Haryana Rail Infrastructure Development Corporation Ltd
(A Joint Venture Govt. of Haryana and Ministry of Railways)
Plot no.143, Railtel Tower, Sector-44, Floor/ Room number: 5th floor, City: Gurugram, Zip code: 122003, Country: INDIA
Telephone: +91 9729410447, E-mail: horc.etendering@gmail.com , Website: www.hridc.co.in

Tender No.: HORC/HRIDC/C-5/2023 Date 15.01.2024

Reference: Specific Procurement Notice dated 03.11.2023.
E-tender No.: 2023_HBC_327530_1

CORRIGENDUM No. 4

Name of Work: Contract Package C-5: Composite Contract package in connection with New BG Double Railway Line of HORC project between stations Prithla and Dhulawat for:

(i) Design and Construction of Civil Works (Earthwork, Bridges, Stations and Retaining Walls) from km -2.296 to km 12.00 & km 18.00 to km 20.942;
(ii) Design & Construction of viaduct from km 20.942 to km 24.844;
(iii) Design & Construction of Ballastless track from km 20.842 to km 24.844; and
(iv) Design, Supply, Installation, Testing & Commissioning of General Electrical Services from km -2.296 to km 12.00 and Km 18.00 to Km 24.844.

<table>
<tr><th>S. No.</th><th>Tender Document Part / Section/ Clause No.</th><th>Description of Existing Clause</th><th>Modified Description of Existing Clause / New Clause</th></tr>
<tr><td>1.</td><td>Corrigendum No. 2, Final Tender Document, Part 2, Section VII-8: Tender Drawings and Documents, 8B Documents. S. No 7.3</td><td>Report No: 1901-HORC-II
Report No: 1901-HORC-VI
Report No: 1901-HORC-VII</td><td>Additional 36 Nos. bore holes reports have been included in the revised Report No.: 1901-HORC-II, Report No: 1901-HORC-VI and Report No: 1901-HORC-VII. Revised Reports have been annexed as Attachment 1 of this Corrigendum No. 4.
Details of Additional Bore Holes Reports
<table>
<tr><th>S. No</th><th>Report No.</th><th>No. of Bore Holes Report issued vide Corrigendum No. 2</th><th>Additional No. of Bore Holes Report included with Corrigendum No. 4</th><th>Toal No. of Bore Holes Report issued with Corrigendum No. 4</th></tr>
<tr><td>1</td><td>1901-HORC-II</td><td>8</td><td>12</td><td>20</td></tr>
<tr><td>2</td><td>1901-HORC-VI</td><td>7</td><td>06</td><td>13</td></tr>
<tr><td>3</td><td>1901-HORC-VII</td><td>2</td><td>18</td><td>20</td></tr>
<tr><td colspan="2">Total</td><td>17</td><td>36</td><td>53</td></tr>
</table></td></tr>
</table>

--SD --
Chief Project Manager/South,
Haryana Rail Infrastructure Development Corporation Limited Plot No 143, 5th Floor, RailTel Tower, Sector-44, Gurugram,Haryana-122003

Tender No. HORC/HRIDC/C-5/2023

Attachment 1

to

Corrigendum No. 4

Part 2, Section VII-8B: Documents

1. Revised Geotechnical Investigation Reports

S. No	Report No.	No. of Bore Holes Report issued vide Corrigendum No. 2	Additional No. of Bore Holes Report included with Corrigendum No. 4	Toal No. of Bore Holes Report issued with Corrigendum No. 4
1	1901-HORC-II	8	12	20
2	1901-HORC-VI	7	06	13
3	1901-HORC-VII	2	18	20
	Total	**17**	**36**	**53**

Report No.: 1901-HORC-II Date: Oct 16th; 2023

GEOTECHNICAL INVESTIGATION REPORT

ULR No.: TC916923000000032P
REVISION-R2

AT THE SITE FOR

HORC VIADUCT BETWEEN SOHANA & DHULAWAT STATIONS OF HARYANA ORBITAL RAIL CORRIDOR (HORC) PROJECT, HARYANA

FROM BOREHOLES P21 TO P40

CLIENT

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

Plot No. 143, 5th floor RailTel tower, Sector-44,
Gurugram, Haryana 122003

GENERAL CONSULTANTS

RITES-SMEC JV

Gurugram, Haryana

GEOTECHNICAL CONSULTANTS

TECHPRO ENGINEERS PVT. LTD.

114, RAM GANGA HOUSING SOCIETY, NARAMAU, G T ROAD,
KANPUR-209 217, Phone: 9793209918
e-mail: info@techproindia.com

TC-9169

REVISION NOTES

REVISION NO.	DATE	DESCRIPTION
R1	13.12.2023	• Lithological profile added in Appendix-C.
R2	02.01.2024	• Test data and SBC of pile added for bore holes P21 to P23, P25 to P29, P31, P35, P37 & P38.

REPORT FORMAT

Report No.	Bore included	Total Number of Bores
1901-HORC-I	A1 to P20	21
1901-HORC-II	P21 to P40	20
1901-HORC-III	P41 to P60	20
1901-HORC-IV	P61 to P80	20
1901-HORC-V	P81 to P100	20
1901-HORC-VI	P101 to P113	13
1901-HORC-VII	P114A to P133A	20
1901-HORC-VIII	P134A to A2A	16
1901-HORC-IX	P114B to P133B	20
1901-HORC-X	P134B to A2B	16

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APPENDICES

TECHPRO ENGINEERS PVT.LTD.

114, Ram Ganga Housing Society, Naramau, G T Road, Kanpur-209 217
Tel.: 9793209918, e-mail: info@techproindia.com
Web site: www.techproindia.com

National Accreditation Board for
Testing and Calibration Laboratories

NABL

CERTIFICATE OF ACCREDITATION

TECHPRO ENGINEERS PVT. LTD. (LABORATORY DIVISION)

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

114, RAM GANGA HOUSING SOCIETY, NARAMAU, G.T. ROAD, KANPUR, UTTAR PRADESH, INDIA

in the field of

TESTING

Certificate Number: TC-9169

Issue Date: 23/12/2022 Valid Until: 22/12/2024

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Identity : Techpro Engineers Private Limited

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer

TECHPRO ENGINEERS PVT. LTD.
114, Ram Ganga Housing Society, Naramau, G T Road, Kanpur-209 217
Tel.: 9793209918, e-mail: info@techproindia.com
Web site: www.techproindia.com

Oct 16th; 2023

ACKNOWLEDGEMENTS

We are pleased to submit the part-2 of the report of Geotechnical investigation, conducted for the boreholes P21 to P40 for the design of foundations for HORC Viaduct between Sohana & Dhulawat stations of Haryana Orbital Rail Corridor (HORC) project in the state of Haryana, India.

We hereby, convey our sincere thanks to Mr. Neeraj Bhandari (CPM/South) and Mr. Raju Solanki (DGM/C/South), HRIDCL for trust and support during the investigation. We also acknowledge our thanks to Mr. Uma Maheshwara Rao B, DGM/C/West, HRIDCL for awarding the said work to us. We are also grateful Mr. Ravindra Dutta Upadhyay (Geotech Expert), Mr. PS Gautam & Mr. Jitender Parashar, Site Engineer from the RITES- SMEC JV and Mohd. Ishak (Executive/Civil) from HRIDCL, for their help rendered during and prior to the investigation work.

We are also thankful to our staff members for conducting field and laboratory test, preparing sketches, and typing the report.

for Techpro Engineers Pvt. Ltd.

(Arvind K. Garg)
B.Tech. (Civil), M.Tech.
Principal Consultant &
Managing Director

1. INTRODUCTION:

Haryana Rail Infrastructure Development Corporation Ltd. (HRIDC) and Ministry of Railways, Govt. of India has come together to form a new company namely Haryana Orbital Rail Corporation Limited (HORCL), to design and construction of new BG line from Palwal to Sonipat named Haryana Orbital Rail Corridor (HORC), in the state of Haryana, India. In this connection, a Geotechnical investigation has been planned for the design of foundations of Viaduct between Sohana & Dhulawat stations of Haryana Orbital Rail Corridor (HORC) Project in the state of Haryana. The work of conducting the detailed Geotechnical Investigation has been awarded to us by HRIDC, through work order No. HRIDC/HORC/GTI/211/2023-2024/Vol-0 dated 02-09-2023, which includes investigation in field, laboratory testing of disturbed and undisturbed samples, collected from the field, and submission of the geotechnical **investigation** test report.

A geotechnical investigation was carried out, with the locations, planned by the client. Purpose of the investigation is to determine the nature and properties of soil and rock strata across the bore holes and representing them through log sections showing the levels, nature, and properties of various strata up to a sufficient depth below the founding level, proneness of site to artesian conditions, seismic disturbance and other engineering properties of soil and rock strata.

This part -2 of the report includes the detailed methodology of investigation, collection of samples, field and laboratory test result including their interpretation/ analysis, recommendations on the properties of soils and rock required for design of foundation and suggesting suitable type and depth of foundation with allowable bearing capacity for safe and strong foundations for the Bore Hole numbers P21 to P40.

2. SCOPE OF WORK:

For the design of foundation of viaduct, it is required to determine the allowable bearing capacity together with necessary engineering characteristics of underlying soil & rock strata. In general, the geotechnical investigation has been planned as per IS:1892-2021 and further extended to IS: 1904, IS:2911 (part-1/Sec 2) & IRC 78:2014 for planning the laboratory testing and computing the allowable bearing capacity, hence the scope of work is as follows:

2.1. Mobilisation of all tools & plants along with accessories, materials, labours etc. at site of work for drilling and testing work, including setting up boring and shifting to different bore holes point etc.

2.2. Exploratory drilling of 150 mm diameter bore holes through soil deposits and 75 mm in rock within the proposed alignment upto the required depth.

2.3. Collection of disturbed soil samples at an interval of 3.00 meter in all the bore holes.

2.4. Collection of undisturbed soil samples at every 3.00 m interval or at change of stratum from all the boreholes.

2.5. To conduct Standard Penetration Test (SPT) at an interval of 3.00 m or noticeable change of stratum in soil deposits in all bore holes.

2.6. Collection of rock core samples and preserving them in core boxes.

2.7. To collect ground water sample on completion of bore holes.

2.8. To record the ground water table in all the bore holes.

2.9. Transporting all the disturbed, undisturbed soil and rock core samples collected during the field investigation to our NABL accredited Geotech Engineering laboratory at Kanpur.

2.10. To conduct the laboratory tests on all the soil and rock core samples collected during field investigation for determination of their engineering characteristics.

2.11. To compile of field and laboratory test results, working out the allowable bearing capacity and preparing the report including detailed recommendations and necessary precautions.

3. GEOLOGICAL INFORMATION OF THE REGION:

3.1. Geography:

The project location is in the bordering area of Gurugram and Nuh (recent old name-Mewat), districts in the Indian state of Haryana. The stretch of the alignment of the proposed corridor starts from southmost part of Gurugram in the town of Sohna and ends at Dhulawat, which is a village lying at the north of Nuh district.

Haryana is a state located in the northern part of India. Gurugram is among one of the districts in Haryana which is also the part of National Capital Region (30km south of New Delhi). It lies at an elevation of 217 m above msl. Sohna is a small town located 25km in the south of Gurugram. Sohna is well known for its hot water springs and famous Shiva temple. Sohna is located in between 28°15' N latitude and 77°40' E longitude at the elevation of 212.14m above msl. Mewat district is located at 28 °12′ N latitude, 77 °3′ E longitude, at the south of Gurugram at an elevation of 199 m above msl. The location is bordered by Rewari district on west and Faridabad & Palwal district on the east.

3.2. Geology:

The Gurugram district is having of almost flat topography, however, in the north-eastern part small isolated hillocks of Precambrian rocks are exposed. Small hill ranges which are part of the Aravali and Mangar Bani ranges exists in the district. The major part of district is underlain by Quaternary alluvium consisting of sand, clay and silt. The alluvial plain is formed by the Sahibi river which is a tributary of River Yamuna. Soils of the Gurgaon district is classified as tropical and brown soils, existing in the north western extreme, northern and north eastern parts of the district and water logged and salt affected soils in the southern parts of the district. The soils are medium textured loamy sand is the average texture in Gurgaon and Sohna blocks.

3.3. Rainfall and Climate:

The area has hot semi-arid type of climate characterising extreme dryness of the air except in the monsoon season. Intense hot summer and cold winters. The total annual rainfall in the region is about 596 mm, of which 75 to 80% is because of the south-west monsoon.

3.4. Seismicity:

The site under consideration exists in the district of Gurugram and Mewat which lies in the Seismic Zone IV (high damage risk zone), as per the current seismic zonation map of India (IS 1893-2016): RA 2021 and have a zone factor of 0.24 for design basis earthquake. The region is surrounded by many in-homogeneities in the form of faults and ridges like Sohna Fault, Moradabad Fault, Delhi-Moradabad Fault, Delhi-Haridwar ridge, junction of Aravalli and Alluvium near Delhi. The Sohna fault line lies between the Delhi ridge and Sohna town and falls between the Arjangarh and

Manesar outcrops. All the developed area in Gurugram comes within 200 km of the fault line. The Sohna fault line is located at the junction between the hard rock terrain of the Aravalli hills and the sandy formation of the Yamuna River and is currently inactive from several years and is capable of a disastrous earthquake.

The project location has been marked in Fig.1 Seismic zone map of India.

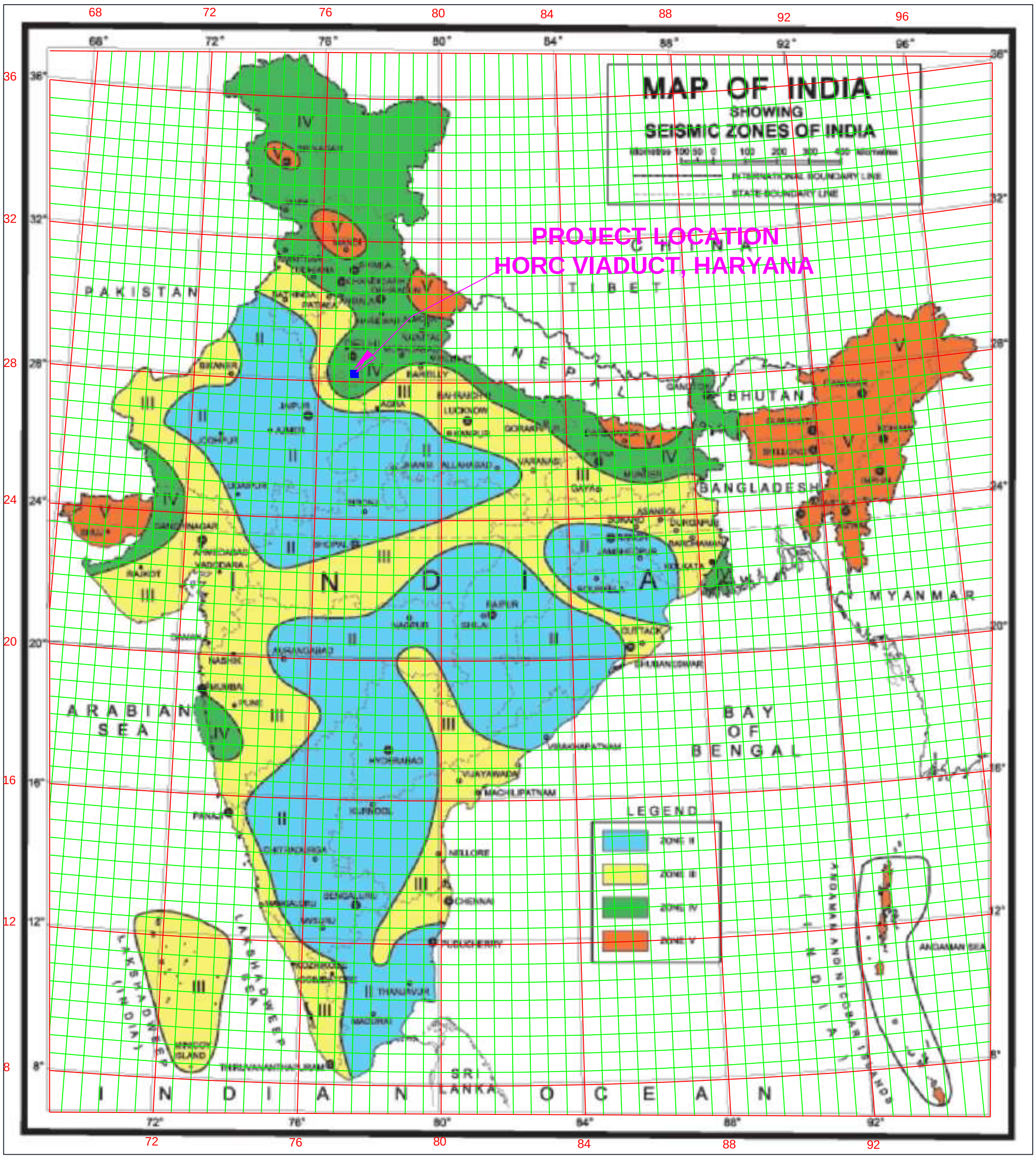


Fig.1: Seismic Zone Map of India

4. FIELD INVESTIGATION:

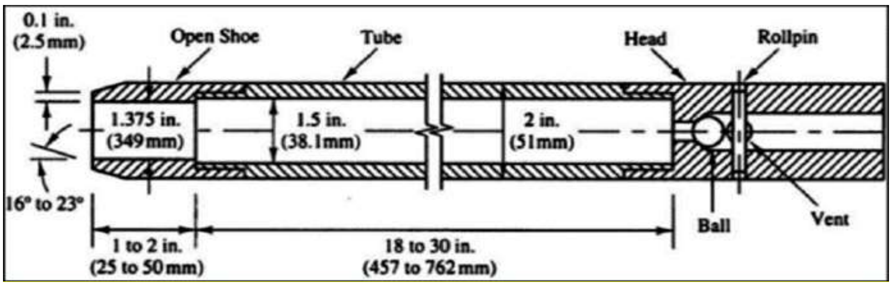
The field investigation work at this site was carried out from Sep 24th; 2023 to Sep 27th; 2023, Oct 15th; 2023 to Oct 22nd; 2023, Nov 06th; 2023 to Nov 23rd;

2023 & Dec 12th; 2023 to Dec 19th; 2023. The following investigation work was carried out:

4.1. **Twenty number** of **boreholes** (marked as P21 to P40) of diameter 150 mm in soil were made within the proposed alignment for conducting Standard Penetration Test and collection of disturbed and undisturbed soil samples. The boreholes were progressed using power operated winch and hydraulic rig machine under **percussion** and **rotary** method of drilling respectively. Casing was used to keep the borehole stable, and Bentonite was also used as drilling mud to help prevent wall collapse of boreholes at deeper depth. The records of achieved depth of bore holes have been given in Para No. 6, the details of drilled bores along with depth of casing used have been reported in Appendix B. Locations of boreholes have been reported in "TEST LOCATION PLAN" in Appendix A.

4.2. **Standard Penetration Tests** were conducted at 1.00 to 2.00 metre interval upto the depth of 12.00 meter and 3.00 metre interval, beyond 12.00 metre depth, as per the procedure in IS: 2131-1981-(RA: 2021) in all the bore holes. The **standard SPT sampler** (without liner and with no space for liner) and **auto-trip and rope-pulley driven hammer** of standard weight of 63.50 kg have been used to perform the test.

For conducting the test, the bottom of the borehole was properly cleaned, and split spoon sampler was properly seated in position in the borehole. The split spoon sampler resting on the bottom of borehole was allowed to sink under its own weight; then the sampler was allowed to penetrate 15 cm with the blows of the hammer 63.50 kg weight falling free through 75cm, thereafter the split spoon sampler was further driven by another 15 cm. For the 3rd and final drive, the sampler was further allowed to penetrate 15 cm. The number of blows required to get each 15 cm of penetration, was recorded. The first 15 cm of drive is seating drive.



Structure of SPT Sampler

The total blows of penetration for the second and third 15 cm of penetration is

termed the penetration resistance N. The N' values are indicative of the compactness/ relative density of cohesion less soils and consistency of cohesive soils.

In case the blows count of SPT in soil (including the number of blows of seating) exceeds 100, the corresponding penetration was recorded and this particular test at that depth stopped. If the total penetration is more than the seating penetration of 15 cm, then breakup of blow counts for 15 cm seating penetration and for remaining portion of penetration is also given.

SPT 'N' values are correlated with non-cohesive stratum as per BS: 5930 (1999) – for sandy strata and with consistency of cohesive stratum.

Correlation For Clay/Plastic Silt		Correlation For Sand/Non-Plastic Silt	
Consistency of clays	**Penetration Value**	**Relative Density of sand**	**Penetration Value**
Very Soft	0 to 2 Blows	Very loose	0 to 4 Blows
Soft	3 to 4 Blows	Loose	5 to 10 Blows
Medium Stiff	5 to 8 Blows	Medium	11 to 30 Blows
Stiff	9 to 16 Blows	Dense	31 to 80 Blows
Very Stiff	17 to 32 Blows	Very Dense	Above 50
Hard	Above 32		

In this method, the sampler acts as a probe and the driving energy is supplied by the fall of the drop weight. The values of 'N' depend on the compactness or relative density of the material. In hard formations, the testing is discontinued if 'N' value is found to be more than 100. It is termed as 'Refusal'. Refusal is also recorded when SPT blow count records 50 or more for any of the single drive of 15 cm.

'N' value depends upon degree of saturation and over burden pressure of the formation. Silty fine sand and fine sand below the water table develop pore water pressure depending on the in-situ void ratio which in turn affects the effective stress. This change in effective stress influences the 'N' value considerably.

Depth of overburden affects the SPT values in none to low cohesive soils and hence need correction. The SPT value after the overburden correction, N' is as follows:

$$N' = 0.77x \log(2000/q) \times N$$

Where, q= Overburden Pressure (kN/m^2) and N = observed SPT value

N' is corrected further for dilatancy in case of saturated fine sands and silts for the values of N' greater than 15.

Modified value after dilatancy correction N" = 15+ (N'-15)/2

Soil samples obtained from split spoon sampler were collected in the polythene bags of suitable size. These samples were property sealed, labelled, and carefully transported to the laboratory for testing. The results have been reported in Table 1 to 20 of Appendix B under the title "SUMMARY OF TEST RESULTS".

4.3. Disturbed soil samples were collected at 0.50 metre, then at 1.00 to 2.00 metre interval upto the depth of 12.00 meter and 3.00 metre interval, beyond 12.00 metre depth and at significant change of stratum. Soil from cutting edge of SPT samplers and retained in split spoon, used for Standard Penetration Tests was taken as disturbed samples. These samples were placed without delay in adequately sealed polythene bags. Where the collection of disturbed soil samples could not be collected from SPT samples, Shelby tubes were driven and retained soil samples were obtained. The laboratory tests were conducted on the collected soil samples and reported in Table 1 to 20 of Appendix-B under the title "SUMMARY OF TEST RESULTS".

4.4. Undisturbed soil samples were collected in accordance with IS: 2132-1986-(RA: 2021) at an interval of 3.00 metre or at change of stratum, starting from the depth of 1.00 or 2.00 m, by using 100 mm dia. and 450 mm long MS tubes provided with sampler head with ball check arrangement. However, the some of the samples could not be extracted due to the partial penetration or slippage during the evacuation.

Moreover, collection of Undisturbed samples in very hard cohesive soils/ dense granular soils/gravels/ cobbles/ pebbles/ boulders, refusal strata is practically not possible and such collected samples will not truly represent the undisturbed conditions.

Immediately after taking undisturbed sample in the tube, the adopter head was removed along with the disturbed material. The visible ends of the samples shall then be trimmed off any wet disturbed soil. The ends will then be coated alternately with four layers of molten wax. More molten wax will then be added to give a total thickness of not less than 25 mm. The laboratory test results have been reported in Table 1 to 20 of Appendix-B.

4.5. The **ground water table** in the borehole was allowed to stabilize and measured after 8, 16, 24 and 48 hours after completion of the bore hole. It was ensured that last two reading were identical. The records of ground water table have been given in Para No.6.

4.6. **Ground water samples** were collected from borehole as per IS: 6935-1973-(RA:2019) for chemical analysis to determine aggressiveness in relation to attack on concrete / reinforcement including determination of pH value.

5. LABORATORY TESTS:

The following laboratory tests were conducted to determine the engineering characteristics of sub-soils:

5.1. **Field moisture contents** were determined by oven drying method as per IS: 2720 (part II)-1973-(RA: 2020). The results have been reported in Table 1 to 20: “SUMMARY OF TEST RESULTS” of Appendix B.

5.2. **Bulk density** of soil strata was obtained using Shelby tubes in accordance with IS 2720 (part XXIX)-1975-(RA: 2020). The results have been reported in Table 1 to 20: “SUMMARY OF TEST RESULTS” of Appendix B.

5.3. **Mechanical sieve analysis** test was performed in accordance with IS: 2720 (Part IV) – 1985-(RA: 2020), for the purpose of identification by grain size analysis, on coarse part of the soil samples and the results have been reported in Table 1 to 20: “SUMMARY OF TEST RESULTS” of Appendix B.

5.4. **Particle size analysis** test by **Hydrometer method** were performed in accordance with IS: 2720 (Part IV) -1985-(RA: 2020) on the part of soil samples obtained after the sieve analysis. The results have been reported in Table 1 to 20: “SUMMARY OF TEST RESULTS” of Appendix B.

5.5. **Atterbergs’ limits tests** were performed in accordance with IS: 2720 (part V)-1985-(RA: 2020) and results have been reported in Table 1 to 20: “SUMMARY OF TEST RESULTS” of Appendix B.

5.6. **Specific gravity tests** were performed in accordance with IS 2720 (part III-sec. 1) -1980-(RA: 2021) and the results have been reported in Table 1 to 20: "SUMMARY OF TEST RESULTS" of Appendix B.

5.7. **Consolidation tests** were performed on cohesive soil samples in accordance with IS: 2720 (part XV)-1965-(RA: 2021). The results have been reported in Table 1 to 20: "SUMMARY OF TEST RESULTS" of Appendix B.

5.8. **Direct shear tests** were performed as per IS: 2720 (part XIII)-1986-(RA: 2021), on the undisturbed soil samples obtained during the field investigation. The results and the density of samples have been reported in Table 1 to 20: "SUMMARY OF TEST RESULTS" of Appendix B.

5.9. **Tri-axial Compression Test** under Unconsolidated Un-drained (UU) condition as per IS: 2720 (Part-XI)-1993-(RA: 2021) were performed on the selected undisturbed soil samples, obtained during the field investigation. The results have been reported in Table 1 to 20: "SUMMARY OF TEST RESULTS" of Appendix B.

5.10. **Unconfined Compressive strength tests** were performed in accordance with IS 2720 (Part-X) -1991-(RA:2020) on selected undisturbed soil samples and the results have been reported in Table 23 of Appendix B.

5.11. **Shrinkage Limit tests** were performed in accordance with IS 2720 (part-VI) -1972-(RA: 2021) and the results have been reported in Table 1 to 20: "SUMMARY OF TEST RESULTS" of Appendix B.

5.12. **Free Swell Index** were performed in accordance with IS 2720 (part-XL) -1977-(RA: 2021) and the results have been reported in Table 1 to 20: "SUMMARY OF TEST RESULTS" of Appendix B.

5.13. **Chemical analysis on soil samples** was performed in accordance with IS: 2720 (Part-XXVI)-1987-(RA: 2021) for pH value, IS: 2720 (Part-XXVII)-1977-(RA: 2020) for Sulphate & BS:1377-3-2018 for chlorides and results have been reported in Table 21 "CHEMICAL TEST ON SOIL SAMPLES" of Appendix B.

5.14. **Chemical analysis on Ground Water sample** was performed in accordance with IS: 3025 (Part-XI)-2022 for pH value, IS: 3025 (Part-XXIV: Sec-1)-2022 for Sulphate & IS: 3025-(Part-XXXII)-1988-(RA: 2019) for chlorides and results have been reported in

Table 22 “CHEMICAL TEST ON GROUND WATER SAMPLES” of Appendix B.

6. GROUND WATER TABLE:

The water table at this site was encountered during the drilling operation up to the depth of investigation.

Borehole No.	Chainage	Global Co-ordinates (UTM format)		Reduced level (m)	Depth of Borehole (m)	Water table (m)
		Easting	Northing			
P21	21466.087	702087.747	3118970.246	191.644	40.00	1.60
P22	21492.287	702061.713	3118973.876	191.995	40.00	1.55
P23	21518.487	702035.737	3118957.327	192.094	40.00	1.60
P24	21544.687	702009.821	3118982.298	192.043	40.00	1.40
P25	21570.887	701983.963	3118987.279	191.290	40.00	1.60
P26	21597.087	701958.272	3118992.792	192.090	40.00	1.70
P27	21623.287	701932.610	3118998.866	191.906	40.00	2.40
P28	21649.487	701907.194	3119005.450	191.559	40.00	2.30
P29	21675.687	701881.838	3119012.591	191.481	40.00	1.40
P30	21701.887	701856.668	3119020.255	191.396	40.00	1.50
P31	21728.087	701831.622	3119028.461	191.259	40.00	1.50
P32	21754.287	701806.797	3119037.179	191.328	40.00	1.30
P33	21780.487	701782.232	3119046.389	191.287	40.00	1.35
P34	21806.687	701757.766	3119056.154	191.452	40.00	1.40
P35	21832.887	701733.569	3119066.408	191.306	40.00	2.65
P36	21859.087	701709.564	3119077.181	191.271	40.00	1.30
P37	21885.287	701685.792	3119088.456	191.192	40.00	1.30
P38	21911.487	701662.194	3119100.259	191.236	40.00	1.30
P39	21937.687	701638.957	3119112.511	191.204	40.00	1.30
P40	21963.887	701615.905	3119125.287	191.009	40.00	1.40

7. DESCRIPTION OF STRATA:

The classification of soil stratum has been done with the help of soil characteristics obtained in laboratory tests as per IS 1498-1970-(RA:2021). The classification of rock masses has been done based on RMR as per IS: 4464-1985, IS: 13365-1. The detailed nature of the strata has been reported in Table 1 to 20: “SUMMARY OF TEST RESULTS” of Appendix-B and represented through Lithological plots in Appendix-C.

The strata exhibited in the boreholes, is predominantly comprising of inorganic silty clays of low plasticity and inorganic silts of non to low plastic category. Silty sands were encountered at variable depth and thickness. Inorganic silts and silty clays of intermediate plasticity were also encountered at some depth and thickness in some of the bores. Some lenses of sands with clay binders and poorly graded sands were also seen in some bores at varying depth with thickness of about 1.00 to 3.00 meters.

8. SAFE BEARING CAPACITY COMPUTATIONS:

For the construction of viaducts, deep foundation **(Bored Cast-In-Situ RCC piles)** have been considered for computation of load bearing capacity of the underlying soil strata. The computation of load bearing capacity of bored cast-in-situ RCC piles have been done as per IS 2911 (part-1, section-2)-2010-(RA: 2020) with due consideration of effects of liquefaction.

8.1. Design Parameters:

Factor of safety in compression	=	2.50
Factor of safety in tension	=	3.00
Depth of critical water table	=	0.00 m
Diameter of pile	=	1.00 & 1.20 m
Cut off length	=	2.50 m
Type of pile head consider	=	Fixed

8.2. Computation of friction along pile stem:

$Q_{uf}= \sum K_i.P_{di}.\tan\delta_i.A_{si}$

where,

Q_{uf} = Ultimate shaft friction (kN/m^2)

K_i = Coefficient of earth pressure at mid-depth of ith layer

P_{di} = Effective overburden pressure at mid-depth of ith layer (kN/m^2)

A_{si} = Surface area of pile stem in ith layer (m^2)

δ_i = Angle of wall friction between pile and soil of ith layer (= ϕ) (degree)

ϕ_i = Angle of internal friction of soil in ith layer (degree)

$\sum$ = Sum of all layers up to ith layer

8.3. Computation of Cohesion along the stem of pile:

$Q_{uc} = \sum \alpha_i . c_i . A_{si}$

Where,

c_i = Cohesion in ith layer

A_{si} = Surface area of pile stem in ith layer (m^2)

α_i = Adhesion factor for ith layer of soil depending of consistency of soils

$\sum$ = Sum of cohesion of all layers considered

8.4. Computation of end bearing resistance:

$Q_{ub} = A_p (c.Nc + q.Nq + 0.5.\ \gamma.B.N\gamma)$

Where,

A_p = Area of the pile toe (m^2)

c = cohesion of soils at pile toe (kN/m^2)

γ = Effective Unit weight of soils at pile toe (kN/m^3)

B = Diameter of pile (m)

q = Effective overburden pressure at pile toe (kN/m^2)

N_c = Bearing Capacity Factor (Recommended equal to 9)

Nq, Nγ = Bearing Capacity Factor

8.5. Lateral load capacity of piles in soils:

$Q_u = 12.E.I.\delta/(L_1+L_f)^3$

where,

Q_u = Ultimate lateral load capacity of pile (kN)

δ = Permissible deflection (m) = 1% of diameter of pile

E = Young Modulus of pile material (kN/m^2)

I = Moment of Inertia of the pile cross section (m^4)

L_1 = Cantilever Length of pile (m)

L_f = Length of fixity (m)

Detailed calculations of pile load carrying capacity in compression & uplift in soil have been reported in **Table-1 to 2** of **APPENDIX-H.**

Pile lateral Load capacity has been given in **Table-3 to 4** of **APPENDIX-H**.

9. LIQUEFACTION ANALYSIS:

Liquefaction is the sudden loss of shear strength of the loose fine sands due to earthquake-induced vibration under saturated conditions. Liquefaction generally takes place in loose fine sands (fines < 10 %, D_{60}= 0.20 mm to 1.0 mm and C_u between 2 to 5) with N value less than 15. In case of soil strata having N>15, liquefaction of soil will not take place normally.

The present site falls in **seismic zone – IV.** Considering the history of past earthquakes and available seismic data, an earthquake of **magnitude 7.0** having peak ground acceleration **a_{max}= 0.24 g** is considered in the present analysis.

Preliminary assessment of liquefaction potential of foundation strata is made by simplified approach proposed by IS: 1893 (part-1)-2016-(RA: 2021) from the data obtained in Standard Penetration Test.

In this method, cyclic shear stress likely to be induced in the foundation strata by Design Basis Earthquake is first evaluated. Next threshold cyclic shear stress, which is good enough to cause liquefaction, is determined from SPT data and the empirical relations. Finally, comparison of these two stresses is used in the estimation of liquefaction susceptibility of the foundation strata.

Cyclic Stress Ratio (CSR):

The equivalent average of shear stress likely to be induced in the foundation material due to an earthquake is calculated by using the equations.

Cyclic Resistance Ratio (CRR):

It expresses capacity of soil to resist liquefaction. CRR is determined using correlation between corrected blow count $(N_1)_{60}$ and CRR for earthquake of magnitude 7.5. $(N_1)_{60}$ is the SPT blow count corrected to an effective overburden pressure of 100 kPa and to hammer energy efficiency of 60 %.

Following variable have been adopted in calculation of N_{60} (SPT value for 60% efficiency)

Energy correction to SPT values:

C_{60} = 1.00 (energy efficiency factor)

Design Earthquake Base:

Earthquake zone	= IV
Magnitude of earthquake	= 7
Seismic Zone factor	= 0.24

Status of Liquefaction:

The value of CSR and CRR are computed at different depth and then the ratio of CRR to CSR to get the factor of safety towards the susceptibility of the stratum towards liquefaction potential.

If factor of safety:

< 1.00 : Stratum is to be considered as liquefiable.

> 1.20 : Non-Liquefiable

The detailed calculations of liquefaction have been reported in **Table-5** of **APPENDIX-H.**

10. RECOMMENDATIONS:

Keeping in mind, the field test results, laboratory test results and IS codes of practice the following recommendations are hereby made:

10.1. Bored Cast-In-Situ RCC Piles of diameter 1000 and 1200 mm have been adopted for SBC computations of foundation for Viaduct.

10.2. **Cut off length** of piles have been considered as 2.50 m from the existing ground level for the purpose of computation of SBC.

10.3. **Pile length** recommended in the table below, shall be measured **after the cut-off depth.**

10.4. **Allowable load carrying capacity** of pile corresponding to the length and diameter of pile shall be read from the tables below:

10.4.1. For Pile diameter = 1000 mm

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
P21	25.00	2350	1800	40
	27.50	2850	2050	
	30.00	3650	2200	
	32.50	3900	2400	
	35.00	3500	2600	
P22	25.00	2150	1650	35
	27.50	2450	1900	
	30.00	3000	2100	
	32.50	3700	2350	
	35.00	3850	2550	
P23	25.00	2500	1950	175
	27.50	2800	2200	
	30.00	3050	2450	
	32.50	4800	2650	
	35.00	5700	3000	
P24	25.00	2350	1750	55
	27.50	2600	2050	
	30.00	2900	2300	
	32.50	3600	2500	
	35.00	4350	2750	
P25	25.00	2150	1550	30
	27.50	2400	1750	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
	30.00	2500	2000	
	32.50	2750	2200	
	35.00	3050	2450	
P26	25.00	2250	1750	180
	27.50	2600	2000	
	30.00	2800	2250	
	32.50	3050	2450	
	35.00	3300	2650	
P27	25.00	2300	1750	135
	27.50	2550	2000	
	30.00	3750	2200	
	32.50	4150	2450	
	35.00	4650	2750	
P28	25.00	2250	1750	115
	27.50	2450	1950	
	30.00	3700	2200	
	32.50	2950	2400	
	35.00	3200	2600	
P29	25.00	2050	1550	45
	27.50	2350	1800	
	30.00	2600	2050	
	32.50	2900	2300	
	35.00	4600	2550	
P30	25.00	1700	1350	30
	27.50	1950	1500	
	30.00	2150	1700	
	32.50	2350	1900	
	35.00	2600	2050	
P31	25.00	2150	1650	35
	27.50	2350	1850	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
	30.00	2650	2100	
	32.50	3600	2300	
	35.00	3800	2550	
P32	25.00	2150	1700	40
	27.50	2400	1900	
	30.00	2600	2100	
	32.50	2850	2300	
	35.00	3100	2500	
P33	25.00	2300	1750	65
	27.50	2600	2000	
	30.00	2850	2250	
	32.50	3100	2500	
	35.00	3350	2700	
P34	25.00	2200	1700	105
	27.50	2450	1950	
	30.00	2800	2200	
	32.50	2950	2400	
	35.00	3150	2600	
P35	25.00	2150	1700	100
	27.50	3450	1900	
	30.00	2800	2150	
	32.50	3000	2400	
	35.00	3300	2650	
P36	25.00	2450	1900	140
	27.50	2750	2150	
	30.00	3150	2350	
	32.50	3300	2600	
	35.00	3650	2850	
P37	25.00	2100	1600	45
	27.50	2400	1850	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
	30.00	2750	2100	
	32.50	2950	2350	
	35.00	3350	2600	
P38	25.00	2050	1600	85
	27.50	2300	1800	
	30.00	2750	2000	
	32.50	2950	2200	
	35.00	3000	2400	
P39	25.00	2050	1600	35
	27.50	2200	1750	
	30.00	2750	1950	
	32.50	2650	2100	
	35.00	2900	2300	
P40	25.00	2000	1550	30
	27.50	2350	1750	
	30.00	3000	2000	
	32.50	3050	2200	
	35.00	2950	2350	

***** *Indicates Grade of Concrete*

10.4.2. For Pile diameter = 1200 mm

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
P21	25.00	3000	2300	65
	27.50	3850	2600	
	30.00	5250	2800	
	32.50	5600	3150	
	35.00	4800	3400	
P22	25.00	2750	2050	55
	27.50	3150	2350	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
	30.00	3950	2650	
	32.50	5050	3000	
	35.00	5200	3300	
P23	25.00	3300	2550	235
	27.50	3700	2850	
	30.00	4000	3150	
	32.50	7350	3500	
	35.00	8850	3950	
P24	25.00	3100	2250	85
	27.50	3450	2600	
	30.00	3800	2900	
	32.50	4950	3200	
	35.00	6250	3550	
P25	25.00	3150	2150	50
	27.50	3450	2400	
	30.00	3500	2700	
	32.50	3800	3000	
	35.00	4150	3300	
P26	25.00	2950	2200	240
	27.50	3350	2550	
	30.00	3650	2900	
	32.50	4050	3200	
	35.00	4350	3450	
P27	25.00	3000	2250	180
	27.50	3250	2550	
	30.00	5400	2800	
	32.50	6000	3200	
	35.00	6750	3600	
P28	25.00	2950	2250	165
	27.50	3200	2500	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	**Uplift**	**Lateral** Concrete M35*
	30.00	5300	2850	
	32.50	3900	3150	
	35.00	4250	3400	
P29	25.00	2700	2000	70
	27.50	3050	2300	
	30.00	3400	2600	
	32.50	3750	2900	
	35.00	6700	3300	
P30	25.00	2300	1750	45
	27.50	2600	1950	
	30.00	2850	2250	
	32.50	3150	2500	
	35.00	3450	2700	
P31	25.00	2750	2100	55
	27.50	3000	2350	
	30.00	3350	2600	
	32.50	4800	2900	
	35.00	5100	3250	
P32	25.00	2800	2150	65
	27.50	3100	2400	
	30.00	3350	2650	
	32.50	3700	2900	
	35.00	4000	3200	
P33	25.00	2950	2200	100
	27.50	3350	2500	
	30.00	3700	2850	
	32.50	4000	3150	
	35.00	4250	3400	
P34	25.00	2850	2150	150
	27.50	3150	2450	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
	30.00	3700	2800	
	32.50	3850	3100	
	35.00	4150	3350	
P35	25.00	2850	2200	150
	27.50	4800	2500	
	30.00	3700	2800	
	32.50	3950	3150	
	35.00	4300	3400	
P36	25.00	3150	2400	190
	27.50	3550	2700	
	30.00	4100	3000	
	32.50	4300	3300	
	35.00	4750	3650	
P37	25.00	2750	2100	75
	27.50	3200	2400	
	30.00	3700	2700	
	32.50	3950	3050	
	35.00	4500	3400	
P38	25.00	2700	2050	125
	27.50	3000	2300	
	30.00	3750	2600	
	32.50	4050	2900	
	35.00	3950	3150	
P39	25.00	2650	2050	55
	27.50	2850	2250	
	30.00	3800	2500	
	32.50	3500	2800	
	35.00	3850	3050	
P40	25.00	2600	2000	50
	27.50	3100	2250	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
	30.00	4250	2600	
	32.50	4300	2900	
	35.00	3950	3150	

** Indicates Grade of Concrete*

10.5. Liquefaction Potential: All the bore holes have been analysed for Liquefaction potential as per IS: 1893 (part-1)-2016-(RA: 2021) with Seismic Zone IV, earthquake intensity of 7.0 on Richter scale and critical ground water table at existing ground level. Out of which several boreholes show the potential at various depths mentioned in the table below:

Bore No.	Liquefiable depth zone (meter)
P21	Top 5.00 & 6.00 to 8.00
P22	Top 2.00 & 9.00 to 10.00
P23	Top 1.00
P24	Top 1.00 & 6.00 to 7.00
P25	Top 3.00 & 9.00 to 10.00
P26	None
P27	Top 3.00
P28	Top 4.00
P29	Top 8.00
P30	Top 10.00
P31	Top 2.00 & 6.00 to 9.00
P32	Top 1.00 & 2.00 to 8.00
P33	Top 6.00
P34	Top 4.00
P35	Top 4.00
P36	1.00 to 3.00

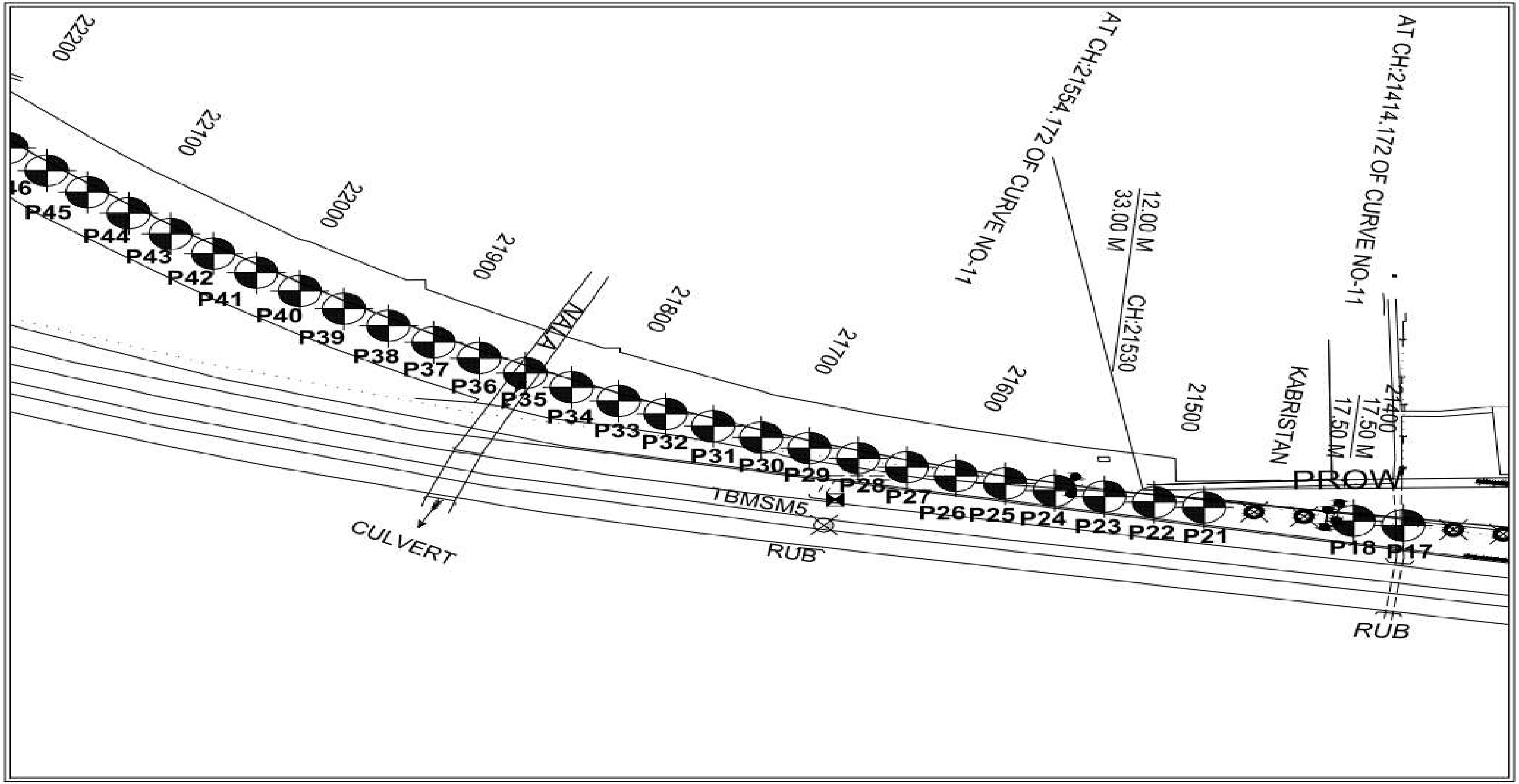
Bore No.	Liquefiable depth zone (meter)
P37	Top 3.00 & 5.00 to 7.00
P38	Top 3.00 & 4.00 to 5.00
P39	Top 9.00
P40	Top 1.00, 5.00 to 6.00 & 8.00 to 9.00

10.6. Type of cement to be used: Harmful chemical contents in the soil samples are within the permissible limit. So, Ordinary Portland Cement or Portland Pozzolana Cement may be used for all civil constructions.

for Techpro Engineers Pvt. Ltd.

(Arvind K. Garg)
B.Tech.(Civil), M.Tech.
Principal Consultant &
Managing Director

APPENDIX-A
TEST LOCATION PLAN



APPENDIX "B"

TABLE 1: SUMMARY OF TEST RESULTS

Bore No: P21	**Ground Elevation: RL 191.644 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.60 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 15/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 21466.087	**Casing Lowered: 23.00 m**	**Ending Date: 19/12/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	1	52	47	0	12.04	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	U	2	-	-	-	-	-	SM	0	0	1	53	46	0	11.68	1.81	1.62	Non-Plastic			2.64	DST	4.0	26.4	-	0.630	-	-	-	-												
	2.00	D	3	2	3	3	6	8.29	-	-	-	-	-	-	-	11.73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	3.00	D	4	2	4	4	8	10.45	SM	0	0	1	60	39	0	17.76	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	-	-	-	-	-	-	-	-	-	-	-	-	20.58	1.95	1.62	-	-	-	2.65	RDST	0.0	27.2	-	0.636	-	-	-	-												
	5.00	D	6	2	4	7	11	12.94	-	-	-	-	-	-	-	24.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	6.00	D	7	3	4	6	10	11.26	SM	0	0	1	56	43	0	21.18	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	-	-	-	-	-	SM	0	0	2	67	31	0	28.03	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	8.00	D	9	4	6	8	14	14.61	-	-	-	-	-	-	-	26.88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	9.00	D	10	6	7	8	15	15.00	CL	1	1	2	14	71	11	19.81	-	-	32.0	21.5	10.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	10.00	U	11	-	-	-	-	-	SM	0	0	1	70	29	0	22.32	2.00	1.64	Non-Plastic			2.62	DST	0.0	29.0	-	0.602	-	-	-	-	Silty Sands											
	11.00	D	12	3	5	7	12	12.00	CL	2	2	2	18	63	13	19.05	-	-	32.0	21.0	11.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	12.00	D	13	4	7	11	18	18.00	-	-	-	-	-	-	-	17.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	13.00	U	14	-	-	-	-	-	-	-	-	-	-	-	-	19.16	2.05	1.72	-	-	-	2.66	-	-	-	-	0.547	-	-	-	-												
	14.50	D	15	6	10	13	23	23.00	CI	1	1	1	8	65	24	19.85	-	-	44.0	25.0	19.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of Intermediate plasticity											
	16.00	U	16	-	-	-	-	-	CI	3	1	1	7	61	27	19.67	2.06	1.72	48.0	25.5	22.5	2.69	UU	74.0	11.4	-	0.564	-	14	15	-												
	17.50	D	17	7	10	15	25	25.00	-	-	-	-	-	-	-	22.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 1: SUMMARY OF TEST RESULTS

Bore No: P21	**Ground Elevation: RL 191.644 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.60 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 15/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 21466.087	**Casing Lowered: 23.00 m**	**Ending Date: 19/12/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	19.00	U	18	-	-	-	-	-	CI	1	1	2	6	76	14	19.77	2.03	1.70	37.0	24.0	13.0	2.68	UU	62.0	9.2	-	0.581	-	-	-	-	Inorganic clays of Intermediate plasticity											
	20.50	D	19	8	11	16	27	27.00	-	-	-	-	-	-	-	19.38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	22.00	U	20	-	-	-	-	-	CI	8	4	5	7	58	18	16.91	2.04	1.75	36.5	21.0	15.5	2.68	UU	67.0	12.0	-	0.536	-	-	-	-												
	23.50	D	21	8	11	15	26	26.00	CL-CI	1	2	2	7	73	15	17.80	-	-	35.0	22.0	13.0	-	-	-	-	-	-	-	-	-	-	Inorganic Clays of low to Intermediate plasticity											
	25.00	U	22	-	-	-	-	-	CL	3	1	2	8	75	11	19.07	2.02	1.70	32.0	22.5	9.5	2.67	UU	57.0	10.2	-	0.571	-	-	-	-	Inorganic clays of low plasticity											
	26.50	D	23	18	35	41	76	76.00	CL	1	2	4	6	77	10	19.01	-	-	30.0	22.0	8.0	-	-	-	-	-	-	-	-	-	-												
	28.00	D	24	17	28	32	60	60.00	CL	2	1	2	5	77	13	16.95	-	-	34.0	22.5	11.5	-	-	-	-	-	-	-	-	-	-												
	29.50	D	25	9	20	35	55	55.00	CL	0	0	1	5	77	17	31.08	-	-	34.0	22.5	11.5	-	-	-	-	-	-	-	-	-	-												
	31.00	D	26	19	25	35	60	25.74	ML	2	1	1	31	65	0	20.16	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	32.50	D	27	14	28	35	63	26.22	SM	1	1	1	65	32	0	19.13	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	34.00	D	28	13	25	38	63	25.81	-	-	-	-	-	-	-	18.09	-	-	-	-	-	2.65	-	-	-	-	-	-	-	-	-												
	35.50	D	29	14	27	32	59	24.26	ML	0	0	2	42	51	5	21.00	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	37.00	D	30	13	28	38	66	25.89	-	-	-	-	-	-	-	13.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	38.50	D	31	11	24	34	58	23.34	SM	1	1	0	48	50	0	15.04	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	40.00	D	32	21	32	42	74	27.33	-	-	-	-	-	-	-	14.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 2: SUMMARY OF TEST RESULTS

Bore No: P22	**Ground Elevation: RL 191.995 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.55 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 15/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 21492.287	**Casing Lowered: 12.00 m**	**Ending Date: 19/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	ML	0	0	1	46	53	0	9.22	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	1.00	D	2	2	3	5	8	12.43	SM	0	0	1	54	45	0	17.98	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	2.00	U	3	-	-	-	-	-	CL-ML	2	1	2	10	77	8	21.51	1.92	1.58	27.0	20.5	6.5	2.66	UU	46.0	8.0	-	0.684	-	-	-	-	Inorganic Silty Clays of low plasticity											
	3.00	D	4	4	6	8	14	16.48	SM	0	0	1	55	44	0	27.70	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	4.00	D	5	5	7	9	16	17.25	-	-	-	-	-	-	-	26.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	5.00	D	6	-	-	-	-	-	SM	0	0	2	75	23	0	18.85	1.97	1.66	Non-Plastic			2.65	RDST	0.0	29.7	-	0.596	-	-	-	-												
	6.00	D	7	6	7	10	17	16.96	-	-	-	-	-	-	-	26.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	6	13	15	28	22.48	-	-	-	-	-	-	-	28.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	D	9	-	-	-	-	-	SM	0	0	0	71	29	0	26.99	2.17	1.71	Non-Plastic			-	RDST	0.0	30.1	-	-	-	-	-	-												
	9.00	D	10	4	6	7	13	12.81	-	-	-	-	-	-	-	22.47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	5	8	12	20	17.00	ML	1	1	0	19	73	6	17.70	-	-	27.0	22.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	11.00	U	12	-	-	-	-	-	CL-ML	5	4	5	8	70	8	18.16	2.09	1.77	28.0	21.5	6.5	2.67	-	-	-	0.134	0.508	-	9	19	-	Inorganic Silty Clays of low plasticity											
	12.50	D	13	6	13	18	31	31.00	CL	0	1	1	6	83	9	17.02	-	-	29.0	21.0	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	14.00	U	14	-	-	-	-	-	CI	1	1	2	7	71	18	16.96	2.06	1.76	40.0	23.0	17.0	2.69	UU	69.0	11.5	-	0.528	-	17	14	-	Inorganic clays of Intermediate plasticity											
	15.50	D	15	14	20	27	47	47.00	-	-	-	-	-	-	-	15.57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	17.00	D	16	-	-	-	-	-	-	-	-	-	-	-	-	18.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	18.50	D	17	5	12	19	31	31.00	CL	2	1	2	16	70	9	15.26	-	-	29.0	21.0	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											

APPENDIX "B"

TABLE 2: SUMMARY OF TEST RESULTS

Bore No: P22	**Ground Elevation: RL 191.995 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.55 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 15/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 21492.287	**Casing Lowered: 12.00 m**	**Ending Date: 19/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	CL	1	2	5	17	67	8	17.74	2.06	1.75	28.0	20.5	7.5	2.67	UU	52.0	10.2	-	0.526	-	-	-	-	Inorganic clays of low plasticity											
	21.50	D	19	8	15	21	36	36.00	-	-	-	-	-	-	-	21.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.00	D	20	-	-	-	-	-	CL	0	0	1	8	79	12	17.68	-	-	34.0	22.0	12.0	-	-	-	-	-	-	-	-	-	-												
	24.50	D	21	10	20	27	47	47.00	-	-	-	-	-	-	-	19.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	-	-	-	-	-	CL	4	2	3	15	63	13	18.70	2.05	1.73	32.0	22.0	10.0	2.68	RUU	62.0	10.3	-	0.549	-	-	-	-												
	27.50	D	23	12	25	30	55	55.00	CL	2	1	3	21	61	12	16.73	-	-	31.5	22.0	9.5	-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	13	26	36	62	62.00	-	-	-	-	-	-	-	15.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	30.50	D	25	17	27	40	67	27.62	ML	2	1	1	40	56	0	19.29	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	32.00	D	26	14	25	38	63	26.02	-	-	-	-	-	-	-	16.41	-	-	-	-	-	2.65	-	-	-	-	-	-	-	-	-												
	33.50	D	27	12	24	35	59	24.47	SM	0	0	2	53	45	0	17.84	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	35.00	D	28	13	23	36	59	24.12	SM	0	1	1	54	44	0	16.09	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	16	27	39	66	25.71	SM	0	1	2	52	45	0	17.41	-	-	Non-Plastic			2.65	-	-	-	-	-	-	-	-	-												
	38.00	D	30	15	25	35	60	23.72	-	-	-	-	-	-	-	16.28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	14	22	37	59	23.02	SM	0	0	1	56	43	0	18.01	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 3: SUMMARY OF TEST RESULTS

Bore No: P23	**Ground Elevation: RL 192.094 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.60 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 13/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 21518.487	**Casing Lowered: 12.00 m**	**Ending Date: 15/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	ML	0	0	1	42	57	0	4.54	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	1.00	D	2	3	3	5	8	8.00	CL	1	0	1	19	74	5	23.09	-	-	29.0	21.5	7.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	2.00	U	3	-	-	-	-	-	MI	4	1	2	5	72	16	26.14	2.07	1.64	37.0	26.0	11.0	2.68	UU	50.0	9.7	-	0.634	-	-	-	-	Inorganic Silts of Intermediate plasticity											
	3.00	D	4	2	3	7	10	12.47	ML	0	0	1	42	57	0	21.17	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	4.00	D	5	5	8	12	20	19.30	SM	0	0	1	64	35	0	25.59	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	5.00	D	6	-	-	-	-	-	SM	0	0	0	66	34	0	22.81	2.05	1.67	Non-Plastic			2.65	RDST	0.0	29.7	-	0.587	-	-	-	-												
	6.00	D	7	6	7	14	21	18.81	-	-	-	-	-	-	-	25.83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	7	11	16	27	21.49	-	-	-	-	-	-	-	22.77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	D	9	-	-	-	-	-	SM	0	0	1	72	27	0	26.15	2.13	1.69	Non-Plastic			-	RDST	0.0	30.9	-	-	-	-	-	-												
	9.00	D	10	5	10	13	23	18.55	-	-	-	-	-	-	-	23.52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	4	8	10	18	15.86	CL-ML	0	0	1	11	81	7	19.16	-	-	27.0	20.5	6.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	11.00	U	12	-	-	-	-	-	CL	2	1	2	8	76	11	20.53	2.03	1.69	29.0	21.5	7.5	2.67	UU	47.0	9.7	0.149	0.585	-	9	20	-	Inorganic clays of low plasticity											
	12.50	D	13	6	11	15	26	26.00	-	-	-	-	-	-	-	20.35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	14.00	U	14	-	-	-	-	-	CL	0	1	2	8	78	11	21.60	2.02	1.66	32.0	21.5	10.5	2.67	-	-	-	-	0.608	-	17	16	-												
	15.50	D	15	8	13	20	33	33.00	CI	1	1	2	11	62	23	21.12	-	-	40.0	22.0	18.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of Intermediate plasticity											
	17.00	U	16	-	-	-	-	-	CL	1	3	5	16	65	10	18.39	2.06	1.74	27.5	20.5	7.0	2.67	UU	52.0	13.4	-	0.534	-	-	-	-	Inorganic clays of low plasticity											

APPENDIX "B"
TABLE 3: SUMMARY OF TEST RESULTS

Bore No: P23	**Ground Elevation: RL 192.094 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.60 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 13/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 21518.487	**Casing Lowered: 12.00 m**	**Ending Date: 15/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	18.50	D	17	5	9	13	22	15.75	-	-	-	-	-	-	-	19.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	20.00	U	18	-	-	-	-	-	CL-ML	1	1	2	21	67	8	21.10	2.04	1.69	26.5	20.5	6.0	2.66	DST	11.0	24.2	-	0.579	-	-	-	-												
	21.50	D	19	8	14	20	34	19.47	-	-	-	-	-	-	-	20.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	23.00	D	20	-	-	-	-	-	CL-ML	0	0	1	18	74	7	19.96	-	-	27.0	20.5	6.5	-	-	-	-	-	-	-	-	-	-												
	24.50	D	21	10	14	22	36	36.00	CL	0	1	1	7	78	13	20.65	-	-	32.0	19.0	13.0	-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	-	-	-	-	-	-	-	-	-	-	-	-	20.51	2.06	1.71	-	-	-	-	RUU	67.0	8.6	-	-	-	-	-	-	Inorganic clays of low plasticity											
	27.50	D	23	13	27	34	61	61.00	CL	0	1	0	7	82	10	23.06	-	-	30.0	21.0	9.0	-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	14	30	42	72	72.00	MI	1	1	0	5	76	17	31.45	-	-	42.0	27.0	15.0	2.69	-	-	-	-	-	-	-	-	-	Inorganic Silts of Intermediate plasticity											
	30.50	D	25	10	22	40	62	62.00	CL	1	0	0	8	80	11	20.54	-	-	32.0	23.0	9.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	32.00	D	26	11	28	47	75	75.00	-	-	-	-	-	-	-	18.82	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	33.50	D	27	12	18	44	62	25.16	SM	0	0	1	55	44	0	18.35	-	-	Non-Plastic			2.65	-	-	-	-	-	-	-	-	-												
	35.00	D	28	17	23	35	58	23.71	SM	1	0	0	79	20	0	13.05	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	14	25	34	59	23.67	-	-	-	-	-	-	-	12.57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Silty Sands											
	38.00	D	30	20	33	40	73	27.14	SM	0	0	0	80	20	0	12.67	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	19	35	45	80	28.51	SM	0	0	1	76	23	0	11.53	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 4: SUMMARY OF TEST RESULTS

Bore No: P24	Ground Elevation: RL 192.043 m	Method of drilling: Percussion	Depth of Water-table: 1.40 m
Diameter of Bore Hole: 150 mm	Bore Retained using: Casing	Starting Date: 24/09/2023	SPT Sampler: Standard
Location / Chainage: 21544.687	Casing Lowered: 19.00 m	Ending Date: 27/09/2023	Hammer type: Auto-trip

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	ML	0	0	2	34	64	0	10.85	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	1.00	D	2	1	2	2	4	6.10	CL-ML	3	2	1	22	65	7	21.40	-	-	26.0	20.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	2.00	U	3	-	-	-	-	-	CL	10	1	4	33	44	8	20.41	2.10	1.74	29.0	19.0	10.0	2.68	UU	51.0	7.5	-	0.540	-	8	19	-	Inorganic clays of low plasticity											
	3.00	D	4	5	6	8	14	16.29	SM	4	1	3	66	26	0	22.82	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	4.00	D	5	6	8	10	18	18.17	-	-	-	-	-	-	-	22.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	5.00	D	6	-	-	-	-	-	-	-	-	-	-	-	-	23.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	6.00	D	7	3	5	7	12	13.15	SM	2	1	4	70	23	0	21.57	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	4	7	12	19	17.55	-	-	-	-	-	-	-	26.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	SP-ML	0	0	0	90	10	0	24.78	1.90	1.52	Non-Plastic			2.65	DST	2.0	28.0	-	0.743	-	-	-	-	Poorly Graded Sands with inorganic Silts of low plasticity											
	9.00	D	10	5	9	14	23	18.93	-	-	-	-	-	-	-	26.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	6	10	16	26	20.06	SM	0	0	0	87	13	0	23.88	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	11.00	U	12	-	-	-	-	-	-	-	-	-	-	-	-	26.75	1.91	1.51	-	-	-	-	-	-	-	-	-	-	-	-	-												
	12.50	D	13	6	11	17	28	20.15	-	-	-	-	-	-	-	28.45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	14.00	U	14	-	-	-	-	-	CL-ML	1	1	2	21	68	7	19.75	2.10	1.75	24.0	18.0	6.0	-	DST	14.0	26.5	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	15.50	D	15	4	8	10	18	14.94	ML	2	2	2	28	61	5	21.10	-	-	23.0	19.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	17.00	U	16	-	-	-	-	-	CL	4	1	4	30	48	13	21.94	2.09	1.71	27.5	18.0	9.5	2.67	UU	45.0	14.6	-	0.561	-	8	19	-	Inorganic clays of low plasticity											

APPENDIX "B"
TABLE 4: SUMMARY OF TEST RESULTS

Bore No: P24	Ground Elevation: RL 192.043 m	Method of drilling: Percussion	Depth of Water-table: 1.40 m
Diameter of Bore Hole: 150 mm	Bore Retained using: Casing	Starting Date: 24/09/2023	SPT Sampler: Standard
Location / Chainage: 21544.687	Casing Lowered: 19.00 m	Ending Date: 27/09/2023	Hammer type: Auto-trip

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	18.50	D	17	5	10	12	22	22.00	-	-	-	-	-	-	-	16.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	20.00	U	18	-	-	-	-	-	CL	6	4	3	30	46	11	18.52	2.09	1.76	26.0	18.0	8.0	-	-	-	-	-	-	-	-	-	-												
	21.50	D	19	8	15	20	35	35.00	-	-	-	-	-	-	-	14.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.00	U	20	-	-	-	-	-	CL	9	1	2	9	70	9	19.01	2.02	1.70	30.0	21.0	9.0	2.67	UU	44.0	11.1	0.140	0.571	-	8	17	-												
	24.50	D	21	9	16	16	32	32.00	-	-	-	-	-	-	-	16.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	26.00	U	22	-	-	-	-	-	CI	7	2	1	11	64	15	21.12	2.03	1.68	36.0	20.5	15.5	2.68	-	-	-	-	0.595	-	8	17	-	Inorganic clays of Intermediate plasticity											
	27.50	D	23	10	18	20	38	38.00	-	-	-	-	-	-	-	21.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.00	U	24	-	-	-	-	-	CL	3	2	5	21	57	12	18.13	1.91	1.62	31.0	18.5	12.5	-	UU	54.0	13.3	-	-	-	17	14	-	Inorganic clays of low plasticity											
	30.50	D	25	10	15	18	33	33.00	-	-	-	-	-	-	-	19.83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	32.00	D	26	-	-	-	-	-	CL	7	2	2	15	63	11	17.31	-	-	30.0	18.0	12.0	-	-	-	-	-	-	-	-	-	-												
	33.50	D	27	11	18	21	39	39.00	-	-	-	-	-	-	-	18.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	-	-	-	-	-	SM	0	0	1	62	37	0	18.94	-	-		Non-Plastic		-	-	-	-	-	-	-	-	-	-	Silty Sands											
	36.50	D	29	12	14	22	36	17.54	SM	0	0	1	83	16	0	23.66	-	-		Non-Plastic		-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	-	-	-	-	-	-	-	-	-	-	-	-	25.27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	17	24	45	69	25.84	-	-	-	-	-	-	-	17.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 5: SUMMARY OF TEST RESULTS

Bore No: P25	**Ground Elevation: RL 191.29 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.60 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 14/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 21570.887	**Casing Lowered: 18.00 m**	**Ending Date: 16/12/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	ML	0	0	1	28	65	6	5.97	-	`	27.0	22.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	1.00	D	2	1	1	3	4	6.22	-	-	-	-	-	-	-	17.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	ML	3	0	2	38	57	0	20.45	1.92	1.59	Non-Plastic			2.65	DST	5.0	24.2	-	0.667	-	-	-	-												
	3.00	D	4	5	7	8	15	17.10	-	-	-	-	-	-	-	25.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	5	8	10	18	18.45	SM	0	0	1	55	44	0	26.30	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	5.00	D	6	-	-	-	-	-	-	-	-	-	-	-	-	24.35	2.00	1.61	-	-	-	2.66	RDST	2.0	28.1	-	0.652	-	-	-	-												
	6.00	D	7	6	9	12	21	19.14	SM	0	0	1	67	32	0	25.62	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	7	10	14	24	20.29	-	-	-	-	-	-	-	27.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	D	9	-	-	-	-	-	-	-	-	-	-	-	-	27.87	2.08	1.63	-	-	-	-	RDST	0.0	30.1	-	-	-	-	-	-												
	9.00	D	10	4	5	9	14	13.83	SM	0	0	1	71	28	0	28.15	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	5	8	10	18	18.00	CL	1	2	3	15	66	13	18.48	-	-	34.0	23.0	11.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	11.00	U	12	-	-	-	-	-	ML	0	0	1	14	81	4	20.10	2.07	1.72	24.0	20.0	4.0	2.65	DST	7.0	25.3	-	0.541	-	-	-	-	Inorganic Silts of low plasticity											
	12.50	D	13	6	10	16	26	26.00	CI	0	1	1	5	75	18	19.64	-	-	43.0	26.0	17.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of Intermediate plasticity											
	14.00	U	14	-	-	-	-	-	CI	0	0	1	4	71	24	23.08	2.05	1.67	46.0	24.5	21.5	2.69	UU	72.0	9.3	0.206	0.616	-	18	16	-												
	15.50	D	15	6	9	12	21	21.00	-	-	-	-	-	-	-	19.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	17.00	U	16	-	-	-	-	-	CL	1	1	2	17	67	12	19.16	2.05	1.72	32.0	22.0	10.0	2.68	UU	55.0	11.6	-	0.558	-	9	16	-	Inorganic clays of low plasticity											
	18.50	D	17	7	9	14	23	23.00	-	-	-	-	-	-	-	20.85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 5: SUMMARY OF TEST RESULTS

Bore No: P25	Ground Elevation: RL 191.29 m	Method of drilling: Percussion	Depth of Water-table: 1.60 m
Diameter of Bore Hole: 150 mm	Bore Retained using: Casing	Starting Date: 14/12/2023	SPT Sampler: Standard
Location / Chainage: 21570.887	Casing Lowered: 18.00 m	Ending Date: 16/12/2023	Hammer type: Auto-trip

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	CL	0	1	2	28	61	8	19.86	2.04	1.70	27.0	20.0	7.0	2.67	DST	14.0	23.5	-	0.571	-	-	19	-	Inorganic clays of low plasticity											
	21.50	D	19	9	16	22	38	21.08	-	-	-	-	-	-	-	19.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.00	D	20	-	-	-	-	-	CL	0	0	1	14	76	9	20.41	-	-	30.0	22.0	8.0	-	-	-	-	-	-	-	-	-	-												
	24.50	D	21	13	23	25	48	48.00	-	-	-	-	-	-	-	16.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	-	-	-	-	-	ML	1	0	1	43	55	0	19.52	2.07	1.73	Non-Plastic			-	RDST	4.0	27.2	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	27.50	D	23	11	25	35	60	26.53	ML	1	1	1	35	57	5	18.21	-	-	25.0	21.0	4.0	-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	15	31	43	74	30.33	ML	0	0	1	44	55	0	20.65	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	30.50	D	25	15	28	32	60	60.00	CL	1	2	2	5	79	11	24.83	-	-	34.0	23.0	11.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	32.00	D	26	12	25	30	55	55.00	CL	6	3	2	6	71	12	21.79	-	-	34.5	23.0	11.5	2.69	-	-	-	-	-	-	-	-	-												
	33.50	D	27	14	20	35	55	55.00	-	-	-	-	-	-	-	20.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	16	22	37	59	59.00	CL-CI	0	0	1	9	75	15	20.61	-	-	35.0	21.5	13.5	-	-	-	-	-	-	-	-	-	-	Inorganic Clays of low to Intermediate plasticity											
	36.50	D	29	15	25	38	63	63.00	-	-	-	-	-	-	-	18.84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	17	30	39	69	69.00	CL	0	1	1	10	74	14	21.88	-	-	33.0	22.0	11.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	40.00	D	31	21	34	45	79	79.00	CL	1	0	1	9	76	13	20.25	-	-	34.0	22.5	11.5	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"

TABLE 6: SUMMARY OF TEST RESULTS

Bore No: P26	**Ground Elevation: RL 192.09 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.70 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: NA**	**Starting Date: 12/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 21597.087	**Casing Lowered: 0.00 m**	**Ending Date: 14/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	1	53	46	0	9.39	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	D	2	4	5	7	12	18.91	-	-	-	-	-	-	-	9.58	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	SM	0	0	0	55	45	0	10.34	1.80	1.63	Non-Plastic			2.64	DST	5.0	24.9	-	0.620	-	-	-	-												
	3.00	D	4	5	8	9	17	18.55	-	-	-	-	-	-	-	26.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	6	10	11	21	20.53	SM	0	0	0	65	35	0	24.03	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	SM	0	0	0	68	32	0	8.31	1.75	1.62	Non-Plastic			2.62	DST	1.0	30.6	-	0.617	-	-	-	-												
	6.00	D	7	6	9	14	23	20.73	-	-	-	-	-	-	-	20.24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	7	10	15	25	21.42	-	-	-	-	-	-	-	25.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	CL-ML	0	1	1	13	79	6	22.56	1.94	1.58	27.0	20.5	6.5	2.66	UU	41.0	8.1	0.098	0.684	-	9	19	-	Inorganic Silty Clays of low plasticity											
	9.00	D	10	6	8	11	19	17.34	-	-	-	-	-	-	-	20.69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	8	11	15	26	20.54	-	-	-	-	-	-	-	19.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	D	12	-	-	-	-	-	CL-ML	3	2	2	18	69	6	14.51	1.94	1.69	26.0	21.0	5.0	-	RUU	34.0	12.2	-	-	-	-	-	-												
	12.50	D	13	12	15	18	33	33.00	CL	0	0	1	11	79	9	20.29	-	-	30.0	22.0	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	14.00	U	14	-	-	-	-	-	CL-ML	2	1	1	20	69	7	20.12	2.03	1.69	27.5	22.0	5.5	2.66	-	-	-	-	0.574	-	7	20	-	Inorganic Silty Clays of low plasticity											
	15.50	D	15	10	15	20	35	35.00	CL	0	0	1	8	81	10	21.94	-	-	29.0	21.0	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	17.00	U	16	-	-	-	-	-	ML	1	0	2	44	53	0	19.17	1.82	1.53	Non-Plastic			2.64	DST	3.0	26.4	-	-	-	-	-	-	Inorganic Silts of low plasticity											

APPENDIX "B"
TABLE 6: SUMMARY OF TEST RESULTS

Bore No: P26	**Ground Elevation: RL 192.09 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.70 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: NA**	**Starting Date: 12/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 21597.087	**Casing Lowered: 0.00 m**	**Ending Date: 14/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	18.50	D	17	15	21	25	46	26.08	ML	0	0	1	22	70	7	20.16	-	-	27.0	22.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	20.00	U	18	-	-	-	-	-	CL	0	2	2	17	67	12	20.61	2.04	1.69	30.0	20.0	10.0	2.67	UU	55.0	9.7	-	0.580	-	-	-	-	Inorganic clays of low plasticity											
	21.50	D	19	10	15	21	36	36.00	-	-	-	-	-	-	-	19.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.00	U	20	-	-	-	-	-	CL	2	2	2	11	70	13	17.52	2.09	1.78	30.5	20.0	10.5	2.68	UU	57.0	10.6	-	0.506	-	-	-	-												
	24.50	D	21	9	18	28	46	46.00	CL-CI	3	2	2	9	69	15	17.14	-	-	35.0	20.0	15.0	-	-	-	-	-	-	-	-	-	-	Inorganic Clays of low to Intermediate plasticity											
	26.00	D	22	-	-	-	-	-	CI	3	2	4	9	66	16	14.88	2.06	1.79	36.0	21.0	15.0	-	RUU	77.0	10.2	-	-	-	-	-	-	Inorganic clays of Intermediate plasticity											
	27.50	D	23	16	30	34	64	64.00	CI	0	0	0	5	77	18	24.21	-	-	39.0	25.0	14.0	-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	13	32	37	69	69.00	-	-	-	-	-	-	-	23.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	30.50	D	25	15	35	40	75	31.14	ML	0	0	0	42	58	0	18.51	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	32.00	D	26	26	45	55	R	-	ML	1	1	2	10	74	12	19.16	-	-	33.0	24.0	9.0	2.67	-	-	-	-	-	-	-	-	-												
	33.50	D	27	29	38	45	83	32.50	SM	0	0	1	54	45	0	16.54	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	35.00	D	28	18	25	38	63	26.05	ML	6	6	5	11	68	4	19.72	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	36.50	D	29	15	27	35	62	25.35	CL-ML	0	0	1	27	67	5	19.92	-	-	26.0	21.0	5.0	2.66	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	38.00	D	30	27	32	39	71	71.00	CL	6	3	5	7	69	10	18.57	-	-	30.5	21.5	9.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	40.00	D	31	32	100	-	R	-	-	-	-	-	-	-	-	18.85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 7: SUMMARY OF TEST RESULTS

Bore No: P27	Ground Elevation: RL 191.906 m	Method of drilling: Percussion	Depth of Water-table: 2.40 m
Diameter of Bore Hole: 150 mm	Bore Retained using: Casing	Starting Date: 17/11/2023	SPT Sampler: Standard
Location / Chainage: 21623.287	Casing Lowered: 24.00 m	Ending Date: 20/11/2023	Hammer type: Rope-pulley driven

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.00	D	1	-	-	-	-	-	ML	0	0	1	46	53	0	11.07	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	1.00	D	2	2	2	3	5	7.71	-	-	-	-	-	-	-	17.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	2.00	U	3	-	-	-	-	-	ML	6	2	5	15	68	4	24.49	1.99	1.60	25.0	21.0	4.0	2.66	DST	10.0	27.2	-	0.663	-	-	-	-												
	3.00	D	4	3	4	6	10	12.09	ML	1	0	0	38	61	0	24.19	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	5	6	8	14	15.57	SM	0	0	1	72	27	0	27.29	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	SM	0	0	1	74	25	0	25.06	1.93	1.54	Non-Plastic			2.62	DST	0.0	27.9	-	0.701	-	-	-	-												
	6.00	D	7	6	8	11	19	17.64	-	-	-	-	-	-	-	28.53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Silty Sands											
	7.00	D	8	5	7	12	19	17.30	SM	0	1	2	70	27	0	27.54	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	8.00	D	9	-	-	-	-	-	-	-	-	-	-	-	-	27.08	-	-	-	-	-	-	RDST	0.0	27.8	-	-	-	-	-	-												
	9.00	D	10	3	6	8	14	13.64	CL-ML	1	1	1	17	74	6	20.10	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	10.00	D	11	4	6	10	16	15.03	CL-ML	3	2	4	8	75	8	19.54	-	-	28.0	22.0	6.0	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	CL	3	2	3	8	74	10	18.89	2.11	1.78	28.5	20.0	8.5	2.69	UU	59.0	10.1	0.126	0.515	-	-	-	-	Inorganic clays of low plasticity											
	12.50	D	13	6	9	11	20	20.00	-	-	-	-	-	-	-	21.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	14.00	U	14	-	-	-	-	-	CL-ML	0	1	1	14	76	8	20.44	2.05	1.70	27.5	21.5	6.0	2.67	UU	52.0	10.6	-	0.571	-	6	19	-	Inorganic Silty Clays of low plasticity											
	15.50	D	15	7	9	12	21	15.98	-	-	-	-	-	-	-	20.69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	17.00	U	16	-	-	-	-	-	CL	6	2	3	11	67	11	18.52	2.04	1.72	30.0	21.5	8.5	2.68	UU	50.0	10.9	-	0.558	-	9	19	-	Inorganic clays of low plasticity											

APPENDIX "B"
TABLE 7: SUMMARY OF TEST RESULTS

Bore No: P27	**Ground Elevation: RL 191.906 m**	**Method of drilling: Percussion**	**Depth of Water-table: 2.40 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 17/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 21623.287	**Casing Lowered: 24.00 m**	**Ending Date: 20/11/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	18.50	D	17	8	12	18	30	30.00	-	-	-	-	-	-	-	17.88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	20.00	U	18	-	-	-	-	-	CL	2	0	2	16	68	12	23.81	2.04	1.65	31.0	22.0	9.0	2.67	UU	46.0	11.1	-	0.618	-	-	-	-												
	21.50	D	19	7	13	25	38	38.00	-	-	-	-	-	-	-	23.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.00	U	20	-	-	-	-	-	CL	1	1	1	8	78	11	20.17	2.07	1.72	30.0	22.0	8.0	2.67	UU	47.0	10.6	-	0.552	-	-	-	-	Inorganic clays of low plasticity											
	24.50	D	21	10	14	29	43	43.00	-	-	-	-	-	-	-	19.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	26.00	U	22	-	-	-	-	-	CL	2	0	2	6	80	10	21.66	2.03	1.67	30.0	20.5	9.5	2.68	UU	57.0	11.1	-	0.605	-	-	-	-												
	27.50	D	23	12	25	34	59	59.00	-	-	-	-	-	-	-	20.74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	18	27	32	59	25.58	CL-ML	2	1	1	15	74	7	17.97	-	-	28.0	22.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	30.50	D	25	22	30	38	68	27.87	ML	0	0	1	24	75	0	18.83	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	32.00	D	26	18	26	32	58	24.49	SM	0	0	0	65	35	0	19.24	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	33.50	D	27	16	24	34	58	24.13	-	-	-	-	-	-	-	17.42	-	-	-	-	-	2.63	-	-	-	-	-	-	-	-	-												
	35.00	D	28	17	24	28	52	22.09	SM	0	0	2	68	30	0	17.51	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	18	23	35	58	23.44	SM	1	0	1	72	26	0	16.91	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	38.00	D	30	13	28	31	59	23.38	-	-	-	-	-	-	-	18.38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	14	21	35	56	22.17	SM	0	1	1	73	25	0	17.92	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"

TABLE 8: SUMMARY OF TEST RESULTS

Bore No: P28	**Ground Elevation: RL 191.559 m**	**Method of drilling: Percussion**	**Depth of Water-table: 2.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 17/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 21649.487	**Casing Lowered: 13.50 m**	**Ending Date: 20/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM-SC	0	0	0	52	44	4	10.71	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Silty Sands with clay binder											
	1.00	D	2	1	2	2	4	6.19	-	-	-	-	-	-	-	12.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	SM-SC	0	1	1	56	38	4	18.55	1.96	1.65	24.0	20.0	4.0	2.65	DST	4.0	27.5	-	0.606	-	-	-	-												
	3.00	D	4	2	3	3	6	7.34	SM	0	1	0	58	41	0	24.14	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	4.00	D	5	3	6	8	14	15.66	-	-	-	-	-	-	-	24.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	SM	2	0	0	70	28	0	27.09	1.86	1.46	Non-Plastic			2.62	DST	0.0	30.2	-	0.795	-	-	-	-												
	6.00	D	7	6	12	17	29	23.21	-	-	-	-	-	-	-	26.53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	6	11	15	26	21.13	-	-	-	-	-	-	-	28.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	D	9	-	-	-	-	-	SM	0	1	0	71	28	0	24.51	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	9.00	D	10	5	13	18	31	22.68	-	-	-	-	-	-	-	25.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	4	12	14	26	19.85	-	-	-	-	-	-	-	27.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	CL-ML	4	0	3	35	50	8	21.07	1.99	1.64	28.0	21.5	6.5	2.66	DST	3.0	28.7	-	0.622	-	-	-	-	Inorganic Silty Clays of low plasticity											
	12.50	D	13	5	7	9	16	16.00	CL	2	1	1	17	71	8	20.13	-	-	29.0	21.0	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	14.00	U	14	-	-	-	-	-	CL-ML	1	0	0	38	56	5	17.14	1.98	1.69	26.0	21.0	5.0	2.66	DST	6.0	29.4	-	0.574	-	-	-	-	Inorganic Silty Clays of low plasticity											
	15.50	D	15	5	8	16	24	24.00	CI	0	1	2	8	73	16	18.60	-	-	38.0	23.0	15.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of Intermediate plasticity											
	17.00	U	16	-	-	-	-	-	CL	1	0	1	30	54	14	18.40	2.05	1.73	32.5	20.0	12.5	2.69	UU	57.0	11.1	0.131	0.555	-	9	19	-	Inorganic clays of low plasticity											
	18.50	D	17	7	13	18	31	31.00	-	-	-	-	-	-	-	18.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 8: SUMMARY OF TEST RESULTS

Bore No: P28	**Ground Elevation: RL 191.559 m**	**Method of drilling: Percussion**	**Depth of Water-table: 2.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 17/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 21649.487	**Casing Lowered: 13.50 m**	**Ending Date: 20/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	CL	3	0	1	30	57	9	20.06	2.04	1.70	29.0	21.0	8.0	2.68	UU	58.0	10.1	-	0.576	-	10	19	-	Inorganic clays of low plasticity											
	21.50	D	19	18	28	32	60	29.04	SM	0	0	0	72	28	0	22.47	-	-		Non-Plastic		-	-	-	-	-	-	-	-	-	-	Silty Sands											
	23.00	D	20	17	23	35	58	58.00	CL	8	4	3	11	63	11	15.21	-	-	30.0	21.0	9.0	2.68	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	24.50	D	21	14	22	28	50	24.41	ML	1	1	2	26	65	5	18.17	-	-	26.0	22.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	26.00	D	22	-	-	-	-	-	ML	9	3	2	12	65	9	19.60	2.02	1.69	30.5	23.0	7.5	2.67	RUU	46.0	11.6	-	0.580	-	-	-	-												
	27.50	D	23	18	23	32	55	55.00	-	-	-	-	-	-	-	23.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	21	29	38	67	28.37	CL	2	1	1	11	76	9	19.83	-	-	29.0	22.0	7.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	30.50	D	25	17	26	35	61	25.99	SM	0	1	0	68	31	0	28.13	-	-		Non-Plastic		-	-	-	-	-	-	-	-	-	-	Silty Sands											
	32.00	D	26	13	28	36	64	26.45	-	-	-	-	-	-	-	21.94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	33.50	D	27	11	21	32	53	22.85	CL-ML	0	0	1	9	82	8	18.56	-	-	28.0	21.5	6.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	35.00	D	28	18	25	35	60	24.48	-	-	-	-	-	-	-	21.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	14	22	38	60	60.00	CL	0	0	1	10	79	10	18.62	-	-	30.0	21.0	9.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	38.00	D	30	21	32	36	68	68.00	-	-	-	-	-	-	-	24.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	17	22	32	54	54.00	CL	0	0	2	14	75	9	24.86	-	-	29.5	21.0	8.5	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, '-' indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 9: SUMMARY OF TEST RESULTS

Bore No: P29	**Ground Elevation: RL 191.481 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.40 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 16/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 21675.687	**Casing Lowered: 19.00 m**	**Ending Date: 19/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	ML	2	1	1	44	52	0	6.56	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	1.00	U	2	-	-	-	-	-	SM-SC	1	0	0	57	37	5	9.99	1.99	1.81	24.0	20.0	4.0	2.66	DST	5.0	26.2	-	0.470	-	-	-	-	Silty Sands with clay binder											
	2.00	D	3	2	3	5	8	10.91	SM	2	1	1	76	20	0	20.77	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	3.00	D	4	2	3	6	9	11.51	-	-	-	-	-	-	-	22.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	-	-	-	-	-	SM	0	1	0	84	15	0	26.23	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	5.00	D	6	3	4	6	10	11.53	-	-	-	-	-	-	-	28.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	6.00	D	7	3	6	7	13	14.40	-	-	-	-	-	-	-	28.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	U	8	-	-	-	-	-	SM	2	0	1	84	13	0	29.21	1.93	1.49	Non-Plastic			2.63	DST	0.0	29.8	-	0.765	-	-	-	-												
	8.00	D	9	6	11	13	24	19.89	-	-	-	-	-	-	-	27.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	9.00	D	10	6	10	11	21	18.00	-	-	-	-	-	-	-	22.76	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	-	-	-	-	-	SM	0	0	1	86	13	0	26.41	1.91	1.51	Non-Plastic			-	RDST	0.0	30.1	-	-	-	-	-	-												
	11.00	D	12	4	7	9	16	16.00	CL	3	2	2	10	73	10	20.18	-	-	30.0	21.0	9.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	12.00	D	13	6	8	12	20	20.00	-	-	-	-	-	-	-	19.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	13.00	U	14	-	-	-	-	-	SM	3	4	10	59	24	0	19.65	1.96	1.64	Non-Plastic			2.62	DST	2.0	27.1	-	0.598	-	-	-	-	Silty Sands											
	14.50	D	15	7	11	13	24	24.00	CL	3	2	3	14	65	13	18.57	-	-	30.0	19.5	10.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	16.00	U	16	-	-	-	-	-	CL	5	3	5	19	56	12	19.78	2.03	1.69	29.0	19.5	9.5	2.69	UU	57.0	9.5	-	0.587	-	8	15	-												
	17.50	D	17	7	12	15	27	27.00	-	-	-	-	-	-	-	15.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 9: SUMMARY OF TEST RESULTS

Bore No: P29	**Ground Elevation: RL 191.481 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.40 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 16/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 21675.687	**Casing Lowered: 19.00 m**	**Ending Date: 19/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																		
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen												
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL												
	19.00	U	18	-	-	-	-	-	CL-ML	4	1	2	34	52	7	18.84	1.94	1.63	26.0	20.5	5.5	2.67	UU	32.0	11.5	-	0.638	-	7	18	-	Inorganic Silty Clays of low plasticity												
	20.50	D	19	6	13	17	30	30.00	CL	4	1	2	12	69	12	17.75	-	-	30.0	20.5	9.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity												
	22.00	U	20	-	-	-	-	-	SM	3	1	4	56	36	0	16.78	1.96	1.68	Non-Plastic			2.65	DST	0.0	28.6	-	0.577	-	-	-	-	Silty Sands												
	23.50	D	21	8	16	18	34	34.00	CL	1	1	0	14	76	8	20.28	-	-	28.0	20.5	7.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity												
	25.00	D	22	-	-	-	-	-	SM	0	0	0	62	38	0	19.93	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands												
	26.50	D	23	6	17	20	37	37.00	CL	0	0	1	15	75	9	20.01	-	-	29.0	21.0	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity												
	28.00	U	24	-	-	-	-	-	CL	2	2	5	17	61	13	20.95	2.06	1.70	32.5	21.0	11.5	2.69	UU	60.0	10.2	-	0.582	-	-	-	-													
	29.50	D	25	7	17	22	39	39.00	-	-	-	-	-	-	-	20.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-													
	31.00	U	26	-	-	-	-	-	CL-CI	9	4	4	10	59	14	15.84	2.02	1.74	35.0	23.5	11.5	2.69	UU	62.0	11.6	-	0.546	-	-	-	-	Inorganic Clays of low to Intermediate plasticity												
	32.50	D	27	11	24	27	51	51.00	CL	0	0	1	8	81	10	13.91	-	-	31.0	21.0	10.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity												
	34.00	D	28	15	30	31	61	61.00	-	-	-	-	-	-	-	15.41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-													
	35.50	D	29	14	27	30	57	23.80	SM	0	0	1	82	17	0	16.32	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands												
	37.00	D	30	16	26	28	54	22.63	-	-	-	-	-	-	-	15.65	-	-	-	-	-	2.65	-	-	-	-	-	-	-	-	-													
	38.50	D	31	15	24	28	52	21.78	-	-	-	-	-	-	-	15.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-													
	40.00	D	32	19	29	31	60	23.64	SM	0	0	0	80	20	0	16.23	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-													

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 10: SUMMARY OF TEST RESULTS

Bore No: P30	Ground Elevation: RL 191.396 m	Method of drilling: Percussion	Depth of Water-table: 1.50 m
Diameter of Bore Hole: 150 mm	Bore Retained using: Casing	Starting Date: 25/09/2023	SPT Sampler: Standard
Location / Chainage: 21701.887	Casing Lowered: 25.00 m	Ending Date: 27/09/2023	Hammer type: Auto-trip

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	0	68	32	0	17.34	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	U	2	-	-	-	-	-	SM	0	0	0	70	30	0	21.46	1.80	1.48	Non-Plastic			-	DST	12.0	27.2	-	-	-	-	-	-												
	2.00	D	3	2	2	3	5	6.97	-	-	-	-	-	-	-	24.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	3.00	D	4	3	4	5	9	11.86	-	-	-	-	-	-	-	25.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	U	5	-	-	-	-	-	SM	0	1	0	86	13	0	27.71	1.92	1.50	Non-Plastic			-	DST	9.0	28.3	-	-	-	-	-	-												
	5.00	D	6	4	5	6	11	13.07	-	-	-	-	-	-	-	28.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	6.00	D	7	3	5	7	12	13.66	SM	0	1	1	85	13	0	25.04	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	-	-	-	-	-	-	-	-	-	-	-	-	27.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	D	9	4	6	8	14	14.74	-	-	-	-	-	-	-	27.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	9.00	D	10	5	7	9	16	15.60	SM	0	1	2	82	15	0	28.54	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	10.00	U	11	-	-	-	-	-	CL	8	4	7	15	54	12	20.27	2.10	1.75	29.5	20.0	9.5	2.67	UU	40.0	10.6	-	0.526	-	0	18	-	Inorganic clays of low plasticity											
	11.00	D	12	4	7	8	15	15.00	-	-	-	-	-	-	-	21.92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	12.00	D	13	4	8	9	17	17.00	-	-	-	-	-	-	-	18.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	13.00	U	14	-	-	-	-	-	CL	1	4	1	18	67	9	20.36	2.15	1.79	27.0	19.0	8.0	-	-	-	-	0.146	-	-	8	15	-												
	14.50	D	15	4	9	12	21	21.00	-	-	-	-	-	-	-	18.77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	16.00	U	16	-	-	-	-	-	CL	3	2	3	16	64	12	19.34	2.14	1.79	29.0	18.0	11.0	-	UU	45.0	11.2	-	-	-	-	-	-												
	17.50	D	17	6	9	13	22	22.00	-	-	-	-	-	-	-	18.65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 10: SUMMARY OF TEST RESULTS

Bore No: P30	Ground Elevation: RL 191.396 m	Method of drilling: Percussion	Depth of Water-table: 1.50 m
Diameter of Bore Hole: 150 mm	Bore Retained using: Casing	Starting Date: 25/09/2023	SPT Sampler: Standard
Location / Chainage: 21701.887	Casing Lowered: 25.00 m	Ending Date: 27/09/2023	Hammer type: Auto-trip

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	19.00	U	18	-	-	-	-	-	SM-SC	2	1	3	45	44	5	17.47	2.07	1.76	25.5	20.0	5.5	2.66	DST	10.0	24.3	-	0.511	-	-	16	-	Silty Sands with clay binder											
	20.50	D	19	7	11	15	26	26.00	CL	0	1	2	28	61	8	16.98	-	-	26.0	18.0	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	22.00	D	20	-	-	-	-	-	-	-	-	-	-	-	-	19.86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.50	D	21	6	10	13	23	23.00	-	-	-	-	-	-	-	18.52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	25.00	U	22	-	-	-	-	-	CL	1	1	3	13	68	14	26.47	2.18	1.72	34.0	21.5	12.5	2.67	UU	41.0	8.6	-	0.552	-	0	17	-												
	26.50	D	23	5	9	13	22	22.00	-	-	-	-	-	-	-	23.86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	28.00	D	24	-	-	-	-	-	CL	2	1	4	15	66	12	20.72	-	-	31.0	20.5	10.5	-	-	-	-	-	-	-	-	-	-												
	29.50	D	25	6	11	15	26	26.00	-	-	-	-	-	-	-	16.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	31.00	U	26	-	-	-	-	-	CL-ML	5	2	2	34	52	5	28.46	1.93	1.50	25.0	19.0	6.0	-	DST	5.0	27.8	-	-	-	8	-	-	Inorganic Silty Clays of low plasticity											
	32.50	D	27	8	14	18	32	32.00	CL	0	0	1	16	71	12	15.94	-	-	31.0	19.0	12.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	34.00	D	28	-	-	-	-	-	-	-	-	-	-	-	-	16.84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	35.50	D	29	9	18	22	40	18.63	CL-ML	4	1	1	18	71	5	20.07	-	-	24.0	19.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	37.00	D	30	-	-	-	-	-	CL	0	1	1	12	72	14	21.46	-	-	32.0	18.0	14.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	38.50	D	31	10	20	30	50	50.00	CL	5	4	3	20	56	12	24.79	-	-	28.5	19.5	9.0	-	-	-	-	-	-	-	-	-	-												
	40.00	D	32	11	23	36	59	59.00	-	-	-	-	-	-	-	14.74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 11: SUMMARY OF TEST RESULTS

Bore No: P31	**Ground Elevation: RL 191.259 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.50 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 16/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 21728.087	**Casing Lowered: 22.00 m**	**Ending Date: 23/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	ML	0	0	1	44	51	4	13.98	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	1.00	D	2	1	2	2	4	6.13	-	-	-	-	-	-	-	13.52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	CL-ML	0	1	1	46	47	5	17.81	2.04	1.73	25.0	20.0	5.0	2.65	DST	4.0	26.7	-	0.532	-	-	-	-												
	3.00	D	4	2	3	5	8	10.08	-	-	-	-	-	-	-	19.46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	4.00	D	5	3	4	7	11	13.12	CL-ML	5	2	2	27	58	6	23.20	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	SM-SC	1	1	2	48	43	5	17.86	1.97	1.67	24.0	20.0	4.0	2.64	DST	2.0	27.2	-	0.581	-	-	-	-	Silty Sands with clay binder											
	6.00	D	7	4	5	8	13	14.22	SP-ML	0	0	1	88	11	0	28.62	-	-		Non-Plastic		-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	4	7	10	17	16.46	-	-	-	-	-	-	-	26.46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Poorly Graded Sands with inorganic Silts of low plasticity											
	8.00	D	9	-	-	-	-	-	-	-	-	-	-	-	-	24.36	2.08	1.67	-	-	-	2.63	RDST	0.0	30.4	-	0.575	-	-	-	-												
	9.00	D	10	6	9	13	22	18.27	CL-ML	3	2	2	14	71	8	16.55	-	-	28.0	21.5	6.5	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	7	10	14	24	18.86	-	-	-	-	-	-	-	17.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	CL-ML	6	1	2	14	70	7	17.90	2.04	1.73	26.0	20.0	6.0	2.66	UU	44.0	12.1	0.098	0.538	-	6	17	-	Inorganic Silty Clays of low plasticity											
	12.50	D	13	6	11	14	25	18.50	-	-	-	-	-	-	-	17.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	14.00	U	14	-	-	-	-	-	SM	2	1	1	46	50	0	17.30	1.97	1.68		Non-Plastic		2.64	DST	3.0	27.5	-	0.571	-	-	-	-	Silty Sands											
	15.50	D	15	4	9	12	21	21.00	CL	0	1	1	18	71	9	19.33	-	-	30.0	20.5	9.5	-	-	-	-	-	-	-	-	-	-												
	17.00	U	16	-	-	-	-	-	CL	0	1	1	35	52	11	16.43	1.96	1.68	30.0	19.5	10.5	2.67	UU	58.0	10.5	-	0.589	-	9	16	-	Inorganic clays of low plasticity											
	18.50	D	17	7	11	15	26	26.00	-	-	-	-	-	-	-	15.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 11: SUMMARY OF TEST RESULTS

Bore No: P31	**Ground Elevation: RL 191.259 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.50 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 16/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 21728.087	**Casing Lowered: 22.00 m**	**Ending Date: 23/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	CL	2	0	1	17	67	13	15.69	2.05	1.77	32.0	21.0	11.0	2.68	UU	62.0	9.5	-	0.514	-	-	-	-	Inorganic clays of low plasticity											
	21.50	D	19	8	13	16	29	17.92	CL-ML	3	1	1	38	52	5	18.71	-	-	25.0	20.5	4.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	23.00	U	20	-	-	-	-	-	CL-ML	2	0	2	30	60	6	21.25	1.98	1.63	26.5	21.0	5.5	2.66	DST	10.0	24.7	-	0.632	-	-	-	-												
	24.50	D	21	7	13	19	32	32.00	CL	7	4	4	14	59	12	18.19	-	-	32.0	21.5	10.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	26.00	U	22	-	-	-	-	-	CL	4	3	5	13	62	13	14.15	1.96	1.72	32.5	21.0	11.5	2.68	UU	57.0	10.2	-	0.558	-	-	-	-												
	27.50	D	23	16	27	30	57	57.00	-	-	-	-	-	-	-	26.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	15	28	32	60	60.00	CL	1	1	2	9	79	8	19.93	-	-	29.0	21.0	8.0	-	-	-	-	-	-	-	-	-	-												
	30.50	D	25	13	26	29	55	55.00	MI	12	3	2	3	69	11	26.09	-	-	36.0	26.5	9.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of Intermediate plasticity											
	32.00	D	26	11	25	27	52	52.00	CL-CI	5	1	2	2	77	13	24.64	-	-	35.0	24.0	11.0	-	-	-	-	-	-	-	-	-	-	Inorganic Clays of low to Intermediate plasticity											
	33.50	D	27	13	24	29	53	53.00	-	-	-	-	-	-	-	22.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	15	27	30	57	23.75	SM	0	1	2	52	45	0	17.22	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	36.50	D	29	17	30	32	62	24.83	-	-	-	-	-	-	-	14.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	16	28	31	59	23.66	SM	0	1	3	55	41	0	16.06	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	19	31	34	65	24.86	-	-	-	-	-	-	-	12.96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, '-' indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 12: SUMMARY OF TEST RESULTS

Bore No: P32	**Ground Elevation: RL 191.328 m**	**Method of drilling: Rotary**	**Depth of Water-table: 1.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 06/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 21754.287	**Casing Lowered: 0.00 m**	**Ending Date: 09/11/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	1	55	44	0	5.80	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	U	2	-	-	-	-	-	CL-ML	2	1	1	38	51	7	10.99	1.97	1.78	26.0	20.5	5.5	2.66	DST	5.0	25.2	-	0.499	-	-	-	-	Inorganic Silty Clays of low plasticity											
	2.00	D	3	1	2	2	4	5.51	SM	0	0	0	76	24	0	25.30	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	3.00	D	4	2	2	3	5	6.46	-	-	-	-	-	-	-	23.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	-	-	-	-	-	SM	4	0	0	65	31	0	20.42	1.94	1.61	Non-Plastic			2.62	DST	0.0	28.2	-	0.627	-	-	-	-												
	5.00	D	6	3	3	4	7	8.17	SM-SC	3	3	4	42	43	5	15.91	-	-	25.0	21.0	4.0	-	-	-	-	-	-	-	-	-	-	Silty Sands with clay binder											
	6.00	D	7	3	4	5	9	10.08	SM	0	0	1	77	22	0	23.35	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	7.00	D	8	-	-	-	-	-	-	-	-	-	-	-	-	21.25	1.96	1.62	-	-	-	-	RDST	0.0	28.5	-	-	-	-	-	-												
	8.00	D	9	4	6	7	13	13.50	CL-ML	2	1	1	24	66	6	17.61	-	-	27.0	21.5	5.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	9.00	D	10	5	8	9	17	16.04	-	-	-	-	-	-	-	16.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	U	11	-	-	-	-	-	CL	4	2	2	11	70	11	18.31	2.04	1.72	28.0	19.0	9.0	2.68	UU	54.0	11.6	0.141	0.555	-	8	16	-	Inorganic clays of low plasticity											
	11.00	D	12	5	8	10	18	18.00	-	-	-	-	-	-	-	19.38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	12.00	D	13	6	10	12	22	22.00	-	-	-	-	-	-	-	19.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	13.00	D	15	-	-	-	-	-	SM	0	0	0	56	44	0	18.51	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	14.50	D	16	8	14	22	36	22.86	-	-	-	-	-	-	-	16.62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	16.00	U	17	-	-	-	-	-	CL	3	2	2	18	65	10	21.54	2.02	1.66	28.0	20.5	7.5	2.68	UU	51.0	10.4	-	0.614	-	10	18	-	Inorganic clays of low plasticity											
	17.50	D	18	5	9	10	19	19.00	-	-	-	-	-	-	-	18.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	19.00	U	19	-	-	-	-	-	CL-ML	4	1	0	28	60	7	21.18	2.00	1.65	26.0	20.0	6.0	2.66	DST	12.0	24.0	-	0.612	-	-	-	-	Inorganic Silty Clays of low plasticity											

APPENDIX "B"
TABLE 12: SUMMARY OF TEST RESULTS

Bore No: P32	**Ground Elevation: RL 191.328 m**	**Method of drilling: Rotary**	**Depth of Water-table: 1.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 06/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 21754.287	**Casing Lowered: 0.00 m**	**Ending Date: 09/11/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.50	D	20	11	18	20	38	38.00	CL	0	1	0	12	76	11	18.63	-	-	29.0	21.0	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	22.00	U	21	-	-	-	-	-	CL	2	1	2	8	74	13	18.70	2.04	1.72	33.0	20.0	13.0	2.68	UU	62.0	9.3	-	0.558	-	-	-	-												
	23.50	D	22	27	35	40	75	75.00	-	-	-	-	-	-	-	19.43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	25.00	D	23	17	28	35	63	63.00	-	-	-	-	-	-	-	17.79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	26.50	D	24	21	32	39	71	71.00	CL	2	1	1	6	78	12	16.16	-	-	30.0	19.5	10.5	-	-	-	-	-	-	-	-	-	-												
	28.00	D	25	19	35	40	75	75.00	CL	4	0	1	6	76	13	18.11	-	-	32.0	21.5	10.5	2.68	-	-	-	-	-	-	-	-	-												
	29.50	D	26	14	25	37	62	62.00	-	-	-	-	-	-	-	17.83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	31.00	D	27	20	42	60	R	-	CL-ML	0	0	1	10	81	8	23.33	-	-	27.0	20.5	6.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	32.50	D	28	21	45	50	95	95.00	CL	4	1	1	8	76	10	15.86	-	-	28.0	20.5	7.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	34.00	D	29	32	48	55	R	-	ML	0	0	1	22	72	5	19.58	-	-	27.0	22.0	5.0	2.66	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	35.50	D	30	22	40	47	87	87.00	CL	1	1	0	5	80	13	17.41	-	-	31.0	21.0	10.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	37.00	D	31	25	43	48	91	91.00	-	-	-	-	-	-	-	19.85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	38.50	D	32	27	38	45	83	83.00	CL	1	1	2	10	75	11	17.66	-	-	30.0	20.5	9.5	-	-	-	-	-	-	-	-	-	-												
	40.00	D	33	14	19	37	56	56.00	-	-	-	-	-	-	-	20.57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 13: SUMMARY OF TEST RESULTS

Bore No: P33	**Ground Elevation: RL 191.287m**	**Method of drilling: Rotary**	**Depth of Water-table: 1.35 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 06/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 21780.487	**Casing Lowered: 0.00 m**	**Ending Date: 08/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.00	D	1	-	-	-	-	-	CL-ML	0	0	1	46	47	6	11.63	-	-	26.0	20.5	5.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	1.00	U	2	-	-	-	-	-	CL-ML	0	0	0	44	49	7	13.09	1.98	1.75	27.0	21.0	6.0	2.66	DST	8.0	25.5	-	0.520	-	-	-	-												
	2.00	D	3	2	2	3	5	6.86	SM	0	0	1	55	44	0	19.27	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	3.00	D	4	2	3	4	7	9.00	-	-	-	-	-	-	-	21.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	U	5	-	-	-	-	-	SM	0	0	1	62	37	0	19.07	1.95	1.64	Non-Plastic			2.61	DST	0.0	28.6	-	0.591	-	-	-	-												
	5.00	D	6	3	4	6	10	11.62	-	-	-	-	-	-	-	26.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	6.00	D	7	4	5	7	12	13.37	-	-	-	-	-	-	-	27.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	U	8	-	-	-	-	-	SM	0	0	0	70	30	0	24.71	1.95	1.56	Non-Plastic			2.61	DST	0.0	29.3	-	0.673	-	-	-	-												
	8.00	D	9	5	6	8	14	14.50	-	-	-	-	-	-	-	25.45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	9.00	D	10	4	9	11	20	20.00	CL	3	2	1	7	79	8	17.42	-	-	28.0	20.5	7.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	10.00	U	11	-	-	-	-	-	CL	4	1	1	9	74	11	13.73	2.02	1.78	29.0	21.0	8.0	2.67	UU	56.0	12.2	0.148	0.500	-	6	17	-												
	11.00	D	12	11	14	16	30	21.60	SM-SC	1	1	0	52	42	4	16.18	-	-	24.0	19.0	5.0	-	-	-	-	-	-	-	-	-	-	Silty Sands with clay binder											
	12.00	D	13	9	12	17	29	20.73	SM	0	0	1	55	44	0	16.46	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	13.00	U	14	-	-	-	-	-	CL	3	2	1	8	74	12	22.84	2.04	1.66	30.0	21.0	9.0	2.68	UU	59.0	8.6	-	0.614	-	-	-	-	Inorganic clays of low plasticity											
	14.50	D	15	11	15	17	32	32.00	-	-	-	-	-	-	-	21.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	16.00	U	16	-	-	-	-	-	CL	3	2	0	7	75	13	18.44	2.06	1.74	30.0	19.0	11.0	2.68	UU	62.0	10.3	-	0.540	-	10	16	-												
	17.50	D	17	13	17	22	39	39.00	-	-	-	-	-	-	-	19.27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"

TABLE 13: SUMMARY OF TEST RESULTS

Bore No: P33	**Ground Elevation: RL 191.287m**	**Method of drilling: Rotary**	**Depth of Water-table: 1.35 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 06/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 21780.487	**Casing Lowered: 0.00 m**	**Ending Date: 08/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	19.00	U	18	-	-	-	-	-	CL	0	0	1	6	79	14	16.01	2.04	1.76	33.0	21.0	12.0	2.69	UU	65.0	11.6	-	0.528	-	-	-	-	Inorganic clays of low plasticity											
	20.50	D	19	15	19	23	42	42.00	-	-	-	-	-	-	-	14.28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	22.00	U	20	-	-	-	-	-	CL-ML	2	0	1	44	49	4	19.10	1.97	1.65	24.0	19.5	4.5	2.66	DST	8.0	25.2	-	0.612	-	-	-	-	Inorganic Silty Clays of low plasticity											
	23.50	D	21	32	43	45	88	88.00	CL	3	2	2	9	73	11	19.26	-	-	29.0	20.5	8.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	25.00	D	22	12	35	40	75	75.00	-	-	-	-	-	-	-	16.98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	26.50	D	23	25	38	42	80	80.00	-	-	-	-	-	-	-	17.38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	28.00	D	24	27	42	45	87	87.00	CL-CI	4	2	0	6	74	14	21.63	-	-	35.0	21.5	13.5	-	-	-	-	-	-	-	-	-	-	Inorganic Clays of low to Intermediate plasticity											
	29.50	D	25	32	45	56	R	-	-	-	-	-	-	-	-	17.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	31.00	D	26	24	32	50	82	82.00	-	-	-	-	-	-	-	18.59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	32.50	D	27	23	35	55	90	90.00	CL	4	2	1	16	66	11	18.51	-	-	31.0	21.5	9.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	34.00	D	28	25	38	60	98	98.00	-	-	-	-	-	-	-	18.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	35.50	D	29	21	35	37	72	72.00	CL	4	1	0	12	75	8	16.53	-	-	29.0	21.5	7.5	-	-	-	-	-	-	-	-	-	-												
	37.00	D	30	26	38	50	88	88.00	CL	2	1	1	6	77	13	19.23	-	-	32.0	20.0	12.0	-	-	-	-	-	-	-	-	-	-												
	38.50	D	31	30	42	58	R	-	-	-	-	-	-	-	-	12.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	32	29	43	53	96	96.00	CL	1	1	2	12	74	10	21.70	-	-	30.0	20.5	9.5	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 14: SUMMARY OF TEST RESULTS

Bore No: P34	**Ground Elevation: RL 191.452 m**	**Method of drilling: Rotary**	**Depth of Water-table: 1.40 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 06/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 21806.687	**Casing Lowered: 0.00 m**	**Ending Date: 08/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																		
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen												
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion C (kN/m2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL												
	0.50	D	1	-	-	-	-	-	SM	0	0	1	52	47	0	23.24	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands												
	1.00	D	2	1	1	2	3	4.64	SM-SC	1	0	1	48	45	5	16.32	-	-	25.0	20.5	4.5	-	-	-	-	-	-	-	-	-	-	Silty Sands with clay binder												
	2.00	U	3	-	-	-	-	-	-	-	-	-	-	-	-	15.88	1.96	1.69	-	-	-	2.66	DST	6.0	26.7	-	0.574	-	-	-	-													
	3.00	D	4	2	2	4	6	7.72	ML	3	1	1	44	51	0	20.01	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity												
	4.00	D	5	3	6	8	14	16.03	SM	0	0	0	70	30	0	25.69	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands												
	5.00	U	6	-	-	-	-	-	SM	6	2	3	65	24	0	21.35	1.93	1.59	Non-Plastic			2.61	RDST	0.0	30.8	-	0.642	-	-	-	-													
	6.00	D	7	3	7	11	18	17.55	SM	0	2	3	75	20	0	23.73	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-													
	7.00	D	8	5	11	12	23	19.87	SM	0	0	0	55	45	0	19.54	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-													
	8.00	U	9	-	-	-	-	-	ML	0	0	1	48	51	0	17.54	1.97	1.68	Non-Plastic			2.65	DST	7.0	25.8	-	0.577	-	-	-	-	Inorganic Silts of low plasticity												
	9.00	D	10	4	7	8	15	15.02	SM	2	0	0	54	44	0	18.10	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands												
	10.00	D	11	6	8	12	20	17.22	-	-	-	-	-	-	-	18.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-													
	11.00	U	12	-	-	-	-	-	SM	0	0	1	53	46	0	17.43	1.95	1.66	Non-Plastic			2.65	DST	9.0	26.2	-	0.596	-	-	-	-													
	12.50	D	13	5	9	10	19	19.00	CL	0	0	1	5	81	13	20.88	-	-	32.0	21.5	10.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity												
	14.00	U	14	-	-	-	-	-	CL	1	1	0	6	81	11	22.21	2.04	1.67	30.0	20.5	9.5	2.67	UU	55.0	9.5	-	0.599	-	0	17	-													
	15.50	D	15	4	5	7	12	12.00	-	-	-	-	-	-	-	21.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-													
	17.00	D	16	-	-	-	-	-	-	-	-	-	-	-	-	19.41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-													
	18.50	D	17	6	8	13	21	21.00	CL	0	1	1	7	79	12	19.07	-	-	32.0	21.5	10.5	-	-	-	-	-	-	-	-	-	-													

APPENDIX "B"
TABLE 14: SUMMARY OF TEST RESULTS

Bore No: P34	**Ground Elevation: RL 191.452 m**	**Method of drilling: Rotary**	**Depth of Water-table: 1.40 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 06/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 21806.687	**Casing Lowered: 0.00 m**	**Ending Date: 08/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion C (kN/m2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	CL	7	2	3	8	69	11	17.16	2.06	1.76	30.0	20.5	9.5	2.67	UU	58.0	11.5	-	0.517	-	8	17	-	Inorganic clays of low plasticity											
	21.50	D	19	8	16	14	30	30.00	-	-	-	-	-	-	-	19.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.00	U	20	-	-	-	-	-	CL	2	0	1	5	79	13	21.33	2.01	1.66	32.0	21.0	11.0	2.68	UU	62.0	8.2	-	0.614	-	-	-	-												
	24.50	D	21	11	17	21	38	38.00	-	-	-	-	-	-	-	16.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	-	-	-	-	-	-	-	-	-	-	-	-	19.43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	27.50	D	23	14	22	25	47	47.00	CL	1	1	0	6	80	12	20.51	-	-	30.0	20.5	9.5	-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	-	-	-	-	-	-	-	-	-	-	-	-	18.99	2.06	1.73	-	-	-	2.67	RUU	59.0	9.1	-	0.543	-	-	-	-												
	30.50	D	25	17	32	39	71	29.18	SM	0	0	0	64	36	0	16.69	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	32.00	D	26	18	34	41	75	29.80	CL-ML	3	0	2	34	56	5	18.52	-	-	25.0	20.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	33.50	D	27	15	30	38	68	27.25	-	-	-	-	-	-	-	21.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	11	20	35	55	23.12	CL-ML	1	0	1	22	70	6	19.59	-	-	27.0	21.5	5.5	-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	13	24	28	52	21.95	-	-	-	-	-	-	-	19.82	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	16	29	36	65	65.00	CL	2	1	1	12	75	9	19.04	-	-	28.0	20.5	7.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	40.00	D	31	15	22	31	53	53.00	-	-	-	-	-	-	-	23.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 15: SUMMARY OF TEST RESULTS

Bore No: P35	**Ground Elevation: RL 191.306m**	**Method of drilling: Percussion**	**Depth of Water-table: 2.65 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 16/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 21832.887	**Casing Lowered: 16.00 m**	**Ending Date: 18/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion C (kN/m2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	0	54	46	0	1.52	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	1.00	D	2	1	1	2	3	4.64	-	-	-	-	-	-	-	17.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	SM	0	0	0	59	41	0	18.91	1.96	1.65	Non-Plastic			2.63	DST	2.0	27.7	-	0.594	-	-	-	-	Silty Sands											
	3.00	D	4	2	3	4	7	8.40	SM	0	0	0	56	44	0	17.28	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	3	5	7	12	13.75	-	-	-	-	-	-	-	12.24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	ML	0	1	0	37	62	0	25.19	1.82	1.45	Non-Plastic			2.65	DST	5.0	26.6	-	0.828	-	-	-	-	Inorganic Silts of low plasticity											
	6.00	D	7	3	6	8	14	15.00	-	-	-	-	-	-	-	20.85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	4	7	9	16	15.81	SM	0	0	1	64	35	0	22.36	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	SM	1	0	0	76	23	0	27.39	1.95	1.53	Non-Plastic			2.62	DST	0.0	28.7	-	0.712	-	-	-	-	Silty Sands											
	9.00	D	10	6	8	10	18	16.27	SM	0	0	1	73	26	0	23.71	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	7	9	11	20	16.97	-	-	-	-	-	-	-	25.79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	CL	1	2	3	17	67	10	18.27	2.01	1.70	28.0	21.0	7.0	2.67	UU	54.0	9.3	0.107	0.571	-	8	17	-	Inorganic clays of low plasticity											
	12.50	D	13	7	12	14	26	18.96	CL-ML	0	1	1	27	65	6	19.60	-	-	25.0	20.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	14.00	U	14	-	-	-	-	-	SM	0	1	0	49	50	0	14.75	1.93	1.68	Non-Plastic			2.64	DST	3.0	26.8	-	0.571	-	-	-	-												
	15.50	D	15	7	14	18	32	20.66	-	-	-	-	-	-	-	17.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Silty Sands											
	17.00	D	16	-	-	-	-	-	SM	0	1	1	77	21	0	19.06	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 15: SUMMARY OF TEST RESULTS

Bore No: P35	**Ground Elevation: RL 191.306m**	**Method of drilling: Percussion**	**Depth of Water-table: 2.65 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 16/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 21832.887	**Casing Lowered: 16.00 m**	**Ending Date: 18/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion C (kN/m2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	18.50	D	17	8	15	19	34	20.61	SM	0	1	2	70	27	0	20.44	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	20.00	U	18	-	-	-	-	-	-	-	-	-	-	-	-	21.64	1.95	1.60	-	-	-	2.63	DST	0.0	28.5	-	0.644	-	-	-	-												
	21.50	D	19	9	16	22	38	21.30	CL-ML	0	1	1	17	74	7	20.92	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	23.00	D	20	-	-	-	-	-	CL-ML	1	2	2	21	68	6	18.80	2.03	1.71	26.5	21.0	5.5	-	RUU	38.0	12.2	-	-	-	-	-	-												
	24.50	D	21	15	19	25	44	22.55	-	-	-	-	-	-	-	17.96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	-	-	-	-	-	CL	0	1	1	10	78	10	21.59	2.10	1.73	29.0	20.5	8.5	-	RUU	59.0	9.1	-	-	-	-	-	-	Inorganic clays of low plasticity											
	27.50	D	23	17	28	35	63	63.00	CL	2	3	3	7	76	9	17.08	-	-	28.0	20.5	7.5	-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	19	31	38	69	29.07	SM	0	0	1	58	41	0	21.49	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	30.50	D	25	25	35	42	77	31.02	ML	0	0	1	35	56	8	18.40	-	-	29.0	22.5	6.5	2.65	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	32.00	D	26	23	37	45	82	31.99	-	-	-	-	-	-	-	18.61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	33.50	D	27	19	35	42	77	30.02	-	-	-	-	-	-	-	14.69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	17	28	38	66	26.40	CL-ML	1	1	3	22	66	7	16.61	-	-	26.0	19.5	6.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	36.50	D	29	21	31	40	71	27.39	-	-	-	-	-	-	-	20.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	24	35	43	78	78.00	CL	0	1	2	16	73	8	15.89	-	-	28.0	20.5	7.5	2.67	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	40.00	D	31	27	42	50	92	92.00	-	-	-	-	-	-	-	17.69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 16: SUMMARY OF TEST RESULTS

Bore No: P36	**Ground Elevation: RL 191.271 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 15/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 21859.087	**Casing Lowered: 22.00 m**	**Ending Date: 17/10/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	CL-ML	0	0	1	42	51	6	12.41	-	-	26.5	21.5	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	1.00	U	2	-	-	-	-	-	SM	1	0	0	58	41	0	17.43	2.04	1.74	Non-Plastic			2.65	DST	0.0	25.9	-	-	-	-	-	-	Silty Sands											
	2.00	D	3	2	3	3	6	8.18	SM-SC	1	1	2	46	43	7	19.33	-	-	27.0	21.5	5.5	-	-	-	-	-	-	-	-	-	-	Silty Sands with clay binder											
	3.00	D	4	3	5	5	10	12.74	SM	2	1	0	57	40	0	22.55	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	4.00	U	5	-	-	-	-	-	SM	3	0	0	59	38	0	27.83	2.07	1.62	Non-Plastic			2.62	DST	0.0	29.5	-	0.617	-	-	-	-												
	5.00	D	6	4	7	9	16	16.64	SM	0	0	0	76	24	0	26.28	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	6.00	D	7	3	9	13	22	19.51	-	-	-	-	-	-	-	25.52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	U	8	-	-	-	-	-	-	-	-	-	-	-	-	24.15	2.05	1.65	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	D	9	3	6	11	17	16.09	CL-ML	1	1	0	18	74	6	17.92	-	-	26.0	20.0	6.0	2.63	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	9.00	D	10	5	11	11	22	18.24	-	-	-	-	-	-	-	19.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	U	11	-	-	-	-	-	CL	3	3	3	14	66	11	19.59	2.05	1.71	31.0	21.5	9.5	2.67	UU	49.0	9.5	0.162	0.557	-	-	-	-	Inorganic clays of low plasticity											
	11.00	D	12	6	12	17	29	20.80	CL-ML	3	2	2	7	79	7	17.25	-	-	27.0	21.0	6.0	-	-	-	-	-	-	-	0	18	-	Inorganic Silty Clays of low plasticity											
	12.00	D	13	7	11	15	26	19.08	-	-	-	-	-	-	-	19.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	13.00	U	14	-	-	-	-	-	SM	0	0	0	55	45	0	19.70	2.00	1.67	Non-Plastic			-	DST	4.0	26.1	-	-	-	-	-	-	Silty Sands											
	14.50	D	15	5	12	15	27	18.78	-	-	-	-	-	-	-	19.98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	16.00	U	16	-	-	-	-	-	CL	1	1	1	23	63	11	20.97	2.06	1.70	29.5	19.5	10.0	2.67	UU	54.0	9.0	-	0.571	-	8	15	-	Inorganic clays of low plasticity											
	17.50	D	17	6	9	14	23	23.00	CL	1	1	1	18	67	12	16.48	-	-	31.0	18.5	12.5	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 16: SUMMARY OF TEST RESULTS

Bore No: P36	**Ground Elevation: RL 191.271 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 15/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 21859.087	**Casing Lowered: 22.00 m**	**Ending Date: 17/10/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	19.00	U	18	-	-	-	-	-	-	-	-	-	-	-	-	17.68	2.08	1.77	-	-	-	2.68	UU	60.0	10.0	-	0.514	-	-	-	-	Inorganic clays of low plasticity											
	20.50	D	19	7	9	17	26	26.00	-	-	-	-	-	-	-	17.92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	22.00	U	20	-	-	-	-	-	CL	0	0	0	14	72	14	18.22	2.07	1.75	32.0	19.0	13.0	2.68	UU	64.0	9.5	-	0.531	-	15	15	-												
	23.50	D	21	6	12	17	29	29.00	CL	5	4	4	11	64	12	17.97	-	-	30.0	18.5	11.5	-	-	-	-	-	-	-	-	-	-												
	25.00	D	22	-	-	-	-	-	CL	3	1	3	14	71	8	21.35	-	-	27.5	20.0	7.5	-	-	-	-	-	-	-	-	-	-												
	26.50	D	23	11	17	28	45	45.00	-	-	-	-	-	-	-	19.89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	28.00	U	24	-	-	-	-	-	MI	1	1	0	14	68	16	19.30	2.05	1.72	36.0	25.0	11.0	2.69	UU	68.0	11.5	-	0.564	-	20	20	-	Inorganic Silts of Intermediate plasticity											
	29.50	D	25	11	19	26	45	45.00	-	-	-	-	-	-	-	19.95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	31.00	D	26	-	-	-	-	-	CL-ML	2	1	2	18	68	9	19.18	-	-	27.5	21.5	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	32.50	D	27	17	26	30	56	23.79	ML	0	1	1	42	56	0	19.86	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	34.00	D	28	16	29	33	62	25.14	CL-ML	0	0	1	28	65	6	18.90	-	-	25.5	21.0	4.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	35.50	D	29	18	20	29	49	49.00	CL	2	1	2	22	64	9	20.07	-	-	28.5	20.5	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	37.00	D	30	-	-	-	-	-	-	-	-	-	-	-	-	18.24	2.05	1.73	-	-	-	2.67	RDST	16.0	20.2	-	0.543	-	-	-	-												
	38.50	D	31	16	22	26	48	20.18	CL-ML	0	1	1	32	60	6	17.08	-	-	26.5	21.5	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	40.00	D	32	17	24	30	54	21.43	-	-	-	-	-	-	-	17.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 17: SUMMARY OF TEST RESULTS

Bore No: P37	**Ground Elevation: RL 191.192m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 15/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 21885.287	**Casing Lowered: 17.00 m**	**Ending Date: 17/11/2023**	**Hammer type: Auto-trip**

<table>
<tr><th colspan="10">FIELD TEST RESULT</th><th colspan="34">LABORATORY TEST RESULT</th></tr>
<tr><th rowspan="2">RL in Meter</th><th rowspan="2">Depth Below NGL (Meter)</th><th rowspan="2">Nature of Sample</th><th rowspan="2">Sample Reference No.</th><th colspan="5">SPT Test Result</th><th rowspan="2">Soil Classification</th><th colspan="6">Grain Size Analysis</th><th colspan="7">Index Property</th><th colspan="3">Shear Strength Parameters</th><th colspan="3">Consolidation Characteristic</th><th colspan="3">Shrinkage</th><th colspan="12">Test on Rock Specimen</th></tr>
<tr><th>N1 (Seating Drive)</th><th>N2 (First Drive)</th><th>N3 (Second Drive)</th><th>Observed SPT</th><th>N (Corrected)</th><th>Gravel (%)</th><th>Coarse Sand (%)</th><th>Medium Sand (%)</th><th>Fine Sand (%)</th><th>Silt (%)</th><th>Clay (%)</th><th>Moisture Content (%)</th><th>Bulk Density (gm/cc)</th><th>Dry Density (gm/cc)</th><th>Liquid Limit (%)</th><th>Plastic Limit (%)</th><th>Plastic Index (%)</th><th>Specific Gravity</th><th>Type of Test</th><th>Cohesion (kN/m^2)</th><th>Angle of Friction</th><th>Compression Index</th><th>Initial Void Ratio</th><th>Pre-consolidation Pressure (Kg/cm^2)</th><th>Free Swell Index</th><th>Shrinkage Limit</th><th>Swell Pressure</th><th>Core Recovery %</th><th>R.Q.D %</th><th>Density (gm /cc)</th><th>Specific gravity</th><th>Moisture content (%)</th><th>Water absorption (%)</th><th>Point load Index</th><th>U.C.S (MPa)</th><th>Porosity</th><th>Hardness</th><th>Modulus of Elasticity</th><th>Cerchar Abrasive Index</th></tr>
<tr><th colspan="23"></th><th colspan="9">Classification of ROCK</th><th colspan="12">Classification of SOIL</th></tr>
<tr><td></td><td>0.50</td><td>D</td><td>1</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>SM</td><td>0</td><td>0</td><td>1</td><td>54</td><td>45</td><td>0</td><td>6.58</td><td>-</td><td>-</td><td colspan="3">Non-Plastic</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td colspan="12" rowspan="2">Silty Sands</td></tr>
<tr><td></td><td>1.00</td><td>D</td><td>2</td><td>1</td><td>1</td><td>2</td><td>3</td><td>4.69</td><td>SM</td><td>2</td><td>1</td><td>2</td><td>58</td><td>37</td><td>0</td><td>19.97</td><td>-</td><td>-</td><td colspan="3">Non-Plastic</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td></td><td>2.00</td><td>D</td><td>3</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>SM-SC</td><td>1</td><td>0</td><td>1</td><td>48</td><td>45</td><td>5</td><td>18.04</td><td>1.87</td><td>1.58</td><td>25.0</td><td>20.5</td><td>4.5</td><td>-</td><td>RDST</td><td>10.0</td><td>23.5</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td colspan="12">Silty Sands with clay binder</td></tr>
<tr><td></td><td>3.00</td><td>D</td><td>4</td><td>2</td><td>2</td><td>3</td><td>5</td><td>6.59</td><td>CL-ML</td><td>4</td><td>1</td><td>2</td><td>27</td><td>61</td><td>5</td><td>17.83</td><td>-</td><td>-</td><td>25.0</td><td>20.5</td><td>4.5</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td colspan="12" rowspan="2">Inorganic Silty Clays of low plasticity</td></tr>
<tr><td></td><td>4.00</td><td>D</td><td>5</td><td>2</td><td>3</td><td>3</td><td>6</td><td>7.50</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>21.18</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td></td><td>5.00</td><td>U</td><td>6</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>SM</td><td>0</td><td>0</td><td>0</td><td>74</td><td>26</td><td>0</td><td>20.41</td><td>1.97</td><td>1.64</td><td colspan="3">Non-Plastic</td><td>2.63</td><td>DST</td><td>0.0</td><td>28.2</td><td>-</td><td>0.604</td><td>-</td><td>-</td><td>-</td><td>-</td><td colspan="12" rowspan="4">Silty Sands</td></tr>
<tr><td></td><td>6.00</td><td>D</td><td>7</td><td>3</td><td>5</td><td>6</td><td>11</td><td>12.49</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>25.97</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td></td><td>7.00</td><td>D</td><td>8</td><td>4</td><td>6</td><td>8</td><td>14</td><td>15.13</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>24.18</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td></td><td>8.00</td><td>U</td><td>9</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>SM</td><td>0</td><td>0</td><td>1</td><td>78</td><td>21</td><td>0</td><td>24.90</td><td>1.84</td><td>1.47</td><td colspan="3">Non-Plastic</td><td>2.62</td><td>DST</td><td>0.0</td><td>27.6</td><td>-</td><td>0.782</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td></td><td>9.00</td><td>D</td><td>10</td><td>3</td><td>5</td><td>6</td><td>11</td><td>11.26</td><td>CL-ML</td><td>1</td><td>0</td><td>0</td><td>7</td><td>85</td><td>7</td><td>19.52</td><td>-</td><td>-</td><td>27.0</td><td>21.0</td><td>6.0</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td colspan="12" rowspan="4">Inorganic Silty Clays of low plasticity</td></tr>
<tr><td></td><td>10.00</td><td>D</td><td>11</td><td>4</td><td>5</td><td>9</td><td>14</td><td>13.94</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>17.20</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td></td><td>11.00</td><td>U</td><td>12</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>CL-ML</td><td>3</td><td>2</td><td>2</td><td>14</td><td>71</td><td>8</td><td>22.03</td><td>2.06</td><td>1.69</td><td>26.0</td><td>21.0</td><td>5.0</td><td>2.66</td><td>UU</td><td>44.0</td><td>9.1</td><td>-</td><td>0.574</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td></td><td>12.50</td><td>D</td><td>13</td><td>6</td><td>8</td><td>11</td><td>19</td><td>16.22</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>17.06</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td></td><td>14.00</td><td>U</td><td>14</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>CL</td><td>2</td><td>1</td><td>1</td><td>8</td><td>74</td><td>14</td><td>21.70</td><td>2.03</td><td>1.67</td><td>34.5</td><td>21.0</td><td>13.5</td><td>2.68</td><td>UU</td><td>62.0</td><td>8.5</td><td>0.112</td><td>0.605</td><td>-</td><td>10</td><td>14</td><td>-</td><td colspan="12" rowspan="2">Inorganic clays of low plasticity</td></tr>
<tr><td></td><td>15.50</td><td>D</td><td>15</td><td>9</td><td>14</td><td>16</td><td>30</td><td>30.00</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>19.44</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td></td><td>17.00</td><td>U</td><td>16</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>ML</td><td>1</td><td>0</td><td>1</td><td>41</td><td>52</td><td>5</td><td>16.12</td><td>1.99</td><td>1.71</td><td>24.0</td><td>20.0</td><td>4.0</td><td>2.65</td><td>DST</td><td>9.0</td><td>25.8</td><td>-</td><td>0.550</td><td>-</td><td>-</td><td>-</td><td>-</td><td colspan="12">Inorganic Silts of low plasticity</td></tr>
</table>

APPENDIX "B"
TABLE 17: SUMMARY OF TEST RESULTS

Bore No: P37	**Ground Elevation: RL 191.192m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 15/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 21885.287	**Casing Lowered: 17.00 m**	**Ending Date: 17/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	18.50	D	17	8	15	18	33	20.52	-	-	-	-	-	-	-	18.24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	20.00	U	18	-	-	-	-	-	CL	7	2	3	11	68	9	19.12	2.07	1.74	28.0	20.0	8.0	2.67	UU	53.0	10.2	-	0.534	-	9	16	-	Inorganic clays of low plasticity											
	21.50	D	19	9	17	22	39	39.00	CL	4	2	3	9	70	12	17.43	-	-	33.0	22.0	11.0	-	-	-	-	-	-	-	-	-	-												
	23.00	U	20	-	-	-	-	-	CL	6	3	4	15	61	11	18.92	2.06	1.73	31.0	21.0	10.0	2.68	UU	56.0	11.7	-	0.549	-	-	-	-												
	24.50	D	21	22	50	50	R	-	-	-	-	-	-	-	-	12.53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	16	30	36	66	66.00	CL	2	0	1	10	77	10	17.49	-	-	29.0	21.5	7.5	-	-	-	-	-	-	-	-	-	-												
	27.50	D	23	14	28	34	62	62.00	CL	0	0	0	9	78	13	20.19	-	-	32.0	21.0	11.0	-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	16	32	48	80	33.02	ML	0	0	0	34	66	0	21.19	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	30.50	D	25	13	27	32	59	25.88	CL-ML	0	0	1	36	56	7	19.01	-	-	26.0	20.5	5.5	2.65	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	32.00	D	26	20	42	51	93	35.81	ML	1	1	1	40	53	4	18.89	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	33.50	D	27	18	38	49	87	33.36	ML	0	0	0	39	61	0	22.11	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	14	28	36	64	26.12	CL-ML	7	2	3	17	63	8	15.95	-	-	27.0	20.5	6.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	36.50	D	29	17	32	40	72	27.99	CL-ML	8	6	4	21	53	8	19.56	-	-	27.5	21.5	6.0	-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	10	20	43	63	63.00	CL	2	1	1	11	75	10	20.99	-	-	29.0	20.0	9.0	2.68	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	40.00	D	31	27	38	52	90	90.00	-	-	-	-	-	-	-	15.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 18: SUMMARY OF TEST RESULTS

Bore No: P38	**Ground Elevation: RL 191.236 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 08/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 21911.487	**Casing Lowered: 22.00 m**	**Ending Date: 10/11/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	1	1	0	57	41	0	4.81	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	U	2	-	-	-	-	-	SM-SC	2	0	2	56	35	5	20.15	1.95	1.62	25.0	21.0	4.0	2.65	DST	4.0	26.5	-	0.636	-	-	-	-	Silty Sands with clay binder											
	2.00	D	3	1	2	2	4	5.53	ML	2	1	1	42	50	4	20.68	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	3.00	D	4	2	3	3	6	7.78	CL-ML	1	0	1	46	48	4	22.28	-	-	24.5	20.0	4.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	4.00	D	5	-	-	-	-	-	SM	1	1	1	47	50	0	20.30	1.91	1.59	Non-Plastic			2.63	RDST	4.0	24.3	-	0.654	-	-	-	-	Silty Sands											
	5.00	D	6	4	5	7	12	14.09	-	-	-	-	-	-	-	19.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	6.00	D	7	4	6	8	14	15.39	CL-ML	3	2	1	38	50	6	17.49	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	7.00	U	8	-	-	-	-	-	CL-ML	0	0	0	40	55	5	19.06	2.06	1.73	25.0	20.5	4.5	2.65	DST	7.0	25.7	-	0.532	-	-	-	-												
	8.00	D	9	5	7	10	17	16.32	-	-	-	-	-	-	-	19.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	9.00	D	10	6	8	11	19	17.00	CL-ML	4	2	3	10	73	8	18.29	-	-	27.0	20.5	6.5	-	-	-	-	-	-	-	-	-	-												
	10.00	U	11	-	-	-	-	-	CL-ML	3	3	2	8	77	7	20.09	2.01	1.67	26.5	21.0	5.5	2.66	UU	42.0	11.0	0.093	0.593	-	0	20	-												
	11.00	D	12	11	21	24	45	28.63	CL-ML	0	1	2	14	76	7	21.63	-	-	27.0	21.0	6.0	-	-	-	-	-	-	-	-	-	-												
	12.00	D	13	7	10	13	23	17.99	-	-	-	-	-	-	-	19.62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	13.00	D	14	-	-	-	-	-	CL	1	1	1	7	79	11	28.85	2.16	1.68	29.0	21.0	8.0	-	RUU	55.0	8.2	-	-	-	-	-	-	Inorganic clays of low plasticity											
	14.50	D	15	6	9	12	21	21.00	-	-	-	-	-	-	-	25.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	16.00	U	16	-	-	-	-	-	CL-ML	0	1	3	23	65	8	20.68	2.11	1.75	26.0	19.5	6.5	2.66	UU	48.0	9.5	-	0.520	-	-	-	-	Inorganic Silty Clays of low plasticity											
	17.50	D	17	7	10	14	24	16.88	-	-	-	-	-	-	-	19.88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 18: SUMMARY OF TEST RESULTS

Bore No: P38	Ground Elevation: RL 191.236 m	Method of drilling: Percussion	Depth of Water-table: 1.30 m
Diameter of Bore Hole: 150 mm	Bore Retained using: Casing	Starting Date: 08/11/2023	SPT Sampler: Standard
Location / Chainage: 21911.487	Casing Lowered: 22.00 m	Ending Date: 10/11/2023	Hammer type: Rope-pulley driven

FIELD TEST RESULT										LABORATORY TEST RESULT																						
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery % / R.Q.D % / Density (gm /cc) / Specific gravity / Moisture content (%) / Water absorption (%) / Point load Index / U.C.S (MPa) / Porosity / Hardness / Modulus of Elasticity / Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL
	19.00	U	18	-	-	-	-	-	SM	1	1	0	53	45	0	18.97	1.93	1.62	Non-Plastic			2.64	DST	3.0	27.2	-	0.630	-	-	-	-	Silty Sands
	20.50	D	19	11	13	17	30	18.55	CL-ML	2	1	1	22	67	7	19.38	-	-	27.0	21.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity
	22.00	U	20	-	-	-	-	-	ML	3	1	2	14	73	7	22.70	1.98	1.61	28.0	23.0	5.0	2.67	UU	38.0	10.2	-	0.658	-	-	-	-	Inorganic Silts of low plasticity
	23.50	D	21	12	16	21	37	20.36	CL	1	1	2	12	75	9	17.63	-	-	28.0	21.0	7.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity
	25.00	D	22	-	-	-	-	-	-	-	-	-	-	-	-	18.46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	26.50	D	23	13	17	23	40	20.64	-	-	-	-	-	-	-	21.96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	28.00	D	24	-	-	-	-	-	CL	7	2	3	10	68	10	16.16	2.00	1.72	29.0	21.5	7.5	2.69	RUU	49.0	9.1	-	-	-	-	-	-	
	29.50	D	25	15	20	25	45	45.00	MI	2	1	1	5	75	16	26.60	-	-	38.0	27.0	11.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of Intermediate plasticity
	31.00	D	26	-	-	-	-	-	-	-	-	-	-	-	-	28.40	2.17	1.69	-	-	-	-	RUU	63.0	7.4	-	-	-	-	-	-	
	32.50	D	27	17	21	27	48	21.60	CL-ML	2	1	1	36	55	5	16.29	-	-	25.0	20.5	4.5	2.65	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity
	34.00	D	28	-	-	-	-	-	-	-	-	-	-	-	-	18.29	2.08	1.76	-	-	-	-	RDST	8.0	24.2	-	-	-	-	-	-	
	35.50	D	29	20	23	29	52	21.99	CL-ML	1	0	1	42	50	6	19.15	-	-	25.5	20.5	5.0	-	-	-	-	-	-	-	-	-	-	
	37.00	D	30	21	25	30	55	22.44	-	-	-	-	-	-	-	19.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	38.50	D	31	23	27	31	58	22.92	CL	3	2	1	15	71	8	21.16	-	-	27.0	20.0	7.0	2.66	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity
	40.00	D	32	25	30	32	62	23.64	-	-	-	-	-	-	-	18.79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 19: SUMMARY OF TEST RESULTS

Bore No: P39	**Ground Elevation: RL 191.204 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 17/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 21937.687	**Casing Lowered: 22.00 m**	**Ending Date: 19/10/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	0	56	44	0	10.61	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	D	2	-	-	-	-	-	ML	0	0	0	46	49	5	22.14	-	-	26.5	22.0	4.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	2.00	D	3	2	3	4	7	9.79	SM-SC	4	2	2	46	39	7	20.85	-	-	27.5	21.5	6.0	-	-	-	-	-	-	-	-	-	-	Silty Sands with clay binder											
	3.00	D	4	2	3	3	6	7.88	SM	7	3	4	44	42	0	20.69	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	4.00	U	5	-	-	-	-	-	-	-	-	-	-	-	-	18.45	1.90	1.60	-	-	-	2.63	DST	7.0	24.5	-	0.644	-	-	-	-												
	5.00	D	6	3	3	4	7	8.32	ML	0	0	0	36	64	0	18.50	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	6.00	D	7	3	3	5	8	9.11	ML	0	0	1	39	60	0	19.18	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	-	-	-	-	-	-	-	-	-	-	-	-	19.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	D	9	3	4	5	9	9.58	ML	0	0	0	44	56	0	18.34	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	9.00	D	10	3	4	6	10	10.26	CL-ML	1	1	1	24	68	5	18.71	-	-	26.0	20.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	10.00	U	11	-	-	-	-	-	CL	7	6	5	14	60	8	16.15	2.02	1.74	29.0	21.0	8.0	2.67	UU	51.0	9.5	0.131	0.535	-	8	17	-	Inorganic clays of low plasticity											
	11.00	D	12	5	9	14	23	23.00	-	-	-	-	-	-	-	20.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	12.00	D	13	6	12	13	25	25.00	-	-	-	-	-	-	-	20.61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	13.00	U	14	-	-	-	-	-	CL	2	1	1	11	72	13	19.90	2.05	1.71	32.0	21.0	11.0	2.67	UU	56.0	8.2	-	0.562	-	-	-	-												
	14.50	D	15	4	7	11	18	15.30	CL-ML	0	1	1	32	61	5	21.24	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	16.00	U	16	-	-	-	-	-	CL	9	5	5	9	61	11	20.78	2.05	1.70	30.0	20.0	10.0	2.67	UU	53.0	11.5	-	0.573	-	-	-	-	Inorganic clays of low plasticity											
	17.50	D	17	4	6	9	15	15.00	CL	1	1	1	14	71	12	20.51	-	-	31.0	19.5	11.5	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 19: SUMMARY OF TEST RESULTS

Bore No: P39	**Ground Elevation: RL 191.204 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 17/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 21937.687	**Casing Lowered: 22.00 m**	**Ending Date: 19/10/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	19.00	U	18	-	-	-	-	-	CL	5	4	3	16	60	12	17.30	1.99	1.70	31.0	22.0	9.0	2.67	UU	58.0	10.5	-	0.574	-	-	-	-	Inorganic clays of low plasticity											
	20.50	D	19	5	7	12	19	19.00	CL	9	3	3	17	58	10	19.43	-	-	29.0	19.5	9.5	-	-	-	-	-	-	-	0	19	-												
	22.00	U	20	-	-	-	-	-	CI	4	3	4	9	64	16	18.23	2.03	1.72	37.0	23.0	14.0	2.68	UU	62.0	9.7	-	0.561	-	-	-	-	Inorganic clays of Intermediate plasticity											
	23.50	D	21	6	15	27	42	42.00	-	-	-	-	-	-	-	20.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	25.00	U	22	-	-	-	-	-	CL	1	1	1	17	71	9	22.72	2.06	1.68	28.0	21.0	7.0	2.67	UU	46.0	10.4	-	0.591	-	-	-	-	Inorganic clays of low plasticity											
	26.50	D	23	11	22	29	51	24.46	-	-	-	-	-	-	-	20.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	28.00	D	24	-	-	-	-	-	-	-	-	-	-	-	-	20.86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.50	D	25	12	24	30	54	24.61	CL-ML	0	0	2	28	63	7	18.31	-	-	27.0	21.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	31.00	D	26	16	19	27	46	46.00	CL	1	1	1	12	76	9	19.96	-	-	28.0	19.5	8.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	32.50	D	27	14	20	29	49	22.32	SM	0	0	1	52	47	0	18.43	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	34.00	D	28	-	-	-	-	-	CL	2	1	2	18	69	8	17.57	-	-	27.5	20.5	7.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	35.50	D	29	17	24	26	50	21.86	ML	2	2	3	28	61	4	13.25	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	37.00	D	30	-	-	-	-	-	CL	2	1	1	12	73	11	16.66	2.04	1.75	29.0	19.0	10.0	2.67	RUU	54.0	9.6	-	0.526	-	-	-	-	Inorganic clays of low plasticity											
	38.50	D	31	16	22	30	52	52.00	-	-	-	-	-	-	-	11.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	32	18	24	38	62	62.00	-	-	-	-	-	-	-	20.57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 20: SUMMARY OF TEST RESULTS

Bore No: P40	**Ground Elevation: RL 191.009 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.40 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 20/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 21963.887	**Casing Lowered: 21.00 m**	**Ending Date: 22/10/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	0	62	38	0	10.72	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	U	2	-	-	-	-	-	CL	2	1	1	44	44	8	22.17	2.01	1.65	27.5	20.5	7.0	2.66	DST	8.0	26.0	-	0.617	-	-	-	-	Inorganic clays of low plasticity											
	2.00	D	3	1	2	2	4	4.00	CL	0	0	0	24	63	13	24.75	-	-	33.0	23.0	10.0	-	-	-	-	-	-	-	-	-	-												
	3.00	D	4	2	2	3	5	5.00	-	-	-	-	-	-	-	23.85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	-	-	-	-	-	CL-ML	0	0	1	35	59	5	20.50	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	5.00	D	6	2	3	4	7	8.08	SM	0	0	1	58	41	0	26.44	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	6.00	D	7	3	6	6	12	13.28	SM	0	0	1	68	31	0	28.88	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	7.00	U	8	-	-	-	-	-	SM	0	0	1	52	47	0	19.76	1.96	1.64	Non-Plastic			2.63	DST	5.0	27.5	-	0.604	-	-	-	-												
	8.00	D	9	2	3	6	9	9.25	SM	0	0	1	62	37	0	27.91	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	9.00	D	10	3	3	5	8	8.00	CL	0	0	1	12	76	11	21.38	-	-	30.0	20.0	10.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	10.00	U	11	-	-	-	-	-	CL	3	1	2	12	70	12	19.66	2.04	1.70	33.0	22.0	11.0	2.67	UU	56.0	10.5	0.162	0.567	-	-	16	13.80												
	11.00	D	12	5	10	13	23	23.00	-	-	-	-	-	-	-	20.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	12.00	D	13	5	7	9	16	16.00	-	-	-	-	-	-	-	21.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	13.00	U	14	-	-	-	-	-	CL	3	1	2	9	72	13	21.68	2.05	1.68	32.0	20.0	12.0	2.67	UU	58.0	9.6	-	0.586	-	-	17	16.60												
	14.50	D	15	2	6	8	14	11.84	CL-ML	0	1	1	18	71	9	20.81	-	-	28.0	21.5	6.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	16.00	U	16	-	-	-	-	-	CL	2	1	2	17	66	12	19.59	2.01	1.68	30.0	18.5	11.5	2.68	UU	60.0	8.3	-	0.595	-	-	-	-	Inorganic clays of low plasticity											
	17.50	D	17	5	10	12	22	22.00	-	-	-	-	-	-	-	19.83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 20: SUMMARY OF TEST RESULTS

Bore No: P40	**Ground Elevation: RL 191.009 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.40 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 20/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 21963.887	**Casing Lowered: 21.00 m**	**Ending Date: 22/10/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	19.00	U	18	-	-	-	-	-	CL	2	1	3	26	58	10	19.69	2.03	1.70	29.0	20.0	9.0	2.67	UU	52.0	10.2	-	0.573	-	-	-	-	Inorganic clays of low plasticity											
	20.50	D	19	8	10	14	24	16.35	CL-ML	0	0	1	36	58	5	17.83	-	-	24.0	19.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	22.00	D	20	-	-	-	-	-	-	-	-	-	-	-	-	21.94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.50	D	21	5	11	15	26	26.00	CL	4	2	3	14	64	13	20.84	-	-	33.0	21.0	12.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	25.00	D	22	-	-	-	-	-	CL	0	1	3	28	60	8	20.40	-	-	28.5	21.0	7.5	-	-	-	-	-	-	-	-	-	-												
	26.50	D	23	12	19	30	49	49.00	CL	0	1	1	14	76	8	19.50	-	-	29.0	20.5	8.5	-	-	-	-	-	-	-	-	-	-												
	28.00	D	24	-	-	-	-	-	-	-	-	-	-	-	-	22.63	2.08	1.70	-	-	-	2.67	RUU	49.0	8.7	-	0.571	-	-	-	-												
	29.50	D	25	7	13	19	32	32.00	CI	5	2	1	11	66	15	19.31	-	-	42.0	24.0	18.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of Intermediate plasticity											
	31.00	D	26	-	-	-	-	-	SM	0	0	0	54	46	0	19.95	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	32.50	D	27	18	20	30	50	22.22	-	-	-	-	-	-	-	18.91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	34.00	D	28	-	-	-	-	-	CL-ML	0	0	1	41	53	5	19.82	2.00	1.67	26.0	21.5	4.5	2.66	RDST	7.0	26.3	-	0.593	-	-	-	-	Inorganic Silty Clays of low plasticity											
	35.50	D	29	17	22	27	49	21.24	-	-	-	-	-	-	-	25.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	37.00	D	30	-	-	-	-	-	MI	2	1	1	11	71	14	22.39	-	-	38.0	27.0	11.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of Intermediate plasticity											
	38.50	D	31	18	24	29	53	21.72	CL-ML	4	2	2	34	53	5	20.66	-	-	27.0	21.5	5.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	40.00	D	32	20	28	33	61	23.52	-	-	-	-	-	-	-	20.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX-B
TABLE 21: CHEMICAL TEST ON SOIL SAMPLES

BH No.	DEPTH (m)	SULPHATE CONTENT AS SO_3 (%)	CHLORIDE CONTENT (%)	pH VALUE
P24	2.00	0.034	0.030	8.42
P30	4.00	0.069	0.069	8.97
P38	2.00	0.055	0.024	9.59

APPENDIX-B
TABLE 22: CHEMICAL TEST ON GROUND WATER SAMPLES

BH No.	SULPHATE CONTENT AS SO_3 (mg/l)	CHLORIDE CONTENT (mg/l)	pH VALUE
P24	61.725	447.861	7.22
P30	57.610	417.870	7.00
P38	210.39	546.83	7.49

APPENDIX-B

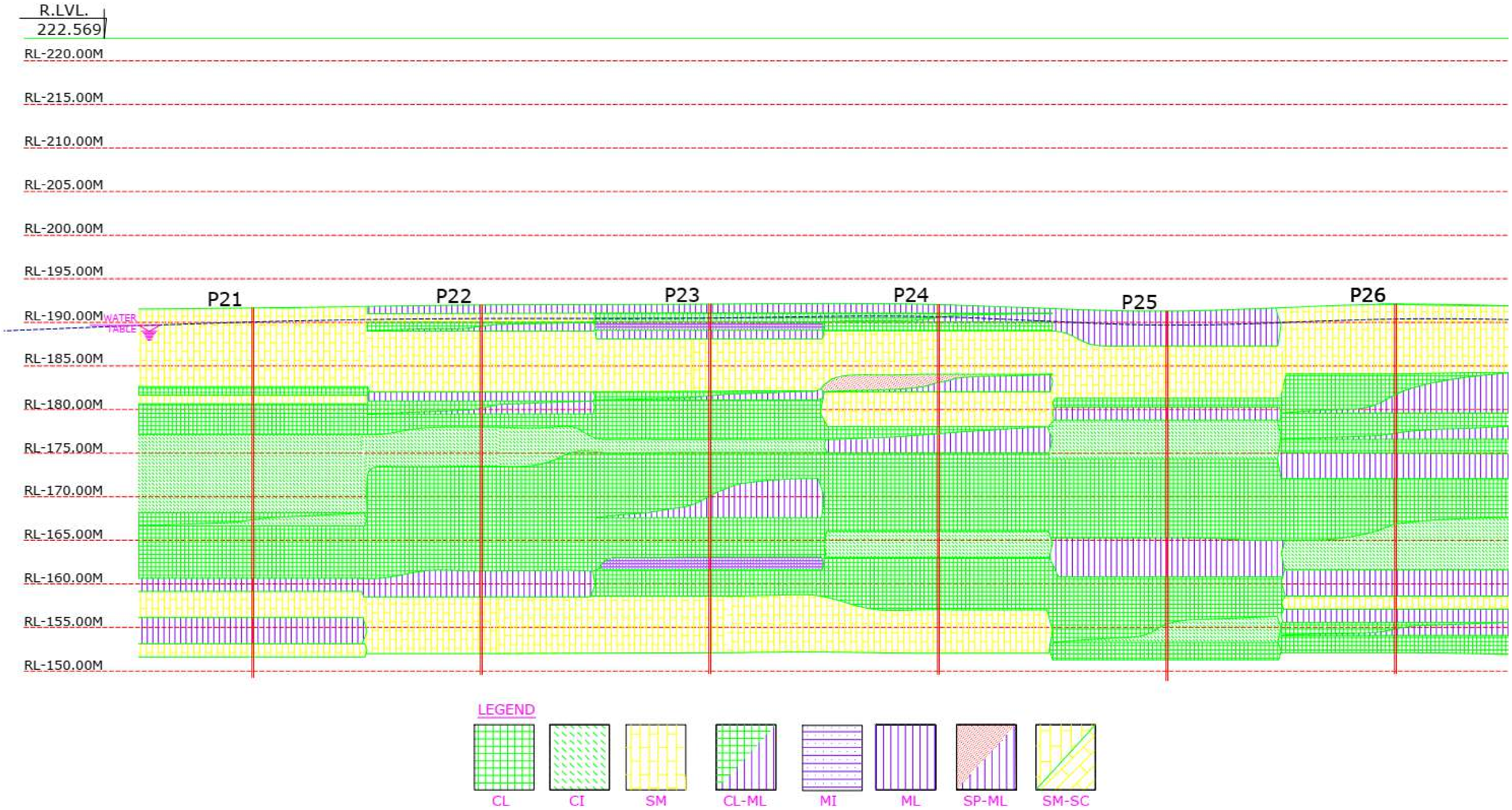
TABLE 23: UCS TEST ON SOIL SAMPLES

BH No.	DEPTH (m)	UCS (kg/cm²)
P21	13.00	0.67
P22	11.00	0.56
P23	14.00	0.71
P24	2.00	0.75
	23.00	0.47
	29.00	0.37
P26	14.00	0.61
P27	11.00	0.81
	17.00	0.74
P28	17.00	0.62
	23.00	0.52
P29	16.00	0.86
	28.00	0.89
P30	10.00	0.32
	25.00	0.71
	31.00	0.20
P31	11.00	0.58
	17.00	0.72
P32	10.00	0.63
	16.00	0.60
	22.00	0.71
P33	10.00	0.62
	13.00	0.66
	16.00	0.72
	19.00	0.75
P34	14.00	0.66
	20.00	0.70
	23.00	0.75
P35	11.00	0.71
P36	10.00	0.73
	16.00	0.76
	19.00	0.81
	22.00	0.84
	28.00	0.89
P37	14.00	0.95
	23.00	0.77

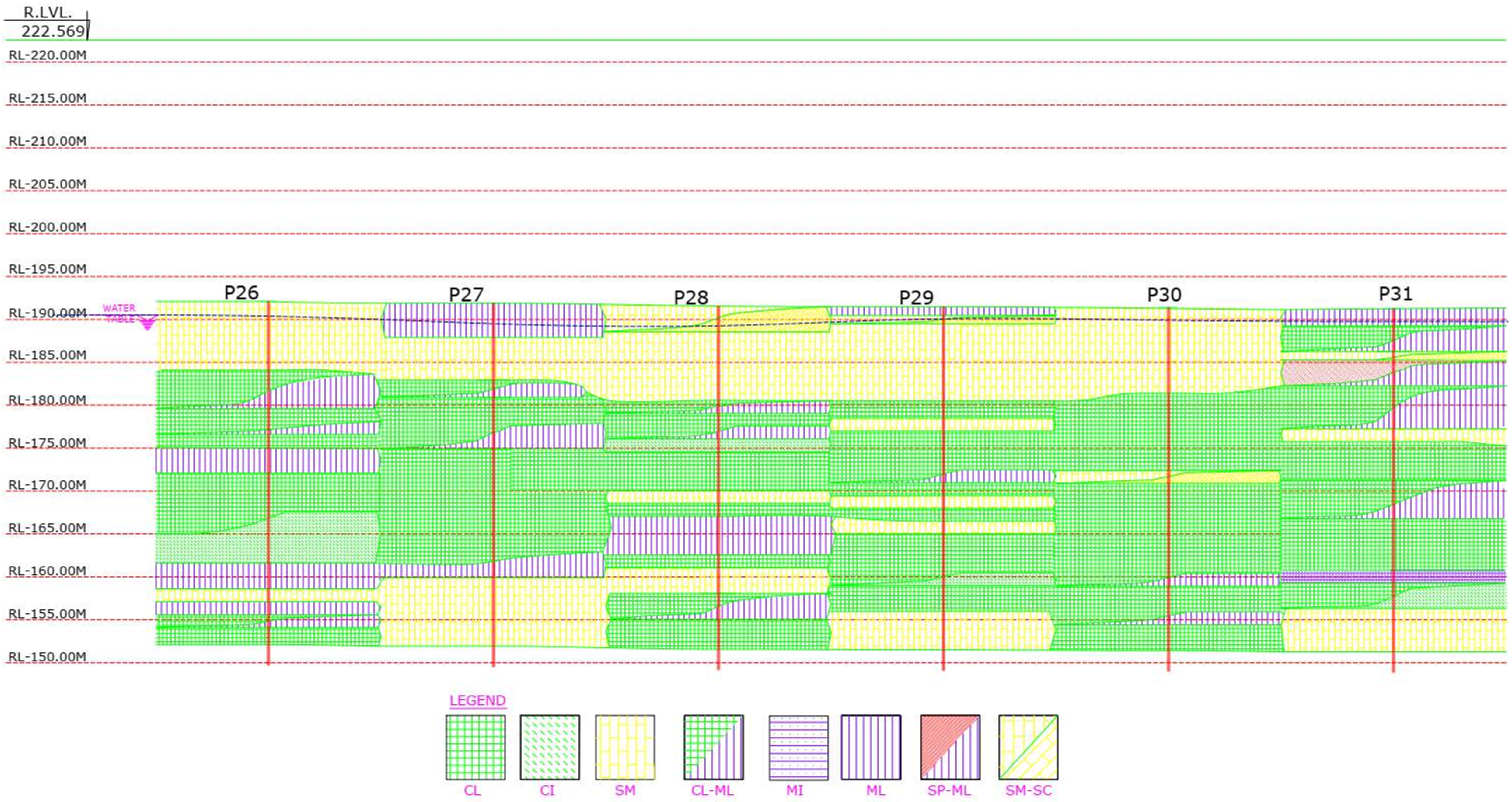
APPENDIX-B
TABLE 23: UCS TEST ON SOIL SAMPLES

BH No.	DEPTH (m)	UCS (kg/cm²)
P38	10.00	0.63
P39	10.00	0.78
	13.00	0.76
	16.00	0.79
	19.00	0.81
	22.00	0.96
	25.00	0.68
P40	10.00	0.78
	13.00	0.83
	16.00	0.95
	19.00	0.71

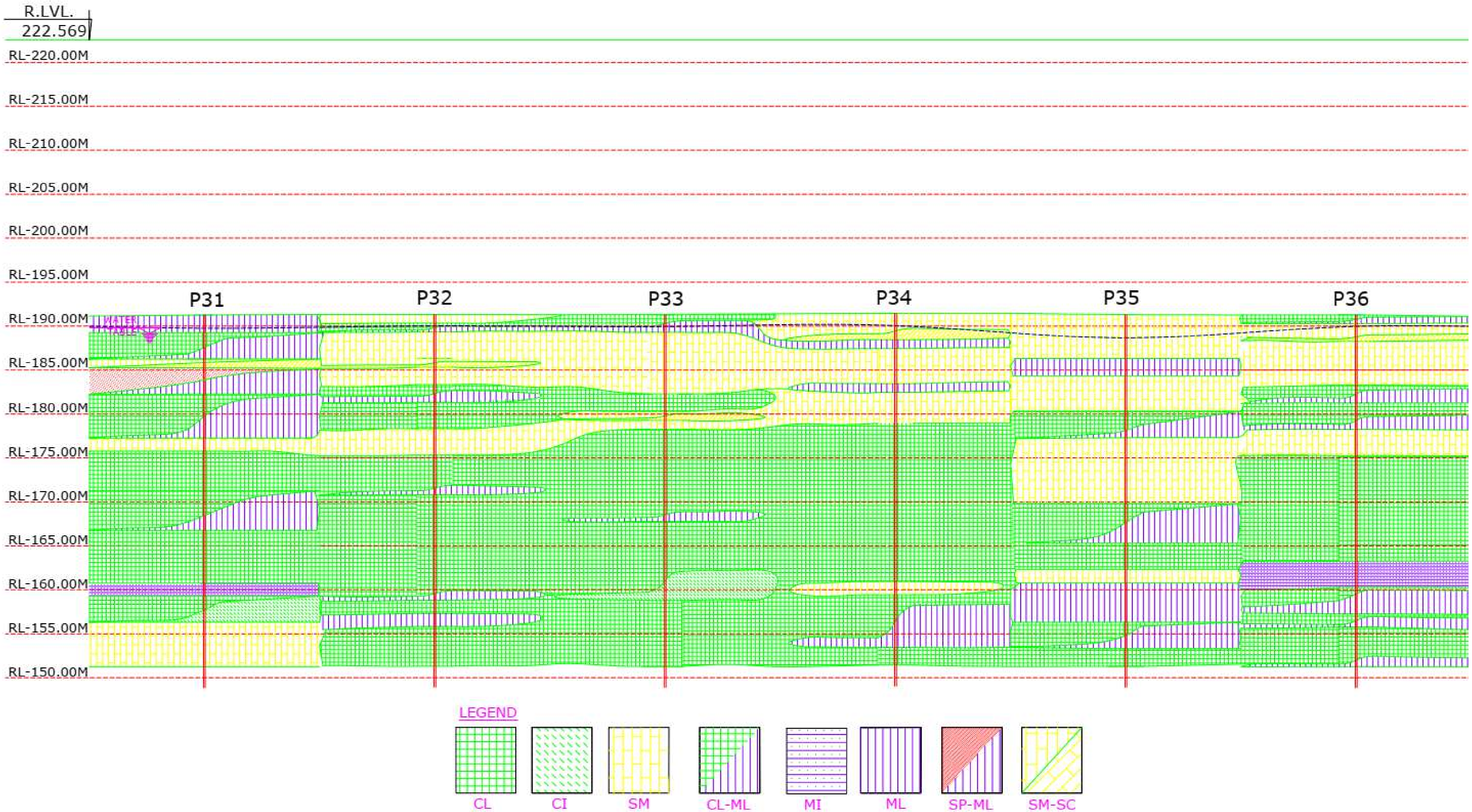
APPENDIX-C
PLOT 1: LITHOLOGICAL PROFILE-1



APPENDIX-C
PLOT 2: LITHOLOGICAL PROFILE-2



APPENDIX-C
PLOT 3: LITHOLOGICAL PROFILE-3



APPENDIX-C
PLOT 4: LITHOLOGICAL PROFILE-4

APPENDIX-C
PLOT 5: LITHOLOGICAL PLOTS

BH-P21-21466.087

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM (WATER LVL.)		0.50	D		-	-
			1.00	U		-	-
			2.00	D	6	-	-
			3.00	D	8	-	-
			4.00	D		-	-
			5.00	D	11	-	-
			6.00	D	10	-	-
			7.00	D		-	-
			8.00	D	14	-	-
Inorganic clays of low plasticity	CL		9.00	D	15	-	-
Silty Sands	SM		10.00	U		-	-
Inorganic clays of low plasticity	CL		11.00	D	12	-	-
			12.00	D	18	-	-
			13.00	U		-	-
Inorganic clays of Intermediate plasticity	CI		14.50	D	23	-	-
			16.00	U		-	-
			17.50	D	25	-	-
			19.00	U		-	-
			20.00	D	27	-	-

BH-P21-21466.087

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of Intermediate plasticity	CI		20.50	D	27	-	-
			22.00	U		-	-
Inorganic Clays of low to Intermediate plasticity	CL-CI		23.50	D	26	-	-
Inorganic clays of low plasticity	CL		25.00	U		-	-
			26.50	D	76	-	-
			28.00	D	60	-	-
			29.50	D	55	-	-
Inorganic Silts of low plasticity	ML		31.00	D	60	-	-
Silty Sands	SM		32.50	D	63	-	-
			34.00	D	63	-	-
Inorganic Silts of low plasticity	ML		35.50	D	59	-	-
			37.00	D	66	-	-
Silty Sands	SM		38.50	D	58	-	-
			40.00	D	74	-	-

APPENDIX-C

PLOT 6: LITHOLOGICAL PLOTS

BH-P22-21492.287

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML		0.50	D		-	-
Silty Sands	SM		1.00	D	8	-	-
Inorganic Silty Clays of low plasticity	CL-ML		2.00	U		-	-
Silty Sands	SM		3.00	D	14	-	-
			4.00	D	16	-	-
			5.00	D		-	-
			6.00	D	17	-	-
			7.00	D	28	-	-
			8.00	D		-	-
			9.00	D	13	-	-
Inorganic Silts of low plasticity	ML		10.00	D	20	-	-
Inorganic Silty Clays of low plasticity	CL-ML		11.00	U		-	-
Inorganic clays of low plasticity	CL		12.50	D	31	-	-
Inorganic clays of Intermediate plasticity	CI		14.00	U		-	-
			15.50	D	47	-	-
			17.00	D		-	-
Inorganic clays of low plasticity	CL		18.50	D	31	-	-
			20.00	U		-	-

BH-P22-21492.287

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.00	U		-	-
			21.50	D	36	-	-
			23.00	D		-	-
			24.50	D	47	-	-
			26.00	D		-	-
			27.50	D	55	-	-
			29.00	D	62	-	-
Inorganic Silts of low plasticity	ML		30.50	D	67	-	-
			32.00	D	63	-	-
Silty Sands	SM		33.50	D	59	-	-
			35.00	D	59	-	-
			36.50	D	66	-	-
			38.00	D	60	-	-
			40.00	D	59	-	-

APPENDIX-C
PLOT 7: LITHOLOGICAL PLOTS

BH-P23-21518.487

DESCRIPTION	I.S. GROUP	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML	0.50	D		-	-
Inorganic clays of low plasticity	CL (WATER LVL)	1.00	D	8	-	-
Inorganic Silts of Intermediate plasticity	MI	2.00	U		-	-
Inorganic Silts of low plasticity	ML	3.00	D	10	-	-
		4.00	D	20	-	-
		5.00	D		-	-
		6.00	D	21	-	-
Silty Sands	SM	7.00	D	27	-	-
		8.00	D		-	-
		9.00	D	23	-	-
Inorganic Silty Clays of low plasticity	CL-ML	10.00	D	18	-	-
		11.00	U		-	-
		12.50	D	26	-	-
Inorganic clays of low plasticity	CL	14.00	U		-	-
Inorganic clays of Intermediate plasticity	CI	15.50	D	33	-	-
		17.00	U		-	-
Inorganic clays of low plasticity	CL	18.50	D	22	-	-
		20.00	U		-	-

BH-P23-21518.487

DESCRIPTION	I.S. GROUP	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
		20.00	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML	21.50	D	34	-	-
		23.00	D		-	-
		24.50	D	36	-	-
Inorganic clays of low plasticity	CL	26.00	D		-	-
		27.50	D	61	-	-
Inorganic Silts of Intermediate plasticity	MI	29.00	D	72	-	-
		30.50	D	62	-	-
Inorganic clays of low plasticity	CL	32.00	D	75	-	-
		33.50	D	62	-	-
		35.00	D	58	-	-
Silty Sands	SM	36.50	D	59	-	-
		38.00	D	73	-	-
		40.00	D	80	-	-

APPENDIX-C
PLOT 8: LITHOLOGICAL PLOTS

BH-P24-21544.687

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML		0.50	D		-	-
Inorganic Silty Clays of low plasticity	CL-ML	WATER LVL	1.00	D	4	-	-
Inorganic clays of low plasticity	CL		2.00	U		-	-
Silty Sands	SM		3.00	D	14	-	-
			4.00	D	18	-	-
			5.00	D		-	-
			6.00	D	12	-	-
			7.00	D	19	-	-
			8.00	U		-	-
Poorly Graded Sands with inorganic Silts of low plasticity	SP-ML		9.00	D	23	-	-
Silty Sands	SM		10.00	D	26	-	-
			11.00	U		-	-
			12.50	D	28	-	-
Inorganic Silty Clays of low plasticity	CL-ML		14.00	U		-	-
Inorganic Silts of low plasticity	ML		15.50	D	18	-	-
Inorganic clays of low plasticity	CL		17.00	U		-	-
			18.50	D	22	-	-
			20.00	U		-	-

BH-P24-21544.687

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.00	U		-	-
			21.50	D	35	-	-
			23.00	U		-	-
			24.50	D	32	-	-
Inorganic clays of Intermediate plasticity	CI		26.00	U		-	-
			27.50	D	38	-	-
Inorganic clays of low plasticity	CL		29.00	U		-	-
			30.50	D	33	-	-
			32.00	D		-	-
			33.50	D	39	-	-
Silty Sands	SM		35.00	D		-	-
			36.50	D	36	-	-
			38.00	D		-	-
			40.00	D	69	-	-

APPENDIX-C
PLOT 9: LITHOLOGICAL PLOTS

BH-P25-21570.887

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML		0.50	D		-	-
	WATER LVL		1.00	D	4	-	-
			2.00	U		-	-
			3.00	D	15	-	-
Silty Sands	SM		4.00	D	18	-	-
			5.00	D		-	-
			6.00	D	21	-	-
			7.00	D	24	-	-
			8.00	D		-	-
			9.00	D	14	-	-
Inorganic clays of low plasticity	CL		10.00	D	18	-	-
Inorganic Silts of low plasticity	ML		11.00	U		-	-
Inorganic clays of Intermediate plasticity	CI		12.50	D	26	-	-
			14.00	U		-	-
			15.50	D	21	-	-
Inorganic clays of low plasticity	CL		17.00	U		-	-
			18.50	D	23	-	-
			20.00	U		-	-

BH-P25-21570.887

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.00	U		-	-
			21.50	D	38	-	-
			23.00	D		-	-
			24.50	D	48	-	-
Inorganic Silts of low plasticity	ML		26.00	D		-	-
			27.50	D	60	-	-
			29.00	D	74	-	-
Inorganic clays of low plasticity	CL		30.50	D	60	-	-
			32.00	D	55	-	-
			33.50	D	55	-	-
Inorganic Clays of low to Intermediate plasticity	CL-CI		35.00	D	59	-	-
			36.50	D	63	-	-
Inorganic clays of low plasticity	CL		38.00	D	69	-	-
			40.00	D	79	-	-

APPENDIX-C
PLOT 10: LITHOLOGICAL PLOTS

BH-P26-21597.087

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	D	12	-	-
	WATER LVL		2.00	U		-	-
			3.00	D	17	-	-
			4.00	D	21	-	-
			5.00	U		-	-
			6.00	D	23	-	-
			7.00	D	25	-	-
Inorganic Silty Clays of low plasticity	CL-ML		8.00	U		-	-
			9.00	D	19	-	-
			10.00	D	26	-	-
			11.00	D		-	-
Inorganic clays of low plasticity	CL		12.50	D	33	-	-
Inorganic Silty Clays of low plasticity	CL-ML		14.00	U		-	-
Inorganic clays of low plasticity	CL		15.50	D	35	-	-
Inorganic Silts of low plasticity	ML		17.00	U		-	-
			18.50	D	46	-	-
			20.00	U		-	-

BH-P26-21597.087

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.00	U		-	-
			21.50	D	36	-	-
			23.00	U		-	-
Inorganic Clays of low to Intermediate plasticity	CL-CI		24.50	D	46	-	-
Inorganic clays of Intermediate plasticity	CI		26.00	D		-	-
			27.50	D	64	-	-
			29.00	D	69	-	-
Inorganic Silts of low plasticity	ML		30.50	D	75	-	-
			32.00	D	100	-	-
Silty Sands	SM		33.50	D	83	-	-
Inorganic Silts of low plasticity	ML		35.00	D	63	-	-
Inorganic Silty Clays of low plasticity	CL-ML		36.50	D	62	-	-
Inorganic clays of low plasticity	CL		38.00	D	71	-	-
			40.00	D	100	-	-

APPENDIX-C

PLOT 11: LITHOLOGICAL PLOTS

BH-P27-21623.287

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML (WATER LVL)		0.00	D		-	-
			1.00	D	5	-	-
			2.00	U		-	-
			3.00	D	10	-	-
Silty Sands	SM		4.00	D	14	-	-
			5.00	U		-	-
			6.00	D	19	-	-
			7.00	D	19	-	-
			8.00	D		-	-
Inorganic Silty Clays of low plasticity	CL-ML		9.00	D	14	-	-
			10.00	D	16	-	-
Inorganic clays of low plasticity	CL		11.00	U		-	-
			12.50	D	20	-	-
Inorganic Silty Clays of low plasticity	CL-ML		14.00	U		-	-
			15.50	D	21	-	-
Inorganic clays of low plasticity	CL		17.00	U		-	-
			18.50	D	30	-	-
			20.00	U		-	-

BH-P27-21623.287

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.00	U		-	-
			21.50	D	38	-	-
			23.00	U		-	-
			24.50	D	43	-	-
			26.00	U		-	-
			27.50	D	59	-	-
Inorganic Silty Clays of low plasticity	CL-ML		29.00	D	59	-	-
Inorganic Silts of low plasticity	ML		30.50	D	68	-	-
Silty Sands	SM		32.00	D	58	-	-
			33.50	D	58	-	-
			35.00	D	52	-	-
			36.50	D	58	-	-
			38.00	D	59	-	-
			40.00	D	56	-	-

APPENDIX-C
PLOT 12: LITHOLOGICAL PLOTS

BH-P28-21649.487

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands with clay binder	SM-SC		0.50	D		-	-
			1.00	D	4	-	-
	WATER LVL		2.00	U		-	-
Silty Sands	SM		3.00	D	6	-	-
			4.00	D	14	-	-
			5.00	U		-	-
			6.00	D	29	-	-
			7.00	D	26	-	-
			8.00	D		-	-
			9.00	D	31	-	-
			10.00	D	26	-	-
Inorganic Silty Clays of low plasticity	CL-ML		11.00	U		-	-
Inorganic clays of low plasticity	CL		12.50	D	16	-	-
Inorganic Silty Clays of low plasticity	CL-ML		14.00	U		-	-
Inorganic clays of Intermediate plasticity	CI		15.50	D	24	-	-
Inorganic clays of low plasticity	CL		17.00	U		-	-
			18.50	D	31	-	-
			20.00	U		-	-

BH-P28-21649.487

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.00	U		-	-
Silty Sands	SM		21.50	D	60	-	-
Inorganic clays of low plasticity	CL		23.00	D	58	-	-
Inorganic Silts of low plasticity	ML		24.50	D	50	-	-
			26.00	D		-	-
			27.50	D	55	-	-
Inorganic clays of low plasticity	CL		29.00	D	67	-	-
Silty Sands	SM		30.50	D	61	-	-
			32.00	D	64	-	-
Inorganic Silty Clays of low plasticity	CL-ML		33.50	D	53	-	-
			35.00	D	60	-	-
Inorganic clays of low plasticity	CL		36.50	D	60	-	-
			38.00	D	68	-	-
			40.00	D	54	-	-

APPENDIX-C
PLOT 13: LITHOLOGICAL PLOTS

BH-P29-21675.687

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML		0.50	D		-	-
Silty Sands with clay binder	WATER LVL SM-SC		1.00	U		-	-
			2.00	D	8	-	-
			3.00	D	9	-	-
			4.00	D		-	-
			5.00	D	10	-	-
Silty Sands	SM		6.00	D	13	-	-
			7.00	U		-	-
			8.00	D	24	-	-
			9.00	D	21	-	-
			10.00	D		-	-
			11.00	D	16	-	-
Inorganic clays of low plasticity	CL		12.00	D	20	-	-
Silty Sands	SM		13.00	U		-	-
			14.50	D	24	-	-
Inorganic clays of low plasticity	CL		16.00	U		-	-
			17.50	D	27	-	-
Inorganic Silty Clays of low plasticity	CL-ML		19.00	U		-	-
			20.00	D	30	-	-

BH-P29-21675.687

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silty Clays of low plasticity	CL-ML		20.50	D	30	-	-
Inorganic clays of low plasticity	CL		22.00	U		-	-
Silty Sands	SM		23.50	D	34	-	-
Inorganic clays of low plasticity	CL		25.00	D		-	-
Silty Sands	SM		26.50	D	37	-	-
Inorganic clays of low plasticity	CL		28.00	U		-	-
			29.50	D	39	-	-
Inorganic Clays of low to Intermediate plasticity	CL-CI		31.00	U		-	-
			32.50	D	51	-	-
Inorganic clays of low plasticity	CL		34.00	D	61	-	-
			35.50	D	57	-	-
Silty Sands	SM		37.00	D	54	-	-
			38.50	D	52	-	-
			40.00	D	60	-	-

APPENDIX-C
PLOT 14: LITHOLOGICAL PLOTS

BH-P30-21701.8870

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	U		-	-
			2.00	D	5	-	-
			3.00	D	9	-	-
			4.00	U		-	-
			5.00	D	11	-	-
			6.00	D	12	-	-
			7.00	D		-	-
			8.00	D	14	-	-
			9.00	D	16	-	-
Inorganic clays of low plasticity	CL		10.00	U		-	-
			11.00	D	15	-	-
			12.00	D	17	-	-
			13.00	U		-	-
			14.50	D	21	-	-
			16.00	U		-	-
			17.50	D	22	-	-
Silty Sands with clay binder	SM-SC		19.00	U		-	-
			20.00	D	26	-	-

BH-P30-21701.8870

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands with clay binder	SM-SC						
Inorganic clays of low plasticity	CL		20.50	D	26	-	-
			22.00	D		-	-
			23.50	D	23	-	-
			25.00	U		-	-
			26.50	D	22	-	-
			28.00	D		-	-
			29.50	D	26	-	-
Inorganic Silty Clays of low plasticity	CL-ML		31.00	U		-	-
Inorganic clays of low plasticity	CL		32.50	D	32	-	-
			34.00	D		-	-
Inorganic Silty Clays of low plasticity	CL-ML		35.50	D	40	-	-
Inorganic clays of low plasticity	CL		37.00	D		-	-
			38.50	D	50	-	-
			40.00	D	59	-	-

APPENDIX-C
PLOT 15: LITHOLOGICAL PLOTS

BH-P31-21728.087

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML		0.50	D		-	-
	WATER LVL		1.00	D	4	-	-
			2.00	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML		3.00	D	8	-	-
			4.00	D	11	-	-
Silty Sands with clay binder	SM-SC		5.00	U		-	-
			6.00	D	13	-	-
Poorly Graded Sands with inorganic Silts of low plasticity	SP-ML		7.00	D	17	-	-
			8.00	D		-	-
			9.00	D	22	-	-
			10.00	D	24	-	-
Inorganic Silty Clays of low plasticity	CL-ML		11.00	U		-	-
			12.50	D	25	-	-
Silty Sands	SM		14.00	U		-	-
			15.50	D	21	-	-
			17.00	U		-	-
Inorganic clays of low plasticity	CL		18.50	D	26	-	-
			20.00	U		-	-

BH-P31-21728.087

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.00	U		-	-
			21.50	D	29	-	-
Inorganic Silty Clays of low plasticity	CL-ML		23.00	U		-	-
			24.50	D	32	-	-
			26.00	U		-	-
Inorganic clays of low plasticity	CL		27.50	D	57	-	-
			29.00	D	60	-	-
			30.50	D	55	-	-
Inorganic Silts of Intermediate plasticity	MI		32.00	D	52	-	-
Inorganic Clays of low to Intermediate plasticity	CL-CI		33.50	D	53	-	-
			35.00	D	57	-	-
			36.50	D	62	-	-
Silty Sands	SM		38.00	D	59	-	-
			40.00	D	65	-	-

APPENDIX-C
PLOT 16: LITHOLOGICAL PLOTS

BH-P32-21754.2870

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
Inorganic Silty Clays of low plasticity	CL-ML	WATER LVL	1.00	U		-	-
			2.00	D	4	-	-
Silty Sands	SM		3.00	D	5	-	-
			4.00	D		-	-
Silty Sands with clay binder	SM-SC		5.00	D	7	-	-
			6.00	D	9	-	-
Silty Sands	SM		7.00	D		-	-
			8.00	D	13	-	-
Inorganic Silty Clays of low plasticity	CL-ML		9.00	D	17	-	-
			10.00	U		-	-
Inorganic clays of low plasticity	CL		11.00	D	18	-	-
			12.00	D	22	-	-
			13.00	D		-	-
Silty Sands	SM		14.50	D	36	-	-
			16.00	U		-	-
Inorganic clays of low plasticity	CL		17.50	D	19	-	-
Inorganic Silty Clays of low plasticity	CL-ML		19.00	U		-	-
			20.00	D	38	-	-

BH-P32-21754.2870

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silty Clays of low plasticity	CL-ML		20.50	D	38	-	-
			22.00	U		-	-
			23.50	D	75	-	-
Inorganic clays of low plasticity	CL		25.00	D	63	-	-
			26.50	D	71	-	-
			28.00	D	75	-	-
			29.50	D	62	-	-
			31.00	D	102	-	-
Inorganic Silty Clays of low plasticity	CL-ML		32.50	D	95	-	-
Inorganic clays of low plasticity	CL		34.00	D	103	-	-
Inorganic Silts of low plasticity	ML		35.50	D	87	-	-
			37.00	D	91	-	-
Inorganic clays of low plasticity	CL		38.50	D	83	-	-
			40.00	D	56	-	-

APPENDIX-C
PLOT 17: LITHOLOGICAL PLOTS

BH-P33-21780.4870

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			0.00	D		-	-
Inorganic Silty Clays of low plasticity	CL-ML		1.00	U		-	-
			2.00	D	5	-	-
			3.00	D	7	-	-
			4.00	U		-	-
Silty Sands	SM		5.00	D	10	-	-
			6.00	D	12	-	-
			7.00	U		-	-
			8.00	D	14	-	-
			9.00	D	20	-	-
Inorganic clays of low plasticity	CL		10.00	U		-	-
Silty Sands with clay binder	SM-SC		11.00	D	30	-	-
Silty Sands	SM		12.00	D	29	-	-
			13.00	U		-	-
			14.50	D	32	-	-
Inorganic clays of low plasticity	CL		16.00	U		-	-
			17.50	D	39	-	-
			19.00	U		-	-
			20.00	D	42	-	-

BH-P33-21780.4870

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.50	D	42	-	-
Inorganic Silty Clays of low plasticity	CL-ML		22.00	U		-	-
			23.50	D	88	-	-
Inorganic clays of low plasticity	CL		25.00	D	75	-	-
			26.50	D	80	-	-
			28.00	D	87	-	-
Inorganic Clays of low to Intermediate plasticity	CL-CI		29.50	D	101	-	-
			31.00	D	82	-	-
			32.50	D	90	-	-
			34.00	D	98	-	-
			35.50	D	72	-	-
Inorganic clays of low plasticity	CL		37.00	D	88	-	-
			38.50	D	100	-	-
			40.00	D	96	-	-

APPENDIX-C
PLOT 18: LITHOLOGICAL PLOTS

BH-P34-21806.6870

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
	WATER LVL		1.00	D	3	-	-
Silty Sands with clay binder	SM-SC		2.00	U		-	-
Inorganic Silts of low plasticity	ML		3.00	D	6	-	-
			4.00	D	14	-	-
Silty Sands	SM		5.00	U		-	-
			6.00	D	18	-	-
			7.00	D	23	-	-
Inorganic Silts of low plasticity	ML		8.00	U		-	-
			9.00	D	15	-	-
Silty Sands	SM		10.00	D	20	-	-
			11.00	U		-	-
Inorganic clays of low plasticity	CL		12.50	D	19	-	-
			14.00	U		-	-
			15.50	D	12	-	-
			17.00	D		-	-
			18.50	D	21	-	-
			20.00	U		-	-

BH-P34-21806.6870

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.00	U		-	-
			21.50	D	30	-	-
			23.00	U		-	-
			24.50	D	38	-	-
			26.00	D		-	-
			27.50	D	47	-	-
			29.00	D		-	-
Silty Sands	SM		30.50	D	71	-	-
			32.00	D	75	-	-
Inorganic Silty Clays of low plasticity	CL-ML		33.50	D	68	-	-
			35.00	D	55	-	-
			36.50	D	52	-	-
			38.00	D	65	-	-
Inorganic clays of low plasticity	CL		40.00	D	53	-	-

APPENDIX-C

PLOT 19: LITHOLOGICAL PLOTS

BH-P35-21832.887

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM (WATER LVL)		0.50	D		-	-
			1.00	D	3	-	-
			2.00	U		-	-
			3.00	D	7	-	-
			4.00	D	12	-	-
			5.00	U		-	-
Inorganic Silts of low plasticity	ML		6.00	D	14	-	-
			7.00	D	16	-	-
Silty Sands	SM		8.00	U		-	-
			9.00	D	18	-	-
			10.00	D	20	-	-
			11.00	U		-	-
Inorganic clays of low plasticity	CL						
Inorganic Silty Clays of low plasticity	CL-ML		12.50	D	26	-	-
			14.00	U		-	-
Silty Sands	SM		15.50	D	32	-	-
			17.00	D		-	-
			18.50	D	34	-	-
			20.00	U		-	-

BH-P35-21832.887

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		20.00	U		-	-
			21.50	D	38	-	-
Inorganic Silty Clays of low plasticity	CL-ML		23.00	D		-	-
			24.50	D	44	-	-
			26.00	D		-	-
Inorganic clays of low plasticity	CL		27.50	D	63	-	-
			29.00	D	69	-	-
Silty Sands	SM		30.50	D	77	-	-
Inorganic Silts of low plasticity	ML		32.00	D	82	-	-
			33.50	D	77	-	-
			35.00	D	66	-	-
Inorganic Silty Clays of low plasticity	CL-ML		36.50	D	71	-	-
			38.00	D	78	-	-
Inorganic clays of low plasticity	CL		40.00	D	92	-	-

APPENDIX-C

PLOT 20: LITHOLOGICAL PLOTS

BH-P36-21859.0870

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silty Clays of low plasticity	CL-ML		0.50	D		-	-
Silty Sands	WATER LVL SM		1.00	U		-	-
Silty Sands with clay binder	SM-SC		2.00	D	6	-	-
			3.00	D	10	-	-
			4.00	U		-	-
Silty Sands	SM		5.00	D	16	-	-
			6.00	D	22	-	-
			7.00	U		-	-
			8.00	D	17	-	-
Inorganic Silty Clays of low plasticity	CL-ML		9.00	D	22	-	-
Inorganic clays of low plasticity	CL		10.00	U		-	-
			11.00	D	29	-	-
Inorganic Silty Clays of low plasticity	CL-ML		12.00	D	26	-	-
			13.00	U		-	-
Silty Sands	SM		14.50	D	27	-	-
			16.00	U		-	-
Inorganic clays of low plasticity	CL		17.50	D	23	-	-
			19.00	U		-	-
			20.00	D	26	-	-

BH-P36-21859.0870

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			20.50	D	26	-	-
			22.00	U		-	-
Inorganic clays of low plasticity	CL		23.50	D	29	-	-
			25.00	D		-	-
			26.50	D	45	-	-
			28.00	U		-	-
Inorganic Silts of Intermediate plasticity	MI		29.50	D	45	-	-
			31.00	D		-	-
Inorganic Silty Clays of low plasticity	CL-ML						
Inorganic Silts of low plasticity	ML		32.50	D	56	-	-
Inorganic Silty Clays of low plasticity	CL-ML		34.00	D	62	-	-
			35.50	D	49	-	-
Inorganic clays of low plasticity	CL		37.00	D		-	-
			38.50	D	48	-	-
Inorganic Silty Clays of low plasticity	CL-ML		40.00	D	54	-	-

APPENDIX-C
PLOT 21: LITHOLOGICAL PLOTS

BH-P37-21885.287

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	D	3	-	-
Silty Sands with clay binder	SM-SC		2.00	D		-	-
			3.00	D	5	-	-
Inorganic Silty Clays of low plasticity	CL-ML		4.00	D	6	-	-
			5.00	U		-	-
Silty Sands	SM		6.00	D	11	-	-
			7.00	D	14	-	-
			8.00	U		-	-
			9.00	D	11	-	-
Inorganic Silty Clays of low plasticity	CL-ML		10.00	D	14	-	-
			11.00	U		-	-
			12.50	D	19	-	-
			14.00	U		-	-
Inorganic clays of low plasticity	CL		15.50	D	30	-	-
			17.00	U		-	-
Inorganic Silts of low plasticity	ML		18.50	D	33	-	-
			20.00	U		-	-

BH-P37-21885.287

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			20.00	U		-	-
			21.50	D	39	-	-
			23.00	U		-	-
Inorganic clays of low plasticity	CL		24.50	D	100	-	-
			26.00	D	66	-	-
			27.50	D	62	-	-
			29.00	D	80	-	-
Inorganic Silts of low plasticity	ML		30.50	D	59	-	-
Inorganic Silty Clays of low plasticity	CL-ML		32.00	D	93	-	-
Inorganic Silts of low plasticity	ML		33.50	D	87	-	-
			35.00	D	64	-	-
Inorganic Silty Clays of low plasticity	CL-ML		36.50	D	72	-	-
			38.00	D	63	-	-
Inorganic clays of low plasticity	CL		40.00	D	90	-	-

APPENDIX-C
PLOT 22: LITHOLOGICAL PLOTS

BH-P38-21911.487

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
Silty Sands with clay binder	SM-SC		1.00	U		-	-
Inorganic Silts of low plasticity	ML		2.00	D	4	-	-
Inorganic Silty Clays of low plasticity	CL-ML		3.00	D	6	-	-
			4.00	D		-	-
Silty Sands	SM		5.00	D	12	-	-
			6.00	D	14	-	-
			7.00	U		-	-
			8.00	D	17	-	-
Inorganic Silty Clays of low plasticity	CL-ML		9.00	D	19	-	-
			10.00	U		-	-
			11.00	D	45	-	-
			12.00	D	23	-	-
			13.00	D		-	-
Inorganic clays of low plasticity	CL		14.50	D	21	-	-
			16.00	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML		17.50	D	24	-	-
Silty Sands	SM		19.00	U		-	-
			20.00	D	30	-	-

BH-P38-21911.487

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM						
Inorganic Silty Clays of low plasticity	CL-ML		20.50	D	30	-	-
Inorganic Silts of low plasticity	ML		22.00	U		-	-
			23.50	D	37	-	-
			25.00	D		-	-
Inorganic clays of low plasticity	CL		26.50	D	40	-	-
			28.00	D		-	-
			29.50	D	45	-	-
Inorganic Silts of Intermediate plasticity	MI		31.00	D		-	-
			32.50	D	48	-	-
			34.00	D		-	-
Inorganic Silty Clays of low plasticity	CL-ML		35.50	D	52	-	-
			37.00	D	55	-	-
			38.50	D	58	-	-
Inorganic clays of low plasticity	CL		40.00	D	62	-	-

APPENDIX-C

PLOT 23: LITHOLOGICAL PLOTS

BH-P39-21937.6870

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
Inorganic Silts of low plasticity	ML	WATER LVL	1.00	D		-	-
Silty Sands with clay binder	SM-SC		2.00	D	7	-	-
			3.00	D	6	-	-
Silty Sands	SM		4.00	U		-	-
			5.00	D	7	-	-
			6.00	D	8	-	-
Inorganic Silts of low plasticity	ML		7.00	D		-	-
			8.00	D	9	-	-
Inorganic Silty Clays of low plasticity	CL-ML		9.00	D	10	-	-
			10.00	U		-	-
			11.00	D	23	-	-
Inorganic clays of low plasticity	CL		12.00	D	25	-	-
			13.00	U		-	-
			14.50	D	18	-	-
Inorganic Silty Clays of low plasticity	CL-ML						
			16.00	U		-	-
Inorganic clays of low plasticity	CL		17.50	D	15	-	-
			19.00	U		-	-
			20.00	D	19	-	-

BH-P39-21937.6870

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.50	D	19	-	-
			22.00	U		-	-
Inorganic clays of Intermediate plasticity	CI		23.50	D	42	-	-
			25.00	U		-	-
Inorganic clays of low plasticity	CL		26.50	D	51	-	-
			28.00	D		-	-
			29.50	D	54	-	-
Inorganic Silty Clays of low plasticity	CL-ML						
			31.00	D	46	-	-
Inorganic clays of low plasticity	CL						
			32.50	D	49	-	-
Silty Sands	SM						
			34.00	D		-	-
Inorganic clays of low plasticity	CL						
			35.50	D	50	-	-
Inorganic Silts of low plasticity	ML						
			37.00	D		-	-
Inorganic clays of low plasticity	CL		38.50	D	52	-	-
			40.00	D	62	-	-

APPENDIX-C

PLOT 24: LITHOLOGICAL PLOTS

BH-P40-21963.8870

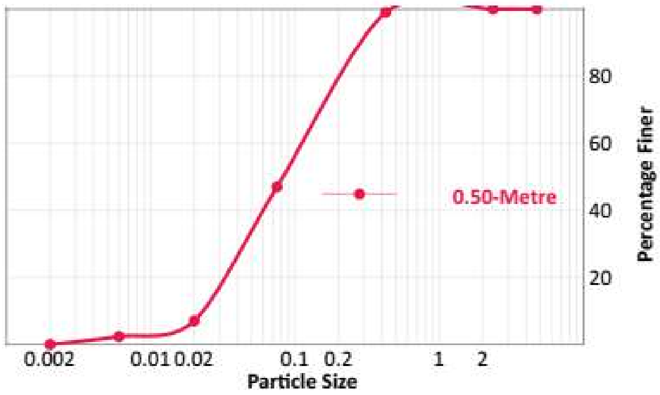
DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
	WATER LVL		1.00	U		-	-
Inorganic clays of low plasticity	CL		2.00	D	4	-	-
			3.00	D	5	-	-
Inorganic Silty Clays of low plasticity	CL-ML		4.00	D		-	-
			5.00	D	7	-	-
Silty Sands	SM		6.00	D	12	-	-
			7.00	U		-	-
			8.00	D	9	-	-
			9.00	D	8	-	-
Inorganic clays of low plasticity	CL		10.00	U		-	-
			11.00	D	23	-	-
			12.00	D	16	-	-
			13.00	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML		14.50	D	14	-	-
			16.00	U		-	-
Inorganic clays of low plasticity	CL		17.50	D	22	-	-
			19.00	U		-	-
			20.00	D	24	-	-

BH-P40-21963.8870

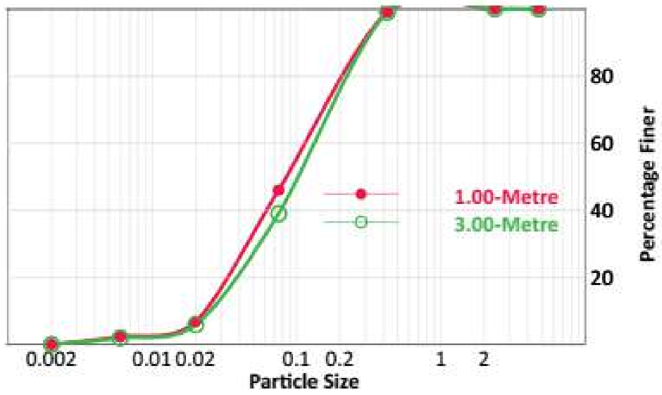
DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.50	D	24	-	-
Inorganic Silty Clays of low plasticity	CL-ML		22.00	D		-	-
			23.50	D	26	-	-
Inorganic clays of low plasticity	CL		25.00	D		-	-
			26.50	D	49	-	-
			28.00	D		-	-
Inorganic clays of Intermediate plasticity	CI		29.50	D	32	-	-
Silty Sands	SM		31.00	D		-	-
			32.50	D	50	-	-
			34.00	D		-	-
Inorganic Silty Clays of low plasticity	CL-ML		35.50	D	49	-	-
Inorganic Silts of Intermediate plasticity	MI		37.00	D		-	-
Inorganic Silty Clays of low plasticity	CL-ML		38.50	D	53	-	-
			40.00	D	61	-	-

APPENDIX-D
PLOT 1: GRAIN SIZE DISTRIBUTION PLOTS

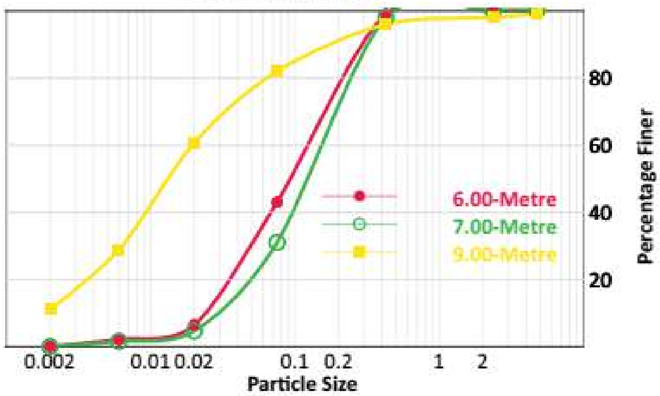
BH- P21-CH.21466.087



BH- P21-CH.21466.087



BH- P21-CH.21466.087



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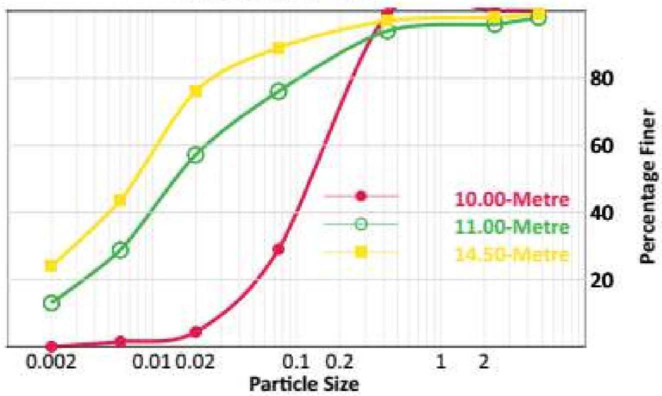

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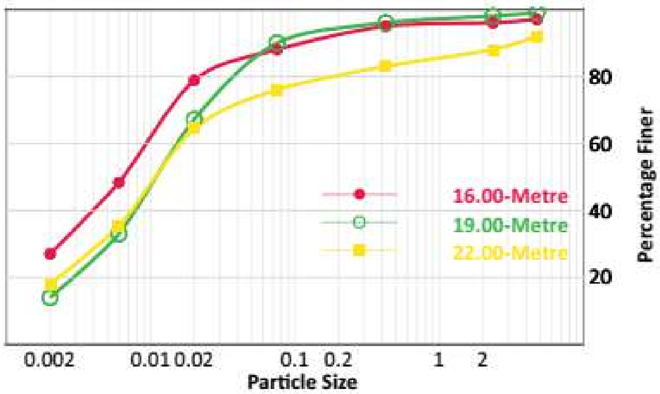

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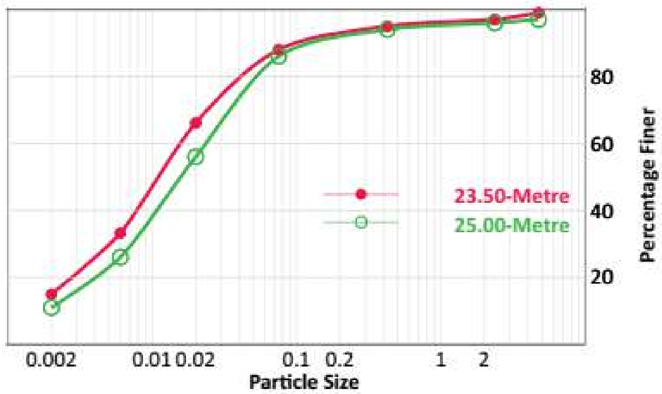

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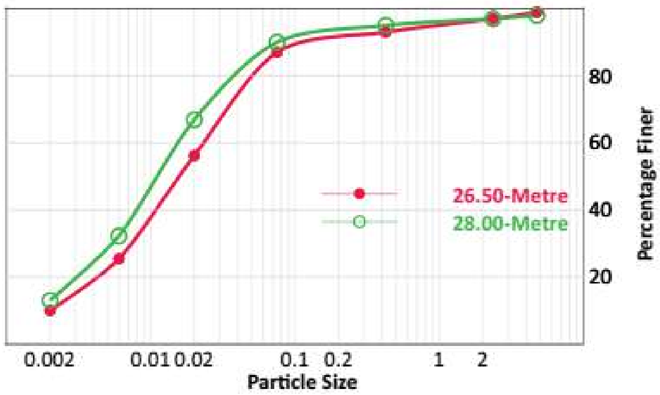

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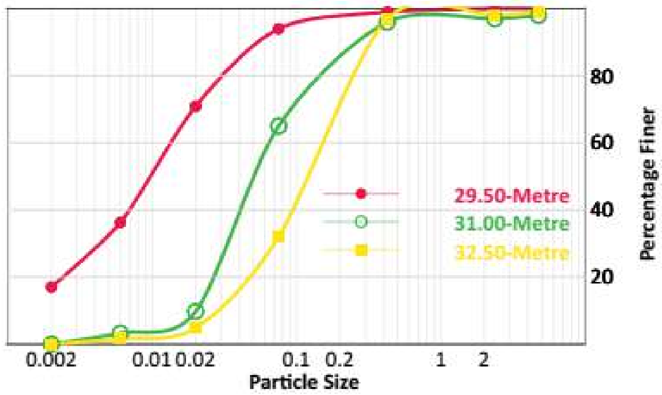
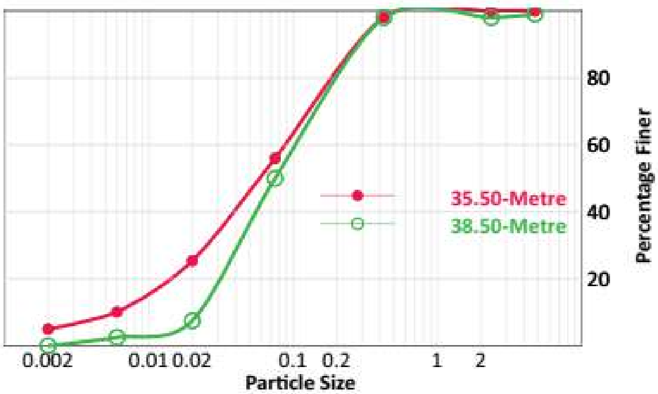


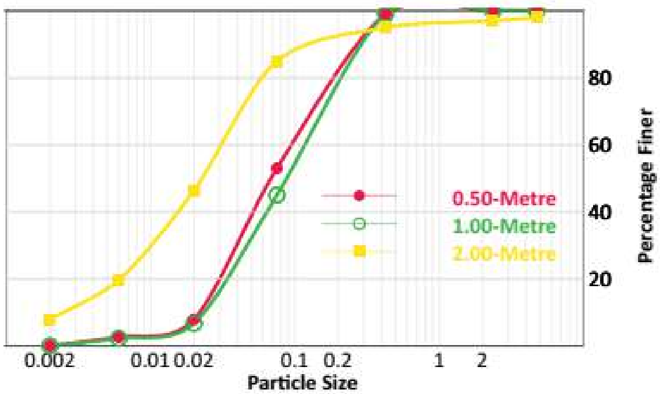
APPENDIX-D

PLOT 2: GRAIN SIZE DISTRIBUTION PLOTS

BH- P21-CH.21466.087



BH- P22-CH.21492.287



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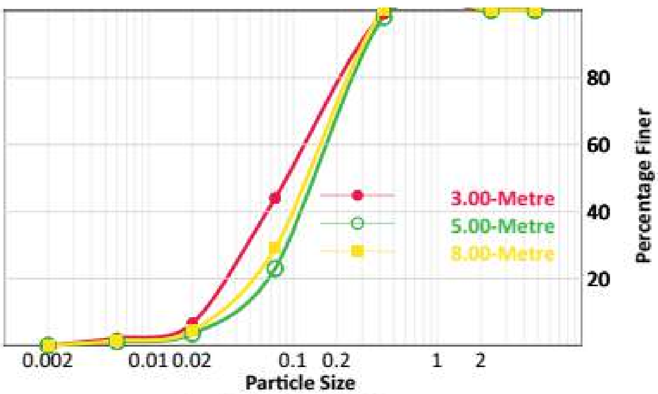

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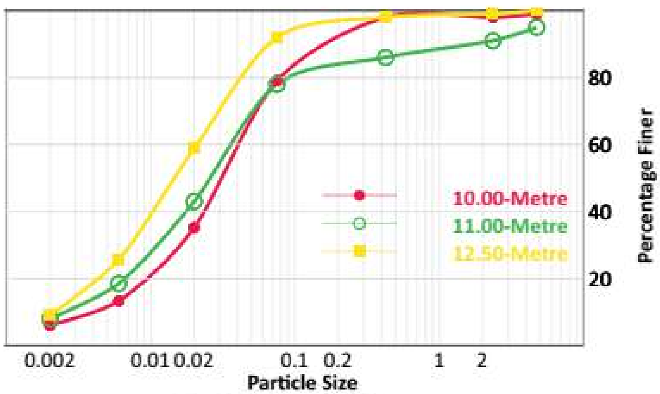

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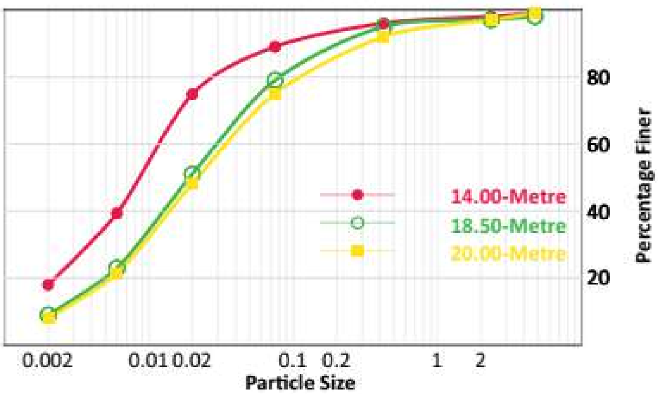

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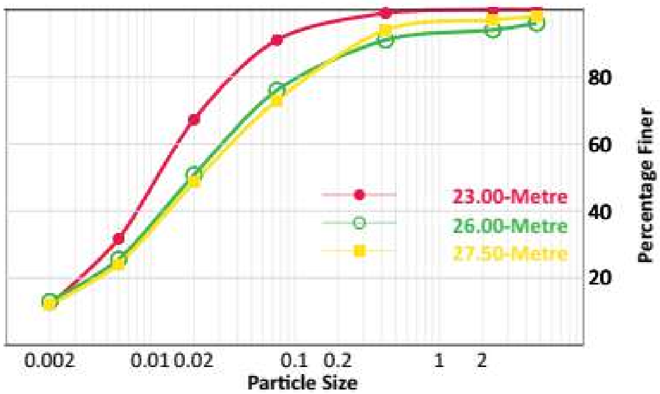

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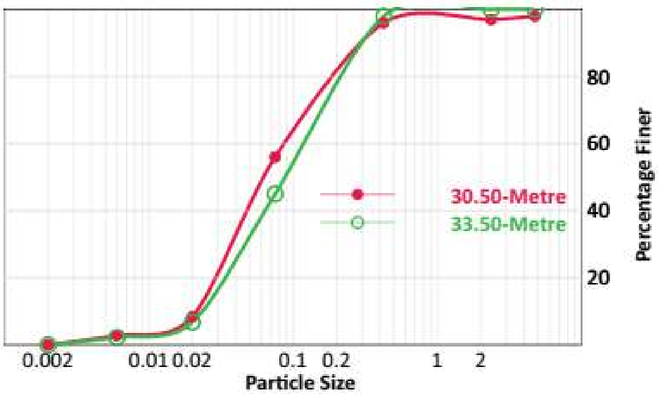

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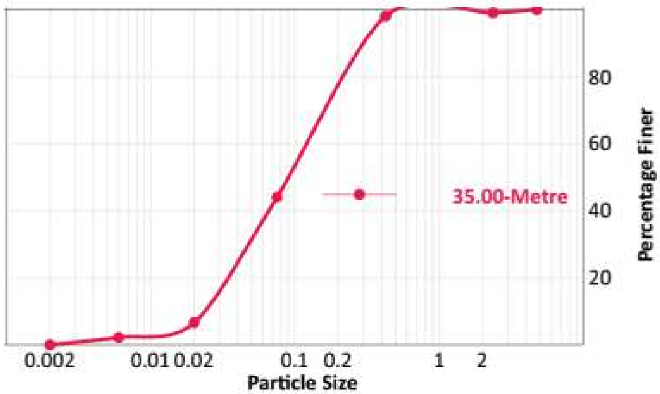
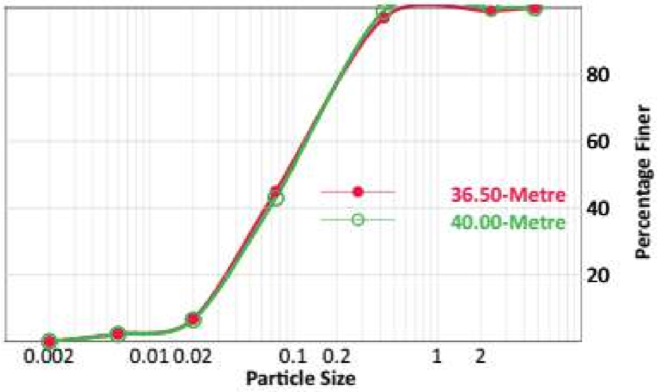
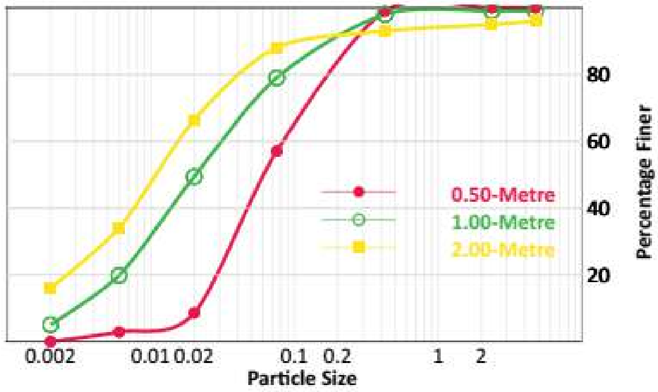


APPENDIX-D
PLOT 3: GRAIN SIZE DISTRIBUTION PLOTS

BH- P22-CH.21492.287



BH- P23-CH.21518.487



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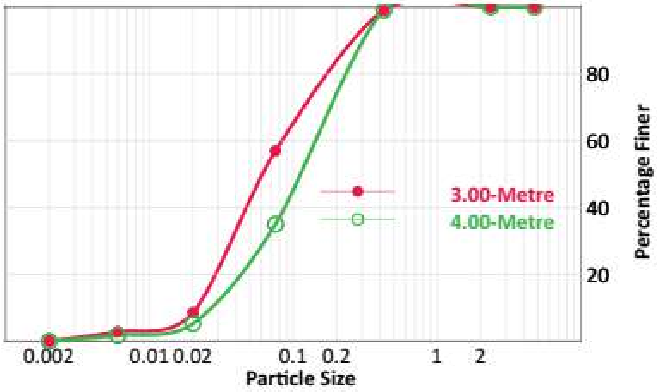

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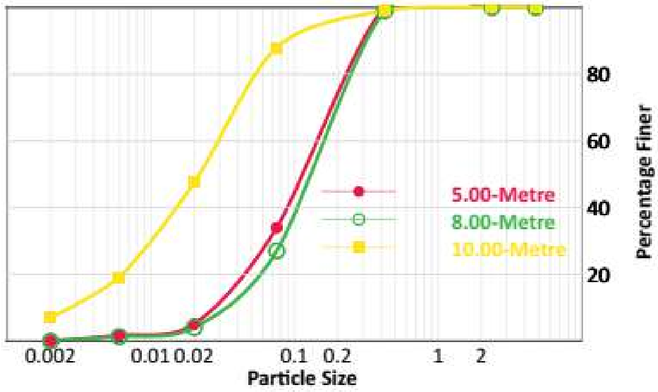

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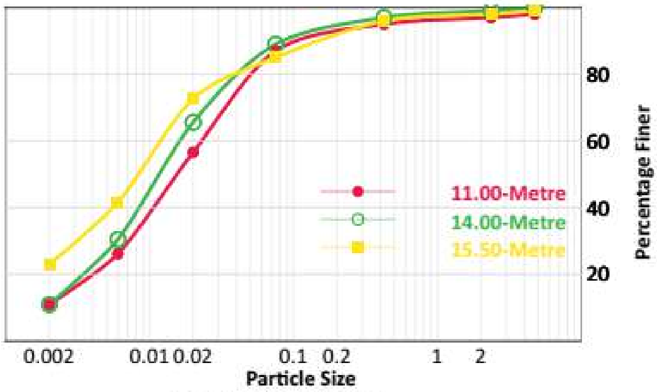

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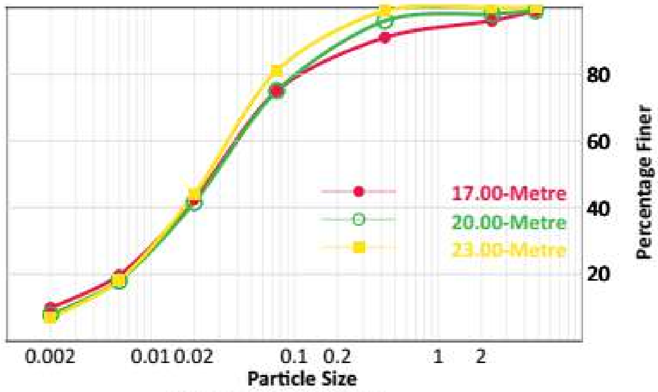

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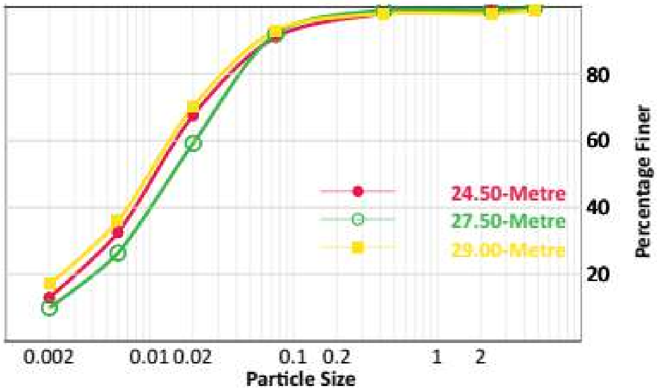

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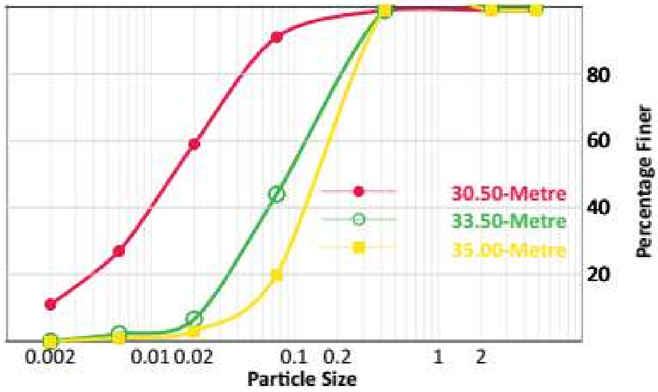
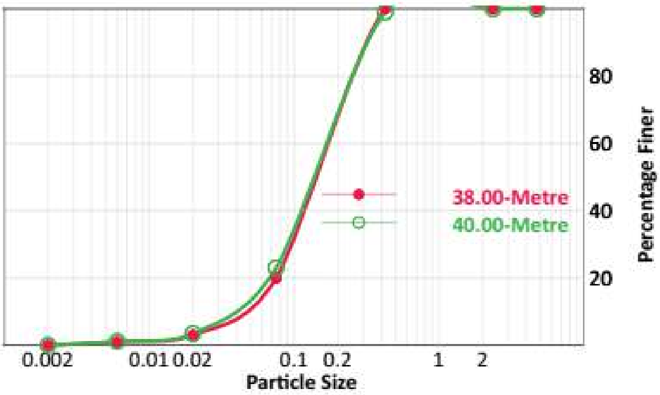


APPENDIX-D
PLOT 4: GRAIN SIZE DISTRIBUTION PLOTS

BH- P23-CH.21518.487



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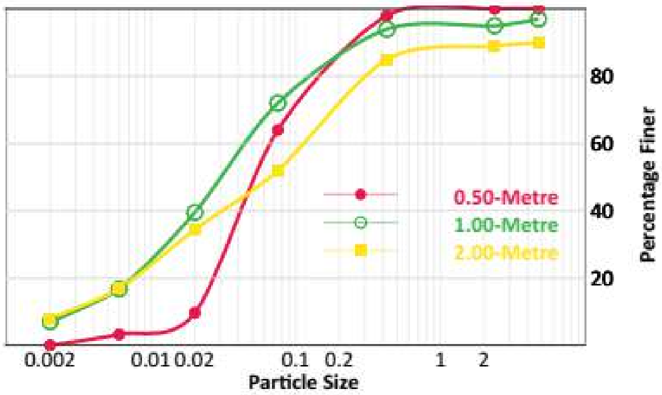

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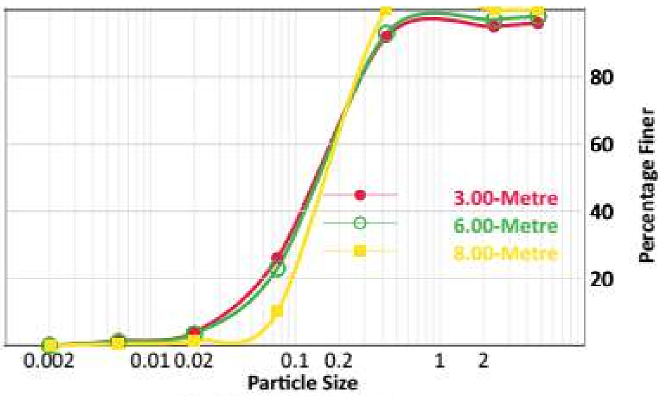

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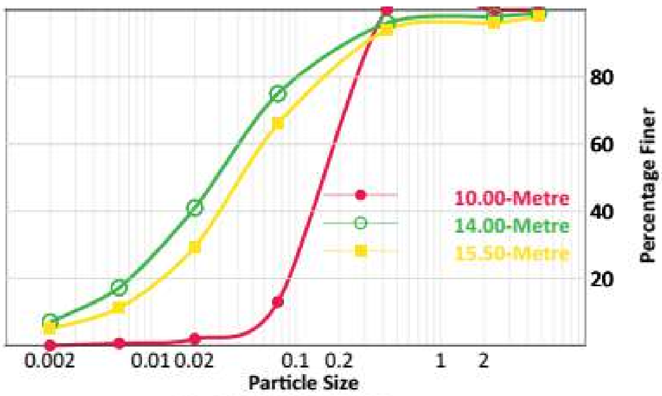

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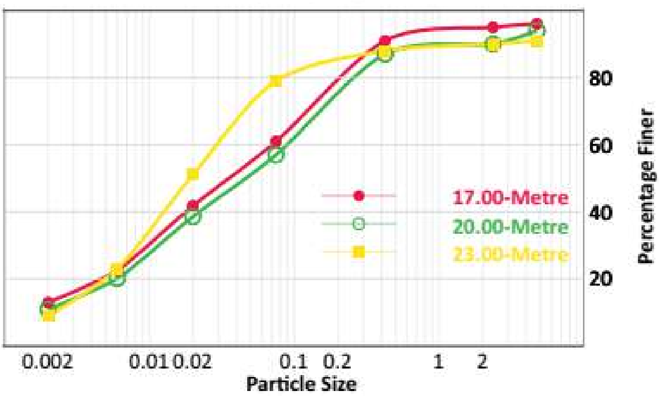

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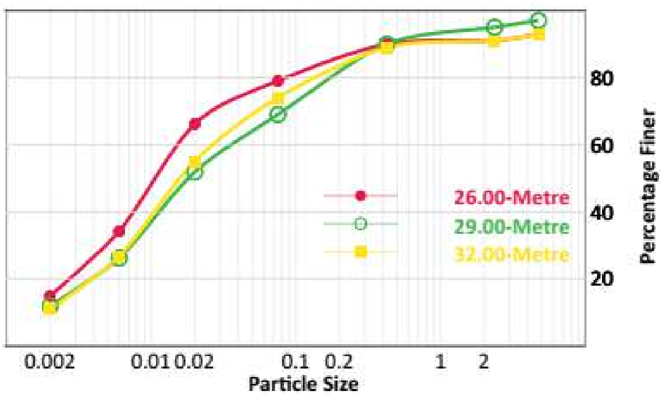

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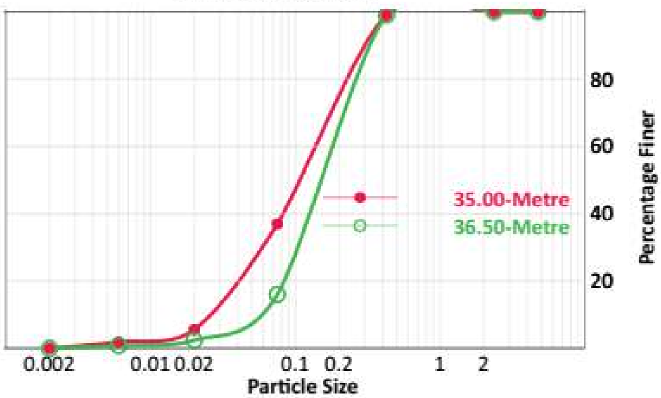
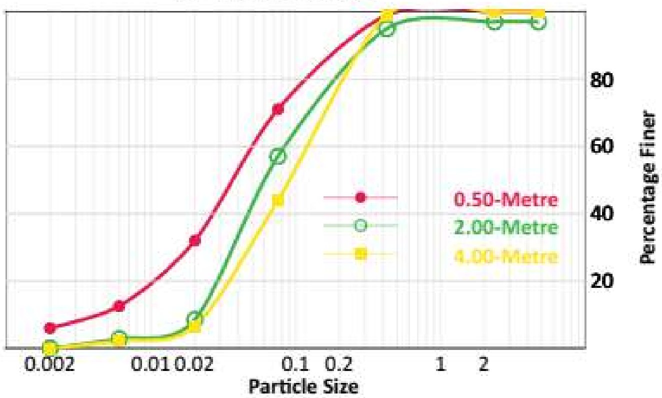


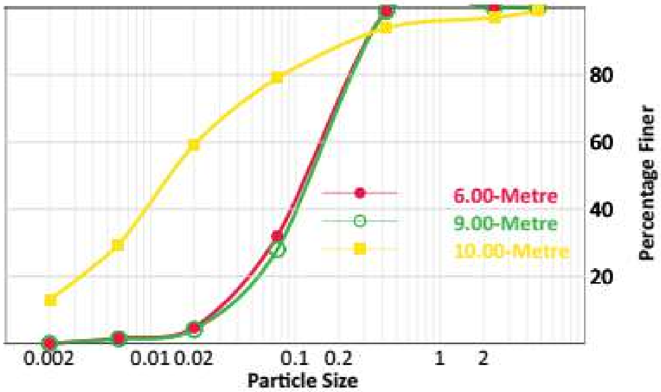
BH- P25-CH.21570.887



APPENDIX-D

PLOT 5: GRAIN SIZE DISTRIBUTION PLOTS

BH- P25-CH.21570.887



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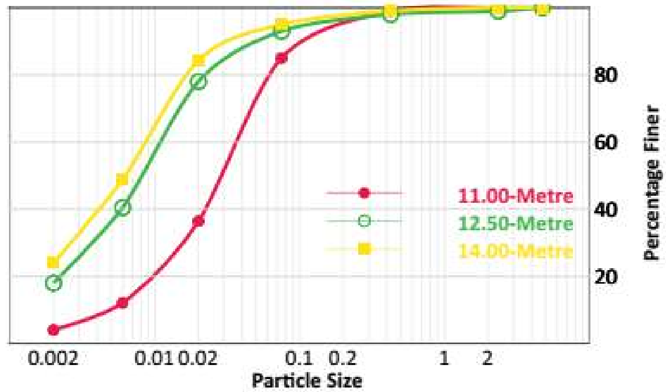

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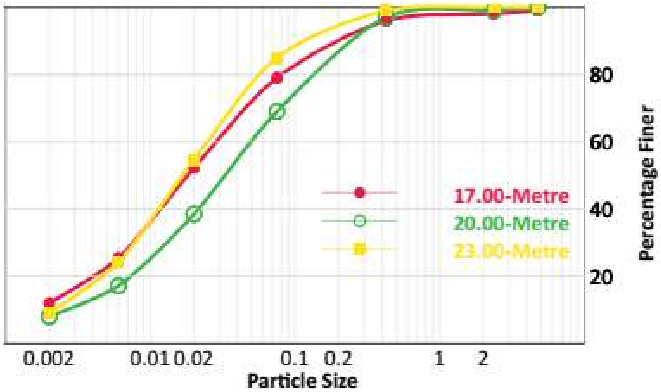

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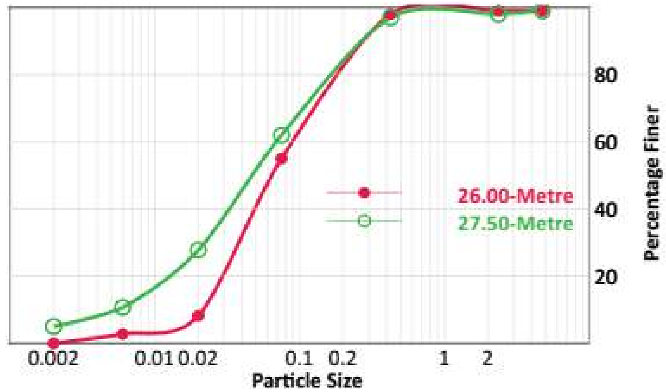

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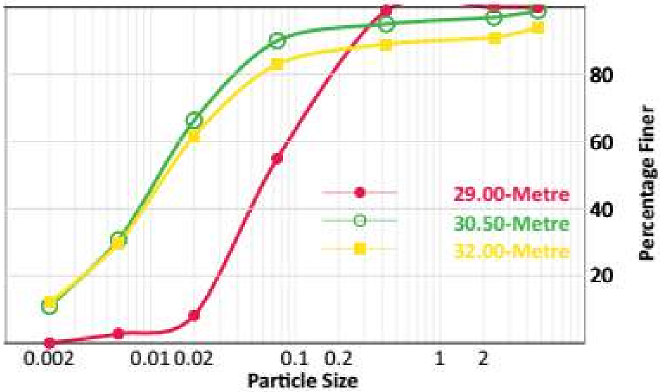

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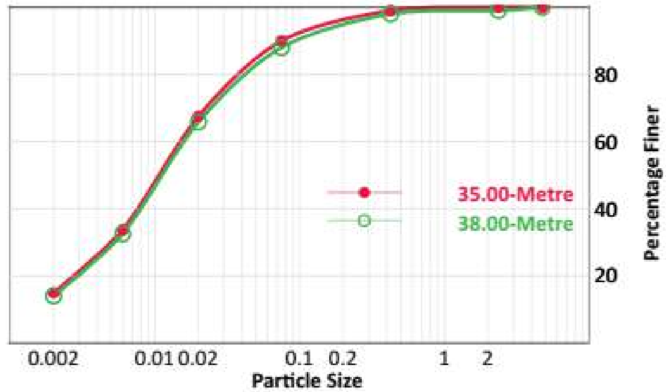

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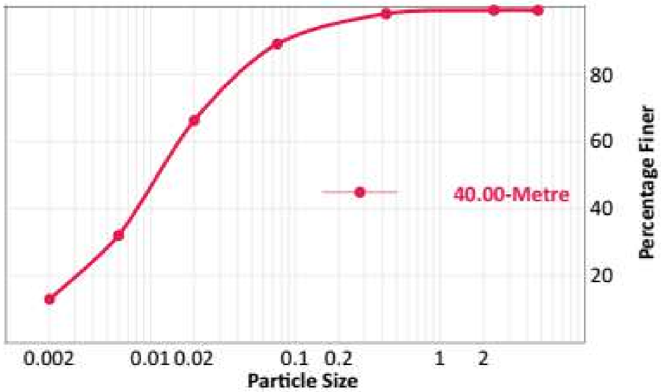
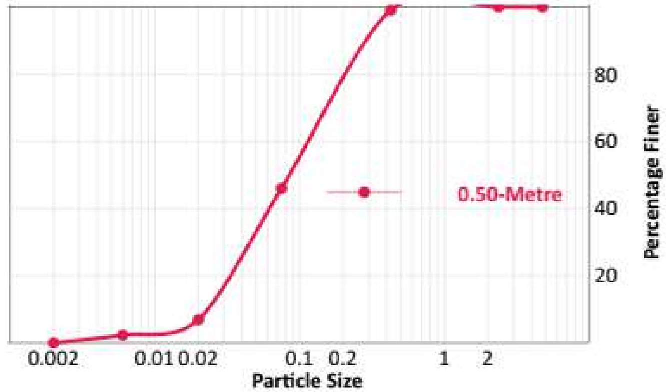
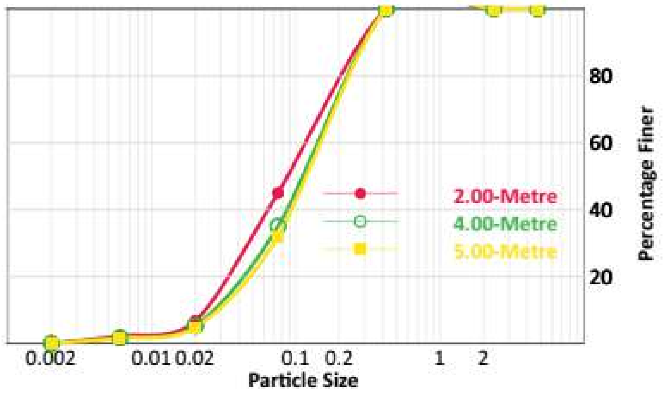


BH- P26-CH.21597.087



APPENDIX-D
PLOT 6: GRAIN SIZE DISTRIBUTION PLOTS

BH- P26-CH.21597.087



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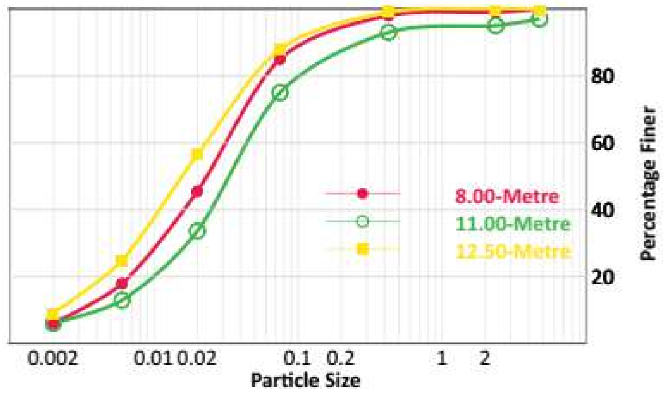

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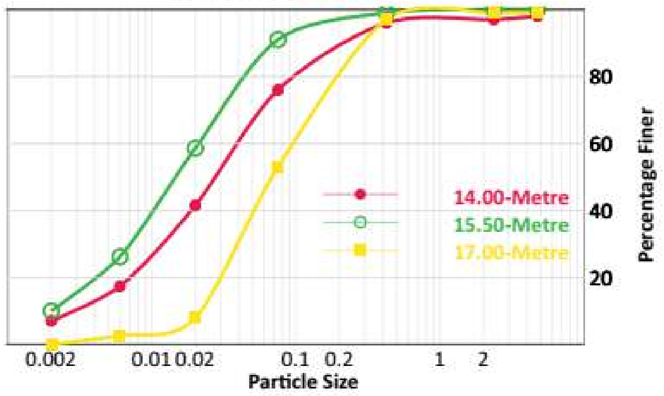

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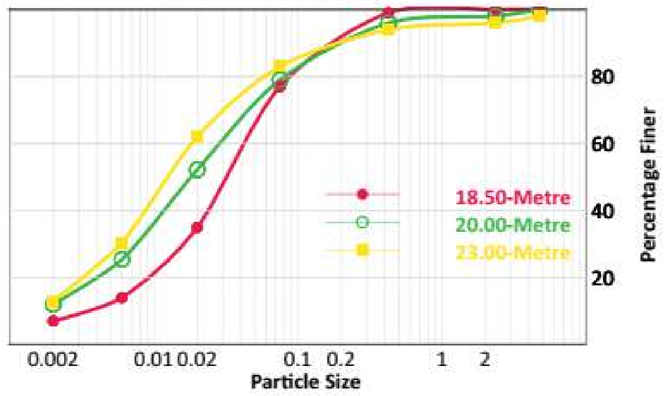

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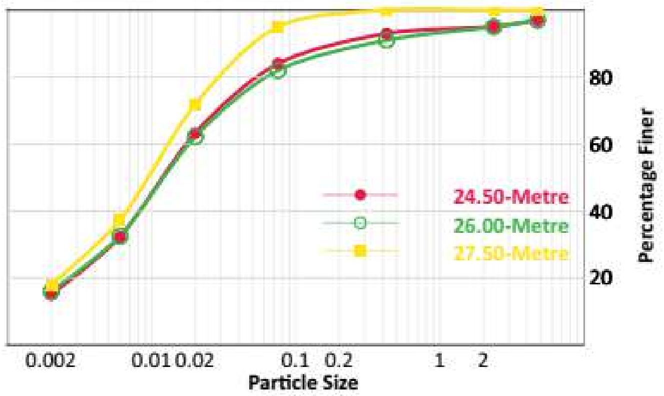

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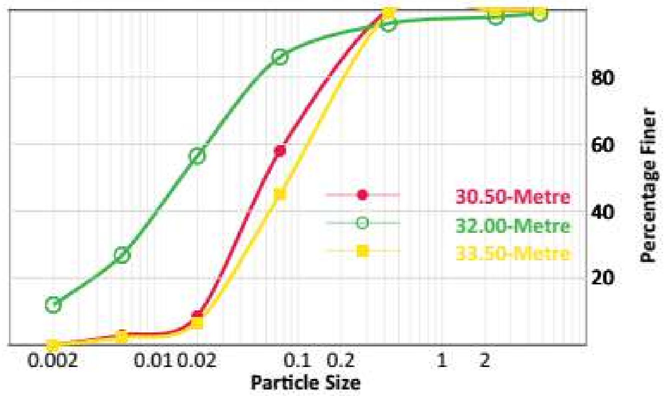

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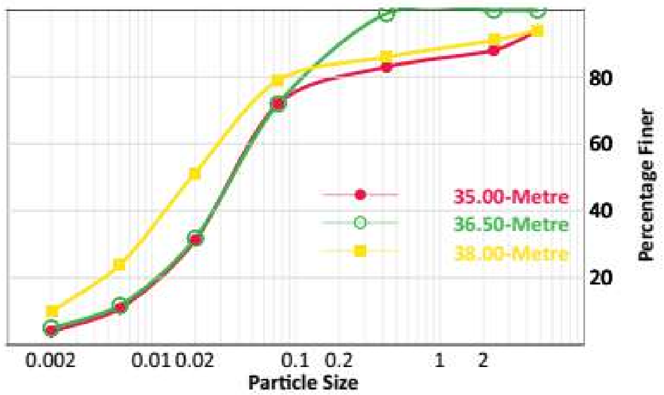
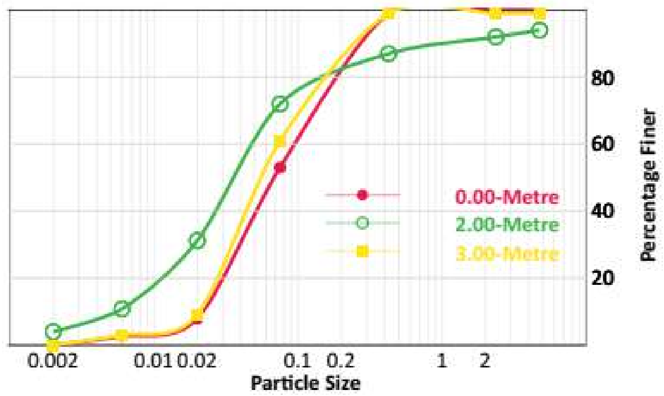
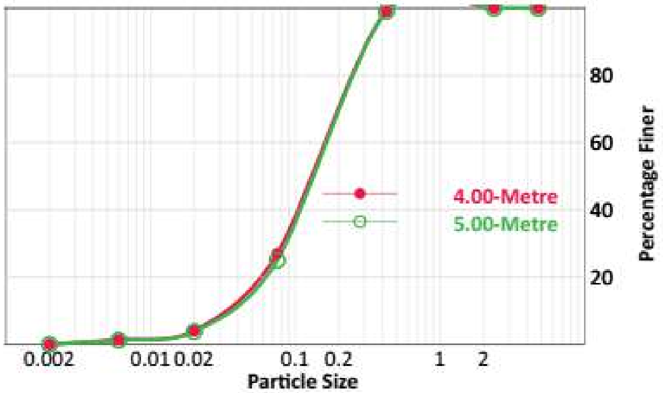


BH- P27-CH.21623.287



APPENDIX-D
PLOT 7: GRAIN SIZE DISTRIBUTION PLOTS

BH- P27-CH.21623.287



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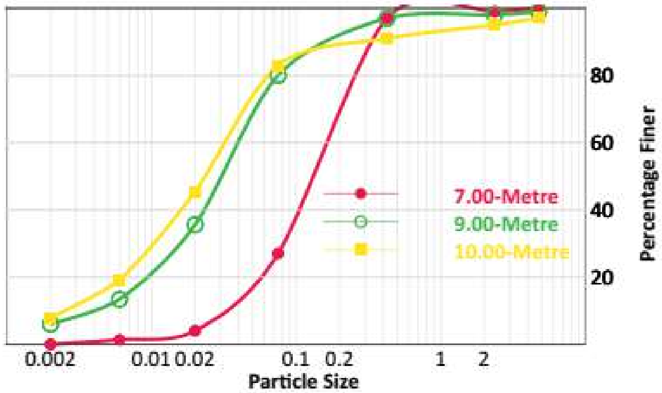

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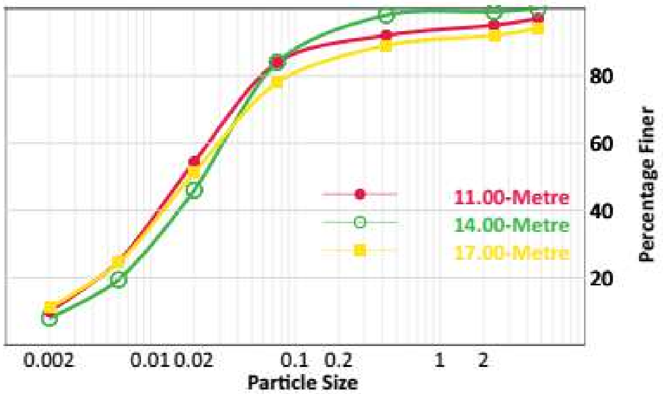

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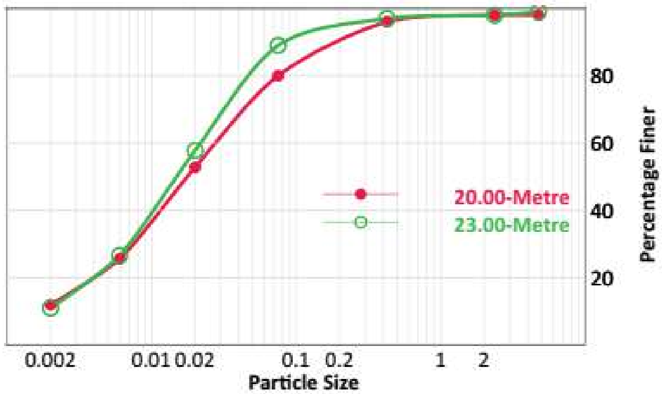

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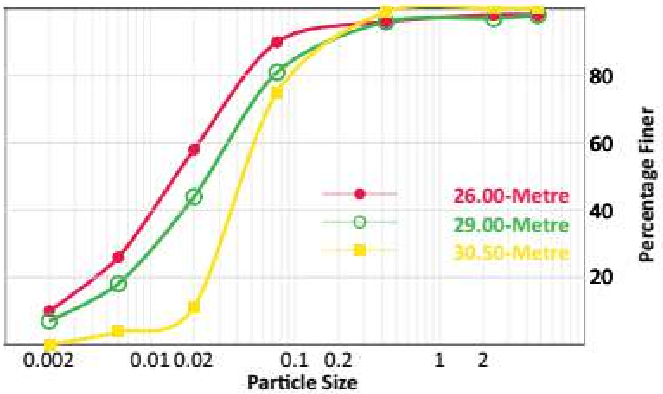

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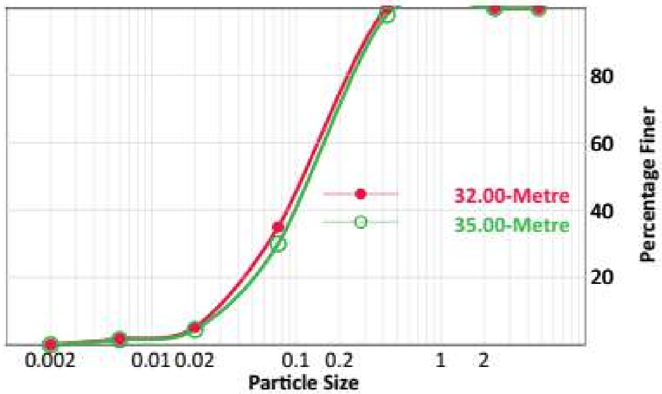

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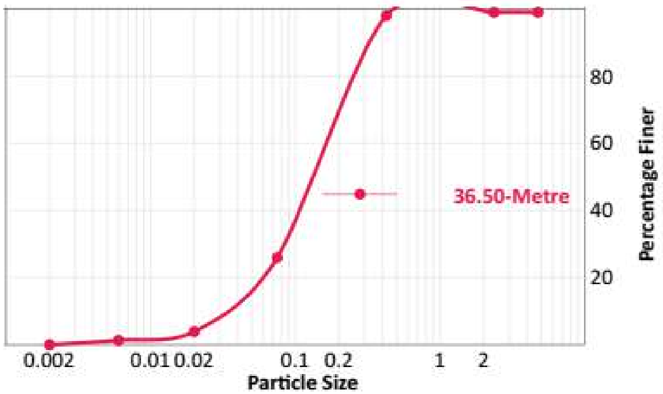

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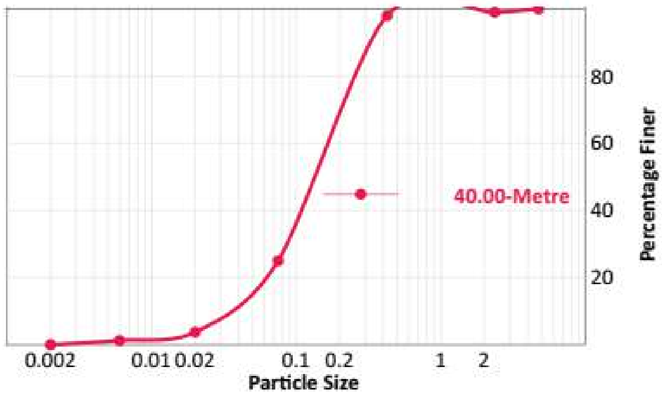
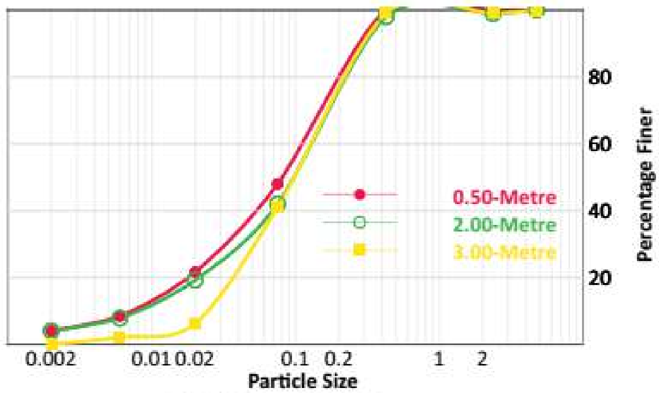


APPENDIX-D
PLOT 8: GRAIN SIZE DISTRIBUTION PLOTS

BH- P28-CH.21649.487



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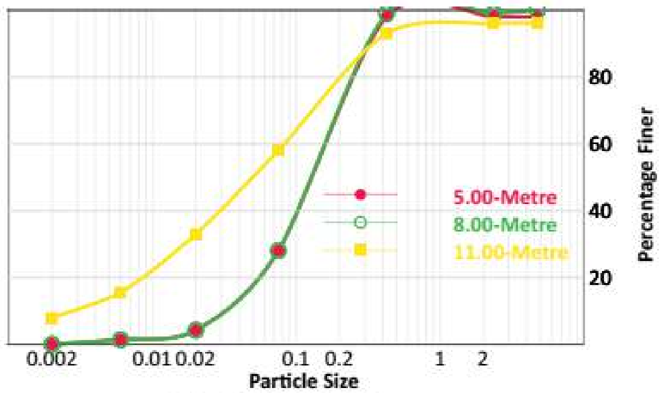

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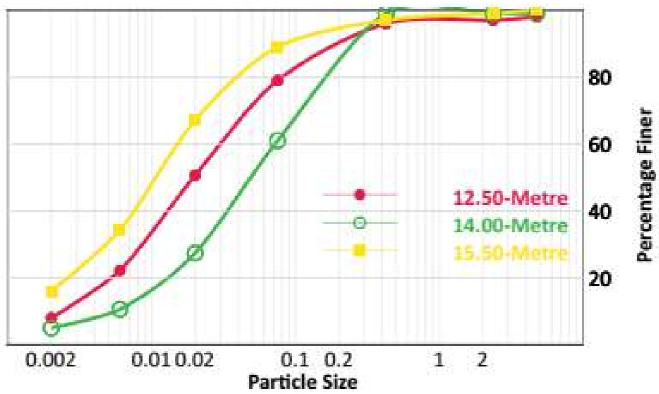

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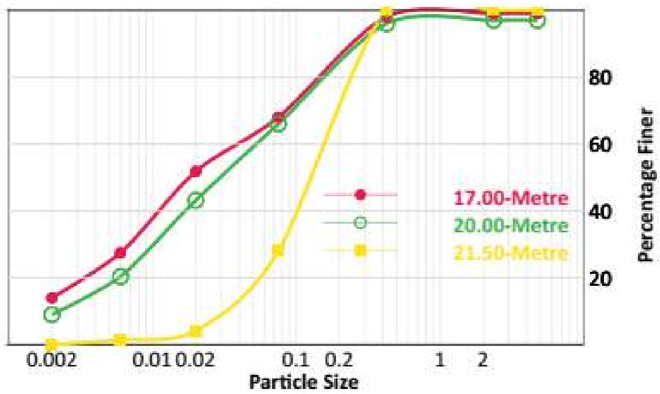

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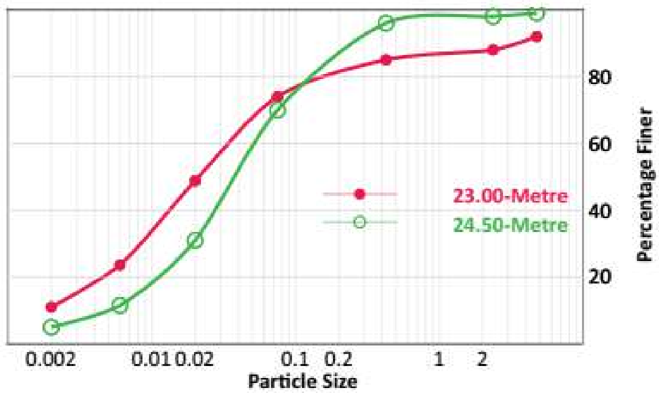

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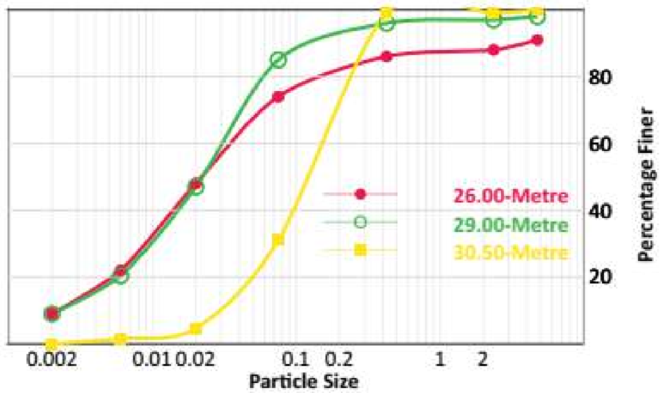

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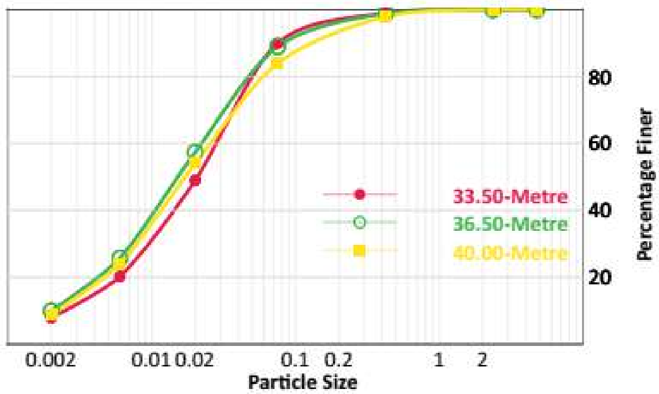
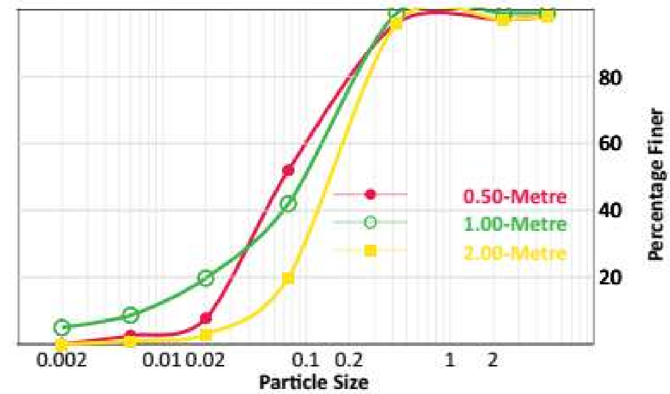


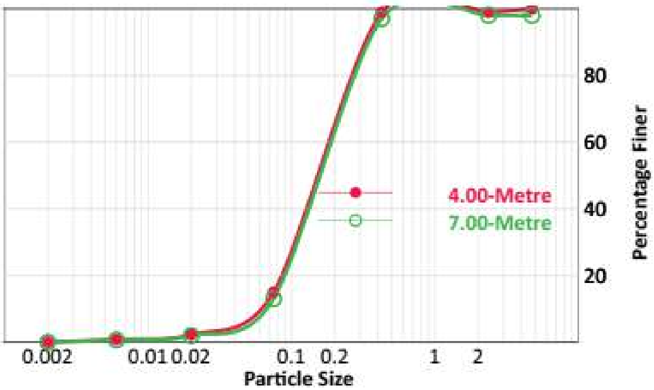
BH- P29-CH.21675.687



APPENDIX-D

PLOT 9: GRAIN SIZE DISTRIBUTION PLOTS

BH- P29-CH.21675.687



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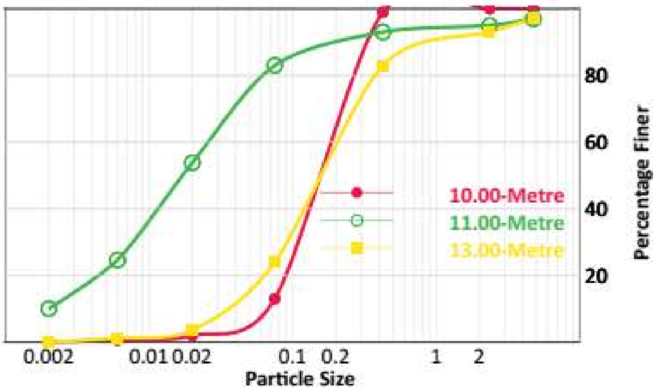

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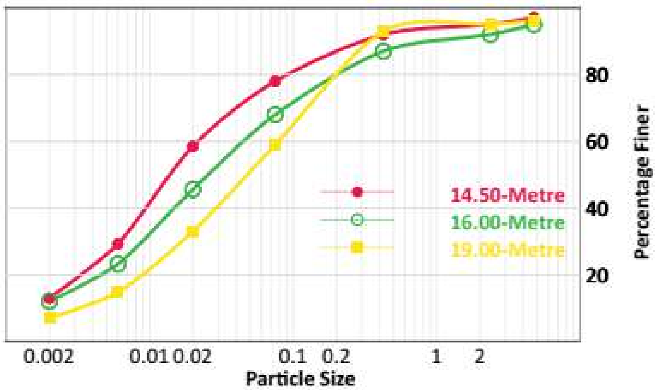

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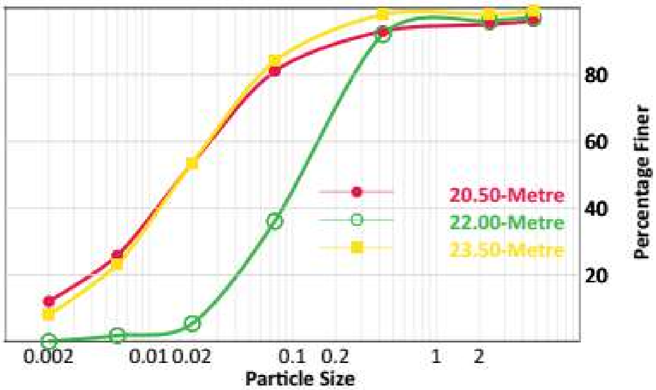

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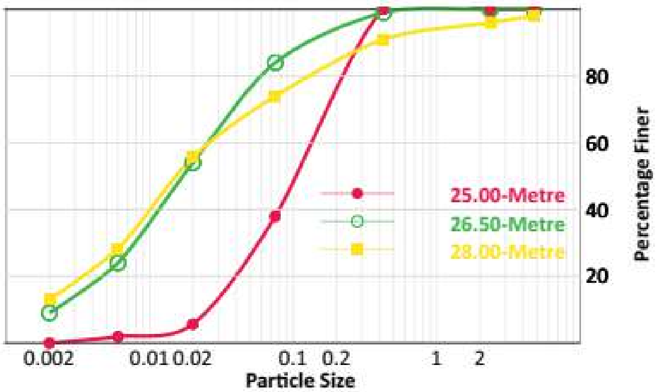
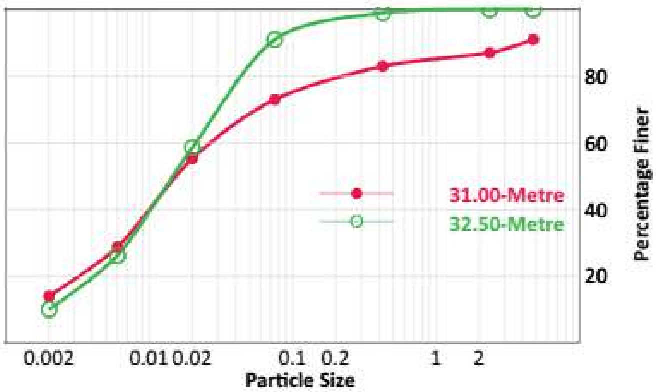
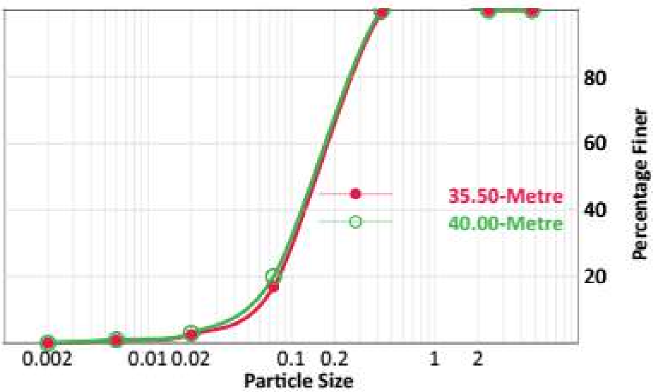


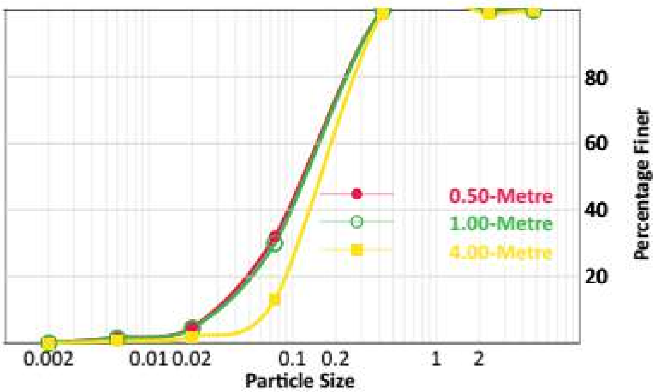
BH- P29-CH.21675.687



BH- P29-CH.21675.687

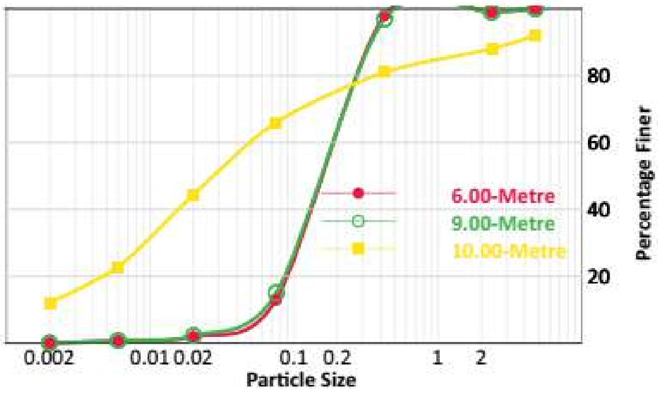


BH- P30-CH.21701.887

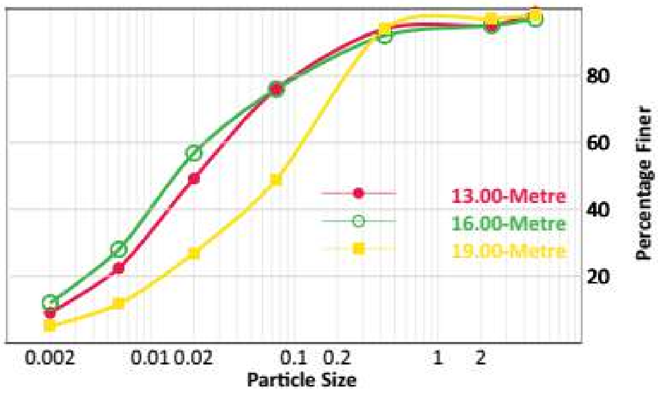


APPENDIX-D
PLOT 10: GRAIN SIZE DISTRIBUTION PLOTS

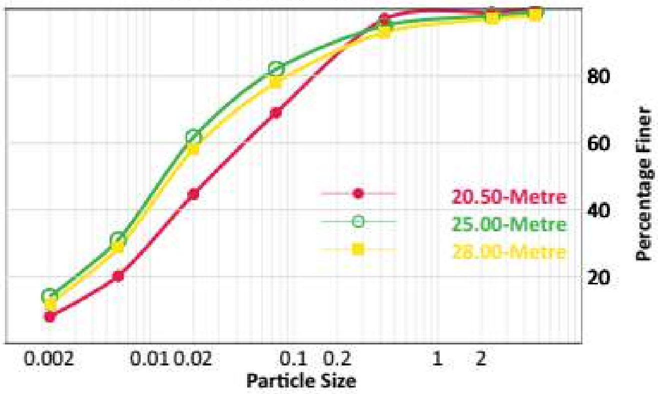
BH- P30-CH.21701.887



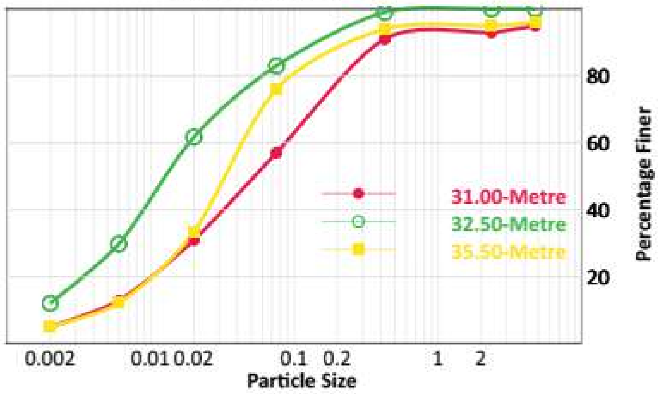
BH- P30-CH.21701.887



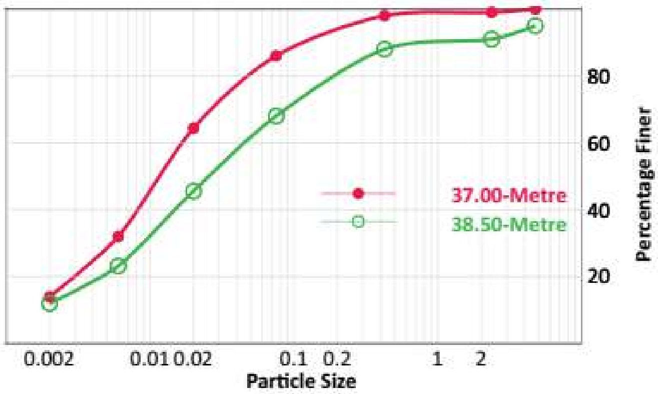
BH- P30-CH.21701.887



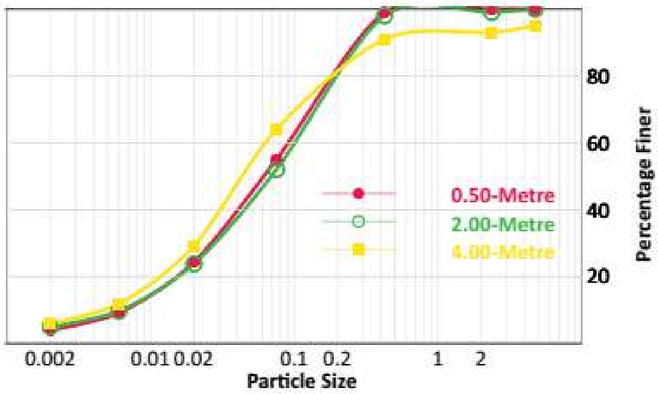
BH- P30-CH.21701.887



BH- P30-CH.21701.887



BH- P31-CH.21728.087



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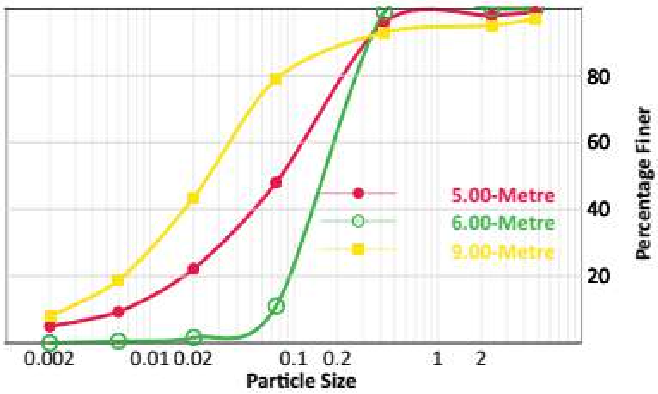

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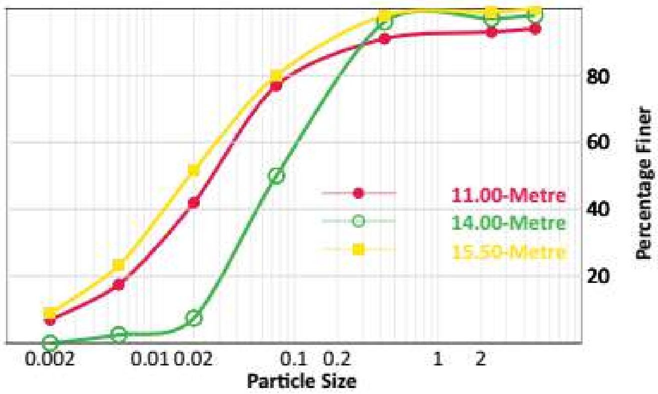
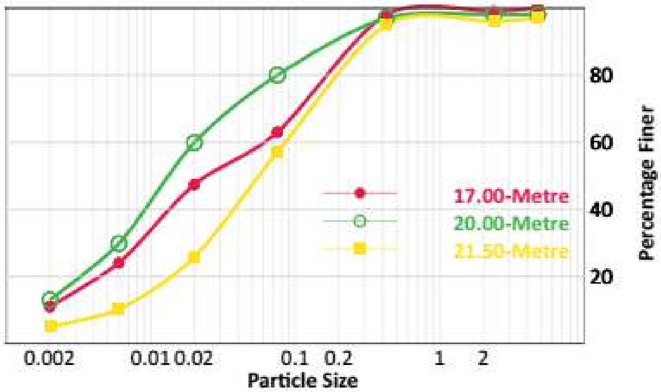
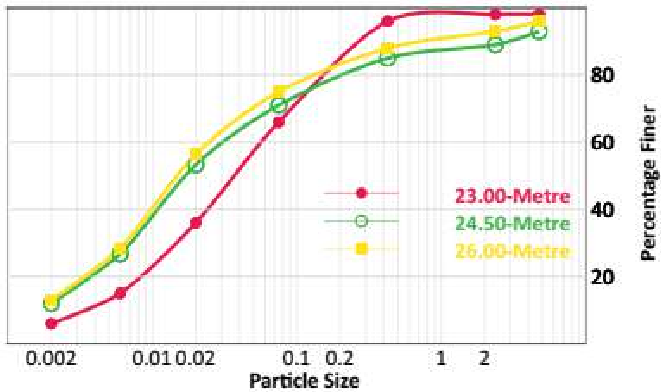


APPENDIX-D
PLOT 11: GRAIN SIZE DISTRIBUTION PLOTS

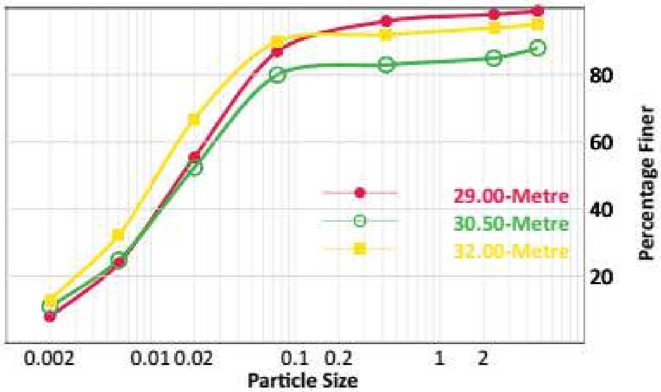
BH- P31-CH.21728.087



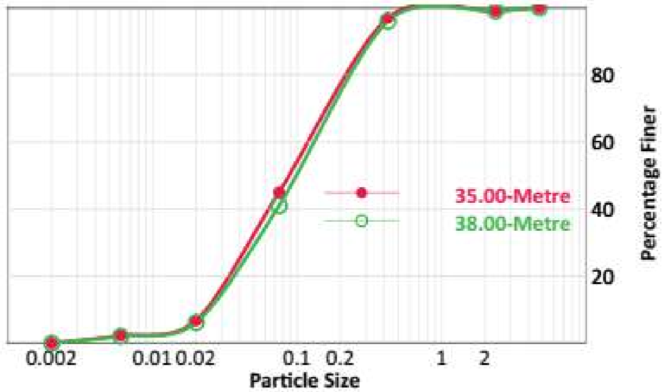
BH- P31-CH.21728.087



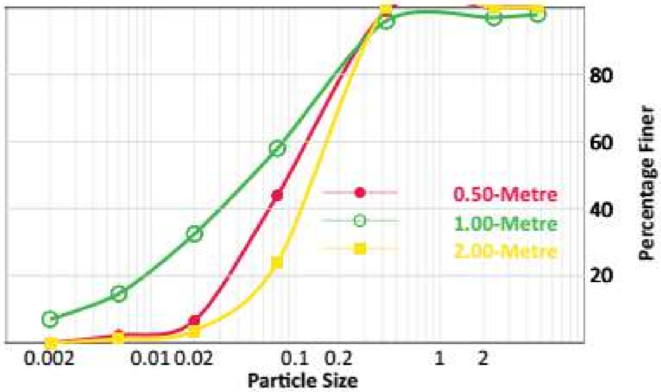
BH- P31-CH.21728.087



BH- P31-CH.21728.087



BH- P32-CH.21754.287



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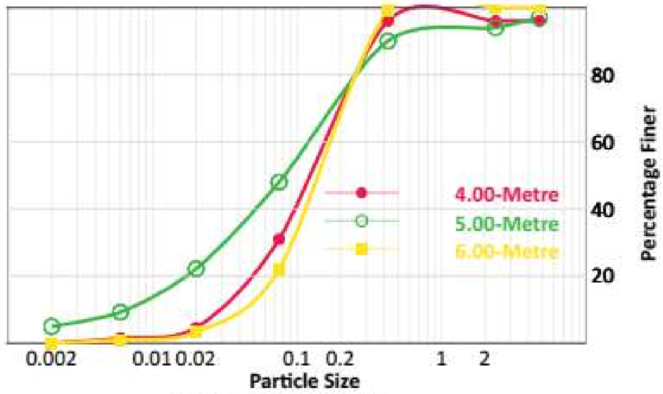
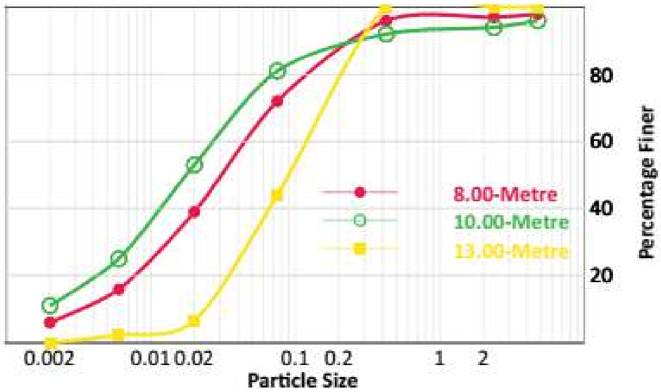
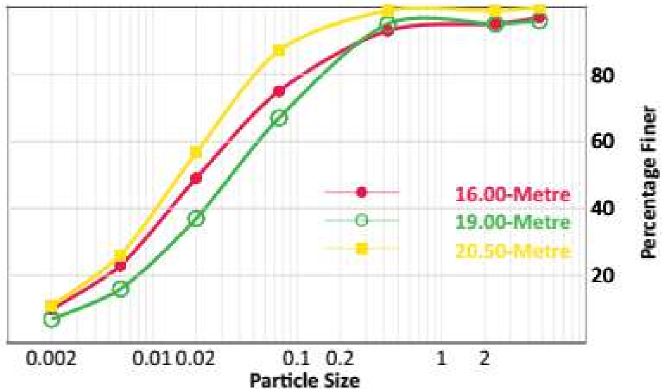


BH- P32-CH.21754.287

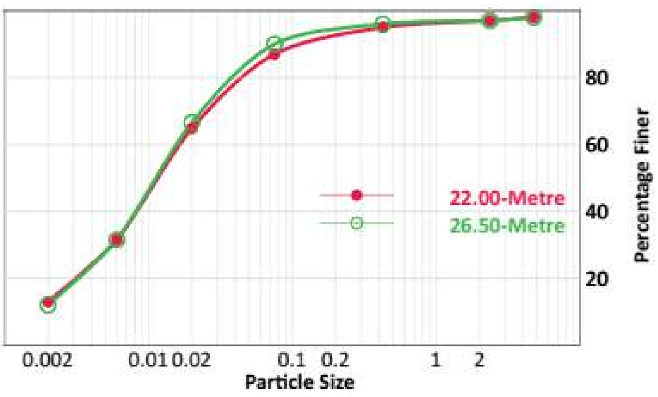


BH- P32-CH.21754.287

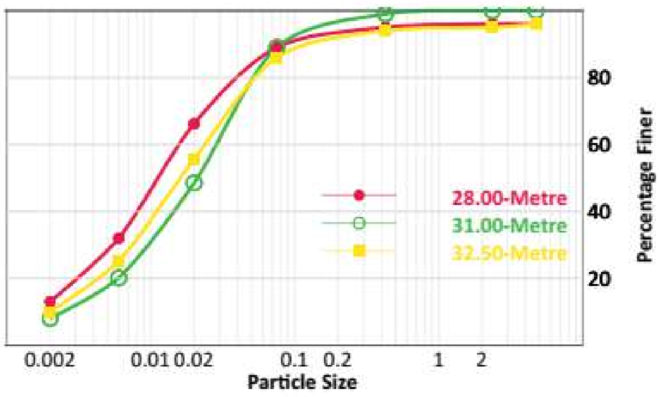


APPENDIX-D
PLOT 12: GRAIN SIZE DISTRIBUTION PLOTS

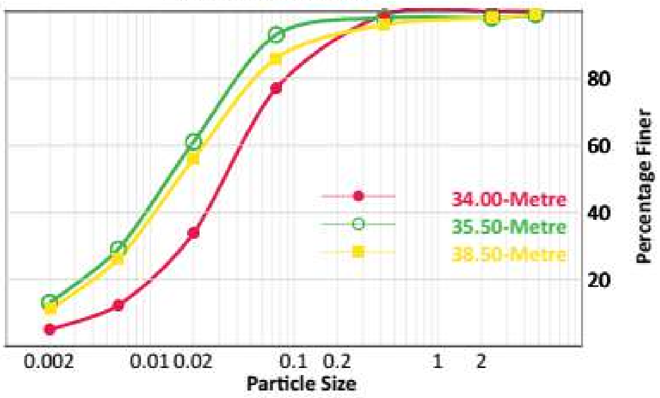
BH- P32-CH.21754.287



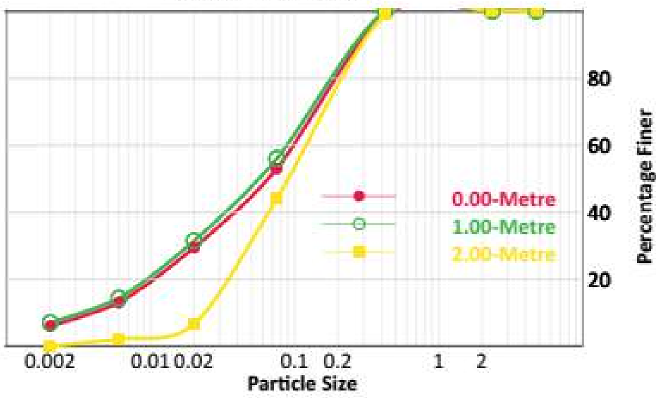
BH- P32-CH.21754.287



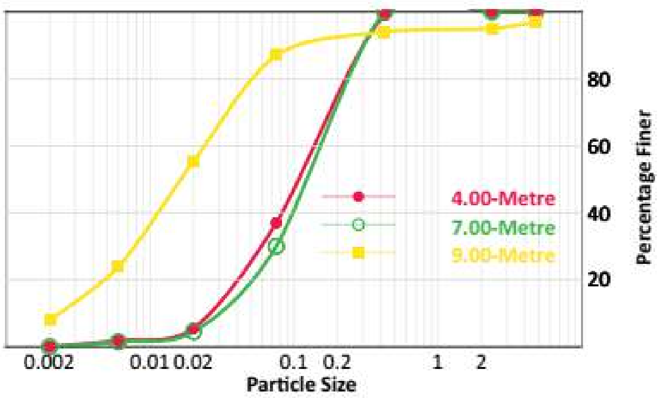
BH- P32-CH.21754.287



BH- P33-CH.21780.487



BH- P33-CH.21780.487



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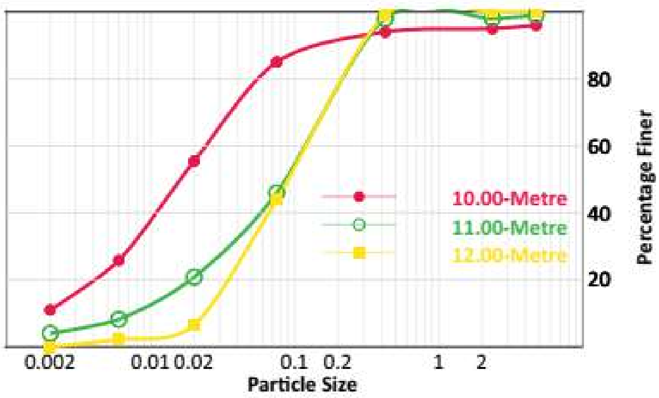

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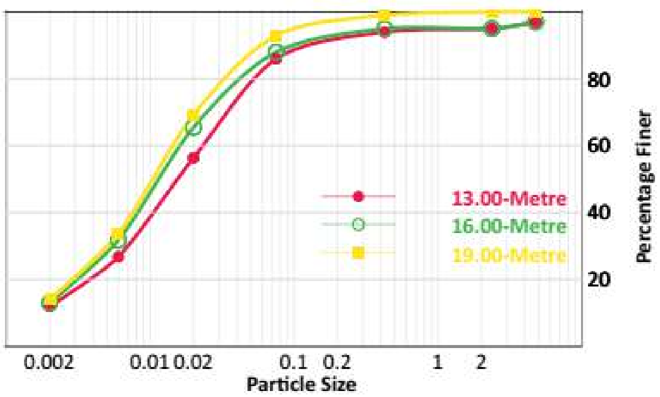
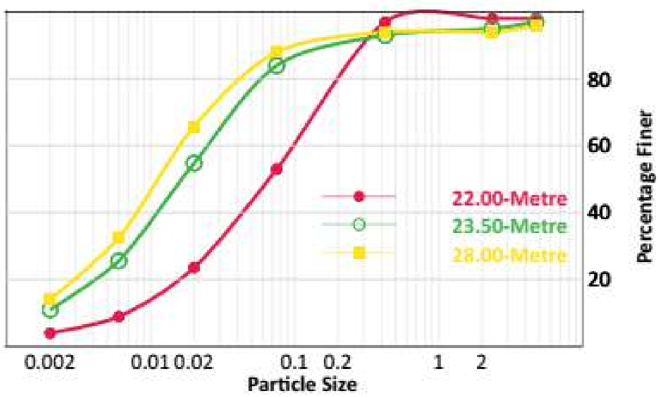


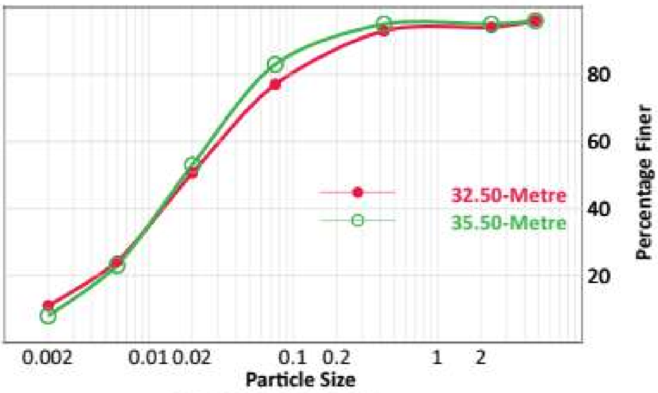
BH- P33-CH.21780.487



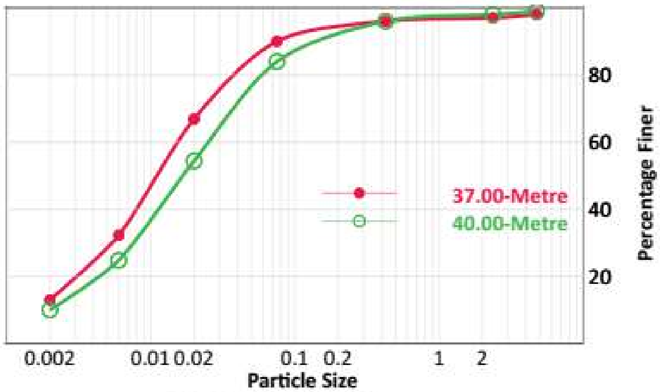
APPENDIX-D

PLOT 13: GRAIN SIZE DISTRIBUTION PLOTS

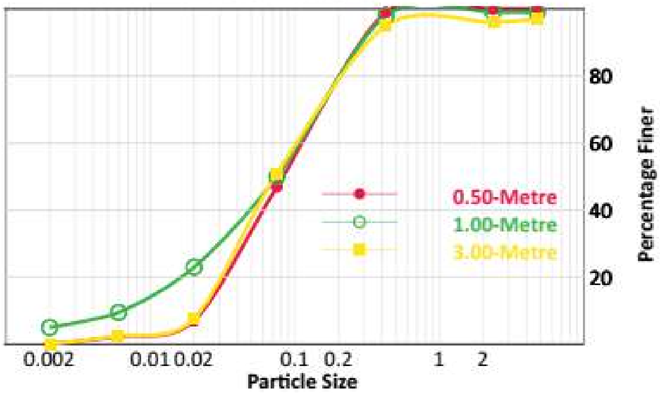
BH- P33-CH.21780.487



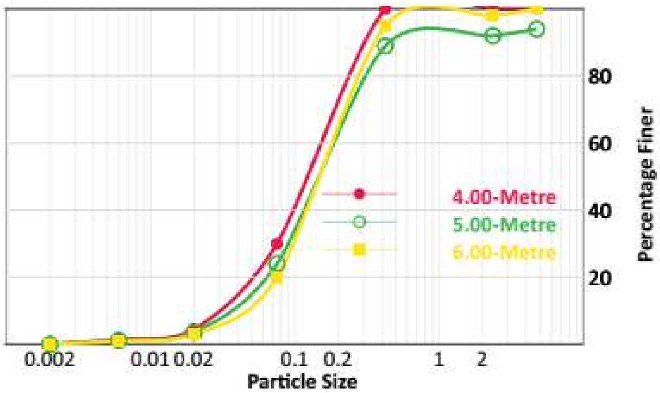
BH- P33-CH.21780.487



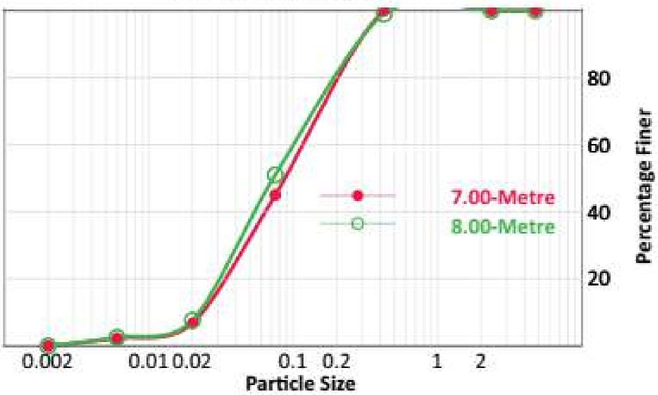
BH- P34-CH.21806.687



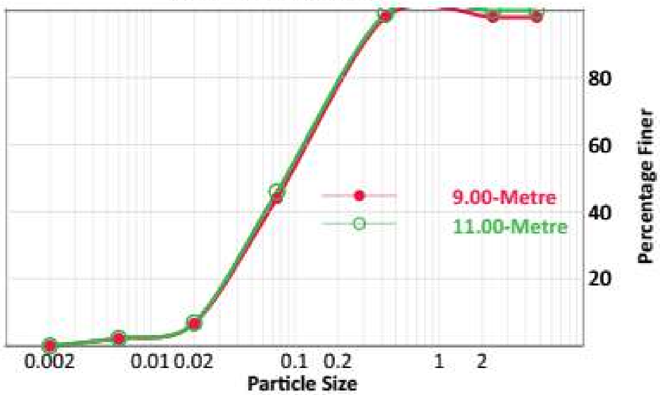
BH- P34-CH.21806.687



BH- P34-CH.21806.687



BH- P34-CH.21806.687



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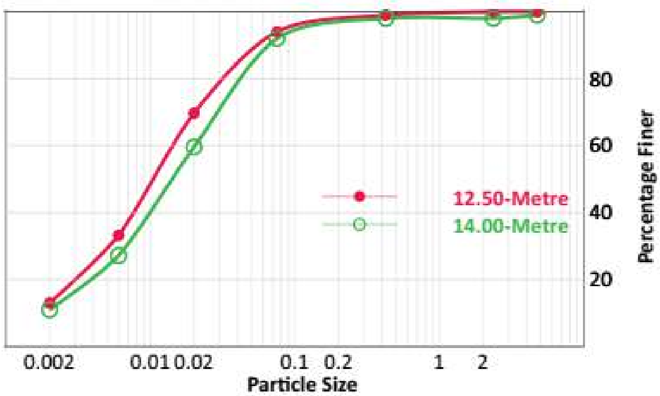
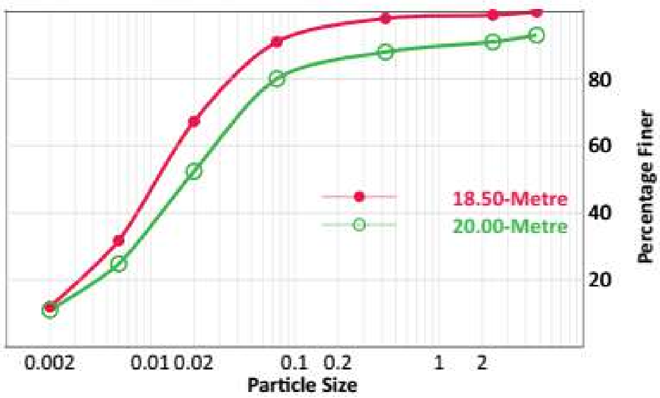
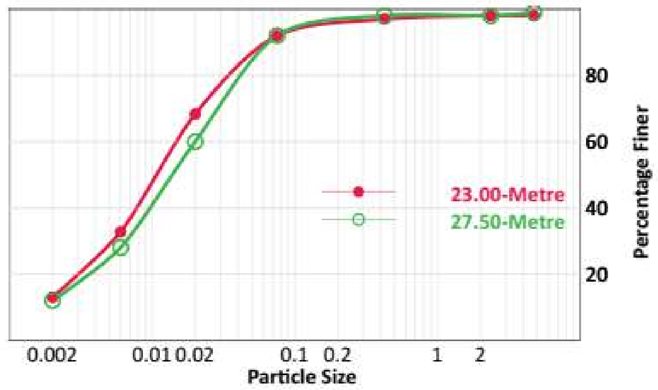


BH- P34-CH.21806.687



APPENDIX-D
PLOT 14: GRAIN SIZE DISTRIBUTION PLOTS

BH- P34-CH.21806.687



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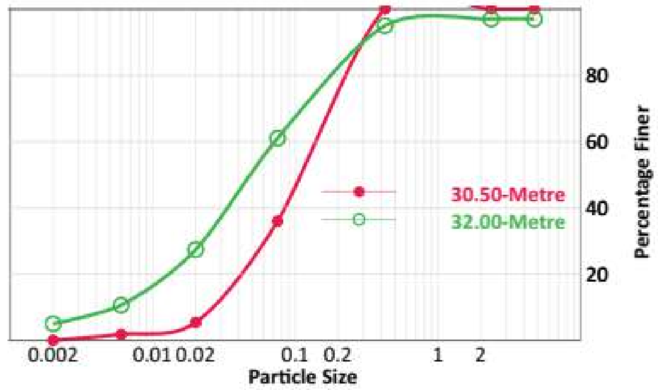
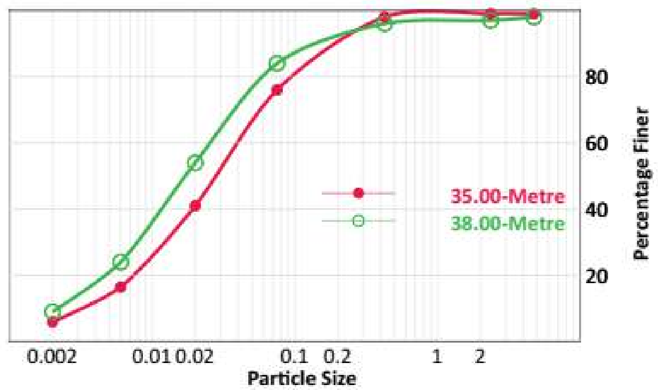
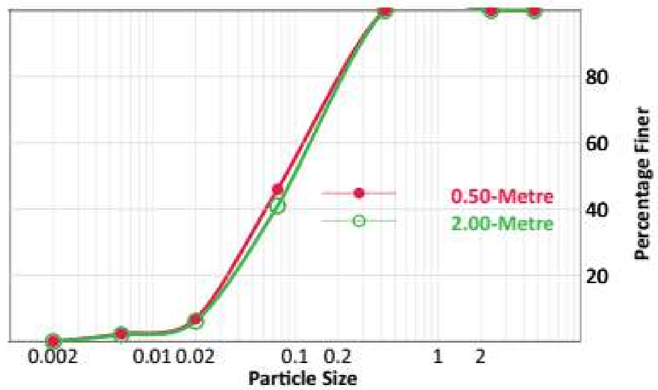


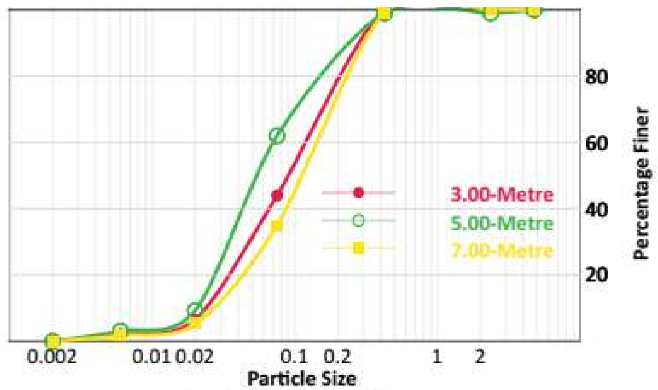
BH- P34-CH.21806.687



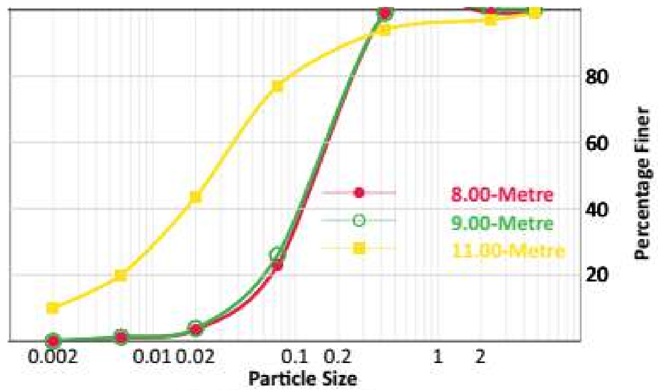
BH- P35-CH.21832.887



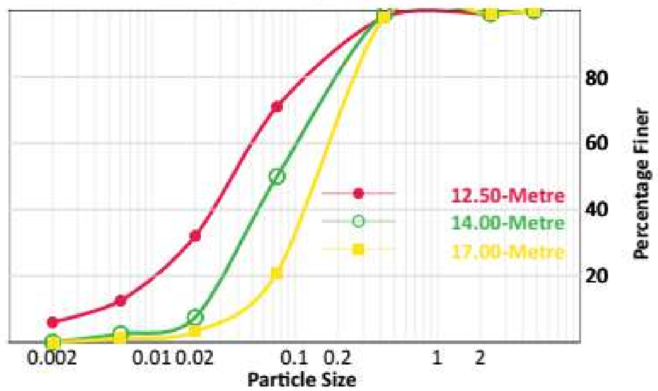
BH- P35-CH.21832.887



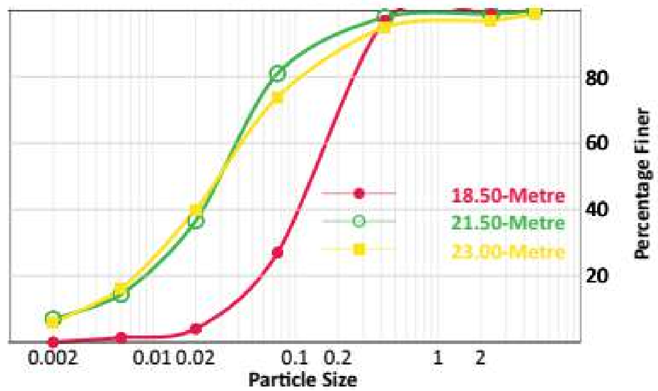
BH- P35-CH.21832.887



BH- P35-CH.21832.887



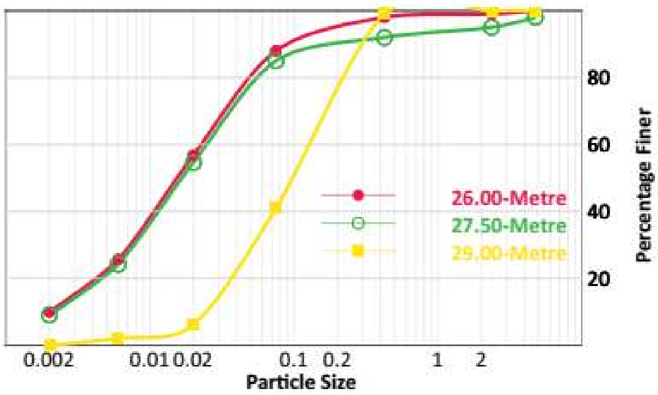
BH- P35-CH.21832.887



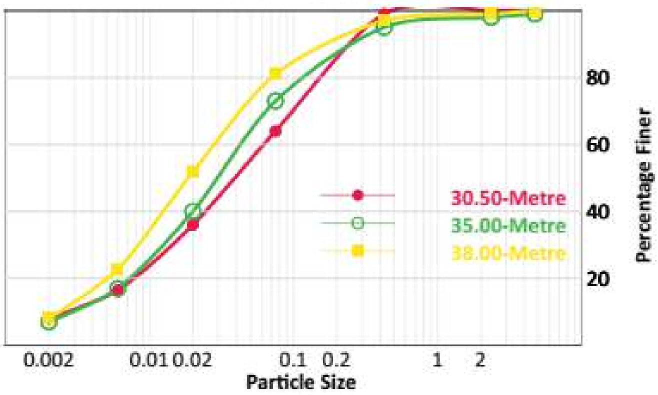
APPENDIX-D

PLOT 15: GRAIN SIZE DISTRIBUTION PLOTS

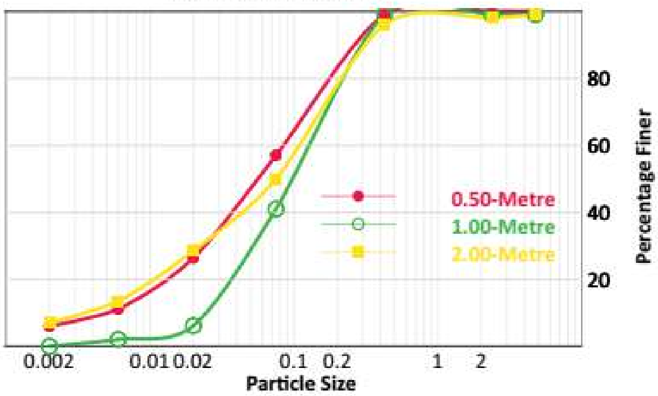
BH- P35-CH.21832.887



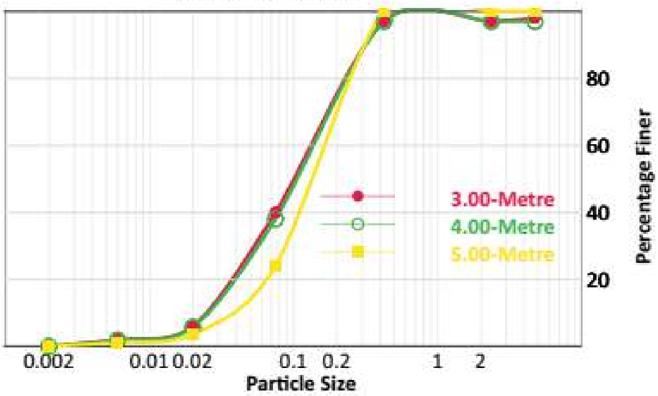
BH- P35-CH.21832.887



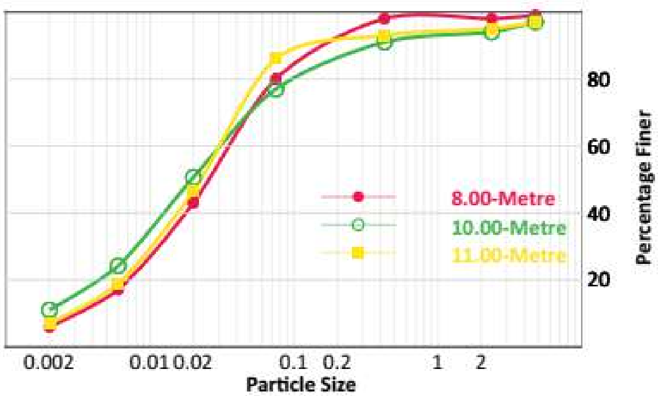
BH- P36-CH.21859.087



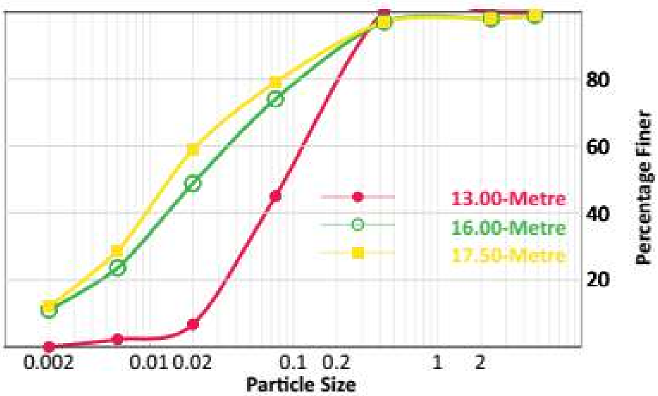
BH- P36-CH.21859.087



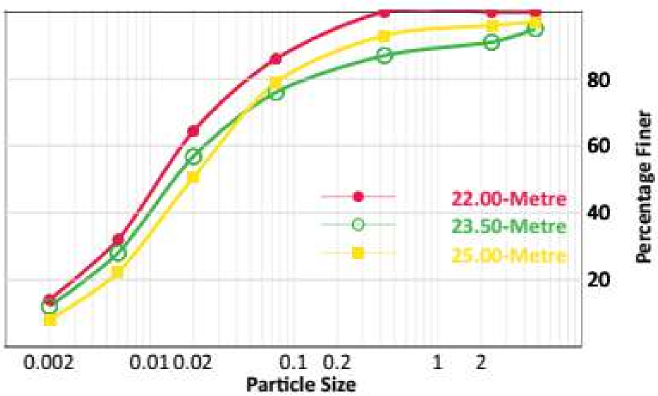
BH- P36-CH.21859.087



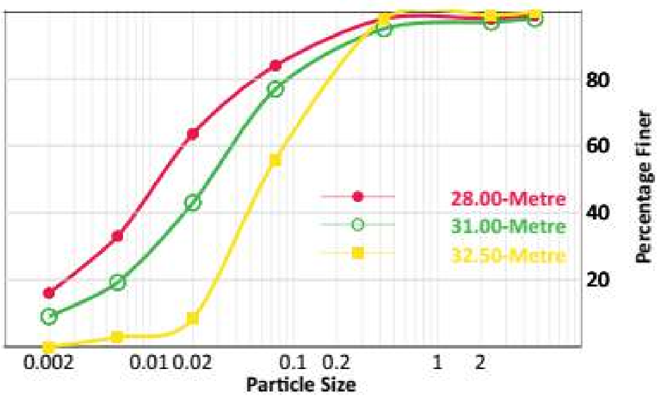
BH- P36-CH.21859.087



BH- P36-CH.21859.087

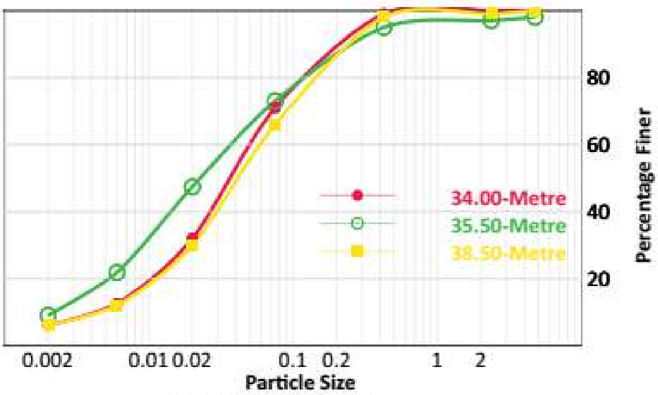


BH- P36-CH.21859.087

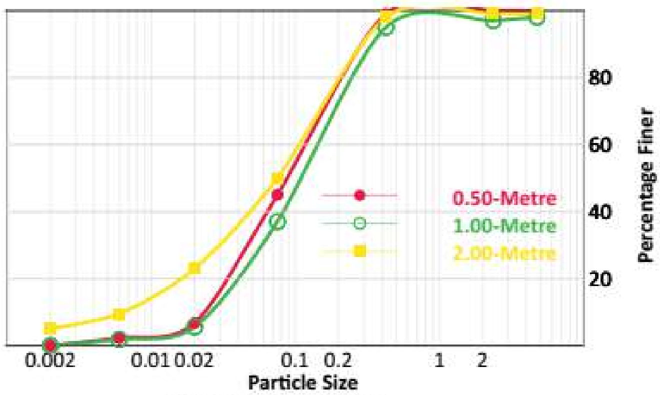


APPENDIX-D
PLOT 16: GRAIN SIZE DISTRIBUTION PLOTS

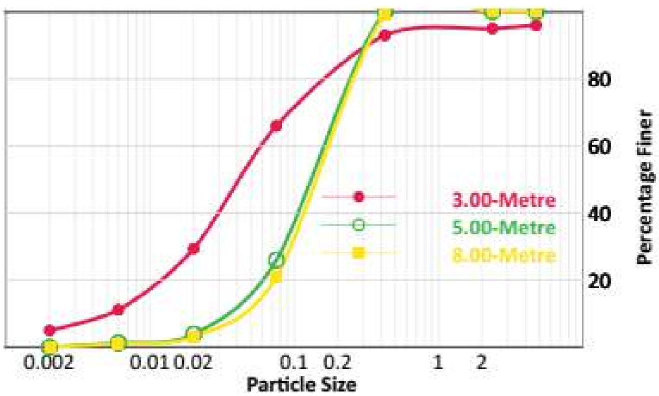
BH- P36-CH.21859.087



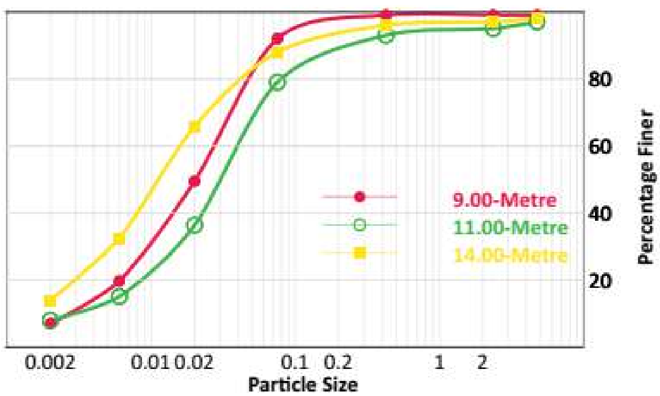
BH- P37-CH.21885.287



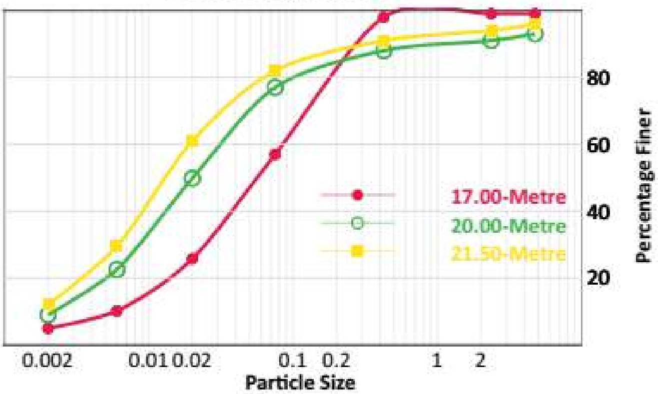
BH- P37-CH.21885.287



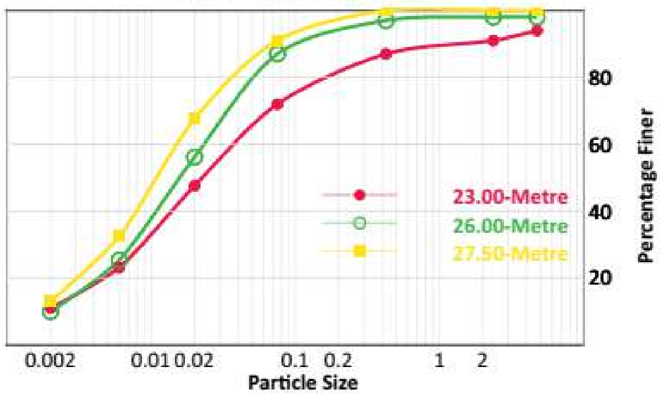
BH- P37-CH.21885.287



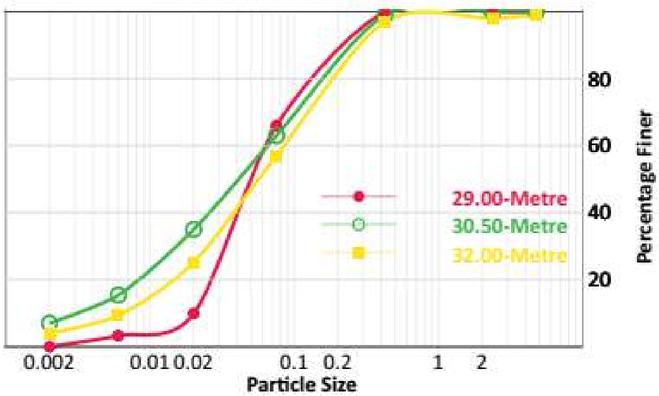
BH- P37-CH.21885.287



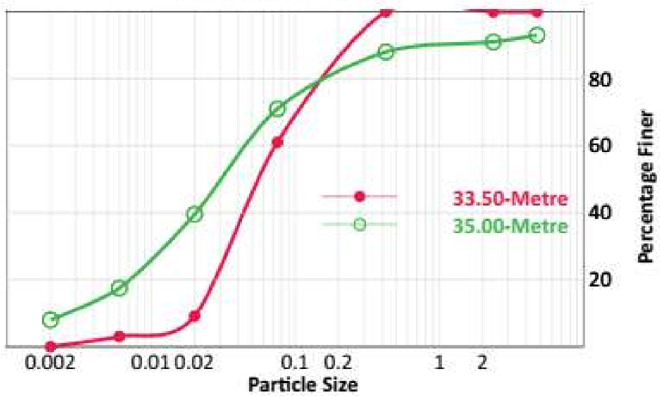
BH- P37-CH.21885.287



BH- P37-CH.21885.287

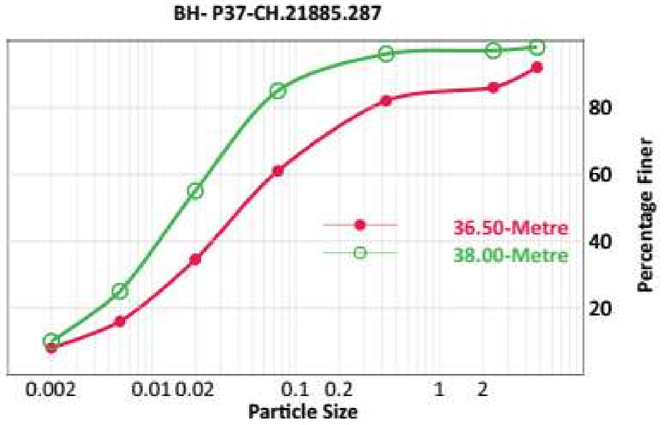


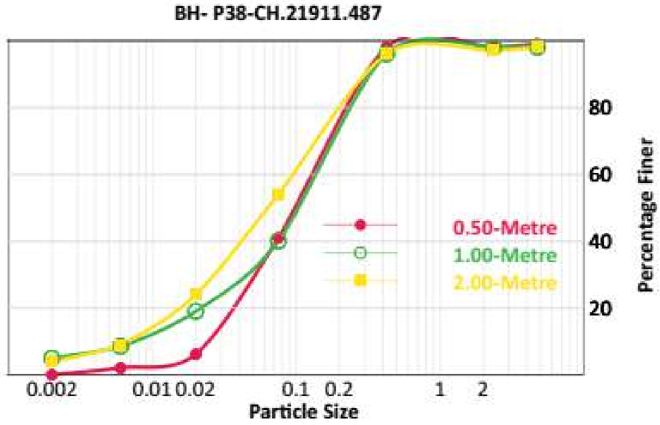
BH- P37-CH.21885.287

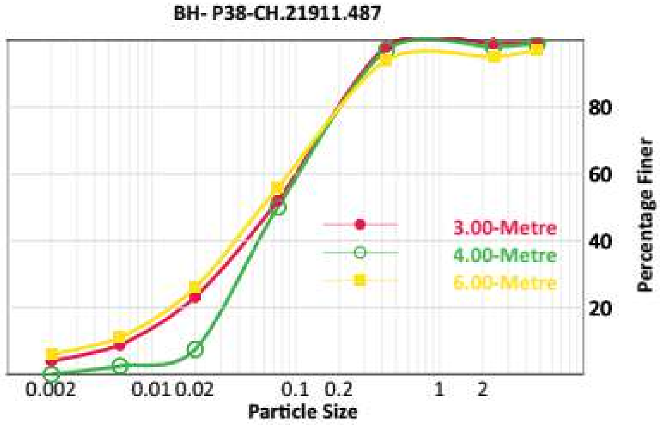


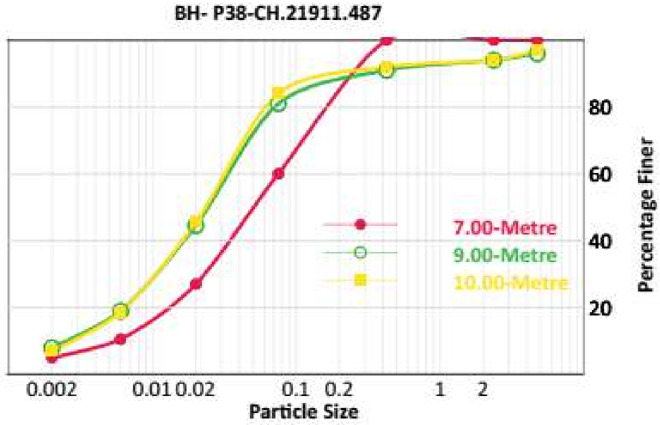
APPENDIX-D

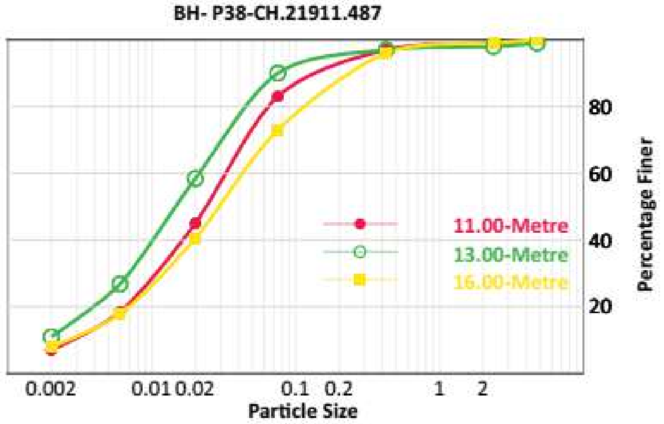
PLOT 17: GRAIN SIZE DISTRIBUTION PLOTS

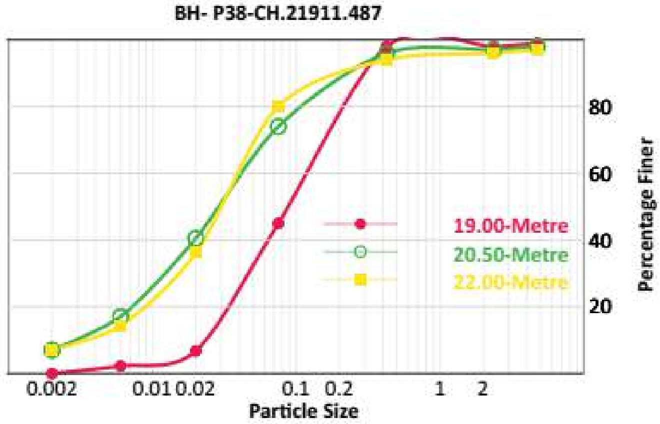


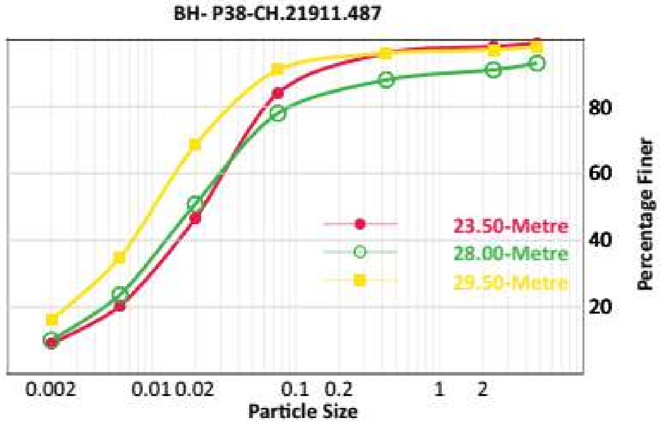


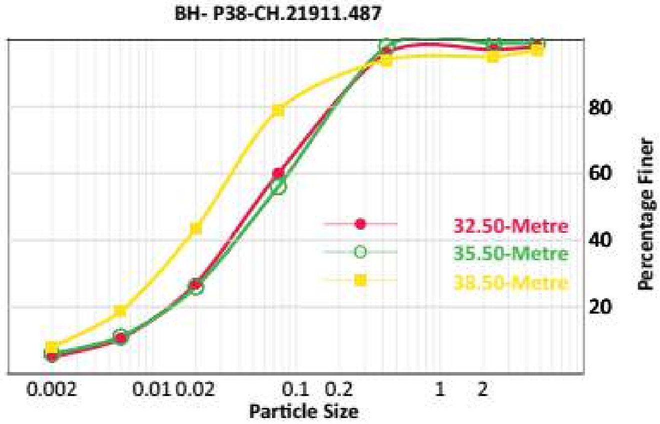








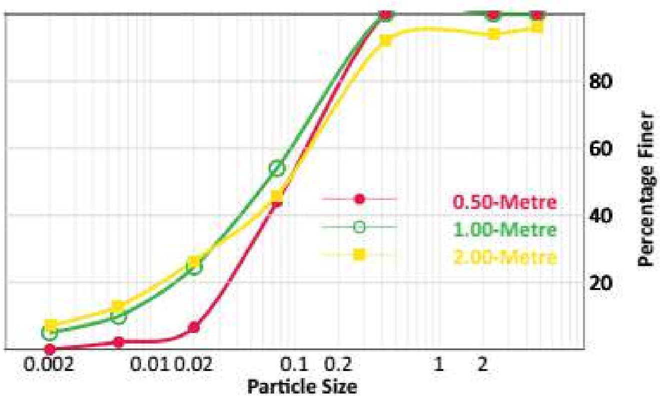




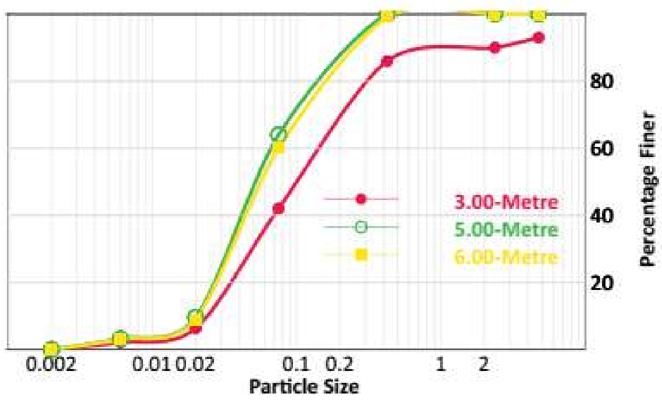
APPENDIX-D

PLOT 18: GRAIN SIZE DISTRIBUTION PLOTS

BH- P39-CH.21937.687



BH- P39-CH.21937.687



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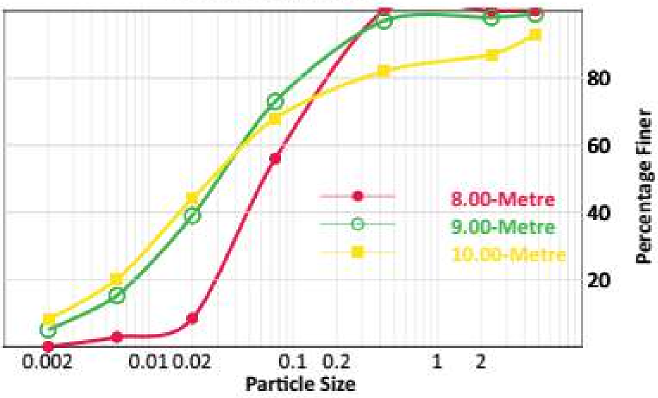
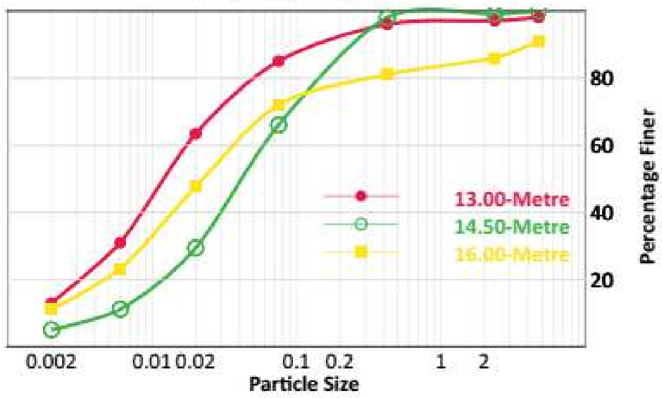


BH- P39-CH.21937.687



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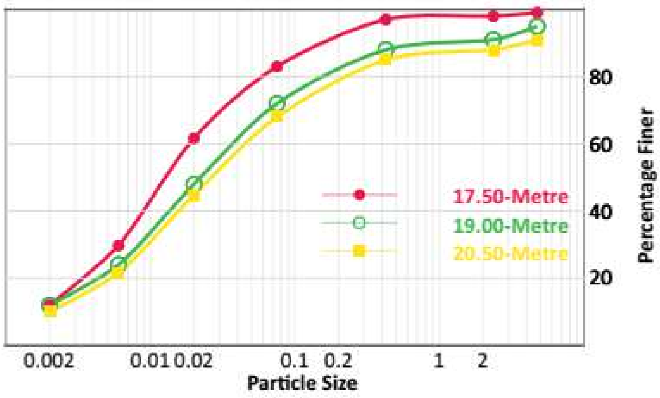

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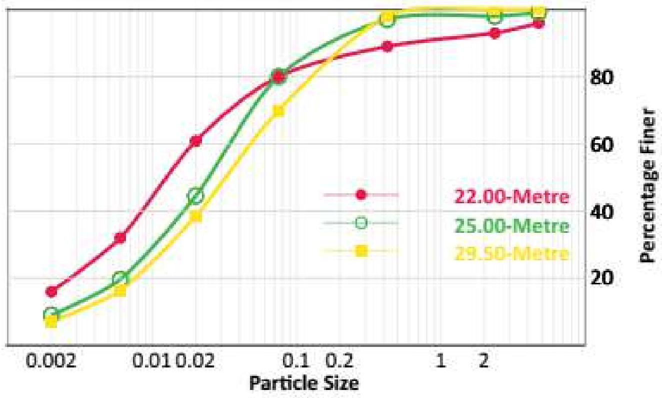

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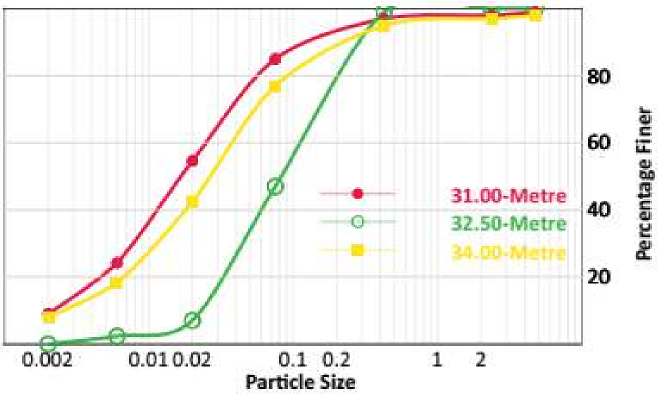

