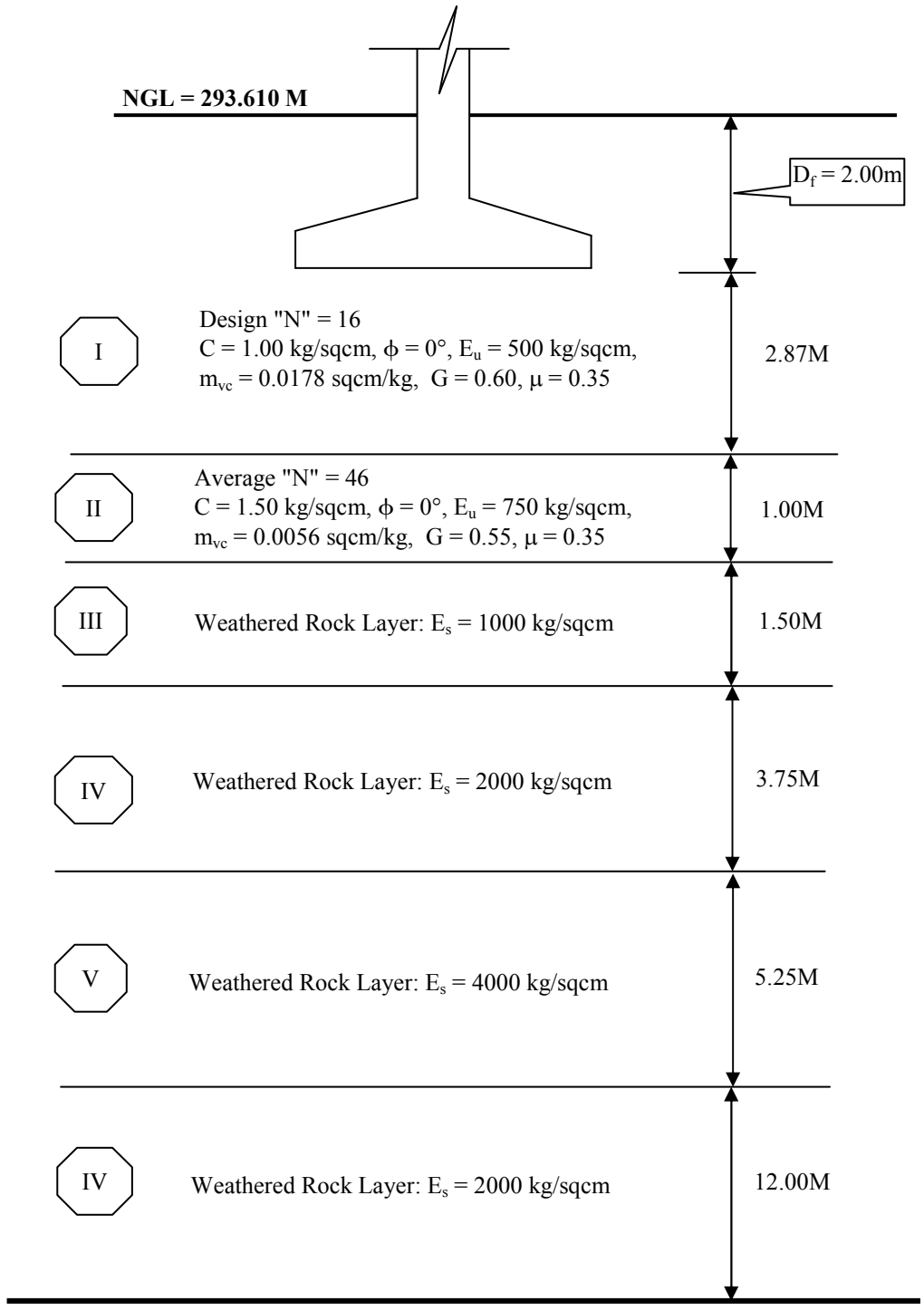


FIG. 4.3. SHALLOW FOUNDATION DESIGN MODEL FOR BOOSTER FAN UNIT-2 [BH-06 & 07]

(Not to Scale)

C) Settlement Calculations:

With reference to the above, the settlement is calculated and presented below.

A) General Data:

Width of foundation =	6.0	m
Length of foundation =	12.0	m
Depth of foundation =	2.0	m
Net Base Pressure =	1.5	kg/sqcm

B) Subsoil Properties:

Layer - I

Young's Modulus =	500	kg/sqcm
Poisson Ratio, μ =	0.35	
Top of Stratum =	2.00	m
End of Stratum =	4.87	m
Geological factor, G =	0.60	
m_{vc} =	0.0178	sqcm/kg

Layer - II

Young's Modulus =	750	kg/sqcm
Poisson Ratio, μ =	0.35	
Top of Stratum =	4.87	m
End of Stratum =	5.871	m
Geological factor, G =	0.55	
m_{vc} =	0.0056	sqcm/kg

C) Calculation of Immediate Settlement:

Settlement at center

M = L' / B' =	2.0000	
N = H / B' =	0.9570	
I_1 =	0.1172	
I_2 =	0.1081	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.167	
Immediate settlement S_i = $[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$	0.528	cm

Settlement at corner

M = L' / B' =	2.0000	
N = H / B' =	0.4785	
I_1 =	0.0369	
I_2 =	0.0815	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.0745	
Immediate settlement S_i =	0.118	cm

Average S_i for Stratum I= 3.23 mm

Settlement at center

M = L' / B' =	1.6764	
N = H / B' =	0.2255	
I_1 =	0.0092	
I_2 =	0.0471	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.0309	
Immediate settlement S_i = $[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$	0.0526	cm

Settlement at corner

M = L' / B' =	1.6764	
N = H / B' =	0.1127	
I_1 =	0.0023	
I_2 =	0.0258	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.0143	
Immediate settlement S_i =	0.012	cm

Average S_i for Stratum II= 0.32 mm

Layer - III

Young's Modulus =	1000	kg/sqcm
Poisson Ratio, μ =	0.25	
Top of Stratum =	5.87	m
End of Stratum =	7.371	m
Geological factor, G =	1	
m_{vc} =	0	sqcm/kg

Settlement at center

M = L' / B' =	1.6078	
N = H / B' =	0.3039	
I_1 =	0.0166	
I_2 =	0.0592	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.0560	
Immediate settlement S_i = $[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$	0.071	cm

Settlement at corner

M = L' / B' =	1.608	
N = H / B' =	0.152	
I_1 =	0.004	
I_2 =	0.034	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.0267	
Immediate settlement S_i =	0.017	cm

Average S_i for Stratum III= 0.44 mm

Layer - IV

Young's Modulus =	2000	kg/sqcm
Poisson Ratio, μ =	0.25	
Top of Stratum =	7.371	m
End of Stratum =	11.121	m
Geological factor, G =	1	
m_{vc} =	0	sqcm/kg

Settlement at center

M = L' / B' =	1.5277	
N = H / B' =	0.6596	
I_1 =	0.0688	
I_2 =	0.0917	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.1299	
Immediate settlement S_i = $[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$	0.076	cm

Settlement at corner

M = L' / B' =	1.528	
N = H / B' =	0.330	
I_1 =	0.020	
I_2 =	0.062	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.0613	
Immediate settlement S_i =	0.018	cm

Average S_i for Stratum IV= 0.468 mm

Layer - V

Young's Modulus =	4000	kg/sqcm
Poisson Ratio, μ =	0.25	
Top of Stratum =	11.12	m
End of Stratum =	14	m
Geological factor, G =	1	
m_{vc} =	0	sqcm/kg

Settlement at center

M = L' / B' = 1.3968
N = H / B' = 0.3808
I_1 = 0.0265
I_2 = 0.0681
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ = 0.0719
Immediate settlement S_i = 0.017 cm
$[q_o \times B' \times (1- \mu^2) \times m \times I_s] / E_s$

Settlement at corner

M = L' / B' = 1.3968
N = H / B' = 0.1904
I_1 = 0.0070
I_2 = 0.0406
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ = 0.0340
Immediate settlement S_i = 0.004 cm

Average S_i for Stratum V= 0.11 mm

Total immediate settlement = 4.57 mm

D) Calculation of Consolidation Settlement:

Strata	From (M)	To (M)	Thickness (M)	Mid depth (M)	Δ P (kg/sqcm)	m_{vc}, sqcm/kg	G	S_c (cm)
Layer - I	2.00	3.44	1.44	0.72	1.26	0.0178	0.60	1.94
	3.44	4.87	1.44	2.15	0.94	0.0178	0.60	1.43
Layer - II	4.87	5.37	0.50	3.12	0.78	0.0056	0.55	0.12
	5.37	5.87	0.50	3.62	0.72	0.0056	0.55	0.11

Hence, Total Consolidation Settlement = 36.04 mm

So, Total Settlement = 40.61 mm
Foxe's Depth correction Factor = 0.94
Corrected total settlement = 38.12 mm

The calculated settlement is well within permissible limit. However as per technical specification, let us restrict the net allowable bearing capacity to 14 t/sqm at 2.00m below NGL for 40mm limiting settlement.

5.3.4. AROUND ABSORBER, RC PUMPS & OB HOUSE UNIT-1 (BH-22 & 23):

Let us place the foundation at 2.00m below NGL i.e. 2.38m below FGL (where, FGL = 294M and NGL around Absorber, RC Pumps & Oxidation Blower House Unit-1 = 293.620 M)

Founding level falls inside Stratum –I, consisting of stiff to very stiff, silty clay / clayey silt.

A) Design Strength and Deformation Parameters:

For Stratum I

Use design "N" = 11, corresponding estimated cohesion = 0.71 kg/sqcm.

From laboratory TRSH-UU test result, we have C = 0.54 kg/sqcm & Φ = 6°

Thus, average Cohesion = 0.63 kg/sqcm & Φ = 3°

Let us use, design C = 0.60 kg/sqcm & Φ = 0° for bearing capacity calculation.

So, Undrained Young's modulus, E_u = K x C = 350 x 0.60 = 210 kg/sqcm

We know, E_s = 4.4 x N = 48.4 kg/sqcm

Again, $1/E_s = 1/E_u + 1/E_d$ giving drained Young's modulus, E_d = 62.9 kg/sqcm

Now, we have, $E_d = E_u/3$ = 70 kg/sqcm

Considering the above, let us use E_d = 66 kg/sqcm

From E_d, $m_{vc} = 1/G.E_d$ = 0.0189 sqcm/kg [Geological Factor, G = 0.80 & μ = 0.35]

Again from SPT "N", m_{vc} = 1/5N = 0.0182 sqcm/kg

Now, let us consider the m_{vc} value for the pressure range between 0.25 to 1.00 kg/sqcm

Sample No.	0.25 – 0.50kg/sqcm	0.50 – 1.00kg/sqcm
BH-22 / UDS01	0.0169	0.0138
Average weighted m_{vc}over entire pressure range	**0.0148**	

Giving more weightage to the laboratory test results,

Thus average m_{vc} = [2 X 0.0148 + 0.0182 + 0.0189]/4 = 0.0167 sqcm/kg

For Stratum II

Use average "N" = 39, corresponding estimated cohesion = 1.30 kg/sqcm.

From laboratory TRSH-UU test result, we have C = 1.31 kg/sqcm & Φ = 6°

Thus, average Cohesion = 1.31 kg/sqcm & Φ = 3°

Let us use, design C = 1.30 kg/sqcm & Φ = 0° for bearing capacity calculation.

So, Undrained Young's modulus, E_u = K x C = 500 x 1.30 = 650 kg/sqcm

We know, E_s = 4.4 x N = 171.60 kg/sqcm

Again, $1/E_s = 1/E_u + 1/E_d$ giving drained Young's modulus, E_d = 233.15 kg/sqcm

Now, we have, $E_d = E_u/3$ = 216.67 kg/sqcm

Considering the above, let us use E_d = 224 kg/sqcm

From E_d, $m_{vc} = 1/G.E_d$ = 0.0074 sqcm/kg [Geological Factor, G = 0.60 & μ = 0.35]

Again from SPT "N", m_{vc} = 1/5N = 0.0051 sqcm/kg

Now, let us consider the m_{vc} value for the pressure range between 1.00 to 2.00 kg/sqcm

Sample No.	1.00 – 2.00kg/sqcm
BH-23 / UDS02	0.0085
Average weighted m_{vc}over entire pressure range	**0.0085**

Giving more weightage to the laboratory test results,

Thus average m_{vc} = [2 X 0.0085 + 0.0051 + 0.0074]/4 = 0.0074 sqcm/kg

For Stratum III, IV & V:

After that rock layer was encountered. Settlement of rock may be neglected. However, to be in the conservative side, use a lowest probable Young's modulus, E_s = 1000 kg/sqcm, 2000 kg/sqcm & 4000 kg/sqcm for layer-III, IV & V respectively.

B) Calculation of Net Safe Bearing Capacity:

The Net Ultimate Bearing Capacity is given as per Hansen Equation:

$$q_{nu} = C.N_c.S_c.D_c + q.N_q.S_q.D_q + 0.5\gamma.B.N_\gamma.S_\gamma.D_\gamma - q$$

Where, N_c, N_q and N_γ are bearing capacity factors,
S_c, S_q and S_γ are shape factors,
D_c, D_q and D_γ are depth factors,
And C = Cohesion
q = Overburden pressure,
B = Width of foundation,
γ = Effective density below foundation.

For 6m x 12m Isolated Foundation

Cohesion, C = 6.00 t/sqm
Using ϕ = 0 degree, the bearing capacity factors are:
N_c = 5.14
N_q = 1.00
N_γ = 0.00
Use,
Depth of Foundation = D_f = 2.00 M (below NGL)
Width of Foundation = B = 6.00 M
Length of Foundation = L = 12.00 M
Overburden Pressure = q =2.000 (Depth) x 0.90 (Submerged density) = 1.80 t/sqm (assuming the ground water table is flushing with the ground level)
The Shape factors are [IS:6403 - 1981]
S_c = 1.10 S_q = 1.10 S_γ = 0.80
The Depth factors are [IS:6403 - 1981]
D_c = 1.07 D_q = 1.00 D_γ = 1.00
Computed Net Ultimate Bearing Capacity = 36.40 t/sqm
Using a factor of safety of 2.5, Net Safe Bearing Capacity = 14.56 t/sqm

The above bearing capacity should be checked against settlement criteria and this is shown below.

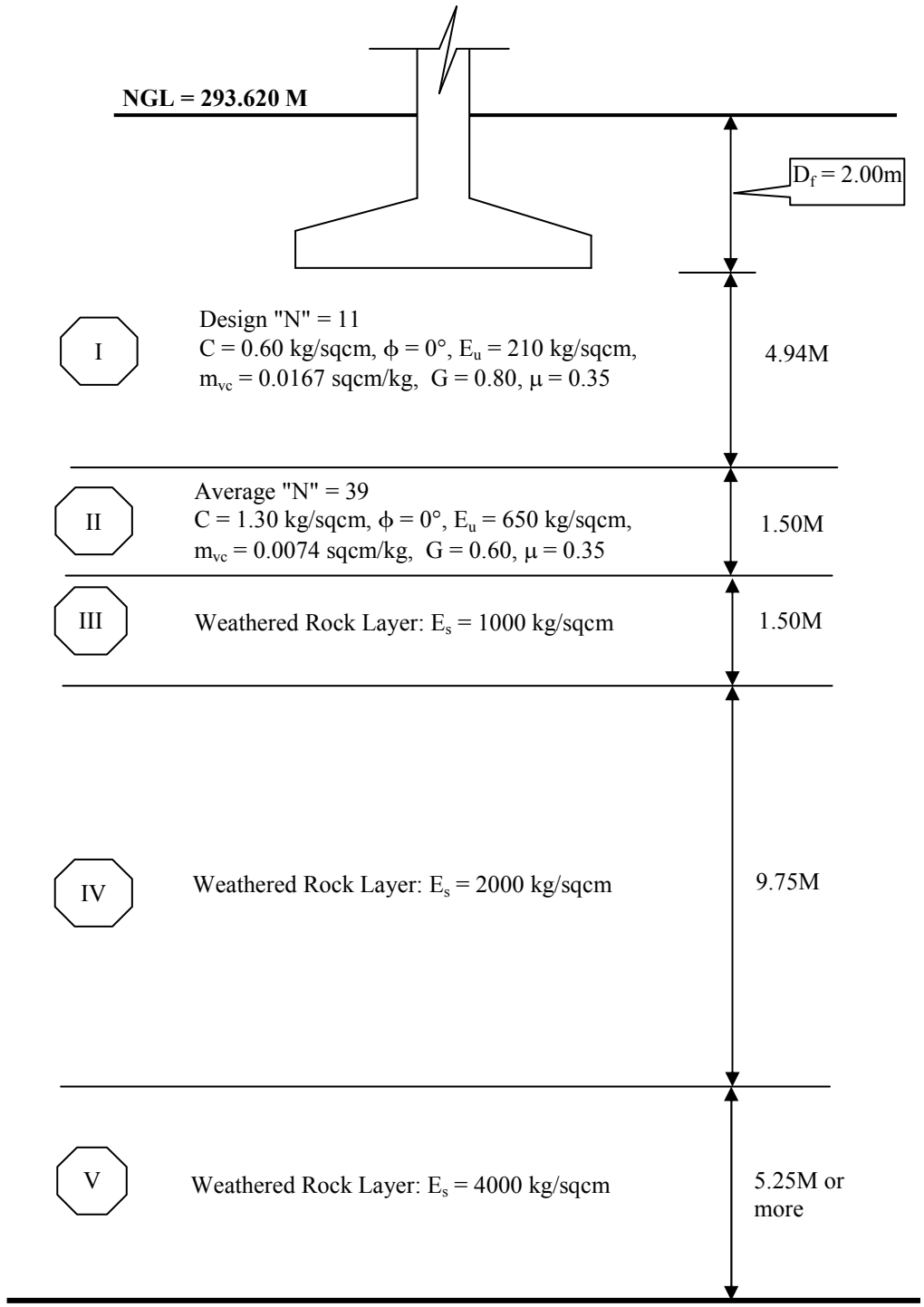


FIG. 4.4. SHALLOW FOUNDATION DESIGN MODEL FOR ABSORBER, RC PUMPS & OB HOUSE UNIT-1 [BH-22 & 23]

(Not to Scale)

C) Settlement Calculations:

With reference to the above, the settlement is calculated and presented below.

A) General Data:

Width of foundation =	6.0	m
Length of foundation =	12.0	m
Depth of foundation =	2.0	m
Net Base Pressure =	0.8	kg/sqcm

B) Subsoil Properties:

Layer - I

Young's Modulus =	210	kg/sqcm
Poisson Ratio, μ =	0.35	
Top of Stratum =	2.00	m
End of Stratum =	6.94	m
Geological factor, G =	0.80	
m_{vc} =	0.0167	sqcm/kg

Layer - II

Young's Modulus =	650	kg/sqcm
Poisson Ratio, μ =	0.35	
Top of Stratum =	6.94	m
End of Stratum =	8.435	m
Geological factor, G =	0.6	
m_{vc} =	0.0074	sqcm/kg

C) Calculation of Immediate Settlement:

Settlement at center

M = L' / B' =	2.0000	
N = H / B' =	1.6450	
I_1 =	0.2365	
I_2 =	0.1081	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.286	
Immediate settlement S_i =	1.149	cm

$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$

Settlement at corner

M = L' / B' =	2.0000	
N = H / B' =	0.8225	
I_1 =	0.0930	
I_2 =	0.1041	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.1410	
Immediate settlement S_i =	0.283	cm

Average S_i for Stratum I= 7.16 mm

Settlement at center

M = L' / B' =	1.5487	
N = H / B' =	0.2743	
I_1 =	0.0138	
I_2 =	0.0547	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.0390	
Immediate settlement S_i =	0.0358	cm

$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$

Settlement at corner

M = L' / B' =	1.5487	
N = H / B' =	0.1372	
I_1 =	0.0035	
I_2 =	0.0308	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.0177	
Immediate settlement S_i =	0.008	cm

Average S_i for Stratum II= 0.22 mm

Layer - III

Young's Modulus =	1000	kg/sqcm
Poisson Ratio, μ =	0.25	
Top of Stratum =	8.44	m
End of Stratum =	9.935	m
Geological factor, G =	1	
m_{vc} =	0	sqcm/kg

Settlement at center

M = L' / B' =	1.4825	
N = H / B' =	0.2413	
I_1 =	0.0109	
I_2 =	0.0493	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.0438	
Immediate settlement S_i =	0.026	cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$		

Settlement at corner

M = L' / B' =	1.483	
N = H / B' =	0.121	
I_1 =	0.003	
I_2 =	0.027	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.0210	
Immediate settlement S_i =	0.006	cm

Average S_i for Stratum III= 0.16 mm

Layer - IV

Young's Modulus =	2000	kg/sqcm
Poisson Ratio, μ =	0.25	
Top of Stratum =	9.935	m
End of Stratum =	14	m
Geological factor, G =	1	
m_{vc} =	0	sqcm/kg

Settlement at center

M = L' / B' =	1.4306	
N = H / B' =	0.5834	
I_1 =	0.0568	
I_2 =	0.0861	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.1142	
Immediate settlement S_i =	0.031	cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$		

Settlement at corner

M = L' / B' =	1.431	
N = H / B' =	0.292	
I_1 =	0.016	
I_2 =	0.057	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.0538	
Immediate settlement S_i =	0.007	cm

Average S_i for Stratum IV= 0.191 mm

Total immediate settlement = 7.73 mm

D) Calculation of Consolidation Settlement:

Strata	From (M)	To (M)	Thickness (M)	Mid depth (M)	Δ P (kg/sqcm)	m_{vc}, sqcm/kg	G	S_c (cm)
Layer - I	2.00	4.47	2.47	1.23	0.60	0.0167	0.80	1.98
	4.47	6.94	2.47	3.70	0.38	0.0167	0.80	1.25
Layer - II	6.94	7.69	0.75	5.31	0.29	0.0074	0.60	0.10
	7.69	8.44	0.75	6.06	0.26	0.0074	0.60	0.09

Hence, Total Consolidation Settlement = 34.16 mm

So, Total Settlement = 41.89 mm
Foxe's Depth correction Factor = 0.94
Corrected total settlement = 39.32 mm

The calculated settlement is well within permissible limit. Hence, use a net allowable bearing capacity of 08 t/sqm at 2.00m below NGL for 40mm limiting settlement.

5.3.5. AROUND WASTE WATER TANK, FILTRATE WATER TANK & LIMESTONE CRUSHER HOUSE (BH-26 & IBH-08):

Let us place the foundation at 2.00m below NGL i.e. 3.68m below FGL (where, FGL = 294M and NGL around Waste Water Tank, Filtrate Water Tank & Limestone Crusher House = 292.320 M)

Founding level falls inside Stratum –I, consisting of stiff to very stiff, silty clay / clayey silt.

A) Design Strength and Deformation Parameters:

For Stratum I

Use design "N" = 16, corresponding estimated cohesion = 0.88 kg/sqcm.

To be in conservative side, use design C = 0.85 kg/sqcm for bearing capacity calculation.

So, Undrained Young's modulus, E_u = K x C = 400 x 0.85 = 340 kg/sqcm

We know, E_s = 4.4 x N = 70.4 kg/sqcm

Again, $1/E_s = 1/E_u + 1/E_d$ giving drained Young's modulus, E_d = 88.78 kg/sqcm

Now, we have, $E_d = E_u/3$ = 113.33 kg/sqcm

Considering the above, let us use E_d = 101 kg/sqcm

From E_d, $m_{vc} = 1/G.E_d$ = 0.0141 sqcm/kg [Geological Factor, G = 0.70 & μ = 0.35]

Again from SPT “N”, m_{vc} = 1/5N = 0.0125 sqcm/kg

Thus average m_{vc} = [0.0125 + 0.0141]/2 = 0.0133 sqcm/kg

For Stratum II

Use average "N" = 77, corresponding estimated cohesion = 2.85 kg/sqcm.

To be in conservative side, use design C = 1.75 kg/sqcm for bearing capacity calculation.

So, Undrained Young's modulus, E_u = K x C = 500 x 1.75 = 875 kg/sqcm

We know, E_s = 4.4 x N = 338.8 kg/sqcm

Again, $1/E_s = 1/E_u + 1/E_d$ giving drained Young's modulus, E_d = 552.87 kg/sqcm

Now, we have, $E_d = E_u/3$ = 291.67 kg/sqcm

Considering the above, let us use E_d = 422 kg/sqcm

From E_d, $m_{vc} = 1/G.E_d$ = 0.0043 sqcm/kg [Geological Factor, G = 0.55 & μ = 0.35]

Again from SPT “N”, m_{vc} = 1/5N = 0.0026 sqcm/kg

Now, let us consider the m_{vc} value for the pressure range between 0.50 to 2.00 kg/sqcm

Sample No.	0.50 – 1.00kg/sqcm	1.00 – 2.00kg/sqcm
BH-22 / UDS01	0.0106	0.0084
Average weighted m_{vc}over entire pressure range	**0.0091**	

Giving more weightage to the laboratory test results,

Thus average m_{vc} = [2 X 0.0091 + 0.0043 + 0.0026]/4 = 0.0063 sqcm/kg

For Stratum III, IV & V:

After that rock layer was encountered. Settlement of rock may be neglected. However, to be in the conservative side, use a lowest probable Young's modulus, E_s = 1000 kg/sqcm, 2000 kg/sqcm & 4000 kg/sqcm for layer-III, IV & V respectively.

B) Calculation of Net Safe Bearing Capacity:

The Net Ultimate Bearing Capacity is given as per Hansen Equation:

$$q_{nu} = C.N_c.S_c.D_c + q.N_q.S_q.D_q + 0.5\gamma.B.N_\gamma.S_\gamma.D_\gamma - q$$

Where, N_c, N_q and N_γ are bearing capacity factors,
S_c, S_q and S_γ are shape factors,
D_c, D_q and D_γ are depth factors,
And C = Cohesion
q = Overburden pressure,
B = Width of foundation,
γ = Effective density below foundation.

For 6m x 12m Isolated Foundation

Cohesion, C = 8.50 t/sqm
Using ϕ = 0 degree, the bearing capacity factors are:
N_c = 5.14
N_q = 1.00
N_γ = 0.00
Use,
Depth of Foundation = D_f = 2.00 M (below NGL)
Width of Foundation = B = 6.00 M
Length of Foundation = L = 12.00 M
Overburden Pressure = q =2.000 (Depth) x 0.90 (Submerged density) = 1.80 t/sqm (assuming the ground water table is flushing with the ground level)
The Shape factors are [IS:6403 - 1981]
S_c = 1.10 S_q = 1.10 S_γ = 0.80
The Depth factors are [IS:6403 - 1981]
D_c = 1.07 D_q = 1.00 D_γ = 1.00
Computed Net Ultimate Bearing Capacity = 51.49 t/sqm
Using a factor of safety of 2.5, Net Safe Bearing Capacity = 20.59 t/sqm

The above bearing capacity should be checked against settlement criteria and this is shown below.

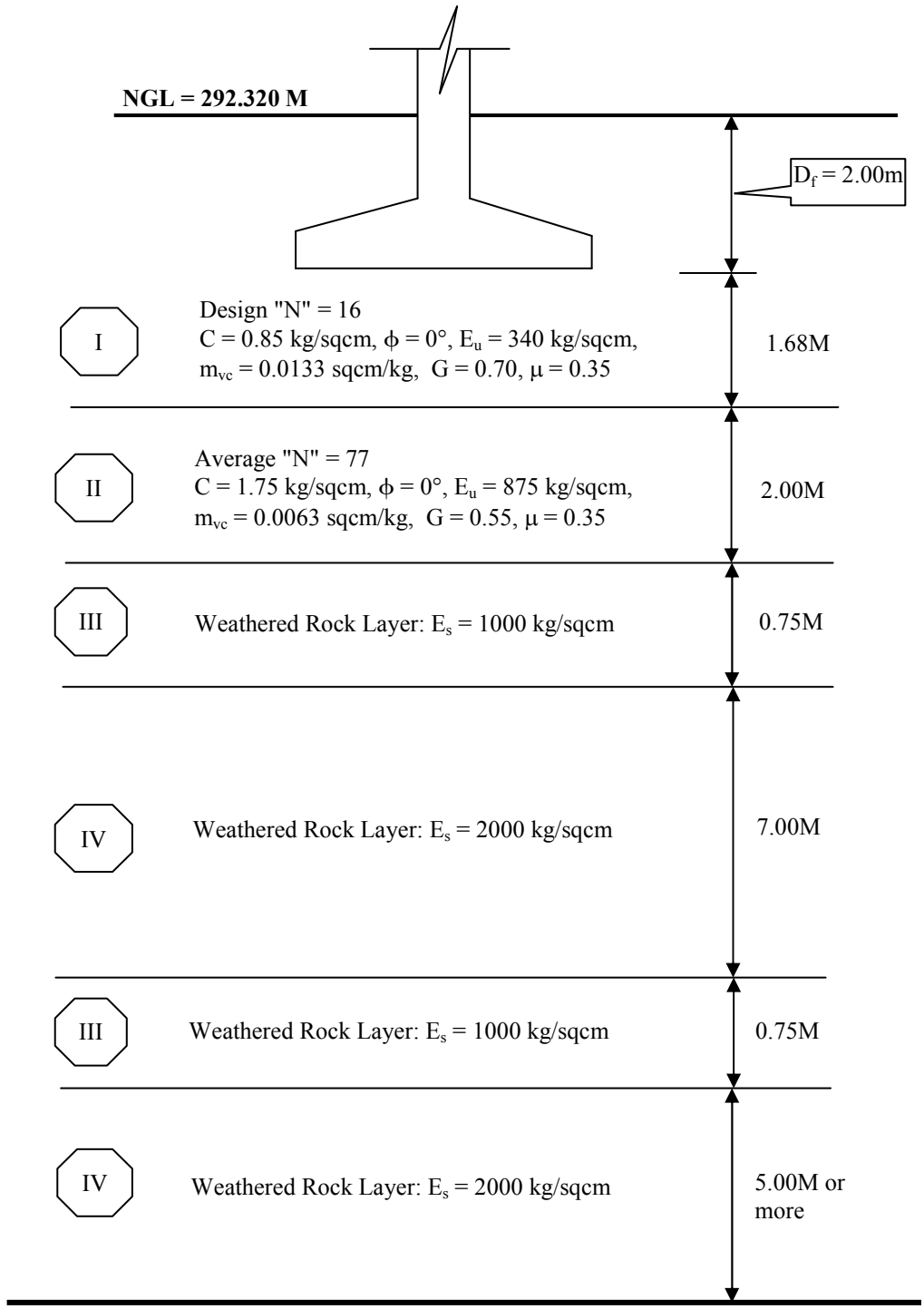


FIG. 4.5. SHALLOW FOUNDATION DESIGN MODEL FOR WASTE WATER TANK, FILTRATE WATER TANK & LIMESTONE CRUSHER HOUSE [BH-26 & IBH-08]

(Not to Scale)

C) Settlement Calculations:

With reference to the above, the settlement is calculated and presented below.

A) General Data:

Width of foundation =	6.0	m
Length of foundation =	12.0	m
Depth of foundation =	2.0	m
Net Base Pressure =	1.3	kg/sqcm

B) Subsoil Properties:

Layer - I

Young's Modulus =	340	kg/sqcm
Poisson Ratio, μ =	0.35	
Top of Stratum =	2.00	m
End of Stratum =	3.68	m
Geological factor, G =	0.70	
m_{vc} =	0.0133	sqcm/kg

Layer - II

Young's Modulus =	875	kg/sqcm
Poisson Ratio, μ =	0.35	
Top of Stratum =	3.68	m
End of Stratum =	5.678	m
Geological factor, G =	0.55	
m_{vc} =	0.0063	sqcm/kg

C) Calculation of Immediate Settlement:

Settlement at center

M = L' / B' =	2.0000		
N = H / B' =	0.5593		
I_1 =	0.0487		
I_2 =	0.0889		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.090	
Immediate settlement S_i =		0.361	cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$			

Settlement at center

M = L' / B' =	1.7815		
N = H / B' =	0.5210		
I_1 =	0.0440		
I_2 =	0.0844		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0830	
Immediate settlement S_i =		0.1139	cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$			

Settlement at corner

M = L' / B' =	2.0000		
N = H / B' =	0.2797		
I_1 =	0.0134		
I_2 =	0.0563		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0394	
Immediate settlement S_i =		0.079	cm

Settlement at corner

M = L' / B' =	1.7815		
N = H / B' =	0.2605		
I_1 =	0.0120		
I_2 =	0.0530		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0365	
Immediate settlement S_i =		0.025	cm

Average S_i for Stratum I= 2.20 mm

Average S_i for Stratum II= 0.69 mm

Layer - III

Young's Modulus =	1000	kg/sqcm
Poisson Ratio, μ =	0.25	
Top of Stratum =	5.68	m
End of Stratum =	6.428	m
Geological factor, G =	1	
m_{vc} =	0	sqcm/kg

Layer - IV

Young's Modulus =	2000	kg/sqcm
Poisson Ratio, μ =	0.25	
Top of Stratum =	6.428	m
End of Stratum =	13.928	m
Geological factor, G =	1	
m_{vc} =	0	sqcm/kg

Settlement at center

M = L' / B' =	1.6200		
N = H / B' =	0.1550		
I_1 =	0.0044		
I_2 =	0.0343		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0273	
Immediate settlement S_i =		0.031	cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$			

Settlement at center

M = L' / B' =	1.5754		
N = H / B' =	1.4384		
I_1 =	0.2090		
I_2 =	0.0996		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.2754	
Immediate settlement S_i =		0.147	cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$			

Settlement at corner

M = L' / B' =	1.620		
N = H / B' =	0.077		
I_1 =	0.001		
I_2 =	0.018		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0133	
Immediate settlement S_i =		0.007	cm

Settlement at corner

M = L' / B' =	1.575		
N = H / B' =	0.719		
I_1 =	0.079		
I_2 =	0.095		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.1422	
Immediate settlement S_i =		0.038	cm

Average S_i for Stratum III= 0.19 mm

Average S_i for Stratum IV= 0.925 mm

Layer - III

Young's Modulus =	1000	kg/sqcm
Poisson Ratio, μ =	0.25	
Top of Stratum =	13.93	m
End of Stratum =	14	m
Geological factor, G =	1	
m_{vc} =	0	sqcm/kg

Settlement at center

M = L' / B' = 1.3347
N = H / B' = 0.0080
I_1 = 0.0000
I_2 = 0.0020
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ = 0.0013
Immediate settlement S_i = 0.001 cm
$[q_o \times B' \times (1- \mu^2) \times m \times I_s] / E_s$

Settlement at corner

M = L' / B' = 1.3347
N = H / B' = 0.0040
I_1 = 0.0000
I_2 = 0.0010
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ = 0.0007
Immediate settlement S_i = 0.000 cm

Average S_i for Stratum V= 0.01 mm

Total immediate settlement = 4.02 mm

D) Calculation of Consolidation Settlement:

Strata	From (M)	To (M)	Thickness (M)	Mid depth (M)	Δ P (kg/sqcm)	m_{vc}, sqcm/kg	G	S_c (cm)
Layer - I	2.00	2.84	0.84	0.42	1.17	0.0133	0.70	0.92
	2.84	3.68	0.84	1.26	0.97	0.0133	0.70	0.76
Layer - II	3.68	4.68	1.00	2.18	0.81	0.0063	0.55	0.28
	4.68	5.68	1.00	3.18	0.67	0.0063	0.55	0.23
Hence, Total Consolidation Settlement =								21.89 mm

So, Total Settlement = 25.91 mm
Foxe's Depth correction Factor = 0.94
Corrected total settlement = 24.32 mm

The calculated settlement is well within permissible limit. However as per technical specification, let us restrict the net allowable bearing capacity to 12 t/sqm at 2.00m below NGL for 25mm limiting settlement.

5.3.6. RECOMMENDATIONS:

With reference to the above the following bearing capacity values may be used.

Foundation Location	Average EGL (M)	Natural Ground Level, NGL (M)	Finished Ground Level, FGL (M)	Founding RL (M)	D_f below FGL	Width of Foundation (m)	Recommended NABC (t/sqm)				NABC (t/sqm) as per soil condition			
							S=12mm	S=25mm	S=40mm	S=75mm	S=12mm	S=25mm	S=40mm	S=75mm
BH-01, 02 & 03 (Ball Mill Building)	292.973	292.650	294.000	290.65	3.35	1≤B≤3	--	12	14	--	--	22	28	--
						3<B≤6	--	12	14	--	--	15	24	--
						B>6	--	--	--	20	--	--	--	25
				289.65	4.35	1≤B≤3	--	15	20	--	--	28	29	--
						3<B≤6	--	15	20	--	--	19	27	--
						B>6	--	--	--	25	--	--	--	26
				288.65	5.35	1≤B≤3	--	20	25	--	--	30	30	--
						3<B≤6	--	20	25	--	--	28	28	--
						B>6	--	--	--	27	--	--	--	27
				287.65	6.35	1≤B≤3	--	25	30	--	--	30	30	--
						3<B≤6	--	25	30	--	--	30	30	--
						B>6	--	--	--	30	--	--	--	30
				286.25	7.75	B≤6	30	--	--	--	30	--	--	--
						B>6	30	--	--	--	30	--	--	--
				285.75	8.25	B≤6	35	--	--	--	35	--	--	--
						B>6	35	--	--	--	35	--	--	--
BH-04, 05 & 27 (Absorber, RC Pump & Oxidation Blower house Unit-2)	293.309	292.630	294.000	290.63	3.37	1≤B≤3	--	12	14	--	--	21	21	--
						3<B≤6	--	12	14	--	--	17	20	--
						B>6	--	--	--	20	--	--	--	20
				289.63	4.37	1≤B≤3	--	15	20	--	--	23	23	--
						3<B≤6	--	15	20	--	--	21	21	--
						B>6	--	--	--	20	--	--	--	20
				288.63	5.37	1≤B≤3	--	20	25	--	--	30	30	--
						3<B≤6	--	20	25	--	--	30	30	--
						B>6	--	--	--	30	--	--	--	30
				287.63	6.37	1≤B≤3	--	25	30	--	--	30	30	--
						3<B≤6	--	25	30	--	--	30	30	--
						B>6	--	--	--	30	--	--	--	30
				286.25	7.75	B≤6	30	--	--	--	30	--	--	--
						B>6	30	--	--	--	30	--	--	--
				285.75	8.25	B≤6	35	--	--	--	35	--	--	--
						B>6	35	--	--	--	35	--	--	--
BH-06 & 07 (Booster Fan Unit-2)	293.776	293.610	294.000	291.61	2.39	1≤B≤3	--	12	14	--	--	12	20	--
						3<B≤6	--	9	14	--	--	9	15	--
						B>6	--	--	--	20	--	--	--	20
				290.61	3.39	1≤B≤3	--	15	20	--	--	18	27	--
						3<B≤6	--	13	20	--	--	13	21	--
						B>6	--	--	--	20	--	--	--	20
				289.61	4.39	1≤B≤3	--	20	25	--	--	28	28	--
						3<B≤6	--	20	25	--	--	25	25	--
						B>6	--	--	--	24	--	--	--	24
				288.61	5.39	1≤B≤3	--	25	30	--	--	30	30	--
						3<B≤6	--	25	30	--	--	30	30	--
						B>6	--	--	--	30	--	--	--	30
				287.00	7.00	B≤6	30	--	--	--	30	--	--	--
						B>6	30	--	--	--	30	--	--	--
				286.50	7.50	B≤6	35	--	--	--	35	--	--	--
						B>6	35	--	--	--	35	--	--	--
BH-08 (Duct Unit-2)	294.112	293.342	294.000	291.34	2.66	1≤B≤3	--	7	10	--	--	7	10	--
						3<B≤6	--	8	12	--	--	8	12	--
						B>6	--	--	--	18	--	--	--	18
				290.34	3.66	1≤B≤3	--	15	20	--	--	15	23	--
						3<B≤6	--	9	15	--	--	9	15	--
						B>6	--	--	--	18	--	--	--	18
				289.34	4.66	1≤B≤3	--	17	24	--	--	17	24	--
						3<B≤6	--	11	18	--	--	11	18	--
						B>6	--	--	--	20	--	--	--	20
				288.34	5.66	1≤B≤3	--	21	25	--	--	21	25	--
						3<B≤6	--	14	22	--	--	14	22	--
						B>6	--	--	--	21	--	--	--	21
				281.75	12.25	B≤6	30	--	--	--	30	--	--	--
						B>6	30	--	--	--	30	--	--	--
				281.25	12.75	B≤6	35	--	--	--	35	--	--	--
						B>6	35	--	--	--	35	--	--	--

Foundation Location	Average EGL (M)	Natural Ground Level, NGL (M)	Finished Ground Level, FGL (M)	Founding RL (M)	D_f below FGL	Width of Foundation (m)	Recommended NABC (t/sqm)				NABC (t/sqm) as per soil condition			
							S=12mm	S=25mm	S=40mm	S=75mm	S=12mm	S=25mm	S=40mm	S=75mm
BH-09 (Limestone Storage Silo)	293.681	293.070	294.000	291.07	2.93	1≤B≤3	--	12	14	--	--	20	23	--
						3<B≤6	--	12	14	--	--	15	21	--
						B>6	--	--	--	20	--	--	--	20
				290.07	3.93	1≤B≤3	--	15	20	--	--	24	24	--
						3<B≤6	--	15	20	--	--	22	22	--
						B>6	--	--	--	21	--	--	--	21
				289.07	4.93	1≤B≤3	--	20	25	--	--	30	30	--
						3<B≤6	--	20	25	--	--	30	30	--
						B>6	--	--	--	30	--	--	--	30
				288.07	5.93	1≤B≤3	--	25	30	--	--	30	30	--
						3<B≤6	--	25	30	--	--	30	30	--
						B>6	--	--	--	30	--	--	--	30
				287.00	7.00	B≤6	30	--	--	--	30	--	--	--
						B>6	30	--	--	--	30	--	--	--
				286.50	7.50	B≤6	35	--	--	--	35	--	--	--
						B>6	35	--	--	--	35	--	--	--
BH-10 (Duct Unit-1)	294.267	293.950	294.000	291.95	2.05	1≤B≤3	--	11	14	--	--	11	17	--
						3<B≤6	--	7	11	--	--	7	11	--
						B>6	--	--	--	18	--	--	--	18
				290.95	3.05	1≤B≤3	--	13	20	--	--	13	20	--
						3<B≤6	--	8	14	--	--	8	14	--
						B>6	--	--	--	19	--	--	--	19
				289.95	4.05	1≤B≤3	--	20	25	--	--	20	27	--
						3<B≤6	--	14	22	--	--	14	22	--
						B>6	--	--	--	22	--	--	--	22
				288.95	5.05	1≤B≤3	--	25	28	--	--	28	28	--
						3<B≤6	--	19	25	--	--	19	25	--
						B>6	--	--	--	23	--	--	--	23
				284.75	9.25	B≤6	30	--	--	--	30	--	--	--
						B>6	30	--	--	--	30	--	--	--
				284.25	9.75	B≤6	35	--	--	--	35	--	--	--
						B>6	35	--	--	--	35	--	--	--
BH-11, IBH-06 & BH-20 (Wet Stack Unit-2 & Limestone Slurry Storage Tanks)	292.992	292.590	294.000	290.59	3.41	1≤B≤3	--	9	12	--	--	9	12	--
						3<B≤6	--	7	11	--	--	7	11	--
						B>6	--	--	--	11	--	--	--	11
				289.59	4.41	1≤B≤3	--	13	13	--	--	13	13	--
						3<B≤6	--	10	12	--	--	10	12	--
						B>6	--	--	--	12	--	--	--	12
				286.75	7.25	1≤B≤3	30	--	--	--	30	--	--	--
						B>6	30	--	--	--	30	--	--	--
						30m Dia.	30	--	--	--	30	--	--	--
						35m Dia.	30	--	--	--	30	--	--	--
						40m Dia.	30	--	--	--	30	--	--	--
				286.25	7.75	1≤B≤3	35	--	--	--	35	--	--	--
						B>6	35	--	--	--	35	--	--	--
						30m Dia.	35	--	--	--	35	--	--	--
						35m Dia.	35	--	--	--	35	--	--	--
						40m Dia.	35	--	--	--	35	--	--	--
BH-12, 13 & 14 (Duct near existing Chimney)	294.112	293.365	294.000	291.37	2.63	1≤B≤3	--	12	14	--	--	14	21	--
						3<B≤6	--	8	14	--	--	8	14	--
						B>6	--	--	--	20	--	--	--	20
				290.37	3.63	1≤B≤3	--	15	20	--	--	16	23	--
						3<B≤6	--	10	16	--	--	10	16	--
						B>6	--	--	--	20	--	--	--	20
				289.37	4.63	1≤B≤3	--	20	25	--	--	20	27	--
						3<B≤6	--	12	20	--	--	12	20	--
						B>6	--	--	--	22	--	--	--	22
				288.37	5.63	1≤B≤3	--	25	28	--	--	26	28	--
						3<B≤6	--	17	25	--	--	17	25	--
						B>6	--	--	--	23	--	--	--	23
				281.50	12.50	B≤6	30	--	--	--	30	--	--	--
						B>6	30	--	--	--	30	--	--	--
				281.00	13.00	B≤6	35	--	--	--	35	--	--	--
						B>6	35	--	--	--	35	--	--	--

Foundation Location	Average EGL (M)	Natural Ground Level, NGL (M)	Finished Ground Level, FGL (M)	Founding RL (M)	D_f below FGL	Width of Foundation (m)	Recommended NABC (t/sqm)				NABC (t/sqm) as per soil condition			
							S=12mm	S=25mm	S=40mm	S=75mm	S=12mm	S=25mm	S=40mm	S=75mm
BH-15 (FGD Control Room)	294.436	293.940	294.000	291.94	2.06	1≤B≤3	--	6	10	--	--	6	10	--
						3<B≤6	--	5	7	--	--	5	7	--
						B>6	--	--	--	11	--	--	--	11
				290.94	3.06	1≤B≤3	--	10	13	--	--	10	13	--
						3<B≤6	--	7	11	--	--	7	11	--
						B>6	--	--	--	12	--	--	--	12
				289.94	4.06	1≤B≤3	--	16	24	--	--	16	24	--
						3<B≤6	--	10	17	--	--	10	17	--
						B>6	--	--	--	20	--	--	--	20
				288.94	5.06	1≤B≤3	--	20	25	--	--	20	25	--
						3<B≤6	--	14	22	--	--	14	22	--
						B>6	--	--	--	21	--	--	--	21
				285.25	8.75	B≤6	30	--	--	--	30	--	--	--
						B>6	30	--	--	--	30	--	--	--
				284.75	9.25	B≤6	35	--	--	--	35	--	--	--
						B>6	35	--	--	--	35	--	--	--
BH-16, 24 & 25 (Wet Stack Unit-1)	293.811	293.600	294.000	290.60	3.40	1≤B≤3	--	15	20	--	--	18	25	--
						3<B≤6	--	12	19	--	--	12	19	--
						B>6	--	--	--	22	--	--	--	22
				286.75	7.25	30m Dia.	--	--	--	30	--	--	--	35
						35m Dia.	--	--	--	30	--	--	--	35
						40m Dia.	--	--	--	30	--	--	--	35
				284.75	9.25	1≤B≤3	30	--	--	--	30	--	--	--
						B>6	30	--	--	--	30	--	--	--
						30m Dia.	30	--	--	--	30	--	--	--
						35m Dia.	30	--	--	--	30	--	--	--
						40m Dia.	30	--	--	--	30	--	--	--
				284.25	9.75	1≤B≤3	35	--	--	--	35	--	--	--
						B>6	35	--	--	--	35	--	--	--
						30m Dia.	35	--	--	--	35	--	--	--
						35m Dia.	35	--	--	--	35	--	--	--
						40m Dia.	35	--	--	--	35	--	--	--
BH-17 & 18 (ACW Pump House & Compressor House)	291.263	291.010	294.000	289.01	4.99	1≤B≤3	--	11	14	--	--	11	15	--
						3<B≤6	--	5	8	--	--	5	8	--
						B>6	--	--	--	8	--	--	--	8
				288.01	5.99	1≤B≤3	--	15	16	--	--	15	16	--
						3<B≤6	--	10	15	--	--	10	15	--
						B>6	--	--	--	14	--	--	--	14
				287.01	6.99	1≤B≤3	--	20	23	--	--	23	23	--
						3<B≤6	--	20	20	--	--	20	20	--
						B>6	--	--	--	19	--	--	--	19
				286.01	7.99	1≤B≤3	--	25	30	--	--	30	30	--
						3<B≤6	--	25	30	--	--	30	30	--
						B>6	--	--	--	30	--	--	--	30
				284.25	9.75	B≤6	30	--	--	--	30	--	--	--
						B>6	30	--	--	--	30	--	--	--
				283.75	10.25	B≤6	35	--	--	--	35	--	--	--
						B>6	35	--	--	--	35	--	--	--
BH-19 & 21 (Booster Fan Unit-1)	294.268	293.670	294.000	291.67	2.33	1≤B≤3	--	8	13	--	--	8	13	--
						3<B≤6	--	9	14	--	--	9	15	--
						B>6	--	--	--	20	--	--	--	20
				290.67	3.33	1≤B≤3	--	15	20	--	--	15	20	--
						3<B≤6	--	11	17	--	--	11	17	--
						B>6	--	--	--	25	--	--	--	25
				289.67	4.33	1≤B≤3	--	20	25	--	--	21	28	--
						3<B≤6	--	13	21	--	--	13	21	--
						B>6	--	--	--	25	--	--	--	25
				288.67	5.33	1≤B≤3	--	25	30	--	--	26	30	--
						3<B≤6	--	17	26	--	--	17	26	--
						B>6	--	--	--	25	--	--	--	25
				284.50	9.50	B≤6	30	--	--	--	30	--	--	--
						B>6	30	--	--	--	30	--	--	--
				284.00	10.00	B≤6	35	--	--	--	35	--	--	--
						B>6	35	--	--	--	35	--	--	--

Foundation Location	Average EGL (M)	Natural Ground Level, NGL (M)	Finished Ground Level, FGL (M)	Founding RL (M)	D_f below FGL	Width of Foundation (m)	Recommended NABC (t/sqm)				NABC (t/sqm) as per soil condition			
							S=12mm	S=25mm	S=40mm	S=75mm	S=12mm	S=25mm	S=40mm	S=75mm
BH-22 & 23 (Absorber, RC Pumps & Oxidation Blower House Unit-1)	293.673	293.620	294.000	291.62	2.38	1≤B≤3	--	7	12	--	--	7	12	--
						3<B≤6	--	5	8	--	--	5	8	--
						B>6	--	--	--	14	--	--	--	14
				290.62	3.38	1≤B≤3	--	10	17	--	--	10	17	--
						3<B≤6	--	6	11	--	--	6	11	--
						B>6	--	--	--	16	--	--	--	16
				289.62	4.38	1≤B≤3	--	16	25	--	--	16	25	--
						3<B≤6	--	11	17	--	--	11	17	--
						B>6	--	--	--	20	--	--	--	20
				288.62	5.38	1≤B≤3	--	20	27	--	--	20	27	--
						3<B≤6	--	14	23	--	--	14	23	--
						B>6	--	--	--	22	--	--	--	22
				284.50	9.50	B≤6	30	--	--	--	30	--	--	--
						B>6	30	--	--	--	30	--	--	--
				284.00	10.00	B≤6	35	--	--	--	35	--	--	--
						B>6	35	--	--	--	35	--	--	--
BH-26 & IBH-08 (Waste Water Tank, Filterate Water Tank & Limestone Crusher House)	292.827	292.320	294.000	290.32	3.68	1≤B≤3	--	12	14	--	--	18	21	--
						3<B≤6	--	12	14	--	--	13	20	--
						B>6	--	--	--	20	--	--	--	20
				289.32	4.68	1≤B≤3	--	15	20	--	--	23	23	--
						3<B≤6	--	15	20	--	--	21	21	--
						B>6	--	--	--	20	--	--	--	20
				288.32	5.68	1≤B≤3	--	20	25	--	--	30	30	--
						3<B≤6	--	20	25	--	--	30	30	--
						B>6	--	--	--	30	--	--	--	30
				287.32	6.68	1≤B≤3	--	25	30	--	--	30	30	--
						3<B≤6	--	25	30	--	--	30	30	--
						B>6	--	--	--	30	--	--	--	30
				286.00	8.00	B≤6	30	--	--	--	30	--	--	--
						B>6	30	--	--	--	30	--	--	--
				285.50	8.50	B≤6	35	--	--	--	35	--	--	--
						B>6	35	--	--	--	35	--	--	--
BH-28, 29, 30 & IBH-04 (Pipe Rack)	293.579	291.990	294.000	289.99	4.01	1≤B≤3	--	12	14	--	--	14	21	--
						3<B≤6	--	9	14	--	--	9	15	--
						B>6	--	--	--	20	--	--	--	20
				288.99	5.01	1≤B≤3	--	15	20	--	--	17	23	--
						3<B≤6	--	12	19	--	--	12	19	--
						B>6	--	--	--	20	--	--	--	20
				287.99	6.01	1≤B≤3	--	20	24	--	--	24	24	--
						3<B≤6	--	17	21	--	--	17	21	--
						B>6	--	--	--	21	--	--	--	21
				286.99	7.01	1≤B≤3	--	25	25	--	--	25	25	--
						3<B≤6	--	22	22	--	--	22	22	--
						B>6	--	--	--	22	--	--	--	22
				284.25	9.75	B≤6	30	--	--	--	30	--	--	--
						B>6	30	--	--	--	30	--	--	--
				283.75	10.25	B≤6	35	--	--	--	35	--	--	--
						B>6	35	--	--	--	35	--	--	--
BH-31 & IBH-11 & 12 (Gypsum Dewatering Building & Gypsum Storage Shed)	290.83	290.35	294.000	288.35	5.65	1≤B≤3	--	12	14	--	--	15	15	--
						3<B≤6	--	12	14	--	--	14	14	--
						B>6	--	--	--	14	--	--	--	14
				287.35	6.65	1≤B≤3	--	15	15	--	--	15	15	--
						3<B≤6	--	15	15	--	--	15	15	--
						B>6	--	--	--	15	--	--	--	15
				286.35	7.65	1≤B≤3	--	20	25	--	--	30	30	--
						3<B≤6	--	20	25	--	--	30	30	--
						B>6	--	--	--	30	--	--	--	30
				284.00	10.00	B≤6	30	--	--	--	30	--	--	--
						B>6	30	--	--	--	30	--	--	--
				283.50	10.50	B≤6	35	--	--	--	35	--	--	--
						B>6	35	--	--	--	35	--	--	--

Foundation Location	Average EGL (M)	Natural Ground Level, NGL (M)	Finished Ground Level, FGL (M)	Founding RL (M)	D_f below FGL	Width of Foundation (m)	Recommended NABC (t/sqm)				NABC (t/sqm) as per soil condition			
							S=12mm	S=25mm	S=40mm	S=75mm	S=12mm	S=25mm	S=40mm	S=75mm
IBH-01, 02 & 03 (Limestone Unloading Area)	292.913	292.275	294.000	290.28	3.73	1≤B≤3	--	12	14	--	--	19	24	--
						3<B≤6	--	12	14	--	--	14	22	--
						B>6	--	--	--	20	--	--	--	22
				289.28	4.73	1≤B≤3	--	15	20	--	--	25	25	--
						3<B≤6	--	15	20	--	--	19	23	--
						B>6	--	--	--	22	--	--	--	22
				288.28	5.73	1≤B≤3	--	20	25	--	--	28	28	--
						3<B≤6	--	20	25	--	--	25	25	--
						B>6	--	--	--	25	--	--	--	25
				287.28	6.73	1≤B≤3	--	25	30	--	--	30	30	--
						3<B≤6	--	25	30	--	--	30	30	--
						B>6	--	--	--	30	--	--	--	30
				285.25	8.75	B≤6	30	--	--	--	30	--	--	--
						B>6	30	--	--	--	30	--	--	--
				284.75	9.25	B≤6	35	--	--	--	35	--	--	--
						B>6	35	--	--	--	35	--	--	--
IBH-05, 07, 09 & 10 (Limestone Belt Conveyor & Surface Feeder 1 / 2)	291.992	291.040	294.000	289.04	4.96	1≤B≤3	--	12	14	--	--	19	25	--
						3<B≤6	--	12	14	--	--	13	22	--
						B>6	--	--	--	20	--	--	--	23
				288.04	5.96	1≤B≤3	--	15	20	--	--	26	27	--
						3<B≤6	--	15	20	--	--	18	25	--
						B>6	--	--	--	24	--	--	--	25
				287.04	6.96	1≤B≤3	--	20	25	--	--	28	28	--
						3<B≤6	--	20	25	--	--	25	25	--
						B>6	--	--	--	25	--	--	--	25
				286.04	7.96	1≤B≤3	--	25	30	--	--	30	30	--
						3<B≤6	--	25	30	--	--	30	30	--
						B>6	--	--	--	30	--	--	--	30
				283.25	10.75	B≤6	30	--	--	--	30	--	--	--
						B>6	30	--	--	--	30	--	--	--
				282.75	11.25	B≤6	35	--	--	--	35	--	--	--
						B>6	35	--	--	--	35	--	--	--

Note:

1. NABC = Net Allowable Bearing Capacity, FGL = Finished Ground Level & S = Limiting Settlement.
2. # - The roads, ground floor slabs, trenches, pipe pedestals, channels / drains and staircase foundations with foundation loading intensity less than 4 t/sqm can be placed inside fill.

5.4. SWELLING CHARACTERISTICS:

The swelling pressure and Free Swell Index tests were performed on twenty nos. of soil samples and the test results are presented in the Appendix. The average swelling pressure and Free Swell Index as found from the tests are 0.57kg/sqcm (varies from 0.02 to 1.00 kg/sqm) and 37.10% (varying from 27.27% to 61.90%) respectively. Thus, the subsoil has low to medium swelling characteristics. So, no problem regarding swelling of subsoil is anticipated.

5.5. FIELD PERMEABILITY TEST RESULTS:

Field permeability tests were conducted at five different depths in each of the three bore holes by falling head and single packer method and the test results are presented below.

Test Locations	Type of Test	Depth of Test (M)	Permeability (cm/sec)
FPT-BH01	Falling Head	0.90 – 1.50	3.559×10^{-6}
	Falling Head	2.70 – 3.50	3.970×10^{-6}
	Single Packer	4.80 – 5.50	1.407×10^{-6}
	Single Packer	7.90 – 8.50	3.814×10^{-6}
	Single Packer	11.80 – 12.50	2.918×10^{-6}
FPT-BH08	Falling Head	0.70 – 1.50	1.307×10^{-6}
	Falling Head	2.90 - 3.50	5.543×10^{-7}
	Falling Head	4.80 – 5.50	1.638×10^{-6}
	Falling Head	7.70 – 8.30	3.304×10^{-6}
	Single Packer	11.50 – 12.50	9.584×10^{-7}
FPT-BH22	Falling Head	0.80 – 1.50	1.641×10^{-6}
	Falling Head	3.00 – 3.50	2.206×10^{-6}
	Falling Head	4.80 – 5.50	9.346×10^{-7}
	Falling Head	7.80 – 8.40	1.011×10^{-6}
	Single Packer	11.80 – 12.50	7.001×10^{-7}

5.6. CHEMICAL TESTS:

Chemical tests were performed on few soil and water samples for determining the pH value, Sulphate, Chloride content, Carbonate, Nitrate, Turbidity & Organic Matter. The results are given in a tabular form below:

CHEMICAL TEST RESULTS ON SOIL SAMPLES:

BH/Sample No.	Depth (m)	pH value	Sulphate as SO_3 (%)	Chloride as Cl (%)
BH-03 / UDS01	2.00 – 2.45	7.95	0.100	0.0020
BH-17 / UDS01	2.00 – 2.45	5.82	0.700	0.0060
BH-17 / UDS02	4.00 – 4.45	6.37	0.960	0.0030

BH/Sample No.	Depth (m)	pH value	Sulphate as SO_3 (%)	Chloride as Cl (%)
BH-30 / UDS01	2.00 – 2.45	7.03	0.350	0.0020
IBH-10 / UDS02	4.00 – 4.45	6.60	0.500	0.0040

CHEMICAL TEST RESULTS ON WATER SAMPLES:

BH No.	Depth (M)	pH value	Sulphate as SO_4 (mg/L)	Chloride as Cl (mg/L)	Carbonate as $CaCO_3$ (mg/L)	Nitrate as NO_3 (mg/L)	Organic Matter (mg/L)	Turbidity (JTU)
BH-12	3.00	6.75	B.D.L	42	12	0.18	1.14	2.0
BH-15	4.90	6.72	60	43	18	0.15	2.92	5.0
BH-20	4.20	6.38	60	36	6	0.28	8.63	3.0
BH-25	5.90	6.73	60	40	16	0.36	5.80	2.5
IBH-07	2.80	6.44	60	42	15	0.18	1.10	8.0

*- **B.D.L: B**elow **D**etection **L**imit (<60 mg/l).

5.7. SUITABILITY OF EXISTING SOIL FOR FILLING AND BACK-FILLING:

The subsoil at the site is inorganic in nature & consists of silty clay (CI type soil) having low to medium swelling properties. So, the soil can be used for filling and backfilling purposes with necessary compaction as required.

5.8. SUITABILITY OF SOIL FOR CONSTRUCTION OF ROADS & PAVEMENT:

In the laboratory, standard proctor compaction tests were performed, using samples collected at a depth varying from 1.00-3.00m below ground level. The MDD ranges between 1.587 gm/cc to 2.110 gm/cc.

Laboratory CBR tests were performed on remoulded soil samples (compacted at 95% of MDD) under soaked (4 days soaking) condition. The CBR values are in the range of 3% to 5% for soaked condition. For design of pavement, CBR value of 3% is recommended to be considered.

6. SUMMARY & CONCLUSIONS

Based on the field and laboratory tests and the foregoing discussion the following are summarised.

1. The subsoil is characterized by a thin layer of filled up soil / medium, silty clay / clayey silt layer at top, found at few places, followed by stiff to very stiff, silty clay / clayey silt layer. After that, hard, silty clay / clayey silt is encountered followed by weathered rock layer and that continues up to the terminating depth of all the boreholes.
2. Six nos. Plate Load Tests were conducted around plant area (03 nos. are of routine type & rest 03 nos. are of cyclic type). The plate settlement, corresponding safe load, subgrade modulus and the dynamic properties using the elastic rebound as we obtain from CPLT-01 to 03 have been discussed in the Section 5.1.
3. Recommendation for open foundation has been discussed earlier and the recommended bearing capacity values are presented in the sec. 5.3.6.
4. The discussion on swelling characteristics is given in Section 5.4**.**
5. Field permeability test results are presented in Section 5.5**.**
6. Chemical test results are presented in Section 5.6**.**
7. The suitability of existing soil for filling and back-filling is given in Section 5.7.
8. The suitability of soil for construction of roads & pavement is discussed in Section 5.8.
9. The Geological logging of the zone of investigation is presented in Section - 7.

For C. E. Testing Company Private Limited,

Prepared By	Checked By	Approved By
(A. DUTTA)	(S. NATH)	(DR. M. NAYAK)

7. GEOLOGICAL LOGGING

BH: 01

(00.00 – 04.75) m: Overburden.

(04.75 – 25.00) m: **(04.75–17.50)m:**

Rock Description: Highly weathered (up to 11.50m) followed by moderately weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong.

(17.50–25.00)m:

Rock Description: Moderately to slightly weathered, yellowish brown (up to 22.00m) followed by dark steel grey, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely to closely spaced (>15 no's/m to 15-8 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and clean (up to 17.50m) followed by planar, smooth slightly alter to almost clean.
Description of Core: Recovered core occurs as discontinuous (up to 11.50m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30mm (up to 10.00m) alternately mixed with 100-200mm.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to slightly weathered and huge to little amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to little amount of core loss occurred.

BH: 02

(00.00 – 05.50) m: Overburden.

(05.50 – 24.00) m: **(05.50–19.00)m:**

Rock Description: Highly weathered (up to 09.25m) followed by moderately weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong.

(19.00–24.00)m:

Rock Description: Moderately weathered, yellowish brown, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely to closely spaced (>15 no's/m to 15-8 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, alter, apparently smooth and clean (up to 08.50m) followed by planar, smooth slightly alter to almost clean.
Description of Core: Recovered core occurs as discontinuous (up to 08.50m) followed by continuous framework. Cores are mostly in

lengths of 30–100mm and <30mm (up to 06.25m) alternately mixed with 100-200mm.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result huge to modest amount of core loss occurred.

BH: 03

(00.00 – 06.50) m: Overburden.

(06.50– 20.00) m: **(06.50–16.25)m:**
Rock Description: Highly weathered (up to 16.25m) followed by moderately weathered, yellowish brown, very fine grains are moderately compact, thinly bedded, **Shale.**

(16.25–20.00)m:
Rock Description: Moderately to slightly weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong.

Structural Condition: Very closely (>15 no's/m; up to 16.25m) followed by closely spaced fractures (15-8 no's/m). Dominantly horizontal fractures. Open fracture surfaces are planar, smooth slightly alter to almost clean (up to 16.25m) followed by apparently planar to planar, apparently rough and clean
Description of Core: Recovered core occurs as discontinuous (up to 16.25m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30mm (up to 10.00m) alternately mixed with 100-200mm.
Rock Mass Structure: The rock mass is very poor (up to 16.25m) to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to slightly weathered and huge to little amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result huge to little amount of core loss occurred.

BH: 04

(00.00 – 05.60) m: Overburden.

(05.60 – 30.00) m: **(05.60–25.50)m:**
Rock Description: Highly weathered (up to 08.25m) followed by moderately weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and moderately strong to strong rock.

(25.50–30.00)m:
Rock Description: Moderately weathered, steel grey, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and clean (up to 14.50m) followed by planar, smooth slightly alter to almost clean.
Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30mm randomly mixed with 100-200mm.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to moderately weathered and huge to little amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to little amount of core loss occurred.

BH: 05
(00.00 – 06.00) m: Overburden.
(06.00 – 35.00) m: **(06.00–20.00)m:**
Rock Description: Highly weathered (up to 08.25m) followed by moderately to slightly weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong.

(20.00–35.00)m:
Rock Description: Slightly weathered to fresh, yellowish brown (up to 23.25m) followed by dark steel grey, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely to closely spaced (>15 no's/m to 15-8 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and clean (up to 20.00) followed by planar, smooth slightly alter to almost clean.
Description of Core: Recovered core occurs as discontinuous (up to 08.25m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30mm (up to 08.25m) alternately mixed with 100-200mm.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly weathered to fresh and huge to little amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to little amount of core loss occurred.

BH: 06

(00.00 – 06.00) m: Overburden.

(06.00– 25.00) m: **(06.00–19.50)m:**
(21.00-24.00)m:
Rock Description: Highly (up to 15.75m) followed by moderately weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong rock.

(19.50–21.00)m:
(24.00–25.00)m:
Rock Description: Moderately (up to 21.00m) followed by slightly weathered, dark reddish brown, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely (>15 no's/m; up to 24.00m) to medium spaced (8-5 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and clean (up to to 19.50m) followed by planar, smooth slightly alter to almost clean.
Description of Core: Recovered core occurs as discontinuous (up to 12.75m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30mm (up to 12.75m) alternately mixed with 100-200mm.
Rock Mass Structure: The rock mass is very poor (up to 24.00m) to fair quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result huge to modest amount of core loss occurred.

BH: 07

(00.00 – 06.00) m: Overburden.

(06.00 – 30.00) m: **Rock Description**: Highly weathered (up to 09.75m) followed by moderately to slightly weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and moderately strong to strong rock.

At (27.00–28.75)m:
Rock Description: Moderately weathered, steel grey, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely to closely spaced (>15 no's/m to 15-8 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and clean

(up to 10.00) followed by planar, smooth slightly alter to almost clean.
Description of Core: Recovered core occurs as discontinuous (up to 07.50m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30mm mixed with 100-200mm pieces at places,
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to slightly weathered and huge to little amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to little amount of core loss occurred.

BH: 08

(00.00 – 11.50) m: Overburden.

(11.50 – 25.00) m: **Rock Description**: Highly weathered (up to 18.25m) followed by moderately to slightly weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and moderately strong to strong rock.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and clean (up to 13.50) followed by planar, smooth, and clean.
Description of Core: Recovered core occurs as discontinuous (up to 12.25m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30mm mixed with 100-200mm pieces at places,
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to slightly weathered and huge to little amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to little amount of core loss occurred.

BH: 09

(00.00 – 06.00) m: Overburden.

(06.00 – 25.00) m: **(06.00–21.00)m:**
Rock Description: Highly (up to 08.25) to moderately (up to 22.50m), followed by slightly weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong.

(21.00–25.00)m:
Rock Description: Slightly weathered to fresh, steel grey, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak to moderately strong rock.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and clean (up to 10.25) followed by planar, smooth slightly alter to almost clean.
Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30mm (up to 08.25m) alternately mixed with 100-200mm.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly weathered to fresh and huge to little amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to little amount of core loss occurred.

BH: 10

(00.00 – 09.00) m: Overburden.

(09.00 – 20.00) m: **Rock Description**: Highly weathered (up to 19.50m) followed by moderately weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and clean (up to 11.00) followed by planar, smooth, and clean.
Description of Core: Recovered core occurs as discontinuous (up to 12.25m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30 mm pieces.
Rock Mass Structure: The rock mass is very poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to modest amount of core loss occurred.

BH: 11

(00.00 – 05.25) m: Overburden.

(05.25 – 20.00) m: **(05.25–17.25)m:**
Rock Description: Highly (up to 12.25) to moderately (up to 19.50m), followed by slightly weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong.

(17.25–20.00)m:
Rock Description: Slightly weathered, steel grey, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak to moderately strong

rock.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and clean (up to 12.00) followed by planar, smooth slightly alter to almost clean.
Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30mm (up to 08.25m) rarely mixed with 100-200mm.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly weathered to fresh and huge to little amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to little amount of core loss occurred.

BH: 12

(00.00 – 11.50) m: Overburden.

(11.50 – 20.00) m: **Rock Description**: Highly weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and clean (up to 10.00) followed by planar, smooth, and clean.
Description of Core: Recovered core occurs as discontinuous (up to 12.25m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30 mm pieces.
Rock Mass Structure: The rock mass is very poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly weathered and huge amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to modest amount of core loss occurred.

BH: 13

(00.00 – 12.00) m: Overburden.

(12.00 – 20.00) m: **Rock Description**: Highly weathered, dull grey to brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and clean (up to 14.25) followed by planar, smooth, and clean.
Description of Core: Recovered core occurs as discontinuous (up to 13.50m) followed by continuous framework. Cores are mostly in

lengths of 30–100mm and <30 mm with rare 100-200 mm pieces.
Rock Mass Structure: The rock mass is very poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly weathered and huge amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to modest amount of core loss occurred.

BH: 14

(00.00 – 11.50) m: Overburden.

(11.50 – 20.00) m: **Rock Description**: Highly weathered, dull grey to brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and clean (up to 13.75) followed by planar, smooth, and clean.
Description of Core: Recovered core occurs as discontinuous (up to 12.25m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30 mm with rare 100-200 mm pieces.
Rock Mass Structure: The rock mass is very poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly weathered and huge amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to modest amount of core loss occurred.

BH: 15

(00.00 – 08.50) m: Overburden.

(08.50 – 25.00) m: **Rock Description**: Highly (up to 11.50m) to moderately weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and moderately strong to strong.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and stains (up to 10.75) followed by planar, smooth, and clean.
Description of Core: Recovered core occurs as discontinuous (up to 09.25m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30 mm with rare 100-200 mm pieces at places.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been

removed by drill water. As a result, huge to modest amount of core loss occurred.

BH: 16

(00.00 – 07.25) m: Overburden.

(07.25 – 20.00) m: **Rock Description**: Highly to moderately weathered, brick red and dull grey with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and moderately strong to strong.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and stains (up to 09.00) followed by planar, smooth, and clean.
Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30 mm with rare 100-200 mm pieces at places.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to modest amount of core loss occurred.

BH: 17

(00.00 – 06.25) m: Overburden.

(06.25 – 20.00) m: **Rock Description**: Highly to moderately weathered, brick red and dull grey with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and moderately strong to strong.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and stains (up to 08.50) followed by planar, smooth, and clean.
Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30 mm up to 14.50m, followed by mostly 100-200 mm pieces.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to modest amount of core loss occurred.

BH: 18

(00.00 – 06.25) m: Overburden.

(06.25 – 20.00) m: **Rock Description**: Highly (up to 10.75m) to moderately weathered,

brick red and dull grey alternation with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and moderately strong to strong.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and stains (up to 10.75) followed by planar, smooth, and clean.
Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30 mm with locally 100-200 mm pieces at places.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to modest amount of core loss occurred.

BH: 19

(00.00 – 09.00) m: Overburden.

(09.00 – 20.00) m: **Rock Description**: Highly (up to 15.75m) to moderately weathered, brick red and dull grey alternation with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and moderately strong to strong.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and stains (up to 17.25) followed by planar, smooth, and clean.
Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30 mm with locally 100-200 mm pieces at places.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to modest amount of core loss occurred.

BH: 20

(00.00 – 05.25) m: Overburden.

(05.25 – 20.00) m: **(05.25–17.25)m:**
Rock Description: Highly (up to 09.00) to moderately weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and moderately strong to strong rock.

(17.25–20.00)m:
Rock Description: Moderately weathered, steel grey, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and stain (up to 09.00) followed by planar, smooth slightly alter to almost clean.
Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30mm (up to 08.25m) alternately mixed with 100-200mm at places.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to modest amount of core loss occurred.

BH: 21
(00.00 – 06.75) m: Overburden.
(06.75 – 25.00) m: **(06.75–09.50)m:**
(11.25–23.25)m:
Rock Description: Highly to moderately weathered, dull grey and brick red with brownish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and moderately strong to strong rock.

(09.50–11.25)m:
(23.25–25.00)m:
Rock Description: Moderately to slightly weathered, steel grey, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely (>15 no's/m) to medium spaced (8-5 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and clean (up to 18.00m) followed by planar, smooth slightly alter to almost clean.
Description of Core: Recovered core occurs as discontinuous (up to 11.25m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30mm alternately mixed with 100-200mm pieces.
Rock Mass Structure: The rock mass is very poor to quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to slightly weathered and huge to little amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been

removed by drill water. As a result huge to little amount of core loss occurred.

BH: 22

(00.00 – 08.50) m: Overburden.

(08.50 – 25.00) m: **(08.50–22.00)m:**

Rock Description: Highly (up to 17.50) to moderately weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.

Rock Properties: Moderately hard and weak to moderately strong rock.

(22.00–25.00)m:

Rock Description: Moderately weathered, steel grey, very fine grains are moderately compact, thinly bedded, **Shale.**

Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and stain (up to 20.50) followed by planar, smooth slightly alter.

Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30mm alternately mixed with 100-200mm pieces at places.

Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.

The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to modest amount of core loss occurred.

BH: 23

(00.00 – 08.50) m: Overburden.

(08.50 – 20.00) m: **Rock Description**: Highly weathered, brick red and dull grey alternation with deep brownish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.

Rock Properties: Moderately hard and weak to moderately strong rock.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and.

Description of Core: Recovered core occurs as discontinuous framework. Cores are mostly in lengths of 30–100mm and <30 mm pieces.

Rock Mass Structure: The rock mass is very poor quality.

Partial drill water loss has been noticed for the entire depth.

The formation rock is highly weathered and huge amount of the rock mass is disintegrated. During drilling the disintegrated rock particles

between fracture planes have been removed by drill water. As a result, huge amount of core loss occurred.

BH: 24

(00.00 – 07.00) m: Overburden.

(07.00 – 30.00) m: **(07.00–17.50)m:**

Rock Description: Highly to moderately weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.

Rock Properties: Moderately hard and weak to moderately strong rock.

(17.50–30.00)m:

Rock Description: Highly to moderately (up to 27.25m), then slightly weathered, khaki green (up to 21.75m) to steel grey, very fine grains are moderately compact, thinly bedded, **Shale.**

Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and.

Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30mm pieces.

Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.

The formation rock is highly to slightly weathered and huge to little amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to little amount of core loss occurred.

BH: 25

(00.00 – 08.25) m: Overburden.

(08.25 – 35.00) m: **(08.25–12.75)m:**

(19.50–25.50)m:

Rock Description: Highly (up to 11.25m) to moderately / slightly weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.

Rock Properties: Moderately hard and weak to moderately strong rock.

(12.75–19.50)m:

(25.50–35.00)m:

Rock Description: Moderately to slightly weathered, khaki green (up to up to 27.00m) to steel grey, very fine grains are moderately compact, thinly bedded, **Shale.**

Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely (>15 no's/m) spaced fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently

planar to planar, apparently rough and slightly alter to clean.
Description of Core: Recovered core occurs as discontinuous (up to 09.75m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30mm alternately mixed with 100-200mm pieces.
Rock Mass Structure: The rock mass is very poor to quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to slightly weathered and huge to little amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result huge to little amount of core loss occurred.

BH: 26

(00.00 – 06.00) m: Overburden.

(06.00 – 20.00) m: **Rock Description**: Highly to moderately weathered, brick red to dull grey with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong rock.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and stain.
Description of Core: Recovered core occurs as discontinuous (up to 07.50m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30 mm with rare 100-200 mm pieces at places.
Rock Mass Structure: The rock mass is very poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to modest amount of core loss occurred.

BH: 27

(00.00 – 06.00) m: Overburden.

(06.00 – 20.00) m: **(06.00–14.50)m:**
Rock Description: Highly weathered (up to 07.00m) followed by moderately to slightly weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong.

(14.50–20.00)m:
Rock Description: Slightly weathered, steel grey, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely spaced (>15 no's/m) fractures.

Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and clean (up to 14.50m) followed by planar, smooth slightly alter to almost clean.
Description of Core: Recovered core occurs as discontinuous (up to 09.00m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30mm (up to 10.00m) alternately mixed with 100-200mm.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to slightly weathered and huge to little amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result huge to little amount of core loss occurred.

BH: 28

(00.00 – 06.00) m: Overburden.

(06.00 – 20.00) m: **(06.00–19.50)m:**
Rock Description: Highly weathered (up to 10.50m) followed by moderately/slightly weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong.

(19.50–20.00)m:
Rock Description: Slightly weathered, steel grey, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely to closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and altered (up to 11.00m) followed by planar, smooth, slightly alter to almost clean.
Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30mm with locally mixed with 100-200mm pieces.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to slightly weathered and huge to little amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result huge to little amount of core loss occurred.

BH: 29

(00.00 – 09.50) m: Overburden.

(09.50 – 20.00) m: **Rock Description**: Highly to moderately weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong rock.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and stain.
Description of Core: Recovered core occurs as discontinuous (up to 11.00m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30 mm pieces.
Rock Mass Structure: The rock mass is very poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to modest amount of core loss occurred.

BH: 30

(00.00 – 08.25) m: Overburden.

(08.25 – 20.00) m: **(08.25–14.25)m:**
Rock Description: Highly weathered, khaki green color, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

(14.25–20.00)m:
Rock Description: Highly weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong.

Structural Condition: Very closely to closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and altered.
Description of Core: Recovered core occurs as discontinuous (09.75m) to continuous framework. Cores are mostly in lengths of 30–100mm and <30mm pieces.
Rock Mass Structure: The rock mass is very poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly weathered and huge amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result huge amount of core loss occurred.

BH: 31

(00.00 – 03.75) m: Overburden.

(03.75 – 25.00) m: **(03.75–17.25)m:**
Rock Description: Highly to moderately weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong.

(17.25–25.00)m:
Rock Description: Moderately weathered, steel grey to dull grey, very

fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely to closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and altered (up to 17.25m) followed by planar, smooth, slightly alter to almost clean.
Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30mm with locally mixed with 100-200mm pieces.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result huge to modest amount of core loss occurred.

IBH: 01

(00.00 – 06.50) m: Overburden.

(06.50 – 30.00) m: **(06.50–18.50)m:**
Rock Description: Highly to moderately weathered, brick red to dull grey with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong.

(18.50–30.00)m:
Rock Description: Moderately weathered, khaki green (up to 25.25m) to steel grey, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely to closely spaced (>15 no's/m to 15-8 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and altered (up to 25.25m) followed by planar, smooth, and clean.
Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30mm with locally mixed with 100-200mm pieces.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result huge to modest amount of core loss occurred.

IBH: 02

(00.00 – 05.75) m: Overburden.

(05.75 – 20.00) m: **Rock Description**: Highly to moderately weathered, brick red with

whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and moderately strong to strong rock.

Structural Condition: Very closely to closely spaced (>15 to 15-8 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and slightly stain.
Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30 mm locally mixed with 100-200 mm pieces.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to modest amount of core loss occurred.

IBH: 03

(00.00 – 06.75) m: Overburden.

(06.75 – 25.00) m: **Rock Description**: Highly to moderately weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and moderately strong to strong rock.
Pockets of highly weathered, khaki green shale was found at (21.75-23.25) m depth.

Structural Condition: Very closely to closely spaced (>15 to 15-8 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and slightly stain.
Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30 mm locally mixed with 100-200 mm pieces, rare 100-300mm pieces at 24.00-25.00 m depth.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to modest amount of core loss occurred.

IBH: 04

(00.00 – 06.00) m: Overburden.

(06.00 – 20.00) m: **(06.00–16.50)m**
(18.50–20.00)m:

Rock Description: Highly weathered (up to 16.50m) followed by slightly weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong rock.

(16.50–18.50)m:
Rock Description: Highly weathered, dark brownish grey, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely to closely spaced (>15 no's/m to 15-8 no's/m; up to 19.50m) followed by medium (8-5 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and clean (up to 19.50m) followed by planar, smooth slightly alter to almost clean.
Description of Core: Recovered core occurs as discontinuous (up to 11.50m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30mm (up to 10.50m) alternately mixed with 100-200mm.
Rock Mass Structure: The rock mass is very poor to fair quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to slightly weathered and huge to little amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to little amount of core loss occurred.

IBH: 05

(00.00 – 06.00) m: Overburden.

(06.00 – 20.00) m: **(06.00–16.50)m:**
Rock Description: Highly weathered (up to 09.50m) followed by moderately weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong rock.

(16.50–20.00)m:
Rock Description: Moderately weathered, dark brownish grey, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and clean (up to 16.50m) followed by planar, smooth slightly alter to almost clean.
Description of Core: Recovered core occurs as discontinuous (up to 08.25m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30mm (up to 07.50m) alternately mixed with 100-200mm.
Rock Mass Structure: The rock mass is very poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result huge to modest amount of core loss occurred.

IBH: 06

(00.00 – 05.75) m: Overburden.

(05.75 – 30.00) m: **(05.75–11.50)m**
(12.00–14.00)m:
Rock Description: Highly weathered (up to 11.00m) followed by moderately weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong rock.

(11.50–12.00)m
(14.00–30.00)m:
Rock Description: Highly (up to 12.50m) followed by moderately to slightly weathered, yellowish brown (up to 16.50m) followed by dark steel grey, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and clean (up to 14.00m) followed by planar, smooth slightly alter to almost clean.
Description of Core: Recovered core occurs as discontinuous (up to 09.50m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30mm (up to 09.50m) alternately mixed with 100-200mm.
Rock Mass Structure: The rock mass is very poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to slightly weathered and huge to little amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result huge to little amount of core loss occurred.

IBH: 07

(00.00 – 06.00) m: Overburden.

(06.00 – 28.30) m: **(06.00–17.25)m:**
Rock Description: Highly weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong rock.

(17.25–28.30)m:

Rock Description: Highly (up to 22.50m) followed by moderately to slightly weathered, yellowish brown (up to 23.25m) followed by dark steel grey, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely (>15 no's/m; up to 23.25m) to closely spaced (15-8 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and clean (up to 17.25m) followed by planar, smooth slightly alter to almost clean.
Description of Core: Recovered core occurs as discontinuous (up to 11.50m) followed by continuous framework. Cores are mostly in lengths of 30–100mm and <30mm (up to 12.75m) alternately mixed with 100-200mm.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to slightly weathered and huge to little amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result huge to little amount of core loss occurred.

IBH: 08
(00.00 – 06.50) m: Overburden.
(06.50 – 30.00) m: **(06.50–19.25)m:**
Rock Description: Highly to moderately weathered, brick red to dull grey with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong.

(19.25–30.00)m:
Rock Description: Moderately to slightly weathered, khaki green (up to 26.50m) to steel grey, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and altered (up to 26.50m) followed by planar, smooth, and clean.
Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30mm pieces.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to slightly weathered and huge to little amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result huge to little amount of core loss

occurred.

IBH: 09

(00.00 – 07.25) m: Overburden.

(07.25 – 25.00) m: **(07.25–22.25)m:**

Rock Description: Highly weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong.

(22.25–25.00)m:

Rock Description: Highly weathered, khaki green, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and altered to slightly altered.
Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30mm pieces.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly weathered and huge amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result huge amount of core loss occurred.

IBH: 10

(00.00 – 07.50) m: Overburden.

(07.50 – 30.00) m: **(07.50–12.75)m**
(25.50–30.00)m:

Rock Description: Highly to moderately weathered, brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong rock.

(12.75–25.50)m

Rock Description: Highly to moderately weathered, steel grey, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

Structural Condition: Very closely spaced (>15 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, smooth, slightly alter to almost clean.
Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30mm pieces.
Rock Mass Structure: The rock mass is very poor quality.

Partial drill water loss has been noticed for the entire depth.

The formation rock is highly to slightly weathered and huge to little amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result huge to little amount of core loss occurred.

IBH: 11

(00.00 – 05.75) m: Overburden.

(05.75 – 25.00) m: **Rock Description**: Highly to moderately weathered, brick red to dull grey with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong rock.

Structural Condition: Very closely to closely spaced (>15 to 15-8 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and slightly stain.
Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30 mm locally mixed with 100-200 mm pieces.
Rock Mass Structure: The rock mass is very poor to poor quality.

Partial drill water loss has been noticed for the entire depth.
The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result, huge to modest amount of core loss occurred.

IBH: 12

(00.00 – 06.75) m: Overburden.

(06.75 – 30.00) m: **(06.75–15.00)m:**
Rock Description: Highly weathered, khaki green color, very fine grains are moderately compact, thinly bedded, **Shale.**
Rock Properties: Moderately soft and weak rock.

(15.00–30.00)m:
Rock Description: Highly (up to 27.75m) to moderately weathered, dull grey to brick red with whitish spots and patches, very fine grain, densely compact, **Argillaceous Limestone**.
Rock Properties: Moderately hard and weak to moderately strong.

Structural Condition: Very closely to closely spaced (>15 to 15-8 no's/m) fractures. Dominantly horizontal fractures. Open fracture surfaces are apparently planar to planar, apparently rough and altered.
Description of Core: Recovered core occurs as continuous framework. Cores are mostly in lengths of 30–100mm and <30mm pieces.
Rock Mass Structure: The rock mass is very poor quality.

Partial drill water loss has been noticed for the entire depth.

The formation rock is highly to moderately weathered and huge to modest amount of the rock mass is disintegrated. During drilling the disintegrated rock particles between fracture planes have been removed by drill water. As a result huge to modest amount of core loss occurred.

For C. E. Testing Company Private Limited,

(G. Mukherjee, Geologist) **(S. Paramanik, Geologist)**

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PART I: FIELD TEST RESULTS

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 12/03/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO. 1

Co-ordinates E=9094 N=1779

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 13/02/2020
Completion Date : 23/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.902 M.
Water Struck At :
Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
			DS-1	0.50
		2 2 3 3 12/3 3	SPT-1	1.00-1.45
Stiff to very stiff, brownish grey, silty clay. Observed kankar.			UDS-1	2.00-2.45
		3 3 3 4 16/4 5	SPT-2	3.00-3.45
4.00m				
Hard, brownish grey, silty clay with decomposed rock fragments.		4 4 5 6 >100/2.5 cm Penetn.	UDS-2	4.00-4.45
			SPT-3	4.60-4.70
4.75m		100/4.0 cm Refusal Penetn.	*SPT-4	4.75-4.79 4.75
		NX rotary drilling from 4.75m to 25.00m	R1	CR=27%/RQD=Nil 5.50
			R2	CR=32%/RQD=Nil 6.25
			R3	CR=39%/RQD=19% 7.00
			R4	CR=35%/RQD=19% 7.75
Highly to moderately weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.			R5	CR=36%/RQD=Nil 8.50
			R6	CR=28%/RQD=Nil 9.25
			R7	CR=32%/RQD=Nil 10.00
			R8	CR=52%/RQD=Nil 10.75
			R9	CR=44%/RQD=Nil 11.50
11.50m				
Moderately weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.			R10	CR=60%/RQD=14% 12.25
			R11	CR=52%/RQD=22% 13.00
13.00m				
Moderately weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.			R12	CR=49%/RQD=16% 13.75
			R13	CR=48%/RQD=13% 14.50
14.50m				
Moderately to slightly weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.			R14	CR=74%/RQD=17% 15.25
			R15	CR=72%/RQD=36% 16.00
			R16	CR=60%/RQD=14% 16.75
			R17	CR=64%/RQD=28% 17.50
17.50m				
17.60m				

BH-1/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 12/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.1

Co-ordinates E=9094 N=1779

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 13/02/2020
Completion Date : 23/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.902 M.
Water Struck At :
Standing Water Level : 2.90 m.

DESCRIPTION	SYMBOL	N-VALUE EACH DIVN. = 7.5cm	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m.				
Slightly weathered, yellowish grey, fine grained, fractured Shale.			R18	CR=78%/RQD=Nil 18.25
			R19	CR=72%/RQD=Nil 19.00
			R20	CR=68%/RQD=Nil 19.75
19.75m.			R21	CR=64%/RQD=Nil 20.50
			R22	CR=72%/RQD=20% 21.25
Moderately to slightly weathered, steel grey, fine grained, fractured Shale.			R23	CR=62%/RQD=Nil 22.00
			R24	CR=68%/RQD=16% 22.75
			R25	CR=60%/RQD=Nil 23.50
			R26	CR=72%/RQD=24% 24.25
			R27	CR=64%/RQD=Nil 25.00
25.00m.				