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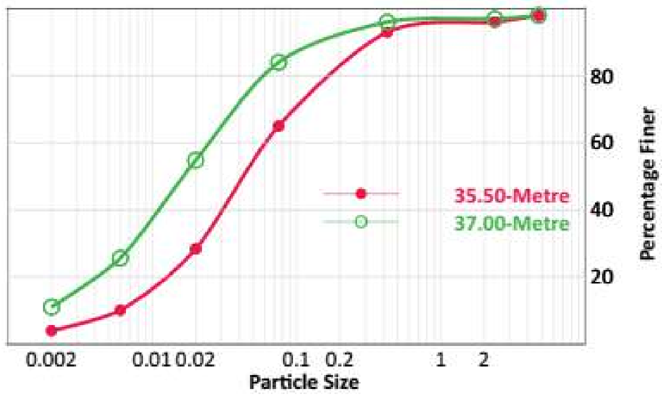
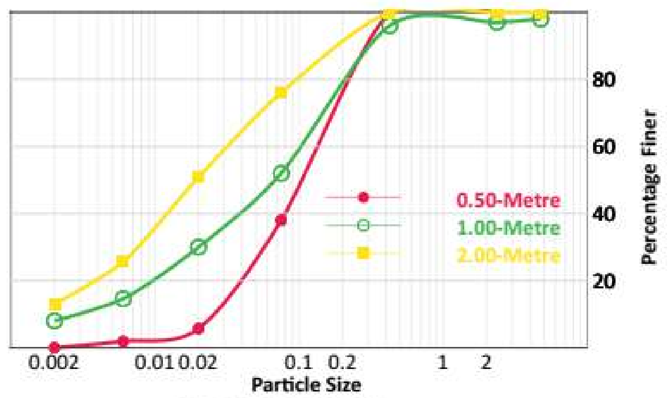


APPENDIX-D
PLOT 19: GRAIN SIZE DISTRIBUTION PLOTS

BH- P40-CH.21963.887



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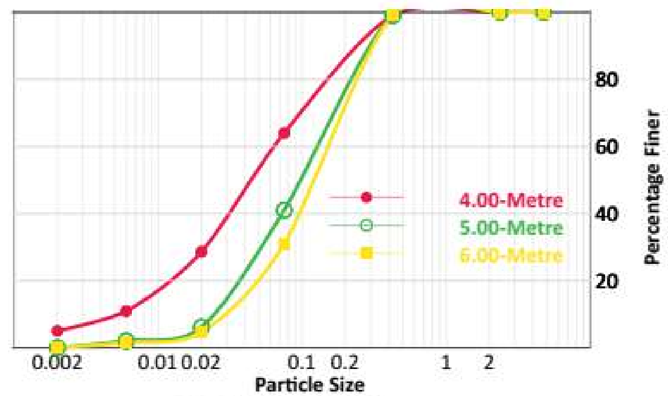

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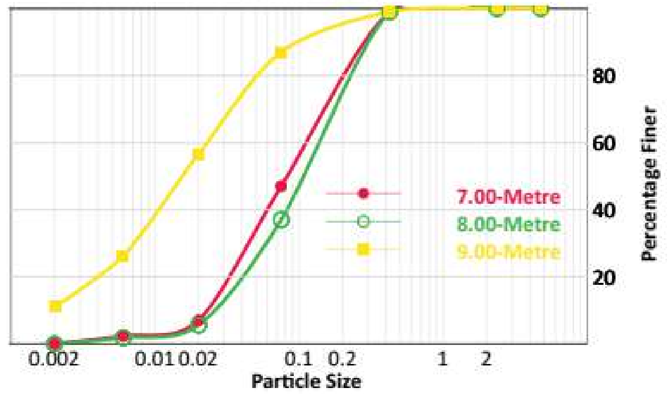

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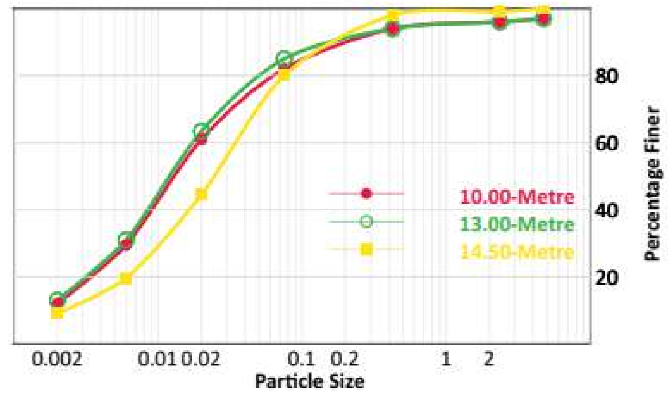

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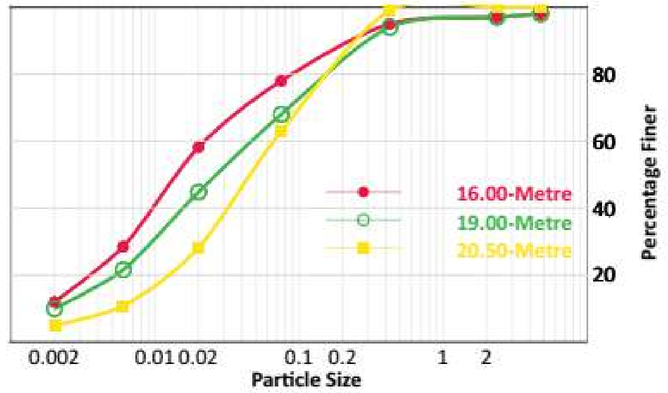

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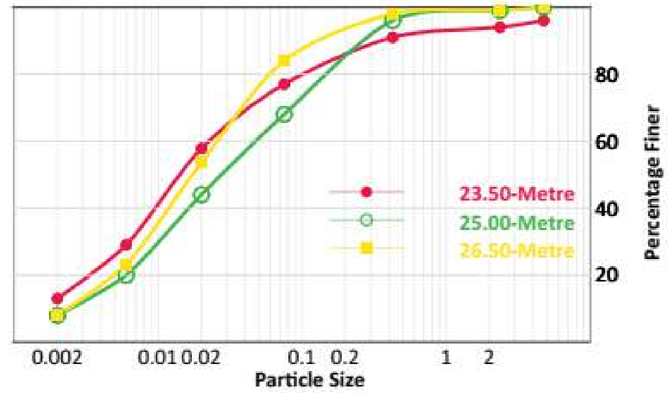

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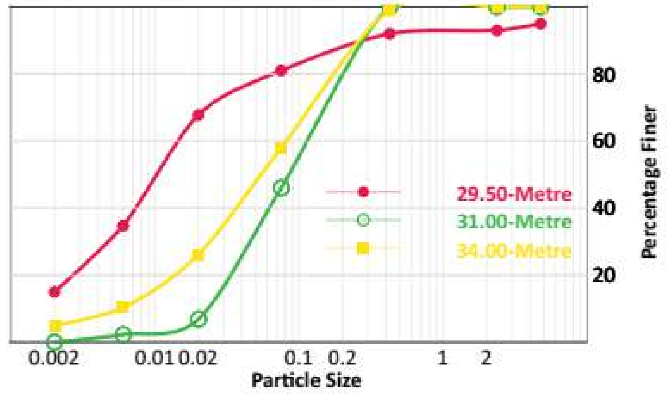

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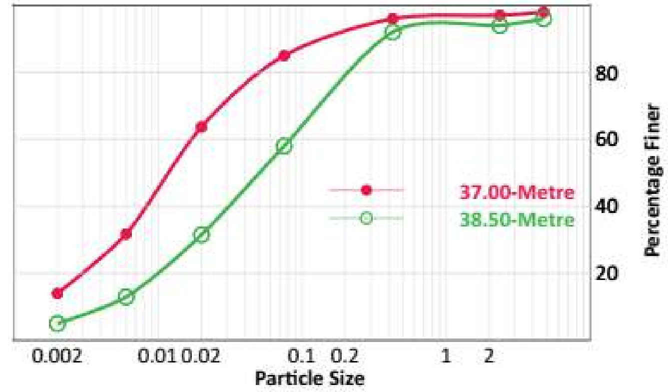
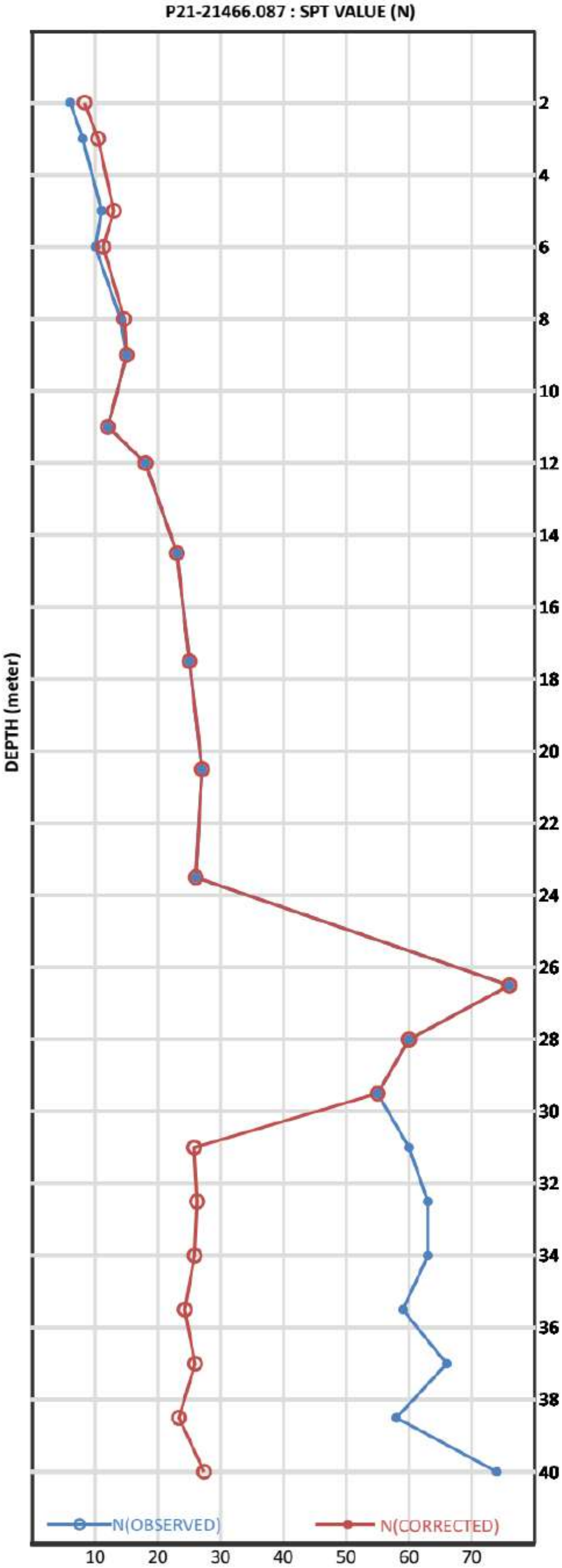
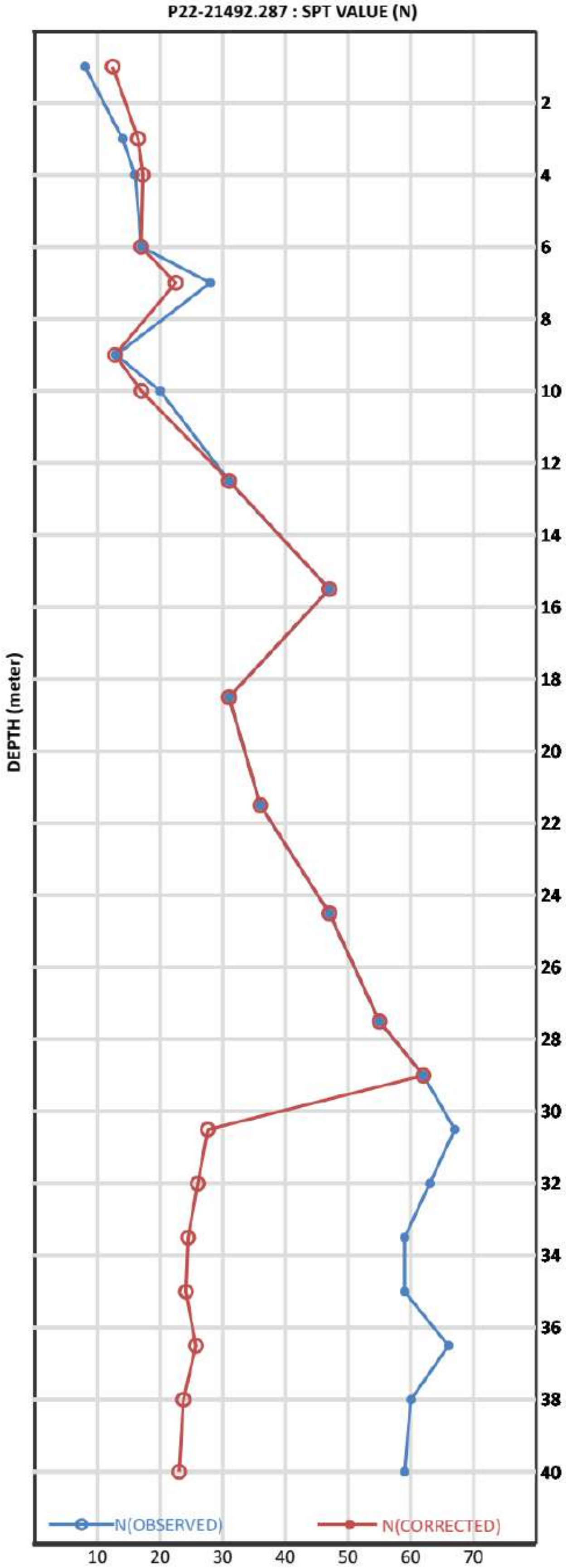


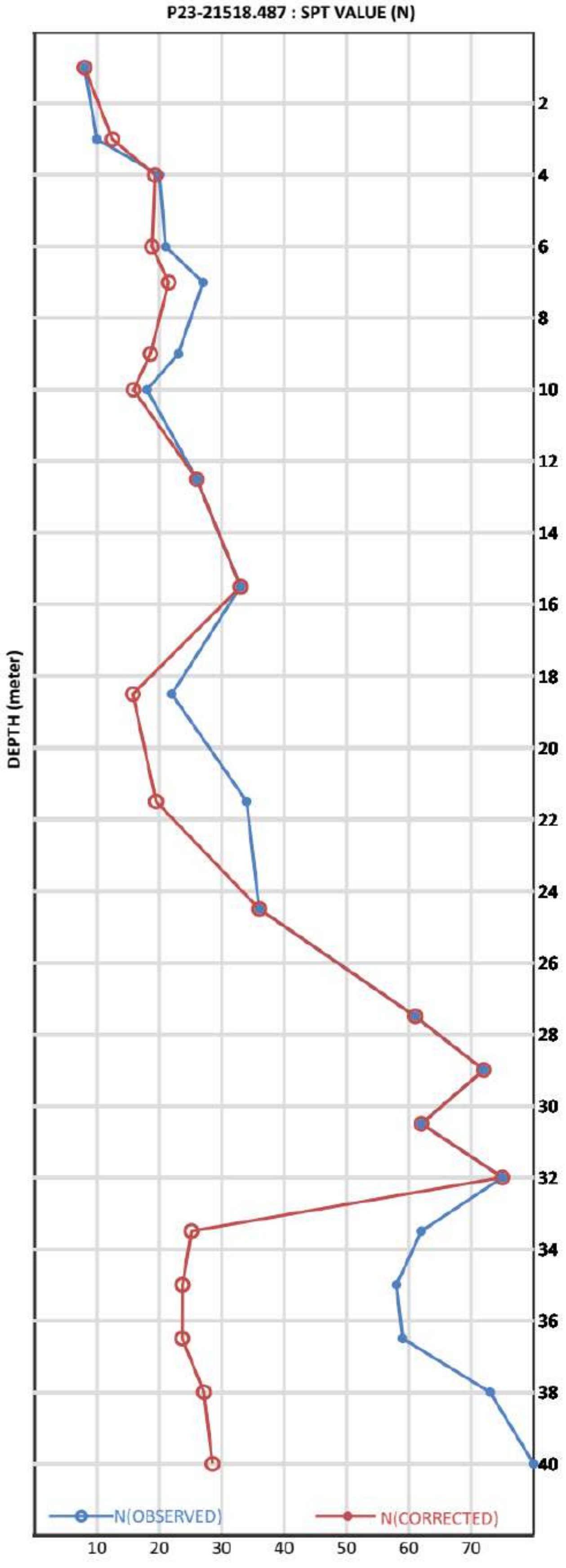
APPENDIX-E
PLOT 1: RECORDED SPT Vs CORRECTED SPT

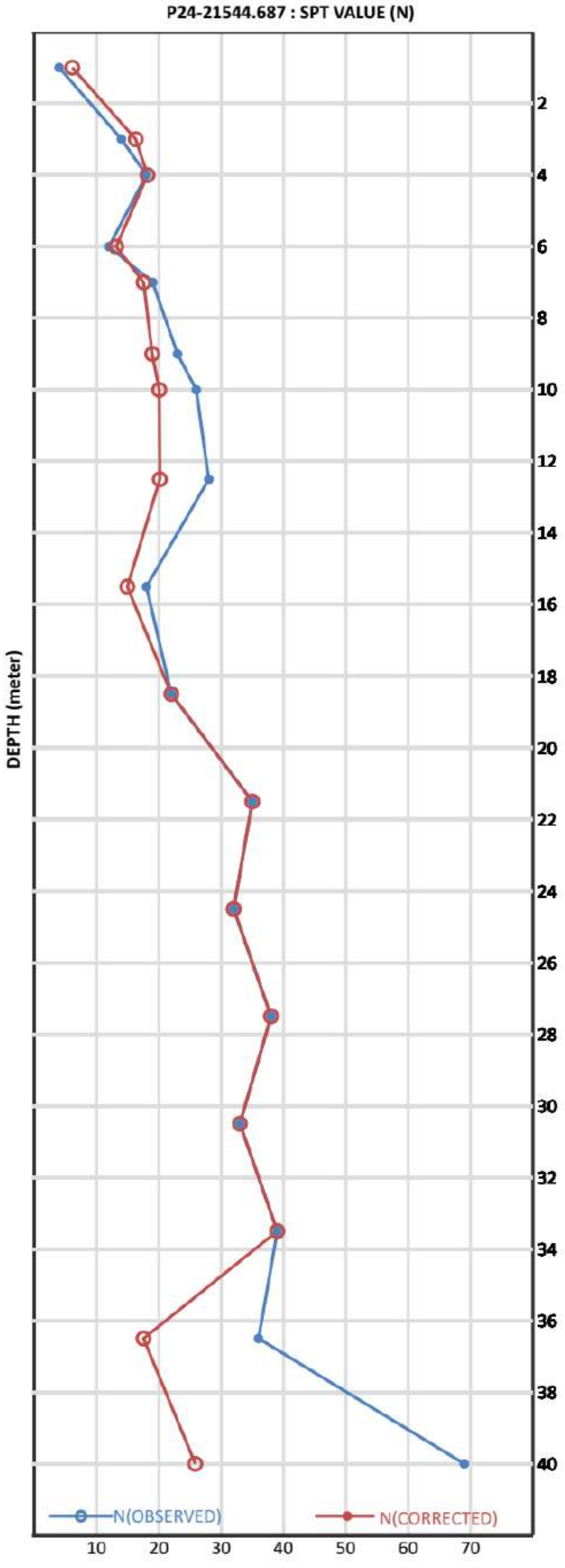




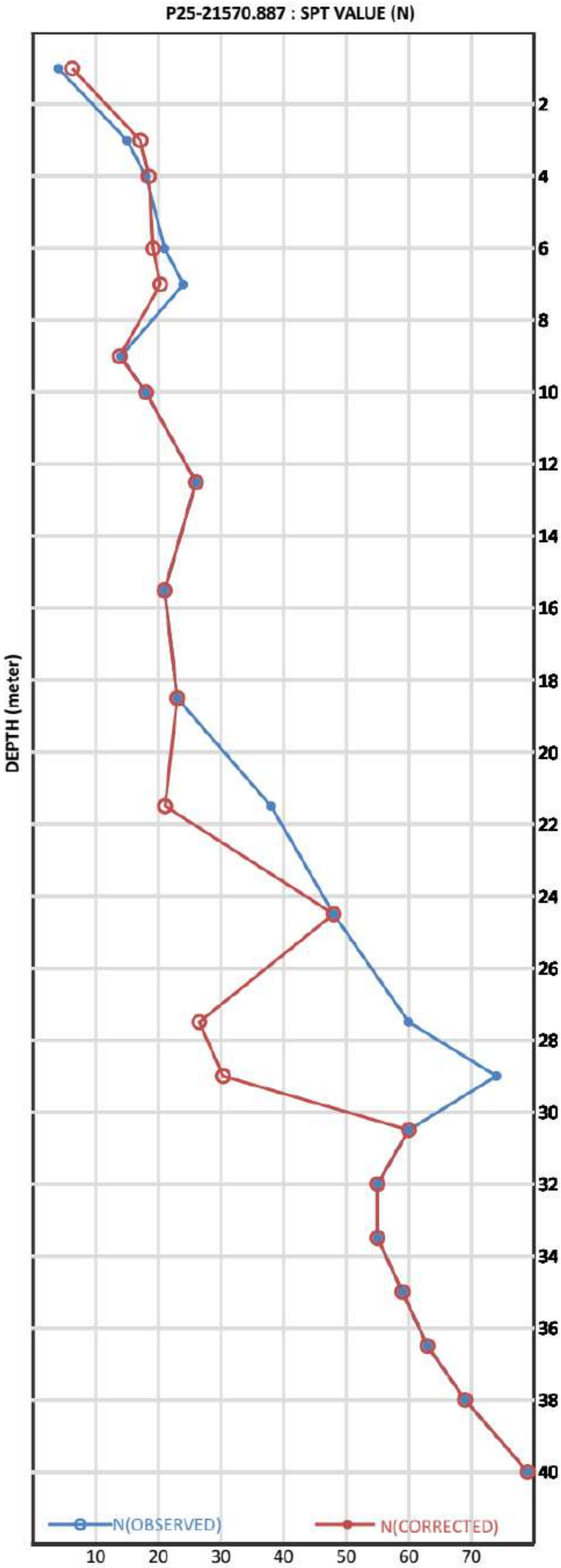
APPENDIX-E

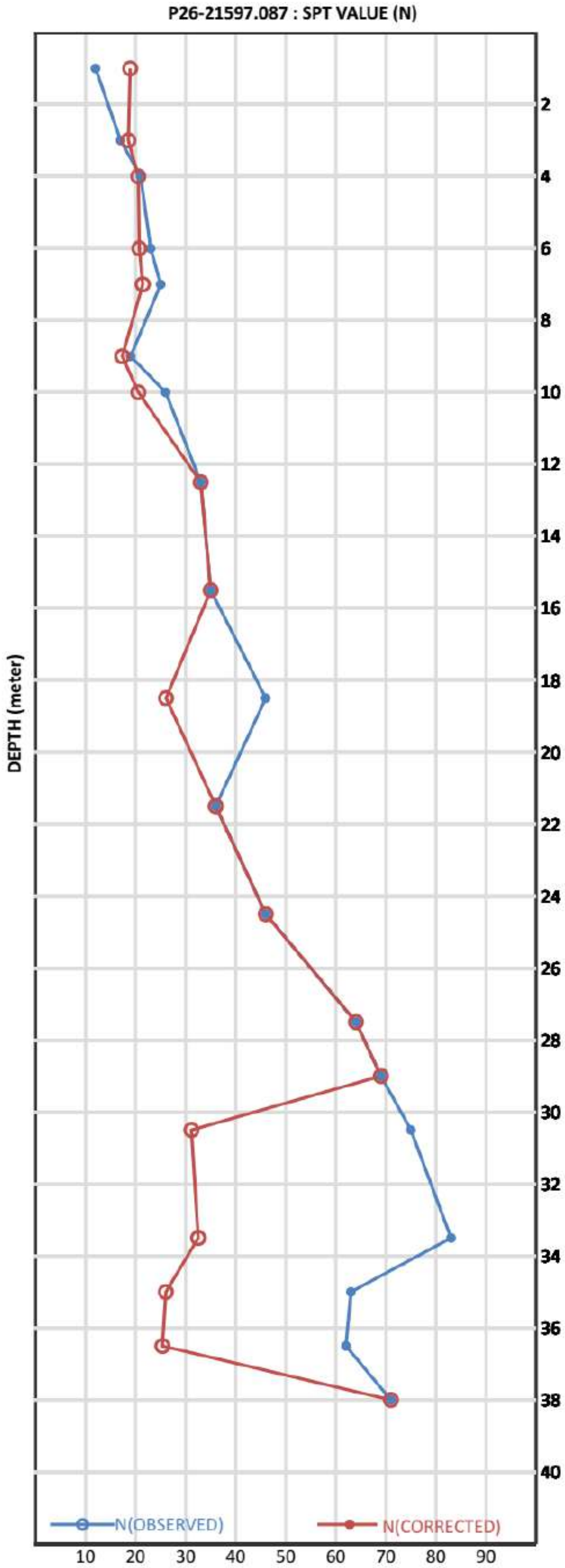
PLOT 2: RECORDED SPT Vs CORRECTED SPT





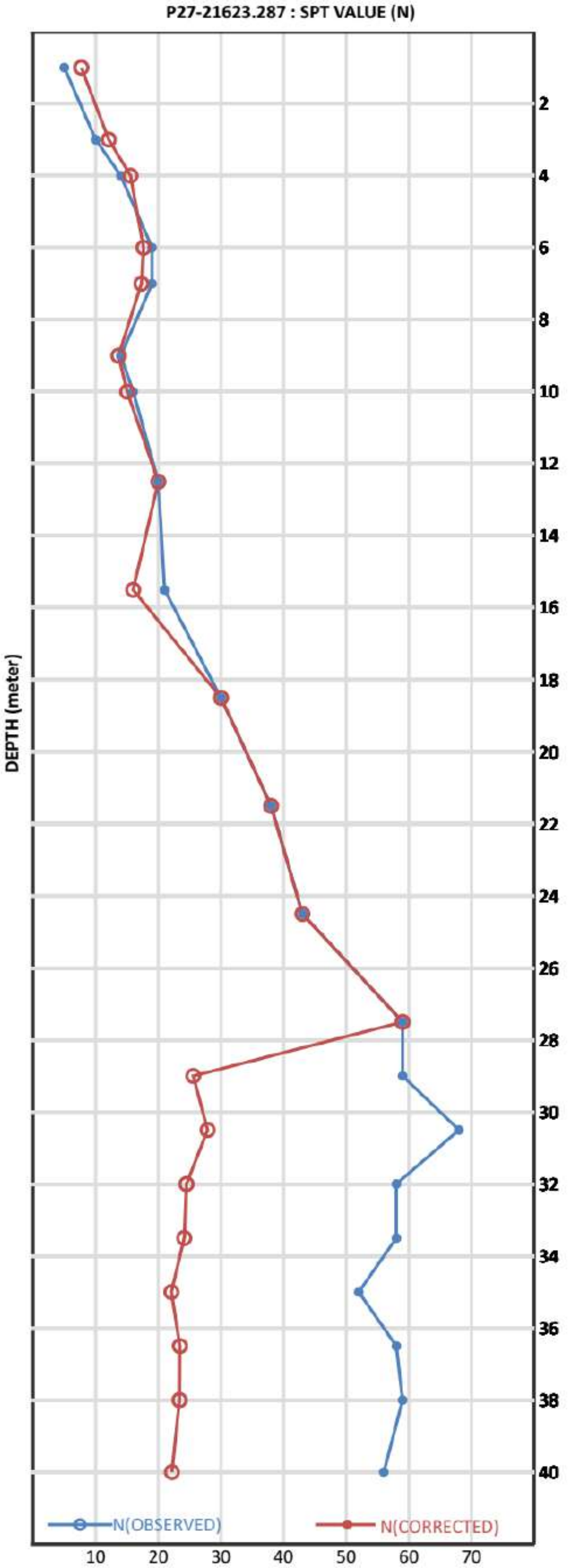
APPENDIX-E
PLOT 3: RECORDED SPT Vs CORRECTED SPT

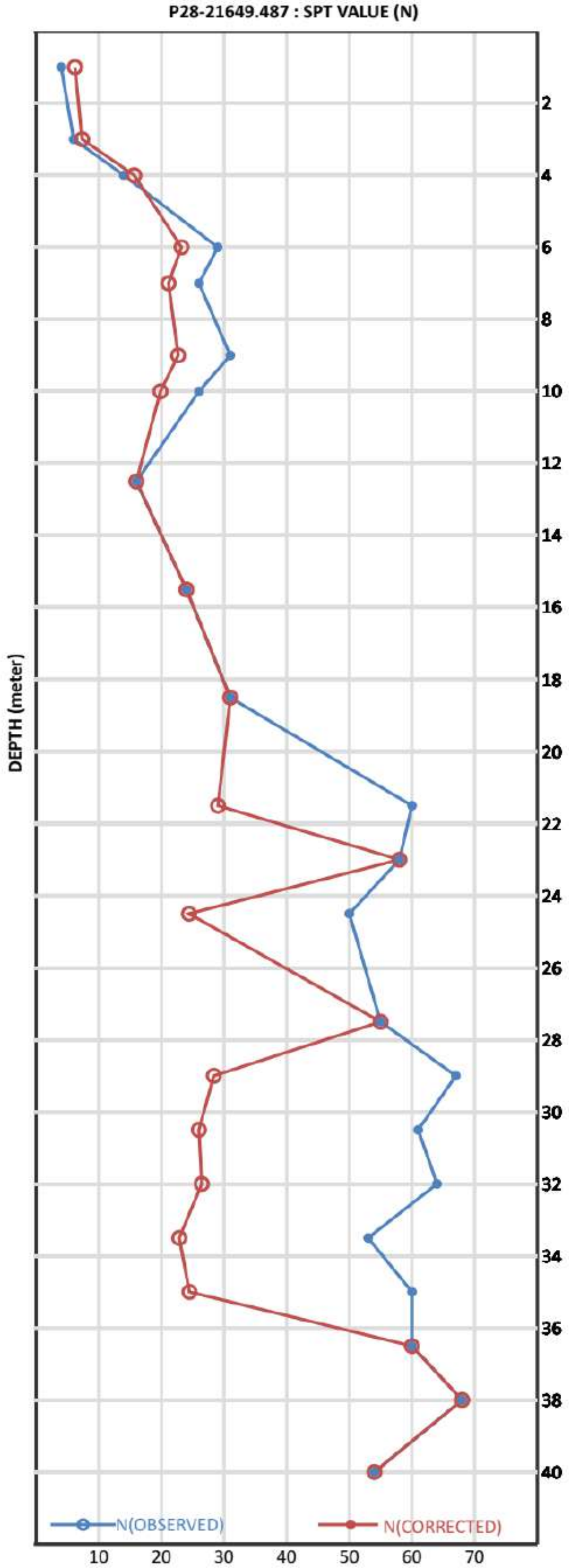




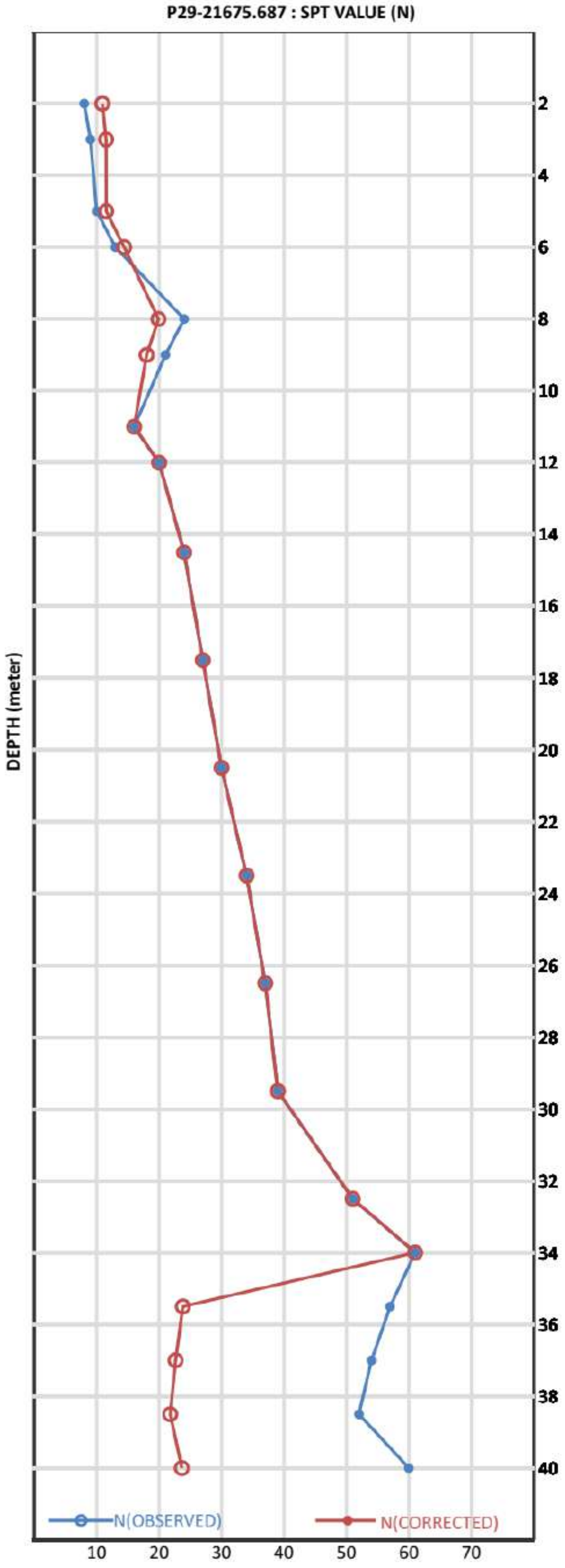
APPENDIX-E

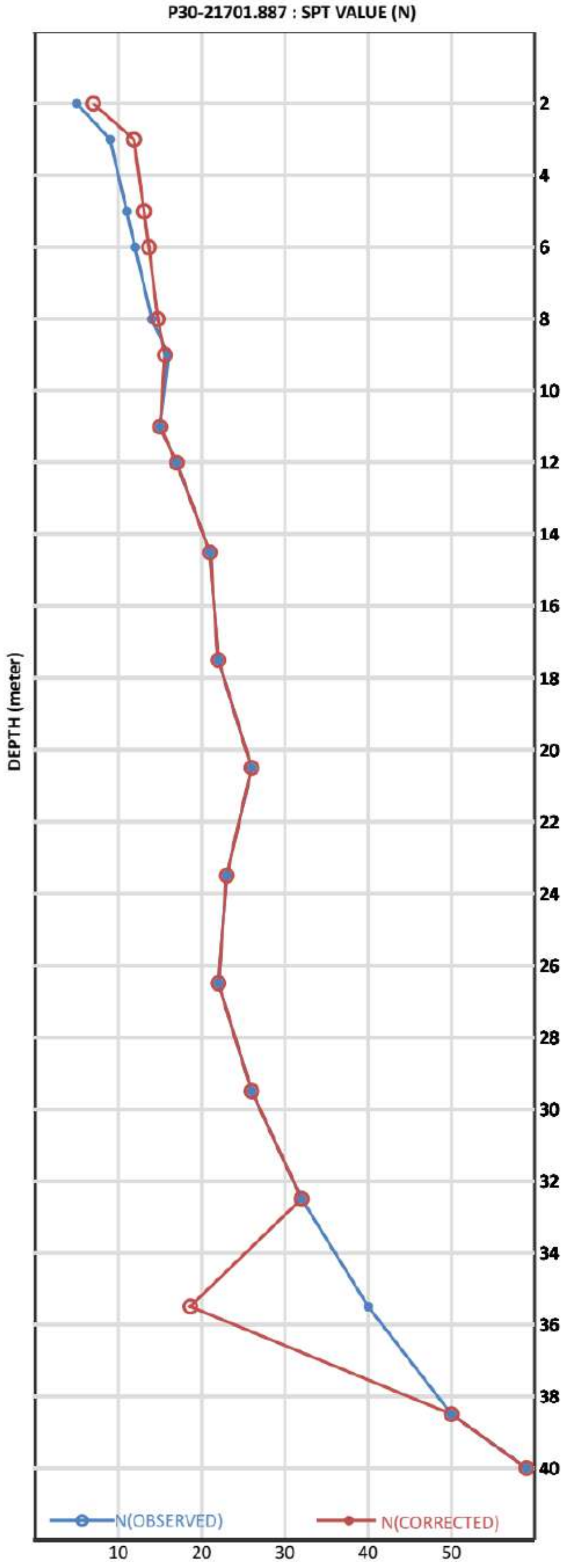
PLOT 4: RECORDED SPT Vs CORRECTED SPT



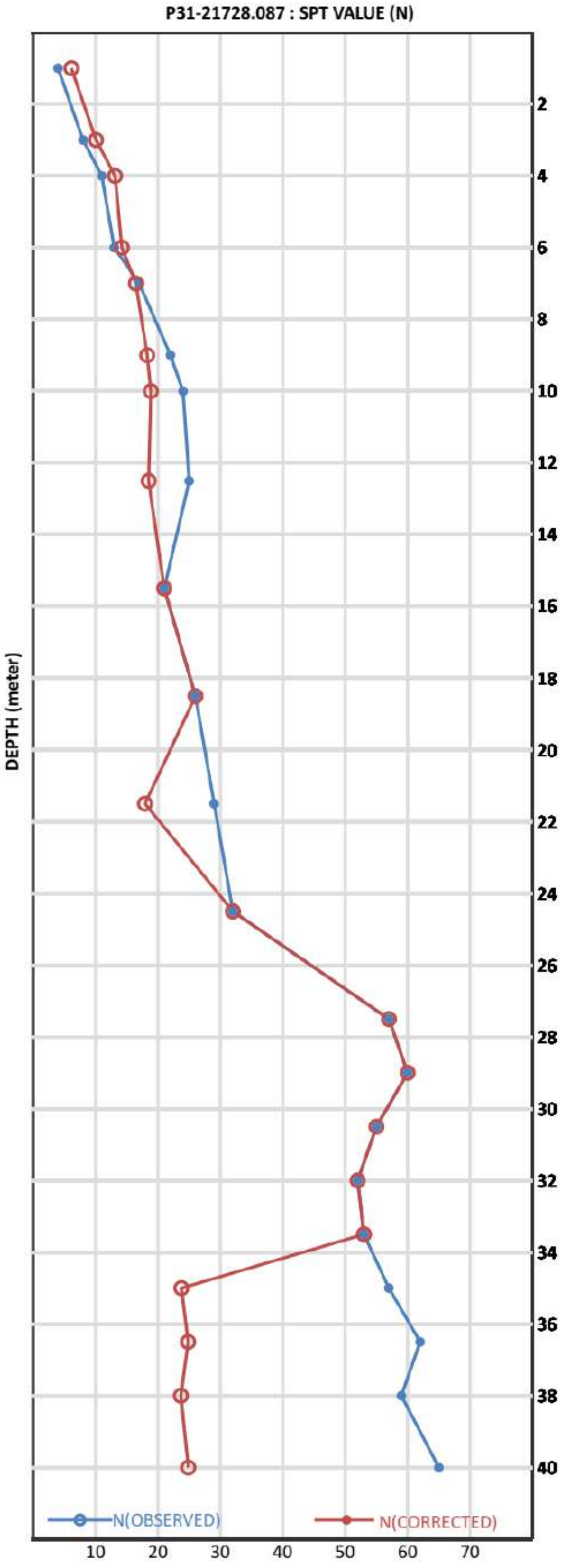


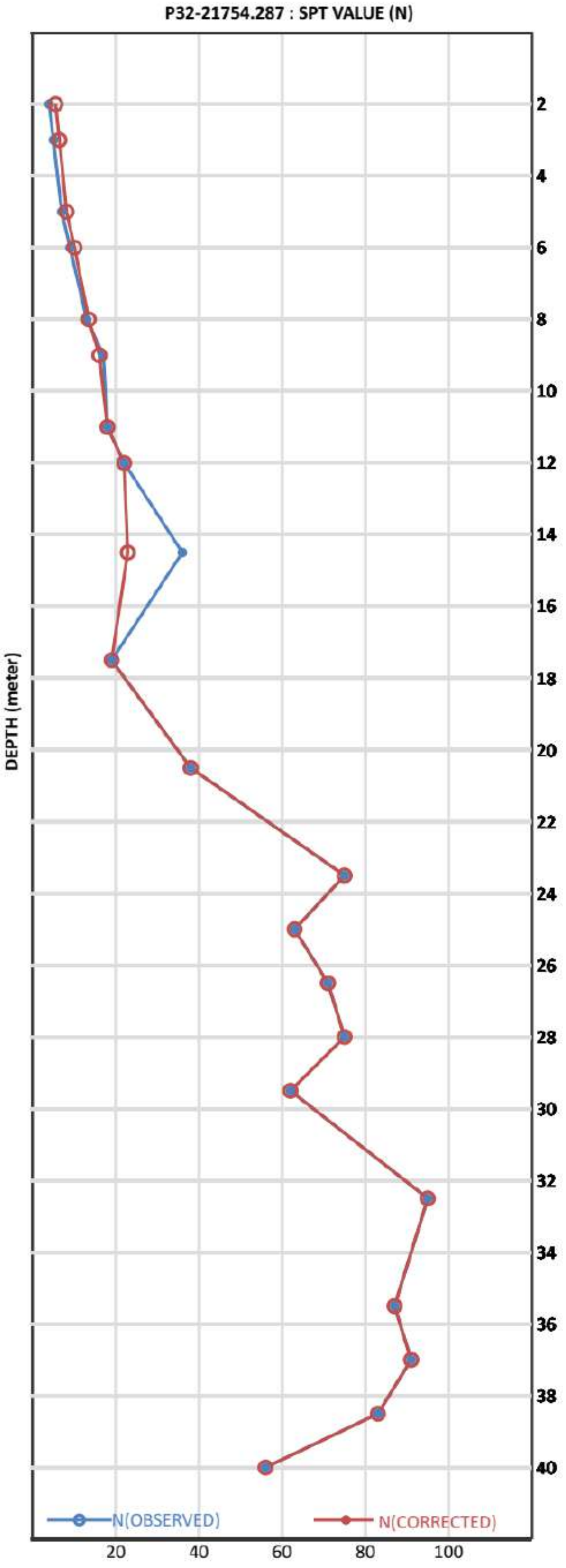
APPENDIX-E
PLOT 5: RECORDED SPT Vs CORRECTED SPT



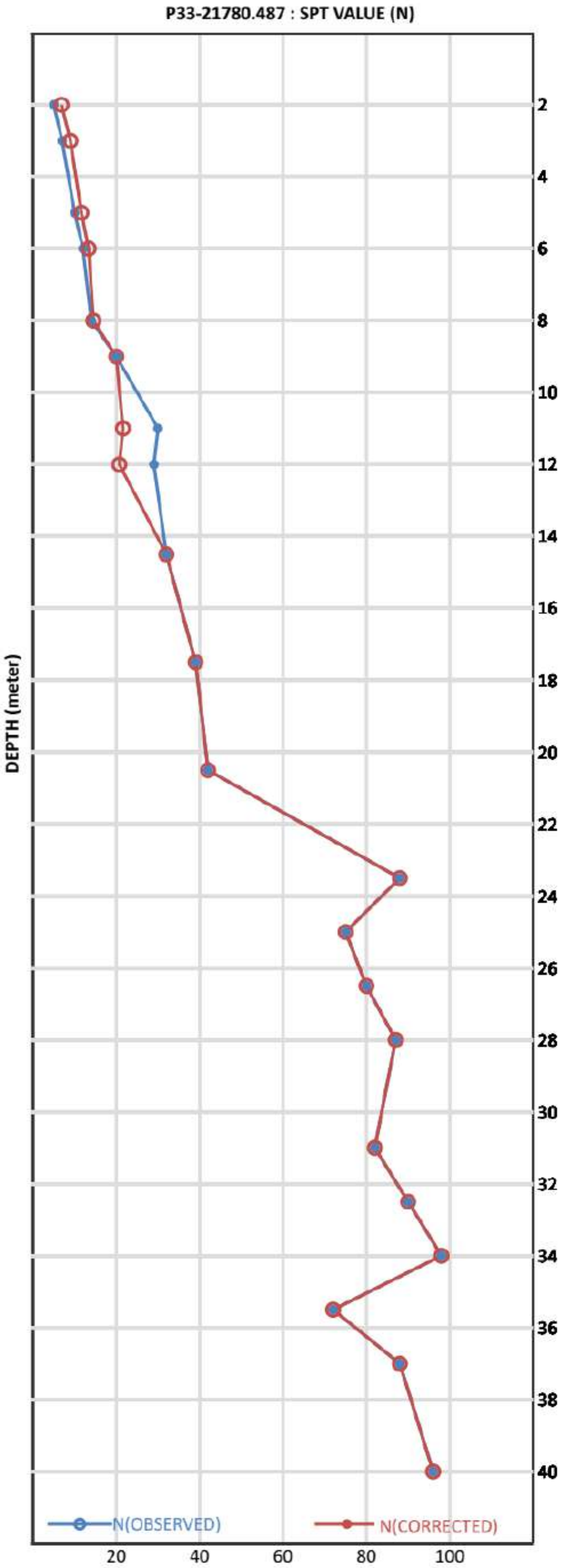


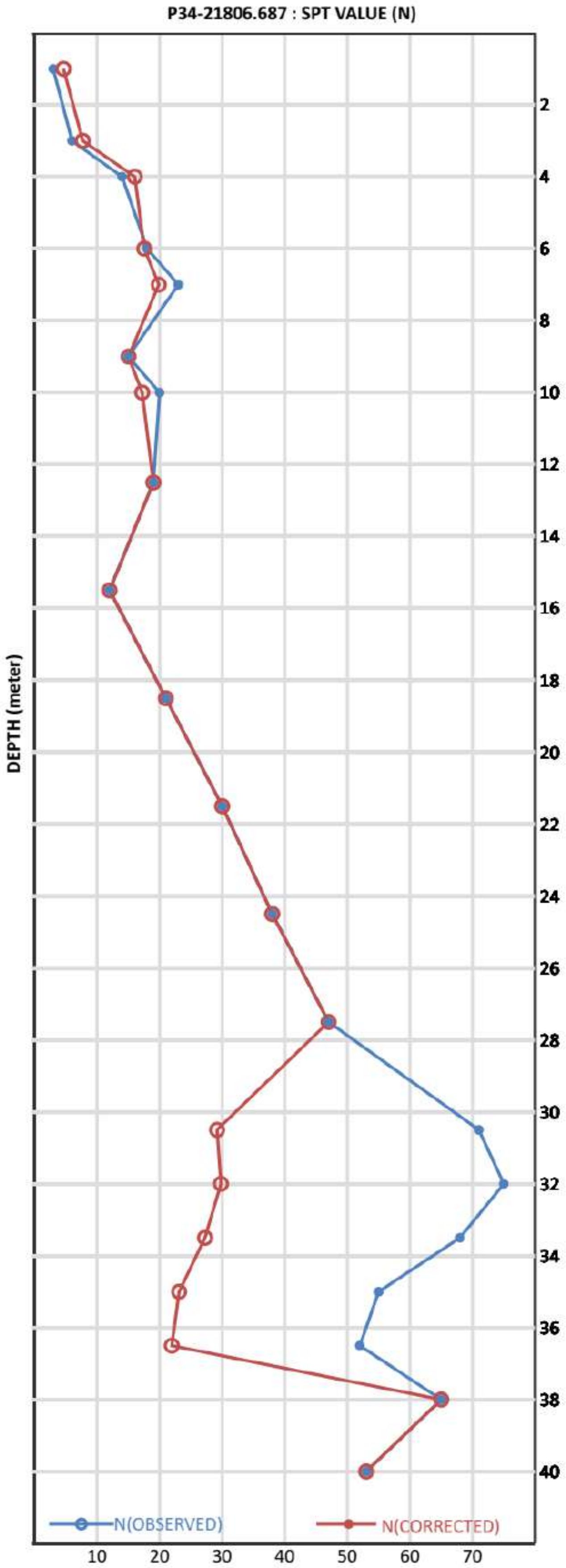
APPENDIX-E
PLOT 6: RECORDED SPT Vs CORRECTED SPT



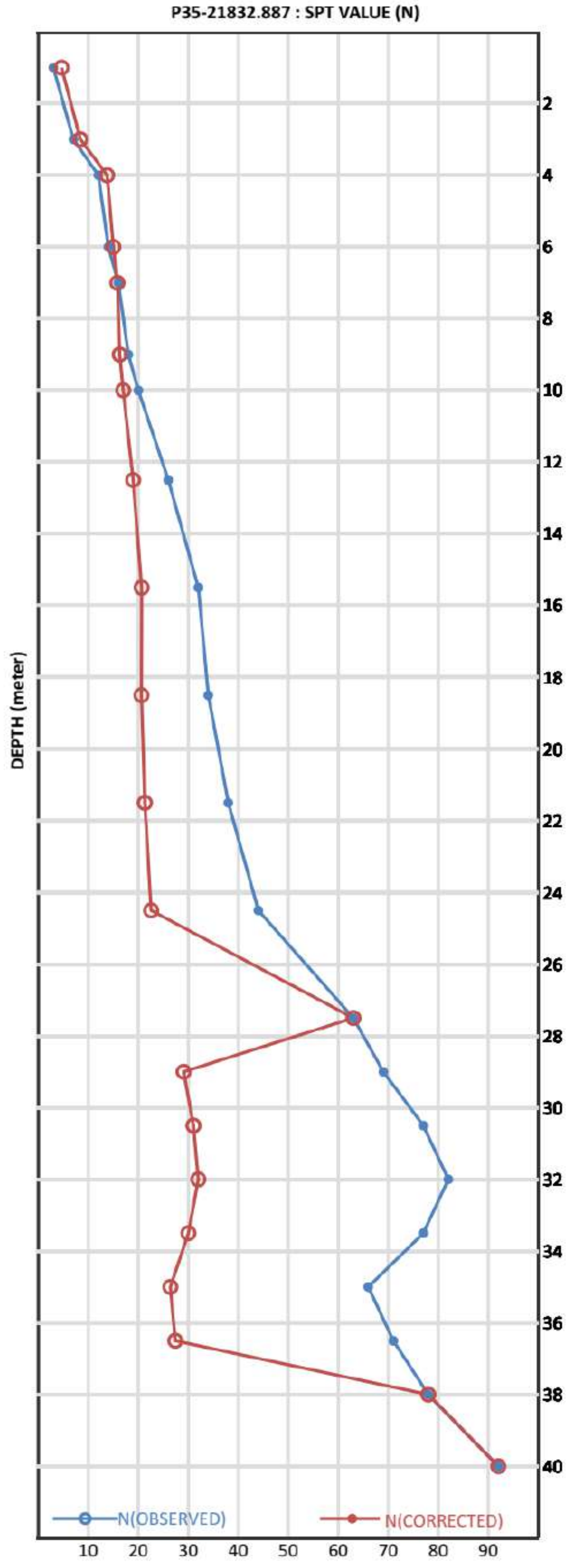


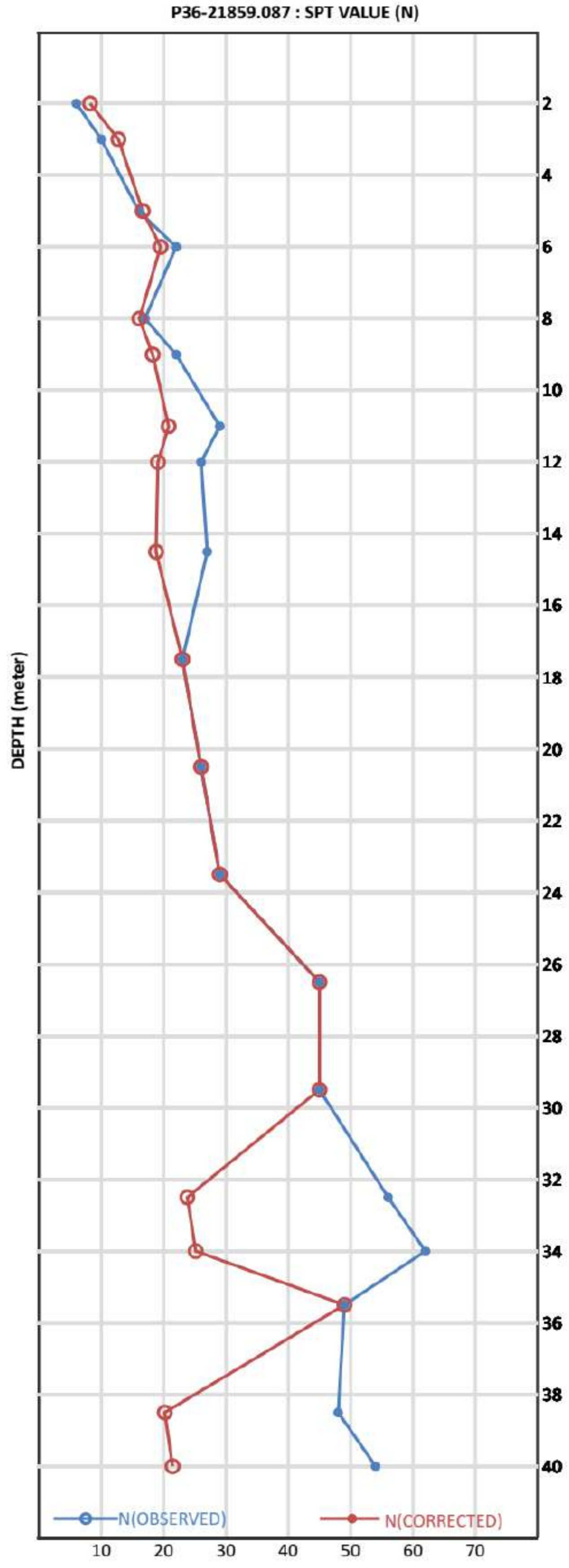
APPENDIX-E
PLOT 7: RECORDED SPT Vs CORRECTED SPT



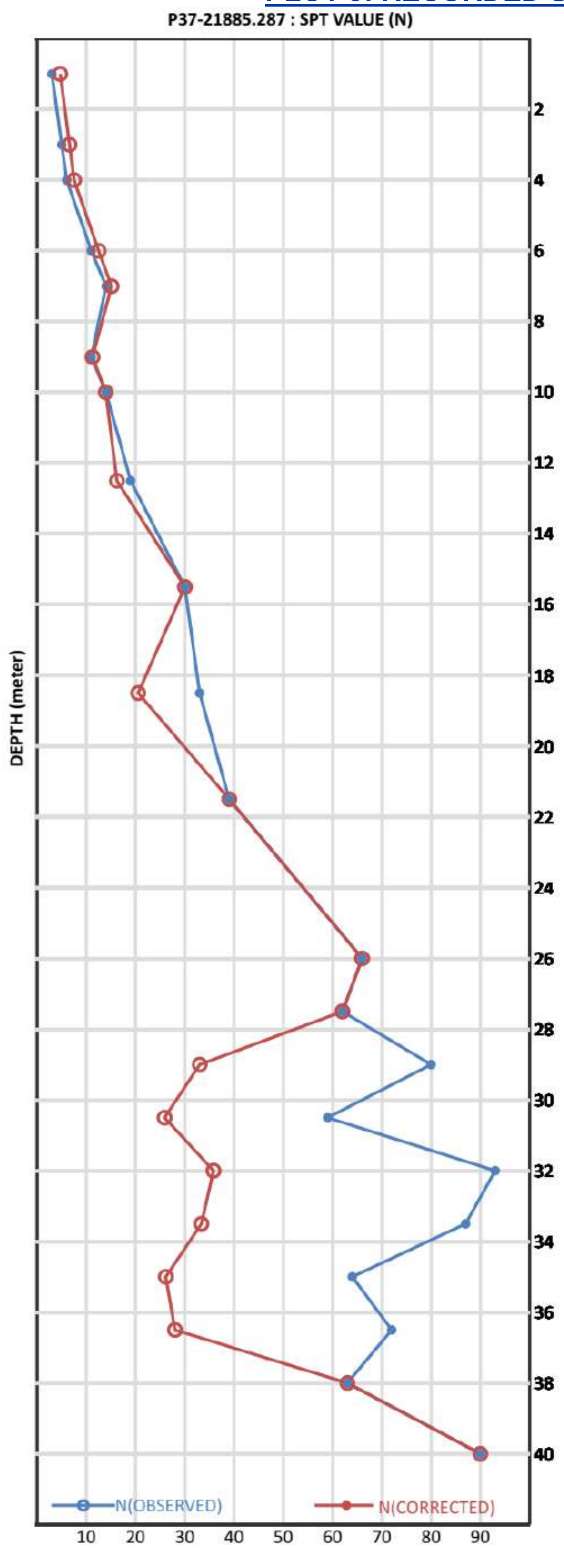


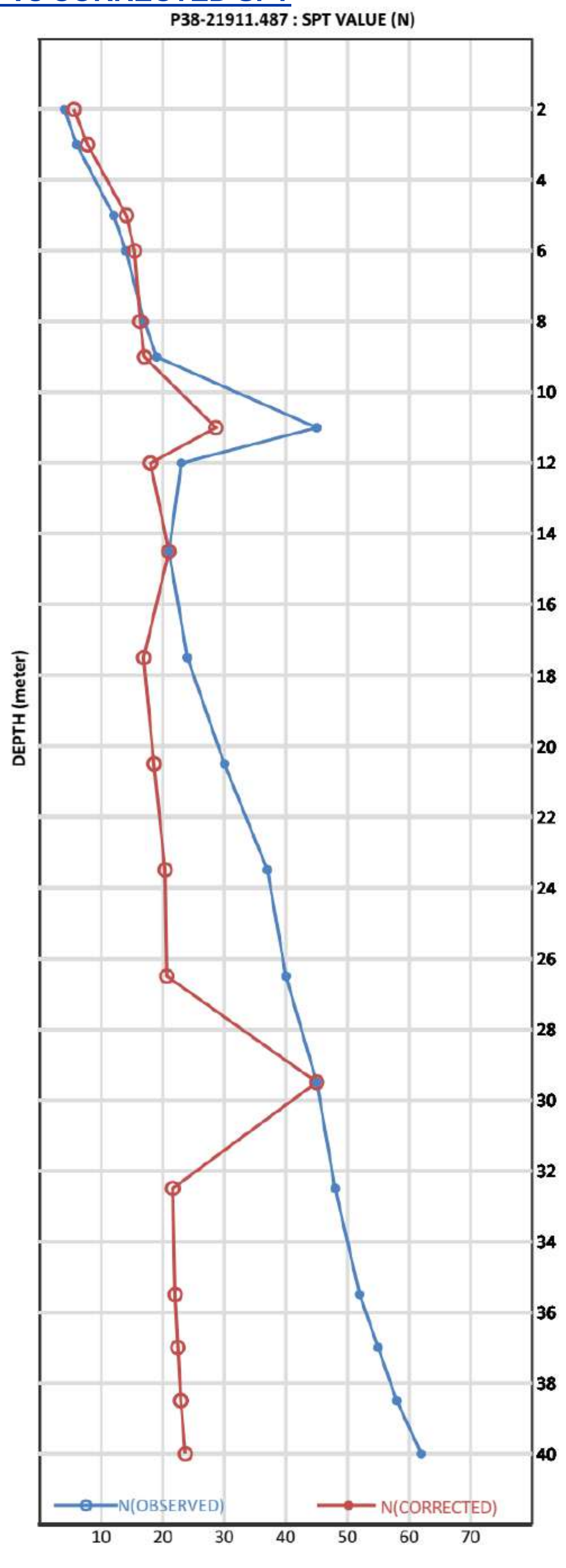
APPENDIX-E
PLOT 8: RECORDED SPT Vs CORRECTED SPT



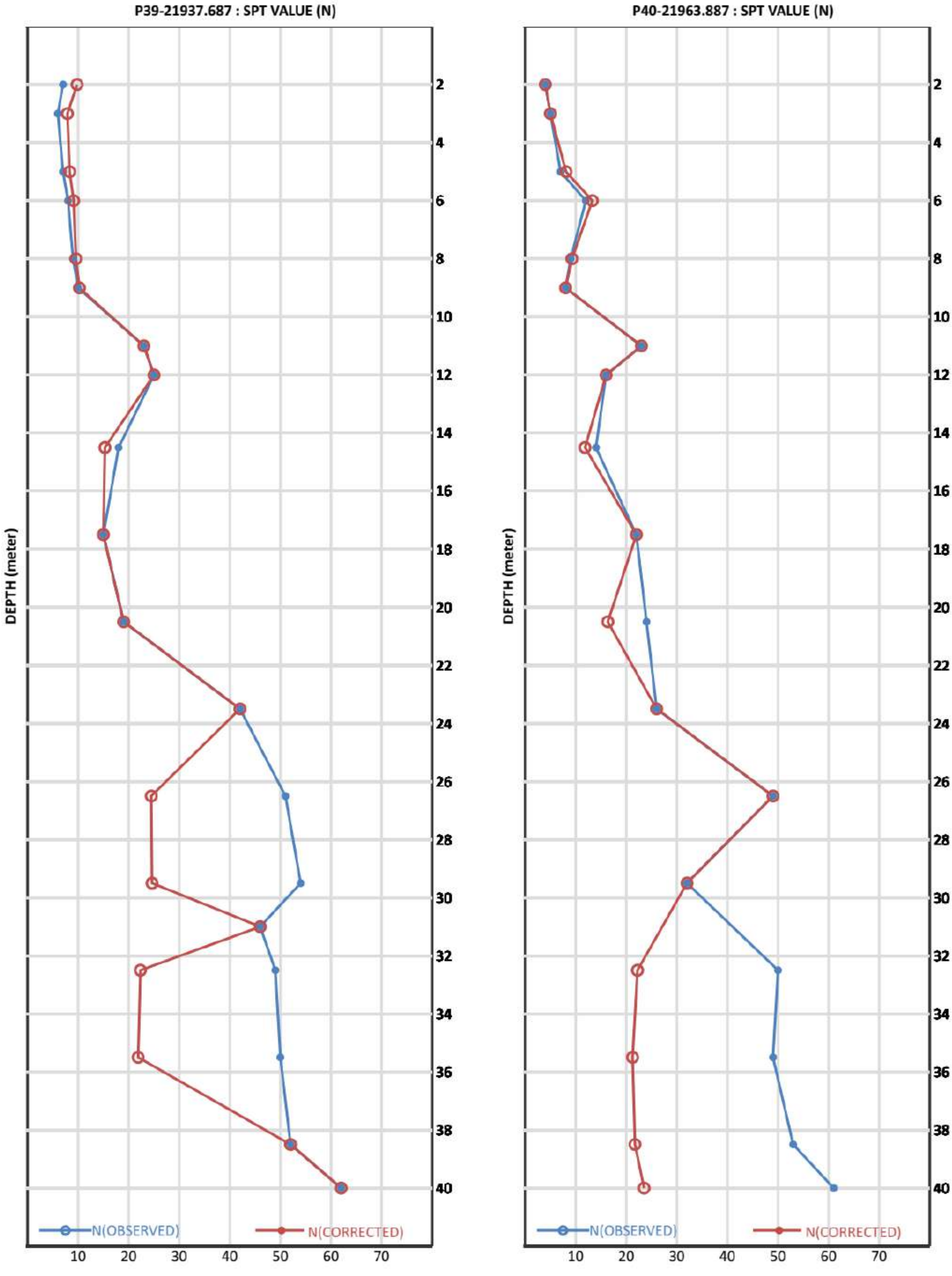


APPENDIX-E
PLOT 9: RECORDED SPT Vs CORRECTED SPT

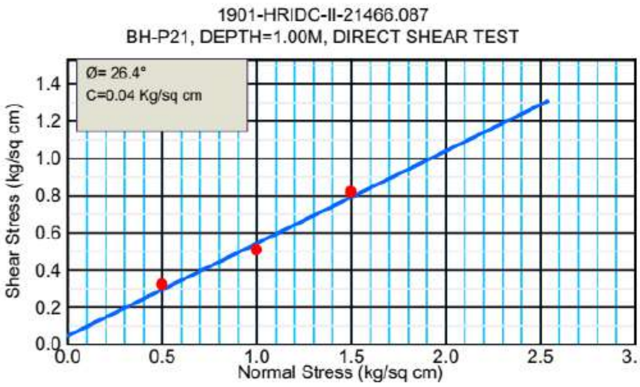


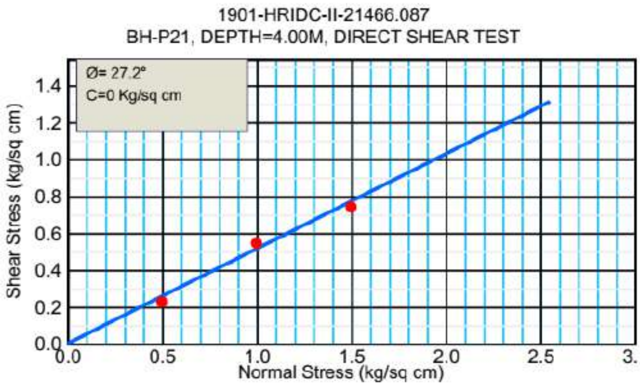


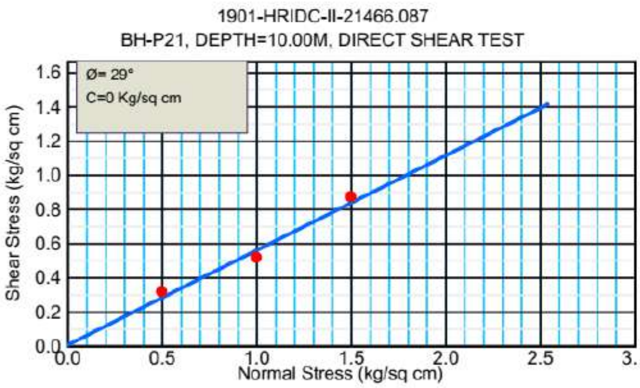
APPENDIX-E
PLOT 10: RECORDED SPT Vs CORRECTED SPT

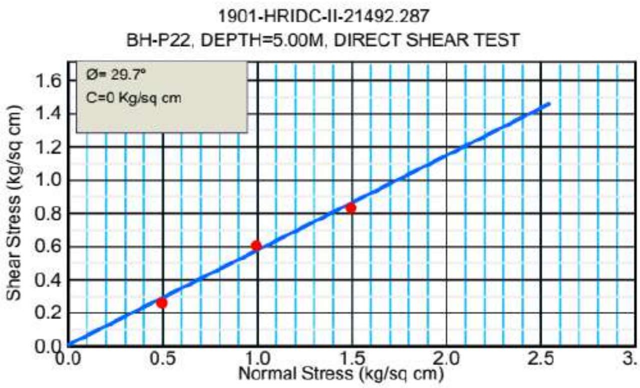


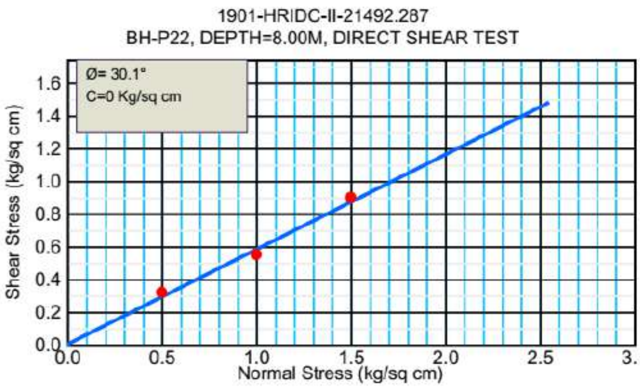
APPENDIX-F
GRAPH 1: DST GRAPH

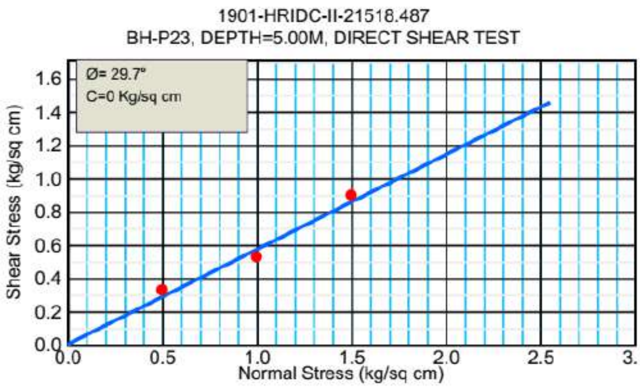


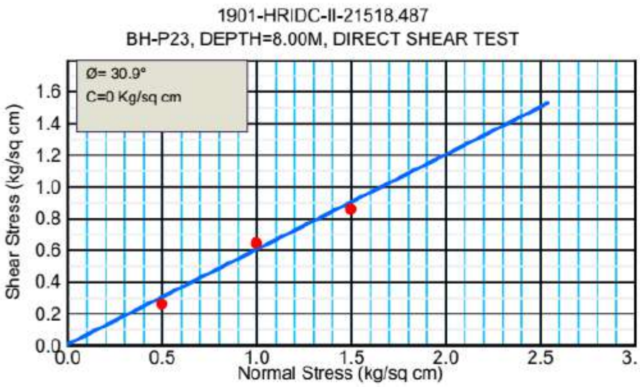


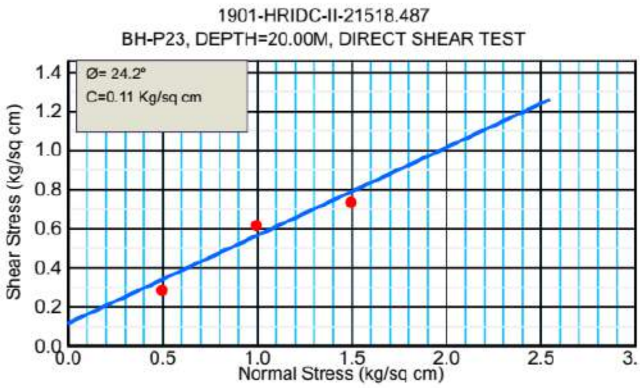




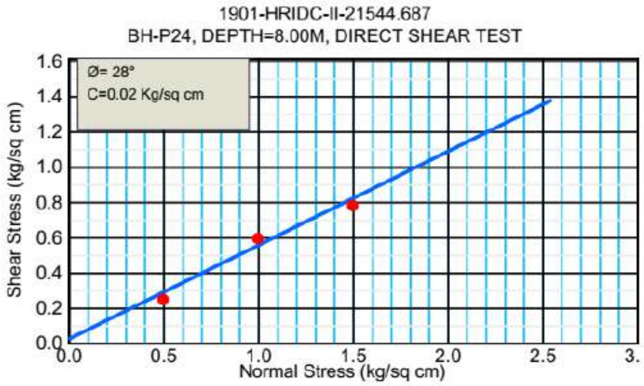


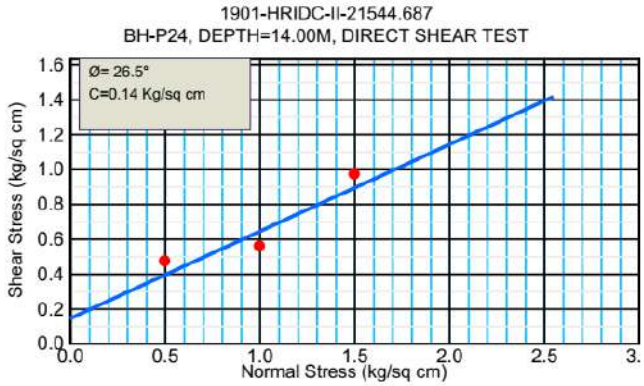


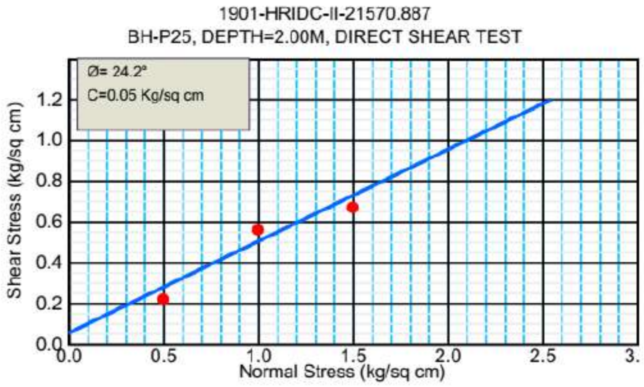


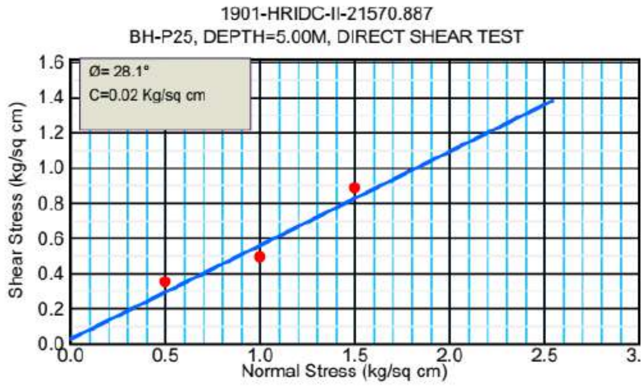


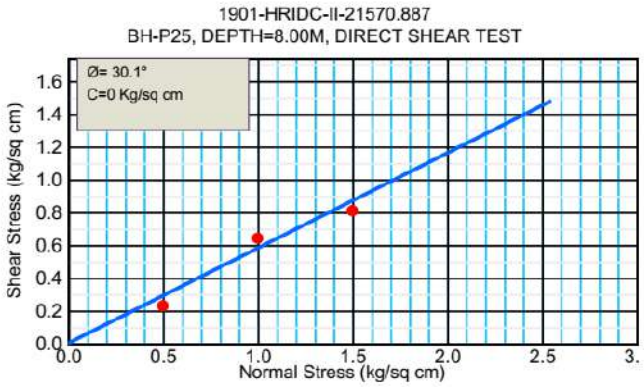
APPENDIX-F
GRAPH 2: DST GRAPH

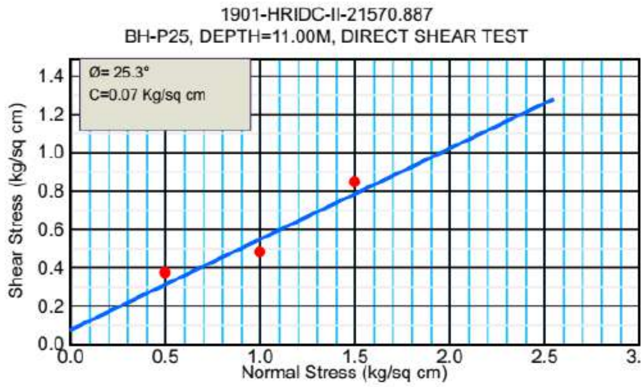


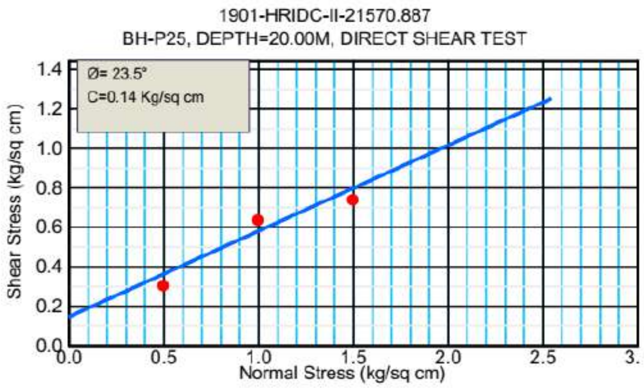


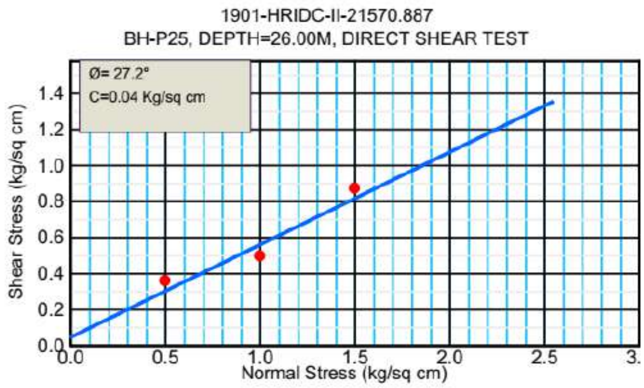




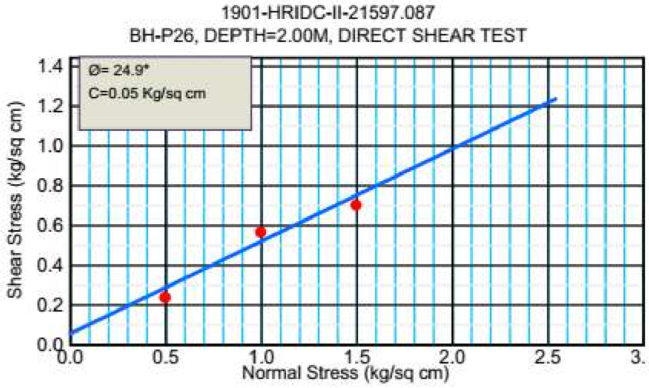


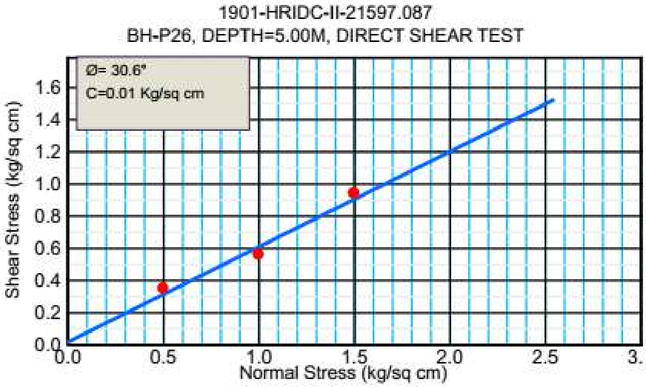


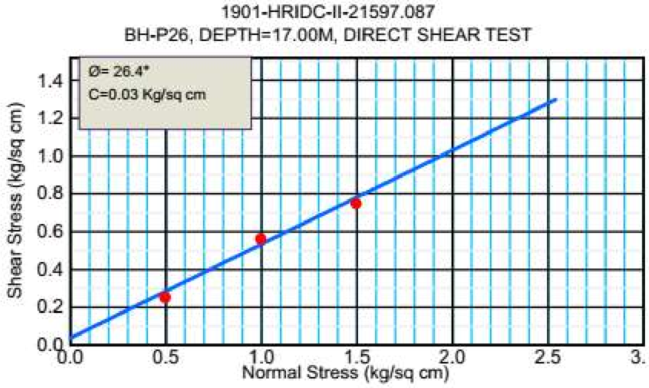


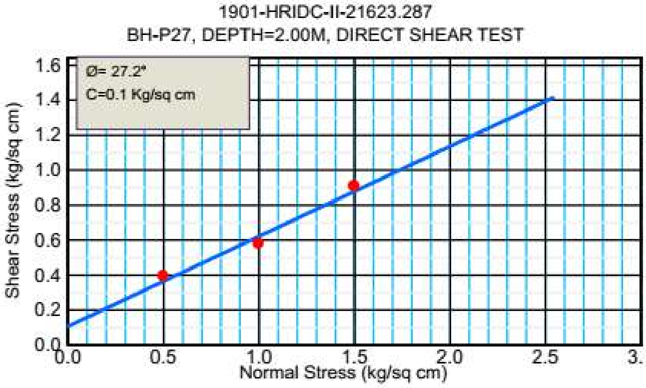


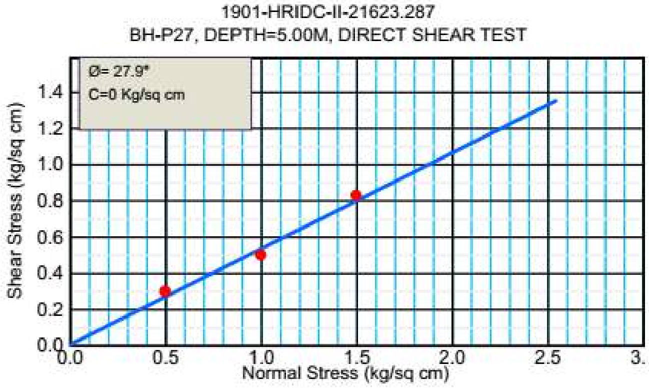
APPENDIX-F
GRAPH 3: DST GRAPH

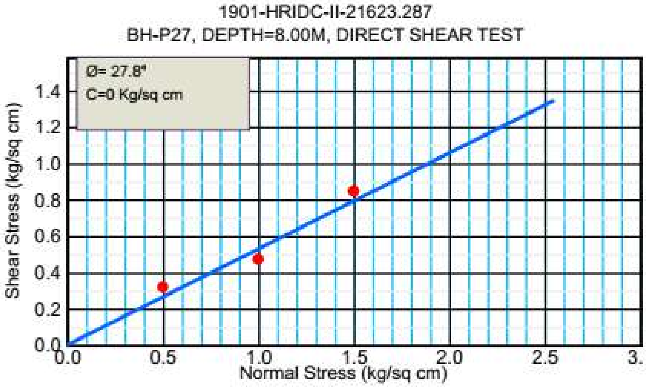


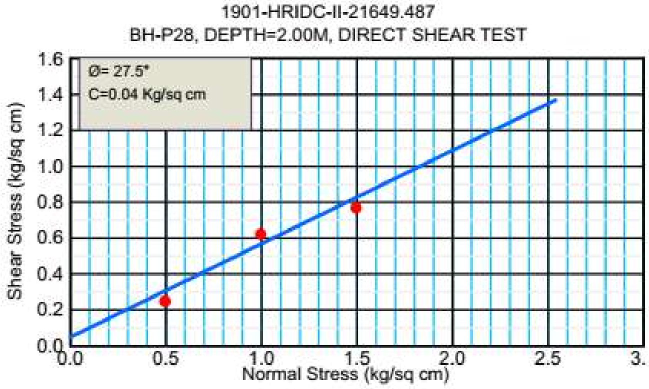


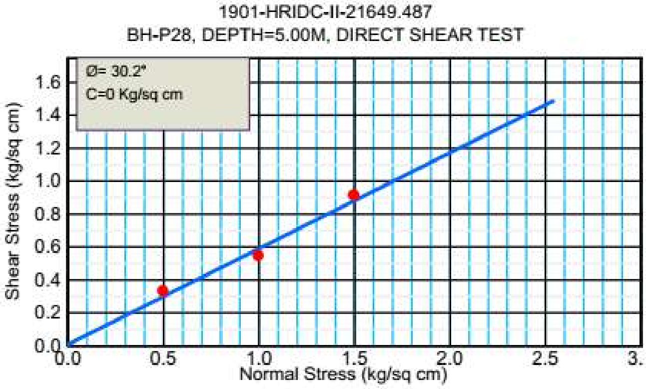




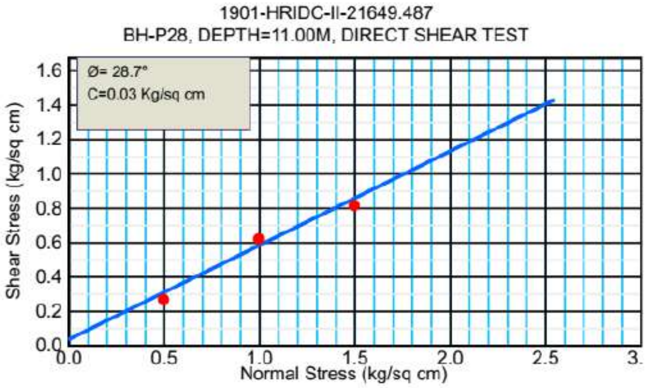


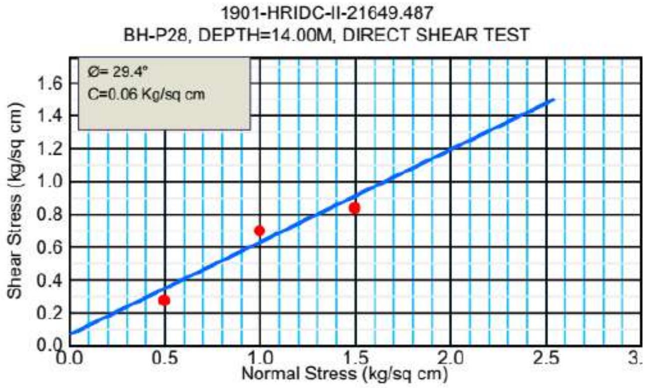


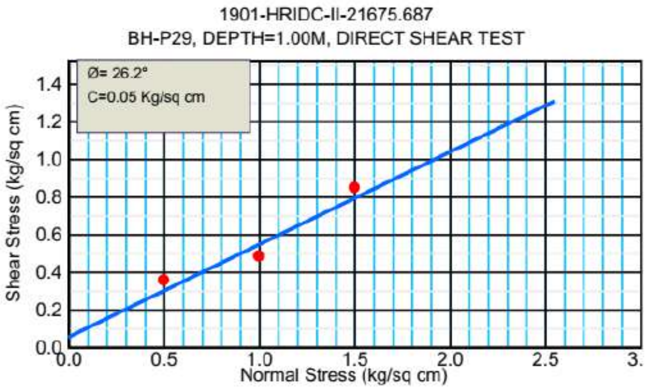


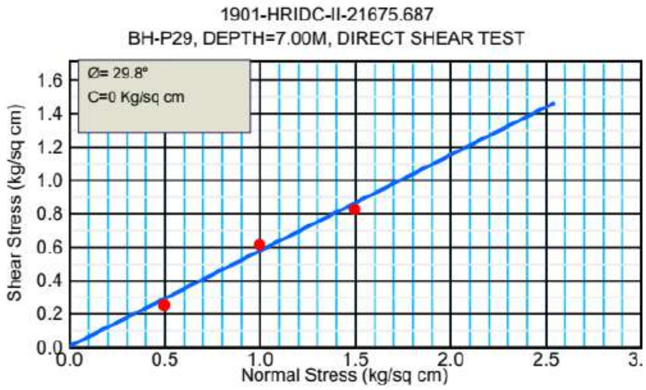


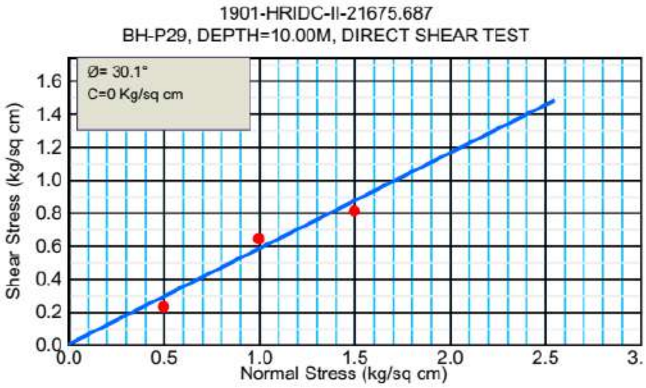
APPENDIX-F
GRAPH 4: DST GRAPH

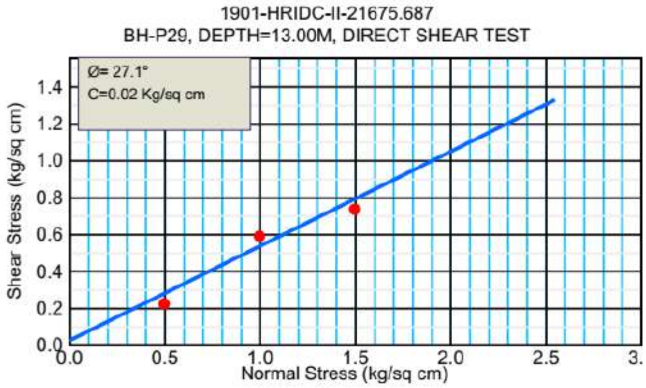


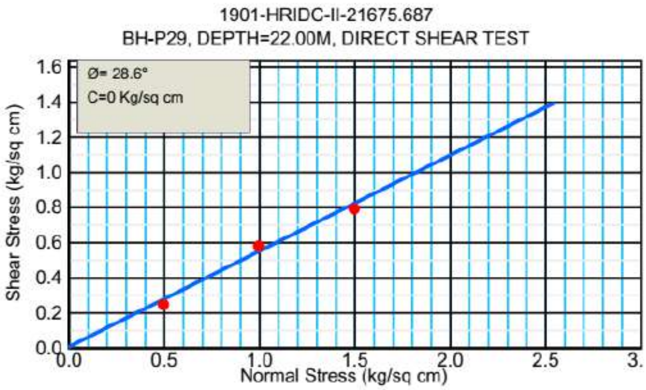


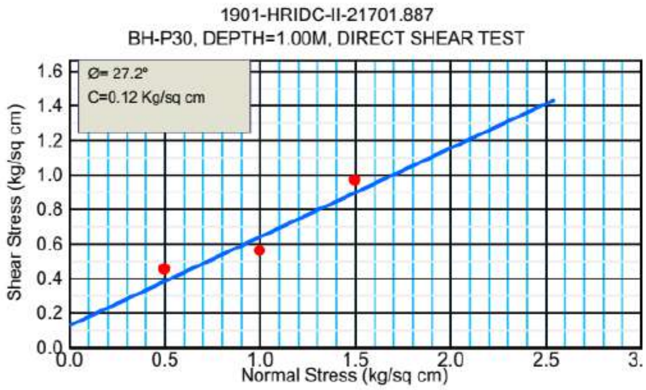






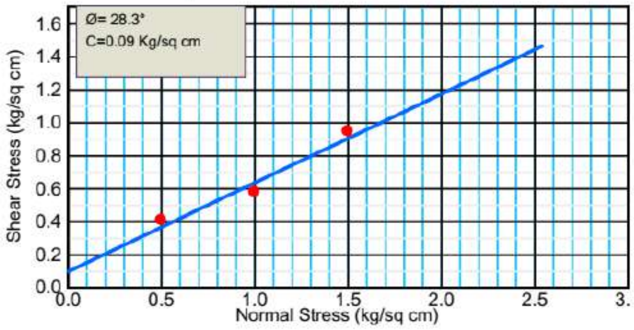






APPENDIX-F
GRAPH 5: DST GRAPH

1901-HRIDC-II-21701.887
BH-P30, DEPTH=4.00M, DIRECT SHEAR TEST



1901-HRIDC-II-21701.887
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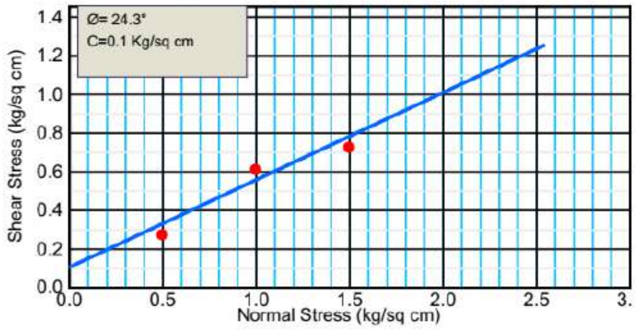
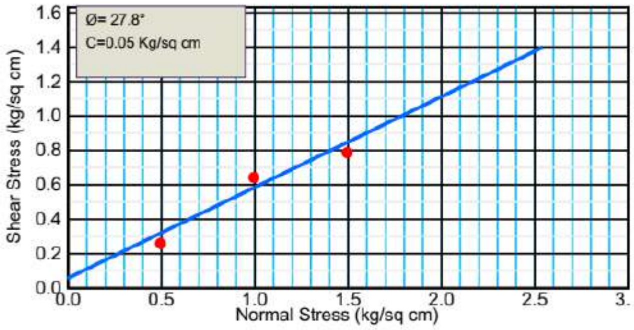
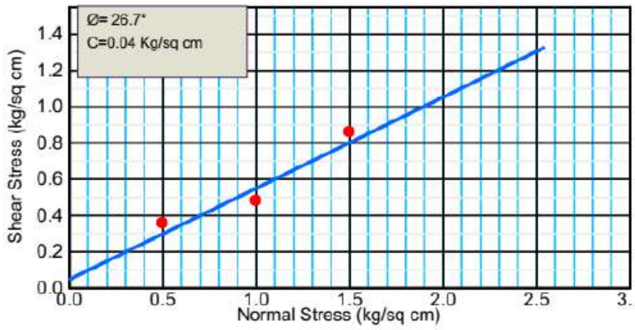


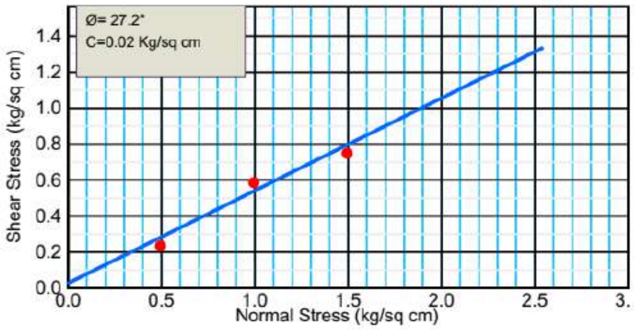
1901-HRIDC-II-21701.887
BH-P30, DEPTH=31.00M, DIRECT SHEAR TEST



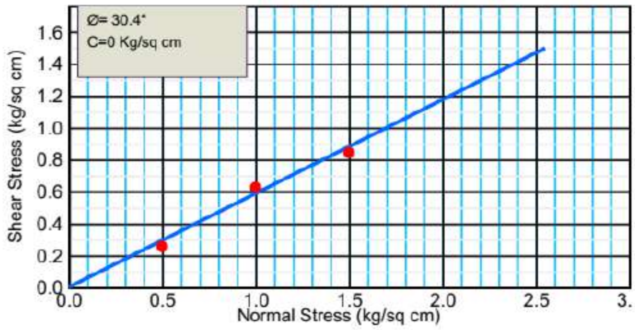
1901-HRIDC-II-21728.087
BH-P31, DEPTH=2.00M, DIRECT SHEAR TEST



1901-HRIDC-II-21728.087
BH-P31, DEPTH=5.00M, DIRECT SHEAR TEST



1901-HRIDC-II-21728.087
BH-P31, DEPTH=8.00M, DIRECT SHEAR TEST



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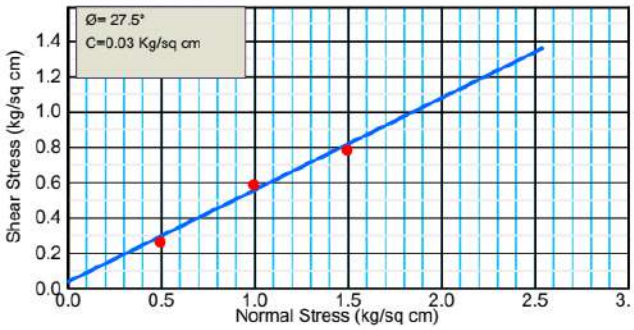

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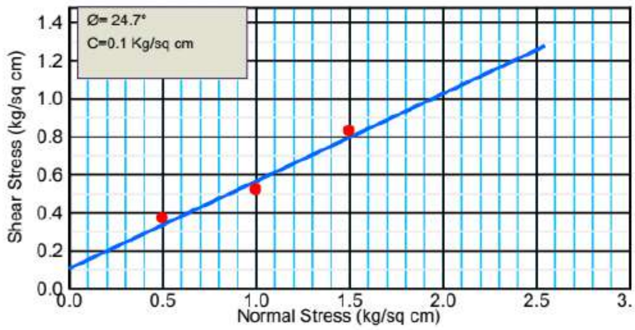
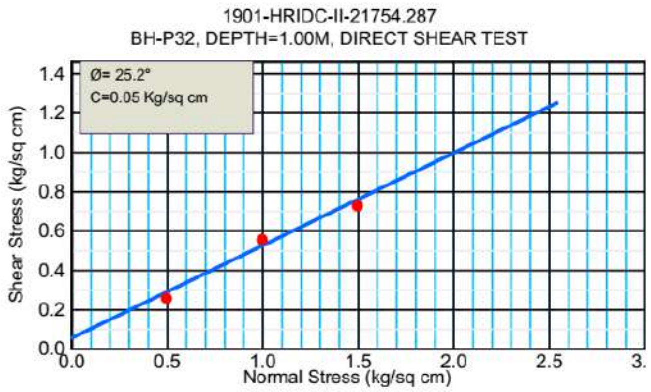
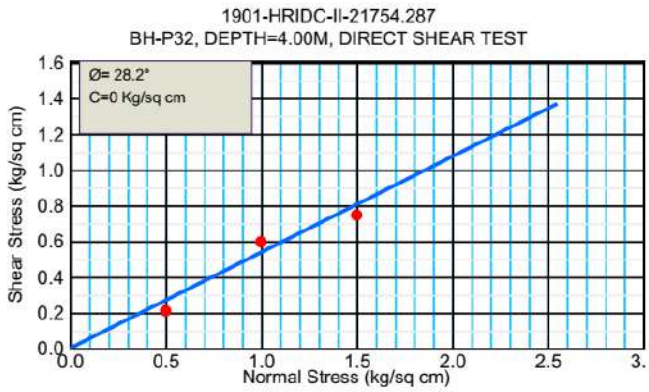
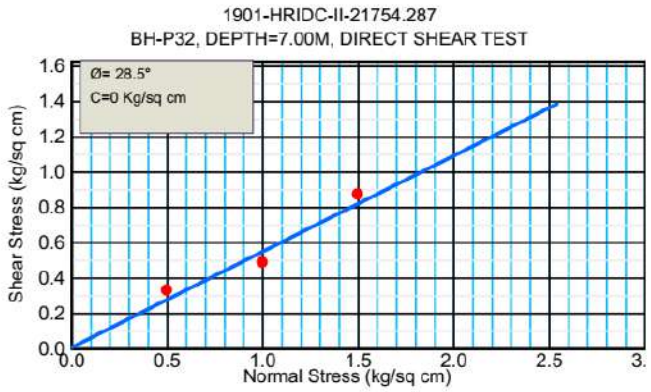
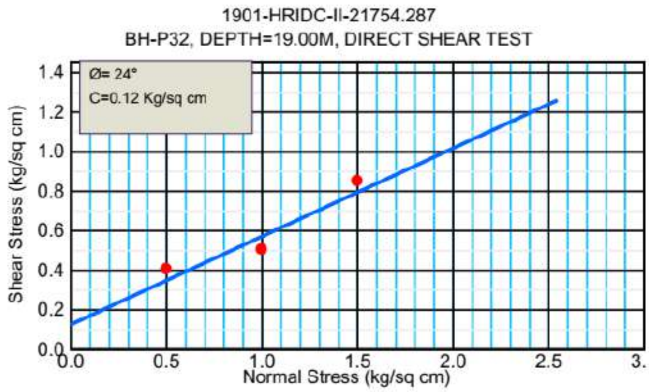


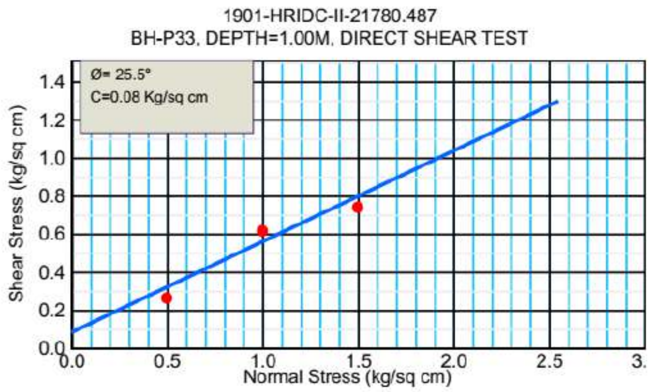
APPENDIX-F
GRAPH 6: DST GRAPH

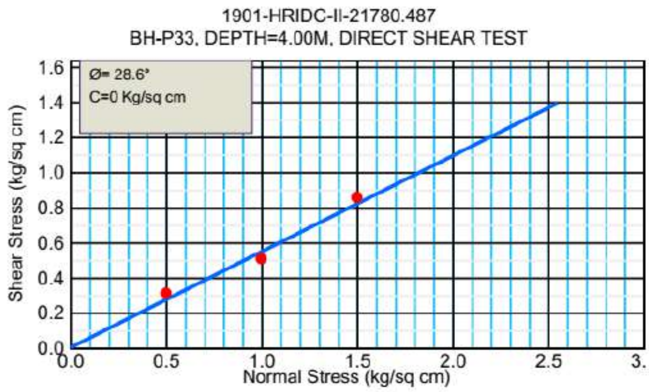


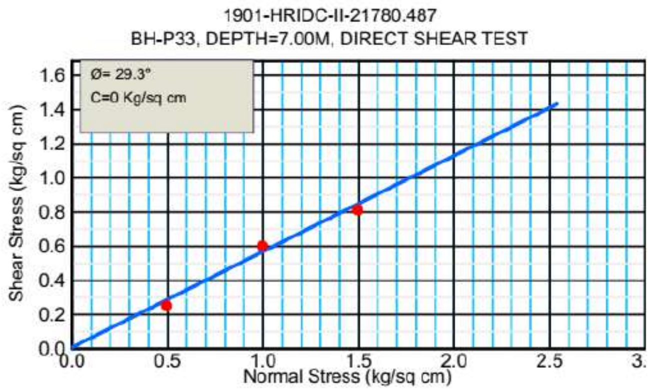


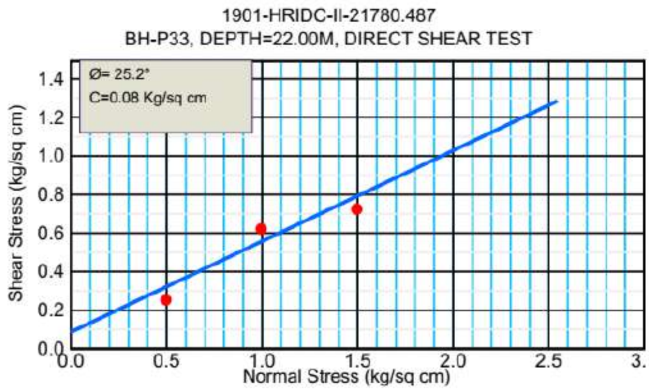




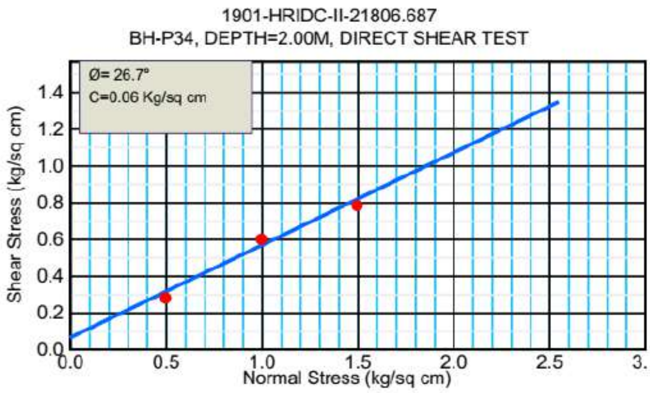


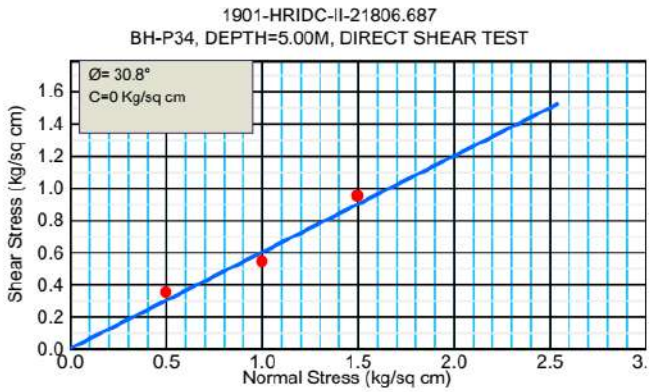


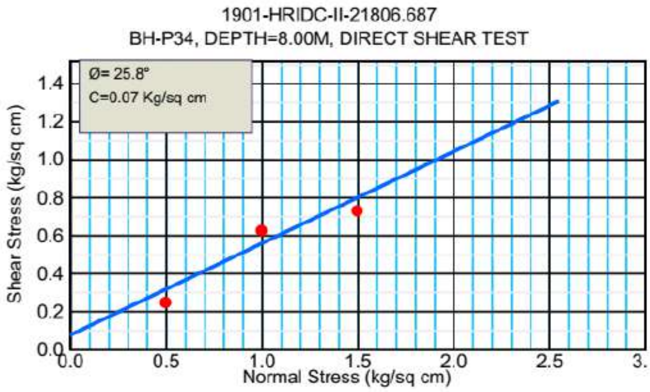


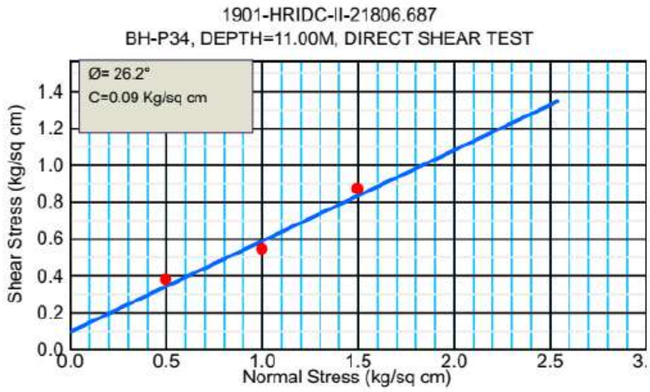


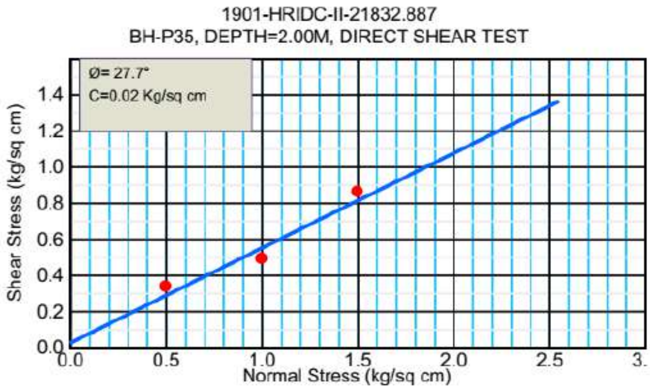
APPENDIX-F
GRAPH 7: DST GRAPH

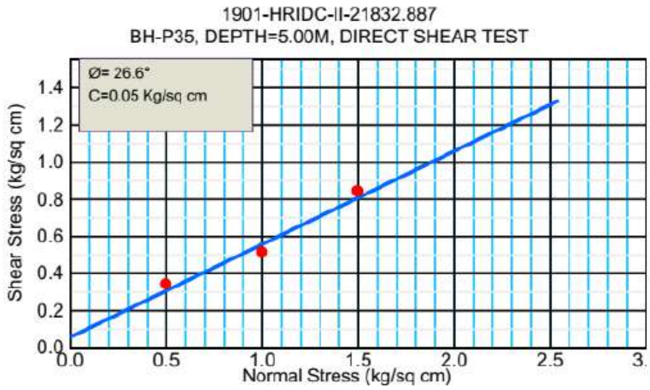


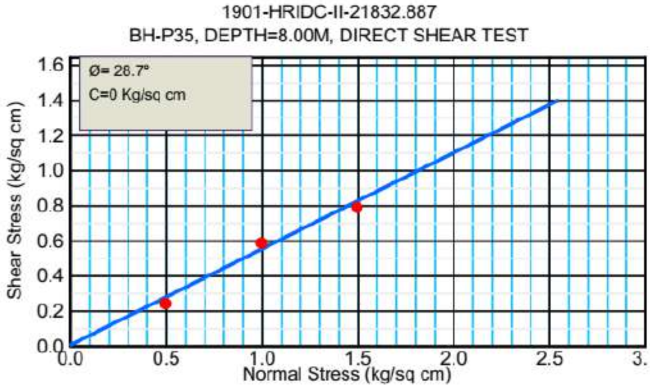


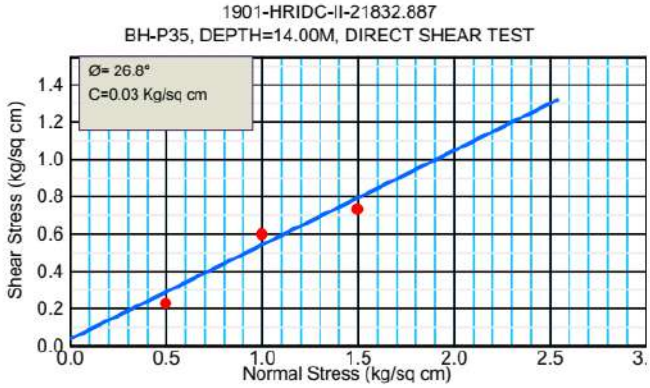




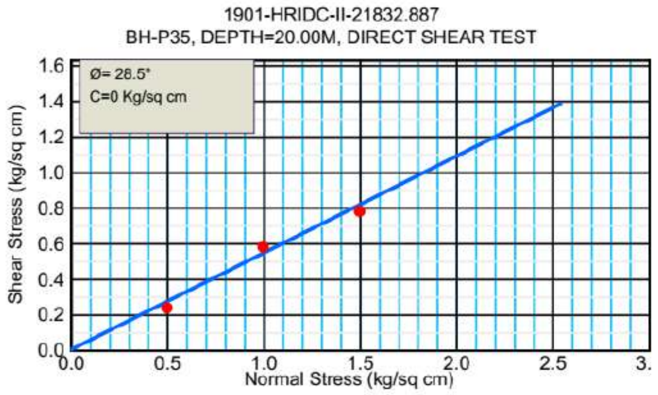


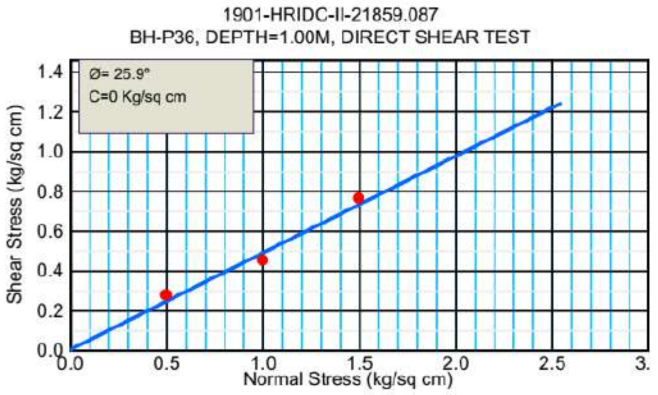


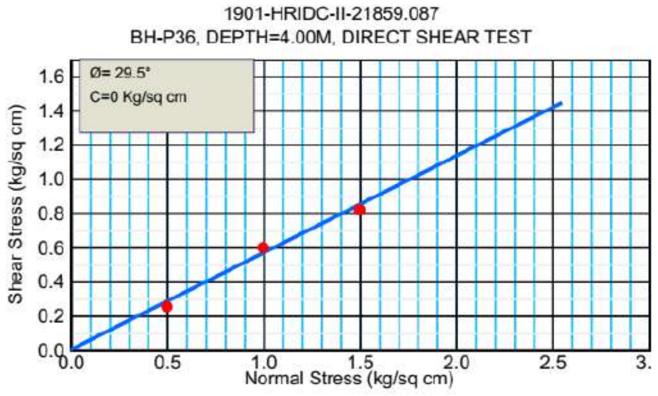


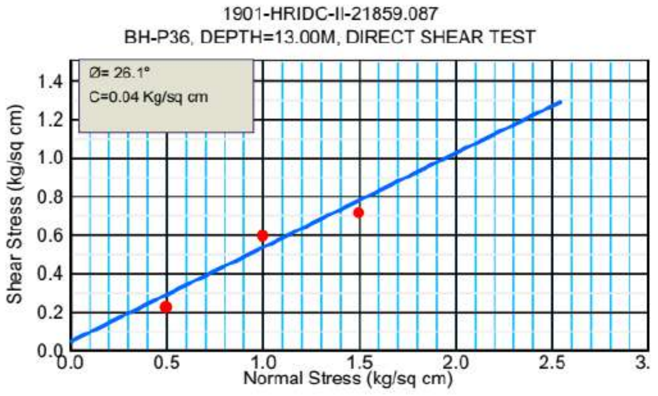


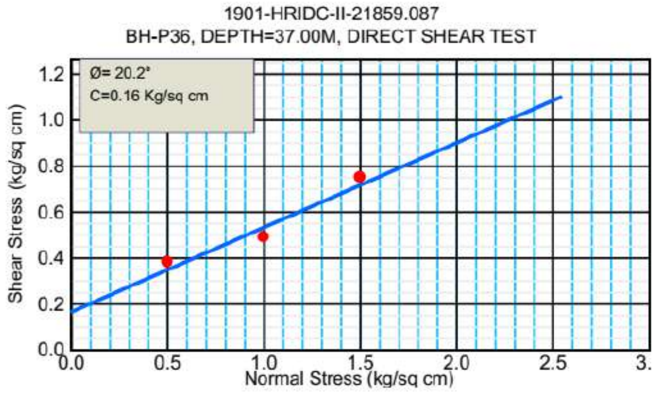
APPENDIX-F
GRAPH 8: DST GRAPH

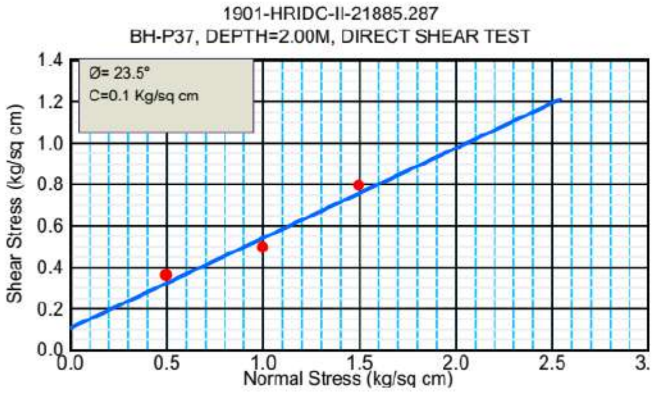


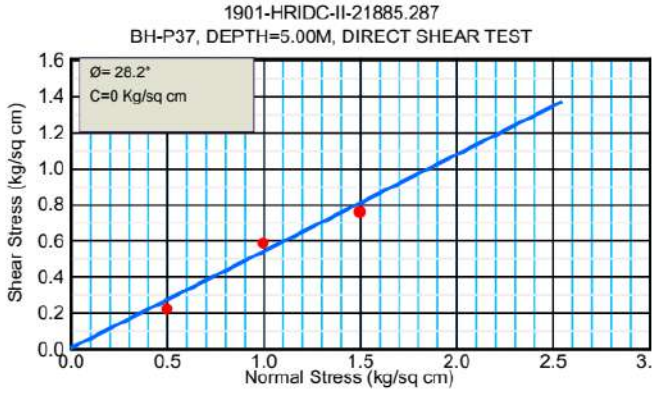


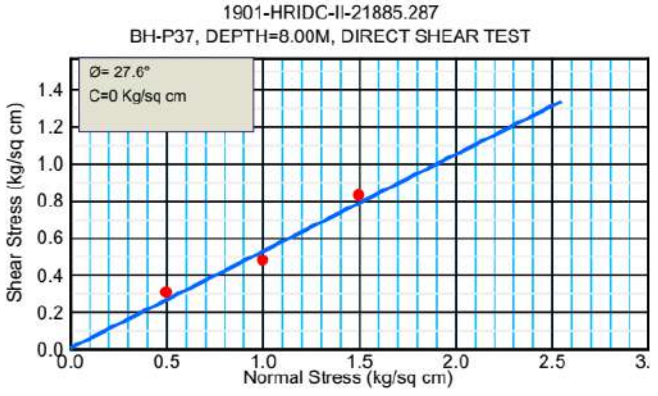




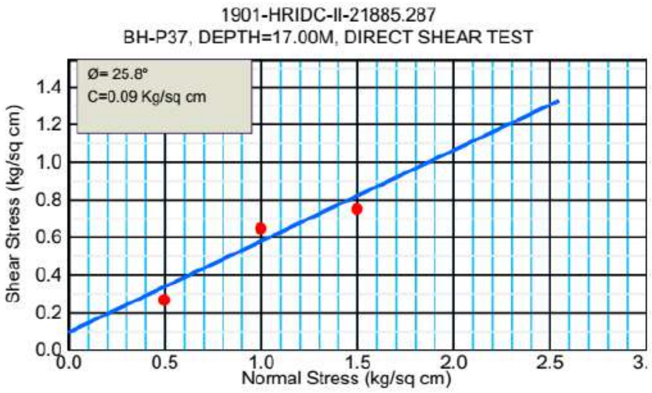


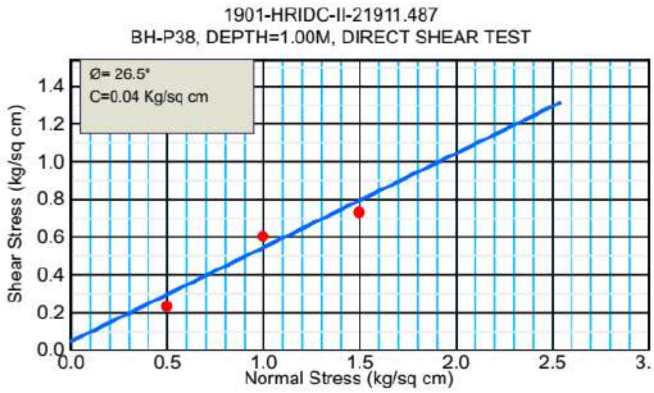


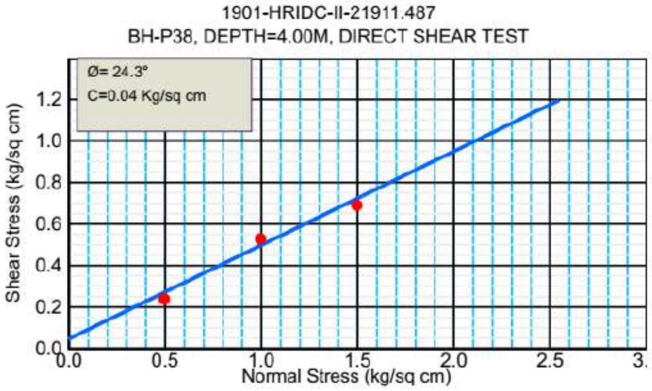


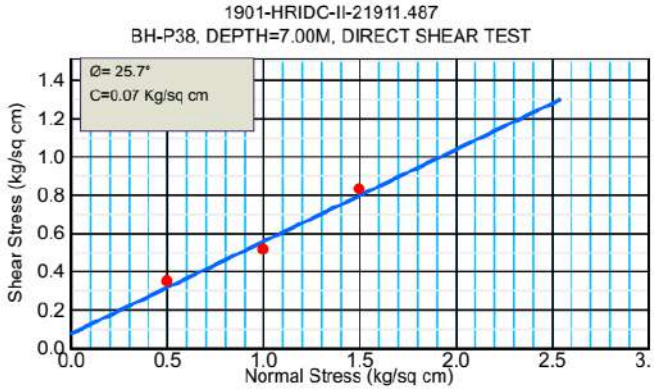


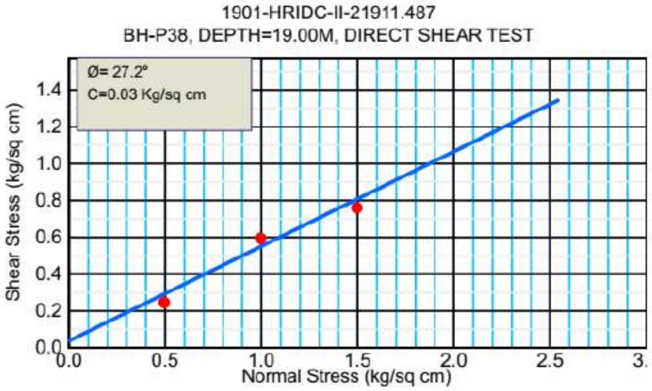
APPENDIX-F
GRAPH 9: DST GRAPH

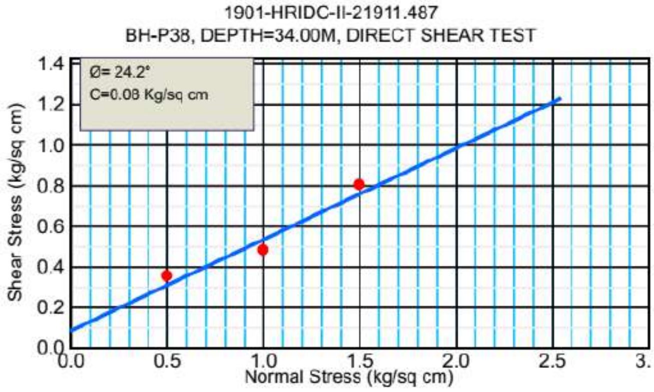




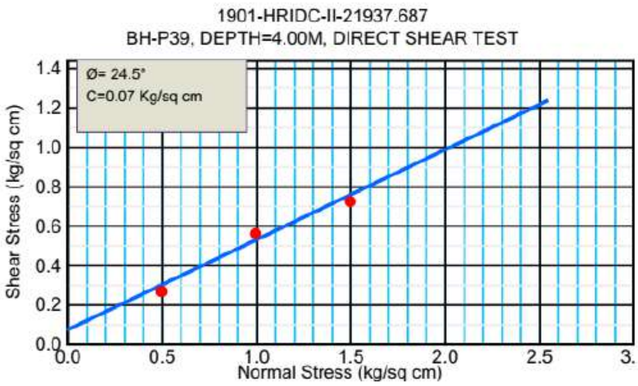


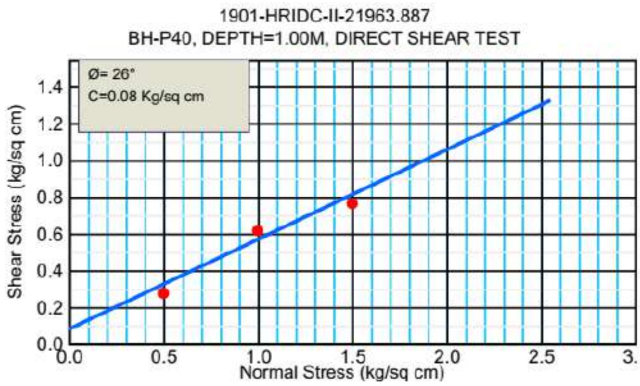


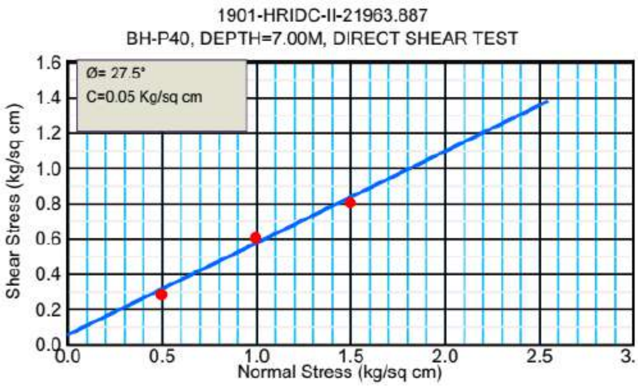


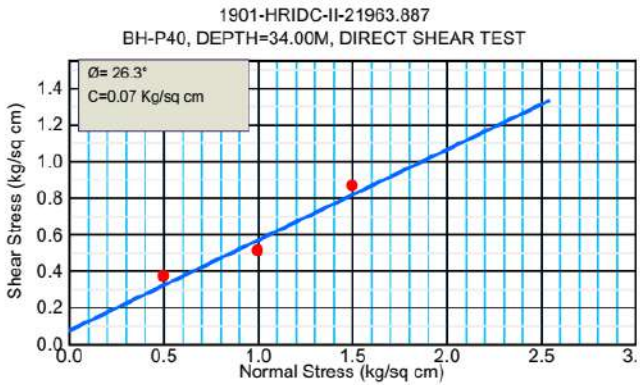


APPENDIX-F
GRAPH 10: DST GRAPH





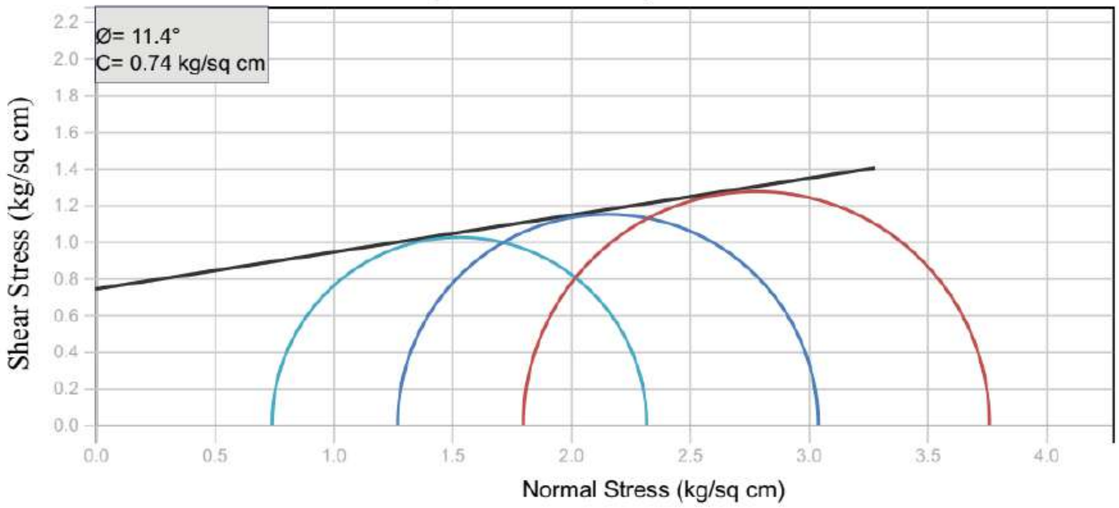




APPENDIX-G

GRAPH 1: UU GRAPH

1901-HRIDC-II-21466.087
BH-NO.P21, DEPTH-16.00M, TRIAXIAL GRAPH



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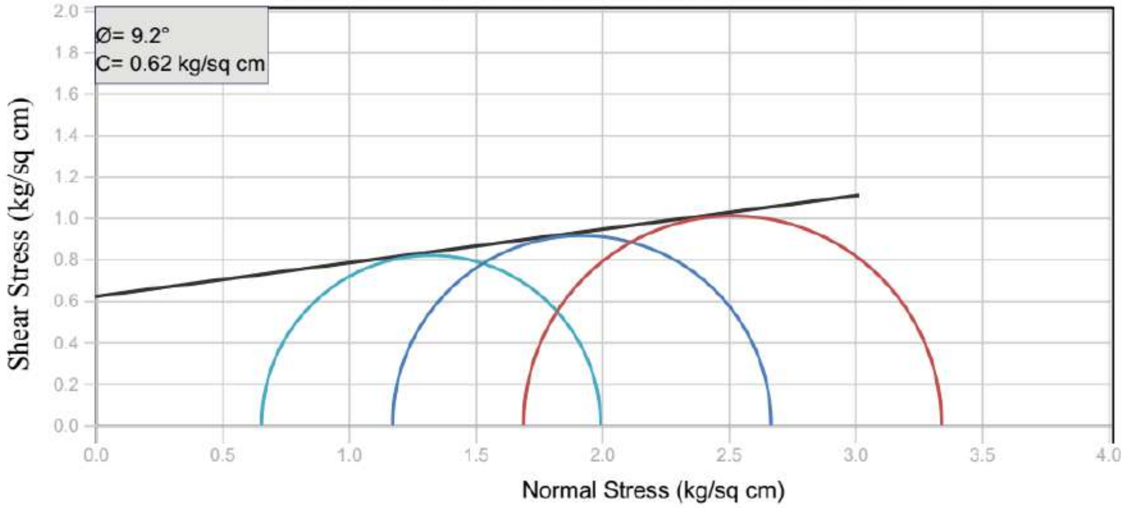

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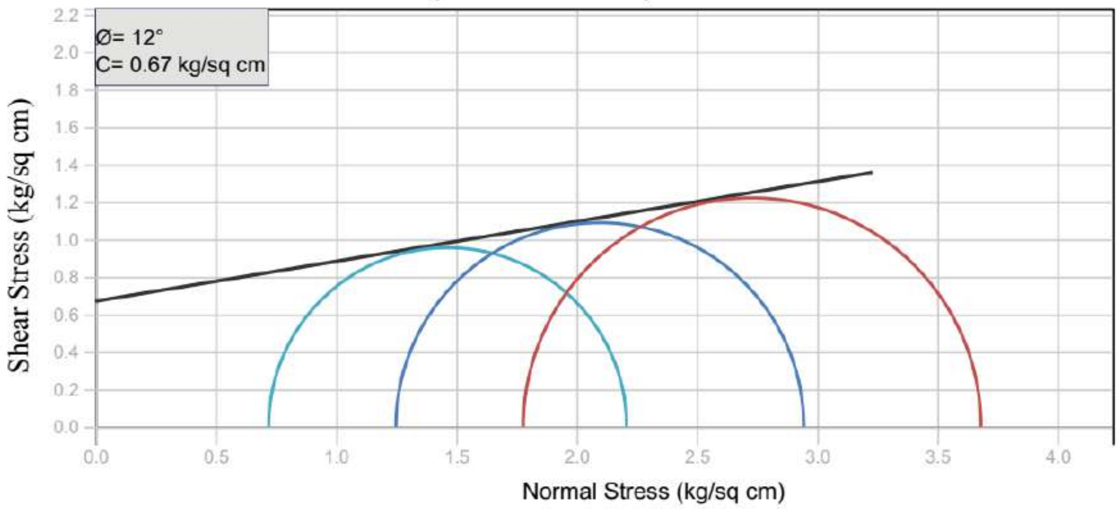
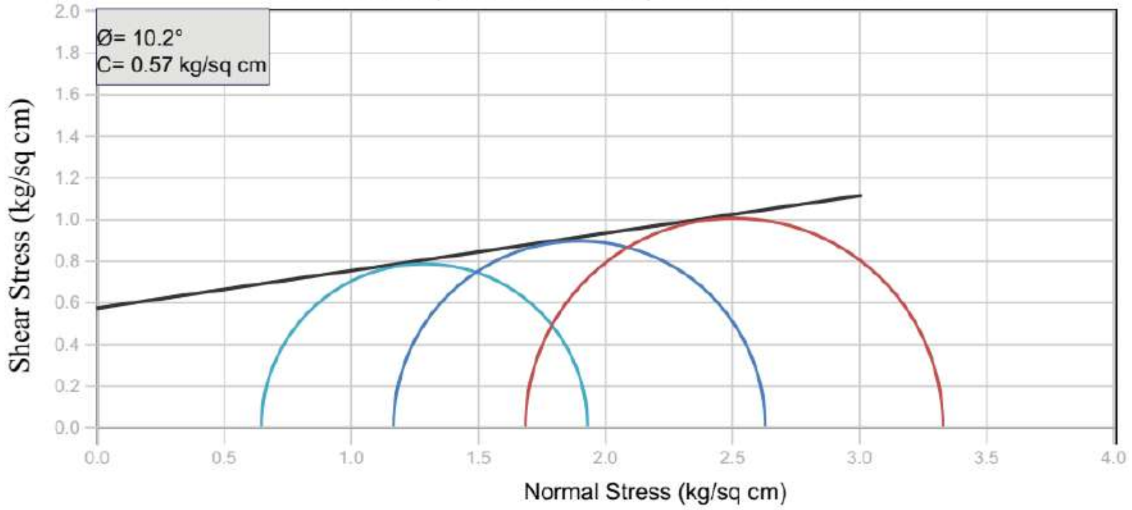
BH-NO.P21, DEPTH-22.00M, TRIAXIAL GRAPH

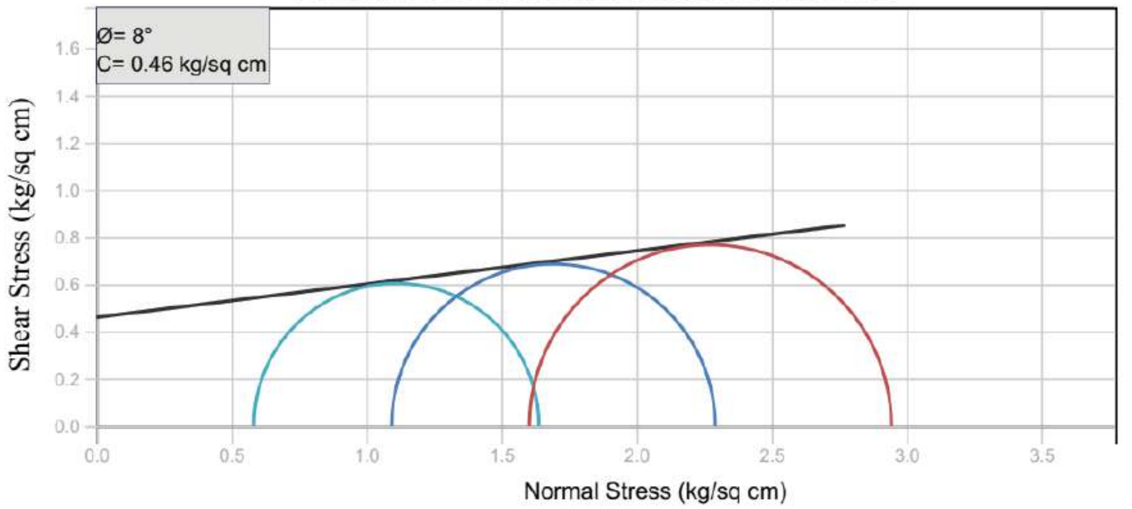


APPENDIX-G
GRAPH 2: UU GRAPH

1901-HRIDC-II-21466.087
BH-NO.P21, DEPTH-25.00M, TRIAXIAL GRAPH



1901-HRIDC-II-21492.287
BH-NO.P22, DEPTH-2.00M, TRIAXIAL GRAPH



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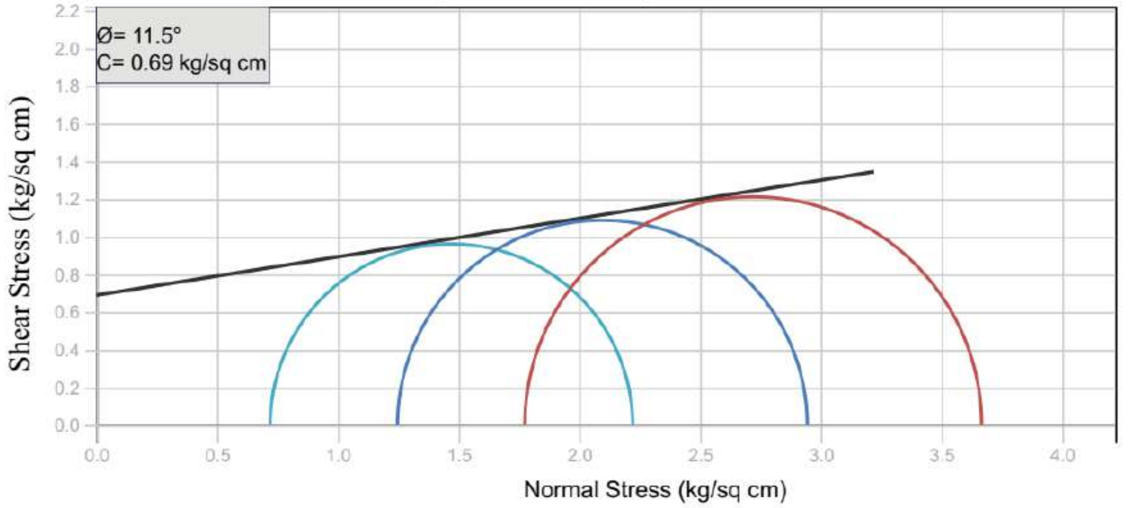
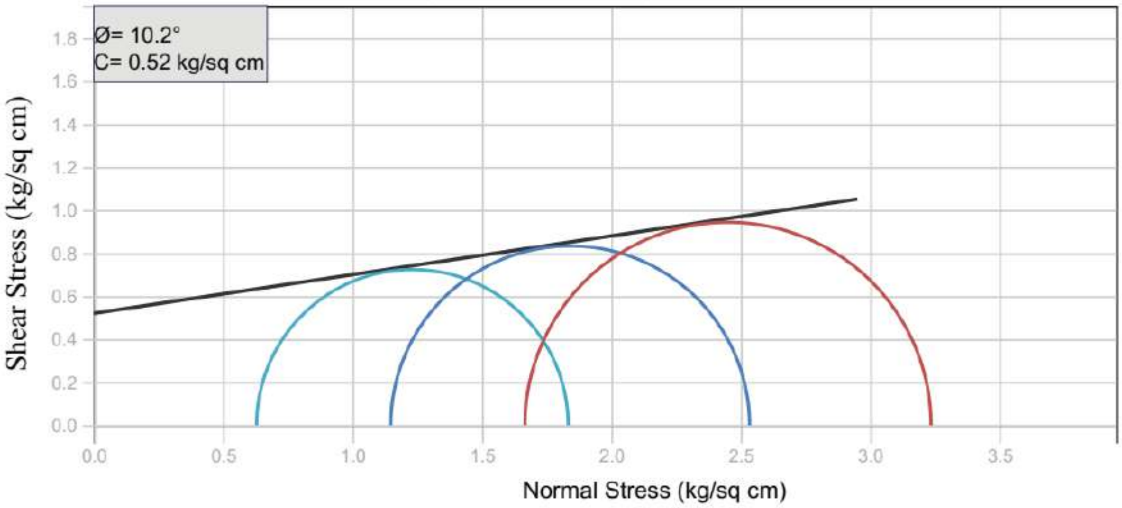
BH-NO.P22, DEPTH-14.00M, TRIAXIAL GRAPH



APPENDIX-G

GRAPH 3: UU GRAPH

1901-HRIDC-II-21492.287
BH-NO.P22, DEPTH-20.00M, TRIAXIAL GRAPH



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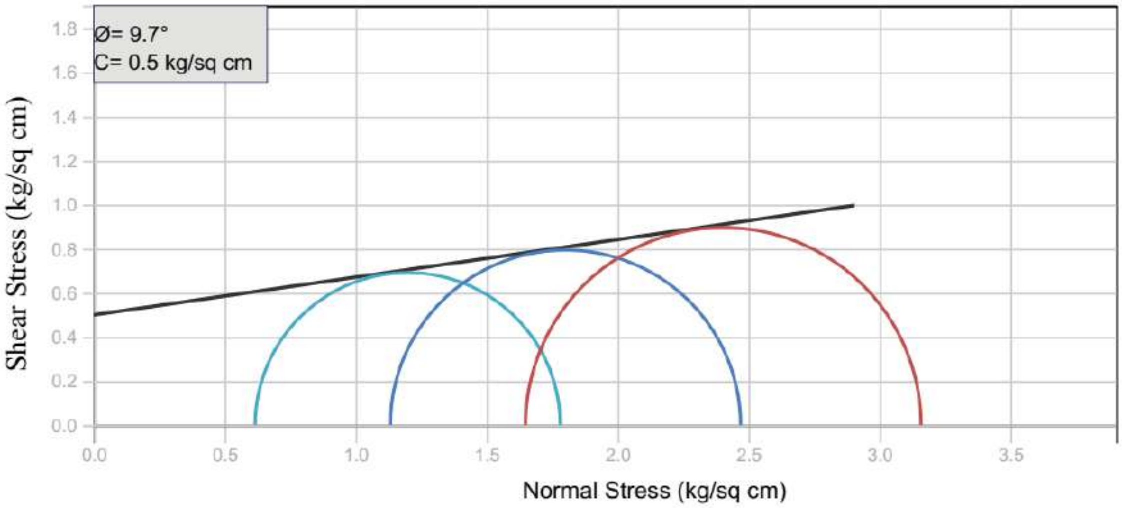
BH-NO.P23, DEPTH-2.00M, TRIAXIAL GRAPH



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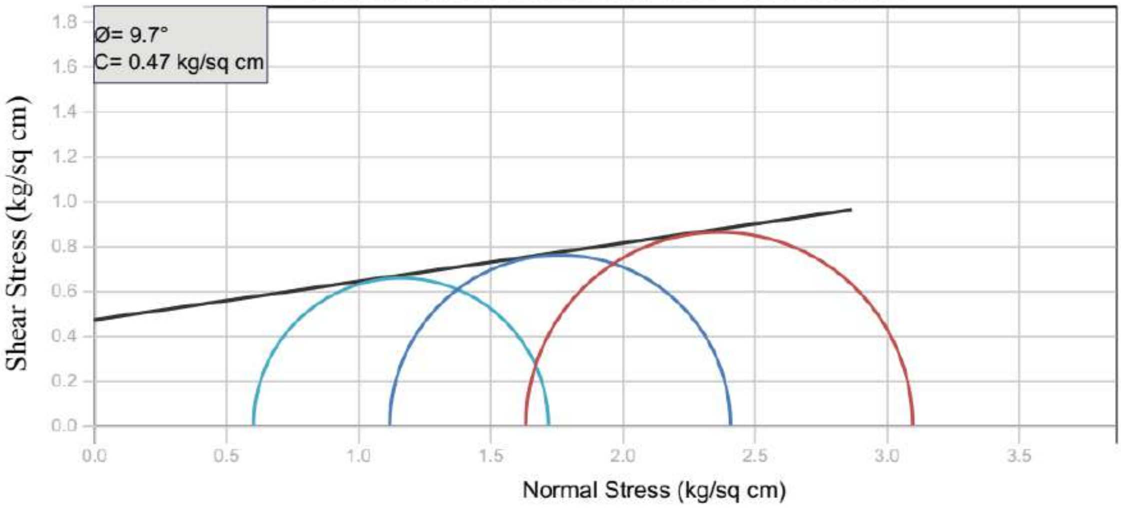
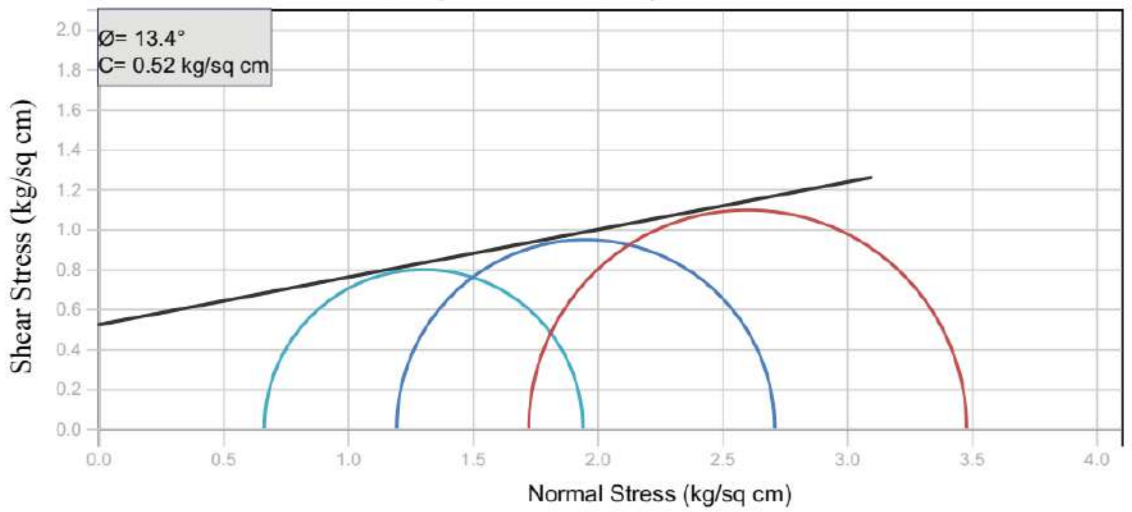
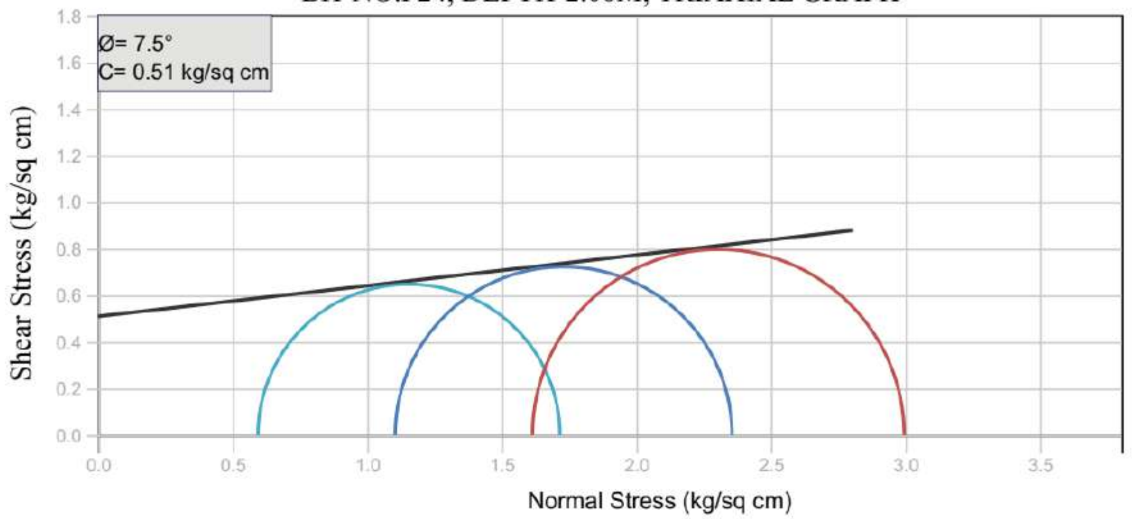
BH-NO.P23, DEPTH-11.00M, TRIAXIAL GRAPH

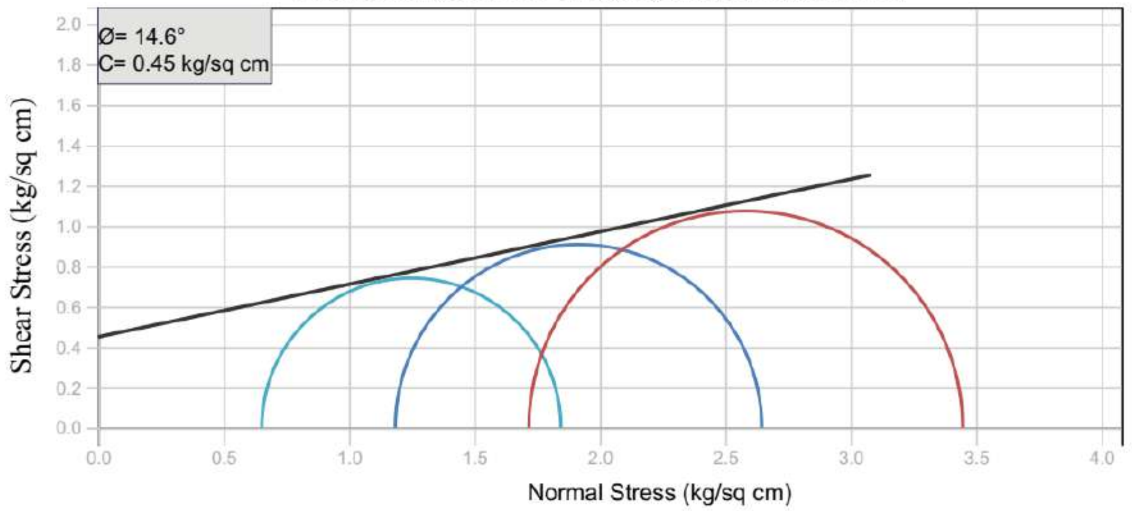


APPENDIX-G

GRAPH 4: UU GRAPH



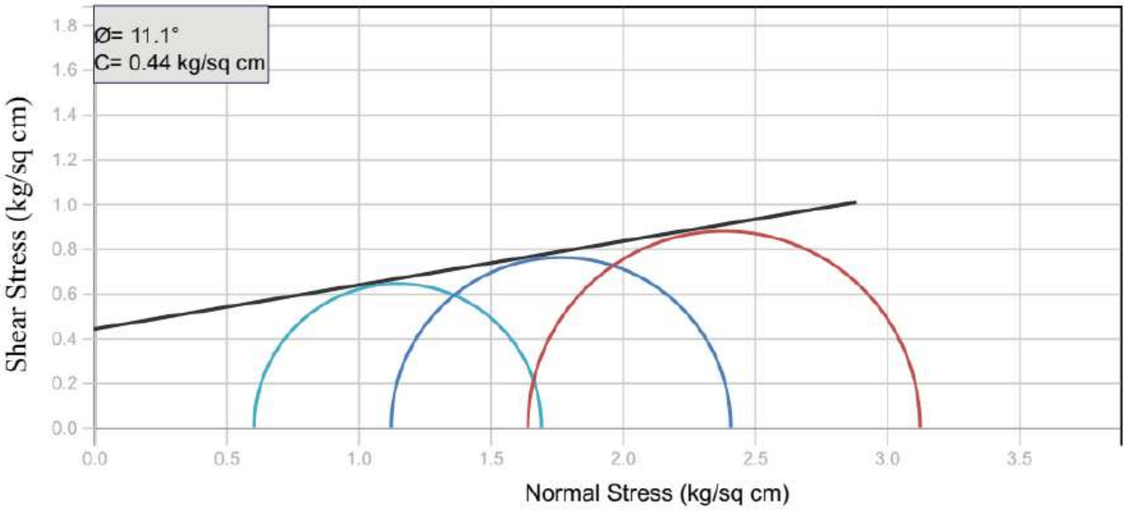




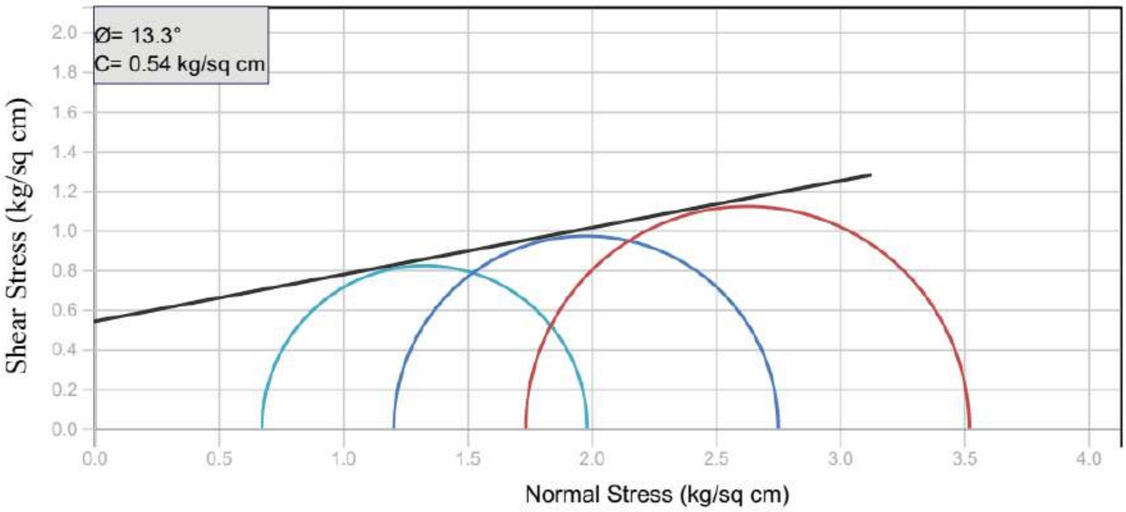
APPENDIX-G

GRAPH 5: UU GRAPH

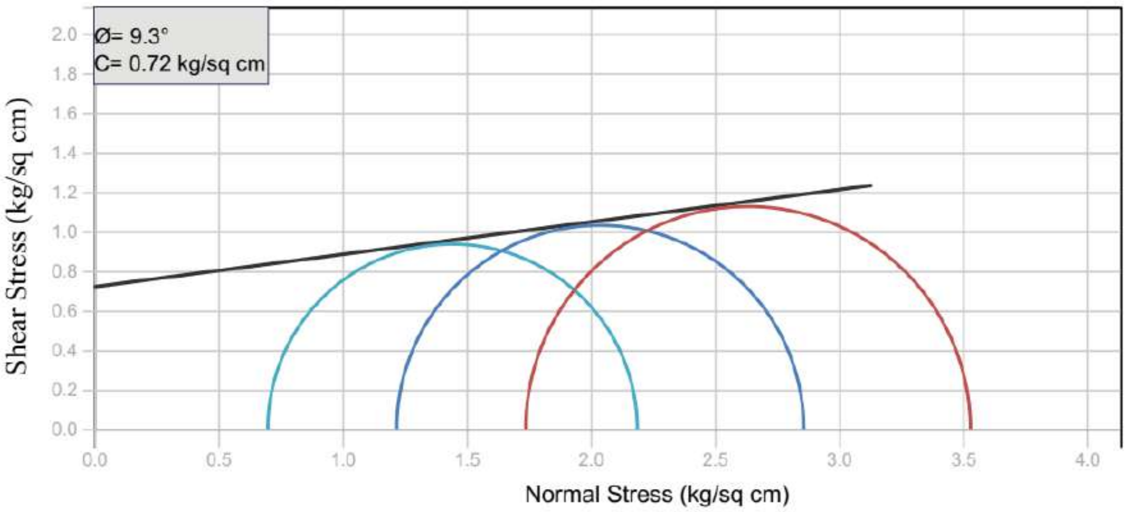
1901-HRIDC-II-21544.687
BH-NO.P24, DEPTH-23.00M, TRIAXIAL GRAPH



1901-HRIDC-II-21544.687
BH-NO.P24, DEPTH-29.00M, TRIAXIAL GRAPH

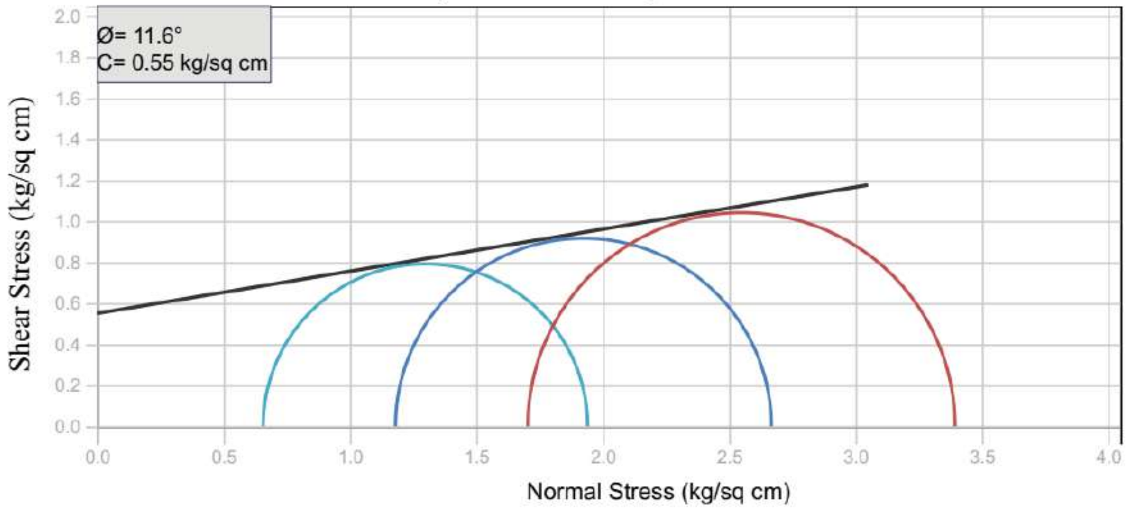


1901-HRIDC-II-21570.887
BH-NO.P25, DEPTH-14.00M, TRIAXIAL GRAPH

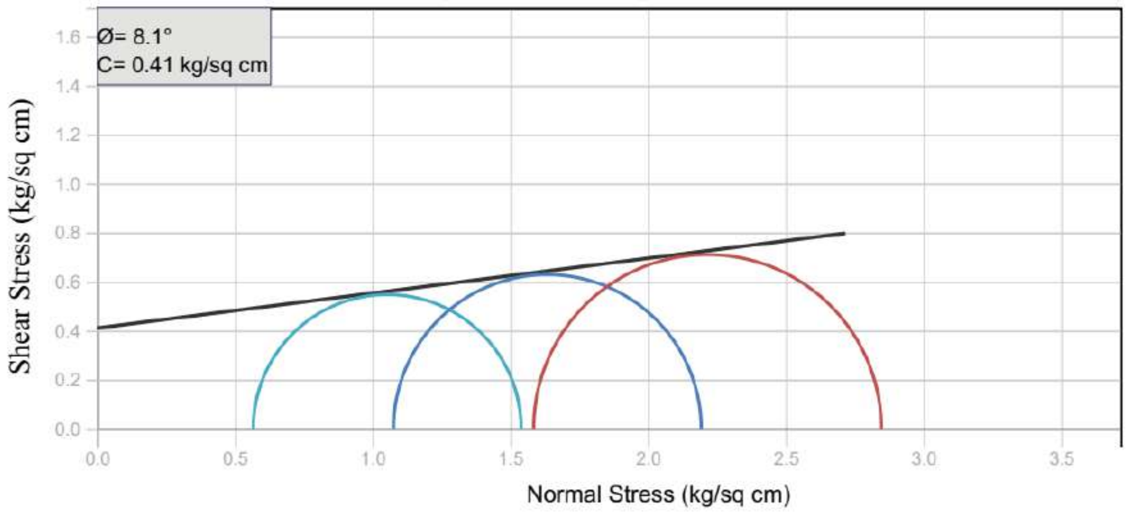


APPENDIX-G
GRAPH 6: UU GRAPH

1901-HRIDC-II-21570.887
BH-NO.P25, DEPTH-17.00M, TRIAXIAL GRAPH



1901-HRIDC-II-21597.087
BH-NO.P26, DEPTH-8.00M, TRIAXIAL GRAPH



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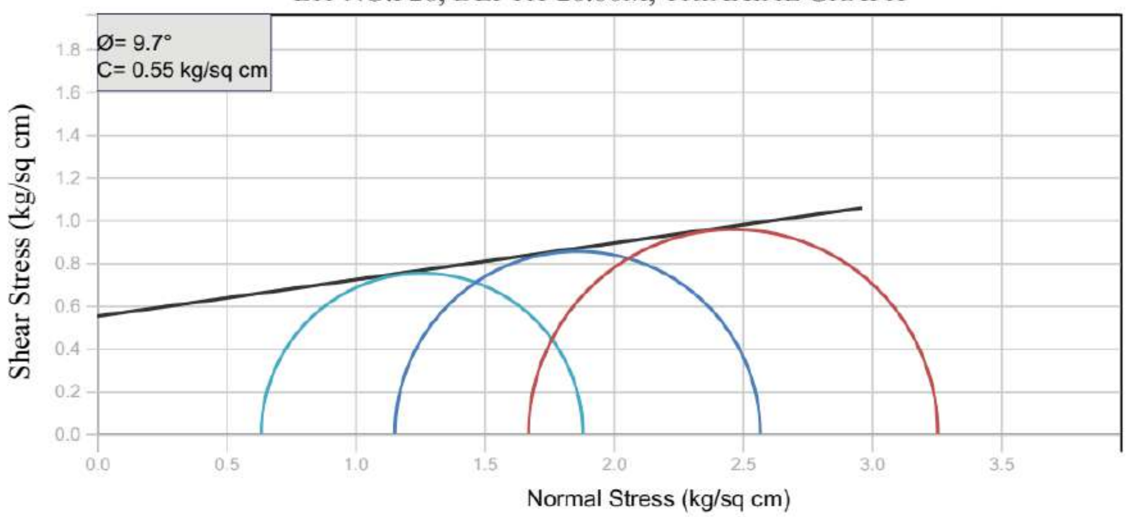
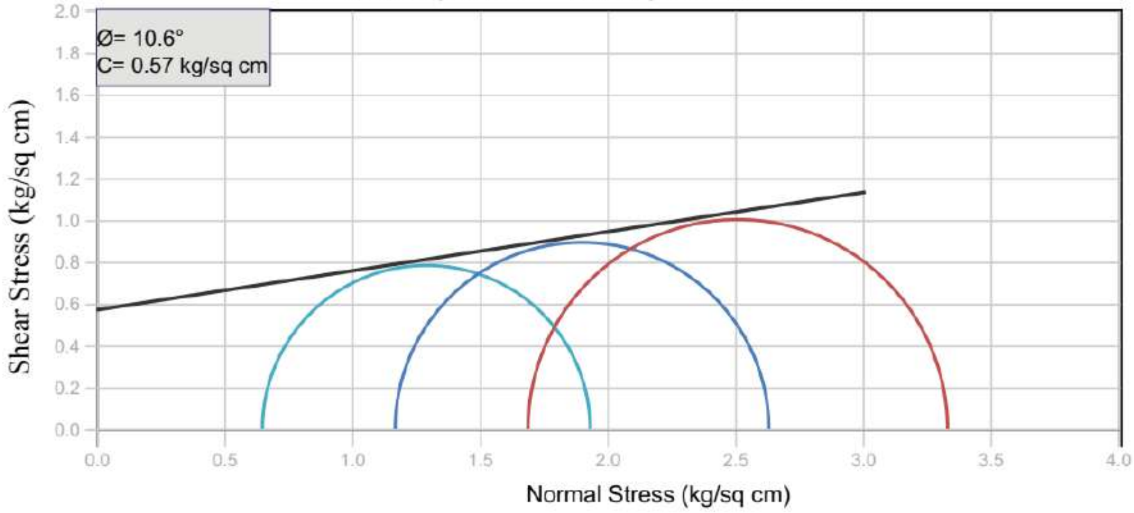
BH-NO.P26, DEPTH-20.00M, TRIAXIAL GRAPH

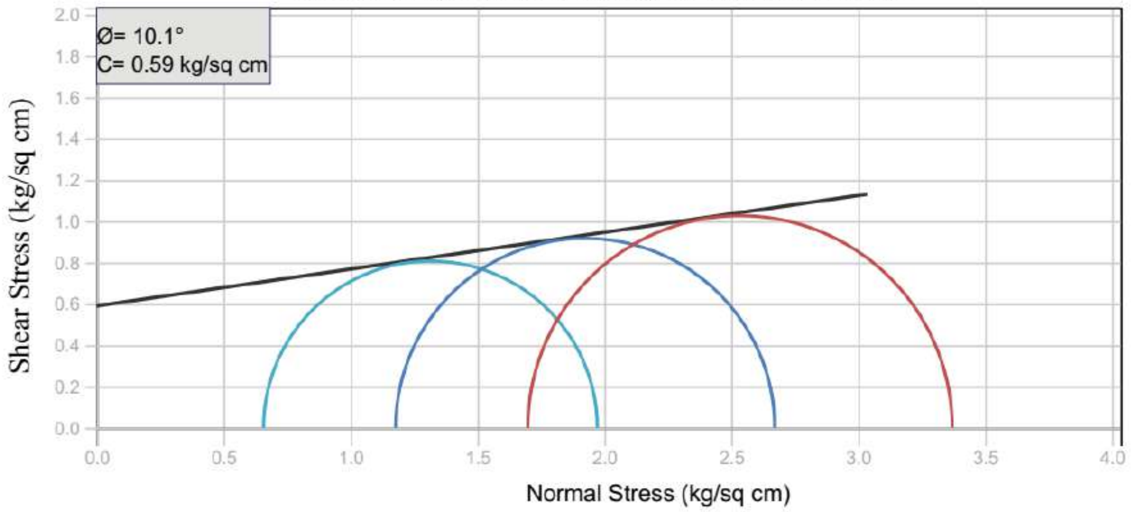


APPENDIX-G
GRAPH 7: UU GRAPH

1901-HRIDC-II-21597.087
BH-NO.P26, DEPTH-23.00M, TRIAXIAL GRAPH



1901-HRIDC-II-21623.287
BH-NO.P27, DEPTH-11.00M, TRIAXIAL GRAPH



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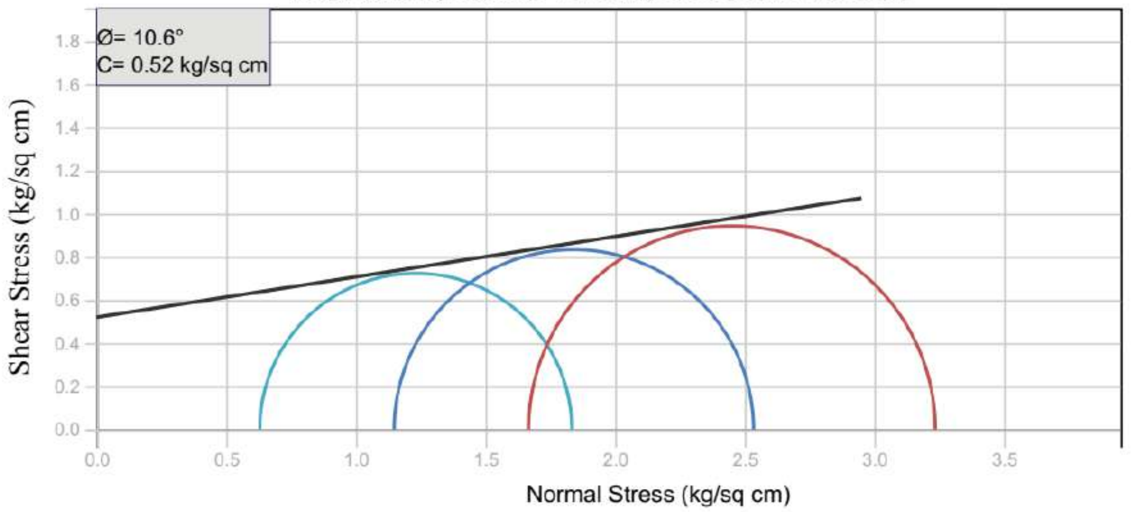
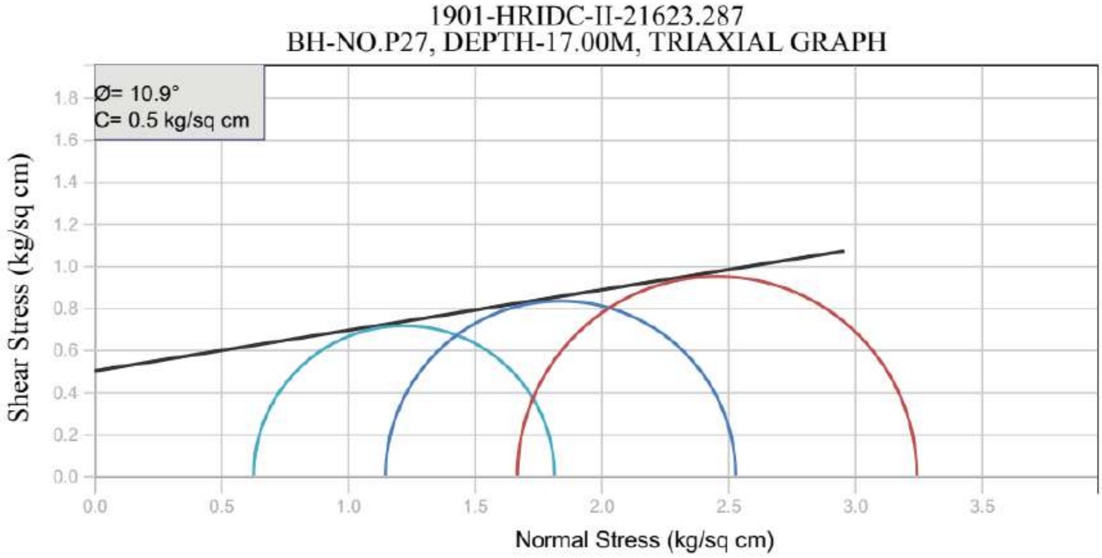
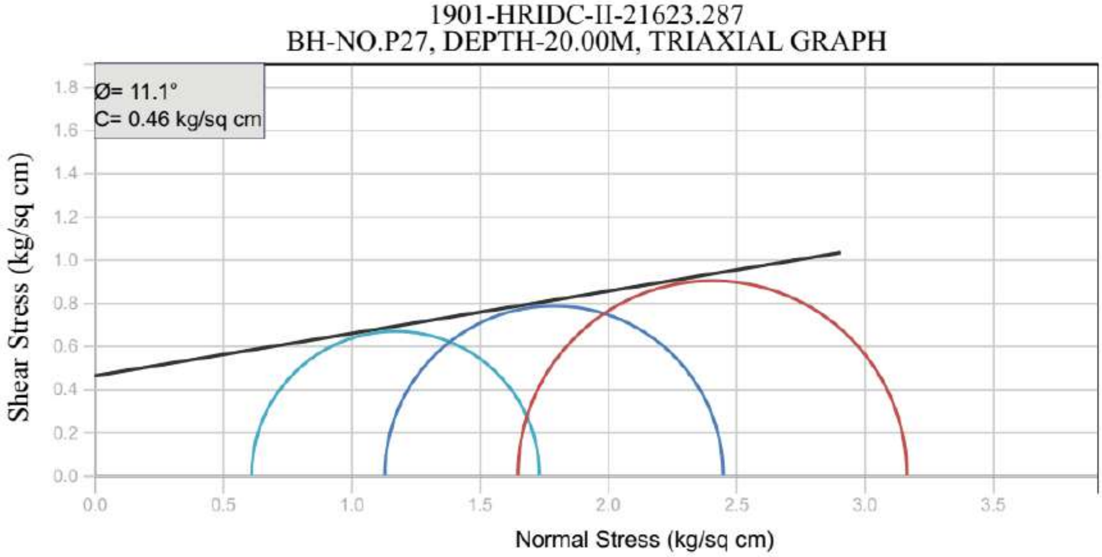
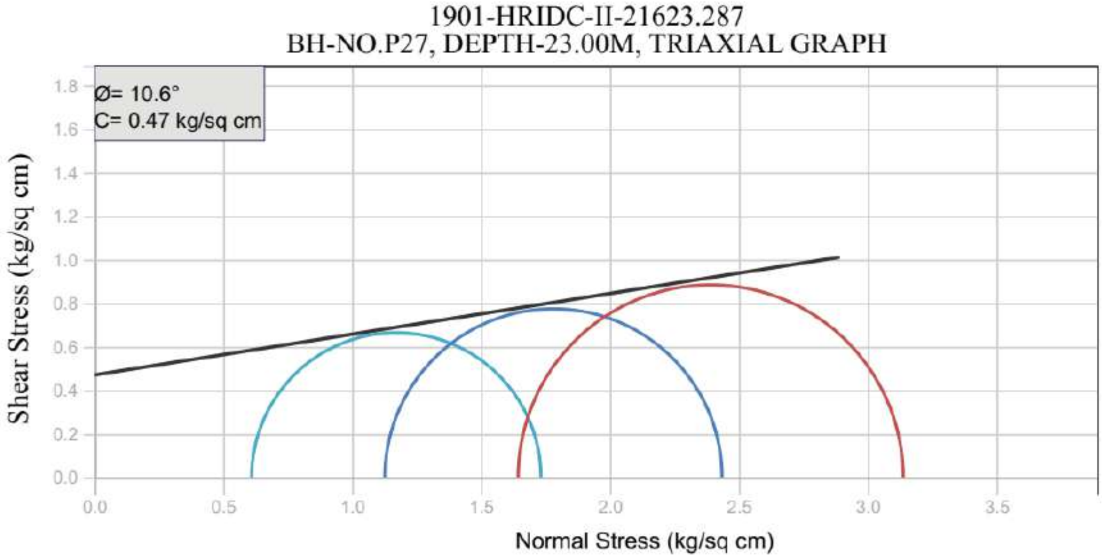
BH-NO.P27, DEPTH-14.00M, TRIAXIAL GRAPH



APPENDIX-G
GRAPH 8: UU GRAPH

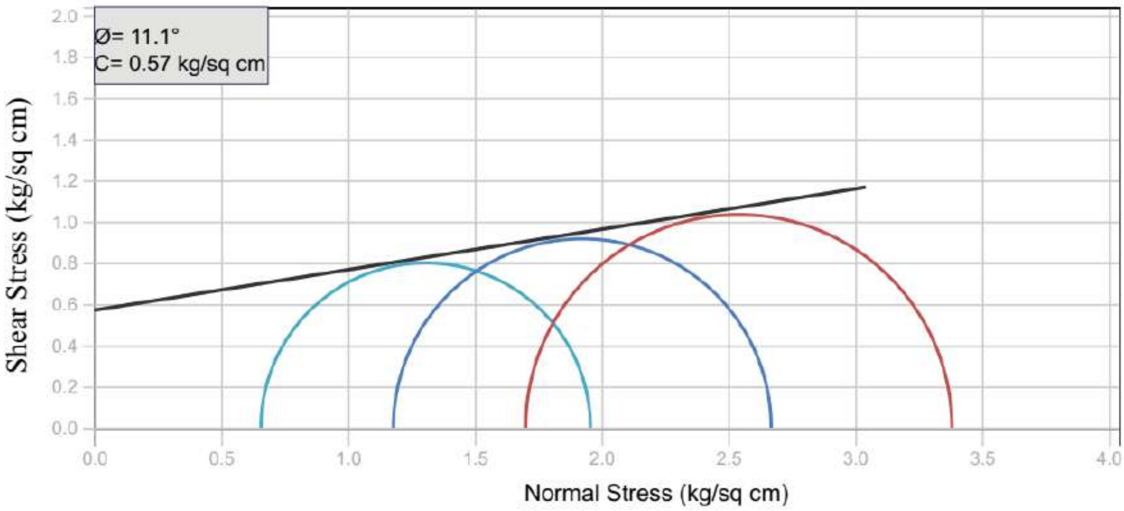




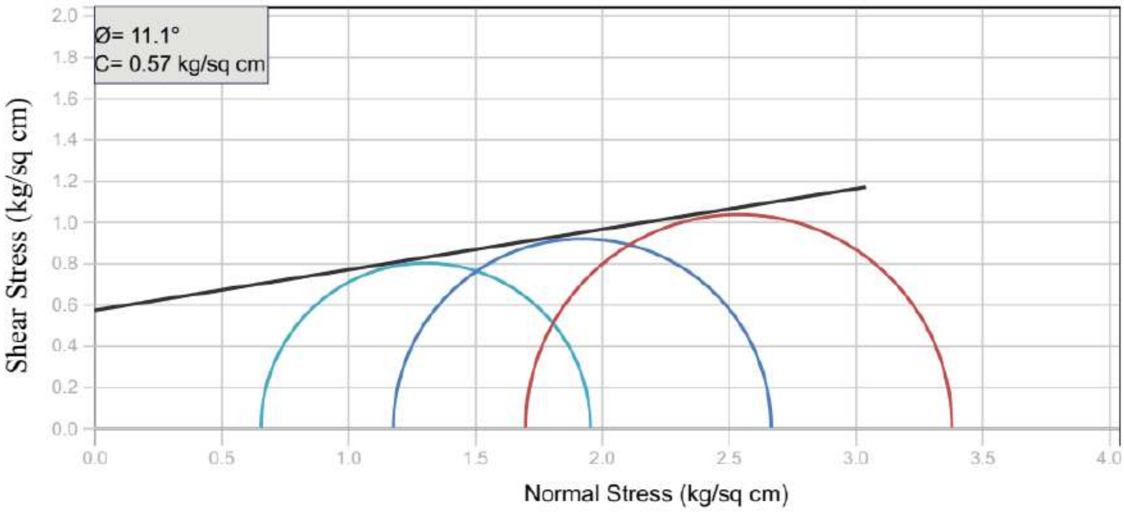


APPENDIX-G
GRAPH 9: UU GRAPH

1901-HRIDC-II-21623.287
BH-NO.P27, DEPTH-26.00M, TRIAXIAL GRAPH



1901-HRIDC-II-21649.487
BH-NO.P28, DEPTH-17.00M, TRIAXIAL GRAPH



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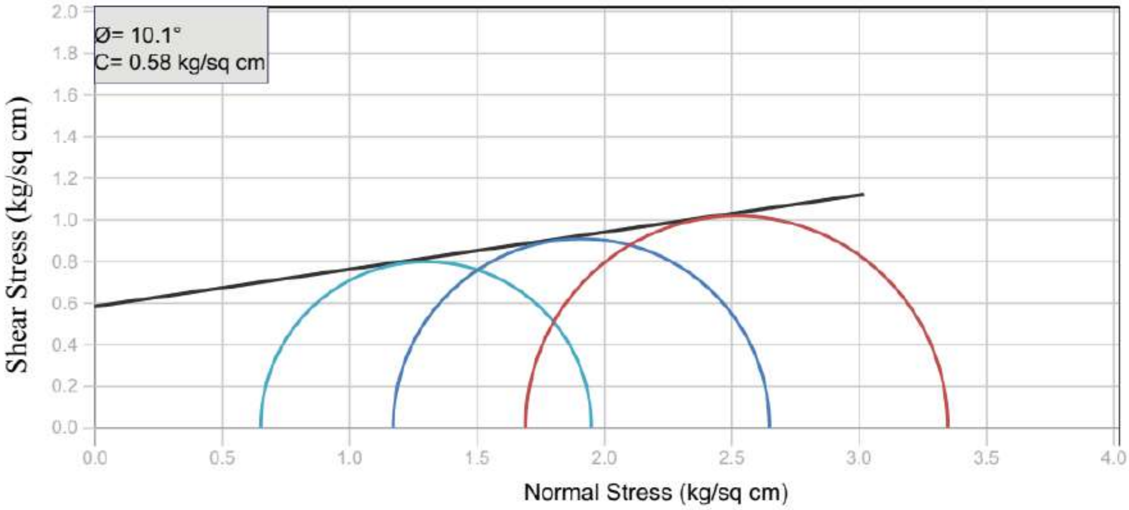
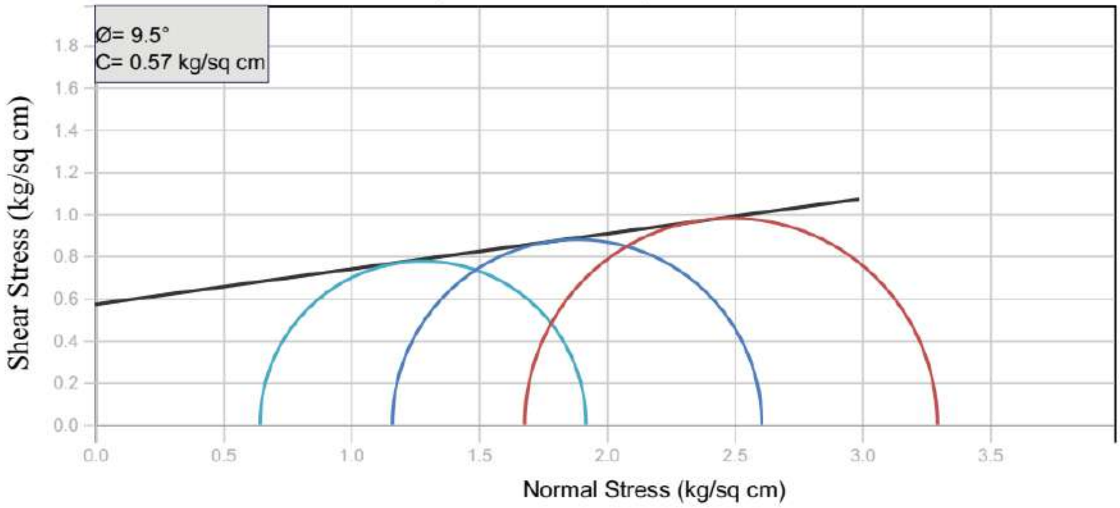
BH-NO.P28, DEPTH-20.00M, TRIAXIAL GRAPH

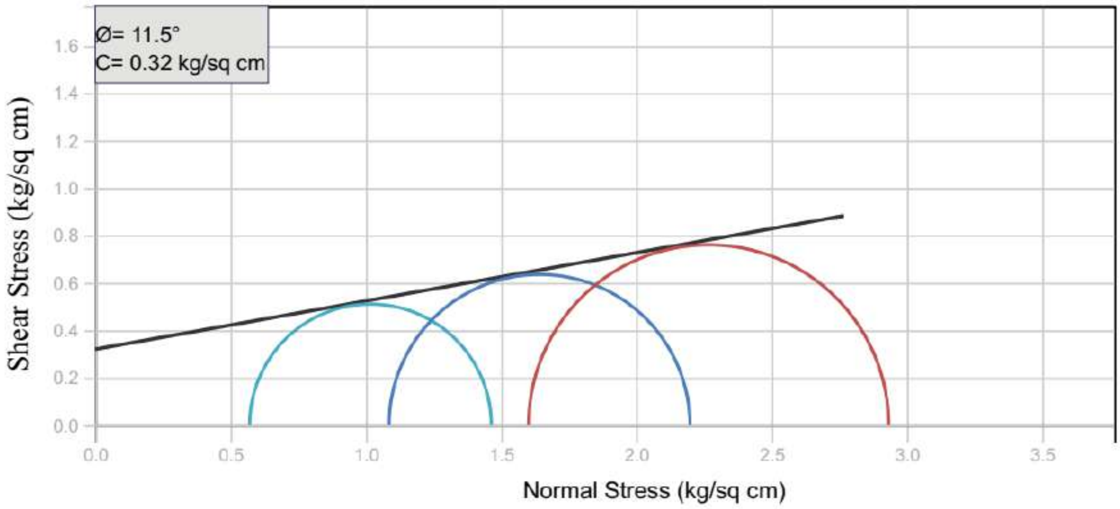


APPENDIX-G
GRAPH 10: UU GRAPH

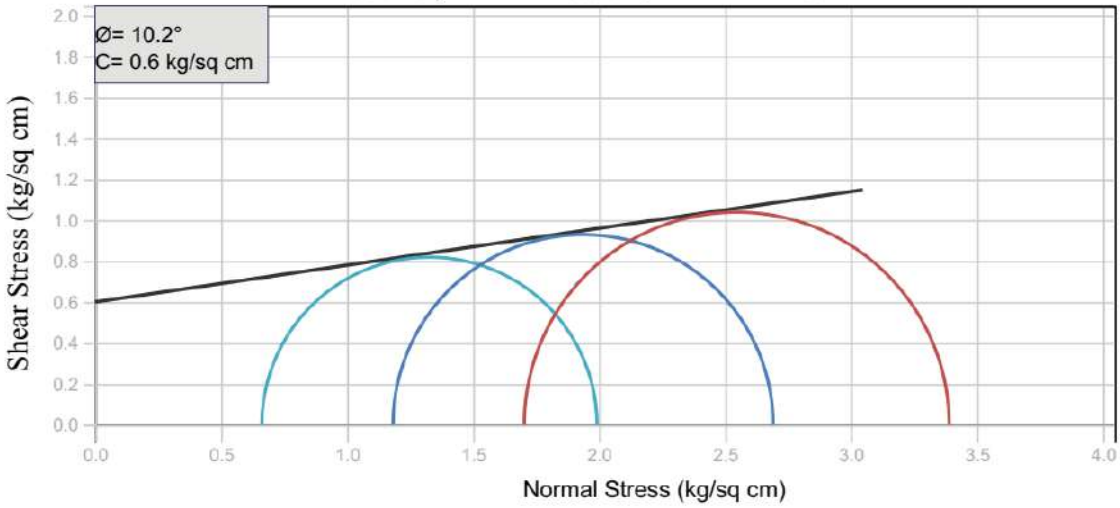
1901-HRIDC-II-21675.687
BH-NO.P29, DEPTH-16.00M, TRIAXIAL GRAPH



1901-HRIDC-II-21675.687
BH-NO.P29, DEPTH-19.00M, TRIAXIAL GRAPH

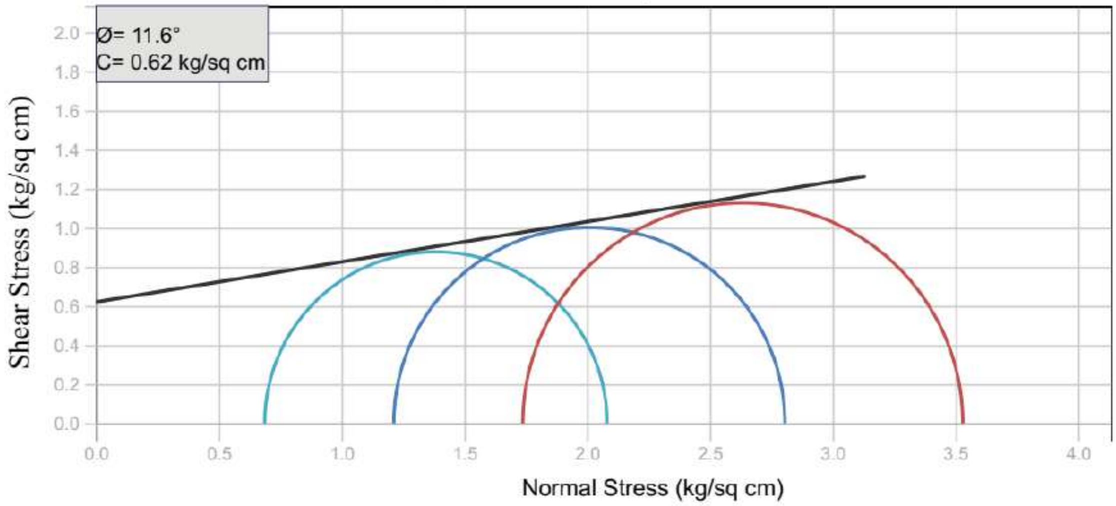


1901-HRIDC-II-21675.687
BH-NO.P29, DEPTH-28.00M, TRIAXIAL GRAPH

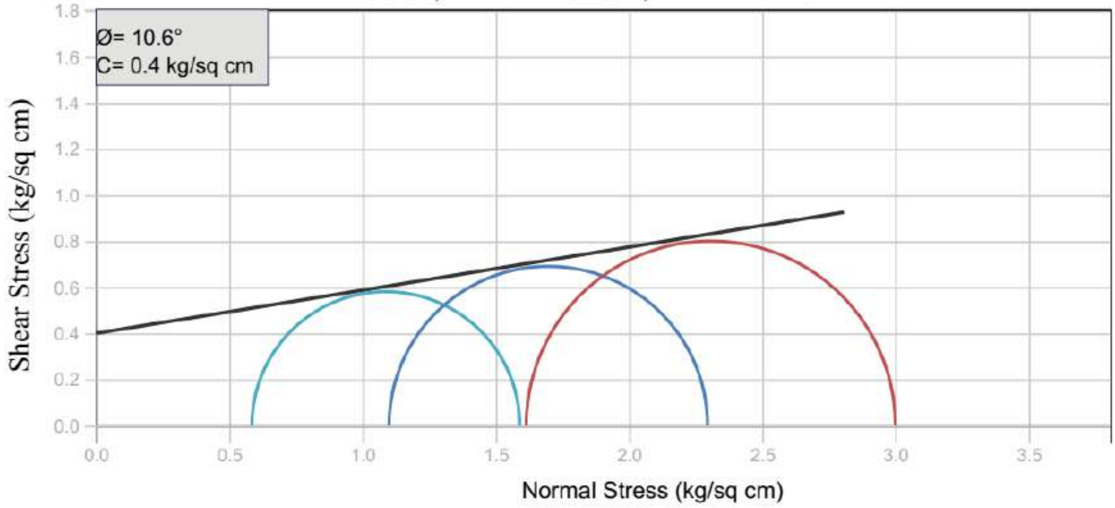


APPENDIX-G
GRAPH 11: UU GRAPH

1901-HRIDC-II-21675.687
BH-NO.P29, DEPTH-31.00M, TRIAXIAL GRAPH



1901-HRIDC-II-21701.887
BH-NO.P30, DEPTH-10.00M, TRIAXIAL GRAPH



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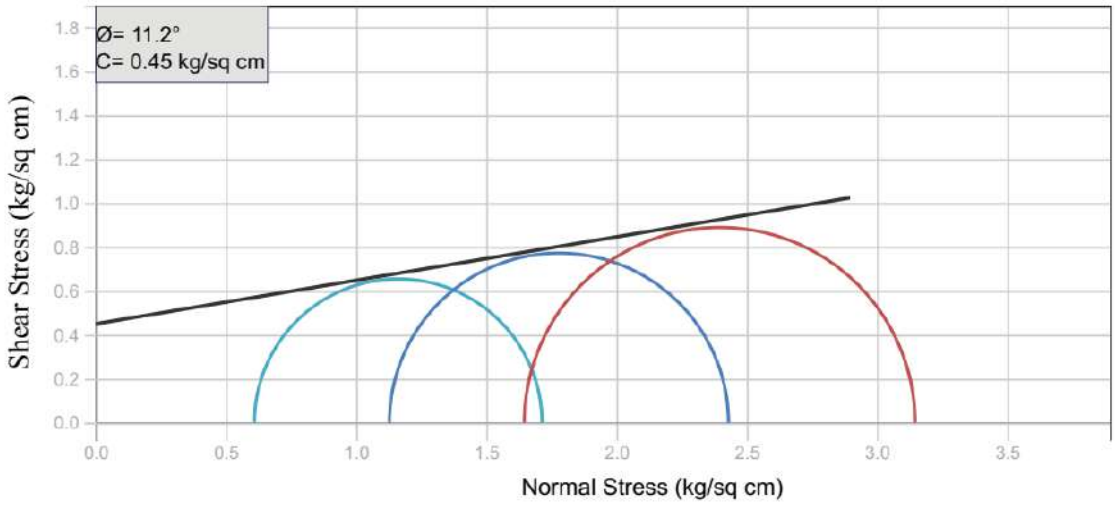
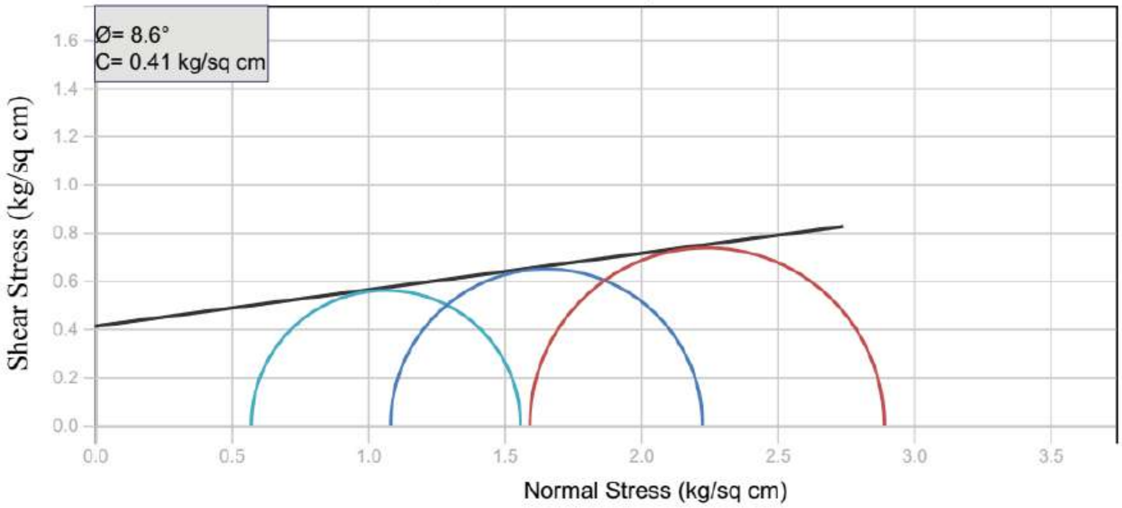
BH-NO.P30, DEPTH-16.00M, TRIAXIAL GRAPH

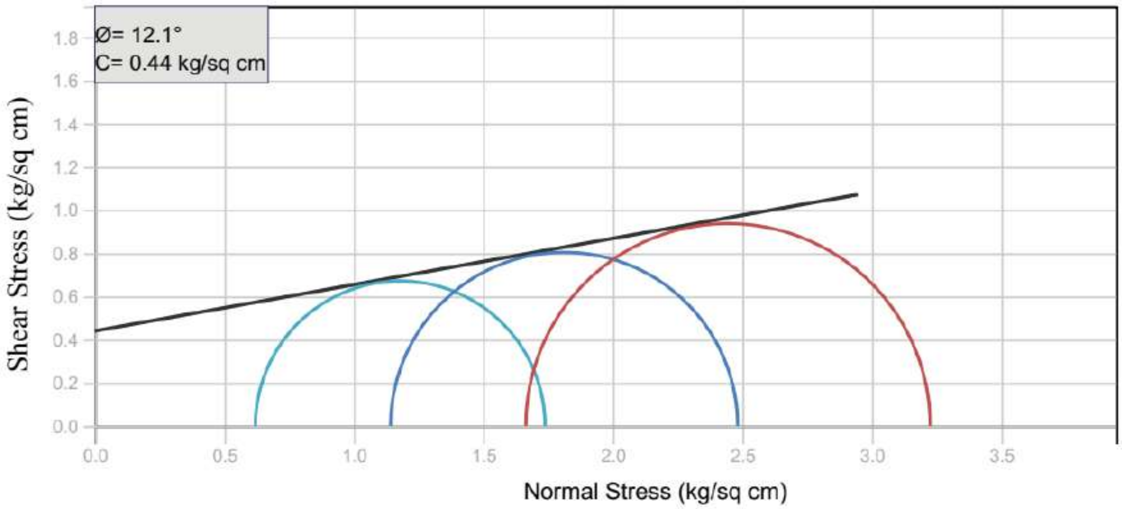


APPENDIX-G
GRAPH 12: UU GRAPH

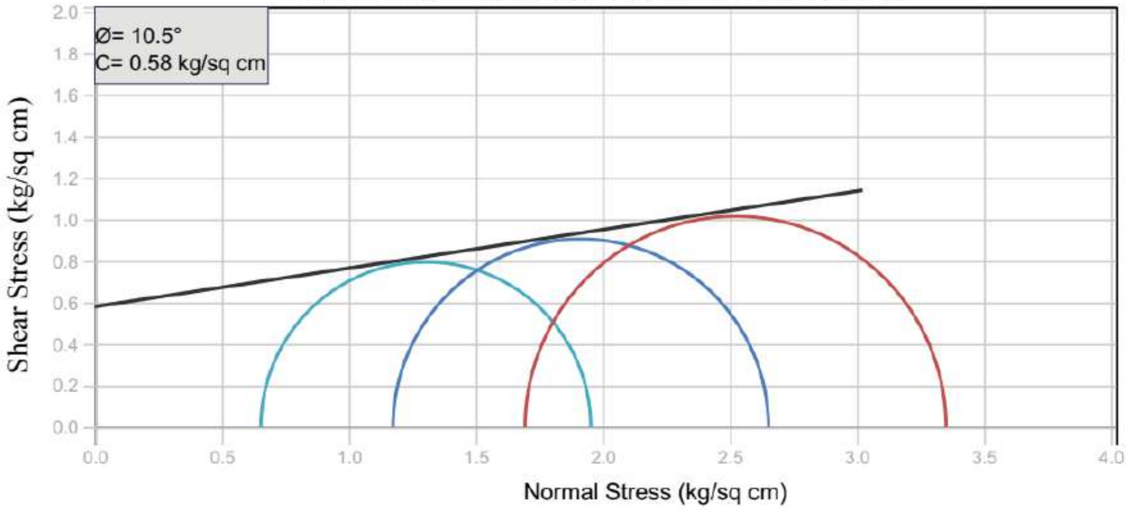
1901-HRIDC-II-21701.887
BH-NO.P30, DEPTH-25.00M, TRIAXIAL GRAPH



1901-HRIDC-II-21728.087
BH-NO.P31, DEPTH-11.00M, TRIAXIAL GRAPH

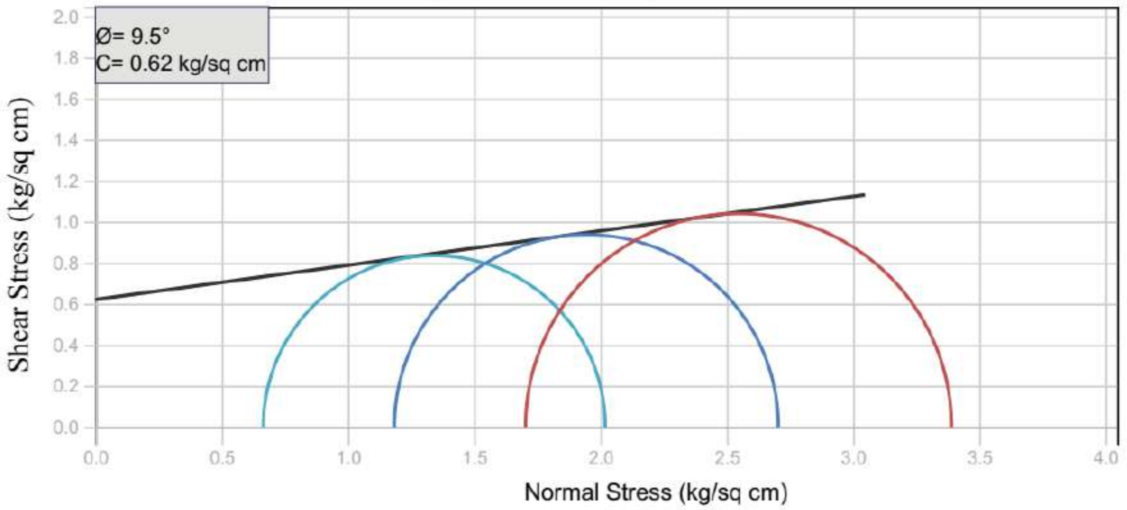


1901-HRIDC-II-21728.087
BH-NO.P31, DEPTH-17.00M, TRIAXIAL GRAPH



APPENDIX-G
GRAPH 13: UU GRAPH

1901-HRIDC-II-21728.087
BH-NO.P31, DEPTH-20.00M, TRIAXIAL GRAPH



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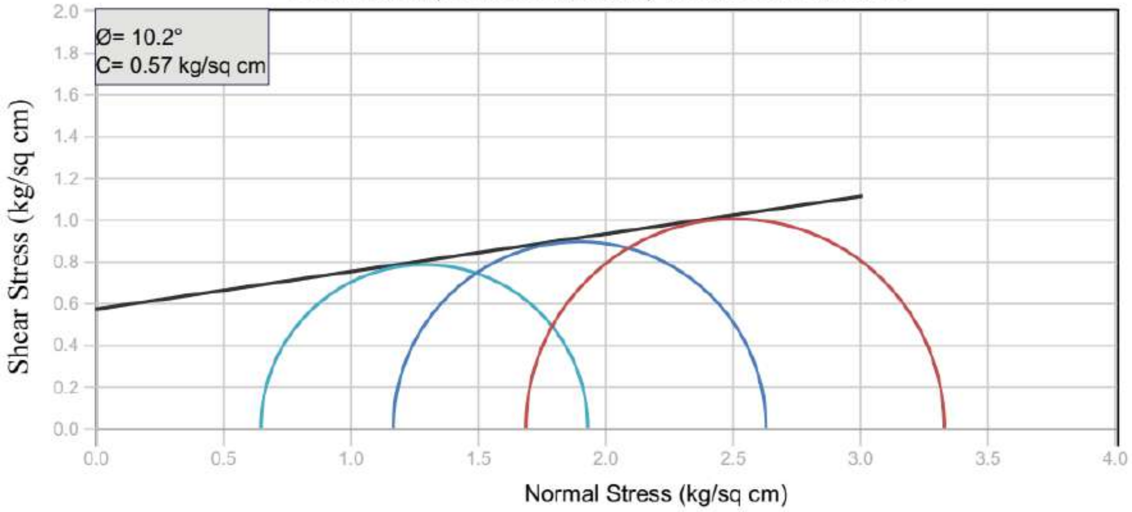
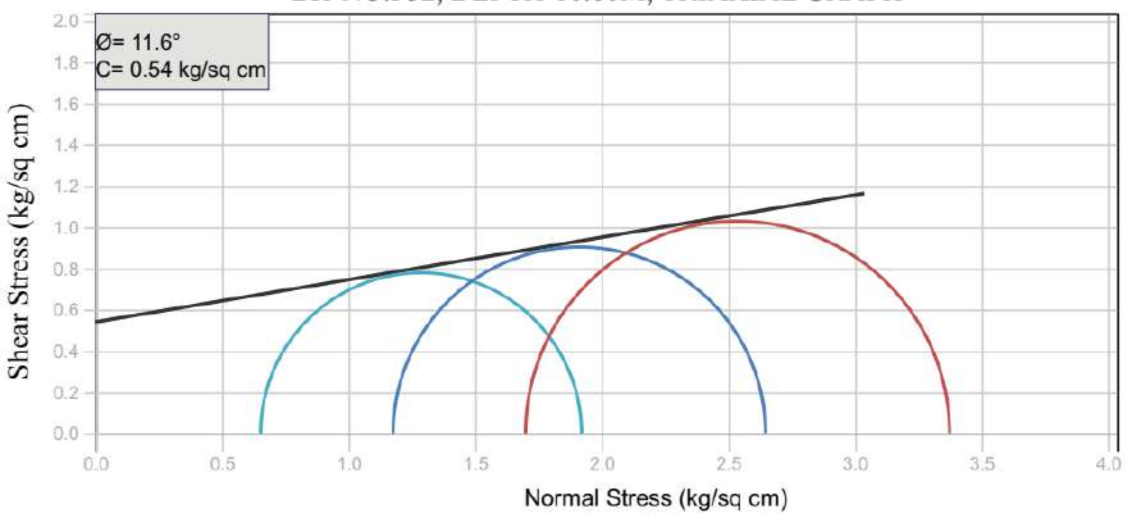
BH-NO.P31, DEPTH-26.00M, TRIAXIAL GRAPH

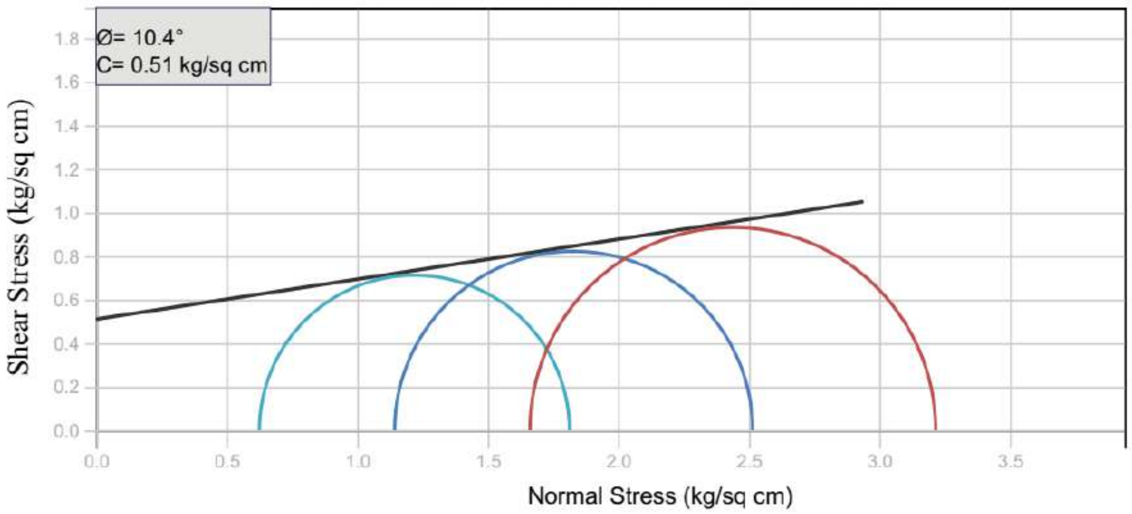


1901-HRIDC-II-21754.287
BH-NO.P32, DEPTH-10.00M, TRIAXIAL GRAPH



APPENDIX-G
GRAPH 14: UU GRAPH

1901-HRIDC-II-21754.287
BH-NO.P32, DEPTH-16.00M, TRIAXIAL GRAPH



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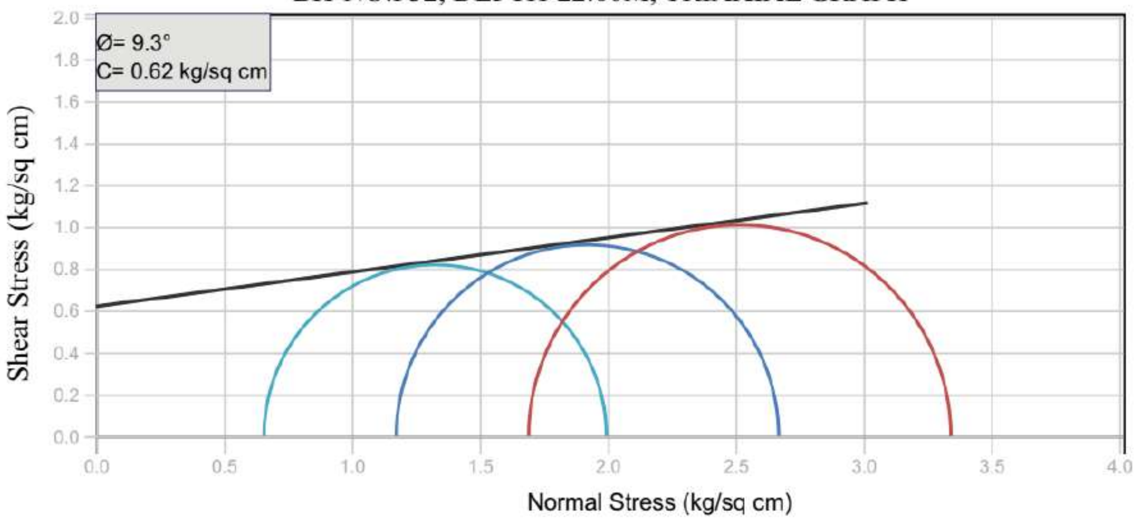
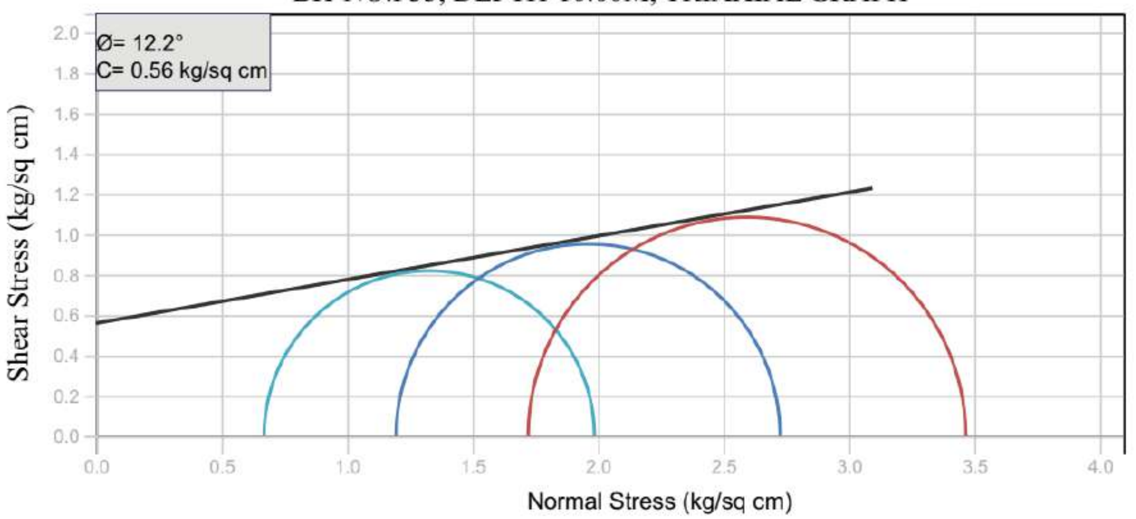
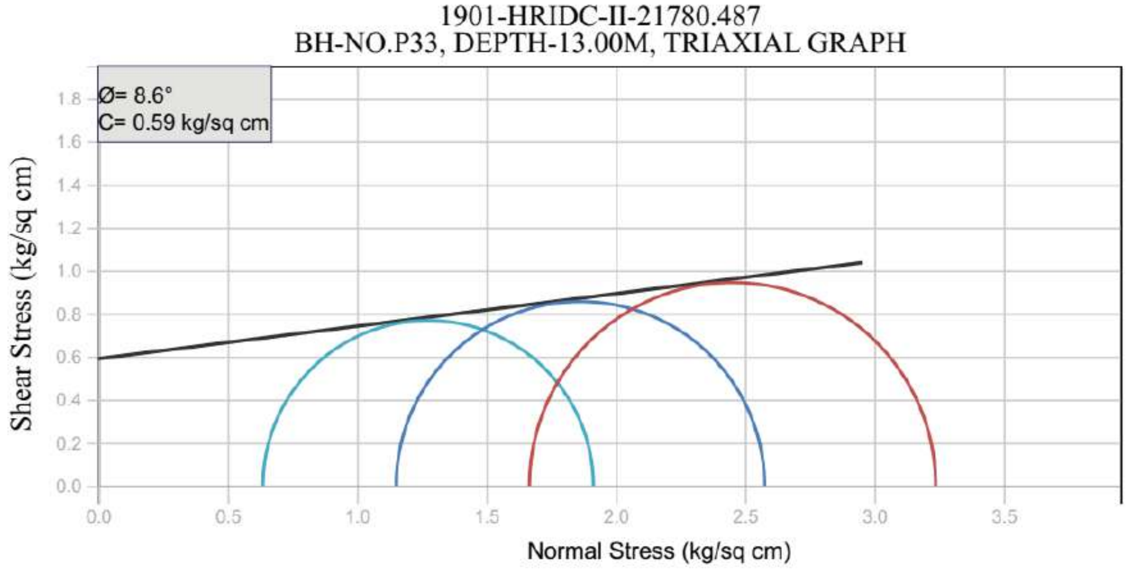
BH-NO.P32, DEPTH-22.00M, TRIAXIAL GRAPH

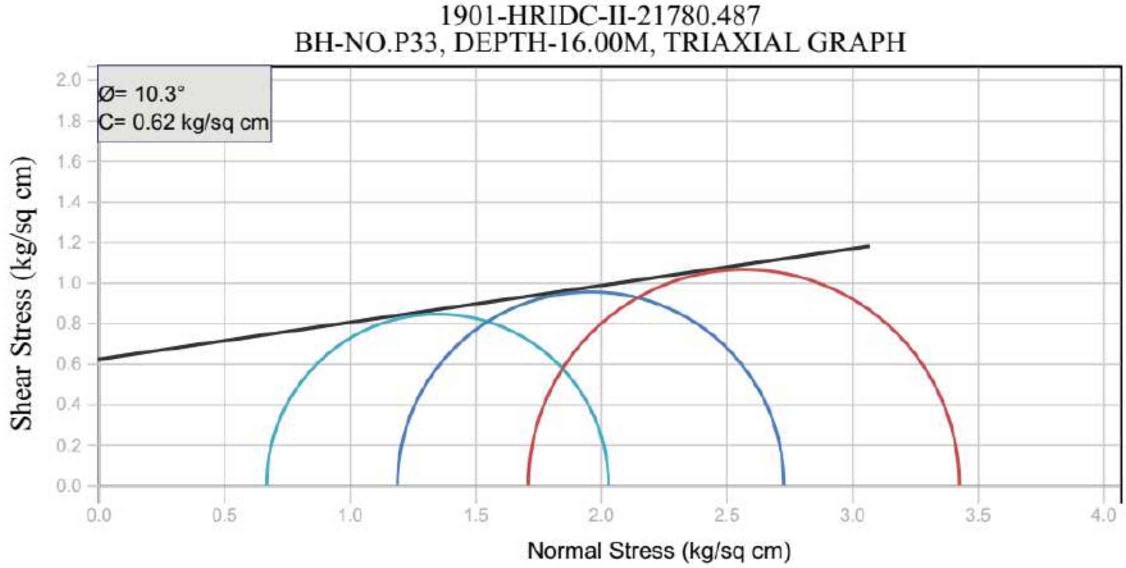


1901-HRIDC-II-21780.487
BH-NO.P33, DEPTH-10.00M, TRIAXIAL GRAPH

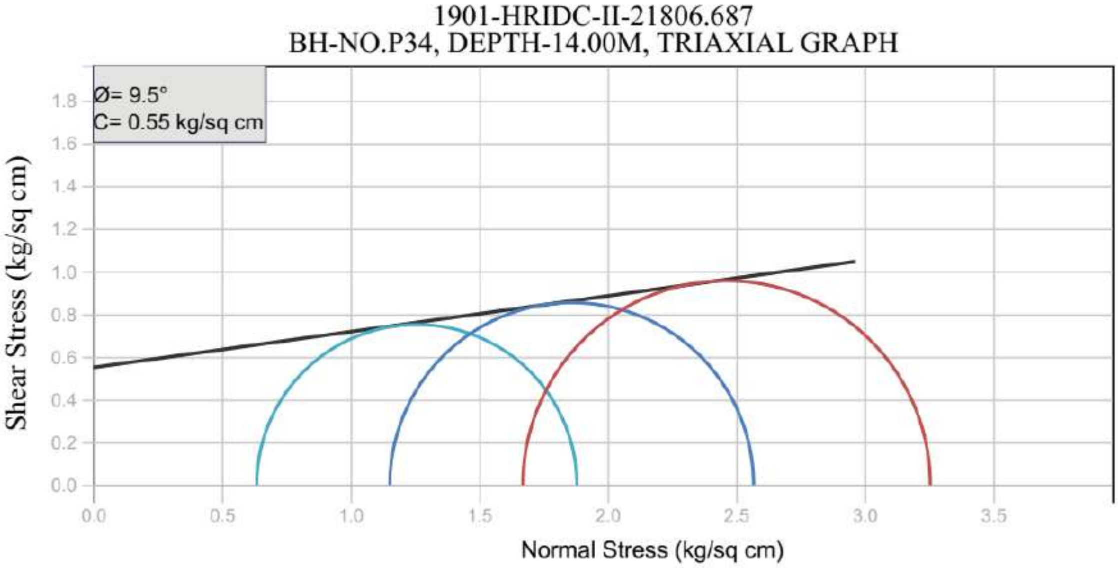


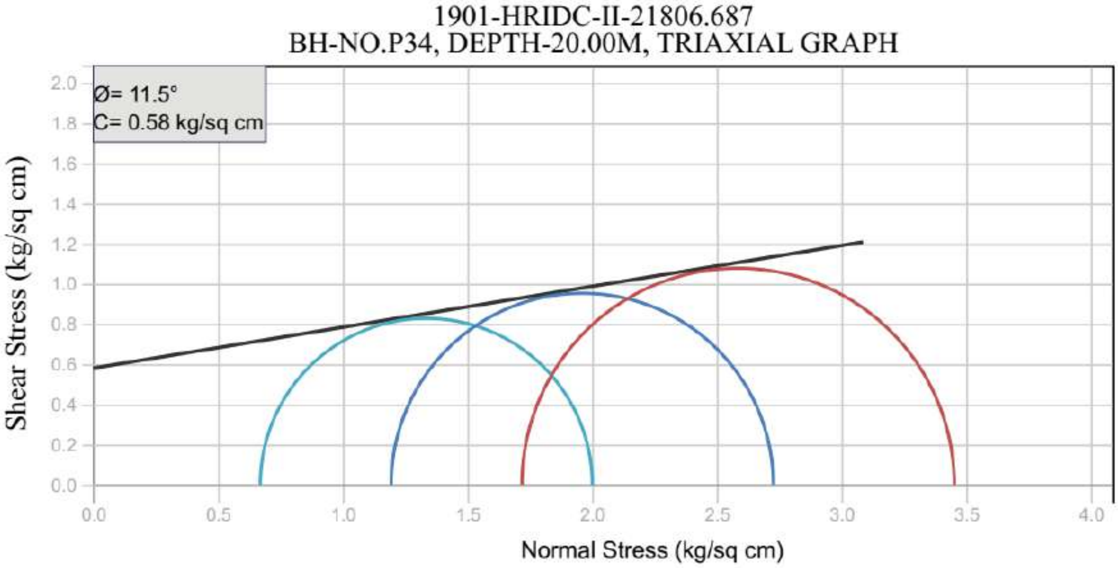
APPENDIX-G
GRAPH 15: UU GRAPH

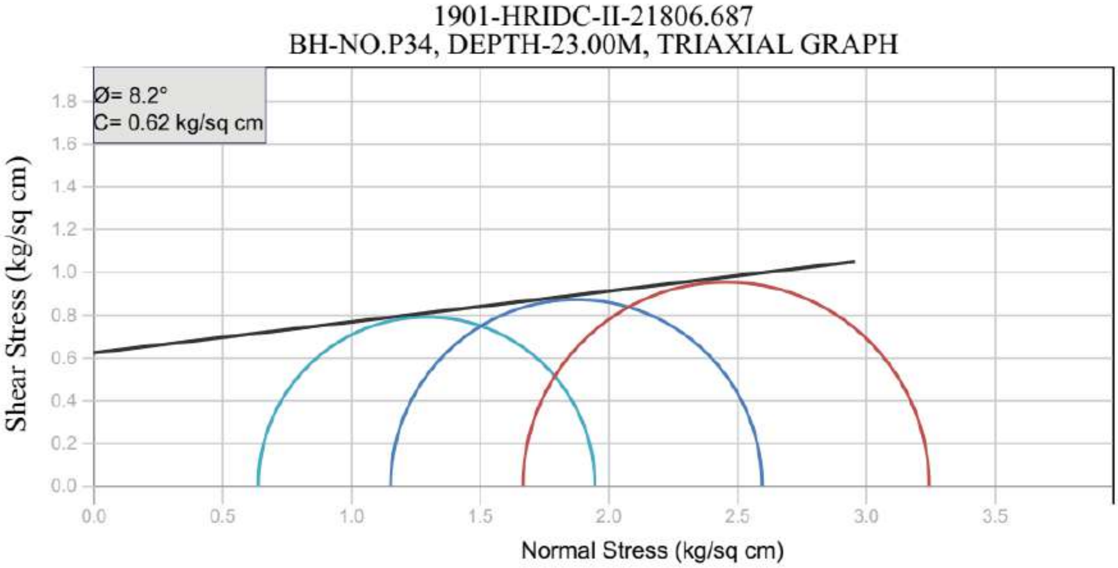




APPENDIX-G
GRAPH 16: UU GRAPH

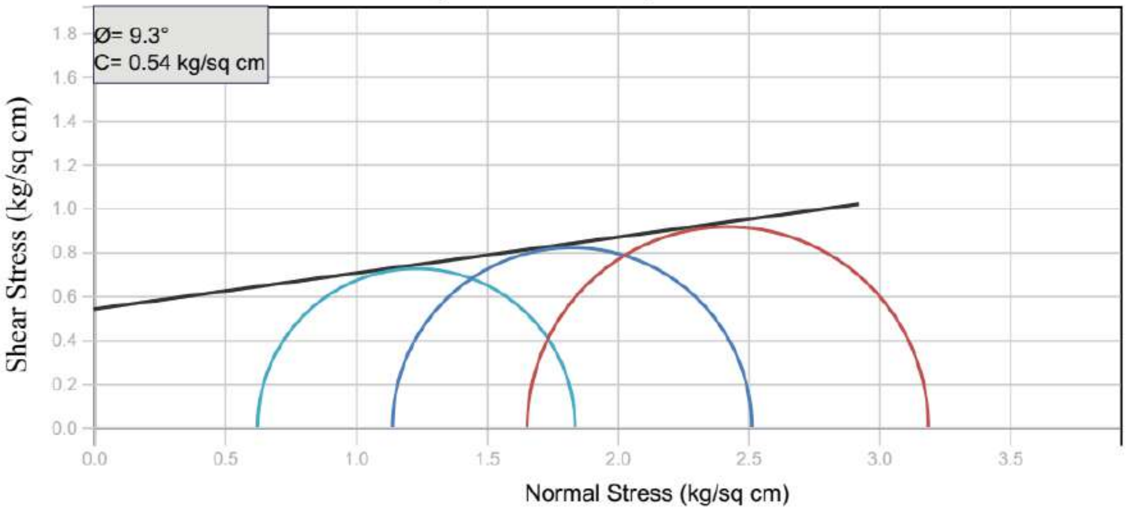




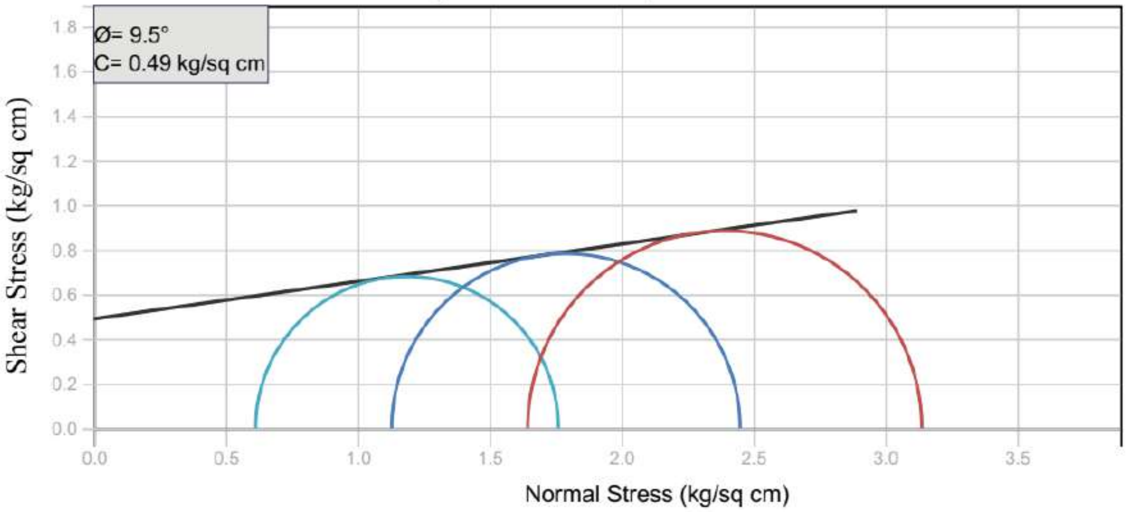


APPENDIX-G
GRAPH 17: UU GRAPH

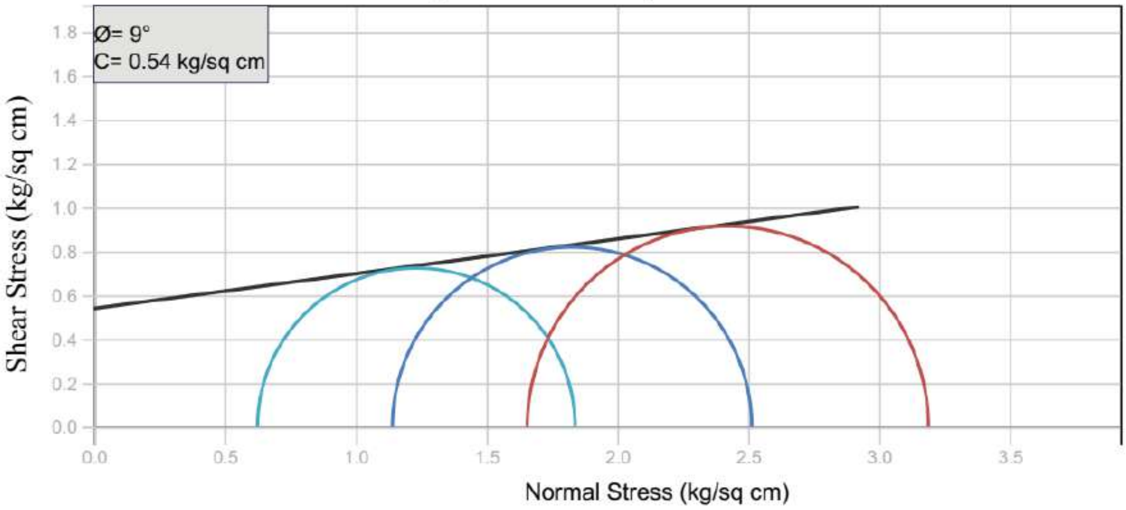
1901-HRIDC-II-21832.887
BH-NO.P35, DEPTH-11.00M, TRIAXIAL GRAPH



1901-HRIDC-II-21859.087
BH-NO.P36, DEPTH-10.00M, TRIAXIAL GRAPH

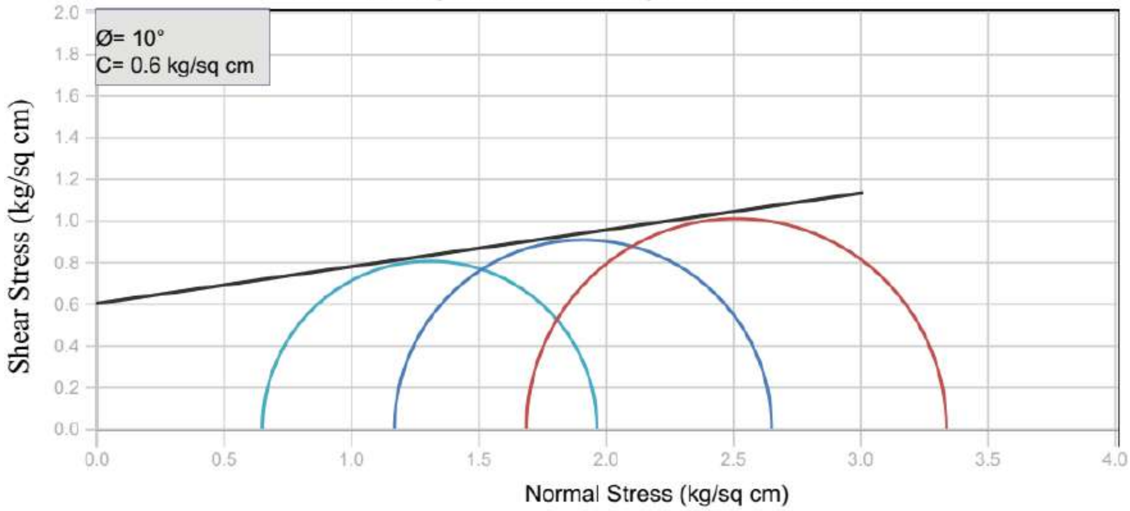


1901-HRIDC-II-21859.087
BH-NO.P36, DEPTH-16.00M, TRIAXIAL GRAPH

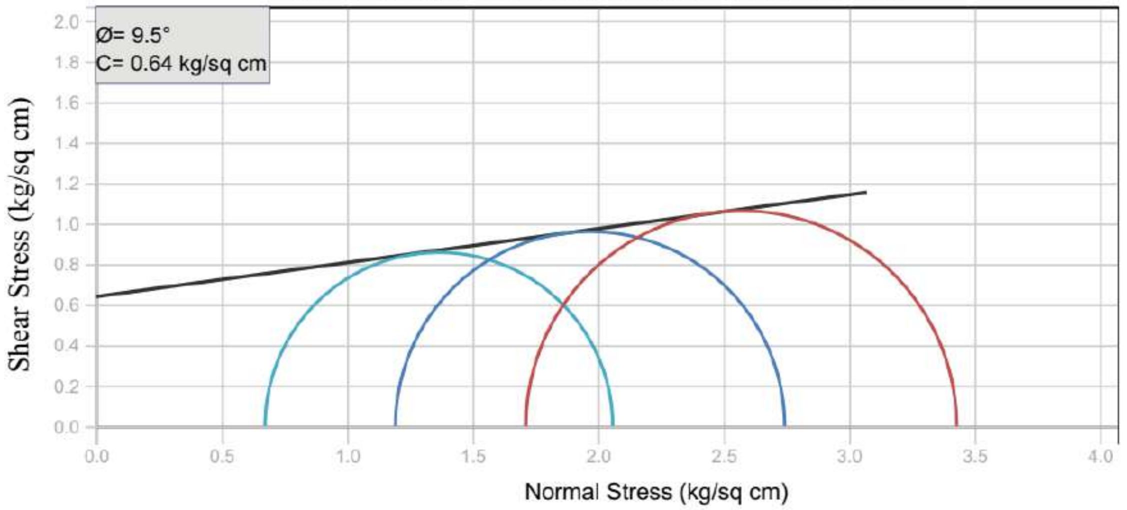


APPENDIX-G
GRAPH 18: UU GRAPH

1901-HRIDC-II-21859.087
BH-NO.P36, DEPTH-19.00M, TRIAXIAL GRAPH



1901-HRIDC-II-21859.087
BH-NO.P36, DEPTH-22.00M, TRIAXIAL GRAPH



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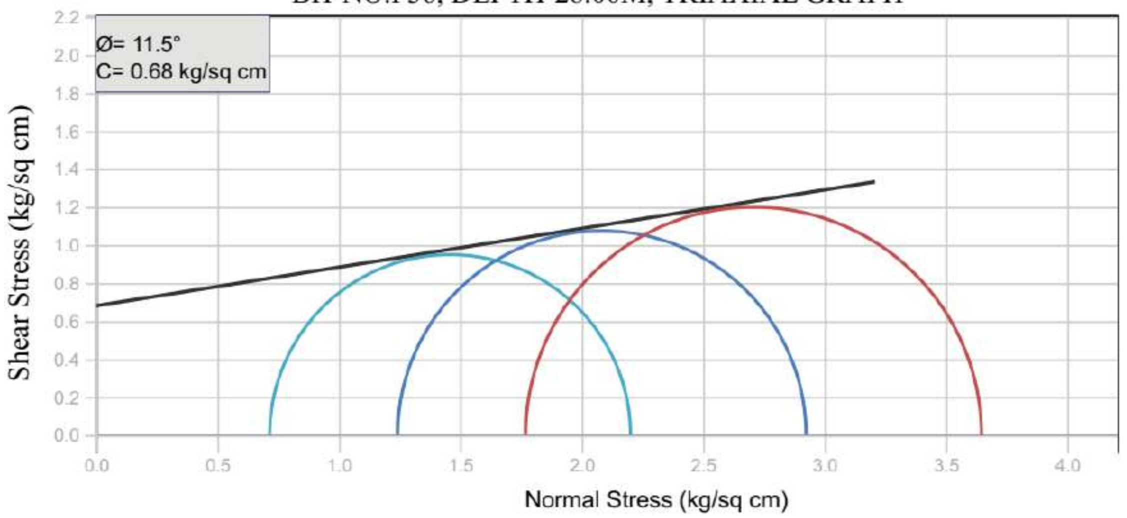
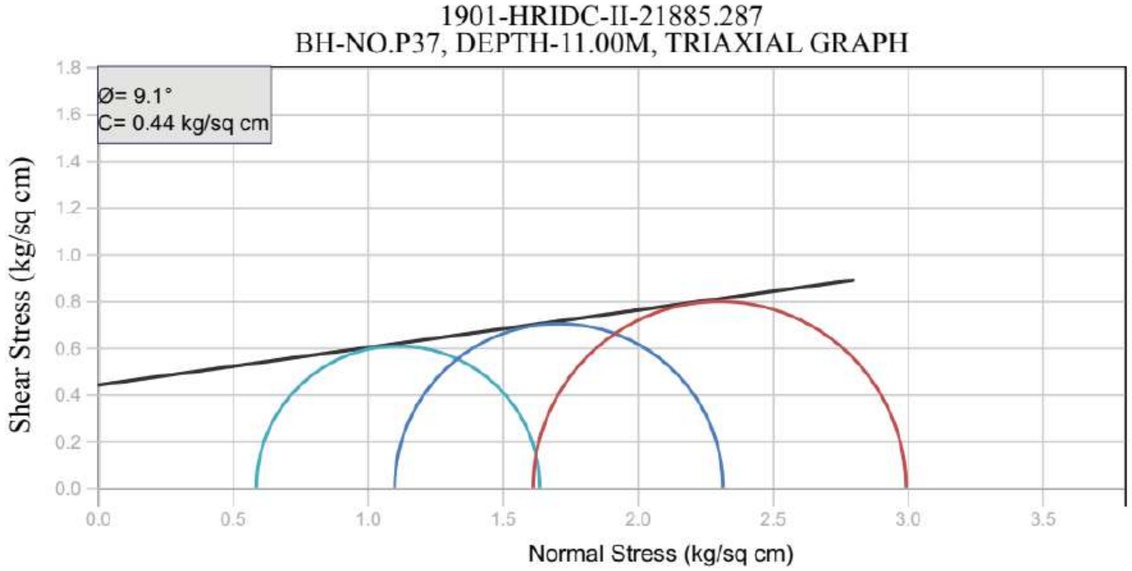
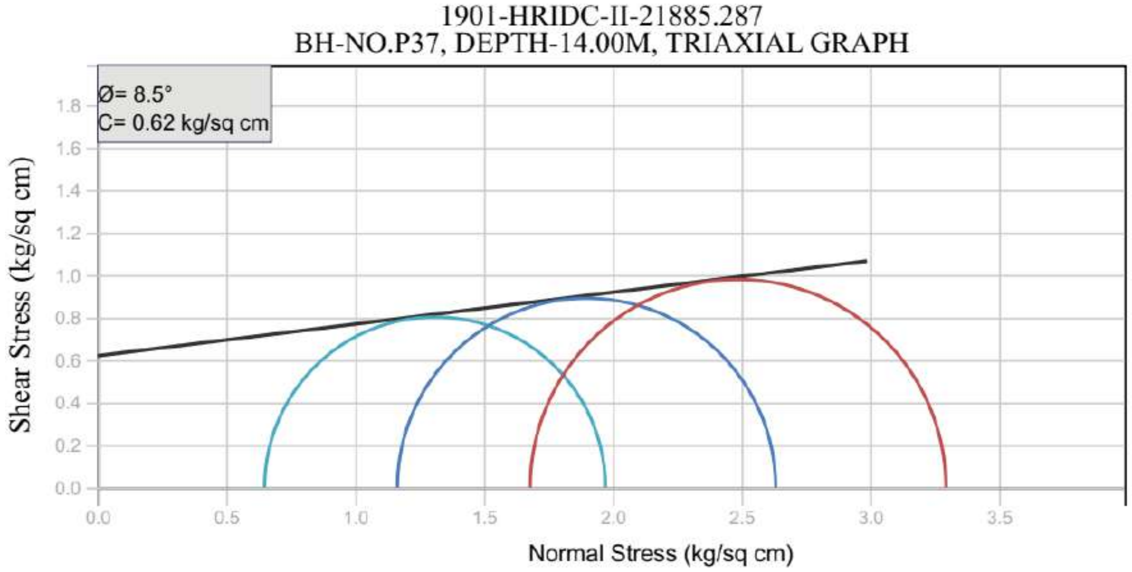
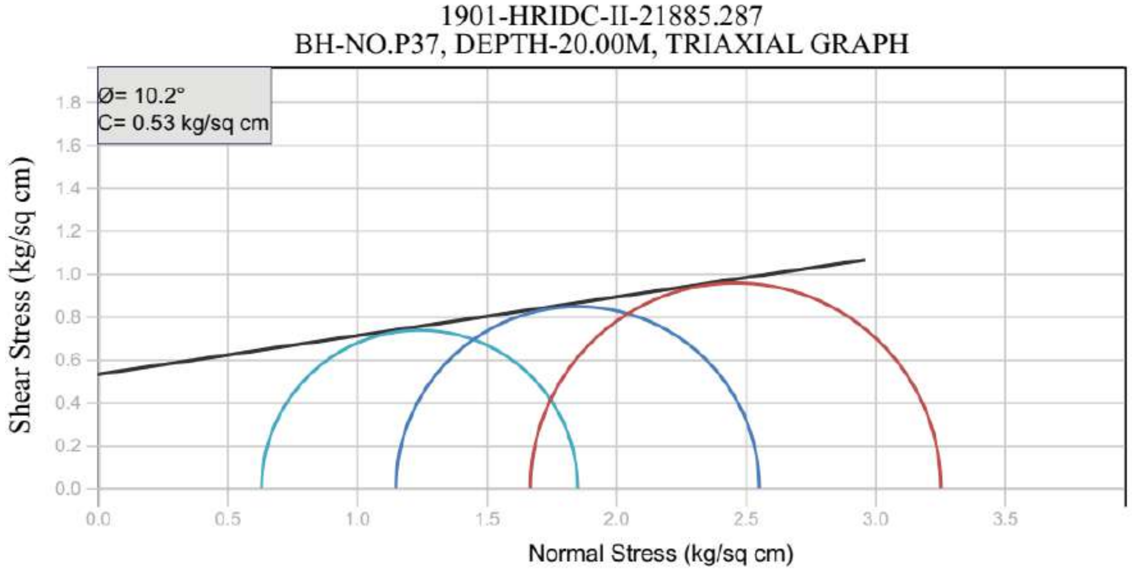
BH-NO.P36, DEPTH-28.00M, TRIAXIAL GRAPH



APPENDIX-G
GRAPH 19: UU GRAPH

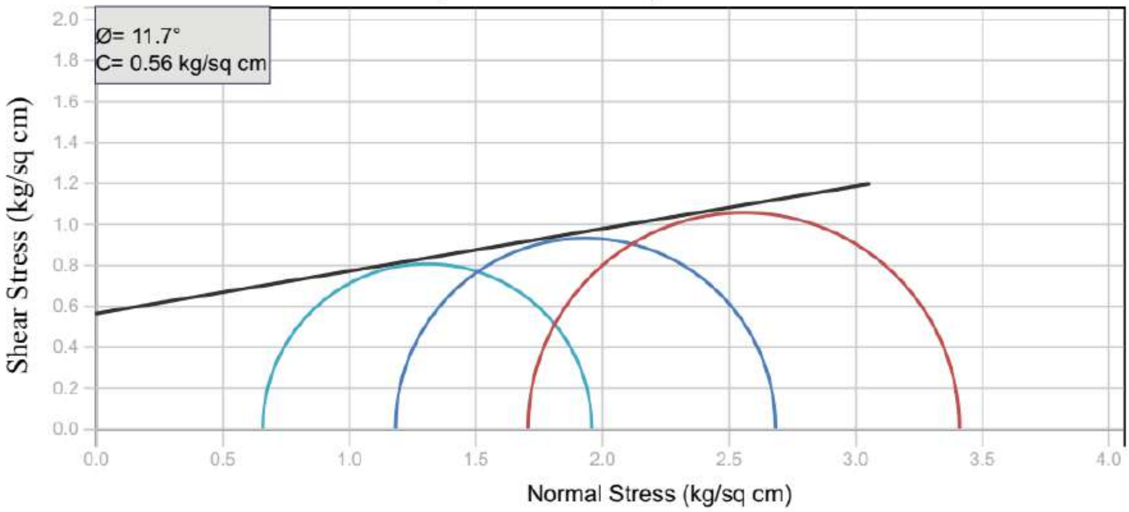




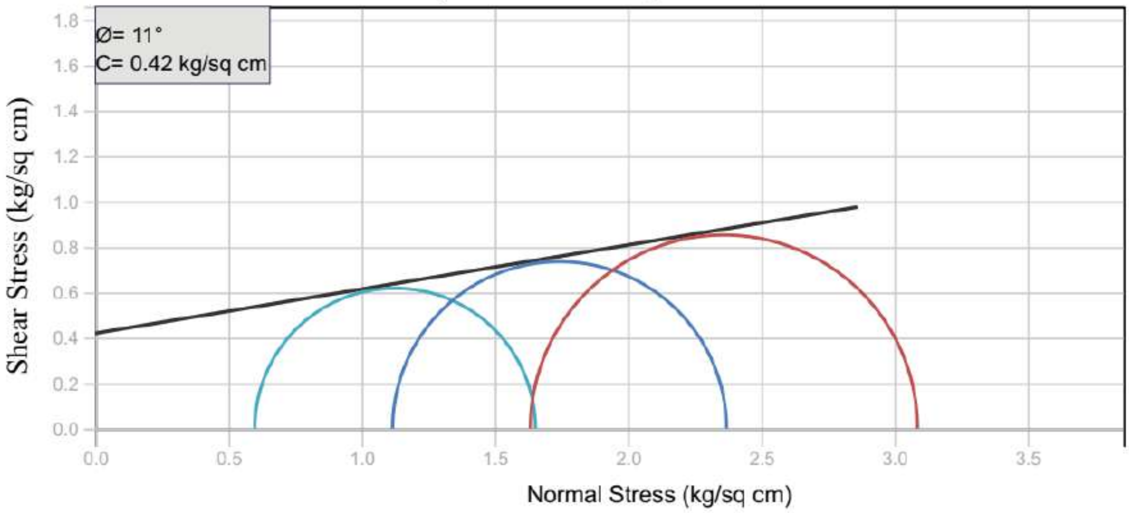


APPENDIX-G
GRAPH 20: UU GRAPH

1901-HRIDC-II-21885.287
BH-NO.P37, DEPTH-23.00M, TRIAXIAL GRAPH



1901-HRIDC-II-21911.487
BH-NO.P38, DEPTH-10.00M, TRIAXIAL GRAPH



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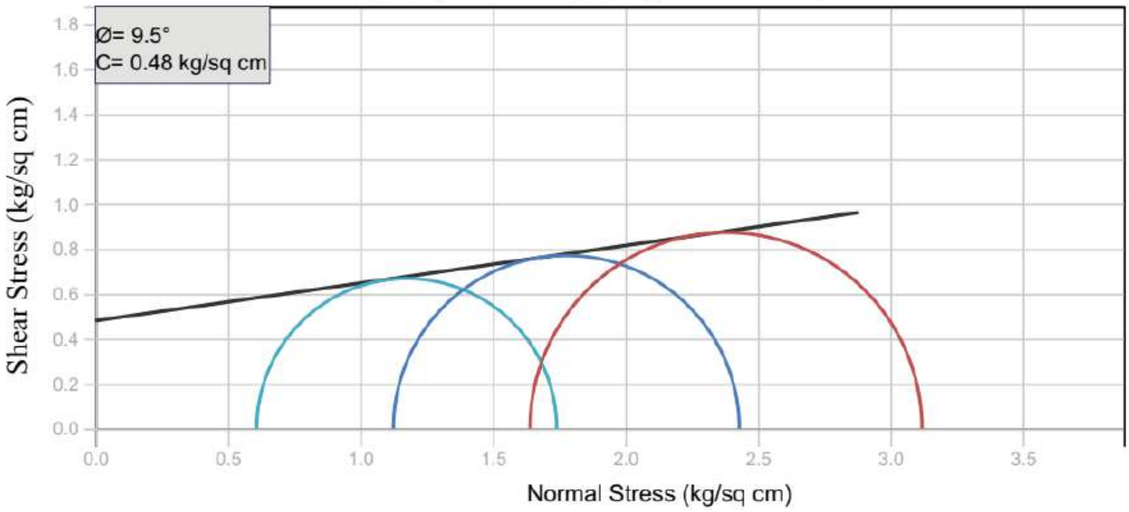
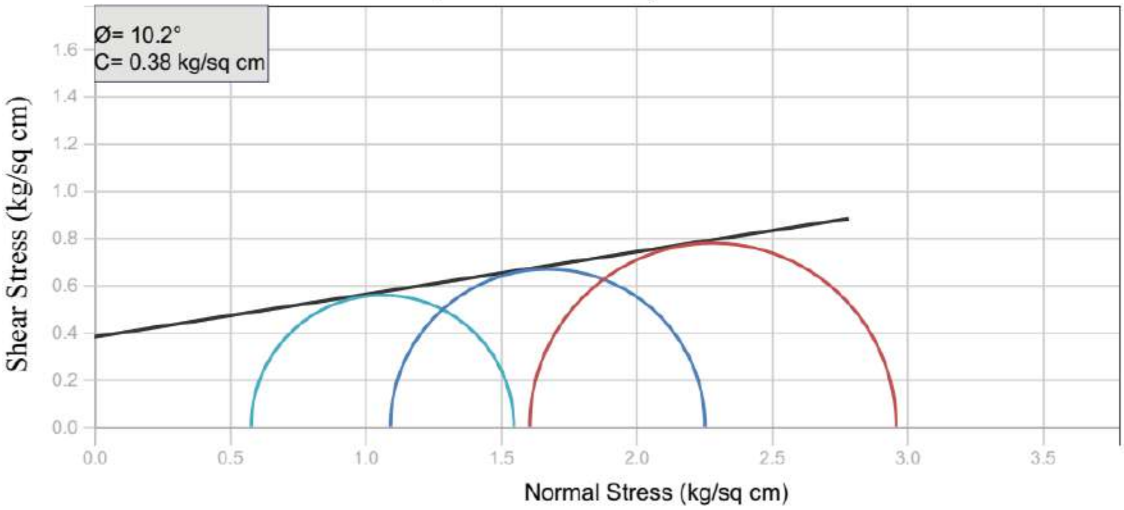
BH-NO.P38, DEPTH-16.00M, TRIAXIAL GRAPH

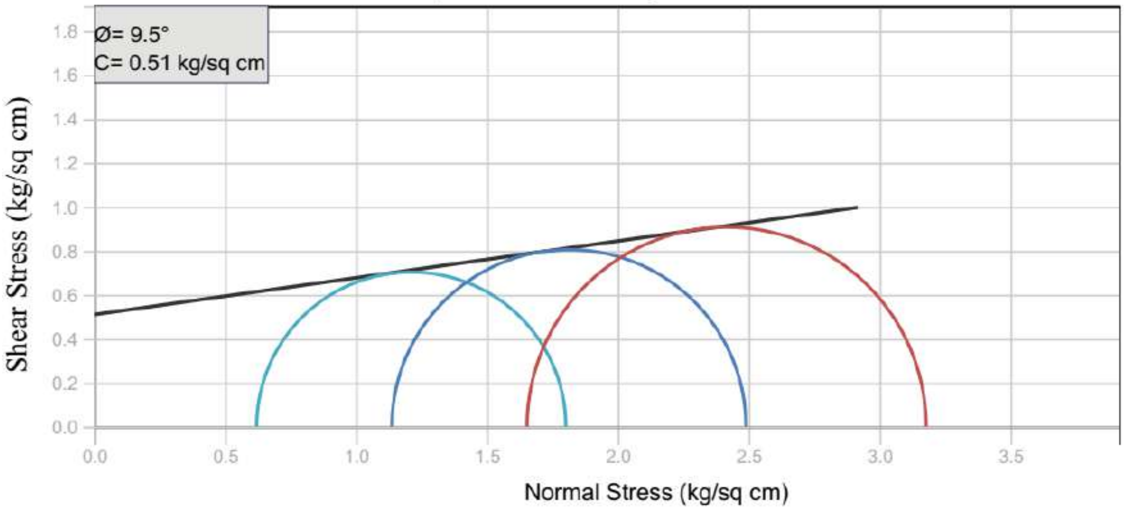


APPENDIX-G
GRAPH 21: UU GRAPH

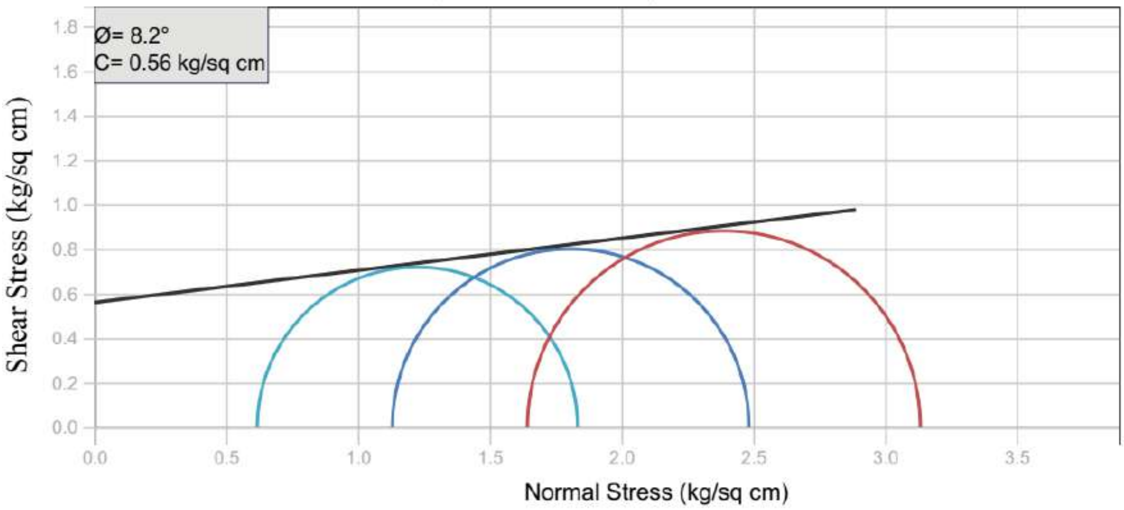
1901-HRIDC-II-21911.487
BH-NO.P38, DEPTH-22.00M, TRIAXIAL GRAPH



1901-HRIDC-II-21937.687
BH-NO.P39, DEPTH-10.00M, TRIAXIAL GRAPH

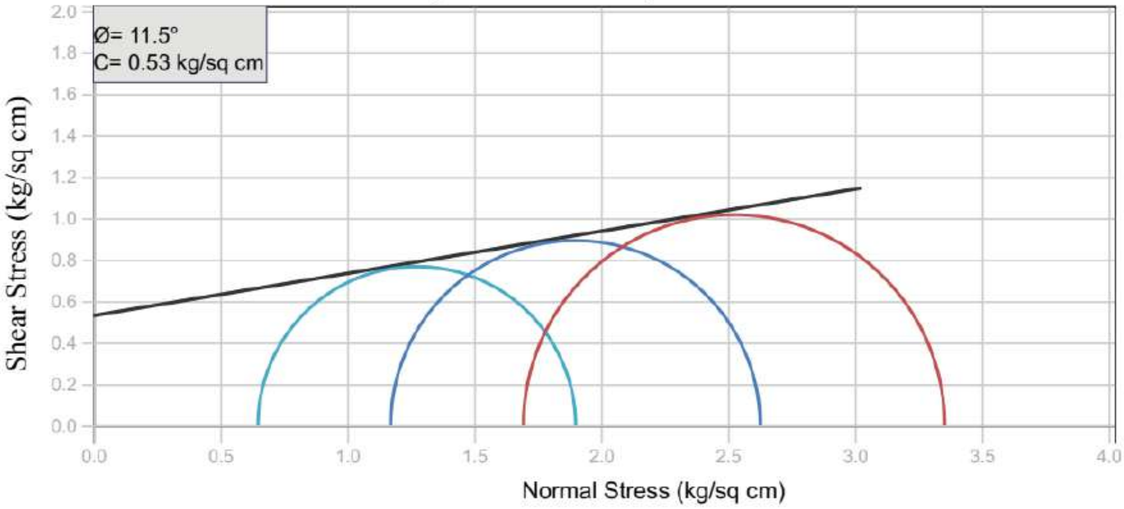


1901-HRIDC-II-21937.687
BH-NO.P39, DEPTH-13.00M, TRIAXIAL GRAPH

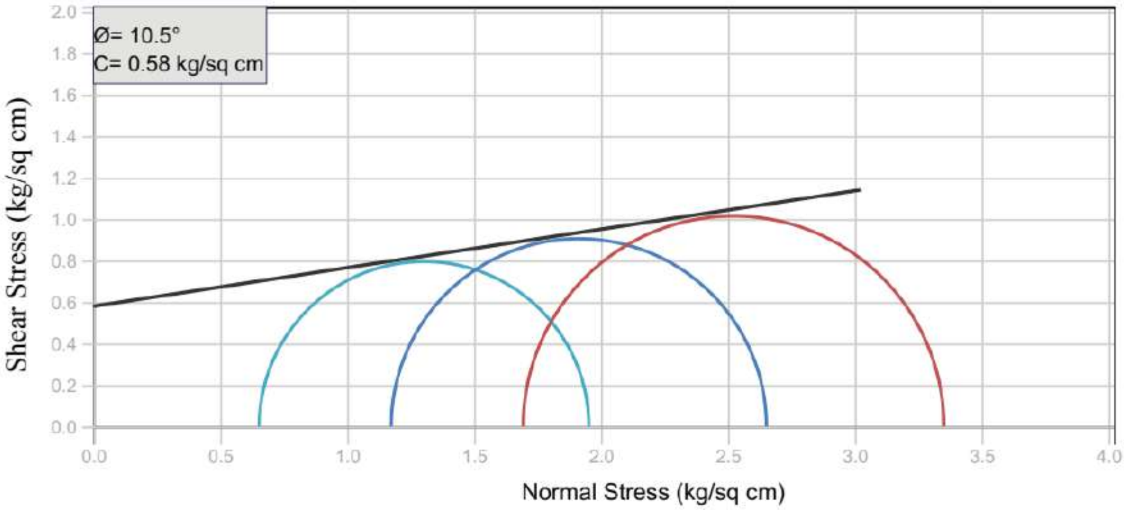


APPENDIX-G
GRAPH 22: UU GRAPH

1901-HRIDC-II-21937.687
BH-NO.P39, DEPTH-16.00M, TRIAXIAL GRAPH



1901-HRIDC-II-21937.687
BH-NO.P39, DEPTH-19.00M, TRIAXIAL GRAPH



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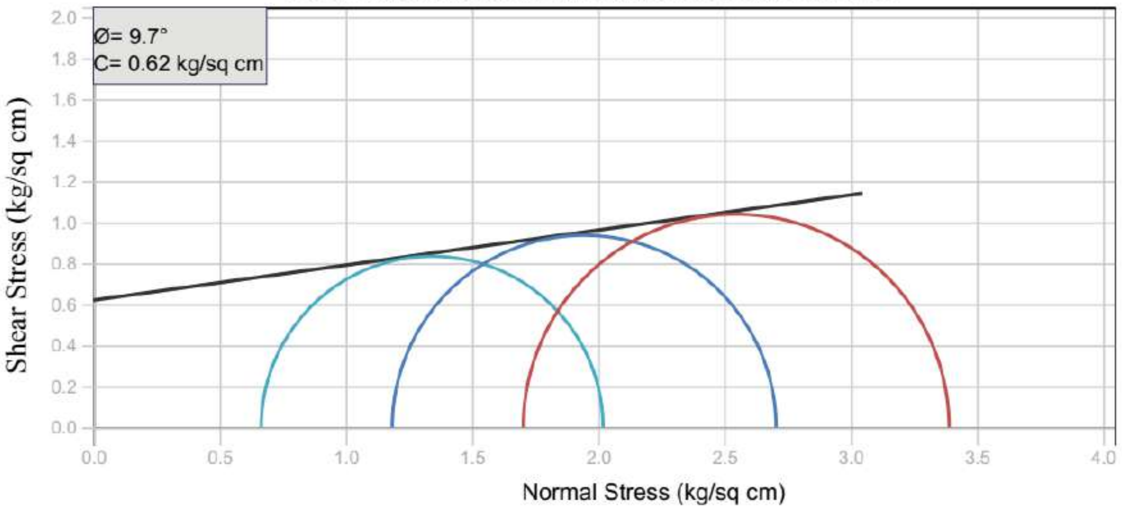
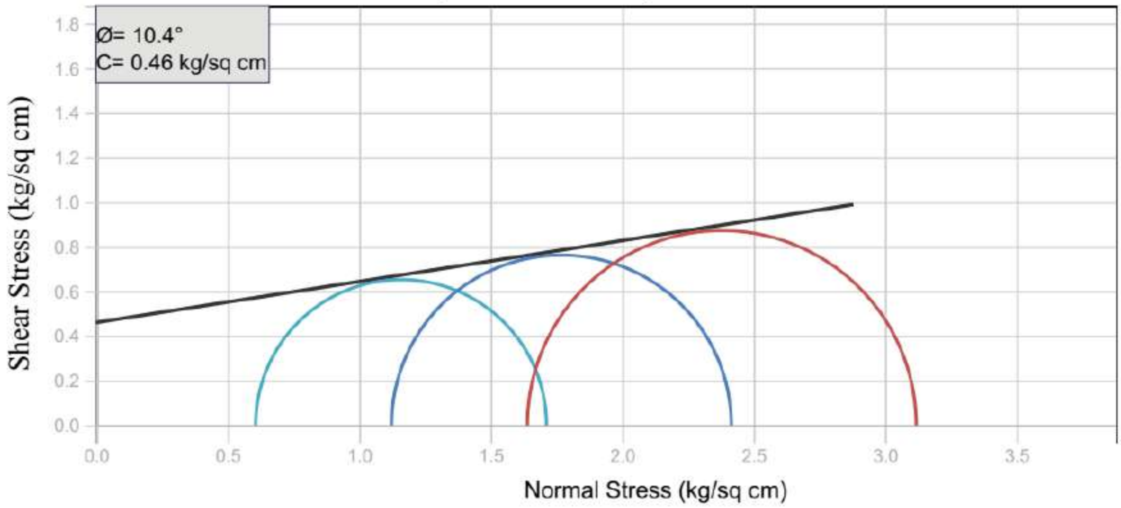
BH-NO.P39, DEPTH-22.00M, TRIAXIAL GRAPH

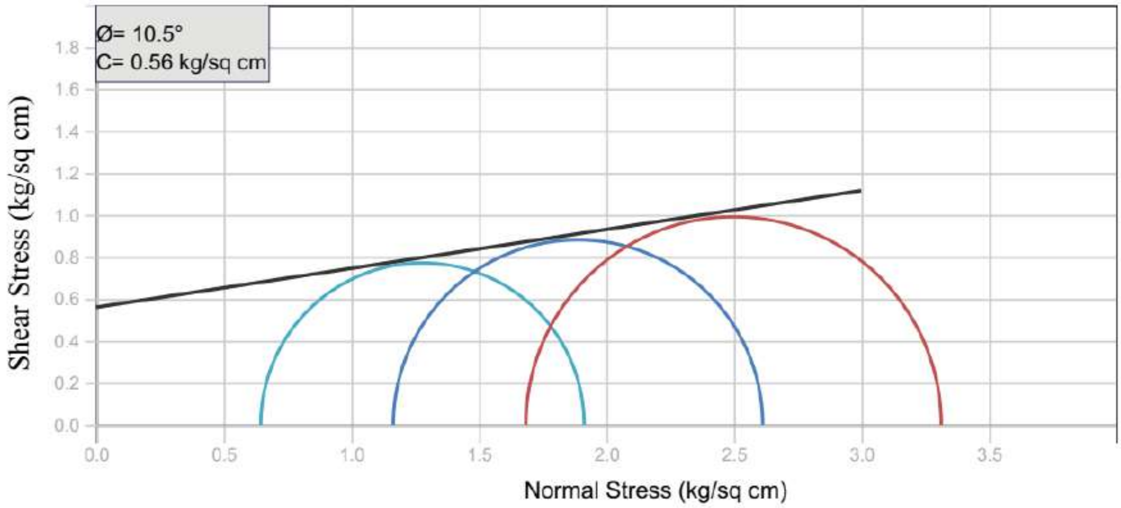


APPENDIX-G
GRAPH 23: UU GRAPH

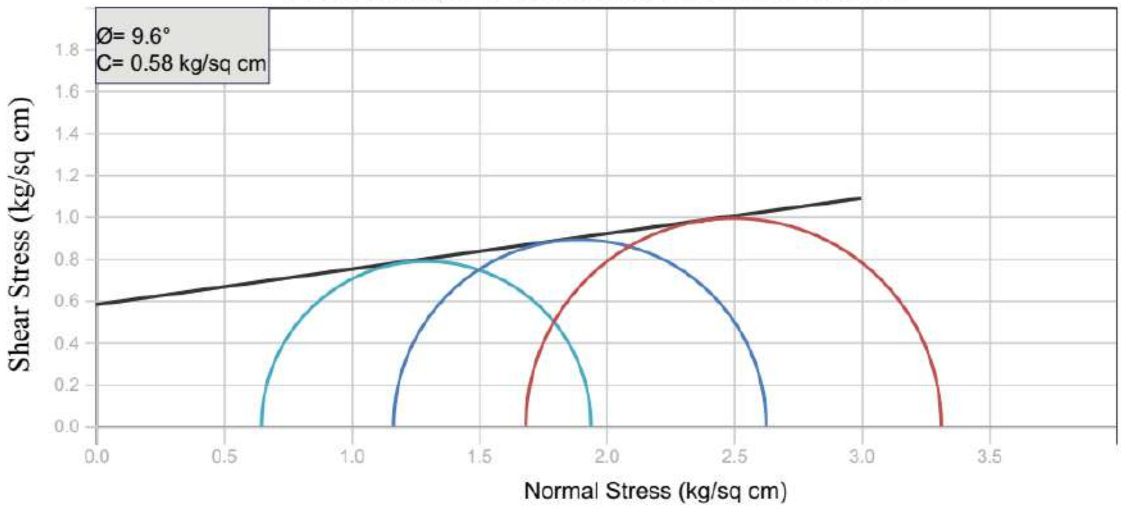
1901-HRIDC-II-21937.687
BH-NO.P39, DEPTH-25.00M, TRIAXIAL GRAPH



1901-HRIDC-II-21963.887
BH-NO.P40, DEPTH-10.00M, TRIAXIAL GRAPH

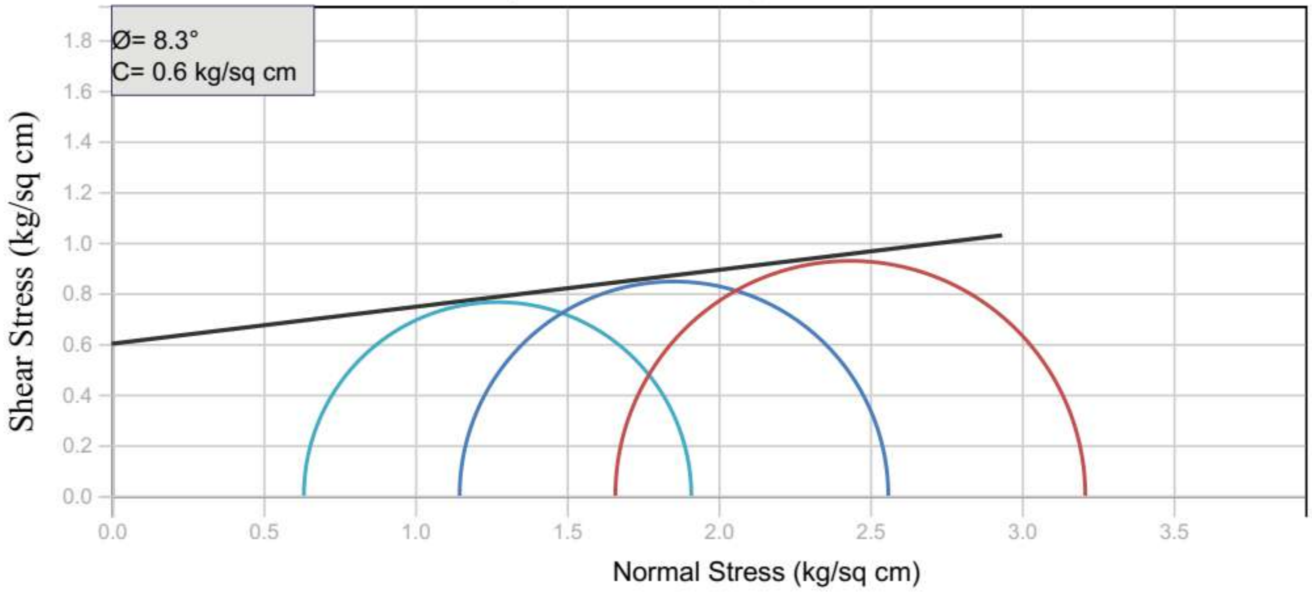


1901-HRIDC-II-21963.887
BH-NO.P40, DEPTH-13.00M, TRIAXIAL GRAPH

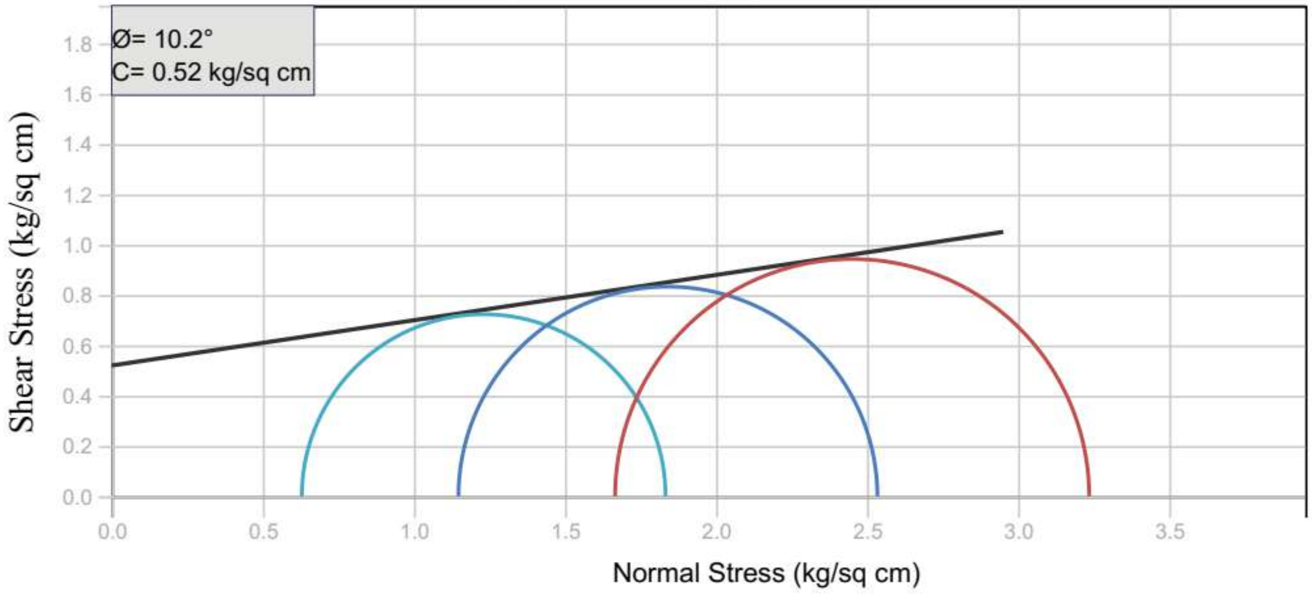


APPENDIX-G
GRAPH 24: UU GRAPH

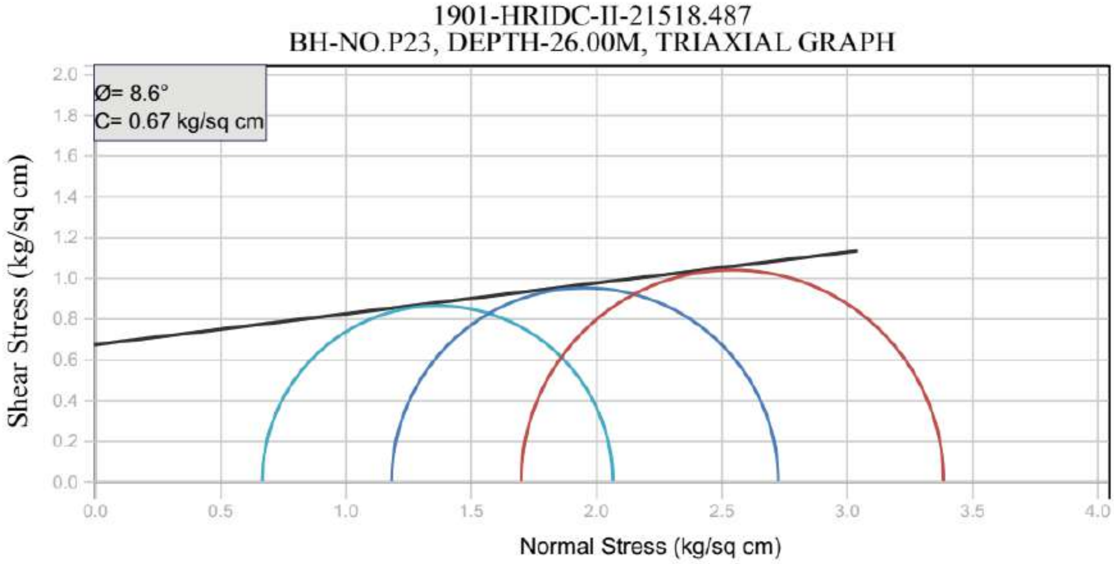
1901-HRIDC-II-21963.887
BH-NO.P40, DEPTH-16.00M, TRIAXIAL GRAPH

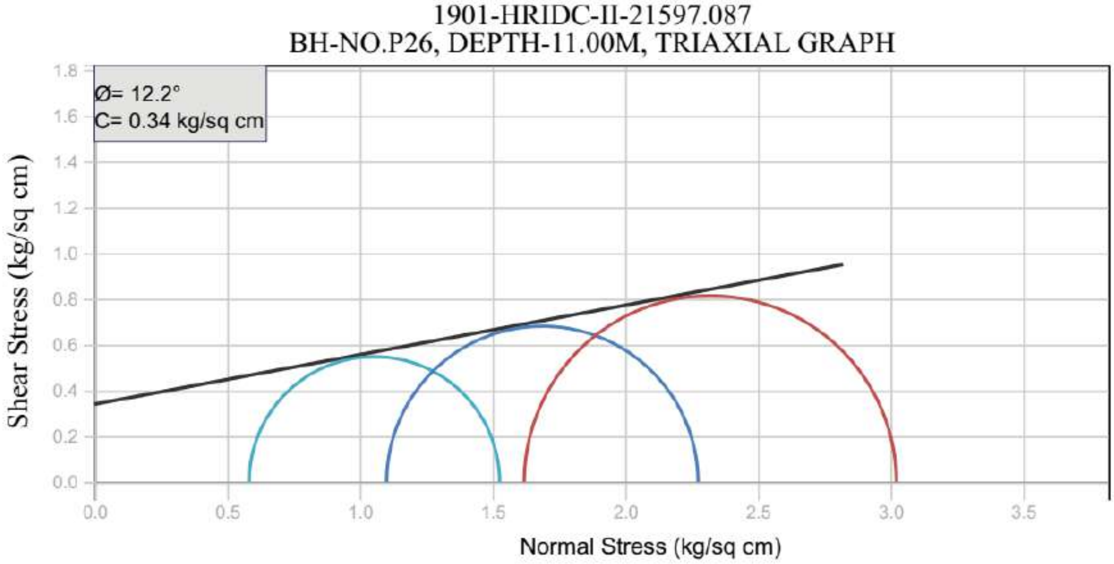


1901-HRIDC-II-21963.887
BH-NO.P40, DEPTH-19.00M, TRIAXIAL GRAPH



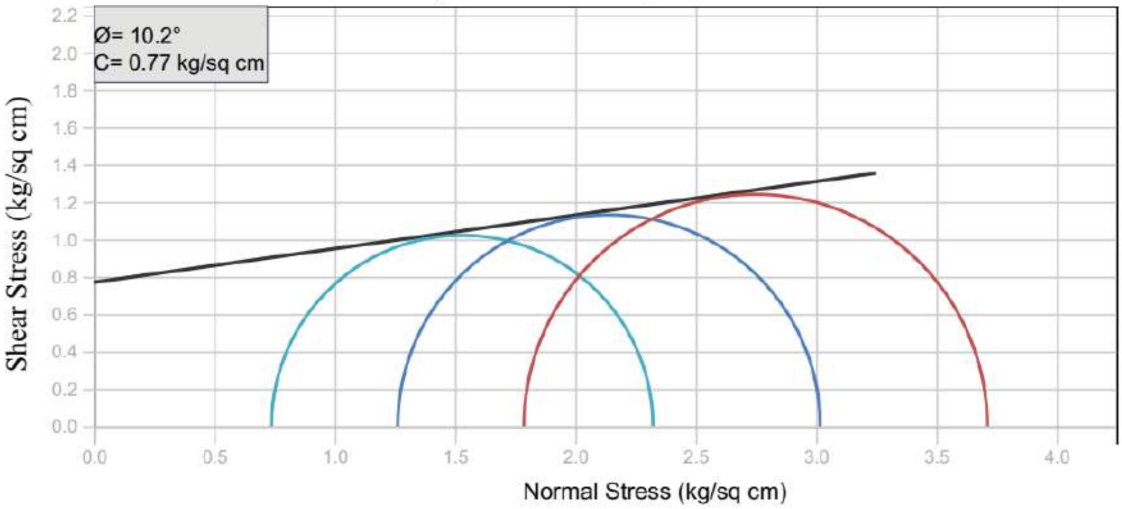
APPENDIX-G
GRAPH 25: RUU GRAPH



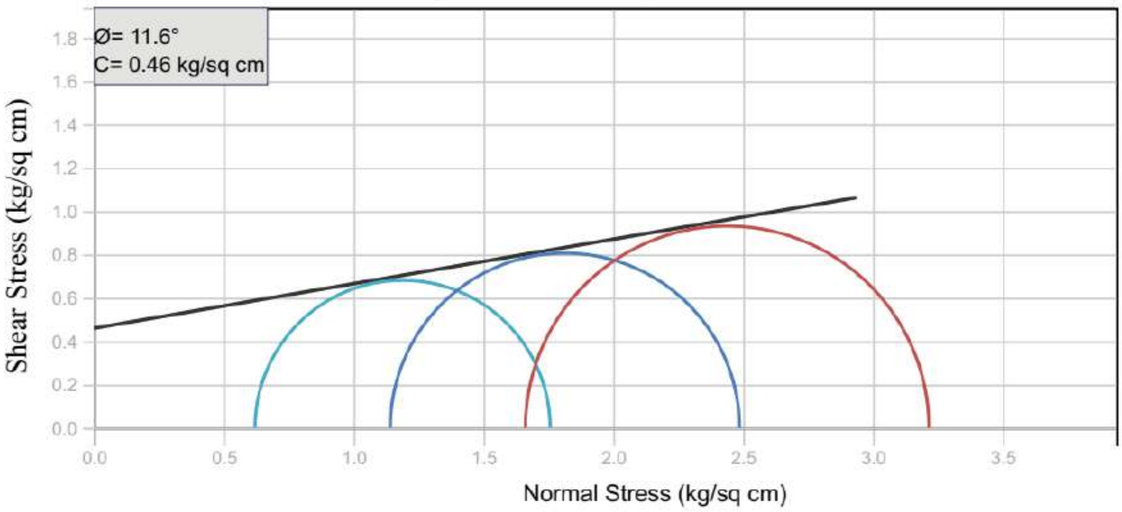


APPENDIX-G
GRAPH 26: RUU GRAPH

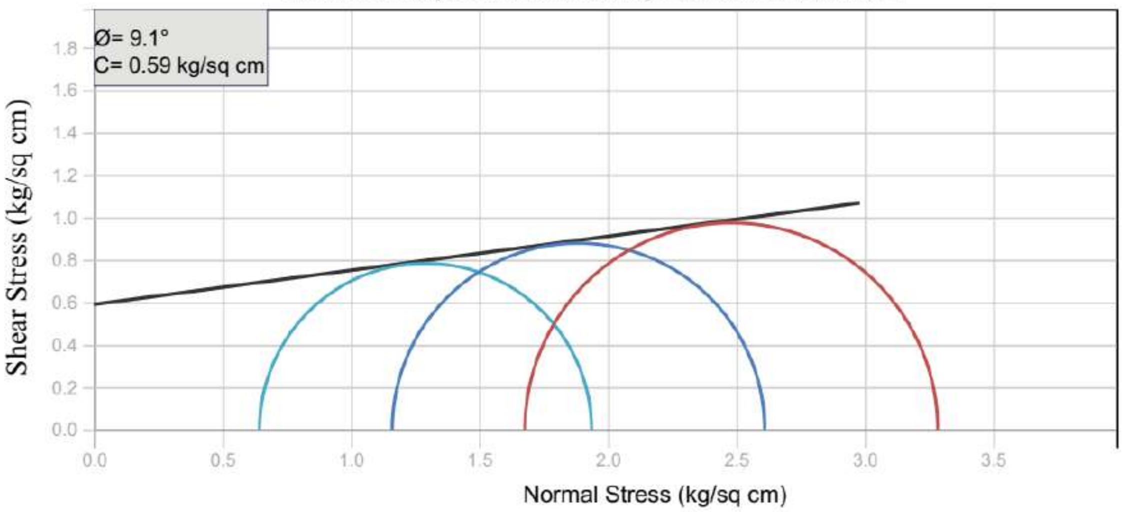
1901-HRIDC-II-21597.087
BH-NO.P26, DEPTH-26.00M, TRIAXIAL GRAPH



1901-HRIDC-II-21649.487
BH-NO.P28, DEPTH-26.00M, TRIAXIAL GRAPH

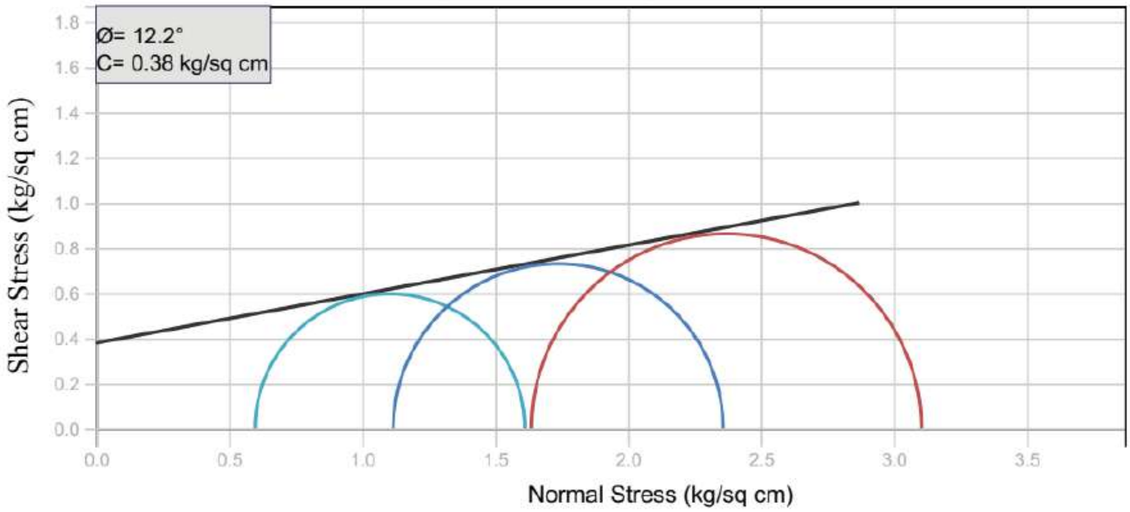


1901-HRIDC-II-21806.687
BH-NO.P34, DEPTH-29.00M, TRIAXIAL GRAPH



APPENDIX-G
GRAPH 27: RUU GRAPH

1901-HRIDC-II-21832.887
BH-NO.P35, DEPTH-23.00M, TRIAXIAL GRAPH



1901-HRIDC-II-21832.887
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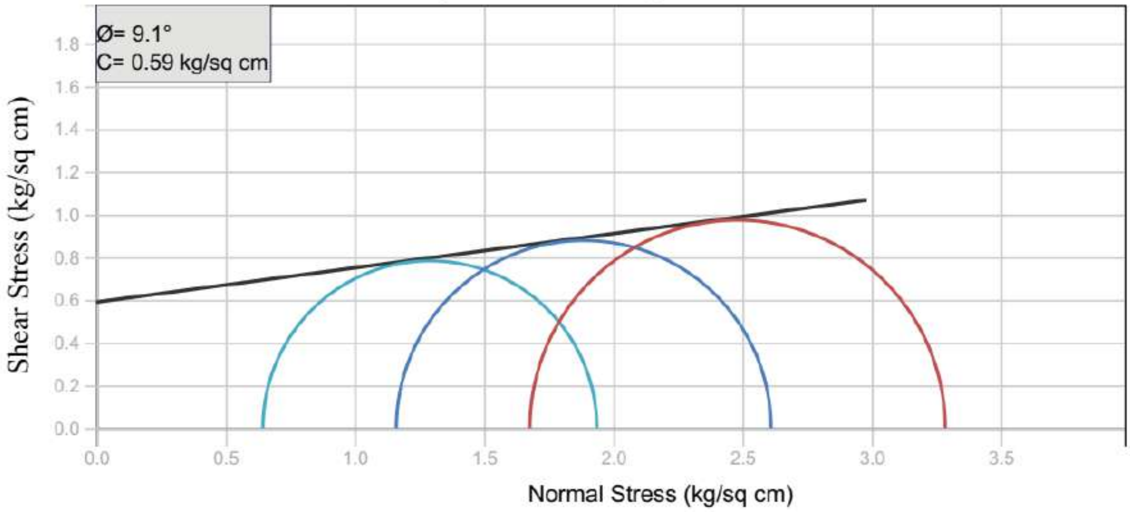
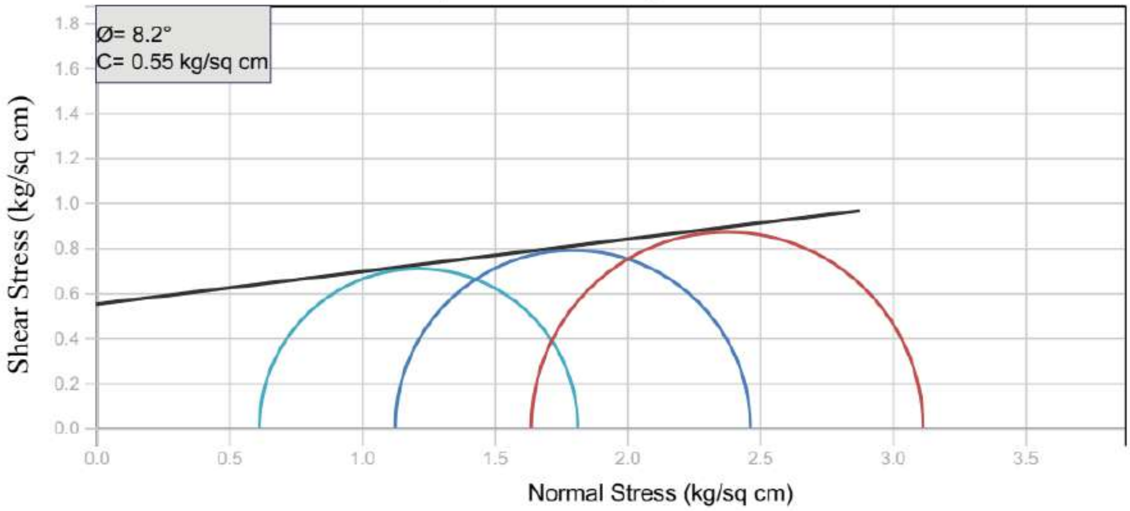
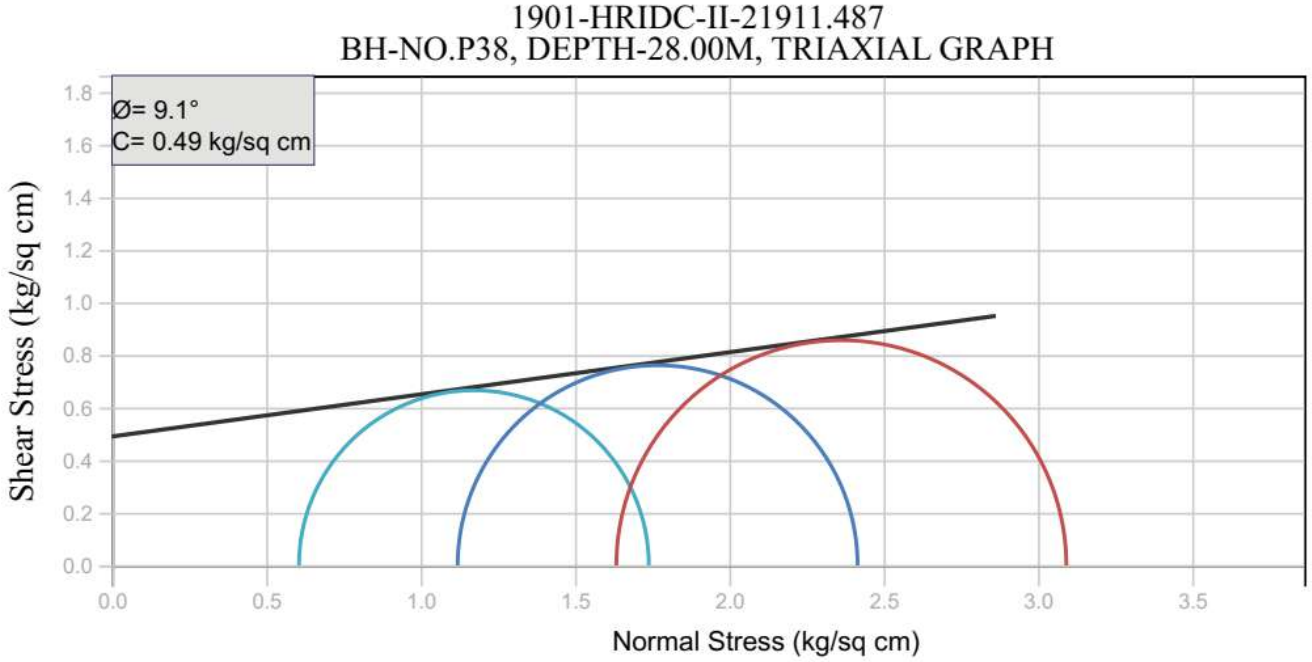
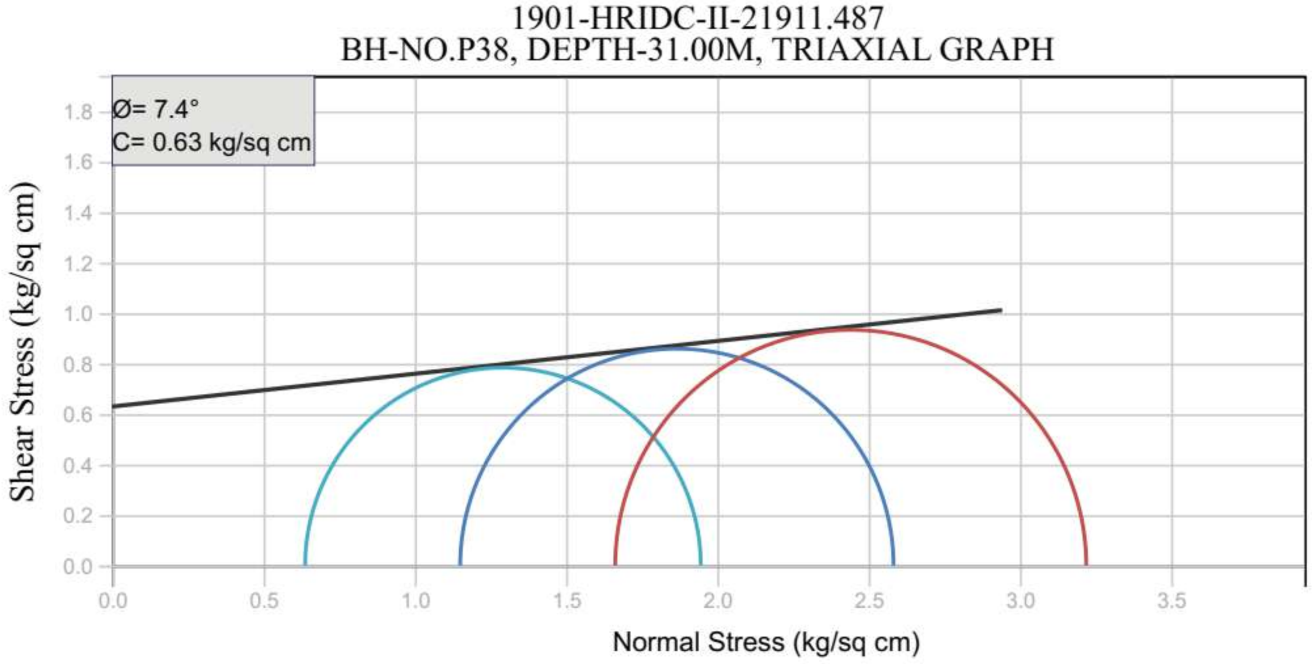


1901-HRIDC-II-21911.487
BH-NO.P38, DEPTH-13.00M, TRIAXIAL GRAPH

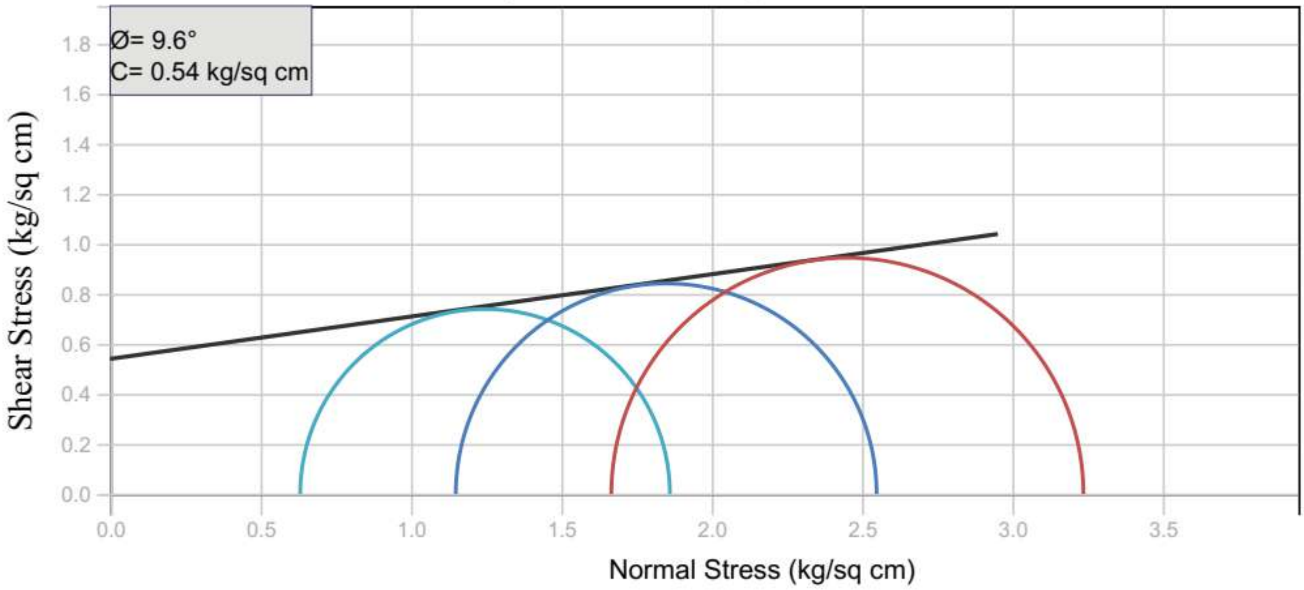


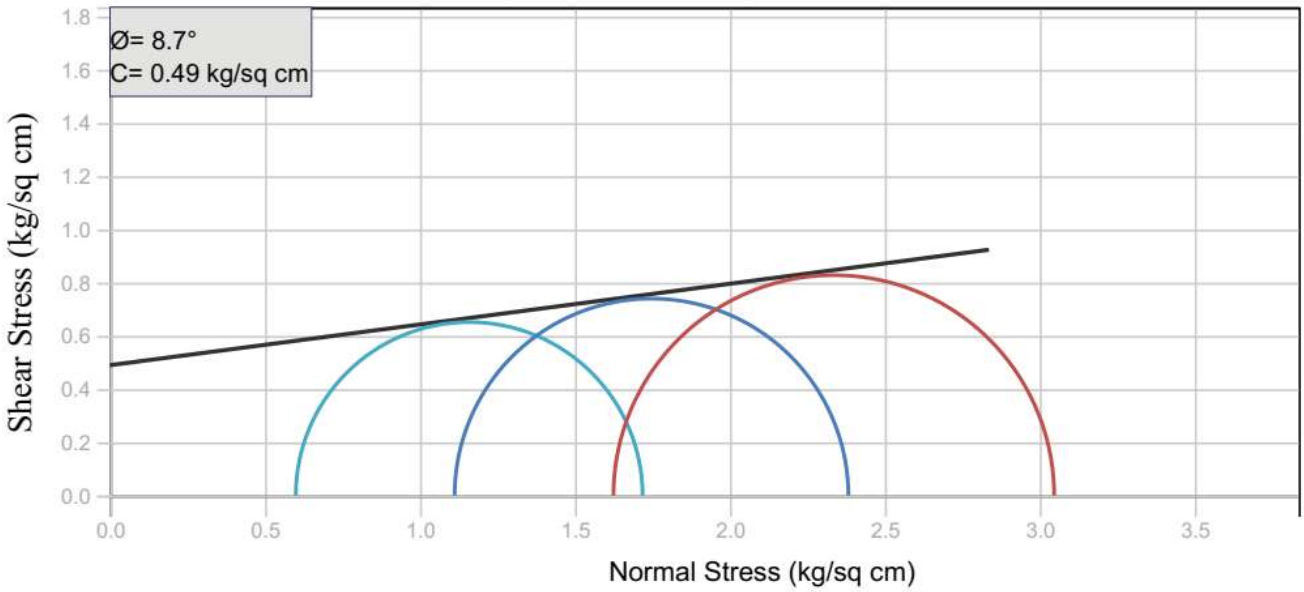
APPENDIX-G
GRAPH 28: RUU GRAPH





APPENDIX-G
GRAPH 29: RUU GRAPH





APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
BORE NO: P21, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	18.09	8.09	22.25	1.57	27.2	27.2	1.0	17.97	0	0	1.0	0.0	0	3.0	27.2	0	9.53	14.95	15.95	24.3	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	5.00	4.00	2.00	2.5	19.53	9.53	33.80	6.29	27.2	27.2	1.0	109.19	0	0	1.0	0.0	0	5.0	27.2	0	9.53	14.95	15.95	43.3	0	0.0	29.5	29.5	**0.00**	**9.82**
5.00	6.00	5.50	1.00	3.5	19.53	9.53	48.10	3.14	27.2	27.2	1.0	77.68	0	0	1.0	0.0	0	6.0	27.1	0	9.53	14.73	15.72	52.9	0	0.0	41.2	41.2	**0.00**	**13.74**
6.00	8.00	7.00	2.00	5.5	19.53	9.53	62.39	6.29	27.1	27.1	1.0	200.68	0	0	1.0	0.0	0	8.0	27.4	0	10.00	15.40	16.41	71.9	935.0	935.0	64.8	64.8	**373.98**	**21.60**
8.00	9.00	8.50	1.00	6.5	20.00	10.00	76.92	3.14	27.4	27.4	1.0	125.31	125.31	0	1.0	0.0	0.0	9.0	8.1	59	10.00	2.13	0.93	81.9	557.8	683.1	76.6	201.9	**273.26**	**67.30**
9.00	10.00	9.50	1.00	7.5	20.00	10.00	86.92	3.14	8.1	8.1	1.0	38.88	164.19	59	1.0	185.4	185.4	10.0	29.0	0	10.00	19.01	20.10	91.9	1451.7	1801.4	88.4	438.0	**720.54**	**145.99**
10.00	11.00	10.50	1.00	8.5	20.00	10.00	96.92	3.14	29.0	29.0	1.0	168.85	333.04	0	1.0	0.0	185.4	11.0	10.2	70	10.00	2.53	1.28	101.9	702.5	1221.0	100.1	618.6	**488.40**	**206.20**
11.00	12.00	11.50	1.00	9.5	20.00	10.00	106.92	3.14	10.2	10.2	1.0	60.46	393.50	70	1.0	220.0	405.4	12.0	10.8	70	10.50	2.71	1.45	111.9	738.9	1537.8	111.9	910.8	**615.12**	**303.62**
12.00	14.50	13.25	2.50	12.0	20.50	10.50	125.05	7.86	10.8	10.8	1.0	187.42	580.92	70	1.0	550.0	955.4	14.5	11.4	74	10.58	2.88	1.62	138.2	842.9	2379.2	141.4	1677.7	**951.68**	**559.24**
14.50	17.50	16.00	3.00	15.0	20.58	10.58	125.05	9.43	11.4	11.4	1.0	237.73	818.65	74	1.0	697.7	1653.1	17.5	9.2	62	10.30	2.33	1.10	138.2	695.4	3167.2	176.7	2648.5	**1266.87**	**882.83**
17.50	20.50	19.00	3.00	18.0	20.30	10.30	125.05	9.43	9.2	9.2	1.0	190.96	1009.60	62	1.0	584.6	2237.7	20.5	12.0	67	10.40	3.06	1.79	138.2	813.1	4060.4	212.1	3459.4	**1624.16**	**1153.12**
20.50	23.50	22.00	3.00	21.0	20.40	10.40	125.05	9.43	12.0	12.0	1.0	250.60	1260.20	67	1.0	631.7	2869.4	23.5	12.0	67	10.40	3.06	1.79	138.2	813.1	4942.7	247.4	4377.0	**1977.09**	**1459.01**
23.50	25.00	24.25	1.50	22.5	20.40	10.40	125.05	4.71	12.0	12.0	1.0	125.30	1385.51	67	1.0	315.9	3185.3	25.0	10.2	57	10.24	2.53	1.28	138.2	682.7	5253.5	265.1	4835.9	**2101.41**	**1611.95**
25.00	26.50	25.75	1.50	24.0	20.24	10.24	125.05	4.71	10.2	10.2	1.0	106.07	1491.57	57	1.0	268.7	3454.0	26.5	10.2	57	10.24	2.53	1.28	138.2	682.7	5628.3	282.7	5228.3	**2251.33**	**1742.77**
26.50	27.50	27.00	1.00	25.0	20.24	10.24	125.05	3.14	10.2	10.2	1.0	70.71	1562.29	57	1.0	179.1	3633.1	27.5	10.2	57	10.24	2.53	1.28	138.2	682.7	5878.2	294.5	5490.0	**2351.27**	**1829.98**
27.50	28.00	27.75	0.50	25.5	20.24	10.24	125.05	1.57	10.2	10.2	1.0	35.36	1597.64	57	1.0	89.6	3722.7	28.0	10.2	57	10.24	2.53	1.28	138.2	682.7	6003.1	300.4	5620.8	**2401.24**	**1873.59**
28.00	29.50	28.75	1.50	27.0	20.24	10.24	125.05	4.71	10.2	10.2	1.0	106.07	1703.71	57	1.0	268.7	3991.4	29.5	10.2	57	10.97	2.53	1.28	138.2	683.1	6378.2	318.1	6013.2	**2551.30**	**2004.41**

APPENDIX-H
TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
29.50	30.00	29.75	0.50	27.5	20.97	10.97	125.05	1.57	10.2	10.2	1.0	35.36	1739.06	57	1.0	89.6	4081.0	30.0	25.8	0	10.97	11.80	12.72	138.2	1336.0	7156.1	324.0	6144.0	**2862.44**	**2048.01**
30.00	31.00	30.50	1.00	28.5	20.97	10.97	125.05	3.14	25.8	25.8	1.0	189.98	1929.05	0	1.0	0.0	4081.0	31.0	25.8	0	9.23	11.80	12.72	138.2	1327.3	7337.4	335.8	6345.8	**2934.95**	**2115.27**
31.00	32.50	31.75	1.50	30.0	19.23	9.23	125.05	4.71	25.8	25.8	1.0	284.97	2214.02	0	1.0	0.0	4081.0	32.5	30.9	0	9.06	25.79	27.01	138.2	2896.3	9191.3	353.4	6648.5	**3676.53**	**2216.15**
32.50	34.00	33.25	1.50	31.5	19.06	9.06	125.05	4.71	30.9	30.9	1.0	368.68	2582.71	0	1.0	0.0	4081.0	34.0	30.9	0	8.89	25.79	27.01	138.2	2894.5	9558.2	371.1	7034.8	**3823.29**	**2344.94**
34.00	35.00	34.50	1.00	32.5	18.89	8.89	125.05	3.14	30.9	30.9	1.0	245.79	2828.49	0	1.0	0.0	4081.0	35.0	30.9	0	8.89	25.79	27.01	138.2	2894.5	9804.0	382.9	7292.4	**3921.60**	**2430.79**
35.00	35.50	35.25	0.50	33.0	18.89	8.89	125.05	1.57	30.9	30.9	1.0	122.89	2951.39	0	1.0	0.0	4081.0	35.5	25.6	8	9.36	11.35	12.26	138.2	1334.0	8366.4	388.8	7421.2	**3346.54**	**2473.72**
35.50	37.00	36.25	1.50	34.5	19.36	9.36	125.05	4.71	25.6	25.6	1.0	282.44	3233.83	8	1.0	37.7	4118.7	37.0	25.6	8	8.12	11.35	12.26	138.2	1328.0	8680.5	406.4	7759.0	**3472.21**	**2586.33**
37.00	37.50	37.25	0.50	35.0	18.12	8.12	125.05	1.57	25.6	25.6	1.0	94.15	3327.98	8	1.0	12.6	4131.3	37.5	25.6	8	8.12	11.35	12.26	138.2	1328.0	8787.3	412.3	7871.6	**3514.90**	**2623.87**
37.50	38.50	38.00	1.00	36.0	18.12	8.12	125.05	3.14	25.6	25.6	1.0	188.29	3516.27	8	1.0	25.1	4156.4	38.5	29.6	0	8.41	20.36	21.48	138.2	2281.2	9953.9	424.1	8096.8	**3981.54**	**2698.94**
38.50	40.00	39.25	1.50	37.5	18.41	8.41	125.05	4.71	29.6	29.6	1.0	334.88	3851.15	0	1.0	0.0	4156.4	40.0	29.6	0	8.41	20.36	21.48	138.2	2281.2	10288.7	441.8	8449.4	**4115.49**	**2816.46**
BORE NO: P22, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	19.20	9.20	25.30	1.57	8.0	8.0	1.0	5.59	0	46	1.0	72.3	0	3.0	29.7	0	9.20	20.58	21.71	27.6	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.5	19.20	9.20	32.20	3.14	29.7	29.7	1.0	57.72	0	0	1.0	0.0	0	4.0	29.7	0	9.73	20.58	21.71	36.8	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	6.00	5.00	2.00	3.5	19.73	9.73	46.53	6.29	29.7	29.7	1.0	166.82	0	0	1.0	0.0	0	6.0	32.5	0	9.73	33.85	35.22	56.3	0	0.0	41.2	41.2	**0.00**	**13.74**
6.00	7.00	6.50	1.00	4.5	19.73	9.73	61.13	3.14	32.5	32.5	1.1	137.68	0	0	1.0	0.0	0	7.0	30.1	0	11.72	21.76	22.91	66.0	0	0.0	53.0	53.0	**0.00**	**17.67**
7.00	9.00	8.00	2.00	6.5	21.72	11.72	77.71	6.29	30.1	30.1	1.0	284.57	0	0	1.0	0.0	0	9.0	28.8	0	11.72	18.56	19.64	89.4	0	0.0	76.6	76.6	**0.00**	**25.53**
9.00	10.00	9.50	1.00	7.5	21.72	11.72	95.29	3.14	28.8	28.8	1.0	164.64	0	0	1.0	0.0	0	10.0	12.5	29	11.72	3.20	1.94	101.2	468.6	468.6	88.4	88.4	**187.45**	**29.45**
10.00	11.00	10.50	1.00	8.5	21.72	11.72	107.01	3.14	12.5	12.5	1.0	74.56	74.56	29	1.0	91.1	91.1	11.0	11.0	40	10.91	2.76	1.51	112.9	534.4	700.1	100.1	265.8	**280.05**	**88.61**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
11.00	12.50	11.75	1.50	10.0	20.91	10.91	121.05	4.71	11.0	11.0	1.0	110.93	185.49	40	1.0	188.6	279.7	12.5	11.0	40	10.91	2.76	1.51	129.2	570.0	1035.2	117.8	583.0	**414.07**	**194.34**
12.50	14.00	13.25	1.50	11.5	20.91	10.91	137.42	4.71	11.0	11.0	1.0	125.92	311.41	40	1.0	188.6	468.3	14.0	11.5	69	10.58	2.91	1.65	145.6	827.8	1607.5	135.5	915.2	**643.00**	**305.06**
14.00	15.50	14.75	1.50	13.0	20.58	10.58	153.54	4.71	11.5	11.5	1.0	147.26	458.67	69	1.0	325.3	793.6	15.5	11.5	69	10.58	2.91	1.65	145.6	827.8	2080.0	153.2	1405.4	**832.02**	**468.47**
15.50	18.50	17.00	3.00	16.0	20.58	10.58	153.54	9.43	11.5	11.5	1.0	294.52	753.19	69	1.0	650.6	1444.1	18.5	10.2	52	10.60	2.53	1.28	145.6	662.3	2859.7	188.5	2385.8	**1143.87**	**795.28**
18.50	21.50	20.00	3.00	19.0	20.60	10.60	153.54	9.43	10.2	10.2	1.0	260.47	1013.66	52	1.0	490.3	1934.4	21.5	10.3	62	10.60	2.56	1.31	145.6	736.5	3684.6	223.8	3171.9	**1473.85**	**1057.31**
21.50	24.50	23.00	3.00	22.0	20.60	10.60	153.54	9.43	10.3	10.3	1.0	263.08	1276.74	62	1.0	584.6	2519.0	24.5	10.3	62	10.54	2.56	1.31	145.6	736.5	4532.2	259.2	4054.9	**1812.89**	**1351.64**
24.50	27.50	26.00	3.00	25.0	20.54	10.54	153.54	9.43	10.3	10.3	1.0	263.08	1539.81	62	1.0	584.6	3103.6	27.5	10.3	62	10.54	2.56	1.31	145.6	736.5	5379.9	294.5	4937.9	**2151.95**	**1645.97**
27.50	29.00	28.25	1.50	26.5	20.54	10.54	153.54	4.71	10.3	10.3	1.0	131.54	1671.35	62	1.0	292.3	3395.9	29.0	10.3	62	10.54	2.56	1.31	145.6	736.5	5803.7	312.2	5379.4	**2321.48**	**1793.13**
29.00	30.00	29.50	1.00	27.5	20.54	10.54	153.54	3.14	10.3	10.3	1.0	87.69	1759.04	62	1.0	194.9	3590.7	30.0	13.5	55	8.48	3.50	2.22	145.6	796.7	6146.5	324.0	5673.7	**2458.59**	**1891.24**
30.00	30.50	30.25	0.50	28.0	18.48	8.48	153.54	1.57	13.5	13.5	1.0	57.92	1816.97	55	1.0	86.4	3677.1	30.5	25.9	4	9.09	12.03	12.95	145.6	1450.4	6944.5	329.9	5824.0	**2777.80**	**1941.33**
30.50	32.00	31.25	1.50	29.5	19.09	9.09	153.54	4.71	25.9	25.9	1.0	351.46	2168.43	4	1.0	18.9	3696.0	32.0	25.9	4	8.63	12.03	12.95	145.6	1448.1	7312.5	347.5	6212.0	**2925.00**	**2070.66**
32.00	32.50	32.25	0.50	30.0	18.63	8.63	153.54	1.57	25.9	25.9	1.0	117.15	2285.58	4	1.0	6.3	3702.3	32.5	26.2	3	8.63	12.70	13.64	145.6	1520.6	7508.5	353.4	6341.3	**3003.39**	**2113.77**
32.50	33.50	33.00	1.00	31.0	18.63	8.63	153.54	3.14	26.2	26.2	1.0	237.44	2523.02	3	1.0	9.4	3711.7	33.5	29.4	0	8.85	19.91	21.02	145.6	2350.6	8585.3	365.2	6599.9	**3434.13**	**2199.98**
33.50	35.00	34.25	1.50	32.5	18.85	8.85	153.54	4.71	29.4	29.4	1.0	407.84	2930.87	0	1.0	0.0	3711.7	35.0	30.2	0	8.57	22.27	23.43	145.6	2626.2	9268.8	382.9	7025.5	**3707.52**	**2341.82**
35.00	36.50	35.75	1.50	34.0	18.57	8.57	153.54	4.71	30.2	30.2	1.0	425.48	3356.35	0	1.0	0.0	3711.7	36.5	30.0	0	8.79	21.26	22.40	145.6	2509.4	9577.5	400.6	7468.6	**3831.00**	**2489.54**
36.50	37.50	37.00	1.00	35.0	18.79	8.79	153.54	3.14	30.0	30.0	1.0	278.59	3634.94	0	1.0	0.0	3711.7	37.5	29.2	0	8.79	19.46	20.56	145.6	2297.0	9643.6	412.3	7759.0	**3857.45**	**2586.33**
37.50	38.00	37.75	0.50	35.5	18.79	8.79	153.54	1.57	29.2	29.2	1.0	134.84	3769.78	0	1.0	0.0	3711.7	38.0	29.0	0	8.60	19.01	20.10	145.6	2242.4	9723.9	418.2	7899.7	**3889.54**	**2633.24**
38.00	40.00	39.00	2.00	37.5	18.60	8.60	153.54	6.29	29.0	29.0	1.0	534.95	4304.73	0	1.0	0.0	3711.7	40.0	29.0	0	8.60	19.01	20.10	145.6	2242.4	10258.8	441.8	8458.2	**4103.53**	**2819.41**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m — Factor of Safety in Compression: 2.5 — Area of Pile: 0.79 m^2

Critical water table: 0.00 m — Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
BORE NO: P23, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	20.69	10.69	29.40	1.57	9.7	9.7	1.0	7.90	7.90	50	1.0	78.6	78.6	3.0	17.2	35	10.69	5.02	3.86	32.1	390.2	476.7	5.9	92.4	**190.69**	**30.79**
3.00	4.00	3.50	1.00	1.5	20.69	10.69	37.42	3.14	17.2	17.2	1.0	36.40	44.30	35	1.0	110.0	188.6	4.0	29.7	0	10.51	20.58	21.71	42.8	781.2	1014.1	17.7	250.5	**405.63**	**83.51**
4.00	6.00	5.00	2.00	3.5	20.51	10.51	53.27	6.29	29.7	29.7	1.0	190.99	235.29	0	1.0	0.0	188.6	6.0	30.9	0	10.51	25.79	27.01	63.8	1404.1	1828.0	41.2	465.1	**731.19**	**155.03**
6.00	7.00	6.50	1.00	4.5	20.51	10.51	69.04	3.14	30.9	30.9	1.0	135.70	370.98	0	1.0	0.0	188.6	7.0	30.9	0	11.32	25.79	27.01	74.3	1625.7	2185.3	53.0	612.6	**874.10**	**204.19**
7.00	9.00	8.00	2.00	6.5	21.32	11.32	85.61	6.29	30.9	30.9	1.0	336.55	707.53	0	1.0	0.0	188.6	9.0	28.3	0	11.32	17.43	18.48	96.9	1409.8	2305.9	76.6	972.7	**922.34**	**324.23**
9.00	10.00	9.50	1.00	7.5	21.32	11.32	102.59	3.14	28.3	28.3	1.0	173.61	881.14	0	1.0	0.0	188.6	10.0	9.7	47	11.32	2.42	1.17	108.3	543.1	1612.8	88.4	1158.1	**645.11**	**386.02**
10.00	11.00	10.50	1.00	8.5	21.32	11.32	113.91	3.14	9.7	9.7	1.0	61.19	942.34	47	1.0	147.7	336.3	11.0	9.7	47	10.31	2.42	1.17	119.6	564.1	1842.7	100.1	1378.8	**737.08**	**459.59**
11.00	12.50	11.75	1.50	10.0	20.31	10.31	127.30	4.71	9.7	9.7	1.0	102.58	1044.92	47	1.0	221.6	557.9	12.5	9.7	47	10.19	2.42	1.17	135.0	593.4	2196.2	117.8	1720.6	**878.47**	**573.53**
12.50	15.50	14.00	3.00	13.0	20.19	10.19	150.32	9.43	9.7	9.7	1.0	242.26	1287.18	47	1.0	443.1	1001.0	15.5	10.6	85	10.19	2.65	1.39	135.0	887.4	3175.6	153.2	2441.3	**1270.24**	**813.78**
15.50	17.00	16.25	1.50	14.5	20.19	10.19	150.32	4.71	10.6	10.6	1.0	132.62	1419.80	85	1.0	400.7	1401.7	17.0	13.4	52	10.60	3.47	2.19	135.0	745.0	3566.5	170.8	2992.3	**1426.61**	**997.45**
17.00	18.50	17.75	1.50	16.0	20.60	10.60	150.32	4.71	13.4	13.4	1.0	168.82	1588.63	52	1.0	245.1	1646.9	18.5	13.4	52	10.60	3.47	2.19	135.0	745.0	3980.5	188.5	3424.0	**1592.20**	**1141.33**
18.50	20.00	19.25	1.50	17.5	20.60	10.60	150.32	4.71	13.4	13.4	1.0	168.82	1757.45	52	1.0	245.1	1892.0	20.0	24.2	10	10.41	9.42	10.00	135.0	1111.5	4760.9	206.2	3855.6	**1904.38**	**1285.21**
20.00	21.50	20.75	1.50	19.0	20.41	10.41	150.32	4.71	24.2	24.2	1.0	318.48	2075.93	10	1.0	47.1	1939.1	21.5	24.2	10	10.41	9.42	10.00	135.0	1111.5	5126.6	223.8	4238.9	**2050.63**	**1412.97**
21.50	24.50	23.00	3.00	22.0	20.41	10.41	150.32	9.43	24.2	24.2	1.0	636.96	2712.89	10	1.0	94.3	2033.4	24.5	8.6	67	10.61	2.22	1.00	135.0	713.3	5459.6	259.2	5005.5	**2183.85**	**1668.50**
24.50	27.50	26.00	3.00	25.0	20.61	10.61	150.32	9.43	8.6	8.6	1.0	214.35	2927.24	67	1.0	631.7	2665.1	27.5	8.6	67	10.61	2.22	1.00	135.0	713.3	6305.7	294.5	5886.9	**2522.27**	**1962.30**
27.50	29.00	28.25	1.50	26.5	20.61	10.61	150.32	4.71	8.6	8.6	1.0	107.17	3034.41	67	1.0	315.9	2981.0	29.0	8.0	75	10.61	2.11	0.91	135.0	758.0	6773.4	312.2	6327.6	**2709.38**	**2109.20**
29.00	30.00	29.50	1.00	27.5	20.61	10.61	150.32	3.14	8.0	8.0	1.0	66.40	3100.81	75	1.0	235.7	3216.7	30.0	8.0	75	11.03	2.11	0.91	135.0	758.2	7075.7	324.0	6641.5	**2830.28**	**2213.83**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
30.00	30.50	30.25	0.50	28.0	21.03	11.03	150.32	1.57	8.0	8.0	1.0	33.20	3134.01	75	1.0	117.9	3334.6	30.5	8.5	63	9.29	2.20	0.99	135.0	682.5	7151.1	329.9	6798.4	**2860.44**	**2266.15**
30.50	32.00	31.25	1.50	29.5	19.29	9.29	150.32	4.71	8.5	8.5	1.0	105.91	3239.92	63	1.0	297.0	3631.6	32.0	8.5	63	9.01	2.20	0.99	135.0	682.4	7553.9	347.5	7219.0	**3021.56**	**2406.34**
32.00	32.50	32.25	0.50	30.0	19.01	9.01	150.32	1.57	8.5	8.5	1.0	35.30	3275.22	63	1.0	99.0	3730.6	32.5	8.5	63	9.01	2.20	0.99	135.0	682.4	7688.2	353.4	7359.2	**3075.28**	**2453.07**
32.50	33.50	33.00	1.00	31.0	19.01	9.01	150.32	3.14	8.5	8.5	1.0	70.61	3345.83	63	1.0	198.0	3928.6	33.5	29.4	0	8.94	19.91	21.02	135.0	2186.1	9460.5	365.2	7639.6	**3784.19**	**2546.54**
33.50	35.00	34.25	1.50	32.5	18.94	8.94	150.32	4.71	29.4	29.4	1.0	399.30	3745.13	0	1.0	0.0	3928.6	35.0	33.8	0	8.09	40.40	41.88	135.0	4419.7	12093.4	382.9	8056.6	**4837.35**	**2685.53**
35.00	36.50	35.75	1.50	34.0	18.09	8.09	150.32	4.71	33.8	33.8	1.2	564.54	4309.67	0	1.0	0.0	3928.6	36.5	33.8	0	8.01	40.40	41.88	135.0	4418.4	12656.6	400.6	8638.8	**5062.64**	**2879.60**
36.50	37.50	37.00	1.00	35.0	18.01	8.01	150.32	3.14	33.8	33.8	1.2	376.36	4686.03	0	1.0	0.0	3928.6	37.5	35.4	0	8.01	51.53	52.94	135.0	5634.0	14248.6	412.3	9026.9	**5699.43**	**3008.98**
37.50	38.00	37.75	0.50	35.5	18.01	8.01	150.32	1.57	35.4	35.4	1.3	213.20	4899.22	0	1.0	0.0	3928.6	38.0	35.4	0	8.03	51.53	52.94	135.0	5634.4	14462.2	418.2	9246.0	**5784.87**	**3082.01**
38.00	40.00	39.00	2.00	37.5	18.03	8.03	150.32	6.29	35.4	35.4	1.3	852.78	5752.01	0	1.0	0.0	3928.6	40.0	35.4	0	8.03	51.53	52.94	135.0	5634.4	15315.0	441.8	10122.4	**6125.99**	**3374.12**
BORE NO: P24, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	20.95	10.95	30.11	1.57	7.5	7.5	1.0	6.23	0	51	1.0	80.1	0	3.0	29.5	0	10.95	20.13	21.25	32.9	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.5	20.95	10.95	38.33	3.14	29.5	29.5	1.0	68.15	0	0	1.0	0.0	0	4.0	28.2	0	10.95	17.21	18.25	43.8	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	6.00	5.00	2.00	3.5	20.95	10.95	54.75	6.29	28.2	28.2	1.0	184.53	0	0	1.0	0.0	0	6.0	28.0	2	8.97	16.76	17.79	65.7	0	0.0	41.2	41.2	**0.00**	**13.74**
6.00	7.00	6.50	1.00	4.5	18.97	8.97	70.19	3.14	28.0	28.0	1.0	117.29	0	2	1.0	6.3	0	7.0	28.0	2	8.97	16.76	17.79	74.7	1059.9	1059.9	53.0	53.0	**423.95**	**17.67**
7.00	8.00	7.50	1.00	5.5	18.97	8.97	79.16	3.14	28.0	28.0	1.0	132.27	132.27	2	1.0	6.3	6.3	8.0	28.0	2	8.97	16.76	17.79	83.6	1178.0	1316.5	64.8	203.4	**526.62**	**67.79**
8.00	9.00	8.50	1.00	6.5	18.97	8.97	88.13	3.14	28.0	28.0	1.0	147.26	279.54	2	1.0	6.3	12.6	9.0	28.0	2	8.97	16.76	17.79	92.6	1296.1	1588.2	76.6	368.7	**635.27**	**122.90**
9.00	10.00	9.50	1.00	7.5	18.97	8.97	97.10	3.14	28.0	28.0	1.0	162.25	441.79	2	1.0	6.3	18.9	10.0	32.8	0	9.14	35.36	36.75	101.6	2954.5	3415.1	88.4	549.0	**1366.06**	**183.00**
10.00	12.50	11.25	2.50	10.0	19.14	9.14	113.01	7.86	32.8	32.8	1.1	652.32	1094.11	0	1.0	0.0	18.9	12.5	32.8	0	9.14	35.36	36.75	124.4	3589.4	4702.4	117.8	1230.8	**1880.95**	**410.26**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
12.50	14.00	13.25	1.50	11.5	19.14	9.14	131.29	4.71	32.8	32.8	1.1	454.70	1548.82	0	1.0	0.0	18.9	14.0	26.5	14	10.96	13.38	14.34	138.1	1612.7	3180.4	135.5	1703.2	**1272.17**	**567.72**
14.00	15.50	14.75	1.50	13.0	20.96	10.96	146.36	4.71	26.5	26.5	1.0	344.01	1892.83	14	1.0	66.0	84.9	15.5	26.5	0	10.96	13.38	14.34	138.1	1513.7	3491.4	153.2	2130.8	**1396.57**	**710.28**
15.50	17.00	16.25	1.50	14.5	20.96	10.96	146.36	4.71	26.5	26.5	1.0	344.01	2236.84	0	1.0	0.0	84.9	17.0	14.6	45	10.85	3.82	2.54	138.1	744.1	3065.8	170.8	2492.5	**1226.31**	**830.84**
17.00	18.50	17.75	1.50	16.0	20.85	10.85	146.36	4.71	14.6	14.6	1.0	179.73	2416.57	45	1.0	212.1	297.0	18.5	14.6	45	10.86	3.82	2.54	138.1	744.1	3457.7	188.5	2902.1	**1383.06**	**967.36**
18.50	21.50	20.00	3.00	19.0	20.86	10.86	146.36	9.43	14.6	14.6	1.0	359.45	2776.02	45	1.0	424.3	721.3	21.5	11.1	44	10.23	2.79	1.53	138.1	620.5	4117.8	223.8	3721.1	**1647.12**	**1240.38**
21.50	24.50	23.00	3.00	22.0	20.23	10.23	146.36	9.43	11.1	11.1	1.0	270.74	3046.76	44	1.0	414.9	1136.1	24.5	10.5	56	10.23	2.62	1.36	138.1	685.5	4868.4	259.2	4442.1	**1947.37**	**1480.70**
24.50	26.00	25.25	1.50	23.5	20.23	10.23	146.36	4.71	10.5	10.5	1.0	127.88	3174.64	56	1.0	264.0	1400.1	26.0	10.5	75	10.35	2.62	1.36	138.1	819.9	5394.7	276.9	4851.6	**2157.89**	**1617.21**
26.00	27.50	26.75	1.50	25.0	20.35	10.35	146.36	4.71	10.5	10.5	1.0	127.88	3302.52	75	1.0	353.6	1753.7	27.5	10.5	75	10.35	2.62	1.36	138.1	819.9	5876.2	294.5	5350.8	**2350.47**	**1783.59**
27.50	29.00	28.25	1.50	26.5	20.35	10.35	146.36	4.71	10.5	10.5	1.0	127.88	3430.41	75	1.0	353.6	2107.3	29.0	13.3	54	9.14	3.44	2.16	138.1	763.0	6300.7	312.2	5849.9	**2520.28**	**1949.96**
29.00	30.00	29.50	1.00	27.5	19.14	9.14	146.36	3.14	13.3	13.3	1.0	108.74	3539.14	54	1.0	169.7	2277.0	30.0	13.3	54	9.14	3.44	2.16	138.1	763.0	6579.1	324.0	6140.1	**2631.66**	**2046.71**
30.00	30.50	30.25	0.50	28.0	19.14	9.14	146.36	1.57	13.3	13.3	1.0	54.37	3593.51	54	1.0	84.9	2361.9	30.5	13.3	54	9.14	3.44	2.16	138.1	763.0	6718.4	329.9	6285.2	**2687.35**	**2095.08**
30.50	32.50	31.50	2.00	30.0	19.14	9.14	146.36	6.29	13.3	13.3	1.0	217.47	3810.98	54	1.0	339.4	2701.3	32.5	13.0	50	9.17	3.35	2.08	138.1	724.7	7236.9	353.4	6865.7	**2894.77**	**2288.57**
32.50	33.50	33.00	1.00	31.0	19.17	9.17	146.36	3.14	13.0	13.0	1.0	106.20	3917.18	50	1.0	157.1	2858.4	33.5	13.0	50	8.93	3.35	2.08	138.1	724.5	7500.1	365.2	7140.8	**3000.03**	**2380.27**
33.50	35.00	34.25	1.50	32.5	18.93	8.93	146.36	4.71	13.0	13.0	1.0	159.30	4076.48	50	1.0	235.7	3094.1	35.0	27.7	0	8.93	16.08	17.10	138.1	1805.3	8975.9	382.9	7553.5	**3590.37**	**2517.83**
35.00	36.50	35.75	1.50	34.0	18.93	8.93	146.36	4.71	27.7	27.7	1.0	362.25	4438.72	0	1.0	0.0	3094.1	36.5	31.2	0	9.79	27.30	28.55	138.1	3073.4	10606.3	400.6	7933.4	**4242.51**	**2644.47**
36.50	37.50	37.00	1.00	35.0	19.79	9.79	146.36	3.14	31.2	31.2	1.1	295.29	4734.02	0	1.0	0.0	3094.1	37.5	31.2	0	9.79	27.30	28.55	138.1	3073.4	10901.6	412.3	8240.5	**4360.62**	**2746.83**
37.50	40.00	38.75	2.50	37.5	19.79	9.79	146.36	7.86	31.2	31.2	1.1	738.23	5472.25	0	1.0	0.0	3094.1	40.0	31.2	0	9.79	27.30	28.55	138.1	3073.4	11639.8	441.8	9008.2	**4655.92**	**3002.73**