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 12/03/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO.2

Co-ordinates E=9114 N=1754

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 15/02/2020
Completion Date : 20/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.738 M.
Water Struck At :
Standing Water Level : 2.50 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Very stiff, reddish brown, silty clay with moorum & kankar.		4 5 6 7 28 (7 8)	DS-1	0.50
			SPT-1	1.00-1.45
			UDS-1	2.00-2.45
3.50m		4 6 7 7 30 (8 8)	SPT-2	3.00-3.45
Hard, deep grey, silty clay. Observed kankar.			UDS-2	4.00-4.45
5.00m		4 6 7 30 ≥100 (50) 5.0 cm Pentn.	SPT-3	5.00-5.35
Hard, brownish grey, silty clay with decomposed rock.			*SPT-4	5.50-5.52
5.50m		100 ≥100 (2.0 cm Pentn.)	R1	CR=20%/RQD=Nil 5.50
		NX rotary drilling from 5.50m to 24.00m	R2	CR=21%/RQD=Nil 6.25
Completely to highly weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.			R3	CR=25%/RQD=Nil 7.00
			R4	CR=21%/RQD=Nil 7.75
8.50m			R5	CR=37%/RQD=14% 8.50
Highly weathered, brownish grey, fine grained, fractured Argillaceous Limestone. 9.25m			R6	CR=52%/RQD=20% 9.25
			R7	CR=53%/RQD=38% 10.00
Moderately weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.			R8	CR=56%/RQD=21% 10.75
			R9	CR=58%/RQD=Nil 11.50
12.25m			R10	CR=49%/RQD=26% 12.25
Highly/moderately weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.			R11	CR=51%/RQD=Nil 13.00
			R12	CR=40%/RQD=18% 13.75
			R13	CR=50%/RQD=37% 14.50
			R14	CR=37%/RQD=19% 15.25
16.00m			R15	CR=60%/RQD=29% 16.00
Moderately/slightly weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.			R16	CR=57%/RQD=26% 16.75
17.60m				17.50

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 12/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.2

Co-ordinates E=9114 N=1754

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 15/02/2020
Completion Date : 20/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.738 M.
Water Struck At :
Standing Water Level : 2.50 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m. Moderately/slightly weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.			R17	CR=69%/RQD=16% 18.25
19.00m. Moderately/slightly weathered, brownish grey, medium to fine grained, fractured Shale.			R18	CR=54%/RQD=44% 19.00
			R19	CR=66%/RQD=Nil 19.75
			R20	CR=53%/RQD=Nil 20.50
21.25m. Moderately to slightly weathered / fresh, deep to light grey, fine grained, fractured Shale.			R21	CR=50%/RQD=Nil 21.25
			R22	CR=57%/RQD=13% 22.00
			R23	CR=85%/RQD=14% 22.75
			R24	CR=68%/RQD=Nil 23.50
24.00m.			R25	CR=60%/RQD=Nil 24.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376	Created by : SKD	Created on : 12/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.3

Co-ordinates E=9123 N=1784

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 04/02/2020
Completion Date : 11/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.279 M.
Water Struck At :
Standing Water Level : 3.00 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Very stiff, reddish brown, clayey silt / silty clay with moorum. Observed sand mixture.		4 6 7 — 6 7 7 (27)	DS-1	0.50
			SPT-1	1.00-1.45
			UDS-1	2.00-2.45
		4 6 7 — 7 7 8 (29)	SPT-2	3.00-3.45
4.00m			UDS-2	4.00-4.45
Very stiff, brownish grey, silty clay. Observed kankar.		3 3 3 — 6 6 6 (21)	SPT-3	5.00-5.45
6.00m		26 28 52 — >100	SPT-4	6.00-6.20
Hard, brownish grey, silty clay with deomposed rock fragments.		5.0 cm Pentn.	*SPT-5	6.50-6.54 6.50
6.50m		100 Refusal	R1	CR=19%/RQD=Nil
		4.0 cm Pentn.	*SPT-6	7.25-7.29 7.25
Completely to highly weathered, brownish grey, fine grained, fractured Shale.		100 Refusal	R2	CR=20%/RQD=Nil
		4.0 cm Pentn.	*SPT-7	8.00-8.03 8.00
		100 Refusal	R3	CR=22%/RQD=Nil
		3.0 cm Pentn.		8.75
8.75m		NX rotary drilling from 6.50m to 20.00m	R4	CR=28%/RQD=Nil
				9.50
			R5	CR=32%/RQD=Nil
				10.25
Highly to moderately weathered, brownish grey, fine grained, fractured Shale.			R6	CR=40%/RQD=Nil
				11.00
			R7	CR=35%/RQD=Nil
				11.75
			R8	CR=48%/RQD=Nil
				12.50
			R9	CR=45%/RQD=Nil
				13.25
			R10	CR=46%/RQD=Nil
14.00m				14.00
Moderately weathered, brownish grey, fine grained, fractured Shale.			R11	CR=53%/RQD=Nil
				14.75
			R12	CR=55%/RQD=Nil
				15.50
			R13	CR=52%/RQD=Nil
16.25m				16.25
Moderately to slightly weathered, grey, fine grained, fractured Argillaceous Limestone.			R14	CR=56%/RQD=29%
				17.00
17.60m			R15	CR=68%/RQD=16%

BH-3/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 12/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.3

Co-ordinates E=9123 N=1784

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 04/02/2020
Completion Date : 11/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.279 M.
Water Struck At :
Standing Water Level : 3.00 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m.				17.75
			R16	CR=55%/RQD=13%
Moderately to slightly weathered, grey, fine grained, fractured Argillaceous Limestone.				18.50
			R17	CR=63%/RQD=29%
				19.25
			R18	CR=75%/RQD=29%
20.00m.				20.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 12/03/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO.4

Co-ordinates E=9167 N=1769

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 20/02/2020
Completion Date : 23/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.500 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Stiff, brownish grey, silty clay with kankar.		2 3 3 4 15 (4 4)	DS-1	0.50
			SPT-1	1.00-1.45
			UDS-1	2.00-2.45
3.00m				
Very stiff, deep grey, silty clay.		3 3 5 5 26 (6 10)	SPT-2	3.00-3.45
4.00m				
			UDS-2	4.00-4.45
Hard, brownish grey, silty clay with decomposed rock pcs.		10 10 15 29 >100 (36) 2.0 cm Pentn.	SPT-3	5.00-5.32
5.60m		100 Refusal 2.0 cm Pentn.	*SPT-4	5.60-5.62 5.60
		NX rotary drilling from 5.60m to 30.00m	R1	CR=44%/RQD=Nil 6.75
			R2	CR=30%/RQD=Nil 7.50
Highly to moderately weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.			R3	CR=34%/RQD=Nil 8.25
			R4	CR=52%/RQD=Nil 9.00
			R5	CR=48%/RQD=Nil 9.75
			R6	CR=33%/RQD=Nil 10.50
			R7	CR=49%/RQD=Nil 11.25
11.25m				
			R8	CR=63%/RQD=29% 12.00
			R9	CR=65%/RQD=18% 12.75
			R10	CR=65%/RQD=40% 13.50
Moderately to slightly weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.			R11	CR=61%/RQD=16% 14.25
			R12	CR=67%/RQD=28% 15.00
			R13	CR=58%/RQD=24% 15.75
			R14	CR=68%/RQD=20% 16.50
			R15	CR=69%/RQD=14% 17.25
17.60m				

BH-4/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 12/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.4

Co-ordinates E=9167 N=1769

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 20/02/2020
Completion Date : 23/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.500 M.
Water Struck At :
Standing Water Level : 2.85 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m. Moderately to slightly weathered, brownish grey, medium to fine grained, fractured rArgillaceous Limestone. 18.00m.			R16	CR=74%/RQD=42% 18.00
			R17	CR=48%/RQD=Nil 18.75
Moderately weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.			R18	CR=60%/RQD=Nil 19.50
			R19	CR=49%/RQD=Nil 20.25
20.50m.			R20	CR=57%/RQD=20% 21.00
			R21	CR=54%/RQD=15% 21.75
Moderately to slightly weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.			R22	CR=64%/RQD=26% 22.50
			R23	CR=76%/RQD=33% 23.25
			R24	CR=68%/RQD=Nil 24.00
			R25	CR=60%/RQD=Nil 24.75
25.50m.			R26	CR=68%/RQD=24% 25.50
			R27	CR=60%/RQD=24% 26.25
Moderately to slightly weathered, brownish grey to steel grey, fine grained, fractured Shale.			R28	CR=62%/RQD=Nil 27.00
			R29	CR=64%/RQD=Nil 27.75
			R30	CR=64%/RQD=Nil 28.50
			R31	CR=68%/RQD=Nil 29.25
30.00m.			R32	CR=62%/RQD=Nil 30.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 12/03/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO.5

Co-ordinates E=9184 N=1758

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 11/02/2020
Completion Date : 15/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.502 M.
Water Struck At :
Standing Water Level : 3.00 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Stiff, brownish grey, silty clay with moorum & kankar.		2 2 3 3 4 4 (14)	DS-1	0.50
			SPT-1	1.00-1.45
			UDS-1	2.00-2.45
3.00m				
Very stiff, deep grey, silty clay. Observed kankar.		3 3 4 4 5 5 (18)	SPT-2	3.00-3.45
4.00m			*UDS-2	4.00-4.15
Hard, brownish grey, clayey silt with decomposed rock.		10 16 24 30 20 (≥100) 3.0 cm Pentn. Refusal	SPT-3	5.00-5.33
6.00m		100 3.0 cm Pentn.	*SPT-4	6.00-6.03 6.00
Highly to moderately weathered, deep brown, medium to fine grained, fractured Argillaceous Limestone.		NX rotary drilling from 6.00m to 35.00m	R1	CR=40%/RQD=Nil 6.75
			R2	CR=41%/RQD=Nil 7.50
			R3	CR=44%/RQD=Nil 8.25
8.25m			R4	CR=52%/RQD=20% 9.00
			R5	CR=68%/RQD=28% 9.75
			R6	CR=70%/RQD=14% 10.50
Moderately/slightly weathered, deep brown, medium to fine grained, fractured Argillaceous Limestone.			R7	CR=68%/RQD=20% 11.25
			R8	CR=72%/RQD=25% 12.00
			R9	CR=52%/RQD=Nil 12.75
			R10	CR=56%/RQD=Nil 13.50
13.50m			R11	CR=49%/RQD=14% 14.25
Moderately weathered, deep brown, medium to fine grained, slightly fractured Argillaceous Limestone.			R12	CR=60%/RQD=Nil 15.00
14.25m			R13	CR=64%/RQD=36% 15.75
Moderately to slightly weathered, deep brown, medium to fine grained, fractured Argillaceous Limestone.			R14	CR=62%/RQD=20% 16.50
			R15	CR=61%/RQD=14% 17.25
17.60m				

BH-5/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 12/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.5

Co-ordinates E=9184 N=1758

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 11/02/2020
Completion Date : 15/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.502 M.
Water Struck At :
Standing Water Level : 3.00 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m.			R16	CR=78%/RQD=22% 18.00
Moderately to slightly weathered, deep brown, medium to fine grained, fractured Argillaceous Limestone.			R17	CR=76%/RQD=36% 18.75
			R18	CR=68%/RQD=32% 19.50
			R19	CR=72%/RQD=24% 20.25
20.25m.			R20	CR=78%/RQD=Nil 21.00
Slightly weathered, deep brown, medium to fine grained, fractured Shale. 21.00m.			R21	CR=76%/RQD=Nil 21.75
Slightly weathered, grey, fine grained, fractured Shale.			R22	CR=68%/RQD=Nil 22.50
			R23	CR=80%/RQD=Nil 23.25
23.25m.			R24	CR=76%/RQD=32% 24.00
			R25	CR=72%/RQD=24% 24.75
			R26	CR=76%/RQD=16% 25.50
			R27	CR=78%/RQD=14% 26.25
			R28	CR=64%/RQD=Nil 27.00
			R29	CR=80%/RQD=21% 27.75
			R30	CR=84%/RQD=61% 28.50
Slightly weathered to fresh, steel grey, fine grained, fractured Shale.			R31	CR=86%/RQD=16% 30.00
			R32	CR=92%/RQD=Nil 31.50
			R33	CR=80%/RQD=34% 33.00
			R34	CR=81%/RQD=28% 34.50
N.B. – '*' means sample could not be recovered. 35.00m.			R35	CR=81%/RQD=Nil 35.00

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 12/03/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO.6

Co-ordinates E=9156 N=1800

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 24/02/2020
Completion Date : 29/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.812 M.
Water Struck At :
Standing Water Level : 2.30 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
			DS-1	0.50
		2 2 3 3 4 3 (13)	SPT-1	1.00-1.45
Stiff, brownish grey, silty clay. Observed kankar.			UDS-1	2.00-2.45
		2 2 2 2 3 3 (10)	SPT-2	3.00-3.45
4.00m			UDS-2	4.00-4.45
Hard, brownish grey, silty clay. Observed kankar & decomposed rock.		2 2 5 11 12 15 (43)	SPT-3	5.00-5.45
		51 49 2.5 cm Pentn. >100 Refusal	SPT-4	5.70-5.80
6.00m		100 4.0 cm Pentn.	*SPT-5	6.00-6.04
Moderately weathered, brownish grey, fine grained, fractured Argillaceous Limestone.		NX rotary drilling from 6.00m to 25.00m	R1	CR=44%/RQD=Nil 6.00
6.75m			R2	CR=52%/RQD=Nil 6.75
Moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R3	CR=24%/RQD=18% 7.50
7.50m			R4	CR=20%/RQD=Nil 8.25
8.25m			R5	CR=22%/RQD=Nil 9.00
Highly weathered, brownish grey, medium grained, fractured Argillaceous Limestone.			R6	CR=20%/RQD=Nil 9.75
Completely/highly weathered, brownish grey, medium grained, decomposed Argillaceous Limestone.			R7	CR=21%/RQD=Nil 10.50
			R8	CR=20%/RQD=Nil 11.25
12.00m			R9	CR=32%/RQD=Nil 12.00
			R10	CR=52%/RQD=24% 12.75
Highly to moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R11	CR=45%/RQD=16% 13.50
			R12	CR=37%/RQD=Nil 14.25
			R13	CR=40%/RQD=28% 15.00
			R14	CR=52%/RQD=36% 15.75
			R15	CR=44%/RQD=40% 16.50
17.25m				17.25
17.60m				

BH-6/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 12/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.6

Co-ordinates E=9156 N=1800

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 24/02/2020
Completion Date : 29/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.812 M.
Water Struck At :
Standing Water Level : 2.30 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
Moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R16	CR=58%/RQD=Nil 18.00
17.60m			R17	CR=56%/RQD=Nil 18.75
Moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R18	CR=42%/RQD=Nil 19.50
18.75m			R19	CR=25%/RQD=Nil 20.25
Highly weathered, brownish grey, fine to medium grained, fractured Shale.			R20	CR=47%/RQD=Nil 21.00
19.50m			R21	CR=40%/RQD=Nil 21.75
Moderately weathered, brownish grey, fine to medium grained, fractured Shale.			R22	CR=52%/RQD=Nil 22.50
20.25m			R23	CR=43%/RQD=24% 23.25
Highly to moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R24	CR=80%/RQD=42% 24.00
21.00m			R25	CR=60%/RQD=55% 25.00
Slightly weathered, brownnish grey, medium grained, fractured Argillaceous Limestone.				
23.25m				
Moderately weathered, steel grey, fine to medium grained, fractured Shale.				
24.00m				
25.00m				

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 23/03/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO.7

Co-ordinates E=9176 N=1792

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 01/03/2020
Completion Date : 07/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.739 m.
Water Struck At :
Standing Water Level : 2.95 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Stiff, brownsh grey, silty clay with moorum.		2 2 3 2 11/2 4	DS-1	0.50
			SPT-1	1.00-1.45
			UDS-1	2.00-2.45
3.00m				
Very stiff, deep grey, silty clay / clayey silt.		3 4 4 5 22/6 7	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
5.00m				
Hard, deep grey, silty clay / clayey silt. Observed decomposed rock.		7 9 9 12 50/12 17	SPT-3	5.00-5.45
		49 51 >100 2.5 cm Pentn.	SPT-4	5.80-5.90
6.00m		100 Refusal 3.0 cm Pentn.	*SPT-5	6.00-6.03 6.00
Highly weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.		NX rotary drilling from 6.00m to 30.00m	R1	CR=25%/RQD=Nil 6.75
7.50m			R2	CR=23%/RQD=Nil 7.50
Highly to moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R3	CR=32%/RQD=Nil 8.25
			R4	CR=35%/RQD=Nil 9.00
			R5	CR=40%/RQD=Nil 9.75
			R6	CR=50%/RQD=Nil 10.50
			R7	CR=45%/RQD=Nil 11.25
11.25m			R8	CR=52%/RQD=16% 12.00
Moderately/slightly weathered, browish grey, fine to medium grained, fractured Argillaceous Limestone.			R9	CR=64%/RQD=Nil 12.75
			R10	CR=72%/RQD=52% 13.50
			R11	CR=80%/RQD=20% 14.25
			R12	CR=65%/RQD=20% 15.00
			R13	CR=60%/RQD=Nil 15.75
			R14	CR=52%/RQD=Nil 16.50
16.50m			R15	CR=34%/RQD=Nil 17.25
Highly to moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone. 17.60m				

BH-7/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 23/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.7

Co-ordinates E=9176 N=1792

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 01/03/2020
Completion Date : 07/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.739 m.
Water Struck At :
Standing Water Level : 2.95 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m.			R16	CR=49%/RQD=Nil 18.00
			R17	CR=40%/RQD=Nil 18.75
			R18	CR=47%/RQD=16% 19.50
			R19	CR=34%/RQD=17% 20.25
Highly to moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R20	CR=40%/RQD=20% 21.00
			R21	CR=40%/RQD=16% 21.75
			R22	CR=65%/RQD=20% 22.50
			R23	CR=40%/RQD=Nil 23.25
24.00m.			R24	CR=50%/RQD=Nil 24.00
			R25	CR=52%/RQD=Nil 24.75
Moderately weathered, brownish grey to deep grey, fine grained, fractured Argillaceous Limestone.			R26	CR=60%/RQD=Nil 25.50
			R27	CR=48%/RQD=Nil 26.25
			R28	CR=52%/RQD=Nil 27.00
27.00m.				
Moderately weathered, brownish grey to deep grey, fine grained, fractured Shale.			R29	CR=48%/RQD=Nil 27.75
28.50m.			R30	CR=52%/RQD=Nil 28.50
Slightly weathered, brownish grey, fine grained, fractured Argillaceous Limestone.			R31	CR=70%/RQD=40% 27.75
30.00m.			R32	CR=80%/RQD=60% 28.50

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376	Created by : SKD	Created on : 30/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.8

Co-ordinates E=9262 N=1811

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	4
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 17/03/2020
Completion Date : 25/04/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.942 m.
Water Struck At :
Standing Water Level : 2.8 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m Filled up with road materials. 0.60m			DS-1	0.50
		1 2 2 1 6/2 1	SPT-1	1.00-1.45
Medium, brownish grey, clayey silt. Observed moorum & kankar.			UDS-1	2.00-2.45
		2 3 2 2 8/2 2	SPT-2	3.00-3.45
3.80m			UDS-2	4.00-4.45
		3 3 3 2 16/4 7	SPT-3	5.00-5.45
Very stiff, brownish grey, clayey silt. Observed kankar.			*UDS-3	6.00-6.45
		2 2 2 5 22/5 10	SPT-4	7.00-7.45
8.00m			*UDS-4	8.00-8.07
Hard, brownish grey, clayey silt. Observed kankar.		5 7 7 9 52/15 21	SPT-5	9.00-9.45
		8 9 10 13 >100/3.5 cm Pentn.	SPT-6	10.00-10.41
10.80m				
Hard, brownish grey, clayey silt with decomposed rock.		11 22 35 42 >100/2.5 cm Pentn.	SPT-7	11.00-11.25
11.50m		100 Refusal 3.0 cm Penth.	*SPT-8	11.50-11.53
Highly weathered, deep brownish grey, fine to medium grained, highly fractured Argillaceous Limestone. 12.25m		NX rotary drilling from 11.50m to 25.00m	R1	CR=25%/RQD=Nil 11.50 / 12.25
			R2	CR=35%/RQD=Nil 12.25 / 13.00
Highly to moderately weathered, deep brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R3	CR=32%/RQD=Nil 13.00 / 13.75
			R4	CR=46%/RQD=Nil 13.75 / 14.50
14.50m Highly weathered, deep brownish grey, fine to medium grained, highly fractured Argillaceous Limestone. 15.25m			R5	CR=25%/RQD=Nil 14.50 / 15.25
			R6	CR=27%/RQD=Nil 15.25 / 16.00
Highly to moderately weathered, deep brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R7	CR=37%/RQD=Nil 16.00 / 16.75
			R8	CR=42%/RQD=Nil 16.75 / 17.50
17.60m				

BH-8/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 30/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.8

Co-ordinates E=9262 N=1811

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	4
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 17/03/2020
Completion Date : 25/04/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.942 m.
Water Struck At :
Standing Water Level : 2.8 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m Highly to moderately weathered, deep brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R9	CR=35%/RQD=Nil 18.25
19.00m Moderately to slightly weathered, deep brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R10	CR=48%/RQD=Nil 19.00
			R11	CR=52%/RQD=Nil 19.75
			R12	CR=56%/RQD=20% 20.50
			R13	CR=51%/RQD=Nil 21.25
			R14	CR=68%/RQD=25% 22.00
			R15	CR=65%/RQD=37% 22.75
			R16	CR=68%/RQD=25% 23.50
			R17	CR=72%/RQD=16% 24.25
			R18	CR=78%/RQD=28% 25.00
25.00m				

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 30/05/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO.9

Co-ordinates E=9104 N=1805

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 27/04/2020
Completion Date : 30/04/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.681 m.
Water Struck At :
Standing Water Level : 2.95 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Stiff, reddish brown, clayey silt with moorum & kankar.		2 2 2 3 10/2 3	DS-1	0.50
			SPT-1	1.00-1.45
1.50m. Very stiff, brownish grey, clayey silt with kankar.			UDS-1	2.00-2.45
		3 2 3 4 18/4 7	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
4.50m. Hard, brownish grey, clayey silt with kankar.		7 9 17 19 >100/48	SPT-3	5.00-5.35
5.50m. Hard, brownish grey, clayey silt with decomposed rock.		5.0 cm Penetn. Refusal		
6.00m.		100 3.0 cm Penetn.	*SPT-4	6.00-6.03 6.00
		NX rotary drilling from 6.00m to 25.00m	R1	CR=37%/RQD=Nil 6.75
			R2	CR=45%/RQD=Nil 7.50
Highly to moderately weathered, brownish grey, fine grained, highly fractured Argillaceous Limestone.			R3	CR=35%/RQD=25% 8.25
			R4	CR=56%/RQD=16% 9.00
			R5	CR=48%/RQD=Nil 9.75
9.75m. Moderately weathered, brownish grey, fine grained, highly fractured Argillaceous Limestone.			R6	CR=52%/RQD=Nil 10.50
			R7	CR=55%/RQD=18% 11.25
11.25m. Highly/moderately weathered, brownish grey, fine grained, highly fractured Argillaceous Limestone.			R8	CR=42%/RQD=Nil 12.00
			R9	CR=45%/RQD=15% 12.75
			R10	CR=56%/RQD=20% 13.50
			R11	CR=43%/RQD=15% 14.25
			R12	CR=48%/RQD=Nil 15.00
			R13	CR=50%/RQD=Nil 15.75
			R14	CR=35%/RQD=Nil 16.50
			R15	CR=40%/RQD=Nil 17.25
17.25m. 17.60m.				

BH-9/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 30/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.9

Co-ordinates E=9104 N=1805

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 27/04/2020
Completion Date : 30/04/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.681 m.
Water Struck At :
Standing Water Level : 2.95 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m Moderately weathered, brownish grey, fine grained, highly fractured Argillaceous Limestone.			R16	CR=52%/RQD=30% 18.00
18.75m Moderately weathered, brownish grey, fine grained, highly fractured Argillaceous Limestone.			R17	CR=57%/RQD=20% 18.75
19.50m Moderately/slightly weathered, brownish grey, fine grained, highly fractured Argillaceous Limestone.			R18	CR=48%/RQD=Nil 19.50
21.00m Slightly weathered, steel grey, medium grained, highly fractured Shale.			R19	CR=68%/RQD=Nil 20.25
21.75m Moderately weathered, steel grey, medium to fine grained, highly fractured Shale.			R20	CR=52%/RQD=Nil 21.00
22.50m Slightly weathered to fresh, steel grey, medium to fine grained, highly fractured Shale.			R21	CR=71%/RQD=Nil 21.75
25.00m			R22	CR=50%/RQD=Nil 22.50
			R23	CR=82%/RQD=Nil 23.25
			R24	CR=77%/RQD=38% 24.00
			R25	CR=88%/RQD=Nil 25.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376	Created by : SKD	Created on : 23/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.10

Co-ordinates E=9429 N=1813

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	4
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 09/03/2020
Completion Date : 11/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 294.267 M.
Water Struck At :
Standing Water Level : 3.60 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Stiff, brownish grey, clayey silt. Observed kankar & moorum.		1 1 2 2 10/3 3	DS-1	0.50
			SPT-1	1.00-1.45
			UDS-1	2.00-2.45
3.00m				
Very stiff, brownish grey, silty clay / clayey silt. Observed kankar.		2 2 3 5 20/6 6	SPT-2	3.00-3.45
			*UDS-2	4.00-4.45
		2 3 3 4 21/6 8	SPT-3	5.00-5.45
			UDS-3	6.00-6.45
7.00m				
Hard, brownish grey, silty clay / clayey silt. Observed kankar.		3 5 5 7 31/9 10	SPT-4	7.00-7.45
8.00m				
Hard, brownish grey, clayey silt / silty clay with decomposed rock.		17 21 35 27 >100 2.5 cm Pentn.	*UDS-4	8.00-8.05
			SPT-5	8.50-8.75
9.00m		100 >100 4.0 cm Pentn.	*SPT-6	9.00-9.04
		NX rotary drilling from 9.00m to 20.00m	R1	CR=20%/RQD=Nil 9.75
Completely to highly weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R2	CR=25%/RQD=Nil 10.50
			R3	CR=30%/RQD=Nil 11.25
			R4	CR=25%/RQD=Nil 12.00
12.00m			R5	CR=32%/RQD=Nil 12.75
			R6	CR=35%/RQD=Nil 13.50
			R7	CR=40%/RQD=Nil 14.25
Highly to moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R8	CR=35%/RQD=Nil 15.00
			R9	CR=40%/RQD=Nil 15.75
			R10	CR=38%/RQD=Nil 16.50
			R11	CR=35%/RQD=Nil 17.25
17.60m				

BH-10/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 23/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.10

Co-ordinates E=9429 N=1813

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	4
Cone (Pc)		Penetrometer (SPT)	6
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	0

Commencement Date : 09/03/2020
Completion Date : 11/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 294.267 M.
Water Struck At :
Standing Water Level : 3.60 m.

DESCRIPTION	SYMBOL	N-VALUE EACH DIVN. = 7.5cm	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m Highly to moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone. 18.00m			R12	CR=42%/RQD=Nil 18.00
			R13	CR=30%/RQD=Nil 18.75
Highly to moderately weathered, deep grey, medium grained, fractured Argillaceous Limestone.			R14	CR=38%/RQD=Nil 19.50
20.00m			R15	CR=48%/RQD=Nil 20.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 30/05/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO.11

Co-ordinates E=9172 N=1732

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 04/05/2020
Completion Date : 05/05/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.921 m.
Water Struck At :
Standing Water Level : 4.5 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Stiff, brownish grey, clayey silt. Observed kankar & moorum.		1 2 2 3 9/2 2	DS-1	0.50
			SPT-1	1.00-1.45
			UDS-1	2.00-2.45
2.50m				
Stiff, brownish grey, clayey silt. Observed kankar.		1 2 3 3 13/3 4	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
4.80m				
Hard, brownish grey, clayey silt with decomposed rock.		37 63 >100 2.5 cm Penetn.	SPT-3	5.00-5.10
5.25m		100 Refusal 3.0 cm Penetn.	*SPT-4	5.25-5.28
		NX rotary drilling from 5.25m to 20.00m	R1	CR=30%/RQD=Nil 5.25
			R2	CR=28%/RQD=Nil 6.00
			R3	CR=36%/RQD=Nil 6.75
			R4	CR=30%/RQD=Nil 7.50
			R5	CR=35%/RQD=Nil 8.25
Highly to moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R6	CR=42%/RQD=20% 9.00
			R7	CR=38%/RQD=Nil 9.75
			R8	CR=30%/RQD=Nil 10.50
			R9	CR=45%/RQD=Nil 11.25
			R10	CR=40%/RQD=Nil 12.00
			R11	CR=52%/RQD=Nil 12.75
			R12	CR=45%/RQD=Nil 13.50
14.25m			R13	CR=62%/RQD=30% 14.25
Moderately/slightly weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R14	CR=52%/RQD=28% 15.00
			R15	CR=66%/RQD=40% 15.75
			R16	CR=52%/RQD=18% 16.50
17.25m				17.25
17.60m				

BH-11/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 30/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.11

Co-ordinates E=9172 N=1732

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 04/05/2020
Completion Date : 05/05/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.921 m.
Water Struck At :
Standing Water Level : 4.5 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
Highly weathered, brownish grey, medium grained, fractured Shale. 17.60m 18.00m			R17	CR=40%/RQD=32% 18.00
			R18	CR=67%/RQD=Nil 18.75
Moderately to slightly weathered, steel grey to brownish grey, medium grained, highly fractured Shale. 20.00m			R19	CR=58%/RQD=Nil 19.50
			R20	CR=80%/RQD=Nil 20.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 30/05/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO.12

Co-ordinates E=9303 N=1842

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	9	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	9
Vane (V)		Disturbed (DS)	13
		Water Sample (WS)	1

Commencement Date : 13/05/2020
Completion Date : 15/05/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 294.224 m.
Water Struck At :
Standing Water Level : 3.0 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Filled up with concrete blocks & boulders.			DS-1	0.50
0.80m		4 5 4 6 (21) 5 6	SPT-1	1.00-1.45
Stiff / very stiff, brownish grey, clayey silt with moorum. Observed kankar.			UDS-1	2.00-2.45
			WS-1	3.00
		3 2 3 3 (13) 4 3	SPT-2	3.00-3.45
3.80m			UDS-2	4.00-4.45
		5 5 6 6 (32) 9 11	SPT-3	5.00-5.45
Hard, light brownish grey, clayey silt with traces of kankar			*UDS-3	6.00-6.12
		4 5 7 8 (51) 14 22	SPT-4	7.00-7.45
		5 7 9 11 (59) 16 23	SPT-5	8.00-8.45
9.00m		5 7 12 16 (70) 18 24	SPT-6	9.00-9.45
Hard, brownish grey, clayey silt with decomposed rock.		9 15 21 25 (>100) 30 7.0 cm Pentn.	SPT-7	10.00-10.37
		43 57 (>100) 1.5 cm Pentn.	DS-2	11.00
			SPT-8	11.20-11.29
11.50m		100 (Refusal) 3.0 cm Pentn.	*SPT-9	11.50-11.53
		NX rotary drilling from 11.50m to 20.00m	R1	CR=41%/RQD=19% 11.50 - 12.25
			R2	CR=47%/RQD=15% 12.25 - 13.00
			R3	CR=47%/RQD=14% 13.00 - 13.75
Highly/moderately weathered, light brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R4	CR=59%/RQD=17% 13.75 - 14.50
			R5	CR=43%/RQD=Nil 14.50 - 15.25
			R6	CR=28%/RQD=Nil 15.25 - 16.00
			R7	CR=36%/RQD=19% 16.00 - 16.75
			R8	CR=31%/RQD=Nil 16.75 - 17.50
17.60m				

BH-12/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 30/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.12

Co-ordinates E=9303 N=1842

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	9	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	9
Vane (V)		Disturbed (DS)	13
		Water Sample (WS)	1

Commencement Date : 13/05/2020
Completion Date : 15/05/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 294.224 m.
Water Struck At :
Standing Water Level : 3.0 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m				
Highly/moderately weathered, light brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R9	CR=40%/RQD=Nil 18.25
			R10	CR=44%/RQD=Nil 19.00
			R11	CR=40%/RQD=Nil 20.00
20.00m				

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376	Created by : SKD	Created on : 30/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.13

Co-ordinates E=9352 N=1848

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	9	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	9
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 13/05/2020
Completion Date : 16/05/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 294.165 m.
Water Struck At :
Standing Water Level : 2.9 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m Filled up with concrete blocks & boulders.			DS-1	0.50
0.80m Stiff / very stiff, brownish grey, clayey silt with moorum. Observed kankar.		3 5 4 5 (26) 8 9	SPT-1	1.00-1.45
			UDS-1	2.00-2.45
		3 3 3 4 (14) 3 4	SPT-2	3.00-3.45
3.50m Hard, light brownish grey, clayey silt with traces of kankar.			UDS-2	4.00-4.45
		4 5 5 6 (32) 9 12	SPT-3	5.00-5.45
			*UDS-3	6.00-6.12
		3 6 8 12 (53) 15 18	SPT-4	7.00-7.45
		5 7 8 11 (57) 18 20	SPT-5	8.00-8.45
9.00m Hard, light brownish grey, clayey silt with decomposed rock.		7 8 11 14 (62) 18 19	SPT-6	9.00-9.45
		10 12 17 30 (>100) 31 5.0 cm Pentn.	SPT-7	10.00-10.35
			DS-2	11.00
		13 28 35 24 (>100) 4.5 cm Pentn.	SPT-8	11.50-11.77
12.00m Highly weathered, light yellowish grey to light brownish grey, fine grained, highly fractured Argillaceous Limestone.		100 (>100) 3.0 cm Pentn. NX rotary drilling from 12.00m to 20.00m	*SPT-9 R1 R2 R3 R4 R5 R6 R7	12.00-12.03 12.00 CR=21%/RQD=Nil 12.75 CR=24%/RQD=Nil 13.50 CR=30%/RQD=Nil 14.25 CR=34%/RQD=Nil 15.00 CR=27%/RQD=Nil 15.75 CR=22%/RQD=Nil 16.50 CR=31%/RQD=17% 17.25
13.50m Highly weathered, light brownish grey, fine grained, highly fractured Argillaceous Argillaceous Limestone. 14.25m				
Highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone. 15.75m				
Highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone. 16.50m				
Highly to moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone. 17.60m				

BH-13/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 30/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.13

Co-ordinates E=9352 N=1848

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	9	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	2
Vane (V)		Disturbed (DS)	13
		Water Sample (WS)	0

Commencement Date : 13/05/2020
Completion Date : 16/05/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 294.165 m.
Water Struck At :
Standing Water Level : 2.9 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m.			R8	CR=28%/RQD=Nil 18.00
Highly to moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R9	CR=31%/RQD=Nil 18.75
			R10	CR=38%/RQD=26% 19.50
20.00m.			R11	CR=46%/RQD=20% 20.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376	Created by : SKD	Created on : 30/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.14

Co-ordinates E=9382 N=1834

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	4
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 18/05/2020
Completion Date : 19/05/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 294.115 m.
Water Struck At :
Standing Water Level : 3.2 m.

DESCRIPTION	SYMBOL	N-VALUE EACH DIVN. = 7.5cm	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m Filled up with concrete blocks & boulders. 0.60m			DS-1	0.50
Stiff / very stiff, brownish grey, clayey silt with moorum. Observed kankar.		4 4 5 4 (18) 4 5	SPT-1	1.00-1.45
			UDS-1	2.00-2.45
3.60m		1 2 2 2 (10) 3 3	SPT-2	3.00-3.45
Very stiff, brownish grey, clayey silt with traces of kankar.			UDS-2	4.00-4.45
		3 3 4 5 (21) 5 7	SPT-3	5.00-5.45
			UDS-3	6.00-6.45
7.00m Hard, brownish grey, clayey silt with traces of kankar.		5 5 7 8 (37) 10 12	SPT-4	7.00-7.45
			*UDS-4	8.00-8.12
9.00m Hard, brownish grey, clayey silt with decomposed rock.		7 8 10 12 (59) 16 21	SPT-5	9.00-9.45
		12 14 22 26 (≥100) 26 4.0 cm Pentn.	SPT-6	10.00-10.34
		10 28 38 24 (≥100) 2.5 cm Pentn.	SPT-7	11.00-11.25
11.50m		100 Refusal 3.0 cm Penth.	*SPT-8	11.50-11.53
Highly weathered, brownish grey, fine grained, highly fractured Argillaceous Limestone. 12.25m		NX rotary drilling from 11.50m to 20.00m		11.50
			R1	CR=24%/RQD=Nil
				12.25
			R2	CR=30%/RQD=Nil
				13.00
			R3	CR=36%/RQD=Nil
				13.75
			R4	CR=35%/RQD=Nil
				14.50
			R5	CR=28%/RQD=21%
				15.25
Highly/moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R6	CR=47%/RQD=18%
				16.00
			R7	CR=40%/RQD=14%
				16.75
			R8	CR=40%/RQD=14%
17.60m				17.50

BH-14/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 30/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.14

Co-ordinates E=9382 N=1834

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	8	Undisturbed (UDS)	4
Cone (Pc)		Penetrometer (SPT)	8
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 18/05/2020
Completion Date : 19/05/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 294.115 m.
Water Struck At :
Standing Water Level : 3.2 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m.				
Highly/moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R9	CR=38%/RQD=Nil 18.25
			R10	CR=42%/RQD=Nil 19.00
			R11	CR=39%/RQD=18% 20.00
20.00m.				

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376	Created by : SKD	Created on : 30/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.15

Co-ordinates E=9379 N=1772

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	1

Commencement Date : 23/04/2020
Completion Date : 26/04/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 294.436 m.
Water Struck At :
Standing Water Level : 4.9 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m Reddish brown, clayey silt with moorum & kankar. 0.50m			DS-1	0.50
		1 2 1 2 6/1 2	SPT-1	1.00-1.45
Medium, brownish grey, clayey silt / silty clay. Observed kankar.			UDS-1	2.00-2.45
		2 1 2 1 6/1 2	SPT-2	3.00-3.45
4.00m			UDS-2	4.00-4.45
			WS-1	4.90
		1 1 2 2 9/2 3	SPT-3	5.00-5.45
Stiff to very stiff, brownish grey, clayey silt / silty clay. Observed kankar.			UDS-3	6.00-6.45
		2 2 2 3 18/5 8	SPT-4	7.00-7.45
7.80m		>100		
		15 12 17 19 42 5.0 cm Pentn.	SPT-5	8.00-8.35
Hard, brownish grey, clayey silt with decomposed rock. 8.50m		100 Refusal 4.0 cm Pentn.	*SPT-6	8.50-8.54 8.50
		NX rotary drilling from 8.50m to 25.00m	R1	CR=28%/RQD=Nil 9.25
			R2	CR=41%/RQD=Nil 10.00
Highly to moderately weathered, brownish grey, fine grained, fractured Argillaceous Limestone.			R3	CR=28%/RQD=16% 10.75
			R4	CR=42%/RQD=20% 11.50
			R5	CR=48%/RQD=25% 12.25
12.25m			R6	CR=56%/RQD=16% 13.00
Moderately/slightly weathered, brownish grey, fine grained, highly fractured Argillaceous Limestone.			R7	CR=62%/RQD=20% 13.75
			R8	CR=52%/RQD=16% 14.50
14.50m Moderately weathered, brownish grey, fine grained, highly fractured Argillaceous Limestone. 15.25m			R9	CR=45%/RQD=Nil 15.25
			R10	CR=68%/RQD=25% 16.00
Moderately/slightly weathered, brownish grey, fine grained, fractured Argillaceous Limestone.			R11	CR=62%/RQD=20% 16.75
			R12	CR=72%/RQD=32% 17.50
17.60m				

BH-15/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 30/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.15

Co-ordinates E=9379 N=1772

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	1

Commencement Date : 23/04/2020
Completion Date : 26/04/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 294.436 m.
Water Struck At :
Standing Water Level : 4.9 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m.				
Moderately/slightly weathered, brownish grey, fine grained, fractured Argillaceous Limestone.			R13	CR=68%/RQD=20% 18.25
			R14	CR=52%/RQD=Nil 19.00
			R15	CR=56%/RQD=20% 19.75
19.75m.			R16	CR=43%/RQD=Nil 20.50
			R17	CR=58%/RQD=26% 21.25
Highly to moderately / slightly weathered, brownish grey, fine grained, fractured Argillaceous Limestone.			R18	CR=39%/RQD=Nil 22.00
			R19	CR=37%/RQD=16% 22.75
			R20	CR=68%/RQD=Nil 23.50
			R21	CR=49%/RQD=22% 24.25
			R22	CR=57%/RQD=28% 25.00
25.00m.				

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 25/04/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO.16

Co-ordinates E=9453 N=1713

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 16/03/2020
Completion Date : 18/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.965 m.
Water Struck At :
Standing Water Level : 5.8 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m Brownish grey to yellowish brown, clayey silt with moorum. 0.40m.			DS-1	0.50
Medium, brownish grey, clayey silt. silt. Observed kankar.		1 2 2 2 (7) 1 2	SPT-1	1.00-1.45
			UDS-1	2.00-2.45
3.00m Very stiff, brownish grey, clayey silt. Observed kankar.		2 1 2 3 (16) 5 6	SPT-2	3.00-3.45
			*UDS-2	4.00-4.45
4.60m Hard, deep grey, clayey silt / silty clay. Observed kankar.		2 3 5 7 (36) 12 12	SPT-3	5.00-5.45
			*UDS-3	6.00-6.06
6.50m Hard, brownish grey, clayey silt with decomposed rock.		6 12 19 23 (≥100) 40	SPT-4	6.50-6.85
7.25m		100 5.0 cm Pentn. Refusal 3.0 cm Pentn.	*SPT-5	7.25-7.28 7.25
Highly to moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.		NX rotary drilling from 7.25m to 20.00m	R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14	CR=28%/RQD=Nil 8.00 CR=40%/RQD=Nil 8.75 CR=43%/RQD=Nil 9.50 CR=52%/RQD=Nil 10.25 CR=50%/RQD=Nil 11.00 CR=42%/RQD=Nil 11.75 CR=38%/RQD=Nil 12.50 CR=53%/RQD=Nil 13.25 CR=47%/RQD=Nil 14.00 CR=40%/RQD=Nil 14.75 CR=44%/RQD=Nil 15.50 CR=32%/RQD=Nil 16.25 CR=48%/RQD=Nil 17.00 CR=34%/RQD=Nil
15.50m Highly/moderately weathered, deep grey, medium grained, highly fractured Argillaceous Limestone.				
17.60m				

BH-16/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 25/04/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.16

Co-ordinates E=9453 N=1713

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 16/03/2020
Completion Date : 18/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.965 m.
Water Struck At :
Standing Water Level : 5.8 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
				17.75
17.60m. Highly/moderately weathered, deep grey, medium grained, highly fractured Argillaceous Limestone.			R15	CR=44%/RQD=Nil
				18.50
			R16	CR=36%/RQD=Nil
19.25m. Moderately weathered, deep grey, medium grained, highly fractured Argillaceous Limestone. 20.00m.				19.25
			R17	CR=57%/RQD=Nil
				20.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376	Created by : SKD	Created on : 30/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.17

Co-ordinates E=9265 N=1716

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 19/03/2020
Completion Date : 22/04/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 291.025 m.
Water Struck At :
Standing Water Level : 1.9 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Medium, brownish grey, clayey silt. Observed kankar.		1 2 2 2 7/1 2	DS-1	0.50
			SPT-1	1.00-1.45
			UDS-1	2.00-2.45
3.00m				
Stiff, brownish grey, clayey silt. Observed kankar.		2 2 2 2 9/3 2	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
4.50m				
Hard, brownish grey, clayey silt. Observed kankar.		3 5 7 7 36/10 12	SPT-3	5.00-5.45
5.80m		4 3 57 ≥100 2.5 cm Penth.	SPT-4	6.00-6.10
Hard, brownish grey, clayey silt with decomposed rock.			*SPT-5	6.25-6.28 6.25
6.25m		100 ≥100 3.0 cm Penth.		
Highly weathered, brownish grey, fine grained, highly fractured Argillaceous Limestone.			R1	CR=25%/RQD=Nil 7.00
7.00m		NX rotary drilling from 6.25m to 20.00m	R2	CR=35%/RQD=Nil 7.75
			R3	CR=37%/RQD=18% 8.50
Highly/moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R4	CR=45%/RQD=Nil 9.25
			R5	CR=50%/RQD=Nil 10.00
			R6	CR=38%/RQD=19% 10.75
10.75m			R7	CR=55%/RQD=Nil 11.50
Moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R8	CR=60%/RQD=36% 12.25
			R9	CR=51%/RQD=Nil 13.00
13.00m			R10	CR=48%/RQD=Nil 13.75
			R11	CR=32%/RQD=16% 14.50
Highly/moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R12	CR=32%/RQD=20% 15.25
			R13	CR=52%/RQD=40% 16.00
			R14	CR=44%/RQD=30% 16.75
			R15	CR=32%/RQD=Nil 17.50
17.50m				
17.60m				

BH-17/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 30/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.17

Co-ordinates E=9265 N=1716

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 19/03/2020
Completion Date : 22/04/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 291.025 m.
Water Struck At :
Standing Water Level : 1.9 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m.				
Moderately / slightly weathered, brownish grey to steel grey, fine to medium grained, fractured Argillaceous Limestone.			R16	CR=68%/RQD=50% 18.25
			R17	CR=60%/RQD=20% 19.00
			R18	CR=60%/RQD=28% 20.00
20.00m.				

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376	Created by : SKD	Created on : 30/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.18

Co-ordinates E=9239 N=1716

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 23/04/2020
Completion Date : 26/04/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 291.50 m.
Water Struck At :
Standing Water Level : 1.85 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Medium, brownish grey, clayey silt. Observed kankar.		2 2 1 2 8/2 3	DS-1	0.50
			SPT-1	1.00-1.45
2.00m			UDS-1	2.00-2.45
Stiff, brownish grey, clayey silt. Observed kankar.		1 2 2 3 10/2 3	SPT-2	3.00-3.45
4.00m			UDS-2	4.00-4.45
Hard, brownish grey, clayey silt. Observed kankar.		4 5 6 7 35/9 13	SPT-3	5.00-5.45
5.60m				
Very dense, brownish grey, clayey silty sand with decomposed rock.		39 61 1.5 cm Pentn. ≥100	SPT-4	6.00-6.09
6.25m		100 3.0 cm Pentn. Refusal	*SPT-5	6.25-6.28
		NX rotary drilling from 6.25m to 20.00m	R1	CR=30%/RQD=Nil 6.25
			R2	CR=34%/RQD=Nil 7.00
			R3	CR=33%/RQD=Nil 7.75
Highly to moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R4	CR=38%/RQD=Nil 8.50
			R5	CR=31%/RQD=Nil 9.25
			R6	CR=43%/RQD=Nil 10.00
			R7	CR=51%/RQD=22% 10.75
			R8	CR=45%/RQD=24% 11.50
12.25m			R9	CR=55%/RQD=34% 12.25
Moderately to slightly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R10	CR=62%/RQD=15% 13.00
			R11	CR=51%/RQD=16% 13.75
			R12	CR=63%/RQD=15% 14.50
15.25m			R13	CR=47%/RQD=Nil 15.25
Moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R14	CR=45%/RQD=18% 16.00
			R15	CR=54%/RQD=45% 16.75
17.60m				17.50

BH-18/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 30/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.18

Co-ordinates E=9239 N=1716

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 23/04/2020
Completion Date : 26/04/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 291.50 m.
Water Struck At :
Standing Water Level : 1.85 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m.				
Moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R16	CR=43%/RQD=Nil 18.25
			R17	CR=46%/RQD=Nil 19.00
			R18	CR=52%/RQD=18% 20.00
20.00m.				

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 23/03/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO.19

Co-ordinates E=9428 N=1792

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	7
		Disturbed (DS)	2
Vane (V)		Water Sample (WS)	0

Commencement Date : 07/03/2020
Completion Date : 08/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 294.12 m.
Water Struck At :
Standing Water Level : 3.10 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Stiff, brownish grey to yellowish grey, clayey silt. Observed kankar & moorum.		2 2 3 2 13/5 3	DS-1	0.50
			SPT-1	1.00-1.45
			UDS-1	2.00-2.45
3.00m				
Very stiff, deep grey, clayey silt. Observed kankar.		3 3 3 4 19/6 6	SPT-2	3.00-3.45
			*UDS-2	4.00-4.45
		2 3 3 7 20/5 5	SPT-3	5.00-5.45
			UDS-3	6.00-6.45
		3 2 3 5 28/8 12	SPT-4	7.00-7.45
8.00m				
Hard, brownish grey, clayey silt / silty clay with decomposed rock.		11 17 19 >100/21 32 3.0 cm Pentn.	SPT-5	8.00-8.33
9.00m		100 Refusal 3.0 cm Pentn.	*SPT-6	9.00-9.03 9.00
			R1/DS-2	CR=Nil/RQD=Nil
		100 Refusal 2.0 cm Pentn.	*SPT-7	9.75-9.77 9.75
			R2	CR=20%/RQD=Nil 10.50
Completely to highly weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.		NX rotary drilling from 9.00m to 20.00m	R3	CR=20%/RQD=Nil 11.25
			R4	CR=25%/RQD=Nil 12.00
			R5	CR=30%/RQD=Nil 12.75
			R6	CR=25%/RQD=Nil 13.50
13.50m				
Highly weathered, brownish grey, medium grained, fractured Argillaceous Limestone. 14.25m			R7	CR=37%/RQD=Nil 14.25
			R8	CR=44%/RQD=Nil 15.00
Moderately weathered, deep grey, medium grained, highly fractured Argillaceous Limestone.			R9	CR=42%/RQD=Nil 15.75
			R10	CR=48%/RQD=16% 16.50
16.50m				
Slightly weathered, deep grey, medium grained, fractured Argillaceous Limestone.			R11	CR=68%/RQD=26% 17.25
17.25m				
17.60m				

BH-19/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 23/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.19

Co-ordinates E=9428 N=1792

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	2
		Water Sample (WS)	0

Commencement Date : 07/03/2020
Completion Date : 08/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 294.12 m.
Water Struck At :
Standing Water Level : 3.10 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
Moderately weathered, brownish grey, fine grained, fractured Argillaceous Limestone. 17.60m – 18.00m			R12	CR=52%/RQD=Nil 18.00
Moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone. 18.75m			R13	CR=48%/RQD=Nil 18.75
			R14	CR=68%/RQD=Nil 19.50
Slightly weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone. 20.00m			R15	CR=80%/RQD=Nil 20.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 30/05/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO.20

Co-ordinates E=9135 N=1758

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	1

Commencement Date : 01/05/2020
Completion Date : 03/05/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.688 m.
Water Struck At :
Standing Water Level : 4.2 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Reddish brown, clayey silt / silty clay with moorum.			DS-1	0.50
0.80m		2 2 3 2 11/2 4	SPT-1	1.00-1.45
			UDS-1	2.00-2.45
Stiff, brownish grey, clayey silt with sand mixture. Observed kankar.		1 2 2 2 8/2 2	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
			WS-1	4.20
5.00m		18 32/3.0 cm 50 ≥100 Pentn.	SPT-3	5.00-5.18
Hard, brownish grey, clayey silt with decomposed rock.		100/3.0 cm ≥100 Pentn.	*SPT-4	5.25-5.28
5.25m				5.25
		NX rotary drilling from 5.25m to 20.00m	R1	CR=28%/RQD=Nil
				6.00
			R2	CR=35%/RQD=18%
				6.75
Highly to moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R3	CR=37%/RQD=Nil
				7.50
			R4	CR=32%/RQD=Nil
				8.25
			R5	CR=45%/RQD=Nil
9.00m				9.00
			R6	CR=56%/RQD=Nil
				9.75
Moderately to slightly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R7	CR=52%/RQD=15%
				10.50
			R8	CR=62%/RQD=30%
11.25m				11.25
			R9	CR=45%/RQD=20%
				12.00
Moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R10	CR=52%/RQD=30%
				12.75
			R11	CR=42%/RQD=Nil
13.50m				13.50
Moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R12	CR=60%/RQD=27%
				14.25
			R13	CR=52%/RQD=30%
15.00m				15.00
			R14	CR=45%/RQD=Nil
				15.75
Highly/moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R15	CR=56%/RQD=16%
				16.50
			R16	CR=30%/RQD=Nil
17.25m				17.25
17.60m				

BH-20/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 30/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.20

Co-ordinates E=9135 N=1758

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	1

Commencement Date : 01/05/2020
Completion Date : 03/05/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.688 m.
Water Struck At :
Standing Water Level : 4.2 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m.			R17	CR=66%/RQD=Nil 18.00
Moderately to slightly weathered, steel grey, fine to medium grained, highly fractured Shale.			R18	CR=60%/RQD=Nil 18.75
			R19	CR=52%/RQD=Nil 19.50
20.00m.			R20	CR=65%/RQD=Nil 20.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376	Created by : SKD	Created on : 27/04/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.21

Co-ordinates E=9435 N=1772

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 06/03/2020
Completion Date : 07/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 294.415 m.
Water Struck At :
Standing Water Level : 2.9 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Stiff, reddish brown, clayey silt. Observed kankar.		1 1 1 2 8/3 2	DS-1	0.50
			SPT-1	1.00-1.45
			UDS-1	2.00-2.45
2.50m				
Very stiff, brownish grey, clayey silt. Observed kankar & moorum.		2 2 2 3 17/5 7	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
4.00m				
Stiff, brownish grey, clayey silt. Observed kankar & moorum.		2 2 1 2 9/3 3	SPT-3	5.00-5.45
6.00m				
Hard, brownish grey, clayey silt with decomposed rock.		12 22 32 34 ≥100 2.5 cm Pentn.	*UDS-3	6.00-6.06
			SPT-4	6.25-6.50
6.75m		100 Refusal 4.0 cm Pentn.	*SPT-5	6.75-6.79
			R1	CR=20%/RQD=Nil
				7.50
Completely to highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.		NX rotary drilling from 6.75m to 25.00m	R2	CR=23%/RQD=Nil
				8.25
			R3	CR=20%/RQD=Nil
				9.00
			R4	CR=25%/RQD=Nil
9.75m				9.75
Highly weathered, brownish grey, fine to medium grained, highly fractured Shale.			R5	CR=28%/RQD=Nil
				10.50
			R6	CR=25%/RQD=Nil
11.25m				11.25
Moderately weathered, brownish grey, medium grained, highly fractured Argillaceous Limestone.			R7	CR=40%/RQD=20%
12.00m				12.00
			R8	CR=60%/RQD=40%
Moderately weathered, brownish grey, medium grained, highly fractured Argillaceous Limestone. 12.75m				12.75
			R9	CR=72%/RQD=Nil
				13.50
			R10	CR=60%/RQD=40%
				14.25
Moderately/slightly weathered, deep grey, medium grained, highly fractured Argillaceous Limestone.			R11	CR=52%/RQD=20%
				15.00
			R12	CR=68%/RQD=Nil
				15.75
			R13	CR=60%/RQD=Nil
16.50m				16.50
Moderately to slightly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R14	CR=75%/RQD=28%
17.60m				17.25

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 27/04/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.21

Co-ordinates E=9435 N=1772

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 06/03/2020
Completion Date : 07/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 294.415 m.
Water Struck At :
Standing Water Level : 2.9 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m. Moderately to slightly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R15	CR=52%/RQD=Nil 18.00
			R16	CR=80%/RQD=Nil 18.75
18.75m. Highly/moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R17	CR=44%/RQD=Nil 19.50
			R18	CR=52%/RQD=Nil 20.25
			R19	CR=45%/RQD=Nil 21.00
			R20	CR=50%/RQD=Nil 21.75
			R21	CR=48%/RQD=Nil 22.50
			R22	CR=40%/RQD=Nil 23.25
23.25m. Moderately to slightly weathered, brownish grey, fine to medium grained, highly fractured Shale.			R23	CR=60%/RQD=Nil 24.00
			R24	CR=80%/RQD=Nil 25.00
25.00m.				

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 25/04/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO.22

Co-ordinates E=9450 N=1758

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	6
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	0

Commencement Date : 18/03/2020
Completion Date : 20/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.685 m.
Water Struck At :
Standing Water Level : 4.3 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Medium, brownish grey, clayey silt. Observed kankar & moorum.		0 0 2 1 8/2 3	DS-1	0.50
			SPT-1	1.00-1.45
			UDS-1	2.00-2.45
2.50m				
Stiff, brownish grey, clayey silt. Observed kankar.		2 3 3 2 13/3 5	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
5.00m				
Very stiff, brownish grey, clayey silt. Observed kankar.		2 3 2 5 17/5 5	SPT-3	5.00-5.45
			*UDS-3	6.00-6.45
7.00m				
Hard, brownish grey, clayey silt with decomposed rock.		3 3 5 7 31/7 12	SPT-4	7.00-7.45
		>100 12 29 11 26 2.5 cm Pentn.	SPT-5	8.00-8.25
8.50m		100 Refusal 3.0 cm Pentn.	SPT-6	8.50-8.53 8.50
Highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.		NX rotary drilling from 8.50m to 25.00m	R1	CR=22%/RQD=Nil 9.25
			R2	CR=25%/RQD=Nil 10.00
10.00m				
Highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R3	CR=40%/RQD=Nil 10.75
			R4	CR=32%/RQD=Nil 11.50
11.50m				
Highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R5	CR=25%/RQD=Nil 12.25
12.25m				
Highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R6	CR=40%/RQD=Nil 13.00
			R7	CR=37%/RQD=22% 13.75
13.75m				
Highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R8	CR=23%/RQD=Nil 14.50
14.50m				
			R9	CR=40%/RQD=Nil 15.25
			R10	CR=27%/RQD=Nil 16.00
Highly to moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R11	CR=30%/RQD=18% 16.75
			R12	CR=40%/RQD=Nil 17.50
17.60m				

BH-22/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 25/04/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.22

Co-ordinates E=9450 N=1758

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 18/03/2020
Completion Date : 20/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.685 m.
Water Struck At :
Standing Water Level : 4.3 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m. Highly to moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R13	CR=50%/RQD=Nil 18.25
18.25m. Moderately weathered, deep grey, medium grained, highly fractured Argillaceous Limestone.			R14	CR=56%/RQD=Nil 19.00
19.00m. Moderately weathered, deep grey, medium grained, highly fractured Argillaceous Limestone.			R15	CR=43%/RQD=Nil 19.75
19.75m. Moderately to slightly weathered, deep grey, medium grained, highly fractured Argillaceous Limestone.			R16	CR=52%/RQD=Nil 20.50
21.25m. Moderately weathered, deep grey, medium grained, highly fractured Argillaceous Limestone.			R17	CR=67%/RQD=Nil 21.25
22.00m. Moderately to slightly weathered, steel grey, medium grained, highly fractured Shale.			R18	CR=50%/RQD=Nil 22.00
			R19	CR=70%/RQD=Nil 22.75
			R20	CR=62%/RQD=Nil 23.50
			R21	CR=60%/RQD=Nil 24.25
			R22	CR=72%/RQD=Nil 25.00
25.00m.				

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 30/05/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO.23

Co-ordinates E=9473 N=1748

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 21/03/2020
Completion Date : 23/04/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.66 m.
Water Struck At :
Standing Water Level : 4.8 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
			DS-1	0.50
Stiff, brownish grey, clayey silt. Observed kankar & moorum.		1 1 2 2 9/2 3	SPT-1	1.00-1.45
			UDS-1	2.00-2.45
		1 2 2 3 9/2 2	SPT-2	3.00-3.45
3.50m				
			UDS-2	4.00-4.45
Hard, brownish grey, clayey silt. Observed kankar.		3 5 6 6 31/7 12	SPT-3	5.00-5.45
			*UDS-3	6.00-6.05
		3 7 7 6 56/18 25	SPT-4	7.00-7.45
8.00m				
Hard, brownish grey, clayey silt with decomposed rock.		17 30 53 >100 3.0 cm Pentn.	SPT-5	8.00-8.18
8.50m		100 >100 3.0 cm Pentn.	*SPT-6	8.50-8.53 8.50
			R1	CR=20%/RQD=Nil 9.25
			R2	CR=21%/RQD=Nil 10.00
Completely/highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.		NX rotary drilling from 8.50m to 20.00m	R3	CR=25%/RQD=Nil 10.75
			R4	CR=20%/RQD=Nil 11.50
			R5	CR=20%/RQD=Nil 12.25
12.25m				
			R6	CR=30%/RQD=Nil 13.00
Highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R7	CR=32%/RQD=Nil 13.75
			R8	CR=28%/RQD=Nil 14.50
			R9	CR=32%/RQD=Nil 15.25
15.25m				
Highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone. 16.00m			R10	CR=24%/RQD=Nil 16.00
			R11	CR=27%/RQD=Nil 16.75
Highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone. 17.60m			R12	CR=32%/RQD=Nil 17.50

BH-23/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 30/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.23

Co-ordinates E=9473 N=1748

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 21/03/2020
Completion Date : 23/04/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.66 m.
Water Struck At :
Standing Water Level : 4.8 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m.				
Highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R13	CR=30%/RQD=Nil 18.25
			R14	CR=28%/RQD=Nil 19.00
			R15	CR=30%/RQD=Nil 20.00
20.00m.				

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 23/03/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO.24

Co-ordinates E=9452 N=1729

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 11/03/2020
Completion Date : 13/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.775 M.
Water Struck At :
Standing Water Level : 6.10 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
			DS-1	0.50
Stiff, brownish grey, clayey silt. Observed kankar & moorum.		2 3 2 3 (11) 3 3	SPT-1	1.00-1.45
			UDS-1	2.00-2.45
3.00m				
		2 2 2 4 (16) 5 5	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
Very stiff, deep grey, clayey silt. Observed kankar.		2 3 3 5 (23) 6 9	SPT-3	5.00-5.45
		≥100	*UDS-3	6.00-6.07
6.50m		12 18 29 41	SPT-4	6.50-6.75
Hard, brownish grey, clayey silt with decomposed rock.		2.5 cm Pentn.	*SPT-5	7.00-7.03
7.00m		100 Refusal		7.00
		30 cm Pentn.	R1	CR=30%/RQD=Nil
		NX rotary drilling from 7.00m to 30.00m		7.75
			R2	CR=35%/RQD=Nil
				8.50
			R3	CR=28%/RQD=Nil
				9.25
			R4	CR=35%/RQD=Nil
				10.00
			R5	CR=40%/RQD=Nil
				10.75
			R6	CR=38%/RQD=Nil
				11.50
Highly/moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R7	CR=40%/RQD=18%
				12.25
			R8	CR=48%/RQD=Nil
				13.00
			R9	CR=35%/RQD=Nil
				13.75
			R10	CR=45%/RQD=Nil
				14.50
			R11	CR=42%/RQD=Nil
				15.25
			R12	CR=38%/RQD=16%
				16.00
			R13	CR=40%/RQD=Nil
				16.75
16.75m			R14	CR=35%/RQD=Nil
Highly weathered, deep grey, medium grained, fractured Argillaceous Limestone.				17.50
17.50m				

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 23/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.24

Co-ordinates E=9452 N=1729

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 11/03/2020
Completion Date : 13/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.775 M.
Water Struck At :
Standing Water Level : 6.10 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m				
Highly/moderately weathered, deep grey, medium grained, fractured Shale.			R15	CR=47%/RQD=Nil 18.25
			R16	CR=38%/RQD=Nil 19.00
19.00m				
			R17	CR=52%/RQD=Nil 19.75
			R18	CR=65%/RQD=Nil 20.50
Moderately/slightly weathered, deep grey, medium grained, fractured Shale.			R19	CR=70%/RQD=Nil 21.25
			R20	CR=56%/RQD=Nil 22.00
			R21	CR=68%/RQD=Nil 22.75
			R22	CR=59%/RQD=Nil 23.50
23.50m				
Moderately weathered, deep grey, medium grained, fractured Shale.			R23	CR=47%/RQD=Nil 24.25
24.25m				
			R24	CR=56%/RQD=Nil 25.00
			R25	CR=60%/RQD=Nil 25.75
Moderately/slightly weathered, deep grey, medium grained, fractured Shale.			R26	CR=52%/RQD=Nil 26.50
			R27	CR=66%/RQD=Nil 27.25
			R28	CR=78%/RQD=Nil 28.00
			R29	CR=60%/RQD=Nil 28.75
28.75m				
Fresh, steel grey, medium grained, fractured Shale.			R30	CR=85%/RQD=Nil 29.50
30.00m			R31	CR=90%/RQD=Nil 30.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 25/04/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO.25

Co-ordinates E=9470 N=1719

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	6
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	1

Commencement Date : 13/03/2020
Completion Date : 15/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.692 m.
Water Struck At :
Standing Water Level : 5.9 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	Depth (m)
0.00m Reddish brown, clayey silt with moorum. 0.30m			DS-1	0.50
Stiff, brownish grey, clayey silt. Observed kankar.		1 2 2 3 14 (5 4)	SPT-1	1.00-1.45
			UDS-1	2.00-2.45
2.50m Stiff, brownish grey, clayey silt. Observed kankar.		1 2 2 2 12 (4 4)	SPT-2	3.00-3.45
			*UDS-2	4.00-4.45
5.00m Very stiff, brownish grey, clayey silt. Observed kankar.		2 3 5 6 25 (7 7)	SPT-3	5.00-5.45
			WS-1	5.90
			UDS-3	6.00-6.45
7.00m Hard, brownish grey, clayey silt with decomposed rock.		5 5 6 9 43 (12 16)	SPT-4	7.00-7.45
		47/2.5 cm >100/3.0 cm Pentn. Refusal	SPT-5	8.00-8.10
8.25m		100	*SPT-6	8.25-8.28 8.25
Completely to highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.		NX rotary drilling from 8.25m to 35.00m	R1	CR=22%/RQD=Nil 9.00
			R2	CR=20%/RQD=Nil 9.75
			R3	CR=28%/RQD=Nil 10.50
			R4	CR=25%/RQD=Nil 11.25
11.25m Moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R5	CR=50%/RQD=28% 12.00
			R6	CR=45%/RQD=20% 12.75
12.75m Moderately weathered, brownish grey, fine to medium grained, highly fractured Shale.			R7	CR=47%/RQD=16% 13.50
			R8	CR=50%/RQD=Nil 14.25
14.25m Moderately/slightly weathered, brownish grey, fine to medium grained, highly fractured Shale.			R9	CR=56%/RQD=Nil 15.00
			R10	CR=70%/RQD=Nil 15.75
			R11	CR=52%/RQD=Nil 16.50
			R12	CR=58%/RQD=Nil 17.25
17.25m 17.60m				

BH-25/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376	Created by : SKD	Created on : 25/04/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.25

Co-ordinates E=9470 N=1719

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	1

Commencement Date : 13/03/2020
Completion Date : 15/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.692 m.
Water Struck At :
Standing Water Level : 5.9 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m. Moderately weathered, brownish grey, fine to medium grained, highly fractured Shale.			R13	CR=50%/RQD=Nil 18.00
			R14	CR=56%/RQD=Nil 18.75
			R15	CR=48%/RQD=Nil 19.50
19.50m. Moderately to slightly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R16	CR=58%/RQD=Nil 20.25
			R17	CR=65%/RQD=Nil 21.00
21.00m. Moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R18	CR=50%/RQD=Nil 21.75
21.75m. Moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R19	CR=57%/RQD=Nil 22.50
			R20	CR=60%/RQD=Nil 23.25
23.25m. Moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R21	CR=50%/RQD=Nil 24.00
24.00m. Moderately/slightly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R22	CR=70%/RQD=Nil 24.75
			R23	CR=68%/RQD=Nil 25.50
25.50m. Moderately/slightly weathered, brownish grey, fine to medium grained, highly fractured Shale.			R24	CR=55%/RQD=Nil 26.25
			R25	CR=58%/RQD=Nil 27.00
			R26	CR=62%/RQD=Nil 27.75
			R27	CR=60%/RQD=Nil 28.50
28.50m. Moderately to slightly weathered / fresh, steel grey, fine grained, highly fractured Shale.			R28	CR=60%/RQD=Nil 29.25
			R29	CR=52%/RQD=Nil 30.00
			R30	CR=57%/RQD=Nil 30.75
			R31	CR=68%/RQD=Nil 31.50
			R32	CR=73%/RQD=Nil 32.25
			R33	CR=60%/RQD=Nil 33.00
			R34	CR=56%/RQD=Nil 30.75
			R35	CR=67%/RQD=Nil 34.50
N.B. – '*' means sample could not be recovered. 35.00m.			R36	CR=90%/RQD=Nil 35.00

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376	Created by : SKD	Created on : 31/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.26

Co-ordinates E=9196 N=1701

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 26/04/2020
Completion Date : 30/04/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.642 m.
Water Struck At :
Standing Water Level : 3.1 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m Very stiff, reddish brown, clayey silt / silty clay with moorum.		3 3 3 4 6 8 (21)	DS-1	0.50
			SPT-1	1.00-1.45
1.50m Vrey stiff, light brownish grey, clayey silt. Observed moorum & kankar.			UDS-1	2.00-2.45
		3 4 4 4 5 6 (19)	SPT-2	3.00-3.45
4.00m Hard, light brownish grey, clayey silt. Observed moorum & kankar.			UDS-2	4.00-4.45
		3 4 5 7 11 12 (35)	SPT-3	5.00-5.45
5.60m Hard, brownish grey, clayey silt with decomposed rock.		4 3 5 7 >100 (>100) 3.5 cm Penth.	SPT-4	5.70-5.81
6.00m		100 Refusal 3.0 cm Penth.	*SPT-5	6.00-6.03
			R1	CR=24%/RQD=Nil 6.00 / 6.75
6.75m Highly weathered, brownish grey, fine grained, highly fractured Argillaceous Limestone.		NX rotary drilling from 6.00m to 20.00m	R2	CR=29%/RQD=16% 7.50
			R3	CR=41%/RQD=Nil 8.25
			R4	CR=26%/RQD=Nil 9.00
			R5	CR=45%/RQD=Nil 9.75
Highly/moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R6	CR=49%/RQD=Nil 10.50
			R7	CR=45%/RQD=Nil 11.25
			R8	CR=42%/RQD=14% 12.00
			R9	CR=44%/RQD=18% 12.75
			R10	CR=47%/RQD=21% 13.50
			R11	CR=28%/RQD=Nil 14.25
14.25m Highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R12	CR=24%/RQD=Nil 15.00
15.00m Moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R13	CR=52%/RQD=14% 15.75
15.75m Highly to moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R14	CR=33%/RQD=21% 16.50
			R15	CR=52%/RQD=16% 17.25
17.60m				

BH-26/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 31/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.26

Co-ordinates E=9196 N=1701

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	0

Commencement Date : 26/04/2020
Completion Date : 30/04/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.642 m.
Water Struck At :
Standing Water Level : 3.1 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m.			R16	CR=46%/RQD=22% 18.00
Highly to moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R17	CR=48%/RQD=13% 18.75
			R18	CR=46%/RQD=Nil 19.50
20.00m.			R19	CR=42%/RQD=Nil 20.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376	Created by : SKD	Created on : 13/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.27

Co-ordinates E=9152 N=1749

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 16/02/2020
Completion Date : 18/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.925 M.
Water Struck At :
Standing Water Level : 2.70 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Very stiff, brownish grey, silty clay with moorum & kankar.		2 2 3 3 4 6 (16)	DS-1	0.50
			SPT-1	1.00-1.45
2.00m			UDS-1	2.00-2.45
Very stiff, deep grey, silty clay. Observed kankar.		3 3 4 4 5 7 (20)	SPT-2	3.00-3.45
4.00m			*UDS-2	4.00-4.15
Hard, brownish grey, silty clay with decomposed rock.		5 8 14 30 34 (≥100)	SPT-3	5.00-5.36
6.00m		100 Refusal 6.0 cm Pentn.	*SPT-4	6.00-6.03 6.00
		100 Refusal 3.0 cm Pentn.	R1	CR=15%/RQD=Nil 6.75
Completely weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.		100 Refusal 2.0 cm Pentn.	*SPT-5	6.75-6.77 7.50
		100 Refusal 3.0 cm Pentn.	R2	CR=16%/RQD=Nil
8.25m		100 Refusal 2.0 cm Pentn.	*SPT-6	7.50-7.53
Highly weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.			R3	CR=13%/RQD=Nil
9.00m		NX rotary drilling from 6.00m to 20.00m	*SPT-7	8.25-8.27 8.25
			R4	CR=36%/RQD=Nil 9.00
Moderately weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.			R5	CR=53%/RQD=17% 9.75
			R6	CR=54%/RQD=14% 10.50
11.25m			R7	CR=51%/RQD=Nil 11.25
Highly/moderately weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.			R8	CR=45%/RQD=24% 12.00
12.75m			R9	CR=37%/RQD=Nil 12.75
Moderately to slightly weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.			R10	CR=55%/RQD=28% 13.50
14.25m			R11	CR=68%/RQD=33% 14.25
			R12	CR=70%/RQD=26% 15.00
			R13	CR=68%/RQD=32% 15.75
Slightly weathered, deep to light grey, fine grained, fractured Argillaceous Limestone.			R14	CR=75%/RQD=Nil 16.50
			R15	CR=74%/RQD=24% 17.25
17.60m				

BH-27/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 13/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.27

Co-ordinates E=9152 N=1749

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 16/02/2020
Completion Date : 18/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.925 M.
Water Struck At :
Standing Water Level : 2.70 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m.			R16	CR=72%/RQD=20% 18.00
Slightly weathered, deep to light grey, fine grained, fractured Argillaceous Limestone.			R17	CR=80%/RQD=20% 18.75
			R18	CR=78%/RQD=Nil 19.50
20.00m.			R19	CR=70%/RQD=Nil 20.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 25/04/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO.28

Co-ordinates E=9234 N=1749

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 09/03/2020
Completion Date : 15/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.565 m.
Water Struck At :
Standing Water Level : 3.7 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Filled up soil consists of clayey silt with ash, moorum etc.			DS-1	0.50
0.80m. Stiff, brownish grey, silty clay / clayey silt. Observed kankar.		2 2 2 2 9/3 2	SPT-1	1.00-1.45
			UDS-1	2.00-2.45
		2 2 1 3 12/3 5	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
5.00m. Hard, brownish grey, clayey silt / silty clay with decomposed rock.		7 8 7 7 41/15 12	SPT-3	5.00-5.45
		49 51 ≥100 2.5 cm Pentn.	SPT-4	5.75-5.85
6.00m.		Refusal 100 3.0 cm Pentn.	*SPT-5	6.00-6.03 6.00
		NX rotary drilling from 6.00m to 20.00m	R1	CR=30%/RQD=Nil 6.75
			R2	CR=35%/RQD=Nil 7.50
			R3	CR=28%/RQD=Nil 8.25
			R4	CR=45%/RQD=22% 9.00
Highly to moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R5	CR=30%/RQD=16% 9.75
			R6	CR=48%/RQD=Nil 10.50
			R7	CR=52%/RQD=Nil 11.25
			R8	CR=40%/RQD=Nil 12.00
			R9	CR=48%/RQD=Nil 12.75
12.75m. Moderately/slightly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R10	CR=56%/RQD=Nil 13.50
			R11	CR=70%/RQD=40% 14.25
			R12	CR=65%/RQD=Nil 15.00
			R13	CR=55%/RQD=42% 15.75
15.75m. Highly to moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R14	CR=50%/RQD=28% 16.50
			R15	CR=28%/RQD=18% 17.25
17.60m.				

BH-28/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 25/04/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.28

Co-ordinates E=9234 N=1749

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 09/03/2020
Completion Date : 15/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.565 m.
Water Struck At :
Standing Water Level : 3.7 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m Highly to moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R16	CR=37%/RQD=Nil 18.00
18.75m Moderately weathered, steel grey, fine to medium grained, highly fractured Argillaceous Limestone.			R17	CR=48%/RQD=Nil 18.75
19.50m Fresh, steel grey, fine to medium grained, highly fractured Shale.			R18	CR=47%/RQD=Nil 19.50
20.00m			R19	CR=90%/RQD=Nil 20.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 08/04/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO.29

Co-ordinates E=9345 N=1762

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 02/03/2020
Completion Date : 03/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 294.259 M.
Water Struck At :
Standing Water Level : 1.90 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
			DS-1	0.50
		2 2 2 1 7/2 2	SPT-1	1.00-1.45
Medium, brownish grey, clayey silt. Observed kankar.			UDS-1	2.00-2.45
3.00m		1 2 3 3 11/2 3	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
Stiff, reddish brown to brownish grey, silty clay. Observed kankar.		1 2 2 3 14/3 6	SPT-3	5.00-5.45
			*UDS-3	6.00-6.45
		2 3 2 2 14/5 5	SPT-4	7.00-7.45
8.00m		12 15 23 23 >100/28	SPT-5	8.00-8.33
Hard, reddish brown to brownish grey, clayey silt / silty clay. Obseved kankar & decomposed rock.		3.0 cm Pentn.		
		17 19 35 >100/29	SPT-6	9.00-9.26
9.50m		3.5 cm Pentn.	*SPT-7	9.50-9.54 9.50
		100 Refusal	R1	CR=20%/RQD=Nil 10.25
Highly weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.		4.0 cm Pentn.	R2	CR=25%/RQD=Nil 11.00
		NX rotary drilling from 9.50m to 20.00m	R3	CR=30%/RQD=Nil 11.75
11.00m			R4	CR=32%/RQD=Nil 12.50
			R5	CR=32%/RQD=18% 13.25
			R6	CR=28%/RQD=Nil 14.00
Highly/moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R7	CR=30%/RQD=Nil 14.75
			R8	CR=45%/RQD=Nil 15.50
			R9	CR=56%/RQD=Nil 16.25
			R10	CR=43%/RQD=Nil 17.00
17.60m			R11	CR=35%/RQD=Nil

BH-29/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 08/04/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.29

Co-ordinates E=9345 N=1762

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 02/03/2020
Completion Date : 03/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 294.259 M.
Water Struck At :
Standing Water Level : 1.90 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m.				17.75
Highly/moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R12	CR=33%/RQD=Nil 18.50
			R13	CR=30%/RQD=Nil 19.25
			R14	CR=35%/RQD=Nil 20.00
20.00m.				

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376	Created by : SKD	Created on : 08/04/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.30

Co-ordinates E=9405 N=1762

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 04/03/2020
Completion Date : 05/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 294.235 M.
Water Struck At :
Standing Water Level : 2.65 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Medium, reddish brown to brownish grey, clayey silt / silty clay. Observed kankar.		1 1 1 2 7/2 2	DS-1	0.50
			SPT-1	1.00-1.45
			UDS-1	2.00-2.45
3.00m				
Stiff, brownish grey, silty clay. Observed kankar.		1 1 1 2 11/3 5	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
		2 2 3 2 14/5 4	SPT-3	5.00-5.45
6.00m				
Very stiff, brownish grey, silty clay. Observed kankar.			UDS-3	6.00-6.45
		2 2 3 3 18/5 7	SPT-4	7.00-7.45
8.00m		49 51 >100 4.5 cm Pentn.	SPT-5	8.00-8.12
Hard, brownish grey, silty clay / clayey silt with decomposed rock. 8.25m		100 Refusal 3.0 cm Pentn.	*SPT-6	8.25-8.28 8.25
		NX rotary drilling from 8.25m to 20.00m	R1	CR=22%/RQD=Nil 9.00
			R2	CR=20%/RQD=Nil 9.75
Highly weathered, deep grey, medium grained, fractured Shale.			R3	CR=25%/RQD=Nil 10.50
			R4	CR=25%/RQD=Nil 11.25
			R5	CR=20%/RQD=Nil 12.00
12.00m			R6	CR=40%/RQD=Nil 12.75
Highly weathered, deep grey, medium grained, fractured Shale.			R7	CR=38%/RQD=Nil 13.50
			R8	CR=36%/RQD=Nil 14.25
14.25m			R9	CR=28%/RQD=Nil 15.00
Highly weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R10	CR=40%/RQD=Nil 15.75
			R11	CR=28%/RQD=Nil 16.50
			R12	CR=30%/RQD=Nil 17.25
17.60m				

BH-30/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 08/04/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.30

Co-ordinates E=9405 N=1762

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 04/03/2020
Completion Date : 05/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 294.235 M.
Water Struck At :
Standing Water Level : 2.65 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m. Highly weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R13	CR=30%/RQD=Nil 18.00
			R14	CR=28%/RQD=Nil 18.75
			R15	CR=32%/RQD=Nil 19.50
19.50m. Highlly weathered, brownish grey, medium grained, fractured Argillaceous Limestone. 20.00m.			R16	CR=25%/RQD=Nil 20.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 31/05/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO.31

Co-ordinates E=9199 N=1683

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 30/04/2020
Completion Date : 05/05/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 290.151 m.
Water Struck At :
Standing Water Level : 1.2 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m Filled up with concrete block.				
0.80m Medium dense, brownish grey, silty sand with clay binder. Observed moorum & kankar.		3 3 2 3 16 (5 6)	DS-1 SPT-1	0.50 1.00-1.45
			*UDS-1	2.00-2.45
3.50m Hard, brownish grey, clayey silt with decomposed rock. 3.75m		4 3 4 4 21 (6 7) 100 for 7cm Pentn. Refusal 100 Refusal 3.0 cm Pentn.	SPT-2 SPT-3 *SPT-4	3.00-3.45 3.60-3.67 3.75-3.78 3.75
4.50m Highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.		NX rotary drilling from 3.75m to 25.00m	R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15 R16 R17 R18	CR=24%/RQD=Nil 4.50 CR=32%/RQD=Nil 5.25 CR=35%/RQD=Nil 6.00 CR=25%/RQD=Nil 6.75 CR=40%/RQD=14% 7.50 CR=24%/RQD=Nil 8.25 CR=26%/RQD=Nil 9.00 CR=20%/RQD=Nil 9.75 CR=36%/RQD=14% 10.50 CR=42%/RQD=15% 11.25 CR=47%/RQD=Nil 12.00 CR=40%/RQD=Nil 12.75 CR=44%/RQD=Nil 13.50 CR=56%/RQD=20% 14.25 CR=63%/RQD=15% 15.00 CR=53%/RQD=16% 15.75 CR=62%/RQD=15% 16.50 CR=57%/RQD=Nil 17.25
7.50m Completely/highly weathered, brorwnish grey, fine to medium grained, highly fractured Argillaceous Limestone.				
9.75m Highly to moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.				
13.50m Moderately/slightly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.				
17.25m 17.60m				

BH-31/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 31/05/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO.31

Co-ordinates E=9199 N=1683

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 30/04/2020
Completion Date : 05/05/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 290.151 m.
Water Struck At :
Standing Water Level : 1.2 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m.			R19	CR=34%/RQD=Nil 18.00
			R20	CR=27%/RQD=Nil 18.75
			R21	CR=29%/RQD=Nil 19.50
			R22	CR=36%/RQD=Nil 20.25
Highly weathered, light brownish grey to light yellowish grey, fine to medium grained, highly fractured Shale.			R23	CR=29%/RQD=Nil 21.00
			R24	CR=30%/RQD=Nil 21.75
			R25	CR=28%/RQD=Nil 22.50
			R26	CR=40%/RQD=Nil 23.25
			R27	CR=29%/RQD=Nil 24.00
			R28	CR=31%/RQD=Nil 25.00
25.00m.				

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 25/04/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO. IBH1

Co-ordinates E=9177 N=1699

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 09/03/2020
Completion Date : 15/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.775 m.
Water Struck At :
Standing Water Level : 2.9 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Filled up with brick bats & coal dust.				
0.50m. Stiff, brownish grey to yellowish grey, silty clay. Observed kankar.		2 2 3 3 2 5 (13)	DS-1	0.50
			SPT-1	1.00-1.45
			UDS-1	2.00-2.45
2.80m. Very stiff, brownish grey, clayey silt. Observed kankar.		2 2 3 3 6 10 (22)	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
5.00m. Hard, brownish grey, silty clay / clayey silt with decomposed rock.		3 5 8 9 9 12 (38)	SPT-3	5.00-5.45
		47 53 ≥100 2.5 cm Pentn. Refusal	*UDS-3	6.00-6.05
			SPT-4	6.20-6.30
6.50m. Highly weathered, brownish grey, fine grained, highly fractured Argillaceous Limestone.		100 4.0 cm Pentn.	*SPT-5	6.50-6.54
7.25m.		NX rotary drilling from 6.50m to 30.00m	R1	CR=25%/RQD=Nil
Highly/moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R2	CR=30%/RQD=Nil
			R3	CR=37%/RQD=26%
			R4	CR=42%/RQD=Nil
			R5	CR=30%/RQD=Nil
			R6	CR=40%/RQD=28%
			R7	CR=56%/RQD=Nil
			R8	CR=35%/RQD=Nil
			R9	CR=40%/RQD=Nil
13.25m. Moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R10	CR=52%/RQD=24%
14.75m. Highly/moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R11	CR=56%/RQD=30%
			R12	CR=44%/RQD=20%
			R13	CR=56%/RQD=16%
			R14	CR=48%/RQD=20%
			R15	CR=40%/RQD=Nil
17.75m.				6.50 7.25 8.00 8.75 9.50 10.25 11.00 11.75 12.50 13.25 14.00 14.75 15.50 16.25 17.00 17.75

BH-1/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 25/04/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH1 | Co-ordinates E=9177 N=1699

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 09/03/2020
Completion Date : 15/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.775 m.
Water Struck At :
Standing Water Level : 2.9 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
				17.75m
Highly to moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R16	CR=52%/RQD=Nil
				18.50
			R17	CR=56%/RQD=Nil
Moderately weathered, brownish grey, fine to medium grained, highly fractured Shale.				19.25
			R18	CR=50%/RQD=Nil
				20.00
Highly to moderately weathered, yellowish grey to grey, fine grained, fractured Shale.			R19	CR=38%/RQD=Nil
				20.75
			R20	CR=48%/RQD=Nil
				21.50
Moderately to slightly weathered, yellowish grey to grey, highly fractured Shale.			R21	CR=65%/RQD=Nil
				22.25
			R22	CR=52%/RQD=Nil
				23.00
			R23	CR=68%/RQD=Nil
				23.75
Highly weathered, yellowish grey to grey, fine grained, highly fractured Shale.			R24	CR=40%/RQD=Nil
				24.50
Moderately weathered, grey, fine grained, highly fractured Shale.			R25	CR=52%/RQD=20%
				25.25
			R26	CR=58%/RQD=Nil
				26.00
			R27	CR=65%/RQD=40%
				26.75
			R28	CR=70%/RQD=45%
Moderately to slightly weathered, steel grey, fine grained, fractured Shale.				27.50
			R29	CR=65%/RQD=Nil
				28.25
			R30	CR=60%/RQD=30%
				29.00
			R31	CR=69%/RQD=Nil
				30.00
				30.00m

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 09/06/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH2 — Co-ordinates E=9196 N=1725

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 27/04/2020
Completion Date : 30/04/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.252 m.
Water Struck At :
Standing Water Level : 3.3 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m Filled up with moorum & kankar. 0.60m			DS-1	0.50
Very stiff, reddish brown, clayey silt with moorum & kankar		3 4 6 5 (23) 4 8	SPT-1	1.00-1.45
			*UDS-1	2.00-2.45
3.00m Very stiff, brownish grey, clayey silt. Observed kankar.		3 5 5 6 (27) 7 9	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
5.00m Hard, brownish grey, clayey silt with decomposed rock.		11 15 17 22 (≥100) 35 4.0 cm Pentn.	SPT-3	5.00-5.34
5.75m		100 (Refusal) 3.0 cm Penth.	*SPT-4	5.75-5.78 5.75
Highly/moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.		NX rotary drilling from 5.75m to 20.00m	R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15 R16	CR=33%/RQD=Nil 6.50 CR=36%/RQD=Nil 7.25 CR=39%/RQD=14% 8.00 CR=44%/RQD=20% 8.75 CR=34%/RQD=Nil 9.50 CR=53%/RQD=27% 10.25 CR=68%/RQD=14% 11.00 CR=56%/RQD=22% 11.75 CR=58%/RQD=Nil 12.50 CR=50%/RQD=25% 13.25 CR=57%/RQD=Nil 14.00 CR=53%/RQD=Nil 14.75 CR=41%/RQD=16% 15.50 CR=53%/RQD=14% 16.25 CR=62%/RQD=35% 17.00 CR=57%/RQD=15%
9.50m Moderately/slightly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.				
14.75m Moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone. 15.50m				
Moderately/slightly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone. 17.60m				

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 09/06/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH2

Co-ordinates E=9196 N=1725

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 27/04/2020
Completion Date : 30/04/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.252 m.
Water Struck At :
Standing Water Level : 3.3 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m.				17.75
			R17	CR=49%/RQD=Nil
				18.50
Moderately/slightly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R18	CR=62%/RQD=34%
				19.25
			R19	CR=50%/RQD=Nil
20.00m.				20.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 09/04/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO. IBH3

Co-ordinates E=9164 N=1683

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 05/03/2020
Completion Date : 08/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.711 m.
Water Struck At :
Standing Water Level : 3.20 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Brownish grey, clayey silt Observed brick bats, coal dust etc. 0.30m.			DS-1	0.50
Medium, brownish grey, clayey silt. Observed kankar & moorum.		1 1 1 1 5/1 2	SPT-1	1.00-1.45
2.00m.			UDS-1	2.00-2.45
Very stiff, brownish grey, clayey silt. Observed kankar & moorum.		2 3 2 3 17/5 7	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
5.00m.				
Hard, brownish grey, clayey silt. Observed kankar.		2 3 5 7 43/12 19	SPT-3	5.00-5.45
6.00m.			*UDS-3	6.00-6.07
Hard, brownish grey, clayey silt with decomposed rock.		12 20 25 21 >100/22 3.0 cm Pentn.	SPT-4	6.25-6.58
6.75m.		Refusal 100/2.0 cm Penth.	*SPT-5	6.75-6.77 6.75
Highly to moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.		NX rotary drilling from 6.75m to 25.00m	R1 CR=40%/RQD=20% 7.50 R2 CR=50%/RQD=Nil 8.25 R3 CR=62%/RQD=30% 9.00 R4 CR=45%/RQD=Nil 9.75 R5 CR=50%/RQD=Nil 10.50 R6 CR=56%/RQD=16% 11.25 R7 CR=60%/RQD=30% 12.00 R8 CR=52%/RQD=Nil 12.75 R9 CR=45%/RQD=20% 13.50 R10 CR=52%/RQD=Nil 14.25 R11 CR=50%/RQD=20% 15.00 R12 CR=56%/RQD=Nil 15.75 R13 CR=52%/RQD=16% 16.50 R14 CR=55%/RQD=36% 17.25	
10.50m.				
Moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.				
12.75m.				
Moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.				
15.00m.				
Moderately to slightly weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.				
17.60m.				

BH-3/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 09/04/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH3 | Co-ordinates E=9164 N=1683

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	3
Cone (Pc)		Penetrometer (SPT)	5
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	0

Commencement Date : 05/03/2020
Completion Date : 08/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.711 m.
Water Struck At :
Standing Water Level : 3.20 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m.			R15	CR=68%/RQD=26% 18.00
			R16	CR=56%/RQD=Nil 18.75
			R17	CR=70%/RQD=Nil 19.50
			R18	CR=45%/RQD=Nil 20.25
Moderately to slightly weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R19	CR=60%/RQD=28% 21.00
			R20	CR=60%/RQD=14% 21.75
			R21	CR=54%/RQD=Nil 22.50
			R22	CR=52%/RQD=Nil 23.25
			R23	CR=51%/RQD=Nil 24.00
			R24	CR=75%/RQD=40% 25.00
25.00m.				

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376	Created by : SKD	Created on : 13/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH4 | Co-ordinates E=9116 N=1716

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 24/02/2020
Completion Date : 28/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.255 M.
Water Struck At :
Standing Water Level : 2.20 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Stiff, brownish grey, silty clay. Observed moorum.		1 2 1 2 9/3 3	DS-1	0.50
			SPT-1	1.00-1.45
			UDS-1	2.00-2.45
3.00m				
Very stiff, brownish grey, silty clay. Observed kankar.		2 2 3 3 18/5 7	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
5.00m				
Hard, brownish grey, silty clay with decomposed rock.		8 12 12 15 63/15 21	SPT-3	5.00-5.45
		17 19 39 25 2.5 cm Pentn. >100	SPT-4	5.60-5.85
6.00m		Refusal	*SPT-5	6.00-6.03
Moderately weathered, brownish grey, fine grained, highly fractured Argillaceous Limestone. 6.75m		100 3.0 cm Penth.	R1	CR=44%/RQD=Nil 6.00 6.75
Moderately to slightly weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.		NX rotary drilling from 6.00m to 20.00m	R2	CR=57%/RQD=36% 7.50
			R3	CR=60%/RQD=13% 8.25
			R4	CR=68%/RQD=Nil 9.00
9.00m			R5	CR=40%/RQD=16% 9.75
			R6	CR=52%/RQD=25% 10.50
			R7	CR=32%/RQD=20% 11.25
			R8	CR=40%/RQD=30% 12.00
Highly/moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R9	CR=42%/RQD=Nil 12.75
			R10	CR=35%/RQD=20% 13.50
			R11	CR=45%/RQD=Nil 14.25
			R12	CR=36%/RQD=Nil 15.00
			R13	CR=40%/RQD=Nil 15.75
Highly weathered, brownish grey, fine to medium grained, fractured Shale. 16.50m			R14	CR=56%/RQD=24% 16.50
17.25m			R15	CR=25%/RQD=Nil 17.25
17.60m				

BH-4/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 13/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH4

Co-ordinates E=9116 N=1716

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 24/02/2020
Completion Date : 28/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.255 M.
Water Struck At :
Standing Water Level : 2.20 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m. Highly weathered, brownish grey, fine to medium grained, fractured Shale.			R16	CR=30%/RQD=Nil 18.00
			R17	CR=38%/RQD=Nil 18.75
18.75m. Fresh, steel grey, fine to medium grained, fractured Argillaceous Limestone.			R18	CR=84%/RQD=40% 19.50
			R19	CR=88%/RQD=63% 20.00
20.00m.				