BORE NO: P25, CUT OFF LENGTH: 2.50 m, Nc= 9

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
2.50	3.00	2.75	0.50	0.5	19.15	9.15	25.16	1.57	24.2	24.2	1.0	17.77	0	5	1.0	7.9	0	3.0	24.2	5	9.15	9.42	10.00	27.5	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.5	19.15	9.15	32.03	3.14	24.2	24.2	1.0	45.23	0	5	1.0	15.7	0	4.0	28.1	2	10.02	16.98	18.02	36.6	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	6.00	5.00	2.00	3.5	20.02	10.02	46.62	6.29	28.1	28.1	1.0	156.47	0	2	1.0	12.6	0	6.0	30.1	0	10.02	21.76	22.91	56.6	0	0.0	41.2	41.2	**0.00**	**13.74**
6.00	7.00	6.50	1.00	4.5	20.02	10.02	61.65	3.14	30.1	30.1	1.0	112.88	0	0	1.0	0.0	0	7.0	30.1	0	10.84	21.76	22.91	66.7	0	0.0	53.0	53.0	**0.00**	**17.67**
7.00	9.00	8.00	2.00	6.5	20.84	10.84	77.50	6.29	30.1	30.1	1.0	283.80	0	0	1.0	0.0	0	9.0	30.1	0	10.84	21.76	22.91	88.3	0	0.0	76.6	76.6	**0.00**	**25.53**
9.00	10.00	9.50	1.00	7.5	20.84	10.84	93.76	3.14	30.1	30.1	1.0	171.67	0	0	1.0	0.0	0	10.0	8.9	70	10.84	2.27	1.05	99.2	676.5	676.5	88.4	88.4	**270.61**	**29.45**
10.00	11.00	10.50	1.00	8.5	20.84	10.84	104.60	3.14	8.9	8.9	1.0	51.48	51.48	70	1.0	220.0	220.0	11.0	25.3	7	10.66	10.68	11.57	110.0	1020.8	1292.3	100.1	371.6	**516.91**	**123.87**
11.00	12.50	11.75	1.50	10.0	20.66	10.66	118.02	4.71	25.3	25.3	1.0	262.99	314.47	7	1.0	33.0	253.0	12.5	9.3	72	10.49	2.34	1.11	126.0	745.8	1313.3	117.8	685.3	**525.31**	**228.43**
12.50	15.50	14.00	3.00	13.0	20.49	10.49	141.75	9.43	9.3	9.3	1.0	218.85	533.32	72	1.0	678.9	931.9	15.5	9.3	72	10.49	2.34	1.11	126.0	745.8	2211.0	153.2	1618.3	**884.39**	**539.44**
15.50	17.00	16.25	1.50	14.5	20.49	10.49	141.75	4.71	9.3	9.3	1.0	109.43	642.75	72	1.0	339.4	1271.3	17.0	11.6	55	10.50	2.94	1.68	126.0	687.0	2601.0	170.8	2084.9	**1040.40**	**694.95**
17.00	18.50	17.75	1.50	16.0	20.50	10.50	141.75	4.71	11.6	11.6	1.0	137.17	779.91	55	1.0	259.3	1530.6	18.5	23.5	14	10.38	8.92	9.23	126.0	1019.8	3330.3	188.5	2499.0	**1332.11**	**832.99**
18.50	21.50	20.00	3.00	19.0	20.38	10.38	141.75	9.43	23.5	23.5	1.0	581.11	1361.02	14	1.0	132.0	1662.6	21.5	23.5	14	10.38	8.92	9.23	126.0	1019.8	4043.4	223.8	3247.4	**1617.36**	**1082.48**
21.50	24.50	23.00	3.00	22.0	20.38	10.38	141.75	9.43	23.5	23.5	1.0	581.11	1942.13	14	1.0	132.0	1794.6	24.5	23.5	14	10.68	8.92	9.23	126.0	1020.9	4757.6	259.2	3995.9	**1903.03**	**1331.96**
24.50	26.00	25.25	1.50	23.5	20.68	10.68	141.75	4.71	23.5	23.5	1.0	290.55	2232.68	14	1.0	66.0	1860.6	26.0	27.2	4	10.68	14.95	15.95	126.0	1575.8	5669.0	276.9	4370.1	**2267.61**	**1456.70**
26.00	27.50	26.75	1.50	25.0	20.68	10.68	141.75	4.71	27.2	27.2	1.0	343.42	2576.10	4	1.0	18.9	1879.4	27.5	23.5	8	10.68	8.92	9.23	126.0	978.5	5434.0	294.5	4750.1	**2173.60**	**1583.35**
27.50	29.00	28.25	1.50	26.5	20.68	10.68	141.75	4.71	23.5	23.5	1.0	290.55	2866.65	8	1.0	37.7	1917.1	29.0	23.5	8	10.68	8.92	9.23	126.0	978.5	5762.3	312.2	5096.0	**2304.90**	**1698.66**
29.00	30.00	29.50	1.00	27.5	20.68	10.68	141.75	3.14	23.5	23.5	1.0	193.70	3060.36	8	1.0	25.1	1942.3	30.0	23.5	8	9.30	8.92	9.23	126.0	973.5	5976.1	324.0	5326.6	**2390.44**	**1775.54**
30.00	30.50	30.25	0.50	28.0	19.30	9.30	141.75	1.57	23.5	23.5	1.0	96.85	3157.21	8	1.0	12.6	1954.9	30.5	8.5	60	9.97	2.20	0.99	126.0	646.0	5758.0	329.9	5441.9	**2303.22**	**1813.98**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
30.50	32.00	31.25	1.50	29.5	19.97	9.97	141.75	4.71	8.5	8.5	1.0	99.87	3257.07	60	1.0	282.9	2237.7	32.0	8.5	60	9.49	2.20	0.99	126.0	645.8	6140.6	347.5	5842.3	**2456.23**	**1947.44**
32.00	32.50	32.25	0.50	30.0	19.49	9.49	141.75	1.57	8.5	8.5	1.0	33.29	3290.36	60	1.0	94.3	2332.0	32.5	8.5	60	9.49	2.20	0.99	126.0	645.8	6268.2	353.4	5975.8	**2507.26**	**1991.93**
32.50	33.50	33.00	1.00	31.0	19.49	9.49	141.75	3.14	8.5	8.5	1.0	66.58	3356.94	60	1.0	188.6	2520.6	33.5	8.5	60	9.49	2.20	0.99	126.0	645.8	6523.3	365.2	6242.7	**2609.32**	**2080.91**
33.50	35.00	34.25	1.50	32.5	19.49	9.49	141.75	4.71	8.5	8.5	1.0	99.87	3456.81	60	1.0	282.9	2803.4	35.0	9.0	65	9.30	2.29	1.07	126.0	690.3	6950.5	382.9	6643.1	**2780.20**	**2214.37**
35.00	36.50	35.75	1.50	34.0	19.30	9.30	141.75	4.71	9.0	9.0	1.0	105.84	3562.65	65	1.0	306.4	3109.9	36.5	9.0	65	9.01	2.29	1.07	126.0	690.1	7362.6	400.6	7073.1	**2945.06**	**2357.69**
36.50	37.50	37.00	1.00	35.0	19.01	9.01	141.75	3.14	9.0	9.0	1.0	70.56	3633.20	65	1.0	204.3	3314.1	37.5	9.0	65	9.01	2.29	1.07	126.0	690.1	7637.5	412.3	7359.7	**3055.00**	**2453.23**
37.50	38.00	37.75	0.50	35.5	19.01	9.01	141.75	1.57	9.0	9.0	1.0	35.28	3668.48	65	1.0	102.1	3416.3	38.0	9.0	65	9.50	2.29	1.07	126.0	690.3	7775.1	418.2	7503.0	**3110.05**	**2501.00**
38.00	40.00	39.00	2.00	37.5	19.50	9.50	141.75	6.29	9.0	9.0	1.0	141.12	3809.60	65	1.0	408.6	3824.9	40.0	9.0	65	9.50	2.29	1.07	126.0	690.3	8324.8	441.8	8076.2	**3329.92**	**2692.08**
BORE NO: P26, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	17.99	7.99	21.97	1.57	24.9	24.9	1.0	16.03	16.03	5	1.0	7.9	7.9	3.0	30.6	1	7.99	24.28	25.48	24.0	544.4	568.2	5.9	29.8	**227.30**	**9.93**
3.00	4.00	3.50	1.00	1.5	17.99	7.99	27.97	3.14	30.6	30.6	1.0	53.54	69.56	1	1.0	3.1	11.0	4.0	30.6	1	7.55	24.28	25.48	32.0	692.4	773.0	17.7	98.2	**309.18**	**32.75**
4.00	6.00	5.00	2.00	3.5	17.55	7.55	39.51	6.29	30.6	30.6	1.0	151.28	220.84	1	1.0	6.3	17.3	6.0	30.6	1	7.55	24.28	25.48	47.1	980.5	1218.6	41.2	279.4	**487.44**	**93.12**
6.00	7.00	6.50	1.00	4.5	17.55	7.55	50.84	3.14	30.6	30.6	1.0	97.32	318.16	1	1.0	3.1	20.4	7.0	30.4	0	7.55	23.27	24.45	54.6	1071.2	1409.8	53.0	391.6	**563.91**	**130.54**
7.00	8.00	7.50	1.00	5.5	17.55	7.55	58.39	3.14	30.4	30.4	1.0	109.81	427.97	0	1.0	0.0	20.4	8.0	8.1	41	9.36	2.13	0.93	62.2	397.3	845.7	64.8	513.2	**338.27**	**171.07**
8.00	9.00	8.50	1.00	6.5	19.36	9.36	66.84	3.14	8.1	8.1	1.0	29.90	457.87	41	1.0	128.9	149.3	9.0	8.1	41	9.36	2.13	0.93	71.5	412.9	1020.1	76.6	683.7	**408.03**	**227.91**
9.00	10.00	9.50	1.00	7.5	19.36	9.36	76.20	3.14	8.1	8.1	1.0	34.08	491.96	41	1.0	128.9	278.1	10.0	12.2	34	9.35	3.12	1.85	80.9	445.3	1215.4	88.4	858.5	**486.14**	**286.15**
10.00	12.50	11.25	2.50	10.0	19.35	9.35	92.57	7.86	12.2	12.2	1.0	157.25	649.21	34	1.0	267.1	545.3	12.5	12.2	34	9.35	3.12	1.85	104.3	502.5	1697.0	117.8	1312.3	**678.80**	**437.43**
12.50	14.00	13.25	1.50	11.5	19.35	9.35	111.27	4.71	12.2	12.2	1.0	113.41	762.62	34	1.0	160.3	705.6	14.0	12.2	34	10.30	3.12	1.85	118.3	537.5	2005.7	135.5	1603.7	**802.29**	**534.56**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
14.00	15.50	14.75	1.50	13.0	20.30	10.30	126.01	4.71	12.2	12.2	1.0	128.43	891.05	34	1.0	160.3	865.9	15.5	4.5	96	10.30	1.51	0.41	118.3	821.1	2578.0	153.2	1910.1	**1031.20**	**636.69**
15.50	17.00	16.25	1.50	14.5	20.30	10.30	126.01	4.71	4.5	4.5	1.0	46.75	937.80	96	1.0	452.6	1318.4	17.0	26.4	3	8.23	13.15	14.11	118.3	1289.2	3545.4	170.8	2427.1	**1418.15**	**809.02**
17.00	18.50	17.75	1.50	16.0	18.23	8.23	126.01	4.71	26.4	26.4	1.0	294.88	1232.68	3	1.0	14.1	1332.6	18.5	26.4	3	8.23	13.15	14.11	118.3	1289.2	3854.4	188.5	2753.7	**1541.76**	**917.91**
18.50	20.00	19.25	1.50	17.5	18.23	8.23	126.01	4.71	26.4	26.4	1.0	294.88	1527.55	3	1.0	14.1	1346.7	20.0	9.7	55	10.38	2.42	1.17	118.3	618.2	3492.5	206.2	3080.4	**1397.00**	**1026.81**
20.00	21.50	20.75	1.50	19.0	20.38	10.38	126.01	4.71	9.7	9.7	1.0	101.54	1629.09	55	1.0	259.3	1606.0	21.5	10.6	57	10.92	2.65	1.39	118.3	655.0	3890.1	223.8	3458.9	**1556.03**	**1152.98**
21.50	24.50	23.00	3.00	22.0	20.92	10.92	126.01	9.43	10.6	10.6	1.0	222.34	1851.43	57	1.0	537.4	2143.4	24.5	10.2	77	10.92	2.53	1.28	118.3	785.0	4779.8	259.2	4254.0	**1911.94**	**1418.01**
24.50	26.00	25.25	1.50	23.5	20.92	10.92	126.01	4.71	10.2	10.2	1.0	106.88	1958.31	77	1.0	363.0	2506.4	26.0	10.2	77	10.56	2.53	1.28	118.3	784.8	5249.5	276.9	4741.6	**2099.82**	**1580.53**
26.00	27.50	26.75	1.50	25.0	20.56	10.56	126.01	4.71	10.2	10.2	1.0	106.88	2065.19	77	1.0	363.0	2869.4	27.5	10.2	77	10.56	2.53	1.28	118.3	784.8	5719.4	294.5	5229.1	**2287.77**	**1743.05**
27.50	29.00	28.25	1.50	26.5	20.56	10.56	126.01	4.71	10.2	10.2	1.0	106.88	2172.07	77	1.0	363.0	3232.4	29.0	10.2	77	10.56	2.53	1.28	118.3	784.8	6189.3	312.2	5716.7	**2475.72**	**1905.57**
29.00	30.00	29.50	1.00	27.5	20.56	10.56	126.01	3.14	10.2	10.2	1.0	71.25	2243.33	77	1.0	242.0	3474.4	30.0	10.2	77	9.72	2.53	1.28	118.3	784.4	6502.1	324.0	6041.7	**2600.86**	**2013.91**
30.00	30.50	30.25	0.50	28.0	19.72	9.72	126.01	1.57	10.2	10.2	1.0	35.63	2278.95	77	1.0	121.0	3595.4	30.5	21.0	48	8.96	7.12	6.49	118.3	1024.0	6898.3	329.9	6204.3	**2759.34**	**2068.08**
30.50	32.00	31.25	1.50	29.5	18.96	8.96	126.01	4.71	21.0	21.0	1.0	228.02	2506.98	48	1.0	226.3	3821.7	32.0	9.0	54	9.07	2.29	1.07	118.3	598.5	6927.2	347.5	6676.2	**2770.87**	**2225.41**
32.00	32.50	32.25	0.50	30.0	19.07	9.07	126.01	1.57	9.0	9.0	1.0	31.36	2538.34	54	1.0	84.9	3906.6	32.5	9.0	54	9.07	2.29	1.07	118.3	598.5	7043.4	353.4	6798.3	**2817.35**	**2266.11**
32.50	33.50	33.00	1.00	31.0	19.07	9.07	126.01	3.14	9.0	9.0	1.0	62.72	2601.06	54	1.0	169.7	4076.3	33.5	30.2	0	8.65	22.27	23.43	118.3	2149.0	8826.3	365.2	7042.6	**3530.53**	**2347.52**
33.50	35.00	34.25	1.50	32.5	18.65	8.65	126.01	4.71	30.2	30.2	1.0	349.19	2950.25	0	1.0	0.0	4076.3	35.0	14.0	48	9.16	3.65	2.36	118.3	687.1	7713.7	382.9	7409.4	**3085.47**	**2469.81**
35.00	36.50	35.75	1.50	34.0	19.16	9.16	126.01	4.71	14.0	14.0	1.0	148.11	3098.36	48	1.0	226.3	4302.6	36.5	14.0	48	9.19	3.65	2.36	118.3	687.2	8088.1	400.6	7801.5	**3235.24**	**2600.49**
36.50	37.50	37.00	1.00	35.0	19.19	9.19	126.01	3.14	14.0	14.0	1.0	98.74	3197.09	48	1.0	150.9	4453.4	37.5	14.0	48	9.19	3.65	2.36	118.3	687.2	8337.7	412.3	8062.9	**3335.08**	**2687.62**
37.50	38.00	37.75	0.50	35.5	19.19	9.19	126.01	1.57	14.0	14.0	1.0	49.37	3246.46	48	1.0	75.4	4528.9	38.0	10.5	63	8.97	2.62	1.36	118.3	693.5	8468.8	418.2	8193.5	**3387.53**	**2731.18**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
38.00	40.00	39.00	2.00	37.5	18.97	8.97	126.01	6.29	10.5	10.5	1.0	146.79	3393.26	63	1.0	396.0	4924.9	40.0	10.5	63	8.97	2.62	1.36	118.3	693.5	9011.6	441.8	8759.9	**3604.65**	**2919.97**
BORE NO: P27, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	19.92	9.92	27.28	1.57	27.2	27.2	1.0	22.03	0	10	1.0	15.7	0	3.0	27.2	10	9.92	14.95	15.95	29.8	482.5	482.5	5.9	5.9	**193.02**	**1.96**
3.00	4.00	3.50	1.00	1.5	19.92	9.92	34.72	3.14	27.2	27.2	1.0	56.08	56.08	10	1.0	31.4	31.4	4.0	27.9	0	9.26	16.53	17.56	39.7	579.3	666.8	17.7	105.2	**266.71**	**35.06**
4.00	6.00	5.00	2.00	3.5	19.26	9.26	48.94	6.29	27.9	27.9	1.0	162.88	218.96	0	1.0	0.0	31.4	6.0	27.8	0	9.26	16.31	17.33	58.2	808.7	1059.1	41.2	291.6	**423.62**	**97.21**
6.00	7.00	6.50	1.00	4.5	19.26	9.26	62.83	3.14	27.8	27.8	1.0	104.11	323.07	0	1.0	0.0	31.4	7.0	27.8	0	9.26	16.31	17.33	67.5	927.3	1281.8	53.0	407.5	**512.72**	**135.84**
7.00	9.00	8.00	2.00	6.5	19.26	9.26	76.72	6.29	27.8	27.8	1.0	254.26	577.33	0	1.0	0.0	31.4	9.0	10.1	59	11.10	2.50	1.25	86.0	591.5	1200.3	76.6	685.3	**480.11**	**228.44**
9.00	10.00	9.50	1.00	7.5	21.10	11.10	91.53	3.14	10.1	10.1	1.0	51.24	628.57	59	1.0	185.4	216.9	10.0	10.1	59	11.10	2.50	1.25	97.1	613.3	1458.7	88.4	933.8	**583.49**	**311.26**
10.00	11.00	10.50	1.00	8.5	21.10	11.10	102.63	3.14	10.1	10.1	1.0	57.46	686.02	59	1.0	185.4	402.3	11.0	10.1	59	11.10	2.50	1.25	108.2	635.1	1723.4	100.1	1188.4	**689.37**	**396.15**
11.00	12.50	11.75	1.50	10.0	21.10	11.10	116.51	4.71	10.1	10.1	1.0	97.83	783.86	59	1.0	278.1	680.4	12.5	10.6	52	11.10	2.65	1.39	124.8	633.3	2097.6	117.8	1582.1	**839.05**	**527.36**
12.50	14.00	13.25	1.50	11.5	21.10	11.10	133.16	4.71	10.6	10.6	1.0	117.48	901.33	52	1.0	245.1	925.6	14.0	10.6	52	10.47	2.65	1.39	141.5	667.6	2494.5	135.5	1962.4	**997.81**	**654.13**
14.00	15.50	14.75	1.50	13.0	20.47	10.47	149.33	4.71	10.6	10.6	1.0	131.75	1033.08	52	1.0	245.1	1170.7	15.5	10.9	50	10.47	2.73	1.48	141.5	663.6	2867.4	153.2	2356.9	**1146.97**	**785.65**
15.50	17.00	16.25	1.50	14.5	20.47	10.47	149.33	4.71	10.9	10.9	1.0	135.57	1168.65	50	1.0	235.7	1406.4	17.0	10.9	50	10.39	2.73	1.48	141.5	663.6	3238.7	170.8	2745.9	**1295.47**	**915.30**
17.00	18.50	17.75	1.50	16.0	20.39	10.39	149.33	4.71	10.9	10.9	1.0	135.57	1304.22	50	1.0	235.7	1642.1	18.5	11.1	46	10.43	2.79	1.53	141.5	642.1	3588.5	188.5	3134.9	**1435.38**	**1044.95**
18.50	21.50	20.00	3.00	19.0	20.43	10.43	149.33	9.43	11.1	11.1	1.0	276.24	1580.46	46	1.0	433.7	2075.9	21.5	10.6	47	10.67	2.65	1.39	141.5	632.4	4288.7	223.8	3880.2	**1715.47**	**1293.38**
21.50	24.50	23.00	3.00	22.0	20.67	10.67	149.33	9.43	10.6	10.6	1.0	263.50	1843.95	47	1.0	443.1	2519.0	24.5	10.6	47	10.32	2.65	1.39	141.5	632.2	4995.1	259.2	4622.1	**1998.05**	**1540.71**
24.50	27.50	26.00	3.00	25.0	20.32	10.32	149.33	9.43	10.6	10.6	1.0	263.50	2107.45	47	1.0	443.1	2962.1	27.5	11.1	57	10.32	2.79	1.53	141.5	719.8	5789.4	294.5	5364.1	**2315.76**	**1788.04**
27.50	29.00	28.25	1.50	26.5	20.32	10.32	149.33	4.71	11.1	11.1	1.0	138.12	2245.57	57	1.0	268.7	3230.9	29.0	12.2	42	10.32	3.12	1.85	141.5	650.9	6127.4	312.2	5788.6	**2450.94**	**1929.54**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
29.00	30.00	29.50	1.00	27.5	20.32	10.32	149.33	3.14	12.2	12.2	1.0	101.47	2347.04	42	1.0	132.0	3362.9	30.0	12.2	42	8.88	3.12	1.85	141.5	649.9	6359.8	324.0	6033.9	**2543.91**	**2011.29**
30.00	30.50	30.25	0.50	28.0	18.88	8.88	149.33	1.57	12.2	12.2	1.0	50.74	2397.78	42	1.0	66.0	3428.9	30.5	12.5	38	9.01	3.20	1.94	141.5	631.7	6458.4	329.9	6156.5	**2583.35**	**2052.17**
30.50	32.00	31.25	1.50	29.5	19.01	9.01	149.33	4.71	12.5	12.5	1.0	156.07	2553.85	38	1.0	179.1	3608.0	32.0	31.2	0	9.08	27.30	28.55	141.5	3137.1	9298.9	347.5	6509.4	**3719.58**	**2169.80**
32.00	32.50	32.25	0.50	30.0	19.08	9.08	149.33	1.57	31.2	31.2	1.1	150.65	2704.50	0	1.0	0.0	3608.0	32.5	31.2	0	9.08	27.30	28.55	141.5	3137.1	9449.6	353.4	6665.9	**3779.83**	**2221.98**
32.50	33.50	33.00	1.00	31.0	19.08	9.08	149.33	3.14	31.2	31.2	1.1	301.29	3005.79	0	1.0	0.0	3608.0	33.5	30.3	0	8.79	22.77	23.94	141.5	2613.9	9227.7	365.2	6979.0	**3691.09**	**2326.33**
33.50	35.00	34.25	1.50	32.5	18.79	8.79	149.33	4.71	30.3	30.3	1.0	417.55	3423.34	0	1.0	0.0	3608.0	35.0	31.7	0	8.80	29.82	31.11	141.5	3422.8	10454.1	382.9	7414.2	**4181.65**	**2471.41**
35.00	36.50	35.75	1.50	34.0	18.80	8.80	149.33	4.71	31.7	31.7	1.1	471.75	3895.10	0	1.0	0.0	3608.0	36.5	32.4	0	8.71	33.35	34.70	141.5	3826.0	11329.1	400.6	7903.7	**4531.62**	**2634.55**
36.50	37.50	37.00	1.00	35.0	18.71	8.71	149.33	3.14	32.4	32.4	1.1	333.59	4228.69	0	1.0	0.0	3608.0	37.5	32.4	0	8.71	33.35	34.70	141.5	3826.0	11662.6	412.3	8249.0	**4665.06**	**2749.67**
37.50	38.00	37.75	0.50	35.5	18.71	8.71	149.33	1.57	32.4	32.4	1.1	166.79	4395.48	0	1.0	0.0	3608.0	38.0	32.0	0	8.94	31.33	32.65	141.5	3597.9	11601.4	418.2	8421.7	**4640.55**	**2807.23**
38.00	40.00	39.00	2.00	37.5	18.94	8.94	149.33	6.29	32.0	32.0	1.1	645.19	5040.67	0	1.0	0.0	3608.0	40.0	32.0	0	8.94	31.33	32.65	141.5	3597.9	12246.6	441.8	9090.5	**4898.63**	**3030.15**
BORE NO: P28, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	19.56	9.56	26.29	1.57	24.5	24.5	1.0	18.83	0	0	1.0	0.0	0	3.0	26.1	0	9.56	12.48	13.41	28.7	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.5	19.56	9.56	33.46	3.14	26.1	26.1	1.0	51.52	0	0	1.0	0.0	0	4.0	30.2	0	8.56	22.27	23.43	38.2	747.8	747.8	17.7	17.7	**299.12**	**5.89**
4.00	6.00	5.00	2.00	3.5	18.56	8.56	46.80	6.29	30.2	30.2	1.0	172.92	172.92	0	1.0	0.0	0.0	6.0	30.2	0	8.56	22.27	23.43	55.4	1047.3	1220.3	41.2	214.2	**488.10**	**71.39**
6.00	7.00	6.50	1.00	4.5	18.56	8.56	59.64	3.14	30.2	30.2	1.0	110.18	283.11	0	1.0	0.0	0.0	7.0	31.9	0	8.56	30.83	32.14	63.9	1656.5	1939.6	53.0	336.1	**775.84**	**112.04**
7.00	9.00	8.00	2.00	6.5	18.56	8.56	72.48	6.29	31.9	31.9	1.1	310.52	593.63	0	1.0	0.0	0.0	9.0	30.3	0	9.86	22.77	23.94	81.0	1542.6	2136.3	76.6	670.2	**854.51**	**223.40**
9.00	10.00	9.50	1.00	7.5	19.86	9.86	85.97	3.14	30.3	30.3	1.0	160.26	753.88	0	1.0	0.0	0.0	10.0	30.3	0	9.86	22.77	23.94	90.9	1719.0	2472.9	88.4	842.2	**989.17**	**280.75**
10.00	11.00	10.50	1.00	8.5	19.86	9.86	95.83	3.14	30.3	30.3	1.0	178.64	932.52	0	1.0	0.0	0.0	11.0	28.7	3	9.86	18.33	19.40	100.8	1547.7	2480.2	100.1	1032.7	**992.09**	**344.22**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 0.79 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
11.00	12.50	11.75	1.50	10.0	19.86	9.86	108.16	4.71	28.7	28.7	1.0	279.15	1211.66	3	1.0	14.1	14.1	12.5	8.9	48	9.86	2.27	1.05	115.6	549.8	1775.6	117.8	1343.6	**710.23**	**447.87**
12.50	14.00	13.25	1.50	11.5	19.86	9.86	122.95	4.71	8.9	8.9	1.0	90.76	1302.43	48	1.0	226.3	240.4	14.0	29.4	6	9.80	19.91	21.02	130.3	2162.2	3705.0	135.5	1678.3	**1482.01**	**559.45**
14.00	15.50	14.75	1.50	13.0	19.80	9.80	137.69	4.71	29.4	29.4	1.0	365.75	1668.18	6	1.0	28.3	268.7	15.5	11.1	65	9.80	2.79	1.53	130.3	751.6	2688.5	153.2	2090.0	**1075.41**	**696.68**
15.50	17.00	16.25	1.50	14.5	19.80	9.80	137.69	4.71	11.1	11.1	1.0	127.35	1795.53	65	1.0	306.4	575.1	17.0	11.1	57	10.48	2.79	1.53	130.3	695.5	3066.1	170.8	2541.5	**1226.45**	**847.17**
17.00	18.50	17.75	1.50	16.0	20.48	10.48	137.69	4.71	11.1	11.1	1.0	127.35	1922.88	57	1.0	268.7	843.9	18.5	10.1	58	10.41	2.50	1.25	130.3	671.2	3438.0	188.5	2955.2	**1375.18**	**985.08**
18.50	21.50	20.00	3.00	19.0	20.41	10.41	137.69	9.43	10.1	10.1	1.0	231.25	2154.13	58	1.0	546.9	1390.7	21.5	32.1	0	10.41	31.84	33.16	130.3	3396.2	6941.0	223.8	3768.7	**2776.41**	**1256.23**
21.50	23.00	22.25	1.50	20.5	20.41	10.41	137.69	4.71	32.1	32.1	1.1	449.94	2604.07	0	1.0	0.0	1390.7	23.0	11.6	46	10.41	2.94	1.68	130.3	633.3	4628.1	241.5	4236.3	**1851.22**	**1412.10**
23.00	24.50	23.75	1.50	22.0	20.41	10.41	137.69	4.71	11.6	11.6	1.0	133.24	2737.31	46	1.0	216.9	1607.6	24.5	11.6	46	10.21	2.94	1.68	130.3	633.1	4978.0	259.2	4604.1	**1991.21**	**1534.69**
24.50	27.50	26.00	3.00	25.0	20.21	10.21	137.69	9.43	11.6	11.6	1.0	266.49	3003.80	46	1.0	433.7	2041.3	27.5	11.6	46	10.21	2.94	1.68	130.3	633.1	5678.2	294.5	5339.6	**2271.29**	**1779.87**
27.50	29.00	28.25	1.50	26.5	20.21	10.21	137.69	4.71	11.6	11.6	1.0	133.24	3137.04	46	1.0	216.9	2258.1	29.0	9.2	49	10.21	2.33	1.10	130.3	589.1	5984.3	312.2	5707.4	**2393.72**	**1902.46**
29.00	30.00	29.50	1.00	27.5	20.21	10.21	137.69	3.14	9.2	9.2	1.0	70.09	3207.13	49	1.0	154.0	2412.1	30.0	9.2	49	9.17	2.33	1.10	130.3	588.7	6207.9	324.0	5943.3	**2483.17**	**1981.08**
30.00	30.50	30.25	0.50	28.0	19.17	9.17	137.69	1.57	9.2	9.2	1.0	35.04	3242.18	49	1.0	77.0	2489.1	30.5	31.3	0	10.50	27.81	29.06	130.3	2967.7	8699.0	329.9	6061.2	**3479.62**	**2020.40**
30.50	32.00	31.25	1.50	29.5	20.50	10.50	137.69	4.71	31.3	31.3	1.1	420.32	3662.50	0	1.0	0.0	2489.1	32.0	31.3	0	9.51	27.81	29.06	130.3	2956.4	9108.1	347.5	6499.2	**3643.22**	**2166.39**
32.00	32.50	32.25	0.50	30.0	19.51	9.51	137.69	1.57	31.3	31.3	1.1	140.11	3802.60	0	1.0	0.0	2489.1	32.5	31.3	0	9.51	27.81	29.06	130.3	2956.4	9248.2	353.4	6645.2	**3699.27**	**2215.06**
32.50	33.50	33.00	1.00	31.0	19.51	9.51	137.69	3.14	31.3	31.3	1.1	280.21	4082.81	0	1.0	0.0	2489.1	33.5	9.5	39	8.97	2.38	1.14	130.3	523.5	7095.5	365.2	6937.2	**2838.20**	**2312.39**
33.50	35.00	34.25	1.50	32.5	18.97	8.97	137.69	4.71	9.5	9.5	1.0	108.62	4191.44	39	1.0	183.9	2673.0	35.0	9.5	39	9.52	2.38	1.14	130.3	523.8	7388.2	382.9	7247.3	**2955.29**	**2415.77**
35.00	36.50	35.75	1.50	34.0	19.52	9.52	137.69	4.71	9.5	9.5	1.0	108.62	4300.06	39	1.0	183.9	2856.9	36.5	10.1	56	8.98	2.50	1.25	130.3	656.4	7813.3	400.6	7557.5	**3125.31**	**2519.16**
36.50	37.50	37.00	1.00	35.0	18.98	8.98	137.69	3.14	10.1	10.1	1.0	77.08	4377.14	56	1.0	176.0	3032.9	37.5	10.1	56	8.98	2.50	1.25	130.3	656.4	8066.4	412.3	7822.3	**3226.55**	**2607.44**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
37.50	38.00	37.75	0.50	35.5	18.98	8.98	137.69	1.57	10.1	10.1	1.0	38.54	4415.69	56	1.0	88.0	3120.9	38.0	10.1	56	9.94	2.50	1.25	130.3	656.8	8193.4	418.2	7954.8	**3277.35**	**2651.59**
38.00	40.00	39.00	2.00	37.5	19.94	9.94	137.69	6.29	10.1	10.1	1.0	154.17	4569.85	56	1.0	352.0	3472.9	40.0	10.1	56	9.94	2.50	1.25	130.3	656.8	8699.5	441.8	8484.5	**3479.82**	**2828.16**
BORE NO: P29, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	19.91	9.91	27.25	1.57	26.2	26.2	1.0	21.07	0	5	1.0	7.9	0	3.0	28.8	0	9.91	18.56	19.64	29.7	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	5.00	4.00	2.00	2.5	19.91	9.91	39.64	6.29	28.8	28.8	1.0	136.98	0	0	1.0	0.0	0	5.0	29.6	0	9.25	20.36	21.48	49.6	0	0.0	29.5	29.5	**0.00**	**9.82**
5.00	6.00	5.50	1.00	3.5	19.25	9.25	54.18	3.14	29.6	29.6	1.0	96.72	0	0	1.0	0.0	0	6.0	29.8	0	9.25	20.81	21.94	58.8	0	0.0	41.2	41.2	**0.00**	**13.74**
6.00	8.00	7.00	2.00	5.5	19.25	9.25	68.05	6.29	29.8	29.8	1.0	244.97	0	0	1.0	0.0	0	8.0	30.1	0	9.25	21.76	22.91	77.3	1405.1	1405.1	64.8	64.8	**562.03**	**21.60**
8.00	9.00	8.50	1.00	6.5	19.25	9.25	81.93	3.14	30.1	30.1	1.0	150.00	150.00	0	1.0	0.0	0.0	9.0	30.1	0	9.09	21.76	22.91	86.6	1561.8	1711.8	76.6	226.6	**684.72**	**75.53**
9.00	11.00	10.00	2.00	8.5	19.09	9.09	95.64	6.29	30.1	30.1	1.0	350.23	500.23	0	1.0	0.0	0.0	11.0	8.1	60	9.09	2.13	0.93	104.7	602.7	1102.9	100.1	600.4	**441.17**	**200.12**
11.00	12.00	11.50	1.00	9.5	19.09	9.09	109.28	3.14	8.1	8.1	1.0	48.88	549.11	60	1.0	188.6	188.6	12.0	8.1	60	9.09	2.13	0.93	113.8	617.9	1355.6	111.9	849.6	**542.23**	**283.20**
12.00	13.00	12.50	1.00	10.5	19.09	9.09	118.37	3.14	8.1	8.1	1.0	52.94	602.05	60	1.0	188.6	377.1	13.0	31.0	0	9.62	26.30	27.53	122.9	2643.6	3622.8	123.7	1102.9	**1449.11**	**367.63**
13.00	14.50	13.75	1.50	12.0	19.62	9.62	130.13	4.71	31.0	31.0	1.1	387.03	989.08	0	1.0	0.0	377.1	14.5	9.5	57	10.30	2.38	1.14	137.3	664.5	2030.7	141.4	1507.6	**812.30**	**502.53**
14.50	17.50	16.00	3.00	15.0	20.30	10.30	130.13	9.43	9.5	9.5	1.0	205.31	1194.39	57	1.0	537.4	914.6	17.5	9.5	57	10.30	2.38	1.14	137.3	664.5	2773.5	176.7	2285.7	**1109.39**	**761.89**
17.50	19.00	18.25	1.50	16.5	20.30	10.30	130.13	4.71	9.5	9.5	1.0	102.66	1297.04	57	1.0	268.7	1183.3	19.0	11.5	32	9.37	2.91	1.65	137.3	546.5	3026.8	194.4	2674.7	**1210.72**	**891.57**
19.00	20.50	19.75	1.50	18.0	19.37	9.37	130.13	4.71	11.5	11.5	1.0	124.81	1421.85	32	1.0	150.9	1334.1	20.5	9.5	55	9.37	2.38	1.14	137.3	650.0	3406.0	212.1	2968.0	**1362.38**	**989.35**
20.50	22.00	21.25	1.50	19.5	19.37	9.37	130.13	4.71	9.5	9.5	1.0	102.66	1524.51	55	1.0	259.3	1593.4	22.0	28.6	0	9.62	18.11	19.17	137.3	2026.4	5144.3	229.7	3347.7	**2057.72**	**1115.89**
22.00	23.50	22.75	1.50	21.0	19.62	9.62	130.13	4.71	28.6	28.6	1.0	334.46	1858.97	0	1.0	0.0	1593.4	23.5	11.3	49	9.62	2.85	1.59	137.3	660.3	4112.7	247.4	3699.8	**1645.08**	**1233.27**
23.50	25.00	24.25	1.50	22.5	19.62	9.62	130.13	4.71	11.3	11.3	1.0	122.58	1981.55	49	1.0	231.0	1824.4	25.0	31.5	0	9.62	28.82	30.09	137.3	3223.2	7029.2	265.1	4071.0	**2811.68**	**1357.02**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
25.00	26.50	25.75	1.50	24.0	19.62	9.62	130.13	4.71	31.5	31.5	1.1	404.11	2385.66	0	1.0	0.0	1824.4	26.5	10.2	60	10.56	2.53	1.28	137.3	702.5	4912.6	282.7	4492.8	**1965.02**	**1497.61**
26.50	27.50	27.00	1.00	25.0	20.56	10.56	130.13	3.14	10.2	10.2	1.0	73.58	2459.24	60	1.0	188.6	2013.0	27.5	10.2	60	10.56	2.53	1.28	137.3	702.5	5174.7	294.5	4766.8	**2069.88**	**1588.92**
27.50	29.50	28.50	2.00	27.0	20.56	10.56	130.13	6.29	10.2	10.2	1.0	147.17	2606.41	60	1.0	377.1	2390.1	29.5	11.6	62	10.56	2.94	1.68	137.3	762.7	5759.2	318.1	5314.6	**2303.70**	**1771.55**
29.50	30.00	29.75	0.50	27.5	20.56	10.56	130.13	1.57	11.6	11.6	1.0	41.97	2648.39	62	1.0	97.4	2487.6	30.0	11.6	62	10.56	2.94	1.68	137.3	762.7	5898.6	324.0	5459.9	**2359.46**	**1819.98**
30.00	31.00	30.50	1.00	28.5	20.56	10.56	130.13	3.14	11.6	11.6	1.0	83.95	2732.34	62	1.0	194.9	2682.4	31.0	11.6	62	10.16	2.94	1.68	137.3	762.4	6177.2	335.8	5750.5	**2470.87**	**1916.84**
31.00	32.50	31.75	1.50	30.0	20.16	10.16	130.13	4.71	11.6	11.6	1.0	125.92	2858.26	62	1.0	292.3	2974.7	32.5	11.0	60	10.16	2.76	1.51	137.3	728.6	6561.5	353.4	6186.4	**2624.61**	**2062.13**
32.50	34.00	33.25	1.50	31.5	20.16	10.16	130.13	4.71	11.0	11.0	1.0	119.24	2977.50	60	1.0	282.9	3257.6	34.0	11.0	60	10.16	2.76	1.51	137.3	728.6	6963.6	371.1	6606.2	**2785.45**	**2202.06**
34.00	35.00	34.50	1.00	32.5	20.16	10.16	130.13	3.14	11.0	11.0	1.0	79.49	3056.99	60	1.0	188.6	3446.1	35.0	11.0	60	8.47	2.76	1.51	137.3	727.6	7230.7	382.9	6886.0	**2892.28**	**2295.34**
35.00	35.50	35.25	0.50	33.0	18.47	8.47	130.13	1.57	11.0	11.0	1.0	39.75	3096.74	60	1.0	94.3	3540.4	35.5	33.8	0	8.61	40.40	41.88	137.3	4501.4	11138.6	388.8	7025.9	**4455.43**	**2341.98**
35.50	37.00	36.25	1.50	34.5	18.61	8.61	130.13	4.71	33.8	33.8	1.2	488.69	3585.44	0	1.0	0.0	3540.4	37.0	33.8	0	8.50	40.40	41.88	137.3	4499.6	11625.5	406.4	7532.3	**4650.19**	**2510.77**
37.00	37.50	37.25	0.50	35.0	18.50	8.50	130.13	1.57	33.8	33.8	1.2	162.90	3748.33	0	1.0	0.0	3540.4	37.5	33.3	0	8.50	37.88	39.32	137.3	4219.2	11508.0	412.3	7701.1	**4603.20**	**2567.03**
37.50	38.50	38.00	1.00	36.0	18.50	8.50	130.13	3.14	33.3	33.3	1.2	312.96	4061.30	0	1.0	0.0	3540.4	38.5	34.3	0	8.47	42.92	44.44	137.3	4779.4	12381.2	424.1	8025.8	**4952.46**	**2675.28**
38.50	40.00	39.25	1.50	37.5	18.47	8.47	130.13	4.71	34.3	34.3	1.2	508.43	4569.73	0	1.0	0.0	3540.4	40.0	34.3	0	8.47	42.92	44.44	137.3	4779.4	12889.6	441.8	8551.9	**5155.84**	**2850.65**
BORE NO: P30, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	17.98	7.98	21.95	1.57	27.2	27.2	1.0	17.72	0	12	1.0	18.9	0	3.0	28.3	9	9.16	17.43	18.48	23.9	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	5.00	4.00	2.00	2.5	19.16	9.16	33.10	6.29	28.3	28.3	1.0	112.03	0	9	1.0	56.6	0	5.0	28.3	9	9.16	17.43	18.48	42.3	0	0.0	29.5	29.5	**0.00**	**9.82**
5.00	6.00	5.50	1.00	3.5	19.16	9.16	46.84	3.14	28.3	28.3	1.0	79.27	0	9	1.0	28.3	0	6.0	28.3	0	9.16	17.43	18.48	51.4	0	0.0	41.2	41.2	**0.00**	**13.74**
6.00	8.00	7.00	2.00	5.5	19.16	9.16	60.58	6.29	28.3	28.3	1.0	205.03	0	0	1.0	0.0	0	8.0	28.3	0	11.05	17.43	18.48	69.7	0	0.0	64.8	64.8	**0.00**	**21.60**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
8.00	9.00	8.50	1.00	6.5	21.05	11.05	75.27	3.14	28.3	28.3	1.0	127.37	0	0	1.0	0.0	0	9.0	28.3	0	11.05	17.43	18.48	80.8	0	0.0	76.6	76.6	**0.00**	**25.53**
9.00	10.00	9.50	1.00	7.5	21.05	11.05	86.32	3.14	28.3	28.3	1.0	146.07	0	0	1.0	0.0	0	10.0	10.6	40	11.05	2.65	1.39	91.8	479.9	479.9	88.4	88.4	**191.94**	**29.45**
10.00	11.00	10.50	1.00	8.5	21.05	11.05	97.37	3.14	10.6	10.6	1.0	57.27	57.27	40	1.0	125.7	125.7	11.0	10.6	40	11.05	2.65	1.39	102.9	502.8	685.8	100.1	283.1	**274.33**	**94.37**
11.00	12.00	11.50	1.00	9.5	21.05	11.05	108.42	3.14	10.6	10.6	1.0	63.77	121.03	40	1.0	125.7	251.4	12.0	11.4	45	11.54	2.88	1.62	113.9	583.5	956.0	111.9	484.4	**382.40**	**161.46**
12.00	14.50	13.25	2.50	12.0	21.54	11.54	128.37	7.86	11.4	11.4	1.0	203.37	324.40	45	1.0	353.6	605.0	14.5	11.2	45	11.36	2.82	1.56	142.8	641.9	1571.3	141.4	1070.8	**628.51**	**356.92**
14.50	17.50	16.00	3.00	15.0	21.36	11.36	128.37	9.43	11.2	11.2	1.0	239.65	564.04	45	1.0	424.3	1029.3	17.5	11.2	45	11.36	2.82	1.56	142.8	641.9	2235.2	176.7	1770.0	**894.09**	**590.02**
17.50	19.00	18.25	1.50	16.5	21.36	11.36	128.37	4.71	11.2	11.2	1.0	119.82	683.87	45	1.0	212.1	1241.4	19.0	24.3	10	10.67	9.50	10.11	142.8	1178.5	3103.8	194.4	2119.7	**1241.51**	**706.56**
19.00	20.50	19.75	1.50	18.0	20.67	10.67	128.37	4.71	24.3	24.3	1.0	273.24	957.10	10	1.0	47.1	1288.6	20.5	15.5	42	10.67	4.19	2.92	142.8	778.9	3024.6	212.1	2457.7	**1209.83**	**819.24**
20.50	23.50	22.00	3.00	21.0	20.67	10.67	128.37	9.43	15.5	15.5	1.0	335.65	1292.75	42	1.0	396.0	1684.6	23.5	8.6	41	11.75	2.22	1.00	142.8	543.4	3520.7	247.4	3224.7	**1408.29**	**1074.91**
23.50	26.50	25.00	3.00	24.0	21.75	11.75	128.37	9.43	8.6	8.6	1.0	183.04	1475.79	41	1.0	386.6	2071.1	26.5	8.6	41	11.75	2.22	1.00	142.8	543.4	4090.3	282.7	3829.7	**1636.14**	**1276.56**
26.50	27.50	27.00	1.00	25.0	21.75	11.75	128.37	3.14	8.6	8.6	1.0	61.01	1536.80	41	1.0	128.9	2200.0	27.5	9.0	41	11.75	2.29	1.07	142.8	551.8	4288.6	294.5	4031.3	**1715.43**	**1343.78**
27.50	29.50	28.50	2.00	27.0	21.75	11.75	128.37	6.29	9.0	9.0	1.0	127.79	1664.60	41	1.0	257.7	2457.7	29.5	11.0	41	9.27	2.76	1.51	142.8	605.5	4727.8	318.1	4440.4	**1891.13**	**1480.13**
29.50	30.00	29.75	0.50	27.5	19.27	9.27	128.37	1.57	11.0	11.0	1.0	39.21	1703.81	41	1.0	64.4	2522.1	30.0	11.0	41	9.27	2.76	1.51	142.8	605.5	4831.5	324.0	4549.9	**1932.58**	**1516.64**
30.00	31.00	30.50	1.00	28.5	19.27	9.27	128.37	3.14	11.0	11.0	1.0	78.42	1782.23	41	1.0	128.9	2651.0	31.0	27.8	5	9.27	16.31	17.33	142.8	1927.8	6361.0	335.8	4769.0	**2544.41**	**1589.66**
31.00	32.50	31.75	1.50	30.0	19.27	9.27	128.37	4.71	27.8	27.8	1.0	319.06	2101.29	5	1.0	23.6	2674.6	32.5	8.5	48	9.27	2.20	0.99	142.8	589.9	5365.7	353.4	5129.3	**2146.28**	**1709.76**
32.50	35.00	33.75	2.50	32.5	19.27	9.27	128.37	7.86	8.5	8.5	1.0	150.73	2252.02	48	1.0	377.1	3051.7	35.0	8.1	48	8.55	2.13	0.93	142.8	581.3	5885.0	382.9	5686.6	**2354.01**	**1895.54**
35.00	35.50	35.25	0.50	33.0	18.55	8.55	128.37	1.57	8.1	8.1	1.0	28.71	2280.73	48	1.0	75.4	3127.1	35.5	10.8	33	9.21	2.71	1.45	142.8	542.1	5950.0	388.8	5796.6	**2379.99**	**1932.21**
35.50	37.00	36.25	1.50	34.5	19.21	9.21	128.37	4.71	10.8	10.8	1.0	115.44	2396.17	33	1.0	155.6	3282.7	37.0	9.4	56	9.21	2.36	1.13	142.8	665.1	6344.0	406.4	6085.3	**2537.58**	**2028.44**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
37.00	37.50	37.25	0.50	35.0	19.21	9.21	128.37	1.57	9.4	9.4	1.0	33.39	2429.56	56	1.0	88.0	3370.7	37.5	10.2	56	9.21	2.53	1.28	142.8	684.3	6484.6	412.3	6212.6	**2593.84**	**2070.87**
37.50	38.50	38.00	1.00	36.0	19.21	9.21	128.37	3.14	10.2	10.2	1.0	72.59	2502.15	56	1.0	176.0	3546.7	38.5	14.3	48	9.97	3.74	2.45	142.8	768.3	6817.1	424.1	6473.0	**2726.86**	**2157.66**
38.50	40.00	39.25	1.50	37.5	19.97	9.97	128.37	4.71	14.3	14.3	1.0	154.25	2656.40	48	1.0	226.3	3773.0	40.0	14.3	48	9.97	3.74	2.45	142.8	768.3	7197.7	441.8	6871.2	**2879.07**	**2290.40**
BORE NO: P31, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	20.38	10.38	28.55	1.57	26.7	26.7	1.0	22.56	0	4	1.0	6.3	0	3.0	26.7	4	10.38	13.83	14.80	31.1	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.5	20.38	10.38	36.33	3.14	26.7	26.7	1.0	57.43	0	4	1.0	12.6	0	4.0	26.7	0	10.38	13.83	14.80	41.5	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	5.00	4.50	1.00	2.5	20.38	10.38	46.71	3.14	26.7	26.7	1.0	73.83	0	0	1.0	0.0	0	5.0	27.2	2	9.68	14.95	15.95	51.9	0	0.0	29.5	29.5	**0.00**	**9.82**
5.00	6.00	5.50	1.00	3.5	19.68	9.68	56.74	3.14	27.2	27.2	1.0	91.65	0	2	1.0	6.3	0	6.0	30.4	0	9.68	23.27	24.45	61.6	0	0.0	41.2	41.2	**0.00**	**13.74**
6.00	7.00	6.50	1.00	4.5	19.68	9.68	66.42	3.14	30.4	30.4	1.0	124.92	0	0	1.0	0.0	0	7.0	30.4	0	10.77	23.27	24.45	71.3	0	0.0	53.0	53.0	**0.00**	**17.67**
7.00	9.00	8.00	2.00	6.5	20.77	10.77	82.03	6.29	30.4	30.4	1.0	308.56	0	0	1.0	0.0	0	9.0	12.1	44	10.77	3.09	1.82	92.8	543.9	543.9	76.6	76.6	**217.58**	**25.53**
9.00	10.00	9.50	1.00	7.5	20.77	10.77	98.19	3.14	12.1	12.1	1.0	66.15	66.15	44	1.0	138.3	138.3	10.0	12.1	44	10.40	3.09	1.82	103.6	569.8	774.2	88.4	292.8	**309.70**	**97.60**
10.00	12.50	11.25	2.50	10.0	20.40	10.40	116.57	7.86	12.1	12.1	1.0	196.35	262.51	44	1.0	345.7	484.0	12.5	12.1	44	10.40	3.09	1.82	129.6	632.9	1379.4	117.8	864.3	**551.75**	**288.11**
12.50	14.00	13.25	1.50	11.5	20.40	10.40	137.37	4.71	12.1	12.1	1.0	138.83	401.34	44	1.0	207.4	691.4	14.0	27.5	3	9.71	15.63	16.64	145.2	1867.5	2960.2	135.5	1228.3	**1184.09**	**409.42**
14.00	15.50	14.75	1.50	13.0	19.71	9.71	152.45	4.71	27.5	27.5	1.0	374.13	775.48	3	1.0	14.1	705.6	15.5	10.5	58	9.56	2.62	1.36	145.2	713.8	2194.8	153.2	1634.2	**877.92**	**544.73**
15.50	18.50	17.00	3.00	16.0	19.56	9.56	152.45	9.43	10.5	10.5	1.0	266.41	1041.88	58	1.0	546.9	1252.4	18.5	9.5	62	10.48	2.38	1.14	145.2	714.6	3008.9	188.5	2482.8	**1203.57**	**827.60**
18.50	21.50	20.00	3.00	19.0	20.48	10.48	152.45	9.43	9.5	9.5	1.0	240.54	1282.42	62	1.0	584.6	1837.0	21.5	24.7	10	9.76	9.78	10.55	145.2	1227.2	4346.6	223.8	3343.3	**1738.63**	**1114.42**
21.50	24.50	23.00	3.00	22.0	19.76	9.76	152.45	9.43	24.7	24.7	1.0	661.13	1943.56	10	1.0	94.3	1931.3	24.5	10.2	57	9.63	2.53	1.28	145.2	696.3	4571.2	259.2	4134.0	**1828.47**	**1378.01**
24.50	27.50	26.00	3.00	25.0	19.63	9.63	152.45	9.43	10.2	10.2	1.0	258.63	2202.19	57	1.0	537.4	2468.7	27.5	10.2	57	9.63	2.53	1.28	145.2	696.3	5367.2	294.5	4965.4	**2146.90**	**1655.14**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
27.50	29.00	28.25	1.50	26.5	19.63	9.63	152.45	4.71	10.2	10.2	1.0	129.32	2331.50	57	1.0	268.7	2737.4	29.0	9.5	48	9.63	2.38	1.14	145.2	615.2	5684.2	312.2	5381.1	**2273.66**	**1793.71**
29.00	30.00	29.50	1.00	27.5	19.63	9.63	152.45	3.14	9.5	9.5	1.0	80.18	2411.68	48	1.0	150.9	2888.3	30.0	9.5	48	9.19	2.38	1.14	145.2	615.0	5915.0	324.0	5623.9	**2366.00**	**1874.65**
30.00	30.50	30.25	0.50	28.0	19.19	9.19	152.45	1.57	9.5	9.5	1.0	40.09	2451.77	48	1.0	75.4	2963.7	30.5	7.0	59	10.17	1.93	0.76	145.2	640.4	6055.9	329.9	5745.4	**2422.35**	**1915.12**
30.50	32.00	31.25	1.50	29.5	20.17	10.17	152.45	4.71	7.0	7.0	1.0	88.25	2540.02	59	1.0	278.1	3241.9	32.0	8.0	66	9.94	2.11	0.91	145.2	710.9	6492.8	347.5	6129.4	**2597.13**	**2043.14**
32.00	32.50	32.25	0.50	30.0	19.94	9.94	152.45	1.57	8.0	8.0	1.0	33.67	2573.69	66	1.0	103.7	3345.6	32.5	8.0	66	9.94	2.11	0.91	145.2	710.9	6630.2	353.4	6272.7	**2652.08**	**2090.90**
32.50	33.50	33.00	1.00	31.0	19.94	9.94	152.45	3.14	8.0	8.0	1.0	67.34	2641.03	66	1.0	207.4	3553.0	33.5	8.0	66	9.58	2.11	0.91	145.2	710.8	6904.8	365.2	6559.2	**2761.94**	**2186.41**
33.50	35.00	34.25	1.50	32.5	19.58	9.58	152.45	4.71	8.0	8.0	1.0	101.01	2742.03	66	1.0	311.1	3864.1	35.0	29.6	0	8.76	20.36	21.48	145.2	2396.1	9002.3	382.9	6989.1	**3600.90**	**2329.69**
35.00	36.50	35.75	1.50	34.0	18.76	8.76	152.45	4.71	29.6	29.6	1.0	408.28	3150.32	0	1.0	0.0	3864.1	36.5	29.6	0	8.37	20.36	21.48	145.2	2392.8	9407.2	400.6	7415.0	**3762.90**	**2471.67**
36.50	37.50	37.00	1.00	35.0	18.37	8.37	152.45	3.14	29.6	29.6	1.0	272.19	3422.50	0	1.0	0.0	3864.1	37.5	29.2	0	8.37	19.46	20.56	145.2	2287.0	9573.7	412.3	7699.0	**3829.46**	**2566.33**
37.50	38.00	37.75	0.50	35.5	18.37	8.37	152.45	1.57	29.2	29.2	1.0	133.89	3556.39	0	1.0	0.0	3864.1	38.0	30.3	0	8.57	22.77	23.94	145.2	2677.9	10098.4	418.2	7838.8	**4039.36**	**2612.92**
38.00	40.00	39.00	2.00	37.5	18.57	8.57	152.45	6.29	30.3	30.3	1.0	568.37	4124.76	0	1.0	0.0	3864.1	40.0	30.3	0	8.57	22.77	23.94	145.2	2677.9	10666.8	441.8	8430.7	**4266.71**	**2810.23**
BORE NO: P32, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	19.70	9.70	26.68	1.57	28.2	28.2	1.0	22.48	0	0	1.0	0.0	0	3.0	28.2	0	9.39	17.21	18.25	29.1	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	5.00	4.00	2.00	2.5	19.39	9.39	38.49	6.29	28.2	28.2	1.0	129.73	0	0	1.0	0.0	0	5.0	28.5	0	9.39	17.88	18.94	47.9	0	0.0	29.5	29.5	**0.00**	**9.82**
5.00	6.00	5.50	1.00	3.5	19.39	9.39	52.58	3.14	28.5	28.5	1.0	89.72	0	0	1.0	0.0	0	6.0	28.5	0	9.64	17.88	18.94	57.3	0	0.0	41.2	41.2	**0.00**	**13.74**
6.00	8.00	7.00	2.00	5.5	19.64	9.64	66.91	6.29	28.5	28.5	1.0	228.35	0	0	1.0	0.0	0	8.0	11.6	54	9.64	2.94	1.68	76.6	565.1	565.1	64.8	64.8	**226.03**	**21.60**
8.00	9.00	8.50	1.00	6.5	19.64	9.64	81.37	3.14	11.6	11.6	1.0	52.49	52.49	54	1.0	169.7	169.7	9.0	11.6	54	9.64	2.94	1.68	86.2	587.3	809.5	76.6	298.8	**323.82**	**99.60**
9.00	10.00	9.50	1.00	7.5	19.64	9.64	91.01	3.14	11.6	11.6	1.0	58.71	111.21	54	1.0	169.7	339.4	10.0	11.6	54	10.40	2.94	1.68	95.8	610.1	1060.7	88.4	539.0	**424.30**	**179.66**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
10.00	11.00	10.50	1.00	8.5	20.40	10.40	101.03	3.14	11.6	11.6	1.0	65.18	176.39	54	1.0	169.7	509.1	11.0	11.6	54	10.40	2.94	1.68	106.2	634.1	1319.7	100.1	785.7	**527.87**	**261.89**
11.00	12.00	11.50	1.00	9.5	20.40	10.40	111.43	3.14	11.6	11.6	1.0	71.89	248.27	54	1.0	169.7	678.9	12.0	9.0	66	10.40	2.29	1.07	116.6	680.9	1608.1	111.9	1039.1	**643.22**	**346.35**
12.00	13.00	12.50	1.00	10.5	20.40	10.40	121.83	3.14	9.0	9.0	1.0	60.64	308.92	66	1.0	207.4	886.3	13.0	29.0	0	10.40	19.01	20.10	127.0	1979.2	3174.4	123.7	1318.9	**1269.78**	**439.63**
13.00	14.50	13.75	1.50	12.0	20.40	10.40	134.83	4.71	29.0	29.0	1.0	352.33	661.25	0	1.0	0.0	886.3	14.5	29.0	0	10.18	19.01	20.10	142.6	2210.5	3758.0	141.4	1688.9	**1503.21**	**562.97**
14.50	16.00	15.25	1.50	13.5	20.18	10.18	134.83	4.71	29.0	29.0	1.0	352.33	1013.59	0	1.0	0.0	886.3	16.0	10.4	51	10.18	2.59	1.33	142.6	656.0	2555.8	159.0	2058.9	**1022.33**	**686.31**
16.00	17.50	16.75	1.50	15.0	20.18	10.18	134.83	4.71	10.4	10.4	1.0	116.66	1130.25	51	1.0	240.4	1126.7	17.5	10.4	51	10.18	2.59	1.33	142.6	656.0	2912.9	176.7	2433.7	**1165.17**	**811.22**
17.50	19.00	18.25	1.50	16.5	20.18	10.18	134.83	4.71	10.4	10.4	1.0	116.66	1246.91	51	1.0	240.4	1367.1	19.0	24.0	12	9.99	9.28	9.78	142.6	1163.2	3777.3	194.4	2808.4	**1510.91**	**936.14**
19.00	20.50	19.75	1.50	18.0	19.99	9.99	134.83	4.71	24.0	24.0	1.0	283.00	1529.90	12	1.0	56.6	1423.7	20.5	9.3	62	10.42	2.34	1.11	142.6	705.7	3659.3	212.1	3165.7	**1463.71**	**1055.23**
20.50	23.50	22.00	3.00	21.0	20.42	10.42	134.83	9.43	9.3	9.3	1.0	208.18	1738.08	62	1.0	584.6	2008.3	23.5	9.3	62	10.42	2.34	1.11	142.6	705.7	4452.0	247.4	3993.8	**1780.81**	**1331.26**
23.50	25.00	24.25	1.50	22.5	20.42	10.42	134.83	4.71	9.3	9.3	1.0	104.09	1842.17	62	1.0	292.3	2300.6	25.0	9.3	62	10.42	2.34	1.11	142.6	705.7	4848.4	265.1	4407.8	**1939.36**	**1469.27**
25.00	26.50	25.75	1.50	24.0	20.42	10.42	134.83	4.71	9.3	9.3	1.0	104.09	1946.26	62	1.0	292.3	2592.9	26.5	7.5	60	8.59	2.02	0.84	142.6	653.5	5192.6	282.7	4821.9	**2077.04**	**1607.29**
26.50	27.50	27.00	1.00	25.0	18.59	8.59	134.83	3.14	7.5	7.5	1.0	55.79	2002.04	60	1.0	188.6	2781.4	27.5	7.5	60	8.59	2.02	0.84	142.6	653.5	5437.0	294.5	5078.0	**2174.78**	**1692.67**
27.50	28.00	27.75	0.50	25.5	18.59	8.59	134.83	1.57	7.5	7.5	1.0	27.89	2029.94	60	1.0	94.3	2875.7	28.0	7.5	60	9.11	2.02	0.84	142.6	653.6	5559.3	300.4	5206.1	**2223.72**	**1735.36**
28.00	29.50	28.75	1.50	27.0	19.11	9.11	134.83	4.71	7.5	7.5	1.0	83.68	2113.62	60	1.0	282.9	3158.6	29.5	7.5	60	8.85	2.02	0.84	142.6	653.6	5925.8	318.1	5590.3	**2370.30**	**1863.43**
29.50	30.00	29.75	0.50	27.5	18.85	8.85	134.83	1.57	7.5	7.5	1.0	27.89	2141.51	60	1.0	94.3	3252.9	30.0	8.0	54	8.85	2.11	0.91	142.6	621.5	6015.9	324.0	5718.3	**2406.34**	**1906.12**
30.00	31.00	30.50	1.00	28.5	18.85	8.85	134.83	3.14	8.0	8.0	1.0	59.55	2201.07	54	1.0	169.7	3422.6	31.0	9.2	44	9.73	2.33	1.10	142.6	576.0	6199.6	335.8	5959.4	**2479.86**	**1986.47**
31.00	32.50	31.75	1.50	30.0	19.73	9.73	134.83	4.71	9.2	9.2	1.0	102.95	2304.02	44	1.0	207.4	3630.0	32.5	7.0	51	8.54	1.93	0.76	142.6	579.5	6513.5	353.4	6287.4	**2605.40**	**2095.82**
32.50	34.00	33.25	1.50	31.5	18.54	8.54	134.83	4.71	7.0	7.0	1.0	78.05	2382.06	51	1.0	240.4	3870.4	34.0	11.5	48	9.73	2.91	1.65	142.6	672.0	6924.4	371.1	6623.6	**2769.78**	**2207.86**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
34.00	35.00	34.50	1.00	32.5	19.73	9.73	134.83	3.14	11.5	11.5	1.0	86.21	2468.28	48	1.0	150.9	4021.3	35.0	11.5	48	9.73	2.91	1.65	142.6	672.0	7161.5	382.9	6872.4	**2864.61**	**2290.81**
35.00	35.50	35.25	0.50	33.0	19.73	9.73	134.83	1.57	11.5	11.5	1.0	43.11	2511.38	48	1.0	75.4	4096.7	35.5	8.0	60	8.79	2.11	0.91	142.6	663.9	7272.0	388.8	6996.9	**2908.80**	**2332.29**
35.50	37.00	36.25	1.50	34.5	18.79	8.79	134.83	4.71	8.0	8.0	1.0	89.33	2600.71	60	1.0	282.9	4379.6	37.0	8.0	60	9.18	2.11	0.91	142.6	664.0	7644.3	406.4	7386.7	**3057.73**	**2462.24**
37.00	37.50	37.25	0.50	35.0	19.18	9.18	134.83	1.57	8.0	8.0	1.0	29.78	2630.49	60	1.0	94.3	4473.9	37.5	8.0	60	9.18	2.11	0.91	142.6	664.0	7768.4	412.3	7516.7	**3107.35**	**2505.56**
37.50	38.50	38.00	1.00	36.0	19.18	9.18	134.83	3.14	8.0	8.0	1.0	59.55	2690.05	60	1.0	188.6	4662.4	38.5	9.2	56	8.83	2.33	1.10	142.6	660.5	8012.9	424.1	7776.6	**3205.18**	**2592.20**
38.50	40.00	39.25	1.50	37.5	18.83	8.83	134.83	4.71	9.2	9.2	1.0	102.95	2792.99	56	1.0	264.0	4926.4	40.0	9.2	56	0.00	2.33	1.10	142.6	656.7	8376.1	441.8	8161.2	**3350.44**	**2720.40**
BORE NO: P33, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	19.79	9.79	26.92	1.57	28.6	28.6	1.0	23.07	0	0	1.0	0.0	0	3.0	28.6	0	9.53	18.11	19.17	29.4	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	5.00	4.00	2.00	2.5	19.53	9.53	38.90	6.29	28.6	28.6	1.0	133.31	0	0	1.0	0.0	0	5.0	29.3	0	9.53	19.68	20.79	48.4	0	0.0	29.5	29.5	**0.00**	**9.82**
5.00	6.00	5.50	1.00	3.5	19.53	9.53	53.20	3.14	29.3	29.3	1.0	93.82	0	0	1.0	0.0	0	6.0	29.3	0	9.45	19.68	20.79	58.0	973.5	973.5	41.2	41.2	**389.42**	**13.74**
6.00	8.00	7.00	2.00	5.5	19.45	9.45	67.41	6.29	29.3	29.3	1.0	237.78	237.78	0	1.0	0.0	0.0	8.0	29.3	0	9.45	19.68	20.79	76.9	1265.8	1503.6	64.8	302.6	**601.45**	**100.86**
8.00	9.00	8.50	1.00	6.5	19.45	9.45	81.59	3.14	29.3	29.3	1.0	143.89	381.67	0	1.0	0.0	0.0	9.0	12.2	56	10.24	3.12	1.85	86.3	614.8	996.4	76.6	458.2	**398.58**	**152.75**
9.00	11.00	10.00	2.00	8.5	20.24	10.24	96.55	6.29	12.2	12.2	1.0	131.21	512.88	56	1.0	352.0	352.0	11.0	27.7	0	10.24	16.08	17.10	106.8	1418.0	2282.9	100.1	965.0	**913.16**	**321.67**
11.00	12.00	11.50	1.00	9.5	20.24	10.24	111.91	3.14	27.7	27.7	1.0	184.66	697.54	0	1.0	0.0	352.0	12.0	28.0	0	10.24	16.76	17.79	117.0	1612.3	2661.8	111.9	1161.5	**1064.74**	**387.15**
12.00	13.00	12.50	1.00	10.5	20.24	10.24	122.15	3.14	28.0	28.0	1.0	204.12	901.66	0	1.0	0.0	352.0	13.0	8.6	59	10.39	2.22	1.00	127.3	643.1	1896.8	123.7	1377.4	**758.71**	**459.12**
13.00	14.50	13.75	1.50	12.0	20.39	10.39	135.06	4.71	8.6	8.6	1.0	96.30	997.96	59	1.0	278.1	630.1	14.5	8.6	59	10.61	2.22	1.00	142.9	670.4	2298.5	141.4	1769.5	**919.38**	**589.82**
14.50	17.50	16.00	3.00	15.0	20.61	10.61	135.06	9.43	8.6	8.6	1.0	192.59	1190.55	59	1.0	556.3	1186.4	17.5	10.3	62	10.42	2.56	1.31	142.9	730.9	3107.9	176.7	2553.7	**1243.16**	**851.23**
17.50	20.50	19.00	3.00	18.0	20.42	10.42	135.06	9.43	10.3	10.3	1.0	231.42	1421.97	62	1.0	584.6	1771.0	20.5	11.6	65	10.42	2.94	1.68	142.9	796.6	3989.5	212.1	3405.0	**1595.81**	**1135.01**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 0.79 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
20.50	22.00	21.25	1.50	19.5	20.42	10.42	135.06	4.71	11.6	11.6	1.0	130.70	1552.67	65	1.0	306.4	2077.4	22.0	25.2	8	9.65	10.45	11.34	142.9	1272.5	4902.7	229.7	3859.8	**1961.06**	**1286.61**
22.00	23.50	22.75	1.50	21.0	19.65	9.65	135.06	4.71	25.2	25.2	1.0	299.62	1852.29	8	1.0	37.7	2115.1	23.5	11.0	56	9.65	2.76	1.51	142.9	711.9	4679.4	247.4	4214.8	**1871.75**	**1404.95**
23.50	25.00	24.25	1.50	22.5	19.65	9.65	135.06	4.71	11.0	11.0	1.0	123.77	1976.06	56	1.0	264.0	2379.1	25.0	11.0	56	9.65	2.76	1.51	142.9	711.9	5067.2	265.1	4620.3	**2026.86**	**1540.09**
25.00	26.50	25.75	1.50	24.0	19.65	9.65	135.06	4.71	11.0	11.0	1.0	123.77	2099.83	56	1.0	264.0	2643.1	26.5	11.0	56	8.78	2.76	1.51	142.9	711.4	5454.4	282.7	5025.7	**2181.76**	**1675.24**
26.50	27.50	27.00	1.00	25.0	18.78	8.78	135.06	3.14	11.0	11.0	1.0	82.51	2182.34	56	1.0	176.0	2819.1	27.5	11.0	56	8.78	2.76	1.51	142.9	711.4	5712.9	294.5	5296.0	**2285.17**	**1765.33**
27.50	28.00	27.75	0.50	25.5	18.78	8.78	135.06	1.57	11.0	11.0	1.0	41.26	2223.59	56	1.0	88.0	2907.1	28.0	11.6	65	9.46	2.94	1.68	142.9	795.9	5926.7	300.4	5431.2	**2370.66**	**1810.38**
28.00	29.50	28.75	1.50	27.0	19.46	9.46	135.06	4.71	11.6	11.6	1.0	130.70	2354.29	65	1.0	306.4	3213.6	29.5	11.6	65	8.75	2.94	1.68	142.9	795.4	6363.3	318.1	5886.0	**2545.33**	**1961.98**
29.50	30.00	29.75	0.50	27.5	18.75	8.75	135.06	1.57	11.6	11.6	1.0	43.57	2397.86	65	1.0	102.1	3315.7	30.0	11.6	65	8.75	2.94	1.68	142.9	795.4	6509.0	324.0	6037.6	**2603.61**	**2012.52**
30.00	31.00	30.50	1.00	28.5	18.75	8.75	135.06	3.14	11.6	11.6	1.0	87.13	2484.99	65	1.0	204.3	3520.0	31.0	11.6	65	8.97	2.94	1.68	142.9	795.6	6800.6	335.8	6340.8	**2720.24**	**2113.58**
31.00	32.50	31.75	1.50	30.0	18.97	8.97	135.06	4.71	11.6	11.6	1.0	130.70	2615.69	65	1.0	306.4	3826.4	32.5	11.5	57	8.96	2.91	1.65	142.9	735.6	7177.7	353.4	6795.6	**2871.10**	**2265.18**
32.50	34.00	33.25	1.50	31.5	18.96	8.96	135.06	4.71	11.5	11.5	1.0	129.54	2745.24	57	1.0	268.7	4095.1	34.0	11.5	57	8.95	2.91	1.65	142.9	735.6	7576.0	371.1	7211.5	**3030.40**	**2403.83**
34.00	35.00	34.50	1.00	32.5	18.95	8.95	135.06	3.14	11.5	11.5	1.0	86.36	2831.60	57	1.0	179.1	4274.3	35.0	11.5	57	8.95	2.91	1.65	142.9	735.6	7841.5	382.9	7488.8	**3136.60**	**2496.26**
35.00	35.50	35.25	0.50	33.0	18.95	8.95	135.06	1.57	11.5	11.5	1.0	43.18	2874.78	57	1.0	89.6	4363.9	35.5	8.5	46	8.64	2.20	0.99	142.9	575.6	7814.2	388.8	7627.4	**3125.69**	**2542.47**
35.50	37.00	36.25	1.50	34.5	18.64	8.64	135.06	4.71	8.5	8.5	1.0	95.16	2969.94	46	1.0	216.9	4580.7	37.0	8.7	60	9.08	2.24	1.02	142.9	678.9	8229.6	406.4	7957.1	**3291.82**	**2652.37**
37.00	37.50	37.25	0.50	35.0	19.08	9.08	135.06	1.57	8.7	8.7	1.0	32.48	3002.42	60	1.0	94.3	4675.0	37.5	8.7	60	9.08	2.24	1.02	142.9	678.9	8356.3	412.3	8089.8	**3342.53**	**2696.58**
37.50	38.50	38.00	1.00	36.0	19.08	9.08	135.06	3.14	8.7	8.7	1.0	64.95	3067.37	60	1.0	188.6	4863.6	38.5	8.7	60	8.75	2.24	1.02	142.9	678.8	8609.7	424.1	8355.1	**3443.88**	**2785.02**
38.50	40.00	39.25	1.50	37.5	18.75	8.75	135.06	4.71	8.7	8.7	1.0	97.43	3164.80	60	1.0	282.9	5146.4	40.0	9.8	54	0.00	2.43	1.19	142.9	655.1	8966.3	441.8	8753.0	**3586.52**	**2917.67**
BORE NO: P34, CUT OFF LENGTH: 2.50 m, Nc= 9																														

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
2.50	3.00	2.75	0.50	0.5	19.58	9.58	26.35	1.57	23.3	23.3	1.0	17.83	0	0	1.0	0.0	0	3.0	15.9	26	9.58	4.38	3.14	28.7	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.5	19.58	9.58	33.53	3.14	15.9	15.9	1.0	30.02	0	26	1.0	81.7	0	4.0	30.8	0	9.29	25.29	26.50	38.3	858.1	858.1	17.7	17.7	**343.26**	**5.89**
4.00	6.00	5.00	2.00	3.5	19.29	9.29	47.61	6.29	30.8	30.8	1.0	185.53	185.53	0	1.0	0.0	0.0	6.0	30.8	0	9.29	25.29	26.50	56.9	1227.3	1412.9	41.2	226.8	**565.15**	**75.59**
6.00	7.00	6.50	1.00	4.5	19.29	9.29	61.55	3.14	30.8	30.8	1.0	119.92	305.45	0	1.0	0.0	0.0	7.0	27.4	0	9.29	15.40	16.41	66.2	861.0	1166.5	53.0	358.5	**466.59**	**119.49**
7.00	8.00	7.50	1.00	5.5	19.29	9.29	70.84	3.14	27.4	27.4	1.0	115.40	420.85	0	1.0	0.0	0.0	8.0	25.8	7	9.75	11.80	12.72	75.5	798.1	1219.0	64.8	485.6	**487.59**	**161.88**
8.00	9.00	8.50	1.00	6.5	19.75	9.75	80.36	3.14	25.8	25.8	1.0	122.08	542.93	7	1.0	22.0	22.0	9.0	26.2	9	9.75	12.70	13.64	85.2	966.5	1531.5	76.6	641.5	**612.59**	**213.84**
9.00	10.00	9.50	1.00	7.5	19.75	9.75	90.11	3.14	26.2	26.2	1.0	139.35	682.28	9	1.0	28.3	50.3	10.0	26.0	0	9.49	12.25	13.18	95.0	963.5	1696.0	88.4	820.9	**678.42**	**273.64**
10.00	12.50	11.25	2.50	10.0	19.49	9.49	106.84	7.86	26.0	26.0	1.0	409.44	1091.72	0	1.0	0.0	50.3	12.5	9.5	55	10.41	2.38	1.14	118.7	615.6	1757.6	117.8	1259.8	**703.03**	**419.94**
12.50	15.50	14.00	3.00	13.0	20.41	10.41	134.32	9.43	9.5	9.5	1.0	211.93	1303.65	55	1.0	518.6	568.9	15.5	9.5	55	10.41	2.38	1.14	118.7	615.6	2488.1	153.2	2025.7	**995.23**	**675.22**
15.50	18.50	17.00	3.00	16.0	20.41	10.41	134.32	9.43	9.5	9.5	1.0	211.93	1515.58	55	1.0	518.6	1087.4	18.5	9.5	55	10.62	2.38	1.14	118.7	615.7	3218.7	188.5	2791.5	**1287.47**	**930.50**
18.50	21.50	20.00	3.00	19.0	20.62	10.62	134.32	9.43	9.5	9.5	1.0	211.93	1727.51	55	1.0	518.6	1606.0	21.5	11.5	58	10.14	2.91	1.65	118.7	688.2	4021.7	223.8	3557.3	**1608.69**	**1185.78**
21.50	24.50	23.00	3.00	22.0	20.14	10.14	134.32	9.43	11.5	11.5	1.0	257.66	1985.17	58	1.0	546.9	2152.9	24.5	8.2	62	10.14	2.15	0.94	118.7	642.3	4780.4	259.2	4397.2	**1912.15**	**1465.74**
24.50	27.50	26.00	3.00	25.0	20.14	10.14	134.32	9.43	8.2	8.2	1.0	182.50	2167.67	62	1.0	584.6	2737.4	27.5	8.2	60	10.59	2.15	0.94	118.7	628.4	5533.5	294.5	5199.6	**2213.38**	**1733.21**
27.50	30.00	28.75	2.50	27.5	20.59	10.59	134.32	7.86	8.2	8.2	1.0	152.08	2319.75	60	1.0	471.4	3208.9	30.0	9.1	59	10.59	2.31	1.08	118.7	637.0	6165.6	324.0	5852.6	**2466.23**	**1950.86**
30.00	30.50	30.25	0.50	28.0	20.59	10.59	134.32	1.57	9.1	9.1	1.0	33.81	2353.56	59	1.0	92.7	3301.6	30.5	32.5	0	10.59	33.85	35.22	118.7	3303.9	8959.1	329.9	5985.0	**3583.62**	**1995.00**
30.50	32.00	31.25	1.50	29.5	20.59	10.59	134.32	4.71	32.5	32.5	1.1	453.83	2807.39	0	1.0	0.0	3301.6	32.0	19.5	32	10.59	6.13	5.12	118.7	819.7	6928.6	347.5	6456.5	**2771.46**	**2152.17**
32.00	32.50	32.25	0.50	30.0	20.59	10.59	134.32	1.57	19.5	19.5	1.0	74.75	2882.14	32	1.0	50.3	3351.9	32.5	19.5	32	8.96	6.13	5.12	118.7	816.4	7050.4	353.4	6587.4	**2820.16**	**2195.81**
32.50	33.50	33.00	1.00	31.0	18.96	8.96	134.32	3.14	19.5	19.5	1.0	149.49	3031.63	32	1.0	100.6	3452.4	33.5	19.5	32	9.42	6.13	5.12	118.7	817.3	7301.4	365.2	6849.3	**2920.55**	**2283.09**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
33.50	35.00	34.25	1.50	32.5	19.42	9.42	134.32	4.71	19.5	19.5	1.0	224.24	3255.86	32	1.0	150.9	3603.3	35.0	11.4	39	9.13	2.88	1.62	118.7	550.4	7409.5	382.9	7242.0	**2963.80**	**2414.01**
35.00	36.50	35.75	1.50	34.0	19.13	9.13	134.32	4.71	11.4	11.4	1.0	127.68	3383.54	39	1.0	183.9	3787.1	36.5	11.4	39	9.17	2.88	1.62	118.7	550.4	7721.1	400.6	7571.2	**3088.43**	**2523.75**
36.50	37.50	37.00	1.00	35.0	19.17	9.17	134.32	3.14	11.4	11.4	1.0	85.12	3468.66	39	1.0	122.6	3909.7	37.5	12.0	39	9.17	3.06	1.79	118.7	567.5	7945.8	412.3	7790.7	**3178.33**	**2596.90**
37.50	38.00	37.75	0.50	35.5	19.17	9.17	134.32	1.57	12.0	12.0	1.0	44.87	3513.53	39	1.0	61.3	3971.0	38.0	8.0	50	9.05	2.11	0.91	118.7	553.6	8038.1	418.2	7902.8	**3215.26**	**2634.25**
38.00	40.00	39.00	2.00	37.5	19.05	9.05	134.32	6.29	8.0	8.0	1.0	118.66	3632.19	50	1.0	314.3	4285.3	40.0	8.0	50	0.00	2.11	0.91	118.7	550.4	8467.8	441.8	8359.3	**3387.14**	**2786.42**
BORE NO: P35, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	19.62	9.62	26.46	1.57	24.6	24.6	1.0	19.03	0	0	1.0	0.0	0	3.0	27.7	2	9.62	16.08	17.10	28.9	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.5	19.62	9.62	33.67	3.14	27.7	27.7	1.0	55.56	0	2	1.0	6.3	0	4.0	24.9	0	9.62	9.93	10.77	38.5	340.9	340.9	17.7	17.7	**136.35**	**5.89**
4.00	5.00	4.50	1.00	2.5	19.62	9.62	43.29	3.14	24.9	24.9	1.0	63.15	63.15	0	1.0	0.0	0.0	5.0	26.6	5	8.15	13.60	14.57	48.1	596.1	659.2	29.5	92.6	**263.70**	**30.87**
5.00	6.00	5.50	1.00	3.5	18.15	8.15	52.18	3.14	26.6	26.6	1.0	82.11	145.27	5	1.0	15.7	15.7	6.0	26.6	5	8.15	13.60	14.57	56.3	683.2	844.2	41.2	202.2	**337.67**	**67.41**
6.00	7.00	6.50	1.00	4.5	18.15	8.15	60.33	3.14	26.6	26.6	1.0	94.94	240.21	5	1.0	15.7	31.4	7.0	28.7	0	9.49	18.33	19.40	64.4	999.9	1271.6	53.0	324.7	**508.63**	**108.22**
7.00	9.00	8.00	2.00	6.5	19.49	9.49	73.89	6.29	28.7	28.7	1.0	254.28	494.49	0	1.0	0.0	31.4	9.0	28.7	0	9.49	18.33	19.40	83.4	1273.3	1799.2	76.6	602.5	**719.70**	**200.83**
9.00	10.00	9.50	1.00	7.5	19.49	9.49	88.13	3.14	28.7	28.7	1.0	151.63	646.12	0	1.0	0.0	31.4	10.0	29.0	0	9.49	19.01	20.10	92.9	1461.9	2139.4	88.4	765.9	**855.78**	**255.30**
10.00	11.00	10.50	1.00	8.5	19.49	9.49	97.62	3.14	29.0	29.0	1.0	170.06	816.18	0	1.0	0.0	31.4	11.0	9.3	54	10.11	2.34	1.11	102.4	574.8	1422.4	100.1	947.7	**568.96**	**315.92**
11.00	12.50	11.75	1.50	10.0	20.11	10.11	109.94	4.71	9.3	9.3	1.0	84.87	901.05	54	1.0	254.6	286.0	12.5	13.1	34	10.11	3.38	2.11	117.5	560.9	1748.0	117.8	1304.9	**699.19**	**434.95**
12.50	14.00	13.25	1.50	11.5	20.11	10.11	125.11	4.71	13.1	13.1	1.0	137.25	1038.30	34	1.0	160.3	446.3	14.0	27.0	0	9.28	14.50	15.49	132.7	1568.6	3053.2	135.5	1620.1	**1221.27**	**540.02**
14.00	15.50	14.75	1.50	13.0	19.28	9.28	139.65	4.71	27.0	27.0	1.0	335.45	1373.75	0	1.0	0.0	446.3	15.5	32.0	0	9.28	31.33	32.65	132.7	3385.9	5205.9	153.2	1973.2	**2082.35**	**657.73**
15.50	18.50	17.00	3.00	16.0	19.28	9.28	139.65	9.43	32.0	32.0	1.1	905.04	2278.79	0	1.0	0.0	446.3	18.5	28.5	0	9.46	17.88	18.94	132.7	1934.7	4659.8	188.5	2913.6	**1863.90**	**971.19**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m) From	Layers (m) To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi: ϕ	δ	Ki	Qi	ΣQi	Ultimate Shaft Cohesion Quc= Σα.c.Asi: c	α	α.c.Asi	ΣQi	Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ): Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
18.50	21.50	20.00	3.00	19.0	19.46	9.46	139.65	9.43	28.5	28.5	1.0	714.91	2993.70	0	1.0	0.0	446.3	21.5	12.2	38	10.31	3.12	1.85	132.7	601.1	4041.1	223.8	3663.8	**1616.44**	**1221.28**
21.50	24.50	23.00	3.00	22.0	20.31	10.31	139.65	9.43	12.2	12.2	1.0	284.68	3278.38	38	1.0	358.3	804.6	24.5	12.2	38	10.31	3.12	1.85	132.7	601.1	4684.1	259.2	4342.1	**1873.62**	**1447.38**
24.50	26.00	25.25	1.50	23.5	20.31	10.31	139.65	4.71	12.2	12.2	1.0	142.34	3420.72	38	1.0	179.1	983.7	26.0	9.1	59	11.04	2.31	1.08	132.7	662.5	5067.0	276.9	4681.3	**2026.79**	**1560.43**
26.00	27.50	26.75	1.50	25.0	21.04	11.04	139.65	4.71	9.1	9.1	1.0	105.45	3526.17	59	1.0	278.1	1261.9	27.5	9.1	59	11.04	2.31	1.08	132.7	662.5	5450.6	294.5	5082.6	**2180.22**	**1694.18**
27.50	29.00	28.25	1.50	26.5	21.04	11.04	139.65	4.71	9.1	9.1	1.0	105.45	3631.62	59	1.0	278.1	1540.0	29.0	31.6	0	11.04	29.32	30.60	132.7	3189.5	8361.1	312.2	5483.8	**3344.43**	**1827.94**
29.00	30.00	29.50	1.00	27.5	21.04	11.04	139.65	3.14	31.6	31.6	1.1	291.61	3923.24	0	1.0	0.0	1540.0	30.0	31.6	0	9.44	29.32	30.60	132.7	3170.2	8633.5	324.0	5787.2	**3453.39**	**1929.07**
30.00	30.50	30.25	0.50	28.0	19.44	9.44	139.65	1.57	31.6	31.6	1.1	145.81	4069.04	0	1.0	0.0	1540.0	30.5	18.0	46	8.94	5.42	4.29	132.7	905.0	6514.1	329.9	5938.9	**2605.63**	**1979.64**
30.50	32.00	31.25	1.50	29.5	18.94	8.94	139.65	4.71	18.0	18.0	1.0	213.91	4282.96	46	1.0	216.9	1756.9	32.0	18.0	46	8.98	5.42	4.29	132.7	905.1	6944.9	347.5	6387.4	**2777.96**	**2129.12**
32.00	32.50	32.25	0.50	30.0	18.98	8.98	139.65	1.57	18.0	18.0	1.0	71.30	4354.26	46	1.0	72.3	1829.1	32.5	18.0	46	8.98	5.42	4.29	132.7	905.1	7088.5	353.4	6536.8	**2835.40**	**2178.94**
32.50	33.50	33.00	1.00	31.0	18.98	8.98	139.65	3.14	18.0	18.0	1.0	142.61	4496.87	46	1.0	144.6	1973.7	33.5	18.0	46	8.35	5.42	4.29	132.7	904.0	7374.6	365.2	6835.8	**2949.84**	**2278.60**
33.50	35.00	34.25	1.50	32.5	18.35	8.35	139.65	4.71	18.0	18.0	1.0	213.91	4710.78	46	1.0	216.9	2190.6	35.0	13.5	46	8.66	3.50	2.22	132.7	697.7	7599.1	382.9	7284.2	**3039.64**	**2428.08**
35.00	36.50	35.75	1.50	34.0	18.66	8.66	139.65	4.71	13.5	13.5	1.0	158.06	4868.83	46	1.0	216.9	2407.4	36.5	13.5	46	9.21	3.50	2.22	132.7	698.2	7974.5	400.6	7676.8	**3189.79**	**2558.94**
36.50	37.50	37.00	1.00	35.0	19.21	9.21	139.65	3.14	13.5	13.5	1.0	105.37	4974.20	46	1.0	144.6	2552.0	37.5	13.5	46	9.21	3.50	2.22	132.7	698.2	8224.4	412.3	7938.5	**3289.77**	**2646.18**
37.50	38.00	37.75	0.50	35.5	19.21	9.21	139.65	1.57	13.5	13.5	1.0	52.69	5026.89	46	1.0	72.3	2624.3	38.0	9.5	52	8.54	2.38	1.14	132.7	619.7	8270.9	418.2	8069.4	**3308.34**	**2689.80**
38.00	40.00	39.00	2.00	37.5	18.54	8.54	139.65	6.29	9.5	9.5	1.0	146.89	5173.78	52	1.0	326.9	2951.1	40.0	9.5	52	8.54	2.38	1.14	132.7	619.7	8744.6	441.8	8566.7	**3497.84**	**2855.57**
BORE NO: P36, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	20.43	10.43	28.68	1.57	29.5	29.5	1.0	25.50	0	0	1.0	0.0	0	3.0	29.5	0	10.71	20.13	21.25	31.3	584.4	584.4	5.9	5.9	**233.75**	**1.96**
3.00	5.00	4.00	2.00	2.5	20.71	10.71	42.00	6.29	29.5	29.5	1.0	149.36	149.36	0	1.0	0.0	0.0	5.0	29.5	0	10.71	20.13	21.25	52.7	923.2	1072.6	29.5	178.8	**429.04**	**59.61**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
5.00	6.00	5.50	1.00	3.5	20.71	10.71	58.07	3.14	29.5	29.5	1.0	103.25	252.61	0	1.0	0.0	0.0	6.0	29.3	0	10.48	19.68	20.79	63.4	1066.4	1319.0	41.2	293.8	**527.60**	**97.95**
6.00	8.00	7.00	2.00	5.5	20.48	10.48	73.90	6.29	29.3	29.3	1.0	260.67	513.29	0	1.0	0.0	0.0	8.0	9.5	49	10.48	2.38	1.14	84.4	509.0	1022.3	64.8	578.1	**408.91**	**192.69**
8.00	9.00	8.50	1.00	6.5	20.48	10.48	89.62	3.14	9.5	9.5	1.0	47.13	560.42	49	1.0	154.0	154.0	9.0	9.5	49	10.48	2.38	1.14	94.9	528.6	1243.0	76.6	791.0	**497.21**	**263.67**
9.00	10.00	9.50	1.00	7.5	20.48	10.48	100.10	3.14	9.5	9.5	1.0	52.65	613.07	49	1.0	154.0	308.0	10.0	9.5	49	10.50	2.38	1.14	105.3	548.2	1469.3	88.4	1009.4	**587.71**	**336.47**
10.00	11.00	10.50	1.00	8.5	20.50	10.50	110.59	3.14	9.5	9.5	1.0	58.16	671.23	49	1.0	154.0	462.0	11.0	9.5	49	10.50	2.38	1.14	115.8	567.8	1701.1	100.1	1233.4	**680.43**	**411.12**
11.00	12.00	11.50	1.00	9.5	20.50	10.50	121.09	3.14	9.5	9.5	1.0	63.69	734.91	49	1.0	154.0	616.0	12.0	6.7	69	10.50	1.88	0.71	126.3	677.1	2028.0	111.9	1462.8	**811.20**	**487.61**
12.00	13.00	12.50	1.00	10.5	20.50	10.50	131.59	3.14	6.7	6.7	1.0	48.58	783.50	69	1.0	216.9	832.9	13.0	26.9	0	9.99	14.28	15.26	136.8	1595.1	3211.4	123.7	1740.1	**1284.57**	**580.02**
13.00	14.50	13.75	1.50	12.0	19.99	9.99	144.33	4.71	26.9	26.9	1.0	345.20	1128.70	0	1.0	0.0	832.9	14.5	26.9	0	9.99	14.28	15.26	151.8	1763.2	3724.7	141.4	2102.9	**1489.90**	**700.97**
14.50	16.00	15.25	1.50	13.5	19.99	9.99	144.33	4.71	26.9	26.9	1.0	345.20	1473.90	0	1.0	0.0	832.9	16.0	9.0	54	10.56	2.29	1.07	151.8	659.5	2966.2	159.0	2465.8	**1186.48**	**821.93**
16.00	17.50	16.75	1.50	15.0	20.56	10.56	144.33	4.71	9.0	9.0	1.0	107.77	1581.66	54	1.0	254.6	1087.4	17.5	10.0	60	10.83	2.47	1.22	151.8	724.1	3393.2	176.7	2845.8	**1357.29**	**948.60**
17.50	20.50	19.00	3.00	18.0	20.83	10.83	144.33	9.43	10.0	10.0	1.0	239.95	1821.62	60	1.0	565.7	1653.1	20.5	9.5	64	10.69	2.38	1.14	151.8	741.3	4216.0	212.1	3686.8	**1686.42**	**1228.94**
20.50	23.50	22.00	3.00	21.0	20.69	10.69	144.33	9.43	9.5	9.5	1.0	227.73	2049.35	64	1.0	603.4	2256.6	23.5	9.5	64	10.69	2.38	1.14	151.8	741.3	5047.2	247.4	4553.3	**2018.88**	**1517.77**
23.50	26.50	25.00	3.00	24.0	20.69	10.69	144.33	9.43	9.5	9.5	1.0	227.73	2277.07	64	1.0	603.4	2860.0	26.5	9.5	64	10.52	2.38	1.14	151.8	741.2	5878.3	282.7	5419.8	**2351.31**	**1806.61**
26.50	27.50	27.00	1.00	25.0	20.52	10.52	144.33	3.14	9.5	9.5	1.0	75.91	2352.98	64	1.0	201.1	3061.1	27.5	10.5	60	10.52	2.62	1.36	151.8	742.1	6156.2	294.5	5708.7	**2462.49**	**1902.88**
27.50	28.00	27.75	0.50	25.5	20.52	10.52	144.33	1.57	10.5	10.5	1.0	42.04	2395.02	60	1.0	94.3	3155.4	28.0	11.5	68	10.52	2.91	1.65	151.8	834.9	6385.4	300.4	5850.9	**2554.15**	**1950.29**
28.00	29.50	28.75	1.50	27.0	20.52	10.52	144.33	4.71	11.5	11.5	1.0	138.43	2533.45	68	1.0	320.6	3476.0	29.5	11.5	68	10.52	2.91	1.65	151.8	834.9	6844.4	318.1	6327.5	**2737.75**	**2109.18**
29.50	30.00	29.75	0.50	27.5	20.52	10.52	144.33	1.57	11.5	11.5	1.0	46.14	2579.60	68	1.0	106.9	3582.9	30.0	11.5	60	10.52	2.91	1.65	151.8	778.4	6940.8	324.0	6486.4	**2776.33**	**2162.14**
30.00	31.00	30.50	1.00	28.5	20.52	10.52	144.33	3.14	11.5	11.5	1.0	92.29	2671.89	60	1.0	188.6	3771.4	31.0	12.9	38	10.52	3.32	2.05	151.8	673.3	7116.6	335.8	6779.1	**2846.66**	**2259.69**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
31.00	32.50	31.75	1.50	30.0	20.52	10.52	144.33	4.71	12.9	12.9	1.0	155.84	2827.73	38	1.0	179.1	3950.6	32.5	19.8	45	10.46	6.29	5.28	151.8	1090.7	7869.0	353.4	7131.7	**3147.59**	**2377.24**
32.50	34.00	33.25	1.50	31.5	20.46	10.46	144.33	4.71	19.8	19.8	1.0	244.97	3072.69	45	1.0	212.1	4162.7	34.0	13.8	45	10.46	3.59	2.31	151.8	755.9	7991.4	371.1	7606.5	**3196.54**	**2535.50**
34.00	35.00	34.50	1.00	32.5	20.46	10.46	144.33	3.14	13.8	13.8	1.0	111.42	3184.11	45	1.0	141.4	4304.1	35.0	14.5	48	10.46	3.80	2.51	151.8	802.4	8290.7	382.9	7871.1	**3316.28**	**2623.71**
35.00	35.50	35.25	0.50	33.0	20.46	10.46	144.33	1.57	14.5	14.5	1.0	58.66	3242.77	48	1.0	75.4	4379.6	35.5	13.5	54	10.46	3.50	2.22	151.8	808.5	8430.8	388.8	8011.1	**3372.34**	**2670.37**
35.50	37.50	36.50	2.00	35.0	20.46	10.46	144.33	6.29	13.5	13.5	1.0	217.81	3460.58	54	1.0	339.4	4719.0	37.5	20.2	16	10.46	6.54	5.61	151.8	916.8	9096.4	412.3	8591.9	**3638.56**	**2863.97**
37.50	38.50	38.00	1.00	36.0	20.46	10.46	144.33	3.14	20.2	20.2	1.0	166.90	3627.48	16	1.0	50.3	4769.3	38.5	20.0	16	10.46	6.40	5.39	151.8	898.8	9295.5	424.1	8820.9	**3718.21**	**2940.29**
38.50	40.00	39.25	1.50	37.5	20.46	10.46	144.33	4.71	20.0	20.0	1.0	247.65	3875.13	16	1.0	75.4	4844.7	40.0	20.0	16	10.46	6.40	5.39	151.8	898.8	9618.6	441.8	9161.6	**3847.44**	**3053.88**
BORE NO: P37, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	18.65	8.65	23.79	1.57	23.5	23.5	1.0	16.25	0	10	1.0	15.7	0	3.0	23.5	11	8.65	8.92	9.23	26.0	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.5	18.65	8.65	30.28	3.14	23.5	23.5	1.0	41.37	0	11	1.0	34.6	0	4.0	23.5	11	8.65	8.92	9.23	34.6	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	5.00	4.50	1.00	2.5	18.65	8.65	38.93	3.14	23.5	23.5	1.0	53.19	0	11	1.0	34.6	0	5.0	28.2	0	9.75	17.21	18.25	43.3	0	0.0	29.5	29.5	**0.00**	**9.82**
5.00	6.00	5.50	1.00	3.5	19.75	9.75	48.13	3.14	28.2	28.2	1.0	81.10	0	0	1.0	0.0	0	6.0	27.6	0	9.75	15.85	16.87	53.0	0	0.0	41.2	41.2	**0.00**	**13.74**
6.00	7.00	6.50	1.00	4.5	19.75	9.75	57.88	3.14	27.6	27.6	1.0	95.09	0	0	1.0	0.0	0	7.0	27.6	0	8.36	15.85	16.87	62.8	837.1	837.1	53.0	53.0	**334.85**	**17.67**
7.00	9.00	8.00	2.00	6.5	18.36	8.36	71.11	6.29	27.6	27.6	1.0	233.67	233.67	0	1.0	0.0	0.0	9.0	9.1	44	8.36	2.31	1.08	79.5	458.8	692.5	76.6	310.3	**276.99**	**103.42**
9.00	10.00	9.50	1.00	7.5	18.36	8.36	83.65	3.14	9.1	9.1	1.0	42.11	275.78	44	1.0	138.3	138.3	10.0	9.1	44	10.62	2.31	1.08	87.8	474.9	889.0	88.4	502.4	**355.60**	**167.48**
10.00	12.50	11.25	2.50	10.0	20.62	10.62	101.11	7.86	9.1	9.1	1.0	127.24	403.03	44	1.0	345.7	484.0	12.5	9.1	44	10.62	2.31	1.08	114.4	523.1	1410.1	117.8	1004.8	**564.04**	**334.95**
12.50	14.00	13.25	1.50	11.5	20.62	10.62	122.35	4.71	9.1	9.1	1.0	92.38	495.41	44	1.0	207.4	691.4	14.0	8.5	62	10.32	2.20	0.99	130.3	667.7	1854.5	135.5	1322.3	**741.81**	**440.77**
14.00	15.50	14.75	1.50	13.0	20.32	10.32	138.05	4.71	8.5	8.5	1.0	97.26	592.67	62	1.0	292.3	983.7	15.5	8.5	62	10.32	2.20	0.99	130.3	667.7	2244.1	153.2	1729.5	**897.63**	**576.51**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
15.50	17.00	16.25	1.50	14.5	20.32	10.32	138.05	4.71	8.5	8.5	1.0	97.26	689.94	62	1.0	292.3	1276.0	17.0	25.8	9	9.86	11.80	12.72	130.3	1321.2	3287.2	170.8	2136.8	**1314.87**	**712.25**
17.00	18.50	17.75	1.50	16.0	19.86	9.86	138.05	4.71	25.8	25.8	1.0	314.61	1004.55	9	1.0	42.4	1318.4	18.5	25.8	9	9.86	11.80	12.72	130.3	1321.2	3644.2	188.5	2511.5	**1457.69**	**837.16**
18.50	20.00	19.25	1.50	17.5	19.86	9.86	138.05	4.71	25.8	25.8	1.0	314.61	1319.16	9	1.0	42.4	1360.9	20.0	10.2	53	10.73	2.53	1.28	130.3	639.1	3319.1	206.2	2886.2	**1327.64**	**962.06**
20.00	21.50	20.75	1.50	19.0	20.73	10.73	138.05	4.71	10.2	10.2	1.0	117.10	1436.26	53	1.0	249.9	1610.7	21.5	11.7	56	10.57	2.97	1.71	130.3	707.2	3754.1	223.8	3270.8	**1501.65**	**1090.27**
21.50	24.50	23.00	3.00	22.0	20.57	10.57	138.05	9.43	11.7	11.7	1.0	269.55	1705.81	56	1.0	528.0	2138.7	24.5	11.7	56	10.57	2.97	1.71	130.3	707.2	4551.7	259.2	4103.7	**1820.67**	**1367.90**
24.50	26.00	25.25	1.50	23.5	20.57	10.57	138.05	4.71	11.7	11.7	1.0	134.78	1840.59	56	1.0	264.0	2402.7	26.0	10.2	56	10.57	2.53	1.28	130.3	660.2	4903.5	276.9	4520.2	**1961.41**	**1506.72**
26.00	27.50	26.75	1.50	25.0	20.57	10.57	138.05	4.71	10.2	10.2	1.0	117.10	1957.69	56	1.0	264.0	2666.7	27.5	10.2	56	9.23	2.53	1.28	130.3	659.5	5283.9	294.5	4918.9	**2113.58**	**1639.64**
27.50	29.00	28.25	1.50	26.5	19.23	9.23	138.05	4.71	10.2	10.2	1.0	117.10	2074.78	56	1.0	264.0	2930.7	29.0	17.0	40	9.39	4.92	3.75	130.3	800.8	5806.3	312.2	5317.7	**2322.53**	**1772.56**
29.00	30.00	29.50	1.00	27.5	19.39	9.39	138.05	3.14	17.0	17.0	1.0	132.65	2207.43	40	1.0	125.7	3056.4	30.0	17.0	40	9.39	4.92	3.75	130.3	800.8	6064.7	324.0	5587.8	**2425.88**	**1862.61**
30.00	30.50	30.25	0.50	28.0	19.39	9.39	138.05	1.57	17.0	17.0	1.0	66.32	2273.76	40	1.0	62.9	3119.3	30.5	18.5	48	9.04	5.64	4.57	130.3	933.3	6326.4	329.9	5722.9	**2530.54**	**1907.64**
30.50	32.00	31.25	1.50	29.5	19.04	9.04	138.05	4.71	18.5	18.5	1.0	217.76	2491.51	48	1.0	226.3	3345.6	32.0	18.5	48	9.02	5.64	4.57	130.3	933.3	6770.4	347.5	6184.6	**2708.15**	**2061.54**
32.00	32.50	32.25	0.50	30.0	19.02	9.02	138.05	1.57	18.5	18.5	1.0	72.59	2564.10	48	1.0	75.4	3421.0	32.5	18.5	48	9.02	5.64	4.57	130.3	933.3	6918.4	353.4	6338.5	**2767.35**	**2112.84**
32.50	33.50	33.00	1.00	31.0	19.02	9.02	138.05	3.14	18.5	18.5	1.0	145.17	2709.27	48	1.0	150.9	3571.9	33.5	18.5	48	9.54	5.64	4.57	130.3	934.2	7215.3	365.2	6646.3	**2886.14**	**2215.45**
33.50	35.00	34.25	1.50	32.5	19.54	9.54	138.05	4.71	18.5	18.5	1.0	217.76	2927.03	48	1.0	226.3	3798.1	35.0	14.5	48	8.55	3.80	2.51	130.3	736.4	7461.6	382.9	7108.1	**2984.63**	**2369.35**
35.00	36.50	35.75	1.50	34.0	18.55	8.55	138.05	4.71	14.5	14.5	1.0	168.31	3095.34	48	1.0	226.3	4024.4	36.5	19.5	48	9.13	6.13	5.12	130.3	985.8	8105.6	400.6	7520.3	**3242.23**	**2506.77**
36.50	37.50	37.00	1.00	35.0	19.13	9.13	138.05	3.14	19.5	19.5	1.0	153.64	3248.98	48	1.0	150.9	4175.3	37.5	19.5	48	9.13	6.13	5.12	130.3	985.8	8410.1	412.3	7836.6	**3364.03**	**2612.20**
37.50	38.00	37.75	0.50	35.5	19.13	9.13	138.05	1.57	19.5	19.5	1.0	76.82	3325.80	48	1.0	75.4	4250.7	38.0	8.5	60	9.36	2.20	0.99	130.3	653.2	8229.7	418.2	7994.7	**3291.87**	**2664.91**
38.00	40.00	39.00	2.00	37.5	19.36	9.36	138.05	6.29	8.5	8.5	1.0	129.69	3455.49	60	1.0	377.1	4627.9	40.0	8.5	60	9.36	2.20	0.99	130.3	653.2	8736.5	441.8	8525.1	**3494.61**	**2841.71**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
BORE NO: P38, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	19.46	9.46	26.02	1.57	24.0	24.0	1.0	18.20	0	4	1.0	6.3	0	3.0	24.0	4	9.46	9.28	9.78	28.4	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.5	19.46	9.46	33.11	3.14	24.0	24.0	1.0	46.33	0	4	1.0	12.6	0	4.0	24.3	4	9.13	9.50	10.11	37.8	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	5.00	4.50	1.00	2.5	19.13	9.13	42.41	3.14	24.3	24.3	1.0	60.18	0	4	1.0	12.6	0	5.0	24.3	4	9.13	9.50	10.11	47.0	415.0	415.0	29.5	29.5	**166.00**	**9.82**
5.00	6.00	5.50	1.00	3.5	19.13	9.13	51.54	3.14	24.3	24.3	1.0	73.13	73.13	4	1.0	12.6	12.6	6.0	25.7	7	10.60	11.58	12.49	56.1	611.8	697.5	41.2	126.9	**279.00**	**42.31**
6.00	8.00	7.00	2.00	5.5	20.60	10.60	66.70	6.29	25.7	25.7	1.0	201.77	274.91	7	1.0	44.0	56.6	8.0	25.7	7	10.60	11.58	12.49	77.3	804.6	1136.1	64.8	396.3	**454.44**	**132.09**
8.00	9.00	8.50	1.00	6.5	20.60	10.60	82.60	3.14	25.7	25.7	1.0	124.94	399.84	7	1.0	22.0	78.6	9.0	11.0	42	10.06	2.76	1.51	87.9	493.8	972.3	76.6	555.0	**388.90**	**185.00**
9.00	11.00	10.00	2.00	8.5	20.06	10.06	97.96	6.29	11.0	11.0	1.0	119.69	519.53	42	1.0	264.0	342.6	11.0	11.0	42	10.06	2.76	1.51	108.0	537.5	1399.6	100.1	962.2	**559.86**	**320.75**
11.00	12.00	11.50	1.00	9.5	20.06	10.06	113.05	3.14	11.0	11.0	1.0	69.06	588.60	42	1.0	132.0	474.6	12.0	11.0	42	10.06	2.76	1.51	118.1	559.4	1622.6	111.9	1175.1	**649.02**	**391.70**
12.00	13.00	12.50	1.00	10.5	20.06	10.06	123.11	3.14	11.0	11.0	1.0	75.21	663.80	42	1.0	132.0	606.6	13.0	8.2	55	11.65	2.15	0.94	128.1	609.3	1879.7	123.7	1394.1	**751.87**	**464.69**
13.00	14.50	13.75	1.50	12.0	21.65	11.65	136.88	4.71	8.2	8.2	1.0	92.99	756.79	55	1.0	259.3	865.9	14.5	8.2	55	11.65	2.15	0.94	145.6	638.8	2261.4	141.4	1764.0	**904.57**	**588.01**
14.50	16.00	15.25	1.50	13.5	21.65	11.65	136.88	4.71	8.2	8.2	1.0	92.99	849.78	55	1.0	259.3	1125.1	16.0	9.5	56	11.12	2.38	1.14	145.6	673.3	2648.2	159.0	2134.0	**1059.29**	**711.32**
16.00	17.50	16.75	1.50	15.0	21.12	11.12	136.88	4.71	9.5	9.5	1.0	107.98	957.76	56	1.0	264.0	1389.1	17.5	11.5	48	11.12	2.91	1.65	145.6	679.7	3026.6	176.7	2523.6	**1210.64**	**841.21**
17.50	19.00	18.25	1.50	16.5	21.12	11.12	136.88	4.71	11.5	11.5	1.0	131.28	1089.04	48	1.0	226.3	1615.4	19.0	27.2	0	9.27	14.95	15.95	145.6	1769.0	4473.5	194.4	2898.9	**1789.40**	**966.29**
19.00	20.50	19.75	1.50	18.0	19.27	9.27	136.88	4.71	27.2	27.2	1.0	331.63	1420.67	0	1.0	0.0	1615.4	20.5	10.2	38	9.27	2.53	1.28	145.6	562.7	3598.8	212.1	3248.2	**1439.52**	**1082.72**
20.50	22.00	21.25	1.50	19.5	19.27	9.27	136.88	4.71	10.2	10.2	1.0	116.10	1536.78	38	1.0	179.1	1794.6	22.0	10.2	38	9.75	2.53	1.28	145.6	562.9	3894.3	229.7	3561.1	**1557.71**	**1187.03**
22.00	23.50	22.75	1.50	21.0	19.75	9.75	136.88	4.71	10.2	10.2	1.0	116.10	1652.88	38	1.0	179.1	1973.7	23.5	9.1	49	9.75	2.31	1.08	145.6	614.7	4241.3	247.4	3874.0	**1696.52**	**1291.33**
23.50	26.50	25.00	3.00	24.0	19.75	9.75	136.88	9.43	9.1	9.1	1.0	206.71	1859.59	49	1.0	462.0	2435.7	26.5	9.1	49	9.98	2.31	1.08	145.6	614.8	4910.1	282.7	4578.1	**1964.04**	**1526.02**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m
Critical water table: 0.00 m
Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0
Area of Pile: 0.79 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
26.50	27.50	27.00	1.00	25.0	19.98	9.98	136.88	3.14	9.1	9.1	1.0	68.90	1928.50	49	1.0	154.0	2589.7	27.5	9.1	49	9.98	2.31	1.08	145.6	614.8	5133.0	294.5	4812.7	**2053.21**	**1604.25**
27.50	29.50	28.50	2.00	27.0	19.98	9.98	136.88	6.29	9.1	9.1	1.0	137.81	2066.31	49	1.0	308.0	2897.7	29.5	7.4	63	9.98	2.00	0.82	145.6	677.8	5641.8	318.1	5282.1	**2256.72**	**1760.70**
29.50	30.00	29.75	0.50	27.5	19.98	9.98	136.88	1.57	7.4	7.4	1.0	27.94	2094.24	63	1.0	99.0	2996.7	30.0	7.4	63	11.70	2.00	0.82	145.6	678.3	5769.3	324.0	5414.9	**2307.71**	**1804.98**
30.00	32.50	31.25	2.50	30.0	21.70	11.70	136.88	7.86	7.4	7.4	1.0	139.68	2233.92	63	1.0	495.0	3491.7	32.5	24.2	8	11.70	9.42	10.00	145.6	1180.8	6906.4	353.4	6079.1	**2762.56**	**2026.36**
32.50	35.00	33.75	2.50	32.5	21.70	11.70	136.88	7.86	24.2	24.2	1.0	483.33	2717.26	8	1.0	62.9	3554.6	35.0	24.2	8	10.82	9.42	10.00	145.6	1177.3	7449.1	382.9	6654.7	**2979.65**	**2218.24**
35.00	35.50	35.25	0.50	33.0	20.82	10.82	136.88	1.57	24.2	24.2	1.0	96.67	2813.92	8	1.0	12.6	3567.1	35.5	24.2	8	10.82	9.42	10.00	145.6	1177.3	7558.4	388.8	6769.8	**3023.35**	**2256.61**
35.50	37.00	36.25	1.50	34.5	20.82	10.82	136.88	4.71	24.2	24.2	1.0	290.00	3103.92	8	1.0	37.7	3604.9	37.0	24.2	8	10.82	9.42	10.00	145.6	1177.3	7886.1	406.4	7115.2	**3154.43**	**2371.74**
37.00	37.50	37.25	0.50	35.0	20.82	10.82	136.88	1.57	24.2	24.2	1.0	96.67	3200.59	8	1.0	12.6	3617.4	37.5	10.5	49	9.07	2.62	1.36	145.6	650.8	7468.8	412.3	7230.4	**2987.52**	**2410.12**
37.50	38.50	38.00	1.00	36.0	19.07	9.07	136.88	3.14	10.5	10.5	1.0	79.73	3280.32	49	1.0	154.0	3771.4	38.5	10.5	49	9.39	2.62	1.36	145.6	650.9	7702.7	424.1	7475.9	**3081.08**	**2491.95**
38.50	40.00	39.25	1.50	37.5	19.39	9.39	136.88	4.71	10.5	10.5	1.0	119.60	3399.92	49	1.0	231.0	4002.4	40.0	10.5	49	9.39	2.62	1.36	145.6	650.9	8053.3	441.8	7844.1	**3221.32**	**2614.71**
BORE NO: P39, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	18.95	8.95	24.61	1.57	24.5	24.5	1.0	17.63	0	7	1.0	11.0	0	3.0	24.5	7	8.95	9.64	10.33	26.9	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	5.00	4.00	2.00	2.5	18.95	8.95	35.80	6.29	24.5	24.5	1.0	102.55	0	7	1.0	44.0	0	5.0	13.5	17	8.95	3.50	2.22	44.8	0	0.0	29.5	29.5	**0.00**	**9.82**
5.00	6.00	5.50	1.00	3.5	18.95	8.95	49.23	3.14	13.5	13.5	1.0	37.14	0	17	1.0	53.4	0	6.0	15.0	20	8.95	3.94	2.65	53.7	0	0.0	41.2	41.2	**0.00**	**13.74**
6.00	8.00	7.00	2.00	5.5	18.95	8.95	62.65	6.29	15.0	15.0	1.0	105.52	0	20	1.0	125.7	0	8.0	13.2	21	10.20	3.41	2.14	71.6	0	0.0	64.8	64.8	**0.00**	**21.60**
8.00	9.00	8.50	1.00	6.5	20.20	10.20	76.70	3.14	13.2	13.2	1.0	56.54	0	21	1.0	66.0	0	9.0	9.5	51	10.20	2.38	1.14	81.8	518.2	518.2	76.6	76.6	**207.28**	**25.53**
9.00	10.00	9.50	1.00	7.5	20.20	10.20	86.90	3.14	9.5	9.5	1.0	45.70	45.70	51	1.0	160.3	160.3	10.0	9.5	51	10.20	2.38	1.14	92.0	537.3	743.3	88.4	294.3	**297.30**	**98.12**
10.00	11.00	10.50	1.00	8.5	20.20	10.20	97.10	3.14	9.5	9.5	1.0	51.07	96.77	51	1.0	160.3	320.6	11.0	9.5	51	10.20	2.38	1.14	102.2	556.3	973.7	100.1	517.5	**389.47**	**172.49**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
11.00	12.00	11.50	1.00	9.5	20.20	10.20	107.30	3.14	9.5	9.5	1.0	56.43	153.20	51	1.0	160.3	480.9	12.0	8.2	56	10.49	2.15	0.94	112.4	589.4	1223.5	111.9	746.0	**489.39**	**248.66**
12.00	14.50	13.25	2.50	12.0	20.49	10.49	125.51	7.86	8.2	8.2	1.0	142.11	295.31	56	1.0	440.0	920.9	14.5	12.8	27	10.49	3.29	2.02	138.6	557.8	1773.9	141.4	1357.5	**709.58**	**452.51**
14.50	16.00	15.25	1.50	13.5	20.49	10.49	125.51	4.71	12.8	12.8	1.0	134.43	429.75	27	1.0	127.3	1048.1	16.0	11.5	53	10.50	2.91	1.65	138.6	698.7	2176.5	159.0	1636.9	**870.62**	**545.64**
16.00	17.50	16.75	1.50	15.0	20.50	10.50	125.51	4.71	11.5	11.5	1.0	120.38	550.13	53	1.0	249.9	1298.0	17.5	10.5	58	9.89	2.62	1.36	138.6	700.5	2548.6	176.7	2024.8	**1019.44**	**674.95**
17.50	20.50	19.00	3.00	18.0	19.89	9.89	125.51	9.43	10.5	10.5	1.0	219.33	769.46	58	1.0	546.9	1844.9	20.5	14.4	80	9.89	3.77	2.48	138.6	985.5	3599.9	212.1	2826.4	**1439.94**	**942.12**
20.50	22.00	21.25	1.50	19.5	19.89	9.89	125.51	4.71	14.4	14.4	1.0	151.92	921.38	80	1.0	377.1	2222.0	22.0	9.7	62	10.30	2.42	1.17	138.6	706.3	3849.7	229.7	3373.1	**1539.88**	**1124.37**
22.00	23.50	22.75	1.50	21.0	20.30	10.30	125.51	4.71	9.7	9.7	1.0	101.14	1022.52	62	1.0	292.3	2514.3	23.5	9.7	62	10.30	2.42	1.17	138.6	706.3	4243.1	247.4	3784.2	**1697.26**	**1261.40**
23.50	25.00	24.25	1.50	22.5	20.30	10.30	125.51	4.71	9.7	9.7	1.0	101.14	1123.67	62	1.0	292.3	2806.6	25.0	10.4	46	10.60	2.59	1.33	138.6	612.7	4542.9	265.1	4195.3	**1817.17**	**1398.44**
25.00	26.50	25.75	1.50	24.0	20.60	10.60	125.51	4.71	10.4	10.4	1.0	108.60	1232.26	46	1.0	216.9	3023.4	26.5	10.0	46	10.60	2.47	1.22	138.6	599.4	4855.1	282.7	4538.4	**1942.04**	**1512.81**
26.50	27.50	27.00	1.00	25.0	20.60	10.60	125.51	3.14	10.0	10.0	1.0	69.56	1301.82	46	1.0	144.6	3168.0	27.5	10.0	46	10.60	2.47	1.22	138.6	599.4	5069.2	294.5	4764.3	**2027.69**	**1588.11**
27.50	29.50	28.50	2.00	27.0	20.60	10.60	125.51	6.29	10.0	10.0	1.0	139.11	1440.93	46	1.0	289.1	3457.1	29.5	14.3	30	8.93	3.74	2.45	138.6	627.8	5525.8	318.1	5216.2	**2210.34**	**1738.72**
29.50	30.00	29.75	0.50	27.5	18.93	8.93	125.51	1.57	14.3	14.3	1.0	50.27	1491.20	30	1.0	47.1	3504.3	30.0	9.5	30	8.93	2.38	1.14	138.6	475.4	5470.9	324.0	5319.5	**2188.35**	**1773.16**
30.00	31.00	30.50	1.00	28.5	18.93	8.93	125.51	3.14	9.5	9.5	1.0	66.01	1557.21	30	1.0	94.3	3598.6	31.0	9.5	50	9.19	2.38	1.14	138.6	616.9	5772.7	335.8	5491.5	**2309.09**	**1830.51**
31.00	32.50	31.75	1.50	30.0	19.19	9.19	125.51	4.71	9.5	9.5	1.0	99.02	1656.23	50	1.0	235.7	3834.3	32.5	26.1	0	10.42	12.48	13.41	138.6	1413.9	6904.4	353.4	5843.9	**2761.77**	**1947.98**
32.50	34.00	33.25	1.50	31.5	20.42	10.42	125.51	4.71	27.5	27.5	1.0	308.02	1964.25	0	1.0	0.0	3834.3	34.0	10.9	47	10.42	2.73	1.48	138.6	636.3	6434.8	371.1	6169.6	**2573.92**	**2056.55**
34.00	35.00	34.50	1.00	32.5	20.42	10.42	125.51	3.14	10.9	10.9	1.0	75.96	2040.21	47	1.0	147.7	3982.0	35.0	10.9	47	10.42	2.73	1.48	138.6	636.3	6658.5	382.9	6405.1	**2663.39**	**2135.03**
35.00	35.50	35.25	0.50	33.0	20.42	10.42	125.51	1.57	10.9	10.9	1.0	37.98	2078.20	47	1.0	73.9	4055.9	35.5	15.8	39	10.42	4.33	3.09	138.6	760.4	6894.5	388.8	6522.8	**2757.80**	**2174.27**
35.50	37.00	36.25	1.50	34.5	20.42	10.42	125.51	4.71	15.8	15.8	1.0	167.43	2245.63	39	1.0	183.9	4239.7	37.0	9.6	54	10.42	2.40	1.16	138.6	647.8	7133.1	406.4	6891.8	**2853.25**	**2297.26**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
37.00	37.50	37.25	0.50	35.0	20.42	10.42	125.51	1.57	9.6	9.6	1.0	33.36	2278.99	54	1.0	84.9	4324.6	37.5	9.6	54	10.42	2.40	1.16	138.6	647.8	7251.3	412.3	7015.9	**2900.54**	**2338.63**
37.50	38.50	38.00	1.00	36.0	20.42	10.42	125.51	3.14	9.6	9.6	1.0	66.72	2345.71	54	1.0	169.7	4494.3	38.5	8.0	54	10.42	2.11	0.91	138.6	615.4	7455.4	424.1	7264.1	**2982.16**	**2421.37**
38.50	40.00	39.25	1.50	37.5	20.42	10.42	125.51	4.71	8.0	8.0	1.0	83.16	2428.87	54	1.0	254.6	4748.9	40.0	8.0	96	10.42	2.11	0.91	138.6	912.4	8090.1	441.8	7619.5	**3236.05**	**2539.84**
BORE NO: P40, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	20.10	10.10	27.78	1.57	9.6	9.6	1.0	7.38	0	48	1.0	75.4	0	3.0	9.6	30	10.10	2.40	1.16	30.3	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.5	20.10	10.10	35.35	3.14	9.6	9.6	1.0	18.79	0	30	1.0	94.3	0	4.0	13.5	16	10.10	3.50	2.22	40.4	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	5.00	4.50	1.00	2.5	20.10	10.10	45.45	3.14	13.5	13.5	1.0	34.29	0	16	1.0	50.3	0	5.0	27.5	5	9.64	15.63	16.64	50.5	0	0.0	29.5	29.5	**0.00**	**9.82**
5.00	6.00	5.50	1.00	3.5	19.64	9.64	55.32	3.14	27.5	27.5	1.0	90.51	0	5	1.0	15.7	0	6.0	27.5	5	9.64	15.63	16.64	60.1	0	0.0	41.2	41.2	**0.00**	**13.74**
6.00	8.00	7.00	2.00	5.5	19.64	9.64	69.78	6.29	27.5	27.5	1.0	228.33	0	5	1.0	31.4	0	8.0	25.2	0	9.64	10.45	11.34	79.4	0	0.0	64.8	64.8	**0.00**	**21.60**
8.00	9.00	8.50	1.00	6.5	19.64	9.64	84.24	3.14	25.2	25.2	1.0	124.58	0	0	1.0	0.0	0	9.0	10.5	56	10.39	2.62	1.36	89.1	584.7	584.7	76.6	76.6	**233.88**	**25.53**
9.00	11.00	10.00	2.00	8.5	20.39	10.39	99.45	6.29	10.5	10.5	1.0	115.86	115.86	56	1.0	352.0	352.0	11.0	9.6	58	10.39	2.40	1.16	109.8	621.8	1089.7	100.1	568.0	**435.87**	**189.33**
11.00	12.00	11.50	1.00	9.5	20.39	10.39	115.04	3.14	9.6	9.6	1.0	61.15	177.01	58	1.0	182.3	534.3	12.0	7.1	59	10.49	1.95	0.77	120.2	604.4	1315.7	111.9	823.2	**526.29**	**274.40**
12.00	14.50	13.25	2.50	12.0	20.49	10.49	133.34	7.86	7.1	7.1	1.0	130.50	307.50	59	1.0	463.6	997.9	14.5	9.5	46	10.49	2.38	1.14	146.5	603.9	1909.2	141.4	1446.7	**763.69**	**482.24**
14.50	16.00	15.25	1.50	13.5	20.49	10.49	133.34	4.71	9.5	9.5	1.0	105.19	412.70	46	1.0	216.9	1214.7	16.0	8.3	60	10.09	2.16	0.96	146.5	677.1	2304.5	159.0	1786.5	**921.80**	**595.49**
16.00	17.50	16.75	1.50	15.0	20.09	10.09	133.34	4.71	8.3	8.3	1.0	91.70	504.40	60	1.0	282.9	1497.6	17.5	8.3	52	10.31	2.16	0.96	146.5	620.6	2622.6	176.7	2178.7	**1049.03**	**726.23**
17.50	20.50	19.00	3.00	18.0	20.31	10.31	133.34	9.43	8.3	8.3	1.0	183.41	687.81	52	1.0	490.3	1987.9	20.5	18.5	28	10.31	5.64	4.57	146.5	865.7	3541.4	212.1	2887.7	**1416.56**	**962.58**
20.50	23.50	22.00	3.00	21.0	20.31	10.31	133.34	9.43	18.5	18.5	1.0	420.66	1108.48	28	1.0	264.0	2251.9	23.5	11.2	57	10.85	2.82	1.56	146.5	734.6	4094.9	247.4	3607.7	**1637.96**	**1202.58**
23.50	26.50	25.00	3.00	24.0	20.85	10.85	133.34	9.43	11.2	11.2	1.0	248.94	1357.41	57	1.0	537.4	2789.3	26.5	8.7	50	10.85	2.24	1.02	146.5	615.2	4761.9	282.7	4429.4	**1904.77**	**1476.48**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
26.50	27.50	27.00	1.00	25.0	20.85	10.85	133.34	3.14	8.7	8.7	1.0	64.13	1421.54	50	1.0	157.1	2946.4	27.5	8.7	49	10.85	2.24	1.02	146.5	608.1	4976.1	294.5	4662.5	**1990.45**	**1554.17**
27.50	29.50	28.50	2.00	27.0	20.85	10.85	133.34	6.29	8.7	8.7	1.0	128.26	1549.80	49	1.0	308.0	3254.4	29.5	9.5	88	10.85	2.38	1.14	146.5	901.0	5705.3	318.1	5122.3	**2282.10**	**1707.44**
29.50	30.00	29.75	0.50	27.5	20.85	10.85	133.34	1.57	9.5	9.5	1.0	35.06	1584.86	88	1.0	138.3	3392.7	30.0	9.5	88	10.85	2.38	1.14	146.5	901.0	5878.6	324.0	5301.6	**2351.44**	**1767.18**
30.00	31.00	30.50	1.00	28.5	20.85	10.85	133.34	3.14	9.5	9.5	1.0	70.13	1654.99	88	1.0	276.6	3669.3	31.0	27.7	0	10.85	16.08	17.10	146.5	1923.3	7247.5	335.8	5660.0	**2899.02**	**1886.68**
31.00	32.50	31.75	1.50	30.0	20.85	10.85	133.34	4.71	27.7	27.7	1.0	330.03	1985.02	0	1.0	0.0	3669.3	32.5	27.7	0	10.01	16.08	17.10	146.5	1917.6	7571.9	353.4	6007.7	**3028.77**	**2002.58**
32.50	34.00	33.25	1.50	31.5	20.01	10.01	133.34	4.71	27.7	27.7	1.0	330.03	2315.05	0	1.0	0.0	3669.3	34.0	26.3	7	10.01	12.93	13.88	146.5	1591.7	7576.0	371.1	6355.4	**3030.40**	**2118.48**
34.00	35.00	34.50	1.00	32.5	20.01	10.01	133.34	3.14	26.3	26.3	1.0	207.12	2522.17	7	1.0	22.0	3691.3	35.0	26.0	7	10.01	12.25	13.18	146.5	1511.2	7724.7	382.9	6596.3	**3089.86**	**2198.78**
35.00	35.50	35.25	0.50	33.0	20.01	10.01	133.34	1.57	26.0	26.0	1.0	102.20	2624.37	7	1.0	11.0	3702.3	35.5	18.9	7	10.01	5.82	4.79	146.5	738.4	7065.0	388.8	6715.4	**2826.01**	**2238.48**
35.50	37.00	36.25	1.50	34.5	20.01	10.01	133.34	4.71	18.9	18.9	1.0	215.22	2839.59	7	1.0	33.0	3735.3	37.0	8.9	56	10.01	2.27	1.05	146.5	661.6	7236.5	406.4	6981.3	**2894.58**	**2327.11**
37.00	37.50	37.25	0.50	35.0	20.01	10.01	133.34	1.57	8.9	8.9	1.0	32.81	2872.41	56	1.0	88.0	3823.3	37.5	8.9	56	10.16	2.27	1.05	146.5	661.6	7357.3	412.3	7108.0	**2942.93**	**2369.34**
37.50	38.50	38.00	1.00	36.0	20.16	10.16	133.34	3.14	8.9	8.9	1.0	65.63	2938.03	56	1.0	176.0	3999.3	38.5	8.9	56	9.31	2.27	1.05	146.5	661.3	7598.6	424.1	7361.4	**3039.44**	**2453.81**
38.50	40.00	39.25	1.50	37.5	19.31	9.31	133.34	4.71	8.9	8.9	1.0	98.44	3036.47	56	1.0	264.0	4263.3	40.0	18.9	10	9.31	5.82	4.79	146.5	758.3	8058.0	441.8	7741.5	**3223.21**	**2580.51**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 1.13 m^2

Layers (m) From	Layers (m) To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi: ϕ	δ	Ki	Qi	ΣQi	Ultimate Shaft Cohesion Quc= Σα.c.Asi: c	α	α.c.Asi	ΣQi	Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ): Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
BORE NO: P21, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	18.09	8.09	22.25	1.89	27.2	27.2	1.0	21.56	0	0	1.0	0.0	0	3.0	27.2	0	9.53	14.95	15.95	24.3	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	5.00	4.00	2.00	2.5	19.53	9.53	33.80	7.54	27.2	27.2	1.0	131.03	0	0	1.0	0.0	0	5.0	27.2	0	9.53	14.95	15.95	43.3	0	0.0	42.4	42.4	**0.00**	**14.14**
5.00	6.00	5.50	1.00	3.5	19.53	9.53	48.10	3.77	27.2	27.2	1.0	93.22	0	0	1.0	0.0	0	6.0	27.1	0	9.53	14.73	15.72	52.9	0	0.0	59.4	59.4	**0.00**	**19.79**
6.00	8.00	7.00	2.00	5.5	19.53	9.53	62.39	7.54	27.1	27.1	1.0	240.82	0	0	1.0	0.0	0	8.0	27.4	0	10.00	15.40	16.41	71.9	1364.9	1364.9	93.3	93.3	**545.96**	**31.10**
8.00	9.00	8.50	1.00	6.5	20.00	10.00	76.92	3.77	27.4	27.4	1.0	150.37	150.37	0	1.0	0.0	0.0	9.0	8.1	59	10.00	2.13	0.93	81.9	804.3	954.7	110.3	260.6	**381.88**	**86.88**
9.00	10.00	9.50	1.00	7.5	20.00	10.00	86.92	3.77	8.1	8.1	1.0	46.65	197.03	59	1.0	222.5	222.5	10.0	29.0	0	10.00	19.01	20.10	91.9	2113.2	2532.8	127.2	546.8	**1013.11**	**182.26**
10.00	11.00	10.50	1.00	8.5	20.00	10.00	96.92	3.77	29.0	29.0	1.0	202.61	399.64	0	1.0	0.0	222.5	11.0	10.2	70	10.00	2.53	1.28	101.9	1013.1	1635.2	144.2	766.4	**654.09**	**255.45**
11.00	12.00	11.50	1.00	9.5	20.00	10.00	106.92	3.77	10.2	10.2	1.0	72.55	472.20	70	1.0	264.0	486.5	12.0	10.8	70	10.50	2.71	1.45	111.9	1065.7	2024.4	161.2	1119.9	**809.76**	**373.29**
12.00	14.50	13.25	2.50	12.0	20.50	10.50	125.05	9.43	10.8	10.8	1.0	224.91	697.10	70	1.0	660.0	1146.5	14.5	11.4	74	10.58	2.88	1.62	138.2	1215.6	3059.3	203.6	2047.2	**1223.71**	**682.40**
14.50	17.50	16.00	3.00	15.0	20.58	10.58	154.04	11.31	11.4	11.4	1.0	351.42	1048.52	74	1.0	837.3	1983.8	17.5	9.2	62	10.30	2.33	1.10	169.9	1086.2	4118.5	254.5	3286.8	**1647.38**	**1095.59**
17.50	20.50	19.00	3.00	18.0	20.30	10.30	154.04	11.31	9.2	9.2	1.0	282.28	1330.80	62	1.0	701.5	2685.3	20.5	12.0	67	10.40	3.06	1.79	169.9	1282.8	5298.8	305.4	4321.4	**2119.53**	**1440.47**
20.50	23.50	22.00	3.00	21.0	20.40	10.40	154.04	11.31	12.0	12.0	1.0	370.45	1701.26	67	1.0	758.1	3443.3	23.5	12.0	67	10.40	3.06	1.79	169.9	1282.8	6427.3	356.3	5500.8	**2570.94**	**1833.61**
23.50	25.00	24.25	1.50	22.5	20.40	10.40	154.04	5.66	12.0	12.0	1.0	185.23	1886.49	67	1.0	379.0	3822.3	25.0	10.2	57	10.24	2.53	1.28	169.9	1075.4	6784.3	381.7	6090.5	**2713.71**	**2030.18**
25.00	26.50	25.75	1.50	24.0	20.24	10.24	154.04	5.66	10.2	10.2	1.0	156.79	2043.28	57	1.0	322.5	4144.8	26.5	10.2	57	10.24	2.53	1.28	169.9	1075.4	7263.5	407.2	6595.2	**2905.41**	**2198.41**
26.50	27.50	27.00	1.00	25.0	20.24	10.24	154.04	3.77	10.2	10.2	1.0	104.53	2147.81	57	1.0	215.0	4359.8	27.5	10.2	57	10.24	2.53	1.28	169.9	1075.4	7583.0	424.1	6931.7	**3033.21**	**2310.57**
27.50	28.00	27.75	0.50	25.5	20.24	10.24	154.04	1.89	10.2	10.2	1.0	52.26	2200.07	57	1.0	107.5	4467.3	28.0	10.2	57	10.24	2.53	1.28	169.9	1075.4	7742.8	432.6	7099.9	**3097.11**	**2366.64**
28.00	29.50	28.75	1.50	27.0	20.24	10.24	154.04	5.66	10.2	10.2	1.0	156.79	2356.87	57	1.0	322.5	4789.7	29.5	10.2	57	10.97	2.53	1.28	169.9	1076.1	8222.7	458.0	7604.6	**3289.06**	**2534.88**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 1.13 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
29.50	30.00	29.75	0.50	27.5	20.97	10.97	154.04	1.89	10.2	10.2	1.0	52.26	2409.13	57	1.0	107.5	4897.2	30.0	25.8	0	10.97	11.80	12.72	169.9	2363.5	9669.8	466.5	7772.9	**3867.93**	**2590.95**
30.00	31.00	30.50	1.00	28.5	20.97	10.97	154.04	3.77	25.8	25.8	1.0	280.84	2689.98	0	1.0	0.0	4897.2	31.0	25.8	0	9.23	11.80	12.72	169.9	2348.5	9935.6	483.5	8070.7	**3974.25**	**2690.22**
31.00	32.50	31.75	1.50	30.0	19.23	9.23	154.04	5.66	25.8	25.8	1.0	421.26	3111.24	0	1.0	0.0	4897.2	32.5	30.9	0	9.06	25.79	27.01	169.9	5124.7	13133.1	508.9	8517.4	**5253.24**	**2839.13**
32.50	34.00	33.25	1.50	31.5	19.06	9.06	154.04	5.66	30.9	30.9	1.0	545.01	3656.25	0	1.0	0.0	4897.2	34.0	30.9	0	8.89	25.79	27.01	169.9	5121.5	13675.0	534.4	9087.8	**5470.00**	**3029.28**
34.00	35.00	34.50	1.00	32.5	18.89	8.89	154.04	3.77	30.9	30.9	1.0	363.34	4019.58	0	1.0	0.0	4897.2	35.0	30.9	0	8.89	25.79	27.01	169.9	5121.5	14038.3	551.3	9468.1	**5615.33**	**3156.04**
35.00	35.50	35.25	0.50	33.0	18.89	8.89	154.04	1.89	30.9	30.9	1.0	181.67	4201.25	0	1.0	0.0	4897.2	35.5	25.6	8	9.36	11.35	12.26	169.9	2341.5	11440.0	559.8	9658.3	**4576.00**	**3219.43**
35.50	37.00	36.25	1.50	34.5	19.36	9.36	154.04	5.66	25.6	25.6	1.0	417.52	4618.77	8	1.0	45.3	4942.5	37.0	25.6	8	8.12	11.35	12.26	169.9	2331.2	11892.4	585.3	10146.5	**4756.98**	**3382.17**
37.00	37.50	37.25	0.50	35.0	18.12	8.12	154.04	1.89	25.6	25.6	1.0	139.17	4757.94	8	1.0	15.1	4957.5	37.5	25.6	8	8.12	11.35	12.26	169.9	2331.2	12046.7	593.8	10309.2	**4818.68**	**3436.42**
37.50	38.50	38.00	1.00	36.0	18.12	8.12	154.04	3.77	25.6	25.6	1.0	278.35	5036.29	8	1.0	30.2	4987.7	38.5	29.6	0	8.41	20.36	21.48	169.9	4036.4	14060.4	610.7	10634.7	**5624.17**	**3544.91**
38.50	40.00	39.25	1.50	37.5	18.41	8.41	154.04	5.66	29.6	29.6	1.0	495.04	5531.33	0	1.0	0.0	4987.7	40.0	29.6	0	8.41	20.36	21.48	169.9	4036.4	14555.5	636.2	11155.2	**5822.18**	**3718.40**
BORE NO: P22, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	19.20	9.20	25.30	1.89	8.0	8.0	1.0	6.71	0	46	1.0	86.7	0	3.0	29.7	0	9.20	20.58	21.71	27.6	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.5	19.20	9.20	32.20	3.77	29.7	29.7	1.0	69.27	0	0	1.0	0.0	0	4.0	29.7	0	9.73	20.58	21.71	36.8	0	0.0	25.4	25.4	**0.00**	**8.48**
4.00	6.00	5.00	2.00	3.5	19.73	9.73	46.53	7.54	29.7	29.7	1.0	200.19	0	0	1.0	0.0	0	6.0	32.5	0	9.73	33.85	35.22	56.3	0	0.0	59.4	59.4	**0.00**	**19.79**
6.00	7.00	6.50	1.00	4.5	19.73	9.73	61.13	3.77	32.5	32.5	1.1	165.22	0	0	1.0	0.0	0	7.0	30.1	0	11.72	21.76	22.91	66.0	0	0.0	76.3	76.3	**0.00**	**25.45**
7.00	9.00	8.00	2.00	6.5	21.72	11.72	77.71	7.54	30.1	30.1	1.0	341.48	0	0	1.0	0.0	0	9.0	28.8	0	11.72	18.56	19.64	89.4	0	0.0	110.3	110.3	**0.00**	**36.76**
9.00	10.00	9.50	1.00	7.5	21.72	11.72	95.29	3.77	28.8	28.8	1.0	197.57	0	0	1.0	0.0	0	10.0	12.5	29	11.72	3.20	1.94	101.2	677.4	677.4	127.2	127.2	**270.95**	**42.41**
10.00	11.00	10.50	1.00	8.5	21.72	11.72	107.01	3.77	12.5	12.5	1.0	89.47	89.47	29	1.0	109.4	109.4	11.0	11.0	40	10.91	2.76	1.51	112.9	771.4	970.3	144.2	343.0	**388.11**	**114.35**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
11.00	12.50	11.75	1.50	10.0	20.91	10.91	121.05	5.66	11.0	11.0	1.0	133.11	222.59	40	1.0	226.3	335.7	12.5	11.0	40	10.91	2.76	1.51	129.2	822.6	1380.9	169.6	727.9	**552.35**	**242.63**
12.50	14.00	13.25	1.50	11.5	20.91	10.91	137.42	5.66	11.0	11.0	1.0	151.11	373.69	40	1.0	226.3	561.9	14.0	11.5	69	10.58	2.91	1.65	145.6	1194.0	2129.6	195.1	1130.7	**851.86**	**376.91**
14.00	15.50	14.75	1.50	13.0	20.58	10.58	153.54	5.66	11.5	11.5	1.0	176.71	550.41	69	1.0	390.3	952.3	15.5	11.5	69	10.58	2.91	1.65	161.5	1246.3	2749.0	220.5	1723.2	**1099.59**	**574.41**
15.50	18.50	17.00	3.00	16.0	20.58	10.58	177.34	11.31	11.5	11.5	1.0	408.22	958.63	69	1.0	780.7	1733.0	18.5	10.2	52	10.60	2.53	1.28	161.5	1000.7	3692.3	271.4	2963.0	**1476.92**	**987.68**
18.50	21.50	20.00	3.00	19.0	20.60	10.60	177.34	11.31	10.2	10.2	1.0	361.02	1319.65	52	1.0	588.3	2321.3	21.5	10.3	62	10.60	2.56	1.31	161.5	1108.1	4749.1	322.3	3963.3	**1899.62**	**1321.10**
21.50	24.50	23.00	3.00	22.0	20.60	10.60	177.34	11.31	10.3	10.3	1.0	364.64	1684.29	62	1.0	701.5	3022.8	24.5	10.3	62	10.54	2.56	1.31	161.5	1108.0	5815.1	373.2	5080.3	**2326.05**	**1693.44**
24.50	27.50	26.00	3.00	25.0	20.54	10.54	177.34	11.31	10.3	10.3	1.0	364.64	2048.93	62	1.0	701.5	3724.3	27.5	10.3	62	10.54	2.56	1.31	161.5	1108.0	6881.3	424.1	6197.3	**2752.50**	**2065.78**
27.50	29.00	28.25	1.50	26.5	20.54	10.54	177.34	5.66	10.3	10.3	1.0	182.32	2231.25	62	1.0	350.7	4075.0	29.0	10.3	62	10.54	2.56	1.31	161.5	1108.0	7414.3	449.6	6755.8	**2965.73**	**2251.95**
29.00	30.00	29.50	1.00	27.5	20.54	10.54	177.34	3.77	10.3	10.3	1.0	121.55	2352.79	62	1.0	233.8	4308.9	30.0	13.5	55	8.48	3.50	2.22	161.5	1212.3	7873.9	466.5	7128.2	**3149.57**	**2376.06**
30.00	30.50	30.25	0.50	28.0	18.48	8.48	177.34	1.89	13.5	13.5	1.0	80.29	2433.08	55	1.0	103.7	4412.6	30.5	25.9	4	9.09	12.03	12.95	161.5	2317.8	9163.5	475.0	7320.7	**3665.40**	**2440.22**
30.50	32.00	31.25	1.50	29.5	19.09	9.09	177.34	5.66	25.9	25.9	1.0	487.15	2920.22	4	1.0	22.6	4435.2	32.0	25.9	4	8.63	12.03	12.95	161.5	2313.8	9669.2	500.5	7855.9	**3867.69**	**2618.63**
32.00	32.50	32.25	0.50	30.0	18.63	8.63	177.34	1.89	25.9	25.9	1.0	162.38	3082.61	4	1.0	7.5	4442.7	32.5	26.2	3	8.63	12.70	13.64	161.5	2431.1	9956.4	508.9	8034.3	**3982.58**	**2678.10**
32.50	33.50	33.00	1.00	31.0	18.63	8.63	177.34	3.77	26.2	26.2	1.0	329.10	3411.71	3	1.0	11.3	4454.1	33.5	29.4	0	8.85	19.91	21.02	161.5	3763.4	11629.1	525.9	8391.7	**4651.65**	**2797.22**
33.50	35.00	34.25	1.50	32.5	18.85	8.85	177.34	5.66	29.4	29.4	1.0	565.30	3977.00	0	1.0	0.0	4454.1	35.0	30.2	0	8.57	22.27	23.43	161.5	4204.3	12635.3	551.3	8982.4	**5054.14**	**2994.14**
35.00	36.50	35.75	1.50	34.0	18.57	8.57	177.34	5.66	30.2	30.2	1.0	589.74	4566.74	0	1.0	0.0	4454.1	36.5	30.0	0	8.79	21.26	22.40	161.5	4017.6	13038.4	576.8	9597.6	**5215.36**	**3199.20**
36.50	37.50	37.00	1.00	35.0	18.79	8.79	177.34	3.77	30.0	30.0	1.0	386.15	4952.89	0	1.0	0.0	4454.1	37.5	29.2	0	8.79	19.46	20.56	161.5	3677.5	13084.4	593.8	10000.7	**5233.77**	**3333.57**
37.50	38.00	37.75	0.50	35.5	18.79	8.79	177.34	1.89	29.2	29.2	1.0	186.90	5139.79	0	1.0	0.0	4454.1	38.0	29.0	0	8.60	19.01	20.10	161.5	3589.9	13183.7	602.2	10196.1	**5273.48**	**3398.70**
38.00	40.00	39.00	2.00	37.5	18.60	8.60	177.34	7.54	29.0	29.0	1.0	741.47	5881.26	0	1.0	0.0	4454.1	40.0	29.0	0	8.60	19.01	20.10	161.5	3589.9	13925.2	636.2	10971.5	**5570.07**	**3657.16**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 1.13 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
BORE NO: P23, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	20.69	10.69	29.40	1.89	9.7	9.7	1.0	9.48	9.48	50	1.0	94.3	94.3	3.0	17.2	35	10.69	5.02	3.86	32.1	566.6	670.4	8.5	112.2	**268.15**	**37.41**
3.00	4.00	3.50	1.00	1.5	20.69	10.69	37.42	3.77	17.2	17.2	1.0	43.68	53.16	35	1.0	132.0	226.3	4.0	29.7	0	10.51	20.58	21.71	42.8	1150.7	1430.2	25.4	304.9	**572.07**	**101.63**
4.00	6.00	5.00	2.00	3.5	20.51	10.51	53.27	7.54	29.7	29.7	1.0	229.19	282.34	0	1.0	0.0	226.3	6.0	30.9	0	10.51	25.79	27.01	63.8	2054.0	2562.7	59.4	568.0	**1025.07**	**189.34**
6.00	7.00	6.50	1.00	4.5	20.51	10.51	69.04	3.77	30.9	30.9	1.0	162.83	445.18	0	1.0	0.0	226.3	7.0	30.9	0	11.32	25.79	27.01	74.3	2375.6	3047.1	76.3	747.8	**1218.83**	**249.27**
7.00	9.00	8.00	2.00	6.5	21.32	11.32	85.61	7.54	30.9	30.9	1.0	403.86	849.04	0	1.0	0.0	226.3	9.0	28.3	0	11.32	17.43	18.48	96.9	2053.7	3129.0	110.3	1185.6	**1251.62**	**395.20**
9.00	10.00	9.50	1.00	7.5	21.32	11.32	102.59	3.77	28.3	28.3	1.0	208.33	1057.37	0	1.0	0.0	226.3	10.0	9.7	47	11.32	2.42	1.17	108.3	783.5	2067.2	127.2	1410.9	**826.87**	**470.30**
10.00	11.00	10.50	1.00	8.5	21.32	11.32	113.91	3.77	9.7	9.7	1.0	73.43	1130.80	47	1.0	177.3	403.5	11.0	9.7	47	10.31	2.42	1.17	119.6	813.7	2348.0	144.2	1678.5	**939.20**	**559.51**
11.00	12.50	11.75	1.50	10.0	20.31	10.31	127.30	5.66	9.7	9.7	1.0	123.10	1253.90	47	1.0	265.9	669.4	12.5	9.7	47	10.19	2.42	1.17	135.0	855.8	2779.2	169.6	2093.0	**1111.67**	**697.66**
12.50	15.50	14.00	3.00	13.0	20.19	10.19	150.32	11.31	9.7	9.7	1.0	290.72	1544.62	47	1.0	531.8	1201.2	15.5	10.6	85	10.19	2.65	1.39	165.6	1371.0	4116.8	220.5	2966.4	**1646.74**	**988.79**
15.50	17.00	16.25	1.50	14.5	20.19	10.19	173.25	5.66	10.6	10.6	1.0	183.42	1728.04	85	1.0	480.9	1682.1	17.0	13.4	52	10.60	3.47	2.19	180.9	1255.5	4665.6	246.0	3656.1	**1866.23**	**1218.69**
17.00	18.50	17.75	1.50	16.0	20.60	10.60	188.84	5.66	13.4	13.4	1.0	254.50	1982.54	52	1.0	294.2	1976.2	18.5	13.4	52	10.60	3.47	2.19	180.9	1255.5	5214.2	271.4	4230.2	**2085.70**	**1410.07**
18.50	20.00	19.25	1.50	17.5	20.60	10.60	188.84	5.66	13.4	13.4	1.0	254.50	2237.05	52	1.0	294.2	2270.4	20.0	24.2	10	10.41	9.42	10.00	180.9	2101.3	6608.7	296.9	4804.3	**2643.48**	**1601.44**
20.00	21.50	20.75	1.50	19.0	20.41	10.41	188.84	5.66	24.2	24.2	1.0	480.11	2717.16	10	1.0	56.6	2327.0	21.5	24.2	10	10.41	9.42	10.00	180.9	2101.3	7145.4	322.3	5366.5	**2858.16**	**1788.82**
21.50	24.50	23.00	3.00	22.0	20.41	10.41	188.84	11.31	24.2	24.2	1.0	960.22	3677.38	10	1.0	113.1	2440.1	24.5	8.6	67	10.61	2.22	1.00	180.9	1143.4	7260.9	373.2	6490.7	**2904.37**	**2163.57**
24.50	27.50	26.00	3.00	25.0	20.61	10.61	188.84	11.31	8.6	8.6	1.0	323.13	4000.51	67	1.0	758.1	3198.2	27.5	8.6	67	10.61	2.22	1.00	180.9	1143.4	8342.1	424.1	7622.8	**3336.84**	**2540.93**
27.50	29.00	28.25	1.50	26.5	20.61	10.61	188.84	5.66	8.6	8.6	1.0	161.56	4162.07	67	1.0	379.0	3577.2	29.0	8.0	75	10.61	2.11	0.91	180.9	1202.1	8941.4	449.6	8188.8	**3576.56**	**2729.61**
29.00	30.00	29.50	1.00	27.5	20.61	10.61	188.84	3.77	8.0	8.0	1.0	100.09	4262.16	75	1.0	282.9	3860.1	30.0	8.0	75	11.03	2.11	0.91	180.9	1202.4	9324.6	466.5	8588.7	**3729.84**	**2862.92**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
30.00	30.50	30.25	0.50	28.0	21.03	11.03	188.84	1.89	8.0	8.0	1.0	50.05	4312.21	75	1.0	141.4	4001.5	30.5	8.5	63	9.29	2.20	0.99	180.9	1098.0	9411.7	475.0	8788.7	**3764.69**	**2929.57**
30.50	32.00	31.25	1.50	29.5	19.29	9.29	188.84	5.66	8.5	8.5	1.0	159.66	4471.87	63	1.0	356.4	4357.9	32.0	8.5	63	9.01	2.20	0.99	180.9	1097.8	9927.6	500.5	9330.2	**3971.03**	**3110.07**
32.00	32.50	32.25	0.50	30.0	19.01	9.01	188.84	1.89	8.5	8.5	1.0	53.22	4525.09	63	1.0	118.8	4476.7	32.5	8.5	63	9.01	2.20	0.99	180.9	1097.8	10099.6	508.9	9510.7	**4039.84**	**3170.24**
32.50	33.50	33.00	1.00	31.0	19.01	9.01	188.84	3.77	8.5	8.5	1.0	106.44	4631.53	63	1.0	237.6	4714.3	33.5	29.4	0	8.94	19.91	21.02	180.9	4202.1	13547.9	525.9	9871.7	**5419.16**	**3290.57**
33.50	35.00	34.25	1.50	32.5	18.94	8.94	188.84	5.66	29.4	29.4	1.0	601.95	5233.48	0	1.0	0.0	4714.3	35.0	33.8	0	8.09	40.40	41.88	180.9	8498.8	18446.6	551.3	10499.1	**7378.62**	**3499.70**
35.00	36.50	35.75	1.50	34.0	18.09	8.09	188.84	5.66	33.8	33.8	1.2	851.04	6084.52	0	1.0	0.0	4714.3	36.5	33.8	0	8.01	40.40	41.88	180.9	8496.5	19295.3	576.8	11375.6	**7718.13**	**3791.87**
36.50	37.50	37.00	1.00	35.0	18.01	8.01	188.84	3.77	33.8	33.8	1.2	567.36	6651.88	0	1.0	0.0	4714.3	37.5	35.4	0	8.01	51.53	52.94	180.9	10834.4	22200.6	593.8	11959.9	**8880.23**	**3986.64**
37.50	38.00	37.75	0.50	35.5	18.01	8.01	188.84	1.89	35.4	35.4	1.3	321.39	6973.27	0	1.0	0.0	4714.3	38.0	35.4	0	8.03	51.53	52.94	180.9	10835.1	22522.7	602.2	12289.8	**9009.07**	**4096.60**
38.00	40.00	39.00	2.00	37.5	18.03	8.03	188.84	7.54	35.4	35.4	1.3	1285.57	8258.85	0	1.0	0.0	4714.3	40.0	35.4	0	8.03	51.53	52.94	180.9	10835.1	23808.3	636.2	13609.3	**9523.30**	**4536.44**
BORE NO: P24, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	20.95	10.95	30.11	1.89	7.5	7.5	1.0	7.48	0	51	1.0	96.2	0	3.0	29.5	0	10.95	20.13	21.25	32.9	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.5	20.95	10.95	38.33	3.77	29.5	29.5	1.0	81.78	0	0	1.0	0.0	0	4.0	28.2	0	10.95	17.21	18.25	43.8	0	0.0	25.4	25.4	**0.00**	**8.48**
4.00	6.00	5.00	2.00	3.5	20.95	10.95	54.75	7.54	28.2	28.2	1.0	221.43	0	0	1.0	0.0	0	6.0	28.0	2	8.97	16.76	17.79	65.7	0	0.0	59.4	59.4	**0.00**	**19.79**
6.00	7.00	6.50	1.00	4.5	18.97	8.97	70.19	3.77	28.0	28.0	1.0	140.74	0	2	1.0	7.5	0	7.0	28.0	2	8.97	16.76	17.79	74.7	1544.3	1544.3	76.3	76.3	**617.72**	**25.45**
7.00	8.00	7.50	1.00	5.5	18.97	8.97	79.16	3.77	28.0	28.0	1.0	158.73	158.73	2	1.0	7.5	7.5	8.0	28.0	2	8.97	16.76	17.79	83.6	1714.3	1880.6	93.3	259.6	**752.25**	**86.53**
8.00	9.00	8.50	1.00	6.5	18.97	8.97	88.13	3.77	28.0	28.0	1.0	176.72	335.45	2	1.0	7.5	15.1	9.0	28.0	2	8.97	16.76	17.79	92.6	1884.4	2234.9	110.3	460.8	**893.97**	**153.60**
9.00	10.00	9.50	1.00	7.5	18.97	8.97	97.10	3.77	28.0	28.0	1.0	194.71	530.15	2	1.0	7.5	22.6	10.0	32.8	0	9.14	35.36	36.75	101.6	4292.5	4845.3	127.2	680.0	**1938.11**	**226.67**
10.00	12.50	11.25	2.50	10.0	19.14	9.14	113.01	9.43	32.8	32.8	1.1	782.78	1312.94	0	1.0	0.0	22.6	12.5	32.8	0	9.14	35.36	36.75	124.4	5206.8	6542.3	169.6	1505.2	**2616.93**	**501.74**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 1.13 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
12.50	14.00	13.25	1.50	11.5	19.14	9.14	131.29	5.66	32.8	32.8	1.1	545.65	1858.58	0	1.0	0.0	22.6	14.0	26.5	14	10.96	13.38	14.34	138.1	2340.1	4221.3	195.1	2076.3	**1688.53**	**692.10**
14.00	15.50	14.75	1.50	13.0	20.96	10.96	146.36	5.66	26.5	26.5	1.0	412.82	2271.40	14	1.0	79.2	101.8	15.5	26.5	0	10.96	13.38	14.34	154.6	2446.4	4819.6	220.5	2593.8	**1927.85**	**864.59**
15.50	17.00	16.25	1.50	14.5	20.96	10.96	162.80	5.66	26.5	26.5	1.0	459.19	2730.58	0	1.0	0.0	101.8	17.0	14.6	45	10.85	3.82	2.54	171.0	1216.8	4049.2	246.0	3078.4	**1619.70**	**1026.13**
17.00	18.50	17.75	1.50	16.0	20.85	10.85	179.16	5.66	14.6	14.6	1.0	264.00	2994.58	45	1.0	254.6	356.4	18.5	14.6	45	10.86	3.82	2.54	171.0	1216.9	4567.8	271.4	3622.4	**1827.14**	**1207.47**
18.50	21.50	20.00	3.00	19.0	20.86	10.86	179.16	11.31	14.6	14.6	1.0	528.00	3522.59	45	1.0	509.1	865.5	21.5	11.1	44	10.23	2.79	1.53	171.0	999.2	5387.3	322.3	4710.5	**2154.94**	**1570.15**
21.50	24.50	23.00	3.00	22.0	20.23	10.23	179.16	11.31	11.1	11.1	1.0	397.69	3920.28	44	1.0	497.8	1363.4	24.5	10.5	56	10.23	2.62	1.36	171.0	1086.1	6369.7	373.2	5656.9	**2547.89**	**1885.62**
24.50	26.00	25.25	1.50	23.5	20.23	10.23	179.16	5.66	10.5	10.5	1.0	187.84	4108.12	56	1.0	316.8	1680.2	26.0	10.5	75	10.35	2.62	1.36	171.0	1279.7	7068.0	398.7	6187.0	**2827.19**	**2062.32**
26.00	27.50	26.75	1.50	25.0	20.35	10.35	179.16	5.66	10.5	10.5	1.0	187.84	4295.97	75	1.0	424.3	2104.5	27.5	10.5	75	10.35	2.62	1.36	171.0	1279.7	7680.1	424.1	6824.5	**3072.04**	**2274.85**
27.50	29.00	28.25	1.50	26.5	20.35	10.35	179.16	5.66	10.5	10.5	1.0	187.84	4483.81	75	1.0	424.3	2528.7	29.0	13.3	54	9.14	3.44	2.16	171.0	1228.9	8241.5	449.6	7462.1	**3296.59**	**2487.37**
29.00	30.00	29.50	1.00	27.5	19.14	9.14	179.16	3.77	13.3	13.3	1.0	159.72	4643.54	54	1.0	203.7	2732.4	30.0	13.3	54	9.14	3.44	2.16	171.0	1228.9	8604.9	466.5	7842.5	**3441.95**	**2614.15**
30.00	30.50	30.25	0.50	28.0	19.14	9.14	179.16	1.89	13.3	13.3	1.0	79.86	4723.40	54	1.0	101.8	2834.2	30.5	13.3	54	9.14	3.44	2.16	171.0	1228.9	8786.6	475.0	8032.6	**3514.62**	**2677.54**
30.50	32.50	31.50	2.00	30.0	19.14	9.14	179.16	7.54	13.3	13.3	1.0	319.45	5042.84	54	1.0	407.3	3241.5	32.5	13.0	50	9.17	3.35	2.08	171.0	1170.3	9454.7	508.9	8793.3	**3781.87**	**2931.11**
32.50	33.50	33.00	1.00	31.0	19.17	9.17	179.16	3.77	13.0	13.0	1.0	155.99	5198.84	50	1.0	188.6	3430.1	33.5	13.0	50	8.93	3.35	2.08	171.0	1170.0	9798.9	525.9	9154.9	**3919.56**	**3051.62**
33.50	35.00	34.25	1.50	32.5	18.93	8.93	179.16	5.66	13.0	13.0	1.0	233.99	5432.83	50	1.0	282.9	3713.0	35.0	27.7	0	8.93	16.08	17.10	171.0	3215.1	12360.9	551.3	9697.1	**4944.37**	**3232.38**
35.00	36.50	35.75	1.50	34.0	18.93	8.93	179.16	5.66	27.7	27.7	1.0	532.11	5964.94	0	1.0	0.0	3713.0	36.5	31.2	0	9.79	27.30	28.55	171.0	5473.1	15151.0	576.8	10254.7	**6060.39**	**3418.23**
36.50	37.50	37.00	1.00	35.0	19.79	9.79	179.16	3.77	31.2	31.2	1.1	433.76	6398.70	0	1.0	0.0	3713.0	37.5	31.2	0	9.79	27.30	28.55	171.0	5473.1	15584.7	593.8	10705.4	**6233.90**	**3568.48**
37.50	40.00	38.75	2.50	37.5	19.79	9.79	179.16	9.43	31.2	31.2	1.1	1084.40	7483.09	0	1.0	0.0	3713.0	40.0	31.2	0	9.79	27.30	28.55	171.0	5473.1	16669.1	636.2	11832.2	**6667.66**	**3944.08**

BORE NO: P25, CUT OFF LENGTH: 2.50 m, Nc= 9

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m — Factor of Safety in Compression: 2.5 — Area of Pile: 1.13 m^2

Critical water table: 0.00 m — Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
2.50	3.00	2.75	0.50	0.5	19.15	9.15	25.16	1.89	24.2	24.2	1.0	21.32	0	5	1.0	9.4	0	3.0	24.2	5	9.15	9.42	10.00	27.5	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.5	19.15	9.15	32.03	3.77	24.2	24.2	1.0	54.28	0	5	1.0	18.9	0	4.0	28.1	2	10.02	16.98	18.02	36.6	0	0.0	25.4	25.4	**0.00**	**8.48**
4.00	6.00	5.00	2.00	3.5	20.02	10.02	46.62	7.54	28.1	28.1	1.0	187.76	0	2	1.0	15.1	0	6.0	30.1	0	10.02	21.76	22.91	56.6	0	0.0	59.4	59.4	**0.00**	**19.79**
6.00	7.00	6.50	1.00	4.5	20.02	10.02	61.65	3.77	30.1	30.1	1.0	135.45	0	0	1.0	0.0	0	7.0	30.1	0	10.84	21.76	22.91	66.7	0	0.0	76.3	76.3	**0.00**	**25.45**
7.00	9.00	8.00	2.00	6.5	20.84	10.84	77.50	7.54	30.1	30.1	1.0	340.56	0	0	1.0	0.0	0	9.0	30.1	0	10.84	21.76	22.91	88.3	0	0.0	110.3	110.3	**0.00**	**36.76**
9.00	10.00	9.50	1.00	7.5	20.84	10.84	93.76	3.77	30.1	30.1	1.0	206.00	0	0	1.0	0.0	0	10.0	8.9	70	10.84	2.27	1.05	99.2	975.5	975.5	127.2	127.2	**390.19**	**42.41**
10.00	11.00	10.50	1.00	8.5	20.84	10.84	104.60	3.77	8.9	8.9	1.0	61.78	61.78	70	1.0	264.0	264.0	11.0	25.3	7	10.66	10.68	11.57	110.0	1483.9	1809.7	144.2	470.0	**723.87**	**156.66**
11.00	12.50	11.75	1.50	10.0	20.66	10.66	118.02	5.66	25.3	25.3	1.0	315.59	377.36	7	1.0	39.6	303.6	12.5	9.3	72	10.49	2.34	1.11	126.0	1075.3	1756.2	169.6	850.6	**702.49**	**283.54**
12.50	15.50	14.00	3.00	13.0	20.49	10.49	141.75	11.31	9.3	9.3	1.0	262.62	639.98	72	1.0	814.6	1118.2	15.5	9.3	72	10.49	2.34	1.11	157.5	1158.7	2916.9	220.5	1978.8	**1166.78**	**659.58**
15.50	17.00	16.25	1.50	14.5	20.49	10.49	165.35	5.66	9.3	9.3	1.0	153.18	793.16	72	1.0	407.3	1525.5	17.0	11.6	55	10.50	2.94	1.68	173.2	1148.3	3467.0	246.0	2564.7	**1386.79**	**854.90**
17.00	18.50	17.75	1.50	16.0	20.50	10.50	181.09	5.66	11.6	11.6	1.0	210.29	1003.45	55	1.0	311.1	1836.7	18.5	23.5	14	10.38	8.92	9.23	173.2	1955.8	4795.9	271.4	3111.6	**1918.36**	**1037.19**
18.50	21.50	20.00	3.00	19.0	20.38	10.38	181.09	11.31	23.5	23.5	1.0	890.89	1894.34	14	1.0	158.4	1995.1	21.5	23.5	14	10.38	8.92	9.23	173.2	1955.8	5845.2	322.3	4211.8	**2338.08**	**1403.92**
21.50	24.50	23.00	3.00	22.0	20.38	10.38	181.09	11.31	23.5	23.5	1.0	890.89	2785.23	14	1.0	158.4	2153.5	24.5	23.5	14	10.68	8.92	9.23	173.2	1957.6	6896.4	373.2	5311.9	**2758.54**	**1770.65**
24.50	26.00	25.25	1.50	23.5	20.68	10.68	181.09	5.66	23.5	23.5	1.0	445.44	3230.67	14	1.0	79.2	2232.7	26.0	27.2	4	10.68	14.95	15.95	173.2	3087.1	8550.5	398.7	5862.0	**3420.18**	**1954.01**
26.00	27.50	26.75	1.50	25.0	20.68	10.68	181.09	5.66	27.2	27.2	1.0	526.50	3757.17	4	1.0	22.6	2255.3	27.5	23.5	8	10.68	8.92	9.23	173.2	1896.5	7909.0	424.1	6436.6	**3163.61**	**2145.53**
27.50	29.00	28.25	1.50	26.5	20.68	10.68	181.09	5.66	23.5	23.5	1.0	445.44	4202.61	8	1.0	45.3	2300.6	29.0	23.5	8	10.68	8.92	9.23	173.2	1896.5	8399.7	449.6	6952.7	**3359.89**	**2317.58**
29.00	30.00	29.50	1.00	27.5	20.68	10.68	181.09	3.77	23.5	23.5	1.0	296.96	4499.58	8	1.0	30.2	2330.7	30.0	23.5	8	9.30	8.92	9.23	173.2	1887.9	8718.2	466.5	7296.8	**3487.29**	**2432.28**
30.00	30.50	30.25	0.50	28.0	19.30	9.30	181.09	1.89	23.5	23.5	1.0	148.48	4648.06	8	1.0	15.1	2345.8	30.5	8.5	60	9.97	2.20	0.99	173.2	1048.8	8042.7	475.0	7468.9	**3217.08**	**2489.63**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
30.50	32.00	31.25	1.50	29.5	19.97	9.97	181.09	5.66	8.5	8.5	1.0	153.11	4801.16	60	1.0	339.4	2685.3	32.0	8.5	60	9.49	2.20	0.99	173.2	1048.5	8534.9	500.5	7986.9	**3413.97**	**2662.29**
32.00	32.50	32.25	0.50	30.0	19.49	9.49	181.09	1.89	8.5	8.5	1.0	51.04	4852.20	60	1.0	113.1	2798.4	32.5	8.5	60	9.49	2.20	0.99	173.2	1048.5	8699.1	508.9	8159.5	**3479.64**	**2719.85**
32.50	33.50	33.00	1.00	31.0	19.49	9.49	181.09	3.77	8.5	8.5	1.0	102.07	4954.27	60	1.0	226.3	3024.7	33.5	8.5	60	9.49	2.20	0.99	173.2	1048.5	9027.5	525.9	8504.9	**3610.98**	**2834.95**
33.50	35.00	34.25	1.50	32.5	19.49	9.49	181.09	5.66	8.5	8.5	1.0	153.11	5107.38	60	1.0	339.4	3364.1	35.0	9.0	65	9.30	2.29	1.07	173.2	1117.4	9588.9	551.3	9022.8	**3835.56**	**3007.61**
35.00	36.50	35.75	1.50	34.0	19.30	9.30	181.09	5.66	9.0	9.0	1.0	162.26	5269.63	65	1.0	367.7	3731.8	36.5	9.0	65	9.01	2.29	1.07	173.2	1117.2	10118.7	576.8	9578.3	**4047.46**	**3192.75**
36.50	37.50	37.00	1.00	35.0	19.01	9.01	181.09	3.77	9.0	9.0	1.0	108.17	5377.80	65	1.0	245.1	3977.0	37.5	9.0	65	9.01	2.29	1.07	173.2	1117.2	10472.0	593.8	9948.5	**4188.79**	**3316.18**
37.50	38.00	37.75	0.50	35.5	19.01	9.01	181.09	1.89	9.0	9.0	1.0	54.09	5431.89	65	1.0	122.6	4099.5	38.0	9.0	65	9.50	2.29	1.07	173.2	1117.6	10649.0	602.2	10133.7	**4259.60**	**3377.89**
38.00	40.00	39.00	2.00	37.5	19.50	9.50	181.09	7.54	9.0	9.0	1.0	216.34	5648.23	65	1.0	490.3	4589.8	40.0	9.0	65	9.50	2.29	1.07	173.2	1117.6	11355.6	636.2	10874.2	**4542.25**	**3624.74**
BORE NO: P26, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	17.99	7.99	21.97	1.89	24.9	24.9	1.0	19.23	19.23	5	1.0	9.4	9.4	3.0	30.6	1	7.99	24.28	25.48	24.0	806.9	835.6	8.5	37.1	**334.22**	**12.38**
3.00	4.00	3.50	1.00	1.5	17.99	7.99	27.97	3.77	30.6	30.6	1.0	64.24	83.48	1	1.0	3.8	13.2	4.0	30.6	1	7.55	24.28	25.48	32.0	1018.8	1115.5	25.4	122.1	**446.19**	**40.71**
4.00	6.00	5.00	2.00	3.5	17.55	7.55	39.51	7.54	30.6	30.6	1.0	181.53	265.01	1	1.0	7.5	20.7	6.0	30.6	1	7.55	24.28	25.48	47.1	1433.6	1719.4	59.4	345.1	**687.76**	**115.04**
6.00	7.00	6.50	1.00	4.5	17.55	7.55	50.84	3.77	30.6	30.6	1.0	116.78	381.80	1	1.0	3.8	24.5	7.0	30.4	0	7.55	23.27	24.45	54.6	1563.4	1969.7	76.3	482.7	**787.88**	**160.88**
7.00	8.00	7.50	1.00	5.5	17.55	7.55	58.39	3.77	30.4	30.4	1.0	131.77	513.57	0	1.0	0.0	24.5	8.0	8.1	41	9.36	2.13	0.93	62.2	573.1	1111.1	93.3	631.4	**444.45**	**210.46**
8.00	9.00	8.50	1.00	6.5	19.36	9.36	66.84	3.77	8.1	8.1	1.0	35.88	549.45	41	1.0	154.6	179.1	9.0	8.1	41	9.36	2.13	0.93	71.5	595.6	1324.2	110.3	838.9	**529.67**	**279.62**
9.00	10.00	9.50	1.00	7.5	19.36	9.36	76.20	3.77	8.1	8.1	1.0	40.90	590.35	41	1.0	154.6	333.8	10.0	12.2	34	9.35	3.12	1.85	80.9	643.1	1567.3	127.2	1051.4	**626.90**	**350.45**
10.00	12.50	11.25	2.50	10.0	19.35	9.35	92.57	9.43	12.2	12.2	1.0	188.70	779.05	34	1.0	320.6	654.3	12.5	12.2	34	9.35	3.12	1.85	104.3	725.6	2158.9	169.6	1603.0	**863.58**	**534.35**
12.50	14.00	13.25	1.50	11.5	19.35	9.35	111.27	5.66	12.2	12.2	1.0	136.09	915.14	34	1.0	192.3	846.7	14.0	12.2	34	10.30	3.12	1.85	118.3	776.2	2538.0	195.1	1956.9	**1015.21**	**652.31**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m
Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0
Area of Pile: 1.13 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
14.00	15.50	14.75	1.50	13.0	20.30	10.30	126.01	5.66	12.2	12.2	1.0	154.12	1069.26	34	1.0	192.3	1039.0	15.5	4.5	96	10.30	1.51	0.41	133.7	1209.3	3317.6	220.5	2328.8	**1327.04**	**776.28**
15.50	17.00	16.25	1.50	14.5	20.30	10.30	141.46	5.66	4.5	4.5	1.0	62.98	1132.24	96	1.0	543.1	1582.1	17.0	26.4	3	8.23	13.15	14.11	149.2	2329.3	5043.7	246.0	2960.3	**2017.48**	**986.78**
17.00	18.50	17.75	1.50	16.0	18.23	8.23	155.35	5.66	26.4	26.4	1.0	436.27	1568.50	3	1.0	17.0	1599.1	18.5	26.4	3	8.23	13.15	14.11	149.2	2329.3	5496.9	271.4	3439.0	**2198.78**	**1146.34**
18.50	20.00	19.25	1.50	17.5	18.23	8.23	155.35	5.66	26.4	26.4	1.0	436.27	2004.77	3	1.0	17.0	1616.1	20.0	9.7	55	10.38	2.42	1.17	149.2	976.1	4596.9	296.9	3917.7	**1838.78**	**1305.90**
20.00	21.50	20.75	1.50	19.0	20.38	10.38	155.35	5.66	9.7	9.7	1.0	150.22	2155.00	55	1.0	311.1	1927.2	21.5	10.6	57	10.92	2.65	1.39	149.2	1037.4	5119.6	322.3	4404.5	**2047.84**	**1468.17**
21.50	24.50	23.00	3.00	22.0	20.92	10.92	155.35	11.31	10.6	10.6	1.0	328.95	2483.94	57	1.0	644.9	2572.1	24.5	10.2	77	10.92	2.53	1.28	149.2	1220.4	6276.4	373.2	5429.3	**2510.57**	**1809.76**
24.50	26.00	25.25	1.50	23.5	20.92	10.92	155.35	5.66	10.2	10.2	1.0	158.13	2642.07	77	1.0	435.6	3007.7	26.0	10.2	77	10.56	2.53	1.28	149.2	1220.1	6869.8	398.7	6048.5	**2747.94**	**2016.15**
26.00	27.50	26.75	1.50	25.0	20.56	10.56	155.35	5.66	10.2	10.2	1.0	158.13	2800.20	77	1.0	435.6	3443.3	27.5	10.2	77	10.56	2.53	1.28	149.2	1220.1	7463.6	424.1	6667.6	**2985.43**	**2222.54**
27.50	29.00	28.25	1.50	26.5	20.56	10.56	155.35	5.66	10.2	10.2	1.0	158.13	2958.33	77	1.0	435.6	3878.9	29.0	10.2	77	10.56	2.53	1.28	149.2	1220.1	8057.3	449.6	7286.8	**3222.92**	**2428.94**
29.00	30.00	29.50	1.00	27.5	20.56	10.56	155.35	3.77	10.2	10.2	1.0	105.42	3063.75	77	1.0	290.4	4169.3	30.0	10.2	77	9.72	2.53	1.28	149.2	1219.3	8452.4	466.5	7699.6	**3380.96**	**2566.53**
30.00	30.50	30.25	0.50	28.0	19.72	9.72	155.35	1.89	10.2	10.2	1.0	52.71	3116.46	77	1.0	145.2	4314.5	30.5	21.0	48	8.96	7.12	6.49	149.2	1730.0	9161.0	475.0	7906.0	**3664.39**	**2635.33**
30.50	32.00	31.25	1.50	29.5	18.96	8.96	155.35	5.66	21.0	21.0	1.0	337.36	3453.82	48	1.0	271.5	4586.1	32.0	9.0	54	9.07	2.29	1.07	149.2	943.0	8982.8	500.5	8540.3	**3593.13**	**2846.78**
32.00	32.50	32.25	0.50	30.0	19.07	9.07	155.35	1.89	9.0	9.0	1.0	46.40	3500.22	54	1.0	101.8	4687.9	32.5	9.0	54	9.07	2.29	1.07	149.2	943.0	9131.1	508.9	8697.0	**3652.43**	**2899.01**
32.50	33.50	33.00	1.00	31.0	19.07	9.07	155.35	3.77	9.0	9.0	1.0	92.80	3593.02	54	1.0	203.7	4891.5	33.5	30.2	0	8.65	22.27	23.43	149.2	3895.9	12380.5	525.9	9010.5	**4952.19**	**3003.49**
33.50	35.00	34.25	1.50	32.5	18.65	8.65	155.35	5.66	30.2	30.2	1.0	516.62	4109.64	0	1.0	0.0	4891.5	35.0	14.0	48	9.16	3.65	2.36	149.2	1119.5	10120.7	551.3	9552.5	**4048.29**	**3184.18**
35.00	36.50	35.75	1.50	34.0	19.16	9.16	155.35	5.66	14.0	14.0	1.0	219.12	4328.76	48	1.0	271.5	5163.1	36.5	14.0	48	9.19	3.65	2.36	149.2	1119.6	10611.4	576.8	10068.6	**4244.58**	**3356.21**
36.50	37.50	37.00	1.00	35.0	19.19	9.19	155.35	3.77	14.0	14.0	1.0	146.08	4474.84	48	1.0	181.0	5344.1	37.5	14.0	48	9.19	3.65	2.36	149.2	1119.6	10938.6	593.8	10412.7	**4375.42**	**3470.91**
37.50	38.00	37.75	0.50	35.5	19.19	9.19	155.35	1.89	14.0	14.0	1.0	73.04	4547.88	48	1.0	90.5	5434.6	38.0	10.5	63	8.97	2.62	1.36	149.2	1091.5	11074.0	602.2	10584.8	**4429.62**	**3528.25**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m
Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0
Area of Pile: 1.13 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
38.00	40.00	39.00	2.00	37.5	18.97	8.97	155.35	7.54	10.5	10.5	1.0	217.18	4765.06	63	1.0	475.2	5909.8	40.0	10.5	63	8.97	2.62	1.36	149.2	1091.5	11766.4	636.2	11311.1	**4706.57**	**3770.35**
BORE NO: P27, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	19.92	9.92	27.28	1.89	27.2	27.2	1.0	26.44	0	10	1.0	18.9	0	3.0	27.2	10	9.92	14.95	15.95	29.8	712.8	712.8	8.5	8.5	**285.10**	**2.83**
3.00	4.00	3.50	1.00	1.5	19.92	9.92	34.72	3.77	27.2	27.2	1.0	67.30	67.30	10	1.0	37.7	37.7	4.0	27.9	0	9.26	16.53	17.56	39.7	852.5	957.5	25.4	130.5	**383.02**	**43.49**
4.00	6.00	5.00	2.00	3.5	19.26	9.26	48.94	7.54	27.9	27.9	1.0	195.45	262.75	0	1.0	0.0	37.7	6.0	27.8	0	9.26	16.31	17.33	58.2	1182.6	1483.1	59.4	359.8	**593.24**	**119.95**
6.00	7.00	6.50	1.00	4.5	19.26	9.26	62.83	3.77	27.8	27.8	1.0	124.93	387.68	0	1.0	0.0	37.7	7.0	27.8	0	9.26	16.31	17.33	67.5	1353.5	1778.9	76.3	501.7	**711.55**	**167.25**
7.00	9.00	8.00	2.00	6.5	19.26	9.26	76.72	7.54	27.8	27.8	1.0	305.11	692.79	0	1.0	0.0	37.7	9.0	10.1	59	11.10	2.50	1.25	86.0	853.3	1583.8	110.3	840.8	**633.54**	**280.26**
9.00	10.00	9.50	1.00	7.5	21.10	11.10	91.53	3.77	10.1	10.1	1.0	61.49	754.28	59	1.0	222.5	260.2	10.0	10.1	59	11.10	2.50	1.25	97.1	884.7	1899.2	127.2	1141.7	**759.70**	**380.58**
10.00	11.00	10.50	1.00	8.5	21.10	11.10	102.63	3.77	10.1	10.1	1.0	68.95	823.23	59	1.0	222.5	482.7	11.0	10.1	59	11.10	2.50	1.25	108.2	916.1	2222.1	144.2	1450.2	**888.84**	**483.39**
11.00	12.50	11.75	1.50	10.0	21.10	11.10	116.51	5.66	10.1	10.1	1.0	117.40	940.63	59	1.0	333.8	816.5	12.5	10.6	52	11.10	2.65	1.39	124.8	913.8	2670.9	169.6	1926.8	**1068.36**	**642.26**
12.50	14.00	13.25	1.50	11.5	21.10	11.10	133.16	5.66	10.6	10.6	1.0	140.97	1081.60	52	1.0	294.2	1110.7	14.0	10.6	52	10.47	2.65	1.39	141.5	963.0	3155.3	195.1	2387.4	**1262.12**	**795.79**
14.00	15.50	14.75	1.50	13.0	20.47	10.47	149.33	5.66	10.6	10.6	1.0	158.10	1239.70	52	1.0	294.2	1404.9	15.5	10.9	50	10.47	2.73	1.48	157.2	1006.0	3650.5	220.5	2865.1	**1460.21**	**955.03**
15.50	17.00	16.25	1.50	14.5	20.47	10.47	165.04	5.66	10.9	10.9	1.0	179.79	1419.49	50	1.0	282.9	1687.7	17.0	10.9	50	10.39	2.73	1.48	172.9	1054.5	4161.7	246.0	3353.2	**1664.68**	**1117.73**
17.00	18.50	17.75	1.50	16.0	20.39	10.39	180.68	5.66	10.9	10.9	1.0	196.83	1616.32	50	1.0	282.9	1970.6	18.5	11.1	46	10.43	2.79	1.53	172.9	1025.7	4612.6	271.4	3858.3	**1845.04**	**1286.11**
18.50	21.50	20.00	3.00	19.0	20.43	10.43	180.68	11.31	11.1	11.1	1.0	401.07	2017.40	46	1.0	520.5	2491.0	21.5	10.6	47	10.67	2.65	1.39	172.9	1006.3	5514.8	322.3	4830.8	**2205.91**	**1610.25**
21.50	24.50	23.00	3.00	22.0	20.67	10.67	180.68	11.31	10.6	10.6	1.0	382.58	2399.98	47	1.0	531.8	3022.8	24.5	10.6	47	10.32	2.65	1.39	172.9	1006.0	6428.8	373.2	5796.0	**2571.52**	**1932.00**
24.50	27.50	26.00	3.00	25.0	20.32	10.32	180.68	11.31	10.6	10.6	1.0	382.58	2782.56	47	1.0	531.8	3554.6	27.5	11.1	57	10.32	2.79	1.53	172.9	1137.6	7474.7	424.1	6761.2	**2989.89**	**2253.75**
27.50	29.00	28.25	1.50	26.5	20.32	10.32	180.68	5.66	11.1	11.1	1.0	200.54	2983.09	57	1.0	322.5	3877.0	29.0	12.2	42	10.32	3.12	1.85	172.9	1050.2	7910.4	449.6	7309.7	**3164.15**	**2436.56**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
29.00	30.00	29.50	1.00	27.5	20.32	10.32	180.68	3.77	12.2	12.2	1.0	147.33	3130.42	42	1.0	158.4	4035.4	30.0	12.2	42	8.88	3.12	1.85	172.9	1048.4	8214.3	466.5	7632.4	**3285.72**	**2544.13**
30.00	30.50	30.25	0.50	28.0	18.88	8.88	180.68	1.89	12.2	12.2	1.0	73.67	3204.09	42	1.0	79.2	4114.6	30.5	12.5	38	9.01	3.20	1.94	172.9	1025.5	8344.2	475.0	7793.7	**3337.70**	**2597.91**
30.50	32.00	31.25	1.50	29.5	19.01	9.01	180.68	5.66	12.5	12.5	1.0	226.60	3430.69	38	1.0	215.0	4329.6	32.0	31.2	0	9.08	27.30	28.55	172.9	5517.1	13277.4	500.5	8260.8	**5310.95**	**2753.58**
32.00	32.50	32.25	0.50	30.0	19.08	9.08	180.68	1.89	31.2	31.2	1.1	218.73	3649.42	0	1.0	0.0	4329.6	32.5	31.2	0	9.08	27.30	28.55	172.9	5517.1	13496.1	508.9	8488.0	**5398.44**	**2829.32**
32.50	33.50	33.00	1.00	31.0	19.08	9.08	180.68	3.77	31.2	31.2	1.1	437.45	4086.87	0	1.0	0.0	4329.6	33.5	30.3	0	8.79	22.77	23.94	172.9	4597.1	13013.6	525.9	8942.4	**5205.42**	**2980.79**
33.50	35.00	34.25	1.50	32.5	18.79	8.79	180.68	5.66	30.3	30.3	1.0	606.25	4693.12	0	1.0	0.0	4329.6	35.0	31.7	0	8.80	29.82	31.11	172.9	6019.7	15042.4	551.3	9574.1	**6016.95**	**3191.36**
35.00	36.50	35.75	1.50	34.0	18.80	8.80	180.68	5.66	31.7	31.7	1.1	684.95	5378.07	0	1.0	0.0	4329.6	36.5	32.4	0	8.71	33.35	34.70	172.9	6728.7	16436.4	576.8	10284.5	**6574.57**	**3428.16**
36.50	37.50	37.00	1.00	35.0	18.71	8.71	180.68	3.77	32.4	32.4	1.1	484.34	5862.42	0	1.0	0.0	4329.6	37.5	32.4	0	8.71	33.35	34.70	172.9	6728.7	16920.8	593.8	10785.8	**6768.31**	**3595.26**
37.50	38.00	37.75	0.50	35.5	18.71	8.71	180.68	1.89	32.4	32.4	1.1	242.17	6104.59	0	1.0	0.0	4329.6	38.0	32.0	0	8.94	31.33	32.65	172.9	6327.6	16761.8	602.2	11036.4	**6704.70**	**3678.81**
38.00	40.00	39.00	2.00	37.5	18.94	8.94	180.68	7.54	32.0	32.0	1.1	936.77	7041.36	0	1.0	0.0	4329.6	40.0	32.0	0	8.94	31.33	32.65	172.9	6327.6	17698.5	636.2	12007.1	**7079.41**	**4002.38**
BORE NO: P28, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	19.56	9.56	26.29	1.89	24.5	24.5	1.0	22.59	0	0	1.0	0.0	0	3.0	26.1	0	9.56	12.48	13.41	28.7	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.5	19.56	9.56	33.46	3.77	26.1	26.1	1.0	61.82	0	0	1.0	0.0	0	4.0	30.2	0	8.56	22.27	23.43	38.2	1099.5	1099.5	25.4	25.4	**439.81**	**8.48**
4.00	6.00	5.00	2.00	3.5	18.56	8.56	46.80	7.54	30.2	30.2	1.0	207.51	207.51	0	1.0	0.0	0.0	6.0	30.2	0	8.56	22.27	23.43	55.4	1530.8	1738.3	59.4	266.9	**695.34**	**88.96**
6.00	7.00	6.50	1.00	4.5	18.56	8.56	59.64	3.77	30.2	30.2	1.0	132.22	339.73	0	1.0	0.0	0.0	7.0	31.9	0	8.56	30.83	32.14	63.9	2416.5	2756.2	76.3	416.1	**1102.48**	**138.69**
7.00	9.00	8.00	2.00	6.5	18.56	8.56	72.48	7.54	31.9	31.9	1.1	372.62	712.35	0	1.0	0.0	0.0	9.0	30.3	0	9.86	22.77	23.94	81.0	2248.1	2960.5	110.3	822.6	**1184.18**	**274.21**
9.00	10.00	9.50	1.00	7.5	19.86	9.86	85.97	3.77	30.3	30.3	1.0	192.31	904.66	0	1.0	0.0	0.0	10.0	30.3	0	9.86	22.77	23.94	90.9	2502.1	3406.8	127.2	1031.9	**1362.71**	**343.96**
10.00	11.00	10.50	1.00	8.5	19.86	9.86	95.83	3.77	30.3	30.3	1.0	214.36	1119.02	0	1.0	0.0	0.0	11.0	28.7	3	9.86	18.33	19.40	100.8	2250.3	3369.4	144.2	1263.2	**1347.74**	**421.07**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
11.00	12.50	11.75	1.50	10.0	19.86	9.86	108.16	5.66	28.7	28.7	1.0	334.98	1454.00	3	1.0	17.0	17.0	12.5	8.9	48	9.86	2.27	1.05	115.6	792.8	2263.8	169.6	1640.6	**905.52**	**546.87**
12.50	14.00	13.25	1.50	11.5	19.86	9.86	122.95	5.66	8.9	8.9	1.0	108.92	1562.91	48	1.0	271.5	288.5	14.0	29.4	6	9.80	19.91	21.02	130.3	3136.8	4988.2	195.1	2046.5	**1995.30**	**682.17**
14.00	15.50	14.75	1.50	13.0	19.80	9.80	137.69	5.66	29.4	29.4	1.0	438.91	2001.82	6	1.0	33.9	322.5	15.5	11.1	65	9.80	2.79	1.53	145.0	1130.5	3454.8	220.5	2544.8	**1381.91**	**848.27**
15.50	17.00	16.25	1.50	14.5	19.80	9.80	152.39	5.66	11.1	11.1	1.0	169.14	2170.95	65	1.0	367.7	690.2	17.0	11.1	57	10.48	2.79	1.53	159.7	1096.2	3957.3	246.0	3107.1	**1582.93**	**1035.70**
17.00	18.50	17.75	1.50	16.0	20.48	10.48	167.60	5.66	11.1	11.1	1.0	186.02	2356.97	57	1.0	322.5	1012.6	18.5	10.1	58	10.41	2.50	1.25	159.7	1051.2	4420.8	271.4	3641.0	**1768.30**	**1213.68**
18.50	21.50	20.00	3.00	19.0	20.41	10.41	167.60	11.31	10.1	10.1	1.0	337.78	2694.75	58	1.0	656.2	1668.9	21.5	32.1	0	10.41	31.84	33.16	159.7	5988.6	10352.2	322.3	4685.9	**4140.89**	**1561.98**
21.50	23.00	22.25	1.50	20.5	20.41	10.41	167.60	5.66	32.1	32.1	1.1	657.22	3351.96	0	1.0	0.0	1668.9	23.0	11.6	46	10.41	2.94	1.68	159.7	1011.7	6032.5	347.8	5368.6	**2413.01**	**1789.53**
23.00	24.50	23.75	1.50	22.0	20.41	10.41	167.60	5.66	11.6	11.6	1.0	194.62	3546.59	46	1.0	260.2	1929.1	24.5	11.6	46	10.21	2.94	1.68	159.7	1011.5	6487.1	373.2	5848.9	**2594.86**	**1949.63**
24.50	27.50	26.00	3.00	25.0	20.21	10.21	167.60	11.31	11.6	11.6	1.0	389.25	3935.84	46	1.0	520.5	2449.5	27.5	11.6	46	10.21	2.94	1.68	159.7	1011.5	7396.9	424.1	6809.5	**2958.74**	**2269.83**
27.50	29.00	28.25	1.50	26.5	20.21	10.21	167.60	5.66	11.6	11.6	1.0	194.62	4130.46	46	1.0	260.2	2709.8	29.0	9.2	49	10.21	2.33	1.10	159.7	927.0	7767.2	449.6	7289.8	**3106.87**	**2429.93**
29.00	30.00	29.50	1.00	27.5	20.21	10.21	167.60	3.77	9.2	9.2	1.0	102.38	4232.84	49	1.0	184.8	2894.6	30.0	9.2	49	9.17	2.33	1.10	159.7	926.2	8053.6	466.5	7593.9	**3221.43**	**2531.31**
30.00	30.50	30.25	0.50	28.0	19.17	9.17	167.60	1.89	9.2	9.2	1.0	51.19	4284.03	49	1.0	92.4	2987.0	30.5	31.3	0	10.50	27.81	29.06	159.7	5233.1	12504.1	475.0	7746.0	**5001.62**	**2582.00**
30.50	32.00	31.25	1.50	29.5	20.50	10.50	167.60	5.66	31.3	31.3	1.1	613.95	4897.98	0	1.0	0.0	2987.0	32.0	31.3	0	9.51	27.81	29.06	159.7	5213.5	13098.5	500.5	8385.4	**5239.39**	**2795.13**
32.00	32.50	32.25	0.50	30.0	19.51	9.51	167.60	1.89	31.3	31.3	1.1	204.65	5102.62	0	1.0	0.0	2987.0	32.5	31.3	0	9.51	27.81	29.06	159.7	5213.5	13303.1	508.9	8598.5	**5321.25**	**2866.18**
32.50	33.50	33.00	1.00	31.0	19.51	9.51	167.60	3.77	31.3	31.3	1.1	409.30	5511.92	0	1.0	0.0	2987.0	33.5	9.5	39	8.97	2.38	1.14	159.7	834.2	9333.1	525.9	9024.8	**3733.25**	**3008.27**
33.50	35.00	34.25	1.50	32.5	18.97	8.97	167.60	5.66	9.5	9.5	1.0	158.66	5670.59	39	1.0	220.6	3207.6	35.0	9.5	39	9.52	2.38	1.14	159.7	834.7	9712.9	551.3	9429.5	**3885.14**	**3143.18**
35.00	36.50	35.75	1.50	34.0	19.52	9.52	167.60	5.66	9.5	9.5	1.0	158.66	5829.25	39	1.0	220.6	3428.2	36.5	10.1	56	8.98	2.50	1.25	159.7	1029.6	10287.1	576.8	9834.3	**4114.82**	**3278.09**
36.50	37.50	37.00	1.00	35.0	18.98	8.98	167.60	3.77	10.1	10.1	1.0	112.59	5941.84	56	1.0	211.2	3639.4	37.5	10.1	56	8.98	2.50	1.25	159.7	1029.6	10610.9	593.8	10175.0	**4244.34**	**3391.68**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
37.50	38.00	37.75	0.50	35.5	18.98	8.98	167.60	1.89	10.1	10.1	1.0	56.30	5998.14	56	1.0	105.6	3745.0	38.0	10.1	56	9.94	2.50	1.25	159.7	1030.4	10773.6	602.2	10345.4	**4309.42**	**3448.47**
38.00	40.00	39.00	2.00	37.5	19.94	9.94	167.60	7.54	10.1	10.1	1.0	225.19	6223.32	56	1.0	422.4	4167.4	40.0	10.1	56	9.94	2.50	1.25	159.7	1030.4	11421.1	636.2	11026.9	**4568.46**	**3675.64**
BORE NO: P29, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	19.91	9.91	27.25	1.89	26.2	26.2	1.0	25.29	0	5	1.0	9.4	0	3.0	28.8	0	9.91	18.56	19.64	29.7	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	5.00	4.00	2.00	2.5	19.91	9.91	39.64	7.54	28.8	28.8	1.0	164.38	0	0	1.0	0.0	0	5.0	29.6	0	9.25	20.36	21.48	49.6	0	0.0	42.4	42.4	**0.00**	**14.14**
5.00	6.00	5.50	1.00	3.5	19.25	9.25	54.18	3.77	29.6	29.6	1.0	116.07	0	0	1.0	0.0	0	6.0	29.8	0	9.25	20.81	21.94	58.8	0	0.0	59.4	59.4	**0.00**	**19.79**
6.00	8.00	7.00	2.00	5.5	19.25	9.25	68.05	7.54	29.8	29.8	1.0	293.96	0	0	1.0	0.0	0	8.0	30.1	0	9.25	21.76	22.91	77.3	2047.3	2047.3	93.3	93.3	**818.91**	**31.10**
8.00	9.00	8.50	1.00	6.5	19.25	9.25	81.93	3.77	30.1	30.1	1.0	180.00	180.00	0	1.0	0.0	0.0	9.0	30.1	0	9.09	21.76	22.91	86.6	2272.6	2452.6	110.3	290.3	**981.02**	**96.76**
9.00	11.00	10.00	2.00	8.5	19.09	9.09	95.64	7.54	30.1	30.1	1.0	420.27	600.27	0	1.0	0.0	0.0	11.0	8.1	60	9.09	2.13	0.93	104.7	868.9	1469.1	144.2	744.5	**587.65**	**248.16**
11.00	12.00	11.50	1.00	9.5	19.09	9.09	109.28	3.77	8.1	8.1	1.0	58.65	658.93	60	1.0	226.3	226.3	12.0	8.1	60	9.09	2.13	0.93	113.8	890.7	1775.9	161.2	1046.4	**710.38**	**348.79**
12.00	13.00	12.50	1.00	10.5	19.09	9.09	118.37	3.77	8.1	8.1	1.0	63.53	722.46	60	1.0	226.3	452.6	13.0	31.0	0	9.62	26.30	27.53	122.9	3836.7	5011.7	178.1	1353.2	**2004.70**	**451.05**
13.00	14.50	13.75	1.50	12.0	19.62	9.62	130.13	5.66	31.0	31.0	1.1	464.43	1186.89	0	1.0	0.0	452.6	14.5	9.5	57	10.30	2.38	1.14	137.3	958.2	2597.7	203.6	1843.0	**1039.08**	**614.35**
14.50	17.50	16.00	3.00	15.0	20.30	10.30	152.79	11.31	9.5	9.5	1.0	289.29	1476.18	57	1.0	644.9	1097.5	17.5	9.5	57	10.30	2.38	1.14	168.2	1041.5	3615.1	254.5	2828.1	**1446.05**	**942.71**
17.50	19.00	18.25	1.50	16.5	20.30	10.30	152.79	5.66	9.5	9.5	1.0	144.64	1620.82	57	1.0	322.5	1419.9	19.0	11.5	32	9.37	2.91	1.65	168.2	890.5	3931.2	279.9	3320.7	**1572.49**	**1106.89**
19.00	20.50	19.75	1.50	18.0	19.37	9.37	152.79	5.66	11.5	11.5	1.0	175.85	1796.68	32	1.0	181.0	1601.0	20.5	9.5	55	9.37	2.38	1.14	168.2	1020.4	4418.0	305.4	3703.0	**1767.20**	**1234.34**
20.50	22.00	21.25	1.50	19.5	19.37	9.37	152.79	5.66	9.5	9.5	1.0	144.64	1941.32	55	1.0	311.1	1912.1	22.0	28.6	0	9.62	18.11	19.17	168.2	3571.9	7425.3	330.8	4184.2	**2970.13**	**1394.75**
22.00	23.50	22.75	1.50	21.0	19.62	9.62	152.79	5.66	28.6	28.6	1.0	471.26	2412.58	0	1.0	0.0	1912.1	23.5	11.3	49	9.62	2.85	1.59	168.2	1052.3	5377.0	356.3	4681.0	**2150.79**	**1560.32**
23.50	25.00	24.25	1.50	22.5	19.62	9.62	152.79	5.66	11.3	11.3	1.0	172.72	2585.30	49	1.0	277.2	2189.3	25.0	31.5	0	9.62	28.82	30.09	168.2	5681.6	10456.2	381.7	5156.3	**4182.49**	**1718.77**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2
Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
25.00	26.50	25.75	1.50	24.0	19.62	9.62	152.79	5.66	31.5	31.5	1.1	569.40	3154.70	0	1.0	0.0	2189.3	26.5	10.2	60	10.56	2.53	1.28	168.2	1101.5	6445.5	407.2	5751.2	**2578.20**	**1917.05**
26.50	27.50	27.00	1.00	25.0	20.56	10.56	152.79	3.77	10.2	10.2	1.0	103.68	3258.38	60	1.0	226.3	2415.6	27.5	10.2	60	10.56	2.53	1.28	168.2	1101.5	6775.5	424.1	6098.1	**2710.19**	**2032.70**
27.50	29.50	28.50	2.00	27.0	20.56	10.56	152.79	7.54	10.2	10.2	1.0	207.36	3465.74	60	1.0	452.6	2868.2	29.5	11.6	62	10.56	2.94	1.68	168.2	1203.1	7537.0	458.0	6792.0	**3014.79**	**2263.99**
29.50	30.00	29.75	0.50	27.5	20.56	10.56	152.79	1.89	11.6	11.6	1.0	59.14	3524.88	62	1.0	116.9	2985.1	30.0	11.6	62	10.56	2.94	1.68	168.2	1203.1	7713.0	466.5	6976.5	**3085.22**	**2325.50**
30.00	31.00	30.50	1.00	28.5	20.56	10.56	152.79	3.77	11.6	11.6	1.0	118.28	3643.17	62	1.0	233.8	3218.9	31.0	11.6	62	10.16	2.94	1.68	168.2	1202.6	8064.7	483.5	7345.6	**3225.88**	**2448.52**
31.00	32.50	31.75	1.50	30.0	20.16	10.16	152.79	5.66	11.6	11.6	1.0	177.43	3820.60	62	1.0	350.7	3569.7	32.5	11.0	60	10.16	2.76	1.51	168.2	1147.5	8537.7	508.9	7899.2	**3415.10**	**2633.06**
32.50	34.00	33.25	1.50	31.5	20.16	10.16	152.79	5.66	11.0	11.0	1.0	168.01	3988.61	60	1.0	339.4	3909.1	34.0	11.0	60	10.16	2.76	1.51	168.2	1147.5	9045.2	534.4	8432.1	**3618.07**	**2810.69**
34.00	35.00	34.50	1.00	32.5	20.16	10.16	152.79	3.77	11.0	11.0	1.0	112.01	4100.62	60	1.0	226.3	4135.4	35.0	11.0	60	8.47	2.76	1.51	168.2	1145.8	9381.8	551.3	8787.3	**3752.70**	**2929.11**
35.00	35.50	35.25	0.50	33.0	18.47	8.47	152.79	1.89	11.0	11.0	1.0	56.00	4156.62	60	1.0	113.1	4248.5	35.5	33.8	0	8.61	40.40	41.88	168.2	7935.3	16340.5	559.8	8965.0	**6536.18**	**2988.32**
35.50	37.00	36.25	1.50	34.5	18.61	8.61	152.79	5.66	33.8	33.8	1.2	688.58	4845.20	0	1.0	0.0	4248.5	37.0	33.8	0	8.50	40.40	41.88	168.2	7932.2	17025.9	585.3	9679.0	**6810.36**	**3226.33**
37.00	37.50	37.25	0.50	35.0	18.50	8.50	152.79	1.89	33.8	33.8	1.2	229.53	5074.72	0	1.0	0.0	4248.5	37.5	33.3	0	8.50	37.88	39.32	168.2	7438.0	16761.2	593.8	9917.0	**6704.48**	**3305.67**
37.50	38.50	38.00	1.00	36.0	18.50	8.50	152.79	3.77	33.3	33.3	1.2	440.97	5515.70	0	1.0	0.0	4248.5	38.5	34.3	0	8.47	42.92	44.44	168.2	8425.5	18189.7	610.7	10374.9	**7275.89**	**3458.31**
38.50	40.00	39.25	1.50	37.5	18.47	8.47	152.79	5.66	34.3	34.3	1.2	716.39	6232.09	0	1.0	0.0	4248.5	40.0	34.3	0	8.47	42.92	44.44	168.2	8425.5	18906.1	636.2	11116.8	**7562.45**	**3705.59**
BORE NO: P30, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	17.98	7.98	21.95	1.89	27.2	27.2	1.0	21.27	0	12	1.0	22.6	0	3.0	28.3	9	9.16	17.43	18.48	23.9	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	5.00	4.00	2.00	2.5	19.16	9.16	33.10	7.54	28.3	28.3	1.0	134.43	0	9	1.0	67.9	0	5.0	28.3	9	9.16	17.43	18.48	42.3	0	0.0	42.4	42.4	**0.00**	**14.14**
5.00	6.00	5.50	1.00	3.5	19.16	9.16	46.84	3.77	28.3	28.3	1.0	95.12	0	9	1.0	33.9	0	6.0	28.3	0	9.16	17.43	18.48	51.4	0	0.0	59.4	59.4	**0.00**	**19.79**
6.00	8.00	7.00	2.00	5.5	19.16	9.16	60.58	7.54	28.3	28.3	1.0	246.04	0	0	1.0	0.0	0	8.0	28.3	0	11.05	17.43	18.48	69.7	0	0.0	93.3	93.3	**0.00**	**31.10**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m
Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0
Area of Pile: 1.13 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
8.00	9.00	8.50	1.00	6.5	21.05	11.05	75.27	3.77	28.3	28.3	1.0	152.84	0	0	1.0	0.0	0	9.0	28.3	0	11.05	17.43	18.48	80.8	0	0.0	110.3	110.3	**0.00**	**36.76**
9.00	10.00	9.50	1.00	7.5	21.05	11.05	86.32	3.77	28.3	28.3	1.0	175.28	0	0	1.0	0.0	0	10.0	10.6	40	11.05	2.65	1.39	91.8	692.7	692.7	127.2	127.2	**277.10**	**42.41**
10.00	11.00	10.50	1.00	8.5	21.05	11.05	97.37	3.77	10.6	10.6	1.0	68.72	68.72	40	1.0	150.9	150.9	11.0	10.6	40	11.05	2.65	1.39	102.9	725.8	945.4	144.2	363.8	**378.16**	**121.26**
11.00	12.00	11.50	1.00	9.5	21.05	11.05	108.42	3.77	10.6	10.6	1.0	76.52	145.24	40	1.0	150.9	301.7	12.0	11.4	45	11.54	2.88	1.62	113.9	842.4	1289.4	161.2	608.1	**515.74**	**202.71**
12.00	14.50	13.25	2.50	12.0	21.54	11.54	128.37	9.43	11.4	11.4	1.0	244.04	389.28	45	1.0	424.3	726.0	14.5	11.2	45	11.36	2.82	1.56	142.8	926.3	2041.6	203.6	1318.9	**816.64**	**439.62**
14.50	17.50	16.00	3.00	15.0	21.36	11.36	159.83	11.31	11.2	11.2	1.0	358.07	747.34	45	1.0	509.1	1235.1	17.5	11.2	45	11.36	2.82	1.56	176.9	1035.2	3017.7	254.5	2237.0	**1207.06**	**745.65**
17.50	19.00	18.25	1.50	16.5	21.36	11.36	159.83	5.66	11.2	11.2	1.0	179.03	926.38	45	1.0	254.6	1489.7	19.0	24.3	10	10.67	9.50	10.11	176.9	2075.4	4491.5	279.9	2696.0	**1796.58**	**898.67**
19.00	20.50	19.75	1.50	18.0	20.67	10.67	159.83	5.66	24.3	24.3	1.0	408.25	1334.63	10	1.0	56.6	1546.3	20.5	15.5	42	10.67	4.19	2.92	176.9	1286.5	4167.5	305.4	3186.3	**1666.98**	**1062.09**
20.50	23.50	22.00	3.00	21.0	20.67	10.67	159.83	11.31	15.5	15.5	1.0	501.50	1836.13	42	1.0	475.2	2021.5	23.5	8.6	41	11.75	2.22	1.00	176.9	869.4	4727.0	356.3	4213.9	**1890.79**	**1404.63**
23.50	26.50	25.00	3.00	24.0	21.75	11.75	159.83	11.31	8.6	8.6	1.0	273.49	2109.62	41	1.0	463.9	2485.4	26.5	8.6	41	11.75	2.22	1.00	176.9	869.4	5464.4	407.2	5002.1	**2185.74**	**1667.38**
26.50	27.50	27.00	1.00	25.0	21.75	11.75	159.83	3.77	8.6	8.6	1.0	91.16	2200.79	41	1.0	154.6	2640.0	27.5	9.0	41	11.75	2.29	1.07	176.9	884.3	5725.1	424.1	5264.9	**2290.02**	**1754.97**
27.50	29.50	28.50	2.00	27.0	21.75	11.75	159.83	7.54	9.0	9.0	1.0	190.94	2391.73	41	1.0	309.3	2949.3	29.5	11.0	41	9.27	2.76	1.51	176.9	980.1	6321.1	458.0	5799.0	**2528.43**	**1933.01**
29.50	30.00	29.75	0.50	27.5	19.27	9.27	159.83	1.89	11.0	11.0	1.0	58.59	2450.32	41	1.0	77.3	3026.6	30.0	11.0	41	9.27	2.76	1.51	176.9	980.1	6457.0	466.5	5943.4	**2582.79**	**1981.14**
30.00	31.00	30.50	1.00	28.5	19.27	9.27	159.83	3.77	11.0	11.0	1.0	117.17	2567.49	41	1.0	154.6	3181.2	31.0	27.8	5	9.27	16.31	17.33	176.9	3422.9	9171.6	483.5	6232.2	**3668.65**	**2077.39**
31.00	32.50	31.75	1.50	30.0	19.27	9.27	159.83	5.66	27.8	27.8	1.0	476.72	3044.21	5	1.0	28.3	3209.5	32.5	8.5	48	9.27	2.20	0.99	176.9	935.3	7188.9	508.9	6762.6	**2875.58**	**2254.21**
32.50	35.00	33.75	2.50	32.5	19.27	9.27	159.83	9.43	8.5	8.5	1.0	225.22	3269.42	48	1.0	452.6	3662.1	35.0	8.1	48	8.55	2.13	0.93	176.9	920.0	7851.5	551.3	7482.8	**3140.60**	**2494.28**
35.00	35.50	35.25	0.50	33.0	18.55	8.55	159.83	1.89	8.1	8.1	1.0	42.89	3312.32	48	1.0	90.5	3752.6	35.5	10.8	33	9.21	2.71	1.45	176.9	886.4	7951.3	559.8	7624.7	**3180.53**	**2541.57**
35.50	37.00	36.25	1.50	34.5	19.21	9.21	159.83	5.66	10.8	10.8	1.0	172.48	3484.80	33	1.0	186.7	3939.3	37.0	9.4	56	9.21	2.36	1.13	176.9	1050.0	8474.0	585.3	8009.3	**3389.61**	**2669.78**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
37.00	37.50	37.25	0.50	35.0	19.21	9.21	159.83	1.89	9.4	9.4	1.0	49.90	3534.70	56	1.0	105.6	4044.9	37.5	10.2	56	9.21	2.53	1.28	176.9	1084.3	8663.8	593.8	8173.3	**3465.53**	**2724.44**
37.50	38.50	38.00	1.00	36.0	19.21	9.21	159.83	3.77	10.2	10.2	1.0	108.46	3643.15	56	1.0	211.2	4256.1	38.5	14.3	48	9.97	3.74	2.45	176.9	1253.2	9152.4	610.7	8509.9	**3660.96**	**2836.65**
38.50	40.00	39.25	1.50	37.5	19.97	9.97	159.83	5.66	14.3	14.3	1.0	230.47	3873.63	48	1.0	271.5	4527.6	40.0	14.3	48	9.97	3.74	2.45	176.9	1253.2	9654.4	636.2	9037.4	**3861.77**	**3012.47**
BORE NO: P31, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	20.38	10.38	28.55	1.89	26.7	26.7	1.0	27.07	0	4	1.0	7.5	0	3.0	26.7	4	10.38	13.83	14.80	31.1	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.5	20.38	10.38	36.33	3.77	26.7	26.7	1.0	68.91	0	4	1.0	15.1	0	4.0	26.7	0	10.38	13.83	14.80	41.5	0	0.0	25.4	25.4	**0.00**	**8.48**
4.00	5.00	4.50	1.00	2.5	20.38	10.38	46.71	3.77	26.7	26.7	1.0	88.60	0	0	1.0	0.0	0	5.0	27.2	2	9.68	14.95	15.95	51.9	0	0.0	42.4	42.4	**0.00**	**14.14**
5.00	6.00	5.50	1.00	3.5	19.68	9.68	56.74	3.77	27.2	27.2	1.0	109.98	0	2	1.0	7.5	0	6.0	30.4	0	9.68	23.27	24.45	61.6	0	0.0	59.4	59.4	**0.00**	**19.79**
6.00	7.00	6.50	1.00	4.5	19.68	9.68	66.42	3.77	30.4	30.4	1.0	149.91	0	0	1.0	0.0	0	7.0	30.4	0	10.77	23.27	24.45	71.3	0	0.0	76.3	76.3	**0.00**	**25.45**
7.00	9.00	8.00	2.00	6.5	20.77	10.77	82.03	7.54	30.4	30.4	1.0	370.27	0	0	1.0	0.0	0	9.0	12.1	44	10.77	3.09	1.82	92.8	785.5	785.5	110.3	110.3	**314.20**	**36.76**
9.00	10.00	9.50	1.00	7.5	20.77	10.77	98.19	3.77	12.1	12.1	1.0	79.38	79.38	44	1.0	165.9	165.9	10.0	12.1	44	10.40	3.09	1.82	103.6	822.7	1068.0	127.2	372.6	**427.20**	**124.19**
10.00	12.50	11.25	2.50	10.0	20.40	10.40	116.57	9.43	12.1	12.1	1.0	235.62	315.01	44	1.0	414.9	580.8	12.5	12.1	44	10.40	3.09	1.82	129.6	913.5	1809.3	169.6	1065.5	**723.72**	**355.15**
12.50	14.00	13.25	1.50	11.5	20.40	10.40	137.37	5.66	12.1	12.1	1.0	166.60	481.61	44	1.0	248.9	829.7	14.0	27.5	3	9.71	15.63	16.64	145.2	2707.4	4018.7	195.1	1506.4	**1607.50**	**502.14**
14.00	15.50	14.75	1.50	13.0	19.71	9.71	152.45	5.66	27.5	27.5	1.0	448.96	930.57	3	1.0	17.0	846.7	15.5	10.5	58	9.56	2.62	1.36	159.7	1072.4	2849.7	220.5	1997.8	**1139.87**	**665.93**
15.50	18.50	17.00	3.00	16.0	19.56	9.56	174.08	11.31	10.5	10.5	1.0	365.03	1295.60	58	1.0	656.2	1502.9	18.5	9.5	62	10.48	2.38	1.14	159.7	1069.6	3868.1	271.4	3069.9	**1547.25**	**1023.32**
18.50	21.50	20.00	3.00	19.0	20.48	10.48	174.08	11.31	9.5	9.5	1.0	329.59	1625.19	62	1.0	701.5	2204.4	21.5	24.7	10	9.76	9.78	10.55	159.7	1940.0	5769.6	322.3	4151.9	**2307.83**	**1383.97**
21.50	24.50	23.00	3.00	22.0	19.76	9.76	174.08	11.31	24.7	24.7	1.0	905.88	2531.07	10	1.0	113.1	2317.5	24.5	10.2	57	9.63	2.53	1.28	159.7	1045.8	5894.4	373.2	5221.8	**2357.77**	**1740.61**
24.50	27.50	26.00	3.00	25.0	19.63	9.63	174.08	11.31	10.2	10.2	1.0	354.38	2885.45	57	1.0	644.9	2962.5	27.5	10.2	57	9.63	2.53	1.28	159.7	1045.8	6893.7	424.1	6272.0	**2757.48**	**2090.67**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
27.50	29.00	28.25	1.50	26.5	19.63	9.63	174.08	5.66	10.2	10.2	1.0	177.19	3062.64	57	1.0	322.5	3284.9	29.0	9.5	48	9.63	2.38	1.14	159.7	926.4	7273.9	449.6	6797.1	**2909.57**	**2265.70**
29.00	30.00	29.50	1.00	27.5	19.63	9.63	174.08	3.77	9.5	9.5	1.0	109.86	3172.50	48	1.0	181.0	3465.9	30.0	9.5	48	9.19	2.38	1.14	159.7	926.0	7564.5	466.5	7105.0	**3025.79**	**2368.32**
30.00	30.50	30.25	0.50	28.0	19.19	9.19	174.08	1.89	9.5	9.5	1.0	54.93	3227.43	48	1.0	90.5	3556.5	30.5	7.0	59	10.17	1.93	0.76	159.7	954.8	7738.7	475.0	7258.9	**3095.49**	**2419.63**
30.50	32.00	31.25	1.50	29.5	20.17	10.17	174.08	5.66	7.0	7.0	1.0	120.91	3348.34	59	1.0	333.8	3890.2	32.0	8.0	66	9.94	2.11	0.91	159.7	1059.6	8298.1	500.5	7739.0	**3319.25**	**2579.68**
32.00	32.50	32.25	0.50	30.0	19.94	9.94	174.08	1.89	8.0	8.0	1.0	46.13	3394.48	66	1.0	124.5	4014.7	32.5	8.0	66	9.94	2.11	0.91	159.7	1059.6	8468.7	508.9	7918.1	**3387.49**	**2639.37**
32.50	33.50	33.00	1.00	31.0	19.94	9.94	174.08	3.77	8.0	8.0	1.0	92.27	3486.74	66	1.0	248.9	4263.6	33.5	8.0	66	9.58	2.11	0.91	159.7	1059.3	8809.7	525.9	8276.2	**3523.87**	**2758.75**
33.50	35.00	34.25	1.50	32.5	19.58	9.58	174.08	5.66	8.0	8.0	1.0	138.40	3625.14	66	1.0	373.4	4637.0	35.0	29.6	0	8.76	20.36	21.48	159.7	3807.1	12069.3	551.3	8813.5	**4827.70**	**2937.82**
35.00	36.50	35.75	1.50	34.0	18.76	8.76	174.08	5.66	29.6	29.6	1.0	559.43	4184.57	0	1.0	0.0	4637.0	36.5	29.6	0	8.37	20.36	21.48	159.7	3801.5	12623.0	576.8	9398.3	**5049.20**	**3132.78**
36.50	37.50	37.00	1.00	35.0	18.37	8.37	174.08	3.77	29.6	29.6	1.0	372.95	4557.52	0	1.0	0.0	4637.0	37.5	29.2	0	8.37	19.46	20.56	159.7	3633.4	12827.9	593.8	9788.3	**5131.17**	**3262.75**
37.50	38.00	37.75	0.50	35.5	18.37	8.37	174.08	1.89	29.2	29.2	1.0	183.46	4740.98	0	1.0	0.0	4637.0	38.0	30.3	0	8.57	22.77	23.94	159.7	4254.6	13632.5	602.2	9980.2	**5453.02**	**3326.73**
38.00	40.00	39.00	2.00	37.5	18.57	8.57	174.08	7.54	30.3	30.3	1.0	778.78	5519.75	0	1.0	0.0	4637.0	40.0	30.3	0	8.57	22.77	23.94	159.7	4254.6	14411.3	636.2	10792.9	**5764.53**	**3597.63**
BORE NO: P32, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	19.70	9.70	26.68	1.89	28.2	28.2	1.0	26.97	0	0	1.0	0.0	0	3.0	28.2	0	9.39	17.21	18.25	29.1	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	5.00	4.00	2.00	2.5	19.39	9.39	38.49	7.54	28.2	28.2	1.0	155.67	0	0	1.0	0.0	0	5.0	28.5	0	9.39	17.88	18.94	47.9	0	0.0	42.4	42.4	**0.00**	**14.14**
5.00	6.00	5.50	1.00	3.5	19.39	9.39	52.58	3.77	28.5	28.5	1.0	107.66	0	0	1.0	0.0	0	6.0	28.5	0	9.64	17.88	18.94	57.3	0	0.0	59.4	59.4	**0.00**	**19.79**
6.00	8.00	7.00	2.00	5.5	19.64	9.64	66.91	7.54	28.5	28.5	1.0	274.03	0	0	1.0	0.0	0	8.0	11.6	54	9.64	2.94	1.68	76.6	815.5	815.5	93.3	93.3	**326.21**	**31.10**
8.00	9.00	8.50	1.00	6.5	19.64	9.64	81.37	3.77	11.6	11.6	1.0	62.99	62.99	54	1.0	203.7	203.7	9.0	11.6	54	9.64	2.94	1.68	86.2	847.6	1114.2	110.3	376.9	**445.70**	**125.64**
9.00	10.00	9.50	1.00	7.5	19.64	9.64	91.01	3.77	11.6	11.6	1.0	70.46	133.45	54	1.0	203.7	407.3	10.0	11.6	54	10.40	2.94	1.68	95.8	880.5	1421.3	127.2	668.0	**568.52**	**222.67**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m) From	Layers (m) To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi: ϕ	δ	Ki	Qi	∑Qi	Ultimate Shaft Cohesion Quc= Σα.c.Asi: c	α	α.c.Asi	∑Qi	Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ): Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
10.00	11.00	10.50	1.00	8.5	20.40	10.40	101.03	3.77	11.6	11.6	1.0	78.21	211.66	54	1.0	203.7	611.0	11.0	11.6	54	10.40	2.94	1.68	106.2	915.1	1737.8	144.2	966.8	**695.11**	**322.28**
11.00	12.00	11.50	1.00	9.5	20.40	10.40	111.43	3.77	11.6	11.6	1.0	86.26	297.93	54	1.0	203.7	814.6	12.0	9.0	66	10.40	2.29	1.07	116.6	981.8	2094.3	161.2	1273.7	**837.73**	**424.57**
12.00	13.00	12.50	1.00	10.5	20.40	10.40	121.83	3.77	9.0	9.0	1.0	72.77	370.70	66	1.0	248.9	1063.5	13.0	29.0	0	10.40	19.01	20.10	127.0	2873.8	4308.0	178.1	1612.4	**1723.20**	**537.46**
13.00	14.50	13.75	1.50	12.0	20.40	10.40	134.83	5.66	29.0	29.0	1.0	422.80	793.50	0	1.0	0.0	1063.5	14.5	29.0	0	10.18	19.01	20.10	142.6	3206.2	5063.3	203.6	2060.6	**2025.32**	**686.87**
14.50	16.00	15.25	1.50	13.5	20.18	10.18	150.27	5.66	29.0	29.0	1.0	471.20	1264.70	0	1.0	0.0	1063.5	16.0	10.4	51	10.18	2.59	1.33	157.9	990.8	3319.1	229.0	2557.3	**1327.63**	**852.42**
16.00	17.50	16.75	1.50	15.0	20.18	10.18	165.54	5.66	10.4	10.4	1.0	171.87	1436.58	51	1.0	288.5	1352.1	17.5	10.4	51	10.18	2.59	1.33	173.2	1035.5	3824.2	254.5	3043.1	**1529.67**	**1014.37**
17.50	19.00	18.25	1.50	16.5	20.18	10.18	165.54	5.66	10.4	10.4	1.0	171.87	1608.45	51	1.0	288.5	1640.6	19.0	24.0	12	9.99	9.28	9.78	173.2	2006.8	5255.8	279.9	3528.9	**2102.31**	**1176.31**
19.00	20.50	19.75	1.50	18.0	19.99	9.99	165.54	5.66	24.0	24.0	1.0	416.94	2025.38	12	1.0	67.9	1708.5	20.5	9.3	62	10.42	2.34	1.11	173.2	1098.5	4832.3	305.4	4039.2	**1932.92**	**1346.40**
20.50	23.50	22.00	3.00	21.0	20.42	10.42	165.54	11.31	9.3	9.3	1.0	306.70	2332.09	62	1.0	701.5	2409.9	23.5	9.3	62	10.42	2.34	1.11	173.2	1098.5	5840.5	356.3	5098.3	**2336.20**	**1699.43**
23.50	25.00	24.25	1.50	22.5	20.42	10.42	165.54	5.66	9.3	9.3	1.0	153.35	2485.44	62	1.0	350.7	2760.7	25.0	9.3	62	10.42	2.34	1.11	173.2	1098.5	6344.6	381.7	5627.8	**2537.83**	**1875.94**
25.00	26.50	25.75	1.50	24.0	20.42	10.42	165.54	5.66	9.3	9.3	1.0	153.35	2638.79	62	1.0	350.7	3111.4	26.5	7.5	60	8.59	2.02	0.84	173.2	1011.6	6761.8	407.2	6157.4	**2704.73**	**2052.46**
26.50	27.50	27.00	1.00	25.0	18.59	8.59	165.54	3.77	7.5	7.5	1.0	82.19	2720.98	60	1.0	226.3	3337.7	27.5	7.5	60	8.59	2.02	0.84	173.2	1011.6	7070.3	424.1	6482.8	**2828.12**	**2160.94**
27.50	28.00	27.75	0.50	25.5	18.59	8.59	165.54	1.89	7.5	7.5	1.0	41.10	2762.07	60	1.0	113.1	3450.9	28.0	7.5	60	9.11	2.02	0.84	173.2	1011.9	7224.8	432.6	6645.5	**2889.94**	**2215.18**
28.00	29.50	28.75	1.50	27.0	19.11	9.11	165.54	5.66	7.5	7.5	1.0	123.29	2885.36	60	1.0	339.4	3790.3	29.5	7.5	60	8.85	2.02	0.84	173.2	1011.8	7687.4	458.0	7133.7	**3074.96**	**2377.90**
29.50	30.00	29.75	0.50	27.5	18.85	8.85	165.54	1.89	7.5	7.5	1.0	41.10	2926.46	60	1.0	113.1	3903.4	30.0	8.0	54	8.85	2.11	0.91	173.2	968.8	7798.6	466.5	7296.4	**3119.46**	**2432.14**
30.00	31.00	30.50	1.00	28.5	18.85	8.85	165.54	3.77	8.0	8.0	1.0	87.74	3014.20	54	1.0	203.7	4107.1	31.0	9.2	44	9.73	2.33	1.10	173.2	911.0	8032.3	483.5	7604.8	**3212.92**	**2534.92**
31.00	32.50	31.75	1.50	30.0	19.73	9.73	165.54	5.66	9.2	9.2	1.0	151.67	3165.87	44	1.0	248.9	4356.0	32.5	7.0	51	8.54	1.93	0.76	173.2	901.9	8423.7	508.9	8030.8	**3369.49**	**2676.94**
32.50	34.00	33.25	1.50	31.5	18.54	8.54	165.54	5.66	7.0	7.0	1.0	114.98	3280.85	51	1.0	288.5	4644.5	34.0	11.5	48	9.73	2.91	1.65	173.2	1070.0	8995.4	534.4	8459.7	**3598.15**	**2819.92**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
34.00	35.00	34.50	1.00	32.5	19.73	9.73	165.54	3.77	11.5	11.5	1.0	127.02	3407.87	48	1.0	181.0	4825.5	35.0	11.5	48	9.73	2.91	1.65	173.2	1070.0	9303.4	551.3	8784.8	**3721.37**	**2928.25**
35.00	35.50	35.25	0.50	33.0	19.73	9.73	165.54	1.89	11.5	11.5	1.0	63.51	3471.37	48	1.0	90.5	4916.1	35.5	8.0	60	8.79	2.11	0.91	173.2	1029.8	9417.3	559.8	8947.3	**3766.90**	**2982.42**
35.50	37.00	36.25	1.50	34.5	18.79	8.79	165.54	5.66	8.0	8.0	1.0	131.61	3602.98	60	1.0	339.4	5255.5	37.0	8.0	60	9.18	2.11	0.91	173.2	1030.1	9888.5	585.3	9443.7	**3955.41**	**3147.92**
37.00	37.50	37.25	0.50	35.0	19.18	9.18	165.54	1.89	8.0	8.0	1.0	43.87	3646.85	60	1.0	113.1	5368.6	37.5	8.0	60	9.18	2.11	0.91	173.2	1030.1	10045.5	593.8	9609.2	**4018.22**	**3203.08**
37.50	38.50	38.00	1.00	36.0	19.18	9.18	165.54	3.77	8.0	8.0	1.0	87.74	3734.59	60	1.0	226.3	5594.9	38.5	9.2	56	8.83	2.33	1.10	173.2	1032.5	10362.1	610.7	9940.2	**4144.82**	**3313.41**
38.50	40.00	39.25	1.50	37.5	18.83	8.83	165.54	5.66	9.2	9.2	1.0	151.67	3886.27	56	1.0	316.8	5911.7	40.0	9.2	56	0.00	2.33	1.10	173.2	1026.0	10824.0	636.2	10434.2	**4329.58**	**3478.05**
BORE NO: P33, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	19.79	9.79	26.92	1.89	28.6	28.6	1.0	27.68	0	0	1.0	0.0	0	3.0	28.6	0	9.53	18.11	19.17	29.4	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	5.00	4.00	2.00	2.5	19.53	9.53	38.90	7.54	28.6	28.6	1.0	159.98	0	0	1.0	0.0	0	5.0	29.3	0	9.53	19.68	20.79	48.4	0	0.0	42.4	42.4	**0.00**	**14.14**
5.00	6.00	5.50	1.00	3.5	19.53	9.53	53.20	3.77	29.3	29.3	1.0	112.58	0	0	1.0	0.0	0	6.0	29.3	0	9.45	19.68	20.79	58.0	1424.1	1424.1	59.4	59.4	**569.65**	**19.79**
6.00	8.00	7.00	2.00	5.5	19.45	9.45	67.41	7.54	29.3	29.3	1.0	285.34	285.34	0	1.0	0.0	0.0	8.0	29.3	0	9.45	19.68	20.79	76.9	1845.0	2130.4	93.3	378.6	**852.15**	**126.21**
8.00	9.00	8.50	1.00	6.5	19.45	9.45	81.59	3.77	29.3	29.3	1.0	172.67	458.01	0	1.0	0.0	0.0	9.0	12.2	56	10.24	3.12	1.85	86.3	887.4	1345.4	110.3	568.3	**538.17**	**189.43**
9.00	11.00	10.00	2.00	8.5	20.24	10.24	96.55	7.54	12.2	12.2	1.0	157.46	615.46	56	1.0	422.4	422.4	11.0	27.7	0	10.24	16.08	17.10	106.8	2061.8	3099.6	144.2	1182.1	**1239.85**	**394.02**
11.00	12.00	11.50	1.00	9.5	20.24	10.24	111.91	3.77	27.7	27.7	1.0	221.59	837.05	0	1.0	0.0	422.4	12.0	28.0	0	10.24	16.76	17.79	117.0	2342.3	3601.8	161.2	1420.6	**1440.71**	**473.54**
12.00	13.00	12.50	1.00	10.5	20.24	10.24	122.15	3.77	28.0	28.0	1.0	244.95	1082.00	0	1.0	0.0	422.4	13.0	8.6	59	10.39	2.22	1.00	127.3	927.3	2431.7	178.1	1682.5	**972.66**	**560.84**
13.00	14.50	13.75	1.50	12.0	20.39	10.39	135.06	5.66	8.6	8.6	1.0	115.55	1197.55	59	1.0	333.8	756.2	14.5	8.6	59	10.61	2.22	1.00	142.9	966.5	2920.2	203.6	2157.3	**1168.10**	**719.10**
14.50	17.50	16.00	3.00	15.0	20.61	10.61	158.77	11.31	8.6	8.6	1.0	271.68	1469.23	59	1.0	667.5	1423.7	17.5	10.3	62	10.42	2.56	1.31	174.7	1146.2	4039.1	254.5	3147.4	**1615.65**	**1049.14**
17.50	20.50	19.00	3.00	18.0	20.42	10.42	158.77	11.31	10.3	10.3	1.0	326.46	1795.68	62	1.0	701.5	2125.2	20.5	11.6	65	10.42	2.94	1.68	174.7	1254.9	5175.8	305.4	4226.2	**2070.31**	**1408.75**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
20.50	22.00	21.25	1.50	19.5	20.42	10.42	158.77	5.66	11.6	11.6	1.0	184.37	1980.05	65	1.0	367.7	2492.9	22.0	25.2	8	9.65	10.45	11.34	174.7	2221.2	6694.2	330.8	4803.8	**2677.67**	**1601.26**
22.00	23.50	22.75	1.50	21.0	19.65	9.65	158.77	5.66	25.2	25.2	1.0	422.65	2402.71	8	1.0	45.3	2538.2	23.5	11.0	56	9.65	2.76	1.51	174.7	1126.4	6067.3	356.3	5297.1	**2426.91**	**1765.71**
23.50	25.00	24.25	1.50	22.5	19.65	9.65	158.77	5.66	11.0	11.0	1.0	174.59	2577.30	56	1.0	316.8	2855.0	25.0	11.0	56	9.65	2.76	1.51	174.7	1126.4	6558.7	381.7	5814.0	**2623.46**	**1937.99**
25.00	26.50	25.75	1.50	24.0	19.65	9.65	158.77	5.66	11.0	11.0	1.0	174.59	2751.88	56	1.0	316.8	3171.8	26.5	11.0	56	8.78	2.76	1.51	174.7	1125.5	7049.2	407.2	6330.8	**2819.66**	**2110.27**
26.50	27.50	27.00	1.00	25.0	18.78	8.78	158.77	3.77	11.0	11.0	1.0	116.39	2868.28	56	1.0	211.2	3383.0	27.5	11.0	56	8.78	2.76	1.51	174.7	1125.5	7376.8	424.1	6675.4	**2950.70**	**2225.12**
27.50	28.00	27.75	0.50	25.5	18.78	8.78	158.77	1.89	11.0	11.0	1.0	58.20	2926.47	56	1.0	105.6	3488.6	28.0	11.6	65	9.46	2.94	1.68	174.7	1253.8	7668.9	432.6	6847.6	**3067.54**	**2282.55**
28.00	29.50	28.75	1.50	27.0	19.46	9.46	158.77	5.66	11.6	11.6	1.0	184.37	3110.84	65	1.0	367.7	3856.3	29.5	11.6	65	8.75	2.94	1.68	174.7	1253.0	8220.1	458.0	7425.2	**3288.05**	**2475.06**
29.50	30.00	29.75	0.50	27.5	18.75	8.75	158.77	1.89	11.6	11.6	1.0	61.46	3172.30	65	1.0	122.6	3978.9	30.0	11.6	65	8.75	2.94	1.68	174.7	1253.0	8404.2	466.5	7617.7	**3361.66**	**2539.23**
30.00	31.00	30.50	1.00	28.5	18.75	8.75	158.77	3.77	11.6	11.6	1.0	122.91	3295.22	65	1.0	245.1	4224.0	31.0	11.6	65	8.97	2.94	1.68	174.7	1253.3	8772.5	483.5	8002.7	**3508.99**	**2667.57**
31.00	32.50	31.75	1.50	30.0	18.97	8.97	158.77	5.66	11.6	11.6	1.0	184.37	3479.59	65	1.0	367.7	4591.7	32.5	11.5	57	8.96	2.91	1.65	174.7	1165.8	9237.1	508.9	8580.2	**3694.84**	**2860.08**
32.50	34.00	33.25	1.50	31.5	18.96	8.96	158.77	5.66	11.5	11.5	1.0	182.74	3662.32	57	1.0	322.5	4914.2	34.0	11.5	57	8.95	2.91	1.65	174.7	1165.8	9742.3	534.4	9110.9	**3896.91**	**3036.96**
34.00	35.00	34.50	1.00	32.5	18.95	8.95	158.77	3.77	11.5	11.5	1.0	121.83	3784.15	57	1.0	215.0	5129.1	35.0	11.5	57	8.95	2.91	1.65	174.7	1165.8	10079.1	551.3	9464.6	**4031.63**	**3154.88**
35.00	35.50	35.25	0.50	33.0	18.95	8.95	158.77	1.89	11.5	11.5	1.0	60.91	3845.06	57	1.0	107.5	5236.6	35.5	8.5	46	8.64	2.20	0.99	174.7	909.0	9990.7	559.8	9641.5	**3996.29**	**3213.84**
35.50	37.00	36.25	1.50	34.5	18.64	8.64	158.77	5.66	8.5	8.5	1.0	134.23	3979.30	46	1.0	260.2	5496.9	37.0	8.7	60	9.08	2.24	1.02	174.7	1059.2	10535.3	585.3	10061.4	**4214.14**	**3353.81**
37.00	37.50	37.25	0.50	35.0	19.08	9.08	158.77	1.89	8.7	8.7	1.0	45.81	4025.11	60	1.0	113.1	5610.0	37.5	8.7	60	9.08	2.24	1.02	174.7	1059.2	10694.3	593.8	10228.9	**4277.72**	**3409.62**
37.50	38.50	38.00	1.00	36.0	19.08	9.08	158.77	3.77	8.7	8.7	1.0	91.63	4116.74	60	1.0	226.3	5836.3	38.5	8.7	60	8.75	2.24	1.02	174.7	1059.0	11012.0	610.7	10563.7	**4404.79**	**3521.25**
38.50	40.00	39.25	1.50	37.5	18.75	8.75	158.77	5.66	8.7	8.7	1.0	137.44	4254.18	60	1.0	339.4	6175.7	40.0	9.8	54	0.00	2.43	1.19	174.7	1030.9	11460.8	636.2	11066.1	**4584.33**	**3688.69**

BORE NO: P34, CUT OFF LENGTH: 2.50 m, Nc= 9

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
2.50	3.00	2.75	0.50	0.5	19.58	9.58	26.35	1.89	23.3	23.3	1.0	21.40	0	0	1.0	0.0	0	3.0	15.9	26	9.58	4.38	3.14	28.7	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.5	19.58	9.58	33.53	3.77	15.9	15.9	1.0	36.02	0	26	1.0	98.1	0	4.0	30.8	0	9.29	25.29	26.50	38.3	1263.6	1263.6	25.4	25.4	**505.44**	**8.48**
4.00	6.00	5.00	2.00	3.5	19.29	9.29	47.61	7.54	30.8	30.8	1.0	222.64	222.64	0	1.0	0.0	0.0	6.0	30.8	0	9.29	25.29	26.50	56.9	1795.2	2017.9	59.4	282.0	**807.14**	**94.00**
6.00	7.00	6.50	1.00	4.5	19.29	9.29	61.55	3.77	30.8	30.8	1.0	143.90	366.54	0	1.0	0.0	0.0	7.0	27.4	0	9.29	15.40	16.41	66.2	1257.1	1623.7	76.3	442.9	**649.47**	**147.63**
7.00	8.00	7.50	1.00	5.5	19.29	9.29	70.84	3.77	27.4	27.4	1.0	138.48	505.02	0	1.0	0.0	0.0	8.0	25.8	7	9.75	11.80	12.72	75.5	1163.3	1668.4	93.3	598.3	**667.35**	**199.44**
8.00	9.00	8.50	1.00	6.5	19.75	9.75	80.36	3.77	25.8	25.8	1.0	146.50	651.52	7	1.0	26.4	26.4	9.0	26.2	9	9.75	12.70	13.64	85.2	1406.9	2084.8	110.3	788.2	**833.91**	**262.73**
9.00	10.00	9.50	1.00	7.5	19.75	9.75	90.11	3.77	26.2	26.2	1.0	167.21	818.73	9	1.0	33.9	60.3	10.0	26.0	0	9.49	12.25	13.18	95.0	1401.6	2280.6	127.2	1006.3	**912.26**	**335.44**
10.00	12.50	11.25	2.50	10.0	19.49	9.49	106.84	9.43	26.0	26.0	1.0	491.33	1310.06	0	1.0	0.0	60.3	12.5	9.5	55	10.41	2.38	1.14	118.7	887.8	2258.2	169.6	1540.1	**903.28**	**513.35**
12.50	15.50	14.00	3.00	13.0	20.41	10.41	134.32	11.31	9.5	9.5	1.0	254.32	1564.38	55	1.0	622.3	682.6	15.5	9.5	55	10.41	2.38	1.14	149.9	971.9	3218.9	220.5	2467.5	**1287.55**	**822.52**
15.50	18.50	17.00	3.00	16.0	20.41	10.41	165.55	11.31	9.5	9.5	1.0	313.45	1877.82	55	1.0	622.3	1304.9	18.5	9.5	55	10.62	2.38	1.14	149.9	972.0	4154.8	271.4	3454.2	**1661.91**	**1151.39**
18.50	21.50	20.00	3.00	19.0	20.62	10.62	165.55	11.31	9.5	9.5	1.0	313.45	2191.27	55	1.0	622.3	1927.2	21.5	11.5	58	10.14	2.91	1.65	149.9	1095.8	5214.3	322.3	4440.8	**2085.70**	**1480.27**
21.50	24.50	23.00	3.00	22.0	20.14	10.14	165.55	11.31	11.5	11.5	1.0	381.08	2572.35	58	1.0	656.2	2583.4	24.5	8.2	62	10.14	2.15	0.94	149.9	1001.9	6157.7	373.2	5529.0	**2463.06**	**1843.00**
24.50	27.50	26.00	3.00	25.0	20.14	10.14	165.55	11.31	8.2	8.2	1.0	269.91	2842.27	62	1.0	701.5	3284.9	27.5	8.2	60	10.59	2.15	0.94	149.9	981.8	7109.0	424.1	6551.3	**2843.59**	**2183.77**
27.50	30.00	28.75	2.50	27.5	20.59	10.59	165.55	9.43	8.2	8.2	1.0	224.93	3067.20	60	1.0	565.7	3850.6	30.0	9.1	59	10.59	2.31	1.08	149.9	1000.1	7917.9	466.5	7384.4	**3167.17**	**2461.45**
30.00	30.50	30.25	0.50	28.0	20.59	10.59	165.55	1.89	9.1	9.1	1.0	50.00	3117.20	59	1.0	111.3	3961.9	30.5	32.5	0	10.59	33.85	35.22	149.9	5996.0	13075.1	475.0	7554.1	**5230.05**	**2518.03**
30.50	32.00	31.25	1.50	29.5	20.59	10.59	165.55	5.66	32.5	32.5	1.1	671.22	3788.42	0	1.0	0.0	3961.9	32.0	19.5	32	10.59	6.13	5.12	149.9	1403.2	9153.5	500.5	8250.8	**3661.41**	**2750.25**
32.00	32.50	32.25	0.50	30.0	20.59	10.59	165.55	1.89	19.5	19.5	1.0	110.55	3898.97	32	1.0	60.3	4022.2	32.5	19.5	32	8.96	6.13	5.12	149.9	1397.5	9318.7	508.9	8430.1	**3727.50**	**2810.05**
32.50	33.50	33.00	1.00	31.0	18.96	8.96	165.55	3.77	19.5	19.5	1.0	221.10	4120.07	32	1.0	120.7	4142.9	33.5	19.5	32	9.42	6.13	5.12	149.9	1399.1	9662.1	525.9	8788.9	**3864.85**	**2929.63**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
33.50	35.00	34.25	1.50	32.5	19.42	9.42	165.55	5.66	19.5	19.5	1.0	331.65	4451.71	32	1.0	181.0	4323.9	35.0	11.4	39	9.13	2.88	1.62	149.9	896.0	9671.7	551.3	9327.0	**3868.67**	**3109.00**
35.00	36.50	35.75	1.50	34.0	19.13	9.13	165.55	5.66	11.4	11.4	1.0	188.84	4640.55	39	1.0	220.6	4544.6	36.5	11.4	39	9.17	2.88	1.62	149.9	896.1	10081.2	576.8	9761.9	**4032.47**	**3253.97**
36.50	37.50	37.00	1.00	35.0	19.17	9.17	165.55	3.77	11.4	11.4	1.0	125.89	4766.45	39	1.0	147.1	4691.7	37.5	12.0	39	9.17	3.06	1.79	149.9	927.0	10385.2	593.8	10051.9	**4154.06**	**3350.62**
37.50	38.00	37.75	0.50	35.5	19.17	9.17	165.55	1.89	12.0	12.0	1.0	66.36	4832.80	39	1.0	73.5	4765.2	38.0	8.0	50	9.05	2.11	0.91	149.9	872.7	10470.7	602.2	10200.2	**4188.28**	**3400.08**
38.00	40.00	39.00	2.00	37.5	19.05	9.05	165.55	7.54	8.0	8.0	1.0	175.50	5008.30	50	1.0	377.1	5142.3	40.0	8.0	50	0.00	2.11	0.91	149.9	867.1	11017.7	636.2	10786.8	**4407.09**	**3595.60**
BORE NO: P35, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	19.62	9.62	26.46	1.89	24.6	24.6	1.0	22.84	0	0	1.0	0.0	0	3.0	27.7	2	9.62	16.08	17.10	28.9	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.5	19.62	9.62	33.67	3.77	27.7	27.7	1.0	66.67	0	2	1.0	7.5	0	4.0	24.9	0	9.62	9.93	10.77	38.5	502.6	502.6	25.4	25.4	**201.03**	**8.48**
4.00	5.00	4.50	1.00	2.5	19.62	9.62	43.29	3.77	24.9	24.9	1.0	75.79	75.79	0	1.0	0.0	0.0	5.0	26.6	5	8.15	13.60	14.57	48.1	871.8	947.6	42.4	118.2	**379.04**	**39.40**
5.00	6.00	5.50	1.00	3.5	18.15	8.15	52.18	3.77	26.6	26.6	1.0	98.54	174.32	5	1.0	18.9	18.9	6.0	26.6	5	8.15	13.60	14.57	56.3	997.2	1190.4	59.4	252.6	**476.17**	**84.19**
6.00	7.00	6.50	1.00	4.5	18.15	8.15	60.33	3.77	26.6	26.6	1.0	113.93	288.25	5	1.0	18.9	37.7	7.0	28.7	0	9.49	18.33	19.40	64.4	1460.8	1786.7	76.3	402.3	**714.69**	**134.10**
7.00	9.00	8.00	2.00	6.5	19.49	9.49	73.89	7.54	28.7	28.7	1.0	305.14	593.39	0	1.0	0.0	37.7	9.0	28.7	0	9.49	18.33	19.40	83.4	1854.4	2485.5	110.3	741.4	**994.21**	**247.12**
9.00	10.00	9.50	1.00	7.5	19.49	9.49	88.13	3.77	28.7	28.7	1.0	181.96	775.35	0	1.0	0.0	37.7	10.0	29.0	0	9.49	19.01	20.10	92.9	2126.7	2939.8	127.2	940.3	**1175.91**	**313.43**
10.00	11.00	10.50	1.00	8.5	19.49	9.49	97.62	3.77	29.0	29.0	1.0	204.07	979.42	0	1.0	0.0	37.7	11.0	9.3	54	10.11	2.34	1.11	102.4	829.0	1846.1	144.2	1161.3	**738.44**	**387.11**
11.00	12.50	11.75	1.50	10.0	20.11	10.11	109.94	5.66	9.3	9.3	1.0	101.85	1081.27	54	1.0	305.5	343.2	12.5	13.1	34	10.11	3.38	2.11	117.5	810.1	2234.6	169.6	1594.1	**893.83**	**531.37**
12.50	14.00	13.25	1.50	11.5	20.11	10.11	125.11	5.66	13.1	13.1	1.0	164.70	1245.96	34	1.0	192.3	535.5	14.0	27.0	0	9.28	14.50	15.49	132.7	2275.0	4056.5	195.1	1976.6	**1622.61**	**658.87**
14.00	15.50	14.75	1.50	13.0	19.28	9.28	139.65	5.66	27.0	27.0	1.0	402.54	1648.50	0	1.0	0.0	535.5	15.5	32.0	0	9.28	31.33	32.65	146.6	5403.4	7587.5	220.5	2404.6	**3034.98**	**801.53**
15.50	18.50	17.00	3.00	16.0	19.28	9.28	160.53	11.31	32.0	32.0	1.1	1248.43	2896.93	0	1.0	0.0	535.5	18.5	28.5	0	9.46	17.88	18.94	146.6	3087.8	6520.3	271.4	3703.9	**2608.13**	**1234.64**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2
Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
18.50	21.50	20.00	3.00	19.0	19.46	9.46	160.53	11.31	28.5	28.5	1.0	986.16	3883.09	0	1.0	0.0	535.5	21.5	12.2	38	10.31	3.12	1.85	146.6	916.8	5335.5	322.3	4741.0	**2134.19**	**1580.32**
21.50	24.50	23.00	3.00	22.0	20.31	10.31	160.53	11.31	12.2	12.2	1.0	392.69	4275.79	38	1.0	429.9	965.5	24.5	12.2	38	10.31	3.12	1.85	146.6	916.8	6158.1	373.2	5614.5	**2463.24**	**1871.50**
24.50	26.00	25.25	1.50	23.5	20.31	10.31	160.53	5.66	12.2	12.2	1.0	196.35	4472.13	38	1.0	215.0	1180.5	26.0	9.1	59	11.04	2.31	1.08	146.6	991.7	6644.3	398.7	6051.3	**2657.73**	**2017.09**
26.00	27.50	26.75	1.50	25.0	21.04	11.04	160.53	5.66	9.1	9.1	1.0	145.46	4617.60	59	1.0	333.8	1514.2	27.5	9.1	59	11.04	2.31	1.08	146.6	991.7	7123.6	424.1	6555.9	**2849.43**	**2185.31**
27.50	29.00	28.25	1.50	26.5	21.04	11.04	160.53	5.66	9.1	9.1	1.0	145.46	4763.06	59	1.0	333.8	1848.0	29.0	31.6	0	11.04	29.32	30.60	146.6	5092.8	11703.9	449.6	7060.6	**4681.55**	**2353.54**
29.00	30.00	29.50	1.00	27.5	21.04	11.04	160.53	3.77	31.6	31.6	1.1	402.26	5165.31	0	1.0	0.0	1848.0	30.0	31.6	0	9.44	29.32	30.60	146.6	5059.6	12072.9	466.5	7479.8	**4829.16**	**2493.28**
30.00	30.50	30.25	0.50	28.0	19.44	9.44	160.53	1.89	31.6	31.6	1.1	201.13	5366.44	0	1.0	0.0	1848.0	30.5	18.0	46	8.94	5.42	4.29	146.6	1392.9	8607.3	475.0	7689.5	**3442.93**	**2563.15**
30.50	32.00	31.25	1.50	29.5	18.94	8.94	160.53	5.66	18.0	18.0	1.0	295.07	5661.52	46	1.0	260.2	2108.2	32.0	18.0	46	8.98	5.42	4.29	146.6	1393.0	9162.7	500.5	8270.2	**3665.09**	**2756.73**
32.00	32.50	32.25	0.50	30.0	18.98	8.98	160.53	1.89	18.0	18.0	1.0	98.36	5759.87	46	1.0	86.7	2195.0	32.5	18.0	46	8.98	5.42	4.29	146.6	1393.0	9347.8	508.9	8463.8	**3739.13**	**2821.26**
32.50	33.50	33.00	1.00	31.0	18.98	8.98	160.53	3.77	18.0	18.0	1.0	196.72	5956.59	46	1.0	173.5	2368.5	33.5	18.0	46	8.35	5.42	4.29	146.6	1391.2	9716.2	525.9	8850.9	**3886.48**	**2950.32**
33.50	35.00	34.25	1.50	32.5	18.35	8.35	160.53	5.66	18.0	18.0	1.0	295.07	6251.66	46	1.0	260.2	2628.7	35.0	13.5	46	8.66	3.50	2.22	146.6	1062.0	9942.4	551.3	9431.7	**3976.96**	**3143.90**
35.00	36.50	35.75	1.50	34.0	18.66	8.66	160.53	5.66	13.5	13.5	1.0	218.03	6469.69	46	1.0	260.2	2888.9	36.5	13.5	46	9.21	3.50	2.22	146.6	1062.9	10421.5	576.8	9935.4	**4168.59**	**3311.80**
36.50	37.50	37.00	1.00	35.0	19.21	9.21	160.53	3.77	13.5	13.5	1.0	145.35	6615.04	46	1.0	173.5	3062.4	37.5	13.5	46	9.21	3.50	2.22	146.6	1062.9	10740.3	593.8	10271.2	**4296.12**	**3423.73**
37.50	38.00	37.75	0.50	35.5	19.21	9.21	160.53	1.89	13.5	13.5	1.0	72.68	6687.71	46	1.0	86.7	3149.1	38.0	9.5	52	8.54	2.38	1.14	146.6	930.9	10767.8	602.2	10439.1	**4307.11**	**3479.70**
38.00	40.00	39.00	2.00	37.5	18.54	8.54	160.53	7.54	9.5	9.5	1.0	202.63	6890.34	52	1.0	392.2	3541.4	40.0	9.5	52	8.54	2.38	1.14	146.6	930.9	11362.6	636.2	11067.9	**4545.06**	**3689.29**
BORE NO: P36, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	20.43	10.43	28.68	1.89	29.5	29.5	1.0	30.60	0	0	1.0	0.0	0	3.0	29.5	0	10.71	20.13	21.25	31.3	867.3	867.3	8.5	8.5	**346.90**	**2.83**
3.00	5.00	4.00	2.00	2.5	20.71	10.71	42.00	7.54	29.5	29.5	1.0	179.24	179.24	0	1.0	0.0	0.0	5.0	29.5	0	10.71	20.13	21.25	52.7	1355.2	1534.4	42.4	221.6	**613.78**	**73.88**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
5.00	6.00	5.50	1.00	3.5	20.71	10.71	58.07	3.77	29.5	29.5	1.0	123.90	303.13	0	1.0	0.0	0.0	6.0	29.3	0	10.48	19.68	20.79	63.4	1560.3	1863.4	59.4	362.5	**745.36**	**120.84**
6.00	8.00	7.00	2.00	5.5	20.48	10.48	73.90	7.54	29.3	29.3	1.0	312.81	615.94	0	1.0	0.0	0.0	8.0	9.5	49	10.48	2.38	1.14	84.4	734.3	1350.3	93.3	709.2	**540.10**	**236.42**
8.00	9.00	8.50	1.00	6.5	20.48	10.48	89.62	3.77	9.5	9.5	1.0	56.56	672.50	49	1.0	184.8	184.8	9.0	9.5	49	10.48	2.38	1.14	94.9	762.5	1619.8	110.3	967.6	**647.93**	**322.52**
9.00	10.00	9.50	1.00	7.5	20.48	10.48	100.10	3.77	9.5	9.5	1.0	63.18	735.68	49	1.0	184.8	369.6	10.0	9.5	49	10.50	2.38	1.14	105.3	790.8	1896.0	127.2	1232.5	**758.42**	**410.84**
10.00	11.00	10.50	1.00	8.5	20.50	10.50	110.59	3.77	9.5	9.5	1.0	69.80	805.47	49	1.0	184.8	554.4	11.0	9.5	49	10.50	2.38	1.14	115.8	819.0	2178.9	144.2	1504.1	**871.57**	**501.36**
11.00	12.00	11.50	1.00	9.5	20.50	10.50	121.09	3.77	9.5	9.5	1.0	76.42	881.90	49	1.0	184.8	739.2	12.0	6.7	69	10.50	1.88	0.71	126.3	975.9	2597.0	161.2	1782.3	**1038.78**	**594.09**
12.00	13.00	12.50	1.00	10.5	20.50	10.50	131.59	3.77	6.7	6.7	1.0	58.30	940.20	69	1.0	260.2	999.4	13.0	26.9	0	9.99	14.28	15.26	136.8	2314.2	4253.8	178.1	2117.8	**1701.51**	**705.92**
13.00	14.50	13.75	1.50	12.0	19.99	9.99	144.33	5.66	26.9	26.9	1.0	414.24	1354.44	0	1.0	0.0	999.4	14.5	26.9	0	9.99	14.28	15.26	151.8	2556.2	4910.1	203.6	2557.4	**1964.04**	**852.48**
14.50	16.00	15.25	1.50	13.5	19.99	9.99	159.32	5.66	26.9	26.9	1.0	457.25	1811.68	0	1.0	0.0	999.4	16.0	9.0	54	10.56	2.29	1.07	166.8	989.7	3800.8	229.0	3040.1	**1520.33**	**1013.38**
16.00	17.50	16.75	1.50	15.0	20.56	10.56	174.73	5.66	9.0	9.0	1.0	156.56	1968.24	54	1.0	305.5	1304.9	17.5	10.0	60	10.83	2.47	1.22	182.7	1130.4	4403.5	254.5	3527.6	**1761.41**	**1175.87**
17.50	20.50	19.00	3.00	18.0	20.83	10.83	174.73	11.31	10.0	10.0	1.0	348.59	2316.83	60	1.0	678.9	1983.8	20.5	9.5	64	10.69	2.38	1.14	182.7	1151.8	5452.4	305.4	4606.0	**2180.98**	**1535.32**
20.50	23.50	22.00	3.00	21.0	20.69	10.69	174.73	11.31	9.5	9.5	1.0	330.83	2647.66	64	1.0	724.1	2707.9	23.5	9.5	64	10.69	2.38	1.14	182.7	1151.8	6507.4	356.3	5711.8	**2602.95**	**1903.93**
23.50	26.50	25.00	3.00	24.0	20.69	10.69	174.73	11.31	9.5	9.5	1.0	330.83	2978.48	64	1.0	724.1	3432.0	26.5	9.5	64	10.52	2.38	1.14	182.7	1151.7	7562.2	407.2	6817.6	**3024.88**	**2272.54**
26.50	27.50	27.00	1.00	25.0	20.52	10.52	174.73	3.77	9.5	9.5	1.0	110.28	3088.76	64	1.0	241.4	3673.4	27.5	10.5	60	10.52	2.62	1.36	182.7	1161.5	7923.7	424.1	7186.2	**3169.46**	**2395.42**
27.50	28.00	27.75	0.50	25.5	20.52	10.52	174.73	1.89	10.5	10.5	1.0	61.07	3149.83	60	1.0	113.1	3786.5	28.0	11.5	68	10.52	2.91	1.65	182.7	1305.8	8242.1	432.6	7368.9	**3296.85**	**2456.31**
28.00	29.50	28.75	1.50	27.0	20.52	10.52	174.73	5.66	11.5	11.5	1.0	201.11	3350.93	68	1.0	384.7	4171.2	29.5	11.5	68	10.52	2.91	1.65	182.7	1305.8	8827.9	458.0	7980.2	**3531.17**	**2660.06**
29.50	30.00	29.75	0.50	27.5	20.52	10.52	174.73	1.89	11.5	11.5	1.0	67.04	3417.97	68	1.0	128.2	4299.4	30.0	11.5	60	10.52	2.91	1.65	182.7	1224.3	8941.7	466.5	8183.9	**3576.69**	**2727.97**
30.00	31.00	30.50	1.00	28.5	20.52	10.52	174.73	3.77	11.5	11.5	1.0	134.07	3552.04	60	1.0	226.3	4525.7	31.0	12.9	38	10.52	3.32	2.05	182.7	1087.8	9165.6	483.5	8561.2	**3666.24**	**2853.75**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
31.00	32.50	31.75	1.50	30.0	20.52	10.52	174.73	5.66	12.9	12.9	1.0	226.39	3778.43	38	1.0	215.0	4740.7	32.5	19.8	45	10.46	6.29	5.28	182.7	1796.3	10315.4	508.9	9028.1	**4126.18**	**3009.35**
32.50	34.00	33.25	1.50	31.5	20.46	10.46	174.73	5.66	19.8	19.8	1.0	355.87	4134.30	45	1.0	254.6	4995.3	34.0	13.8	45	10.46	3.59	2.31	182.7	1216.5	10346.1	534.4	9663.9	**4138.42**	**3221.32**
34.00	35.00	34.50	1.00	32.5	20.46	10.46	174.73	3.77	13.8	13.8	1.0	161.86	4296.16	45	1.0	169.7	5165.0	35.0	14.5	48	10.46	3.80	2.51	182.7	1290.8	10752.0	551.3	10012.5	**4300.79**	**3337.50**
35.00	35.50	35.25	0.50	33.0	20.46	10.46	174.73	1.89	14.5	14.5	1.0	85.21	4381.38	48	1.0	90.5	5255.5	35.5	13.5	54	10.46	3.50	2.22	182.7	1288.9	10925.8	559.8	10196.7	**4370.32**	**3398.90**
35.50	37.50	36.50	2.00	35.0	20.46	10.46	174.73	7.54	13.5	13.5	1.0	316.42	4697.79	54	1.0	407.3	5662.8	37.5	20.2	16	10.46	6.54	5.61	182.7	1555.1	11915.7	593.8	10954.4	**4766.28**	**3651.45**
37.50	38.50	38.00	1.00	36.0	20.46	10.46	174.73	3.77	20.2	20.2	1.0	242.46	4940.25	16	1.0	60.3	5723.1	38.5	20.0	16	10.46	6.40	5.39	182.7	1523.8	12187.2	610.7	11274.1	**4874.87**	**3758.04**
38.50	40.00	39.25	1.50	37.5	20.46	10.46	174.73	5.66	20.0	20.0	1.0	359.77	5300.02	16	1.0	90.5	5813.7	40.0	20.0	16	10.46	6.40	5.39	182.7	1523.8	12637.5	636.2	11749.9	**5054.99**	**3916.62**
BORE NO: P37, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	18.65	8.65	23.79	1.89	23.5	23.5	1.0	19.50	0	10	1.0	18.9	0	3.0	23.5	11	8.65	8.92	9.23	26.0	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.5	18.65	8.65	30.28	3.77	23.5	23.5	1.0	49.65	0	11	1.0	41.5	0	4.0	23.5	11	8.65	8.92	9.23	34.6	0	0.0	25.4	25.4	**0.00**	**8.48**
4.00	5.00	4.50	1.00	2.5	18.65	8.65	38.93	3.77	23.5	23.5	1.0	63.83	0	11	1.0	41.5	0	5.0	28.2	0	9.75	17.21	18.25	43.3	0	0.0	42.4	42.4	**0.00**	**14.14**
5.00	6.00	5.50	1.00	3.5	19.75	9.75	48.13	3.77	28.2	28.2	1.0	97.32	0	0	1.0	0.0	0	6.0	27.6	0	9.75	15.85	16.87	53.0	0	0.0	59.4	59.4	**0.00**	**19.79**
6.00	7.00	6.50	1.00	4.5	19.75	9.75	57.88	3.77	27.6	27.6	1.0	114.11	0	0	1.0	0.0	0	7.0	27.6	0	8.36	15.85	16.87	62.8	1221.4	1221.4	76.3	76.3	**488.56**	**25.45**
7.00	9.00	8.00	2.00	6.5	18.36	8.36	71.11	7.54	27.6	27.6	1.0	280.41	280.41	0	1.0	0.0	0.0	9.0	9.1	44	8.36	2.31	1.08	79.5	661.7	942.1	110.3	390.7	**376.85**	**130.23**
9.00	10.00	9.50	1.00	7.5	18.36	8.36	83.65	3.77	9.1	9.1	1.0	50.53	330.94	44	1.0	165.9	165.9	10.0	9.1	44	10.62	2.31	1.08	87.8	685.2	1182.1	127.2	624.1	**472.83**	**208.04**
10.00	12.50	11.25	2.50	10.0	20.62	10.62	101.11	9.43	9.1	9.1	1.0	152.69	483.63	44	1.0	414.9	580.8	12.5	9.1	44	10.62	2.31	1.08	114.4	754.5	1819.0	169.6	1234.1	**727.58**	**411.36**
12.50	14.00	13.25	1.50	11.5	20.62	10.62	122.35	5.66	9.1	9.1	1.0	110.86	594.49	44	1.0	248.9	829.7	14.0	8.5	62	10.32	2.20	0.99	130.3	962.6	2386.8	195.1	1619.3	**954.73**	**539.77**
14.00	15.50	14.75	1.50	13.0	20.32	10.32	138.05	5.66	8.5	8.5	1.0	116.72	711.21	62	1.0	350.7	1180.5	15.5	8.5	62	10.32	2.20	0.99	145.8	1001.2	2892.8	220.5	2112.2	**1157.13**	**704.07**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
15.50	17.00	16.25	1.50	14.5	20.32	10.32	153.53	5.66	8.5	8.5	1.0	129.80	841.01	62	1.0	350.7	1531.2	17.0	25.8	9	9.86	11.80	12.72	161.3	2330.2	4702.4	246.0	2618.2	**1880.96**	**872.73**
17.00	18.50	17.75	1.50	16.0	19.86	9.86	168.67	5.66	25.8	25.8	1.0	461.26	1302.27	9	1.0	50.9	1582.1	18.5	25.8	9	9.86	11.80	12.72	161.3	2330.2	5214.6	271.4	3155.8	**2085.83**	**1051.94**
18.50	20.00	19.25	1.50	17.5	19.86	9.86	168.67	5.66	25.8	25.8	1.0	461.26	1763.53	9	1.0	50.9	1633.0	20.0	10.2	53	10.73	2.53	1.28	161.3	1010.4	4407.0	296.9	3693.4	**1762.79**	**1231.15**
20.00	21.50	20.75	1.50	19.0	20.73	10.73	168.67	5.66	10.2	10.2	1.0	171.68	1935.21	53	1.0	299.8	1932.9	21.5	11.7	56	10.57	2.97	1.71	161.3	1124.4	4992.4	322.3	4190.4	**1996.98**	**1396.80**
21.50	24.50	23.00	3.00	22.0	20.57	10.57	168.67	11.31	11.7	11.7	1.0	395.19	2330.41	56	1.0	633.6	2566.5	24.5	11.7	56	10.57	2.97	1.71	161.3	1124.4	6021.2	373.2	5270.1	**2408.49**	**1756.70**
24.50	26.00	25.25	1.50	23.5	20.57	10.57	168.67	5.66	11.7	11.7	1.0	197.60	2528.00	56	1.0	316.8	2883.3	26.0	10.2	56	10.57	2.53	1.28	161.3	1040.8	6452.1	398.7	5809.9	**2580.83**	**1936.64**
26.00	27.50	26.75	1.50	25.0	20.57	10.57	168.67	5.66	10.2	10.2	1.0	171.68	2699.69	56	1.0	316.8	3200.1	27.5	10.2	56	9.23	2.53	1.28	161.3	1039.7	6939.4	424.1	6323.9	**2775.76**	**2107.95**
27.50	29.00	28.25	1.50	26.5	19.23	9.23	168.67	5.66	10.2	10.2	1.0	171.68	2871.37	56	1.0	316.8	3516.9	29.0	17.0	40	9.39	4.92	3.75	161.3	1329.7	7717.9	449.6	6837.8	**3087.15**	**2279.26**
29.00	30.00	29.50	1.00	27.5	19.39	9.39	168.67	3.77	17.0	17.0	1.0	194.48	3065.84	40	1.0	150.9	3667.7	30.0	17.0	40	9.39	4.92	3.75	161.3	1329.7	8063.2	466.5	7200.1	**3225.28**	**2400.03**
30.00	30.50	30.25	0.50	28.0	19.39	9.39	168.67	1.89	17.0	17.0	1.0	97.24	3163.08	40	1.0	75.4	3743.1	30.5	18.5	48	9.04	5.64	4.57	161.3	1546.3	8452.5	475.0	7381.2	**3381.00**	**2460.41**
30.50	32.00	31.25	1.50	29.5	19.04	9.04	168.67	5.66	18.5	18.5	1.0	319.26	3482.34	48	1.0	271.5	4014.7	32.0	18.5	48	9.02	5.64	4.57	161.3	1546.2	9043.2	500.5	7997.5	**3617.30**	**2665.83**
32.00	32.50	32.25	0.50	30.0	19.02	9.02	168.67	1.89	18.5	18.5	1.0	106.42	3588.76	48	1.0	90.5	4105.2	32.5	18.5	48	9.02	5.64	4.57	161.3	1546.2	9240.2	508.9	8202.9	**3696.07**	**2734.30**
32.50	33.50	33.00	1.00	31.0	19.02	9.02	168.67	3.77	18.5	18.5	1.0	212.84	3801.60	48	1.0	181.0	4286.2	33.5	18.5	48	9.54	5.64	4.57	161.3	1547.8	9635.7	525.9	8613.7	**3854.26**	**2871.24**
33.50	35.00	34.25	1.50	32.5	19.54	9.54	168.67	5.66	18.5	18.5	1.0	319.26	4120.86	48	1.0	271.5	4557.8	35.0	14.5	48	8.55	3.80	2.51	161.3	1195.8	9874.4	551.3	9230.0	**3949.77**	**3076.66**
35.00	36.50	35.75	1.50	34.0	18.55	8.55	168.67	5.66	14.5	14.5	1.0	246.76	4367.62	48	1.0	271.5	4829.3	36.5	19.5	48	9.13	6.13	5.12	161.3	1639.7	10836.7	576.8	9773.7	**4334.67**	**3257.91**
36.50	37.50	37.00	1.00	35.0	19.13	9.13	168.67	3.77	19.5	19.5	1.0	225.26	4592.88	48	1.0	181.0	5010.3	37.5	19.5	48	9.13	6.13	5.12	161.3	1639.7	11243.0	593.8	10197.0	**4497.18**	**3398.99**
37.50	38.00	37.75	0.50	35.5	19.13	9.13	168.67	1.89	19.5	19.5	1.0	112.63	4705.51	48	1.0	90.5	5100.9	38.0	8.5	60	9.36	2.20	0.99	161.3	1018.7	10825.0	602.2	10408.6	**4330.02**	**3469.54**
38.00	40.00	39.00	2.00	37.5	19.36	9.36	168.67	7.54	8.5	8.5	1.0	190.13	4895.64	60	1.0	452.6	5553.4	40.0	8.5	60	9.36	2.20	0.99	161.3	1018.7	11467.7	636.2	11085.2	**4587.10**	**3695.08**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m
Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0
Area of Pile: 1.13 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
BORE NO: P38, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	19.46	9.46	26.02	1.89	24.0	24.0	1.0	21.84	0	4	1.0	7.5	0	3.0	24.0	4	9.46	9.28	9.78	28.4	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.5	19.46	9.46	33.11	3.77	24.0	24.0	1.0	55.60	0	4	1.0	15.1	0	4.0	24.3	4	9.13	9.50	10.11	37.8	0	0.0	25.4	25.4	**0.00**	**8.48**
4.00	5.00	4.50	1.00	2.5	19.13	9.13	42.41	3.77	24.3	24.3	1.0	72.21	0	4	1.0	15.1	0	5.0	24.3	4	9.13	9.50	10.11	47.0	608.0	608.0	42.4	42.4	**243.22**	**14.14**
5.00	6.00	5.50	1.00	3.5	19.13	9.13	51.54	3.77	24.3	24.3	1.0	87.76	87.76	4	1.0	15.1	15.1	6.0	25.7	7	10.60	11.58	12.49	56.1	896.0	998.8	59.4	162.2	**399.52**	**54.07**
6.00	8.00	7.00	2.00	5.5	20.60	10.60	66.70	7.54	25.7	25.7	1.0	242.13	329.89	7	1.0	52.8	67.9	8.0	25.7	7	10.60	11.58	12.49	77.3	1173.6	1571.4	93.3	491.1	**628.56**	**163.69**
8.00	9.00	8.50	1.00	6.5	20.60	10.60	82.60	3.77	25.7	25.7	1.0	149.92	479.81	7	1.0	26.4	94.3	9.0	11.0	42	10.06	2.76	1.51	87.9	712.9	1286.9	110.3	684.4	**514.78**	**228.12**
9.00	11.00	10.00	2.00	8.5	20.06	10.06	97.96	7.54	11.0	11.0	1.0	143.63	623.44	42	1.0	316.8	411.1	11.0	11.0	42	10.06	2.76	1.51	108.0	775.8	1810.3	144.2	1178.7	**724.12**	**392.91**
11.00	12.00	11.50	1.00	9.5	20.06	10.06	113.05	3.77	11.0	11.0	1.0	82.88	706.31	42	1.0	158.4	569.5	12.0	11.0	42	10.06	2.76	1.51	118.1	807.2	2083.0	161.2	1437.0	**833.21**	**478.99**
12.00	13.00	12.50	1.00	10.5	20.06	10.06	123.11	3.77	11.0	11.0	1.0	90.25	796.57	42	1.0	158.4	727.9	13.0	8.2	55	11.65	2.15	0.94	128.1	878.6	2403.1	178.1	1702.6	**961.24**	**567.53**
13.00	14.50	13.75	1.50	12.0	21.65	11.65	136.88	5.66	8.2	8.2	1.0	111.58	908.15	55	1.0	311.1	1039.0	14.5	8.2	55	11.65	2.15	0.94	145.6	921.1	2868.3	203.6	2150.8	**1147.30**	**716.92**
14.50	16.00	15.25	1.50	13.5	21.65	11.65	154.35	5.66	8.2	8.2	1.0	125.83	1033.98	55	1.0	311.1	1350.2	16.0	9.5	56	11.12	2.38	1.14	163.1	1018.0	3402.2	229.0	2613.2	**1360.87**	**871.06**
16.00	17.50	16.75	1.50	15.0	21.12	11.12	171.43	5.66	9.5	9.5	1.0	162.29	1196.27	56	1.0	316.8	1667.0	17.5	11.5	48	11.12	2.91	1.65	179.8	1093.3	3956.6	254.5	3117.7	**1582.62**	**1039.24**
17.50	19.00	18.25	1.50	16.5	21.12	11.12	171.43	5.66	11.5	11.5	1.0	197.31	1393.58	48	1.0	271.5	1938.5	19.0	27.2	0	9.27	14.95	15.95	179.8	3142.0	6474.1	279.9	3612.0	**2589.64**	**1204.00**
19.00	20.50	19.75	1.50	18.0	19.27	9.27	171.43	5.66	27.2	27.2	1.0	498.41	1891.99	0	1.0	0.0	1938.5	20.5	10.2	38	9.27	2.53	1.28	179.8	909.3	4739.8	305.4	4135.9	**1895.94**	**1378.62**
20.50	22.00	21.25	1.50	19.5	19.27	9.27	171.43	5.66	10.2	10.2	1.0	174.50	2066.48	38	1.0	215.0	2153.5	22.0	10.2	38	9.75	2.53	1.28	179.8	909.8	5129.7	330.8	4550.8	**2051.89**	**1516.93**
22.00	23.50	22.75	1.50	21.0	19.75	9.75	171.43	5.66	10.2	10.2	1.0	174.50	2240.98	38	1.0	215.0	2368.5	23.5	9.1	49	9.75	2.31	1.08	179.8	975.6	5585.0	356.3	4965.7	**2234.00**	**1655.23**
23.50	26.50	25.00	3.00	24.0	19.75	9.75	171.43	11.31	9.1	9.1	1.0	310.67	2551.65	49	1.0	554.4	2922.9	26.5	9.1	49	9.98	2.31	1.08	179.8	975.7	6450.2	407.2	5881.7	**2580.09**	**1960.55**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
26.50	27.50	27.00	1.00	25.0	19.98	9.98	171.43	3.77	9.1	9.1	1.0	103.56	2655.21	49	1.0	184.8	3107.7	27.5	9.1	49	9.98	2.31	1.08	179.8	975.7	6738.6	424.1	6187.0	**2695.44**	**2062.33**
27.50	29.50	28.50	2.00	27.0	19.98	9.98	171.43	7.54	9.1	9.1	1.0	207.12	2862.33	49	1.0	369.6	3477.3	29.5	7.4	63	9.98	2.00	0.82	179.8	1054.3	7393.9	458.0	6797.6	**2957.54**	**2265.88**
29.50	30.00	29.75	0.50	27.5	19.98	9.98	171.43	1.89	7.4	7.4	1.0	41.99	2904.31	63	1.0	118.8	3596.1	30.0	7.4	63	11.70	2.00	0.82	179.8	1055.2	7555.6	466.5	6966.9	**3022.24**	**2322.30**
30.00	32.50	31.25	2.50	30.0	21.70	11.70	171.43	9.43	7.4	7.4	1.0	209.93	3114.24	63	1.0	594.0	4190.1	32.5	24.2	8	11.70	9.42	10.00	179.8	2077.7	9382.0	508.9	7813.2	**3752.80**	**2604.41**
32.50	35.00	33.75	2.50	32.5	21.70	11.70	171.43	9.43	24.2	24.2	1.0	726.41	3840.65	8	1.0	75.4	4265.5	35.0	24.2	8	10.82	9.42	10.00	179.8	2071.7	10177.9	551.3	8657.5	**4071.15**	**2885.83**
35.00	35.50	35.25	0.50	33.0	20.82	10.82	171.43	1.89	24.2	24.2	1.0	145.28	3985.93	8	1.0	15.1	4280.6	35.5	24.2	8	10.82	9.42	10.00	179.8	2071.7	10338.2	559.8	8826.3	**4135.30**	**2942.11**
35.50	37.00	36.25	1.50	34.5	20.82	10.82	171.43	5.66	24.2	24.2	1.0	435.85	4421.78	8	1.0	45.3	4325.8	37.0	24.2	8	10.82	9.42	10.00	179.8	2071.7	10819.3	585.3	9332.9	**4327.74**	**3110.96**
37.00	37.50	37.25	0.50	35.0	20.82	10.82	171.43	1.89	24.2	24.2	1.0	145.28	4567.06	8	1.0	15.1	4340.9	37.5	10.5	49	9.07	2.62	1.36	179.8	1039.6	9947.6	593.8	9501.7	**3979.05**	**3167.25**
37.50	38.50	38.00	1.00	36.0	19.07	9.07	171.43	3.77	10.5	10.5	1.0	119.83	4686.89	49	1.0	184.8	4525.7	38.5	10.5	49	9.39	2.62	1.36	179.8	1039.9	10252.5	610.7	9823.3	**4101.02**	**3274.44**
38.50	40.00	39.25	1.50	37.5	19.39	9.39	171.43	5.66	10.5	10.5	1.0	179.74	4866.63	49	1.0	277.2	4802.9	40.0	10.5	49	9.39	2.62	1.36	179.8	1039.9	10709.5	636.2	10305.7	**4283.79**	**3435.24**
BORE NO: P39, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	18.95	8.95	24.61	1.89	24.5	24.5	1.0	21.15	0	7	1.0	13.2	0	3.0	24.5	7	8.95	9.64	10.33	26.9	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	5.00	4.00	2.00	2.5	18.95	8.95	35.80	7.54	24.5	24.5	1.0	123.06	0	7	1.0	52.8	0	5.0	13.5	17	8.95	3.50	2.22	44.8	0	0.0	42.4	42.4	**0.00**	**14.14**
5.00	6.00	5.50	1.00	3.5	18.95	8.95	49.23	3.77	13.5	13.5	1.0	44.57	0	17	1.0	64.1	0	6.0	15.0	20	8.95	3.94	2.65	53.7	0	0.0	59.4	59.4	**0.00**	**19.79**
6.00	8.00	7.00	2.00	5.5	18.95	8.95	62.65	7.54	15.0	15.0	1.0	126.62	0	20	1.0	150.9	0	8.0	13.2	21	10.20	3.41	2.14	71.6	0	0.0	93.3	93.3	**0.00**	**31.10**
8.00	9.00	8.50	1.00	6.5	20.20	10.20	76.70	3.77	13.2	13.2	1.0	67.85	0	21	1.0	79.2	0	9.0	9.5	51	10.20	2.38	1.14	81.8	747.5	747.5	110.3	110.3	**299.00**	**36.76**
9.00	10.00	9.50	1.00	7.5	20.20	10.20	86.90	3.77	9.5	9.5	1.0	54.84	54.84	51	1.0	192.3	192.3	10.0	9.5	51	10.20	2.38	1.14	92.0	775.0	1022.2	127.2	374.4	**408.87**	**124.81**
10.00	11.00	10.50	1.00	8.5	20.20	10.20	97.10	3.77	9.5	9.5	1.0	61.28	116.13	51	1.0	192.3	384.7	11.0	9.5	51	10.20	2.38	1.14	102.2	802.4	1303.3	144.2	645.0	**521.30**	**215.00**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Factor of Safety in Compression: 2.5
Area of Pile: 1.13 m^2
Critical water table: 0.00 m
Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
11.00	12.00	11.50	1.00	9.5	20.20	10.20	107.30	3.77	9.5	9.5	1.0	67.72	183.85	51	1.0	192.3	577.0	12.0	8.2	56	10.49	2.15	0.94	112.4	849.9	1610.7	161.2	922.0	**644.30**	**307.35**
12.00	14.50	13.25	2.50	12.0	20.49	10.49	125.51	9.43	8.2	8.2	1.0	170.53	354.38	56	1.0	528.0	1105.0	14.5	12.8	27	10.49	3.29	2.02	138.6	805.6	2265.0	203.6	1663.0	**906.00**	**554.33**
14.50	16.00	15.25	1.50	13.5	20.49	10.49	146.49	5.66	12.8	12.8	1.0	188.28	542.66	27	1.0	152.7	1257.8	16.0	11.5	53	10.50	2.91	1.65	154.4	1059.8	2860.3	229.0	2029.5	**1144.11**	**676.48**
16.00	17.50	16.75	1.50	15.0	20.50	10.50	162.24	5.66	11.5	11.5	1.0	186.73	729.38	53	1.0	299.8	1557.6	17.5	10.5	58	9.89	2.62	1.36	170.1	1103.4	3390.4	254.5	2541.5	**1356.17**	**847.15**
17.50	20.50	19.00	3.00	18.0	19.89	9.89	162.24	11.31	10.5	10.5	1.0	340.20	1069.59	58	1.0	656.2	2213.8	20.5	14.4	80	9.89	3.77	2.48	170.1	1556.1	4839.5	305.4	3588.8	**1935.81**	**1196.26**
20.50	22.00	21.25	1.50	19.5	19.89	9.89	162.24	5.66	14.4	14.4	1.0	235.65	1305.24	80	1.0	452.6	2666.4	22.0	9.7	62	10.30	2.42	1.17	170.1	1104.5	5076.2	330.8	4302.4	**2030.47**	**1434.15**
22.00	23.50	22.75	1.50	21.0	20.30	10.30	162.24	5.66	9.7	9.7	1.0	156.88	1462.12	62	1.0	350.7	3017.1	23.5	9.7	62	10.30	2.42	1.17	170.1	1104.5	5583.8	356.3	4835.5	**2233.52**	**1611.84**
23.50	25.00	24.25	1.50	22.5	20.30	10.30	162.24	5.66	9.7	9.7	1.0	156.88	1619.00	62	1.0	350.7	3367.9	25.0	10.4	46	10.60	2.59	1.33	170.1	976.0	5962.9	381.7	5368.6	**2385.17**	**1789.53**
25.00	26.50	25.75	1.50	24.0	20.60	10.60	162.24	5.66	10.4	10.4	1.0	168.45	1787.44	46	1.0	260.2	3628.1	26.5	10.0	46	10.60	2.47	1.22	170.1	952.6	6368.1	407.2	5822.7	**2547.26**	**1940.90**
26.50	27.50	27.00	1.00	25.0	20.60	10.60	162.24	3.77	10.0	10.0	1.0	107.89	1895.33	46	1.0	173.5	3801.6	27.5	10.0	46	10.60	2.47	1.22	170.1	952.6	6649.5	424.1	6121.0	**2659.81**	**2040.35**
27.50	29.50	28.50	2.00	27.0	20.60	10.60	162.24	7.54	10.0	10.0	1.0	215.77	2111.10	46	1.0	347.0	4148.6	29.5	14.3	30	8.93	3.74	2.45	170.1	1039.6	7299.3	458.0	6717.7	**2919.70**	**2239.24**
29.50	30.00	29.75	0.50	27.5	18.93	8.93	162.24	1.89	14.3	14.3	1.0	77.98	2189.08	30	1.0	56.6	4205.1	30.0	9.5	30	8.93	2.38	1.14	170.1	770.5	7164.7	466.5	6860.8	**2865.89**	**2286.92**
30.00	31.00	30.50	1.00	28.5	18.93	8.93	162.24	3.77	9.5	9.5	1.0	102.39	2291.47	30	1.0	113.1	4318.3	31.0	9.5	50	9.19	2.38	1.14	170.1	974.3	7584.1	483.5	7093.2	**3033.64**	**2364.42**
31.00	32.50	31.75	1.50	30.0	19.19	9.19	162.24	5.66	9.5	9.5	1.0	153.58	2445.06	50	1.0	282.9	4601.1	32.5	26.1	0	10.42	12.48	13.41	170.1	2496.3	9542.5	508.9	7555.1	**3817.01**	**2518.38**
32.50	34.00	33.25	1.50	31.5	20.42	10.42	162.24	5.66	27.5	27.5	1.0	477.77	2922.83	0	1.0	0.0	4601.1	34.0	10.9	47	10.42	2.73	1.48	170.1	1015.4	8539.3	534.4	8058.4	**3415.73**	**2686.12**
34.00	35.00	34.50	1.00	32.5	20.42	10.42	162.24	3.77	10.9	10.9	1.0	117.83	3040.65	47	1.0	177.3	4778.4	35.0	10.9	47	10.42	2.73	1.48	170.1	1015.4	8834.4	551.3	8370.4	**3533.77**	**2790.13**
35.00	35.50	35.25	0.50	33.0	20.42	10.42	162.24	1.89	10.9	10.9	1.0	58.91	3099.56	47	1.0	88.6	4867.0	35.5	15.8	39	10.42	4.33	3.09	170.1	1253.1	9219.6	559.8	8526.4	**3687.86**	**2842.14**
35.50	37.00	36.25	1.50	34.5	20.42	10.42	162.24	5.66	15.8	15.8	1.0	259.71	3359.27	39	1.0	220.6	5087.7	37.0	9.6	54	10.42	2.40	1.16	170.1	1019.6	9466.5	585.3	9032.2	**3786.61**	**3010.74**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m
Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0
Area of Pile: 1.13 m^2

Layers (m) From	Layers (m) To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi: ϕ	δ	Ki	Qi	ΣQi	Ultimate Shaft Cohesion Quc= Σα.c.Asi: c	α	α.c.Asi	ΣQi	Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ): Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
37.00	37.50	37.25	0.50	35.0	20.42	10.42	162.24	1.89	9.6	9.6	1.0	51.74	3411.02	54	1.0	101.8	5189.5	37.5	9.6	54	10.42	2.40	1.16	170.1	1019.6	9620.1	593.8	9194.3	**3848.04**	**3064.75**
37.50	38.50	38.00	1.00	36.0	20.42	10.42	162.24	3.77	9.6	9.6	1.0	103.49	3514.50	54	1.0	203.7	5393.1	38.5	8.0	54	10.42	2.11	0.91	170.1	962.4	9870.1	610.7	9518.4	**3948.03**	**3172.79**
38.50	40.00	39.25	1.50	37.5	20.42	10.42	162.24	5.66	8.0	8.0	1.0	128.99	3643.49	54	1.0	305.5	5698.6	40.0	8.0	96	10.42	2.11	0.91	170.1	1390.1	10732.2	636.2	9978.3	**4292.89**	**3326.10**
BORE NO: P40, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.5	20.10	10.10	27.78	1.89	9.6	9.6	1.0	8.86	0	48	1.0	90.5	0	3.0	9.6	30	10.10	2.40	1.16	30.3	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.5	20.10	10.10	35.35	3.77	9.6	9.6	1.0	22.55	0	30	1.0	113.1	0	4.0	13.5	16	10.10	3.50	2.22	40.4	0	0.0	25.4	25.4	**0.00**	**8.48**
4.00	5.00	4.50	1.00	2.5	20.10	10.10	45.45	3.77	13.5	13.5	1.0	41.15	0	16	1.0	60.3	0	5.0	27.5	5	9.64	15.63	16.64	50.5	0	0.0	42.4	42.4	**0.00**	**14.14**
5.00	6.00	5.50	1.00	3.5	19.64	9.64	55.32	3.77	27.5	27.5	1.0	108.61	0	5	1.0	18.9	0	6.0	27.5	5	9.64	15.63	16.64	60.1	0	0.0	59.4	59.4	**0.00**	**19.79**
6.00	8.00	7.00	2.00	5.5	19.64	9.64	69.78	7.54	27.5	27.5	1.0	274.00	0	5	1.0	37.7	0	8.0	25.2	0	9.64	10.45	11.34	79.4	0	0.0	93.3	93.3	**0.00**	**31.10**
8.00	9.00	8.50	1.00	6.5	19.64	9.64	84.24	3.77	25.2	25.2	1.0	149.50	0	0	1.0	0.0	0	9.0	10.5	56	10.39	2.62	1.36	89.1	843.6	843.6	110.3	110.3	**337.42**	**36.76**
9.00	11.00	10.00	2.00	8.5	20.39	10.39	99.45	7.54	10.5	10.5	1.0	139.03	139.03	56	1.0	422.4	422.4	11.0	9.6	58	10.39	2.40	1.16	109.8	896.8	1458.2	144.2	705.6	**583.29**	**235.21**
11.00	12.00	11.50	1.00	9.5	20.39	10.39	115.04	3.77	9.6	9.6	1.0	73.38	212.41	58	1.0	218.7	641.1	12.0	7.1	59	10.49	1.95	0.77	120.2	871.3	1724.8	161.2	1014.7	**689.94**	**338.24**
12.00	14.50	13.25	2.50	12.0	20.49	10.49	133.34	9.43	7.1	7.1	1.0	156.60	369.01	59	1.0	556.3	1197.4	14.5	9.5	46	10.49	2.38	1.14	146.5	870.9	2437.4	203.6	1770.0	**974.94**	**590.00**
14.50	16.00	15.25	1.50	13.5	20.49	10.49	154.32	5.66	9.5	9.5	1.0	146.09	515.10	46	1.0	260.2	1457.7	16.0	8.3	60	10.09	2.16	0.96	162.2	1014.6	2987.4	229.0	2201.8	**1194.96**	**733.93**
16.00	17.50	16.75	1.50	15.0	20.09	10.09	169.76	5.66	8.3	8.3	1.0	140.10	655.20	60	1.0	339.4	1797.1	17.5	8.3	52	10.31	2.16	0.96	177.3	970.4	3422.7	254.5	2706.8	**1369.07**	**902.25**
17.50	20.50	19.00	3.00	18.0	20.31	10.31	169.76	11.31	8.3	8.3	1.0	280.20	935.40	52	1.0	588.3	2385.4	20.5	18.5	28	10.31	5.64	4.57	177.3	1449.0	4769.9	305.4	3626.2	**1907.95**	**1208.73**
20.50	23.50	22.00	3.00	21.0	20.31	10.31	169.76	11.31	18.5	18.5	1.0	642.65	1578.05	28	1.0	316.8	2702.2	23.5	11.2	57	10.85	2.82	1.56	177.3	1158.3	5438.6	356.3	4636.5	**2175.42**	**1545.51**
23.50	26.50	25.00	3.00	24.0	20.85	10.85	169.76	11.31	11.2	11.2	1.0	380.31	1958.35	57	1.0	644.9	3347.1	26.5	8.7	50	10.85	2.24	1.02	177.3	965.3	6270.8	407.2	5712.6	**2508.30**	**1904.22**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	φ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	φ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
26.50	27.50	27.00	1.00	25.0	20.85	10.85	169.76	3.77	8.7	8.7	1.0	97.97	2056.32	50	1.0	188.6	3535.7	27.5	8.7	49	10.85	2.24	1.02	177.3	955.1	6547.1	424.1	6016.2	**2618.85**	**2005.38**
27.50	29.50	28.50	2.00	27.0	20.85	10.85	169.76	7.54	8.7	8.7	1.0	195.94	2252.26	49	1.0	369.6	3905.3	29.5	9.5	88	10.85	2.38	1.14	177.3	1382.0	7539.6	458.0	6615.6	**3015.83**	**2205.21**
29.50	30.00	29.75	0.50	27.5	20.85	10.85	169.76	1.89	9.5	9.5	1.0	53.57	2305.83	88	1.0	165.9	4071.3	30.0	9.5	88	10.85	2.38	1.14	177.3	1382.0	7759.1	466.5	6843.6	**3103.64**	**2281.20**
30.00	31.00	30.50	1.00	28.5	20.85	10.85	169.76	3.77	9.5	9.5	1.0	107.14	2412.97	88	1.0	331.9	4403.1	31.0	27.7	0	10.85	16.08	17.10	177.3	3352.1	10168.2	483.5	7299.6	**4067.29**	**2433.20**
31.00	32.50	31.75	1.50	30.0	20.85	10.85	169.76	5.66	27.7	27.7	1.0	504.19	2917.16	0	1.0	0.0	4403.1	32.5	27.7	0	10.01	16.08	17.10	177.3	3342.4	10662.7	508.9	7829.2	**4265.07**	**2609.75**
32.50	34.00	33.25	1.50	31.5	20.01	10.01	169.76	5.66	27.7	27.7	1.0	504.19	3421.35	0	1.0	0.0	4403.1	34.0	26.3	7	10.01	12.93	13.88	177.3	2759.2	10583.7	534.4	8358.9	**4233.48**	**2786.29**
34.00	35.00	34.50	1.00	32.5	20.01	10.01	169.76	3.77	26.3	26.3	1.0	316.42	3737.77	7	1.0	26.4	4429.5	35.0	26.0	7	10.01	12.25	13.18	177.3	2619.0	10786.3	551.3	8718.7	**4314.52**	**2906.22**
35.00	35.50	35.25	0.50	33.0	20.01	10.01	169.76	1.89	26.0	26.0	1.0	156.13	3893.90	7	1.0	13.2	4442.7	35.5	18.9	7	10.01	5.82	4.79	177.3	1272.0	9608.7	559.8	8896.5	**3843.47**	**2965.49**
35.50	37.00	36.25	1.50	34.5	20.01	10.01	169.76	5.66	18.9	18.9	1.0	328.80	4222.70	7	1.0	39.6	4482.3	37.0	8.9	56	10.01	2.27	1.05	177.3	1033.2	9738.3	585.3	9290.3	**3895.30**	**3096.77**
37.00	37.50	37.25	0.50	35.0	20.01	10.01	169.76	1.89	8.9	8.9	1.0	50.13	4272.83	56	1.0	105.6	4587.9	37.5	8.9	56	10.16	2.27	1.05	177.3	1033.3	9894.1	593.8	9454.5	**3957.64**	**3151.51**
37.50	38.50	38.00	1.00	36.0	20.16	10.16	169.76	3.77	8.9	8.9	1.0	100.26	4373.08	56	1.0	211.2	4799.1	38.5	8.9	56	9.31	2.27	1.05	177.3	1032.7	10204.9	610.7	9783.0	**4081.98**	**3260.98**
38.50	40.00	39.25	1.50	37.5	19.31	9.31	169.76	5.66	8.9	8.9	1.0	150.39	4523.47	56	1.0	316.8	5115.9	40.0	18.9	10	9.31	5.82	4.79	177.3	1300.3	10939.7	636.2	10275.6	**4375.89**	**3425.19**

APPENDIX-H

TABLE 3: COMPUTATION OF LATERAL PILE LOAD CAPACITY (Dia. 1000 mm)

Bore No.	Dia. of pile (m)	Cut-off length (m)	Scour depth (m)	Concrete Grade	Young's Modulus (kN/m^2)	Moment of Inertia (m^4)	Average SPT	Modulus of sub grade (k_1)	Stiffness Factor (T)	Cantilever length	L_1/T	L_f/T	Permissible deflection (m)	Depth of Fixity (m)	Allowable Load capacity of pile(kN)
P21	1.00	2.50	0.00	35	29580399	0.0491	16	2264	3.64	5.50	1.51	2.00	0.005	7.30	42
P22	1.00	2.50	0.00	35	29580399	0.0491	31	4424	3.19	7.50	2.35	1.92	0.005	6.12	34
P23	1.00	2.50	0.00	35	29580399	0.0491	18	2552	3.56	0.00	0.00	2.23	0.005	7.93	175
P24	1.00	2.50	0.00	35	29580399	0.0491	19	2696	3.52	4.50	1.28	2.04	0.005	7.17	55
P25	1.00	2.50	0.00	35	29580399	0.0491	21	2984	3.45	7.50	2.18	1.93	0.005	6.64	31
P26	1.00	2.50	0.00	35	29580399	0.0491	19	2696	3.52	0.00	0.00	2.23	0.005	7.84	180
P27	1.00	2.50	0.00	35	29580399	0.0491	15	2120	3.69	0.50	0.14	2.21	0.005	8.16	134
P28	1.00	2.50	0.00	35	29580399	0.0491	20	2840	3.48	1.50	0.43	2.17	0.005	7.54	118
P29	1.00	2.50	0.00	35	29580399	0.0491	19	2696	3.52	5.50	1.56	2.00	0.005	7.02	44
P30	1.00	2.50	0.00	35	29580399	0.0491	17	2408	3.60	7.50	2.08	1.93	0.005	6.94	29
P31	1.00	2.50	0.00	35	29580399	0.0491	19	2696	3.52	6.50	1.85	1.95	0.005	6.87	36
P32	1.00	2.50	0.00	35	29580399	0.0491	17	2408	3.60	5.50	1.53	2.00	0.005	7.20	43
P33	1.00	2.50	0.00	35	29580399	0.0491	18	2552	3.56	3.50	0.98	2.08	0.005	7.41	67
P34	1.00	2.50	0.00	35	29580399	0.0491	17	2408	3.60	1.50	0.42	2.17	0.005	7.80	108
P35	1.00	2.50	0.00	35	29580399	0.0491	15	2120	3.69	1.50	0.41	2.17	0.005	8.01	101
P36	1.00	2.50	0.00	35	29580399	0.0491	16	2264	3.64	0.50	0.14	2.21	0.005	8.05	139
P37	1.00	2.50	0.00	35	29580399	0.0491	14	1976	3.74	4.50	1.20	2.05	0.005	7.67	48
P38	1.00	2.50	0.00	35	29580399	0.0491	18	2552	3.56	2.50	0.70	2.12	0.005	7.56	86
P39	1.00	2.50	0.00	35	29580399	0.0491	18	2552	3.56	6.50	1.83	1.96	0.005	6.96	36
P40	1.00	2.50	0.00	35	29580399	0.0491	14	1976	3.74	6.50	1.74	1.97	0.005	7.37	33

APPENDIX-H

TABLE 4: COMPUTATION OF LATERAL PILE LOAD CAPACITY (Dia. 1200 mm)

Bore No.	Dia. of pile (m)	Cut-off length (m)	Scour depth (m)	Concrete Grade	Young's Modulus (kN/m^2)	Moment of Inertia (m^4)	Average SPT	Modulus of sub grade (k_1)	Stiffness Factor (T)	Cantilever length	L_1/T	L_f/T	Permissible deflection (m)	Depth of Fixity (m)	Allowable Load capacity of pile(kN)
P21	1.20	2.50	0.00	35	29580399	0.1018	17	2408	4.16	5.50	1.32	2.03	0.005	8.46	66
P22	1.20	2.50	0.00	35	29580399	0.1018	31	4424	3.69	7.50	2.03	1.93	0.005	7.11	58
P23	1.20	2.50	0.00	35	29580399	0.1018	18	2552	4.11	0.00	0.00	2.23	0.005	9.18	234
P24	1.20	2.50	0.00	35	29580399	0.1018	19	2696	4.07	4.50	1.11	2.06	0.005	8.40	84
P25	1.20	2.50	0.00	35	29580399	0.1018	22	3128	3.95	7.50	1.90	1.95	0.005	7.69	52
P26	1.20	2.50	0.00	35	29580399	0.1018	19	2696	4.07	0.00	0.00	2.23	0.005	9.08	242
P27	1.20	2.50	0.00	35	29580399	0.1018	15	2120	4.27	0.50	0.12	2.21	0.005	9.45	183
P28	1.20	2.50	0.00	35	29580399	0.1018	20	2840	4.03	1.50	0.37	2.17	0.005	8.76	167
P29	1.20	2.50	0.00	35	29580399	0.1018	20	2840	4.03	5.50	1.37	2.03	0.005	8.16	71
P30	1.20	2.50	0.00	35	29580399	0.1018	17	2408	4.16	7.50	1.80	1.96	0.005	8.16	47
P31	1.20	2.50	0.00	35	29580399	0.1018	19	2696	4.07	6.50	1.60	1.99	0.005	8.10	58
P32	1.20	2.50	0.00	35	29580399	0.1018	17	2408	4.16	5.50	1.32	2.03	0.005	8.46	66
P33	1.20	2.50	0.00	35	29580399	0.1018	18	2552	4.11	3.50	0.85	2.10	0.005	8.65	101
P34	1.20	2.50	0.00	35	29580399	0.1018	17	2408	4.16	1.50	0.36	2.18	0.005	9.06	153
P35	1.20	2.50	0.00	35	29580399	0.1018	16	2264	4.21	1.50	0.36	2.18	0.005	9.17	149
P36	1.20	2.50	0.00	35	29580399	0.1018	16	2264	4.21	0.50	0.12	2.21	0.005	9.32	191
P37	1.20	2.50	0.00	35	29580399	0.1018	15	2120	4.27	4.50	1.05	2.07	0.005	8.85	76
P38	1.20	2.50	0.00	35	29580399	0.1018	18	2552	4.11	2.50	0.61	2.14	0.005	8.80	125
P39	1.20	2.50	0.00	35	29580399	0.1018	18	2552	4.11	6.50	1.58	1.99	0.005	8.20	57
P40	1.20	2.50	0.00	35	29580399	0.1018	14	1976	4.33	6.50	1.50	2.00	0.005	8.68	52

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
P21	0.50	SM	47	6	9.05	5.00	4.05	1.00	0.347	1.70	10.20	5.00	1.20	17.24	0.18	1.00	0.219	0.630	Liquefiable
	2.00	SM	46	6	36.20	20.00	16.20	0.98	0.343	1.70	10.20	5.00	1.20	17.24	0.18	1.00	0.219	0.637	Liquefiable
	3.00	SM	39	8	54.30	30.00	24.30	0.98	0.341	1.70	13.60	5.00	1.20	21.32	0.23	1.00	0.277	0.814	Liquefiable
	5.00	SM	39	11	90.50	50.00	40.50	0.96	0.335	1.57	17.28	5.00	1.20	25.74	0.31	1.00	0.367	1.093	Non-liquefiable
	6.00	SM	43	10	117.00	60.00	57.00	0.95	0.306	1.32	13.25	5.00	1.20	20.89	0.23	1.00	0.271	0.886	Liquefiable
	8.00	SM	31	14	156.00	80.00	76.00	0.94	0.301	1.15	16.06	4.77	1.16	23.44	0.26	1.00	0.315	1.047	Non-liquefiable
	9.00	CL	82	15	175.50	90.00	85.50	0.93	0.298	1.08	16.22	5.00	1.20	24.47	0.28	1.00	-	-	Non-liquefiable
	10.00	SM	29	15	195.00	100.00	95.00	0.91	0.290	1.03	15.39	4.64	1.15	22.28	0.25	1.00	0.293	1.010	Non-liquefiable
	11.00	CL	76	12	220.00	110.00	110.00	0.88	0.275	0.95	11.44	5.00	1.20	18.73	0.20	1.00	-	-	Non-liquefiable
	12.00	CL	76	18	240.00	120.00	120.00	0.85	0.266	0.91	16.43	5.00	1.20	24.72	0.29	1.00	-	-	Non-liquefiable
	14.50	CI	89	23	290.00	145.00	145.00	0.79	0.245	0.83	19.10	5.00	1.20	27.92	0.37	1.00	-	-	Non-liquefiable
	17.50	CI	88	25	358.75	175.00	183.75	0.71	0.215	0.74	18.44	5.00	1.20	27.13	0.34	0.82	-	-	Non-liquefiable
	20.50	CI	90	27	422.30	205.00	217.30	0.63	0.190	0.68	18.32	5.00	1.20	26.98	0.34	0.79	-	-	Non-liquefiable
	23.50	CL-CI	88	26	477.05	235.00	242.05	0.56	0.172	0.64	16.71	5.00	1.20	25.05	0.29	0.72	-	-	Non-liquefiable
	25.00	CL	86	26	510.00	250.00	260.00	0.56	0.171	0.62	16.12	5.00	1.20	24.35	0.28	0.73	-	-	Non-liquefiable
	26.50	CL	87	76	535.30	265.00	270.30	0.56	0.173	0.61	46.23	5.00	1.20	60.47	0.52	0.72	-	-	Non-liquefiable
	28.00	CL	90	60	565.60	280.00	285.60	0.56	0.173	0.59	35.50	5.00	1.20	47.60	0.52	0.71	-	-	Non-liquefiable
	29.50	CL	94	55	595.90	295.00	300.90	0.56	0.173	0.58	31.71	5.00	1.20	43.05	0.52	0.70	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	31.00	ML	65	60	626.20	310.00	316.20	0.56	0.173	0.56	33.74	5.00	1.20	45.49	0.52	0.69	0.427	2.470	Non-liquefiable
	32.50	SM	32	63	656.50	325.00	331.50	0.56	0.173	0.55	34.60	4.83	1.17	45.35	0.52	0.68	0.421	2.433	Non-liquefiable
	34.00	SM	32	63	686.80	340.00	346.80	0.56	0.173	0.54	33.83	4.83	1.17	44.44	0.52	0.67	0.415	2.397	Non-liquefiable
	35.50	ML	56	59	717.10	355.00	362.10	0.56	0.173	0.53	31.01	5.00	1.20	42.21	0.52	0.66	0.409	2.364	Non-liquefiable
	37.00	ML	56	66	747.40	370.00	377.40	0.56	0.173	0.51	33.97	5.00	1.20	45.77	0.52	0.65	0.403	2.333	Non-liquefiable
	38.50	SM	50	58	777.70	385.00	392.70	0.56	0.173	0.50	29.27	5.00	1.20	40.12	0.52	0.64	0.398	2.303	Non-liquefiable
	40.00	SM	50	74	808.00	400.00	408.00	0.56	0.173	0.50	36.64	5.00	1.20	48.96	0.52	0.63	0.393	2.274	Non-liquefiable
P22	0.50	ML	53	8	9.60	5.00	4.60	1.00	0.324	1.70	13.60	5.00	1.20	21.32	0.23	1.00	0.277	0.855	Liquefiable
	1.00	SM	45	8	19.20	10.00	9.20	0.99	0.323	1.70	13.60	5.00	1.20	21.32	0.23	1.00	0.277	0.859	Liquefiable
	2.00	CL-ML	85	8	38.40	20.00	18.40	0.98	0.321	1.70	13.60	5.00	1.20	21.32	0.23	1.00	-	-	Non-liquefiable
	3.00	SM	44	14	57.60	30.00	27.60	0.98	0.318	1.70	23.80	5.00	1.20	33.56	0.52	1.00	0.620	1.950	Non-liquefiable
	4.00	SM	44	16	76.80	40.00	36.80	0.97	0.316	1.65	26.38	5.00	1.20	36.65	0.52	1.00	0.620	1.965	Non-liquefiable
	6.00	SM	23	17	115.20	60.00	55.20	0.95	0.311	1.35	22.88	4.06	1.10	29.23	0.42	1.00	0.503	1.620	Non-liquefiable
	7.00	SM	23	28	137.90	70.00	67.90	0.95	0.300	1.21	33.98	4.06	1.10	41.45	0.52	1.00	0.620	2.068	Non-liquefiable
	9.00	SM	29	13	177.30	90.00	87.30	0.93	0.295	1.07	13.91	4.64	1.15	20.58	0.22	1.00	0.266	0.901	Liquefiable
	10.00	ML	79	20	217.00	100.00	117.00	0.91	0.262	0.92	18.49	5.00	1.20	27.19	0.34	1.00	0.410	1.562	Non-liquefiable
	11.00	CL-ML	78	20	238.70	110.00	128.70	0.88	0.255	0.88	17.63	5.00	1.20	26.16	0.32	1.00	-	-	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	12.50	CL	92	31	261.25	125.00	136.25	0.84	0.251	0.86	26.56	5.00	1.20	36.87	0.52	1.00	-	-	Non-liquefiable
	14.00	CI	89	31	292.60	140.00	152.60	0.80	0.239	0.81	25.09	5.00	1.20	35.11	0.52	1.00	-	-	Non-liquefiable
	15.50	CI	89	47	319.30	155.00	164.30	0.76	0.230	0.78	36.67	5.00	1.20	49.00	0.52	0.83	-	-	Non-liquefiable
	18.50	CL	79	31	381.10	185.00	196.10	0.68	0.206	0.71	22.14	5.00	1.20	31.56	0.52	0.78	-	-	Non-liquefiable
	21.50	CL	75	36	442.90	215.00	227.90	0.60	0.182	0.66	23.85	5.00	1.20	33.62	0.52	0.73	-	-	Non-liquefiable
	24.50	CL	91	47	504.70	245.00	259.70	0.56	0.170	0.62	29.16	5.00	1.20	40.00	0.52	0.70	-	-	Non-liquefiable
	27.50	CL	73	55	566.50	275.00	291.50	0.56	0.170	0.59	32.21	5.00	1.20	43.66	0.52	0.69	-	-	Non-liquefiable
	29.00	CL	73	62	594.50	290.00	304.50	0.56	0.171	0.57	35.53	5.00	1.20	47.64	0.52	0.68	-	-	Non-liquefiable
	30.50	ML	56	67	625.25	305.00	320.25	0.56	0.171	0.56	37.44	5.00	1.20	49.93	0.52	0.66	0.412	2.417	Non-liquefiable
	32.00	ML	56	63	656.00	320.00	336.00	0.56	0.171	0.55	34.37	5.00	1.20	46.24	0.52	0.65	0.405	2.376	Non-liquefiable
	33.50	SM	45	59	686.75	335.00	351.75	0.56	0.171	0.53	31.46	5.00	1.20	42.75	0.52	0.64	0.399	2.338	Non-liquefiable
	35.00	SM	44	59	717.50	350.00	367.50	0.56	0.171	0.52	30.78	5.00	1.20	41.93	0.52	0.63	0.393	2.303	Non-liquefiable
	36.50	SM	45	66	748.25	365.00	383.25	0.56	0.171	0.51	33.71	5.00	1.20	45.46	0.52	0.62	0.387	2.269	Non-liquefiable
	38.00	SM	45	60	779.00	380.00	399.00	0.56	0.171	0.50	30.04	5.00	1.20	41.05	0.52	0.62	0.381	2.237	Non-liquefiable
	40.00	SM	43	59	820.00	400.00	420.00	0.56	0.171	0.49	28.79	5.00	1.20	39.55	0.52	0.60	0.375	2.197	Non-liquefiable
P23	0.50	ML	57	8	10.35	5.00	5.35	1.00	0.301	1.70	13.60	5.00	1.20	21.32	0.23	1.00	0.277	0.923	Liquefiable
	1.00	CL	79	8	20.70	10.00	10.70	0.99	0.299	1.70	13.60	5.00	1.20	21.32	0.23	1.00	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	2.00	MI	88	8	41.40	20.00	21.40	0.98	0.297	1.70	13.60	5.00	1.20	21.32	0.23	1.00	-	-	Non-liquefiable
	3.00	ML	57	10	62.10	30.00	32.10	0.98	0.295	1.70	17.00	5.00	1.20	25.40	0.30	1.00	0.358	1.213	Non-liquefiable
	4.00	SM	35	20	82.80	40.00	42.80	0.97	0.293	1.53	30.57	5.00	1.20	41.69	0.52	1.00	0.620	2.120	Non-liquefiable
	6.00	SM	34	21	124.20	60.00	64.20	0.95	0.288	1.25	26.21	4.93	1.19	36.07	0.52	1.00	0.620	2.154	Non-liquefiable
	7.00	SM	34	27	143.50	70.00	73.50	0.95	0.288	1.17	31.49	4.93	1.19	42.35	0.52	1.00	0.620	2.152	Non-liquefiable
	9.00	SM	27	23	184.50	90.00	94.50	0.93	0.284	1.03	23.66	4.48	1.13	31.22	0.52	1.00	0.620	2.187	Non-liquefiable
	10.00	CL-ML	88	18	213.00	100.00	113.00	0.91	0.267	0.94	16.93	5.00	1.20	25.32	0.30	1.00	-	-	Non-liquefiable
	11.00	CL	87	18	234.30	110.00	124.30	0.88	0.259	0.90	16.14	5.00	1.20	24.37	0.28	1.00	-	-	Non-liquefiable
	12.50	CL	87	26	253.75	125.00	128.75	0.84	0.258	0.88	22.91	5.00	1.20	32.50	0.52	1.00	-	-	Non-liquefiable
	15.50	CI	85	33	314.65	155.00	159.65	0.76	0.234	0.79	26.12	5.00	1.20	36.34	0.52	0.88	-	-	Non-liquefiable
	17.00	CL	75	33	343.40	170.00	173.40	0.72	0.222	0.76	25.06	5.00	1.20	35.07	0.52	0.82	-	-	Non-liquefiable
	18.50	CL	75	22	381.10	185.00	196.10	0.68	0.206	0.71	15.71	5.00	1.20	23.85	0.27	0.78	-	-	Non-liquefiable
	20.00	CL-ML	75	22	412.00	200.00	212.00	0.64	0.194	0.69	15.11	5.00	1.20	23.13	0.26	0.79	-	-	Non-liquefiable
	21.50	CL-ML	75	34	438.60	215.00	223.60	0.60	0.184	0.67	22.74	5.00	1.20	32.29	0.52	0.78	-	-	Non-liquefiable
	24.50	CL	91	36	499.80	245.00	254.80	0.56	0.171	0.63	22.55	5.00	1.20	32.06	0.52	0.75	-	-	Non-liquefiable
	27.50	CL	92	61	561.00	275.00	286.00	0.56	0.171	0.59	36.07	5.00	1.20	48.28	0.52	0.72	-	-	Non-liquefiable
	29.00	MI	93	72	597.40	290.00	307.40	0.56	0.170	0.57	41.07	5.00	1.20	54.28	0.52	0.70	-	-	Non-liquefiable
	30.50	CL	91	62	628.30	305.00	323.30	0.56	0.170	0.56	34.48	5.00	1.20	46.38	0.52	0.69	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 Earthquake Zone= IV amax/g=0.24 K(alpha)= 1.00 MSF= 1.193 Critical Water Table (m)=0.00 m

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	32.00	CL	91	75	659.20	320.00	339.20	0.56	0.170	0.54	40.72	5.00	1.20	53.87	0.52	0.68	-	-	Non-liquefiable
	33.50	SM	44	62	690.10	335.00	355.10	0.56	0.170	0.53	32.90	5.00	1.20	44.48	0.52	0.67	0.417	2.455	Non-liquefiable
	35.00	SM	20	58	721.00	350.00	371.00	0.56	0.170	0.52	30.11	3.61	1.08	36.12	0.52	0.66	0.411	2.422	Non-liquefiable
	36.50	SM	20	59	751.90	365.00	386.90	0.56	0.170	0.51	30.00	3.61	1.08	35.99	0.52	0.65	0.406	2.390	Non-liquefiable
	38.00	SM	20	73	782.80	380.00	402.80	0.56	0.170	0.50	36.37	3.61	1.08	42.88	0.52	0.65	0.401	2.360	Non-liquefiable
	40.00	SM	23	80	824.00	400.00	424.00	0.56	0.170	0.49	38.85	4.06	1.10	46.81	0.52	0.64	0.394	2.322	Non-liquefiable
P24	0.50	ML	64	4.00	10.50	5.00	5.50	1.00	0.30	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.17	0.571	Liquefiable
P24	1.00	CL-ML	72	4.00	21.00	10.00	11.00	0.99	0.30	1.70	6.80	5.00	1.20	13.16	0.14	1.00	-	-	Non-liquefiable
P24	2.00	CL	52	4.00	42.00	20.00	22.00	0.98	0.29	1.70	6.80	5.00	1.20	13.16	0.14	1.00	-	-	Non-liquefiable
P24	3.00	SM	26	14.00	63.00	30.00	33.00	0.98	0.29	1.70	23.80	4.39	1.12	31.11	0.52	1.00	0.62	2.131	Non-liquefiable
P24	4.00	SM	26	18.00	84.00	40.00	44.00	0.97	0.29	1.51	27.14	4.39	1.12	34.85	0.52	1.00	0.62	2.148	Non-liquefiable
P24	6.00	SM	23	12.00	126.00	60.00	66.00	0.95	0.28	1.23	14.77	4.06	1.10	20.31	0.22	1.00	0.26	0.921	Liquefiable
P24	7.00	SM	23	19.00	147.00	70.00	77.00	0.95	0.28	1.14	21.65	4.06	1.10	27.88	0.37	1.00	0.44	1.547	Non-liquefiable
P24	8.00	SP-ML	10	19.00	152.00	80.00	72.00	0.94	0.31	1.18	22.39	0.87	1.02	23.75	0.27	1.00	0.32	1.038	Non-liquefiable
P24	9.00	SP-ML	10	23.00	171.00	90.00	81.00	0.93	0.31	1.11	25.56	0.87	1.02	26.98	0.34	1.00	0.40	1.314	Non-liquefiable
P24	10.00	SM	13	26.00	190.00	100.00	90.00	0.91	0.30	1.05	27.41	1.89	1.04	30.31	0.49	1.00	0.59	1.959	Non-liquefiable
P24	12.50	SM	13	28.00	238.75	125.00	113.75	0.84	0.28	0.94	26.25	1.89	1.04	29.11	0.42	1.00	0.50	1.802	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	14.00	CL-ML	75	28.00	294.00	140.00	154.00	0.80	0.24	0.81	22.56	5.00	1.20	32.08	0.52	1.00	-	-	Non-liquefiable
	15.50	ML	66	18.00	325.50	155.00	170.50	0.76	0.23	0.77	13.79	5.00	1.20	21.54	0.24	0.96	0.27	1.192	Non-liquefiable
	17.00	CL	61	18.00	355.30	170.00	185.30	0.72	0.22	0.73	13.22	5.00	1.20	20.87	0.23	0.85	-	-	Non-liquefiable
	18.50	CL	61	22.00	386.65	185.00	201.65	0.68	0.20	0.70	15.49	5.00	1.20	23.59	0.27	0.83	-	-	Non-liquefiable
	21.50	CL	57	35.00	449.35	215.00	234.35	0.60	0.18	0.65	22.86	5.00	1.20	32.44	0.52	0.78	-	-	Non-liquefiable
	24.50	CL	79	32.00	494.90	245.00	249.90	0.56	0.17	0.63	20.24	5.00	1.20	29.29	0.42	0.74	-	-	Non-liquefiable
	26.00	CI	79	32.00	527.80	260.00	267.80	0.56	0.17	0.61	19.55	5.00	1.20	28.47	0.39	0.75	-	-	Non-liquefiable
	27.50	CI	79	38.00	558.25	275.00	283.25	0.56	0.17	0.59	22.58	5.00	1.20	32.09	0.52	0.74	-	-	Non-liquefiable
	29.00	CL	69	38.00	553.90	290.00	263.90	0.56	0.18	0.62	23.39	5.00	1.20	33.07	0.52	0.71	-	-	Non-liquefiable
	30.50	CL	69	33.00	582.55	305.00	277.55	0.56	0.18	0.60	19.81	5.00	1.20	28.77	0.40	0.70	-	-	Non-liquefiable
	33.50	CL	74	39.00	639.85	335.00	304.85	0.56	0.18	0.57	22.34	5.00	1.20	31.80	0.52	0.68	-	-	Non-liquefiable
	35.00	SM	37	39.00	668.50	350.00	318.50	0.56	0.18	0.56	21.85	5.00	1.20	31.22	0.52	0.67	0.42	2.267	Non-liquefiable
	36.50	SM	16	36.00	697.15	365.00	332.15	0.56	0.18	0.55	19.75	2.77	1.05	23.59	0.27	0.67	0.21	1.161	Non-liquefiable
	40.00	SM	16	69.00	764.00	400.00	364.00	0.56	0.18	0.52	36.17	2.77	1.05	40.89	0.52	0.65	0.40	2.199	Non-liquefiable
P25	0.50	ML	71	4	9.60	5.00	4.60	1.00	0.324	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.522	Liquefiable
P25	1.00	ML	71	4	19.20	10.00	9.20	0.99	0.323	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.525	Liquefiable
P25	3.00	ML	57	15	57.60	30.00	27.60	0.98	0.318	1.70	25.50	5.00	1.20	35.60	0.52	1.00	0.620	1.950	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	4.00	SM	44	18	76.80	40.00	36.80	0.97	0.316	1.65	29.67	5.00	1.20	40.61	0.52	1.00	0.620	1.965	Non-liquefiable
	6.00	SM	32	21	115.20	60.00	55.20	0.95	0.311	1.35	28.27	4.83	1.17	37.93	0.52	1.00	0.620	1.997	Non-liquefiable
	7.00	SM	32	24	140.00	70.00	70.00	0.95	0.295	1.20	28.69	4.83	1.17	38.42	0.52	1.00	0.620	2.100	Non-liquefiable
	9.00	SM	28	14	180.00	90.00	90.00	0.93	0.291	1.05	14.76	4.56	1.14	21.36	0.23	1.00	0.278	0.957	Liquefiable
	10.00	CL	79	18	208.00	100.00	108.00	0.91	0.273	0.96	17.32	5.00	1.20	25.78	0.31	1.00	-	-	Non-liquefiable
	11.00	ML	85	18	228.80	110.00	118.80	0.88	0.264	0.92	16.51	5.00	1.20	24.82	0.29	1.00	0.344	1.300	Non-liquefiable
	12.50	CI	93	26	258.75	125.00	133.75	0.84	0.254	0.86	22.48	5.00	1.20	31.98	0.52	1.00	-	-	Non-liquefiable
	15.50	CI	95	21	320.85	155.00	165.85	0.76	0.229	0.78	16.31	5.00	1.20	24.57	0.28	0.87	-	-	Non-liquefiable
	17.00	CL	79	21	348.50	170.00	178.50	0.72	0.219	0.75	15.72	5.00	1.20	23.86	0.27	0.82	-	-	Non-liquefiable
	18.50	CL	79	23	379.25	185.00	194.25	0.68	0.207	0.72	16.50	5.00	1.20	24.80	0.29	0.80	-	-	Non-liquefiable
	21.50	CL	69	38	440.75	215.00	225.75	0.60	0.183	0.67	25.29	5.00	1.20	35.35	0.52	0.77	-	-	Non-liquefiable
	24.50	CL	85	48	499.80	245.00	254.80	0.56	0.171	0.63	30.07	5.00	1.20	41.08	0.52	0.74	-	-	Non-liquefiable
	26.00	ML	55	48	530.40	260.00	270.40	0.56	0.171	0.61	29.19	5.00	1.20	40.03	0.52	0.72	0.449	2.623	Non-liquefiable
	27.50	ML	62	60	569.25	275.00	294.25	0.56	0.169	0.58	34.98	5.00	1.20	46.97	0.52	0.71	0.437	2.588	Non-liquefiable
	29.00	ML	55	74	600.30	290.00	310.30	0.56	0.169	0.57	42.01	5.00	1.20	55.41	0.52	0.69	0.430	2.544	Non-liquefiable
	30.50	CL	90	60	631.35	305.00	326.35	0.56	0.169	0.55	33.21	5.00	1.20	44.86	0.52	0.68	-	-	Non-liquefiable
	32.00	CL	83	55	662.40	320.00	342.40	0.56	0.169	0.54	29.72	5.00	1.20	40.67	0.52	0.67	-	-	Non-liquefiable
	33.50	CL	83	55	693.45	335.00	358.45	0.56	0.169	0.53	29.05	5.00	1.20	39.86	0.52	0.66	-	-	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	35.00	CL-CI	90	59	724.50	350.00	374.50	0.56	0.169	0.52	30.49	5.00	1.20	41.59	0.52	0.65	-	-	Non-liquefiable
	36.50	CL-CI	90	63	755.55	365.00	390.55	0.56	0.169	0.51	31.88	5.00	1.20	43.25	0.52	0.64	-	-	Non-liquefiable
	38.00	CL	88	69	786.60	380.00	406.60	0.56	0.169	0.50	34.22	5.00	1.20	46.06	0.52	0.64	-	-	Non-liquefiable
	40.00	CL	89	79	828.00	400.00	428.00	0.56	0.169	0.48	38.19	5.00	1.20	50.82	0.52	0.62	-	-	Non-liquefiable
	0.50	SM	46	12	9.00	5.00	4.00	1.00	0.350	1.70	20.40	5.00	1.20	29.48	0.44	1.00	0.519	1.484	Non-liquefiable
	1.00	SM	46	12	18.00	10.00	8.00	0.99	0.348	1.70	20.40	5.00	1.20	29.48	0.44	1.00	0.519	1.490	Non-liquefiable
	3.00	SM	45	17	54.00	30.00	24.00	0.98	0.343	1.70	28.90	5.00	1.20	39.68	0.52	1.00	0.620	1.809	Non-liquefiable
	4.00	SM	35	21	72.00	40.00	32.00	0.97	0.340	1.70	35.70	5.00	1.20	47.84	0.52	1.00	0.620	1.823	Non-liquefiable
	6.00	SM	32	23	108.00	60.00	48.00	0.95	0.335	1.44	33.20	4.83	1.17	43.70	0.52	1.00	0.620	1.852	Non-liquefiable
	7.00	SM	32	25	122.50	70.00	52.50	0.95	0.345	1.38	34.50	4.83	1.17	45.23	0.52	1.00	0.620	1.800	Non-liquefiable
P26	8.00	CL-ML	85	25	140.00	80.00	60.00	0.94	0.342	1.29	32.27	5.00	1.20	43.73	0.52	1.00	-	-	Non-liquefiable
	9.00	CL-ML	85	19	174.60	90.00	84.60	0.93	0.300	1.09	20.66	5.00	1.20	29.79	0.45	1.00	-	-	Non-liquefiable
	10.00	CL-ML	85	26	194.00	100.00	94.00	0.91	0.292	1.03	26.82	5.00	1.20	37.18	0.52	1.00	-	-	Non-liquefiable
	12.50	CL	88	33	242.50	125.00	117.50	0.84	0.271	0.92	30.44	5.00	1.20	41.53	0.52	1.00	-	-	Non-liquefiable
	14.00	CL-ML	76	33	271.60	140.00	131.60	0.80	0.258	0.87	28.77	5.00	1.20	39.52	0.52	1.00	-	-	Non-liquefiable
	15.50	CL	91	35	314.65	155.00	159.65	0.76	0.234	0.79	27.70	5.00	1.20	38.24	0.52	0.86	-	-	Non-liquefiable
	17.00	ML	53	35	345.10	170.00	175.10	0.72	0.221	0.76	26.45	5.00	1.20	36.74	0.52	0.84	0.518	2.342	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	18.50	ML	77	46	336.70	185.00	151.70	0.68	0.235	0.81	37.35	5.00	1.20	49.82	0.52	0.88	0.543	2.305	Non-liquefiable
	20.00	CL	79	46	364.00	200.00	164.00	0.64	0.222	0.78	35.92	5.00	1.20	48.10	0.52	0.86	-	-	Non-liquefiable
	21.50	CL	79	36	438.60	215.00	223.60	0.60	0.184	0.67	24.08	5.00	1.20	33.89	0.52	0.78	-	-	Non-liquefiable
	24.50	CL-CI	84	46	499.80	245.00	254.80	0.56	0.171	0.63	28.82	5.00	1.20	39.58	0.52	0.68	-	-	Non-liquefiable
	26.00	CI	82	46	543.40	260.00	283.40	0.56	0.167	0.59	27.32	5.00	1.20	37.79	0.52	0.66	-	-	Non-liquefiable
	27.50	CI	95	64	566.50	275.00	291.50	0.56	0.170	0.59	37.49	5.00	1.20	49.98	0.52	0.65	-	-	Non-liquefiable
	29.00	CI	95	69	597.40	290.00	307.40	0.56	0.170	0.57	39.35	5.00	1.20	52.23	0.52	0.63	-	-	Non-liquefiable
	30.50	ML	58	75	628.30	305.00	323.30	0.56	0.170	0.56	41.71	5.00	1.20	55.05	0.52	0.62	0.386	2.272	Non-liquefiable
	32.00	ML	86	100	659.20	320.00	339.20	0.56	0.170	0.54	54.30	5.00	1.20	70.16	0.52	0.61	0.378	2.228	Non-liquefiable
	33.50	SM	45	83	690.10	335.00	355.10	0.56	0.170	0.53	44.05	5.00	1.20	57.85	0.52	0.60	0.371	2.187	Non-liquefiable
	35.00	ML	72	63	721.00	350.00	371.00	0.56	0.170	0.52	32.71	5.00	1.20	44.25	0.52	0.59	0.365	2.149	Non-liquefiable
	36.50	CL-ML	72	62	751.90	365.00	386.90	0.56	0.170	0.51	31.52	5.00	1.20	42.82	0.52	0.58	-	-	Non-liquefiable
	38.00	CL	79	71	782.80	380.00	402.80	0.56	0.170	0.50	35.38	5.00	1.20	47.45	0.52	0.57	-	-	Non-liquefiable
	40.00	CL	79	100	824.00	400.00	424.00	0.56	0.170	0.49	48.56	5.00	1.20	63.28	0.52	0.56	-	-	Non-liquefiable
P27	1.00	ML	53	5	19.90	10.00	9.90	0.99	0.311	1.70	8.50	5.00	1.20	15.20	0.16	1.00	0.193	0.621	Liquefiable
P27	3.00	ML	61	10	59.70	30.00	29.70	0.98	0.306	1.70	17.00	5.00	1.20	25.40	0.30	1.00	0.358	1.168	Non-liquefiable
P27	4.00	SM	27	14	79.60	40.00	39.60	0.97	0.304	1.59	22.25	4.48	1.13	29.63	0.44	1.00	0.529	1.740	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	6.00	SM	25	19	119.40	60.00	59.40	0.95	0.299	1.30	24.65	4.29	1.12	31.78	0.52	1.00	0.620	2.073	Non-liquefiable
	7.00	SM	27	19	135.10	70.00	65.10	0.95	0.306	1.24	23.55	4.48	1.13	31.10	0.52	1.00	0.620	2.024	Non-liquefiable
	9.00	CL-ML	80	14	173.70	90.00	83.70	0.93	0.301	1.09	15.30	5.00	1.20	23.36	0.26	1.00	-	-	Non-liquefiable
	10.00	CL-ML	83	16	193.00	100.00	93.00	0.91	0.294	1.04	16.59	5.00	1.20	24.91	0.29	1.00	-	-	Non-liquefiable
	11.00	CL	84	16	212.30	110.00	102.30	0.88	0.285	0.99	15.82	5.00	1.20	23.98	0.27	1.00	-	-	Non-liquefiable
	12.50	CL	84	20	263.75	125.00	138.75	0.84	0.249	0.85	16.98	5.00	1.20	25.37	0.30	1.00	-	-	Non-liquefiable
	14.00	CL-ML	84	20	295.40	140.00	155.40	0.80	0.237	0.80	16.04	5.00	1.20	24.25	0.28	1.00	-	-	Non-liquefiable
	15.50	CL-ML	84	21	317.75	155.00	162.75	0.76	0.232	0.78	16.46	5.00	1.20	24.75	0.29	0.85	-	-	Non-liquefiable
	17.00	CL	78	21	348.50	170.00	178.50	0.72	0.219	0.75	15.72	5.00	1.20	23.86	0.27	0.82	-	-	Non-liquefiable
	18.50	CL	78	30	377.40	185.00	192.40	0.68	0.208	0.72	21.63	5.00	1.20	30.95	0.52	0.80	-	-	Non-liquefiable
	21.50	CL	80	38	438.60	215.00	223.60	0.60	0.184	0.67	25.41	5.00	1.20	35.50	0.52	0.81	-	-	Non-liquefiable
	24.50	CL	89	43	499.80	245.00	254.80	0.56	0.171	0.63	26.94	5.00	1.20	37.33	0.52	0.72	-	-	Non-liquefiable
	27.50	CL	90	59	569.25	275.00	294.25	0.56	0.169	0.58	34.39	5.00	1.20	46.27	0.52	0.74	-	-	Non-liquefiable
	29.00	CL-ML	81	59	588.70	290.00	298.70	0.56	0.172	0.58	34.14	5.00	1.20	45.97	0.52	0.74	-	-	Non-liquefiable
	30.50	ML	75	68	619.15	305.00	314.15	0.56	0.172	0.56	38.37	5.00	1.20	51.04	0.52	0.72	0.450	2.611	Non-liquefiable
	32.00	SM	35	58	649.60	320.00	329.60	0.56	0.172	0.55	31.95	5.00	1.20	43.34	0.52	0.72	0.443	2.576	Non-liquefiable
	33.50	SM	35	58	680.05	335.00	345.05	0.56	0.172	0.54	31.22	5.00	1.20	42.47	0.52	0.71	0.438	2.543	Non-liquefiable
	35.00	SM	30	52	710.50	350.00	360.50	0.56	0.172	0.53	27.39	4.71	1.15	36.32	0.52	0.70	0.432	2.512	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	36.50	SM	26	58	740.95	365.00	375.95	0.56	0.172	0.52	29.91	4.39	1.12	37.97	0.52	0.69	0.427	2.483	Non-liquefiable
	38.00	SM	26	59	771.40	380.00	391.40	0.56	0.172	0.51	29.82	4.39	1.12	37.87	0.52	0.68	0.423	2.455	Non-liquefiable
	40.00	SM	25	56	812.00	400.00	412.00	0.56	0.172	0.49	27.59	4.29	1.12	35.05	0.52	0.67	0.416	2.419	Non-liquefiable
P28	0.50	SM-SC	48	4	9.80	5.00	4.80	1.00	0.317	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.534	Liquefiable
	1.00	SM-SC	48	4	19.60	10.00	9.60	0.99	0.316	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.536	Liquefiable
	3.00	SM	41	6	58.80	30.00	28.80	0.98	0.311	1.70	10.20	5.00	1.20	17.24	0.18	1.00	0.219	0.703	Liquefiable
	4.00	SM	41	14	78.40	40.00	38.40	0.97	0.309	1.61	22.59	5.00	1.20	32.11	0.52	1.00	0.620	2.009	Non-liquefiable
	6.00	SM	28	29	117.60	60.00	57.60	0.95	0.304	1.32	38.21	4.56	1.14	48.05	0.52	1.00	0.620	2.041	Non-liquefiable
	7.00	SM	28	26	130.20	70.00	60.20	0.95	0.319	1.29	33.51	4.56	1.14	42.70	0.52	1.00	0.620	1.942	Non-liquefiable
	9.00	SM	28	31	167.40	90.00	77.40	0.93	0.314	1.14	35.24	4.56	1.14	44.67	0.52	1.00	0.620	1.974	Non-liquefiable
	10.00	SM	28	26	186.00	100.00	86.00	0.91	0.306	1.08	28.04	4.56	1.14	36.47	0.52	1.00	0.620	2.027	Non-liquefiable
	11.00	CL-ML	58	26	204.60	110.00	94.60	0.88	0.297	1.03	26.73	5.00	1.20	37.08	0.52	1.00	-	-	Non-liquefiable
	12.50	CL	79	16	248.75	125.00	123.75	0.84	0.263	0.90	14.38	5.00	1.20	22.26	0.25	1.00	-	-	Non-liquefiable
	14.00	CL-ML	61	16	278.60	140.00	138.60	0.80	0.251	0.85	13.59	5.00	1.20	21.31	0.23	1.00	-	-	Non-liquefiable
	15.50	CI	89	24	306.90	155.00	151.90	0.76	0.240	0.81	19.47	5.00	1.20	28.37	0.38	0.87	-	-	Non-liquefiable
	17.00	CL	68	24	336.60	170.00	166.60	0.72	0.227	0.77	18.59	5.00	1.20	27.31	0.35	0.84	-	-	Non-liquefiable
	18.50	CL	68	31	379.25	185.00	194.25	0.68	0.207	0.72	22.24	5.00	1.20	31.69	0.52	0.80	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m²	Pore Water Pressure (μ) kN/m²	Effective Overburden Stress (S_{v0}'), kN/m²	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	21.50	SM	28	60	440.75	215.00	225.75	0.60	0.183	0.67	39.93	4.56	1.14	50.01	0.52	0.77	0.479	2.621	Non-liquefiable
	23.00	CL	74	58	469.20	230.00	239.20	0.56	0.171	0.65	37.50	5.00	1.20	50.00	0.52	0.76	-	-	Non-liquefiable
	24.50	ML	70	50	499.80	245.00	254.80	0.56	0.171	0.63	31.32	5.00	1.20	42.59	0.52	0.74	0.461	2.690	Non-liquefiable
	27.50	ML	74	55	561.00	275.00	286.00	0.56	0.171	0.59	32.52	5.00	1.20	44.03	0.52	0.72	0.447	2.607	Non-liquefiable
	29.00	CL	85	67	585.80	290.00	295.80	0.56	0.173	0.58	38.96	5.00	1.20	51.75	0.52	0.71	-	-	Non-liquefiable
	30.50	SM	31	61	616.10	305.00	311.10	0.56	0.173	0.57	34.58	4.77	1.16	44.98	0.52	0.70	0.435	2.515	Non-liquefiable
	32.00	SM	31	64	646.40	320.00	326.40	0.56	0.173	0.55	35.42	4.77	1.16	45.95	0.52	0.69	0.429	2.478	Non-liquefiable
	33.50	CL-ML	90	53	676.70	335.00	341.70	0.56	0.173	0.54	28.67	5.00	1.20	39.41	0.52	0.68	-	-	Non-liquefiable
	35.00	CL-ML	90	60	707.00	350.00	357.00	0.56	0.173	0.53	31.76	5.00	1.20	43.11	0.52	0.67	-	-	Non-liquefiable
	36.50	CL	89	60	737.30	365.00	372.30	0.56	0.173	0.52	31.10	5.00	1.20	42.32	0.52	0.66	-	-	Non-liquefiable
	38.00	CL	89	68	767.60	380.00	387.60	0.56	0.173	0.51	34.54	5.00	1.20	46.45	0.52	0.65	-	-	Non-liquefiable
	40.00	CL	84	54	808.00	400.00	408.00	0.56	0.173	0.50	26.73	5.00	1.20	37.08	0.52	0.64	-	-	Non-liquefiable
	0.50	ML	52	8	9.95	5.00	4.95	1.00	0.312	1.70	13.60	5.00	1.20	21.32	0.23	1.00	0.277	0.888	Liquefiable
	1.00	SM-SC	42	8	19.90	10.00	9.90	0.99	0.311	1.70	13.60	5.00	1.20	21.32	0.23	1.00	0.277	0.891	Liquefiable
P29	2.00	SM	20	8	39.80	20.00	19.80	0.98	0.309	1.70	13.60	3.61	1.08	18.30	0.20	1.00	0.233	0.754	Liquefiable
	3.00	SM	20	9	59.70	30.00	29.70	0.98	0.306	1.70	15.30	3.61	1.08	20.13	0.22	1.00	0.259	0.845	Liquefiable
	5.00	SM	15	10	99.50	50.00	49.50	0.96	0.302	1.42	14.21	2.50	1.05	17.40	0.19	1.00	0.221	0.732	Liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 Earthquake Zone= IV amax/g=0.24 K(alpha)= 1.00 MSF= 1.193 Critical Water Table (m)=0.00 m

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	6.00	SM	15	13	119.40	60.00	59.40	0.95	0.299	1.30	16.87	2.50	1.05	20.18	0.22	1.00	0.260	0.868	Liquefiable
	8.00	SM	13	24	159.20	80.00	79.20	0.94	0.294	1.12	26.97	1.89	1.04	29.85	0.46	1.00	0.546	1.854	Non-liquefiable
	9.00	SM	13	21	173.70	90.00	83.70	0.93	0.301	1.09	22.95	1.89	1.04	25.69	0.31	1.00	0.365	1.211	Non-liquefiable
	11.00	CL	83	16	212.30	110.00	102.30	0.88	0.285	0.99	15.82	5.00	1.20	23.98	0.27	1.00	-	-	Non-liquefiable
	12.00	CL	83	20	229.20	120.00	109.20	0.85	0.279	0.96	19.14	5.00	1.20	27.97	0.37	1.00	-	-	Non-liquefiable
	13.00	SM	24	20	248.30	130.00	118.30	0.83	0.271	0.92	18.39	4.18	1.11	24.55	0.28	1.00	0.338	1.248	Non-liquefiable
	14.50	CL	78	24	284.20	145.00	139.20	0.79	0.251	0.85	20.34	5.00	1.20	29.41	0.43	1.00	-	-	Non-liquefiable
	17.50	CL	68	27	343.00	175.00	168.00	0.71	0.225	0.77	20.83	5.00	1.20	30.00	0.47	0.85	-	-	Non-liquefiable
	19.00	CL-ML	59	27	385.70	190.00	195.70	0.67	0.205	0.71	19.30	5.00	1.20	28.16	0.38	0.85	-	-	Non-liquefiable
	20.50	CL	81	30	397.70	205.00	192.70	0.63	0.202	0.72	21.61	5.00	1.20	30.93	0.52	0.85	-	-	Non-liquefiable
	22.00	SM	36	30	426.80	220.00	206.80	0.59	0.189	0.70	20.86	5.00	1.20	30.03	0.47	0.79	0.446	2.359	Non-liquefiable
	23.50	CL	84	34	460.60	235.00	225.60	0.56	0.178	0.67	22.64	5.00	1.20	32.16	0.52	0.77	-	-	Non-liquefiable
	25.00	SM	38	34	490.00	250.00	240.00	0.56	0.178	0.65	21.95	5.00	1.20	31.34	0.52	0.76	0.470	2.637	Non-liquefiable
	26.50	CL	84	37	519.40	265.00	254.40	0.56	0.178	0.63	23.20	5.00	1.20	32.84	0.52	0.74	-	-	Non-liquefiable
	29.50	CL	74	39	578.20	295.00	283.20	0.56	0.178	0.59	23.17	5.00	1.20	32.81	0.52	0.72	-	-	Non-liquefiable
	31.00	CL-CI	73	39	638.60	310.00	328.60	0.56	0.170	0.55	21.51	5.00	1.20	30.82	0.52	0.66	-	-	Non-liquefiable
	32.50	CL	91	51	656.50	325.00	331.50	0.56	0.173	0.55	28.01	5.00	1.20	38.61	0.52	0.65	-	-	Non-liquefiable
	34.00	CL	91	61	686.80	340.00	346.80	0.56	0.173	0.54	32.76	5.00	1.20	44.31	0.52	0.64	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (σ_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (σ_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	35.50	SM	17	57	717.10	355.00	362.10	0.56	0.173	0.53	29.95	3.01	1.06	34.77	0.52	0.63	0.393	2.271	Non-liquefiable
	37.00	SM	17	54	747.40	370.00	377.40	0.56	0.173	0.51	27.80	3.01	1.06	32.48	0.52	0.62	0.387	2.238	Non-liquefiable
	38.50	SM	17	52	777.70	385.00	392.70	0.56	0.173	0.50	26.24	3.01	1.06	30.83	0.52	0.62	0.382	2.206	Non-liquefiable
	40.00	SM	20	60	808.00	400.00	408.00	0.56	0.173	0.50	29.70	3.61	1.08	35.68	0.52	0.61	0.377	2.177	Non-liquefiable
	0.50	SM	32	5.00	9.00	5.00	4.00	1.00	0.35	1.70	8.50	4.83	1.17	14.78	0.16	1.00	0.19	0.539	Liquefiable
	2.00	SM	30	5.00	36.00	20.00	16.00	0.98	0.35	1.70	8.50	4.71	1.15	14.52	0.16	1.00	0.19	0.536	Liquefiable
	3.00	SM	30	9.00	54.00	30.00	24.00	0.98	0.34	1.70	15.30	4.71	1.15	22.37	0.25	1.00	0.30	0.860	Liquefiable
	5.00	SM	13	11.00	96.00	50.00	46.00	0.96	0.31	1.47	16.22	1.89	1.04	18.71	0.20	1.00	0.24	0.761	Liquefiable
	6.00	SM	13	12.00	115.20	60.00	55.20	0.95	0.31	1.35	16.15	1.89	1.04	18.64	0.20	1.00	0.24	0.764	Liquefiable
	8.00	SM	13	14.00	153.60	80.00	73.60	0.94	0.31	1.17	16.32	1.89	1.04	18.81	0.20	1.00	0.24	0.785	Liquefiable
P30	9.00	SM	15	16.00	172.80	90.00	82.80	0.93	0.30	1.10	17.58	2.50	1.05	20.93	0.23	1.00	0.27	0.894	Liquefiable
	10.00	CL	66	16.00	210.00	100.00	110.00	0.91	0.27	0.95	15.26	5.00	1.20	23.31	0.26	1.00	-	-	Non-liquefiable
	11.00	CL	66	15.00	231.00	110.00	121.00	0.88	0.26	0.91	13.64	5.00	1.20	21.36	0.23	1.00	-	-	Non-liquefiable
	12.00	CL	66	17.00	252.00	120.00	132.00	0.85	0.25	0.87	14.80	5.00	1.20	22.76	0.25	1.00	-	-	Non-liquefiable
	14.50	CL	76	21.00	311.75	145.00	166.75	0.79	0.23	0.77	16.26	5.00	1.20	24.51	0.28	1.00	-	-	Non-liquefiable
	17.50	CL	76	22.00	374.50	175.00	199.50	0.71	0.21	0.71	15.58	5.00	1.20	23.69	0.27	0.85	-	-	Non-liquefiable
	19.00	SM-SC	49	22.00	393.30	190.00	203.30	0.67	0.20	0.70	15.43	5.00	1.20	23.52	0.27	0.79	0.25	1.242	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	20.50	CL	69	26.00	424.35	205.00	219.35	0.63	0.19	0.68	17.56	5.00	1.20	26.07	0.31	0.77	-	-	Non-liquefiable
	23.50	CL	69	23.00	486.45	235.00	251.45	0.56	0.17	0.63	14.50	5.00	1.20	22.41	0.25	0.73	-	-	Non-liquefiable
	26.50	CL	82	22.00	577.70	265.00	312.70	0.56	0.16	0.57	12.44	5.00	1.20	19.93	0.21	0.75	-	-	Non-liquefiable
	29.50	CL	78	26.00	643.10	295.00	348.10	0.56	0.16	0.54	13.94	5.00	1.20	21.72	0.24	0.72	-	-	Non-liquefiable
	31.00	CL-ML	57	26.00	598.30	310.00	288.30	0.56	0.18	0.59	15.31	5.00	1.20	23.38	0.26	0.65	-	-	Non-liquefiable
	32.50	CL	83	32.00	627.25	325.00	302.25	0.56	0.18	0.58	18.41	5.00	1.20	27.09	0.34	0.64	-	-	Non-liquefiable
	35.50	CL-ML	76	40.00	685.15	355.00	330.15	0.56	0.18	0.55	22.01	5.00	1.20	31.42	0.52	0.62	-	-	Non-liquefiable
	37.00	CL	86	40.00	714.10	370.00	344.10	0.56	0.18	0.54	21.56	5.00	1.20	30.88	0.52	0.61	-	-	Non-liquefiable
	38.50	CL	68	50.00	743.05	385.00	358.05	0.56	0.18	0.53	26.42	5.00	1.20	36.71	0.52	0.61	-	-	Non-liquefiable
	40.00	CL	68	59.00	772.00	400.00	372.00	0.56	0.18	0.52	30.59	5.00	1.20	41.71	0.52	0.60	-	-	Non-liquefiable
P31	0.50	ML	55	4	10.20	5.00	5.20	1.00	0.305	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.556	Liquefiable
	1.00	ML	55	4	20.40	10.00	10.40	0.99	0.304	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.558	Liquefiable
	2.00	CL-ML	52	4	40.80	20.00	20.80	0.98	0.301	1.70	6.80	5.00	1.20	13.16	0.14	1.00	-	-	Non-liquefiable
	3.00	CL-ML	52	8	61.20	30.00	31.20	0.98	0.299	1.70	13.60	5.00	1.20	21.32	0.23	1.00	-	-	Non-liquefiable
	4.00	CL-ML	64	11	81.60	40.00	41.60	0.97	0.297	1.55	17.05	5.00	1.20	25.47	0.30	1.00	-	-	Non-liquefiable
	5.00	SM-SC	48	11	102.00	50.00	52.00	0.96	0.294	1.39	15.25	5.00	1.20	23.31	0.26	1.00	0.312	1.061	Non-liquefiable
	6.00	SP-ML	11	13	118.20	60.00	58.20	0.95	0.302	1.31	17.04	1.21	1.03	18.70	0.20	1.00	0.238	0.788	Liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (µ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	7.00	SP-ML	11	17	137.90	70.00	67.90	0.95	0.300	1.21	20.63	1.21	1.03	22.39	0.25	1.00	0.295	0.985	Liquefiable
	9.00	CL-ML	79	22	177.30	90.00	87.30	0.93	0.295	1.07	23.55	5.00	1.20	33.26	0.52	1.00	-	-	Non-liquefiable
	10.00	CL-ML	79	24	208.00	100.00	108.00	0.91	0.273	0.96	23.09	5.00	1.20	32.71	0.52	1.00	-	-	Non-liquefiable
	12.50	CL-ML	77	25	260.00	125.00	135.00	0.84	0.252	0.86	21.52	5.00	1.20	30.82	0.52	1.00	-	-	Non-liquefiable
	14.00	SM	50	25	285.60	140.00	145.60	0.80	0.245	0.83	20.72	5.00	1.20	29.86	0.46	1.00	0.547	2.232	Non-liquefiable
	15.50	CL	80	21	305.35	155.00	150.35	0.76	0.241	0.82	17.13	5.00	1.20	25.55	0.30	0.88	-	-	Non-liquefiable
	18.50	CL	63	26	364.45	185.00	179.45	0.68	0.215	0.75	19.41	5.00	1.20	28.29	0.38	0.84	-	-	Non-liquefiable
	21.50	CL-ML	57	29	421.40	215.00	206.40	0.60	0.191	0.70	20.19	5.00	1.20	29.22	0.42	0.75	-	-	Non-liquefiable
	24.50	CL	71	32	502.25	245.00	257.25	0.56	0.171	0.62	19.95	5.00	1.20	28.94	0.41	0.79	-	-	Non-liquefiable
	27.50	CL	75	57	544.50	275.00	269.50	0.56	0.176	0.61	34.72	5.00	1.20	46.67	0.52	0.71	-	-	Non-liquefiable
	29.00	CL	87	60	568.40	290.00	278.40	0.56	0.178	0.60	35.96	5.00	1.20	48.15	0.52	0.71	-	-	Non-liquefiable
	30.50	MI	80	55	597.80	305.00	292.80	0.56	0.178	0.58	32.14	5.00	1.20	43.57	0.52	0.69	-	-	Non-liquefiable
	32.00	CL-CI	90	52	627.20	320.00	307.20	0.56	0.178	0.57	29.67	5.00	1.20	40.60	0.52	0.68	-	-	Non-liquefiable
	33.50	CL-CI	90	53	656.60	335.00	321.60	0.56	0.178	0.56	29.55	5.00	1.20	40.46	0.52	0.67	-	-	Non-liquefiable
	35.00	SM	45	57	686.00	350.00	336.00	0.56	0.178	0.55	31.10	5.00	1.20	42.32	0.52	0.66	0.411	2.303	Non-liquefiable
	36.50	SM	45	62	715.40	365.00	350.40	0.56	0.178	0.53	33.12	5.00	1.20	44.75	0.52	0.65	0.405	2.271	Non-liquefiable
	38.00	SM	41	59	744.80	380.00	364.80	0.56	0.178	0.52	30.89	5.00	1.20	42.07	0.52	0.64	0.399	2.240	Non-liquefiable
	40.00	SM	41	65	784.00	400.00	384.00	0.56	0.178	0.51	33.17	5.00	1.20	44.80	0.52	0.63	0.393	2.201	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
P32	0.50	SM	44	4	9.85	5.00	4.85	1.00	0.316	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.537	Liquefiable
	1.00	CL-ML	58	4	19.70	10.00	9.70	0.99	0.314	1.70	6.80	5.00	1.20	13.16	0.14	1.00	-	-	Non-liquefiable
	2.00	SM	24	4	39.40	20.00	19.40	0.98	0.312	1.70	6.80	4.18	1.11	11.71	0.13	1.00	0.153	0.491	Liquefiable
	3.00	SM	24	5	59.10	30.00	29.10	0.98	0.310	1.70	8.50	4.18	1.11	13.59	0.15	1.00	0.174	0.563	Liquefiable
	5.00	SM-SC	48	7	98.50	50.00	48.50	0.96	0.305	1.44	10.05	5.00	1.20	17.06	0.18	1.00	0.216	0.710	Liquefiable
	6.00	SM	22	9	116.40	60.00	56.40	0.95	0.307	1.33	11.98	3.93	1.09	17.03	0.18	1.00	0.216	0.703	Liquefiable
	8.00	CL-ML	72	13	155.20	80.00	75.20	0.94	0.302	1.15	14.99	5.00	1.20	22.99	0.26	1.00	-	-	Non-liquefiable
	9.00	CL-ML	72	17	176.40	90.00	86.40	0.93	0.297	1.08	18.29	5.00	1.20	26.95	0.34	1.00	-	-	Non-liquefiable
	10.00	CL	81	17	196.00	100.00	96.00	0.91	0.289	1.02	17.35	5.00	1.20	25.82	0.31	1.00	-	-	Non-liquefiable
	11.00	CL	81	18	224.40	110.00	114.40	0.88	0.269	0.93	16.83	5.00	1.20	25.19	0.30	1.00	-	-	Non-liquefiable
	12.00	CL	81	22	244.80	120.00	124.80	0.85	0.261	0.90	19.69	5.00	1.20	28.63	0.39	1.00	-	-	Non-liquefiable
	13.00	SM	44	22	265.20	130.00	135.20	0.83	0.253	0.86	18.92	5.00	1.20	27.70	0.36	1.00	0.429	1.695	Non-liquefiable
	14.50	SM	44	36	295.80	145.00	150.80	0.79	0.241	0.81	29.32	5.00	1.20	40.18	0.52	1.00	0.620	2.576	Non-liquefiable
	16.00	CL	75	36	326.40	160.00	166.40	0.75	0.229	0.78	27.91	5.00	1.20	38.49	0.52	0.87	-	-	Non-liquefiable
	17.50	CL	75	19	353.50	175.00	178.50	0.71	0.218	0.75	14.22	5.00	1.20	22.07	0.24	0.86	-	-	Non-liquefiable
	19.00	CL-ML	67	19	383.80	190.00	193.80	0.67	0.206	0.72	13.65	5.00	1.20	21.38	0.23	0.84	-	-	Non-liquefiable
	20.50	CL	87	38	410.00	205.00	205.00	0.63	0.196	0.70	26.54	5.00	1.20	36.85	0.52	0.82	-	-	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	23.50	CL	87	75	470.00	235.00	235.00	0.56	0.175	0.65	48.92	5.00	1.20	63.71	0.52	0.75	-	-	Non-liquefiable
	25.00	CL	87	63	510.00	250.00	260.00	0.56	0.171	0.62	39.07	5.00	1.20	51.89	0.52	0.72	-	-	Non-liquefiable
	26.50	CL	90	71	540.60	265.00	275.60	0.56	0.171	0.60	42.77	5.00	1.20	56.32	0.52	0.71	-	-	Non-liquefiable
	28.00	CL	89	75	571.20	280.00	291.20	0.56	0.171	0.59	43.95	5.00	1.20	57.74	0.52	0.70	-	-	Non-liquefiable
	29.50	CL	89	62	601.80	295.00	306.80	0.56	0.171	0.57	35.40	5.00	1.20	47.48	0.52	0.68	-	-	Non-liquefiable
	31.00	CL-ML	89	102	632.40	310.00	322.40	0.56	0.171	0.56	56.81	5.00	1.20	73.17	0.52	0.67	-	-	Non-liquefiable
	32.50	CL	86	95	663.00	325.00	338.00	0.56	0.171	0.54	51.67	5.00	1.20	67.01	0.52	0.66	-	-	Non-liquefiable
	34.00	ML	77	103	693.60	340.00	353.60	0.56	0.171	0.53	54.77	5.00	1.20	70.73	0.52	0.65	0.404	2.356	Non-liquefiable
	35.50	CL	93	87	724.20	355.00	369.20	0.56	0.171	0.52	45.28	5.00	1.20	59.33	0.52	0.64	-	-	Non-liquefiable
	37.00	CL	93	91	754.80	370.00	384.80	0.56	0.171	0.51	46.39	5.00	1.20	60.67	0.52	0.63	-	-	Non-liquefiable
	38.50	CL	86	83	785.40	385.00	400.40	0.56	0.171	0.50	41.48	5.00	1.20	54.78	0.52	0.62	-	-	Non-liquefiable
	40.00	CL	86	56	816.00	400.00	416.00	0.56	0.171	0.49	27.46	5.00	1.20	37.95	0.52	0.62	-	-	Non-liquefiable
	2.00	SM	44	5	39.60	20.00	19.60	0.98	0.310	1.70	8.50	5.00	1.20	15.20	0.16	1.00	0.193	0.623	Liquefiable
	3.00	SM	44	7	59.40	30.00	29.40	0.98	0.308	1.70	11.90	5.00	1.20	19.28	0.21	1.00	0.246	0.800	Liquefiable
P33	5.00	SM	37	10	99.00	50.00	49.00	0.96	0.303	1.43	14.29	5.00	1.20	22.14	0.24	1.00	0.291	0.960	Liquefiable
	6.00	SM	37	12	117.00	60.00	57.00	0.95	0.306	1.32	15.89	5.00	1.20	24.07	0.27	1.00	0.328	1.072	Non-liquefiable
	8.00	SM	30	14	156.00	80.00	76.00	0.94	0.301	1.15	16.06	4.71	1.15	23.24	0.26	1.00	0.311	1.035	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	9.00	CL	87	20	175.50	90.00	85.50	0.93	0.298	1.08	21.63	5.00	1.20	30.96	0.52	1.00	-	-	Non-liquefiable
	11.00	SM-SC	46	30	214.50	110.00	104.50	0.88	0.282	0.98	29.35	5.00	1.20	40.22	0.52	1.00	0.620	2.200	Non-liquefiable
	12.00	SM	44	29	242.40	120.00	122.40	0.85	0.264	0.90	26.21	5.00	1.20	36.45	0.52	1.00	0.620	2.352	Non-liquefiable
	13.00	CL	86	29	262.60	130.00	132.60	0.83	0.255	0.87	25.18	5.00	1.20	35.22	0.52	1.00	-	-	Non-liquefiable
	14.50	CL	86	32	295.80	145.00	150.80	0.79	0.241	0.81	26.06	5.00	1.20	36.27	0.52	1.00	-	-	Non-liquefiable
	17.50	CL	88	39	357.00	175.00	182.00	0.71	0.216	0.74	28.91	5.00	1.20	39.69	0.52	0.80	-	-	Non-liquefiable
	20.50	CL	93	42	422.30	205.00	217.30	0.63	0.190	0.68	28.49	5.00	1.20	39.19	0.52	0.75	-	-	Non-liquefiable
	22.00	CL-ML	53	42	448.80	220.00	228.80	0.59	0.179	0.66	27.77	5.00	1.20	38.32	0.52	0.80	-	-	Non-liquefiable
	23.50	CL	84	88	462.95	235.00	227.95	0.56	0.177	0.66	58.29	5.00	1.20	74.94	0.52	0.80	-	-	Non-liquefiable
	25.00	CL	84	75	492.50	250.00	242.50	0.56	0.177	0.64	48.16	5.00	1.20	62.79	0.52	0.79	-	-	Non-liquefiable
	26.50	CL	84	80	522.05	265.00	257.05	0.56	0.177	0.62	49.90	5.00	1.20	64.88	0.52	0.77	-	-	Non-liquefiable
	28.00	CL-CI	88	87	551.60	280.00	271.60	0.56	0.177	0.61	52.79	5.00	1.20	68.35	0.52	0.76	-	-	Non-liquefiable
	29.50	CL-CI	88	101	581.15	295.00	286.15	0.56	0.177	0.59	59.71	5.00	1.20	76.65	0.52	0.75	-	-	Non-liquefiable
	31.00	CL-CI	88	82	610.70	310.00	300.70	0.56	0.177	0.58	47.29	5.00	1.20	61.75	0.52	0.74	-	-	Non-liquefiable
	32.50	CL	77	90	640.25	325.00	315.25	0.56	0.177	0.56	50.69	5.00	1.20	65.83	0.52	0.73	-	-	Non-liquefiable
	34.00	CL	77	98	669.80	340.00	329.80	0.56	0.177	0.55	53.96	5.00	1.20	69.76	0.52	0.72	-	-	Non-liquefiable
	35.50	CL	83	72	699.35	355.00	344.35	0.56	0.177	0.54	38.80	5.00	1.20	51.56	0.52	0.71	-	-	Non-liquefiable
	37.00	CL	90	88	728.90	370.00	358.90	0.56	0.177	0.53	46.45	5.00	1.20	60.74	0.52	0.71	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	38.50	CL	90	100	758.45	385.00	373.45	0.56	0.177	0.52	51.75	5.00	1.20	67.10	0.52	0.70	-	-	Non-liquefiable
	40.00	CL	84	96	788.00	400.00	388.00	0.56	0.177	0.51	48.74	5.00	1.20	63.48	0.52	0.69	-	-	Non-liquefiable
P34	0.50	SM	47	3	9.80	5.00	4.80	1.00	0.317	1.70	5.10	5.00	1.20	11.12	0.12	1.00	0.147	0.463	Liquefiable
	1.00	SM-SC	50	3	19.60	10.00	9.60	0.99	0.316	1.70	5.10	5.00	1.20	11.12	0.12	1.00	0.147	0.465	Liquefiable
	3.00	ML	51	6	58.80	30.00	28.80	0.98	0.311	1.70	10.20	5.00	1.20	17.24	0.18	1.00	0.219	0.703	Liquefiable
	4.00	SM	30	14	78.40	40.00	38.40	0.97	0.309	1.61	22.59	4.71	1.15	30.79	0.52	1.00	0.620	2.009	Non-liquefiable
	6.00	SM	20	18	117.60	60.00	57.60	0.95	0.304	1.32	23.72	3.61	1.08	29.22	0.42	1.00	0.502	1.652	Non-liquefiable
	7.00	SM	45	23	135.10	70.00	65.10	0.95	0.306	1.24	28.51	5.00	1.20	39.21	0.52	1.00	0.620	2.024	Non-liquefiable
	8.00	ML	51	23	154.40	80.00	74.40	0.94	0.304	1.16	26.66	5.00	1.20	37.00	0.52	1.00	0.620	2.041	Non-liquefiable
	9.00	SM	44	15	177.30	90.00	87.30	0.93	0.295	1.07	16.05	5.00	1.20	24.26	0.28	1.00	0.332	1.124	Non-liquefiable
	10.00	SM	44	20	197.00	100.00	97.00	0.91	0.287	1.02	20.31	5.00	1.20	29.37	0.43	1.00	0.512	1.780	Non-liquefiable
	12.50	CL	94	19	246.25	125.00	121.25	0.84	0.266	0.91	17.25	5.00	1.20	25.71	0.31	1.00	-	-	Non-liquefiable
	15.50	CL	92	12	302.25	155.00	147.25	0.76	0.243	0.82	9.89	5.00	1.20	16.87	0.18	0.89	-	-	Non-liquefiable
	18.50	CL	91	21	377.40	185.00	192.40	0.68	0.208	0.72	15.14	5.00	1.20	23.17	0.26	0.83	-	-	Non-liquefiable
	21.50	CL	80	30	438.60	215.00	223.60	0.60	0.184	0.67	20.06	5.00	1.20	29.08	0.41	0.73	-	-	Non-liquefiable
	24.50	CL	92	38	504.70	245.00	259.70	0.56	0.170	0.62	23.58	5.00	1.20	33.30	0.52	0.77	-	-	Non-liquefiable
	27.50	CL	92	47	552.75	275.00	277.75	0.56	0.174	0.60	28.20	5.00	1.20	38.84	0.52	0.76	-	-	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	30.50	SM	36	71	613.05	305.00	308.05	0.56	0.174	0.57	40.45	5.00	1.20	53.54	0.52	0.67	0.414	2.383	Non-liquefiable
	32.00	CL-ML	61	75	659.20	320.00	339.20	0.56	0.170	0.54	40.72	5.00	1.20	53.87	0.52	0.65	-	-	Non-liquefiable
	33.50	CL-ML	61	68	690.10	335.00	355.10	0.56	0.170	0.53	36.09	5.00	1.20	48.30	0.52	0.63	-	-	Non-liquefiable
	35.00	CL-ML	76	55	721.00	350.00	371.00	0.56	0.170	0.52	28.55	5.00	1.20	39.27	0.52	0.62	-	-	Non-liquefiable
	36.50	CL-ML	76	52	751.90	365.00	386.90	0.56	0.170	0.51	26.44	5.00	1.20	36.72	0.52	0.62	-	-	Non-liquefiable
	38.00	CL	84	65	782.80	380.00	402.80	0.56	0.170	0.50	32.39	5.00	1.20	43.86	0.52	0.61	-	-	Non-liquefiable
	40.00	CL	84	53	824.00	400.00	424.00	0.56	0.170	0.49	25.74	5.00	1.20	35.89	0.52	0.60	-	-	Non-liquefiable
P35	0.50	SM	46	3	9.80	5.00	4.80	1.00	0.317	1.70	5.10	5.00	1.20	11.12	0.12	1.00	0.147	0.463	Liquefiable
P35	1.00	SM	46	3	19.60	10.00	9.60	0.99	0.316	1.70	5.10	5.00	1.20	11.12	0.12	1.00	0.147	0.465	Liquefiable
P35	3.00	SM	44	7	58.80	30.00	28.80	0.98	0.311	1.70	11.90	5.00	1.20	19.28	0.21	1.00	0.246	0.792	Liquefiable
P35	4.00	SM	44	12	78.40	40.00	38.40	0.97	0.309	1.61	19.36	5.00	1.20	28.24	0.38	1.00	0.451	1.461	Non-liquefiable
P35	5.00	ML	62	12	98.00	50.00	48.00	0.96	0.306	1.44	17.32	5.00	1.20	25.78	0.31	1.00	0.368	1.200	Non-liquefiable
P35	6.00	ML	62	14	109.20	60.00	49.20	0.95	0.330	1.43	19.96	5.00	1.20	28.95	0.41	1.00	0.487	1.473	Non-liquefiable
P35	7.00	SM	35	16	127.40	70.00	57.40	0.95	0.328	1.32	21.12	5.00	1.20	30.34	0.49	1.00	0.589	1.796	Non-liquefiable
P35	9.00	SM	26	18	163.80	90.00	73.80	0.93	0.322	1.16	20.95	4.39	1.12	27.91	0.37	1.00	0.437	1.356	Non-liquefiable
P35	10.00	SM	26	20	195.00	100.00	95.00	0.91	0.290	1.03	20.52	4.39	1.12	27.42	0.35	1.00	0.418	1.440	Non-liquefiable
P35	11.00	CL	77	20	214.50	110.00	104.50	0.88	0.282	0.98	19.56	5.00	1.20	28.48	0.39	1.00	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (µ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	12.50	CL-ML	71	26	251.25	125.00	126.25	0.84	0.261	0.89	23.14	5.00	1.20	32.77	0.52	1.00	-	-	Non-liquefiable
	14.00	SM	50	26	281.40	140.00	141.40	0.80	0.248	0.84	21.86	5.00	1.20	31.24	0.52	1.00	0.620	2.497	Non-liquefiable
	15.50	SM	50	32	299.15	155.00	144.15	0.76	0.246	0.83	26.65	5.00	1.20	36.98	0.52	0.89	0.551	2.239	Non-liquefiable
	18.50	SM	27	34	357.05	185.00	172.05	0.68	0.220	0.76	25.92	4.48	1.13	33.78	0.52	0.84	0.520	2.363	Non-liquefiable
	21.50	CL-ML	81	38	414.95	215.00	199.95	0.60	0.194	0.71	26.87	5.00	1.20	37.25	0.52	0.85	-	-	Non-liquefiable
	24.50	CL-ML	74	44	477.75	245.00	232.75	0.56	0.179	0.66	28.84	5.00	1.20	39.61	0.52	0.82	-	-	Non-liquefiable
	26.00	CL	88	44	527.80	260.00	267.80	0.56	0.172	0.61	26.89	5.00	1.20	37.26	0.52	0.80	-	-	Non-liquefiable
	27.50	CL	85	63	577.50	275.00	302.50	0.56	0.167	0.57	36.22	5.00	1.20	48.47	0.52	0.77	-	-	Non-liquefiable
	29.00	SM	41	69	609.00	290.00	319.00	0.56	0.167	0.56	38.63	5.00	1.20	51.36	0.52	0.76	0.474	2.840	Non-liquefiable
	30.50	ML	64	77	640.50	305.00	335.50	0.56	0.167	0.55	42.04	5.00	1.20	55.45	0.52	0.75	0.468	2.807	Non-liquefiable
	32.00	ML	64	82	672.00	320.00	352.00	0.56	0.167	0.53	43.71	5.00	1.20	57.45	0.52	0.75	0.463	2.776	Non-liquefiable
	33.50	ML	64	77	703.50	335.00	368.50	0.56	0.167	0.52	40.11	5.00	1.20	53.13	0.52	0.74	0.458	2.747	Non-liquefiable
	35.00	CL-ML	73	66	735.00	350.00	385.00	0.56	0.167	0.51	33.64	5.00	1.20	45.36	0.52	0.73	-	-	Non-liquefiable
	36.50	CL-ML	73	71	766.50	365.00	401.50	0.56	0.167	0.50	35.43	5.00	1.20	47.52	0.52	0.72	-	-	Non-liquefiable
	38.00	CL	81	78	798.00	380.00	418.00	0.56	0.167	0.49	38.15	5.00	1.20	50.78	0.52	0.72	-	-	Non-liquefiable
	40.00	CL	81	92	840.00	400.00	440.00	0.56	0.167	0.48	43.86	5.00	1.20	57.63	0.52	0.71	-	-	Non-liquefiable
P36	0.50	CL-ML	57	6.00	10.20	5.00	5.20	1.00	0.30	1.70	10.20	5.00	1.20	17.24	0.18	1.00	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	1.00	SM	41	6.00	20.40	10.00	10.40	0.99	0.30	1.70	10.20	5.00	1.20	17.24	0.18	1.00	0.22	0.720	Liquefiable
	2.00	SM-SC	50	6.00	40.80	20.00	20.80	0.98	0.30	1.70	10.20	5.00	1.20	17.24	0.18	1.00	0.22	0.726	Liquefiable
	3.00	SM	40	10.00	61.20	30.00	31.20	0.98	0.30	1.70	17.00	5.00	1.20	25.40	0.30	1.00	0.36	1.197	Non-liquefiable
	5.00	SM	24	16.00	103.50	50.00	53.50	0.96	0.29	1.37	21.87	4.18	1.11	28.41	0.38	1.00	0.46	1.581	Non-liquefiable
	6.00	SM	24	22.00	124.20	60.00	64.20	0.95	0.29	1.25	27.46	4.18	1.11	34.59	0.52	1.00	0.62	2.154	Non-liquefiable
	8.00	CL-ML	80	17.00	164.00	80.00	84.00	0.94	0.29	1.09	18.55	5.00	1.20	27.26	0.35	1.00	-	-	Non-liquefiable
	9.00	CL-ML	80	22.00	184.50	90.00	94.50	0.93	0.28	1.03	22.63	5.00	1.20	32.16	0.52	1.00	-	-	Non-liquefiable
	10.00	CL	77	22.00	205.00	100.00	105.00	0.91	0.28	0.98	21.47	5.00	1.20	30.76	0.52	1.00	-	-	Non-liquefiable
	11.00	CL-ML	86	29.00	225.50	110.00	115.50	0.88	0.27	0.93	26.98	5.00	1.20	37.38	0.52	1.00	-	-	Non-liquefiable
	12.00	CL-ML	86	26.00	246.00	120.00	126.00	0.85	0.26	0.89	23.16	5.00	1.20	32.80	0.52	1.00	-	-	Non-liquefiable
	13.00	SM	45	26.00	260.00	130.00	130.00	0.83	0.26	0.88	22.80	5.00	1.20	32.36	0.52	1.00	0.62	2.404	Non-liquefiable
	14.50	SM	45	27.00	290.00	145.00	145.00	0.79	0.25	0.83	22.42	5.00	1.20	31.91	0.52	1.00	0.62	2.526	Non-liquefiable
	16.00	CL	74	27.00	329.60	160.00	169.60	0.75	0.23	0.77	20.73	5.00	1.20	29.88	0.46	0.86	-	-	Non-liquefiable
	17.50	CL	79	23.00	360.50	175.00	185.50	0.71	0.21	0.73	16.89	5.00	1.20	25.26	0.30	0.84	-	-	Non-liquefiable
	20.50	CL	79	26.00	426.40	205.00	221.40	0.63	0.19	0.67	17.47	5.00	1.20	25.97	0.31	0.76	-	-	Non-liquefiable
	23.50	CL	76	29.00	486.45	235.00	251.45	0.56	0.17	0.63	18.29	5.00	1.20	26.95	0.34	0.73	-	-	Non-liquefiable
	26.50	CL	79	45.00	548.55	265.00	283.55	0.56	0.17	0.59	26.72	5.00	1.20	37.07	0.52	0.70	-	-	Non-liquefiable
	28.00	MI	84	45.00	574.00	280.00	294.00	0.56	0.17	0.58	26.24	5.00	1.20	36.49	0.52	0.71	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	29.50	MI	84	45.00	604.75	295.00	309.75	0.56	0.17	0.57	25.57	5.00	1.20	35.68	0.52	0.70	-	-	Non-liquefiable
	31.00	CL-ML	77	45.00	635.50	310.00	325.50	0.56	0.17	0.55	24.94	5.00	1.20	34.93	0.52	0.69	-	-	Non-liquefiable
	32.50	ML	56	56.00	666.25	325.00	341.25	0.56	0.17	0.54	30.31	5.00	1.20	41.38	0.52	0.68	0.42	2.473	Non-liquefiable
	34.00	CL-ML	71	62.00	697.00	340.00	357.00	0.56	0.17	0.53	32.81	5.00	1.20	44.38	0.52	0.67	-	-	Non-liquefiable
	35.50	CL	73	49.00	727.75	355.00	372.75	0.56	0.17	0.52	25.38	5.00	1.20	35.46	0.52	0.66	-	-	Non-liquefiable
	38.50	CL-ML	66	48.00	789.25	385.00	404.25	0.56	0.17	0.50	23.87	5.00	1.20	33.65	0.52	0.62	-	-	Non-liquefiable
	40.00	CL-ML	66	54.00	820.00	400.00	420.00	0.56	0.17	0.49	26.35	5.00	1.20	36.62	0.52	0.61	-	-	Non-liquefiable
P37	0.50	SM	45	3	9.35	5.00	4.35	1.00	0.334	1.70	5.10	5.00	1.20	11.12	0.12	1.00	0.147	0.440	Liquefiable
P37	1.00	SM	37	3	18.70	10.00	8.70	0.99	0.333	1.70	5.10	5.00	1.20	11.12	0.12	1.00	0.147	0.441	Liquefiable
P37	2.00	SM-SC	50	3	37.40	20.00	17.40	0.98	0.330	1.70	5.10	5.00	1.20	11.12	0.12	1.00	0.147	0.445	Liquefiable
P37	3.00	CL-ML	66	5	56.10	30.00	26.10	0.98	0.328	1.70	8.50	5.00	1.20	15.20	0.16	1.00	-	-	Non-liquefiable
P37	4.00	CL-ML	66	6	74.80	40.00	34.80	0.97	0.325	1.70	10.17	5.00	1.20	17.21	0.18	1.00	-	-	Non-liquefiable
P37	5.00	SM	26	6	93.50	50.00	43.50	0.96	0.322	1.52	9.10	4.39	1.12	14.60	0.16	1.00	0.186	0.577	Liquefiable
P37	6.00	SM	26	11	118.20	60.00	58.20	0.95	0.302	1.31	14.42	4.39	1.12	20.57	0.22	1.00	0.266	0.879	Liquefiable
P37	7.00	SM	26	14	137.90	70.00	67.90	0.95	0.300	1.21	16.99	4.39	1.12	23.46	0.26	1.00	0.315	1.051	Non-liquefiable
P37	9.00	CL-ML	92	11	177.30	90.00	87.30	0.93	0.295	1.07	11.77	5.00	1.20	19.13	0.20	1.00	-	-	Non-liquefiable
P37	10.00	CL-ML	92	14	184.00	100.00	84.00	0.91	0.310	1.09	15.28	5.00	1.20	23.33	0.26	1.00	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	$K_σ$	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	12.50	CL-ML	79	19	230.00	125.00	105.00	0.84	0.287	0.98	18.54	5.00	1.20	27.25	0.35	1.00	-	-	Non-liquefiable
	14.00	CL	88	19	288.40	140.00	148.40	0.80	0.243	0.82	15.60	5.00	1.20	23.72	0.27	1.00	-	-	Non-liquefiable
	15.50	CL	88	30	314.65	155.00	159.65	0.76	0.234	0.79	23.74	5.00	1.20	33.49	0.52	0.88	-	-	Non-liquefiable
	17.00	ML	57	30	345.10	170.00	175.10	0.72	0.221	0.76	22.67	5.00	1.20	32.21	0.52	0.82	0.510	2.303	Non-liquefiable
	18.50	ML	57	33	368.15	185.00	183.15	0.68	0.213	0.74	24.38	5.00	1.20	34.26	0.52	0.81	0.502	2.353	Non-liquefiable
	20.00	CL	77	33	398.00	200.00	198.00	0.64	0.201	0.71	23.45	5.00	1.20	33.14	0.52	0.78	-	-	Non-liquefiable
	21.50	CL	82	39	445.05	215.00	230.05	0.60	0.181	0.66	25.71	5.00	1.20	35.86	0.52	0.73	-	-	Non-liquefiable
	24.50	CL	72	100	507.15	245.00	262.15	0.56	0.169	0.62	61.76	5.00	1.20	79.12	0.52	0.71	-	-	Non-liquefiable
	26.00	CL	87	66	535.60	260.00	275.60	0.56	0.170	0.60	39.76	5.00	1.20	52.71	0.52	0.70	-	-	Non-liquefiable
	27.50	CL	91	62	566.50	275.00	291.50	0.56	0.170	0.59	36.31	5.00	1.20	48.58	0.52	0.69	-	-	Non-liquefiable
	29.00	ML	66	80	597.40	290.00	307.40	0.56	0.170	0.57	45.63	5.00	1.20	59.75	0.52	0.67	0.418	2.463	Non-liquefiable
	30.50	CL-ML	63	59	628.30	305.00	323.30	0.56	0.170	0.56	32.81	5.00	1.20	44.38	0.52	0.66	-	-	Non-liquefiable
	32.00	ML	57	93	659.20	320.00	339.20	0.56	0.170	0.54	50.50	5.00	1.20	65.59	0.52	0.65	0.404	2.379	Non-liquefiable
	33.50	ML	61	87	690.10	335.00	355.10	0.56	0.170	0.53	46.17	5.00	1.20	60.40	0.52	0.64	0.397	2.341	Non-liquefiable
	35.00	CL-ML	71	64	721.00	350.00	371.00	0.56	0.170	0.52	33.23	5.00	1.20	44.87	0.52	0.63	-	-	Non-liquefiable
	36.50	CL-ML	61	72	751.90	365.00	386.90	0.56	0.170	0.51	36.60	5.00	1.20	48.93	0.52	0.62	-	-	Non-liquefiable
	38.00	CL	85	63	782.80	380.00	402.80	0.56	0.170	0.50	31.39	5.00	1.20	42.67	0.52	0.61	-	-	Non-liquefiable
	40.00	CL	85	90	824.00	400.00	424.00	0.56	0.170	0.49	43.71	5.00	1.20	57.45	0.52	0.60	-	-	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (σ_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (σ_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
P38	0.50	SM	41	4	9.75	5.00	4.75	1.00	0.319	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.531	Liquefiable
	1.00	SM-SC	40	4	19.50	10.00	9.50	0.99	0.318	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.533	Liquefiable
	2.00	ML	54	4	39.00	20.00	19.00	0.98	0.315	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.537	Liquefiable
	3.00	CL-ML	52	6	58.50	30.00	28.50	0.98	0.313	1.70	10.20	5.00	1.20	17.24	0.18	1.00	-	-	Non-liquefiable
	4.00	SM	50	6	78.00	40.00	38.00	0.97	0.310	1.62	9.73	5.00	1.20	16.68	0.18	1.00	0.212	0.682	Liquefiable
	5.00	SM	50	12	95.50	50.00	45.50	0.96	0.315	1.48	17.79	5.00	1.20	26.35	0.32	1.00	0.383	1.217	Non-liquefiable
	6.00	CL-ML	56	14	114.60	60.00	54.60	0.95	0.312	1.35	18.95	5.00	1.20	27.74	0.36	1.00	-	-	Non-liquefiable
	8.00	CL-ML	60	17	152.80	80.00	72.80	0.94	0.307	1.17	19.92	5.00	1.20	28.91	0.41	1.00	-	-	Non-liquefiable
	9.00	CL-ML	81	19	185.40	90.00	95.40	0.93	0.282	1.02	19.45	5.00	1.20	28.34	0.38	1.00	-	-	Non-liquefiable
	11.00	CL-ML	83	45	226.60	110.00	116.60	0.88	0.267	0.93	41.67	5.00	1.20	55.01	0.52	1.00	-	-	Non-liquefiable
	12.00	CL-ML	83	23	241.20	120.00	121.20	0.85	0.265	0.91	20.89	5.00	1.20	30.07	0.47	1.00	-	-	Non-liquefiable
	13.00	CL	90	23	261.30	130.00	131.30	0.83	0.257	0.87	20.07	5.00	1.20	29.09	0.41	1.00	-	-	Non-liquefiable
	14.50	CL	90	21	313.20	145.00	168.20	0.79	0.229	0.77	16.19	5.00	1.20	24.43	0.28	1.00	-	-	Non-liquefiable
	16.00	CL-ML	73	21	345.60	160.00	185.60	0.75	0.217	0.73	15.41	5.00	1.20	23.50	0.26	0.79	-	-	Non-liquefiable
	17.50	CL-ML	73	24	369.25	175.00	194.25	0.71	0.210	0.72	17.22	5.00	1.20	25.66	0.31	0.77	-	-	Non-liquefiable
	19.00	SM	45	24	400.90	190.00	210.90	0.67	0.198	0.69	16.53	5.00	1.20	24.83	0.29	0.83	0.286	1.445	Non-liquefiable
	20.50	CL-ML	74	30	395.65	205.00	190.65	0.63	0.203	0.72	21.73	5.00	1.20	31.07	0.52	0.85	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	22.00	ML	80	30	424.60	220.00	204.60	0.59	0.190	0.70	20.97	5.00	1.20	30.17	0.48	0.86	0.491	2.584	Non-liquefiable
	23.50	CL	84	37	465.30	235.00	230.30	0.56	0.176	0.66	24.38	5.00	1.20	34.26	0.52	0.84	-	-	Non-liquefiable
	26.50	CL	84	40	524.70	265.00	259.70	0.56	0.176	0.62	24.82	5.00	1.20	34.79	0.52	0.81	-	-	Non-liquefiable
	29.50	MI	91	45	584.10	295.00	289.10	0.56	0.176	0.59	26.47	5.00	1.20	36.76	0.52	0.80	-	-	Non-liquefiable
	32.50	CL-ML	60	48	650.00	325.00	325.00	0.56	0.175	0.55	26.63	5.00	1.20	36.95	0.52	0.78	-	-	Non-liquefiable
	35.50	CL-ML	56	52	770.35	355.00	415.35	0.56	0.162	0.49	25.52	5.00	1.20	35.62	0.52	0.74	-	-	Non-liquefiable
	37.00	CL-ML	56	55	769.60	370.00	399.60	0.56	0.168	0.50	27.51	5.00	1.20	38.02	0.52	0.74	-	-	Non-liquefiable
	38.50	CL	79	58	800.80	385.00	415.80	0.56	0.168	0.49	28.44	5.00	1.20	39.13	0.52	0.74	-	-	Non-liquefiable
	40.00	CL	79	62	832.00	400.00	432.00	0.56	0.168	0.48	29.83	5.00	1.20	40.80	0.52	0.73	-	-	Non-liquefiable
P39	0.50	SM	44	7.00	9.50	5.00	4.50	1.00	0.33	1.70	11.90	5.00	1.20	19.28	0.21	1.00	0.25	0.751	Liquefiable
P39	1.00	ML	54	7.00	19.00	10.00	9.00	0.99	0.33	1.70	11.90	5.00	1.20	19.28	0.21	1.00	0.25	0.754	Liquefiable
P39	2.00	SM-SC	46	7.00	38.00	20.00	18.00	0.98	0.32	1.70	11.90	5.00	1.20	19.28	0.21	1.00	0.25	0.760	Liquefiable
P39	3.00	SM	42	6.00	57.00	30.00	27.00	0.98	0.32	1.70	10.20	5.00	1.20	17.24	0.18	1.00	0.22	0.680	Liquefiable
P39	5.00	ML	64	7.00	95.00	50.00	45.00	0.96	0.32	1.49	10.43	5.00	1.20	17.52	0.19	1.00	0.22	0.702	Liquefiable
P39	6.00	ML	60	8.00	114.00	60.00	54.00	0.95	0.31	1.36	10.89	5.00	1.20	18.06	0.19	1.00	0.23	0.731	Liquefiable
P39	8.00	ML	56	9.00	152.00	80.00	72.00	0.94	0.31	1.18	10.61	5.00	1.20	17.73	0.19	1.00	0.23	0.728	Liquefiable
P39	9.00	CL-ML	73	10.00	171.00	90.00	81.00	0.93	0.31	1.11	11.11	5.00	1.20	18.33	0.20	1.00	-	-	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	10.00	CL	68	10.00	202.00	100.00	102.00	0.91	0.28	0.99	9.90	5.00	1.20	16.88	0.18	1.00	-	-	Non-liquefiable
	11.00	CL	68	23.00	222.20	110.00	112.20	0.88	0.27	0.94	21.71	5.00	1.20	31.06	0.52	1.00	-	-	Non-liquefiable
	12.00	CL	68	25.00	242.40	120.00	122.40	0.85	0.26	0.90	22.60	5.00	1.20	32.12	0.52	1.00	-	-	Non-liquefiable
	14.50	CL-ML	66	18.00	297.25	145.00	152.25	0.79	0.24	0.81	14.59	5.00	1.20	22.51	0.25	1.00	-	-	Non-liquefiable
	16.00	CL	72	18.00	328.00	160.00	168.00	0.75	0.23	0.77	13.89	5.00	1.20	21.66	0.24	0.89	-	-	Non-liquefiable
	17.50	CL	83	15.00	358.75	175.00	183.75	0.71	0.22	0.74	11.07	5.00	1.20	18.28	0.19	0.86	-	-	Non-liquefiable
	20.50	CL	68	19.00	407.95	205.00	202.95	0.63	0.20	0.70	13.34	5.00	1.20	21.00	0.23	0.80	-	-	Non-liquefiable
	22.00	CI	80	19.00	446.60	220.00	226.60	0.59	0.18	0.66	12.62	5.00	1.20	20.15	0.22	0.78	-	-	Non-liquefiable
	23.50	CI	80	42.00	477.05	235.00	242.05	0.56	0.17	0.64	27.00	5.00	1.20	37.40	0.52	0.76	-	-	Non-liquefiable
	25.00	CL	80	42.00	515.00	250.00	265.00	0.56	0.17	0.61	25.80	5.00	1.20	35.96	0.52	0.78	-	-	Non-liquefiable
	26.50	CL	80	51.00	545.90	265.00	280.90	0.56	0.17	0.60	30.43	5.00	1.20	41.52	0.52	0.76	-	-	Non-liquefiable
	29.50	CL-ML	70	54.00	607.70	295.00	312.70	0.56	0.17	0.57	30.54	5.00	1.20	41.64	0.52	0.74	-	-	Non-liquefiable
	31.00	CL	85	46.00	638.60	310.00	328.60	0.56	0.17	0.55	25.38	5.00	1.20	35.45	0.52	0.73	-	-	Non-liquefiable
	32.50	SM	47	49.00	669.50	325.00	344.50	0.56	0.17	0.54	26.40	5.00	1.20	36.68	0.52	0.72	0.45	2.631	Non-liquefiable
	34.00	CL	77	49.00	700.40	340.00	360.40	0.56	0.17	0.53	25.81	5.00	1.20	35.97	0.52	0.71	-	-	Non-liquefiable
	35.50	ML	65	50.00	731.30	355.00	376.30	0.56	0.17	0.52	25.78	5.00	1.20	35.93	0.52	0.70	0.43	2.558	Non-liquefiable
	37.00	CL	84	50.00	754.80	370.00	384.80	0.56	0.17	0.51	25.49	5.00	1.20	35.59	0.52	0.62	-	-	Non-liquefiable
	38.50	CL	84	52.00	785.40	385.00	400.40	0.56	0.17	0.50	25.99	5.00	1.20	36.18	0.52	0.61	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (µ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	40.00	CL	84	62.00	816.00	400.00	416.00	0.56	0.17	0.49	30.40	5.00	1.20	41.48	0.52	0.60	-	-	Non-liquefiable
P40	0.50	SM	38	4.00	10.05	5.00	5.05	1.00	0.31	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.17	0.548	Liquefiable
	1.00	CL	52	4.00	20.10	10.00	10.10	0.99	0.31	1.70	6.80	5.00	1.20	13.16	0.14	1.00	-	-	Non-liquefiable
	2.00	CL	76	4.00	40.20	20.00	20.20	0.98	0.31	1.70	6.80	5.00	1.20	13.16	0.14	1.00	-	-	Non-liquefiable
	3.00	CL	76	5.00	60.30	30.00	30.30	0.98	0.30	1.70	8.50	5.00	1.20	15.20	0.16	1.00	-	-	Non-liquefiable
	4.00	CL-ML	64	5.00	80.40	40.00	40.40	0.97	0.30	1.57	7.87	5.00	1.20	14.44	0.15	1.00	-	-	Non-liquefiable
	5.00	SM	41	7.00	100.50	50.00	50.50	0.96	0.30	1.41	9.85	5.00	1.20	16.82	0.18	1.00	0.21	0.715	Liquefiable
	6.00	SM	31	12.00	120.60	60.00	60.60	0.95	0.30	1.28	15.42	4.77	1.16	22.69	0.25	1.00	0.30	1.015	Non-liquefiable
	8.00	SM	37	9.00	156.80	80.00	76.80	0.94	0.30	1.14	10.27	5.00	1.20	17.32	0.18	1.00	0.22	0.735	Liquefiable
	9.00	CL	87	8.00	176.40	90.00	86.40	0.93	0.30	1.08	8.61	5.00	1.20	15.33	0.16	1.00	-	-	Non-liquefiable
	11.00	CL	82	23.00	224.40	110.00	114.40	0.88	0.27	0.93	21.50	5.00	1.20	30.80	0.52	1.00	-	-	Non-liquefiable
	12.00	CL	82	16.00	244.80	120.00	124.80	0.85	0.26	0.90	14.32	5.00	1.20	22.19	0.24	1.00	-	-	Non-liquefiable
	14.50	CL-ML	80	14.00	297.25	145.00	152.25	0.79	0.24	0.81	11.35	5.00	1.20	18.62	0.20	1.00	-	-	Non-liquefiable
	16.00	CL	78	14.00	321.60	160.00	161.60	0.75	0.23	0.79	11.01	5.00	1.20	18.22	0.19	0.87	-	-	Non-liquefiable
	17.50	CL	78	22.00	351.75	175.00	176.75	0.71	0.22	0.75	16.55	5.00	1.20	24.86	0.29	0.85	-	-	Non-liquefiable
	20.50	CL-ML	63	24.00	416.15	205.00	211.15	0.63	0.19	0.69	16.52	5.00	1.20	24.82	0.29	0.80	-	-	Non-liquefiable
	23.50	CL	77	26.00	477.05	235.00	242.05	0.56	0.17	0.64	16.71	5.00	1.20	25.05	0.29	0.76	-	-	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

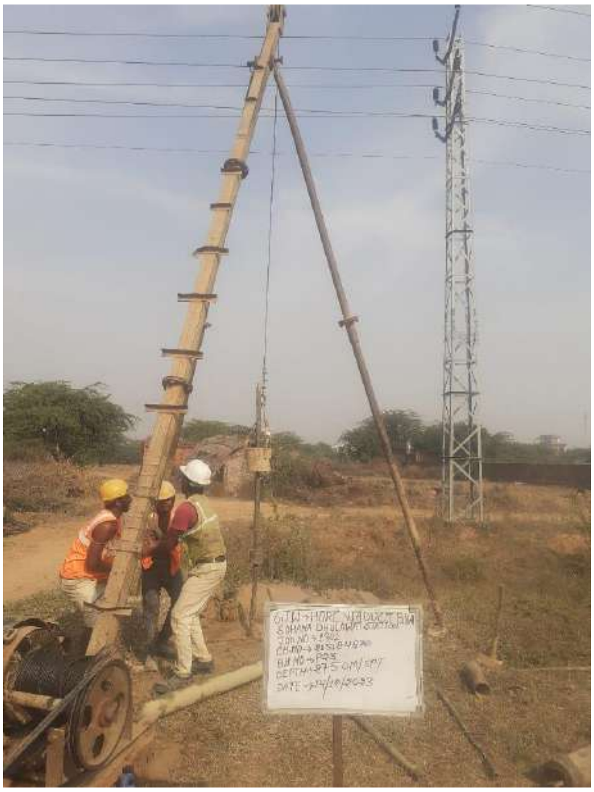
BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	26.50	CL	84	49.00	537.95	265.00	272.95	0.56	0.17	0.61	29.66	5.00	1.20	40.59	0.52	0.73	-	-	Non-liquefiable
	29.50	CI	81	32.00	613.60	295.00	318.60	0.56	0.17	0.56	17.93	5.00	1.20	26.51	0.33	0.72	-	-	Non-liquefiable
	31.00	SM	46	32.00	644.80	310.00	334.80	0.56	0.17	0.55	17.49	5.00	1.20	25.99	0.31	0.71	0.26	1.575	Non-liquefiable
	32.50	SM	46	50.00	676.00	325.00	351.00	0.56	0.17	0.53	26.69	5.00	1.20	37.03	0.52	0.69	0.43	2.544	Non-liquefiable
	34.00	CL-ML	58	50.00	680.00	340.00	340.00	0.56	0.17	0.54	27.12	5.00	1.20	37.54	0.52	0.69	-	-	Non-liquefiable
	35.50	CL-ML	58	49.00	710.00	355.00	355.00	0.56	0.17	0.53	26.01	5.00	1.20	36.21	0.52	0.68	-	-	Non-liquefiable
	37.00	MI	85	49.00	740.00	370.00	370.00	0.56	0.17	0.52	25.47	5.00	1.20	35.57	0.52	0.67	-	-	Non-liquefiable
	38.50	CL-ML	58	53.00	770.00	385.00	385.00	0.56	0.17	0.51	27.01	5.00	1.20	37.41	0.52	0.67	-	-	Non-liquefiable
	40.00	CL-ML	58	61.00	800.00	400.00	400.00	0.56	0.17	0.50	30.50	5.00	1.20	41.60	0.52	0.66	-	-	Non-liquefiable

APPENDIX-I
SITE PHOTOGRAPHS

SPT at depth 9.00 m

SPT at depth 31.00 m

SPT at depth 30.50 m



SPT at depth 27.50 m

APPENDIX-I
SITE PHOTOGRAPHS

SPT sample at depth 4.00 m

SPT at depth 33.50 m


SPT at depth 40.00 m

SPT sample at depth 32.00 m

APPENDIX-I
SITE PHOTOGRAPHS

SPT at depth 32.00 m

SPT at depth 9.00 m

UDS at depth 19.00 m

SPT sample at depth 20.50 m

APPENDIX-I
SITE PHOTOGRAPHS

UDS at depth 34.00 m

SPT at depth 9.00 m

SPT sample at depth 12.00 m

SPT at depth 31.00 m

APPENDIX-I
SITE PHOTOGRAPHS

UDS at depth 22.00 m

SPT sample at depth 31.00 m

SPT at depth 27.50 m

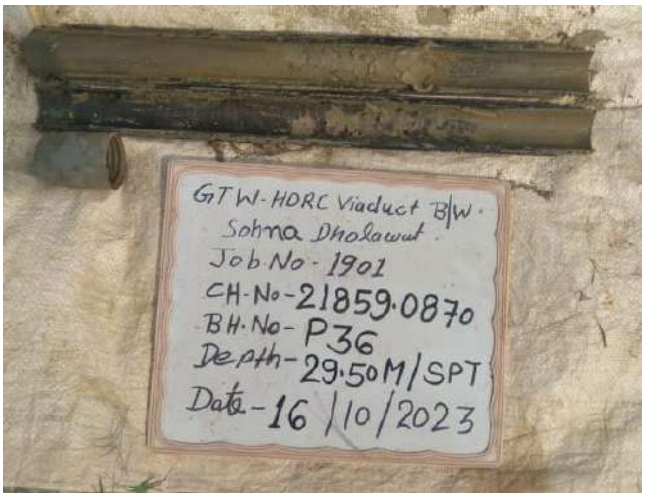
SPT sample at depth 30.50 m

APPENDIX-I
SITE PHOTOGRAPHS

UDS at depth 11.00 m

SPT sample at depth 29.00 m

SPT at depth 14.50 m



SPT sample at depth 29.50 m

APPENDIX-I
SITE PHOTOGRAPHS

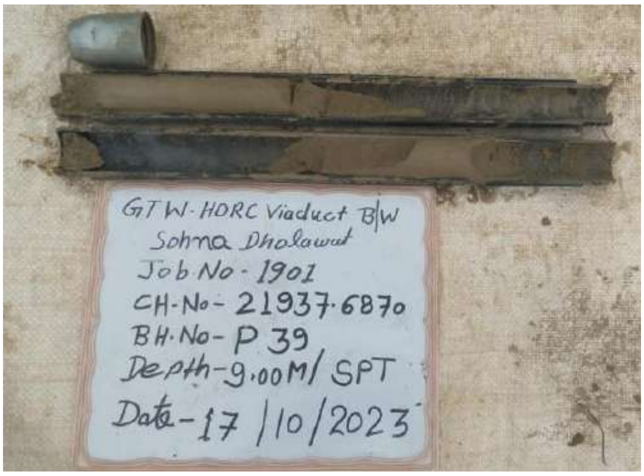
SPT at depth 4.00 m


SPT at depth 35.00 m

SPT at depth 11.00 m

SPT sample at depth 26.50 m

APPENDIX-I
SITE PHOTOGRAPHS



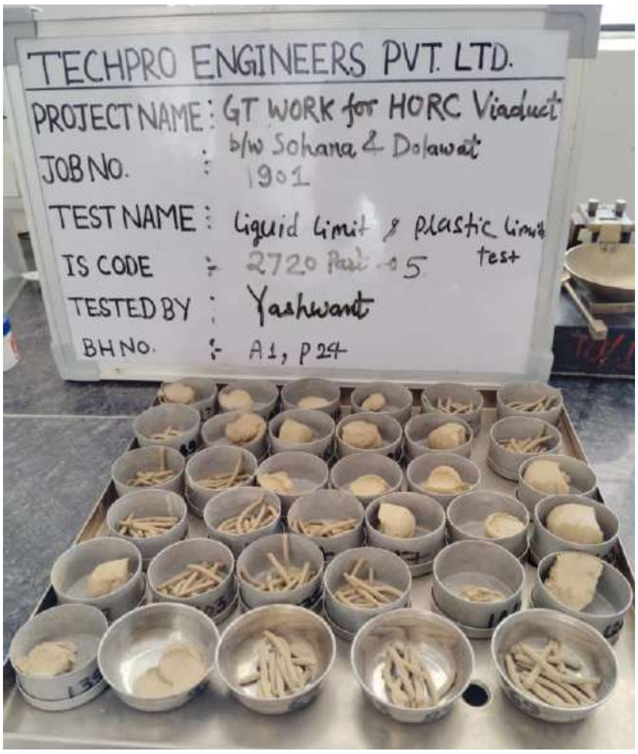
SPT sample at depth 9.00 m

UDS at depth 25.00 m

SPT sample at depth 9.00 m

SPT at depth 26.50 m

APPENDIX-J
LABORATORY PHOTOGRAPHS



Atterbergs' limit test

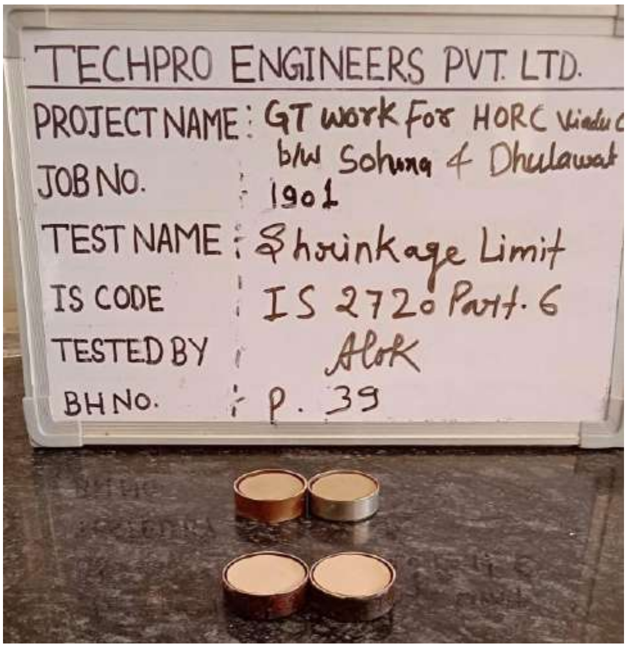
Triaxial test

UCS test soil

Grain size analysis

APPENDIX-J
LABORATORY PHOTOGRAPHS

Atterbergs' limit test

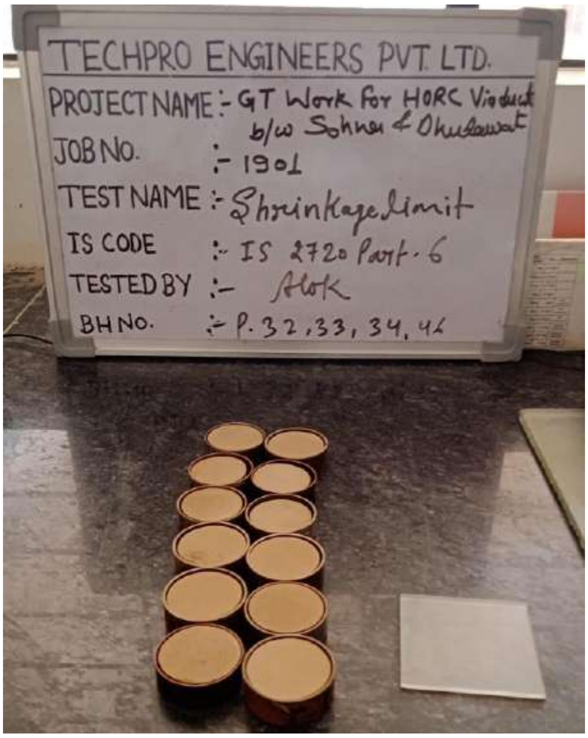


Triaxial test

UCS test soil

Direct shear test

APPENDIX-J
LABORATORY PHOTOGRAPHS

 Shrinkage limit test	 Atterbergs' limit test
 Direct shear test	 Tri-axial test

APPENDIX-K
CHART 1: FIELD BORELOG CHARTS (P21)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date:	28.12.2021

Project Name:	GTW for HORC viaduct B/w SohanaDhulawal Station			Project Code:	1901
Coordinate:	N: 3118970.246	E: 709087.747		Location/ Chainage:	91466.0870
Method of Drilling:	Percussion	Drilling Equipment	Auto Trip Powerwinch	Bore No.:	P.21
Casing Lowered (M):	23.00	Bentonite Used: yes	Standard Sampler: yes	Barrel Type:	NA
Ground Elevation:	R.L-191.644	Date: From 15/12/23 to 19/12/23		Water Table (M):	1.60

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
15/12/23	0.0	0.50	0.50	DS	8X	Collected										Non Cohesive Soil
"	1.00	1.45	0.45	U	"	Received										do
"	2.00	2.45	0.45	DP	"	2	3	3	6							do
"	3.00	3.45	0.45	DP	"	2	4	4	8							do
"	4.00	4.45	0.45	U	"	Slipped										DS Collect
"	5.00	5.45	0.45	DP	"	9	4	7	11							Non Cohesiv Soil
"	6.00	6.45	0.45	DP	"	3	4	6	10							do
"	7.00	7.45	0.45	U	"	Slipped										DS Collect
16/12/23	8.00	8.45	0.45	DP	"	4	6	8	14							Non Cohesive Soil
"	9.00	9.45	0.45	DP	"	6	7	8	15							Cohesive Soil with gravel
"	10.00	10.45	0.45	U	"	Received										Non Cohesive Soil
"	11.00	11.45	0.45	DP	"	3	5	7	12							Cohesive Soil with gravel
"	12.00	12.45	0.45	DP	"	4	7	11	18							do
"	13.00	13.45	0.45	U	"	Received										do
"	14.50	14.95	0.45	DP	"	6	10	13	23							do
"	16.00	16.45	0.45	U	"	Received										do
"	17.50	17.95	0.45	DP	"	7	10	15	25							Cohesive Soil with
17/12/23	19.00	19.45	0.45	U	"	Received										gravel
"	20.50	20.95	0.45	DP	"	9	11	16	27							do
"	22.00	22.45	0.45	U	"	Received										do
"	23.50	23.95	0.45	DP	"	8	11	15	26							do
"	25.00	25.45	0.45	U	"	Received										do
"	26.50	26.95	0.45	DP	"	18	35	41	76							Cohesive Soil with gravel
"	28.00	28.45	0.45	DP	"	17	28	32	60							do

Supervisor Lalaleuyadav

Techpro Engineers Pvt. Kanpur

E-in-C

Abbreviation Used: U- Undisturbed Sample, C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 2: FIELD BORELOG CHARTS (P21)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name: GTI(c) for Horc viaduct B/w Sohana Dhulawat Station		Project Code:	1901
Coordinate: N: 3118970.246	E: 702087.747	Location/ Chainage:	21466.0870
Method of Drilling: Percussion	Drilling Equipment: Auto Trip Powerwinch	Bore No.:	P.21
Casing Lowered (M): 29.00 Bentonite Used: Yes	Standard Sampler:	Barrel Type:	NA
Ground Elevation: R.L-191.644	Date: From 15/12/23 to 19/12/23	Water Table (M):	1.60

Day	Depth/RUN (m)		Length(m)	Nature of sample	Hole Size	SPT Record				Run Time		C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
	From	To				0-15cm	15-30cm	30-45cm	N Value	Start	End					
18/12/23	29.50	29.95	0.45	DP	Sx	9	20	35	55							Cohesive Soil with
11	31.00	31.45	0.45	DP	11	19	25	35	60							do gravel
11	32.50	32.95	0.45	DP	11	14	28	35	63							do
11	34.00	34.45	0.45	DP	11	13	25	38	63							do
11	35.50	35.95	0.45	DP	11	14	27	32	59							do
19/12/23	37.00	37.45	0.45	DP	11	13	28	38	66							do
11	38.50	38.95	0.45	DP	11	11	24	34	58							Cohesive soil with gravel
11	40.00	40.45	0.45	DP	11	21	32	42	74							do

Supervisor Laldev yadav

Techpro Engineers Pvt. Kanpur

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100) Sampler means SPT sampler

APPENDIX-K
CHART 3: FIELD BORELOG CHARTS (P22)

TECHPRO ENGINEERS PVT. LTD. — **BORE/ DRILL LOG**

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date.:	28.12.2021

Project Name:	GITW-HORC Viaduct b/w Sohana Dhulawat station	**Project Code:**	1901
Coordinate:	N: 3118973.876 E: 702061.713	**Location/ Chainage:**	21492.2870
Method of Drilling:	Percussion	**Drilling Equipment:**	Manual Powerwinch
Bore No.:	P22	**Casing Lowered (M):**	12.00
Bentonite Used:	Yes	**Standard Sampler:**	Yes
Barrel Type:	N/A	**Ground Elevation:**	R.L-191.995
Date: From	15/12/23 to 19/12/23	**Water Table (M):**	1.55

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
15/12/23	0.00	0.50	0.50	DS	SX	collected										Non-cohesive soil
	1.00	1.45	0.45	DP	"	2	3	5	8							— do —
"	2.00	2.45	0.45	U	"	Received										— do —
"	3.00	3.45	0.45	DP	"	4	6	8	14							— do —
"	4.00	4.45	0.45	DP	"	5	7	9	16							— do —
"	5.00	5.45	0.45	U	"	slipped										— do —
"	6.00	6.45	0.45	DP	"	6	7	10	17							— do —
"	7.00	7.45	0.45	DP	"	6	13	15	28							— do —
"	8.00	8.45	0.45	U	"	slipped										-do- DS collected
"	9.00	9.45	0.45	DP	"	4	6	7	13							cohesive soil
"	10.00	10.45	0.45	DP	"	5	8	12	20							— do —
"	11.00	11.45	0.45	U	"	Received										cohesive soil with gravel
"	12.50	12.95	0.45	DP	"	6	13	18	31							— do —
"	14.00	14.45	0.45	U	"	Received										— do —
"	15.50	15.95	0.45	DP	"	14	20	27	47							— do —
"	17.00	17.45	0.45	U	"	slipped										-do- DS collected
17/12/23	18.50	18.95	0.45	DP	"	5	12	19	31							cohesive soil with gravel
	20.00	20.45	0.45	U	"	Received										— do —
"	21.50	21.95	0.45	DP	"	8	15	21	36							— do —
"	23.00	23.45	0.45	U	"	slipped										-do- DS collected
"	24.50	24.95	0.45	DP	"	10	20	27	47							cohesive soil with gravel
"	26.00	26.45	0.45	U	"	slipped										-do- DS collected
"	27.50	27.95	0.45	DP	"	12	25	30	55							cohesive soil with gravel
"	29.00	29.45	0.45	DP	"	13	26	36	62							— do —

Aftab
Supervisor

Techpro Engineers Pvt. Ltd. Kanpur

Engineer-in-Charge

Abbreviation Used: U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 4: FIELD BORELOG CHARTS (P22)

TECHPRO ENGINEERS PVT. LTD. — BORE/ DRILL LOG

Doc. No.	[illegible]
Date of Issue	01.08.2012
Rev. No.	[illegible]
Rev. Date	22.12.2021

Project Name:	GTW-HORC Viaduct b/w Sohana Dhulawat station	Project Code:	1901
Coordinate:	N:3118973.076 / E:702061.713	Location/ Chainage:	31493.3870
Method of Drilling:	Percussion / Drilling Equipment: Manual Percussion	Bore No.:	P22
Casing Lowered (M):	12.00 / Bentonite Used: Yes / Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation:	R.L-191.995 / Date: From 17/12/23 to 19/12/23	Water Table (M):	1.55

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
17/12/23	30.50	30.95	0.45	DP	SX	17	27	40	67							Non-cohesive soil with gravel
	32.00	32.45	0.45	DP	"	14	25	38	63							Non-cohesive soil
"	33.50	33.95	0.45	DP	"	13	24	35	59							— do —
"	35.00	35.45	0.45	DP	"	13	33	26	59							— do —
"	36.50	36.95	0.45	DP	"	16	27	39	66							— do —
19/12/23	38.00	38.45	0.45	DP	"	15	25	35	60							— do —
"	40.00	40.45	0.45	DP	"	14	22	37	59							— do —

Supervisor

E-In-C

Abbreviation Used: U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100). Sampler means SPT sampler

Techpro Engineers Pvt. Ltd. Kanpur

APPENDIX-K

CHART 5: FIELD BORELOG CHARTS (P23)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GIW-HORC Viaduct b/w Sohana Dhulawat station	Project Code:	1901
Coordinate:	N:3118957.327 E:702035.737	Location/ Chainage:	21518.4870
Method of Drilling:	Percussion; Drilling Equipment: Manhual Power winch	Bore No.:	P23
Casing Lowered (M):	12.00; Bentonite Used: Yes; Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation:	R.L-192.094; Date: From 13/12/23 to 15/12/23	Water Table (M):	1.60

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
13/12/23	0.00	0.50	0.50	DS	SX	collected										Non-cohesive soil
	1.00	1.45	0.45	DP	"	3	3	5	8							Cohesive soil with gravel
"	2.00	2.45	0.45	U	"	Received										do
"	3.00	3.45	0.45	DP	"	2	3	7	10							do
"	4.00	4.45	0.45	DP	"	5	8	12	20							Non-cohesive soil
"	5.00	5.45	0.45	U	"	slipped										do
"	6.00	6.45	0.45	DP	"	6	7	14	21							do
"	7.00	7.45	0.45	DP	"	7	11	16	27							do
"	8.00	8.45	0.45	U	"	slipped										do
"	9.00	9.45	0.45	DP	"	5	10	13	23							do
"	10.00	10.45	0.45	DP	"	4	8	10	18							Cohesive soil with gravel
"	11.00	11.45	0.45	U	"	Received										do
"	12.50	12.95	0.45	DP	"	6	11	15	26							do
"	14.00	14.45	0.45	U	"	Received										do
"	15.50	15.95	0.45	DP	"	8	13	20	33							do
"	17.00	17.45	0.45	U	"	Received										do
"	18.50	18.95	0.45	DP	"	5	9	13	22							do
"	20.00	20.45	0.45	U	"	Received										do
14/12/23	21.50	21.95	0.45	DP	"	8	14	20	34							do
	23.00	23.45	0.45	U	"	slipped										do
"	24.50	24.95	0.45	DP	"	10	14	22	36							do
"	26.00	26.45	0.45	U	"	slipped										do
"	27.50	27.95	0.45	DP	"	13	27	34	61							do
"	29.00	29.45	0.45	DP	"	14	30	42	72							do

Supervisor

Engineer

Techpro Engineers Pvt. Ltd. Kanpur

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 6: FIELD BORELOG CHARTS (P23)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/03
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW-HORC Viaduct b/w Sohana Dhulawat station			Project Code:	1901
Coordinate:	N:3118957.327	E:702035.737	Location/ Chainage: 91510.4870		
Method of Drilling:	Percussion	Drilling Equipment:	Manual Powerwinch	Bore No.:	P23
Casing Lowered (M):	12.00	Bentonite Used: Yes	Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation:	R.L-192.094	Date: From 13/12/23 to 15/12/23		Water Table (M):	1.60

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
14/12/23	30.50	30.95	0.45	DP	SX	10	22	40	62							Cohesive soil with gravel
	32.00	32.45	0.45	DP	"	11	28	47	75							—do—
"	33.50	33.95	0.45	DP	"	12	18	44	62							—do—
"	35.00	35.45	0.45	DP	"	17	23	35	58							Non-cohesive soil
"	36.50	36.95	0.45	DP	"	14	25	34	59							—do—
15/12/23	38.00	38.45	0.45	DP	"	20	33	40	73							—do—
"	40.00	40.45	0.45	DP	"	19	35	45	80							—do—

Nitesh
Supervisor

Techpro Engineers Pvt. Ltd.

E-In-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 7: FIELD BORELOG CHARTS (P24)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GT. For HORC Viaduct b/w Sohana Dhulawat station			Project Code:	1901
Coordinate:	N: 3118982.298	E: 702009.821		Location/ Chainage:	21544.6870
Method of Drilling:	Percussion	Drilling Equipment	Powerwinch	Bore No.:	P24
Casing Lowered (M):	19.00	Bentonite Used: Yes	Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation:	RL-193.043	Date: From 24/09/23 to 27/9/23		Water Table (M):	1.40

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT 0-15cm	SPT 15-30cm	SPT 30-45cm	N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
	0.0	0.50	0.50	DS	SX	Received										Brownish soil
	1.00	1.45	0.45	DP	"	1	2	2	4							Non-cohesive soil with Gra
	2.00	2.45	0.45	U	"	Received										— do —
	3.00	3.45	0.45	DP	"	5	6	8	14							Non-cohesive
	4.00	4.45	0.45	DP	"	6	8	10	18							— do —
	5.00	5.45	0.45	U	"	Slipped										— do —
	6.00	6.45	0.45	DP	"	3	5	7	12							— do —
	7.00	7.45	0.45	DP	"	4	7	12	19							— do —
	8.00	8.45	0.45	U	"	Received										— do —
	9.00	9.45	0.45	DP	"	5	9	14	23							— do —
	10.00	10.45	0.45	DP	"	6	10	16	26							— do —
	11.00	11.45	0.45	U	"	Received										— do —
	12.50	12.95	0.45	DP	"	6	11	17	28							— do —
	14.00	14.45	0.45	U	"	Received										Brownish / Light Brownish
	15.50	15.95	0.45	DP	"	4	8	10	18							Non-cohesive / Yellowish soil
	17.00	17.45	0.45	U	"	Received										Cohesive soil with Gravel
	18.50	18.95	0.45	DP	"	5	10	12	22							— do —
	20.00	20.45	0.45	U	"	Received										— do —
	21.50	21.95	0.45	DP	"	8	15	20	35							— do —
	23.00	23.45	0.45	U	"	Received										— do —
	24.50	24.95	0.45	DP	"	9	16	16	32							— do — / Yellowish soil
	26.00	26.45	0.45	U	"	Received										Cohesive soil
	27.50	27.95	0.45	DP	"	10	18	20	38							— do —
	29.00	29.45	0.45	U	"	Received										— do —

Supervisor E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 8: FIELD BORELOG CHARTS (P24)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GT for HORC Viaduct b/w Sohana Dhulawat station			Project Code:	1901
Coordinate:	N: 3118982.298	E: 702009.821		Location/ Chainage:	21544.6870
Method of Drilling:	Percussion	Drilling Equipment	Powerwinch	Bore No.:	P24
Casing Lowered (M):	19.00	Bentonite Used: Yes	Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation:	RL-192.043	Date: From 24/09/23 to 27/9/23		Water Table (M):	1.40

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
	30.50	30.95	0.45	DP		10	15	18	33							— do —
	32.00	32.45	0.45	U		slipped										— do —
	33.50	33.95	0.45	DP		11	18	21	39							— do —
	35.00	35.45	0.45	U		slipped										Non-cohesive soil Brownish
	36.50	36.95	0.45	DP		12	14	22	36							— do —
	38.00	38.45	0.45	U		slipped										— do —
	40.00	40.45	0.45	DP		17	24	45	69							— do —

Jitender Prashar

Supervisor | E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 9: FIELD BORELOG CHARTS (P25)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/003
		Date of Issue	01.04.2018
		Rev. No.:	R03
		Rev. Date:	28.12.2021

Project Name:	GTW-HORC Viaduct b/w Sohana Dhulawat station			Project Code:	1901
Coordinate:	N: 3118987.279	E: 701983.963		Location/ Chainage:	21570.2870
Method of Drilling:	Percussion	Drilling Equipment:	Automatic powerwinch	Bore No.:	P25
Casing Lowered (M):	18.00	Bentonite Used: Yes	Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation:	RL-191.29	Date: From 14/12/23 to 26/12/23		Water Table (M):	1.60

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
14/12/23	0.00	0.50	0.50	DS	SX	collected										Non-cohesive soil
	1.00	1.45	0.45	DP	"	1	1	3	4							Non-cohesive soil with gravel
"	2.00	2.45	0.45	U	"	Received										— do —
"	3.00	3.45	0.45	DP	"	5	7	8	15							Non-cohesive soil
"	4.00	4.45	0.45	DP	"	5	8	10	18							— do —
"	5.00	5.45	0.45	U	"	slipped										— do —
"	6.00	6.45	0.45	DP	"	6	9	12	21							— do —
"	7.00	7.45	0.45	DP	"	7	10	14	24							— do —
"	8.00	8.45	0.45	U	"	slipped										— do —
"	9.00	9.45	0.45	DP	"	4	5	9	14							cohesive soil with gravel
"	10.00	10.45	0.45	DP	"	5	8	10	18							— do —
"	11.00	11.45	0.45	U	"	Received										— do —
"	12.50	12.95	0.45	DP	"	6	10	16	26							— do —
"	14.00	14.45	0.45	U	"	Received										— do —
"	15.50	15.95	0.45	DP	"	6	9	12	21							— do —
"	17.00	17.45	0.45	U	"	Received										— do —
"	18.50	18.95	0.45	DP	"	7	9	14	23							— do —
"	20.00	20.45	0.45	U	"	Received										— do —
"	21.50	21.95	0.45	DP	"	9	16	22	38							— do —
15/12/23	23.00	23.45	0.45	U	"	slipped										— do —
	24.50	24.95	0.45	DP	"	13	23	25	48							— do —
"	26.00	26.45	0.45	U	"	slipped										— do —
"	27.50	27.95	0.45	DP	"	11	25	35	60							— do —
"	29.00	29.45	0.45	DP	"	15	31	43	74							— do —

Nifesh
Supervisor

Techpro Engineers Pvt. Ltd.

SE - In - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K

CHART 10: FIELD BORELOG CHARTS (P25)

TECHPRO ENGINEERS PVT. LTD. | **BORE/ DRILL LOG**

Doc No:	GT/003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date.:	28.12.2021

Project Name:	GT-HORC Viaduct b/w Sohana Dhulawat station	**Project Code:**	1901
Coordinate:	N:3118987.279 E:701983.963	**Location/ Chainage:**	21540.2870
Method of Drilling:	Percussion	**Drilling Equipment:**	Powerwinch
Casing Lowered (M):	18.00 **Bentonite Used:** Yes	**Standard Sampler:**	Yes
Bore No.:	P25	**Barrel Type:**	N/A
Ground Elevation:	R.L-191.29 **Date: From** 14/12/23 **to** 16/12/23	**Water Table (M):**	1.60

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
15/12/23	30.50	30.95	0.45	DP	SX	15	28	32	60							Cohesive soil with gravel
	32.00	32.45	0.45	DP	"	12	25	30	55							—do—
"	33.50	33.95	0.45	DP	"	14	20	35	55							—do—
"	35.00	35.45	0.45	DP	"	16	22	37	59							—do—
16/12/23	36.50	36.95	0.45	DP	"	15	25	38	63							—do—
"	38.00	38.45	0.45	DP	"	17	30	39	69							—do—
"	40.00	40.45	0.45	DP	"	21	34	45	79							—do—

Nitesh
Supervisor

Techpro Engineers Pvt. Ltd.

In - C

Abbreviation Used: U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 11: FIELD BORELOG CHARTS (P26)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW FOR HORC Viaduct B/w Sohana Dhulawat station	Project Code:	1901
Coordinate: N: 3118992.792	E: 701958.272	Location/ Chainage:	21597.0870
Method of Drilling: Rotary	Drilling Equipment: manual T/Mounted	Bore No.:	P-26
Casing Lowered (M): — Bentonite Used: —	Standard Sampler: Yes.	Barrel Type:	NA
Ground Elevation: R.L - 192.09	Date: From 12/12/23 to 14/12/23	Water Table (M):	1.70

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
12/12/23	0.00	0.50	0.50	D	SX	collected				—	—	—	—	—	—	Non cohesive soil
"	1.00	1.45	0.45	DP	"	4	5	7	12	—	—	—	—	—	—	do
"	2.00	2.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	3.00	3.45	0.45	DP	"	5	8	9	17	—	—	—	—	—	—	Non Cohesive soil.
"	4.00	4.45	0.45	DP	"	6	10	11	22	—	—	—	—	—	—	do
"	5.00	5.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	6.00	6.45	0.45	DP	"	6	9	14	23	—	—	—	—	—	—	do
"	7.00	7.45	0.45	DP	"	7	10	15	25	—	—	—	—	—	—	do
"	8.00	8.45	0.45	U	"	Received				—	—	—	—	—	—	Cohesive soil
"	9.00	9.45	0.45	DP	"	6	8	11	19	—	—	—	—	—	—	do
"	10.00	10.45	0.45	DP	"	8	11	15	26	—	—	—	—	—	—	do
"	11.00	11.45	0.45	U/D	"	slipped				—	—	—	—	—	—	do
"	12.50	12.95	0.45	DP	"	12	15	18	33	—	—	—	—	—	—	do
"	14.00	14.45	0.45	U	"	Received				—	—	—	—	—	—	Cohesive soil
"	15.50	15.95	0.45	DP	"	10	15	20	35	—	—	—	—	—	—	do
"	17.00	17.45	0.45	U	"	Received				—	—	—	—	—	—	do
13/12/23	18.50	18.95	0.45	DP	"	15	21	25	36	—	—	—	—	—	—	Cohesive soil
"	20.00	20.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	21.50	21.95	0.45	DP	"	10	15	21	36	—	—	—	—	—	—	do
"	23.00	23.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	24.50	24.95	0.45	DP	"	9	18	28	46	—	—	—	—	—	—	Cohesive soil with Gravel
"	26.00	26.45	0.45	U	"	slipped				—	—	—	—	—	—	do
"	27.50	27.95	0.45	DP	"	16	30	34	64	—	—	—	—	—	—	cohesive soil with Gravel
"	29.00	29.45	0.45	DP	"	13	32	37	69	—	—	—	—	—	—	do

Supervisor

Techpro Engineers Pvt.

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 12: FIELD BORELOG CHARTS (P26)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW FOR HORC Viaduct B/W Sohana Dhulawat station	Project Code:	1901
Coordinate:	N: 3118992.792 E: 701958.272	Location/ Chainage:	21597.0870
Method of Drilling:	Rotary	Drilling Equipment:	Manual T/Mounted
Bore No.:	P-26		
Casing Lowered (M):	— Bentonite Used: —	Standard Sampler:	Yes
Barrel Type:	NA		
Ground Elevation:	R.L-192.09	Date: From	12/12/23 to 14/12/23
Water Table (M):	1.70		

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
13/12/23	30.50	30.95	0.45	DP	SX	15	35	40	75	—	—	—	—	—	—	Non cohesive soil
"	32.00	32.45	0.45	DP	"	26	45	55	100	—	—	—	—	—	—	do
"	33.50	33.95	0.45	DP	"	29	38	45	83	—	—	—	—	—	—	do
"	35.00	35.45	0.45	DP	"	18	25	38	63	—	—	—	—	—	—	do
14/12/23	36.50	36.95	0.45	DP	"	15	27	35	62	—	—	—	—	—	—	Cohesive soil
"	38.00	38.45	0.45	DP	"	17	32	39	71	—	—	—	—	—	—	Cohesive soil with Gravel
"	40.00	40.30	0.30	DP	"	32	100	—	100	—	—	—	—	—	—	do

Supervisor

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 13: FIELD BORELOG CHARTS (P27)

TECHPRO ENGINEERS PVT. LTD. — **BORE/ DRILL LOG**

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date.:	28.12.2021

Project Name: GTI FOR HORC Viaduct B/W Sohana Dhulawat Station — Project Code: 1901

Coordinate: N: 3118998.866 E: 701932.61 — Location/ Chainage: 91623.2870

Method of Drilling: Percussion — Drilling Equipment: Manual Power Winch — Bore No.: P.27

Casing Lowered (M): 94.00 — Bentonite Used: NO — Standard Sampler: Yes — Barrel Type: NA

Ground Elevation: RL-191.906 — Date: From 17/11/23 to 20/11/23 — Water Table (M): 2.40

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
17/11/23	0.0	0.50	0.50	DS	SX	Collected										Non Cohesive Soil
〃	1.00	1.45	0.45	DP	〃	2	2	3	5							do
〃	2.00	2.45	0.45	U	〃	Received										do
〃	3.00	3.45	0.45	DP	〃	3	4	6	10							do
〃	4.00	4.45	0.45	DP	〃	5	6	8	14							do
〃	5.00	5.45	0.45	U	〃	Received										do
〃	6.00	6.45	0.45	DP	〃	6	8	11	19							do
〃	7.00	7.45	0.45	DP	〃	5	7	12	19							do
〃	8.00	8.45	0.45	U	〃	Slipped										do
〃	9.00	9.45	0.45	DP	〃	3	6	8	14							Non Cohesive Soil
〃	10.00	10.45	0.45	DP	〃	4	6	10	16							do
〃	11.00	11.45	0.45	U	〃	Received										do
〃	12.50	12.95	0.45	DP	〃	6	9	11	20							do
18/11/23	14.00	14.45	0.45	U	〃	Received										do
〃	15.50	15.95	0.45	DP	〃	7	9	12	21							do
〃	17.00	17.45	0.45	U	〃	Received										Non Cohesive Soil
〃	18.50	18.95	0.45	DP	〃	8	12	18	30							do
〃	20.00	20.45	0.45	U	〃	Received										do
〃	21.50	21.95	0.45	DP	〃	7	13	25	38							do
〃	23.00	23.45	0.45	U	〃	Received										do
〃	24.50	24.95	0.45	DP	〃	10	14	29	43							do
〃	26.00	26.45	0.45	U	〃	Received										Cohesive Soil
19/11/23	27.50	27.95	0.45	DP	〃	12	25	34	59							do
〃	29.00	29.45	0.45	DP	〃	18	23	32	55							do

Supervisor Jaldev yadav — Techpro Engineers Pvt. Ltd. — E-In-C

Abbreviation Used: U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 14: FIELD BORELOG CHARTS (P27)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW FOR HORC viaduct B/w Sohana Dhulawat Station	Project Code:	1901
Coordinate:	N: 3118998.866 E: 701932.61	Location/ Chainage:	21623.2870
Method of Drilling:	Percussion; Drilling Equipment: manual Power winch	Bore No.:	P.27
Casing Lowered (M):	24.00; Bentonite Used: NO; Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation:	R.L-191.906; Date: From 17/11/23 to 20/11/23	Water Table (M):	2.40

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
19/11/23	30.50	30.95	0.45	DP	SX	22	30	38	68							Cohesive Soil
"	32.00	32.45	0.45	DP	"	18	26	32	58							Non Cohesive Soil
"	33.50	33.95	0.45	DP	"	16	24	34	58							d/o
"	35.00	35.45	0.45	DP	"	17	24	28	52							d/o
"	36.50	36.95	0.45	DP	"	18	23	35	58							d/o
20/11/23	38.00	38.45	0.45	DP	"	13	28	31	59							d/o
"	40.00	40.45	0.45	DP	"	14	21	35	56							d/o

Supervisor Laldev yadav

Techpro Engineers Pvt. Ltd.

S.E. Civil

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100). Sampler means SPT sampler

APPENDIX-K
CHART 15: FIELD BORELOG CHARTS (P28)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTG For HORC Viaduct B/w Sohana Dhulawal Station	Project Code:	1901
Coordinate: N: 3119005.48	E: 701907.194	Location/ Chainage:	31649.4870
Method of Drilling: Percussion	Drilling Equipment: Auto Trip Powerwinch	Bore No.:	P.28
Casing Lowered (M): 13.50 / Bentonite Used: Yes	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation: R.L - 191.559	Date: From 17/11/23 to 20/11/23	Water Table (M):	2.30

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
17/11/23	0.0	0.50	0.50	DS	SX	Collected										Non Cohesive Soil
〃	1.00	1.45	0.45	DP	〃	1	2	2	4							do
〃	2.00	2.45	0.45	U	〃	Received										do
〃	3.00	3.45	0.45	DP	〃	2	3	3	6							Non Cohesive Soil
〃	4.00	4.45	0.45	DP	〃	3	6	8	14							do
〃	5.00	5.45	0.45	U	〃	Received										do
〃	6.00	6.45	0.45	DP	〃	6	12	17	29							do
〃	7.00	7.45	0.45	DP	〃	6	11	15	26							do
〃	8.00	8.45	0.45	U	〃	Slipped										DS Collect
〃	9.00	9.45	0.45	DP	〃	5	13	18	31							do
〃	10.00	10.45	0.45	DP	〃	4	12	14	26							do
〃	11.00	11.45	0.45	U	〃	Received										Non Cohesive Soil
〃	12.50	12.95	0.45	DP	〃	5	7	9	16							Non Cohesive Soil
〃	14.00	14.45	0.45	U	〃	Received										with gravel
18/11/23	15.50	15.95	0.45	DP	〃	5	8	16	24							do
〃	17.00	17.45	0.45	U	〃	Received										do
〃	18.50	18.95	0.45	DP	〃	7	13	18	31							do
〃	20.00	20.45	0.45	U	〃	Received										do
〃	21.50	21.95	0.45	DP	〃	18	28	32	60							Non Cohesive Soil
〃	23.00	23.45	0.45	DP	〃	13	23	35	58							do
〃	24.50	24.95	0.45	DP	〃	14	22	28	50							do
〃	26.00	26.45	0.45	U	〃	Slipped										DS Collect
19/11/23	27.50	27.95	0.45	DP	〃	18	23	32	55							Cohesive Soil
〃	29.00	29.45	0.45	DP	〃	21	29	38	67							do

Supervisor Lal Yadav

E - In - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K

CHART 16: FIELD BORELOG CHARTS (P28)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW for Horc viaduct B/W Sohana Dhulawat Station			Project Code:	1901
Coordinate:	N: 3119005.45	E: 701907.194	Location/ Chainage: 91649.4870		
Method of Drilling:	Percussion	Drilling Equipment	Auto Trip Powerwinch	Bore No.:	P.28
Casing Lowered (M):	13.50	Bentonite Used: NO	Standard Sampler : Yes	Barrel Type :	NA
Ground Elevation:	R.L-191.559	Date: From 17/11/23 to 20/11/23		Water Table (M):	2.30

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
19/11/23	30.50	30.95	0.45	DP	8x	17	26	35	61							Non Cohesive Soil
"	32.00	32.45	0.45	DP	"	13	28	36	64							-do-
"	33.50	33.95	0.45	DP	"	11	21	32	53							-do-
"	35.00	35.45	0.45	DP	"	18	25	35	60							-do-
20/11/23	36.50	36.95	0.45	DP	"	14	22	38	60							-do-
"	38.00	38.45	0.45	DP	"	21	32	36	68							-do-
"	40.00	40.45	0.45	DP	"	17	22	32	54							Non Cohesive Soil

Supervisor Lakhan yadav

E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 17: FIELD BORELOG CHARTS (P29)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name: RITES for HORC viaduct B/w Sohana & Dhulawat Station				Project Code:	1901
Coordinate:	N: 3119012.591	E: 701881.838		Location/ Chainage:	21675.6870
Method of Drilling:	percussion	Drilling Equipment	Auto trip/ Power winch	Bore No.:	P-29
Casing Lowered (M):	19. m	Bentonite Used: Not.	Standard Sampler : Yes	Barrel Type :	N/A
Ground Elevation:	R.L-191.481	Date: From 16/11/2023 to 19/11/2023		Water Table (M):	1.40 M

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
16/11/23	0.00	0.50	0.50	D	SX	Collected										cohesive soil
"	1.00	1.45	0.45	U		Received										— do —
"	2.00	2.45	0.45	DP		2	3	5	8							Non cohesive soil
"	3.00	3.45	0.45	DP		2	3	6	9							— do —
"	4.00	4.45	0.45	U		Slipped										— do —
"	5.00	5.45	0.45	DP		3	4	6	10							— do —
"	6.00	6.45	0.45	DP		3	6	7	13							— do —
"	7.00	7.45	0.45	U		Received										— do —
"	8.00	8.45	0.45	DP		6	11	13	24							— do —
"	9.00	9.45	0.45	DP		6	10	11	21							— do —
"	10.00	10.45	0.45	U		Slipped										— do —
"	11.00	11.45	0.45	DP		4	7	9	16							cohesive soil
"	12.00	12.45	0.45	DP		6	8	12	20							— do —
"	13.00	13.45	0.45	U		Received										
"	14.50	14.95	0.45	DP		7	11	13	24							(Non) cohesive soil
17/11/23	16.00	16.45	0.45	U		Received										cohesive soil with gravel
"	17.50	17.95	0.45	DP		7	12	15	27							— do —
"	19.00	19.45	0.45	U		Received										do
"	20.50	20.95	0.45	DP		6	13	17	30							— do —
"	22.00	22.45	0.45	U		Received										Non cohesive soil
"	23.50	23.95	0.45	DP		8	16	18	34							cohesive soil
"	25.00	25.45	0.45	U		Slipped										— do —
"	26.50	26.95	0.45	DP		6	17	20	37							— do —
"	28.00	28.45	0.45	U		Received										— do —

Supervisor

Techpro Engineers Pvt. Ltd. Gurugram

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 18: FIELD BORELOG CHARTS (P29)

TECHPRO ENGINEERS PVT. LTD. — BORE/ DRILL LOG

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date.:	28.12.2021

Project Name: C.n T.w. for HORC Viaduct B/w Sohena & Dhulawat Staiton
Project Code: 1901
Coordinate: N: 3119012.591 E: 701881.838 Location/ Chainage: 21675.6870
Method of Drilling: Percussion Drilling Equipment: Auto Trip Power winch Bore No.: P-29
Casing Lowered (M): 19.m Bentonite Used: No Standard Sampler: YES Barrel Type: N/A
Ground Elevation: R.L-191.481 Date: From 16/11/2023 to 19/11/2023 Water Table (M): 1.40.m

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT 0-15cm	SPT 15-30cm	SPT 30-45cm	N Value	Run Time Start	End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
18/11/23	29.50	29.95	0.45	DP	SX	7	17	22	39							cohesive soil
18/11/23	31.00	31.45	0.45	U		Received										— do —
11	32.50	32.95	0.45	DP		11	24	27	51							— do —
11	34.00	34.45	0.45	DP		15	30	31	61							— do —
11	35.50	35.95	0.45	DP		14	27	30	57							Non cohesive soil
19/11/23	37.00	37.45	0.45	DP		16	26	28	54							— do —
11	38.50	38.95	0.45	DP		15	24	28	52							— do —
11	40.00	40.45	0.45	DP		19	29	31	60							— do —

Supervisor

Techpro Engineers Pvt. Ltd. Kanpur

S.E-C(vil) E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 19: FIELD BORELOG CHARTS (P30)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG		Doc No:	GT/ 003
			Date of Issue:	01.04.2018
			Rev. No.:	R03
			Rev. Date.:	28.12.2021
Project Name:	GT Work For HORC Viaduct B/w Sohana & Dhulawat Station		Project Code:	1901
Coordinate:	N: 3119020.255	E: 70185.6.668	Location/ Chainage:	21701.8870
Method of Drilling:	Percussion	Drilling Equipment: Power winch	Bore No.:	P30
Casing Lowered (M): 25 M	Bentonite Used: yes	Standard Sampler: yes	Barrel Type:	NA
Ground Elevation: RL	191.396	Date: From 25-9-23 to 27-9-23	Water Table (M):	1.50

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
1	0.0	0.50	0.50	D	SX	Collected				—	—	—	—	—	—	Non Cohesive Soil
"	1.00	1.45	0.45	U	—	Received				—	—	—	—	—	—	"
"	2.00	2.45	0.45	DP	—	2	2	3	5	—	—	—	—	—	—	"
"	3.00	3.45	0.45	DP	—	3	4	5	9	—	—	—	—	—	—	"
"	4.00	4.45	0.45	U	—	Received				—	—	—	—	—	—	"
"	5.00	5.45	0.45	DP	—	4	5	6	11	—	—	—	—	—	—	"
"	6.00	6.45	0.45	DP	—	3	5	7	12	—	—	—	—	—	—	"
"	7.00	7.45	0.45	U	—	Slipped				—	—	—	—	—	—	" / DS Collected
"	8.00	8.45	0.45	DP	—	4	6	8	14	—	—	—	—	—	—	"
"	9.00	9.45	0.45	DP	—	5	7	9	16	—	—	—	—	—	—	"
"	10.00	10.45	0.45	U	—	Received				—	—	—	—	—	—	Cohesive Soil
"	11.00	11.45	0.45	DP	—	4	7	8	15	—	—	—	—	—	—	"
"	12.00	12.45	0.45	DP	—	4	8	9	17	—	—	—	—	—	—	"
"	13.00	13.45	0.45	U	—	Received				—	—	—	—	—	—	"
"	14.50	14.95	0.45	DP	—	4	9	12	21	—	—	—	—	—	—	"
"	16.00	16.45	0.45	U	—	Received				—	—	—	—	—	—	Cohesive Soil with Gravel
"	17.50	17.95	0.45	DP	—	6	9	13	22	—	—	—	—	—	—	"
"	19.00	19.45	0.45	U	—	Received				—	—	—	—	—	—	"
"	20.50	20.95	0.45	DP	—	7	11	15	26	—	—	—	—	—	—	"
"	22.00	22.45	0.45	U	—	Slipped				—	—	—	—	—	—	" DS Collected
"	23.50	23.95	0.45	DP	—	6	10	13	23	—	—	—	—	—	—	"
"	25.00	25.45	0.45	U	—	Received				—	—	—	—	—	—	"
2	26.50	26.95	0.45	DP	—	5	9	13	22	—	—	—	—	—	—	"
"	28.00	28.45	0.45	U	—	Slipped				—	—	—	—	—	—	" DS Collected

C.P. Kashyap
Supervisor

E - in - C
S.F.

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 20: FIELD BORELOG CHARTS (P30)

TECHPRO ENGINEERS PVT. LTD. — BORE/ DRILL LOG

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date.:	28.12.2021

Project Name: GT Work For HORC Viaduct B/w Sohana & Dhulawat Station — Project Code: 1901

Coordinate: N: 3119020.255 E: 70185 6.668 — Location/ Chainage: 21701.8870

Method of Drilling: Percussion — Drilling Equipment: Power winch — Bore No.: P30

Casing Lowered (M): 25 M — Bentonite Used: Yes — Standard Sampler: Yes — Barrel Type: NA

Ground Elevation: RL 191.396 — Date: From 25-9-23 to 27-9-23 — Water Table (M): 1.50

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT 0-15cm	SPT 15-30cm	SPT 30-45cm	N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
2	29.50	29.95	0.45	DP	SX	6	11	15	26	–	–	–	–	–	–	Cohesive Soil with Gravel
"	31.00	31.45	0.45	U	–	Received				–	–	–	–	–	–	"
"	32.50	32.95	0.45	DP	–	8	14	18	32	–	–	–	–	–	–	"
3	34.00	34.45	0.45	U	–	Slipped				–	–	–	–	–	–	Non Cohesive Soil
4	35.50	35.95	0.45	DP	–	9	18	22	40	–	–	–	–	–	–	"
"	37.00	37.45	0.45	U	–	Slipped				–	–	–	–	–	–	"
"	38.50	38.95	0.45	DP	–	10	20	30	50	–	–	–	–	–	–	"
"	40.00	40.45	0.45	DP	–	11	23	36	59	–	–	–	–	–	–	"

Jitender Parashar

C.P Kashyap
Supervisor

Techpro Engineers Pvt. Ltd. Kanpur

E - in - C

S.E.

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 21: FIELD BORELOG CHARTS (P31)

TECHPRO ENGINEERS PVT. LTD. — **BORE/ DRILL LOG**

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date.:	28.12.2021

Project Name:	GTCO. for HORC Viaduct B/w Sohana & Dhulawat staiton	Project Code:	1901
Coordinate:	N: 3119028.461 E: 701881.622	Location/ Chainage:	21728.0870
Method of Drilling:	Percussion; Drilling Equipment: Autotsup Powerwinch	Bore No.:	P-31
Casing Lowered (M):	22.00; Bentonite Used: No; Standard Sampler: YES	Barrel Type:	N/A
Ground Elevation:	RL-191.259; Date: From 16/11/2023 to 23/11/2023	Water Table (M):	1.50.m

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
16/11/23	0.50	0.50	0.50	D	SX	Collected				–	–	–	–	–	–	cohesive soil
"	1.00	1.45	0.45	DP	–	1	2	2	4	–	–	–	–	–	–	— do —
"	2.00	2.45	0.45	U	–	Received				–	–	–	–	–	–	cohesive soil with gravel
"	3.00	3.45	0.45	DP	–	2	3	5	8	–	–	–	–	–	–	Non cohesive soil
"	4.00	4.45	0.45	DP	–	3	4	7	11	–	–	–	–	–	–	— do —
"	5.00	5.45	0.45	U	–	Received				–	–	–	–	–	–	— do —
"	6.00	6.45	0.45	DP	–	4	5	8	13	–	–	–	–	–	–	— do —
"	7.00	7.45	0.45	DP	–	4	7	10	17	–	–	–	–	–	–	— do —
"	8.00	8.45	0.45	U	–	Slipped				–	–	–	–	–	–	— do —
"	9.00	9.45	0.45	DP	–	6	9	13	22	–	–	–	–	–	–	cohesive soil
"	10.00	10.45	0.45	DP	–	7	10	14	24	–	–	–	–	–	–	— do —
"	11.00	11.45	0.45	U	–	Received				–	–	–	–	–	–	— do —
"	12.50	12.95	0.45	DP	–	6	11	14	25	–	–	–	–	–	–	— do —
"	14.00	14.45	0.45	U	–	Received				–	–	–	–	–	–	— do —
"	15.50	15.95	0.45	DP	–	9	9	12	21	–	–	–	–	–	–	— do —
"	17.00	17.45	0.45	U	–	Received				–	–	–	–	–	–	— do —
"	18.50	18.95	0.45	DP	–	7	11	15	26	–	–	–	–	–	–	— do —
22/11/23	20.00	20.45	0.45	U	–	Received				–	–	–	–	–	–	Non cohesive soil
"	21.50	21.95	0.45	DP	–	8	13	16	29	–	–	–	–	–	–	— do —
"	23.00	23.45	0.45	U	–	Received				–	–	–	–	–	–	— do —
"	24.50	24.95	0.45	DP	–	7	13	19	32	–	–	–	–	–	–	cohesive soil with gravel
23/11/23	26.00	26.45	0.45	U	–	Received				–	–	–	–	–	–	— do —
"	27.50	27.95	0.45	DP	–	16	27	30	57	–	–	–	–	–	–	— do —
"	29.00	29.45	0.45	DP	–	15	28	32	60	–	–	–	–	–	–	— do —

Hiera 21/4

Supervisor

S.E. Civil

E - in - C

Techpro Engineers Pvt. Ltd.

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 22: FIELD BORELOG CHARTS (P31)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name: GTW for HORC Viaduct B/w Sohana & Dhulawat station		Project Code:	1901
Coordinate: N: 3119028.461	E: 701831.622	Location/ Chainage:	21728.0870
Method of Drilling: Percussion	Drilling Equipment: Auto trip Power winch	Bore No.:	P-31
Casing Lowered (M): 22.00 Bentonite Used: No	Standard Sampler: YES	Barrel Type:	N/A
Ground Elevation: RL-191.259	Date: From 16/11/2023 to 23/11/2023	Water Table (M):	1.50 m

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
22/11/23	30.50	30.95	0.45	DP	–	13	26	29	55	–	–	–	–	–	–	cohesive soil with Gravel
〃	32.00	32.45	0.45	DP	–	11	25	27	52	–	–	–	–	–	–	– do –
〃	33.50	33.95	0.45	DP	–	13	24	29	53	–	–	–	–	–	–	– do –
23/11/23	35.00	35.45	0.45	DP	–	15	27	30	57	–	–	–	–	–	–	Non cohesive soil
〃	36.50	36.95	0.45	DP	–	17	30	32	62	–	–	–	–	–	–	– do –
〃	38.00	38.45	0.45	DP	–	16	28	31	59	–	–	–	–	–	–	– do –
〃	40.00	40.45	0.45	DP	–	19	31	34	65	–	–	–	–	–	–	– do –

23/11/2023
Supervisor

Techpro Engineers Pvt. Ltd.

S.E. 1901
E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 23: FIELD BORELOG CHARTS (P32)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTI FOR HORC Viaduct B/W Sohana Dhulawat Station			Project Code:	1901
Coordinate:	N: 3119037.179	E: 701806.797	Location/Chainage: 21754.2870		
Method of Drilling:	Rotery	Drilling Equipment:	Manual Tripod / Hidrolic	Bore No.:	P-32
Casing Lowered (M):	—	Bentonite Used: NA	Standard Sampler: Yes.	Barrel Type:	NA
Ground Elevation:	R.L-191.328	Date: From 06/11/23 to 9/11/23		Water Table (M):	1.30

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
6/11/23	0.00	0.50	0.50	D	SX	collected				—	—	—	—	—	—	Non cohesive soil
"	1.00	1.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	2.00	2.45	0.45	DP	"	1	2	2	4	—	—	—	—	—	—	do
"	3.00	3.45	0.45	DP	"	2	2	3	5	—	—	—	—	—	—	do
7/11/23	4.00	4.45	0.45	U/D	"	slipped				—	—	—	—	—	—	Non cohesive soil
"	5.00	5.45	0.45	DP	"	3	3	4	7	—	—	—	—	—	—	do
"	6.00	6.45	0.45	DP	"	3	4	5	9	—	—	—	—	—	—	do
"	7.00	7.45	0.45	U	"	slipped				—	—	—	—	—	—	do
"	8.00	8.45	0.45	DP	"	4	6	7	13	—	—	—	—	—	—	do
"	9.00	9.45	0.45	DP	"	5	8	9	17	—	—	—	—	—	—	do
"	10.00	10.45	0.45	U	"	Received				—	—	—	—	—	—	Non cohesive soil.
"	11.00	11.45	0.45	DP	SX	5	8	10	18	—	—	—	—	—	—	do
"	12.00	12.45	0.45	DP	"	6	10	12	22	—	—	—	—	—	—	do
"	13.00	13.45	0.45	U	"	slipped				—	—	—	—	—	—	do
"	14.50	14.95	0.45	DP	"	8	14	22	36	—	—	—	—	—	—	do
"	16.00	16.45	0.45	U	"	Received				—	—	—	—	—	—	Cohesive soil.
"	17.50	17.95	0.45	DP	"	5	9	10	19	—	—	—	—	—	—	Cohesive soil with Gravel
"	19.00	19.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	20.50	20.95	0.45	DP	"	11	18	20	38	—	—	—	—	—	—	do
"	22.00	22.45	0.45	U	"	Received				—	—	—	—	—	—	Cohesive soil with Gravel
"	23.50	23.95	0.45	DP	"	27	35	40	75	—	—	—	—	—	—	do
"	25.00	25.45	0.45	U	"	17	28	35	63	—	—	—	—	—	—	do
"	26.50	26.95	0.45	DP	"	21	32	39	71	—	—	—	—	—	—	do
8/11/23	28.00	28.45	0.45	U	"	19	35	40	75	—	—	—	—	—	—	do

Supervisor

Techpro Engineers Pvt. Kanpur

S.E-Civil

E - In - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 24: FIELD BORELOG CHARTS (P32)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name: GTW For HORC Viaduct B/W Sohana Dhulawat Station		Project Code:	1901
Coordinate: N: 3119037.179	E: 701806.797	Location/ Chainage:	21754.2870
Method of Drilling: Rotery	Drilling Equipment: Manual Tripod Hydrolic	Bore No.:	P-32
Casing Lowered (M): — Bentonite Used: NA	Standard Sampler: yes	Barrel Type:	NA
Ground Elevation: R.L- 191.328	Date: From 06/11/23 to 9/11/23	Water Table (M):	1.30

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
8/11/23	29.50	29.95	0.45	DP	SX	14	25	37	62	—	—	—	—	—	—	Cohesive soil with ~~Non~~ Gravel.
"	31.00	31.45	0.45	DP	"	20	42	60	102	—	—	—	—	—	—	do
"	32.50	32.95	0.45	DP	"	21	45	50	95	—	—	—	—	—	—	do
"	34.00	34.45	0.45	DP	"	32	48	55	103	—	—	—	—	—	—	Non cohesive soil
9/11/23	35.50	35.95	0.45	DP	"	22	40	47	87	—	—	—	—	—	—	do
"	37.00	37.45	0.45	DP	"	25	43	48	91	—	—	—	—	—	—	Cohesive soil with Gravel
"	38.50	38.95	0.45	DP	"	27	38	45	93	—	—	—	—	—	—	do
"	40.00	40.45	0.45	DP	"	14	19	37	56	—	—	—	—	—	—	do

Supervisor

Techpro Engineers Pvt. Ltd. Kanpur

Engin - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K

CHART 25: FIELD BORELOG CHARTS (P33)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date:	28.12.2021

Project Name:	GTW FOR HORC Viaduct b/w Sohana Dhulawat station	Project Code:	1901
Coordinate: N: 3119046.389	E: 701782.232	Location/ Chainage:	21780.4870
Method of Drilling: Rotary	Drilling Equipment: Hydraulic	Bore No.:	P 33
Casing Lowered (M): 1.95 / Bentonite Used: NA	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation: R.L-191.287	Date: From 06/11/23 to 8/11/23	Water Table (M):	1.25

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
06/11/23	0.00	0.50	0.50	D	SX	Collected				–	–	–	–	–	–	Non cohesive soil
"	1.00	1.45	0.45	U	"	Received				–	–	–	–	–	–	do
"	2.00	2.45	0.45	DP	"	2	2	3	5	–	–	–	–	–	–	do
"	3.00	3.45	0.45	DP	"	2	3	4	7	–	–	–	–	–	–	do
07/11/23	4.00	4.45	0.45	U	"	Received				–	–	–	–	–	–	Non cohesive soil
"	5.00	5.45	0.45	DP	"	3	4	6	10	–	–	–	–	–	–	do
"	6.00	6.45	0.45	DP	"	4	5	7	12	–	–	–	–	–	–	do
"	7.00	7.45	0.45	U	"	Received				–	–	–	–	–	–	do
"	8.00	8.45	0.45	DP	"	5	6	8	14	–	–	–	–	–	–	do
"	9.00	9.45	0.45	DP	"	4	9	11	20	–	–	–	–	–	–	cohesive soil
"	10.00	10.45	0.45	U	"	Received				–	–	–	–	–	–	do
"	11.00	11.45	0.45	DP	SX	11	14	16	30	–	–	–	–	–	–	Non cohesive soil
"	12.00	12.45	0.45	DP	"	9	12	17	29	–	–	–	–	–	–	do
"	13.00	13.45	0.45	U	"	Received				–	–	–	–	–	–	cohesive soil
"	14.50	14.95	0.45	DP	"	11	15	17	32	–	–	–	–	–	–	do
"	16.00	16.45	0.45	U	"	Received				–	–	–	–	–	–	do
"	17.50	17.95	0.45	DP	"	13	17	22	39	–	–	–	–	–	–	do
"	19.00	19.45	0.45	U	"	Received				–	–	–	–	–	–	cohesive soil with gravel
"	20.50	20.95	0.45	DP	"	15	19	23	42	–	–	–	–	–	–	do
"	22.00	22.45	0.45	U	"	Received				–	–	–	–	–	–	Non cohesive soil
"	23.50	23.95	0.45	DP	"	32	43	45	88	–	–	–	–	–	–	cohesive soil with gravel
"	25.00	25.45	0.45	U	"	32	35	40	75	–	–	–	–	–	–	do
"	26.50	26.95	0.45	DP	"	25	38	42	80	–	–	–	–	–	–	do
"	28.00	28.45	0.45	U	"	27	42	45	87	–	–	–	–	–	–	do

Supervisor

B-In-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test(N) > 100). Sampler means SPT sampler

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APPENDIX-K
CHART 26: FIELD BORELOG CHARTS (P33)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name: GTW For HORC Viaduct B/w Sohana Dhulawat station | Project Code: 1901

Coordinate: N: 3119046.389 | E: 701782232 | Location/ Chainage: 21780.4870

Method of Drilling: Rotery | Drilling Equipment: Auto Trip Hydrolic | Bore No.: P-33

Casing Lowered (M): — | Bentonite Used: NA | Standard Sampler: Yes | Barrel Type: NA

Ground Elevation: RL-191.287 | Date: From 06/11/23 to 08/11/23 | Water Table (M): 1.35

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
7/11/23	29.50	29.95	0.45	DP	Sx	32	45	56	101	—	—	—	—	—	—	Cohesive soil with Gravel
8/11/23	31.00	31.45	0.45	DP	"	24	32	50	82	—	—	—	—	—	—	do
"	32.50	32.95	0.45	DP	"	23	35	55	90	—	—	—	—	—	—	do
"	34.00	34.45	0.45	DP	"	25	38	60	98	—	—	—	—	—	—	do
"	35.50	35.95	0.45	DP	"	21	35	37	72	—	—	—	—	—	—	Cohesive soil with Gravel
"	37.00	37.45	0.45	DP	"	26	38	50	88	—	—	—	—	—	—	do
"	38.50	38.95	0.45	DP	"	30	42	58	100	—	—	—	—	—	—	do
"	40.00	40.45	0.45	DP	"	29	43	53	96	—	—	—	—	—	—	do

Supervisor

S.E-civil

E - In - C

Techpro Engineers Pvt. Kanpur

Abbreviation Used : U- Undisturbed Sample, C- Core Sample, D- Disturbed Sample, P- Standard Penetration Test, R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 27: FIELD BORELOG CHARTS (P34)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name: GTW HORC Viaduct b/w Sohna & Dhulawat Station		Project Code:	1901
Coordinate: N: 3119056.154	E: 704757.766	Location/ Chainage:	21806.6870
Method of Drilling: Rotary	Drilling Equipment: Autotrip Hydraulic	Bore No.:	P-34
Casing Lowered (M): — Bentonite Used: Not	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation: R.L- 191.452	Date: From 06/11/2023 to 08/11/2023	Water Table (M):	1.40

Day / Date	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
06/11/23	0.00	0.50	0.50	DS	Sx	Collected										Non-Cohesive Soil.
11	1.00	1.45	0.45	DP	11	1	1	2	3							—do—
11	2.00	2.45	0.45	U	11	Received.										—do—
11	3.00	3.45	0.45	DP	11	2	2	4	6							Cohesive Soil with Gravel
11	4.00	4.45	0.45	DP	11	3	6	8	14							Non-Cohesive with Gravel.
11	5.00	5.45	0.45	U	11	Received.										—do—
11	6.00	6.45	0.45	DP	11	3	7	11	18							Non-Cohesive Soil.
11	7.00	7.45	0.45	DP	11	5	11	12	23							Brownish Non-Cohesive Soil
11	8.00	8.45	0.45	U	11	Received										Cohesive Soil with Gravel
11	9.00	9.45	0.45	DP	11	4	7	8	15							Cohesive Soil.
11	10.00	10.45	0.45	DP	11	6	8	12	20							—do—
07/11/23	11.00	11.45	0.45	U	11	Received.										—do—
11	12.50	12.95	0.45	DP	11	5	9	10	19							—do—
11	14.00	14.45	0.45	U	11	Received.										Cohesive Soil with Gravel.
11	15.50	15.95	0.45	DP	11	4	5	7	12							—do—
11	17.00	17.45	0.45	U	11	Skipped.										—do— DS Collected
11	18.50	18.95	0.45	DP	11	6	8	13	21							Cohesive Soil.
11	20.00	20.45	0.45	U	11	Received										—do—
11	21.50	21.95	0.45	DP	11	8	14	16	30							—do—
11	23.00	23.45	0.45	U	11	Received.										—do—
11	24.50	24.95	0.45	DP	11	11	17	21	38							Cohesive Soil with Gravel.
11	26.00	21.45	0.45	U	11	Skipped.										—do— DS Collected.
11	27.50	27.95	0.45	DP	11	14	22	25	47							—do—
11	29.00	29.45	0.45	U	11	Skipped.										—do— DS Collected

Supervisor

S.E. Civil

E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

Techpro Engineers Pvt. Ltd.

APPENDIX-K
CHART 28: FIELD BORELOG CHARTS (P34)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW HORC Viaduct b/w Sohna & Dhulawat Station			Project Code:	1901
Coordinate:	N: 3119056.154	E: 701757.766	Location/ Chainage: 21806.6870		
Method of Drilling:	Rotary	Drilling Equipment:	Autorip Hydraulic	Bore No.:	P-34
Casing Lowered (M):	–	Bentonite Used: Not	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation:	R.L-191.452	Date: From 06/11/2023 to 08/11/2023		Water Table (M):	1.40

Day / Date	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
〃	30.50	30.95	0.45	DP	Sx	17	32	39	71							Non-Cohesive Soil with Gravel
〃	32.00	32.45	0.45	DP	〃	18	34	41	75							—do—
08/11/23	33.50	33.95	0.45	DP	〃	15	30	38	68							—do—
〃	35.00	35.45	0.45	DP	〃	11	20	35	55							Cohesive Soil with Gravel
〃	36.50	36.95	0.45	DP	〃	13	24	28	52							—do—
〃	38.00	38.45	0.45	DP	〃	16	29	36	65							—do—
〃	40.00	40.45	0.45	DP	〃	15	22	31	53							—do—

Supervisor

Techpro Engineers Pvt. Ltd.

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 29: FIELD BORELOG CHARTS (P35)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW FOR HORC Viaduct B/w Sohana Dhulawat.			Project Code:	1901
Coordinate:	N: 3119066.408	E: 701733.564	Location/ Chainage: 21832.8870		
Method of Drilling:	Percussion	Drilling Equipment:	Automatic Power winch	Bore No.:	P.35
Casing Lowered (M):	16.00	Bentonite Used: NA	Standard Sampler: Yes.	Barrel Type:	NA
Ground Elevation:	RL-191.306	Date: From 16/11/23	to 18/11/2023	Water Table (M):	2.65

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
16/11/23	0.00	0.50	0.50	D	SX	Collected				—	—	—	—	—	—	Non Cohesive soil
"	1.00	1.45	0.45	DP	"	1	1	2	3	—	—	—	—	—	—	do
"	2.00	2.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	3.00	3.45	0.45	DP	"	2	3	4	7	—	—	—	—	—	—	do
"	4.00	4.45	0.45	DP	"	3	5	7	12	—	—	—	—	—	—	Non cohesive soil
"	5.00	5.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	6.00	6.45	0.45	DP	"	3	6	8	14	—	—	—	—	—	—	Noncohesive soil
"	7.00	7.45	0.45	DP	"	4	7	9	16	—	—	—	—	—	—	do
"	8.00	8.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	9.00	9.45	0.45	DP	"	6	8	10	18	—	—	—	—	—	—	do
"	10.00	10.45	0.45	DP	"	7	9	11	20	—	—	—	—	—	—	do
"	11.00	11.45	0.45	U	"	Received				—	—	—	—	—	—	Cohesive soil.
"	12.50	12.95	0.45	DP	SX	7	12	14	26	—	—	—	—	—	—	do
"	14.00	14.45	0.45	U	"	Received				—	—	—	—	—	—	Non cohesive soil
"	15.50	15.95	0.45	DP	"	7	14	18	32	—	—	—	—	—	—	do
"	17.00	17.45	0.45	U/DS	"	slipped				—	—	—	—	—	—	Non cohesive soil
"	18.50	18.95	0.45	DP	"	8	15	19	34	—	—	—	—	—	—	do
"	20.00	20.45	0.45	D	"	Received				—	—	—	—	—	—	do
"	21.50	21.95	0.45	DP	"	9	16	22	38	—	—	—	—	—	—	Non cohesive soil
17/11/23	23.00	23.45	0.45	U/DS	"	slipped				—	—	—	—	—	—	do
"	24.50	24.95	0.45	DP	"	15	19	25	44	—	—	—	—	—	—	Non cohesive soil
"	26.00	26.45	0.45	U/DS	"	slipped				—	—	—	—	—	—	do
"	27.50	27.95	0.45	DP	"	17	28	35	63	—	—	—	—	—	—	Coshesiv soil with Gravel
"	29.00	29.45	0.45	U	"	19	31	38	69	—	—	—	—	—	—	do

Supervisor

Techpro Engineers Pvt. Ltd.

E-In-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K

CHART 30: FIELD BORELOG CHARTS (P35)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW For HORC Viduct B/w Sohana Dhulawat Station			Project Code:	1901
Coordinate:	N: 3119066.408	E: 701733.569	Location/ Chainage: 21832.8370		
Method of Drilling:	Percussion	Drilling Equipment:	Automatic Power winch	Bore No.:	P-35
Casing Lowered (M):	16.00	Bentonite Used: NA	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation:	RL-191.306	Date: From 16/11/23	to 18/11/2023	Water Table (M):	

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
17/11/23	30.50	30.95	0.45	DP	SX	25	35	42	77	–	–	–	–	–	–	Noncohesive soil
"	32.00	32.45	0.45	DP	"	23	37	45	82	–	–	–	–	–	–	do
"	33.50	33.95	0.45	DP	"	19	35	42	77	–	–	–	–	–	–	do
18/11/23	35.00	35.45	0.45	DP	"	17	28	38	66	–	–	–	–	–	–	cohesive soil with Gravel
"	36.50	36.95	0.45	DP	"	21	31	40	71	–	–	–	–	–	–	do
"	38.00	38.45	0.45	DP	"	24	35	43	78	–	–	–	–	–	–	cohesive soil
"	40.00	40.45	0.45	DP	"	27	42	50	92	–	–	–	–	–	–	do

Supervisor

Techpro Engineers Pvt. Ltd.

E-In-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 31: FIELD BORELOG CHARTS (P36)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name: GT. For HORC viaduct b/w Sohna Dhulawat station		Project Code:	1901
Coordinate: N: 3119077.181	E: 701709.564	Location/ Chainage:	21859.0870
Method of Drilling: Percussion	Drilling Equipment: Powerwinch	Bore No.:	P36
Casing Lowered (M): 22.00	Bentonite Used: NO / Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation: R.L-191.271	Date: From 15/10/23 to 17/10/23	Water Table (M):	1.30

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
15/10/23	0.0	0.50	0.45	DS	SX	-	Received									NON cohesvie soil
23	1.00	1.45	0.45	U	"	-	Received									— do —
"	2.00	2.45	0.45	DP	"	2	3	3	6							— do —
"	3.00	3.45	0.45	DP	"	3	5	5	10							— do —
"	4.00	4.45	0.45	U	"	Received			—							— do —
"	5.00	5.45	0.45	DP	"	4	7	9	16							— do —
"	6.00	6.45	0.45	DP	"	3	9	13	22							— do —
"	7.00	7.45	0.45	U	"	Received			—							— do —
"	8.00	8.45	0.45	DP	"	3	6	11	17							— do —
"	9.00	9.45	0.45	DP	"	5	11	11	22							— do —
"	10.00	10.45	0.45	U	"	Received			—							— do —
"	11.00	11.45	0.45	DP	"	6	12	17	29							NON cohesvie soil with Gravel soil
"	12.00	12.45	0.45	DP	"	7	11	15	26							
"	13.00	13.45	0.45	U	"	Received			-							— do —
"	14.50	14.95	0.45	DP	"	5	12	15	27							NON cohesvie soil
"	16.00	16.45	0.45	U	"	Received			-							cohesvie soil
"	17.50	17.95	0.45	DP	"	6	9	14	23							— do —
"	19.00	19.45	0.45	U	"	Received			—							— do —
"	20.50	20.95	0.45	DP	"	7	9	17	26							— do —
"	22.00	22.45	0.45	U	"	Received			—							— do —
"	23.50	23.95	0.45	DP	"	6	12	17	29							— do —
16/10/23	25.00	25.45	0.45	U	"	slipped			—							NON cohesvie soil
"	26.50	26.95	0.45	DP	"	11	17	28	45							— do —
"	28.00	28.45	0.45	U	"	Received			—							cohesvie soil with Gravel

Supervisor

Techpro Engineers Kanpur

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 32: FIELD BORELOG CHARTS (P36)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GIT for HORC Viaduct b/w Sohna Dhulawat Station			Project Code:	1901
Coordinate:	N: 3119077.181	E: 701709.564	Location/ Chainage: 21859.0870		
Method of Drilling:	Percussion	Drilling Equipment	Powerwinch	Bore No.:	P36
Casing Lowered (M):	22.00	Bentonite Used: NO	Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation:	R.L-191.271	Date: From 15/10/23 to 17/10/23		Water Table (M):	1.30

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
16/10/23	29.50	29.95	0.45	DP	SX	11	19	26	45							
"	31.40	31.45	0.45	U	"	Slipped –										cohesvie soil with gravel soil
"	32.50	32.95	0.45	DP	"	17	26	30	56							– do –
"	34.00	34.45	0.45	DP	"	16	29	33	62							Non cohesvie soil
"	35.50	35.45	0.45	DP	"	18	20	29	49							– do –
17/10/23	37.00	37.45	0.45	U	"	Slipped –										– do –
"	38.50	38.95	0.45	DP	"	16	22	26	48							– do –
"	40.00	40.45	0.45	DP	"	17	24	30	54							– do –

Supervisor

E - in - C

Abbreviation Used: U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 33: FIELD BORELOG CHARTS (P37)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW For HORC Viaduct B/w Sohana Dhulawat	Project Code:	1901
Coordinate:	N: 3119088456 E: 701685.792	Location/ Chainage:	21885.2870
Method of Drilling:	Percussion; Drilling Equipment: Auto Trip Bucnmach	Bore No.:	P-37
Casing Lowered (M):	17.00; Bentonite Used: NA; Standard Sampler: yes	Barrel Type:	NA
Ground Elevation:	R.L-191.192; Date: From 15/11/23 to 17/11/23	Water Table (M):	1.30 M

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
15/11/23	0.00	0.50	0.50	D	SX	collected				—	—	—	—	—	—	Non cohesive soil
"	1.00	1.45	0.45	U	"	1	1	2	3	—	—	—	—	—	—	do
"	2.00	2.45	0.45	D	"	slipped				—	—	—	—	—	—	do
"	3.00	3.45	0.45	DP	"	2	2	3	5	—	—	—	—	—	—	Non cohesive soil with Gravel
"	4.00	4.45	0.45	DP	"	2	3	3	6	—	—	—	—	—	—	Non cohesive soil
"	5.00	5.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	6.00	6.45	0.45	DP	"	3	5	6	11	—	—	—	—	—	—	do
"	7.00	7.45	0.45	DP	"	4	6	8	14	—	—	—	—	—	—	Non cohesive soil
"	8.00	8.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	9.00	9.45	0.45	DP	"	3	5	6	11	—	—	—	—	—	—	do
"	10.00	10.45	0.45	DP	"	4	5	9	14	—	—	—	—	—	—	Non cohesive soil
"	11.00	11.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	12.50	12.95	0.45	DP	"	6	8	11	19	—	—	—	—	—	—	Cohesive soil
"	14.00	14.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	15.50	15.95	0.45	DP	"	9	14	16	30	—	—	—	—	—	—	do
"	17.00	17.45	0.45	U/DS	"	Received slipped				—	—	—	—	—	—	Non cohesive soil
16/11/23	18.50	18.95	0.45	DP	SX	8	15	18	33	—	—	—	—	—	—	do
"	20.00	20.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	21.50	21.95	0.45	DP	"	9	17	22	39	—	—	—	—	—	—	Cohesive soil with Gravel
"	23.00	23.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	24.50	24.95	0.45	DP	"	22	50	50	100	—	—	—	—	—	—	do
"	26.00	26.45	0.45	U	"	16	30	36	66	—	—	—	—	—	—	Cohesive soil
"	27.50	27.91	0.45	DP	"	14	28	34	62	—	—	—	—	—	—	do
"	29.00	29.45	0.45	U	"	16	32	48	80	—	—	—	—	—	—	Non cohesive soil with Gravel

Supervisor

Techpro Engineers Pvt. Ltd.

G.E. (Civil)

E - In - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 34: FIELD BORELOG CHARTS (P37)

TECHPRO ENGINEERS PVT. LTD. — **BORE/ DRILL LOG**

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date.:	28.12.2021

Project Name:	GTW FOR HORC Viaduct B/w Sohana Dhulawat			Project Code:	1901
Coordinate:	N: 3119088.456	E: 701685.792		Location/ Chainage:	21885.2870
Method of Drilling:	Percussion	Drilling Equipment:	Auto Trip Powerwinch	Bore No.:	P.37
Casing Lowered (M):	17.00	Bentonite Used: NA	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation:	R.L-191.192	Date: From 15/11/23	to 17/11/23	Water Table (M):	1.70m

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
	30.50	30.95	0.45	DP	SX	13	27	32	59	–	–	–	–	–	–	cohesive soil.
17/11/23	32.00	32.45	0.45	DP	"	20	42	51	93	–	–	–	–	–	–	Non cohesie soil
	33.50	33.95	0.45	DP	"	18	38	49	87	–	–	–	–	–	–	do
	35.00	35.45	0.45	DP	"	14	28	36	64	–	–	–	–	–	–	cohesive soil with Gravel
	36.50	36.95	0.45	DP	"	17	32	40	72	–	–	–	–	–	–	do
	38.00	38.45	0.45	DP	"	10	20	43	63	–	–	–	–	–	–	do
	40.00	40.45	0.45	DP	"	27	38	52	90	–	–	–	–	–	–	cohesive soil with Gravel

Supervisor — Techpro Engineers Pvt. Ltd. — T.E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 35: FIELD BORELOG CHARTS (P38)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	(WTW)-HORC Viaduct b/w Sohana Dhulawat Stations	Project Code:	1901
Coordinate:	N:3119100.259 E:701662.194	Location/ Chainage:	21911.4870
Method of Drilling:	Percussion	Drilling Equipment:	Mannual Power winch
Bore No.:	P.38	Casing Lowered (M):	22.00
Bentonite Used:	NO	Standard Sampler:	Yes
Barrel Type:	N/A	Ground Elevation:	R.L-191.236
Date: From	8/11/23 to 10/11/23	Water Table (M):	1.30

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
8/11/23	0.00	0.50	0.50	DS	SX	Received										Non-cohesive soil
"	1.00	1.45	0.45	U	"	Received										— do —
"	2.00	2.45	0.45	DP	"	1	2	2	4							— do —
"	3.00	3.45	0.45	DP	"	2	3	3	6							— do —
"	4.00	4.45	0.45	U	"	slipped										— do —
"	5.00	5.45	0.45	DP	"	4	5	7	12							— do —
"	6.00	6.45	0.45	DP	"	4	6	8	14							— do —
"	7.00	7.45	0.45	U	"	Received										— do —
"	8.00	8.45	0.45	DP	"	5	7	10	17							Cohesive soil with gravel
"	9.00	9.45	0.45	DP	"	6	8	11	19							— do —
"	10.00	10.45	0.45	U	"	Received										— do —
"	11.00	11.45	0.45	DP	"	11	21	24	45							— do —
"	12.00	12.45	0.45	DP	"	7	10	13	23							cohesive soil
"	13.00	13.45	0.45	U	"	slipped										-do- DS collected
9/11/23	14.50	14.95	0.45	DP	"	6	9	12	21							cohesive soil
"	16.00	16.45	0.45	U	"	Received										Non-cohesive soil
"	17.50	17.95	0.45	DP	"	7	10	14	24							— do —
"	19.00	19.45	0.45	U	"	Received										— do —
"	20.50	20.95	0.45	DP	"	11	13	17	30							— do —
"	22.00	22.45	0.45	U	"	Received										Non-cohesive soil with gravel
"	23.50	23.95	0.45	DP	"	12	16	21	37							Non-cohesive soil
"	25.00	25.45	0.45	U	"	slipped										-do- DS collected
"	26.50	26.95	0.45	DP	"	13	17	23	40							Non-cohesive soil
"	28.00	28.45	0.45	U	"	slipped										-do- DS collected

Nitesh
Supervisor

E-in-C

Techpro Engineers Kanpur

Abbreviation Used: U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 36: FIELD BORELOG CHARTS (P38)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	(e)TW-HORC Viaduct b/w Sohana Dhulawat station	Project Code:	1901
Coordinate:	N:3119100.259 E:701662.194	Location/ Chainage:	21911.4870
Method of Drilling:	Percussion; Drilling Equipment: Mannual Powerwinch	Bore No.:	P38
Casing Lowered (M):	22.00; Bentonite Used: NO; Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation:	R.L-191.236; Date: From 8/11/23 to 10/11/23	Water Table (M):	1.30

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
9/11/23	29.50	29.95	0.45	DP	SX	15	20	25	45							Non-cohesive soil
"	31.00	31.45	0.45	U	"	Slipped										-do- DS collected
"	32.50	32.95	0.45	DP	"	17	21	27	48							Non-cohesive soil
10/11/23	34.00	34.45	0.45	U	"	slipped										-do- DS collected
"	35.50	35.95	0.45	DP	"	20	23	29	52							Non-cohesive soil
"	37.00	37.45	0.45	DP	"	21	25	30	55							—do—
"	38.50	38.95	0.45	DP	"	23	27	31	58							—do—
"	40.00	40.45	0.45	DP	"	25	30	32	62							—do—

Techpro Engineers Pvt. Ltd. Kanpur

Supervisor

E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 37: FIELD BORELOG CHARTS (P39)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GT for HORC viaduct b/w Sohna Dhulawat Station			**Project Code:**	1901
Coordinate:	N: 3119112.511	E: 701638.957	**Location/ Chainage:**	21937.6870	
Method of Drilling:	Percussion	**Drilling Equipment:**	Auto Trip/ Powerwinch	**Bore No.:**	P39
Casing Lowered (M):	27.00	**Bentonite Used:** NO	**Standard Sampler:** Yes	**Barrel Type:**	N/A
Ground Elevation:	R.L-191.204	**Date: From** 17/10/23 **to** 19/10/23		**Water Table (M):**	1.30

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
17/10/23	0.0	0.50	0.50	DS	SX	Received										NON cohesvie soil
〃	1.00	1.45	0.45	U	〃	Slipped										— do —
〃	2.00	2.45	0.45	DP	〃	2	3	4	7							NON cohesvie soil
〃	3.00	3.45	0.45	DP	〃	2	3	3	6							with Gravel soil
〃	4.00	4.45	0.45	U	〃	Received										— do —
〃	5.00	5.45	0.45	DP	〃	3	3	4	7							— do —
〃	6.00	6.45	0.45	DP	〃	3	3	5	8							— do —
〃	7.00	7.45	0.45	U	〃	Slipped										— do —
〃	8.00	8.45	0.45	DP	〃	3	4	5	9							— do —
〃	9.00	9.45	0.45	DP	〃	3	4	6	10							— do —
〃	10.00	10.45	0.45	U	〃	Received										— do —
〃	11.00	11.45	0.45	DP	〃	5	9	14	23							— do —
〃	12.00	12.45	0.45	DP	〃	6	12	13	25							NON Cohesvie soil
〃	13.00	13.45	0.45	U	〃	Received										cohesvie soil with
〃	14.50	14.95	0.45	DP	〃	4	7	11	18							Gravel Soil
〃	16.00	16.45	0.45	U	〃	Received										— do —
〃	17.50	17.95	0.45	DP	〃	4	6	9	15							— do —
〃	19.00	19.45	0.45	U	〃	Received										— do —
〃	20.50	20.95	0.45	DP	〃	5	7	12	19							— do —
18/10/23	22.00	22.45	0.45	U	〃	Received										— do —
〃	23.50	23.95	0.45	DP	〃	6	15	27	42							— do —
〃	25.00	25.45	0.45	U	〃	Received										NON cohesvie soil
〃	27.50	27.95	0.45	DP	〃	11	22	29	51							— do —
〃	28.00	28.45	0.45	U	〃	Slipped										— do —

Supervisor **E - in - C**

Techpro Engineers Kanpur

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 38: FIELD BORELOG CHARTS (P39)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name: GT for HORC Viaduct b/w Sohna Dhulawat station — **Project Code:** 1901

Coordinate: N: 3119112.511 — E: 701638.957 — **Location/ Chainage:** 21937.6870

Method of Drilling: Percussion — **Drilling Equipment:** Auto Trip Power winch — **Bore No.:** P39

Casing Lowered (M): 22.00 — **Bentonite Used:** NO — **Standard Sampler:** Yes — **Barrel Type:** N/A

Ground Elevation: R.L-191.204 — **Date: From** 17/10/23 **to** 19/10/23 — **Water Table (M):** 1.30

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
18/10/23	29.50	29.95	0.45	DP	SX	12	24	30	54							NON cohesvie soil with Gravel
"	31.00	31.45	0.45	DP	"	16	19	27	46							
"	32.50	32.95	0.45	DP	"	14	20	29	49							— do —
"	34.00	34.45	0.45	U	"	slipped										— do —
19/10/23	35.50	35.95	0.45	DP	"	17	24	26	50							— do —
"	37.00	37.45	0.45	U	"	slipped										— do —
"	38.50	38.95	0.45	DP	"	16	22	30	52							NON cohesvie soil
"	40.00	40.45	0.45	DP	"	18	24	38	62							— do —

Supervisor — E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 39: FIELD BORELOG CHARTS (P40)

TECHPRO ENGINEERS PVT. LTD.

BORE/ DRILL LOG

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev No:	P03
Rev. Date:	28.12.2021

Project Name:	GTD- HORC Viaduct B/w Sohana Dhulawat station			Project Code:	B01
Coordinate:	N: 2119125.267	E: 701615.905	Location/ Chainage: 21963.8870		
Method of Drilling:	Percussion	Drilling Equipment	Powerwinch	Bore No.:	P-40
Casing Lowered (M):	21.00	Bentonite Used: NO	Standard Sampler: YES	Barrel Type:	NA
Ground Elevation:	RL-191.009	Date: From 20/10/23 to 21/10/23		Water Table (M):	1.40

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
20/10/23	0.00	0.50	0.50	DS	SX	Received.										Non Cohesive Soil
"	1.00	1.45	0.45	U	"	Received-										- do -
"	2.00	2.45	0.45	DP	"	1	2	2	4							- do -
"	3.00	3.45	0.45	DP	"	2	2	3	5							- do -
"	4.00	4.45	0.45	U	"	Slipped										- do -
"	5.00	5.45	0.45	DP	"	2	3	4	7							- do -
"	6.00	6.45	0.45	DP	"	3	6	6	12							- do -
"	7.00	7.45	0.45	U	"	Received										- do -
"	8.00	8.45	0.45	DP	"	2	3	6	9							- do -
"	9.00	9.45	0.45	DP	"	3	3	5	8							- do -
"	10.00	10.45	0.45	U	"	Received										Cohesive Soil with gravel
"	11.00	11.45	0.45	DP	"	5	10	13	23							- do -
"	12.00	12.45	0.45	DP	"	5	7	9	16							- do -
"	13.00	13.45	0.45	U	"	Received										- do -
"	14.50	14.95	0.45	DP	"	2	6	8	14							Cohesive Soil
"	16.00	16.45	0.45	U	"	Received										- do -
"	17.50	17.95	0.45	DP	"	5	10	12	22							- do -
"	19.00	19.45	0.45	U	"	Received										- do -
"	20.50	20.95	0.45	DP	"	8	10	14	24							Non Cohesive Soil
21/10/23	22.00	22.45	0.45	U	"	Slipped-										- do -
"	23.50	23.95	0.45	DP	"	5	11	15	26							Cohesive Soil with gravel
"	25.00	25.45	0.45	U	"	Slipped										Non Cohesive Soil
"	26.50	26.95	0.45	DP	"	12	19	30	49							- do -
"	28.00	28.45	0.45	U	"	Slipped-										- do -

Supervisor | E - in - C

Abbreviation Used-: U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K

CHART 40: FIELD BORELOG CHARTS (P40)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	OT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW- HORC Viaduct B/W Sohana Dhulawat Station			Project Code:	1901
Coordinate:	N: 3119125.287	E: 701615.905		Location/ Chainage:	21963.8870
Method of Drilling:	Percussion	Drilling Equipment:	Powerwinch	Bore No.:	P.40
Casing Lowered (M):	21.00	Bentonite Used: NO	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation:	R.L-191.009	Date: From 20/10/23	to 22/10/23	Water Table (M):	1.40

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
21/10/23	29.50	29.95	0.45	DP	SX	7	13	19	32							- do -
"	31.00	31.45	0.45	U	"	Slipped										- do -
"	32.50	32.95	0.45	DP	"	18	20	30	50							Non Cohesive Soil with Gravel
"	34.00	34.45	0.45	U	"	Slipped-										Cohesive Soil
22/10/23	35.50	35.95	0.45	DP	"	17	22	27	49							- do -
"	37.00	37.45	0.45	U	"	Slipped-										Non Cohesive Soil
"	38.50	38.95	0.45	DP	"	18	24	29	53							- do -
"	40.00	40.45	0.45	DP	"	20	28	33	61							- do -

Supervisor

E - In - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

End of Report

Report No.: 1901-HORC-VI

Date: Nov 30th; 2023

GEOTECHNICAL INVESTIGATION REPORT

ULR No.: TC916923000000032P
REVISION-R3

AT THE SITE FOR

HORC VIADUCT BETWEEN SOHANA & DHULAWAT STATIONS OF HARYANA ORBITAL RAIL CORRIDOR (HORC) PROJECT, HARYANA

FROM BOREHOLES P101 TO P113

CLIENT

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

Plot No. 143, 5th floor RailTel tower, Sector-44,
Gurugram, Haryana 122003

GENERAL CONSULTANTS

RITES-SMEC JV

Gurugram, Haryana

GEOTECHNICAL CONSULTANTS

TECHPRO ENGINEERS PVT. LTD.

114, RAM GANGA HOUSING SOCIETY, NARAMAU, G T ROAD,
KANPUR-209 217, Phone: 9793209918
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TC-9169

TECHPRO ENGINEERS PVT.LTD.
114, Ram Ganga Housing Society, Naramau, G T Road, Kanpur-209 217
Tel.: 9793209918, e-mail: info@techproindia.com
Web site: www.techproindia.com

REVISION NOTES

REVISION NO.	DATE	DESCRIPTION
R1	09.12.2023	• Vertical and Lateral pile load capacity in Table 1 to 4 of Appendix-H and recommendations revised. • Field bore log charts added in Appendix-K.
R2	12.12.2023	• Lithological profile added in Appendix-C.
R3	27.12.2023	• Test data and SBC of pile added for bore holes P107, P108, P109, P110, P112 & P113

REPORT FORMAT

Report No.	Bore included	Total Number of Bores
1901-HORC-I	A1 to P20	21
1901-HORC-II	P21 to P40	20
1901-HORC-III	P41 to P60	20
1901-HORC-IV	P61 to P80	20
1901-HORC-V	P81 to P100	20
1901-HORC-VI	P101 to P113	13
1901-HORC-VII	P114A to P133A	20
1901-HORC-VIII	P134A to A2A	16
1901-HORC-IX	P114B to P133B	20
1901-HORC-X	P134B to A2B	16

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APPENDICES

National Accreditation Board for Testing and Calibration Laboratories

NABL

CERTIFICATE OF ACCREDITATION

TECHPRO ENGINEERS PVT. LTD. (LABORATORY DIVISION)

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

114, RAM GANGA HOUSING SOCIETY, NARAMAU, G.T. ROAD, KANPUR, UTTAR PRADESH, INDIA

in the field of

TESTING

Certificate Number: TC-9169

Issue Date: 23/12/2022 Valid Until: 22/12/2024

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.

(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Identity : Techpro Engineers Private Limited

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer

TechproEngineersPvt.Ltd.
114, Ram Ganga Housing Society, Naramau, G T Road, Kanpur-209 217
Tel.: 9793209918, e-mail: info@techproindia.com
Web site: www.techproindia.com

Nov 30th; 2023

ACKNOWLEDGEMENTS

We are pleased to submit the part-6 of the report of Geotechnical investigation, conducted for the boreholes P101 to P113 for the design of foundations for HORC Viaduct between Sohana & Dhulawat stations of Haryana Orbital Rail Corridor (HORC) project in the state of Haryana, India.

We hereby, convey our sincere thanks to Mr. Neeraj Bhandari (CPM/South) and Mr. Raju Solanki (DGM/C/South), HRIDCL for trust and support during the investigation. We also acknowledge our thanks to Mr. Uma Maheshwara Rao B, DGM/C/West, HRIDCL for awarding the said work to us. We are also grateful Mr. Ravindra Dutta Upadhyay (Geotech Expert), Mr. PS Gautam & Mr. Jitender Parashar, Site Engineer from the RITES- SMEC JV and Mohd. Ishak (Executive/Civil) from HRIDCL, for their help rendered during and prior to the investigation work.

We are also thankful to our staff members for conducting field and laboratory test, preparing sketches, and typing the report.

for Techpro Engineers Pvt. Ltd.

(Arvind K. Garg)
B.Tech. (Civil), M.Tech.
Principal Consultant &
Managing Director

1. INTRODUCTION:

Haryana Rail Infrastructure Development Corporation Ltd. (HRIDC) and Ministry of Railways, Govt. of India has come together to form a new company namely Haryana Orbital Rail Corporation Limited (HORCL), to design and construction of new BG line from Palwal to Sonipat named Haryana Orbital Rail Corridor (HORC), in the state of Haryana, India. In this connection, a Geotechnical investigation has been planned for the design of foundations of Viaduct between Sohana & Dhulawat stations of Haryana Orbital Rail Corridor (HORC) Project in the state of Haryana. The work of conducting the detailed Geotechnical Investigation has been awarded to us by HRIDC, through work order No. HRIDC/HORC/GTI/211/2023-2024/Vol-0 dated 02-09-2023, which includes investigation in field, laboratory testing of disturbed and undisturbed samples, collected from the field, and submission of the geotechnical **investigation** test report.

A geotechnical investigation was carried out, with the locations, planned by the client. Purpose of the investigation is to determine the nature and properties of soil and rock strata across the bore holes and representing them through log sections showing the levels, nature, and properties of various strata up to a sufficient depth below the founding level, proneness of site to artesian conditions, seismic disturbance and other engineering properties of soil and rock strata.

This part -6 of the report includes the detailed methodology of investigation, collection of samples, field and laboratory test result including their interpretation/ analysis, recommendations on the properties of soils and rock required for design of foundation and suggesting suitable type and depth of foundation with allowable bearing capacity for safe and strong foundations for the Bore Hole numbers P101 to P113.

2. SCOPE OF WORK:

For the design of foundation of viaduct, it is required to determine the allowable bearing capacity together with necessary engineering characteristics of underlying soil & rock strata. In general, the geotechnical investigation has been planned as per IS:1892-2021 and further extended to IS: 1904, IS:2911 (part-1/Sec 2) & IRC 78:2014 for planning the laboratory testing and computing the allowable bearing capacity, hence the scope of work is as follows:

2.1. Mobilisation of all tools & plants along with accessories, materials, labours etc. at site of work for drilling and testing work, including setting up boring and shifting to different bore holes point etc.

2.2. Exploratory drilling of 150 mm diameter bore holes through soil deposits and 75 mm in rock within the proposed alignment upto the required depth.

2.3. Collection of disturbed soil samples at an interval of 3.00 meter in all the bore holes.

2.4. Collection of undisturbed soil samples at every 3.00 m interval or at change of stratum from all the boreholes.

2.5. To conduct Standard Penetration Test (SPT) at an interval of 3.00 m or noticeable change of stratum in soil deposits in all bore holes.

2.6. Collection of rock core samples and preserving them in core boxes.

2.7. To collect ground water sample on completion of bore holes.

2.8. To record the ground water table in all the bore holes.

2.9. Transporting all the disturbed, undisturbed soil and rock core samples collected during the field investigation to our NABL accredited Geotech Engineering laboratory at Kanpur.

2.10. To conduct the laboratory tests on all the soil and rock core samples collected during field investigation for determination of their engineering characteristics.

2.11. To compile of field and laboratory test results, working out the allowable bearing capacity and preparing the report including detailed recommendations and necessary precautions.

3. GEOLOGICAL INFORMATION OF THE REGION:

3.1. Geography:

The project location is in the bordering area of Gurugram and Nuh (recent old name-Mewat), districts in the Indian state of Haryana. The stretch of the alignment of the proposed corridor starts from southmost part of Gurugram in the town of Sohna and ends at Dhulawat, which is a village lying at the north of Nuh district.

Haryana is a state located in the northern part of India. Gurugram is among one of the districts in Haryana which is also the part of National Capital Region (30km south of New Delhi). It lies at an elevation of 217 m above msl. Sohna is a small town located 25km in the south of Gurugram. Sohna is well known for its hot water springs and famous Shiva temple. Sohna is located in between 28°15' N latitude and 77°40' E longitude at the elevation of 212.14m above msl. Mewat district is located at 28 °12′ N latitude, 77 °3′ E longitude, at the south of Gurugram at an elevation of 199 m above msl. The location is bordered by Rewari district on west and Faridabad & Palwal district on the east.

3.2. Geology:

The Gurugram district is having of almost flat topography, however, in the north-eastern part small isolated hillocks of Precambrian rocks are exposed. Small hill ranges which are part of the Aravali and Mangar Bani ranges exists in the district. The major part of district is underlain by Quaternary alluvium consisting of sand, clay and silt. The alluvial plain is formed by the Sahibi river which is a tributary of River Yamuna. Soils of the Gurgaon district is classified as tropical and brown soils, existing in the north western extreme, northern and north eastern parts of the district and water logged and salt affected soils in the southern parts of the district. The soils are medium textured loamy sand is the average texture in Gurgaon and Sohna blocks.

3.3. Rainfall and Climate:

The area has hot semi-arid type of climate characterising extreme dryness of the air except in the monsoon season. Intense hot summer and cold winters. The total annual rainfall in the region is about 596 mm, of which 75 to 80% is because of the south-west monsoon.

3.4. Seismicity:

The site under consideration exists in the district of Gurugram and Mewat which lies in the Seismic Zone IV (high damage risk zone), as per the current seismic zonation map of India (IS 1893-2016): RA 2021 and have a zone factor of 0.24 for design basis earthquake. The region is surrounded by many in-homogeneities in the form of faults and ridges like Sohna Fault, Moradabad Fault, Delhi-Moradabad Fault, Delhi-Haridwar ridge, junction of Aravalli and Alluvium near Delhi. The Sohna fault line lies between the Delhi ridge and Sohna town and falls between the Arjangarh and

Manesar outcrops. All the developed area in Gurugram comes within 200 km of the fault line. The Sohna fault line is located at the junction between the hard rock terrain of the Aravalli hills and the sandy formation of the Yamuna River and is currently inactive from several years and is capable of a disastrous earthquake.

The project location has been marked in Fig.1 Seismic zone map of India.

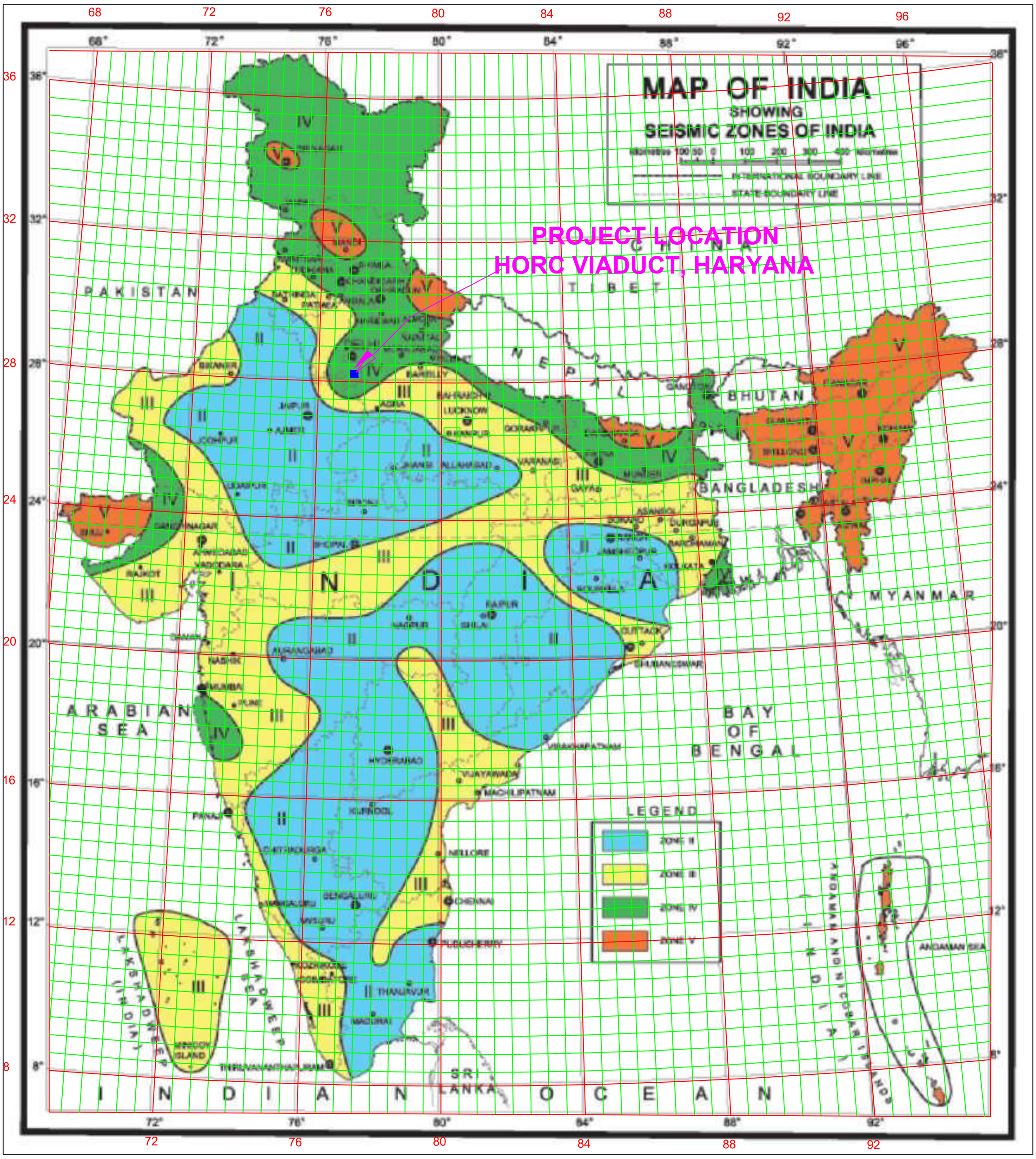


Fig.1: Seismic Zone Map of India

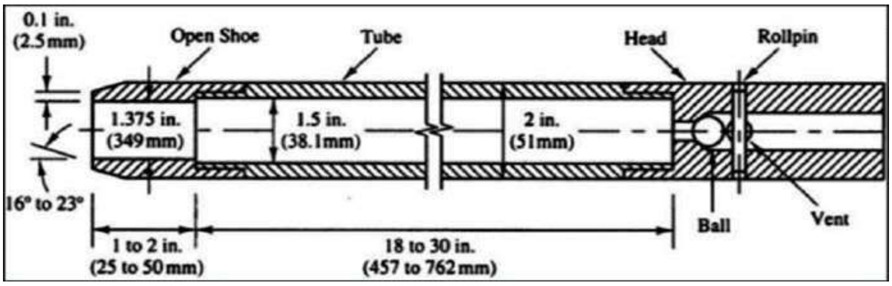
4. FIELD INVESTIGATION:

The field investigation work at this site was carried out from Oct 11th; 2023 to Nov 2nd; 2023 and Nov 30th; 2023 to Dec 16th; 2023. The following investigation work was carried out:

4.1. **Thirteen number** of **boreholes** (marked as P101 to P113) of diameter 150 mm in soil were made within the proposed alignment for conducting Standard Penetration Test and collection of disturbed and undisturbed samples. The boreholes were progressed using power operated winch and hydraulic rig machine under **percussion** and **rotary** method of drilling respectively. Casing was used to keep the borehole stable and Bentonite was also used as drilling mud to help prevent wall collapse of boreholes at deeper depth. The records of achieved depth of bore holes have been given in Para No. 6, the details of drilled bores along with depth of casing used have been reported in Appendix B. Locations of boreholes have been reported in "TEST LOCATION PLAN" in Appendix A.

4.2. **Standard Penetration Tests** were conducted at 1.00 to 2.00 metre interval upto the depth of 12.00 meter and 3.00 metre interval, beyond 12.00 metre depth, as per the procedure in IS: 2131-1981-(RA: 2021) in all the bore holes. The **standard SPT sampler** (without liner and with no space for liner) and **auto-trip & rope-pulley driven hammer** of standard weight of 63.50 kg have been used to perform the test.

For conducting the test, the bottom of the borehole was properly cleaned, and split spoon sampler was properly seated in position in the borehole. The split spoon sampler resting on the bottom of borehole was allowed to sink under its own weight; then the sampler was allowed to penetrate 15 cm with the blows of the hammer 63.50 kg weight falling free through 75cm, thereafter the split spoon sampler was further driven by another 15 cm. For the 3rd and final drive, the sampler was further allowed to penetrate 15 cm. The number of blows required to get each 15 cm of penetration, was recorded. The first 15 cm of drive is seating drive.



Structure of SPT Sampler

The total blows of penetration for the second and third 15 cm of penetration is

termed the penetration resistance N. The N' values are indicative of the compactness/ relative density of cohesion less soils and consistency of cohesive soils.

In case the blows count of SPT in soil (including the number of blows of seating) exceeds 100, the corresponding penetration was recorded and this particular test at that depth stopped. If the total penetration is more than the seating penetration of 15 cm, then breakup of blow counts for 15 cm seating penetration and for remaining portion of penetration is also given.

SPT 'N' values are correlated with non-cohesive stratum as per BS: 5930 (1999) – for sandy strata and with consistency of cohesive stratum.

Correlation For Clay/Plastic Silt		**Correlation For Sand/Non-Plastic Silt**	
Consistency of clays	**Penetration Value**	**Relative Density of sand**	**Penetration Value**
Very Soft	0 to 2 Blows	Very loose	0 to 4 Blows
Soft	3 to 4 Blows	Loose	5 to 10 Blows
Medium Stiff	5 to 8 Blows	Medium	11 to 30 Blows
Stiff	9 to 16 Blows	Dense	31 to 50 Blows
Very Stiff	17 to 32 Blows	Very Dense	Above 50
Hard	Above 32		

In this method, the sampler acts as a probe and the driving energy is supplied by the fall of the drop weight. The values of 'N' depend on the compactness or relative density of the material. In hard formations, the testing is discontinued if 'N' value is found to be more than 100. It is termed as 'Refusal'. Refusal is also recorded when SPT blow count records 50 or more for any of the single drive of 15 cm.

'N' value depends upon degree of saturation and over burden pressure of the formation. Silty fine sand and fine sand below the water table develop pore water pressure depending on the in-situ void ratio which in turn affects the effective stress. This change in effective stress influences the 'N' value considerably.

Depth of overburden affects the SPT values in none to low cohesive soils and hence need correction. The SPT value after the overburden correction, N' is as follows:

$$N' = 0.77x \log (2000/q) \times N$$

Where, q= Overburden Pressure (kN/m^2) and N = observed SPT value

N' is corrected further for dilatancy in case of saturated fine sands and silts for the values of N' greater than 15.

Modified value after dilatancy correction N" = 15+ (N'-15)/2

Soil samples obtained from split spoon sampler were collected in the polythene bags of suitable size. These samples were property sealed, labelled, and carefully transported to the laboratory for testing. The results have been reported in Table 1 to 13 of Appendix B under the title "SUMMARY OF TEST RESULTS".

4.3. **Disturbed soil samples** were collected at 0.50 metre, then at 1.00 to 2.00 metre interval upto the depth of 12.00 meter and 3.00 metre interval, beyond 12.00 metre depth and at significant change of stratum. Soil from cutting edge of SPT samplers and retained in split spoon, used for Standard Penetration Tests was taken as disturbed samples. These samples were placed without delay in adequately sealed polythene bags. Where the collection of disturbed soil samples could not be collected from SPT samples, Shelby tubes were driven and retained soil samples were obtained. The laboratory tests were conducted on the collected soil samples and reported in Table 1 to 13 of Appendix-B under the title "SUMMARY OF TEST RESULTS".

4.4. **Undisturbed soil samples** were collected in accordance with IS: 2132-1986-(RA: 2021) at an interval of 3.00 metre or at change of stratum, starting from the depth of 1.00 or 2.00 m, by using 100 mm dia. and 450 mm long MS tubes provided with sampler head with ball check arrangement. However, the some of the samples could not be extracted due to the partial penetration or slippage during the evacuation.

Moreover, collection of Undisturbed samples in very hard cohesive soils/ dense granular soils/gravels/ cobbles/ pebbles/ boulders, refusal strata is practically not possible and such collected samples will not truly represent the undisturbed conditions.

Immediately after taking undisturbed sample in the tube, the adopter head was removed along with the disturbed material. The visible ends of the samples shall then be trimmed off any wet disturbed soil. The ends will then be coated alternately with four layers of molten wax. More molten wax will then be added to give a total thickness of not less than 25 mm. The laboratory test results have been reported in Table 1 to 13 of Appendix-B.

4.5. The **ground water table** in the borehole was allowed to stabilize and measured after 8, 16, 24 and 48 hours after completion of the bore hole. It was ensured that last two reading were identical. The records of ground water table have been given in Para No.6.

4.6. **Ground water samples** were collected from borehole as per IS: 6935-1973-(RA:2019) for chemical analysis to determine aggressiveness in relation to attack on concrete / reinforcement including determination of pH value.

5. LABORATORY TESTS:

The following laboratory tests were conducted to determine the engineering characteristics of sub-soils:

5.1. **Field moisture contents** were determined by oven drying method as per IS: 2720 (part II)-1973-(RA: 2020). The results have been reported in Table 1 to 13: "SUMMARY OF TEST RESULTS" of Appendix B.

5.2. **Bulk density** of soil strata was obtained using Shelby tubes in accordance with IS 2720 (part XXIX)-1975-(RA: 2020). The results have been reported in Table 1 to 13: "SUMMARY OF TEST RESULTS" of Appendix B.

5.3. **Mechanical sieve analysis** test was performed in accordance with IS: 2720 (Part IV) – 1985-(RA: 2020), for the purpose of identification by grain size analysis, on coarse part of the soil samples and the results have been reported in Table 1 to 13: "SUMMARY OF TEST RESULTS" of Appendix B.

5.4. **Particle size analysis** test by **Hydrometer method** were performed in accordance with IS: 2720 (Part IV) -1985-(RA: 2020) on the part of soil samples obtained after the sieve analysis. The results have been reported in Table 1 to 13: "SUMMARY OF TEST RESULTS" of Appendix B.

5.5. **Atterbergs' limits tests** were performed in accordance with IS: 2720 (part V)-1985-(RA: 2020) and results have been reported in Table 1 to 13: "SUMMARY OF TEST RESULTS" of Appendix B.

5.6. **Specific gravity tests** were performed in accordance with IS 2720 (part III-sec. 1) -1980-(RA: 2021) and the results have been reported in Table 1 to 13: "SUMMARY OF TEST RESULTS" of Appendix B.

5.7. **Consolidation tests** were performed on cohesive soil samples in accordance with IS: 2720 (part XV)-1965-(RA: 2021). The results have been reported in Table 1 to 13: "SUMMARY OF TEST RESULTS" of Appendix B.

5.8. **Direct shear tests** were performed as per IS: 2720 (part XIII)-1986-(RA: 2021), on the undisturbed soil samples obtained during the field investigation. The results and the density of samples have been reported in Table 1 to 13: "SUMMARY OF TEST RESULTS" of Appendix B.

5.9. **Tri-axial Compression Test** under Unconsolidated Un-drained (UU) condition as per IS: 2720 (Part-XI)-1993-(RA: 2021) were performed on the selected undisturbed soil samples, obtained during the field investigation. The results have been reported in Table 1 to 13: "SUMMARY OF TEST RESULTS" of Appendix B.

5.10. **Unconfined Compressive strength tests** were performed in accordance with IS 2720 (Part-X) -1991-(RA:2020) on selected undisturbed soil samples and the results have been reported in Table 14 of Appendix B.

5.11. **Shrinkage Limit tests** were performed in accordance with IS 2720 (part-VI) -1972-(RA: 2021) and the results have been reported in Table 1 to 13: "SUMMARY OF TEST RESULTS" of Appendix B.

5.12. **Free Swell Index** were performed in accordance with IS 2720 (part-XL) -1977-(RA: 2021) and the results have been reported in Table 1 to 13: "SUMMARY OF TEST RESULTS" of Appendix B.

6. GROUND WATER TABLE:

The water table at this site was encountered during the drilling operation up to the depth of investigation.

Borehole No.	Chainage	Global Co-ordinates (UTM format)		Reduced Level (m)	Depth of Borehole (m)	Water table (m)
		Easting	Northing			
P101	23562.087	700986.455	3120498.173	193.949	40.00	1.30

Borehole No.	Chainage	Global Co-ordinates (UTM format)		Reduced Level (m)	Depth of Borehole (m)	Water table (m)
		Easting	Northing			
P102	23588.287	700986.810	3120524.371	194.023	40.00	1.00
P103	23614.487	700987.165	3120550.568	194.050	40.00	0.50
P104	23640.687	700987.521	3120576.766	194.067	40.00	1.20
P105	23666.887	700987.876	3120602.953	193.916	40.00	1.30
P106	23693.087	700988.231	3120629.123	194.696	40.00	0.60
P107	23725.647	700988.675	3120661.817	194.725	40.00	0.50
P108	23751.847	700989.030	3120687.995	194.470	40.00	1.40
P109	23778.047	700989.386	3120714.192	194.428	40.00	1.20
P110	23804.247	700989.674	3120740.391	194.740	40.00	2.30
P111	23830.447	700989.842	3120766.590	194.745	40.00	1.30
P112	23856.647	700989.782	3120792.783	194.948	40.00	2.40
P113	23882.847	700989.522	3120818.988	195.004	40.00	1.90

7. DESCRIPTION OF STRATA:

The classification of soil stratum has been done with the help of soil characteristics obtained in laboratory tests as per IS 1498-1970-(RA:2021). The classification of rock masses has been done based on RMR as per IS: 4464-1985, IS: 13365-1. The detailed nature of the strata has been reported in Table 1 to 13: “SUMMARY OF TEST RESULTS” of Appendix-B and represented through Lithological plots in Appendix-C.

The strata exhibited in all the bore hole, is predominantly comprising of inorganic silty clays of low plasticity and inorganic silts of non to low plastic category. Silty sands and silty sands containing clay binders were also encountered at variable depths and thickness. Inorganic silty clays of intermediate plastic category were found as exception in borehole P101 at the depth of 22.00 to 25.00 meters and in borehole P105 at the depth of 12.00 to 13.00 meters.

8. SAFE BEARING CAPACITY COMPUTATIONS:

For the construction of viaducts, deep foundation **(Bored Cast-In-Situ RCC piles)** have been considered for computation of load bearing capacity of the underlying soil strata. The computation of load bearing capacity of bored cast-in-situ RCC piles have been done as per IS 2911 (part-1, section-2)-2010-(RA: 2020) with due consideration of effects of liquefaction.

8.1. Design Parameters:

Factor of safety in compression	=	2.50
Factor of safety in tension	=	3.00
Depth of critical water table	=	0.00 m
Diameter of pile	=	1.00 & 1.20 m
Cut off length	=	2.50 m
Type of pile head consider	=	Fixed

8.2. Computation of friction along pile stem:

$Q_{uf} = \sum K_i . P_{di} . \tan\delta_i . A_{si}$

where,

Q_{uf} = Ultimate shaft friction (kN/m^2)

K_i = Coefficient of earth pressure at mid-depth of ith layer

P_{di} = Effective overburden pressure at mid-depth of ith layer (kN/m^2)

A_{si} = Surface area of pile stem in ith layer (m^2)

δ_i = Angle of wall friction between pile and soil of ith layer (= ϕ) (degree)

ϕ_i = Angle of internal friction of soil in ith layer (degree)

$\sum$ = Sum of all layers up to ith layer

8.3. Computation of Cohesion along the stem of pile:

$Q_{uc} = \sum \alpha_i . c_i . A_{si}$

Where,

c_i = Cohesion in ith layer

A_{si} = Surface area of pile stem in ith layer (m^2)

α_i = Adhesion factor for ith layer of soil depending of consistency of soils

$\sum$ = Sum of cohesion of all layers considered

8.4. Computation of end bearing resistance:

$$Q_{ub} = A_p\,(c.N_c + q.N_q + 0.5.\,\gamma.B.N_\gamma)$$

Where,

A_p = Area of the pile toe (m^2)

c = cohesion of soils at pile toe (kN/m^2)

γ = Effective Unit weight of soils at pile toe (kN/m^3)

B = Diameter of pile (m)

q = Effective overburden pressure at pile toe (kN/m^2)

N_c = Bearing Capacity Factor (Recommended equal to 9)

N_q, N_γ = Bearing Capacity Factor

8.5. Lateral load capacity of piles in soils:

$$Q_u = 12.E.I.\delta/(L_1+L_f)^3$$

where,

Q_u = Ultimate lateral load capacity of pile (kN)

δ = Permissible deflection (m) = 5 mm

E = Young Modulus of pile material (kN/m^2)

I = Moment of Inertia of the pile cross section (m^4)

L_1 = Cantilever Length of pile (m)

L_f = Length of fixity (m)

Detailed calculations of pile load carrying capacity in compression & uplift in soil have been reported in **Table-1 to 2** of **Appendix-H.**

Pile lateral Load capacity has been given in **Table-3 to 4** of **Appendix-H**.

9. LIQUEFACTION ANALYSIS:

Liquefaction is the sudden loss of shear strength of the loose fine sands due to earthquake-induced vibration under saturated conditions. Liquefaction generally takes place in loose fine sands (fines < 10 %, D_{60}= 0.20 mm to 1.0 mm and C_u between 2 to 5) with N value less than 15. In case of soil strata having N>15, liquefaction of soil will not take place normally.

The present site falls in **seismic zone – IV.** Considering the history of past earthquakes and available seismic data, an earthquake of **magnitude 7.0** having peak ground acceleration $\mathbf{a_{max}}$**= 0.24 g** is considered in the present analysis.

Preliminary assessment of liquefaction potential of foundation strata is made by simplified approach proposed by IS: 1893 (part-1)-2016-(RA: 2021) from the data obtained in Standard Penetration Test.

In this method, cyclic shear stress likely to be induced in the foundation strata by Design Basis Earthquake is first evaluated. Next threshold cyclic shear stress, which is good enough to cause liquefaction, is determined from SPT data and the empirical relations. Finally, comparison of these two stresses is used in the estimation of liquefaction susceptibility of the foundation strata.

Cyclic Stress Ratio (CSR):

The equivalent average of shear stress likely to be induced in the foundation material due to an earthquake is calculated by using the equations

Cyclic Resistance Ratio (CRR):

It expresses capacity of soil to resist liquefaction. CRR is determined using correlation between corrected blow count $(N_1)_{60}$ and CRR for earthquake of magnitude 7.5. $(N_1)_{60}$ is the SPT blow count corrected to an effective overburden pressure of 100 kPa and to hammer energy efficiency of 60 %.

Following variable have been adopted in calculation of N_{60} (SPT value for 60% efficiency)

Energy correction to SPT values:

C_{60} = 1.00 (energy efficiency factor)

Design Earthquake Base:

Earthquake zone	= IV
Magnitude of earthquake	= 7
Seismic Zone factor	= 0.24

Status of Liquefaction:

The value of CSR and CRR are computed at different depth and then the ratio of CRR to CSR to get the factor of safety towards the susceptibility of the stratum towards liquefaction potential.

If factor of safety:

< 1.00 : Stratum is to be considered as liquefiable

> 1.20 : Non-Liquefiable

The detailed calculations of liquefaction, have been reported in **Table-5** of **Appendix-H.**

10. RECOMMENDATIONS:

Keeping in mind, the field test results, laboratory test results and IS codes of practice the following recommendations are hereby made:

10.1. **Bored Cast-In-Situ RCC Piles** of diameter 1000 and 1200 mm have been adopted for SBC computations of foundation for Viaduct.

10.2. **Cut off length** of piles have been considered as 2.50 m from the existing ground level for the purpose of computation of SBC.

10.3. **Pile length** recommended in the table below, shall be measured **after the cut-off depth.**

10.4. **Allowable load carrying capacity** of pile corresponding to the length and diameter of pile shall be read from the tables below:

10.4.1. For Pile diameter = 1000 mm

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
P101	25.00	2900	1750	85
	27.50	2900	1950	
	30.00	2750	2150	
	32.50	3000	2400	
	35.00	4000	2600	
P102	25.00	2500	1600	40
	27.50	2700	1800	
	30.00	3100	2000	
	32.50	3800	2250	
	35.00	4050	2500	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
P103	25.00	3200	1800	110
	27.50	3500	2100	
	30.00	3300	2350	
	32.50	3300	2600	
	35.00	3650	2850	
P104	25.00	3000	1850	75
	27.50	3750	2050	
	30.00	4200	2300	
	32.50	4400	2550	
	35.00	4350	2800	
P105	25.00	2150	1150	15
	27.50	2650	1350	
	30.00	2050	1600	
	32.50	2600	1800	
	35.00	3150	2000	
P106	25.00	2750	1850	85
	27.50	2650	2000	
	30.00	2850	2250	
	32.50	3050	2450	
	35.00	3300	2650	
P107	25.00	1800	900	8
	27.50	2050	1100	
	30.00	2000	1300	
	32.50	2250	1500	
	35.00	2450	1700	
P108	25.00	3050	1650	35
	27.50	3300	1900	
	30.00	2900	2150	
	32.50	3100	2400	
	35.00	4150	2700	
P109	25.00	2750	1400	15
	27.50	3000	1650	
	30.00	2500	1900	
	32.50	2850	2150	
	35.00	3650	2400	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
P110	25.00	4150	2000	70
	27.50	3650	2300	
	30.00	3900	2550	
	32.50	4200	2800	
	35.00	4000	3000	
P111	25.00	3650	2050	140
	27.50	4000	2300	
	30.00	4300	2550	
	32.50	4700	2850	
	35.00	5050	3100	
P112	25.00	2900	1750	35
	27.50	3100	2000	
	30.00	2850	2250	
	32.50	3150	2500	
	35.00	4200	2750	
P113	25.00	3450	1950	65
	27.50	3750	2200	
	30.00	4000	2450	
	32.50	3950	2700	
	35.00	4200	2900	

** Indicates Grade of Concrete*

10.4.2. For Pile diameter = 1200 mm

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
P101	25.00	4250	2350	130
	27.50	4250	2650	
	30.00	3850	2950	
	32.50	4150	3250	
	35.00	5850	3600	
P102	25.00	3950	2200	65
	27.50	4150	2500	
	30.00	4900	2800	
	32.50	6100	3200	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
	35.00	6500	3600	
P103	25.00	5000	2450	155
	27.50	5500	2850	
	30.00	4900	3200	
	32.50	4600	3550	
	35.00	5150	3900	
P104	25.00	4400	2450	115
	27.50	5600	2800	
	30.00	6350	3150	
	32.50	6600	3550	
	35.00	6450	3950	
P105	25.00	3200	1500	25
	27.50	3950	1800	
	30.00	2750	2100	
	32.50	3700	2400	
	35.00	4550	2650	
P106	25.00	3950	2500	130
	27.50	3700	2750	
	30.00	3900	3050	
	32.50	4200	3350	
	35.00	4550	3600	
P107	25.00	2850	1250	15
	27.50	3200	1550	
	30.00	3000	1850	
	32.50	3350	2150	
	35.00	3700	2450	
P108	25.00	4750	2200	55
	27.50	5100	2600	
	30.00	4200	2950	
	32.50	4400	3300	
	35.00	6350	3700	
P109	25.00	4200	1950	30
	27.50	4600	2300	
	30.00	3600	2650	
	32.50	4000	3000	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
	35.00	5400	3350	
P110	25.00	5900	2600	100
	27.50	5050	3000	
	30.00	5350	3300	
	32.50	5850	3650	
	35.00	5400	4000	
P111	25.00	5500	2700	215
	27.50	5950	3100	
	30.00	6400	3500	
	32.50	7050	3900	
	35.00	7550	4300	
P112	25.00	4050	2250	55
	27.50	4300	2600	
	30.00	3800	2950	
	32.50	4150	3250	
	35.00	5750	3550	
P113	25.00	5050	2500	95
	27.50	5550	2900	
	30.00	5900	3250	
	32.50	5650	3600	
	35.00	6100	3950	

** Indicates Grade of Concrete*

10.5. Liquefaction Potential: All the bore holes have been analysed for Liquefaction potential as per IS: 1893 (part-1)-2016-(RA: 2021) with Seismic Zone IV, earthquake intensity of 7.0 on Richter scale and critical ground water table at existing ground level. Out of which several boreholes show the potential at various depths mentioned in the table below:

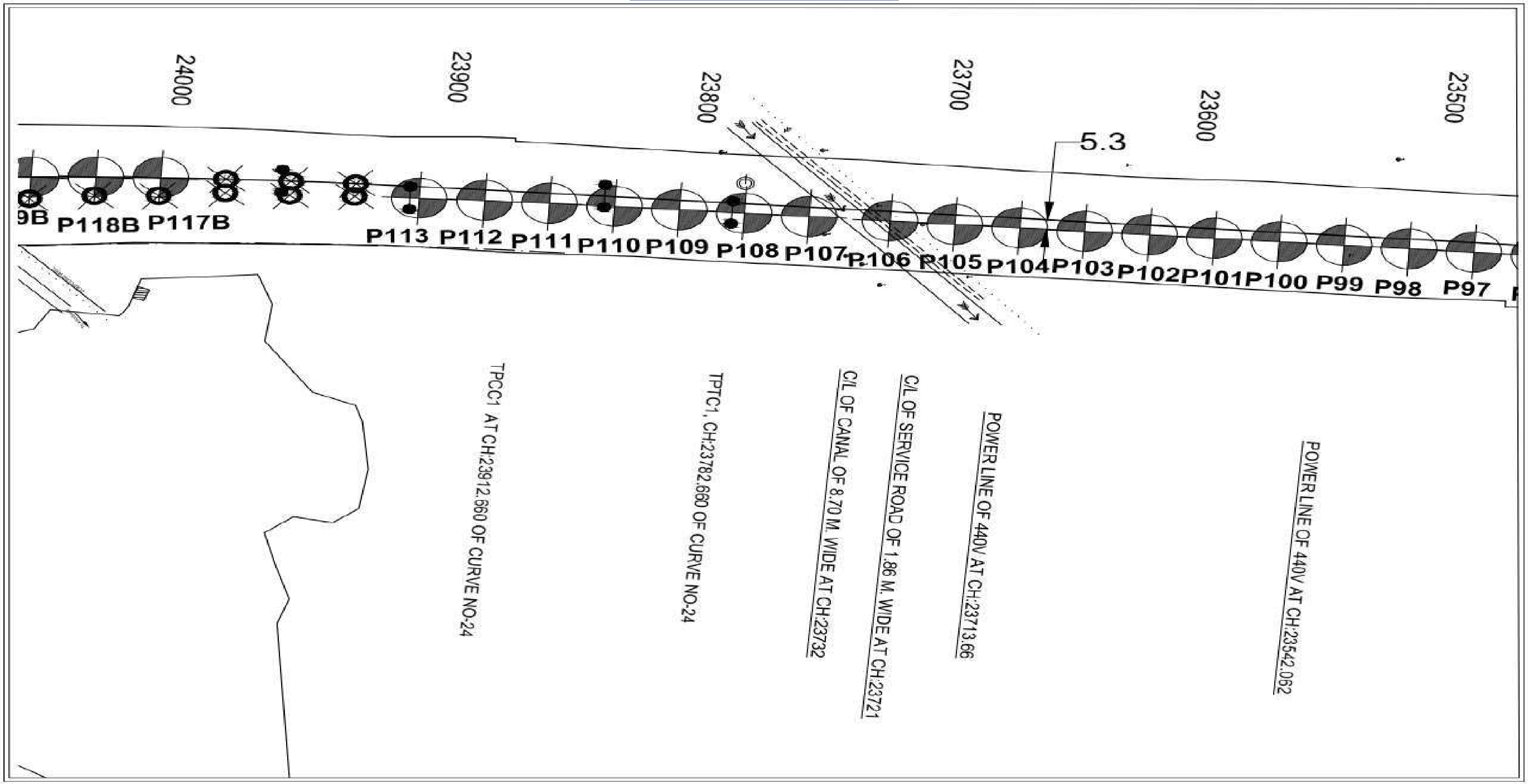
Bore No.	Liquefiable depth zone (meter)
P101	Top 5.00
P102	Top 3.00, 4.00 to 6.00 & 7.00 to 8.00
P103	Top 4.00
P104	Top 5.00

Bore No.	Liquefiable depth zone (meter)
P105	3.00 to 4.00, 5.00 to 9.00 & 13.00 to 14.50
P106	None
P107	2.00 to 3.00, 5.00 to 9.00 & 17.00 to 18.50
P108	Top 5.00 & 8.00 to 9.00
P109	Top 4.00 & 12.50 to 14.00
P110	Top 5.00
P111	None
P112	Top 5.00 & 8.00 to 9.00
P113	Top 6.00

for Techpro Engineers Pvt. Ltd.

(Arvind K. Garg)
B.Tech.(Civil), M.Tech.
Principal Consultant &
Managing Director

APPENDIX-A
TEST LOCATION PLAN



APPENDIX "B"
TABLE 1: SUMMARY OF TEST RESULTS

Bore No: P101	Ground Elevation: RL 193.949 m	Method of drilling: Percussion	Depth of Water-table: 1.30 m
Diameter of Bore Hole: 150 mm	Bore Retained using: Casing	Starting Date: 28/10/2023	SPT Sampler: Standard
Location / Chainage: 23562.087	Casing Lowered: 21.50 m	Ending Date: 30/10/2023	Hammer type: Rope-pulley driven

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	ML	0	0	0	47	49	4	16.22	-	-	26.0	22.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	1.00	U	2	-	-	-	-	-	SM-SC	0	0	1	49	44	6	20.85	2.03	1.68	27.0	21.5	5.5	2.65	-	-	-	-	0.577	-	-	-	-	Silty Sands with clay binder											
	2.00	D	3	2	3	4	7	9.57	-	-	-	-	-	-	-	16.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	3.00	D	4	2	2	2	4	5.11	SM	6	2	3	49	40	0	16.91	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	4.00	D	5	-	-	-	-	-	ML	0	0	0	48	46	6	20.15	1.96	1.63	25.0	21.0	4.0	2.65	RDST	8.0	26.6	-	0.626	-	-	-	-	Inorganic Silts of low plasticity											
	5.00	D	6	4	5	7	12	13.87	SM	0	0	1	52	47	0	20.06	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	6.00	D	7	6	8	11	19	18.03	CL-ML	1	1	0	20	73	5	22.59	-	-	28.0	22.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	7.00	U	8	-	-	-	-	-	ML	1	0	0	14	76	9	21.95	2.06	1.69	30.0	23.0	7.0	2.67	UU	48.0	9.5	0.151	0.580	-	-	-	-	Inorganic Silts of low plasticity											
	8.00	D	9	9	8	13	21	18.24	-	-	-	-	-	-	-	21.62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	9.00	D	10	8	12	16	28	21.32	ML	0	0	1	18	76	5	21.81	-	-	25.0	21.0	4.0	-	-	-	-	-	-	-	-	-	-												
	10.00	U	11	-	-	-	-	-	-	-	-	-	-	-	-	22.89	2.04	1.66	-	-	-	2.65	DST	6.0	26.0	-	0.596	-	-	-	-												
	11.00	D	12	8	13	17	30	21.40	CL	0	0	0	8	84	8	21.29	-	-	29.5	22.5	7.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	12.00	D	13	7	12	16	28	20.10	-	-	-	-	-	-	-	20.57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	13.00	U	14	-	-	-	-	-	-	-	-	-	-	-	-	19.35	2.05	1.72	-	-	-	2.66	UU	45.0	9.5	-	0.547	-	-	-	-												
	14.50	D	15	5	7	12	19	15.48	CL-ML	1	0	1	11	78	9	18.60	-	-	28.0	21.5	6.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	16.00	U	16	-	-	-	-	-	SM-SC	1	0	1	50	40	8	16.75	2.05	1.76	26.5	19.5	7.0	2.66	UU	43.0	13.0	-	0.511	-	9	16	-	Silty Sands with clay binder											
	17.50	D	17	8	15	23	38	22.33	-	-	-	-	-	-	-	19.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 1: SUMMARY OF TEST RESULTS

Bore No: P101	**Ground Elevation: RL 193.949 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 28/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 23562.087	**Casing Lowered: 21.50 m**	**Ending Date: 30/10/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	19.00	U	18	-	-	-	-	-	SM	0	1	1	57	41	0	19.58	1.89	1.58	Non-Plastic			2.62	DST	0.0	32.1	-	0.658	-	-	-	-	Silty Sands											
	20.50	D	19	14	20	24	44	23.73	-	-	-	-	-	-	-	20.85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	22.00	U	20	-	-	-	-	-	CI	7	5	5	14	53	16	20.18	1.97	1.64	38.5	23.0	15.5	2.68	UU	47.0	13.0	-	0.634	-	8	19	-	Inorganic clays of Intermediate plasticity											
	23.50	D	21	13	21	23	44	44.00	-	-	-	-	-	-	-	22.86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	25.00	D	22	-	-	-	-	-	ML	0	0	1	42	53	4	19.36	2.01	1.68	25.0	21.0	4.0	2.66	RDST	7.0	29.6	-	0.583	-	-	-	-	Inorganic Silts of low plasticity											
	26.50	D	23	14	21	25	46	22.63	-	-	-	-	-	-	-	17.61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	28.00	D	24	-	-	-	-	-	ML	1	1	0	38	53	7	17.36	-	-	29.0	22.5	6.5	-	-	-	-	-	-	-	-	-	-												
	29.50	D	25	14	28	48	76	31.36	ML	0	0	1	48	51	0	17.03	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	31.00	D	26	13	21	24	45	45.00	CL	4	6	8	26	44	12	17.18	-	-	32.0	20.0	12.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	32.50	D	27	18	21	23	44	44.00	-	-	-	-	-	-	-	14.67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	34.00	D	28	-	-	-	-	-	CL	2	1	2	22	64	9	18.75	2.04	1.72	30.0	22.0	8.0	2.67	RUU	49.0	12.3	-	0.552	-	-	-	-												
	35.50	D	29	15	23	24	47	20.85	SM	1	0	2	47	50	0	17.04	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	37.00	D	30	-	-	-	-	-	CL-ML	0	0	0	47	48	5	18.42	2.05	1.73	26.0	20.5	5.5	2.66	RDST	5.0	30.0	-	0.538	-	-	-	-	Inorganic Silty Clays of low plasticity											
	38.50	D	31	12	24	28	52	21.55	-	-	-	-	-	-	-	20.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	32	16	23	25	48	20.16	CL-ML	0	0	1	42	53	4	14.65	-	-	25.0	20.5	4.5	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"

TABLE 2: SUMMARY OF TEST RESULTS

Bore No: P102	**Ground Elevation: RL 194.023 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.00 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 29/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 23588.287	**Casing Lowered: 24.00 m**	**Ending Date: 02/11/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	1	50	49	0	15.33	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	D	2	1	2	2	4	6.18	SM-SC	0	0	1	54	41	4	18.29	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Silty Sands with clay binder											
	2.00	U	3	-	-	-	-	-	SM-SC	0	0	0	56	40	4	14.21	1.96	1.72	25.0	21.0	4.0	2.63	DST	11.0	27.2	-	0.529	-	-	-	-												
	3.00	D	4	3	5	8	13	16.06	SM	0	0	0	60	40	0	19.41	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	4.00	D	5	3	3	4	7	8.70	SM	3	1	2	55	39	0	16.15	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	5.00	D	6	-	-	-	-	-	-	-	-	-	-	-	-	17.82	1.89	1.60	-	-	-	-	RDST	0.0	27.0	-	-	-	-	-	-												
	6.00	D	7	4	6	9	15	16.05	SM	0	0	1	75	24	0	20.43	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	4	4	6	10	10.97	-	-	-	-	-	-	-	23.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	CL	4	0	2	11	71	12	17.09	1.96	1.67	31.0	20.0	11.0	2.67	UU	53.0	10.2	0.158	0.599	-	-	-	-	Inorganic clays of low plasticity											
	9.00	D	10	7	9	11	20	20.00	CL	6	1	2	9	72	10	18.48	-	-	30.0	21.0	9.0	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	7	8	10	18	18.00	CL	1	0	0	7	83	9	21.53	-	-	29.5	21.5	8.0	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	ML	1	0	1	6	85	7	18.55	1.99	1.68	29.0	23.5	5.5	2.66	UU	42.0	12.5	-	0.583	-	0	22	-	Inorganic Silts of low plasticity											
	12.50	D	13	5	7	9	16	16.00	CL	3	1	2	11	72	11	18.40	-	-	29.0	20.0	9.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	14.00	U	14	-	-	-	-	-	CL	9	3	2	16	60	10	17.28	2.00	1.71	28.0	20.0	8.0	2.67	UU	44.0	12.9	-	0.566	-	-	-	-												
	15.50	D	15	7	13	15	28	19.37	CL-ML	0	1	1	42	50	6	16.22	-	-	27.0	21.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	17.00	D	16	-	-	-	-	-	SM	1	1	0	70	28	0	17.89	2.06	1.75	Non-Plastic			-	RDST	0.0	30.1	-	-	-	-	-	-	Silty Sands											
	18.50	D	17	10	12	16	28	18.51	CL	6	2	2	14	68	8	18.88	-	-	29.0	22.0	7.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											

APPENDIX "B"
TABLE 2: SUMMARY OF TEST RESULTS

Bore No: P102	**Ground Elevation: RL 194.023 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.00 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 29/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 23588.287	**Casing Lowered: 24.00 m**	**Ending Date: 02/11/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	D	18	-	-	-	-	-	SM	0	0	0	62	38	0	16.87	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	21.50	D	19	15	21	23	44	23.69	SM	3	1	1	61	34	0	18.77	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	23.00	D	20	-	-	-	-	-	ML	1	1	1	45	52	0	18.23	2.03	1.72	Non-Plastic			2.65	RDST	3.0	29.6	-	0.541	-	-	-	-	Inorganic Silts of low plasticity											
	24.50	D	21	14	22	28	50	24.80	SM	1	1	1	50	47	0	18.71	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	26.00	D	22	-	-	-	-	-	-	-	-	-	-	-	-	18.71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	27.50	D	23	18	21	30	51	24.27	-	-	-	-	-	-	-	19.74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	-	-	-	-	-	SM	2	1	1	49	47	0	16.05	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	30.50	D	25	16	20	28	48	22.41	-	-	-	-	-	-	-	19.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	32.00	D	26	-	-	-	-	-	-	-	-	-	-	-	-	19.32	2.06	1.73	-	-	-	2.65	RDST	0.0	30.2	-	0.532	-	-	-	-												
	33.50	D	27	17	22	29	51	22.52	SM	1	2	2	69	26	0	19.61	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	19	23	33	56	23.56	-	-	-	-	-	-	-	18.71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	19	24	31	55	22.94	-	-	-	-	-	-	-	18.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	20	26	30	56	22.89	ML	1	2	1	40	56	0	18.33	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	40.00	D	31	20	30	36	66	25.15	-	-	-	-	-	-	-	17.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed samples.

APPENDIX "B"

TABLE 3: SUMMARY OF TEST RESULTS

Bore No: P103	**Ground Elevation: RL 194.05 m**	**Method of drilling: Percussion**	**Depth of Water-table: 0.50 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 11/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 23614.487	**Casing Lowered: 27.00 m**	**Ending Date: 13/10/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	1	54	45	0	15.68	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	1.00	D	2	1	2	3	5	8.18	-	-	-	-	-	-	-	15.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	SM	0	0	0	57	43	0	18.33	2.00	1.69	Non-Plastic			2.63	DST	2.0	28.5	-	0.556	-	-	-	-	Silty Sands											
	3.00	D	4	2	3	4	7	9.47	-	-	-	-	-	-	-	16.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	4	5	7	12	15.11	-	-	-	-	-	-	-	17.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	SM-SC	1	0	1	52	40	6	19.12	2.01	1.69	26.5	21.5	5.0	2.65	DST	4.0	26.5	-	0.571	-	0	15	-	Silty Sands with clay binder											
	6.00	D	7	5	7	9	16	16.66	SM	0	0	1	58	41	0	21.11	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	7.00	D	8	6	9	11	20	20.00	CL	0	0	1	14	77	8	21.70	-	-	29.0	21.0	8.0	-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	CL	5	1	1	18	66	9	21.16	2.06	1.70	30.0	22.0	8.0	2.66	UU	49.0	10.5	0.156	0.565	-	17	18	-												
	9.00	D	10	5	8	11	19	19.00	-	-	-	-	-	-	-	22.84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	5	9	13	22	22.00	-	-	-	-	-	-	-	20.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	11.00	U	12	-	-	-	-	-	CL	4	0	2	6	81	7	20.57	1.98	1.64	29.5	22.0	7.5	2.66	DST	14.0	24.4	-	0.622	-	-	-	-												
	12.50	D	13	7	8	9	17	17.00	-	-	-	-	-	-	-	21.38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	14.00	U	14	-	-	-	-	-	CL	3	0	1	7	83	6	20.77	2.06	1.71	29.0	21.0	8.0	2.66	UU	52.0	9.5	-	0.560	-	-	-	-												
	15.50	D	15	11	16	20	36	22.58	SM	6	2	1	41	50	0	17.14	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	17.00	U	16	-	-	-	-	-	CL	7	3	3	22	55	10	19.14	2.07	1.74	29.0	19.5	9.5	2.66	UU	54.0	10.5	-	0.531	-	9	17	-	Inorganic clays of low plasticity											
	18.50	D	17	8	12	15	27	18.00	SM	3	2	4	58	33	0	16.47	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											

APPENDIX "B"
TABLE 3: SUMMARY OF TEST RESULTS

Bore No: P103	Ground Elevation: RL 194.05 m	Method of drilling: Percussion	Depth of Water-table: 0.50 m
Diameter of Bore Hole: 150 mm	Bore Retained using: Casing	Starting Date: 11/10/2023	SPT Sampler: Standard
Location / Chainage: 23614.487	Casing Lowered: 27.00 m	Ending Date: 13/10/2023	Hammer type: Auto-trip

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	CL	5	2	2	24	57	10	21.93	2.04	1.67	29.0	19.5	9.5	2.67	UU	51.0	11.0	-	0.596	-	-	-	-	Inorganic clays of low plasticity											
	21.50	D	19	9	19	25	44	44.00	CL	6	3	4	8	67	12	18.01	-	-	32.0	21.0	11.0	-	-	-	-	-	-	-	-	-	-												
	23.00	U	20	-	-	-	-	-	SM	0	1	2	53	44	0	19.33	1.96	1.64	Non-Plastic			2.64	DST	2.0	27.5	-	0.610	-	-	-	-	Silty Sands											
	24.50	D	21	10	23	42	65	29.87	-	-	-	-	-	-	-	18.38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	10	24	43	67	29.95	SM	0	1	1	55	43	0	17.90	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	27.50	D	23	13	26	45	71	30.70	-	-	-	-	-	-	-	19.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	13	25	46	71	30.17	SM	0	0	1	57	42	0	16.44	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	30.50	D	25	14	25	45	70	29.33	-	-	-	-	-	-	-	18.68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	32.00	D	26	16	28	47	75	30.36	ML	0	1	1	44	54	0	18.54	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	33.50	D	27	16	28	47	75	75.00	CL	3	2	2	18	63	12	17.00	-	-	32.0	20.5	11.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	35.00	D	28	15	26	46	72	72.00	CL	8	2	2	24	52	12	17.65	-	-	31.5	21.0	10.5	-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	16	27	46	73	73.00	-	-	-	-	-	-	-	14.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	17	28	47	75	75.00	CL	3	1	2	30	54	10	20.82	-	-	30.0	18.5	11.5	-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	19	34	48	82	82.00	-	-	-	-	-	-	-	14.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 4: SUMMARY OF TEST RESULTS

Bore No: P104	**Ground Elevation: RL 194.067 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.20 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 30/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 23640.687	**Casing Lowered: 18.00 m**	**Ending Date: 02/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	0	55	45	0	18.84	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	U	2	-	-	-	-	-	SM-SC	0	0	0	57	38	5	18.90	1.98	1.67	26.0	20.5	5.5	2.65	DST	8.0	24.0	-	0.592	-	-	-	-	Silty Sands with clay binder											
	2.00	D	3	2	2	2	4	5.55	SM	3	2	2	60	33	0	18.11	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	3.00	D	4	2	2	4	6	7.78	-	-	-	-	-	-	-	16.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	-	-	-	-	-	SM	2	1	2	54	41	0	18.93	1.90	1.60	Non-Plastic			-	DST	0.0	25.4	-	-	-	-	-	-												
	5.00	D	6	3	5	7	12	14.11	-	-	-	-	-	-	-	20.94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	6.00	D	7	3	3	7	10	10.00	CL	5	2	1	19	63	10	20.87	-	-	29.0	20.5	8.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	7.00	U	8	-	-	-	-	-	CL	2	1	2	16	68	11	20.73	2.10	1.74	30.0	21.0	9.0	2.67	UU	50.0	11.1	0.145	0.534	-	10	20	-												
	8.00	D	9	7	8	10	18	16.82	CL-ML	0	0	1	20	72	7	21.83	-	-	28.0	22.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	9.00	D	10	6	10	12	22	22.00	CL	0	0	1	7	84	8	19.99	-	-	30.0	22.0	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	10.00	U	11	-	-	-	-	-	CL	1	1	0	8	81	9	22.58	2.03	1.66	29.0	21.5	7.5	2.66	UU	41.0	11.6	-	0.602	-	8	21	-												
	11.00	D	12	5	6	9	15	15.00	CL	1	0	2	10	74	13	20.33	-	-	34.0	21.0	13.0	-	-	-	-	-	-	-	-	-	-												
	12.00	D	13	6	9	13	22	22.00	CL	2	1	0	17	72	8	17.46	-	-	30.0	22.0	8.0	-	-	-	-	-	-	-	-	-	-												
	13.00	U	14	-	-	-	-	-	-	-	-	-	-	-	-	16.94	1.99	1.70	-	-	-	2.66	DST	11.0	25.6	-	0.565	-	-	-	-												
	14.50	D	15	6	12	16	28	28.00	-	-	-	-	-	-	-	16.47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	16.00	U	16	-	-	-	-	-	SM	5	2	2	44	47	0	13.21	2.02	1.78	Non-Plastic			2.63	DST	8.0	26.5	-	0.478	-	-	-	-	Silty Sands											
	17.50	D	17	8	15	20	35	21.35	SM	2	1	1	47	49	0	19.87	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 4: SUMMARY OF TEST RESULTS

Bore No: P104	Ground Elevation: RL 194.067 m	Method of drilling: Percussion	Depth of Water-table: 1.20 m
Diameter of Bore Hole: 150 mm	Bore Retained using: Casing	Starting Date: 30/10/2023	SPT Sampler: Standard
Location / Chainage: 23640.687	Casing Lowered: 18.00 m	Ending Date: 02/11/2023	Hammer type: Auto-trip

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	19.00	D	18	-	-	-	-	-	CL-ML	1	0	1	32	60	6	19.68	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-												
	20.50	D	19	10	16	23	39	21.98	-	-	-	-	-	-	-	17.41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	22.00	U	20	-	-	-	-	-	CL-ML	3	1	1	25	63	7	20.07	1.98	1.65	27.0	20.5	6.5	2.66	DST	9.0	25.5	-	0.612	-	-	-	-												
	23.50	D	21	13	18	24	42	22.20	ML	1	1	0	44	54	0	16.84	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	25.00	U	22	-	-	-	-	-	SM	0	1	1	59	39	0	18.05	2.01	1.70	Non-Plastic			2.63	DST	4.0	28.0	-	0.547	-	-	-	-												
	26.50	D	23	13	15	30	45	22.38	-	-	-	-	-	-	-	18.96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	28.00	U	24	-	-	-	-	-	SM	0	0	1	64	35	0	20.18	1.97	1.64	Non-Plastic			2.62	DST	2.0	29.1	-	0.598	-	-	-	-												
	29.50	D	25	13	27	31	58	25.71	SM	0	0	0	62	38	0	18.28	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	31.00	D	26	18	31	32	63	26.79	-	-	-	-	-	-	-	20.75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	32.50	D	27	13	28	38	66	27.25	SM	0	1	0	72	27	0	19.33	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	34.00	D	28	14	24	32	56	23.87	-	-	-	-	-	-	-	20.38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	35.50	D	29	13	18	35	53	22.65	-	-	-	-	-	-	-	20.47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	37.00	D	30	18	28	35	63	25.11	SM	0	0	1	69	30	0	20.14	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	38.50	D	31	12	19	29	48	20.63	-	-	-	-	-	-	-	20.57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	32	17	21	31	52	21.42	SM	0	0	2	65	33	0	18.95	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 5: SUMMARY OF TEST RESULTS

Bore No: P105	**Ground Elevation: RL 193.916 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 30/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 23666.887	**Casing Lowered: 20.00 m**	**Ending Date: 02/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	CL-ML	0	0	1	47	46	6	17.64	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	1.00	D	2	-	-	-	-	-	CL-ML	0	1	1	44	48	6	19.19	1.97	1.65	26.0	20.5	5.5	2.65	-	-	-	-	0.606	-	-	-	-												
	2.00	D	3	2	2	2	4	5.52	-	-	-	-	-	-	-	18.43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	3.00	D	4	2	3	3	6	7.75	SM	2	1	1	60	36	0	19.20	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	4.00	U	5	-	-	-	-	-	CL-ML	1	1	0	42	51	5	16.36	2.02	1.74	26.0	21.0	5.0	2.65	DST	2.0	28.6	-	0.523	-	-	-	-	Inorganic Silty Clays of low plasticity											
	5.00	D	6	3	3	4	7	8.11	SM	0	1	1	53	45	0	18.33	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	6.00	D	7	3	4	6	10	11.08	SM	0	0	1	69	30	0	21.07	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	-	-	-	-	-	-	-	-	-	-	-	-	19.58	1.94	1.62	-	-	-	-	RDST	0.0	28.5	-	-	-	-	-	-												
	8.00	D	9	3	5	7	12	12.38	ML	2	1	0	35	57	5	19.04	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	9.00	D	10	4	6	9	15	14.98	-	-	-	-	-	-	-	19.43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	U	11	-	-	-	-	-	CL	0	1	0	14	76	9	20.99	2.01	1.66	28.0	21.0	7.0	2.66	UU	46.0	10.2	-	0.602	-	-	-	-	Inorganic clays of low plasticity											
	11.00	D	12	3	4	4	8	8.00	CL	2	1	2	9	73	13	18.78	-	-	34.0	21.0	13.0	-	-	-	-	-	-	-	-	-	-												
	12.00	D	13	4	6	8	14	14.00	CI	4	3	5	16	57	15	19.22	-	-	38.0	24.0	14.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of Intermediate plasticity											
	13.00	U	14	-	-	-	-	-	ML	2	1	1	18	66	12	20.25	2.00	1.66	34.0	24.0	10.0	2.68	UU	62.0	9.5	0.163	0.614	-	-	-	-	Inorganic Silts of low plasticity											
	14.50	D	15	9	9	12	21	16.46	ML	1	1	0	25	65	8	18.36	-	-	30.0	23.0	7.0	-	-	-	-	-	-	-	-	-	-												
	16.00	D	16	-	-	-	-	-	-	-	-	-	-	-	-	17.73	1.97	1.67	-	-	-	2.67	RUU	45.0	12.8	-	0.599	-	-	-	-												
	17.50	D	17	9	14	19	33	20.64	ML	0	0	1	45	54	0	20.54	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 5: SUMMARY OF TEST RESULTS

Bore No: P105	**Ground Elevation: RL 193.916 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 30/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 23666.887	**Casing Lowered: 20.00 m**	**Ending Date: 02/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	19.00	D	18	-	-	-	-	-	CL-ML	3	1	0	35	55	6	18.46	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	20.50	D	19	13	20	26	46	46.00	CL	0	0	0	14	76	10	17.20	-	-	31.5	23.0	8.5	-	-	-	-	-	-	-	-	-	-												
	22.00	U	20	-	-	-	-	-	CL	0	1	0	12	75	12	17.81	2.05	1.74	31.0	22.0	9.0	2.67	UU	48.0	11.2	-	0.534	-	-	-	-	Inorganic clays of low plasticity											
	23.50	D	21	8	15	23	38	38.00	-	-	-	-	-	-	-	19.91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	25.00	U	22	-	-	-	-	-	ML	1	1	0	32	59	7	19.99	2.06	1.72	27.0	22.0	5.0	2.66	UU	45.0	10.5	-	0.547	-	-	-	-	Inorganic Silts of low plasticity											
	26.50	D	23	18	25	25	50	23.94	SM	0	0	0	55	45	0	18.72	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	28.00	U	24	-	-	-	-	-	CL	0	0	1	12	77	10	20.09	2.10	1.75	32.0	23.0	9.0	2.67	-	-	-	-	0.526	-	-	-	-	Inorganic clays of low plasticity											
	29.50	D	25	15	24	26	50	23.01	SM	1	0	1	65	33	0	19.86	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	31.00	U	26	-	-	-	-	-	-	-	-	-	-	-	-	16.97	2.08	1.78	-	-	-	2.63	DST	0.0	30.7	-	0.478	-	-	-	-												
	32.50	D	27	11	21	32	53	53.00	CL	0	1	1	12	74	12	16.59	-	-	33.0	22.0	11.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	34.00	D	28	14	24	28	52	22.37	ML	2	1	0	40	57	0	17.24	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	35.50	D	29	18	28	30	58	23.74	SM	0	0	1	55	44	0	16.99	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	37.00	D	30	13	21	28	49	20.94	-	-	-	-	-	-	-	16.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Silty Sands											
	38.50	D	31	17	26	35	61	23.89	SM	0	1	1	52	46	0	17.84	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	40.00	D	32	18	28	32	60	23.30	-	-	-	-	-	-	-	17.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample

APPENDIX "B"
TABLE 6: SUMMARY OF TEST RESULTS

Bore No: P106	**Ground Elevation: RL 194.696 m**	**Method of drilling: Percussion**	**Depth of Water-table: 0.60 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 11/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 23693.087	**Casing Lowered: 20.00 m**	**Ending Date: 13/10/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	0	55	45	0	6.38	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	U	2	-	-	-	-	-	SM	0	0	0	59	41	0	18.50	1.90	1.60	Non-Plastic			2.64	DST	3.0	27.5	-	0.647	-	-	-	-												
	2.00	D	3	1	1	1	2	2.00	CL	0	1	2	37	53	7	17.80	-	-	27.0	19.5	7.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	3.00	D	4	1	1	2	3	3.00	-	-	-	-	-	-	-	18.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	U	5	-	-	-	-	-	CL	0	0	1	44	45	10	21.52	1.82	1.50	28.0	20.0	8.0	2.67	UU	45.0	12.5	0.193	0.783	-	17	16	-												
	5.00	D	6	2	2	5	7	8.66	SM	0	0	2	59	39	0	17.69	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	6.00	D	7	2	3	6	9	10.68	-	-	-	-	-	-	-	18.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	-	-	-	-	-	CL-ML	0	0	1	44	48	7	23.04	1.98	1.61	26.5	20.0	6.5	2.66	RUU	39.0	12.8	-	0.652	-	-	-	-	Inorganic Silty Clays of low plasticity											
	8.00	D	9	4	4	6	10	10.88	CL-ML	0	1	1	16	75	7	20.11	-	-	25.0	19.5	5.5	-	-	-	-	-	-	-	-	-	-												
	9.00	D	10	3	6	9	15	15.36	-	-	-	-	-	-	-	21.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	U	11	-	-	-	-	-	CL	1	1	1	8	77	12	18.03	2.06	1.75	32.0	21.5	10.5	2.67	UU	54.0	8.5	-	0.530	-	9	18	-	Inorganic clays of low plasticity											
	11.00	D	12	8	13	18	31	31.00	-	-	-	-	-	-	-	18.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	12.00	D	13	10	15	21	36	36.00	-	-	-	-	-	-	-	16.79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	13.00	U	14	-	-	-	-	-	CL	6	2	4	11	66	11	20.43	2.05	1.70	31.0	20.5	10.5	2.67	UU	52.0	9.0	-	0.571	-	-	-	-												
	14.50	D	15	5	9	10	19	19.00	-	-	-	-	-	-	-	19.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	16.00	U	16	-	-	-	-	-	ML	3	1	1	42	47	6	16.17	1.98	1.70	24.0	20.0	4.0	2.66	DST	8.0	25.5	-	0.561	-	-	-	-	Inorganic Silts of low plasticity											
	17.50	D	17	8	14	17	31	20.15	SM	0	0	0	52	48	0	17.25	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											

APPENDIX "B"
TABLE 6: SUMMARY OF TEST RESULTS

Bore No: P106	**Ground Elevation: RL 194.696 m**	**Method of drilling: Percussion**	**Depth of Water-table: 0.60 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 11/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 23693.087	**Casing Lowered: 20.00 m**	**Ending Date: 13/10/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	19.00	U	18	-	-	-	-	-	SM	2	1	1	53	43	0	19.18	1.92	1.61	Non-Plastic			2.64	DST	4.0	26.5	-	0.640	-	-	-	-	Silty Sands											
	20.50	D	19	12	16	20	36	21.30	-	-	-	-	-	-	-	19.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	22.00	D	20	-	-	-	-	-	ML	1	1	1	38	59	0	20.34	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	23.50	D	21	13	18	23	41	22.29	-	-	-	-	-	-	-	17.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	25.00	U	22	-	-	-	-	-	ML	0	0	0	48	52	0	18.42	1.98	1.67	Non-Plastic			2.63	DST	7.0	27.0	-	0.573	-	-	-	-												
	26.50	D	23	15	27	39	66	29.98	-	-	-	-	-	-	-	17.27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	28.00	D	24	-	-	-	-	-	-	-	-	-	-	-	-	19.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.50	D	25	11	22	31	53	24.74	CL-ML	13	4	5	16	55	7	14.63	-	-	25.0	18.5	6.5	-	-	-	-	-	-	-	8	14	-	Inorganic Silty Clays of low plasticity											
	31.00	D	26	14	31	45	76	76.00	CL	7	2	3	10	67	11	17.83	-	-	31.0	22.0	9.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	32.50	D	27	13	29	40	69	69.00	-	-	-	-	-	-	-	16.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	34.00	D	28	-	-	-	-	-	CL	2	2	3	14	70	9	18.50	2.01	1.70	29.0	19.5	9.5	2.67	RUU	55.0	11.2	-	0.571	-	-	-	-												
	35.50	D	29	15	32	43	75	75.00	-	-	-	-	-	-	-	17.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	37.00	D	30	-	-	-	-	-	-	-	-	-	-	-	-	18.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	38.50	D	31	16	33	40	73	73.00	CL	1	2	3	7	75	12	16.29	-	-	30.0	19.0	11.0	-	-	-	-	-	-	-	-	-	-												
	40.00	D	32	14	35	44	79	79.00	-	-	-	-	-	-	-	14.28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 7: SUMMARY OF TEST RESULTS

Bore No : P107	**Ground Elevation : RL 194.725 m**	**Method of drilling :Percussion**	**Depth of Water-table: 0.50 m**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 10/12/2023**	**SPT Sampler: Standard**
Location / Chainage : 23725.647	**Casing Lowered : 24.00 m**	**Ending Date : 16/12/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	CL-ML	0	0	1	30	62	7	18.26	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	1.00	D	2	1	2	2	4	6.67	-	-	-	-	-	-	-	18.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	D	3	-	-	-	-	-	SM	2	2	3	47	46	0	18.33	1.87	1.58	Non-Plastic			-	RDST	3.0	24.1	-	-	-	-	-	-	Silty Sands											
	3.00	D	4	2	2	2	4	5.57	CL-ML	2	1	2	35	55	5	18.63	-	-	25.0	20.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	4.00	D	5	3	4	6	10	13.10	CL-ML	1	1	2	27	63	6	17.95	-	-	24.5	19.5	5.0	-	-	-	-	-	-	-	6	18	-												
	5.00	U	6	-	-	-	-	-	SM	0	0	1	54	45	0	17.44	1.94	1.65	Non-Plastic			2.64	DST	2.0	27.3	-	0.600	-	-	-	-	Silty Sands											
	6.00	D	7	3	4	6	10	11.81	ML	1	1	2	30	61	5	18.92	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	7.00	D	8	3	5	7	12	13.57	-	-	-	-	-	-	-	16.66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	ML	4	1	1	14	72	8	17.75	2.06	1.75	29.0	23.0	6.0	2.66	UU	49.0	10.7	0.113	0.520	-	7	20	-												
	9.00	D	10	4	6	9	15	15.30	ML	3	0	2	12	76	7	24.92	-	-	28.0	22.5	5.5	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	8	10	11	21	18.03	-	-	-	-	-	-	-	19.92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	CL	0	0	2	11	75	12	18.50	1.99	1.68	31.0	20.5	10.5	2.68	UU	57.0	9.2	-	0.595	-	-	-	-	Inorganic clays of low plasticity											
	12.50	D	13	9	11	13	24	18.64	CL-ML	1	0	1	28	63	7	20.34	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	14.00	U	14	-	-	-	-	-	CL	2	1	1	14	71	11	17.03	2.05	1.75	32.0	23.0	9.0	2.67	-	-	-	-	0.526	-	-	-	-	Inorganic clays of low plasticity											
	15.50	D	15	7	8	10	18	18.00	-	-	-	-	-	-	-	22.74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	17.00	U	16	-	-	-	-	-	SM	2	1	0	63	34	0	16.44	2.03	1.74	Non-Plastic			-	DST	0.0	29.2	-	-	-	-	-	-	Silty Sands											
	18.50	D	17	12	16	22	38	22.57	-	-	-	-	-	-	-	20.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 7: SUMMARY OF TEST RESULTS

Bore No : P107	**Ground Elevation : RL 194.725 m**	**Method of drilling :Percussion**	**Depth of Water-table: 0.50 m**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 10/12/2023**	**SPT Sampler: Standard**
Location / Chainage : 23725.647	**Casing Lowered : 24.00 m**	**Ending Date : 16/12/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	CL	5	2	2	18	58	15	21.31	2.03	1.67	34.5	22.5	12.0	2.68	UU	64.0	10.6	-	0.605	-	14	19	-	Inorganic clays of low plasticity											
	21.50	D	19	18	32	40	72	72.00	-	-	-	-	-	-	-	14.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.00	D	20	14	29	37	66	31.23	ML	2	1	1	42	54	0	17.60	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	24.50	D	21	16	27	33	60	28.51	SM	1	0	0	60	39	0	18.51	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	26.00	D	22	18	30	36	66	30.06	-	-	-	-	-	-	-	15.46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	27.50	D	23	15	23	28	51	24.47	SM	0	0	1	64	35	0	22.67	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	16	24	29	53	24.71	SM	0	0	1	52	47	0	18.21	-	-	Non-Plastic			2.63	-	-	-	-	-	-	-	-	-												
	30.50	D	25	20	30	37	67	28.73	-	-	-	-	-	-	-	20.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	32.00	D	26	17	42	29	71	29.50	ML	4	2	2	34	52	6	15.53	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	33.50	D	27	16	26	33	59	25.37	ML	0	0	1	44	55	0	18.58	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	15	24	40	64	26.45	-	-	-	-	-	-	-	19.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	16	27	38	65	26.32	ML	0	0	1	46	53	0	18.94	-	-	Non-Plastic			2.64	-	-	-	-	-	-	-	-	-												
	38.00	D	30	17	30	33	63	25.34	-	-	-	-	-	-	-	19.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	19	32	36	68	26.23	ML	0	1	1	47	51	0	17.48	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 8: SUMMARY OF TEST RESULTS

Bore No : P108	**Ground Elevation : RL 194.47 m**	**Method of drilling :Percussion**	**Depth of Water-table: 1.40 m**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 07/12/2023**	**SPT Sampler: Standard**
Location / Chainage : 23751.847	**Casing Lowered : 20.00 m**	**Ending Date : 09/12/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	ML	0	0	1	44	51	4	17.68	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	1.00	D	2	1	2	2	4	6.20	-	-	-	-	-	-	-	18.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	SM	0	0	1	54	45	0	16.12	1.94	1.67	Non-Plastic			2.65	DST	4.0	27.0	-	0.587	-	-	-	-	Silty Sands											
	3.00	D	4	1	2	3	5	6.45	SM	0	1	1	52	46	0	18.77	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	2	3	4	7	8.56	-	-	-	-	-	-	-	18.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	CL-ML	0	0	0	41	54	5	18.47	2.03	1.71	24.5	20.0	4.5	2.66	UU	37.0	14.7	-	0.556	-	-	19	-	Inorganic Silty Clays of low plasticity											
	6.00	D	7	2	4	6	10	11.11	-	-	-	-	-	-	-	15.92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	3	4	7	11	11.73	CL-ML	2	1	1	27	64	5	16.52	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	ML	2	0	2	18	68	10	20.54	2.13	1.77	30.0	23.0	7.0	2.67	UU	56.0	11.1	0.147	0.508	-	-	20	-	Inorganic Silts of low plasticity											
	9.00	D	10	5	7	9	16	15.38	-	-	-	-	-	-	-	18.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	6	9	12	21	17.49	-	-	-	-	-	-	-	20.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	CL	0	1	1	12	74	12	23.01	2.08	1.69	32.0	21.5	10.5	2.68	UU	58.0	10.1	-	0.586	-	-	21	-	Inorganic clays of low plasticity											
	12.50	D	13	6	11	14	25	25.00	-	-	-	-	-	-	-	22.47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	14.00	D	14	-	-	-	-	-	-	-	-	-	-	-	-	20.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	15.50	D	15	7	13	18	31	31.00	CL	0	1	1	11	75	12	20.97	-	-	31.0	20.0	11.0	-	-	-	-	-	-	-	-	-	-												
	17.00	U	16	-	-	-	-	-	SM	2	1	2	47	48	0	19.75	2.06	1.72	Non-Plastic			2.65	DST	9.0	27.2	-	0.541	-	-	-	-	Silty Sands											
	18.50	D	17	10	16	20	36	21.16	ML	1	1	2	38	53	5	12.87	-	-	28.0	22.5	5.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											

APPENDIX "B"
TABLE 8: SUMMARY OF TEST RESULTS

Bore No : P108	**Ground Elevation : RL 194.47 m**	**Method of drilling :Percussion**	**Depth of Water-table: 1.40 m**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 07/12/2023**	**SPT Sampler: Standard**
Location / Chainage : 23751.847	**Casing Lowered : 20.00 m**	**Ending Date : 09/12/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	ML	6	2	4	19	61	8	17.07	2.05	1.75	32.5	25.0	7.5	2.66	RUU	42.0	12.2	-	0.520	-	-	-	-	Inorganic Silts of low plasticity											
	21.50	D	19	8	15	23	38	38.00	-	-	-	-	-	-	-	18.57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.00	D	20	-	-	-	-	-	CL	2	1	2	16	69	10	16.92	-	-	30.0	22.0	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	24.50	D	21	12	18	25	43	43.00	CL-CI	1	1	3	23	61	11	18.53	-	-	35.0	23.0	12.0	-	-	-	-	-	-	-	-	-	-	Inorganic Clays of low to Intermediate plasticity											
	26.00	D	22	-	-	-	-	-	SM	0	0	1	70	29	0	19.17	2.07	1.74	Non-Plastic			2.65	RDST	0.0	31.3	-	0.523	-	-	-	-	Silty Sands											
	27.50	D	23	15	26	35	61	26.76	-	-	-	-	-	-	-	19.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	18	28	36	64	27.15	-	-	-	-	-	-	-	19.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	30.50	D	25	24	35	40	75	30.01	SM	0	0	1	67	32	0	18.50	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	32.00	D	26	20	31	35	66	26.89	ML	0	1	1	44	50	4	15.86	-	-	25.0	21.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	33.50	D	27	21	33	37	70	70.00	CL	6	2	2	26	56	8	16.37	-	-	30.0	22.5	7.5	2.67	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	35.00	D	28	18	29	33	62	62.00	-	-	-	-	-	-	-	16.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	22	31	35	66	25.70	SM	0	0	1	62	37	0	17.99	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	38.00	D	30	24	36	41	77	28.30	-	-	-	-	-	-	-	17.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	26	39	47	86	30.11	SM	0	1	1	59	39	0	17.30	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 9: SUMMARY OF TEST RESULTS

Bore No : P109	Ground Elevation : RL 194.428 m	Method of drilling :Percussion	Depth of Water-table: 1.20 m
Diameter of Bore Hole : 150 mm	Bore Retained using : Casing	Starting Date : 06/12/2023	SPT Sampler: Standard
Location / Chainage : 23778.047	Casing Lowered : 21.00 m	Ending Date : 08/12/2023	Hammer type: Rope-pulley driven

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM-SC	0	0	0	51	45	4	19.09	-	-	25.0	21.0	4.0	-	-	-	-	-	-	-	-	-	-	Silty Sands with clay binder											
	1.00	D	2	2	2	2	4	6.18	-	-	-	-	-	-	-	20.91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	SM	0	0	0	57	43	0	19.22	1.97	1.65	Non-Plastic			2.65	DST	7.0	26.5	-	0.606	-	-	-	-	Silty Sands											
	3.00	D	4	2	2	4	6	7.80	-	-	-	-	-	-	-	17.54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	3	4	7	11	13.52	CL-ML	1	0	0	35	57	7	18.94	-	-	27.0	21.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	5.00	U	6	-	-	-	-	-	ML	0	0	1	46	49	4	19.18	2.09	1.75	24.0	20.0	4.0	2.65	DST	9.0	23.5	-	0.514	-	-	-	-	Inorganic Silts of low plasticity											
	6.00	D	7	5	6	9	15	15.82	-	-	-	-	-	-	-	16.72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	6	7	7	14	14.88	SM	0	0	0	62	38	0	19.51	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	8.00	D	9	-	-	-	-	-	-	-	-	-	-	-	-	19.11	1.99	1.67	-	-	-	-	RDST	0.0	26.6	-	-	-	-	-	-												
	9.00	D	10	6	12	14	26	20.39	ML	0	0	1	22	69	8	21.32	-	-	29.5	23.5	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	10.00	D	11	7	8	10	18	16.15	-	-	-	-	-	-	-	20.91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	D	12	-	-	-	-	-	ML	1	1	1	30	61	6	18.65	1.99	1.68	27.0	22.0	5.0	2.66	RUU	29.0	14.3	-	0.583	-	-	-	-												
	12.50	D	13	4	5	6	11	11.00	ML	1	0	2	14	74	9	22.22	-	-	31.0	23.0	8.0	-	-	-	-	-	-	-	-	-	-												
	14.00	U	14	-	-	-	-	-	CL	1	1	2	20	68	8	15.52	2.03	1.76	30.0	22.5	7.5	2.67	UU	45.0	12.5	-	0.517	-	-	20	-	Inorganic clays of low plasticity											
	15.50	D	15	10	19	22	41	24.45	ML	2	2	3	42	45	6	16.55	-	-	27.0	22.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	17.00	U	16	-	-	-	-	-	SM-SC	5	2	3	43	42	5	18.03	2.03	1.72	27.5	22.0	5.5	2.66	DST	4.0	28.3	-	0.547	-	-	-	-	Silty Sands with clay binder											
	18.50	D	17	20	26	37	63	63.00	CL	7	3	5	22	55	8	13.67	-	-	30.0	22.0	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											

APPENDIX "B"
TABLE 9: SUMMARY OF TEST RESULTS

Bore No : P109	**Ground Elevation : RL 194.428 m**	**Method of drilling :Percussion**	**Depth of Water-table: 1.20 m**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 06/12/2023**	**SPT Sampler: Standard**
Location / Chainage : 23778.047	**Casing Lowered : 21.00 m**	**Ending Date : 08/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	D	18	15	21	30	51	51.00	-	-	-	-	-	-	-	19.53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	21.50	D	19	16	23	31	54	54.00	-	-	-	-	-	-	-	17.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.00	D	20	18	26	33	59	28.34	SM	1	0	2	61	36	0	18.79	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	24.50	D	21	17	28	34	62	28.89	-	-	-	-	-	-	-	13.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	18	27	31	58	27.00	SM	0	0	1	54	45	0	19.31	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	27.50	D	23	20	30	34	64	28.47	-	-	-	-	-	-	-	20.91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	50	100	-	R	-	SM	0	2	1	52	45	0	17.87	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	30.50	D	25	25	33	41	74	30.69	-	-	-	-	-	-	-	15.46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	32.00	D	26	31	40	62	R	-	CL	5	2	4	22	59	8	15.77	-	-	28.0	20.5	7.5	-	-	-	-	-	-	-	-	-	-												
	33.50	D	27	28	37	49	86	86.00	CL	1	2	3	28	57	9	19.52	-	-	29.5	21.5	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	35.00	D	28	29	40	54	94	94.00	-	-	-	-	-	-	-	20.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	25	38	44	82	31.00	SM	2	1	1	48	48	0	16.80	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	22	30	36	66	26.02	-	-	-	-	-	-	-	16.91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Silty Sands											
	40.00	D	31	20	28	32	60	23.89	SM	2	0	0	53	45	0	16.16	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 10: SUMMARY OF TEST RESULTS

Bore No : P110	**Ground Elevation : RL 194.74 m**	**Method of drilling :Percussion**	**Depth of Water-table: 2.30 m**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 04/12/2023**	**SPT Sampler: Standard**
Location / Chainage : 23804.247	**Casing Lowered : 22.00 m**	**Ending Date : 06/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	0	65	35	0	13.90	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	D	2	1	1	2	3	4.63	-	-	-	-	-	-	-	18.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	SM	0	0	0	67	33	0	14.78	1.99	1.73	Non-Plastic			2.62	DST	3.0	26.6	-	0.514	-	-	-	-												
	3.00	D	4	2	2	2	4	4.87	-	-	-	-	-	-	-	18.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	2	3	3	6	6.96	ML	0	0	1	40	59	0	17.30	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	5.00	U	6	-	-	-	-	-	CL-ML	1	1	2	25	63	8	20.82	2.07	1.71	27.5	21.0	6.5	2.66	UU	47.0	12.5	-	0.556	-	-	20	-	Inorganic Silty Clays of low plasticity											
	6.00	D	7	3	4	4	8	8.49	-	-	-	-	-	-	-	19.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	2	3	6	9	9.19	-	-	-	-	-	-	-	18.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	CL-ML	9	2	2	12	68	7	22.49	2.05	1.67	28.0	21.5	6.5	2.66	UU	51.0	10.1	0.123	0.593	-	-	-	-												
	9.00	D	10	4	5	8	13	13.00	CL	3	1	2	15	71	8	21.51	-	-	28.5	21.0	7.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	10.00	D	11	5	7	11	18	18.00	-	-	-	-	-	-	-	20.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	CL	2	1	2	13	73	9	22.61	2.06	1.68	29.0	21.0	8.0	2.67	DST	12.0	25.3	-	0.589	-	-	-	-												
	12.50	D	13	8	12	14	26	26.00	-	-	-	-	-	-	-	20.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	14.00	U	14	-	-	-	-	-	ML	6	3	1	12	68	10	19.12	2.05	1.72	30.5	23.5	7.0	2.68	UU	55.0	11.6	-	0.558	-	-	23	-	Inorganic Silts of low plasticity											
	15.50	D	15	12	19	22	41	23.87	CL-ML	3	2	2	38	50	5	18.71	-	-	25.0	20.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	17.00	D	16	-	-	-	-	-	CL-ML	4	2	2	17	68	7	23.98	-	-	27.0	21.0	6.0	-	-	-	-	-	-	-	-	-	-												
	18.50	D	17	13	24	28	52	27.04	-	-	-	-	-	-	-	19.86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 10: SUMMARY OF TEST RESULTS

Bore No : P110	**Ground Elevation : RL 194.74 m**	**Method of drilling :Percussion**	**Depth of Water-table: 2.30 m**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 04/12/2023**	**SPT Sampler: Standard**
Location / Chainage : 23804.247	**Casing Lowered : 22.00 m**	**Ending Date : 06/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	D	18	15	27	33	60	60.00	CL	3	2	1	12	72	10	16.91	-	-	29.0	21.5	7.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	21.50	D	19	18	31	35	66	31.00	ML	0	0	1	40	55	4	18.45	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	23.00	D	20	19	33	38	71	32.12	SM	0	0	0	60	40	0	19.36	-	-	Non-Plastic			2.65	-	-	-	-	-	-	-	-	-	Silty Sands											
	24.50	D	21	16	28	32	60	27.79	-	-	-	-	-	-	-	17.72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	18	31	37	68	30.00	SM	0	0	1	70	29	0	11.88	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	27.50	D	23	17	30	40	70	30.09	-	-	-	-	-	-	-	20.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	15	27	36	63	27.40	SM-SC	2	1	2	47	43	5	12.84	-	-	24.5	19.5	5.0	-	-	-	-	-	-	-	-	-	-	Silty Sands with clay binder											
	30.50	D	25	18	33	52	85	33.74	-	-	-	-	-	-	-	16.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	32.00	D	26	19	34	49	83	32.55	SM	2	1	2	45	50	0	18.62	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	33.50	D	27	20	30	44	74	29.35	-	-	-	-	-	-	-	16.77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	22	32	47	79	30.33	SM	7	4	3	38	48	0	17.09	-	-	Non-Plastic			2.65	-	-	-	-	-	-	-	-	-												
	36.50	D	29	19	30	41	71	27.57	ML	0	0	1	47	52	0	19.18	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	38.00	D	30	18	28	29	57	23.27	-	-	-	-	-	-	-	19.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	16	26	38	64	24.70	ML	0	1	2	43	54	0	19.88	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 11: SUMMARY OF TEST RESULTS

Bore No: P111	**Ground Elevation: RL 194.745 m**	**Method of drilling: Rotary**	**Depth of Water-table: 1.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 18/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 23830.447	**Casing Lowered: 15.00 m**	**Ending Date: 21/10/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	CL-ML	0	0	1	48	46	5	14.48	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	1.00	D	2	1	2	2	4	6.16	-	-	-	-	-	-	-	14.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	-	-	-	-	-	-	-	18.60	2.00	1.69	-	-	-	2.63	DST	7.0	26.5	-	0.556	-	-	-	-												
	3.00	D	4	4	5	5	10	12.83	SM	1	1	2	54	42	0	15.60	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	4.00	D	5	6	7	7	14	15.99	-	-	-	-	-	-	-	16.74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	CL	2	2	2	20	66	8	19.11	1.97	1.65	27.5	20.5	7.0	2.67	UU	46.0	11.2	0.145	0.618	-	9	18	-	Inorganic clays of low plasticity											
	6.00	D	7	4	5	6	11	12.20	-	-	-	-	-	-	-	19.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	10	14	16	30	23.51	SM	2	3	3	47	45	0	18.89	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	8.00	U	9	-	-	-	-	-	SM	3	6	16	42	33	0	16.86	1.98	1.70	Non-Plastic			2.63	DST	0.0	29.5	-	0.551	-	-	-	-												
	9.00	D	10	10	13	18	31	31.00	CL	5	3	7	11	64	10	21.19	-	-	29.0	21.0	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	10.00	D	11	13	20	24	44	44.00	CL	1	1	1	5	80	12	19.87	-	-	31.0	20.5	10.5	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	CL	7	10	9	16	48	10	16.42	2.01	1.73	29.0	20.0	9.0	2.66	UU	48.0	11.5	-	0.538	-	17	16	-												
	12.50	D	13	7	12	15	27	27.00	CL	3	2	4	12	71	8	21.13	-	-	28.0	20.0	8.0	-	-	-	-	-	-	-	-	-	-												
	14.00	U	14	-	-	-	-	-	CL	4	4	6	8	66	12	21.13	2.05	1.69	32.0	21.0	11.0	2.68	UU	58.0	9.5	-	0.586	-	-	-	-												
	15.50	D	15	10	17	20	37	37.00	SC	4	8	12	30	36	10	16.10	-	-	28.0	18.5	9.5	-	-	-	-	-	-	-	-	-	-	Clayey Sands											
	17.00	U	16	-	-	-	-	-	SC	5	7	11	30	35	12	17.69	2.03	1.72	30.0	20.0	10.0	2.67	UU	56.0	10.4	-	0.548	-	0	18	-												
	18.50	D	17	9	18	22	40	22.93	CL-ML	2	1	3	40	48	6	14.98	-	-	26.0	21.5	4.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											

APPENDIX "B"

TABLE 11: SUMMARY OF TEST RESULTS

Bore No: P111	**Ground Elevation: RL 194.745 m**	**Method of drilling: Rotary**	**Depth of Water-table: 1.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 18/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 23830.447	**Casing Lowered: 15.00 m**	**Ending Date: 21/10/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	D	18	-	-	-	-	-	SM	0	0	2	63	35	0	19.54	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	21.50	D	19	13	24	30	54	26.98	-	-	-	-	-	-	-	11.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.00	D	20	-	-	-	-	-	SM	2	2	12	54	30	0	16.85	2.07	1.77	Non-Plastic			2.65	RDST	0.0	32.3	-	0.497	-	-	-	-												
	24.50	D	21	14	26	31	57	26.82	SM	7	10	8	28	47	0	13.14	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	16	35	51	86	35.81	SM	4	8	18	34	36	0	13.14	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	27.50	D	23	15	36	49	85	34.88	SM	8	8	8	39	37	0	12.75	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	16	38	50	88	35.22	-	-	-	-	-	-	-	15.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	30.50	D	25	14	33	46	79	31.85	-	-	-	-	-	-	-	14.96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	32.00	D	26	15	36	47	83	32.50	SM	1	1	3	58	37	0	18.96	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	33.50	D	27	16	37	45	82	31.65	-	-	-	-	-	-	-	18.71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	18	39	48	87	87.00	SC	8	7	13	38	27	7	17.66	-	-	28.0	20.0	8.0	-	-	-	-	-	-	-	-	-	-	Clayey Sands											
	36.50	D	29	17	40	45	85	85.00	-	-	-	-	-	-	-	17.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	16	42	46	88	88.00	CL	4	4	7	24	50	11	16.60	-	-	30.0	19.5	10.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	40.00	D	31	37	55	-	R	-	SC	0	10	14	34	34	8	16.52	-	-	29.0	20.0	9.0	-	-	-	-	-	-	-	-	-	-	Clayey Sands											

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 12: SUMMARY OF TEST RESULTS

Bore No : P112	**Ground Elevation : RL 194.948 m**	**Method of drilling :Percussion**	**Depth of Water-table: 2.40 m**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 04/12/2023**	**SPT Sampler: Standard**
Location / Chainage : 23856.647	**Casing Lowered : 20.00 m**	**Ending Date : 06/12/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	1	53	46	0	4.08	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	D	2	1	2	2	4	6.29	SM	5	2	3	58	32	0	16.72	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	2.00	D	3	-	-	-	-	-	-	-	-	-	-	-	-	5.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	3.00	D	4	2	2	3	5	6.23	-	-	-	-	-	-	-	16.27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	2	3	5	8	9.46	ML	0	0	1	45	54	0	21.16	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	5.00	U	6	-	-	-	-	-	CL	2	1	1	14	73	9	19.50	2.01	1.68	30.0	22.0	8.0	2.67	-	-	-	-	0.589	-	-	-	-	Inorganic clays of low plasticity											
	6.00	D	7	3	4	5	9	9.00	-	-	-	-	-	-	-	19.74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	3	5	7	12	12.00	-	-	-	-	-	-	-	20.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	ML	8	4	3	8	68	9	16.96	2.02	1.73	29.5	23.5	6.0	2.67	UU	53.0	12.5	-	0.543	-	-	23	-	Inorganic Silts of low plasticity											
	9.00	D	10	5	7	10	17	15.77	-	-	-	-	-	-	-	14.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	7	9	13	22	22.00	ML	1	1	2	12	74	10	20.28	-	-	31.0	23.0	8.0	-	-	-	-	-	-	-	-	-	-												
	11.00	D	12	-	-	-	-	-	-	-	-	-	-	-	-	15.22	1.94	1.68	-	-	-	-	RUU	57.0	9.5	-	-	-	-	-	-												
	12.50	D	13	6	8	12	20	20.00	-	-	-	-	-	-	-	21.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	14.00	U	14	-	-	-	-	-	CL	3	2	2	17	66	10	19.85	2.04	1.70	30.5	22.5	8.0	2.68	UU	61.0	9.1	-	0.576	-	-	22	-	Inorganic clays of low plasticity											
	15.50	D	15	9	14	19	33	33.00	-	-	-	-	-	-	-	20.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	17.00	U	16	-	-	-	-	-	CL	2	1	2	19	68	8	18.13	2.01	1.70	29.0	22.0	7.0	2.66	DST	7.0	26.5	-	0.565	-	-	-	-												
	18.50	D	17	12	25	29	54	28.12	ML	0	0	1	46	53	0	20.44	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											

APPENDIX "B"
TABLE 12: SUMMARY OF TEST RESULTS

Bore No : P112	**Ground Elevation : RL 194.948 m**	**Method of drilling :Percussion**	**Depth of Water-table: 2.40 m**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 04/12/2023**	**SPT Sampler: Standard**
Location / Chainage : 23856.647	**Casing Lowered : 20.00 m**	**Ending Date : 06/12/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	D	18	13	18	28	46	46.00	CL	2	1	2	22	65	8	17.72	-	-	30.0	21.0	9.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	21.50	D	19	11	15	19	34	34.00	CL	5	1	3	39	44	8	16.87	-	-	29.5	20.0	9.5	-	-	-	-	-	-	-	-	-	-												
	23.00	U	20	-	-	-	-	-	SM-SC	2	0	4	45	43	6	16.48	2.02	1.73	26.0	21.0	5.0	2.66	DST	4.0	27.8	-	0.538	-	-	-	-	Silty Sands with clay binder											
	24.50	D	21	15	24	28	52	52.00	CL	1	1	1	13	74	10	15.02	-	-	30.0	21.5	8.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	26.00	D	22	17	26	31	57	26.24	SM	0	0	1	52	47	0	17.95	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	27.50	D	23	16	25	34	59	26.45	SM	0	0	1	50	49	0	17.14	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	19	28	35	63	27.28	-	-	-	-	-	-	-	16.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	30.50	D	25	15	23	34	57	25.00	ML	0	2	3	42	46	7	16.48	-	-	29.0	22.5	6.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	32.00	D	26	17	22	32	54	23.71	-	-	-	-	-	-	-	18.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	33.50	D	27	18	23	34	57	57.00	CL	5	1	3	15	65	11	16.10	-	-	31.0	21.0	10.0	2.67	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	35.00	D	28	16	21	32	53	53.00	-	-	-	-	-	-	-	15.65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	15	22	33	55	22.99	SM	0	0	1	60	39	0	18.02	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	38.00	D	30	18	24	36	60	24.04	-	-	-	-	-	-	-	18.77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	20	25	38	63	24.39	SM	0	1	1	56	42	0	17.36	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 13: SUMMARY OF TEST RESULTS

Bore No : P113	**Ground Elevation : RL 195.004 m**	**Method of drilling :Percussion**	**Depth of Water-table: 1.90 m**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 30/11/2023**	**SPT Sampler: Standard**
Location / Chainage : 23882.847	**Casing Lowered : 18.00 m**	**Ending Date : 02/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	0	58	42	0	2.80	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	1.00	D	2	2	2	3	5	7.81	SM	0	0	0	61	39	0	18.48	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	2.00	D	3	-	-	-	-	-	-	-	-	-	-	-	-	18.06	1.88	1.59	-	-	-	-	RDST	0.0	24.8	-	-	-	-	-	-												
	3.00	D	4	2	2	4	6	7.60	ML	0	0	1	40	54	5	17.80	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	4.00	D	5	3	3	5	8	9.66	SM	0	0	1	54	45	0	18.35	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	-	-	-	-	-	-	-	18.09	2.01	1.70	-	-	-	2.65	DST	1.0	28.6	-	0.559	-	-	-	-	Silty Sands											
	6.00	D	7	4	5	7	12	13.22	-	-	-	-	-	-	-	18.91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	4	6	7	13	13.77	CL-ML	0	0	2	20	70	8	20.65	-	-	26.0	20.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	8.00	U	9	-	-	-	-	-	ML	8	2	3	16	61	10	23.49	2.07	1.68	32.5	24.0	8.5	2.67	UU	54.0	8.6	-	0.589	-	14	22	-												
	9.00	D	10	6	8	10	18	18.00	-	-	-	-	-	-	-	19.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	10.00	D	11	7	10	13	23	23.00	-	-	-	-	-	-	-	21.65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	CL	1	1	1	12	73	12	21.20	2.11	1.74	32.5	20.5	12.0	-	-	-	-	0.168	-	-	-	18	-												
	12.50	D	13	7	11	15	26	26.00	-	-	-	-	-	-	-	20.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	14.00	D	14	-	-	-	-	-	-	-	-	-	-	-	-	16.77	2.02	1.73	-	-	-	2.68	RUU	57.0	11.0	-	0.549	-	-	-	-	Inorganic clays of low plasticity											
	15.50	D	15	9	14	17	31	31.00	CL	2	1	1	11	73	12	19.78	-	-	31.0	20.5	10.5	-	-	-	-	-	-	-	-	-	-												
	17.00	U	16	-	-	-	-	-	CL	5	2	2	14	66	11	21.03	2.07	1.71	30.0	19.0	11.0	2.67	UU	58.0	11.6	-	0.561	-	13	22	-												
	18.50	D	17	10	16	19	35	20.77	ML	1	1	0	44	54	0	18.84	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											

APPENDIX "B"
TABLE 13: SUMMARY OF TEST RESULTS

Bore No : P113	**Ground Elevation : RL 195.004 m**	**Method of drilling :Percussion**	**Depth of Water-table: 1.90 m**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 30/11/2023**	**SPT Sampler: Standard**
Location / Chainage : 23882.847	**Casing Lowered : 18.00 m**	**Ending Date : 02/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	CL	8	3	2	30	51	6	20.52	2.05	1.70	28.5	20.5	8.0	2.66	-	-	-	-	0.565	-	-	20	-	Inorganic clays of low plasticity											
	21.50	D	19	16	29	35	64	64.00	CL	2	1	2	14	69	12	14.85	-	-	32.0	21.5	10.5	-	-	-	-	-	-	-	-	-	-												
	23.00	D	20	17	31	38	69	69.00	-	-	-	-	-	-	-	18.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	24.50	D	21	15	24	27	51	24.66	SM	0	0	0	55	45	0	17.69	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	26.00	D	22	17	27	31	58	26.54	SM	0	0	1	59	40	0	18.17	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	27.50	D	23	19	29	33	62	27.36	-	-	-	-	-	-	-	19.48	-	-	-	-	-	2.65	-	-	-	-	-	-	-	-	-												
	29.00	D	24	21	33	35	68	28.76	SM	0	0	1	62	37	0	20.03	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	30.50	D	25	17	27	36	63	26.74	SM	0	0	0	66	34	0	19.71	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	32.00	D	26	19	24	30	54	23.63	-	-	-	-	-	-	-	16.41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	33.50	D	27	21	27	33	60	25.04	SM	0	1	3	47	49	0	17.96	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	22	30	35	65	26.10	SM	0	1	2	51	46	0	17.01	-	-	Non-Plastic			2.65	-	-	-	-	-	-	-	-	-												
	36.50	D	29	24	31	36	67	26.27	-	-	-	-	-	-	-	17.62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	23	33	38	71	26.98	SM	0	0	0	55	45	0	17.07	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	25	36	41	77	28.04	-	-	-	-	-	-	-	18.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

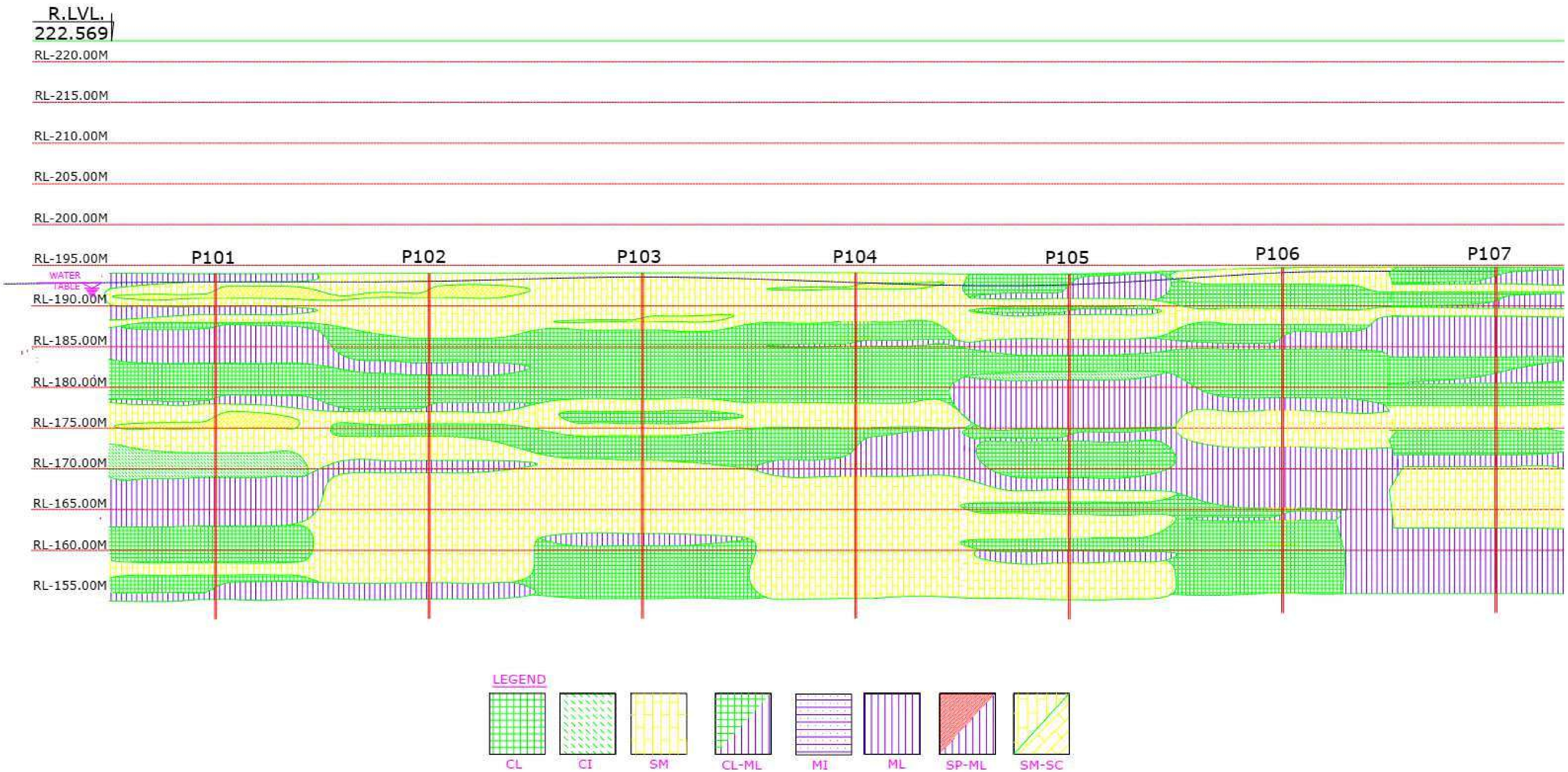
Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX-B
TABLE 14: UCS TEST ON SOIL SAMPLES

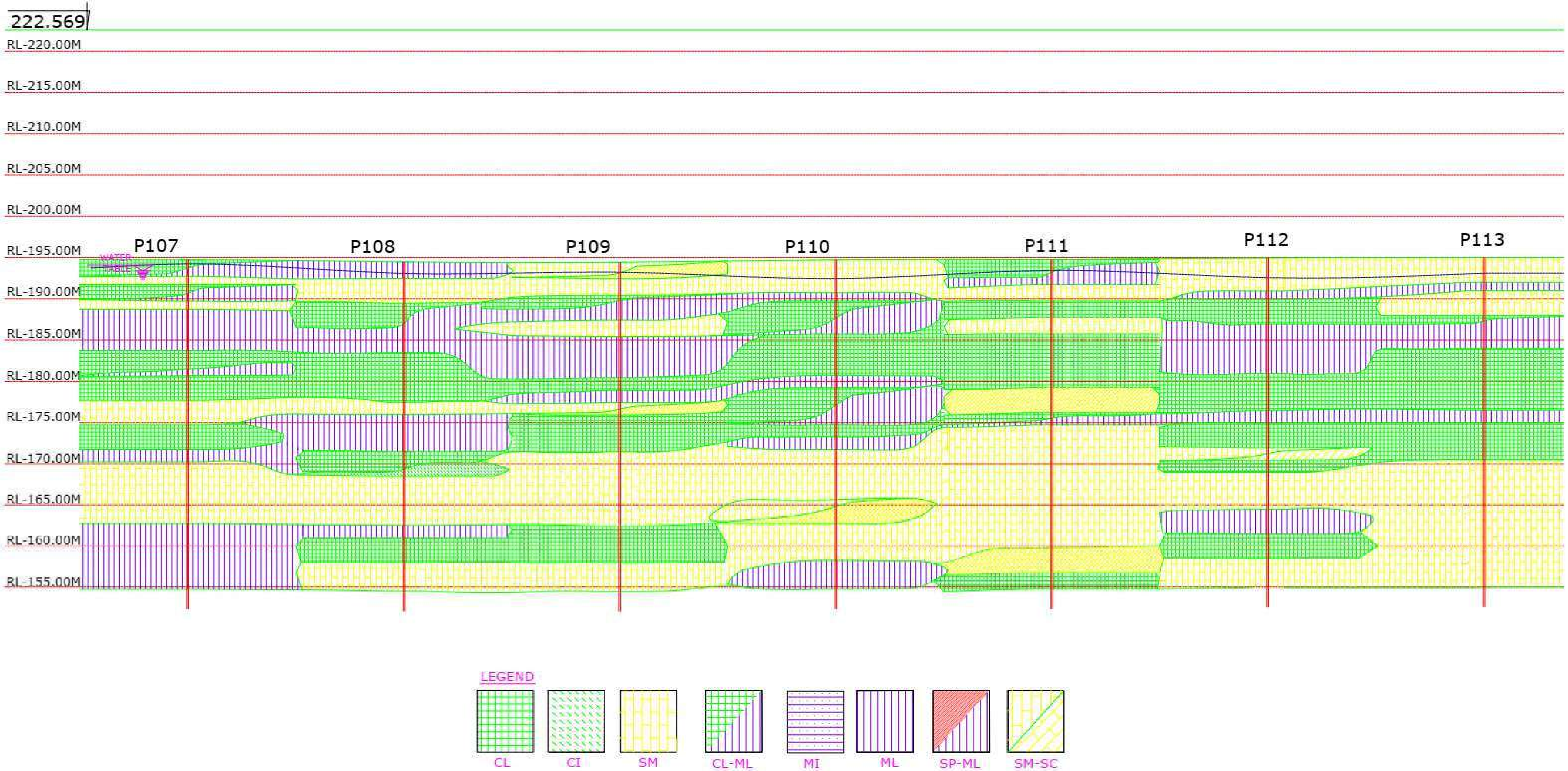
BH No.	DEPTH (m)	UCS (kg/cm²)
P101	16.00	0.56
	22.00	0.44
P102	11.00	0.52
	14.00	0.46
P103	8.00	0.59
	14.00	0.64
	17.00	0.66
	20.00	0.63
P104	7.00	0.60
	10.00	0.49
P105	10.00	0.61
	13.00	0.70
	22.00	0.63
	25.00	0.57
P106	4.00	0.53
	10.00	0.66
	13.00	0.60
P107	14.00	0.73
P108	5.00	0.57
P110	8.00	0.69
P111	5.00	0.69
	11.00	0.72
	14.00	0.86
	17.00	0.79
P112	5.00	0.86
P113	11.00	0.72

APPENDIX-C

PLOT 1: LITHOLOGICAL PROFILE-01



APPENDIX-C
PLOT 2: LITHOLOGICAL PROFILE-02



APPENDIX-C
PLOT 3: LITHOLOGICAL PLOTS

BH-P101-23562.087

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML		0.50	D		-	-
		WATER LVL	1.00	U		-	-
Silty Sands with clay binder	SM-SC		2.00	D	7	-	-
Silty Sands	SM		3.00	D	4	-	-
Inorganic Silts of low plasticity	ML		4.00	D		-	-
Silty Sands	SM		5.00	D	12	-	-
Inorganic Silty Clays of low plasticity	CL-ML		6.00	D	19	-	-
			7.00	U		-	-
Inorganic Silts of low plasticity	ML		8.00	D	21	-	-
			9.00	D	28	-	-
			10.00	U		-	-
			11.00	D	30	-	-
Inorganic clays of low plasticity	CL		12.00	D	28	-	-
			13.00	U		-	-
			14.50	D	19	-	-
Inorganic Silty Clays of low plasticity	CL-ML		16.00	U		-	-
Silty Sands with clay binder	SM-SC		17.50	D	38	-	-
Silty Sands	SM		19.00	U		-	-
			20.00	D	44	-	-

BH-P101-23562.087

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		20.50	D	44	-	-
			22.00	U		-	-
Inorganic clays of intermediate plasticity	CI		23.50	D	44	-	-
			25.00	D		-	-
Inorganic Silts of low plasticity	ML		26.50	D	46	-	-
			28.00	D		-	-
			29.50	D	76	-	-
			31.00	D	45	-	-
Inorganic clays of low plasticity	CL		32.50	D	44	-	-
			34.00	D		-	-
Silty Sands	SM		35.50	D	47	-	-
Inorganic Silty Clays of low plasticity	CL-ML		37.00	D		-	-
			38.50	D	52	-	-
			40.00	D	48	-	-

APPENDIX-C
PLOT 4: LITHOLOGICAL PLOTS

BH-P102-23588.287

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	D	4	-	-
Silty Sands with clay binder	SM-SC		2.00	U		-	-
			3.00	D	13	-	-
			4.00	D	7	-	-
Silty Sands	SM		5.00	D		-	-
			6.00	D	15	-	-
			7.00	D	10	-	-
			8.00	U		-	-
Inorganic clays of low plasticity	CL		9.00	D	20	-	-
			10.00	D	18	-	-
Inorganic Silts of low plasticity	ML		11.00	U		-	-
			12.50	D	16	-	-
Inorganic clays of low plasticity	CL		14.00	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML		15.50	D	28	-	-
Silty Sands	SM		17.00	D		-	-
			18.50	D	28	-	-
Inorganic clays of low plasticity	CL		20.00	D		-	-

BH-P102-23588.287

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			20.00	D		-	-
Silty Sands	SM		21.50	D	44	-	-
			23.00	D		-	-
Inorganic Silts of low plasticity	ML		24.50	D	50	-	-
			26.00	D		-	-
			27.50	D	51	-	-
			29.00	D		-	-
			30.50	D	48	-	-
Silty Sands	SM		32.00	D		-	-
			33.50	D	51	-	-
			35.00	D	56	-	-
			36.50	D	55	-	-
			38.00	D	56	-	-
Inorganic Silts of low plasticity	ML		40.00	D	66	-	-

APPENDIX-C
PLOT 5: LITHOLOGICAL PLOTS

BH-P103-23614.487

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
		WATER LVL	0.50	D		-	-
			1.00	D	5	-	-
Silty Sands	SM		2.00	U		-	-
			3.00	D	7	-	-
			4.00	D	12	-	-
Silty Sands with clay binder	SM-SC		5.00	U		-	-
Silty Sands	SM		6.00	D	16	-	-
			7.00	D	20	-	-
			8.00	U		-	-
			9.00	D	19	-	-
			10.00	D	22	-	-
Inorganic clays of low plasticity	CL		11.00	U		-	-
			12.50	D	17	-	-
			14.00	U		-	-
Silty Sands	SM		15.50	D	36	-	-
Inorganic clays of low plasticity	CL		17.00	U		-	-
Silty Sands	SM		18.50	D	27	-	-
			20.00	U		-	-

BH-P103-23614.487

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			20.00	U		-	-
Inorganic clays of low plasticity	CL		21.50	D	44	-	-
			23.00	U		-	-
			24.50	D	65	-	-
			26.00	D	67	-	-
Silty Sands	SM		27.50	D	71	-	-
			29.00	D	71	-	-
			30.50	D	70	-	-
Inorganic Silts of low plasticity	ML		32.00	D	75	-	-
			33.50	D	75	-	-
			35.00	D	72	-	-
Inorganic clays of low plasticity	CL		36.50	D	73	-	-
			38.00	D	75	-	-
			40.00	D	82	-	-

APPENDIX-C
PLOT 6: LITHOLOGICAL PLOTS

BH-P104-23640.687

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
Silty Sands with clay binder	SM-SC	WATER LVL	1.00	U		-	-
Silty Sands	SM		2.00	D	4	-	-
			3.00	D	6	-	-
			4.00	D		-	-
			5.00	D	12	-	-
Inorganic clays of low plasticity	CL		6.00	D	10	-	-
			7.00	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML		8.00	D	18	-	-
Inorganic clays of low plasticity	CL		9.00	D	22	-	-
			10.00	U		-	-
			11.00	D	15	-	-
			12.00	D	22	-	-
			13.00	U		-	-
			14.50	D	28	-	-
Silty Sands	SM		16.00	U		-	-
			17.50	D	35	-	-
Inorganic Silty Clays of low plasticity	CL-ML		19.00	D		-	-
			20.00	D	39	-	-

BH-P104-23640.687

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silty Clays of low plasticity	CL-ML		20.50	D	39	-	-
			22.00	U		-	-
Inorganic Silts of low plasticity	ML		23.50	D	42	-	-
Silty Sands	SM		25.00	U		-	-
			26.50	D	45	-	-
			28.00	U		-	-
			29.50	D	58	-	-
			31.00	D	63	-	-
			32.50	D	66	-	-
			34.00	D	56	-	-
			35.50	D	53	-	-
			37.00	D	63	-	-
			38.50	D	48	-	-
			40.00	D	52	-	-

APPENDIX-C
PLOT 7: LITHOLOGICAL PLOTS

BH-P105-23666.887

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			0.50	D		-	-
Inorganic Silty Clays of low plasticity	WATER LVL CL-ML		1.00	D		-	-
			2.00	D	4	-	-
Silty Sands	SM		3.00	D	6	-	-
Inorganic Silty Clays of low plasticity	CL-ML		4.00	U		-	-
			5.00	D	7	-	-
Silty Sands	SM		6.00	D	10	-	-
			7.00	D		-	-
			8.00	D	12	-	-
Inorganic Silts of low plasticity	ML		9.00	D	15	-	-
			10.00	U		-	-
Inorganic clays of low plasticity	CL		11.00	D	8	-	-
Inorganic clays of Intermediate plasticity	CI		12.00	D	14	-	-
			13.00	U		-	-
			14.50	D	21	-	-
Inorganic Silts of low plasticity	ML		16.00	D		-	-
			17.50	D	33	-	-
Inorganic Silty Clays of low plasticity	CL-ML		19.00	D		-	-
			20.00	D	46	-	-

BH-P105-23666.887

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silty Clays of low plasticity	CL-ML		20.50	D	46	-	-
Inorganic clays of low plasticity	CL		22.00	U		-	-
			23.50	D	38	-	-
			25.00	U		-	-
Inorganic Silts of low plasticity	ML						
Silty Sands	SM		26.50	D	50	-	-
Inorganic clays of low plasticity	CL		28.00	U		-	-
			29.50	D	50	-	-
Silty Sands	SM		31.00	U		-	-
Inorganic clays of low plasticity	CL		32.50	D	53	-	-
Inorganic Silts of low plasticity	ML		34.00	D	52	-	-
			35.50	D	58	-	-
Silty Sands	SM		37.00	D	49	-	-
			38.50	D	61	-	-
			40.00	D	60	-	-

APPENDIX-C

PLOT 8: LITHOLOGICAL PLOTS

BH-P106-23693.087

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	WATER LVL SM		0.50	D		-	-
			1.00	U		-	-
Inorganic clays of low plasticity	CL		2.00	D	2	-	-
			3.00	D	3	-	-
			4.00	U		-	-
Silty Sands	SM		5.00	D	7	-	-
			6.00	D	9	-	-
Inorganic Silty Clays of low plasticity	CL-ML		7.00	D		-	-
			8.00	D	10	-	-
			9.00	D	15	-	-
Inorganic clays of low plasticity	CL		10.00	U		-	-
			11.00	D	31	-	-
			12.00	D	36	-	-
			13.00	U		-	-
			14.50	D	19	-	-
Inorganic Silts of low plasticity	ML		16.00	U		-	-
Silty Sands	SM		17.50	D	31	-	-
			19.00	U		-	-
			20.00	D	36	-	-

BH-P106-23693.087

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		20.50	D	36	-	-
Inorganic Silts of low plasticity	ML		22.00	D		-	-
			23.50	D	41	-	-
			25.00	U		-	-
			26.50	D	66	-	-
			28.00	D		-	-
Inorganic Silty Clays of low plasticity	CL-ML		29.50	D	53	-	-
Inorganic clays of low plasticity	CL		31.00	D	76	-	-
			32.50	D	69	-	-
			34.00	D		-	-
			35.50	D	75	-	-
			37.00	D		-	-
			38.50	D	73	-	-
			40.00	D	79	-	-

APPENDIX-C
PLOT 9: LITHOLOGICAL PLOTS

BH-P107-23725.647

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
		WATER LVL					
Inorganic Silty Clays of low plasticity	CL-ML		0.50	D		-	-
			1.00	D	4	-	-
Silty Sands	SM		2.00	D		-	-
			3.00	D	4	-	-
Inorganic Silty Clays of low plasticity	CL-ML		4.00	D	10	-	-
Silty Sands	SM		5.00	U		-	-
Inorganic Silts of low plasticity	ML		6.00	D	10	-	-
			7.00	D	12	-	-
			8.00	U		-	-
			9.00	D	15	-	-
			10.00	D	21	-	-
Inorganic clays of low plasticity	CL		11.00	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML		12.50	D	24	-	-
Inorganic clays of low plasticity	CL		14.00	U		-	-
			15.50	D	18	-	-
Silty Sands	SM		17.00	U		-	-
			18.50	D	38	-	-
			20.00	U		-	-

BH-P107-23725.647

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.00	U		-	-
			21.50	D	72	-	-
Inorganic Silts of low plasticity	ML		23.00	D	66	-	-
Silty Sands	SM		24.50	D	60	-	-
			26.00	D	66	-	-
			27.50	D	51	-	-
			29.00	D	53	-	-
			30.50	D	67	-	-
Inorganic Silts of low plasticity	ML		32.00	D	71	-	-
			33.50	D	59	-	-
			35.00	D	64	-	-
			36.50	D	65	-	-
			38.00	D	63	-	-
			40.00	D	68	-	-

APPENDIX-C
PLOT 10: LITHOLOGICAL PLOTS

BH-P108-23751.847

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML (WATER LVL)		0.50	D		-	-
			1.00	D	4	-	-
Silty Sands	SM		2.00	U		-	-
			3.00	D	5	-	-
			4.00	D	7	-	-
Inorganic Silty Clays of low plasticity	CL-ML		5.00	U		-	-
			6.00	D	10	-	-
			7.00	D	11	-	-
Inorganic Silts of low plasticity	ML		8.00	U		-	-
			9.00	D	16	-	-
			10.00	D	21	-	-
Inorganic clays of low plasticity	CL		11.00	U		-	-
			12.50	D	25	-	-
			14.00	D		-	-
			15.50	D	31	-	-
Silty Sands	SM		17.00	U		-	-
Inorganic Silts of low plasticity	ML		18.50	D	36	-	-
			20.00	U		-	-

BH-P108-23751.847

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML		20.00	U		-	-
			21.50	D	38	-	-
Inorganic clays of low plasticity	CL		23.00	D		-	-
			24.50	D	43	-	-
Inorganic Clays of low to Intermediate plasticity	CL-CI						
Silty Sands	SM		26.00	D		-	-
			27.50	D	61	-	-
			29.00	D	64	-	-
			30.50	D	75	-	-
Inorganic Silts of low plasticity	ML		32.00	D	66	-	-
Inorganic clays of low plasticity	CL		33.50	D	70	-	-
			35.00	D	62	-	-
Silty Sands	SM		36.50	D	66	-	-
			38.00	D	77	-	-
			40.00	D	86	-	-

APPENDIX-C
PLOT 11: LITHOLOGICAL PLOTS

BH-P109-23778.047

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands with clay binder	SM-SC		0.50	D		-	-
			1.00	D	4	-	-
Silty Sands	SM		2.00	U		-	-
			3.00	D	6	-	-
Inorganic Silty Clays of low plasticity	CL-ML		4.00	D	11	-	-
Inorganic Silts of low plasticity	ML		5.00	U		-	-
			6.00	D	15	-	-
Silty Sands	SM		7.00	D	14	-	-
			8.00	D		-	-
Inorganic Silts of low plasticity	ML		9.00	D	26	-	-
			10.00	D	18	-	-
			11.00	D		-	-
			12.50	D	11	-	-
Inorganic clays of low plasticity	CL		14.00	U		-	-
Inorganic Silts of low plasticity	ML		15.50	D	41	-	-
Silty Sands with clay binder	SM-SC		17.00	U		-	-
Inorganic clays of low plasticity	CL		18.50	D	63	-	-
			20.00	D	51	-	-

BH-P109-23778.047

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.00	D	51	-	-
			21.50	D	54	-	-
Silty Sands	SM		23.00	D	59	-	-
			24.50	D	62	-	-
			26.00	D	58	-	-
			27.50	D	64	-	-
			29.00	D	R	-	-
			30.50	D	74	-	-
Inorganic clays of low plasticity	CL		32.00	D	102	-	-
			33.50	D	86	-	-
			35.00	D	94	-	-
Silty Sands	SM		36.50	D	82	-	-
			38.00	D	66	-	-
			40.00	D	60	-	-

APPENDIX-C
PLOT 12: LITHOLOGICAL PLOTS

BH-P110-23804.247

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	D	3	-	-
			2.00	U		-	-
			3.00	D	4	-	-
Inorganic Silts of low plasticity	ML		4.00	D	6	-	-
Inorganic Silty Clays of low plasticity	CL-ML		5.00	U		-	-
			6.00	D	8	-	-
			7.00	D	9	-	-
			8.00	U		-	-
Inorganic clays of low plasticity	CL		9.00	D	13	-	-
			10.00	D	18	-	-
			11.00	U		-	-
			12.50	D	26	-	-
Inorganic Silts of low plasticity	ML		14.00	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML		15.50	D	41	-	-
			17.00	D		-	-
			18.50	D	52	-	-
			20.00	D	60	-	-

BH-P110-23804.247

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.00	D	60	-	-
Inorganic Silts of low plasticity	ML		21.50	D	66	-	-
Silty Sands	SM		23.00	D	71	-	-
			24.50	D	60	-	-
			26.00	D	68	-	-
			27.50	D	70	-	-
Silty Sands with clay binder	SM-SC		29.00	D	63	-	-
			30.50	D	85	-	-
Silty Sands	SM		32.00	D	83	-	-
			33.50	D	74	-	-
			35.00	D	79	-	-
Inorganic Silts of low plasticity	ML		36.50	D	71	-	-
			38.00	D	57	-	-
			40.00	D	64	-	-

APPENDIX-C
PLOT 13: LITHOLOGICAL PLOTS

BH-P111-23830.447

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silty Clays of low plasticity	CL-ML (WATER LVL)		0.50	D		-	-
			1.00	D	4	-	-
			2.00	U		-	-
Silty Sands	SM		3.00	D	10	-	-
			4.00	D	14	-	-
			5.00	U		-	-
Inorganic clays of low plasticity	CL		6.00	D	11	-	-
Silty Sands	SM		7.00	D	30	-	-
			8.00	U		-	-
Inorganic clays of low plasticity	CL		9.00	D	31	-	-
			10.00	D	44	-	-
			11.00	U		-	-
			12.50	D	27	-	-
			14.00	U		-	-
Clayey Sands	SC		15.50	D	37	-	-
			17.00	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML		18.50	D	40	-	-
			20.00	D		-	-

BH-P111-23830.447

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		20.00	D		-	-
			21.50	D	54	-	-
			23.00	D		-	-
			24.50	D	57	-	-
			26.00	D	86	-	-
			27.50	D	85	-	-
			29.00	D	88	-	-
			30.50	D	79	-	-
			32.00	D	83	-	-
			33.50	D	82	-	-
Clayey Sands	SC		35.00	D	87	-	-
			36.50	D	85	-	-
Inorganic clays of low plasticity	CL		38.00	D	88	-	-
			40.00	D	R	-	-

APPENDIX-C
PLOT 14: LITHOLOGICAL PLOTS

BH-P112-23856.647

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			0.50	D		-	-
			1.00	D	4	-	-
Silty Sands	SM		2.00	D		-	-
	WATER LVL		3.00	D	5	-	-
Inorganic Silts of low plasticity	ML		4.00	D	8	-	-
			5.00	U		-	-
Inorganic clays of low plasticity	CL		6.00	D	9	-	-
			7.00	D	12	-	-
			8.00	U		-	-
			9.00	D	17	-	-
			10.00	D	22	-	-
Inorganic Silts of low plasticity	ML		11.00	D		-	-
			12.50	D	20	-	-
			14.00	U		-	-
Inorganic clays of low plasticity	CL		15.50	D	33	-	-
			17.00	U		-	-
Inorganic Silts of low plasticity	ML		18.50	D	54	-	-
			20.00	D	46	-	-

BH-P112-23856.647

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			20.00	D	46	-	-
Inorganic clays of low plasticity	CL		21.50	D	34	-	-
Silty Sands with clay binder	SM-SC		23.00	U		-	-
Inorganic clays of low plasticity	CL		24.50	D	52	-	-
			26.00	D	57	-	-
Silty Sands	SM		27.50	D	59	-	-
			29.00	D	63	-	-
			30.50	D	57	-	-
Inorganic Silts of low plasticity	ML		32.00	D	54	-	-
			33.50	D	57	-	-
Inorganic clays of low plasticity	CL		35.00	D	53	-	-
			36.50	D	55	-	-
Silty Sands	SM		38.00	D	60	-	-
			40.00	D	63	-	-

APPENDIX-C
PLOT 15: LITHOLOGICAL PLOTS

BH-P113-23882.847

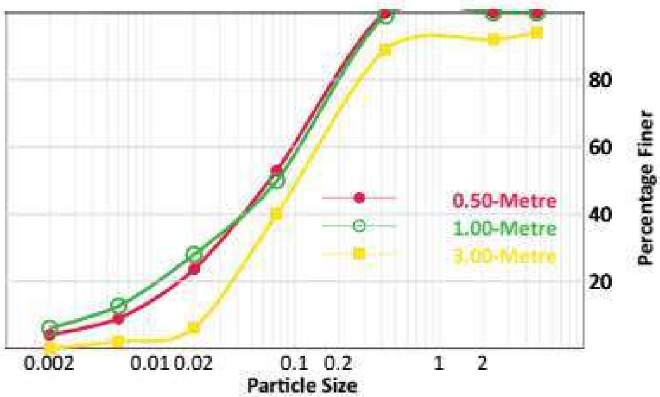
DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	D	5	-	-
			2.00	D		-	-
Inorganic Silts of low plasticity	ML		3.00	D	6	-	-
Silty Sands	SM		4.00	D	8	-	-
			5.00	U		-	-
			6.00	D	12	-	-
Inorganic Silty Clays of low plasticity	CL-ML		7.00	D	13	-	-
Inorganic Silts of low plasticity	ML		8.00	U		-	-
			9.00	D	18	-	-
			10.00	D	23	-	-
Inorganic clays of low plasticity	CL		11.00	U		-	-
			12.50	D	26	-	-
			14.00	D		-	-
			15.50	D	31	-	-
			17.00	U		-	-
Inorganic Silts of low plasticity	ML		18.50	D	35	-	-
			20.00	U		-	-

BH-P113-23882.847

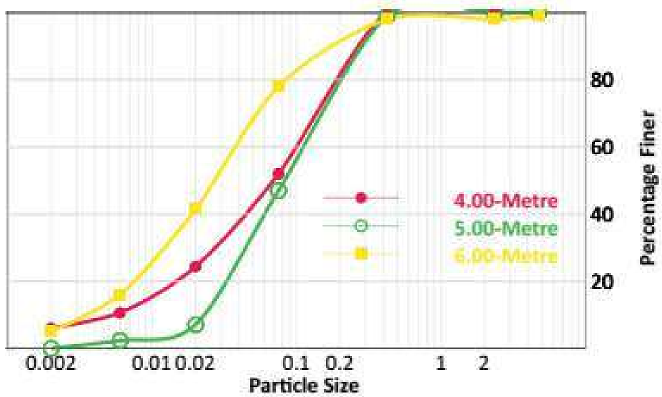
DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.00	U		-	-
			21.50	D	64	-	-
			23.00	D	69	-	-
Silty Sands	SM		24.50	D	51	-	-
			26.00	D	58	-	-
			27.50	D	62	-	-
			29.00	D	68	-	-
			30.50	D	63	-	-
			32.00	D	54	-	-
			33.50	D	60	-	-
			35.00	D	65	-	-
			36.50	D	67	-	-
			38.00	D	71	-	-
			40.00	D	77	-	-

APPENDIX-D
PLOT 1: GRAIN SIZE DISTRIBUTION PLOTS

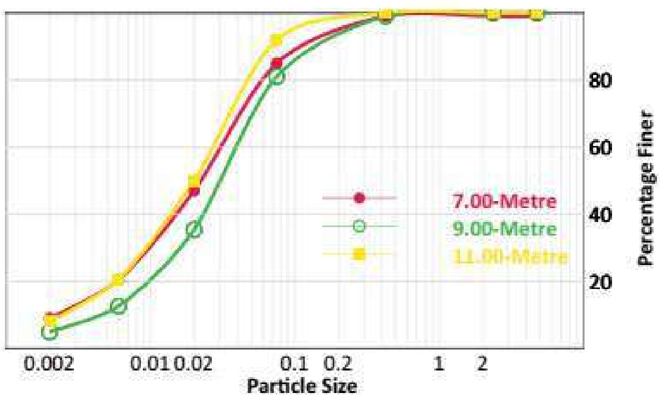
BH- P101-CH.23562.087



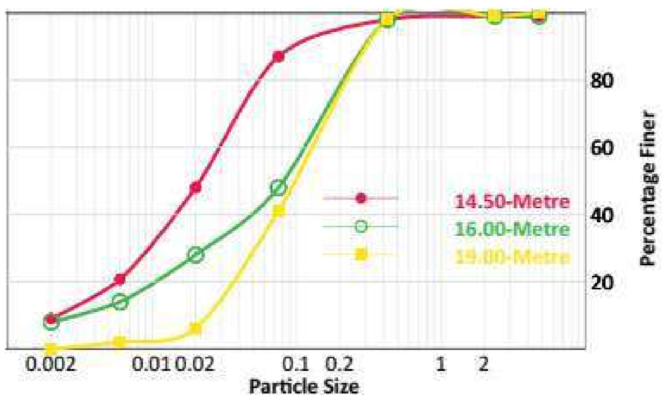
BH- P101-CH.23562.087



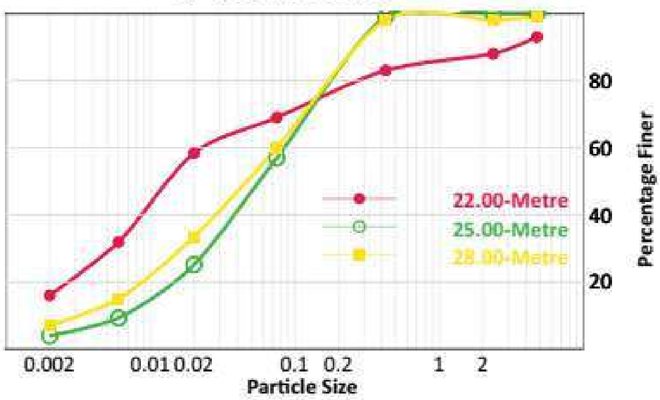
BH- P101-CH.23562.087



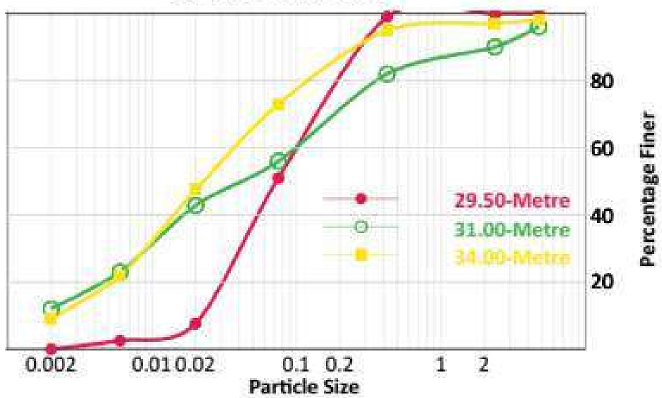
BH- P101-CH.23562.087



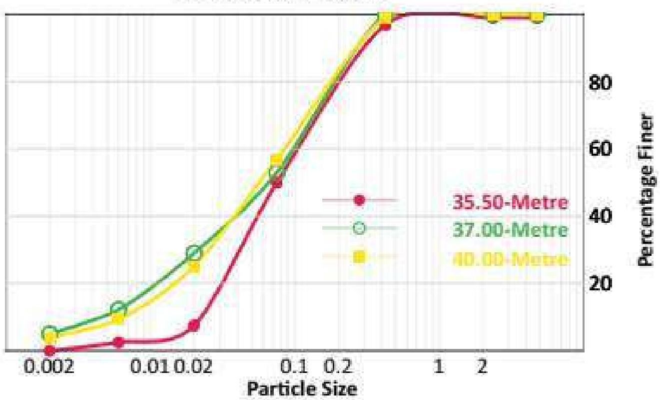
BH- P101-CH.23562.087



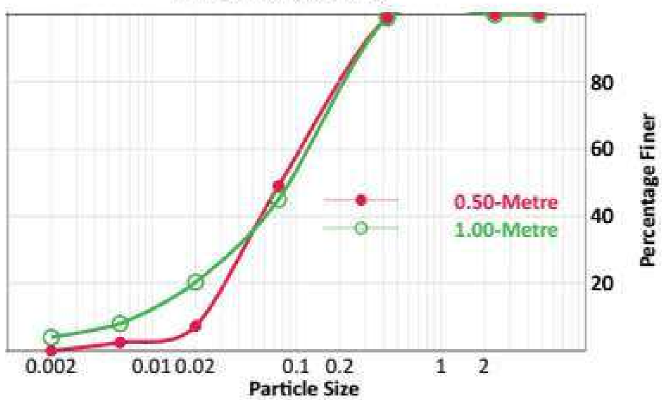
BH- P101-CH.23562.087



BH- P101-CH.23562.087

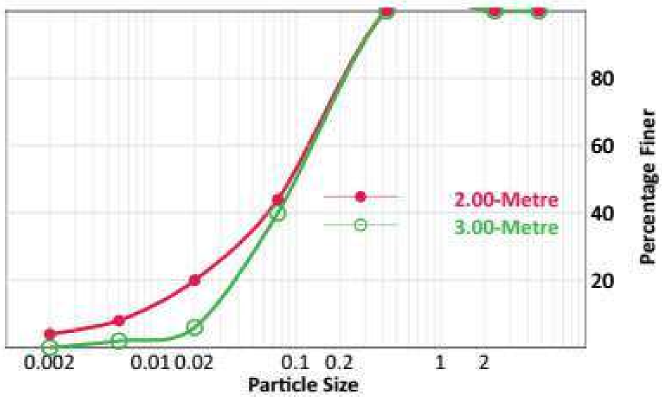


BH- P102-CH.23588.287

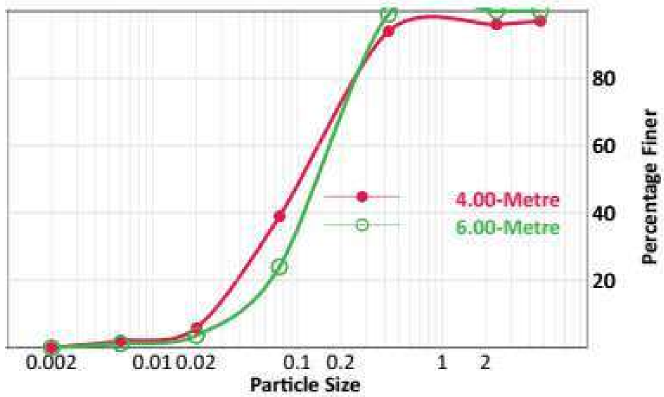


APPENDIX-D
PLOT 2: GRAIN SIZE DISTRIBUTION PLOTS

BH- P102-CH.23588.287



BH- P102-CH.23588.287



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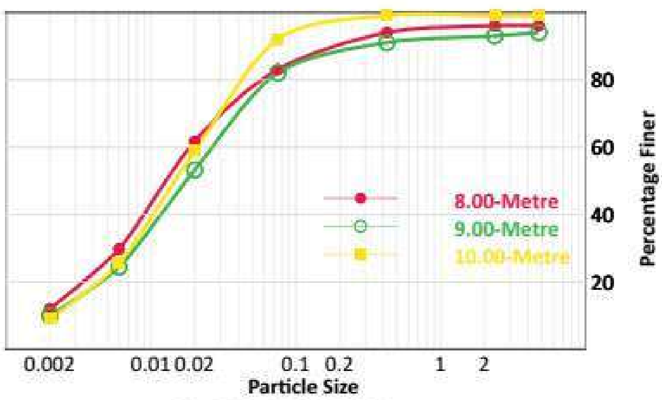
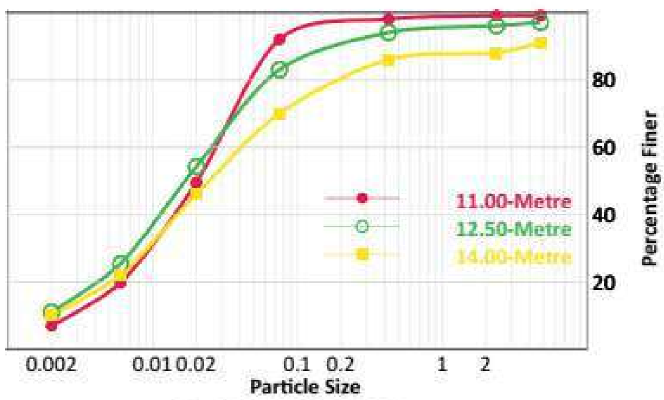
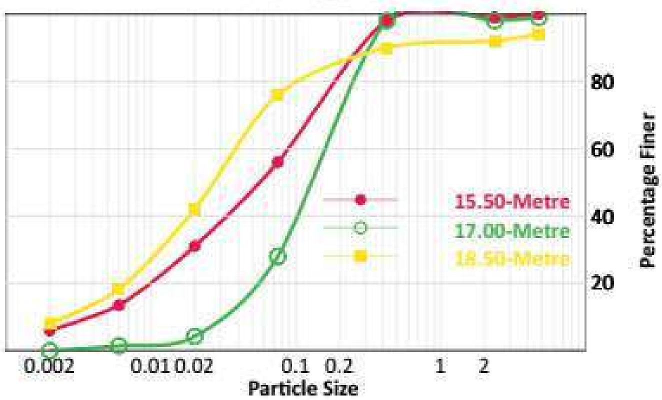


BH- P102-CH.23588.287



BH- P102-CH.23588.287



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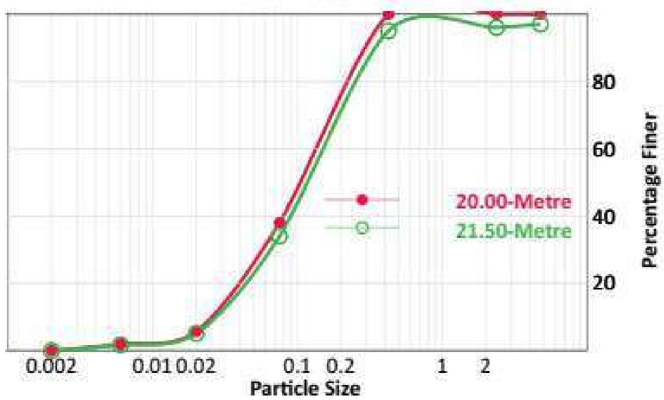

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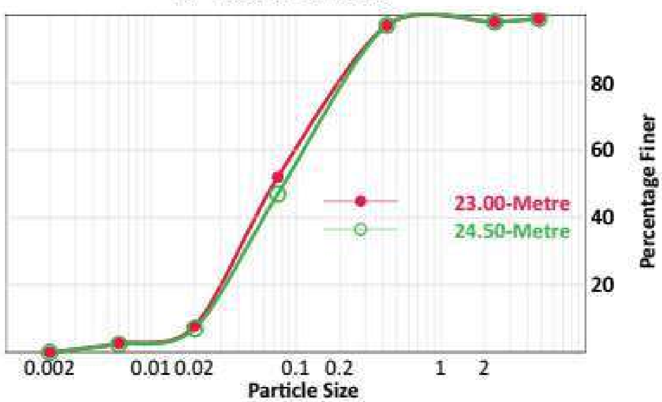
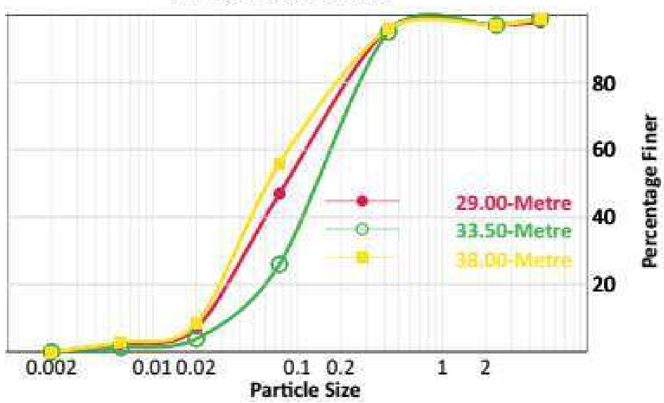
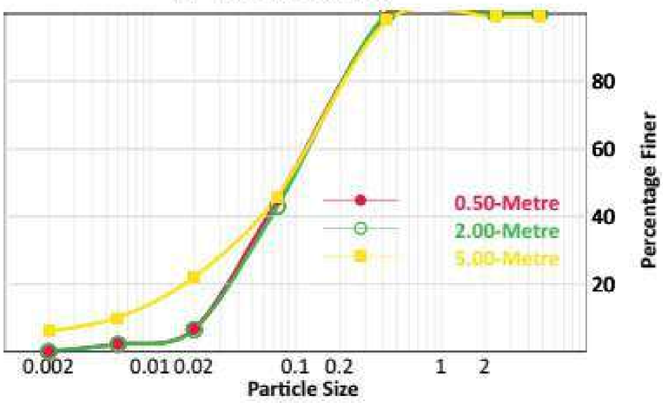


BH- P102-CH.23588.287



APPENDIX-D
PLOT 3: GRAIN SIZE DISTRIBUTION PLOTS

BH- P103-CH.23614.487



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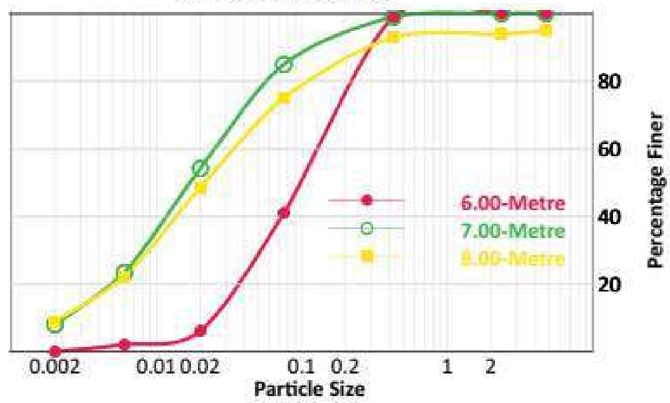

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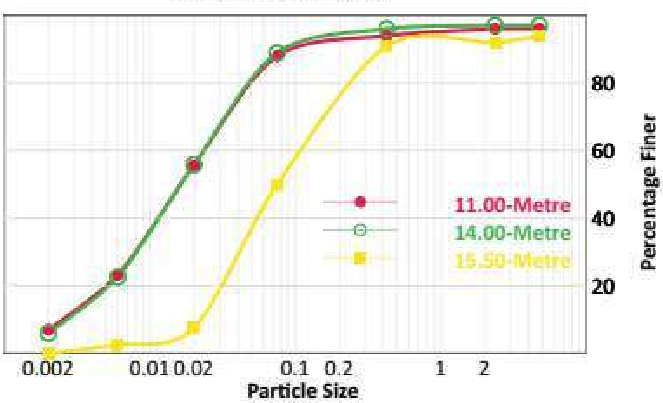

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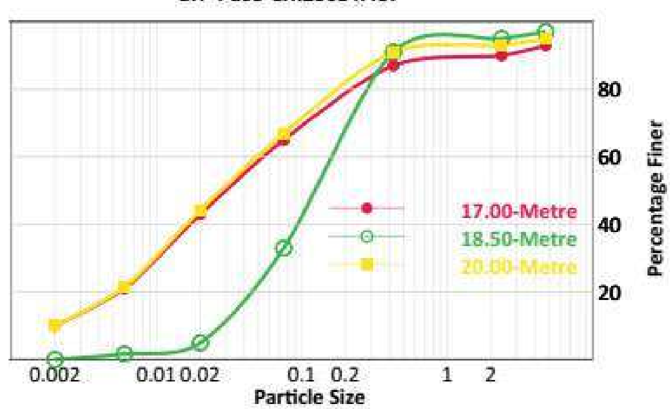

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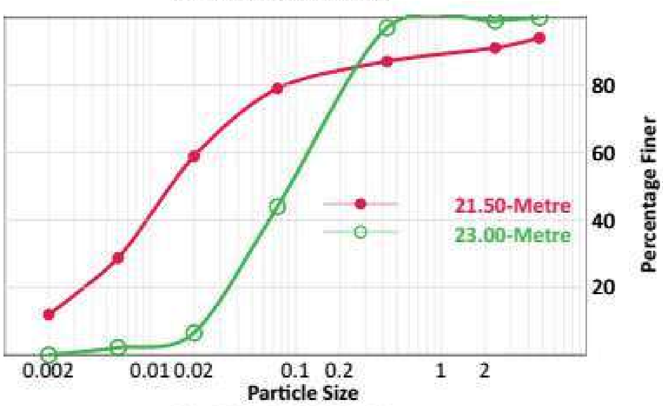
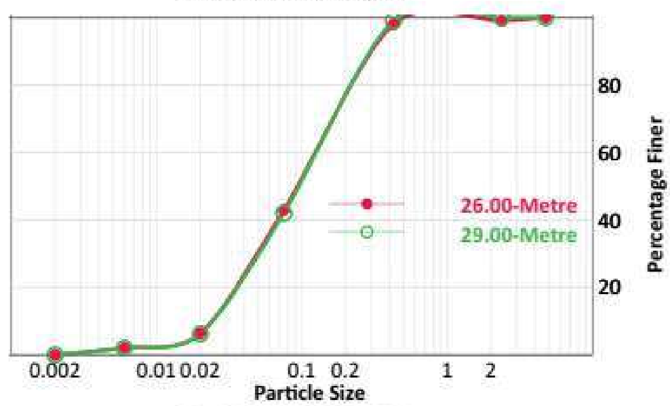


BH- P103-CH.23614.487



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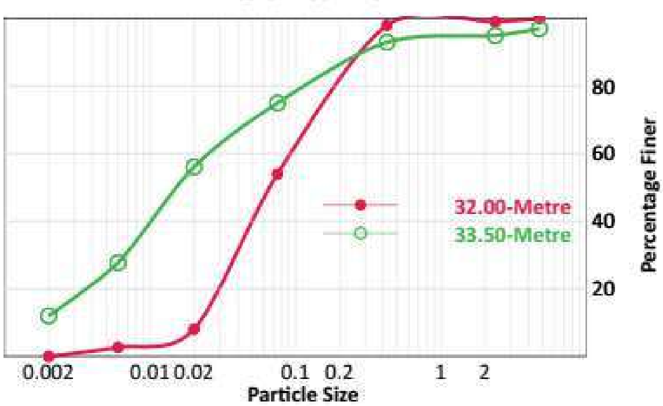

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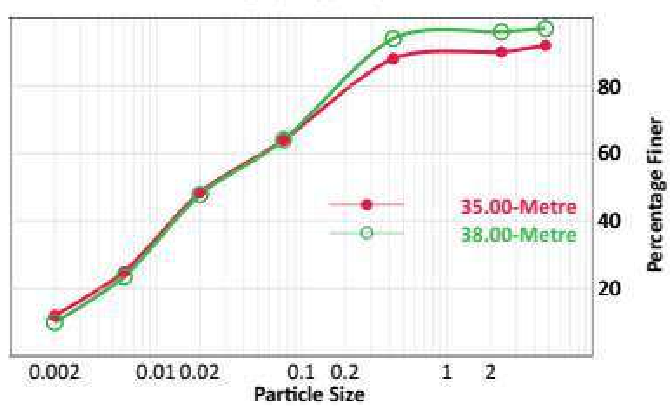
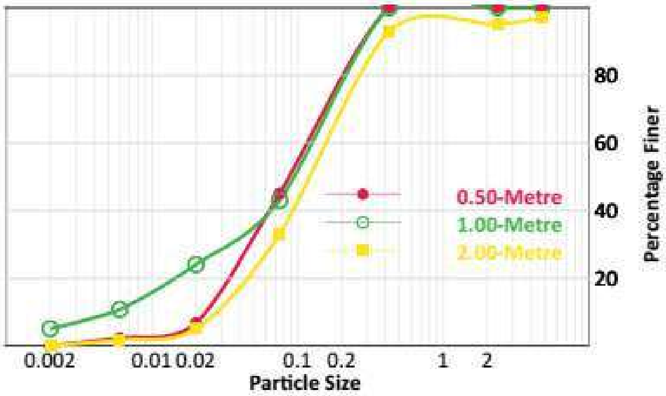


APPENDIX-D

PLOT 4: GRAIN SIZE DISTRIBUTION PLOTS

BH- P104-CH.23640.687



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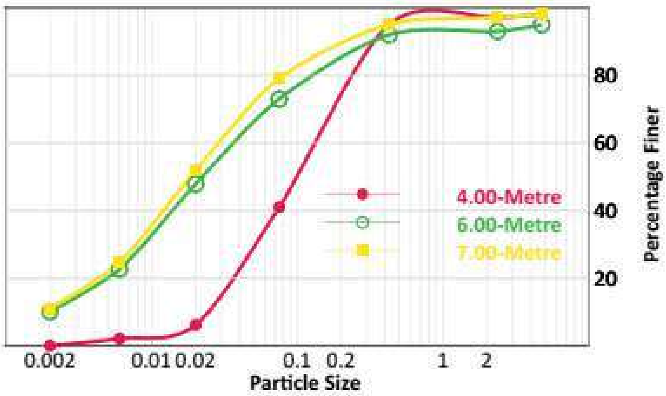
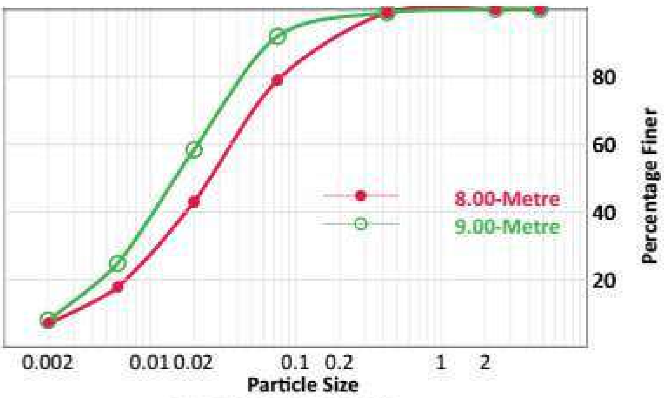


BH- P104-CH.23640.687



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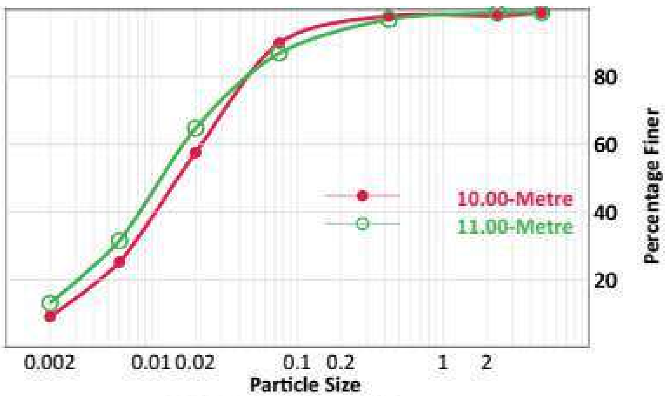

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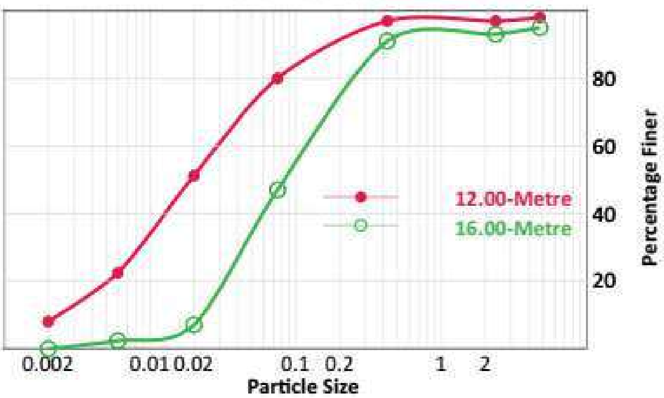

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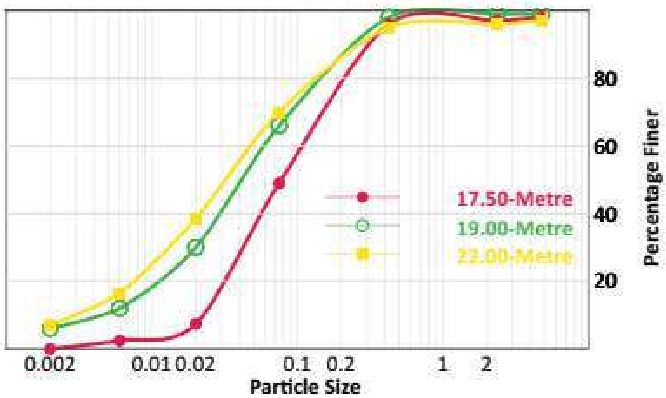

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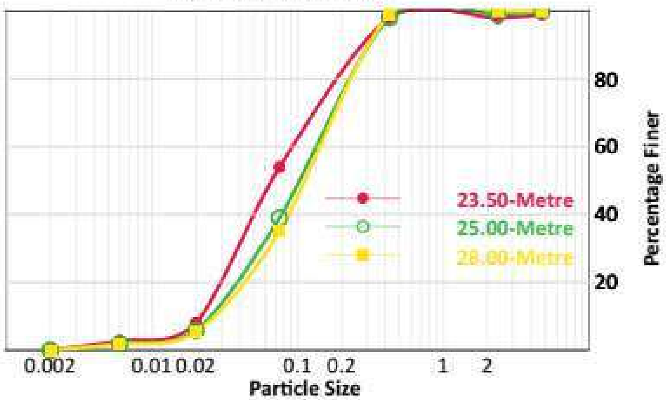

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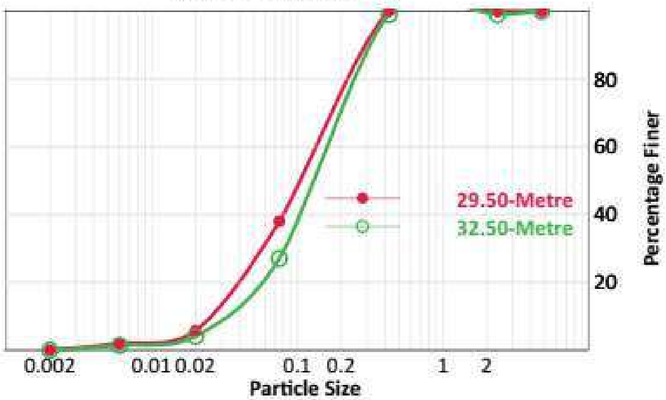
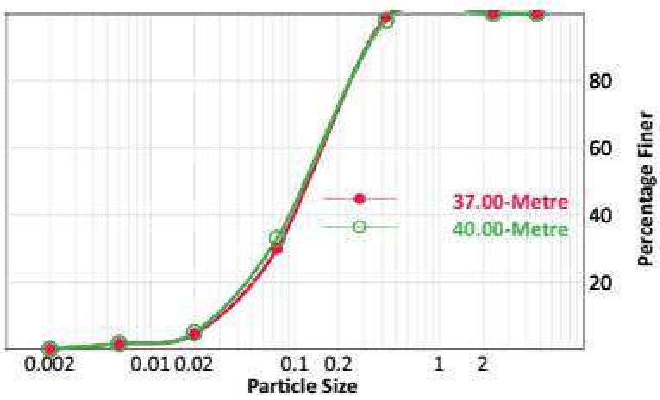
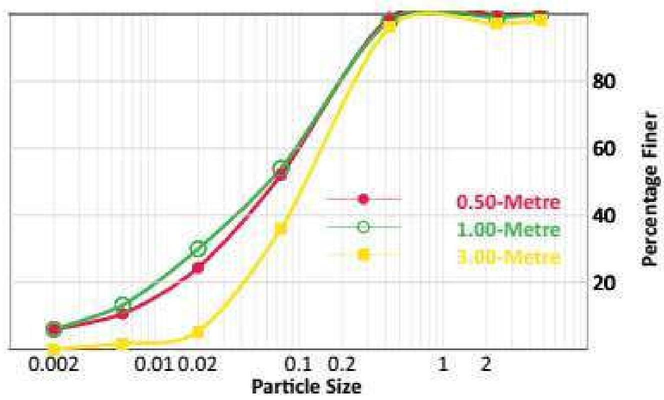


APPENDIX-D
PLOT 5: GRAIN SIZE DISTRIBUTION PLOTS

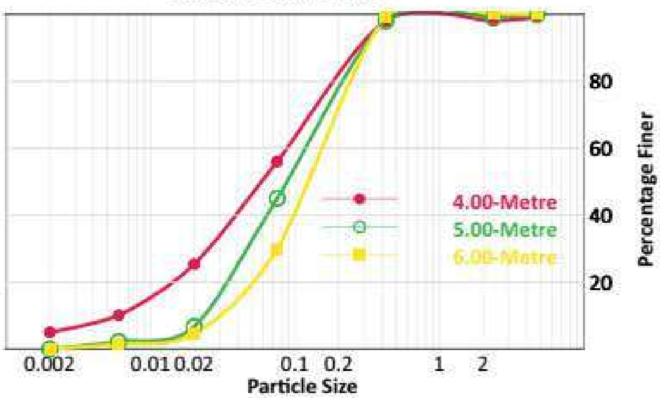
BH- P104-CH.23640.687



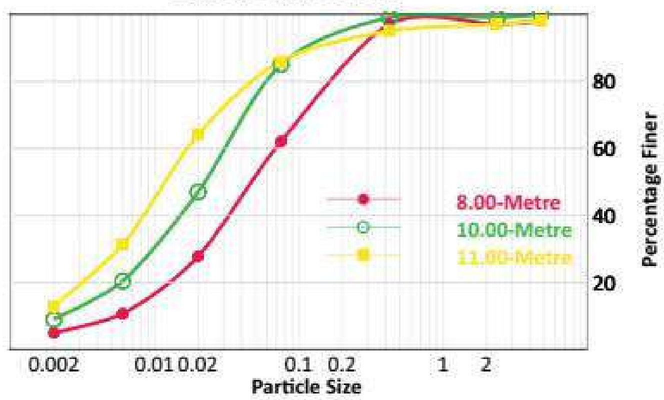
BH- P105-CH.23666.887



BH- P105-CH.23666.887



BH- P105-CH.23666.887



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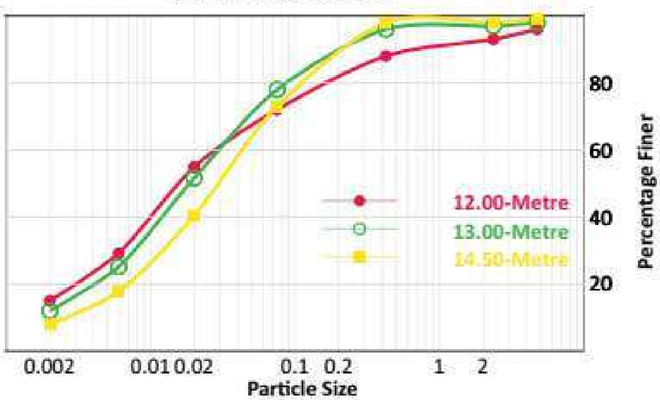
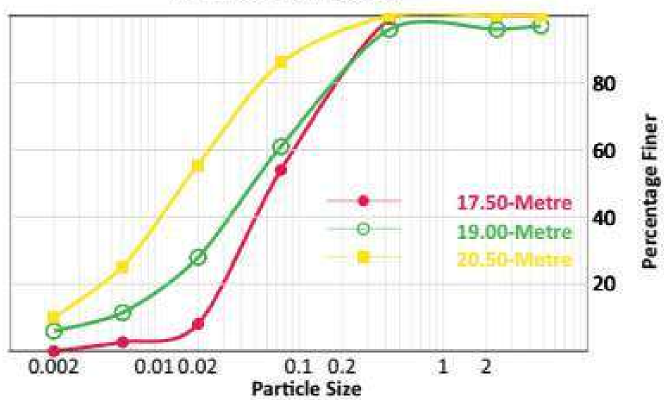


BH- P105-CH.23666.887



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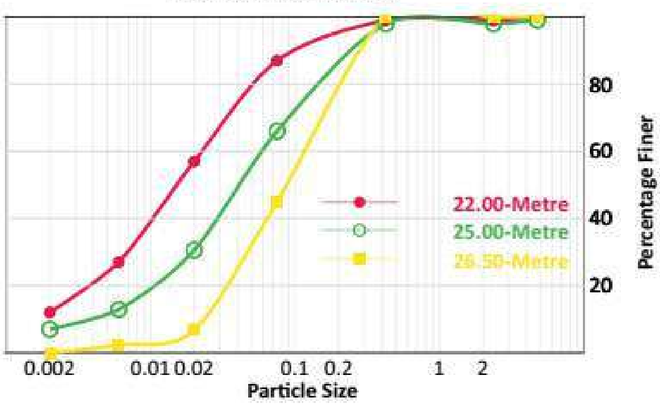

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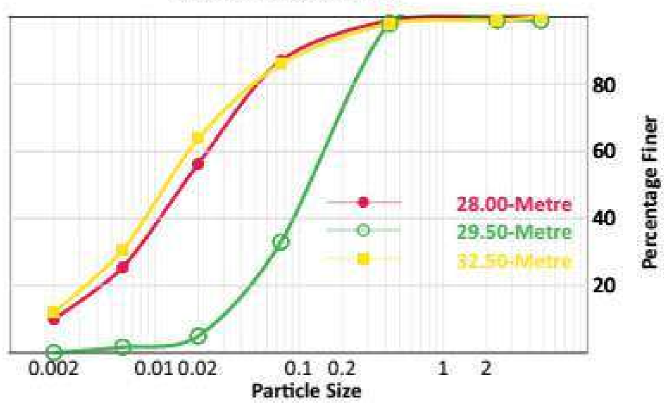
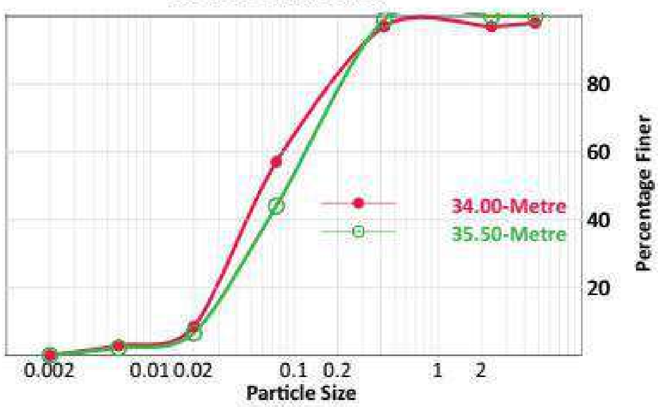
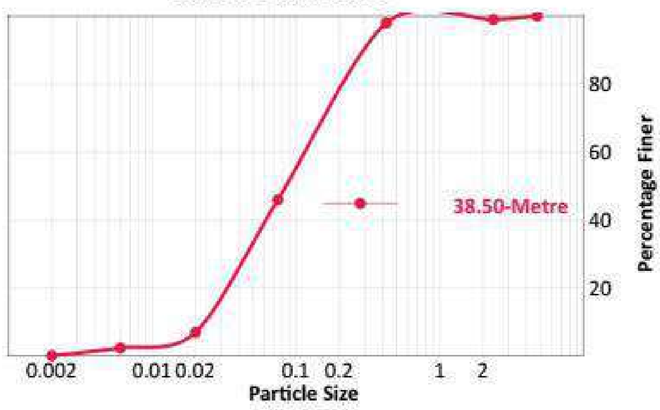