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 13/03/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO. IBH5

Co-ordinates E=9085 N=1751

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	0

Commencement Date : 20/02/2020
Completion Date : 23/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.625 M.
Water Struck At :
Standing Water Level : 2.70 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Very stiff, brownish grey, silty clay with moorum & kankar.		4 5 5 6 24 (6 7)	DS-1	0.50
			SPT-1	1.00-1.45
2.00m			UDS-1	2.00-2.45
Very stiff, deep grey, silty clay.		3 3 4 4 18 (5 5)	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
5.00m		12 17 31 55 (≥100) 2.5 cm Pentn.	SPT-3	5.00-5.25
Hard, brownish grey, silty clay with decomposed rock.		11 6 6 16 61 5.0 cm Pentn. >100	SPT-4	5.50-5.85
6.00m		Refusal	*SPT-5	6.00-6.03
Completely weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.		100 3.0 cm Pentn.	R1	CR=20%/RQD=Nil
6.75m				6.75
		NX rotary drilling from 6.00m to 20.00m	R2	CR=40%/RQD=24%
				7.50
Highly to moderately weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.			R3	CR=28%/RQD=Nil
				8.25
			R4	CR=36%/RQD=Nil
				9.00
			R5	CR=44%/RQD=Nil
9.75m				9.75
			R6	CR=72%/RQD=24%
				10.50
			R7	CR=64%/RQD=Nil
				11.25
			R8	CR=68%/RQD=40%
				12.00
			R9	CR=68%/RQD=48%
Moderately to slightly weathered, brownish grey, medium to fine grained, fractured Argillaceous Limestone.				12.75
			R10	CR=56%/RQD=14%
				13.50
			R11	CR=58%/RQD=20%
				14.25
			R12	CR=52%/RQD=18%
				15.00
			R13	CR=60%/RQD=14%
				15.75
			R14	CR=64%/RQD=60%
16.50m				16.50
Moderately to slightly weathered, yellowish grey, fine grained, fractured Shale.			R15	CR=52%/RQD=Nil
17.60m				17.25

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 13/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH5 | Co-ordinates E=9085 N=1751

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	0

Commencement Date : 20/02/2020
Completion Date : 23/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.625 M.
Water Struck At :
Standing Water Level : 2.70 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m.			R16	CR=64%/RQD=Nil 18.00
Moderately to slightly weathered, yellowish grey, fine grained, fractured Shale.			R17	CR=56%/RQD=16% 18.75
			R18	CR=64%/RQD=14% 19.50
20.00m.			R19	CR=65%/RQD=Nil 20.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 13/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH6 | Co-ordinates E=9158 N=1720

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 24/02/2020
Completion Date : 26/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.062 M.
Water Struck At :
Standing Water Level : 1.90 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Filled up with sand, kankar & stone. 0.30m.			DS-1	0.50
		2 2 2 3 13/4 4	SPT-1	1.00-1.45
			UDS-1	2.00-2.45
Stiff, brownish grey, silty clay. Observed kankar.		2 2 1 2 9/3 3	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
5.00m. Hard, brownish grey, silty clay with decomposed rock.		5 17 20 29 ≥100/29 5.0 cm Pentn. Refusal	SPT-3	5.00-5.35
5.75m.		100 3.0 cm Pentn.	*SPT-4	5.75-5.78 5.75
		NX rotary drilling from 5.75m to 30.00m	R1	CR=20%/RQD=Nil 6.50
Completely to highly weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R2	CR=22%/RQD=Nil 7.25
			R3	CR=20%/RQD=Nil 8.00
			R4	CR=25%/RQD=Nil 8.75
8.75m.			R5	CR=32%/RQD=Nil 9.50
Highly to moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R6	CR=44%/RQD=Nil 10.25
			R7	CR=42%/RQD=36% 11.00
Moderately weathered, brownish grey, fine to medium grained, fractured Shale. 11.75m.			R8	CR=60%/RQD=40% 11.75
			R9	CR=44%/RQD=Nil 12.50
12.50m. Moderately to slightly weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R10	CR=60%/RQD=Nil 13.25
			R11	CR=68%/RQD=16% 14.00
14.00m.			R12	CR=70%/RQD=Nil 14.75
			R13	CR=60%/RQD=Nil 15.50
Moderately to slightly weathered / fresh, steel grey, fine to medium grained, fractured Shale.			R14	CR=74%/RQD=Nil 16.25
			R15	CR=68%/RQD=Nil 17.00
17.60m.			R16	CR=77%/RQD=Nil

BH-6/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 13/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH6

Co-ordinates E=9158 N=1720

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	4	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	4
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 24/02/2020
Completion Date : 26/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.062 M.
Water Struck At :
Standing Water Level : 1.90 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
				17.75
			R17	CR=57%/RQD=Nil
				18.50
Moderately to slightly weathered / fresh, steel grey, fine to medium grained, fractured Shale.			R18	CR=64%/RQD=Nil
				19.25
			R19	CR=82%/RQD=Nil
17.60m				20.00
			R20	CR=60%/RQD=Nil
				20.75
Moderately to slightly weathered / fresh, steel grey, fine to medium grained, fractured Shale.			R21	CR=62%/RQD=20%
				21.50
			R22	CR=68%/RQD=16%
22.25m				22.25
Highly weathered, steel grey, fine to medium grained, fractured Shale.			R23	CR=40%/RQD=Nil
23.00m				23.00
			R24	CR=62%/RQD=Nil
				23.75
			R25	CR=68%/RQD=Nil
				24.50
			R26	CR=75%/RQD=Nil
				25.25
			R27	CR=60%/RQD=Nil
				26.00
Moderately to slightly weathered, steel grey, fine to medium grained, fractured Shale.			R28	CR=65%/RQD=Nil
				26.75
			R29	CR=60%/RQD=Nil
				27.50
			R30	CR=67%/RQD=Nil
				28.25
			R31	CR=60%/RQD=Nil
				29.00
			R32	CR=75%/RQD=Nil
30.00m				30.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 13/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH7 | Co-ordinates E=9055 N=1779

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	1

Commencement Date : 05/02/2020
Completion Date : 12/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.711 M.
Water Struck At :
Standing Water Level : 2.80 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.			DS-1	0.50
		4 4 5 5 5 5 (20)	SPT-1	1.00-1.45
			UDS-1	2.00-2.45
Very stiff, brownish grey, silty clay. Observed traces of kankar & calcareous nodules.			WS-1	2.80
		2 2 3 4 6 7 (20)	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
		3 4 4 5 7 7 (23)	SPT-3	5.00-5.45
5.75m.		23 27 50 3.0 cm Pentr. >100	SPT-4	5.75-5.93
6.00m. Hard, brownish grey, silty clay with decomposed rock fragments.		100 4.0 cm Penth. Refusal	*SPT-5	6.00-6.04 **6.00**
			R1	CR=14%/RQD=Nil
Completely weathered, brownish grey, fine grained, fractured Argillaceous Limestone.		100 3.0 cm Penth. Refusal	*SPT-6	6.75-6.78 **6.75**
			R2	CR=20%/RQD=Nil
7.50m.		100 Refusal 4.0 cm Penth.	*SPT-7	7.50-7.54 **7.50**
			R3	CR=36%/RQD=24% **8.25**
		NX rotary drilling from 6.00m to 28.30m	R4	CR=34%/RQD=16% **9.00**
			R5	CR=36%/RQD=21% **9.75**
			R6	CR=33%/RQD=16% **10.50**
			R7	CR=37%/RQD=27% **11.25**
			R8	CR=36%/RQD=27% **12.00**
Highly to moderately weathered, brownish grey, fine grained, fractured Argillaceous Limestone.			R9	CR=42%/RQD=14% **12.75**
			R10	CR=35%/RQD=20% **13.50**
			R11	CR=48%/RQD=24% **14.25**
			R12	CR=49%/RQD=23% **15.00**
			R13	CR=40%/RQD=Nil **15.75**
			R14	CR=48%/RQD=13% **16.50**
			R15	CR=44%/RQD=Nil **17.25**
17.25m.				
17.60m.				

BH-7/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 13/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH7 | Co-ordinates E=9055 N=1779

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	7	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	7
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	1

Commencement Date : 05/02/2020
Completion Date : 12/02/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 292.711 M.
Water Struck At :
Standing Water Level : 2.80 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
			R16	CR=45%/RQD=Nil 18.00
			R17	CR=41%/RQD=Nil 18.75
			R18	CR=49%/RQD=Nil 19.50
			R19	CR=44%/RQD=Nil 20.25
			R20	CR=49%/RQD=Nil 21.00
			R21	CR=45%/RQD=Nil 21.75
			R22	CR=48%/RQD=16% 22.50
			R23	CR=63%/RQD=13% 23.25
			R24	CR=64%/RQD=44% 24.00
			R25	CR=61%/RQD=37% 24.75
			R26	CR=60%/RQD=41% 25.50
			R27	CR=63%/RQD=37% 26.25
			R28	CR=68%/RQD=36% 27.00
			R29	CR=72%/RQD=38% 27.75
			R30	CR=74%/RQD=26% 28.30
17.60m Moderately weathered, brownish grey, fine grained, fractured Shale. 22.50m Moderately to slightly weathered, grey, fine grained, fractured Shale. 28.30m				

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 13/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH8 | Co-ordinates E=9080 N=1795

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 27/02/2020
Completion Date : 01/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.012 M.
Water Struck At :
Standing Water Level : 3.20 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m				
Stiff, brownish grey, silty clay / clayey silt. Observed kankar & moorum.		2 2 3 3 4 4 (14)	DS-1	0.50
			SPT-1	1.00-1.45
			UDS-1	2.00-2.45
2.50m				
Stiff, brownish grey, silty clay / clayey silt. Observed kankar.		3 3 4 3 3 3 (13)	SPT-2	3.00-3.45
4.00m			UDS-2	4.00-4.45
Hard, brownish grey, silty clay / clayey silt. Observed kankar & decomposed rock.		7 12 17 17 20 19 (73)	SPT-3	5.00-5.45
		9 18 22 25 26 (>100) 5.0 cm Pentn.	SPT-4	6.00-6.35
6.50m		100 Refusal 4.0 cm Pentn.	*SPT-5	6.50-6.54 6.50
Completely to highly weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.		NX rotary drilling from 6.50m to 30.00m	R1	CR=20%/RQD=Nil 7.25
			R2	CR=22%/RQD=Nil 8.00
8.00m			R3	CR=28%/RQD=Nil 8.75
Highly weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R4	CR=32%/RQD=Nil 9.50
9.50m			R5	CR=20%/RQD=Nil 10.25
Completely weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R6	CR=28%/RQD=Nil 11.00
10.25m			R7	CR=35%/RQD=Nil 11.75
			R8	CR=32%/RQD=Nil 12.50
			R9	CR=35%/RQD=Nil 13.25
Highly to moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R10	CR=40%/RQD=Nil 14.00
			R11	CR=52%/RQD=Nil 14.75
			R12	CR=43%/RQD=Nil 15.50
			R13	CR=47%/RQD=Nil 16.25
			R14	CR=40%/RQD=Nil 17.00
17.60m			R15	CR=45%/RQD=Nil

BH-8/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 13/03/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH8

Co-ordinates E=9080 N=1795

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 27/02/2020
Completion Date : 01/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 293.012 M.
Water Struck At :
Standing Water Level : 3.20 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m				17.75
Highly to moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R16	CR=46%/RQD=Nil 18.50
			R17	CR=52%/RQD=Nil 19.25
19.25m			R18	CR=40%/RQD=Nil 20.00
Highly to moderately weathered, deep grey, medium grained, fractured Shale.			R19	CR=57%/RQD=Nil 20.75
			R20	CR=50%/RQD=Nil 21.50
			R21	CR=48%/RQD=Nil 22.25
22.25m			R22	CR=56%/RQD=Nil 23.00
Moderately to slightly weathered / fresh, deep grey, medium grained, fractured Shale.			R23	CR=68%/RQD=Nil 23.75
			R24	CR=82%/RQD=Nil 24.50
24.50m			R25	CR=45%/RQD=Nil 25.25
Moderately weathered, deep grey, medium grained, fractured Shale.			R26	CR=60%/RQD=Nil 26.00
25.25m			R27	CR=70%/RQD=Nil 26.75
Moderately weathered, deep grey, medium grained, fractured Shale.			R28	CR=84%/RQD=Nil 27.50
26.00m			R29	CR=78%/RQD=Nil 28.25
Slightly weathered to fresh, steel grey, medium grained, fractured Shale.			R30	CR=88%/RQD=Nil 29.00
			R31	CR=92%/RQD=Nil 30.00
30.00m				

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376	Created by : SKD	Created on : 09/06/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH9

Co-ordinates E=9081 N=1682

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 06/05/2020
Completion Date : 08/05/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 291.321 m.
Water Struck At :
Standing Water Level : 2.7 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m Brownish grey, clayey silt with kankar, boulders etc. 0.60m			DS-1	0.50
		1 2 3 3 4 15 5	SPT-1	1.00-1.45
			UDS-1	2.00-2.45
Stiff to very stiff, brownish grey, clayey silt with kankar & moorum.		2 2 3 4 5 17 5	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
5.00m Hard, brownish grey, clayey silt. Observed kankar.		2 2 3 8 10 35 14	SPT-3	5.00-5.45
		4 10 12 15 15 59 17	SPT-4	6.00-6.45
6.50m Hard, brownish grey, clayey silt with decomposed rock.		39 61 >100 2.5 cm Penth.	SPT-5	7.00-7.10
7.25m Highly weathered, brownish grey, fine grained, highly fractured Argillaceous Limestone. 8.00m		100 Refusal 3.0 cm Penth. NX rotary drilling from 7.25m to 25.00m	*SPT-6 R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14	7.25-7.28 7.25 CR=23%/RQD=Nil 8.00 CR=28%/RQD=Nil 8.75 CR=35%/RQD=Nil 9.50 CR=36%/RQD=Nil 10.25 CR=23%/RQD=Nil 11.00 CR=35%/RQD=Nil 11.75 CR=27%/RQD=Nil 12.50 CR=23%/RQD=Nil 13.25 CR=29%/RQD=Nil 14.00 CR=23%/RQD=Nil 14.75 CR=33%/RQD=Nil 15.50 CR=35%/RQD=Nil 16.25 CR=32%/RQD=Nil 17.00 CR=35%/RQD=Nil
Highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.				
10.25m Highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone. 11.00m				
Highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone. 12.50m				
Highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone. 14.75m				
Highly to moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone. 17.60m				

BH-9/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 09/06/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH9

Co-ordinates E=9081 N=1682

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	0

Commencement Date : 06/05/2020
Completion Date : 08/05/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 291.321 m.
Water Struck At :
Standing Water Level : 2.7 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m. Highly to moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.				17.75
			R15	CR=44%/RQD=14% 18.50
			R16	CR=42%/RQD=14% 19.25
19.25m. Highly weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R17	CR=21%/RQD=Nil 20.00
			R18	CR=24%/RQD=Nil 20.75
			R19	CR=23%/RQD=Nil 21.50
22.25m. Highly weathered, light grey, fine to medium grained, highly fractured Shale.			R20	CR=21%/RQD=Nil 22.25
			R21	CR=21%/RQD=Nil 23.00
			R22	CR=26%/RQD=Nil 23.75
			R23	CR=22%/RQD=Nil 24.50
25.00m.			R24	CR=23%/RQD=Nil 25.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376	Created by : SKD	Created on : 09/06/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH10 Co-ordinates E=9101 N=1672

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 09/05/2020
Completion Date : 12/05/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 291.312 m.
Water Struck At :
Standing Water Level : 2.5 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Deep brownish grey, clayey silt with moorum & kankar. 0.60m.			DS-1	0.50
		2 2 3 2 12/3 4	SPT-1	1.00-1.45
			UDS-1	2.00-2.45
Stiff to very stiff, brownish grey, clayey silt with moorum. Observed kankar.		2 3 4 4 21/6 7	SPT-2	3.00-3.45
			UDS-2	4.00-4.45
5.00m.		2 4 5 6 31/8 12	SPT-3	5.00-5.45
Hard, brownish grey, clayey silt. Observed kankar.		5 6 8 11 51/14 18	SPT-4	6.00-6.45
6.60m. Hard, brownish grey, clayey silt with decomposed rock.		13 18 28 41 ≥100 5.5 cm Pentn.	SPT-5	7.00-7.28
7.50m.		100 Refusal 3.0 cm Pentn.	*SPT-6	7.50-7.53 7.50
		NX rotary drilling from 7.50m to 30.00m	R1	CR=26%/RQD=Nil 8.25
Highly to moderately weathered, light brownish grey to yellowish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R2	CR=40%/RQD=14% 9.00
			R3	CR=41%/RQD=Nil 9.75
			R4	CR=43%/RQD=Nil 10.50
			R5	CR=42%/RQD=Nil 11.25
11.25m. Moderately weathered, light yellowish grey, medium to fine grained, highly fractured Argillaceous Limestone. Observed brownish spots.			R6	CR=52%/RQD=17% 12.00
			R7	CR=52%/RQD=Nil 12.75
12.75m. Moderately weathered, light yellowish grey, fine grained, highly fractured Shale.			R8	CR=49%/RQD=Nil 13.50
13.50m.			R9	CR=59%/RQD=Nil 14.25
			R10	CR=64%/RQD=Nil 15.00
Moderately/slightly weathered, light yellowish grey to light grey, fine grained, highly fractured Shale. Observed brownish spots.			R11	CR=74%/RQD=Nil 15.75
			R12	CR=54%/RQD=Nil 16.50
16.50m. Moderately weathered, light yellowish grey, fine grained, highly fractured Shale. 17.25m.			R13	CR=46%/RQD=Nil 17.25
17.60m.				

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 09/06/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH10 | Co-ordinates E=9101 N=1672

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 09/05/2020
Completion Date : 12/05/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 291.312 m.
Water Struck At :
Standing Water Level : 2.5 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m. Moderately/slightly weathered, light yellowish grey to light grey, fine grained, highly fractured Shale.			R14	CR=62%/RQD=Nil 18.00
18.75m.			R15	CR=51%/RQD=Nil 18.75
			R16	CR=38%/RQD=Nil 19.50
			R17	CR=34%/RQD=Nil 20.25
Highly weathered, light yellowish grey to light grey, fine grained, highly fractured Shale. Observed brownish spots.			R18	CR=32%/RQD=Nil 21.00
			R19	CR=35%/RQD=Nil 21.75
			R20	CR=28%/RQD=Nil 22.50
			R21	CR=34%/RQD=Nil 23.25
23.25m. Highly/moderately weathered, light grey to grey, fine to medium grained, highly fractured Shale.			R22	CR=49%/RQD=Nil 24.00
			R23	CR=33%/RQD=Nil 24.75
			R24	CR=38%/RQD=Nil 25.50
25.50m. Moderately weathered, light grey to grey, fine to medium grained, highly fractured Argillaceous Limestone.			R25	CR=56%/RQD=23% 26.25
			R26	CR=52%/RQD=Nil 27.00
27.00m. Highly to moderately weathered, light brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R27	CR=40%/RQD=22% 27.75
			R28	CR=56%/RQD=14% 28.50
			R29	CR=47%/RQD=Nil 29.25
29.25m. Moderately weathered, light brownish grey, medium grained, fractured Argillaceous Limestone. 30.00m.			R30	CR=58%/RQD=17% 30.00

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376 | **Created by : SKD** | **Created on : 09/04/2020** | **Sheet No:**

BORE LOG DATA SHEET

BORE HOLE NO. IBH11

Co-ordinates E=9126 N=1640

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
		Disturbed (DS)	1
Vane (V)		Water Sample (WS)	0

Commencement Date : 23/02/2020
Completion Date : 05/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 291.089 M.
Water Struck At :
Standing Water Level : 2.80 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m.				
			DS-1	0.50
		2 2 1 3 10/3 3	SPT-1	1.00-1.45
Stiff, yellowish grey, silty clay with moorum. Observed kankar.			UDS-1	2.00-2.45
		2 2 1 2 8/3 2	SPT-2	3.00-3.45
4.45m.			UDS-2	4.00-4.45
Hard, brownish grey, silty clay. Observed kankar & decomposed rock.		8 12 15 18 74/20 21	SPT-3	5.00-5.45
		35 75 2.5 cm Pentn. >100 Refusal	SPT-4	5.60-5.70
5.75m.			*SPT-5	5.75-5.78
		100 3.0 cm Pentn.	R1	CR=40%/RQD=Nil 5.75 / 6.50
			R2	CR=44%/RQD=28% 6.50 / 7.25
			R3	CR=50%/RQD=Nil 7.25 / 8.00
		NX rotary drilling from 5.75m to 25.00m	R4	CR=40%/RQD=Nil 8.00 / 8.75
			R5	CR=37%/RQD=Nil 8.75 / 9.50
			R6	CR=30%/RQD=Nil 9.50 / 10.25
			R7	CR=32%/RQD=Nil 10.25 / 11.00
Highly to moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R8	CR=35%/RQD=Nil 11.00 / 11.75
			R9	CR=35%/RQD=Nil 11.75 / 12.50
			R10	CR=40%/RQD=Nil 12.50 / 13.25
			R11	CR=35%/RQD=Nil 13.25 / 14.00
			R12	CR=40%/RQD=Nil 14.00 / 14.75
			R13	CR=57%/RQD=Nil 14.75 / 15.50
			R14	CR=48%/RQD=Nil 15.50 / 16.25
16.25m.			R15	CR=62%/RQD=28% 16.25 / 17.00
Moderately/slightly weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R16	CR=55%/RQD=30% 17.00 / 17.75
17.75m.				

BH-11/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4376	Created by : SKD	Created on : 09/04/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH11 | Co-ordinates E=9126 N=1640

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	5	Undisturbed (UDS)	2
Cone (Pc)		Penetrometer (SPT)	5
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 23/02/2020
Completion Date : 05/03/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 291.089 M.
Water Struck At :
Standing Water Level : 2.80 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.75m.				
Highly to moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R17	CR=38%/RQD=Nil 18.50
			R18	CR=45%/RQD=Nil 19.25
19.25m.				
Moderately weathered, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R19	CR=56%/RQD=28% 20.00
			R20	CR=56%/RQD=20% 20.75
20.75m.				
Slightly weathered, deep grey, medium grained, fractured Argillaceous Limestone.			R21	CR=68%/RQD=Nil 21.50
21.50m.				
			R22	CR=60%/RQD=Nil 22.25
			R23	CR=86%/RQD=16% 23.00
Moderately to slightly weathered / fresh, brownish grey, fine to medium grained, fractured Argillaceous Limestone.			R24	CR=60%/RQD=20% 23.75
			R25	CR=65%/RQD=50% 24.50
			R26	CR=88%/RQD=48% 25.00
25.00m.				

N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376	Created by : SKD	Created on : 09/06/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH12 Co-ordinates E=9172 N=1659

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 01/05/2020
Completion Date : 06/05/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 291.25 m.
Water Struck At :
Standing Water Level : 3.3 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
0.00m. Filled up soil consists of clayey silt with moorum & kankar. 0.70m.			DS-1	0.50
Hard, reddish brown, clayey silt with moorum.		3 3 4 6 33/11 12	SPT-1	1.00-1.45
			*UDS-1	2.00-2.13
		4 6 12 14 66/18 22	SPT-2	3.00-3.45
3.60m.				
Hard, yellowish grey, clayey silt with decomposed rock.		7 9 10 15 59/17 17	SPT-3	4.00-4.45
		3 5 6 8 51/15 22	SPT-4	5.00-5.45
		7 8 17 22 87/32 16	SPT-5	6.00-6.39
6.75m. Completely weathered, light grey, fine grained, highly fractured Shale.		100 / 3.0 cm Pentn. (1.5 cm Pentn. Refusal)	*SPT-6	6.75-6.78 6.75
7.50m.		NX rotary drilling from 6.75m to 30.00m	R1	CR=20%/RQD=Nil 7.50
Highly/moderately weathered, light grey, fine grained, highly fractured Shale.			R2	CR=37%/RQD=Nil 8.25
			R3	CR=34%/RQD=Nil 9.00
			R4	CR=42%/RQD=Nil 9.75
			R5	CR=40%/RQD=Nil 10.50
			R6	CR=36%/RQD=Nil 11.25
			R7	CR=35%/RQD=Nil 12.00
			R8	CR=37%/RQD=16% 12.75
			R9	CR=34%/RQD=Nil 13.50
			R10	CR=27%/RQD=Nil 14.25
			R11	CR=26%/RQD=Nil 15.00
15.00m.			R12	CR=35%/RQD=16% 15.75
Highly weathered, light brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R13	CR=40%/RQD=14% 16.50
			R14	CR=32%/RQD=14% 17.25
17.60m.				

BH-12/Sheet-1

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. CETEST

Job No : 4376	Created by : SKD	Created on : 09/06/2020	Sheet No:

BORE LOG DATA SHEET

BORE HOLE NO. IBH12 Co-ordinates E=9172 N=1659

Field Test	Nos	Samples	Nos
Penetrometer (SPT)	6	Undisturbed (UDS)	1
Cone (Pc)		Penetrometer (SPT)	6
Vane (V)		Disturbed (DS)	1
		Water Sample (WS)	0

Commencement Date : 01/05/2020
Completion Date : 06/05/2020
Bore Hole Diameter : 150mm / NX.
Level Of Ground : 291.25 m.
Water Struck At :
Standing Water Level : 3.3 m.

DESCRIPTION	SYMBOL	N-VALUE (EACH DIVN. = 7.5cm)	SAMPLES Ref. No	SAMPLES Depth (m)
17.60m. Highly weathered, light brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R15	CR=37%/RQD=Nil 18.00
			R16	CR=39%/RQD=Nil 18.75
18.75m.			R17	CR=24%/RQD=Nil 19.50
Highly weathered, light brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R18	CR=21%/RQD=Nil 20.25
			R19	CR=33%/RQD=Nil 21.00
			R20	CR=23%/RQD=Nil 21.75
			R21	CR=23%/RQD=Nil 22.50
			R22	CR=21%/RQD=Nil 23.25
23.25m. Highly weathered, light brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R23	CR=30%/RQD=16% 24.00
24.75m. Highly weathered, steel grey, fine to medium grained, highly fractured Argillaceous Limestone.			R24	CR=27%/RQD=Nil 24.75
			R25	CR=35%/RQD=Nil 25.50
			R26	CR=31%/RQD=Nil 26.25
			R27	CR=28%/RQD=Nil 27.00
27.00m. Slightly weathered, steel grey, fine to medium grained, fractured Argillaceous Limestone.			R28	CR=61%/RQD=18% 27.75
			R29	CR=71%/RQD=38% 28.50
28.50m. Moderately weathered, brownish grey, fine to medium grained, highly fractured Argillaceous Limestone.			R30	CR=58%/RQD=Nil 29.25
			R31	CR=52%/RQD=Nil 30.00
30.00m.				

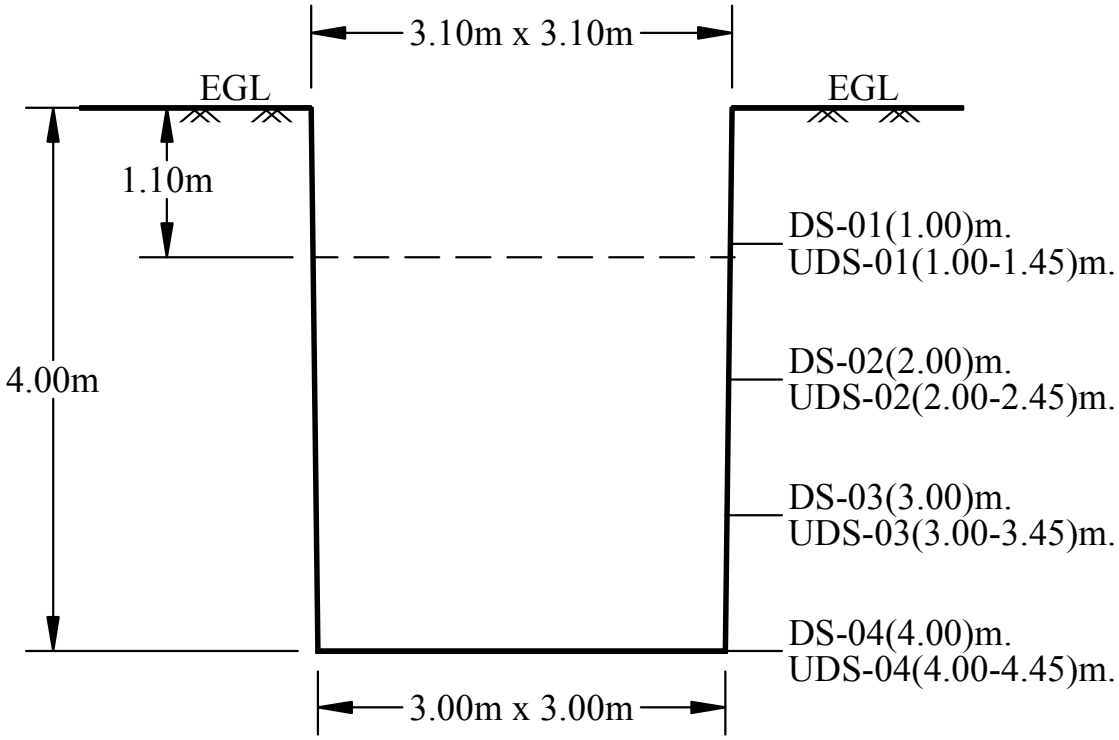
N.B. – '*' means sample could not be recovered.

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			GETEST
Job No : 4 3 7 6	Created by : Chandrani	Created on : 24/06/2020	Sheet No:

Commenced on: 22/05/2020
Completed on: 22/05/2020
Pit size: 3.00mX3.000m
Load on pr.guage/divn.=10kg/sq.cm
Load on jack/divn. = 0.708t
Plate size: 0.60mX0.60m
Load on plate/divn.= 1.96t/sq.m
Test Type: Routine

Co-ordinates:
E = 9215 M.
N =1806 M.
RL = 294.311 M.

SWL = 2.40 M.



Description of Soil:-

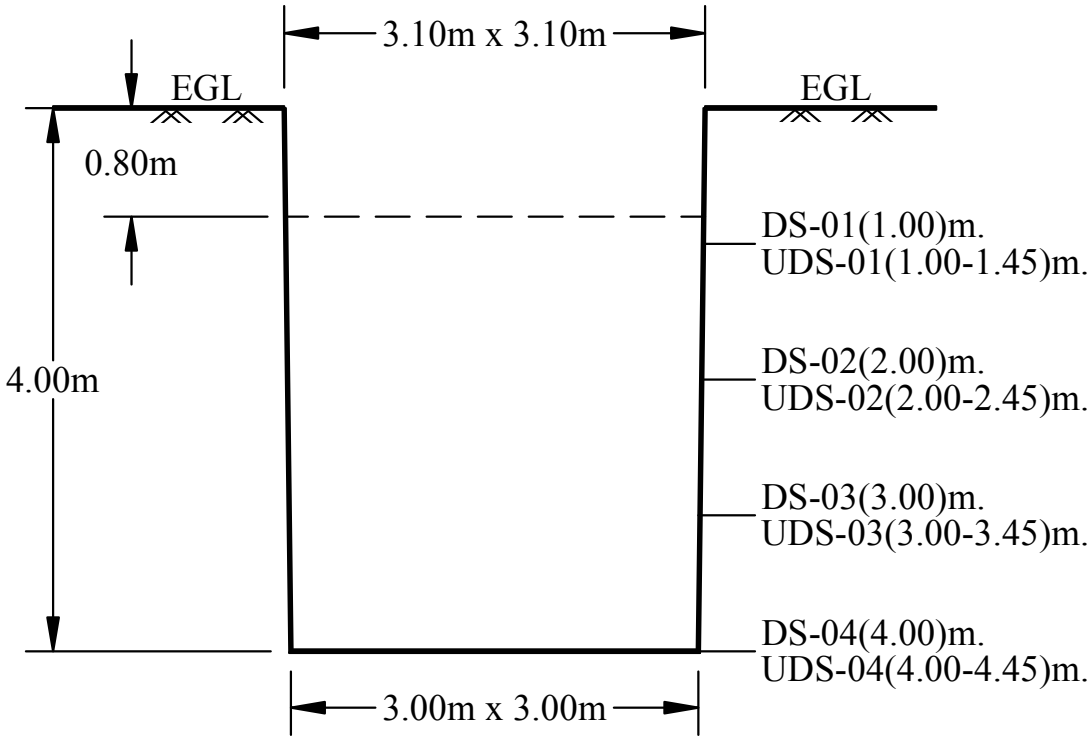
(EGL -1.10)m :- Brownish grey, silty clay with moorum.
(1.10 - 4.00)m :- Deep grey, silty clay. Obs. kankars.

PIT LOG OF PLT - 01

Commenced on: 15/05/2020
Completed on: 15/05/2020
Pit size: 3.00mX3.000m
Load on pr.guage/divn.=10kg/sq.cm
Load on jack/divn. = 0.708t
Plate size: 0.60mX0.60m
Load on plate/divn.= 1.96t/sq.m
Test Type: Routine

Co-ordinates:
E = 9413 M.
N = 1808 M.
RL = 293.785 M.

SWL = Not Found.



Description of Soil:-

(EGL - 0.80)m :- Brownish grey, silty clay with moourm.
(0.80 - 4.00)m :- Deep brown, silty clay. Obs. kankars.

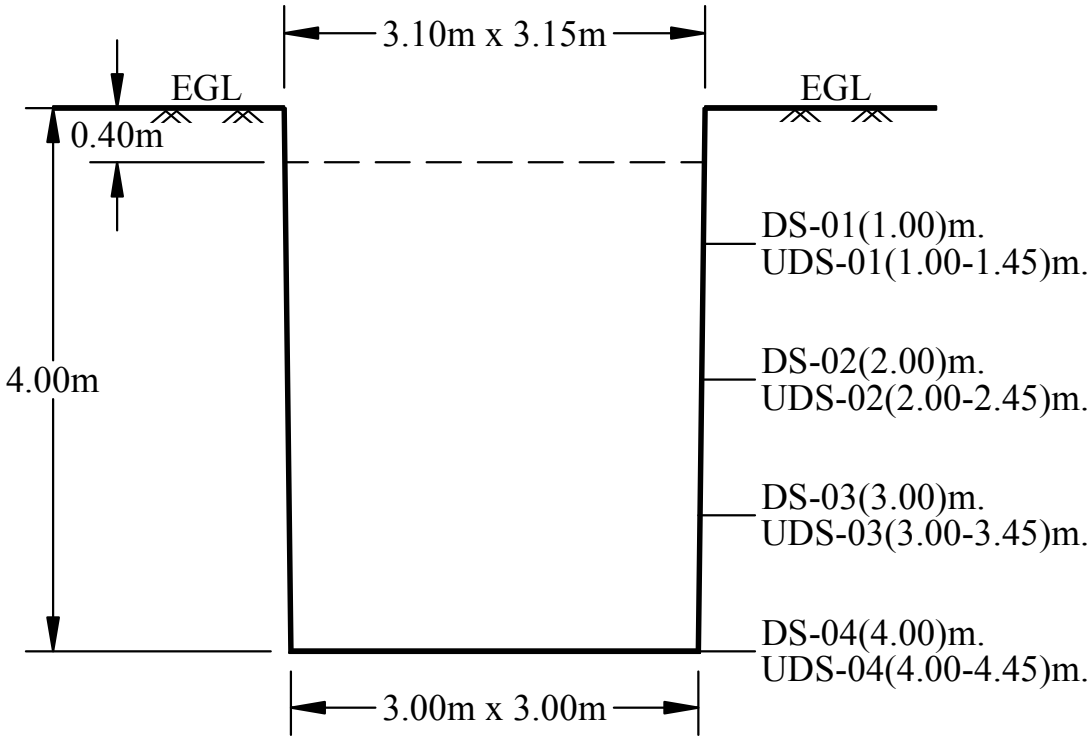
PIT LOG OF PLT - 02

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4 3 7 6	Created by : Chandrani	Created on : 24/06/2020	Sheet No:

Commenced on: 23/05/2020
Completed on: 23/05/2020
Pit size: 3.00mX3.000m
Load on pr.guage/divn.=10kg/sq.cm
Load on jack/divn. = 0.708t
Plate size: 0.60mX0.60m
Load on plate/divn.= 1.96t/sq.m
Test Type: Routine

Co-ordinates:
E = 9092 M.
N = 1622 M.
RL = 292.786 M.

SWL = 2.30 m.



Description of Soil:-

(EGL - 0.40)m :- Brownish grey, silty clay with moourm.
(0.40 - 4.00)m :- Deep grey, silty clay. Obs. kankars.

PIT LOG OF IPLT - 01

Commenced on: 20/05/2020

Completed on: 20/05/2020

Pit size: 3.00mX3.000m

Load on pr.guage/divn.=10kg/sq.cm

Load on jack/divn. = 0.708t

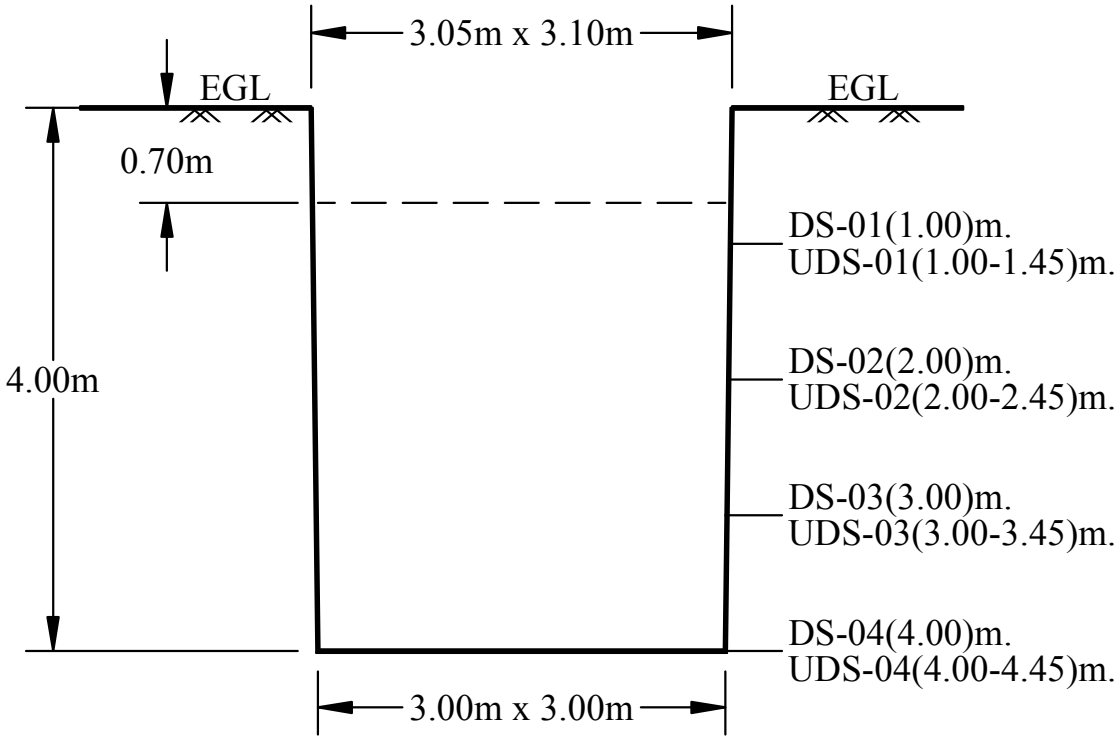
Plate size: 0.60mX0.60m

Load on plate/divn.= 1.96t/sq.m

Test Type: Cyclic

Co-ordinates:
E = 9164 M.
N = 1790 M.
RL = 293.832 M.

SWL = 2.50 m.



Description of Soil:-

(EGL - 0.70)m :- Brownish grey, silty clay with moorum.

(0.70-4.00)m :- Deep grey, silty clay. Obs. kankars.

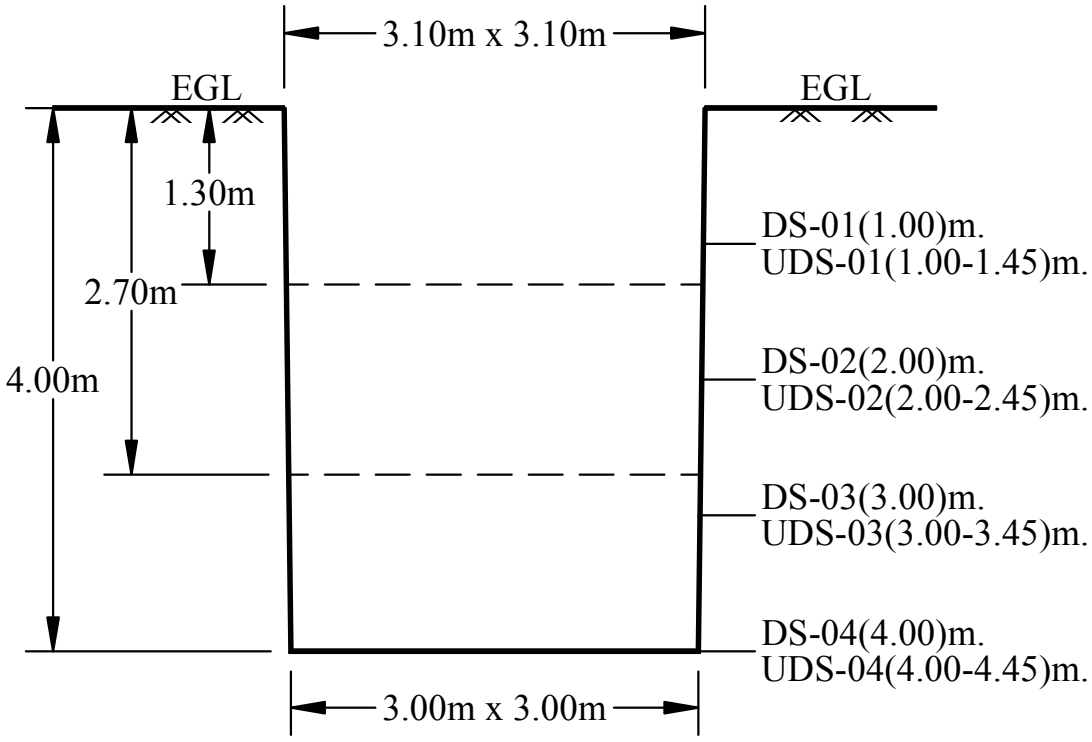
PIT LOG OF CPLT - 01

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4 3 7 6	Created by : Chandrani	Created on : 24/06/2020	Sheet No:

Commenced on: 21/03/2020
Completed on: 22/03/2020
Pit size: 3.00mX3.000m
Load on pr.guage/divn.=10kg/sq.cm
Load on jack/divn. = 0.708t
Plate size: 0.60mX0.60m
Load on plate/divn.= 1.96t/sq.m
Test Type: Cyclic

Co-ordinates:
E = 9105 M.
N = 1759 M.
RL = 292.742 M.

SWL = 2.90 m.



Description of Soil:-

(EGL - 1.30)m :- Brownish grey, silty clay with moourm & kankars.
(1.30 - 2.70)m :- Deep brown, clayey silt with sand mixture.
(2.70 - 4.00)m :- Deep grey, silty clay / clayey silt.

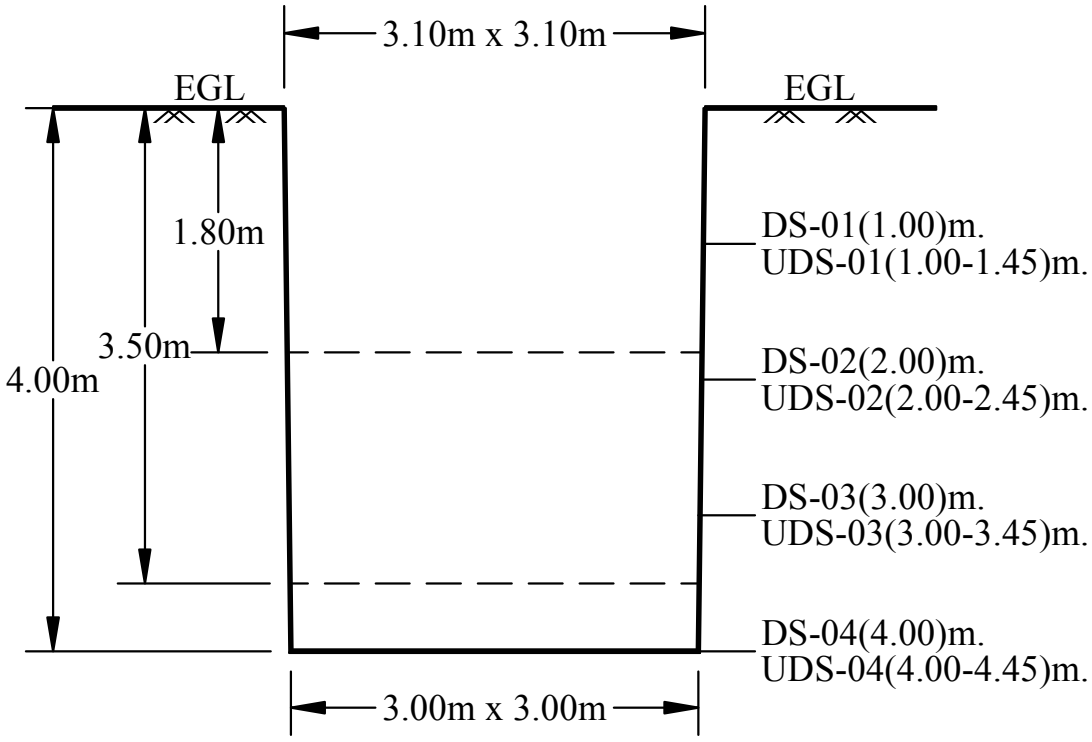
PIT LOG OF CPLT - 02

Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.			CETEST
Job No : 4 3 7 6	Created by : Chandrani	Created on : 24/06/2020	Sheet No:

Commenced on: 13/05/2020
Completed on: 13/05/2020
Pit size: 3.00mX3.000m
Load on pr.guage/divn.=10kg/sq.cm
Load on jack/divn. = 0.708t
Plate size: 0.60mX0.60m
Load on plate/divn.= 1.96t/sq.m
Test Type: Cyclic

Co-ordinates:
E = 9432 M.
N = 1785 M.
RL = 294.112 M.

SWL = Not Found



Description of Soil:-

(EGL - 1.80)m :- Brownish grey, silty clay.
(1.80 - 3.50)m :- Yellowish grey, silty clay / clayey silt. Observed kankar.
(3.50 - 4.00)m :- Brownish grey, silty clay.

PIT LOG OF CPLT - 03

DYNAMIC CONE PENETRATION TEST RESULTS

DCPT No.	Co-Ordinates		R.L. of Ground (M)	Starting Depth (M)	Ending Depth (M)	Average Depth (M)	Nc Value
	Easting	Northinng					
DCPT-01	9359	1773	294.286	0.00	0.30	0.15	43
				0.30	0.60	0.45	37
				0.60	0.90	0.75	38
				0.90	1.20	1.05	36
				1.20	1.50	1.35	30
				1.50	1.80	1.65	26
				1.80	2.10	1.95	33
				2.10	2.40	2.25	15
				2.40	2.70	2.55	21
				2.70	3.00	2.85	23
				3.00	3.30	3.15	23
				3.30	3.60	3.45	7
				3.60	3.90	3.75	9
				3.90	4.20	4.05	12
				4.20	4.50	4.35	15
				4.50	4.80	4.65	18
				4.80	5.10	4.95	34
				5.10	5.40	5.25	43
				5.40	5.70	5.55	45
				5.70	6.00	5.85	64
				6.00	6.30	6.15	67
				6.30	6.60	6.45	92
				6.60	6.90	6.75	154
DCPT-02	9407	1833	294.159	0.00	0.30	0.15	16
				0.30	0.60	0.45	6
				0.60	0.90	0.75	8
				0.90	1.20	1.05	10
				1.20	1.50	1.35	10
				1.50	1.80	1.65	10
				1.80	2.10	1.95	8
				2.10	2.40	2.25	10
				2.40	2.70	2.55	10
				2.70	3.00	2.85	8
				3.00	3.30	3.15	7
				3.30	3.60	3.45	6
				3.60	3.90	3.75	7
				3.90	4.20	4.05	7
				4.20	4.50	4.35	8
				4.50	4.80	4.65	13
				4.80	5.10	4.95	26
				5.10	5.40	5.25	47
				5.40	5.70	5.55	62
				5.70	6.00	5.85	74
				6.00	6.30	6.15	85
				6.30	6.60	6.45	97
				6.60	6.90	6.75	145
				6.90	7.20	7.05	228

DYNAMIC CONE PENETRATION TEST RESULTS

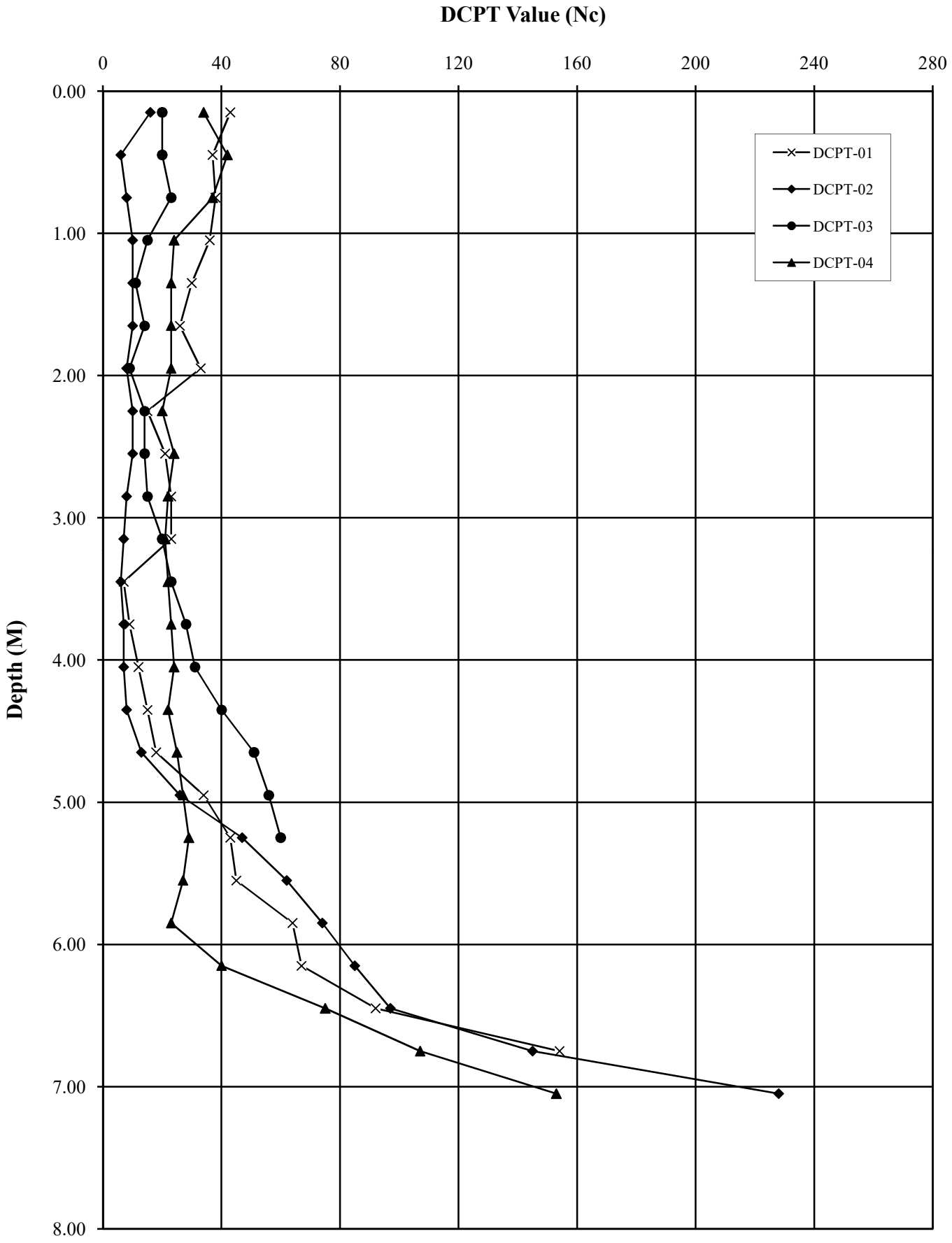
DCPT No.	Co-Ordinates		R.L. of Ground (M)	Starting Depth (M)	Ending Depth (M)	Average Depth (M)	Nc Value
	Easting	Northinng					
DCPT-03	9217	1700	292.000	0.00	0.30	0.15	20
				0.30	0.60	0.45	20
				0.60	0.90	0.75	23
				0.90	1.20	1.05	15
				1.20	1.50	1.35	11
				1.50	1.80	1.65	14
				1.80	2.10	1.95	9
				2.10	2.40	2.25	14
				2.40	2.70	2.55	14
				2.70	3.00	2.85	15
				3.00	3.30	3.15	20
				3.30	3.60	3.45	23
				3.60	3.90	3.75	28
				3.90	4.20	4.05	31
				4.20	4.50	4.35	40
				4.50	4.80	4.65	51
				4.80	5.10	4.95	56
				5.10	5.40	5.25	60
				5.40	5.70	5.55	82
				5.70	6.00	5.85	107
				6.00	6.30	6.15	137
				6.30	6.60	6.45	173
DCPT-04	9476	1768	293.714	0.00	0.30	0.15	34
				0.30	0.60	0.45	42
				0.60	0.90	0.75	37
				0.90	1.20	1.05	24
				1.20	1.50	1.35	23
				1.50	1.80	1.65	23
				1.80	2.10	1.95	23
				2.10	2.40	2.25	20
				2.40	2.70	2.55	24
				2.70	3.00	2.85	22
				3.00	3.30	3.15	21
				3.30	3.60	3.45	22
				3.60	3.90	3.75	23
				3.90	4.20	4.05	24
				4.20	4.50	4.35	22
				4.50	4.80	4.65	25
				4.80	5.10	4.95	27
				5.10	5.40	5.25	29
				5.40	5.70	5.55	27
				5.70	6.00	5.85	23
				6.00	6.30	6.15	40
				6.30	6.60	6.45	75
				6.60	6.90	6.75	107
				6.90	7.20	7.05	153

DYNAMIC CONE PENETRATION TEST RESULTS

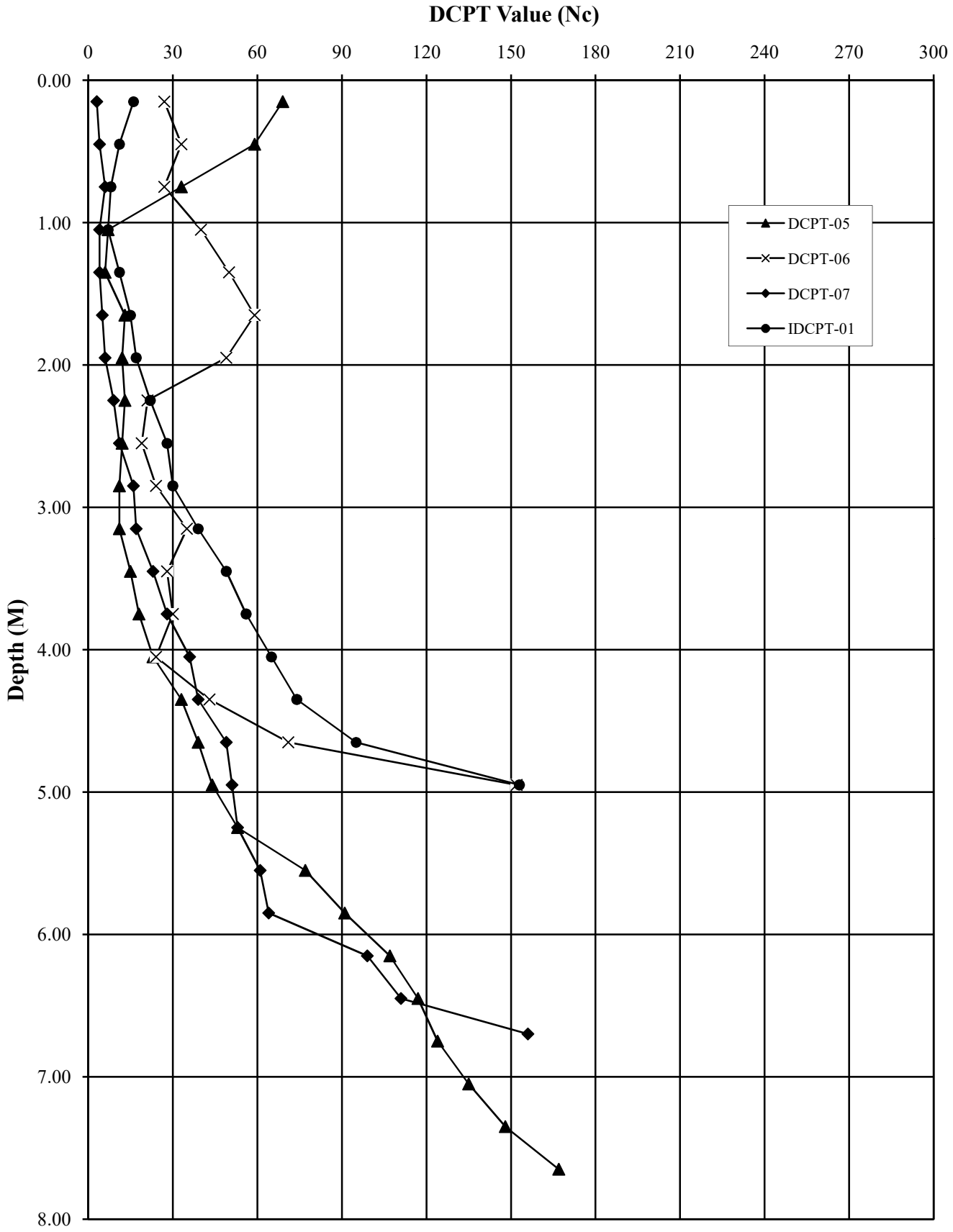
DCPT No.	Co-Ordinates		R.L. of Ground (M)	Starting Depth (M)	Ending Depth (M)	Average Depth (M)	Nc Value
	Easting	Northinng					
DCPT-05	9279	1833	294.128	0.00	0.30	0.15	69
				0.30	0.60	0.45	59
				0.60	0.90	0.75	33
				0.90	1.20	1.05	7
				1.20	1.50	1.35	6
				1.50	1.80	1.65	13
				1.80	2.10	1.95	12
				2.10	2.40	2.25	13
				2.40	2.70	2.55	12
				2.70	3.00	2.85	11
				3.00	3.30	3.15	11
				3.30	3.60	3.45	15
				3.60	3.90	3.75	18
				3.90	4.20	4.05	23
				4.20	4.50	4.35	33
				4.50	4.80	4.65	39
				4.80	5.10	4.95	44
				5.10	5.40	5.25	53
				5.40	5.70	5.55	77
				5.70	6.00	5.85	91
				6.00	6.30	6.15	107
				6.30	6.60	6.45	117
				6.60	6.90	6.75	124
				6.90	7.20	7.05	135
				7.20	7.50	7.35	148
				7.50	7.80	7.65	167
DCPT-06	9188	1806	294.000	0.00	0.30	0.15	27
				0.30	0.60	0.45	33
				0.60	0.90	0.75	27
				0.90	1.20	1.05	40
				1.20	1.50	1.35	50
				1.50	1.80	1.65	59
				1.80	2.10	1.95	49
				2.10	2.40	2.25	21
				2.40	2.70	2.55	19
				2.70	3.00	2.85	24
				3.00	3.30	3.15	35
				3.30	3.60	3.45	28
				3.60	3.90	3.75	30
				3.90	4.20	4.05	24
				4.20	4.50	4.35	43
				4.50	4.80	4.65	71
				4.80	5.10	4.95	152

DYNAMIC CONE PENETRATION TEST RESULTS

DCPT No.	Co-Ordinates		R.L. of Ground (M)	Starting Depth (M)	Ending Depth (M)	Average Depth (M)	Nc Value
	Easting	Northinng					
DCPT-07	9291	1750	293.581	0.00	0.30	0.15	3
				0.30	0.60	0.45	4
				0.60	0.90	0.75	6
				0.90	1.20	1.05	4
				1.20	1.50	1.35	4
				1.50	1.80	1.65	5
				1.80	2.10	1.95	6
				2.10	2.40	2.25	9
				2.40	2.70	2.55	11
				2.70	3.00	2.85	16
				3.00	3.30	3.15	17
				3.30	3.60	3.45	23
				3.60	3.90	3.75	28
				3.90	4.20	4.05	36
				4.20	4.50	4.35	39
				4.50	4.80	4.65	49
				4.80	5.10	4.95	51
				5.10	5.40	5.25	53
				5.40	5.70	5.55	61
				5.70	6.00	5.85	64
				6.00	6.30	6.15	99
				6.30	6.60	6.45	111
				6.60	6.80	6.70	156
IDCPT-01	9115	1703	292.098	0.00	0.30	0.15	16
				0.30	0.60	0.45	11
				0.60	0.90	0.75	8
				0.90	1.20	1.05	7
				1.20	1.50	1.35	11
				1.50	1.80	1.65	15
				1.80	2.10	1.95	17
				2.10	2.40	2.25	22
				2.40	2.70	2.55	28
				2.70	3.00	2.85	30
				3.00	3.30	3.15	39
				3.30	3.60	3.45	49
				3.60	3.90	3.75	56
				3.90	4.20	4.05	65
				4.20	4.50	4.35	74
				4.50	4.80	4.65	95
				4.80	5.10	4.95	153



DCPT Value (Nc) vs. Depth Plot



DCPT Value (Nc) vs. Depth Plot

Summarised Field Density Test Results

Test Location	Depth of Test (M)	Avg. Field Bulk Density (gm/cc)	Avg. Field Dry Density (gm/cc)	Moisture Content (%)
PLT-01	1.00	1.897	1.619	17.2
	2.00	1.907	1.595	19.5
	3.00	1.833	1.494	22.7
	4.00	1.817	1.453	25.0
PLT-02	1.00	1.970	1.665	18.3
	2.00	1.720	1.428	20.5
	3.00	1.877	1.533	22.4
	4.00	1.820	1.447	25.8
IPLT-01	1.00	1.917	1.617	18.5
	2.00	1.903	1.586	20.0
	3.00	1.877	1.521	23.4
	4.00	1.837	1.445	27.1
CPLT-01	1.00	1.873	1.611	16.3
	2.00	1.900	1.590	19.5
	3.00	1.890	1.562	21.0
	4.00	1.877	1.504	24.7
CPLT-02	1.00	1.773	1.460	21.5
	2.00	1.637	1.315	24.5
	3.00	1.647	1.312	25.5
	4.00	1.690	1.323	27.8
CPLT-03	1.00	1.759	1.525	15.4
	2.00	1.643	1.408	16.7
	3.00	1.678	1.415	18.6
	4.00	1.733	1.398	24.0

FIELD PERMEABILITY TEST RESULTS

Field permeability test was conducted at different depths by falling head method and the test results are presented below.

Test Locations	Type of Test	Depth of Test (M)	Permeability (cm/sec)
BH-01	Falling Head	0.90 – 1.50	3.559×10^{-6}
	Falling Head	2.70 – 3.50	3.970×10^{-6}
	Single Packer	4.80 – 5.50	1.407×10^{-6}
	Single Packer	7.90 – 8.50	3.814×10^{-6}
	Single Packer	11.80 – 12.50	2.918×10^{-6}
BH-08	Falling Head	0.70 – 1.50	1.307×10^{-6}
	Falling Head	2.90 - 3.50	5.543×10^{-7}
	Falling Head	4.80 – 5.50	1.638×10^{-6}
	Falling Head	7.70 – 8.30	3.304×10^{-6}
	Single Packer	11.50 – 12.50	9.584×10^{-7}
BH-22	Falling Head	0.80 – 1.50	1.641×10^{-6}
	Falling Head	3.00 – 3.50	2.206×10^{-6}
	Falling Head	4.80 – 5.50	9.346×10^{-7}
	Falling Head	7.80 – 8.40	1.011×10^{-6}
	Single Packer	11.80 – 12.50	7.001×10^{-7}

PART II: LABORATORY TEST RESULTS

CETEST
Engineering Consultants
An ISO 9001, 14001 & OHSAS 18001 Certified Company

C. E. Testing Company Pvt. Ltd.
(AN NABL ACCREDITED TESTING LABORATORY AS PER ISO/IEC 17025)
Sardarpara, Brahmapur,Kolkata-700 096,Tel: (033) 2410 5085/9813
E-mail: cetest.lab@gmail.com •Web: www.cetestindia.com
CIN: U74920WB1988PTC045778

Certificate No : TC-6840

Format No: CET/FM/42

TEST REPORT

TEST REPORT NO	: 4376	DATE: 10/07/2020
ULR	: TC684020000000009P	
Name and Address of Customer	: M/s. Bharat Heavy Electricals Limited, Power Sector – Western Region, Shreemohini Complex, 345 Kingsway, Nagpur – 440001, India	
Customer Reference No	: BHE/PW/PUR/BHFGD-TOPO-GEO/2190	
Customer Reference Date	: 09/01/2020	
Date of Sample Received at Lab	: 02/06/2020	
Date of Starting of Test	: 06/06/2020	
Date of Completion of Test	: 29/06/2020	
Sample ID Nos	: 4376/BH-01/UDS-01 to 4376/CPLT-03/DS-03	

Please refer the page no. A104 of A217 to A132 of A217 of the Report for the following:

1. Sample Description
2. Test methods used
3. Test results

Further to note that the test parameters are mentioned at the header of test result table.

* The report related to the particular sample(s) tested under stated condition.
* All tests are based as per IS specifications and/or SOPs.
* Any discrepancy in this report should be brought to the notice within 15 (fifteen) days from the date of certificate
* Full/Partial use of this test results should not be done without the written permission of authorized signatory and are to be considered as confidential.
* This laboratory is not responsible for the sampling processes.

Head Office: 124-A, N.S.C Bose Road, Kolkata-700092
Project Office: Agartala•Patna•Ranchi•Hyderabad

JAS-ANZ TUV NABCB QM011

Bore	Sample	Depth	Sample Description	Bulk	Dry	Spec.	Nat.	Void	Strength Test Results				Atter. Limits			IS Classification	Grain Size				Test Method
Hole	Number	M		Dens.	Dens.	Grav.	Mois.	Ratio	Pc/Pn	Shear	Cohesn	Frictn	LL	PL	SL		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc		%		kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
BH01	UDS01	2.00	Brownish grey silty clay with traces of calcareous nodules.	2.03	1.70	2.69	21 S	0.491	UNCONFD		1.11	0	42	18	8	CI		20	65	15	** See the Note
							17 C		0.0	1.027											
									0.0	1.075											
									0.0	1.214											
									REMOULD		0.85	0									
									0.0	0.806											
									0.0	0.820											
									0.0	0.910											
BH01	UDS02	4.00	Brownish grey clayey silt with traces of sand mixture.	2.06	1.72	2.66	20 S		UNCONFD		2.00	0	55	23	11	CH		15	65	20	Do
									0.0	1.999											
									0.0	2.075											
									0.0	1.910											
									REMOULD		1.60	0									
									0.0	1.606											
									0.0	1.672											
									0.0	1.534											
BH01	SPT03	4.60	Brownish grey clayey silt with traces of fine sand mixtures													CI*		3	97 (Silt+Clay)		Do
BH02	UDS01	2.00	Brownish grey silty clay with traces of kankars and calcareous nodules.	2.05	1.73	2.65	24 S		TRSH-UU		1.88	0	45	18		CI		13	72	15	Do
							19 T		3.0	1.923											
									2.0	1.901											
									1.0	1.801											
BH02	SPT02	3.00	Brownish grey silty clay with traces of kankars and sand mixture.										48	20		CI					Do
BH02	UDS02	4.00	Brownish grey clayey silt with traces of sand mixtures and kankars.	2.04	1.67	2.68	24 S	0.641	UNCONFD		1.67	0	55	18		CH		16	65	19	Do
							21 C		0.0	1.700											
									0.0	1.477											
									0.0	1.821											
									REMOULD		1.26	0									
									0.0	1.230											
									0.0	1.151											
									0.0	1.391											
BH02	SPT03	5.00	Reddish brown clayey silt with sand mixtures and traces of kankars.													CI*	5	38	57 (Silt+Clay)		Do
BH03	UDS01	2.00	Greyish yellow silty clay with calcareous nodules.	2.09	1.66	2.70	26 S		UNCONFD		1.42	0	42	16		CI	14	38	40	8	Do
									0.0	1.303											
									0.0	1.583											
									0.0	1.361											

Bore	Sample	Depth	Sample Description	Bulk	Dry	Spec.	Nat.	Void	Strength Test Results				Atter. Limits			IS Classification	Grain Size				Test Method
Hole	Number	M		Dens.	Dens.	Grav.	Mois.	Ratio	Pc/Pn	Shear	Cohesn	Frictn	LL	PL	SL		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc		%		kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
									REMOULD		1.05	0									
									0.0	0.935											
									0.0	1.222											
									0.0	0.986											
BH03	UDS02	4.00	Brownish grey clayey silt with traces of sand mixtures and kankars.	2.02	1.63	2.73	24 S		UNCONFD		1.13	0	55	19	10	CH		19	64	17	Do
									0.0	1.040											
									0.0	1.071											
									0.0	1.282											
									REMOULD		0.81	0									
									0.0	0.702											
									0.0	0.730											
									0.0	0.986											
BH03	SPT03	5.00	Brownish grey clayey silt with traces of sand mixture.													CI*		2	98 (Silt+Clay)		Do
BH03	SPT04	6.20	Brownish grey silty clay with traces of decomposed rock fragments.										43	21		CI					Do
BH04	UDS01	2.00	Brownish grey silty clay withh calcareous nodules.	1.95	1.60	2.65	23 S	0.686	TRSH-UU		0.57	9	52	18		CH		17	65	18	Do
							22 T		3.0	1.256											
							25 C		2.0	0.952											
									1.0	0.896											
BH04	UDS02	4.00	Brownish grey silty clay with calcareous nodules.	2.03	1.74	2.73	14 S		TRSH-UU		1.43	12	49	18		CI		12	67	21	Do
							16 T		3.0	2.579											
									2.0	2.288											
									1.0	2.046											
BH04	SPT03	5.00	Brownish grey clayey silt with traces of fine sand mixtures													CI*		2	98 (Silt+Clay)		Do
BH05	UDS01	2.00	Brownish grey silty clay with calcareous nodules.	2.07	1.82	2.66	12 S	0.444	UNCONFD		1.58	0	51	19	6	CH		21	63	16	Do
							15 C		0.0	1.650											
									0.0	1.531											
									0.0	1.559											
									REMOULD		1.31	0									
									0.0	1.350											
									0.0	1.271											
									0.0	1.297											
BH05	SPT02	3.00	Deep grey clayey silt with traces of fine sand mixture.													CI*		2	98 (Silt+Clay)		Do

Project: G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.

Job No: 4376

Sheet No.

CETEST

Bore	Sample	Depth	Sample Description	Bulk	Dry	Spec.	Nat.	Void	Strength Test Results				Atter. Limits			IS Classification	Grain Size				Test Method
Hole	Number	M		Dens.	Dens.	Grav.	Mois.	Ratio	Pc/Pn	Shear	Cohesn	Frictn	LL	PL	SL		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc		%		kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
BH02	SPT03	5.00	Brownish grey silty clay with traces of decomposed rock fragments.										45	19		CI					Do
BH06	UDS01	2.00	Brownish grey silty clay with traces of kankars	1.90	1.53	2.55	23 S	0.613	UNCONFD		0.74	0	45	15	9	CI		5	80	15	Do
							25 C		0.0	0.740											
									0.0	0.771											
									0.0	0.713											
									REMOULD		0.57	0									
									0.0	0.570											
									0.0	0.617											
									0.0	0.534											
BH06	UDS02	4.00	Brownish grey silty clay with calcareous nodules.	1.92	1.61	2.68	18 S		UNCONFD		1.46	0	45	18	9	CI		15	68	17	Do
									0.0	1.401											
									0.0	1.459											
									0.0	1.511											
									REMOULD		1.11	0									
									0.0	1.048											
									0.0	1.113											
									0.0	1.167											
BH06	SPT03	5.00	Yellowish grey clayey silt with traces of sand mixtures													CI*		3	97 (Silt+Clay)		Do
BH07	UDS01	2.00	Brownish grey silty clay with traces of sand mixture & moorum.	1.88	1.49	2.65	26 S		UNCONFD		0.66	0	47	20		CI	8	11	81 (Silt+Clay)		Do
									0.0	0.674											
									0.0	0.610											
									0.0	0.682											
									REMOULD		0.49	0									
									0.0	0.502											
									0.0	0.473											
									0.0	0.501											
BH07	UDS02	4.00	Brownish grey silty clay with traces of sand mixture.	1.97	1.63		20 S		TRSH-UU		1.19	0	40	17		CI		15	85 (Silt+Clay)		Do
							22 T		3.0	1.262											
									2.0	1.181											
									1.0	1.137											
BH07	SPT03	5.00	Deep grey clayey silt with traces of decomposed rock fragments													CI*	5	8	87 (Silt+Clay)		Do
BH08	UDS01	2.00	Reddish brown clayey moorum.			2.74	9 S						44	19	12	CI	67	19	12	2	Do

Project: G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.

Job No: 4376

Sheet No.

CETEST

Bore	Sample	Depth	Sample Description	Bulk	Dry	Spec.	Nat.	Void	Strength Test Results				Atter. Limits			IS Classification	Grain Size				Test Method
Hole	Number	M		Dens.	Dens.	Grav.	Mois.	Ratio	Pc/Pn	Shear	Cohesn	Frictn	LL	PL	SL		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc		%		kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
BH08	UDS02	4.00	Brownish grey silty clay with traces of calcareous nodules.	1.94	1.67	2.69	18 S	0.518	UNCONFD		1.08	0	50	19		CH		23	61	16	Do
							19 C		0.0	1.069											
									0.0	1.092											
									0.0	1.074											
									REMOULD		0.87	0									
									0.0	0.857											
									0.0	0.880											
									0.0	0.865											
BH08	SPT03	5.00	Brownish grey clayey silt with traces of sand mixture.													CI*		5	95 (Silt+Clay)		Do
BH08	SPT05	9.00	Brownish grey clayey silt with traces of sand mixture & kankar.													CI*		16	84 (Silt+Clay)		Do
BH08	SPT07	11.00	Brownish grey silty clay with traces of decomposed rock fragments.										42	21		CI					Do
BH09	UDS01	2.00	Brownish grey silty clay with traces of kankars.	1.98	1.64	2.54	21 S	0.572	TRSH-UU		1.05	0	51	19		CH		14	70	16	Do
							21 T		3.0	1.113											
							22 C		2.0	1.058											
									1.0	0.969											
BH09	UDS02	4.00	Brownish grey silty clay with traces of kankars and calcareous nodules.	2.01	1.65	2.54	22 S		TRSH-UU		0.83	6	46	17		CI		6	82	12	Do
							22 T		3.0	1.280											
									2.0	1.222											
									1.0	1.030											
BH09	SPT03	5.00	Brownish grey clayey silt with traces of fine sand mixtures													CI*		3	97 (Silt+Clay)		Do
BH10	UDS01	2.00	Brownish grey silty clay with traces of kankars.	1.97	1.61	2.70	23 S		UNCONFD		0.90	0	35	17	13	CI		17	63	20	Do
									0.0	0.871											
									0.0	0.938											
									0.0	0.880											
									REMOULD		0.57	0									
									0.0	0.554											
									0.0	0.590											
									0.0	0.560											
BH10	SPT03	5.00	Brownish grey clayey silt with traces of sand mixture.										40	18		CI					Do

Bore	Sample	Depth	Sample Description	Bulk	Dry	Spec.	Nat.	Void	Strength Test Results				Atter. Limits			IS Classification	Grain Size				Test Method
Hole	Number	M		Dens.	Dens.	Grav.	Mois.	Ratio	Pc/Pn	Shear	Cohesn	Frictn	LL	PL	SL		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc		%		kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
BH10	UDS03	6.00	Brownish grey silty clay with calcareous nodules	2.01	1.65	2.62	21 S		UNCONFD		1.13	0	46	16		CI		5	82	13	Do
									0.0	1.105											
									0.0	1.168											
									0.0	1.116											
									REMOULD		0.71	0									
									0.0	0.697											
									0.0	0.737											
									0.0	0.705											
BH10	SPT04	7.00	Brownish grey clayey silt with traces of fine sand mixture.													CI*		1	99 (Silt+Clay)		Do
BH11	UDS01	2.00	Brownish grey silty clay with traces of kankars & moorum			2.65	25 S						41	15		CI	8	48	37	7	Do
BH11	UDS02	4.00	Reddish brown silty clay with moorum	2.01	1.61	2.76	25 S	0.526	UNCONFD		0.17	0	47	17		CI		38	47	15	Do
							25 C		0.0	0.201											
									0.0	0.150											
									0.0	0.166											
									REMOULD		0.13	0									
									0.0	0.150											
									0.0	0.136											
									0.0	0.105											
BH11	SPT03	5.00	Brownish grey clayey silt with traces of fine sand mixtures													CI*		2	98 (Silt+Clay)		Do
BH12	UDS01	2.00	Brownish grey silty clay with traces of kankars	1.94	1.60	2.66	21 S		UNCONFD		0.77	0	49	22		CI	5	13	82 (Silt+Clay)		Do
									0.0	0.795											
									0.0	0.737											
									0.0	0.782											
									REMOULD		0.58	0									
									0.0	0.602											
									0.0	0.573											
									0.0	0.564											
BH12	UDS02	4.00	Brownish grey silty clay with calcareous nodules.	1.99	1.67	2.69	19 S		UNCONFD		1.49	0	43	19		CI		17	83 (Silt+Clay)		Do
									0.0	1.489											
									0.0	1.414											
									0.0	1.572											
									REMOULD		1.12	0									
									0.0	1.100											
									0.0	1.035											
									0.0	1.231											

Bore	Sample	Depth	Sample Description	Bulk	Dry	Spec.	Nat.	Void	Strength Test Results				Atter. Limits			IS Classification	Grain Size				Test Method
Hole	Number	M		Dens.	Dens.	Grav.	Mois.	Ratio	Pc/Pn	Shear	Cohesn	Frictn	LL	PL	SL		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc		%		kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
BH12	SPT03	5.00	Brownish grey clayey silt with traces of fine sand mixture.													CI*		3	97 (Silt+Clay)		Do
BH12	SPT05	8.00	Brownish grey clayey silt with traces of sand mixture & kankar.										43	21		CI					Do
BH12	SPT07	10.00	Brownish grey clayey silt with traces of decomposed rock fragments.													CI*	7	10	83 (Silt+Clay)		Do
BH13	UDS01	2.00	Brownish grey silty clay with traces of kankars	1.92	1.54	2.67	25 S		UNCONFD		0.73	0	45	20		CI	11	12	77 (Silt+Clay)		Do
									0.0	0.680											
									0.0	0.757											
									0.0	0.739											
									REMOULD		0.57	0									
									0.0	0.560											
									0.0	0.597											
									0.0	0.556											
BH13	UDS02	4.00	Brownish grey silty clay with calcareous nodules.	2.02	1.68	2.65	20 S		UNCONFD		1.60	0	44	19		CI		14	86 (Silt+Clay)		Do
									0.0	1.518											
									0.0	1.693											
									0.0	1.593											
									REMOULD		1.23	0									
									0.0	1.178											
									0.0	1.286											
									0.0	1.213											
BH13	SPT03	5.00	Brownish grey clayey silt with traces of fine sand mixtures													CI*		2	98 (Silt+Clay)		Do
BH13	SPT05	8.00	Light brownish grey clayey silt with traces of sand mixture & kankar.										40	17		CI					Do
BH13	SPT07	10.00	Light brownish grey clayey silt with traces of decomposed rock fragments.													CI*	10	16	74 (Silt+Clay)		Do
BH14	UDS01	2.00	Brownish grey silty clay with traces of sand mixture & moorum.	1.85	1.52		22 S		UNCONFD		0.59	0	47	20		CI	4	16	80 (Silt+Clay)		Do
									0.0	0.595											
									0.0	0.631											
									0.0	0.539											

Bore	Sample	Depth	Sample Description	Bulk	Dry	Spec.	Nat.	Void	Strength Test Results				Atter. Limits			IS Classification	Grain Size				Test Method
Hole	Number	M		Dens.	Dens.	Grav.	Mois.	Ratio	Pc/Pn	Shear	Cohesn	Frictn	LL	PL	SL		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc		%		kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
									REMOULD		0.48	0									
									0.0	0.503											
									0.0	0.515											
									0.0	0.413											
BH14	UDS02	4.00	Brownish grey silty clay with traces of kankar & sand mixture.	1.95	1.57	2.66	23 S		TRSH-UU		0.92	0	40	17		CI		12	88 (Silt+Clay)		Do
							24 T		3.0	0.985											
									2.0	0.912											
									1.0	0.869											
BH14	UDS03	6.00	Brownish grey silty clay with traces of sand mixture & moorum.	2.01	1.66	2.68	21 S		UNCONFD		1.08	0	42	18		CI		10	90 (Silt+Clay)		Do
									0.0	1.160											
									0.0	1.073											
									0.0	0.998											
									REMOULD		0.81	0									
									0.0	0.950											
									0.0	0.773											
									0.0	0.713											
BH14	SPT04	7.00	Brownish grey clayey silt with traces of fine sand mixtures													CI*		3	97 (Silt+Clay)		Do
BH14	SPT06	10.00	Brownish grey silty clay with traces of decomposed rock fragments.										38	19		CI					Do
BH15	UDS01	2.00	Brownish grey silty clay with traces of kankars and calcareous nodules.	1.93	1.61	2.66	20 S		UNCONFD		0.60	0	44	17	12	CI		21	61	18	Do
									0.0	0.516											
									0.0	0.707											
									0.0	0.580											
									REMOULD		0.43	0									
									0.0	0.346											
									0.0	0.527											
									0.0	0.403											
BH15	UDS02	4.00	Brownish grey silty clay with kankars	2.01	1.65	2.70	22 S	0.585	TRSH-UU		1.08	0	40	17		CI		17	64	19	Do
							22 T		3.0	1.124											
							21 C		2.0	1.058											
									1.0	1.047											
BH15	UDS03	6.00	Brownish grey silty clay with traces of kankars	1.99	1.61	2.68	23 S		TRSH-UU		0.85	0	46	16		CI		4	89	7	Do
							23 T		3.0	0.869											
									2.0	0.858											
									1.0	0.825											

Project: G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.

Job No: 4376

Sheet No.

CETEST

Bore	Sample	Depth	Sample Description	Bulk	Dry	Spec.	Nat.	Void	Strength Test Results				Atter. Limits			IS Classification	Grain Size				Test Method
Hole	Number	M		Dens.	Dens.	Grav.	Mois.	Ratio	Pc/Pn	Shear	Cohesn	Frictn	LL	PL	SL		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc		%		kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
BH15	SPT04	7.00	Brownish grey clayey silt with traces of fine sand mixtures													CI*		2	98 (Silt+Clay)		Do
BH15	SPT05	8.00	Brownish grey silty clay with decomposed rock fragments.										40	19		CI					
BH16	UDS01	2.00	Brownish grey silty clay with traces of sand mixture & kankar.	1.90	1.54	2.66	23 S		UNCONFD		0.62	0	46	18		CI		13	87 (Silt+Clay)		Do
									0.0	0.616											
									0.0	0.601											
									0.0	0.654											
									REMOULD		0.46	0									
									0.0	0.450											
									0.0	0.427											
									0.0	0.491											
BH16	SPT02	3.50	Brownish grey clayey silt with traces of fine sand mixtures													CI*		2	98 (Silt+Clay)		Do
BH16	SPT03	5.00	Deep grey silty clay with traces of sand mixture & kankar.										41	19		CI					Do
BH16	SPT04	6.50	Brownish grey clayey silt with traces of decomposed rock fragments.													CI*	6	8	86 (Silt+Clay)		Do
BH17	UDS01	2.00	Brownish grey silty clay with traces of sand mixture and kankars.	1.86	1.47	2.68	27 S		UNCONFD		0.25	0	48	22		CI		24	65	11	Do
									0.0	0.288											
									0.0	0.214											
									0.0	0.236											
									REMOULD		0.16	0									
									0.0	0.190											
									0.0	0.139											
									0.0	0.159											
BH17	UDS02	4.00	Brownish grey clayey silt with traces of sand mixture.	1.93	1.57	2.67	22 S	0.673	UNCONFD		0.84	0	55	19		CH		12	70	18	Do
							24 C		0.0	0.795											
									0.0	0.860											
									0.0	0.865											
									REMOULD		0.63	0									
									0.0	0.603											
									0.0	0.673											
									0.0	0.613											

Bore	Sample	Depth	Sample Description	Bulk	Dry	Spec.	Nat.	Void	Strength Test Results				Atter. Limits			IS Classification	Grain Size				Test Method
Hole	Number	M		Dens.	Dens.	Grav.	Mois.	Ratio	Pc/Pn	Shear	Cohesn	Frictn	LL	PL	SL		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc		%		kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
BH17	SPT03	5.00	Brownish grey silty clay with traces of sand mixture & kankar.										46	20		CI					Do
BH18	UDS01	2.00	Brownish grey silty clay with kankars and calcareous nodules.	1.95	1.56	2.68	24 S		UNCONFD		0.75	0	49	20		CI		20	69	11	Do
							25 T		0.0	0.740											
									0.0	0.720											
									0.0	0.787											
									REMOULD		0.57	0									
									0.0	0.560											
									0.0	0.543											
									0.0	0.608											
BH18	UDS02	4.00	Brownish grey silty clay with kankars and calcareous nodules.	2.05	1.78	2.68	14 S	0.554	TRSH-UU		1.25	8	42	22		CI		26	74 (Silt+Clay)		Do
							15 T		3.0	1.930											
							17 C		2.0	1.758											
									1.0	1.593											
BH18	SPT03	5.00	Brownish grey silty clay with kankars and sand mixture.										40	19		CI					Do
BH18	SPT04	6.00	Brownish grey silty sand with traces of rock dust and rock pieces.			2.68										SM	4	65	31 (Silt+Clay)		Do
BH19	UDS01	2.00	Brownish grey silty clay with traces of sand mixture & kankar.	1.88	1.55		21 S		UNCONFD		0.80	0	43	19		CI		17	83 (Silt+Clay)		Do
									0.0	0.860											
									0.0	0.763											
									0.0	0.789											
									REMOULD		0.61	0									
									0.0	0.643											
									0.0	0.573											
									0.0	0.614											
BH19	UDS03	6.00	Brownish grey silty clay with traces of kankar & sand mixture.	1.98	1.65	2.68	20 S		TRSH-UU		1.48	0	45	18		CI		9	91 (Silt+Clay)		Do
							19 T		3.0	1.532											
									2.0	1.491											
									1.0	1.414											
BH19	SPT04	7.00	Brownish grey clayey silt with traces of sand mixture.													CI*		3	97 (Silt+Clay)		Do
BH19	SPT05	8.00	Brownish grey silty clay with decomposed rock fragments.										38	17		CI					Do

Bore	Sample	Depth	Sample Description	Bulk	Dry	Spec.	Nat.	Void	Strength Test Results				Atter. Limits			IS Classification	Grain Size				Test Method
Hole	Number	M		Dens.	Dens.	Grav.	Mois.	Ratio	Pc/Pn	Shear	Cohesn	Frictn	LL	PL	SL		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc		%		kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
BH20	UDS01	2.00	Reddish brown silty clay with kankars.	1.97	1.61	2.65	23 S	0.530	TRSH-UU		0.24	7	43	18		CI		39	45	16	Do
							22 T		3.0	0.682											
							24 C		2.0	0.557											
									1.0	0.410											
BH20	UDS02	4.00	Brownish grey silty clay with traces of kankars.	1.95	1.56	2.71	24 S		UNCONFD		0.20	0	46	16		CI		29	55	16	Do
									0.0	0.189											
									0.0	0.198											
									0.0	0.196											
									REMOULD		0.14	0									
									0.0	0.135											
									0.0	0.149											
									0.0	0.131											
BH20	SPT03	5.00	Deep grey clayey silt with traces of fine sand mixture.													CI*		1	99 (Silt+Clay)		Do
BH21	UDS01	2.00	Brownish grey silty clay with traces of sand mixture.	1.91	1.52	2.65	26 S		UNCONFD		0.55	0	44	20		CI		13	87 (Silt+Clay)		Do
									0.0	0.595											
									0.0	0.531											
									0.0	0.518											
									REMOULD		0.42	0									
									0.0	0.464											
									0.0	0.406											
									0.0	0.391											
BH21	UDS02	4.00	Brownish grey silty clay with traces of kankar, moorum & sand mixture.	1.94	1.58		22 S		TRSH-UU		0.73	0	39	21		CI	7	11	82 (Silt+Clay)		Do
							24 T		3.0	0.784											
									2.0	0.718											
									1.0	0.697											
BH21	SPT04	6.25	Brownish grey clayey silt with traces of decomposed rock gragments													CI*		6	94 (Silt+Clay)		Do
BH22	UDS01	2.00	Brownish grey clayey silt with traces of fine sand mixture.	1.90	1.53	2.65	24 S	0.603	UNCONFD		0.62	0	48	17		CI		12	70	18	Do
							23 C		0.0	0.655											
									0.0	0.634											
									0.0	0.586											
									REMOULD		0.49	0									
									0.0	0.499											
									0.0	0.495											
									0.0	0.479											

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Bore	Sample	Depth	Sample Description	Bulk	Dry	Spec.	Nat.	Void	Strength Test Results				Atter. Limits			IS Classification	Grain Size				Test Method
Hole	Number	M		Dens.	Dens.	Grav.	Mois.	Ratio	Pc/Pn	Shear	Cohesn	Frictn	LL	PL	SL		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc		%		kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
BH22	UDS02	4.00	Brownish grey silty clay with calcareous nodules and kankars	2.04	1.70	2.67	20 S		UNCONFD		1.27	0	44	15	6	CI		17	69	14	Do
									0.0	1.305											
									0.0	1.234											
									0.0	1.265											
									REMOULD		0.92	0									
									0.0	0.953											
									0.0	0.889											
									0.0	0.909											
BH22	SPT03	5.00	Brownish grey clayey silt with traces of sand mixtures													CI*		3	97 (Silt+Clay)		Do
BH22	SPT04	7.00	Brownish grey silty clay with decomposed rock fragments.										39	18		CI					Do
BH23	UDS01	2.00	Brownish grey silty clay with traces of kankars	1.96	1.59	2.64	22 S		TRSH-UU		0.54	6	45	16		CI		13	72	15	Do
							24 T		3.0	0.985											
									2.0	0.791											
									1.0	0.748											
BH23	UDS02	4.00	Brownish grey silty clay with calcareous nodules.	2.01	1.68	2.65	20 S	0.502	TRSH-UU		1.31	6	47	18	10	CI		14	65	21	Do
							20 T		3.0	1.826											
							20 C		2.0	1.724											
									1.0	1.579											
BH23	SPT03	5.00	Deep grey clayey silt with traces of fine sand mixtures													CI*		2	98 (Silt+Clay)		Do
BH23	SPT04	7.00	Brownish grey silty clay / clayey silt.										37	21		CI					Do
BH24	UDS01	2.00	Brownish grey silty clay with calcareous nodules.	2.02	1.66	2.68	21 S	0.546	TRSH-UU		0.72	5	46	17		CI		17	64	19	Do
							21 T		3.0	1.096											
							20 C		2.0	0.980											
									1.0	0.895											
BH24	UDS02	4.00	Brownish grey silty clay with calcareous nodules.	2.03	1.67		20 S		TRSH-UU		1.24	0	46	18	7	CI		17	71	12	Do
							22 T		3.0	1.257											
									2.0	1.257											
									1.0	1.191											
BH24	SPT03	5.00	Brownish grey clayey silt with traces of fine sand mixture.													CI*		1	99 (Silt+Clay)		Do

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Bore	Sample	Depth	Sample Description	Bulk	Dry	Spec.	Nat.	Void	Strength Test Results				Atter. Limits			IS Classification	Grain Size				Test Method
Hole	Number	M		Dens.	Dens.	Grav.	Mois.	Ratio	Pc/Pn	Shear	Cohesn	Frictn	LL	PL	SL		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc		%		kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
BH24	SPT04	6.50	Brownish grey silty clay with decomposed rock fragments.										38	23		CI					Do
BH25	UDS01	2.00	Brownish grey clayey silt with traces of kankar.	1.92	1.52	2.66	26 S		UNCONFD		0.63	0	46	18		CI		11	89 (Silt+Clay)		Do
									0.0	0.679											
									0.0	0.600											
									0.0	0.627											
									REMOULD		0.45	0									
									0.0	0.470											
									0.0	0.418											
									0.0	0.460											
BH25	UDS03	6.00	Grey silty clay with traces of sand mixture.	1.95	1.57	2.70	23 S	0.468	UNCONFD		0.74	0	44	15		CI		15	66	19	Do
							17 C		0.0	0.809											
									0.0	0.696											
									0.0	0.727											
									REMOULD		0.47	0									
									0.0	0.509											
									0.0	0.441											
									0.0	0.462											
BH25	SPT04	7.00	Brownish grey silty clay with decomposed rock fragments.										40	21		CI					Do
BH25	SPT05	8.00	Brownish grey clayey silt with traces of fine sand mixtures													CI*		3	97 (Silt+Clay)		Do
BH26	UDS01	2.00	Brownish grey silty clay / clayey silt with sand, moorum & kankars.	2.01	1.68	2.64	20 S		UNCONFD		1.46	0	46	16		CI	30	30	32	8	Do
									0.0	1.466											
									0.0	1.507											
									0.0	1.392											
									REMOULD		1.18	0									
									0.0	1.192											
									0.0	1.213											
									0.0	1.119											
BH26	UDS02	4.00	Reddish brown clayey moorum			2.78	11 S						44	19		CI	34	37	25	4	Do
BH26	SPT04	5.70	Brownish grey clayey silt with traces of fine sand mixture.													CI*		2	98 (Silt+Clay)		Do

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Bore	Sample	Depth	Sample Description	Bulk	Dry	Spec.	Nat.	Void	Strength Test Results				Atter. Limits			IS Classification	Grain Size				Test Method
Hole	Number	M		Dens.	Dens.	Grav.	Mois.	Ratio	Pc/Pn	Shear	Cohesn	Frictn	LL	PL	SL		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc		%		kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
BH27	UDS01	2.00	Brownish grey clayey silt with traces of sand mixtures	1.95	1.56	2.69	24 S	0.667	UNCONFD		0.88	0	55	18	8	CH		15	68	17	Do
							25 C		0.0	0.891											
									0.0	0.907											
									0.0	0.849											
									REMOULD		0.67	0									
									0.0	0.691											
									0.0	0.702											
									0.0	0.612											
BH27	SPT02	3.00	Brownish grey clayey silt with traces of fine sand mixtures													CI*		2	98 (Silt+Clay)		Do
BH27	SPT03	5.00	Brownish grey silty clay with decomposed rock fragments.										42	22		CI					Do
BH28	UDS01	2.00	Brownish grey silty clay with traces of sand mixture.	1.89	1.55	2.67	22 S		UNCONFD		0.68	0	45	18		CI		10	90 (Silt+Clay)		Do
									0.0	0.666											
									0.0	0.710											
									0.0	0.679											
									REMOULD		0.50	0									
									0.0	0.463											
									0.0	0.541											
									0.0	0.491											
BH28	UDS02	4.00	Brownish grey silty clay with traces of kankar & sand mixture.	1.97	1.59		23 S		TRSH-UU		0.82	0	43	18		CI		15	85 (Silt+Clay)		Do
							24 T		3.0	0.878											
									2.0	0.807											
									1.0	0.770											
BH28	SPT03	5.00	Brownish grey clayey silt with traces of sand mixture.													CI*		5	95 (Silt+Clay)		Do
BH29	UDS01	2.00	Brownish grey silty clay with traces of sand mixture.	1.91	1.49	2.64	28 S		UNCONFD		0.56	0	50	19		CH		11	89 (Silt+Clay)		Do
									0.0	0.560											
									0.0	0.587											
									0.0	0.527											
									REMOULD		0.42	0									
									0.0	0.423											
									0.0	0.454											
									0.0	0.391											
BH29	UDS02	4.00	Brownish grey clayey silt with traces of sand mixtures	1.88	1.61	2.71	17 S		UNCONFD		0.81	0	47	17	8	CI		12	71	17	Do
									0.0	0.860											
									0.0	0.751											
									0.0	0.831											

Bore	Sample	Depth	Sample Description	Bulk	Dry	Spec.	Nat.	Void	Strength Test Results				Atter. Limits			IS Classification	Grain Size				Test Method
Hole	Number	M		Dens.	Dens.	Grav.	Mois.	Ratio	Pc/Pn	Shear	Cohesn	Frictn	LL	PL	SL		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc		%		kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
									REMOULD		0.63	0									
									0.0	0.673											
									0.0	0.594											
									0.0	0.614											
BH29	SPT04	7.00	Brownish grey clayey silt with traces of sand mixtures													CI*		2	98 (Silt+Clay)		Do
BH29	SPT05	8.00	Reddish brown, clayey silt with decomposed rock fragments.										35	24		CI					Do
BH30	UDS01	2.00	Brownish grey silty clay with traces of calcareous nodules and kankars.	2.02	1.62	2.68	25 S		TRSH-UU		0.61	0	45	18	9	CI		9	70	21	Do
							24 T		3.0	0.660											
									2.0	0.598											
									1.0	0.567											
BH30	UDS02	4.00	Brownish grey silty clay with sand mixture & kankars.	2.01	1.69	2.68	18 S	0.541	UNCONFD		1.07	0	51	18		CH		38	43	19	Do
							19 C		0.0	1.153											
									0.0	1.025											
									0.0	1.020											
									REMOULD		0.84	0									
									0.0	0.907											
									0.0	0.805											
									0.0	0.805											
BH30	UDS03	6.00	Brownish grey silty clay with calcareous nodule, kankar and rock pieces.	2.03	1.72	2.65	19 S		TRSH-UU		0.98	6	45	16	8	CI		21	65	14	Do
							18 T		3.0	1.470											
									2.0	1.324											
									1.0	1.224											
BH30	SPT04	7.00	Brownish grey clayey silt with traces of fine sand mixtures													CI*		2	98 (Silt+Clay)		Do
BH31	SPT01	1.00	Reddish brown silty sand with traces of mica.			2.65										SM		85	15 (Silt+Clay)		Do
BH31	SPT03	3.60	Greyish brown clayey silt with traces of fine mixture & decomposed rockdust.			2.68										CI*		4	71	25	Do
IBH01	UDS01	2.00	Brownish grey clayey silt with traces of sand mixtures and kankars.			2.72	17 S	0.511					48	17		CI		24	60	16	Do
							17 C														

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Bore	Sample	Depth	Sample Description	Bulk	Dry	Spec.	Nat.	Void	Strength Test Results				Atter. Limits			IS Classification	Grain Size				Test Method
Hole	Number	M		Dens.	Dens.	Grav.	Mois.	Ratio	Pc/Pn	Shear	Cohesn	Frictn	LL	PL	SL		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc		%		kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
IBH01	UDS02	4.00	Reddish grey silty clay with traces of kankars and decomposed rock pieces.	2.04	1.71		19 S		UNCONFD		1.18	0	47	18		CI					Do
									0.0	0.860											
									0.0	0.751											
									0.0	0.831											
									REMOULD		0.92	0									
									0.0	0.673											
									0.0	0.594											
									0.0	0.614											
IBH01	SPT03	5.00	Brownish grey clayey silt with traces of fine sand mixture.													CI*		2	98 (Silt+Clay)		Do
IBH01	SPT04	6.20	Brownish grey, silty clay with decomposed rock fragments.										38	20		CI					Do
IBH02	UDS02	4.00	Brownish grey silty clay with sand mixture & calcareuos nodules.	1.90	1.55	2.68	23 S	0.665	UNCONFD		0.70	0	51	21	11	CH		22	67	11	Do
							23 C		0.0	0.676											
									0.0	0.690											
									0.0	0.722											
									REMOULD		0.47	0									
									0.0	0.453											
									0.0	0.466											
									0.0	0.485											
IBH02	SPT03	5.00	Brownish grey clayey silt with traces of fine sand mixtures													CI*		7	93 (Silt+Clay)		Do
IBH03	UDS01	2.00	Brownish grey silty clay with kankars and calcareous nodules.	2.01	1.68	2.71	19 S	0.529	TRSH-UU		0.76	0	44	17		CI		31	58	11	Do
							20 T		3.0	0.825											
							20 C		2.0	0.772											
									1.0	0.669											
IBH03	UDS02	4.00	Brownish grey silty clay with calcareous nodules	2.03	1.70	2.66	22 S		TRSH-UU		1.02	0	46	17	9	CI		21	65	14	Do
							19 T		3.0	1.069											
									2.0	1.030											
									1.0	0.947											
IBH03	SPT03	5.00	Brownish grey clayey silt with traces of sand mixture.													CI*		2	98 (Silt+Clay)		Do
IBH03	SPT04	6.25	Brownish grey, clayey silt with decomposed rock fragments.										36	22		CI					Do

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Bore Hole	Sample Number	Depth M	Sample Description	Bulk Dens. gms/cc	Dry Dens. gms/cc	Spec. Grav.	Nat. Mois. %	Void Ratio	Strength Test Results Pc/Pn kg/sqcm	Shear kg/sqcm	Cohesn kg/sqcm	Frictn Deg.	Atter. Limits LL %	PL %	SL %	IS Classification	Grain Size Gravl %	Sand %	Silt %	Clay %	Test Method
IBH04	UDS01	2.00	Brownish grey silty clay with traces of kankars	1.97	1.57		25 S		UNCONFD		0.64	0	47	20		CI		8	92 (Silt+Clay)		Do
									0.0	0.675											
									0.0	0.657											
									0.0	0.601											
									REMOULD		0.52	0									
									0.0	0.556											
									0.0	0.540											
									0.0	0.456											
IBH04	UDS02	4.00	Brownish grey silty clay with traces of sand mixture & kankar.	2.01	1.65	2.67	22 S		UNCONFD		1.07	0	43	18		CI		11	89 (Silt+Clay)		Do
									0.0	1.052											
									0.0	1.130											
									0.0	1.033											
									REMOULD		0.79	0									
									0.0	0.781											
									0.0	0.859											
									0.0	0.737											
IBH04	SPT03	5.00	Brownish grey clayey silt with traces of sand mixture.													CI*		3	97 (Silt+Clay)		Do
IBH04	SPT04	5.60	Brownish grey, silty clay with decomposed rock fragments.										37	21		CI					Do
IBH05	UDS01	2.00	Brownish grey silty clay with calcareous nodules and kankars.	1.92	1.61	2.73	19 S		UNCONFD		1.24	0	45	18		CI		17	61	22	Do
									0.0	1.315											
									0.0	1.267											
									0.0	1.144											
									REMOULD		0.96	0									
									0.0	1.055											
									0.0	0.892											
									0.0	0.927											
IBH05	UDS02	4.00	Greyish brown silty clay with calcareous nodules.	1.96	1.62	2.65	21 S	0.591	UNCONFD		1.39	0	45	17	9	CI		6	80	14	Do
							23 C		0.0	1.366											
									0.0	1.388											
									0.0	1.417											
									REMOULD		1.04	0									
									0.0	1.020											
									0.0	1.039											
									0.0	1.050											
IBH05	SPT03	5.00	Brownish grey, silty clay with traces of decomposed rock fragments.										34	20		CL					Do

Bore	Sample	Depth	Sample Description	Bulk	Dry	Spec.	Nat.	Void	Strength Test Results				Atter. Limits			IS Classification	Grain Size				Test Method
Hole	Number	M		Dens.	Dens.	Grav.	Mois.	Ratio	Pc/Pn	Shear	Cohesn	Frictn	LL	PL	SL		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc		%		kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
IBH05	SPT04	5.50	Reddish brown clayey silt with sand mixtures and traces of kankars and rock dust.													SM	5	45	50 (Silt+Clay)		Do
IBH06	UDS01	2.00	Brownish grey silty clay with kankars.	1.84	1.45	2.53	30 S		TRSH-UU		0.31	0	50	18		CH		22	59	19	Do
							28 T		3.0	0.314											
									2.0	0.314											
									1.0	0.303											
IBH06	UDS02	4.00	Brownish grey clayey silt with traces of sand mixtures and kankars.	1.94	1.54	2.72	26 S		UNCONFD		0.70	0	49	16		CI		21	64	15	Do
									0.0	0.752											
									0.0	0.681											
									0.0	0.673											
									REMOULD		0.53	0									
									0.0	0.549											
									0.0	0.539											
									0.0	0.497											
IBH06	SPT03	5.00	Brownish grey clayey silt with traces of fine sand mixture.													CI*		2	98 (Silt+Clay)		Do
IBH07	UDS01	2.00	Reddish brown, clayey morrum with kankar & fine sand mixture.			2.81	13 S						44	15	8	CI	21	48	25	6	Do
IBH07	UDS02	4.00	Brownish grey silty clay with kankars and calcareous nodules	2.05	1.83	2.82	13 S		TRSH-UU		1.26	11	53	17	10	CH	11	50	32	7	Do
							11 T		3.0	2.267											
									2.0	1.979											
									1.0	1.790											
IBH07	SPT04	5.75	Light grey clayey silt with traces of sand mixtures and rock fragments													CI*		9	91 (Silt+Clay)		Do
IBH08	UDS01	2.00	Brownish grey clayey silt with traces of sand mixtures.	1.98	1.68		18 S		UNCONFD		0.83	0	58	18		CH		17	62	21	Do
									0.0	0.875											
									0.0	0.813											
									0.0	0.797											
									REMOULD		0.65	0									
									0.0	0.690											
									0.0	0.639											
									0.0	0.615											

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Sheet No.