APPENDIX-D
PLOT 6: GRAIN SIZE DISTRIBUTION PLOTS

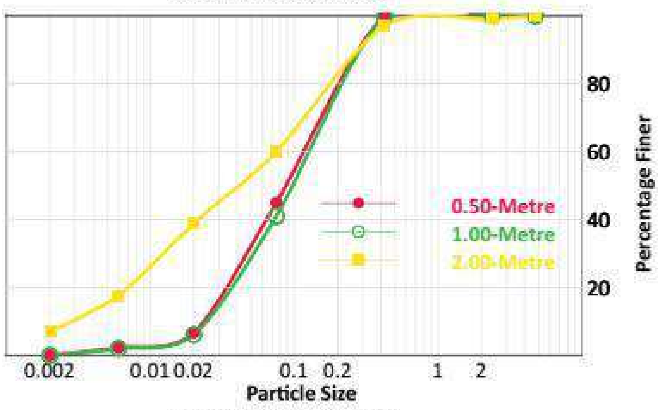
BH- P105-CH.23666.887



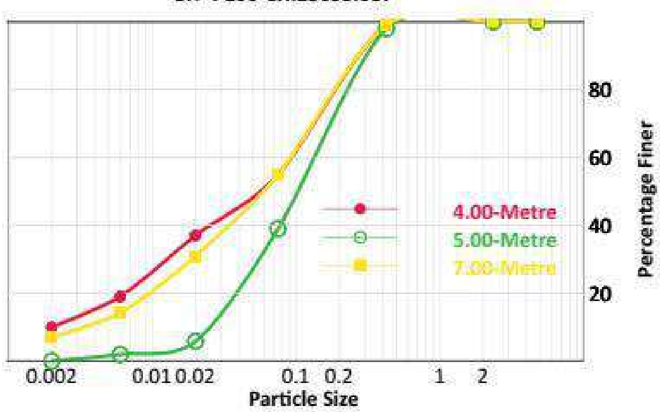
BH- P105-CH.23666.887



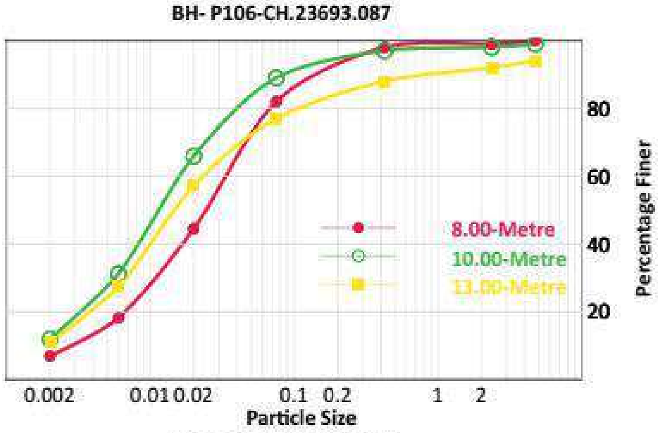
BH- P106-CH.23693.087



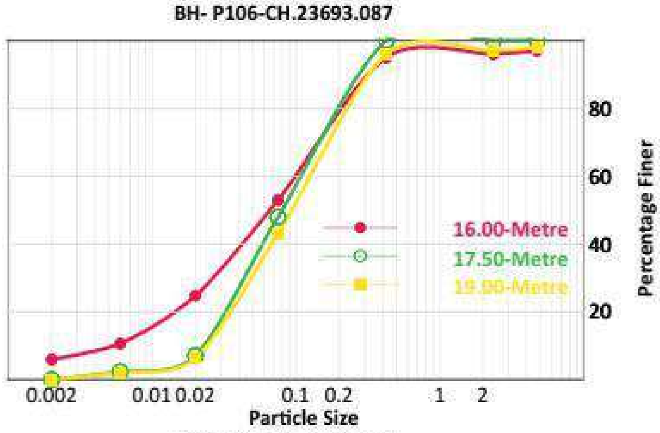
BH- P106-CH.23693.087



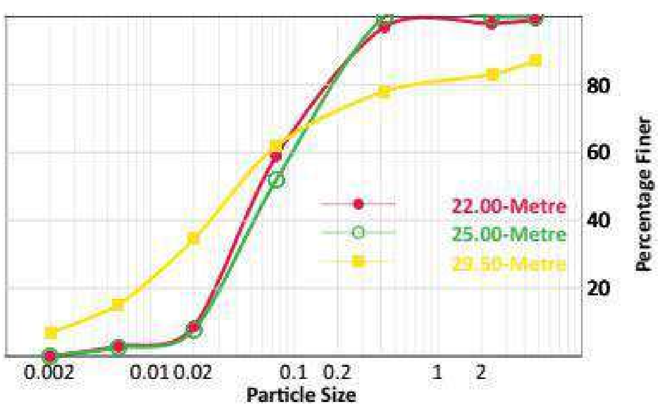
BH- P106-CH.23693.087



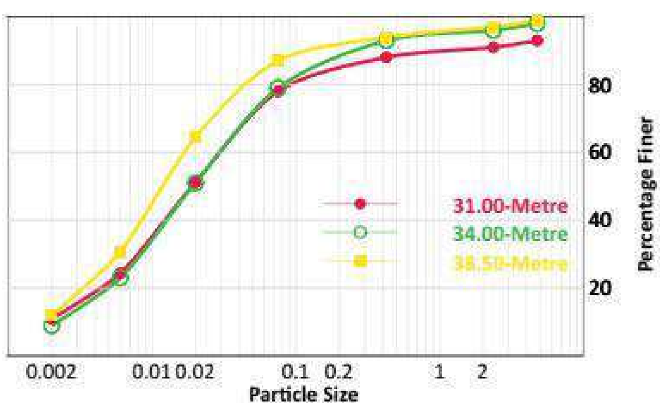
BH- P106-CH.23693.087



BH- P106-CH.23693.087

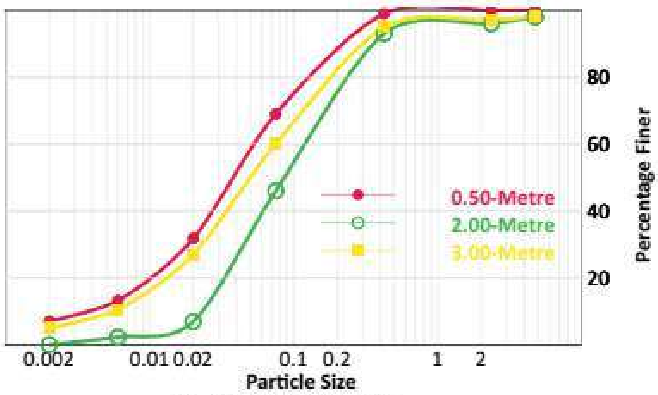


BH- P106-CH.23693.087

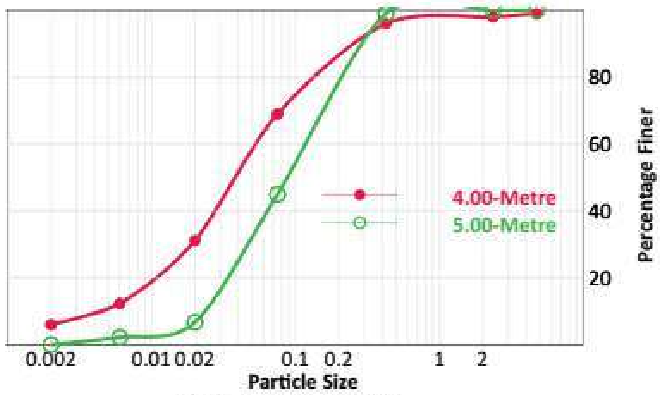


APPENDIX-D
PLOT 7: GRAIN SIZE DISTRIBUTION PLOTS

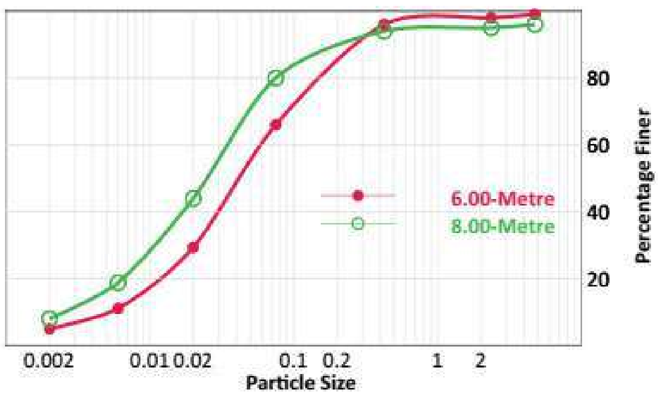
BH- P107-CH.23725.647



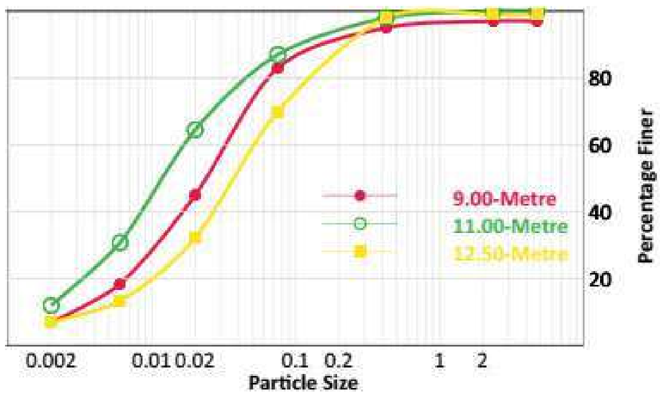
BH- P107-CH.23725.647



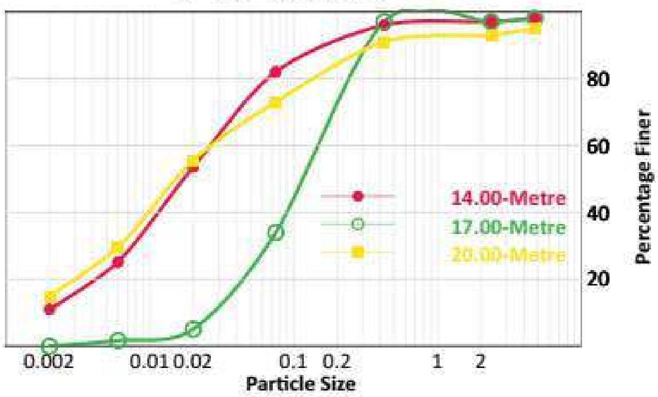
BH- P107-CH.23725.647



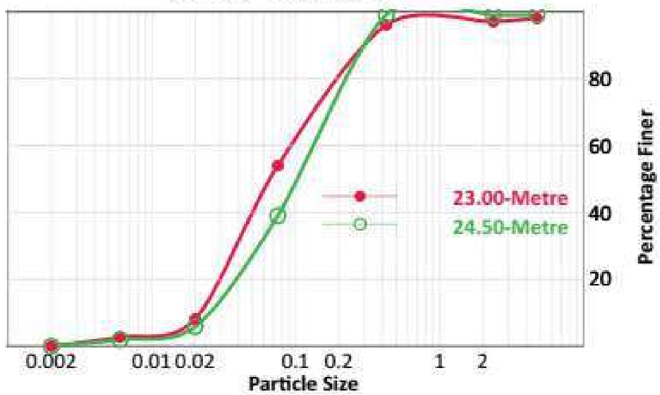
BH- P107-CH.23725.647



BH- P107-CH.23725.647



BH- P107-CH.23725.647



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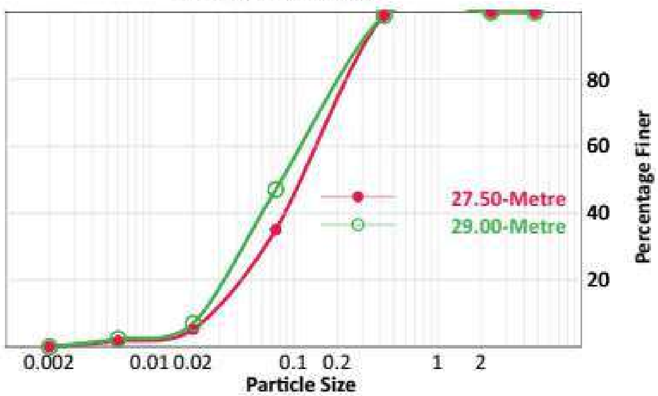
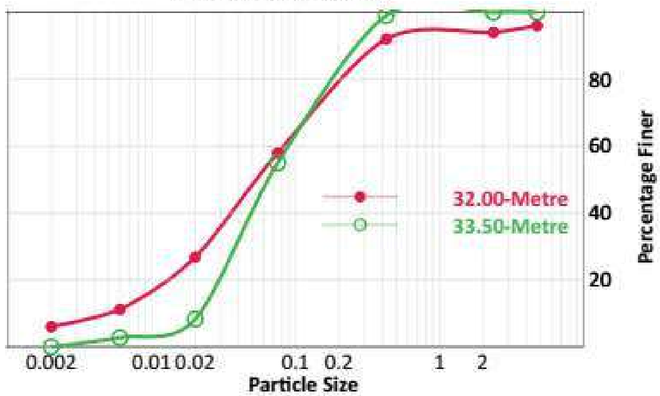
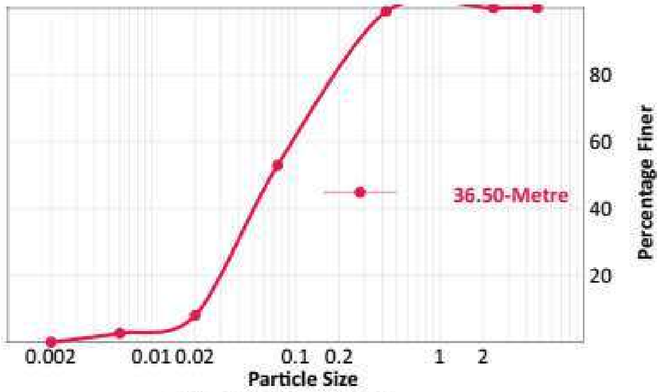


BH- P107-CH.23725.647

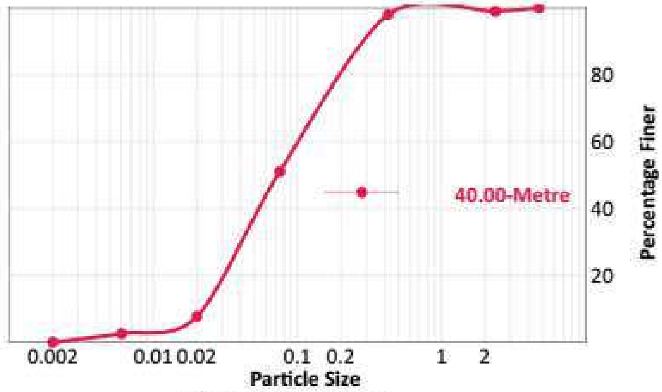


APPENDIX-D
PLOT 8: GRAIN SIZE DISTRIBUTION PLOTS

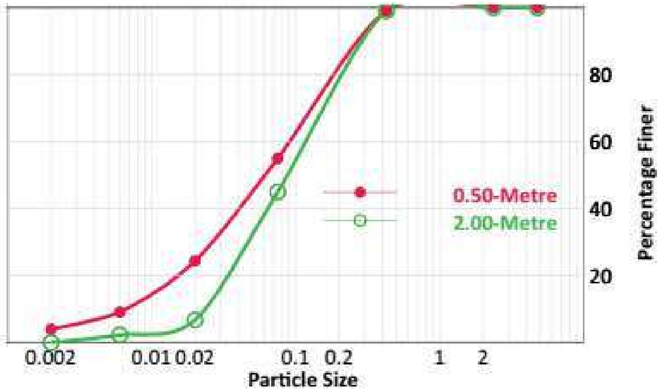
BH- P107-CH.23725.647



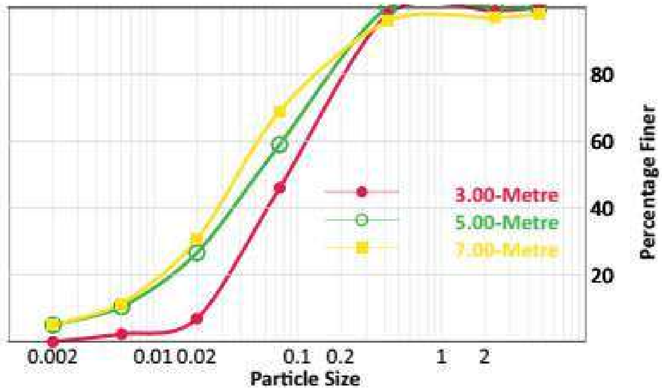
BH- P107-CH.23725.647



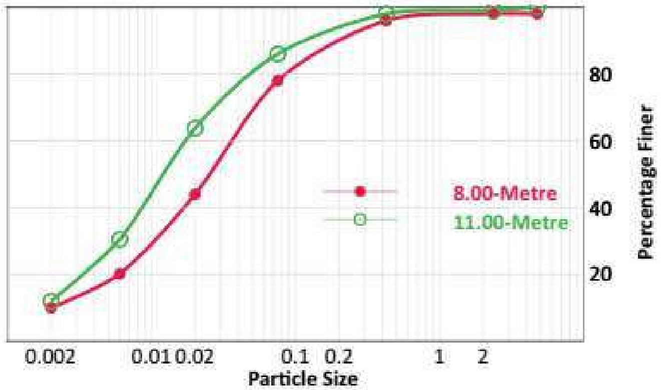
BH- P108-CH.23751.847



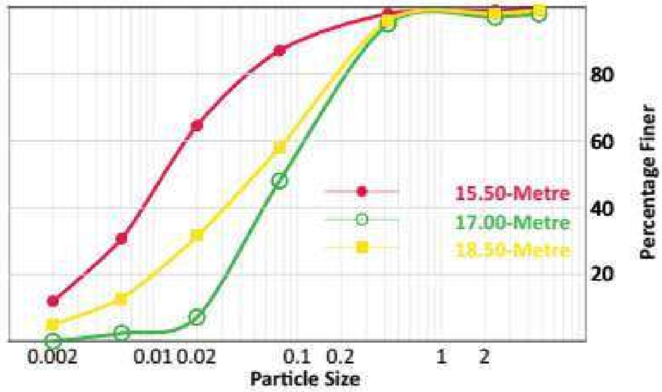
BH- P108-CH.23751.847



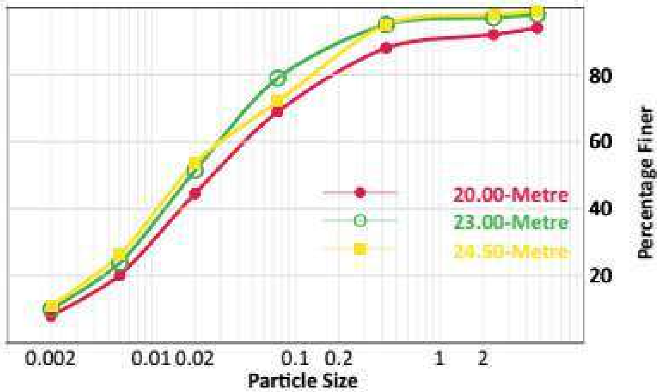
BH- P108-CH.23751.847



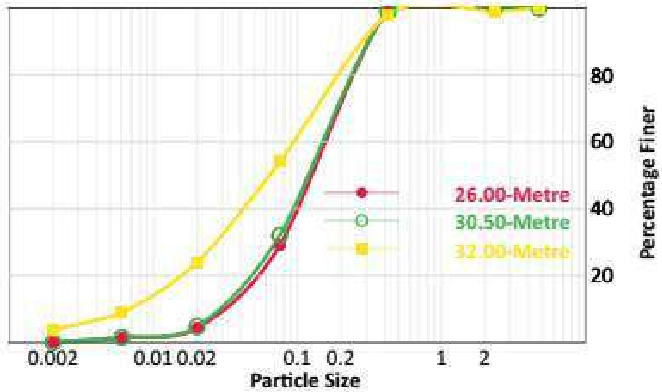
BH- P108-CH.23751.847



BH- P108-CH.23751.847

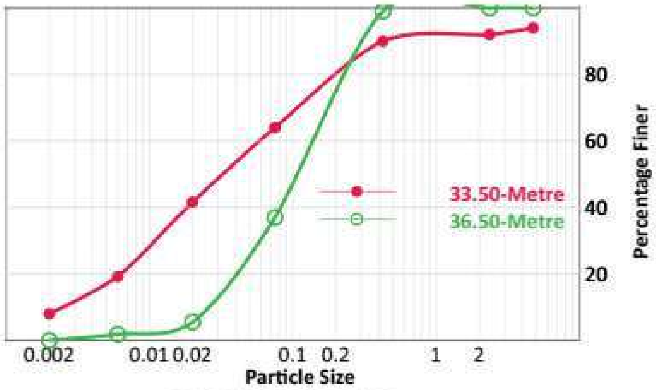


BH- P108-CH.23751.847

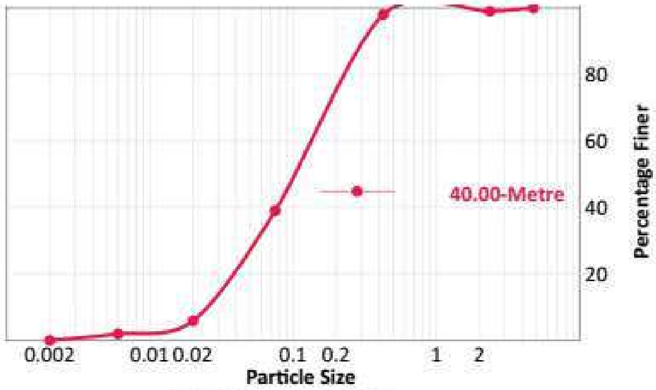


APPENDIX-D
PLOT 9: GRAIN SIZE DISTRIBUTION PLOTS

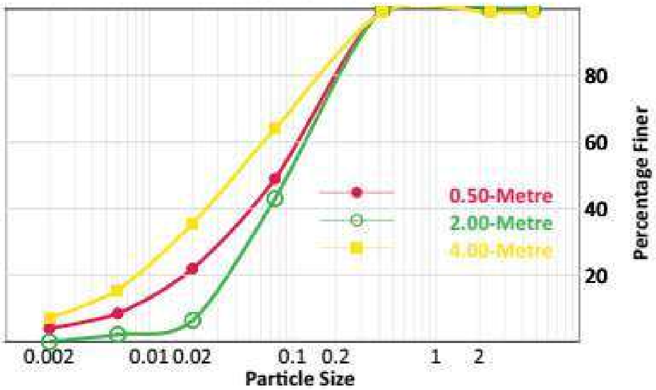
BH- P108-CH.23751.847



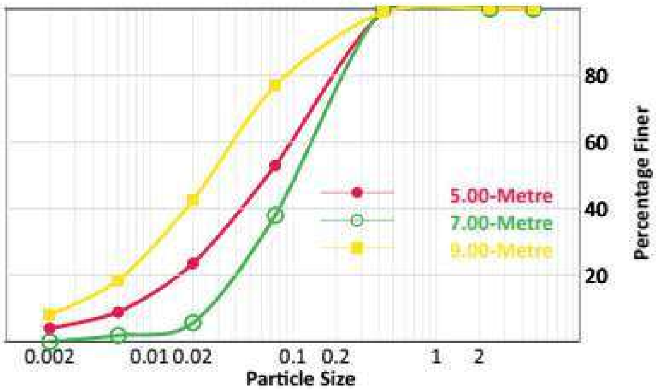
BH- P108-CH.23751.847



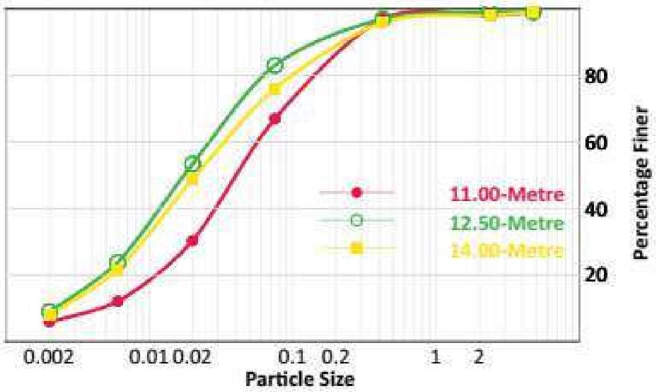
BH- P109-CH.23778.047



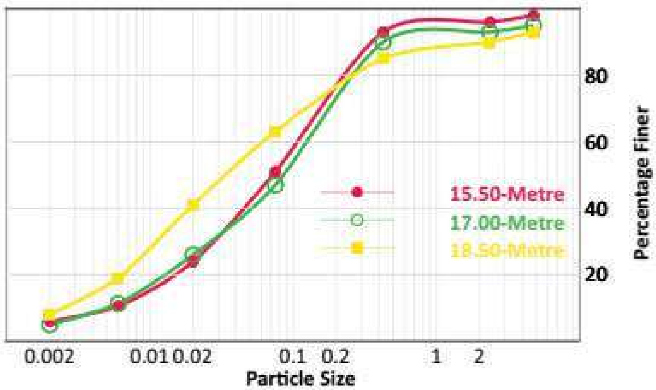
BH- P109-CH.23778.047



BH- P109-CH.23778.047



BH- P109-CH.23778.047



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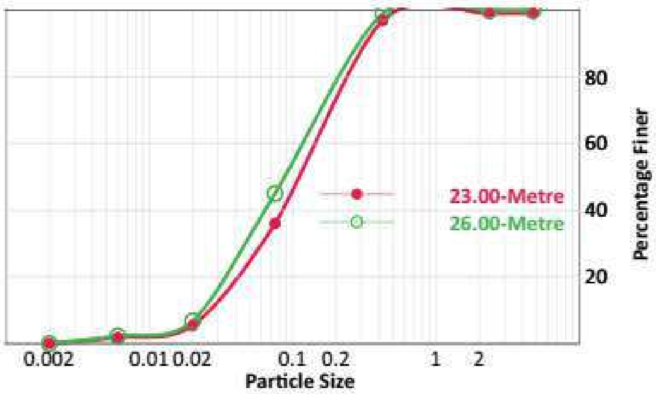

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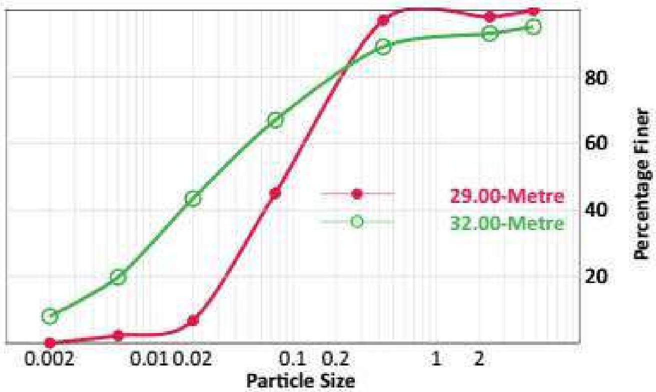
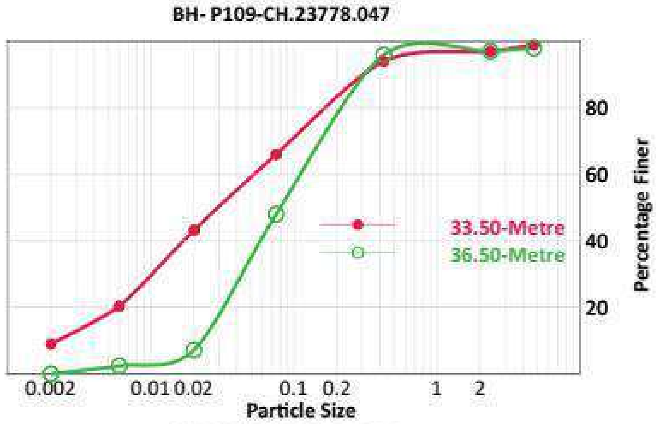
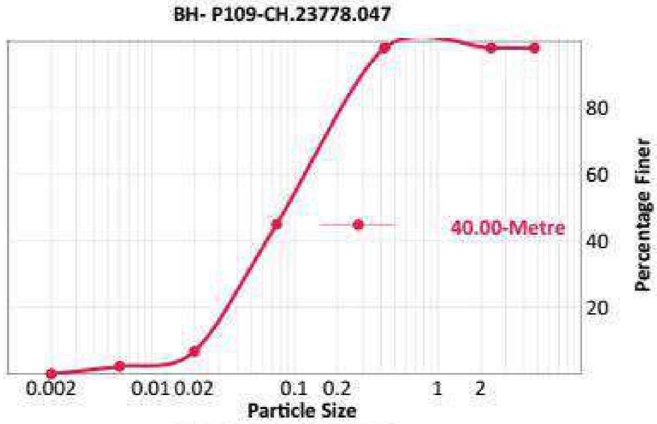
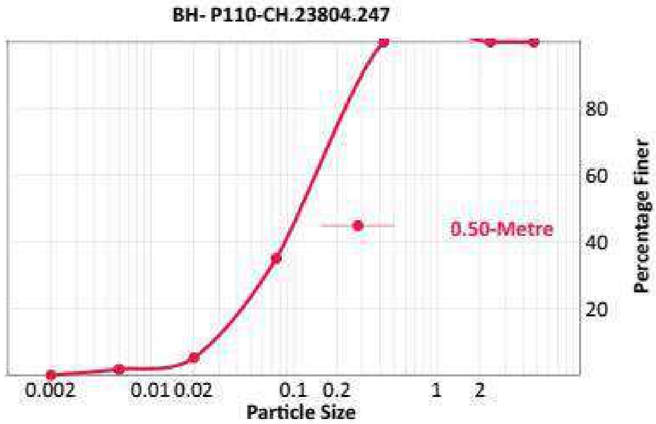
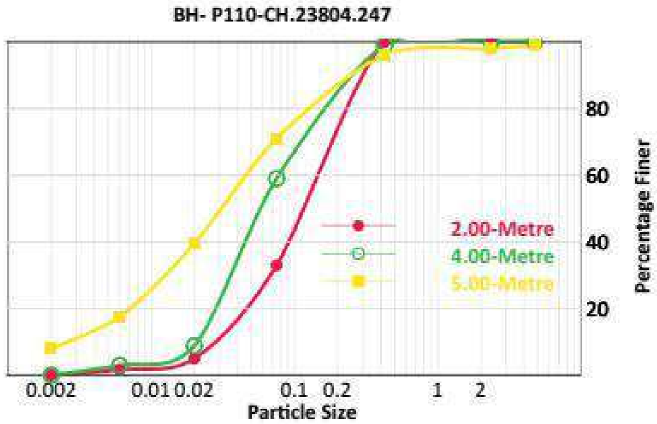


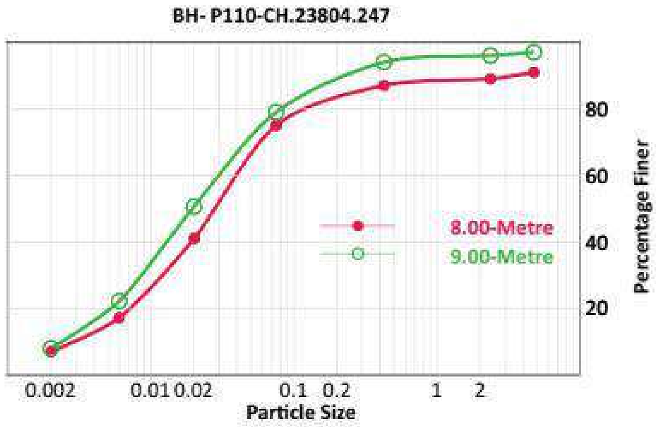
APPENDIX-D
PLOT 10: GRAIN SIZE DISTRIBUTION PLOTS

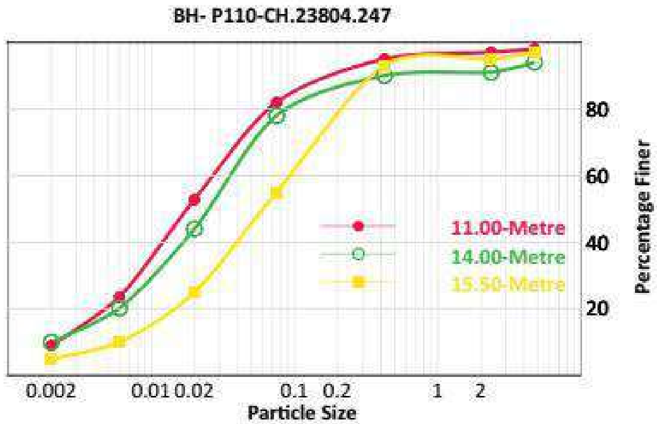


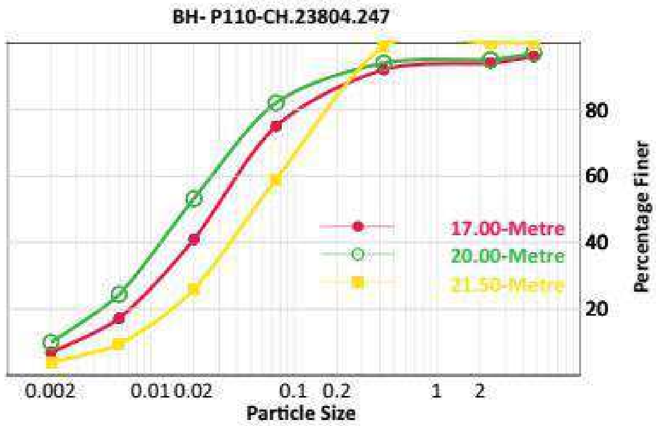


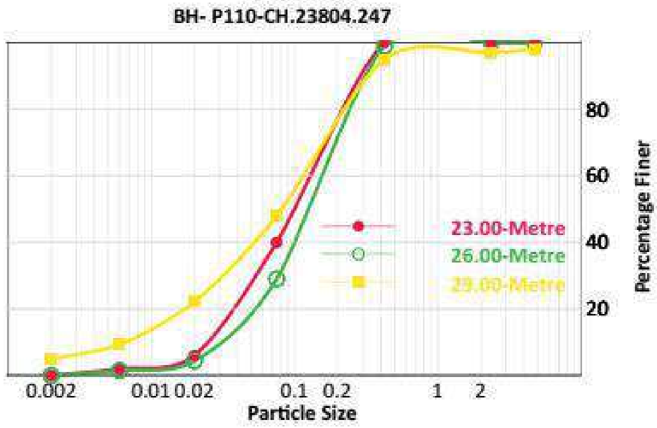






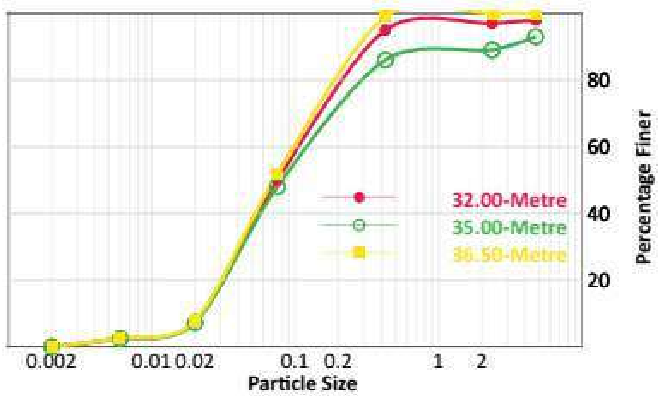






APPENDIX-D
PLOT 11: GRAIN SIZE DISTRIBUTION PLOTS

BH- P110-CH.23804.247



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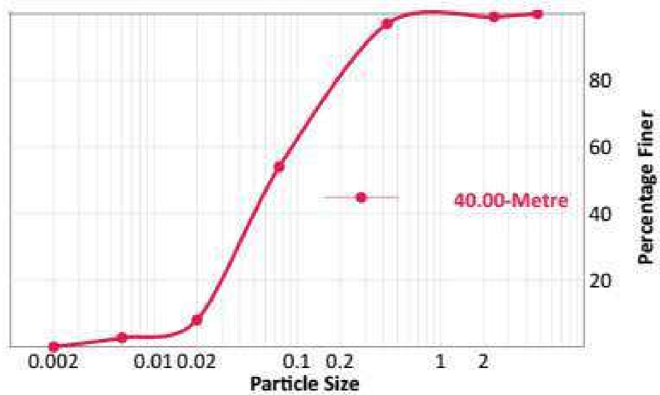
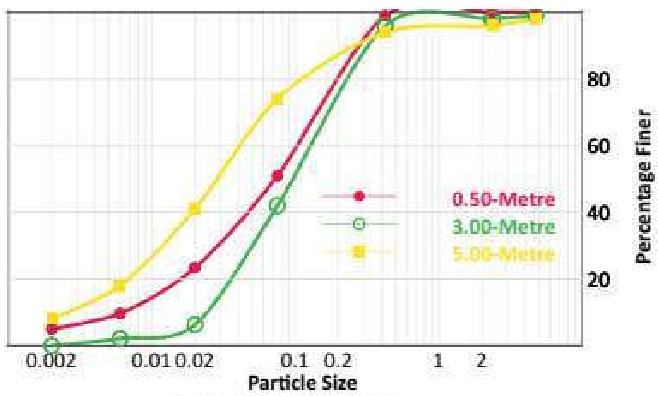


BH- P111-CH.23830.447



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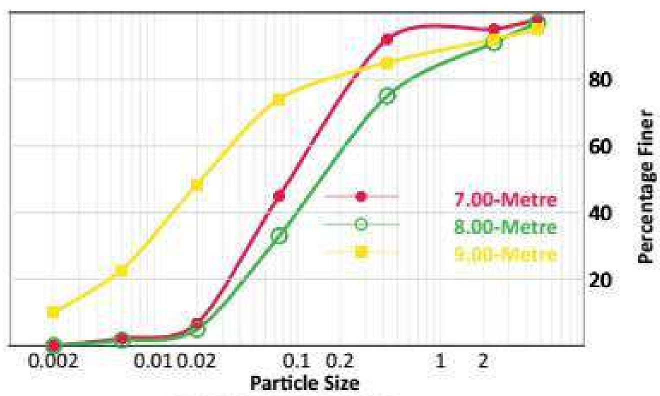

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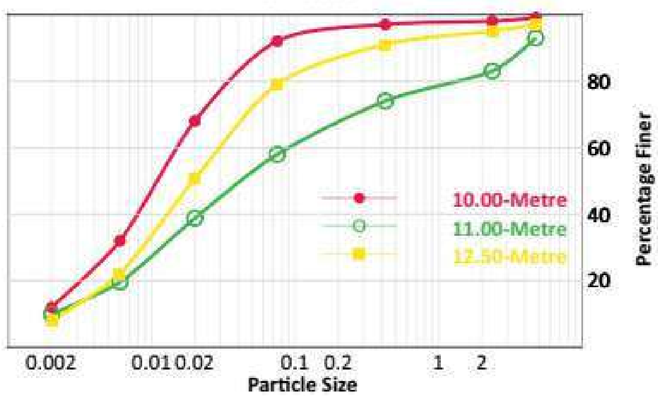

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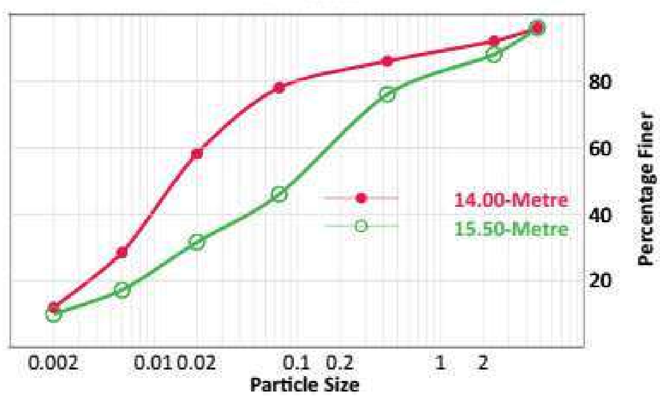

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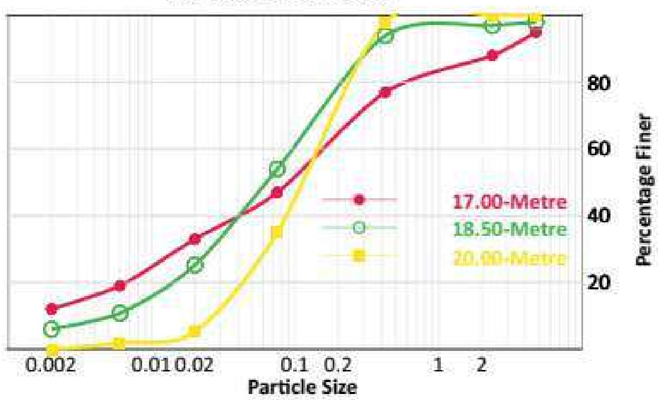

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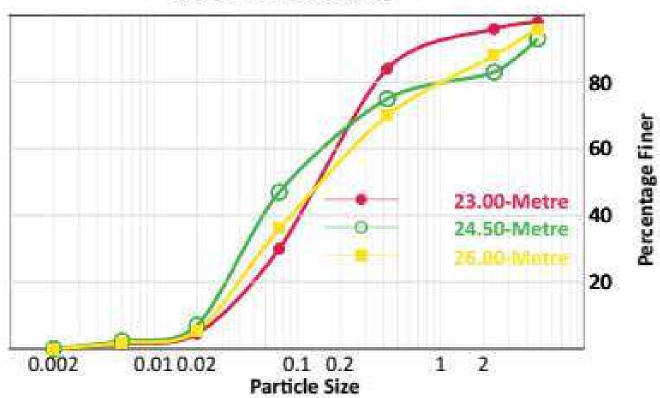
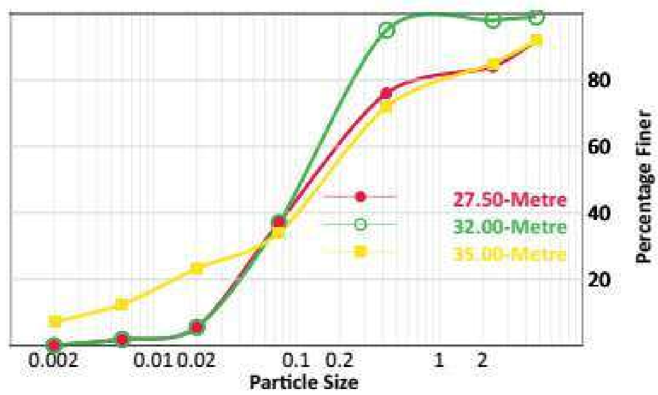


APPENDIX-D
PLOT 12: GRAIN SIZE DISTRIBUTION PLOTS

BH- P111-CH.23830.447



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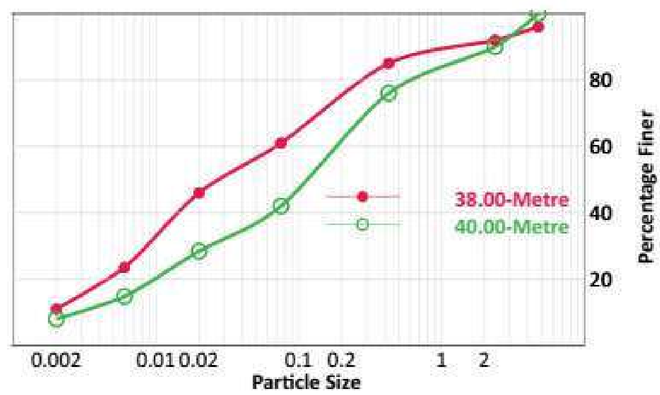

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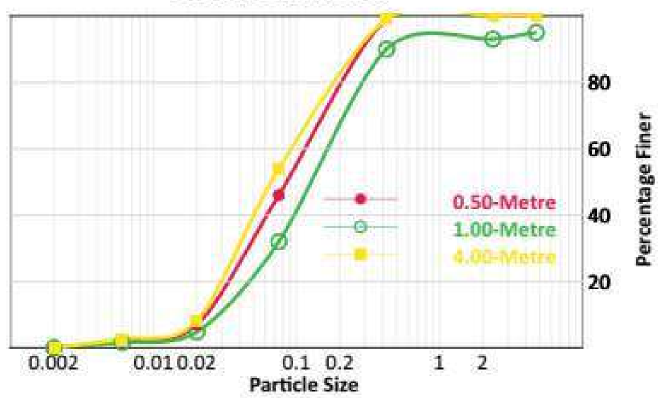

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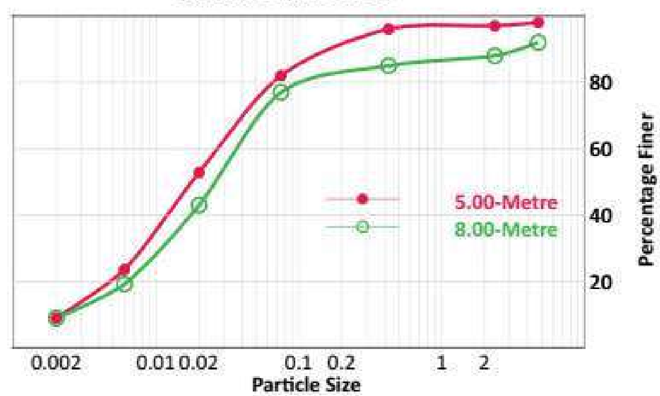

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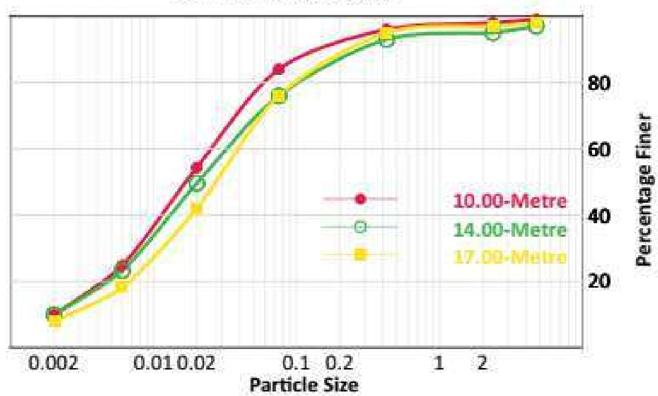

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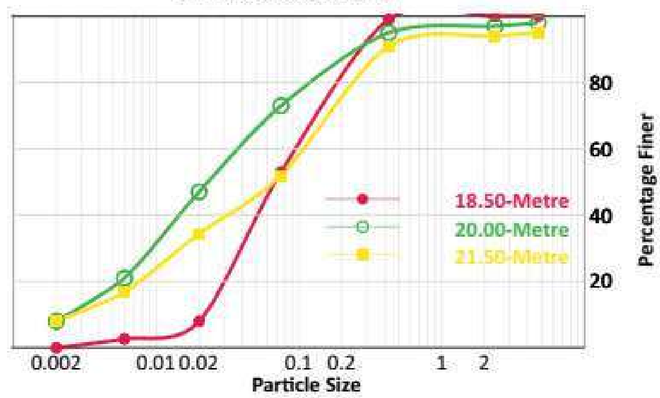

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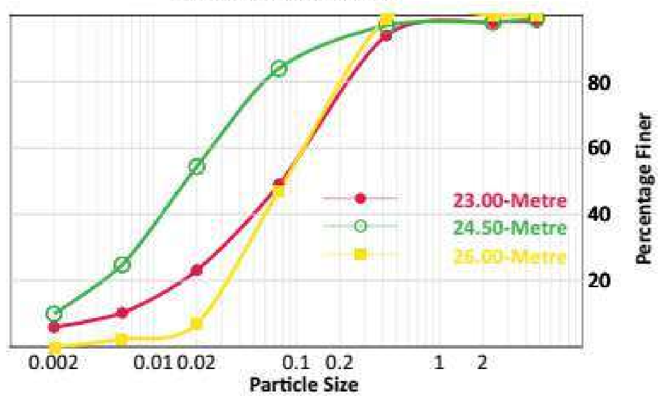

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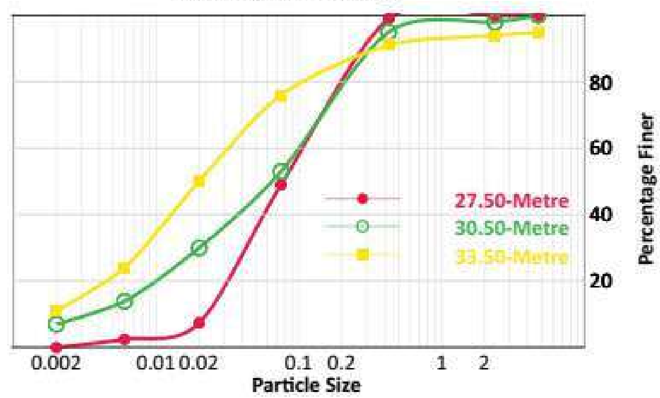
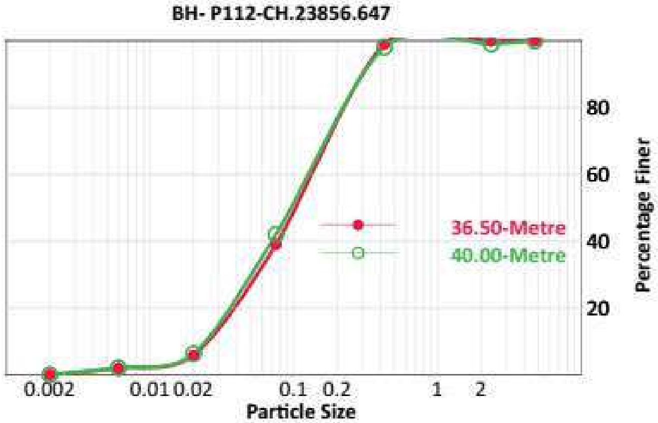
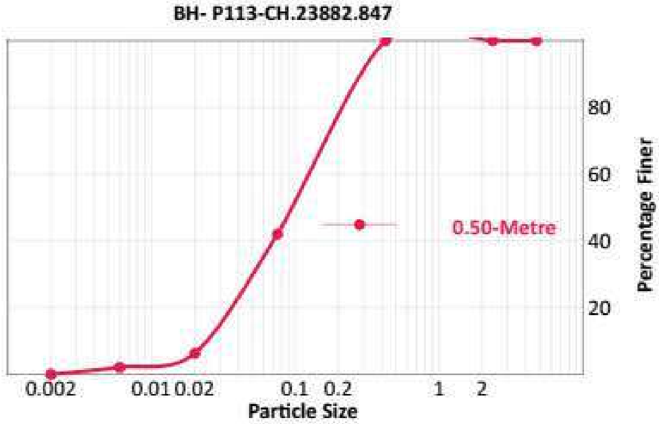
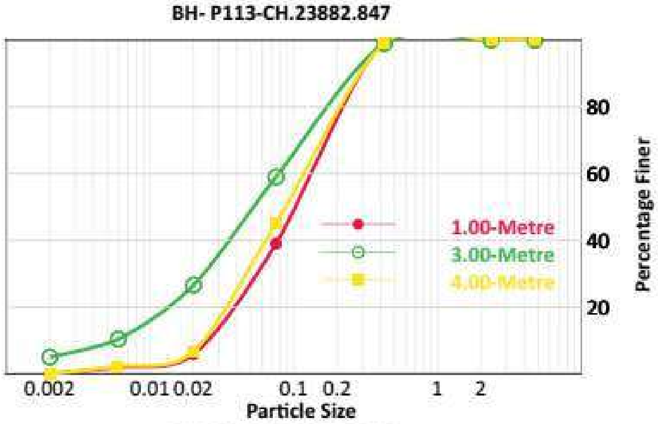
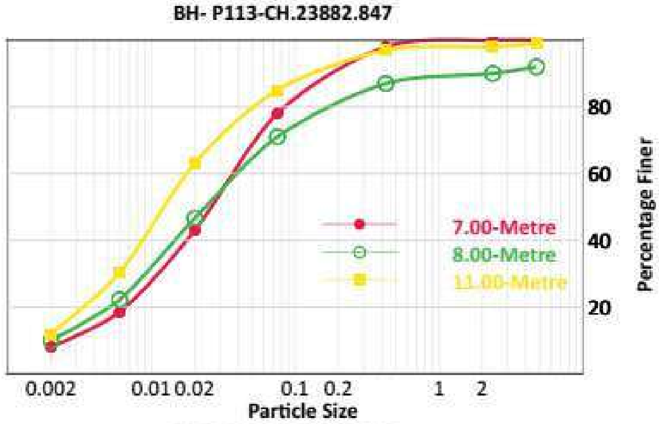


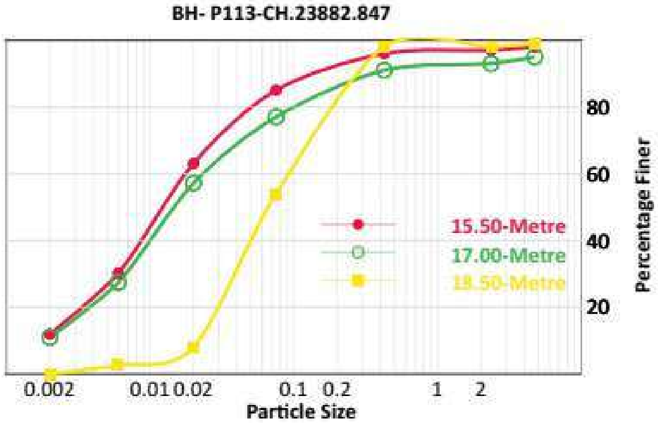
APPENDIX-D
PLOT 13: GRAIN SIZE DISTRIBUTION PLOTS

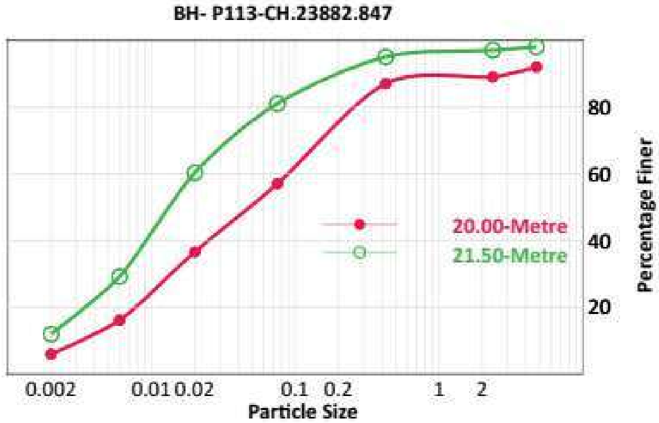


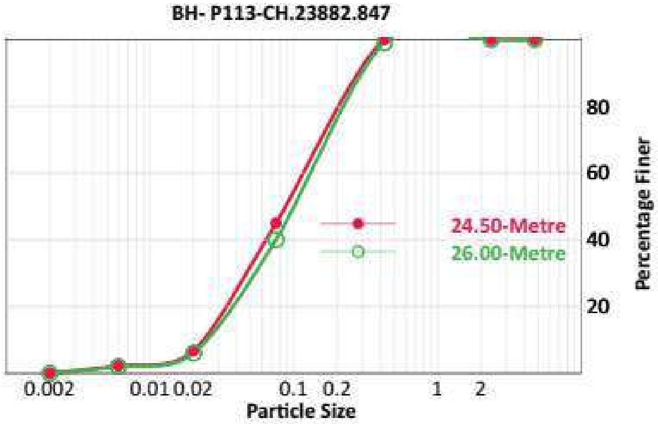


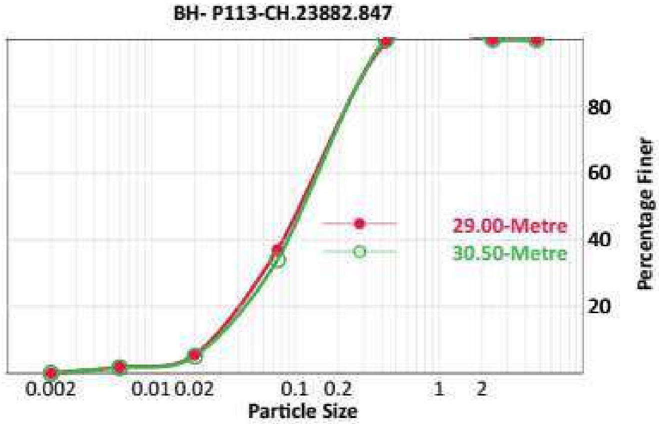






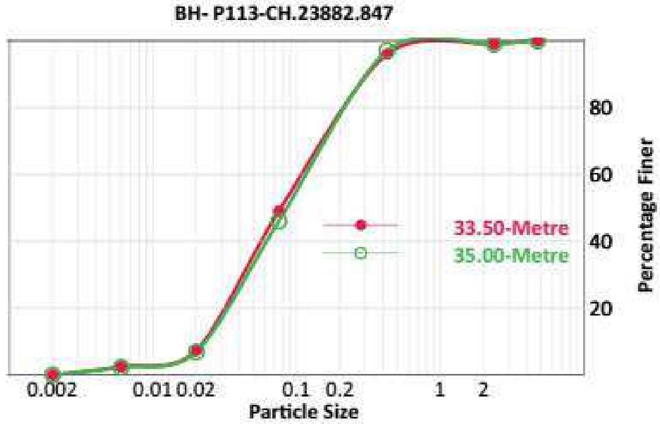


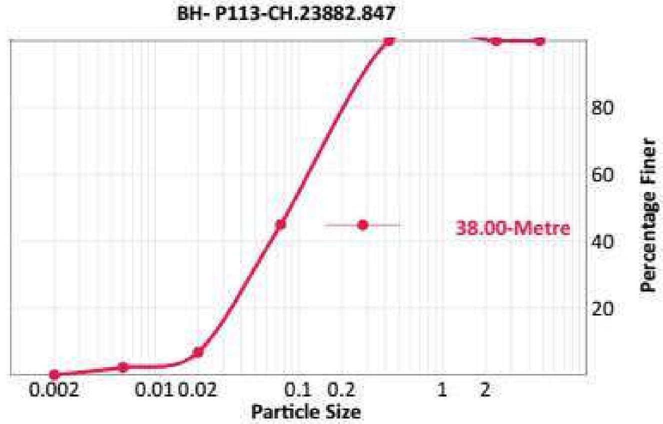




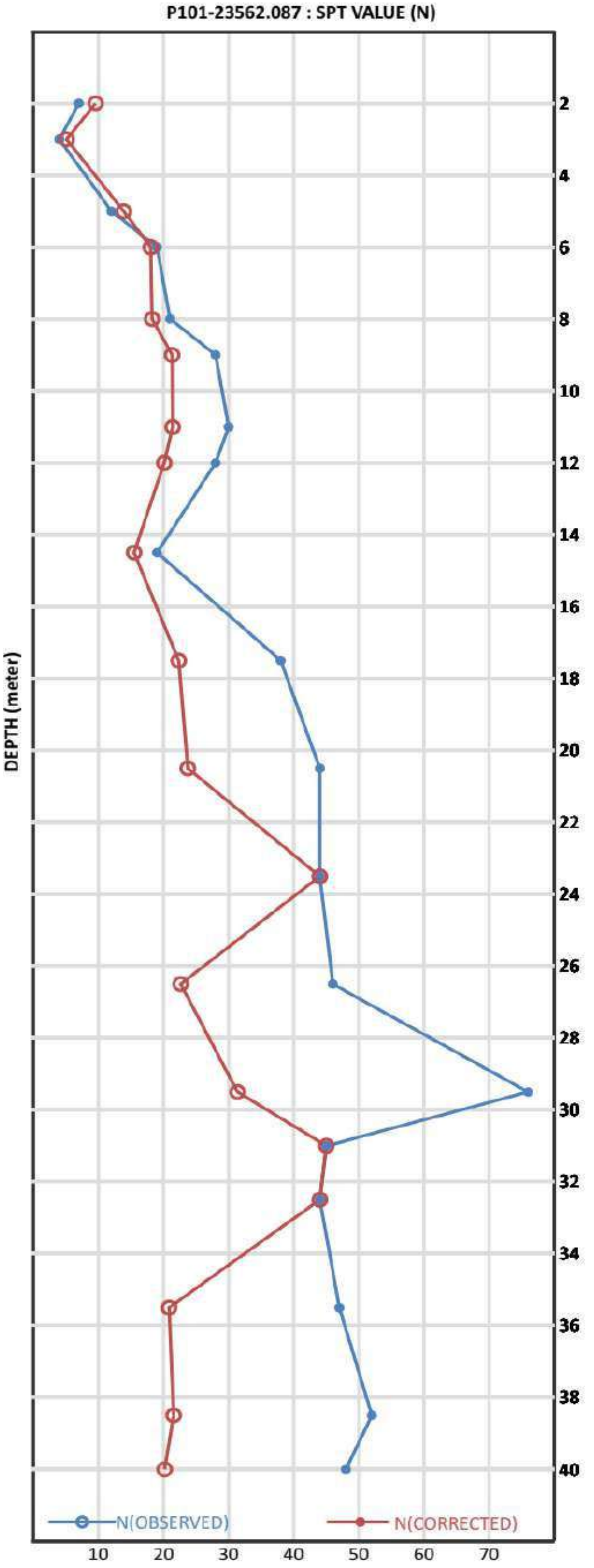
APPENDIX-D

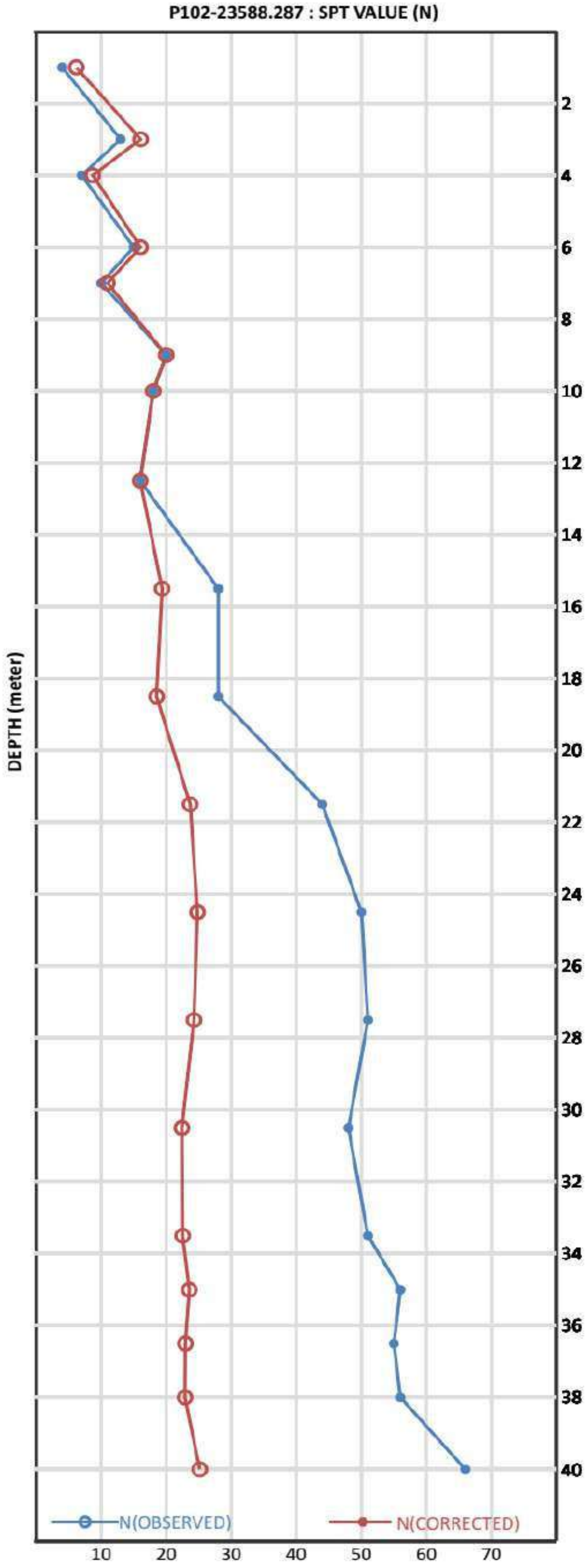
PLOT 14: GRAIN SIZE DISTRIBUTION PLOTS



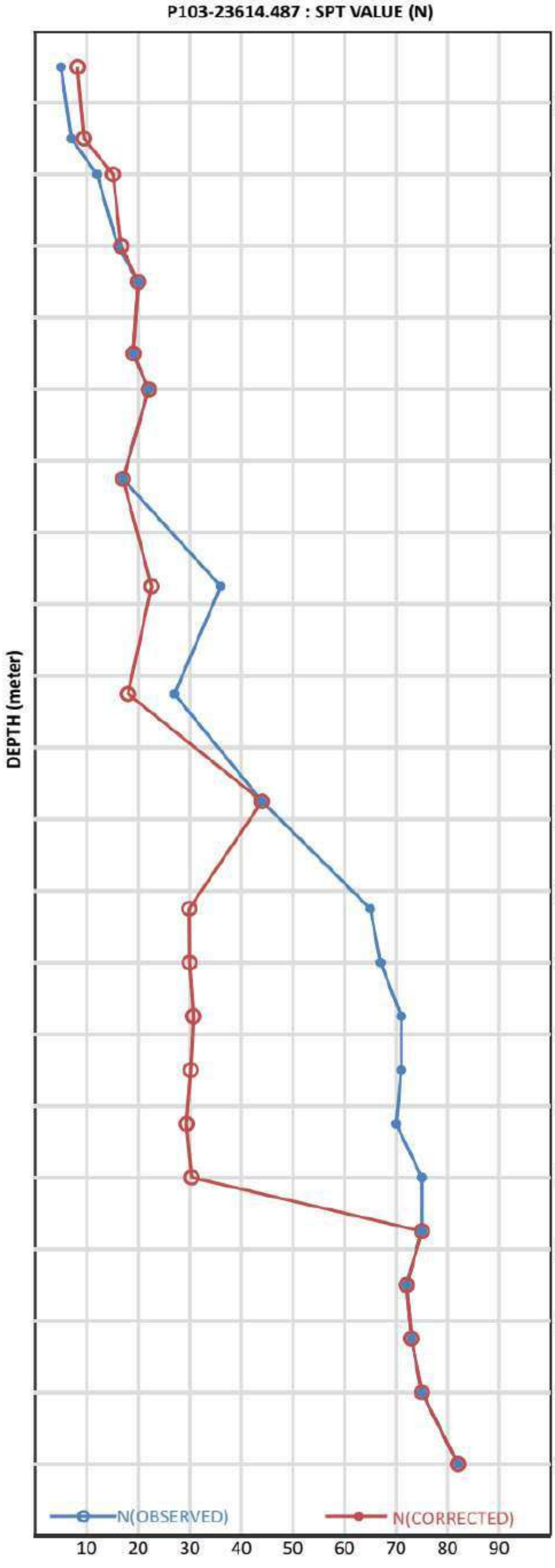


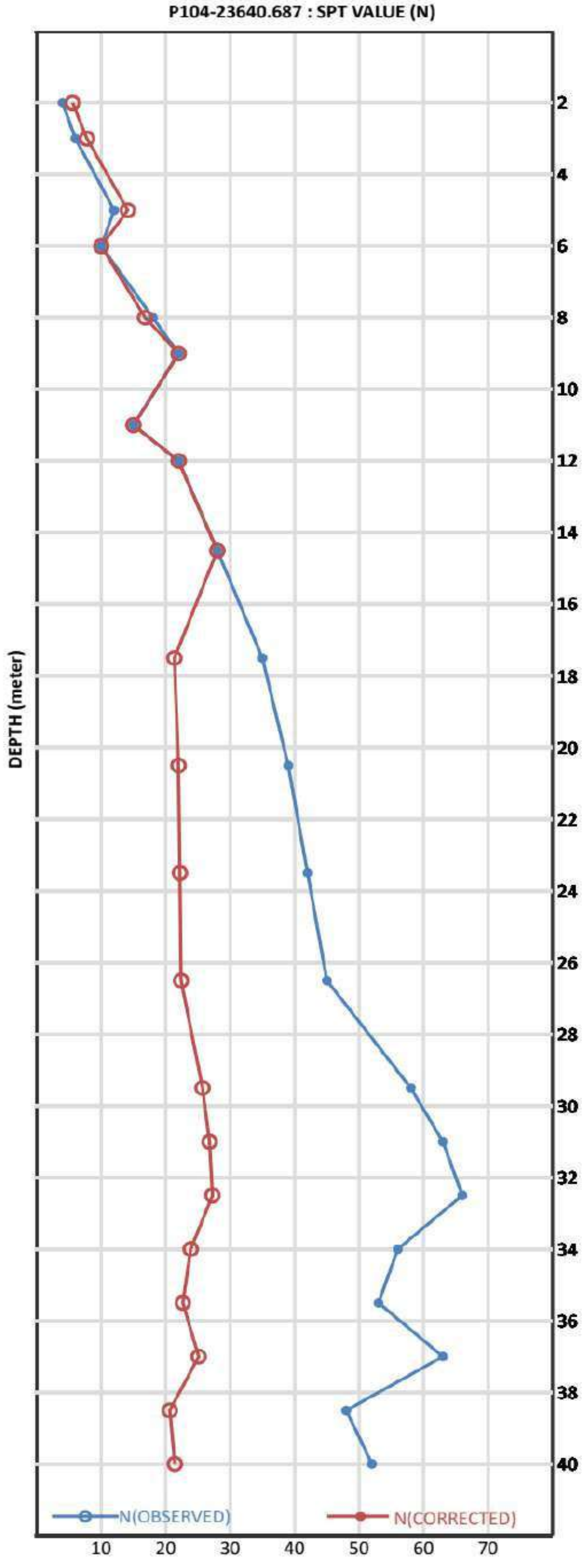
APPENDIX-E
PLOT 1: RECORDED SPT Vs CORRECTED SPT



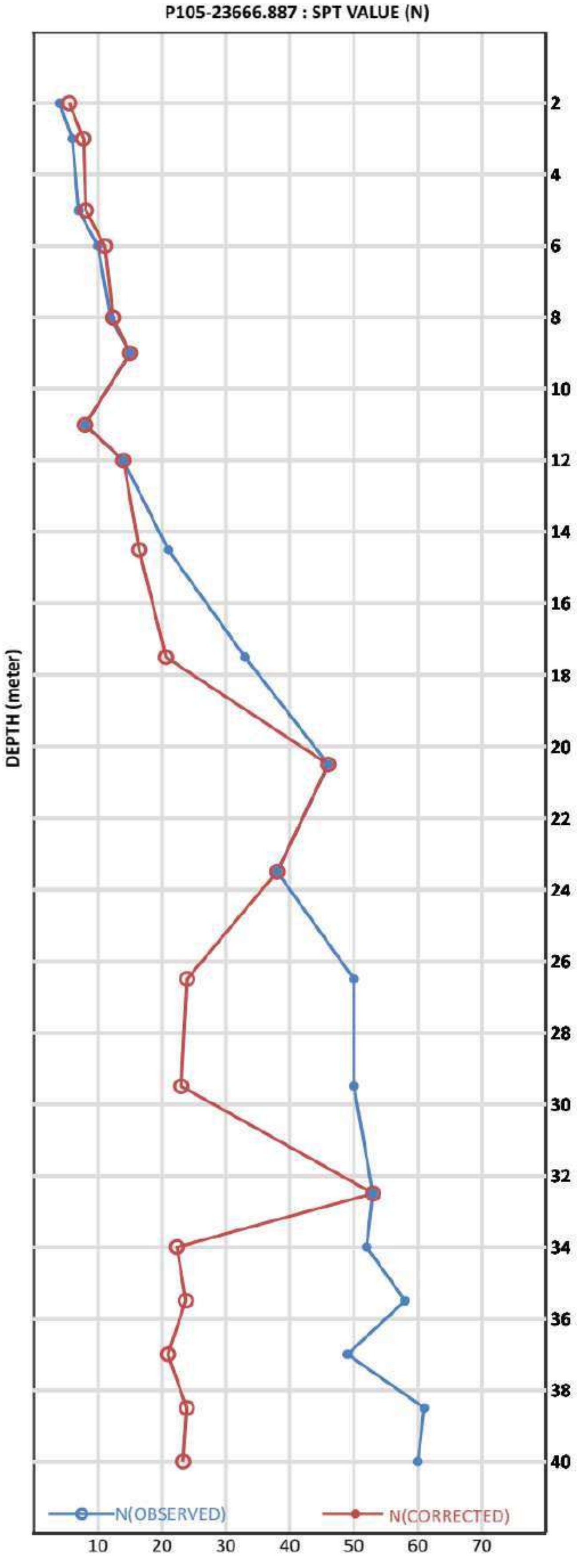


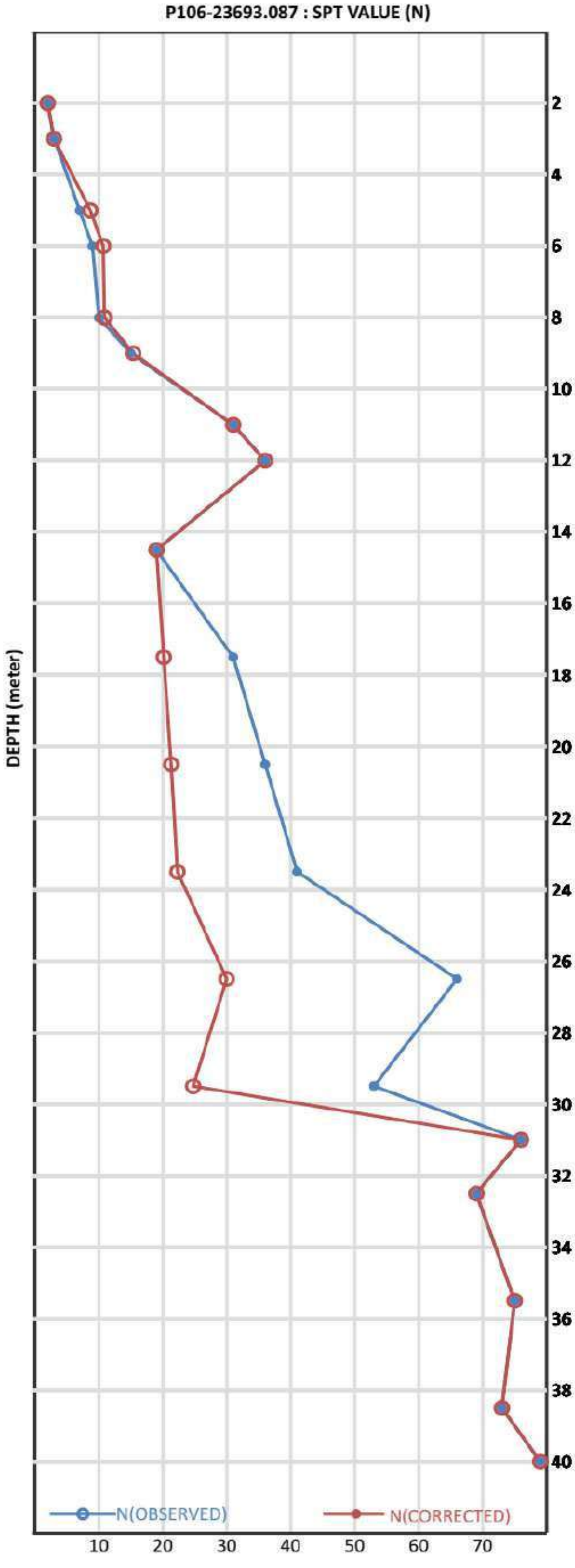
APPENDIX-E
PLOT 2: RECORDED SPT Vs CORRECTED SPT



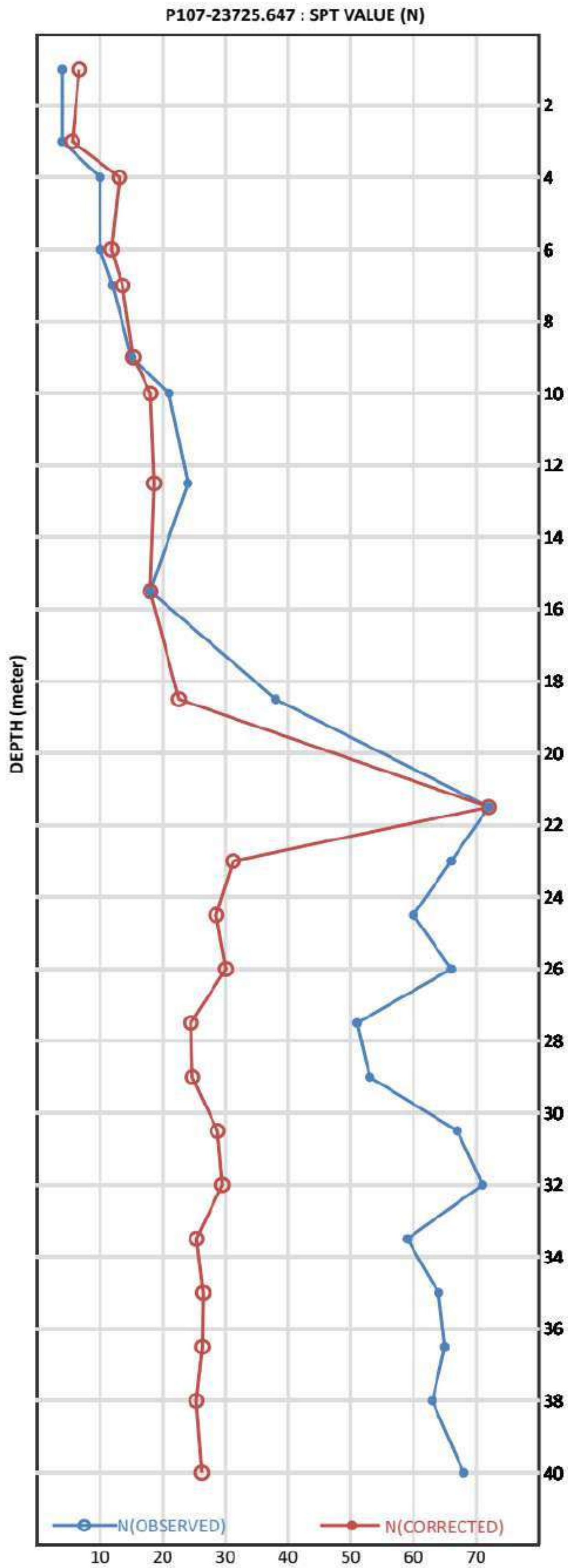


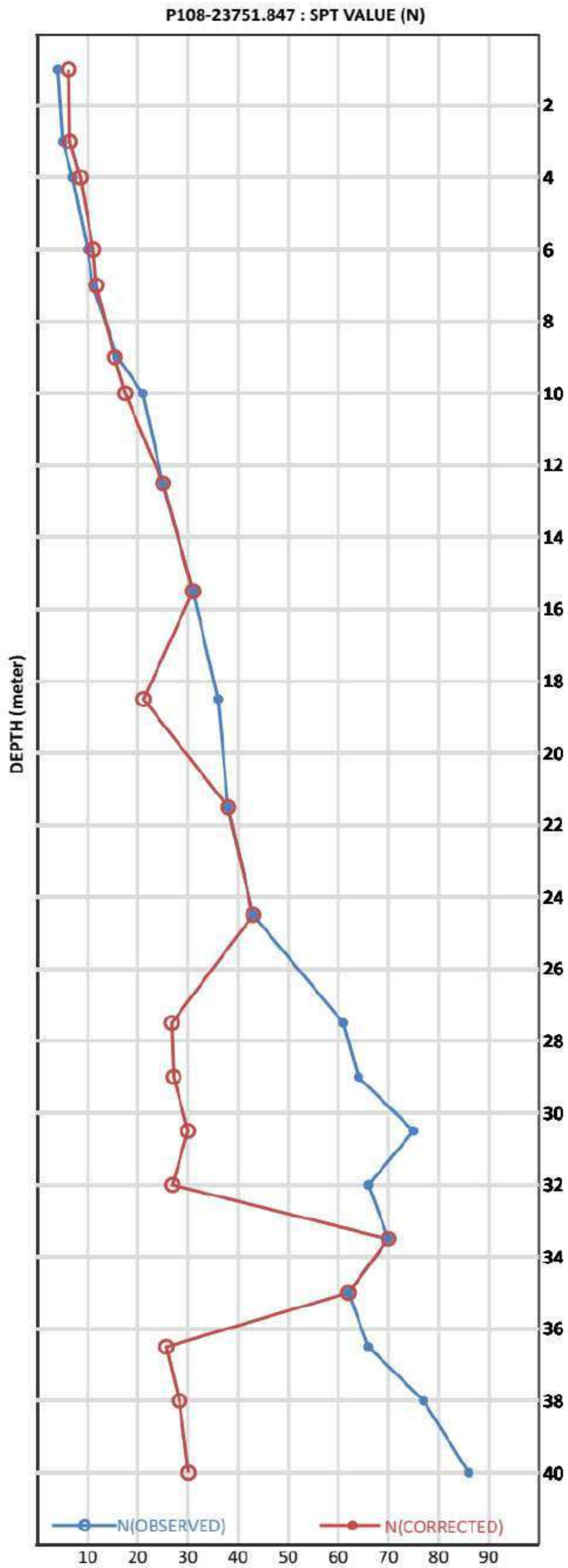
APPENDIX-E
PLOT 3: RECORDED SPT Vs CORRECTED SPT



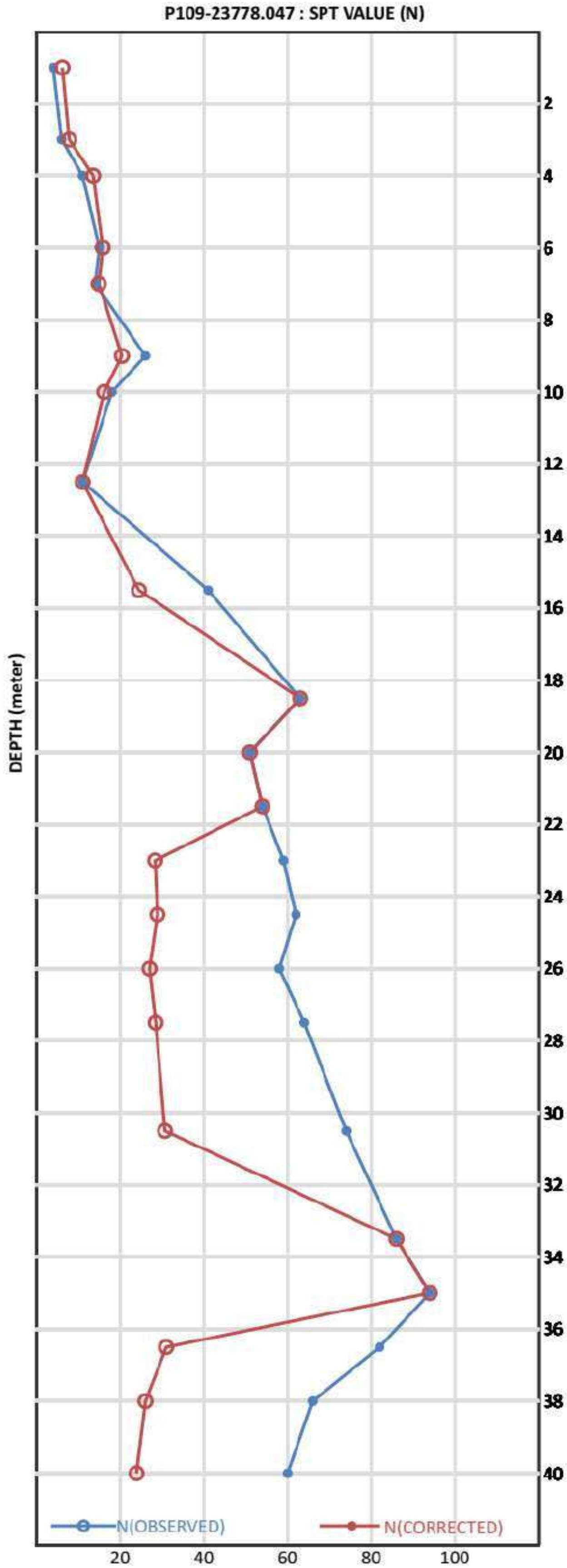


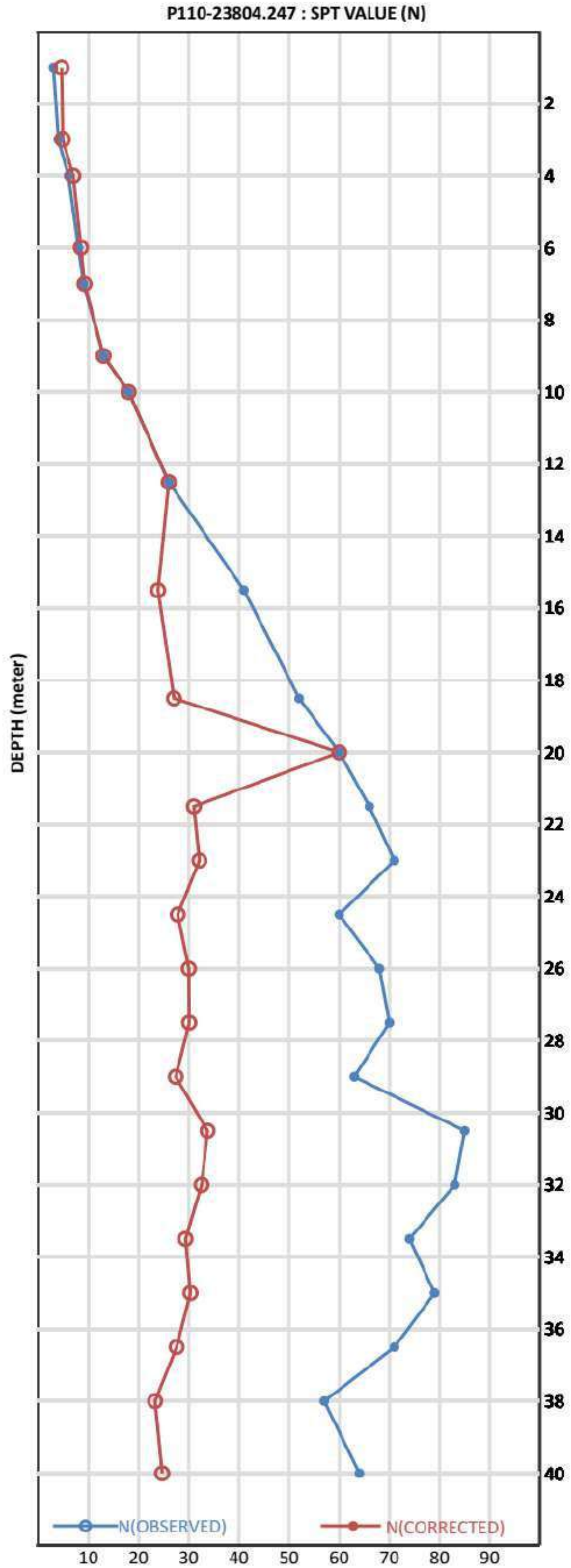
APPENDIX-E
PLOT 4: RECORDED SPT Vs CORRECTED SPT



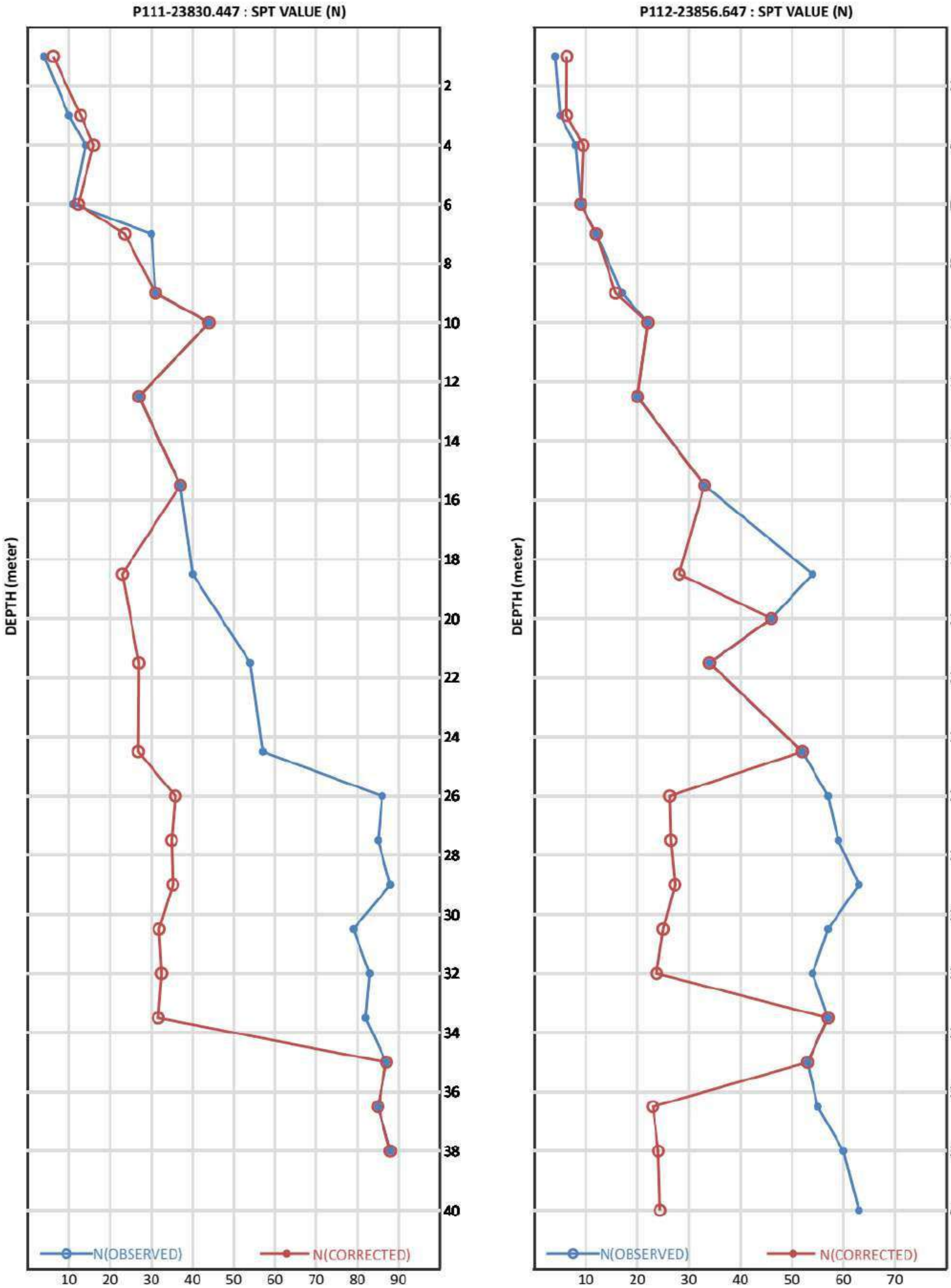


APPENDIX-E
PLOT 5: RECORDED SPT Vs CORRECTED SPT

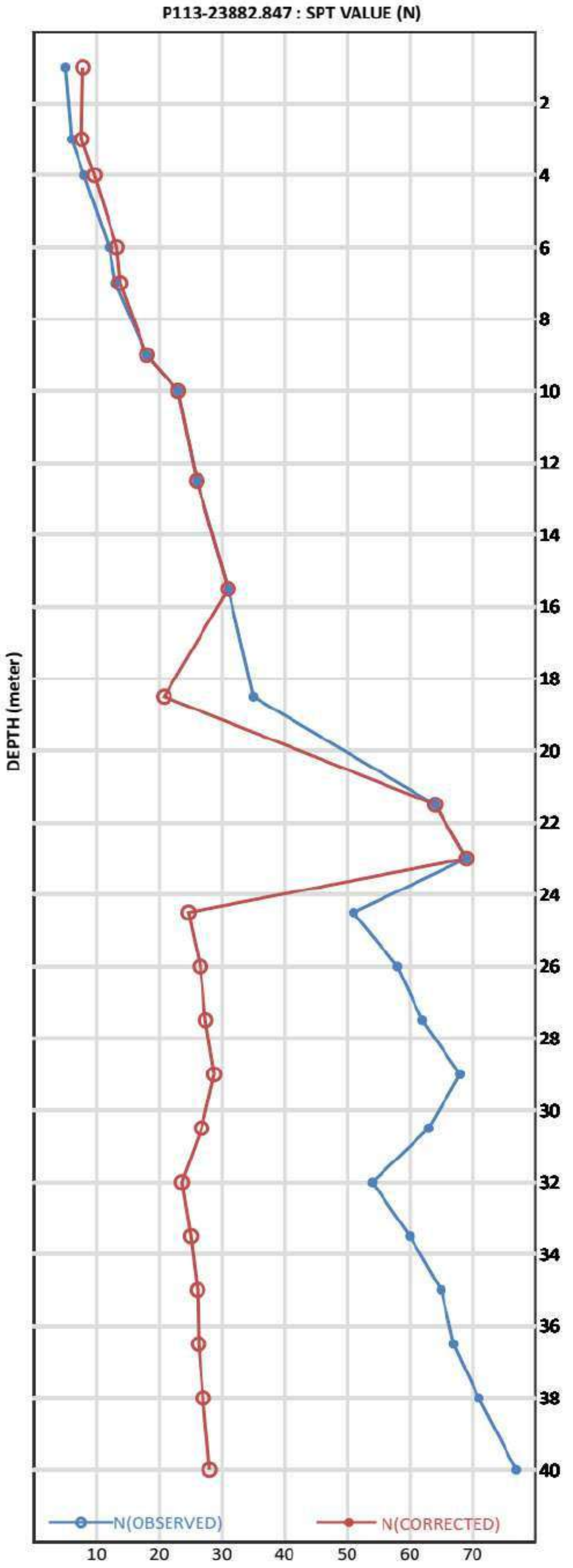




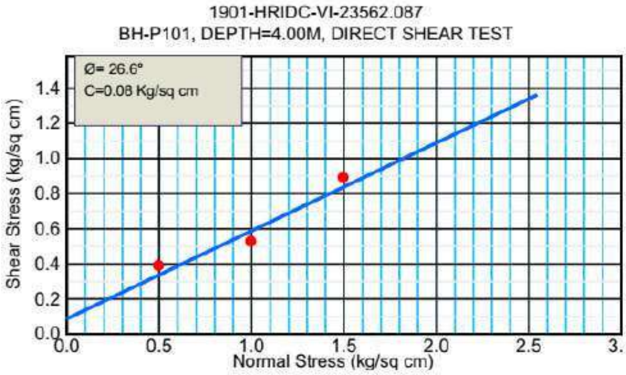
APPENDIX-E
PLOT 6: RECORDED SPT Vs CORRECTED SPT

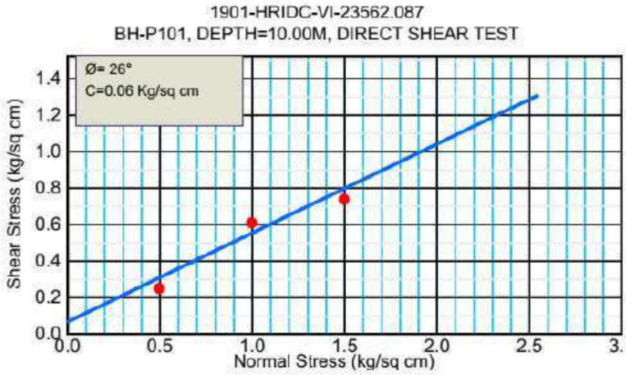


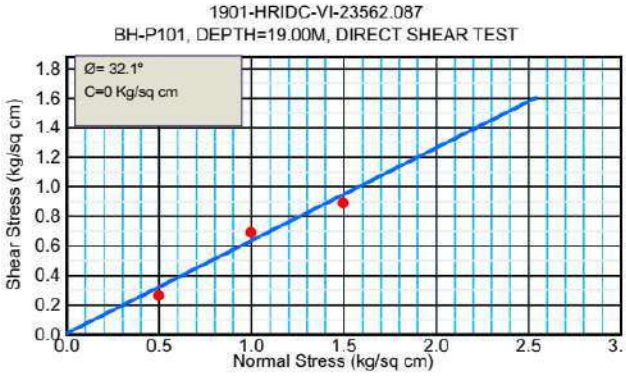
APPENDIX-E
PLOT 7: RECORDED SPT Vs CORRECTED SPT

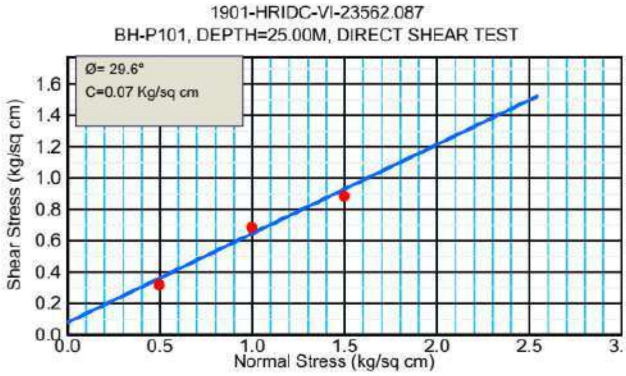


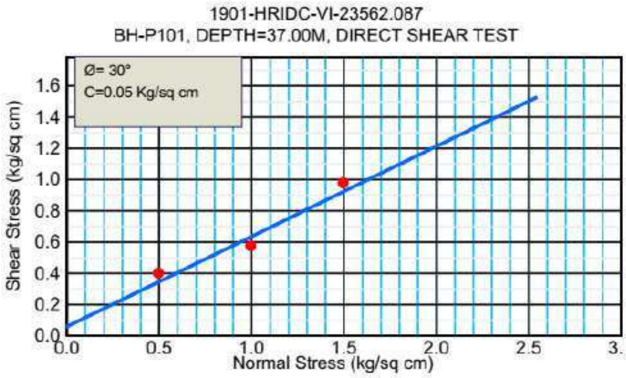
APPENDIX-F
GRAPH 1: DST GRAPH

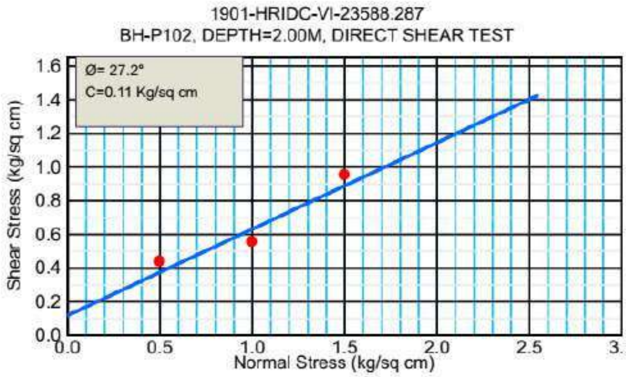


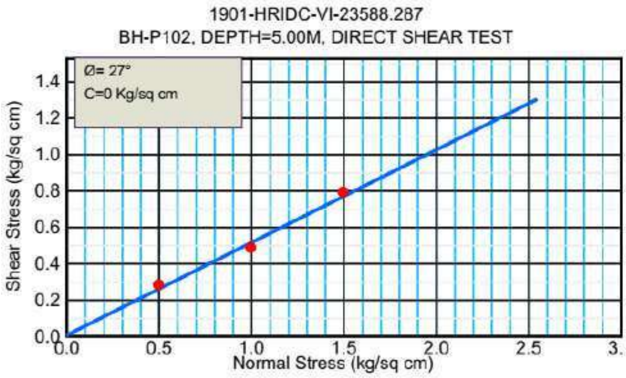


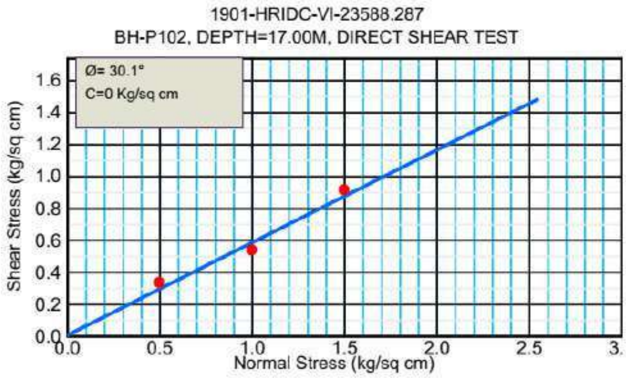




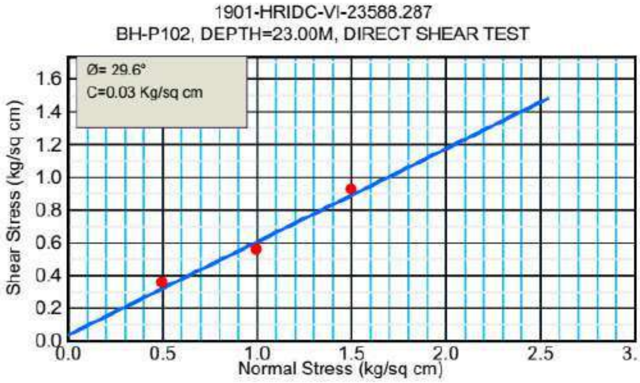


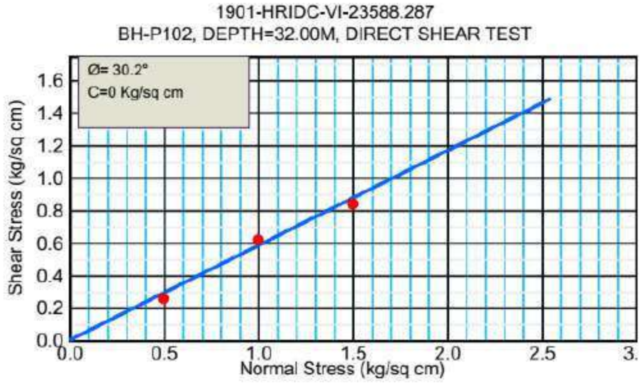


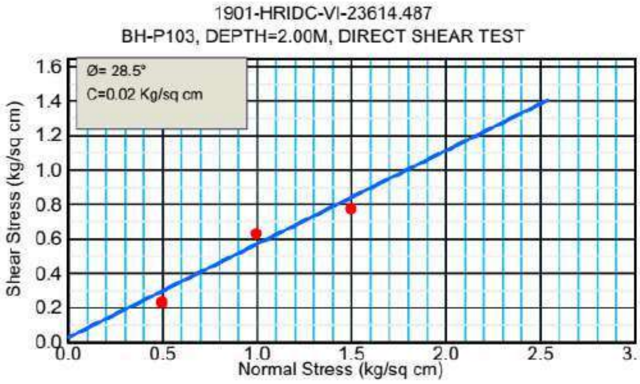


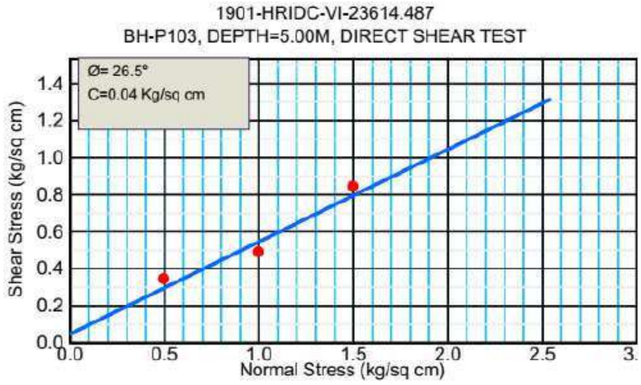


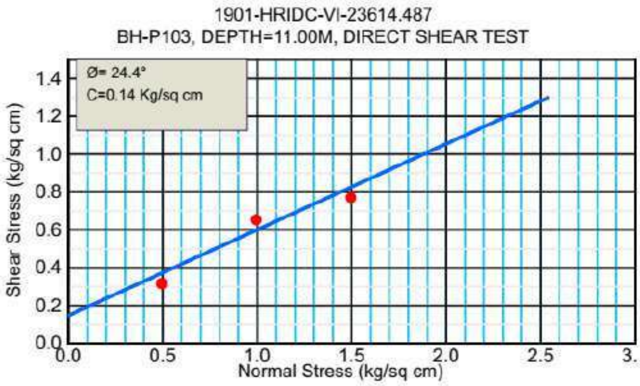
APPENDIX-F
GRAPH 2: DST GRAPH

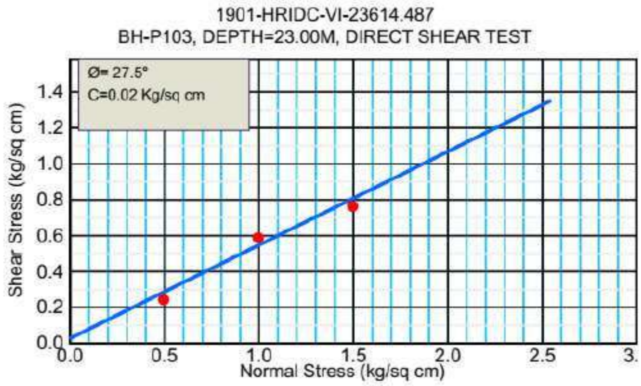


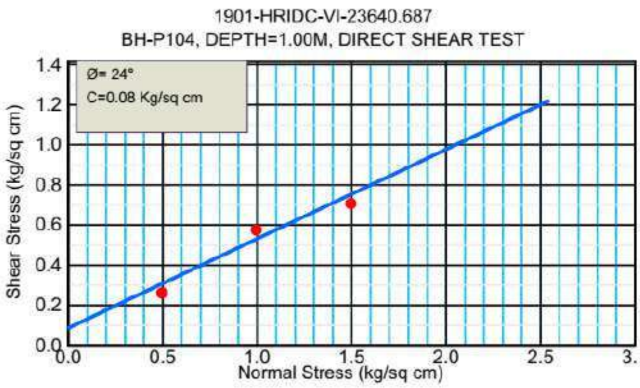


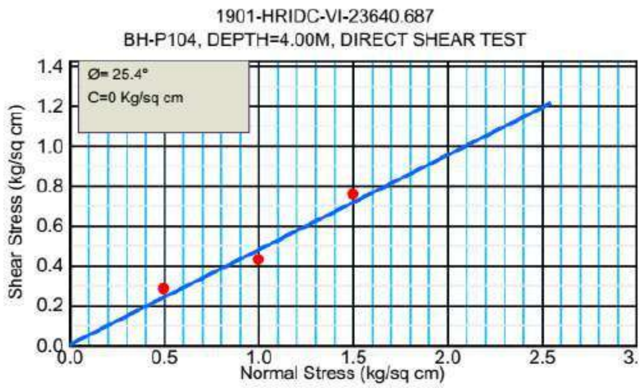




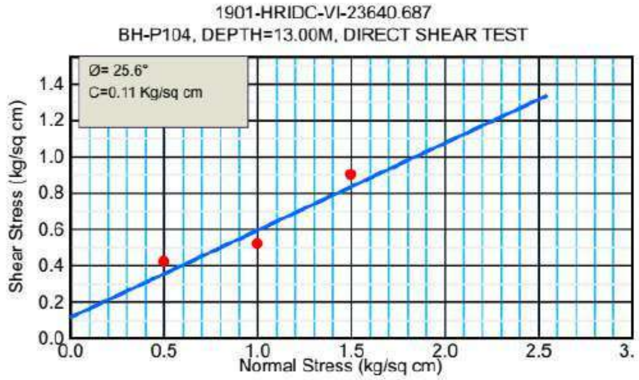


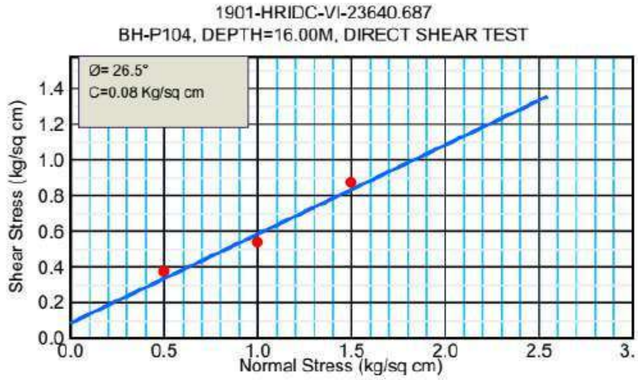


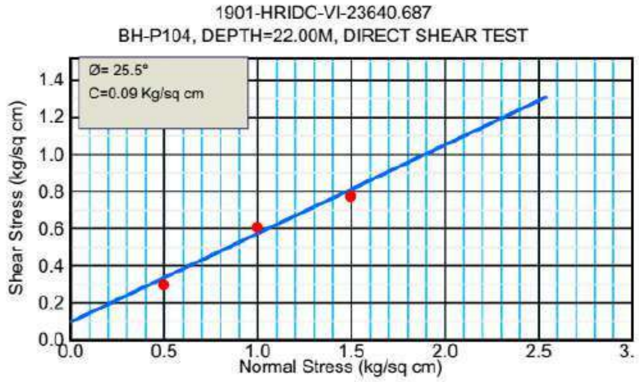


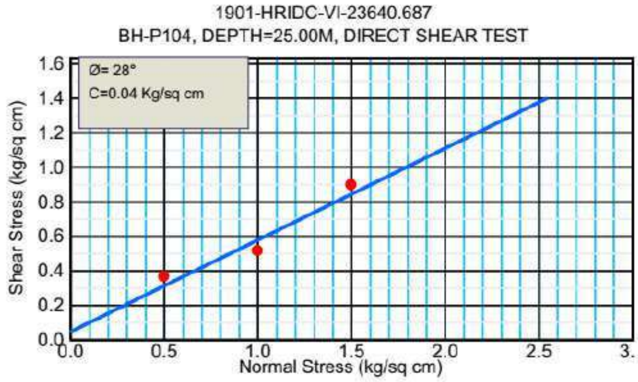


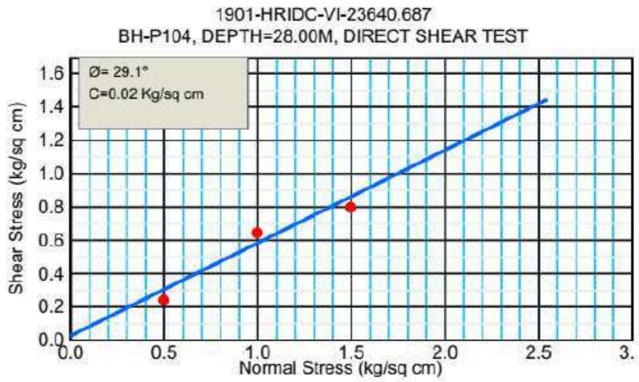
APPENDIX-F
GRAPH 3: DST GRAPH

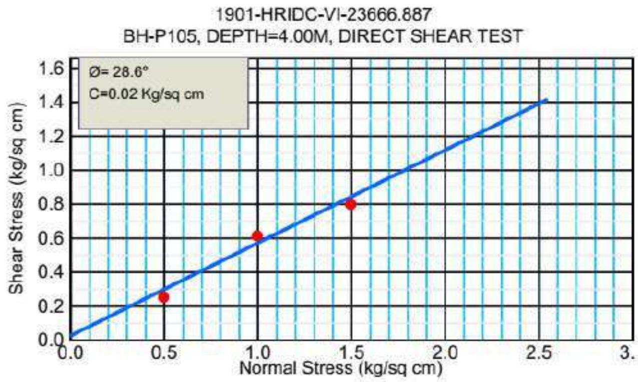


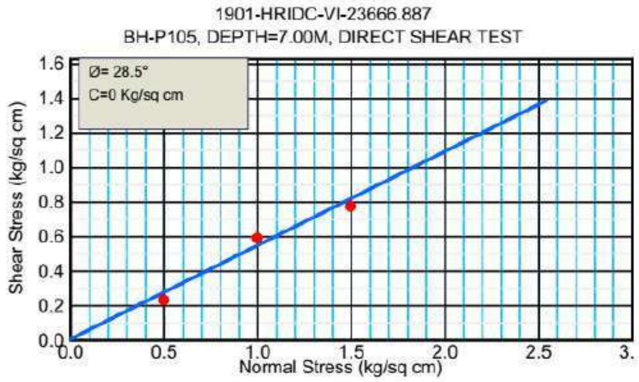


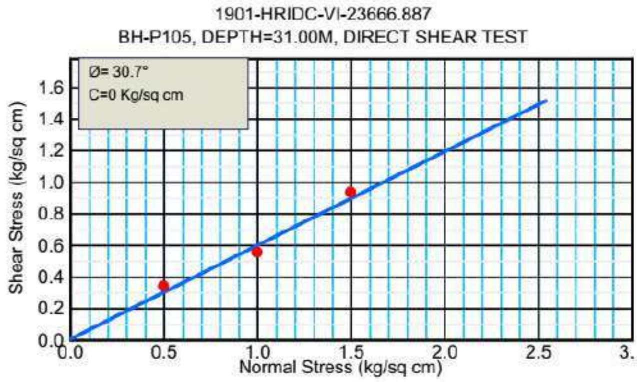




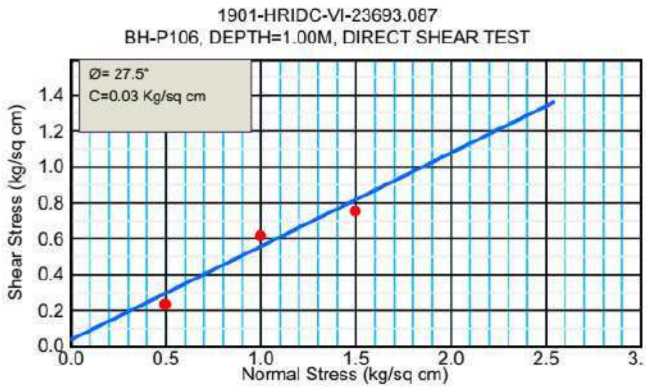


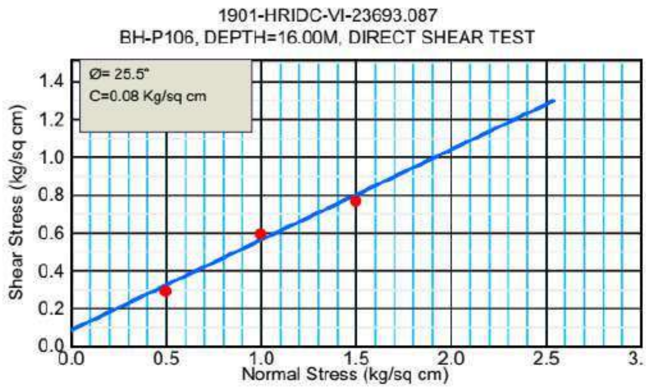


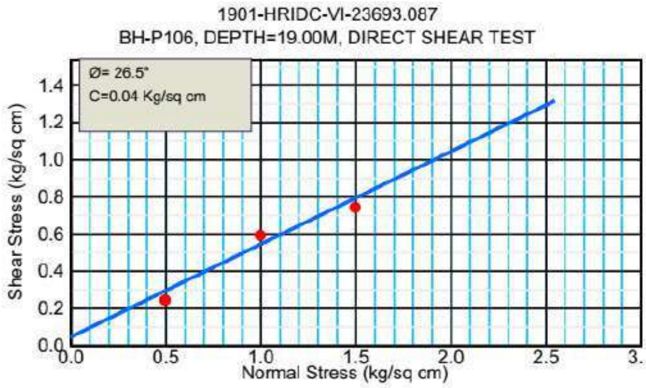


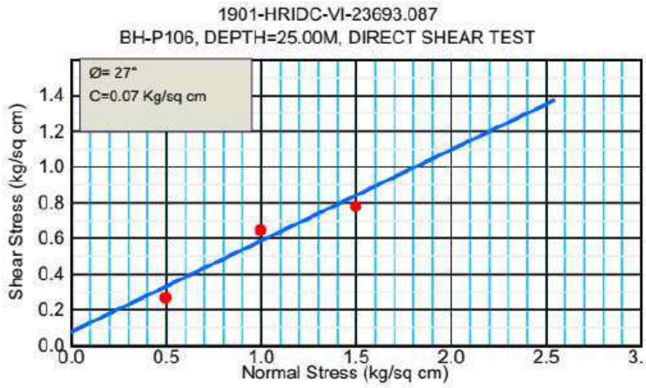


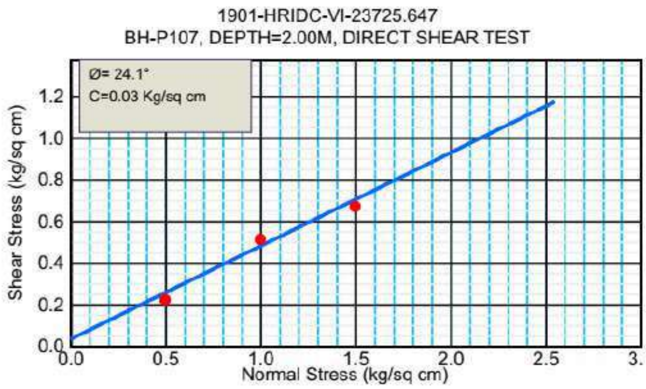
APPENDIX-F
GRAPH 4: DST GRAPH

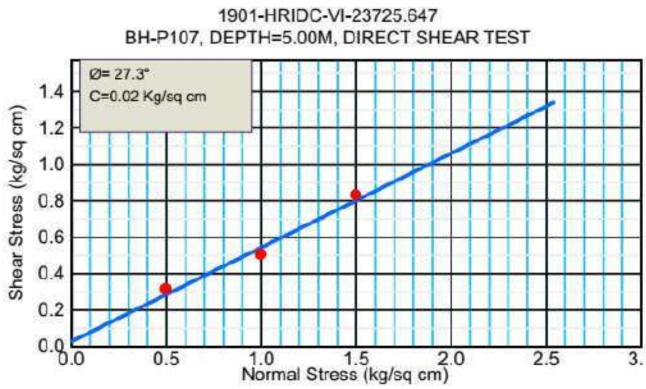


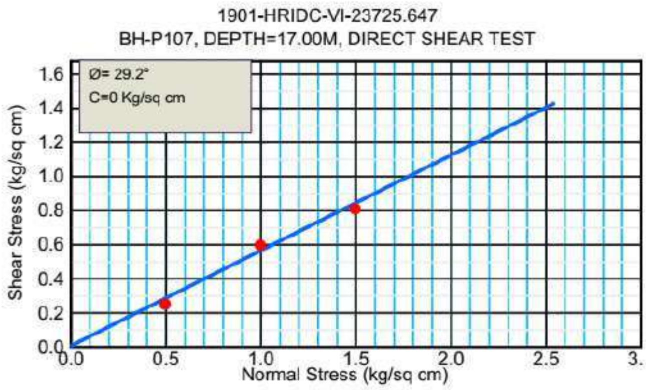


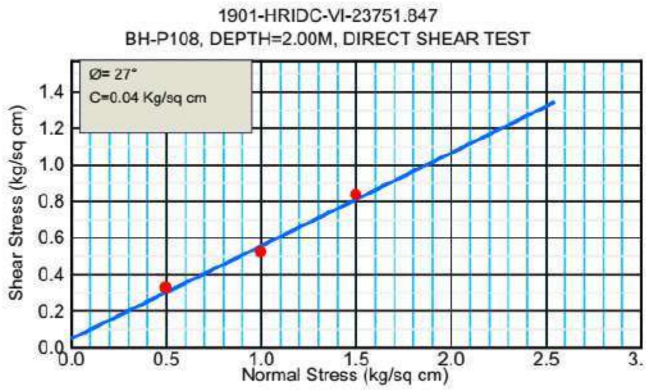




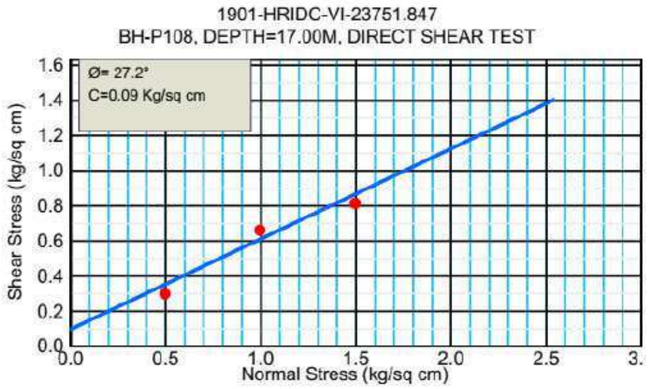


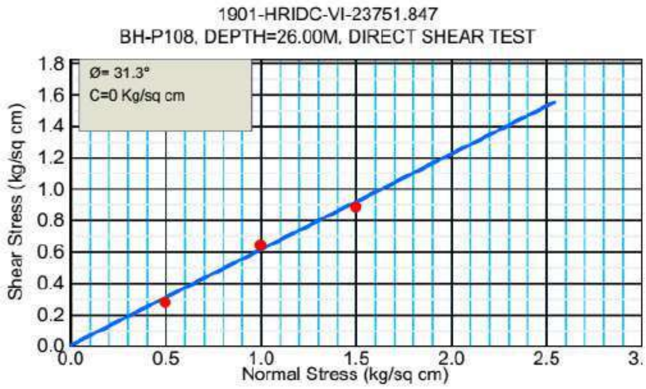


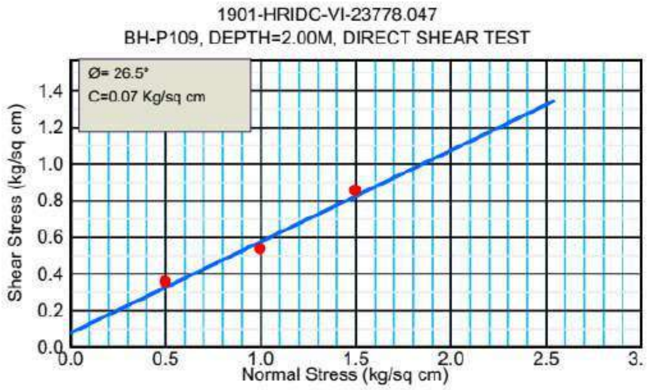


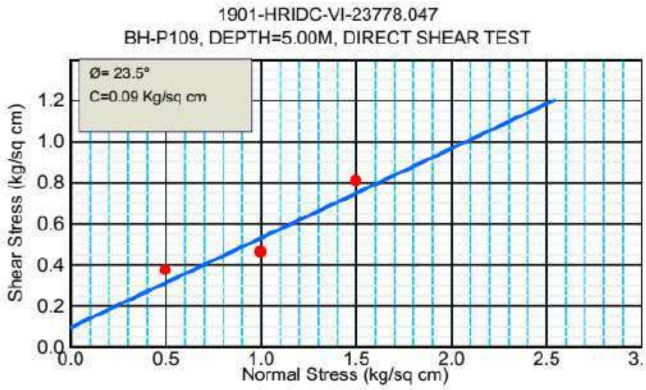


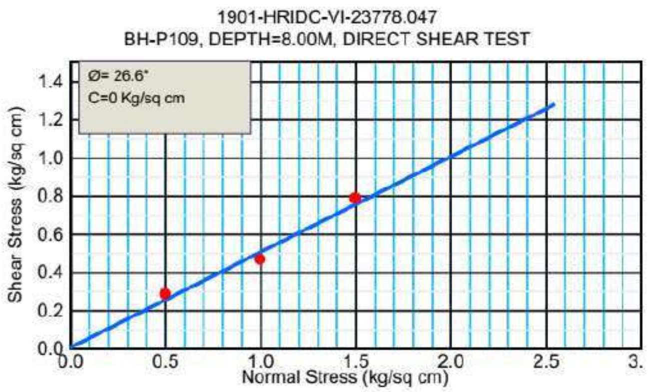
APPENDIX-F
GRAPH 5: DST GRAPH

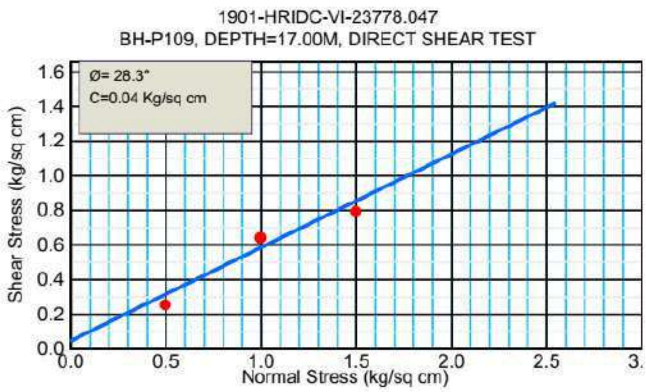


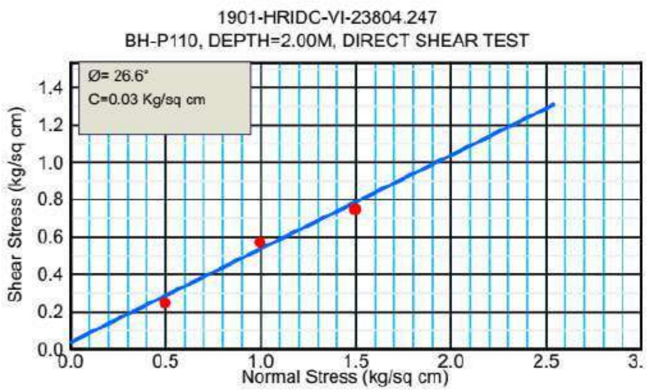


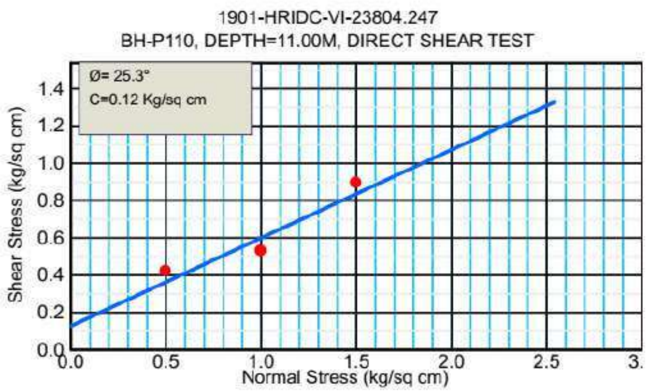




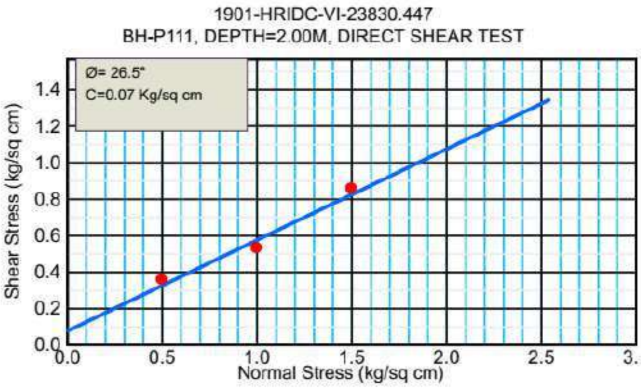


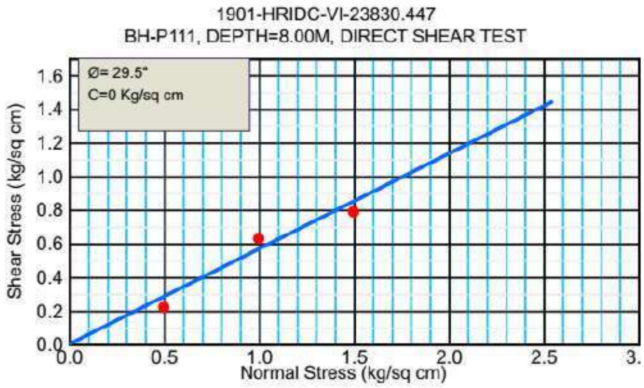


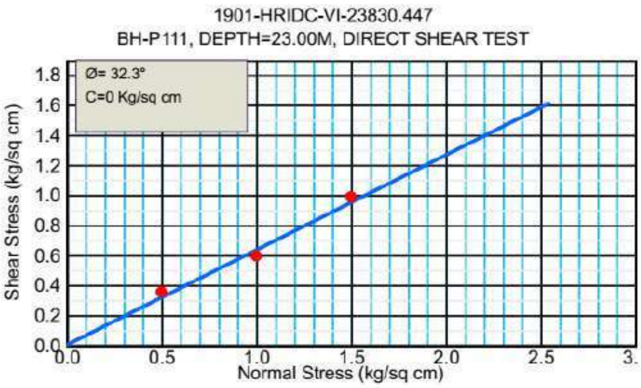


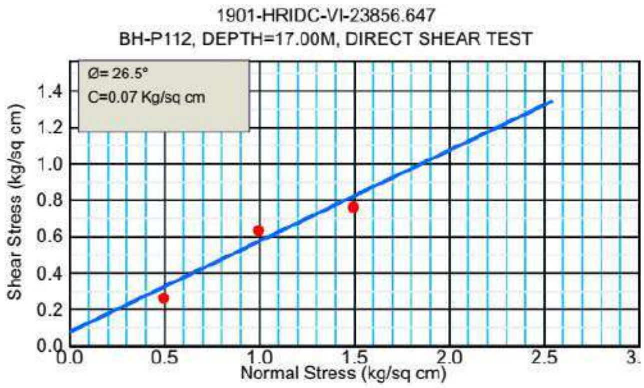


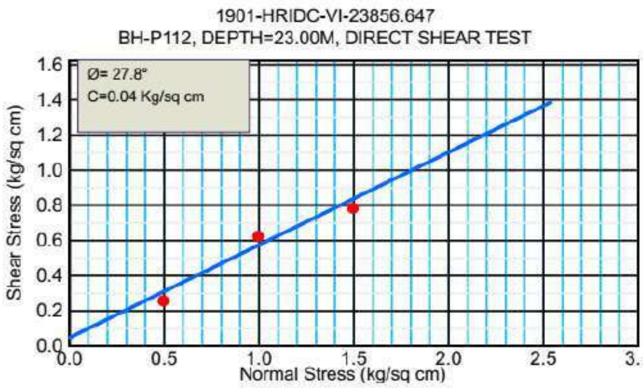
APPENDIX-F
GRAPH 6: DST GRAPH

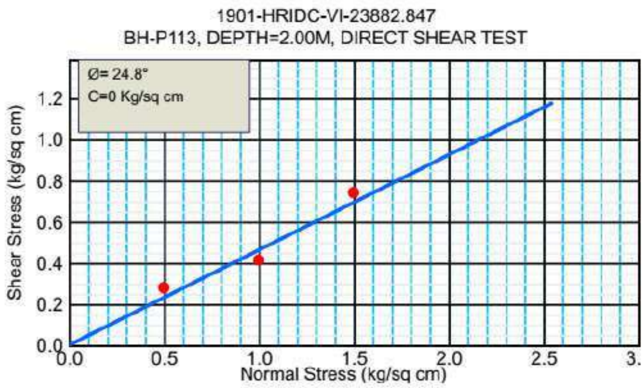


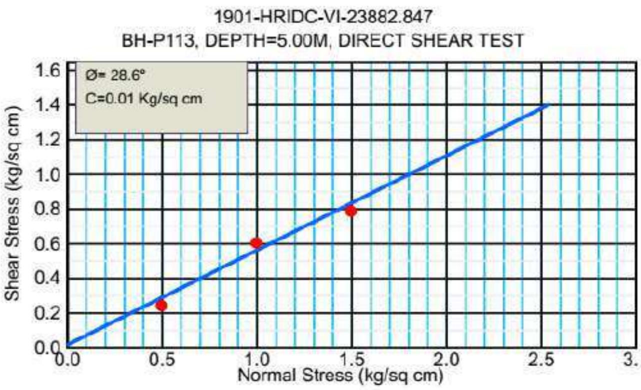






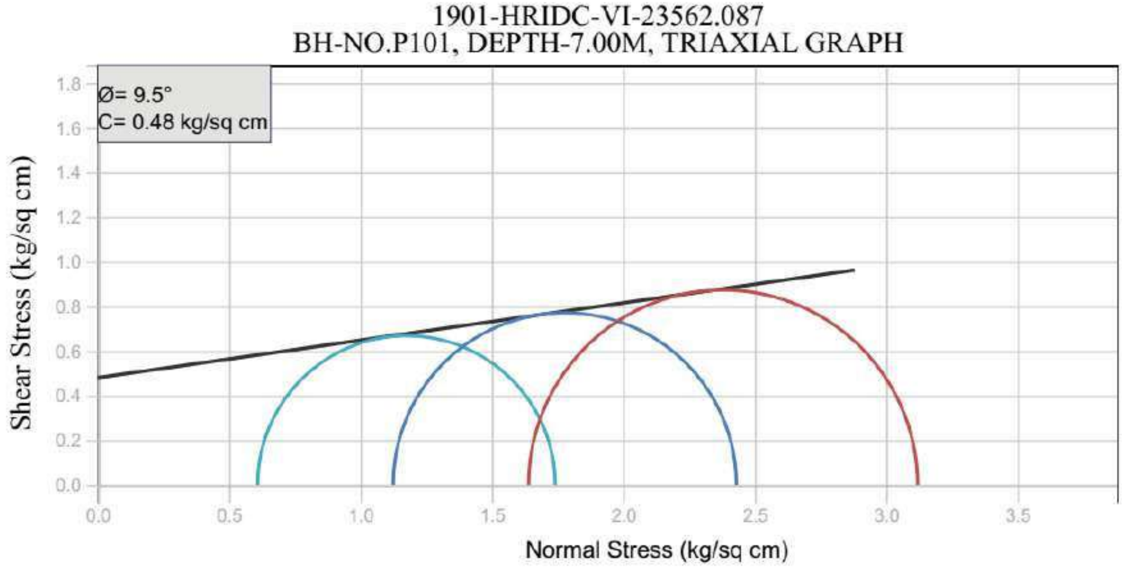


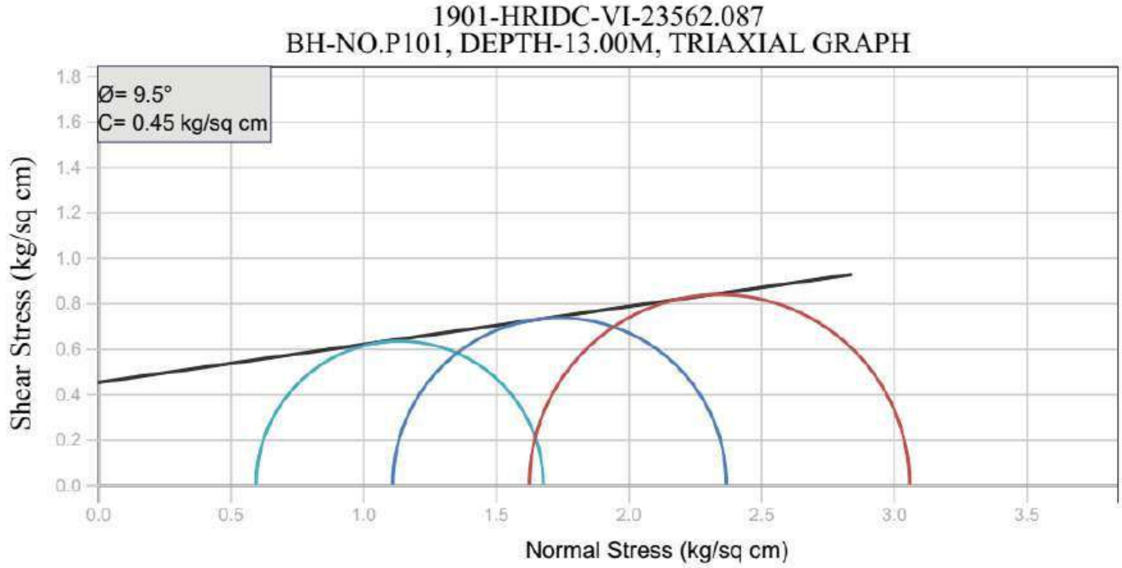




APPENDIX-G

GRAPH 1: UU GRAPH

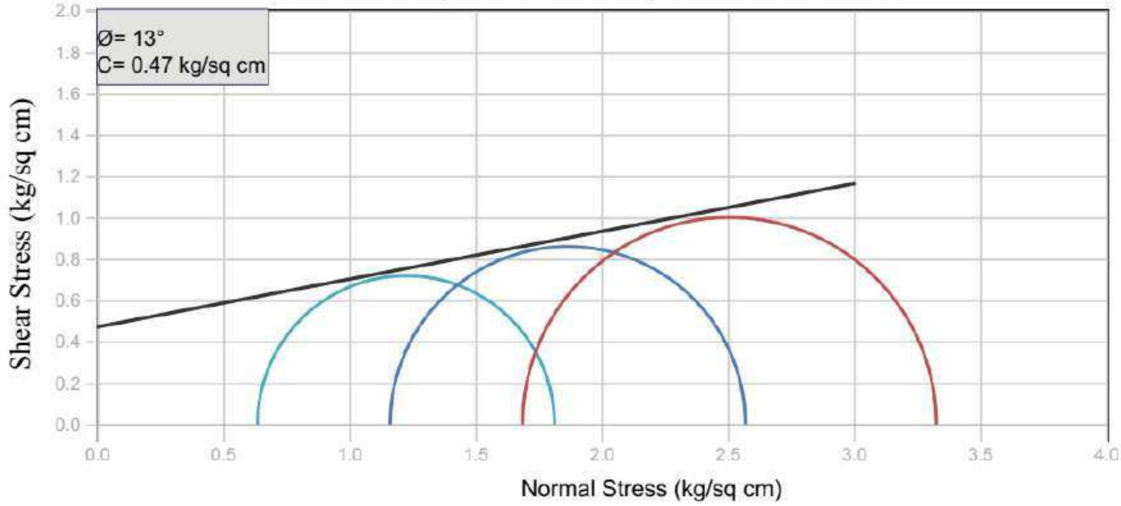




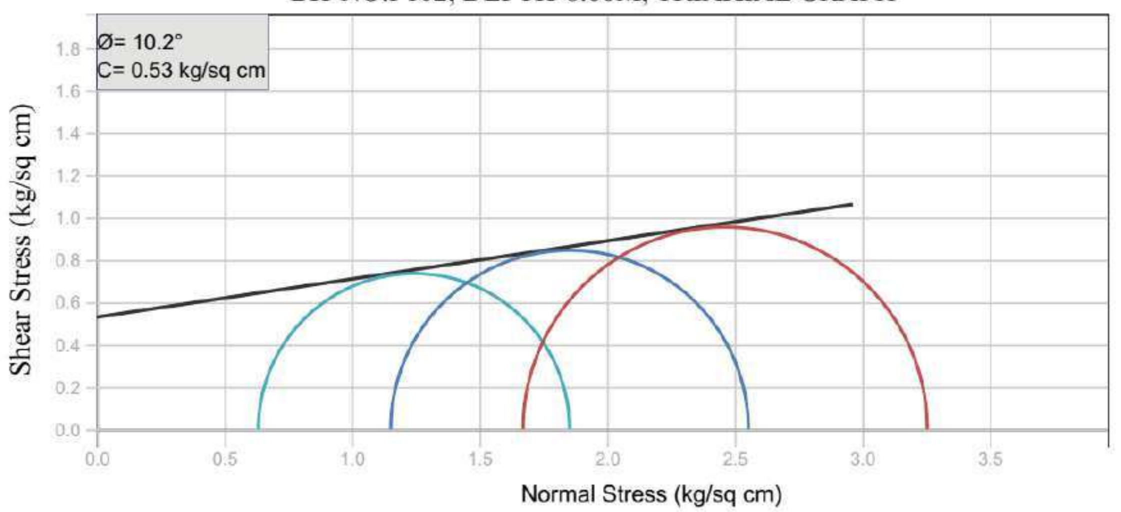
APPENDIX-G

GRAPH 2: UU GRAPH

1901-HRIDC-VI-23562.087
BH-NO.P101, DEPTH-22.00M, TRIAXIAL GRAPH



1901-HRIDC-VI-23588.287
BH-NO.P102, DEPTH-8.00M, TRIAXIAL GRAPH



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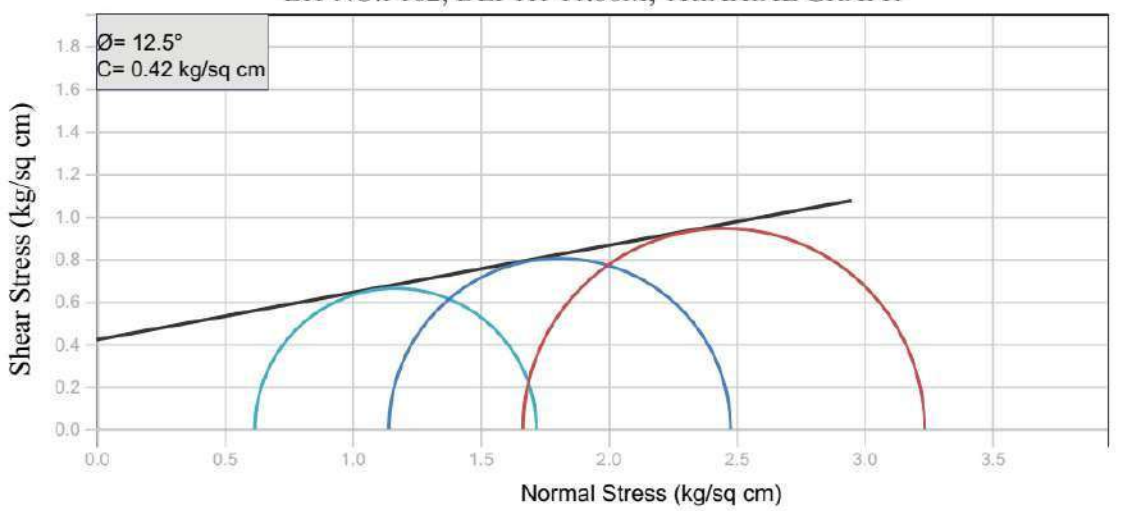
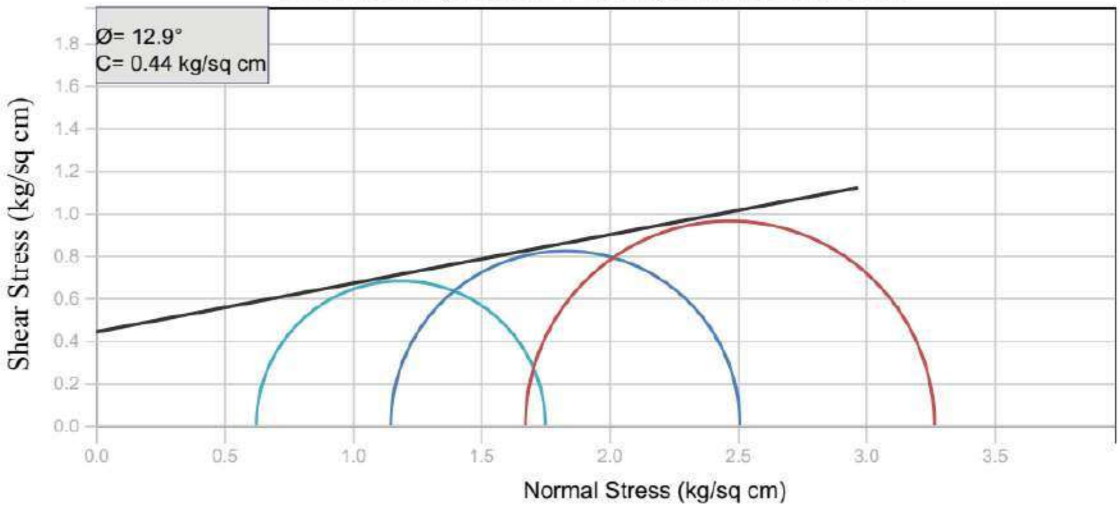
BH-NO.P102, DEPTH-11.00M, TRIAXIAL GRAPH

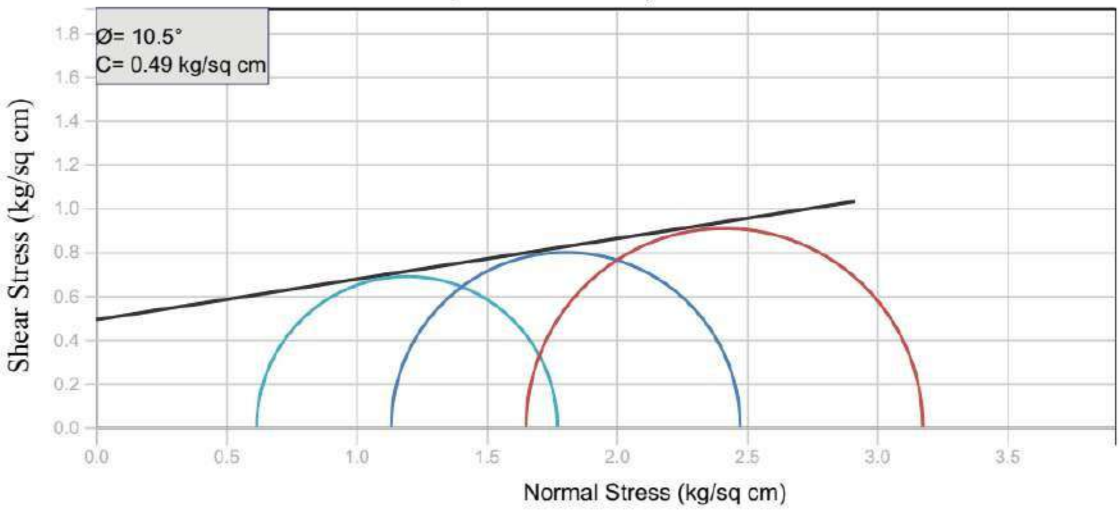


APPENDIX-G
GRAPH 3: UU GRAPH

1901-HRIDC-VI-23588.287
BH-NO.P102, DEPTH-14.00M, TRIAXIAL GRAPH



1901-HRIDC-VI-23614.487
BH-NO.P103, DEPTH-8.00M, TRIAXIAL GRAPH



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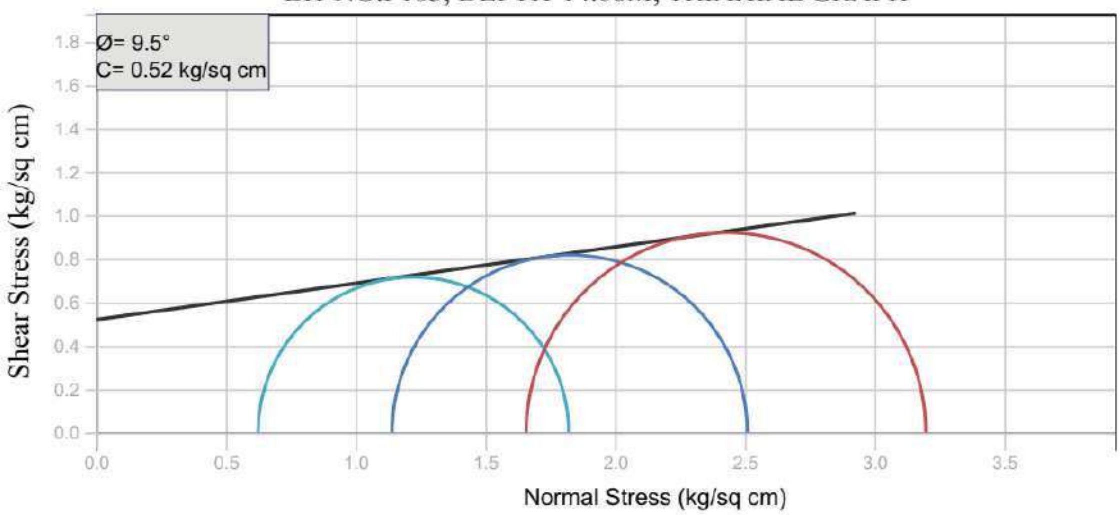
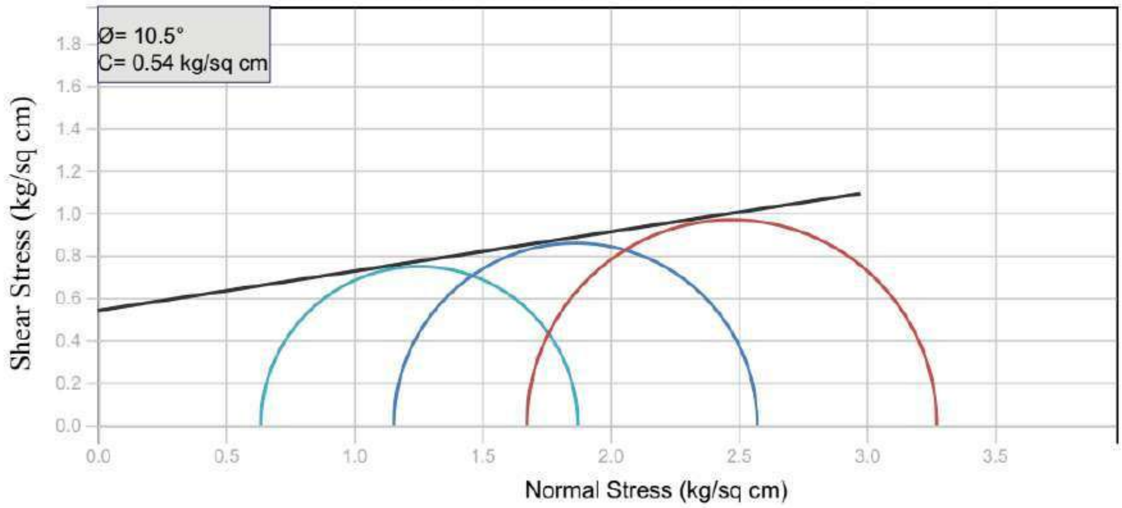


APPENDIX-G
GRAPH 4: UU GRAPH

1901-HRIDC-VI-23614.487
BH-NO.P103, DEPTH-17.00M, TRIAXIAL GRAPH



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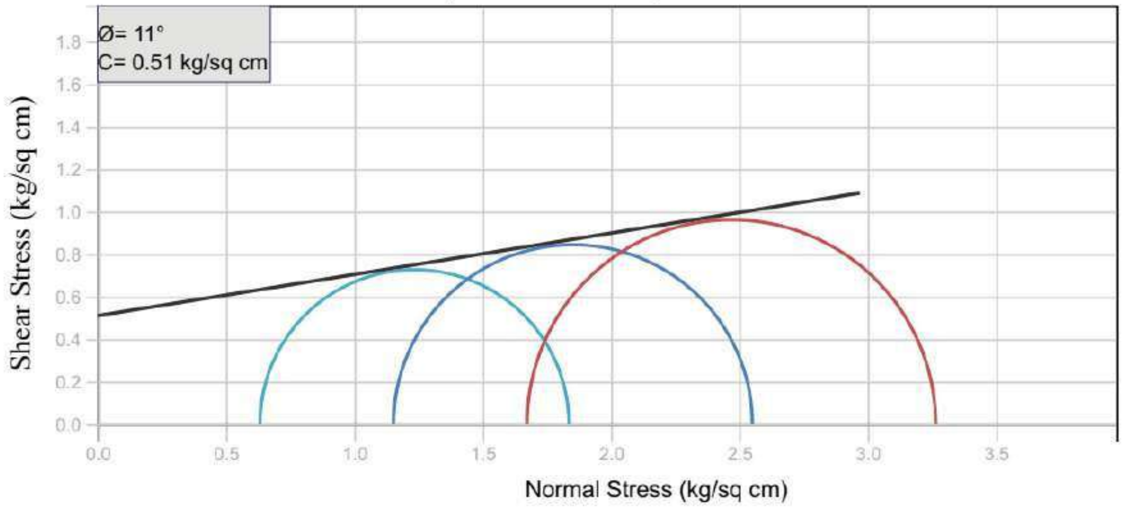
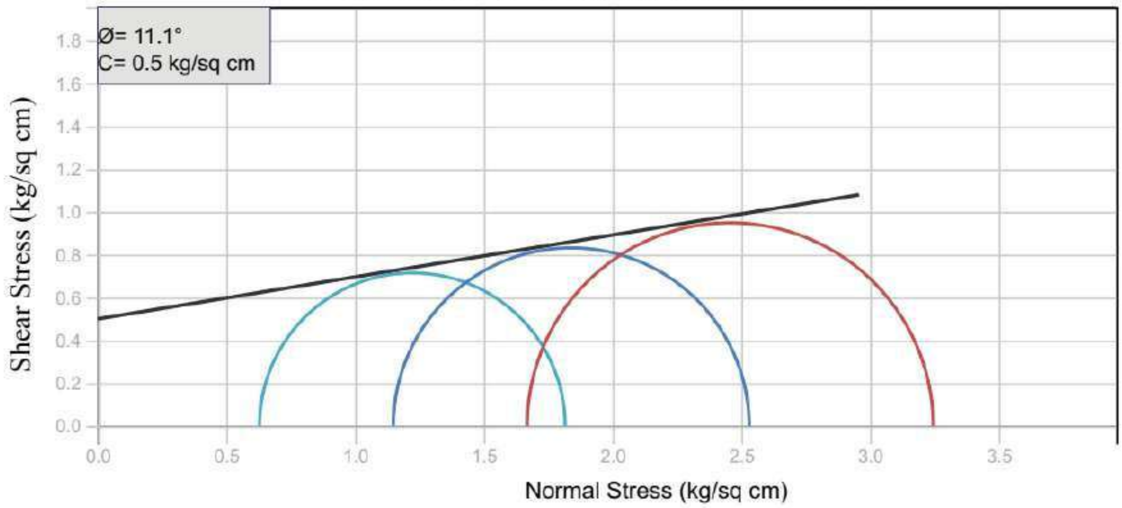
BH-NO.P103, DEPTH-20.00M, TRIAXIAL GRAPH

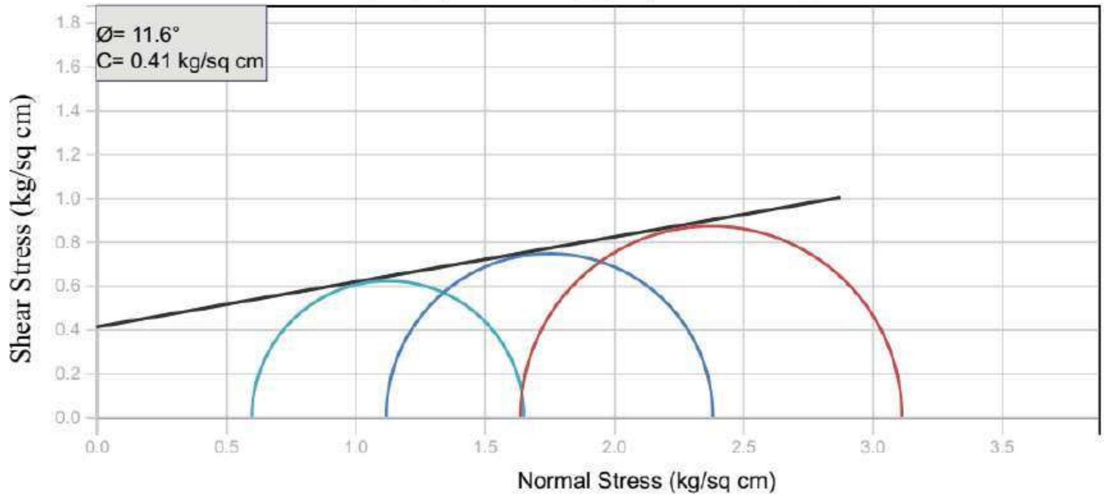


1901-HRIDC-VI-23640.687
BH-NO.P104, DEPTH-7.00M, TRIAXIAL GRAPH



APPENDIX-G
GRAPH 5: UU GRAPH

1901-HRIDC-VI-23640.687
BH-NO.P104, DEPTH-10.00M, TRIAXIAL GRAPH



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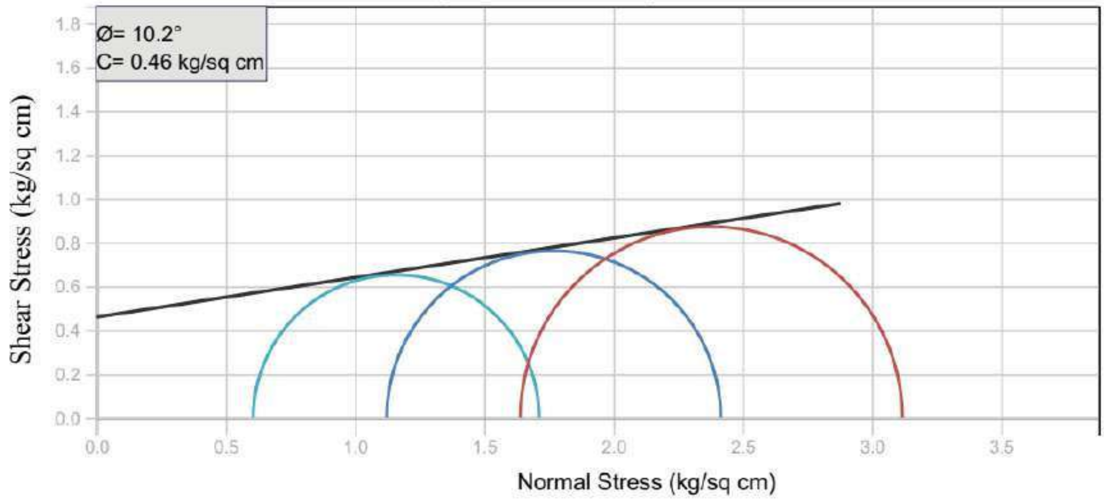
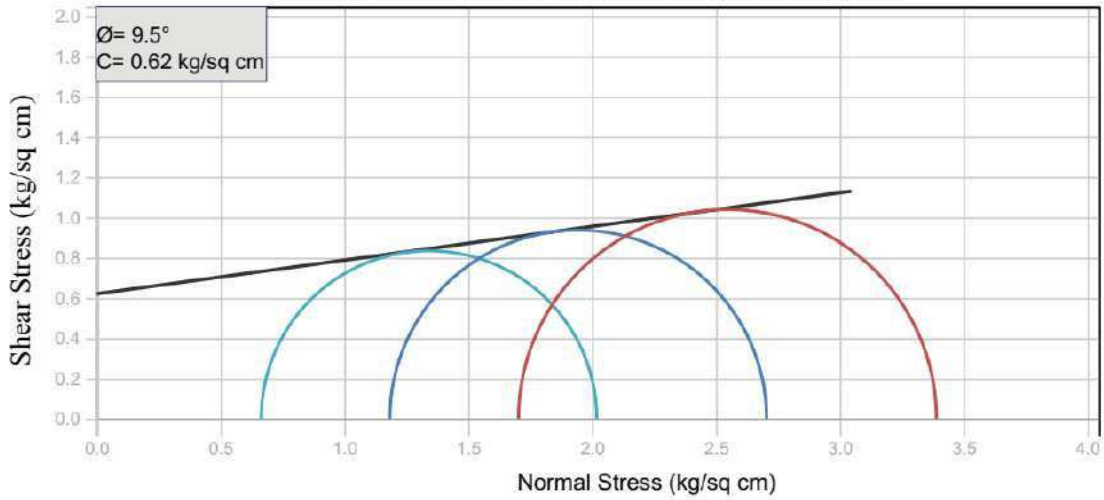
BH-NO.P105, DEPTH-10.00M, TRIAXIAL GRAPH

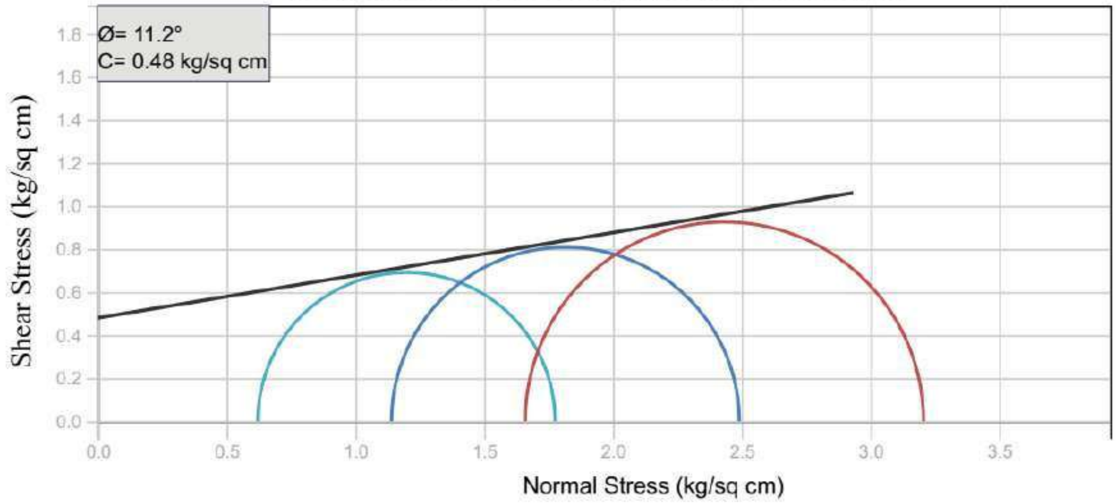


1901-HRIDC-VI-23666.887
BH-NO.P105, DEPTH-13.00M, TRIAXIAL GRAPH



APPENDIX-G
GRAPH 6: UU GRAPH

1901-HRIDC-VI-23666.887
BH-NO.P105, DEPTH-22.00M, TRIAXIAL GRAPH



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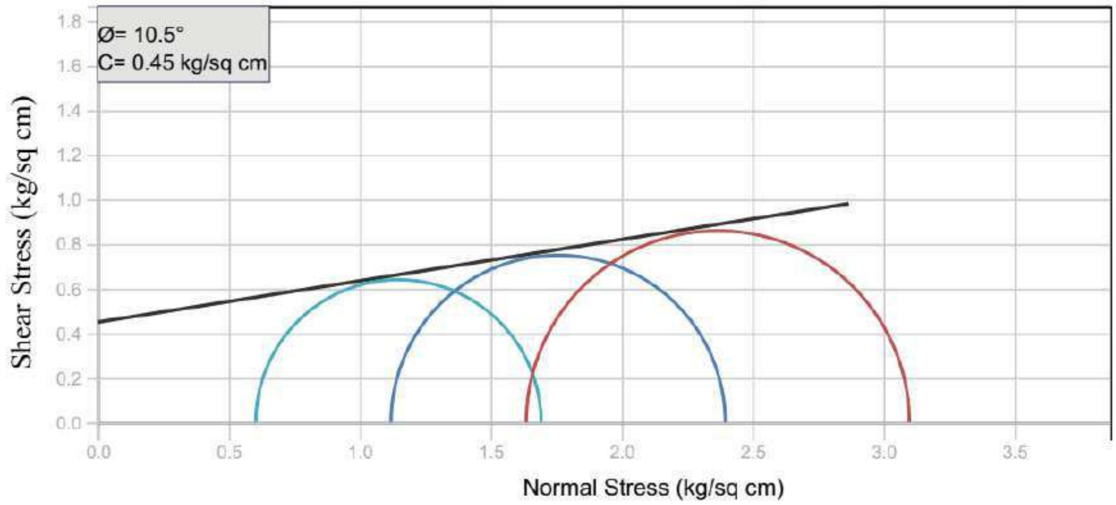
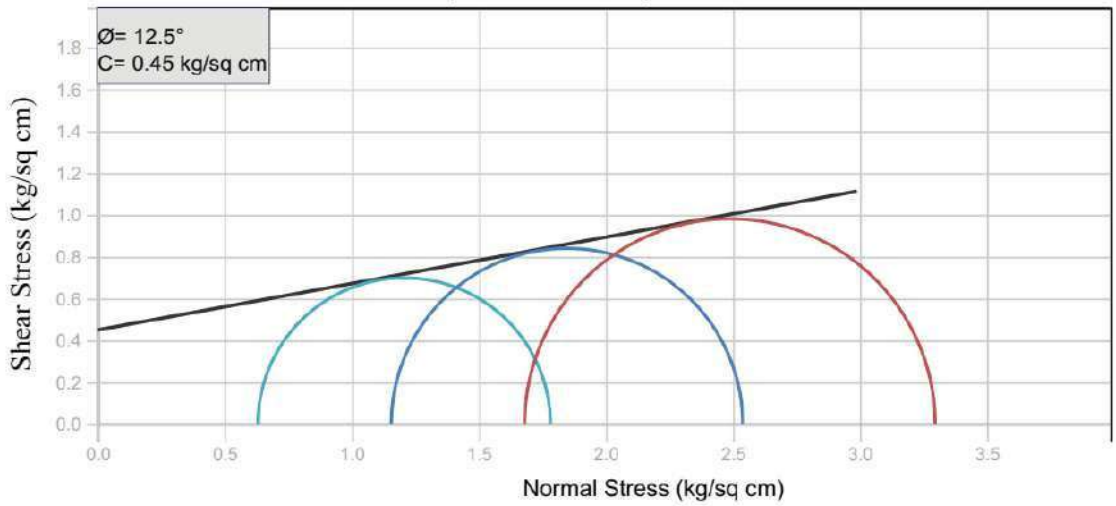
BH-NO.P105, DEPTH-25.00M, TRIAXIAL GRAPH

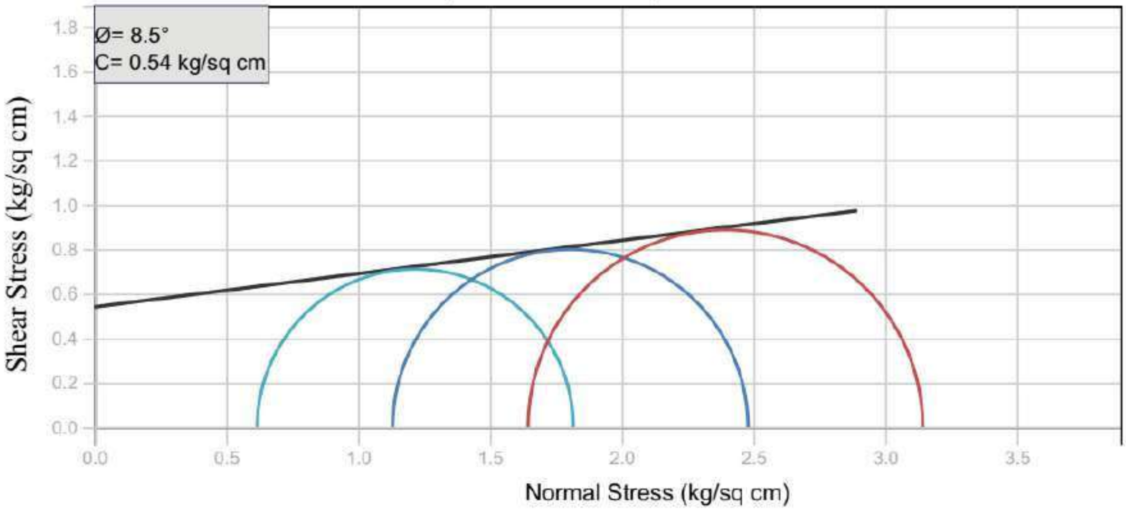


1901-HRIDC-VI-23693.087
BH-NO.P106, DEPTH-4.00M, TRIAXIAL GRAPH



APPENDIX-G
GRAPH 7: UU GRAPH

1901-HRIDC-VI-23693.087
BH-NO.P106, DEPTH-10.00M, TRIAXIAL GRAPH



1901-HRIDC-VI-23693.087
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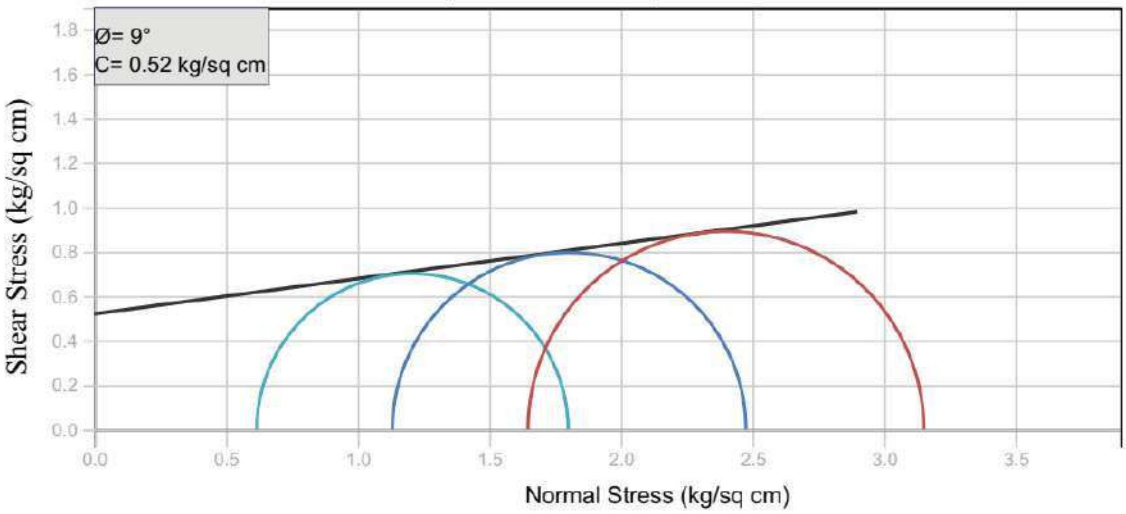
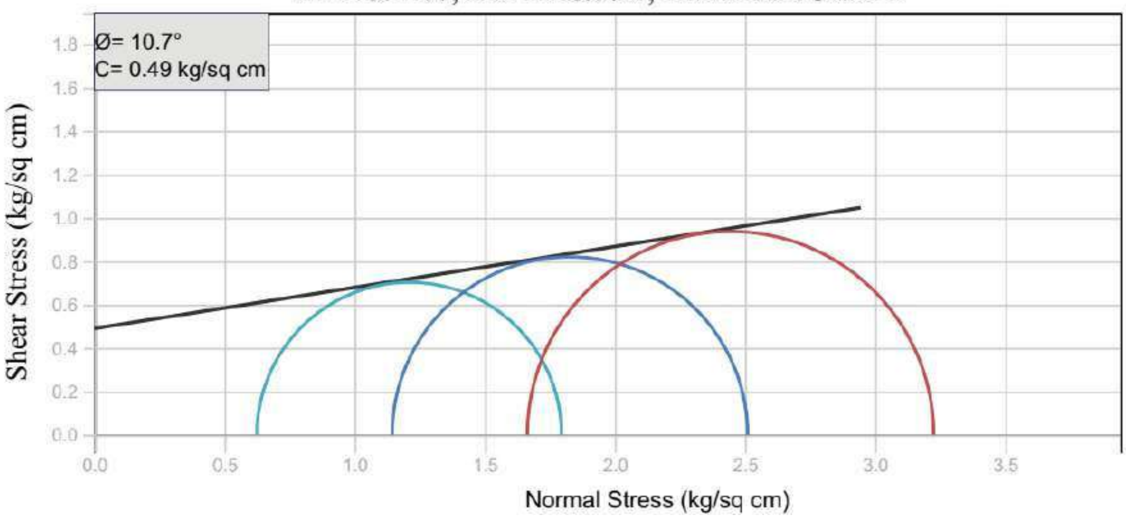


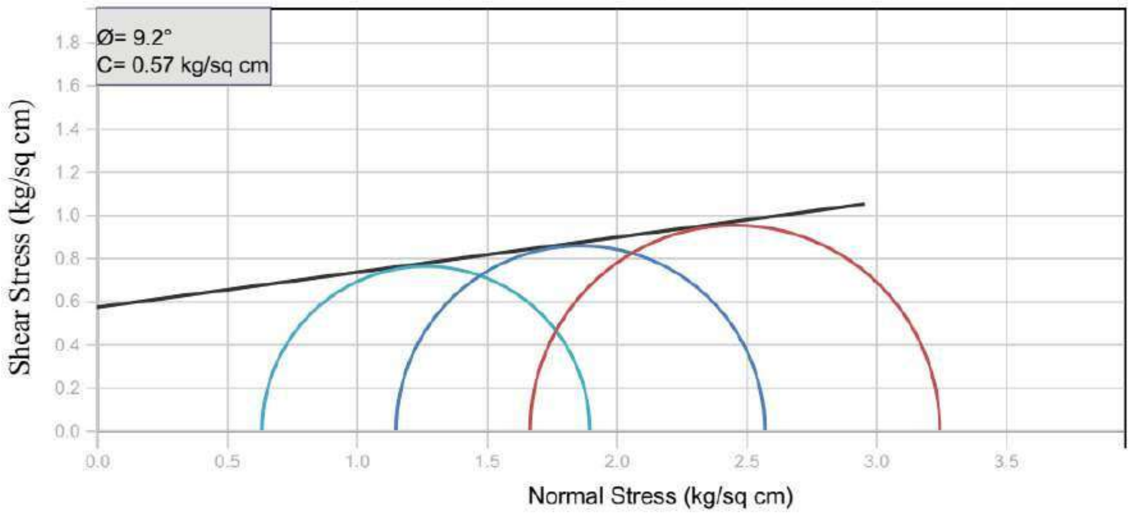
1901-HRIDC-VI-23725.647
BH-NO.P107, DEPTH-8.00M, TRIAXIAL GRAPH



APPENDIX-G

GRAPH 8: UU GRAPH

1901-HRIDC-VI-23725.647
BH-NO.P107, DEPTH-11.00M, TRIAXIAL GRAPH



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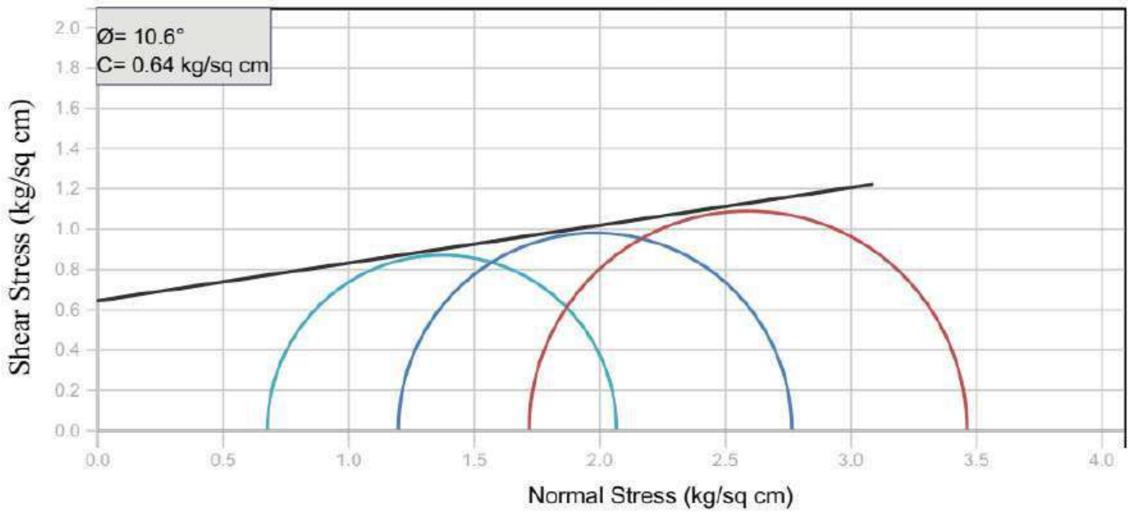
BH-NO.P107, DEPTH-20.00M, TRIAXIAL GRAPH



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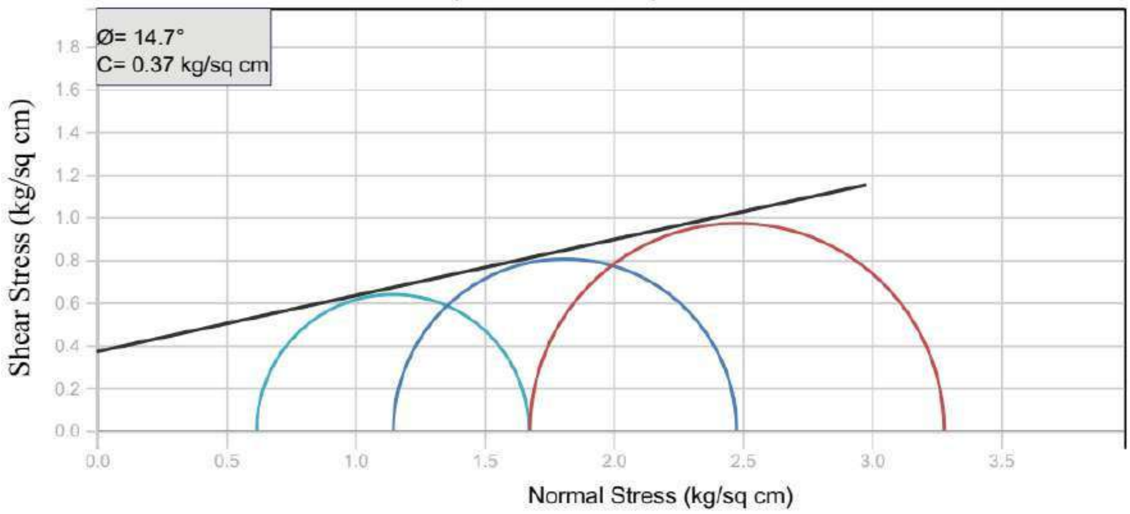
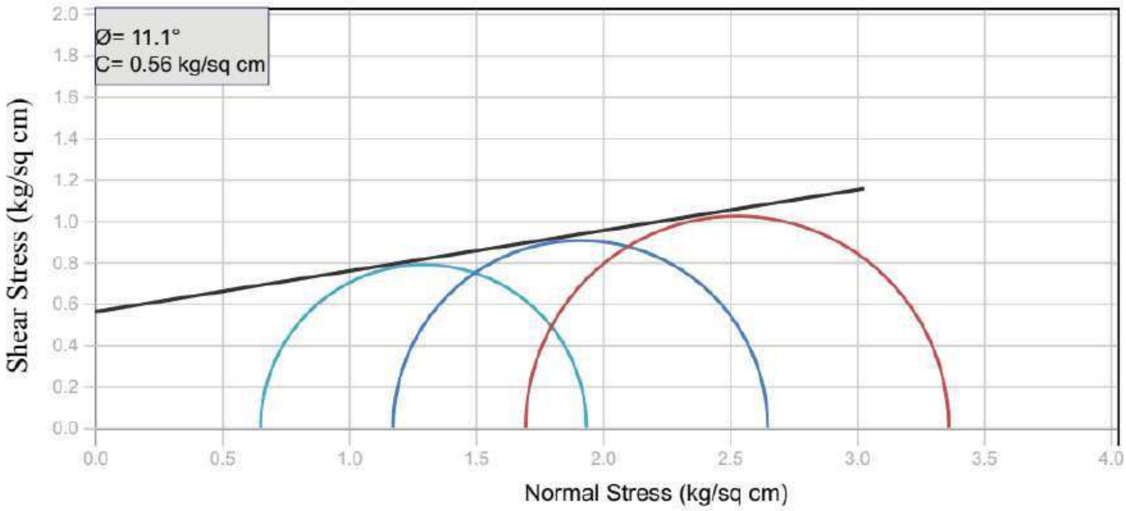
BH-NO.P108, DEPTH-5.00M, TRIAXIAL GRAPH



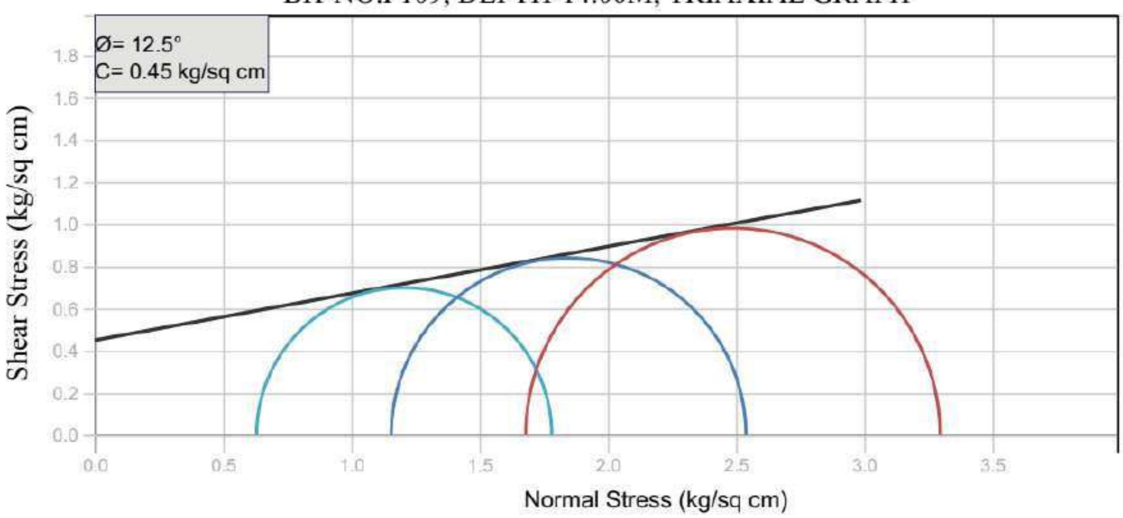
APPENDIX-G
GRAPH 9: UU GRAPH

1901-HRIDC-VI-23751.847
BH-NO.P108, DEPTH-8.00M, TRIAXIAL GRAPH



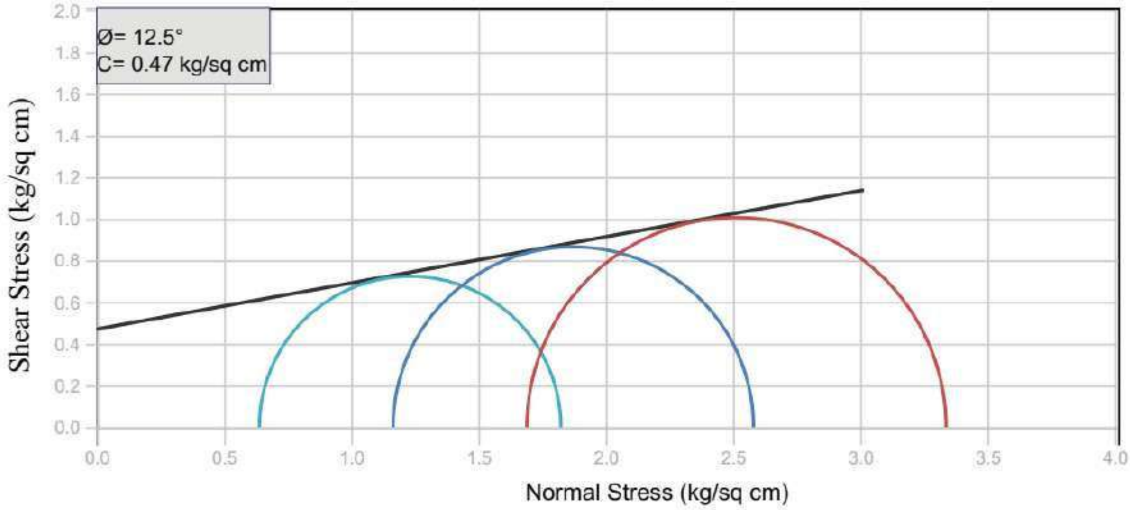
1901-HRIDC-VI-23751.847
BH-NO.P108, DEPTH-11.00M, TRIAXIAL GRAPH

1901-HRIDC-VI-23778.047
BH-NO.P109, DEPTH-14.00M, TRIAXIAL GRAPH

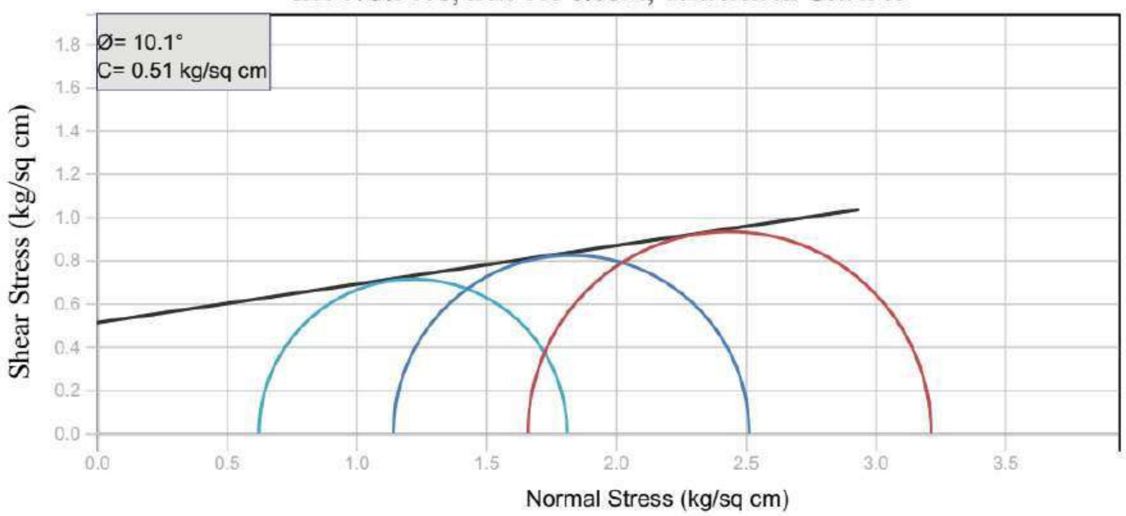


APPENDIX-G
GRAPH 10: UU GRAPH

1901-HRIDC-VI-23804.247
BH-NO.P110, DEPTH-5.00M, TRIAXIAL GRAPH



1901-HRIDC-VI-23804.247
BH-NO.P110, DEPTH-8.00M, TRIAXIAL GRAPH



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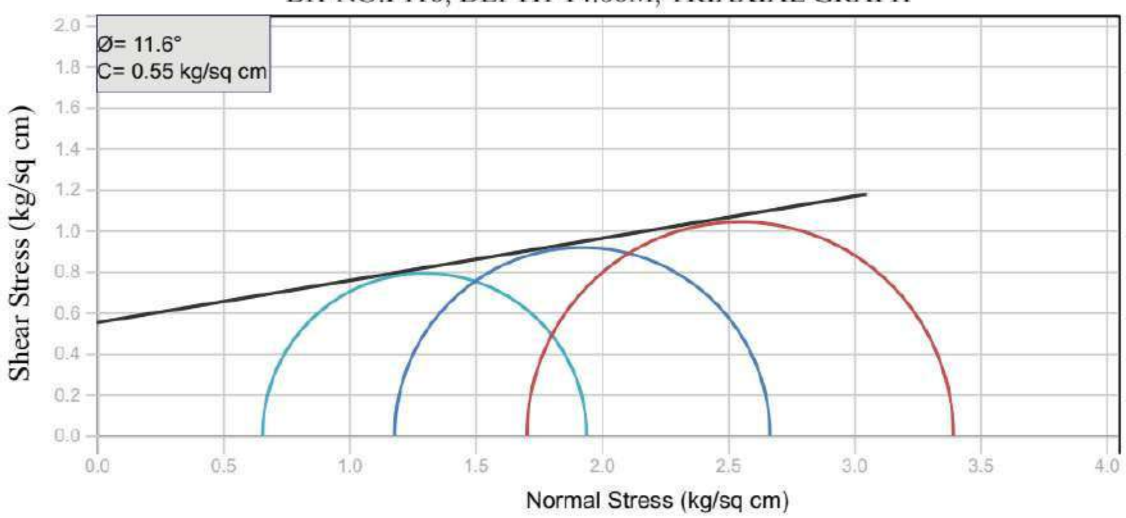
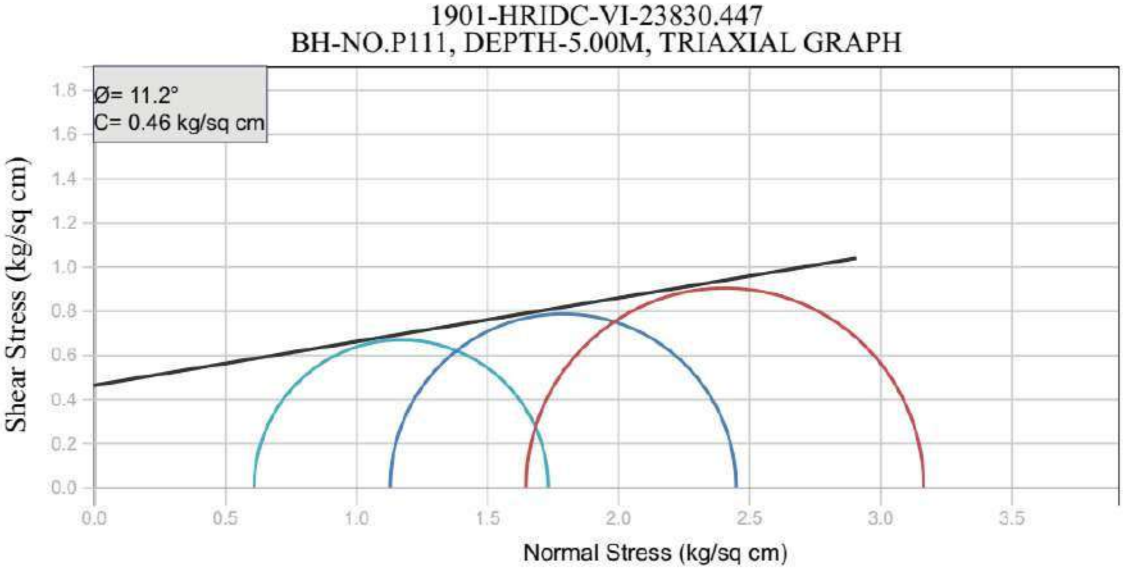
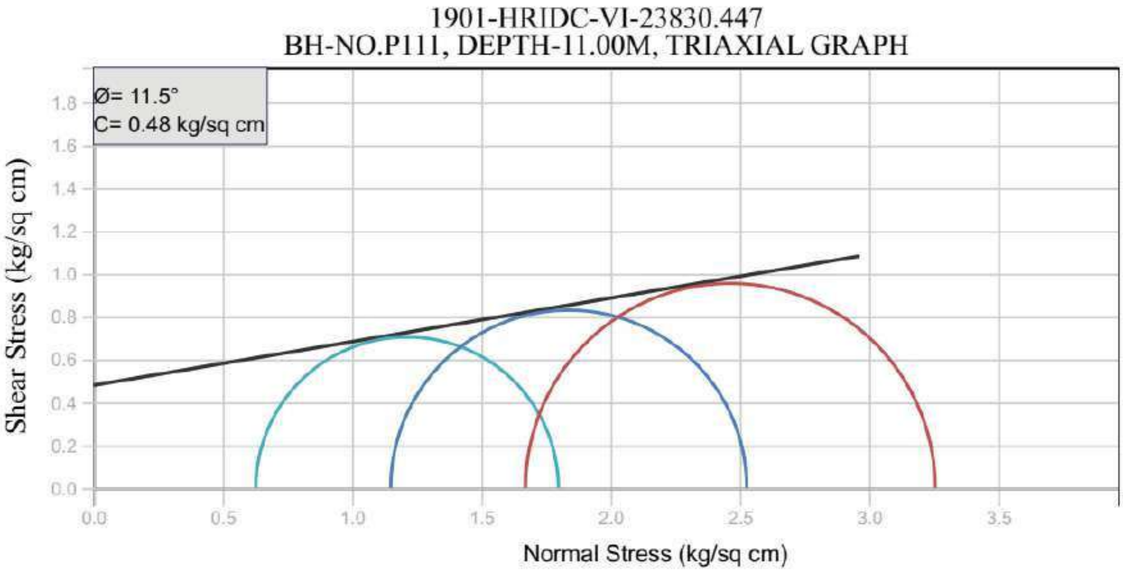
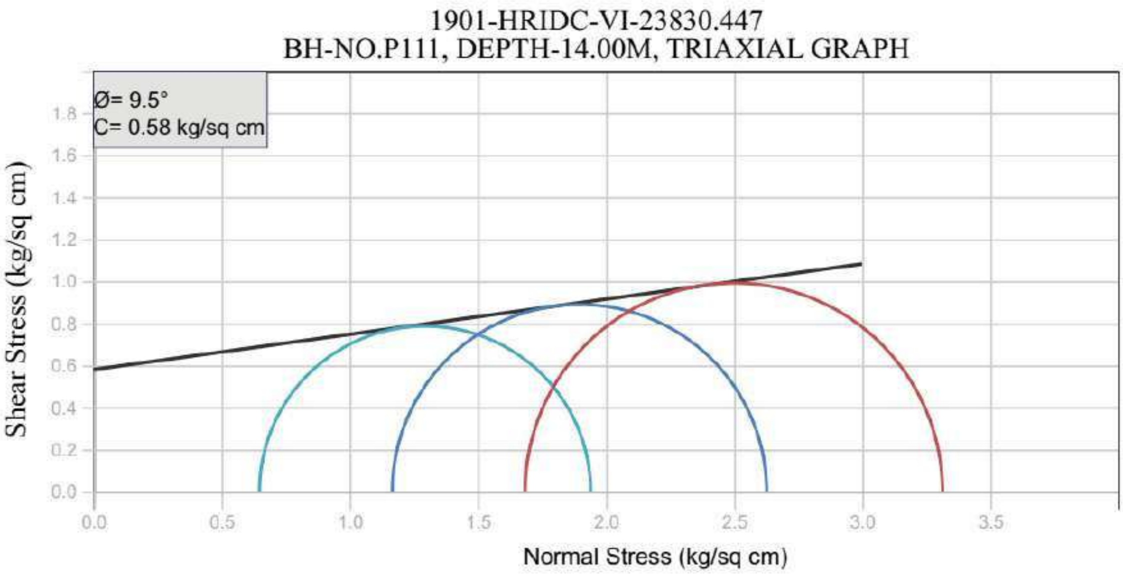


APPENDIX-G
GRAPH 11: UU GRAPH

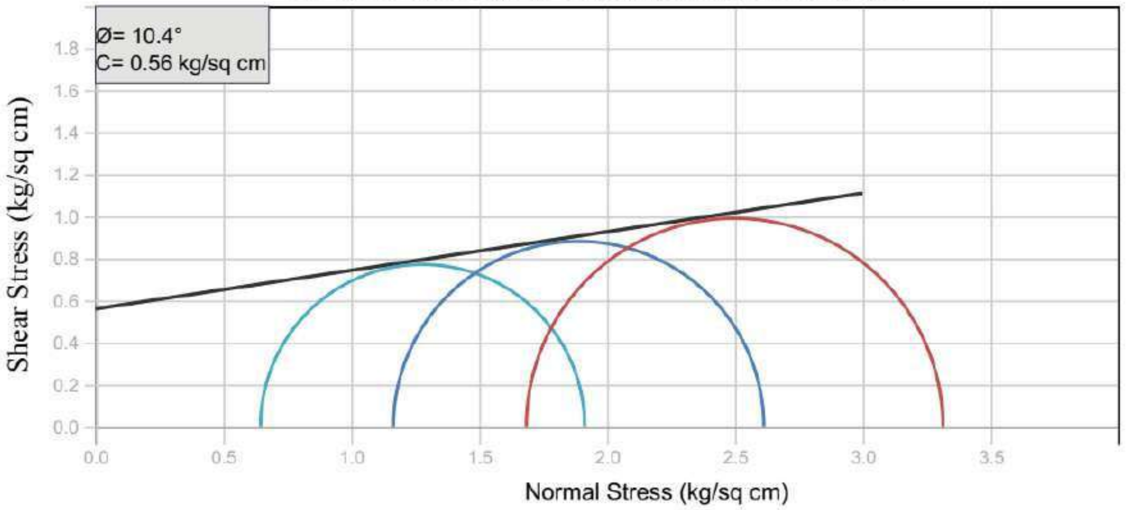




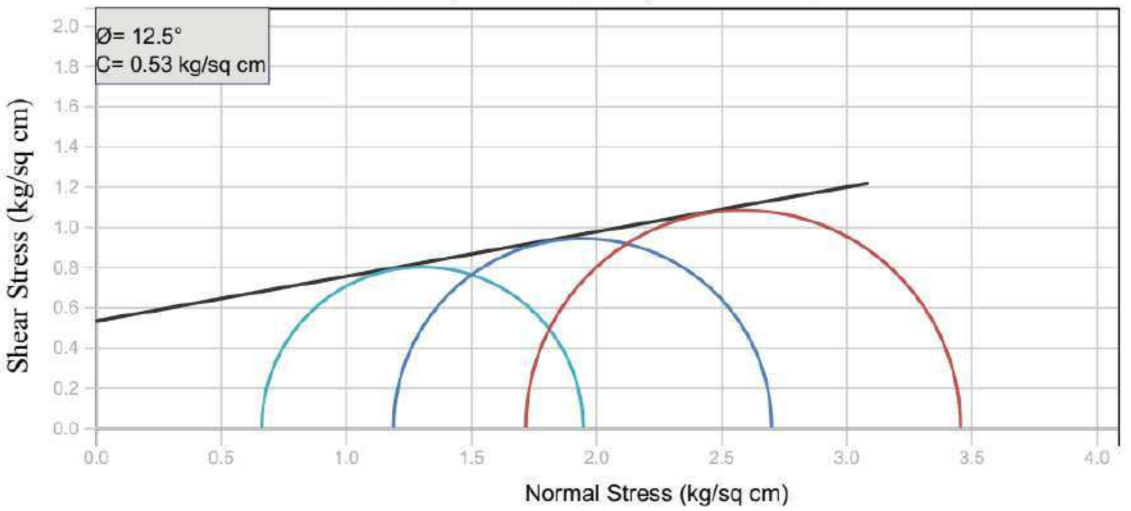


APPENDIX-G
GRAPH 12: UU GRAPH

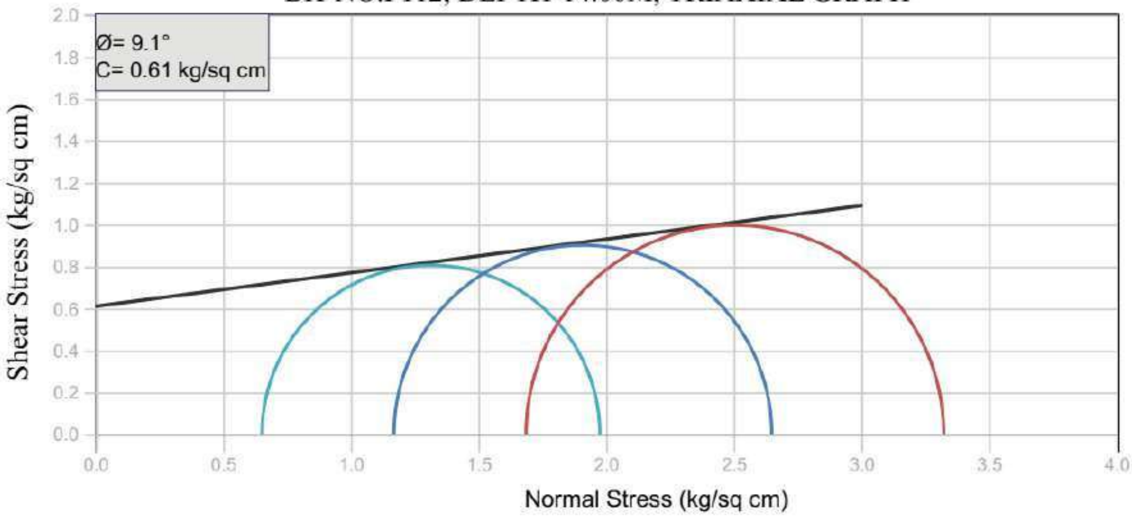
1901-HRIDC-VI-23830.447
BH-NO.P111, DEPTH-17.00M, TRIAXIAL GRAPH



1901-HRIDC-VI-23856.647
BH-NO.P112, DEPTH-8.00M, TRIAXIAL GRAPH

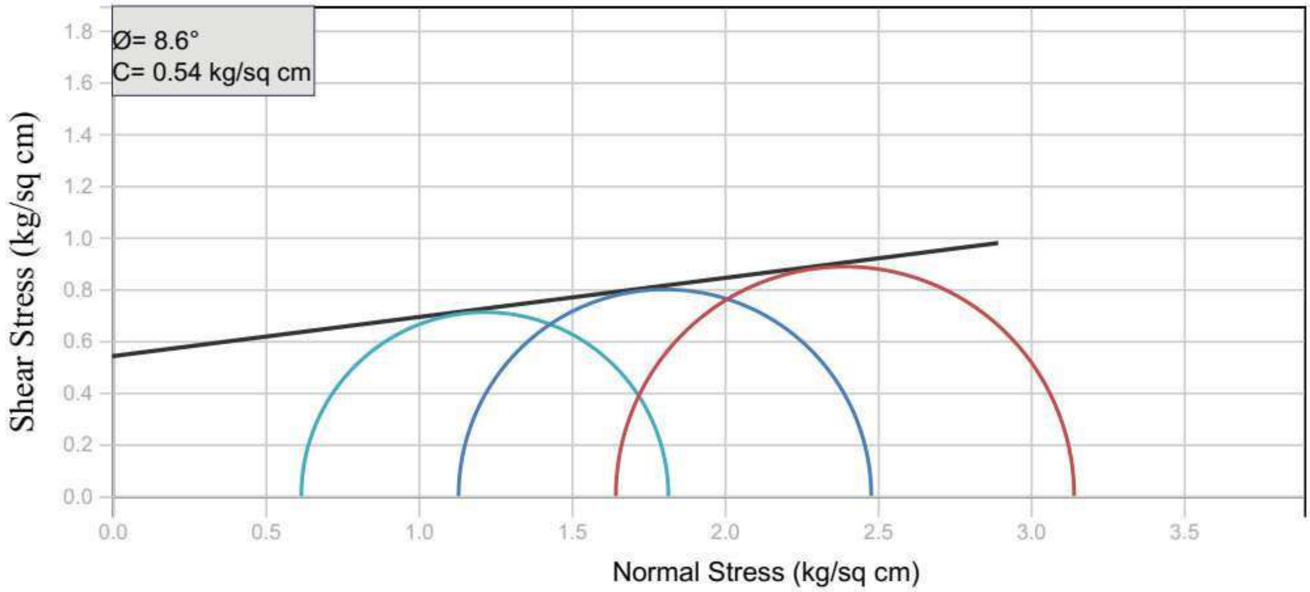


1901-HRIDC-VI-23856.647
BH-NO.P112, DEPTH-14.00M, TRIAXIAL GRAPH

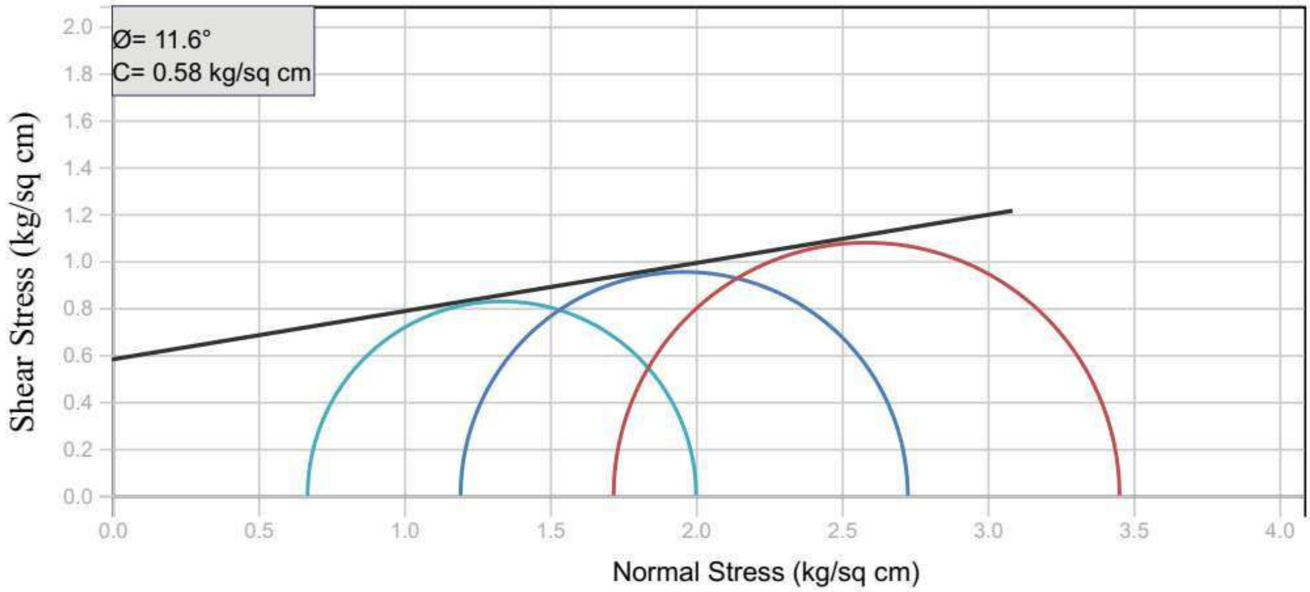


APPENDIX-G
GRAPH 13: UU GRAPH

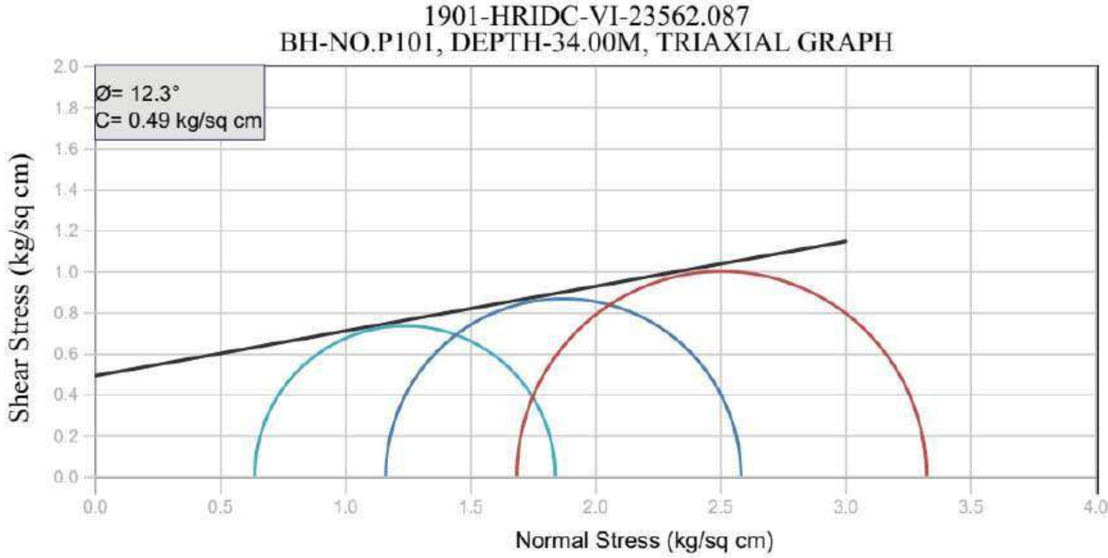
1901-HRIDC-VI-23882.847
BH-NO.P113, DEPTH-8.00M, TRIAXIAL GRAPH

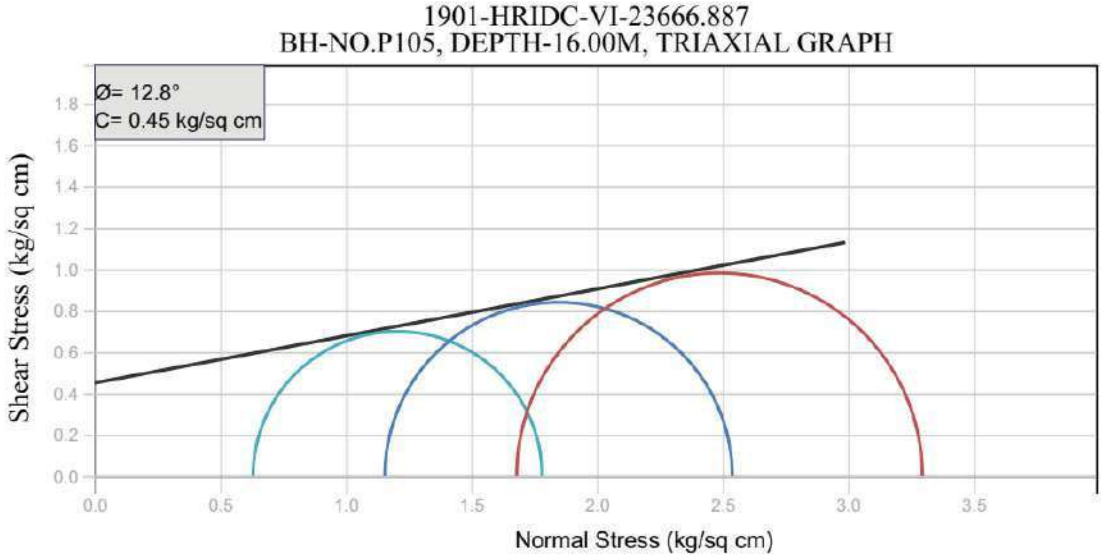


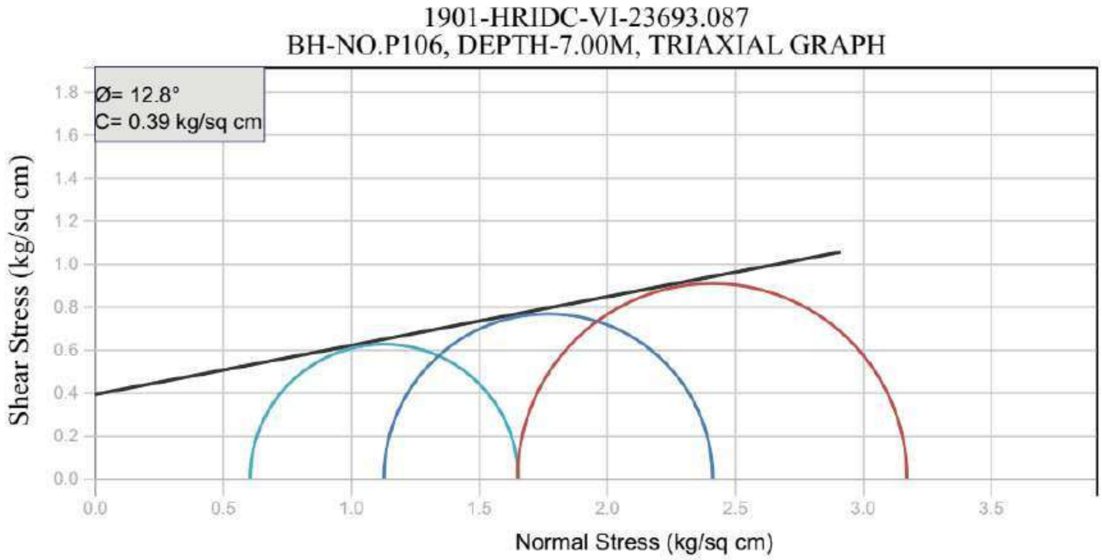
1901-HRIDC-VI-23882.847
BH-NO.P113, DEPTH-17.00M, TRIAXIAL GRAPH



APPENDIX-G
GRAPH 14: RUU GRAPH

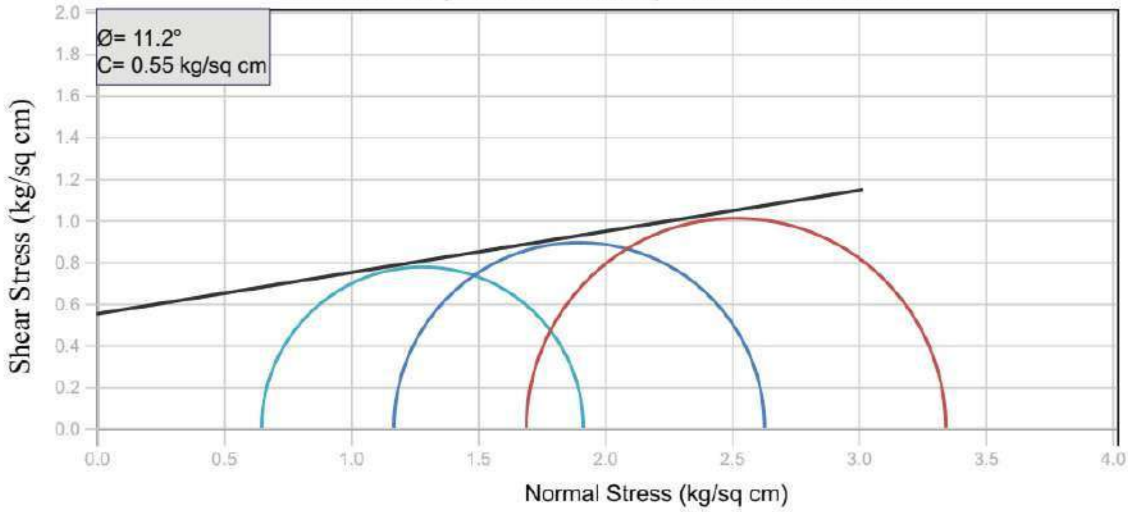




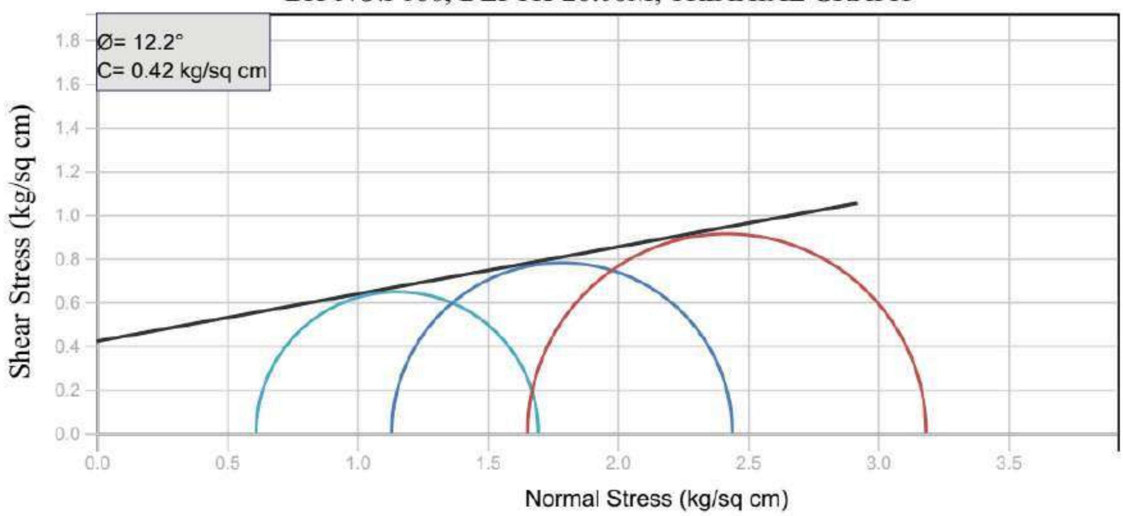


APPENDIX-G
GRAPH 15: RUU GRAPH

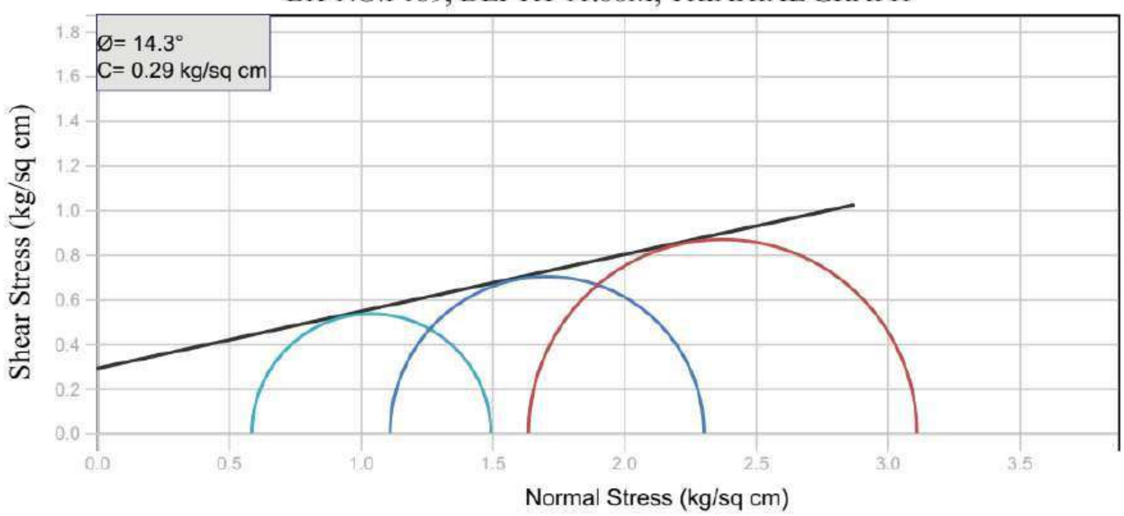
1901-HRIDC-VI-23693.087
BH-NO.P106, DEPTH-34.00M, TRIAXIAL GRAPH



1901-HRIDC-VI-23751.847
BH-NO.P108, DEPTH-20.00M, TRIAXIAL GRAPH

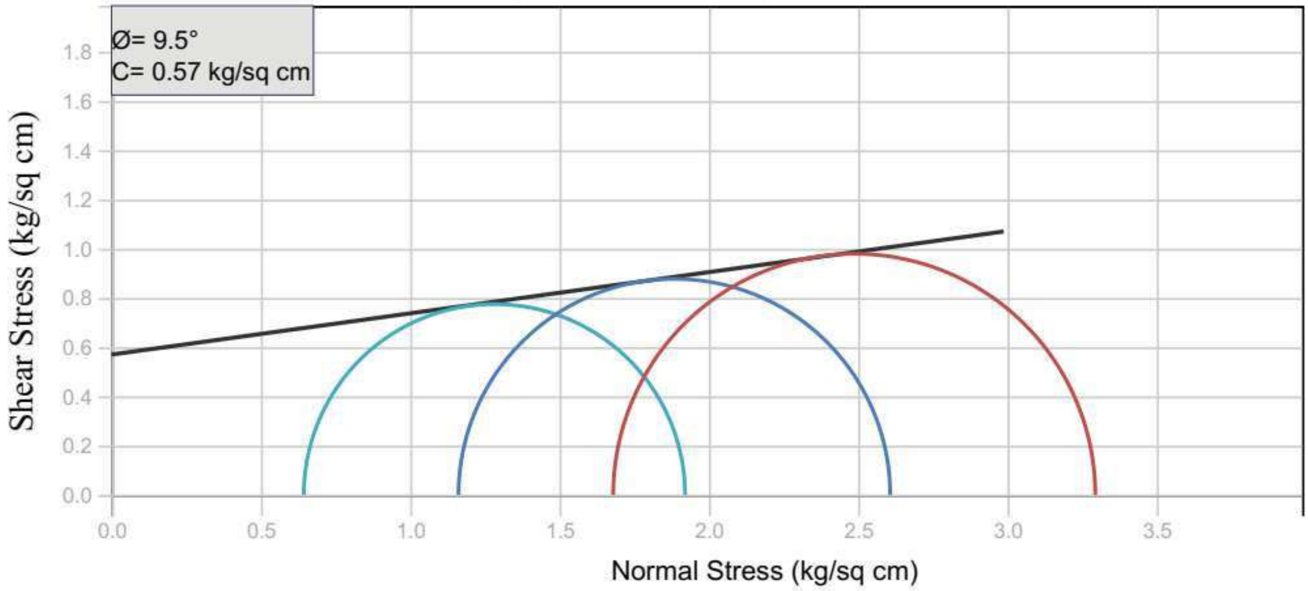


1901-HRIDC-VI-23778.047
BH-NO.P109, DEPTH-11.00M, TRIAXIAL GRAPH

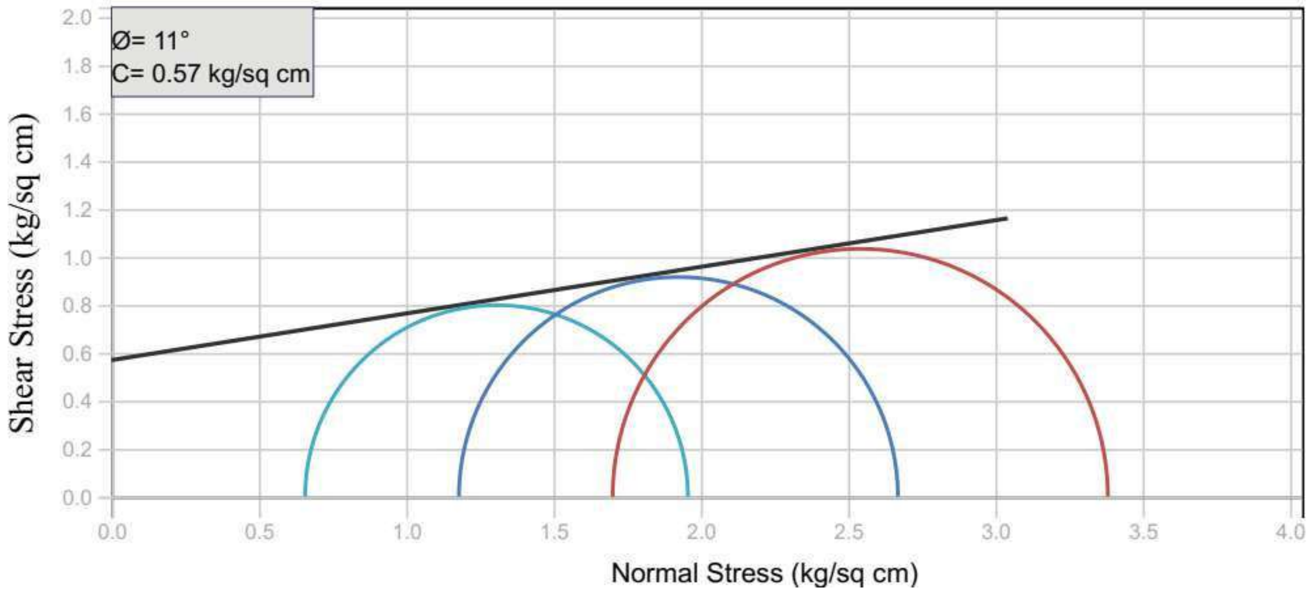


APPENDIX-G
GRAPH 16: RUU GRAPH

1901-HRIDC-VI-23856.647
BH-NO.P112, DEPTH-11.00M, TRIAXIAL GRAPH



1901-HRIDC-VI-23882.847
BH-NO.P113, DEPTH-14.00M, TRIAXIAL GRAPH



APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 0.79 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
BORE NO: P101, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	20.30	10.30	28.33	1.57	23.3	23.3	1.0	19.17	0	0	1.0	0.0	0	3.0	24.8	0	10.30	9.86	10.66	30.9	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.50	20.30	10.30	36.05	3.14	24.8	24.8	1.0	52.35	0	0	1.0	0.0	0	4.0	26.6	8	9.58	13.60	14.57	41.2	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	5.00	4.50	1.00	2.50	19.58	9.58	45.99	3.14	26.6	26.6	1.0	72.38	0	8	1.0	25.1	0	5.0	26.3	0	9.58	12.93	13.88	50.8	568.0	568.0	29.5	29.5	**227.20**	**9.82**
5.00	6.00	5.50	1.00	3.50	19.58	9.58	55.57	3.14	26.3	26.3	1.0	86.32	86.32	0	1.0	0.0	0.00	6.0	9.5	48	9.58	2.38	1.14	60.4	456.6	542.9	41.3	127.6	**217.17**	**42.52**
6.00	7.00	6.50	1.00	4.50	19.58	9.58	65.15	3.14	9.5	9.5	1.0	34.26	120.58	48	1.0	150.9	150.86	7.0	9.5	48	10.61	2.38	1.14	69.9	475.0	746.4	53.0	324.5	**298.57**	**108.16**
7.00	8.00	7.50	1.00	5.50	20.61	10.61	75.25	3.14	9.5	9.5	1.0	39.57	160.16	48	1.0	150.9	301.71	8.0	26.0	6	10.61	12.25	13.18	80.6	872.8	1334.7	64.8	526.7	**533.87**	**175.56**
8.00	9.00	8.50	1.00	6.50	20.61	10.61	85.86	3.14	26.0	26.0	1.0	131.60	291.76	6	1.0	18.9	320.57	9.0	26.0	6	10.40	12.25	13.18	91.2	973.8	1586.2	76.6	688.9	**634.47**	**229.65**
9.00	11.00	10.00	2.00	8.50	20.40	10.40	101.56	6.29	26.0	26.0	1.0	311.36	603.12	6	1.0	37.7	358.29	11.0	9.5	45	10.40	2.38	1.14	112.0	532.2	1493.7	100.2	1061.6	**597.46**	**353.86**
11.00	12.00	11.50	1.00	9.50	20.40	10.40	117.16	3.14	9.5	9.5	1.0	61.62	664.74	45	1.0	141.4	499.71	12.0	9.5	45	10.53	2.38	1.14	122.4	551.8	1716.2	112.0	1276.4	**686.48**	**425.47**
12.00	14.50	13.25	2.50	12.00	20.53	10.53	135.52	7.86	9.5	9.5	1.0	178.19	842.93	45	1.0	353.6	853.29	14.5	9.5	45	10.53	2.38	1.14	148.7	601.0	2297.2	141.4	1837.6	**918.88**	**612.55**
14.50	16.00	15.25	1.50	13.50	20.53	10.53	135.52	4.71	9.5	9.5	1.0	106.91	949.84	45	1.0	212.1	1065.43	16.0	13.0	43	10.55	3.35	2.08	148.7	704.0	2719.3	159.1	2174.4	**1087.72**	**724.79**
16.00	17.50	16.75	1.50	15.00	20.55	10.55	135.52	4.71	13.0	13.0	1.0	147.50	1097.34	43	1.0	202.7	1268.14	17.5	13.0	43	10.55	3.35	2.08	148.7	704.0	3069.5	176.8	2542.3	**1227.81**	**847.42**
17.50	19.00	18.25	1.50	16.50	20.55	10.55	135.52	4.71	13.0	13.0	1.0	147.50	1244.84	43	1.0	202.7	1470.86	19.0	32.1	0	8.89	31.84	33.16	148.7	3835.3	6551.0	194.5	2910.2	**2620.39**	**970.05**
19.00	20.50	19.75	1.50	18.00	18.89	8.89	135.52	4.71	32.1	32.1	1.1	442.86	1687.70	0	1.0	0.0	1470.86	20.5	32.1	0	8.89	31.84	33.16	148.7	3835.3	6993.8	212.1	3370.7	**2797.53**	**1123.57**
20.50	22.00	21.25	1.50	19.50	18.89	8.89	135.52	4.71	32.1	32.1	1.1	442.86	2130.55	0	1.0	0.0	1470.86	22.0	13.0	47	9.71	3.35	2.08	148.7	731.6	4333.1	229.8	3831.2	**1733.22**	**1277.08**
22.00	23.50	22.75	1.50	21.00	19.71	9.71	135.52	4.71	13.0	13.0	1.0	147.50	2278.05	47	1.0	221.6	1692.43	23.5	13.0	47	9.71	3.35	2.08	148.7	731.6	4702.1	247.5	4218.0	**1880.85**	**1405.99**
23.50	25.00	24.25	1.50	22.50	19.71	9.71	135.52	4.71	13.0	13.0	1.0	147.50	2425.55	47	1.0	221.6	1914.00	25.0	29.6	0	10.05	20.36	21.48	148.7	2463.2	6802.7	265.2	4604.7	**2721.10**	**1534.91**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
25.00	26.50	25.75	1.50	24.00	20.05	10.05	135.52	4.71	29.6	29.6	1.0	362.94	2788.49	0	1.0	0.0	1914.00	26.5	29.0	0	10.05	19.01	20.10	148.7	2299.9	7002.4	282.9	4985.4	**2800.95**	**1661.78**
26.50	27.50	27.00	1.00	25.00	20.05	10.05	135.52	3.14	29.0	29.0	1.0	236.10	3024.59	0	1.0	0.0	1914.00	27.5	29.0	0	10.05	19.01	20.10	148.7	2299.9	7238.5	294.6	5233.2	**2895.39**	**1744.41**
27.50	29.50	28.50	2.00	27.00	20.05	10.05	135.52	6.29	29.0	29.0	1.0	472.19	3496.78	0	1.0	0.0	1914.00	29.5	27.2	0	8.72	14.95	15.95	148.7	1801.6	7212.4	318.2	5729.0	**2884.97**	**1909.67**
29.50	30.00	29.75	0.50	27.50	18.72	8.72	135.52	1.57	27.2	27.2	1.0	109.45	3606.23	0	1.0	0.0	1914.00	30.0	27.2	0	10.43	14.95	15.95	148.7	1812.4	7332.6	324.1	5844.3	**2933.04**	**1948.11**
30.00	31.00	30.50	1.00	28.50	20.43	10.43	135.52	3.14	27.2	27.2	1.0	218.90	3825.13	0	1.0	0.0	1914.00	31.0	12.8	56	10.43	3.29	2.02	148.7	788.8	6527.9	335.9	6075.0	**2611.18**	**2025.01**
31.00	32.50	31.75	1.50	30.00	20.43	10.43	135.52	4.71	12.8	12.8	1.0	145.15	3970.28	56	1.0	264.0	2178.00	32.5	12.8	56	10.43	3.29	2.02	148.7	788.8	6937.1	353.6	6501.9	**2774.84**	**2167.28**
32.50	35.00	33.75	2.50	32.50	20.43	10.43	135.52	7.86	12.8	12.8	1.0	241.92	4212.20	56	1.0	440.0	2618.00	35.0	12.3	49	10.43	3.15	1.88	148.7	721.7	7551.9	383.0	7213.2	**3020.75**	**2404.41**
35.00	35.50	35.25	0.50	33.00	20.43	10.43	135.52	1.57	12.3	12.3	1.0	46.43	4258.63	49	1.0	77.0	2695.00	35.5	30.0	0	10.43	21.26	22.40	148.7	2575.4	9529.0	388.9	7342.6	**3811.62**	**2447.52**
35.50	37.00	36.25	1.50	34.50	20.43	10.43	135.52	4.71	30.0	30.0	1.0	368.86	4627.50	0	1.0	0.0	2695.00	37.0	30.0	0	10.49	21.26	22.40	148.7	2575.9	9898.4	406.6	7729.1	**3959.37**	**2576.37**
37.00	37.50	37.25	0.50	35.00	20.49	10.49	135.52	1.57	30.0	30.0	1.0	122.95	4750.45	0	1.0	0.0	2695.00	37.5	30.0	0	10.49	21.26	22.40	148.7	2575.9	10021.4	412.5	7858.0	**4008.55**	**2619.32**
37.50	38.50	38.00	1.00	36.00	20.49	10.49	135.52	3.14	30.0	30.0	1.0	245.91	4996.36	0	1.0	0.0	2695.00	38.5	30.0	0	10.49	21.26	22.40	148.7	2575.9	10267.3	424.3	8115.6	**4106.92**	**2705.22**
38.50	40.00	39.25	1.50	37.50	20.49	10.49	135.52	4.71	30.0	30.0	1.0	368.86	5365.23	0	1.0	0.0	2695.00	40.0	30.0	0	10.49	21.26	22.40	148.7	2575.9	10636.2	442.0	8502.2	**4254.46**	**2834.06**
BORE NO: P102, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.64	9.64	26.51	1.57	27.2	27.2	1.0	21.41	0	11	1.0	17.3	0	3.0	24.8	0	9.64	9.86	10.66	28.9	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.50	19.64	9.64	33.74	3.14	24.8	24.8	1.0	49.00	0	0	1.0	0.0	0	4.0	27.0	0	8.85	14.50	15.49	38.6	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	6.00	5.00	2.00	3.50	18.85	8.85	47.41	6.29	27.0	27.0	1.0	151.84	0	0	1.0	0.0	0	6.0	27.2	0	8.85	14.95	15.95	56.3	0	0.0	41.3	41.3	**0.00**	**13.75**
6.00	7.00	6.50	1.00	4.50	18.85	8.85	60.69	3.14	27.2	27.2	1.0	98.02	0	0	1.0	0.0	0	7.0	27.2	0	8.85	14.95	15.95	65.1	0	0.0	53.0	53.0	**0.00**	**17.68**
7.00	8.00	7.50	1.00	5.50	18.85	8.85	69.54	3.14	27.2	27.2	1.0	112.31	0	0	1.0	0.0	0	8.0	10.2	53	9.55	2.53	1.28	74.0	526.5	526.5	64.8	64.8	**210.61**	**21.61**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
8.00	9.00	8.50	1.00	6.50	19.55	9.55	78.74	3.14	10.2	10.2	1.0	44.52	44.52	53	1.0	166.6	166.57	9.0	10.2	53	9.55	2.53	1.28	83.5	545.5	756.6	76.6	287.7	**302.64**	**95.90**
9.00	10.00	9.50	1.00	7.50	19.55	9.55	88.29	3.14	10.2	10.2	1.0	49.92	94.45	53	1.0	166.6	333.14	10.0	12.5	42	9.55	3.20	1.94	93.1	538.5	966.1	88.4	516.0	**386.45**	**171.99**
10.00	11.00	10.50	1.00	8.50	19.55	9.55	97.84	3.14	12.5	12.5	1.0	68.17	162.62	42	1.0	132.0	465.14	11.0	12.5	42	9.92	3.20	1.94	102.6	562.9	1190.6	100.2	727.9	**476.24**	**242.65**
11.00	12.50	11.75	1.50	10.00	19.92	9.92	110.05	4.71	12.5	12.5	1.0	115.02	277.63	42	1.0	198.0	663.14	12.5	12.5	44	10.00	3.20	1.94	117.5	614.5	1555.3	117.9	1058.6	**622.12**	**352.88**
12.50	15.50	14.00	3.00	13.00	20.00	10.00	132.49	9.43	12.5	12.5	1.0	276.94	554.57	44	1.0	414.9	1078.00	15.5	12.9	44	10.00	3.32	2.05	117.5	625.7	2258.3	153.2	1785.8	**903.33**	**595.26**
15.50	17.00	16.25	1.50	14.50	20.00	10.00	132.49	4.71	12.9	12.9	1.0	143.05	697.62	44	1.0	207.4	1285.43	17.0	29.7	0	10.63	20.58	21.71	117.5	1990.8	3973.9	170.9	2153.9	**1589.55**	**717.98**
17.00	18.50	17.75	1.50	16.00	20.63	10.63	132.49	4.71	29.7	29.7	1.0	356.26	1053.89	0	1.0	0.0	1285.43	18.5	10.8	45	10.63	2.71	1.45	117.5	574.0	2913.3	188.6	2527.9	**1165.32**	**842.63**
18.50	20.00	19.25	1.50	17.50	20.63	10.63	132.49	4.71	10.8	10.8	1.0	119.15	1173.03	45	1.0	212.1	1497.57	20.0	30.5	0	10.63	23.78	24.96	117.5	2299.3	4969.9	206.3	2876.9	**1987.96**	**958.95**
20.00	21.50	20.75	1.50	19.00	20.63	10.63	132.49	4.71	30.5	30.5	1.0	377.11	1550.15	0	1.0	0.0	1497.57	21.5	31.2	0	10.34	27.30	28.55	117.5	2636.5	5684.3	223.9	3271.6	**2273.71**	**1090.55**
21.50	23.00	22.25	1.50	20.50	20.34	10.34	132.49	4.71	31.2	31.2	1.1	400.96	1951.11	0	1.0	0.0	1497.57	23.0	29.6	3	10.34	20.36	21.48	117.5	1987.9	5436.5	241.6	3690.3	**2174.61**	**1230.10**
23.00	24.50	23.75	1.50	22.00	20.34	10.34	132.49	4.71	29.6	29.6	1.0	354.82	2305.93	3	1.0	14.1	1511.71	24.5	29.0	0	10.34	19.01	20.10	117.5	1836.3	5653.9	259.3	4076.9	**2261.58**	**1358.98**
24.50	27.50	26.00	3.00	25.00	20.34	10.34	132.49	9.43	29.0	29.0	1.0	692.44	2998.37	0	1.0	0.0	1511.71	27.5	29.0	0	10.64	19.01	20.10	117.5	1838.7	6348.7	294.6	4804.7	**2539.50**	**1601.58**
27.50	30.00	28.75	2.50	27.50	20.64	10.64	132.49	7.86	29.0	29.0	1.0	577.03	3575.40	0	1.0	0.0	1511.71	30.0	28.2	0	10.64	17.21	18.25	117.5	1664.7	6751.8	324.1	5411.2	**2700.71**	**1803.74**
30.00	30.50	30.25	0.50	28.00	20.64	10.64	132.49	1.57	28.2	28.2	1.0	111.64	3687.04	0	1.0	0.0	1511.71	30.5	28.2	0	10.64	17.21	18.25	117.5	1664.7	6863.4	330.0	5528.8	**2745.36**	**1842.92**
30.50	32.50	31.50	2.00	30.00	20.64	10.64	132.49	6.29	28.2	28.2	1.0	446.54	4133.58	0	1.0	0.0	1511.71	32.5	30.2	0	10.64	22.27	23.43	117.5	2153.5	7798.8	353.6	5998.9	**3119.50**	**1999.62**
32.50	33.50	33.00	1.00	31.00	20.64	10.64	132.49	3.14	30.2	30.2	1.0	244.77	4378.35	0	1.0	0.0	1511.71	33.5	32.7	0	10.64	34.86	36.24	117.5	3369.6	9259.7	365.4	6255.4	**3703.86**	**2085.14**
33.50	35.00	34.25	1.50	32.50	20.64	10.64	132.49	4.71	32.7	32.7	1.1	455.12	4833.46	0	1.0	0.0	1511.71	35.0	32.2	0	10.64	32.34	33.68	117.5	3126.4	9471.5	383.0	6728.2	**3788.62**	**2242.74**
35.00	36.50	35.75	1.50	34.00	20.64	10.64	132.49	4.71	32.2	32.2	1.1	436.60	5270.06	0	1.0	0.0	1511.71	36.5	32.2	0	8.88	32.34	33.68	117.5	3103.1	9884.9	400.7	7182.5	**3953.94**	**2394.16**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
36.50	37.50	37.00	1.00	35.00	18.88	8.88	132.49	3.14	32.2	32.2	1.1	291.06	5561.12	0	1.0	0.0	1511.71	37.5	32.2	0	8.88	32.34	33.68	117.5	3103.1	10175.9	412.5	7485.3	**4070.37**	**2495.11**
37.50	38.00	37.75	0.50	35.50	18.88	8.88	132.49	1.57	32.2	32.2	1.1	145.53	5706.65	0	1.0	0.0	1511.71	38.0	25.2	10	8.93	10.45	11.34	117.5	1075.2	8293.6	418.4	7636.8	**3317.43**	**2545.59**
38.00	40.00	39.00	2.00	37.50	18.93	8.93	132.49	6.29	25.2	25.2	1.0	391.88	6098.54	10	1.0	62.9	1574.57	40.0	25.2	10	8.93	10.45	11.34	117.5	1075.2	8748.3	442.0	8115.1	**3499.33**	**2705.02**
BORE NO: P103, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	20.00	10.00	27.50	1.57	24.3	24.3	1.0	19.51	0	0	1.0	0.0	0	3.0	26.5	4	10.00	13.38	14.34	30.0	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.50	20.00	10.00	35.00	3.14	26.5	26.5	1.0	54.84	0	4	1.0	12.6	0	4.0	26.5	4	10.00	13.38	14.34	40.0	505.1	505.1	17.7	17.7	**202.02**	**5.89**
4.00	5.00	4.50	1.00	2.50	20.00	10.00	45.00	3.14	26.5	26.5	1.0	70.51	70.51	4	1.0	12.6	12.57	5.0	26.5	4	10.10	13.38	14.34	50.0	610.7	693.8	29.5	112.5	**277.53**	**37.52**
5.00	6.00	5.50	1.00	3.50	20.10	10.10	55.05	3.14	26.5	26.5	1.0	86.26	156.78	4	1.0	12.6	25.14	6.0	26.5	4	10.10	13.38	14.34	60.1	716.9	898.8	41.3	223.2	**359.52**	**74.39**
6.00	7.00	6.50	1.00	4.50	20.10	10.10	65.15	3.14	26.5	26.5	1.0	102.09	258.86	4	1.0	12.6	37.71	7.0	10.5	49	10.60	2.62	1.36	70.2	496.5	793.1	53.0	349.6	**317.24**	**116.54**
7.00	9.00	8.00	2.00	6.50	20.60	10.60	80.80	6.29	10.5	10.5	1.0	94.13	352.99	49	1.0	308.0	345.71	9.0	10.5	49	10.60	2.62	1.36	91.4	540.1	1238.8	76.6	775.3	**495.53**	**258.44**
9.00	10.00	9.50	1.00	7.50	20.60	10.60	96.70	3.14	10.5	10.5	1.0	56.33	409.32	49	1.0	154.0	499.71	10.0	24.4	14	9.77	9.57	10.22	102.0	905.0	1814.1	88.4	997.4	**725.63**	**332.48**
10.00	12.50	11.25	2.50	10.00	19.77	9.77	114.21	7.86	24.4	24.4	1.0	407.07	816.39	14	1.0	110.0	609.71	12.5	24.4	14	10.59	9.57	10.22	126.4	1092.0	2518.1	117.9	1544.0	**1007.22**	**514.65**
12.50	15.50	14.00	3.00	13.00	20.59	10.59	142.31	9.43	24.4	24.4	1.0	608.66	1425.05	14	1.0	132.0	741.71	15.5	27.9	0	10.59	16.53	17.56	126.4	1715.1	3881.9	153.2	2320.0	**1552.75**	**773.33**
15.50	17.00	16.25	1.50	14.50	20.59	10.59	142.31	4.71	27.9	27.9	1.0	355.22	1780.27	0	1.0	0.0	741.71	17.0	10.5	54	10.69	2.62	1.36	126.4	647.5	3169.5	170.9	2692.9	**1267.81**	**897.63**
17.00	18.50	17.75	1.50	16.00	20.69	10.69	142.31	4.71	10.5	10.5	1.0	124.34	1904.61	54	1.0	254.6	996.29	18.5	28.6	0	10.69	18.11	19.17	126.4	1879.2	4780.0	188.6	3089.5	**1912.02**	**1029.82**
18.50	20.00	19.25	1.50	17.50	20.69	10.69	142.31	4.71	28.6	28.6	1.0	365.78	2270.39	0	1.0	0.0	996.29	20.0	11.0	51	10.40	2.76	1.51	126.4	641.4	3908.0	206.3	3472.9	**1563.21**	**1157.64**
20.00	21.50	20.75	1.50	19.00	20.40	10.40	142.31	4.71	11.0	11.0	1.0	130.41	2400.80	51	1.0	240.4	1236.71	21.5	11.0	51	10.40	2.76	1.51	126.4	641.4	4278.9	223.9	3861.4	**1711.55**	**1287.15**
21.50	23.00	22.25	1.50	20.50	20.40	10.40	142.31	4.71	11.0	11.0	1.0	130.41	2531.21	51	1.0	240.4	1477.14	23.0	27.5	2	9.57	15.63	16.64	126.4	1629.3	5637.6	241.6	4250.0	**2255.05**	**1416.65**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
23.00	24.50	23.75	1.50	22.00	19.57	9.57	142.31	4.71	27.5	27.5	1.0	349.24	2880.45	2	1.0	9.4	1486.57	24.5	31.0	0	9.57	26.30	27.53	126.4	2715.7	7082.7	259.3	4626.3	**2833.08**	**1542.10**
24.50	26.00	25.25	1.50	23.50	19.57	9.57	142.31	4.71	31.0	31.0	1.1	423.27	3303.72	0	1.0	0.0	1486.57	26.0	31.2	0	9.57	27.30	28.55	126.4	2819.6	7609.9	277.0	5067.3	**3043.96**	**1689.08**
26.00	27.50	26.75	1.50	25.00	19.57	9.57	142.31	4.71	31.2	31.2	1.1	430.68	3734.40	0	1.0	0.0	1486.57	27.5	31.2	0	9.13	27.30	28.55	126.4	2814.7	8035.6	294.6	5515.6	**3214.26**	**1838.54**
27.50	29.00	28.25	1.50	26.50	19.13	9.13	142.31	4.71	31.2	31.2	1.1	430.68	4165.09	0	1.0	0.0	1486.57	29.0	31.4	0	8.63	28.31	29.58	126.4	2912.6	8564.3	312.3	5964.0	**3425.71**	**1987.99**
29.00	30.00	29.50	1.00	27.50	18.63	8.63	142.31	3.14	31.4	31.4	1.1	292.12	4457.21	0	1.0	0.0	1486.57	30.0	31.4	0	8.63	28.31	29.58	126.4	2912.6	8856.4	324.1	6267.9	**3542.55**	**2089.29**
30.00	30.50	30.25	0.50	28.00	18.63	8.63	142.31	1.57	31.4	31.4	1.1	146.06	4603.27	0	1.0	0.0	1486.57	30.5	31.4	0	8.99	28.31	29.58	126.4	2916.8	9006.6	330.0	6419.8	**3602.65**	**2139.95**
30.50	32.00	31.25	1.50	29.50	18.99	8.99	142.31	4.71	31.4	31.4	1.1	438.18	5041.44	0	1.0	0.0	1486.57	32.0	27.0	18	8.97	14.50	15.49	126.4	1622.6	8150.6	347.7	6875.7	**3260.24**	**2291.90**
32.00	32.50	32.25	0.50	30.00	18.97	8.97	142.31	1.57	27.0	27.0	1.0	113.95	5155.39	18	1.0	28.3	1514.86	32.5	27.0	18	8.97	14.50	15.49	126.4	1622.6	8292.8	353.6	7023.8	**3317.13**	**2341.27**
32.50	33.50	33.00	1.00	31.00	18.97	8.97	142.31	3.14	27.0	27.0	1.0	227.89	5383.28	18	1.0	56.6	1571.43	33.5	12.5	60	8.72	3.20	1.94	126.4	749.2	7703.9	365.4	7320.1	**3081.56**	**2440.02**
33.50	35.00	34.25	1.50	32.50	18.72	8.72	142.31	4.71	12.5	12.5	1.0	148.73	5532.01	60	1.0	282.9	1854.29	35.0	14.0	60	8.82	3.65	2.36	126.4	795.0	8181.3	383.0	7769.3	**3272.54**	**2589.78**
35.00	36.50	35.75	1.50	34.00	18.82	8.82	142.31	4.71	14.0	14.0	1.0	167.27	5699.28	60	1.0	282.9	2137.14	36.5	14.0	60	8.34	3.65	2.36	126.4	794.6	8631.0	400.7	8237.1	**3452.41**	**2745.71**
36.50	37.50	37.00	1.00	35.00	18.34	8.34	142.31	3.14	14.0	14.0	1.0	111.51	5810.80	60	1.0	188.6	2325.71	37.5	18.0	60	8.34	5.42	4.29	126.4	976.3	9112.9	412.5	8549.0	**3645.14**	**2849.67**
37.50	38.00	37.75	0.50	35.50	18.34	8.34	142.31	1.57	18.0	18.0	1.0	72.66	5883.46	60	1.0	94.3	2420.00	38.0	18.0	60	8.72	5.42	4.29	126.4	977.0	9280.4	418.4	8721.9	**3712.18**	**2907.28**
38.00	40.00	39.00	2.00	37.50	18.72	8.72	142.31	6.29	18.0	18.0	1.0	290.65	6174.11	60	1.0	377.1	2797.14	40.0	18.0	125	8.72	5.42	4.29	126.4	1436.6	10407.9	442.0	9413.2	**4163.15**	**3137.74**
BORE NO: P104, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.80	9.80	26.95	1.57	25.8	25.8	1.0	20.47	0	0	1.0	0.0	0	3.0	25.4	0	9.03	10.90	11.80	29.4	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	5.00	4.00	2.00	2.50	19.03	9.03	38.43	6.29	25.4	25.4	1.0	114.70	0	0	1.0	0.0	0	5.0	24.6	0	9.03	9.71	10.44	47.5	399.2	399.2	29.5	29.5	**159.68**	**9.82**
5.00	6.00	5.50	1.00	3.50	19.03	9.03	51.98	3.14	24.6	24.6	1.0	74.79	74.79	0	1.0	0.0	0.00	6.0	11.1	50	11.01	2.79	1.53	56.5	484.2	559.0	41.3	116.0	**223.59**	**38.68**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
6.00	8.00	7.00	2.00	5.50	21.01	11.01	67.50	6.29	11.1	11.1	1.0	83.24	158.03	50	1.0	314.3	314.29	8.0	11.6	41	11.01	2.94	1.68	78.5	478.6	950.9	64.8	537.1	**380.35**	**179.05**
8.00	9.00	8.50	1.00	6.50	21.01	11.01	84.02	3.14	11.6	11.6	1.0	54.20	212.23	41	1.0	128.9	443.14	9.0	11.6	41	10.35	2.94	1.68	89.5	503.6	1158.9	76.6	732.0	**463.58**	**243.99**
9.00	11.00	10.00	2.00	8.50	20.35	10.35	99.87	6.29	11.6	11.6	1.0	128.86	341.09	41	1.0	257.7	700.86	11.0	6.2	86	10.35	1.79	0.63	110.2	765.4	1807.3	100.2	1142.1	**722.94**	**380.71**
11.00	12.00	11.50	1.00	9.50	20.35	10.35	115.40	3.14	6.2	6.2	1.0	39.40	380.49	86	1.0	270.3	971.14	12.0	10.0	84	9.88	2.47	1.22	120.6	832.7	2184.4	112.0	1463.6	**873.74**	**487.87**
12.00	14.50	13.25	2.50	12.00	19.88	9.88	132.92	7.86	10.0	10.0	1.0	184.15	564.64	84	1.0	660.0	1631.14	14.5	10.0	42	9.88	2.47	1.22	145.3	583.7	2779.4	141.4	2337.2	**1111.78**	**779.07**
14.50	16.00	15.25	1.50	13.50	19.88	9.88	132.92	4.71	10.0	10.0	1.0	110.49	675.13	42	1.0	198.0	1829.14	16.0	27.7	0	10.15	16.08	17.10	145.3	1903.6	4407.9	159.1	2663.4	**1763.14**	**887.79**
16.00	17.50	16.75	1.50	15.00	20.15	10.15	132.92	4.71	27.7	27.7	1.0	328.98	1004.11	0	1.0	0.0	1829.14	17.5	27.4	0	10.15	15.40	16.41	145.3	1823.7	4657.0	176.8	3010.0	**1862.79**	**1003.35**
17.50	19.00	18.25	1.50	16.50	20.15	10.15	132.92	4.71	27.4	27.4	1.0	324.81	1328.92	0	1.0	0.0	1829.14	19.0	15.3	43	10.15	4.09	2.81	145.3	781.9	3939.9	194.5	3352.5	**1575.97**	**1117.51**
19.00	20.50	19.75	1.50	18.00	20.15	10.15	132.92	4.71	15.3	15.3	1.0	171.42	1500.35	43	1.0	202.7	2031.86	20.5	25.5	9	9.81	11.13	12.03	145.3	1379.9	4912.1	212.1	3744.3	**1964.86**	**1248.12**
20.50	23.50	22.00	3.00	21.00	19.81	9.81	132.92	9.43	25.5	25.5	1.0	597.77	2098.12	9	1.0	84.9	2116.71	23.5	20.7	44	9.81	6.90	6.16	145.3	1122.9	5337.7	247.5	4462.3	**2135.09**	**1487.44**
23.50	25.00	24.25	1.50	22.50	19.81	9.81	132.92	4.71	20.7	20.7	1.0	236.78	2334.90	44	1.0	207.4	2324.14	25.0	29.6	0	10.07	20.36	21.48	145.3	2408.7	7067.8	265.2	4924.2	**2827.11**	**1641.41**
25.00	26.50	25.75	1.50	24.00	20.07	10.07	132.92	4.71	29.6	29.6	1.0	355.97	2690.87	0	1.0	0.0	2324.14	26.5	29.6	0	10.07	20.36	21.48	145.3	2408.7	7423.7	282.9	5297.9	**2969.50**	**1765.96**
26.50	27.50	27.00	1.00	25.00	20.07	10.07	132.92	3.14	29.6	29.6	1.0	237.31	2928.18	0	1.0	0.0	2324.14	27.5	29.1	2	9.71	19.23	20.33	145.3	2286.9	7539.3	294.6	5547.0	**3015.70**	**1848.99**
27.50	29.50	28.50	2.00	27.00	19.71	9.71	132.92	6.29	29.1	29.1	1.0	465.03	3393.21	2	1.0	12.6	2336.71	29.5	31.3	0	9.71	27.81	29.06	145.3	3284.9	9014.8	318.2	6048.1	**3605.94**	**2016.05**
29.50	30.00	29.75	0.50	27.50	19.71	9.71	132.92	1.57	31.3	31.3	1.1	135.25	3528.47	0	1.0	0.0	2336.71	30.0	31.7	0	9.71	29.82	31.11	145.3	3522.7	9387.9	324.1	6189.3	**3755.16**	**2063.10**
30.00	31.00	30.50	1.00	28.50	19.71	9.71	132.92	3.14	31.7	31.7	1.1	279.94	3808.40	0	1.0	0.0	2336.71	31.0	31.9	0	9.71	30.83	32.14	145.3	3641.6	9786.8	335.9	6481.0	**3914.70**	**2160.34**
31.00	32.50	31.75	1.50	30.00	19.71	9.71	132.92	4.71	31.9	31.9	1.1	427.09	4235.50	0	1.0	0.0	2336.71	32.5	32.5	0	9.09	33.85	35.22	145.3	3989.8	10562.0	353.6	6925.8	**4224.79**	**2308.59**
32.50	34.00	33.25	1.50	31.50	19.09	9.09	132.92	4.71	32.5	32.5	1.1	449.10	4684.60	0	1.0	0.0	2336.71	34.0	32.5	0	9.26	33.85	35.22	145.3	3992.1	11013.4	371.3	7392.6	**4405.38**	**2464.19**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
34.00	35.00	34.50	1.00	32.50	19.26	9.26	132.92	3.14	32.5	32.5	1.1	299.40	4984.00	0	1.0	0.0	2336.71	35.0	32.0	0	9.26	31.33	32.65	145.3	3695.3	11016.0	383.0	7703.8	**4406.41**	**2567.92**
35.00	35.50	35.25	0.50	33.00	19.26	9.26	132.92	1.57	32.0	32.0	1.1	143.57	5127.57	0	1.0	0.0	2336.71	35.5	33.2	0	9.28	37.38	38.80	145.3	4408.0	11872.3	388.9	7853.2	**4748.90**	**2617.74**
35.50	37.00	36.25	1.50	34.50	19.28	9.28	132.92	4.71	33.2	33.2	1.2	475.66	5603.23	0	1.0	0.0	2336.71	37.0	32.6	0	9.22	34.36	35.73	145.3	4050.9	11990.9	406.6	8346.6	**4796.35**	**2782.18**
37.00	37.50	37.25	0.50	35.00	19.22	9.22	132.92	1.57	32.6	32.6	1.1	150.95	5754.18	0	1.0	0.0	2336.71	37.5	30.5	0	9.22	23.78	24.96	145.3	2804.5	10895.4	412.5	8503.4	**4358.15**	**2834.46**
37.50	38.50	38.00	1.00	36.00	19.22	9.22	132.92	3.14	30.5	30.5	1.0	252.22	6006.40	0	1.0	0.0	2336.71	38.5	30.7	0	9.29	24.79	25.99	145.3	2923.9	11267.0	424.3	8767.4	**4506.81**	**2922.47**
38.50	40.00	39.25	1.50	37.50	19.29	9.29	132.92	4.71	30.7	30.7	1.0	385.08	6391.49	0	1.0	0.0	2336.71	40.0	30.7	0	9.29	24.79	25.99	145.3	2923.9	11652.1	442.0	9170.2	**4660.84**	**3056.72**
BORE NO: P105, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.67	9.67	26.59	1.57	12.7	12.7	1.0	9.42	0	23	1.0	36.1	0	3.0	25.4	0	9.67	10.90	11.80	29.0	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.50	19.67	9.67	33.85	3.14	25.4	25.4	1.0	50.51	0	0	1.0	0.0	0	4.0	28.6	2	10.25	18.11	19.17	38.7	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	5.00	4.50	1.00	2.50	20.25	10.25	43.81	3.14	28.6	28.6	1.0	75.06	0	2	1.0	6.3	0	5.0	28.5	0	10.25	17.88	18.94	48.9	0	0.0	29.5	29.5	**0.00**	**9.82**
5.00	6.00	5.50	1.00	3.50	20.25	10.25	54.06	3.14	28.5	28.5	1.0	92.24	0	0	1.0	0.0	0	6.0	28.5	0	9.37	17.88	18.94	59.2	0	0.0	41.3	41.3	**0.00**	**13.75**
6.00	8.00	7.00	2.00	5.50	19.37	9.37	68.55	6.29	28.5	28.5	1.0	233.95	0	0	1.0	0.0	0	8.0	10.2	46	9.37	2.53	1.28	77.9	0	0.0	64.8	64.8	**0.00**	**21.61**
8.00	9.00	8.50	1.00	6.50	19.37	9.37	82.61	3.14	10.2	10.2	1.0	46.71	0	46	1.0	144.6	0	9.0	14.3	23	9.37	3.74	2.45	87.3	0	0.0	76.6	76.6	**0.00**	**25.54**
9.00	10.00	9.50	1.00	7.50	19.37	9.37	91.98	3.14	14.3	14.3	1.0	73.68	0	23	1.0	72.3	0	10.0	6.8	24	10.08	1.89	0.73	96.7	0	0.0	88.4	88.4	**0.00**	**29.46**
10.00	11.00	10.50	1.00	8.50	20.08	10.08	101.70	3.14	6.8	6.8	1.0	38.11	0	24	1.0	75.4	0	11.0	9.5	62	10.08	2.38	1.14	106.7	0	0.0	100.2	100.2	**0.00**	**33.39**
11.00	12.00	11.50	1.00	9.50	20.08	10.08	111.78	3.14	9.5	9.5	1.0	58.79	0	62	1.0	194.9	0	12.0	11.9	55	10.08	3.03	1.76	116.8	0	0.0	112.0	112.0	**0.00**	**37.32**
12.00	13.00	12.50	1.00	10.50	20.08	10.08	121.86	3.14	11.9	11.9	1.0	80.71	0	55	1.0	172.9	0	13.0	9.4	54	9.96	2.36	1.13	126.9	0	0.0	123.8	123.8	**0.00**	**41.25**
13.00	14.50	13.75	1.50	12.00	19.96	9.96	134.37	4.71	9.4	9.4	1.0	104.87	0	54	1.0	254.6	0	14.5	12.8	45	9.66	3.29	2.02	141.8	692.7	692.7	141.4	141.4	**277.09**	**47.14**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 0.79 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
14.50	17.50	16.00	3.00	15.00	19.66	9.66	134.37	9.43	12.8	12.8	1.0	287.84	287.84	45	1.0	424.3	424.29	17.5	20.7	39	9.66	6.90	6.16	141.8	1068.6	1780.7	176.8	888.9	**712.28**	**296.30**
17.50	19.00	18.25	1.50	16.50	19.66	9.66	134.37	4.71	20.7	20.7	1.0	239.36	527.20	39	1.0	183.9	608.14	19.0	19.5	48	9.66	6.13	5.12	141.8	1042.5	2177.8	194.5	1329.8	**871.12**	**443.27**
19.00	20.50	19.75	1.50	18.00	19.66	9.66	134.37	4.71	19.5	19.5	1.0	224.32	751.52	48	1.0	226.3	834.43	20.5	11.2	48	10.50	2.82	1.56	141.8	660.5	2246.4	212.1	1798.1	**898.57**	**599.36**
20.50	23.50	22.00	3.00	21.00	20.50	10.50	134.37	9.43	11.2	11.2	1.0	250.86	1002.38	48	1.0	452.6	1287.00	23.5	11.2	48	10.50	2.82	1.56	141.8	660.5	2949.8	247.5	2536.9	**1179.94**	**845.63**
23.50	25.00	24.25	1.50	22.50	20.50	10.50	134.37	4.71	11.2	11.2	1.0	125.43	1127.80	48	1.0	226.3	1513.29	25.0	10.5	45	10.64	2.62	1.36	141.8	615.6	3256.7	265.2	2906.3	**1302.66**	**968.76**
25.00	26.50	25.75	1.50	24.00	20.64	10.64	134.37	4.71	10.5	10.5	1.0	117.40	1245.21	45	1.0	212.1	1725.43	26.5	29.2	0	10.64	19.46	20.56	141.8	2254.4	5225.1	282.9	3253.5	**2090.03**	**1084.50**
26.50	27.50	27.00	1.00	25.00	20.64	10.64	134.37	3.14	29.2	29.2	1.0	236.02	1481.23	0	1.0	0.0	1725.43	27.5	29.2	0	10.64	19.46	20.56	141.8	2254.4	5461.1	294.6	3501.3	**2184.44**	**1167.10**
27.50	28.00	27.75	0.50	25.50	20.64	10.64	134.37	1.57	29.2	29.2	1.0	118.01	1599.24	0	1.0	0.0	1725.43	28.0	11.0	48	11.02	2.76	1.51	141.8	654.0	3978.7	300.5	3625.2	**1591.46**	**1208.40**
28.00	29.50	28.75	1.50	27.00	21.02	11.02	134.37	4.71	11.0	11.0	1.0	123.13	1722.37	48	1.0	226.3	1951.71	29.5	30.0	0	11.02	21.26	22.40	141.8	2466.3	6140.3	318.2	3992.3	**2456.14**	**1330.77**
29.50	30.00	29.75	0.50	27.50	21.02	11.02	134.37	1.57	30.0	30.0	1.0	121.91	1844.28	0	1.0	0.0	1951.71	30.0	30.7	0	10.82	24.79	25.99	141.8	2872.7	6668.7	324.1	4120.1	**2667.49**	**1373.37**
30.00	32.50	31.25	2.50	30.00	20.82	10.82	134.37	7.86	30.7	30.7	1.0	648.81	2493.09	0	1.0	0.0	1951.71	32.5	10.3	55	10.82	2.56	1.31	141.8	679.6	5124.4	353.6	4798.4	**2049.75**	**1599.46**
32.50	34.00	33.25	1.50	31.50	20.82	10.82	134.37	4.71	10.3	10.3	1.0	115.12	2608.20	55	1.0	259.3	2211.00	34.0	25.2	15	10.82	10.45	11.34	141.8	1318.9	6138.1	371.3	5190.5	**2455.25**	**1730.15**
34.00	35.00	34.50	1.00	32.50	20.82	10.82	134.37	3.14	25.2	25.2	1.0	198.72	2806.93	15	1.0	47.1	2258.14	35.0	26.0	15	8.76	12.25	13.18	141.8	1516.9	6581.9	383.0	5448.1	**2632.77**	**1816.03**
35.00	35.50	35.25	0.50	33.00	18.76	8.76	134.37	1.57	26.0	26.0	1.0	102.99	2909.91	15	1.0	23.6	2281.71	35.5	28.0	0	8.72	16.76	17.79	141.8	1928.3	7119.9	388.9	5580.6	**2847.97**	**1860.19**
35.50	37.00	36.25	1.50	34.50	18.72	8.72	134.37	4.71	28.0	28.0	1.0	336.82	3246.73	0	1.0	0.0	2281.71	37.0	28.0	0	8.62	16.76	17.79	141.8	1927.6	7456.0	406.6	5935.0	**2982.42**	**1978.35**
37.00	37.50	37.25	0.50	35.00	18.62	8.62	134.37	1.57	28.0	28.0	1.0	112.27	3359.00	0	1.0	0.0	2281.71	37.5	29.4	0	8.62	19.91	21.02	141.8	2289.9	7930.6	412.5	6053.2	**3172.24**	**2017.74**
37.50	38.50	38.00	1.00	36.00	18.62	8.62	134.37	3.14	29.4	29.4	1.0	237.96	3596.96	0	1.0	0.0	2281.71	38.5	29.0	0	8.85	19.01	20.10	141.8	2188.2	8066.9	424.3	6303.0	**3226.74**	**2100.99**
38.50	40.00	39.25	1.50	37.50	18.85	8.85	134.37	4.71	29.0	29.0	1.0	351.13	3948.09	0	1.0	0.0	2281.71	40.0	29.0	0	8.85	19.01	20.10	141.8	2188.2	8418.0	442.0	6671.8	**3367.20**	**2223.92**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 0.79 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
BORE NO: P106, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.00	9.00	24.75	1.57	14.0	14.0	1.0	9.70	9.70	9	1.0	14.1	14.14	3.0	12.5	45	8.20	3.20	1.94	27.0	392.4	416.3	5.9	29.7	**166.50**	**9.91**
3.00	5.00	4.00	2.00	2.50	18.20	8.20	35.20	6.29	12.5	12.5	1.0	49.05	58.75	45	1.0	282.9	297.00	5.0	24.9	0	8.20	9.93	10.77	43.4	373.2	729.0	29.5	385.2	**291.60**	**128.40**
5.00	6.00	5.50	1.00	3.50	18.20	8.20	47.50	3.14	24.9	24.9	1.0	69.30	128.04	0	1.0	0.0	297.00	6.0	24.9	0	8.20	9.93	10.77	51.6	437.2	862.2	41.3	466.3	**344.90**	**155.43**
6.00	7.00	6.50	1.00	4.50	18.20	8.20	55.70	3.14	24.9	24.9	1.0	81.26	209.30	0	1.0	0.0	297.00	7.0	12.8	39	9.81	3.29	2.02	59.8	438.2	944.5	53.0	559.3	**377.81**	**186.45**
7.00	8.00	7.50	1.00	5.50	19.81	9.81	64.71	3.14	12.8	12.8	1.0	46.20	255.51	39	1.0	122.6	419.57	8.0	8.6	47	9.81	2.22	1.00	69.6	457.5	1132.6	64.8	739.9	**453.05**	**246.63**
8.00	9.00	8.50	1.00	6.50	19.81	9.81	74.52	3.14	8.6	8.6	1.0	35.42	290.92	47	1.0	147.7	567.29	9.0	8.6	47	9.81	2.22	1.00	79.4	474.6	1332.8	76.6	934.8	**533.14**	**311.61**
9.00	10.00	9.50	1.00	7.50	19.81	9.81	84.33	3.14	8.6	8.6	1.0	40.08	331.00	47	1.0	147.7	715.00	10.0	8.5	54	10.60	2.20	0.99	89.2	540.2	1586.2	88.4	1134.4	**634.49**	**378.13**
10.00	11.00	10.50	1.00	8.50	20.60	10.60	94.53	3.14	8.5	8.5	1.0	44.40	375.41	54	1.0	169.7	884.71	11.0	9.0	52	10.60	2.29	1.07	99.8	551.8	1811.9	100.2	1360.3	**724.76**	**453.43**
11.00	12.00	11.50	1.00	9.50	20.60	10.60	105.13	3.14	9.0	9.0	1.0	52.33	427.74	52	1.0	163.4	1048.14	12.0	9.8	74	10.47	2.43	1.19	110.4	739.4	2215.2	112.0	1587.8	**886.10**	**529.28**
12.00	14.50	13.25	2.50	12.00	20.47	10.47	123.52	7.86	9.8	9.8	1.0	167.63	595.37	74	1.0	581.4	1629.57	14.5	9.8	74	10.47	2.43	1.19	136.6	789.4	3014.4	141.4	2366.4	**1205.75**	**788.79**
14.50	16.00	15.25	1.50	13.50	20.47	10.47	123.52	4.71	9.8	9.8	1.0	100.58	695.95	74	1.0	348.9	1978.43	16.0	21.2	38	9.80	7.26	6.71	136.6	1074.2	3748.6	159.1	2833.5	**1499.43**	**944.50**
16.00	17.50	16.75	1.50	15.00	19.80	9.80	123.52	4.71	21.2	21.2	1.0	225.86	921.81	38	1.0	179.1	2157.57	17.5	26.5	4	9.19	13.38	14.34	136.6	1515.9	4595.3	176.8	3256.2	**1838.12**	**1085.39**
17.50	20.50	19.00	3.00	18.00	19.19	9.19	123.52	9.43	26.5	26.5	1.0	580.64	1502.45	4	1.0	37.7	2195.29	20.5	28.4	0	9.19	17.66	18.71	136.6	1962.7	5660.4	212.1	3909.9	**2264.17**	**1303.29**
20.50	22.00	21.25	1.50	19.50	19.19	9.19	123.52	4.71	28.4	28.4	1.0	314.85	1817.30	0	1.0	0.0	2195.29	22.0	18.5	44	9.19	5.64	4.57	136.6	933.2	4945.8	229.8	4242.4	**1978.32**	**1414.14**
22.00	23.50	22.75	1.50	21.00	19.19	9.19	123.52	4.71	18.5	18.5	1.0	194.83	2012.13	44	1.0	207.4	2402.71	23.5	27.0	7	9.80	14.50	15.49	136.6	1665.9	6080.7	247.5	4662.3	**2432.28**	**1554.12**
23.50	26.50	25.00	3.00	24.00	19.80	9.80	123.52	9.43	27.0	27.0	1.0	593.39	2605.52	7	1.0	66.0	2468.71	26.5	27.0	0	9.80	14.50	15.49	136.6	1616.4	6690.6	282.9	5357.1	**2676.24**	**1785.70**
26.50	27.50	27.00	1.00	25.00	19.80	9.80	123.52	3.14	27.0	27.0	1.0	197.80	2803.32	0	1.0	0.0	2468.71	27.5	27.0	0	9.80	14.50	15.49	136.6	1616.4	6888.4	294.6	5566.7	**2755.36**	**1855.56**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
27.50	29.50	28.50	2.00	27.00	19.80	9.80	123.52	6.29	27.0	27.0	1.0	395.59	3198.91	0	1.0	0.0	2468.71	29.5	17.3	40	8.34	5.07	3.91	136.6	840.0	6507.6	318.2	5985.8	**2603.06**	**1995.28**
29.50	30.00	29.75	0.50	27.50	18.34	8.34	123.52	1.57	17.3	17.3	1.0	60.46	3259.37	40	1.0	62.9	2531.57	30.0	17.0	40	10.15	4.92	3.75	136.6	826.3	6617.2	324.1	6115.0	**2646.90**	**2038.35**
30.00	31.00	30.50	1.00	28.50	20.15	10.15	123.52	3.14	17.0	17.0	1.0	118.68	3378.05	40	1.0	125.7	2657.29	31.0	11.2	55	10.15	2.82	1.56	136.6	698.1	6733.5	335.9	6371.2	**2693.39**	**2123.74**
31.00	32.50	31.75	1.50	30.00	20.15	10.15	123.52	4.71	11.2	11.2	1.0	115.30	3493.35	55	1.0	259.3	2916.57	32.5	11.2	55	10.15	2.82	1.56	136.6	698.1	7108.1	353.6	6763.5	**2843.22**	**2254.50**
32.50	35.00	33.75	2.50	32.50	20.15	10.15	123.52	7.86	11.2	11.2	1.0	192.16	3685.51	55	1.0	432.1	3348.71	35.0	10.5	55	10.15	2.62	1.36	136.6	675.3	7709.5	383.0	7417.3	**3083.79**	**2472.42**
35.00	35.50	35.25	0.50	33.00	20.15	10.15	123.52	1.57	10.5	10.5	1.0	35.97	3721.49	55	1.0	86.4	3435.14	35.5	10.5	55	10.15	2.62	1.36	136.6	675.3	7831.9	388.9	7545.6	**3132.75**	**2515.19**
35.50	37.50	36.50	2.00	35.00	20.15	10.15	123.52	6.29	10.5	10.5	1.0	143.90	3865.38	55	1.0	345.7	3780.86	37.5	10.5	55	8.76	2.62	1.36	136.6	674.5	8320.8	412.5	8058.7	**3328.30**	**2686.25**
37.50	38.50	38.00	1.00	36.00	18.76	8.76	123.52	3.14	10.5	10.5	1.0	71.95	3937.33	55	1.0	172.9	3953.71	38.5	10.0	60	8.61	2.47	1.22	136.6	693.5	8584.6	424.3	8315.3	**3433.83**	**2771.78**
38.50	40.00	39.25	1.50	37.50	18.61	8.61	123.52	4.71	10.0	10.0	1.0	102.67	4040.01	60	1.0	282.9	4236.57	40.0	10.0	60	8.61	2.47	1.22	136.6	693.5	8970.1	442.0	8718.5	**3588.04**	**2906.18**
BORE NO: P107, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	18.70	8.70	23.93	1.57	24.1	24.1	1.0	16.82	0	3	1.0	4.7	0	3.0	15.0	20	8.70	3.94	2.65	26.1	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.50	18.70	8.70	30.45	3.14	15.0	15.0	1.0	25.64	0	20	1.0	62.9	0	4.0	11.6	20	8.70	2.94	1.68	34.8	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	5.00	4.50	1.00	2.50	18.70	8.70	39.15	3.14	11.6	11.6	1.0	25.26	0	20	1.0	62.9	0	5.0	27.3	2	9.38	15.18	16.18	43.5	0	0.0	29.5	29.5	**0.00**	**9.82**
5.00	6.00	5.50	1.00	3.50	19.38	9.38	48.19	3.14	27.3	27.3	1.0	78.17	0	2	1.0	6.3	0	6.0	10.7	49	9.38	2.68	1.42	52.9	0	0.0	41.3	41.3	**0.00**	**13.75**
6.00	7.00	6.50	1.00	4.50	19.38	9.38	57.57	3.14	10.7	10.7	1.0	34.19	0	49	1.0	154.0	0	7.0	10.7	49	10.61	2.68	1.42	62.3	0	0.0	53.0	53.0	**0.00**	**17.68**
7.00	9.00	8.00	2.00	6.50	20.61	10.61	72.87	6.29	10.7	10.7	1.0	86.55	0	49	1.0	308.0	0	9.0	10.7	49	10.61	2.68	1.42	83.5	0	0.0	76.6	76.6	**0.00**	**25.54**
9.00	10.00	9.50	1.00	7.50	20.61	10.61	88.79	3.14	10.7	10.7	1.0	52.72	0	49	1.0	154.0	0	10.0	8.1	63	10.61	2.13	0.93	94.1	0	0.0	88.4	88.4	**0.00**	**29.46**
10.00	11.00	10.50	1.00	8.50	20.61	10.61	99.40	3.14	8.1	8.1	1.0	44.46	0	63	1.0	198.0	0	11.0	9.2	57	9.91	2.33	1.10	104.7	0	0.0	100.2	100.2	**0.00**	**33.39**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
11.00	12.50	11.75	1.50	10.00	19.91	9.91	112.13	4.71	9.2	9.2	1.0	85.62	0	57	1.0	268.7	0	12.5	13.5	33	9.91	3.50	2.22	119.6	0	0.0	117.9	117.9	**0.00**	**39.29**
12.50	14.00	13.25	1.50	11.50	19.91	9.91	127.00	4.71	13.5	13.5	1.0	143.74	0	33	1.0	155.6	0	14.0	8.6	54	10.48	2.22	1.00	134.4	0	0.0	135.5	135.5	**0.00**	**45.18**
14.00	15.50	14.75	1.50	13.00	20.48	10.48	142.29	4.71	8.6	8.6	1.0	101.45	0	54	1.0	254.6	0	15.5	8.6	54	10.48	2.22	1.00	134.4	0	0.0	153.2	153.2	**0.00**	**51.07**
15.50	17.00	16.25	1.50	14.50	20.48	10.48	142.29	4.71	8.6	8.6	1.0	101.45	0	54	1.0	254.6	0	17.0	29.2	0	10.26	19.46	20.56	134.4	0	0.0	170.9	170.9	**0.00**	**56.96**
17.00	18.50	17.75	1.50	16.00	20.26	10.26	142.29	4.71	29.2	29.2	1.0	374.90	0	0	1.0	0.0	0	18.5	29.2	0	10.26	19.46	20.56	134.4	2138.1	2138.1	188.6	188.6	**855.23**	**62.86**
18.50	20.00	19.25	1.50	17.50	20.26	10.26	142.29	4.71	29.2	29.2	1.0	374.90	374.90	0	1.0	0.0	0.00	20.0	10.6	64	10.26	2.65	1.39	134.4	737.7	1112.6	206.3	581.1	**445.04**	**193.72**
20.00	21.50	20.75	1.50	19.00	20.26	10.26	142.29	4.71	10.6	10.6	1.0	125.54	500.43	64	1.0	301.7	301.71	21.5	10.6	64	10.26	2.65	1.39	134.4	737.7	1539.8	223.9	1026.1	**615.94**	**342.02**
21.50	23.00	22.25	1.50	20.50	20.26	10.26	142.29	4.71	10.6	10.6	1.0	125.54	625.97	64	1.0	301.7	603.43	23.0	27.2	5	10.26	14.95	15.95	134.4	1679.2	2908.6	241.6	1471.0	**1163.42**	**490.33**
23.00	24.50	23.75	1.50	22.00	20.26	10.26	142.29	4.71	27.2	27.2	1.0	344.74	970.71	5	1.0	23.6	627.00	24.5	30.1	0	8.96	21.76	22.91	134.4	2379.4	3977.1	259.3	1857.0	**1590.83**	**619.00**
24.50	26.00	25.25	1.50	23.50	18.96	8.96	142.29	4.71	30.1	30.1	1.0	390.79	1361.50	0	1.0	0.0	627.00	26.0	30.6	0	8.47	24.28	25.48	134.4	2649.5	4638.0	277.0	2265.5	**1855.21**	**755.15**
26.00	27.50	26.75	1.50	25.00	18.47	8.47	142.29	4.71	30.6	30.6	1.0	408.61	1770.11	0	1.0	0.0	627.00	27.5	29.4	0	9.63	19.91	21.02	134.4	2182.3	4579.4	294.6	2691.8	**1831.77**	**897.25**
27.50	29.00	28.25	1.50	26.50	19.63	9.63	142.29	4.71	29.4	29.4	1.0	377.97	2148.08	0	1.0	0.0	627.00	29.0	29.1	0	8.91	19.23	20.33	134.4	2102.6	4877.7	312.3	3087.4	**1951.07**	**1029.13**
29.00	30.00	29.50	1.00	27.50	18.91	8.91	142.29	3.14	29.1	29.1	1.0	248.91	2396.99	0	1.0	0.0	627.00	30.0	29.1	0	8.91	19.23	20.33	134.4	2102.6	5126.6	324.1	3348.1	**2050.63**	**1116.03**
30.00	30.50	30.25	0.50	28.00	18.91	8.91	142.29	1.57	29.1	29.1	1.0	124.45	2521.44	0	1.0	0.0	627.00	30.5	29.1	0	9.23	19.23	20.33	134.4	2105.1	5253.6	330.0	3478.4	**2101.43**	**1159.48**
30.50	32.00	31.25	1.50	29.50	19.23	9.23	142.29	4.71	29.1	29.1	1.0	373.36	2894.80	0	1.0	0.0	627.00	32.0	26.0	4	8.48	12.25	13.18	134.4	1366.3	4888.1	347.7	3869.5	**1955.24**	**1289.83**
32.00	32.50	32.25	0.50	30.00	18.48	8.48	142.29	1.57	26.0	26.0	1.0	109.06	3003.86	4	1.0	6.3	633.29	32.5	26.0	4	8.48	12.25	13.18	134.4	1366.3	5003.4	353.6	3990.7	**2001.38**	**1330.24**
32.50	33.50	33.00	1.00	31.00	18.48	8.48	142.29	3.14	26.0	26.0	1.0	218.11	3221.97	4	1.0	12.6	645.86	33.5	25.9	5	8.97	12.03	12.95	134.4	1351.3	5219.1	365.4	4233.2	**2087.66**	**1411.06**
33.50	35.00	34.25	1.50	32.50	18.97	8.97	142.29	4.71	25.9	25.9	1.0	325.72	3547.69	5	1.0	23.6	669.43	35.0	26.1	5	9.08	12.48	13.41	134.4	1401.1	5618.2	383.0	4600.2	**2247.28**	**1533.39**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m) From	Layers (m) To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi: ϕ	δ	Ki	Qi	ΣQi	Ultimate Shaft Cohesion Quc= Σα.c.Asi: c	α	α.c.Asi	ΣQi	Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ): Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
35.00	36.50	35.75	1.50	34.00	19.08	9.08	142.29	4.71	26.1	26.1	1.0	328.62	3876.31	5	1.0	23.6	693.00	36.5	26.1	5	9.03	12.48	13.41	134.4	1400.8	5970.1	400.7	4970.0	**2388.05**	**1656.68**
36.50	37.50	37.00	1.00	35.00	19.03	9.03	142.29	3.14	26.1	26.1	1.0	219.08	4095.39	5	1.0	15.7	708.71	37.5	26.1	4	9.03	12.48	13.41	134.4	1393.7	6197.9	412.5	5216.6	**2479.14**	**1738.87**
37.50	38.00	37.75	0.50	35.50	19.03	9.03	142.29	1.57	26.1	26.1	1.0	109.54	4204.93	4	1.0	6.3	715.00	38.0	26.1	4	9.08	12.48	13.41	134.4	1394.0	6313.9	418.4	5338.3	**2525.58**	**1779.44**
38.00	40.00	39.00	2.00	37.50	19.08	9.08	142.29	6.29	26.1	26.1	1.0	438.16	4643.09	4	1.0	25.1	740.14	40.0	26.1	4	9.08	12.48	13.41	134.4	1394.0	6777.2	442.0	5825.2	**2710.90**	**1941.73**
BORE NO: P108, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.39	9.39	25.82	1.57	27.0	27.0	1.0	20.68	0	4	1.0	6.3	0	3.0	27.0	4	9.39	14.50	15.49	28.2	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.50	19.39	9.39	32.87	3.14	27.0	27.0	1.0	52.63	0	4	1.0	12.6	0	4.0	23.9	0	9.39	9.21	9.67	37.6	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	5.00	4.50	1.00	2.50	19.39	9.39	42.26	3.14	23.9	23.9	1.0	58.85	0	0	1.0	0.0	0	5.0	14.7	37	10.26	3.85	2.56	47.0	0	0.0	29.5	29.5	**0.00**	**9.82**
5.00	6.00	5.50	1.00	3.50	20.26	10.26	52.08	3.14	14.7	14.7	1.0	42.94	0	37	1.0	116.3	0	6.0	14.7	37	10.26	3.85	2.56	57.2	0	0.0	41.3	41.3	**0.00**	**13.75**
6.00	7.00	6.50	1.00	4.50	20.26	10.26	62.34	3.14	14.7	14.7	1.0	51.40	0	37	1.0	116.3	0	7.0	11.1	56	10.26	2.79	1.53	67.5	0	0.0	53.0	53.0	**0.00**	**17.68**
7.00	8.00	7.50	1.00	5.50	20.26	10.26	72.60	3.14	11.1	11.1	1.0	44.77	0	56	1.0	176.0	0	8.0	11.1	56	11.34	2.79	1.53	77.7	0	0.0	64.8	64.8	**0.00**	**21.61**
8.00	9.00	8.50	1.00	6.50	21.34	11.34	83.40	3.14	11.1	11.1	1.0	51.42	0	56	1.0	176.0	0	9.0	11.1	56	11.34	2.79	1.53	89.1	598.3	598.3	76.6	76.6	**239.33**	**25.54**
9.00	10.00	9.50	1.00	7.50	21.34	11.34	94.74	3.14	11.1	11.1	1.0	58.42	58.42	56	1.0	176.0	176.00	10.0	9.4	60	11.34	2.36	1.13	100.4	615.7	850.1	88.4	322.8	**340.03**	**107.60**
10.00	11.00	10.50	1.00	8.50	21.34	11.34	106.08	3.14	9.4	9.4	1.0	55.19	113.61	60	1.0	188.6	364.57	11.0	10.1	58	10.79	2.50	1.25	111.8	634.9	1113.1	100.2	578.4	**445.23**	**192.79**
11.00	12.50	11.75	1.50	10.00	20.79	10.79	119.84	4.71	10.1	10.1	1.0	100.64	214.25	58	1.0	273.4	638.00	12.5	10.1	58	10.79	2.50	1.25	127.9	666.7	1518.9	117.9	970.1	**607.57**	**323.37**
12.50	15.50	14.00	3.00	13.00	20.79	10.79	144.12	9.43	10.1	10.1	1.0	242.05	456.29	58	1.0	546.9	1184.86	15.5	10.0	60	10.60	2.47	1.22	127.9	677.7	2318.8	153.2	1794.4	**927.52**	**598.12**
15.50	17.00	16.25	1.50	14.50	20.60	10.60	144.12	4.71	10.0	10.0	1.0	119.80	576.09	60	1.0	282.9	1467.71	17.0	27.2	0	10.60	14.95	15.95	127.9	1569.6	3613.4	170.9	2214.7	**1445.37**	**738.23**
17.00	18.50	17.75	1.50	16.00	20.60	10.60	144.12	4.71	27.2	27.2	1.0	349.18	925.27	0	1.0	0.0	1467.71	18.5	12.2	42	10.49	3.12	1.85	127.9	617.9	3010.9	188.6	2581.6	**1204.35**	**860.52**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
18.50	21.50	20.00	3.00	19.00	20.49	10.49	144.12	9.43	12.2	12.2	1.0	293.79	1219.06	42	1.0	396.0	1863.71	21.5	12.2	42	10.49	3.12	1.85	127.9	617.9	3700.7	223.9	3306.7	**1480.26**	**1102.24**
21.50	23.00	22.25	1.50	20.50	20.49	10.49	144.12	4.71	12.2	12.2	1.0	146.90	1365.96	42	1.0	198.0	2061.71	23.0	12.2	42	10.49	3.12	1.85	127.9	617.9	4045.6	241.6	3669.3	**1618.22**	**1223.09**
23.00	24.50	23.75	1.50	22.00	20.49	10.49	144.12	4.71	12.2	12.2	1.0	146.90	1512.86	42	1.0	198.0	2259.71	24.5	14.0	72	10.74	3.65	2.36	127.9	886.0	4658.6	259.3	4031.9	**1863.43**	**1343.95**
24.50	26.00	25.25	1.50	23.50	20.74	10.74	144.12	4.71	14.0	14.0	1.0	169.40	1682.26	72	1.0	339.4	2599.14	26.0	31.3	0	10.74	27.81	29.06	127.9	2917.9	7199.3	277.0	4558.4	**2879.73**	**1519.45**
26.00	27.50	26.75	1.50	25.00	20.74	10.74	144.12	4.71	31.3	31.3	1.1	439.95	2122.20	0	1.0	0.0	2599.14	27.5	31.3	0	10.74	27.81	29.06	127.9	2917.9	7639.3	294.6	5016.0	**3055.71**	**1672.00**
27.50	29.00	28.25	1.50	26.50	20.74	10.74	144.12	4.71	31.3	31.3	1.1	439.95	2562.15	0	1.0	0.0	2599.14	29.0	31.3	0	10.74	27.81	29.06	127.9	2917.9	8079.2	312.3	5473.6	**3231.68**	**1824.54**
29.00	30.00	29.50	1.00	27.50	20.74	10.74	144.12	3.14	31.3	31.3	1.1	293.30	2855.45	0	1.0	0.0	2599.14	30.0	31.1	0	9.08	26.80	28.04	127.9	2794.0	8248.6	324.1	5778.7	**3299.45**	**1926.23**
30.00	30.50	30.25	0.50	28.00	19.08	9.08	144.12	1.57	31.1	31.1	1.1	144.13	2999.58	0	1.0	0.0	2599.14	30.5	31.1	0	8.96	26.80	28.04	127.9	2792.7	8391.4	330.0	5928.7	**3356.57**	**1976.24**
30.50	32.00	31.25	1.50	29.50	18.96	8.96	144.12	4.71	31.1	31.1	1.1	432.40	3431.98	0	1.0	0.0	2599.14	32.0	23.0	35	8.54	8.56	8.68	127.9	1137.1	7168.2	347.7	6378.8	**2867.28**	**2126.27**
32.00	32.50	32.25	0.50	30.00	18.54	8.54	144.12	1.57	23.0	23.0	1.0	96.13	3528.11	35	1.0	55.0	2654.14	32.5	23.0	35	8.54	8.56	8.68	127.9	1137.1	7319.3	353.6	6535.8	**2927.74**	**2178.61**
32.50	33.50	33.00	1.00	31.00	18.54	8.54	144.12	3.14	23.0	23.0	1.0	192.27	3720.37	35	1.0	110.0	2764.14	33.5	18.0	48	8.62	5.42	4.29	127.9	898.4	7382.9	365.4	6849.9	**2953.16**	**2283.29**
33.50	35.00	34.25	1.50	32.50	18.62	8.62	144.12	4.71	18.0	18.0	1.0	220.76	3941.13	48	1.0	226.3	2990.43	35.0	18.0	48	8.57	5.42	4.29	127.9	898.3	7829.9	383.0	7314.6	**3131.95**	**2438.20**
35.00	36.50	35.75	1.50	34.00	18.57	8.57	144.12	4.71	18.0	18.0	1.0	220.76	4161.89	48	1.0	226.3	3216.71	36.5	31.5	0	8.88	28.82	30.09	127.9	3001.5	10380.1	400.7	7779.3	**4152.05**	**2593.11**
36.50	37.50	37.00	1.00	35.00	18.88	8.88	144.12	3.14	31.5	31.5	1.1	298.38	4460.27	0	1.0	0.0	3216.71	37.5	31.0	0	8.88	26.30	27.53	127.9	2739.4	10416.4	412.5	8089.5	**4166.56**	**2696.50**
37.50	38.00	37.75	0.50	35.50	18.88	8.88	144.12	1.57	31.0	31.0	1.1	142.88	4603.16	0	1.0	0.0	3216.71	38.0	31.0	0	8.82	26.30	27.53	127.9	2738.8	10558.6	418.4	8238.3	**4223.45**	**2746.09**
38.00	40.00	39.00	2.00	37.50	18.82	8.82	144.12	6.29	31.0	31.0	1.1	571.53	5174.69	0	1.0	0.0	3216.71	40.0	31.0	0	8.82	26.30	27.53	127.9	2738.8	11130.2	442.0	8833.4	**4452.06**	**2944.46**
BORE NO: P109, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.67	9.67	26.59	1.57	24.3	24.3	1.0	18.87	0	0	1.0	0.0	0	3.0	26.5	7	9.67	13.38	14.34	29.0	0	0.0	5.9	5.9	**0.00**	**1.96**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
3.00	4.00	3.50	1.00	1.50	19.67	9.67	33.85	3.14	26.5	26.5	1.0	53.03	0	7	1.0	22.0	0	4.0	23.5	9	9.67	8.92	9.23	38.7	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	5.00	4.50	1.00	2.50	19.67	9.67	43.52	3.14	23.5	23.5	1.0	59.47	0	9	1.0	28.3	0	5.0	23.5	9	10.86	8.92	9.23	48.4	0	0.0	29.5	29.5	**0.00**	**9.82**
5.00	6.00	5.50	1.00	3.50	20.86	10.86	53.78	3.14	23.5	23.5	1.0	73.49	0	9	1.0	28.3	0	6.0	23.5	9	10.86	8.92	9.23	59.2	0	0.0	41.3	41.3	**0.00**	**13.75**
6.00	7.00	6.50	1.00	4.50	20.86	10.86	64.64	3.14	23.5	23.5	1.0	88.33	0	9	1.0	28.3	0	7.0	26.6	0	9.89	13.60	14.57	70.1	0	0.0	53.0	53.0	**0.00**	**17.68**
7.00	9.00	8.00	2.00	6.50	19.89	9.89	79.96	6.29	26.6	26.6	1.0	251.69	0	0	1.0	0.0	0	9.0	14.3	29	9.89	3.74	2.45	89.9	0	0.0	76.6	76.6	**0.00**	**25.54**
9.00	10.00	9.50	1.00	7.50	19.89	9.89	94.80	3.14	14.3	14.3	1.0	75.94	0	29	1.0	91.1	0	10.0	14.3	29	9.93	3.74	2.45	99.7	0	0.0	88.4	88.4	**0.00**	**29.46**
10.00	12.50	11.25	2.50	10.00	19.93	9.93	112.15	7.86	14.3	14.3	1.0	224.61	0	29	1.0	227.9	0	12.5	12.0	33	9.93	3.06	1.79	124.6	0	0.0	117.9	117.9	**0.00**	**39.29**
12.50	14.00	13.25	1.50	11.50	19.93	9.93	132.01	4.71	12.0	12.0	1.0	132.28	0	33	1.0	155.6	0	14.0	12.5	45	10.33	3.20	1.94	139.5	677.1	677.1	135.5	135.5	**270.86**	**45.18**
14.00	15.50	14.75	1.50	13.00	20.33	10.33	147.21	4.71	12.5	12.5	1.0	153.85	153.85	45	1.0	212.1	212.14	15.5	24.5	28	10.33	9.64	10.33	139.5	1296.2	1662.2	153.2	519.2	**664.89**	**173.07**
15.50	17.00	16.25	1.50	14.50	20.33	10.33	147.21	4.71	24.5	24.5	1.0	316.26	470.12	28	1.0	132.0	344.14	17.0	28.3	4	10.30	17.43	18.48	139.5	2013.1	2827.4	170.9	985.2	**1130.95**	**328.38**
17.00	18.50	17.75	1.50	16.00	20.30	10.30	147.21	4.71	28.3	28.3	1.0	373.67	843.78	4	1.0	18.9	363.00	18.5	18.5	48	10.30	5.64	4.57	139.5	976.1	2182.9	188.6	1395.4	**873.17**	**465.12**
18.50	20.00	19.25	1.50	17.50	20.30	10.30	147.21	4.71	18.5	18.5	1.0	232.20	1075.99	48	1.0	226.3	589.29	20.0	18.5	48	10.30	5.64	4.57	139.5	976.1	2641.4	206.3	1871.5	**1056.56**	**623.84**
20.00	21.50	20.75	1.50	19.00	20.30	10.30	147.21	4.71	18.5	18.5	1.0	232.20	1308.19	48	1.0	226.3	815.57	21.5	18.5	48	8.85	5.64	4.57	139.5	973.5	3097.3	223.9	2347.7	**1238.92**	**782.56**
21.50	23.00	22.25	1.50	20.50	18.85	8.85	147.21	4.71	18.5	18.5	1.0	232.20	1540.39	48	1.0	226.3	1041.86	23.0	32.5	0	9.01	33.85	35.22	139.5	3834.1	6416.4	241.6	2823.9	**2566.55**	**941.28**
23.00	24.50	23.75	1.50	22.00	19.01	9.01	147.21	4.71	32.5	32.5	1.1	497.38	2037.77	0	1.0	0.0	1041.86	24.5	32.3	0	8.18	32.85	34.19	139.5	3709.0	6788.6	259.3	3338.9	**2715.43**	**1112.97**
24.50	26.00	25.25	1.50	23.50	18.18	8.18	147.21	4.71	32.3	32.3	1.1	489.17	2526.93	0	1.0	0.0	1041.86	26.0	30.8	0	9.09	25.29	26.50	139.5	2865.7	6434.5	277.0	3845.8	**2573.82**	**1281.92**
26.00	27.50	26.75	1.50	25.00	19.09	9.09	147.21	4.71	30.8	30.8	1.0	430.24	2957.18	0	1.0	0.0	1041.86	27.5	30.8	0	9.35	25.29	26.50	139.5	2868.5	6867.5	294.6	4293.7	**2747.00**	**1431.23**
27.50	29.00	28.25	1.50	26.50	19.35	9.35	147.21	4.71	30.8	30.8	1.0	430.24	3387.42	0	1.0	0.0	1041.86	29.0	30.8	0	8.86	25.29	26.50	139.5	2863.4	7292.6	312.3	4741.6	**2917.05**	**1580.53**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
29.00	30.00	29.50	1.00	27.50	18.86	8.86	147.21	3.14	30.8	30.8	1.0	286.83	3674.25	0	1.0	0.0	1041.86	30.0	30.8	0	8.86	25.29	26.50	139.5	2863.4	7579.5	324.1	5040.2	**3031.78**	**1680.07**
30.00	30.50	30.25	0.50	28.00	18.86	8.86	147.21	1.57	30.8	30.8	1.0	143.41	3817.66	0	1.0	0.0	1041.86	30.5	30.8	0	8.47	25.29	26.50	139.5	2859.3	7718.8	330.0	5189.5	**3087.52**	**1729.84**
30.50	32.00	31.25	1.50	29.50	18.47	8.47	147.21	4.71	30.8	30.8	1.0	430.24	4247.90	0	1.0	0.0	1041.86	32.0	16.5	49	8.86	4.68	3.47	139.5	871.2	6160.9	347.7	5637.4	**2464.38**	**1879.15**
32.00	32.50	32.25	0.50	30.00	18.86	8.86	147.21	1.57	16.5	16.5	1.0	68.52	4316.42	49	1.0	77.0	1118.86	32.5	16.5	49	8.86	4.68	3.47	139.5	871.2	6306.5	353.6	5788.9	**2522.58**	**1929.62**
32.50	33.50	33.00	1.00	31.00	18.86	8.86	147.21	3.14	16.5	16.5	1.0	137.04	4453.47	49	1.0	154.0	1272.86	33.5	17.0	52	9.12	4.92	3.75	139.5	920.7	6647.0	365.4	6091.7	**2658.80**	**2030.56**
33.50	35.00	34.25	1.50	32.50	19.12	9.12	147.21	4.71	17.0	17.0	1.0	212.17	4665.64	52	1.0	245.1	1518.00	35.0	17.0	52	9.23	4.92	3.75	139.5	920.8	7104.5	383.0	6566.7	**2841.79**	**2188.89**
35.00	36.50	35.75	1.50	34.00	19.23	9.23	147.21	4.71	17.0	17.0	1.0	212.17	4877.81	52	1.0	245.1	1763.14	36.5	29.6	0	8.69	20.36	21.48	139.5	2304.2	8945.1	400.7	7041.7	**3578.04**	**2347.22**
36.50	37.50	37.00	1.00	35.00	18.69	8.69	147.21	3.14	29.6	29.6	1.0	262.82	5140.63	0	1.0	0.0	1763.14	37.5	29.6	0	8.69	20.36	21.48	139.5	2304.2	9207.9	412.5	7316.3	**3683.17**	**2438.76**
37.50	38.00	37.75	0.50	35.50	18.69	8.69	147.21	1.57	29.6	29.6	1.0	131.41	5272.04	0	1.0	0.0	1763.14	38.0	28.7	0	8.71	18.33	19.40	139.5	2075.1	9110.3	418.4	7453.6	**3644.13**	**2484.53**
38.00	40.00	39.00	2.00	37.50	18.71	8.71	147.21	6.29	28.7	28.7	1.0	506.59	5778.63	0	1.0	0.0	1763.14	40.0	28.7	0	8.71	18.33	19.40	139.5	2075.1	9616.9	442.0	7983.7	**3846.77**	**2661.25**
BORE NO: P110, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.86	9.86	27.12	1.57	26.6	26.6	1.0	21.34	0	3	1.0	4.7	0	3.0	26.6	3	9.86	13.60	14.57	29.6	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.50	19.86	9.86	34.51	3.14	26.6	26.6	1.0	54.31	0	3	1.0	9.4	0	4.0	12.5	47	9.86	3.20	1.94	39.4	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	5.00	4.50	1.00	2.50	19.86	9.86	44.37	3.14	12.5	12.5	1.0	30.92	0	47	1.0	147.7	0	5.0	12.5	47	10.66	3.20	1.94	49.3	464.6	464.6	29.5	29.5	**185.83**	**9.82**
5.00	6.00	5.50	1.00	3.50	20.66	10.66	54.63	3.14	12.5	12.5	1.0	38.06	38.06	47	1.0	147.7	147.71	6.0	10.1	51	10.66	2.50	1.25	60.0	483.6	669.4	41.3	227.0	**267.76**	**75.68**
6.00	7.00	6.50	1.00	4.50	20.66	10.66	65.29	3.14	10.1	10.1	1.0	36.55	74.61	51	1.0	160.3	308.00	7.0	10.1	51	10.46	2.50	1.25	70.6	504.5	887.1	53.0	435.7	**354.83**	**145.22**
7.00	9.00	8.00	2.00	6.50	20.46	10.46	81.08	6.29	10.1	10.1	1.0	90.78	165.40	51	1.0	320.6	628.57	9.0	10.1	51	10.46	2.50	1.25	91.5	545.5	1339.5	76.6	870.6	**535.80**	**290.19**
9.00	10.00	9.50	1.00	7.50	20.46	10.46	96.77	3.14	10.1	10.1	1.0	54.17	219.57	51	1.0	160.3	788.86	10.0	25.3	12	10.60	10.68	11.57	102.0	988.6	1997.0	88.4	1096.8	**798.82**	**365.61**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
10.00	12.50	11.25	2.50	10.00	20.60	10.60	115.25	7.86	25.3	25.3	1.0	428.04	647.62	12	1.0	94.3	883.14	12.5	25.3	12	10.60	10.68	11.57	128.5	1210.9	2741.7	117.9	1648.6	**1096.66**	**549.54**
12.50	14.00	13.25	1.50	11.50	20.60	10.60	136.45	4.71	25.3	25.3	1.0	304.07	951.69	12	1.0	56.6	939.71	14.0	11.6	55	10.49	2.94	1.68	144.4	729.5	2620.9	135.5	2026.9	**1048.34**	**675.65**
14.00	15.50	14.75	1.50	13.00	20.49	10.49	152.27	4.71	11.6	11.6	1.0	147.35	1099.04	55	1.0	259.3	1199.00	15.5	12.5	50	10.49	3.20	1.94	144.4	725.1	3023.1	153.2	2451.2	**1209.24**	**817.08**
15.50	18.50	17.00	3.00	16.00	20.49	10.49	152.27	9.43	12.5	12.5	1.0	318.28	1417.31	50	1.0	471.4	1670.43	18.5	12.5	50	9.18	3.20	1.94	144.4	724.1	3811.8	188.6	3276.3	**1524.72**	**1092.10**
18.50	20.00	19.25	1.50	17.50	19.18	9.18	152.27	4.71	12.5	12.5	1.0	159.14	1576.45	50	1.0	235.7	1906.14	20.0	9.0	51	8.71	2.29	1.07	144.4	624.1	4106.7	206.3	3688.8	**1642.68**	**1229.62**
20.00	21.50	20.75	1.50	19.00	18.71	8.71	152.27	4.71	9.0	9.0	1.0	113.69	1690.15	51	1.0	240.4	2146.57	21.5	20.5	25	8.95	6.76	5.94	144.4	964.6	4801.4	223.9	4060.6	**1920.54**	**1353.55**
21.50	23.00	22.25	1.50	20.50	18.95	8.95	152.27	4.71	20.5	20.5	1.0	268.39	1958.53	25	1.0	117.9	2264.43	23.0	31.8	0	9.10	30.33	31.63	144.4	3553.9	7776.8	241.6	4464.6	**3110.73**	**1488.19**
23.00	24.50	23.75	1.50	22.00	19.10	9.10	152.27	4.71	31.8	31.8	1.1	485.13	2443.67	0	1.0	0.0	2264.43	24.5	31.8	0	8.84	30.33	31.63	144.4	3550.6	8258.7	259.3	4967.4	**3303.49**	**1655.79**
24.50	26.00	25.25	1.50	23.50	18.84	8.84	152.27	4.71	31.8	31.8	1.1	485.13	2928.80	0	1.0	0.0	2264.43	26.0	33.9	0	7.90	40.91	42.39	144.4	4772.6	9965.8	277.0	5470.2	**3986.33**	**1823.40**
26.00	27.50	26.75	1.50	25.00	17.90	7.90	152.27	4.71	33.9	33.9	1.2	576.42	3505.22	0	1.0	0.0	2264.43	27.5	33.7	0	9.26	39.90	41.37	144.4	4677.2	10446.9	294.6	6064.3	**4178.74**	**2021.43**
27.50	29.00	28.25	1.50	26.50	19.26	9.26	152.27	4.71	33.7	33.7	1.2	567.30	4072.52	0	1.0	0.0	2264.43	29.0	30.0	0	8.05	21.26	22.40	144.4	2482.9	8819.8	312.3	6649.3	**3527.93**	**2216.42**
29.00	30.00	29.50	1.00	27.50	18.05	8.05	152.27	3.14	30.0	30.0	1.0	276.29	4348.82	0	1.0	0.0	2264.43	30.0	30.2	0	8.05	22.27	23.43	144.4	2600.4	9213.7	324.1	6937.4	**3685.47**	**2312.45**
30.00	30.50	30.25	0.50	28.00	18.05	8.05	152.27	1.57	30.2	30.2	1.0	140.66	4489.47	0	1.0	0.0	2264.43	30.5	30.2	0	8.72	22.27	23.43	144.4	2606.6	9360.5	330.0	7083.9	**3744.20**	**2361.30**
30.50	32.00	31.25	1.50	29.50	18.72	8.72	152.27	4.71	30.2	30.2	1.0	421.97	4911.44	0	1.0	0.0	2264.43	32.0	29.8	0	8.98	20.81	21.94	144.4	2438.3	9614.2	347.7	7523.5	**3845.68**	**2507.85**
32.00	32.50	32.25	0.50	30.00	18.98	8.98	152.27	1.57	29.8	29.8	1.0	137.04	5048.47	0	1.0	0.0	2264.43	32.5	29.8	0	8.98	20.81	21.94	144.4	2438.3	9751.2	353.6	7666.5	**3900.50**	**2555.49**
32.50	33.50	33.00	1.00	31.00	18.98	8.98	152.27	3.14	29.8	29.8	1.0	274.07	5322.55	0	1.0	0.0	2264.43	33.5	29.8	0	8.68	20.81	21.94	144.4	2435.8	10022.7	365.4	7952.3	**4009.09**	**2650.78**
33.50	35.00	34.25	1.50	32.50	18.68	8.68	152.27	4.71	29.8	29.8	1.0	411.11	5733.65	0	1.0	0.0	2264.43	35.0	30.2	0	8.73	22.27	23.43	144.4	2606.7	10604.8	383.0	8381.1	**4241.91**	**2793.71**
35.00	36.50	35.75	1.50	34.00	18.73	8.73	152.27	4.71	30.2	30.2	1.0	421.97	6155.62	0	1.0	0.0	2264.43	36.5	26.3	10	9.07	12.97	13.92	144.4	1592.1	10012.2	400.7	8820.8	**4004.88**	**2940.25**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
36.50	37.50	37.00	1.00	35.00	19.07	9.07	152.27	3.14	26.3	26.3	1.0	236.72	6392.34	10	1.0	31.4	2295.86	37.5	25.4	10	9.07	10.90	11.80	144.4	1349.5	10037.7	412.5	9100.7	**4015.09**	**3033.57**
37.50	38.00	37.75	0.50	35.50	19.07	9.07	152.27	1.57	25.4	25.4	1.0	113.62	6505.96	10	1.0	15.7	2311.57	38.0	25.6	10	9.04	11.35	12.26	144.4	1402.1	10219.7	418.4	9235.9	**4087.87**	**3078.64**
38.00	40.00	39.00	2.00	37.50	19.04	9.04	152.27	6.29	25.6	25.6	1.0	458.57	6964.53	10	1.0	62.9	2374.43	40.0	25.6	10	9.04	11.35	12.26	144.4	1402.1	10741.1	442.0	9780.9	**4296.44**	**3260.31**
BORE NO: P111, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	20.04	10.04	27.61	1.57	26.5	26.5	1.0	21.63	21.63	7	1.0	11.0	11.00	3.0	25.9	0	10.04	12.03	12.95	30.1	335.7	368.3	5.9	38.5	**147.34**	**12.84**
3.00	4.00	3.50	1.00	1.50	20.04	10.04	35.14	3.14	25.9	25.9	1.0	53.63	75.26	0	1.0	0.0	11.00	4.0	25.9	0	10.04	12.03	12.95	40.2	430.6	516.8	17.7	103.9	**206.74**	**34.65**
4.00	5.00	4.50	1.00	2.50	20.04	10.04	45.18	3.14	25.9	25.9	1.0	68.95	144.21	0	1.0	0.0	11.00	5.0	11.1	37	9.65	2.79	1.53	50.2	377.6	532.8	29.5	184.7	**213.14**	**61.56**
5.00	6.00	5.50	1.00	3.50	19.65	9.65	55.03	3.14	11.1	11.1	1.0	33.93	178.14	37	1.0	116.3	127.29	6.0	11.2	46	9.65	2.82	1.56	59.9	464.0	769.4	41.3	346.7	**307.75**	**115.56**
6.00	7.00	6.50	1.00	4.50	19.65	9.65	64.68	3.14	11.2	11.2	1.0	40.25	218.38	46	1.0	144.6	271.86	7.0	29.5	0	9.81	20.13	21.25	69.5	1181.3	1671.6	53.0	543.3	**668.63**	**181.09**
7.00	9.00	8.00	2.00	6.50	19.81	9.81	79.31	6.29	29.5	29.5	1.0	282.05	500.43	0	1.0	0.0	271.86	9.0	13.0	48	9.81	3.35	2.08	89.1	582.0	1354.3	76.6	848.9	**541.72**	**282.97**
9.00	10.00	9.50	1.00	7.50	19.81	9.81	94.03	3.14	13.0	13.0	1.0	68.22	568.66	48	1.0	150.9	422.71	10.0	11.0	50	10.14	2.76	1.51	98.9	574.4	1565.8	88.4	1079.8	**626.32**	**359.92**
10.00	12.50	11.25	2.50	10.00	20.14	10.14	111.61	7.86	11.0	11.0	1.0	170.45	739.11	50	1.0	392.9	815.57	12.5	9.5	58	10.47	2.38	1.14	124.3	647.2	2201.9	117.9	1672.5	**880.77**	**557.51**
12.50	15.50	14.00	3.00	13.00	20.47	10.47	139.99	9.43	9.5	9.5	1.0	220.87	959.98	58	1.0	546.9	1362.43	15.5	10.4	56	10.30	2.59	1.33	124.3	654.1	2976.5	153.2	2475.6	**1190.59**	**825.21**
15.50	18.50	17.00	3.00	16.00	20.30	10.30	139.99	9.43	10.4	10.4	1.0	242.24	1202.22	56	1.0	528.0	1890.43	18.5	23.0	46	10.30	8.56	8.68	124.3	1196.3	4288.9	188.6	3281.2	**1715.58**	**1093.74**
18.50	20.00	19.25	1.50	17.50	20.30	10.30	139.99	4.71	23.0	23.0	1.0	280.12	1482.34	46	1.0	216.9	2107.29	20.0	32.3	0	10.30	32.85	34.19	124.3	3345.7	6935.3	206.3	3795.9	**2774.12**	**1265.29**
20.00	21.50	20.75	1.50	19.00	20.30	10.30	139.99	4.71	32.3	32.3	1.1	465.17	1947.51	0	1.0	0.0	2107.29	21.5	32.3	0	10.68	32.85	34.19	124.3	3350.8	7405.6	223.9	4278.7	**2962.23**	**1426.24**
21.50	24.50	23.00	3.00	22.00	20.68	10.68	139.99	9.43	32.3	32.3	1.1	930.33	2877.84	0	1.0	0.0	2107.29	24.5	30.4	0	10.68	23.27	24.45	124.3	2375.3	7360.4	259.3	5244.4	**2944.17**	**1748.14**
24.50	26.00	25.25	1.50	23.50	20.68	10.68	139.99	4.71	30.4	30.4	1.0	394.92	3272.76	0	1.0	0.0	2107.29	26.0	32.5	0	10.68	33.85	35.22	124.3	3453.5	8833.5	277.0	5657.0	**3533.40**	**1885.67**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
26.00	27.50	26.75	1.50	25.00	20.68	10.68	139.99	4.71	32.5	32.5	1.1	472.97	3745.73	0	1.0	0.0	2107.29	27.5	32.3	0	8.04	32.85	34.19	124.3	3315.3	9168.3	294.6	6147.7	**3667.34**	**2049.22**
27.50	29.00	28.25	1.50	26.50	18.04	8.04	139.99	4.71	32.3	32.3	1.1	465.17	4210.90	0	1.0	0.0	2107.29	29.0	32.3	0	8.40	32.85	34.19	124.3	3320.2	9638.3	312.3	6630.5	**3855.34**	**2210.17**
29.00	30.00	29.50	1.00	27.50	18.40	8.40	139.99	3.14	32.3	32.3	1.1	310.11	4521.01	0	1.0	0.0	2107.29	30.0	32.3	0	8.40	32.85	34.19	124.3	3320.2	9948.5	324.1	6952.4	**3979.38**	**2317.47**
30.00	30.50	30.25	0.50	28.00	18.40	8.40	139.99	1.57	32.3	32.3	1.1	155.06	4676.07	0	1.0	0.0	2107.29	30.5	32.3	0	8.39	32.85	34.19	124.3	3320.0	10103.4	330.0	7113.4	**4041.35**	**2371.12**
30.50	32.00	31.25	1.50	29.50	18.39	8.39	139.99	4.71	32.3	32.3	1.1	465.17	5141.24	0	1.0	0.0	2107.29	32.0	32.3	0	9.03	32.85	34.19	124.3	3328.6	10577.1	347.7	7596.2	**4230.85**	**2532.07**
32.00	32.50	32.25	0.50	30.00	19.03	9.03	139.99	1.57	32.3	32.3	1.1	155.06	5296.29	0	1.0	0.0	2107.29	32.5	32.3	0	9.03	32.85	34.19	124.3	3328.6	10732.2	353.6	7757.1	**4292.88**	**2585.72**
32.50	33.50	33.00	1.00	31.00	19.03	9.03	139.99	3.14	32.3	32.3	1.1	310.11	5606.40	0	1.0	0.0	2107.29	33.5	32.3	0	8.99	32.85	34.19	124.3	3328.1	11041.8	365.4	8079.0	**4416.71**	**2693.01**
33.50	35.00	34.25	1.50	32.50	18.99	8.99	139.99	4.71	32.3	32.3	1.1	465.17	6071.57	0	1.0	0.0	2107.29	35.0	32.9	0	8.83	35.87	37.27	124.3	3631.7	11810.6	383.0	8561.9	**4724.24**	**2853.96**
35.00	36.50	35.75	1.50	34.00	18.83	8.83	139.99	4.71	32.9	32.9	1.1	488.83	6560.40	0	1.0	0.0	2107.29	36.5	32.9	0	8.85	35.87	37.27	124.3	3632.0	12299.7	400.7	9068.4	**4919.89**	**3022.80**
36.50	37.50	37.00	1.00	35.00	18.85	8.85	139.99	3.14	32.9	32.9	1.1	325.89	6886.29	0	1.0	0.0	2107.29	37.5	32.9	0	8.85	35.87	37.27	124.3	3632.0	12625.6	412.5	9406.1	**5050.24**	**3135.36**
37.50	38.00	37.75	0.50	35.50	18.85	8.85	139.99	1.57	32.9	32.9	1.1	162.94	7049.23	0	1.0	0.0	2107.29	38.0	19.5	45	8.66	6.13	5.12	124.3	934.6	10091.1	418.4	9574.9	**4036.45**	**3191.64**
38.00	40.00	39.00	2.00	37.50	18.66	8.66	139.99	6.29	19.5	19.5	1.0	311.59	7360.82	45	1.0	282.9	2390.14	40.0	19.0	45	8.61	5.87	4.84	124.3	907.6	10658.6	442.0	10192.9	**4263.42**	**3397.64**
BORE NO: P112, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	20.08	10.08	27.72	1.57	26.0	26.0	1.0	21.25	0	0	1.0	0.0	0	3.0	26.0	0	10.08	12.25	13.18	30.2	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.50	20.08	10.08	35.28	3.14	26.0	26.0	1.0	54.08	0	0	1.0	0.0	0	4.0	22.5	14	10.08	8.20	8.14	40.3	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	5.00	4.50	1.00	2.50	20.08	10.08	45.36	3.14	22.5	22.5	1.0	59.05	0	14	1.0	44.0	0	5.0	10.0	57	10.08	2.47	1.22	50.4	0	0.0	29.5	29.5	**0.00**	**9.82**
5.00	6.00	5.50	1.00	3.50	20.08	10.08	55.44	3.14	10.0	10.0	1.0	30.72	0	57	1.0	179.1	0	6.0	12.5	53	10.08	3.20	1.94	60.5	0	0.0	41.3	41.3	**0.00**	**13.75**
6.00	7.00	6.50	1.00	4.50	20.08	10.08	65.52	3.14	12.5	12.5	1.0	45.65	0	53	1.0	166.6	0	7.0	12.5	53	10.08	3.20	1.94	70.6	0	0.0	53.0	53.0	**0.00**	**17.68**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
7.00	8.00	7.50	1.00	5.50	20.08	10.08	75.60	3.14	12.5	12.5	1.0	52.67	0	53	1.0	166.6	0	8.0	12.5	53	10.23	3.20	1.94	80.6	0	0.0	64.8	64.8	**0.00**	**21.61**
8.00	9.00	8.50	1.00	6.50	20.23	10.23	85.76	3.14	12.5	12.5	1.0	59.75	0	53	1.0	166.6	0	9.0	9.5	57	10.23	2.38	1.14	90.9	577.6	577.6	76.6	76.6	**231.04**	**25.54**
9.00	10.00	9.50	1.00	7.50	20.23	10.23	95.98	3.14	9.5	9.5	1.0	50.48	50.48	57	1.0	179.1	179.14	10.0	9.5	57	9.36	2.38	1.14	101.1	596.3	826.0	88.4	318.0	**330.38**	**106.01**
10.00	12.50	11.25	2.50	10.00	19.36	9.36	112.80	7.86	9.5	9.5	1.0	148.31	198.80	57	1.0	447.9	627.00	12.5	9.1	61	9.36	2.31	1.08	124.5	661.1	1486.9	117.9	943.7	**594.76**	**314.55**
12.50	14.00	13.25	1.50	11.50	19.36	9.36	131.52	4.71	9.1	9.1	1.0	99.31	298.11	61	1.0	287.6	914.57	14.0	9.1	61	10.37	2.31	1.08	138.5	687.0	1899.7	135.5	1348.2	**759.87**	**449.40**
14.00	15.50	14.75	1.50	13.00	20.37	10.37	146.32	4.71	9.1	9.1	1.0	110.49	408.59	61	1.0	287.6	1202.14	15.5	26.5	7	10.08	13.38	14.34	138.5	1562.5	3173.2	153.2	1763.9	**1269.29**	**587.98**
15.50	18.50	17.00	3.00	16.00	20.08	10.08	146.32	9.43	26.5	26.5	1.0	687.83	1096.42	7	1.0	66.0	1268.14	18.5	23.5	18	10.08	8.92	9.23	138.5	1134.8	3499.4	188.6	2553.1	**1399.75**	**851.04**
18.50	20.00	19.25	1.50	17.50	20.08	10.08	146.32	4.71	23.5	23.5	1.0	299.93	1396.34	18	1.0	84.9	1353.00	20.0	13.5	63	10.08	3.50	2.22	138.5	835.3	3584.6	206.3	2955.6	**1433.85**	**985.20**
20.00	21.50	20.75	1.50	19.00	20.08	10.08	146.32	4.71	13.5	13.5	1.0	165.60	1561.95	63	1.0	297.0	1650.00	21.5	24.0	60	10.15	9.28	9.78	138.5	1473.4	4685.4	223.9	3435.9	**1874.16**	**1145.29**
21.50	23.00	22.25	1.50	20.50	20.15	10.15	146.32	4.71	24.0	24.0	1.0	307.11	1869.06	60	1.0	282.9	1932.86	23.0	27.8	4	10.15	16.31	17.33	138.5	1872.3	5674.2	241.6	4043.5	**2269.68**	**1347.84**
23.00	24.50	23.75	1.50	22.00	20.15	10.15	146.32	4.71	27.8	27.8	1.0	363.68	2232.74	4	1.0	18.9	1951.71	24.5	10.3	60	10.15	2.56	1.31	138.5	708.0	4892.4	259.3	4443.7	**1956.96**	**1481.25**
24.50	26.00	25.25	1.50	23.50	20.15	10.15	146.32	4.71	10.3	10.3	1.0	125.35	2358.09	60	1.0	282.9	2234.57	26.0	29.8	0	10.15	20.81	21.94	138.5	2352.6	6945.3	277.0	4869.6	**2778.11**	**1623.21**
26.00	27.50	26.75	1.50	25.00	20.15	10.15	146.32	4.71	29.8	29.8	1.0	395.04	2753.13	0	1.0	0.0	2234.57	27.5	29.8	0	8.74	20.81	21.94	138.5	2340.5	7328.2	294.6	5282.3	**2931.27**	**1760.78**
27.50	29.00	28.25	1.50	26.50	18.74	8.74	146.32	4.71	29.8	29.8	1.0	395.04	3148.18	0	1.0	0.0	2234.57	29.0	29.8	0	8.60	20.81	21.94	138.5	2339.3	7722.0	312.3	5695.1	**3088.80**	**1898.36**
29.00	30.00	29.50	1.00	27.50	18.60	8.60	146.32	3.14	29.8	29.8	1.0	263.36	3411.54	0	1.0	0.0	2234.57	30.0	29.1	0	8.60	19.23	20.33	138.5	2162.2	7808.3	324.1	5970.2	**3123.33**	**1990.07**
30.00	30.50	30.25	0.50	28.00	18.60	8.60	146.32	1.57	29.1	29.1	1.0	127.98	3539.51	0	1.0	0.0	2234.57	30.5	23.5	36	8.64	8.92	9.23	138.5	1256.9	7031.0	330.0	6104.1	**2812.39**	**2034.70**
30.50	32.00	31.25	1.50	29.50	18.64	8.64	146.32	4.71	23.5	23.5	1.0	299.93	3839.44	36	1.0	169.7	2404.29	32.0	23.5	36	8.90	8.92	9.23	138.5	1257.8	7501.5	347.7	6591.4	**3000.62**	**2197.13**
32.00	32.50	32.25	0.50	30.00	18.90	8.90	146.32	1.57	23.5	23.5	1.0	99.98	3939.42	36	1.0	56.6	2460.86	32.5	12.0	60	8.90	3.06	1.79	138.5	763.4	7163.7	353.6	6753.8	**2865.48**	**2251.28**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
32.50	33.50	33.00	1.00	31.00	18.90	8.90	146.32	3.14	12.0	12.0	1.0	97.75	4037.16	60	1.0	188.6	2649.43	33.5	12.0	60	8.58	3.06	1.79	138.5	763.2	7449.8	365.4	7051.9	**2979.91**	**2350.65**
33.50	35.00	34.25	1.50	32.50	18.58	8.58	146.32	4.71	12.0	12.0	1.0	146.62	4183.78	60	1.0	282.9	2932.29	35.0	12.0	60	8.50	3.06	1.79	138.5	763.1	7879.2	383.0	7499.1	**3151.68**	**2499.70**
35.00	36.50	35.75	1.50	34.00	18.50	8.50	146.32	4.71	12.0	12.0	1.0	146.62	4330.40	60	1.0	282.9	3215.14	36.5	29.9	0	8.88	21.03	22.17	138.5	2367.0	9912.5	400.7	7946.3	**3965.01**	**2648.75**
36.50	37.50	37.00	1.00	35.00	18.88	8.88	146.32	3.14	29.9	29.9	1.0	264.43	4594.82	0	1.0	0.0	3215.14	37.5	30.5	0	8.88	23.78	24.96	138.5	2675.4	10485.4	412.5	8222.5	**4194.15**	**2740.82**
37.50	38.00	37.75	0.50	35.50	18.88	8.88	146.32	1.57	30.5	30.5	1.0	138.82	4733.65	0	1.0	0.0	3215.14	38.0	30.5	0	9.00	23.78	24.96	138.5	2676.6	10625.4	418.4	8367.2	**4250.15**	**2789.06**
38.00	40.00	39.00	2.00	37.50	19.00	9.00	146.32	6.29	30.5	30.5	1.0	555.29	5288.94	0	1.0	0.0	3215.14	40.0	30.5	0	9.00	23.78	24.96	138.5	2676.6	11180.7	442.0	8946.0	**4472.27**	**2982.02**
BORE NO: P113, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	18.77	8.77	24.12	1.57	24.8	24.8	1.0	17.51	0	0	1.0	0.0	0	3.0	24.3	15	8.77	9.50	10.11	26.3	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.50	18.77	8.77	30.70	3.14	24.3	24.3	1.0	43.56	0	15	1.0	47.1	0	4.0	28.6	1	10.08	18.11	19.17	35.1	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	6.00	5.00	2.00	3.50	20.08	10.08	45.16	6.29	28.6	28.6	1.0	154.77	0	1	1.0	6.3	0	6.0	28.6	1	10.08	18.11	19.17	55.2	868.9	868.9	41.3	41.3	**347.56**	**13.75**
6.00	7.00	6.50	1.00	4.50	20.08	10.08	60.28	3.14	28.6	28.6	1.0	103.29	103.29	1	1.0	3.1	3.14	7.0	8.6	54	10.08	2.22	1.00	65.3	499.7	606.1	53.0	159.5	**242.44**	**53.16**
7.00	8.00	7.50	1.00	5.50	20.08	10.08	70.36	3.14	8.6	8.6	1.0	33.44	136.74	54	1.0	169.7	172.86	8.0	8.6	54	10.75	2.22	1.00	75.4	517.5	827.1	64.8	374.4	**330.84**	**124.80**
8.00	9.00	8.50	1.00	6.50	20.75	10.75	80.78	3.14	8.6	8.6	1.0	38.39	175.13	54	1.0	169.7	342.57	9.0	8.6	54	10.75	2.22	1.00	86.2	536.2	1053.9	76.6	594.3	**421.57**	**198.10**
9.00	10.00	9.50	1.00	7.50	20.75	10.75	91.53	3.14	8.6	8.6	1.0	43.50	218.63	54	1.0	169.7	512.29	10.0	12.1	69	10.75	3.09	1.82	96.9	730.7	1461.6	88.4	819.3	**584.63**	**273.10**
10.00	11.00	10.50	1.00	8.50	20.75	10.75	102.28	3.14	12.1	12.1	1.0	68.91	287.54	69	1.0	216.9	729.14	11.0	12.1	69	11.09	3.09	1.82	107.7	757.0	1773.7	100.2	1116.9	**709.47**	**372.29**
11.00	12.50	11.75	1.50	10.00	21.09	11.09	115.97	4.71	12.1	12.1	1.0	117.20	404.74	69	1.0	325.3	1054.43	12.5	11.0	57	10.20	2.76	1.51	124.3	679.0	2138.2	117.9	1577.0	**855.28**	**525.68**
12.50	15.50	14.00	3.00	13.00	20.20	10.20	139.59	9.43	11.0	11.0	1.0	255.82	660.57	57	1.0	537.4	1591.86	15.5	11.6	58	10.70	2.94	1.68	124.3	704.3	2956.8	153.2	2405.6	**1182.70**	**801.88**
15.50	18.50	17.00	3.00	16.00	20.70	10.70	139.59	9.43	11.6	11.6	1.0	270.15	930.72	58	1.0	546.9	2138.71	18.5	20.7	40	10.70	6.90	6.16	124.3	982.9	4052.4	188.6	3258.0	**1620.95**	**1086.00**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 0.79 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
18.50	20.00	19.25	1.50	17.50	20.70	10.70	139.59	4.71	20.7	20.7	1.0	248.65	1179.37	40	1.0	188.6	2327.29	20.0	21.5	40	10.49	7.48	7.04	124.3	1042.3	4549.0	206.3	3712.9	**1819.58**	**1237.64**
20.00	21.50	20.75	1.50	19.00	20.49	10.49	139.59	4.71	21.5	21.5	1.0	259.21	1438.58	40	1.0	188.6	2515.86	21.5	9.5	60	10.49	2.38	1.14	124.3	661.4	4615.9	223.9	4178.4	**1846.34**	**1392.79**
21.50	23.00	22.25	1.50	20.50	20.49	10.49	139.59	4.71	9.5	9.5	1.0	110.12	1548.70	60	1.0	282.9	2798.71	23.0	9.5	60	10.49	2.38	1.14	124.3	661.4	5008.8	241.6	4589.0	**2003.53**	**1529.67**
23.00	24.50	23.75	1.50	22.00	20.49	10.49	139.59	4.71	9.5	9.5	1.0	110.12	1658.82	60	1.0	282.9	3081.57	24.5	30.4	0	8.83	23.27	24.45	124.3	2357.6	7098.0	259.3	4999.7	**2839.21**	**1666.56**
24.50	26.00	25.25	1.50	23.50	18.83	8.83	139.59	4.71	30.4	30.4	1.0	393.79	2052.61	0	1.0	0.0	3081.57	26.0	31.6	0	8.91	29.32	30.60	124.3	2970.2	8104.4	277.0	5411.2	**3241.77**	**1803.72**
26.00	27.50	26.75	1.50	25.00	18.91	8.91	139.59	4.71	31.6	31.6	1.1	437.22	2489.83	0	1.0	0.0	3081.57	27.5	31.8	0	9.12	30.33	31.63	124.3	3074.8	8646.2	294.6	5866.0	**3458.49**	**1955.35**
27.50	29.00	28.25	1.50	26.50	19.12	9.12	139.59	4.71	31.8	31.8	1.1	444.72	2934.56	0	1.0	0.0	3081.57	29.0	32.3	0	9.20	32.85	34.19	124.3	3331.0	9347.2	312.3	6328.5	**3738.86**	**2109.48**
29.00	30.00	29.50	1.00	27.50	19.20	9.20	139.59	3.14	32.3	32.3	1.1	309.23	3243.78	0	1.0	0.0	3081.57	30.0	31.9	0	9.20	30.83	32.14	124.3	3126.9	9452.2	324.1	6649.5	**3780.88**	**2216.49**
30.00	30.50	30.25	0.50	28.00	19.20	9.20	139.59	1.57	31.9	31.9	1.1	149.50	3393.28	0	1.0	0.0	3081.57	30.5	31.2	0	9.15	27.30	28.55	124.3	2769.0	9243.8	330.0	6804.9	**3697.53**	**2268.29**
30.50	32.00	31.25	1.50	29.50	19.15	9.15	139.59	4.71	31.2	31.2	1.1	422.44	3815.72	0	1.0	0.0	3081.57	32.0	31.2	0	8.63	27.30	28.55	124.3	2763.1	9660.4	347.7	7245.0	**3864.18**	**2414.99**
32.00	32.50	32.25	0.50	30.00	18.63	8.63	139.59	1.57	31.2	31.2	1.1	140.81	3956.53	0	1.0	0.0	3081.57	32.5	31.8	0	8.63	30.33	31.63	124.3	3068.7	10106.8	353.6	7391.7	**4042.73**	**2463.89**
32.50	33.50	33.00	1.00	31.00	18.63	8.63	139.59	3.14	31.8	31.8	1.1	296.48	4253.02	0	1.0	0.0	3081.57	33.5	29.4	0	8.87	19.91	21.02	124.3	2017.3	9351.9	365.4	7699.9	**3740.77**	**2566.65**
33.50	35.00	34.25	1.50	32.50	18.87	8.87	139.59	4.71	29.4	29.4	1.0	370.79	4623.81	0	1.0	0.0	3081.57	35.0	30.0	0	8.72	21.26	22.40	124.3	2152.8	9858.2	383.0	8088.4	**3943.26**	**2696.14**
35.00	36.50	35.75	1.50	34.00	18.72	8.72	139.59	4.71	30.0	30.0	1.0	379.92	5003.73	0	1.0	0.0	3081.57	36.5	30.0	0	8.82	21.26	22.40	124.3	2153.7	10239.0	400.7	8486.0	**4095.58**	**2828.67**
36.50	37.50	37.00	1.00	35.00	18.82	8.82	139.59	3.14	30.0	30.0	1.0	253.28	5257.01	0	1.0	0.0	3081.57	37.5	30.2	0	8.82	22.27	23.43	124.3	2255.6	10594.2	412.5	8751.1	**4237.67**	**2917.03**
37.50	38.00	37.75	0.50	35.50	18.82	8.82	139.59	1.57	30.2	30.2	1.0	128.94	5385.95	0	1.0	0.0	3081.57	38.0	30.8	0	8.73	25.29	26.50	124.3	2560.5	11028.0	418.4	8885.9	**4411.20**	**2961.97**
38.00	40.00	39.00	2.00	37.50	18.73	8.73	139.59	6.29	30.8	30.8	1.0	543.95	5929.90	0	1.0	0.0	3081.57	40.0	30.8	0	8.73	25.29	26.50	124.3	2560.5	11571.9	442.0	9453.4	**4628.78**	**3151.15**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
BORE NO: P101 CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	20.30	10.30	28.33	1.89	23.3	23.3	1.0	23.00	0	0	1.0	0.0	0	3.0	24.8	0	10.30	9.86	10.66	30.9	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.50	20.30	10.30	36.05	3.77	24.8	24.8	1.0	62.82	0	0	1.0	0.0	0	4.0	26.6	8	9.58	13.60	14.57	41.2	0	0.0	25.5	25.5	**0.00**	**8.49**
4.00	5.00	4.50	1.00	2.50	19.58	9.58	45.99	3.77	26.6	26.6	1.0	86.86	0	8	1.0	30.2	0	5.0	26.3	0	9.58	12.93	13.88	50.8	833.0	833.0	42.4	42.4	**333.19**	**14.14**
5.00	6.00	5.50	1.00	3.50	19.58	9.58	55.57	3.77	26.3	26.3	1.0	103.58	103.58	0	1.0	0.0	0.00	6.0	9.5	48	9.58	2.38	1.14	60.4	658.7	762.3	59.4	163.0	**304.93**	**54.33**
6.00	7.00	6.50	1.00	4.50	19.58	9.58	65.15	3.77	9.5	9.5	1.0	41.12	144.70	48	1.0	181.0	181.03	7.0	9.5	48	10.61	2.38	1.14	69.9	685.3	1011.1	76.4	402.1	**404.43**	**134.03**
7.00	8.00	7.50	1.00	5.50	20.61	10.61	75.25	3.77	9.5	9.5	1.0	47.49	192.19	48	1.0	181.0	362.06	8.0	26.0	6	10.61	12.25	13.18	80.6	1272.7	1826.9	93.3	647.6	**730.76**	**215.86**
8.00	9.00	8.50	1.00	6.50	20.61	10.61	85.86	3.77	26.0	26.0	1.0	157.93	350.11	6	1.0	22.6	384.69	9.0	26.0	6	10.40	12.25	13.18	91.2	1417.9	2152.6	110.3	845.1	**861.06**	**281.70**
9.00	11.00	10.00	2.00	8.50	20.40	10.40	101.56	7.54	26.0	26.0	1.0	373.63	723.74	6	1.0	45.3	429.94	11.0	9.5	45	10.40	2.38	1.14	112.0	767.8	1921.5	144.3	1297.9	**768.59**	**432.65**
11.00	12.00	11.50	1.00	9.50	20.40	10.40	117.16	3.77	9.5	9.5	1.0	73.94	797.68	45	1.0	169.7	599.66	12.0	9.5	45	10.53	2.38	1.14	122.4	795.9	2193.2	161.2	1558.6	**877.29**	**519.52**
12.00	14.50	13.25	2.50	12.00	20.53	10.53	135.52	9.43	9.5	9.5	1.0	213.83	1011.51	45	1.0	424.3	1023.94	14.5	9.5	45	10.53	2.38	1.14	148.7	866.8	2902.2	203.7	2239.1	**1160.89**	**746.37**
14.50	16.00	15.25	1.50	13.50	20.53	10.53	156.58	5.66	9.5	9.5	1.0	148.23	1159.74	45	1.0	254.6	1278.51	16.0	13.0	43	10.55	3.35	2.08	164.5	1076.2	3514.4	229.1	2667.4	**1405.77**	**889.12**
16.00	17.50	16.75	1.50	15.00	20.55	10.55	172.39	5.66	13.0	13.0	1.0	225.15	1384.90	43	1.0	243.3	1521.77	17.5	13.0	43	10.55	3.35	2.08	180.3	1136.2	4042.8	254.6	3161.2	**1617.13**	**1053.75**
17.50	19.00	18.25	1.50	16.50	20.55	10.55	172.39	5.66	13.0	13.0	1.0	225.15	1610.05	43	1.0	243.3	1765.03	19.0	32.1	0	8.89	31.84	33.16	180.3	6695.2	10070.3	280.0	3655.1	**4028.11**	**1218.37**
19.00	20.50	19.75	1.50	18.00	18.89	8.89	172.39	5.66	32.1	32.1	1.1	676.01	2286.06	0	1.0	0.0	1765.03	20.5	32.1	0	8.89	31.84	33.16	180.3	6695.2	10746.3	305.5	4356.6	**4298.52**	**1452.19**
20.50	22.00	21.25	1.50	19.50	18.89	8.89	172.39	5.66	32.1	32.1	1.1	676.01	2962.07	0	1.0	0.0	1765.03	22.0	13.0	47	9.71	3.35	2.08	180.3	1175.7	5902.8	330.9	5058.0	**2361.12**	**1686.01**
22.00	23.50	22.75	1.50	21.00	19.71	9.71	172.39	5.66	13.0	13.0	1.0	225.15	3187.22	47	1.0	265.9	2030.91	23.5	13.0	47	9.71	3.35	2.08	180.3	1175.7	6393.8	356.4	5574.5	**2557.53**	**1858.18**
23.50	25.00	24.25	1.50	22.50	19.71	9.71	172.39	5.66	13.0	13.0	1.0	225.15	3412.38	47	1.0	265.9	2296.80	25.0	29.6	0	10.05	20.36	21.48	180.3	4299.8	10008.9	381.9	6091.0	**4003.58**	**2030.34**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
25.00	26.50	25.75	1.50	24.00	20.05	10.05	172.39	5.66	29.6	29.6	1.0	554.02	3966.40	0	1.0	0.0	2296.80	26.5	29.0	0	10.05	19.01	20.10	180.3	4014.7	10277.9	407.3	6670.5	**4111.16**	**2223.50**
26.50	27.50	27.00	1.00	25.00	20.05	10.05	172.39	3.77	29.0	29.0	1.0	360.39	4326.79	0	1.0	0.0	2296.80	27.5	29.0	0	10.05	19.01	20.10	180.3	4014.7	10638.3	424.3	7047.9	**4255.32**	**2349.29**
27.50	29.50	28.50	2.00	27.00	20.05	10.05	172.39	7.54	29.0	29.0	1.0	720.79	5047.57	0	1.0	0.0	2296.80	29.5	27.2	0	8.72	14.95	15.95	180.3	3145.1	10489.5	458.2	7802.6	**4195.79**	**2600.87**
29.50	30.00	29.75	0.50	27.50	18.72	8.72	172.39	1.89	27.2	27.2	1.0	167.07	5214.64	0	1.0	0.0	2296.80	30.0	27.2	0	10.43	14.95	15.95	180.3	3163.6	10675.1	466.7	7978.2	**4270.02**	**2659.39**
30.00	31.00	30.50	1.00	28.50	20.43	10.43	172.39	3.77	27.2	27.2	1.0	334.14	5548.78	0	1.0	0.0	2296.80	31.0	12.8	56	10.43	3.29	2.02	180.3	1256.0	9101.6	483.7	8329.3	**3640.65**	**2776.42**
31.00	32.50	31.75	1.50	30.00	20.43	10.43	172.39	5.66	12.8	12.8	1.0	221.57	5770.36	56	1.0	316.8	2613.60	32.5	12.8	56	10.43	3.29	2.02	180.3	1256.0	9640.0	509.1	8893.1	**3856.00**	**2964.37**
32.50	35.00	33.75	2.50	32.50	20.43	10.43	172.39	9.43	12.8	12.8	1.0	369.29	6139.64	56	1.0	528.0	3141.60	35.0	12.3	49	10.43	3.15	1.88	180.3	1154.0	10435.2	551.6	9832.8	**4174.08**	**3277.60**
35.00	35.50	35.25	0.50	33.00	20.43	10.43	172.39	1.89	12.3	12.3	1.0	70.88	6210.52	49	1.0	92.4	3234.00	35.5	30.0	0	10.43	21.26	22.40	180.3	4495.6	13940.1	560.1	10004.6	**5576.05**	**3334.86**
35.50	37.00	36.25	1.50	34.50	20.43	10.43	172.39	5.66	30.0	30.0	1.0	563.06	6773.58	0	1.0	0.0	3234.00	37.0	30.0	0	10.49	21.26	22.40	180.3	4496.5	14504.1	585.5	10593.1	**5801.63**	**3531.03**
37.00	37.50	37.25	0.50	35.00	20.49	10.49	172.39	1.89	30.0	30.0	1.0	187.69	6961.27	0	1.0	0.0	3234.00	37.5	30.0	0	10.49	21.26	22.40	180.3	4496.5	14691.8	594.0	10789.3	**5876.71**	**3596.42**
37.50	38.50	38.00	1.00	36.00	20.49	10.49	172.39	3.77	30.0	30.0	1.0	375.37	7336.64	0	1.0	0.0	3234.00	38.5	30.0	0	10.49	21.26	22.40	180.3	4496.5	15067.1	611.0	11181.6	**6026.86**	**3727.20**
38.50	40.00	39.25	1.50	37.50	20.49	10.49	172.39	5.66	30.0	30.0	1.0	563.06	7899.70	0	1.0	0.0	3234.00	40.0	30.0	0	10.49	21.26	22.40	180.3	4496.5	15630.2	636.4	11770.1	**6252.08**	**3923.38**
BORE NO: P102, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.64	9.64	26.51	1.89	27.2	27.2	1.0	25.69	0	11	1.0	20.7	0	3.0	24.8	0	9.64	9.86	10.66	28.9	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.50	19.64	9.64	33.74	3.77	24.8	24.8	1.0	58.80	0	0	1.0	0.0	0	4.0	27.0	0	8.85	14.50	15.49	38.6	0	0.0	25.5	25.5	**0.00**	**8.49**
4.00	6.00	5.00	2.00	3.50	18.85	8.85	47.41	7.54	27.0	27.0	1.0	182.21	0	0	1.0	0.0	0	6.0	27.2	0	8.85	14.95	15.95	56.3	0	0.0	59.4	59.4	**0.00**	**19.80**
6.00	7.00	6.50	1.00	4.50	18.85	8.85	60.69	3.77	27.2	27.2	1.0	117.62	0	0	1.0	0.0	0	7.0	27.2	0	8.85	14.95	15.95	65.1	0	0.0	76.4	76.4	**0.00**	**25.46**
7.00	8.00	7.50	1.00	5.50	18.85	8.85	69.54	3.77	27.2	27.2	1.0	134.78	0	0	1.0	0.0	0	8.0	10.2	53	9.55	2.53	1.28	74.0	759.6	759.6	93.3	93.3	**303.83**	**31.11**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 1.13 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
8.00	9.00	8.50	1.00	6.50	19.55	9.55	78.74	3.77	10.2	10.2	1.0	53.43	53.43	53	1.0	199.9	199.89	9.0	10.2	53	9.55	2.53	1.28	83.5	786.9	1040.2	110.3	363.6	**416.09**	**121.21**
9.00	10.00	9.50	1.00	7.50	19.55	9.55	88.29	3.77	10.2	10.2	1.0	59.91	113.34	53	1.0	199.9	399.77	10.0	12.5	42	9.55	3.20	1.94	93.1	777.6	1290.7	127.3	640.4	**516.27**	**213.46**
10.00	11.00	10.50	1.00	8.50	19.55	9.55	97.84	3.77	12.5	12.5	1.0	81.80	195.14	42	1.0	158.4	558.17	11.0	12.5	42	9.92	3.20	1.94	102.6	812.7	1566.0	144.3	897.6	**626.40**	**299.19**
11.00	12.50	11.75	1.50	10.00	19.92	9.92	110.05	5.66	12.5	12.5	1.0	138.02	333.16	42	1.0	237.6	795.77	12.5	12.5	44	10.00	3.20	1.94	117.5	887.1	2016.0	169.7	1298.6	**806.41**	**432.88**
12.50	15.50	14.00	3.00	13.00	20.00	10.00	132.49	11.31	12.5	12.5	1.0	332.33	665.49	44	1.0	497.8	1293.60	15.5	12.9	44	10.00	3.32	2.05	147.5	1016.1	2975.2	220.6	2179.7	**1190.08**	**726.57**
15.50	17.00	16.25	1.50	14.50	20.00	10.00	154.99	5.66	12.9	12.9	1.0	200.81	866.30	44	1.0	248.9	1542.51	17.0	29.7	0	10.63	20.58	21.71	162.5	3940.9	6349.7	246.1	2654.9	**2539.90**	**884.97**
17.00	18.50	17.75	1.50	16.00	20.63	10.63	170.46	5.66	29.7	29.7	1.0	550.04	1416.34	0	1.0	0.0	1542.51	18.5	10.8	45	10.63	2.71	1.45	162.5	966.0	3924.9	271.5	3230.4	**1569.95**	**1076.80**
18.50	20.00	19.25	1.50	17.50	20.63	10.63	170.46	5.66	10.8	10.8	1.0	183.96	1600.30	45	1.0	254.6	1797.09	20.0	30.5	0	10.63	23.78	24.96	162.5	4551.7	7949.1	297.0	3694.4	**3179.62**	**1231.46**
20.00	21.50	20.75	1.50	19.00	20.63	10.63	170.46	5.66	30.5	30.5	1.0	582.24	2182.53	0	1.0	0.0	1797.09	21.5	31.2	0	10.34	27.30	28.55	162.5	5220.2	9199.8	322.5	4302.1	**3679.94**	**1434.03**
21.50	23.00	22.25	1.50	20.50	20.34	10.34	170.46	5.66	31.2	31.2	1.1	619.06	2801.60	0	1.0	0.0	1797.09	23.0	29.6	3	10.34	20.36	21.48	162.5	3924.2	8522.9	347.9	4946.6	**3409.15**	**1648.87**
23.00	24.50	23.75	1.50	22.00	20.34	10.34	170.46	5.66	29.6	29.6	1.0	547.82	3349.41	3	1.0	17.0	1814.06	24.5	29.0	0	10.34	19.01	20.10	162.5	3635.5	8799.0	373.4	5536.8	**3519.60**	**1845.61**
24.50	27.50	26.00	3.00	25.00	20.34	10.34	170.46	11.31	29.0	29.0	1.0	1069.07	4418.49	0	1.0	0.0	1814.06	27.5	29.0	0	10.64	19.01	20.10	162.5	3639.6	9872.2	424.3	6656.8	**3948.87**	**2218.94**
27.50	30.00	28.75	2.50	27.50	20.64	10.64	170.46	9.43	29.0	29.0	1.0	890.90	5309.38	0	1.0	0.0	1814.06	30.0	28.2	0	10.64	17.21	18.25	162.5	3295.1	10418.5	466.7	7590.2	**4167.42**	**2530.05**
30.00	30.50	30.25	0.50	28.00	20.64	10.64	170.46	1.89	28.2	28.2	1.0	172.36	5481.74	0	1.0	0.0	1814.06	30.5	28.2	0	10.64	17.21	18.25	162.5	3295.1	10590.9	475.2	7771.0	**4236.36**	**2590.33**
30.50	32.50	31.50	2.00	30.00	20.64	10.64	170.46	7.54	28.2	28.2	1.0	689.43	6171.16	0	1.0	0.0	1814.06	32.5	30.2	0	10.64	22.27	23.43	162.5	4262.9	12248.1	509.1	8494.4	**4899.25**	**2831.45**
32.50	33.50	33.00	1.00	31.00	20.64	10.64	170.46	3.77	30.2	30.2	1.0	377.91	6549.07	0	1.0	0.0	1814.06	33.5	32.7	0	10.64	34.86	36.24	162.5	6670.7	15033.9	526.1	8889.2	**6013.55**	**2963.08**
33.50	35.00	34.25	1.50	32.50	20.64	10.64	170.46	5.66	32.7	32.7	1.1	702.67	7251.74	0	1.0	0.0	1814.06	35.0	32.2	0	10.64	32.34	33.68	162.5	6189.2	15255.0	551.6	9617.4	**6101.99**	**3205.79**
35.00	36.50	35.75	1.50	34.00	20.64	10.64	170.46	5.66	32.2	32.2	1.1	674.07	7925.81	0	1.0	0.0	1814.06	36.5	32.2	0	8.88	32.34	33.68	162.5	6148.9	15888.8	577.0	10316.9	**6355.52**	**3438.97**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Factor of Safety in Compression: 2.5
Area of Pile: 1.13 m^2
Critical water table: 0.00 m
Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
36.50	37.50	37.00	1.00	35.00	18.88	8.88	170.46	3.77	32.2	32.2	1.1	449.38	8375.19	0	1.0	0.0	1814.06	37.5	32.2	0	8.88	32.34	33.68	162.5	6148.9	16338.2	594.0	10783.3	**6535.27**	**3594.42**
37.50	38.00	37.75	0.50	35.50	18.88	8.88	170.46	1.89	32.2	32.2	1.1	224.69	8599.88	0	1.0	0.0	1814.06	38.0	25.2	10	8.93	10.45	11.34	162.5	2091.8	12505.8	602.5	11016.4	**5002.31**	**3672.14**
38.00	40.00	39.00	2.00	37.50	18.93	8.93	170.46	7.54	25.2	25.2	1.0	605.04	9204.92	10	1.0	75.4	1889.49	40.0	25.2	10	8.93	10.45	11.34	162.5	2091.8	13186.2	636.4	11730.8	**5274.50**	**3910.28**
BORE NO: P103, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	20.00	10.00	27.50	1.89	24.3	24.3	1.0	23.41	0	0	1.0	0.0	0	3.0	26.5	4	10.00	13.38	14.34	30.0	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.50	20.00	10.00	35.00	3.77	26.5	26.5	1.0	65.81	0	4	1.0	15.1	0	4.0	26.5	4	10.00	13.38	14.34	40.0	743.5	743.5	25.5	25.5	**297.40**	**8.49**
4.00	5.00	4.50	1.00	2.50	20.00	10.00	45.00	3.77	26.5	26.5	1.0	84.62	84.62	4	1.0	15.1	15.09	5.0	26.5	4	10.10	13.38	14.34	50.0	895.8	995.5	42.4	142.1	**398.21**	**47.38**
5.00	6.00	5.50	1.00	3.50	20.10	10.10	55.05	3.77	26.5	26.5	1.0	103.51	188.13	4	1.0	15.1	30.17	6.0	26.5	4	10.10	13.38	14.34	60.1	1048.7	1267.0	59.4	277.7	**506.80**	**92.57**
6.00	7.00	6.50	1.00	4.50	20.10	10.10	65.15	3.77	26.5	26.5	1.0	122.51	310.64	4	1.0	15.1	45.26	7.0	10.5	49	10.60	2.62	1.36	70.2	716.6	1072.5	76.4	432.3	**429.01**	**144.09**
7.00	9.00	8.00	2.00	6.50	20.60	10.60	80.80	7.54	10.5	10.5	1.0	112.96	423.59	49	1.0	369.6	414.86	9.0	10.5	49	10.60	2.62	1.36	91.4	779.4	1617.8	110.3	948.8	**647.14**	**316.25**
9.00	10.00	9.50	1.00	7.50	20.60	10.60	96.70	3.77	10.5	10.5	1.0	67.59	491.19	49	1.0	184.8	599.66	10.0	24.4	14	9.77	9.57	10.22	102.0	1314.6	2405.4	127.3	1218.1	**962.16**	**406.04**
10.00	12.50	11.25	2.50	10.00	19.77	9.77	114.21	9.43	24.4	24.4	1.0	488.49	979.67	14	1.0	132.0	731.66	12.5	24.4	14	10.59	9.57	10.22	126.4	1584.7	3296.0	169.7	1881.0	**1318.39**	**627.01**
12.50	15.50	14.00	3.00	13.00	20.59	10.59	142.31	11.31	24.4	24.4	1.0	730.39	1710.06	14	1.0	158.4	890.06	15.5	27.9	0	10.59	16.53	17.56	158.2	3085.0	5685.1	220.6	2820.7	**2274.04**	**940.25**
15.50	17.00	16.25	1.50	14.50	20.59	10.59	166.14	5.66	27.9	27.9	1.0	497.63	2207.69	0	1.0	0.0	890.06	17.0	10.5	54	10.69	2.62	1.36	174.1	1075.2	4173.0	246.1	3343.8	**1669.18**	**1114.61**
17.00	18.50	17.75	1.50	16.00	20.69	10.69	182.10	5.66	10.5	10.5	1.0	190.93	2398.62	54	1.0	305.5	1195.54	18.5	28.6	0	10.69	18.11	19.17	174.1	3705.5	7299.6	271.5	3865.7	**2919.85**	**1288.57**
18.50	20.00	19.25	1.50	17.50	20.69	10.69	182.10	5.66	28.6	28.6	1.0	561.66	2960.28	0	1.0	0.0	1195.54	20.0	11.0	51	10.40	2.76	1.51	174.1	1074.4	5230.2	297.0	4452.8	**2092.07**	**1484.27**
20.00	21.50	20.75	1.50	19.00	20.40	10.40	182.10	5.66	11.0	11.0	1.0	200.24	3160.52	51	1.0	288.5	1484.06	21.5	11.0	51	10.40	2.76	1.51	174.1	1074.4	5718.9	322.5	4967.0	**2287.57**	**1655.68**
21.50	23.00	22.25	1.50	20.50	20.40	10.40	182.10	5.66	11.0	11.0	1.0	200.24	3360.76	51	1.0	288.5	1772.57	23.0	27.5	2	9.57	15.63	16.64	174.1	3206.9	8340.2	347.9	5481.2	**3336.09**	**1827.08**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m) From	Layers (m) To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi: ϕ	δ	Ki	Qi	ΣQi	Ultimate Shaft Cohesion Quc= Σα.c.Asi: c	α	α.c.Asi	ΣQi	Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ): Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
23.00	24.50	23.75	1.50	22.00	19.57	9.57	182.10	5.66	27.5	27.5	1.0	536.26	3897.02	2	1.0	11.3	1783.89	24.5	31.0	0	9.57	26.30	27.53	174.1	5358.3	11039.2	373.4	6054.3	**4415.66**	**2018.09**
24.50	26.00	25.25	1.50	23.50	19.57	9.57	182.10	5.66	31.0	31.0	1.1	649.93	4546.95	0	1.0	0.0	1783.89	26.0	31.2	0	9.57	27.30	28.55	174.1	5563.3	11894.2	398.8	6729.7	**4757.67**	**2243.22**
26.00	27.50	26.75	1.50	25.00	19.57	9.57	182.10	5.66	31.2	31.2	1.1	661.31	5208.26	0	1.0	0.0	1783.89	27.5	31.2	0	9.13	27.30	28.55	174.1	5554.8	12547.0	424.3	7416.4	**5018.79**	**2472.15**
27.50	29.00	28.25	1.50	26.50	19.13	9.13	182.10	5.66	31.2	31.2	1.1	661.31	5869.58	0	1.0	0.0	1783.89	29.0	31.4	0	8.63	28.31	29.58	174.1	5749.6	13403.0	449.7	8103.2	**5361.21**	**2701.07**
29.00	30.00	29.50	1.00	27.50	18.63	8.63	182.10	3.77	31.4	31.4	1.1	448.55	6318.13	0	1.0	0.0	1783.89	30.0	31.4	0	8.63	28.31	29.58	174.1	5749.6	13851.6	466.7	8568.7	**5540.63**	**2856.24**
30.00	30.50	30.25	0.50	28.00	18.63	8.63	182.10	1.89	31.4	31.4	1.1	224.27	6542.40	0	1.0	0.0	1783.89	30.5	31.4	0	8.99	28.31	29.58	174.1	5756.8	14083.1	475.2	8801.5	**5633.23**	**2933.83**
30.50	32.00	31.25	1.50	29.50	18.99	8.99	182.10	5.66	31.4	31.4	1.1	672.82	7215.23	0	1.0	0.0	1783.89	32.0	27.0	18	8.97	14.50	15.49	174.1	3134.3	12133.4	500.7	9499.8	**4853.35**	**3166.59**
32.00	32.50	32.25	0.50	30.00	18.97	8.97	182.10	1.89	27.0	27.0	1.0	174.96	7390.19	18	1.0	33.9	1817.83	32.5	27.0	18	8.97	14.50	15.49	174.1	3134.3	12342.3	509.1	9717.2	**4936.91**	**3239.05**
32.50	33.50	33.00	1.00	31.00	18.97	8.97	182.10	3.77	27.0	27.0	1.0	349.93	7740.12	18	1.0	67.9	1885.71	33.5	12.5	60	8.72	3.20	1.94	174.1	1253.5	10879.3	526.1	10151.9	**4351.73**	**3383.98**
33.50	35.00	34.25	1.50	32.50	18.72	8.72	182.10	5.66	12.5	12.5	1.0	228.38	7968.49	60	1.0	339.4	2225.14	35.0	14.0	60	8.82	3.65	2.36	174.1	1344.0	11537.7	551.6	10745.2	**4615.07**	**3581.74**
35.00	36.50	35.75	1.50	34.00	18.82	8.82	182.10	5.66	14.0	14.0	1.0	256.85	8225.34	60	1.0	339.4	2564.57	36.5	14.0	60	8.34	3.65	2.36	174.1	1343.3	12133.2	577.0	11366.9	**4853.27**	**3788.98**
36.50	37.50	37.00	1.00	35.00	18.34	8.34	182.10	3.77	14.0	14.0	1.0	171.23	8396.57	60	1.0	226.3	2790.86	37.5	18.0	60	8.34	5.42	4.29	174.1	1702.0	12889.4	594.0	11781.4	**5155.78**	**3927.14**
37.50	38.00	37.75	0.50	35.50	18.34	8.34	182.10	1.89	18.0	18.0	1.0	111.57	8508.14	60	1.0	113.1	2904.00	38.0	18.0	60	8.72	5.42	4.29	174.1	1703.1	13115.3	602.5	12014.6	**5246.11**	**4004.88**
38.00	40.00	39.00	2.00	37.50	18.72	8.72	182.10	7.54	18.0	18.0	1.0	446.29	8954.43	60	1.0	452.6	3356.57	40.0	18.0	125	8.72	5.42	4.29	174.1	2365.0	14676.0	636.4	12947.4	**5870.40**	**4315.81**
BORE NO: P104, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.80	9.80	26.95	1.89	25.8	25.8	1.0	24.57	0	0	1.0	0.0	0	3.0	25.4	0	9.03	10.90	11.80	29.4	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	5.00	4.00	2.00	2.50	19.03	9.03	38.43	7.54	25.4	25.4	1.0	137.64	0	0	1.0	0.0	0	5.0	24.6	0	9.03	9.71	10.44	47.5	585.5	585.5	42.4	42.4	**234.21**	**14.14**
5.00	6.00	5.50	1.00	3.50	19.03	9.03	51.98	3.77	24.6	24.6	1.0	89.74	89.74	0	1.0	0.0	0.00	6.0	11.1	50	11.01	2.79	1.53	56.5	699.2	788.9	59.4	149.1	**315.56**	**49.71**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 1.13 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
6.00	8.00	7.00	2.00	5.50	21.01	11.01	67.50	7.54	11.1	11.1	1.0	99.89	189.63	50	1.0	377.1	377.14	8.0	11.6	41	11.01	2.94	1.68	78.5	691.2	1258.0	93.3	660.1	**503.20**	**220.04**
8.00	9.00	8.50	1.00	6.50	21.01	11.01	84.02	3.77	11.6	11.6	1.0	65.04	254.68	41	1.0	154.6	531.77	9.0	11.6	41	10.35	2.94	1.68	89.5	727.1	1513.6	110.3	896.8	**605.42**	**298.92**
9.00	11.00	10.00	2.00	8.50	20.35	10.35	99.87	7.54	11.6	11.6	1.0	154.63	409.31	41	1.0	309.3	841.03	11.0	6.2	86	10.35	1.79	0.63	110.2	1102.9	2353.2	144.3	1394.6	**941.30**	**464.86**
11.00	12.00	11.50	1.00	9.50	20.35	10.35	115.40	3.77	6.2	6.2	1.0	47.28	456.59	86	1.0	324.3	1165.37	12.0	10.0	84	9.88	2.47	1.22	120.6	1200.5	2822.4	161.2	1783.2	**1128.98**	**594.40**
12.00	14.50	13.25	2.50	12.00	19.88	9.88	132.92	9.43	10.0	10.0	1.0	220.98	677.57	84	1.0	792.0	1957.37	14.5	10.0	42	9.88	2.47	1.22	145.3	841.8	3476.8	203.7	2838.6	**1390.71**	**946.20**
14.50	16.00	15.25	1.50	13.50	19.88	9.88	152.68	5.66	10.0	10.0	1.0	152.30	829.87	42	1.0	237.6	2194.97	16.0	27.7	0	10.15	16.08	17.10	160.1	3030.4	6055.3	229.1	3254.0	**2422.11**	**1084.65**
16.00	17.50	16.75	1.50	15.00	20.15	10.15	167.70	5.66	27.7	27.7	1.0	498.09	1327.95	0	1.0	0.0	2194.97	17.5	27.4	0	10.15	15.40	16.41	175.3	3168.7	6691.6	254.6	3777.5	**2676.64**	**1259.17**
17.50	19.00	18.25	1.50	16.50	20.15	10.15	167.70	5.66	27.4	27.4	1.0	491.77	1819.72	0	1.0	0.0	2194.97	19.0	15.3	43	10.15	4.09	2.81	175.3	1268.1	5282.8	280.0	4294.7	**2113.10**	**1431.57**
19.00	20.50	19.75	1.50	18.00	20.15	10.15	167.70	5.66	15.3	15.3	1.0	259.54	2079.26	43	1.0	243.3	2438.23	20.5	25.5	9	9.81	11.13	12.03	175.3	2378.7	6896.2	305.5	4823.0	**2758.47**	**1607.66**
20.50	23.50	22.00	3.00	21.00	19.81	9.81	167.70	11.31	25.5	25.5	1.0	905.03	2984.29	9	1.0	101.8	2540.06	23.5	20.7	44	9.81	6.90	6.16	175.3	1858.5	7382.9	356.4	5880.7	**2953.14**	**1960.25**
23.50	25.00	24.25	1.50	22.50	19.81	9.81	167.70	5.66	20.7	20.7	1.0	358.49	3342.78	44	1.0	248.9	2788.97	25.0	29.6	0	10.07	20.36	21.48	175.3	4185.1	10316.9	381.9	6513.6	**4126.75**	**2171.20**
25.00	26.50	25.75	1.50	24.00	20.07	10.07	167.70	5.66	29.6	29.6	1.0	538.95	3881.73	0	1.0	0.0	2788.97	26.5	29.6	0	10.07	20.36	21.48	175.3	4185.1	10855.8	407.3	7078.0	**4342.33**	**2359.34**
26.50	27.50	27.00	1.00	25.00	20.07	10.07	167.70	3.77	29.6	29.6	1.0	359.30	4241.03	0	1.0	0.0	2788.97	27.5	29.1	2	9.71	19.23	20.33	175.3	3969.3	10999.3	424.3	7454.3	**4399.72**	**2484.76**
27.50	29.50	28.50	2.00	27.00	19.71	9.71	167.70	7.54	29.1	29.1	1.0	704.07	4945.09	2	1.0	15.1	2804.06	29.5	31.3	0	9.71	27.81	29.06	175.3	5707.5	13456.7	458.2	8207.4	**5382.66**	**2735.79**
29.50	30.00	29.75	0.50	27.50	19.71	9.71	167.70	1.89	31.3	31.3	1.1	204.77	5149.86	0	1.0	0.0	2804.06	30.0	31.7	0	9.71	29.82	31.11	175.3	6120.7	14074.6	466.7	8420.6	**5629.85**	**2806.88**
30.00	31.00	30.50	1.00	28.50	19.71	9.71	167.70	3.77	31.7	31.7	1.1	423.83	5573.69	0	1.0	0.0	2804.06	31.0	31.9	0	9.71	30.83	32.14	175.3	6327.3	14705.1	483.7	8861.4	**5882.02**	**2953.81**
31.00	32.50	31.75	1.50	30.00	19.71	9.71	167.70	5.66	31.9	31.9	1.1	646.62	6220.32	0	1.0	0.0	2804.06	32.5	32.5	0	9.09	33.85	35.22	175.3	6932.3	15956.7	509.1	9533.5	**6382.66**	**3177.84**
32.50	34.00	33.25	1.50	31.50	19.09	9.09	167.70	5.66	32.5	32.5	1.1	679.95	6900.27	0	1.0	0.0	2804.06	34.0	32.5	0	9.26	33.85	35.22	175.3	6936.3	16640.7	534.6	10238.9	**6656.27**	**3412.98**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
34.00	35.00	34.50	1.00	32.50	19.26	9.26	167.70	3.77	32.5	32.5	1.1	453.30	7353.57	0	1.0	0.0	2804.06	35.0	32.0	0	9.26	31.33	32.65	175.3	6420.6	16578.3	551.6	10709.2	**6631.30**	**3569.73**
35.00	35.50	35.25	0.50	33.00	19.26	9.26	167.70	1.89	32.0	32.0	1.1	217.37	7570.94	0	1.0	0.0	2804.06	35.5	33.2	0	9.28	37.38	38.80	175.3	7658.9	18033.9	560.1	10935.1	**7213.55**	**3645.02**
35.50	37.00	36.25	1.50	34.50	19.28	9.28	167.70	5.66	33.2	33.2	1.2	720.15	8291.09	0	1.0	0.0	2804.06	37.0	32.6	0	9.22	34.36	35.73	175.3	7038.5	18133.7	585.5	11680.7	**7253.47**	**3893.55**
37.00	37.50	37.25	0.50	35.00	19.22	9.22	167.70	1.89	32.6	32.6	1.1	228.53	8519.63	0	1.0	0.0	2804.06	37.5	30.5	0	9.22	23.78	24.96	175.3	4872.8	16196.5	594.0	11917.7	**6478.60**	**3972.56**
37.50	38.50	38.00	1.00	36.00	19.22	9.22	167.70	3.77	30.5	30.5	1.0	381.87	8901.50	0	1.0	0.0	2804.06	38.5	30.7	0	9.29	24.79	25.99	175.3	5080.3	16785.9	611.0	12316.5	**6714.34**	**4105.51**
38.50	40.00	39.25	1.50	37.50	19.29	9.29	167.70	5.66	30.7	30.7	1.0	583.02	9484.52	0	1.0	0.0	2804.06	40.0	30.7	0	9.29	24.79	25.99	175.3	5080.3	17368.9	636.4	12925.0	**6947.55**	**4308.34**
BORE NO: P105, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.67	9.67	26.59	1.89	12.7	12.7	1.0	11.30	0	23	1.0	43.4	0	3.0	25.4	0	9.67	10.90	11.80	29.0	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.50	19.67	9.67	33.85	3.77	25.4	25.4	1.0	60.61	0	0	1.0	0.0	0	4.0	28.6	2	10.25	18.11	19.17	38.7	0	0.0	25.5	25.5	**0.00**	**8.49**
4.00	5.00	4.50	1.00	2.50	20.25	10.25	43.81	3.77	28.6	28.6	1.0	90.07	0	2	1.0	7.5	0	5.0	28.5	0	10.25	17.88	18.94	48.9	0	0.0	42.4	42.4	**0.00**	**14.14**
5.00	6.00	5.50	1.00	3.50	20.25	10.25	54.06	3.77	28.5	28.5	1.0	110.69	0	0	1.0	0.0	0	6.0	28.5	0	9.37	17.88	18.94	59.2	0	0.0	59.4	59.4	**0.00**	**19.80**
6.00	8.00	7.00	2.00	5.50	19.37	9.37	68.55	7.54	28.5	28.5	1.0	280.74	0	0	1.0	0.0	0	8.0	10.2	46	9.37	2.53	1.28	77.9	0	0.0	93.3	93.3	**0.00**	**31.11**
8.00	9.00	8.50	1.00	6.50	19.37	9.37	82.61	3.77	10.2	10.2	1.0	56.05	0	46	1.0	173.5	0	9.0	14.3	23	9.37	3.74	2.45	87.3	0	0.0	110.3	110.3	**0.00**	**36.77**
9.00	10.00	9.50	1.00	7.50	19.37	9.37	91.98	3.77	14.3	14.3	1.0	88.42	0	23	1.0	86.7	0	10.0	6.8	24	10.08	1.89	0.73	96.7	0	0.0	127.3	127.3	**0.00**	**42.43**
10.00	11.00	10.50	1.00	8.50	20.08	10.08	101.70	3.77	6.8	6.8	1.0	45.74	0	24	1.0	90.5	0	11.0	9.5	62	10.08	2.38	1.14	106.7	0	0.0	144.3	144.3	**0.00**	**48.09**
11.00	12.00	11.50	1.00	9.50	20.08	10.08	111.78	3.77	9.5	9.5	1.0	70.55	0	62	1.0	233.8	0	12.0	11.9	55	10.08	3.03	1.76	116.8	0	0.0	161.2	161.2	**0.00**	**53.74**
12.00	13.00	12.50	1.00	10.50	20.08	10.08	121.86	3.77	11.9	11.9	1.0	96.85	0	55	1.0	207.4	0	13.0	9.4	54	9.96	2.36	1.13	126.9	0	0.0	178.2	178.2	**0.00**	**59.40**
13.00	14.50	13.75	1.50	12.00	19.96	9.96	134.37	5.66	9.4	9.4	1.0	125.84	0	54	1.0	305.5	0	14.5	12.8	45	9.66	3.29	2.02	141.8	999.7	999.7	203.7	203.7	**399.89**	**67.89**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
14.50	17.50	16.00	3.00	15.00	19.66	9.66	156.33	11.31	12.8	12.8	1.0	401.85	401.85	45	1.0	509.1	509.14	17.5	20.7	39	9.66	6.90	6.16	170.8	1771.9	2682.9	254.6	1165.6	**1073.14**	**388.52**
17.50	19.00	18.25	1.50	16.50	19.66	9.66	156.33	5.66	20.7	20.7	1.0	334.18	736.03	39	1.0	220.6	729.77	19.0	19.5	48	9.66	6.13	5.12	170.8	1707.8	3173.7	280.0	1745.8	**1269.46**	**581.94**
19.00	20.50	19.75	1.50	18.00	19.66	9.66	156.33	5.66	19.5	19.5	1.0	313.18	1049.21	48	1.0	271.5	1001.31	20.5	11.2	48	10.50	2.82	1.56	170.8	1045.5	3096.0	305.5	2356.0	**1238.40**	**785.34**
20.50	23.50	22.00	3.00	21.00	20.50	10.50	156.33	11.31	11.2	11.2	1.0	350.22	1399.43	48	1.0	543.1	1544.40	23.5	11.2	48	10.50	2.82	1.56	170.8	1045.5	3989.3	356.4	3300.2	**1595.73**	**1100.08**
23.50	25.00	24.25	1.50	22.50	20.50	10.50	156.33	5.66	11.2	11.2	1.0	175.11	1574.55	48	1.0	271.5	1815.94	25.0	10.5	45	10.64	2.62	1.36	170.8	973.9	4364.4	381.9	3772.3	**1745.74**	**1257.45**
25.00	26.50	25.75	1.50	24.00	20.64	10.64	156.33	5.66	10.5	10.5	1.0	163.91	1738.46	45	1.0	254.6	2070.51	26.5	29.2	0	10.64	19.46	20.56	170.8	3909.1	7718.1	407.3	4216.3	**3087.25**	**1405.43**
26.50	27.50	27.00	1.00	25.00	20.64	10.64	156.33	3.77	29.2	29.2	1.0	329.51	2067.96	0	1.0	0.0	2070.51	27.5	29.2	0	10.64	19.46	20.56	170.8	3909.1	8047.6	424.3	4562.8	**3219.05**	**1520.92**
27.50	28.00	27.75	0.50	25.50	20.64	10.64	156.33	1.89	29.2	29.2	1.0	164.75	2232.72	0	1.0	0.0	2070.51	28.0	11.0	48	11.02	2.76	1.51	170.8	1034.2	5337.5	432.8	4736.0	**2134.99**	**1578.67**
28.00	29.50	28.75	1.50	27.00	21.02	11.02	156.33	5.66	11.0	11.0	1.0	171.91	2404.63	48	1.0	271.5	2342.06	29.5	30.0	0	11.02	21.26	22.40	170.8	4276.4	9023.1	458.2	5204.9	**3609.24**	**1734.97**
29.50	30.00	29.75	0.50	27.50	21.02	11.02	156.33	1.89	30.0	30.0	1.0	170.20	2574.82	0	1.0	0.0	2342.06	30.0	30.7	0	10.82	24.79	25.99	170.8	4981.2	9898.1	466.7	5383.6	**3959.25**	**1794.53**
30.00	32.50	31.25	2.50	30.00	20.82	10.82	156.33	9.43	30.7	30.7	1.0	905.81	3480.63	0	1.0	0.0	2342.06	32.5	10.3	55	10.82	2.56	1.31	170.8	1064.1	6886.8	509.1	6331.8	**2754.71**	**2110.61**
32.50	34.00	33.25	1.50	31.50	20.82	10.82	156.33	5.66	10.3	10.3	1.0	160.72	3641.35	55	1.0	311.1	2653.20	34.0	25.2	15	10.82	10.45	11.34	170.8	2255.8	8550.3	534.6	6829.2	**3420.14**	**2276.38**
34.00	35.00	34.50	1.00	32.50	20.82	10.82	156.33	3.77	25.2	25.2	1.0	277.44	3918.79	15	1.0	56.6	2709.77	35.0	26.0	15	8.76	12.25	13.18	170.8	2599.1	9227.6	551.6	7180.1	**3691.06**	**2393.38**
35.00	35.50	35.25	0.50	33.00	18.76	8.76	156.33	1.89	26.0	26.0	1.0	143.78	4062.57	15	1.0	28.3	2738.06	35.5	28.0	0	8.72	16.76	17.79	170.8	3343.7	10144.3	560.1	7360.7	**4057.74**	**2453.56**
35.50	37.00	36.25	1.50	34.50	18.72	8.72	156.33	5.66	28.0	28.0	1.0	470.23	4532.81	0	1.0	0.0	2738.06	37.0	28.0	0	8.62	16.76	17.79	170.8	3342.5	10613.4	585.5	7856.4	**4245.35**	**2618.79**
37.00	37.50	37.25	0.50	35.00	18.62	8.62	156.33	1.89	28.0	28.0	1.0	156.74	4689.55	0	1.0	0.0	2738.06	37.5	29.4	0	8.62	19.91	21.02	170.8	3970.7	11398.3	594.0	8021.6	**4559.32**	**2673.87**
37.50	38.50	38.00	1.00	36.00	18.62	8.62	156.33	3.77	29.4	29.4	1.0	332.22	5021.77	0	1.0	0.0	2738.06	38.5	29.0	0	8.85	19.01	20.10	170.8	3794.3	11554.2	611.0	8370.8	**4621.67**	**2790.27**
38.50	40.00	39.25	1.50	37.50	18.85	8.85	156.33	5.66	29.0	29.0	1.0	490.22	5511.99	0	1.0	0.0	2738.06	40.0	29.0	0	8.85	19.01	20.10	170.8	3794.3	12044.4	636.4	8886.5	**4817.76**	**2962.16**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
BORE NO: P106, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.00	9.00	24.75	1.89	14.0	14.0	1.0	11.64	11.64	9	1.0	17.0	16.97	3.0	12.5	45	8.20	3.20	1.94	27.0	566.9	595.5	8.5	37.1	**238.19**	**12.36**
3.00	5.00	4.00	2.00	2.50	18.20	8.20	35.20	7.54	12.5	12.5	1.0	58.86	70.50	45	1.0	339.4	356.40	5.0	24.9	0	8.20	9.93	10.77	43.4	547.5	974.4	42.4	469.3	**389.74**	**156.44**
5.00	6.00	5.50	1.00	3.50	18.20	8.20	47.50	3.77	24.9	24.9	1.0	83.16	153.65	0	1.0	0.0	356.40	6.0	24.9	0	8.20	9.93	10.77	51.6	639.6	1149.6	59.4	569.5	**459.85**	**189.82**
6.00	7.00	6.50	1.00	4.50	18.20	8.20	55.70	3.77	24.9	24.9	1.0	97.51	251.16	0	1.0	0.0	356.40	7.0	12.8	39	9.81	3.29	2.02	59.8	633.3	1240.9	76.4	683.9	**496.34**	**227.98**
7.00	8.00	7.50	1.00	5.50	19.81	9.81	64.71	3.77	12.8	12.8	1.0	55.44	306.61	39	1.0	147.1	503.49	8.0	8.6	47	9.81	2.22	1.00	69.6	660.0	1470.1	93.3	903.4	**588.02**	**301.15**
8.00	9.00	8.50	1.00	6.50	19.81	9.81	74.52	3.77	8.6	8.6	1.0	42.50	349.11	47	1.0	177.3	680.74	9.0	8.6	47	9.81	2.22	1.00	79.4	684.6	1714.4	110.3	1140.2	**685.78**	**380.06**
9.00	10.00	9.50	1.00	7.50	19.81	9.81	84.33	3.77	8.6	8.6	1.0	48.10	397.20	47	1.0	177.3	858.00	10.0	8.5	54	10.60	2.20	0.99	89.2	779.1	2034.3	127.3	1382.5	**813.72**	**460.83**
10.00	11.00	10.50	1.00	8.50	20.60	10.60	94.53	3.77	8.5	8.5	1.0	53.28	450.49	54	1.0	203.7	1061.66	11.0	9.0	52	10.60	2.29	1.07	99.8	795.8	2308.0	144.3	1656.4	**923.19**	**552.13**
11.00	12.00	11.50	1.00	9.50	20.60	10.60	105.13	3.77	9.0	9.0	1.0	62.80	513.28	52	1.0	196.1	1257.77	12.0	9.8	74	10.47	2.43	1.19	110.4	1066.1	2837.2	161.2	1932.3	**1134.86**	**644.09**
12.00	14.50	13.25	2.50	12.00	20.47	10.47	123.52	9.43	9.8	9.8	1.0	201.16	714.44	74	1.0	697.7	1955.49	14.5	9.8	74	10.47	2.43	1.19	136.6	1138.2	3808.1	203.7	2873.6	**1523.24**	**957.86**
14.50	16.00	15.25	1.50	13.50	20.47	10.47	144.46	5.66	9.8	9.8	1.0	141.16	855.60	74	1.0	418.6	2374.11	16.0	21.2	38	9.80	7.26	6.71	152.3	1683.4	4913.1	229.1	3458.8	**1965.23**	**1152.94**
16.00	17.50	16.75	1.50	15.00	19.80	9.80	159.66	5.66	21.2	21.2	1.0	350.34	1205.94	38	1.0	215.0	2589.09	17.5	26.5	4	9.19	13.38	14.34	167.0	2658.0	6453.1	254.6	4049.6	**2581.23**	**1349.87**
17.50	20.50	19.00	3.00	18.00	19.19	9.19	159.66	11.31	26.5	26.5	1.0	900.66	2106.60	4	1.0	45.3	2634.34	20.5	28.4	0	9.19	17.66	18.71	167.0	3453.1	8194.1	305.5	5046.4	**3277.62**	**1682.14**
20.50	22.00	21.25	1.50	19.50	19.19	9.19	159.66	5.66	28.4	28.4	1.0	488.37	2594.96	0	1.0	0.0	2634.34	22.0	18.5	44	9.19	5.64	4.57	167.0	1542.7	6772.0	330.9	5560.2	**2708.79**	**1853.42**
22.00	23.50	22.75	1.50	21.00	19.19	9.19	159.66	5.66	18.5	18.5	1.0	302.21	2897.18	44	1.0	248.9	2883.26	23.5	27.0	7	9.80	14.50	15.49	167.0	2915.0	8695.4	356.4	6136.8	**3478.16**	**2045.61**
23.50	26.50	25.00	3.00	24.00	19.80	9.80	159.66	11.31	27.0	27.0	1.0	920.43	3817.60	7	1.0	79.2	2962.46	26.5	27.0	0	9.80	14.50	15.49	167.0	2843.7	9623.7	407.3	7187.4	**3849.50**	**2395.79**
26.50	27.50	27.00	1.00	25.00	19.80	9.80	159.66	3.77	27.0	27.0	1.0	306.81	4124.41	0	1.0	0.0	2962.46	27.5	27.0	0	9.80	14.50	15.49	167.0	2843.7	9930.5	424.3	7511.2	**3972.22**	**2503.72**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
27.50	29.50	28.50	2.00	27.00	19.80	9.80	159.66	7.54	27.0	27.0	1.0	613.62	4738.03	0	1.0	0.0	2962.46	29.5	17.3	40	8.34	5.07	3.91	167.0	1387.8	9088.3	458.2	8158.7	**3635.31**	**2719.57**
29.50	30.00	29.75	0.50	27.50	18.34	8.34	159.66	1.89	17.3	17.3	1.0	93.77	4831.80	40	1.0	75.4	3037.89	30.0	17.0	40	10.15	4.92	3.75	167.0	1363.6	9233.3	466.7	8336.4	**3693.30**	**2778.80**
30.00	31.00	30.50	1.00	28.50	20.15	10.15	159.66	3.77	17.0	17.0	1.0	184.09	5015.90	40	1.0	150.9	3188.74	31.0	11.2	55	10.15	2.82	1.56	167.0	1104.2	9308.9	483.7	8688.3	**3723.55**	**2896.11**
31.00	32.50	31.75	1.50	30.00	20.15	10.15	159.66	5.66	11.2	11.2	1.0	178.84	5194.74	55	1.0	311.1	3499.89	32.5	11.2	55	10.15	2.82	1.56	167.0	1104.2	9798.9	509.1	9203.8	**3919.54**	**3067.92**
32.50	35.00	33.75	2.50	32.50	20.15	10.15	159.66	9.43	11.2	11.2	1.0	298.07	5492.81	55	1.0	518.6	4018.46	35.0	10.5	55	10.15	2.62	1.36	167.0	1064.0	10575.2	551.6	10062.8	**4230.09**	**3354.28**
35.00	35.50	35.25	0.50	33.00	20.15	10.15	159.66	1.89	10.5	10.5	1.0	55.80	5548.61	55	1.0	103.7	4122.17	35.5	10.5	55	10.15	2.62	1.36	167.0	1064.0	10734.7	560.1	10230.8	**4293.90**	**3410.28**
35.50	37.50	36.50	2.00	35.00	20.15	10.15	159.66	7.54	10.5	10.5	1.0	223.20	5771.81	55	1.0	414.9	4537.03	37.5	10.5	55	8.76	2.62	1.36	167.0	1062.7	11371.5	594.0	10902.8	**4548.61**	**3634.28**
37.50	38.50	38.00	1.00	36.00	18.76	8.76	159.66	3.77	10.5	10.5	1.0	111.60	5883.42	55	1.0	207.4	4744.46	38.5	10.0	60	8.61	2.47	1.22	167.0	1084.8	11712.7	611.0	11238.8	**4685.08**	**3746.28**
38.50	40.00	39.25	1.50	37.50	18.61	8.61	159.66	5.66	10.0	10.0	1.0	159.26	6042.68	60	1.0	339.4	5083.89	40.0	10.0	60	8.61	2.47	1.22	167.0	1084.8	12211.4	636.4	11763.0	**4884.56**	**3921.00**
BORE NO: P107, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	18.70	8.70	23.93	1.89	24.1	24.1	1.0	20.18	0	3	1.0	5.7	0	3.0	15.0	20	8.70	3.94	2.65	26.1	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.50	18.70	8.70	30.45	3.77	15.0	15.0	1.0	30.77	0	20	1.0	75.4	0	4.0	11.6	20	8.70	2.94	1.68	34.8	0	0.0	25.5	25.5	**0.00**	**8.49**
4.00	5.00	4.50	1.00	2.50	18.70	8.70	39.15	3.77	11.6	11.6	1.0	30.31	0	20	1.0	75.4	0	5.0	27.3	2	9.38	15.18	16.18	43.5	0	0.0	42.4	42.4	**0.00**	**14.14**
5.00	6.00	5.50	1.00	3.50	19.38	9.38	48.19	3.77	27.3	27.3	1.0	93.81	0	2	1.0	7.5	0	6.0	10.7	49	9.38	2.68	1.42	52.9	0	0.0	59.4	59.4	**0.00**	**19.80**
6.00	7.00	6.50	1.00	4.50	19.38	9.38	57.57	3.77	10.7	10.7	1.0	41.03	0	49	1.0	184.8	0	7.0	10.7	49	10.61	2.68	1.42	62.3	0	0.0	76.4	76.4	**0.00**	**25.46**
7.00	9.00	8.00	2.00	6.50	20.61	10.61	72.87	7.54	10.7	10.7	1.0	103.86	0	49	1.0	369.6	0	9.0	10.7	49	10.61	2.68	1.42	83.5	0	0.0	110.3	110.3	**0.00**	**36.77**
9.00	10.00	9.50	1.00	7.50	20.61	10.61	88.79	3.77	10.7	10.7	1.0	63.27	0	49	1.0	184.8	0	10.0	8.1	63	10.61	2.13	0.93	94.1	0	0.0	127.3	127.3	**0.00**	**42.43**
10.00	11.00	10.50	1.00	8.50	20.61	10.61	99.40	3.77	8.1	8.1	1.0	53.35	0	63	1.0	237.6	0	11.0	9.2	57	9.91	2.33	1.10	104.7	0	0.0	144.3	144.3	**0.00**	**48.09**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
11.00	12.50	11.75	1.50	10.00	19.91	9.91	112.13	5.66	9.2	9.2	1.0	102.74	0	57	1.0	322.5	0	12.5	13.5	33	9.91	3.50	2.22	119.6	0	0.0	169.7	169.7	**0.00**	**56.57**
12.50	14.00	13.25	1.50	11.50	19.91	9.91	127.00	5.66	13.5	13.5	1.0	172.48	0	33	1.0	186.7	0	14.0	8.6	54	10.48	2.22	1.00	134.4	0	0.0	195.2	195.2	**0.00**	**65.06**
14.00	15.50	14.75	1.50	13.00	20.48	10.48	142.29	5.66	8.6	8.6	1.0	121.74	0	54	1.0	305.5	0	15.5	8.6	54	10.48	2.22	1.00	150.2	0	0.0	220.6	220.6	**0.00**	**73.54**
15.50	17.00	16.25	1.50	14.50	20.48	10.48	158.01	5.66	8.6	8.6	1.0	135.19	0	54	1.0	305.5	0	17.0	29.2	0	10.26	19.46	20.56	165.9	0	0.0	246.1	246.1	**0.00**	**82.03**
17.00	18.50	17.75	1.50	16.00	20.26	10.26	173.57	5.66	29.2	29.2	1.0	548.76	0	0	1.0	0.0	0	18.5	29.2	0	10.26	19.46	20.56	165.9	3794.9	3794.9	271.5	271.5	**1517.95**	**90.51**
18.50	20.00	19.25	1.50	17.50	20.26	10.26	173.57	5.66	29.2	29.2	1.0	548.76	548.76	0	1.0	0.0	0.00	20.0	10.6	64	10.26	2.65	1.39	165.9	1158.0	1706.8	297.0	845.8	**682.72**	**281.92**
20.00	21.50	20.75	1.50	19.00	20.26	10.26	173.57	5.66	10.6	10.6	1.0	183.75	732.51	64	1.0	362.1	362.06	21.5	10.6	64	10.26	2.65	1.39	165.9	1158.0	2252.6	322.5	1417.0	**901.04**	**472.34**
21.50	23.00	22.25	1.50	20.50	20.26	10.26	173.57	5.66	10.6	10.6	1.0	183.75	916.26	64	1.0	362.1	724.11	23.0	27.2	5	10.26	14.95	15.95	165.9	2968.5	4608.8	347.9	1988.3	**1843.53**	**662.76**
23.00	24.50	23.75	1.50	22.00	20.26	10.26	173.57	5.66	27.2	27.2	1.0	504.62	1420.88	5	1.0	28.3	752.40	24.5	30.1	0	8.96	21.76	22.91	165.9	4223.7	6397.0	373.4	2546.7	**2558.79**	**848.88**
24.50	26.00	25.25	1.50	23.50	18.96	8.96	173.57	5.66	30.1	30.1	1.0	572.02	1992.91	0	1.0	0.0	752.40	26.0	30.6	0	8.47	24.28	25.48	165.9	4703.5	7448.8	398.8	3144.1	**2979.52**	**1048.04**
26.00	27.50	26.75	1.50	25.00	18.47	8.47	173.57	5.66	30.6	30.6	1.0	598.10	2591.01	0	1.0	0.0	752.40	27.5	29.4	0	9.63	19.91	21.02	165.9	3873.6	7217.0	424.3	3767.7	**2886.81**	**1255.90**
27.50	29.00	28.25	1.50	26.50	19.63	9.63	173.57	5.66	29.4	29.4	1.0	553.26	3144.27	0	1.0	0.0	752.40	29.0	29.1	0	8.91	19.23	20.33	165.9	3732.4	7629.0	449.7	4346.4	**3051.62**	**1448.80**
29.00	30.00	29.50	1.00	27.50	18.91	8.91	173.57	3.77	29.1	29.1	1.0	364.34	3508.61	0	1.0	0.0	752.40	30.0	29.1	0	8.91	19.23	20.33	165.9	3732.4	7993.4	466.7	4727.7	**3197.35**	**1575.91**
30.00	30.50	30.25	0.50	28.00	18.91	8.91	173.57	1.89	29.1	29.1	1.0	182.17	3690.78	0	1.0	0.0	752.40	30.5	29.1	0	9.23	19.23	20.33	165.9	3736.8	8180.0	475.2	4918.4	**3271.99**	**1639.46**
30.50	32.00	31.25	1.50	29.50	19.23	9.23	173.57	5.66	29.1	29.1	1.0	546.51	4237.29	0	1.0	0.0	752.40	32.0	26.0	4	8.48	12.25	13.18	165.9	2415.9	7405.6	500.7	5490.3	**2962.25**	**1830.12**
32.00	32.50	32.25	0.50	30.00	18.48	8.48	173.57	1.89	26.0	26.0	1.0	159.63	4396.92	4	1.0	7.5	759.94	32.5	26.0	4	8.48	12.25	13.18	165.9	2415.9	7572.8	509.1	5666.0	**3029.12**	**1888.67**
32.50	33.50	33.00	1.00	31.00	18.48	8.48	173.57	3.77	26.0	26.0	1.0	319.26	4716.18	4	1.0	15.1	775.03	33.5	25.9	5	8.97	12.03	12.95	165.9	2386.8	7878.1	526.1	6017.3	**3151.22**	**2005.78**
33.50	35.00	34.25	1.50	32.50	18.97	8.97	173.57	5.66	25.9	25.9	1.0	476.78	5192.96	5	1.0	28.3	803.31	35.0	26.1	5	9.08	12.48	13.41	165.9	2475.2	8471.5	551.6	6547.8	**3388.58**	**2182.62**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
35.00	36.50	35.75	1.50	34.00	19.08	9.08	173.57	5.66	26.1	26.1	1.0	481.02	5673.98	5	1.0	28.3	831.60	36.5	26.1	5	9.03	12.48	13.41	165.9	2474.7	8980.3	577.0	7082.6	**3592.12**	**2360.87**
36.50	37.50	37.00	1.00	35.00	19.03	9.03	173.57	3.77	26.1	26.1	1.0	320.68	5994.66	5	1.0	18.9	850.46	37.5	26.1	4	9.03	12.48	13.41	165.9	2464.5	9309.7	594.0	7439.1	**3723.86**	**2479.71**
37.50	38.00	37.75	0.50	35.50	19.03	9.03	173.57	1.89	26.1	26.1	1.0	160.34	6155.00	4	1.0	7.5	858.00	38.0	26.1	4	9.08	12.48	13.41	165.9	2465.0	9478.0	602.5	7615.5	**3791.20**	**2538.49**
38.00	40.00	39.00	2.00	37.50	19.08	9.08	173.57	7.54	26.1	26.1	1.0	641.36	6796.36	4	1.0	30.2	888.17	40.0	26.1	4	9.08	12.48	13.41	165.9	2465.0	10149.5	636.4	8321.0	**4059.81**	**2773.65**
BORE NO: P108, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.39	9.39	25.82	1.89	27.0	27.0	1.0	24.81	0	4	1.0	7.5	0	3.0	27.0	4	9.39	14.50	15.49	28.2	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.50	19.39	9.39	32.87	3.77	27.0	27.0	1.0	63.15	0	4	1.0	15.1	0	4.0	23.9	0	9.39	9.21	9.67	37.6	0	0.0	25.5	25.5	**0.00**	**8.49**
4.00	5.00	4.50	1.00	2.50	19.39	9.39	42.26	3.77	23.9	23.9	1.0	70.62	0	0	1.0	0.0	0	5.0	14.7	37	10.26	3.85	2.56	47.0	0	0.0	42.4	42.4	**0.00**	**14.14**
5.00	6.00	5.50	1.00	3.50	20.26	10.26	52.08	3.77	14.7	14.7	1.0	51.53	0	37	1.0	139.5	0	6.0	14.7	37	10.26	3.85	2.56	57.2	0	0.0	59.4	59.4	**0.00**	**19.80**
6.00	7.00	6.50	1.00	4.50	20.26	10.26	62.34	3.77	14.7	14.7	1.0	61.68	0	37	1.0	139.5	0	7.0	11.1	56	10.26	2.79	1.53	67.5	0	0.0	76.4	76.4	**0.00**	**25.46**
7.00	8.00	7.50	1.00	5.50	20.26	10.26	72.60	3.77	11.1	11.1	1.0	53.72	0	56	1.0	211.2	0	8.0	11.1	56	11.34	2.79	1.53	77.7	0	0.0	93.3	93.3	**0.00**	**31.11**
8.00	9.00	8.50	1.00	6.50	21.34	11.34	83.40	3.77	11.1	11.1	1.0	61.71	0	56	1.0	211.2	0	9.0	11.1	56	11.34	2.79	1.53	89.1	863.6	863.6	110.3	110.3	**345.42**	**36.77**
9.00	10.00	9.50	1.00	7.50	21.34	11.34	94.74	3.77	11.1	11.1	1.0	70.10	70.10	56	1.0	211.2	211.20	10.0	9.4	60	11.34	2.36	1.13	100.4	888.0	1169.3	127.3	408.6	**467.72**	**136.20**
10.00	11.00	10.50	1.00	8.50	21.34	11.34	106.08	3.77	9.4	9.4	1.0	66.23	136.33	60	1.0	226.3	437.49	11.0	10.1	58	10.79	2.50	1.25	111.8	915.8	1489.6	144.3	718.1	**595.83**	**239.36**
11.00	12.50	11.75	1.50	10.00	20.79	10.79	119.84	5.66	10.1	10.1	1.0	120.76	257.10	58	1.0	328.1	765.60	12.5	10.1	58	10.79	2.50	1.25	127.9	961.5	1984.2	169.7	1192.4	**793.69**	**397.47**
12.50	15.50	14.00	3.00	13.00	20.79	10.79	144.12	11.31	10.1	10.1	1.0	290.46	547.55	58	1.0	656.2	1421.83	15.5	10.0	60	10.60	2.47	1.22	160.3	1067.7	3037.1	220.6	2190.0	**1214.85**	**730.00**
15.50	17.00	16.25	1.50	14.50	20.60	10.60	168.26	5.66	10.0	10.0	1.0	167.84	715.39	60	1.0	339.4	1761.26	17.0	27.2	0	10.60	14.95	15.95	176.2	3096.1	5572.7	246.1	2722.7	**2229.09**	**907.58**
17.00	18.50	17.75	1.50	16.00	20.60	10.60	184.16	5.66	27.2	27.2	1.0	535.41	1250.80	0	1.0	0.0	1761.26	18.5	12.2	42	10.49	3.12	1.85	176.2	1062.1	4074.2	271.5	3283.6	**1629.68**	**1094.53**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
18.50	21.50	20.00	3.00	19.00	20.49	10.49	184.16	11.31	12.2	12.2	1.0	450.49	1701.28	42	1.0	475.2	2236.46	21.5	12.2	42	10.49	3.12	1.85	176.2	1062.1	4999.9	322.5	4260.2	**1999.95**	**1420.07**
21.50	23.00	22.25	1.50	20.50	20.49	10.49	184.16	5.66	12.2	12.2	1.0	225.24	1926.53	42	1.0	237.6	2474.06	23.0	12.2	42	10.49	3.12	1.85	176.2	1062.1	5462.7	347.9	4748.5	**2185.09**	**1582.83**
23.00	24.50	23.75	1.50	22.00	20.49	10.49	184.16	5.66	12.2	12.2	1.0	225.24	2151.77	42	1.0	237.6	2711.66	24.5	14.0	72	10.74	3.65	2.36	176.2	1478.1	6341.5	373.4	5236.8	**2536.60**	**1745.60**
24.50	26.00	25.25	1.50	23.50	20.74	10.74	184.16	5.66	14.0	14.0	1.0	259.75	2411.52	72	1.0	407.3	3118.97	26.0	31.3	0	10.74	27.81	29.06	176.2	5755.8	11286.3	398.8	5929.3	**4514.53**	**1976.44**
26.00	27.50	26.75	1.50	25.00	20.74	10.74	184.16	5.66	31.3	31.3	1.1	674.59	3086.11	0	1.0	0.0	3118.97	27.5	31.3	0	10.74	27.81	29.06	176.2	5755.8	11960.9	424.3	6629.4	**4784.37**	**2209.79**
27.50	29.00	28.25	1.50	26.50	20.74	10.74	184.16	5.66	31.3	31.3	1.1	674.59	3760.70	0	1.0	0.0	3118.97	29.0	31.3	0	10.74	27.81	29.06	176.2	5755.8	12635.5	449.7	7329.4	**5054.20**	**2443.14**
29.00	30.00	29.50	1.00	27.50	20.74	10.74	184.16	3.77	31.3	31.3	1.1	449.73	4210.43	0	1.0	0.0	3118.97	30.0	31.1	0	9.08	26.80	28.04	176.2	5515.9	12845.3	466.7	7796.1	**5138.12**	**2598.70**
30.00	30.50	30.25	0.50	28.00	19.08	9.08	184.16	1.89	31.1	31.1	1.1	221.00	4431.43	0	1.0	0.0	3118.97	30.5	31.1	0	8.96	26.80	28.04	176.2	5513.6	13064.0	475.2	8025.6	**5225.61**	**2675.20**
30.50	32.00	31.25	1.50	29.50	18.96	8.96	184.16	5.66	31.1	31.1	1.1	663.01	5094.44	0	1.0	0.0	3118.97	32.0	23.0	35	8.54	8.56	8.68	176.2	2113.3	10326.7	500.7	8714.1	**4130.68**	**2904.69**
32.00	32.50	32.25	0.50	30.00	18.54	8.54	184.16	1.89	23.0	23.0	1.0	147.40	5241.85	35	1.0	66.0	3184.97	32.5	23.0	35	8.54	8.56	8.68	176.2	2113.3	10540.1	509.1	8936.0	**4216.05**	**2978.65**
32.50	33.50	33.00	1.00	31.00	18.54	8.54	184.16	3.77	23.0	23.0	1.0	294.81	5536.66	35	1.0	132.0	3316.97	33.5	18.0	48	8.62	5.42	4.29	176.2	1593.7	10447.3	526.1	9379.7	**4178.91**	**3126.58**
33.50	35.00	34.25	1.50	32.50	18.62	8.62	184.16	5.66	18.0	18.0	1.0	338.50	5875.16	48	1.0	271.5	3588.51	35.0	18.0	48	8.57	5.42	4.29	176.2	1593.5	11057.2	551.6	10015.2	**4422.87**	**3338.41**
35.00	36.50	35.75	1.50	34.00	18.57	8.57	184.16	5.66	18.0	18.0	1.0	338.50	6213.66	48	1.0	271.5	3860.06	36.5	31.5	0	8.88	28.82	30.09	176.2	5926.2	15999.9	577.0	10650.7	**6399.95**	**3550.25**
36.50	37.50	37.00	1.00	35.00	18.88	8.88	184.16	3.77	31.5	31.5	1.1	457.53	6671.18	0	1.0	0.0	3860.06	37.5	31.0	0	8.88	26.30	27.53	176.2	5408.6	15939.8	594.0	11125.2	**6375.93**	**3708.41**
37.50	38.00	37.75	0.50	35.50	18.88	8.88	184.16	1.89	31.0	31.0	1.1	219.09	6890.27	0	1.0	0.0	3860.06	38.0	31.0	0	8.82	26.30	27.53	176.2	5407.5	16157.8	602.5	11352.8	**6463.12**	**3784.27**
38.00	40.00	39.00	2.00	37.50	18.82	8.82	184.16	7.54	31.0	31.0	1.1	876.36	7766.63	0	1.0	0.0	3860.06	40.0	31.0	0	8.82	26.30	27.53	176.2	5407.5	17034.2	636.4	12263.1	**6813.66**	**4087.71**
BORE NO: P109, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.67	9.67	26.59	1.89	24.3	24.3	1.0	22.64	0	0	1.0	0.0	0	3.0	26.5	7	9.67	13.38	14.34	29.0	0	0.0	8.5	8.5	**0.00**	**2.83**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
3.00	4.00	3.50	1.00	1.50	19.67	9.67	33.85	3.77	26.5	26.5	1.0	63.64	0	7	1.0	26.4	0	4.0	23.5	9	9.67	8.92	9.23	38.7	0	0.0	25.5	25.5	**0.00**	**8.49**
4.00	5.00	4.50	1.00	2.50	19.67	9.67	43.52	3.77	23.5	23.5	1.0	71.36	0	9	1.0	33.9	0	5.0	23.5	9	10.86	8.92	9.23	48.4	0	0.0	42.4	42.4	**0.00**	**14.14**
5.00	6.00	5.50	1.00	3.50	20.86	10.86	53.78	3.77	23.5	23.5	1.0	88.19	0	9	1.0	33.9	0	6.0	23.5	9	10.86	8.92	9.23	59.2	0	0.0	59.4	59.4	**0.00**	**19.80**
6.00	7.00	6.50	1.00	4.50	20.86	10.86	64.64	3.77	23.5	23.5	1.0	106.00	0	9	1.0	33.9	0	7.0	26.6	0	9.89	13.60	14.57	70.1	0	0.0	76.4	76.4	**0.00**	**25.46**
7.00	9.00	8.00	2.00	6.50	19.89	9.89	79.96	7.54	26.6	26.6	1.0	302.02	0	0	1.0	0.0	0	9.0	14.3	29	9.89	3.74	2.45	89.9	0	0.0	110.3	110.3	**0.00**	**36.77**
9.00	10.00	9.50	1.00	7.50	19.89	9.89	94.80	3.77	14.3	14.3	1.0	91.13	0	29	1.0	109.4	0	10.0	14.3	29	9.93	3.74	2.45	99.7	0	0.0	127.3	127.3	**0.00**	**42.43**
10.00	12.50	11.25	2.50	10.00	19.93	9.93	112.15	9.43	14.3	14.3	1.0	269.54	0	29	1.0	273.4	0	12.5	12.0	33	9.93	3.06	1.79	124.6	0	0.0	169.7	169.7	**0.00**	**56.57**
12.50	14.00	13.25	1.50	11.50	19.93	9.93	132.01	5.66	12.0	12.0	1.0	158.74	0	33	1.0	186.7	0	14.0	12.5	45	10.33	3.20	1.94	139.5	977.4	977.4	195.2	195.2	**390.94**	**65.06**
14.00	15.50	14.75	1.50	13.00	20.33	10.33	147.21	5.66	12.5	12.5	1.0	184.62	184.62	45	1.0	254.6	254.57	15.5	24.5	28	10.33	9.64	10.33	155.0	2047.7	2486.8	220.6	659.8	**994.74**	**219.94**
15.50	17.00	16.25	1.50	14.50	20.33	10.33	162.70	5.66	24.5	24.5	1.0	419.46	604.09	28	1.0	158.4	412.97	17.0	28.3	4	10.30	17.43	18.48	170.5	3531.6	4548.7	246.1	1263.1	**1819.47**	**421.05**
17.00	18.50	17.75	1.50	16.00	20.30	10.30	178.18	5.66	28.3	28.3	1.0	542.73	1146.82	4	1.0	22.6	435.60	18.5	18.5	48	10.30	5.64	4.57	170.5	1608.8	3191.2	271.5	1854.0	**1276.48**	**617.99**
18.50	20.00	19.25	1.50	17.50	20.30	10.30	178.18	5.66	18.5	18.5	1.0	337.26	1484.08	48	1.0	271.5	707.14	20.0	18.5	48	10.30	5.64	4.57	170.5	1608.8	3800.0	297.0	2488.2	**1520.00**	**829.41**
20.00	21.50	20.75	1.50	19.00	20.30	10.30	178.18	5.66	18.5	18.5	1.0	337.26	1821.34	48	1.0	271.5	978.69	21.5	18.5	48	8.85	5.64	4.57	170.5	1604.3	4404.3	322.5	3122.5	**1761.73**	**1040.83**
21.50	23.00	22.25	1.50	20.50	18.85	8.85	178.18	5.66	18.5	18.5	1.0	337.26	2158.60	48	1.0	271.5	1250.23	23.0	32.5	0	9.01	33.85	35.22	170.5	6744.0	10152.9	347.9	3756.7	**4061.14**	**1252.25**
23.00	24.50	23.75	1.50	22.00	19.01	9.01	178.18	5.66	32.5	32.5	1.1	722.41	2881.01	0	1.0	0.0	1250.23	24.5	32.3	0	8.18	32.85	34.19	170.5	6524.2	10655.4	373.4	4504.6	**4262.17**	**1501.54**
24.50	26.00	25.25	1.50	23.50	18.18	8.18	178.18	5.66	32.3	32.3	1.1	710.49	3591.49	0	1.0	0.0	1250.23	26.0	30.8	0	9.09	25.29	26.50	170.5	5040.7	9882.4	398.8	5240.5	**3952.95**	**1746.85**
26.00	27.50	26.75	1.50	25.00	19.09	9.09	178.18	5.66	30.8	30.8	1.0	624.90	4216.39	0	1.0	0.0	1250.23	27.5	30.8	0	9.35	25.29	26.50	170.5	5045.3	10512.0	424.3	5890.9	**4204.78**	**1963.64**
27.50	29.00	28.25	1.50	26.50	19.35	9.35	178.18	5.66	30.8	30.8	1.0	624.90	4841.29	0	1.0	0.0	1250.23	29.0	30.8	0	8.86	25.29	26.50	170.5	5036.5	11128.0	449.7	6541.3	**4451.22**	**2180.42**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m³)	Eff. Unit Weight (kN/m³)	Effective Overburden at mid depth	Area of Pile Stem Asi (m²)	ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m³)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
29.00	30.00	29.50	1.00	27.50	18.86	8.86	178.18	3.77	30.8	30.8	1.0	416.60	5257.89	0	1.0	0.0	1250.23	30.0	30.8	0	8.86	25.29	26.50	170.5	5036.5	11544.6	466.7	6974.8	**4617.86**	**2324.94**
30.00	30.50	30.25	0.50	28.00	18.86	8.86	178.18	1.89	30.8	30.8	1.0	208.30	5466.19	0	1.0	0.0	1250.23	30.5	30.8	0	8.47	25.29	26.50	170.5	5029.5	11745.9	475.2	7191.6	**4698.37**	**2397.21**
30.50	32.00	31.25	1.50	29.50	18.47	8.47	178.18	5.66	30.8	30.8	1.0	624.90	6091.09	0	1.0	0.0	1250.23	32.0	16.5	49	8.86	4.68	3.47	170.5	1422.0	8763.3	500.7	7842.0	**3505.33**	**2613.99**
32.00	32.50	32.25	0.50	30.00	18.86	8.86	178.18	1.89	16.5	16.5	1.0	99.52	6190.62	49	1.0	92.4	1342.63	32.5	16.5	49	8.86	4.68	3.47	170.5	1422.0	8955.2	509.1	8042.4	**3582.10**	**2680.80**
32.50	33.50	33.00	1.00	31.00	18.86	8.86	178.18	3.77	16.5	16.5	1.0	199.05	6389.66	49	1.0	184.8	1527.43	33.5	17.0	52	9.12	4.92	3.75	170.5	1502.3	9419.4	526.1	8443.2	**3767.76**	**2814.40**
33.50	35.00	34.25	1.50	32.50	19.12	9.12	178.18	5.66	17.0	17.0	1.0	308.16	6697.83	52	1.0	294.2	1821.60	35.0	17.0	52	9.23	4.92	3.75	170.5	1502.6	10022.0	551.6	9071.0	**4008.80**	**3023.67**
35.00	36.50	35.75	1.50	34.00	19.23	9.23	178.18	5.66	17.0	17.0	1.0	308.16	7005.99	52	1.0	294.2	2115.77	36.5	29.6	0	8.69	20.36	21.48	170.5	4052.9	13174.7	577.0	9698.8	**5269.88**	**3232.93**
36.50	37.50	37.00	1.00	35.00	18.69	8.69	178.18	3.77	29.6	29.6	1.0	381.73	7387.73	0	1.0	0.0	2115.77	37.5	29.6	0	8.69	20.36	21.48	170.5	4052.9	13556.4	594.0	10097.5	**5422.57**	**3365.83**
37.50	38.00	37.75	0.50	35.50	18.69	8.69	178.18	1.89	29.6	29.6	1.0	190.87	7578.59	0	1.0	0.0	2115.77	38.0	28.7	0	8.71	18.33	19.40	170.5	3650.1	13344.5	602.5	10296.9	**5337.79**	**3432.28**
38.00	40.00	39.00	2.00	37.50	18.71	8.71	178.18	7.54	28.7	28.7	1.0	735.79	8314.38	0	1.0	0.0	2115.77	40.0	28.7	0	8.71	18.33	19.40	170.5	3650.1	14080.3	636.4	11066.6	**5632.11**	**3688.86**
BORE NO: P110, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.86	9.86	27.12	1.89	26.6	26.6	1.0	25.60	0	3	1.0	5.7	0	3.0	26.6	3	9.86	13.60	14.57	29.6	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.50	19.86	9.86	34.51	3.77	26.6	26.6	1.0	65.18	0	3	1.0	11.3	0	4.0	12.5	47	9.86	3.20	1.94	39.4	0	0.0	25.5	25.5	**0.00**	**8.49**
4.00	5.00	4.50	1.00	2.50	19.86	9.86	44.37	3.77	12.5	12.5	1.0	37.10	0	47	1.0	177.3	0	5.0	12.5	47	10.66	3.20	1.94	49.3	671.3	671.3	42.4	42.4	**268.53**	**14.14**
5.00	6.00	5.50	1.00	3.50	20.66	10.66	54.63	3.77	12.5	12.5	1.0	45.68	45.68	47	1.0	177.3	177.26	6.0	10.1	51	10.66	2.50	1.25	60.0	697.9	920.9	59.4	282.3	**368.34**	**94.11**
6.00	7.00	6.50	1.00	4.50	20.66	10.66	65.29	3.77	10.1	10.1	1.0	43.86	89.54	51	1.0	192.3	369.60	7.0	10.1	51	10.46	2.50	1.25	70.6	727.9	1187.0	76.4	535.5	**474.81**	**178.50**
7.00	9.00	8.00	2.00	6.50	20.46	10.46	81.08	7.54	10.1	10.1	1.0	108.94	198.48	51	1.0	384.7	754.29	9.0	10.1	51	10.46	2.50	1.25	91.5	787.1	1739.8	110.3	1063.1	**695.93**	**354.36**
9.00	10.00	9.50	1.00	7.50	20.46	10.46	96.77	3.77	10.1	10.1	1.0	65.01	263.49	51	1.0	192.3	946.63	10.0	25.3	12	10.60	10.68	11.57	102.0	1437.5	2647.6	127.3	1337.4	**1059.04**	**445.80**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m³)	Eff. Unit Weight (kN/m³)	Effective Overburden at mid depth	Area of Pile Stem Asi (m²)	ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m³)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
10.00	12.50	11.25	2.50	10.00	20.60	10.60	115.25	9.43	25.3	25.3	1.0	513.65	777.14	12	1.0	113.1	1059.77	12.5	25.3	12	10.60	10.68	11.57	128.5	1757.6	3594.5	169.7	2006.6	**1437.79**	**668.87**
12.50	14.00	13.25	1.50	11.50	20.60	10.60	136.45	5.66	25.3	25.3	1.0	364.88	1142.02	12	1.0	67.9	1127.66	14.0	11.6	55	10.49	2.94	1.68	144.4	1052.4	3322.1	195.2	2464.9	**1328.83**	**821.62**
14.00	15.50	14.75	1.50	13.00	20.49	10.49	152.27	5.66	11.6	11.6	1.0	176.82	1318.84	55	1.0	311.1	1438.80	15.5	12.5	50	10.49	3.20	1.94	160.1	1103.4	3861.1	220.6	2978.3	**1544.43**	**992.76**
15.50	18.50	17.00	3.00	16.00	20.49	10.49	175.87	11.31	12.5	12.5	1.0	441.14	1759.98	50	1.0	565.7	2004.51	18.5	12.5	50	9.18	3.20	1.94	160.1	1101.7	4866.2	271.5	4036.0	**1946.48**	**1345.35**
18.50	20.00	19.25	1.50	17.50	19.18	9.18	175.87	5.66	12.5	12.5	1.0	220.57	1980.55	50	1.0	282.9	2287.37	20.0	9.0	51	8.71	2.29	1.07	160.1	940.5	5208.5	297.0	4564.9	**2083.38**	**1521.64**
20.00	21.50	20.75	1.50	19.00	18.71	8.71	175.87	5.66	9.0	9.0	1.0	157.58	2138.13	51	1.0	288.5	2575.89	21.5	20.5	25	8.95	6.76	5.94	160.1	1515.4	6229.5	322.5	5036.5	**2491.78**	**1678.82**
21.50	23.00	22.25	1.50	20.50	18.95	8.95	175.87	5.66	20.5	20.5	1.0	371.99	2510.12	25	1.0	141.4	2717.31	23.0	31.8	0	9.10	30.33	31.63	160.1	5690.0	10917.5	347.9	5575.3	**4366.99**	**1858.45**
23.00	24.50	23.75	1.50	22.00	19.10	9.10	175.87	5.66	31.8	31.8	1.1	672.40	3182.51	0	1.0	0.0	2717.31	24.5	31.8	0	8.84	30.33	31.63	160.1	5684.5	11584.3	373.4	6273.2	**4633.72**	**2091.07**
24.50	26.00	25.25	1.50	23.50	18.84	8.84	175.87	5.66	31.8	31.8	1.1	672.40	3854.91	0	1.0	0.0	2717.31	26.0	33.9	0	7.90	40.91	42.39	160.1	7638.7	14210.9	398.8	6971.1	**5684.35**	**2323.68**
26.00	27.50	26.75	1.50	25.00	17.90	7.90	175.87	5.66	33.9	33.9	1.2	798.93	4653.84	0	1.0	0.0	2717.31	27.5	33.7	0	9.26	39.90	41.37	160.1	7488.8	14860.0	424.3	7795.4	**5943.99**	**2598.48**
27.50	29.00	28.25	1.50	26.50	19.26	9.26	175.87	5.66	33.7	33.7	1.2	786.28	5440.12	0	1.0	0.0	2717.31	29.0	30.0	0	8.05	21.26	22.40	160.1	3974.2	12131.7	449.7	8607.2	**4852.67**	**2869.06**
29.00	30.00	29.50	1.00	27.50	18.05	8.05	175.87	3.77	30.0	30.0	1.0	382.95	5823.07	0	1.0	0.0	2717.31	30.0	30.2	0	8.05	22.27	23.43	160.1	4162.4	12702.8	466.7	9007.1	**5081.10**	**3002.36**
30.00	30.50	30.25	0.50	28.00	18.05	8.05	175.87	1.89	30.2	30.2	1.0	194.95	6018.02	0	1.0	0.0	2717.31	30.5	30.2	0	8.72	22.27	23.43	160.1	4173.0	12908.4	475.2	9210.5	**5163.35**	**3070.18**
30.50	32.00	31.25	1.50	29.50	18.72	8.72	175.87	5.66	30.2	30.2	1.0	584.85	6602.86	0	1.0	0.0	2717.31	32.0	29.8	0	8.98	20.81	21.94	160.1	3904.0	13224.2	500.7	9820.8	**5289.66**	**3273.61**
32.00	32.50	32.25	0.50	30.00	18.98	8.98	175.87	1.89	29.8	29.8	1.0	189.93	6792.80	0	1.0	0.0	2717.31	32.5	29.8	0	8.98	20.81	21.94	160.1	3904.0	13414.1	509.1	10019.3	**5365.63**	**3339.75**
32.50	33.50	33.00	1.00	31.00	18.98	8.98	175.87	3.77	29.8	29.8	1.0	379.86	7172.66	0	1.0	0.0	2717.31	33.5	29.8	0	8.68	20.81	21.94	160.1	3899.5	13789.5	526.1	10416.1	**5515.79**	**3472.03**
33.50	35.00	34.25	1.50	32.50	18.68	8.68	175.87	5.66	29.8	29.8	1.0	569.80	7742.46	0	1.0	0.0	2717.31	35.0	30.2	0	8.73	22.27	23.43	160.1	4173.2	14633.0	551.6	11011.3	**5853.19**	**3670.45**
35.00	36.50	35.75	1.50	34.00	18.73	8.73	175.87	5.66	30.2	30.2	1.0	584.85	8327.31	0	1.0	0.0	2717.31	36.5	26.3	10	9.07	12.97	13.92	160.1	2537.9	13582.5	577.0	11621.7	**5433.02**	**3873.88**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
36.50	37.50	37.00	1.00	35.00	19.07	9.07	175.87	3.77	26.3	26.3	1.0	328.10	8655.41	10	1.0	37.7	2755.03	37.5	25.4	10	9.07	10.90	11.80	160.1	2149.5	13559.9	594.0	12004.4	**5423.98**	**4001.48**
37.50	38.00	37.75	0.50	35.50	19.07	9.07	175.87	1.89	25.4	25.4	1.0	157.47	8812.88	10	1.0	18.9	2773.89	38.0	25.6	10	9.04	11.35	12.26	160.1	2233.7	13820.5	602.5	12189.3	**5528.19**	**4063.09**
38.00	40.00	39.00	2.00	37.50	19.04	9.04	175.87	7.54	25.6	25.6	1.0	635.58	9448.47	10	1.0	75.4	2849.31	40.0	25.6	10	9.04	11.35	12.26	160.1	2233.7	14531.5	636.4	12934.2	**5812.59**	**4311.40**
BORE NO: P111, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	20.04	10.04	27.61	1.89	26.5	26.5	1.0	25.96	25.96	7	1.0	13.2	13.20	3.0	25.9	0	10.04	12.03	12.95	30.1	498.1	537.3	8.5	47.6	**214.92**	**15.88**
3.00	4.00	3.50	1.00	1.50	20.04	10.04	35.14	3.77	25.9	25.9	1.0	64.35	90.31	0	1.0	0.0	13.20	4.0	25.9	0	10.04	12.03	12.95	40.2	634.8	738.3	25.5	129.0	**295.31**	**42.99**
4.00	5.00	4.50	1.00	2.50	20.04	10.04	45.18	3.77	25.9	25.9	1.0	82.74	173.05	0	1.0	0.0	13.20	5.0	11.1	37	9.65	2.79	1.53	50.2	545.5	731.7	42.4	228.7	**292.69**	**76.23**
5.00	6.00	5.50	1.00	3.50	19.65	9.65	55.03	3.77	11.1	11.1	1.0	40.71	213.76	37	1.0	139.5	152.74	6.0	11.2	46	9.65	2.82	1.56	59.9	669.8	1036.3	59.4	425.9	**414.52**	**141.97**
6.00	7.00	6.50	1.00	4.50	19.65	9.65	64.68	3.77	11.2	11.2	1.0	48.30	262.06	46	1.0	173.5	326.23	7.0	29.5	0	9.81	20.13	21.25	69.5	1724.7	2313.0	76.4	664.7	**925.19**	**221.55**
7.00	9.00	8.00	2.00	6.50	19.81	9.81	79.31	7.54	29.5	29.5	1.0	338.46	600.52	0	1.0	0.0	326.23	9.0	13.0	48	9.81	3.35	2.08	89.1	840.4	1767.2	110.3	1037.1	**706.86**	**345.69**
9.00	10.00	9.50	1.00	7.50	19.81	9.81	94.03	3.77	13.0	13.0	1.0	81.87	682.39	48	1.0	181.0	507.26	10.0	11.0	50	10.14	2.76	1.51	98.9	828.9	2018.5	127.3	1316.9	**807.41**	**438.98**
10.00	12.50	11.25	2.50	10.00	20.14	10.14	111.61	9.43	11.0	11.0	1.0	204.54	886.93	50	1.0	471.4	978.69	12.5	9.5	58	10.47	2.38	1.14	124.3	933.4	2799.0	169.7	2035.3	**1119.60**	**678.44**
12.50	15.50	14.00	3.00	13.00	20.47	10.47	139.99	11.31	9.5	9.5	1.0	265.04	1151.97	58	1.0	656.2	1634.91	15.5	10.4	56	10.30	2.59	1.33	155.7	1035.4	3822.3	220.6	3007.5	**1528.91**	**1002.50**
15.50	18.50	17.00	3.00	16.00	20.30	10.30	171.14	11.31	10.4	10.4	1.0	355.38	1507.35	56	1.0	633.6	2268.51	18.5	23.0	46	10.30	8.56	8.68	155.7	2037.0	5812.9	271.5	4047.4	**2325.14**	**1349.14**
18.50	20.00	19.25	1.50	17.50	20.30	10.30	171.14	5.66	23.0	23.0	1.0	410.96	1918.31	46	1.0	260.2	2528.74	20.0	32.3	0	10.30	32.85	34.19	155.7	6024.9	10471.9	297.0	4744.1	**4188.78**	**1581.35**
20.00	21.50	20.75	1.50	19.00	20.30	10.30	171.14	5.66	32.3	32.3	1.1	682.43	2600.75	0	1.0	0.0	2528.74	21.5	32.3	0	10.68	32.85	34.19	155.7	6033.7	11163.2	322.5	5451.9	**4465.28**	**1817.32**
21.50	24.50	23.00	3.00	22.00	20.68	10.68	171.14	11.31	32.3	32.3	1.1	1364.87	3965.61	0	1.0	0.0	2528.74	24.5	30.4	0	10.68	23.27	24.45	155.7	4277.1	10771.5	373.4	6867.7	**4308.59**	**2289.24**
24.50	26.00	25.25	1.50	23.50	20.68	10.68	171.14	5.66	30.4	30.4	1.0	579.38	4544.99	0	1.0	0.0	2528.74	26.0	32.5	0	10.68	33.85	35.22	155.7	6218.6	13292.3	398.8	7472.6	**5316.94**	**2490.85**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
26.00	27.50	26.75	1.50	25.00	20.68	10.68	171.14	5.66	32.5	32.5	1.1	693.89	5238.88	0	1.0	0.0	2528.74	27.5	32.3	0	8.04	32.85	34.19	155.7	5972.4	13740.1	424.3	8191.9	**5496.02**	**2730.64**
27.50	29.00	28.25	1.50	26.50	18.04	8.04	171.14	5.66	32.3	32.3	1.1	682.43	5921.31	0	1.0	0.0	2528.74	29.0	32.3	0	8.40	32.85	34.19	155.7	5980.8	14430.8	449.7	8899.8	**5772.34**	**2966.60**
29.00	30.00	29.50	1.00	27.50	18.40	8.40	171.14	3.77	32.3	32.3	1.1	454.96	6376.27	0	1.0	0.0	2528.74	30.0	32.3	0	8.40	32.85	34.19	155.7	5980.8	14885.8	466.7	9371.7	**5954.32**	**3123.91**
30.00	30.50	30.25	0.50	28.00	18.40	8.40	171.14	1.89	32.3	32.3	1.1	227.48	6603.74	0	1.0	0.0	2528.74	30.5	32.3	0	8.39	32.85	34.19	155.7	5980.6	15113.0	475.2	9607.7	**6045.22**	**3202.56**
30.50	32.00	31.25	1.50	29.50	18.39	8.39	171.14	5.66	32.3	32.3	1.1	682.43	7286.18	0	1.0	0.0	2528.74	32.0	32.3	0	9.03	32.85	34.19	155.7	5995.4	15810.3	500.7	10315.6	**6324.13**	**3438.53**
32.00	32.50	32.25	0.50	30.00	19.03	9.03	171.14	1.89	32.3	32.3	1.1	227.48	7513.66	0	1.0	0.0	2528.74	32.5	32.3	0	9.03	32.85	34.19	155.7	5995.4	16037.8	509.1	10551.5	**6415.12**	**3517.18**
32.50	33.50	33.00	1.00	31.00	19.03	9.03	171.14	3.77	32.3	32.3	1.1	454.96	7968.61	0	1.0	0.0	2528.74	33.5	32.3	0	8.99	32.85	34.19	155.7	5994.5	16491.8	526.1	11023.5	**6596.73**	**3674.49**
33.50	35.00	34.25	1.50	32.50	18.99	8.99	171.14	5.66	32.3	32.3	1.1	682.43	8651.04	0	1.0	0.0	2528.74	35.0	32.9	0	8.83	35.87	37.27	155.7	6541.6	17721.4	551.6	11731.4	**7088.56**	**3910.45**
35.00	36.50	35.75	1.50	34.00	18.83	8.83	171.14	5.66	32.9	32.9	1.1	717.15	9368.19	0	1.0	0.0	2528.74	36.5	32.9	0	8.85	35.87	37.27	155.7	6542.1	18439.1	577.0	12474.0	**7375.62**	**4157.99**
36.50	37.50	37.00	1.00	35.00	18.85	8.85	171.14	3.77	32.9	32.9	1.1	478.10	9846.30	0	1.0	0.0	2528.74	37.5	32.9	0	8.85	35.87	37.27	155.7	6542.1	18917.2	594.0	12969.0	**7566.87**	**4323.01**
37.50	38.00	37.75	0.50	35.50	18.85	8.85	171.14	1.89	32.9	32.9	1.1	239.05	10085.35	0	1.0	0.0	2528.74	38.0	19.5	45	8.66	6.13	5.12	155.7	1568.8	14182.9	602.5	13216.6	**5673.16**	**4405.52**
38.00	40.00	39.00	2.00	37.50	18.66	8.66	171.14	7.54	19.5	19.5	1.0	457.13	10542.47	45	1.0	339.4	2868.17	40.0	19.0	45	8.61	5.87	4.84	155.7	1520.2	14930.8	636.4	14047.1	**5972.33**	**4682.36**
BORE NO: P112, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	20.08	10.08	27.72	1.89	26.0	26.0	1.0	25.49	0	0	1.0	0.0	0	3.0	26.0	0	10.08	12.25	13.18	30.2	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.50	20.08	10.08	35.28	3.77	26.0	26.0	1.0	64.90	0	0	1.0	0.0	0	4.0	22.5	14	10.08	8.20	8.14	40.3	0	0.0	25.5	25.5	**0.00**	**8.49**
4.00	5.00	4.50	1.00	2.50	20.08	10.08	45.36	3.77	22.5	22.5	1.0	70.86	0	14	1.0	52.8	0	5.0	10.0	57	10.08	2.47	1.22	50.4	0	0.0	42.4	42.4	**0.00**	**14.14**
5.00	6.00	5.50	1.00	3.50	20.08	10.08	55.44	3.77	10.0	10.0	1.0	36.87	0	57	1.0	215.0	0	6.0	12.5	53	10.08	3.20	1.94	60.5	0	0.0	59.4	59.4	**0.00**	**19.80**
6.00	7.00	6.50	1.00	4.50	20.08	10.08	65.52	3.77	12.5	12.5	1.0	54.78	0	53	1.0	199.9	0	7.0	12.5	53	10.08	3.20	1.94	70.6	0	0.0	76.4	76.4	**0.00**	**25.46**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 1.13 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
7.00	8.00	7.50	1.00	5.50	20.08	10.08	75.60	3.77	12.5	12.5	1.0	63.21	0	53	1.0	199.9	0	8.0	12.5	53	10.23	3.20	1.94	80.6	0	0.0	93.3	93.3	**0.00**	**31.11**
8.00	9.00	8.50	1.00	6.50	20.23	10.23	85.76	3.77	12.5	12.5	1.0	71.70	0	53	1.0	199.9	0	9.0	9.5	57	10.23	2.38	1.14	90.9	833.1	833.1	110.3	110.3	**333.22**	**36.77**
9.00	10.00	9.50	1.00	7.50	20.23	10.23	95.98	3.77	9.5	9.5	1.0	60.58	60.58	57	1.0	215.0	214.97	10.0	9.5	57	9.36	2.38	1.14	101.1	859.9	1135.5	127.3	402.8	**454.19**	**134.28**
10.00	12.50	11.25	2.50	10.00	19.36	9.36	112.80	9.43	9.5	9.5	1.0	177.98	238.55	57	1.0	537.4	752.40	12.5	9.1	61	9.36	2.31	1.08	124.5	953.1	1944.1	169.7	1160.7	**777.64**	**386.89**
12.50	14.00	13.25	1.50	11.50	19.36	9.36	131.52	5.66	9.1	9.1	1.0	119.17	357.73	61	1.0	345.1	1097.49	14.0	9.1	61	10.37	2.31	1.08	138.5	990.5	2445.8	195.2	1650.4	**978.30**	**550.13**
14.00	15.50	14.75	1.50	13.00	20.37	10.37	146.32	5.66	9.1	9.1	1.0	132.58	490.31	61	1.0	345.1	1442.57	15.5	26.5	7	10.08	13.38	14.34	154.1	2501.8	4434.7	220.6	2153.5	**1773.86**	**717.84**
15.50	18.50	17.00	3.00	16.00	20.08	10.08	169.22	11.31	26.5	26.5	1.0	954.56	1444.87	7	1.0	79.2	1521.77	18.5	23.5	18	10.08	8.92	9.23	154.1	1801.7	4768.3	271.5	3238.2	**1907.32**	**1079.39**
18.50	20.00	19.25	1.50	17.50	20.08	10.08	169.22	5.66	23.5	23.5	1.0	416.23	1861.10	18	1.0	101.8	1623.60	20.0	13.5	63	10.08	3.50	2.22	154.1	1266.9	4751.6	297.0	3781.7	**1900.65**	**1260.57**
20.00	21.50	20.75	1.50	19.00	20.08	10.08	169.22	5.66	13.5	13.5	1.0	229.82	2090.92	63	1.0	356.4	1980.00	21.5	24.0	60	10.15	9.28	9.78	154.1	2296.3	6367.2	322.5	4393.4	**2546.90**	**1464.46**
21.50	23.00	22.25	1.50	20.50	20.15	10.15	169.22	5.66	24.0	24.0	1.0	426.21	2517.13	60	1.0	339.4	2319.43	23.0	27.8	4	10.15	16.31	17.33	154.1	3002.9	7839.5	347.9	5184.5	**3135.80**	**1728.16**
23.00	24.50	23.75	1.50	22.00	20.15	10.15	169.22	5.66	27.8	27.8	1.0	504.71	3021.84	4	1.0	22.6	2342.06	24.5	10.3	60	10.15	2.56	1.31	154.1	1066.0	6429.9	373.4	5737.3	**2571.95**	**1912.42**
24.50	26.00	25.25	1.50	23.50	20.15	10.15	169.22	5.66	10.3	10.3	1.0	173.97	3195.81	60	1.0	339.4	2681.49	26.0	29.8	0	10.15	20.81	21.94	154.1	3779.2	9656.5	398.8	6276.1	**3862.59**	**2092.04**
26.00	27.50	26.75	1.50	25.00	20.15	10.15	169.22	5.66	29.8	29.8	1.0	548.24	3744.04	0	1.0	0.0	2681.49	27.5	29.8	0	8.74	20.81	21.94	154.1	3758.2	10183.7	424.3	6849.8	**4073.49**	**2283.27**
27.50	29.00	28.25	1.50	26.50	18.74	8.74	169.22	5.66	29.8	29.8	1.0	548.24	4292.28	0	1.0	0.0	2681.49	29.0	29.8	0	8.60	20.81	21.94	154.1	3756.1	10729.9	449.7	7423.5	**4291.95**	**2474.50**
29.00	30.00	29.50	1.00	27.50	18.60	8.60	169.22	3.77	29.8	29.8	1.0	365.49	4657.77	0	1.0	0.0	2681.49	30.0	29.1	0	8.60	19.23	20.33	154.1	3471.9	10811.1	466.7	7806.0	**4324.45**	**2601.99**
30.00	30.50	30.25	0.50	28.00	18.60	8.60	169.22	1.89	29.1	29.1	1.0	177.60	4835.37	0	1.0	0.0	2681.49	30.5	23.5	36	8.64	8.92	9.23	154.1	1975.9	9492.8	475.2	7992.1	**3797.11**	**2664.02**
30.50	32.00	31.25	1.50	29.50	18.64	8.64	169.22	5.66	23.5	23.5	1.0	416.23	5251.61	36	1.0	203.7	2885.14	32.0	23.5	36	8.90	8.92	9.23	154.1	1977.5	10114.3	500.7	8637.4	**4045.72**	**2879.14**
32.00	32.50	32.25	0.50	30.00	18.90	8.90	169.22	1.89	23.5	23.5	1.0	138.74	5390.35	36	1.0	67.9	2953.03	32.5	12.0	60	8.90	3.06	1.79	154.1	1155.0	9498.3	509.1	8852.5	**3799.33**	**2950.84**

APPENDIX-H
TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2
Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
32.50	33.50	33.00	1.00	31.00	18.90	8.90	169.22	3.77	12.0	12.0	1.0	135.65	5526.00	60	1.0	226.3	3179.31	33.5	12.0	60	8.58	3.06	1.79	154.1	1154.6	9859.9	526.1	9231.4	**3943.95**	**3077.14**
33.50	35.00	34.25	1.50	32.50	18.58	8.58	169.22	5.66	12.0	12.0	1.0	203.47	5729.48	60	1.0	339.4	3518.74	35.0	12.0	60	8.50	3.06	1.79	154.1	1154.5	10402.7	551.6	9799.8	**4161.07**	**3266.60**
35.00	36.50	35.75	1.50	34.00	18.50	8.50	169.22	5.66	12.0	12.0	1.0	203.47	5932.95	60	1.0	339.4	3858.17	36.5	29.9	0	8.88	21.03	22.17	154.1	3800.9	13592.1	577.0	10368.2	**5436.82**	**3456.05**
36.50	37.50	37.00	1.00	35.00	18.88	8.88	169.22	3.77	29.9	29.9	1.0	366.97	6299.92	0	1.0	0.0	3858.17	37.5	30.5	0	8.88	23.78	24.96	154.1	4296.2	14454.3	594.0	10752.1	**5781.70**	**3584.03**
37.50	38.00	37.75	0.50	35.50	18.88	8.88	169.22	1.89	30.5	30.5	1.0	192.66	6492.58	0	1.0	0.0	3858.17	38.0	30.5	0	9.00	23.78	24.96	154.1	4298.2	14648.9	602.5	10953.2	**5859.58**	**3651.08**
38.00	40.00	39.00	2.00	37.50	19.00	9.00	169.22	7.54	30.5	30.5	1.0	770.63	7263.21	0	1.0	0.0	3858.17	40.0	30.5	0	9.00	23.78	24.96	154.1	4298.2	15419.6	636.4	11757.8	**6167.83**	**3919.27**
BORE NO: P113, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	18.77	8.77	24.12	1.89	24.8	24.8	1.0	21.01	0	0	1.0	0.0	0	3.0	24.3	15	8.77	9.50	10.11	26.3	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.50	18.77	8.77	30.70	3.77	24.3	24.3	1.0	52.27	0	15	1.0	56.6	0	4.0	28.6	1	10.08	18.11	19.17	35.1	0	0.0	25.5	25.5	**0.00**	**8.49**
4.00	6.00	5.00	2.00	3.50	20.08	10.08	45.16	7.54	28.6	28.6	1.0	185.72	0	1	1.0	7.5	0	6.0	28.6	1	10.08	18.11	19.17	55.2	1273.1	1273.1	59.4	59.4	**509.23**	**19.80**
6.00	7.00	6.50	1.00	4.50	20.08	10.08	60.28	3.77	28.6	28.6	1.0	123.95	123.95	1	1.0	3.8	3.77	7.0	8.6	54	10.08	2.22	1.00	65.3	720.7	848.4	76.4	204.1	**339.36**	**68.03**
7.00	8.00	7.50	1.00	5.50	20.08	10.08	70.36	3.77	8.6	8.6	1.0	40.13	164.08	54	1.0	203.7	207.43	8.0	8.6	54	10.75	2.22	1.00	75.4	746.4	1117.9	93.3	464.9	**447.17**	**154.95**
8.00	9.00	8.50	1.00	6.50	20.75	10.75	80.78	3.77	8.6	8.6	1.0	46.07	210.15	54	1.0	203.7	411.09	9.0	8.6	54	10.75	2.22	1.00	86.2	773.4	1394.6	110.3	731.6	**557.86**	**243.85**
9.00	10.00	9.50	1.00	7.50	20.75	10.75	91.53	3.77	8.6	8.6	1.0	52.20	262.36	54	1.0	203.7	614.74	10.0	12.1	69	10.75	3.09	1.82	96.9	1054.4	1931.5	127.3	1004.4	**772.59**	**334.80**
10.00	11.00	10.50	1.00	8.50	20.75	10.75	102.28	3.77	12.1	12.1	1.0	82.69	345.05	69	1.0	260.2	874.97	11.0	12.1	69	11.09	3.09	1.82	107.7	1092.3	2312.4	144.3	1364.3	**924.94**	**454.76**
11.00	12.50	11.75	1.50	10.00	21.09	11.09	115.97	5.66	12.1	12.1	1.0	140.64	485.69	69	1.0	390.3	1265.31	12.5	11.0	57	10.20	2.76	1.51	124.3	979.5	2730.5	169.7	1920.7	**1092.21**	**640.24**
12.50	15.50	14.00	3.00	13.00	20.20	10.20	139.59	11.31	11.0	11.0	1.0	306.99	792.68	57	1.0	644.9	1910.23	15.5	11.6	58	10.70	2.94	1.68	154.9	1118.1	3821.0	220.6	2923.5	**1528.39**	**974.51**
15.50	18.50	17.00	3.00	16.00	20.70	10.70	170.94	11.31	11.6	11.6	1.0	396.99	1189.67	58	1.0	656.2	2566.46	18.5	20.7	40	10.70	6.90	6.16	154.9	1661.9	5418.0	271.5	4027.7	**2167.22**	**1342.56**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 1.13 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
18.50	20.00	19.25	1.50	17.50	20.70	10.70	170.94	5.66	20.7	20.7	1.0	365.40	1555.07	40	1.0	226.3	2792.74	20.0	21.5	40	10.49	7.48	7.04	154.9	1768.2	6116.0	297.0	4644.8	**2446.42**	**1548.27**
20.00	21.50	20.75	1.50	19.00	20.49	10.49	170.94	5.66	21.5	21.5	1.0	380.91	1935.99	40	1.0	226.3	3019.03	21.5	9.5	60	10.49	2.38	1.14	154.9	1036.2	5991.2	322.5	5277.5	**2396.48**	**1759.16**
21.50	23.00	22.25	1.50	20.50	20.49	10.49	170.94	5.66	9.5	9.5	1.0	161.82	2097.81	60	1.0	339.4	3358.46	23.0	9.5	60	10.49	2.38	1.14	154.9	1036.2	6492.5	347.9	5804.2	**2596.98**	**1934.73**
23.00	24.50	23.75	1.50	22.00	20.49	10.49	170.94	5.66	9.5	9.5	1.0	161.82	2259.63	60	1.0	339.4	3697.89	24.5	30.4	0	8.83	23.27	24.45	154.9	4225.2	10182.7	373.4	6330.9	**4073.09**	**2110.30**
24.50	26.00	25.25	1.50	23.50	18.83	8.83	170.94	5.66	30.4	30.4	1.0	578.68	2838.31	0	1.0	0.0	3697.89	26.0	31.6	0	8.91	29.32	30.60	154.9	5323.1	11859.3	398.8	6935.0	**4743.71**	**2311.68**
26.00	27.50	26.75	1.50	25.00	18.91	8.91	170.94	5.66	31.6	31.6	1.1	642.50	3480.81	0	1.0	0.0	3697.89	27.5	31.8	0	9.12	30.33	31.63	154.9	5510.3	12689.0	424.3	7603.0	**5075.61**	**2534.33**
27.50	29.00	28.25	1.50	26.50	19.12	9.12	170.94	5.66	31.8	31.8	1.1	653.53	4134.34	0	1.0	0.0	3697.89	29.0	32.3	0	9.20	32.85	34.19	154.9	5969.4	13801.7	449.7	8282.0	**5520.67**	**2760.66**
29.00	30.00	29.50	1.00	27.50	19.20	9.20	170.94	3.77	32.3	32.3	1.1	454.41	4588.75	0	1.0	0.0	3697.89	30.0	31.9	0	9.20	30.83	32.14	154.9	5603.5	13890.2	466.7	8753.3	**5556.07**	**2917.78**
30.00	30.50	30.25	0.50	28.00	19.20	9.20	170.94	1.89	31.9	31.9	1.1	219.70	4808.45	0	1.0	0.0	3697.89	30.5	31.2	0	9.15	27.30	28.55	154.9	4962.2	13468.5	475.2	8981.5	**5387.42**	**2993.84**
30.50	32.00	31.25	1.50	29.50	19.15	9.15	170.94	5.66	31.2	31.2	1.1	620.78	5429.22	0	1.0	0.0	3697.89	32.0	31.2	0	8.63	27.30	28.55	154.9	4952.1	14079.2	500.7	9627.8	**5631.70**	**3209.25**
32.00	32.50	32.25	0.50	30.00	18.63	8.63	170.94	1.89	31.2	31.2	1.1	206.93	5636.15	0	1.0	0.0	3697.89	32.5	31.8	0	8.63	30.33	31.63	154.9	5499.8	14833.8	509.1	9843.2	**5933.54**	**3281.06**
32.50	33.50	33.00	1.00	31.00	18.63	8.63	170.94	3.77	31.8	31.8	1.1	435.69	6071.83	0	1.0	0.0	3697.89	33.5	29.4	0	8.87	19.91	21.02	154.9	3615.3	13385.0	526.1	10295.8	**5354.02**	**3431.94**
33.50	35.00	34.25	1.50	32.50	18.87	8.87	170.94	5.66	29.4	29.4	1.0	544.88	6616.71	0	1.0	0.0	3697.89	35.0	30.0	0	8.72	21.26	22.40	154.9	3858.1	14172.7	551.6	10866.2	**5669.10**	**3622.06**
35.00	36.50	35.75	1.50	34.00	18.72	8.72	170.94	5.66	30.0	30.0	1.0	558.30	7175.01	0	1.0	0.0	3697.89	36.5	30.0	0	8.82	21.26	22.40	154.9	3859.7	14732.6	577.0	11449.9	**5893.03**	**3816.64**
36.50	37.50	37.00	1.00	35.00	18.82	8.82	170.94	3.77	30.0	30.0	1.0	372.20	7547.21	0	1.0	0.0	3697.89	37.5	30.2	0	8.82	22.27	23.43	154.9	4042.4	15287.5	594.0	11839.1	**6114.98**	**3946.37**
37.50	38.00	37.75	0.50	35.50	18.82	8.82	170.94	1.89	30.2	30.2	1.0	189.48	7736.69	0	1.0	0.0	3697.89	38.0	30.8	0	8.73	25.29	26.50	154.9	4588.8	16023.4	602.5	12037.1	**6409.36**	**4012.35**
38.00	40.00	39.00	2.00	37.50	18.73	8.73	170.94	7.54	30.8	30.8	1.0	799.34	8536.03	0	1.0	0.0	3697.89	40.0	30.8	0	8.73	25.29	26.50	154.9	4588.8	16822.7	636.4	12870.3	**6729.09**	**4290.12**

APPENDIX-H

TABLE 3: COMPUTATION OF LATERAL PILE LOAD CAPACITY (Dia. 1000 mm)

Bore No.	Dia. of pile (m)	Cut-off length (m)	Scour depth (m)	Concrete Grade	Young's Modulus (kN/m^2)	Moment of Inertia (m^4)	Average SPT	Modulus of sub grade (k_1)	Stiffness Factor (T)	Cantilever length	L_1/T	L_f/T	Permissible deflection (m)	Depth of Fixity (m)	Allowable Load capacity of pile(kN)
P101	1.00	2.50	0.00	35	29580399	0.0491	19	2696	3.52	2.50	0.71	2.12	0.005	7.47	88
P102	1.00	2.50	0.00	35	29580399	0.0491	18	2552	3.56	5.50	1.55	2.00	0.005	7.11	43
P103	1.00	2.50	0.00	35	29580399	0.0491	18	2552	3.56	1.50	0.42	2.17	0.005	7.71	112
P104	1.00	2.50	0.00	35	29580399	0.0491	15	2120	3.69	2.50	0.68	2.13	0.005	7.86	78
P105	1.00	2.50	0.00	35	29580399	0.0491	24	3416	3.35	12.00	3.58	1.89	0.005	6.34	14
P106	1.00	2.50	0.00	35	29580399	0.0491	7	800	4.49	0.00	0.00	2.23	0.005	10.00	87
P107	1.00	2.50	0.00	35	29580399	0.0491	38	5323	3.07	16.00	5.21	1.87	0.005	5.73	8
P108	1.00	2.50	0.00	35	29580399	0.0491	19	2696	3.52	6.50	1.85	1.95	0.005	6.87	36
P109	1.00	2.50	0.00	35	29580399	0.0491	46	6185	2.98	11.50	3.86	1.88	0.005	5.61	17
P110	1.00	2.50	0.00	35	29580399	0.0491	12	1688	3.86	2.50	0.65	2.13	0.005	8.24	70
P111	1.00	2.50	0.00	35	29580399	0.0491	13	1832	3.80	0.00	0.00	2.23	0.005	8.47	143
P112	1.00	2.50	0.00	35	29580399	0.0491	19	2696	3.52	6.50	1.85	1.95	0.005	6.87	36
P113	1.00	2.50	0.00	35	29580399	0.0491	17	2408	3.60	3.50	0.97	2.08	0.005	7.50	65

APPENDIX-H

TABLE 4: COMPUTATION OF LATERAL PILE LOAD CAPACITY (Dia. 1200 mm)

Bore No.	Dia. of pile (m)	Cut-off length (m)	Scour depth (m)	Concrete Grade	Young's Modulus (kN/m^2)	Moment of Inertia (m^4)	Average SPT	Modulus of sub grade (k_1)	Stiffness Factor (T)	Cantilever length	L_1/T	L_f/T	Permissible deflection (m)	Depth of Fixity (m)	Allowable Load capacity of pile(kN)
P101	1.20	2.50	0.00	35	29580399	0.1018	19	2696	4.07	2.50	0.61	2.14	0.005	8.70	129
P102	1.20	2.50	0.00	35	29580399	0.1018	18	2552	4.11	5.50	1.34	2.03	0.005	8.35	68
P103	1.20	2.50	0.00	35	29580399	0.1018	18	2552	4.11	1.50	0.36	2.18	0.005	8.95	158
P104	1.20	2.50	0.00	35	29580399	0.1018	16	2264	4.21	2.50	0.59	2.14	0.005	9.02	118
P105	1.20	2.50	0.00	35	29580399	0.1018	25	3560	3.85	12.00	3.12	1.90	0.005	7.32	25
P106	1.20	2.50	0.00	35	29580399	0.1018	8	1000	4.96	0.00	0.00	2.23	0.005	11.07	133
P107	1.20	2.50	0.00	35	29580399	0.1018	37	5215	3.57	16.00	4.49	1.88	0.005	6.69	15
P108	1.20	2.50	0.00	35	29580399	0.1018	19	2696	4.07	6.50	1.60	1.99	0.005	8.10	58
P109	1.20	2.50	0.00	35	29580399	0.1018	46	6185	3.45	11.50	3.34	1.90	0.005	6.54	31
P110	1.20	2.50	0.00	35	29580399	0.1018	12	1688	4.47	2.50	0.56	2.15	0.005	9.59	102
P111	1.20	2.50	0.00	35	29580399	0.1018	16	2264	4.21	0.00	0.00	2.23	0.005	9.40	218
P112	1.20	2.50	0.00	35	29580399	0.1018	19	2696	4.07	6.50	1.60	1.99	0.005	8.10	58
P113	1.20	2.50	0.00	35	29580399	0.1018	17	2408	4.16	3.50	0.84	2.10	0.005	8.76	98

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
P101	0.50	ML	53	7	10.15	5.00	5.15	1.00	0.306	1.70	11.90	5.00	1.20	19.28	0.21	1.00	0.246	0.805	Liquefiable
	1.00	SM-SC	50	7	20.30	10.00	10.30	0.99	0.305	1.70	11.90	5.00	1.20	19.28	0.21	1.00	0.246	0.808	Liquefiable
	2.00	SM-SC	50	7	40.60	20.00	20.60	0.98	0.303	1.70	11.90	5.00	1.20	19.28	0.21	1.00	0.246	0.814	Liquefiable
	3.00	SM	40	4	60.90	30.00	30.90	0.98	0.300	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.564	Liquefiable
	4.00	ML	52	4	81.20	40.00	41.20	0.97	0.298	1.56	6.23	5.00	1.20	12.48	0.14	1.00	0.162	0.543	Liquefiable
	5.00	SM	47	12	98.00	50.00	48.00	0.96	0.306	1.44	17.32	5.00	1.20	25.78	0.31	1.00	0.368	1.200	Non-liquefiable
	6.00	CL-ML	78	19	117.60	60.00	57.60	0.95	0.304	1.32	25.03	5.00	1.20	35.04	0.52	1.00	-	-	Non-liquefiable
	7.00	ML	85	19	137.20	70.00	67.20	0.95	0.301	1.22	23.18	5.00	1.20	32.81	0.52	1.00	0.620	2.058	Non-liquefiable
	8.00	ML	85	21	164.80	80.00	84.80	0.94	0.285	1.09	22.80	5.00	1.20	32.37	0.52	1.00	0.620	2.179	Non-liquefiable
	9.00	ML	81	28	185.40	90.00	95.40	0.93	0.282	1.02	28.67	5.00	1.20	39.40	0.52	1.00	0.620	2.197	Non-liquefiable
	11.00	CL	92	30	226.60	110.00	116.60	0.88	0.267	0.93	27.78	5.00	1.20	38.34	0.52	1.00	-	-	Non-liquefiable
	12.00	CL	92	28	244.80	120.00	124.80	0.85	0.261	0.90	25.06	5.00	1.20	35.08	0.52	1.00	-	-	Non-liquefiable
	14.50	CL-ML	87	19	295.80	145.00	150.80	0.79	0.241	0.81	15.47	5.00	1.20	23.57	0.27	1.00	-	-	Non-liquefiable
	16.00	SM-SC	48	19	328.00	160.00	168.00	0.75	0.227	0.77	14.66	5.00	1.20	22.59	0.25	0.81	0.243	1.069	Non-liquefiable
	17.50	SM-SC	48	38	358.75	175.00	183.75	0.71	0.215	0.74	28.03	5.00	1.20	38.64	0.52	0.78	0.487	2.261	Non-liquefiable
	19.00	SM	41	38	389.50	190.00	199.50	0.67	0.203	0.71	26.90	5.00	1.20	37.28	0.52	0.86	0.535	2.633	Non-liquefiable
	20.50	SM	41	44	387.45	205.00	182.45	0.63	0.208	0.74	32.57	5.00	1.20	44.09	0.52	0.88	0.545	2.625	Non-liquefiable
	22.00	CI	69	44	415.80	220.00	195.80	0.59	0.194	0.71	31.44	5.00	1.20	42.73	0.52	0.85	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	23.50	CI	69	44	462.95	235.00	227.95	0.56	0.177	0.66	29.14	5.00	1.20	39.97	0.52	0.82	-	-	Non-liquefiable
	25.00	ML	57	44	492.50	250.00	242.50	0.56	0.177	0.64	28.26	5.00	1.20	38.91	0.52	0.76	0.472	2.660	Non-liquefiable
	26.50	ML	57	46	532.65	265.00	267.65	0.56	0.174	0.61	28.12	5.00	1.20	38.74	0.52	0.74	0.458	2.633	Non-liquefiable
	29.50	ML	51	76	592.95	295.00	297.95	0.56	0.174	0.58	44.03	5.00	1.20	57.84	0.52	0.71	0.443	2.547	Non-liquefiable
	31.00	CL	56	45	623.10	310.00	313.10	0.56	0.174	0.57	25.43	5.00	1.20	35.52	0.52	0.70	-	-	Non-liquefiable
	32.50	CL	56	44	653.25	325.00	328.25	0.56	0.174	0.55	24.29	5.00	1.20	34.14	0.52	0.69	-	-	Non-liquefiable
	35.50	SM	50	47	713.55	355.00	358.55	0.56	0.174	0.53	24.82	5.00	1.20	34.79	0.52	0.64	0.398	2.289	Non-liquefiable
	37.00	CL-ML	53	47	754.80	370.00	384.80	0.56	0.171	0.51	23.96	5.00	1.20	33.75	0.52	0.61	-	-	Non-liquefiable
	38.50	CL-ML	53	52	789.25	385.00	404.25	0.56	0.171	0.50	25.86	5.00	1.20	36.04	0.52	0.60	-	-	Non-liquefiable
	40.00	CL-ML	57	48	820.00	400.00	420.00	0.56	0.171	0.49	23.42	5.00	1.20	33.11	0.52	0.59	-	-	Non-liquefiable
P102	0.50	SM	49	4	9.80	5.00	4.80	1.00	0.317	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.534	Liquefiable
P102	1.00	SM-SC	45	4	19.60	10.00	9.60	0.99	0.316	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.536	Liquefiable
P102	3.00	SM	40	13	58.80	30.00	28.80	0.98	0.311	1.70	22.10	5.00	1.20	31.52	0.52	1.00	0.620	1.993	Non-liquefiable
P102	4.00	SM	39	7	78.40	40.00	38.40	0.97	0.309	1.61	11.30	5.00	1.20	18.56	0.20	1.00	0.236	0.765	Liquefiable
P102	6.00	SM	24	15	117.60	60.00	57.60	0.95	0.304	1.32	19.76	4.18	1.11	26.07	0.31	1.00	0.375	1.235	Non-liquefiable
P102	7.00	SM	24	10	132.30	70.00	62.30	0.95	0.314	1.27	12.67	4.18	1.11	18.21	0.19	1.00	0.232	0.739	Liquefiable
P102	8.00	CL	83	10	151.20	80.00	71.20	0.94	0.311	1.19	11.85	5.00	1.20	19.22	0.21	1.00	-	-	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	9.00	CL	82	20	176.40	90.00	86.40	0.93	0.297	1.08	21.52	5.00	1.20	30.82	0.52	1.00	-	-	Non-liquefiable
	10.00	CL	92	18	196.00	100.00	96.00	0.91	0.289	1.02	18.37	5.00	1.20	27.05	0.34	1.00	-	-	Non-liquefiable
	11.00	ML	92	18	215.60	110.00	105.60	0.88	0.280	0.97	17.52	5.00	1.20	26.02	0.31	1.00	0.374	1.334	Non-liquefiable
	12.50	CL	83	16	248.75	125.00	123.75	0.84	0.263	0.90	14.38	5.00	1.20	22.26	0.25	1.00	-	-	Non-liquefiable
	15.50	CL-ML	56	28	308.45	155.00	153.45	0.76	0.238	0.81	22.60	5.00	1.20	32.12	0.52	0.87	-	-	Non-liquefiable
	17.00	SM	28	28	340.00	170.00	170.00	0.72	0.225	0.77	21.48	4.56	1.14	29.00	0.41	0.84	0.411	1.829	Non-liquefiable
	18.50	CL	76	28	381.10	185.00	196.10	0.68	0.206	0.71	19.99	5.00	1.20	28.99	0.41	0.80	-	-	Non-liquefiable
	20.00	SM	38	28	412.00	200.00	212.00	0.64	0.194	0.69	19.23	5.00	1.20	28.08	0.37	0.78	0.347	1.786	Non-liquefiable
	21.50	SM	34	44	442.90	215.00	227.90	0.60	0.182	0.66	29.15	4.93	1.19	39.56	0.52	0.76	0.473	2.598	Non-liquefiable
	23.00	ML	52	44	473.80	230.00	243.80	0.56	0.170	0.64	28.18	5.00	1.20	38.82	0.52	0.72	0.450	2.648	Non-liquefiable
	24.50	SM	47	50	497.35	245.00	252.35	0.56	0.172	0.63	31.48	5.00	1.20	42.77	0.52	0.72	0.444	2.579	Non-liquefiable
	27.50	SM	47	51	558.25	275.00	283.25	0.56	0.172	0.59	30.30	5.00	1.20	41.36	0.52	0.69	0.426	2.474	Non-liquefiable
	30.50	SM	47	48	619.15	305.00	314.15	0.56	0.172	0.56	27.08	5.00	1.20	37.50	0.52	0.66	0.410	2.383	Non-liquefiable
	33.50	SM	26	51	680.05	335.00	345.05	0.56	0.172	0.54	27.46	4.39	1.12	35.21	0.52	0.63	0.391	2.271	Non-liquefiable
	35.00	SM	26	56	721.00	350.00	371.00	0.56	0.170	0.52	29.07	4.39	1.12	37.03	0.52	0.61	0.381	2.242	Non-liquefiable
	36.50	SM	26	55	751.90	365.00	386.90	0.56	0.170	0.51	27.96	4.39	1.12	35.78	0.52	0.60	0.375	2.207	Non-liquefiable
	38.00	ML	56	56	782.80	380.00	402.80	0.56	0.170	0.50	27.90	5.00	1.20	38.48	0.52	0.60	0.369	2.175	Non-liquefiable
	40.00	ML	56	66	824.00	400.00	424.00	0.56	0.170	0.49	32.05	5.00	1.20	43.46	0.52	0.58	0.362	2.133	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	0.50	SM	45	5	10.00	5.00	5.00	1.00	0.311	1.70	8.50	5.00	1.20	15.20	0.16	1.00	0.193	0.622	Liquefiable
	1.00	SM	45	5	20.00	10.00	10.00	0.99	0.310	1.70	8.50	5.00	1.20	15.20	0.16	1.00	0.193	0.624	Liquefiable
	3.00	SM	43	7	60.00	30.00	30.00	0.98	0.305	1.70	11.90	5.00	1.20	19.28	0.21	1.00	0.246	0.808	Liquefiable
	4.00	SM	43	12	80.00	40.00	40.00	0.97	0.302	1.58	18.97	5.00	1.20	27.77	0.36	1.00	0.431	1.426	Non-liquefiable
	5.00	SM-SC	46	12	100.00	50.00	50.00	0.96	0.300	1.41	16.97	5.00	1.20	25.36	0.30	1.00	0.357	1.190	Non-liquefiable
	6.00	SM	41	16	120.60	60.00	60.60	0.95	0.296	1.28	20.55	5.00	1.20	29.66	0.45	1.00	0.532	1.795	Non-liquefiable
	7.00	CL	85	20	140.70	70.00	70.70	0.95	0.294	1.19	23.79	5.00	1.20	33.54	0.52	1.00	-	-	Non-liquefiable
	9.00	CL	75	19	180.90	90.00	90.90	0.93	0.289	1.05	19.93	5.00	1.20	28.91	0.41	1.00	-	-	Non-liquefiable
P103	10.00	CL	75	22	206.00	100.00	106.00	0.91	0.275	0.97	21.37	5.00	1.20	30.64	0.52	1.00	-	-	Non-liquefiable
	12.50	CL	88	17	257.50	125.00	132.50	0.84	0.255	0.87	14.77	5.00	1.20	22.72	0.25	1.00	-	-	Non-liquefiable
	15.50	SM	50	36	306.90	155.00	151.90	0.76	0.240	0.81	29.21	5.00	1.20	40.05	0.52	0.87	0.539	2.248	Non-liquefiable
	17.00	CL	65	36	350.20	170.00	180.20	0.72	0.218	0.74	26.82	5.00	1.20	37.18	0.52	0.80	-	-	Non-liquefiable
	18.50	SM	33	27	382.95	185.00	197.95	0.68	0.205	0.71	19.19	4.88	1.18	27.52	0.35	0.77	0.327	1.592	Non-liquefiable
	20.00	CL	67	27	414.00	200.00	214.00	0.64	0.193	0.68	18.46	5.00	1.20	27.15	0.34	0.80	-	-	Non-liquefiable
	21.50	CL	79	44	438.60	215.00	223.60	0.60	0.184	0.67	29.43	5.00	1.20	40.31	0.52	0.79	-	-	Non-liquefiable
	23.00	SM	44	44	469.20	230.00	239.20	0.56	0.171	0.65	28.45	5.00	1.20	39.14	0.52	0.79	0.488	2.848	Non-liquefiable
	24.50	SM	44	65	480.20	245.00	235.20	0.56	0.178	0.65	42.38	5.00	1.20	55.86	0.52	0.79	0.490	2.749	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	26.00	SM	43	67	509.60	260.00	249.60	0.56	0.178	0.63	42.41	5.00	1.20	55.89	0.52	0.78	0.482	2.705	Non-liquefiable
	27.50	SM	43	71	539.00	275.00	264.00	0.56	0.178	0.62	43.70	5.00	1.20	57.44	0.52	0.77	0.475	2.663	Non-liquefiable
	29.00	SM	42	71	568.40	290.00	278.40	0.56	0.178	0.60	42.55	5.00	1.20	56.06	0.52	0.75	0.468	2.625	Non-liquefiable
	30.50	SM	42	70	597.80	305.00	292.80	0.56	0.178	0.58	40.91	5.00	1.20	54.09	0.52	0.74	0.462	2.588	Non-liquefiable
	32.00	ML	54	75	627.20	320.00	307.20	0.56	0.178	0.57	42.79	5.00	1.20	56.35	0.52	0.73	0.456	2.554	Non-liquefiable
	33.50	CL	75	75	656.60	335.00	321.60	0.56	0.178	0.56	41.82	5.00	1.20	55.19	0.52	0.73	-	-	Non-liquefiable
	35.00	CL	64	72	686.00	350.00	336.00	0.56	0.178	0.55	39.28	5.00	1.20	52.14	0.52	0.72	-	-	Non-liquefiable
	36.50	CL	64	73	715.40	365.00	350.40	0.56	0.178	0.53	39.00	5.00	1.20	51.80	0.52	0.71	-	-	Non-liquefiable
	38.00	CL	64	75	744.80	380.00	364.80	0.56	0.178	0.52	39.27	5.00	1.20	52.12	0.52	0.70	-	-	Non-liquefiable
	40.00	CL	64	82	784.00	400.00	384.00	0.56	0.178	0.51	41.85	5.00	1.20	55.21	0.52	0.69	-	-	Non-liquefiable
	0.50	SM	45	4	9.90	5.00	4.90	1.00	0.314	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.540	Liquefiable
	1.00	SM-SC	43	4	19.80	10.00	9.80	0.99	0.313	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.542	Liquefiable
	2.00	SM	33	4	39.60	20.00	19.60	0.98	0.310	1.70	6.80	4.88	1.18	12.90	0.14	1.00	0.167	0.537	Liquefiable
P104	3.00	SM	33	6	59.40	30.00	29.40	0.98	0.308	1.70	10.20	4.88	1.18	16.91	0.18	1.00	0.215	0.697	Liquefiable
	5.00	SM	41	12	99.00	50.00	49.00	0.96	0.303	1.43	17.14	5.00	1.20	25.57	0.30	1.00	0.362	1.195	Non-liquefiable
	6.00	CL	73	10	114.00	60.00	54.00	0.95	0.314	1.36	13.61	5.00	1.20	21.33	0.23	1.00	-	-	Non-liquefiable
	8.00	CL-ML	79	18	152.00	80.00	72.00	0.94	0.309	1.18	21.21	5.00	1.20	30.46	0.50	1.00	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	9.00	CL	92	22	189.00	90.00	99.00	0.93	0.277	1.01	22.11	5.00	1.20	31.53	0.52	1.00	-	-	Non-liquefiable
	11.00	CL	87	15	231.00	110.00	121.00	0.88	0.262	0.91	13.64	5.00	1.20	21.36	0.23	1.00	-	-	Non-liquefiable
	12.00	CL	80	22	243.60	120.00	123.60	0.85	0.262	0.90	19.79	5.00	1.20	28.75	0.40	1.00	-	-	Non-liquefiable
	14.50	CL	80	28	294.35	145.00	149.35	0.79	0.242	0.82	22.91	5.00	1.20	32.49	0.52	1.00	-	-	Non-liquefiable
	16.00	SM	47	28	318.40	160.00	158.40	0.75	0.234	0.79	22.25	5.00	1.20	31.70	0.52	0.82	0.507	2.163	Non-liquefiable
	17.50	SM	49	35	353.50	175.00	178.50	0.71	0.218	0.75	26.20	5.00	1.20	36.44	0.52	0.77	0.481	2.201	Non-liquefiable
	19.00	CL-ML	66	35	383.80	190.00	193.80	0.67	0.206	0.72	25.14	5.00	1.20	35.17	0.52	0.75	-	-	Non-liquefiable
	20.50	CL-ML	66	39	414.10	205.00	209.10	0.63	0.194	0.69	26.97	5.00	1.20	37.36	0.52	0.72	-	-	Non-liquefiable
	23.50	ML	54	42	474.70	235.00	239.70	0.56	0.173	0.65	27.13	5.00	1.20	37.55	0.52	0.79	0.489	2.826	Non-liquefiable
	25.00	SM	39	42	495.00	250.00	245.00	0.56	0.176	0.64	26.83	5.00	1.20	37.20	0.52	0.73	0.452	2.560	Non-liquefiable
	26.50	SM	39	45	532.65	265.00	267.65	0.56	0.174	0.61	27.51	5.00	1.20	38.01	0.52	0.71	0.438	2.519	Non-liquefiable
	29.50	SM	38	58	592.95	295.00	297.95	0.56	0.174	0.58	33.60	5.00	1.20	45.32	0.52	0.73	0.452	2.600	Non-liquefiable
	31.00	SM	38	63	610.70	310.00	300.70	0.56	0.177	0.58	36.33	5.00	1.20	48.60	0.52	0.73	0.451	2.541	Non-liquefiable
	32.50	SM	27	66	640.25	325.00	315.25	0.56	0.177	0.56	37.17	4.48	1.13	46.49	0.52	0.72	0.445	2.506	Non-liquefiable
	34.00	SM	27	56	669.80	340.00	329.80	0.56	0.177	0.55	30.84	4.48	1.13	39.33	0.52	0.71	0.439	2.474	Non-liquefiable
	35.50	SM	27	53	699.35	355.00	344.35	0.56	0.177	0.54	28.56	4.48	1.13	36.76	0.52	0.70	0.433	2.443	Non-liquefiable
	37.00	SM	30	63	728.90	370.00	358.90	0.56	0.177	0.53	33.25	4.71	1.15	43.09	0.52	0.69	0.428	2.414	Non-liquefiable
	38.50	SM	30	48	758.45	385.00	373.45	0.56	0.177	0.52	24.84	4.71	1.15	33.38	0.52	0.68	0.423	2.386	Non-liquefiable

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Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	40.00	SM	33	52	788.00	400.00	388.00	0.56	0.177	0.51	26.40	4.88	1.18	36.02	0.52	0.69	0.427	2.408	Non-liquefiable
P105	0.50	CL-ML	52	4	9.85	5.00	4.85	1.00	0.316	1.70	6.80	5.00	1.20	13.16	0.14	1.00	-	-	Non-liquefiable
	2.00	CL-ML	54	4	39.40	20.00	19.40	0.98	0.312	1.70	6.80	5.00	1.20	13.16	0.14	1.00	-	-	Non-liquefiable
	3.00	SM	36	6	59.10	30.00	29.10	0.98	0.310	1.70	10.20	5.00	1.20	17.24	0.18	1.00	0.219	0.707	Liquefiable
	4.00	CL-ML	56	6	78.80	40.00	38.80	0.97	0.307	1.61	9.63	5.00	1.20	16.56	0.18	1.00	-	-	Non-liquefiable
	5.00	SM	45	7	101.00	50.00	51.00	0.96	0.297	1.40	9.80	5.00	1.20	16.76	0.18	1.00	0.213	0.716	Liquefiable
	6.00	SM	30	10	121.20	60.00	61.20	0.95	0.295	1.28	12.78	4.71	1.15	19.46	0.21	1.00	0.249	0.845	Liquefiable
	8.00	ML	62	12	161.60	80.00	81.60	0.94	0.290	1.11	13.28	5.00	1.20	20.94	0.23	1.00	0.271	0.935	Liquefiable
	9.00	ML	62	15	174.60	90.00	84.60	0.93	0.300	1.09	16.31	5.00	1.20	24.57	0.28	1.00	0.338	1.128	Non-liquefiable
	10.00	CL	85	15	194.00	100.00	94.00	0.91	0.292	1.03	15.47	5.00	1.20	23.57	0.27	1.00	-	-	Non-liquefiable
	11.00	CL	86	8	221.10	110.00	111.10	0.88	0.273	0.95	7.59	5.00	1.20	14.11	0.15	1.00	-	-	Non-liquefiable
	12.00	CI	72	14	241.20	120.00	121.20	0.85	0.265	0.91	12.72	5.00	1.20	20.26	0.22	1.00	-	-	Non-liquefiable
	13.00	ML	78	14	261.30	130.00	131.30	0.83	0.257	0.87	12.22	5.00	1.20	19.66	0.21	1.00	0.252	0.981	Liquefiable
	14.50	ML	73	21	290.00	145.00	145.00	0.79	0.245	0.83	17.44	5.00	1.20	25.93	0.31	1.00	0.372	1.513	Non-liquefiable
	17.50	ML	54	33	350.00	175.00	175.00	0.71	0.221	0.76	24.95	5.00	1.20	34.93	0.52	0.85	0.528	2.393	Non-liquefiable
	19.00	CL-ML	61	33	374.30	190.00	184.30	0.67	0.211	0.74	24.31	5.00	1.20	34.17	0.52	0.84	-	-	Non-liquefiable
	20.50	CL	86	46	403.85	205.00	198.85	0.63	0.199	0.71	32.62	5.00	1.20	44.14	0.52	0.82	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	23.50	CL	87	38	462.95	235.00	227.95	0.56	0.177	0.66	25.17	5.00	1.20	35.20	0.52	0.74	-	-	Non-liquefiable
	25.00	ML	66	38	512.50	250.00	262.50	0.56	0.171	0.62	23.45	5.00	1.20	33.14	0.52	0.71	0.441	2.585	Non-liquefiable
	26.50	SM	45	50	545.90	265.00	280.90	0.56	0.170	0.60	29.83	5.00	1.20	40.80	0.52	0.69	0.430	2.536	Non-liquefiable
	28.00	CL	87	50	576.80	280.00	296.80	0.56	0.170	0.58	29.02	5.00	1.20	39.83	0.52	0.66	-	-	Non-liquefiable
	29.50	SM	33	50	619.50	295.00	324.50	0.56	0.167	0.56	27.76	4.88	1.18	37.62	0.52	0.64	0.397	2.378	Non-liquefiable
	32.50	CL	86	53	682.50	325.00	357.50	0.56	0.167	0.53	28.03	5.00	1.20	38.64	0.52	0.57	-	-	Non-liquefiable
	34.00	ML	57	52	707.20	340.00	367.20	0.56	0.168	0.52	27.14	5.00	1.20	37.56	0.52	0.56	0.350	2.080	Non-liquefiable
	35.50	SM	44	58	738.40	355.00	383.40	0.56	0.168	0.51	29.62	5.00	1.20	40.55	0.52	0.55	0.343	2.041	Non-liquefiable
	37.00	SM	44	49	769.60	370.00	399.60	0.56	0.168	0.50	24.51	5.00	1.20	34.41	0.52	0.54	0.337	2.004	Non-liquefiable
	38.50	SM	46	61	800.80	385.00	415.80	0.56	0.168	0.49	29.91	5.00	1.20	40.90	0.52	0.53	0.331	1.970	Non-liquefiable
	40.00	SM	46	60	832.00	400.00	432.00	0.56	0.168	0.48	28.87	5.00	1.20	39.64	0.52	0.53	0.326	1.937	Non-liquefiable
P106	0.50	SM	45	2	9.50	5.00	4.50	0.56	0.184	1.70	3.40	5.00	1.20	9.08	0.11	2.03	0.255	1.382	Non-liquefiable
	2.00	CL	60	2	38.00	20.00	18.00	0.56	0.184	1.70	3.40	5.00	1.20	9.08	0.11	1.48	-	-	Non-liquefiable
	3.00	CL	60	3	57.00	30.00	27.00	0.56	0.184	1.70	5.10	5.00	1.20	11.12	0.12	1.35	-	-	Non-liquefiable
	5.00	SM	39	7	95.00	50.00	45.00	0.56	0.184	1.49	10.43	5.00	1.20	17.52	0.19	1.05	0.233	1.264	Non-liquefiable
	6.00	SM	39	9	109.20	60.00	49.20	0.56	0.194	1.43	12.83	5.00	1.20	20.40	0.22	1.04	0.274	1.414	Non-liquefiable
	7.00	CL-ML	55	9	127.40	70.00	57.40	0.56	0.194	1.32	11.88	5.00	1.20	19.26	0.21	1.13	-	-	Non-liquefiable

APPENDIX-H
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Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	8.00	CL-ML	82	10	158.40	80.00	78.40	0.56	0.176	1.13	11.29	5.00	1.20	18.55	0.20	1.06	-	-	Non-liquefiable
	9.00	CL-ML	82	15	178.20	90.00	88.20	0.56	0.176	1.06	15.97	5.00	1.20	24.17	0.28	1.03	-	-	Non-liquefiable
	10.00	CL	89	15	198.00	100.00	98.00	0.56	0.176	1.01	15.15	5.00	1.20	23.18	0.26	1.01	-	-	Non-liquefiable
	11.00	CL	89	31	226.60	110.00	116.60	0.56	0.170	0.93	28.71	5.00	1.20	39.45	0.52	0.94	-	-	Non-liquefiable
	12.00	CL	89	36	247.20	120.00	127.20	0.56	0.170	0.89	31.92	5.00	1.20	43.30	0.52	0.91	-	-	Non-liquefiable
	14.50	CL	77	19	298.70	145.00	153.70	0.56	0.170	0.81	15.33	5.00	1.20	23.39	0.26	0.87	-	-	Non-liquefiable
	16.00	ML	53	19	328.00	160.00	168.00	0.56	0.171	0.77	14.66	5.00	1.20	22.59	0.25	0.84	0.251	1.473	Non-liquefiable
	17.50	SM	48	31	346.50	175.00	171.50	0.56	0.176	0.76	23.67	5.00	1.20	33.41	0.52	0.83	0.517	2.932	Non-liquefiable
	20.50	SM	43	36	405.90	205.00	200.90	0.56	0.176	0.71	25.40	5.00	1.20	35.48	0.52	0.85	0.526	2.978	Non-liquefiable
	22.00	ML	59	36	422.40	220.00	202.40	0.56	0.182	0.70	25.30	5.00	1.20	35.37	0.52	0.85	0.525	2.878	Non-liquefiable
	23.50	ML	59	41	451.20	235.00	216.20	0.56	0.182	0.68	27.88	5.00	1.20	38.46	0.52	0.83	0.516	2.833	Non-liquefiable
	26.50	ML	52	66	508.80	265.00	243.80	0.56	0.182	0.64	42.27	5.00	1.20	55.72	0.52	0.75	0.466	2.555	Non-liquefiable
	29.50	CL-ML	62	53	584.10	295.00	289.10	0.56	0.176	0.59	31.17	5.00	1.20	42.41	0.52	0.71	-	-	Non-liquefiable
	31.00	CL	78	76	613.80	310.00	303.80	0.56	0.176	0.57	43.60	5.00	1.20	57.32	0.52	0.70	-	-	Non-liquefiable
	32.50	CL	78	69	643.50	325.00	318.50	0.56	0.176	0.56	38.66	5.00	1.20	51.40	0.52	0.69	-	-	Non-liquefiable
	35.50	CL	79	75	702.90	355.00	347.90	0.56	0.176	0.54	40.21	5.00	1.20	53.25	0.52	0.67	-	-	Non-liquefiable
	38.50	CL	87	73	773.85	385.00	388.85	0.56	0.174	0.51	37.02	5.00	1.20	49.42	0.52	0.64	-	-	Non-liquefiable
	40.00	CL	87	79	804.00	400.00	404.00	0.56	0.174	0.50	39.30	5.00	1.20	52.16	0.52	0.64	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
P107	0.50	CL-ML	69	4	9.35	5.00	4.35	1.00	0.334	1.70	6.80	5.00	1.20	13.16	0.14	1.00	-	-	Non-liquefiable
	1.00	CL-ML	69	4	18.70	10.00	8.70	0.99	0.333	1.70	6.80	5.00	1.20	13.16	0.14	1.00	-	-	Non-liquefiable
	2.00	SM	46	4	37.40	20.00	17.40	0.98	0.330	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.513	Liquefiable
	3.00	CL-ML	60	4	56.10	30.00	26.10	0.98	0.328	1.70	6.80	5.00	1.20	13.16	0.14	1.00	-	-	Non-liquefiable
	4.00	CL-ML	69	10	74.80	40.00	34.80	0.97	0.325	1.70	16.95	5.00	1.20	25.34	0.30	1.00	-	-	Non-liquefiable
	5.00	SM	45	10	93.50	50.00	43.50	0.96	0.322	1.52	15.16	5.00	1.20	23.19	0.26	1.00	0.310	0.962	Liquefiable
	6.00	ML	66	10	116.40	60.00	56.40	0.95	0.307	1.33	13.32	5.00	1.20	20.98	0.23	1.00	0.272	0.885	Liquefiable
	7.00	ML	66	12	135.80	70.00	65.80	0.95	0.305	1.23	14.79	5.00	1.20	22.75	0.25	1.00	0.302	0.991	Liquefiable
	9.00	ML	83	15	174.60	90.00	84.60	0.93	0.300	1.09	16.31	5.00	1.20	24.57	0.28	1.00	0.338	1.128	Non-liquefiable
	10.00	ML	83	21	206.00	100.00	106.00	0.91	0.275	0.97	20.40	5.00	1.20	29.48	0.43	1.00	0.519	1.886	Non-liquefiable
	11.00	CL	87	21	226.60	110.00	116.60	0.88	0.267	0.93	19.45	5.00	1.20	28.34	0.38	1.00	-	-	Non-liquefiable
	12.50	CL-ML	70	24	248.75	125.00	123.75	0.84	0.263	0.90	21.57	5.00	1.20	30.89	0.52	1.00	-	-	Non-liquefiable
	14.00	CL	82	24	278.60	140.00	138.60	0.80	0.251	0.85	20.39	5.00	1.20	29.46	0.43	1.00	-	-	Non-liquefiable
	15.50	CL	82	18	317.75	155.00	162.75	0.76	0.232	0.78	14.11	5.00	1.20	21.93	0.24	0.83	-	-	Non-liquefiable
	17.00	SM	34	18	348.50	170.00	178.50	0.72	0.219	0.75	13.47	4.93	1.19	20.94	0.23	0.80	0.218	0.993	Liquefiable
	18.50	SM	34	38	375.55	185.00	190.55	0.68	0.209	0.72	27.53	4.93	1.19	37.64	0.52	0.78	0.485	2.322	Non-liquefiable
	20.00	CL	73	38	406.00	200.00	206.00	0.64	0.197	0.70	26.48	5.00	1.20	36.77	0.52	0.82	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 Earthquake Zone= IV a_{max}/g=0.24 K(alpha)= 1.00 MSF= 1.193 Critical Water Table (m)=0.00 m

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	21.50	CL	73	72	436.45	215.00	221.45	0.60	0.184	0.67	48.38	5.00	1.20	63.06	0.52	0.80	-	-	Non-liquefiable
	23.00	ML	54	66	466.90	230.00	236.90	0.56	0.172	0.65	42.88	5.00	1.20	56.46	0.52	0.78	0.487	2.827	Non-liquefiable
	24.50	SM	39	60	497.35	245.00	252.35	0.56	0.172	0.63	37.77	5.00	1.20	50.32	0.52	0.77	0.478	2.777	Non-liquefiable
	26.00	SM	39	66	527.80	260.00	267.80	0.56	0.172	0.61	40.33	5.00	1.20	53.40	0.52	0.76	0.470	2.731	Non-liquefiable
	27.50	SM	35	51	558.25	275.00	283.25	0.56	0.172	0.59	30.30	5.00	1.20	41.36	0.52	0.75	0.463	2.688	Non-liquefiable
	29.00	SM	47	53	588.70	290.00	298.70	0.56	0.172	0.58	30.67	5.00	1.20	41.80	0.52	0.74	0.456	2.648	Non-liquefiable
	30.50	SM	47	67	619.15	305.00	314.15	0.56	0.172	0.56	37.80	5.00	1.20	50.36	0.52	0.72	0.450	2.611	Non-liquefiable
	32.00	ML	58	71	649.60	320.00	329.60	0.56	0.172	0.55	39.11	5.00	1.20	51.93	0.52	0.72	0.443	2.576	Non-liquefiable
	33.50	ML	55	59	680.05	335.00	345.05	0.56	0.172	0.54	31.76	5.00	1.20	43.11	0.52	0.71	0.438	2.543	Non-liquefiable
	35.00	ML	55	64	710.50	350.00	360.50	0.56	0.172	0.53	33.71	5.00	1.20	45.45	0.52	0.70	0.432	2.512	Non-liquefiable
	36.50	ML	53	65	740.95	365.00	375.95	0.56	0.172	0.52	33.52	5.00	1.20	45.23	0.52	0.69	0.427	2.483	Non-liquefiable
	38.00	ML	53	63	771.40	380.00	391.40	0.56	0.172	0.51	31.84	5.00	1.20	43.21	0.52	0.68	0.423	2.455	Non-liquefiable
	40.00	ML	51	68	812.00	400.00	412.00	0.56	0.172	0.49	33.50	5.00	1.20	45.20	0.52	0.67	0.416	2.419	Non-liquefiable
P108	0.50	ML	55	4	9.70	5.00	4.70	1.00	0.321	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.528	Liquefiable
	1.00	ML	55	4	19.40	10.00	9.40	0.99	0.319	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.530	Liquefiable
	2.00	SM	45	4	38.80	20.00	18.80	0.98	0.317	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.534	Liquefiable
	3.00	SM	46	5	58.20	30.00	28.20	0.98	0.315	1.70	8.50	5.00	1.20	15.20	0.16	1.00	0.193	0.615	Liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	4.00	SM	46	7	77.60	40.00	37.60	0.97	0.312	1.63	11.42	5.00	1.20	18.70	0.20	1.00	0.238	0.764	Liquefiable
	5.00	CL-ML	59	7	97.00	50.00	47.00	0.96	0.310	1.46	10.21	5.00	1.20	17.25	0.18	1.00	-	-	Non-liquefiable
	6.00	CL-ML	59	10	121.80	60.00	61.80	0.95	0.293	1.27	12.72	5.00	1.20	20.26	0.22	1.00	-	-	Non-liquefiable
	7.00	CL-ML	69	11	142.10	70.00	72.10	0.95	0.291	1.18	12.95	5.00	1.20	20.55	0.22	1.00	-	-	Non-liquefiable
	8.00	ML	78	11	162.40	80.00	82.40	0.94	0.289	1.10	12.12	5.00	1.20	19.54	0.21	1.00	0.250	0.867	Liquefiable
	9.00	ML	78	16	191.70	90.00	101.70	0.93	0.274	0.99	15.87	5.00	1.20	24.04	0.27	1.00	0.327	1.194	Non-liquefiable
	10.00	ML	78	21	213.00	100.00	113.00	0.91	0.267	0.94	19.76	5.00	1.20	28.71	0.40	1.00	0.474	1.775	Non-liquefiable
	11.00	CL	86	21	234.30	110.00	124.30	0.88	0.259	0.90	18.84	5.00	1.20	27.60	0.36	1.00	-	-	Non-liquefiable
	12.50	CL	86	25	260.00	125.00	135.00	0.84	0.252	0.86	21.52	5.00	1.20	30.82	0.52	1.00	-	-	Non-liquefiable
	15.50	CL	87	31	322.40	155.00	167.40	0.76	0.228	0.77	23.96	5.00	1.20	33.75	0.52	0.85	-	-	Non-liquefiable
	17.00	SM	48	31	353.60	170.00	183.60	0.72	0.216	0.74	22.88	5.00	1.20	32.45	0.52	0.80	0.498	2.302	Non-liquefiable
	18.50	ML	58	36	381.10	185.00	196.10	0.68	0.206	0.71	25.71	5.00	1.20	35.85	0.52	0.78	0.486	2.359	Non-liquefiable
	21.50	ML	69	38	442.90	215.00	227.90	0.60	0.182	0.66	25.17	5.00	1.20	35.21	0.52	0.73	0.451	2.478	Non-liquefiable
	23.00	CL	79	38	471.50	230.00	241.50	0.56	0.171	0.64	24.45	5.00	1.20	34.34	0.52	0.71	-	-	Non-liquefiable
	24.50	CL-CI	72	43	502.25	245.00	257.25	0.56	0.171	0.62	26.81	5.00	1.20	37.17	0.52	0.69	-	-	Non-liquefiable
	26.00	SM	29	43	533.00	260.00	273.00	0.56	0.171	0.61	26.02	4.64	1.15	34.47	0.52	0.68	0.422	2.474	Non-liquefiable
	27.50	SM	29	61	569.25	275.00	294.25	0.56	0.169	0.58	35.56	4.64	1.15	45.40	0.52	0.66	0.410	2.426	Non-liquefiable
	29.00	SM	29	64	600.30	290.00	310.30	0.56	0.169	0.57	36.33	4.64	1.15	46.28	0.52	0.65	0.402	2.377	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (µ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	30.50	SM	32	75	631.35	305.00	326.35	0.56	0.169	0.55	41.52	4.83	1.17	53.44	0.52	0.64	0.394	2.331	Non-liquefiable
	32.00	ML	54	66	662.40	320.00	342.40	0.56	0.169	0.54	35.67	5.00	1.20	47.80	0.52	0.62	0.387	2.289	Non-liquefiable
	33.50	CL	64	70	693.45	335.00	358.45	0.56	0.169	0.53	36.97	5.00	1.20	49.37	0.52	0.61	-	-	Non-liquefiable
	35.00	CL	64	62	724.50	350.00	374.50	0.56	0.169	0.52	32.04	5.00	1.20	43.45	0.52	0.60	-	-	Non-liquefiable
	36.50	SM	37	66	755.55	365.00	390.55	0.56	0.169	0.51	33.40	5.00	1.20	45.08	0.52	0.59	0.368	2.176	Non-liquefiable
	38.00	SM	37	77	786.60	380.00	406.60	0.56	0.169	0.50	38.19	5.00	1.20	50.82	0.52	0.58	0.362	2.143	Non-liquefiable
	40.00	SM	39	86	828.00	400.00	428.00	0.56	0.169	0.48	41.57	5.00	1.20	54.88	0.52	0.57	0.355	2.101	Non-liquefiable
P109	0.50	SM-SC	49	4	9.85	5.00	4.85	1.00	0.316	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.537	Liquefiable
	1.00	SM-SC	49	4	19.70	10.00	9.70	0.99	0.314	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.539	Liquefiable
	2.00	SM	43	4	39.40	20.00	19.40	0.98	0.312	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.543	Liquefiable
	3.00	SM	43	6	59.10	30.00	29.10	0.98	0.310	1.70	10.20	5.00	1.20	17.24	0.18	1.00	0.219	0.707	Liquefiable
	4.00	CL-ML	64	11	78.80	40.00	38.80	0.97	0.307	1.61	17.66	5.00	1.20	26.19	0.32	1.00	-	-	Non-liquefiable
	5.00	ML	53	11	98.50	50.00	48.50	0.96	0.305	1.44	15.80	5.00	1.20	23.95	0.27	1.00	0.325	1.067	Non-liquefiable
	6.00	ML	53	15	125.40	60.00	65.40	0.95	0.285	1.24	18.55	5.00	1.20	27.26	0.35	1.00	0.412	1.445	Non-liquefiable
	7.00	SM	38	14	146.30	70.00	76.30	0.95	0.283	1.14	16.03	5.00	1.20	24.23	0.28	1.00	0.331	1.169	Non-liquefiable
	9.00	ML	77	26	188.10	90.00	98.10	0.93	0.279	1.01	26.25	5.00	1.20	36.50	0.52	1.00	0.620	2.227	Non-liquefiable
	10.00	ML	77	18	199.00	100.00	99.00	0.91	0.284	1.01	18.09	5.00	1.20	26.71	0.33	1.00	0.394	1.386	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 | **Earthquake Zone= IV** | **amax/g=0.24** | **K(alpha)= 1.00** | **MSF= 1.193** | **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	12.50	ML	83	11	248.75	125.00	123.75	0.84	0.263	0.90	9.89	5.00	1.20	16.87	0.18	1.00	0.214	0.812	Liquefiable
	14.00	CL	76	11	278.60	140.00	138.60	0.80	0.251	0.85	9.34	5.00	1.20	16.21	0.17	1.00	-	-	Non-liquefiable
	15.50	ML	51	41	314.65	155.00	159.65	0.76	0.234	0.79	32.45	5.00	1.20	43.94	0.52	0.83	0.516	2.210	Non-liquefiable
	17.00	SM-SC	47	41	345.10	170.00	175.10	0.72	0.221	0.76	30.98	5.00	1.20	42.18	0.52	0.82	0.509	2.298	Non-liquefiable
	18.50	CL	63	63	375.55	185.00	190.55	0.68	0.209	0.72	45.64	5.00	1.20	59.77	0.52	0.80	-	-	Non-liquefiable
	20.00	CL	63	51	406.00	200.00	206.00	0.64	0.197	0.70	35.53	5.00	1.20	47.64	0.52	0.77	-	-	Non-liquefiable
	21.50	CL	63	54	436.45	215.00	221.45	0.60	0.184	0.67	36.29	5.00	1.20	48.54	0.52	0.75	-	-	Non-liquefiable
	23.00	SM	36	59	466.90	230.00	236.90	0.56	0.172	0.65	38.33	5.00	1.20	51.00	0.52	0.74	0.457	2.656	Non-liquefiable
	24.50	SM	36	62	497.35	245.00	252.35	0.56	0.172	0.63	39.03	5.00	1.20	51.84	0.52	0.72	0.447	2.597	Non-liquefiable
	26.00	SM	45	58	527.80	260.00	267.80	0.56	0.172	0.61	35.44	5.00	1.20	47.53	0.52	0.71	0.438	2.543	Non-liquefiable
	27.50	SM	45	64	558.25	275.00	283.25	0.56	0.172	0.59	38.03	5.00	1.20	50.63	0.52	0.69	0.429	2.493	Non-liquefiable
	29.00	SM	45	100	588.70	290.00	298.70	0.56	0.172	0.58	57.86	5.00	1.20	74.43	0.52	0.68	0.421	2.446	Non-liquefiable
	30.50	SM	45	74	619.15	305.00	314.15	0.56	0.172	0.56	41.75	5.00	1.20	55.10	0.52	0.67	0.414	2.403	Non-liquefiable
	32.00	CL	67	102	649.60	320.00	329.60	0.56	0.172	0.55	56.18	5.00	1.20	72.42	0.52	0.66	-	-	Non-liquefiable
	33.50	CL	66	86	680.05	335.00	345.05	0.56	0.172	0.54	46.30	5.00	1.20	60.56	0.52	0.65	-	-	Non-liquefiable
	35.00	CL	66	94	710.50	350.00	360.50	0.56	0.172	0.53	49.51	5.00	1.20	64.41	0.52	0.64	-	-	Non-liquefiable
	36.50	SM	48	82	740.95	365.00	375.95	0.56	0.172	0.52	42.29	5.00	1.20	55.75	0.52	0.63	0.388	2.255	Non-liquefiable
	38.00	SM	48	66	771.40	380.00	391.40	0.56	0.172	0.51	33.36	5.00	1.20	45.03	0.52	0.62	0.383	2.223	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	40.00	SM	45	60	812.00	400.00	412.00	0.56	0.172	0.49	29.56	5.00	1.20	40.47	0.52	0.61	0.376	2.183	Non-liquefiable
P110	0.50	SM	35	3	9.95	5.00	4.95	1.00	0.312	1.70	5.10	5.00	1.20	11.12	0.12	1.00	0.147	0.470	Liquefiable
	1.00	SM	35	3	19.90	10.00	9.90	0.99	0.311	1.70	5.10	5.00	1.20	11.12	0.12	1.00	0.147	0.472	Liquefiable
	3.00	SM	33	4	59.70	30.00	29.70	0.98	0.306	1.70	6.80	4.88	1.18	12.90	0.14	1.00	0.167	0.544	Liquefiable
	4.00	ML	59	6	79.60	40.00	39.60	0.97	0.304	1.59	9.53	5.00	1.20	16.44	0.17	1.00	0.209	0.686	Liquefiable
	5.00	CL-ML	71	6	99.50	50.00	49.50	0.96	0.302	1.42	8.53	5.00	1.20	15.23	0.16	1.00	-	-	Non-liquefiable
	6.00	CL-ML	71	8	124.20	60.00	64.20	0.95	0.288	1.25	9.98	5.00	1.20	16.98	0.18	1.00	-	-	Non-liquefiable
	7.00	CL-ML	71	9	144.90	70.00	74.90	0.95	0.286	1.16	10.40	5.00	1.20	17.48	0.19	1.00	-	-	Non-liquefiable
	9.00	CL	79	13	186.30	90.00	96.30	0.93	0.281	1.02	13.25	5.00	1.20	20.90	0.23	1.00	-	-	Non-liquefiable
	10.00	CL	79	18	205.00	100.00	105.00	0.91	0.276	0.98	17.57	5.00	1.20	26.08	0.31	1.00	-	-	Non-liquefiable
	12.50	CL	82	26	256.25	125.00	131.25	0.84	0.256	0.87	22.69	5.00	1.20	32.23	0.52	1.00	-	-	Non-liquefiable
	14.00	ML	78	26	288.40	140.00	148.40	0.80	0.243	0.82	21.34	5.00	1.20	30.61	0.52	1.00	0.617	2.543	Non-liquefiable
	15.50	CL-ML	55	41	317.75	155.00	162.75	0.76	0.232	0.78	32.14	5.00	1.20	43.57	0.52	0.85	-	-	Non-liquefiable
	18.50	CL-ML	75	52	379.25	185.00	194.25	0.68	0.207	0.72	37.31	5.00	1.20	49.77	0.52	0.80	-	-	Non-liquefiable
	20.00	CL	82	60	410.00	200.00	210.00	0.64	0.195	0.69	41.40	5.00	1.20	54.68	0.52	0.78	-	-	Non-liquefiable
	21.50	ML	59	66	440.75	215.00	225.75	0.60	0.183	0.67	43.93	5.00	1.20	57.71	0.52	0.76	0.470	2.573	Non-liquefiable
	23.00	SM	40	71	471.50	230.00	241.50	0.56	0.171	0.64	45.69	5.00	1.20	59.83	0.52	0.74	0.460	2.695	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60cs}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	24.50	SM	40	60	502.25	245.00	257.25	0.56	0.171	0.62	37.41	5.00	1.20	49.89	0.52	0.73	0.450	2.638	Non-liquefiable
	26.00	SM	29	68	533.00	260.00	273.00	0.56	0.171	0.61	41.16	4.64	1.15	51.81	0.52	0.71	0.441	2.585	Non-liquefiable
	27.50	SM	29	70	563.75	275.00	288.75	0.56	0.171	0.59	41.19	4.64	1.15	51.85	0.52	0.70	0.432	2.536	Non-liquefiable
	29.00	SM-SC	48	63	594.50	290.00	304.50	0.56	0.171	0.57	36.10	5.00	1.20	48.32	0.52	0.68	0.425	2.491	Non-liquefiable
	30.50	SM-SC	48	85	625.25	305.00	320.25	0.56	0.171	0.56	47.50	5.00	1.20	62.00	0.52	0.67	0.418	2.448	Non-liquefiable
	32.00	SM	50	83	656.00	320.00	336.00	0.56	0.171	0.55	45.28	5.00	1.20	59.34	0.52	0.66	0.411	2.409	Non-liquefiable
	33.50	SM	50	74	686.75	335.00	351.75	0.56	0.171	0.53	39.46	5.00	1.20	52.35	0.52	0.65	0.404	2.372	Non-liquefiable
	35.00	SM	48	79	717.50	350.00	367.50	0.56	0.171	0.52	41.21	5.00	1.20	54.45	0.52	0.64	0.398	2.336	Non-liquefiable
	36.50	ML	52	71	748.25	365.00	383.25	0.56	0.171	0.51	36.27	5.00	1.20	48.52	0.52	0.63	0.393	2.303	Non-liquefiable
	38.00	ML	52	57	779.00	380.00	399.00	0.56	0.171	0.50	28.54	5.00	1.20	39.24	0.52	0.62	0.387	2.272	Non-liquefiable
	40.00	ML	54	64	820.00	400.00	420.00	0.56	0.171	0.49	31.23	5.00	1.20	42.47	0.52	0.61	0.381	2.233	Non-liquefiable
P111	0.50	CL-ML	51	4	10.00	5.00	5.00	1.00	0.311	1.70	6.80	5.00	1.20	13.16	0.14	1.00	-	-	Non-liquefiable
P111	1.00	CL-ML	51	4	20.00	10.00	10.00	0.99	0.310	1.70	6.80	5.00	1.20	13.16	0.14	1.00	-	-	Non-liquefiable
P111	3.00	SM	42	10	60.00	30.00	30.00	0.98	0.305	1.70	17.00	5.00	1.20	25.40	0.30	1.00	0.358	1.174	Non-liquefiable
P111	4.00	SM	42	14	80.00	40.00	40.00	0.97	0.302	1.58	22.14	5.00	1.20	31.56	0.52	1.00	0.620	2.051	Non-liquefiable
P111	5.00	CL	74	14	100.00	50.00	50.00	0.96	0.300	1.41	19.80	5.00	1.20	28.76	0.40	1.00	-	-	Non-liquefiable
P111	6.00	CL	74	11	118.20	60.00	58.20	0.95	0.302	1.31	14.42	5.00	1.20	22.30	0.25	1.00	-	-	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	7.00	SM	45	30	137.90	70.00	67.90	0.95	0.300	1.21	36.41	5.00	1.20	48.69	0.52	1.00	0.620	2.068	Non-liquefiable
	9.00	CL	74	31	177.30	90.00	87.30	0.93	0.295	1.07	33.18	5.00	1.20	44.81	0.52	1.00	-	-	Non-liquefiable
	10.00	CL	92	44	198.00	100.00	98.00	0.91	0.286	1.01	44.45	5.00	1.20	58.34	0.52	1.00	-	-	Non-liquefiable
	12.50	CL	79	27	247.50	125.00	122.50	0.84	0.265	0.90	24.39	5.00	1.20	34.27	0.52	1.00	-	-	Non-liquefiable
	15.50	SC	46	37	311.55	155.00	156.55	0.76	0.236	0.80	29.57	5.00	1.20	40.49	0.52	0.87	0.541	2.292	Non-liquefiable
	18.50	CL-ML	54	40	379.25	185.00	194.25	0.68	0.207	0.72	28.70	5.00	1.20	39.44	0.52	0.79	-	-	Non-liquefiable
	20.00	SM	35	40	406.00	200.00	206.00	0.64	0.197	0.70	27.87	5.00	1.20	38.44	0.52	0.78	0.481	2.443	Non-liquefiable
	21.50	SM	35	54	436.45	215.00	221.45	0.60	0.184	0.67	36.29	5.00	1.20	48.54	0.52	0.76	0.469	2.541	Non-liquefiable
	24.50	SM	47	57	497.35	245.00	252.35	0.56	0.172	0.63	35.88	5.00	1.20	48.06	0.52	0.68	0.422	2.451	Non-liquefiable
	26.00	SM	36	86	538.20	260.00	278.20	0.56	0.169	0.60	51.56	5.00	1.20	66.87	0.52	0.65	0.405	2.398	Non-liquefiable
	27.50	SM	37	85	569.25	275.00	294.25	0.56	0.169	0.58	49.55	5.00	1.20	64.46	0.52	0.64	0.396	2.342	Non-liquefiable
	29.00	SM	37	88	600.30	290.00	310.30	0.56	0.169	0.57	49.96	5.00	1.20	64.95	0.52	0.62	0.387	2.291	Non-liquefiable
	30.50	SM	37	79	631.35	305.00	326.35	0.56	0.169	0.55	43.73	5.00	1.20	57.48	0.52	0.61	0.379	2.243	Non-liquefiable
	32.00	SM	37	83	662.40	320.00	342.40	0.56	0.169	0.54	44.86	5.00	1.20	58.83	0.52	0.60	0.372	2.199	Non-liquefiable
	33.50	SM	37	82	693.45	335.00	358.45	0.56	0.169	0.53	43.31	5.00	1.20	56.97	0.52	0.59	0.365	2.157	Non-liquefiable
	35.00	SC	34	87	724.50	350.00	374.50	0.56	0.169	0.52	44.96	4.93	1.19	58.35	0.52	0.58	0.358	2.119	Non-liquefiable
	36.50	SC	34	85	755.55	365.00	390.55	0.56	0.169	0.51	43.01	4.93	1.19	56.04	0.52	0.57	0.352	2.082	Non-liquefiable
	38.00	CL	61	88	786.60	380.00	406.60	0.56	0.169	0.50	43.64	5.00	1.20	57.37	0.52	0.56	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	40.00	SC	42	100	828.00	400.00	428.00	0.56	0.169	0.48	48.34	5.00	1.20	63.00	0.52	0.55	0.339	2.004	Non-liquefiable
P112	0.50	SM	46	4	10.05	5.00	5.05	1.00	0.309	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.548	Liquefiable
	1.00	SM	32	4	20.10	10.00	10.10	0.99	0.308	1.70	6.80	4.83	1.17	12.79	0.14	1.00	0.165	0.536	Liquefiable
	3.00	SM	32	5	60.30	30.00	30.30	0.98	0.303	1.70	8.50	4.83	1.17	14.78	0.16	1.00	0.188	0.621	Liquefiable
	4.00	ML	54	8	80.40	40.00	40.40	0.97	0.301	1.57	12.59	5.00	1.20	20.10	0.22	1.00	0.258	0.859	Liquefiable
	5.00	CL	82	8	100.50	50.00	50.50	0.96	0.299	1.41	11.26	5.00	1.20	18.51	0.20	1.00	-	-	Non-liquefiable
	6.00	CL	82	9	120.60	60.00	60.60	0.95	0.296	1.28	11.56	5.00	1.20	18.87	0.20	1.00	-	-	Non-liquefiable
	7.00	CL	82	12	140.70	70.00	70.70	0.95	0.294	1.19	14.27	5.00	1.20	22.13	0.24	1.00	-	-	Non-liquefiable
	8.00	ML	77	12	160.80	80.00	80.80	0.94	0.291	1.11	13.35	5.00	1.20	21.02	0.23	1.00	0.273	0.935	Liquefiable
	9.00	ML	77	17	181.80	90.00	91.80	0.93	0.288	1.04	17.74	5.00	1.20	26.29	0.32	1.00	0.382	1.327	Non-liquefiable
	10.00	ML	84	22	202.00	100.00	102.00	0.91	0.280	0.99	21.78	5.00	1.20	31.14	0.52	1.00	0.620	2.213	Non-liquefiable
	12.50	ML	84	20	252.50	125.00	127.50	0.84	0.260	0.89	17.71	5.00	1.20	26.25	0.32	1.00	0.381	1.466	Non-liquefiable
	14.00	CL	76	20	271.60	140.00	131.60	0.80	0.258	0.87	17.43	5.00	1.20	25.92	0.31	1.00	-	-	Non-liquefiable
	15.50	CL	76	33	316.20	155.00	161.20	0.76	0.233	0.79	25.99	5.00	1.20	36.19	0.52	0.86	-	-	Non-liquefiable
	18.50	ML	53	54	377.40	185.00	192.40	0.68	0.208	0.72	38.93	5.00	1.20	51.72	0.52	0.81	0.499	2.400	Non-liquefiable
	20.00	CL	73	46	402.00	200.00	202.00	0.64	0.199	0.70	32.37	5.00	1.20	43.84	0.52	0.79	-	-	Non-liquefiable
	21.50	CL	52	34	432.15	215.00	217.15	0.60	0.186	0.68	23.07	5.00	1.20	32.69	0.52	0.77	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (µ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	23.00	SM-SC	49	34	462.30	230.00	232.30	0.56	0.174	0.66	22.31	5.00	1.20	31.77	0.52	0.74	0.456	2.623	Non-liquefiable
	24.50	CL	84	52	494.90	245.00	249.90	0.56	0.173	0.63	32.89	5.00	1.20	44.47	0.52	0.72	-	-	Non-liquefiable
	26.00	SM	47	57	525.20	260.00	265.20	0.56	0.173	0.61	35.00	5.00	1.20	47.00	0.52	0.70	0.434	2.512	Non-liquefiable
	27.50	SM	49	59	555.50	275.00	280.50	0.56	0.173	0.60	35.23	5.00	1.20	47.27	0.52	0.69	0.426	2.461	Non-liquefiable
	29.00	SM	49	63	585.80	290.00	295.80	0.56	0.173	0.58	36.63	5.00	1.20	48.96	0.52	0.67	0.417	2.414	Non-liquefiable
	30.50	ML	53	57	616.10	305.00	311.10	0.56	0.173	0.57	32.32	5.00	1.20	43.78	0.52	0.66	0.410	2.370	Non-liquefiable
	32.00	ML	53	54	646.40	320.00	326.40	0.56	0.173	0.55	29.89	5.00	1.20	40.87	0.52	0.65	0.403	2.328	Non-liquefiable
	33.50	CL	76	57	676.70	335.00	341.70	0.56	0.173	0.54	30.84	5.00	1.20	42.00	0.52	0.64	-	-	Non-liquefiable
	35.00	CL	76	53	707.00	350.00	357.00	0.56	0.173	0.53	28.05	5.00	1.20	38.66	0.52	0.63	-	-	Non-liquefiable
	36.50	SM	39	55	737.30	365.00	372.30	0.56	0.173	0.52	28.50	5.00	1.20	39.21	0.52	0.62	0.384	2.219	Non-liquefiable
	38.00	SM	39	60	767.60	380.00	387.60	0.56	0.173	0.51	30.48	5.00	1.20	41.57	0.52	0.61	0.378	2.187	Non-liquefiable
	40.00	SM	42	63	808.00	400.00	408.00	0.56	0.173	0.50	31.19	5.00	1.20	42.43	0.52	0.60	0.371	2.146	Non-liquefiable
P113	0.50	SM	42	5	9.40	5.00	4.40	1.00	0.332	1.70	8.50	5.00	1.20	15.20	0.16	1.00	0.193	0.582	Liquefiable
	1.00	SM	39	5	18.80	10.00	8.80	0.99	0.331	1.70	8.50	5.00	1.20	15.20	0.16	1.00	0.193	0.585	Liquefiable
	3.00	ML	59	6	56.40	30.00	26.40	0.98	0.326	1.70	10.20	5.00	1.20	17.24	0.18	1.00	0.219	0.672	Liquefiable
	4.00	SM	45	8	75.20	40.00	35.20	0.97	0.323	1.69	13.48	5.00	1.20	21.18	0.23	1.00	0.275	0.852	Liquefiable
	6.00	SM	45	12	112.80	60.00	52.80	0.95	0.318	1.38	16.51	5.00	1.20	24.82	0.29	1.00	0.344	1.081	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	7.00	CL-ML	78	13	140.70	70.00	70.70	0.95	0.294	1.19	15.46	5.00	1.20	23.55	0.27	1.00	-	-	Non-liquefiable
	8.00	ML	71	13	160.80	80.00	80.80	0.94	0.291	1.11	14.46	5.00	1.20	22.35	0.25	1.00	0.295	1.011	Non-liquefiable
	9.00	ML	71	18	186.30	90.00	96.30	0.93	0.281	1.02	18.34	5.00	1.20	27.01	0.34	1.00	0.404	1.437	Non-liquefiable
	10.00	ML	71	23	207.00	100.00	107.00	0.91	0.274	0.97	22.23	5.00	1.20	31.68	0.52	1.00	0.620	2.266	Non-liquefiable
	11.00	CL	85	23	227.70	110.00	117.70	0.88	0.266	0.92	21.20	5.00	1.20	30.44	0.50	1.00	-	-	Non-liquefiable
	12.50	CL	85	26	263.75	125.00	138.75	0.84	0.249	0.85	22.07	5.00	1.20	31.49	0.52	1.00	-	-	Non-liquefiable
	15.50	CL	85	31	327.05	155.00	172.05	0.76	0.225	0.76	23.63	5.00	1.20	33.36	0.52	0.83	-	-	Non-liquefiable
	18.50	ML	54	35	373.70	185.00	188.70	0.68	0.210	0.73	25.48	5.00	1.20	35.57	0.52	0.81	0.501	2.385	Non-liquefiable
	20.00	CL	57	35	414.00	200.00	214.00	0.64	0.193	0.68	23.93	5.00	1.20	33.71	0.52	0.78	-	-	Non-liquefiable
	21.50	CL	81	64	440.75	215.00	225.75	0.60	0.183	0.67	42.60	5.00	1.20	56.11	0.52	0.76	-	-	Non-liquefiable
	23.00	CL	81	69	471.50	230.00	241.50	0.56	0.171	0.64	44.40	5.00	1.20	58.28	0.52	0.75	-	-	Non-liquefiable
	24.50	SM	45	51	502.25	245.00	257.25	0.56	0.171	0.62	31.80	5.00	1.20	43.16	0.52	0.73	0.454	2.660	Non-liquefiable
	26.00	SM	40	58	533.00	260.00	273.00	0.56	0.171	0.61	35.10	5.00	1.20	47.12	0.52	0.72	0.445	2.608	Non-liquefiable
	27.50	SM	40	62	563.75	275.00	288.75	0.56	0.171	0.59	36.49	5.00	1.20	48.78	0.52	0.70	0.437	2.560	Non-liquefiable
	29.00	SM	37	68	594.50	290.00	304.50	0.56	0.171	0.57	38.97	5.00	1.20	51.76	0.52	0.69	0.429	2.515	Non-liquefiable
	30.50	SM	34	63	625.25	305.00	320.25	0.56	0.171	0.56	35.20	4.93	1.19	46.76	0.52	0.68	0.422	2.473	Non-liquefiable
	32.00	SM	34	54	656.00	320.00	336.00	0.56	0.171	0.55	29.46	4.93	1.19	39.94	0.52	0.67	0.415	2.434	Non-liquefiable
	33.50	SM	49	60	686.75	335.00	351.75	0.56	0.171	0.53	31.99	5.00	1.20	43.39	0.52	0.66	0.409	2.398	Non-liquefiable

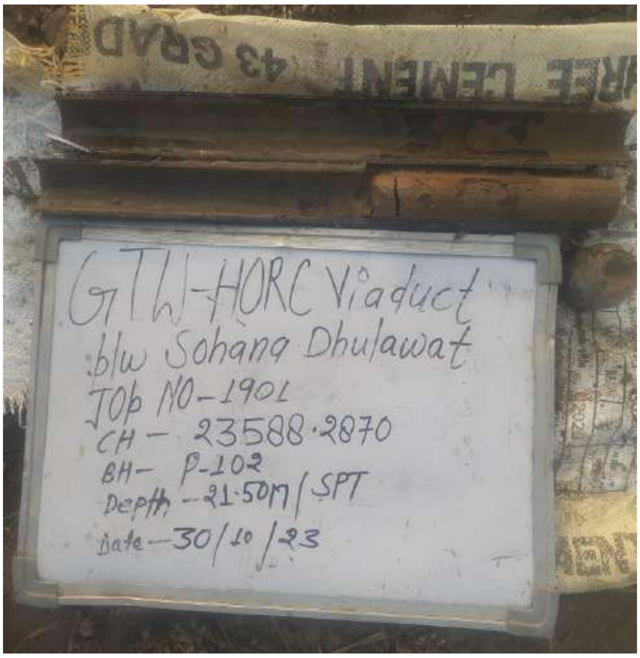
APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	35.00	SM	46	65	717.50	350.00	367.50	0.56	0.171	0.52	33.91	5.00	1.20	45.69	0.52	0.65	0.403	2.363	Non-liquefiable
	36.50	SM	46	67	748.25	365.00	383.25	0.56	0.171	0.51	34.22	5.00	1.20	46.07	0.52	0.64	0.397	2.331	Non-liquefiable
	38.00	SM	45	71	779.00	380.00	399.00	0.56	0.171	0.50	35.54	5.00	1.20	47.65	0.52	0.63	0.392	2.300	Non-liquefiable
	40.00	SM	45	77	820.00	400.00	420.00	0.56	0.171	0.49	37.57	5.00	1.20	50.09	0.52	0.62	0.386	2.261	Non-liquefiable

APPENDIX-I
SITE PHOTOGRAPHS

UD sample at depth 7.00 m



SPT sample at depth 21.50 m

SPT sample at depth 26.00 m

SPT at depth 36.50 m

APPENDIX-I
SITE PHOTOGRAPHS

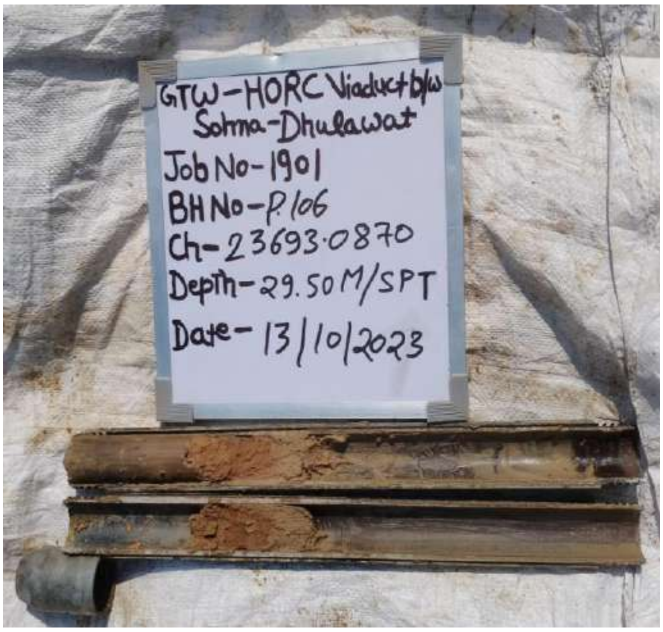
SPT sample at depth 11.00 m

UD sample at depth 4.00 m

SPT at depth 11.00 m

SPT at depth 14.50m

APPENDIX-I
SITE PHOTOGRAPHS



SPT sample at depth 29.50 m

SPT at depth 23.00m

SPT sample at depth 32.00m

SPT at depth 6.00 m

APPENDIX-I
SITE PHOTOGRAPHS

SPT at depth 27.50 m

UDS at depth 14.00m

SPT at depth 26.00m

SPT sample at depth 40.00 m

APPENDIX-I
SITE PHOTOGRAPHS

SPT at depth 3.00 m

SPT sample at depth 24.50 m

UDS at depth 11.00m

SPT sample at depth 32.00 m

APPENDIX-I
SITE PHOTOGRAPHS

SPT at depth 7.00 m

SPT at depth 18.50 m

SPT at depth 9.00m

SPT at depth 32.00m

APPENDIX-J
LABORATORY PHOTOGRAPHS

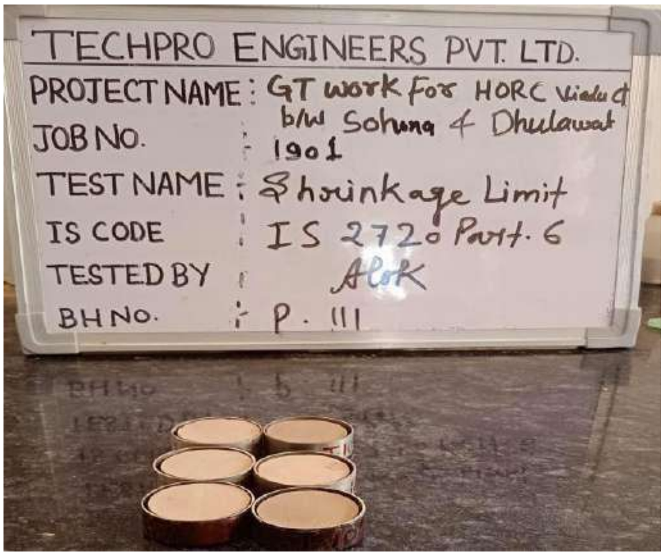
Water content test

Free Swell Index Test

Atterberg's limit test

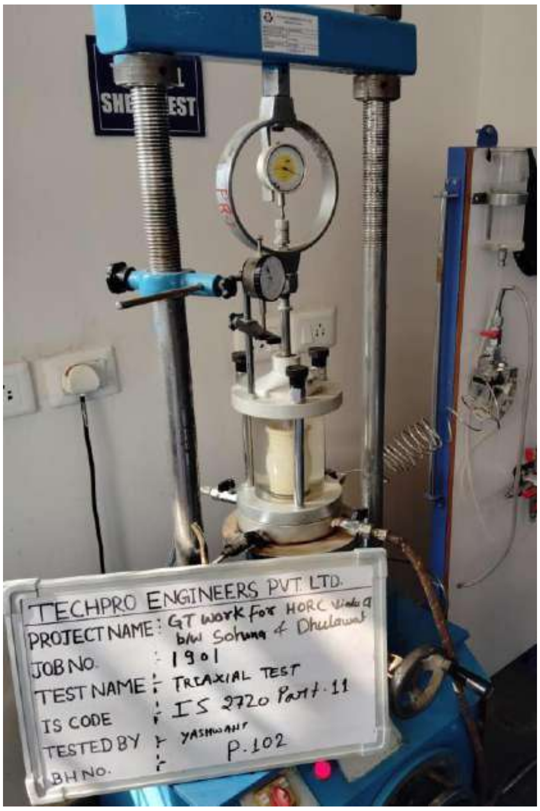
APPENDIX-J
LABORATORY PHOTOGRAPHS

UCS of soil test



Shrinkage limit test

Direct Shear Test



Tri-axial Test

APPENDIX-J
LABORATORY PHOTOGRAPHS

Water content test

Atterberg's limit test

Direct Shear Test

Tri-axial Test

APPENDIX-K
CHART 1: FIELD BORELOG CHARTS (P 101)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW FOR HORC Viaduct B/w Sohana Dhulawat station	Project Code:	1901
Coordinate: N: 3120498.173	E: 700986.455	Location/ Chainage:	23562.0870
Method of Drilling: Percussion	Drilling Equipment: Manual Hydraulically	Bore No.:	P-101
Casing Lowered (M): 21.50M Bentonite Used: NA	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation: R.L-193.949	Date: From 28/10/23 to 30/10/23	Water Table (M):	1.30

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
28/10/23	0.00	0.50	0.50	D	SX	collected				—	—	—	—	—	—	Non cohesive soil
"	1.00	1.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	2.00	2.45	0.45	DP	"	2	3	4	7	—	—	—	—	—	—	do
"	3.00	3.45	0.45	DP	"	2	2	2	4	—	—	—	—	—	—	do
"	4.00	4.45	0.45	U/D	"	slipped				—	—	—	—	—	—	Non cohesive soil
"	5.00	5.45	0.45	DP	"	4	5	7	12	—	—	—	—	—	—	do
"	6.00	6.45	0.45	DP	"	6	8	11	19	—	—	—	—	—	—	do
"	7.00	7.45	0.45	U	"	Received				—	—	—	—	—	—	Non cohesive soil
"	8.00	8.45	0.45	DP	"	9	8	13	21	—	—	—	—	—	—	do
"	9.00	9.45	0.45	DP	"	8	12	16	28	—	—	—	—	—	—	do
"	10.00	10.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	11.00	11.45	0.45	DP	"	8	13	17	30	—	—	—	—	—	—	do
"	12.00	12.45	0.45	DP	"	7	12	16	28	—	—	—	—	—	—	do
"	13.00	13.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	14.50	14.95	0.45	DP	"	5	7	12	19	—	—	—	—	—	—	Cohesive soil with Gravel
"	16.00	16.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	17.50	17.95	0.45	DP	"	8	15	23	38	—	—	—	—	—	—	do
"	19.00	19.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	20.50	20.95	0.45	DP	"	14	20	24	44	—	—	—	—	—	—	do
"	22.00	22.45	0.45	U	"	Received				—	—	—	—	—	—	Non cohesive soil with Gravel
"	23.50	23.95	0.45	DP	"	13	21	23	44	—	—	—	—	—	—	do
29/10/23	25.00	25.45	0.45	U/D	"	slipped				—	—	—	—	—	—	do
"	26.50	26.95	0.45	DP	"	11	21	25	46	—	—	—	—	—	—	do
"	28.00	28.45	0.45	U/D	"	slipped				—	—	—	—	—	—	do

Supervisor Lablesh   Techpro Engineers Pvt. Ltd.   E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 2: FIELD BORELOG CHARTS (P 101)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW FOR HORC Viaduct B/w Sohana Dhulawat station	Project Code:	1901
Coordinate:	N: 3120498.173 E: 700986.455	Location/ Chainage:	23562.0870
Method of Drilling:	Percussion	Drilling Equipment:	Manual Auger winch
Bore No.:	P-101		
Casing Lowered (M):	21.50 M	Bentonite Used:	NA
Standard Sampler:	Yes	Barrel Type:	NA
Ground Elevation:	R.L-193.949	Date: From 28/10/23 to 30/10/23	
Water Table (M):	1.30		

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
29-10-23	29.50	29.95	0.45	DP	SX	14	28	48	76	—	—	—	—	—	—	Noncoheive soil with Gravel
"	31.00	31.45	0.45	U/DP	"	13	21	24	45	—	—	—	—	—	—	do
"	32.50	32.95	0.45	DP	"	18	21	23	44	—	—	—	—	—	—	do
"	34.00	34.45	0.45	U	"	slipped				—	—	—	—	—	—	do
"	35.50	35.95	0.45	DP	"	15	23	24	47	—	—	—	—	—	—	do
"	37.00	37.45	0.45	U	"	slipped				—	—	—	—	—	—	do
30-10-23	38.50	38.45	0.45	DP	"	12	24	28	52	—	—	—	—	—	—	-do-
"	40.00	40.45	0.45	DP	"	16	23	25	48	—	—	—	—	—	—	-do-

Supervisor Lakhey

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 3: FIELD BORELOG CHARTS (P 102)

TECHPRO ENGINEERS PVT. LTD. — **BORE/ DRILL LOG**

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date.:	28.12.2021

Project Name: GTW-HORC Viaduct b/w Sohana Dhulawat Station — Project Code: 1901

Coordinate: N: 3120524.371 E: 700986.81 — Location/ Chainage: 23588.2870

Method of Drilling: Percussion — Drilling Equipment: Manhual Power Winch — Bore No.: P 102

Casing Lowered (M): 24.00 — Bentonite Used: NO — Standard Sampler: Yes — Barrel Type: N/A

Ground Elevation: R.L-194.023 — Date: From 29/10/23 to 9/10/23 — Water Table (M): 1.00

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
29/10/23	0.0	0.50	0.50	DS	SX	Received										NON Cohesive Soil
	1.00	1.45	0.45	DP	〃	1	2	2	4							-do-
〃	2.00	2.45	0.45	U	〃	Received										-do-
〃	3.00	3.45	0.45	DP	〃	3	5	8	13							-do-
〃	4.00	4.45	0.45	DP	〃	3	3	4	7							-do-
〃	5.00	5.45	0.45	U	〃	Slipped										-do-
〃	6.00	6.45	0.45	DP	〃	4	6	9	15							-do-
〃	7.00	7.45	0.45	DP	〃	4	4	6	10							NON cohesive Soil
〃	8.00	8.45	0.45	U	〃	Received										-do-
〃	9.00	9.45	0.45	DP	〃	7	9	11	20							-do-
〃	10.00	10.45	0.45	DP	〃	7	8	10	18							-do-
〃	11.00	11.45	0.45	U	〃	Received										-do-
〃	12.50	12.95	0.45	DP	〃	5	7	9	16							-do-
〃	14.00	14.45	0.45	U	〃	Received										-do-
〃	15.50	15.95	0.45	DP	〃	7	13	15	28							-do-
〃	17.00	17.45	0.45	U	〃	Slipped										-do-
〃	18.50	18.95	0.45	DP	〃	10	12	16	28							-do-
3/10/23	20.00	20.45	0.45	U	〃	Slipped										-do-
〃	21.50	21.95	0.45	DP	〃	15	21	23	44							NON cohesive soil
〃	23.00	23.45	0.45	U	〃	Slipped										-do-
1/10/23	24.50	24.95	0.45	DP	〃	14	22	28	50							-do-
〃	26.00	26.45	0.45	U	〃	Slipped										-do-
〃	27.50	27.95	0.45	DP	〃	18	21	30	51							-do-
〃	29.00	29.45	0.45	U	〃	Slipped										-do-

Nitesh
Supervisor

E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 4: FIELD BORELOG CHARTS (P 102)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	(GTW)-HORC Viaduct b/w Sohana Dhulawat station			Project Code:	1901
Coordinate:	N: 3120524.371	E: 700986.81		Location/ Chainage:	23588.2870
Method of Drilling:	Percussion	Drilling Equipment	Manual. Powerwinch	Bore No.:	P102
Casing Lowered (M):	24.00	Bentonite Used: NO	Standard Sampler : Yes	Barrel Type :	N/A
Ground Elevation:	R.L-194.023	Date: From 29/10/23 to 2/10/23		Water Table (M):	1.00

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
1/10/23	30.50	30.95	0.45	DP	SX	16	20	28	48							NON cohesive soil
"	32.00	32.45	0.45	U	"	Slipped										—do—
"	33.50	33.95	0.45	DP	"	17	22	29	51							—do—
"	35.00	35.45	0.45	DP	"	19	23	33	56							—do—
2/10/23	36.50	36.95	0.45	DP	"	19	24	31	55							—do—
"	38.00	38.45	0.45	DP	"	20	26	30	56							—do—
"	40.00	40.45	0.45	DP	"	20	30	36	66							—do—

Nitesh
Supervisor

Techpro Engineers

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 5: FIELD BORELOG CHARTS (P 103)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No: GT/ 003 Date of Issue: 01.04.2018 Rev. No.: R03 Rev. Date.: 28.12.2021

Project Name:	GT For HORC Viaduct Sohana Dhulawat Station			Project Code:	1901
Coordinate:	N: 3120550.568	E: 700987.165		Location/ Chainage:	23614 6870
Method of Drilling:	Percussion	Drilling Equipment:	Percussion	Bore No.:	P-103
Casing Lowered (M):	27.00	Bentonite Used: NA	Standard Sampler: Yes.	Barrel Type:	NA
Ground Elevation:	RL-194.05	Date: From 11/10/23	to 17/10/23	Water Table (M):	0.50 m

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT 0-15cm	SPT 15-30cm	SPT 30-45cm	N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
11/10/23	0.00	0.50	0.50	D	SX	Collected										Non cohesive soil
"	1.00	1.45	0.45	DP	"	1	2	3	5							do
"	2.00	2.45	0.45	U	"	Received										do
"	3.00	3.45	0.45	DP	"	2	3	4	7							Non cohesive soil
"	4.00	4.45	0.45	DP	"	4	5	7	12							do
"	5.00	5.45	0.45	U	"	Received										do
"	6.00	6.45	0.45	DP	"	5	7	9	16							cohesive soil
"	7.00	7.45	0.45	DP	"	6	9	11	20							do
"	8.00	8.45	0.45	U	"	Received										do
"	9.00	9.45	0.45	DP	"	5	8	11	19							do
"	10.00	10.45	0.45	DP	"	5	9	13	22							do
"	11.00	11.45	0.45	U	"	Received										cohesive soil
"	12.50	12.95	0.45	DP	"	7	8	9	17							do
"	14.00	14.45	0.45	U	"	Received										do
"	15.50	15.95	0.45	DP	"	11	16	20	36							Non cohesive soil
"	17.00	17.45	0.45	U	"	Received										cohesive soil
"	18.50	18.95	0.45	DP	"	8	12	15	27							Noncohesive Soil.
12/10/23	20.00	20.45	0.45	U	"	Received										Cohesive soil.
"	21.50	21.45	0.45	DP	"	9	19	25	44							cohesive soil with Gravel
"	23.00	23.45	0.45	U	"	Received										Cohesive soil.
"	24.50	24.95	0.45	DP	"	10	23	42	65							Non cohesive soil.
"	26.00	26.45	0.45	U/DP	"	10	24	43	67							Non cohesive soil with Gravel
"	27.50	27.95	0.45	DP	"	13	26	45	71							do
"	29.00	29.45	[illegible]	U/DP	"	13	25	46	71							do

Techpro Engineers Pvt. Ltd. Ganpur

Supervisor | E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 6: FIELD BORELOG CHARTS (P 103)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No	GT/ 003
		Date of Issue	01.04.2018
		Rev. No.	R03
		Rev. Date	28.12.2021

Project Name:	GT For HORC Viaduct between Sohana Dhulawat station	Project Code:	1901
Coordinate: N: 3120550.568	E: 700987.165	Location/ Chainage:	23614-4870
Method of Drilling: Percussion	Drilling Equipment: Percussion	Bore No.:	P-103
Casing Lowered (M): 27.00; Bentonite Used: NA	Standard Sampler: Yes.	Barrel Type:	NA
Ground Elevation: RL-194.05	Date: From 11/10/23 to 13/10/23	Water Table (M):	0.50 M

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
	30.50	30.95	0.45	DP	SX	14	25	45	70							Non cohesive soil with Gravel
13/10/23	32.00	32.45	0.45	DP	"	16	28	47	75							do
"	33.50	33.95	0.45	DP	"	16	28	47	75							cohesive soil with Gravel
"	35.00	35.45	0.45	DP	"	15	26	46	72							do
"	36.50	36.45	0.45	DP	"	16	27	46	73							do
"	38.00	38.45	0.45	DP	"	17	28	47	75							do
"	40.00	40.45	0.45	DP	"	19	34	48	82							cohesive soil with Gravel

Supervisor

Techpro Engineers Pvt. Ltd.

E-In-C

Abbreviation Used : U- Undisturbed Sample, C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 7: FIELD BORELOG CHARTS (P 104)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTI for Horc viaduct B/W Sohana Dhulawat station	Project Code:	
Coordinate:	N: 3120576.766 E: 700987.521	Location/ Chainage:	23640.6870
Method of Drilling:	Percussion	Drilling Equipment	Auto trip Powerwinch
Casing Lowered (M):	18 Bentonite Used: NO	Standard Sampler :	Yes
Bore No.:	P 104	Barrel Type :	NA
Ground Elevation:	R.L-194.067	Date: From 30/10/23 to 2/11/23	Water Table (M): 1.20

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
30/10/23	0.00	0.50	0.50	DS	SX	Collected			-	-	-	-	-	-	-	Non Cohesive Soil
"	1.00	1.45	0.45	U	"	Received			-	-	-	-	-	-	-	-do-
"	2.00	2.45	0.45	DP	"	2	2	2	4	-	-	-	-	-	-	-do-
"	3.00	3.45	0.45	DP	"	2	2	4	6	-	-	-	-	-	-	-do-
"	4.00	4.45	0.45	U	"	Slipped				-	-	-	-	-	-	-do-
"	5.00	5.45	0.45	DP	"	3	5	7	12	-	-	-	-	-	-	-do-
"	6.00	6.45	0.45	DP	"	3	3	7	10	-	-	-	-	-	-	-do-
"	7.00	7.45	0.45	U	"	Received				-	-	-	-	-	-	Cohesive Soil with
"	8.00	8.45	0.45	DP	"	7	8	10	18	-	-	-	-	-	-	-do- Gravel
"	9.00	9.45	0.45	DP	"	6	10	12	22	-	-	-	-	-	-	-do-
31/10/23	10.00	10.45	0.45	U	"	Received				-	-	-	-	-	-	-do-
"	11.00	11.45	0.45	DP	"	5	6	9	15	-	-	-	-	-	-	Non Cohesive Soil
"	12.00	12.45	0.45	DP	"	6	9	13	22	-	-	-	-	-	-	-do-
"	13.00	13.45	0.45	U	"	Received				-	-	-	-	-	-	-do-
"	14.50	14.95	0.45	DP	"	6	12	16	28	-	-	-	-	-	-	-do-
"	16.00	16.45	0.45	U	"	Received				-	-	-	-	-	-	-do-
"	17.50	17.95	0.45	DP	"	8	15	20	35	-	-	-	-	-	-	Non Cohesive Soil
"	19.00	19.45	0.45	U	"	Slipped				-	-	-	-	-	-	-do-
"	20.50	20.95	0.45	DP	"	10	16	23	39	-	-	-	-	-	-	-do-
"	22.00	22.45	0.45	U	"	Received			-	-	-	-	-	-	-	Non Cohesive Soil
"	23.50	23.95	0.45	DP	"	13	18	24	42	-	-	-	-	-	-	with Gravel
01/11/23	25.00	25.45	0.45	U	"	Received				-	-	-	-	-	-	-do-
"	26.50	26.95	0.45	DP	"	13	15	30	45	-	-	-	-	-	-	-do-
"	28.00	28.45	0.45	U	"	Received			-	-	-	-	-	-	-	-do-

Supervisor Laldev

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

S.E Civil
E - in - C

APPENDIX-K
CHART 8: FIELD BORELOG CHARTS (P 104)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name: GTW to Horc Viaduct B/w Sohana Dhulawat Station		Project Code:	1901
Coordinate: N: 3120576.766	E: 700987.521	Location/ Chainage:	23640.6870
Method of Drilling: Percussion	Drilling Equipment: Autotrip Powerwinch	Bore No.:	P. 104
Casing Lowered (M): 18 · Bentonite Used: NO	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation: R.L-194.067	Date: From 30/10/23 to 2/11/23	Water Table (M):	1.20

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
01/11/23	29.50	29.95	0.45	DP	Sr	13	27	31	58	–	–	–	–	–	–	Non Cohesive Soil
"	31.00	31.45	0.45	DP	"	18	31	32	63	–	–	–	–	–	–	with Gravel
"	32.50	32.95	0.45	DP	"	13	28	38	66	–	–	–	–	–	–	– do –
2/11/23	34.00	34.45	0.45	DP	"	14	24	32	56	–	–	–	–	–	–	Non Cohesive Soil
"	35.50	35.95	0.45	DP	"	13	18	35	53	–	–	–	–	–	–	– do –
"	37.00	37.45	0.45	DP	"	18	28	35	63	–	–	–	–	–	–	– do –
"	38.50	38.95	0.45	DP	"	12	19	29	48	–	–	–	–	–	–	– do –
"	40.00	40.45	0.45	DP	"	17	21	31	52	–	–	–	–	–	–	– do –

Supervisor Lakhan

CE-Civil
In - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 9: FIELD BORELOG CHARTS (P 105)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No: GT/003; Date of Issue: 01.04.2018; Rev. No.: R03; Rev. Date.: 28.12.2021

Project Name:	GTI for Horc Viaduct B/W Sohana Dhulawat Station			Project Code:	1901
Coordinate:	N: 3120602.953	E: 700987.876	Location/ Chainage: 93666.8870		
Method of Drilling:	Percussion	Drilling Equipment	Automatic Rowerwinch	Bore No.:	P.105
Casing Lowered (M):	20.00	Bentonite Used: No	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation:	R.L-193.916	Date: From 30/10/23 to 02/11/23		Water Table (M):	1.20

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT 0-15cm	SPT 15-30cm	SPT 30-45cm	N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
30/10/23	0.00	0.50	0.50	DS	Sx	Collected										Non Cohesive Soil
	1.00	1.45	0.45	U	"	Slipped										- do -
	2.00	2.45	0.45	DP	"	2	2	2	4							- do -
	3.00	3.45	0.45	DP	"	2	3	3	6							- do -
	4.00	4.45	0.45	U	"	Received										Non Cohesive Soil
	5.00	5.45	0.45	DP	"	3	3	4	7							with gravel
	6.00	6.45	0.45	DP	"	3	4	6	10							- do -
	7.00	7.45	0.45	U	"	Slipped										- do -
	8.00	8.45	0.45	DP	"	3	5	7	12							- do -
31/10/23	9.00	9.45	0.45	DP	"	4	6	9	15							- do -
	10.00	10.45	0.45	U	"	Received										- do -
	11.00	11.45	0.45	DP	"	3	4	4	8							Non Cohesive Soil with
	12.00	12.45	0.45	DP	"	4	6	8	14							- do - Gravel
	13.00	13.45	0.45	U	"	Received										- do -
	14.50	14.95	0.45	DP	"	9	9	12	21							- do -
	16.00	16.45	0.45	U	"	Slipped										- do -
	17.50	17.95	0.45	DP	"	9	14	19	33							- do -
	19.00	19.45	0.45	U	"	Slipped										- do -
	20.50	20.95	0.45	DP	"	13	20	26	46							- do -
	22.00	22.45	0.45	U	"	Received										- do -
	23.50	23.95	0.45	DP	"	8	15	23	38							- do -
	25.00	25.45	0.45	U	"	Received										- do -
1/11/23	26.50	26.95	0.45	DP	"	18	25	25	50							Non Cohesive Soil
	28.00	28.45	0.45	U	"	Received										- do -

Supervisor Laddey

E-In-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 10: FIELD BORELOG CHARTS (P 105)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW for HORC Viaduct B/W Sohana Dhulawat station			Project Code:	1901
Coordinate:	N: 3120602.953	E: 700987.876	Location/ Chainage: 23666.8870		
Method of Drilling:	Percussion	Drilling Equipment	Autotrip Borewinch	Bore No.:	P.105
Casing Lowered (M):	20.00	Bentonite Used: NO	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation:	R.L-193.916	Date: From 30/10/23 to 2/11/23		Water Table (M):	1.30

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
1/11/23	29.50	29.95	0.45	DP	Sx	15	24	26	50	-						Non Cohesive Soil
〃	31.00	31.45	0.45	U	〃	Received										- d/o -
〃	32.50	32.95	0.45	DP	〃	11	21	32	53							- d/o -
〃	34.00	34.45	0.45	DP	〃	14	24	28	52							- d/o -
2/11/23	35.50	35.95	0.45	DP	〃	18	28	30	58							- d/o -
〃	37.00	37.45	0.45	DP	〃	13	21	28	49							- d/o -
〃	38.50	38.95	0.45	DP	〃	17	26	35	61							- d/o -
〃	40.00	40.45	0.45	DP	〃	18	28	32	60							- d/o -

Supervisor Lobley

E-in-C Civil

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 11: FIELD BORELOG CHARTS (P 106)

TECHPRO ENGINEERS PVT. LTD. — BORE/ DRILL LOG

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date.:	28.12.2021

Project Name: GT work for HORC viaduct B/w Sohana & Dhulawat Station — Project Code: 1901

Coordinate: N:3120629.123 E: 700988.231 — Location/ Chainage: 23693.0870

Method of Drilling: Percussion — Drilling Equipment: Powerwinch — Bore No.: P-106

Casing Lowered (M): 20 m — Bentonite Used: No — Standard Sampler: Yes — Barrel Type: N/A

Ground Elevation: R.L-194.696 — Date: From 11/10/2023 to 13/10/2023 — Water Table (M): 0.60 m

Day	Depth/RUN (m) From	To	Length (m)	Nature of sample	Hole Size	SPT 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
11/10/23	0.00	0.50	0.50	DS	SX	Collect				—	—	—	—	—	—	Non cohesive Soil
〃	1.00	1.45	0.45	U	—	Received				—	—	—	—	—	—	— do —
〃	2.00	2.45	0.45	DP	—	1	1	1	2	—	—	—	—	—	—	— do —
12/10/23	3.00	3.45	0.45	DP	—	1	1	2	3	—	—	—	—	—	—	cohesive Soil
〃	4.00	4.45	0.45	U	—	Received				—	—	—	—	—	—	— do —
〃	5.00	5.45	0.45	DP	—	2	2	5	7	—	—	—	—	—	—	— do —
〃	6.00	6.45	0.45	DP	—	2	3	6	9	—	—	—	—	—	—	Non cohesive Soil
〃	7.00	7.45	0.45	U	—	Slipped				—	—	—	—	—	—	— do — / DS collect
〃	8.00	8.45	0.45	DP	—	4	4	6	10	—	—	—	—	—	—	— do —
〃	9.00	9.45	0.45	DP	—	3	6	9	15	—	—	—	—	—	—	Non cohesive soil with Gravels
〃	10.00	10.45	0.45	U	—	Received				—	—	—	—	—	—	cohesive Soil
〃	11.00	11.45	0.45	DP	—	8	13	18	31	—	—	—	—	—	—	cohesive soil
〃	12.00	12.45	0.45	DP	—	10	15	21	36	—	—	—	—	—	—	— do —
〃	13.00	13.45	0.45	U	—	Received				—	—	—	—	—	—	cohesive soil with Gravel
〃	14.50	14.95	0.45	DP	—	5	7	10	19	—	—	—	—	—	—	— do —
〃	16.00	16.45	0.45	U	—	Received				—	—	—	—	—	—	Non cohesive Soil with gra
〃	17.50	17.95	0.45	DP	—	8	14	17	31	—	—	—	—	—	—	— do —
〃	19.00	19.45	0.45	U	—	Received				—	—	—	—	—	—	Non cohesive soil ~~with~~
〃	20.50	20.95	0.45	DP	—	12	16	20	36	—	—	—	—	—	—	— do —
〃	22.00	22.45	0.45	U	—	Slipped				—	—	—	—	—	—	— do — / DS collect
〃	23.50	23.95	0.45	DP	—	13	18	23	41	—	—	—	—	—	—	— do —
〃	25.00	25.45	0.45	U	—	Received				—	—	—	—	—	—	— do —
〃	26.50	26.95	0.45	DP	—	15	27	39	66	—	—	—	—	—	—	Non cohesive Soil
13/10/23	28.00	28.45	0.45	U	—	Slipped				—	—	—	—	—	—	— do —

Supervisor — E-in-C

Techpro Engineers Pvt. Ltd.

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K

CHART 12: FIELD BORELOG CHARTS (P 106)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date:	28.12.2021

Project Name:	GT work for HORC viaduct B/w Sohana & Dhulawat Station			Project Code:	1901
Coordinate:	N: 3120629.123	E: 700988.131		Location/ Chainage:	23693-0870
Method of Drilling:	Percussion	Drilling Equipment:	Power winch	Bore No.:	P-106
Casing Lowered (M):	20.m	Bentonite Used:	ON	Standard Sampler:	Yes
Barrel Type:	N1F				
Ground Elevation:	R.L-194.696	Date: From	11/10/2023 to 13/10/2023	Water Table (M):	0.60 m

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
13/10/23	29.50	29.95	0.45	DP	SX	11	22	31	53	—	—	—	—	—	—	cohesive soil with gravel
"	31.00	31.45	0.45	DP	—	14	31	45	76	—	—	—	—	—	—	—do—
"	32.50	32.95	0.45	DP	—	13	29	40	69	—	—	—	—	—	—	cohesive soil with gravels
"	34.00	34.45	0.45	U	—	Slipped				—	—	—	—	—	—	—do—
"	35.50	35.95	0.45	DP		15	32	43	75	—	—	—	—	—	—	—do—
"	37.00	37.45	0.45	U		Slipped				—	—	—	—	—	—	—do—
"	38.50	38.95	0.45	D.P		16	33	40	73	—	—	—	—	—	—	—do—
"	40.00	40.45	0.45	DP		14	35	44	79	—	—	—	—	—	—	cohesive soil

Supervisor

Techpro Engineers Pvt. Ltd.

E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 13: FIELD BORELOG CHARTS (P 107)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date:	28.12.2021

Project Name: GTN-HORC Viaduct b/w Sohana Dhulawat station.		Project Code:	1901
Coordinate: N: 3120661.817 E: 700988.675	Location/ Chainage: 23725.6470		
Method of Drilling: Percussion	Drilling Equipment: Powerwinch	Bore No.:	P107
Casing Lowered (M): 24.00 Bentonite Used: Yes	Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation: R.L-194.725	Date: From 10/12/23 to 16/12/23	Water Table (M):	0.50

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
10/12/23	0.00	0.50	0.50	DS	SX	Received										Non-cohesive soil
	1.00	1.45	0.45	DP	"	1	2	2	4							do
"	2.00	2.45	0.45	U	"	Slipped										do DS collected
"	3.00	3.45	0.45	DP	"	2	2	2	4							do
"	4.00	4.45	0.45	DP	"	3	4	6	10							do
"	5.00	5.45	0.45	U	"	Received										do
"	6.00	6.45	0.45	DP	"	3	4	6	10							Cohesive soil with gravel
"	7.00	7.45	0.45	DP	"	3	5	7	12							do
"	8.00	8.45	0.45	U	"	Received										do
"	9.00	9.45	0.45	DP	"	4	6	9	15							do
"	10.00	10.45	0.45	DP	"	8	10	11	21							do
"	11.00	11.45	0.45	U	"	Received										do
"	12.50	12.95	0.45	DP	"	9	11	13	24							do
"	14.00	14.45	0.45	U	"	Received										do
"	15.50	15.95	0.45	DP	"	7	8	10	18							do
"	17.00	17.45	0.45	U	"	Received										do
15/12/23	18.50	18.95	0.45	DP	"	12	16	22	38							Non-cohesive soil with gravel
	20.00	20.45	0.45	U	"	Received										do
"	21.50	21.95	0.45	DP	"	18	32	40	72							do
"	23.00	23.45	0.45	DP	"	14	29	37	66							do
"	24.50	24.95	0.45	DP	"	16	27	33	60							do
"	26.00	26.45	0.45	DP	"	18	30	36	66							do
"	27.50	27.95	0.45	DP	"	15	23	28	51							do
"	29.00	29.45	0.45	DP	"	16	24	29	53							do

Supervisor

Techpro Engineers Pvt. Kanpur

JE - in - C

Abbreviation Used: U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 14: FIELD BORELOG CHARTS (P 107)

TECHPRO ENGINEERS PVT. LTD. — BORE/ DRILL LOG

Doc No:	GT/003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date.:	28.12.2021

Project Name:	GTW HORC Viaduct B/w Sohana Dhulawat Station			Project Code:	1901
Coordinate:	N:3120661.817	E:700988.675		Location/ Chainage:	23725.6470
Method of Drilling:	Percussion	Drilling Equipment	Powerwinch	Bore No.:	P107
Casing Lowered (M):	24.00	Bentonite Used: Yes	Standard Sampler : Yes	Barrel Type :	N/A
Ground Elevation:	R.L-194.725	Date: From 10/12/23 to 16/12/23		Water Table (M):	0.50

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT 0-15cm	SPT 15-30cm	SPT 30-45cm	N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
15/12/23	30.50	30.95	0.45	DP	SX	20	30	37	67							Non-cohesive soil with gravel
16/12/23	32.00	32.45	0.45	DP	"	17	42	29	71							—do—
"	33.50	33.95	0.45	DP	"	16	26	33	59							—do—
"	35.00	35.45	0.45	DP	"	15	24	40	64							—do—
"	36.50	36.95	0.45	DP	"	16	27	38	65							—do—
"	38.00	38.45	0.45	DP	"	17	30	33	63							—do—
"	40.00	40.45	0.45	DP	"	19	32	36	68							—do—

Supervisor — Techpro Engineers Pvt. Kanpur — E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 15: FIELD BORELOG CHARTS (P 108)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW FOR HORC Viaduct B/E Sohana Dhulawat station			Project Code:	1901
Coordinate:	N: 3120687.995	E: 700989.03	Location/ Chainage: 23751 & 470		
Method of Drilling:	Percussion	Drilling Equipment:	Tripod Powerwinch	Bore No.:	P108
Casing Lowered (M):	30.00	Bentonite Used: Yes.	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation:	R.L-194.47	Date: From 7/12/23 to 9/12/2023		Water Table (M):	1.00

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
7/12/23	0.00	0.40	0.40	D	SX	Collected				—	—	—	—	—	—	Noncohesive soil
"	1.00	1.45	0.45	DP	"	1	2	2	4	—	—	—	—	—	—	do
"	2.00	2.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	3.00	3.45	0.45	DP	"	1	2	3	5	—	—	—	—	—	—	do
"	4.00	4.45	0.45	DP	"	2	3	4	7	—	—	—	—	—	—	do
"	5.00	5.45	0.45	U	"	Received				—	—	—	—	—	—	Cohesive soil
"	6.00	6.45	0.45	DP	"	2	4	6	10	—	—	—	—	—	—	do
"	7.00	7.45	0.45	DP	"	3	4	7	11	—	—	—	—	—	—	Cohesive soil with Gravel
"	8.00	8.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	9.00	9.45	0.45	DP	"	5	7	9	16	—	—	—	—	—	—	do
"	10.00	10.45	0.45	DP	"	6	9	12	21	—	—	—	—	—	—	do
"	11.00	11.45	0.45	U	"	Received				—	—	—	—	—	—	Cohesive soil with Gravel
"	12.50	12.95	0.45	DP	"	6	11	14	25	—	—	—	—	—	—	do
"	14.00	14.45	0.45	U	"	Sillipped				—	—	—	—	—	—	do
"	15.50	15.95	0.45	DP	"	7	13	18	31	—	—	—	—	—	—	do
"	17.00	17.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	18.50	18.95	0.45	DP	"	10	16	20	36	—	—	—	—	—	—	do
8/12/23	20.00	20.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	21.50	21.95	0.45	DP	"	8	15	23	38	—	—	—	—	—	—	do
"	23.00	23.45	0.45	U/D	"	Sillipped				—	—	—	—	—	—	do
"	24.50	24.95	0.45	DP	"	12	18	25	43	—	—	—	—	—	—	do
"	26.00	26.45	0.45	U/D	"	Sillipped				—	—	—	—	—	—	Noncohesive soil
"	27.50	27.95	0.45	DP	"	15	26	35	61	—	—	—	—	—	—	do
"	29.00	29.45	0.45	DP	"	18	28	36	64	—	—	—	—	—	—	do

Supervisor

Techpro Engineers Pvt. Ltd.

E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 16: FIELD BORELOG CHARTS (P 108)

TECHPRO ENGINEERS PVT. LTD. — **BORE/ DRILL LOG**

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date.:	28.12.2021

Project Name: GTW FOR HORC Viaduct B/W Sohana Dhulawat station — Project Code: 1901

Coordinate: N: 3120687.995 — E: 700984.03 — Location/ Chainage: 23751.8470

Method of Drilling: Percussion — Drilling Equipment: Trip Hammer Powerwinch — Bore No.: P-108

Casing Lowered (M): 20.00 — Bentonite Used: yes — Standard Sampler: yes — Barrel Type: N/A

Ground Elevation: R.L-194.47 — Date: From 7/12/23 to 9/12/2023 — Water Table (M): 1.40

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
"	30.50	30.95	0.45	DP	SX	24	35	40	75	—	—	—	—	—	—	Non cohesive soil.
8/12/23	32.00	32.45	0.45	DP	"	20	31	35	66	—	—	—	—	—	—	cohesive soil
"	33.50	33.95	0.45	DP	"	21	33	37	70	—	—	—	—	—	—	—do—
"	35.00	35.45	0.45	DP	"	28	29	33	62	—	—	—	—	—	—	—do—
"	36.50	36.95	0.45	DP	"	22	31	35	66	—	—	—	—	—	—	Non cohesive soil
"	38.00	38.45	0.45	DP	"	24	36	41	77	—	—	—	—	—	—	—do—
"	40.00	40.45	0.45	DP	"	26	39	47	86	—	—	—	—	—	—	—do—
																—do—

Supervisor — E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100). Sampler means SPT sampler

Techpro Engineers Pvt. Ltd.

APPENDIX-K
CHART 17: FIELD BORELOG CHARTS (P 109)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW For HORC Viaduct B/w Sohana Dhulawat Station			Project Code:	1901
Coordinate:	N: 3120714.192	E: 700989.386		Location/ Chainage:	23778.0470
Method of Drilling:	Percussion	Drilling Equipment:	Mannual Powerwinch	Bore No.:	P-109
Casing Lowered (M):	21m	Bentonite Used: yes	Standard Sampler: yes	Barrel Type:	NA
Ground Elevation:	RL-194.428	Date: From 6/12/23 to 8/12/23		Water Table (M):	1.20

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
6/12/23	0.00	0.50	0.50	D	SX	Collected				—	—	—	—	—	—	Non Cohesive soil
"	1.00	1.45	0.45	DP	"	2	2	2	4	—	—	—	—	—	—	do
"	2.00	2.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	3.00	3.45	0.45	DP	"	2	2	4	6	—	—	—	—	—	—	do
"	4.00	4.45	0.45	DP	"	3	4	7	11	—	—	—	—	—	—	do
"	5.00	5.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	6.00	6.45	0.45	DP	"	5	6	9	15	—	—	—	—	—	—	do
"	7.00	7.45	0.45	DP	"	6	7	7	14	—	—	—	—	—	—	do
"	8.00	8.45	0.45	U/D	"	Sillipped				—	—	—	—	—	—	do
"	9.00	9.45	0.45	DP	"	6	12	14	26	—	—	—	—	—	—	do
"	10.00	10.45	0.45	DP	"	7	8	10	18	—	—	—	—	—	—	do
"	11.00	11.45	0.45	U/D	"	Sillipped				—	—	—	—	—	—	do
"	12.50	12.95	0.45	DP	"	4	5	6	11	—	—	—	—	—	—	Coheosive soil with Gravel
"	14.00	14.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	15.50	15.95	0.45	DP	"	10	19	22	41	—	—	—	—	—	—	do
7/12/23	17.00	17.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	18.50	18.95	0.45	DP	"	20	26	37	63	—	—	—	—	—	—	do
"	20.00	20.45	0.45	DP	"	15	21	30	51	—	—	—	—	—	—	do
"	21.50	21.95	0.45	DP	"	16	23	31	54	—	—	—	—	—	—	do
"	23.00	23.45	0.45	DP	"	18	26	33	59	—	—	—	—	—	—	Non Coheosive soil
"	24.50	24.95	0.45	DP	"	17	28	34	62	—	—	—	—	—	—	do
"	26.00	26.45	0.45	DP	"	18	27	31	58	—	—	—	—	—	—	do
"	27.50	27.95	0.45	DP	"	20	30	34	64	—	—	—	—	—	—	do
"	29.00	29.28	0.28	D		50	100	—	R	—	—	—	—	—	—	Non coheosive soil with Gravel

Supervisor

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 18: FIELD BORELOG CHARTS (P 109)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW FOR HORC Viaduct B/W Sohana Dhoulwat station			Project Code:	1901
Coordinate:	N: 3120714.192	E: 700989.386		Location/ Chainage:	23778.0470
Method of Drilling:	Percussion	Drilling Equipment:	Manual Powerwinch	Bore No.:	P-109
Casing Lowered (M): 91.00	Bentonite Used: Yes	Standard Sampler:	Yes	Barrel Type:	NA
Ground Elevation:	R.L-194.428	Date: From 6/12/23 to 8/12/23		Water Table (M):	1.20

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
8/12/23	30.50	30.95	0.45	DP	SX	25	33	41	74	—	—	—	—	—	—	Non Cohesive soil with Gravel
"	32.00	32.45	0.45	DP	"	31	40	62	102	—	—	—	—	—	—	do
"	33.50	33.95	0.45	DP	"	28	37	49	86	—	—	—	—	—	—	Non cohesive soil
"	35.00	35.45	0.45	DP	"	29	40	54	94	—	—	—	—	—	—	do
"	36.50	36.95	0.45	DP	"	25	38	44	82	—	—	—	—	—	—	do
"	38.00	38.45	0.45	DP	"	22	30	36	66	—	—	—	—	—	—	do
"	40.00	40.45	0.45	DP	"	20	28	32	60	—	—	—	—	—	—	do

Supervisor

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

E-In-C

APPENDIX-K
CHART 19: FIELD BORELOG CHARTS (P 110)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW for HORC viaduct B/w Sohana & Dhulawat stiloh	Project Code:	1901
Coordinate:	N: 3120 7040.391 E: 700989.674	Location/ Chainage:	23804.240
Method of Drilling:	percussion	Drilling Equipment: Mannual Powerwinch	Bore No.: P-110
Casing Lowered (M):	22.00 Bentonite Used: NO	Standard Sampler: Yes	Barrel Type: N/A
Ground Elevation:	R.L-194.74	Date: From 4/12/2023 to 06/12/2023	Water Table (M): 2.30

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
4/12/23	00	0.50	0.50	D	SX	Collected				—	—	—	—	—	—	Non cohesive soil
〃	1.00	1.45	0.45	DP	—	1	1	2	3	—	—	—	—	—	—	—do—
〃	2.00	2.45	0.45	U	—	Received				—	—	—	—	—	—	—do—
〃	3.00	3.45	0.45	DP	—	2	2	2	4	—	—	—	—	—	—	—do—
〃	4.00	4.45	0.45	DP	—	2	3	3	6	—	—	—	—	—	—	—do—
〃	5.00	5.45	0.45	U	—	Received				—	—	—	—	—	—	cohesive soil
〃	6.00	6.45	0.45	DP	—	3	4	4	8	—	—	—	—	—	—	—do—
〃	7.00	7.45	0.45	DP	—	2	3	6	9	—	—	—	—	—	—	—do—
〃	8.00	8.45	0.45	U	—	Received				—	—	—	—	—	—	—do—
〃	9.00	9.45	0.45	DP	—	4	5	8	13	—	—	—	—	—	—	—do—
〃	10.00	10.45	0.45	DP	—	5	7	11	18	—	—	—	—	—	—	—do—
〃	11.00	11.45	0.45	U	—	Received				—	—	—	—	—	—	—do—
〃	12.50	12.95	0.45	DP	—	8	12	14	26	—	—	—	—	—	—	—do—
〃	14.00	14.45	0.45	U	—	Received				—	—	—	—	—	—	cohesive soil with gravel
〃	15.50	15.95	0.45	DP	—	12	19	22	41	—	—	—	—	—	—	—do—
〃	17.00	17.45	0.45	DP	—	slipped				—	—	—	—	—	—	—do— DS collected
〃	18.50	18.95	0.45	DP	—	13	24	28	52	—	—	—	—	—	—	—do—
〃	20.00	20.45	0.45	DP	—	15	27	33	60	—	—	—	—	—	—	—do—
5/12/23	21.50	21.95	0.45	DP	—	18	31	35	66	—	—	—	—	—	—	—do—
〃	23.00	23.45	0.45	DP	—	19	33	38	71	—	—	—	—	—	—	—do—
〃	24.50	24.95	0.45	DP	—	16	28	32	60	—	—	—	—	—	—	Non cohesive soil
〃	26.00	26.45	0.45	DP	—	18	31	37	68	—	—	—	—	—	—	—do—
〃	27.50	27.50	0.45	DP	—	17	30	40	70	—	—	—	—	—	—	—do—
〃	29.00	29.45	0.45	DP	—	15	27	36	63	—	—	—	—	—	—	cohesive soil with gravel

Supervisor

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

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APPENDIX-K
CHART 20: FIELD BORELOG CHARTS (P 110)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No:	R03
		Rev. Date.:	28.12.2021

Project Name: GT w for HORC Viaduct B/w Sohana & Dhulawat Station		Project Code:	1901
Coordinate: N: 3120740.391	E: 700987.674	Location/ Chainage:	23804.2970
Method of Drilling: Percussion	Drilling Equipment: Manual Powerwinch	Bore No.:	P-110
Casing Lowered (M): 22.00 Bentonite Used: No	Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation: R.L-194.74	Date: From 4/12/2023 to 6/12/2023	Water Table (M):	2.30 m

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
5/12/23	30.50	30.95	0.45	DP	–	18	33	52	85	–	–	–	–	–	–	Cohesive soil with gravel
"	32.50	32.95	0.45	DP	–	19	34	49	83	–	–	–	–	–	–	—do—
"	33.50	33.50	0.45	DP	–	20	30	44	74	–	–	–	–	–	–	Noncohesive soil
"	35.00	35.45	0.45	DP	–	22	32	47	79	–	–	–	–	–	–	—do—
"	36.50	36.95	0.45	DP	–	19	30	41	71	–	–	–	–	–	–	—do—
6/12/23	38.50	38.95	0.45	DP	–	18	28	29	57	–	–	–	–	–	–	—do—
"	40.00	40.45	0.45	DP	–	16	26	38	64	–	–	–	–	–	–	—do—

Supervisor

Techpro Engineers Pvt. Ltd. Kanpur

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 21: FIELD BORELOG CHARTS (P 111)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	G.T. Work for HORC Viaduct b/w Sohna & Dhulawat Station			Project Code:	1901
Coordinate:	N: 3120766.59	E: 700989.842	Location/ Chainage:	23830.4470	
Method of Drilling:	Rotary	Drilling Equipment:	Manual / Hydraulic	Bore No.:	P-111
Casing Lowered (M):	15.0	Bentonite Used: No	Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation:	R.L - 194.745	Date: From 18/10/23 to 21/10/23		Water Table (M):	1.30

Day / Date	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
18/10/23	0.00	0.50	0.50	DS	Sx	Collected										Non-Cohesive Soil.
"	1.00	1.45	0.45	DP	"	1	2	2	4							—do—
19/10/23	2.00	2.45	0.45	U	"	Received.										—do + Gravel.
"	3.00	3.45	0.45	DP	"	4	5	5	10							—do—
"	4.00	4.45	0.45	DP	"	6	7	7	14							—do—
"	5.00	5.45	0.45	U	"	Received.										Cohesive Soil with Gravel
"	6.00	6.45	0.45	DP	"	4	5	6	11							—do—
"	7.00	7.45	0.45	DP	"	10	14	16	30							—do—
"	8.00	8.45	0.45	U	"	Received										—do—
"	9.00	9.45	0.45	DP	"	10	13	18	31							—do—
"	10.00	10.45	0.45	DP	"	13	20	24	44							—do—
"	11.00	11.45	0.45	U	"	Received.										—do—
"	12.50	12.95	0.45	DP	"	7	12	15	27							Cohesive Soil
"	14.00	14.45	0.45	U	"	Received.										Cohesive Soil with Gravel
"	15.50	15.95	0.45	DP	"	10	17	20	37							—do—
"	17.00	17.45	0.45	U	"	Received.										—do—
"	18.50	18.95	0.45	DP	"	9	18	22	40							—do—
20/10/23	20.00	20.45	0.45	U	"	Slipped.										Non-Cohesive Soil.
"	21.50	21.95	0.45	DP	"	13	24	30	54							Non Cohesive Soil with Gravel
"	23.00	23.45	0.45	U	"	Slipped.										—do— (DS Collected)
"	24.50	24.95	0.45	DP	"	14	26	31	57							Cohesive Soil with Gravel
"	26.00	26.45	0.45	DP	"	16	35	51	86							Non-Cohesive Soil with Gravel
"	27.50	27.95	0.45	DP	"	15	36	49	85							—do—
"	29.00	29.45	0.45	DP	"	16	38	50	88							—do—

Rajat
Supervisor

Pawan 21/10/23

S.E. Civil
E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 22: FIELD BORELOG CHARTS (P 111)

TECHPRO ENGINEERS PVT. LTD. — **BORE/ DRILL LOG**

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date.:	28.12.2021

Project Name:	G.T. Work for HORC Viaduct b/w Sohana & Dhulawat Station			Project Code:	1901
Coordinate:	N: 3120766.59	E: 700089.842	Location/ Chainage: 23830-4470		
Method of Drilling:	Rotary	Drilling Equipment: Manual/ Hydraulic		Bore No.:	P-111
Casing Lowered (M):	15.0	Bentonite Used: No	Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation:	R.L-194.745	Date: From 18/10/23 to 21/10/23		Water Table (M):	1.30

Day Date	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
21/10/23	30.50	30.95	0.45	DP	Sx.	14	33	46	79							Cohesive Soil with Gravel
"	32.00	32.45	0.45	DP	"	15	36	47	83							Non-Cohesive Soil with Gravel
"	33.50	33.95	0.45	DP	"	16	37	45	82							—do—
"	35.00	35.45	0.45	DP	"	18	39	48	87							Cohesive Soil with Gravel
"	36.50	36.95	0.45	DP	"	17	40	45	85							—do—
"	38.00	38.45	0.45	DP	"	16	42	46	88							—do—
"	40.00	40.20	0.20	DP	"	37	55	-	R							—do—

Supervisor 21/10/23

Techpro Engineers Pvt. Ltd. Kanpur

Engineer-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 23: FIELD BORELOG CHARTS (P 112)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GT w. for HORC Viaduct B/w Sohna & Dhulawat Station			Project Code:	1901
Coordinate:	N: 3120792.783	E: 700989.782	Location/ Chainage: 23856.6470		
Method of Drilling:	Percusstoh	Drilling Equipment	Autotrip Powerinch	Bore No.:	P-112
Casing Lowered (M):	20.m; Bentonite Used: No	Standard Sampler:	Yes	Barrel Type:	N/A
Ground Elevation:	R.L-194.948	Date: From 04/12/2023 to 6/12/2023		Water Table (M):	2.40

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
4/12/23	0.0	0.50	0.50	D	—	Collected				—	—	—	—	—	—	Non cohesive soil
〃	1.00	1.45	0.45	DP	—	1	2	2	4	—	—	—	—	—	—	— do —
〃	2.00	2.45	0.45	U	—	Slipped				—	—	—	—	—	—	— do — (DS collected)
〃	3.00	3.45	0.445	DP	—	2	2	3	5	—	—	—	—	—	—	Non cohesive soil
〃	4.00	4.45	0.45	DP	—	2	3	5	8	—	—	—	—	—	—	— do —
〃	5.00	5.45	0.45	U	—	Received				—	—	—	—	—	—	Cohesive soil
〃	6.00	6.45	0.45	DP	—	3	4	5	9	—	—	—	—	—	—	— do —
〃	7.00	7.45	0.45	DP	—	3	5	7	12	—	—	—	—	—	—	— do —
〃	8.00	8.45	0.45	U	—	Received				—	—	—	—	—	—	— do —
05/12/23	9.00	9.45	0.45	DP	—	5	7	10	17	—	—	—	—	—	—	— do —
〃	10.00	10.45	0.45	DP	—	7	9	13	22	—	—	—	—	—	—	— do —
〃	11.00	11.45	0.45	U	—	Slipped				—	—	—	—	—	—	— do — (DS collected)
〃	12.50	12.95	0.45	DP	—	6	8	12	20	—	—	—	—	—	—	Cohesive soil Gravel
〃	14.00	14.45	0.45	U	—	Received				—	—	—	—	—	—	— do —
〃	15.50	15.95	0.45	DP	—	9	14	19	33	—	—	—	—	—	—	— do —
〃	17.00	17.45	0.45	U	—	Received				—	—	—	—	—	—	— do —
〃	18.50	18.95	0.45	DP	—	12	25	29	54	—	—	—	—	—	—	Non cohesive soil
〃	20.00	20.45	0.45	DP	—	13	18	28	46	—	—	—	—	—	—	Cohesive soil
〃	21.50	21.95	0.45	DP	—	11	15	19	34	—	—	—	—	—	—	— do —
〃	23.00	23.45	0.45	U	—	Received				—	—	—	—	—	—	— do —
〃	24.50	24.95	0.45	DP	—	15	24	28	52	—	—	—	—	—	—	— do —
〃	26.00	26.45	0.45	DP	—	17	26	31	57	—	—	—	—	—	—	Non cohesive soil
06/12/23	27.50	27.95	0.45	DP	—	16	25	34	59	—	—	—	—	—	—	— do —
〃	29.00	29.45	0.45	DP	—	19	28	35	63	—	—	—	—	—	—	— do —

Supervisor | Techpro Engineers Pvt. Kanpur | E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 24: FIELD BORELOG CHARTS (P 112)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No	GT/003
		Date of Issue	01 04 2018
		Rev No	R03
		Rev Date :	28 12 2021

Project Name:	GTW for HORC Viaduct b/w Sohana & Dhulawat station			Project Code:	1911
Coordinate:	N: 3120792.783	E: 700987.282	Location/ Chainage: 25866.6990		
Method of Drilling:	Percussion	Drilling Equipment:	Auto trip (power winch)	Bore No.:	P-112
Casing Lowered (M):	20.m, Bentonite Used: NO	Standard Sampler :	YES	Barrel Type :	N/A
Ground Elevation:	R.L- 194.940	Date: From 4/12/2023 to 6/12/2023		Water Table (M):	2.00

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
6/12/23	30.50	30.95	0.45	DP	SX	15	23	34	57	–	–	–	–	–	–	cohesive soil
"	32.00	32.45	0.45	DP	–	17	22	32	54	–	–	–	–	–	–	–do–
"	33.50	33.95	0.45	DP	–	18	23	34	57	–	–	–	–	–	–	–do–
"	35.00	35.45	0.45	DP	–	16	21	32	53	–	–	–	–	–	–	–do–
"	36.50	36.95	0.45	DP	–	15	22	33	55	–	–	–	–	–	–	Non cohesive soil
"	38.00	38.45	0.45	DP	–	18	20	36	60	–	–	–	–	–	–	–do–
"	40.00	40.45	0.45	DP	–	20	25	38	65	–	–	–	–	–	–	–do–

Supervisor

E-In-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 25: FIELD BORELOG CHARTS (P 113)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No	GT/003
		Date of Issue	01.04.2018
		Rev. No :	R03
		Rev. Date :	28.12.2021

Project Name:	GTI For HORC Viaduct b/w Sohana Dhulawat Station			Project Code:	1901
Coordinate:	N: 3120818.982	E: 703389.523		Location/ Chainage:	2328/2847
Method of Drilling:	Percussion	Drilling Equipment:	Autotrip Percussion	Bore No.:	P-113
Casing Lowered (M):	18.00	Bentonite Used:	No	Standard Sampler:	Yes	Barrel Type:	NX
Ground Elevation:	RL-195.004	Date: From 30/11/2023 to 02/12/2023		Water Table (M):	1.90 m

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
30/11/23	0.00	0.50	0.50	D	SX	Collected				—	—	—	—	—	—	Non cohesive soil
"	1.00	1.45	0.45	DP	"	2	2	3	5	—	—	—	—	—	—	— do —
"	2.00	2.45	0.45	U	"	Slipped				—	—	—	—	—	—	— do — Tos collected
"	3.00	3.45	0.45	DP	"	2	2	4	6	—	—	—	—	—	—	Non cohesive soil
"	4.00	4.45	0.45	DP	"	3	3	5	8	—	—	—	—	—	—	— do —
"	5.00	5.45	0.45	U	"	Received				—	—	—	—	—	—	— do —
"	6.00	6.45	0.45	DP	"	4	5	7	12	—	—	—	—	—	—	— do —
"	7.00	7.45	0.45	DP	"	4	6	7	13	—	—	—	—	—	—	cohesive soil with gravel
"	8.00	8.45	0.45	U	"	Received				—	—	—	—	—	—	— do —
"	9.00	9.45	0.45	DP	"	6	8	10	18	—	—	—	—	—	—	— do —
"	10.00	10.45	0.45	DP	"	7	10	13	23	—	—	—	—	—	—	— do —
"	11.00	11.45	0.45	U	"	Received				—	—	—	—	—	—	— do —
"	12.50	12.95	0.45	DP	"	7	11	15	26	—	—	—	—	—	—	— do —
"	14.00	14.45	0.45	U	"	Slipped				—	—	—	—	—	—	— do — Tos collected
"	15.50	15.95	0.45	DP	"	9	10	17	31	—	—	—	—	—	—	— do —
"	17.00	17.45	0.45	U	"	Received				—	—	—	—	—	—	— do —
"	18.50	18.95	0.45	DP	"	10	16	19	35	—	—	—	—	—	—	— do —
"	20.00	20.45	0.45	U	"	Received				—	—	—	—	—	—	— do —
2/12/23	21.50	21.95	0.45	DP	"	16	29	35	64	—	—	—	—	—	—	Non cohesive soil
"	23.0	23.45	0.45	DP	"	17	31	38	69	—	—	—	—	—	—	— do —
"	24.50	24.95	0.45	DP	"	15	24	27	51	—	—	—	—	—	—	— do —
"	26.00	26.45	0.45	DP	"	17	27	31	58	—	—	—	—	—	—	— do —
"	27.50	27.95	0.45	DP	"	19	29	33	62	—	—	—	—	—	—	— do —
"	29.0	29.45	0.45	DP	"	21	33	35	68	—	—	—	—	—	—	— do —

Supervisor

Techpro Engineers Pvt. Ltd.

E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 26: FIELD BORELOG CHARTS (P 113)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW For HORC Viaduct B/w Sohana Dhulawat Station			Project Code:	1901
Coordinate:	N: 3120818.788	E: 700959.522	Location/ Chainage: 23882.8470		
Method of Drilling:	Percussion	Drilling Equipment: Auto SPT Hammer		Bore No.:	P113
Casing Lowered (M):	18.00	Bentonite Used: NO	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation:	R.L-195.004	Date: From 30/11/23 to 01/12/2023		Water Table (M):	1.90 m

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
30/11/23	30.50	30.95	0.45	DP	SX	17	27	36	63	–	–	–	–	–	–	Non cohesive Soil
01/12/23	32.00	32.45	0.45	DP	"	19	24	30	54	–	–	–	–	–	–	—do—
"	33.50	33.95	0.45	DP	"	21	27	33	60	–	–	–	–	–	–	—do—
"	35.00	35.45	0.45	DP	"	22	30	35	65	–	–	–	–	–	–	—do—
"	36.50	36.95	0.45	DP	"	24	31	36	67	–	–	–	–	–	–	—do—
"	38.00	38.45	0.45	DP	"	23	33	39	71	–	–	–	–	–	–	—do—
"	40.00	40.45	0.45	DP	"	25	36	41	77	–	–	–	–	–	–	Noncohesive soil

Supervisor

Techpro Engineers Pvt. Ltd.

E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

End of Report

Report No.: 1901-HORC-VII Date: Dec 05th; 2023

GEOTECHNICAL INVESTIGATION REPORT

ULR No.: TC916923000000032P
REVISION-R2

AT THE SITE FOR

HORC VIADUCT BETWEEN SOHANA & DHULAWAT STATIONS OF HARYANA ORBITAL RAIL CORRIDOR (HORC) PROJECT, HARYANA

FROM BOREHOLES P114A to P133A

CLIENT

HARYANA RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

Plot No. 143, 5th floor RailTel tower, Sector-44,
Gurugram, Haryana 122003

GENERAL CONSULTANTS

RITES-SMEC JV

Gurugram, Haryana

GEOTECHNICAL CONSULTANTS

TECHPRO ENGINEERS PVT. LTD.

114, RAM GANGA HOUSING SOCIETY, NARAMAU, G T ROAD,
KANPUR-209 217, Phone: 9793209918
e-mail: info@techproindia.com

TC-9169

REVISION NOTES

REVISION NO.	DATE	DESCRIPTION
R1	12.12.2023	• Lithological profile added in Appendix-C.
R2	09.01.2024	• Test data and SBC of pile added for the boreholes P114A, P115A, P117A-P119A and P121A to P133A.

REPORT FORMAT

Report No.	Bore included	Total Number of Bores
1901-HORC-I	A1 to P20	21
1901-HORC-II	P21 to P40	20
1901-HORC-III	P41 to P60	20
1901-HORC-IV	P61 to P80	20
1901-HORC-V	P81 to P100	20
1901-HORC-VI	P101 to P113	13
1901-HORC-VII	P114A to P133A	20
1901-HORC-VIII	P134A to A2A	16
1901-HORC-IX	P114B to P133B	20
1901-HORC-X	P134B to A2B	16

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Web site: www.techproindia.com

APPENDICES

National Accreditation Board for
Testing and Calibration Laboratories

NABL

CERTIFICATE OF ACCREDITATION

TECHPRO ENGINEERS PVT. LTD. (LABORATORY DIVISION)

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

114, RAM GANGA HOUSING SOCIETY, NARAMAU, G.T. ROAD, KANPUR, UTTAR PRADESH, INDIA

in the field of

TESTING

Certificate Number: TC-9169

Issue Date: 23/12/2022 Valid Until: 22/12/2024

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Identity : Techpro Engineers Private Limited

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer

TECHPRO ENGINEERS PVT. LTD.
114, Ram Ganga Housing Society, Naramau, G T Road, Kanpur-209 217
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Dec 05th; 2023

ACKNOWLEDGEMENTS

We are pleased to submit the part-7 of the report of Geotechnical investigation, conducted for the boreholes P114A to P133A for the design of foundations for HORC Viaduct between Sohana & Dhulawat stations of Haryana Orbital Rail Corridor (HORC) project in the state of Haryana, India.

We hereby, convey our sincere thanks to Mr. Neeraj Bhandari (CPM/South) and Mr. Raju Solanki (DGM/C/South), HRIDCL for trust and support during the investigation. We also acknowledge our thanks to Mr. Uma Maheshwara Rao B, DGM/C/West, HRIDCL for awarding the said work to us. We are also grateful Mr. Ravindra Dutta Upadhyay (Geotech Expert), Mr. PS Gautam & Mr. Jitender Parashar, Site Engineer from the RITES- SMEC JV and Mohd. Ishak (Executive/Civil) from HRIDCL, for their help rendered during and prior to the investigation work.

We are also thankful to our staff members for conducting field and laboratory test, preparing sketches, and typing the report.

for Techpro Engineers Pvt. Ltd.

(Arvind K. Garg)
B.Tech. (Civil), M.Tech.
Principal Consultant &
Managing Director

1. INTRODUCTION:

Haryana Rail Infrastructure Development Corporation Ltd. (HRIDC) and Ministry of Railways, Govt. of India has come together to form a new company namely Haryana Orbital Rail Corporation Limited (HORCL), to design and construction of new BG line from Palwal to Sonipat named Haryana Orbital Rail Corridor (HORC), in the state of Haryana, India. In this connection, a Geotechnical investigation has been planned for the design of foundations of Viaduct between Sohana & Dhulawat stations of Haryana Orbital Rail Corridor (HORC) Project in the state of Haryana. The work of conducting the detailed Geotechnical Investigation has been awarded to us by HRIDC, through work order No. HRIDC/HORC/GTI/211/2023-2024/Vol-0 dated 02-09-2023, which includes investigation in field, laboratory testing of disturbed and undisturbed samples, collected from the field, and submission of the geotechnical **investigation** test report.

A geotechnical investigation was carried out, with the locations, planned by the client. Purpose of the investigation is to determine the nature and properties of soil and rock strata across the bore holes and representing them through log sections showing the levels, nature, and properties of various strata up to a sufficient depth below the founding level, proneness of site to artesian conditions, seismic disturbance and other engineering properties of soil and rock strata.

This part -7 of the report includes the detailed methodology of investigation, collection of samples, field and laboratory test result including their interpretation/ analysis, recommendations on the properties of soils and rock required for design of foundation and suggesting suitable type and depth of foundation with allowable bearing capacity for safe and strong foundations for the Bore Hole numbers P114A to P133A.

2. SCOPE OF WORK:

For the design of foundation of viaduct, it is required to determine the allowable bearing capacity together with necessary engineering characteristics of underlying soil & rock strata. In general, the geotechnical investigation has been planned as per IS:1892-2021 and further extended to IS: 1904, IS:2911 (part-1/Sec 2) & IRC 78:2014 for planning the laboratory testing and computing the allowable bearing capacity, hence the scope of work is as follows:

2.1. Mobilisation of all tools & plants along with accessories, materials, labours etc. at site of work for drilling and testing work, including setting up boring and shifting to different bore holes point etc.

2.2. Exploratory drilling of 150 mm diameter bore holes through soil deposits and 75 mm in rock within the proposed alignment upto the required depth.

2.3. Collection of disturbed soil samples at an interval of 3.00 meter in all the bore holes.

2.4. Collection of undisturbed soil samples at every 3.00 m interval or at change of stratum from all the boreholes.

2.5. To conduct Standard Penetration Test (SPT) at an interval of 3.00 m or noticeable change of stratum in soil deposits in all bore holes.

2.6. Collection of rock core samples and preserving them in core boxes.

2.7. To collect ground water sample on completion of bore holes.

2.8. To record the ground water table in all the bore holes.

2.9. Transporting all the disturbed, undisturbed soil and rock core samples collected during the field investigation to our NABL accredited Geotech Engineering laboratory at Kanpur.

2.10. To conduct the laboratory tests on all the soil and rock core samples collected during field investigation for determination of their engineering characteristics.

2.11. To compile of field and laboratory test results, working out the allowable bearing capacity and preparing the report including detailed recommendations and necessary precautions.

3. GEOLOGICAL INFORMATION OF THE REGION:

3.1. Geography:

The project location is in the bordering area of Gurugram and Nuh (recent old name-Mewat), districts in the Indian state of Haryana. The stretch of the alignment of the proposed corridor starts from southmost part of Gurugram in the town of Sohna and ends at Dhulawat, which is a village lying at the north of Nuh district.

Haryana is a state located in the northern part of India. Gurugram is among one of the districts in Haryana which is also the part of National Capital Region (30km south of New Delhi). It lies at an elevation of 217 m above msl. Sohna is a small town located 25km in the south of Gurugram. Sohna is well known for its hot water springs and famous Shiva temple. Sohna is located in between 28°15' N latitude and 77°40' E longitude at the elevation of 212.14m above msl. Mewat district is located at 28 °12′ N latitude, 77 °3′ E longitude, at the south of Gurugram at an elevation of 199 m above msl. The location is bordered by Rewari district on west and Faridabad & Palwal district on the east.

3.2. Geology:

The Gurugram district is having of almost flat topography, however, in the north-eastern part small isolated hillocks of Precambrian rocks are exposed. Small hill ranges which are part of the Aravali and Mangar Bani ranges exists in the district. The major part of district is underlain by Quaternary alluvium consisting of sand, clay and silt. The alluvial plain is formed by the Sahibi river which is a tributary of River Yamuna. Soils of the Gurgaon district is classified as tropical and brown soils, existing in the north western extreme, northern and north eastern parts of the district and water logged and salt affected soils in the southern parts of the district. The soils are medium textured loamy sand is the average texture in Gurgaon and Sohna blocks.

3.3. Rainfall and Climate:

The area has hot semi-arid type of climate characterising extreme dryness of the air except in the monsoon season. Intense hot summer and cold winters. The total annual rainfall in the region is about 596 mm, of which 75 to 80% is because of the south-west monsoon.

3.4. Seismicity:

The site under consideration exists in the district of Gurugram and Mewat which lies in the Seismic Zone IV (high damage risk zone), as per the current seismic zonation map of India (IS 1893-2016): RA 2021 and have a zone factor of 0.24 for design basis earthquake. The region is surrounded by many in-homogeneities in the form of faults and ridges like Sohna Fault, Moradabad Fault, Delhi-Moradabad Fault, Delhi-Haridwar ridge, junction of Aravalli and Alluvium near Delhi. The Sohna fault line lies between the Delhi ridge and Sohna town and falls between the Arjangarh and Manesar outcrops. All the developed area in Gurugram comes within 200 km of the fault line. The Sohna fault line is located at the junction between the hard rock terrain of the Aravalli hills and the sandy formation of the Yamuna River and is currently inactive from several years and is capable of a disastrous earthquake.

The project location has been marked in Fig.1 Seismic zone map of India.

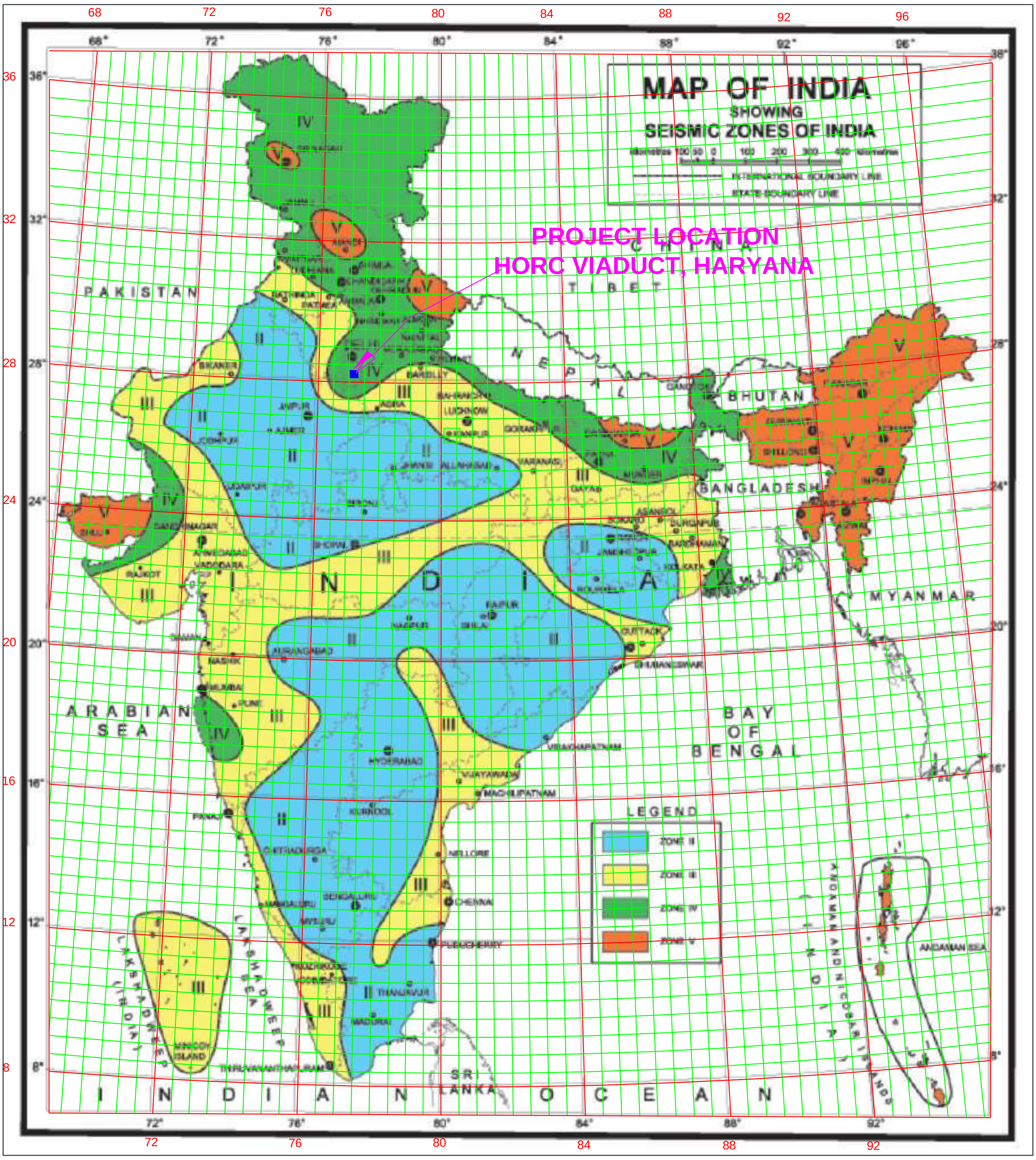


Fig.1: Seismic Zone Map of India

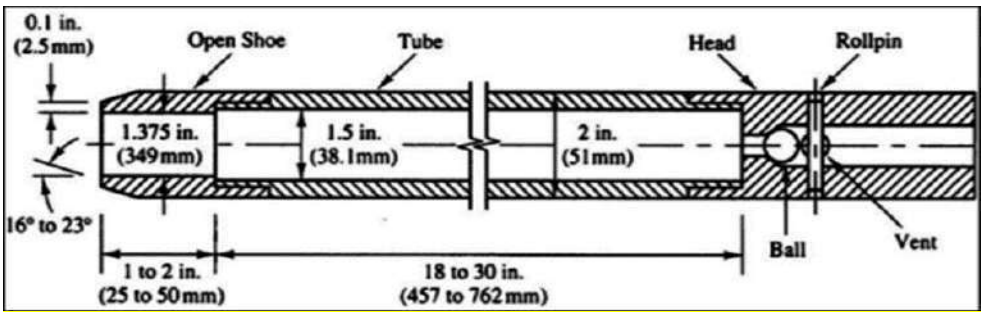
4. FIELD INVES TIGATION:

The field investigation work at this site was carried out from Oct 31st; 2023 to Nov 3rd; 2023 and Nov 18th; 2023 to Dec 13th; 2023. The following investigation work was carried out:

4.1. **Twenty** number of boreholes (marked as P114A to P133A) of diameter 150 mm in soil were made for conducting Standard Penetration Test and collection of disturbed and undisturbed soil samples. The boreholes were progressed using power operated winch and trolley mounted rig machine under **percussion and rotary** methods of drilling respectively. Casing was used to keep the borehole stable, and Bentonite was also used as drilling mud to help prevent wall collapse of boreholes at deeper depth. The records of achieved depth of bore holes have been given in Para No. 6, the details of drilled bores along with depth of casing used have been reported in Appendix B. Locations of boreholes have been reported in “TEST LOCATION PLAN” in Appendix A.

4.2. **Standard Penetration Tests** were conducted at 1.00 to 2.00 metre interval up to the depth of 12.00 meter and 3.00 metre interval, beyond 12.00 metre depth, as per the procedure in IS: 2131-1981-(RA: 2021) in all the bore holes. The **standard SPT sampler** (without liner and with no space for liner) and **auto- trip and rope-pulley driven hammer** of standard weight of 63.50 kg have been used to perform the test.

For conducting the test, the bottom of the borehole was properly cleaned, and split spoon sampler was properly seated in position in the borehole. The split spoon sampler resting on the bottom of borehole was allowed to sink under its own weight; then the sampler was allowed to penetrate 15 cm with the blows of the hammer 63.50 kg weight falling free through 75cm, thereafter the split spoon sampler was further driven by another 15 cm. For the 3rd and final drive, the sampler was further allowed to penetrate 15 cm. The number of blows required to get each 15 cm of penetration, was recorded. The first 15 cm of drive is seating drive.



Structure of SPT Sampler

The total blows of penetration for the second and third 15 cm of penetration is

termed the penetration resistance N. The N' values are indicative of the compactness/ relative density of cohesion less soils and consistency of cohesive soils.

In case the blows count of SPT in soil (including the number of blows of seating) exceeds 100, the corresponding penetration was recorded and this particular test at that depth stopped. If the total penetration is more than the seating penetration of 15 cm, then breakup of blow counts for 15 cm seating penetration and for remaining portion of penetration is also given.

SPT 'N' values are correlated with non-cohesive stratum as per BS: 5930 (1999) – for sandy strata and with consistency of cohesive stratum.

Correlation For Clay/Plastic Silt		**Correlation For Sand/Non-Plastic Silt**	
Consistency of clays	**Penetration Value**	**Relative Density of sand**	**Penetration Value**
Very Soft	0 to 2 Blows	Very loose	0 to 4 Blows
Soft	3 to 4 Blows	Loose	5 to 10 Blows
Medium Stiff	5 to 8 Blows	Medium	11 to 30 Blows
Stiff	9 to 16 Blows	Dense	31 to 50 Blows
Very Stiff	17 to 32 Blows	Very Dense	Above 50
Hard	Above 32		

In this method, the sampler acts as a probe and the driving energy is supplied by the fall of the drop weight. The values of 'N' depend on the compactness or relative density of the material. In hard formations, the testing is discontinued if 'N' value is found to be more than 100. It is termed as 'Refusal'. Refusal is also recorded when SPT blow count records 50 or more for any of the single drive of 15 cm.

'N' value depends upon degree of saturation and over burden pressure of the formation. Silty fine sand and fine sand below the water table develop pore water pressure depending on the in-situ void ratio which in turn affects the effective stress. This change in effective stress influences the 'N' value considerably.

Depth of overburden affects the SPT values in none to low cohesive soils and hence need correction. The SPT value after the overburden correction, N' is as follows:

$$N' = 0.77x \log (2000/q) \times N$$

Where, q= Overburden Pressure (kN/m^2) and N = observed SPT value

N' is corrected further for dilatancy in case of saturated fine sands and silts for the values of N' greater than 15.

Modified value after dilatancy correction N" = 15+ (N'-15)/2

Soil samples obtained from split spoon sampler were collected in the polythene bags of suitable size. These samples were property sealed, labelled, and carefully transported to the laboratory for testing. The results have been reported in Table 1 to 20 of Appendix B under the title "SUMMARY OF TEST RESULTS".

4.3. **Disturbed soil samples** were collected at 0.50 metre, then at 1.00 to 2.00 metre interval up to the depth of 12.00 meter and 3.00 metre interval, beyond 12.00 metre depth and at significant change of stratum. Soil from cutting edge of SPT samplers and retained in split spoon, used for Standard Penetration Tests was taken as disturbed samples. These samples were placed without delay in adequately sealed polythene bags. Where the collection of disturbed soil samples could not be collected from SPT samples, Shelby tubes were driven and retained soil samples were obtained. The laboratory tests were conducted on the collected soil samples and reported in Table 1 to 20 of Appendix-B under the title "SUMMARY OF TEST RESULTS".

4.4. **Undisturbed soil samples** were collected in accordance with IS: 2132-1986-(RA: 2021) at an interval of 3.00 metre or at change of stratum, starting from the depth of 1.00 or 2.00 m, by using 100 mm dia. and 450 mm long MS tubes provided with sampler head with ball check arrangement. However, the some of the samples could not be extracted due to the partial penetration or slippage during the evacuation.

Moreover, collection of Undisturbed samples in very hard cohesive soils/ dense granular soils/gravels/ cobbles/ pebbles/ boulders, refusal strata is practically not possible and such collected samples will not truly represent the undisturbed conditions.

Immediately after taking undisturbed sample in the tube, the adopter head was removed along with the disturbed material. The visible ends of the samples shall then be trimmed off any wet disturbed soil. The ends will then be coated alternately with four layers of molten wax. More molten wax will then be added to give a total thickness of not less than 25 mm. The laboratory test results have been reported in Table 1 to

20 of Appendix-B.

4.5. The **ground water table** in the borehole was allowed to stabilize and measured after 8, 16, 24 and 48 hours after completion of the bore hole. It was ensured that last two reading were identical. The records of ground water table have been given in Para No.6.

4.6. **Ground water samples** were collected from borehole as per IS: 6935-1973-(RA:2019) for chemical analysis to determine aggressiveness in relation to attack on concrete / reinforcement including determination of pH value.

5. LABORATORY TESTS:

The following laboratory tests were conducted to determine the engineering characteristics of sub-soils:

5.1. **Field moisture contents** were determined by oven drying method as per IS: 2720 (part II)-1973-(RA: 2020). The results have been reported in Table 1 to 20: "SUMMARY OF TEST RESULTS" of Appendix B.

5.2. **Bulk density** of soil strata was obtained using Shelby tubes in accordance with IS 2720 (part XXIX)-1975-(RA: 2020). The results have been reported in Table 1 to 20: "SUMMARY OF TEST RESULTS" of Appendix B.

5.3. **Mechanical sieve analysis** test was performed in accordance with IS: 2720 (Part IV) – 1985-(RA: 2020), for the purpose of identification by grain size analysis, on coarse part of the soil samples and the results have been reported in Table 1 to 20: "SUMMARY OF TEST RESULTS" of Appendix B.

5.4. **Particle size analysis** test by **Hydrometer method** were performed in accordance with IS: 2720 (Part IV) -1985-(RA: 2020) on the part of soil samples obtained after the sieve analysis. The results have been reported in Table 1 to 20: "SUMMARY OF TEST RESULTS" of Appendix B.

5.5. **Atterbergs' limits tests** were performed in accordance with IS: 2720 (part V)-1985-(RA: 2020) and results have been reported in Table 1 to 20: "SUMMARY OF TEST RESULTS" of Appendix B.

5.6. **Specific gravity tests** were performed in accordance with IS 2720 (part III-sec. 1) -

1980-(RA: 2021) and the results have been reported in Table 1 to 20: "SUMMARY OF TEST RESULTS" of Appendix B.

5.7. **Consolidation tests** were performed on cohesive soil samples in accordance with IS: 2720 (part XV)-1965-(RA: 2021). The results have been reported in Table 1 to 20: "SUMMARY OF TEST RESULTS" of Appendix B.

5.8. **Direct shear tests** were performed as per IS: 2720 (part XIII)-1986-(RA: 2021), on the undisturbed soil samples obtained during the field investigation. The results and the density of samples have been reported in Table 1 to 20: "SUMMARY OF TEST RESULTS" of Appendix B.

5.9. **Tri-axial Compression Test** under Unconsolidated Un-drained (UU) condition as per IS: 2720 (Part-XI)-1993-(RA: 2021) were performed on the selected undisturbed soil samples, obtained during the field investigation. The results have been reported in Table 1 to 20: "SUMMARY OF TEST RESULTS" of Appendix B.

5.10. **Unconfined Compressive strength tests** were performed in accordance with IS 2720 (Part-X) -1991-(RA:2020) on selected undisturbed soil samples and the results have been reported in Table 21 of Appendix B.

5.11. **Shrinkage Limit tests** were performed in accordance with IS 2720 (part-VI) -1972-(RA: 2021) and the results have been reported in Table 1 to 20: "SUMMARY OF TEST RESULTS" of Appendix B.

5.12. **Free Swell Index** were performed in accordance with IS 2720 (part-XL) -1977-(RA: 2021) and the results have been reported in Table 1 to 20: "SUMMARY OF TEST RESULTS" of Appendix B.

6. GROUND WATER TABLE:

The water table at this site was encountered during the drilling operation up to the depth of investigation.

Borehole No.	Chainage	Global Co-ordinates (UTM format)		Reduced Level (m)	Depth of Borehole (m)	Water table (m)
		Easting	Northing			
P114A	23909.047	700988.908	2120845.201	195.095	40.00	2.30

Borehole No.	Chainage	Global Co-ordinates (UTM format)		Reduced Level (m)	Depth of Borehole (m)	Water table (m)
		Easting	Northing			
P115A	23935.247	700987.943	3120871.363	195.148	40.00	2.35
P116A	23961.447	700986.631	3120897.530	195.485	40.00	1.90
P117A	23987.647	700984.973	3120923.677	195.522	40.00	3.40
P118A	24013.847	700982.969	3120949.800	195.811	40.00	4.00
P119A	24040.047	700980.620	3120975.894	195.917	40.00	5.00
P120A	24066.247	700978.032	3121001.950	196.008	40.00	5.00
P121A	24092.447	700974.887	3121027.982	196.463	40.00	5.00
P122A	24118.647	700971.747	3121054.001	196.901	40.00	5.20
P123A	24144.847	700967.777	3121079.896	196.824	40.00	5.60
P124A	24171.047	700963.709	3121105.774	196.914	40.00	5.70
P125A	24197.247	700959.297	3121131.600	197.890	40.00	5.65
P126A	24223.447	700954.592	3121157.315	197.885	40.00	7.25
P127A	24249.647	700949.451	3121183.068	197.515	40.00	7.35
P128A	24275.847	700944.018	3121208.699	197.204	40.00	8.70
P129A	24302.047	700938.260	3121234.241	198.472	40.00	8.20
P130A	24328.247	700932.137	3121259.733	198.948	40.00	9.00
P131A	24354.447	700925.693	3121285.124	198.559	40.00	10.00
P132A	24380.647	700918.910	3121310.434	198.507	40.00	9.30
P133A	24406.847	700911.942	3121335.667	199.364	40.00	9.30

7. DESCRIPTION OF STRATA:

The classification of soil stratum has been done with the help of soil characteristics obtained in laboratory tests as per IS 1498-1970-(RA:2021). The classification of rock masses has been done based on RMR as per IS: 4464-1985, IS: 13365-1. The detailed nature of the strata has been reported in Table 1 to 20: “SUMMARY OF TEST RESULTS” of Appendix-B and represented through Lithological plots in Appendix-C.

The strata exhibited in the bore holes, is predominantly comprising of silty sands with having thickness of 1.00 to 24.00 meters and inorganic silts and silty clays of non to low plasticity. Silty sands with clay binders were also encountered at varying depth with thickness ranging from 1.00 to 4.50 meters.

8. SAFE BEARING CAPACITY COMPUTATIONS:

For the construction of viaducts, deep foundation **(Bored Cast-In-Situ RCC piles)** have been considered for computation of load bearing capacity of the underlying soil strata. The computation of load bearing capacity of bored cast-in-situ RCC piles have been done as per IS 2911 (part-1, section-2)-2010-(RA: 2020) with due consideration of effects of liquefaction.

8.1. Design Parameters:

Factor of safety in Compression	=	2.50
Factor of safety in Tension	=	3.00
Depth of critical water table	=	0.00 m
Diameter of pile	=	1.00 & 1.20 m
Cut off length	=	2.50 m
Type of pile head consider	=	Fixed

8.2. Computation of friction along pile stem:

$Q_{uf} = \sum K_i . P_{di} . \tan\delta_i . A_{si}$

where,

Q_{uf} = Ultimate shaft friction (kN/m^2)

K_i = Coefficient of earth pressure at mid-depth of ith layer

P_{di} = Effective overburden pressure at mid-depth of ith layer (kN/m^2)

A_{si} = Surface area of pile stem in ith layer (m^2)

δ_i = Angle of wall friction between pile and soil of ith layer (= ϕ) (degree)

ϕ_i = Angle of internal friction of soil in ith layer (degree)

$\sum$ = Sum of all layers up to ith layer

8.3. Computation of Cohesion along the stem of pile:

$Q_{uc} = \sum \alpha_i . c_i . A_{si}$

where,

c_i = Cohesion in i^{th} layer

A_{si} = Surface area of pile stem in i^{th} layer (m^2)

α_i = Adhesion factor for i^{th} layer of soil depending of consistency of soils

$\sum$ = Sum of cohesion of all layers considered

8.4. Computation of end bearing resistance:

$$Q_{ub} = A_p\,(c.N_c + q.N_q + 0.5.\,\gamma.B.N_\gamma)$$

where,

A_p = Area of the pile toe (m^2)

c = cohesion of soils at pile toe (kN/m^2)

γ = Effective Unit weight of soils at pile toe (kN/m^3)

B = Diameter of pile (m)

q = Effective overburden pressure at pile toe (kN/m^2)

N_c = Bearing Capacity Factor (Recommended equal to 9)

N_q, N_γ = Bearing Capacity Factor

8.5. Lateral load capacity of piles in soils:

$$Q_u = 12.E.I.\delta/(L_1+L_f)^3$$

where,

Q_u = Ultimate lateral load capacity of pile (kN)

δ = Permissible deflection (m) = 5 mm

E = Young Modulus of pile material (kN/m^2)

I = Moment of Inertia of the pile cross section (m^4)

L_1 = Cantilever Length of pile (m)

L_f = Length of fixity (m)

Detailed calculations of pile load carrying capacity in compression & uplift in soil have been reported in **Table-1 to 2** of **Appendix-H.**

Pile lateral Load capacity has been given in **Table-3 to 4** of **Appendix-H**.

9. LIQUEFACTION ANALYSIS:

Liquefaction is the sudden loss of shear strength of the loose fine sands due to earthquake-induced vibration under saturated conditions. Liquefaction generally takes place in loose fine sands (fines < 10 %, D_{60}= 0.20 mm to 1.0 mm and C_u between 2 to 5) with N value less than 15. In case of soil strata having N>15, liquefaction of soil will not take place normally.

The present site falls in **seismic zone – IV.** Considering the history of past earthquakes and available seismic data, an earthquake of **magnitude 7.0** having peak ground acceleration **a_{max}= 0.24 g** is considered in the present analysis.

Preliminary assessment of liquefaction potential of foundation strata is made by simplified approach proposed by IS: 1893 (part-1)-2016-(RA: 2021) from the data obtained in Standard Penetration Test.

In this method, cyclic shear stress likely to be induced in the foundation strata by Design Basis Earthquake is first evaluated. Next threshold cyclic shear stress, which is good enough to cause liquefaction, is determined from SPT data and the empirical relations. Finally, comparison of these two stresses is used in the estimation of liquefaction susceptibility of the foundation strata.

Cyclic Stress Ratio (CSR):

The equivalent average of shear stress likely to be induced in the foundation material due to an earthquake is calculated by using the equations

Cyclic Resistance Ratio (CRR):

It expresses capacity of soil to resist liquefaction. CRR is determined using correlation between corrected blow count $(N_1)_{60}$ and CRR for earthquake of magnitude 7.5. $(N_1)_{60}$ is the SPT blow count corrected to an effective overburden pressure of 100 kPa and to hammer energy efficiency of 60 %.

Following variable have been adopted in calculation of N_{60} (SPT value for 60% efficiency)

Energy correction to SPT values:

C_{60} = 1.00 (energy efficiency factor)

Design Earthquake Base:

Earthquake zone = IV

Magnitude of earthquake = 7

Seismic Zone factor = 0.24

Status of Liquefaction:

The value of CSR and CRR are computed at different depth and then the ratio of CRR to CSR to get the factor of safety towards the susceptibility of the stratum towards liquefaction potential.

If factor of safety:

< 1.00 : Stratum is to be considered as liquefiable.

> 1.20 : Non-Liquefiable

The detailed calculations of liquefaction have been reported in **Table-5** of **Appendix-H.**

10. RECOMMENDATIONS:

Keeping in mind, the field test results, laboratory test results and IS codes of practice the following recommendations are hereby made:

10.1. **Bored Cast-In-Situ RCC Piles** of diameter 1000 and 1200 mm have been adopted for SBC computations of foundation for Viaduct.

10.2. **Cut off length** of piles have been considered as 2.50 m from the existing ground level for the purpose of computation of SBC.