CETEST

Bore	Sample	Depth	Sample Description	Bulk	Dry	Spec.	Nat.	Void	Strength Test Results				Atter. Limits			IS Classification	Grain Size				Test Method
Hole	Number	M		Dens.	Dens.	Grav.	Mois.	Ratio	Pc/Pn	Shear	Cohesn	Frictn	LL	PL	SL		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc		%		kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
IBH08	UDS02	4.00	Brownish grey silty clay with calcareous nodules.	2.11	1.80	2.72	18 S	0.398	UNCONFD		1.75	0	52	18	8	CH		17	67	16	Do
							16 C		0.0	1.870											
									0.0	1.556											
									0.0	1.837											
									REMOULD		1.43	0									
									0.0	1.515											
									0.0	1.278											
									0.0	1.500											
IBH08	SPT03	5.00	Brownish grey clayey silt with traces of sand mixture.													CI*		5	95 (Silt+Clay)		Do
IBH08	SPT04	6.00	Brownish grey, silty clay. Observed decomposed rock fragments.										40	23		CI					Do
IBH09	UDS01	2.00	Reddish grey silty clay with decomposed pieces.	2.10	1.78	2.73	18 S	0.490	TRSH-UU		1.13	6	48	19	13	CI		16	64	20	Do
							19 T		3.0	1.602											
							17 C		2.0	1.499											
									1.0	1.370											
IBH09	UDS02	4.00	Brownish grey silty clay with moorum, kankar & sand mixture			2.76	23 S						43	16		CI	25	38	30	7	Do
IBH09	SPT03	5.00	Brownish grey, silty clay with traces of kankar & sand mixture.										41	19		CI					Do
IBH09	SPT04	6.50	Reddish brown clayey silt with moorum kankars and traces of sand mixtures.													CI*	5	25	70 (Silt+Clay)		Do
IBH10	UDS01	2.00	Brownish grey silty clay with kankars and calcareous nodules.	2.10	1.75	2.71	20 S		TRSH-UU		0.74	6	47	17	10	CI		18	62	20	Do
							20 T		3.0	1.178											
									2.0	1.051											
									1.0	0.936											
IBH10	UDS02	4.00	Brownish grey silty clay with kankar, moorum and calcareous nodules.			2.78	26 S						43	16		CI	17	33	42	8	Do
IBH10	SPT04	6.00	Brownish grey, clayey silt with traces of kankar & sand mixture.										37	22		CI					Do

Bore	Sample	Depth	Sample Description	Bulk	Dry	Spec.	Nat.	Void	Strength Test Results				Atter. Limits			IS Classification	Grain Size				Test Method
Hole	Number	M		Dens.	Dens.	Grav.	Mois.	Ratio	Pc/Pn	Shear	Cohesn	Frictn	LL	PL	SL		Gravl	Sand	Silt	Clay	
				gms/cc	gms/cc		%		kg/sqcm	kg/sqcm	kg/sqcm	Deg.	%	%	%		%	%	%	%	
IBH10	SPT05	7.00	Brownish grey clayey silt with traces of sand mixtures													CI*		5	95 (Silt+Clay)		Do
IBH11	UDS01	2.00	Brownish grey clayey moorum with kankar and traces of sand mixture.			2.81	11 S						45	14		CI	90	6	3	1	Do
IBH11	UDS02	4.00	Brownish grey clayey silt with moorum, kankar & traces of sand mixture.			2.77	12 S 15 C	0.424					48	18	14	CI	25	32	32	11	Do
IBH11	SPT03	5.00	Brownish grey clayey silt with traces of fine sand mixture.													CI*		2	98 (Silt+Clay)		Do
IBH11	SPT04	5.60	Brownish grey, silty clay with traces of kankar & decomposed rock.										38	21		CI					Do
IBH12	SPT01	1.00	Reddish brown clayey morrum with kankar and fine sand mixture													SM	8	60	32 (Silt+Clay)		Do
IBH12	SPT02	5.60	Brownish grey clayey silt with moorum, kankar & sand mixture										44	19		CI					Do
IBH12	SPT03	5.00	Yellowish grey clayey silt with traces of sand mixtures and siltstone.			2.69										CI*		20	67	13	Do
IBH12	SPT05	6.00	Yellowish grey, clayey silt with decomposed rock fragments.										33	24		ML					Do

Note: ** - Classification in this case is based on average layer properties.

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Sheet No.

CETEST

Project: G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai.

Job No: 4376

Sheet No.

LABORATORY ROCK TEST RESULTS

BH No.	Run No.	Depth (M)	Density (gm/cc)		Water Content %	Porosity %	Specific Gravity	Unconfined Compressive strength (kg/sqcm)		Coefficient of softening	Point Load Strength Index (kg/sqcm)	Slake Durability Index (%)	Hardness (based on Mohs' Scale)	Soundness* (% Loss)	E (Kg/sqcm) In-situ	E (Kg/sqcm) Saturated	Test Method
			Bulk	Dry				In-situ	Saturated								
BH-01	3	6.25-7.00	2.716	2.711	0.185	0.745	2.732	--	145	--	--	--	--	--	--	12483	** See the Note
BH-01	4	7.00-7.75	2.744	--	--	--	--	168	--	--	--	--	--	--	25271	--	Do
BH-01	5	7.75-8.50	--	--	--	--	--	--	--	--	--	98.71	Moderately Hard	--	--	--	Do
BH-01	8	10.00-10.75	2.718	2.707	0.392	1.692	2.753	--	--	--	20.49	--	--	--	--	--	Do
BH-01	14	14.50-15.25	--	--	--	--	--	--	--	--	--	--	--	19.33	--	--	Do
BH-02	16	16.75-17.50	2.715	2.703	0.469	2.164	2.762	325	218	0.67	--	--	--	--	--	20790	Do
BH-02	19	19.00-19.75	--	--	--	--	--	--	--	--	--	94.99	Soft	--	--	--	Do
BH-03	5	9.50-10.25	--	--	--	--	--	--	--	--	6.32	--	--	--	--	--	Do
BH-04	17	18.50-19.25	2.713	2.697	0.608	3.031	2.781	172	127	0.74	--	--	Soft	--	--	12316	Do
BH-04	8	11.25-12.00	2.772	2.764	0.295	1.141	2.795	--	196	--	--	--	--	--	--	21594	Do
BH-04	9	12.00-12.75	2.793	2.788	0.153	0.747	2.809	--	--	--	--	--	--	20.14	--	--	Do
BH-04	27	25.50-26.25	2.699	2.681	0.671	3.239	2.771	--	91	--	--	--	--	--	--	10718	Do
BH-04	28	26.25-27.00	--	--	--	--	--	--	--	--	--	98.58	Moderately Hard	--	--	--	Do
BH-05	4	8.25-9.00	2.728	2.722	0.195	0.708	2.742	--	345	--	--	--	--	--	--	19451	Do
BH-05	8	11.25-12.00	--	--	--	--	--	--	--	--	--	--	--	17.42	--	--	Do
BH-05	31	28.50-30.00	--	--	--	--	--	--	--	--	--	98.67	--	--	--	--	Do
BH-06	3	7.50-8.25	2.725	2.711	0.508	2.020	2.767	--	--	--	9.80	--	--	--	--	--	Do
BH-06	10	12.75-13.50	2.748	2.743	0.200	0.644	2.761	--	320	--	--	--	Moderately Hard	--	--	18617	Do
BH-06	24	23.25-24.00	--	--	--	--	--	--	--	--	--	--	--	21.25	--	--	Do
BH-07	5	9.00-9.75	--	--	--	--	--	--	--	--	9.29	--	--	--	--	--	Do
BH-07	8	11.25-12.00	2.741	2.730	0.411	1.835	2.781	--	--	--	--	98.32	--	--	--	--	Do
BH-07	12	14.25-15.00	2.750	2.745	0.197	0.959	2.771	--	157	--	--	--	--	--	--	18581	Do

BH No.	Run No.	Depth (M)	Density (gm/cc)		Water Content %	Porosity %	Specific Gravity	Unconfined Compressive strength (kg/sqcm)		Coefficient of softening	Point Load Strength Index (kg/sqcm)	Slake Durability Index (%)	Hardness (based on Mohs' Scale)	Soundness* (% Loss)	E (Kg/sqcm) In-situ	E (Kg/sqcm) Saturated	Test Method
			Bulk	Dry				In-situ	Saturated								
BH-08	1	11.5-12.25	--	--	--	--	--	--	--	--	--	99.01	Moderately Hard	--	--	--	Do
BH-08	7	16.00-16.75	2.811	2.809	0.053	0.314	2.818	--	--	--	48.33	--	--	--	--	--	Do
BH-08	15	22.00-22.75	2.796	2.784	0.419	2.848	2.866	516	485	0.94	--	--	--	--	29977	27717	Do
BH-08	17	23.50-24.25	--	--	--	--	--	--	--	--	--	--	--	23.74	--	--	Do
BH-09	1	6.00-6.75	--	--	--	--	--	--	--	--	--	99.03	Moderately Hard	--	--	--	Do
BH-09	3	7.50-8.25	2.743	2.726	0.616	2.530	2.797	233	145	0.62	--	--	--	--	--	15647	Do
BH-09	13	15.00-15.75	2.718	--	--	--	--	--	--	--	12.35	--	--	--	--	--	Do
BH-10	3	10.50-11.25	2.709	2.699	0.365	1.672	2.745	--	--	--	34.68	--	--	--	--	--	Do
BH-10	5	12.00-12.75	--	--	--	--	--	--	--	--	--	99.01	--	--	--	--	Do
BH-10	12	17.25-18.00	--	--	--	--	--	--	--	--	--	--	--	18.24	--	--	Do
BH-11	14	15.00-15.75	2.692	2.674	0.700	3.787	2.779	--	--	--	4.54	--	--	--	--	--	Do
BH-11	15	15.75-16.50	2.714	2.694	0.727	3.635	--	164	116	0.71	--	--	--	--	--	8948	Do
BH-11	17	17.25-18.00	--	--	--	--	--	--	--	--	--	98.39	Moderately Hard	--	--	--	Do
BH-12	1	11.50-12.25	2.762	2.754	0.285	1.382	2.793	--	--	--	22.40	--	--	--	--	--	Do
BH-12	5	14.50-15.25	--	--	--	--	--	--	--	--	--	6.49	--	--	--	--	Do
BH-12	7	16.00-16.75	2.698	2.687	0.408	2.167	2.747	172	--	--	--	--	--	--	18673		Do
BH-13	1	12.00-12.75	--	--	--	--	--	--	--	--	--	80.28	--	--	--	--	Do
BH-13	4	14.25-15.00	2.741	2.729	0.437	1.852	2.780	--	--	--	14.46	--	--	--	--	--	Do
BH-13	10	18.75-19.50	2.705	--	--	--	--	196	--	--	--	--	Moderately Hard	--	26653	--	Do
BH-13	11	19.50-20.00	2.733	2.719	0.488	2.559	2.791	--	187	--	--	--	--	--	--	29980	Do
BH-14	4	13.75-14.50	2.730	2.713	0.648	3.010	2.797	--	--	--	13.63	--	--	--	--	--	Do
BH-14	5	13.00-13.75	--	--	--	--	--	--	--	--	--	8.99	--	--	--	--	Do
BH-14	6	15.25-16.00	2.742	2.728	0.506	2.607	2.801		188	--	--	--	--	--	--	20312	Do
BH-15	2	9.25-10.00	--	--	--	--	--	--	--	--	--	98.34	--	--	--	--	Do

BH No.	Run No.	Depth (M)	Density (gm/cc)		Water Content %	Porosity %	Specific Gravity	Unconfined Compressive strength (kg/sqcm)		Coefficient of softening	Point Load Strength Index (kg/sqcm)	Slake Durability Index (%)	Hardness (based on Mohs' Scale)	Soundness* (% Loss)	E (Kg/sqcm) In-situ	E (Kg/sqcm) Saturated	Test Method
			Bulk	Dry				In-situ	Saturated								
BH-15	3	10.00-10.75	2.757	2.747	0.345	1.522	2.790	--	111	--	--	--	--	--	--	11494	Do
BH-15	10	15.25-16.00	--	--	--	--	--	--	--	--	--	--	--	19.34	--	--	Do
BH-16	1	7.25-8.00	2.905	2.890	0.510	2.468	2.964	--	--	--	23.71	--	--	--	--	--	Do
BH-16	2	8.00-8.75	--	--	--	--	--	--	--	--	--	98.92	--	--	--	--	Do
BH-16	8	12.50-13.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Do
BH-17	3	7.75-08.50	2.747	2.737	0.338	1.530	2.780	--	201	--	--	--	--	--	--	11393	Do
BH-17	8	11.50-12.25	2.749	--	--	--	--	432	--	--	--	--	Moderately Hard	--	23065	--	Do
BH-18	7	10.75-11.50		--	--	--	--	--	--	--		--	--	17.76	--	--	Do
BH-18	15	16.75-17.50	2.725	2.714	0.415	2.366	2.780	354	201	0.57	--	--	--	--	--	16595	Do
BH-19	10	15.75-16.50	2.765	2.759	0.220	1.003	2.787	--	111	--	--	--	--	--	--	11998	Do
BH-19	11	16.50-17.25	2.758	--	--	--	--	458	--	--	--	--	--	--	18759	--	Do
BH-19	13	18.00-18.75	--	--	--	--	--	--	--	--	--	93.56	--	--	--	--	Do
BH-19	14	18.75-19.50	--	--	--	--	--	--	--	--	--	--	--	18.66	--	--	Do
BH-20	1	5.25-6.00	--	--	--	--	--	--	--	--	--	99.20	Moderately Hard	--	--	--	Do
BH-20	2	6.00-6.75	2.755	2.750	0.194	0.843	2.773	--	365	--	--	--	--	--	--	16490	Do
BH-20	3	6.75-7.50	2.705	2.696	0.328	1.485	2.737	--	--	--	--	--	--	19.25	--	--	Do
BH-20	9	11.25-12.00	2.727	--	--	--	--	163	--	--	--	--	--	--	18418	--	Do
BH-21	4	9.00-9.75	--	--	--	--	--	--	--	--	--	88.42	Soft	--	--	--	Do
BH-21	7	11.25-12.00	2.753	2.747	0.201	0.791	2.769	--	--	--	27.34	--	--	--	--	--	Do
BH-21	10	13.50-14.25	2.779	2.775	0.137	0.484	2.789	866	546	0.63	--	--	--	--	57313	44044	Do
BH-22	1	8.50-9.25	2.955	2.950	0.156	0.957	2.978	--	--	--	--	94.05	Moderately Hard	--	--	--	Do
BH-22	7	13.00-13.75	2.708	2.706	0.077	0.336	2.715	--	405	--	--	--	--	--	--	21955	Do
BH-22	11	16.00-16.75	2.680	--	--	--	--	428	--	--	--	--	--	--	27522	--	Do
BH-22	15	19.00-19.75	--	--	--	--	--	--	--	--	--	--	--	20.83	--	--	Do

BH No.	Run No.	Depth (M)	Density (gm/cc)		Water Content %	Porosity %	Specific Gravity	Unconfined Compressive strength (kg/sqcm)		Coefficient of softening	Point Load Strength Index (kg/sqcm)	Slake Durability Index (%)	Hardness (based on Mohs' Scale)	Soundness* (% Loss)	E (Kg/sqcm) In-situ	E (Kg/sqcm) Saturated	Test Method
			Bulk	Dry				In-situ	Saturated								
BH-23	1	8.50-9.25	--	--	--	--	--	--	--	--	--	59.28	Soft		--	--	Do
BH-23	2	9.25-10.00	2.661	2.648	0.494	2.815	2.724	--	--	--	16.78		--	--	--	--	Do
BH-23	9	14.50-15.25	2.727	2.720	0.248	1.138	2.751	--	--	--	21.44	--	--	--	--	--	Do
BH-23	10	15.25-16.00	--	--	--	--	--	--	--	--	--	--	--	18.69	--	--	Do
BH-24	8	12.25-13.00	2.722	2.716	0.247	1.131	2.747	--	--	--	6.60	--	--	--	--	--	Do
BH-24	12	15.25-16.00	2.622	2.600	0.843	4.737	2.729	--	61	--	--	--	--	--	--	8223	Do
BH-24	19	20.50-21.25	--	--	--	--	--	--	--	--	--	89.12	Soft	--	--	--	Do
BH-25	5	11.25-12.00	2.688	2.676	0.464	2.030	2.731	--	221	--	17.65	--	--	--	--	13323	Do
BH-25	10	15.00-15.75	--	--	--	--	--	--	--	--	--	95.02	--	--	--	--	Do
BH-25	17	20.25-21.50	2.736	--	--	--	--	--	--	--	--	--	--	22.71	--	--	Do
BH-26	2	6.75-7.50	2.689	2.681	0.329	1.521	2.722	--	155	--	--	--	--	--	--	18385	Do
BH-26	3	7.50-8.25	--	--	--	--	--	--	--	--	--	99.33	Moderately Hard	--	--	--	Do
BH-26	7	10.50-11.25	2.767	2.757	0.361	1.574	2.801	--	--	--	--	--	--	18.23	--	--	Do
BH-26	16	17.25-18.00	2.707	--	--	--	--		412	--	--	--	--	--	--	39845	Do
BH-27	10	12.75-13.50	2.747	2.737	0.354	1.371	2.775	311	182	0.59	--	--	--	--	--	20116	Do
BH-27	12	14.25-15.00	2.762	--	--	--	--	--	--	--	--	95.82	--	--	--	--	Do
BH-28	6	9.75-10.50	--	--	--	--	--	--	--	--	--	98.49	--	--	--	--	Do
BH-28	13	15.00-15.75	2.760	2.754	0.231	0.979	2.781	328	271	0.83	--	--	--	--	--	21067	Do
BH-29	2	10.25-11.00	2.711	2.701	0.384	1.395	2.739	--	--	--	17.91	--	--	--	--	--	Do
BH-29	5	12.50-13.25	2.724	2.713	0.377	1.740	2.761	--	178	--	--	--	--	--	--	16965	Do
BH-29	6	13.25-14.00	--	--	--	--	--	--	--	--	--	99.23	--	--	--	--	Do
BH-30	3	9.75-10.50	--	--	--	--	--	--	--	--	--	82.82	--	--	--	--	Do
BH-30	10	15.00-15.75	2.674	2.658	0.592	2.778	2.734	--	--	--	1.89	--	Soft	--	--	--	Do
BH-30	15	18.75-19.50	2.709	--	--	--	--	--	--	--	--	--	--	19.44	--	--	Do

BH No.	Run No.	Depth (M)	Density (gm/cc)		Water Content %	Porosity %	Specific Gravity	Unconfined Compressive strength (kg/sqcm)		Coefficient of softening	Point Load Strength Index (kg/sqcm)	Slake Durability Index (%)	Hardness (based on Mohs' Scale)	Soundness* (% Loss)	E (Kg/sqcm) In-situ	E (Kg/sqcm) Saturated	Test Method
			Bulk	Dry				In-situ	Saturated								
BH-31	4	6.00-6.75	2.673	2.661	0.431	1.910	2.713	--	--	--	5.35	--	--	--	--	--	Do
BH-31	10	10.50-11.25	2.739	2.730	0.334	1.472	2.771	--	118	--	--	--	--	--	--	9656	Do
BH-31	14	13.50-14.25	--	--	--	--	--	--	278	--	--	--	--	--	--	--	Do
BH-31	21	18.75-19.50	--	--	--	--	--	--	--	--	--	94.12	--	--	--	--	Do
IBH-1	3	8.00-8.75	2.767	2.756	0.404	1.596	2.801		307	--	--	--	--	--	--	25789	Do
IBH-1	11	14.00-14.75	2.743	2.731	0.450	1.746	2.780	--	248	--	--	--	--	16.35	--	28832	Do
IBH-1	19	20.00-20.75	--	--	--	--	--	--	--	--	--	92.29	--	--	--	--	Do
IBH-2	2	6.50-7.25	--	--	--	--	--	--	--	--	--	98.78	--		--	--	Do
IBH-2	3	7.25-8.00	2.742	2.738	0.156	0.683	2.757	--	341	--	--	--	--	--	--	27078	Do
IBH-2	4	8.00-8.75	2.746	2.736	0.362	1.501	2.778	--	--	--	8.91	--	--	--	--	--	Do
IBH-3	1	6.75-7.50	2.730	2.709	0.779	3.549	2.809	--	49	--	--	--	--	--	--	7155	Do
IBH-3	23	23.25-24.00	--	--	--	--	--	--	--	--	--	90.20	--	--	--	--	Do
IBH-4	2	6.75-7.50	2.748	2.738	0.374	1.579	2.782	358	205	0.57	--	--	--	--	24866	23296	Do
IBH-5	2	6.75-7.50	2.738	--	--	--	--	231	--	--	--	--	--	--	16607	--	Do
IBH-5	3	7.50-8.25	2.745	2.734	0.368	1.196	2.768	--	--	--	--	--	--	20.66	--	--	Do
IBH-5	14	15.75-16.50	2.770	2.768	0.049	0.231	2.775	--	520	--	--	--	--	--	--	34256	Do
IBH-5	17	18.00-18.75	--	--	--	--	--	--	--	--	--	92.66	--	--	--	--	Do
IBH-6	5	08.75-9.50	--	--	--	--	--	--	--	--	--	92.31	--	--	--	--	Do
IBH-6	7	10.25-11.00	2.779	2.771	0.283	1.040	2.800	372	231	0.62	--	--	Moderately Hard	--	26324	23434	Do
IBH-7	1	6.00-6.75	--	--	--	--	--	--	--	--	--	80.11	--	--	--	--	Do
IBH-7	4	8.25-9.00	2.756	--	--	--	--	--	--	--	39.20	--	--	--	--	--	Do
IBH-7	5	9.00-9.75	2.702	2.685	0.612	3.168	2.773	--	87	--	--	--	--	--	--	9226	Do
IBH-8	2	7.25-8.00	2.729	2.715	0.505	2.227	2.777	--	--	--	21.36	--	--	--	--	--	Do
IBH-8	3	8.00-8.75	2.748	--	--	--	--	--	--	--	25.77	--	--	--	--	--	Do

BH No.	Run No.	Depth (M)	Density (gm/cc)		Water Content %	Porosity %	Specific Gravity	Unconfined Compressive strength (kg/sqcm)		Coefficient of softening	Point Load Strength Index (kg/sqcm)	Slake Durability Index (%)	Hardness (based on Mohs' Scale)	Soundness* (% Loss)	E (Kg/sqcm) In-situ	E (Kg/sqcm) Saturated	Test Method
			Bulk	Dry				In-situ	Saturated								
IBH-8	22	22.25-23.00	--	--	--	--	--	--	--	--	--	94.56	Soft	--	--	--	Do
IBH-9	15	17.75-18.50	2.631	2.619	0.458	2.253	2.679	--	166	--	--	--	--	--	--	--	Do
IBH-9	17	19.25-20.00	2.736	2.731	0.188	1.035	2.760	--	--	--	--	--	--	19.78	--	--	Do
IBH-9	22	23.00-23.75	--	--	--	--	--	--	--	--	--	95.81	Moderately Hard	--	--	--	Do
IBH-10	2	8.25-9.00	2.702	2.692	0.391	1.477	2.732	--	--	--	16.26	--	--	--	--	--	Do
IBH-10	6	11.25-12.00	2.780	2.771	0.324	1.241	2.806	--	396	--	--	--	--	--	--	31094	Do
IBH-10	11	15.00-15.75	--	--	--	--	--	--	--	--	--	90.51	--	--	--	--	Do
IBH-11	21	20.75-21.50	--	--	--	--	--	--	--	--	--	90.06	--	--	--	--	Do
IBH-11	23	22.25-23.00	--	--	--	--	--	--	--	--	--	--	--	18.28	--	--	Do
IBH-11	25	23.75-24.50	2.796	2.795	0.019	0.108	2.799	605	298	0.49	--	--	--	--	27077	14529	Do
IBH-12	2	7.50-8.25	--	--	--	--	--	--	--	--	--	95.81	--	--	--	--	Do
IBH-12	12	15.00-15.75	2.747	2.735	0.416	1.816	2.786	--	191	--	--	--	--	--	--	31720	Do
IBH-12	28	27.00-27.75	--	--	--	--	--	--	--	--	--	--	--	17.52	--	--	Do

SWELLING TEST RESULTS

Bore Hole No.	Sample No.	Depth (M)	Description	Free Swell Index, (%)	Swelling Pressure, (kg/sqcm)	Water Content (%)	PI (%)
BH-01	UDS-01	2.00 - 2.45	Brownish grey, silty clay with traces of kankar & calcareous nodules.	40.48	1.00	17	24
BH-04	UDS-02	4.00 - 4.45	Brownish grey, silty clay with traces of calcareous nodules.	35.00	0.42	15	31
BH-05	UDS-01	2.00 - 2.45	Brownish grey, silty clay with traces of kankar.	61.90	0.96	15	32
BH-07	UDS-02	4.00 - 4.45	Brownish grey, silty clay with traces of sand mixture & kankar.	36.36	0.44	21	23
BH-09	UDS-01	2.00 - 2.45	Brownish grey, silty clay with traces of kankar.	27.27	0.23	22	32
BH-11	UDS-02	4.00 - 4.45	Brownish grey silty clay with moorun.	29.27	0.04	25	30
BH-15	UDS-02	4.00 - 4.45	Brownish grey, silty clay with traces of kankar & calcareous nodules.	35.00	0.66	21	23
BH-17	UDS-02	4.00 - 4.45	Brownish grey, silty clay with traces of kankar & rockdust.	31.71	0.40	24	36
BH-18	UDS-01	2.00 - 2.45	Brownish grey, silty clay with traces of kankar & rockdust.	52.38	1.00	25	29
BH-20	UDS-01	2.00 - 2.45	Brownish grey, silty clay with traces of kankar & rock fragments.	30.00	0.04	24	25
BH-23	UDS-02	4.00 - 4.45	Brownish grey, silty clay with traces of kankar.	47.37	0.81	20	29
BH-24	UDS-01	2.00 - 2.45	Brownish grey, silty clay with traces of kankar.	35.71	0.57	20	29
BH-25	UDS-03	6.00 - 6.45	Brownish grey, silty clay with traces of kankar & calcareous nodules.	29.27	0.72	17	29
BH-30	UDS-02	4.00 - 4.45	Brownish grey, silty clay with calcareous nodules.	43.59	0.67	19	33

SWELLING TEST RESULTS

Bore Hole No.	Sample No.	Depth (M)	Description	Free Swell Index, (%)	Swelling Pressure, (kg/sqcm)	Water Content (%)	PI (%)
IBH-02	UDS-02	4.00 - 4.45	Brownish grey, silty clay with traces of kankar.	33.33	0.02	23	30
IBH-03	UDS-01	2.00 - 2.45	Reddish brown, silty clay with moorum & kankar.	28.57	0.37	20	27
IBH-06	UDS-01	2.00 - 2.45	Brownish grey, silty clay with traces of rock fragments.	28.21	0.18	29	32
IBH-08	UDS-02	4.00 - 4.45	Brownish grey, silty clay with calcareous nodules & rock fragments.	50.00	0.98	16	34
IBH-09	UDS-01	2.00 - 2.45	Reddish brown, silty clay with moorum & kankar.	31.71	1.00	17	29
IBH-11	UDS-02	4.00 - 4.45	Reddish brown, silty clay with moorum & kankar.	34.88	0.90	15	30

SUMMARISED PROCTOR & C.B.R. TEST RESULTS

Sl. No.	Sample No.	Depth (M)	Description	Standard Proctor		Soaked CBR at 95 % of MDD		Recommended Soaked CBR at 95 % of MDD	Test Method
				MDD (gm/cc)	OMC (%)	Penetration			
						2.5mm	5.0mm		
1	PLT-01/DS-03	3.00	Brownish grey, silty clay with traces of kankar & calcareous nodules.	1.714	17.75	4.12	3.17	4	**See the note
2	PLT-02/DS-01	1.00	Brownish grey, silty clay with moorum.	1.887	17.50	--	--	--	Do
3	PLT-02/DS-02	2.00	Deep brown, silty clay with kankar.	1.888	15.25	--	--	--	Do
4	IPLT-01/DS-02	2.00	Deep brown, silty clay with calcareous nodules & kankar.	1.732	16.96	3.49	2.77	3	Do
5	CPLT-01/DS-01	1.00	Brownish grey, silty clay with traces of kankar.	1.635	18.69	3.00	2.41	3	Do
6	CPLT-01/DS-03	3.00	Brownish grey, silty clay with kankar & traces of sand mixture.	1.622	16.55	--	--	--	Do
7	CPLT-02/DS-01	1.00	Reddish brown, silty clay with kankar & moorum.	2.110	11.65	--	--	--	Do
8	CPLT-02/DS-02	2.00	Deep brown, silty clay with kankar.	1.874	14.47	5.98	5.36	5	Do
9	CPLT-03/DS-01	1.00	Brownish grey, silty clay with traces of kankar & calcareous nodules.	1.650	19.32	3.32	2.59	3	Do

SUMMARISED PROCTOR & C.B.R. TEST RESULTS

Sl. No.	Sample No.	Depth (M)	Description	Standard Proctor		Soaked CBR at 95 % of MDD		Recommended Soaked CBR at 95 % of MDD	Test Method
				MDD (gm/cc)	OMC (%)	Penetration 2.5mm	Penetration 5.0mm		
10	CPLT-03/DS-03	3.00	Brownish grey, silty clay with kankar.	1.587	18.30	--	--	--	Do

****Note: Test Methods**

Bulk Density & Dry Density: Ref. CET/SOP/01, Issue No. 01-(Page 27 & 39 of 40)
Natural Moisture Content: IS 2720 (Part 2)
Specific Gravity: IS 2720 (Part 3).
Grain size analysis: IS 2720 (Part 4)
Liquid Limit & Plastic Limit: IS 2720 (Part 5)
Shrinkage Limit: IS 2720 (Part 6)
Standard Proctor Compaction Test (Light Compaction): IS 2720 (Part 7)
Laboratory Determination of CBR: IS 2720 (Part 16)
Water Content, Bulk & Dry Density and Porosity: IS 13030

Unconfined Compressive Strength Test: IS 2720 (Part 10)
Triaxial Test (TRSH-UU): IS 2720 (Part 11)
Consolidation Properties (Void Ratio): IS 2720 (Part 15)
Free Swell Index: IS 2720 (Part 40)
Swelling Pressure: IS 2720 (Part 41)
Unconfined Compressive Strength: IS 9143.
Point Load Index: IS 8764.
Slake Durability Index : IS 10050.

C.E.Testing Company Pvt. Ltd.

Prepared By

Indranil Chowdhury

(I. Chowdhury)
Sr. Geotechnical Engineer

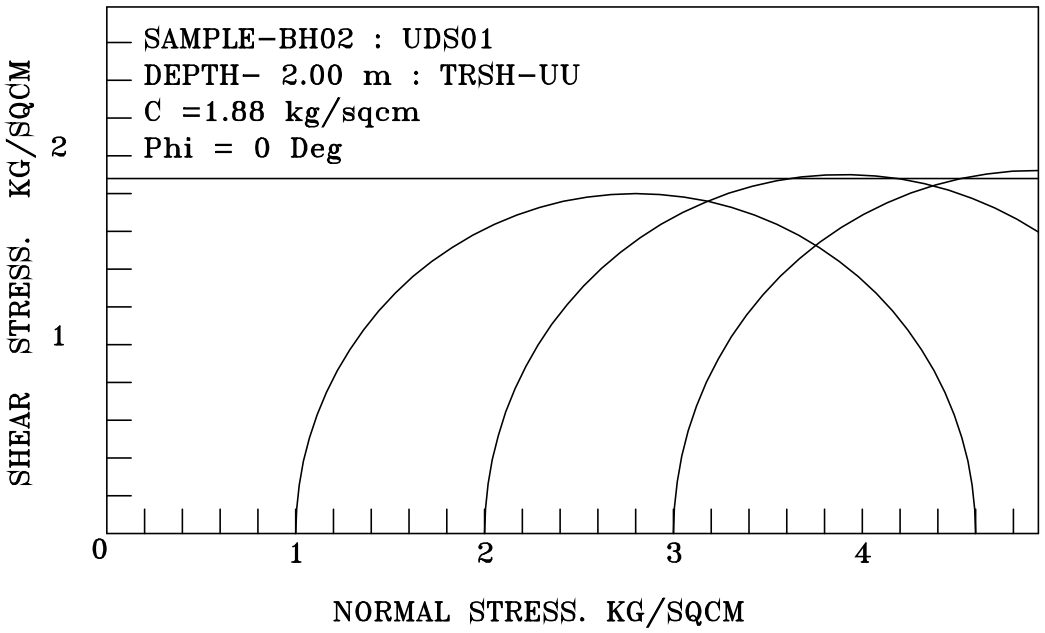
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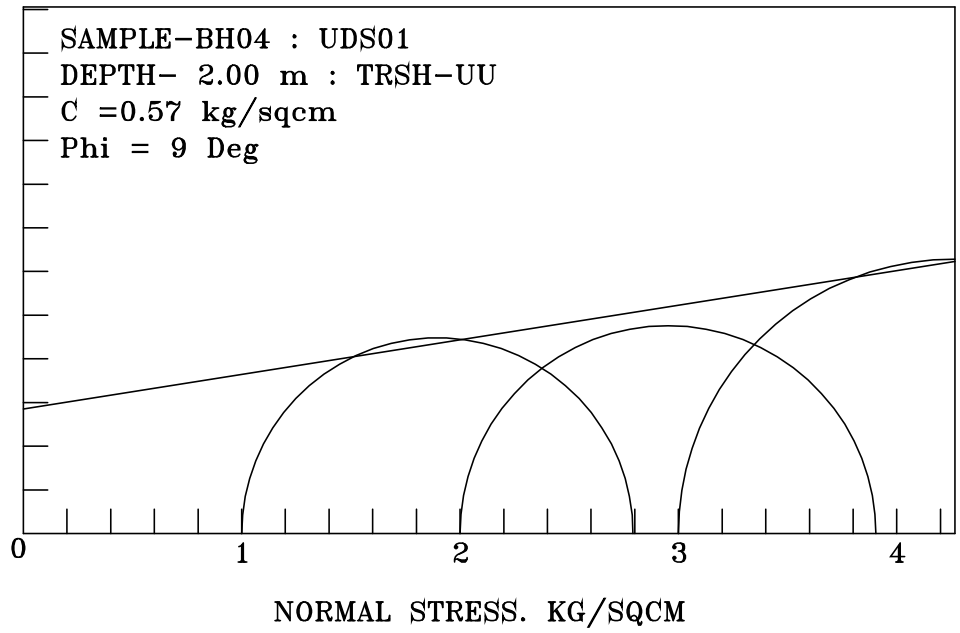
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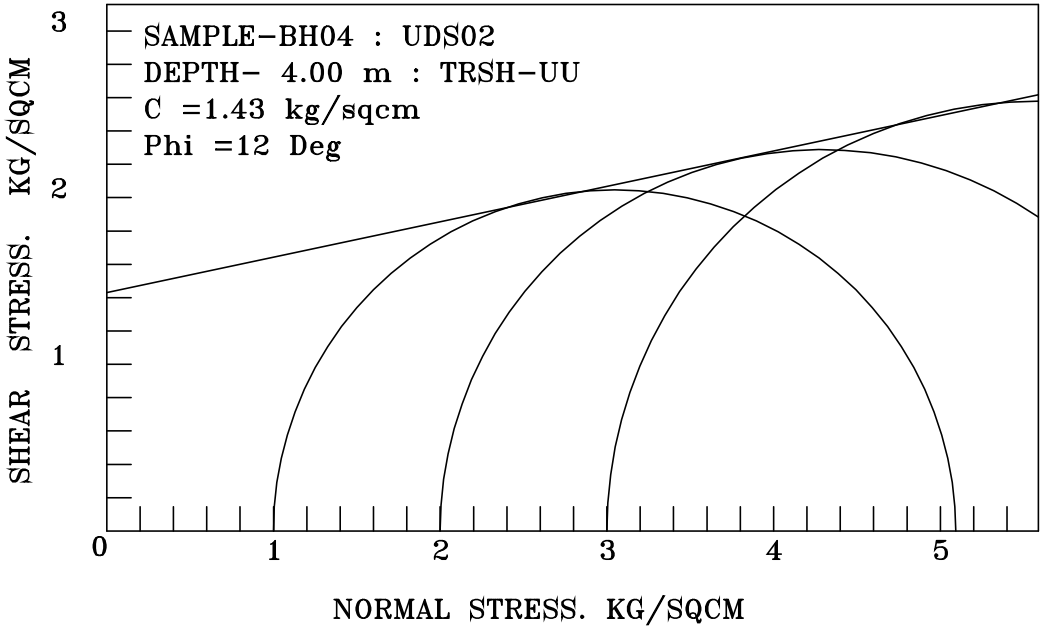
(Sudip Nath)
Technical Manager

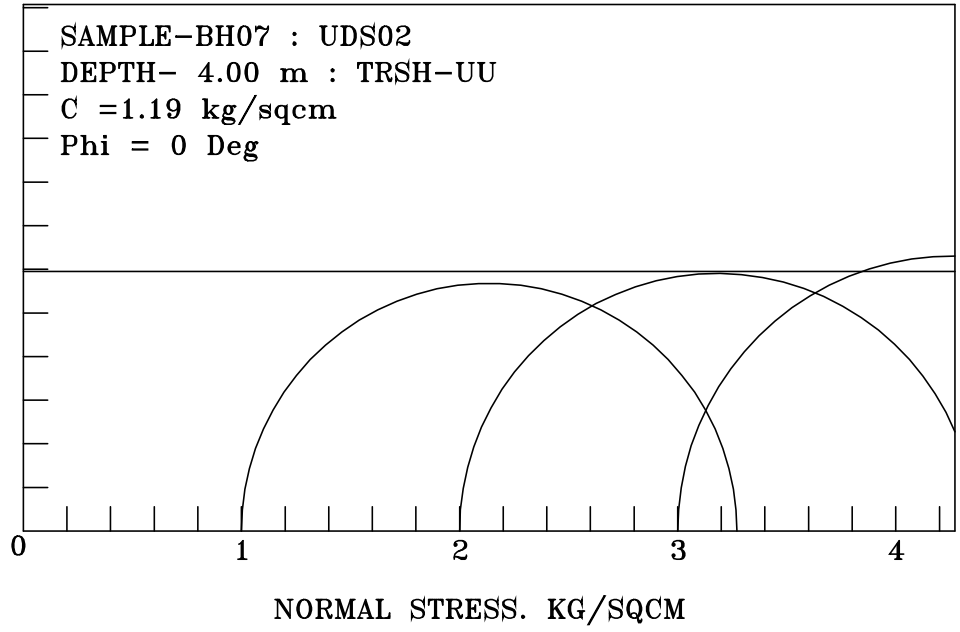
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PART III: CHARTS & GRAPHS





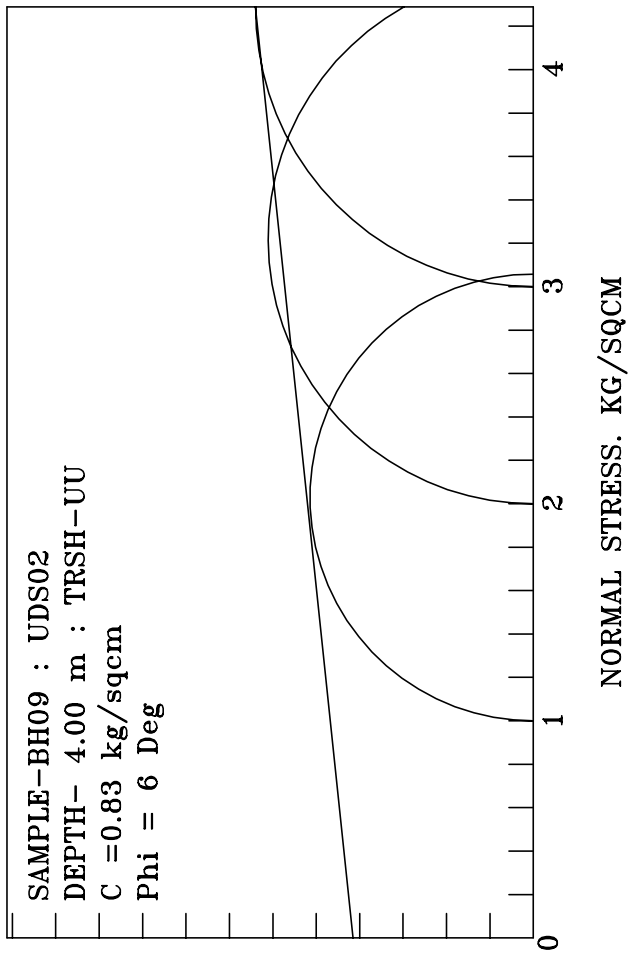


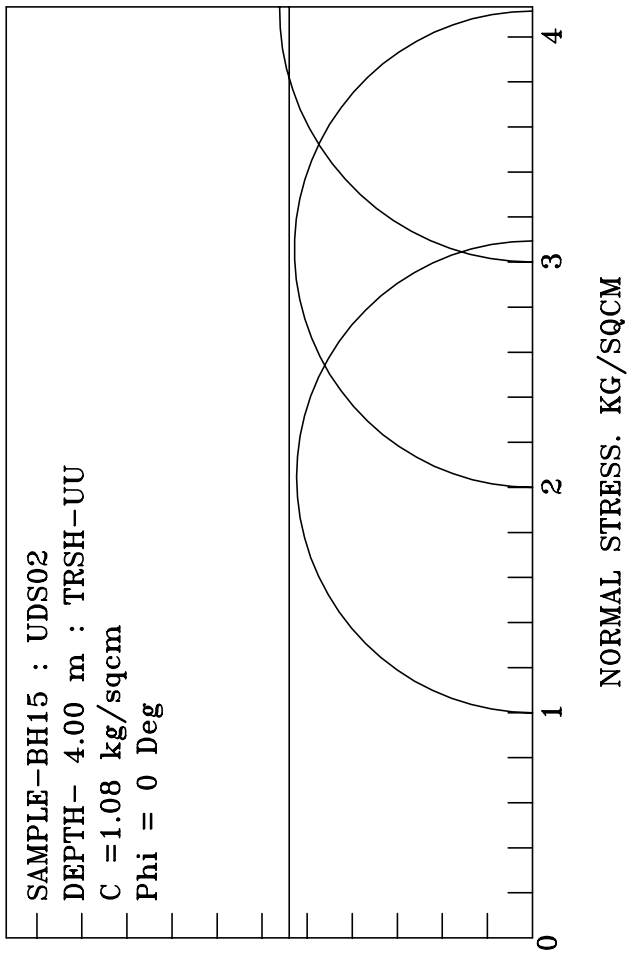


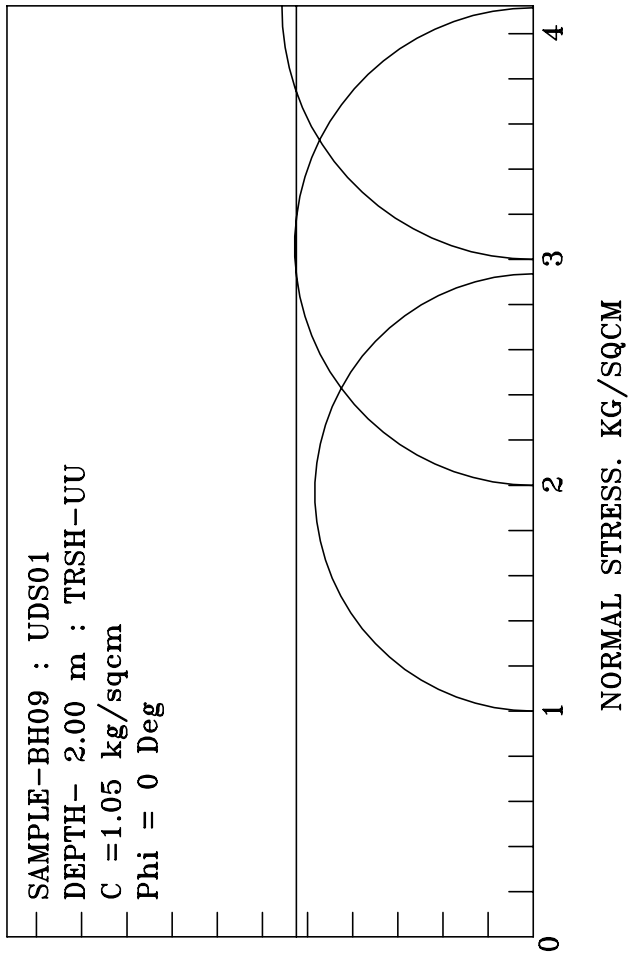
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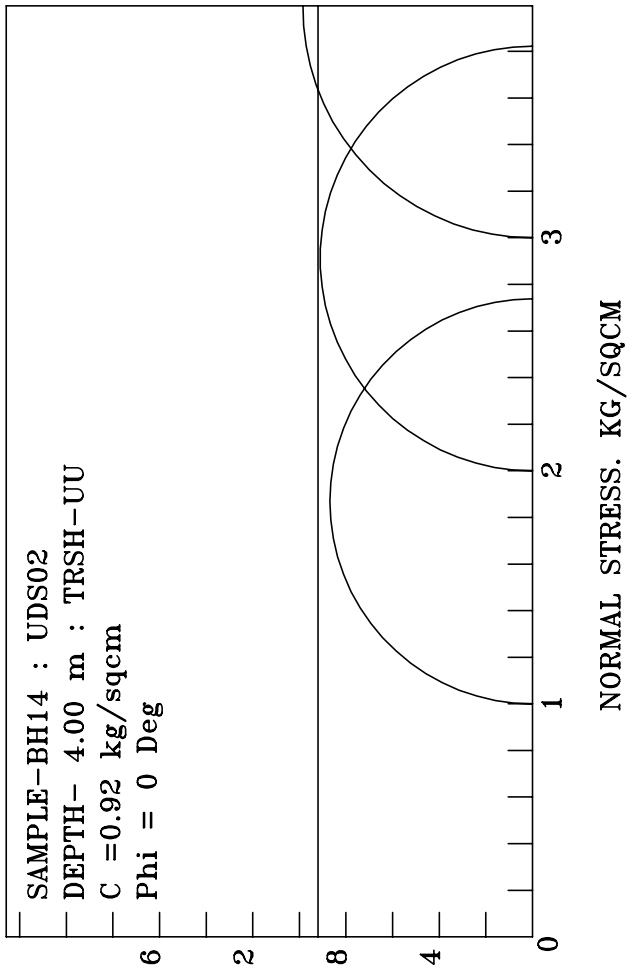
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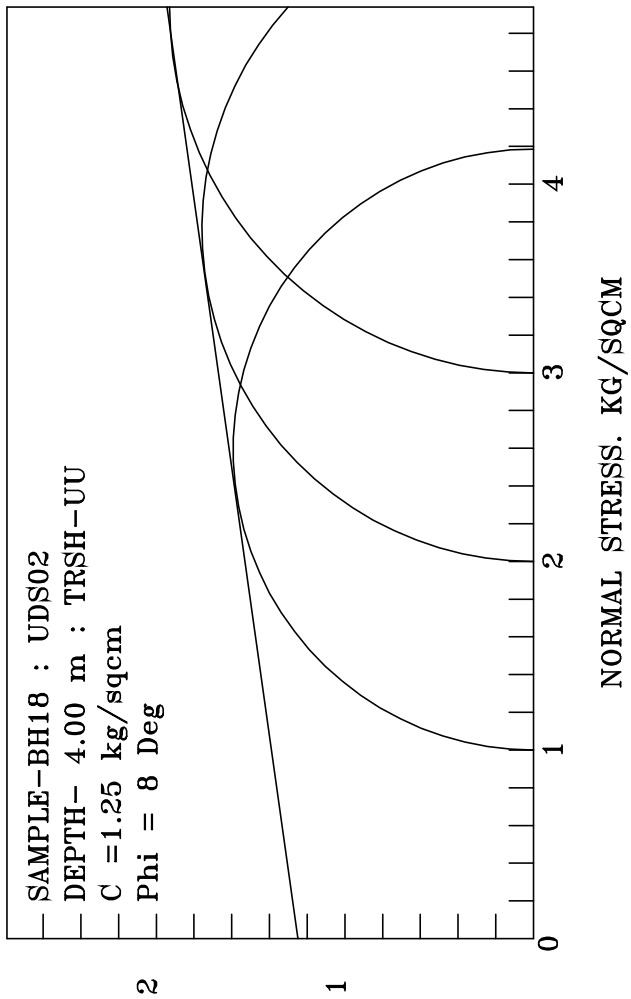
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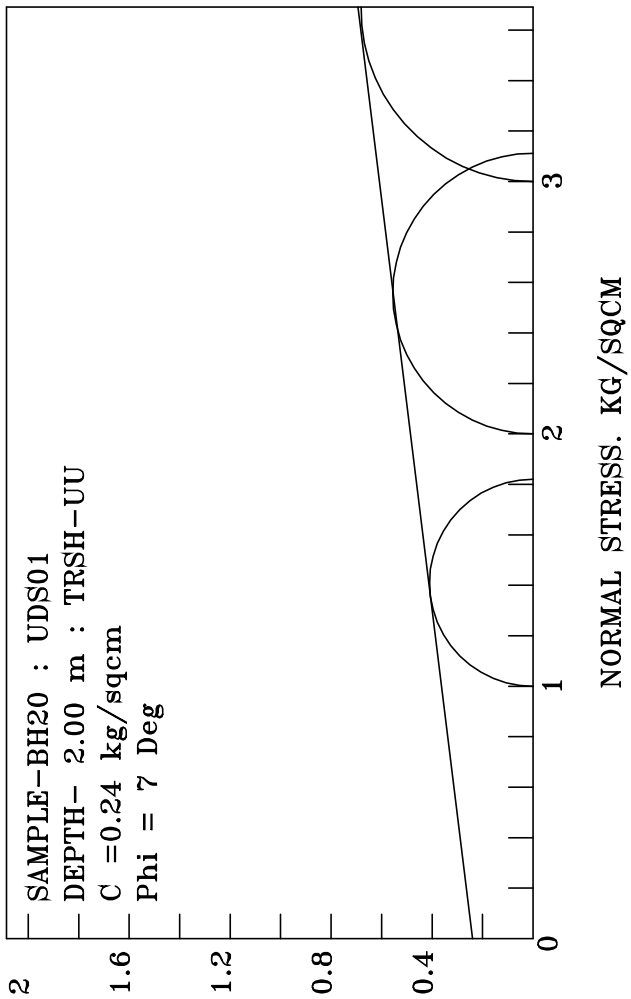

SAMPLE-BH09 : UDS02
DEPTH- 4.00 m : TRSH-UU
C =0.83 kg/sqcm
Phi = 6 Deg
NORMAL STRESS. KG/SQCM

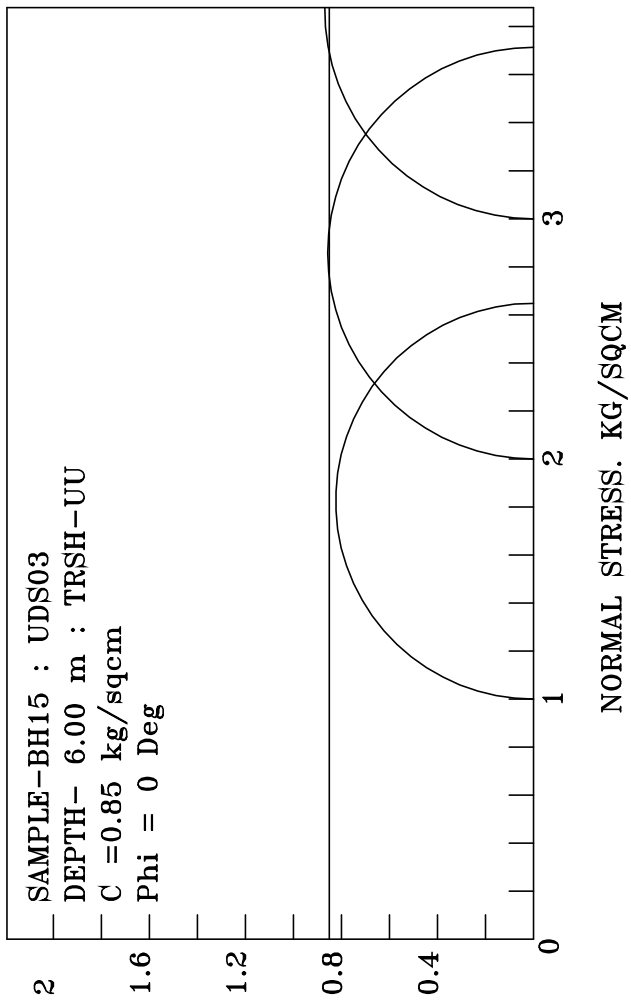

SAMPLE-BH15 : UDS02
DEPTH- 4.00 m : TRSH-UU
C =1.08 kg/sqcm
Phi = 0 Deg
NORMAL STRESS. KG/SQCM

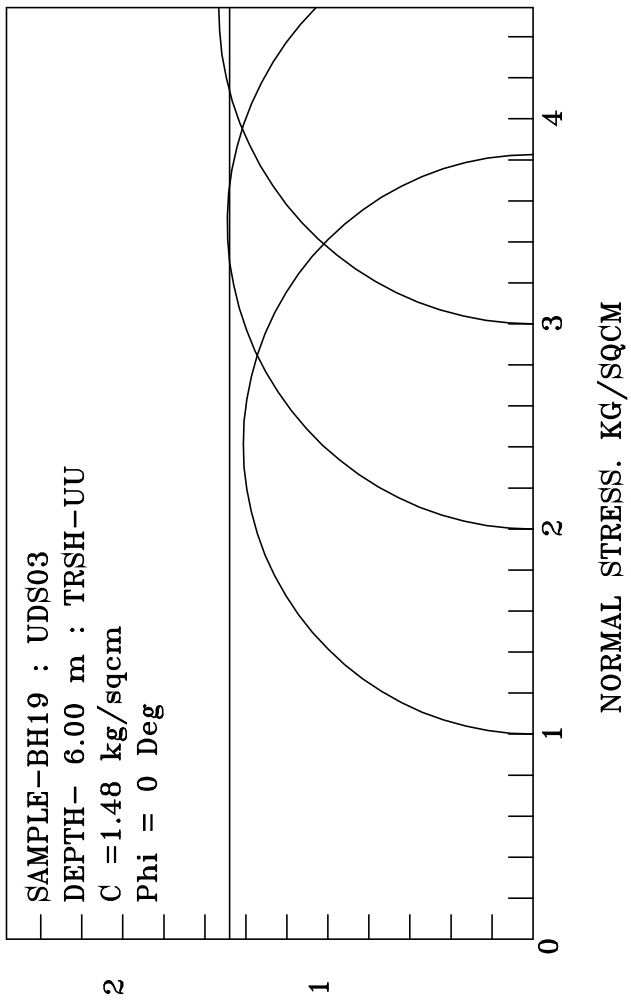

SAMPLE-BH09 : UDS01
DEPTH- 2.00 m : TRSH-UU
C =1.05 kg/sqcm
Phi = 0 Deg
SHEAR STRESS. KG/SQCM
NORMAL STRESS. KG/SQCM

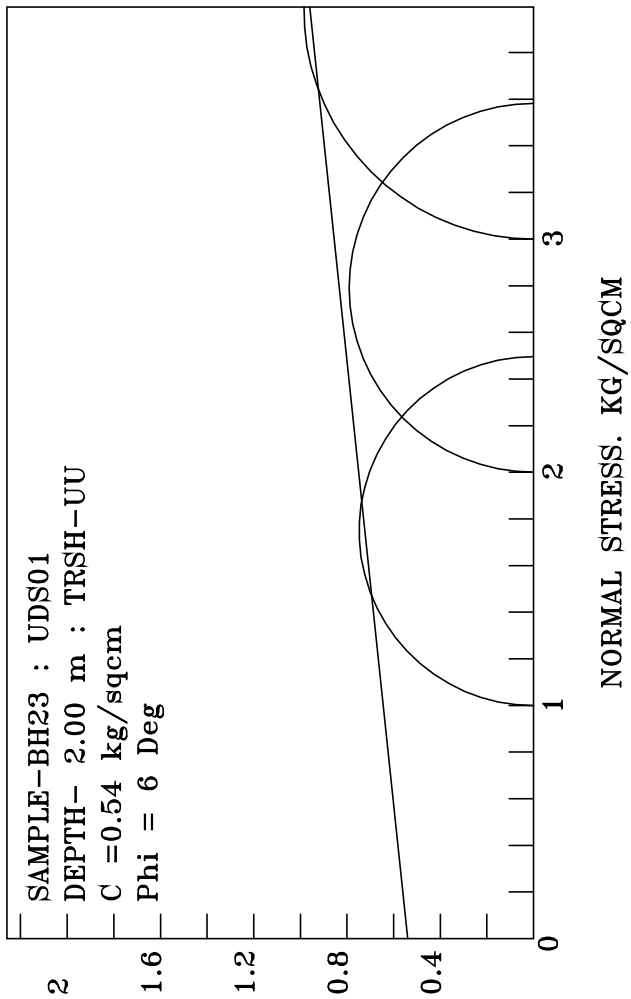

SAMPLE-BH14 : UDS02
DEPTH- 4.00 m : TRSH-UU
C =0.92 kg/sqcm
Phi = 0 Deg
SHEAR STRESS. KG/SQCM
NORMAL STRESS. KG/SQCM

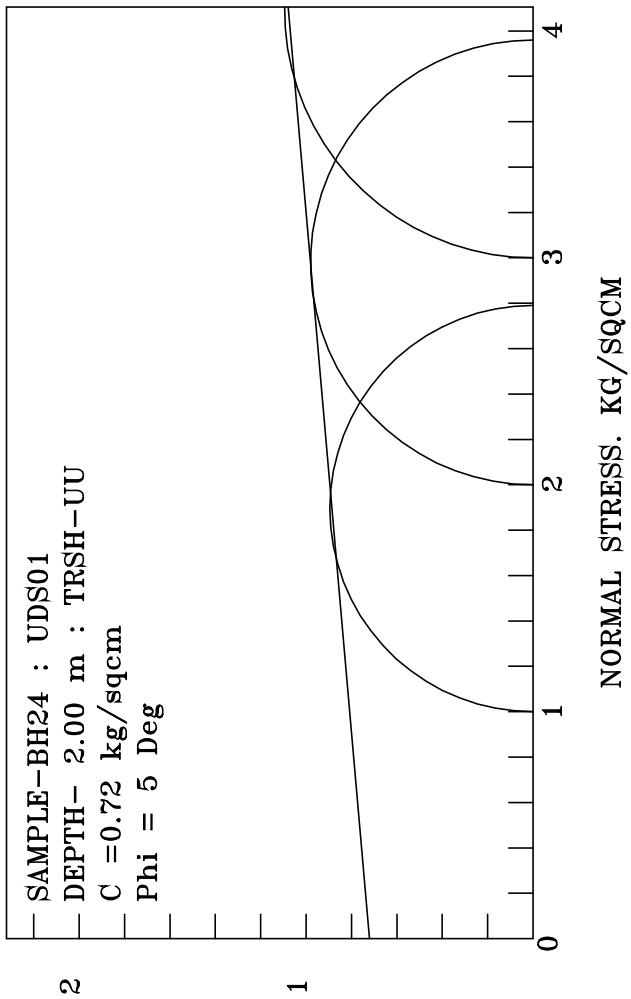

SAMPLE-BH18 : UDS02
DEPTH- 4.00 m : TRSH-UU
C =1.25 kg/sqcm
Phi = 8 Deg
NORMAL STRESS. KG/SQCM

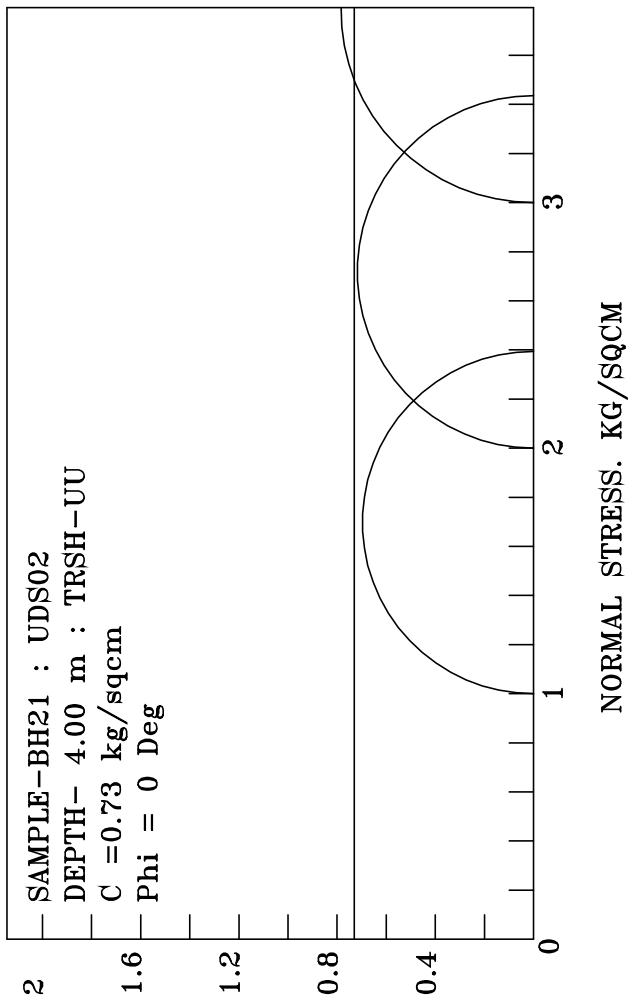

SAMPLE-BH20 : UDS01
DEPTH- 2.00 m : TRSH-UU
C =0.24 kg/sqcm
Phi = 7 Deg
NORMAL STRESS. KG/SQCM

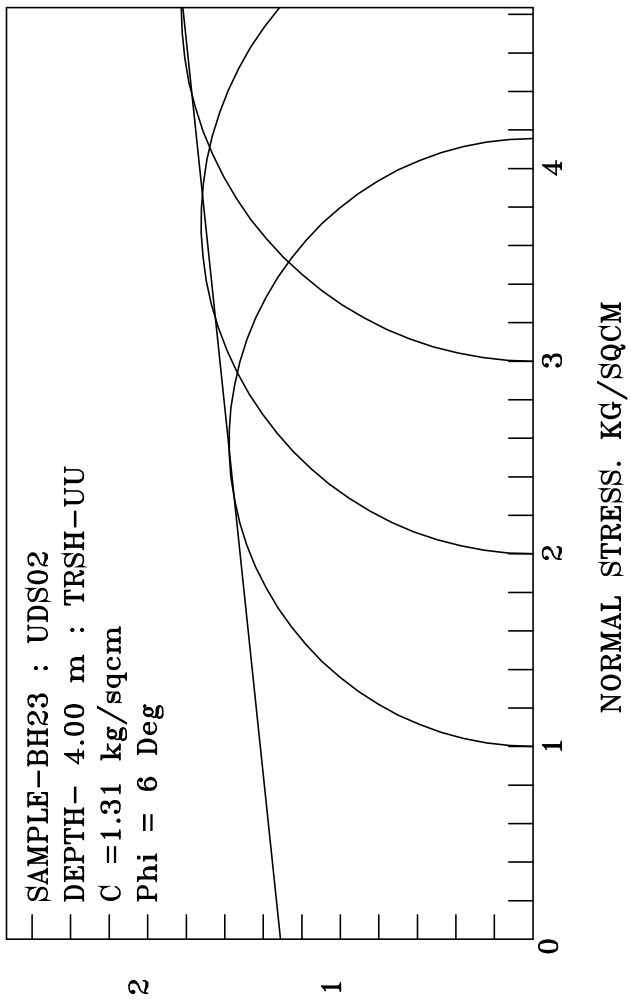

SAMPLE-BH15 : UDS03
DEPTH- 6.00 m : TRSH-UU
C =0.85 kg/sqcm
Phi = 0 Deg
SHEAR STRESS. KG/SQCM
NORMAL STRESS. KG/SQCM

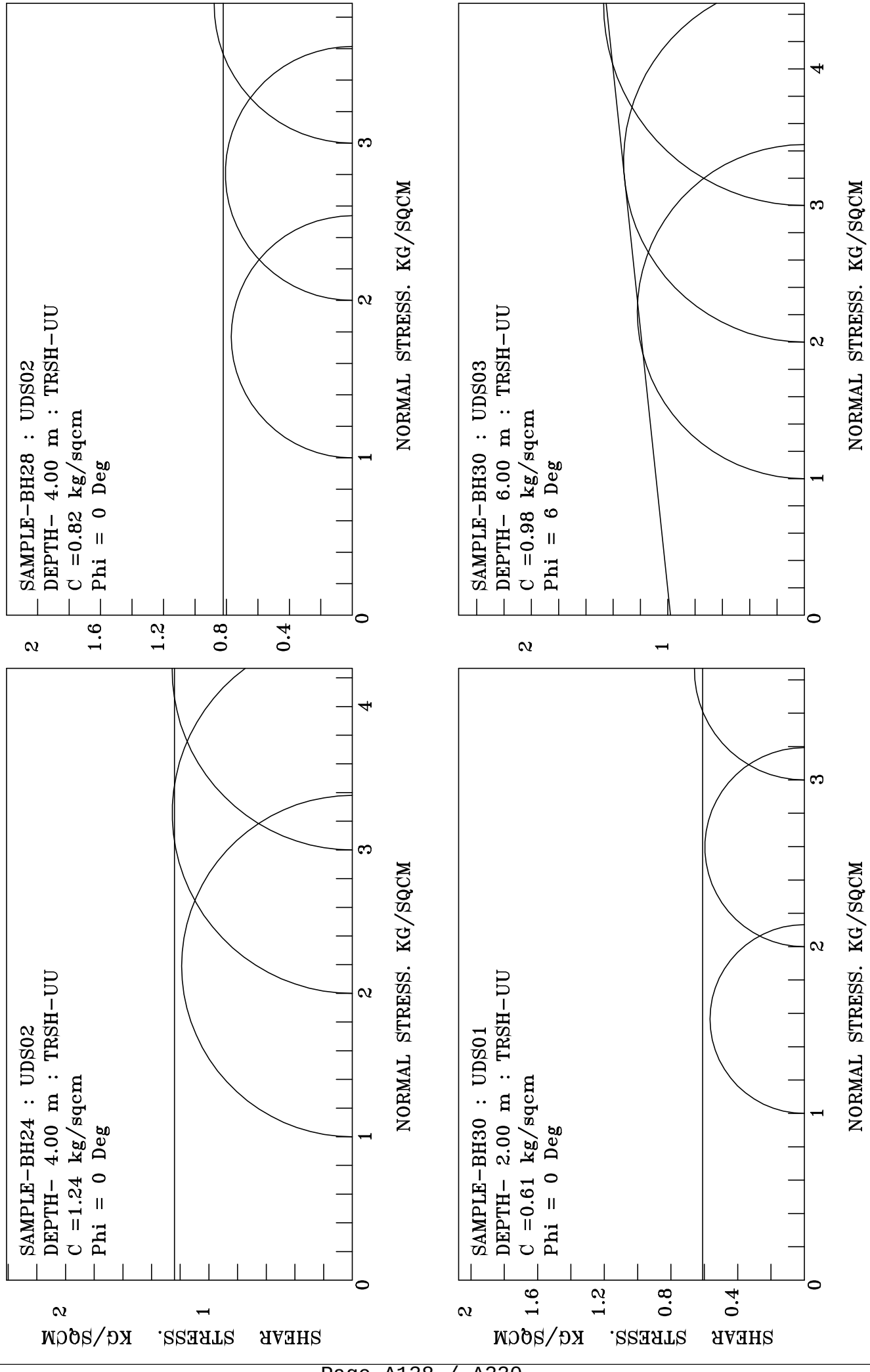

SAMPLE-BH19 : UDS03
DEPTH- 6.00 m : TRSH-UU
C =1.48 kg/sqcm
Phi = 0 Deg
SHEAR STRESS. KG/SQCM
NORMAL STRESS. KG/SQCM

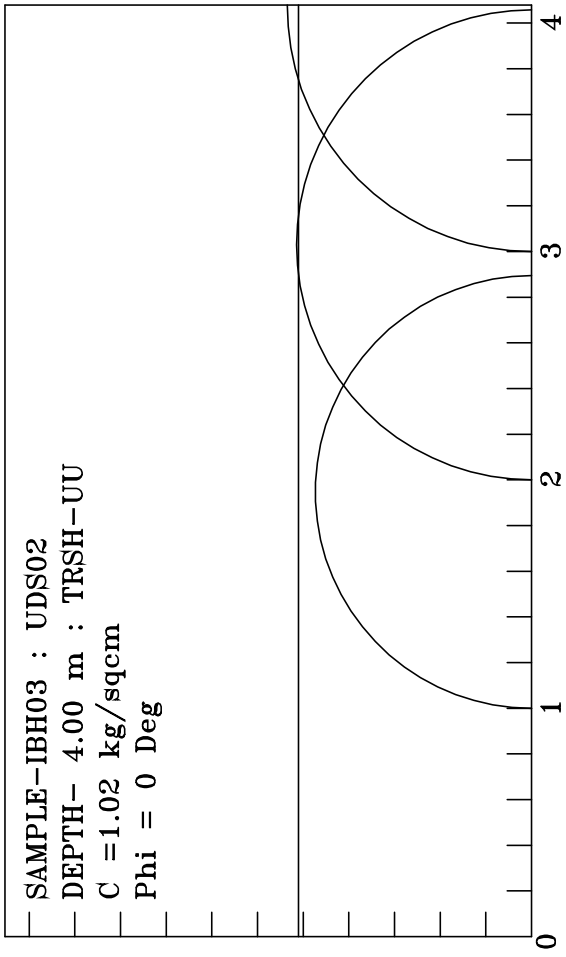

SAMPLE-BH23 : UDS01
DEPTH- 2.00 m : TRSH-UU
C =0.54 kg/sqcm
Phi = 6 Deg
SHEAR STRESS. KG/SQCM
NORMAL STRESS. KG/SQCM

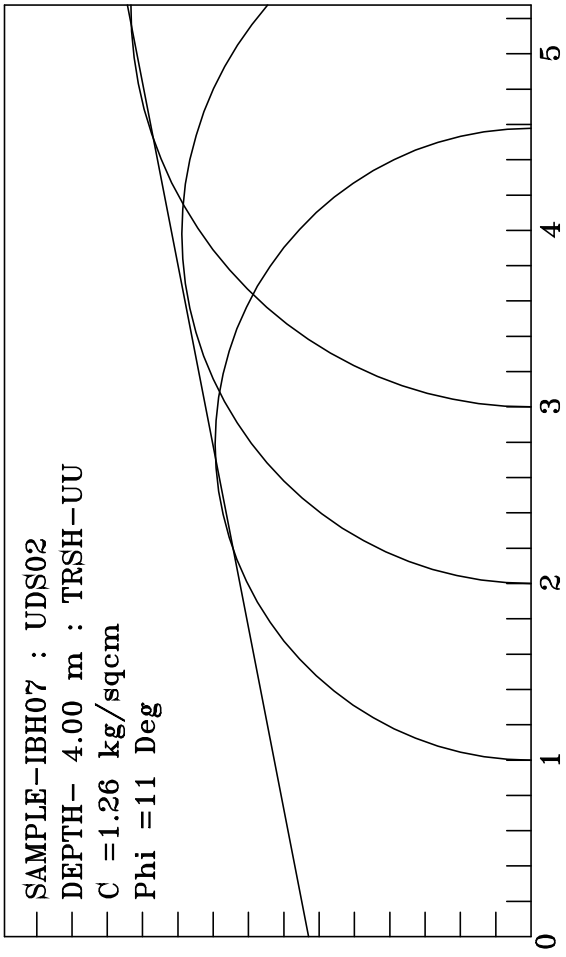

SAMPLE-BH24 : UDS01
DEPTH- 2.00 m : TRSH-UU
C =0.72 kg/sqcm
Phi = 5 Deg
NORMAL STRESS. KG/SQCM

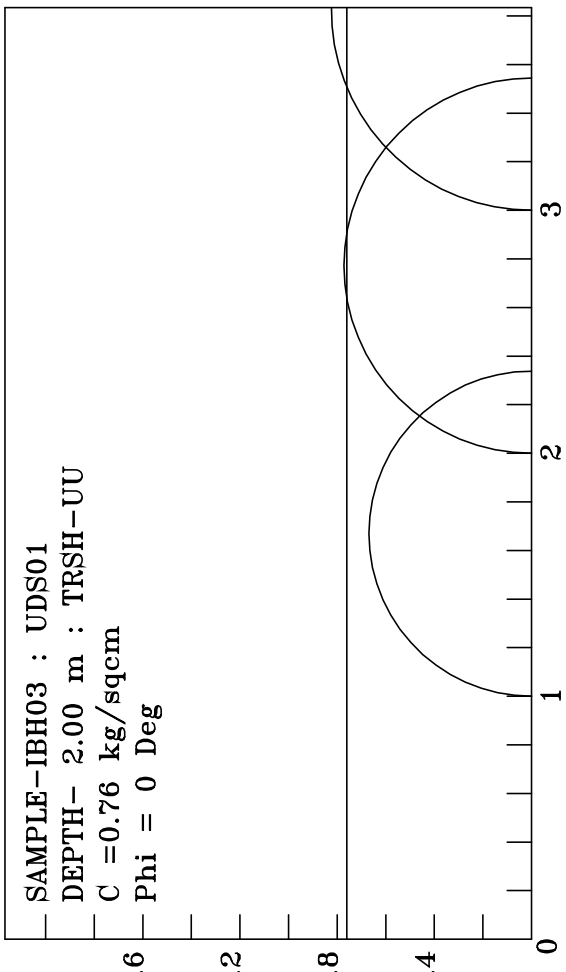

SAMPLE-BH21 : UDS02
DEPTH- 4.00 m : TRSH-UU
C =0.73 kg/sqcm
Phi = 0 Deg
SHEAR STRESS. KG/SQCM
NORMAL STRESS. KG/SQCM

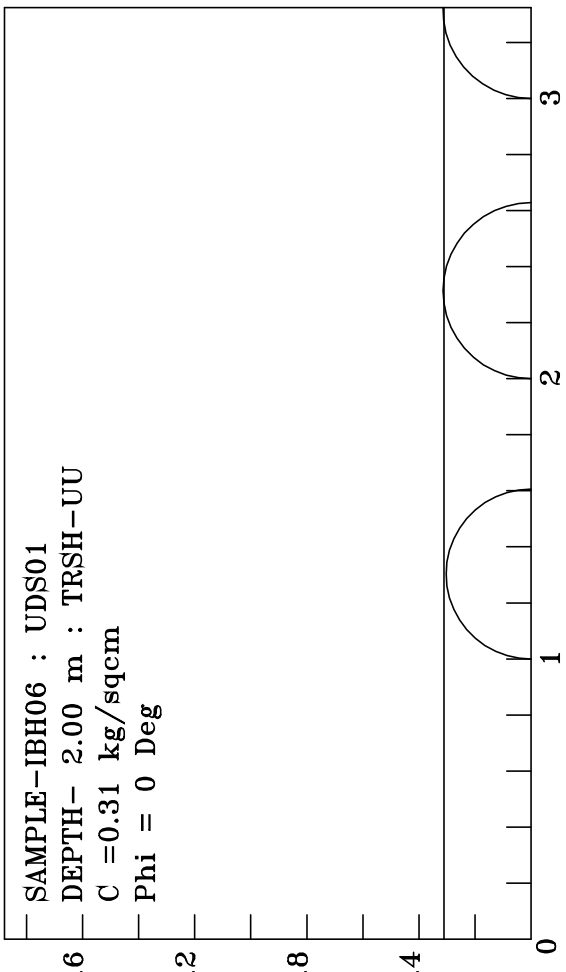

SAMPLE-BH23 : UDS02
DEPTH- 4.00 m : TRSH-UU
C =1.31 kg/sqcm
Phi = 6 Deg
SHEAR STRESS. KG/SQCM
NORMAL STRESS. KG/SQCM

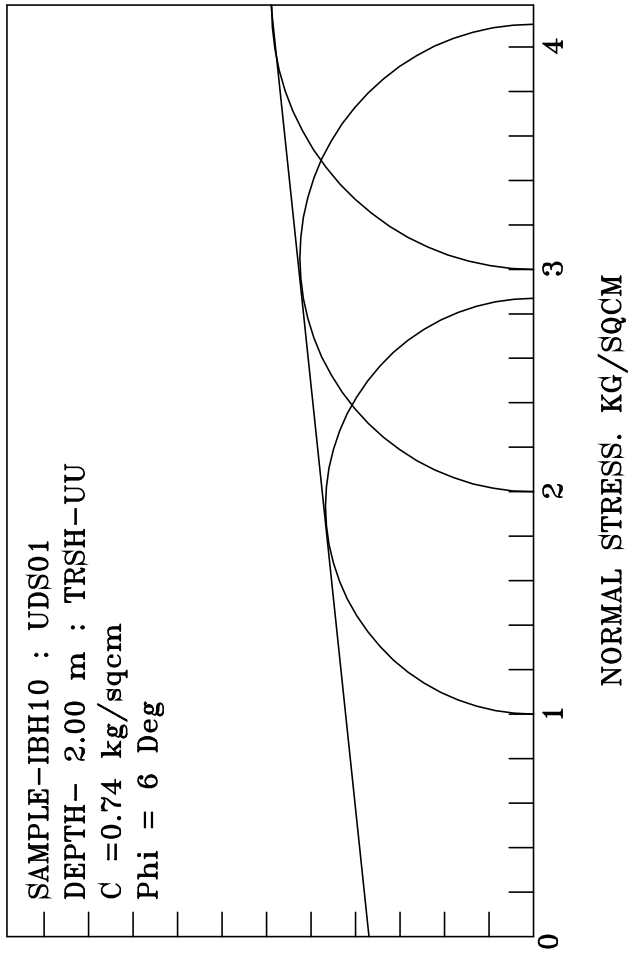

SAMPLE-BH28 : UDS02
DEPTH- 4.00 m : TRSH-UU
C =0.82 kg/sqcm
Phi = 0 Deg
SAMPLE-BH30 : UDS03
DEPTH- 6.00 m : TRSH-UU
C =0.98 kg/sqcm
Phi = 6 Deg
SAMPLE-BH24 : UDS02
DEPTH- 4.00 m : TRSH-UU
C =1.24 kg/sqcm
Phi = 0 Deg
SAMPLE-BH30 : UDS01
DEPTH- 2.00 m : TRSH-UU
C =0.61 kg/sqcm
Phi = 0 Deg
NORMAL STRESS. KG/SQCM
SHEAR STRESS. KG/SQCM

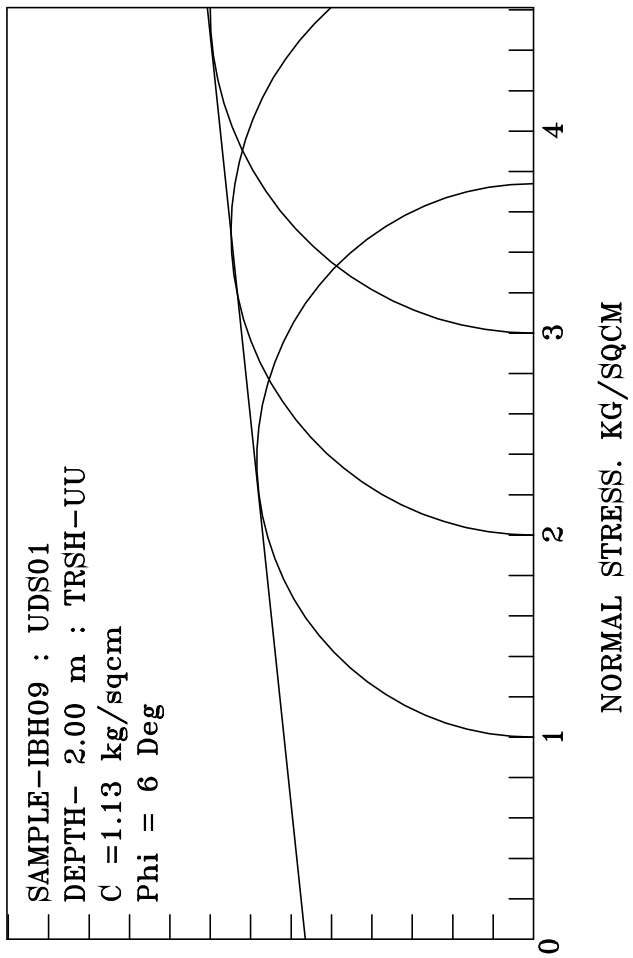

SAMPLE-IBH03 : UDS02
DEPTH- 4.00 m : TRSH-UU
C =1.02 kg/sqcm
Phi = 0 Deg
NORMAL STRESS. KG/SQCM


SAMPLE-IBH07 : UDS02
DEPTH- 4.00 m : TRSH-UU
C =1.26 kg/sqcm
Phi =11 Deg
NORMAL STRESS. KG/SQCM


SAMPLE-IBH03 : UDS01
DEPTH- 2.00 m : TRSH-UU
C =0.76 kg/sqcm
Phi = 0 Deg
SHEAR STRESS. KG/SQCM
NORMAL STRESS. KG/SQCM


SAMPLE-IBH06 : UDS01
DEPTH- 2.00 m : TRSH-UU
C =0.31 kg/sqcm
Phi = 0 Deg
SHEAR STRESS. KG/SQCM
NORMAL STRESS. KG/SQCM


SAMPLE-IBH10 : UDS01
DEPTH- 2.00 m : TRSH-UU
C =0.74 kg/sqcm
Phi = 6 Deg
NORMAL STRESS. KG/SQCM
0
1
2
3
4


SAMPLE-IBH09 : UDS01
DEPTH- 2.00 m : TRSH-UU
C =1.13 kg/sqcm
Phi = 6 Deg
SHEAR STRESS. KG/SQCM
NORMAL STRESS. KG/SQCM
0
1
2
3
4

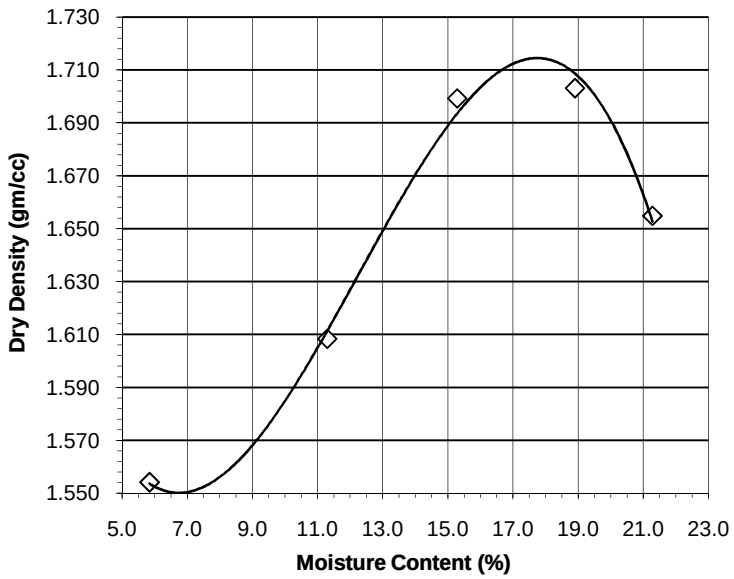
C.B.R. & PROCTOR TEST RESULTS.

PLT01 / DS03

Depth = 3.00m

Maximum Dry Density : 1.714 gm/cc
Optimum Moisture Content: 17.75 %

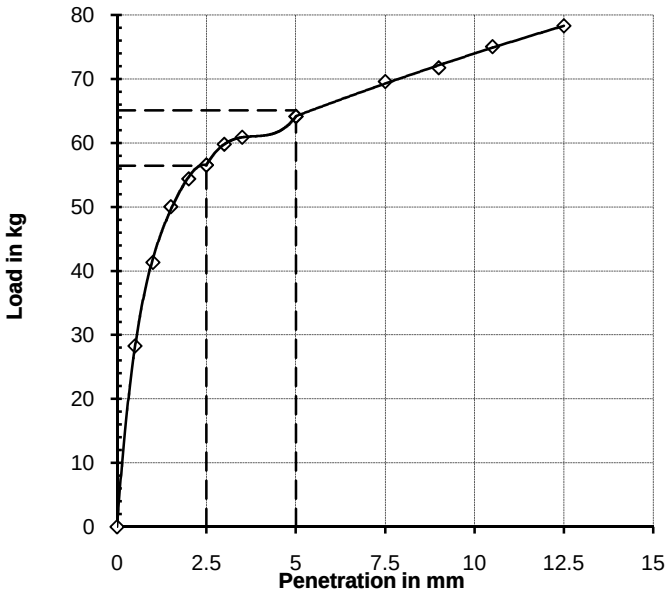
O.M.C. GRAPH



TYPE :- SOAKED

Penetration (mm)	CBR (%)
2.5	4.12
5.0	3.17

CBR GRAPH



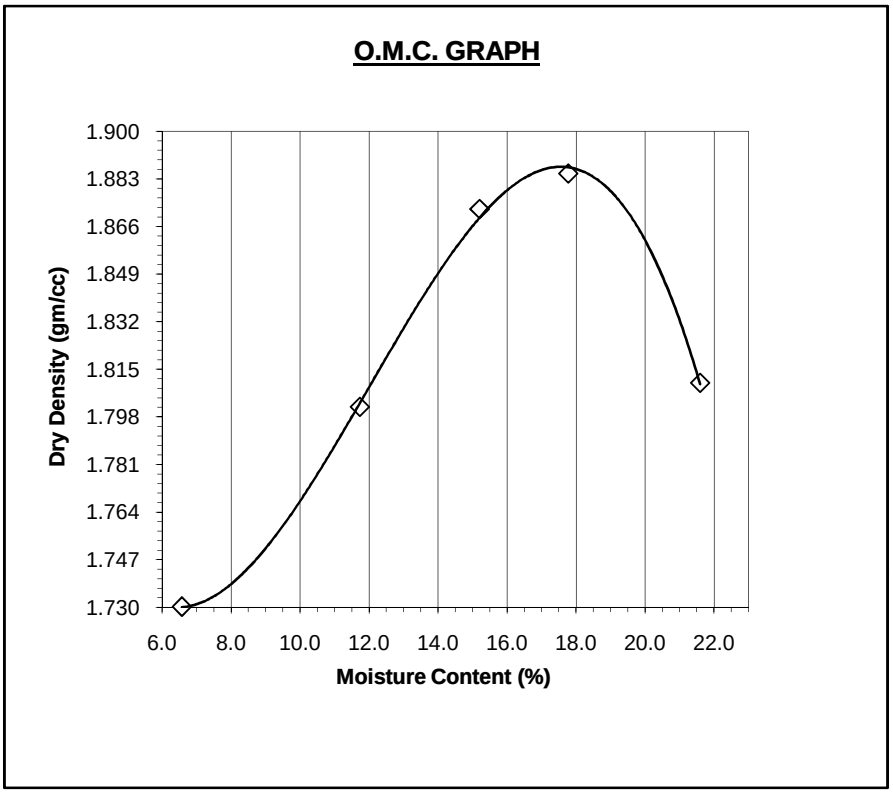
PROCTOR TEST RESULTS.

PLT02 / DS01

Depth = 1.00m

Maximum Dry Density : 1.887 gm/cc

Optimum Moisture Content: 17.50 %

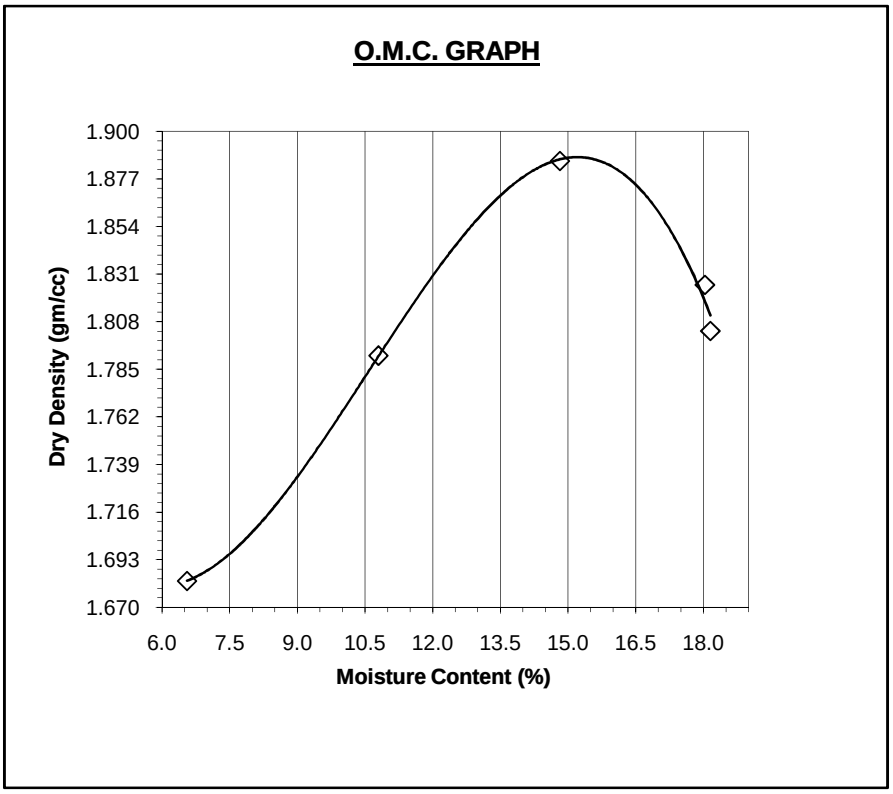


PROCTOR TEST RESULTS.

PLT02 / DS02

Depth = 2.00m

Maximum Dry Density : 1.888 gm/cc
Optimum Moisture Content: 15.25 %



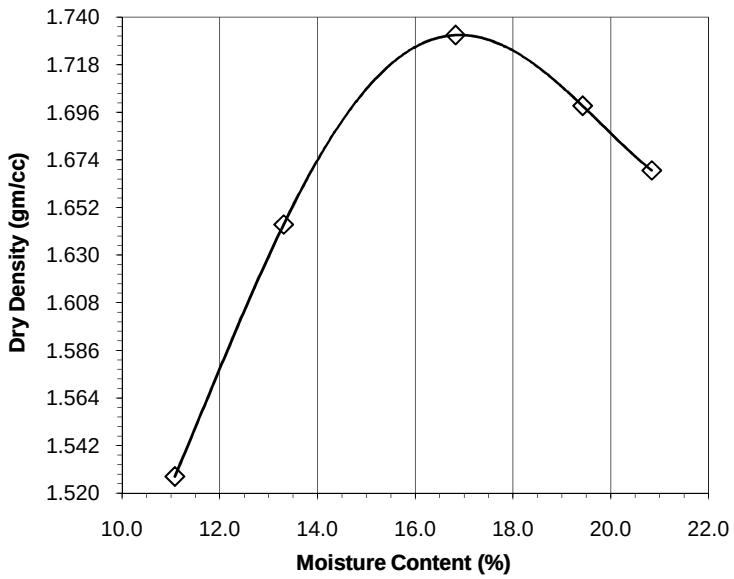
C.B.R. & PROCTOR TEST RESULTS.

IPLT01 / DS02

Depth = 2.00m

Maximum Dry Density : 1.732 gm/cc
Optimum Moisture Content: 16.96 %

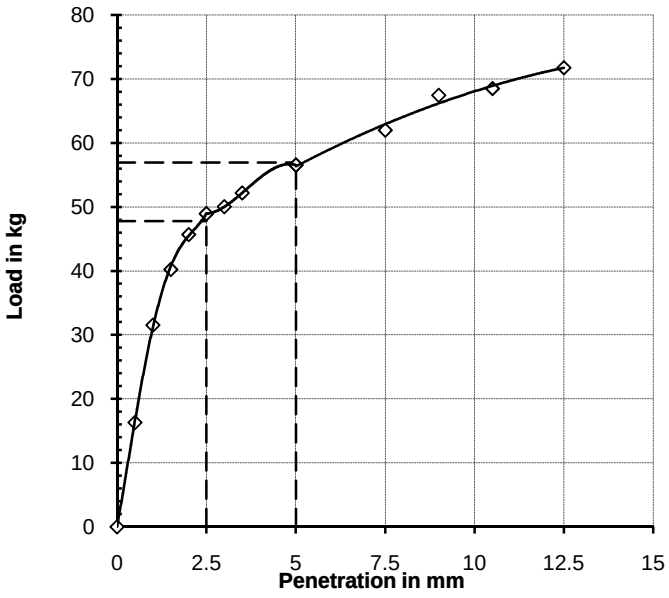
O.M.C. GRAPH



TYPE :- SOAKED

Penetration (mm)	CBR (%)
2.5	3.49
5.0	2.77

CBR GRAPH



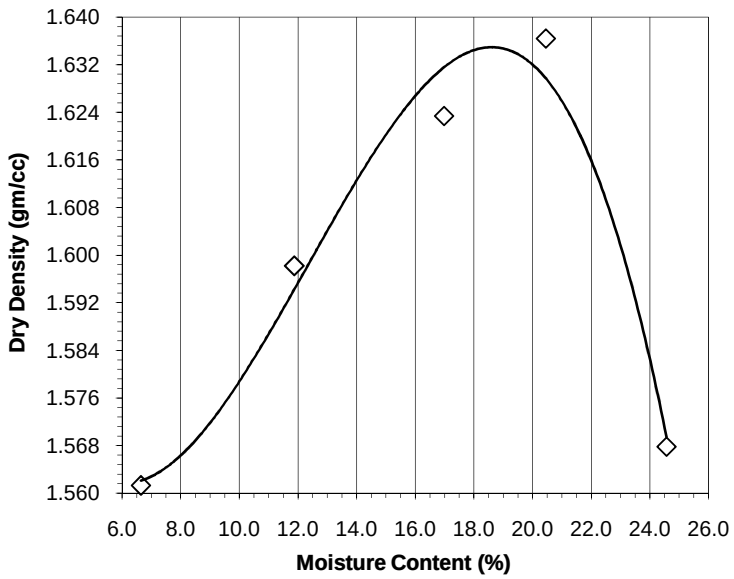
C.B.R. & PROCTOR TEST RESULTS.

CPLT01 / DS01

Depth = 1.00m

Maximum Dry Density : 1.635 gm/cc
Optimum Moisture Content: 18.69 %

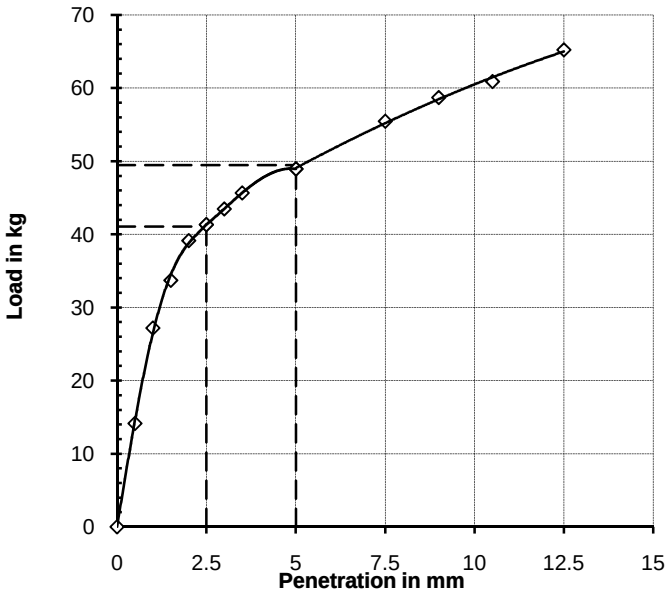
O.M.C. GRAPH



TYPE :- SOAKED

Penetration (mm)	CBR (%)
2.5	3.00
5.0	2.41

CBR GRAPH

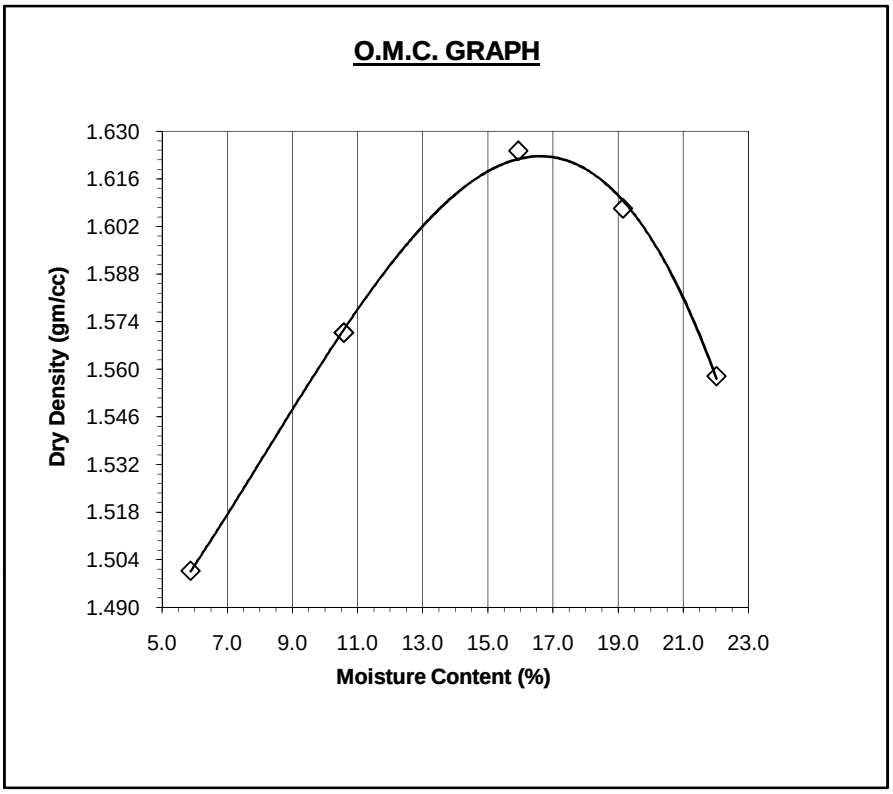


PROCTOR TEST RESULTS.

CPLT01 / DS03

Depth = 3.00m

Maximum Dry Density : 1.622 gm/cc
Optimum Moisture Content: 16.55 %

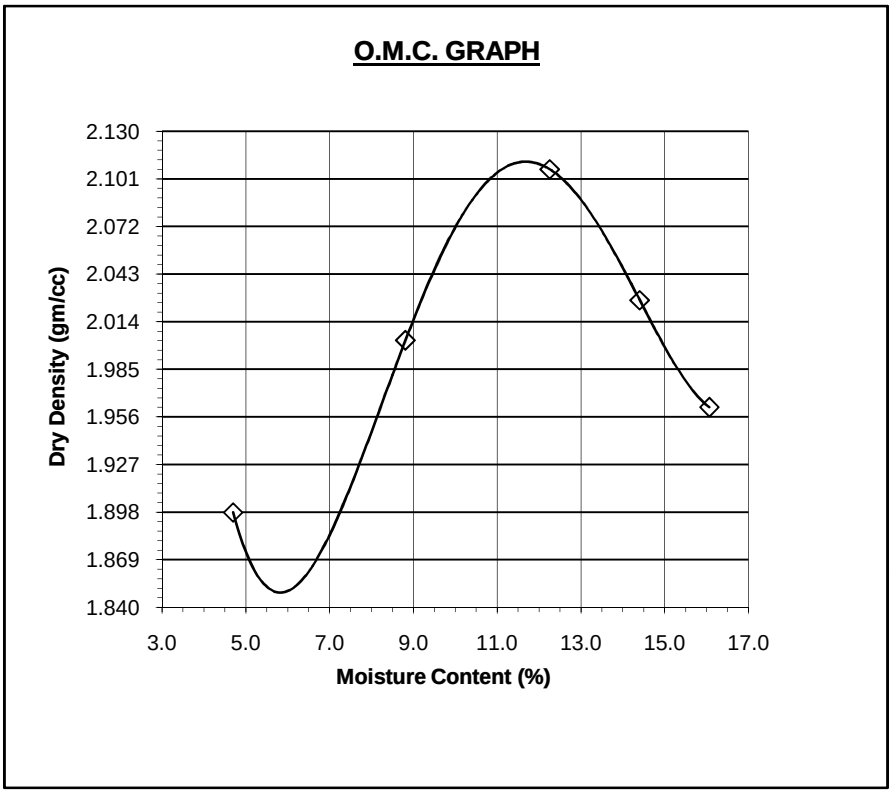


PROCTOR TEST RESULTS.

CPLT02 / DS01

Depth = 1.00m

Maximum Dry Density : 2.110 gm/cc
Optimum Moisture Content: 11.65 %



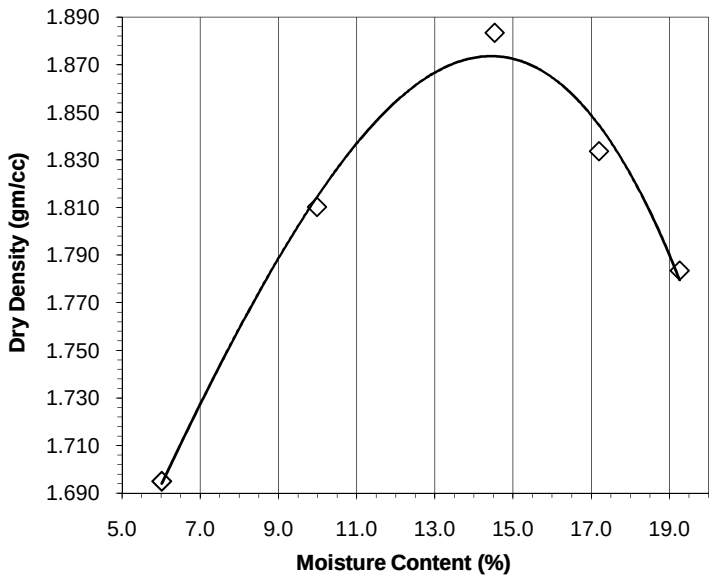
C.B.R. & PROCTOR TEST RESULTS.

CPLT02 / DS02

Depth = 2.00m

Maximum Dry Density : 1.874 gm/cc
Optimum Moisture Content: 14.47 %

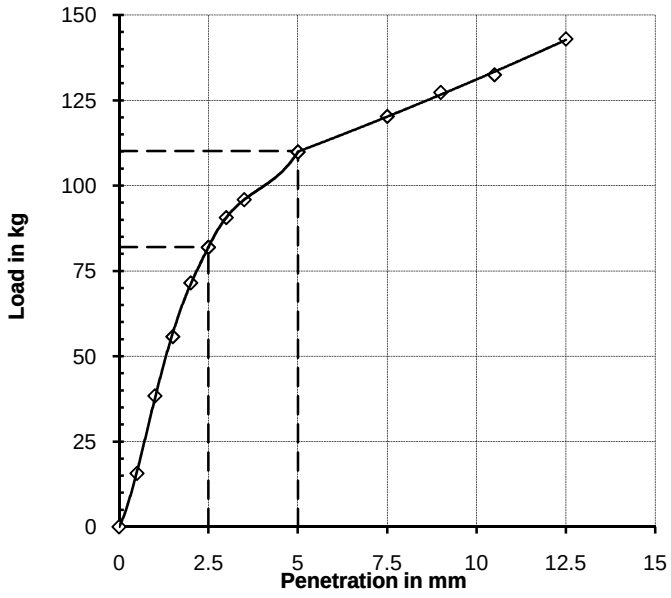
O.M.C. GRAPH



TYPE :- SOAKED

Penetration (mm)	CBR (%)
2.5	5.98
5.0	5.36

CBR GRAPH



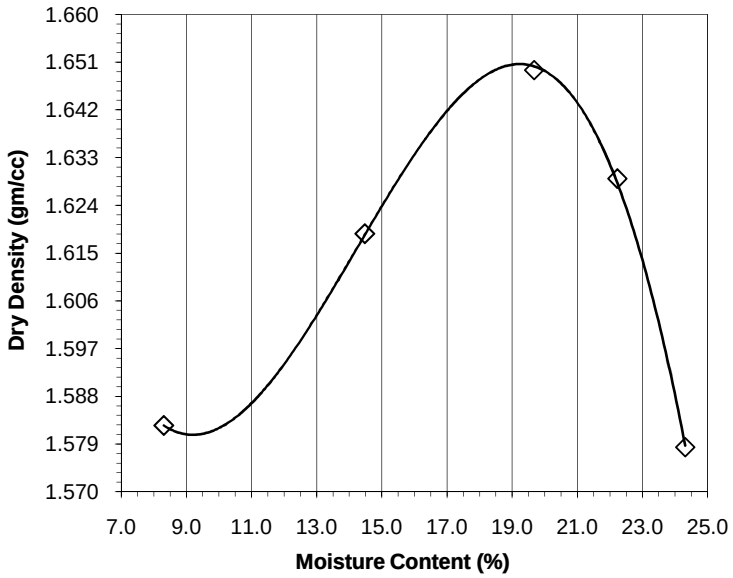
C.B.R. & PROCTOR TEST RESULTS.

CPLT03 / DS01

Depth = 1.00m

Maximum Dry Density : 1.650 gm/cc
Optimum Moisture Content: 19.32 %

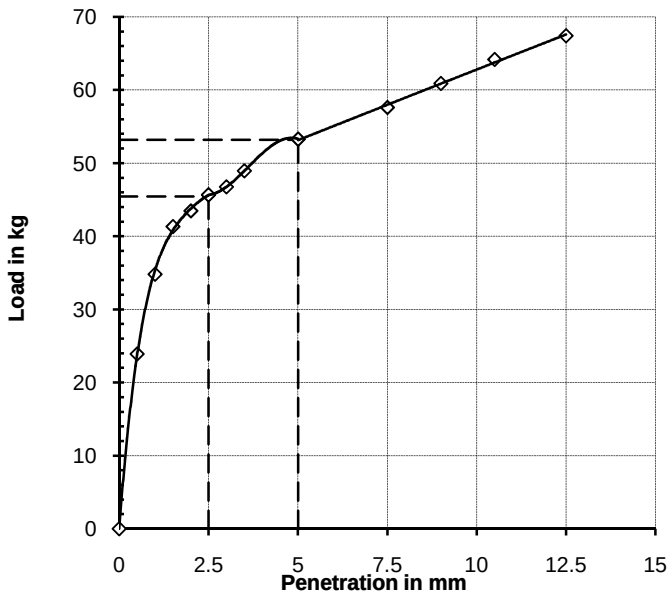
O.M.C. GRAPH



TYPE :- SOAKED

Penetration (mm)	CBR (%)
2.5	3.32
5.0	2.59

CBR GRAPH

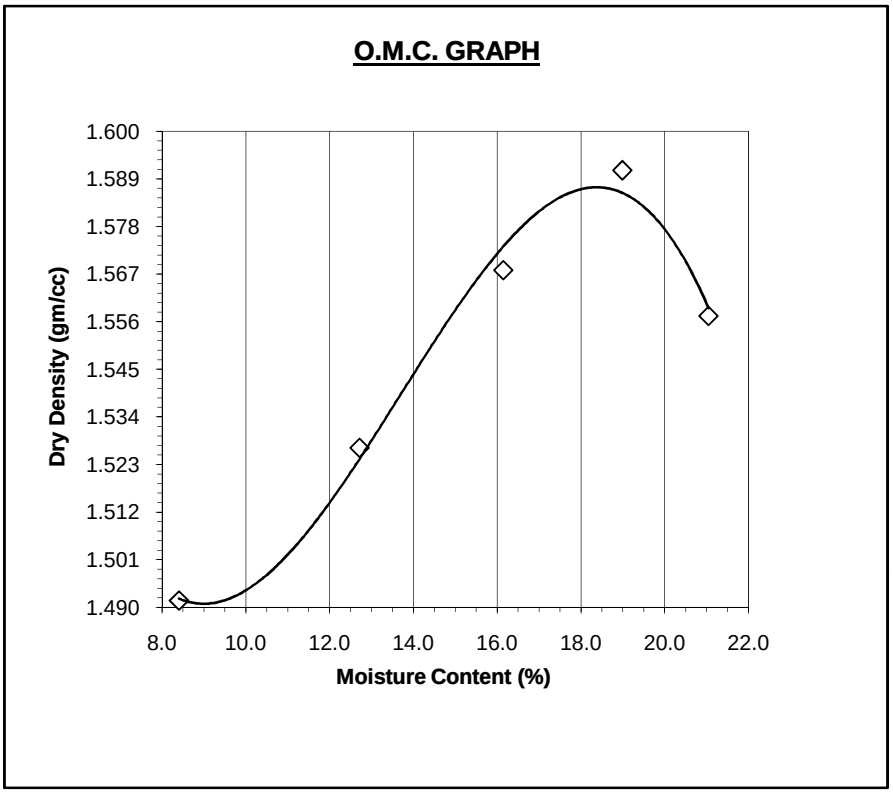


PROCTOR TEST RESULTS.

CPLT03 / DS03

Depth = 3.00m

Maximum Dry Density : 1.587 gm/cc
Optimum Moisture Content: 18.30 %

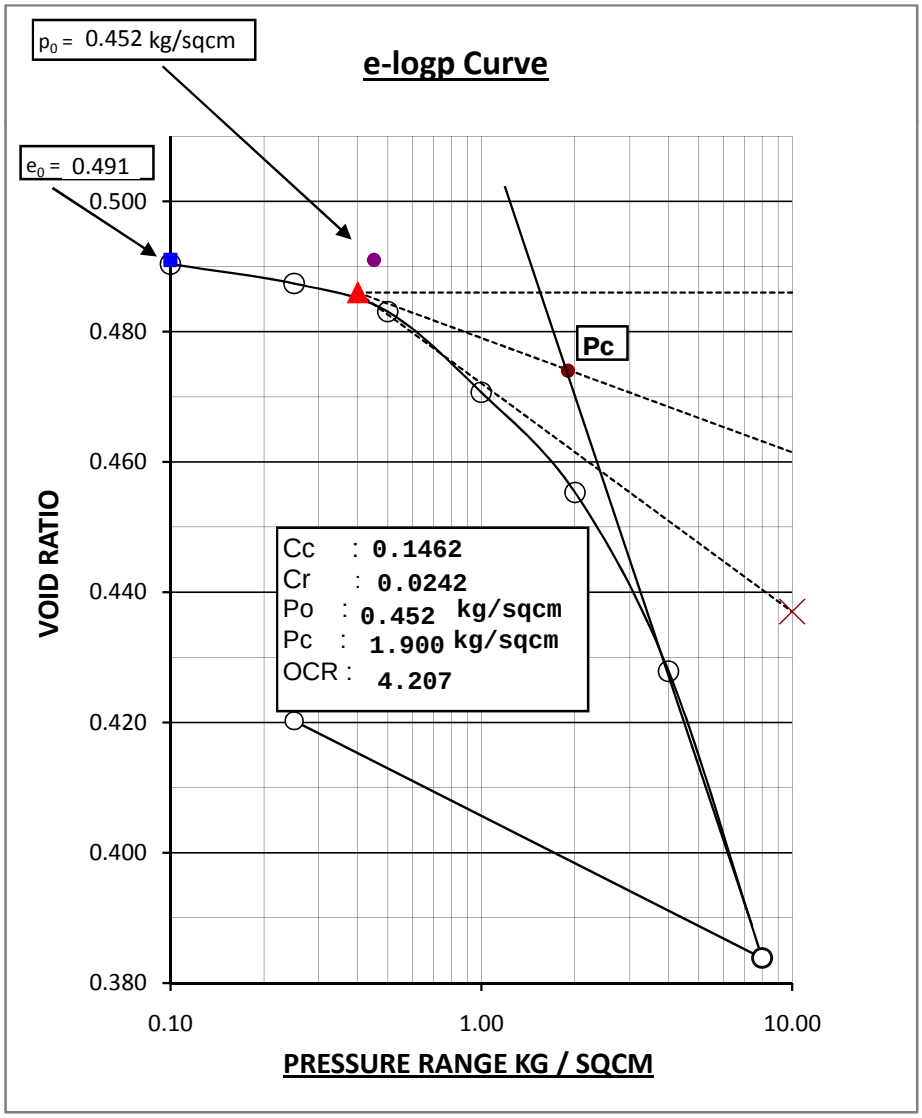


Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai	
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CONSOLIDATION TEST RESULTS

Sample Number:BH-01/UDS-01 Depth :2-2.45 meters
Description :Brownish grey silty clay with traces of kankars and calcareous nodu
Water content:Initial=17.4% Final =18.2% Initial Void Ratio =0.491

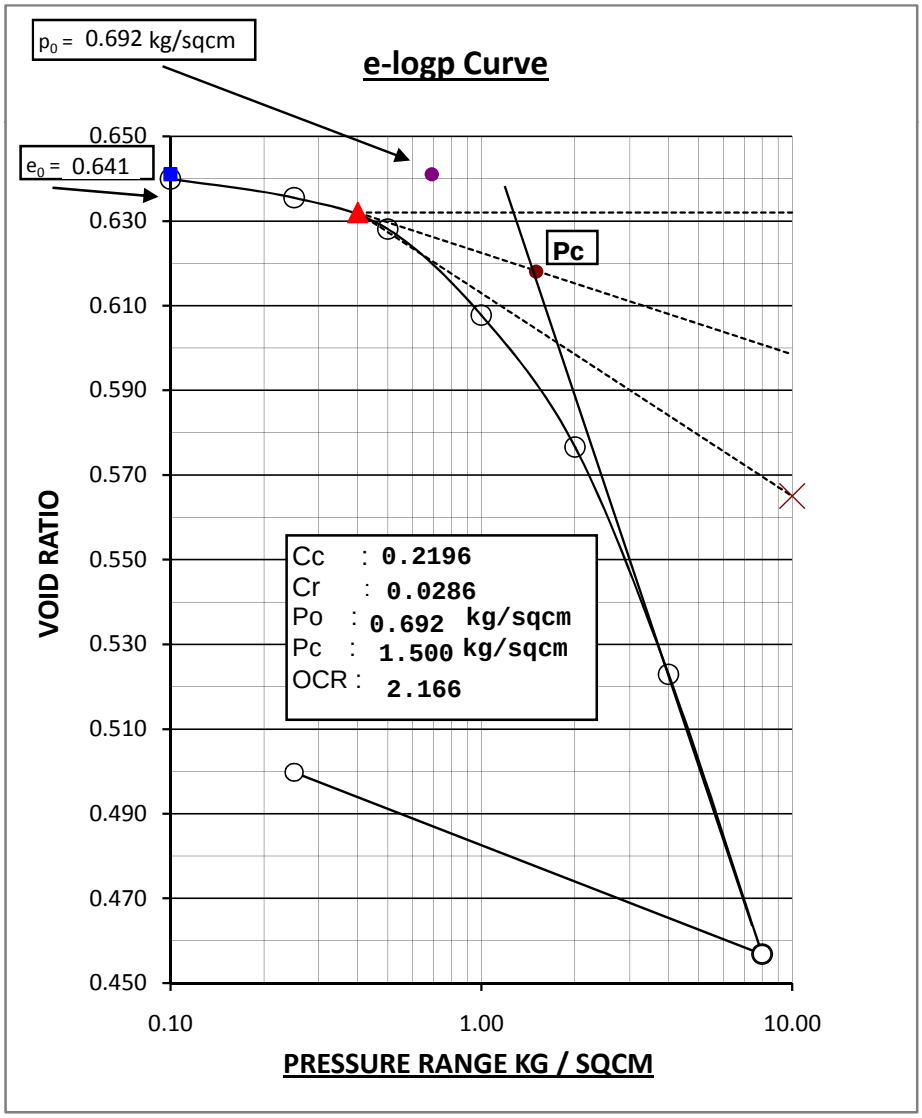
P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	7	0.490	0.0070				
0.10 - 0.25	20	0.487	0.0133	25.00	0.0100	160.0	5.261
0.25 - 0.50	29	0.483	0.0116	24.14	0.0088	202.5	4.116
0.50 - 1.00	83	0.471	0.0167	28.92	0.0119	196.6	4.145
1.00 - 2.00	103	0.455	0.0104	28.00	0.0075	380.7	2.060
2.00 - 4.00	184	0.428	0.0094	29.35	0.0067	599.1	1.232
4.00 - 8.00	295	0.384	0.0077	23.73	0.0059	453.8	1.464
8.00 - 0.25	244	0.420	0.0034				



CONSOLIDATION TEST RESULTS

Sample Number:BH-02/UDS-02 Depth :4-4.45 meters
Description :Brownish grey silty clay with rock pieces.
Water content:Initial=20.8% Final =21.6% Initial Void Ratio =0.641

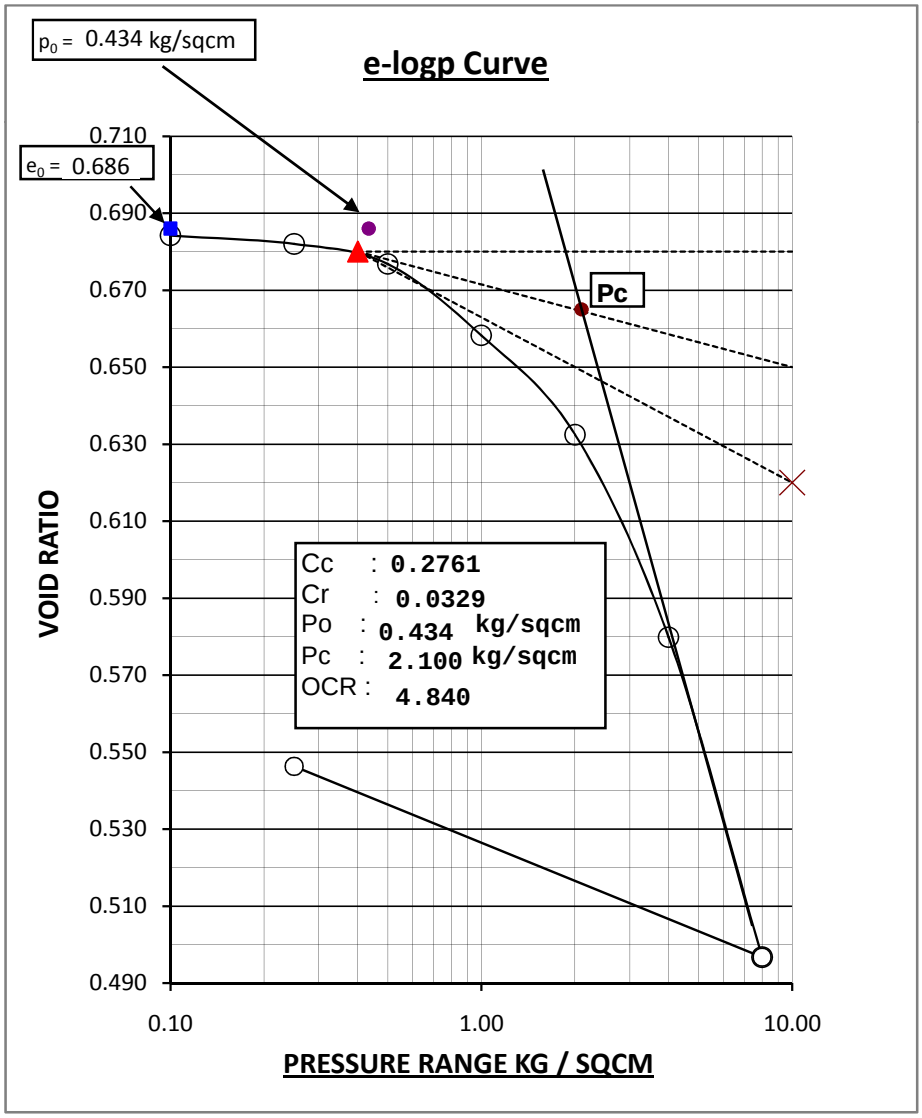
P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	6	0.640	0.0060				
0.10 - 0.25	27	0.635	0.0180	51.85	0.0087	279.3	3.014
0.25 - 0.50	45	0.628	0.0181	33.33	0.0120	357.2	2.322
0.50 - 1.00	124	0.608	0.0250	47.58	0.0131	317.4	2.525
1.00 - 2.00	190	0.577	0.0194	43.68	0.0109	314.6	2.385
2.00 - 4.00	327	0.523	0.0170	47.40	0.0089	190.1	3.526
4.00 - 8.00	403	0.457	0.0109	35.98	0.0069	328.5	1.719
8.00 - 0.25	262	0.500	0.0038				



CONSOLIDATION TEST RESULTS

Sample Number:BH-04/UDS-01 Depth :2-2.45 meters
Description :Brownish grey silty clay, with traces of calcareous nodules
Water content:Initial=25.3% Final =22.8% Initial Void Ratio =0.686

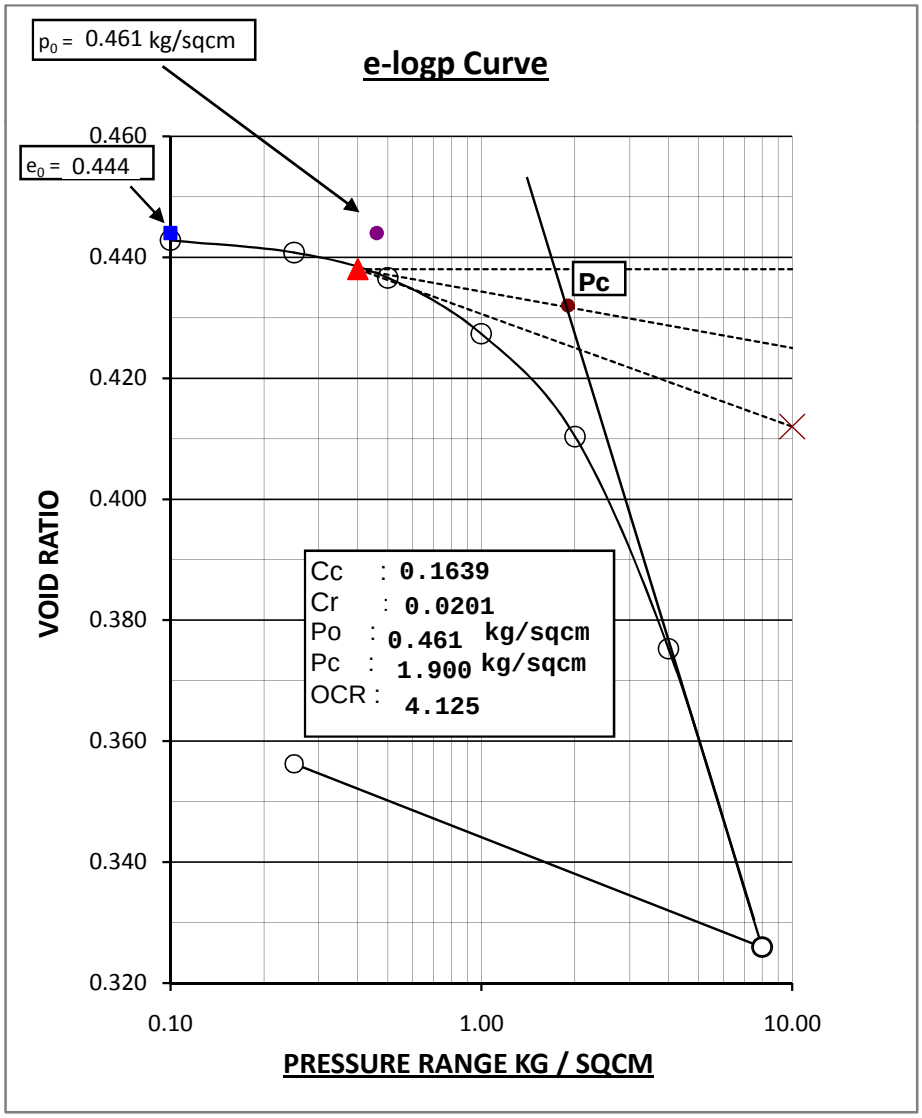
P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	8	0.684	0.0080				
0.10 - 0.25	13	0.682	0.0087	23.08	0.0067	80.7	10.437
0.25 - 0.50	31	0.677	0.0124	22.58	0.0096	118.5	7.048
0.50 - 1.00	110	0.658	0.0221	39.09	0.0135	207.6	3.910
1.00 - 2.00	153	0.632	0.0156	29.41	0.0110	109.6	7.013
2.00 - 4.00	312	0.580	0.0161	33.01	0.0108	181.5	3.831
4.00 - 8.00	493	0.497	0.0132	23.33	0.0101	120.6	4.786
8.00 - 0.25	294	0.546	0.0043				



CONSOLIDATION TEST RESULTS

Sample Number:BH-05/UDS-01 Depth :2-2.45 meters
Description :Brownish grey silty clay with traces of rock pieces.
Water content:Initial=15.4% Final =16.6% Initial Void Ratio =0.444

P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	8	0.443	0.0080				
0.10 - 0.25	14	0.441	0.0093	14.29	0.0080	133.4	6.333
0.25 - 0.50	29	0.437	0.0116	37.93	0.0072	160.0	5.234
0.50 - 1.00	64	0.427	0.0129	23.44	0.0098	144.2	5.702
1.00 - 2.00	118	0.410	0.0119	35.59	0.0077	108.1	7.325
2.00 - 4.00	243	0.375	0.0124	41.56	0.0073	111.0	6.612
4.00 - 8.00	342	0.326	0.0090	40.35	0.0053	253.8	2.539
8.00 - 0.25	210	0.356	0.0029				

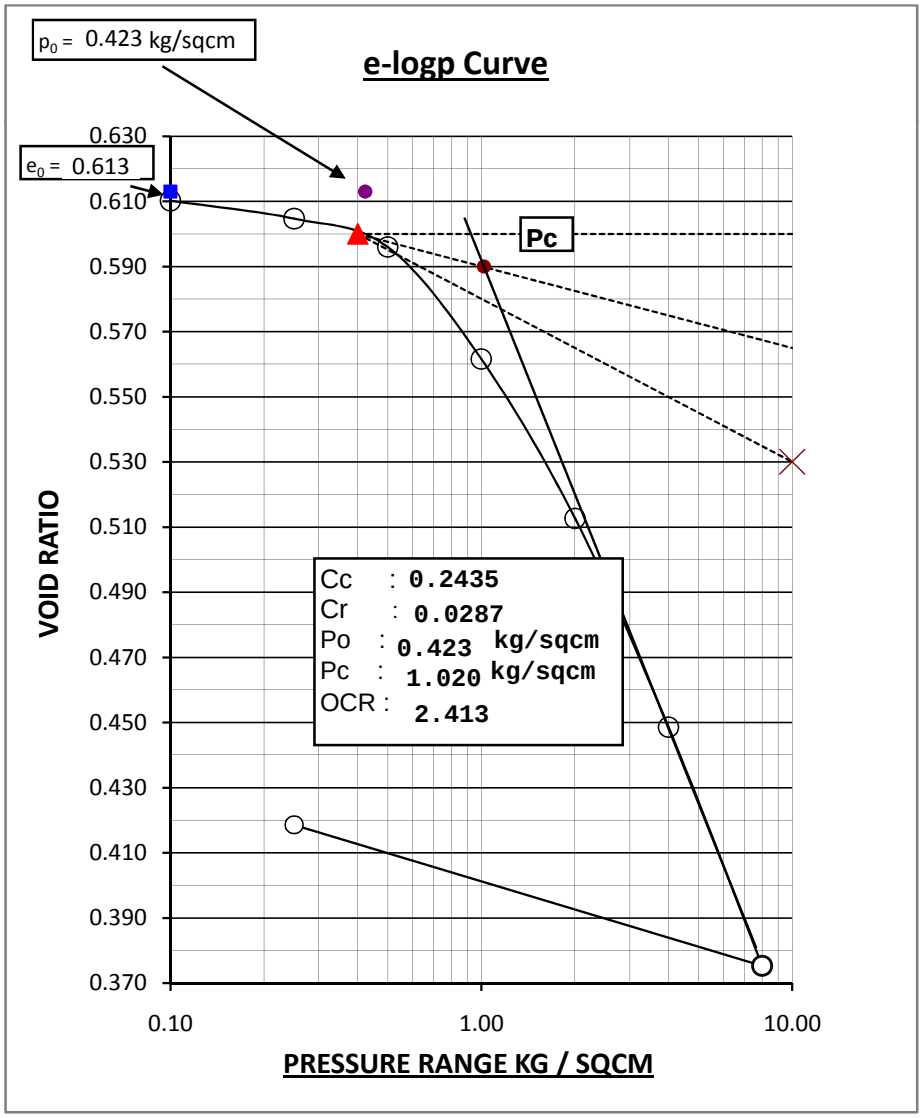


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CONSOLIDATION TEST RESULTS

Sample Number:BH-06/UDS-01 Depth :2.0-2.45 meters
Description :Brownish grey silty clay with traces of rock pieces.
Water content:Initial=24.8% Final =20.5% Initial Void Ratio =0.613

P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	17	0.610	0.0170				
0.10 - 0.25	34	0.605	0.0227	14.71	0.0194	164.2	5.085
0.25 - 0.50	54	0.596	0.0217	22.22	0.0169	244.8	3.350
0.50 - 1.00	213	0.562	0.0431	37.20	0.0271	209.8	3.700
1.00 - 2.00	303	0.513	0.0313	34.65	0.0205	244.8	2.838
2.00 - 4.00	397	0.449	0.0212	30.23	0.0148	138.6	4.267
4.00 - 8.00	454	0.375	0.0126	16.08	0.0106	152.8	3.123
8.00 - 0.25	268	0.419	0.0041				

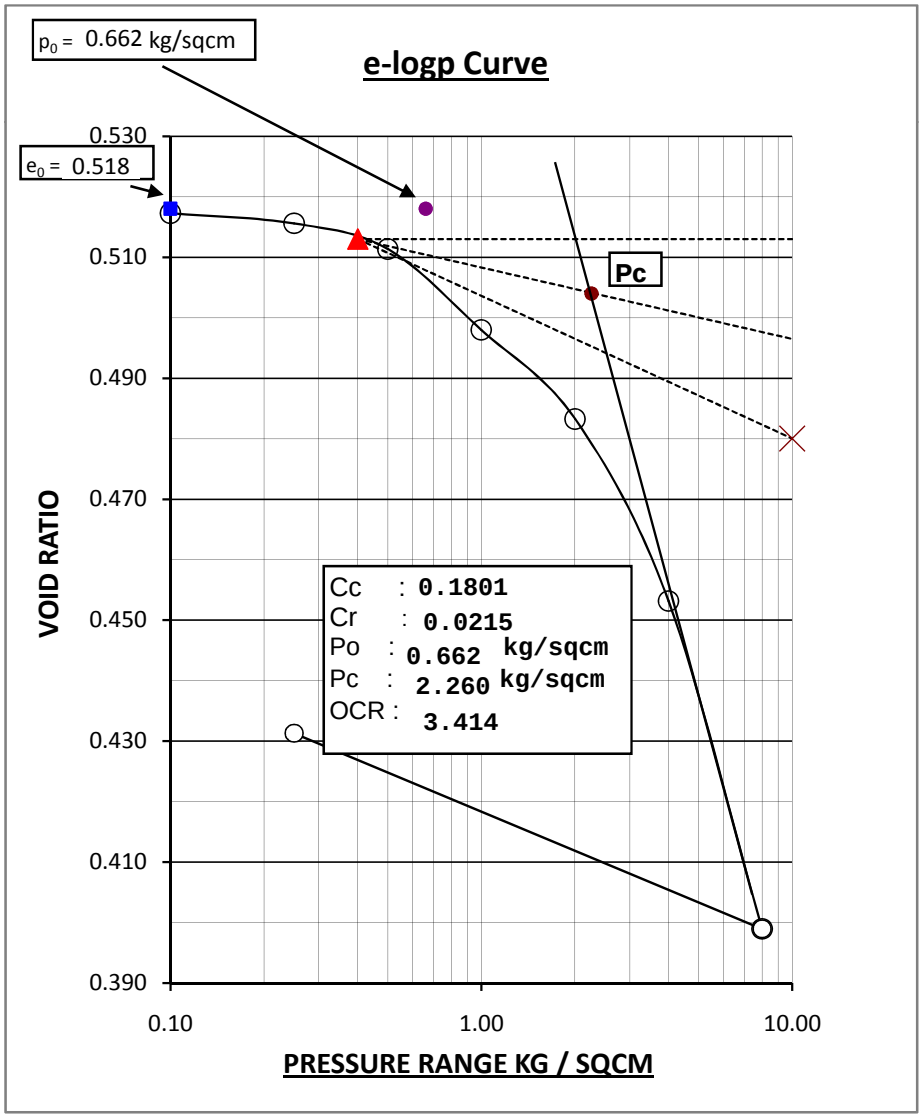


Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai	CETEST
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CONSOLIDATION TEST RESULTS

Sample Number:BH-08/UDS-02 Depth :4-4.45 meters
Description :Brownish grey silty clay with traces of kankars and calcareous nodu
Water content:Initial=19.1% Final =18.5% Initial Void Ratio =0.518

P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	5	0.517	0.0050				
0.10 - 0.25	11	0.516	0.0073	27.27	0.0053	182.1	4.632
0.25 - 0.50	28	0.511	0.0112	25.00	0.0084	254.6	3.287
0.50 - 1.00	88	0.498	0.0177	50.00	0.0088	424.5	1.925
1.00 - 2.00	97	0.483	0.0098	28.87	0.0070	218.9	3.595
2.00 - 4.00	198	0.453	0.0101	28.28	0.0073	126.2	5.862
4.00 - 8.00	357	0.399	0.0093	26.05	0.0069	242.4	2.699
8.00 - 0.25	213	0.431	0.0030				

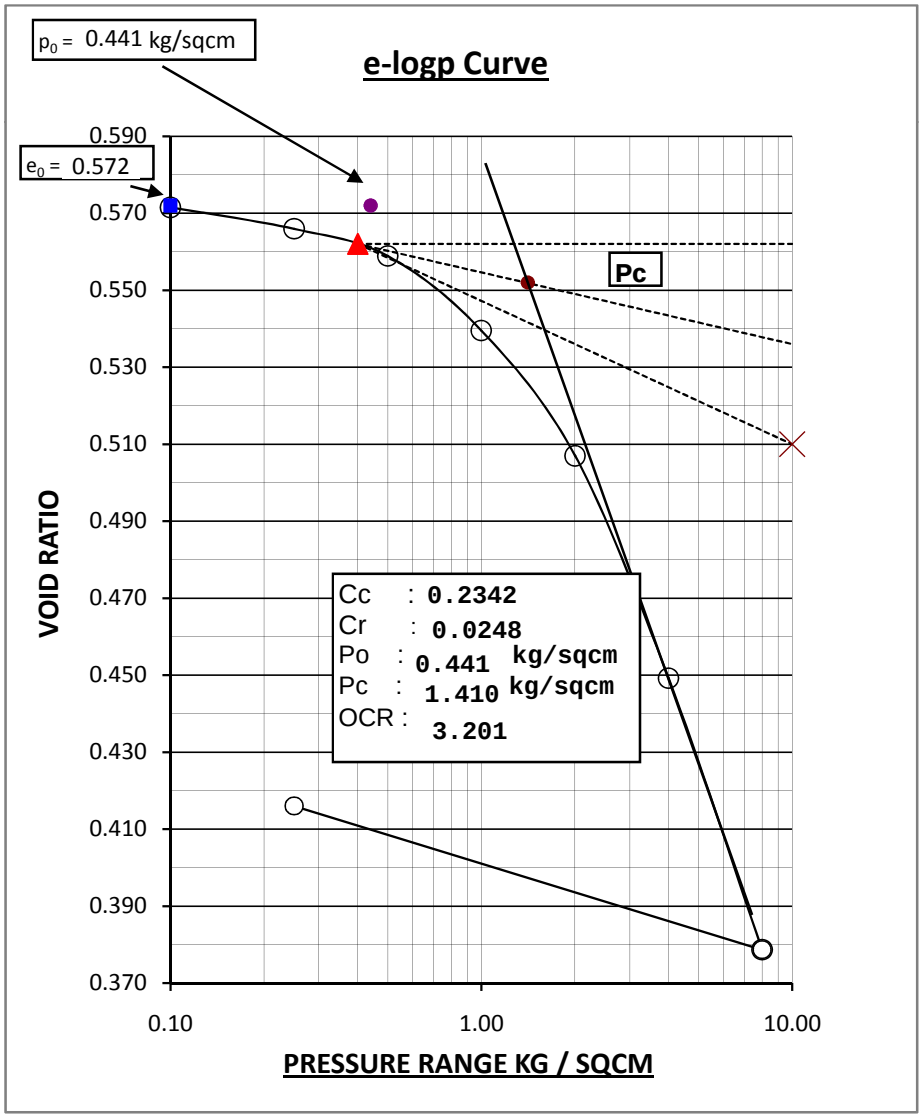


Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai	CETEST
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CONSOLIDATION TEST RESULTS

Sample Number:BH-09/UDS-01 Depth :2-2.45 meters
Description :Brownish grey silty clay with traces of kankars.
Water content:Initial=22% Final =19.8% Initial Void Ratio =0.572

P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	6	0.571	0.0060				
0.10 - 0.25	35	0.566	0.0234	37.14	0.0147	144.2	5.817
0.25 - 0.50	45	0.559	0.0181	17.78	0.0149	194.4	4.244
0.50 - 1.00	123	0.540	0.0248	37.40	0.0155	279.9	2.848
1.00 - 2.00	207	0.507	0.0212	43.48	0.0120	237.6	3.131
2.00 - 4.00	367	0.449	0.0192	41.69	0.0112	345.6	1.897
4.00 - 8.00	448	0.379	0.0122	30.10	0.0085	279.4	1.931
8.00 - 0.25	237	0.416	0.0035				

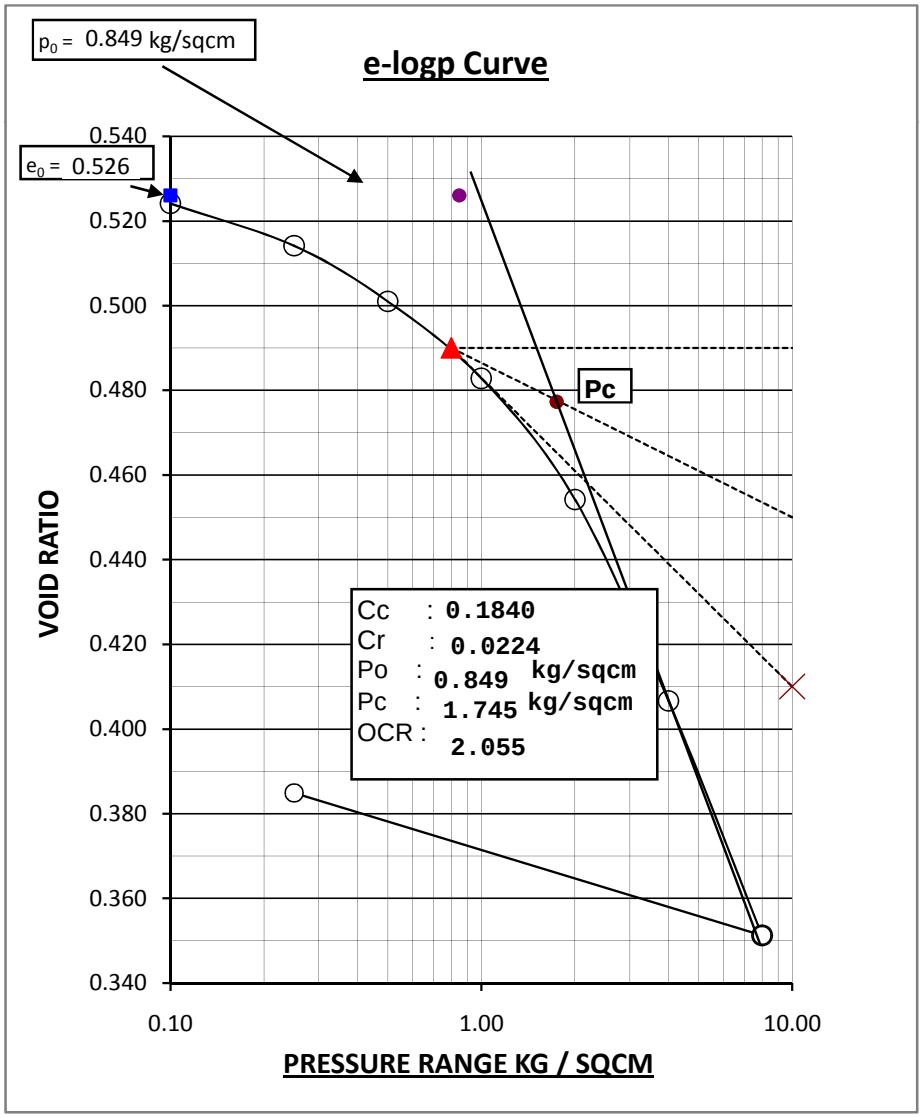


Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai	CETEST
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CONSOLIDATION TEST RESULTS

Sample Number:BH-11/UDS-02 Depth :4-4.45 meters
Description :Brownish grey silty clay with moorum
Water content:Initial=24.8% Final =17.2% Initial Void Ratio =0.526

P_1-P_2 Kg/Sqcm	Dial Change	Void Ratio	M_v Sqcm/kg	Comprn %	M_{vc} sqcm/kg	T90 Sec	1000.C_v sqcm/sec
0.00 - 0.10	11	0.524	0.0110				
0.10 - 0.25	65	0.514	0.0435	27.27	0.0316	165.3	5.014
0.25 - 0.50	86	0.501	0.0348	22.09	0.0271	194.6	4.131
0.50 - 1.00	119	0.483	0.0243	25.79	0.0180	176.1	4.374
1.00 - 2.00	187	0.454	0.0193	18.18	0.0158	298.4	2.419
2.00 - 4.00	311	0.407	0.0164	21.22	0.0129	277.4	2.329
4.00 - 8.00	362	0.351	0.0098	19.06	0.0080	138.3	3.977
8.00 - 0.25	220	0.385	0.0032				

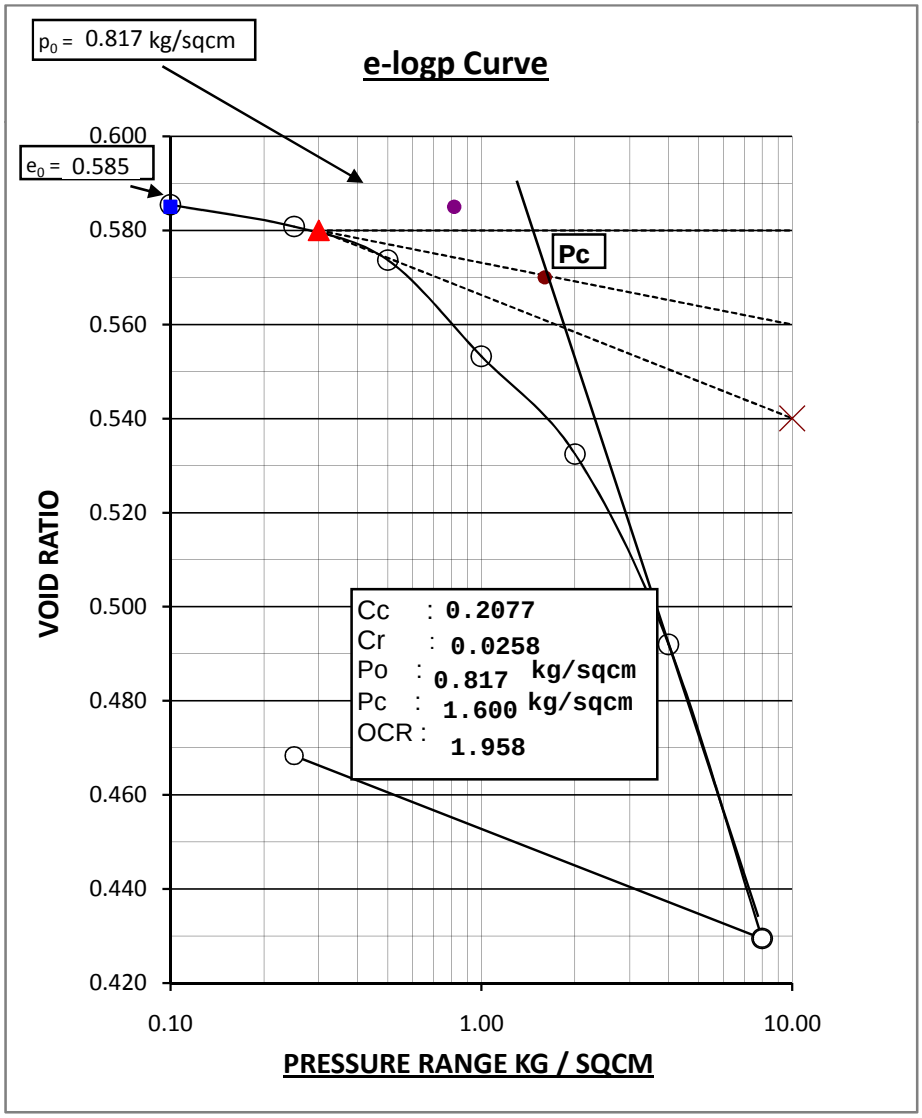


Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai	CETEST
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CONSOLIDATION TEST RESULTS

Sample Number:BH-15/UDS-02 Depth :4-4.45 meters
Description :Brownish grey silty clay with traces of kankars and calcareous nodu
Water content:Initial=21.2% Final =20.3% Initial Void Ratio =0.585

P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	-2	0.585	-0.0020				
0.10 - 0.25	29	0.581	0.0193	35.50	0.0125	190.1	4.430
0.25 - 0.50	45	0.574	0.0181	22.22	0.0141	285.1	2.910
0.50 - 1.00	129	0.553	0.0260	30.23	0.0181	179.0	4.474
1.00 - 2.00	131	0.532	0.0134	27.48	0.0097	137.7	5.509
2.00 - 4.00	255	0.492	0.0132	23.92	0.0100	171.4	4.073
4.00 - 8.00	394	0.429	0.0105	20.81	0.0083	525.7	1.144
8.00 - 0.25	245	0.468	0.0035				

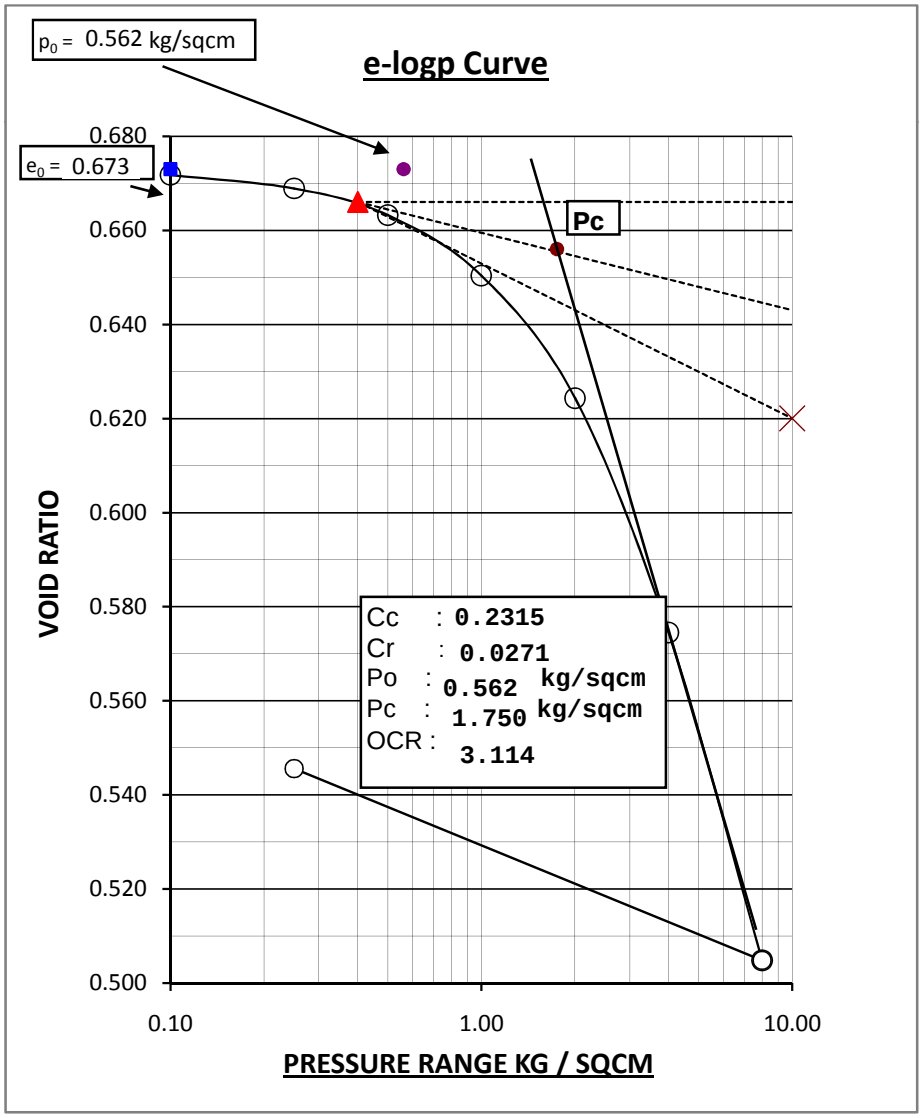


Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai	CETEST
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CONSOLIDATION TEST RESULTS

Sample Number:BH-17/UDS-02 Depth :4-4.45 meters
Description :Brownish grey silty clay with kankars and rock dust
Water content:Initial=24.5% Final =23.3% Initial Void Ratio =0.673

P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	6	0.672	0.0060				
0.10 - 0.25	17	0.669	0.0113	29.41	0.0080	103.4	8.170
0.25 - 0.50	34	0.663	0.0136	41.18	0.0080	124.4	6.721
0.50 - 1.00	77	0.650	0.0155	41.56	0.0090	467.0	1.751
1.00 - 2.00	156	0.624	0.0158	49.36	0.0080	209.6	3.718
2.00 - 4.00	298	0.574	0.0153	45.64	0.0083	453.8	1.559
4.00 - 8.00	417	0.505	0.0111	30.94	0.0076	254.6	2.360
8.00 - 0.25	244	0.546	0.0035				

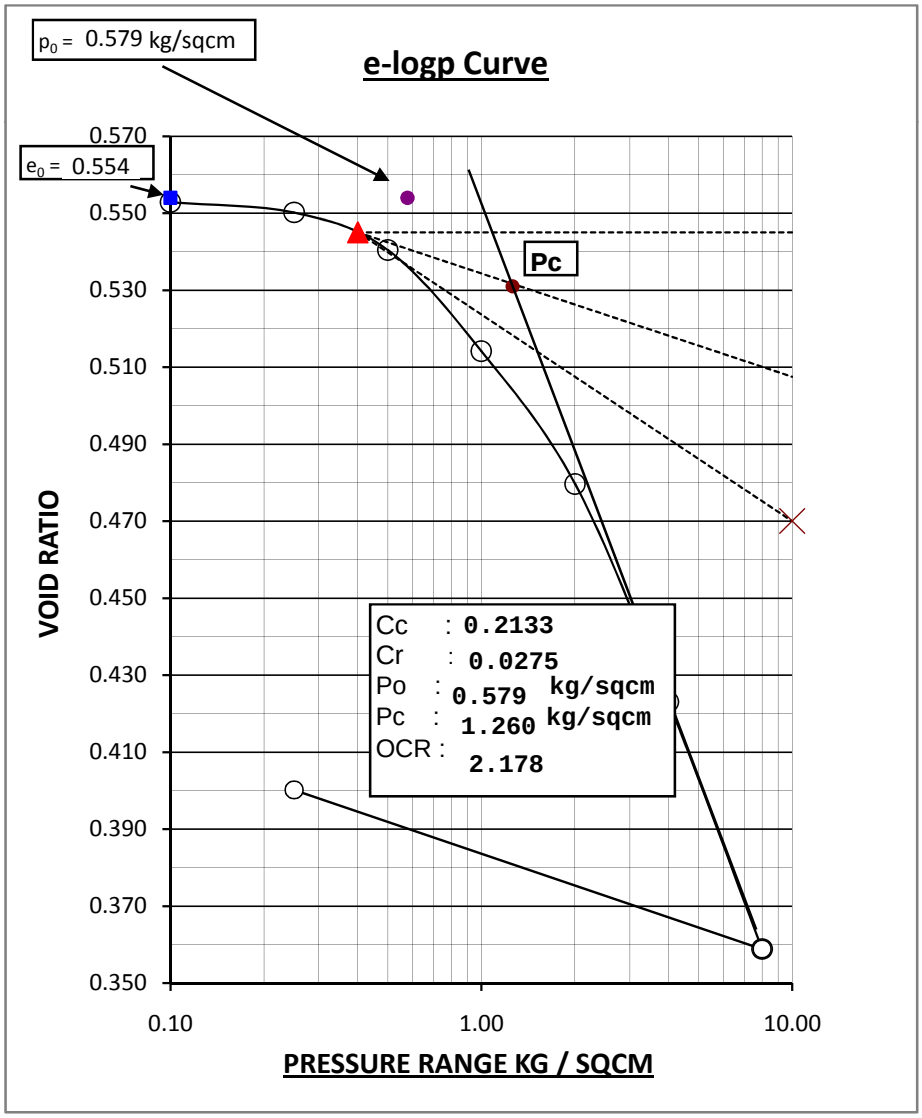


Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai	CETEST
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CONSOLIDATION TEST RESULTS

Sample Number:BH-18/UDS-02 Depth :4-4.45 meters
Description :Brownish grey silty clay with traces of kankars and rock dust.
Water content:Initial=16.9% Final =19% Initial Void Ratio =0.554

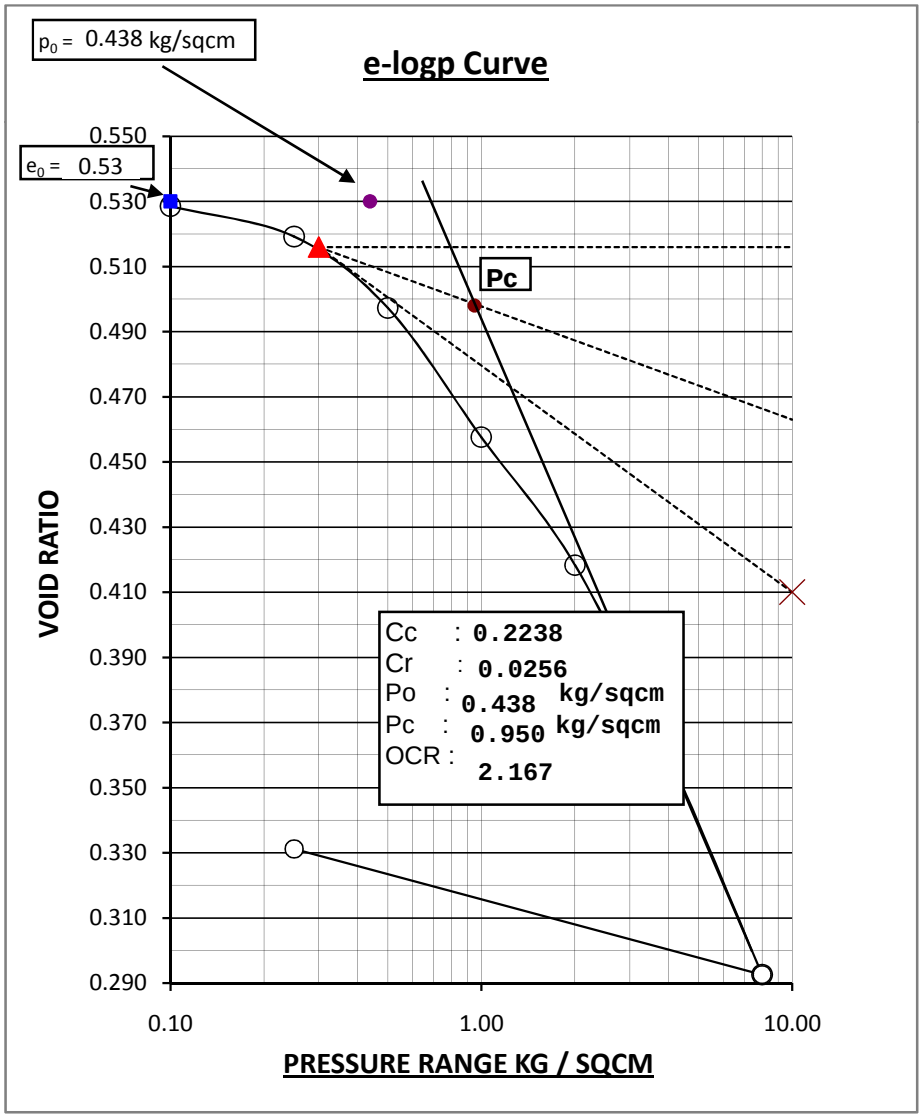
P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	9	0.553	0.0090				
0.10 - 0.25	17	0.550	0.0113	47.06	0.0060	372.0	2.262
0.25 - 0.50	63	0.540	0.0253	46.03	0.0136	183.8	4.506
0.50 - 1.00	169	0.514	0.0341	47.30	0.0180	161.4	4.892
1.00 - 2.00	222	0.480	0.0228	51.35	0.0111	739.2	0.983
2.00 - 4.00	364	0.423	0.0191	59.07	0.0078	328.5	1.941
4.00 - 8.00	413	0.359	0.0113	46.73	0.0060	114.6	4.612
8.00 - 0.25	266	0.400	0.0039				



CONSOLIDATION TEST RESULTS

Sample Number:BH-20/UDS-01 Depth :2-2.45 meters
Description :Brownish grey silty clay with kankars and rock pieces.
Water content:Initial=23.9% Final =17.8% Initial Void Ratio =0.53

P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	11	0.529	0.0110				
0.10 - 0.25	61	0.519	0.0407	34.43	0.0267	232.9	3.577
0.25 - 0.50	143	0.497	0.0576	30.77	0.0399	93.8	8.523
0.50 - 1.00	259	0.458	0.0530	40.54	0.0315	181.6	4.043
1.00 - 2.00	257	0.418	0.0270	19.07	0.0218	118.6	5.523
2.00 - 4.00	381	0.360	0.0206	28.35	0.0147	120.4	4.679
4.00 - 8.00	440	0.293	0.0124	25.45	0.0092	142.6	3.195
8.00 - 0.25	252	0.331	0.0039				

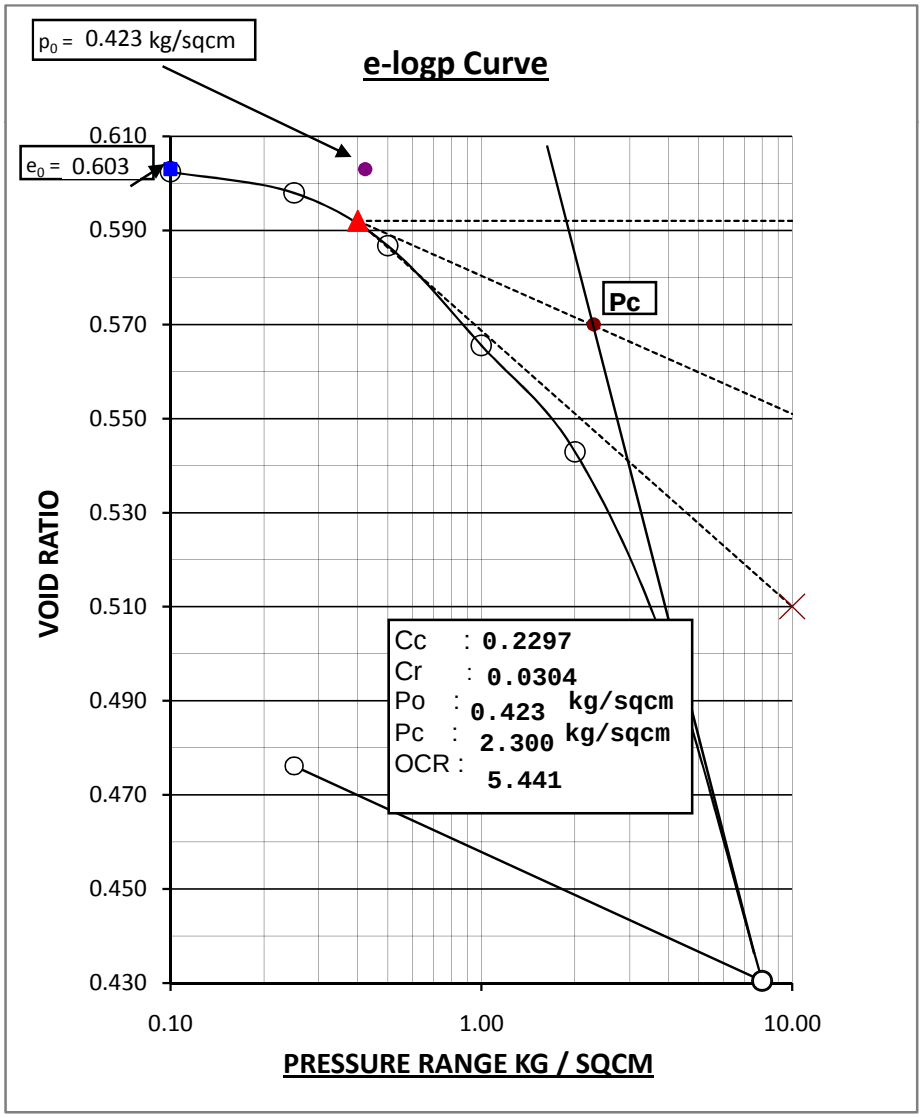


Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai	
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CONSOLIDATION TEST RESULTS

Sample Number:BH-22/UDS-01 Depth :2-2.45 meters
Description : Brownish grey silty clay with traces of kankars
Water content:Initial=23.2% Final =21.7% Initial Void Ratio =0.603

P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	6	0.602	0.0060				
0.10 - 0.25	28	0.598	0.0187	39.29	0.0113	93.8	8.962
0.25 - 0.50	70	0.587	0.0281	40.00	0.0169	123.0	6.697
0.50 - 1.00	132	0.566	0.0267	48.48	0.0138	174.9	4.519
1.00 - 2.00	141	0.543	0.0144	35.46	0.0093	229.9	3.246
2.00 - 4.00	270	0.500	0.0140	30.74	0.0097	215.8	3.162
4.00 - 8.00	431	0.430	0.0115	19.03	0.0093	182.4	3.179
8.00 - 0.25	285	0.476	0.0041				

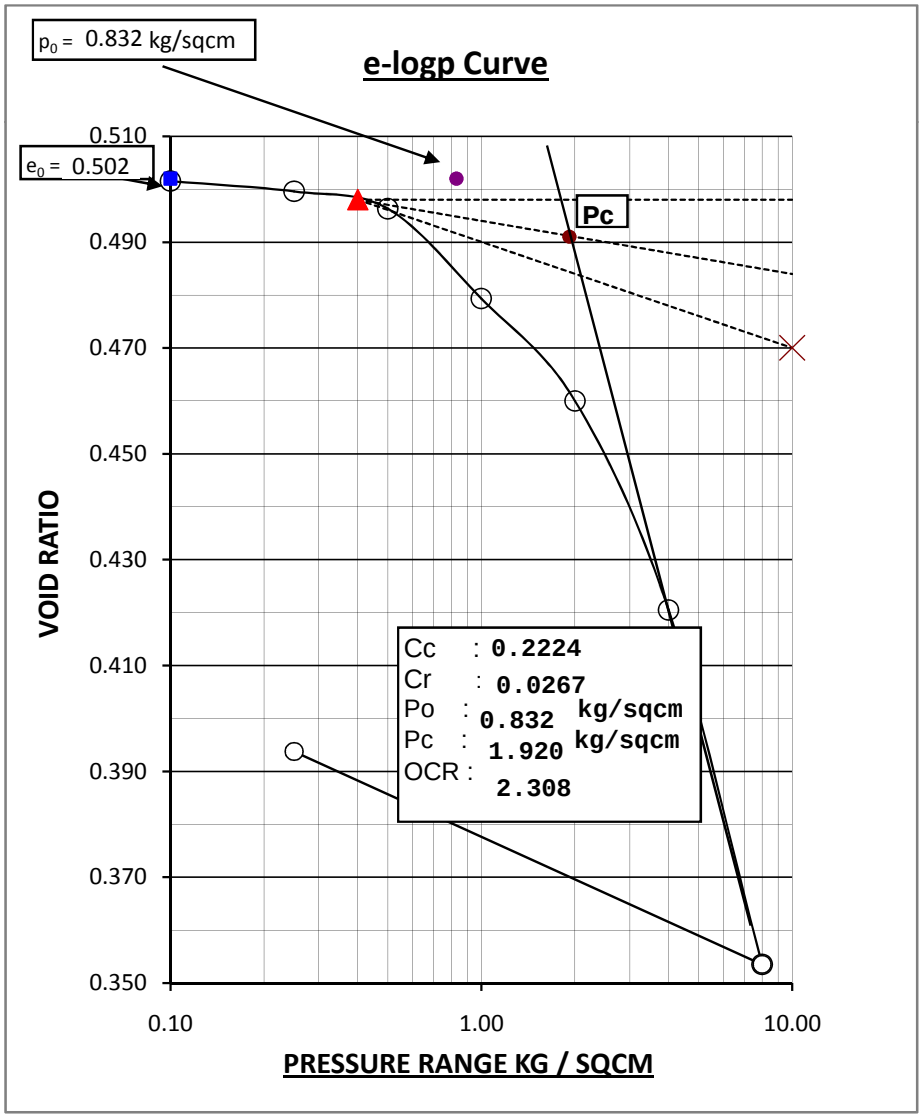


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CONSOLIDATION TEST RESULTS

Sample Number:BH-23/UDS-02 Depth :4-4.45 meters
Description :Brownish grey silty clay with traces of kankars
Water content:Initial=20.3% Final =20% Initial Void Ratio =0.502

P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	6	0.502	0.0060				
0.10 - 0.25	13	0.500	0.0087	23.08	0.0067	249.7	3.385
0.25 - 0.50	22	0.496	0.0088	27.27	0.0064	121.0	6.936
0.50 - 1.00	113	0.479	0.0227	44.25	0.0126	107.7	7.579
1.00 - 2.00	129	0.460	0.0131	34.88	0.0085	339.9	2.286
2.00 - 4.00	263	0.420	0.0135	43.73	0.0076	204.2	3.499
4.00 - 8.00	446	0.354	0.0118	38.30	0.0073	166.4	3.656
8.00 - 0.25	268	0.394	0.0038				

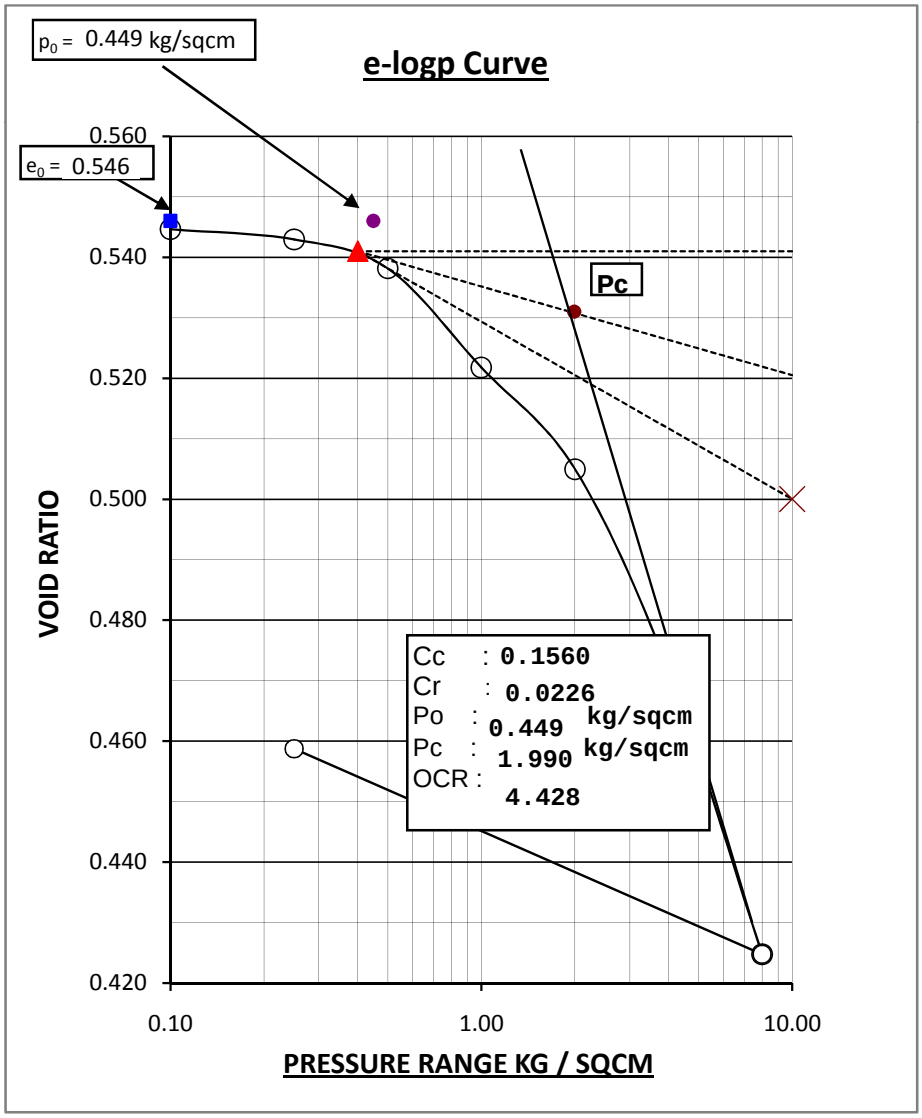


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CONSOLIDATION TEST RESULTS

Sample Number:BH-24/UDS-01 Depth :2-2.45 meters
Description :Brownish grey silty clay with traces of kankars
Water content:Initial=19.6% Final =19.3% Initial Void Ratio =0.546

P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	6	0.545	0.0060				
0.10 - 0.25	11	0.543	0.0073	27.27	0.0053	182.1	4.640
0.25 - 0.50	31	0.538	0.0124	22.58	0.0096	437.4	1.916
0.50 - 1.00	106	0.522	0.0213	47.17	0.0112	238.5	3.417
1.00 - 2.00	109	0.505	0.0111	22.02	0.0086	151.7	5.139
2.00 - 4.00	215	0.472	0.0110	24.65	0.0083	92.3	7.889
4.00 - 8.00	304	0.425	0.0080	19.41	0.0064	167.3	3.876
8.00 - 0.25	220	0.459	0.0031				

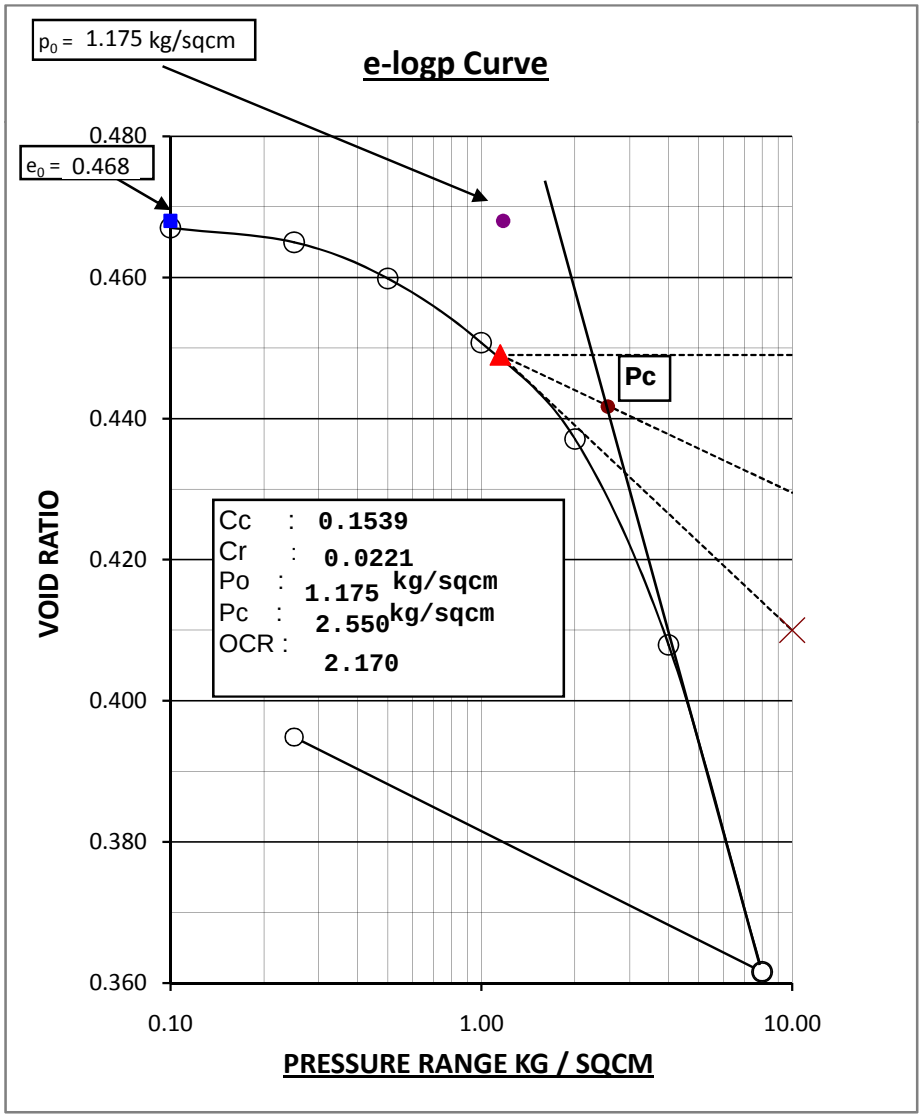


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CONSOLIDATION TEST RESULTS

Sample Number:BH-25/UDS-03 Depth :6-6.45 meters
Description :Brownish grey silty clay with traces of kankars and calcareous nodu
Water content:Initial=16.7% Final =17% Initial Void Ratio =0.468

P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	7	0.467	0.0070				
0.10 - 0.25	14	0.465	0.0093	21.43	0.0073	72.6	11.641
0.25 - 0.50	35	0.460	0.0140	32.00	0.0095	127.9	6.543
0.50 - 1.00	62	0.451	0.0125	53.66	0.0058	115.0	7.135
1.00 - 2.00	93	0.437	0.0094	43.70	0.0053	190.1	4.182
2.00 - 4.00	199	0.408	0.0102	40.20	0.0061	254.6	2.937
4.00 - 8.00	316	0.362	0.0082	37.66	0.0051	158.2	4.222
8.00 - 0.25	227	0.395	0.0032				

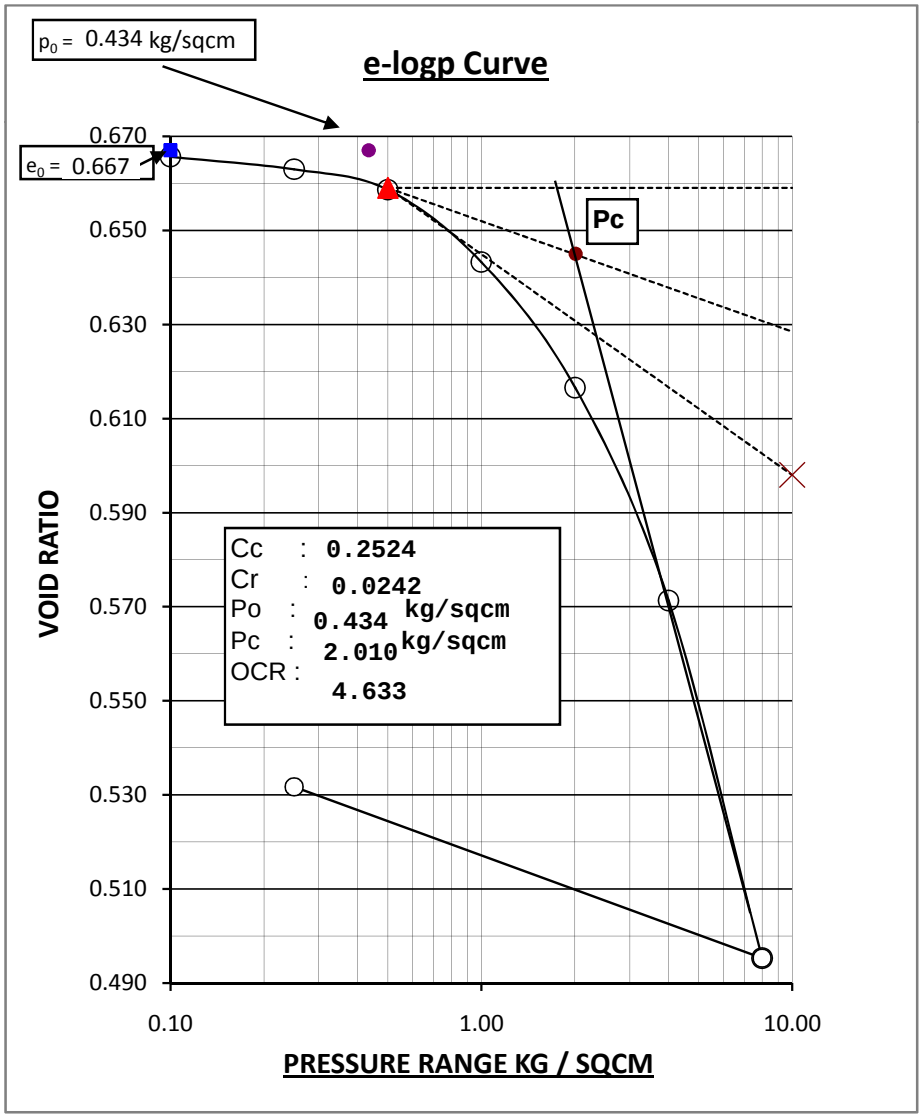


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CONSOLIDATION TEST RESULTS

Sample Number:BH-27/UDS-01 Depth :2-2.45 meters
Description :Brownish grey silty clay with traces of kankars
Water content:Initial=24.9% Final =22.6% Initial Void Ratio =0.667

P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	8	0.666	0.0080				
0.10 - 0.25	16	0.663	0.0107	12.50	0.0094	179.3	4.681
0.25 - 0.50	26	0.659	0.0104	30.77	0.0072	124.4	6.690
0.50 - 1.00	92	0.643	0.0185	33.70	0.0123	591.6	1.374
1.00 - 2.00	160	0.617	0.0163	41.88	0.0095	494.2	1.561
2.00 - 4.00	271	0.571	0.0140	30.63	0.0097	345.7	2.034
4.00 - 8.00	455	0.495	0.0121	19.12	0.0098	290.8	2.048
8.00 - 0.25	218	0.532	0.0031				