10.3. **Pile length** recommended in the table below, shall be measured **after the cut-off depth.**

10.4. **Allowable load carrying capacity** of pile corresponding to the length and diameter of pile shall be read from the tables below:

10.4.1. For Pile diameter = 1000 mm

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
P114A	25.00	3200	1750	85
	27.50	3500	1950	
	30.00	2800	2150	
	32.50	4200	2400	
	35.00	4300	2600	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
P115A	25.00	3350	1600	35
	27.50	3700	1900	
	30.00	3800	2150	
	32.50	4000	2450	
	35.00	4400	2700	
P116A	25.00	2600	1550	65
	27.50	2700	1800	
	30.00	3550	2050	
	32.50	3800	2300	
	35.00	4000	2550	
P117A	25.00	2500	1550	35
	27.50	2750	1750	
	30.00	2550	1950	
	32.50	2700	2150	
	35.00	2950	2400	
P118A	25.00	3500	1750	95
	27.50	3800	2050	
	30.00	4100	2300	
	32.50	4300	2600	
	35.00	4450	2850	
P119A	25.00	2500	1600	130
	27.50	2800	1800	
	30.00	3500	2000	
	32.50	3900	2250	
	35.00	4250	2550	
P120A	25.00	2650	1650	55
	27.50	2850	1850	
	30.00	3100	2050	
	32.50	3600	2300	
	35.00	3700	2500	
P121A	25.00	3400	1850	155
	27.50	3800	2150	
	30.00	4150	2400	
	32.50	4450	2650	
	35.00	4550	2950	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
P122A	25.00	3000	1750	135
	27.50	3450	2000	
	30.00	3600	2250	
	32.50	4000	2500	
	35.00	4300	2750	
P123A	25.00	2400	1750	130
	27.50	2500	1950	
	30.00	2800	2150	
	32.50	3150	2400	
	35.00	3500	2700	
P124A	25.00	3300	1900	170
	27.50	3800	2150	
	30.00	4100	2450	
	32.50	4150	2650	
	35.00	4700	2900	
P125A	25.00	3600	1800	145
	27.50	3700	2050	
	30.00	4000	2300	
	32.50	4350	2550	
	35.00	3550	2800	
P126A	25.00	2850	1750	155
	27.50	3100	1950	
	30.00	3250	2200	
	32.50	3000	2400	
	35.00	3250	2600	
P127A	25.00	3150	1800	195
	27.50	2700	2000	
	30.00	2850	2250	
	32.50	2950	2450	
	35.00	3250	2600	
P128A	25.00	3150	1800	175
	27.50	2600	2050	
	30.00	2800	2250	
	32.50	3050	2450	
	35.00	3300	2700	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
P129A	25.00	3400	1800	175
	27.50	3700	2050	
	30.00	3550	2300	
	32.50	3850	2500	
	35.00	4450	2700	
P130A	25.00	3000	1800	105
	27.50	3550	2000	
	30.00	2900	2300	
	32.50	3300	2500	
	35.00	3600	2700	
P131A	25.00	2800	1650	195
	27.50	2350	1850	
	30.00	2650	2000	
	32.50	3250	2250	
	35.00	3250	2450	
P132A	25.00	3750	1950	200
	27.50	3350	2250	
	30.00	3200	2450	
	32.50	3450	2700	
	35.00	3900	2950	
P133A	25.00	2800	1550	180
	27.50	2700	1750	
	30.00	3100	1950	
	32.50	3250	2150	
	35.00	3600	2300	

** Indicates Grade of Concrete*

10.4.2. For Pile diameter = 1200 mm

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
P114A	25.00	4800	2300	135
	27.50	5250	2650	
	30.00	4000	3000	
	32.50	6450	3300	
	35.00	6500	3650	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
P115A	25.00	5200	2100	55
	27.50	5750	2550	
	30.00	5800	3000	
	32.50	6050	3350	
	35.00	6700	3750	
P116A	25.00	4050	2100	95
	27.50	4000	2450	
	30.00	5600	2850	
	32.50	5950	3200	
	35.00	6300	3600	
P117A	25.00	3850	2100	55
	27.50	4200	2450	
	30.00	3700	2750	
	32.50	3850	3000	
	35.00	4200	3300	
P118A	25.00	5400	2350	140
	27.50	5850	2750	
	30.00	6300	3150	
	32.50	6550	3550	
	35.00	6750	3950	
P119A	25.00	3750	2100	175
	27.50	4300	2400	
	30.00	5500	2750	
	32.50	6150	3150	
	35.00	6750	3550	
P120A	25.00	4050	2150	85
	27.50	4300	2500	
	30.00	4600	2800	
	32.50	5500	3150	
	35.00	5600	3500	
P121A	25.00	5000	2450	215
	27.50	5650	2850	
	30.00	6200	3250	
	32.50	6650	3650	
	35.00	6700	4000	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
	25.00	4350	2350	
	27.50	5100	2700	
P122A	30.00	5300	3050	190
	32.50	5950	3400	
	35.00	6400	3750	
	25.00	3550	2450	
	27.50	3600	2750	
P123A	30.00	4000	3000	180
	32.50	4500	3350	
	35.00	5050	3700	
	25.00	4750	2500	
	27.50	5500	2850	
P124A	30.00	5900	3250	235
	32.50	5950	3600	
	35.00	6800	3950	
	25.00	5450	2400	
	27.50	5550	2750	
P125A	30.00	5950	3100	195
	32.50	6500	3500	
	35.00	4950	3800	
	25.00	4200	2350	
	27.50	4550	2650	
P126A	30.00	4750	3000	220
	32.50	4200	3300	
	35.00	4500	3600	
	25.00	4350	2300	
	27.50	3600	2600	
P127A	30.00	3750	2950	265
	32.50	3850	3150	
	35.00	4250	3400	
	25.00	4600	2400	
	27.50	3550	2750	
P128A	30.00	3850	3000	240
	32.50	4150	3300	
	35.00	4450	3600	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral Concrete M35*
P129A	25.00	5150	2500	235
	27.50	5500	2850	
	30.00	5250	3200	
	32.50	5700	3500	
	35.00	6750	3800	
P130A	25.00	4450	2400	150
	27.50	5350	2750	
	30.00	4050	3100	
	32.50	4700	3400	
	35.00	5150	3700	
P131A	25.00	4250	2300	265
	27.50	3350	2600	
	30.00	3750	2850	
	32.50	4850	3150	
	35.00	4750	3450	
P132A	25.00	5550	2650	270
	27.50	4850	3000	
	30.00	4400	3350	
	32.50	4700	3700	
	35.00	5450	3950	
P133A	25.00	4300	2150	240
	27.50	4100	2450	
	30.00	4700	2750	
	32.50	4900	3050	
	35.00	5500	3300	

** Indicates Grade of Concrete*

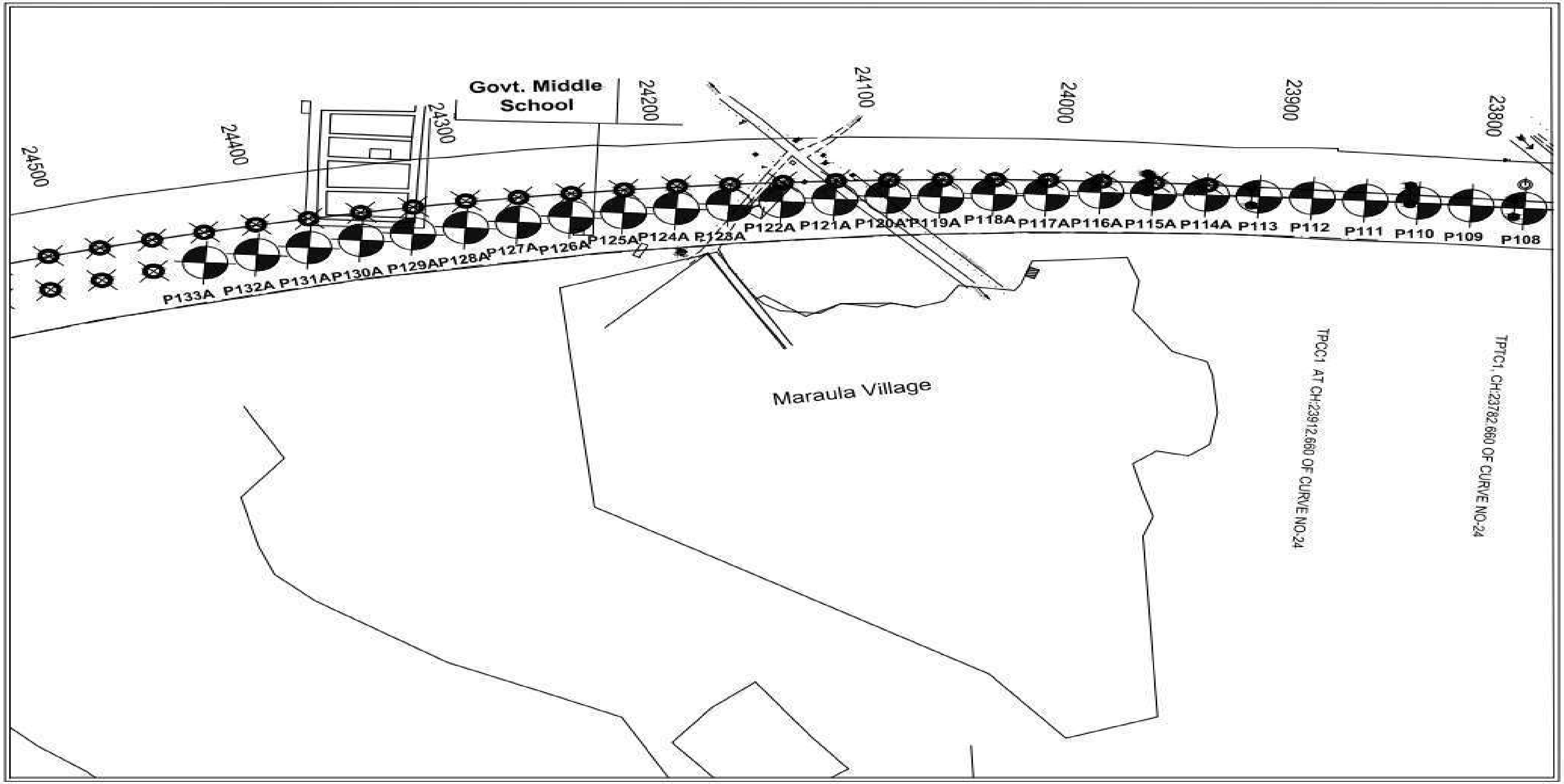
10.5. Liquefaction Potential: All the bore holes have been analysed for Liquefaction potential as per IS: 1893 (part-1)-2016-(RA: 2021) with Seismic Zone IV, earthquake intensity of 7.0 on Richter scale and critical ground water table at existing ground level. Out of which several boreholes show the potential at various depths mentioned in the table below:

Bore No.	Liquefiable depth zone (meter)
P114A	Top 5.00
P115A	Top 4.00, 5.00 to 6.00 & 8.00 to 9.00
P116A	Top 4.00 & 5.00 to 6.00
P117A	Top 6.00 & 7.00 to 9.00
P118A	Top 4.00
P119A	Top 3.00
P120A	Top 3.00 & 6.00 to 7.00
P121A	None
P122A	Top 3.00
P123A	Top 3.00
P124A	None
P125A	2.00 to 3.00
P126A	Top 3.00
P127A	None
P128A	None
P129A	None
P130A	Top 4.00
P131A	None
P132A	None
P133A	None

for Techpro Engineers Pvt. Ltd.

rvind K. Garg)
B.Tech.(Civil), M.Tech.
Principal Consultant &
Managing Director

APPENDIX-A
TEST LOCATION PLAN



APPENDIX "B"
TABLE 1: SUMMARY OF TEST RESULTS

Bore No: P114A	Ground Elevation: RL 195.095 m	Method of drilling: Percussion	Depth of Water-table: 2.30 m
Diameter of Bore Hole: 150 mm	Bore Retained using: Casing	Starting Date: 30/11/2023	SPT Sampler: Standard
Location / Chainage: 23909.047	Casing Lowered: 19.00 m	Ending Date: 02/12/2023	Hammer type: Rope-pulley driven

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	1	58	41	0	4.04	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	U	2	-	-	-	-	-	SM	1	0	1	62	36	0	4.48	1.60	1.53	Non-Plastic			2.63	DST	3.0	26.8	-	0.719	-	-	-	-												
	2.00	D	3	1	1	2	3	4.15	SM-SC	2	1	1	52	39	5	16.41	-	-	25.0	21.0	4.0	-	-	-	-	-	-	-	-	-	-	Silty Sands with clay binder											
	3.00	D	4	1	2	2	4	5.20	-	-	-	-	-	-	-	17.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	-	-	-	-	-	ML	0	0	1	34	60	5	19.55	1.85	1.55	24.0	20.0	4.0	-	RDST	5.0	23.6	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	5.00	D	6	4	7	9	16	16.97	CL-ML	3	0	1	30	60	6	20.67	-	-	25.5	21.0	4.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	6.00	D	7	6	8	11	19	18.31	-	-	-	-	-	-	-	17.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	U	8	-	-	-	-	-	SM	0	0	0	67	33	0	17.73	1.97	1.67	Non-Plastic			2.62	DST	1.0	29.1	-	0.569	-	-	-	-	Silty Sands											
	8.00	D	9	5	10	13	23	19.61	ML	2	1	1	35	54	7	20.38	-	-	27.0	22.5	4.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	9.00	D	10	7	11	13	24	19.71	-	-	-	-	-	-	-	23.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	U	11	-	-	-	-	-	ML	2	1	1	10	78	8	21.40	2.08	1.71	30.5	24.5	6.0	2.66	UU	47.0	12.5	0.123	0.556	-	9	21	-												
	11.00	D	12	6	13	15	28	20.79	-	-	-	-	-	-	-	22.98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	12.00	D	13	8	16	17	33	33.00	CL	2	2	2	8	74	12	22.21	-	-	32.0	22.0	10.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	13.00	U	14	-	-	-	-	-	CL	5	2	3	13	67	10	23.73	2.07	1.67	31.5	22.5	9.0	2.67	-	-	-	-	0.599	-	17	19	-												
	14.50	D	15	7	10	13	23	23.00	-	-	-	-	-	-	-	21.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	16.00	U	16	-	-	-	-	-	SM	1	1	2	48	48	0	20.09	1.97	1.64	Non-Plastic			2.64	DST	8.0	25.7	-	0.610	-	-	-	-	Silty Sands											
	17.50	D	17	10	14	17	31	19.88	ML	3	2	2	35	58	0	21.08	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											

APPENDIX "B"

TABLE 1: SUMMARY OF TEST RESULTS

Bore No: P114A	**Ground Elevation: RL 195.095 m**	**Method of drilling: Percussion**	**Depth of Water-table: 2.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 30/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 23909.047	**Casing Lowered: 19.00 m**	**Ending Date: 02/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	19.00	U	18	-	-	-	-	-	CL	4	4	4	15	62	11	19.51	2.01	1.68	32.0	22.0	10.0	2.67	UU	55.0	11.1	-	0.589	-	-	16	-	Inorganic clays of low plasticity											
	20.50	D	19	11	15	19	34	34.00	-	-	-	-	-	-	-	21.85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	22.00	D	20	-	-	-	-	-	CL	2	1	1	12	72	12	16.45	-	-	32.0	22.5	9.5	-	-	-	-	-	-	-	-	-	-												
	23.50	D	21	14	19	33	52	52.00	-	-	-	-	-	-	-	16.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	25.00	D	22	17	28	35	63	29.26	SM	0	0	2	68	30	0	19.63	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	26.50	D	23	20	31	38	69	30.73	SM	0	1	3	71	25	0	19.46	-	-	Non-Plastic			2.62	-	-	-	-	-	-	-	-	-												
	28.00	D	24	22	33	40	73	31.46	-	-	-	-	-	-	-	19.96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.50	D	25	20	34	41	75	31.51	-	-	-	-	-	-	-	20.74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	31.00	D	26	28	41	58	99	38.43	SM	2	1	2	62	33	0	20.27	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	32.50	D	27	22	40	65	R	-	CL-ML	6	6	9	25	46	8	15.15	-	-	28.0	21.5	6.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	34.00	D	28	20	38	60	98	36.74	SM	1	1	1	75	22	0	22.86	-	-	Non-Plastic			2.62	-	-	-	-	-	-	-	-	-	Silty Sands											
	35.50	D	29	20	36	55	91	34.02	-	-	-	-	-	-	-	21.71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	37.00	D	30	19	35	52	87	32.37	SM	0	1	1	62	36	0	11.65	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	38.50	D	31	21	37	56	93	33.56	-	-	-	-	-	-	-	14.54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	32	22	40	58	98	34.37	-	-	-	-	-	-	-	19.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 2: SUMMARY OF TEST RESULTS

Bore No: P115A	**Ground Elevation: RL 195.148 m**	**Method of drilling: Percussion**	**Depth of Water-table: 2.35 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 29/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 23935.247	**Casing Lowered: 22.00 m**	**Ending Date: 01/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM-SC	0	0	1	54	41	4	8.34	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Silty Sands with clay binder											
	1.00	D	2	2	2	2	4	6.24	SM-SC	0	0	1	57	37	5	15.39	-	-	25.0	20.5	4.5	-	-	-	-	-	-	-	-	-	-												
	2.00	D	3	-	-	-	-	-	-	-	-	-	-	-	-	19.89	1.88	1.57	-	-	-	-	RDST	6.0	25.5	-	-	-	-	-	-												
	3.00	D	4	2	3	3	6	7.40	ML	0	0	1	44	55	0	18.96	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	4.00	D	5	2	3	4	7	8.26	CL-ML	0	0	1	15	78	6	18.84	-	-	27.0	21.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	5.00	U	6	-	-	-	-	-	SM	1	0	2	49	48	0	19.61	1.99	1.66	Non-Plastic			2.64	DST	4.0	26.9	-	0.590	-	-	-	-	Silty Sands											
	6.00	D	7	4	4	6	10	10.83	CL-ML	0	0	1	16	77	6	19.54	-	-	27.0	20.5	6.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	7.00	D	8	5	4	8	12	12.52	CL-ML	0	0	1	35	59	5	19.82	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	ML	3	1	1	14	71	10	22.60	2.01	1.64	32.0	24.0	8.0	2.67	UU	52.0	11.0	0.147	0.628	-	10	17	-	Inorganic Silts of low plasticity											
	9.00	D	10	5	6	9	15	15.00	-	-	-	-	-	-	-	21.71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	5	7	11	18	18.00	-	-	-	-	-	-	-	20.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	ML	3	1	2	6	80	8	22.39	1.99	1.63	30.0	23.5	6.5	2.67	-	-	-	-	0.638	-	6	20	-												
	12.50	D	13	4	8	12	20	16.31	-	-	-	-	-	-	-	20.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	14.00	U	14	-	-	-	-	-	ML	4	2	2	8	73	11	18.95	2.07	1.74	32.0	24.0	8.0	2.68	UU	57.0	12.1	-	0.540	-	-	-	-												
	15.50	D	15	7	12	17	29	19.29	CL-ML	6	2	3	18	64	7	19.80	-	-	27.0	21.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	17.00	D	16	-	-	-	-	-	-	-	-	-	-	-	-	15.93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	18.50	D	17	11	18	22	40	22.68	ML	3	1	2	38	51	5	19.83	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											

APPENDIX "B"
TABLE 2: SUMMARY OF TEST RESULTS

Bore No: P115A	**Ground Elevation: RL 195.148 m**	**Method of drilling: Percussion**	**Depth of Water-table: 2.35 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 29/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 23935.247	**Casing Lowered: 22.00 m**	**Ending Date: 01/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	CL	2	1	3	10	72	12	17.83	2.04	1.73	32.0	22.5	9.5	2.68	UU	58.0	10.2	-	0.549	-	-	-	-	Inorganic clays of low plasticity											
	21.50	D	19	13	19	25	44	23.16	CL-ML	3	1	2	16	70	8	20.25	-	-	27.0	21.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	23.00	U	20	-	-	-	-	-	CL	1	1	1	18	69	10	20.87	2.05	1.70	30.0	21.0	9.0	2.67	-	-	-	-	0.571	-	8	18	-	Inorganic clays of low plasticity											
	24.50	D	21	23	28	45	73	31.96	SM	0	0	1	52	47	0	20.94	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	20	26	38	64	28.33	SM	0	0	0	71	29	0	19.93	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	27.50	D	23	11	20	39	59	26.25	-	-	-	-	-	-	-	18.53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	15	23	40	63	27.06	-	-	-	-	-	-	-	18.35	-	-	-	-	-	2.64	-	-	-	-	-	-	-	-	-												
	30.50	D	25	18	25	43	68	28.12	SM	1	1	1	67	30	0	20.18	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	32.00	D	26	19	27	43	70	28.25	-	-	-	-	-	-	-	19.52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Silty Sands											
	33.50	D	27	16	24	37	61	25.17	SM	0	0	0	71	29	0	20.27	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	15	22	35	57	23.65	-	-	-	-	-	-	-	20.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	17	23	36	59	23.85	-	-	-	-	-	-	-	19.73	-	-	-	-	-	2.63	-	-	-	-	-	-	-	-	-												
	38.00	D	30	18	25	38	63	24.59	SM	0	0	1	74	25	0	19.22	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	21	28	34	62	23.84	-	-	-	-	-	-	-	20.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 3: SUMMARY OF TEST RESULTS

Bore No: P116A	**Ground Elevation: RL 195.485 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.90 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 31/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 23961.447	**Casing Lowered: 24.00 m**	**Ending Date: 03/11/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																		
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen												
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL												
	0.50	D	1	-	-	-	-	-	SM	0	0	1	52	47	0	10.69	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands												
	1.00	D	2	1	2	2	4	6.19	-	-	-	-	-	-	-	10.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-													
	2.00	U	3	-	-	-	-	-	SM	1	0	0	53	46	0	10.24	1.96	1.78	Non-Plastic			2.62	DST	4.0	27.2	-	0.472	-	-	-	-													
	3.00	D	4	2	3	4	7	8.74	-	-	-	-	-	-	-	18.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-													
	4.00	D	5	3	4	5	9	10.68	CL-ML	0	0	1	31	63	5	19.54	-	-	25.0	20.5	4.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity												
	5.00	U	6	-	-	-	-	-	ML	5	1	1	23	64	6	20.57	1.94	1.61	24.0	20.0	4.0	2.65	DST	7.0	25.2	0.114	0.646	-	0	20	-	Inorganic Silts of low plasticity												
	6.00	D	7	5	11	14	25	21.15	-	-	-	-	-	-	-	19.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-													
	7.00	D	8	6	12	15	27	21.72	CL-ML	3	2	2	37	51	5	20.67	-	-	25.0	20.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity												
	8.00	D	9	-	-	-	-	-	-	-	-	-	-	-	-	21.02	2.05	1.69	-	-	-	-	RDST	4.0	26.4	-	-	-	-	-	-													
	9.00	D	10	4	7	9	16	15.34	SM-SC	5	2	3	42	44	4	19.56	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Silty Sands with clay binder												
	10.00	D	11	5	9	10	19	16.52	-	-	-	-	-	-	-	23.58	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-													
	11.00	U	12	-	-	-	-	-	CL-ML	1	0	3	8	79	9	23.33	2.02	1.64	28.5	22.0	6.5	2.66	UU	44.0	8.2	-	0.622	-	0	20	-	Inorganic Silty Clays of low plasticity												
	12.50	D	13	5	7	9	16	14.13	-	-	-	-	-	-	-	22.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-													
	14.00	U	14	-	-	-	-	-	CL-ML	3	2	1	12	75	7	19.66	1.99	1.66	27.0	21.0	6.0	2.65	UU	40.0	10.2	-	0.596	-	-	-	-													
	15.50	D	15	8	15	21	36	22.26	ML	5	2	3	27	58	5	18.58	-	-	26.0	22.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity												
	17.00	U	16	-	-	-	-	-	CL	7	3	2	9	68	11	19.16	2.05	1.72	27.0	20.0	7.0	2.67	UU	53.0	10.5	-	0.552	-	-	16	-	Inorganic clays of low plasticity												
	18.50	D	17	16	36	53	89	41.49	SM	0	0	1	54	45	0	20.44	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands												

APPENDIX "B"
TABLE 3: SUMMARY OF TEST RESULTS

Bore No: P116A	**Ground Elevation: RL 195.485 m**	**Method of drilling: Percussion**	**Depth of Water-table: 1.90 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 31/10/2023**	**SPT Sampler: Standard**
Location / Chainage: 23961.447	**Casing Lowered: 24.00 m**	**Ending Date: 03/11/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	D	18	13	24	28	52	26.71	CL-ML	2	1	1	18	70	8	20.82	-	-	28.0	21.5	6.5	-	-	-	-	-	-	-	-	-	-												
	21.50	D	19	15	26	32	58	28.33	-	-	-	-	-	-	-	20.35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	23.00	D	20	11	23	31	54	26.34	CL-ML	0	1	1	32	60	6	24.60	-	-	26.0	20.5	5.5	-	-	-	-	-	-	-	-	-	-												
	24.50	D	21	13	25	35	60	27.91	SM	0	0	0	58	42	0	17.99	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	24	32	42	74	32.04	-	-	-	-	-	-	-	19.65	-	-	-	-	-	2.65	-	-	-	-	-	-	-	-	-	Silty Sands											
	27.50	D	23	23	30	43	73	31.13	SM	2	1	1	47	49	0	17.64	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	26	33	45	78	32.18	ML	4	2	3	40	51	0	16.00	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	30.50	D	25	27	37	43	80	32.22	SM	1	1	1	57	40	0	19.87	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	32.00	D	26	30	34	40	74	29.84	-	-	-	-	-	-	-	19.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	33.50	D	27	29	31	42	73	29.02	SM	0	1	2	52	45	0	21.74	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	32	35	44	79	30.27	SM	0	0	0	59	41	0	19.77	-	-	Non-Plastic			2.65	-	-	-	-	-	-	-	-	-	Silty Sands											
	36.50	D	29	33	36	42	78	29.50	-	-	-	-	-	-	-	18.86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	30	32	40	72	27.37	SM	0	0	2	64	34	0	19.42	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	28	30	39	69	26.01	-	-	-	-	-	-	-	19.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 4: SUMMARY OF TEST RESULTS

Bore No: P117A	**Ground Elevation: RL 195.522 m**	**Method of drilling: Percussion**	**Depth of Water-table: 3.40 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 22/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 23987.647	**Casing Lowered: 24.00 m**	**Ending Date: 26/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	1	55	44	0	4.25	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	D	2	1	2	3	5	7.85	-	-	-	-	-	-	-	13.74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	SM	2	1	1	66	30	0	15.63	1.83	1.58	Non-Plastic			2.62	DST	0.0	28.2	-	0.658	-	-	-	-												
	3.00	D	4	2	3	5	8	9.62	-	-	-	-	-	-	-	20.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	3	3	6	9	10.22	-	-	-	-	-	-	-	16.76	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	ML	0	0	1	45	54	0	16.46	2.00	1.72	Non-Plastic			2.64	DST	3.0	27.7	-	0.535	-	-	-	-	Inorganic Silts of low plasticity											
	6.00	D	7	4	6	8	14	14.67	SM	0	1	0	65	34	0	18.99	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	7.00	D	8	3	4	7	11	11.13	ML	4	2	2	14	70	8	19.37	-	-	29.0	22.5	6.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	8.00	U	9	-	-	-	-	-	ML	7	1	2	10	73	7	16.36	2.04	1.75	30.0	23.5	6.5	2.66	UU	42.0	11.5	-	0.520	-	0	21	-												
	9.00	D	10	5	9	13	22	17.91	-	-	-	-	-	-	-	24.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	6	9	15	24	18.52	-	-	-	-	-	-	-	23.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	CL	3	2	2	14	67	12	22.14	2.06	1.69	33.0	22.0	11.0	2.67	UU	55.0	9.6	0.157	0.580	-	10	22	-	Inorganic clays of low plasticity											
	12.50	D	13	5	6	8	14	14.00	-	-	-	-	-	-	-	19.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	14.00	D	14	-	-	-	-	-	-	-	-	-	-	-	-	18.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	15.50	D	15	6	13	17	30	19.40	ML	2	1	2	21	65	9	19.43	-	-	30.0	23.0	7.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	17.00	U	16	-	-	-	-	-	CL	8	2	3	34	45	8	19.87	2.05	1.71	30.5	22.5	8.0	2.66	UU	49.0	11.4	-	0.556	-	-	-	-	Inorganic clays of low plasticity											
	18.50	D	17	11	17	26	43	23.44	ML	5	2	1	40	45	7	18.75	-	-	27.0	22.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											

APPENDIX "B"
TABLE 4: SUMMARY OF TEST RESULTS

Bore No: P117A	**Ground Elevation: RL 195.522 m**	**Method of drilling: Percussion**	**Depth of Water-table: 3.40 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 22/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 23987.647	**Casing Lowered: 24.00 m**	**Ending Date: 26/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	CL	7	2	3	12	66	10	14.83	2.04	1.78	31.0	22.5	8.5	2.67	UU	56.0	10.7	-	0.500	-	-	-	-	Inorganic clays of low plasticity											
	21.50	D	19	10	16	24	40	40.00	-	-	-	-	-	-	-	23.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.00	D	20	-	-	-	-	-	SM	0	1	1	61	37	0	18.81	2.04	1.72	Non-Plastic			2.65	RDST	0.0	29.1	-	-	-	-	-	-	Silty Sands											
	24.50	D	21	12	27	38	65	28.85	SM	0	0	0	71	29	0	18.81	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	14	30	40	70	29.86	-	-	-	-	-	-	-	17.66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	27.50	D	23	16	33	42	75	30.90	SM	2	1	2	52	43	0	18.02	-	-	Non-Plastic			2.65	-	-	-	-	-	-	-	-	-												
	29.00	D	24	15	30	36	66	27.64	SM	6	2	3	54	35	0	16.30	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	30.50	D	25	17	23	34	57	24.44	SM	6	2	3	51	38	0	17.57	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	32.00	D	26	-	-	-	-	-	ML	8	4	3	21	56	8	16.89	2.05	1.75	29.0	22.5	6.5	-	RDST	14.0	20.9	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	33.50	D	27	14	20	26	46	20.49	CL-ML	8	4	3	27	51	7	19.08	-	-	28.0	22.0	6.0	2.67	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	35.00	D	28	-	-	-	-	-	CL	3	2	3	16	68	8	17.84	2.04	1.73	30.0	22.5	7.5	-	RUU	52.0	12.3	-	-	-	-	-	-	Inorganic clays of low plasticity											
	36.50	D	29	17	30	33	63	63.00	-	-	-	-	-	-	-	16.54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	18	33	36	69	25.61	CL-ML	9	2	2	11	69	7	20.80	-	-	28.0	22.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	40.00	D	31	19	30	32	62	23.34	-	-	-	-	-	-	-	17.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 5: SUMMARY OF TEST RESULTS

Bore No: P118A	**Ground Elevation: RL 195.811 m**	**Method of drilling: Percussion**	**Depth of Water-table: 4.00 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 27/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 24013.847	**Casing Lowered: 24.00 m**	**Ending Date: 29/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	1	57	42	0	4.24	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	1.00	D	2	3	3	4	7	11.08	SM	1	1	2	48	48	0	8.55	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	2.00	D	3	-	-	-	-	-	-	-	-	-	-	-	-	10.77	1.76	1.59	-	-	-	-	RDST	3.0	23.6	-	-	-	-	-	-												
	3.00	D	4	2	3	3	6	7.29	ML	0	0	1	48	51	0	15.04	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	4	4	6	10	11.19	-	-	-	-	-	-	-	20.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	ML	4	0	1	44	51	0	20.52	1.94	1.61	Non-Plastic			2.64	DST	9.0	24.5	-	0.640	-	-	-	-	Inorganic Silts of low plasticity											
	6.00	D	7	5	6	8	14	14.56	-	-	-	-	-	-	-	19.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	6	7	10	17	16.05	-	-	-	-	-	-	-	18.84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	CL-ML	6	1	1	20	65	7	23.25	2.02	1.64	27.0	20.5	6.5	2.66	UU	44.0	10.6	0.092	0.622	-	0	19	-												
	9.00	D	10	4	6	9	15	14.15	CL-ML	3	2	4	18	67	6	21.58	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	5	9	12	21	17.12	-	-	-	-	-	-	-	24.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	11.00	D	12	-	-	-	-	-	CL-ML	4	2	2	17	69	6	21.31	-	-	25.0	20.0	5.0	-	-	-	-	-	-	-	-	-	-												
	12.50	D	13	7	11	14	25	18.15	CL	3	0	3	13	73	8	21.51	-	-	28.0	21.0	7.0	-	-	-	-	-	-	-	-	-	-												
	14.00	D	14	-	-	-	-	-	-	-	-	-	-	-	-	24.01	2.08	1.68	-	-	-	-	RUU	48.0	10.9	-	-	-	-	-	-												
	15.50	D	15	8	10	13	23	16.57	-	-	-	-	-	-	-	21.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	17.00	U	16	-	-	-	-	-	CL	3	1	1	16	72	7	19.91	2.03	1.69	29.0	22.0	7.0	2.66	-	-	-	-	0.574	-	-	-	-												
	18.50	D	17	11	15	19	34	34.00	CL	2	2	2	18	67	9	17.33	-	-	28.0	20.5	7.5	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 5: SUMMARY OF TEST RESULTS

Bore No: P118A	**Ground Elevation: RL 195.811 m**	**Method of drilling: Percussion**	**Depth of Water-table: 4.00 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 27/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 24013.847	**Casing Lowered: 24.00 m**	**Ending Date: 29/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	CL	3	3	3	26	57	8	15.13	2.07	1.80	28.5	20.5	8.0	2.67	UU	51.0	11.1	-	0.483	-	-	-	-	Inorganic clays of low plasticity											
	21.50	D	19	12	14	22	36	19.97	SM	2	1	3	59	35	0	17.26	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	23.00	D	20	-	-	-	-	-	-	-	-	-	-	-	-	17.96	2.02	1.71	-	-	-	2.65	RDST	2.0	30.1	-	0.550	-	-	-	-												
	24.50	D	21	13	21	26	47	22.88	-	-	-	-	-	-	-	19.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	10	15	41	56	25.34	SM	2	1	2	56	39	0	20.80	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	27.50	D	23	10	28	32	60	26.15	SM	0	0	1	69	30	0	20.52	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	16	33	47	80	31.78	-	-	-	-	-	-	-	21.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	30.50	D	25	18	30	45	75	29.74	-	-	-	-	-	-	-	19.87	-	-	-	-	-	2.65	-	-	-	-	-	-	-	-	-	Silty Sands											
	32.00	D	26	20	26	41	67	26.98	SM	2	1	1	67	29	0	12.63	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	33.50	D	27	21	29	40	69	27.17	SM	1	0	1	65	33	0	13.25	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	23	32	39	71	27.36	-	-	-	-	-	-	-	11.75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	27	35	40	75	28.08	SM	0	0	1	62	37	0	12.67	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	30	34	41	75	27.70	SM	1	1	1	68	29	0	12.24	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	32	36	44	80	28.50	SM	0	0	0	65	35	0	14.29	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 6: SUMMARY OF TEST RESULTS

Bore No: P119A	**Ground Elevation: RL 195.917m**	**Method of drilling: Percussion**	**Depth of Water-table: 5.00 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 25/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 24040.047	**Casing Lowered: 24.00 m**	**Ending Date: 27/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	1	58	41	0	9.56	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	D	2	2	3	4	7	10.82	-	-	-	-	-	-	-	14.46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	SM	1	2	2	65	30	0	11.15	1.97	1.77	Non-Plastic			2.63	DST	2.0	26.0	-	0.486	-	-	-	-												
	3.00	D	4	3	4	6	10	11.78	-	-	-	-	-	-	-	14.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	4	5	6	11	11.90	ML	0	0	1	47	52	0	19.10	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	5.00	U	6	-	-	-	-	-	SM	1	0	1	49	49	0	19.43	1.96	1.64	Non-Plastic			2.64	DST	5.0	25.9	-	0.610	-	-	-	-	Silty Sands											
	6.00	D	7	4	6	9	15	14.65	-	-	-	-	-	-	-	18.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	5	7	10	17	15.56	SM	0	0	1	70	29	0	19.85	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	8.00	D	9	-	-	-	-	-	CL-ML	1	1	0	25	67	6	18.11	1.95	1.65	26.0	21.0	5.0	2.66	RUU	34.0	15.3	-	0.612	-	-	-	-	Inorganic Silty Clays of low plasticity											
	9.00	D	10	7	9	11	20	16.48	-	-	-	-	-	-	-	19.52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	6	10	13	23	17.57	-	-	-	-	-	-	-	19.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	CL	2	2	1	15	68	12	21.12	2.06	1.70	31.0	21.5	9.5	2.67	UU	58.0	9.0	0.157	0.571	-	-	-	-	Inorganic clays of low plasticity											
	12.50	D	13	8	12	14	26	26.00	-	-	-	-	-	-	-	22.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	14.00	U	14	-	-	-	-	-	CL	4	1	3	18	63	11	21.20	2.06	1.70	29.5	21.0	8.5	2.67	UU	60.0	10.2	-	0.571	-	8	15	-												
	15.50	D	15	9	11	13	24	16.66	ML	0	0	1	42	57	0	20.35	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	17.00	D	16	-	-	-	-	-	CL-ML	3	2	1	21	66	7	21.17	2.04	1.68	27.0	21.5	5.5	-	RUU	39.0	14.2	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	18.50	D	17	10	16	20	36	20.38	-	-	-	-	-	-	-	18.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 6: SUMMARY OF TEST RESULTS

Bore No: P119A	**Ground Elevation: RL 195.917m**	**Method of drilling: Percussion**	**Depth of Water-table: 5.00 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 25/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 24040.047	**Casing Lowered: 24.00 m**	**Ending Date: 27/11/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	ML	8	3	3	14	62	10	14.62	2.03	1.77	32.0	24.0	8.0	2.66	UU	55.0	9.6	-	0.503	-	8	15	-	Inorganic Silts of low plasticity											
	21.50	D	19	10	13	18	31	31.00	-	-	-	-	-	-	-	21.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.00	D	20	-	-	-	-	-	-	-	-	-	-	-	-	19.85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	24.50	D	21	12	16	21	37	19.25	SM-SC	7	3	2	40	42	6	18.57	-	-	25.0	21.0	4.0	-	-	-	-	-	-	-	-	-	-	Silty Sands with clay binder											
	26.00	D	22	-	-	-	-	-	ML	0	0	1	47	46	6	22.91	2.10	1.71	26.0	22.0	4.0	2.66	RDST	9.0	28.4	-	0.556	-	-	-	-	Inorganic Silts of low plasticity											
	27.50	D	23	15	20	29	49	22.21	SM	1	1	0	52	46	0	20.42	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	29.00	D	24	-	-	-	-	-	-	-	-	-	-	-	-	18.03	2.08	1.76	-	-	-	-	RDST	3.0	29.3	-	-	-	-	-	-												
	30.50	D	25	18	23	31	54	22.87	SM-SC	10	6	11	33	33	7	11.58	-	-	27.0	21.0	6.0	2.65	-	-	-	-	-	-	-	-	-	Silty Sands with clay binder											
	32.00	D	26	21	25	32	57	23.31	SM	0	0	0	69	31	0	19.69	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	33.50	D	27	19	26	34	60	23.79	-	-	-	-	-	-	-	19.74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	22	30	35	65	24.76	SM	0	0	0	67	33	0	21.34	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	26	34	37	71	25.96	SM	0	0	1	68	31	0	20.40	-	-	Non-Plastic			2.65	-	-	-	-	-	-	-	-	-												
	38.00	D	30	30	32	40	72	25.85	-	-	-	-	-	-	-	17.53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	29	33	44	77	26.61	SM	0	0	1	67	32	0	17.71	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"

TABLE 7: SUMMARY OF TEST RESULTS

Bore No: P120A	**Ground Elevation: RL 196.008 m**	**Method of drilling: Percussion**	**Depth of Water-table: 5.00 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 18/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 24066.247	**Casing Lowered: 21.00 m**	**Ending Date: 21/11/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	ML	0	0	1	44	55	0	3.81	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	1.00	D	2	2	3	4	7	10.83	-	-	-	-	-	-	-	4.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	SM	4	2	2	47	45	0	11.08	1.96	1.76	Non-Plastic			2.65	DST	3.0	26.5	-	0.506	-	-	-	-	Silty Sands											
	3.00	D	4	5	7	8	15	17.70	ML	3	0	1	35	61	0	11.70	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	4.00	D	5	3	5	6	11	11.92	-	-	-	-	-	-	-	11.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	ML	1	1	0	38	60	0	21.09	1.99	1.64	Non-Plastic			2.64	DST	6.0	25.7	-	0.610	-	-	-	-												
	6.00	D	7	4	5	6	11	10.74	ML	0	1	2	30	67	0	19.71	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	4	6	8	14	13.26	-	-	-	-	-	-	-	20.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	CL	5	2	2	14	68	9	28.01	2.00	1.56	28.0	20.5	7.5	2.67	UU	44.0	12.3	0.135	0.712	-	10	18	-	Inorganic clays of low plasticity											
	9.00	D	10	5	10	18	28	20.03	CL	2	1	2	10	77	8	27.44	-	-	27.5	20.5	7.0	-	-	-	-	-	-	-	-	-	-												
	10.00	U	11	6	13	20	33	21.88	-	-	-	-	-	-	-	22.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	CL	6	3	3	9	68	11	22.40	2.06	1.68	29.0	20.5	8.5	2.68	UU	52.0	9.2	-	0.595	-	14	16	-												
	12.50	D	13	6	9	13	22	22.00	-	-	-	-	-	-	-	23.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	14.00	D	14	-	-	-	-	-	-	-	-	-	-	-	-	22.53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	15.50	D	15	10	12	13	25	17.02	CL-ML	7	2	1	22	61	7	18.24	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	17.00	U	16	-	-	-	-	-	CL	4	2	1	11	73	9	17.63	2.03	1.73	28.0	20.0	8.0	2.67	UU	48.0	11.7	-	0.543	-	-	-	-	Inorganic clays of low plasticity											
	18.50	D	17	12	14	18	32	32.00	-	-	-	-	-	-	-	15.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 7: SUMMARY OF TEST RESULTS

Bore No: P120A	**Ground Elevation: RL 196.008 m**	**Method of drilling: Percussion**	**Depth of Water-table: 5.00 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 18/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 24066.247	**Casing Lowered: 21.00 m**	**Ending Date: 21/11/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	D	18	-	-	-	-	-	CL	12	4	4	14	56	10	15.43	1.99	1.72	29.0	22.0	7.0	-	RUU	43.0	12.1	-	-	-	-	-	-	Inorganic clays of low plasticity											
	21.50	D	19	13	15	21	36	36.00	CL	3	1	1	6	77	12	18.43	-	-	29.0	19.5	9.5	-	-	-	-	-	-	-	-	-	-												
	23.00	D	20	-	-	-	-	-	-	-	-	-	-	-	-	21.32	2.07	1.71	-	-	-	-	RUU	64.0	8.7	-	-	-	-	-	-												
	24.50	D	21	14	17	23	40	20.23	SM	0	0	0	55	45	0	20.70	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	26.00	D	22	-	-	-	-	-	-	-	-	-	-	-	-	20.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	27.50	D	23	16	20	25	45	21.17	SM	0	0	1	62	37	0	21.07	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	29.00	U	24	-	-	-	-	-	SM	1	1	0	58	40	0	20.14	1.91	1.59	Non-Plastic			2.61	DST	1.0	29.4	-	0.642	-	-	-	-												
	30.50	D	25	17	21	27	48	21.43	SM	0	1	2	55	42	0	20.30	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	32.00	D	26	-	-	-	-	-	-	-	-	-	-	-	-	21.00	2.09	1.73	-	-	-	-	RDST	0.0	28.6	-	-	-	-	-	-												
	33.50	D	27	22	30	36	66	25.67	SM	0	0	1	54	45	0	20.63	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	27	33	38	71	26.55	-	-	-	-	-	-	-	18.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	29	35	40	75	27.22	SM	4	2	1	44	49	0	17.73	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	28	32	42	74	26.58	-	-	-	-	-	-	-	15.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	46	56	-	R	-	CL-ML	4	2	2	24	61	7	14.68	-	-	26.0	20.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"

TABLE 8: SUMMARY OF TEST RESULTS

Bore No: P121A	**Ground Elevation: RL 196.463 m**	**Method of drilling: Percussion**	**Depth of Water-table: 5.00 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 01/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 24092.447	**Casing Lowered: 19.50 m**	**Ending Date: 03/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	1	54	45	0	3.81	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	D	2	3	4	6	10	15.47	-	-	-	-	-	-	-	5.83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	SM-SC	0	0	1	53	42	4	15.34	1.96	1.70	24.0	20.0	4.0	2.65	DST	2.0	27.8	-	0.559	-	-	-	-	Silty Sands with clay binder											
	3.00	D	4	4	5	7	12	14.15	SM	2	1	2	58	37	0	10.74	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	4.00	D	5	5	7	9	16	17.33	-	-	-	-	-	-	-	8.68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	CL-ML	1	1	1	36	53	8	15.48	1.99	1.72	25.5	19.0	6.5	2.66	DST	8.0	25.6	-	0.547	-	6	16	-	Inorganic Silty Clays of low plasticity											
	6.00	D	7	4	8	9	17	15.79	CL-ML	1	0	1	35	56	7	20.09	-	-	25.0	19.0	6.0	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	5	9	12	21	17.44	-	-	-	-	-	-	-	20.59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	SM	1	1	1	58	39	0	18.47	2.01	1.70	Non-Plastic			2.63	DST	4.0	27.2	-	0.547	-	-	-	-	Silty Sands											
	9.00	D	10	4	7	10	17	15.09	CL-ML	2	1	1	35	54	7	20.20	-	-	26.0	20.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	10.00	D	11	6	8	11	19	15.76	-	-	-	-	-	-	-	23.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	D	12	-	-	-	-	-	CL	2	1	1	18	69	9	22.94	2.04	1.66	30.0	21.0	9.0	-	RUU	61.0	10.6	-	-	-	9	15	-	Inorganic clays of low plasticity											
	12.50	D	13	7	10	13	23	16.88	CL	1	1	2	23	66	7	21.82	-	-	28.0	21.0	7.0	-	-	-	-	-	-	-	-	-	-												
	14.00	U	14	-	-	-	-	-	CL-ML	6	2	2	14	68	8	20.66	2.05	1.70	27.0	20.5	6.5	2.66	DST	9.0	25.3	-	0.565	-	-	-	-	Inorganic Silty Clays of low plasticity											
	15.50	D	15	9	11	14	25	17.00	-	-	-	-	-	-	-	19.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	17.00	U	16	-	-	-	-	-	ML	7	3	2	12	70	6	20.82	2.07	1.71	29.0	22.5	6.5	2.67	-	-	-	-	0.561	-	-	-	-	Inorganic Silts of low plasticity											
	18.50	D	17	13	15	16	31	18.53	ML	2	1	1	42	54	0	18.85	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"

TABLE 8: SUMMARY OF TEST RESULTS

Bore No: P121A	**Ground Elevation: RL 196.463 m**	**Method of drilling: Percussion**	**Depth of Water-table: 5.00 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 01/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 24092.447	**Casing Lowered: 19.50 m**	**Ending Date: 03/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	D	18	-	-	-	-	-	ML	3	1	2	37	52	5	22.07	-	-	27.0	22.0	5.0	-	-	-	-	-	-	-	-	-	-												
	21.50	D	19	10	17	20	37	19.88	-	-	-	-	-	-	-	21.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	23.00	D	20	-	-	-	-	-	-	-	-	-	-	-	-	21.64	2.08	1.71	-	-	-	2.65	RDST	6.0	28.3	-	-	-	-	-	-												
	24.50	D	21	15	21	31	52	23.91	SM	0	0	0	77	23	0	20.02	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	17	30	40	70	28.99	SM	0	0	0	75	25	0	18.93	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	27.50	D	23	12	28	38	66	27.29	-	-	-	-	-	-	-	20.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	17	33	41	74	29.19	SM	1	1	1	62	35	0	19.23	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	30.50	D	25	19	27	39	66	26.41	-	-	-	-	-	-	-	20.76	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	32.00	D	26	20	26	42	68	26.56	SM	1	0	1	69	29	0	19.53	-	-	Non-Plastic			2.62	-	-	-	-	-	-	-	-	-	Silty Sands											
	33.50	D	27	22	28	40	68	26.16	SM	0	1	1	68	30	0	18.53	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	24	30	41	71	26.55	-	-	-	-	-	-	-	22.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	26	34	44	78	27.99	SM	0	0	1	55	44	0	19.63	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	29	36	42	78	27.61	-	-	-	-	-	-	-	13.51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	30	35	46	81	27.87	SM	0	0	0	57	43	0	14.44	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 9: SUMMARY OF TEST RESULTS

Bore No: P122A	**Ground Elevation: RL 196.901 m**	**Method of drilling: Percussion**	**Depth of Water-table: 5.20 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 04/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 24118.647	**Casing Lowered: 24.00 m**	**Ending Date: 06/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	ML	0	0	1	48	46	5	15.91	-	-	25.0	21.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	1.00	D	2	2	3	5	8	12.32	SM	1	1	2	58	38	0	6.74	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	2.00	U	3	-	-	-	-	-	SM	3	2	3	59	33	0	6.36	2.00	1.88	Non-Plastic			2.62	DST	0.0	28.7	-	0.394	-	-	-	-												
	3.00	D	4	4	4	6	10	11.73	-	-	-	-	-	-	-	10.51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	5	7	8	15	16.15	-	-	-	-	-	-	-	11.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	SM-SC	1	1	2	50	41	5	19.70	1.98	1.65	24.0	20.0	4.0	2.65	DST	6.0	26.0	-	0.606	-	-	-	-	Silty Sands with clay binder											
	6.00	D	7	6	7	9	16	15.22	-	-	-	-	-	-	-	20.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	5	8	10	18	15.94	SM	0	1	1	58	40	0	18.97	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	8.00	D	9	-	-	-	-	-	-	-	-	-	-	-	-	19.58	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	9.00	D	10	7	9	12	21	16.83	CL-ML	1	1	1	28	63	6	22.27	-	-	28.0	21.5	6.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	10.00	D	11	10	13	16	29	20.04	-	-	-	-	-	-	-	22.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	CL	3	0	2	11	70	14	21.78	2.03	1.67	31.5	21.0	10.5	2.68	UU	57.0	9.7	0.149	0.605	-	7	17	-	Inorganic clays of low plasticity											
	12.50	D	13	8	11	14	25	25.00	CL	0	1	1	17	73	8	22.35	-	-	28.0	20.5	7.5	-	-	-	-	-	-	-	-	-	-												
	14.00	U	14	-	-	-	-	-	CL-ML	0	0	1	35	59	5	22.05	2.07	1.70	26.0	21.5	4.5	2.65	DST	7.0	26.1	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	15.50	D	15	12	16	19	35	20.72	-	-	-	-	-	-	-	18.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	17.00	U	16	-	-	-	-	-	SM-SC	5	2	2	47	39	5	18.65	2.04	1.72	25.5	21.0	4.5	2.65	DST	2.0	26.4	-	0.541	-	-	-	-	Silty Sands with clay binder											
	18.50	D	17	12	15	17	32	18.84	SM-SC	4	1	2	45	44	4	17.13	-	-	25.0	21.0	4.0	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 9: SUMMARY OF TEST RESULTS

Bore No: P122A	**Ground Elevation: RL 196.901 m**	**Method of drilling: Percussion**	**Depth of Water-table: 5.20 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 04/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 24118.647	**Casing Lowered: 24.00 m**	**Ending Date: 06/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	D	18	-	-	-	-	-	-	-	-	-	-	-	-	18.61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Silty Sands with clay binder											
	21.50	D	19	11	16	20	36	19.49	SM	0	0	1	64	35	0	19.53	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	23.00	D	20	-	-	-	-	-	CL	2	1	3	11	72	11	22.84	2.10	1.71	30.0	21.5	8.5	-	RUU	52.0	9.3	-	-	-	-	-	-	Inorganic clays of low plasticity											
	24.50	D	21	13	19	28	47	22.25	CL	1	1	2	9	77	10	20.95	-	-	29.0	22.0	7.0	-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	-	-	-	-	-	SM	0	0	0	68	32	0	18.24	2.03	1.72	Non-Plastic			-	RDST	0.0	30.0	-	-	-	-	-	-	Silty Sands											
	27.50	D	23	16	23	31	54	23.58	SM	0	0	0	75	25	0	19.08	-	-	Non-Plastic			2.63	-	-	-	-	-	-	-	-	-												
	29.00	D	24	12	25	34	59	24.62	-	-	-	-	-	-	-	19.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	30.50	D	25	26	33	38	71	27.65	-	-	-	-	-	-	-	20.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	32.00	D	26	24	30	35	65	25.56	SM	0	0	1	70	29	0	17.89	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	33.50	D	27	22	32	36	68	25.98	SM	0	0	1	68	31	0	20.53	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	26	35	41	76	27.72	-	-	-	-	-	-	-	19.53	-	-	-	-	-	2.63	-	-	-	-	-	-	-	-	-												
	36.50	D	29	25	33	45	78	27.81	SM	0	0	1	67	32	0	20.59	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	28	37	47	84	28.94	SM	0	0	0	66	34	0	17.68	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	26	34	42	76	26.41	-	-	-	-	-	-	-	16.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 10: SUMMARY OF TEST RESULTS

Bore No: P123A	**Ground Elevation: RL 196.824**	**Method of drilling: Rotary**	**Depth of Water-table: 5.60 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 20/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 24144.847	**Casing Lowered: 0.00 m**	**Ending Date: 24/11/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	0	66	34	0	5.08	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	D	2	2	3	3	6	9.44	-	-	-	-	-	-	-	5.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	SM	0	0	0	78	22	0	12.61	1.81	1.61	Non-Plastic			2.63	DST	0.0	28.2	-	0.634	-	-	-	-												
	3.00	D	4	3	4	6	10	12.05	SM	2	1	3	58	36	0	15.22	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	4	5	7	12	13.31	-	-	-	-	-	-	-	19.57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	SM-SC	6	5	3	47	33	6	14.37	2.08	1.82	26.0	21.0	5.0	2.64	DST	8.0	25.7	-	0.451	-	-	-	-	Silty Sands with clay binder											
	6.00	D	7	5	7	9	16	15.26	SM	0	0	1	53	46	0	19.04	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	7.00	D	8	4	8	10	18	15.94	SM-SC	3	1	1	45	45	5	16.14	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Silty Sands with clay binder											
	8.00	U	9	-	-	-	-	-	SM	12	4	4	43	37	0	18.65	2.06	1.74	Non-Plastic			2.64	DST	6.0	26.1	-	0.517	-	-	-	-	Silty Sands											
	9.00	D	10	5	9	12	21	16.78	CL-ML	0	0	1	12	82	5	21.17	-	-	28.0	22.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	10.00	D	11	9	13	15	28	19.54	-	-	-	-	-	-	-	21.73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	ML	10	1	2	8	71	8	22.08	2.03	1.66	31.0	24.5	6.5	2.67	UU	49.0	8.6	0.107	0.608	-	0	20	-	Inorganic Silts of low plasticity											
	12.50	D	13	5	7	12	19	15.18	-	-	-	-	-	-	-	19.45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	14.00	U	14	-	-	-	-	-	ML	5	2	1	17	68	7	20.24	2.04	1.70	28.0	23.0	5.0	2.66	UU	43.0	12.5	-	0.565	-	0	19	-												
	15.50	D	15	6	9	14	23	16.17	-	-	-	-	-	-	-	17.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	17.00	D	16	-	-	-	-	-	SM	0	0	0	75	25	0	21.90	2.08	1.71	Non-Plastic			2.64	RDST	0.0	28.8	-	0.544	-	-	-	-	Silty Sands											
	18.50	D	17	10	16	24	40	21.61	ML	2	1	1	40	50	6	15.92	-	-	27.0	22.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											

APPENDIX "B"
TABLE 10: SUMMARY OF TEST RESULTS

Bore No: P123A	Ground Elevation: RL 196.824	Method of drilling: Rotary	Depth of Water-table: 5.60 m
Diameter of Bore Hole: 150 mm	Bore Retained using: Casing	Starting Date: 20/11/2023	SPT Sampler: Standard
Location / Chainage: 24144.847	Casing Lowered: 0.00 m	Ending Date: 24/11/2023	Hammer type: Rope-pulley driven

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	-	-	-	-	-	-	-	15.31	2.03	1.76	-	-	-	2.66	DST	5.0	25.3	-	0.511	-	-	-	-	Inorganic Silts of low plasticity											
	21.50	D	19	13	24	30	54	25.47	SM	8	3	3	62	24	0	16.18	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	23.00	D	20	21	30	42	72	30.80	SM	2	1	1	53	43	0	17.87	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	24.50	D	21	17	24	55	79	32.53	SM	7	3	3	47	40	0	12.15	-	-	Non-Plastic			2.64	-	-	-	-	-	-	-	-	-												
	26.00	D	22	15	27	37	64	27.31	-	-	-	-	-	-	-	18.28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	27.50	D	23	9	32	38	70	28.66	ML	2	1	1	43	46	7	20.67	-	-	29.0	22.5	6.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	29.00	D	24	17	32	50	82	31.72	CL	3	1	2	24	62	8	19.90	-	-	29.0	22.0	7.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	30.50	D	25	17	32	50	82	31.21	ML	0	1	1	5	89	4	16.81	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	32.00	D	26	12	25	37	62	62.00	CL	5	3	4	22	55	11	17.32	-	-	32.0	22.5	9.5	2.67	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	33.50	D	27	16	19	32	51	51.00	-	-	-	-	-	-	-	22.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	12	29	45	74	74.00	CL	4	3	5	29	50	9	18.78	-	-	30.0	22.5	7.5	-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	14	32	39	71	71.00	CL	4	2	6	33	45	10	16.73	-	-	29.0	21.0	8.0	-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	16	21	36	57	57.00	-	-	-	-	-	-	-	16.31	-	-	-	-	-	2.67	-	-	-	-	-	-	-	-	-												
	40.00	D	31	23	35	50	85	85.00	CL	5	2	5	26	53	9	14.80	-	-	31.0	22.0	9.0	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 11: SUMMARY OF TEST RESULTS

Bore No: P124A	Ground Elevation: RL 196.914 m	Method of drilling: Percussion	Depth of Water-table: 5.70 m
Diameter of Bore Hole: 150 mm	Bore Retained using: Casing	Starting Date: 05/12/2023	SPT Sampler: Standard
Location / Chainage: 24171.047	Casing Lowered: 21.00 m	Ending Date: 07/12/2023	Hammer type: Auto-trip

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	1	53	46	0	5.34	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	1.00	D	2	3	4	6	10	15.53	-	-	-	-	-	-	-	6.74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	SM	0	0	1	54	45	0	8.74	1.92	1.77	Non-Plastic			2.62	DST	2.0	28.6	-	0.480	-	-	-	-	Silty Sands											
	3.00	D	4	4	5	7	12	14.23	-	-	-	-	-	-	-	12.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	5	7	9	16	17.43	SM	0	0	1	56	43	0	12.05	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	ML	2	1	1	42	49	5	18.28	2.03	1.72	24.0	20.0	4.0	2.65	DST	5.0	26.6	-	0.541	-	-	-	-												
	6.00	D	7	4	8	9	17	15.63	ML	1	1	1	45	48	4	16.08	-	-	25.0	21.0	4.0	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	5	9	12	21	17.23	-	-	-	-	-	-	-	17.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	ML	7	3	4	23	56	7	20.20	2.05	1.71	29.5	23.0	6.5	2.67	-	-	-	-	0.566	-	7	20	-	Inorganic Silts of low plasticity											
	9.00	D	10	5	8	14	22	22.00	ML	4	2	3	8	74	9	18.50	-	-	31.0	23.5	7.5	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	6	10	15	25	25.00	-	-	-	-	-	-	-	20.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	CL	3	1	1	7	77	11	22.15	2.00	1.64	31.5	23.0	8.5	2.68	UU	54.0	8.6	0.163	0.634	-	8	20	-	Inorganic clays of low plasticity											
	12.50	D	13	7	9	11	20	20.00	-	-	-	-	-	-	-	19.57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	14.00	U	14	-	-	-	-	-	CL-ML	3	1	2	28	59	7	19.27	1.85	1.55	27.0	21.0	6.0	2.66	DST	13.0	25.2	-	0.716	-	-	-	-	Inorganic Silty Clays of low plasticity											
	15.50	D	15	6	10	13	23	16.22	CL-ML	1	1	1	34	57	6	17.67	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-												
	17.00	U	16	-	-	-	-	-	SM	4	0	2	46	48	0	19.52	1.97	1.65	Non-Plastic			2.63	DST	3.0	26.7	-	0.594	-	-	-	-	Silty Sands											
	18.50	D	17	8	14	20	34	19.64	-	-	-	-	-	-	-	19.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 11: SUMMARY OF TEST RESULTS

Bore No: P124A	**Ground Elevation: RL 196.914 m**	**Method of drilling: Percussion**	**Depth of Water-table: 5.70 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 05/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 24171.047	**Casing Lowered: 21.00 m**	**Ending Date: 07/12/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	CL-ML	7	5	6	30	45	7	15.59	2.07	1.79	28.0	21.5	6.5	2.67	-	-	-	-	0.492	-	-	19	-	Inorganic Silty Clays of low plasticity											
	21.50	D	19	7	14	25	39	20.60	-	-	-	-	-	-	-	16.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.00	D	20	8	16	25	41	20.87	SM	1	1	1	64	33	0	16.67	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	24.50	D	21	9	18	27	45	21.79	SM	0	1	1	66	32	0	17.21	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	-	-	-	-	-	-	-	-	-	-	-	-	17.90	2.02	1.71	-	-	-	2.65	RDST	0.0	30.8	-	0.550	-	-	-	-												
	27.50	D	23	11	24	28	52	23.16	SM	0	0	2	58	40	0	18.57	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	13	28	32	60	25.12	-	-	-	-	-	-	-	18.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	30.50	D	25	15	32	36	68	27.05	SM	0	1	1	71	27	0	17.49	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	32.00	D	26	19	35	40	75	28.60	SM	0	0	1	69	30	0	17.82	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	33.50	D	27	21	38	43	81	29.82	SM	0	0	1	54	45	0	17.21	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	35.00	D	28	14	32	35	67	25.58	-	-	-	-	-	-	-	17.40	-	-	-	-	-	2.65	-	-	-	-	-	-	-	-	-												
	36.50	D	29	17	35	39	74	27.08	SM	0	0	2	58	40	0	16.72	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	18	37	42	79	27.98	SM	0	1	1	68	30	0	18.21	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	21	38	45	83	28.42	CL	2	1	2	27	61	7	20.15	-	-	29.0	22.0	7.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, '-' indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 12: SUMMARY OF TEST RESULTS

Bore No: P125A	**Ground Elevation: RL 197.89 m**	**Method of drilling: Rotary**	**Depth of Water-table: 5.65 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 25/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 24197.247	**Casing Lowered: 0.00 m**	**Ending Date: 27/11/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																					
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery % / R.Q.D % / Density (gm /cc) / Specific gravity / Moisture content (%) / Water absorption (%) / Point load Index / U.C.S (MPa) / Porosity / Hardness / Modulus of Elasticity / Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL
	0.50	D	1	-	-	-	-	-	SM	0	0	0	68	32	0	5.58	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands
	1.00	U	2	-	-	-	-	-	SM	0	0	0	77	23	0	16.68	2.07	1.77	Non-Plastic			2.63	DST	0.0	28.9	-	0.486	-	-	-	-	Silty Sands
	2.00	D	3	3	4	5	9	11.68	-	-	-	-	-	-	-	17.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Silty Sands
	3.00	D	4	4	5	7	12	13.94	SM	2	1	2	68	27	0	20.41	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands
	4.00	U	5	-	-	-	-	-	SM	7	6	3	59	25	0	12.61	1.98	1.76	Non-Plastic			2.62	DST	1.0	30.0	-	0.489	-	-	-	-	Silty Sands
	5.00	D	6	5	8	10	18	17.94	ML	5	2	3	22	64	4	17.68	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity
	6.00	D	7	6	11	13	24	18.86	SM	0	0	0	56	44	0	20.65	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands
	7.00	U	8	-	-	-	-	-	SM	7	7	7	39	40	0	14.44	1.96	1.71	Non-Plastic			2.65	DST	3.0	27.5	-	0.550	-	-	-	-	Silty Sands
	8.00	D	9	7	8	10	18	15.57	ML	4	2	0	40	49	5	18.12	-	-	25.0	21.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity
	9.00	D	10	8	10	15	25	18.42	-	-	-	-	-	-	-	20.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity
	10.00	U	11	-	-	-	-	-	ML	3	2	2	7	75	11	20.65	2.04	1.69	33.0	25.0	8.0	2.67	UU	46.0	10.0	0.102	0.580	-	8	21	-	Inorganic Silts of low plasticity
	11.00	D	12	9	14	16	30	30.00	-	-	-	-	-	-	-	22.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity
	12.00	D	13	10	15	18	33	33.00	ML	2	1	1	5	81	10	24.14	-	-	32.0	24.5	7.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity
	13.00	U	14	-	-	-	-	-	ML	4	2	1	18	70	5	20.59	2.05	1.70	27.0	22.0	5.0	2.66	DST	10.0	25.6	-	0.565	-	-	-	-	Inorganic Silts of low plasticity
	14.50	D	15	7	9	18	27	27.00	ML	2	1	2	16	69	10	13.61	-	-	32.0	24.0	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity
	16.00	U	16	-	-	-	-	-	ML	4	1	2	42	47	4	17.38	2.07	1.76	24.0	20.0	4.0	2.65	DST	5.0	26.4	-	0.506	-	-	-	-	Inorganic Silts of low plasticity
	17.50	D	17	10	15	18	33	19.29	-	-	-	-	-	-	-	21.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity

APPENDIX "B"
TABLE 12: SUMMARY OF TEST RESULTS

Bore No: P125A	**Ground Elevation: RL 197.89 m**	**Method of drilling: Rotary**	**Depth of Water-table: 5.65 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 25/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 24197.247	**Casing Lowered: 0.00 m**	**Ending Date: 27/11/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	19.00	U	18	-	-	-	-	-	CL	7	3	4	30	46	10	19.17	2.03	1.70	31.0	22.5	8.5	2.67	RUU	53.0	9.5	-	0.571	-	9	19	-	Inorganic clays of low plasticity											
	20.50	D	19	11	24	44	68	68.00	-	-	-	-	-	-	-	20.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	22.00	D	20	15	28	45	73	73.00	CL	7	4	5	22	51	11	14.73	-	-	31.5	22.5	9.0	-	-	-	-	-	-	-	-	-	-												
	23.50	D	21	16	33	46	79	32.74	SM	0	1	0	74	25	0	19.30	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	25.00	D	22	19	35	45	80	32.48	-	-	-	-	-	-	-	17.23	-	-	-	-	-	2.63	-	-	-	-	-	-	-	-	-												
	26.50	D	23	17	36	42	78	31.29	SM	0	0	1	70	29	0	20.27	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	28.00	D	24	27	38	52	90	34.36	-	-	-	-	-	-	-	15.68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.50	D	25	15	32	39	71	28.24	SM	0	1	1	68	30	0	16.79	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	31.00	D	26	17	35	38	73	28.44	-	-	-	-	-	-	-	9.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	32.50	D	27	21	33	42	75	28.63	SM	0	0	0	69	31	0	9.28	-	-	Non-Plastic			2.64	-	-	-	-	-	-	-	-	-												
	34.00	D	28	24	35	50	85	31.02	-	-	-	-	-	-	-	8.98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	35.50	D	29	19	30	36	66	25.43	-	-	-	-	-	-	-	11.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	37.00	D	30	16	28	35	63	63.00	CL	7	9	6	13	53	12	13.81	-	-	32.0	21.0	11.0	2.67	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	38.50	D	31	19	32	39	71	71.00	-	-	-	-	-	-	-	13.89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	32	24	35	42	77	77.00	CL	6	5	5	12	59	13	13.63	-	-	32.5	21.0	11.5	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 13: SUMMARY OF TEST RESULTS

Bore No: P126A	**Ground Elevation: RL 197.885 m**	**Method of drilling: Rotary**	**Depth of Water-table: 7.25 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 06/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 24223.447	**Casing Lowered: 0.00 m**	**Ending Date: 09/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	1	58	41	0	10.50	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	D	2	3	4	5	9	14.03	-	-	-	-	-	-	-	13.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	SM	0	0	0	61	39	0	11.76	1.89	1.69	Non-Plastic			2.63	DST	5.0	26.5	-	0.556	-	-	-	-												
	3.00	D	4	4	5	7	12	14.30	SM	0	0	0	63	37	0	13.36	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	5	7	8	15	16.43	-	-	-	-	-	-	-	15.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	SM	0	0	1	52	47	0	12.49	1.94	1.73	Non-Plastic			2.62	DST	2.0	27.6	-	0.519	-	-	-	-												
	6.00	D	7	7	10	13	23	22.01	SM	0	0	0	54	46	0	20.46	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	9	11	13	24	21.71	SM	0	0	0	56	44	0	13.69	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	CL-ML	7	3	3	31	49	7	14.39	1.97	1.72	27.5	21.0	6.5	2.66	UU	44.0	12.1	0.092	0.547	-	8	18	-	Inorganic Silty Clays of low plasticity											
	9.00	D	10	8	13	21	34	22.02	-	-	-	-	-	-	-	21.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	12	14	17	31	31.00	ML	4	2	1	18	66	9	21.67	-	-	31.0	23.5	7.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	11.00	U	12	-	-	-	-	-	ML	1	1	2	5	81	10	22.54	2.02	1.65	32.1	24.1	8.0	2.67	-	-	-	-	0.618	-	9	20	-												
	12.50	D	13	9	17	22	39	39.00	-	-	-	-	-	-	-	21.86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	14.00	U	14	-	-	-	-	-	ML	2	1	1	24	67	5	18.46	2.00	1.69	27.0	22.0	5.0	2.66	DST	6.0	26.5	-	0.574	-	-	-	-												
	15.50	D	15	11	18	25	43	23.34	ML	0	0	1	45	54	0	16.82	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	17.00	D	16	-	-	-	-	-	-	-	-	-	-	-	-	20.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	18.50	D	17	10	19	30	49	24.45	SM	0	0	1	52	47	0	20.56	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											

APPENDIX "B"
TABLE 13: SUMMARY OF TEST RESULTS

Bore No: P126A	**Ground Elevation: RL 197.885 m**	**Method of drilling: Rotary**	**Depth of Water-table: 7.25 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 06/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 24223.447	**Casing Lowered: 0.00 m**	**Ending Date: 09/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	CL	7	6	6	25	47	9	18.16	2.06	1.74	30.0	22.5	7.5	2.66	DST	11.0	25.0	-	0.529	-	-	-	-	Inorganic clays of low plasticity											
	21.50	D	19	12	14	19	33	33.00	-	-	-	-	-	-	-	17.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.00	U	20	-	-	-	-	-	SM-SC	14	23	16	17	25	5	13.67	2.09	1.84	27.0	21.5	5.5	2.62	DST	0.0	33.0	-	0.424	-	-	-	-	Silty Sands with clay binder											
	24.50	D	21	17	25	30	55	24.44	SM	4	2	2	54	38	0	9.94	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	26.00	D	22	21	32	68	R	-	ML	7	3	2	14	67	7	13.08	-	-	29.0	22.5	6.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	27.50	D	23	100	-	-	R	-	SM	15	5	8	24	44	4	10.23	-	-	25.0	22.0	3.0	-	-	-	-	-	-	-	-	-	-	Silty Sands											
	29.00	D	24	80	-	-	R	-	-	-	-	-	-	-	-	11.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	30.50	D	25	100	-	-	R	-	SM	12	6	4	35	43	0	13.24	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	32.00	D	26	101	-	-	R	-	-	-	-	-	-	-	-	17.88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	33.50	D	27	19	24	32	56	22.74	CL-ML	2	1	1	24	65	7	21.90	-	-	26.0	21.0	5.0	2.65	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	35.00	D	28	23	27	35	62	24.01	CL-ML	1	1	0	26	66	6	20.94	-	-	25.0	20.0	5.0	-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	21	25	33	58	22.61	-	-	-	-	-	-	-	22.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	24	32	38	70	25.37	SM	0	1	2	66	31	0	17.66	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	40.00	D	31	27	33	43	76	26.40	SM	0	0	1	70	29	0	17.37	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 14: SUMMARY OF TEST RESULTS

Bore No: P127A	**Ground Elevation: RL 197.515 m**	**Method of drilling: Rotary**	**Depth of Water-table: 7.35 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 09/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 24249.647	**Casing Lowered: 0.00 m**	**Ending Date: 11/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	1	58	41	0	3.11	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	D	2	3	4	6	10	15.81	-	-	-	-	-	-	-	9.95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	SM	0	0	0	62	38	0	13.84	1.77	1.55	Non-Plastic			2.63	DST	2.0	28.0	-	0.692	-	-	-	-												
	3.00	D	4	4	5	8	13	15.78	-	-	-	-	-	-	-	14.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	5	7	9	16	17.88	-	-	-	-	-	-	-	10.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	SM	1	1	1	77	20	0	20.30	1.98	1.65	Non-Plastic			2.62	DST	3.0	29.7	-	0.588	-	-	-	-												
	6.00	D	7	9	12	16	28	27.12	-	-	-	-	-	-	-	20.84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	8	14	17	31	28.31	-	-	-	-	-	-	-	18.88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	SM	0	0	1	74	25	0	20.25	2.00	1.66	Non-Plastic			2.63	DST	0.0	30.5	-	0.584	-	-	-	-												
	9.00	D	10	10	13	19	32	21.23	CL-ML	1	1	1	36	56	5	20.60	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	10.00	D	11	12	15	20	35	22.15	-	-	-	-	-	-	-	21.61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	CL	3	1	5	21	61	9	21.77	2.05	1.68	28.5	21.5	7.0	2.67	UU	43.0	13.4	0.129	0.589	-	0	19	-	Inorganic clays of low plasticity											
	12.50	D	13	15	18	25	43	24.43	-	-	-	-	-	-	-	21.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	14.00	U	14	-	-	-	-	-	ML	2	1	2	42	53	0	19.79	1.87	1.56	Non-Plastic			2.65	DST	8.0	25.2	-	0.699	-	-	-	-	Inorganic Silts of low plasticity											
	15.50	D	15	11	18	30	48	25.36	SM	0	0	0	55	45	0	20.85	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	17.00	U	16	-	-	-	-	-	SM	0	0	3	56	41	0	20.68	1.82	1.51	Non-Plastic			2.65	DST	2.0	26.4	-	-	-	-	-	-												
	18.50	D	17	14	18	19	37	37.00	CL	2	1	2	11	72	12	17.71	-	-	32.0	22.0	10.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											

APPENDIX "B"
TABLE 14: SUMMARY OF TEST RESULTS

Bore No: P127A	**Ground Elevation: RL 197.515 m**	**Method of drilling: Rotary**	**Depth of Water-table: 7.35 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 09/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 24249.647	**Casing Lowered: 0.00 m**	**Ending Date: 11/12/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	ML	5	3	4	19	60	9	20.13	2.04	1.70	31.0	23.5	7.5	2.66	UU	50.0	11.0	-	0.565	-	0	21	-	Inorganic Silts of low plasticity											
	21.50	D	19	14	24	29	53	25.18	SM	0	0	0	65	35	0	19.48	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	23.00	D	20	18	31	38	69	29.88	-	-	-	-	-	-	-	15.00	-	-	-	-	-	2.65	-	-	-	-	-	-	-	-	-												
	24.50	D	21	20	35	43	78	32.19	SM	3	2	2	62	31	0	19.63	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	23	37	42	79	31.92	SM	1	1	1	51	46	0	19.17	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	27.50	D	23	25	47	56	R	-	SM	0	1	1	62	36	0	18.63	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	27	49	58	R	-	CL	5	5	7	25	50	8	15.62	-	-	29.0	22.0	7.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	30.50	D	25	28	40	62	R	-	-	-	-	-	-	-	-	16.49	-	-	-	-	-	2.65	-	-	-	-	-	-	-	-	-												
	32.00	D	26	24	49	50	99	35.60	CL-ML	4	4	3	22	60	7	13.37	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	33.50	D	27	31	53	60	R	-	ML	0	0	1	17	77	5	20.19	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	35.00	D	28	32	44	60	R	-	-	-	-	-	-	-	-	19.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	24	39	45	84	84.00	CL	3	2	2	15	66	12	17.13	-	-	30.0	21.0	9.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	38.00	D	30	27	42	48	90	90.00	CL	2	2	2	23	60	11	18.53	-	-	30.0	21.5	8.5	2.67	-	-	-	-	-	-	-	-	-												
	40.00	D	31	30	43	54	97	97.00	-	-	-	-	-	-	-	13.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 15: SUMMARY OF TEST RESULTS

Bore No: P128A	Ground Elevation: RL 197.204 m	Method of drilling: Percussion	Depth of Water-table: 8.70 m
Diameter of Bore Hole: 150 mm	Bore Retained using: Casing	Starting Date: 11/12/2023	SPT Sampler: Standard
Location / Chainage: 24275.847	Casing Lowered: 24.00 m	Ending Date: 13/12/2023	Hammer type: Auto-trip

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	1	0	1	70	28	0	3.04	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	D	2	4	5	7	12	18.47	-	-	-	-	-	-	-	11.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	SM	0	1	0	67	32	0	20.16	2.01	1.67	Non-Plastic			2.62	DST	0.0	29.3	-	0.569	-	-	-	-												
	3.00	D	4	5	7	9	16	18.74	-	-	-	-	-	-	-	15.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	5	8	14	22	23.66	ML	0	1	1	42	51	5	14.34	-	-	25.0	21.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	5.00	U	6	-	-	-	-	-	CL-ML	1	2	0	45	46	6	17.26	1.98	1.69	25.5	21.0	4.5	2.65	DST	6.0	27.9	-	0.568	-	-	-	-	Inorganic Silty Clays of low plasticity											
	6.00	D	7	6	7	10	17	16.00	SM	0	0	1	51	48	0	19.17	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	7.00	D	8	3	6	9	15	13.35	-	-	-	-	-	-	-	20.77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	ML	4	1	3	11	74	7	21.78	2.06	1.69	29.5	24.5	5.0	2.66	UU	42.0	12.0	-	0.574	-	8	22	-	Inorganic Silts of low plasticity											
	9.00	D	10	6	12	15	27	18.42	-	-	-	-	-	-	-	22.96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	D	11	5	10	14	24	24.00	CL	1	1	1	4	83	10	24.44	-	-	31.0	21.5	9.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	11.00	U	12	-	-	-	-	-	CL	1	1	2	9	74	13	22.61	2.07	1.69	33.5	22.5	11.0	2.68	UU	53.0	7.5	0.185	0.586	-	-	-	-												
	12.50	D	13	4	7	11	18	13.42	CL-ML	2	1	2	28	61	6	20.20	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	14.00	D	14	-	-	-	-	-	-	-	-	-	-	-	-	21.01	2.01	1.66	-	-	-	-	RDST	9.0	24.3	-	-	-	-	-	-												
	15.50	D	15	8	13	20	33	19.07	SM	0	0	0	66	34	0	20.41	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	17.00	D	16	-	-	-	-	-	-	-	-	-	-	-	-	18.55	1.98	1.67	-	-	-	-	RDST	0.0	29.5	-	-	-	-	-	-												
	18.50	D	17	10	15	22	37	19.78	-	-	-	-	-	-	-	15.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 15: SUMMARY OF TEST RESULTS

Bore No: P128A	**Ground Elevation: RL 197.204 m**	**Method of drilling: Percussion**	**Depth of Water-table: 8.70 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 11/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 24275.847	**Casing Lowered: 24.00 m**	**Ending Date: 13/12/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	SM	2	1	1	72	24	0	19.91	2.00	1.67	Non-Plastic			2.61	DST	0.0	30.4	-	0.563	-	-	-	-	Silty Sands											
	21.50	D	19	7	20	29	49	22.91	-	-	-	-	-	-	-	20.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.00	D	20	-	-	-	-	-	ML	6	3	2	29	54	6	19.22	2.03	1.70	27.0	22.0	5.0	-	RUU	32.0	15.3	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	24.50	D	21	13	25	31	56	24.21	-	-	-	-	-	-	-	21.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	26.00	D	22	15	23	32	55	23.50	SM	1	1	1	60	37	0	21.32	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	27.50	D	23	12	30	35	65	25.99	-	-	-	-	-	-	-	20.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	17	33	41	74	28.09	CL	3	2	4	17	66	8	19.21	-	-	29.0	22.0	7.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	30.50	D	25	15	24	28	52	21.68	CL-ML	1	2	2	20	68	7	16.80	-	-	28.0	22.0	6.0	2.66	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	32.00	D	26	16	31	42	73	27.00	-	-	-	-	-	-	-	17.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	33.50	D	27	20	25	34	59	59.00	CL	2	1	1	14	72	10	19.07	-	-	30.0	22.0	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	35.00	D	28	14	23	32	55	55.00	CL	1	1	1	18	69	10	18.89	-	-	29.0	21.5	7.5	-	-	-	-	-	-	-	-	-	-												
	36.50	D	29	18	33	40	73	73.00	-	-	-	-	-	-	-	16.43	-	-	-	-	-	2.67	-	-	-	-	-	-	-	-	-												
	38.00	D	30	17	26	33	59	59.00	CL	1	2	3	10	73	11	15.97	-	-	30.0	21.0	9.0	-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	15	34	36	70	70.00	-	-	-	-	-	-	-	16.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 16: SUMMARY OF TEST RESULTS

Bore No: P129A	**Ground Elevation: RL 198.472 m**	**Method of drilling: Percussion**	**Depth of Water-table: 8.20 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 21/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 24302.047	**Casing Lowered: 31.00 m**	**Ending Date: 24/11/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	1	54	45	0	3.41	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	1.00	U	2	-	-	-	-	-	SM	0	0	1	65	34	0	12.25	1.98	1.76	Non-Plastic			2.63	DST	2.0	27.4	-	0.494	-	-	-	-												
	2.00	D	3	3	5	7	12	15.75	-	-	-	-	-	-	-	6.28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	3.00	D	4	3	5	8	13	15.30	SM	0	1	1	77	21	0	8.55	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	4.00	U	5	-	-	-	-	-	SM	1	1	1	80	17	0	19.66	1.93	1.61	Non-Plastic			2.62	DST	0.0	28.7	-	0.627	-	-	-	-												
	5.00	D	6	5	8	13	21	21.19	SM	0	0	1	62	37	0	17.84	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	6.00	D	7	5	8	11	19	18.03	-	-	-	-	-	-	-	18.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	U	8	-	-	-	-	-	ML	0	1	4	12	75	8	23.05	1.99	1.62	30.0	25.0	5.0	2.66	UU	44.0	10.6	0.141	0.642	-	0	22	-												
	8.00	D	9	6	10	12	22	18.72	ML	0	1	2	20	71	6	23.30	-	-	28.0	23.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	9.00	D	10	7	9	15	24	17.42	-	-	-	-	-	-	-	22.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	U	11	-	-	-	-	-	CL	1	1	3	9	76	10	23.61	2.01	1.63	30.0	22.5	7.5	2.67	UU	49.0	9.6	-	0.638	-	-	-	-												
	11.00	D	12	7	9	12	21	21.00	-	-	-	-	-	-	-	21.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	12.00	D	13	4	8	14	22	22.00	CL	2	1	2	14	70	11	23.23	-	-	30.0	22.0	8.0	-	-	-	-	-	-	-	-	-	-												
	13.00	U	14	-	-	-	-	-	ML	3	1	0	23	65	8	22.84	2.08	1.69	28.5	22.5	6.0	2.66	UU	44.0	12.4	-	0.574	-	0	20	-	Inorganic Silts of low plasticity											
	14.50	D	15	8	13	21	34	19.89	SM	0	0	0	75	25	0	21.51	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	16.00	U	16	-	-	-	-	-	ML	2	0	1	22	67	8	23.72	2.03	1.64	29.0	22.5	6.5	2.67	UU	53.0	11.4	-	0.628	-	-	-	-	Inorganic Silts of low plasticity											
	17.50	D	17	12	15	23	38	20.53	ML	0	0	1	48	51	0	20.80	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"

TABLE 16: SUMMARY OF TEST RESULTS

Bore No: P129A	**Ground Elevation: RL 198.472 m**	**Method of drilling: Percussion**	**Depth of Water-table: 8.20 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 21/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 24302.047	**Casing Lowered: 31.00 m**	**Ending Date: 24/11/2023**	**Hammer type: Rope-pulley driven**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	19.00	D	18	-	-	-	-	-	ML	1	2	2	41	54	0	20.80	2.05	1.70	Non-Plastic			2.65	RDST	4.0	28.6	-	0.559	-	-	-	-	Inorganic Silts of low plasticity											
	20.50	D	19	12	27	40	67	29.18	-	-	-	-	-	-	-	22.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	22.00	D	20	15	25	32	57	25.44	SM	0	0	0	61	39	0	19.60	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	23.50	D	21	16	30	38	68	28.40	-	-	-	-	-	-	-	19.62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	25.00	D	22	13	32	38	70	28.52	SM	0	0	1	72	27	0	19.36	-	-	Non-Plastic			2.64	-	-	-	-	-	-	-	-	-												
	26.50	D	23	17	25	31	56	23.94	SM	0	0	1	81	18	0	20.17	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	28.00	D	24	16	28	32	60	24.72	-	-	-	-	-	-	-	19.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.50	D	25	17	40	50	90	32.75	-	-	-	-	-	-	-	21.77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	31.00	D	26	16	23	30	53	22.05	SM	1	1	0	82	16	0	20.54	-	-	Non-Plastic			2.63	-	-	-	-	-	-	-	-	-												
	32.50	D	27	17	25	27	52	21.48	SM	2	1	2	65	30	0	18.09	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	34.00	D	28	16	26	32	58	22.76	SM	0	0	0	75	25	0	20.69	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	35.50	D	29	14	28	35	63	23.73	ML	6	3	7	31	53	0	19.62	-	-	Non-Plastic			2.65	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	37.00	D	30	13	25	34	59	22.39	SM	0	1	2	69	28	0	19.28	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	38.50	D	31	17	28	32	60	22.34	SM	1	0	3	65	31	0	19.37	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	40.00	D	32	21	36	43	79	26.66	CL-ML	1	0	2	27	63	7	17.23	-	-	27.0	21.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 17: SUMMARY OF TEST RESULTS

Bore No: P130A	**Ground Elevation: RL 198.948 m**	**Method of drilling: Percussion**	**Depth of Water-table: 9.00 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 09/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 24328.247	**Casing Lowered: 23.00 m**	**Ending Date: 12/12/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	0	55	45	0	2.41	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	D	2	2	3	5	8	12.34	-	-	-	-	-	-	-	7.68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.00	U	3	-	-	-	-	-	SM	1	0	0	55	44	0	12.72	1.98	1.76	Non-Plastic			2.64	DST	3.0	25.2	-	0.500	-	-	-	-												
	3.00	D	4	3	3	5	8	9.40	-	-	-	-	-	-	-	15.79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	D	5	3	5	8	13	14.03	-	-	-	-	-	-	-	16.59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	CL-ML	0	1	1	37	55	6	9.05	1.95	1.79	26.0	21.0	5.0	2.65	DST	6.0	24.2	-	0.480	-	-	-	-	Inorganic Silty Clays of low plasticity											
	6.00	D	7	5	7	9	16	15.13	-	-	-	-	-	-	-	11.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	D	8	4	8	11	19	16.99	-	-	-	-	-	-	-	14.96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	CL-ML	2	0	1	33	56	8	18.09	2.04	1.73	28.0	22.0	6.0	2.66	DST	7.0	27.2	-	0.538	-	0	20	-												
	9.00	D	10	8	8	12	20	15.58	SM	1	1	1	47	50	0	18.88	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	10.00	D	11	8	11	14	25	25.00	CL	3	2	1	30	58	6	17.67	-	-	29.0	21.0	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	11.00	U	12	-	-	-	-	-	ML	0	1	1	8	79	11	20.54	1.99	1.65	32.5	23.5	9.0	2.67	UU	55.0	10.6	0.170	0.618	-	8	21	-	Inorganic Silts of low plasticity											
	12.50	D	13	8	11	13	24	24.00	CL	0	1	2	6	79	12	17.36	-	-	33.0	23.0	10.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	14.00	U	14	-	-	-	-	-	-	-	-	-	-	-	-	20.74	2.02	1.67	-	-	-	2.67	UU	57.0	9.8	-	0.599	-	-	-	-												
	15.50	D	15	9	12	15	27	16.99	ML	1	1	1	42	55	0	18.38	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	17.00	U	16	-	-	-	-	-	ML	3	1	1	43	52	0	18.84	2.00	1.68	Non-Plastic			2.65	DST	4.0	26.7	-	0.577	-	-	-	-												
	18.50	D	17	8	13	17	30	17.47	ML	1	1	2	35	54	7	21.28	-	-	29.0	23.0	6.0	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 17: SUMMARY OF TEST RESULTS

Bore No: P130A	Ground Elevation: RL 198.948 m	Method of drilling: Percussion	Depth of Water-table: 9.00 m
Diameter of Bore Hole: 150 mm	Bore Retained using: Casing	Starting Date: 09/12/2023	SPT Sampler: Standard
Location / Chainage: 24328.247	Casing Lowered: 23.00 m	Ending Date: 12/12/2023	Hammer type: Auto-trip

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	20.00	U	18	-	-	-	-	-	SM	4	2	3	43	48	0	15.38	2.04	1.77	Non-Plastic			2.64	DST	4.0	26.8	-	0.492	-	-	-	-	Silty Sands											
	21.50	D	19	15	30	41	71	29.80	SM	0	0	1	62	37	0	21.16	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	23.00	D	20	13	28	32	60	25.85	-	-	-	-	-	-	-	16.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	24.50	D	21	12	22	34	56	24.18	ML	4	1	1	21	66	7	19.13	-	-	28.0	22.5	5.5	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	26.00	D	22	-	-	-	-	-	SM	0	0	1	60	39	0	19.50	2.04	1.71	Non-Plastic			2.63	RDST	0.0	31.2	-	0.538	-	-	-	-	Silty Sands											
	27.50	D	23	15	25	35	60	24.48	SM	0	0	1	65	34	0	17.81	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	29.00	D	24	14	35	45	80	29.58	-	-	-	-	-	-	-	18.94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	30.50	D	25	15	29	35	64	64.00	CL	4	2	2	24	59	9	14.07	-	-	30.0	22.0	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	32.00	D	26	12	25	37	62	62.00	-	-	-	-	-	-	-	12.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	33.50	D	27	14	35	45	80	28.33	SM	0	0	1	54	45	0	17.85	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	35.00	D	28	21	28	32	60	22.80	ML	3	1	1	42	53	0	20.79	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	36.50	D	29	18	24	36	60	22.50	ML	2	3	4	29	56	6	17.53	-	-	24.0	20.0	4.0	-	-	-	-	-	-	-	-	-	-												
	38.00	D	30	24	32	42	74	25.62	-	-	-	-	-	-	-	19.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	31	13	23	28	51	19.65	CL-ML	1	2	3	34	53	7	20.84	-	-	25.0	20.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 18: SUMMARY OF TEST RESULTS

Bore No: P131A	**Ground Elevation: RL 198.559 m**	**Method of drilling: Percussion**	**Depth of Water-table: 10.00 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 07/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 24354.447	**Casing Lowered: 20.00 m**	**Ending Date: 09/12/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	0	71	29	0	2.16	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	U	2	-	-	-	-	-	SM	0	0	0	73	27	0	5.44	1.67	1.58	Non-Plastic			2.62	DST	3.0	27.2	-	0.658	-	-	-	-												
	2.00	D	3	5	8	10	18	24.65	-	-	-	-	-	-	-	13.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	3.00	D	4	4	7	8	15	18.51	-	-	-	-	-	-	-	10.58	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	U	5	-	-	-	-	-	SM	0	1	1	77	21	0	20.87	1.97	1.63	Non-Plastic			2.62	DST	1.0	28.9	-	0.607	-	-	-	-												
	5.00	D	6	8	11	16	27	28.06	SM	0	0	1	55	44	0	13.02	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	6.00	D	7	10	12	14	26	25.29	-	-	-	-	-	-	-	13.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	U	8	-	-	-	-	-	SM	0	0	0	57	43	0	16.25	1.99	1.71	Non-Plastic			2.63	DST	1.0	28.6	-	0.538	-	-	-	-												
	8.00	D	9	4	8	11	19	16.51	CL-ML	5	3	3	8	75	6	20.00	-	-	27.0	21.0	6.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	9.00	D	10	8	14	28	42	34.73	-	-	-	-	-	-	-	20.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	U	11	-	-	-	-	-	CL-ML	3	2	3	7	80	5	20.16	1.96	1.63	26.0	21.0	5.0	2.66	-	-	-	0.083	0.632	-	0	18	-												
	11.00	D	12	4	6	8	14	14.00	ML	2	1	2	14	70	11	20.34	-	-	31.0	23.0	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	12.00	D	13	5	8	11	19	19.00	-	-	-	-	-	-	-	22.69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	13.00	U	14	-	-	-	-	-	ML	5	3	4	17	63	8	19.19	2.08	1.75	29.0	23.0	6.0	2.67	UU	56.0	10.2	-	0.530	-	0	19	-												
	14.50	D	15	6	8	12	20	14.34	-	-	-	-	-	-	-	21.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	16.00	U	16	-	-	-	-	-	CL-ML	4	2	4	15	68	7	20.24	2.01	1.67	28.0	22.0	6.0	2.67	-	-	-	-	0.599	-	-	-	-	Inorganic Silty Clays of low plasticity											
	17.50	D	17	13	17	25	42	21.70	SM	2	1	2	53	42	0	15.51	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											

APPENDIX "B"
TABLE 18: SUMMARY OF TEST RESULTS

Bore No: P131A	**Ground Elevation: RL 198.559 m**	**Method of drilling: Percussion**	**Depth of Water-table: 10.00 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 07/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 24354.447	**Casing Lowered: 20.00 m**	**Ending Date: 09/12/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	19.00	U	18	-	-	-	-	-	SM	0	1	0	80	19	0	19.50	2.07	1.73	Non-Plastic			2.63	DST	0.0	30.0	-	0.520	-	-	-	-	Silty Sands											
	20.50	D	19	16	35	50	85	34.62	-	-	-	-	-	-	-	19.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Silty Sands											
	22.00	D	20	11	28	40	68	28.60	-	-	-	-	-	-	-	19.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Silty Sands											
	23.50	D	21	12	25	35	60	25.68	SM	0	0	0	71	29	0	19.66	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	25.00	D	22	13	26	36	62	25.87	SM	0	0	1	67	32	0	18.99	-	-	Non-Plastic			2.66	-	-	-	-	-	-	-	-	-	Silty Sands											
	26.50	D	23	18	34	40	74	28.92	-	-	-	-	-	-	-	21.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Silty Sands											
	28.00	D	24	12	35	45	80	30.16	-	-	-	-	-	-	-	18.82	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Silty Sands											
	29.50	D	25	13	34	48	82	30.16	ML	4	2	1	38	48	7	16.46	-	-	30.0	23.0	7.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	31.00	U	26	-	-	-	-	-	SC	3	3	4	41	41	8	19.11	2.04	1.71	29.6	22.5	7.1	2.67	UU	39.0	13.0	-	0.561	-	-	-	-	Clayey Sands											
	32.50	D	27	18	28	50	78	78.00	CL	5	2	3	26	53	11	17.39	-	-	32.0	22.5	9.5	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	34.00	D	28	16	31	45	76	27.04	SM	2	1	1	46	50	0	11.59	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	35.50	D	29	14	28	32	60	22.62	ML	7	3	3	31	52	4	18.05	-	-	25.0	21.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	37.00	D	30	13	25	35	60	22.33	-	-	-	-	-	-	-	17.25	-	-	-	-	-	2.65	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	38.50	D	31	14	28	34	62	22.52	-	-	-	-	-	-	-	18.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	40.00	D	32	16	25	35	60	21.77	SM	1	1	2	52	44	0	14.33	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 19: SUMMARY OF TEST RESULTS

Bore No: P132A	Ground Elevation: RL 198.507 m	Method of drilling: Percussion	Depth of Water-table: 9.30 m
Diameter of Bore Hole: 150 mm	Bore Retained using: Casing	Starting Date: 04/12/2023	SPT Sampler: Standard
Location / Chainage: 24380.647	Casing Lowered: 20.00 m	Ending Date: 08/12/2023	Hammer type: Auto-trip

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m²)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm²)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	0	83	17	0	1.95	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	U	2	-	-	-	-	-	SM	0	0	1	80	19	0	18.58	1.99	1.68	Non-Plastic			2.62	DST	2.0	28.0	-	0.560	-	-	-	-												
	2.00	D	3	6	9	12	21	27.50	-	-	-	-	-	-	-	17.45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	3.00	D	4	6	10	15	25	29.35	-	-	-	-	-	-	-	15.67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	4.00	U	5	-	-	-	-	-	SM	0	0	1	64	35	0	12.05	1.99	1.78	Non-Plastic			2.63	DST	1.0	28.7	-	0.478	-	-	-	-												
	5.00	D	6	13	13	18	31	31.09	SM	0	0	0	63	37	0	19.84	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	6.00	D	7	13	15	18	33	31.08	-	-	-	-	-	-	-	19.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	U	8	-	-	-	-	-	ML	7	3	5	13	65	7	17.57	2.10	1.79	28.7	23.5	5.2	2.66	UU	46.0	12.1	0.106	0.486	-	6	20	-	Inorganic Silts of low plasticity											
	8.00	D	9	4	6	11	17	14.30	ML	5	2	3	15	69	6	18.94	-	-	27.0	22.0	5.0	-	-	-	-	-	-	-	-	-	-												
	9.00	D	10	5	10	13	23	18.40	-	-	-	-	-	-	-	22.27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.00	U	11	-	-	-	-	-	ML	3	1	3	16	69	8	20.99	2.05	1.70	30.0	23.5	6.5	2.67	-	-	-	-	0.575	-	7	20	-												
	11.00	D	12	8	11	15	26	17.37	-	-	-	-	-	-	-	22.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	12.00	D	13	6	10	14	24	16.41	ML	0	0	1	12	81	6	20.76	-	-	27.0	22.0	5.0	-	-	-	-	-	-	-	-	-	-												
	13.00	U	14	-	-	-	-	-	SM	3	1	1	67	28	0	20.53	1.98	1.64	Non-Plastic			2.63	DST	1.0	29.4	-	0.604	-	-	-	-	Silty Sands											
	14.50	D	15	8	17	35	52	25.87	-	-	-	-	-	-	-	20.52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	16.00	D	16	9	20	38	58	27.42	ML	0	0	1	35	59	5	18.83	-	-	25.0	21.0	4.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	17.50	D	17	14	25	35	60	27.57	CL-ML	0	0	1	44	50	5	21.90	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											

APPENDIX "B"
TABLE 19: SUMMARY OF TEST RESULTS

Bore No: P132A	**Ground Elevation: RL 198.507 m**	**Method of drilling: Percussion**	**Depth of Water-table: 9.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 04/12/2023**	**SPT Sampler: Standard**
Location / Chainage: 24380.647	**Casing Lowered: 20.00 m**	**Ending Date: 08/12/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	19.00	D	18	13	24	34	58	26.42	ML	0	0	1	48	51	0	20.03	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	20.50	D	19	26	45	45	90	36.14	SM	4	1	1	63	31	0	19.66	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	22.00	D	20	13	24	32	56	24.90	-	-	-	-	-	-	-	19.74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.50	D	21	11	37	45	82	32.40	-	-	-	-	-	-	-	18.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	25.00	D	22	17	33	49	82	31.84	SM	0	1	0	58	41	0	19.25	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	26.50	D	23	13	33	50	83	31.57	SM	0	0	2	72	26	0	20.58	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	28.00	D	24	14	32	42	74	28.49	-	-	-	-	-	-	-	19.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.50	D	25	13	22	32	54	22.50	SM-SC	8	5	6	31	44	6	16.94	-	-	26.0	21.0	5.0	-	-	-	-	-	-	-	-	-	-	Silty Sands with clay binder											
	31.00	D	26	14	28	35	63	63.00	CL	6	3	3	22	57	9	19.07	-	-	30.0	22.0	8.0	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	32.50	D	27	10	27	46	73	26.94	CL	5	2	3	24	58	8	18.73	-	-	28.0	21.0	7.0	-	-	-	-	-	-	-	-	-	-												
	34.00	D	28	12	28	32	60	23.16	-	-	-	-	-	-	-	16.52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	35.50	D	29	13	19	38	57	22.08	ML	1	2	2	42	53	0	18.46	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	37.00	D	30	14	25	35	60	22.56	-	-	-	-	-	-	-	14.84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	38.50	D	31	16	28	32	60	22.26	ML	0	1	1	40	58	0	18.94	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	40.00	D	32	17	31	41	72	24.87	-	-	-	-	-	-	-	17.86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

APPENDIX "B"
TABLE 20: SUMMARY OF TEST RESULTS

Bore No: P133A	**Ground Elevation: RL 199.364 m**	**Method of drilling: Percussion**	**Depth of Water-table: 9.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 29/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 24406.847	**Casing Lowered: 19.00 m**	**Ending Date: 01/12/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	0.50	D	1	-	-	-	-	-	SM	0	0	0	72	28	0	1.22	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.00	U	2	-	-	-	-	-	SM	0	0	0	74	26	0	4.23	1.70	1.63	Non-Plastic			2.60	DST	0.0	30.6	-	0.595	-	-	-	-												
	2.00	D	3	5	5	7	12	16.35	-	-	-	-	-	-	-	6.46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	3.00	D	4	4	6	8	14	17.18	SM	2	2	2	65	29	0	5.07	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	4.00	U	5	-	-	-	-	-	SM	0	0	1	77	22	0	7.57	1.79	1.66	Non-Plastic			2.61	DST	2.0	28.2	-	0.572	-	-	-	-												
	5.00	D	6	6	9	11	20	20.99	-	-	-	-	-	-	-	11.85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	6.00	D	7	7	10	13	23	22.70	-	-	-	-	-	-	-	18.79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.00	U	8	-	-	-	-	-	SM	0	0	1	76	23	0	17.75	1.84	1.56	Non-Plastic			2.62	DST	2.0	29.1	-	0.679	-	-	-	-												
	8.00	D	9	6	9	9	18	15.95	SM	0	0	0	73	27	0	7.03	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	9.00	D	10	7	10	12	22	18.60	SM	0	0	0	58	42	0	10.54	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	10.00	U	11	-	-	-	-	-	CL	3	1	1	9	76	10	17.53	2.07	1.76	31.0	22.0	9.0	2.68	UU	53.0	8.6	0.142	0.523	-	10	19	-	Inorganic clays of low plasticity											
	11.00	D	12	6	9	11	20	20.00	-	-	-	-	-	-	-	17.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	12.00	D	13	7	10	13	23	23.00	-	-	-	-	-	-	-	19.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	13.00	U	14	-	-	-	-	-	ML	3	2	2	14	71	8	21.46	2.03	1.67	29.0	22.5	6.5	2.68	-	-	-	-	0.605	-	-	-	-	Inorganic Silts of low plasticity											
	14.50	D	15	11	18	22	40	22.25	-	-	-	-	-	-	-	21.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	16.00	U	16	-	-	-	-	-	SM	1	1	2	65	31	0	18.42	1.99	1.68	Non-Plastic			2.64	DST	0.0	28.7	-	0.571	-	-	-	-	Silty Sands											
	17.50	D	17	12	27	28	55	26.62	-	-	-	-	-	-	-	16.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"
TABLE 20: SUMMARY OF TEST RESULTS

Bore No: P133A	**Ground Elevation: RL 199.364 m**	**Method of drilling: Percussion**	**Depth of Water-table: 9.30 m**
Diameter of Bore Hole: 150 mm	**Bore Retained using: Casing**	**Starting Date: 29/11/2023**	**SPT Sampler: Standard**
Location / Chainage: 24406.847	**Casing Lowered: 19.00 m**	**Ending Date: 01/12/2023**	**Hammer type: Auto-trip**

FIELD TEST RESULT										LABORATORY TEST RESULT																																	
				SPT Test Result						Grain Size Analysis						Index Property							Shear Strength Parameters			Consolidation Characteristic			Shrinkage			Test on Rock Specimen											
RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Corrected)	Soil Classification	Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity	Type of Test	Cohesion (kN/m^2)	Angle of Friction	Compression Index	Initial Void Ratio	Pre-consolidation Pressure (Kg/cm^2)	Free Swell Index	Shrinkage Limit	Swell Pressure	Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load Index	U.C.S (MPa)	Porosity	Hardness	Modulus of Elasticity	Cerchar Abrasive Index
																							Classification of ROCK									Classification of SOIL											
	19.00	D	18	13	24	30	54	25.75	SM	0	0	1	68	31	0	19.97	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	20.50	D	19	15	26	32	58	26.68	SM	0	0	1	54	45	0	11.17	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	22.00	D	20	17	25	35	60	26.87	SM	0	0	0	84	16	0	18.35	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	23.50	D	21	13	22	37	59	26.09	-	-	-	-	-	-	-	19.46	-	-	-	-	-	2.61	-	-	-	-	-	-	-	-	-												
	25.00	D	22	13	18	35	53	23.81	SM	0	0	1	64	35	0	20.17	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	26.50	D	23	15	27	36	63	26.44	SM	0	0	0	75	25	0	19.60	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	28.00	D	24	18	28	32	60	25.13	-	-	-	-	-	-	-	19.28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.50	D	25	14	24	35	59	24.47	SM	2	4	7	37	50	0	17.68	-	-	Non-Plastic			2.62	-	-	-	-	-	-	-	-	-	Silty Sands											
	31.00	D	26	13	21	38	59	24.10	SM	1	1	2	55	41	0	18.72	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	32.50	D	27	17	28	32	60	24.02	-	-	-	-	-	-	-	19.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	34.00	D	28	16	24	38	62	24.22	-	-	-	-	-	-	-	18.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	35.50	D	29	18	28	32	60	23.34	SM	0	1	2	65	32	0	19.17	-	-	Non-Plastic			2.63	-	-	-	-	-	-	-	-	-												
	37.00	D	30	15	30	42	72	26.12	SM	3	2	2	69	24	0	18.64	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												
	38.50	D	31	18	35	45	80	27.76	-	-	-	-	-	-	-	20.28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	40.00	D	32	17	32	38	70	24.86	SM	2	1	0	68	29	0	21.48	-	-	Non-Plastic			-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, DST=Direct Shear Test on Undisturbed samples, CU: Consolidated Undrained tri-axial compression test with measurement of pore water pressure, R=Refusal strata (SPT Value>=100), RUU, RCU & RDST indicates relevant test on remoulded samples, "-" indicates test not performed due to identical sample or irrelevant for the sample or not required, C= Rock Core sample, D= Disturbed sample, U= Undisturbed sample.

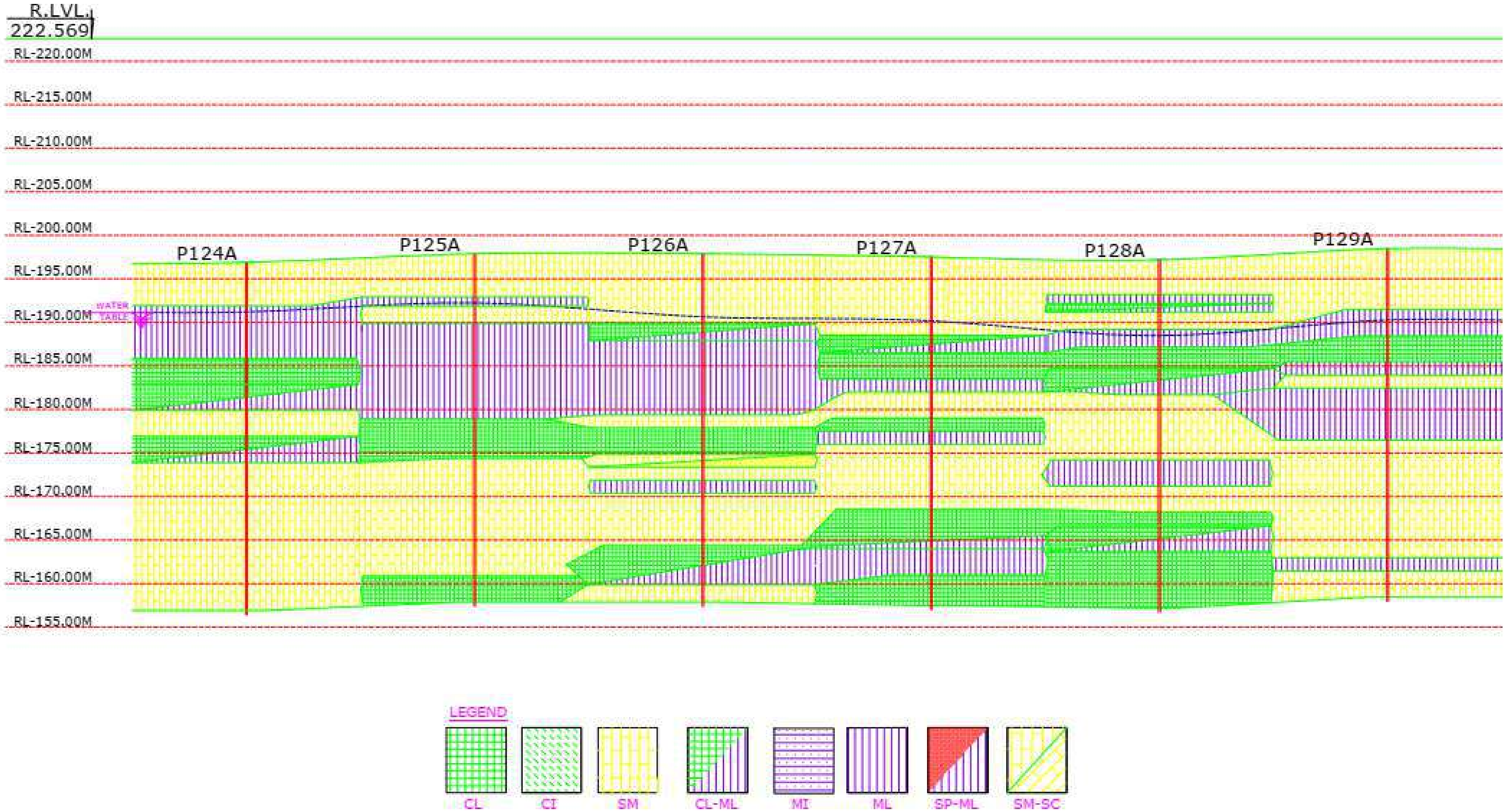
APPENDIX-B
TABLE 21: UCS TEST ON SOIL SAMPLES

BH No.	DEPTH (m)	UCS (kg/cm^2)
P114A	13.00	0.67
P115A	11.00	0.58
	23.00	0.67
P116A	11.00	0.62
	14.00	0.49
	17.00	0.66
P117A	8.00	0.51
	11.00	0.67
P118A	17.00	0.59
P119A	11.00	0.74
P120A	8.00	0.48
	11.00	0.59
	17.00	0.53
P121A	17.00	0.56
P123A	11.00	0.61
P124A	8.00	0.58
	20.00	0.55
P125A	19.00	0.68
P126A	11.00	0.62
P129A	7.00	0.59
	16.00	0.78
P131A	10.00	0.49
	16.00	0.56
P132A	10.00	0.60
P133A	13.00	0.61

APPENDIX-C
PLOT 1: LITHOLOGICAL PROFILE-01

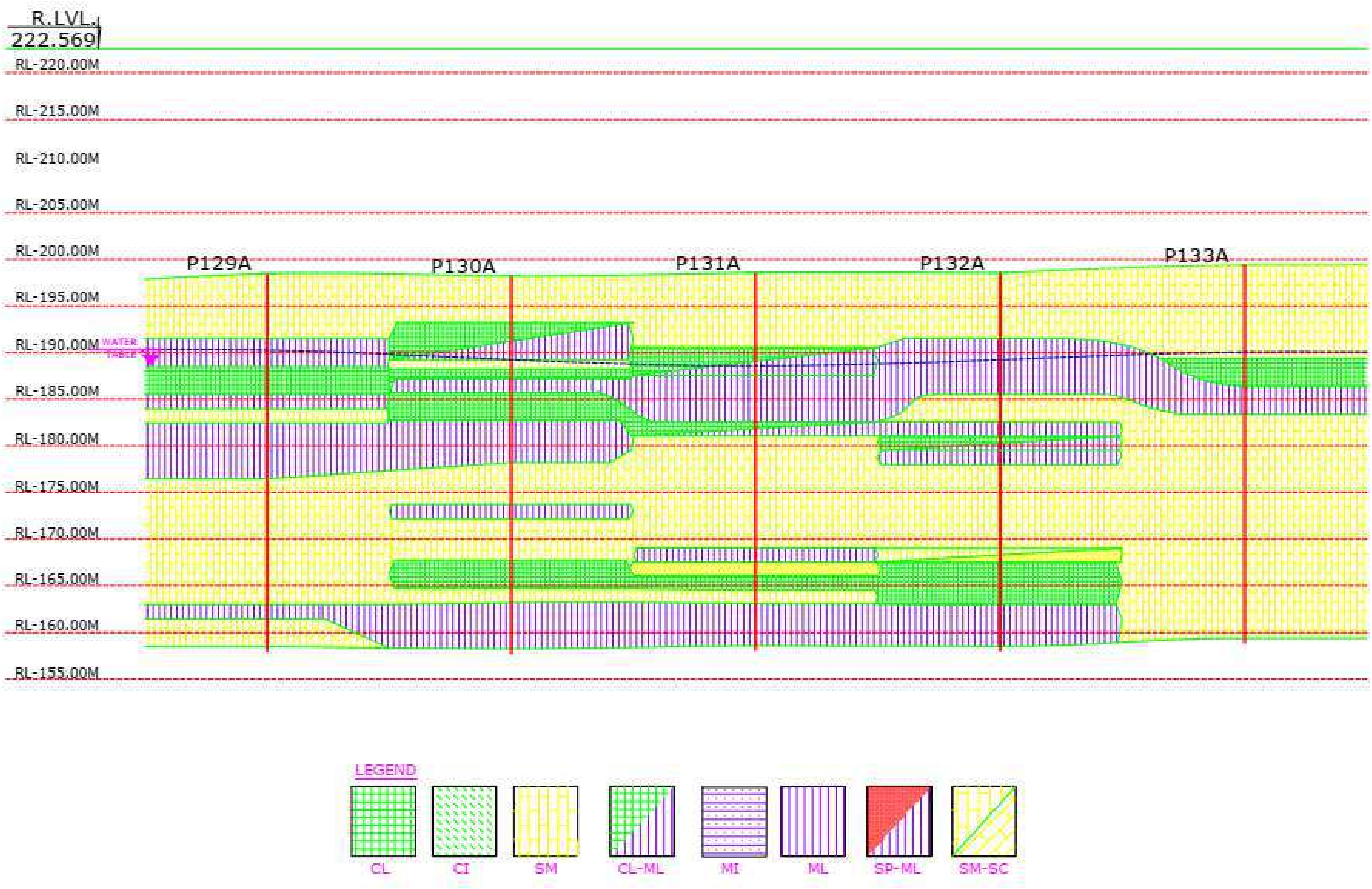
APPENDIX-C
PLOT 2: LITHOLOGICAL PROFILE-02

APPENDIX-C
PLOT 3: LITHOLOGICAL PROFILE-03



APPENDIX-C

PLOT 4: LITHOLOGICAL PROFILE-04



APPENDIX-C
PLOT 5: LITHOLOGICAL PLOTS

BH-P114A-23909.047

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	U		-	-
Silty Sands with clay binder	SM-SC		2.00	D	3	-	-
			3.00	D	4	-	-
Inorganic Silts of low plasticity	ML		4.00	D		-	-
Inorganic Silty Clays of low plasticity	CL-ML		5.00	D	16	-	-
			6.00	D	19	-	-
Silty Sands	SM		7.00	U		-	-
Inorganic Silts of low plasticity	ML		8.00	D	23	-	-
			9.00	D	24	-	-
			10.00	U		-	-
			11.00	D	28	-	-
Inorganic clays of low plasticity	CL		12.00	D	33	-	-
			13.00	U		-	-
			14.50	D	23	-	-
Silty Sands	SM		16.00	U		-	-
Inorganic Silts of low plasticity	ML		17.50	D	31	-	-
Inorganic clays of low plasticity	CL		19.00	U		-	-
			20.00	D	34	-	-

BH-P114A-23909.047

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.50	D	34	-	-
			22.00	D		-	-
			23.50	D	52	-	-
Silty Sands	SM		25.00	D	63	-	-
			26.50	D	69	-	-
			28.00	D	73	-	-
			29.50	D	75	-	-
			31.00	D	99	-	-
Inorganic Silty Clays of low plasticity	CL-ML		32.50	D	105	-	-
Silty Sands	SM		34.00	D	98	-	-
			35.50	D	91	-	-
			37.00	D	87	-	-
			38.50	D	93	-	-
			40.00	D	98	-	-

APPENDIX-C
PLOT 6: LITHOLOGICAL PLOTS

BH-P115A-23935.247

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			0.50	D		-	-
Silty Sands with clay binder	SM-SC		1.00	D	4	-	-
	WATER LVL		2.00	D		-	-
Inorganic Silts of low plasticity	ML		3.00	D	6	-	-
Inorganic Silty Clays of low plasticity	CL-ML		4.00	D	7	-	-
Silty Sands	SM		5.00	U		-	-
			6.00	D	10	-	-
Inorganic Silty Clays of low plasticity	CL-ML		7.00	D	12	-	-
			8.00	U		-	-
			9.00	D	15	-	-
			10.00	D	18	-	-
			11.00	U		-	-
Inorganic Silts of low plasticity	ML		12.50	D	20	-	-
			14.00	U		-	-
			15.50	D	29	-	-
Inorganic Silty Clays of low plasticity	CL-ML		17.00	D		-	-
Inorganic Silts of low plasticity	ML		18.50	D	40	-	-
			20.00	U		-	-

BH-P115A-23935.247

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.00	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML		21.50	D	44	-	-
Inorganic clays of low plasticity	CL		23.00	U		-	-
			24.50	D	73	-	-
			26.00	D	64	-	-
			27.50	D	59	-	-
			29.00	D	63	-	-
			30.50	D	68	-	-
Silty Sands	SM		32.00	D	70	-	-
			33.50	D	61	-	-
			35.00	D	57	-	-
			36.50	D	59	-	-
			38.00	D	63	-	-
			40.00	D	62	-	-

APPENDIX-C
PLOT 7: LITHOLOGICAL PLOTS

BH-P116A-23961.447

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM (WATER LVL)		0.50	D		-	-
			1.00	D	4	-	-
			2.00	U		-	-
			3.00	D	7	-	-
Inorganic Silty Clays of low plasticity	CL-ML		4.00	D	9	-	-
			5.00	U		-	-
Inorganic Silts of low plasticity	ML		6.00	D	25	-	-
Inorganic Silty Clays of low plasticity	CL-ML		7.00	D	27	-	-
			8.00	D		-	-
Silty Sands with clay binder	SM-SC		9.00	D	16	-	-
			10.00	D	19	-	-
Inorganic Silty Clays of low plasticity	CL-ML		11.00	U		-	-
			12.50	D	16	-	-
			14.00	U		-	-
Inorganic Silts of low plasticity	ML		15.50	D	36	-	-
Inorganic clays of low plasticity	CL		17.00	U		-	-
Silty Sands	SM		18.50	D	89	-	-
			20.00	D	52	-	-

BH-P116A-23961.447

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silty Clays of low plasticity	CL-ML		20.00	D	52	-	-
			21.50	D	58	-	-
			23.00	D	54	-	-
Silty Sands	SM		24.50	D	60	-	-
			26.00	D	74	-	-
			27.50	D	73	-	-
Inorganic Silts of low plasticity	ML		29.00	D	78	-	-
Silty Sands	SM		30.50	D	80	-	-
			32.00	D	74	-	-
			33.50	D	73	-	-
			35.00	D	79	-	-
			36.50	D	78	-	-
			38.00	D	72	-	-
			40.00	D	69	-	-

APPENDIX-C
PLOT 8: LITHOLOGICAL PLOTS

BH-P117A-23987.647

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			0.50	D		-	-
			1.00	D	5	-	-
Silty Sands	SM		2.00	U		-	-
	WATER LVL		3.00	D	8	-	-
			4.00	D	9	-	-
Inorganic Silts of low plasticity	ML		5.00	U		-	-
Silty Sands	SM		6.00	D	14	-	-
			7.00	D	11	-	-
			8.00	U		-	-
Inorganic Silts of low plasticity	ML		9.00	D	22	-	-
			10.00	D	24	-	-
			11.00	U		-	-
			12.50	D	14	-	-
Inorganic clays of low plasticity	CL		14.00	D		-	-
			15.50	D	30	-	-
Inorganic Silts of low plasticity	ML		17.00	U		-	-
Inorganic clays of low plasticity	CL		18.50	D	43	-	-
Inorganic Silts of low plasticity	ML		20.00	U		-	-

BH-P117A-23987.647

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			20.00	U		-	-
Inorganic clays of low plasticity	CL		21.50	D	40	-	-
			23.00	D		-	-
			24.50	D	65	-	-
			26.00	D	70	-	-
Silty Sands	SM		27.50	D	75	-	-
			29.00	D	66	-	-
			30.50	D	57	-	-
			32.00	D		-	-
Inorganic Silts of low plasticity	ML		33.50	D	46	-	-
Inorganic Silty Clays of low plasticity	CL-ML		35.00	D		-	-
Inorganic clays of low plasticity	CL		36.50	D	63	-	-
			38.00	D	69	-	-
Inorganic Silty Clays of low plasticity	CL-ML		40.00	D	62	-	-

APPENDIX-C
PLOT 9: LITHOLOGICAL PLOTS

BH-P118A-24013.847

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	D	7	-	-
			2.00	D		-	-
Inorganic Silts of low plasticity	ML		3.00	D	6	-	-
			4.00	D	10	-	-
			5.00	U		-	-
			6.00	D	14	-	-
			7.00	D	17	-	-
Inorganic Silty Clays of low plasticity	CL-ML		8.00	U		-	-
			9.00	D	15	-	-
			10.00	D	21	-	-
			11.00	D		-	-
Inorganic clays of low plasticity	CL		12.50	D	25	-	-
			14.00	D		-	-
			15.50	D	23	-	-
			17.00	U		-	-
			18.50	D	34	-	-
			20.00	U		-	-

BH-P118A-24013.847

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.00	U		-	-
Silty Sands	SM		21.50	D	36	-	-
			23.00	D		-	-
			24.50	D	47	-	-
			26.00	D	56	-	-
			27.50	D	60	-	-
			29.00	D	80	-	-
			30.50	D	75	-	-
			32.00	D	67	-	-
			33.50	D	69	-	-
			35.00	D	71	-	-
			36.50	D	75	-	-
			38.00	D	75	-	-
			40.00	D	80	-	-

APPENDIX-C
PLOT 10: LITHOLOGICAL PLOTS

BH-P119A-24040.047

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			0.50	D		-	-
			1.00	D	7	-	-
Silty Sands	SM		2.00	U		-	-
			3.00	D	10	-	-
Inorganic Silts of low plasticity	ML		4.00	D	11	-	-
	WATER LVL		5.00	U		-	-
Silty Sands	SM		6.00	D	15	-	-
			7.00	D	17	-	-
			8.00	D		-	-
Inorganic Silty Clays of low plasticity	CL-ML		9.00	D	20	-	-
			10.00	D	23	-	-
			11.00	U		-	-
			12.50	D	26	-	-
Inorganic clays of low plasticity	CL		14.00	U		-	-
Inorganic Silts of low plasticity	ML		15.50	D	24	-	-
			17.00	D		-	-
Inorganic Silty Clays of low plasticity	CL-ML		18.50	D	36	-	-
			20.00	U		-	-

BH-P119A-24040.047

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			20.00	U		-	-
			21.50	D	31	-	-
Inorganic Silts of low plasticity	ML		23.00	D		-	-
			24.50	D	37	-	-
Silty Sands with clay binder	SM-SC						
Inorganic Silts of low plasticity	ML		26.00	D		-	-
			27.50	D	49	-	-
Silty Sands	SM		29.00	D		-	-
			30.50	D	54	-	-
Silty Sands with clay binder	SM-SC		32.00	D	57	-	-
			33.50	D	60	-	-
			35.00	D	65	-	-
Silty Sands	SM		36.50	D	71	-	-
			38.00	D	72	-	-
			40.00	D	77	-	-

APPENDIX-C
PLOT 11: LITHOLOGICAL PLOTS

BH-P120A-24066.247

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML		0.50	D		-	-
			1.00	D	7	-	-
Silty Sands	SM		2.00	U		-	-
			3.00	D	15	-	-
			4.00	D	11	-	-
Inorganic Silts of low plasticity	WATER LVL ML		5.00	U		-	-
			6.00	D	11	-	-
			7.00	D	14	-	-
			8.00	U		-	-
			9.00	D	28	-	-
			10.00	U	33	-	-
			11.00	U		-	-
Inorganic clays of low plasticity	CL		12.50	D	22	-	-
			14.00	D		-	-
			15.50	D	25	-	-
Inorganic Silty Clays of low plasticity	CL-ML		17.00	U		-	-
Inorganic clays of low plasticity	CL		18.50	D	32	-	-
			20.00	D		-	-

BH-P120A-24066.247

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			20.00	D		-	-
			21.50	D	36	-	-
Inorganic clays of low plasticity	CL		23.00	D		-	-
			24.50	D	40	-	-
			26.00	D		-	-
			27.50	D	45	-	-
			29.00	U		-	-
			30.50	D	48	-	-
Silty Sands	SM		32.00	D		-	-
			33.50	D	66	-	-
			35.00	D	71	-	-
			36.50	D	75	-	-
			38.00	D	74	-	-
			40.00	D	R	-	-

APPENDIX-C
PLOT 12: LITHOLOGICAL PLOTS

BH-P121A-24092.447

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	D	10	-	-
Silty Sands with clay binder	SM-SC		2.00	U		-	-
			3.00	D	12	-	-
Silty Sands	SM		4.00	D	16	-	-
			5.00	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML		6.00	D	17	-	-
			7.00	D	21	-	-
Silty Sands	SM		8.00	U		-	-
			9.00	D	17	-	-
Inorganic Silty Clays of low plasticity	CL-ML		10.00	D	19	-	-
			11.00	D		-	-
Inorganic clays of low plasticity	CL		12.50	D	23	-	-
			14.00	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML		15.50	D	25	-	-
			17.00	U		-	-
Inorganic Silts of low plasticity	ML		18.50	D	31	-	-
			20.00	D		-	-

BH-P121A-24092.447

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML		20.00	D		-	-
			21.50	D	37	-	-
			23.00	D		-	-
Silty Sands	SM		24.50	D	52	-	-
			26.00	D	70	-	-
			27.50	D	66	-	-
			29.00	D	74	-	-
			30.50	D	66	-	-
			32.00	D	68	-	-
			33.50	D	68	-	-
			35.00	D	71	-	-
			36.50	D	78	-	-
			38.00	D	78	-	-
			40.00	D	81	-	-

APPENDIX-C
PLOT 13: LITHOLOGICAL PLOTS

BH-P122A-24118.647

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML		0.50	D		-	-
			1.00	D	8	-	-
			2.00	U		-	-
Silty Sands	SM		3.00	D	10	-	-
			4.00	D	15	-	-
	WATER LVL		5.00	U		-	-
Silty Sands with clay binder	SM-SC		6.00	D	16	-	-
			7.00	D	18	-	-
Silty Sands	SM		8.00	D		-	-
			9.00	D	21	-	-
Inorganic Silty Clays of low plasticity	CL-ML		10.00	D	29	-	-
			11.00	U		-	-
Inorganic clays of low plasticity	CL		12.50	D	25	-	-
			14.00	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML		15.50	D	35	-	-
			17.00	U		-	-
Silty Sands with clay binder	SM-SC		18.50	D	32	-	-
			20.00	D		-	-

BH-P122A-24118.647

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands with clay binder	SM-SC		20.00	D		-	-
Silty Sands	SM		21.50	D	36	-	-
			23.00	D		-	-
Inorganic clays of low plasticity	CL		24.50	D	47	-	-
			26.00	D		-	-
			27.50	D	54	-	-
			29.00	D	59	-	-
			30.50	D	71	-	-
			32.00	D	65	-	-
Silty Sands	SM		33.50	D	68	-	-
			35.00	D	76	-	-
			36.50	D	78	-	-
			38.00	D	84	-	-
			40.00	D	76	-	-

APPENDIX-C
PLOT 14: LITHOLOGICAL PLOTS

BH-P123A-24144.847

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	D	6	-	-
			2.00	U		-	-
			3.00	D	10	-	-
			4.00	D	12	-	-
			5.00	U		-	-
Silty Sands with clay binder	SM-SC						
Silty Sands	SM		6.00	D	16	-	-
Silty Sands with clay binder	SM-SC		7.00	D	18	-	-
Silty Sands	SM		8.00	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML		9.00	D	21	-	-
			10.00	D	28	-	-
Inorganic Silts of low plasticity	ML		11.00	U		-	-
			12.50	D	19	-	-
			14.00	U		-	-
			15.50	D	23	-	-
Silty Sands	SM		17.00	D		-	-
Inorganic Silts of low plasticity	ML		18.50	D	40	-	-
			20.00	U		-	-

BH-P123A-24144.847

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML		20.00	U		-	-
Silty Sands	SM		21.50	D	54	-	-
			23.00	D	72	-	-
			24.50	D	79	-	-
			26.00	D	64	-	-
Inorganic Silts of low plasticity	ML		27.50	D	70	-	-
Inorganic clays of low plasticity	CL		29.00	D	82	-	-
Inorganic Silts of low plasticity	ML		30.50	D	82	-	-
Inorganic clays of low plasticity	CL		32.00	D	62	-	-
			33.50	D	51	-	-
			35.00	D	74	-	-
			36.50	D	71	-	-
			38.00	D	57	-	-
			40.00	D	85	-	-

APPENDIX-C

PLOT 15: LITHOLOGICAL PLOTS

BH-P124A-24171.047

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	D	10	-	-
			2.00	U		-	-
			3.00	D	12	-	-
			4.00	D	16	-	-
Inorganic Silts of low plasticity	ML		5.00	U		-	-
	WATER LVL		6.00	D	17	-	-
			7.00	D	21	-	-
			8.00	U		-	-
			9.00	D	22	-	-
			10.00	D	25	-	-
Inorganic clays of low plasticity	CL		11.00	U		-	-
			12.50	D	20	-	-
			14.00	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML		15.50	D	23	-	-
Silty Sands	SM		17.00	U		-	-
			18.50	D	34	-	-
			20.00	U		-	-

BH-P124A-24171.047

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silty Clays of low plasticity	CL-ML		20.00	U		-	-
			21.50	D	39	-	-
Silty Sands	SM		23.00	D	41	-	-
			24.50	D	45	-	-
			26.00	D		-	-
			27.50	D	52	-	-
			29.00	D	60	-	-
			30.50	D	68	-	-
			32.00	D	75	-	-
			33.50	D	81	-	-
			35.00	D	67	-	-
			36.50	D	74	-	-
			38.00	D	79	-	-
			40.00	D	83	-	-

APPENDIX-C

PLOT 16: LITHOLOGICAL PLOTS

BH-P125A-24197.247

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	U		-	-
			2.00	D	9	-	-
			3.00	D	12	-	-
			4.00	U		-	-
Inorganic Silts of low plasticity	ML		5.00	D	18	-	-
Silty Sands	SM		6.00	D	24	-	-
			7.00	U		-	-
Inorganic Silts of low plasticity	ML		8.00	D	18	-	-
			9.00	D	25	-	-
			10.00	U		-	-
			11.00	D	30	-	-
			12.00	D	33	-	-
			13.00	U		-	-
			14.50	D	27	-	-
			16.00	U		-	-
			17.50	D	33	-	-
Inorganic clays of low plasticity	CL		19.00	U		-	-
			20.00	D	68	-	-

BH-P125A-24197.247

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.50	D	68	-	-
			22.00	D	73	-	-
Silty Sands	SM		23.50	D	79	-	-
			25.00	D	80	-	-
			26.50	D	78	-	-
			28.00	D	90	-	-
			29.50	D	71	-	-
			31.00	D	73	-	-
			32.50	D	75	-	-
			34.00	D	85	-	-
			35.50	D	66	-	-
Inorganic clays of low plasticity	CL		37.00	D	63	-	-
			38.50	D	71	-	-
			40.00	D	77	-	-

APPENDIX-C
PLOT 17: LITHOLOGICAL PLOTS

BH-P126A-24223.447

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	D	9	-	-
			2.00	U		-	-
			3.00	D	12	-	-
			4.00	D	15	-	-
			5.00	U		-	-
			6.00	D	23	-	-
			7.00	D	24	-	-
			8.00	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML		9.00	D	34	-	-
Inorganic Silts of low plasticity	ML		10.00	D	31	-	-
			11.00	U		-	-
			12.50	D	39	-	-
			14.00	U		-	-
			15.50	D	43	-	-
			17.00	D		-	-
Silty Sands	SM		18.50	D	49	-	-
			20.00	U		-	-

BH-P126A-24223.447

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL		20.00	U		-	-
			21.50	D	33	-	-
Silty Sands with clay binder	SM-SC		23.00	U		-	-
Silty Sands	SM		24.50	D	55	-	-
Inorganic Silts of low plasticity	ML		26.00	D	100	-	-
Silty Sands	SM		27.50	D	R	-	-
			29.00	D	R	-	-
			30.50	D	R	-	-
			32.00	D	R	-	-
Inorganic Silty Clays of low plasticity	CL-ML		33.50	D	56	-	-
			35.00	D	62	-	-
			36.50	D	58	-	-
Silty Sands	SM		38.00	D	70	-	-
			40.00	D	76	-	-

APPENDIX-C
PLOT 18: LITHOLOGICAL PLOTS

BH-P127A-24249.647

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	D	10	-	-
			2.00	U		-	-
			3.00	D	13	-	-
			4.00	D	16	-	-
			5.00	U		-	-
			6.00	D	28	-	-
	WATER LVL		7.00	D	31	-	-
			8.00	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML		9.00	D	32	-	-
			10.00	D	35	-	-
Inorganic clays of low plasticity	CL		11.00	U		-	-
			12.50	D	43	-	-
Inorganic Silts of low plasticity	ML		14.00	U		-	-
Silty Sands	SM		15.50	D	48	-	-
			17.00	U		-	-
Inorganic clays of low plasticity	CL		18.50	D	37	-	-
			20.00	U		-	-

BH-P127A-24249.647

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML		20.00	U		-	-
Silty Sands	SM		21.50	D	53	-	-
			23.00	D	69	-	-
			24.50	D	78	-	-
			26.00	D	79	-	-
			27.50	D	103	-	-
Inorganic clays of low plasticity	CL		29.00	D	107	-	-
			30.50	D	102	-	-
Inorganic Silty Clays of low plasticity	CL-ML		32.00	D	99	-	-
Inorganic Silts of low plasticity	ML		33.50	D	113	-	-
			35.00	D	104	-	-
Inorganic clays of low plasticity	CL		36.50	D	84	-	-
			38.00	D	90	-	-
			40.00	D	97	-	-

APPENDIX-C
PLOT 19: LITHOLOGICAL PLOTS

BH-P128A-24275.847

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	D	12	-	-
			2.00	U		-	-
			3.00	D	16	-	-
Inorganic Silts of low plasticity	ML		4.00	D	22	-	-
Inorganic Silty Clays of low plasticity	CL-ML		5.00	U		-	-
Silty Sands	SM		6.00	D	17	-	-
			7.00	D	15	-	-
Inorganic Silts of low plasticity	ML	WATER LVL	8.00	U		-	-
			9.00	D	27	-	-
Inorganic clays of low plasticity	CL		10.00	D	24	-	-
			11.00	U		-	-
			12.50	D	18	-	-
Inorganic Silty Clays of low plasticity	CL-ML		14.00	D		-	-
Silty Sands	SM		15.50	D	33	-	-
			17.00	D		-	-
			18.50	D	37	-	-
			20.00	U		-	-

BH-P128A-24275.847

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		20.00	U		-	-
			21.50	D	49	-	-
Inorganic Silts of low plasticity	ML		23.00	D		-	-
			24.50	D	56	-	-
Silty Sands	SM		26.00	D	55	-	-
			27.50	D	65	-	-
Inorganic clays of low plasticity	CL		29.00	D	74	-	-
			30.50	D	52	-	-
Inorganic Silty Clays of low plasticity	CL-ML		32.00	D	73	-	-
Inorganic clays of low plasticity	CL		33.50	D	59	-	-
			35.00	D	55	-	-
			36.50	D	73	-	-
			38.00	D	59	-	-
			40.00	D	70	-	-

APPENDIX-C
PLOT 20: LITHOLOGICAL PLOTS

BH-P129A-24302.047

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	U		-	-
			2.00	D	12	-	-
			3.00	D	13	-	-
			4.00	U		-	-
			5.00	D	21	-	-
			6.00	D	19	-	-
Inorganic Silts of low plasticity	ML (WATER LVL)		7.00	U		-	-
			8.00	D	22	-	-
			9.00	D	24	-	-
Inorganic clays of low plasticity	CL		10.00	U		-	-
			11.00	D	21	-	-
			12.00	D	22	-	-
Inorganic Silts of low plasticity	ML		13.00	U		-	-
Silty Sands	SM		14.50	D	34	-	-
Inorganic Silts of low plasticity	ML		16.00	U		-	-
			17.50	D	38	-	-
			19.00	D		-	-
			20.00	D	67	-	-

BH-P129A-24302.047

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML		20.50	D	67	-	-
			22.00	D	57	-	-
Silty Sands	SM		23.50	D	68	-	-
			25.00	D	70	-	-
			26.50	D	56	-	-
			28.00	D	60	-	-
			29.50	D	90	-	-
			31.00	D	53	-	-
			32.50	D	52	-	-
			34.00	D	58	-	-
			35.50	D	63	-	-
Inorganic Silts of low plasticity	ML		37.00	D	59	-	-
Silty Sands	SM		38.50	D	60	-	-
			40.00	D	79	-	-

APPENDIX-C
PLOT 21: LITHOLOGICAL PLOTS

BH-P130A-24328.247

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	D	8	-	-
			2.00	U		-	-
			3.00	D	8	-	-
			4.00	D	13	-	-
Inorganic Silty Clays of low plasticity	CL-ML		5.00	U		-	-
			6.00	D	16	-	-
			7.00	D	19	-	-
			8.00	U		-	-
Silty Sands	SM		9.00	D	20	-	-
Inorganic clays of low plasticity	CL		10.00	D	25	-	-
Inorganic Silts of low plasticity	ML		11.00	U		-	-
Inorganic clays of low plasticity	CL		12.50	D	24	-	-
			14.00	U		-	-
Inorganic Silts of low plasticity	ML		15.50	D	27	-	-
			17.00	U		-	-
			18.50	D	30	-	-
			20.00	U		-	-

WATER LVL

BH-P130A-24328.247

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		20.00	U		-	-
			21.50	D	71	-	-
			23.00	D	60	-	-
Inorganic Silts of low plasticity	ML		24.50	D	56	-	-
Silty Sands	SM		26.00	D		-	-
			27.50	D	60	-	-
			29.00	D	80	-	-
Inorganic clays of low plasticity	CL		30.50	D	64	-	-
			32.00	D	62	-	-
Silty Sands	SM		33.50	D	80	-	-
Inorganic Silts of low plasticity	ML		35.00	D	60	-	-
			36.50	D	60	-	-
			38.00	D	74	-	-
			40.00	D	51	-	-

APPENDIX-C

PLOT 22: LITHOLOGICAL PLOTS

BH-P131A-24354.447

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	U		-	-
			2.00	D	18	-	-
			3.00	D	15	-	-
			4.00	U		-	-
			5.00	D	27	-	-
			6.00	D	26	-	-
			7.00	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML		8.00	D	19	-	-
			9.00	D	42	-	-
Inorganic Silts of low plasticity	ML		10.00	U		-	-
			11.00	D	14	-	-
			12.00	D	19	-	-
			13.00	U		-	-
			14.50	D	20	-	-
Inorganic Silty Clays of low plasticity	CL-ML		16.00	U		-	-
Silty Sands	SM		17.50	D	42	-	-
			19.00	U		-	-
			20.00	D	85	-	-

BH-P131A-24354.447

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		20.50	D	85	-	-
			22.00	D	68	-	-
			23.50	D	60	-	-
			25.00	D	62	-	-
			26.50	D	74	-	-
			28.00	D	80	-	-
Inorganic Silts of low plasticity	ML		29.50	D	82	-	-
Clayey Sands	SC		31.00	U		-	-
Inorganic clays of low plasticity	CL		32.50	D	78	-	-
Silty Sands	SM		34.00	D	76	-	-
Inorganic Silts of low plasticity	ML		35.50	D	60	-	-
			37.00	D	60	-	-
			38.50	D	62	-	-
			40.00	D	60	-	-

APPENDIX-C
PLOT 23: LITHOLOGICAL PLOTS

BH-P132A-24380.647

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			0.50	D		-	-
			1.00	U		-	-
			2.00	D	21	-	-
Silty Sands	SM		3.00	D	25	-	-
			4.00	U		-	-
			5.00	D	31	-	-
			6.00	D	33	-	-
			7.00	U		-	-
			8.00	D	17	-	-
	WATER LVL		9.00	D	23	-	-
Inorganic Silts of low plasticity	ML		10.00	U		-	-
			11.00	D	26	-	-
			12.00	D	24	-	-
			13.00	U		-	-
Silty Sands	SM		14.50	D	52	-	-
			16.00	D	58	-	-
Inorganic Silts of low plasticity	ML						
			17.50	D	60	-	-
Inorganic Silty Clays of low plasticity	CL-ML						
			19.00	D	58	-	-
Inorganic Silts of low plasticity	ML						
			20.00	D	90	-	-

BH-P132A-24380.647

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML						
			20.50	D	90	-	-
			22.00	D	56	-	-
			23.50	D	82	-	-
Silty Sands	SM		25.00	D	82	-	-
			26.50	D	83	-	-
			28.00	D	74	-	-
			29.50	D	54	-	-
Silty Sands with clay binder	SM-SC						
			31.00	D	63	-	-
			32.50	D	73	-	-
Inorganic clays of low plasticity	CL						
			34.00	D	60	-	-
			35.50	D	57	-	-
			37.00	D	60	-	-
Inorganic Silts of low plasticity	ML						
			38.50	D	60	-	-
			40.00	D	72	-	-

APPENDIX-C

PLOT 24: LITHOLOGICAL PLOTS

BH-P133A-24406.847

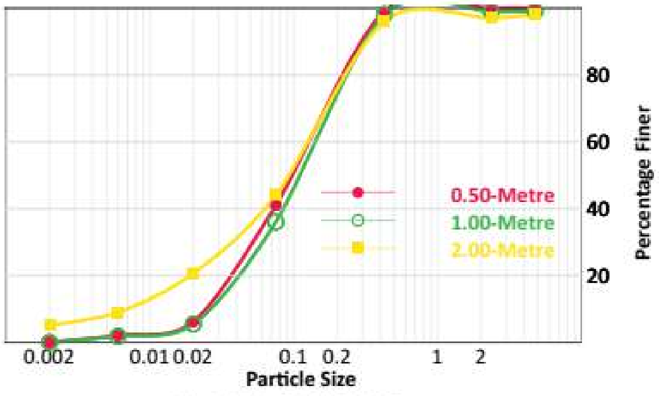
DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		0.50	D		-	-
			1.00	U		-	-
			2.00	D	12	-	-
			3.00	D	14	-	-
			4.00	U		-	-
			5.00	D	20	-	-
			6.00	D	23	-	-
			7.00	U		-	-
			8.00	D	18	-	-
	WATER LVL		9.00	D	22	-	-
Inorganic clays of low plasticity	CL		10.00	U		-	-
			11.00	D	20	-	-
			12.00	D	23	-	-
Inorganic Silts of low plasticity	ML		13.00	U		-	-
			14.50	D	40	-	-
Silty Sands	SM		16.00	U		-	-
			17.50	D	55	-	-
			19.00	D	54	-	-
			20.00	D	58	-	-

BH-P133A-24406.847

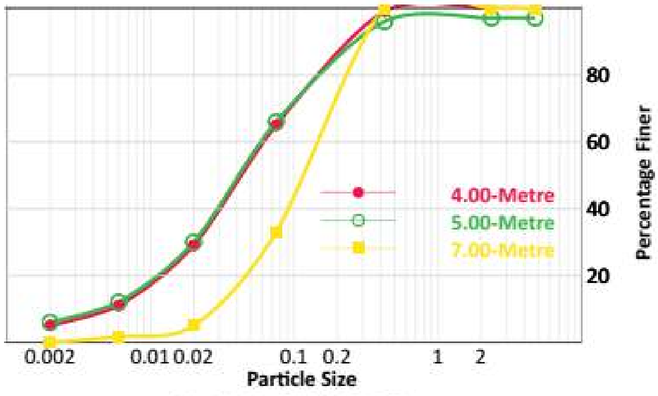
DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM		20.50	D	58	-	-
			22.00	D	60	-	-
			23.50	D	59	-	-
			25.00	D	53	-	-
			26.50	D	63	-	-
			28.00	D	60	-	-
			29.50	D	59	-	-
			31.00	D	59	-	-
			32.50	D	60	-	-
			34.00	D	62	-	-
			35.50	D	60	-	-
			37.00	D	72	-	-
			38.50	D	80	-	-
			40.00	D	70	-	-

APPENDIX-D
PLOT 1: GRAIN SIZE DISTRIBUTION PLOTS

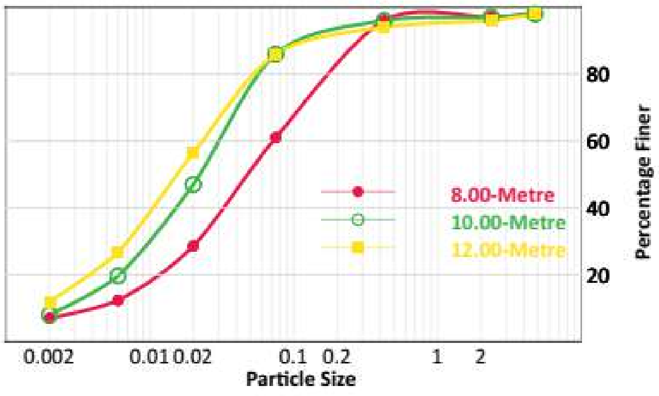
BH- P114A-CH.23909.047



BH- P114A-CH.23909.047



BH- P114A-CH.23909.047



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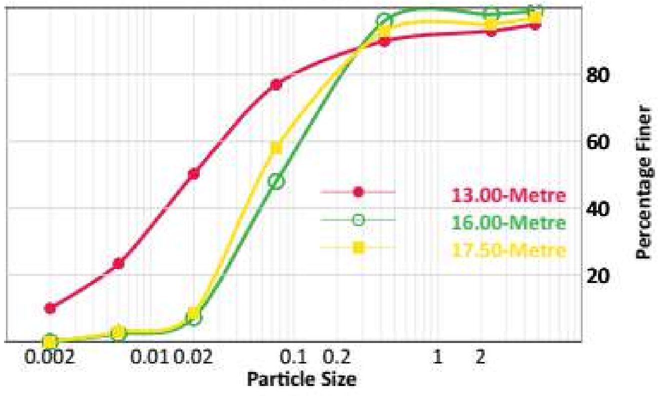

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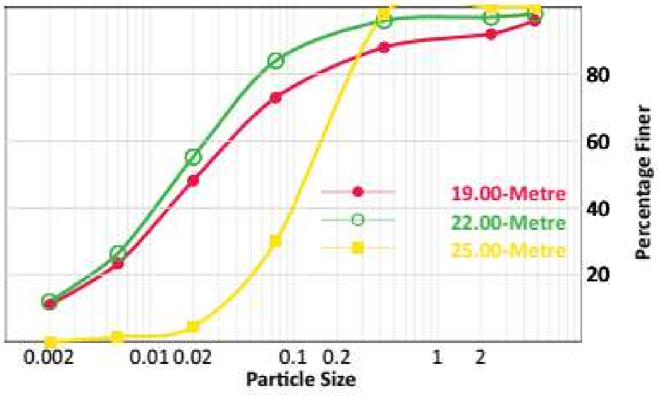

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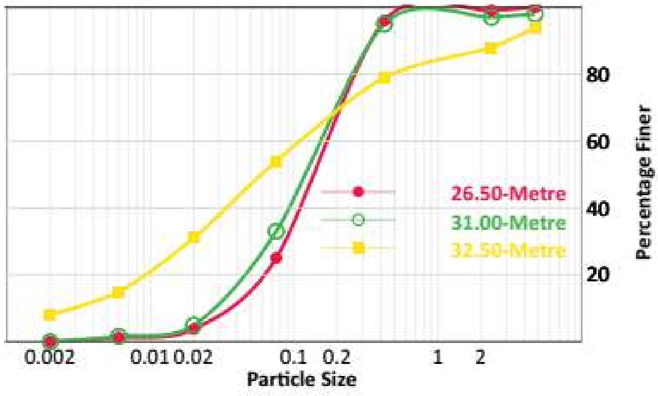

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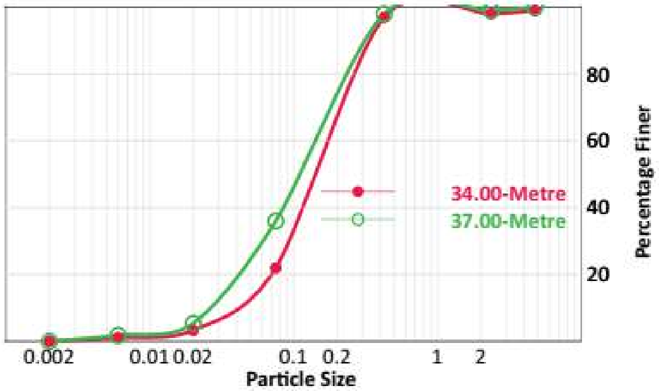
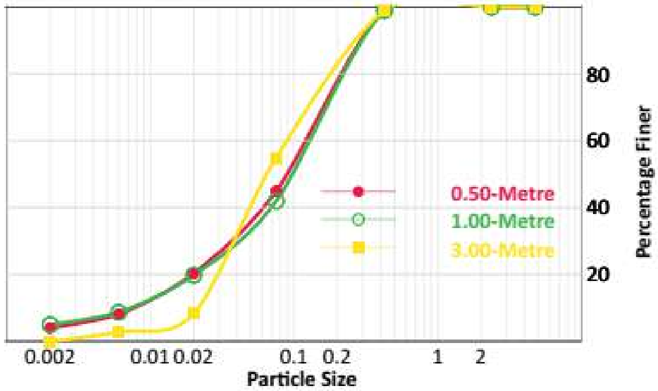
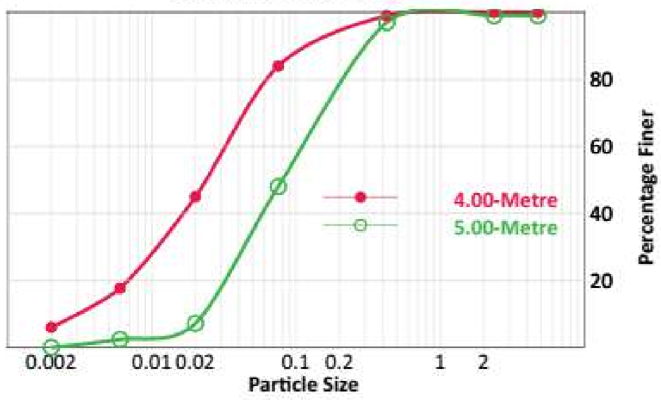


BH- P115A-CH.23935.247



APPENDIX-D
PLOT 2: GRAIN SIZE DISTRIBUTION PLOTS

BH- P115A-CH.23935.247



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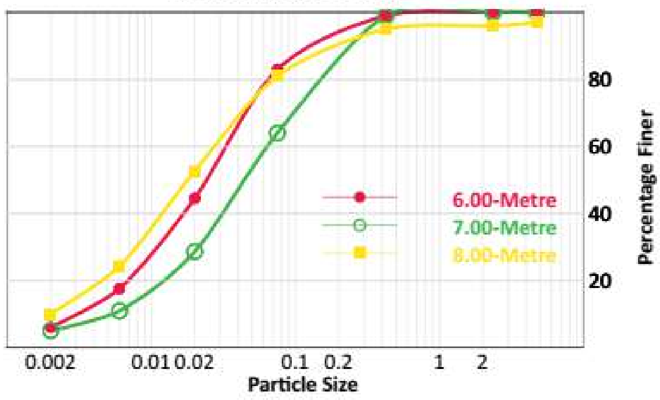

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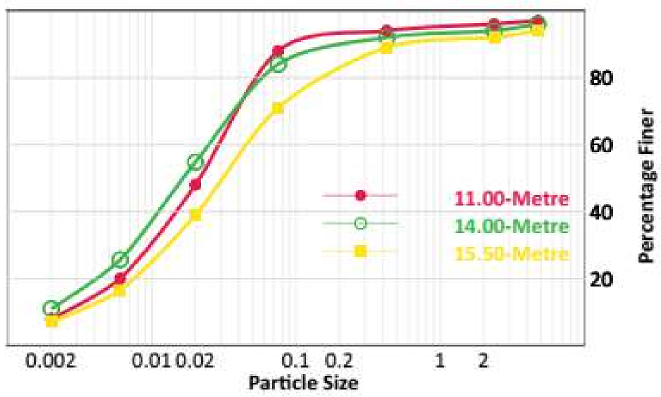

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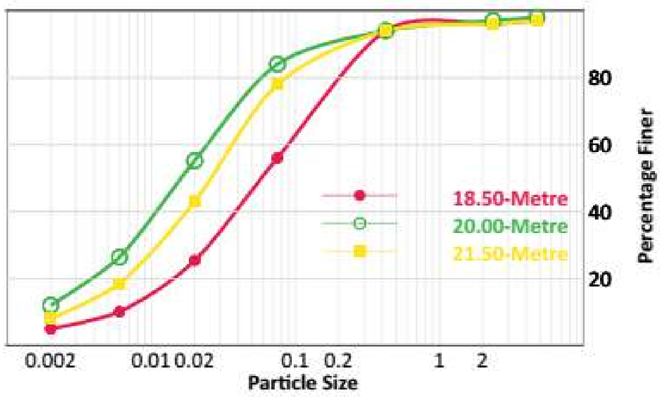

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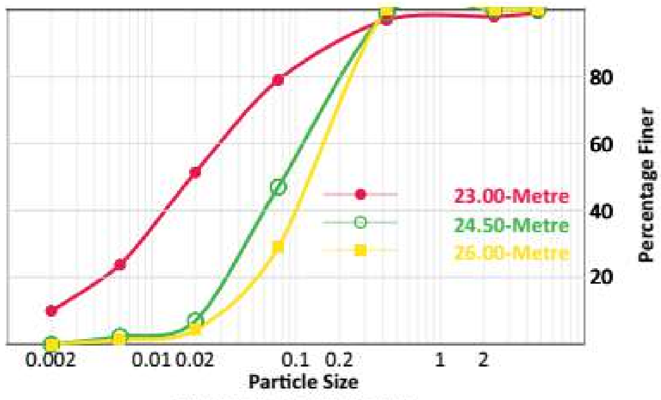

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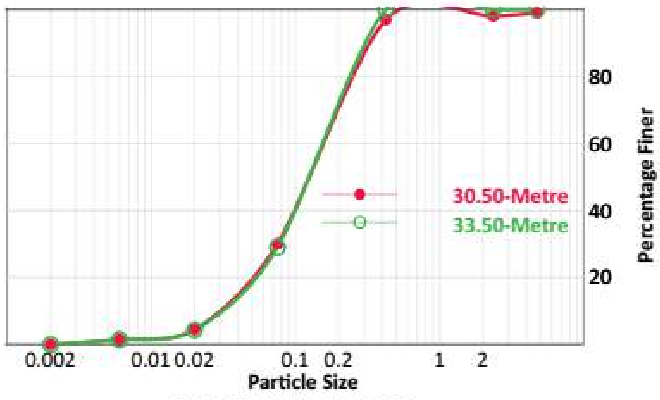

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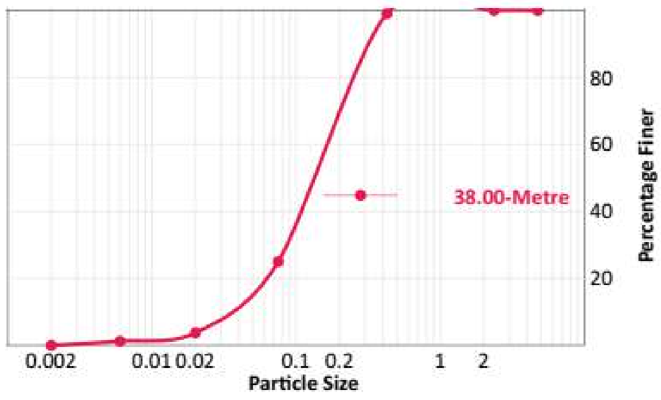

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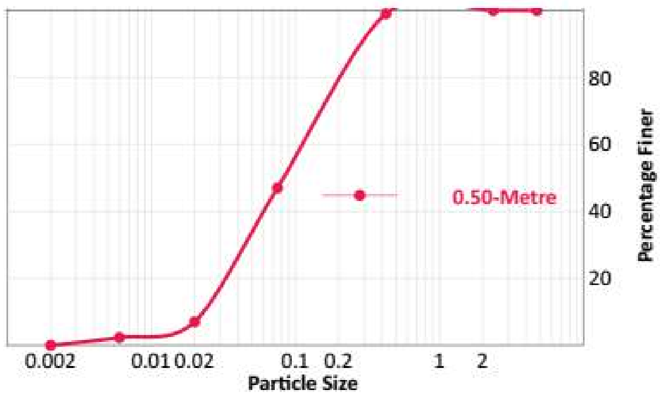
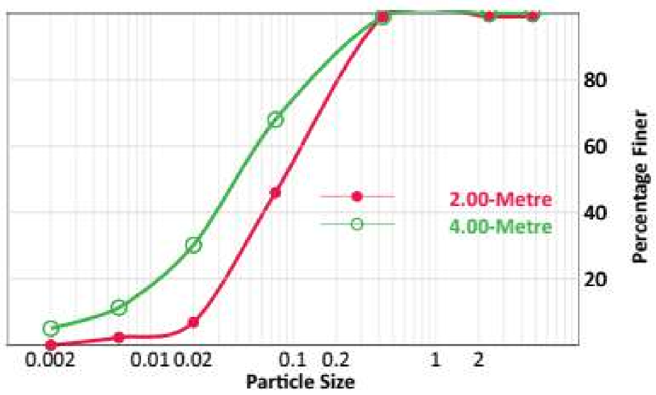


APPENDIX-D
PLOT 3: GRAIN SIZE DISTRIBUTION PLOTS

BH- P116A-CH.23961.447



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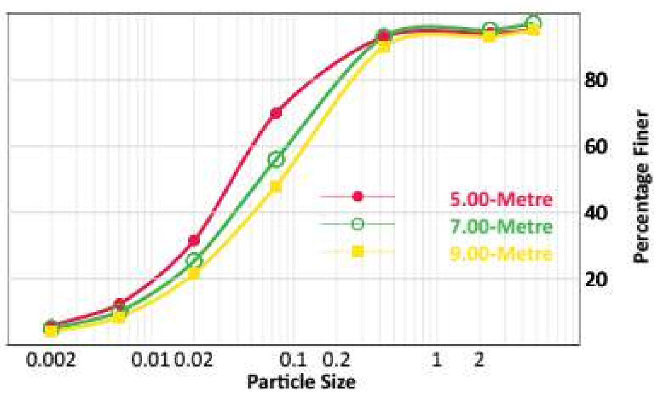

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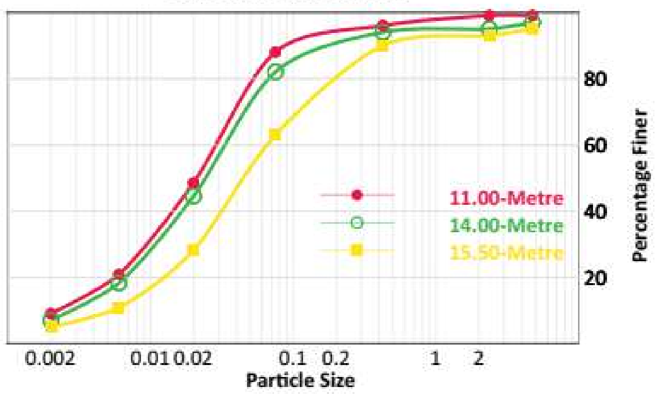

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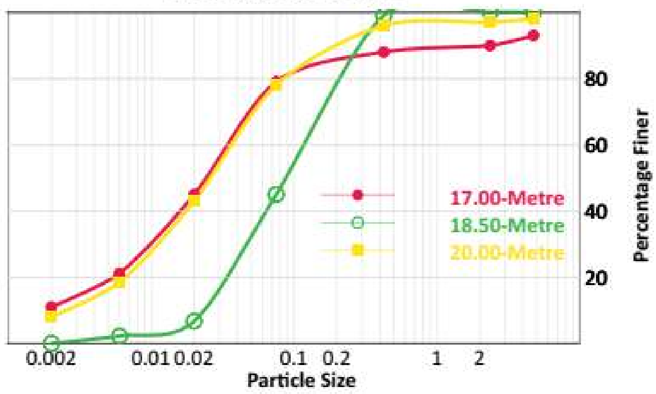

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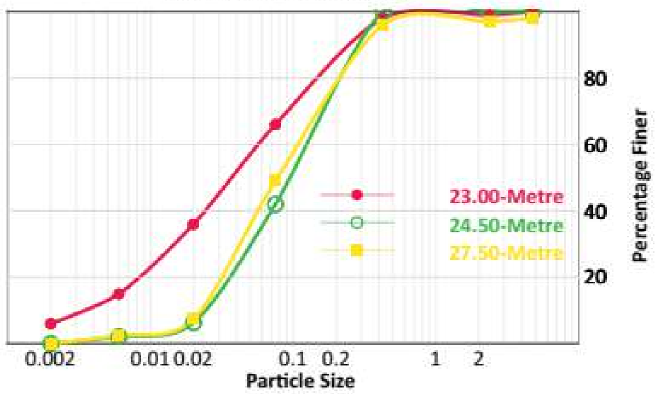

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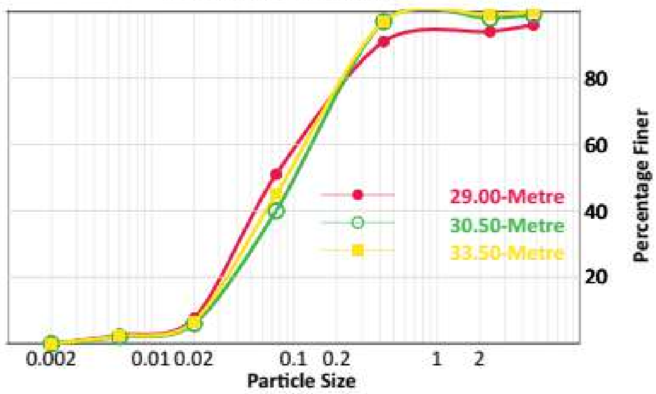

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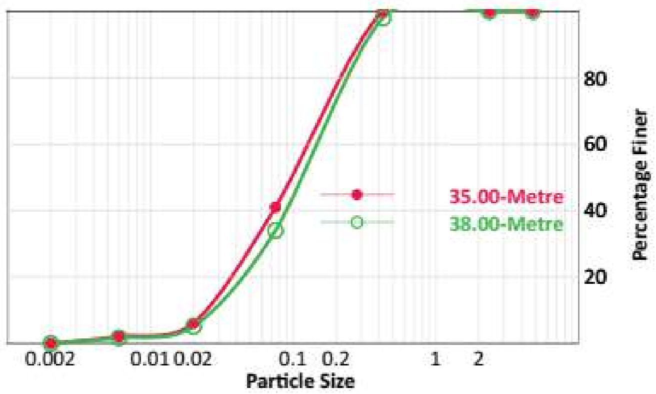

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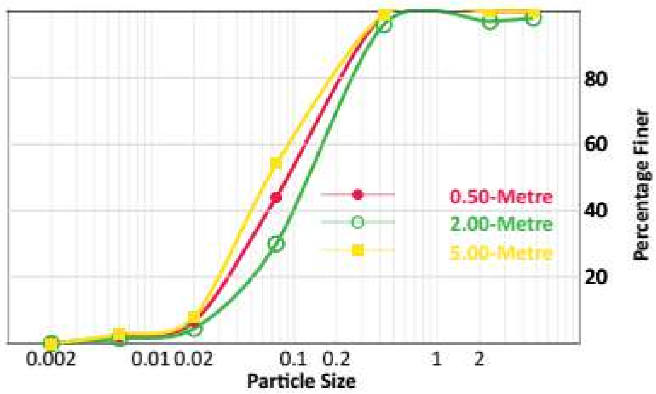
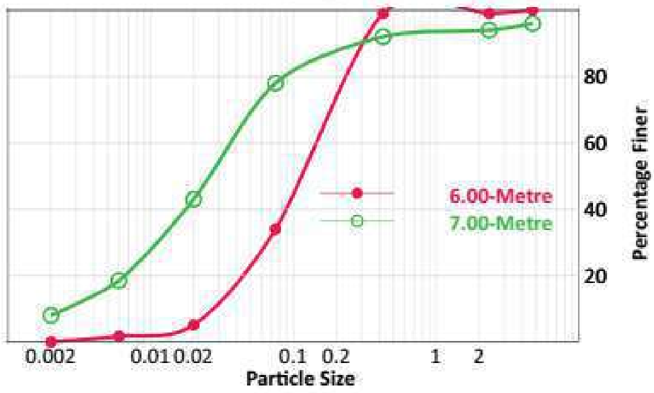


APPENDIX-D
PLOT 4: GRAIN SIZE DISTRIBUTION PLOTS

BH- P117A-CH.23987.647



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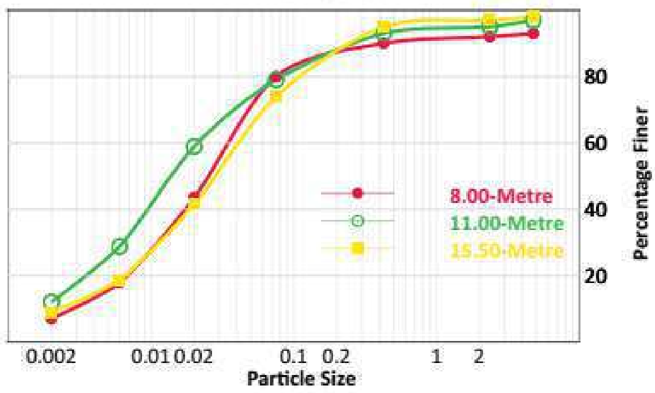

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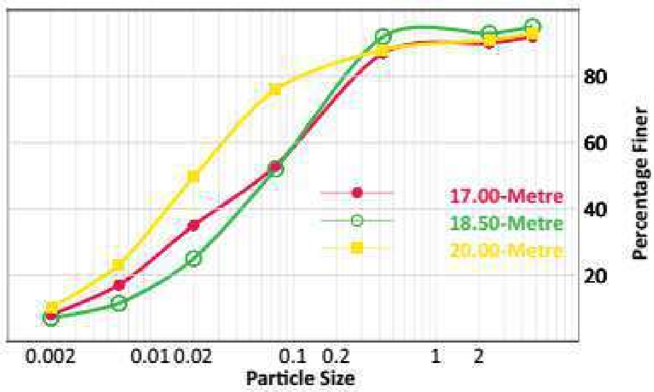

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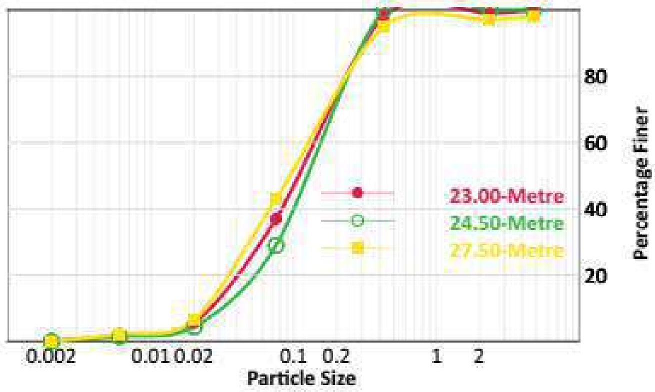

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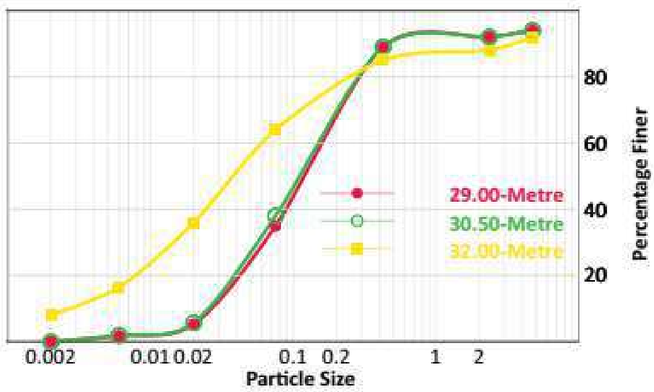

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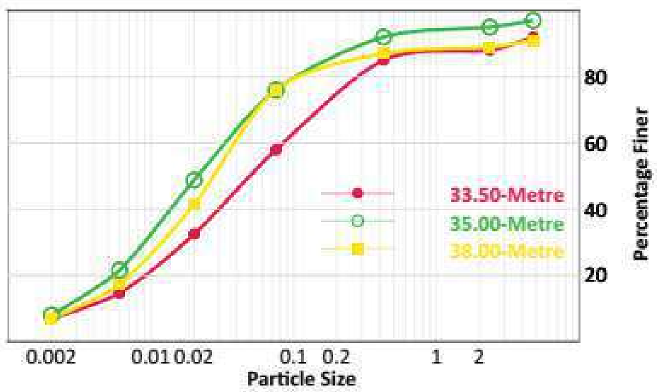
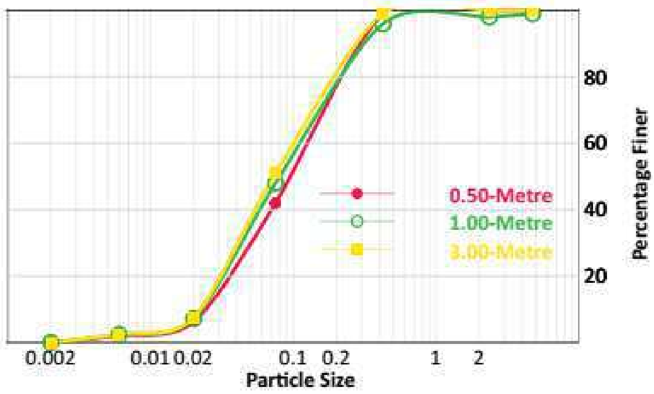


BH- P118A-CH.24013.847



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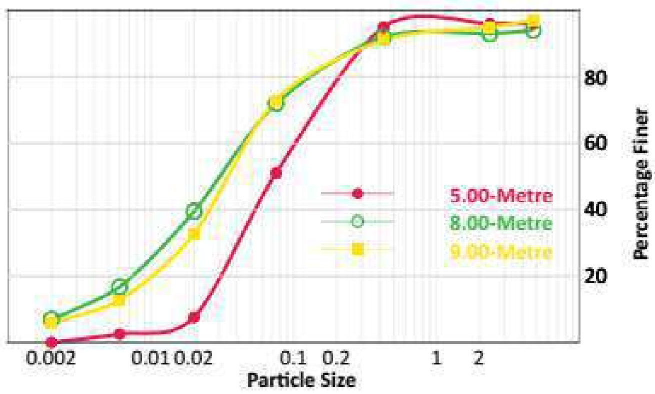

APPENDIX-D
PLOT 5: GRAIN SIZE DISTRIBUTION PLOTS

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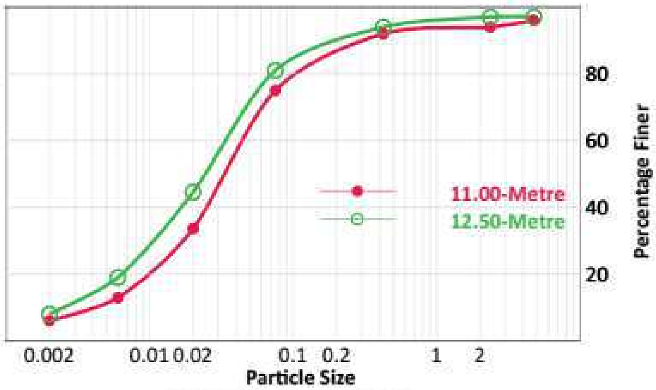

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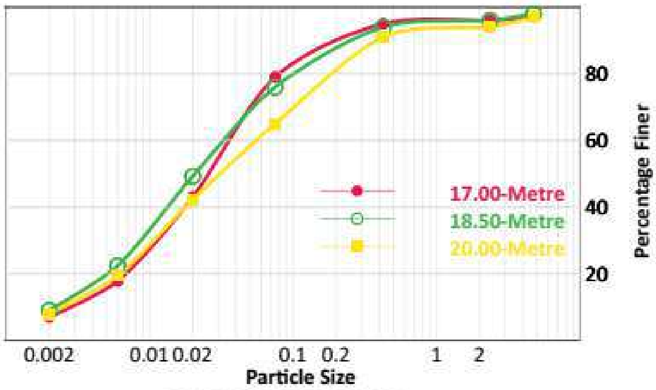

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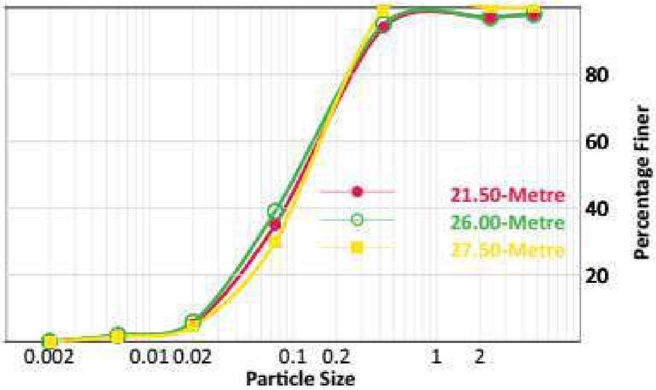

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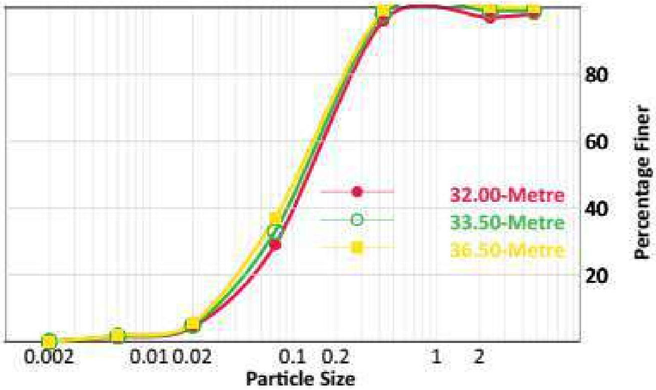

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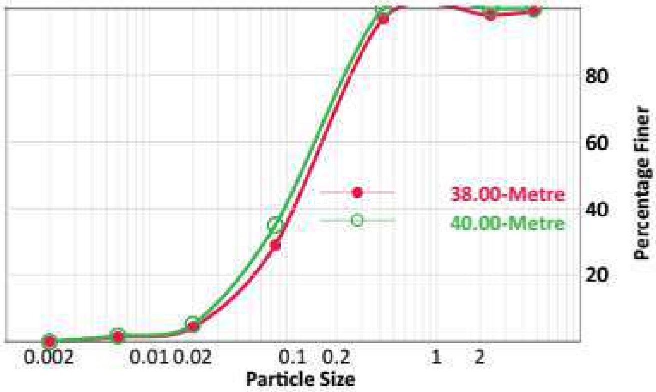
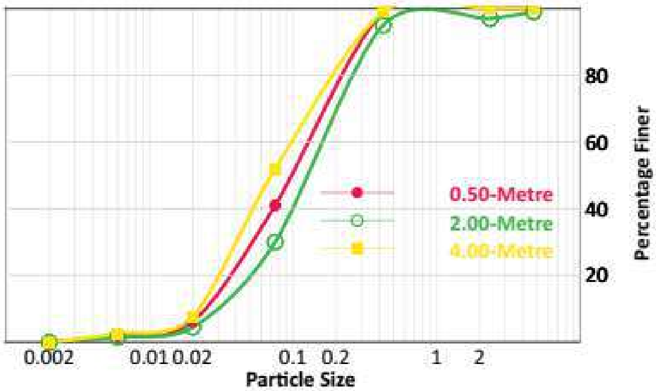


BH- P119A-CH.24040.047



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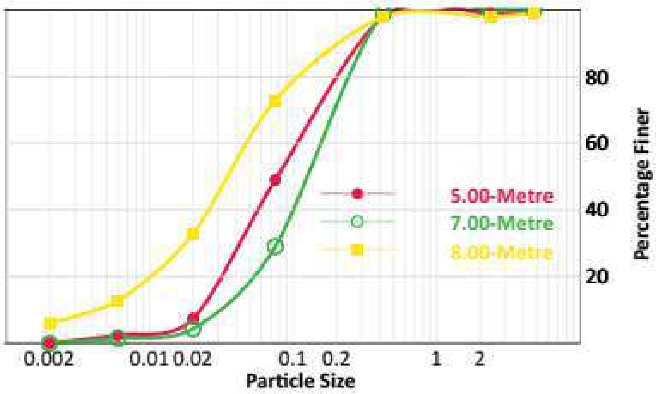

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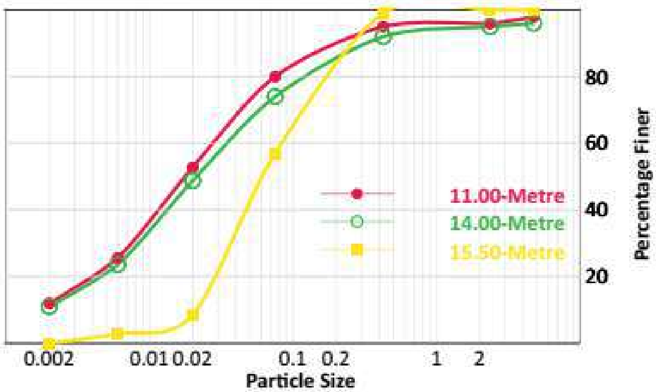
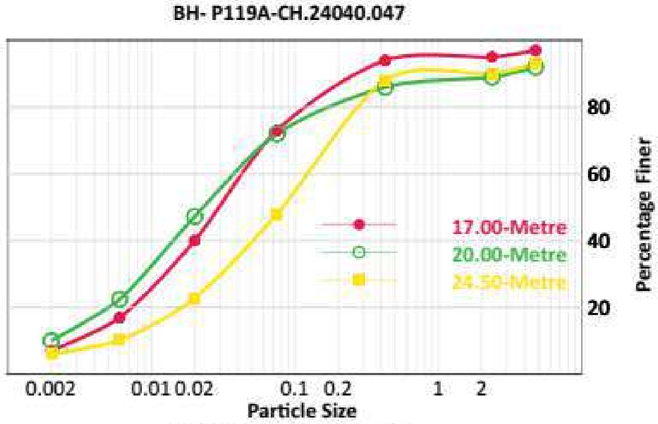
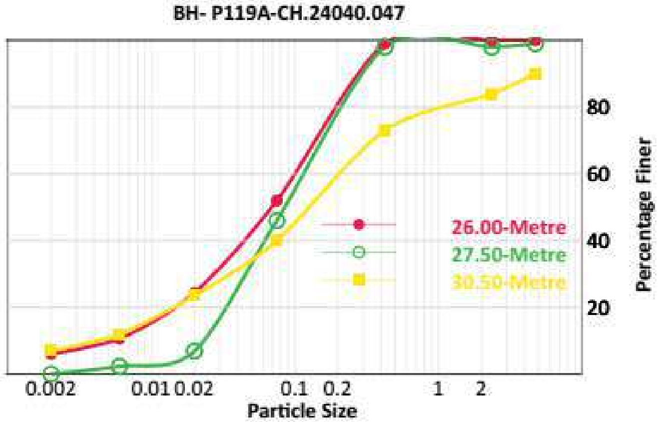
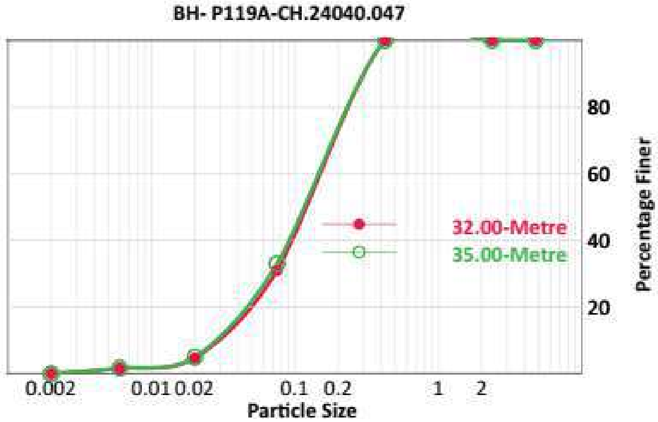


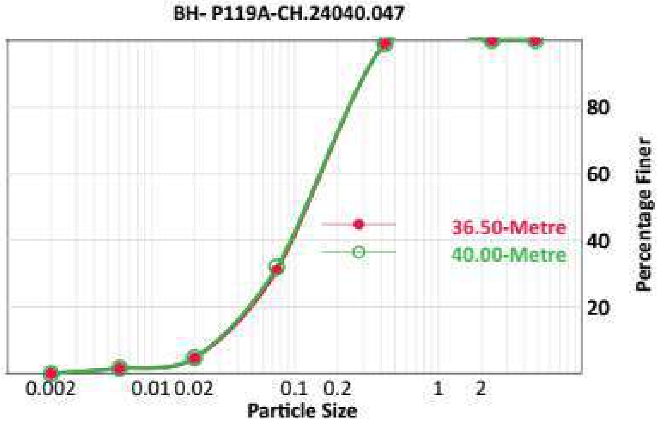
APPENDIX-D

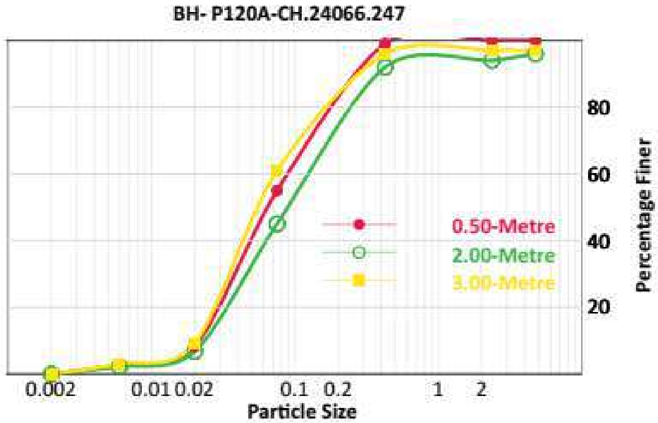
PLOT 6: GRAIN SIZE DISTRIBUTION PLOTS

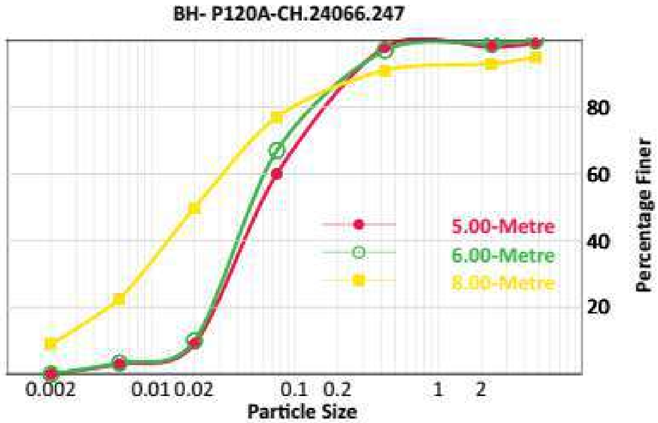


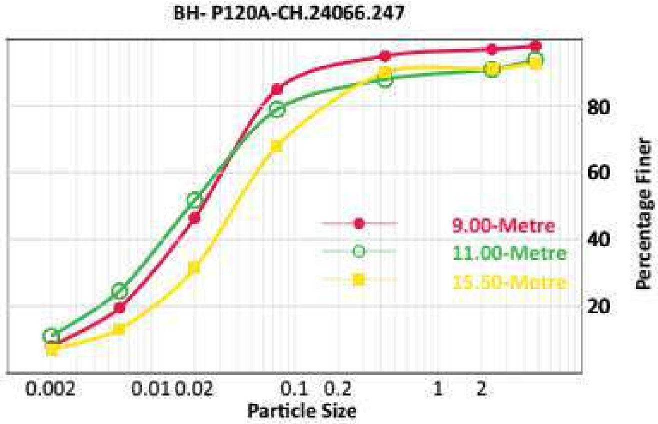


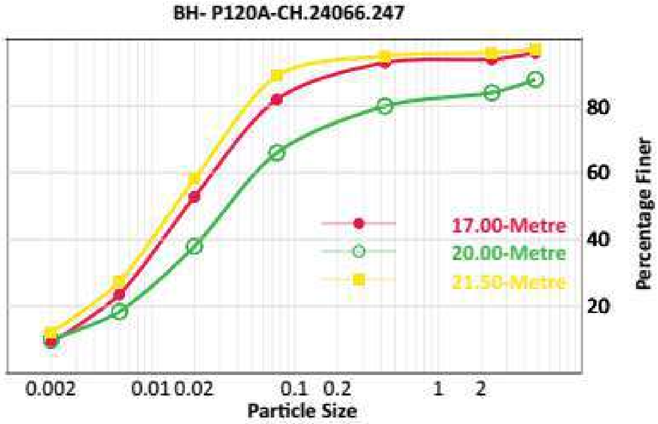








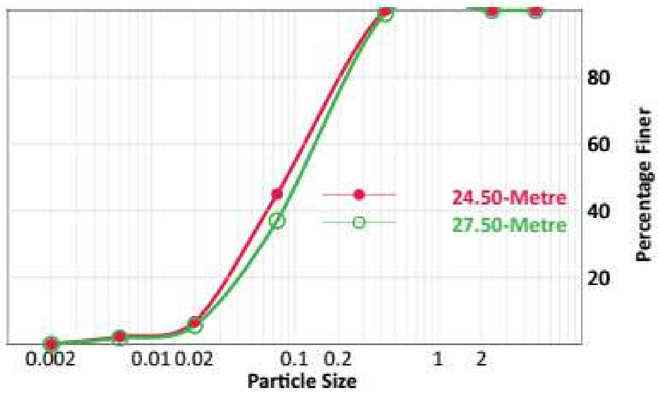




APPENDIX-D

PLOT 7: GRAIN SIZE DISTRIBUTION PLOTS

BH- P120A-CH.24066.247



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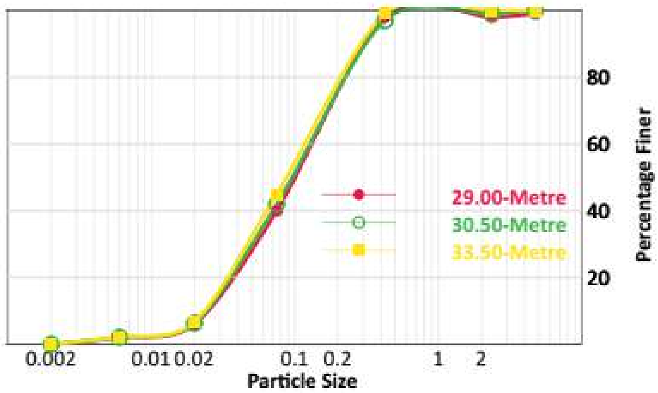

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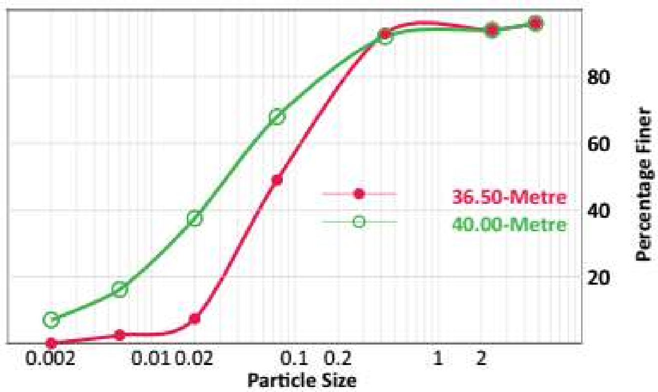
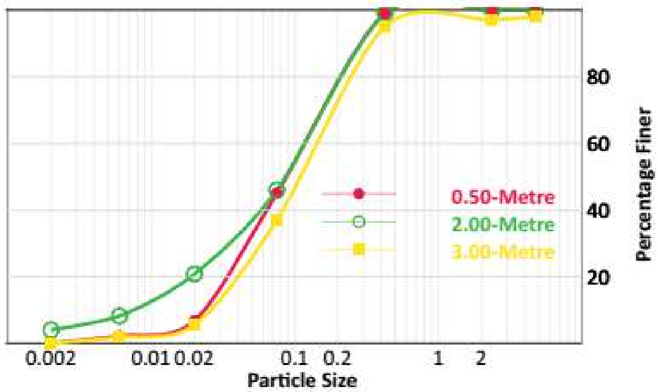


BH- P121A-CH.24092.447



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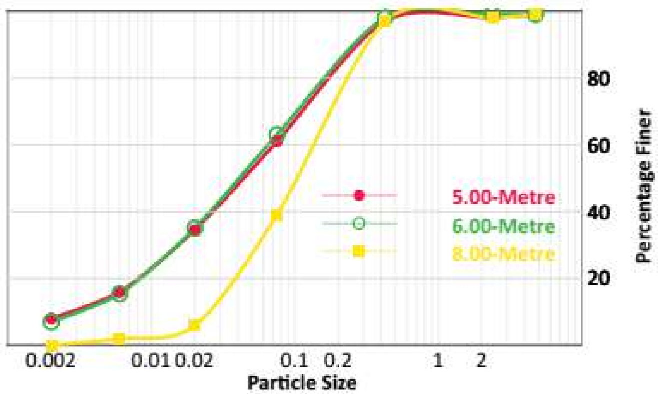

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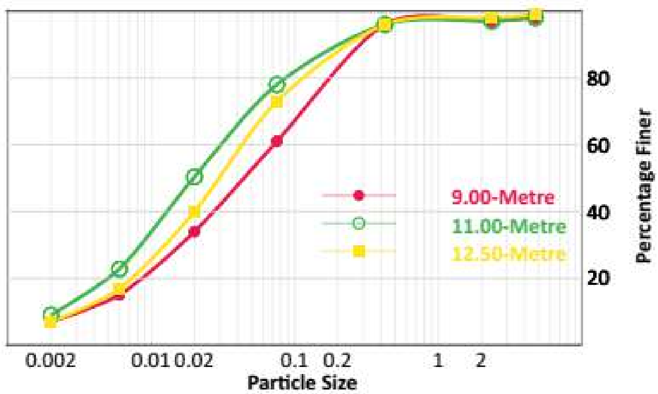

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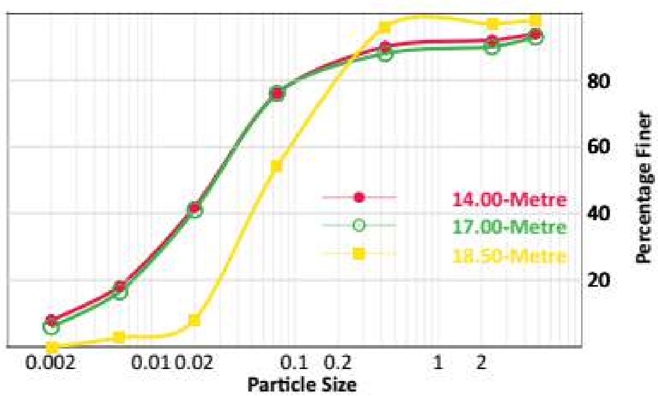

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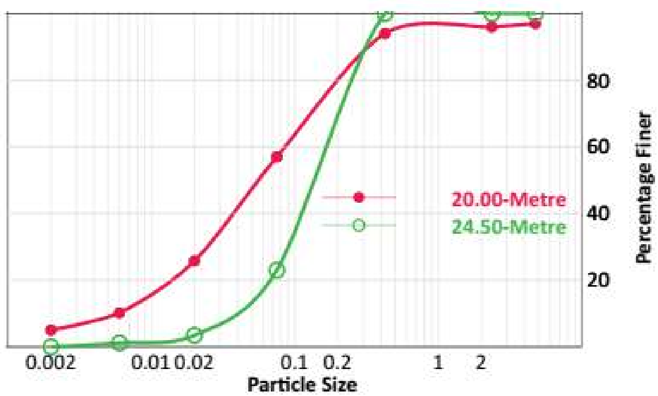
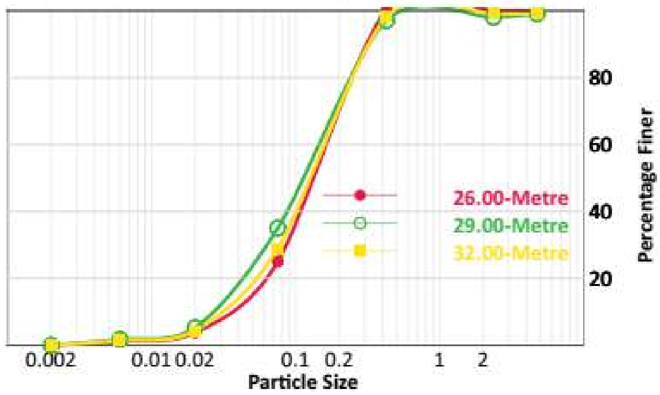


APPENDIX-D
PLOT 8: GRAIN SIZE DISTRIBUTION PLOTS

BH- P121A-CH.24092.447



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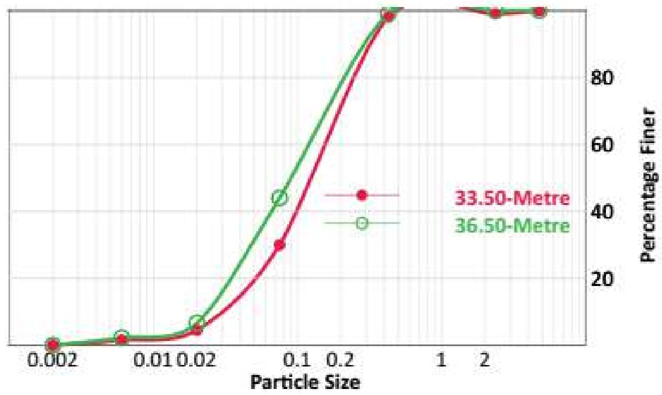

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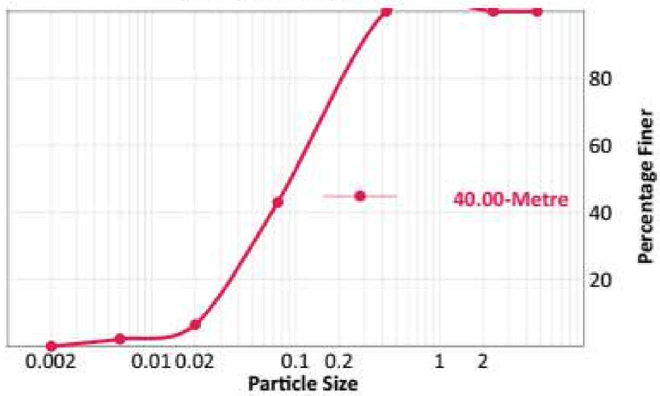
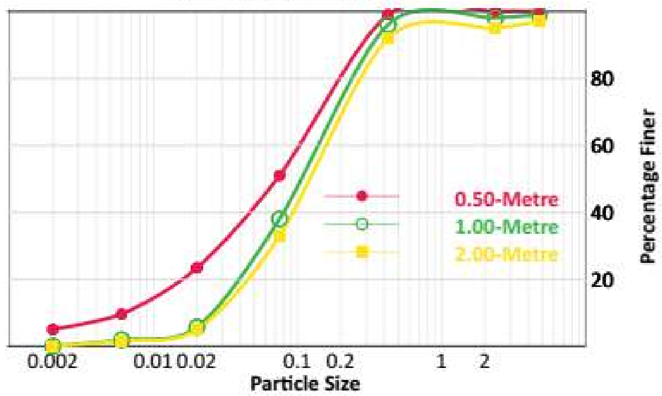


BH- P122A-CH.24118.647



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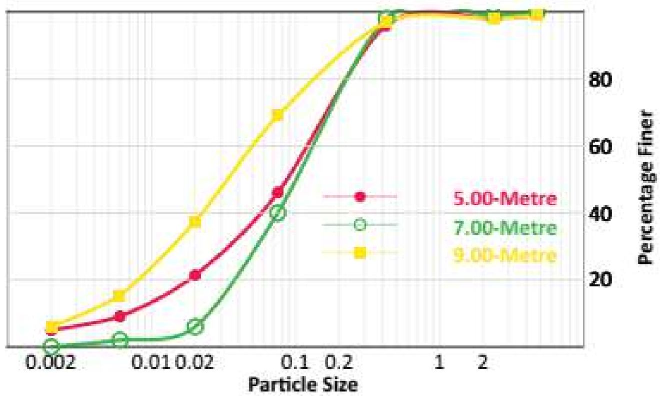

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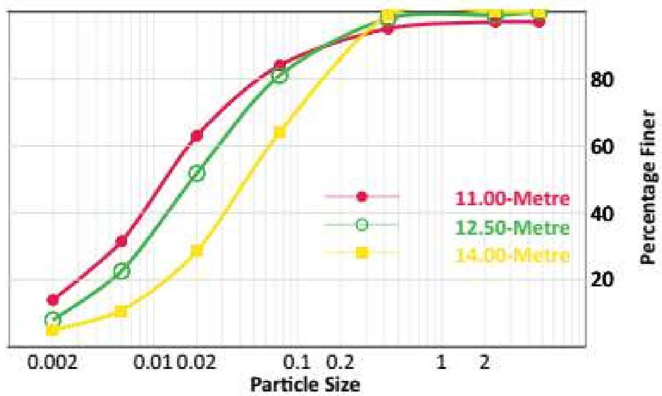

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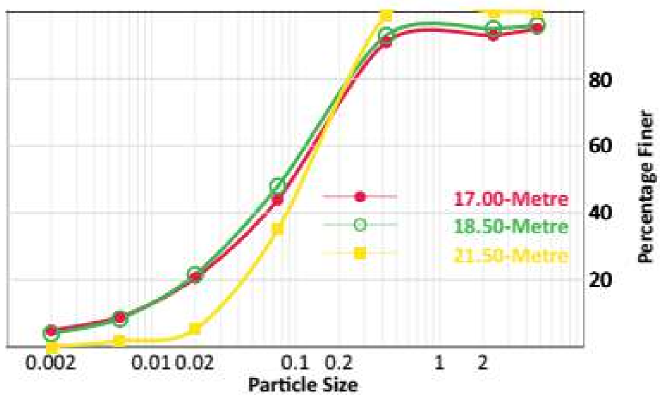

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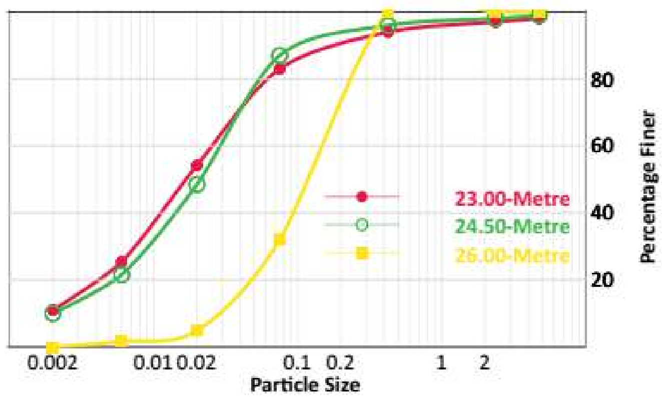
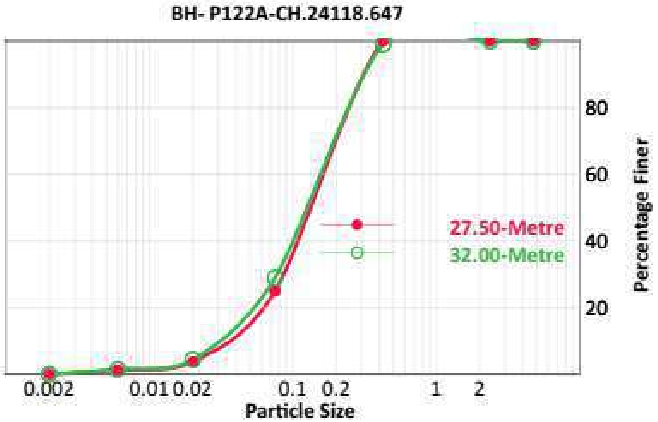
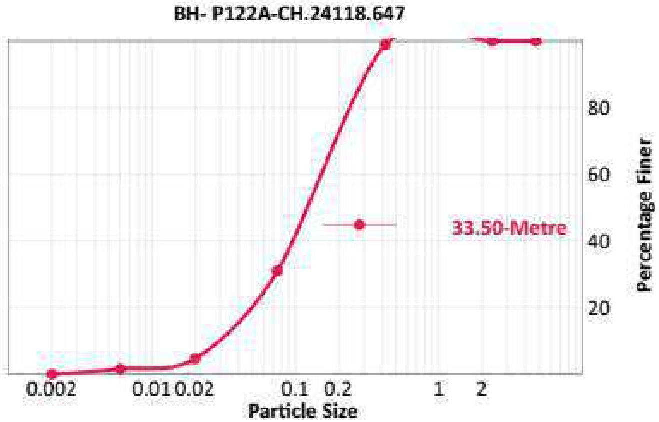
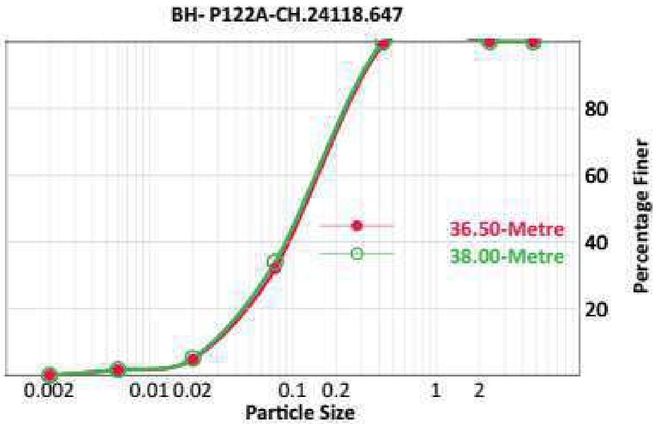
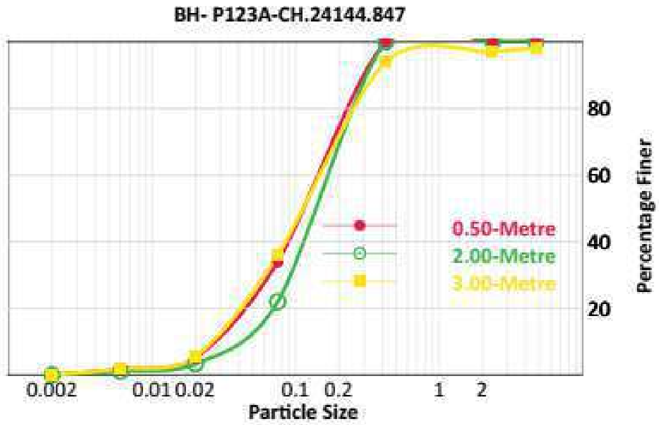


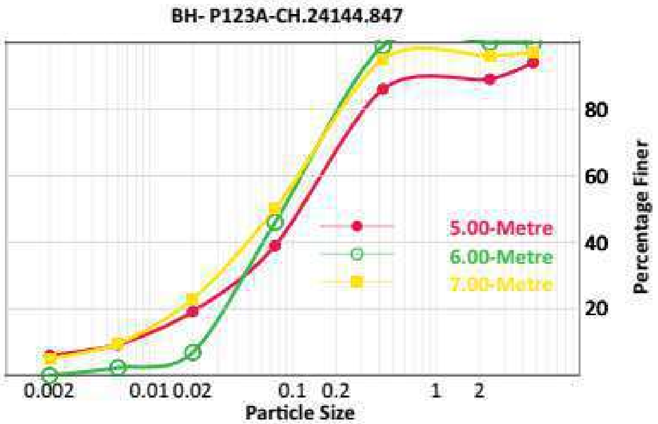
APPENDIX-D
PLOT 9: GRAIN SIZE DISTRIBUTION PLOTS

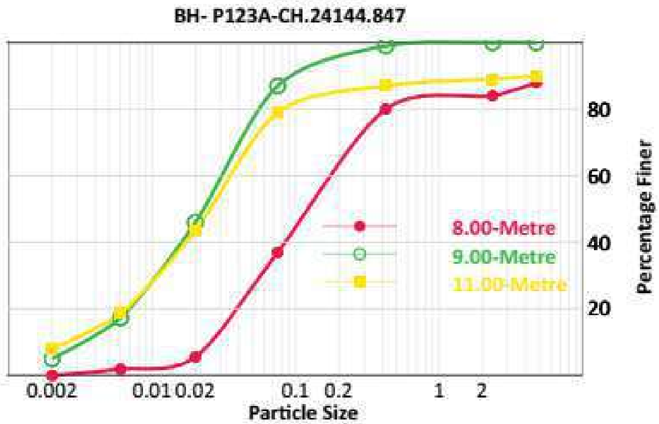


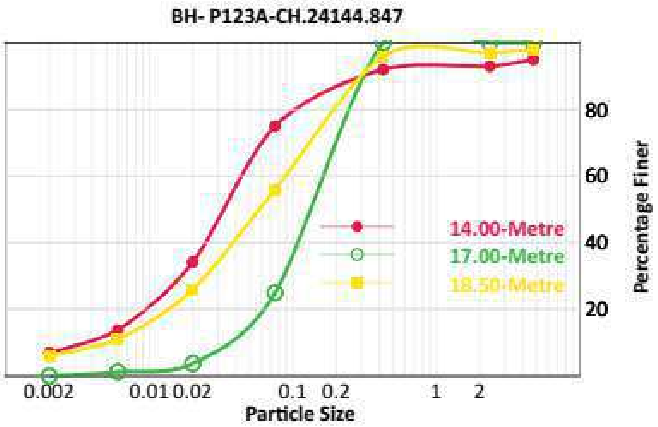


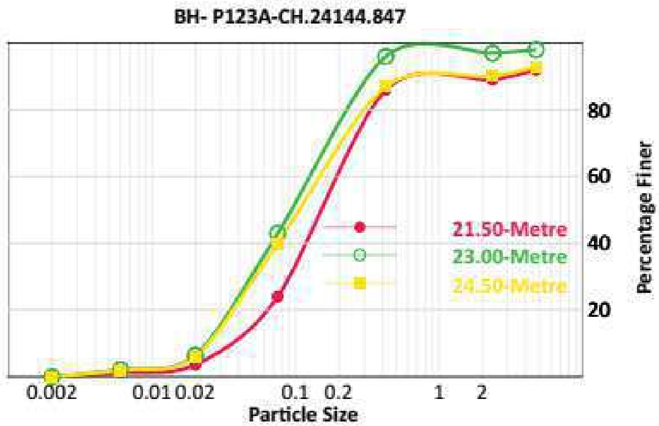








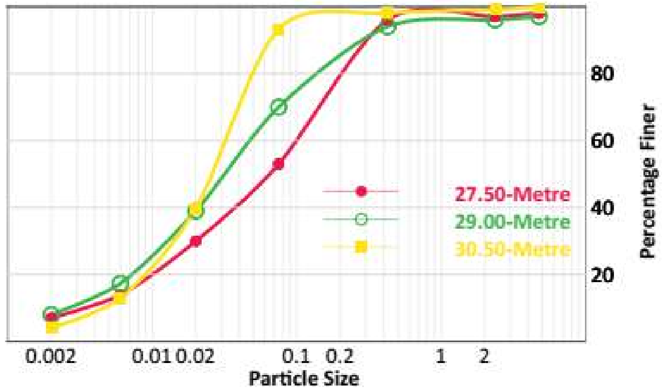




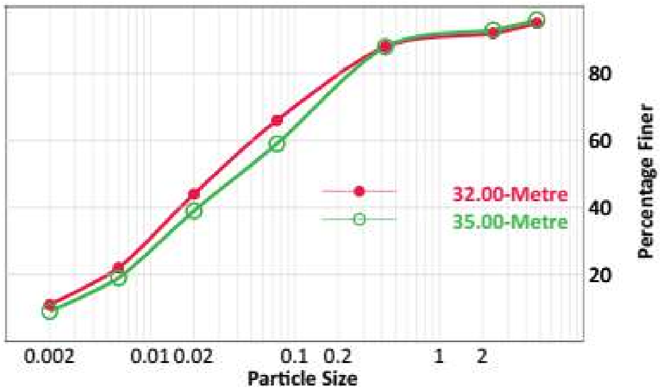
APPENDIX-D

PLOT 10: GRAIN SIZE DISTRIBUTION PLOTS

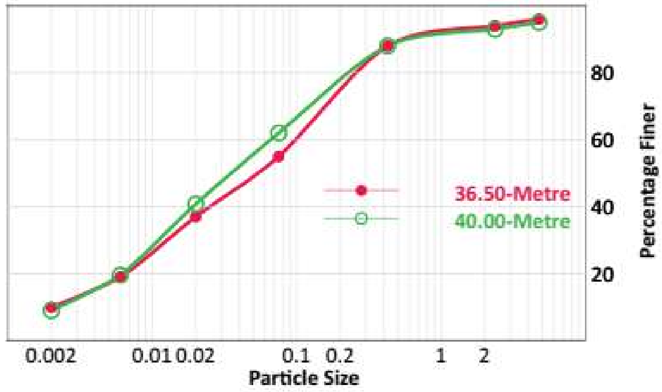
BH- P123A-CH.24144.847



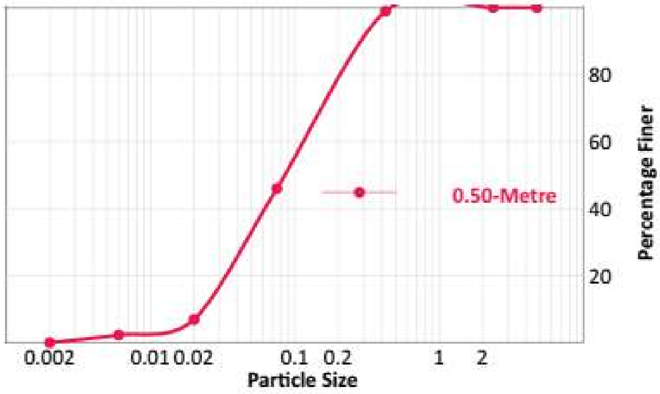
BH- P123A-CH.24144.847



BH- P123A-CH.24144.847



BH- P124A-CH.24171.047



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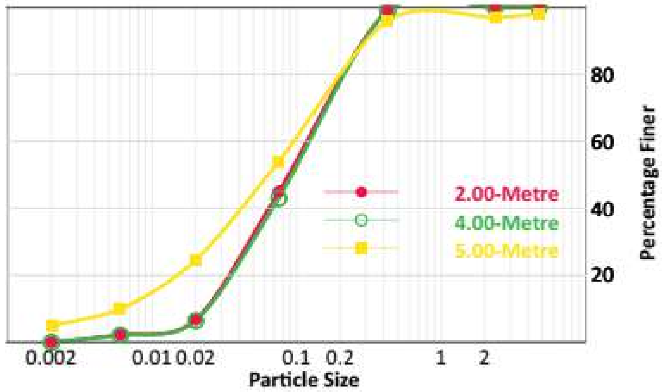

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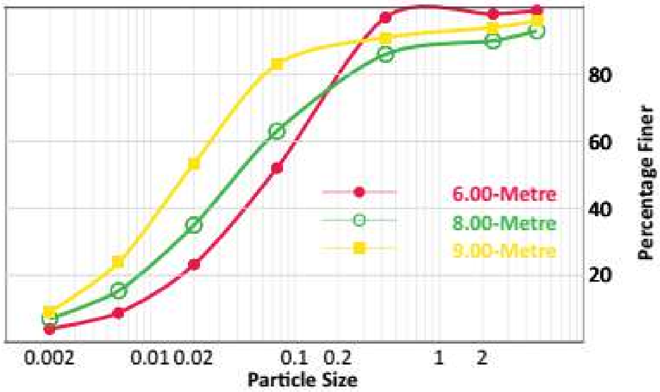

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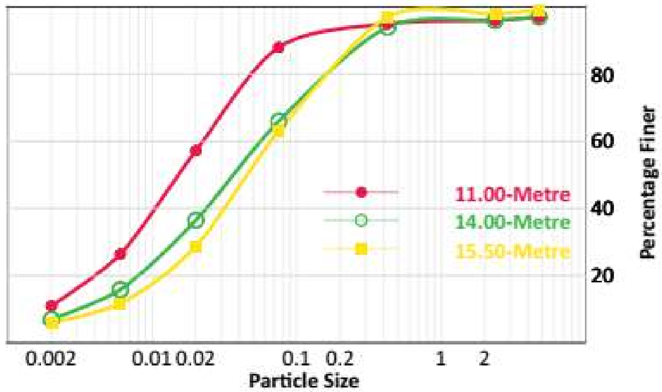

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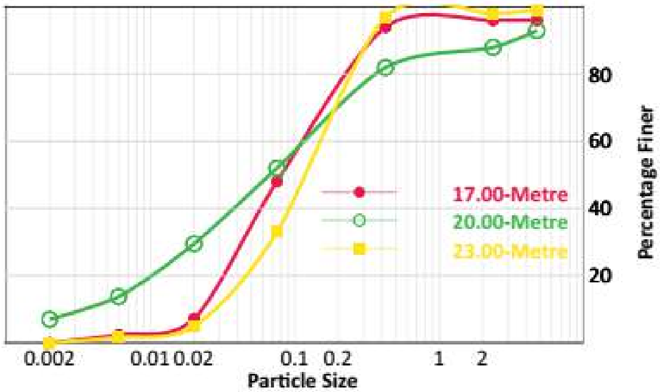
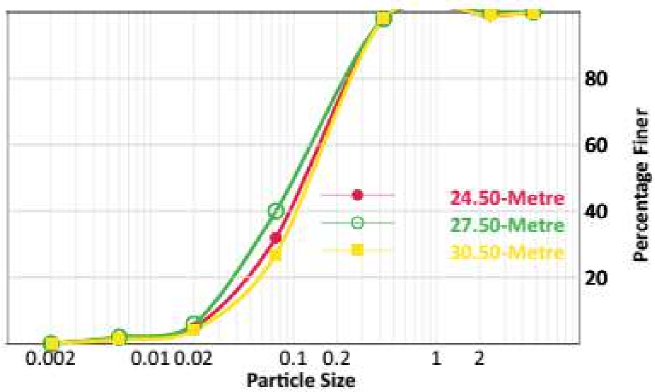


APPENDIX-D

PLOT 11: GRAIN SIZE DISTRIBUTION PLOTS

BH- P124A-CH.24171.047



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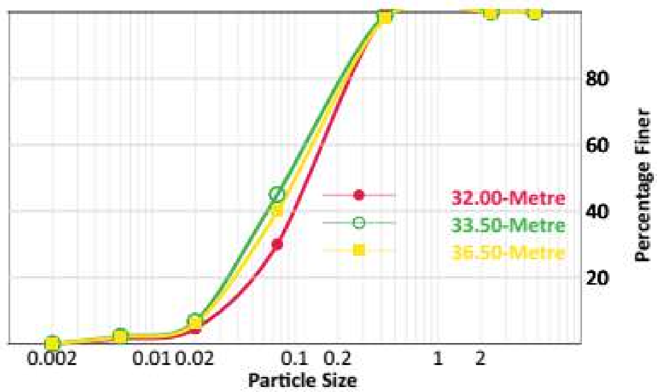

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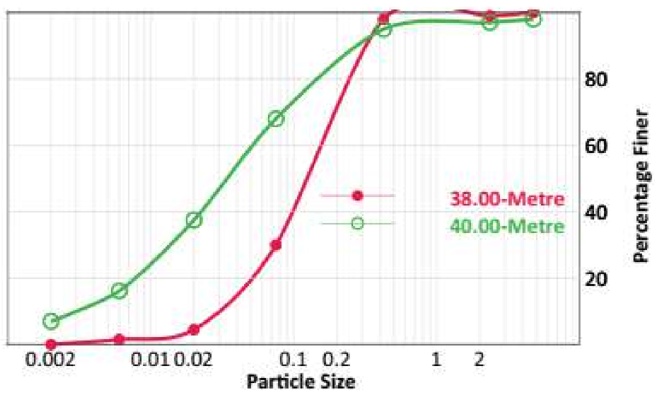
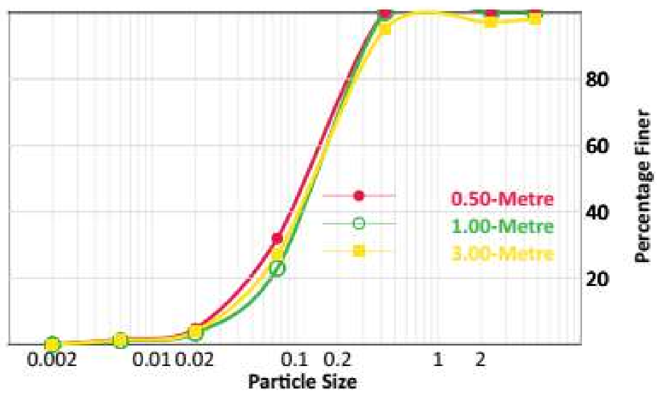
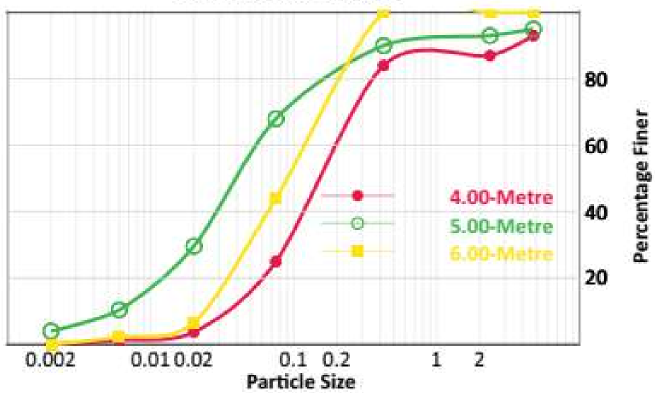


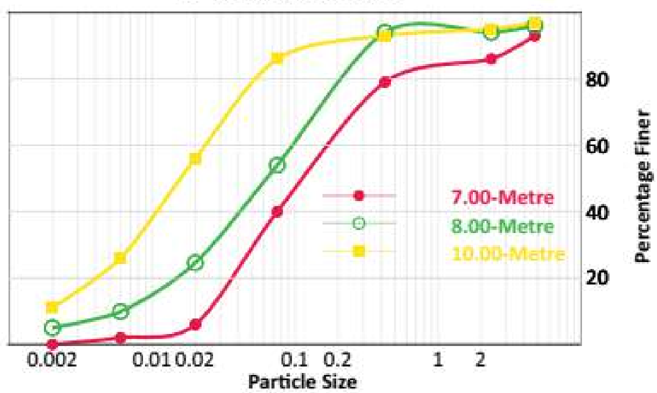
BH- P125A-CH.24197.247



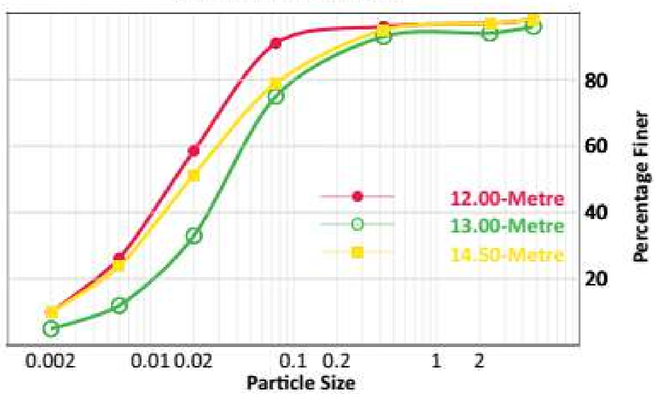
BH- P125A-CH.24197.247



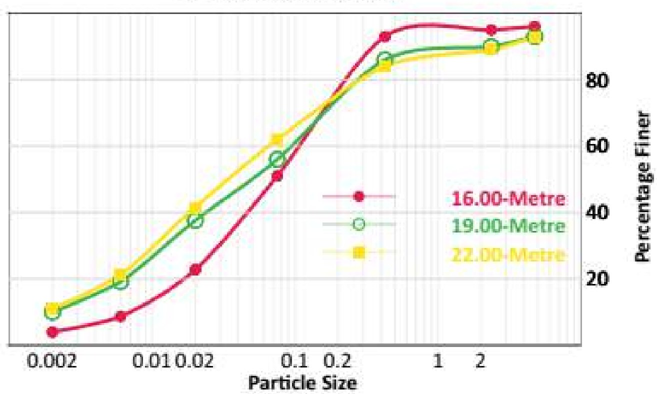
BH- P125A-CH.24197.247



BH- P125A-CH.24197.247



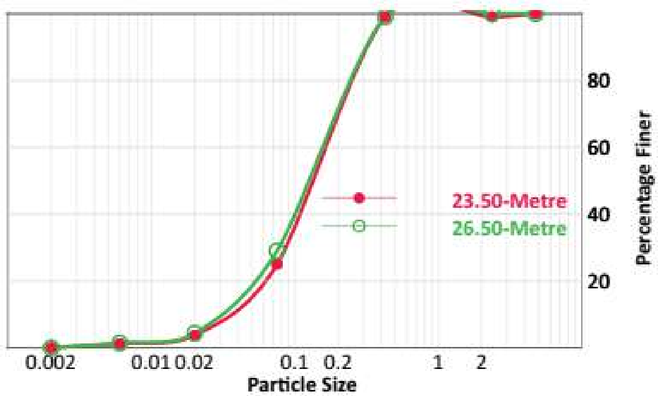
BH- P125A-CH.24197.247



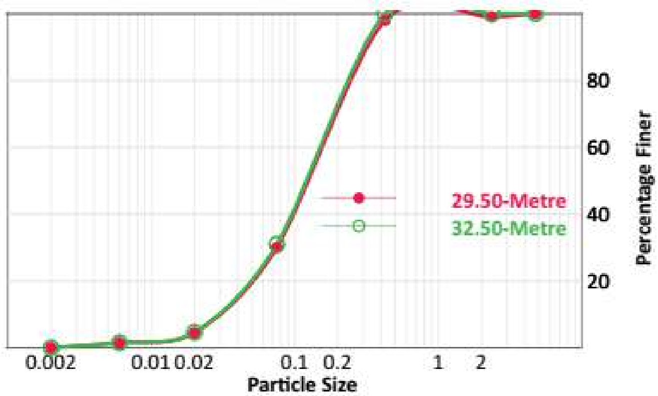
APPENDIX-D

PLOT 12: GRAIN SIZE DISTRIBUTION PLOTS

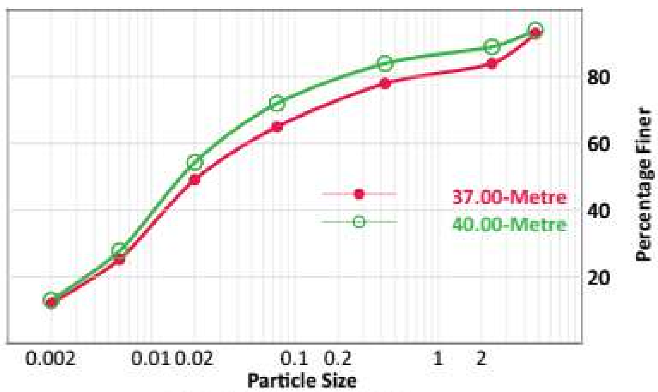
BH- P125A-CH.24197.247



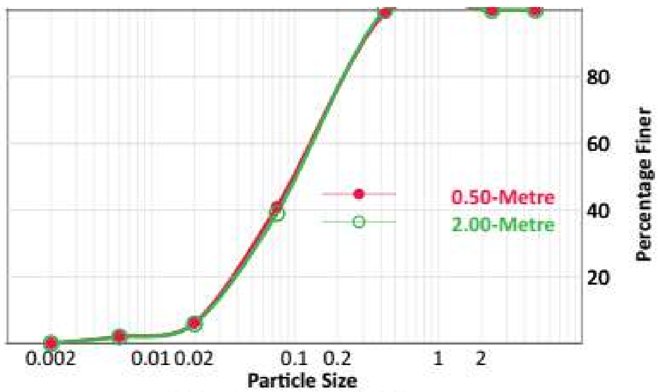
BH- P125A-CH.24197.247



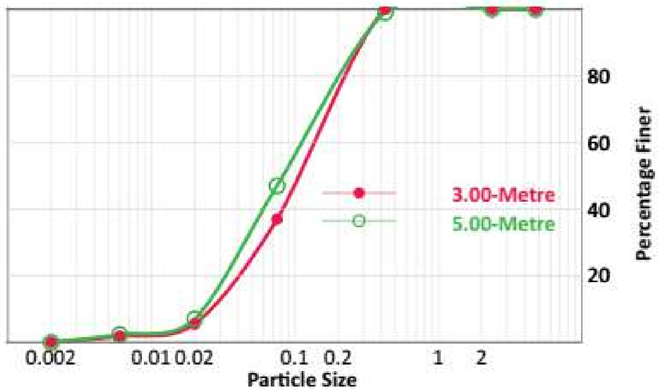
BH- P125A-CH.24197.247



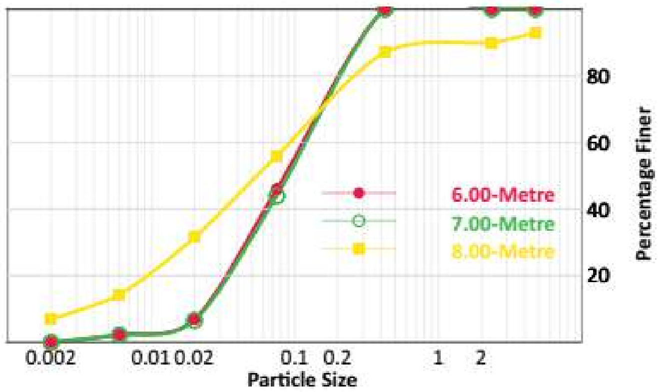
BH- P126A-CH.24223.447



BH- P126A-CH.24223.447



BH- P126A-CH.24223.447



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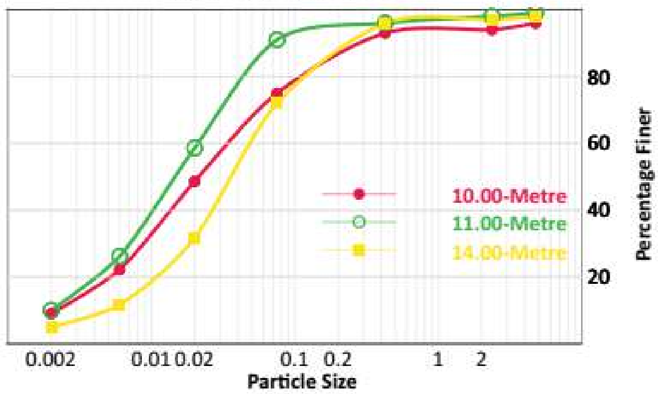

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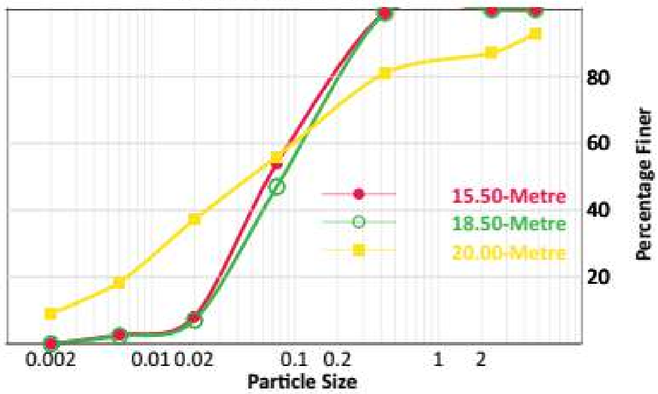
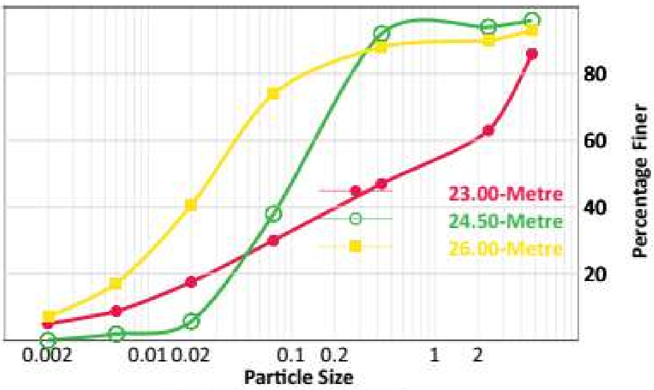


APPENDIX-D
PLOT 13: GRAIN SIZE DISTRIBUTION PLOTS

BH- P126A-CH.24223.447



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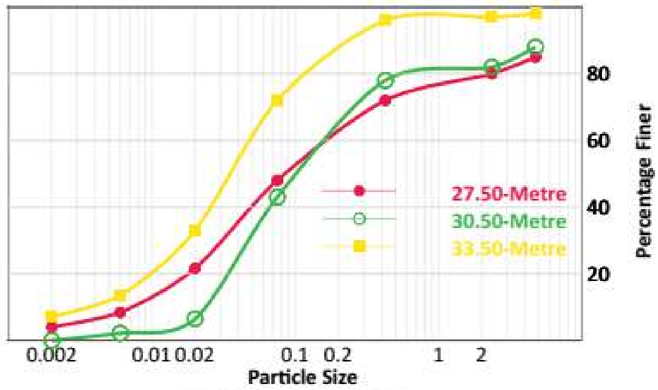
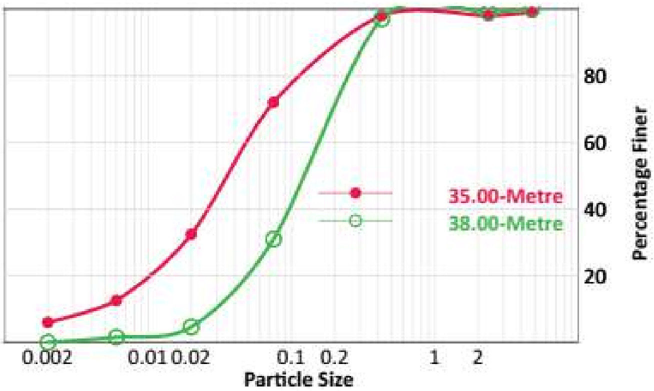
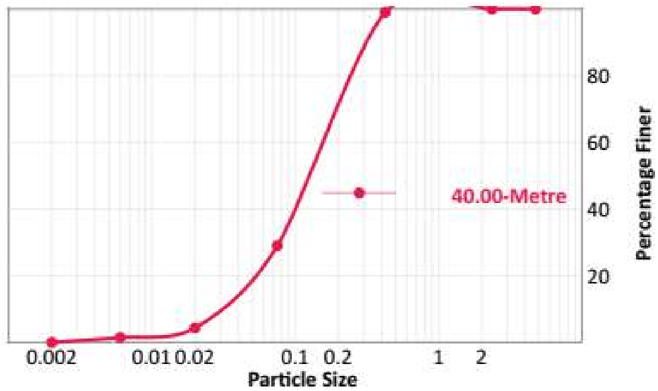


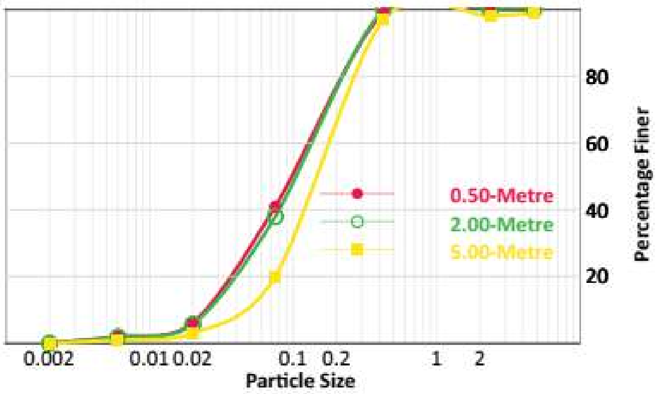
BH- P126A-CH.24223.447



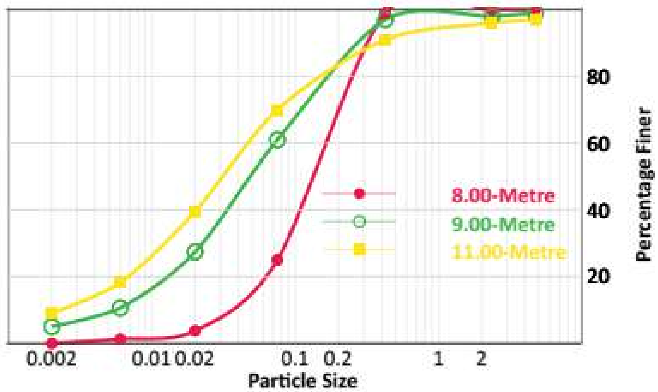
BH- P126A-CH.24223.447



BH- P127A-CH.24249.647



BH- P127A-CH.24249.647



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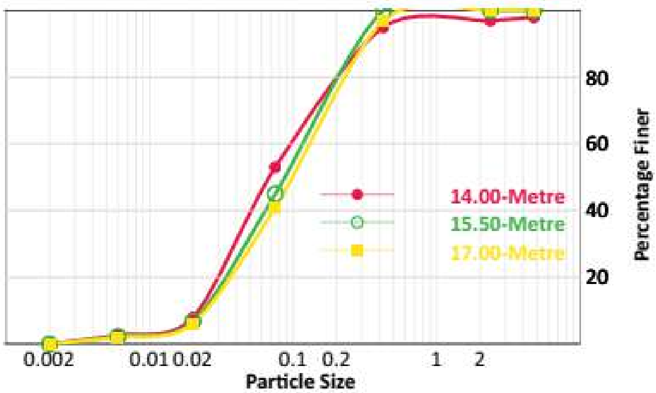
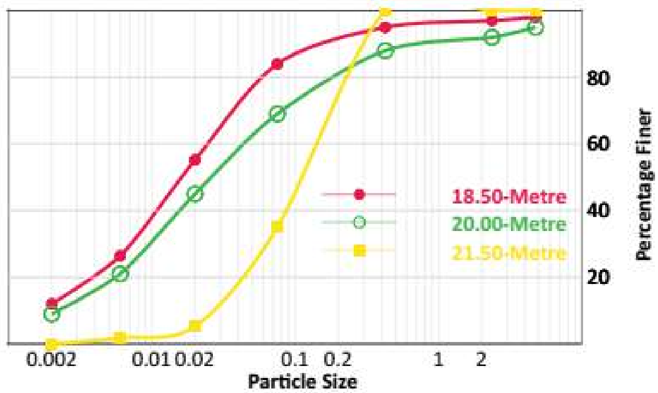
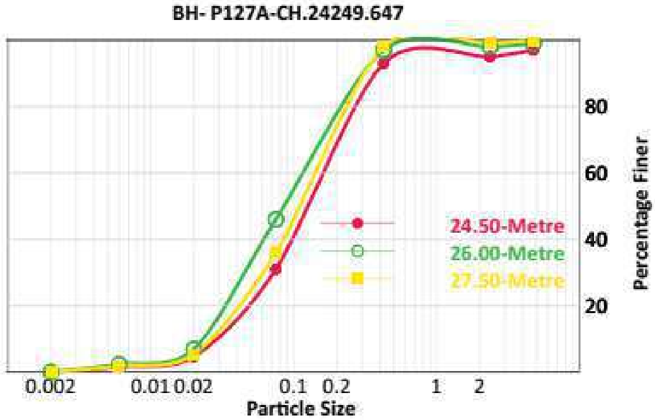


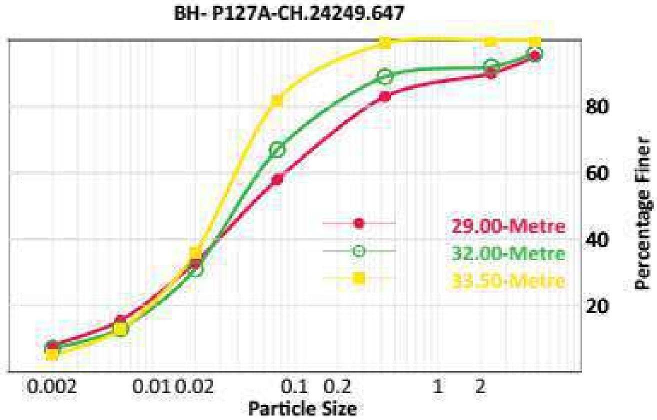
BH- P127A-CH.24249.647

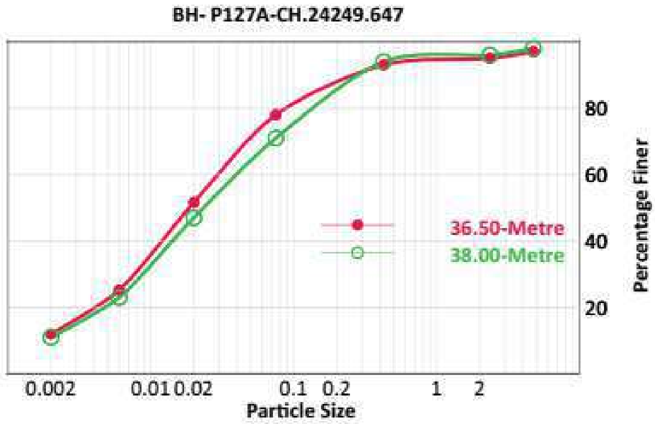


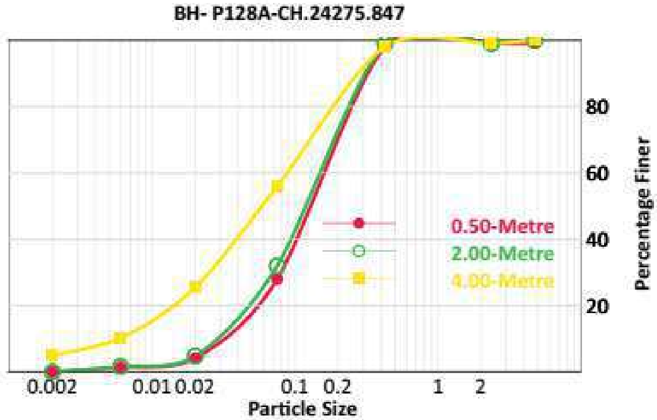
APPENDIX-D

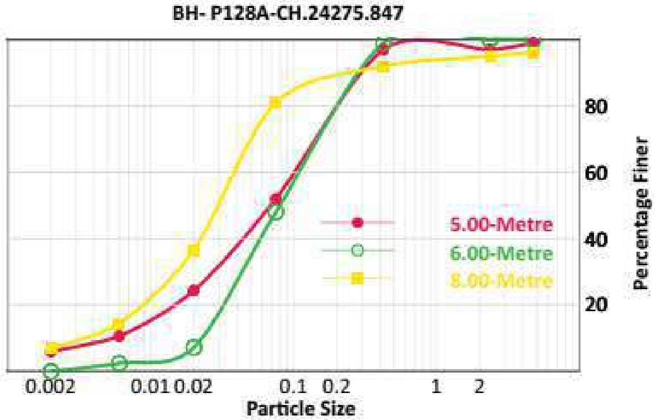
PLOT 14: GRAIN SIZE DISTRIBUTION PLOTS

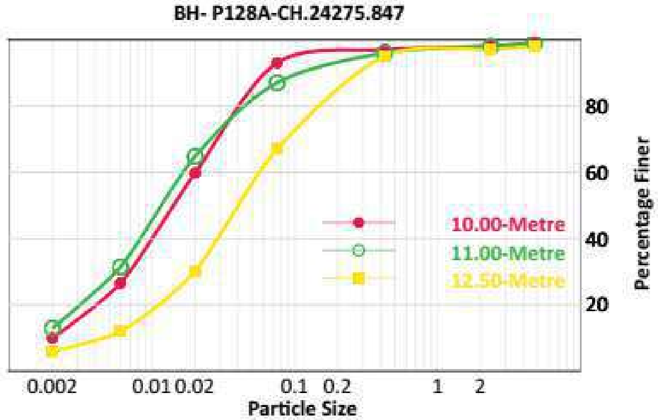


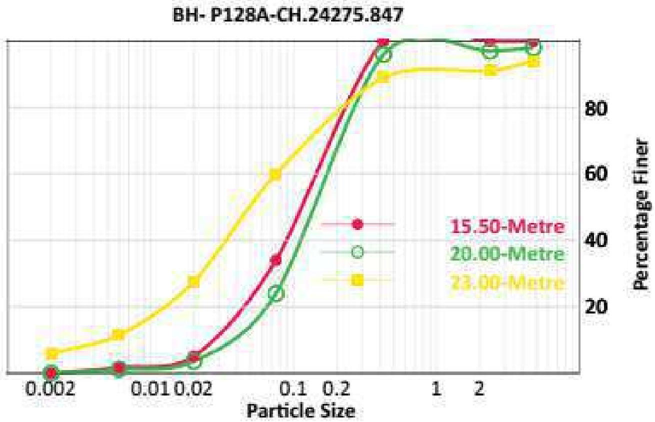


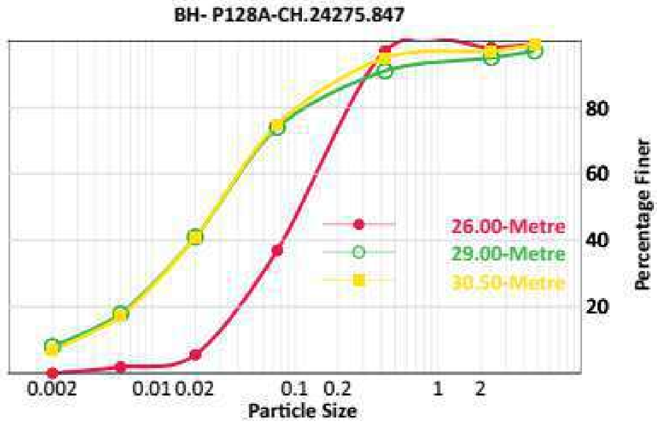






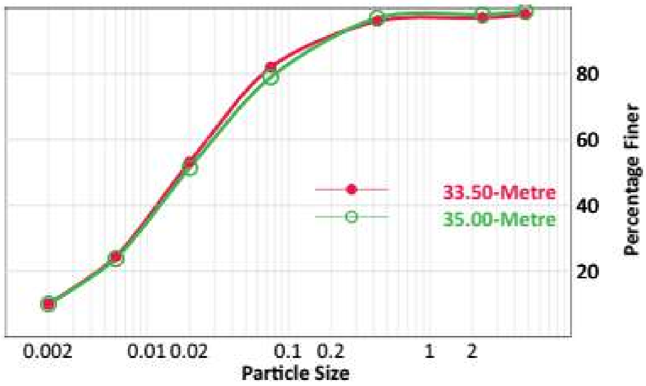




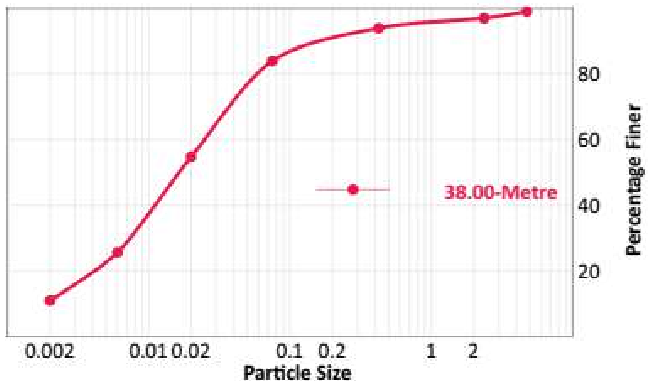


APPENDIX-D
PLOT 15: GRAIN SIZE DISTRIBUTION PLOTS

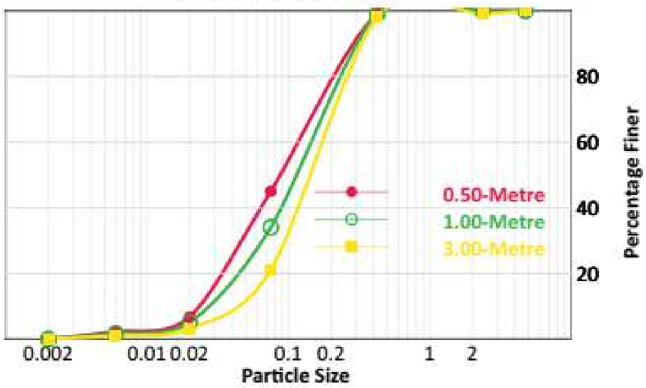
BH- P128A-CH.24275.847



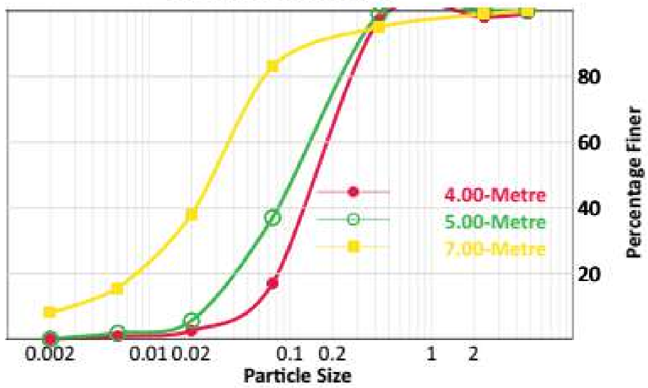
BH- P128A-CH.24275.847



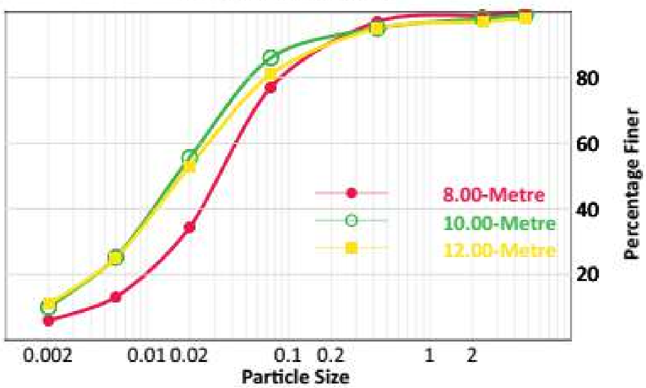
BH- P129A-CH.24302.047



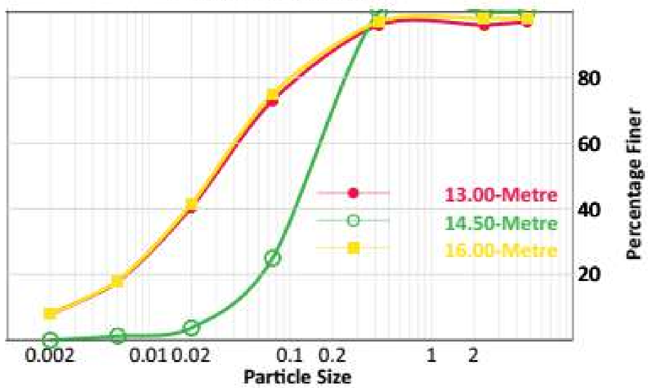
BH- P129A-CH.24302.047



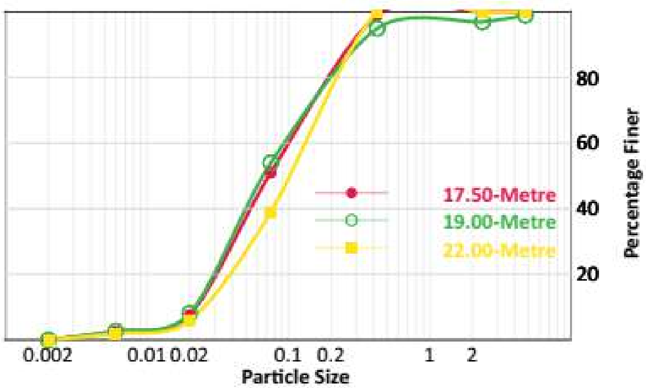
BH- P129A-CH.24302.047



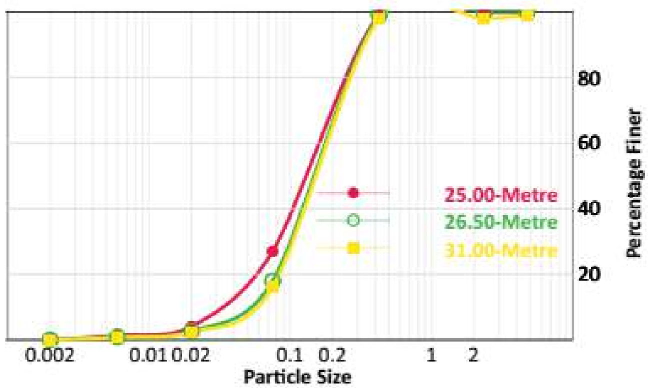
BH- P129A-CH.24302.047



BH- P129A-CH.24302.047

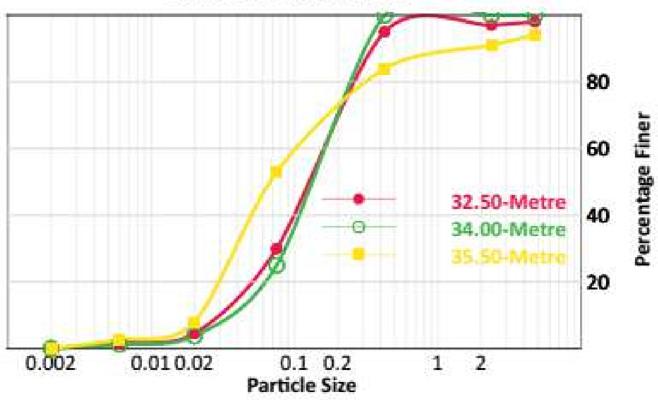


BH- P129A-CH.24302.047

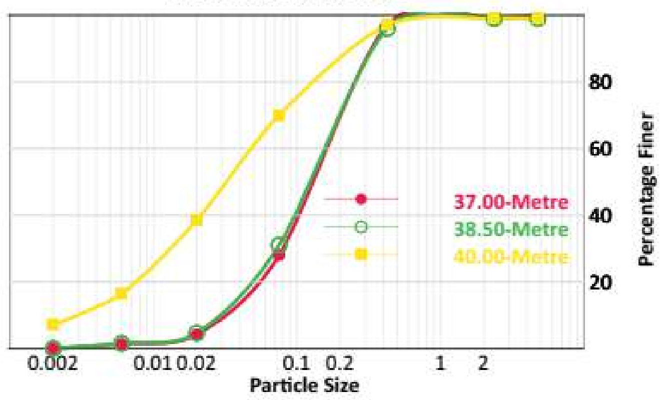


APPENDIX-D
PLOT 16: GRAIN SIZE DISTRIBUTION PLOTS

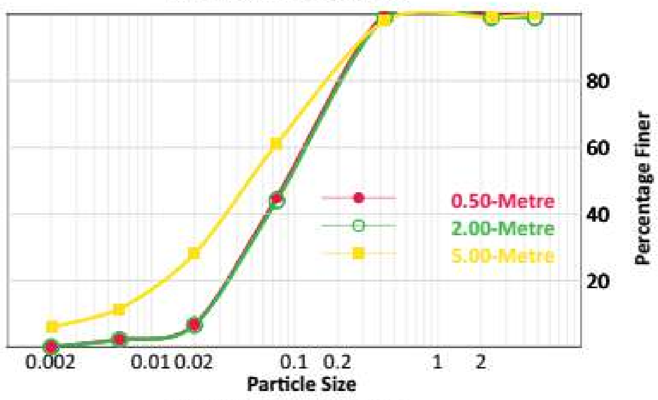
BH- P129A-CH.24302.047



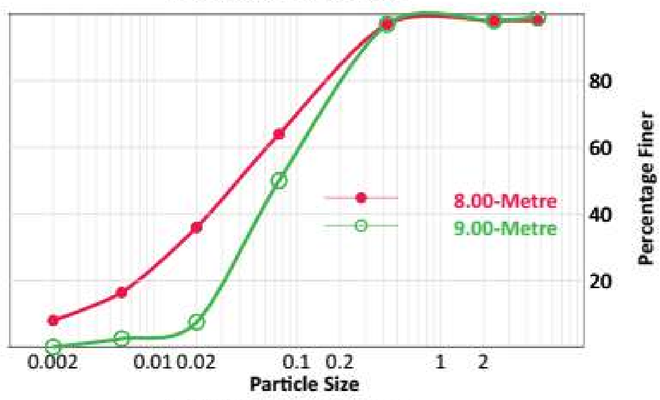
BH- P129A-CH.24302.047



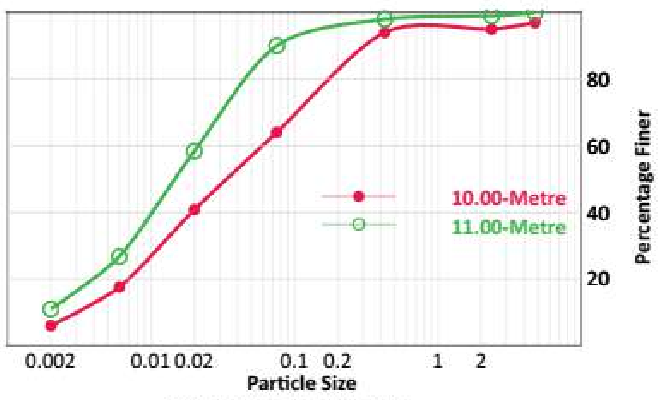
BH- P130A-CH.24328.247



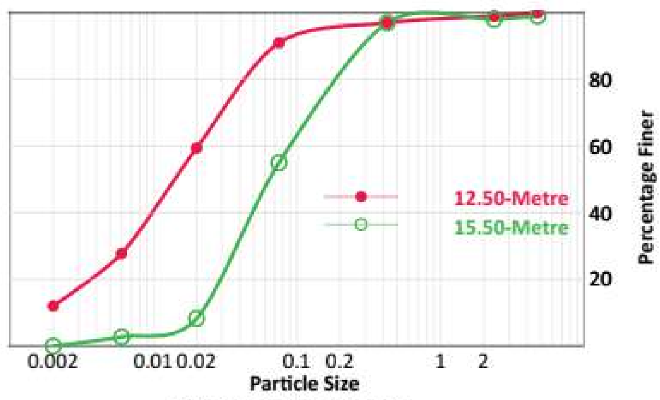
BH- P130A-CH.24328.247



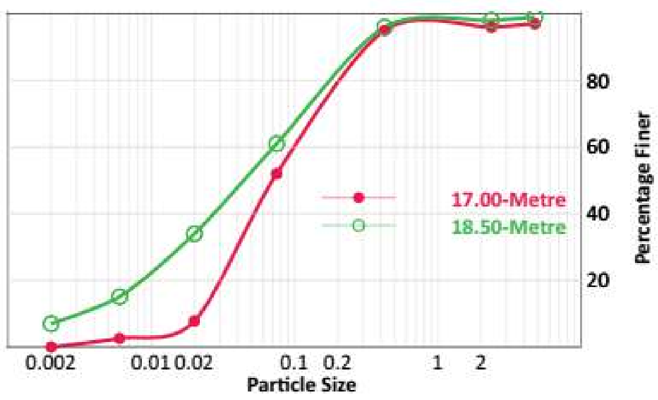
BH- P130A-CH.24328.247



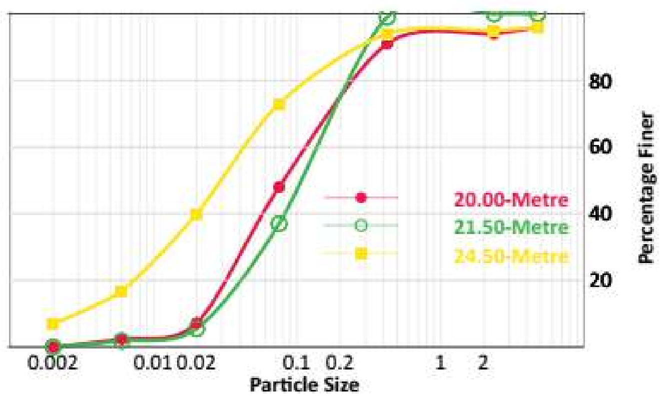
BH- P130A-CH.24328.247



BH- P130A-CH.24328.247



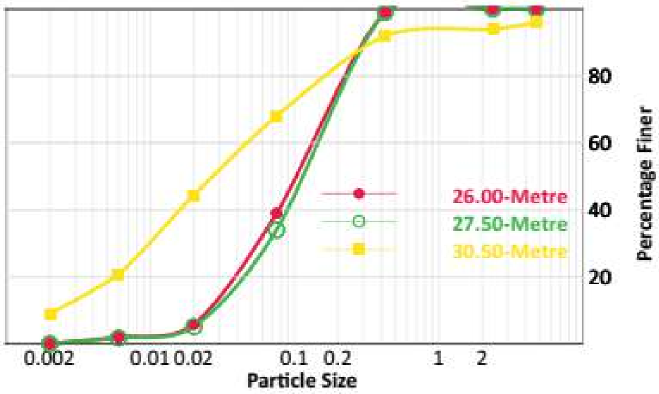
BH- P130A-CH.24328.247



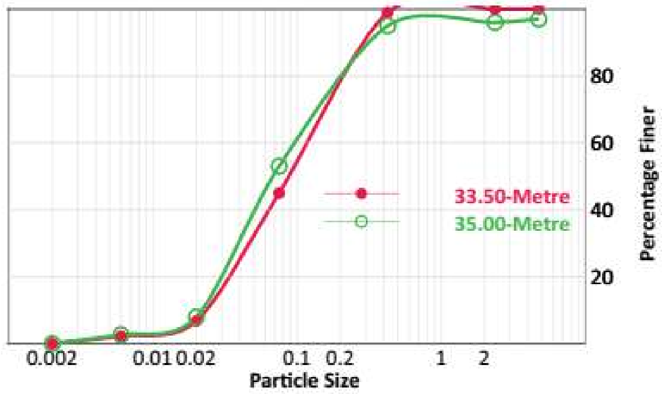
APPENDIX-D

PLOT 17: GRAIN SIZE DISTRIBUTION PLOTS

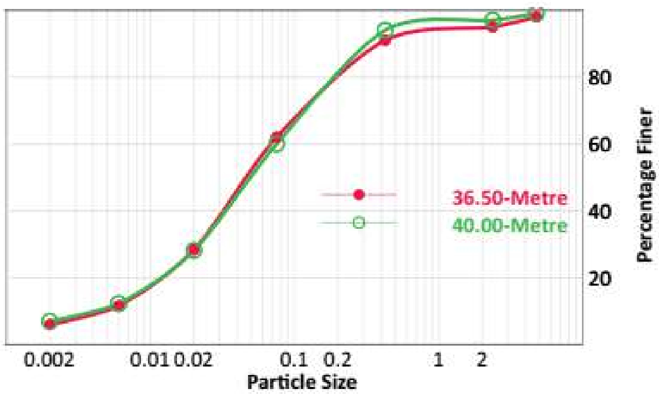
BH- P130A-CH.24328.247



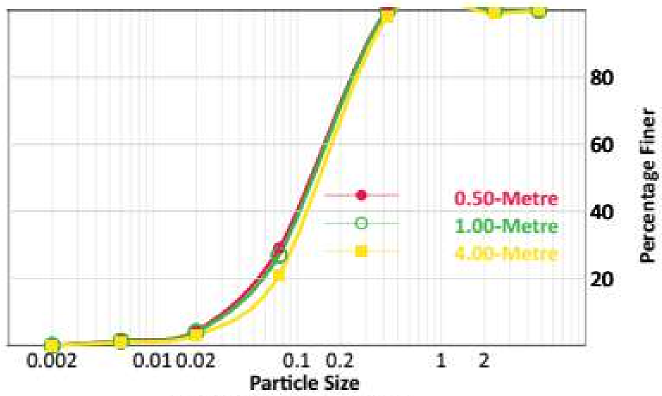
BH- P130A-CH.24328.247



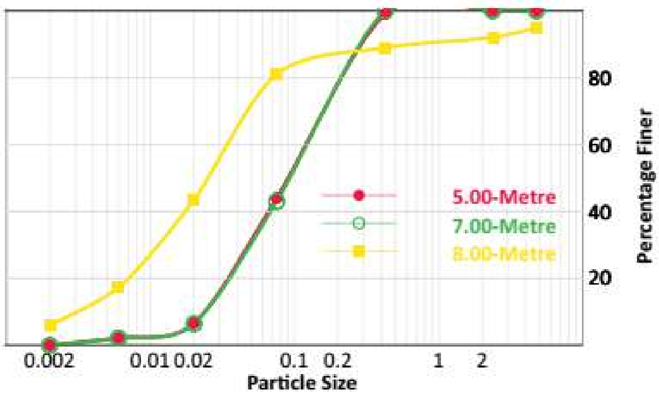
BH- P130A-CH.24328.247



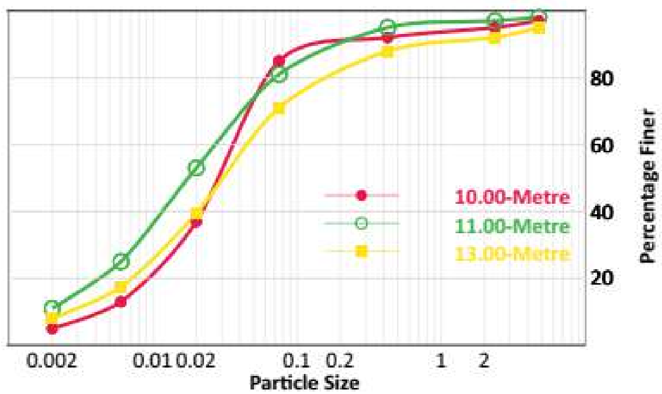
BH- P131A-CH.24354.447



BH- P131A-CH.24354.447



BH- P131A-CH.24354.447



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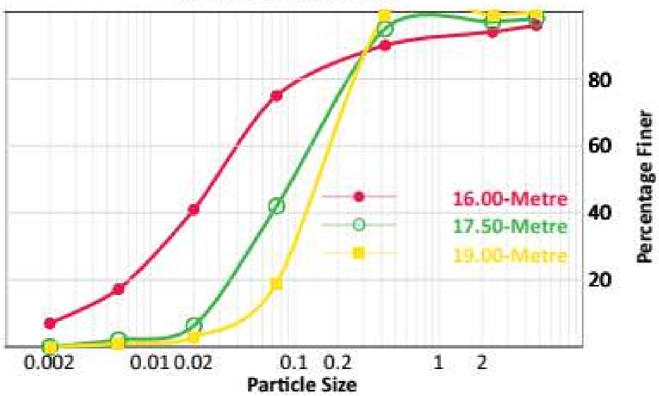
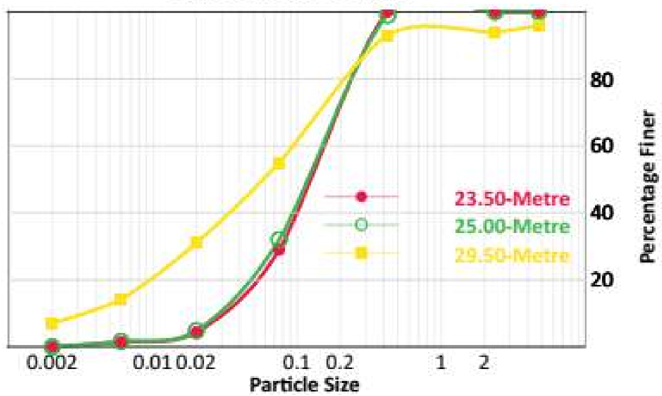
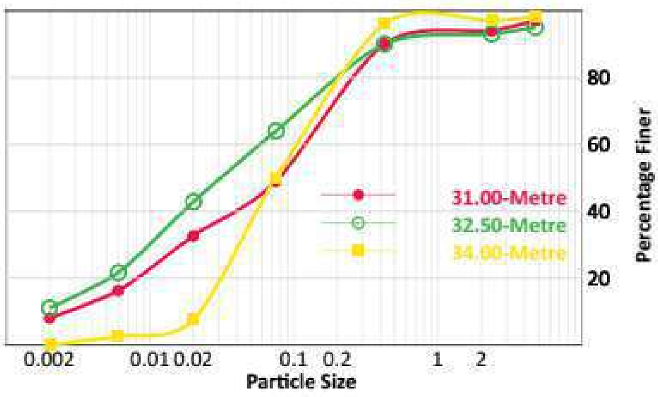


BH- P131A-CH.24354.447

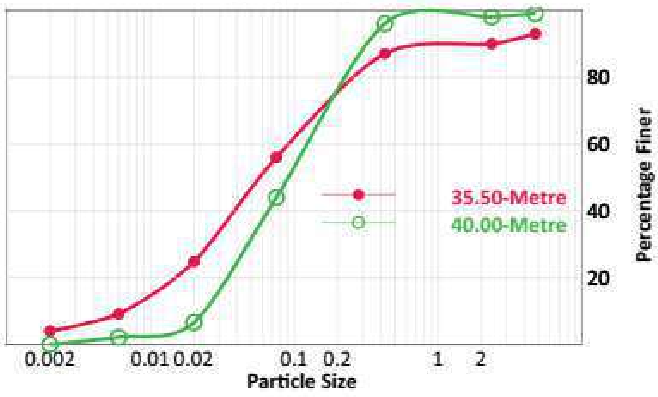


APPENDIX-D
PLOT 18: GRAIN SIZE DISTRIBUTION PLOTS

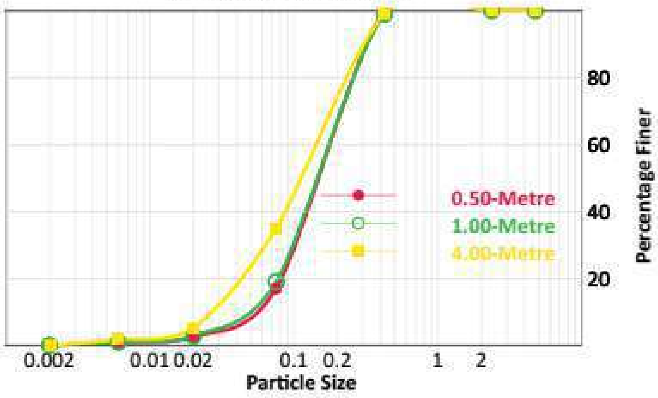
BH- P131A-CH.24354.447



BH- P131A-CH.24354.447



BH- P132A-CH.24380.647



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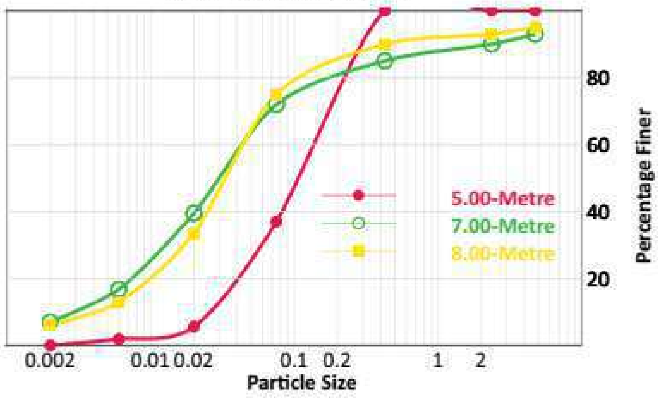

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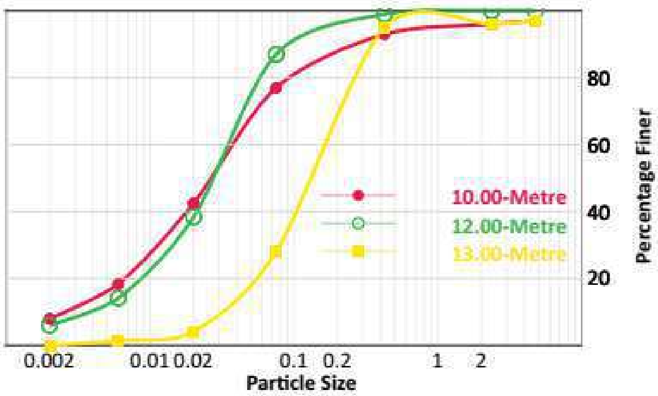

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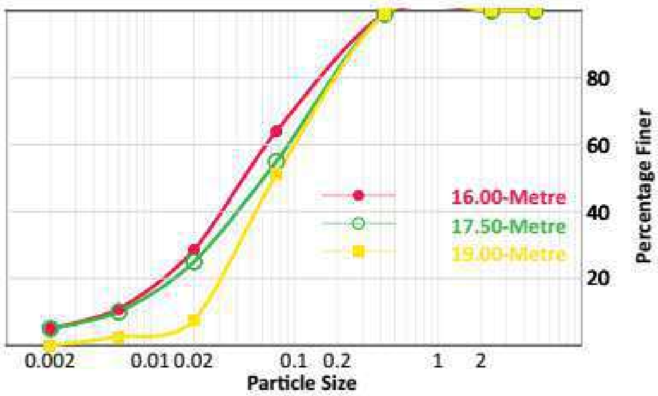

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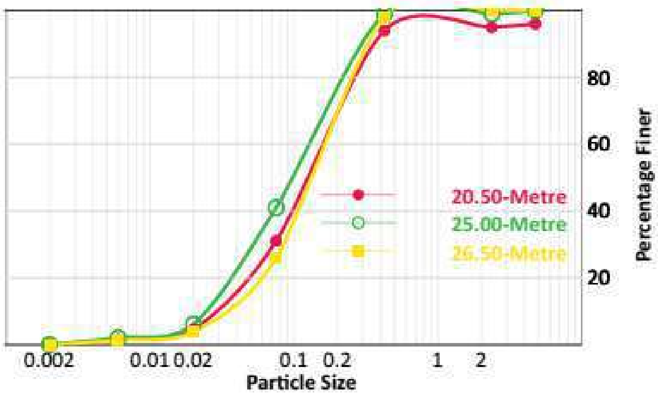

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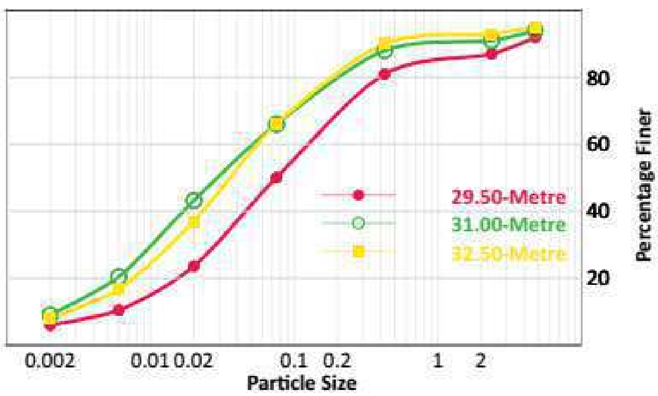
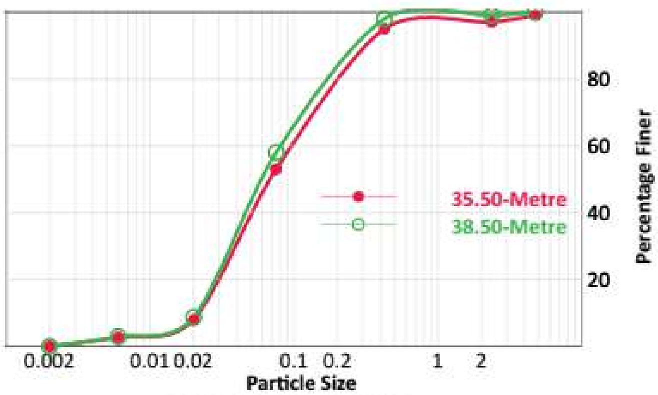
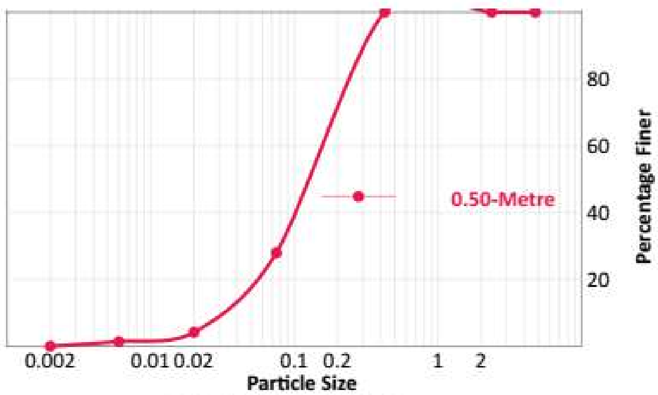


APPENDIX-D
PLOT 19: GRAIN SIZE DISTRIBUTION PLOTS

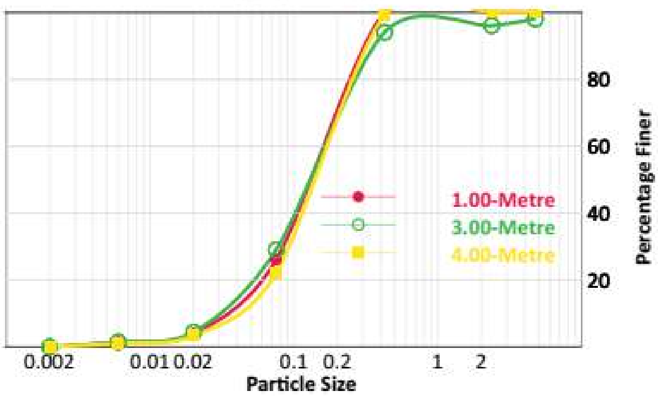
BH- P132A-CH.24380.647



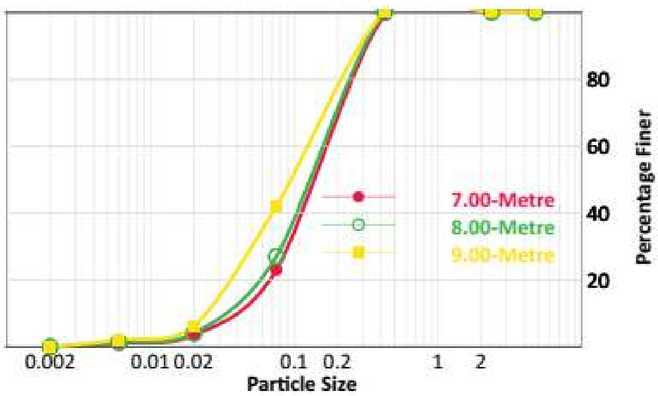
BH- P133A-CH.24406.847



BH- P133A-CH.24406.847



BH- P133A-CH.24406.847



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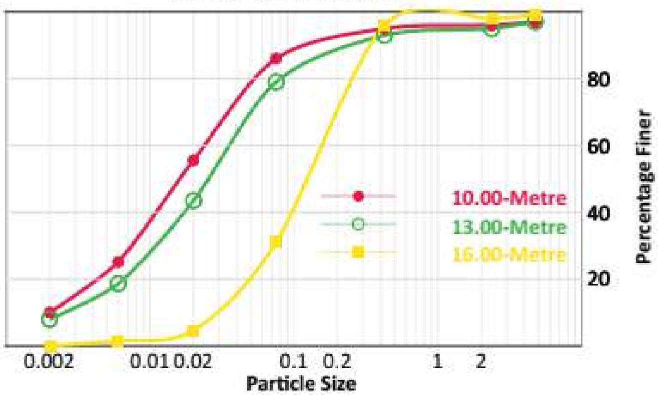

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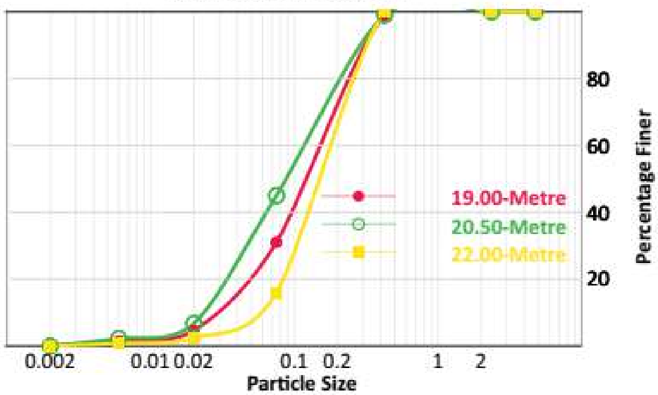

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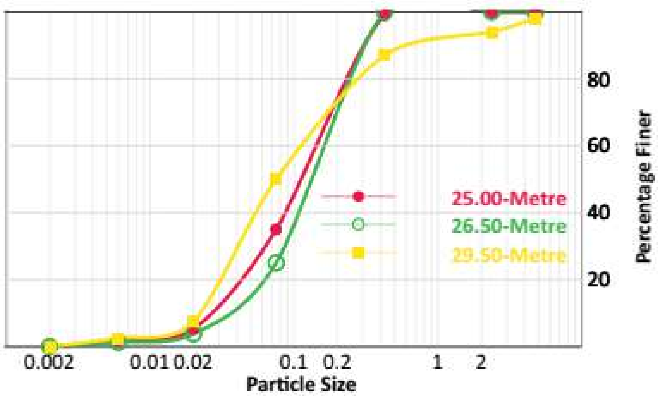

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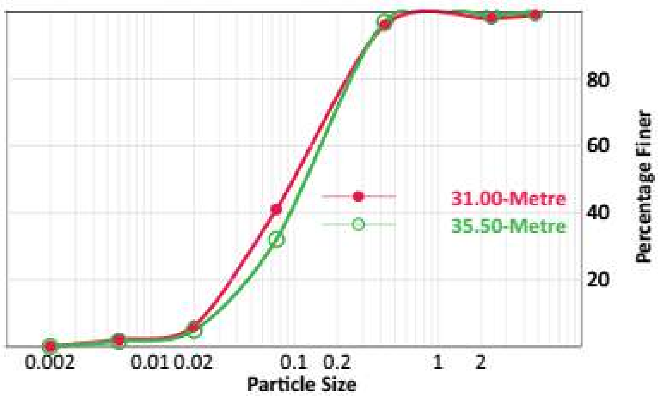
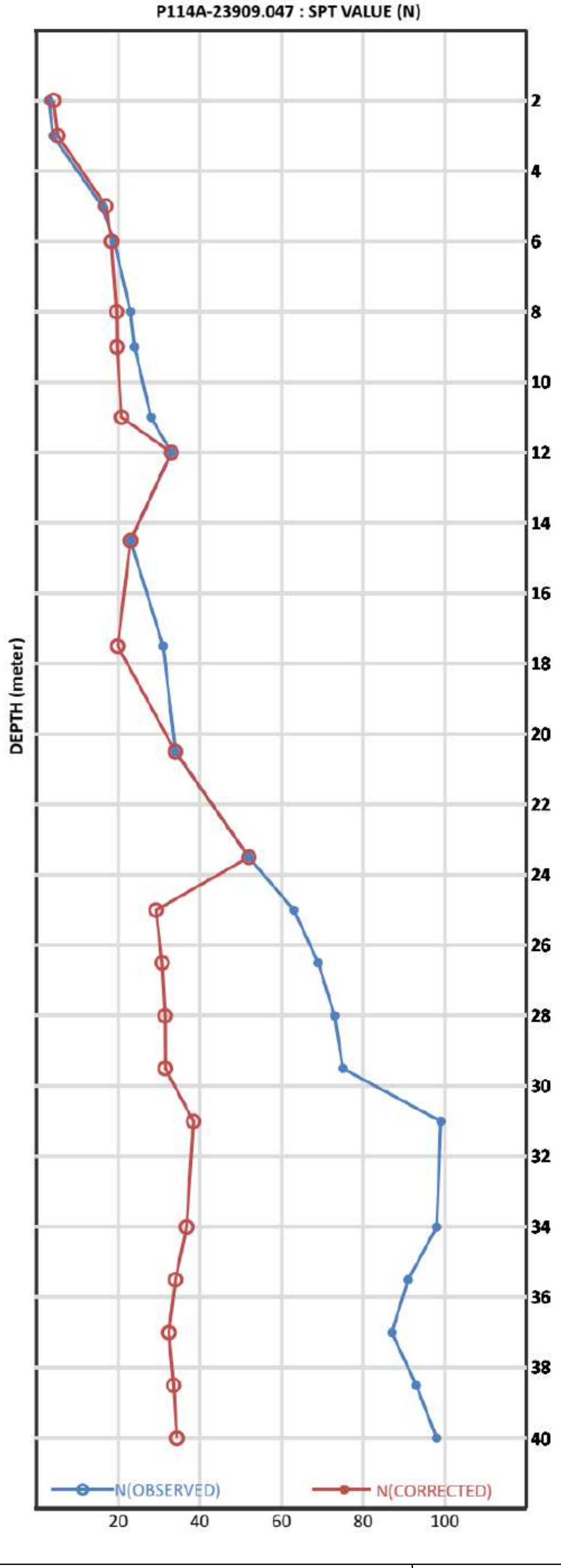
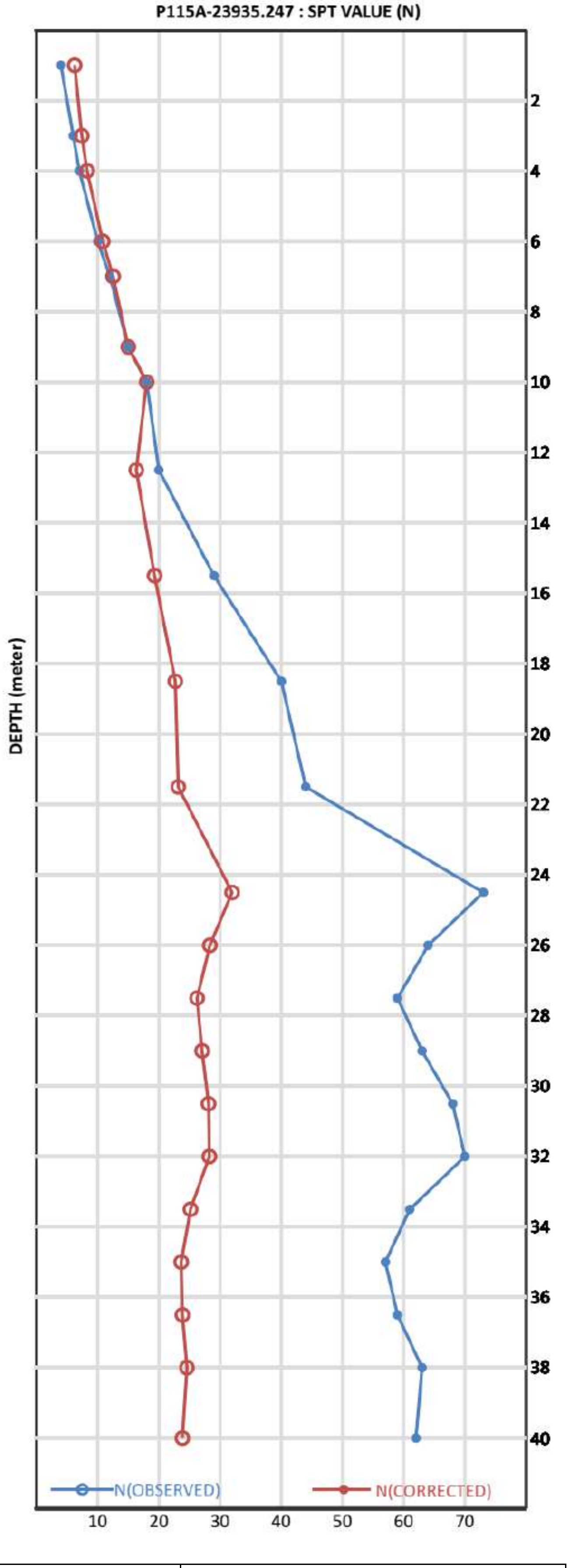
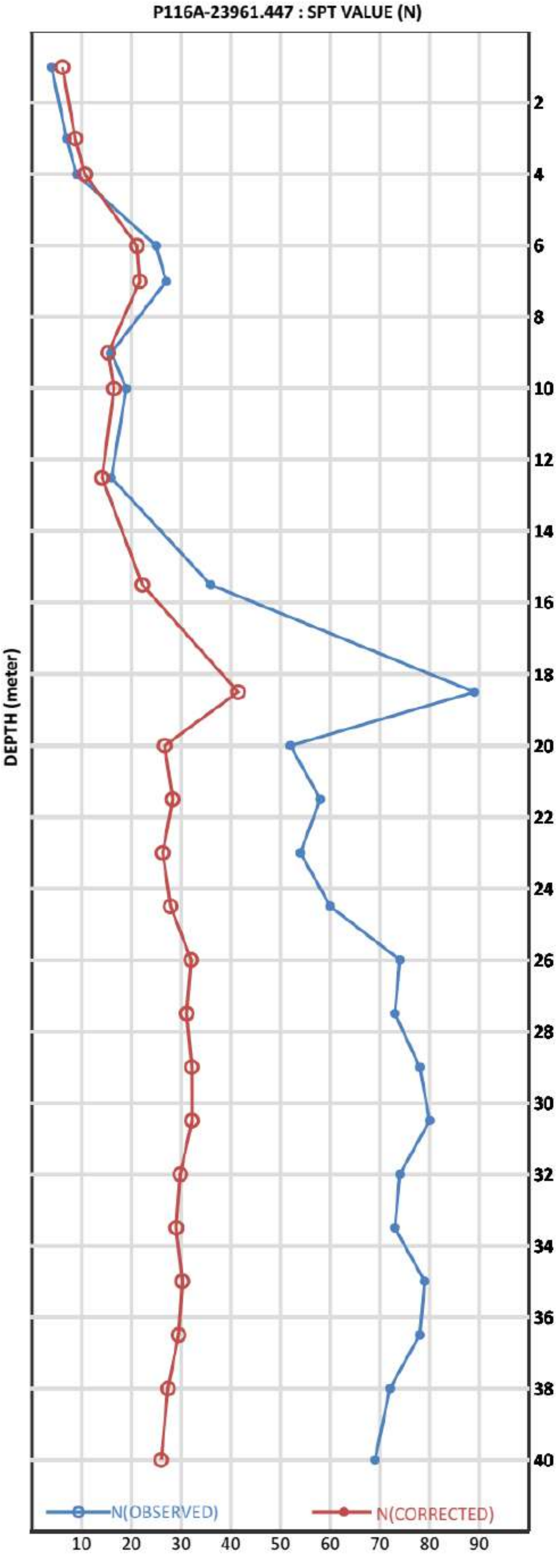


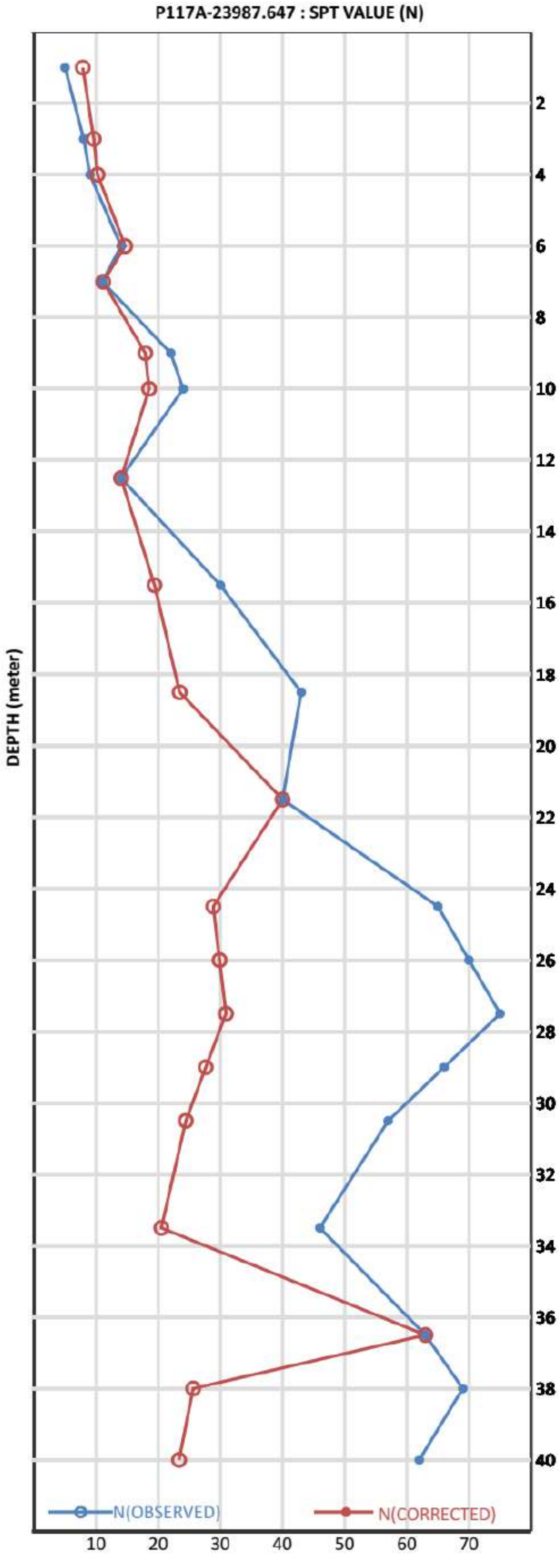
APPENDIX-E
PLOT 1: RECORDED SPT Vs CORRECTED SPT



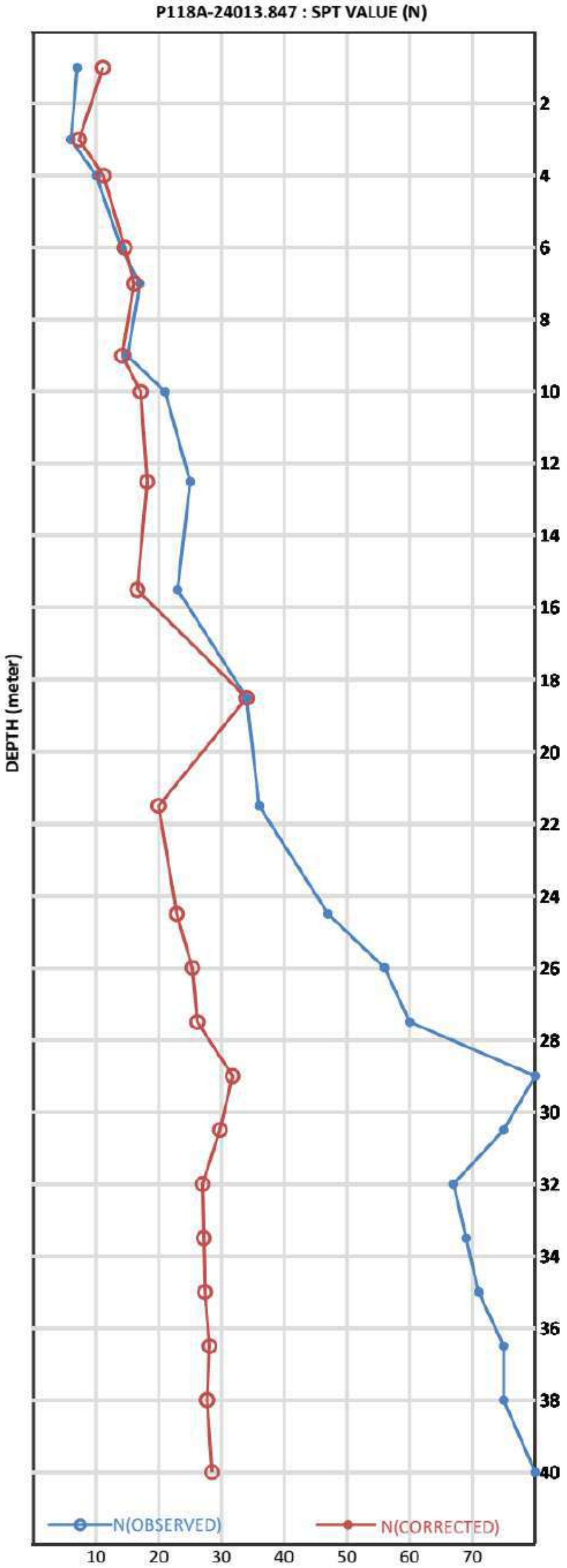


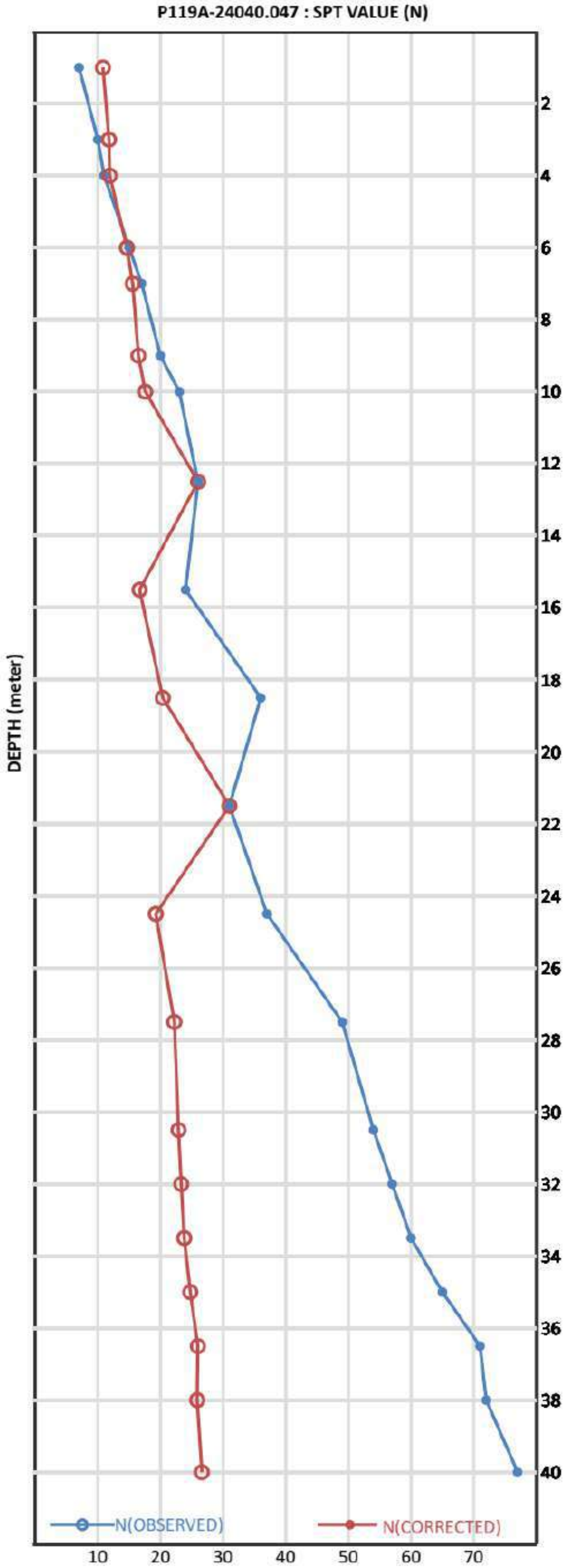
APPENDIX-E
PLOT 2: RECORDED SPT Vs CORRECTED SPT



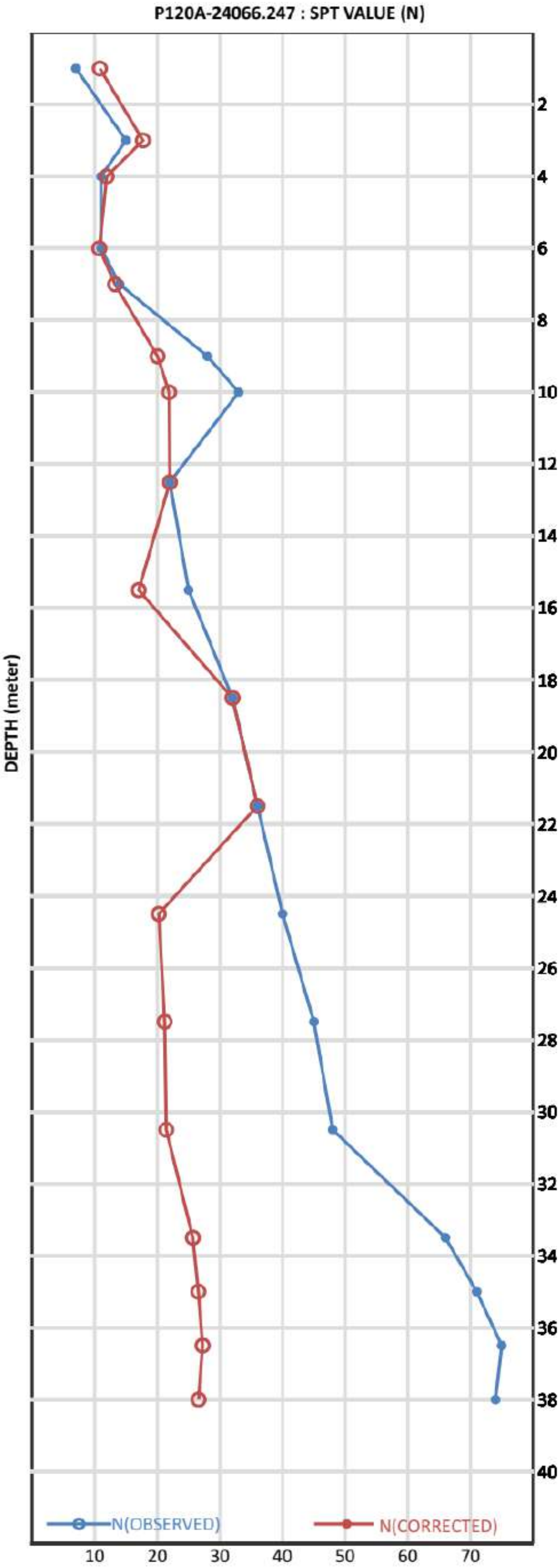


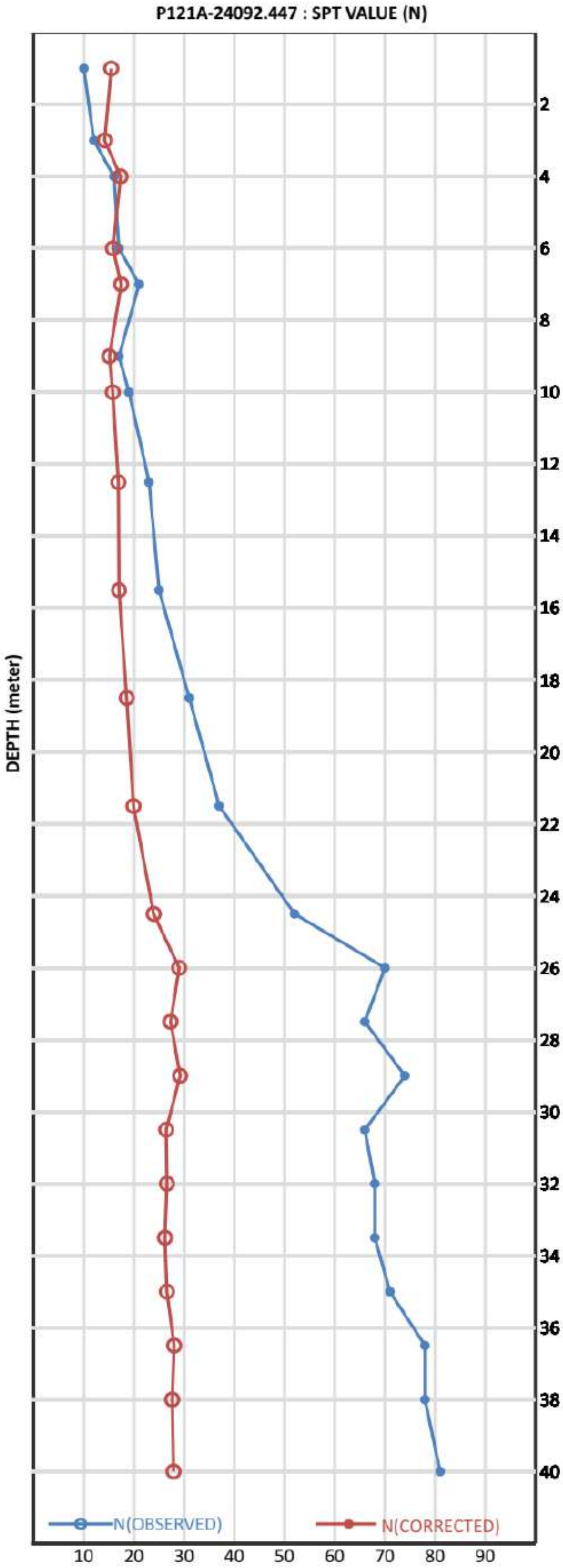
APPENDIX-E
PLOT 3: RECORDED SPT Vs CORRECTED SPT



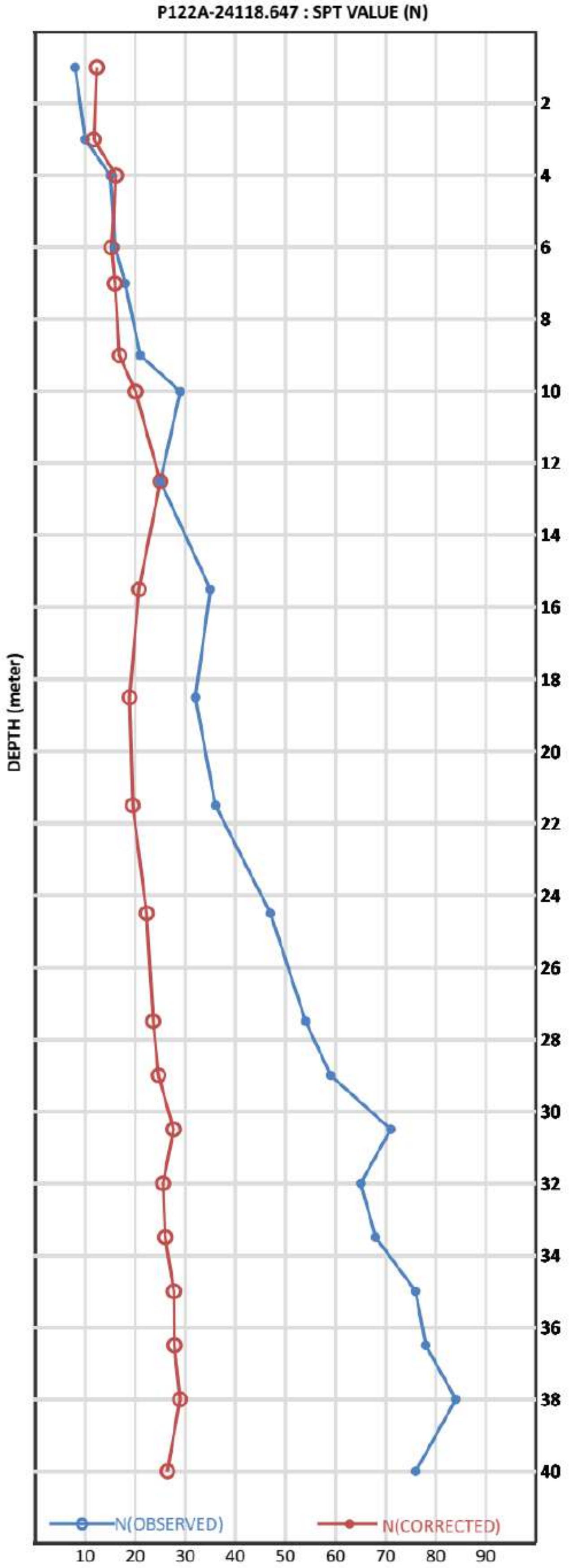


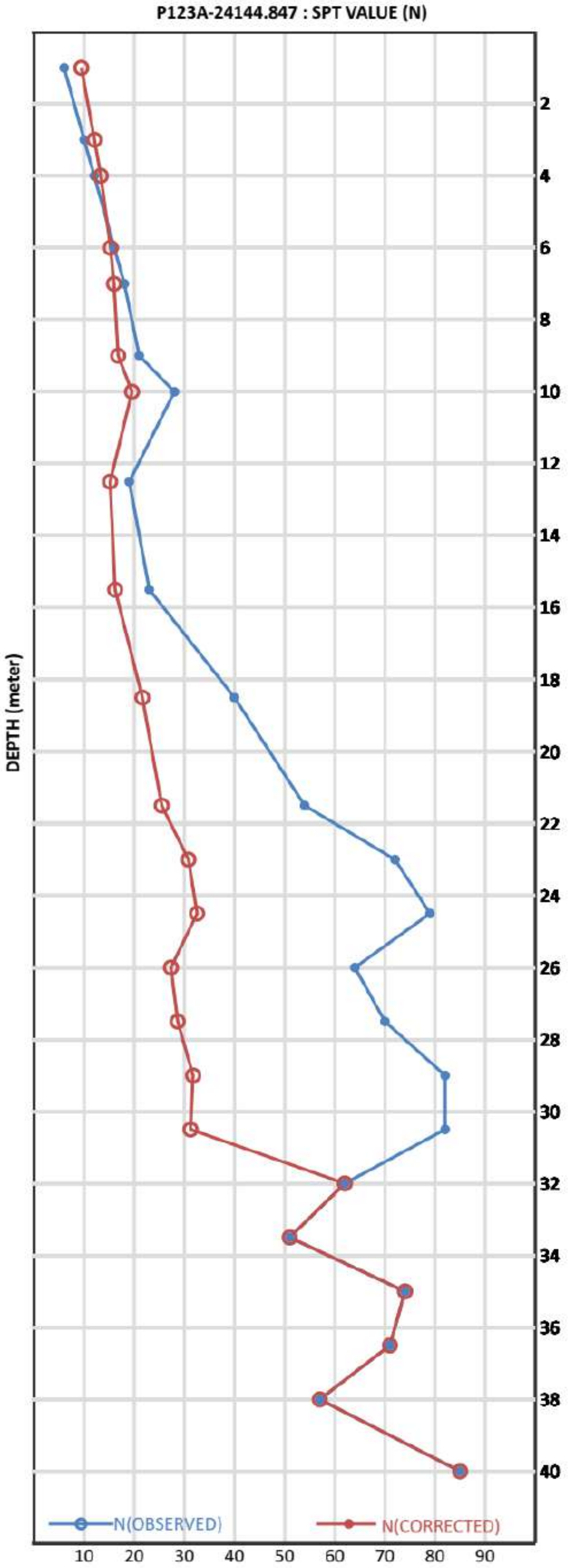
APPENDIX-E
PLOT 4: RECORDED SPT Vs CORRECTED SPT



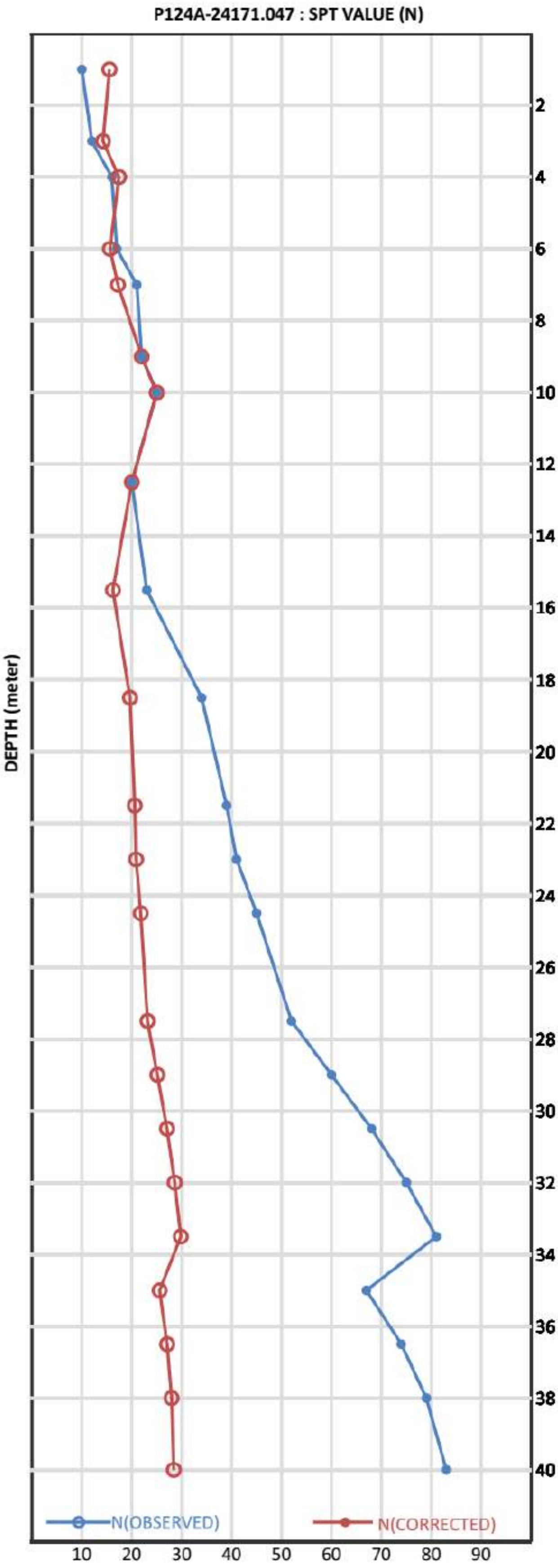


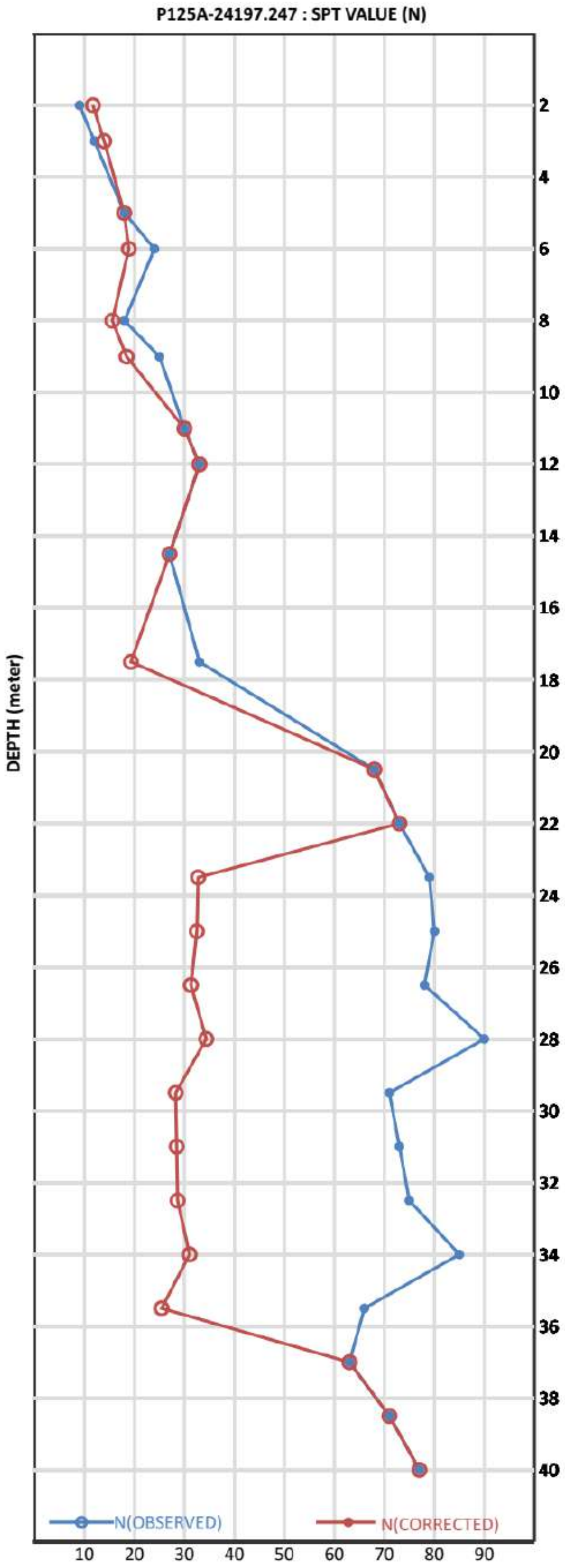
APPENDIX-E
PLOT 5: RECORDED SPT Vs CORRECTED SPT



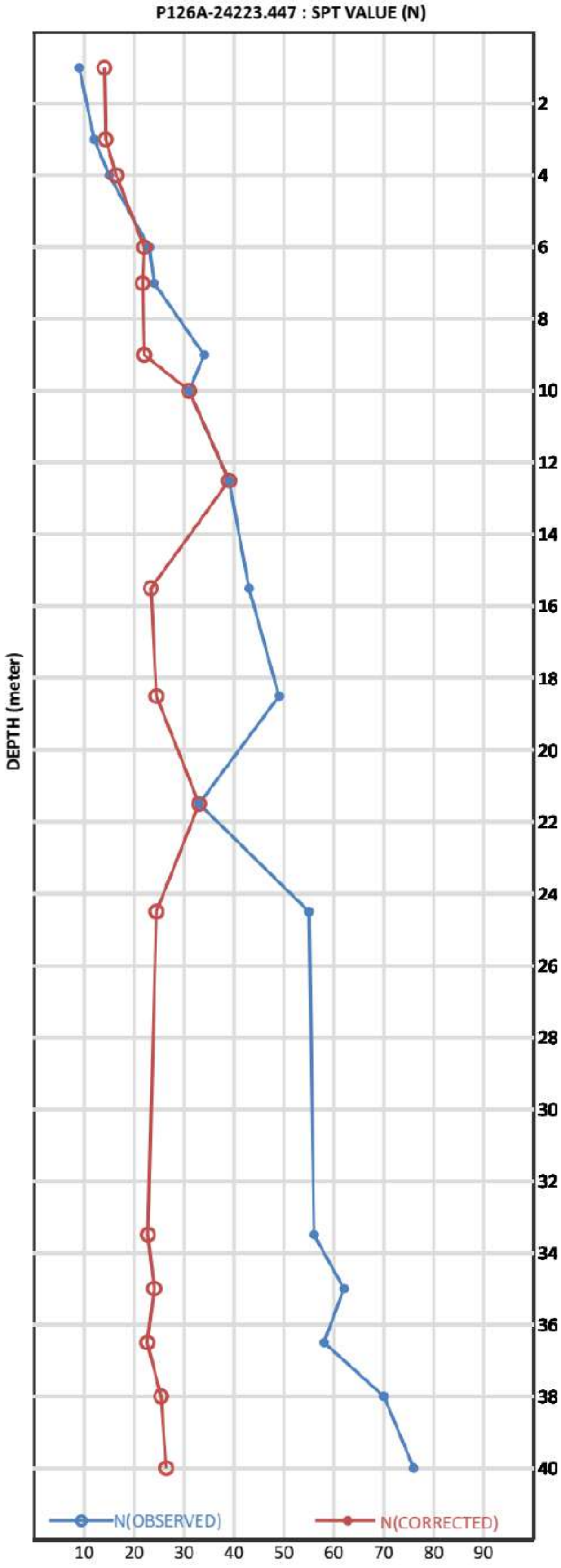


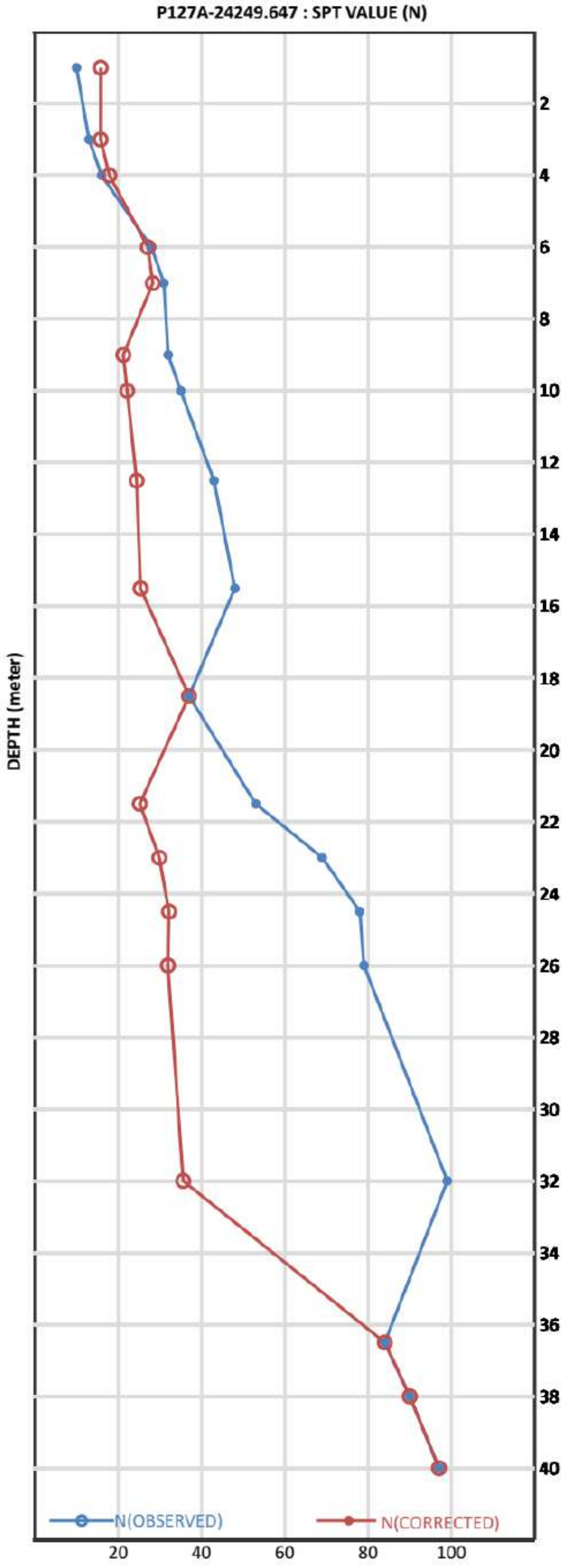
APPENDIX-E
PLOT 6: RECORDED SPT Vs CORRECTED SPT





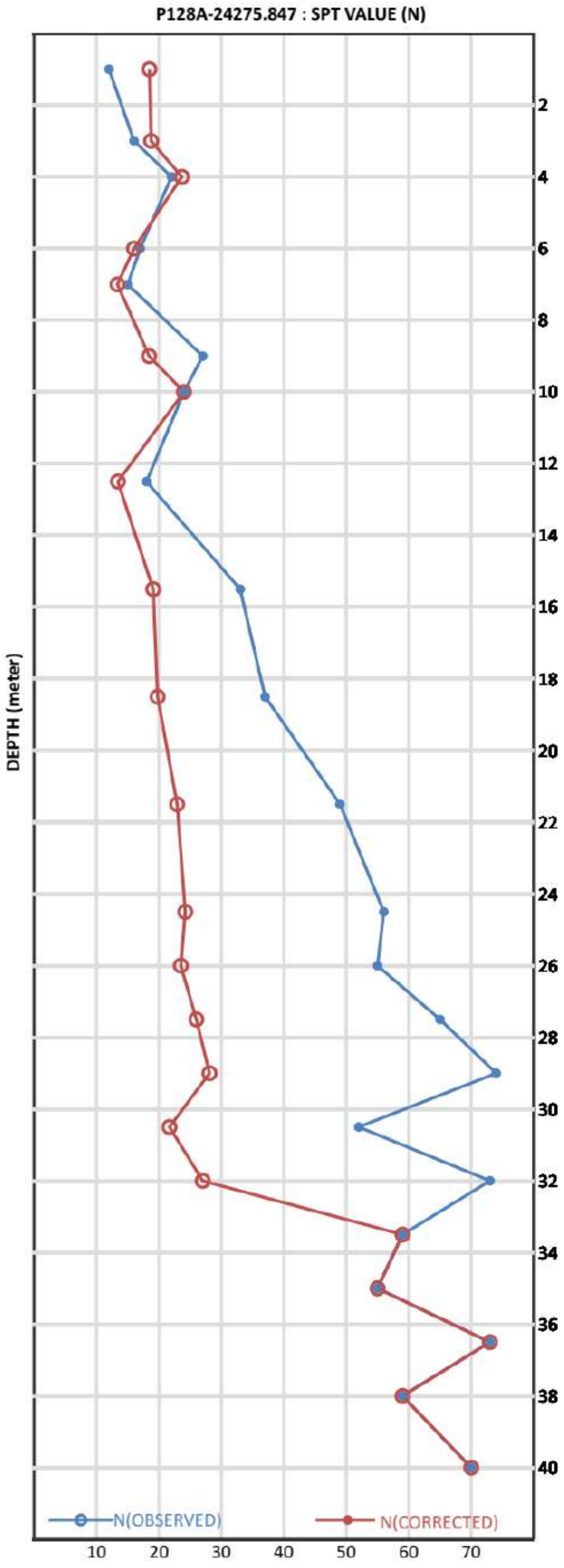
APPENDIX-E
PLOT 7: RECORDED SPT Vs CORRECTED SPT

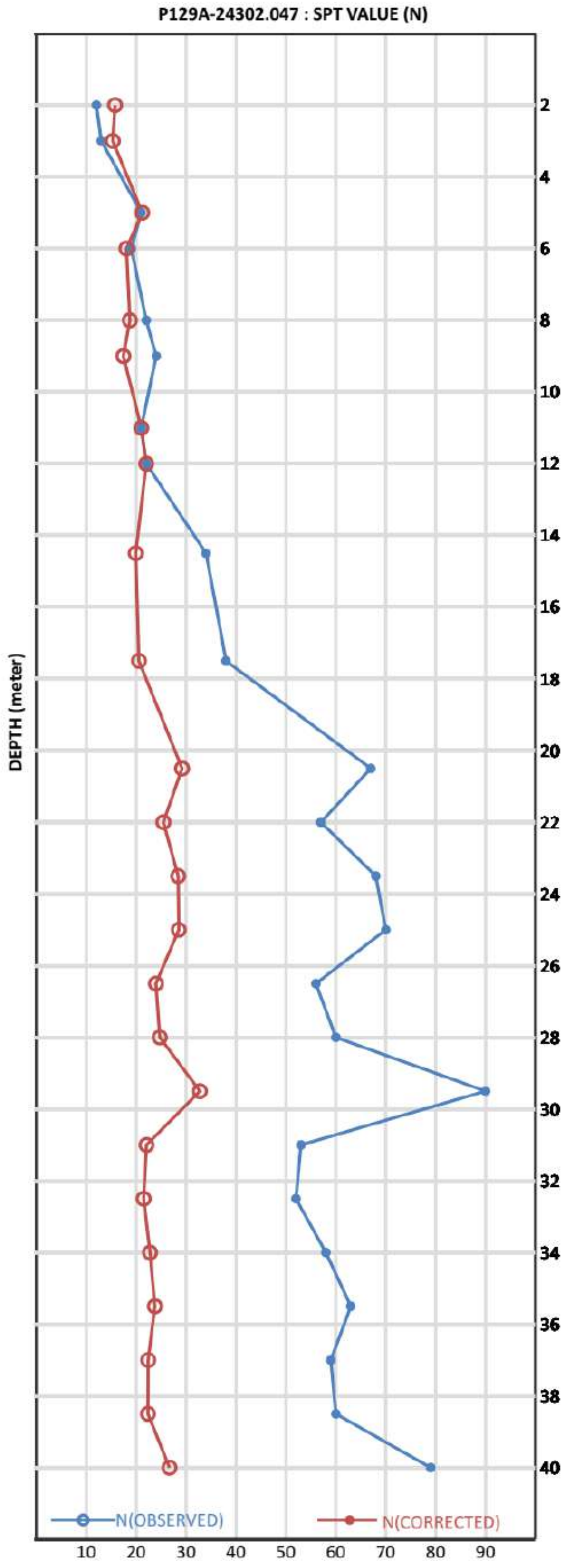




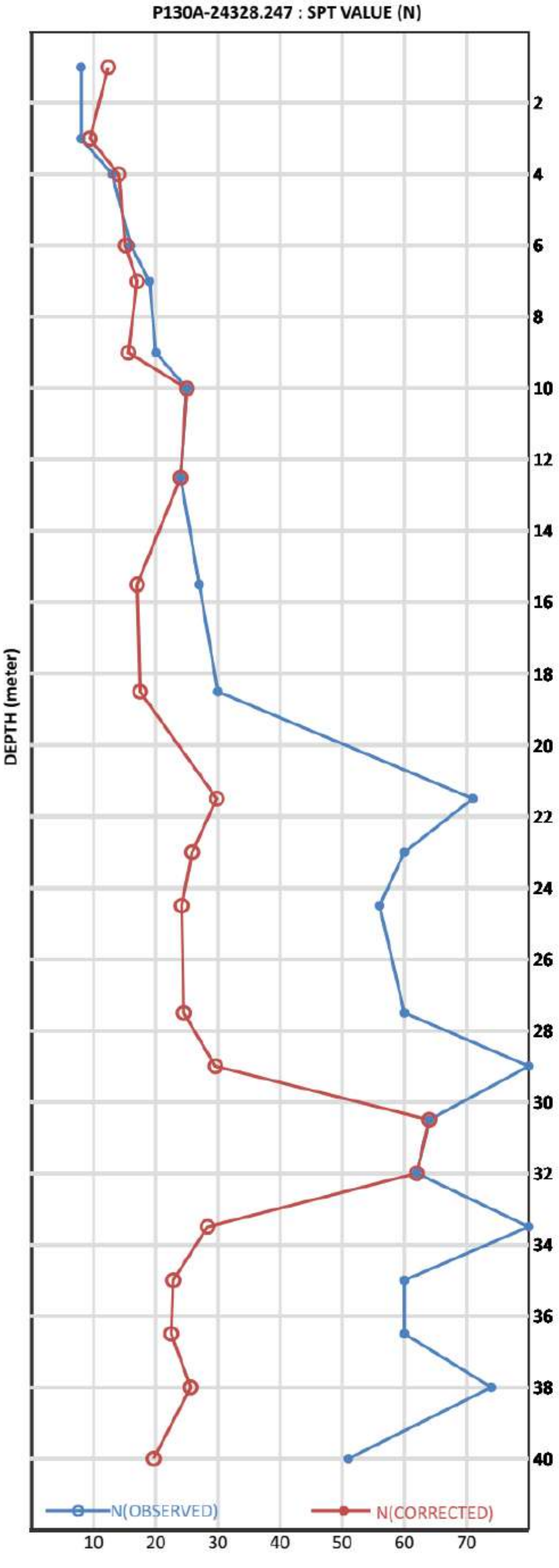
APPENDIX-E

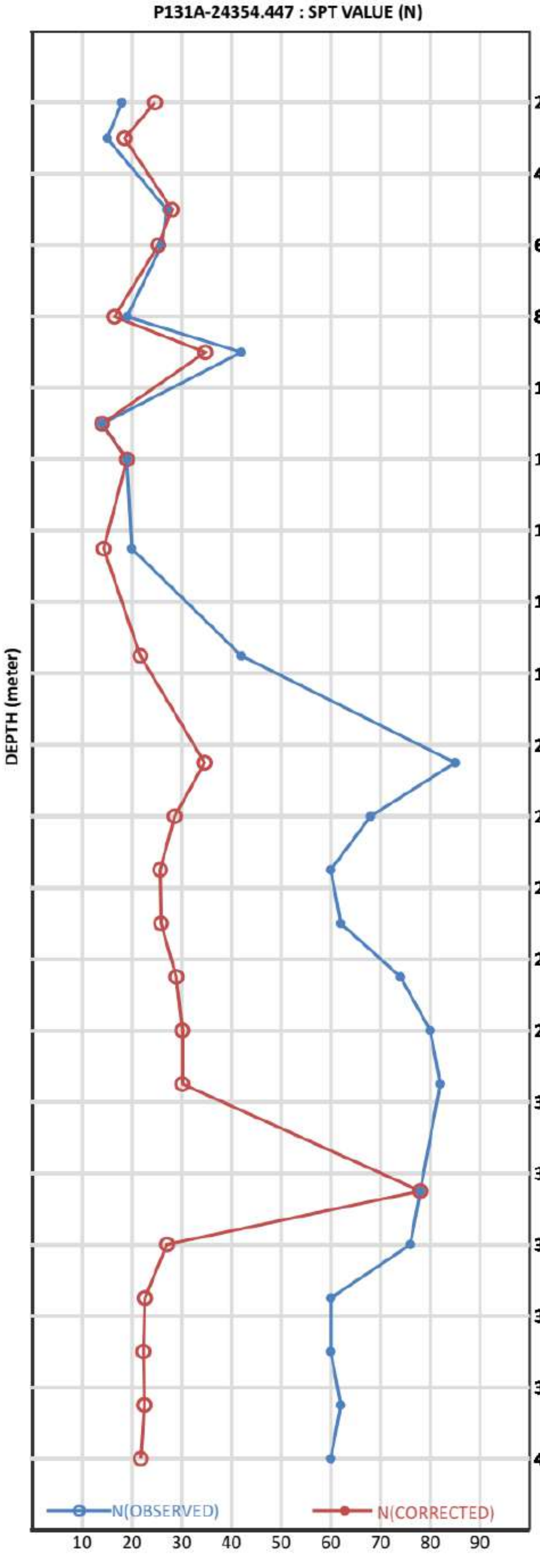
PLOT 8: RECORDED SPT Vs CORRECTED SPT



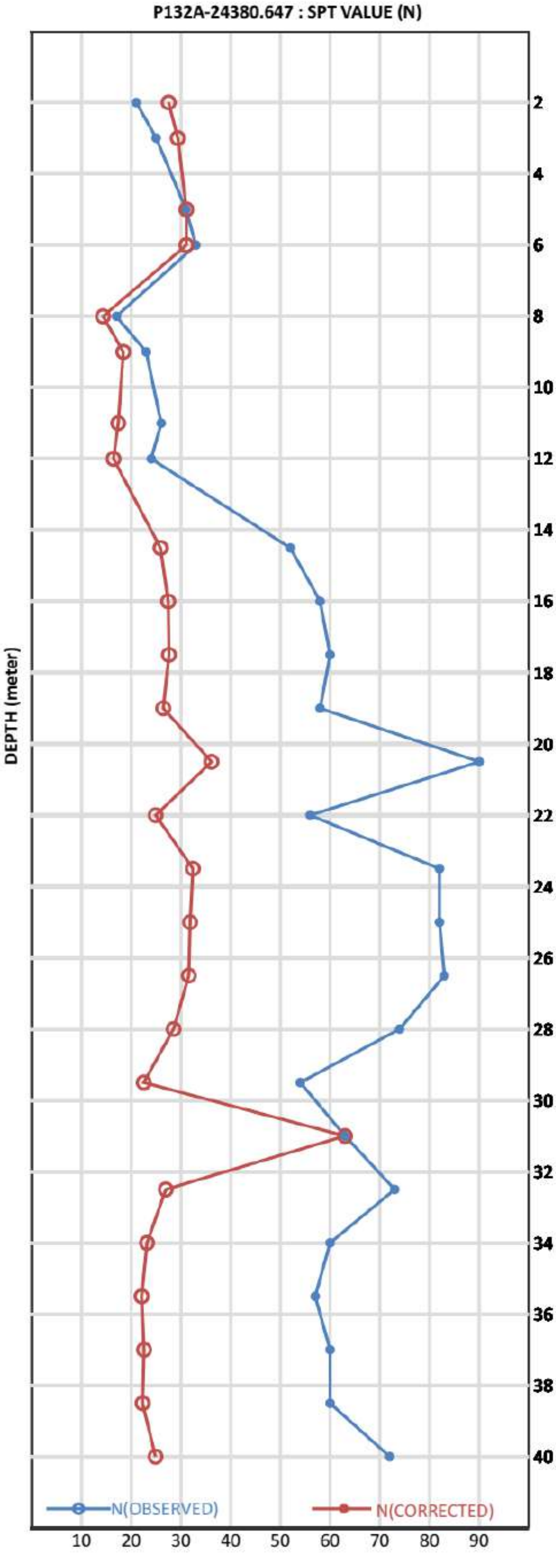


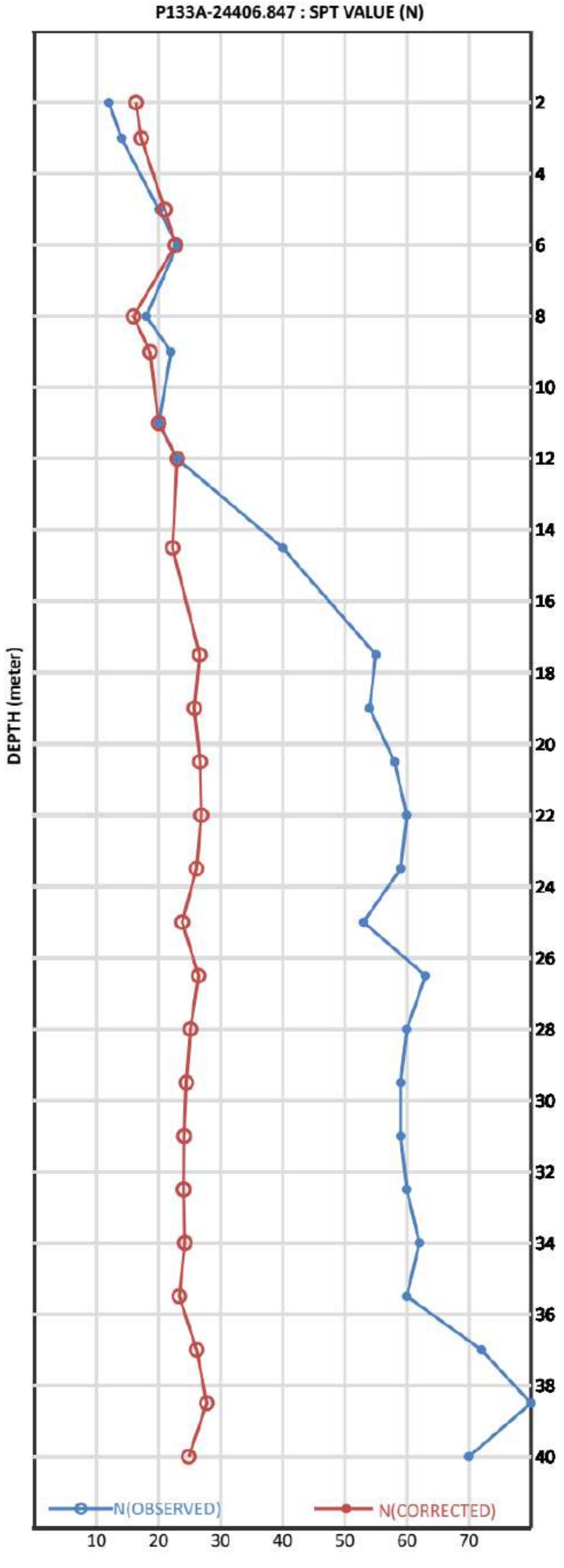
APPENDIX-E
PLOT 9: RECORDED SPT Vs CORRECTED SPT



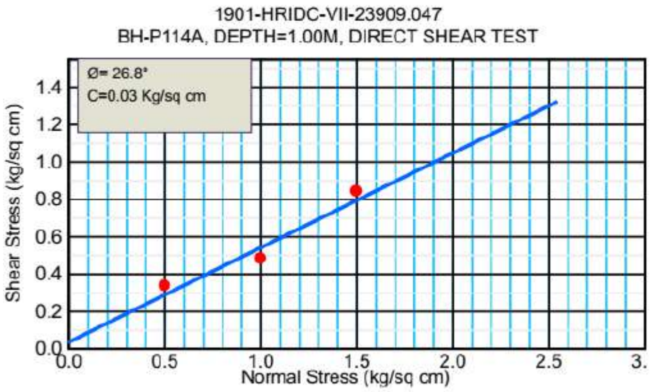


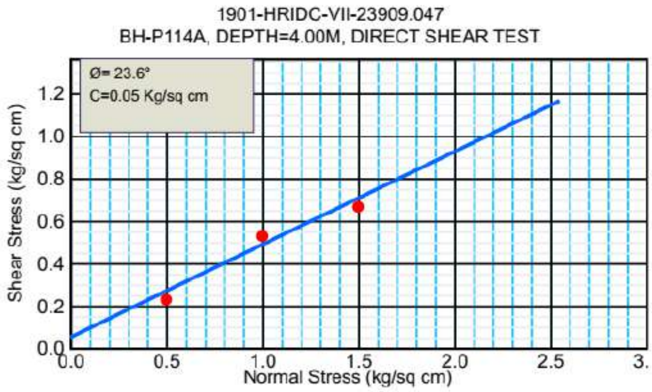
APPENDIX-E
PLOT 10: RECORDED SPT Vs CORRECTED SPT

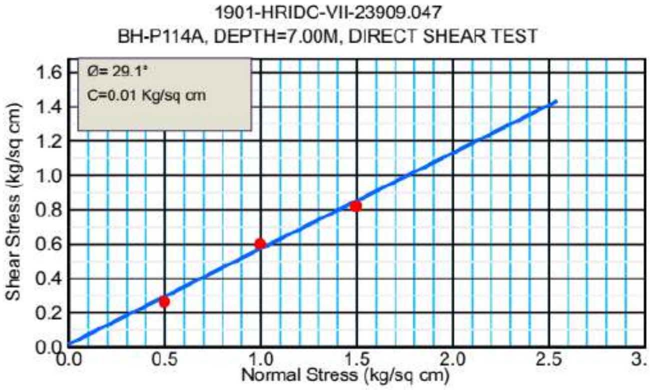


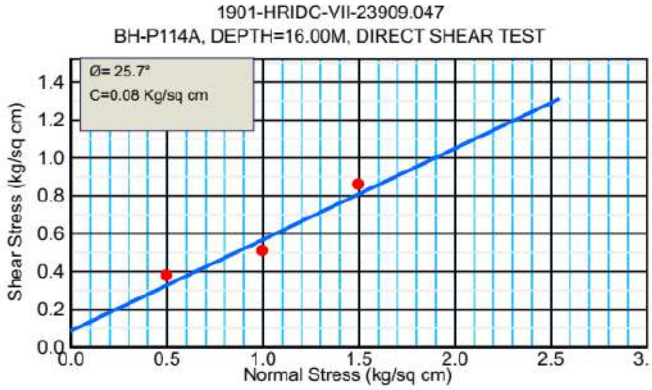


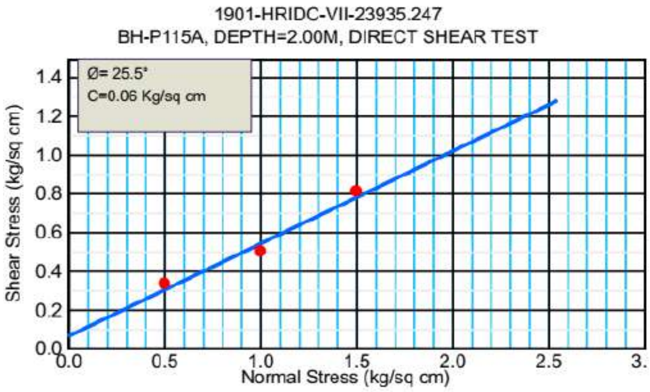
APPENDIX-F
GRAPH 1: DST GRAPH

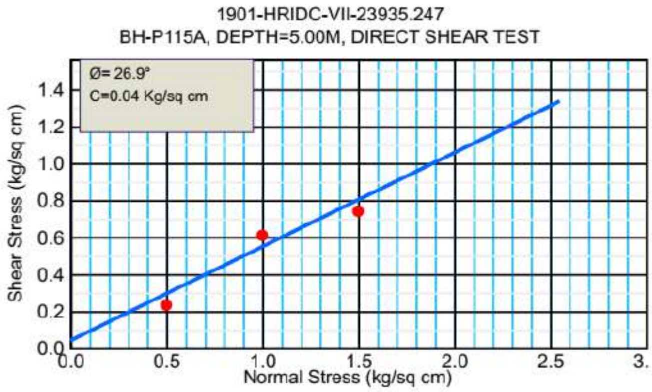


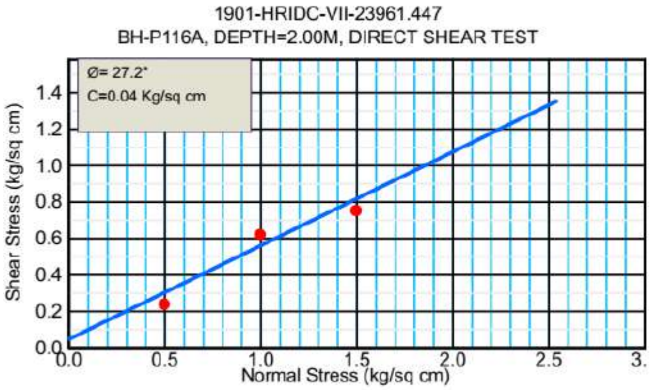


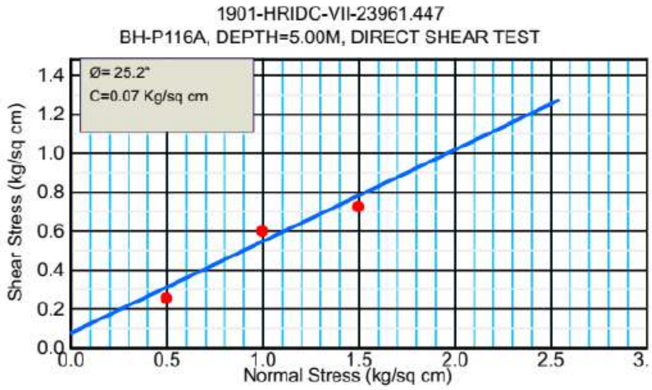






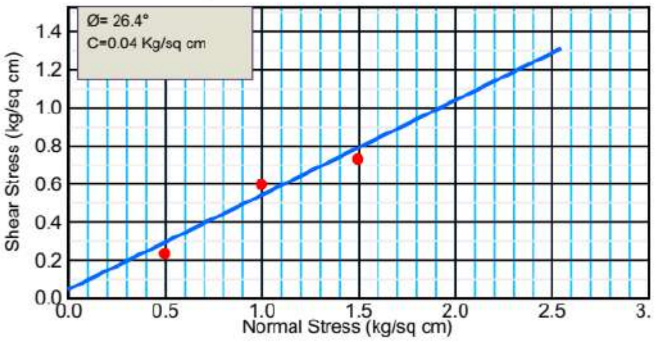




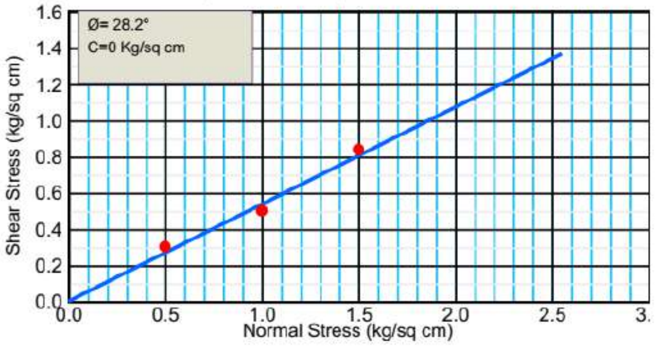


APPENDIX-F
GRAPH 2: DST GRAPH

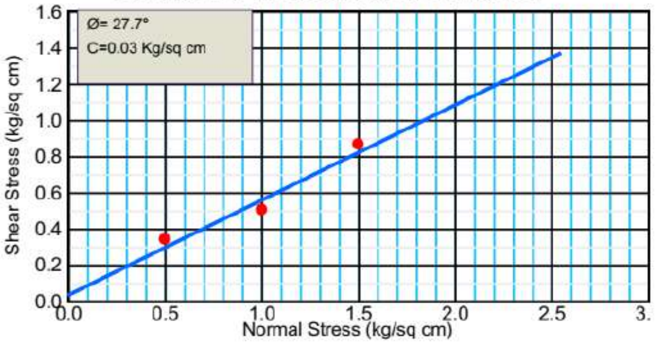
1901-HRIDC-VII-23961.447
BH-P116A, DEPTH=8.00M, DIRECT SHEAR TEST



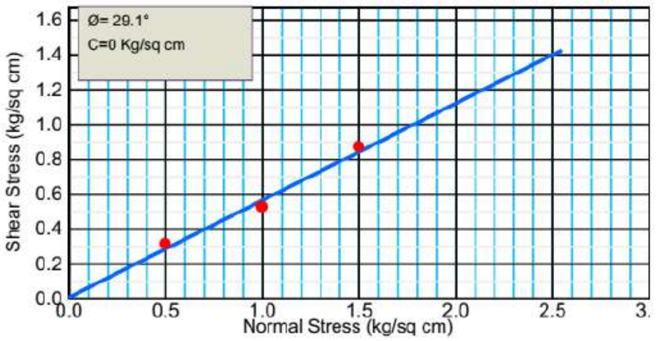
1901-HRIDC-VII-23987.647
BH-P117A, DEPTH=2.00M, DIRECT SHEAR TEST



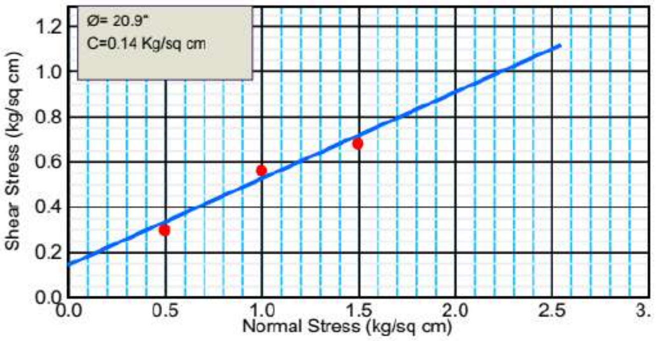
1901-HRIDC-VII-23987.647
BH-P117A, DEPTH=5.00M, DIRECT SHEAR TEST



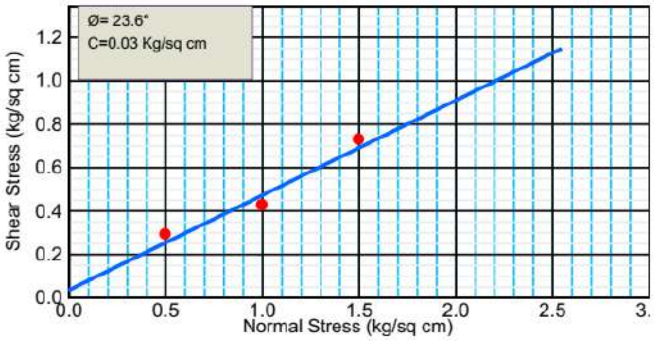
1901-HRIDC-VII-23987.647
BH-P117A, DEPTH=23.00M, DIRECT SHEAR TEST



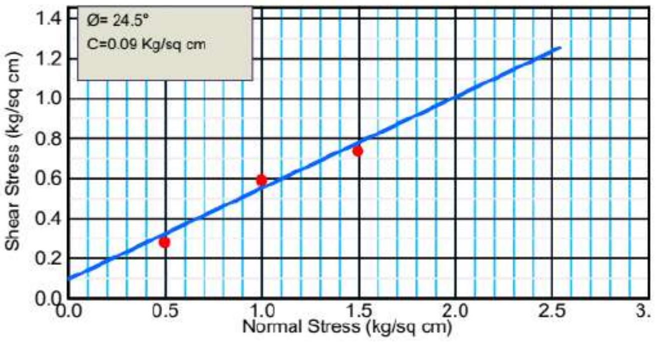
1901-HRIDC-VII-23987.647
BH-P117A, DEPTH=32.00M, DIRECT SHEAR TEST



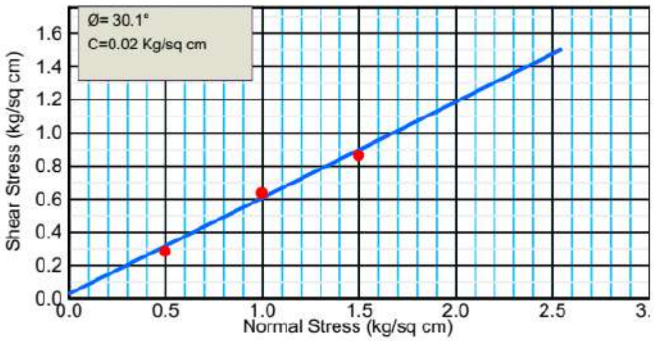
1901-HRIDC-VII-24013.847
BH-P118A, DEPTH=2.00M, DIRECT SHEAR TEST



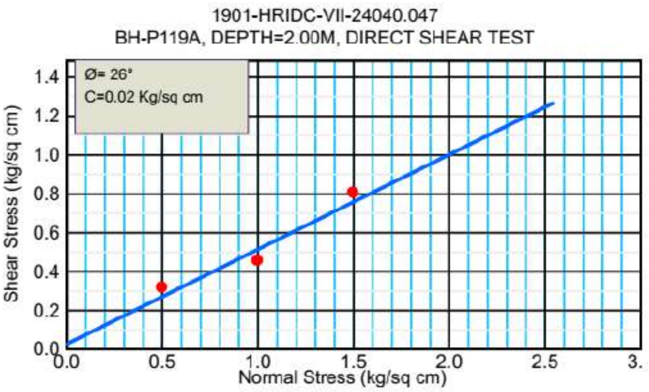
1901-HRIDC-VII-24013.847
BH-P118A, DEPTH=5.00M, DIRECT SHEAR TEST

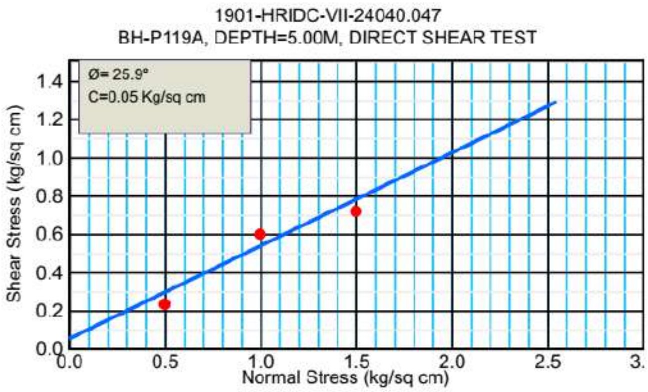


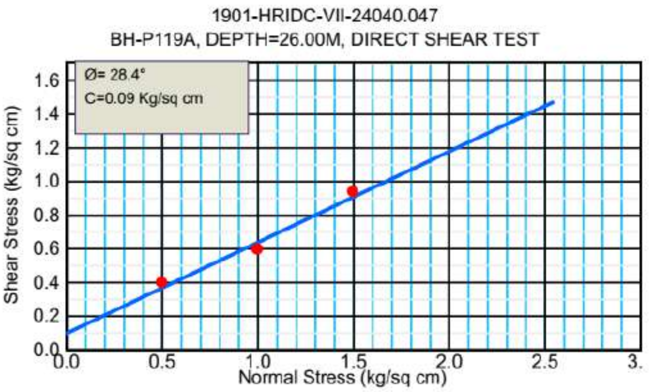
1901-HRIDC-VII-24013.847
BH-P118A, DEPTH=23.00M, DIRECT SHEAR TEST

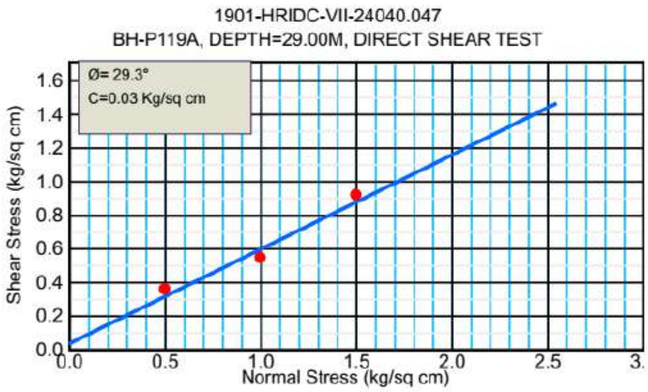


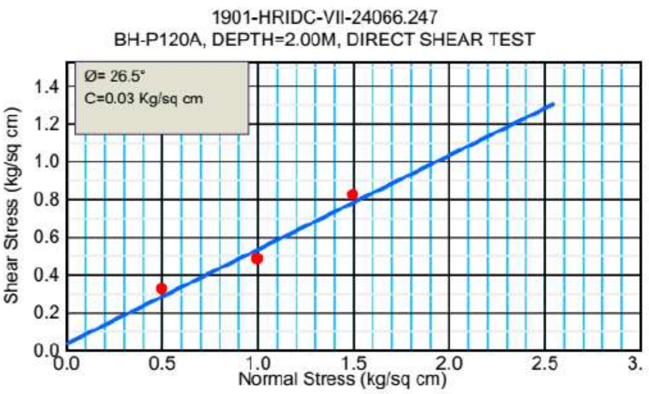
APPENDIX-F
GRAPH 3: DST GRAPH

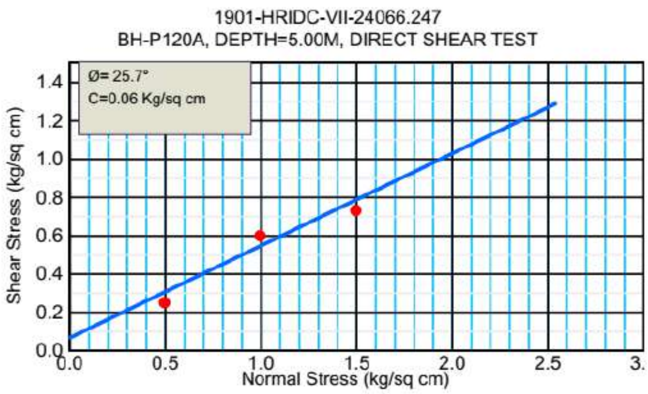


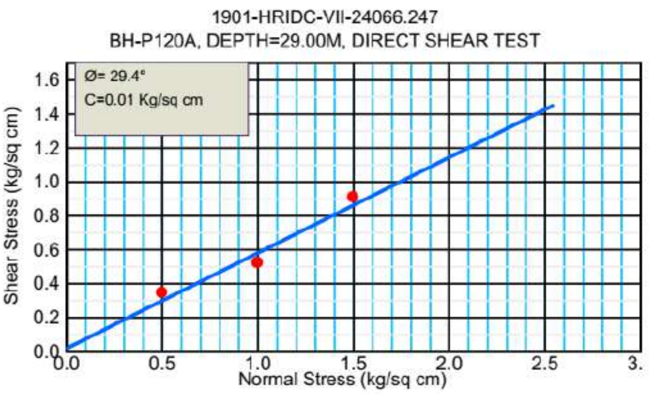


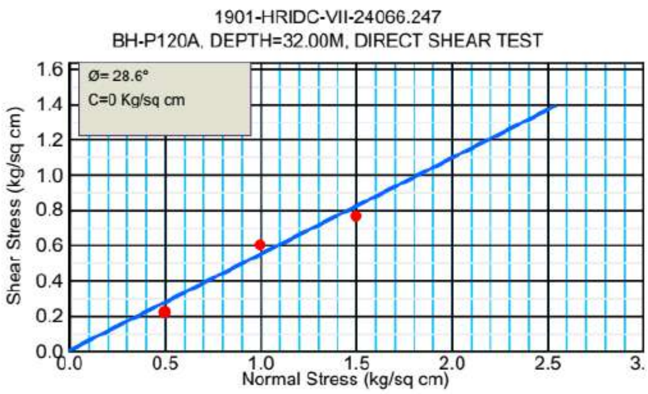




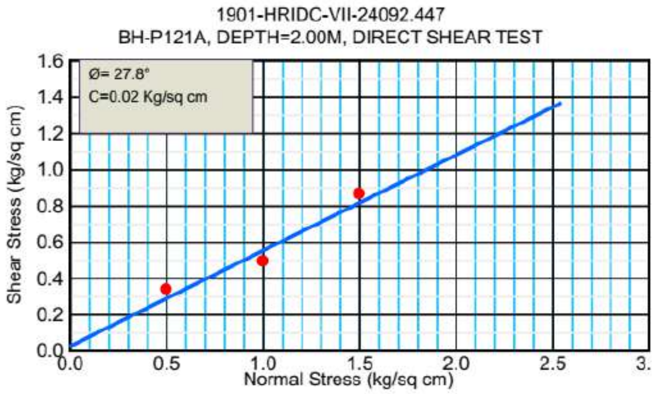


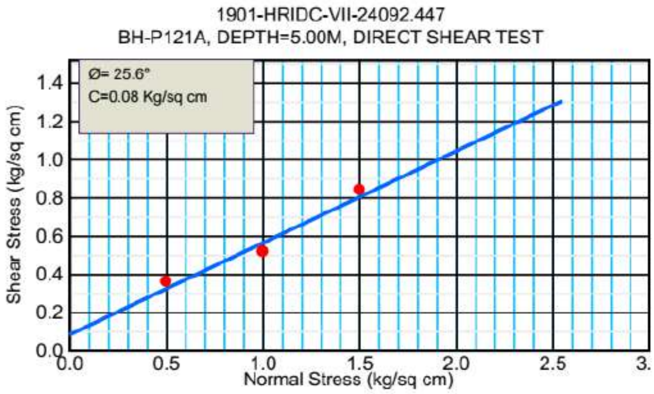


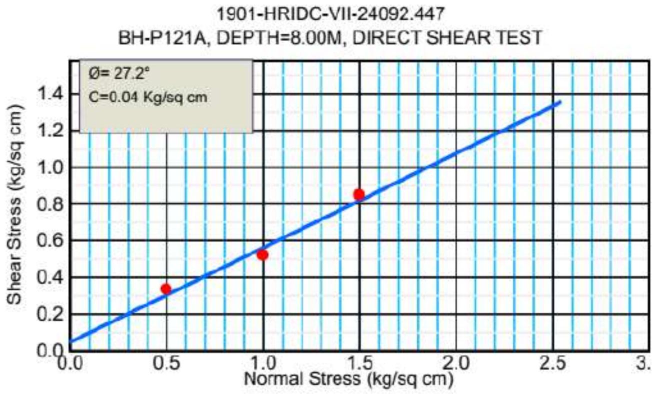


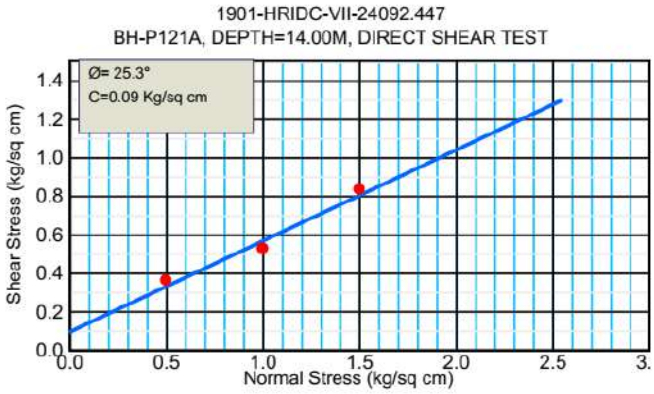


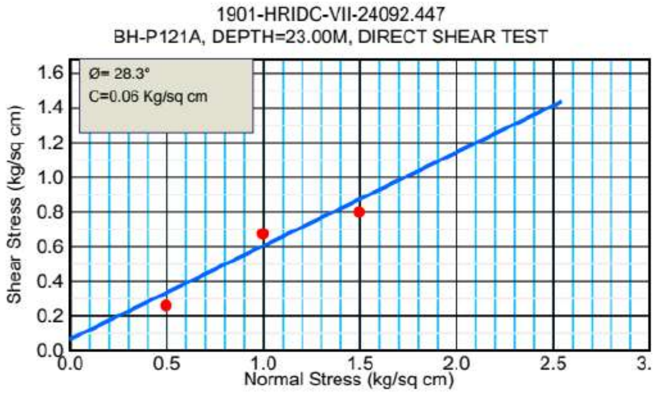
APPENDIX-F
GRAPH 4: DST GRAPH

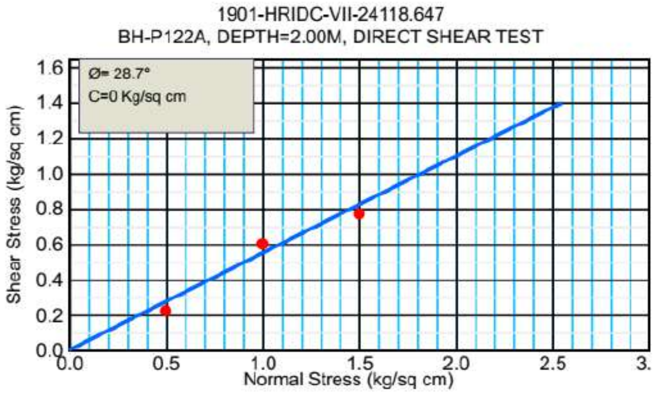


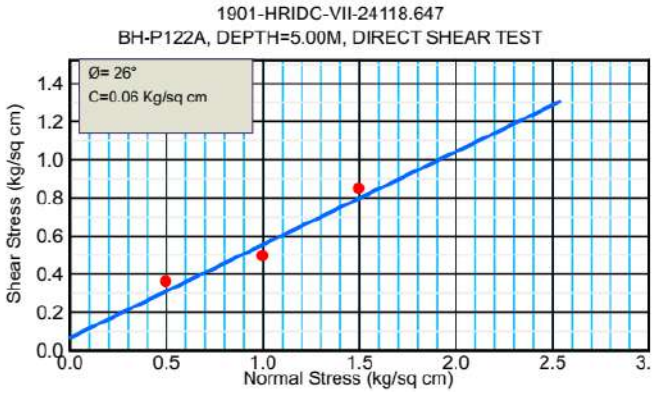


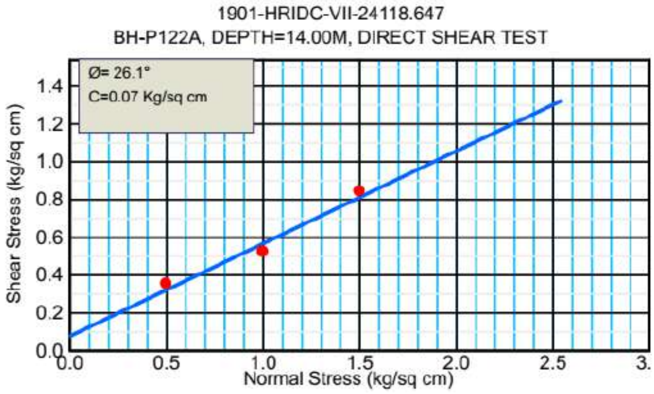






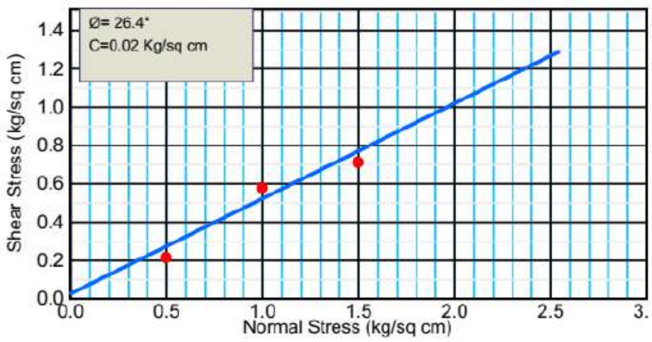




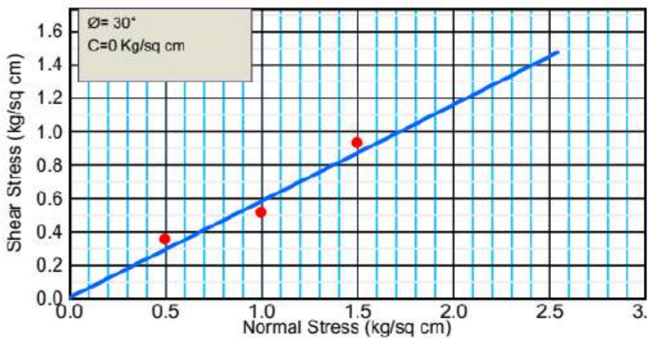


APPENDIX-F
GRAPH 5: DST GRAPH

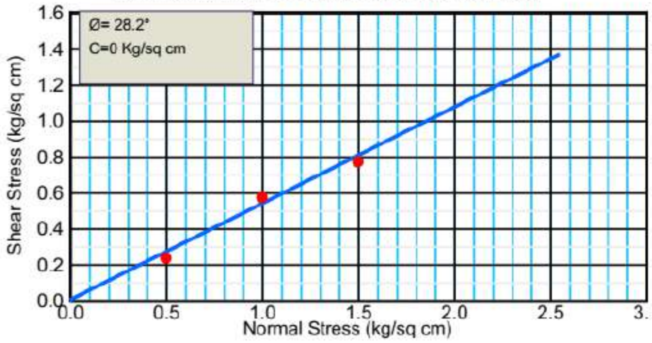
1901-HRIDC-VII-24118.647
BH-P122A, DEPTH=17.00M, DIRECT SHEAR TEST



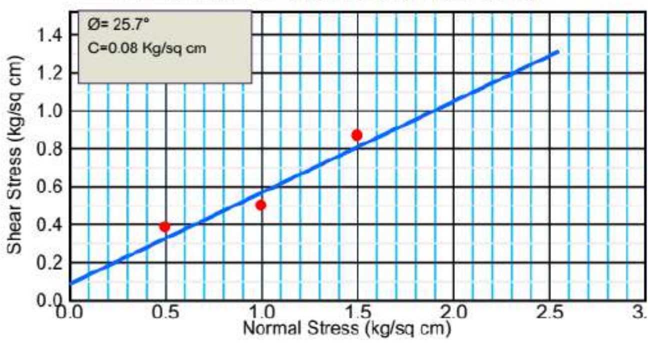
1901-HRIDC-VII-24118.647
BH-P122A, DEPTH=26.00M, DIRECT SHEAR TEST



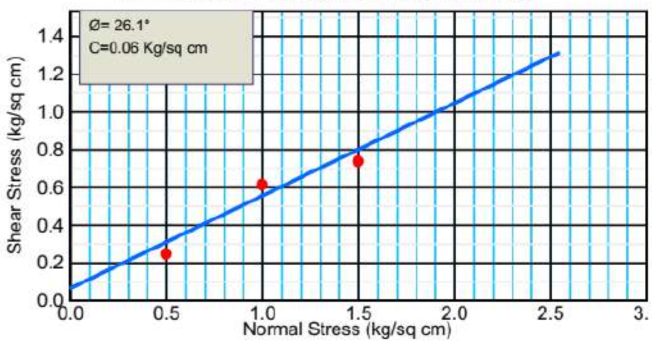
1901-HRIDC-VII-24144.847
BH-P123A, DEPTH=2.00M, DIRECT SHEAR TEST



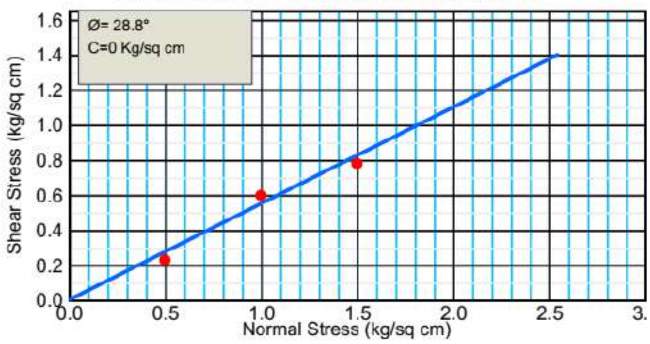
1901-HRIDC-VII-24144.847
BH-P123A, DEPTH=5.00M, DIRECT SHEAR TEST



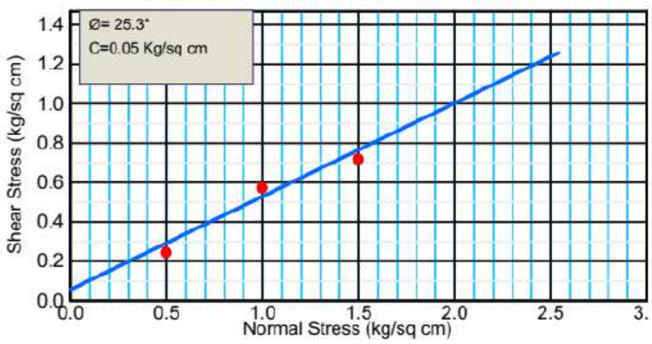
1901-HRIDC-VII-24144.847
BH-P123A, DEPTH=8.00M, DIRECT SHEAR TEST



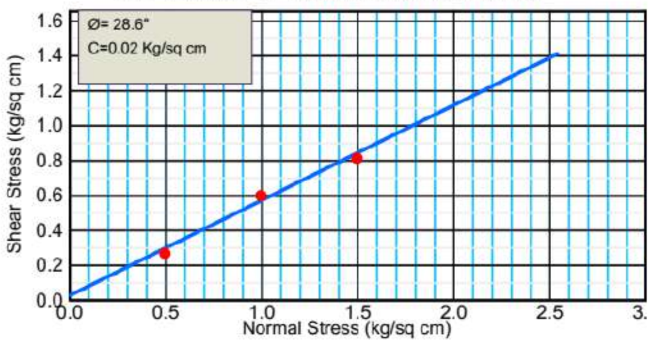
1901-HRIDC-VII-24144.847
BH-P123A, DEPTH=17.00M, DIRECT SHEAR TEST