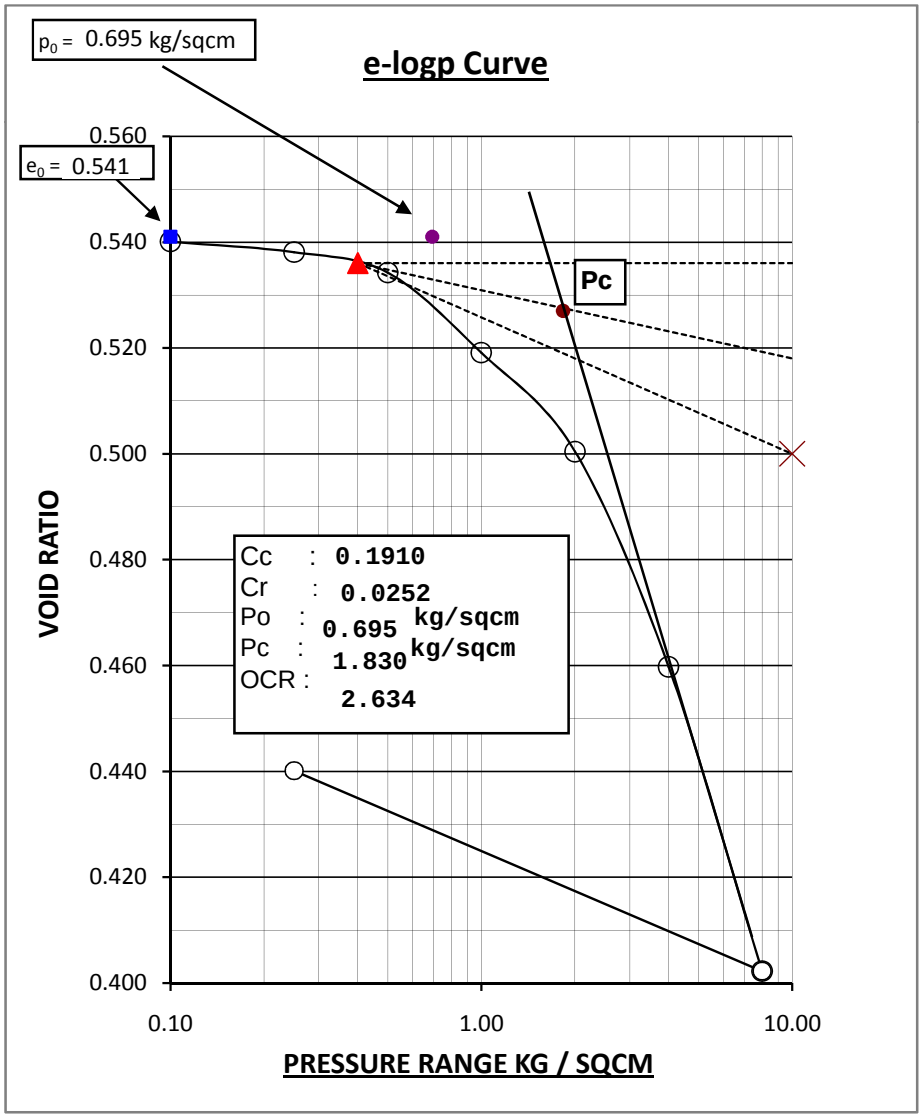


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CONSOLIDATION TEST RESULTS

Sample Number:BH-30/UDS-02 Depth :4-4.45 meters
Description :Brownish grey silty clay with calcareous nodules.
Water content:Initial=19.2% Final =18.7% Initial Void Ratio =0.541

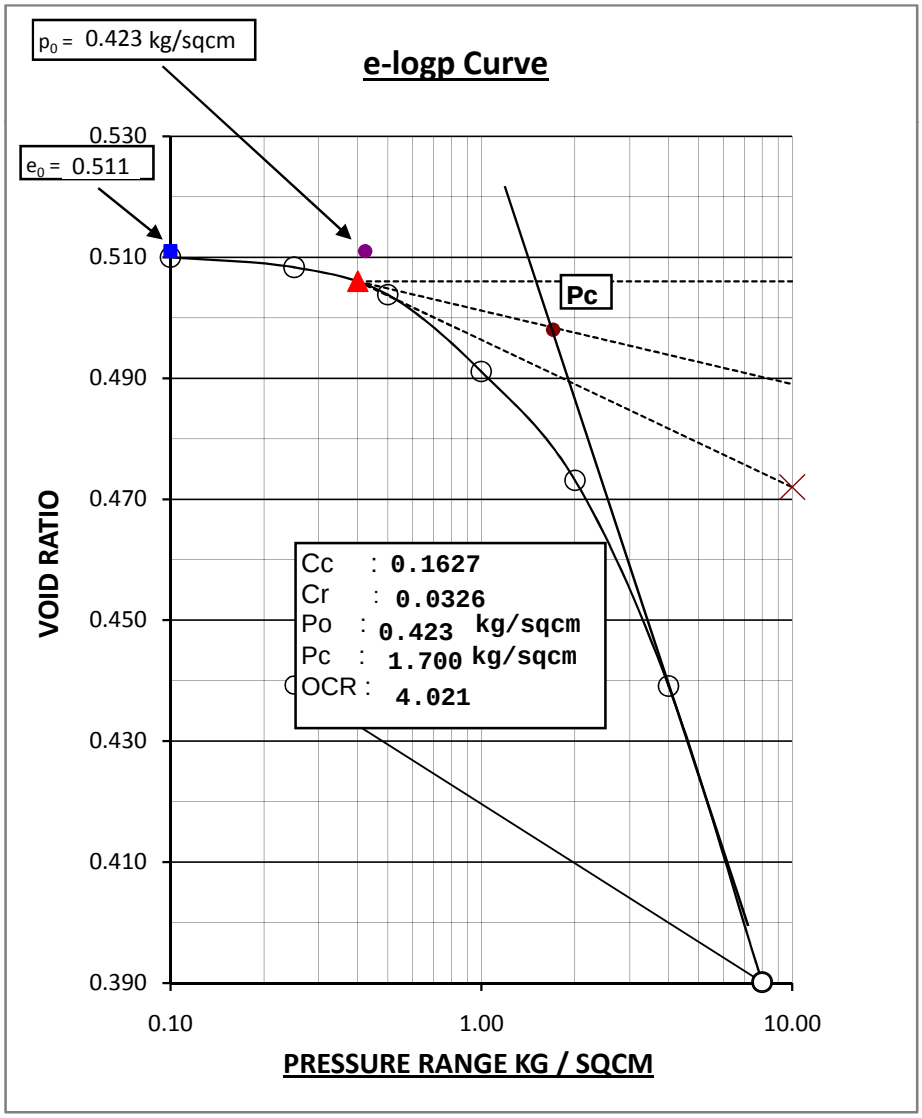
P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	9	0.540	0.0090				
0.10 - 0.25	13	0.538	0.0087	23.08	0.0067	221.2	3.790
0.25 - 0.50	25	0.534	0.0100	20.00	0.0080	140.0	5.943
0.50 - 1.00	98	0.519	0.0197	43.88	0.0111	151.7	5.349
1.00 - 2.00	121	0.500	0.0123	31.40	0.0084	314.6	2.465
2.00 - 4.00	263	0.460	0.0135	39.54	0.0082	351.4	2.033
4.00 - 8.00	372	0.402	0.0098	32.80	0.0066	234.8	2.636
8.00 - 0.25	245	0.440	0.0035				



CONSOLIDATION TEST RESULTS

Sample Number:IBH-01/UDS-01 Depth :2-2.45 meters
Description :Brownish grey silty clay with kankars and rock pieces.
Water content:Initial=17.2% Final =17.7% Initial Void Ratio =0.511

P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	8	0.510	0.0080				
0.10 - 0.25	11	0.508	0.0073	18.18	0.0060	102.1	8.258
0.25 - 0.50	30	0.504	0.0120	40.00	0.0072	106.4	7.860
0.50 - 1.00	84	0.491	0.0169	38.10	0.0105	161.8	5.050
1.00 - 2.00	119	0.473	0.0121	37.82	0.0075	231.4	3.387
2.00 - 4.00	225	0.439	0.0115	44.00	0.0065	183.8	3.965
4.00 - 8.00	324	0.390	0.0085	36.73	0.0054	103.0	6.263
8.00 - 0.25	325	0.439	0.0046				

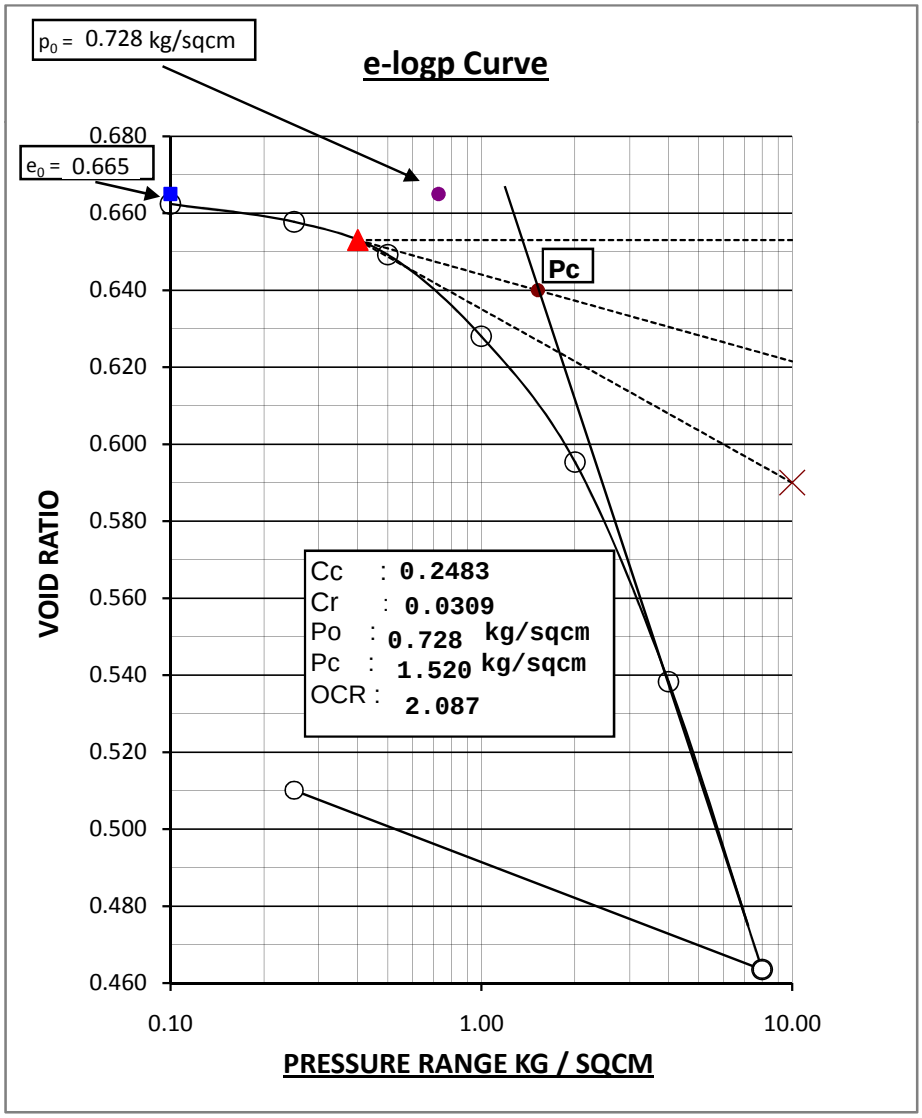


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CONSOLIDATION TEST RESULTS

Sample Number:IBH-02/UDS-02 Depth :4-4.45 meters
Description :Brownish grey silty clay with traces of kankar.
Water content:Initial=23.4% Final =20.9% Initial Void Ratio =0.665

P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	15	0.662	0.0150				
0.10 - 0.25	28	0.658	0.0187	42.86	0.0107	119.3	6.997
0.25 - 0.50	51	0.649	0.0205	37.25	0.0129	369.0	2.226
0.50 - 1.00	127	0.628	0.0257	48.82	0.0132	165.3	4.790
1.00 - 2.00	196	0.595	0.0201	33.67	0.0133	293.0	2.525
2.00 - 4.00	342	0.538	0.0179	44.74	0.0099	275.1	2.389
4.00 - 8.00	448	0.464	0.0121	33.48	0.0081	215.8	2.523
8.00 - 0.25	279	0.510	0.0041				

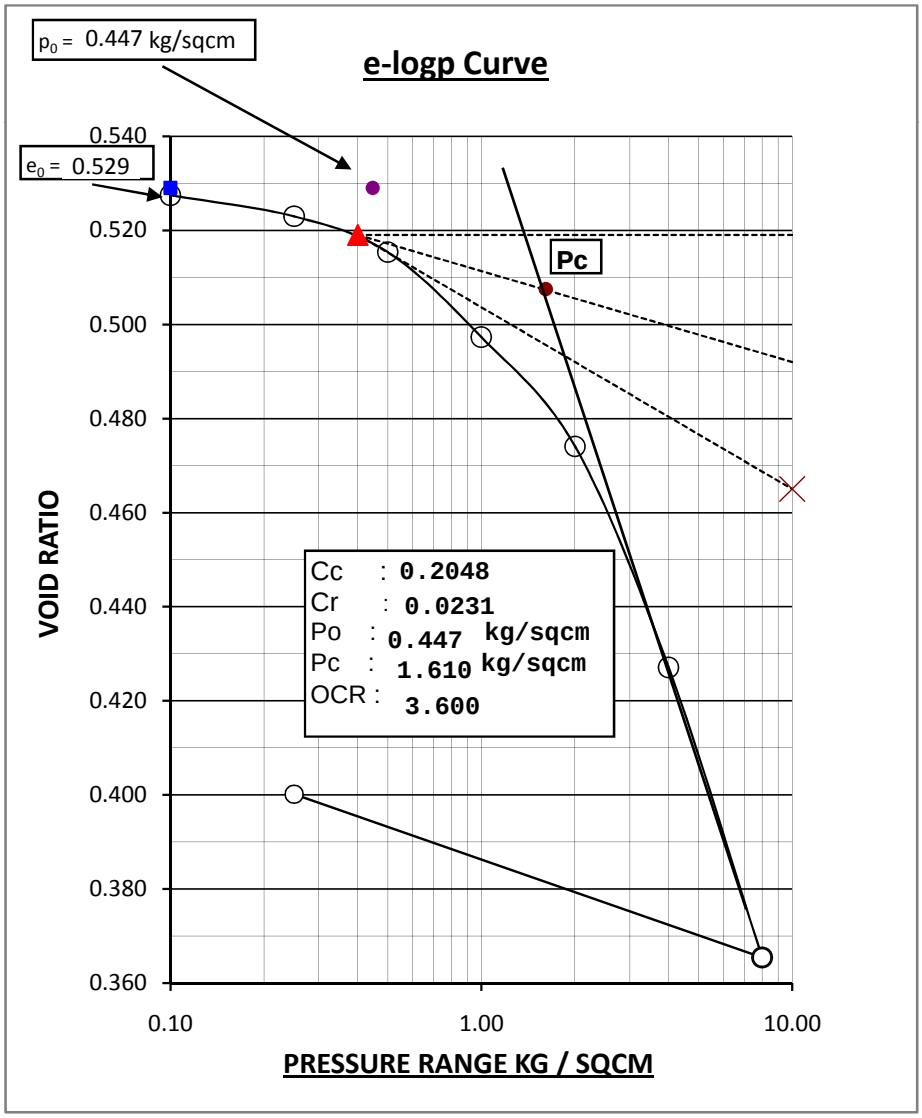


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CONSOLIDATION TEST RESULTS

Sample Number:IBH-03/UDS-01 Depth :2-2.45 meters
Description :Reddish brown silty clay with calcareous nodules and kankars.
Water content:Initial=19.8% Final =18.2% Initial Void Ratio =0.529

P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	8	0.527	0.0080				
0.10 - 0.25	29	0.523	0.0194	27.59	0.0140	119.3	7.032
0.25 - 0.50	50	0.515	0.0201	38.00	0.0125	217.4	3.798
0.50 - 1.00	118	0.497	0.0238	43.22	0.0135	117.0	6.818
1.00 - 2.00	152	0.474	0.0155	38.16	0.0096	161.4	4.672
2.00 - 4.00	307	0.427	0.0159	33.60	0.0106	180.0	3.791
4.00 - 8.00	403	0.365	0.0108	25.56	0.0080	142.3	4.066
8.00 - 0.25	227	0.400	0.0033				

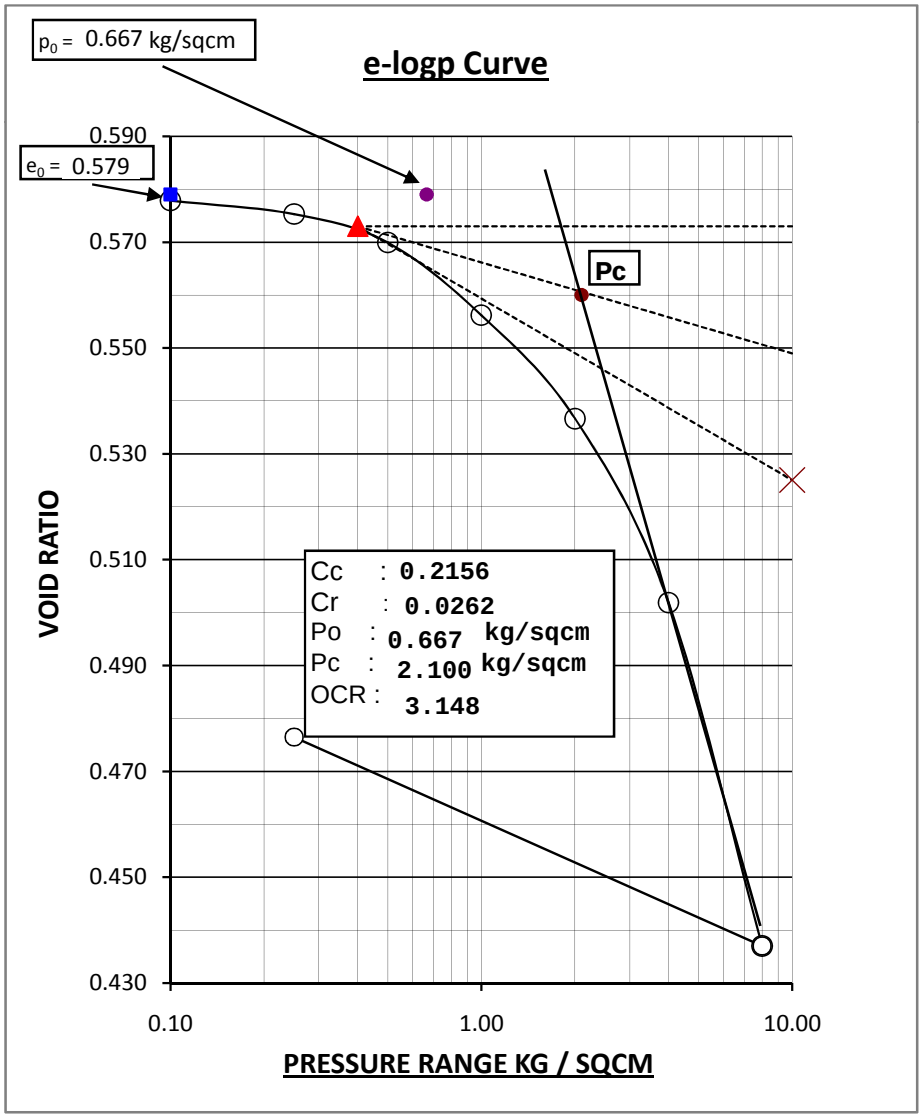


Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai	CETEST
Job No. 4376	Sheet No.

CONSOLIDATION TEST RESULTS

Sample Number:IBH-05/UDS-02 Depth :4-4.45 meters
Description :Brownish grey silty clay, with traces of calcareous nodules.
Water content:Initial=22.5% Final =20.7% Initial Void Ratio =0.579

P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	5	0.578	0.0050				
0.10 - 0.25	16	0.575	0.0107	31.25	0.0073	92.3	9.141
0.25 - 0.50	34	0.570	0.0136	35.29	0.0088	98.0	8.519
0.50 - 1.00	87	0.556	0.0175	37.93	0.0109	101.1	8.058
1.00 - 2.00	124	0.537	0.0126	29.03	0.0089	165.3	4.717
2.00 - 4.00	220	0.502	0.0113	26.36	0.0083	138.6	5.230
4.00 - 8.00	411	0.437	0.0108	19.95	0.0086	173.8	3.622
8.00 - 0.25	250	0.476	0.0035				

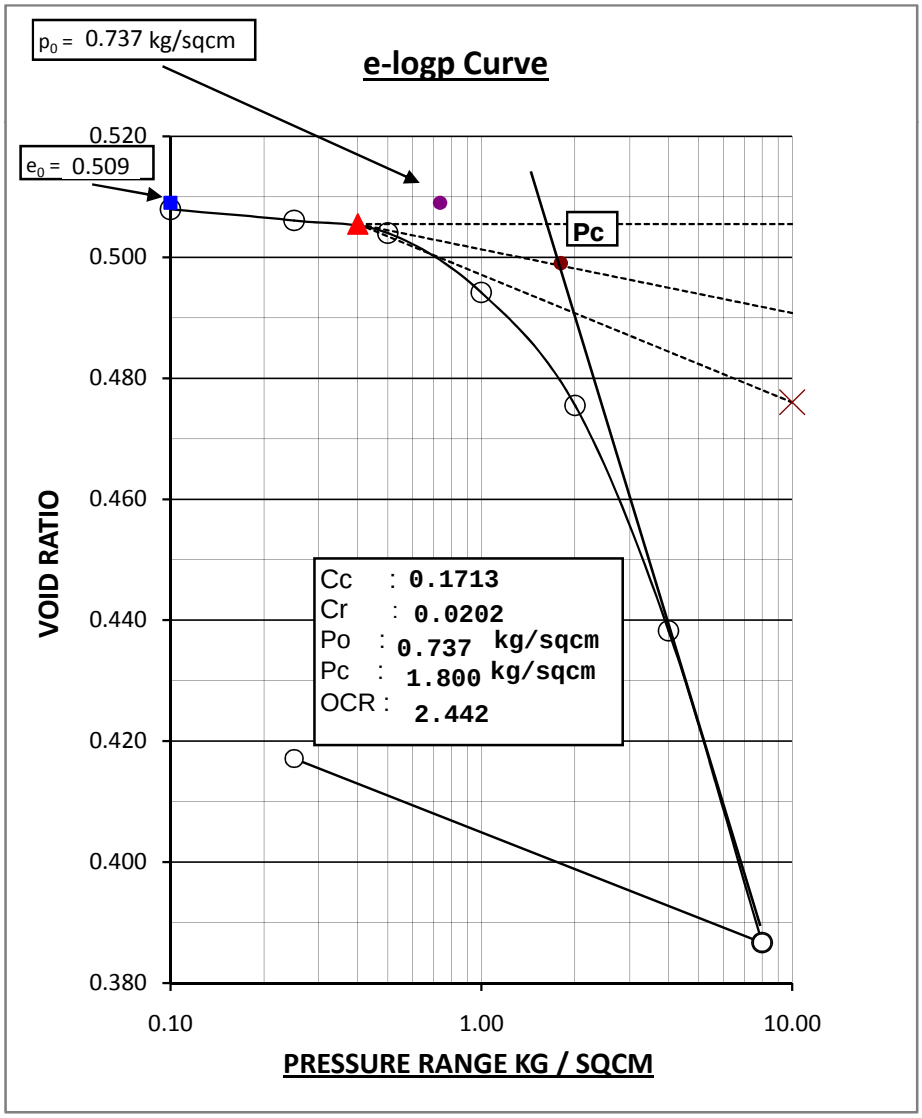


Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai	CETEST
Job No. 4376	Sheet No.

CONSOLIDATION TEST RESULTS

Sample Number:IBH-08/UDS-02 Depth :4-4.45 meters
Description :Brownish grey silty clay with rock pieces and calcareous nodules.
Water content:Initial=16.4% Final =18.4% Initial Void Ratio =0.509

P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	5	0.508	0.0050				
0.10 - 0.25	12	0.506	0.0080	25.00	0.0060	72.6	11.641
0.25 - 0.50	14	0.504	0.0056	21.43	0.0044	158.2	5.314
0.50 - 1.00	65	0.494	0.0130	18.46	0.0106	221.2	3.741
1.00 - 2.00	124	0.475	0.0125	33.06	0.0084	115.9	6.867
2.00 - 4.00	247	0.438	0.0126	33.60	0.0084	272.2	2.705
4.00 - 8.00	342	0.387	0.0090	24.85	0.0067	304.6	2.121
8.00 - 0.25	202	0.417	0.0028				

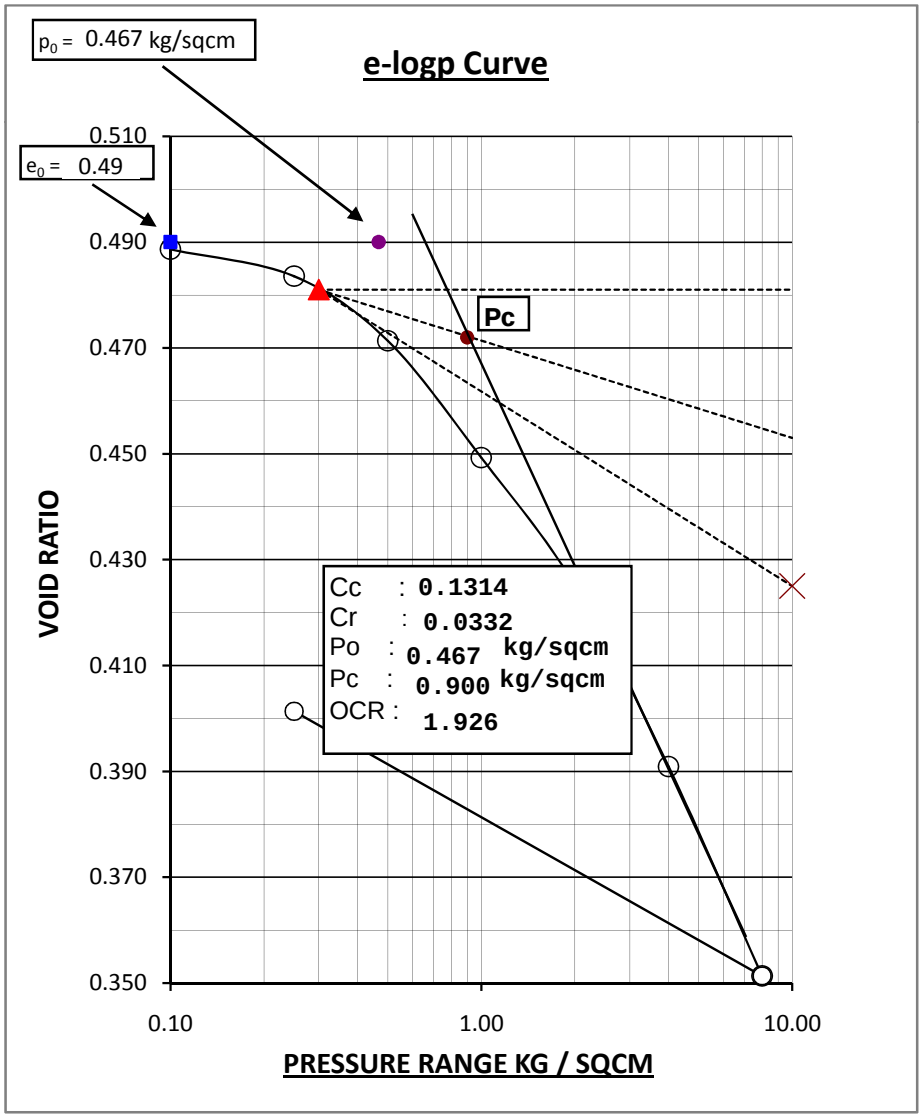


Project : G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai	CETEST
Job No. 4376	Sheet No.

CONSOLIDATION TEST RESULTS

Sample Number:IBH-09/UDS-01 Depth :2-2.45 meters
Description :Reddish brown silty clay with moorum & kankar.
Water content:Initial=17.3% Final =18.7% Initial Void Ratio =0.49

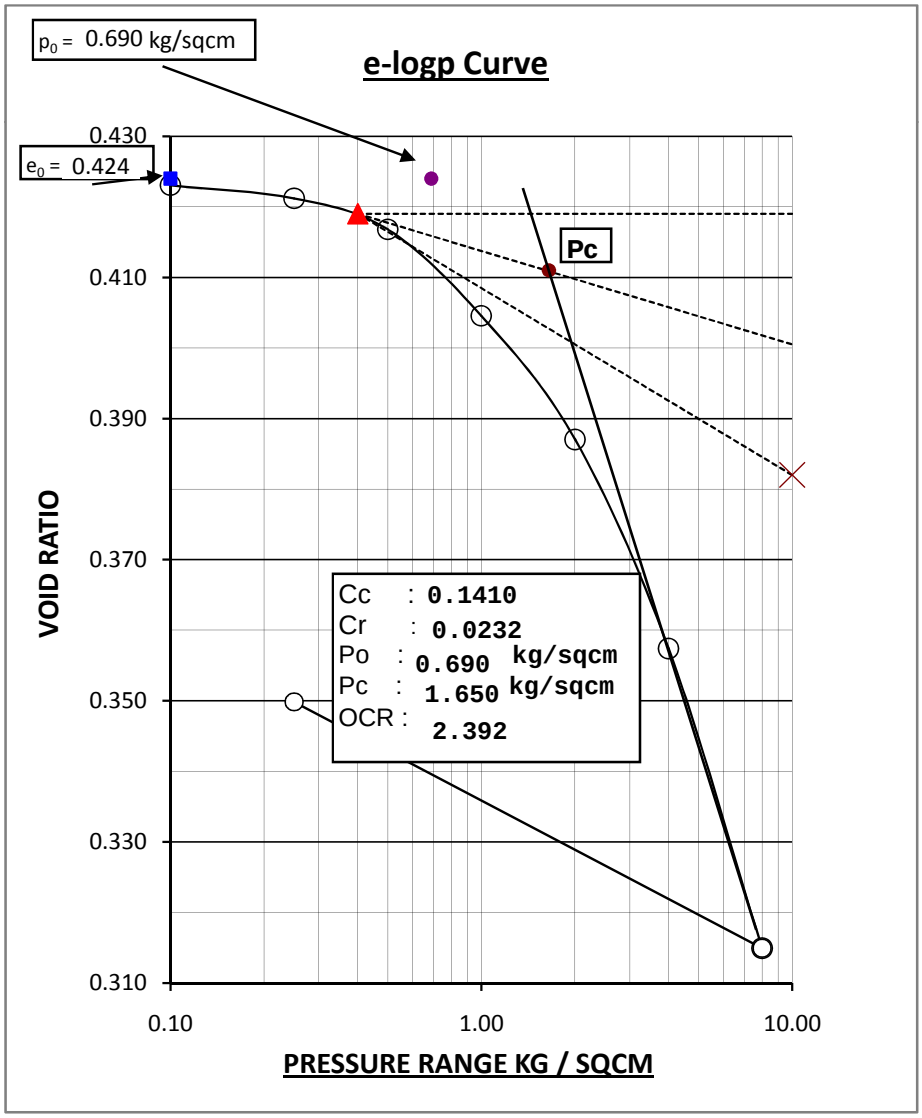
P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	10	0.489	0.0100				
0.10 - 0.25	34	0.484	0.0227	47.06	0.0120	119.3	7.009
0.25 - 0.50	82	0.471	0.0330	35.37	0.0213	191.6	4.262
0.50 - 1.00	148	0.449	0.0300	33.78	0.0199	298.4	2.610
1.00 - 2.00	162	0.425	0.0167	34.57	0.0109	411.9	1.771
2.00 - 4.00	229	0.391	0.0120	41.05	0.0071	508.1	1.317
4.00 - 8.00	265	0.351	0.0071	41.89	0.0041	340.6	1.752
8.00 - 0.25	335	0.401	0.0048				



CONSOLIDATION TEST RESULTS

Sample Number:IBH-11/UDS-02 Depth :4-4.45 meters
Description :Reddish brown silty clay with calcareous nodules.
Water content:Initial=14.6% Final =15.9% Initial Void Ratio =0.424

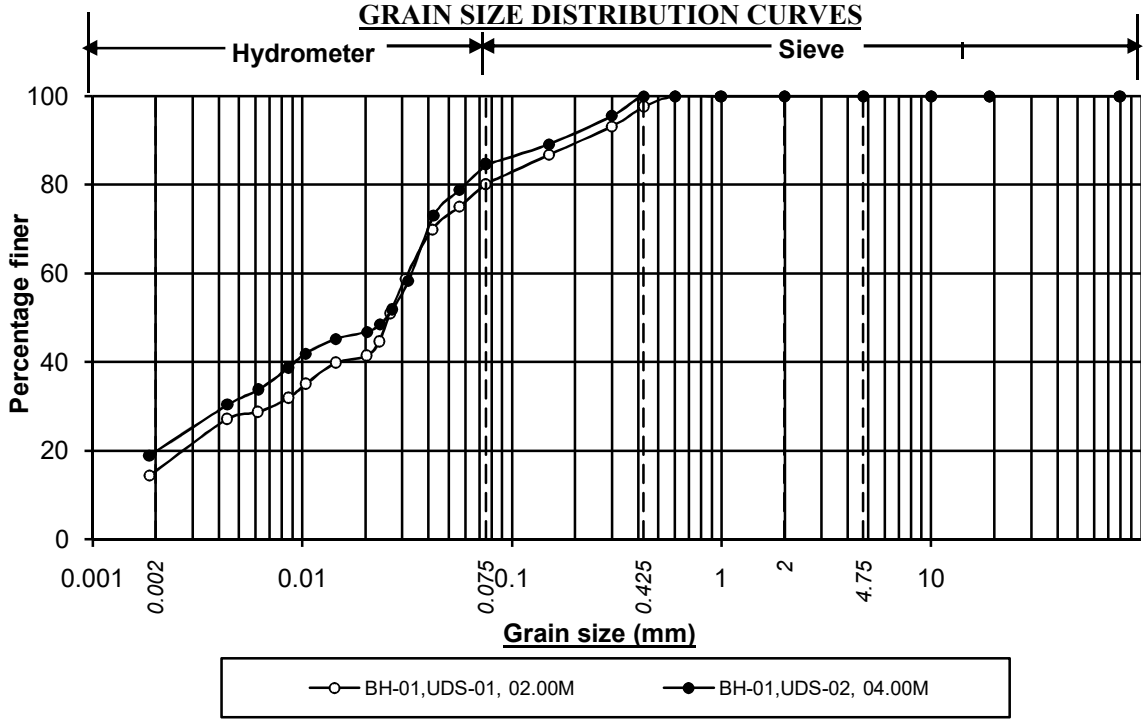
P1-P2 Kg/Sqcm	Dial Change	Void Ratio	Mv Sqcm/kg	Comprn %	Mvc sqcm/kg	T90 Sec	1000.Cv sqcm/sec
0.00 - 0.10	5	0.423	0.0050				
0.10 - 0.25	13	0.421	0.0087	23.08	0.0067	72.6	11.612
0.25 - 0.50	31	0.417	0.0124	29.03	0.0088	184.7	4.524
0.50 - 1.00	86	0.405	0.0173	27.91	0.0125	205.6	3.969
1.00 - 2.00	123	0.387	0.0125	38.21	0.0077	261.3	2.991
2.00 - 4.00	208	0.357	0.0107	44.71	0.0059	242.4	3.006
4.00 - 8.00	298	0.315	0.0078	46.98	0.0041	272.2	2.392
8.00 - 0.25	245	0.350	0.0034				



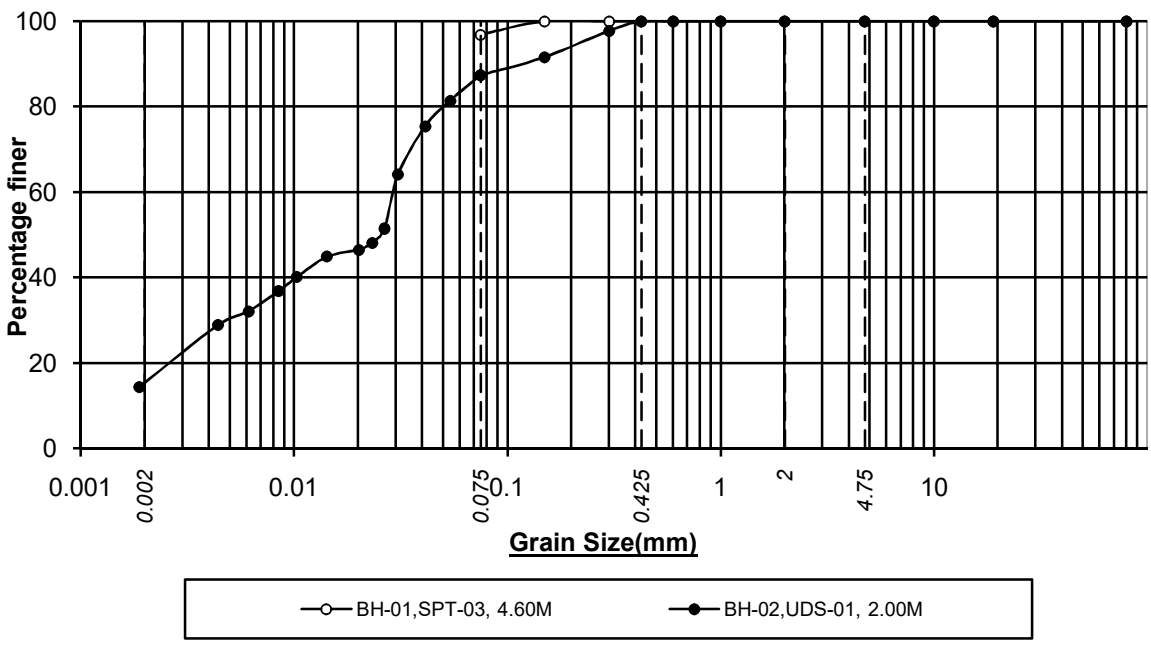
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-01,UDS-01, 02.00M	15.4	64.8	17.4	2.4	0.0	19.8		0.0
BH-01,UDS-02, 04.00M	19.8	64.8	15.4	0.0	0.0	15.4		0.0



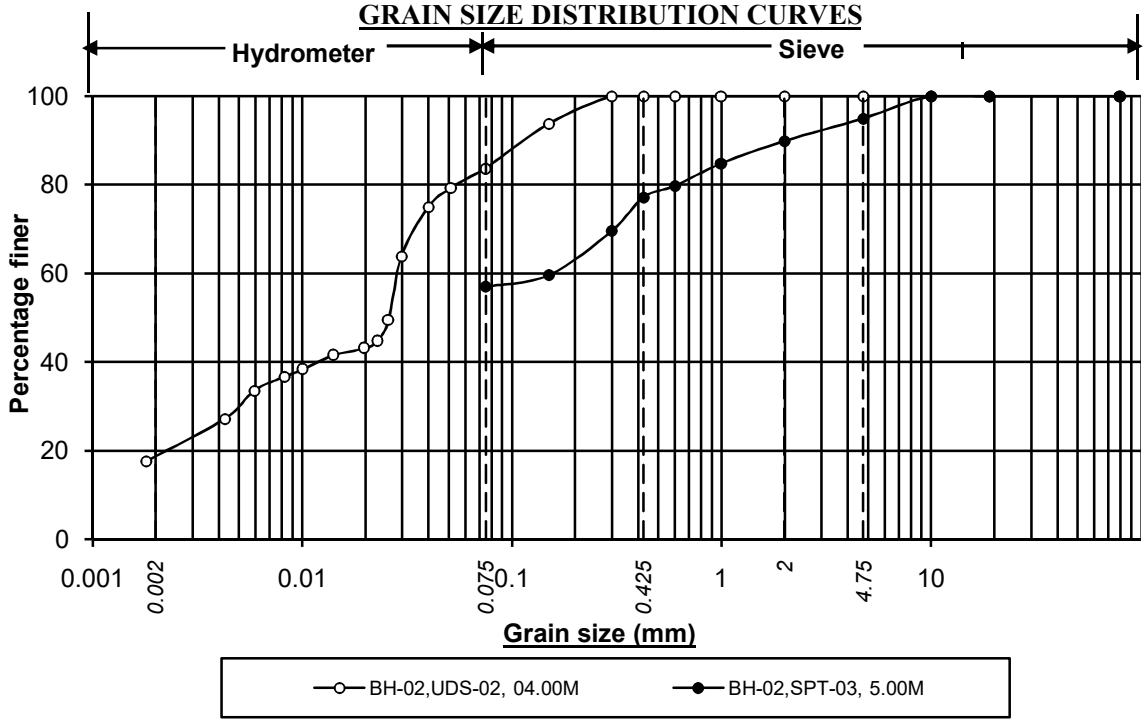
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-01,SPT-03, 4.60M		96.9	3.1	0.0	0.0	3.1		0.0
BH-02,UDS-01, 2.00M	15.4	72.0	12.6	0.0	0.0	12.6		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

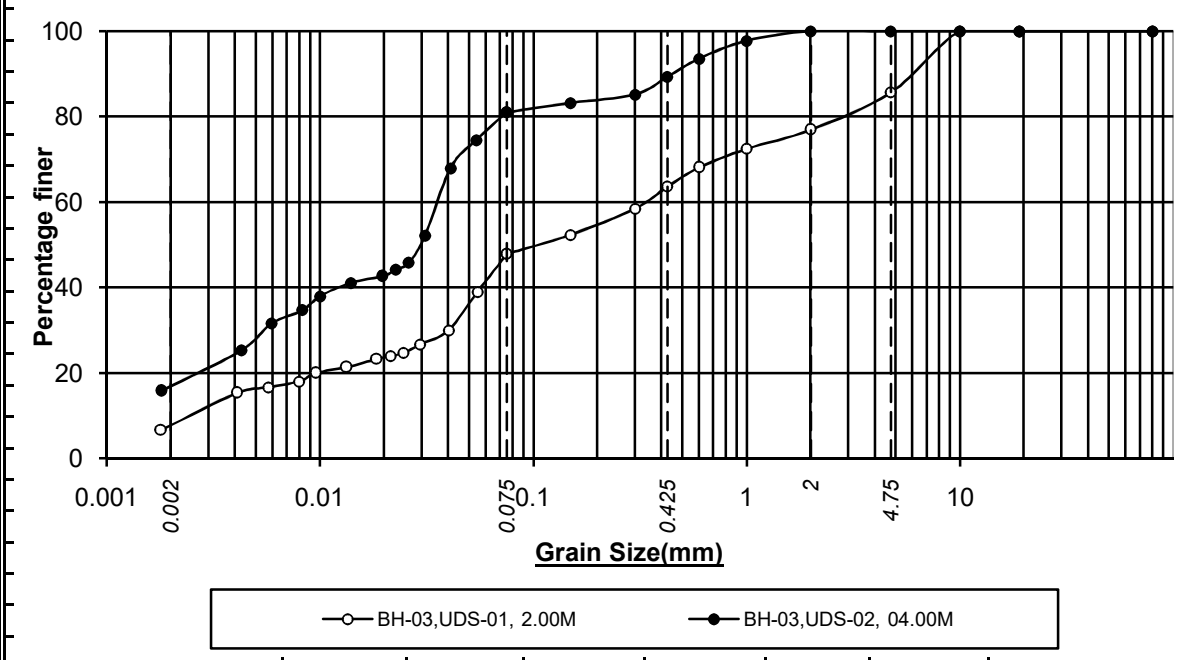
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-02,UDS-02, 04.00M	18.7	65.0	16.3	0.0	0.0	16.3		0.0
BH-02,SPT-03, 5.00M		57.1	20.1	12.7	5.0	37.8		5.1



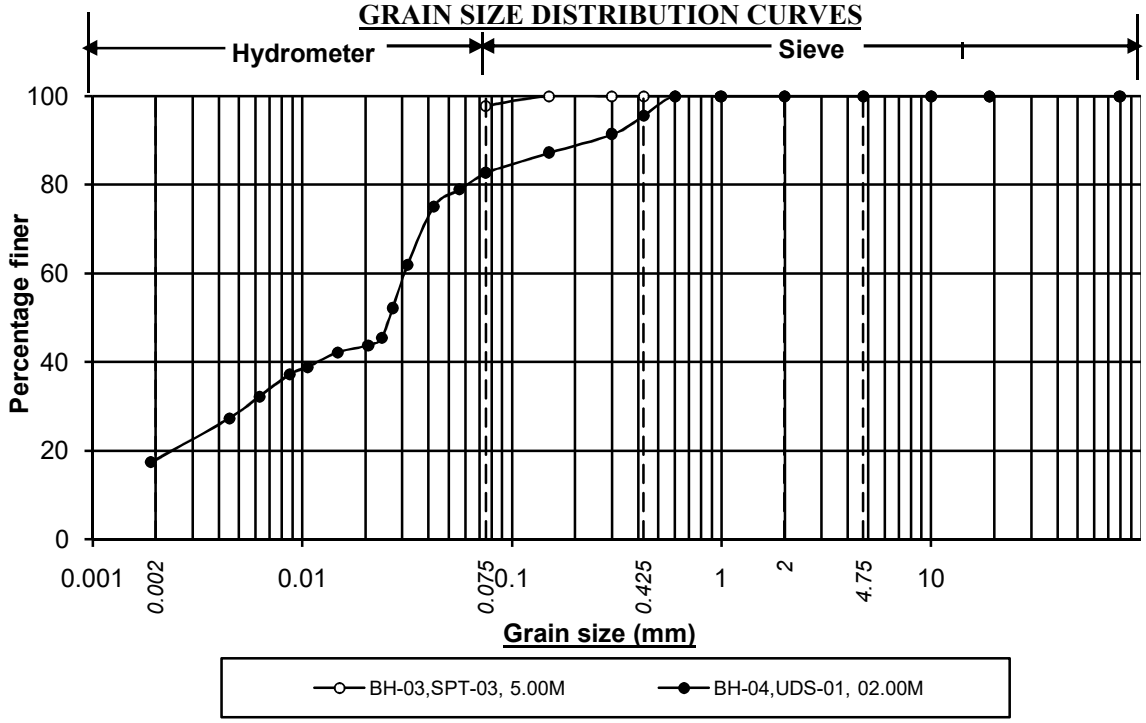
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-03,UDS-01, 2.00M	7.8	40.1	15.8	13.3	8.7	37.8		14.3
BH-03,UDS-02, 04.00M	16.9	64.2	8.3	10.6	0.0	18.9		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

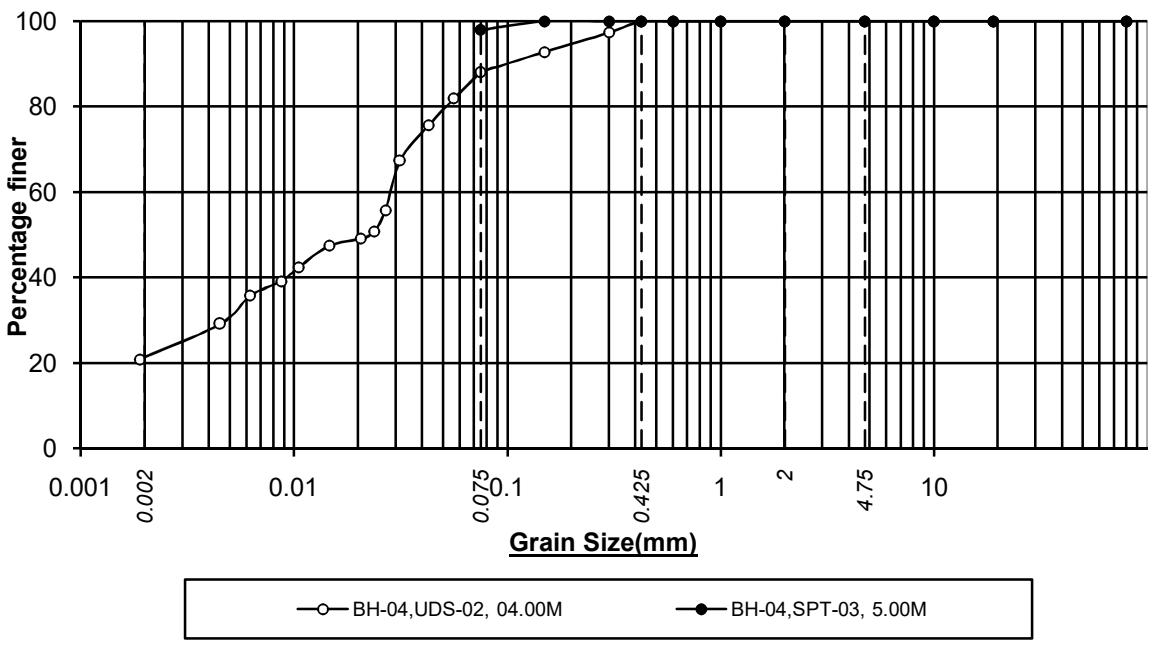
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-03,SPT-03, 5.00M		97.9	2.1	0.0	0.0	2.1		0.0
BH-04,UDS-01, 02.00M	17.9	64.9	12.8	4.4	0.0	17.2		0.0



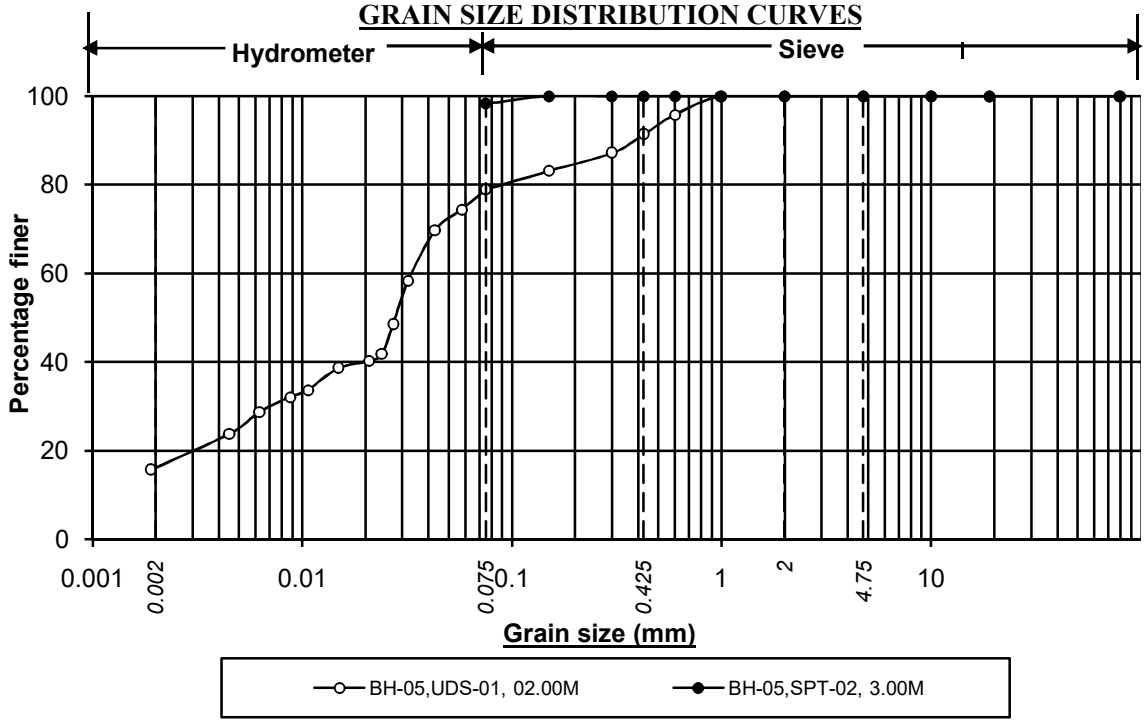
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-04,UDS-02, 04.00M	21.3	66.9	11.8	0.0	0.0	11.8		0.0
BH-04,SPT-03, 5.00M		98.0	2.0	0.0	0.0	2.0		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

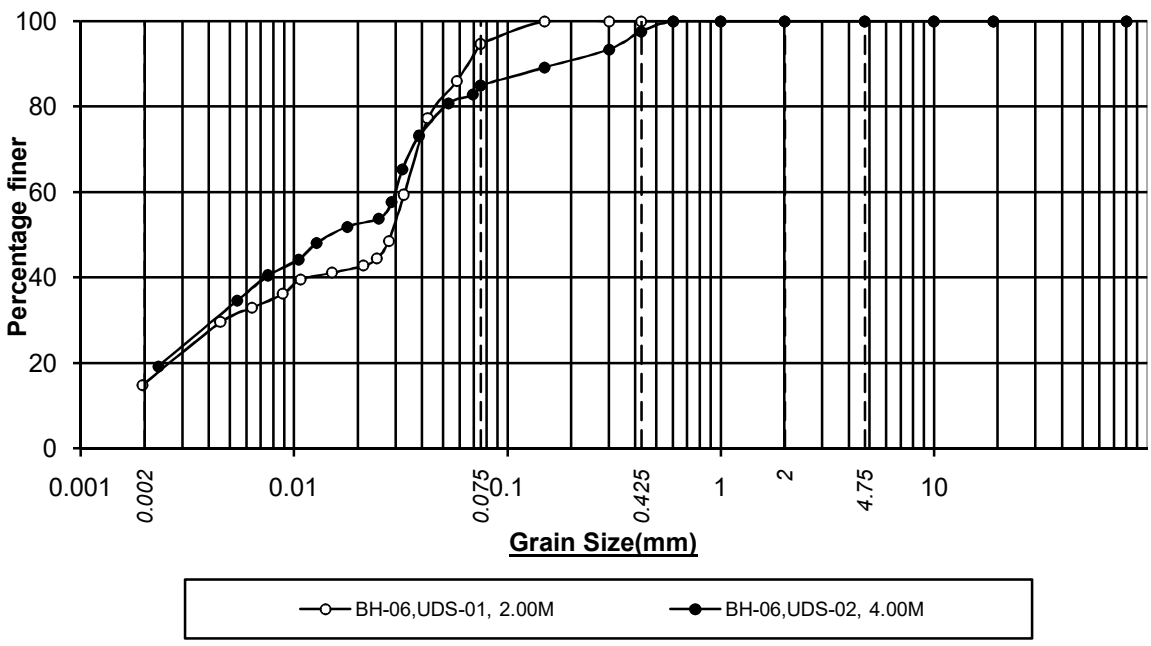
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	**Total sand**	**Weighted mean dia (mm)**	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-05,UDS-01, 02.00M	16.1	62.9	12.4	8.6	0.0	21.0		0.0
BH-05,SPT-02, 3.00M		98.4	1.6	0.0	0.0	1.6		0.0



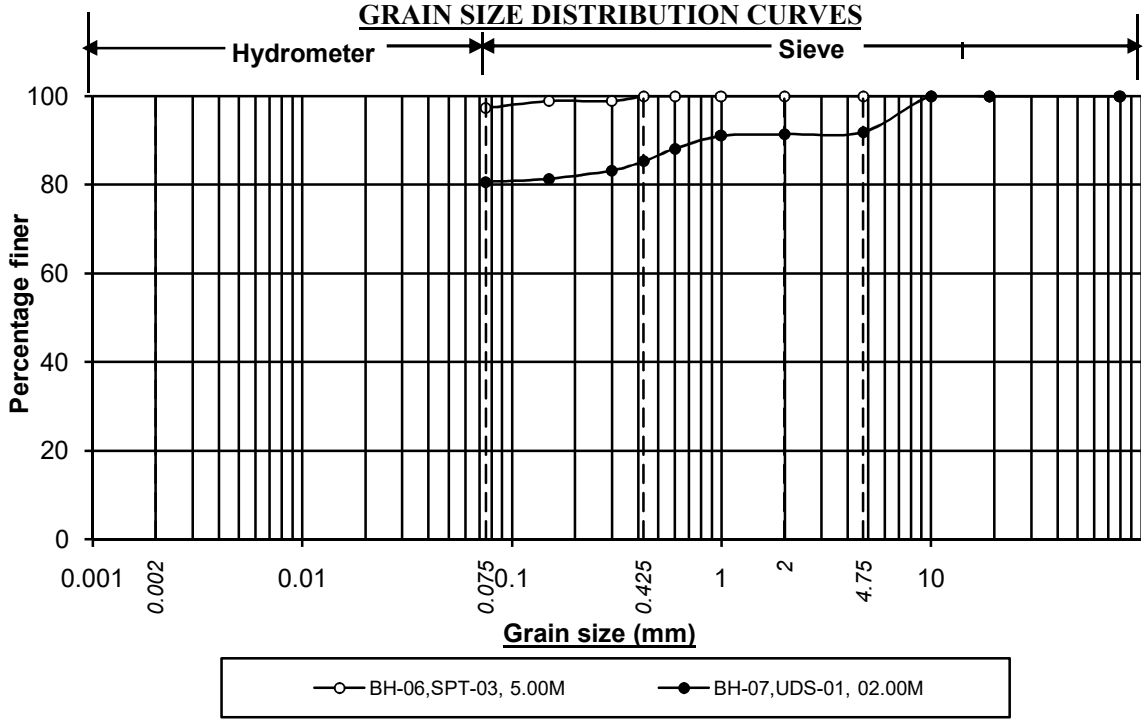
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	**Total sand**	**Weighted mean dia (mm)**	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-06,UDS-01, 2.00M	15.2	79.6	5.2	0.0	0.0	5.2		0.0
BH-06,UDS-02, 4.00M	16.6	68.4	12.6	2.4	0.0	15.0		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

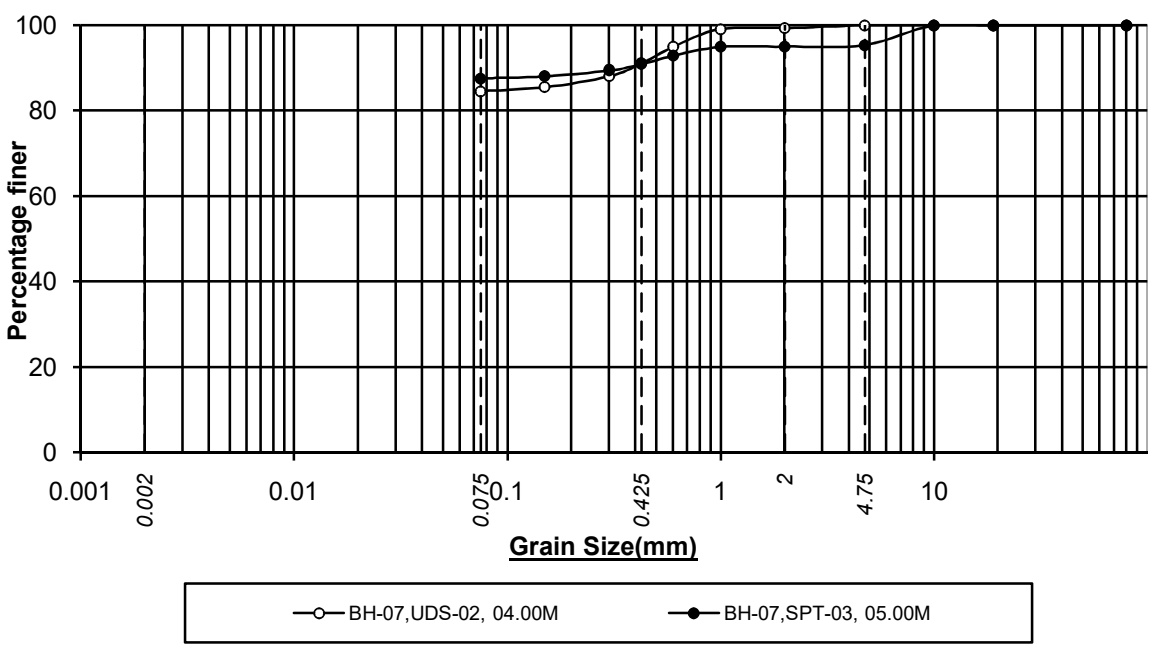
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-0.425	0.425-2.00	2.0-4.75	Total sand	Weighted mean dia (mm)	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-06,SPT-03, 5.00M		97.4	2.6	0.0	0.0	2.6		0.0
BH-07,UDS-01, 02.00M		80.7	4.6	6.1	0.5	11.2		8.1



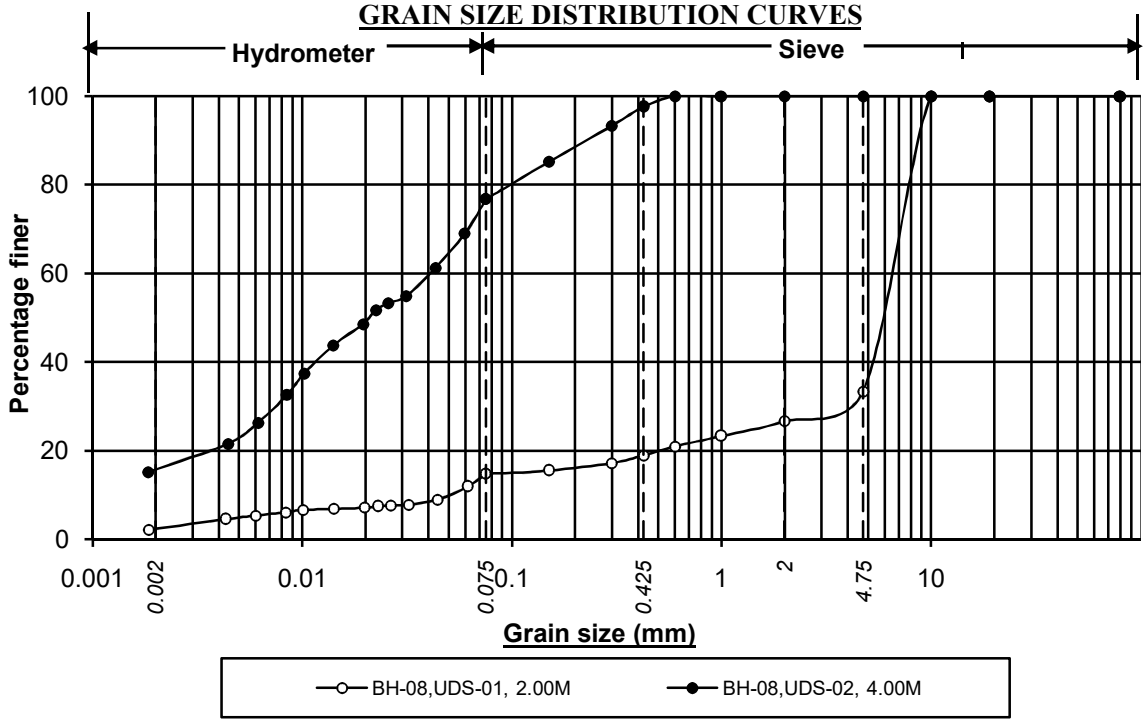
Grain size (mm)	<0.002	0.002-0.075	0.075-0.425	0.425-2.00	2.0-4.75	Total sand	Weighted mean dia (mm)	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-07,UDS-02, 04.00M		84.6	6.6	8.2	0.6	15.4		0.0
BH-07,SPT-03, 05.00M		87.6	3.4	4.1	0.3	7.8		4.6

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

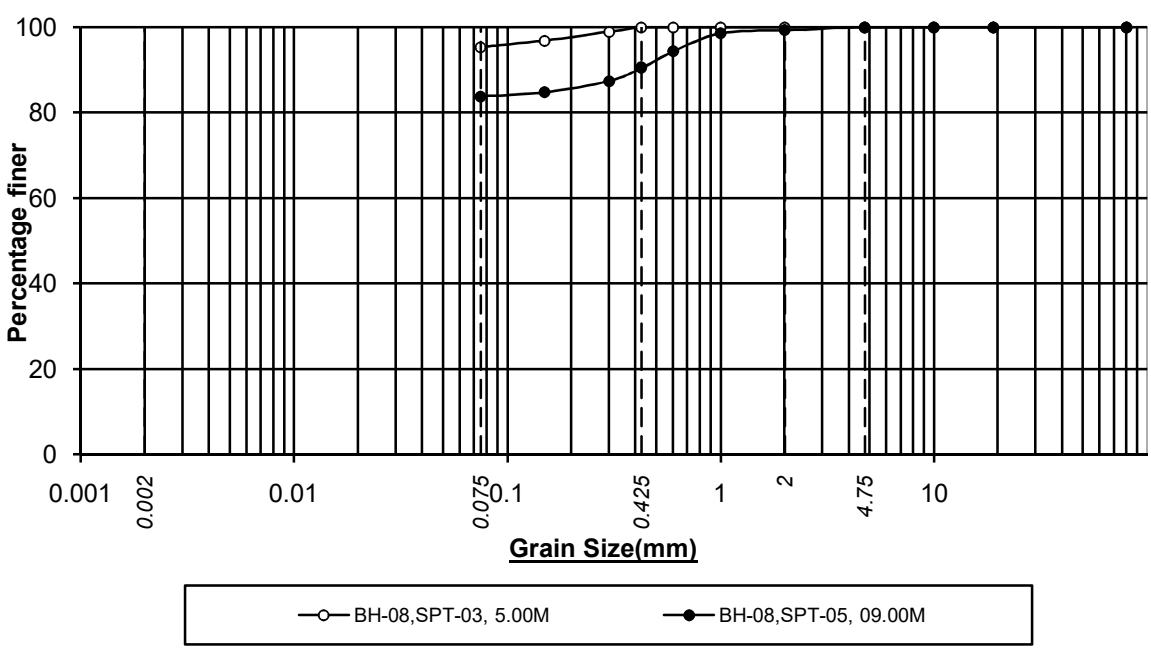
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	**Total sand**	**Weighted mean dia (mm)**	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-08,UDS-01, 2.00M	2.3	12.5	4.0	7.8	6.7	18.5		66.7
BH-08,UDS-02, 4.00M	15.7	61.1	20.8	2.4	0.0	23.2		0.0



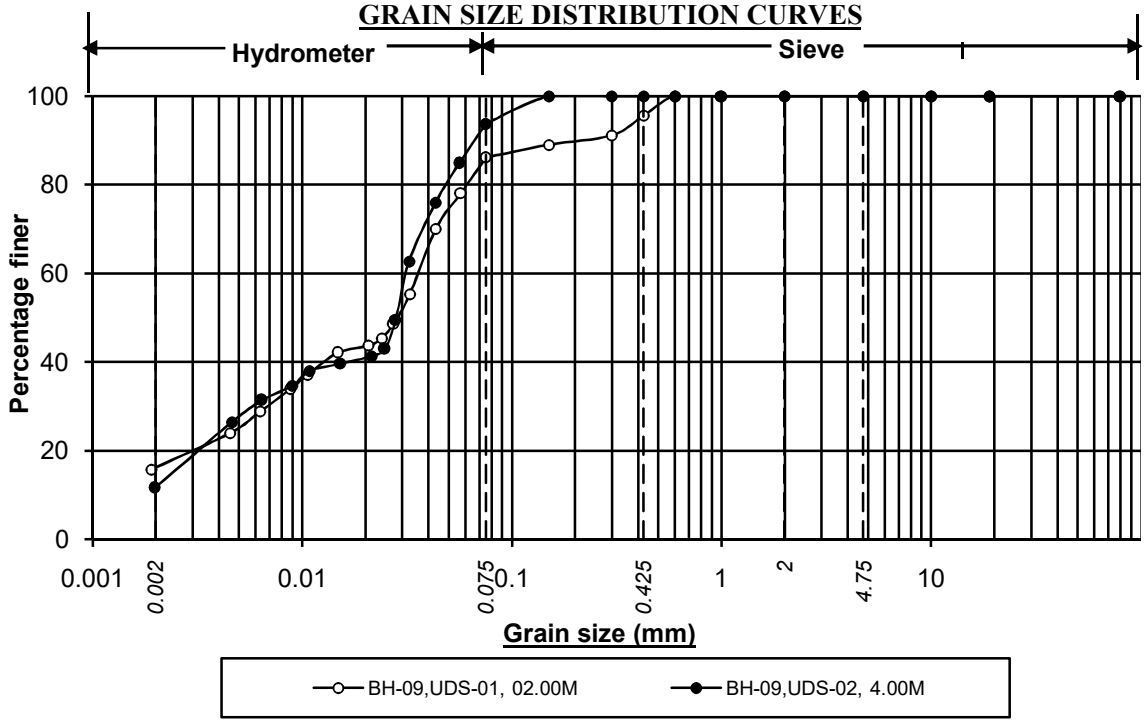
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	**Total sand**	**Weighted mean dia (mm)**	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-08,SPT-03, 5.00M		95.4	4.6	0.0	0.0	4.6		0.0
BH-08,SPT-05, 09.00M		83.8	6.6	8.9	0.7	16.2		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

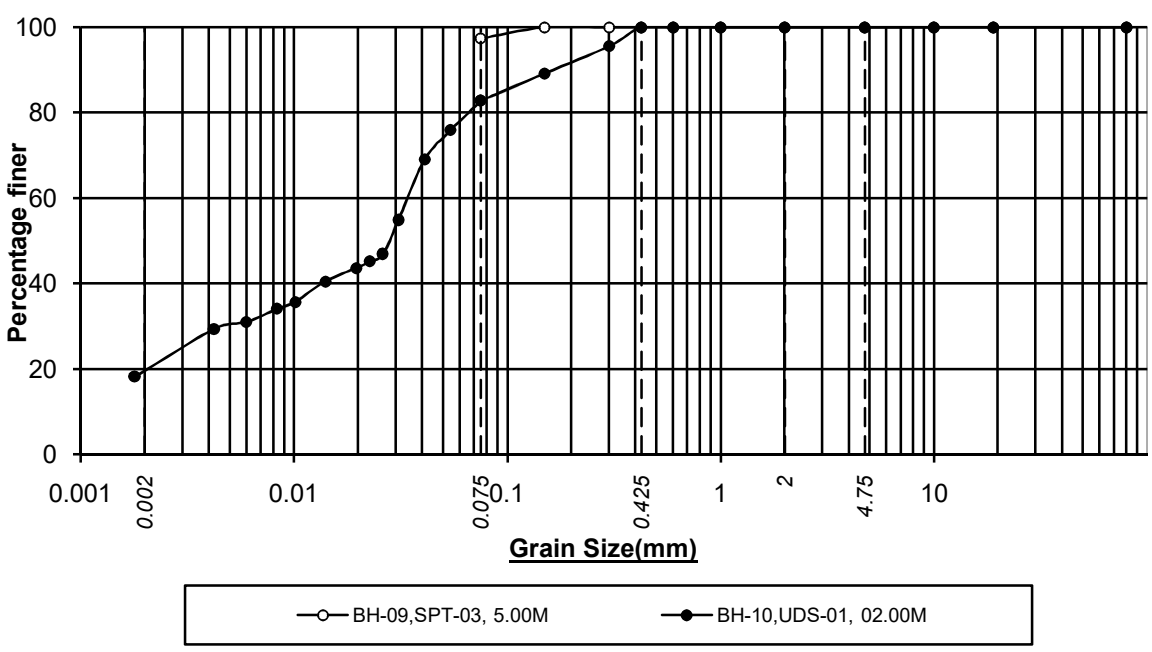
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-09,UDS-01, 02.00M	16.1	70.1	9.4	4.4	0.0	13.8		0.0
BH-09,UDS-02, 4.00M	11.7	82.1	6.2	0.0	0.0	6.2		0.0



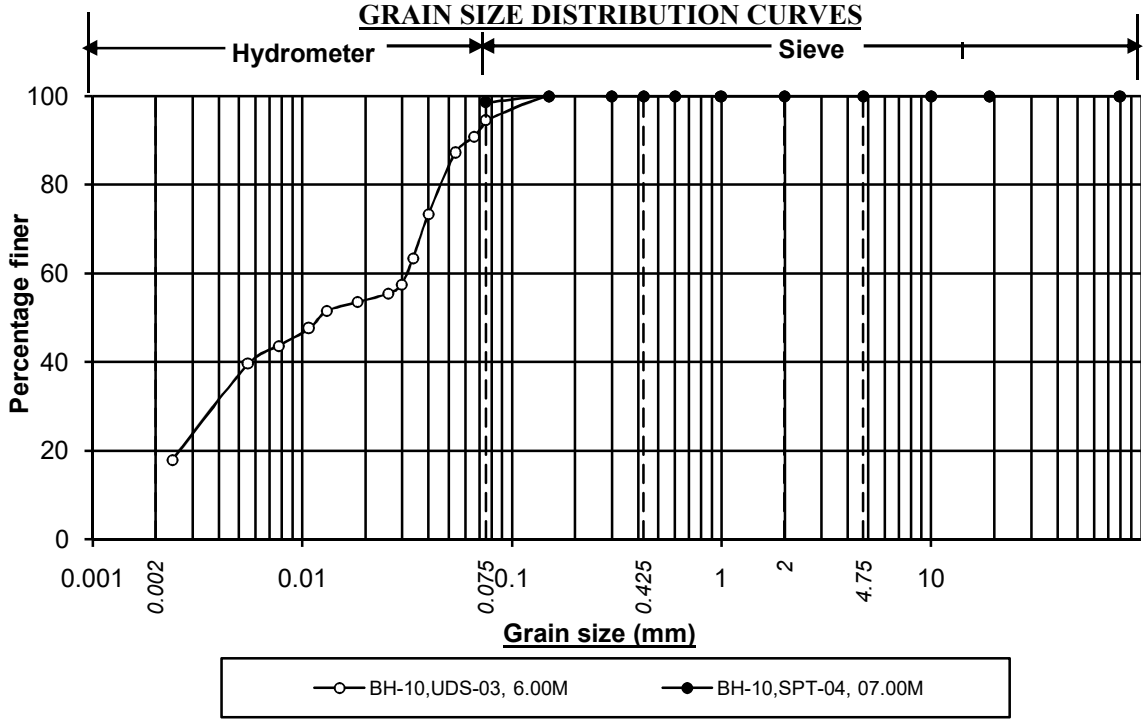
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-09,SPT-03, 5.00M		97.4	2.6	0.0	0.0	2.6		0.0
BH-10,UDS-01, 02.00M	19.6	63.3	17.1	0.0	0.0	17.1		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

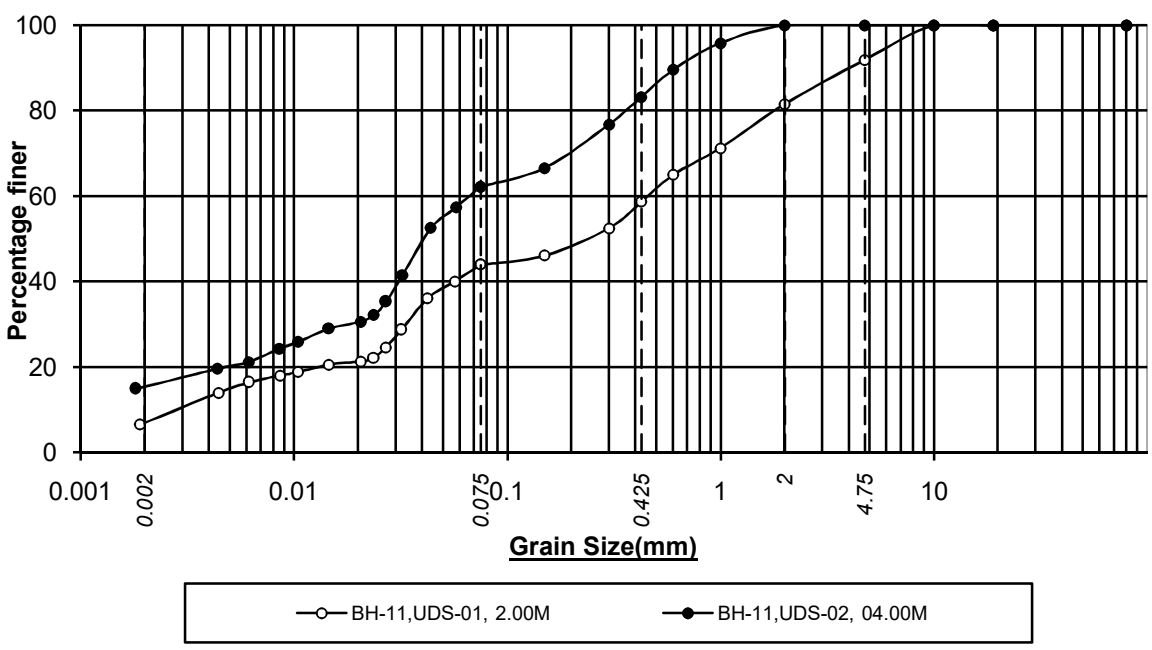
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-10,UDS-03, 6.00M	13.0	81.6	5.4	0.0	0.0	5.4		0.0
BH-10,SPT-04, 07.00M		98.6	1.4	0.0	0.0	1.4		0.0



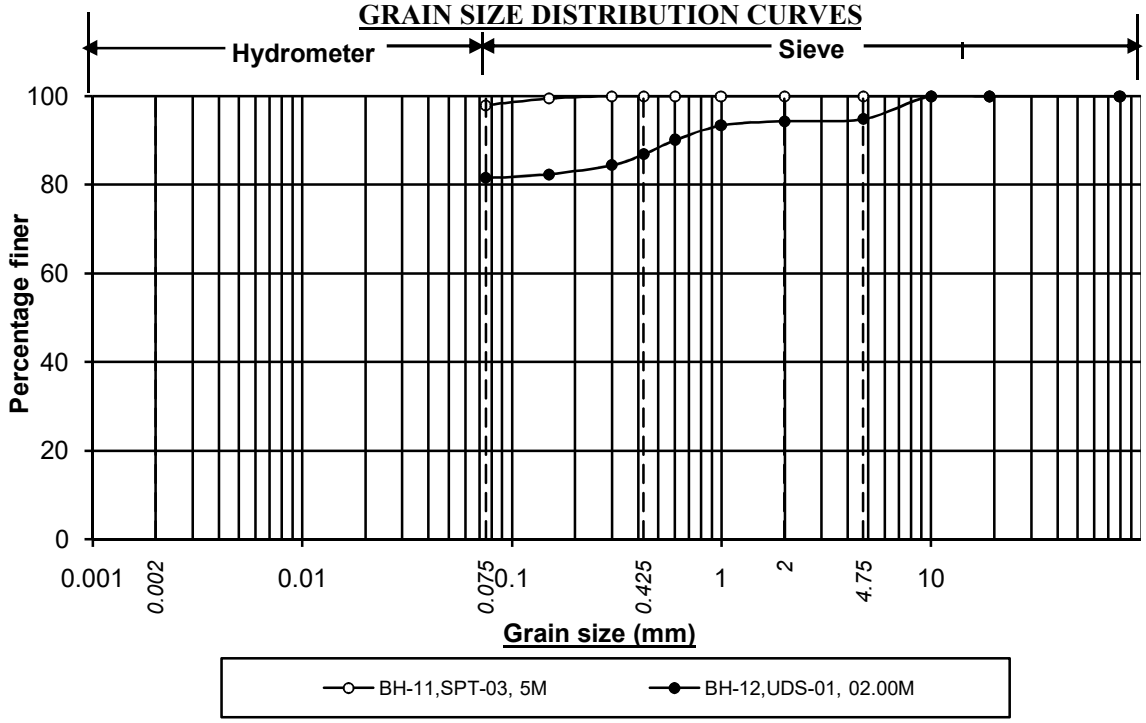
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-11,UDS-01, 2.00M	7.0	37.0	14.7	22.9	10.3	47.9		8.1
BH-11,UDS-02, 04.00M	15.4	46.8	21.0	16.8	0.0	37.8		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

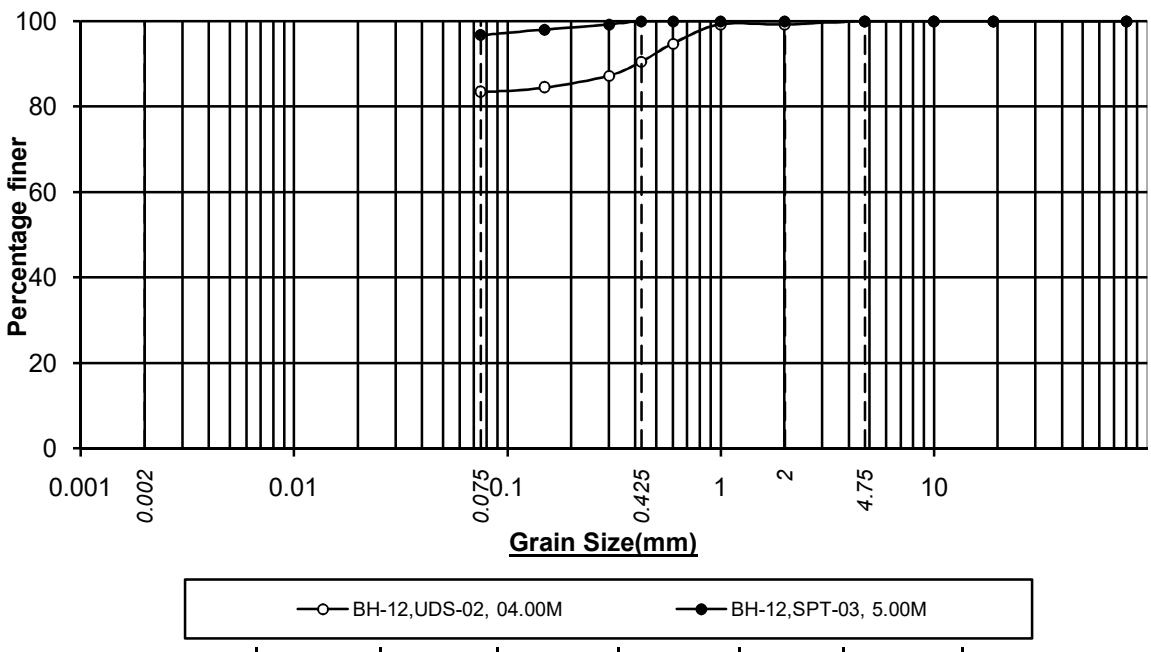
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-0.425	0.425-2.00	2.0-4.75	Total sand	Weighted mean dia (mm)	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-11,SPT-03, 5M		98.0	2.0	0.0	0.0	2.0		0.0
BH-12,UDS-01, 02.00M		81.6	5.3	7.5	0.5	13.3		5.1



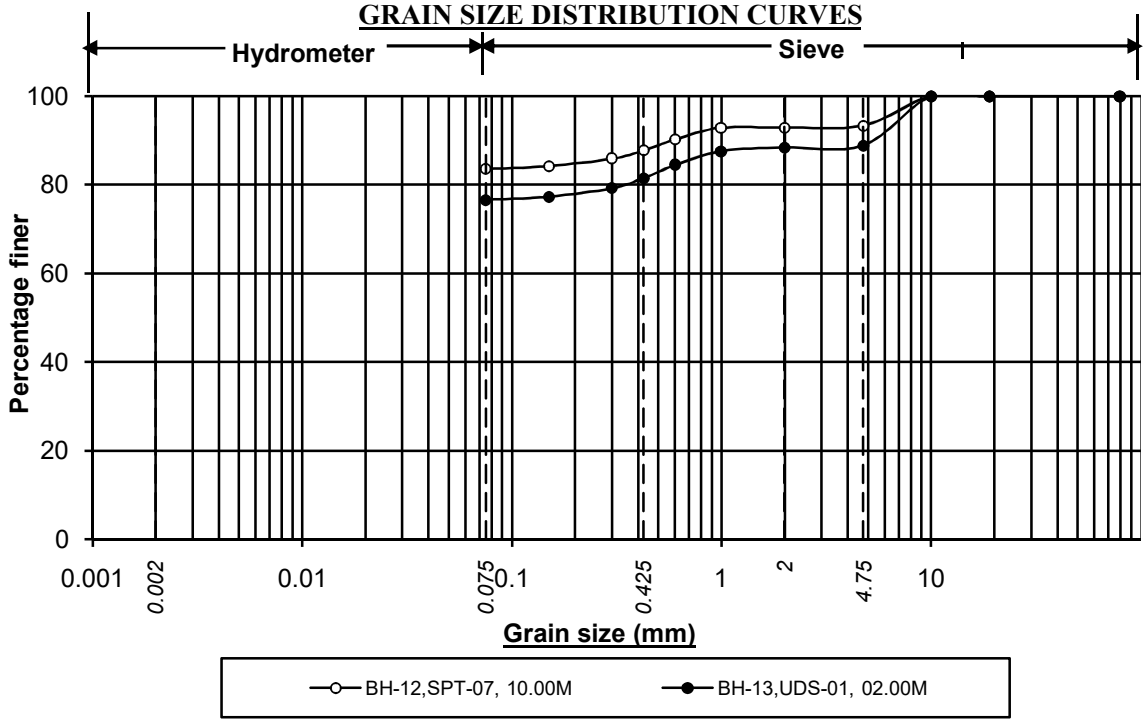
Grain size (mm)	<0.002	0.002-0.075	0.075-0.425	0.425-2.00	2.0-4.75	Total sand	Weighted mean dia (mm)	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-12,UDS-02, 04.00M		83.4	7.2	8.7	0.7	16.6		0.0
BH-12,SPT-03, 5.00M		96.8	3.2	0.0	0.0	3.2		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

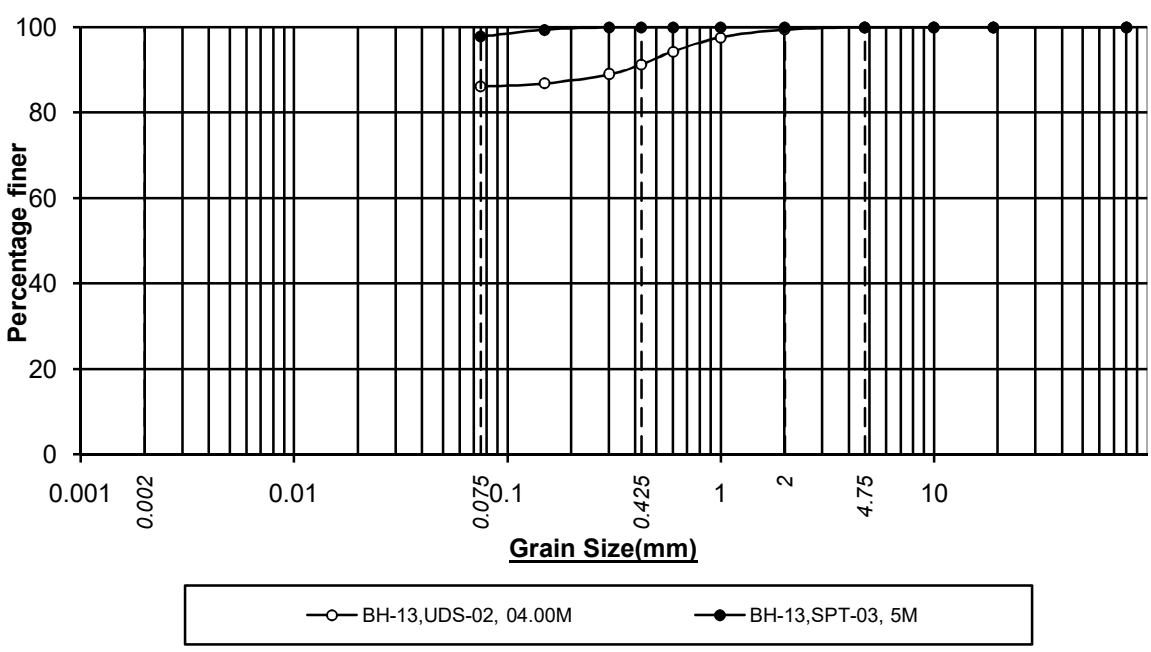
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-0.425	0.425-2.00	2.0-4.75	Total sand	Weighted mean dia (mm)	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-12,SPT-07, 10.00M		83.6	4.2	5.2	0.4	9.8		6.6
BH-13,UDS-01, 02.00M		76.6	4.9	6.9	0.5	12.3		11.1



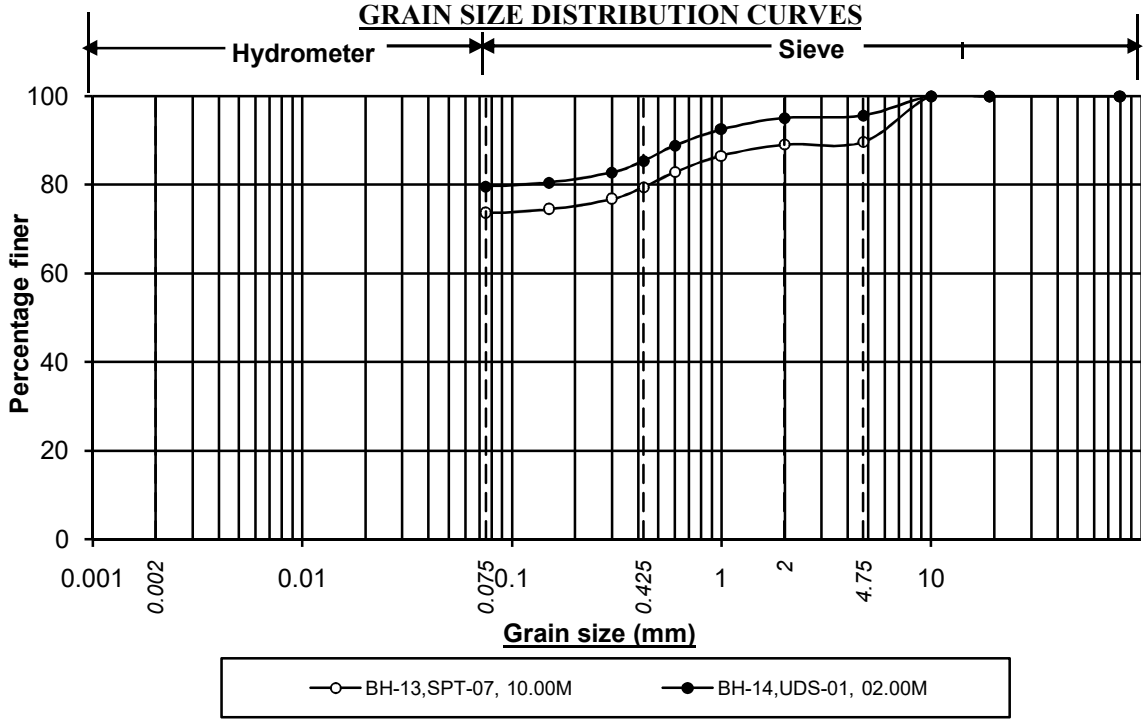
Grain size (mm)	<0.002	0.002-0.075	0.075-0.425	0.425-2.00	2.0-4.75	Total sand	Weighted mean dia (mm)	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-13,UDS-02, 04.00M		86.2	5.1	8.2	0.5	13.8		0.0
BH-13,SPT-03, 5M		97.9	2.1	0.0	0.0	2.1		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

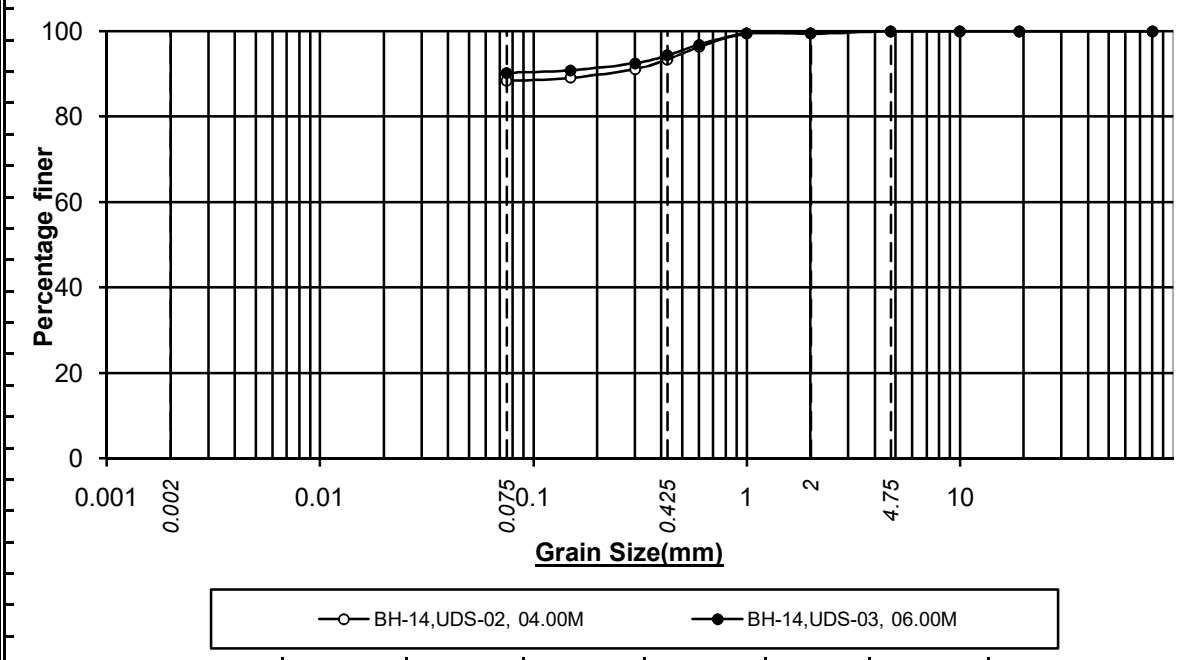
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-0.425	0.425-2.00	2.0-4.75	Total sand	Weighted mean dia (mm)	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-13,SPT-07, 10.00M		73.6	5.8	9.7	0.6	16.1		10.3
BH-14,UDS-01, 02.00M		79.6	5.8	9.7	0.6	16.1		4.3



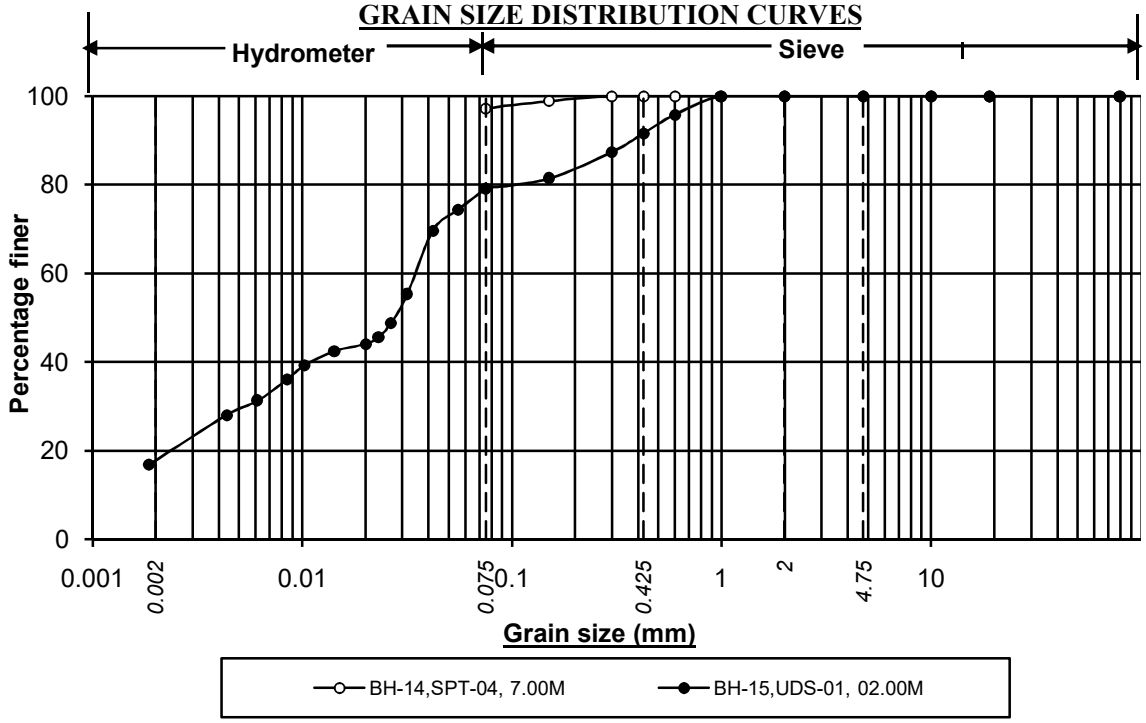
Grain size (mm)	<0.002	0.002-0.075	0.075-0.425	0.425-2.00	2.0-4.75	Total sand	Weighted mean dia (mm)	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-14,UDS-02, 04.00M		88.4	5.0	6.1	0.5	11.6		0.0
BH-14,UDS-03, 06.00M		90.2	4.2	5.2	0.4	9.8		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

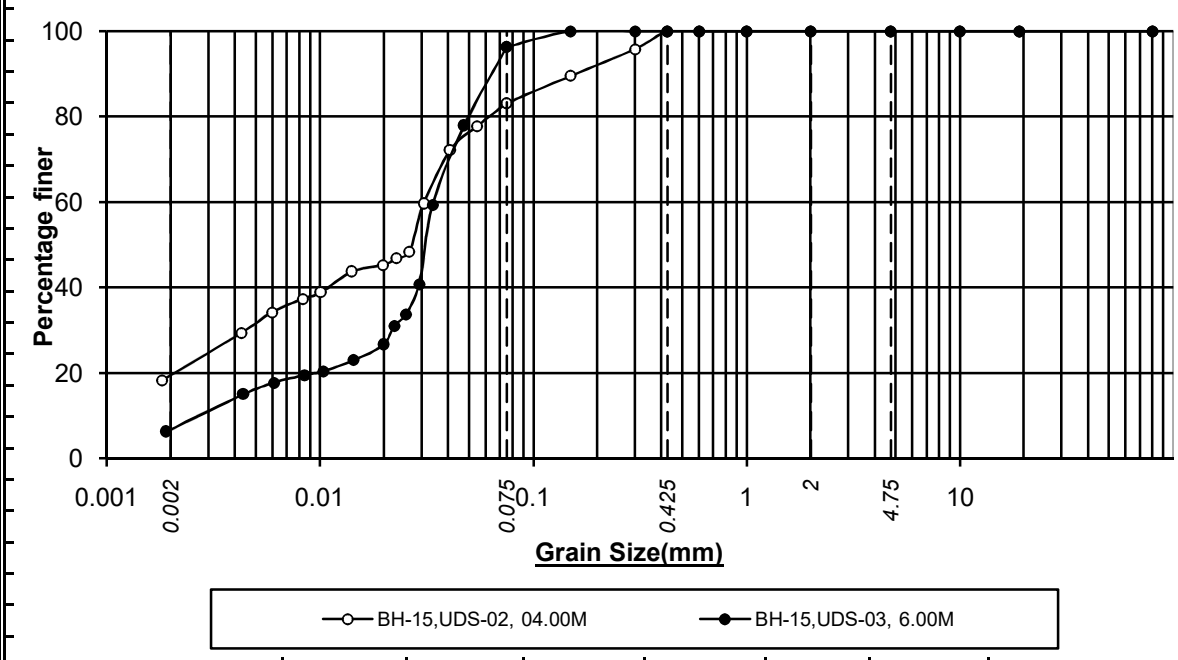
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	**Total sand**	**Weighted mean dia (mm)**	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-14,SPT-04, 7.00M		97.3	2.7	0.0	0.0	2.7		0.0
BH-15,UDS-01, 02.00M	17.8	61.4	12.4	8.4	0.0	20.8		0.0



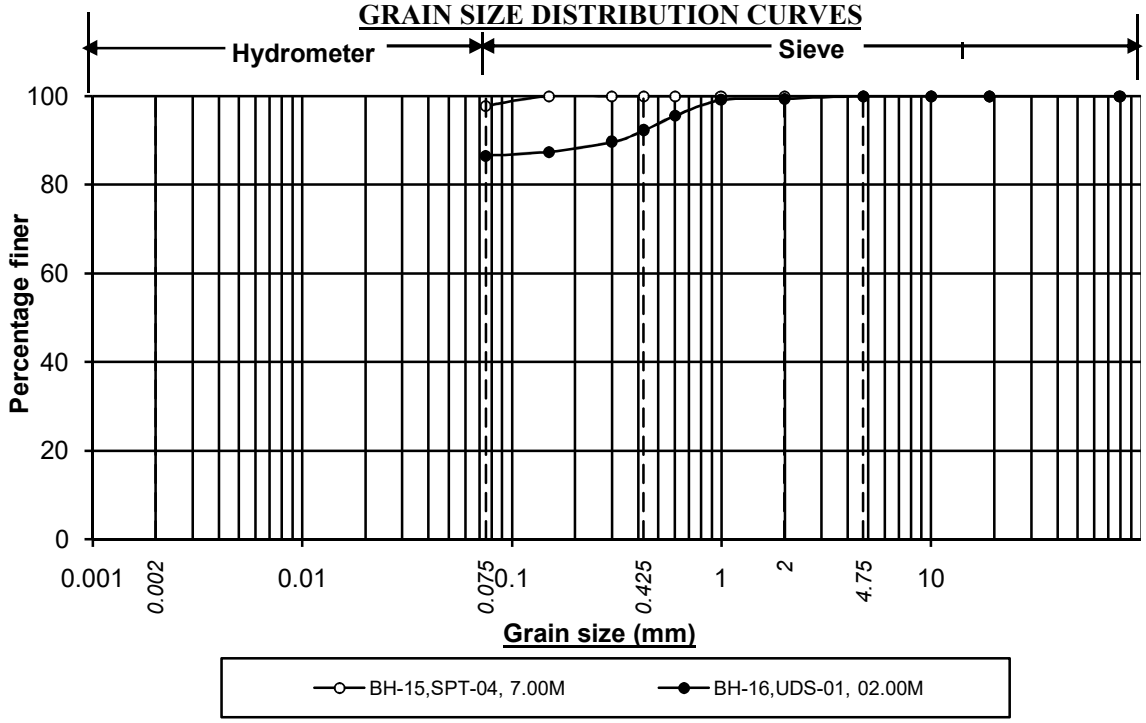
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	**Total sand**	**Weighted mean dia (mm)**	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-15,UDS-02, 04.00M	19.5	63.7	16.8	0.0	0.0	16.8		0.0
BH-15,UDS-03, 6.00M	6.8	89.6	3.6	0.0	0.0	3.6		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

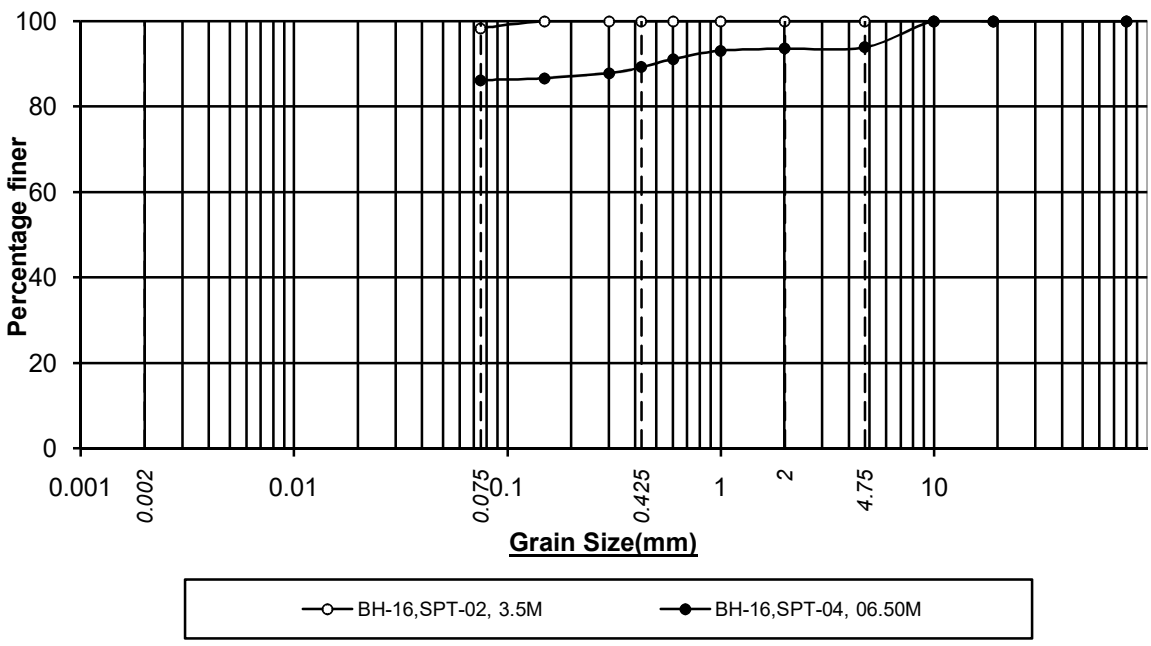
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-0.425	0.425-2.00	2.0-4.75	Total sand	Weighted mean dia (mm)	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-15,SPT-04, 7.00M		97.9	2.1	0.0	0.0	2.1		0.0
BH-16,UDS-01, 02.00M		86.6	5.6	7.2	0.6	13.4		0.0



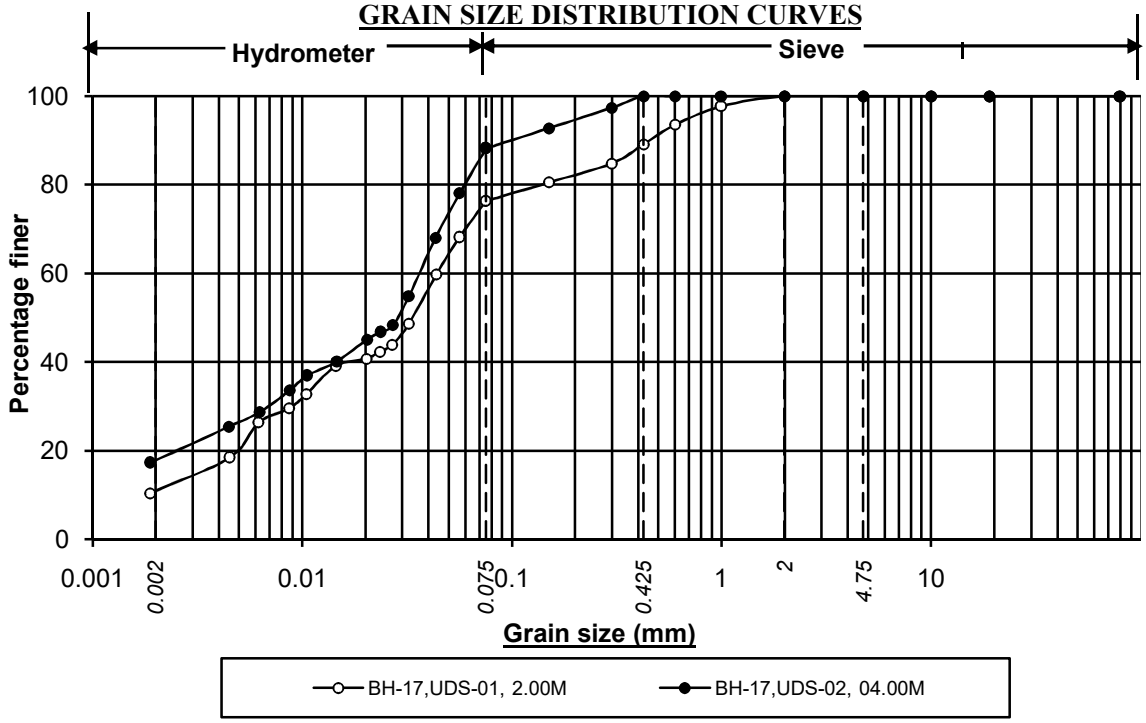
Grain size (mm)	<0.002	0.002-0.075	0.075-0.425	0.425-2.00	2.0-4.75	Total sand	Weighted mean dia (mm)	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-16,SPT-02, 3.5M		98.4	1.6	0.0	0.0	1.6		0.0
BH-16,SPT-04, 06.50M		86.2	3.2	4.3	0.3	7.8		6.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

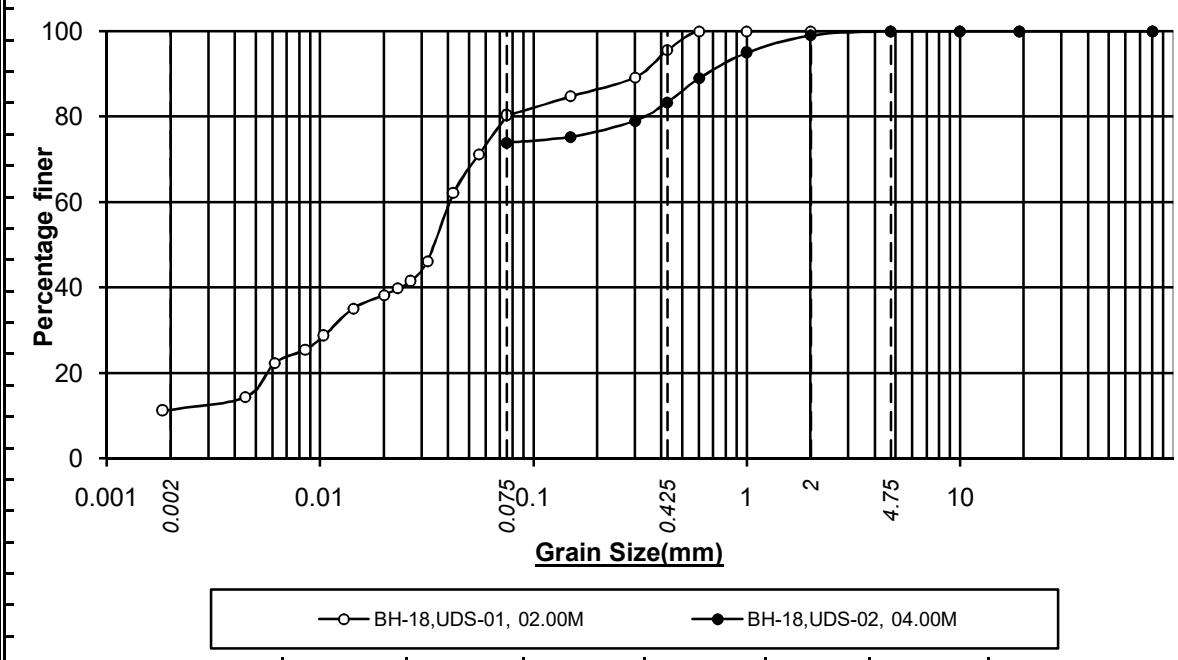
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	**Total sand**	**Weighted mean dia (mm)**	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-17,UDS-01, 2.00M	10.9	65.5	12.8	10.8	0.0	23.6		0.0
BH-17,UDS-02, 04.00M	17.8	70.4	11.8	0.0	0.0	11.8		0.0

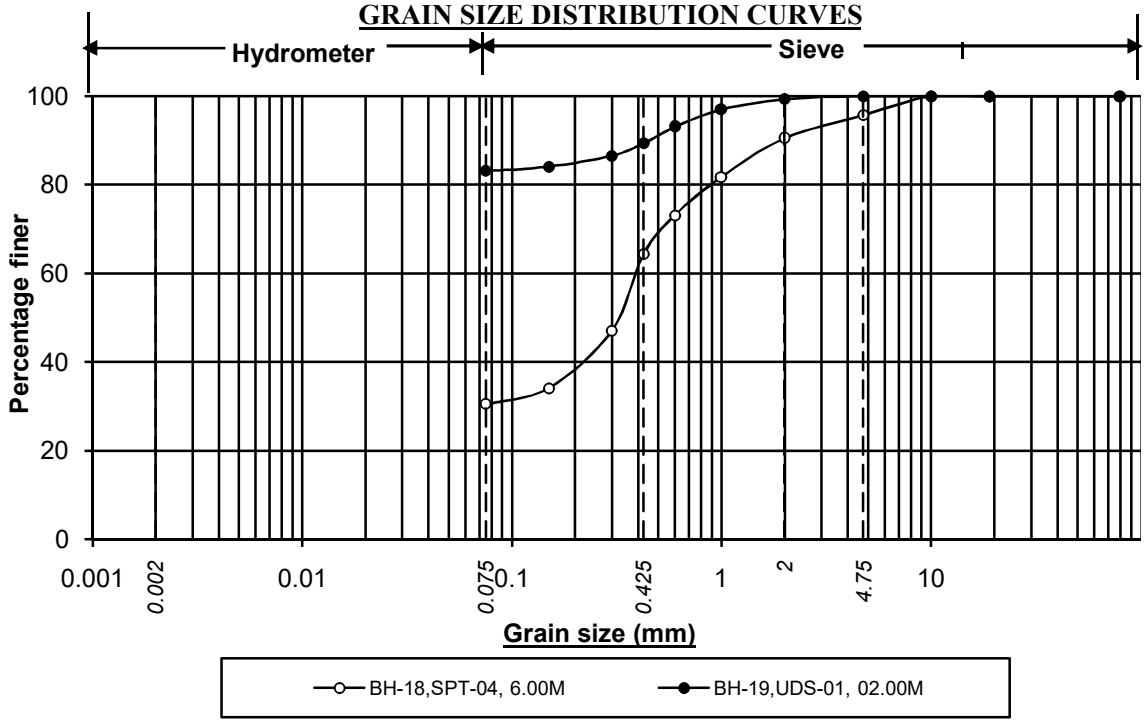


Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	**Total sand**	**Weighted mean dia (mm)**	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-18,UDS-01, 02.00M	11.5	68.8	15.3	4.4	0.0	19.7		0.0
BH-18,UDS-02, 04.00M		73.9	9.5	15.7	0.9	26.1		0.0

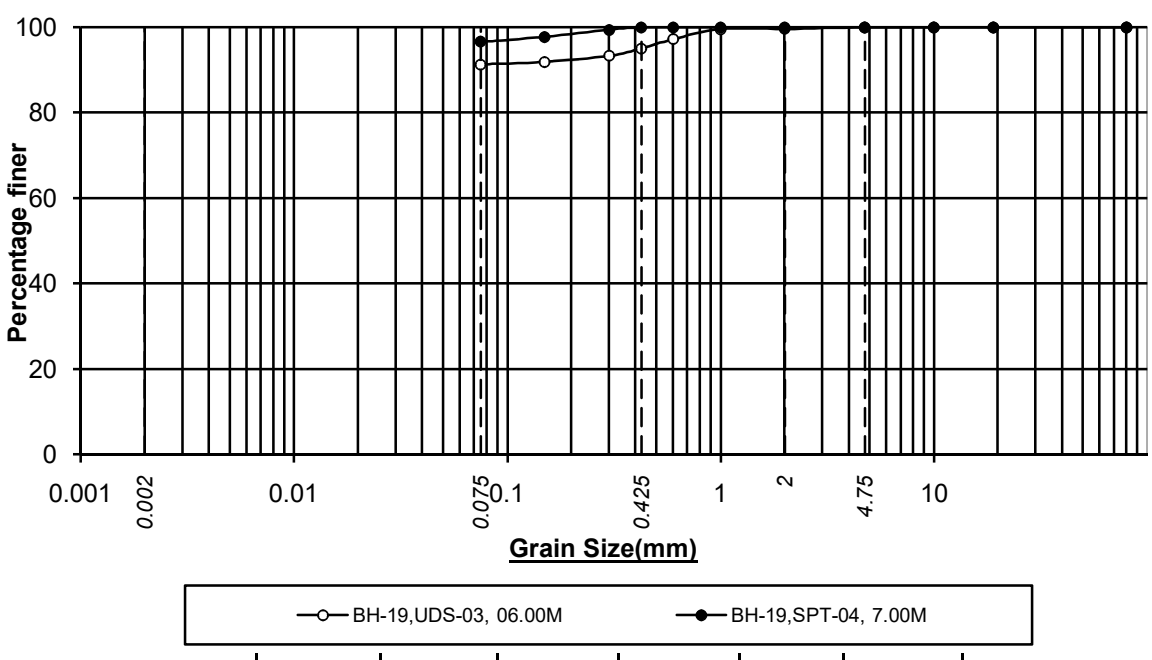
Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

C. E. Testing Company Pvt. Ltd.

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-18,SPT-04, 6.00M		30.5	33.9	26.1	5.3	65.3		4.2
BH-19,UDS-01, 02.00M		83.2	6.2	10.0	0.6	16.8		0.0



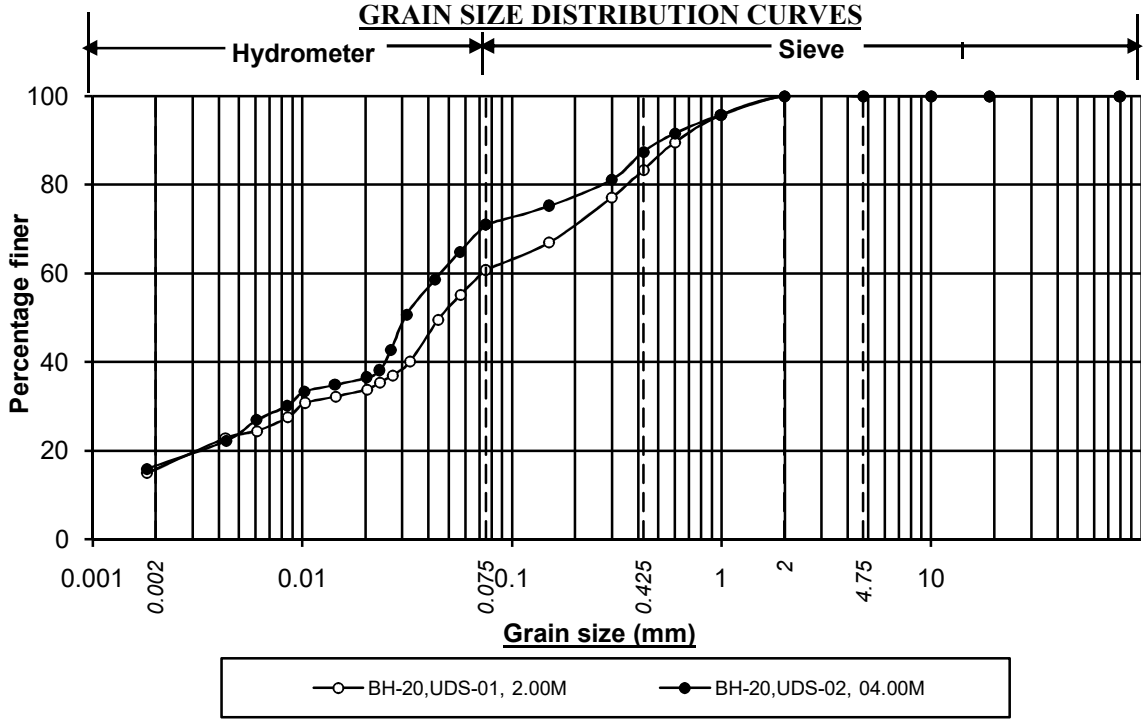
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-19,UDS-03, 06.00M		91.3	3.7	4.6	0.4	8.7		0.0
BH-19,SPT-04, 7.00M		96.7	3.3	0.0	0.0	3.3		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

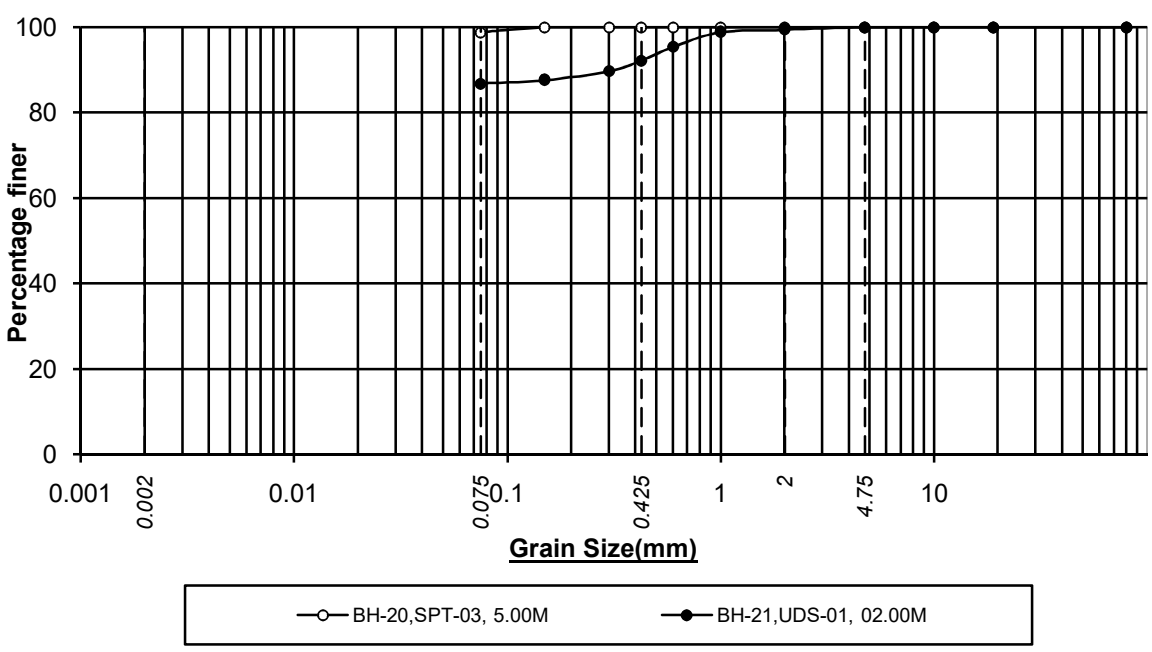
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-20,UDS-01, 2.00M	15.8	45.0	22.6	16.6	0.0	39.2		0.0
BH-20,UDS-02, 04.00M	16.5	54.5	16.4	12.6	0.0	29.0		0.0

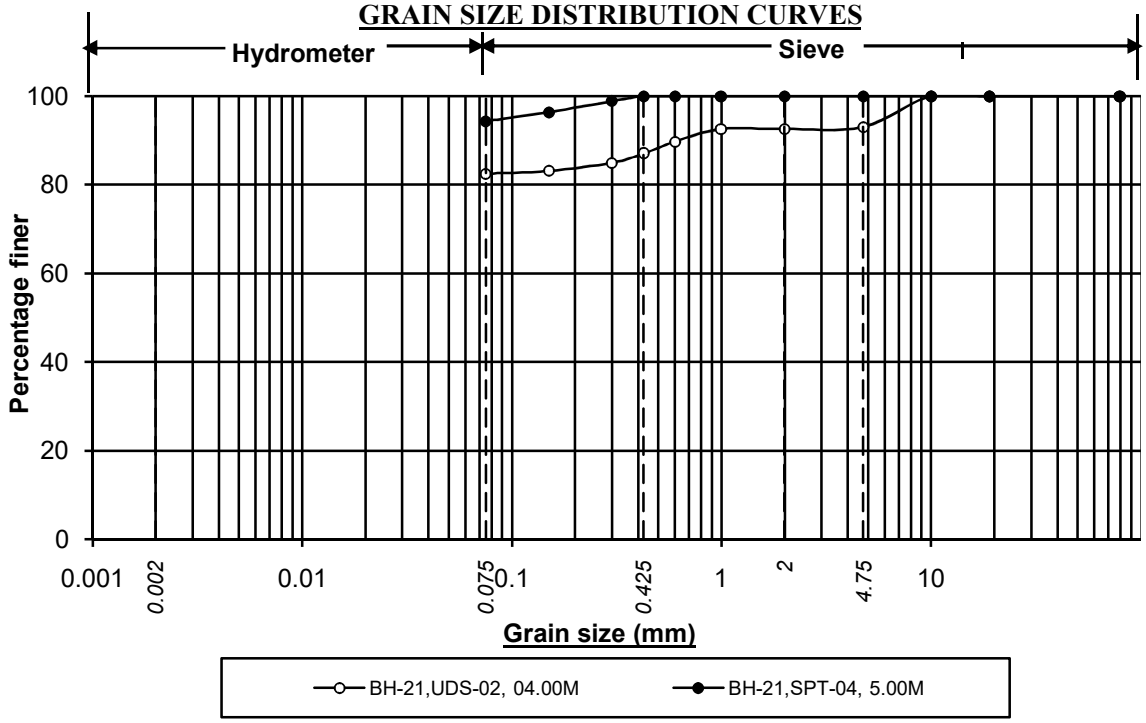


Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-20,SPT-03, 5.00M		98.8	1.2	0.0	0.0	1.2		0.0
BH-21,UDS-01, 02.00M		86.8	5.5	7.2	0.5	13.2		0.0

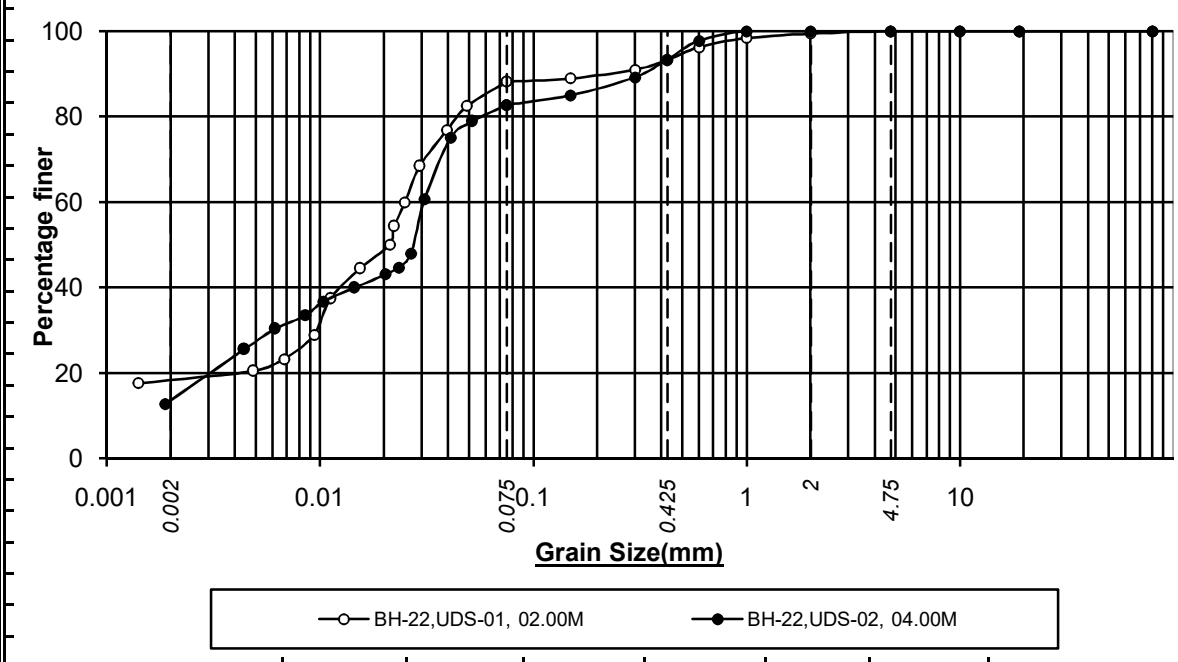
Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

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GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-21,UDS-02, 04.00M		82.5	4.6	5.6	0.4	10.6		6.9
BH-21,SPT-04, 5.00M		94.4	5.6	0.0	0.0	5.6		0.0



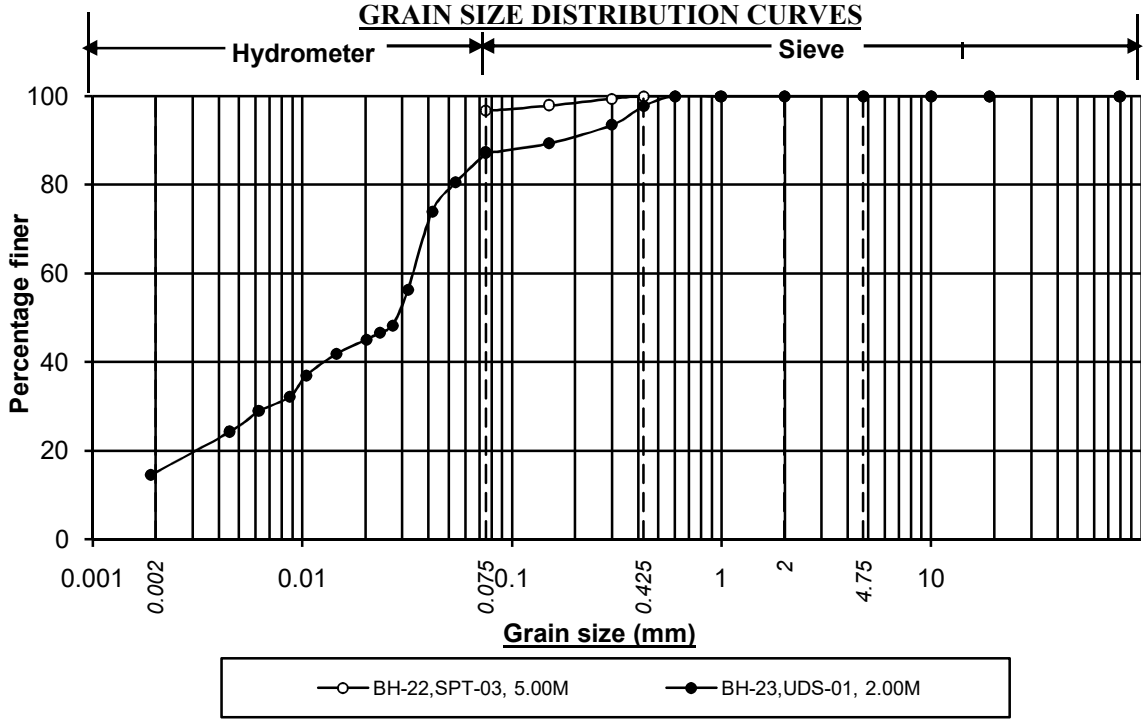
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-22,UDS-01, 02.00M	18.4	69.8	5.1	6.2	0.5	11.8		0.0
BH-22,UDS-02, 04.00M	13.7	69.1	10.6	6.6	0.0	17.2		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

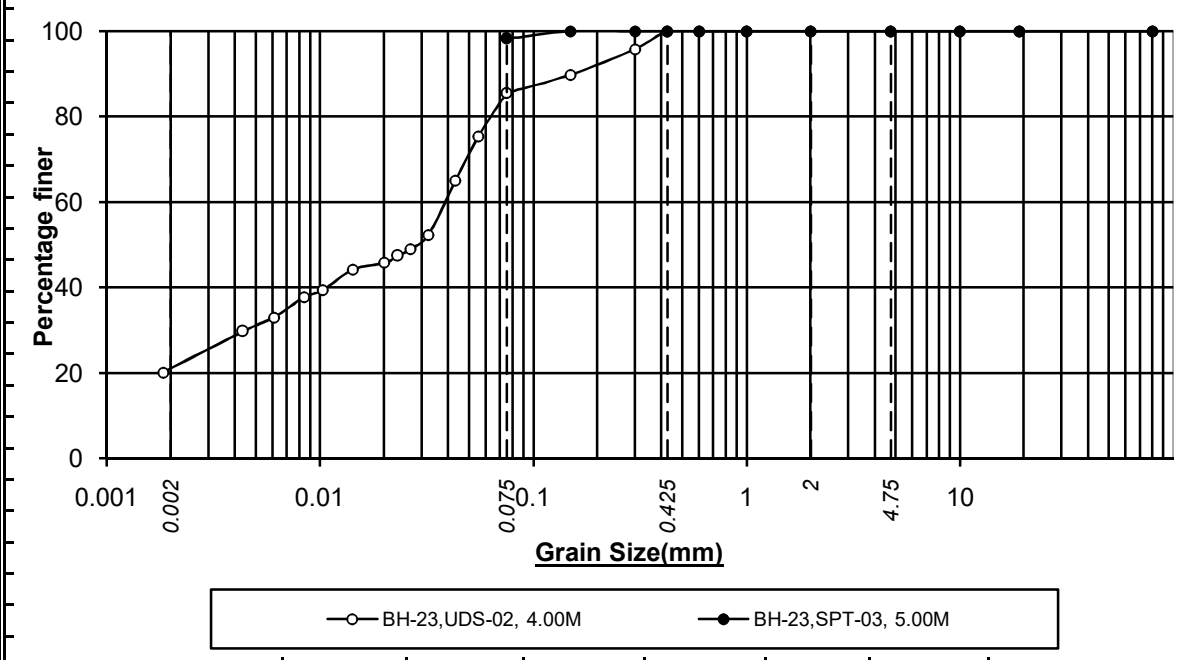
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-0.425	0.425-2.00	2.0-4.75	Total sand	Weighted mean dia (mm)	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-22,SPT-03, 5.00M		96.8	3.2	0.0	0.0	3.2		0.0
BH-23,UDS-01, 2.00M	15.1	72.1	10.6	2.2	0.0	12.8		0.0



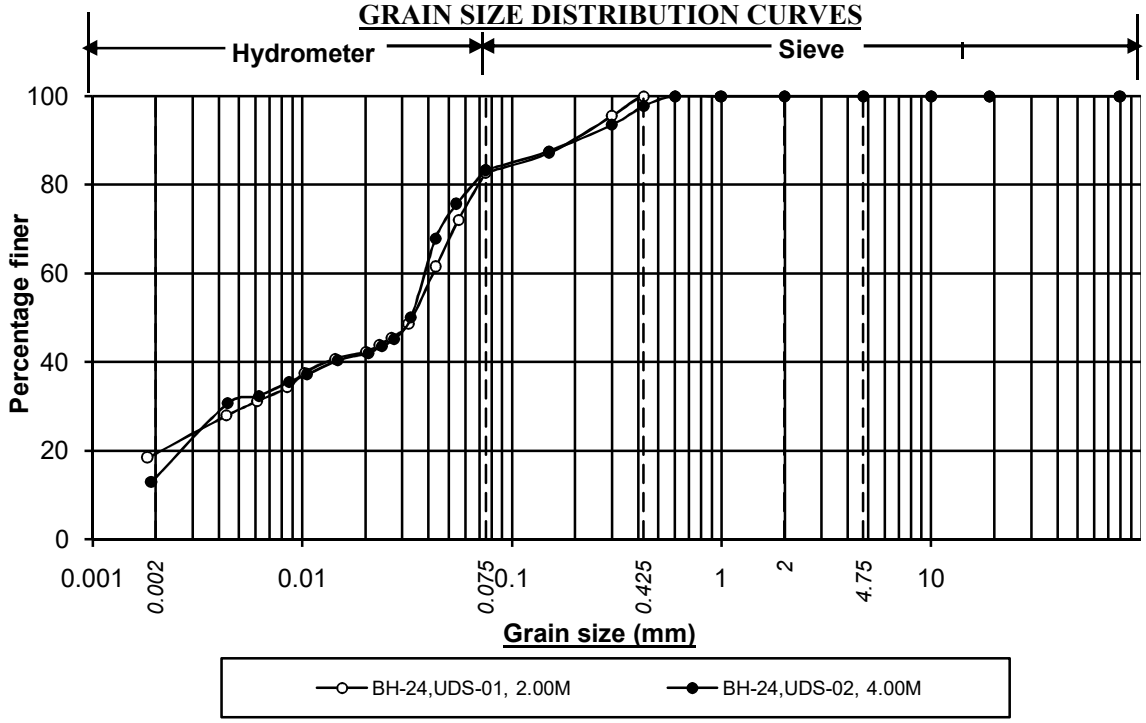
Grain size (mm)	<0.002	0.002-0.075	0.075-0.425	0.425-2.00	2.0-4.75	Total sand	Weighted mean dia (mm)	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-23,UDS-02, 4.00M	21.0	64.6	14.4	0.0	0.0	14.4		0.0
BH-23,SPT-03, 5.00M		98.3	1.7	0.0	0.0	1.7		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

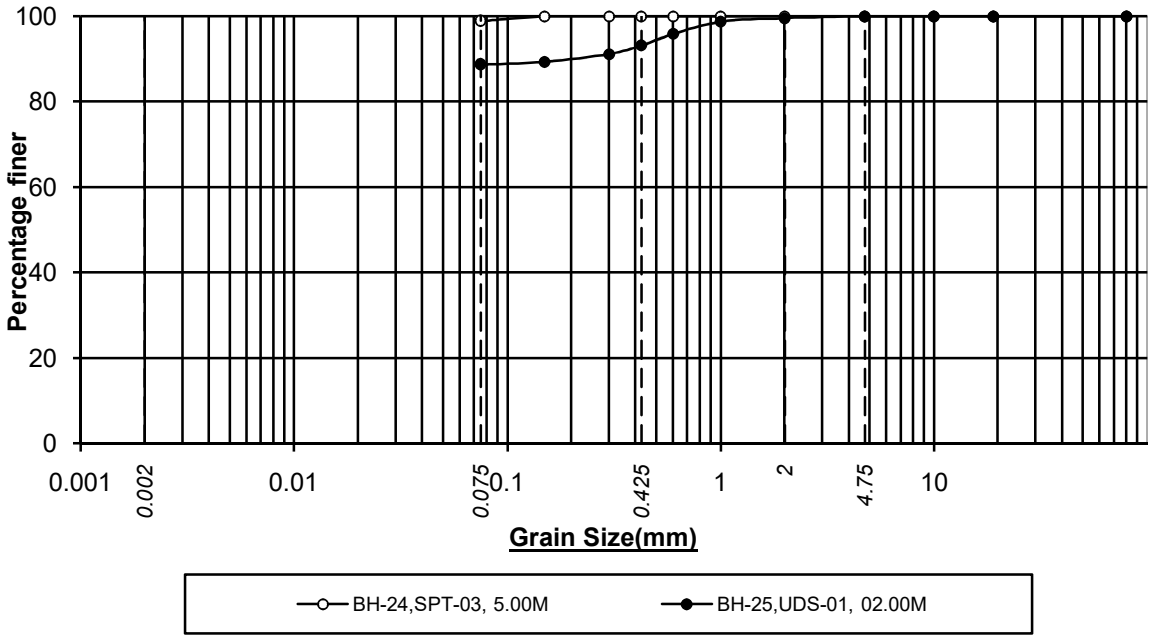
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-24,UDS-01, 2.00M	19.3	63.5	17.2	0.0	0.0	17.2		0.0
BH-24,UDS-02, 4.00M	13.9	69.5	14.4	2.2	0.0	16.6		0.0

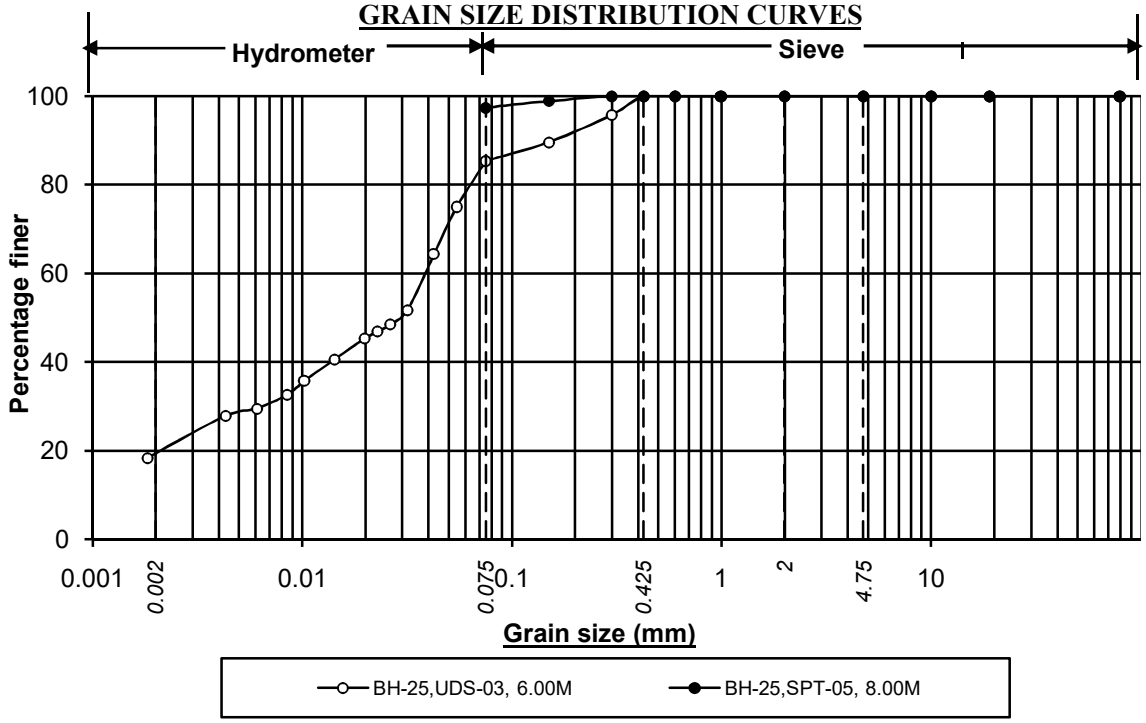


Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-24,SPT-03, 5.00M		98.9	1.1	0.0	0.0	1.1		0.0
BH-25,UDS-01, 02.00M		88.7	4.6	6.3	0.4	11.3		0.0

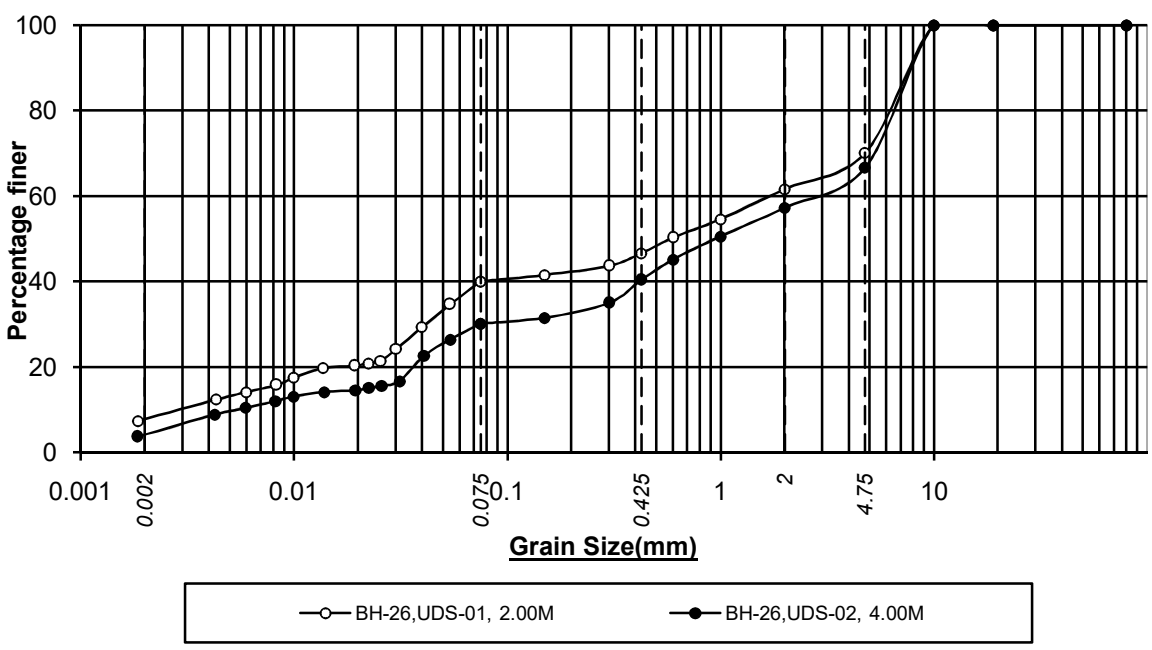
Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

C. E. Testing Company Pvt. Ltd.

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-25,UDS-03, 6.00M	19.3	66.1	14.6	0.0	0.0	14.6		0.0
BH-25,SPT-05, 8.00M		97.4	2.6	0.0	0.0	2.6		0.0



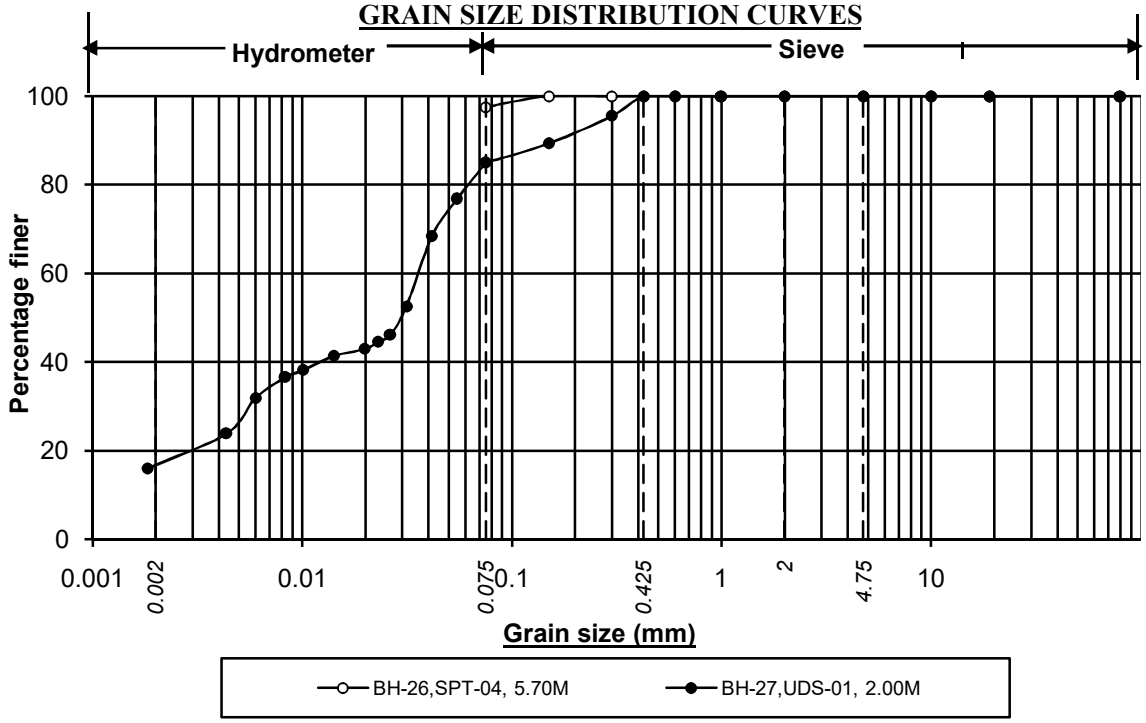
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-26,UDS-01, 2.00M	7.8	32.3	6.5	15.0	8.5	30.0		29.9
BH-26,UDS-02, 4.00M	4.2	26.0	10.2	16.9	9.4	36.5		33.3

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

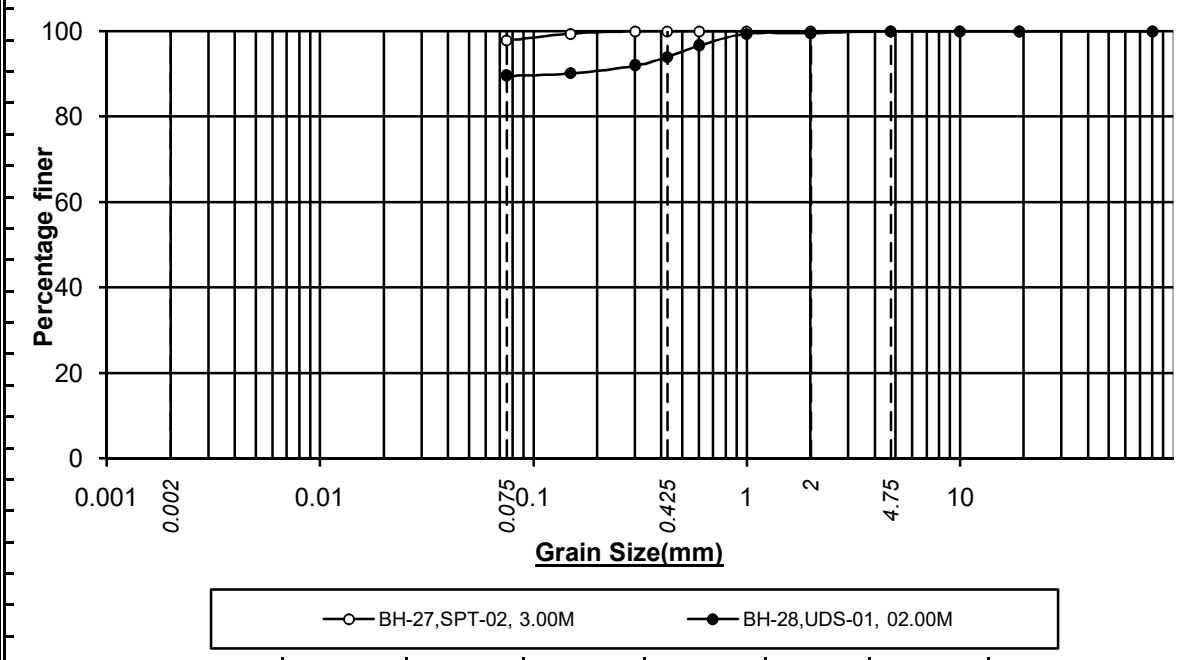
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-0.425	0.425-2.00	2.0-4.75	Total sand	Weighted mean dia (mm)	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-26,SPT-04, 5.70M		97.6	2.4	0.0	0.0	2.4		0.0
BH-27,UDS-01, 2.00M	16.7	68.3	15.0	0.0	0.0	15.0		0.0



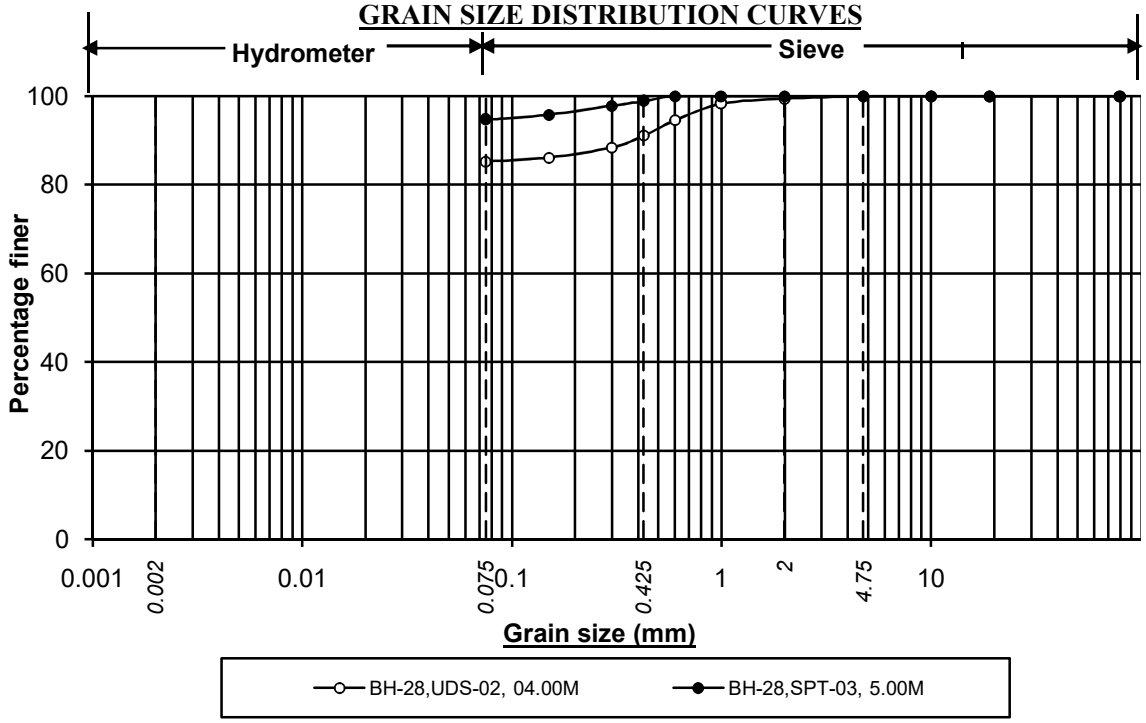
Grain size (mm)	<0.002	0.002-0.075	0.075-0.425	0.425-2.00	2.0-4.75	Total sand	Weighted mean dia (mm)	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-27,SPT-02, 3.00M		97.9	2.1	0.0	0.0	2.1		0.0
BH-28,UDS-01, 02.00M		89.6	4.4	5.6	0.4	10.4		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

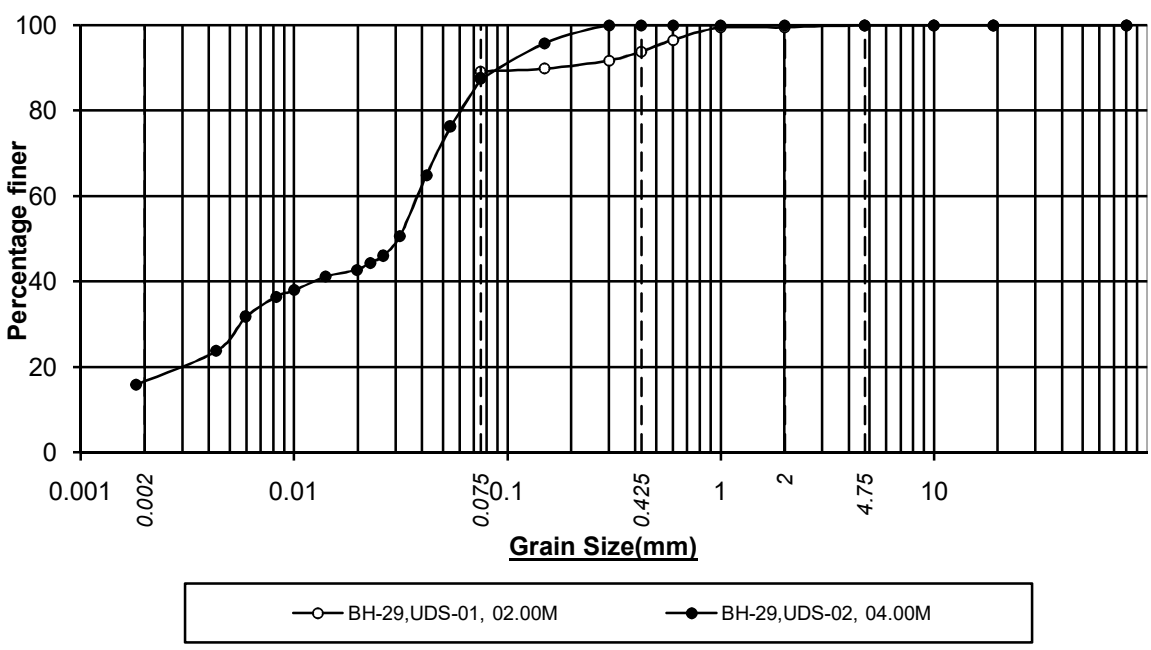
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-28,UDS-02, 04.00M		85.3	5.8	8.3	0.6	14.7		0.0
BH-28,SPT-03, 5.00M		94.7	4.2	1.1	0.0	5.3		0.0



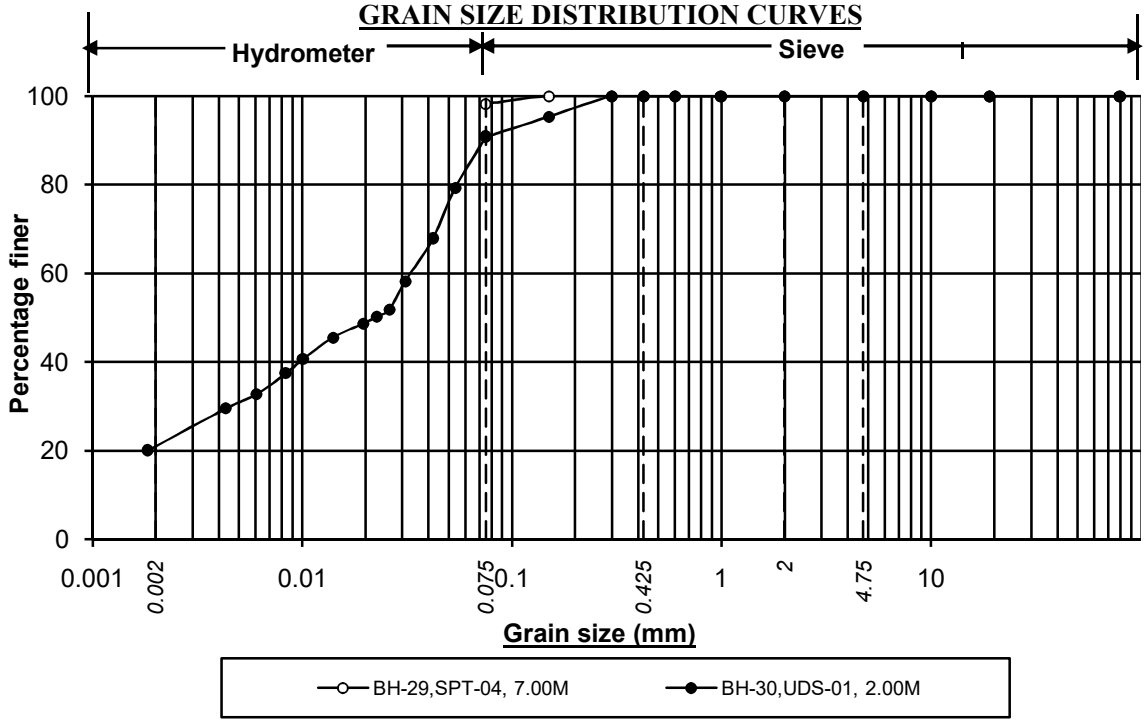
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-29,UDS-01, 02.00M		89.2	4.6	5.7	0.5	10.8		0.0
BH-29,UDS-02, 04.00M	16.7	70.8	12.5	0.0	0.0	12.5		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

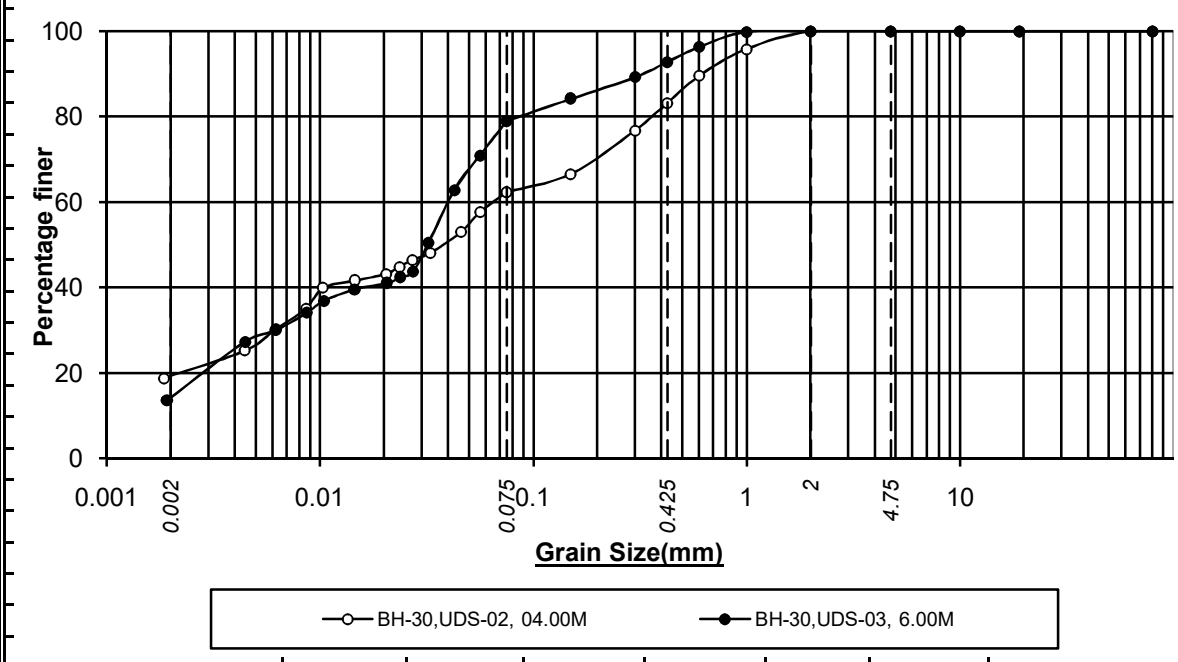
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-29,SPT-04, 7.00M		98.3	1.7	0.0	0.0	1.7		0.0
BH-30,UDS-01, 2.00M	21.0	69.8	9.2	0.0	0.0	9.2		0.0

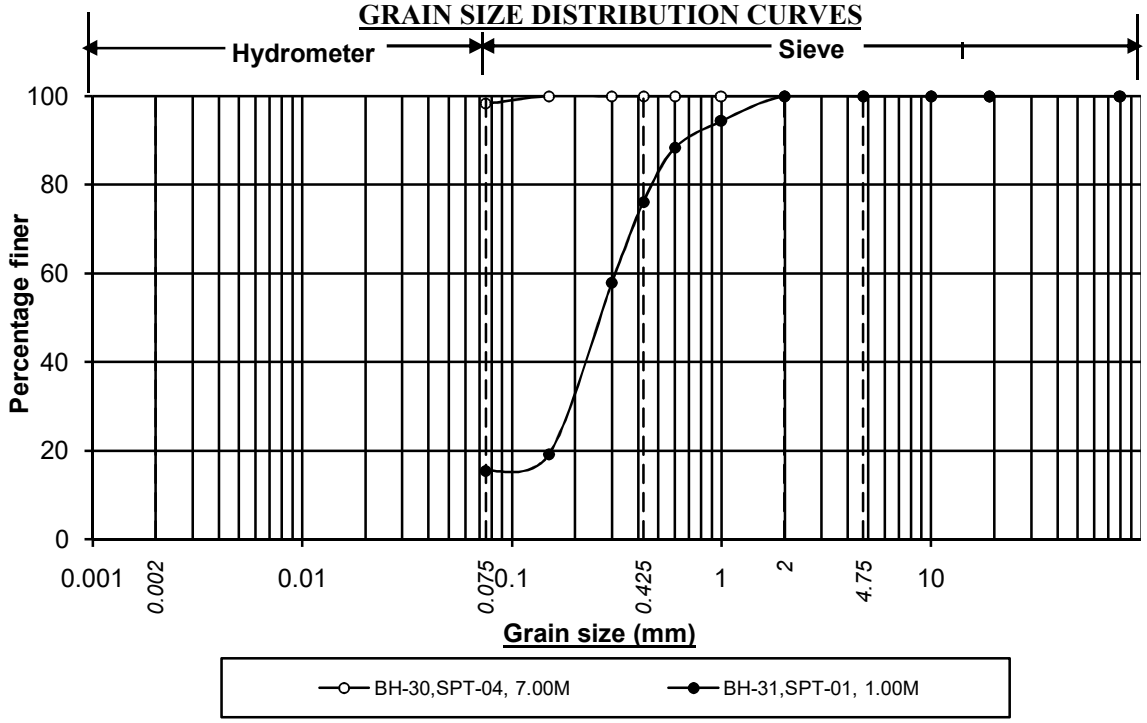


Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-30,UDS-02, 04.00M	19.3	43.1	20.8	16.8	0.0	37.6		0.0
BH-30,UDS-03, 6.00M	14.2	64.8	13.8	7.2	0.0	21.0		0.0

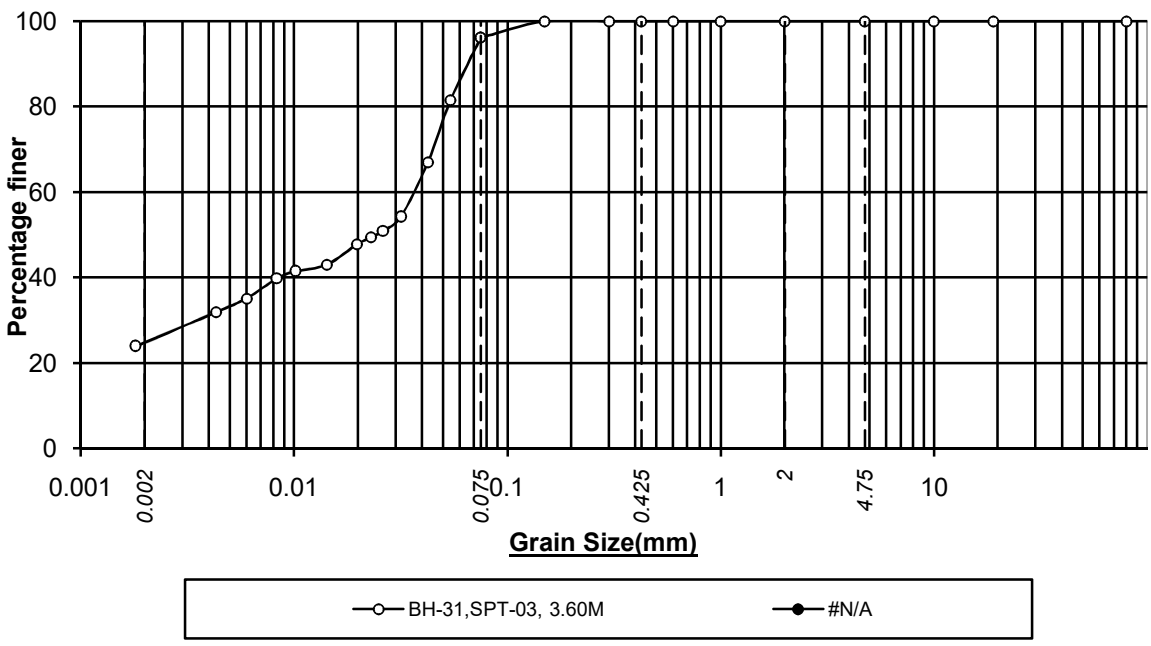
Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

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GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	**Total sand**	**Weighted mean dia (mm)**	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-30,SPT-04, 7.00M		98.4	1.6	0.0	0.0	1.6		0.0
BH-31,SPT-01, 1.00M		15.4	60.8	23.8	0.0	84.6		0.0



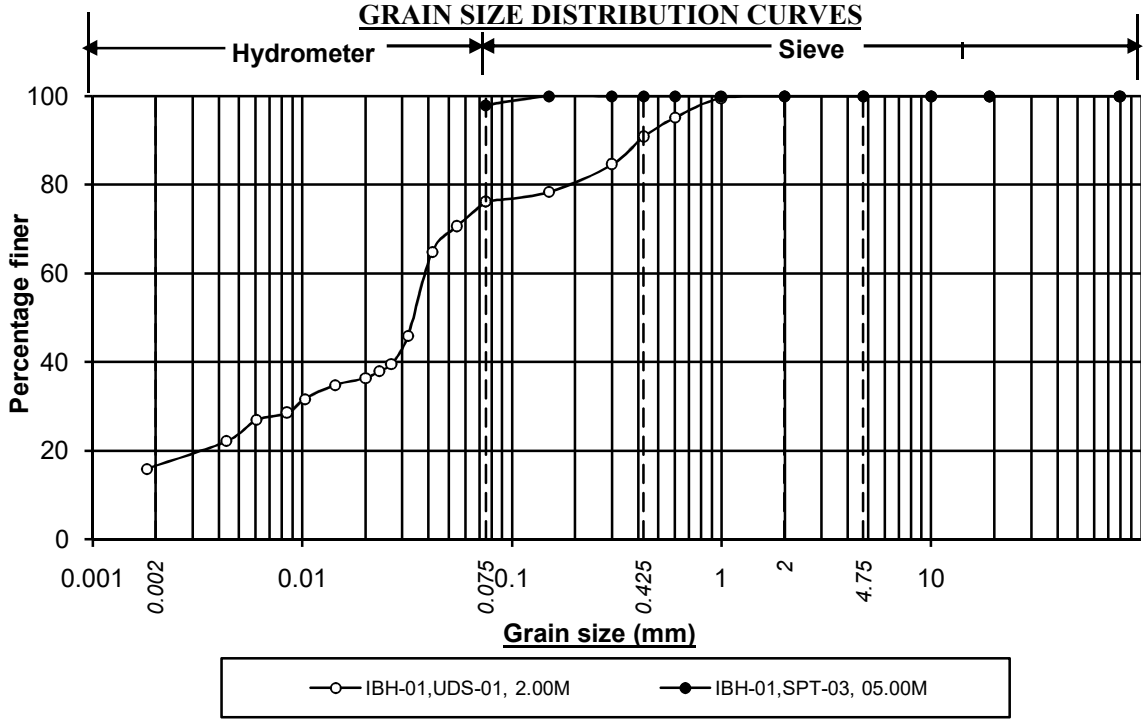
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	**Total sand**	**Weighted mean dia (mm)**	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
BH-31,SPT-03, 3.60M	24.8	71.4	3.8	0.0	0.0	3.8		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

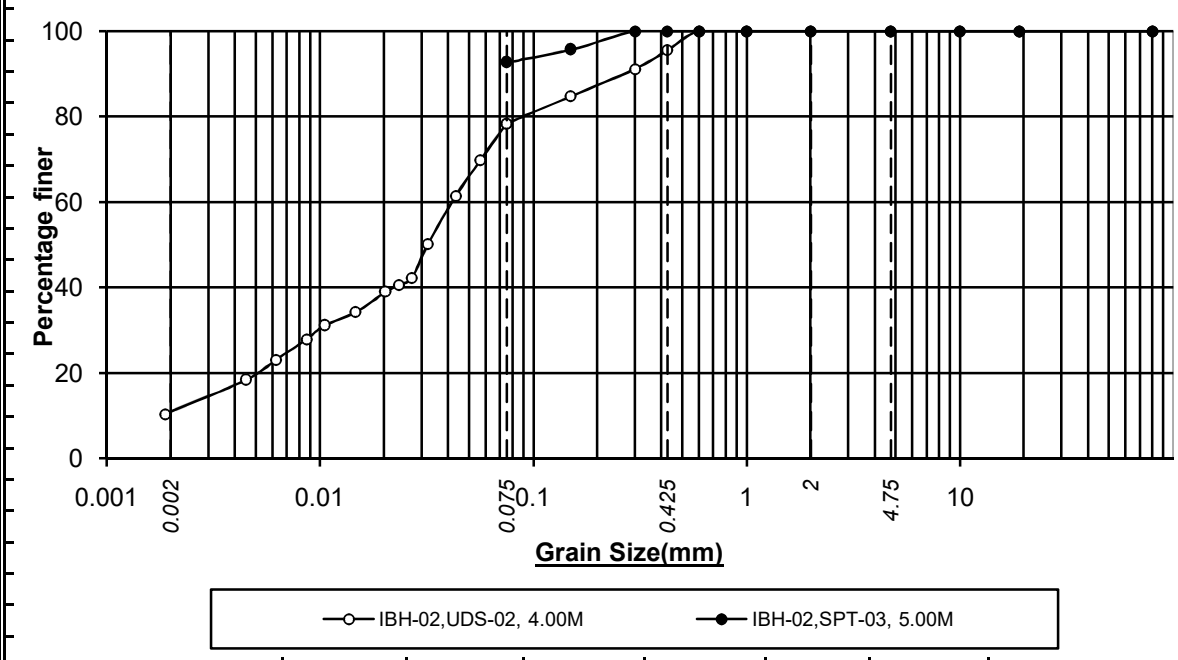
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
IBH-01,UDS-01, 2.00M	16.5	59.7	14.6	9.2	0.0	23.8		0.0
IBH-01,SPT-03, 05.00M		98.0	2.0	0.0	0.0	2.0		0.0



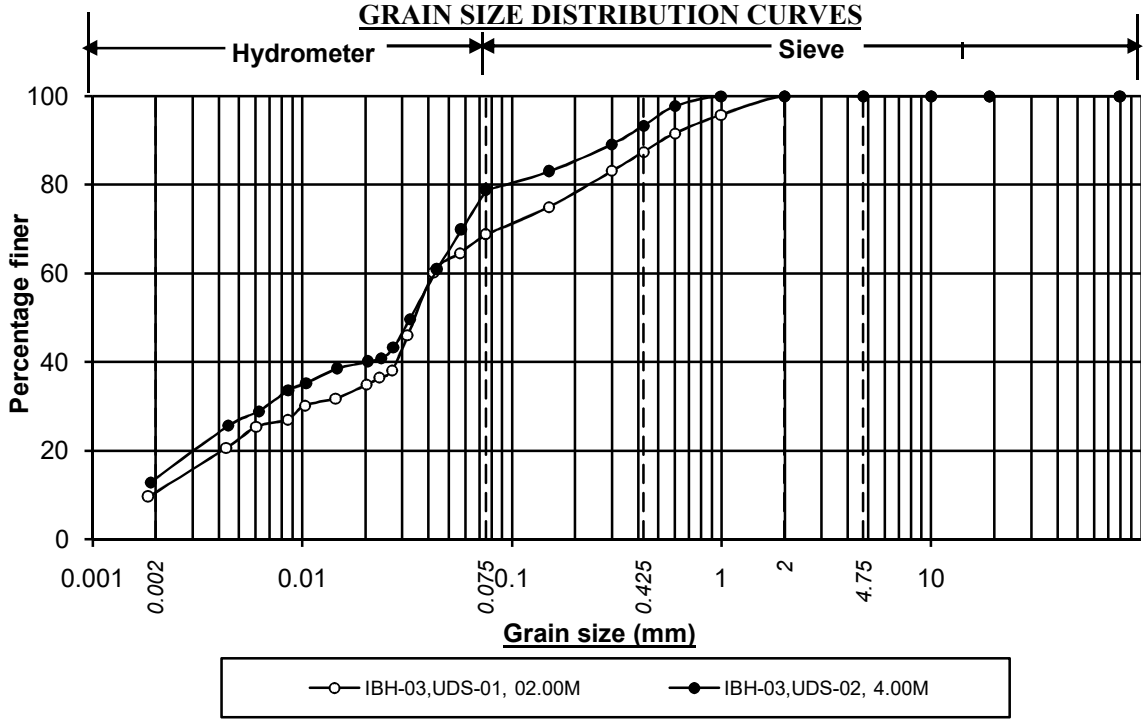
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
IBH-02,UDS-02, 4.00M	10.9	67.5	17.2	4.4	0.0	21.6		0.0
IBH-02,SPT-03, 5.00M		92.7	7.3	0.0	0.0	7.3		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

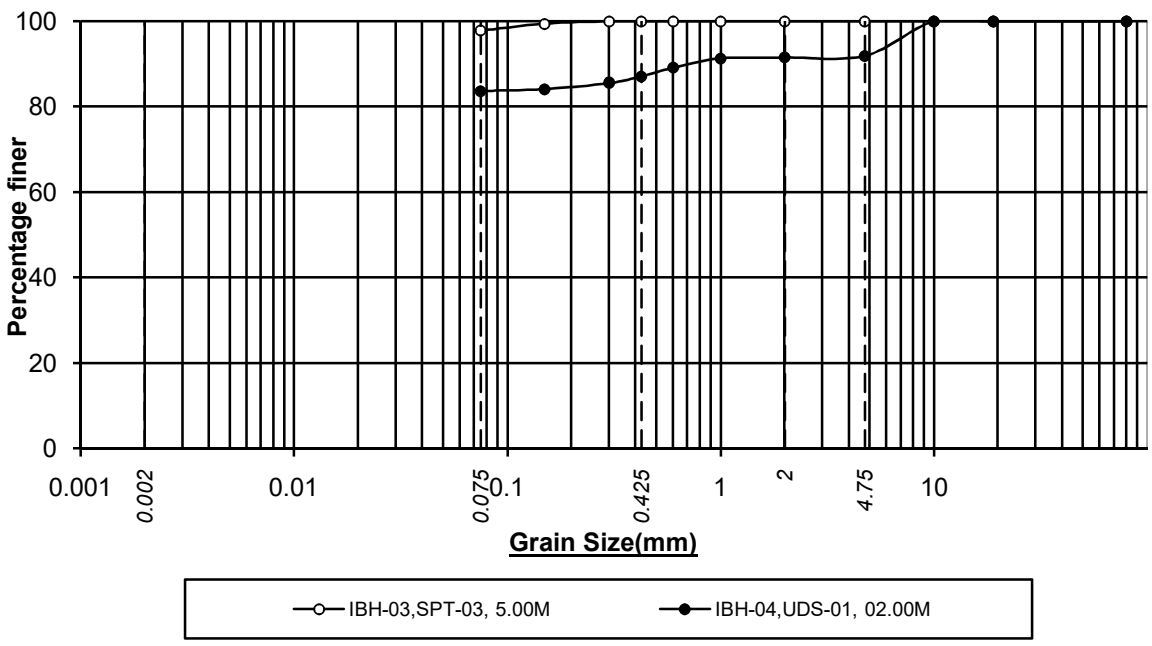
C. E. Testing Company Pvt. Ltd.

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GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
IBH-03,UDS-01, 02.00M	10.5	58.3	18.6	12.6	0.0	31.2		0.0
IBH-03,UDS-02, 4.00M	13.6	65.2	14.6	6.6	0.0	21.2		0.0

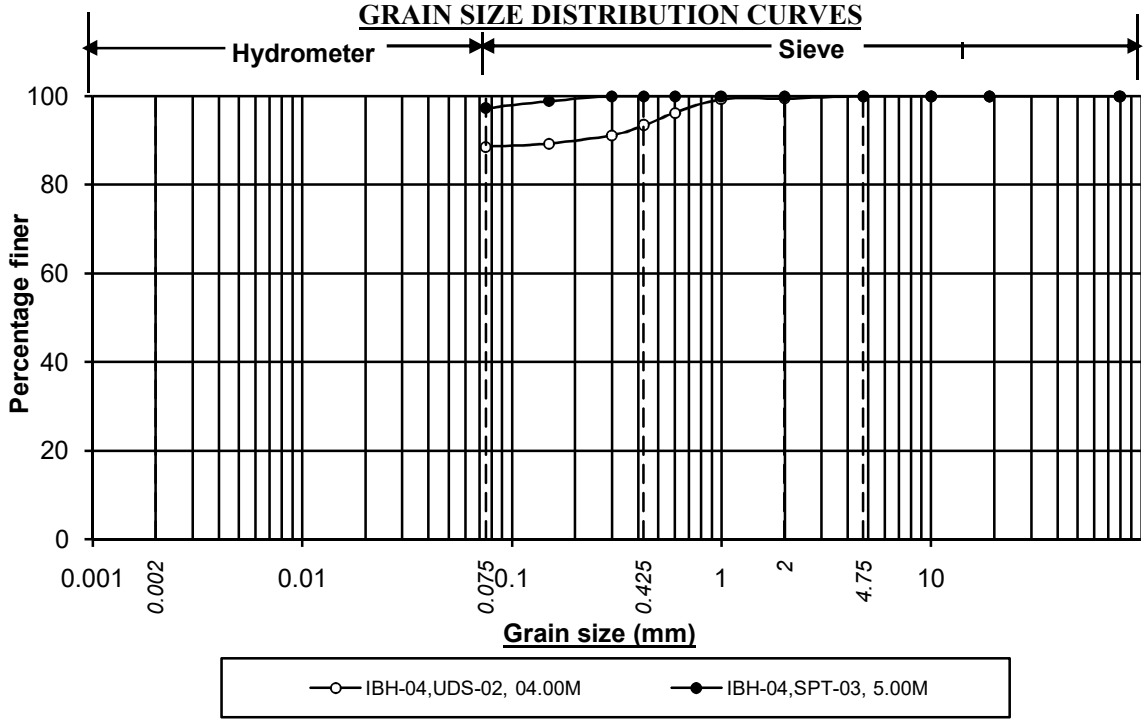


Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
IBH-03,SPT-03, 5.00M		97.9	2.1	0.0	0.0	2.1		0.0
IBH-04,UDS-01, 02.00M		83.7	3.5	4.4	0.3	8.2		8.1

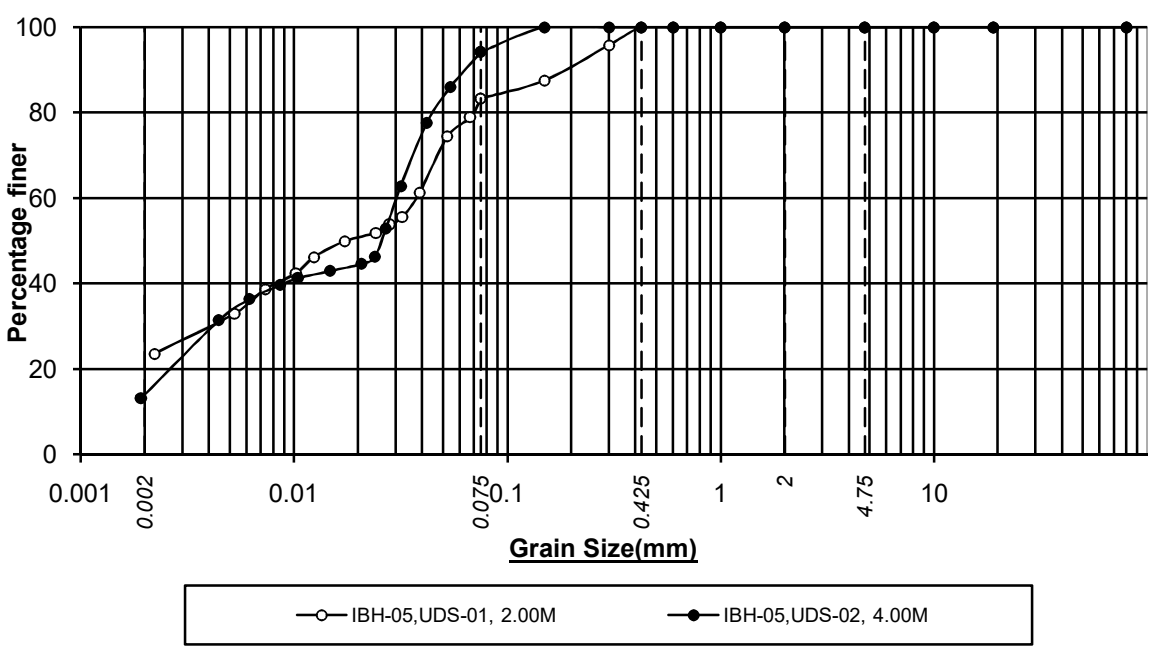
Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

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GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
IBH-04,UDS-02, 04.00M		88.6	4.8	6.1	0.5	11.4		0.0
IBH-04,SPT-03, 5.00M		97.4	2.6	0.0	0.0	2.6		0.0



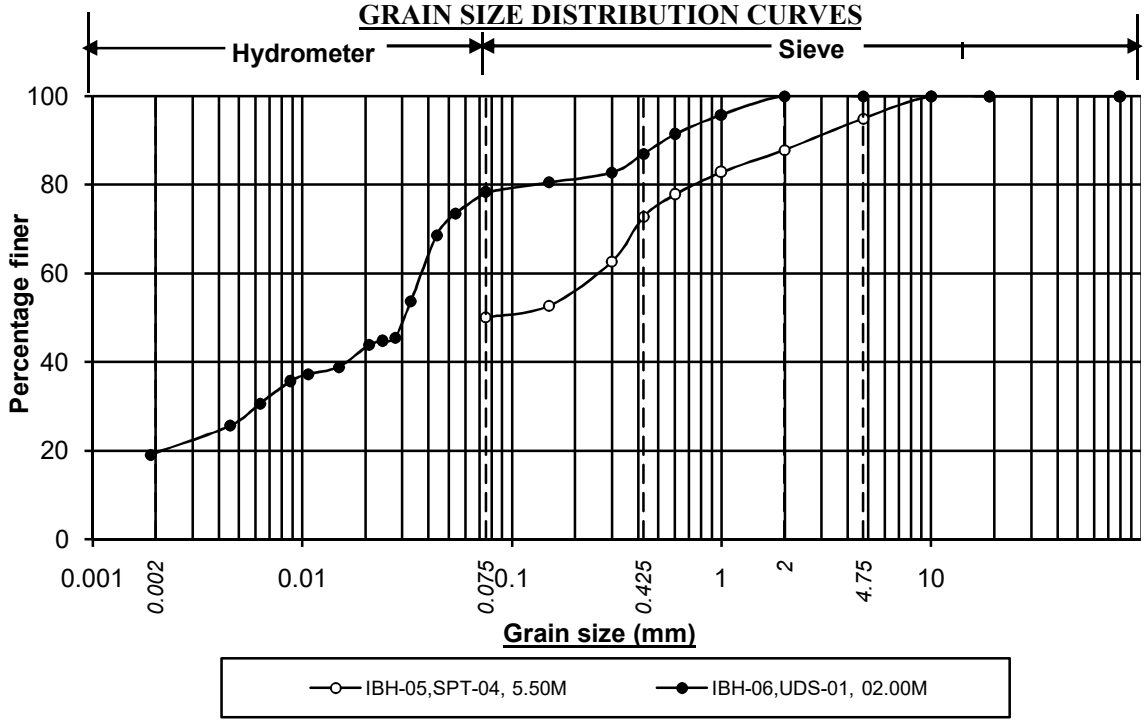
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
IBH-05,UDS-01, 2.00M	22.4	61.0	16.6	0.0	0.0	16.6		0.0
IBH-05,UDS-02, 4.00M	14.0	80.3	5.7	0.0	0.0	5.7		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

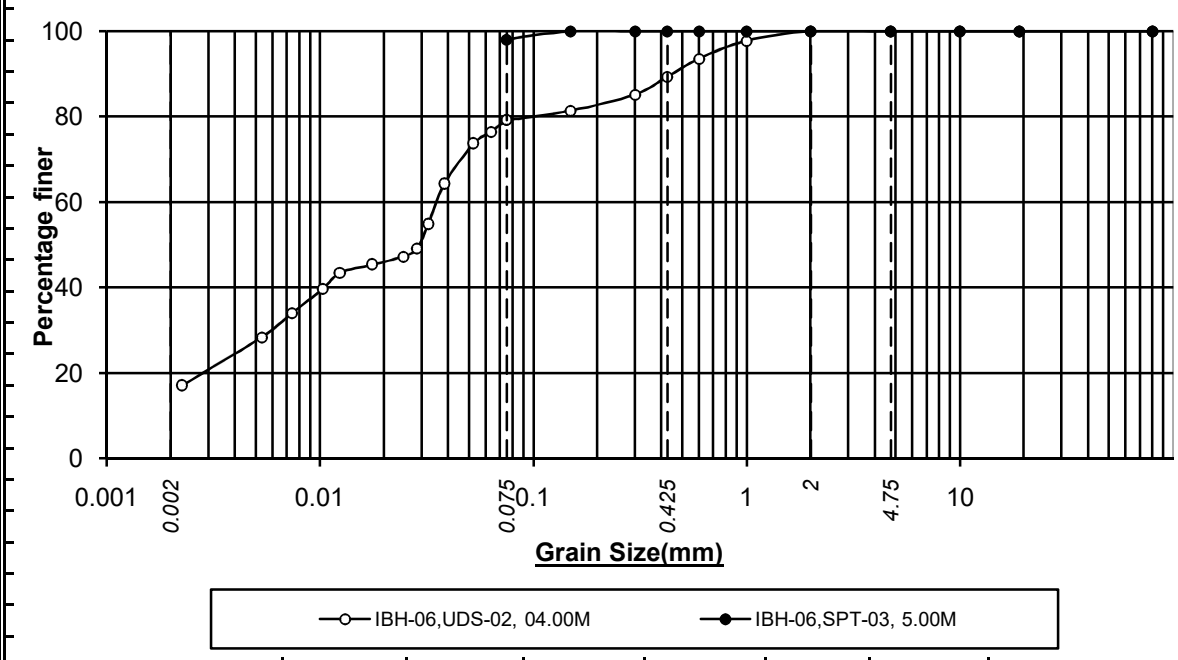
C. E. Testing Company Pvt. Ltd.

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GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
IBH-05,SPT-04, 5.50M		50.1	22.6	15.2	7.0	44.8		5.1
IBH-06,UDS-01, 02.00M	19.4	59.0	8.6	13.0	0.0	21.6		0.0



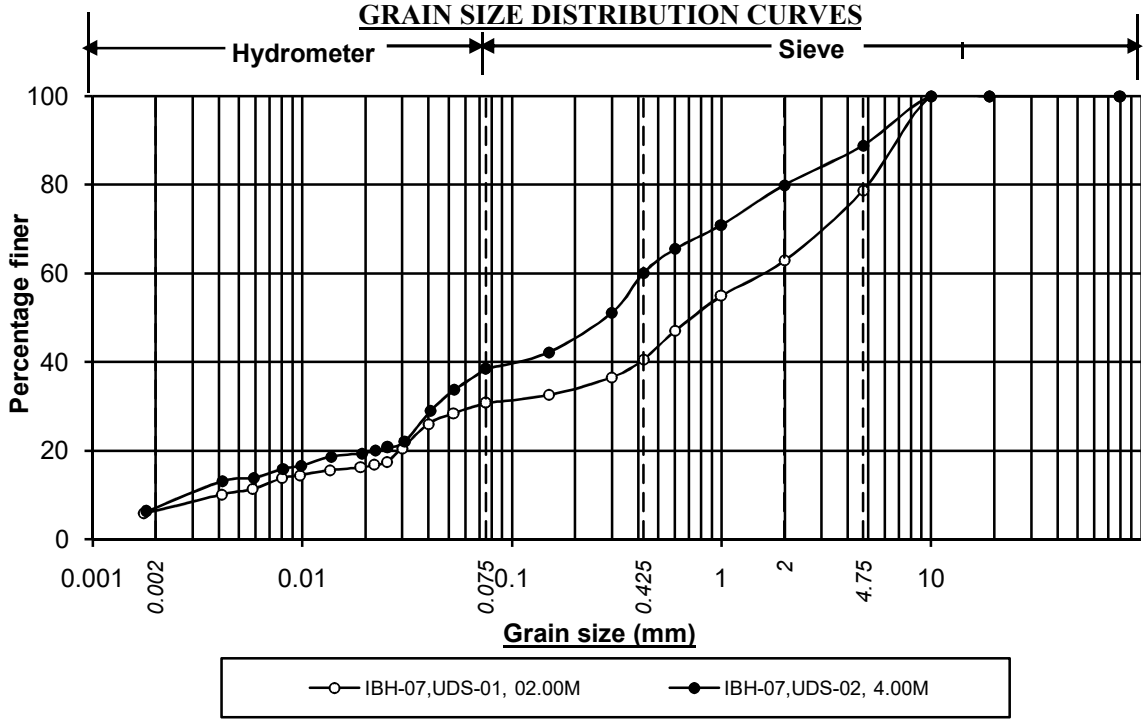
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
IBH-06,UDS-02, 04.00M	15.5	63.8	10.1	10.6	0.0	20.7		0.0
IBH-06,SPT-03, 5.00M		98.1	1.9	0.0	0.0	1.9		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

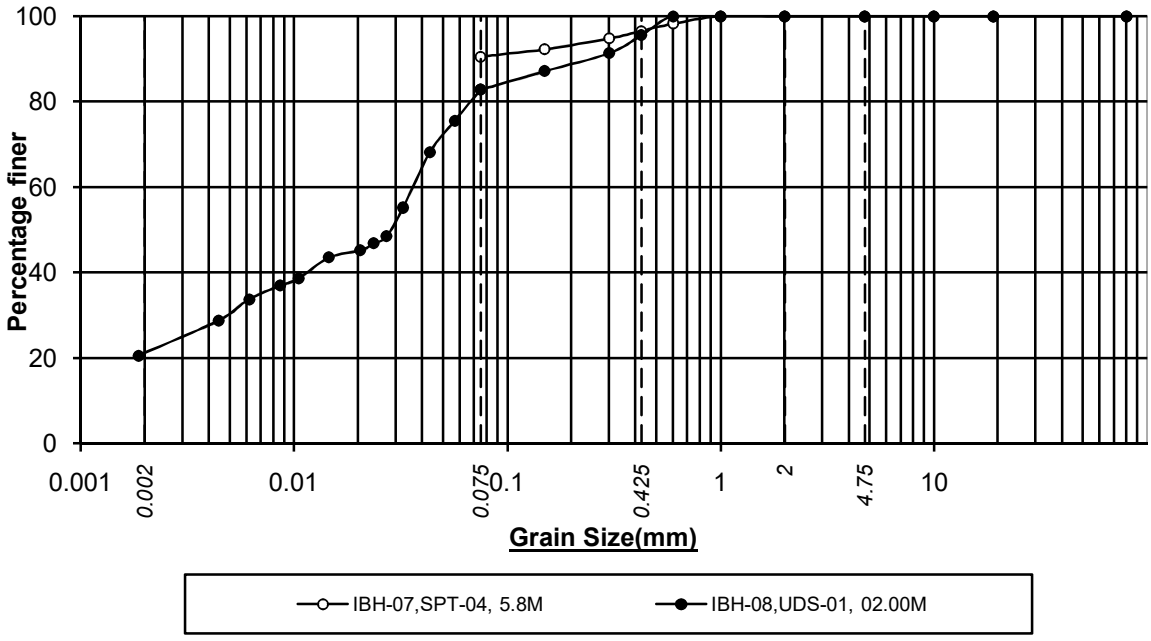
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GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	**Total sand**	**Weighted mean dia (mm)**	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
IBH-07,UDS-01, 02.00M	6.5	24.4	9.7	22.4	15.8	47.9		21.2
IBH-07,UDS-02, 4.00M	7.1	31.4	21.6	19.8	9.0	50.4		11.1



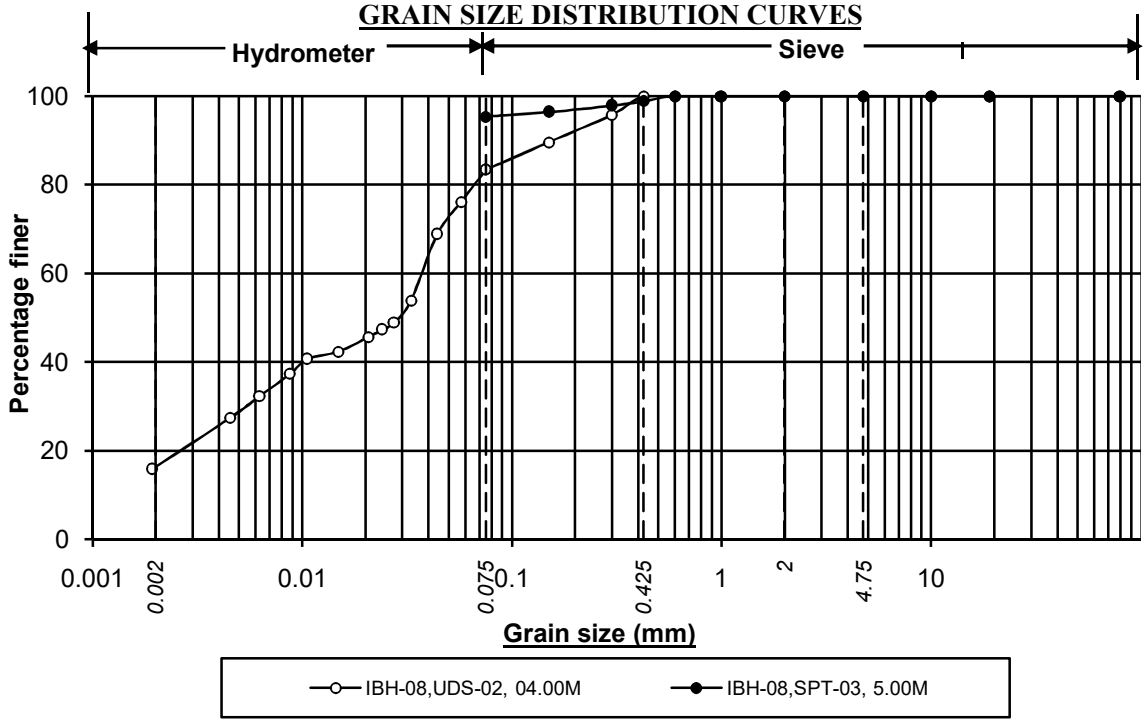
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	**Total sand**	**Weighted mean dia (mm)**	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
IBH-07,SPT-04, 5.8M		90.6	6.0	3.4	0.0	9.4		0.0
IBH-08,UDS-01, 02.00M	21.2	61.7	12.7	4.4	0.0	17.1		0.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

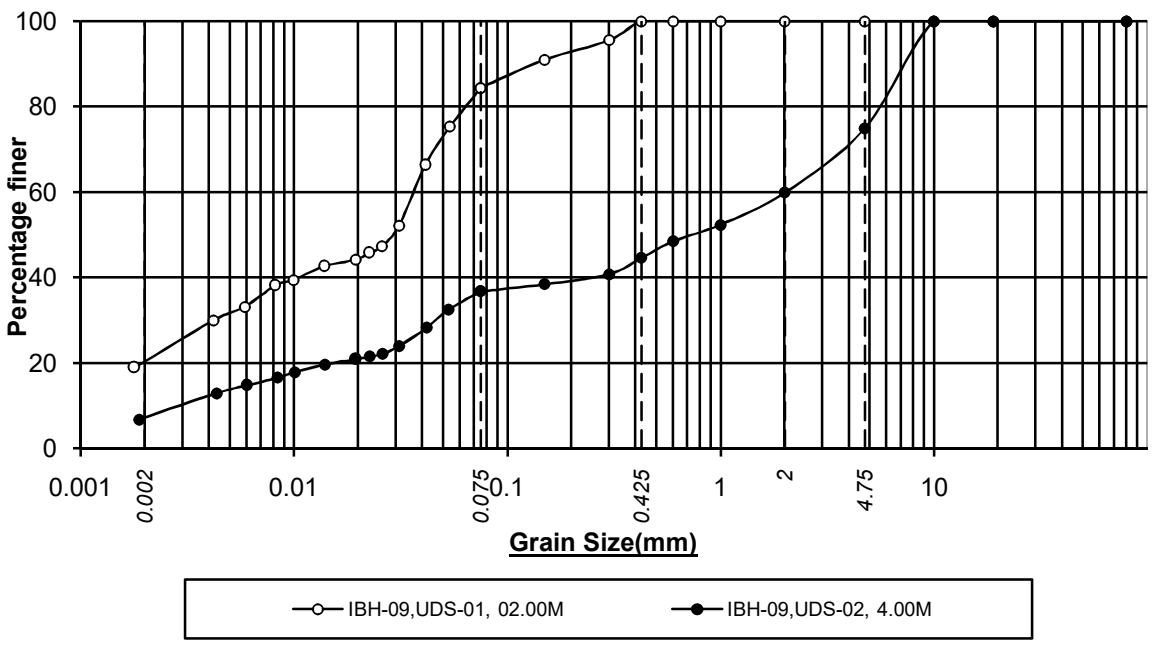
C. E. Testing Company Pvt. Ltd.

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GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
IBH-08,UDS-02, 04.00M	16.3	67.2	16.5	0.0	0.0	16.5		0.0
IBH-08,SPT-03, 5.00M		95.4	3.6	1.0	0.0	4.6		0.0



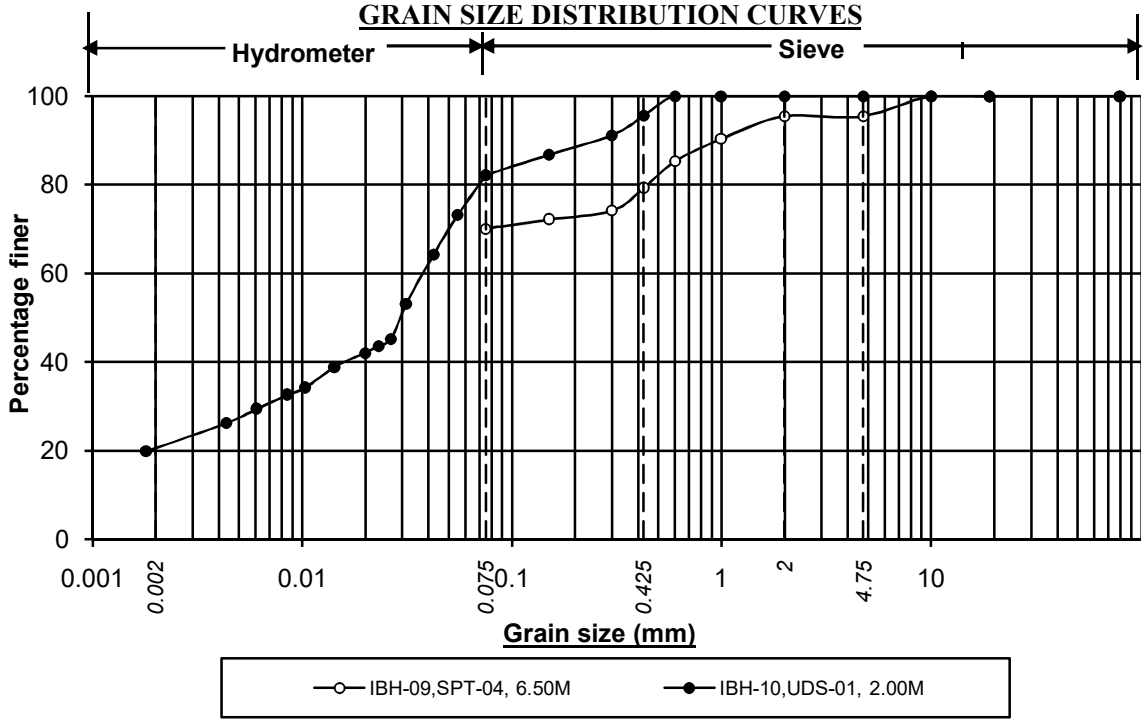
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
IBH-09,UDS-01, 02.00M	20.4	64.0	15.6	0.0	0.0	15.6		0.0
IBH-09,UDS-02, 4.00M	7.2	29.6	7.8	15.3	15.1	38.2		25.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

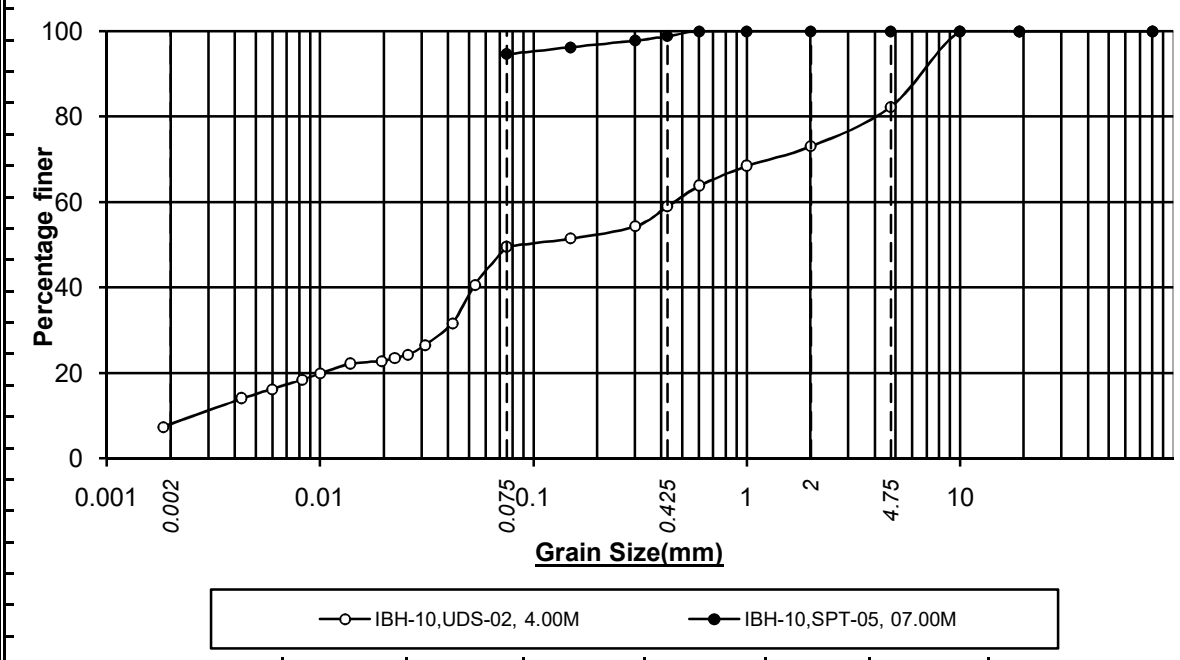
C. E. Testing Company Pvt. Ltd.

Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
IBH-09,SPT-04, 6.50M		70.1	9.1	16.3	0.0	25.4		4.5
IBH-10,UDS-01, 2.00M	20.6	61.6	13.4	4.4	0.0	17.8		0.0



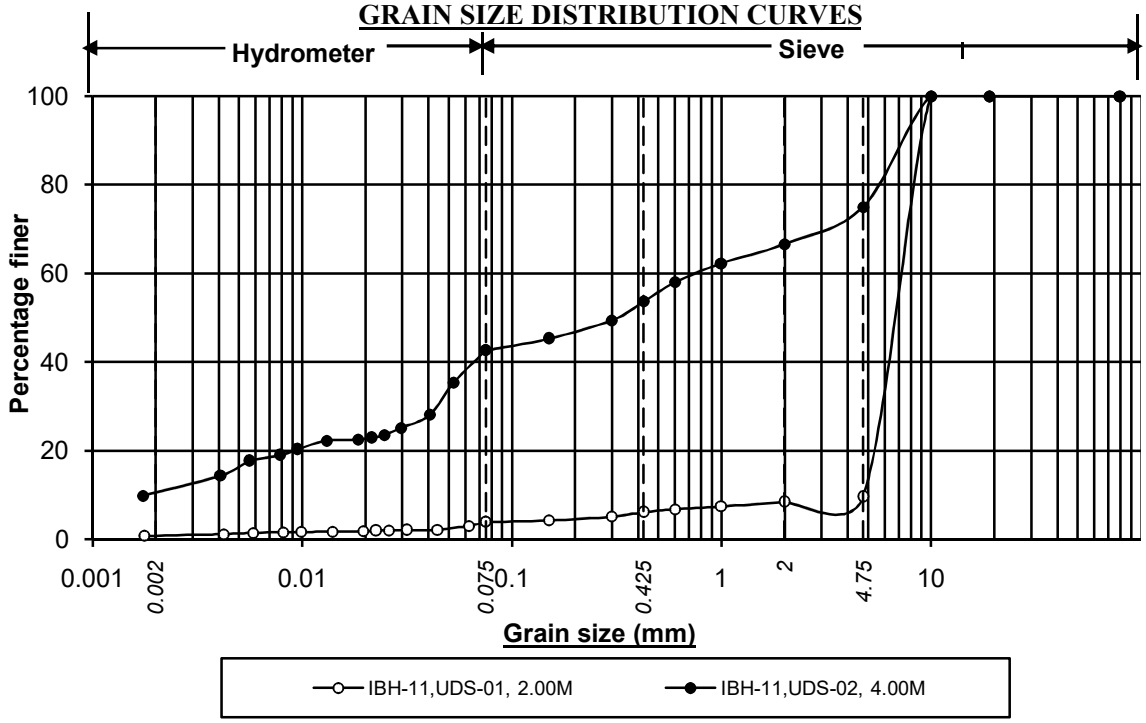
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	Total sand	Weighted mean dia (mm)	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
IBH-10,UDS-02, 4.00M	8.0	41.6	9.5	14.1	9.2	32.8		17.6
IBH-10,SPT-05, 07.00M		94.7	4.2	1.1	0.0	5.3		0.0

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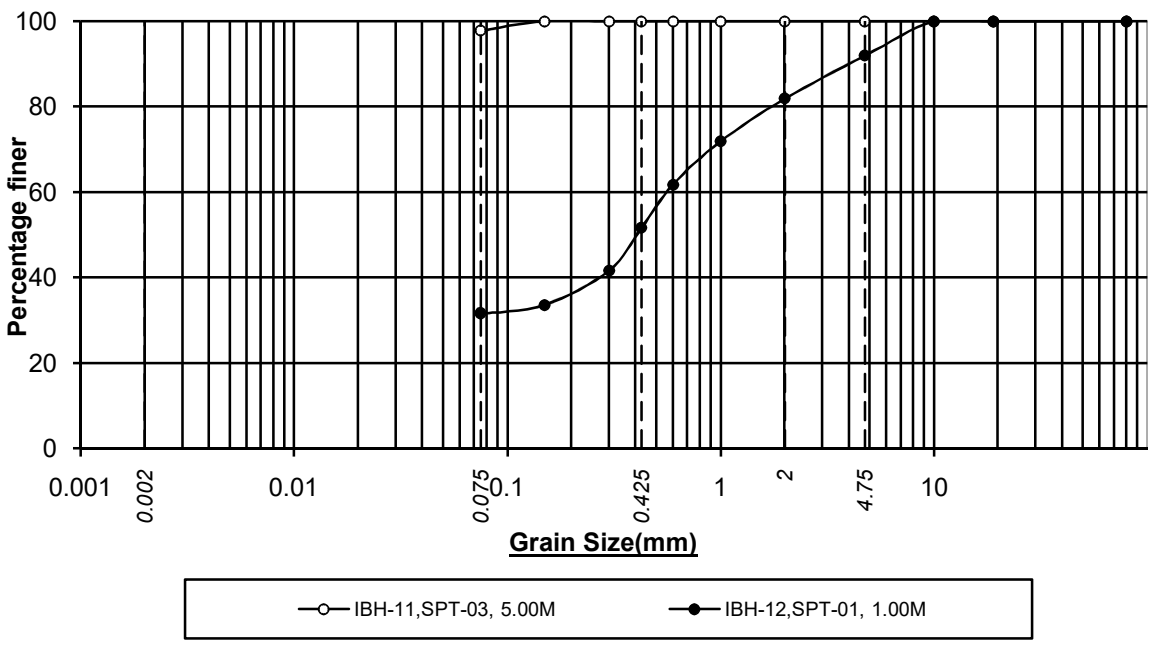
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Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	**Total sand**	**Weighted mean dia (mm)**	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
IBH-11,UDS-01, 2.00M	0.8	3.1	2.1	2.3	1.2	5.6		90.5
IBH-11,UDS-02, 4.00M	10.5	32.2	11.0	12.9	8.4	32.3		25.0



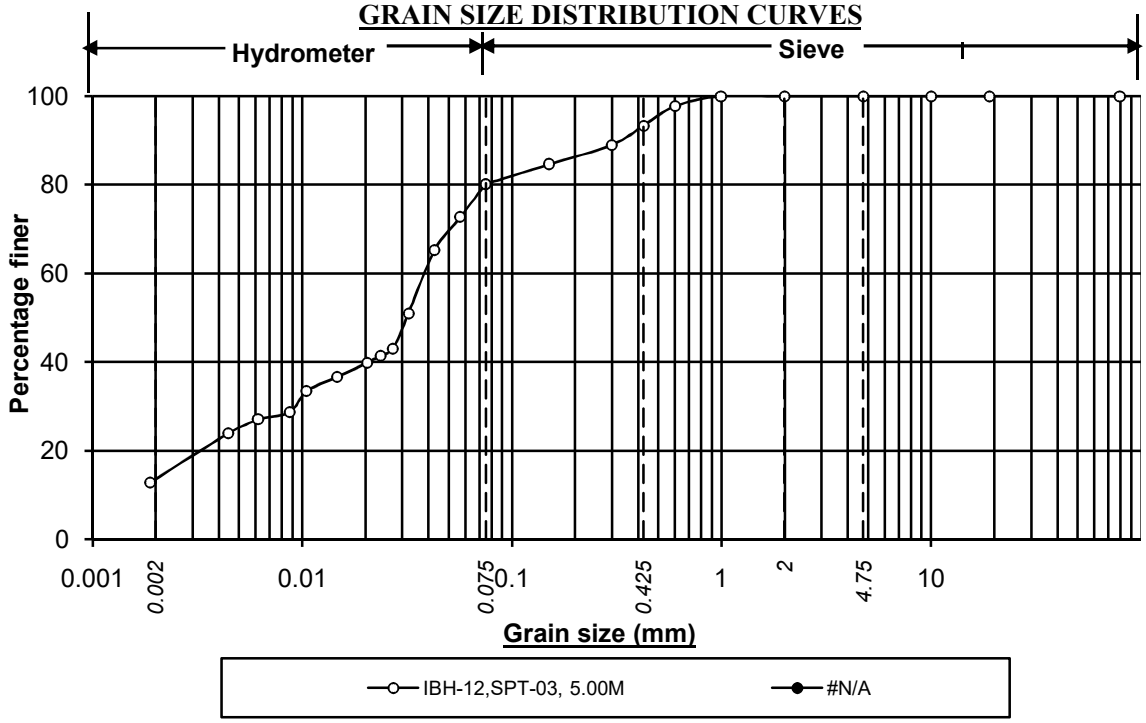
Grain size (mm)	*<0.002*	*0.002-0.075*	*0.075-0.425*	*0.425-2.00*	*2.0-4.75*	**Total sand**	**Weighted mean dia (mm)**	*>4.75*
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
IBH-11,SPT-03, 5.00M		97.9	2.1	0.0	0.0	2.1		0.0
IBH-12,SPT-01, 1.00M		31.6	20.0	30.3	10.1	60.4		8.0

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

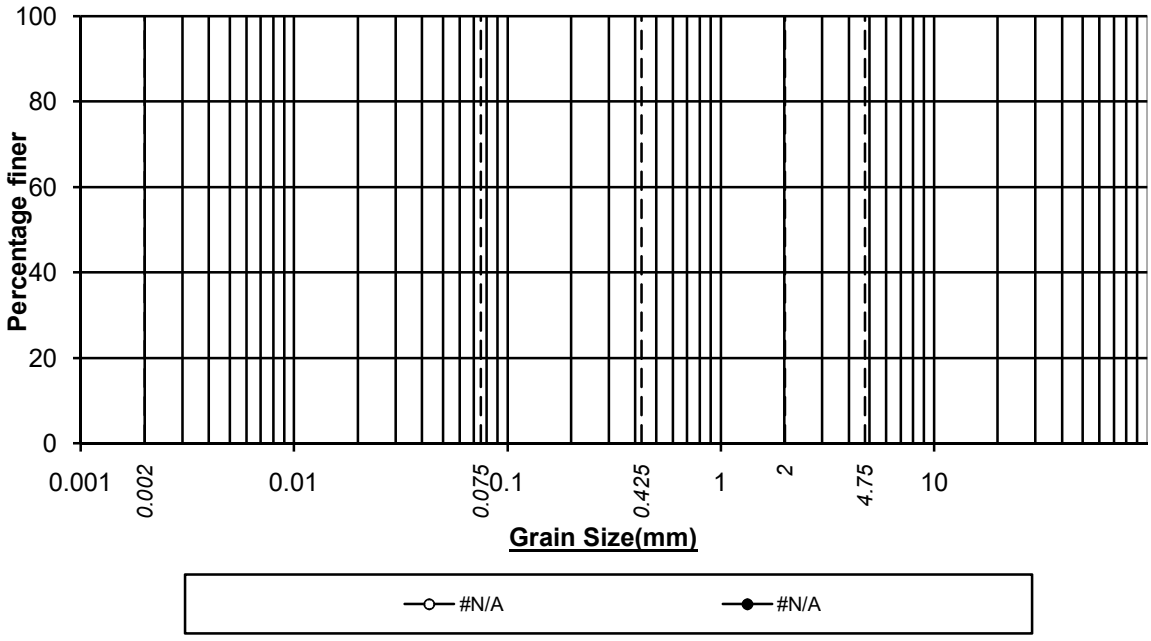
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Sheet No.:

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm)	<0.002	0.002-0.075	0.075-0.425	0.425-2.00	2.0-4.75	Total sand	Weighted mean dia (mm)	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**
IBH-12,SPT-03, 5.00M	13.6	66.6	13.2	6.6	0.0	19.8		0.0



Grain size (mm)	<0.002	0.002-0.075	0.075-0.425	0.425-2.00	2.0-4.75	Total sand	Weighted mean dia (mm)	>4.75
Sample No.	**Clay (%)**	**Silt (%)**	**Fine sand (%)**	**Medium sand (%)**	**Coarse sand (%)**			**Gravel (%)**

Project:- G. I. Work for FGD Package at 2x250 MW NSPCL TPP, Bhilai. | **Job No. 4376**

PART IV: SAMPLE CALCULATION

IN-SITU PERMEABILITY TEST IN OVERBURDEN (FALLING HEAD METHOD)

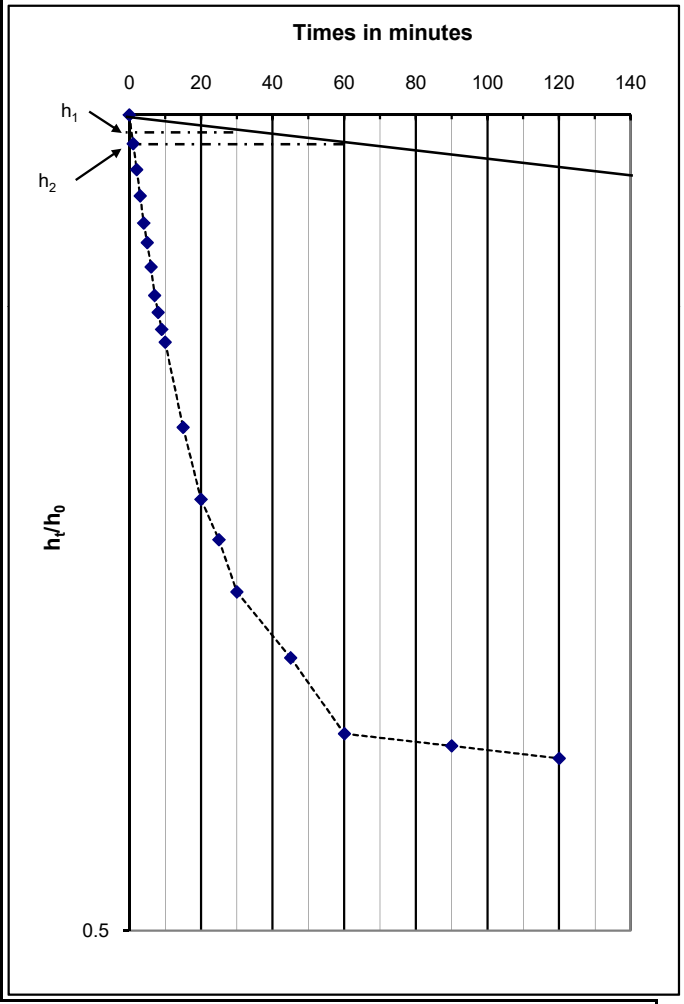
Test location	BH-01		
Ground elevation	292.902M	Static water level	2.90m below G.L.
Diameter of hole (2R)	174.0mm	Ht. of casing from GL	0.40m
Inner diameter of casing/ intake pipe (d)	150.0mm		
Depth tested	2.70m to 3.50m		
Length of test section (L)	0.80m		

Data sheet

Time interval (minute)	Water level in intake pipe (cm)	h_t (cm)	h_t/h_0
0	0.00	330.000	1.0000
1	8.00	322.000	0.9758
2	15.00	315.000	0.9545
3	22.00	308.000	0.9333
4	29.00	301.000	0.9121
5	34.00	296.000	0.8970
6	40.00	290.000	0.8788
7	47.00	283.000	0.8576
8	51.00	279.000	0.8455
9	55.00	275.000	0.8333
10	58.00	272.000	0.8242
15	77.00	253.000	0.7667
20	92.00	238.000	0.7212
25	100.00	230.000	0.6970
30	110.00	220.000	0.6667
45	122.00	208.000	0.6303
60	135.00	195.000	0.5909
90	137.00	193.000	0.5848
120	139.00	191.000	0.5788
From the above Graph, We have			
h1 ⇩	0.987	t1 ⇩	30 min
h2 ⇩	0.978	t2 ⇩	60 min

$$K = \frac{d^2}{8L}\log_e \frac{L}{R}\frac{\log_e(h_1/h_2)}{t_2 - t_1}$$ ⇩ 3.970E-06cm/sec

Time vs. h_t/h_o plot



Legend: h_1 = head of water in the intake pipe at time t_1 above static water level,
h_2 = head of water in the intake pipe at time t_2 above static water level;
h_0 = depth of static water level at time t_0,
h_t = head of water in the intake pipe at any time t

1. AROUND FGD CONTROL ROOM (BH-15):

Let us place the foundation at 2.00m below NGL i.e. 2.06m below FGL (where, FGL = 294M and NGL around FGD Control Room = 293.940 M)

Founding level falls inside Stratum –IA, consisting of medium, silty clay / clayey silt.

A) Design Strength and Deformation Parameters:

For Stratum IA

Use design "N" = 06, corresponding estimated cohesion = 0.50 kg/sqcm.

Hence, use design C = 0.50 kg/sqcm & $\Phi = 0°$ for bearing capacity calculation.

So, Undrained Young's modulus, $E_u = K \times C = 350 \times 0.50 = 175$ kg/sqcm

We know, $E_s = 4.4 \times N = 26.4$ kg/sqcm

Again, $1/E_s = 1/E_u + 1/E_d$ giving drained Young's modulus, $E_d = 31.09$ kg/sqcm

Now, we have, $E_d = E_u/3 = 58.33$ kg/sqcm

Considering the above, let us use $E_d = 44$ kg/sqcm

From E_d, $m_{vc} = 1/G.E_d = 0.0267$ sqcm/kg [Geological Factor, G = 0.85 & $\mu = 0.35$]

Again from SPT "N", $m_{vc} = 1/5N = 0.0333$ sqcm/kg

Thus average $m_{vc} = [0.0333 + 0.0267]/2 = 0.0300$ sqcm/kg

For Stratum I

Use design "N" = 14, corresponding estimated cohesion = 0.82 kg/sqcm.

From laboratory TRSH-UU test result, we have C = 0.96 kg/sqcm & $\Phi = 0°$

Thus, average Cohesion = 0.89 kg/sqcm & $\Phi = 0°$

Let us use, design C = 0.85 kg/sqcm & $\Phi = 0°$ for bearing capacity calculation.

So, Undrained Young's modulus, $E_u = K \times C = 400 \times 0.85 = 340$ kg/sqcm

We know, $E_s = 4.4 \times N = 61.6$ kg/sqcm

Again, $1/E_s = 1/E_u + 1/E_d$ giving drained Young's modulus, $E_d = 75.23$ kg/sqcm

Now, we have, $E_d = E_u/3 = 113.33$ kg/sqcm

Considering the above, let us use $E_d = 94$ kg/sqcm

From E_d, $m_{vc} = 1/G.E_d = 0.0152$ sqcm/kg [Geological Factor, G = 0.70 & $\mu = 0.35$]

Again from SPT "N", $m_{vc} = 1/5N = 0.0143$ sqcm/kg

Now, let us consider the m_{vc} value for the pressure range between 0.50 to 2.00 kg/sqcm

Sample No.	0.50 – 1.00kg/sqcm	1.00 – 2.00kg/sqcm
BH-15 / UDS02	0.0181	0.0097
Average weighted m_{vc}over entire pressure range	**0.0125**	

Giving more weightage to the laboratory test results,

Thus average $m_{vc} = [2 \times 0.0125 + 0.0143 + 0.0152]/4 = 0.0136$ sqcm/kg

For Stratum II

Use average "N" = 100, corresponding estimated cohesion = 3.70 kg/sqcm.

To be in conservative side, use design C = 2.00 kg/sqcm for bearing capacity calculation.

So, Undrained Young's modulus, E_u = K x C = 500 x 2.00 = 1000 kg/sqcm

We know, E_s = 4.4 x N = 440 kg/sqcm

Again, $1/E_s = 1/E_u + 1/E_d$ giving drained Young's modulus, E_d = 785.71 kg/sqcm

Now, we have, $E_d = E_u/3$ = 333.33 kg/sqcm

Considering the above, let us use E_d = 559 kg/sqcm

From E_d, $m_{vc} = 1/G.E_d$ = 0.0036 sqcm/kg [Geological Factor, G = 0.50 & μ = 0.35]

Again from SPT "N", m_{vc} = 1/5N = 0.0020 sqcm/kg

Thus average m_{vc} = [0.0020 + 0.0036]/2 = 0.0028 sqcm/kg

For Stratum III, IV & V:

After that rock layer was encountered. Settlement of rock may be neglected. However, to be in the conservative side, use a lowest probable Young's modulus, E_s = 1000 kg/sqcm, 2000 kg/sqcm & 4000 kg/sqcm for layer-III, IV & V respectively.

B) Calculation of Net Safe Bearing Capacity:

The Net Ultimate Bearing Capacity is given as per Hansen Equation:

$$q_{nu} = C.N_c.S_c.D_c + q.N_q.S_q.D_q + 0.5\gamma.B.N_\gamma.S_\gamma.D_\gamma - q$$

Where, N_c, N_q and N_γ are bearing capacity factors,
S_c, S_q and S_γ are shape factors,
D_c, D_q and D_γ are depth factors,
And C = Cohesion
q = Overburden pressure,
B = Width of foundation,
γ = Effective density below foundation.

For 3m x 6m Isolated Foundation at 2.00m below NGL

Cohesion, C = 5.00 t/sqm

Using ϕ = 0 degree, the bearing capacity factors are:

N_c = 5.14
N_q = 1.00
N_γ = 0.00

Use,

Depth of Foundation = D_f = 2.00 M (below NGL)
Width of Foundation = B = 3.00 M
Length of Foundation = L = 6.00 M

Overburden Pressure = q =2.000 (Depth) x 0.90 (Submerged density) = 1.80 t/sqm (assuming the ground water table is flushing with the ground level)

The Shape factors are [IS:6403 - 1981]

S_c = 1.10 S_q = 1.10 S_γ = 0.80

The Depth factors are [IS:6403 - 1981]

D_c = 1.13 D_q = 1.00 D_γ = 1.00

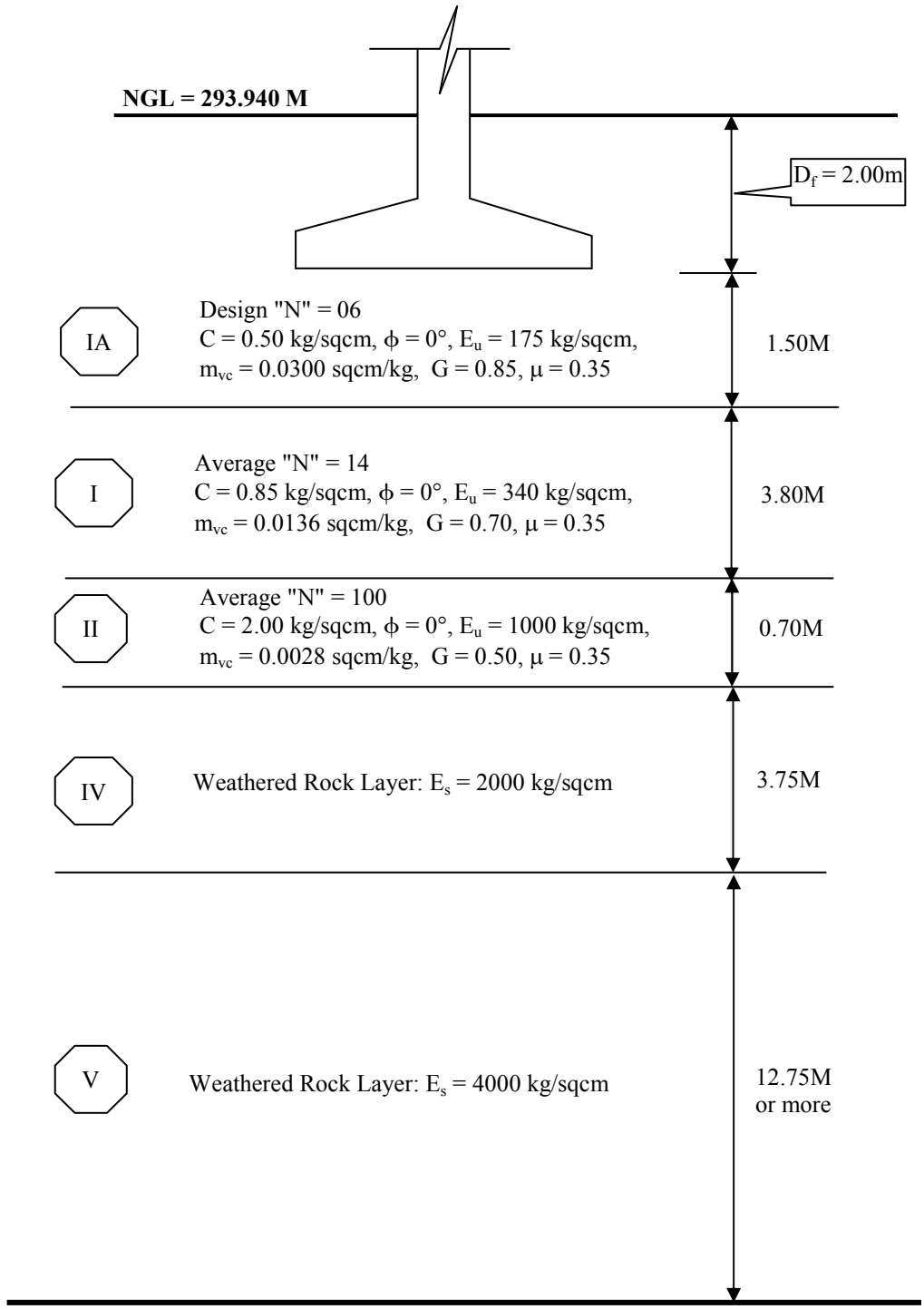
Computed Net Ultimate Bearing Capacity = 32.25 t/sqm

Using a factor of safety of 2.5, Net Safe Bearing Capacity = 12.90 t/sqm

For 6m x 12m Isolated Foundation at 3.00m below NGL

Cohesion, C = 5.00 t/sqm
Using ϕ = 0 degree, the bearing capacity factors are:
N_c = 5.14
N_q = 1.00
N_γ = 0.00
Use,
Depth of Foundation = D_f = 3.00 M (below NGL)
Width of Foundation = B = 6.00 M
Length of Foundation = L = 12.00 M
Overburden Pressure = q =3.000 (Depth) x 0.90 (Submerged density) = 2.70 t/sqm (assuming the ground water table is flushing with the ground level)
The Shape factors are [IS:6403 - 1981]
S_c = 1.10 S_q = 1.10 S_γ = 0.80
The Depth factors are [IS:6403 - 1981]
D_c = 1.10 D_q = 1.00 D_γ = 1.00
Computed Net Ultimate Bearing Capacity = 31.40 t/sqm
Using a factor of safety of 2.5, Net Safe Bearing Capacity = 12.56 t/sqm

The above bearing capacity should be checked against settlement criteria and this is shown below.



SHALLOW FOUNDATION DESIGN MODEL FOR FGD CONTROL ROOM [BH-15]

(Not to Scale)

C) Settlement Calculations:

For 3m x 6m Isolated Foundation at 2.00m below NGL

A) General Data:

Width of foundation =	3.0	m
Length of foundation =	6.0	m
Depth of foundation =	2.0	m
Net Base Pressure =	1.0	kg/sqcm

B) Subsoil Properties:

Layer - IA			Layer - I			Layer - II		
Young's Modulus =	175	kg/sqcm	Young's Modulus =	340	kg/sqcm	Young's Modulus =	1000	kg/sqcm
Poisson Ratio, μ =	0.35		Poisson Ratio, μ =	0.35		Poisson Ratio, μ =	0.35	
Top of Stratum =	2.00	m	Top of Stratum =	3.50	m	Top of Stratum =	7.3	m
End of Stratum =	3.50	m	End of Stratum =	7.30	m	End of Stratum =	8	m
Geological factor, G =	0.85		Geological factor, G =	0.70		Geological factor, G =	0.5	
m_{vc} =	0.0300	sqcm/kg	m_{vc} =	0.0136	sqcm/kg	m_{vc} =	0.0028	sqcm/kg

C) Calculation of Immediate Settlement:

Settlement at center

M = L' / B' =	2.000		M = L' / B' =	1.667		M = L' / B' =	1.361	
N = H / B' =	1.000		N = H / B' =	1.689		N = H / B' =	0.169	
I_1 =	0.125		I_1 =	0.248		I_1 =	0.006	
I_2 =	0.109		I_2 =	0.098		I_2 =	0.037	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.175	$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.293	$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.022
Immediate settlement S_i =		0.528 cm	Immediate settlement S_i =		0.363 cm	Immediate settlement S_i =		0.006 cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$			$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$			$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$		

Settlement at corner

M = L' / B' =	2.00		M = L' / B' =	1.67		M = L' / B' =	1.361	
N = H / B' =	0.500		N = H / B' =	0.844		N = H / B' =	0.084	
I_1 =	0.039918		I_1 =	0.100		I_1 =	0.001	
I_2 =	0.083604		I_2 =	0.101		I_2 =	0.020	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.079	$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.147	$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.010
Immediate settlement S_i =		0.118 cm	Immediate settlement S_i =		0.091 cm	Immediate settlement S_i =		0.001 cm

Average Si for Layer - IA =	3.23 mm	Average Si for Layer - I =	2.27 mm	Average Si for Layer - II =	0.04 mm
Total immediate settlement =	5.54 mm	(for all the three layers)			

D) Calculation of Consolidation Settlement:

Strata	From (M)	To (M)	Thickness (M)	Mid depth (M)	ΔP (kg/sqcm)	m_{vc}, sqcm/kg	G	S_c (cm)
Layer - IA	2.00	2.75	0.75	0.38	0.84	0.0300	0.85	1.60
	2.75	3.50	0.75	1.13	0.61	0.0300	0.85	1.17
Layer - I	3.50	5.40	1.90	2.45	0.39	0.0136	0.70	0.71
	5.40	7.30	1.90	4.35	0.24	0.0136	0.70	0.43
Layer - II	7.30	7.65	0.35	5.48	0.19	0.0028	0.50	0.01
	7.65	8.00	0.35	5.83	0.17	0.0028	0.50	0.01
Hence, Total Consolidation Settlement =								39.24 mm

So, Total Settlement =	44.78 mm
Fox's Depth correction Factor =	0.86
Corrected total settlement =	**38.42 mm**

The calculated settlement is well within permissible limit. Hence, use a net allowable bearing capacity of 10 t/sqm at 2.00m below NGL for 40mm limiting settlement.

Settlement For 6m x 12m Isolated Foundation at 3.00m below NGL

A) General Data:

Width of foundation =	6.0	m
Length of foundation =	12.0	m
Depth of foundation =	3.0	m
Net Base Pressure =	1.1	kg/sqcm

B) Subsoil Properties:

Layer - IA

Young's Modulus =	175	kg/sqcm
Poisson Ratio, μ =	0.35	
Top of Stratum =	3.00	m
End of Stratum =	3.50	m
Geological factor, G =	0.85	
m_{vc} =	0.0300	sqcm/kg

Layer - I

Young's Modulus =	340	kg/sqcm
Poisson Ratio, μ =	0.35	
Top of Stratum =	3.50	m
End of Stratum =	7.3	m
Geological factor, G =	0.7	
m_{vc} =	0.0136	sqcm/kg

C) Calculation of Immediate Settlement:

Settlement at center

M = L' / B' =	2.0000		
N = H / B' =	0.1667		
I_1 =	0.0049		
I_2 =	0.0368		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.022	
Immediate settlement S_i =		0.145	cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$			

Settlement at center

M = L' / B' =	1.9231		
N = H / B' =	1.1692		
I_1 =	0.1567		
I_2 =	0.1096		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.2073	
Immediate settlement S_i =		0.6778	cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$			

Settlement at corner

M = L' / B' =	2.0000		
N = H / B' =	0.0833		
I_1 =	0.0012		
I_2 =	0.0196		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0103	
Immediate settlement S_i =		0.034	cm

Settlement at corner

M = L' / B' =	1.9231		
N = H / B' =	0.5846		
I_1 =	0.0531		
I_2 =	0.0904		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0948	
Immediate settlement S_i =		0.155	cm

Average S_i for Stratum I= 0.89 mm

Average S_i for Stratum II= 4.16 mm

Layer - II

Young's Modulus =	1000	kg/sqcm
Poisson Ratio, μ =	0.35	
Top of Stratum =	7.30	m
End of Stratum =	8	m
Geological factor, G =	0.5	
m_{vc} =	0.0028	sqcm/kg

Layer - IV

Young's Modulus =	2000	kg/sqcm
Poisson Ratio, μ =	0.25	
Top of Stratum =	8	m
End of Stratum =	14.75	m
Geological factor, G =	1	
m_{vc} =	0	sqcm/kg

Settlement at center

M = L' / B' =	1.5825		
N = H / B' =	0.1359		
I_1 =	0.0034		
I_2 =	0.0305		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0175	
Immediate settlement S_i =		0.015	cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$			

Settlement at center

M = L' / B' =	1.5455		
N = H / B' =	1.2273		
I_1 =	0.1729		
I_2 =	0.1011		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.2403	
Immediate settlement S_i =		0.105	cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$			

Settlement at corner

M = L' / B' =	1.583		
N = H / B' =	0.068		
I_1 =	0.001		
I_2 =	0.016		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0083	
Immediate settlement S_i =		0.004	cm

Settlement at corner

M = L' / B' =	1.545		
N = H / B' =	0.614		
I_1 =	0.061		
I_2 =	0.089		
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.1202	
Immediate settlement S_i =		0.026	cm

Average S_i for Stratum III= 0.09 mm

Average S_i for Stratum IV= 0.656 mm

Layer - V

Young's Modulus =	4000	kg/sqcm
Poisson Ratio, μ =	0.25	
Top of Stratum =	14.75	m
End of Stratum =	15	m
Geological factor, G =	1	
m_{vc} =	0	sqcm/kg

Settlement at center

M = L' / B' = 1.3380
N = H / B' = 0.0282
I_1 = 0.0002
I_2 = 0.0069
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ = 0.0047
Immediate settlement S_i = 0.001 cm
$[q_o \times B' \times (1- \mu^2) \times m \times I_s] / E_s$

Settlement at corner

M = L' / B' = 1.3380
N = H / B' = 0.0141
I_1 = 0.0000
I_2 = 0.0035
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ = 0.0024
Immediate settlement S_i = 0.000 cm

Average S_i for Stratum V= 0.00 mm

Total immediate settlement = 5.81 mm

D) Calculation of Consolidation Settlement:

Strata	From (M)	To (M)	Thickness (M)	Mid depth (M)	Δ P (kg/sqcm)	m_{vc}, sqcm/kg	G	S_c (cm)
Layer - IA	3.00	3.25	0.25	0.13	1.07	0.0300	0.85	0.68
	3.25	3.50	0.25	0.38	1.00	0.0300	0.85	0.64
Layer - I	3.50	5.40	1.90	1.45	0.79	0.0136	0.70	1.43
	5.40	7.30	1.90	3.35	0.55	0.0136	0.70	1.00
Layer - II	7.30	7.65	0.35	4.48	0.46	0.0028	0.50	0.02
	7.65	8.00	0.35	4.83	0.43	0.0028	0.50	0.02

Hence, Total Consolidation Settlement = 37.91 mm

So, Total Settlement = 43.73 mm
Foxe's Depth correction Factor = 0.90
Corrected total settlement = 39.39 mm

The calculated settlement is well within permissible limit. Hence, use a net allowable bearing capacity of 11 t/sqm at 3.00m below NGL for 40mm limiting settlement.

2. AROUND LIMESTONE UNLOADING AREA (IBH-01, 02 & 03):

Let us place the foundation at 2.00m below NGL i.e. 3.73m below FGL (where, FGL = 294M and NGL around Limestone Unloading Area = 292.275 M)

Founding level falls inside Stratum –I, consisting of stiff to very stiff, silty clay / clayey silt.

A) Design Strength and Deformation Parameters:

For Stratum I

Use design "N" = 22, corresponding estimated cohesion = 1.02 kg/sqcm.

From laboratory TRSH-UU test result, we have C = 0.89 kg/sqcm & $\Phi = 0°$

Thus, average Cohesion = 0.96 kg/sqcm & $\Phi = 0°$

Let us use, design C = 0.95 kg/sqcm & $\Phi = 0°$ for bearing capacity calculation.

So, Undrained Young's modulus, $E_u = K \times C = 400 \times 0.95 = 380$ kg/sqcm

We know, $E_s = 4.4 \times N = 96.8$ kg/sqcm

Again, $1/E_s = 1/E_u + 1/E_d$ giving drained Young's modulus, $E_d = 129.89$ kg/sqcm

Now, we have, $E_d = E_u/3 = 126.67$ kg/sqcm

Considering the above, let us use $E_d = 128$ kg/sqcm

From E_d, $m_{vc} = 1/G.E_d = 0.0120$ sqcm/kg [Geological Factor, G = 0.65 & $\mu = 0.35$]

Again from SPT "N", $m_{vc} = 1/5N = 0.0091$ sqcm/kg

Now, let us consider the m_{vc} value for the pressure range between 0.50 to 2.00 kg/sqcm

Sample No.	0.50 – 1.00kg/sqcm	1.00 – 2.00kg/sqcm
IBH-01 / UDS01	0.0105	0.0075
IBH-02 / UDS02	0.0132	0.0133
IBH-03 / UDS01	0.0135	0.0096
Average weighted m_{vc}over entire pressure range	**0.0109**	

Giving more weightage to the laboratory test results,

Thus average $m_{vc} = [2 \times 0.0109 + 0.0091 + 0.0120]/4 = 0.0107$ sqcm/kg

For Stratum II

Use average "N" = 76, corresponding estimated cohesion = 2.81 kg/sqcm.

To be in conservative side, use design C = 1.75 kg/sqcm for bearing capacity calculation.

So, Undrained Young's modulus, $E_u = K \times C = 500 \times 1.75 = 875$ kg/sqcm

We know, $E_s = 4.4 \times N = 334.4$ kg/sqcm

Again, $1/E_s = 1/E_u + 1/E_d$ giving drained Young's modulus, $E_d = 541.25$ kg/sqcm

Now, we have, $E_d = E_u/3 = 291.67$ kg/sqcm

Considering the above, let us use $E_d = 416$ kg/sqcm

From E_d, $m_{vc} = 1/G.E_d = 0.0044$ sqcm/kg [Geological Factor, G = 0.55 & $\mu = 0.35$]

Again from SPT "N", $m_{vc} = 1/5N = 0.0026$ sqcm/kg

Thus average m_{vc} = [0.0026 + 0.0044]/2 = 0.0035 sqcm/kg

For Stratum III, IV & V:

After that rock layer was encountered. Settlement of rock may be neglected. However, to be in the conservative side, use a lowest probable Young's modulus, E_s = 1000 kg/sqcm, 2000 kg/sqcm & 4000 kg/sqcm for layer-III, IV & V respectively.

B) Calculation of Net Safe Bearing Capacity:

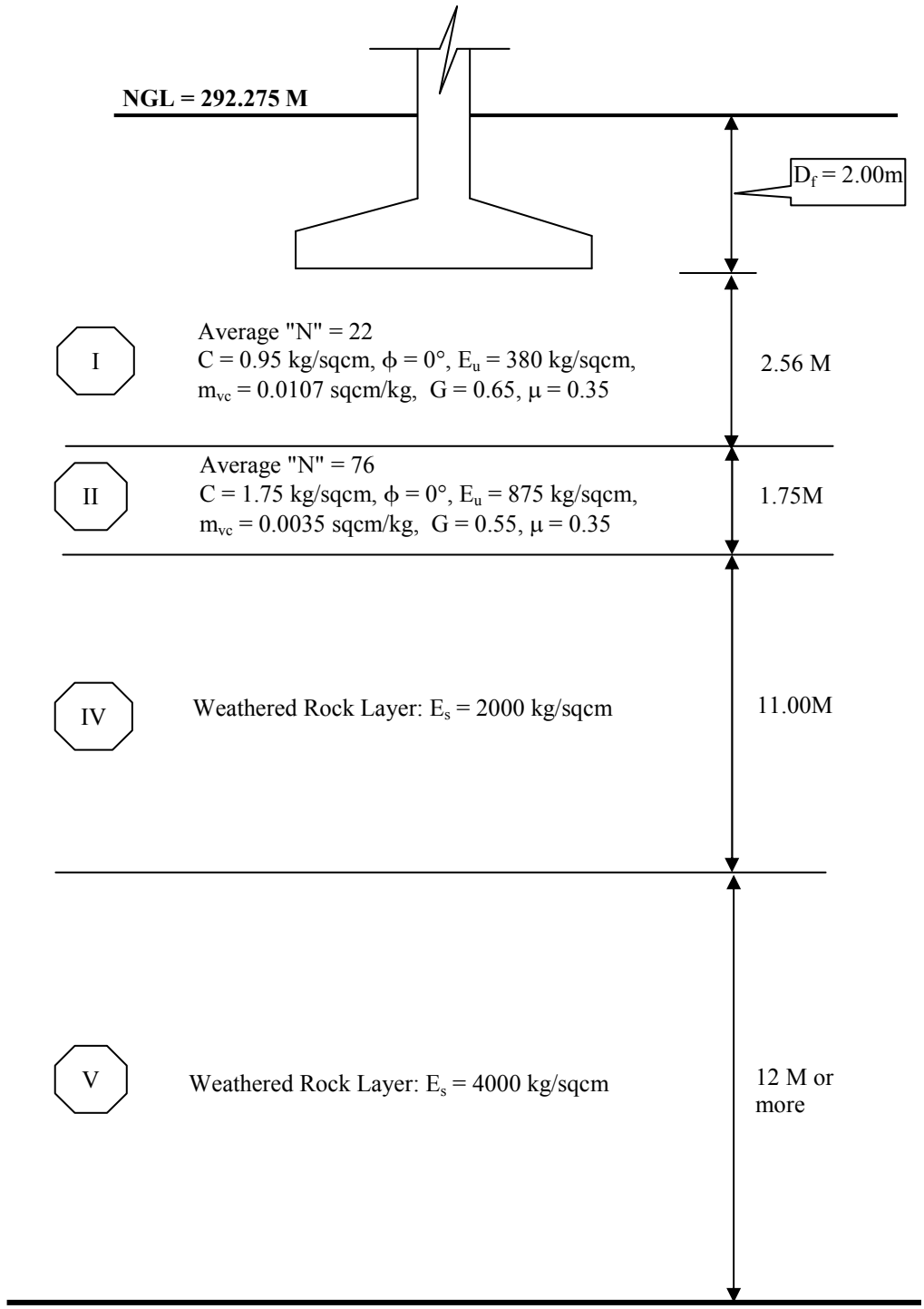
For 10m x 20m Raft Foundation at 2.00m below NGL

Cohesion, C = 9.50 t/sqm
Using ϕ = 0 degree, the bearing capacity factors are:
N_c = 5.14
N_q = 1.00
N_γ = 0.00
Use,
Depth of Foundation = D_f = 2.00 M (below NGL)
Width of Foundation = B = 10.0 M
Length of Foundation = L = 20.0 M
Overburden Pressure = q =2.000 (Depth) x 0.90 (Submerged density) = 1.80 t/sqm (assuming the ground water table is flushing with the ground level)
The Shape factors are [IS:6403 - 1981]
S_c = 1.10 S_q = 1.10 S_γ = 0.80
The Depth factors are [IS:6403 - 1981]
D_c = 1.04 D_q = 1.00 D_γ = 1.00
Computed Net Ultimate Bearing Capacity = 56.09 t/sqm
Using a factor of safety of 2.5, Net Safe Bearing Capacity = 22.44 t/sqm

For 3m x 6m Isolated Foundation at 3.00m below NGL

Cohesion, C = 9.50 t/sqm
Using ϕ = 0 degree, the bearing capacity factors are:
N_c = 5.14
N_q = 1.00
N_γ = 0.00
Use,
Depth of Foundation = D_f = 3.00 M (below NGL)
Width of Foundation = B = 3.00 M
Length of Foundation = L = 6.00 M
Overburden Pressure = q =3.000 (Depth) x 0.90 (Submerged density) = 2.70 t/sqm (assuming the ground water table is flushing with the ground level)
The Shape factors are [IS:6403 - 1981]
S_c = 1.10 S_q = 1.10 S_γ = 0.80
The Depth factors are [IS:6403 - 1981]
D_c = 1.20 D_q = 1.00 D_γ = 1.00
Computed Net Ultimate Bearing Capacity = 64.78 t/sqm
Using a factor of safety of 2.5, Net Safe Bearing Capacity = 25.91 t/sqm

The above bearing capacity should be checked against settlement criteria and this is shown below.



SHALLOW FOUNDATION DESIGN MODEL FOR LIMESTONE UNLOADING AREA [IBH-01, 02 & 03]

(Not to Scale)

C) Settlement Calculations:

For 10m x 20m Raft Foundation at 2.00m below NGL

A) General Data:

Width of foundation =	10.0	m
Length of foundation =	20.0	m
Depth of foundation =	2.0	m
Net Base Pressure =	2.2	kg/sqcm

B) Subsoil Properties:

Layer - I			Layer - II		
Young's Modulus =	380	kg/sqcm	Young's Modulus =	875	kg/sqcm
Poisson Ratio, μ =	0.35		Poisson Ratio, μ =	0.35	
Top of Stratum =	2.00	m	Top of Stratum =	4.56	m
End of Stratum =	4.56	m	End of Stratum =	6.314	m
Geological factor, G =	0.65		Geological factor, G =	0.55	
m_{vc} =	0.0107	sqcm/kg	m_{vc} =	0.0035	sqcm/kg

C) Calculation of Immediate Settlement:

Settlement at center

M = L' / B' =	2.0000		M = L' / B' =	1.7959	
N = H / B' =	0.5128		N = H / B' =	0.2786	
I_1 =	0.0418		I_1 =	0.0136	
I_2 =	0.0848		I_2 =	0.0558	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.081	$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0394
Immediate settlement S_i =		0.822 cm	Immediate settlement S_i =		0.1541 cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$			$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$		

Settlement at corner

M = L' / B' =	2.0000		M = L' / B' =	1.7959	
N = H / B' =	0.2564		N = H / B' =	0.1393	
I_1 =	0.0113		I_1 =	0.0035	
I_2 =	0.0526		I_2 =	0.0313	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0356	$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0180
Immediate settlement S_i =		0.181 cm	Immediate settlement S_i =		0.035 cm

Average S_i for Stratum I= 5.02 mm

Average S_i for Stratum II= 0.95 mm

Layer - IV

Young's Modulus =	2000	kg/sqcm
Poisson Ratio, μ =	0.25	
Top of Stratum =	6.31	m
End of Stratum =	17.31	m
Geological factor, G =	1	
m_{vc} =	0	sqcm/kg

Settlement at center

M = L' / B' =	1.6986	
N = H / B' =	1.5364	
I_1 =	0.2233	
I_2 =	0.1018	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.2912	
Immediate settlement S_i =	0.494	cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$		

Settlement at corner

M = L' / B' =	1.699	
N = H / B' =	0.768	
I_1 =	0.086	
I_2 =	0.099	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.1520	
Immediate settlement S_i =	0.129	cm

Average S_i for Stratum IV= 3.11 mm

Layer - V

Young's Modulus =	4000	kg/sqcm
Poisson Ratio, μ =	0.25	
Top of Stratum =	17.31	m
End of Stratum =	22	m
Geological factor, G =	1	
m_{vc} =	0	sqcm/kg

Settlement at center

M = L' / B' =	1.3951	
N = H / B' =	0.3706	
I_1 =	0.0252	
I_2 =	0.0669	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.0698	
Immediate settlement S_i =	0.041	cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$		

Settlement at corner

M = L' / B' =	1.395	
N = H / B' =	0.185	
I_1 =	0.007	
I_2 =	0.040	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =	0.0331	
Immediate settlement S_i =	0.010	cm

Average S_i for Stratum V= 0.252 mm

Total immediate settlement = 9.33 mm

D) Calculation of Consolidation Settlement:

Strata	From (M)	To (M)	Thickness (M)	Mid depth (M)	Δ P (kg/sqcm)	m_{vc}, sqcm/kg	G	S_c (cm)
Layer - I	2.00	3.28	1.28	0.64	2.00	0.0107	0.65	1.79
	3.28	4.56	1.28	1.92	1.68	0.0107	0.65	1.50
Layer - II	4.56	5.44	0.88	3.00	1.47	0.0035	0.55	0.25
	5.44	6.31	0.88	3.88	1.33	0.0035	0.55	0.22

Hence, Total Consolidation Settlement = 37.59 mm

So, Total Settlement = 46.91 mm
Foxe's Depth correction Factor = 0.97
Applying Rigidity correction Factor = 0.80
Corrected total settlement = 36.33 mm

The calculated settlement is well within permissible limit. However, as per technical specification, let us restrict the net allowable bearing capacity to 20 t/sqm at 2.00m below NGL for 75mm limiting settlement.

Settlement For 3m x 6m Isolated Foundation at 3.00m below NGL

A) General Data:

Width of foundation =	3.0	m
Length of foundation =	6.0	m
Depth of foundation =	3.0	m
Net Base Pressure =	2.5	kg/sqcm

B) Subsoil Properties:

Layer - I			**Layer - II**			**Layer - IV**		
Young's Modulus =	380	kg/sqcm	Young's Modulus =	875	kg/sqcm	Young's Modulus =	2000	kg/sqcm
Poisson Ratio, μ =	0.35		Poisson Ratio, μ =	0.35		Poisson Ratio, μ =	0.25	
Top of Stratum =	3.00	m	Top of Stratum =	4.56	m	Top of Stratum =	6.31	m
End of Stratum =	4.56	m	End of Stratum =	6.31	m	End of Stratum =	9	m
Geological factor, G =	0.65		Geological factor, G =	0.55		Geological factor, G =	1	
m_{vc} =	0.0107	sqcm/kg	m_{vc} =	0.0035	sqcm/kg	m_{vc} =	0	sqcm/kg

C) Calculation of Immediate Settlement:

Settlement at center			*Settlement at center*			*Settlement at center*		
M = L' / B' =	2.0000		M = L' / B' =	1.6573		M = L' / B' =	1.4751	
N = H / B' =	1.0427		N = H / B' =	0.7669		N = H / B' =	0.8508	
I_1 =	0.1328		I_1 =	0.0864		I_1 =	0.1044	
I_2 =	0.1097		I_2 =	0.0981		I_2 =	0.0976	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.183	$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.1317	$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.1694
Immediate settlement S_i =		0.635 cm	Immediate settlement S_i =		0.1572 cm	Immediate settlement S_i =		0.077 cm
$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$			$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$			$[q_o \times B' \times (1-\mu^2) \times m \times I_s] / E_s$		

Settlement at corner			*Settlement at corner*			*Settlement at corner*		
M = L' / B' =	2.0000		M = L' / B' =	1.6573		M = L' / B' =	1.475	
N = H / B' =	0.5213		N = H / B' =	0.3834		N = H / B' =	0.425	
I_1 =	0.0430		I_1 =	0.0256		I_1 =	0.032	
I_2 =	0.0856		I_2 =	0.0697		I_2 =	0.073	
$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0825	$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0577	$I_s = I_1 + \{(1-2\mu) / (1-\mu)\} I_2$ =		0.0810
Immediate settlement S_i =		0.143 cm	Immediate settlement S_i =		0.034 cm	Immediate settlement S_i =		0.018 cm

Average S_i for Stratum I= 3.89 mm

Average S_i for Stratum II= 0.96 mm

Average S_i for Stratum IV = 0.48 mm

Total immediate settlement = 5.32 mm

D) Calculation of Consolidation Settlement:

Strata	From (M)	To (M)	Thickness (M)	Mid depth (M)	ΔP (kg/sqcm)	m_{vc}, sqcm/kg	G	S_c (cm)
Layer - I	3.00	3.78	0.78	0.39	2.08	0.0107	0.65	1.13
	3.78	4.56	0.78	1.17	1.50	0.0107	0.65	0.82
Layer - II	4.56	5.44	0.88	2.00	1.12	0.0035	0.55	0.19
	5.44	6.31	0.88	2.88	0.86	0.0035	0.55	0.15
Hence, Total Consolidation Settlement =								22.82 mm

So, Total Settlement = 28.14 mm

Foxe's Depth correction Factor = 0.79

Corrected total settlement = 22.18 mm

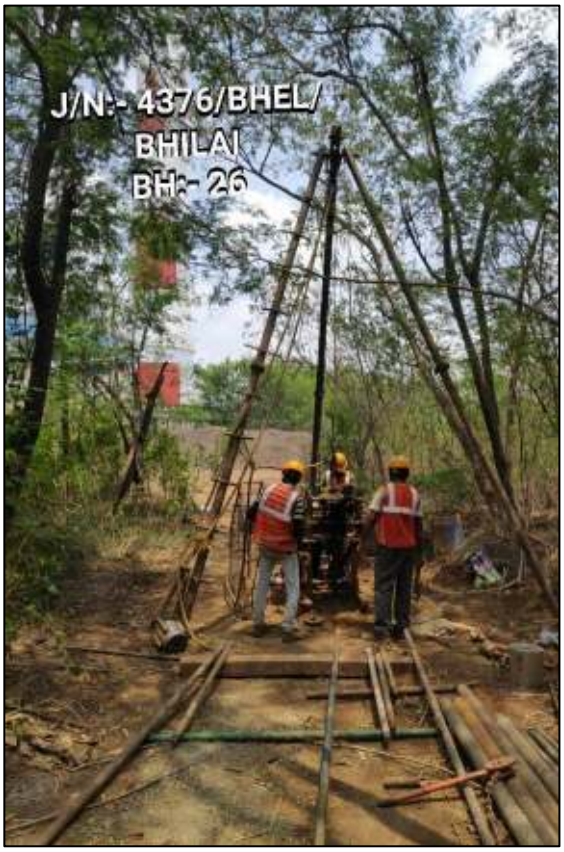
The calculated settlement is well within permissible limit. However, as per technical specification, let us restrict the net allowable bearing capacity to 20 t/sqm at 3.00m below NGL for 40mm limiting settlement.

PART V: PHOTOGRAPHS


J/N:-4376/BHEL/
BHILAI
BH:-13


J/N-4376/BHEL/BHILAI
BH-23


JOB NO=4376
PROJECT=BHEL/
BHILAI
BH NO=09


J/N:- 4376/BHEL/
BHILAI
BH:- 26


J/N:- 4376/BHEL/
BHILAI
BH:-IBH-02


J/N-4376/BHEL/BHILAI
IBH-09
REDMI NOTE 5 PRO
MI DUAL CAMERA


J/N-4376/BHEL/
BHILAI
BH:-IBH-12

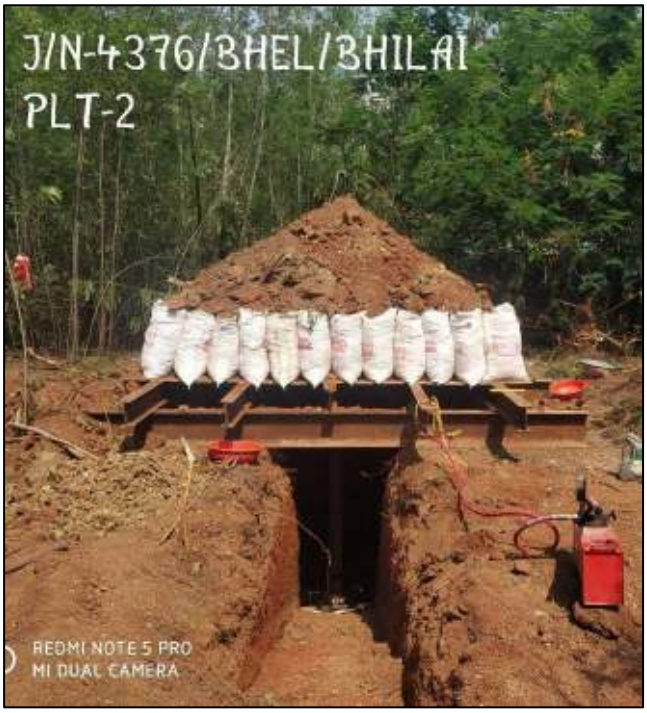





JIN= 4376
BHEL/BHILAI
BH= 12
BOX NO=01/02




BH:-IBH-12
BOX-1/2


J/N-4376/BHEL/BHILAI
PLT-2
REDMI NOTE 5 PRO
MI DUAL CAMERA


J/N-4376/BHEL/BHILAI
PLT-01
REDMI NOTE 5 PRO
MI DUAL CAMERA


J/N-4376/BHEL/BHILAI
CPLT-01
REDMI NOTE 5 PRO
MI DUAL CAMERA


J/N-4376/BHEL/BHILAI
CPLT-1

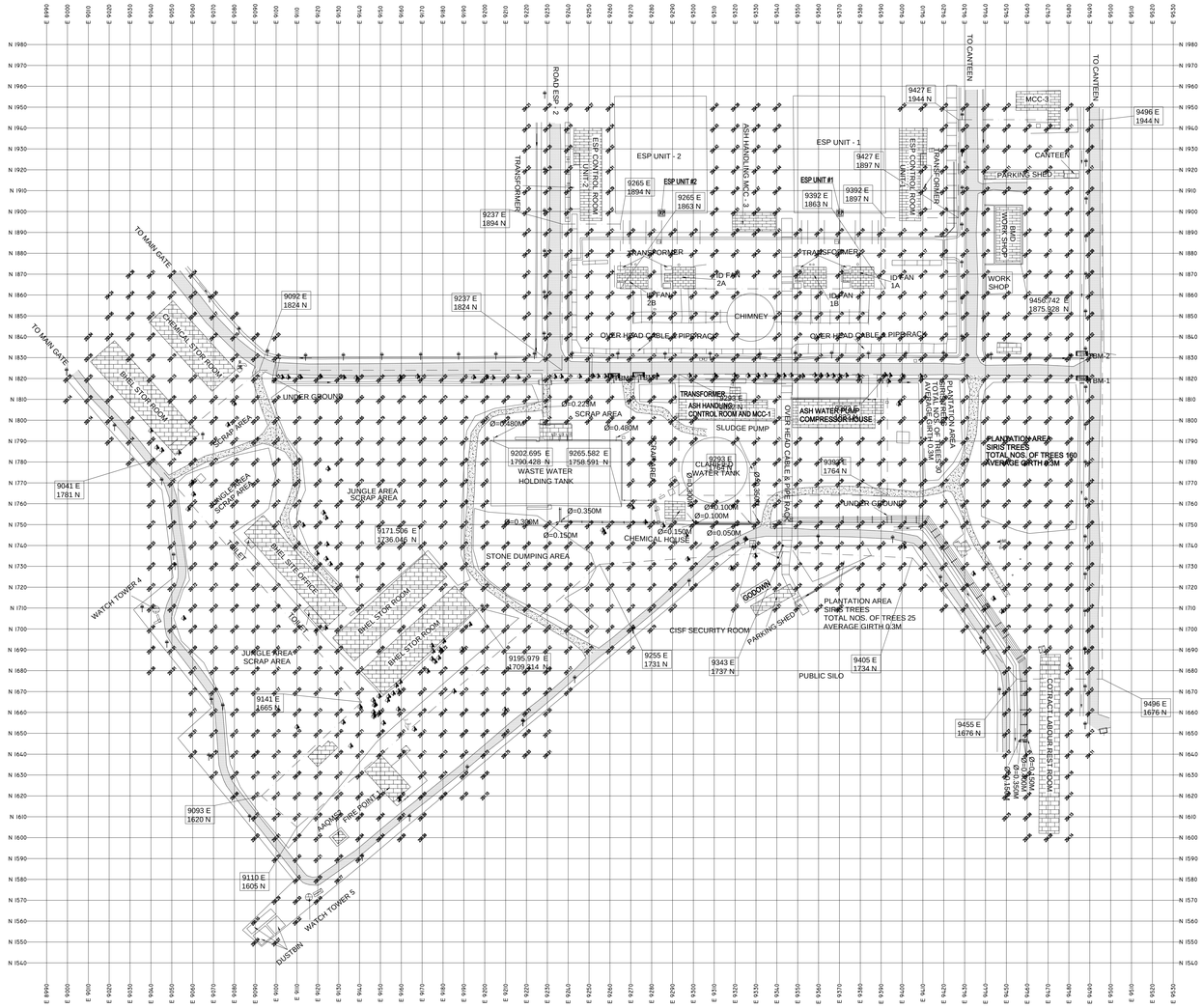

J/N-4376/BHEL/BHILAI
DCPT-1
REDMI NOTE 5 PRO
MI DUAL CAMERA


JOB NO=4376
BHEL/BHILAI
DCPT=05

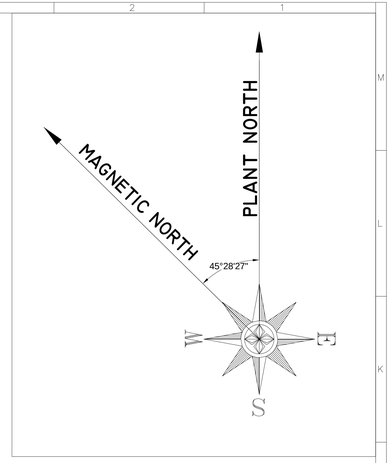



J/N:- 4376/BHEL/
BHILAI
DCPT:-1DCPT-01

FIRST ANGLE PROJECTION
ALL DIMENSIONS ARE IN MM



TREE DETAILS				
TREE NO.	TREE NAME	GIRTH(M)	EASTING (M)	NORTHING (M)
1	NEEM	G=0.7	9334.334	1820.359
2	NEEM	G=0.7	9379.034	1820.099
3	NEEM	G=0.6	9373.291	1820.427
4	NEEM	G=0.6	9369.998	1820.071
5	NEEM	G=0.5	9367.034	1820.189
6	NEEM	G=0.5	9364.187	1820.420
7	NEEM	G=0.5	9361.115	1820.418
8	NEEM	G=0.5	9358.229	1820.524
9	NEEM	G=0.5	9352.447	1820.143
10	NEEM	G=0.5	9346.818	1820.455
11	NEEM	G=0.5	9343.451	1820.296
12	NEEM	G=0.5	9340.337	1820.411
13	NEEM	G=0.4	9391.851	1820.637
14	NEEM	G=0.5	9394.248	1820.395
15	NEEM	G=0.5	9400.045	1820.145
16	NEEM	G=0.7	9408.895	1820.054
17	UNKNOWN	G=0.6	9393.525	1817.604
18	PEEPAL	G=0.5	9479.905	1681.500
19	SHIRISH	G=0.5	9434.196	1725.404
20	SHIRISH	G=0.5	9443.856	1713.476
21	BABUL	G=0.5	9447.747	1707.264
22	MANGO	G=0.5	9325.120	1742.001
23	SHIRISH	G=0.6	9296.576	1743.753
24	UNKNOWN	G=0.6	9401.021	1738.248
25	UNKNOWN	G=0.5	9329.596	1733.933
26	UNKNOWN	G=0.6	9317.953	1728.064
27	UNKNOWN	G=0.8	9270.770	1757.087
28	SHISHAM	G=0.5	9257.182	1745.042
29	SHISHAM	G=0.8	9276.986	1750.067
30	UNKNOWN	G=0.5	9285.523	1748.310
31	SHIRISH	G=0.6	9297.292	1732.400
32	SHIRISH	G=0.7	9256.605	1746.224
33	SHIRISH	G=0.5	9209.592	1660.252
34	SHIRISH	G=0.5	9166.302	1650.870
35	SHIRISH	G=0.6	9158.854	1617.015
36	SHIRISH	G=0.6	9185.276	1669.044
37	SHIRISH	G=0.5	9149.407	1658.639
38	SHIRISH	G=0.9	9146.932	1657.697
39	SHIRISH	G=0.5	9147.493	1662.694
40	SHIRISH	G=0.4	9146.775	1656.978
41	UNKNOWN	G=0.9	9149.335	1666.650
42	SHIRISH	G=0.5	9146.674	1659.085
43	SHIRISH	G=0.6	9153.938	1666.532
44	SHIRISH	G=0.5	9153.428	1664.744
45	SHIRISH	G=0.5	9156.099	1668.029
46	SHIRISH	G=0.5	9158.706	1669.078
47	SHIRISH	G=0.5	9151.472	1653.861
48	UNKNOWN	G=0.5	9157.594	1671.807
49	SHIRISH	G=0.5	9159.425	1673.536
50	SHIRISH	G=0.7	9147.081	1662.382
51	SHIRISH	G=0.8	9146.532	1664.729
52	SHIRISH	G=1.0	9140.290	1661.570
53	SHIRISH	G=0.6	9132.167	1654.190
54	SHIRISH	G=0.6	9135.771	1642.843
55	SHIRISH	G=0.7	9110.035	1651.907
56	SHIRISH	G=0.4	9158.577	1660.453
57	SHIRISH	G=0.5	9192.895	1701.119
58	SHIRISH	G=0.6	9180.347	1693.098
59	SHIRISH	G=0.7	9189.118	1689.259
60	SHIRISH	G=0.8	9179.272	1688.474
61	SHIRISH	G=0.8	9178.486	1689.098
62	SHIRISH	G=0.8	9174.735	1690.830
63	SHIRISH	G=0.6	9175.203	1688.190
64	SHIRISH	G=0.6	9177.948	1685.083
65	SHIRISH	G=0.7	9174.710	1684.550
66	SHIRISH	G=0.6	9176.196	1683.222
67	SHIRISH	G=0.7	9172.622	1678.652
68	NEEM	G=0.5	9260.463	1820.076
69	NEEM	G=0.4	9257.680	1820.048
70	NEEM	G=0.5	9254.245	1820.088
71	NEEM	G=0.4	9251.772	1820.128
72	NEEM	G=0.4	9245.486	1819.930
73	NEEM	G=0.4	9236.617	1819.872
74	NEEM	G=0.4	9233.652	1819.770
75	NEEM	G=0.4	9102.815	1819.580
76	NEEM	G=0.4	9105.749	1819.511
77	NEEM	G=0.4	9111.671	1819.587
78	NEEM	G=0.4	9121.218	1819.876
79	NEEM	G=0.4	9132.433	1819.450
80	NEEM	G=0.4	9138.461	1819.315
81	NEEM	G=0.4	9159.341	1819.482
82	NEEM	G=0.4	9167.858	1819.859
83	NEEM	G=0.4	9194.706	1819.541
84	NEEM	G=0.4	9200.770	1819.440
85	NEEM	G=0.4	9203.956	1819.329
86	NEEM	G=0.4	9215.960	1819.587
87	PEEPAL	G=0.6	9123.883	1752.198
88	UNKNOWN	G=0.5	9122.705	1754.603
89	SHIRISH	G=0.4	9124.427	1739.495
90	UNKNOWN	G=0.5	9124.982	1775.658
91	SHIRISH	G=0.7	9124.985	1775.671
92	UNKNOWN	G=0.5	9112.936	1748.634
93	UNKNOWN	G=0.5	9125.974	1730.006
94	UNKNOWN	G=0.6	9119.604	1735.169
95	UNKNOWN	G=0.5	9124.007	1732.516
96	SHIMUL	G=1.0	9123.712	1699.441
97	SHISHAM	G=0.6	9079.924	1806.832
98	SHISHAM	G=0.5	9076.869	1796.763
99	UNKNOWN	G=0.5	9398.364	1806.706
100	UNKNOWN	G=0.6	9059.567	1769.126
101	UNKNOWN	G=0.5	9053.410	1783.420
102	UNKNOWN	G=0.5	9039.914	1793.927
103	BABUL	G=0.6	9042.889	1785.832
104	KUL	G=0.5	9045.214	1784.547
105	KUL	G=0.5	9057.862	1756.394
106	BABUL	G=0.6	9060.439	1763.460
107	NEEM	G=0.5	9330.985	1820.329
108	NEEM	G=0.5	9326.267	1820.287
109	NEEM	G=0.5	9319.688	1820.405
110	NEEM	G=0.5	9310.306	1820.325
111	NEEM	G=0.5	9298.189	1820.291
112	NEEM	G=0.5	9282.559	1820.320
113	BABUL	G=0.5	9055.731	1704.069



LEGENDS		
SL.NO.	DESCRIPTION	SYMBOL
1	BITUMEN ROAD	
2	WBM ROAD	
3	BUILDING	
4	CHIMNEY	
5	COMPOUND WALL	
6	PUCCA DRAIN	
7	COVER DRAIN	
8	TREE WITH GIRTH	
9	SEMI PUCCA HUTMENT	
10	ID FAN HOUSE	
11	LAMP POST	
12	IRON SHED	
13	PIPE LINE	
14	ELECTRIC POST	
15	GRID SPOT LEVEL	98.65
16	HIGH MAST LIGHT POST	HMLP
17	SEPTIC TANK	
18	TBM	TBM
19	CULVERT PARAPET	
20	CULVERT	
21	CONCRETE STRUCTURE	
22	WATER TANK	
23	WATER TAP	
24	CABLE & PILE RACK	
25	ID FAN BOTTOM	
26	BARBED WIRE FENCING	
27	GATE	
28	CONCRETE STRUCTURE	
29	HUTMENT	
30	REFERENCE POINT	RP
31	DUSTBIN	
32	STAIR	

SUMMARY OF TREE		
SL. NO	NO OF TREE	GIRTH(MM)
1	113	400-1000

LIST OF TBM				
TBM NO	EASTING(M)	NORTHING(M)	RL(M)	REMARKS
TBM-1	9486.344	1817.757	294.964	ON THE TOP OF CULVERT PARAPET
TBM-2	9486.246	1829.504	295.046	ON THE TOP OF CULVERT PARAPET
TBM-3	9261.894	1818.888	294.933	ON THE TOP OF CULVERT PARAPET
TBM-4	9273.773	1819.404	294.765	ON THE TOP OF CULVERT PARAPET

.NOTES.

1. All dimensions are in Metre.
2. Topographical survey work has been carried out by the Co-ordinate and RL taken from following locations with respective values.

SL. NO.	REFERENCE POINT	NORTHING(M)	EASTING(M)	RL(M)
1	CENTER POINT OF GRID EK, ESP UNIT #1	1899.380	9370.250	294.225
2	CENTER POINT OF GRID EK, ESP UNIT #2	1899.380	9284.750	294.250

3. Reduced level (RL) has been transfrred in consultantion with NSPCL which has been taken from TG finished floor (i.e. 0.000=294.500m)
4. North Direction : Plant North.
5. Area of Survey : 63880.00 Sqm. = 6.388 Hectare.

NTPC DRAWING NO.

OWNER: NTPC SAIL POWER COMPANY PVT. LIMITED

CONSULTANT : एन टी पी सी NTPC — एन टी पी सी लिमिटेड NTPC Limited (A Government of India Enterprise)

PROJECT : NSPCL BHILAI TPP FGD (2X250MW)

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR-WESTERN REGION
SHREEMOHINI COMPLEX, 345 KINGSWAY
NAGPUR – 440 001

SURVEY AGENCY: CETEST Engineering Consultants An ISO 9001:2015 & OHSAS 18001 Certified Company

C.E.TESTING COMPANY PVT. LTD.
124A NSC BOSE ROAD,
KOLKATA-700092

DEPT CODE		NAME	SIGN	DATE
C	SUV	SM		14.02.2020
	DWG	KR		14.02.2020
	CHD	JH		14.02.2020
	APPD	JH		14.02.2020

JOB NO. 468
STATUS CONTRACT
DRG./REF. NO. (INTERNAL)
PRINT SCALE IN METRE 0 2 4 6 8 10 20 30 40 50

REV	DATE	ALTD	CHD	APPD
0	14.02.2020			

TITLE : TOPOGRAPHICAL SURVEY WORK FOR 2X250 MW NSPCL BHILAI TPP FGD AREA

MPL	ELEC	C&I	MSE	MAX	DEPT. SIGN DATE	SCALE VARIES

DRAWING NO. SUV/4376/PLAN/FS

SHEET 1 OF 1 REV. 0

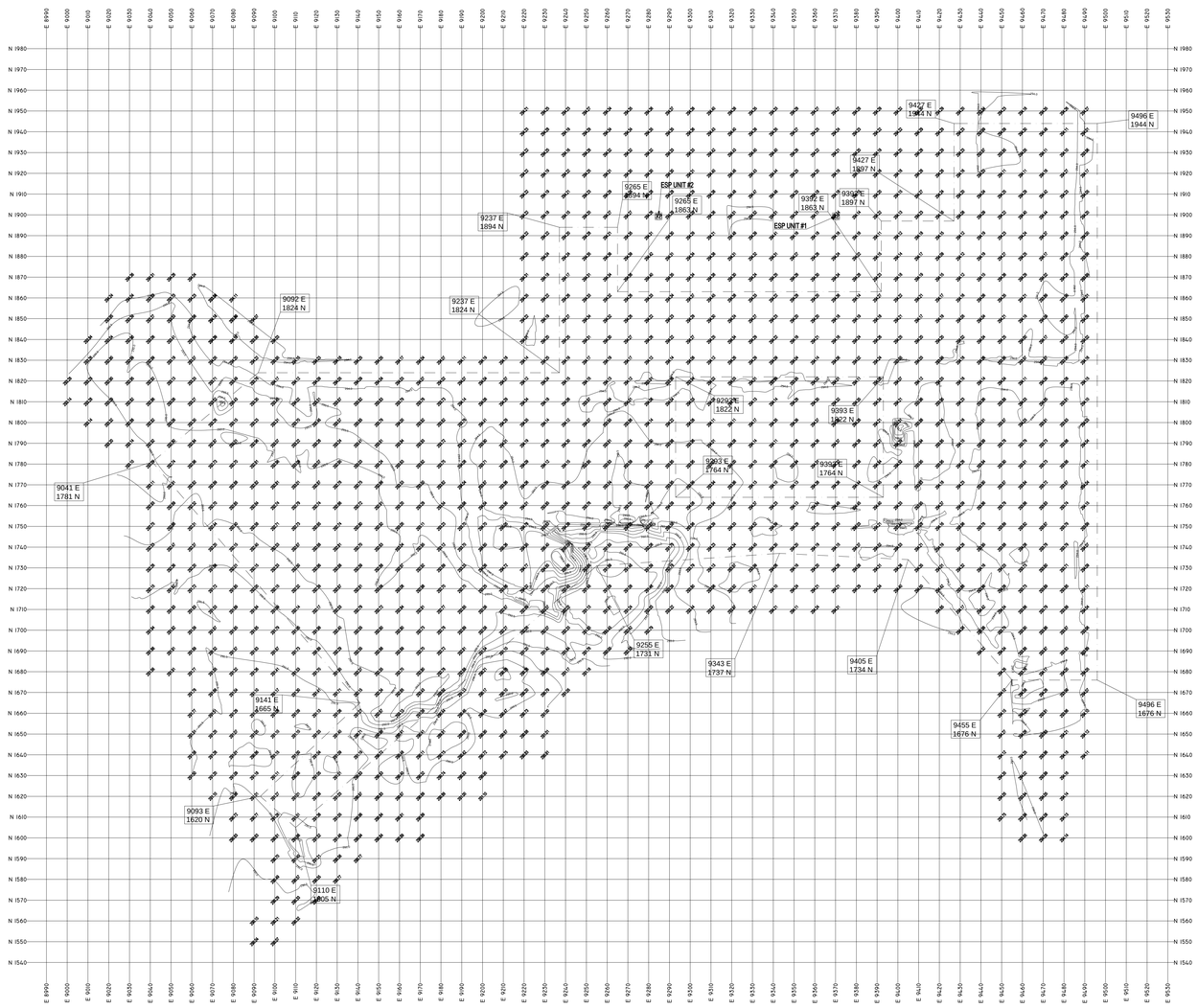
FORMAT SIZE A0

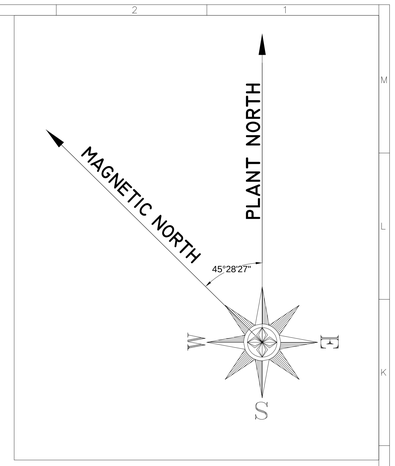
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It must not be used directly or indirectly in any detrimental to the interest of the company

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM

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LEGENDS		
SL.NO.	DESCRIPTION	SYMBOL
1	CONTOUR LINE	294.0 / 293.5
2	GRID SPOT LEVEL	45.0
3	SURVEYED AREA	
4	REFERENCE POINT	RP

.NOTES.

1. All dimensions are in Metre.
2. Topographical survey work has been carried out by the Co-ordinate and RL taken from following locations with respective values.

SL. NO.	REFERENCE POINT	NORTHING(M)	EASTING(M)	RL(M)
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4. North Direction : Plant North.
5. Area of Survey : 63880.00 Sqm. = 6.388 Hectare.

NTPC DRAWING NO.

OWNER: NTPC SAIL POWER COMPANY PVT. LIMITED

CONSULTANT : NTPC Limited (A Government of India Enterprise)

PROJECT : NSPCL BHILAI TPP FGD (2X250MW)

JOB NO. 468
STATUS CONTRACT
DRG./REF. NO. (INTERNAL)
PRINT SCALE IN METRE 0 2 4 6 8 10 20 30 40 50

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR–WESTERN REGION
SHREEMOHINI COMPLEX, 345 KINGSWAY
NAGPUR – 440 001

SURVEY AGENCY.
CETEST Engineering Consultants An ISO 9001:2008 & OHSAS 18001 Certified Company

C.E.TESTING COMPANY PVT. LTD.
124A NSC BOSE ROAD,
KOLKATA–700092

DEPT CODE		NAME	SIGN	DATE
C	SUV	SM		14.02.2020
	DWG	KR		14.02.2020
	CHD	JH		14.02.2020
	APPD	JH		14.02.2020

REV	DATE	ALTD	CHD	APPD	REV	DATE	ALTD	CHD	APPD	REV	DATE	ALTD	CHD	APPD
										0	26.11.19			

TITLE : TOPOGRAPHICAL SURVEY WORK FOR 2X250 MW NSPCL BHILAI TPP FGD AREA

	MPL	ELEC	C&I	MSE	MAX	DEPT.	SCALE VARIES	DRAWING NO. SUV/4376/PLAN/CS
						SIGN.		
						DATE		SHEET 1 OF 1 REV. 0

FORMAT SIZE A0

N

EXISTING CHIMNEY

NEW WET STACK

EL +37.480M

SHEL-RPT

SHEL-RPT

4000

CHIMNEY OPENING

700(TYP)

TOD (EL +33.480M)

EL: +29.580M

CL. EL. +29.580M

7800X3700

BOD (EL +25.680M)

TOD (EL +22.900M)

4200

TOD (EL +22.900M)

BOD (EL +18.700M)

8400

CL. EL. +18.700M

8400X4200

3900X8000

SPOOL DUCT

TOD (EL +18.000M)

TOD (EL +15.700M)

TOD (EL +15.200M)

BOD (EL +14.500M)

700X4500

CL. EL. +14.500M

700X5600

700X7800

O₂ EL. +13.350M

4700X7800

4200X4200

CL. EL. +13.100M

4200X4200

650

BOD (EL +11.000M)

BOD (EL +11.000M)

BOD (EL +11.000M)

TOS (EL +10.350M)

5000X7000

650(TYP)

TOS (EL +4.5M)
EXISTING PIPE RACK

CL. OF ROAD
1824.5N

CL. OF ROAD
1801.6N

3570

3570

1593

4497

6737

1400

1400

FGL -0.5M

EL -0.0M

EL +0.3M
ABSORBER BOTTOM

FGL -0.5M

EL -0.0M

1100

1100

1100