1901-HRIDC-VII-24144.847
BH-P123A, DEPTH=20.00M, DIRECT SHEAR TEST

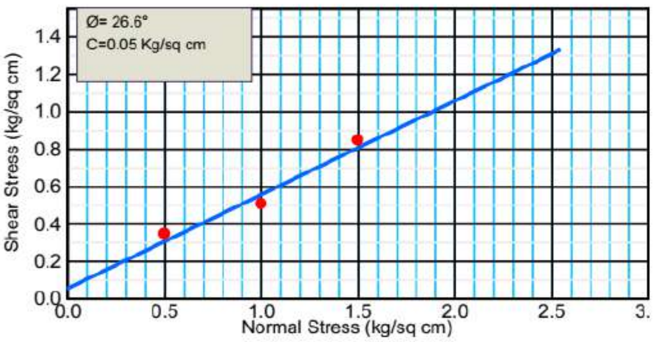


1901-HRIDC-VII-24171.047
BH-P124A, DEPTH=2.00M, DIRECT SHEAR TEST

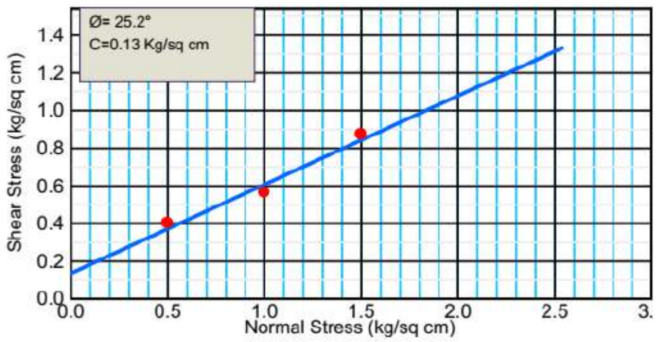


APPENDIX-F
GRAPH 6: DST GRAPH

1901-HRIDC-VII-24171.047
BH-P124A, DEPTH=5.00M, DIRECT SHEAR TEST



1901-HRIDC-VII-24171.047
BH-P124A, DEPTH=14.00M, DIRECT SHEAR TEST



1901-HRIDC-VII-24171.047
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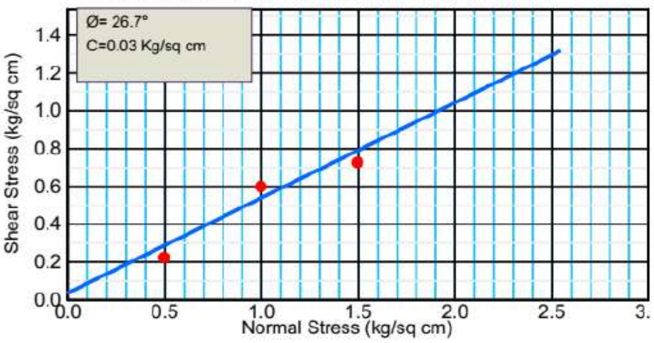
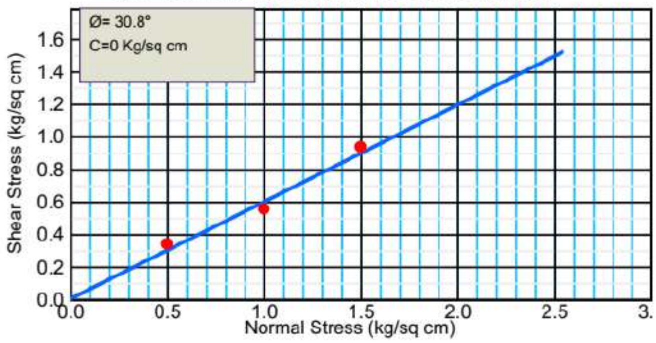
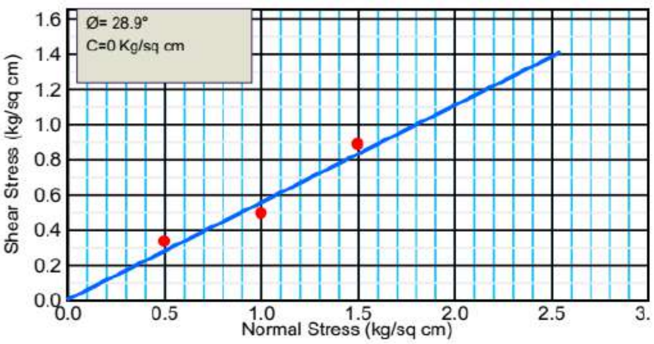


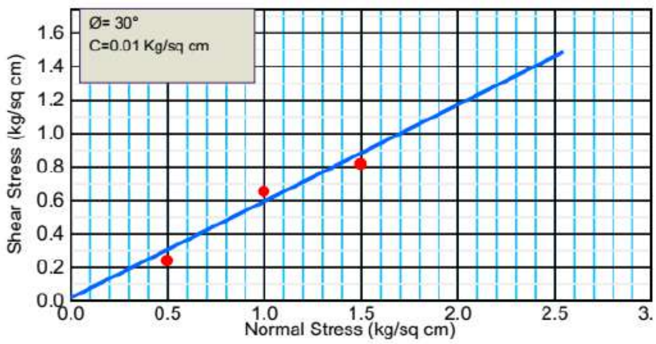
1901-HRIDC-VII-24171.047
BH-P124A, DEPTH=26.00M, DIRECT SHEAR TEST



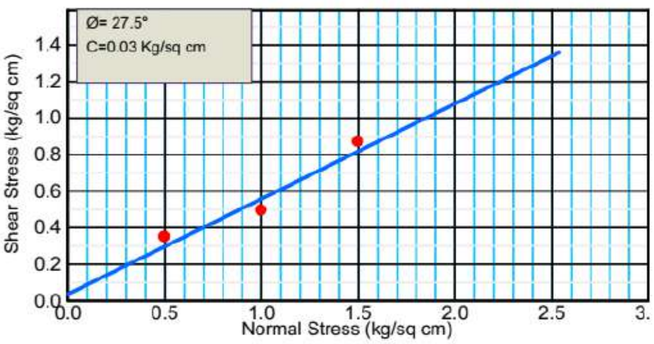
1901-HRIDC-VII-24197.247
BH-P125A, DEPTH=1.00M, DIRECT SHEAR TEST



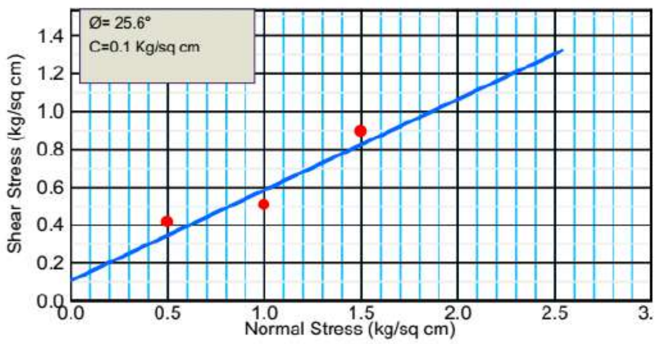
1901-HRIDC-VII-24197.247
BH-P125A, DEPTH=4.00M, DIRECT SHEAR TEST



1901-HRIDC-VII-24197.247
BH-P125A, DEPTH=7.00M, DIRECT SHEAR TEST



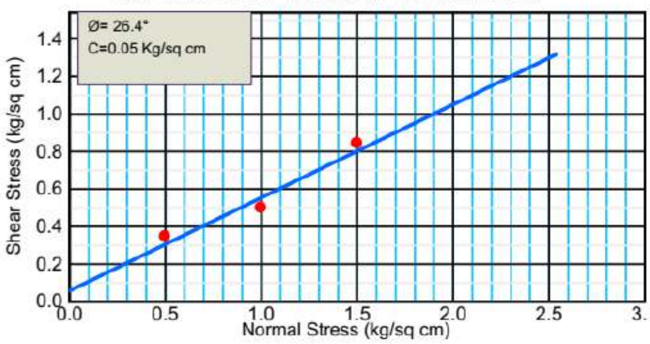
1901-HRIDC-VII-24197.247
BH-P125A, DEPTH=13.00M, DIRECT SHEAR TEST



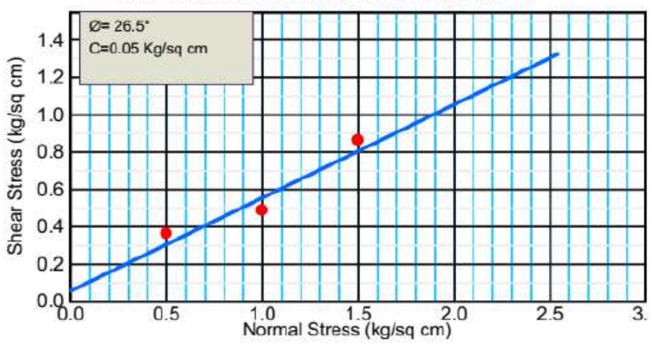
APPENDIX-F

GRAPH 7: DST GRAPH

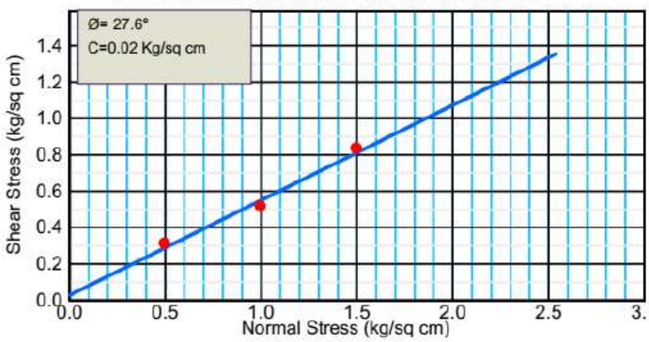
1901-HRIDC-VII-24197.247
BH-P125A, DEPTH=16.00M, DIRECT SHEAR TEST



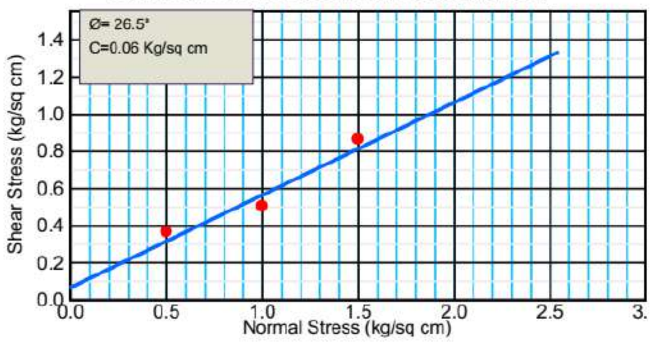
1901-HRIDC-VII-24223.447
BH-P126A, DEPTH=2.00M, DIRECT SHEAR TEST



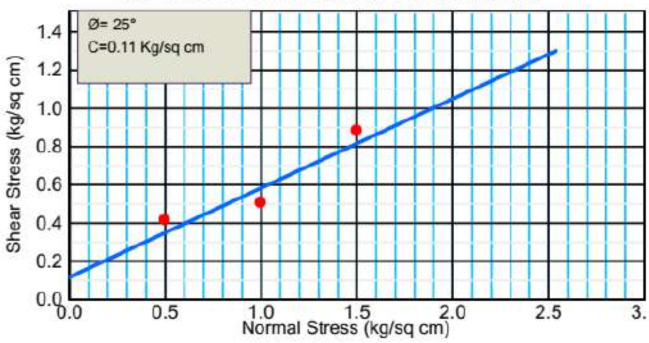
1901-HRIDC-VII-24223.447
BH-P126A, DEPTH=5.00M, DIRECT SHEAR TEST



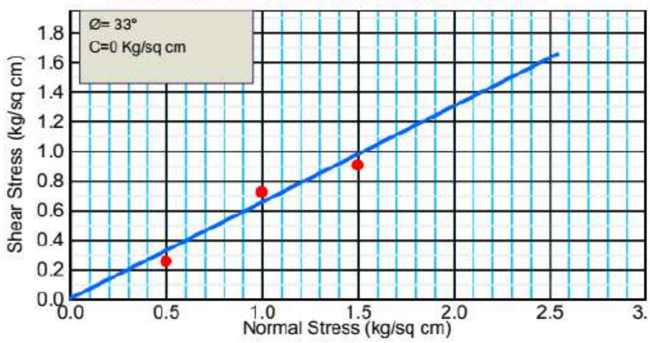
1901-HRIDC-VII-24223.447
BH-P126A, DEPTH=14.00M, DIRECT SHEAR TEST



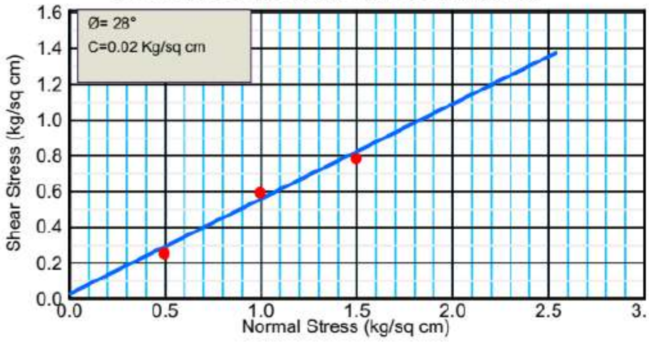
1901-HRIDC-VII-24223.447
BH-P126A, DEPTH=20.00M, DIRECT SHEAR TEST



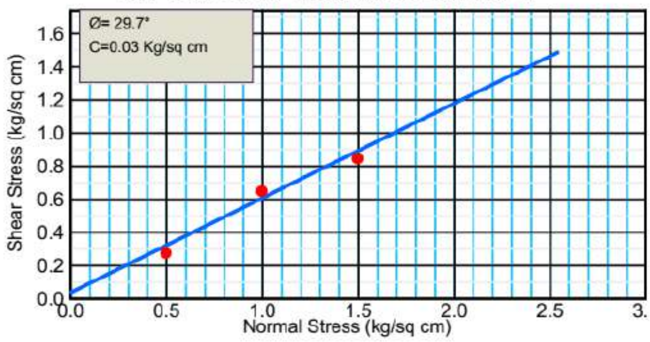
1901-HRIDC-VII-24223.447
BH-P126A, DEPTH=23.00M, DIRECT SHEAR TEST



1901-HRIDC-VII-24249.647
BH-P127A, DEPTH=2.00M, DIRECT SHEAR TEST

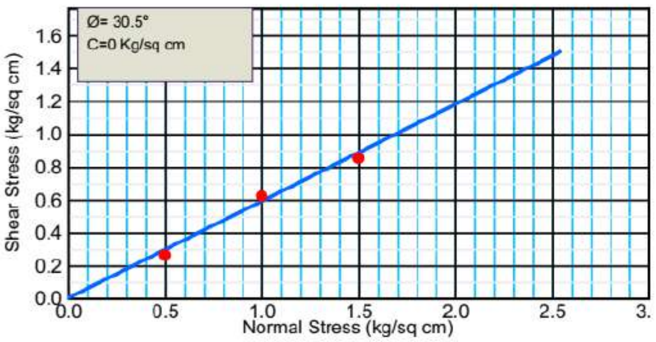


1901-HRIDC-VII-24249.647
BH-P127A, DEPTH=5.00M, DIRECT SHEAR TEST

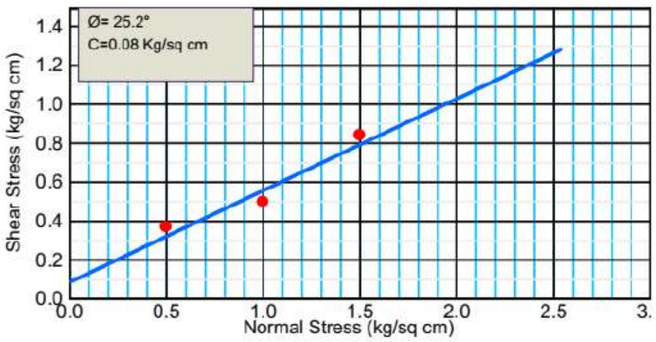


APPENDIX-F
GRAPH 8: DST GRAPH

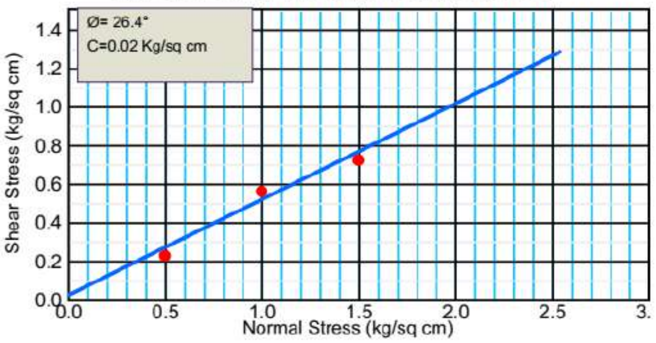
1901-HRIDC-VII-24249.647
BH-P127A, DEPTH=8.00M, DIRECT SHEAR TEST



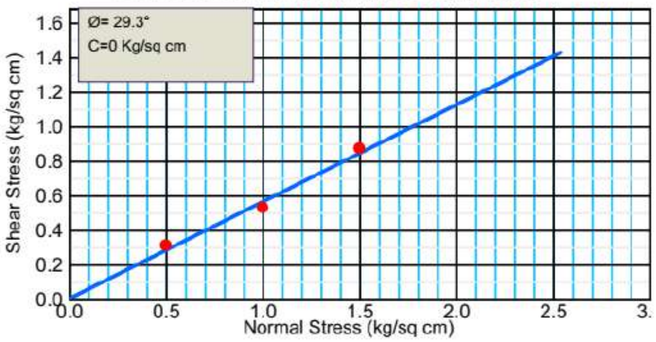
1901-HRIDC-VII-24249.647
BH-P127A, DEPTH=14.00M, DIRECT SHEAR TEST



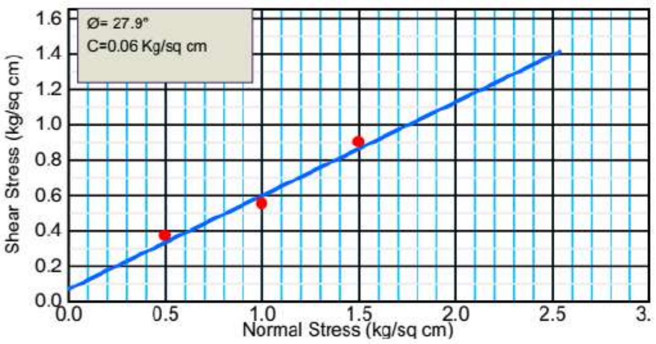
1901-HRIDC-VII-24249.647
BH-P127A, DEPTH=17.00M, DIRECT SHEAR TEST



1901-HRIDC-VII-24275.847
BH-P128A, DEPTH=2.00M, DIRECT SHEAR TEST



1901-HRIDC-VII-24275.847
BH-P128A, DEPTH=5.00M, DIRECT SHEAR TEST



1901-HRIDC-VII-24275.847
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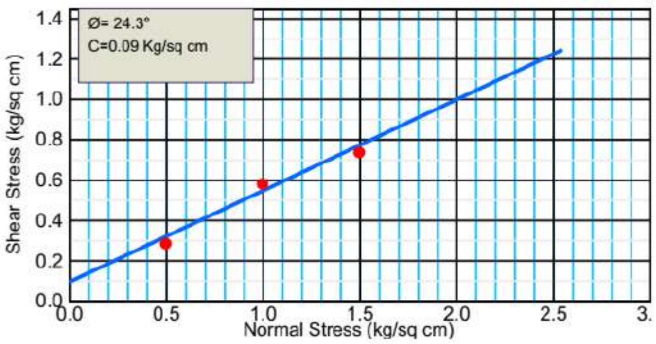
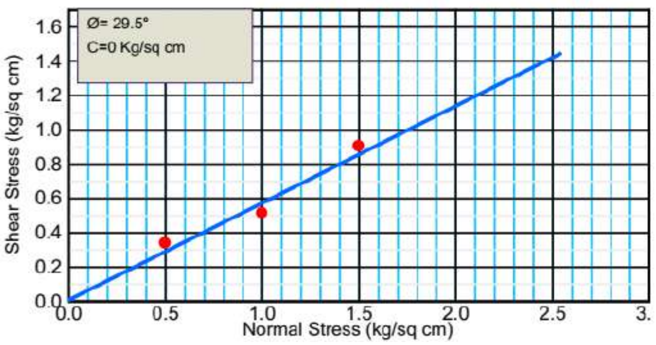
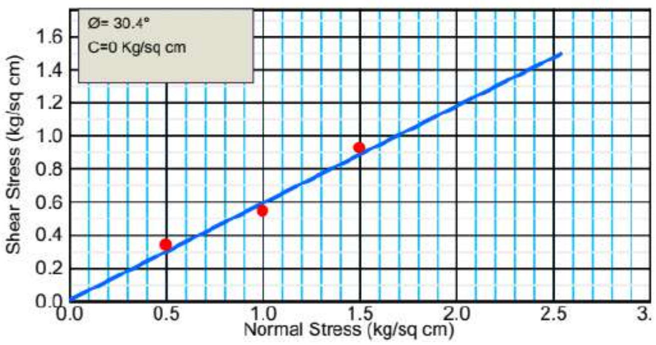


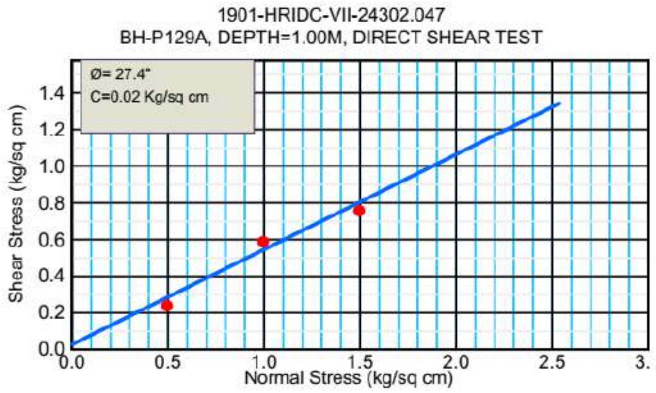
1901-HRIDC-VII-24275.847
BH-P128A, DEPTH=17.00M, DIRECT SHEAR TEST

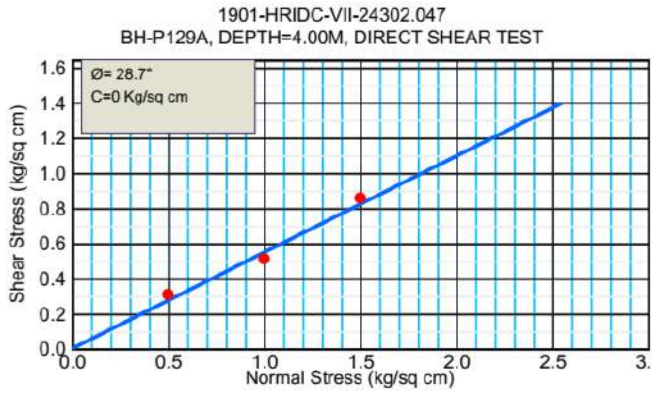


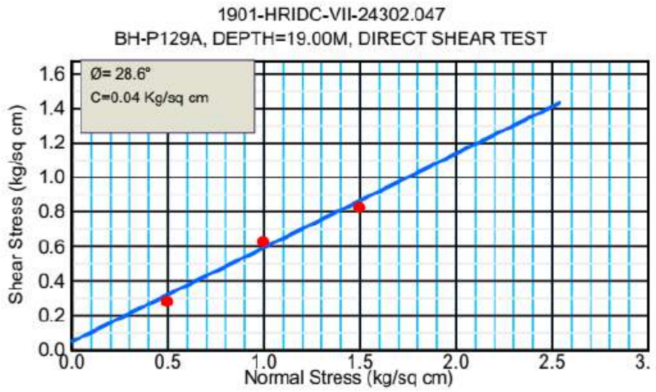
1901-HRIDC-VII-24275.847
BH-P128A, DEPTH=20.00M, DIRECT SHEAR TEST

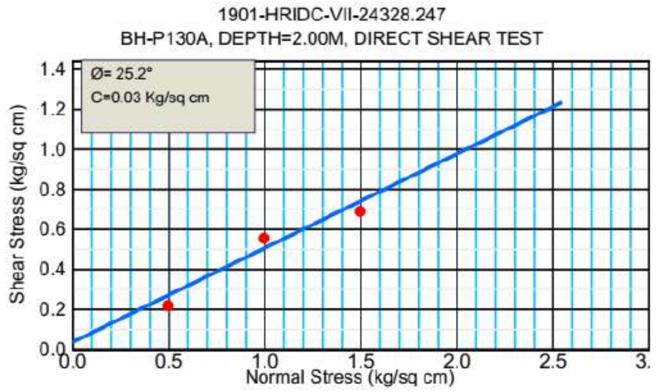


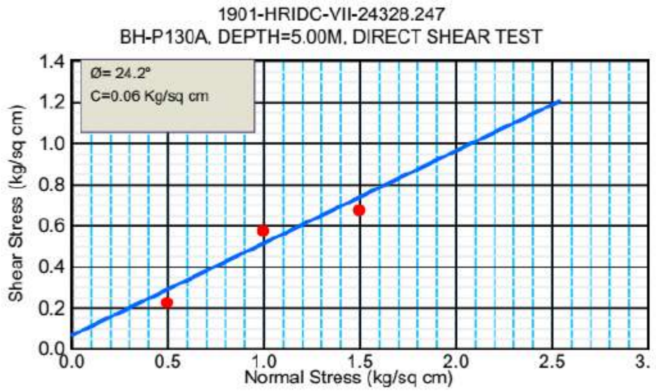
APPENDIX-F
GRAPH 9: DST GRAPH

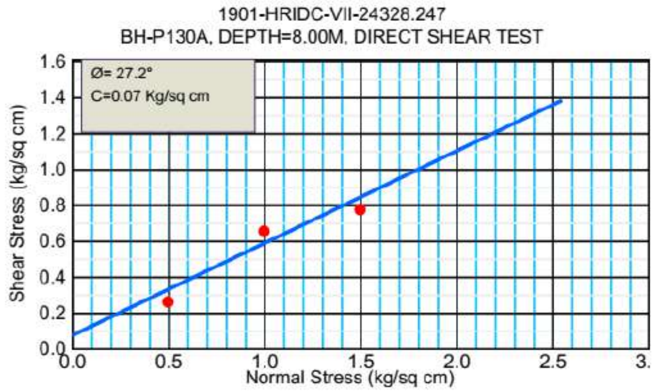


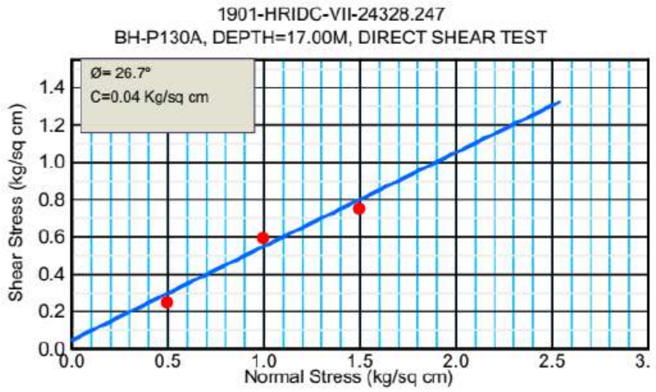


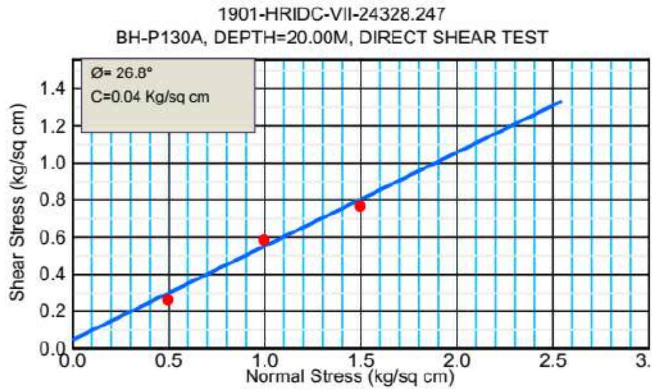






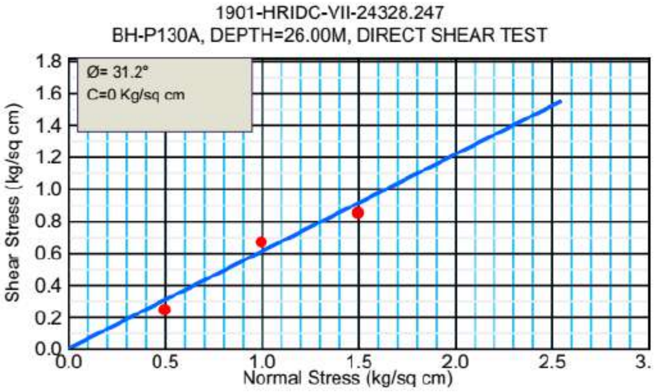


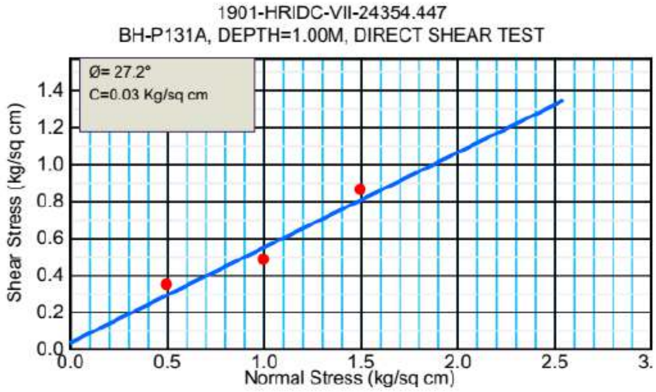


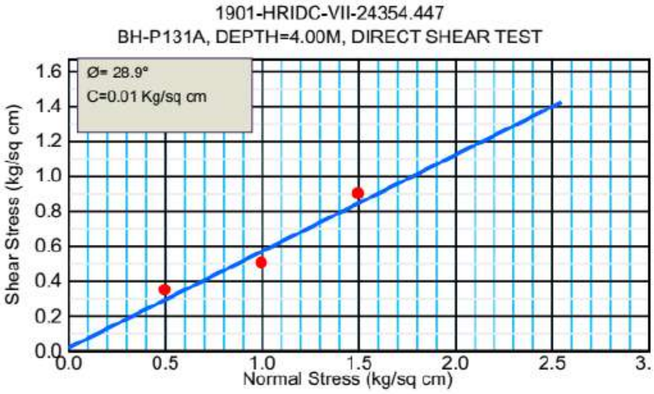


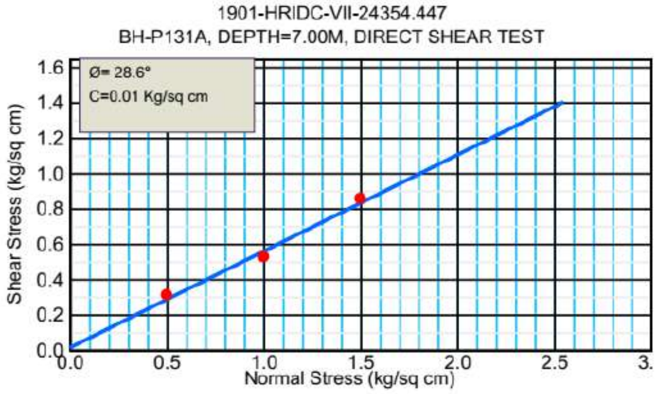
APPENDIX-F

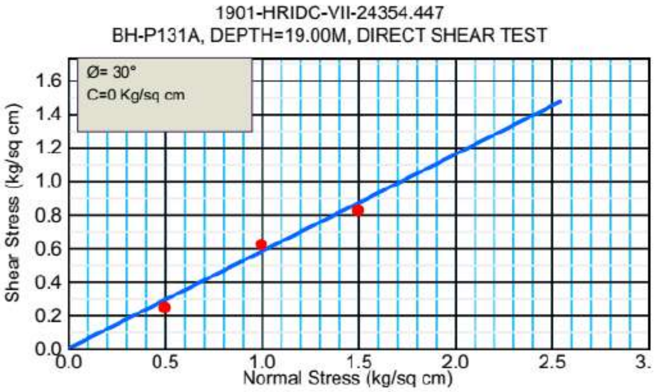
GRAPH 10: DST GRAPH

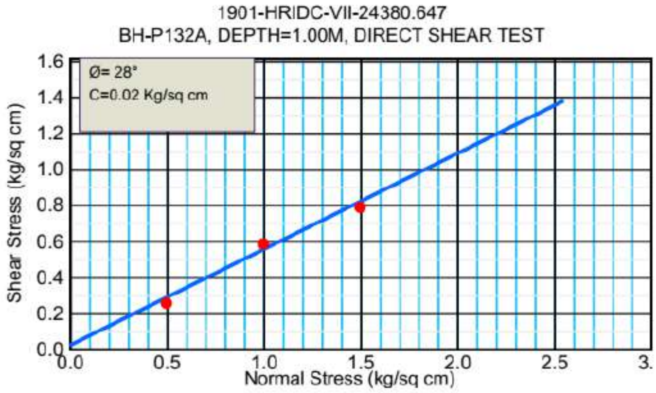


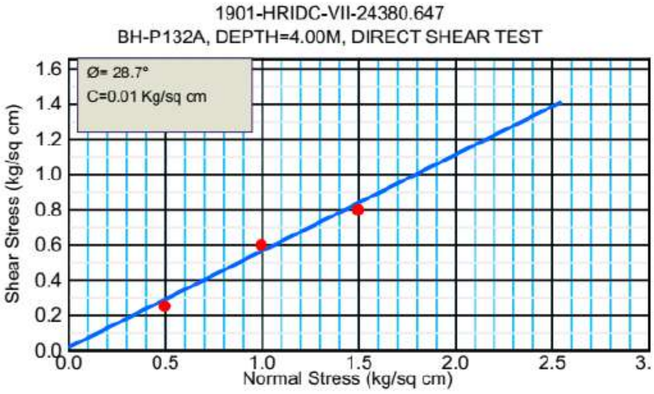


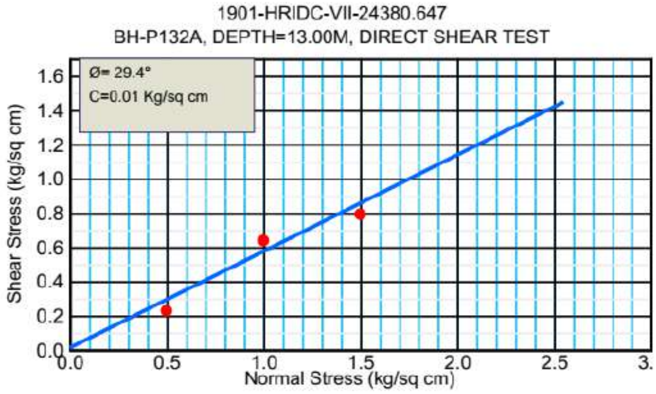




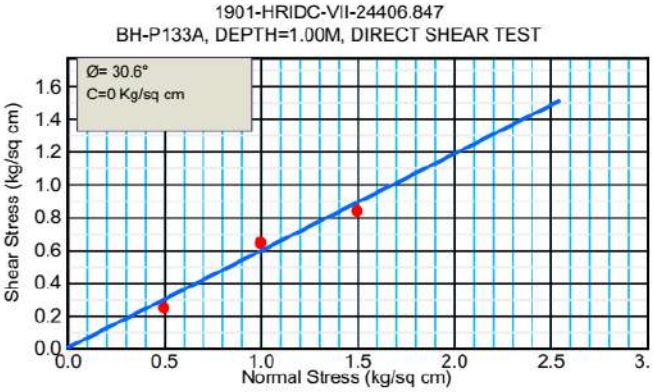


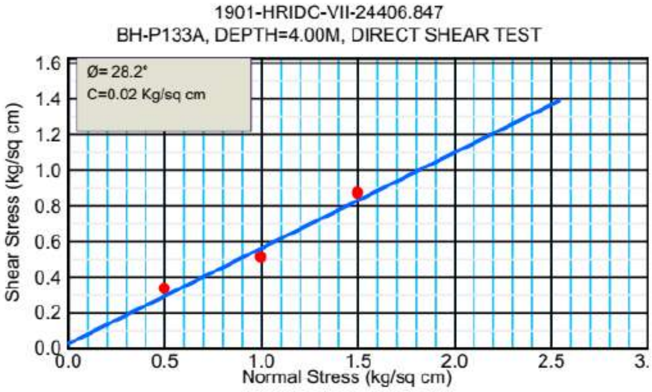


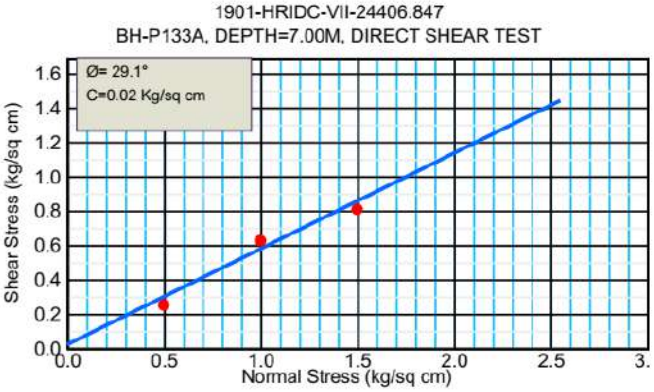


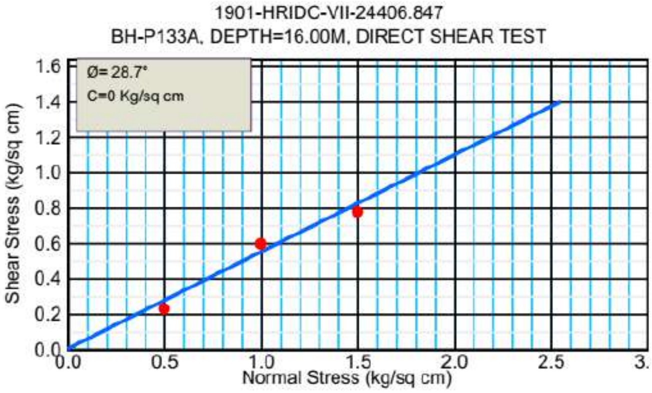


APPENDIX-F
GRAPH 11: DST GRAPH



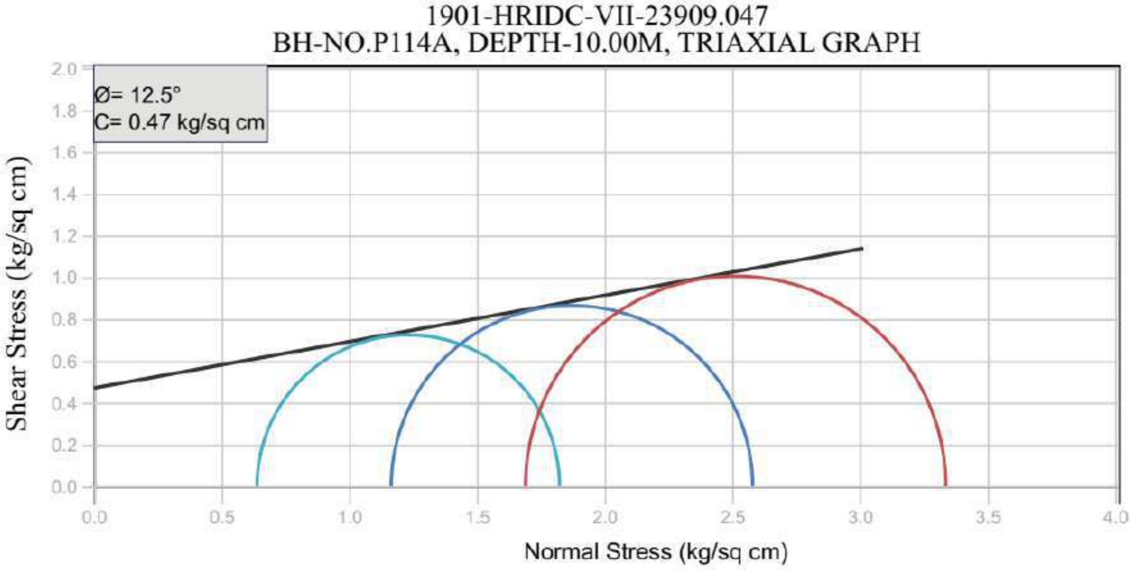


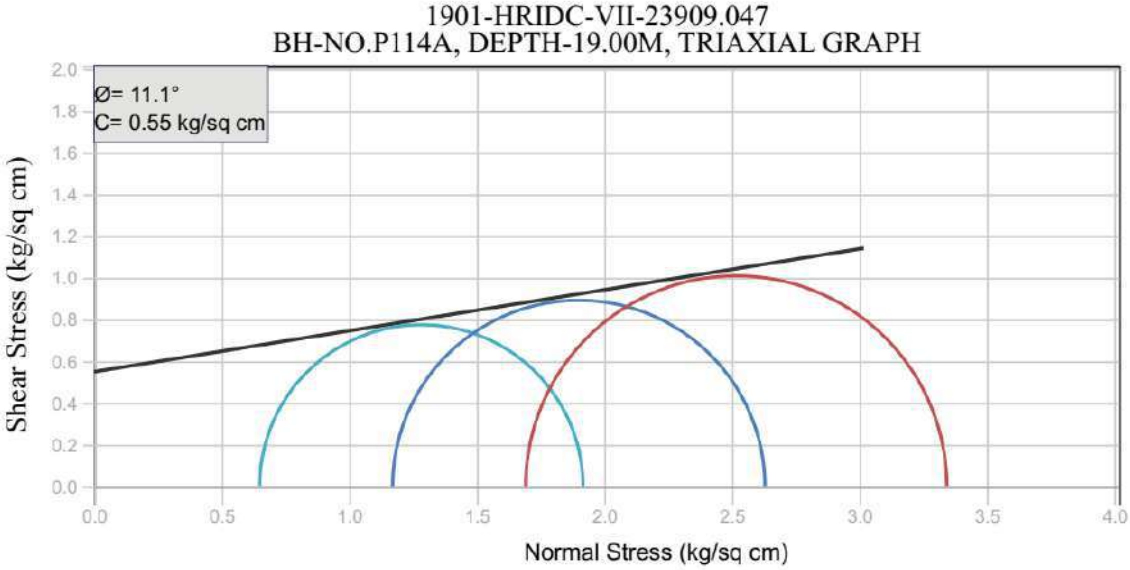


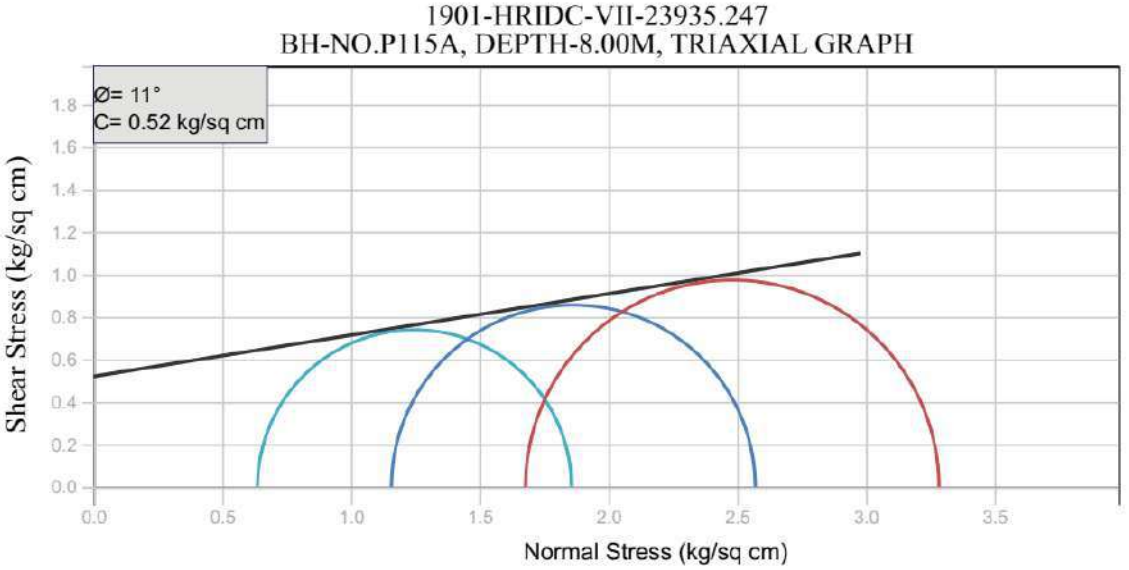


APPENDIX-G

GRAPH 1: UU GRAPH

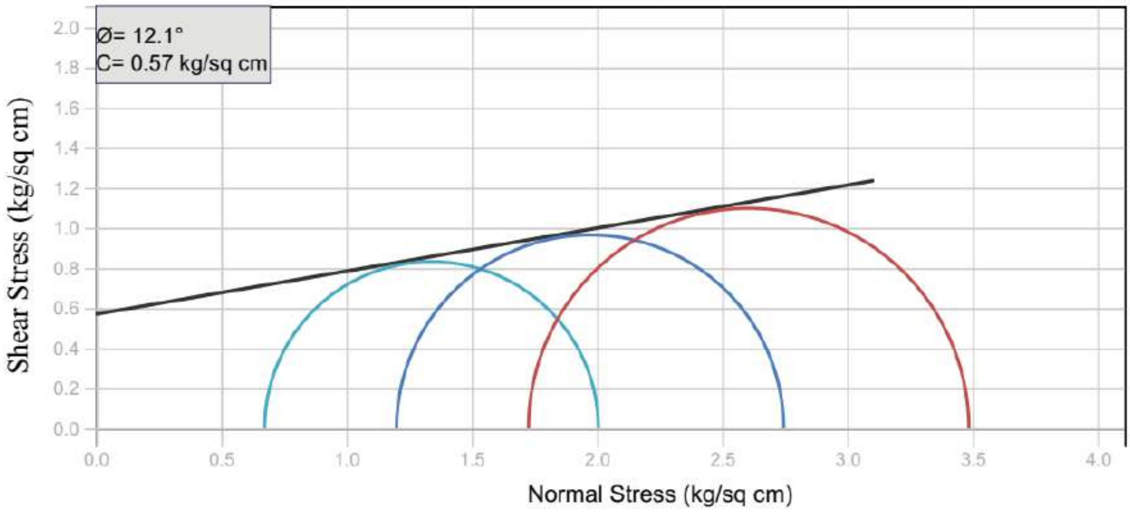




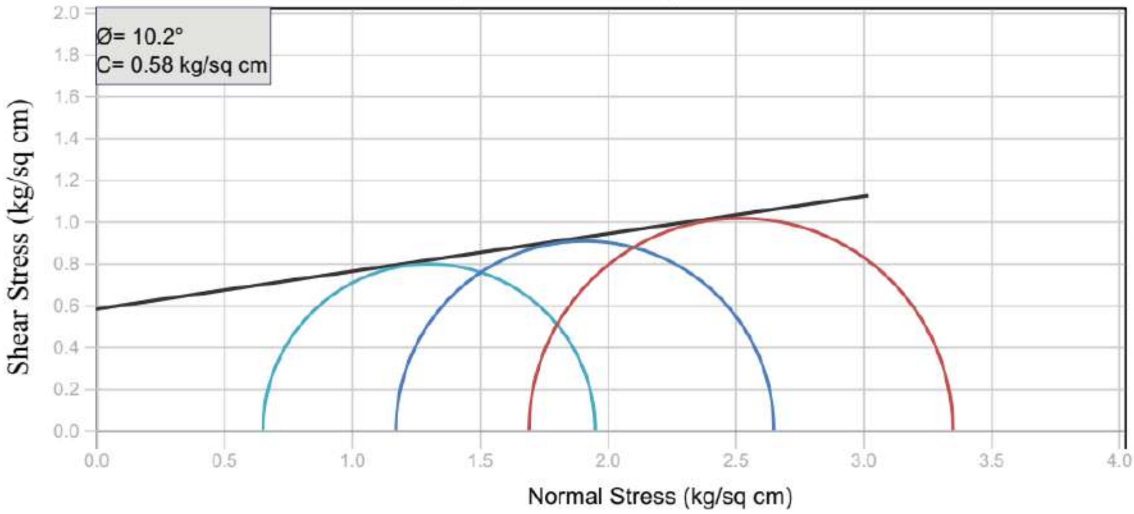


APPENDIX-G
GRAPH 2: UU GRAPH

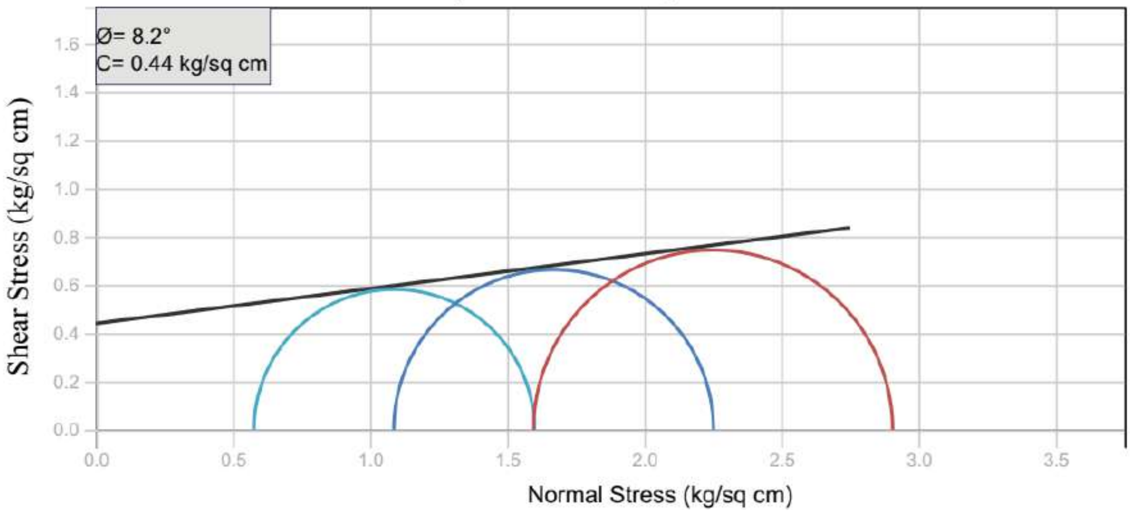
1901-HRIDC-VII-23935.247
BH-NO.P115A, DEPTH-14.00M, TRIAXIAL GRAPH



1901-HRIDC-VII-23935.247
BH-NO.P115A, DEPTH-20.00M, TRIAXIAL GRAPH

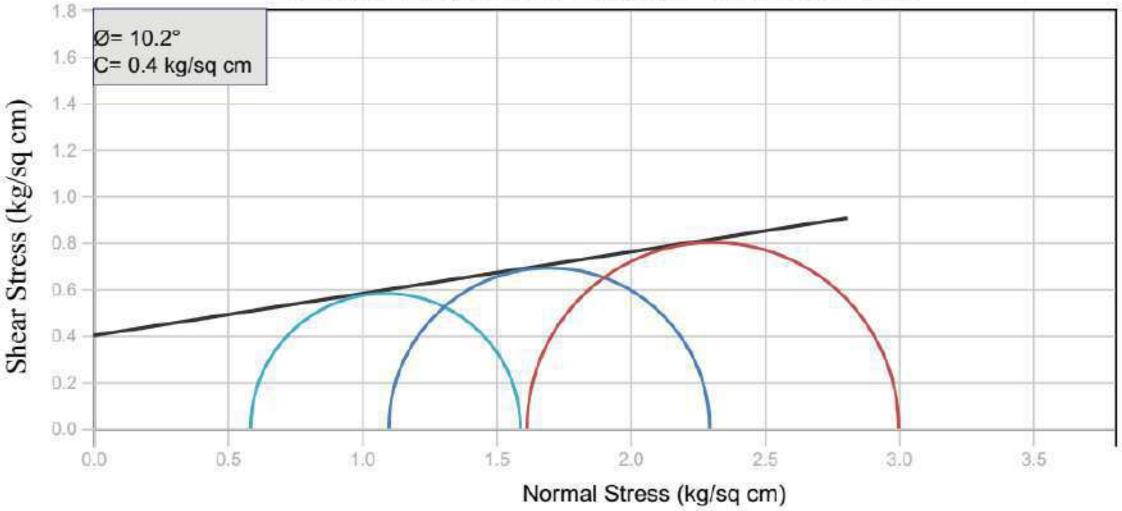


1901-HRIDC-VII-23961.447
BH-NO.P116A, DEPTH-11.00M, TRIAXIAL GRAPH

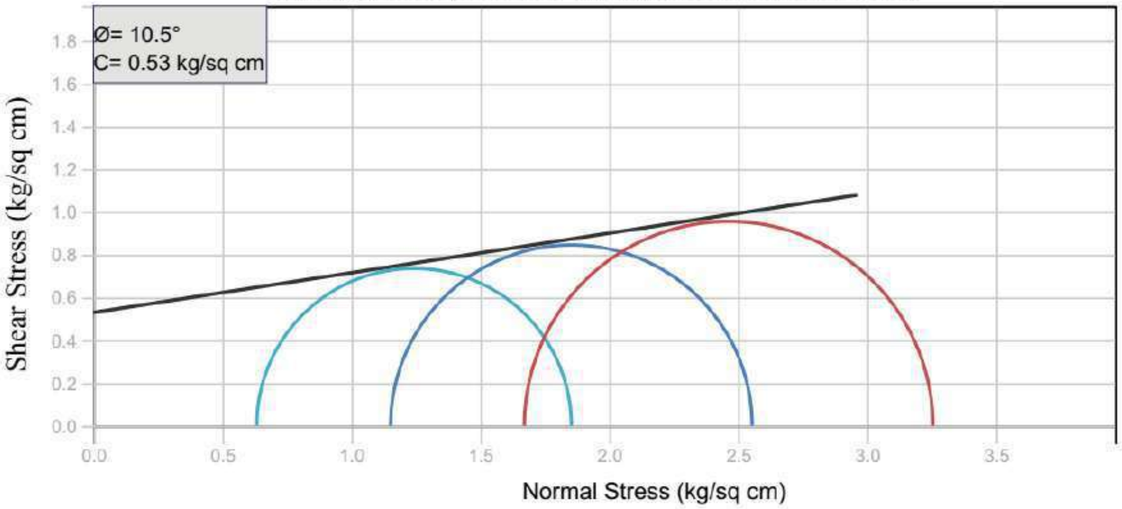


APPENDIX-G
GRAPH 3: UU GRAPH

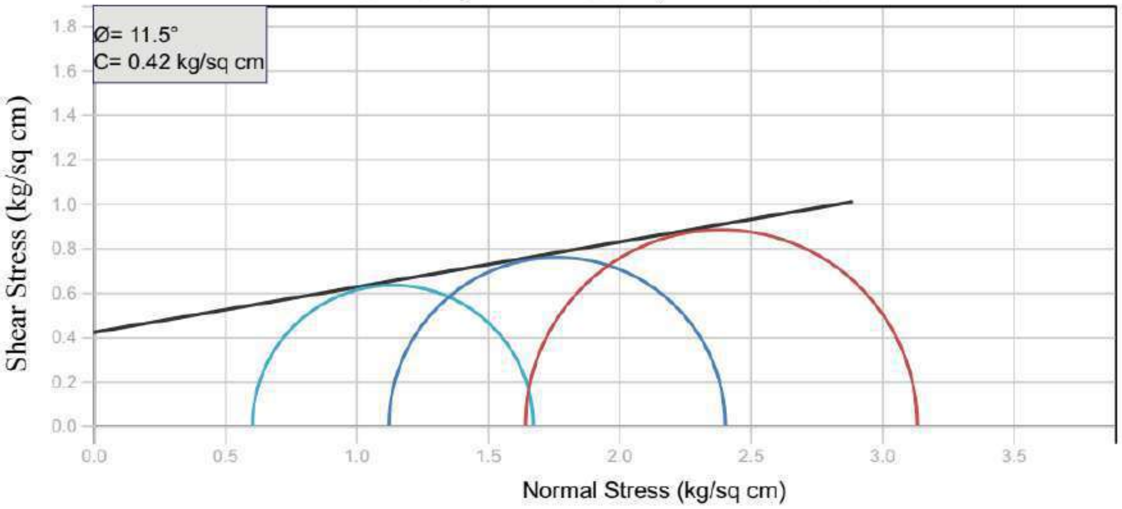
1901-HRIDC-VII-23961.447
BH-NO.P116A, DEPTH-14.00M, TRIAXIAL GRAPH



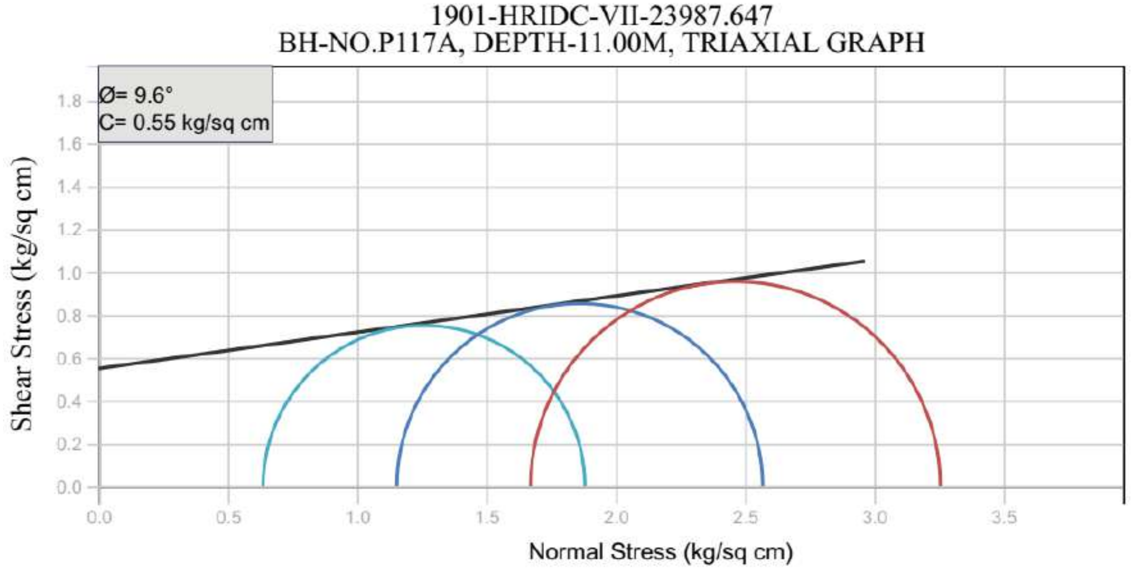
1901-HRIDC-VII-23961.447
BH-NO.P116A, DEPTH-17.00M, TRIAXIAL GRAPH

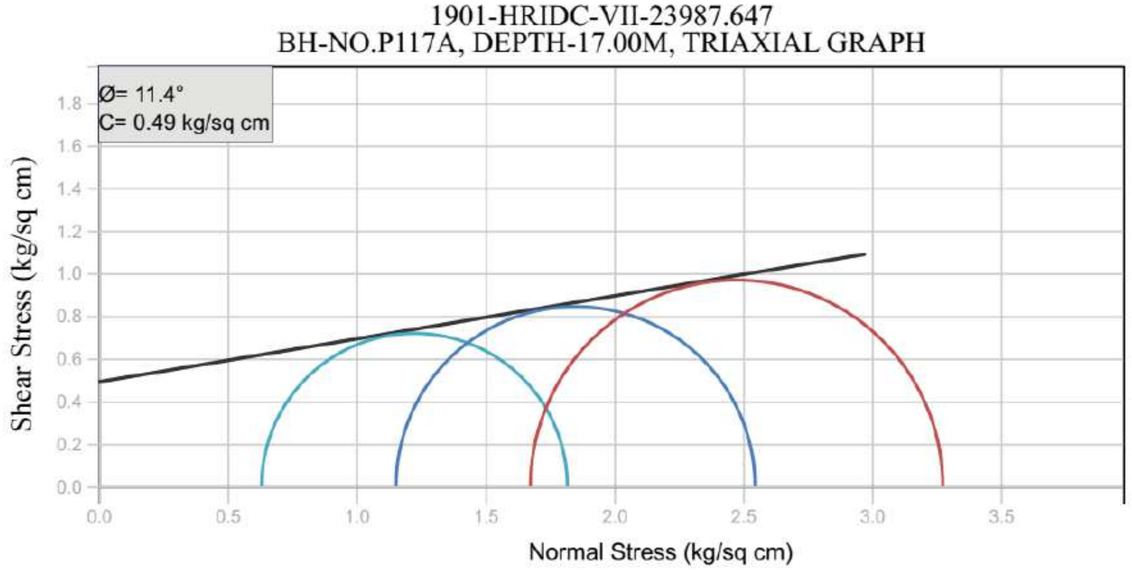


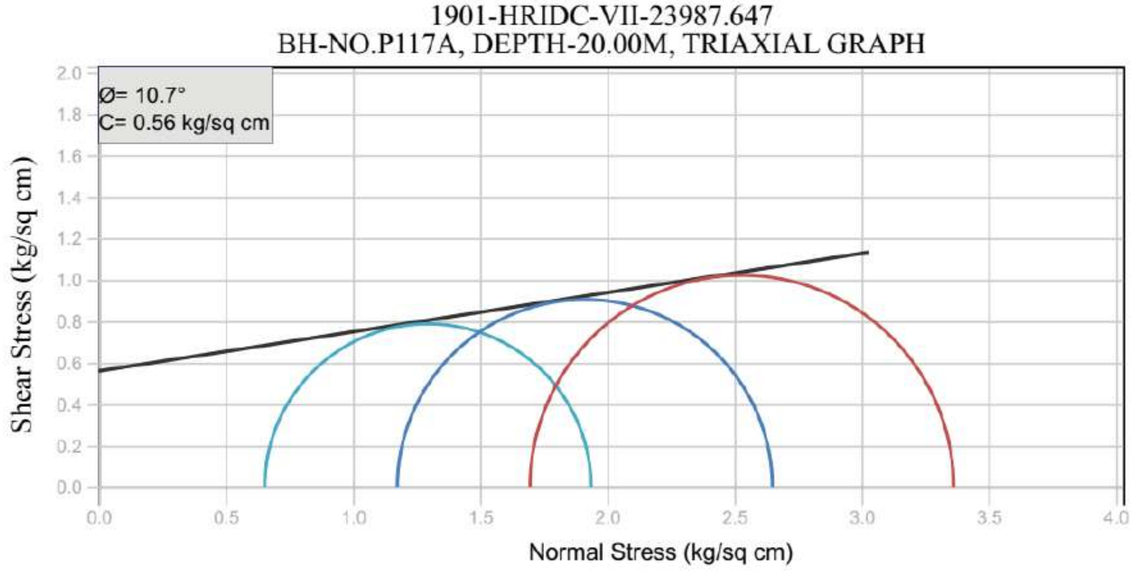
1901-HRIDC-VII-23987.647
BH-NO.P117A, DEPTH-8.00M, TRIAXIAL GRAPH



APPENDIX-G
GRAPH 4: UU GRAPH

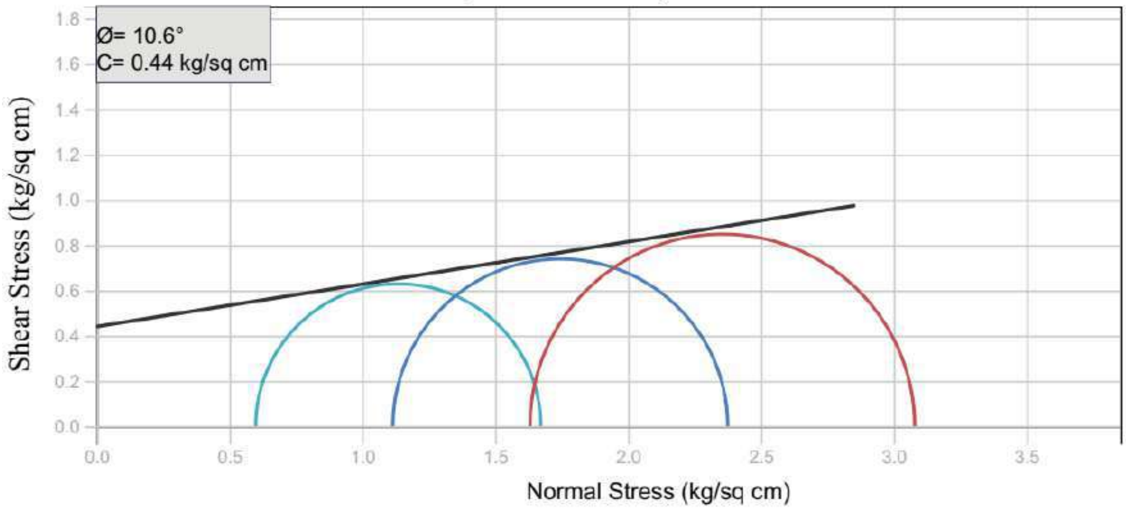




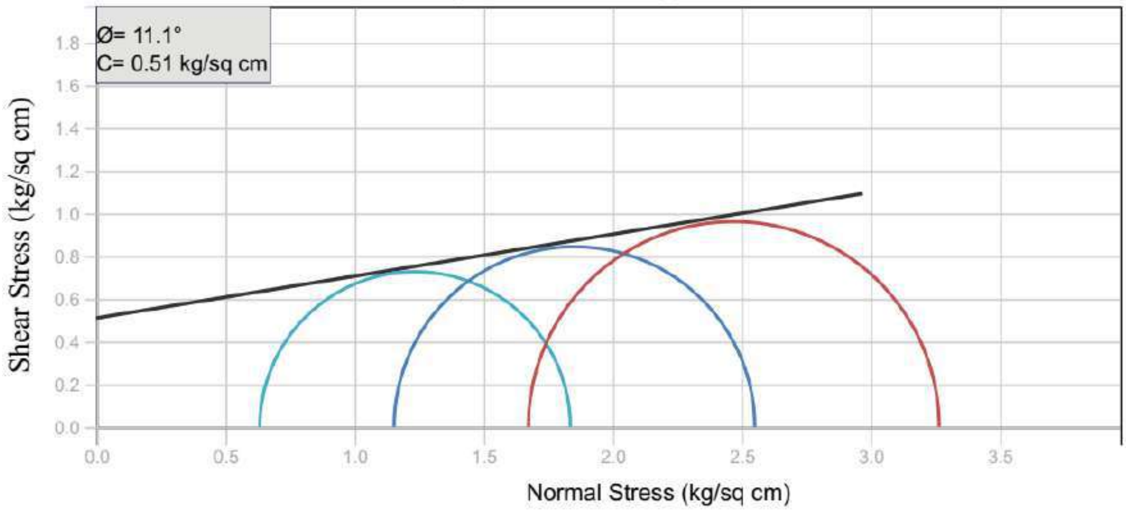


APPENDIX-G
GRAPH 5: UU GRAPH

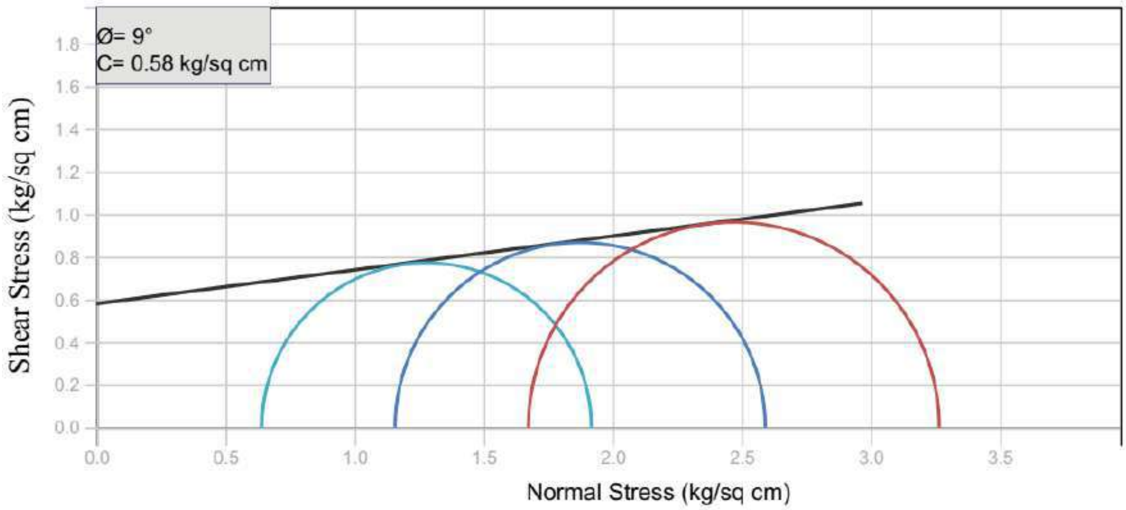
1901-HRIDC-VII-24013.847
BH-NO.P118A, DEPTH-8.00M, TRIAXIAL GRAPH



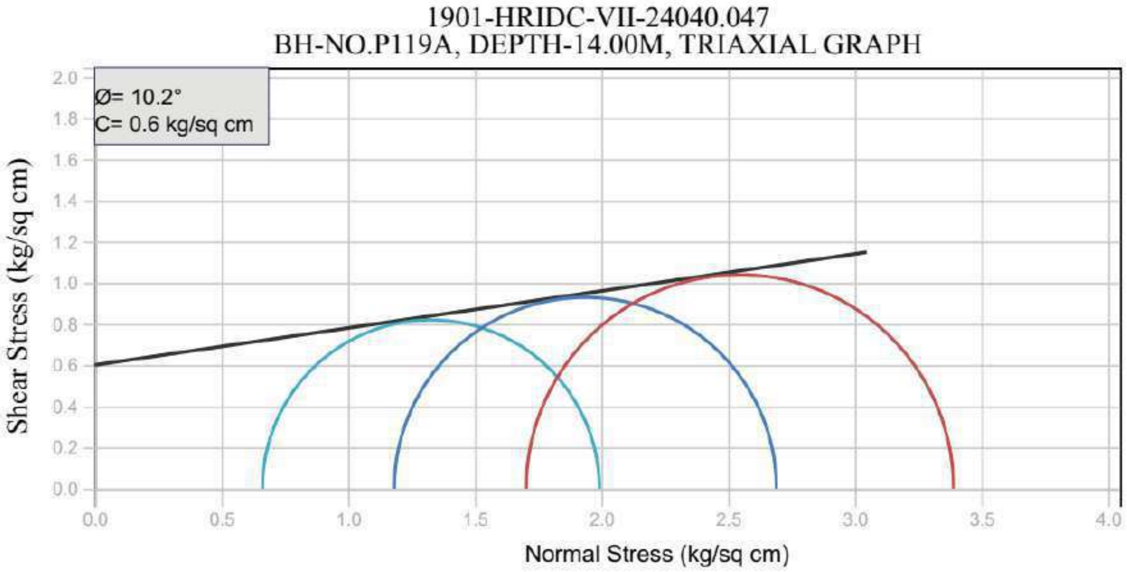
1901-HRIDC-VII-24013.847
BH-NO.P118A, DEPTH-20.00M, TRIAXIAL GRAPH

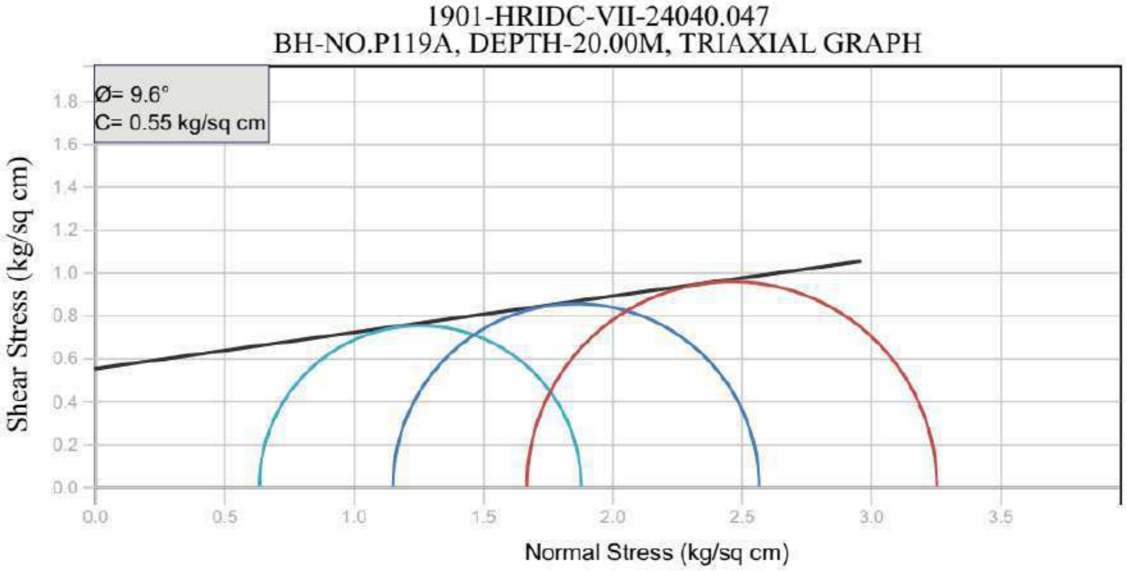


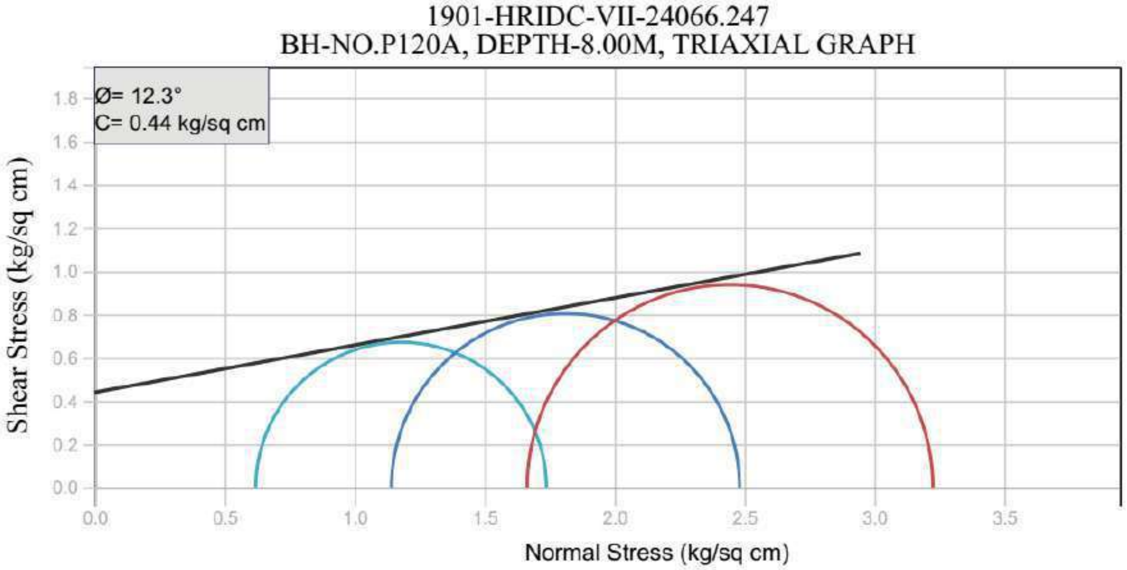
1901-HRIDC-VII-24040.047
BH-NO.P119A, DEPTH-11.00M, TRIAXIAL GRAPH



APPENDIX-G
GRAPH 6: UU GRAPH

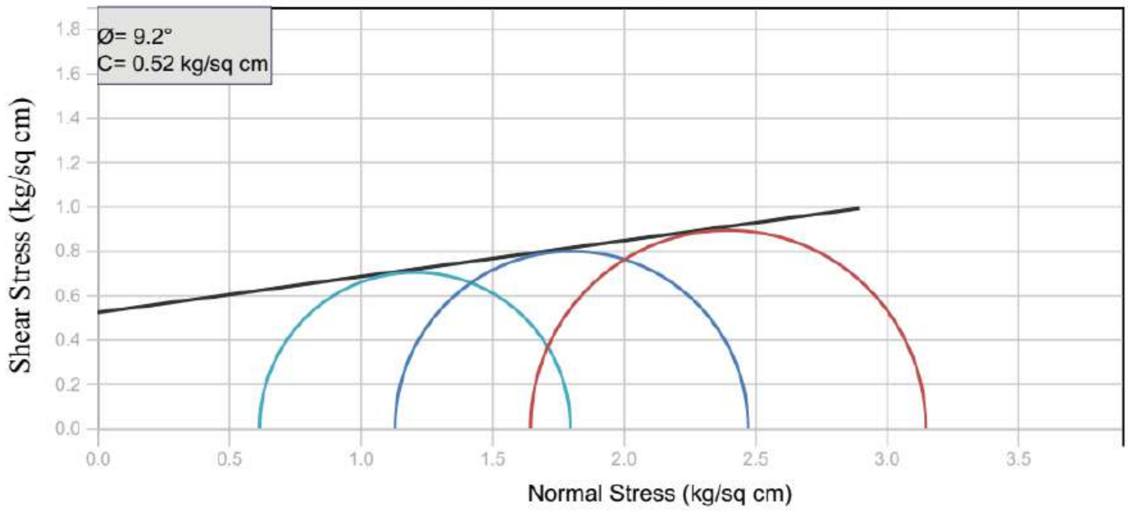




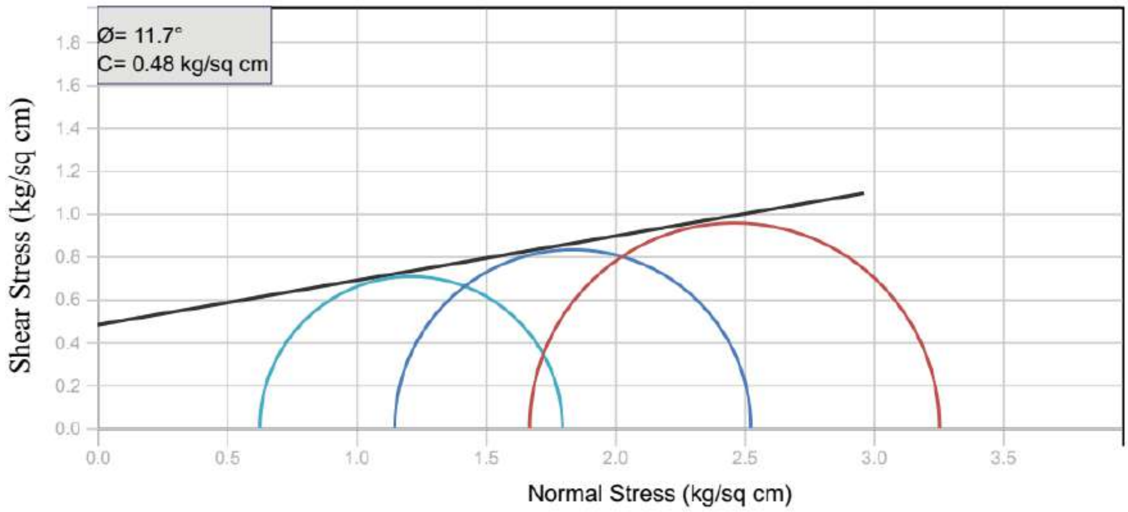


APPENDIX-G
GRAPH 7: UU GRAPH

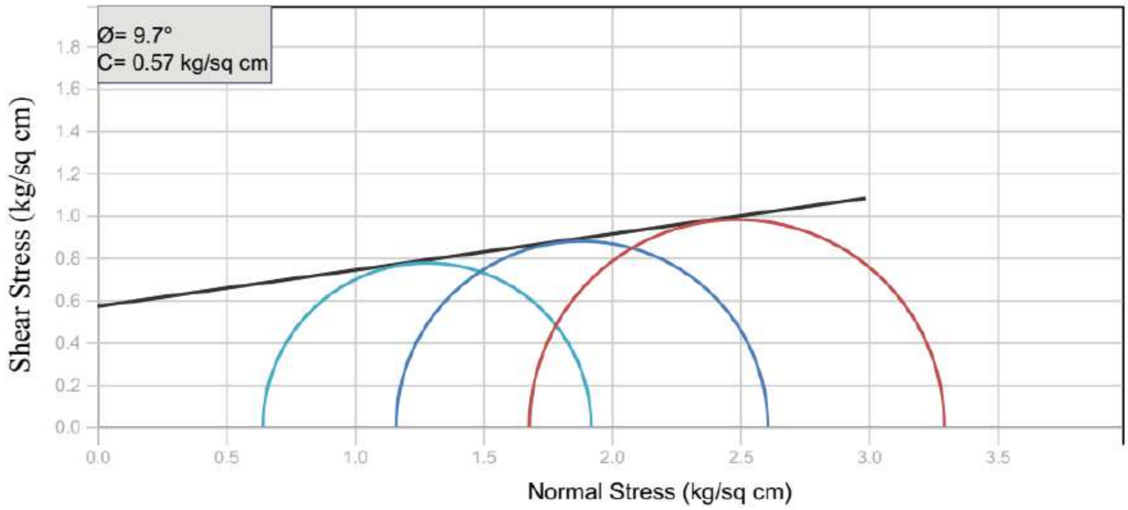
1901-HRIDC-VII-24066.247
BH-NO.P120A, DEPTH-11.00M, TRIAXIAL GRAPH



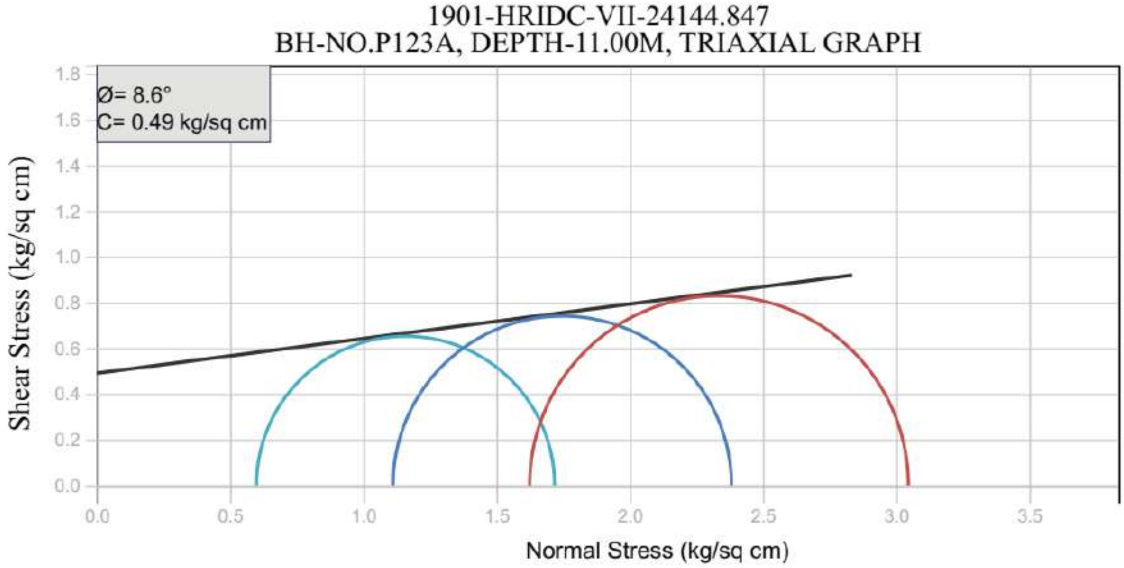
1901-HRIDC-VII-24066.247
BH-NO.P120A, DEPTH-17.00M, TRIAXIAL GRAPH

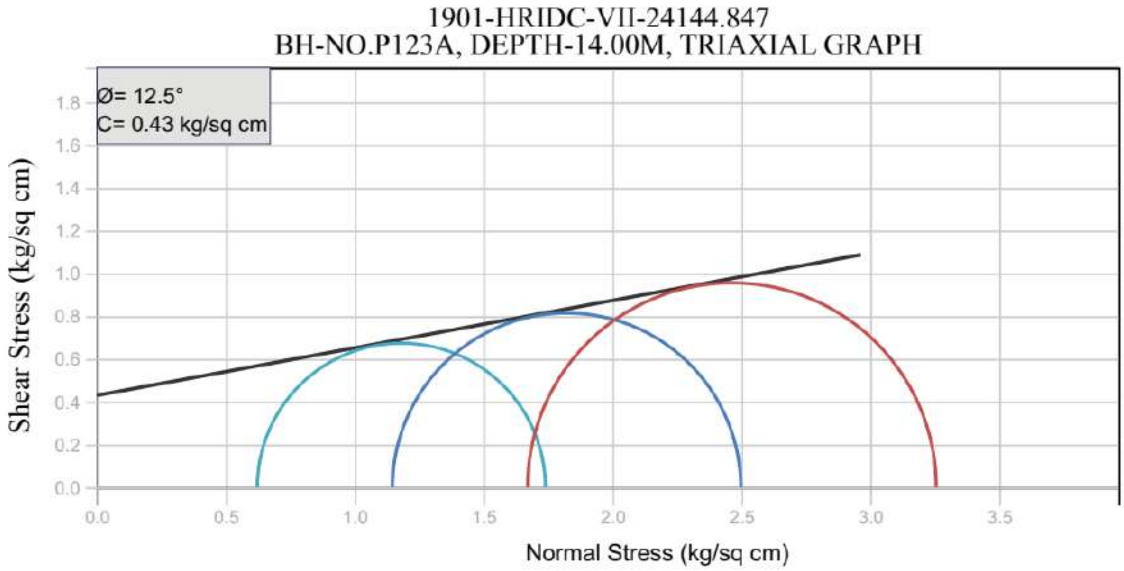


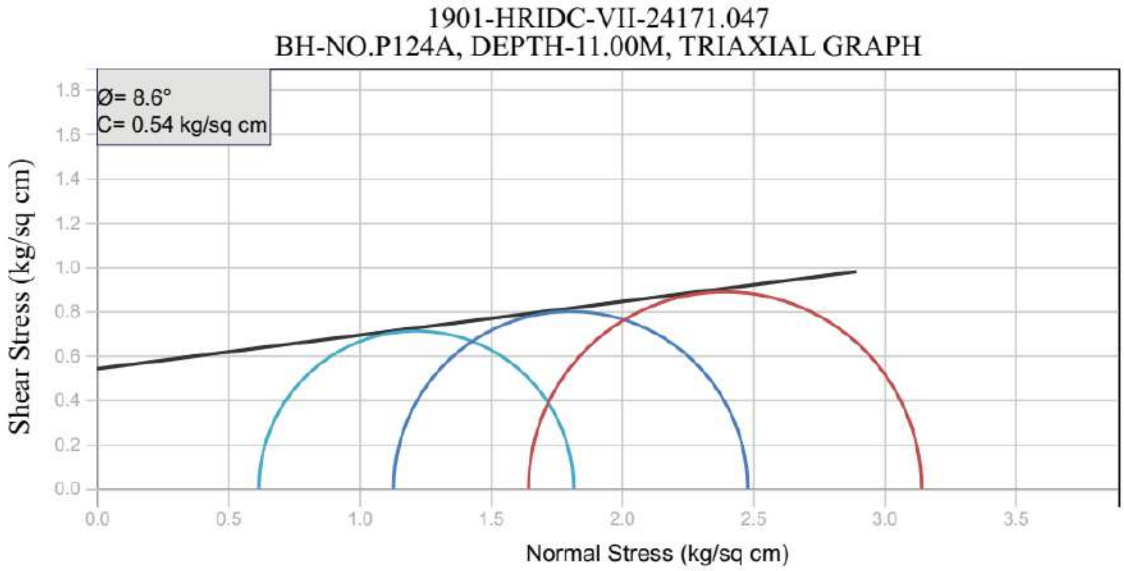
1901-HRIDC-VII-24118.647
BH-NO.P122A, DEPTH-11.00M, TRIAXIAL GRAPH



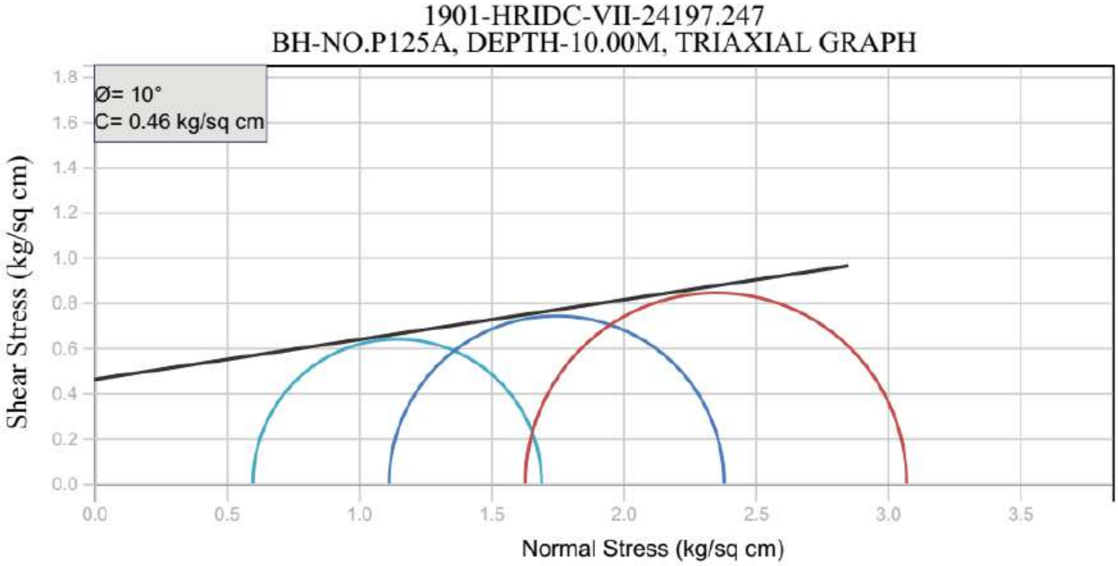
APPENDIX-G
GRAPH 8: UU GRAPH

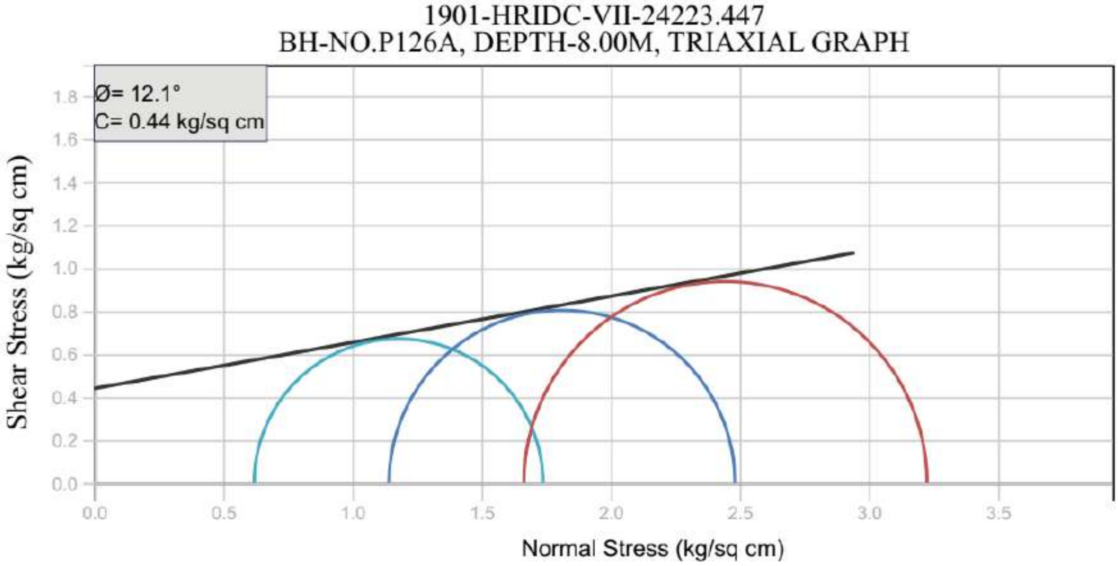


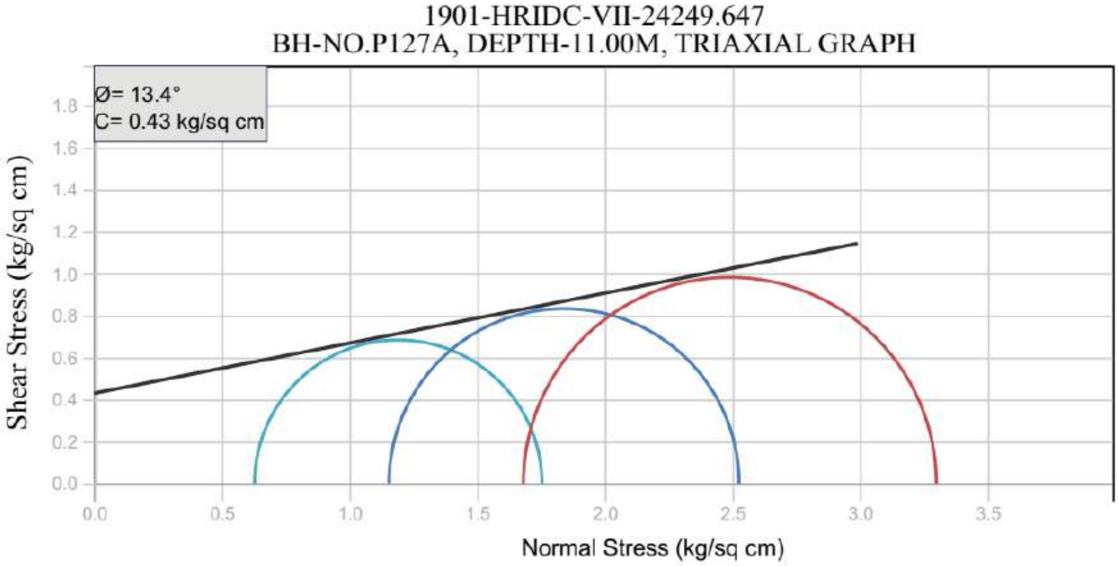




APPENDIX-G
GRAPH 9: UU GRAPH



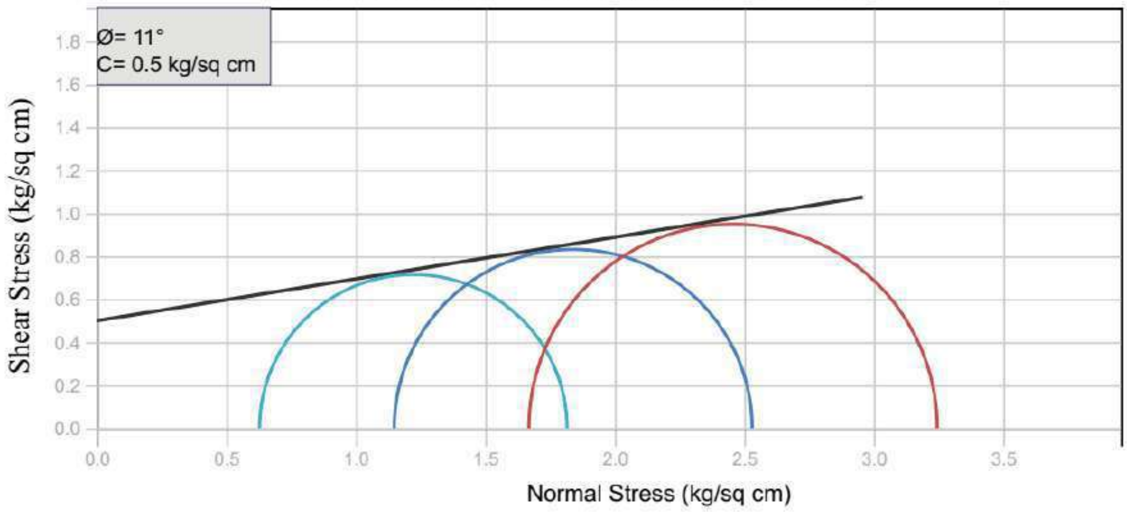




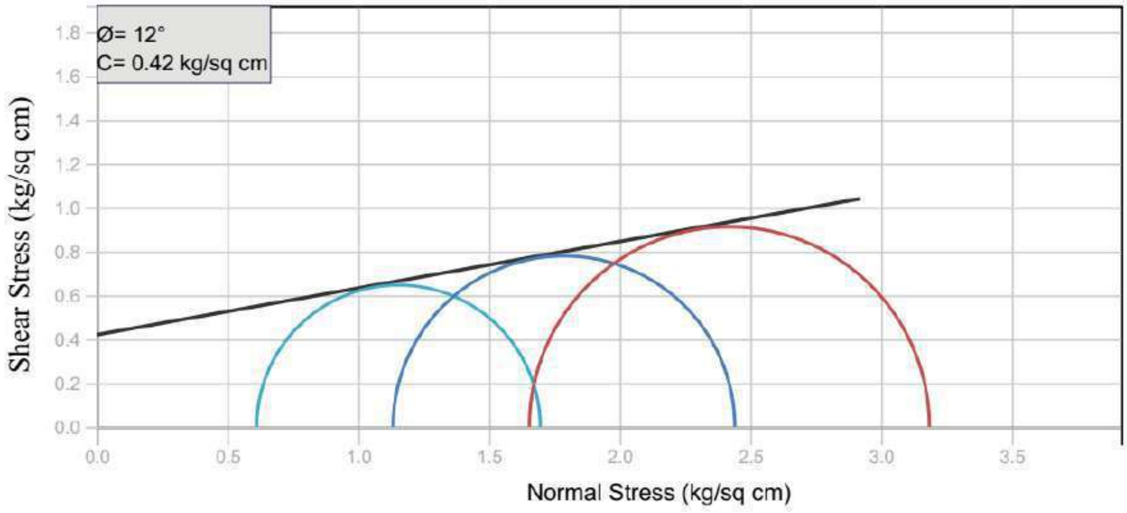
APPENDIX-G

GRAPH 10: UU GRAPH

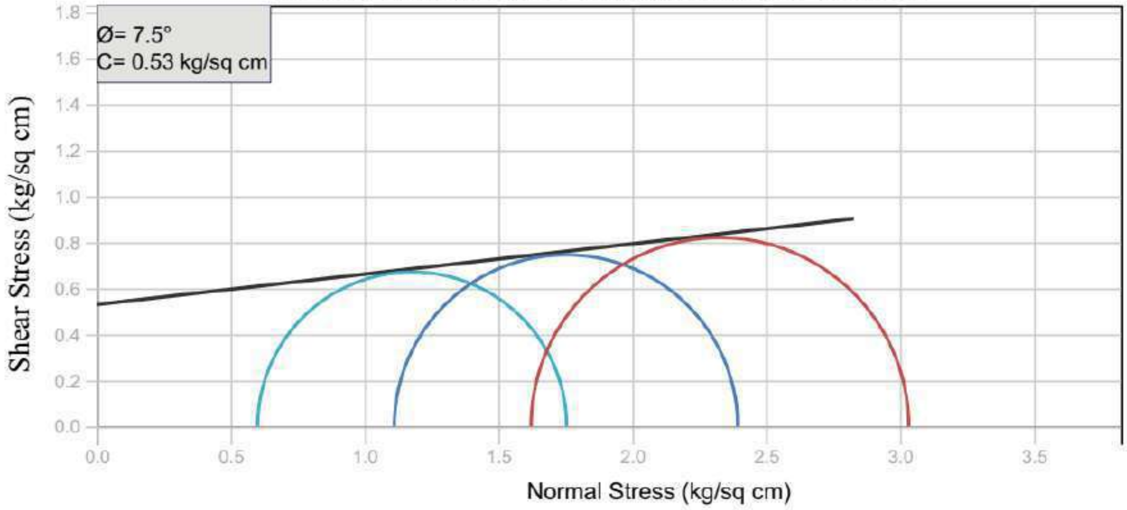
1901-HRIDC-VII-24249.647
BH-NO.P127A, DEPTH-20.00M, TRIAXIAL GRAPH



1901-HRIDC-VII-24275.847
BH-NO.P128A, DEPTH-8.00M, TRIAXIAL GRAPH

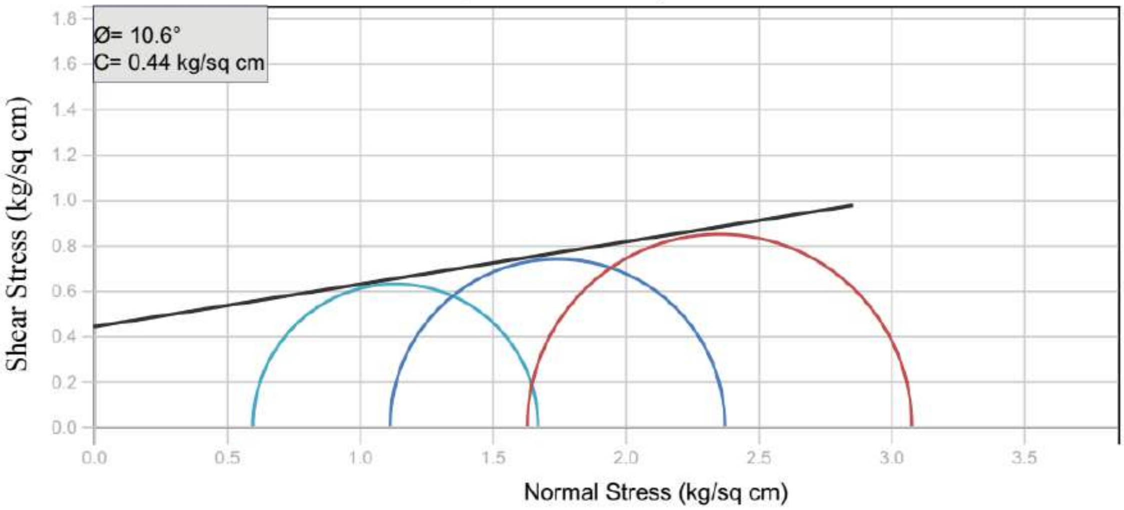


1901-HRIDC-VII-24275.847
BH-NO.P128A, DEPTH-11.00M, TRIAXIAL GRAPH



APPENDIX-G
GRAPH 11: UU GRAPH

1901-HRIDC-VII-24302.047
BH-NO.P129A, DEPTH-7.00M, TRIAXIAL GRAPH



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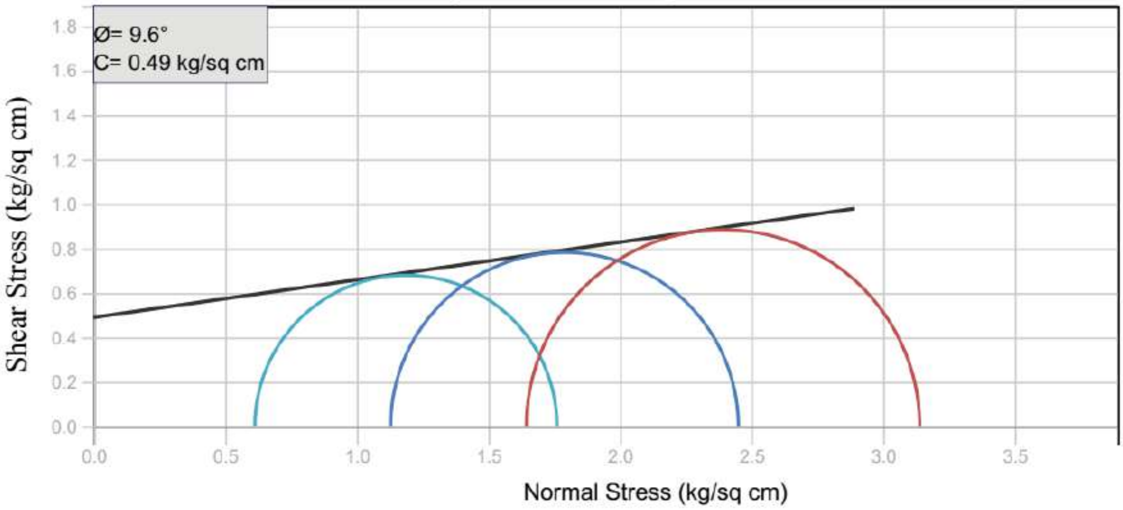
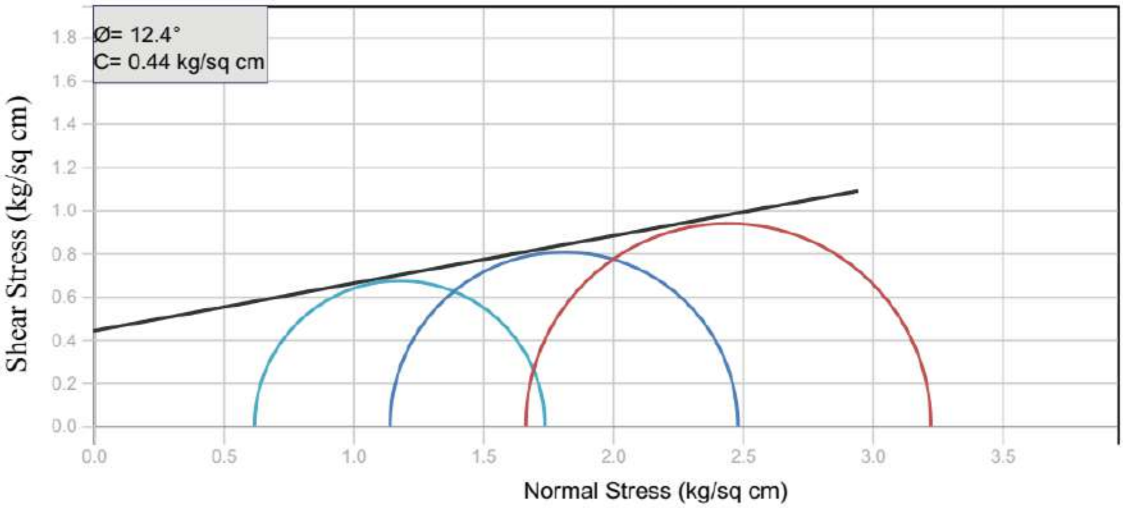
BH-NO.P129A, DEPTH-10.00M, TRIAXIAL GRAPH

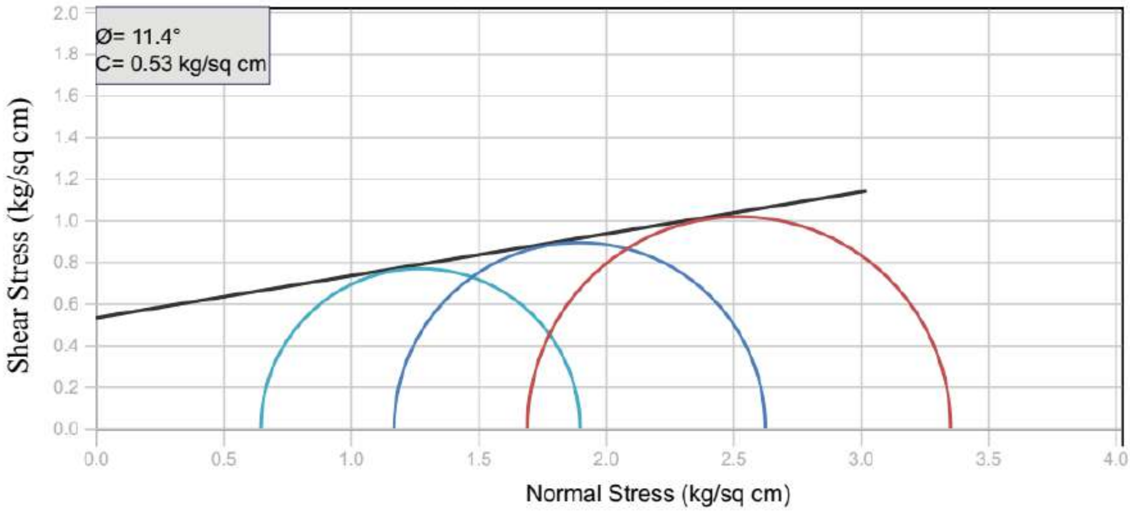


1901-HRIDC-VII-24302.047
BH-NO.P129A, DEPTH-13.00M, TRIAXIAL GRAPH

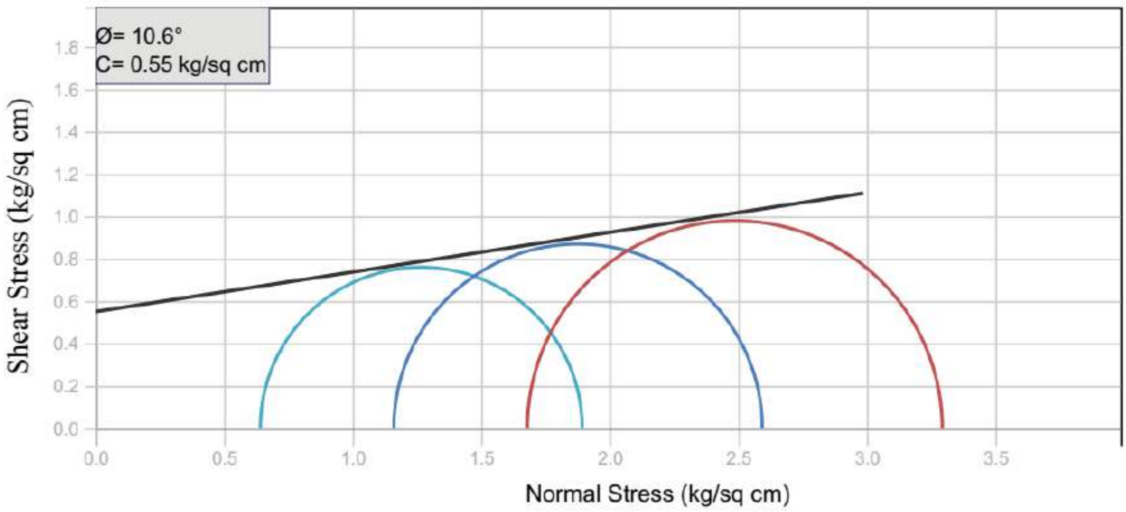


APPENDIX-G
GRAPH 12: UU GRAPH

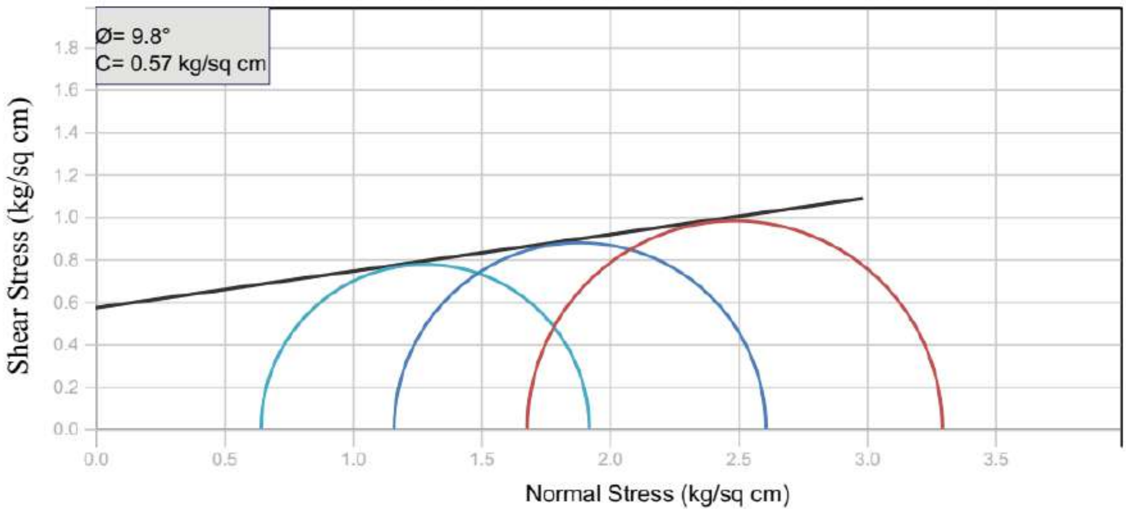
1901-HRIDC-VII-24302.047
BH-NO.P129A, DEPTH-16.00M, TRIAXIAL GRAPH



1901-HRIDC-VII-24328.247
BH-NO.P130A, DEPTH-11.00M, TRIAXIAL GRAPH

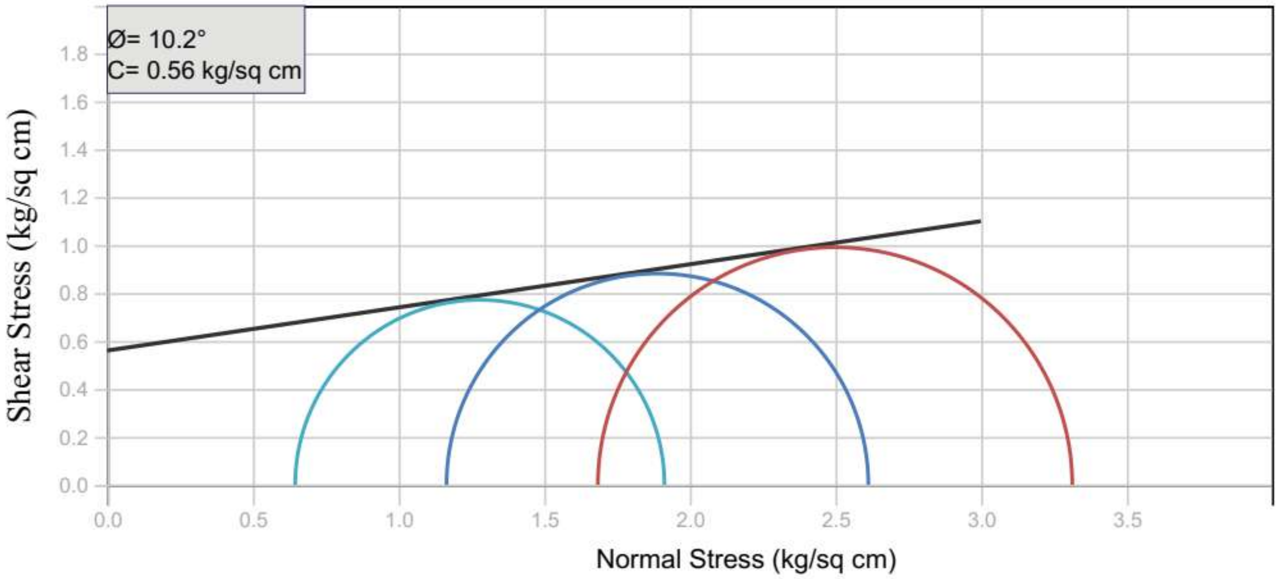


1901-HRIDC-VII-24328.247
BH-NO.P130A, DEPTH-14.00M, TRIAXIAL GRAPH

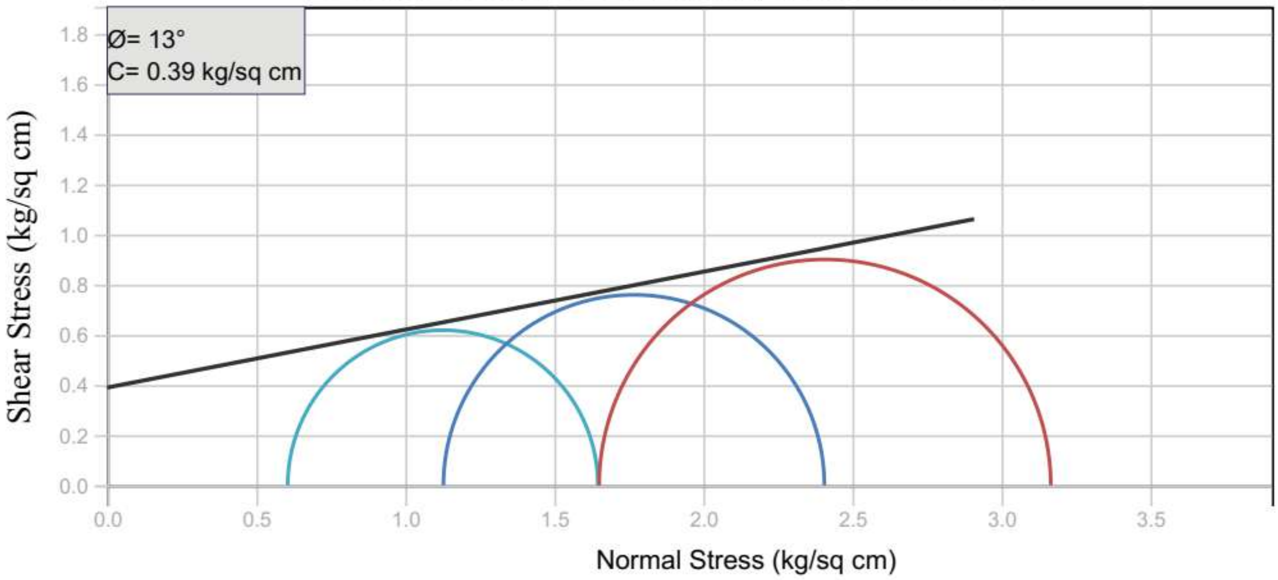


APPENDIX-G
GRAPH 13: UU GRAPH

1901-HRIDC-VII-24354.447
BH-NO.P131A, DEPTH-13.00M, TRIAXIAL GRAPH

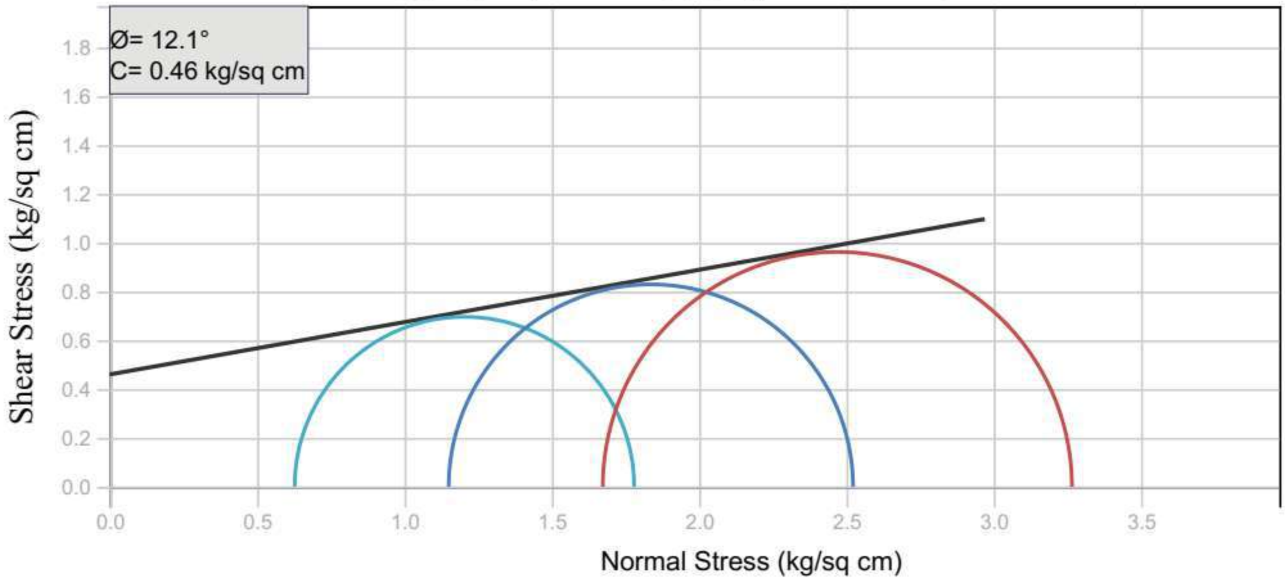


1901-HRIDC-VII-24354.447
BH-NO.P131A, DEPTH-31.00M, TRIAXIAL GRAPH

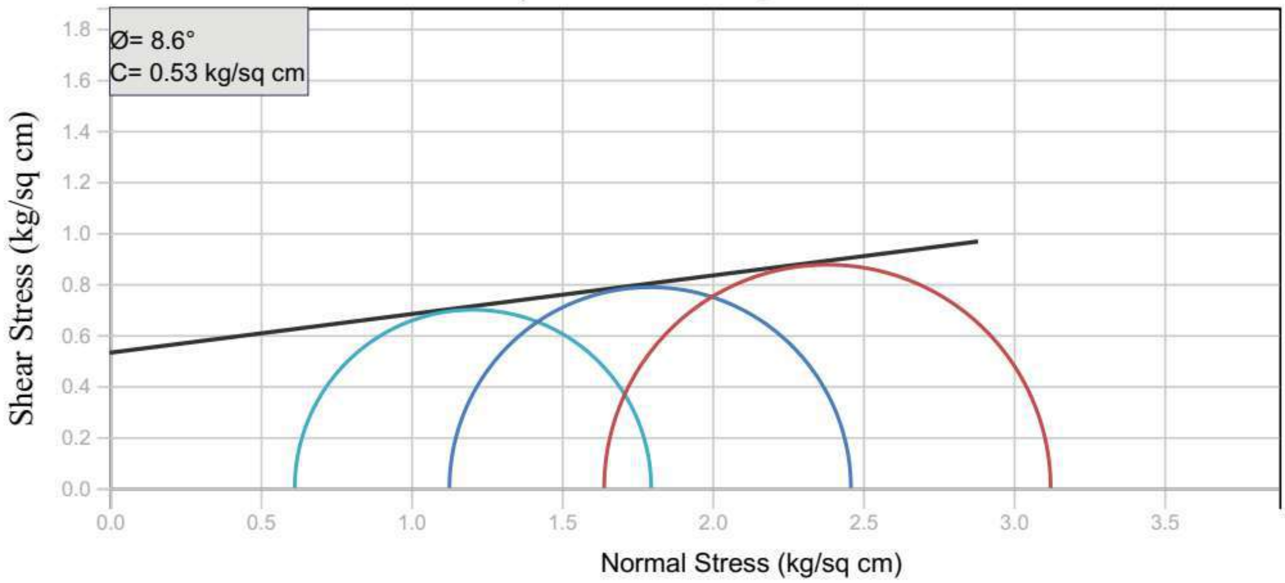


APPENDIX-G
GRAPH 14: UU GRAPH

1901-HRIDC-VII-24380.647
BH-NO.P132A, DEPTH-7.00M, TRIAXIAL GRAPH

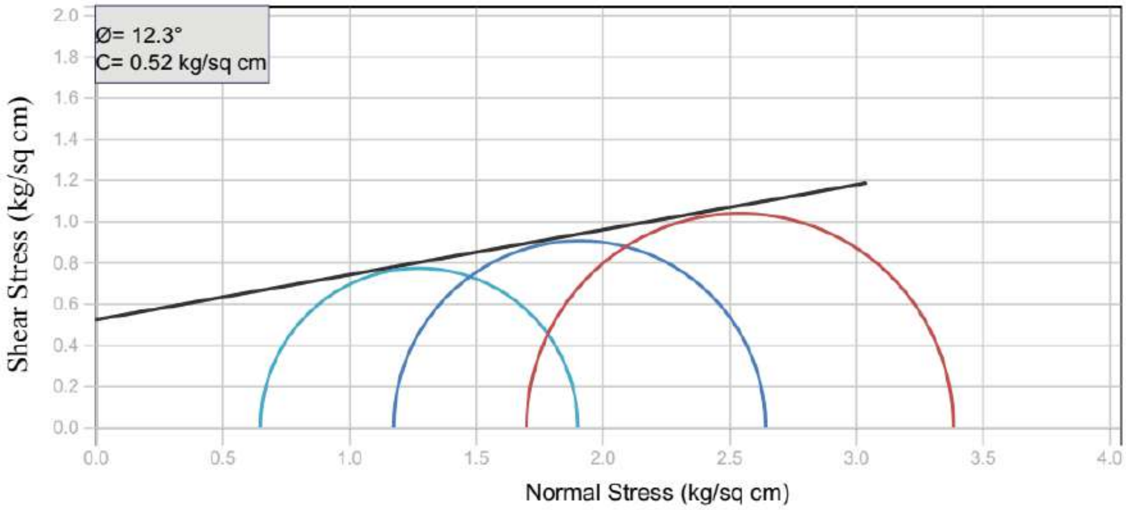


1901-HRIDC-VII-24406.847
BH-NO.P133A, DEPTH-10.00M, TRIAXIAL GRAPH

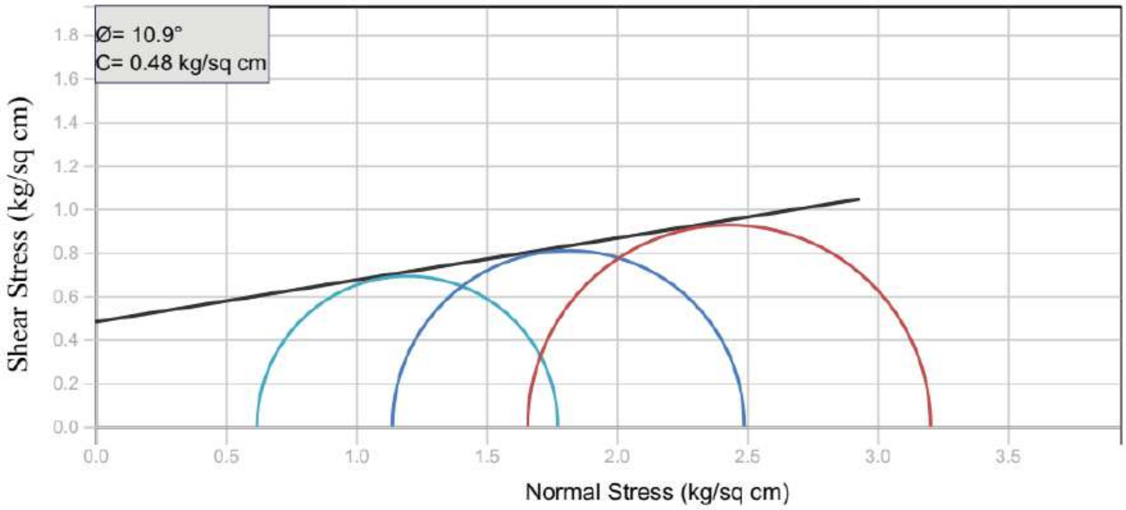


APPENDIX-G
GRAPH 15: RUU GRAPH

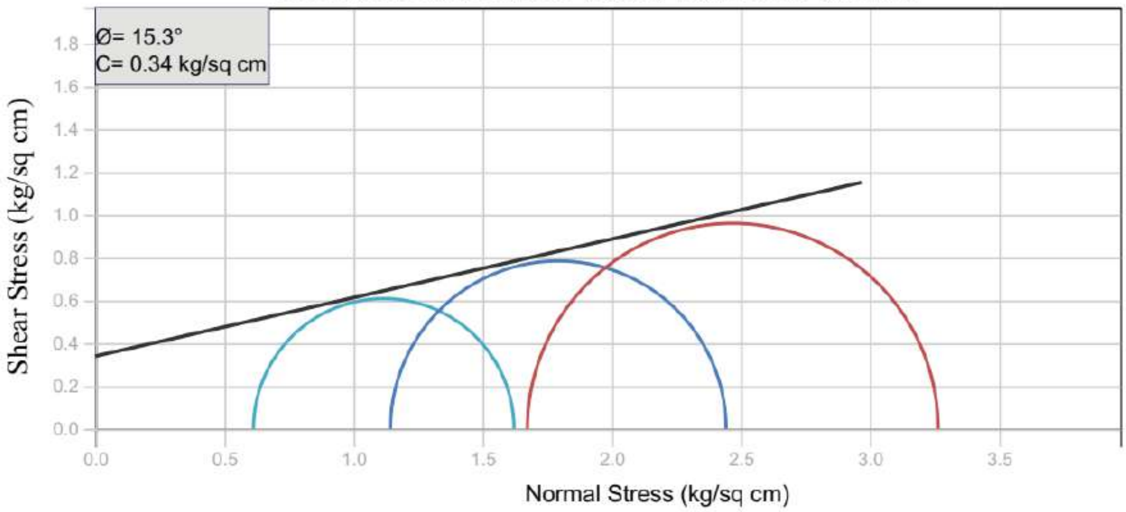
1901-HRIDC-VII-23987.647
BH-NO.P117A, DEPTH-35.00M, TRIAXIAL GRAPH



1901-HRIDC-VII-24013.847
BH-NO.P118A, DEPTH-14.00M, TRIAXIAL GRAPH



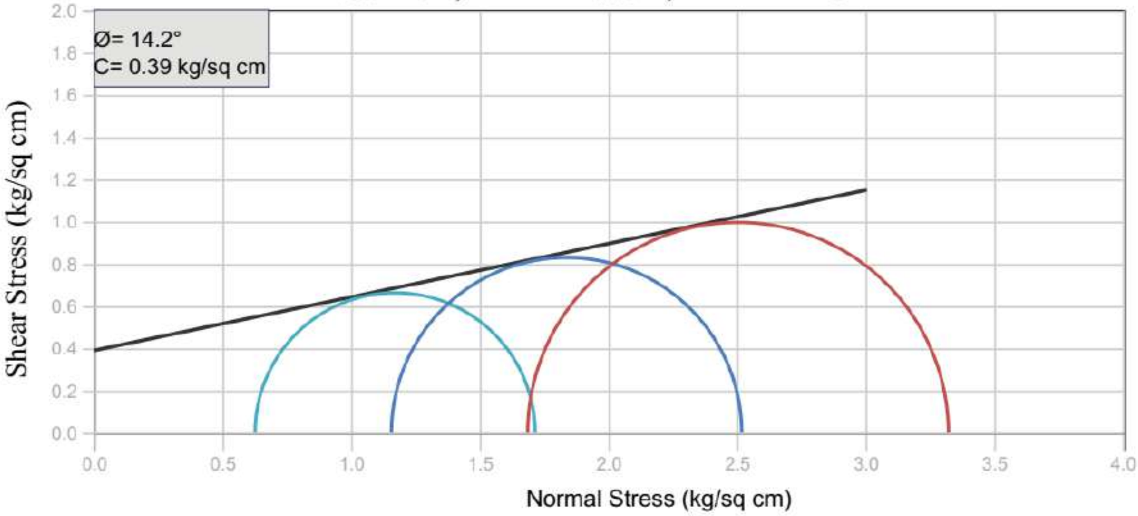
1901-HRIDC-VII-24040.047
BH-NO.P119A, DEPTH-8.00M, TRIAXIAL GRAPH



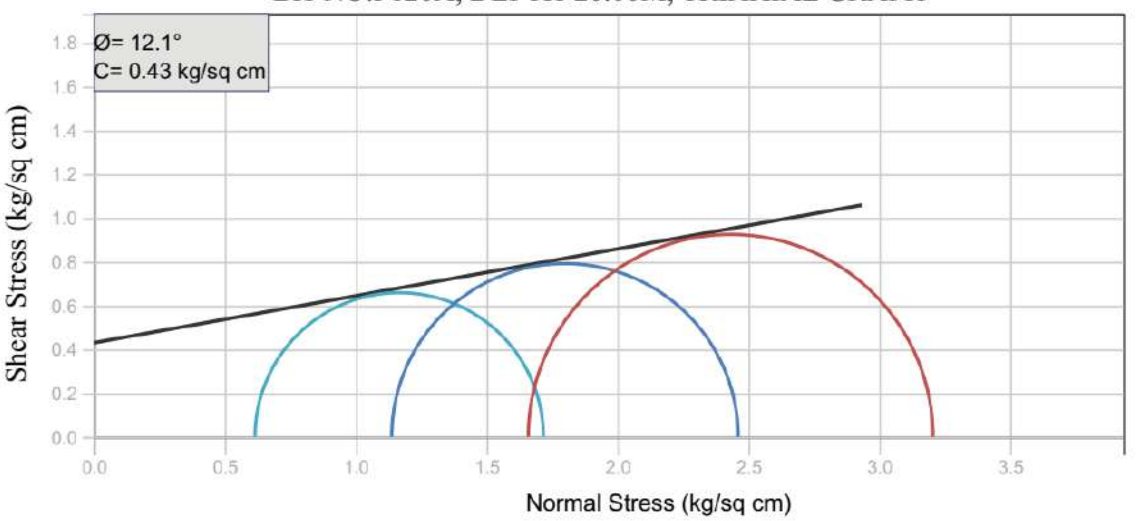
APPENDIX-G

GRAPH 16: RUU GRAPH

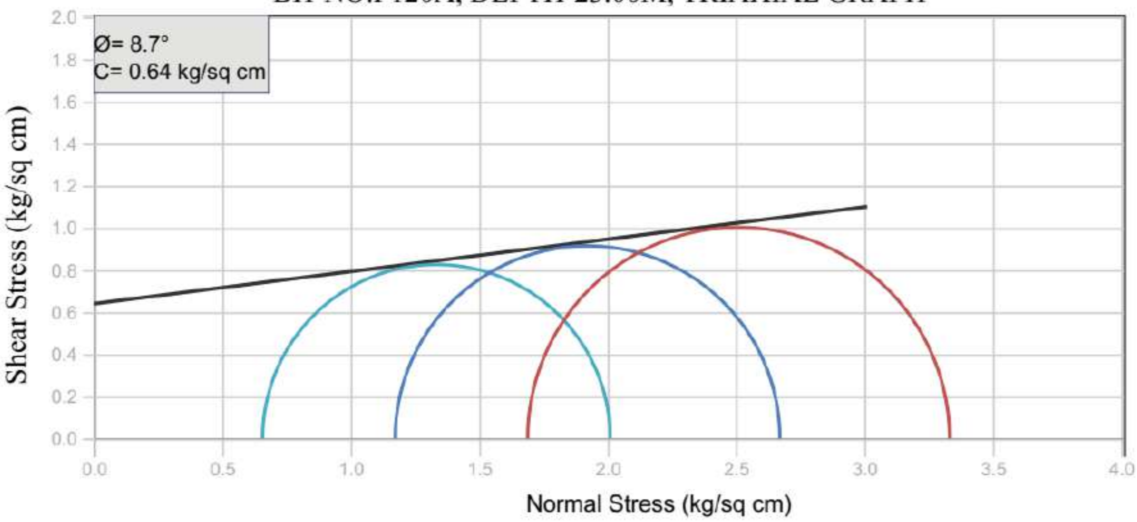
1901-HRIDC-VII-24040.047
BH-NO.P119A, DEPTH-17.00M, TRIAXIAL GRAPH



1901-HRIDC-VII-24066.247
BH-NO.P120A, DEPTH-20.00M, TRIAXIAL GRAPH

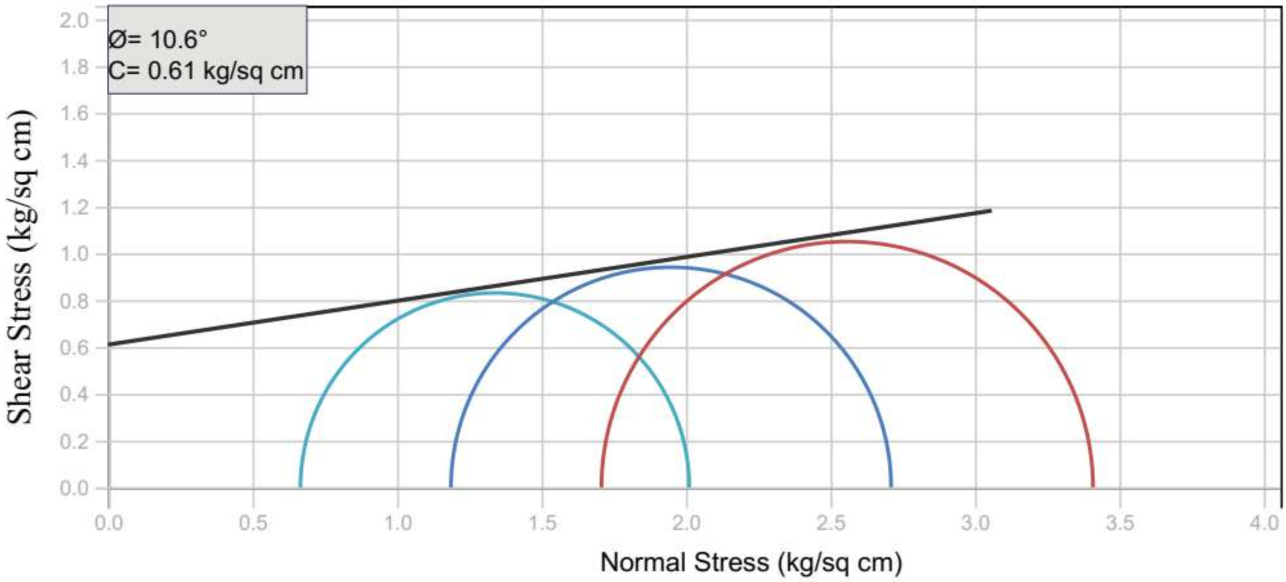


1901-HRIDC-VII-24066.247
BH-NO.P120A, DEPTH-23.00M, TRIAXIAL GRAPH

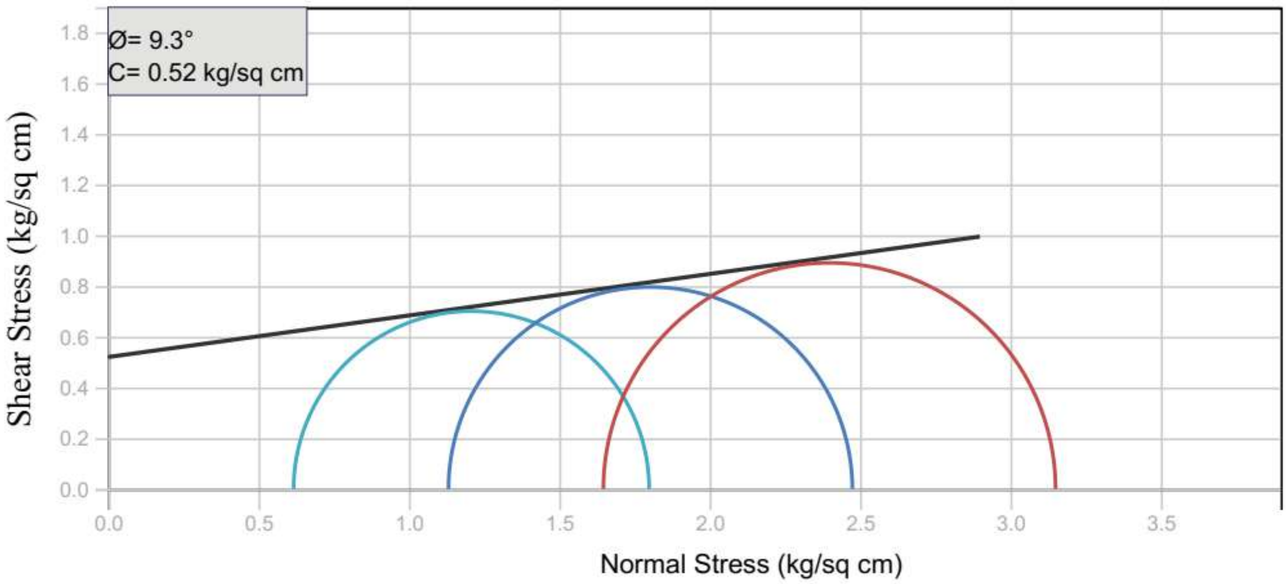


APPENDIX-G
GRAPH 17: RUU GRAPH

1901-HRIDC-VII-24092.447
BH-NO.P121A, DEPTH-11.00M, TRIAXIAL GRAPH

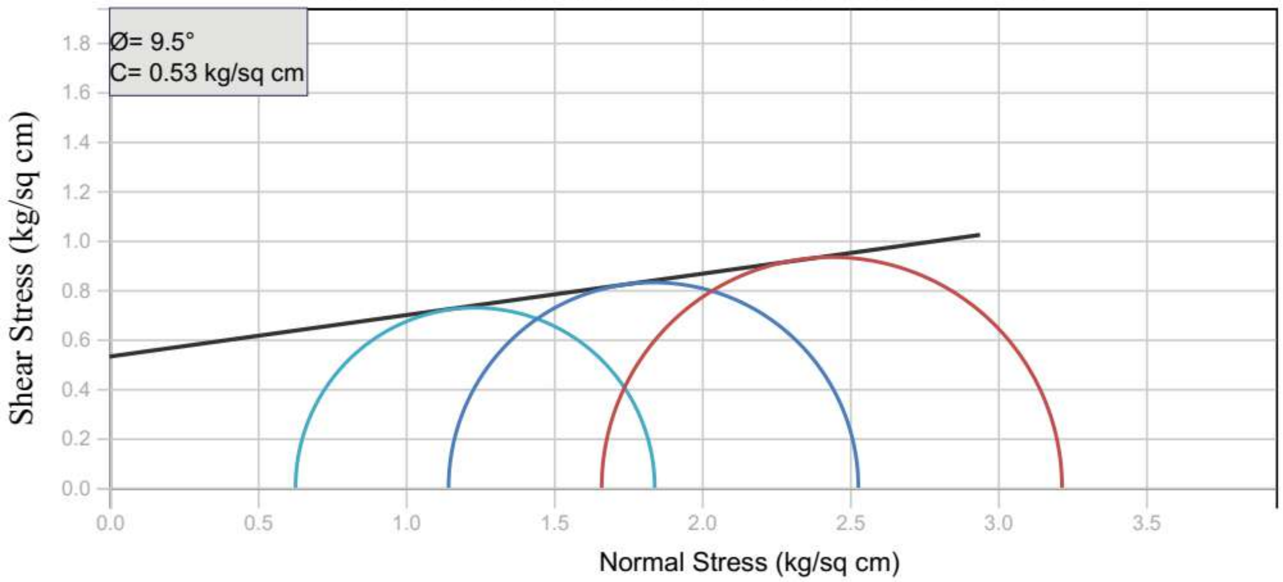


1901-HRIDC-VII-24118.647
BH-NO.P122A, DEPTH-23.00M, TRIAXIAL GRAPH

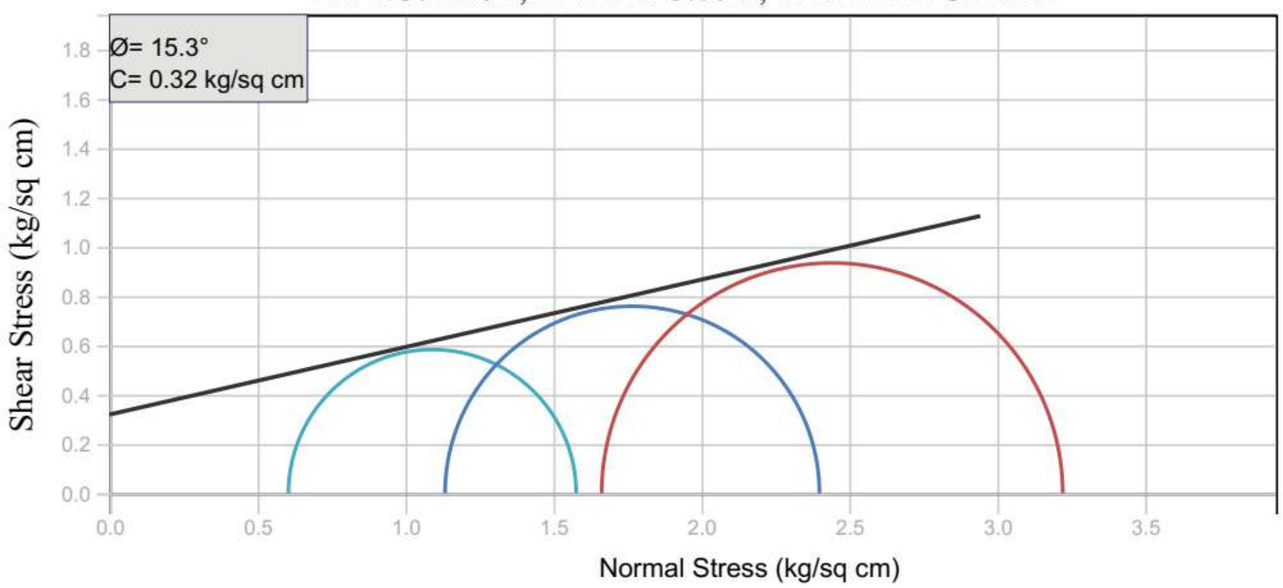


APPENDIX-G
GRAPH 18: RUU GRAPH

1901-HRIDC-VII-24197.247
BH-NO.P125A, DEPTH-19.00M, TRIAXIAL GRAPH



1901-HRIDC-VII-24275.847
BH-NO.P128A, DEPTH-23.00M, TRIAXIAL GRAPH



APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 0.79 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
BORE NO: P114A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	15.99	5.99	16.47	1.57	24.2	24.2	1.0	11.63	0	0	1.0	0.0	0	3.0	24.2	0	5.99	9.42	10.00	18.0	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.50	15.99	5.99	20.97	3.14	24.2	24.2	1.0	29.61	0	0	1.0	0.0	0	4.0	23.6	5	8.53	8.99	9.34	24.0	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	5.00	4.50	1.00	2.50	18.53	8.53	28.23	3.14	23.6	23.6	1.0	38.76	0	5	1.0	15.7	0	5.0	23.6	5	8.53	8.99	9.34	32.5	296.2	296.2	29.5	29.5	**118.48**	**9.82**
5.00	6.00	5.50	1.00	3.50	18.53	8.53	36.76	3.14	23.6	23.6	1.0	50.47	50.47	5	1.0	15.7	15.71	6.0	13.6	32	8.53	3.53	2.25	41.0	347.6	413.8	41.3	107.4	**165.51**	**35.81**
6.00	7.00	6.50	1.00	4.50	18.53	8.53	45.29	3.14	13.6	13.6	1.0	34.43	84.90	32	1.0	100.6	116.29	7.0	29.1	1	9.66	19.23	20.33	49.6	833.0	1034.2	53.0	254.2	**413.67**	**84.74**
7.00	8.00	7.50	1.00	5.50	19.66	9.66	54.38	3.14	29.1	29.1	1.0	95.13	180.03	1	1.0	3.1	119.43	8.0	12.5	47	9.66	3.20	1.94	59.2	488.8	788.2	64.8	364.3	**315.28**	**121.43**
8.00	9.00	8.50	1.00	6.50	19.66	9.66	64.04	3.14	12.5	12.5	1.0	44.62	224.65	47	1.0	147.7	267.14	9.0	12.5	47	10.76	3.20	1.94	68.9	513.9	1005.7	76.6	568.4	**402.28**	**189.47**
9.00	11.00	10.00	2.00	8.50	20.76	10.76	79.63	6.29	12.5	12.5	1.0	110.97	335.61	47	1.0	295.4	562.57	11.0	12.5	47	10.76	3.20	1.94	90.4	568.1	1466.3	100.2	998.4	**586.51**	**332.79**
11.00	12.00	11.50	1.00	9.50	20.76	10.76	95.77	3.14	12.5	12.5	1.0	66.73	402.34	47	1.0	147.7	710.29	12.0	10.4	69	10.66	2.59	1.33	101.2	699.2	1811.8	112.0	1224.6	**724.72**	**408.20**
12.00	14.50	13.25	2.50	12.00	20.66	10.66	114.48	7.86	10.4	10.4	1.0	165.08	567.42	69	1.0	542.1	1252.43	14.5	10.4	69	10.66	2.59	1.33	127.8	753.3	2573.2	141.4	1961.3	**1029.28**	**653.76**
14.50	16.00	15.25	1.50	13.50	20.66	10.66	114.48	4.71	10.4	10.4	1.0	99.05	666.47	69	1.0	325.3	1577.71	16.0	25.7	8	9.69	11.58	12.49	127.8	1266.6	3510.7	159.1	2403.3	**1404.30**	**801.10**
16.00	17.50	16.75	1.50	15.00	19.69	9.69	114.48	4.71	25.7	25.7	1.0	259.72	926.19	8	1.0	37.7	1615.43	17.5	16.8	37	9.69	4.83	3.64	127.8	760.0	3301.7	176.8	2718.4	**1320.67**	**906.14**
17.50	19.00	18.25	1.50	16.50	19.69	9.69	114.48	4.71	16.8	16.8	1.0	162.94	1089.13	37	1.0	174.4	1789.86	19.0	11.1	55	10.08	2.79	1.53	127.8	675.5	3554.5	194.5	3073.4	**1421.79**	**1024.48**
19.00	20.50	19.75	1.50	18.00	20.08	10.08	114.48	4.71	11.1	11.1	1.0	105.88	1195.00	55	1.0	259.3	2049.14	20.5	11.1	55	10.08	2.79	1.53	127.8	675.5	3919.7	212.1	3456.3	**1567.86**	**1152.10**
20.50	23.50	22.00	3.00	21.00	20.08	10.08	114.48	9.43	11.1	11.1	1.0	211.76	1406.76	55	1.0	518.6	2567.71	23.5	11.1	55	8.65	2.79	1.53	127.8	674.6	4649.1	247.5	4222.0	**1859.65**	**1407.33**
23.50	25.00	24.25	1.50	22.50	18.65	8.65	114.48	4.71	11.1	11.1	1.0	105.88	1512.64	55	1.0	259.3	2827.00	25.0	31.4	0	9.14	28.31	29.58	127.8	2949.1	7288.8	265.2	4604.8	**2915.51**	**1534.94**
25.00	26.50	25.75	1.50	24.00	19.14	9.14	114.48	4.71	31.4	31.4	1.1	352.47	1865.11	0	1.0	0.0	2827.00	26.5	31.7	0	9.11	29.82	31.11	127.8	3106.0	7798.1	282.9	4975.0	**3119.26**	**1658.32**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
26.50	27.50	27.00	1.00	25.00	19.11	9.11	114.48	3.14	31.7	31.7	1.1	241.09	2106.21	0	1.0	0.0	2827.00	27.5	31.7	0	9.11	29.82	31.11	127.8	3106.0	8039.2	294.6	5227.8	**3215.69**	**1742.62**
27.50	28.00	27.75	0.50	25.50	19.11	9.11	114.48	1.57	31.7	31.7	1.1	120.55	2226.75	0	1.0	0.0	2827.00	28.0	31.9	0	9.19	30.83	32.14	127.8	3211.9	8265.6	300.5	5354.3	**3306.25**	**1784.76**
28.00	29.50	28.75	1.50	27.00	19.19	9.19	114.48	4.71	31.9	31.9	1.1	367.83	2594.58	0	1.0	0.0	2827.00	29.5	31.9	0	9.32	30.83	32.14	127.8	3213.5	8635.1	318.2	5739.8	**3454.04**	**1913.26**
29.50	30.00	29.75	0.50	27.50	19.32	9.32	114.48	1.57	31.9	31.9	1.1	122.61	2717.19	0	1.0	0.0	2827.00	30.0	31.9	0	9.32	30.83	32.14	127.8	3213.5	8757.7	324.1	5868.3	**3503.08**	**1956.10**
30.00	31.00	30.50	1.00	28.50	19.32	9.32	114.48	3.14	31.9	31.9	1.1	245.22	2962.40	0	1.0	0.0	2827.00	31.0	33.4	0	9.24	38.39	39.83	127.8	3999.2	9788.6	335.9	6125.3	**3915.42**	**2041.76**
31.00	32.50	31.75	1.50	30.00	19.24	9.24	114.48	4.71	33.4	33.4	1.2	416.34	3378.74	0	1.0	0.0	2827.00	32.5	20.0	30	8.42	6.40	5.39	127.8	872.6	7078.4	353.6	6559.3	**2831.35**	**2186.44**
32.50	34.00	33.25	1.50	31.50	18.42	8.42	114.48	4.71	20.0	20.0	1.0	196.42	3575.16	30	1.0	141.4	2968.43	34.0	33.0	0	9.66	36.37	37.78	127.8	3795.6	10339.2	371.3	6914.8	**4135.68**	**2304.95**
34.00	35.00	34.50	1.00	32.50	19.66	9.66	114.48	3.14	33.0	33.0	1.2	268.69	3843.85	0	1.0	0.0	2968.43	35.0	33.0	0	9.66	36.37	37.78	127.8	3795.6	10607.9	383.0	7195.3	**4243.16**	**2398.44**
35.00	35.50	35.25	0.50	33.00	19.66	9.66	114.48	1.57	33.0	33.0	1.2	134.34	3978.20	0	1.0	0.0	2968.43	35.5	32.6	0	9.47	34.36	35.73	127.8	3582.8	10529.5	388.9	7335.6	**4211.79**	**2445.19**
35.50	37.00	36.25	1.50	34.50	19.47	9.47	114.48	4.71	32.6	32.6	1.1	390.00	4368.20	0	1.0	0.0	2968.43	37.0	32.1	0	7.86	31.84	33.16	127.8	3299.4	10636.0	406.6	7743.2	**4254.41**	**2581.08**
37.00	37.50	37.25	0.50	35.00	17.86	7.86	114.48	1.57	32.1	32.1	1.1	124.69	4492.89	0	1.0	0.0	2968.43	37.5	32.1	0	7.86	31.84	33.16	127.8	3299.4	10760.7	412.5	7873.8	**4304.29**	**2624.61**
37.50	38.50	38.00	1.00	36.00	17.86	7.86	114.48	3.14	32.1	32.1	1.1	249.39	4742.28	0	1.0	0.0	2968.43	38.5	32.3	0	8.33	32.85	34.19	127.8	3410.1	11120.8	424.3	8135.0	**4448.30**	**2711.66**
38.50	40.00	39.25	1.50	37.50	18.33	8.33	114.48	4.71	32.3	32.3	1.1	380.40	5122.67	0	1.0	0.0	2968.43	40.0	32.3	0	8.33	32.85	34.19	127.8	3410.1	11501.2	442.0	8533.1	**4600.46**	**2844.36**
BORE NO: P115A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	18.82	8.82	24.26	1.57	25.5	25.5	1.0	18.18	0	6	1.0	9.4	0	3.0	23.0	0	8.82	8.56	8.68	26.5	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.50	18.82	8.82	30.87	3.14	23.0	23.0	1.0	41.18	0	0	1.0	0.0	0	4.0	9.2	28	8.82	2.33	1.10	35.3	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	5.00	4.50	1.00	2.50	18.82	8.82	39.69	3.14	9.2	9.2	1.0	20.20	0	28	1.0	88.0	0	5.0	26.9	4	9.86	14.28	15.26	44.1	0	0.0	29.5	29.5	**0.00**	**9.82**
5.00	6.00	5.50	1.00	3.50	19.86	9.86	49.03	3.14	26.9	26.9	1.0	78.18	0	4	1.0	12.6	0	6.0	11.0	52	9.86	2.76	1.51	54.0	0	0.0	41.3	41.3	**0.00**	**13.75**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
6.00	7.00	6.50	1.00	4.50	19.86	9.86	58.89	3.14	11.0	11.0	1.0	35.98	0	52	1.0	163.4	0	7.0	11.0	52	9.86	2.76	1.51	63.8	0	0.0	53.0	53.0	**0.00**	**17.68**
7.00	8.00	7.50	1.00	5.50	19.86	9.86	68.75	3.14	11.0	11.0	1.0	42.00	0	52	1.0	163.4	0	8.0	11.0	52	10.11	2.76	1.51	73.7	0	0.0	64.8	64.8	**0.00**	**21.61**
8.00	9.00	8.50	1.00	6.50	20.11	10.11	78.74	3.14	11.0	11.0	1.0	48.10	0	52	1.0	163.4	0	9.0	11.0	52	10.11	2.76	1.51	83.8	555.7	555.7	76.6	76.6	**222.27**	**25.54**
9.00	10.00	9.50	1.00	7.50	20.11	10.11	88.85	3.14	11.0	11.0	1.0	54.28	54.28	52	1.0	163.4	163.43	10.0	8.0	43	9.95	2.11	0.91	93.9	463.3	681.0	88.4	306.1	**272.41**	**102.03**
10.00	12.50	11.25	2.50	10.00	19.95	9.95	106.34	7.86	8.0	8.0	1.0	117.42	171.70	43	1.0	337.9	501.29	12.5	12.1	57	10.70	3.09	1.82	118.8	698.8	1371.8	117.9	790.8	**548.73**	**263.61**
12.50	15.50	14.00	3.00	13.00	20.70	10.70	134.83	9.43	12.1	12.1	1.0	272.52	444.22	57	1.0	537.4	1038.71	15.5	14.5	40	10.70	3.80	2.51	118.8	647.6	2130.5	153.2	1636.2	**852.20**	**545.38**
15.50	18.50	17.00	3.00	16.00	20.70	10.70	134.83	9.43	14.5	14.5	1.0	328.76	772.98	40	1.0	377.1	1415.86	18.5	22.0	10	10.38	7.84	7.59	118.8	833.3	3022.1	188.6	2377.4	**1208.86**	**792.47**
18.50	20.00	19.25	1.50	17.50	20.38	10.38	134.83	4.71	22.0	22.0	1.0	256.80	1029.78	10	1.0	47.1	1463.00	20.0	10.2	58	10.38	2.53	1.28	118.8	651.3	3144.1	206.3	2699.0	**1257.65**	**899.68**
20.00	21.50	20.75	1.50	19.00	20.38	10.38	134.83	4.71	10.2	10.2	1.0	114.36	1144.14	58	1.0	273.4	1736.43	21.5	11.0	58	10.38	2.76	1.51	118.8	674.2	3554.8	223.9	3104.5	**1421.92**	**1034.83**
21.50	23.00	22.25	1.50	20.50	20.38	10.38	134.83	4.71	11.0	11.0	1.0	123.55	1267.69	58	1.0	273.4	2009.86	23.0	10.5	58	10.55	2.62	1.36	118.8	660.0	3937.6	241.6	3519.2	**1575.03**	**1173.05**
23.00	24.50	23.75	1.50	22.00	20.55	10.55	134.83	4.71	10.5	10.5	1.0	117.80	1385.49	58	1.0	273.4	2283.29	24.5	30.4	0	10.55	23.27	24.45	118.8	2273.4	5942.2	259.3	3928.1	**2376.87**	**1309.36**
24.50	26.00	25.25	1.50	23.50	20.55	10.55	134.83	4.71	30.4	30.4	1.0	380.36	1765.86	0	1.0	0.0	2283.29	26.0	33.2	0	10.55	37.38	38.80	118.8	3649.2	7698.3	277.0	4326.1	**3079.33**	**1442.04**
26.00	27.50	26.75	1.50	25.00	20.55	10.55	134.83	4.71	33.2	33.2	1.2	482.48	2248.33	0	1.0	0.0	2283.29	27.5	33.7	0	8.96	39.90	41.37	118.8	3869.0	8400.6	294.6	4826.3	**3360.26**	**1608.75**
27.50	29.00	28.25	1.50	26.50	18.96	8.96	134.83	4.71	33.7	33.7	1.2	502.32	2750.65	0	1.0	0.0	2283.29	29.0	33.7	0	8.94	39.90	41.37	118.8	3868.7	8902.6	312.3	5346.3	**3561.05**	**1782.09**
29.00	30.00	29.50	1.00	27.50	18.94	8.94	134.83	3.14	33.7	33.7	1.2	334.88	3085.53	0	1.0	0.0	2283.29	30.0	33.9	0	8.94	40.91	42.39	118.8	3966.3	9335.1	324.1	5692.9	**3734.05**	**1897.64**
30.00	30.50	30.25	0.50	28.00	18.94	8.94	134.83	1.57	33.9	33.9	1.2	170.13	3255.66	0	1.0	0.0	2283.29	30.5	33.7	0	9.23	39.90	41.37	118.8	3873.4	9412.4	330.0	5868.9	**3764.94**	**1956.31**
30.50	32.00	31.25	1.50	29.50	19.23	9.23	134.83	4.71	33.7	33.7	1.2	502.32	3757.97	0	1.0	0.0	2283.29	32.0	33.7	0	9.12	39.90	41.37	118.8	3871.6	9912.9	347.7	6388.9	**3965.15**	**2129.65**
32.00	32.50	32.25	0.50	30.00	19.12	9.12	134.83	1.57	33.7	33.7	1.2	167.44	3925.41	0	1.0	0.0	2283.29	32.5	32.6	0	9.12	34.36	35.73	118.8	3334.3	9543.0	353.6	6562.3	**3817.20**	**2187.42**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 0.79 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
32.50	33.50	33.00	1.00	31.00	19.12	9.12	134.83	3.14	32.6	32.6	1.1	306.22	4231.63	0	1.0	0.0	2283.29	33.5	32.1	0	9.24	31.84	33.16	118.8	3091.6	9606.5	365.4	6880.3	**3842.62**	**2293.42**
33.50	35.00	34.25	1.50	32.50	19.24	9.24	134.83	4.71	32.1	32.1	1.1	440.58	4672.21	0	1.0	0.0	2283.29	35.0	32.1	0	9.25	31.84	33.16	118.8	3091.8	10047.2	383.0	7338.5	**4018.90**	**2446.18**
35.00	36.50	35.75	1.50	34.00	19.25	9.25	134.83	4.71	32.1	32.1	1.1	440.58	5112.79	0	1.0	0.0	2283.29	36.5	32.1	0	9.16	31.84	33.16	118.8	3090.6	10486.7	400.7	7796.8	**4194.66**	**2598.93**
36.50	37.50	37.00	1.00	35.00	19.16	9.16	134.83	3.14	32.1	32.1	1.1	293.72	5406.51	0	1.0	0.0	2283.29	37.5	32.6	0	9.16	34.36	35.73	118.8	3334.9	11024.7	412.5	8102.3	**4409.86**	**2700.76**
37.50	38.00	37.75	0.50	35.50	19.16	9.16	134.83	1.57	32.6	32.6	1.1	153.11	5559.62	0	1.0	0.0	2283.29	38.0	32.9	0	9.08	35.87	37.27	118.8	3480.3	11323.2	418.4	8261.3	**4529.26**	**2753.76**
38.00	40.00	39.00	2.00	37.50	19.08	9.08	134.83	6.29	32.9	32.9	1.1	627.75	6187.37	0	1.0	0.0	2283.29	40.0	32.9	0	9.08	35.87	37.27	118.8	3480.3	11950.9	442.0	8912.6	**4780.36**	**2970.87**
BORE NO: P116A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.62	9.62	26.46	1.57	27.2	27.2	1.0	21.37	0	4	1.0	6.3	0	3.0	25.2	0	9.62	10.45	11.34	28.9	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.50	19.62	9.62	33.67	3.14	25.2	25.2	1.0	49.80	0	0	1.0	0.0	0	4.0	25.2	7	9.62	10.45	11.34	38.5	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	5.00	4.50	1.00	2.50	19.62	9.62	43.29	3.14	25.2	25.2	1.0	64.02	0	7	1.0	22.0	0	5.0	25.2	7	9.41	10.45	11.34	48.1	0	0.0	29.5	29.5	**0.00**	**9.82**
5.00	6.00	5.50	1.00	3.50	19.41	9.41	52.81	3.14	25.2	25.2	1.0	78.09	0	7	1.0	22.0	0	6.0	26.4	4	9.41	13.15	14.11	57.5	674.8	674.8	41.3	41.3	**269.90**	**13.75**
6.00	7.00	6.50	1.00	4.50	19.41	9.41	62.22	3.14	26.4	26.4	1.0	97.06	97.06	4	1.0	12.6	12.57	7.0	26.4	4	10.45	13.15	14.11	66.9	777.8	887.4	53.0	162.7	**354.96**	**54.22**
7.00	9.00	8.00	2.00	6.50	20.45	10.45	77.37	6.29	26.4	26.4	1.0	241.41	338.48	4	1.0	25.1	37.71	9.0	25.4	0	10.45	10.90	11.80	87.8	800.6	1176.8	76.6	452.8	**470.72**	**150.93**
9.00	10.00	9.50	1.00	7.50	20.45	10.45	93.05	3.14	25.4	25.4	1.0	138.85	477.33	0	1.0	0.0	37.71	10.0	25.4	0	10.45	10.90	11.80	98.3	890.1	1405.2	88.4	603.4	**562.07**	**201.15**
10.00	11.00	10.50	1.00	8.50	20.45	10.45	103.50	3.14	25.4	25.4	1.0	154.45	631.78	0	1.0	0.0	37.71	11.0	8.2	44	10.23	2.15	0.94	108.7	498.2	1167.7	100.2	769.7	**467.10**	**256.56**
11.00	12.50	11.75	1.50	10.00	20.23	10.23	116.39	4.71	8.2	8.2	1.0	79.07	710.85	44	1.0	207.4	245.14	12.5	8.2	44	9.86	2.15	0.94	124.1	524.0	1480.0	117.9	1073.9	**591.99**	**357.95**
12.50	15.50	14.00	3.00	13.00	19.86	9.86	138.86	9.43	8.2	8.2	1.0	188.66	899.51	44	1.0	414.9	660.00	15.5	16.7	24	9.86	4.78	3.58	124.1	649.2	2208.7	153.2	1712.7	**883.48**	**570.91**
15.50	17.00	16.25	1.50	14.50	19.86	9.86	138.86	4.71	16.7	16.7	1.0	196.39	1095.90	24	1.0	113.1	773.14	17.0	10.5	53	10.50	2.62	1.36	124.1	635.5	2504.6	170.9	2039.9	**1001.82**	**679.98**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
17.00	18.50	17.75	1.50	16.00	20.50	10.50	138.86	4.71	10.5	10.5	1.0	121.32	1217.22	53	1.0	249.9	1023.00	18.5	30.4	0	10.50	23.27	24.45	124.1	2369.6	4609.9	188.6	2428.8	**1843.95**	**809.60**
18.50	20.00	19.25	1.50	17.50	20.50	10.50	138.86	4.71	30.4	30.4	1.0	391.73	1608.96	0	1.0	0.0	1023.00	20.0	11.0	38	10.50	2.76	1.51	124.1	544.4	3176.3	206.3	2838.2	**1270.53**	**946.07**
20.00	21.50	20.75	1.50	19.00	20.50	10.50	138.86	4.71	11.0	11.0	1.0	127.24	1736.20	38	1.0	179.1	1202.14	21.5	11.0	38	9.26	2.76	1.51	124.1	543.6	3482.0	223.9	3162.3	**1392.79**	**1054.09**
21.50	23.00	22.25	1.50	20.50	19.26	9.26	138.86	4.71	11.0	11.0	1.0	127.24	1863.44	38	1.0	179.1	1381.29	23.0	17.0	32	9.94	4.92	3.75	124.1	720.9	3965.6	241.6	3486.3	**1586.25**	**1162.11**
23.00	24.50	23.75	1.50	22.00	19.94	9.94	138.86	4.71	17.0	17.0	1.0	200.13	2063.57	32	1.0	150.9	1532.14	24.5	31.4	0	8.88	28.31	29.58	124.1	2863.0	6458.7	259.3	3855.0	**2583.49**	**1285.00**
24.50	26.00	25.25	1.50	23.50	18.88	8.88	138.86	4.71	31.4	31.4	1.1	427.54	2491.11	0	1.0	0.0	1532.14	26.0	31.4	0	9.14	28.31	29.58	124.1	2866.0	6889.3	277.0	4300.2	**2755.72**	**1433.41**
26.00	27.50	26.75	1.50	25.00	19.14	9.14	138.86	4.71	31.4	31.4	1.1	427.54	2918.66	0	1.0	0.0	1532.14	27.5	30.0	0	8.82	21.26	22.40	124.1	2150.0	6600.8	294.6	4745.4	**2640.31**	**1581.81**
27.50	29.00	28.25	1.50	26.50	18.82	8.82	138.86	4.71	30.0	30.0	1.0	377.93	3296.59	0	1.0	0.0	1532.14	29.0	27.4	10	8.56	15.40	16.41	124.1	1627.5	6456.3	312.3	5141.1	**2582.50**	**1713.68**
29.00	30.00	29.50	1.00	27.50	18.56	8.56	138.86	3.14	27.4	27.4	1.0	226.21	3522.80	10	1.0	31.4	1563.57	30.0	27.4	10	8.56	15.40	16.41	124.1	1627.5	6713.9	324.1	5410.5	**2685.56**	**1803.49**
30.00	30.50	30.25	0.50	28.00	18.56	8.56	138.86	1.57	27.4	27.4	1.0	113.10	3635.90	10	1.0	15.7	1579.29	30.5	31.8	0	9.18	30.33	31.63	124.1	3070.3	8285.5	330.0	5545.2	**3314.20**	**1848.40**
30.50	32.00	31.25	1.50	29.50	19.18	9.18	138.86	4.71	31.8	31.8	1.1	442.40	4078.30	0	1.0	0.0	1579.29	32.0	31.8	0	9.12	30.33	31.63	124.1	3069.6	8727.2	347.7	6005.3	**3490.86**	**2001.76**
32.00	32.50	32.25	0.50	30.00	19.12	9.12	138.86	1.57	31.8	31.8	1.1	147.47	4225.77	0	1.0	0.0	1579.29	32.5	31.8	0	9.12	30.33	31.63	124.1	3069.6	8874.6	353.6	6158.6	**3549.85**	**2052.88**
32.50	33.50	33.00	1.00	31.00	19.12	9.12	138.86	3.14	31.8	31.8	1.1	294.93	4520.70	0	1.0	0.0	1579.29	33.5	30.8	0	9.48	25.29	26.50	124.1	2563.9	8663.9	365.4	6465.3	**3465.56**	**2155.11**
33.50	35.00	34.25	1.50	32.50	19.48	9.48	138.86	4.71	30.8	30.8	1.0	405.83	4926.53	0	1.0	0.0	1579.29	35.0	31.6	0	9.16	29.32	30.60	124.1	2968.2	9474.0	383.0	6888.9	**3789.59**	**2296.28**
35.00	36.50	35.75	1.50	34.00	19.16	9.16	138.86	4.71	31.6	31.6	1.1	434.93	5361.46	0	1.0	0.0	1579.29	36.5	31.6	0	9.02	29.32	30.60	124.1	2966.5	9907.2	400.7	7341.5	**3962.89**	**2447.15**
36.50	37.50	37.00	1.00	35.00	19.02	9.02	138.86	3.14	31.6	31.6	1.1	289.95	5651.42	0	1.0	0.0	1579.29	37.5	31.4	0	9.02	28.31	29.58	124.1	2864.6	10095.3	412.5	7643.2	**4038.14**	**2547.73**
37.50	38.00	37.75	0.50	35.50	19.02	9.02	138.86	1.57	31.4	31.4	1.1	142.51	5793.93	0	1.0	0.0	1579.29	38.0	32.0	0	9.11	31.33	32.65	124.1	3171.3	10544.5	418.4	7791.6	**4217.82**	**2597.20**
38.00	40.00	39.00	2.00	37.50	19.11	9.11	138.86	6.29	32.0	32.0	1.1	599.93	6393.86	0	1.0	0.0	1579.29	40.0	30.0	0	10.49	21.26	22.40	124.1	2164.7	10137.8	442.0	8415.1	**4055.13**	**2805.04**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
BORE NO: P117A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	18.27	8.27	22.74	1.57	28.2	28.2	1.0	19.16	0	0	1.0	0.0	0	3.0	28.2	0	8.27	17.21	18.25	24.8	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.50	18.27	8.27	28.95	3.14	28.2	28.2	1.0	48.78	0	0	1.0	0.0	0	4.0	26.3	0	8.27	12.93	13.88	33.1	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	5.00	4.50	1.00	2.50	18.27	8.27	37.22	3.14	26.3	26.3	1.0	57.81	0	0	1.0	0.0	0	5.0	27.7	3	10.03	16.08	17.10	41.4	0	0.0	29.5	29.5	**0.00**	**9.82**
5.00	6.00	5.50	1.00	3.50	20.03	10.03	46.37	3.14	27.7	27.7	1.0	76.50	0	3	1.0	9.4	0	6.0	25.9	0	10.03	12.03	12.95	51.4	0	0.0	41.3	41.3	**0.00**	**13.75**
6.00	7.00	6.50	1.00	4.50	20.03	10.03	56.40	3.14	25.9	25.9	1.0	86.06	0	0	1.0	0.0	0	7.0	11.5	42	10.36	2.91	1.65	61.4	0	0.0	53.0	53.0	**0.00**	**17.68**
7.00	9.00	8.00	2.00	6.50	20.36	10.36	71.77	6.29	11.5	11.5	1.0	91.78	0	42	1.0	264.0	0	9.0	11.5	42	10.36	2.91	1.65	82.1	491.6	491.6	76.6	76.6	**196.62**	**25.54**
9.00	10.00	9.50	1.00	7.50	20.36	10.36	87.31	3.14	11.5	11.5	1.0	55.83	55.83	42	1.0	132.0	132.00	10.0	9.5	66	10.36	2.38	1.14	92.5	644.3	832.2	88.4	276.2	**332.86**	**92.07**
10.00	11.00	10.50	1.00	8.50	20.36	10.36	97.67	3.14	9.5	9.5	1.0	51.37	107.20	66	1.0	207.4	339.43	11.0	9.6	55	10.64	2.40	1.16	102.9	587.6	1034.2	100.2	546.8	**413.67**	**182.27**
11.00	12.50	11.75	1.50	10.00	20.64	10.64	110.83	4.71	9.6	9.6	1.0	88.37	195.57	55	1.0	259.3	598.71	12.5	9.6	55	10.64	2.40	1.16	118.8	617.6	1411.9	117.9	912.1	**564.76**	**304.05**
12.50	15.50	14.00	3.00	13.00	20.64	10.64	134.77	9.43	9.6	9.6	1.0	214.92	410.49	55	1.0	518.6	1117.29	15.5	11.4	49	10.50	2.88	1.62	118.8	622.2	2150.0	153.2	1681.0	**859.98**	**560.33**
15.50	17.00	16.25	1.50	14.50	20.50	10.50	134.77	4.71	11.4	11.4	1.0	128.11	538.60	49	1.0	231.0	1348.29	17.0	11.4	49	10.50	2.88	1.62	118.8	622.2	2509.1	170.9	2057.8	**1003.63**	**685.92**
17.00	18.50	17.75	1.50	16.00	20.50	10.50	134.77	4.71	11.4	11.4	1.0	128.11	666.70	49	1.0	231.0	1579.29	18.5	24.0	18	10.50	9.28	9.78	118.8	1033.9	3279.9	188.6	2434.6	**1311.97**	**811.52**
18.50	20.00	19.25	1.50	17.50	20.50	10.50	134.77	4.71	24.0	24.0	1.0	282.87	949.58	18	1.0	84.9	1664.14	20.0	10.7	56	10.44	2.68	1.42	118.8	651.6	3265.3	206.3	2820.0	**1306.13**	**939.99**
20.00	21.50	20.75	1.50	19.00	20.44	10.44	134.77	4.71	10.7	10.7	1.0	120.05	1069.63	56	1.0	264.0	1928.14	21.5	10.7	56	10.44	2.68	1.42	118.8	651.6	3649.4	223.9	3221.7	**1459.75**	**1073.90**
21.50	23.00	22.25	1.50	20.50	20.44	10.44	134.77	4.71	10.7	10.7	1.0	120.05	1189.68	56	1.0	264.0	2192.14	23.0	29.1	0	10.44	19.23	20.33	118.8	1878.8	5260.6	241.6	3623.4	**2104.23**	**1207.81**
23.00	24.50	23.75	1.50	22.00	20.44	10.44	134.77	4.71	29.1	29.1	1.0	353.63	1543.30	0	1.0	0.0	2192.14	24.5	29.1	0	10.44	19.23	20.33	118.8	1878.8	5614.2	259.3	3994.7	**2245.68**	**1331.58**
24.50	26.00	25.25	1.50	23.50	20.44	10.44	134.77	4.71	29.1	29.1	1.0	353.63	1896.93	0	1.0	0.0	2192.14	26.0	29.1	0	10.44	19.23	20.33	118.8	1878.8	5967.8	277.0	4366.0	**2387.14**	**1455.35**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
26.00	27.50	26.75	1.50	25.00	20.44	10.44	134.77	4.71	29.1	29.1	1.0	353.63	2250.56	0	1.0	0.0	2192.14	27.5	29.0	0	10.46	19.01	20.10	118.8	1857.0	6299.7	294.6	4737.3	**2519.86**	**1579.12**
27.50	29.00	28.25	1.50	26.50	20.46	10.46	134.77	4.71	29.0	29.0	1.0	352.18	2602.74	0	1.0	0.0	2192.14	29.0	29.0	0	10.46	19.01	20.10	118.8	1857.0	6651.8	312.3	5107.2	**2660.73**	**1702.40**
29.00	30.00	29.50	1.00	27.50	20.46	10.46	134.77	3.14	29.0	29.0	1.0	234.78	2837.52	0	1.0	0.0	2192.14	30.0	29.0	0	10.46	19.01	20.10	118.8	1857.0	6886.6	324.1	5353.8	**2754.65**	**1784.59**
30.00	30.50	30.25	0.50	28.00	20.46	10.46	134.77	1.57	29.0	29.0	1.0	117.39	2954.92	0	1.0	0.0	2192.14	30.5	29.0	0	10.46	19.01	20.10	118.8	1857.0	7004.0	330.0	5477.1	**2801.61**	**1825.69**
30.50	32.00	31.25	1.50	29.50	20.46	10.46	134.77	4.71	29.0	29.0	1.0	352.18	3307.09	0	1.0	0.0	2192.14	32.0	20.9	14	10.46	7.05	6.38	118.8	783.1	6282.4	347.7	5846.9	**2512.95**	**1948.97**
32.00	32.50	32.25	0.50	30.00	20.46	10.46	134.77	1.57	20.9	20.9	1.0	80.87	3387.96	14	1.0	22.0	2214.14	32.5	20.9	14	10.46	7.05	6.38	118.8	783.1	6385.3	353.6	5955.7	**2554.10**	**1985.23**
32.50	33.50	33.00	1.00	31.00	20.46	10.46	134.77	3.14	20.9	20.9	1.0	161.74	3549.71	14	1.0	44.0	2258.14	33.5	23.0	10	10.46	8.56	8.68	118.8	905.5	6713.3	365.4	6173.2	**2685.33**	**2057.74**
33.50	35.00	34.25	1.50	32.50	20.46	10.46	134.77	4.71	23.0	23.0	1.0	269.69	3819.39	10	1.0	47.1	2305.29	35.0	12.3	52	10.39	3.15	1.88	118.8	669.0	6793.7	383.0	6507.7	**2717.48**	**2169.24**
35.00	36.50	35.75	1.50	34.00	20.39	10.39	134.77	4.71	12.3	12.3	1.0	138.53	3957.92	52	1.0	245.1	2550.43	36.5	12.3	52	10.39	3.15	1.88	118.8	669.0	7177.4	400.7	6909.1	**2870.95**	**2303.02**
36.50	37.50	37.00	1.00	35.00	20.39	10.39	134.77	3.14	12.3	12.3	1.0	92.35	4050.27	52	1.0	163.4	2713.86	37.5	12.0	50	10.39	3.06	1.79	118.8	646.4	7410.5	412.5	7176.6	**2964.19**	**2392.21**
37.50	38.00	37.75	0.50	35.50	20.39	10.39	134.77	1.57	12.0	12.0	1.0	45.02	4095.29	50	1.0	78.6	2792.43	38.0	12.0	50	9.33	3.06	1.79	118.8	645.6	7533.3	418.4	7306.1	**3013.33**	**2435.37**
38.00	40.00	39.00	2.00	37.50	19.33	9.33	134.77	6.29	12.0	12.0	1.0	180.06	4275.35	50	1.0	314.3	3106.71	40.0	12.0	50	9.33	3.06	1.79	118.8	645.6	8027.7	442.0	7824.0	**3211.07**	**2608.01**
BORE NO: P118A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	17.61	7.61	20.93	1.57	23.6	23.6	1.0	14.37	0	0	1.0	0.0	0	3.0	24.5	9	7.61	9.64	10.33	22.8	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.50	17.61	7.61	26.64	3.14	24.5	24.5	1.0	38.15	0	9	1.0	28.3	0	4.0	24.5	9	9.40	9.64	10.33	30.4	332.4	332.4	17.7	17.7	**132.94**	**5.89**
4.00	6.00	5.00	2.00	3.50	19.40	9.40	39.84	6.29	24.5	24.5	1.0	114.12	114.12	9	1.0	56.6	56.57	6.0	10.6	44	9.40	2.65	1.39	49.2	418.7	589.4	41.3	211.9	**235.75**	**70.65**
6.00	7.00	6.50	1.00	4.50	19.40	9.40	53.94	3.14	10.6	10.6	1.0	31.73	145.85	44	1.0	138.3	194.86	7.0	10.6	44	9.40	2.65	1.39	58.6	438.2	778.9	53.0	393.7	**311.57**	**131.25**
7.00	8.00	7.50	1.00	5.50	19.40	9.40	63.34	3.14	10.6	10.6	1.0	37.25	183.10	44	1.0	138.3	333.14	8.0	10.6	44	10.21	2.65	1.39	68.0	458.2	974.4	64.8	581.1	**389.78**	**193.69**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
8.00	9.00	8.50	1.00	6.50	20.21	10.21	73.15	3.14	10.6	10.6	1.0	43.02	226.13	44	1.0	138.3	471.43	9.0	10.6	44	10.21	2.65	1.39	78.3	479.4	1177.0	76.6	774.2	**470.79**	**258.05**
9.00	10.00	9.50	1.00	7.50	20.21	10.21	83.36	3.14	10.6	10.6	1.0	49.03	275.15	44	1.0	138.3	609.71	10.0	10.6	44	10.21	2.65	1.39	88.5	500.7	1385.5	88.4	973.3	**554.21**	**324.42**
10.00	12.50	11.25	2.50	10.00	20.21	10.21	101.22	7.86	10.6	10.6	1.0	148.84	423.99	44	1.0	345.7	955.43	12.5	10.9	48	10.83	2.73	1.48	114.0	590.6	1970.0	117.9	1497.3	**788.02**	**499.09**
12.50	15.50	14.00	3.00	13.00	20.83	10.83	130.23	9.43	10.9	10.9	1.0	236.45	660.45	48	1.0	452.6	1408.00	15.5	10.9	48	10.26	2.73	1.48	114.0	590.3	2658.7	153.2	2221.7	**1063.50**	**740.55**
15.50	18.50	17.00	3.00	16.00	20.26	10.26	130.23	9.43	10.9	10.9	1.0	236.45	896.90	48	1.0	452.6	1860.57	18.5	11.1	51	10.72	2.79	1.53	114.0	617.3	3374.8	188.6	2946.0	**1349.90**	**982.01**
18.50	21.50	20.00	3.00	19.00	20.72	10.72	130.23	9.43	11.1	11.1	1.0	240.90	1137.80	51	1.0	480.9	2341.43	21.5	30.1	2	10.17	21.76	22.91	114.0	2054.8	5534.0	223.9	3703.2	**2213.61**	**1234.39**
21.50	24.50	23.00	3.00	22.00	20.17	10.17	130.23	9.43	30.1	30.1	1.0	715.34	1853.14	2	1.0	18.9	2360.29	24.5	31.7	0	10.17	29.82	31.11	114.0	2795.3	7008.7	259.3	4472.7	**2803.48**	**1490.90**
24.50	26.00	25.25	1.50	23.50	20.17	10.17	130.23	4.71	31.7	31.7	1.1	411.41	2264.55	0	1.0	0.0	2360.29	26.0	31.3	0	10.17	27.81	29.06	114.0	2606.6	7231.4	277.0	4901.8	**2892.58**	**1633.93**
26.00	27.50	26.75	1.50	25.00	20.17	10.17	130.23	4.71	31.3	31.3	1.1	397.55	2662.09	0	1.0	0.0	2360.29	27.5	33.7	0	9.28	39.90	41.37	114.0	3724.1	8746.4	294.6	5317.0	**3498.58**	**1772.34**
27.50	29.00	28.25	1.50	26.50	19.28	9.28	130.23	4.71	33.7	33.7	1.2	485.20	3147.29	0	1.0	0.0	2360.29	29.0	33.7	0	9.39	39.90	41.37	114.0	3725.8	9233.4	312.3	5819.9	**3693.37**	**1939.96**
29.00	30.00	29.50	1.00	27.50	19.39	9.39	130.23	3.14	33.7	33.7	1.2	323.46	3470.75	0	1.0	0.0	2360.29	30.0	33.7	0	9.39	39.90	41.37	114.0	3725.8	9556.9	324.1	6155.1	**3822.75**	**2051.71**
30.00	30.50	30.25	0.50	28.00	19.39	9.39	130.23	1.57	33.7	33.7	1.2	161.73	3632.48	0	1.0	0.0	2360.29	30.5	33.3	0	9.18	37.88	39.32	114.0	3534.6	9527.4	330.0	6322.8	**3810.94**	**2107.59**
30.50	32.00	31.25	1.50	29.50	19.18	9.18	130.23	4.71	33.3	33.3	1.2	469.83	4102.31	0	1.0	0.0	2360.29	32.0	33.4	0	8.02	38.39	39.83	114.0	3563.4	10026.0	347.7	6810.3	**4010.40**	**2270.09**
32.00	32.50	32.25	0.50	30.00	18.02	8.02	130.23	1.57	33.4	33.4	1.2	157.88	4260.19	0	1.0	0.0	2360.29	32.5	33.7	0	8.02	39.90	41.37	114.0	3703.6	10324.1	353.6	6974.0	**4129.62**	**2324.68**
32.50	33.50	33.00	1.00	31.00	18.02	8.02	130.23	3.14	33.7	33.7	1.2	323.46	4583.65	0	1.0	0.0	2360.29	33.5	32.9	0	8.12	35.87	37.27	114.0	3331.2	10275.1	365.4	7309.3	**4110.06**	**2436.43**
33.50	35.00	34.25	1.50	32.50	18.12	8.12	130.23	4.71	32.9	32.9	1.1	454.77	5038.42	0	1.0	0.0	2360.29	35.0	33.1	0	7.88	36.88	38.29	114.0	3421.1	10819.8	383.0	7781.7	**4327.92**	**2593.91**
35.00	36.50	35.75	1.50	34.00	17.88	7.88	130.23	4.71	33.1	33.1	1.2	462.26	5500.68	0	1.0	0.0	2360.29	36.5	32.3	0	8.03	32.85	34.19	114.0	3049.5	10910.5	400.7	8261.7	**4364.19**	**2753.89**
36.50	37.50	37.00	1.00	35.00	18.03	8.03	130.23	3.14	32.3	32.3	1.1	288.50	5789.18	0	1.0	0.0	2360.29	37.5	32.3	0	8.03	32.85	34.19	114.0	3049.5	11199.0	412.5	8562.0	**4479.59**	**2853.99**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
37.50	38.00	37.75	0.50	35.50	18.03	8.03	130.23	1.57	32.3	32.3	1.1	144.25	5933.43	0	1.0	0.0	2360.29	38.0	33.9	0	7.96	40.91	42.39	114.0	3796.0	12089.8	418.4	8712.1	**4835.90**	**2904.04**
38.00	40.00	39.00	2.00	37.50	17.96	7.96	130.23	6.29	33.9	33.9	1.2	657.33	6590.76	0	1.0	0.0	2360.29	40.0	33.9	0	7.96	40.91	42.39	114.0	3796.0	12747.1	442.0	9393.0	**5098.84**	**3131.00**
BORE NO: P119A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.67	9.67	26.59	1.57	26.0	26.0	1.0	20.38	0	2	1.0	3.1	0	3.0	26.0	2	9.67	12.25	13.18	29.0	343.5	343.5	5.9	5.9	**137.40**	**1.96**
3.00	4.00	3.50	1.00	1.50	19.67	9.67	33.85	3.14	26.0	26.0	1.0	51.88	51.88	2	1.0	6.3	6.29	4.0	23.0	8	9.67	8.56	8.68	38.7	349.7	407.9	17.7	75.8	**163.15**	**25.28**
4.00	5.00	4.50	1.00	2.50	19.67	9.67	43.52	3.14	23.0	23.0	1.0	58.05	109.93	8	1.0	25.1	31.43	5.0	25.9	5	9.59	12.03	12.95	48.4	541.0	682.4	29.5	170.8	**272.96**	**56.94**
5.00	6.00	5.50	1.00	3.50	19.59	9.59	53.15	3.14	25.9	25.9	1.0	81.10	191.04	5	1.0	15.7	47.14	6.0	25.9	5	9.59	12.03	12.95	57.9	631.7	869.8	41.3	279.4	**347.94**	**93.14**
6.00	7.00	6.50	1.00	4.50	19.59	9.59	62.74	3.14	25.9	25.9	1.0	95.74	286.78	5	1.0	15.7	62.86	7.0	28.0	0	9.59	16.76	17.79	67.5	956.1	1305.7	53.0	402.7	**522.28**	**134.22**
7.00	8.00	7.50	1.00	5.50	19.59	9.59	72.33	3.14	28.0	28.0	1.0	120.86	407.64	0	1.0	0.0	62.86	8.0	15.3	34	9.49	4.09	2.81	77.1	498.6	969.1	64.8	535.3	**387.64**	**178.44**
8.00	9.00	8.50	1.00	6.50	19.49	9.49	81.87	3.14	15.3	15.3	1.0	70.39	478.02	34	1.0	106.9	169.71	9.0	15.3	34	9.49	4.09	2.81	86.6	529.1	1176.8	76.6	724.3	**470.73**	**241.45**
9.00	10.00	9.50	1.00	7.50	19.49	9.49	91.36	3.14	15.3	15.3	1.0	78.55	556.57	34	1.0	106.9	276.57	10.0	9.0	58	9.49	2.29	1.07	96.1	587.0	1420.2	88.4	921.5	**568.07**	**307.18**
10.00	11.00	10.50	1.00	8.50	19.49	9.49	100.85	3.14	9.0	9.0	1.0	50.20	606.77	58	1.0	182.3	458.86	11.0	9.0	58	10.59	2.29	1.07	105.6	604.6	1670.2	100.2	1165.8	**668.08**	**388.60**
11.00	12.50	11.75	1.50	10.00	20.59	10.59	113.53	4.71	9.0	9.0	1.0	84.77	691.54	58	1.0	273.4	732.29	12.5	10.2	60	10.60	2.53	1.28	121.5	671.0	2094.8	117.9	1541.7	**837.92**	**513.89**
12.50	15.50	14.00	3.00	13.00	20.60	10.60	137.38	9.43	10.2	10.2	1.0	233.05	924.59	60	1.0	565.7	1298.00	15.5	14.0	28	10.60	3.65	2.36	121.5	556.2	2778.8	153.2	2375.8	**1111.52**	**791.94**
15.50	17.00	16.25	1.50	14.50	20.60	10.60	137.38	4.71	14.0	14.0	1.0	161.47	1086.06	28	1.0	132.0	1430.00	17.0	14.2	39	10.36	3.71	2.42	121.5	639.5	3155.6	170.9	2687.0	**1262.24**	**895.65**
17.00	18.50	17.75	1.50	16.00	20.36	10.36	137.38	4.71	14.2	14.2	1.0	163.87	1249.94	39	1.0	183.9	1613.86	18.5	12.8	45	10.36	3.29	2.02	121.5	640.6	3504.4	188.6	3052.4	**1401.76**	**1017.46**
18.50	20.00	19.25	1.50	17.50	20.36	10.36	137.38	4.71	12.8	12.8	1.0	147.14	1397.07	45	1.0	212.1	1826.00	20.0	9.6	55	10.29	2.40	1.16	121.5	622.5	3845.6	206.3	3429.3	**1538.22**	**1143.11**
20.00	21.50	20.75	1.50	19.00	20.29	10.29	137.38	4.71	9.6	9.6	1.0	109.54	1506.61	55	1.0	259.3	2085.29	21.5	12.6	5	10.29	3.23	1.96	121.5	351.9	3943.8	223.9	3815.8	**1577.51**	**1271.94**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2
Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m³)	Eff. Unit Weight (kN/m³)	Effective Overburden at mid depth	Area of Pile Stem Asi (m²)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m³)	Nq	Nγ	q	Qb					
21.50	24.50	23.00	3.00	22.00	20.29	10.29	137.38	9.43	12.6	9.6	1.0	219.08	1725.69	5	1.0	47.1	2132.43	24.5	26.6	0	11.02	13.60	14.57	121.5	1361.4	5219.5	259.3	4117.4	**2087.81**	**1372.47**
24.50	26.00	25.25	1.50	23.50	21.02	11.02	137.38	4.71	26.6	26.6	1.0	324.31	2049.99	0	1.0	0.0	2132.43	26.0	26.6	0	11.02	13.60	14.57	121.5	1361.4	5543.8	277.0	4459.4	**2217.53**	**1486.46**
26.00	27.50	26.75	1.50	25.00	21.02	11.02	137.38	4.71	26.6	26.6	1.0	324.31	2374.30	0	1.0	0.0	2132.43	27.5	28.4	0	11.02	17.66	18.71	121.5	1766.2	6273.0	294.6	4801.4	**2509.18**	**1600.46**
27.50	30.00	28.75	2.50	27.50	21.02	11.02	137.38	7.86	28.4	28.4	1.0	583.62	2957.91	0	1.0	0.0	2132.43	30.0	29.3	3	10.77	19.68	20.79	121.5	1987.8	7078.2	324.1	5414.5	**2831.27**	**1804.82**
30.00	30.50	30.25	0.50	28.00	20.77	10.77	137.38	1.57	29.3	29.3	1.0	121.14	3079.06	3	1.0	4.7	2137.14	30.5	29.9	0	10.77	21.03	22.17	121.5	2101.4	7317.6	330.0	5546.2	**2927.05**	**1848.73**
30.50	32.00	31.25	1.50	29.50	20.77	10.77	137.38	4.71	29.9	29.9	1.0	372.40	3451.46	0	1.0	0.0	2137.14	32.0	31.5	0	10.77	28.82	30.09	121.5	2877.6	8466.2	347.7	5936.3	**3386.48**	**1978.76**
32.00	32.50	32.25	0.50	30.00	20.77	10.77	137.38	1.57	31.5	31.5	1.1	142.21	3593.67	0	1.0	0.0	2137.14	32.5	31.8	0	9.15	30.33	31.63	121.5	3008.2	8739.0	353.6	6084.4	**3495.62**	**2028.13**
32.50	33.50	33.00	1.00	31.00	19.15	9.15	137.38	3.14	31.8	31.8	1.1	291.79	3885.46	0	1.0	0.0	2137.14	33.5	32.2	0	9.16	32.34	33.68	121.5	3208.0	9230.6	365.4	6388.0	**3692.26**	**2129.32**
33.50	35.00	34.25	1.50	32.50	19.16	9.16	137.38	4.71	32.2	32.2	1.1	452.69	4338.15	0	1.0	0.0	2137.14	35.0	32.3	0	9.41	32.85	34.19	121.5	3261.3	9736.6	383.0	6858.3	**3894.65**	**2286.11**
35.00	36.50	35.75	1.50	34.00	19.41	9.41	137.38	4.71	32.3	32.3	1.1	456.49	4794.64	0	1.0	0.0	2137.14	36.5	32.6	0	9.26	34.36	35.73	121.5	3409.1	10340.9	400.7	7332.5	**4136.37**	**2444.17**
36.50	37.50	37.00	1.00	35.00	19.26	9.26	137.38	3.14	32.6	32.6	1.1	312.01	5106.66	0	1.0	0.0	2137.14	37.5	32.6	0	9.26	34.36	35.73	121.5	3409.1	10652.9	412.5	7656.3	**4261.18**	**2552.10**
37.50	38.00	37.75	0.50	35.50	19.26	9.26	137.38	1.57	32.6	32.6	1.1	156.01	5262.66	0	1.0	0.0	2137.14	38.0	33.1	0	8.80	36.88	38.29	121.5	3652.0	11051.8	418.4	7818.2	**4420.70**	**2606.07**
38.00	40.00	39.00	2.00	37.50	18.80	8.80	137.38	6.29	33.1	33.1	1.2	650.16	5912.82	0	1.0	0.0	2137.14	40.0	33.1	0	8.80	36.88	38.29	121.5	3652.0	11701.9	442.0	8491.9	**4680.77**	**2830.64**
BORE NO: P120A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.55	9.55	26.26	1.57	26.5	26.5	1.0	20.58	0	3	1.0	4.7	0	3.0	25.7	6	9.55	11.58	12.49	28.7	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.50	19.55	9.55	33.43	3.14	25.7	25.7	1.0	50.56	0	6	1.0	18.9	0	4.0	25.7	6	9.86	11.58	12.49	38.2	0	0.0	17.7	17.7	**0.00**	**5.89**
4.00	6.00	5.00	2.00	3.50	19.86	9.86	48.06	6.29	25.7	25.7	1.0	145.39	0	6	1.0	37.7	0	6.0	25.7	6	9.86	11.58	12.49	57.9	0	0.0	41.3	41.3	**0.00**	**13.75**
6.00	7.00	6.50	1.00	4.50	19.86	9.86	62.85	3.14	25.7	25.7	1.0	95.06	0	6	1.0	18.9	0	7.0	25.7	6	9.86	11.58	12.49	67.8	707.3	707.3	53.0	53.0	**282.93**	**17.68**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
7.00	8.00	7.50	1.00	5.50	19.86	9.86	72.71	3.14	25.7	25.7	1.0	109.98	109.98	6	1.0	18.9	18.86	8.0	12.3	44	9.97	3.15	1.88	77.6	510.4	639.2	64.8	193.7	**255.69**	**64.55**
8.00	9.00	8.50	1.00	6.50	19.97	9.97	82.63	3.14	12.3	12.3	1.0	56.62	166.60	44	1.0	138.3	157.14	9.0	9.2	52	9.97	2.33	1.10	87.6	532.1	855.9	76.6	400.3	**342.35**	**133.45**
9.00	10.00	9.50	1.00	7.50	19.97	9.97	92.60	3.14	9.2	9.2	1.0	47.13	213.73	52	1.0	163.4	320.57	10.0	9.2	52	10.56	2.33	1.10	97.6	550.6	1084.9	88.4	622.7	**433.96**	**207.57**
10.00	12.50	11.25	2.50	10.00	20.56	10.56	110.78	7.86	9.2	9.2	1.0	140.98	354.71	52	1.0	408.6	729.14	12.5	9.2	52	10.56	2.33	1.10	124.0	598.8	1682.7	117.9	1201.7	**673.08**	**400.57**
12.50	15.50	14.00	3.00	13.00	20.56	10.56	139.82	9.43	9.2	9.2	1.0	213.52	568.23	52	1.0	490.3	1219.43	15.5	12.0	29	10.35	3.06	1.79	124.0	510.2	2297.9	153.2	1940.9	**919.16**	**646.96**
15.50	17.00	16.25	1.50	14.50	20.35	10.35	139.82	4.71	12.0	12.0	1.0	140.11	708.33	29	1.0	136.7	1356.14	17.0	11.7	48	10.35	2.97	1.71	124.0	635.7	2700.1	170.9	2235.4	**1080.06**	**745.12**
17.00	18.50	17.75	1.50	16.00	20.35	10.35	139.82	4.71	11.7	11.7	1.0	136.50	844.84	48	1.0	226.3	1582.43	18.5	11.7	48	9.85	2.97	1.71	124.0	635.3	3062.6	188.6	2615.8	**1225.04**	**871.95**
18.50	21.50	20.00	3.00	19.00	19.85	9.85	139.82	9.43	11.7	11.7	1.0	273.01	1117.84	48	1.0	452.6	2035.00	21.5	8.7	64	10.75	2.24	1.02	124.0	674.7	3827.5	223.9	3376.8	**1531.01**	**1125.59**
21.50	24.50	23.00	3.00	22.00	20.75	10.75	139.82	9.43	8.7	8.7	1.0	201.73	1319.57	64	1.0	603.4	2638.43	24.5	28.1	0	10.75	16.98	18.02	124.0	1730.3	5688.3	259.3	4217.3	**2275.31**	**1405.76**
24.50	27.50	26.00	3.00	25.00	20.75	10.75	139.82	9.43	28.1	28.1	1.0	703.91	2023.48	0	1.0	0.0	2638.43	27.5	29.5	0	9.10	20.13	21.25	124.0	2037.2	6699.1	294.6	4956.6	**2679.66**	**1652.18**
27.50	30.00	28.75	2.50	27.50	19.10	9.10	139.82	7.86	29.5	29.5	1.0	621.55	2645.03	0	1.0	0.0	2638.43	30.0	29.0	0	9.10	19.01	20.10	124.0	1923.4	7206.9	324.1	5607.6	**2882.76**	**1869.19**
30.00	30.50	30.25	0.50	28.00	19.10	9.10	139.82	1.57	29.0	29.0	1.0	121.79	2766.82	0	1.0	0.0	2638.43	30.5	28.6	0	9.10	18.11	19.17	124.0	1832.4	7237.6	330.0	5735.3	**2895.06**	**1911.75**
30.50	32.50	31.50	2.00	30.00	19.10	9.10	139.82	6.29	28.6	28.6	1.0	479.17	3246.00	0	1.0	0.0	2638.43	32.5	28.6	0	10.93	18.11	19.17	124.0	1846.2	7730.6	353.6	6238.0	**3092.24**	**2079.33**
32.50	33.50	33.00	1.00	31.00	20.93	10.93	139.82	3.14	28.6	28.6	1.0	239.59	3485.58	0	1.0	0.0	2638.43	33.5	30.4	0	10.93	23.27	24.45	124.0	2372.2	8496.2	365.4	6489.4	**3398.49**	**2163.12**
33.50	35.00	34.25	1.50	32.50	20.93	10.93	139.82	4.71	30.4	30.4	1.0	394.46	3880.04	0	1.0	0.0	2638.43	35.0	30.6	0	10.93	24.28	25.48	124.0	2474.8	8993.2	383.0	6901.5	**3597.29**	**2300.50**
35.00	36.50	35.75	1.50	34.00	20.93	10.93	139.82	4.71	30.6	30.6	1.0	401.52	4281.56	0	1.0	0.0	2638.43	36.5	29.8	0	8.84	20.81	21.94	124.0	2103.3	9023.3	400.7	7320.7	**3609.30**	**2440.23**
36.50	37.50	37.00	1.00	35.00	18.84	8.84	139.82	3.14	29.8	29.8	1.0	251.67	4533.22	0	1.0	0.0	2638.43	37.5	29.6	0	8.84	20.36	21.48	124.0	2057.8	9229.4	412.5	7584.2	**3691.78**	**2528.05**
37.50	38.00	37.75	0.50	35.50	18.84	8.84	139.82	1.57	29.6	29.6	1.0	124.82	4658.04	0	1.0	0.0	2638.43	38.0	30.0	0	8.48	21.26	22.40	124.0	2145.6	9442.0	418.4	7714.9	**3776.82**	**2571.62**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 0.79 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
38.00	40.00	39.00	2.00	37.50	18.48	8.48	139.82	6.29	30.0	30.0	1.0	507.42	5165.45	0	1.0	0.0	2638.43	40.0	0.0	0	0.00	1.00	0.00	124.0	97.4	7901.3	442.0	8245.8	**3160.52**	**2748.62**
BORE NO: P121A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.61	9.61	26.43	1.57	27.8	27.8	1.0	21.90	21.90	2	1.0	3.1	3.14	3.0	27.8	2	9.61	16.31	17.33	28.8	448.9	474.0	5.9	30.9	**189.59**	**10.31**
3.00	4.00	3.50	1.00	1.50	19.61	9.61	33.64	3.14	27.8	27.8	1.0	55.73	77.63	2	1.0	6.3	9.43	4.0	27.0	0	9.61	14.50	15.49	38.4	496.5	583.6	17.7	104.7	**233.44**	**34.91**
4.00	5.00	4.50	1.00	2.50	19.61	9.61	43.25	3.14	27.0	27.0	1.0	69.25	146.88	0	1.0	0.0	9.43	5.0	25.6	8	9.86	11.35	12.26	48.1	532.6	688.9	29.5	185.8	**275.57**	**61.92**
5.00	6.00	5.50	1.00	3.50	19.86	9.86	52.98	3.14	25.6	25.6	1.0	79.78	226.66	8	1.0	25.1	34.57	6.0	25.6	8	9.86	11.35	12.26	57.9	620.6	881.8	41.3	302.5	**352.71**	**100.83**
6.00	7.00	6.50	1.00	4.50	19.86	9.86	62.84	3.14	25.6	25.6	1.0	94.62	321.28	8	1.0	25.1	59.71	7.0	25.6	8	9.86	11.35	12.26	67.8	708.5	1089.5	53.0	434.0	**435.80**	**144.68**
7.00	8.00	7.50	1.00	5.50	19.86	9.86	72.70	3.14	25.6	25.6	1.0	109.47	430.76	8	1.0	25.1	84.86	8.0	27.2	4	10.14	14.95	15.95	77.6	1003.9	1519.6	64.8	580.4	**607.83**	**193.48**
8.00	9.00	8.50	1.00	6.50	20.14	10.14	82.70	3.14	27.2	27.2	1.0	133.58	564.33	4	1.0	12.6	97.43	9.0	10.6	40	10.14	2.65	1.39	87.8	470.9	1132.7	76.6	738.4	**453.07**	**246.12**
9.00	10.00	9.50	1.00	7.50	20.14	10.14	92.84	3.14	10.6	10.6	1.0	54.61	618.94	40	1.0	125.7	223.14	10.0	10.6	40	10.14	2.65	1.39	97.9	492.0	1334.1	88.4	930.5	**533.63**	**310.16**
10.00	11.00	10.50	1.00	8.50	20.14	10.14	102.98	3.14	10.6	10.6	1.0	60.57	679.51	40	1.0	125.7	348.86	11.0	10.6	61	10.41	2.65	1.39	108.1	661.7	1690.1	100.2	1128.5	**676.03**	**376.18**
11.00	12.50	11.75	1.50	10.00	20.41	10.41	115.86	4.71	10.6	10.6	1.0	102.22	781.72	61	1.0	287.6	636.43	12.5	11.5	56	10.41	2.91	1.65	123.7	685.6	2103.7	117.9	1536.0	**841.50**	**512.00**
12.50	14.00	13.25	1.50	11.50	20.41	10.41	131.47	4.71	11.5	11.5	1.0	126.10	907.82	56	1.0	264.0	900.43	14.0	25.3	9	10.51	10.68	11.57	139.3	1279.7	3087.9	135.5	1943.8	**1235.18**	**647.93**
14.00	15.50	14.75	1.50	13.00	20.51	10.51	147.16	4.71	25.3	25.3	1.0	327.94	1235.77	9	1.0	42.4	942.86	15.5	25.3	9	10.51	10.68	11.57	139.3	1279.7	3458.3	153.2	2331.8	**1383.33**	**777.28**
15.50	17.00	16.25	1.50	14.50	20.51	10.51	147.16	4.71	25.3	25.3	1.0	327.94	1563.71	9	1.0	42.4	985.29	17.0	10.8	40	10.66	2.71	1.45	139.3	585.0	3134.0	170.9	2719.9	**1253.58**	**906.63**
17.00	18.50	17.75	1.50	16.00	20.66	10.66	147.16	4.71	10.8	10.8	1.0	132.34	1696.05	40	1.0	188.6	1173.86	18.5	17.2	37	10.66	5.02	3.86	139.3	827.4	3697.3	188.6	3058.5	**1478.93**	**1019.49**
18.50	21.50	20.00	3.00	19.00	20.66	10.66	147.16	9.43	17.2	17.2	1.0	429.51	2125.56	37	1.0	348.9	1522.71	21.5	28.3	6	10.80	17.43	18.48	139.3	2028.4	5676.7	223.9	3872.2	**2270.68**	**1290.74**
21.50	24.50	23.00	3.00	22.00	20.80	10.80	147.16	9.43	28.3	28.3	1.0	747.11	2872.67	6	1.0	56.6	1579.29	24.5	30.7	0	10.80	24.79	25.99	139.3	2822.7	7274.6	259.3	4711.2	**2909.85**	**1570.41**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
24.50	26.00	25.25	1.50	23.50	20.80	10.80	147.16	4.71	30.7	30.7	1.0	426.35	3299.02	0	1.0	0.0	1579.29	26.0	31.8	0	10.80	30.33	31.63	139.3	3453.0	8331.3	277.0	5155.3	**3332.52**	**1718.42**
26.00	27.50	26.75	1.50	25.00	20.80	10.80	147.16	4.71	31.8	31.8	1.1	468.87	3767.89	0	1.0	0.0	1579.29	27.5	31.3	0	9.23	27.81	29.06	139.3	3148.6	8495.7	294.6	5641.8	**3398.29**	**1880.60**
27.50	29.00	28.25	1.50	26.50	19.23	9.23	147.16	4.71	31.3	31.3	1.1	449.23	4217.12	0	1.0	0.0	1579.29	29.0	31.8	0	9.08	30.33	31.63	139.3	3431.6	9228.0	312.3	6108.7	**3691.21**	**2036.24**
29.00	30.00	29.50	1.00	27.50	19.08	9.08	147.16	3.14	31.8	31.8	1.1	312.58	4529.70	0	1.0	0.0	1579.29	30.0	31.8	0	9.08	30.33	31.63	139.3	3431.6	9540.6	324.1	6433.1	**3816.24**	**2144.36**
30.00	30.50	30.25	0.50	28.00	19.08	9.08	147.16	1.57	31.8	31.8	1.1	156.29	4685.99	0	1.0	0.0	1579.29	30.5	31.0	0	9.32	26.30	27.53	139.3	2978.6	9243.8	330.0	6595.3	**3697.54**	**2198.42**
30.50	32.00	31.25	1.50	29.50	19.32	9.32	147.16	4.71	31.0	31.0	1.1	437.70	5123.69	0	1.0	0.0	1579.29	32.0	32.0	0	9.12	31.33	32.65	139.3	3546.0	10249.0	347.7	7050.7	**4099.61**	**2350.22**
32.00	32.50	32.25	0.50	30.00	19.12	9.12	147.16	1.57	32.0	32.0	1.1	158.95	5282.64	0	1.0	0.0	1579.29	32.5	32.0	0	9.12	31.33	32.65	139.3	3546.0	10408.0	353.6	7215.5	**4163.19**	**2405.17**
32.50	33.50	33.00	1.00	31.00	19.12	9.12	147.16	3.14	32.0	32.0	1.1	317.91	5600.55	0	1.0	0.0	1579.29	33.5	32.0	0	8.96	31.33	32.65	139.3	3544.0	10723.8	365.4	7545.2	**4289.53**	**2515.06**
33.50	35.00	34.25	1.50	32.50	18.96	8.96	147.16	4.71	32.0	32.0	1.1	476.86	6077.42	0	1.0	0.0	1579.29	35.0	32.0	0	9.58	31.33	32.65	139.3	3551.9	11208.6	383.0	8039.7	**4483.46**	**2679.91**
35.00	36.50	35.75	1.50	34.00	19.58	9.58	147.16	4.71	32.0	32.0	1.1	476.86	6554.28	0	1.0	0.0	1579.29	36.5	31.0	0	9.14	26.30	27.53	139.3	2976.6	11110.2	400.7	8534.3	**4444.08**	**2844.76**
36.50	37.50	37.00	1.00	35.00	19.14	9.14	147.16	3.14	31.0	31.0	1.1	291.80	6846.08	0	1.0	0.0	1579.29	37.5	31.0	0	9.14	26.30	27.53	139.3	2976.6	11402.0	412.5	8837.9	**4560.80**	**2945.96**
37.50	38.00	37.75	0.50	35.50	19.14	9.14	147.16	1.57	31.0	31.0	1.1	145.90	6991.98	0	1.0	0.0	1579.29	38.0	31.0	0	8.16	26.30	27.53	139.3	2966.0	11537.3	418.4	8989.7	**4614.92**	**2996.55**
38.00	40.00	39.00	2.00	37.50	18.16	8.16	147.16	6.29	31.0	31.0	1.1	583.60	7575.58	0	1.0	0.0	1579.29	40.0	31.0	0	8.16	26.30	27.53	139.3	2966.0	12120.9	442.0	9596.8	**4848.36**	**3198.94**
BORE NO: P122A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	20.00	10.00	27.50	1.57	28.7	28.7	1.0	23.66	0	0	1.0	0.0	0	3.0	26.0	6	10.00	12.25	13.18	30.0	383.0	383.0	5.9	5.9	**153.21**	**1.96**
3.00	4.00	3.50	1.00	1.50	20.00	10.00	35.00	3.14	26.0	26.0	1.0	53.65	53.65	6	1.0	18.9	18.86	4.0	26.0	6	10.00	12.25	13.18	40.0	479.3	551.8	17.7	90.2	**220.72**	**30.06**
4.00	5.00	4.50	1.00	2.50	20.00	10.00	45.00	3.14	26.0	26.0	1.0	68.98	122.63	6	1.0	18.9	37.71	5.0	26.0	6	9.75	12.25	13.18	50.0	574.3	734.6	29.5	189.8	**293.84**	**63.27**
5.00	6.00	5.50	1.00	3.50	19.75	9.75	54.88	3.14	26.0	26.0	1.0	84.12	206.75	6	1.0	18.9	56.57	6.0	26.0	6	9.75	12.25	13.18	59.8	668.1	931.4	41.3	304.6	**372.57**	**101.52**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
6.00	7.00	6.50	1.00	4.50	19.75	9.75	64.63	3.14	26.0	26.0	1.0	99.06	305.81	6	1.0	18.9	75.43	7.0	26.7	0	9.75	13.83	14.80	69.5	811.8	1193.0	53.0	434.3	**477.21**	**144.76**
7.00	9.00	8.00	2.00	6.50	19.75	9.75	79.25	6.29	26.7	26.7	1.0	250.54	556.35	0	1.0	0.0	75.43	9.0	14.0	35	10.34	3.65	2.36	89.0	512.3	1144.1	76.6	708.4	**457.65**	**236.13**
9.00	10.00	9.50	1.00	7.50	20.34	10.34	94.17	3.14	14.0	14.0	1.0	73.79	630.14	35	1.0	110.0	185.43	10.0	14.0	35	10.34	3.65	2.36	99.3	542.0	1357.6	88.4	904.0	**543.03**	**301.32**
10.00	11.00	10.50	1.00	8.50	20.34	10.34	104.51	3.14	14.0	14.0	1.0	81.89	712.03	35	1.0	110.0	295.43	11.0	9.7	57	10.34	2.42	1.17	109.7	616.0	1623.5	100.2	1107.6	**649.40**	**369.21**
11.00	12.50	11.75	1.50	10.00	20.34	10.34	117.44	4.71	9.7	9.7	1.0	94.63	806.67	57	1.0	268.7	564.14	12.5	9.7	50	10.34	2.42	1.17	125.2	596.0	1966.8	117.9	1488.7	**786.72**	**496.22**
12.50	14.00	13.25	1.50	11.50	20.34	10.34	132.95	4.71	9.7	9.7	1.0	107.13	913.80	50	1.0	235.7	799.86	14.0	26.1	7	10.75	12.48	13.41	140.7	1485.5	3199.1	135.5	1849.2	**1279.66**	**616.40**
14.00	15.50	14.75	1.50	13.00	20.75	10.75	148.76	4.71	26.1	26.1	1.0	343.57	1257.37	7	1.0	33.0	832.86	15.5	26.1	7	10.75	12.48	13.41	140.7	1485.5	3575.7	153.2	2243.4	**1430.29**	**747.81**
15.50	17.00	16.25	1.50	14.50	20.75	10.75	148.76	4.71	26.1	26.1	1.0	343.57	1600.93	7	1.0	33.0	865.86	17.0	26.4	2	10.41	13.15	14.11	140.7	1525.9	3992.6	170.9	2637.7	**1597.06**	**879.23**
17.00	18.50	17.75	1.50	16.00	20.41	10.41	148.76	4.71	26.4	26.4	1.0	348.13	1949.07	2	1.0	9.4	875.29	18.5	26.4	2	10.41	13.15	14.11	140.7	1525.9	4350.2	188.6	3012.9	**1740.08**	**1004.31**
18.50	21.50	20.00	3.00	19.00	20.41	10.41	148.76	9.43	26.4	26.4	1.0	696.27	2645.33	2	1.0	18.9	894.14	21.5	28.8	0	11.01	18.56	19.64	140.7	2136.4	5675.9	223.9	3763.4	**2270.36**	**1254.47**
21.50	23.00	22.25	1.50	20.50	21.01	11.01	148.76	4.71	28.8	28.8	1.0	385.55	3030.88	0	1.0	0.0	894.14	23.0	9.3	52	11.01	2.34	1.11	140.7	631.7	4556.7	241.6	4166.6	**1822.67**	**1388.88**
23.00	24.50	23.75	1.50	22.00	21.01	11.01	148.76	4.71	9.3	9.3	1.0	114.84	3145.72	52	1.0	245.1	1139.29	24.5	9.3	52	11.01	2.34	1.11	140.7	631.7	4916.7	259.3	4544.3	**1966.66**	**1514.76**
24.50	26.00	25.25	1.50	23.50	21.01	11.01	148.76	4.71	9.3	9.3	1.0	114.84	3260.57	52	1.0	245.1	1384.43	26.0	30.0	0	10.34	21.26	22.40	140.7	2441.2	7086.2	277.0	4922.0	**2834.49**	**1640.65**
26.00	27.50	26.75	1.50	25.00	20.34	10.34	148.76	4.71	30.0	30.0	1.0	404.90	3665.47	0	1.0	0.0	1384.43	27.5	30.0	0	10.34	21.26	22.40	140.7	2441.2	7491.1	294.6	5344.5	**2996.45**	**1781.51**
27.50	29.00	28.25	1.50	26.50	20.34	10.34	148.76	4.71	30.0	30.0	1.0	404.90	4070.37	0	1.0	0.0	1384.43	29.0	30.1	0	10.34	21.76	22.91	140.7	2499.0	7953.8	312.3	5767.1	**3181.52**	**1922.37**
29.00	30.00	29.50	1.00	27.50	20.34	10.34	148.76	3.14	30.1	30.1	1.0	272.38	4342.75	0	1.0	0.0	1384.43	30.0	30.9	0	9.13	25.79	27.01	140.7	2948.3	8675.5	324.1	6051.3	**3470.20**	**2017.09**
30.00	30.50	30.25	0.50	28.00	19.13	9.13	148.76	1.57	30.9	30.9	1.0	146.20	4488.95	0	1.0	0.0	1384.43	30.5	30.9	0	9.25	25.79	27.01	140.7	2949.6	8823.0	330.0	6203.4	**3529.19**	**2067.79**
30.50	32.00	31.25	1.50	29.50	19.25	9.25	148.76	4.71	30.9	30.9	1.0	438.61	4927.56	0	1.0	0.0	1384.43	32.0	30.3	0	8.86	22.77	23.94	140.7	2600.6	8912.6	347.7	6659.7	**3565.05**	**2219.89**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
32.00	32.50	32.25	0.50	30.00	18.86	8.86	148.76	1.57	30.3	30.3	1.0	138.65	5066.22	0	1.0	0.0	1384.43	32.5	30.3	0	8.86	22.77	23.94	140.7	2600.6	9051.3	353.6	6804.2	**3620.51**	**2268.07**
32.50	33.50	33.00	1.00	31.00	18.86	8.86	148.76	3.14	30.3	30.3	1.0	277.31	5343.52	0	1.0	0.0	1384.43	33.5	30.4	0	9.28	23.27	24.45	140.7	2662.1	9390.1	365.4	7093.3	**3756.03**	**2364.44**
33.50	35.00	34.25	1.50	32.50	19.28	9.28	148.76	4.71	30.4	30.4	1.0	419.68	5763.21	0	1.0	0.0	1384.43	35.0	30.9	0	9.12	25.79	27.01	140.7	2948.2	10095.9	383.0	7530.7	**4038.34**	**2510.22**
35.00	36.50	35.75	1.50	34.00	19.12	9.12	148.76	4.71	30.9	30.9	1.0	438.61	6201.82	0	1.0	0.0	1384.43	36.5	30.9	0	9.29	25.79	27.01	140.7	2950.0	10536.3	400.7	7987.0	**4214.51**	**2662.32**
36.50	37.50	37.00	1.00	35.00	19.29	9.29	148.76	3.14	30.9	30.9	1.0	292.41	6494.23	0	1.0	0.0	1384.43	37.5	30.9	0	9.29	25.79	27.01	140.7	2950.0	10828.7	412.5	8291.2	**4331.47**	**2763.72**
37.50	38.00	37.75	0.50	35.50	19.29	9.29	148.76	1.57	30.9	30.9	1.0	146.20	6640.43	0	1.0	0.0	1384.43	38.0	31.4	0	8.83	28.31	29.58	140.7	3232.5	11257.3	418.4	8443.3	**4502.94**	**2814.42**
38.00	40.00	39.00	2.00	37.50	18.83	8.83	148.76	6.29	31.4	31.4	1.1	610.73	7251.16	0	1.0	0.0	1384.43	40.0	31.4	0	8.83	28.31	29.58	140.7	3232.5	11868.1	442.0	9077.6	**4747.23**	**3025.85**
BORE NO: P123A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	18.13	8.13	22.36	1.57	28.2	28.2	1.0	18.84	0	0	1.0	0.0	0	3.0	25.7	8	8.13	11.58	12.49	24.4	318.3	318.3	5.9	5.9	**127.33**	**1.96**
3.00	4.00	3.50	1.00	1.50	18.13	8.13	28.46	3.14	25.7	25.7	1.0	43.04	43.04	8	1.0	25.1	25.14	4.0	25.7	8	8.13	11.58	12.49	32.5	392.3	460.4	17.7	85.9	**184.18**	**28.62**
4.00	5.00	4.50	1.00	2.50	18.13	8.13	36.59	3.14	25.7	25.7	1.0	55.34	98.38	8	1.0	25.1	50.29	5.0	25.7	8	10.82	11.58	12.49	40.7	479.4	628.1	29.5	178.1	**251.23**	**59.38**
5.00	6.00	5.50	1.00	3.50	20.82	10.82	46.06	3.14	25.7	25.7	1.0	69.67	168.04	8	1.0	25.1	75.43	6.0	26.1	6	10.82	12.48	13.41	51.5	604.0	847.5	41.3	284.7	**339.00**	**94.91**
6.00	7.00	6.50	1.00	4.50	20.82	10.82	56.88	3.14	26.1	26.1	1.0	87.58	255.62	6	1.0	18.9	94.29	7.0	26.1	6	10.82	12.48	13.41	62.3	710.1	1060.0	53.0	402.9	**424.00**	**134.31**
7.00	8.00	7.50	1.00	5.50	20.82	10.82	67.70	3.14	26.1	26.1	1.0	104.24	359.86	6	1.0	18.9	113.14	8.0	26.1	6	10.65	12.48	13.41	73.1	815.3	1288.3	64.8	537.8	**515.31**	**179.27**
8.00	9.00	8.50	1.00	6.50	20.65	10.65	78.44	3.14	26.1	26.1	1.0	120.76	480.62	6	1.0	18.9	132.00	9.0	8.6	49	10.65	2.22	1.00	83.8	496.7	1109.3	76.6	689.2	**443.72**	**229.74**
9.00	10.00	9.50	1.00	7.50	20.65	10.65	89.09	3.14	8.6	8.6	1.0	42.34	522.96	49	1.0	154.0	286.00	10.0	8.6	49	10.65	2.22	1.00	94.4	515.2	1324.2	88.4	897.4	**529.68**	**299.12**
10.00	11.00	10.50	1.00	8.50	20.65	10.65	99.74	3.14	8.6	8.6	1.0	47.41	570.37	49	1.0	154.0	440.00	11.0	8.9	46	10.27	2.27	1.05	105.1	517.1	1527.4	100.2	1110.5	**610.98**	**370.18**
11.00	12.50	11.75	1.50	10.00	20.27	10.27	112.76	4.71	8.9	8.9	1.0	83.25	653.61	46	1.0	216.9	656.86	12.5	12.5	43	10.44	3.20	1.94	120.5	615.3	1925.7	117.9	1428.3	**770.30**	**476.11**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
12.50	15.50	14.00	3.00	13.00	20.44	10.44	136.13	9.43	12.5	12.5	1.0	284.54	938.15	43	1.0	405.4	1062.29	15.5	12.5	43	10.44	3.20	1.94	120.5	615.3	2615.7	153.2	2153.7	**1046.28**	**717.88**
15.50	17.00	16.25	1.50	14.50	20.44	10.44	136.13	4.71	12.5	12.5	1.0	142.27	1080.42	43	1.0	202.7	1265.00	17.0	28.8	0	10.84	18.56	19.64	120.5	1840.1	4185.5	170.9	2516.3	**1674.20**	**838.77**
17.00	18.50	17.75	1.50	16.00	20.84	10.84	136.13	4.71	28.8	28.8	1.0	352.80	1433.22	0	1.0	0.0	1265.00	18.5	25.3	5	10.29	10.68	11.57	120.5	1092.6	3790.8	188.6	2886.8	**1516.32**	**962.26**
18.50	21.50	20.00	3.00	19.00	20.29	10.29	136.13	9.43	25.3	25.3	1.0	606.69	2039.91	5	1.0	47.1	1312.14	21.5	31.3	0	10.29	27.81	29.06	120.5	2749.6	6101.6	223.9	3576.0	**2440.65**	**1191.99**
21.50	23.00	22.25	1.50	20.50	20.29	10.29	136.13	4.71	31.3	31.3	1.1	415.54	2455.45	0	1.0	0.0	1312.14	23.0	31.2	0	10.29	27.30	28.55	120.5	2699.8	6467.4	241.6	4009.2	**2586.96**	**1336.40**
23.00	24.50	23.75	1.50	22.00	20.29	10.29	136.13	4.71	31.2	31.2	1.1	411.97	2867.41	0	1.0	0.0	1312.14	24.5	31.6	0	7.94	29.32	30.60	120.5	2870.6	7050.1	259.3	4438.8	**2820.05**	**1479.61**
24.50	26.00	25.25	1.50	23.50	17.94	7.94	136.13	4.71	31.6	31.6	1.1	426.38	3293.79	0	1.0	0.0	1312.14	26.0	31.8	0	8.92	30.33	31.63	120.5	2981.3	7587.2	277.0	4882.9	**3034.90**	**1627.63**
26.00	27.50	26.75	1.50	25.00	18.92	8.92	136.13	4.71	31.8	31.8	1.1	433.70	3727.49	0	1.0	0.0	1312.14	27.5	23.5	12	9.31	8.92	9.23	120.5	962.9	6002.6	294.6	5334.3	**2401.02**	**1778.09**
27.50	29.00	28.25	1.50	26.50	19.31	9.31	136.13	4.71	23.5	23.5	1.0	279.03	4006.53	12	1.0	56.6	1368.71	29.0	15.0	42	9.18	3.94	2.65	120.5	679.5	6054.7	312.3	5687.6	**2421.89**	**1895.85**
29.00	30.00	29.50	1.00	27.50	19.18	9.18	136.13	3.14	15.0	15.0	1.0	114.63	4121.16	42	1.0	132.0	1500.71	30.0	15.0	42	9.18	3.94	2.65	120.5	679.5	6301.4	324.1	5946.0	**2520.54**	**1981.99**
30.00	30.50	30.25	0.50	28.00	19.18	9.18	136.13	1.57	15.0	15.0	1.0	57.32	4178.48	42	1.0	66.0	1566.71	30.5	7.4	24	8.69	2.00	0.82	120.5	362.0	6107.2	330.0	6075.2	**2442.88**	**2025.06**
30.50	32.00	31.25	1.50	29.50	18.69	8.69	136.13	4.71	7.4	7.4	1.0	83.35	4261.83	24	1.0	113.1	1679.86	32.0	17.0	60	8.77	4.92	3.75	120.5	903.3	6844.9	347.7	6289.4	**2737.97**	**2096.45**
32.00	32.50	32.25	0.50	30.00	18.77	8.77	136.13	1.57	17.0	17.0	1.0	65.40	4327.22	60	1.0	94.3	1774.14	32.5	17.0	60	8.77	4.92	3.75	120.5	903.3	7004.6	353.6	6454.9	**2801.85**	**2151.65**
32.50	33.50	33.00	1.00	31.00	18.77	8.77	136.13	3.14	17.0	17.0	1.0	130.80	4458.02	60	1.0	188.6	1962.71	33.5	17.0	60	9.57	4.92	3.75	120.5	904.4	7325.2	365.4	6786.1	**2930.07**	**2262.03**
33.50	35.00	34.25	1.50	32.50	19.57	9.57	136.13	4.71	17.0	17.0	1.0	196.20	4654.22	60	1.0	282.9	2245.57	35.0	20.5	45	9.00	6.76	5.94	120.5	979.1	7878.8	383.0	7282.8	**3151.54**	**2427.61**
35.00	36.50	35.75	1.50	34.00	19.00	9.00	136.13	4.71	20.5	20.5	1.0	239.93	4894.15	45	1.0	212.1	2457.71	36.5	22.5	45	8.68	8.20	8.14	120.5	1122.1	8474.0	400.7	7752.6	**3389.58**	**2584.19**
36.50	37.50	37.00	1.00	35.00	18.68	8.68	136.13	3.14	22.5	22.5	1.0	177.21	5071.36	45	1.0	141.4	2599.14	37.5	22.5	45	8.68	8.20	8.14	120.5	1122.1	8792.6	412.5	8083.0	**3517.04**	**2694.34**
37.50	38.00	37.75	0.50	35.50	18.68	8.68	136.13	1.57	22.5	22.5	1.0	88.60	5159.97	45	1.0	70.7	2669.86	38.0	22.5	45	8.61	8.20	8.14	120.5	1121.9	8951.7	418.4	8248.2	**3580.68**	**2749.41**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
38.00	40.00	39.00	2.00	37.50	18.61	8.61	136.13	6.29	22.5	22.5	1.0	354.42	5514.39	45	1.0	282.9	2952.71	40.0	22.5	45	8.61	8.20	8.14	120.5	1121.9	9589.0	442.0	8909.1	**3835.59**	**2969.69**
BORE NO: P124A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.25	9.25	25.44	1.57	28.6	28.6	1.0	21.79	21.79	2	1.0	3.1	3.14	3.0	28.6	2	9.25	18.11	19.17	27.8	478.6	503.6	5.9	30.8	**201.42**	**10.28**
3.00	4.00	3.50	1.00	1.50	19.25	9.25	32.38	3.14	28.6	28.6	1.0	55.48	77.27	2	1.0	6.3	9.43	4.0	26.0	0	9.25	12.25	13.18	37.0	404.1	490.8	17.7	104.4	**196.32**	**34.79**
4.00	5.00	4.50	1.00	2.50	19.25	9.25	41.63	3.14	26.0	26.0	1.0	63.81	141.08	0	1.0	0.0	9.43	5.0	26.6	5	10.34	13.60	14.57	46.3	588.9	739.4	29.5	180.0	**295.74**	**59.99**
5.00	6.00	5.50	1.00	3.50	20.34	10.34	51.42	3.14	26.6	26.6	1.0	80.93	222.00	5	1.0	15.7	25.14	6.0	26.6	5	10.34	13.60	14.57	56.6	699.4	946.5	41.3	288.4	**378.61**	**96.13**
6.00	7.00	6.50	1.00	4.50	20.34	10.34	61.76	3.14	26.6	26.6	1.0	97.20	319.20	5	1.0	15.7	40.86	7.0	14.8	38	10.49	3.88	2.59	66.9	483.5	843.6	53.0	413.1	**337.44**	**137.70**
7.00	9.00	8.00	2.00	6.50	20.49	10.49	77.42	6.29	14.8	14.8	1.0	128.58	447.78	38	1.0	238.9	279.71	9.0	8.6	50	10.49	2.22	1.00	87.9	510.9	1238.4	76.6	804.1	**495.36**	**268.03**
9.00	10.00	9.50	1.00	7.50	20.49	10.49	93.16	3.14	8.6	8.6	1.0	44.28	492.06	50	1.0	157.1	436.86	10.0	8.6	54	10.49	2.22	1.00	98.4	557.5	1486.4	88.4	1017.3	**594.56**	**339.10**
10.00	11.00	10.50	1.00	8.50	20.49	10.49	103.65	3.14	8.6	8.6	1.0	49.26	541.32	54	1.0	169.7	606.57	11.0	8.6	54	10.03	2.22	1.00	108.9	575.6	1723.5	100.2	1248.1	**689.39**	**416.02**
11.00	12.50	11.75	1.50	10.00	20.03	10.03	116.41	4.71	8.6	8.6	1.0	83.00	624.32	54	1.0	254.6	861.14	12.5	8.6	54	10.03	2.22	1.00	123.9	601.8	2087.3	117.9	1603.3	**834.90**	**534.44**
12.50	14.00	13.25	1.50	11.50	20.03	10.03	131.46	4.71	8.6	8.6	1.0	93.73	718.04	54	1.0	254.6	1115.71	14.0	25.2	13	8.49	10.45	11.34	139.0	1270.9	3104.7	135.5	1969.3	**1241.87**	**656.43**
14.00	15.50	14.75	1.50	13.00	18.49	8.49	145.35	4.71	25.2	25.2	1.0	322.44	1040.48	13	1.0	61.3	1177.00	15.5	25.2	13	8.49	10.45	11.34	139.0	1270.9	3488.4	153.2	2370.7	**1395.36**	**790.23**
15.50	17.00	16.25	1.50	14.50	18.49	8.49	145.35	4.71	25.2	25.2	1.0	322.44	1362.91	13	1.0	61.3	1238.29	17.0	26.8	0	9.72	14.05	15.03	139.0	1592.0	4193.2	170.9	2772.1	**1677.28**	**924.03**
17.00	18.50	17.75	1.50	16.00	19.72	9.72	145.35	4.71	26.8	26.8	1.0	346.12	1709.04	0	1.0	0.0	1238.29	18.5	26.8	0	9.72	14.05	15.03	139.0	1592.0	4539.3	188.6	3135.9	**1815.73**	**1045.30**
18.50	20.00	19.25	1.50	17.50	19.72	9.72	145.35	4.71	26.8	26.8	1.0	346.12	2055.16	0	1.0	0.0	1238.29	20.0	21.6	43	10.69	7.55	7.15	139.0	1158.8	4452.2	206.3	3499.7	**1780.88**	**1166.57**
20.00	21.50	20.75	1.50	19.00	20.69	10.69	145.35	4.71	21.6	21.6	1.0	271.29	2326.45	43	1.0	202.7	1441.00	21.5	21.6	43	10.69	7.55	7.15	139.0	1158.8	4926.2	223.9	3991.4	**1970.48**	**1330.46**
21.50	23.00	22.25	1.50	20.50	20.69	10.69	145.35	4.71	21.6	21.6	1.0	271.29	2597.75	43	1.0	202.7	1643.71	23.0	30.4	0	10.69	23.27	24.45	139.0	2644.2	6885.7	241.6	4483.1	**2754.28**	**1494.36**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
23.00	24.50	23.75	1.50	22.00	20.69	10.69	145.35	4.71	30.4	30.4	1.0	410.05	3007.80	0	1.0	0.0	1643.71	24.5	30.8	0	10.16	25.29	26.50	139.0	2867.4	7518.9	259.3	4910.8	**3007.55**	**1636.93**
24.50	27.50	26.00	3.00	25.00	20.16	10.16	145.35	9.43	30.8	30.8	1.0	849.61	3857.41	0	1.0	0.0	1643.71	27.5	30.7	0	10.16	24.79	25.99	139.0	2810.3	8311.4	294.6	5795.8	**3324.57**	**1931.92**
27.50	29.00	28.25	1.50	26.50	20.16	10.16	145.35	4.71	30.7	30.7	1.0	421.09	4278.50	0	1.0	0.0	1643.71	29.0	30.7	0	10.16	24.79	25.99	139.0	2810.3	8732.5	312.3	6234.5	**3493.00**	**2078.18**
29.00	30.00	29.50	1.00	27.50	20.16	10.16	145.35	3.14	30.7	30.7	1.0	280.72	4559.22	0	1.0	0.0	1643.71	30.0	31.6	0	8.91	29.32	30.60	139.0	3308.8	9511.7	324.1	6527.0	**3804.68**	**2175.68**
30.00	30.50	30.25	0.50	28.00	18.91	8.91	145.35	1.57	31.6	31.6	1.1	151.76	4710.98	0	1.0	0.0	1643.71	30.5	31.9	0	8.80	30.83	32.14	139.0	3477.8	9832.5	330.0	6684.7	**3932.99**	**2228.23**
30.50	32.00	31.25	1.50	29.50	18.80	8.80	145.35	4.71	31.9	31.9	1.1	467.02	5178.00	0	1.0	0.0	1643.71	32.0	31.6	0	8.85	29.32	30.60	139.0	3308.0	10129.7	347.7	7169.4	**4051.90**	**2389.80**
32.00	32.50	32.25	0.50	30.00	18.85	8.85	145.35	1.57	31.6	31.6	1.1	151.76	5329.76	0	1.0	0.0	1643.71	32.5	31.6	0	8.85	29.32	30.60	139.0	3308.0	10281.5	353.6	7327.0	**4112.60**	**2442.35**
32.50	33.50	33.00	1.00	31.00	18.85	8.85	145.35	3.14	31.6	31.6	1.1	303.51	5633.27	0	1.0	0.0	1643.71	33.5	30.0	0	8.75	21.26	22.40	139.0	2398.5	9675.5	365.4	7642.3	**3870.20**	**2547.45**
33.50	35.00	34.25	1.50	32.50	18.75	8.75	145.35	4.71	30.0	30.0	1.0	395.61	6028.87	0	1.0	0.0	1643.71	35.0	30.6	0	8.78	24.28	25.48	139.0	2739.4	10412.0	383.0	8055.6	**4164.81**	**2685.21**
35.00	36.50	35.75	1.50	34.00	18.78	8.78	145.35	4.71	30.6	30.6	1.0	417.39	6446.26	0	1.0	0.0	1643.71	36.5	31.6	0	8.68	29.32	30.60	139.0	3306.0	11396.0	400.7	8490.7	**4558.39**	**2830.23**
36.50	37.50	37.00	1.00	35.00	18.68	8.68	145.35	3.14	31.6	31.6	1.1	303.51	6749.78	0	1.0	0.0	1643.71	37.5	31.8	0	8.68	30.33	31.63	139.0	3419.5	11813.0	412.5	8806.0	**4725.20**	**2935.33**
37.50	38.00	37.75	0.50	35.50	18.68	8.68	145.35	1.57	31.8	31.8	1.1	154.36	6904.14	0	1.0	0.0	1643.71	38.0	31.5	0	8.91	28.82	30.09	139.0	3252.0	11799.8	418.4	8966.2	**4719.92**	**2988.75**
38.00	40.00	39.00	2.00	37.50	18.91	8.91	145.35	6.29	31.5	31.5	1.1	601.85	7505.99	0	1.0	0.0	1643.71	40.0	15.0	42	8.91	3.94	2.65	139.0	736.5	9886.2	442.0	9591.7	**3954.49**	**3197.22**
BORE NO: P125A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	20.65	10.65	29.29	1.57	28.9	28.9	1.0	25.41	0	0	1.0	0.0	0	3.0	30.0	1	9.82	21.26	22.40	32.0	627.2	627.2	5.9	5.9	**250.87**	**1.96**
3.00	5.00	4.00	2.00	2.50	19.82	9.82	41.77	6.29	30.0	30.0	1.0	151.59	151.59	1	1.0	6.3	6.29	5.0	12.8	34	9.82	3.29	2.02	51.6	381.6	539.5	29.5	187.3	**215.81**	**62.45**
5.00	6.00	5.50	1.00	3.50	19.82	9.82	56.50	3.14	12.8	12.8	1.0	40.34	191.93	34	1.0	106.9	113.14	6.0	27.5	3	9.57	15.63	16.64	61.4	837.9	1143.0	41.3	346.3	**457.20**	**115.44**
6.00	8.00	7.00	2.00	5.50	19.57	9.57	70.98	6.29	27.5	27.5	1.0	232.26	424.19	3	1.0	18.9	132.00	8.0	23.6	0	9.57	8.99	9.34	80.6	604.2	1160.4	64.8	621.0	**464.16**	**207.00**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 0.79 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
8.00	9.00	8.50	1.00	6.50	19.57	9.57	85.34	3.14	23.6	23.6	1.0	117.17	541.36	0	1.0	0.0	132.00	9.0	10.0	46	10.39	2.47	1.22	90.1	505.2	1178.5	76.6	750.0	**471.41**	**249.99**
9.00	11.00	10.00	2.00	8.50	20.39	10.39	100.51	6.29	10.0	10.0	1.0	111.40	652.76	46	1.0	289.1	421.14	11.0	10.0	46	10.39	2.47	1.22	110.9	545.5	1619.4	100.2	1174.1	**647.76**	**391.36**
11.00	12.00	11.50	1.00	9.50	20.39	10.39	116.10	3.14	10.0	10.0	1.0	64.34	717.09	46	1.0	144.6	565.71	12.0	11.9	41	10.50	3.03	1.76	121.3	585.8	1868.6	112.0	1394.8	**747.45**	**464.92**
12.00	14.50	13.25	2.50	12.00	20.50	10.50	134.42	7.86	11.9	11.9	1.0	222.56	939.65	41	1.0	322.1	887.86	14.5	26.4	5	10.66	13.15	14.11	147.5	1619.1	3446.7	141.4	1968.9	**1378.66**	**656.31**
14.50	17.50	16.00	3.00	15.00	20.66	10.66	134.42	9.43	26.4	26.4	1.0	629.11	1568.77	5	1.0	47.1	935.00	17.5	26.1	5	10.66	12.48	13.41	147.5	1537.9	4041.7	176.8	2680.6	**1616.68**	**893.52**
17.50	19.00	18.25	1.50	16.50	20.66	10.66	134.42	4.71	26.1	26.1	1.0	310.43	1879.20	5	1.0	23.6	958.57	19.0	9.5	53	10.26	2.38	1.14	147.5	655.3	3493.1	194.5	3032.2	**1397.22**	**1010.74**
19.00	20.50	19.75	1.50	18.00	20.26	10.26	134.42	4.71	9.5	9.5	1.0	106.04	1985.24	53	1.0	249.9	1208.43	20.5	9.5	53	10.26	2.38	1.14	147.5	655.3	3849.0	212.1	3405.8	**1539.58**	**1135.27**
20.50	22.00	21.25	1.50	19.50	20.26	10.26	134.42	4.71	9.5	9.5	1.0	106.04	2091.28	53	1.0	249.9	1458.29	22.0	9.5	53	10.26	2.38	1.14	147.5	655.3	4204.9	229.8	3779.4	**1681.94**	**1259.79**
22.00	23.50	22.75	1.50	21.00	20.26	10.26	134.42	4.71	9.5	9.5	1.0	106.04	2197.32	53	1.0	249.9	1708.14	23.5	32.5	0	9.09	33.85	35.22	147.5	4050.2	7955.6	247.5	4153.0	**3182.25**	**1384.32**
23.50	25.00	24.25	1.50	22.50	19.09	9.09	134.42	4.71	32.5	32.5	1.1	454.15	2651.47	0	1.0	0.0	1708.14	25.0	32.5	0	8.76	33.85	35.22	147.5	4045.6	8405.2	265.2	4624.8	**3362.08**	**1541.60**
25.00	26.50	25.75	1.50	24.00	18.76	8.76	134.42	4.71	32.5	32.5	1.1	454.15	3105.63	0	1.0	0.0	1708.14	26.5	32.3	0	9.24	32.85	34.19	147.5	3931.7	8745.5	282.9	5096.6	**3498.19**	**1698.88**
26.50	27.50	27.00	1.00	25.00	19.24	9.24	134.42	3.14	32.3	32.3	1.1	297.77	3403.40	0	1.0	0.0	1708.14	27.5	32.3	0	9.24	32.85	34.19	147.5	3931.7	9043.3	294.6	5406.2	**3617.30**	**1802.06**
27.50	28.00	27.75	0.50	25.50	19.24	9.24	134.42	1.57	32.3	32.3	1.1	148.89	3552.28	0	1.0	0.0	1708.14	28.0	32.9	0	8.51	35.87	37.27	147.5	4282.6	9543.0	300.5	5561.0	**3817.20**	**1853.65**
28.00	29.50	28.75	1.50	27.00	18.51	8.51	134.42	4.71	32.9	32.9	1.1	469.38	4021.67	0	1.0	0.0	1708.14	29.5	31.5	0	8.69	28.82	30.09	147.5	3443.2	9173.0	318.2	6048.0	**3669.19**	**2016.01**
29.50	30.00	29.75	0.50	27.50	18.69	8.69	134.42	1.57	31.5	31.5	1.1	139.15	4160.81	0	1.0	0.0	1708.14	30.0	31.5	0	8.69	28.82	30.09	147.5	3443.2	9312.1	324.1	6193.1	**3724.85**	**2064.35**
30.00	31.00	30.50	1.00	28.50	18.69	8.69	134.42	3.14	31.5	31.5	1.1	278.29	4439.10	0	1.0	0.0	1708.14	31.0	31.5	0	7.44	28.82	30.09	147.5	3428.4	9575.6	335.9	6483.1	**3830.25**	**2161.05**
31.00	32.50	31.75	1.50	30.00	17.44	7.44	134.42	4.71	31.5	31.5	1.1	417.44	4856.54	0	1.0	0.0	1708.14	32.5	31.5	0	7.48	28.82	30.09	147.5	3428.9	9993.5	353.6	6918.3	**3997.42**	**2306.08**
32.50	34.00	33.25	1.50	31.50	17.48	7.48	134.42	4.71	31.5	31.5	1.1	417.44	5273.98	0	1.0	0.0	1708.14	34.0	31.9	0	7.44	30.83	32.14	147.5	3668.0	10650.1	371.3	7353.4	**4260.03**	**2451.12**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
34.00	35.00	34.50	1.00	32.50	17.44	7.44	134.42	3.14	31.9	31.9	1.1	287.93	5561.91	0	1.0	0.0	1708.14	35.0	31.9	0	7.44	30.83	32.14	147.5	3668.0	10938.0	383.0	7653.1	**4375.20**	**2551.03**
35.00	35.50	35.25	0.50	33.00	17.44	7.44	134.42	1.57	31.9	31.9	1.1	143.97	5705.87	0	1.0	0.0	1708.14	35.5	30.4	0	7.79	23.27	24.45	147.5	2772.9	10186.9	388.9	7802.9	**4074.77**	**2600.98**
35.50	37.00	36.25	1.50	34.50	17.79	7.79	134.42	4.71	30.4	30.4	1.0	379.21	6085.08	0	1.0	0.0	1708.14	37.0	15.0	70	8.21	3.94	2.65	147.5	960.3	8753.5	406.6	8199.8	**3501.41**	**2733.28**
37.00	37.50	37.25	0.50	35.00	18.21	8.21	134.42	1.57	15.0	15.0	1.0	56.60	6141.68	70	1.0	110.0	1818.14	37.5	15.0	70	8.21	3.94	2.65	147.5	960.3	8920.1	412.5	8372.3	**3568.04**	**2790.77**
37.50	38.50	38.00	1.00	36.00	18.21	8.21	134.42	3.14	15.0	15.0	1.0	113.19	6254.87	70	1.0	220.0	2038.14	38.5	15.0	70	8.22	3.94	2.65	147.5	960.3	9253.3	424.3	8717.3	**3701.33**	**2905.77**
38.50	40.00	39.25	1.50	37.50	18.22	8.22	134.42	4.71	15.0	15.0	1.0	169.79	6424.66	70	1.0	330.0	2368.14	40.0	15.0	70	8.22	3.94	2.65	147.5	960.3	9753.1	442.0	9234.8	**3901.24**	**3078.26**
BORE NO: P126A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	18.89	8.89	24.45	1.57	26.5	26.5	1.0	19.15	0	5	1.0	7.9	0	3.0	27.6	2	8.89	15.85	16.87	26.7	405.3	405.3	5.9	5.9	**162.12**	**1.96**
3.00	4.00	3.50	1.00	1.50	18.89	8.89	31.12	3.14	27.6	27.6	1.0	51.12	51.12	2	1.0	6.3	6.29	4.0	27.6	2	9.40	15.85	16.87	35.6	519.4	576.8	17.7	75.1	**230.74**	**25.03**
4.00	6.00	5.00	2.00	3.50	19.40	9.40	44.96	6.29	27.6	27.6	1.0	147.74	198.87	2	1.0	12.6	18.86	6.0	27.6	2	9.40	15.85	16.87	54.4	753.6	971.4	41.3	259.0	**388.54**	**86.32**
6.00	7.00	6.50	1.00	4.50	19.40	9.40	59.06	3.14	27.6	27.6	1.0	97.04	295.90	2	1.0	6.3	25.14	7.0	26.8	0	9.40	14.05	15.03	63.8	759.5	1080.6	53.0	374.1	**432.23**	**124.69**
7.00	8.00	7.50	1.00	5.50	19.40	9.40	68.46	3.14	26.8	26.8	1.0	108.69	404.59	0	1.0	0.0	25.14	8.0	12.1	44	9.68	3.09	1.82	73.2	495.5	925.3	64.8	494.6	**370.10**	**164.85**
8.00	9.00	8.50	1.00	6.50	19.68	9.68	78.00	3.14	12.1	12.1	1.0	52.55	457.14	44	1.0	138.3	163.43	9.0	12.1	44	9.68	3.09	1.82	82.8	519.0	1139.6	76.6	697.2	**455.83**	**232.39**
9.00	10.00	9.50	1.00	7.50	19.68	9.68	87.68	3.14	12.1	12.1	1.0	59.08	516.22	44	1.0	138.3	301.71	10.0	12.1	48	10.22	3.09	1.82	92.5	571.2	1389.1	88.4	906.3	**555.64**	**302.11**
10.00	12.50	11.25	2.50	10.00	20.22	10.22	105.30	7.86	12.1	12.1	1.0	177.36	693.58	48	1.0	377.1	678.86	12.5	26.5	6	10.02	13.38	14.34	118.1	1339.9	2712.4	117.9	1490.3	**1084.94**	**496.77**
12.50	15.50	14.00	3.00	13.00	20.02	10.02	133.10	9.43	26.5	26.5	1.0	625.69	1319.27	6	1.0	56.6	735.43	15.5	23.0	18	10.02	8.56	8.68	118.1	955.6	3010.3	153.2	2207.9	**1204.11**	**735.97**
15.50	18.50	17.00	3.00	16.00	20.02	10.02	133.10	9.43	23.0	23.0	1.0	532.69	1851.96	18	1.0	169.7	905.14	18.5	29.0	0	10.56	19.01	20.10	118.1	1846.7	4603.8	188.6	2945.7	**1841.52**	**981.89**
18.50	20.00	19.25	1.50	17.50	20.56	10.56	133.10	4.71	29.0	29.0	1.0	347.81	2199.78	0	1.0	0.0	905.14	20.0	25.0	11	10.56	10.00	10.88	118.1	1050.6	4155.5	206.3	3311.2	**1662.21**	**1103.72**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
20.00	21.50	20.75	1.50	19.00	20.56	10.56	133.10	4.71	25.0	25.0	1.0	292.59	2492.37	11	1.0	51.9	957.00	21.5	25.0	11	10.56	10.00	10.88	118.1	1050.6	4500.0	223.9	3673.3	**1799.99**	**1224.43**
21.50	23.00	22.25	1.50	20.50	20.56	10.56	133.10	4.71	25.0	25.0	1.0	292.59	2784.97	11	1.0	51.9	1008.86	23.0	32.2	0	10.92	32.34	33.68	118.1	3144.8	6938.6	241.6	4035.4	**2775.45**	**1345.14**
23.00	24.50	23.75	1.50	22.00	20.92	10.92	133.10	4.71	32.2	32.2	1.1	438.61	3223.57	0	1.0	0.0	1008.86	24.5	32.1	0	10.92	31.84	33.16	118.1	3095.9	7328.3	259.3	4491.7	**2931.32**	**1497.24**
24.50	26.00	25.25	1.50	23.50	20.92	10.92	133.10	4.71	32.1	32.1	1.1	434.94	3658.51	0	1.0	0.0	1008.86	26.0	13.0	40	10.92	3.35	2.08	118.1	602.5	5269.9	277.0	4944.3	**2107.97**	**1648.11**
26.00	27.50	26.75	1.50	25.00	20.92	10.92	133.10	4.71	13.0	13.0	1.0	144.86	3803.38	40	1.0	188.6	1197.43	27.5	30.2	0	8.09	22.27	23.43	118.1	2140.1	7141.0	294.6	5295.4	**2856.38**	**1765.15**
27.50	29.00	28.25	1.50	26.50	18.09	8.09	133.10	4.71	30.2	30.2	1.0	368.85	4172.23	0	1.0	0.0	1197.43	29.0	30.2	0	8.09	22.27	23.43	118.1	2140.1	7509.8	312.3	5682.0	**3003.92**	**1893.99**
29.00	30.00	29.50	1.00	27.50	18.09	8.09	133.10	3.14	30.2	30.2	1.0	245.90	4418.13	0	1.0	0.0	1197.43	30.0	30.2	0	8.09	22.27	23.43	118.1	2140.1	7755.7	324.1	5939.7	**3102.28**	**1979.89**
30.00	30.50	30.25	0.50	28.00	18.09	8.09	133.10	1.57	30.2	30.2	1.0	122.95	4541.07	0	1.0	0.0	1197.43	30.5	31.2	0	8.09	27.30	28.55	118.1	2623.8	8362.3	330.0	6068.5	**3344.90**	**2022.83**
30.50	32.00	31.25	1.50	29.50	18.09	8.09	133.10	4.71	31.2	31.2	1.1	402.81	4943.89	0	1.0	0.0	1197.43	32.0	31.2	0	8.09	27.30	28.55	118.1	2623.8	8765.1	347.7	6489.0	**3506.03**	**2163.00**
32.00	32.50	32.25	0.50	30.00	18.09	8.09	133.10	1.57	31.2	31.2	1.1	134.27	5078.16	0	1.0	0.0	1197.43	32.5	29.2	0	8.09	19.46	20.56	118.1	1870.4	8146.0	353.6	6629.2	**3258.41**	**2209.72**
32.50	33.50	33.00	1.00	31.00	18.09	8.09	133.10	3.14	29.2	29.2	1.0	233.79	5311.94	0	1.0	0.0	1197.43	33.5	14.0	48	9.50	3.65	2.36	118.1	686.9	7196.2	365.4	6874.7	**2878.49**	**2291.58**
33.50	35.00	34.25	1.50	32.50	19.50	9.50	133.10	4.71	14.0	14.0	1.0	156.45	5468.39	48	1.0	226.3	1423.71	35.0	14.0	45	9.35	3.65	2.36	118.1	665.5	7557.6	383.0	7275.1	**3023.04**	**2425.05**
35.00	36.50	35.75	1.50	34.00	19.35	9.35	133.10	4.71	14.0	14.0	1.0	156.45	5624.84	45	1.0	212.1	1635.86	36.5	14.0	45	9.59	3.65	2.36	118.1	665.7	7926.4	400.7	7661.4	**3170.57**	**2553.80**
36.50	37.50	37.00	1.00	35.00	19.59	9.59	133.10	3.14	14.0	14.0	1.0	104.30	5729.13	45	1.0	141.4	1777.29	37.5	14.0	48	9.59	3.65	2.36	118.1	686.9	8193.4	412.5	7918.9	**3277.34**	**2639.64**
37.50	38.00	37.75	0.50	35.50	19.59	9.59	133.10	1.57	14.0	14.0	1.0	52.15	5781.28	48	1.0	75.4	1852.71	38.0	32.8	0	8.83	35.36	36.75	118.1	3408.2	11042.2	418.4	8052.4	**4416.89**	**2684.13**
38.00	40.00	39.00	2.00	37.50	18.83	8.83	133.10	6.29	32.8	32.8	1.1	614.65	6395.94	0	1.0	0.0	1852.71	40.0	32.8	0	8.83	35.36	36.75	118.1	3408.2	11656.9	442.0	8690.6	**4662.75**	**2896.87**
BORE NO: P127A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	17.70	7.70	21.18	1.57	28.0	28.0	1.0	17.69	17.69	2	1.0	3.1	3.14	3.0	28.0	0	7.70	16.76	17.79	23.1	357.9	378.8	5.9	26.7	**151.51**	**8.91**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
3.00	4.00	3.50	1.00	1.50	17.70	7.70	26.95	3.14	28.0	28.0	1.0	45.04	62.73	0	1.0	0.0	3.14	4.0	29.7	3	9.85	20.58	21.71	30.8	603.4	669.2	17.7	83.5	**267.69**	**27.85**
4.00	6.00	5.00	2.00	3.50	19.85	9.85	40.65	6.29	29.7	29.7	1.0	145.74	208.47	3	1.0	18.9	22.00	6.0	30.5	0	9.85	23.78	24.96	50.5	1040.1	1270.6	41.3	271.7	**508.22**	**90.57**
6.00	7.00	6.50	1.00	4.50	19.85	9.85	55.43	3.14	30.5	30.5	1.0	105.17	313.64	0	1.0	0.0	22.00	7.0	30.5	0	9.96	23.78	24.96	60.4	1225.2	1560.8	53.0	388.7	**624.33**	**129.56**
7.00	9.00	8.00	2.00	6.50	19.96	9.96	70.31	6.29	30.5	30.5	1.0	266.84	580.48	0	1.0	0.0	22.00	9.0	23.4	15	9.96	8.85	9.12	80.3	699.8	1302.3	76.6	679.1	**520.91**	**226.36**
9.00	10.00	9.50	1.00	7.50	19.96	9.96	85.25	3.14	23.4	23.4	1.0	115.94	696.42	15	1.0	47.1	69.14	10.0	23.4	15	9.96	8.85	9.12	90.2	769.0	1534.6	88.4	854.0	**613.85**	**284.65**
10.00	11.00	10.50	1.00	8.50	19.96	9.96	95.21	3.14	23.4	23.4	1.0	129.49	825.91	15	1.0	47.1	116.29	11.0	13.4	43	10.46	3.47	2.19	100.2	586.2	1528.4	100.2	1042.4	**611.38**	**347.46**
11.00	12.50	11.75	1.50	10.00	20.46	10.46	108.04	4.71	13.4	13.4	1.0	121.33	947.25	43	1.0	202.7	319.00	12.5	13.4	43	10.46	3.47	2.19	115.9	629.0	1895.3	117.9	1384.1	**758.11**	**461.37**
12.50	14.00	13.25	1.50	11.50	20.46	10.46	123.73	4.71	13.4	13.4	1.0	138.96	1086.20	43	1.0	202.7	521.71	14.0	23.5	48	8.69	8.92	9.23	131.6	1293.1	2901.0	135.5	1743.5	**1160.39**	**581.15**
14.00	15.50	14.75	1.50	13.00	18.69	8.69	138.09	4.71	23.5	23.5	1.0	283.06	1369.26	48	1.0	226.3	748.00	15.5	26.4	2	8.22	13.15	14.11	131.6	1419.4	3536.6	153.2	2270.5	**1414.65**	**756.82**
15.50	18.50	17.00	3.00	16.00	18.22	8.22	138.09	9.43	26.4	26.4	1.0	646.30	2015.56	2	1.0	18.9	766.86	18.5	11.0	50	8.22	2.76	1.51	131.6	644.2	3426.6	188.6	2971.0	**1370.63**	**990.33**
18.50	20.00	19.25	1.50	17.50	18.22	8.22	138.09	4.71	11.0	11.0	1.0	126.54	2142.10	50	1.0	235.7	1002.57	20.0	11.0	50	10.42	2.76	1.51	131.6	645.5	3790.1	206.3	3350.9	**1516.06**	**1116.97**
20.00	21.50	20.75	1.50	19.00	20.42	10.42	138.09	4.71	11.0	11.0	1.0	126.54	2268.64	50	1.0	235.7	1238.29	21.5	29.3	0	10.42	19.68	20.79	131.6	2119.9	5626.8	223.9	3730.9	**2250.72**	**1243.62**
21.50	23.00	22.25	1.50	20.50	20.42	10.42	138.09	4.71	29.3	29.3	1.0	365.32	2633.95	0	1.0	0.0	1238.29	23.0	30.3	0	10.42	22.77	23.94	131.6	2452.0	6324.2	241.6	4113.8	**2529.68**	**1371.28**
23.00	24.50	23.75	1.50	22.00	20.42	10.42	138.09	4.71	30.3	30.3	1.0	386.11	3020.06	0	1.0	0.0	1238.29	24.5	31.0	0	9.14	26.30	27.53	131.6	2817.3	7075.7	259.3	4517.6	**2830.27**	**1505.88**
24.50	26.00	25.25	1.50	23.50	19.14	9.14	138.09	4.71	31.0	31.0	1.1	410.71	3430.77	0	1.0	0.0	1238.29	26.0	31.0	0	9.07	26.30	27.53	131.6	2816.6	7485.6	277.0	4946.0	**2994.25**	**1648.67**
26.00	27.50	26.75	1.50	25.00	19.07	9.07	138.09	4.71	31.0	31.0	1.1	410.71	3841.48	0	1.0	0.0	1238.29	27.5	31.0	0	8.98	26.30	27.53	131.6	2815.6	7895.4	294.6	5374.4	**3158.14**	**1791.47**
27.50	29.00	28.25	1.50	26.50	18.98	8.98	138.09	4.71	31.0	31.0	1.1	410.71	4252.19	0	1.0	0.0	1238.29	29.0	20.0	45	8.98	6.40	5.39	131.6	998.8	6489.3	312.3	5802.8	**2595.72**	**1934.26**
29.00	30.00	29.50	1.00	27.50	18.98	8.98	138.09	3.14	20.0	20.0	1.0	157.96	4410.15	45	1.0	141.4	1379.71	30.0	20.0	45	8.98	6.40	5.39	131.6	998.8	6788.7	324.1	6114.0	**2715.48**	**2037.99**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
30.00	30.50	30.25	0.50	28.00	18.98	8.98	138.09	1.57	20.0	20.0	1.0	78.98	4489.13	45	1.0	70.7	1450.43	30.5	20.0	45	8.98	6.40	5.39	131.6	998.8	6938.4	330.0	6269.6	**2775.36**	**2089.85**
30.50	32.00	31.25	1.50	29.50	18.98	8.98	138.09	4.71	20.0	20.0	1.0	236.94	4726.06	45	1.0	212.1	1662.57	32.0	22.0	20	8.14	7.84	7.59	131.6	976.2	7364.8	347.7	6736.3	**2945.92**	**2245.44**
32.00	32.50	32.25	0.50	30.00	18.14	8.14	138.09	1.57	22.0	22.0	1.0	87.67	4813.74	20	1.0	31.4	1694.00	32.5	16.5	28	8.14	4.68	3.47	131.6	692.7	7200.4	353.6	6861.3	**2880.17**	**2287.10**
32.50	33.50	33.00	1.00	31.00	18.14	8.14	138.09	3.14	16.5	16.5	1.0	128.55	4942.29	28	1.0	88.0	1782.00	33.5	9.0	28	8.98	2.29	1.07	131.6	438.5	7162.8	365.4	7089.6	**2865.11**	**2363.22**
33.50	35.00	34.25	1.50	32.50	18.98	8.98	138.09	4.71	9.0	9.0	1.0	103.11	5045.40	28	1.0	132.0	1914.00	35.0	9.0	30	8.98	2.29	1.07	131.6	452.6	7412.0	383.0	7342.4	**2964.81**	**2447.48**
35.00	36.50	35.75	1.50	34.00	18.98	8.98	138.09	4.71	9.0	9.0	1.0	103.11	5148.50	30	1.0	141.4	2055.43	36.5	11.0	62	8.74	2.76	1.51	131.6	729.3	7933.3	400.7	7604.6	**3173.30**	**2534.88**
36.50	37.50	37.00	1.00	35.00	18.74	8.74	138.09	3.14	11.0	11.0	1.0	84.36	5232.86	62	1.0	194.9	2250.29	37.5	11.0	62	8.74	2.76	1.51	131.6	729.3	8212.5	412.5	7895.6	**3284.99**	**2631.88**
37.50	38.00	37.75	0.50	35.50	18.74	8.74	138.09	1.57	11.0	11.0	1.0	42.18	5275.04	62	1.0	97.4	2347.71	38.0	14.5	57	8.96	3.80	2.51	131.6	804.2	8427.0	418.4	8041.1	**3370.79**	**2680.38**
38.00	40.00	39.00	2.00	37.50	18.96	8.96	138.09	6.29	14.5	14.5	1.0	224.47	5499.51	57	1.0	358.3	2706.00	40.0	14.5	57	8.96	3.80	2.51	131.6	804.2	9009.7	442.0	8647.5	**3603.89**	**2882.49**
BORE NO: P128A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	20.07	10.07	27.69	1.57	29.3	29.3	1.0	24.42	24.42	0	1.0	0.0	0.00	3.0	29.3	0	10.07	19.68	20.79	30.2	549.4	573.9	5.9	30.3	**229.55**	**10.10**
3.00	4.00	3.50	1.00	1.50	20.07	10.07	35.25	3.14	29.3	29.3	1.0	62.16	86.58	0	1.0	0.0	0.00	4.0	27.9	6	10.07	16.53	17.56	40.3	635.1	721.7	17.7	104.3	**288.66**	**34.75**
4.00	5.00	4.50	1.00	2.50	20.07	10.07	45.32	3.14	27.9	27.9	1.0	75.41	161.99	6	1.0	18.9	18.86	5.0	27.9	6	9.82	16.53	17.56	50.4	764.1	945.0	29.5	210.3	**377.99**	**70.10**
5.00	6.00	5.50	1.00	3.50	19.82	9.82	55.26	3.14	27.9	27.9	1.0	91.96	253.94	6	1.0	18.9	37.71	6.0	24.3	0	9.82	9.50	10.11	60.2	487.9	779.6	41.3	332.9	**311.84**	**110.97**
6.00	7.00	6.50	1.00	4.50	19.82	9.82	65.08	3.14	24.3	24.3	1.0	92.35	346.30	0	1.0	0.0	37.71	7.0	24.3	0	9.82	9.50	10.11	70.0	561.2	945.2	53.0	437.0	**378.09**	**145.68**
7.00	8.00	7.50	1.00	5.50	19.82	9.82	74.90	3.14	24.3	24.3	1.0	106.29	452.58	0	1.0	0.0	37.71	8.0	12.0	42	10.58	3.06	1.79	79.8	496.2	986.5	64.8	555.1	**394.60**	**185.04**
8.00	9.00	8.50	1.00	6.50	20.58	10.58	85.10	3.14	12.0	12.0	1.0	56.85	509.43	42	1.0	132.0	169.71	9.0	12.0	42	10.58	3.06	1.79	90.4	521.6	1200.8	76.6	755.8	**480.31**	**251.92**
9.00	10.00	9.50	1.00	7.50	20.58	10.58	95.68	3.14	12.0	12.0	1.0	63.92	573.35	42	1.0	132.0	301.71	10.0	7.5	53	10.72	2.02	0.84	101.0	538.6	1413.6	88.4	963.5	**565.45**	**321.15**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
10.00	12.50	11.25	2.50	10.00	20.72	10.72	114.37	7.86	7.5	7.5	1.0	118.31	691.66	53	1.0	416.4	718.14	12.5	24.3	9	10.09	9.50	10.11	127.8	1057.0	2466.8	117.9	1527.7	**986.73**	**509.22**
12.50	15.50	14.00	3.00	13.00	20.09	10.09	142.91	9.43	24.3	24.3	1.0	608.37	1300.03	9	1.0	84.9	803.00	15.5	29.5	0	9.80	20.13	21.25	127.8	2103.0	4206.1	153.2	2256.2	**1682.42**	**752.08**
15.50	18.50	17.00	3.00	16.00	19.80	9.80	142.91	9.43	29.5	29.5	1.0	762.32	2062.34	0	1.0	0.0	803.00	18.5	30.4	0	10.02	23.27	24.45	127.8	2432.8	5298.1	188.6	3053.9	**2119.25**	**1017.97**
18.50	21.50	20.00	3.00	19.00	20.02	10.02	142.91	9.43	30.4	30.4	1.0	806.32	2868.66	0	1.0	0.0	803.00	21.5	30.4	0	10.02	23.27	24.45	127.8	2432.8	6104.5	223.9	3895.6	**2441.78**	**1298.53**
21.50	23.00	22.25	1.50	20.50	20.02	10.02	142.91	4.71	30.4	30.4	1.0	403.16	3271.82	0	1.0	0.0	803.00	23.0	15.3	32	10.27	4.09	2.81	127.8	648.0	4722.8	241.6	4316.4	**1889.13**	**1438.81**
23.00	24.50	23.75	1.50	22.00	20.27	10.27	142.91	4.71	15.3	15.3	1.0	184.30	3456.12	32	1.0	150.9	953.86	24.5	15.3	32	10.27	4.09	2.81	127.8	648.0	5058.0	259.3	4669.3	**2023.19**	**1556.42**
24.50	26.00	25.25	1.50	23.50	20.27	10.27	142.91	4.71	15.3	15.3	1.0	184.30	3640.43	32	1.0	150.9	1104.71	26.0	30.2	0	10.27	22.27	23.43	127.8	2329.9	7075.1	277.0	5022.1	**2830.02**	**1674.03**
26.00	27.50	26.75	1.50	25.00	20.27	10.27	142.91	4.71	30.2	30.2	1.0	396.02	4036.45	0	1.0	0.0	1104.71	27.5	31.0	0	9.20	26.30	27.53	127.8	2739.5	7880.6	294.6	5435.8	**3152.25**	**1811.93**
27.50	29.00	28.25	1.50	26.50	19.20	9.20	142.91	4.71	31.0	31.0	1.1	425.04	4461.48	0	1.0	0.0	1104.71	29.0	13.0	53	9.07	3.35	2.08	127.8	718.5	6284.7	312.3	5878.5	**2513.88**	**1959.51**
29.00	30.00	29.50	1.00	27.50	19.07	9.07	142.91	3.14	13.0	13.0	1.0	103.69	4565.17	53	1.0	166.6	1271.29	30.0	12.4	53	9.07	3.17	1.91	127.8	700.3	6536.8	324.1	6160.6	**2614.70**	**2053.52**
30.00	30.50	30.25	0.50	28.00	19.07	9.07	142.91	1.57	12.4	12.4	1.0	49.37	4614.55	53	1.0	83.3	1354.57	30.5	12.5	42	8.69	3.20	1.94	127.8	625.3	6594.4	330.0	6299.1	**2637.75**	**2099.71**
30.50	32.00	31.25	1.50	29.50	18.69	8.69	142.91	4.71	12.5	12.5	1.0	149.35	4763.90	42	1.0	198.0	1552.57	32.0	12.5	42	8.80	3.20	1.94	127.8	625.3	6941.8	347.7	6664.2	**2776.73**	**2221.38**
32.00	32.50	32.25	0.50	30.00	18.80	8.80	142.91	1.57	12.5	12.5	1.0	49.78	4813.69	42	1.0	66.0	1618.57	32.5	12.5	42	8.80	3.20	1.94	127.8	625.3	7057.6	353.6	6785.8	**2823.04**	**2261.94**
32.50	33.50	33.00	1.00	31.00	18.80	8.80	142.91	3.14	12.5	12.5	1.0	99.57	4913.26	42	1.0	132.0	1750.57	33.5	10.4	56	9.05	2.59	1.33	127.8	660.5	7324.3	365.4	7029.2	**2929.74**	**2343.06**
33.50	35.00	34.25	1.50	32.50	19.05	9.05	142.91	4.71	10.4	10.4	1.0	123.65	5036.90	56	1.0	264.0	2014.57	35.0	10.5	56	9.02	2.62	1.36	127.8	663.6	7715.0	383.0	7434.5	**3086.01**	**2478.17**
35.00	36.50	35.75	1.50	34.00	19.02	9.02	142.91	4.71	10.5	10.5	1.0	124.86	5161.76	56	1.0	264.0	2278.57	36.5	10.5	49	8.63	2.62	1.36	127.8	613.8	8054.2	400.7	7841.1	**3221.67**	**2613.68**
36.50	37.50	37.00	1.00	35.00	18.63	8.63	142.91	3.14	10.5	10.5	1.0	83.24	5245.01	49	1.0	154.0	2432.57	37.5	10.5	49	8.63	2.62	1.36	127.8	613.8	8291.4	412.5	8090.1	**3316.57**	**2696.69**
37.50	38.00	37.75	0.50	35.50	18.63	8.63	142.91	1.57	10.5	10.5	1.0	41.62	5286.63	49	1.0	77.0	2509.57	38.0	9.0	55	9.05	2.29	1.07	127.8	622.6	8418.8	418.4	8214.6	**3367.52**	**2738.20**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
38.00	40.00	39.00	2.00	37.50	19.05	9.05	142.91	6.29	9.0	9.0	1.0	142.27	5428.90	55	1.0	345.7	2855.29	40.0	9.0	55	9.05	2.29	1.07	127.8	622.6	8906.8	442.0	8726.1	**3562.72**	**2908.72**
BORE NO: P129A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.76	9.76	26.84	1.57	28.7	28.7	1.0	23.09	23.09	0	1.0	0.0	0.00	3.0	28.7	0	9.27	18.33	19.40	29.3	492.4	515.5	5.9	29.0	**206.20**	**9.66**
3.00	5.00	4.00	2.00	2.50	19.27	9.27	38.55	6.29	28.7	28.7	1.0	132.66	155.75	0	1.0	0.0	0.00	5.0	28.7	0	9.27	18.33	19.40	47.8	759.5	915.2	29.5	185.2	**366.08**	**61.74**
5.00	6.00	5.50	1.00	3.50	19.27	9.27	52.46	3.14	28.7	28.7	1.0	90.26	246.01	0	1.0	0.0	0.00	6.0	27.2	0	9.27	14.95	15.95	57.1	728.9	974.9	41.3	287.3	**389.95**	**95.75**
6.00	7.00	6.50	1.00	4.50	19.27	9.27	61.73	3.14	27.2	27.2	1.0	99.70	345.71	0	1.0	0.0	0.00	7.0	10.6	44	9.93	2.65	1.39	66.4	454.6	800.3	53.0	398.7	**320.11**	**132.92**
7.00	8.00	7.50	1.00	5.50	19.93	9.93	71.33	3.14	10.6	10.6	1.0	41.95	387.66	44	1.0	138.3	138.29	8.0	10.6	44	9.93	2.65	1.39	76.3	475.2	1001.2	64.8	590.8	**400.46**	**196.92**
8.00	9.00	8.50	1.00	6.50	19.93	9.93	81.26	3.14	10.6	10.6	1.0	47.79	435.45	44	1.0	138.3	276.57	9.0	9.6	49	9.93	2.40	1.16	86.2	513.5	1225.5	76.6	788.6	**490.20**	**262.88**
9.00	10.00	9.50	1.00	7.50	19.93	9.93	91.19	3.14	9.6	9.6	1.0	48.47	483.93	49	1.0	154.0	430.57	10.0	9.6	49	10.15	2.40	1.16	96.2	532.3	1446.8	88.4	1002.9	**578.71**	**334.30**
10.00	11.00	10.50	1.00	8.50	20.15	10.15	101.23	3.14	9.6	9.6	1.0	53.81	537.73	49	1.0	154.0	584.57	11.0	9.6	49	10.15	2.40	1.16	106.3	551.4	1673.7	100.2	1222.5	**669.48**	**407.49**
11.00	12.00	11.50	1.00	9.50	20.15	10.15	111.38	3.14	9.6	9.6	1.0	59.20	596.94	49	1.0	154.0	738.57	12.0	9.6	49	10.15	2.40	1.16	116.5	570.5	1906.0	112.0	1447.5	**762.41**	**482.49**
12.00	13.00	12.50	1.00	10.50	20.15	10.15	121.53	3.14	9.6	9.6	1.0	64.60	661.54	49	1.0	154.0	892.57	13.0	12.4	44	10.76	3.17	1.91	126.6	635.0	2189.1	123.8	1677.9	**875.64**	**559.29**
13.00	14.50	13.75	1.50	12.00	20.76	10.76	134.67	4.71	12.4	12.4	1.0	139.59	801.12	44	1.0	207.4	1100.00	14.5	29.3	0	10.76	19.68	20.79	142.7	2295.4	4196.5	141.4	2042.6	**1678.61**	**680.85**
14.50	16.00	15.25	1.50	13.50	20.76	10.76	134.67	4.71	29.3	29.3	1.0	356.27	1157.40	0	1.0	0.0	1100.00	16.0	11.5	53	10.29	2.91	1.65	142.7	707.9	2965.3	159.1	2416.5	**1186.13**	**805.50**
16.00	17.50	16.75	1.50	15.00	20.29	10.29	134.67	4.71	11.5	11.5	1.0	129.17	1286.56	53	1.0	249.9	1349.86	17.5	28.6	4	10.54	18.11	19.17	142.7	2138.4	4774.8	176.8	2813.2	**1909.94**	**937.74**
17.50	20.50	19.00	3.00	18.00	20.54	10.54	134.67	9.43	28.6	28.6	1.0	692.29	1978.85	4	1.0	37.7	1387.57	20.5	28.0	0	10.54	16.76	17.79	142.7	1952.9	5319.3	212.1	3578.6	**2127.72**	**1192.86**
20.50	22.00	21.25	1.50	19.50	20.54	10.54	134.67	4.71	28.0	28.0	1.0	337.57	2316.42	0	1.0	0.0	1387.57	22.0	30.7	0	10.54	24.79	25.99	142.7	2887.4	6591.4	229.8	3933.8	**2636.56**	**1311.27**
22.00	23.50	22.75	1.50	21.00	20.54	10.54	134.67	4.71	30.7	30.7	1.0	390.15	2706.57	0	1.0	0.0	1387.57	23.5	31.5	0	9.14	28.82	30.09	142.7	3339.8	7433.9	247.5	4341.6	**2973.58**	**1447.21**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
23.50	25.00	24.25	1.50	22.50	19.14	9.14	134.67	4.71	31.5	31.5	1.1	418.23	3124.80	0	1.0	0.0	1387.57	25.0	31.5	0	9.10	28.82	30.09	142.7	3339.3	7851.7	265.2	4777.6	**3140.68**	**1592.52**
25.00	26.50	25.75	1.50	24.00	19.10	9.10	134.67	4.71	31.5	31.5	1.1	418.23	3543.03	0	1.0	0.0	1387.57	26.5	31.5	0	9.23	28.82	30.09	142.7	3340.9	8271.5	282.9	5213.5	**3308.59**	**1737.82**
26.50	27.50	27.00	1.00	25.00	19.23	9.23	134.67	3.14	31.5	31.5	1.1	278.82	3821.85	0	1.0	0.0	1387.57	27.5	31.5	0	9.23	28.82	30.09	142.7	3340.9	8550.3	294.6	5504.1	**3420.12**	**1834.69**
27.50	28.00	27.75	0.50	25.50	19.23	9.23	134.67	1.57	31.5	31.5	1.1	139.41	3961.26	0	1.0	0.0	1387.57	28.0	31.5	0	9.05	28.82	30.09	142.7	3338.7	8687.6	300.5	5649.4	**3475.03**	**1883.12**
28.00	29.50	28.75	1.50	27.00	19.05	9.05	134.67	4.71	31.5	31.5	1.1	418.23	4379.49	0	1.0	0.0	1387.57	29.5	31.5	0	9.48	28.82	30.09	142.7	3343.8	9110.9	318.2	6085.3	**3644.35**	**2028.43**
29.50	30.00	29.75	0.50	27.50	19.48	9.48	134.67	1.57	31.5	31.5	1.1	139.41	4518.90	0	1.0	0.0	1387.57	30.0	31.5	0	9.48	28.82	30.09	142.7	3343.8	9250.3	324.1	6230.6	**3700.12**	**2076.86**
30.00	31.00	30.50	1.00	28.50	19.48	9.48	134.67	3.14	31.5	31.5	1.1	278.82	4797.72	0	1.0	0.0	1387.57	31.0	30.9	0	9.29	25.79	27.01	142.7	2991.4	9176.7	335.9	6521.2	**3670.67**	**2173.73**
31.00	32.50	31.75	1.50	30.00	19.29	9.29	134.67	4.71	30.9	30.9	1.0	397.06	5194.78	0	1.0	0.0	1387.57	32.5	29.3	0	8.89	19.68	20.79	142.7	2280.1	8862.5	353.6	6935.9	**3544.99**	**2311.97**
32.50	34.00	33.25	1.50	31.50	18.89	8.89	134.67	4.71	29.3	29.3	1.0	356.27	5551.06	0	1.0	0.0	1387.57	34.0	29.9	0	9.31	21.03	22.17	142.7	2440.1	9378.8	371.3	7309.9	**3751.51**	**2436.63**
34.00	35.00	34.50	1.00	32.50	19.31	9.31	134.67	3.14	29.9	29.9	1.0	243.38	5794.43	0	1.0	0.0	1387.57	35.0	29.9	0	9.31	21.03	22.17	142.7	2440.1	9622.2	383.0	7565.0	**3848.86**	**2521.68**
35.00	35.50	35.25	0.50	33.00	19.31	9.31	134.67	1.57	29.9	29.9	1.0	121.69	5916.12	0	1.0	0.0	1387.57	35.5	25.6	10	9.14	11.35	12.26	142.7	1387.8	8691.5	388.9	7692.6	**3476.60**	**2564.21**
35.50	37.00	36.25	1.50	34.50	19.14	9.14	134.67	4.71	25.6	25.6	1.0	304.18	6220.30	10	1.0	47.1	1434.71	37.0	31.6	0	9.08	29.32	30.60	142.7	3397.4	11052.4	406.6	8061.6	**4420.97**	**2687.21**
37.00	37.50	37.25	0.50	35.00	19.08	9.08	134.67	1.57	31.6	31.6	1.1	140.61	6360.91	0	1.0	0.0	1434.71	37.5	31.6	0	9.08	29.32	30.60	142.7	3397.4	11193.0	412.5	8208.1	**4477.22**	**2736.04**
37.50	38.50	38.00	1.00	36.00	19.08	9.08	134.67	3.14	31.6	31.6	1.1	281.21	6642.13	0	1.0	0.0	1434.71	38.5	31.6	0	9.10	29.32	30.60	142.7	3397.7	11474.5	424.3	8501.1	**4589.80**	**2833.71**
38.50	40.00	39.25	1.50	37.50	19.10	9.10	134.67	4.71	31.6	31.6	1.1	421.82	7063.95	0	1.0	0.0	1434.71	40.0	20.0	35	9.10	6.40	5.39	142.7	984.5	9483.2	442.0	8940.6	**3793.28**	**2980.21**
BORE NO: P130A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.84	9.84	27.06	1.57	25.2	25.2	1.0	20.01	0	3	1.0	4.7	0	3.0	25.2	3	9.84	10.45	11.34	29.5	0	0.0	5.9	5.9	**0.00**	**1.96**
3.00	4.00	3.50	1.00	1.50	19.84	9.84	34.44	3.14	25.2	25.2	1.0	50.93	0	3	1.0	9.4	0	4.0	25.1	0	9.84	10.23	11.11	39.4	359.2	359.2	17.7	17.7	**143.67**	**5.89**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
4.00	5.00	4.50	1.00	2.50	19.84	9.84	44.28	3.14	25.1	25.1	1.0	65.19	65.19	0	1.0	0.0	0.00	5.0	24.2	6	9.52	9.42	10.00	49.2	444.1	509.3	29.5	94.7	**203.73**	**31.55**
5.00	6.00	5.50	1.00	3.50	19.52	9.52	53.96	3.14	24.2	24.2	1.0	76.22	141.41	6	1.0	18.9	18.86	6.0	27.2	7	9.52	14.95	15.95	58.7	799.1	959.4	41.3	201.5	**383.74**	**67.17**
6.00	7.00	6.50	1.00	4.50	19.52	9.52	63.48	3.14	27.2	27.2	1.0	102.53	243.94	7	1.0	22.0	40.86	7.0	27.2	7	10.43	14.95	15.95	68.2	916.7	1201.4	53.0	337.8	**480.58**	**112.61**
7.00	9.00	8.00	2.00	6.50	20.43	10.43	78.67	6.29	27.2	27.2	1.0	254.14	498.08	7	1.0	44.0	84.86	9.0	26.7	0	10.43	13.83	14.80	89.1	1028.7	1611.6	76.6	659.5	**644.66**	**219.85**
9.00	10.00	9.50	1.00	7.50	20.43	10.43	94.32	3.14	26.7	26.7	1.0	149.08	647.16	0	1.0	0.0	84.86	10.0	14.4	56	10.43	3.77	2.48	99.5	700.7	1432.7	88.4	820.4	**573.07**	**273.47**
10.00	11.00	10.50	1.00	8.50	20.43	10.43	104.75	3.14	14.4	14.4	1.0	84.52	731.68	56	1.0	176.0	260.86	11.0	10.6	55	9.89	2.65	1.39	110.0	623.0	1615.5	100.2	1092.7	**646.21**	**364.24**
11.00	12.50	11.75	1.50	10.00	19.89	9.89	117.38	4.71	10.6	10.6	1.0	103.56	835.24	55	1.0	259.3	520.14	12.5	9.8	57	10.16	2.43	1.19	124.8	646.5	2001.9	117.9	1473.2	**800.75**	**491.08**
12.50	15.50	14.00	3.00	13.00	20.16	10.16	140.04	9.43	9.8	9.8	1.0	228.06	1063.30	57	1.0	537.4	1057.57	15.5	26.7	4	9.97	13.83	14.80	124.8	1442.1	3563.0	153.2	2274.1	**1425.21**	**758.03**
15.50	18.50	17.00	3.00	16.00	19.97	9.97	140.04	9.43	26.7	26.7	1.0	664.06	1727.36	4	1.0	37.7	1095.29	18.5	26.0	0	9.97	12.25	13.18	124.8	1253.0	4075.6	188.6	3011.2	**1630.25**	**1003.74**
18.50	20.00	19.25	1.50	17.50	19.97	9.97	140.04	4.71	26.0	26.0	1.0	321.98	2049.34	0	1.0	0.0	1095.29	20.0	26.8	4	10.42	14.05	15.03	124.8	1467.8	4612.4	206.3	3350.9	**1844.96**	**1116.96**
20.00	21.50	20.75	1.50	19.00	20.42	10.42	140.04	4.71	26.8	26.8	1.0	333.47	2382.81	4	1.0	18.9	1114.14	21.5	31.5	0	10.42	28.82	30.09	124.8	2948.6	6445.6	223.9	3720.9	**2578.24**	**1240.30**
21.50	23.00	22.25	1.50	20.50	20.42	10.42	140.04	4.71	31.5	31.5	1.1	434.89	2817.71	0	1.0	0.0	1114.14	23.0	30.7	0	10.42	24.79	25.99	124.8	2536.7	6468.6	241.6	4173.5	**2587.42**	**1391.15**
23.00	24.50	23.75	1.50	22.00	20.42	10.42	140.04	4.71	30.7	30.7	1.0	405.70	3223.40	0	1.0	0.0	1114.14	24.5	25.7	9	10.43	11.58	12.49	124.8	1249.9	5587.5	259.3	4596.8	**2234.99**	**1532.28**
24.50	26.00	25.25	1.50	23.50	20.43	10.43	140.04	4.71	25.7	25.7	1.0	317.72	3541.12	9	1.0	42.4	1156.57	26.0	30.5	0	10.43	23.78	24.96	124.8	2433.8	7131.5	277.0	4974.7	**2852.60**	**1658.22**
26.00	27.50	26.75	1.50	25.00	20.43	10.43	140.04	4.71	30.5	30.5	1.0	398.59	3939.71	0	1.0	0.0	1156.57	27.5	30.5	0	10.43	23.78	24.96	124.8	2433.8	7530.1	294.6	5390.9	**3012.04**	**1796.97**
27.50	29.00	28.25	1.50	26.50	20.43	10.43	140.04	4.71	30.5	30.5	1.0	398.59	4338.30	0	1.0	0.0	1156.57	29.0	31.8	0	10.43	30.33	31.63	124.8	3103.2	8598.1	312.3	5807.2	**3439.24**	**1935.73**
29.00	30.00	29.50	1.00	27.50	20.43	10.43	140.04	3.14	31.8	31.8	1.1	297.44	4635.73	0	1.0	0.0	1156.57	30.0	31.8	0	9.03	30.33	31.63	124.8	3085.8	8878.2	324.1	6116.4	**3551.26**	**2038.80**
30.00	30.50	30.25	0.50	28.00	19.03	9.03	140.04	1.57	31.8	31.8	1.1	148.72	4784.45	0	1.0	0.0	1156.57	30.5	16.0	52	8.25	4.43	3.20	124.8	812.7	6753.7	330.0	6271.0	**2701.47**	**2090.34**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
30.50	32.00	31.25	1.50	29.50	18.25	8.25	140.04	4.71	16.0	16.0	1.0	189.30	4973.75	52	1.0	245.1	1401.71	32.0	16.0	52	7.94	4.43	3.20	124.8	812.3	7187.7	347.7	6723.1	**2875.09**	**2241.05**
32.00	32.50	32.25	0.50	30.00	17.94	7.94	140.04	1.57	16.0	16.0	1.0	63.10	5036.85	52	1.0	81.7	1483.43	32.5	16.0	52	7.94	4.43	3.20	124.8	812.3	7332.5	353.6	6873.9	**2933.02**	**2291.28**
32.50	33.50	33.00	1.00	31.00	17.94	7.94	140.04	3.14	16.0	16.0	1.0	126.20	5163.05	52	1.0	163.4	1646.86	33.5	28.8	0	8.86	18.56	19.64	124.8	1887.9	8697.9	365.4	7175.3	**3479.14**	**2391.76**
33.50	35.00	34.25	1.50	32.50	18.86	8.86	140.04	4.71	28.8	28.8	1.0	362.93	5525.98	0	1.0	0.0	1646.86	35.0	25.2	6	9.33	10.45	11.34	124.8	1108.7	8281.5	383.0	7555.9	**3312.61**	**2518.62**
35.00	36.50	35.75	1.50	34.00	19.33	9.33	140.04	4.71	25.2	25.2	1.0	310.65	5836.63	6	1.0	28.3	1675.14	36.5	25.2	6	8.80	10.45	11.34	124.8	1106.3	8618.1	400.7	7912.5	**3447.24**	**2637.50**
36.50	37.50	37.00	1.00	35.00	18.80	8.80	140.04	3.14	25.2	25.2	1.0	207.10	6043.73	6	1.0	18.9	1694.00	37.5	26.0	6	8.80	12.25	13.18	124.8	1289.3	9027.1	412.5	8150.2	**3610.83**	**2716.74**
37.50	38.00	37.75	0.50	35.50	18.80	8.80	140.04	1.57	26.0	26.0	1.0	107.33	6151.06	6	1.0	9.4	1703.43	38.0	26.0	6	9.17	12.25	13.18	124.8	1291.3	9145.8	418.4	8272.9	**3658.30**	**2757.63**
38.00	40.00	39.00	2.00	37.50	19.17	9.17	140.04	6.29	26.0	26.0	1.0	429.31	6580.37	6	1.0	37.7	1741.14	40.0	23.0	15	9.17	8.56	8.68	124.8	976.7	9298.2	442.0	8763.5	**3719.28**	**2921.16**
BORE NO: P131A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	16.66	6.66	18.32	1.57	27.2	27.2	1.0	14.79	14.79	3	1.0	4.7	4.71	3.0	28.9	1	9.70	18.78	19.87	20.0	377.6	397.1	5.9	25.4	**158.85**	**8.47**
3.00	5.00	4.00	2.00	2.50	19.70	9.70	29.68	6.29	28.9	28.9	1.0	102.99	117.78	1	1.0	6.3	11.00	5.0	28.6	1	9.70	18.11	19.17	39.4	640.4	769.2	29.5	158.2	**307.67**	**52.75**
5.00	6.00	5.50	1.00	3.50	19.70	9.70	44.23	3.14	28.6	28.6	1.0	75.79	193.57	1	1.0	3.1	14.14	6.0	28.6	1	9.88	18.11	19.17	49.1	779.7	987.5	41.3	249.0	**394.98**	**82.99**
6.00	8.00	7.00	2.00	5.50	19.88	9.88	58.96	6.29	28.6	28.6	1.0	202.06	395.63	1	1.0	6.3	20.43	8.0	10.5	36	9.88	2.62	1.36	68.8	401.4	817.5	64.8	480.9	**326.99**	**160.29**
8.00	9.00	8.50	1.00	6.50	19.88	9.88	73.78	3.14	10.5	10.5	1.0	42.98	438.61	36	1.0	113.1	133.57	9.0	10.5	36	9.59	2.62	1.36	78.7	421.6	993.7	76.6	648.8	**397.50**	**216.26**
9.00	11.00	10.00	2.00	8.50	19.59	9.59	88.31	6.29	10.5	10.5	1.0	102.88	541.49	36	1.0	226.3	359.86	11.0	10.2	56	9.59	2.53	1.28	97.9	595.3	1496.7	100.2	1001.5	**598.67**	**333.84**
11.00	12.00	11.50	1.00	9.50	19.59	9.59	102.70	3.14	10.2	10.2	1.0	58.07	599.56	56	1.0	176.0	535.86	12.0	10.2	56	10.80	2.53	1.28	107.5	615.0	1750.4	112.0	1247.4	**700.16**	**415.79**
12.00	14.50	13.25	2.50	12.00	20.80	10.80	120.99	7.86	10.2	10.2	1.0	171.05	770.60	56	1.0	440.0	975.86	14.5	10.2	56	10.80	2.53	1.28	134.5	668.6	2415.1	141.4	1887.9	**966.04**	**629.30**
14.50	16.00	15.25	1.50	13.50	20.80	10.80	120.99	4.71	10.2	10.2	1.0	102.63	873.23	56	1.0	264.0	1239.86	16.0	11.9	54	10.08	3.03	1.76	134.5	708.9	2822.0	159.1	2272.2	**1128.79**	**757.40**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
16.00	17.50	16.75	1.50	15.00	20.08	10.08	120.99	4.71	11.9	11.9	1.0	120.20	993.43	54	1.0	254.6	1494.43	17.5	30.0	0	10.67	21.26	22.40	134.5	2340.4	4828.3	176.8	2664.6	**1931.31**	**888.21**
17.50	20.50	19.00	3.00	18.00	20.67	10.67	120.99	9.43	30.0	30.0	1.0	658.62	1652.05	0	1.0	0.0	1494.43	20.5	30.0	0	10.67	21.26	22.40	134.5	2340.4	5486.9	212.1	3358.6	**2194.75**	**1119.54**
20.50	22.00	21.25	1.50	19.50	20.67	10.67	120.99	4.71	30.0	30.0	1.0	329.31	1981.36	0	1.0	0.0	1494.43	22.0	30.0	0	10.67	21.26	22.40	134.5	2340.4	5816.2	229.8	3705.6	**2326.48**	**1235.20**
22.00	23.50	22.75	1.50	21.00	20.67	10.67	120.99	4.71	30.0	30.0	1.0	329.31	2310.67	0	1.0	0.0	1494.43	23.5	30.0	0	9.15	21.26	22.40	134.5	2327.0	6132.1	247.5	4052.6	**2452.85**	**1350.87**
23.50	25.00	24.25	1.50	22.50	19.15	9.15	120.99	4.71	30.0	30.0	1.0	329.31	2639.98	0	1.0	0.0	1494.43	25.0	30.0	0	9.04	21.26	22.40	134.5	2326.1	6460.5	265.2	4399.6	**2584.19**	**1466.53**
25.00	26.50	25.75	1.50	24.00	19.04	9.04	120.99	4.71	30.0	30.0	1.0	329.31	2969.29	0	1.0	0.0	1494.43	26.5	30.0	0	9.39	21.26	22.40	134.5	2329.1	6792.9	282.9	4746.6	**2717.14**	**1582.19**
26.50	27.50	27.00	1.00	25.00	19.39	9.39	120.99	3.14	30.0	30.0	1.0	219.54	3188.83	0	1.0	0.0	1494.43	27.5	30.0	0	10.37	21.26	22.40	134.5	2337.8	7021.0	294.6	4977.9	**2808.41**	**1659.30**
27.50	28.00	27.75	0.50	25.50	20.37	10.37	120.99	1.57	30.0	30.0	1.0	109.77	3298.60	0	1.0	0.0	1494.43	28.0	30.0	0	10.37	21.26	22.40	134.5	2337.8	7130.8	300.5	5093.6	**2852.32**	**1697.85**
28.00	29.50	28.75	1.50	27.00	20.37	10.37	120.99	4.71	30.0	30.0	1.0	329.31	3627.91	0	1.0	0.0	1494.43	29.5	13.0	39	10.37	3.35	2.08	134.5	638.2	5760.6	318.2	5440.6	**2304.23**	**1813.52**
29.50	30.00	29.75	0.50	27.50	20.37	10.37	120.99	1.57	13.0	13.0	1.0	43.89	3671.80	39	1.0	61.3	1555.71	30.0	13.0	39	10.37	3.35	2.08	134.5	638.2	5865.8	324.1	5551.6	**2346.31**	**1850.54**
30.00	31.00	30.50	1.00	28.50	20.37	10.37	120.99	3.14	13.0	13.0	1.0	87.79	3759.59	39	1.0	122.6	1678.29	31.0	13.0	39	10.37	3.35	2.08	134.5	638.2	6076.1	335.9	5773.8	**2430.45**	**1924.59**
31.00	32.50	31.75	1.50	30.00	20.37	10.37	120.99	4.71	13.0	13.0	1.0	131.68	3891.28	39	1.0	183.9	1862.14	32.5	16.0	56	10.37	4.43	3.20	134.5	877.4	6630.8	353.6	6107.0	**2652.31**	**2035.66**
32.50	34.00	33.25	1.50	31.50	20.37	10.37	120.99	4.71	16.0	16.0	1.0	163.55	4054.83	56	1.0	264.0	2126.14	34.0	29.6	0	10.37	20.36	21.48	134.5	2238.8	8419.8	371.3	6552.2	**3367.92**	**2184.07**
34.00	35.00	34.50	1.00	32.50	20.37	10.37	120.99	3.14	29.6	29.6	1.0	216.01	4270.84	0	1.0	0.0	2126.14	35.0	27.9	0	7.85	16.53	17.56	134.5	1801.0	8197.9	383.0	6780.0	**3279.18**	**2260.01**
35.00	35.50	35.25	0.50	33.00	17.85	7.85	120.99	1.57	27.9	27.9	1.0	100.67	4371.51	0	1.0	0.0	2126.14	35.5	25.2	10	8.89	10.45	11.34	134.5	1214.6	7712.3	388.9	6886.6	**3084.91**	**2295.53**
35.50	37.00	36.25	1.50	34.50	18.89	8.89	120.99	4.71	25.2	25.2	1.0	268.40	4639.91	10	1.0	47.1	2173.29	37.0	25.2	10	8.76	10.45	11.34	134.5	1214.0	8027.2	406.6	7219.8	**3210.90**	**2406.60**
37.00	37.50	37.25	0.50	35.00	18.76	8.76	120.99	1.57	25.2	25.2	1.0	89.47	4729.38	10	1.0	15.7	2189.00	37.5	25.2	10	8.76	10.45	11.34	134.5	1214.0	8132.4	412.5	7330.9	**3252.97**	**2443.63**
37.50	38.50	38.00	1.00	36.00	18.76	8.76	120.99	3.14	25.2	25.2	1.0	178.93	4908.31	10	1.0	31.4	2220.43	38.5	25.2	10	8.94	10.45	11.34	134.5	1214.8	8343.6	424.3	7553.0	**3337.43**	**2517.68**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
38.50	40.00	39.25	1.50	37.50	18.94	8.94	120.99	4.71	25.2	25.2	1.0	268.40	5176.71	10	1.0	47.1	2267.57	40.0	29.6	0	8.94	20.36	21.48	134.5	2226.8	9671.0	442.0	7886.3	**3868.42**	**2628.75**
BORE NO: P132A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.92	9.92	27.28	1.57	28.7	28.7	1.0	23.47	23.47	1	1.0	1.6	1.57	3.0	28.7	1	9.94	18.33	19.40	29.8	511.5	536.5	5.9	30.9	**214.62**	**10.31**
3.00	5.00	4.00	2.00	2.50	19.94	9.94	39.70	6.29	28.7	28.7	1.0	136.62	160.09	1	1.0	6.3	7.86	5.0	28.7	0	9.94	18.33	19.40	49.6	790.8	958.7	29.5	197.4	**383.49**	**65.80**
5.00	6.00	5.50	1.00	3.50	19.94	9.94	54.61	3.14	28.7	28.7	1.0	93.97	254.06	0	1.0	0.0	7.86	6.0	28.7	0	9.94	18.33	19.40	59.6	934.0	1195.9	41.3	303.2	**478.35**	**101.05**
6.00	7.00	6.50	1.00	4.50	19.94	9.94	64.55	3.14	28.7	28.7	1.0	111.07	365.12	0	1.0	0.0	7.86	7.0	12.1	46	11.05	3.09	1.82	69.5	501.8	874.8	53.0	426.0	**349.92**	**142.01**
7.00	8.00	7.50	1.00	5.50	21.05	11.05	75.05	3.14	12.1	12.1	1.0	50.56	415.69	46	1.0	144.6	152.43	8.0	12.1	46	11.05	3.09	1.82	80.6	528.6	1096.7	64.8	632.9	**438.70**	**210.98**
8.00	9.00	8.50	1.00	6.50	21.05	11.05	86.10	3.14	12.1	12.1	1.0	58.01	473.70	46	1.0	144.6	297.00	9.0	12.1	46	10.51	3.09	1.82	91.6	555.0	1325.7	76.6	847.3	**530.30**	**282.43**
9.00	11.00	10.00	2.00	8.50	20.51	10.51	102.13	6.29	12.1	12.1	1.0	137.62	611.32	46	1.0	289.1	586.14	11.0	12.1	46	10.51	3.09	1.82	112.6	606.0	1803.5	100.2	1297.6	**721.40**	**432.55**
11.00	12.00	11.50	1.00	9.50	20.51	10.51	117.90	3.14	12.1	12.1	1.0	79.43	690.75	46	1.0	144.6	730.71	12.0	12.1	46	10.51	3.09	1.82	123.2	631.5	2053.0	112.0	1533.4	**821.20**	**511.14**
12.00	13.00	12.50	1.00	10.50	20.51	10.51	128.41	3.14	12.1	12.1	1.0	86.52	777.27	46	1.0	144.6	875.29	13.0	29.4	1	9.77	19.91	21.02	133.7	2178.5	3831.0	123.8	1776.3	**1532.42**	**592.10**
13.00	14.50	13.75	1.50	12.00	19.77	9.77	140.99	4.71	29.4	29.4	1.0	374.51	1151.78	1	1.0	4.7	880.00	14.5	29.4	0	9.77	19.91	21.02	148.3	2400.7	4432.4	141.4	2173.2	**1772.98**	**724.40**
14.50	16.00	15.25	1.50	13.50	19.77	9.77	140.99	4.71	29.4	29.4	1.0	374.51	1526.30	0	1.0	0.0	880.00	16.0	18.0	28	9.77	5.42	4.29	148.3	845.6	3251.9	159.1	2565.4	**1300.77**	**855.14**
16.00	17.50	16.75	1.50	15.00	19.77	9.77	140.99	4.71	18.0	18.0	1.0	215.96	1742.26	28	1.0	132.0	1012.00	17.5	22.5	30	9.50	8.20	8.14	148.3	1198.1	3952.3	176.8	2931.0	**1580.93**	**977.01**
17.50	19.00	18.25	1.50	16.50	19.50	9.50	140.99	4.71	22.5	22.5	1.0	275.31	2017.57	30	1.0	141.4	1153.43	19.0	24.5	20	9.20	9.64	10.33	148.3	1302.1	4473.1	194.5	3365.5	**1789.26**	**1121.82**
19.00	20.50	19.75	1.50	18.00	19.20	9.20	140.99	4.71	24.5	24.5	1.0	302.90	2320.47	20	1.0	94.3	1247.71	20.5	31.9	0	9.15	30.83	32.14	148.3	3708.3	7276.5	212.1	3780.3	**2910.60**	**1260.11**
20.50	22.00	21.25	1.50	19.50	19.15	9.15	140.99	4.71	31.9	31.9	1.1	453.01	2773.48	0	1.0	0.0	1247.71	22.0	31.9	0	9.16	30.83	32.14	148.3	3708.5	7729.6	229.8	4251.0	**3091.86**	**1417.01**
22.00	23.50	22.75	1.50	21.00	19.16	9.16	140.99	4.71	31.9	31.9	1.1	453.01	3226.50	0	1.0	0.0	1247.71	23.5	31.6	0	9.01	29.32	30.60	148.3	3525.0	7999.2	247.5	4721.7	**3199.69**	**1573.90**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
23.50	25.00	24.25	1.50	22.50	19.01	9.01	140.99	4.71	31.6	31.6	1.1	441.61	3668.11	0	1.0	0.0	1247.71	25.0	31.6	0	9.08	29.32	30.60	148.3	3525.8	8441.7	265.2	5181.0	**3376.67**	**1727.00**
25.00	26.50	25.75	1.50	24.00	19.08	9.08	140.99	4.71	31.6	31.6	1.1	441.61	4109.72	0	1.0	0.0	1247.71	26.5	31.9	0	9.29	30.83	32.14	148.3	3710.1	9067.5	282.9	5640.3	**3627.01**	**1880.10**
26.50	27.50	27.00	1.00	25.00	19.29	9.29	140.99	3.14	31.9	31.9	1.1	302.01	4411.73	0	1.0	0.0	1247.71	27.5	31.9	0	9.29	30.83	32.14	148.3	3710.1	9369.5	294.6	5954.1	**3747.81**	**1984.69**
27.50	28.00	27.75	0.50	25.50	19.29	9.29	140.99	1.57	31.9	31.9	1.1	151.00	4562.73	0	1.0	0.0	1247.71	28.0	31.9	0	9.12	30.83	32.14	148.3	3707.9	9518.4	300.5	6111.0	**3807.36**	**2036.99**
28.00	29.50	28.75	1.50	27.00	19.12	9.12	140.99	4.71	31.9	31.9	1.1	453.01	5015.75	0	1.0	0.0	1247.71	29.5	27.9	10	8.71	16.53	17.56	148.3	2057.2	8320.6	318.2	6581.7	**3328.25**	**2193.89**
29.50	30.00	29.75	0.50	27.50	18.71	8.71	140.99	1.57	27.9	27.9	1.0	117.31	5133.05	10	1.0	15.7	1263.43	30.0	27.9	10	8.71	16.53	17.56	148.3	2057.2	8453.6	324.1	6720.6	**3381.46**	**2240.20**
30.00	31.00	30.50	1.00	28.50	18.71	8.71	140.99	3.14	27.9	27.9	1.0	234.61	5367.66	10	1.0	31.4	1294.86	31.0	17.0	50	9.05	4.92	3.75	148.3	940.7	7603.2	335.9	6998.4	**3041.29**	**2332.80**
31.00	32.50	31.75	1.50	30.00	19.05	9.05	140.99	4.71	17.0	17.0	1.0	203.21	5570.87	50	1.0	235.7	1530.57	32.5	17.0	50	9.00	4.92	3.75	148.3	940.6	8042.1	353.6	7455.0	**3216.83**	**2485.00**
32.50	34.00	33.25	1.50	31.50	19.00	9.00	140.99	4.71	17.0	17.0	1.0	203.21	5774.07	50	1.0	235.7	1766.29	34.0	17.0	50	8.64	4.92	3.75	148.3	940.1	8480.5	371.3	7911.6	**3392.18**	**2637.20**
34.00	35.00	34.50	1.00	32.50	18.64	8.64	140.99	3.14	17.0	17.0	1.0	135.47	5909.54	50	1.0	157.1	1923.43	35.0	15.3	45	8.64	4.09	2.81	148.3	804.1	8637.1	383.0	8216.0	**3454.83**	**2738.67**
35.00	35.50	35.25	0.50	33.00	18.64	8.64	140.99	1.57	15.3	15.3	1.0	60.61	5970.15	45	1.0	70.7	1994.14	35.5	25.2	6	8.95	10.45	11.34	148.3	1300.1	9264.4	388.9	8353.2	**3705.77**	**2784.41**
35.50	37.00	36.25	1.50	34.50	18.95	8.95	140.99	4.71	25.2	25.2	1.0	312.76	6282.92	6	1.0	28.3	2022.43	37.0	25.2	6	8.37	10.45	11.34	148.3	1297.5	9602.9	406.6	8712.0	**3841.15**	**2903.98**
37.00	37.50	37.25	0.50	35.00	18.37	8.37	140.99	1.57	25.2	25.2	1.0	104.25	6387.17	6	1.0	9.4	2031.86	37.5	25.3	10	8.37	10.68	11.57	148.3	1352.8	9771.8	412.5	8831.5	**3908.74**	**2943.84**
37.50	38.50	38.00	1.00	36.00	18.37	8.37	140.99	3.14	25.3	25.3	1.0	209.45	6596.63	10	1.0	31.4	2063.29	38.5	25.3	10	9.03	10.68	11.57	148.3	1355.8	10015.7	424.3	9084.2	**4006.29**	**3028.07**
38.50	40.00	39.25	1.50	37.50	19.03	9.03	140.99	4.71	25.3	25.3	1.0	314.18	6910.81	10	1.0	47.1	2110.43	40.0	25.3	10	9.03	10.68	11.57	148.3	1355.8	10377.1	442.0	9463.2	**4150.82**	**3154.40**
BORE NO: P133A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	16.99	6.99	19.22	1.57	28.2	28.2	1.0	16.20	16.20	2	1.0	3.1	3.14	3.0	28.2	2	7.86	17.21	18.25	21.0	354.0	373.3	5.9	25.2	**149.34**	**8.41**
3.00	5.00	4.00	2.00	2.50	17.86	7.86	28.83	6.29	28.2	28.2	1.0	97.17	113.36	2	1.0	12.6	15.71	5.0	29.1	2	7.86	19.23	20.33	36.7	631.3	760.4	29.5	158.5	**304.17**	**52.85**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
5.00	6.00	5.50	1.00	3.50	17.86	7.86	40.62	3.14	29.1	29.1	1.0	71.06	184.42	2	1.0	6.3	22.00	6.0	29.1	2	8.37	19.23	20.33	44.6	754.2	960.6	41.3	247.7	**384.25**	**82.56**
6.00	8.00	7.00	2.00	5.50	18.37	8.37	52.92	6.29	29.1	29.1	1.0	185.15	369.57	2	1.0	12.6	34.57	8.0	29.1	2	8.37	19.23	20.33	61.3	1007.2	1411.3	64.8	469.0	**564.52**	**156.32**
8.00	9.00	8.50	1.00	6.50	18.37	8.37	65.48	3.14	29.1	29.1	1.0	114.53	484.10	2	1.0	6.3	40.86	9.0	26.4	0	8.37	13.15	14.11	69.7	766.3	1291.2	76.6	601.6	**516.49**	**200.52**
9.00	10.00	9.50	1.00	7.50	18.37	8.37	73.85	3.14	26.4	26.4	1.0	115.21	599.31	0	1.0	0.0	40.86	10.0	8.6	53	10.69	2.22	1.00	78.0	515.0	1155.2	88.4	728.6	**462.06**	**242.85**
10.00	11.00	10.50	1.00	8.50	20.69	10.69	83.38	3.14	8.6	8.6	1.0	39.63	638.94	53	1.0	166.6	207.43	11.0	8.6	53	10.69	2.22	1.00	88.7	533.6	1380.0	100.2	946.5	**551.99**	**315.51**
11.00	12.00	11.50	1.00	9.50	20.69	10.69	94.07	3.14	8.6	8.6	1.0	44.71	683.65	53	1.0	166.6	374.00	12.0	8.6	53	10.69	2.22	1.00	99.4	552.2	1609.9	112.0	1169.6	**643.96**	**389.87**
12.00	13.00	12.50	1.00	10.50	20.69	10.69	104.76	3.14	8.6	8.6	1.0	49.79	733.44	53	1.0	166.6	540.57	13.0	10.0	42	10.28	2.47	1.22	110.1	515.6	1789.6	123.8	1397.8	**715.84**	**465.92**
13.00	14.50	13.75	1.50	12.00	20.28	10.28	117.81	4.71	10.0	10.0	1.0	97.93	831.37	42	1.0	198.0	738.57	14.5	10.0	42	10.28	2.47	1.22	125.5	545.5	2115.5	141.4	1711.4	**846.19**	**570.46**
14.50	16.00	15.25	1.50	13.50	20.28	10.28	117.81	4.71	10.0	10.0	1.0	97.93	929.30	42	1.0	198.0	936.57	16.0	28.7	0	9.89	18.33	19.40	125.5	1883.4	3749.2	159.1	2025.0	**1499.69**	**674.99**
16.00	17.50	16.75	1.50	15.00	19.89	9.89	117.81	4.71	28.7	28.7	1.0	304.07	1233.37	0	1.0	0.0	936.57	17.5	28.7	0	9.89	18.33	19.40	125.5	1883.4	4053.3	176.8	2346.7	**1621.32**	**782.24**
17.50	19.00	18.25	1.50	16.50	19.89	9.89	117.81	4.71	28.7	28.7	1.0	304.07	1537.43	0	1.0	0.0	936.57	19.0	28.7	0	9.89	18.33	19.40	125.5	1883.4	4357.4	194.5	2668.5	**1742.94**	**889.49**
19.00	20.50	19.75	1.50	18.00	19.89	9.89	117.81	4.71	28.7	28.7	1.0	304.07	1841.50	0	1.0	0.0	936.57	20.5	30.4	0	7.79	23.27	24.45	125.5	2370.2	5148.3	212.1	2990.2	**2059.32**	**996.74**
20.50	22.00	21.25	1.50	19.50	17.79	7.79	117.81	4.71	30.4	30.4	1.0	332.36	2173.86	0	1.0	0.0	936.57	22.0	32.0	0	8.94	31.33	32.65	125.5	3205.0	6315.4	229.8	3340.3	**2526.16**	**1113.42**
22.00	23.50	22.75	1.50	21.00	18.94	8.94	117.81	4.71	32.0	32.0	1.1	381.75	2555.61	0	1.0	0.0	936.57	23.5	32.0	0	9.11	31.33	32.65	125.5	3207.1	6699.3	247.5	3739.7	**2679.73**	**1246.56**
23.50	25.00	24.25	1.50	22.50	19.11	9.11	117.81	4.71	32.0	32.0	1.1	381.75	2937.36	0	1.0	0.0	936.57	25.0	29.8	0	9.23	20.81	21.94	125.5	2131.8	6005.7	265.2	4139.1	**2402.30**	**1379.70**
25.00	26.50	25.75	1.50	24.00	19.23	9.23	117.81	4.71	29.8	29.8	1.0	318.07	3255.44	0	1.0	0.0	936.57	26.5	30.9	0	9.14	25.79	27.01	125.5	2640.8	6832.8	282.9	4474.9	**2733.12**	**1491.62**
26.50	27.50	27.00	1.00	25.00	19.14	9.14	117.81	3.14	30.9	30.9	1.0	231.57	3487.01	0	1.0	0.0	936.57	27.5	30.9	0	9.14	25.79	27.01	125.5	2640.8	7064.4	294.6	4718.2	**2825.75**	**1572.74**
27.50	28.00	27.75	0.50	25.50	19.14	9.14	117.81	1.57	30.9	30.9	1.0	115.78	3602.79	0	1.0	0.0	936.57	28.0	30.9	0	9.08	25.79	27.01	125.5	2640.2	7179.5	300.5	4839.9	**2871.81**	**1613.30**

APPENDIX-H

TABLE 1: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1000 mm)

Dia. Of Pile: 1.00 m | Factor of Safety in Compression: 2.5 | Area of Pile: 0.79 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
28.00	29.50	28.75	1.50	27.00	19.08	9.08	117.81	4.71	30.9	30.9	1.0	347.35	3950.14	0	1.0	0.0	936.57	29.5	28.5	0	8.83	17.88	18.94	125.5	1829.3	6716.0	318.2	5204.9	**2686.39**	**1734.98**
29.50	30.00	29.75	0.50	27.50	18.83	8.83	117.81	1.57	28.5	28.5	1.0	100.52	4050.66	0	1.0	0.0	936.57	30.0	28.5	0	8.83	17.88	18.94	125.5	1829.3	6816.5	324.1	5311.3	**2726.60**	**1770.45**
30.00	31.00	30.50	1.00	28.50	18.83	8.83	117.81	3.14	28.5	28.5	1.0	201.03	4251.70	0	1.0	0.0	936.57	31.0	30.1	0	9.00	21.76	22.91	125.5	2227.4	7415.6	335.9	5524.2	**2966.25**	**1841.39**
31.00	32.50	31.75	1.50	30.00	19.00	9.00	117.81	4.71	30.1	30.1	1.0	323.56	4575.25	0	1.0	0.0	936.57	32.5	30.1	0	9.13	21.76	22.91	125.5	2228.5	7740.4	353.6	5865.4	**3096.15**	**1955.13**
32.50	34.00	33.25	1.50	31.50	19.13	9.13	117.81	4.71	30.1	30.1	1.0	323.56	4898.81	0	1.0	0.0	936.57	34.0	30.1	0	8.93	21.76	22.91	125.5	2226.7	8062.1	371.3	6206.6	**3224.85**	**2068.88**
34.00	35.00	34.50	1.00	32.50	18.93	8.93	117.81	3.14	30.1	30.1	1.0	215.71	5114.52	0	1.0	0.0	936.57	35.0	29.7	0	8.93	20.58	21.71	125.5	2106.2	8157.3	383.0	6434.1	**3262.92**	**2144.71**
35.00	35.50	35.25	0.50	33.00	18.93	8.93	117.81	1.57	29.7	29.7	1.0	105.60	5220.11	0	1.0	0.0	936.57	35.5	30.2	0	9.07	22.27	23.43	125.5	2279.5	8436.2	388.9	6545.6	**3374.48**	**2181.87**
35.50	37.00	36.25	1.50	34.50	19.07	9.07	117.81	4.71	30.2	30.2	1.0	326.48	5546.59	0	1.0	0.0	936.57	37.0	30.6	0	8.98	24.28	25.48	125.5	2484.6	8967.8	406.6	6889.8	**3587.12**	**2296.59**
37.00	37.50	37.25	0.50	35.00	18.98	8.98	117.81	1.57	30.6	30.6	1.0	112.77	5659.36	0	1.0	0.0	936.57	37.5	30.6	0	8.98	24.28	25.48	125.5	2484.6	9080.6	412.5	7008.4	**3632.23**	**2336.14**
37.50	38.50	38.00	1.00	36.00	18.98	8.98	117.81	3.14	30.6	30.6	1.0	225.54	5884.90	0	1.0	0.0	936.57	38.5	30.8	0	9.24	25.29	26.50	125.5	2590.3	9411.8	424.3	7245.8	**3764.72**	**2415.25**
38.50	40.00	39.25	1.50	37.50	19.24	9.24	117.81	4.71	30.8	30.8	1.0	344.32	6229.22	0	1.0	0.0	936.57	40.0	30.8	0	9.24	25.29	26.50	125.5	2590.3	9756.1	442.0	7607.8	**3902.44**	**2535.92**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 1.13 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
BORE NO: P114A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	15.99	5.99	16.47	1.89	24.2	24.2	1.0	13.96	0	0	1.0	0.0	0	3.0	24.2	0	5.99	9.42	10.00	18.0	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.50	15.99	5.99	20.97	3.77	24.2	24.2	1.0	35.53	0	0	1.0	0.0	0	4.0	23.6	5	8.53	8.99	9.34	24.0	0	0.0	25.5	25.5	**0.00**	**8.49**
4.00	5.00	4.50	1.00	2.50	18.53	8.53	28.23	3.77	23.6	23.6	1.0	46.51	0	5	1.0	18.9	0	5.0	23.6	5	8.53	8.99	9.34	32.5	435.6	435.6	42.4	42.4	**174.22**	**14.14**
5.00	6.00	5.50	1.00	3.50	18.53	8.53	36.76	3.77	23.6	23.6	1.0	60.56	60.56	5	1.0	18.9	18.86	6.0	13.6	32	8.53	3.53	2.25	41.0	502.7	582.1	59.4	138.8	**232.85**	**46.27**
6.00	7.00	6.50	1.00	4.50	18.53	8.53	45.29	3.77	13.6	13.6	1.0	41.32	101.88	32	1.0	120.7	139.54	7.0	29.1	1	9.66	19.23	20.33	49.6	1221.7	1463.1	76.4	317.8	**585.25**	**105.93**
7.00	8.00	7.50	1.00	5.50	19.66	9.66	54.38	3.77	29.1	29.1	1.0	114.15	216.03	1	1.0	3.8	143.31	8.0	12.5	47	9.66	3.20	1.94	59.2	705.9	1065.3	93.3	452.7	**426.11**	**150.90**
8.00	9.00	8.50	1.00	6.50	19.66	9.66	64.04	3.77	12.5	12.5	1.0	53.54	269.58	47	1.0	177.3	320.57	9.0	12.5	47	10.76	3.20	1.94	68.9	742.4	1332.5	110.3	700.5	**533.01**	**233.49**
9.00	11.00	10.00	2.00	8.50	20.76	10.76	79.63	7.54	12.5	12.5	1.0	133.16	402.73	47	1.0	354.5	675.09	11.0	12.5	47	10.76	3.20	1.94	90.4	820.4	1898.2	144.3	1222.1	**759.29**	**407.36**
11.00	12.00	11.50	1.00	9.50	20.76	10.76	95.77	3.77	12.5	12.5	1.0	80.07	482.81	47	1.0	177.3	852.34	12.0	10.4	69	10.66	2.59	1.33	101.2	1008.4	2343.6	161.2	1496.4	**937.42**	**498.79**
12.00	14.50	13.25	2.50	12.00	20.66	10.66	114.48	9.43	10.4	10.4	1.0	198.10	680.90	69	1.0	650.6	1502.91	14.5	10.4	69	10.66	2.59	1.33	127.8	1086.4	3270.2	203.7	2387.5	**1308.10**	**795.82**
14.50	16.00	15.25	1.50	13.50	20.66	10.66	135.80	5.66	10.4	10.4	1.0	140.99	821.90	69	1.0	390.3	1893.26	16.0	25.7	8	9.69	11.58	12.49	143.8	2047.0	4762.1	229.1	2944.3	**1904.85**	**981.42**
16.00	17.50	16.75	1.50	15.00	19.69	9.69	151.06	5.66	25.7	25.7	1.0	411.27	1233.16	8	1.0	45.3	1938.51	17.5	16.8	37	9.69	4.83	3.64	158.3	1265.1	4436.8	254.6	3426.3	**1774.72**	**1142.08**
17.50	19.00	18.25	1.50	16.50	19.69	9.69	151.06	5.66	16.8	16.8	1.0	258.01	1491.17	37	1.0	209.3	2147.83	19.0	11.1	55	10.08	2.79	1.53	158.3	1070.9	4709.9	280.0	3919.0	**1883.98**	**1306.34**
19.00	20.50	19.75	1.50	18.00	20.08	10.08	151.06	5.66	11.1	11.1	1.0	167.66	1658.83	55	1.0	311.1	2458.97	20.5	11.1	55	10.08	2.79	1.53	158.3	1070.9	5188.7	305.5	4423.3	**2075.50**	**1474.43**
20.50	23.50	22.00	3.00	21.00	20.08	10.08	151.06	11.31	11.1	11.1	1.0	335.31	1994.14	55	1.0	622.3	3081.26	23.5	11.1	55	8.65	2.79	1.53	158.3	1069.5	6144.9	356.4	5431.8	**2457.94**	**1810.60**
23.50	25.00	24.25	1.50	22.50	18.65	8.65	151.06	5.66	11.1	11.1	1.0	167.66	2161.80	55	1.0	311.1	3392.40	25.0	31.4	0	9.14	28.31	29.58	158.3	5255.1	10809.3	381.9	5936.1	**4323.73**	**1978.68**
25.00	26.50	25.75	1.50	24.00	19.14	9.14	151.06	5.66	31.4	31.4	1.1	558.14	2719.93	0	1.0	0.0	3392.40	26.5	31.7	0	9.11	29.82	31.11	158.3	5534.7	11647.1	407.3	6519.6	**4658.83**	**2173.22**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
26.50	27.50	27.00	1.00	25.00	19.11	9.11	151.06	3.77	31.7	31.7	1.1	381.76	3101.70	0	1.0	0.0	3392.40	27.5	31.7	0	9.11	29.82	31.11	158.3	5534.7	12028.8	424.3	6918.4	**4811.54**	**2306.13**
27.50	28.00	27.75	0.50	25.50	19.11	9.11	151.06	1.89	31.7	31.7	1.1	190.88	3292.58	0	1.0	0.0	3392.40	28.0	31.9	0	9.19	30.83	32.14	158.3	5723.3	12408.3	432.8	7117.7	**4963.31**	**2372.58**
28.00	29.50	28.75	1.50	27.00	19.19	9.19	151.06	5.66	31.9	31.9	1.1	582.44	3875.02	0	1.0	0.0	3392.40	29.5	31.9	0	9.32	30.83	32.14	158.3	5726.1	12993.6	458.2	7725.7	**5197.43**	**2575.22**
29.50	30.00	29.75	0.50	27.50	19.32	9.32	151.06	1.89	31.9	31.9	1.1	194.15	4069.17	0	1.0	0.0	3392.40	30.0	31.9	0	9.32	30.83	32.14	158.3	5726.1	13187.7	466.7	7928.3	**5275.09**	**2642.76**
30.00	31.00	30.50	1.00	28.50	19.32	9.32	151.06	3.77	31.9	31.9	1.1	388.30	4457.47	0	1.0	0.0	3392.40	31.0	33.4	0	9.24	38.39	39.83	158.3	7126.2	14976.1	483.7	8333.6	**5990.42**	**2777.85**
31.00	32.50	31.75	1.50	30.00	19.24	9.24	151.06	5.66	33.4	33.4	1.2	659.27	5116.73	0	1.0	0.0	3392.40	32.5	20.0	30	8.42	6.40	5.39	158.3	1482.7	9991.9	509.1	9018.3	**3996.75**	**3006.09**
32.50	34.00	33.25	1.50	31.50	18.42	8.42	151.06	5.66	20.0	20.0	1.0	311.03	5427.76	30	1.0	169.7	3562.11	34.0	33.0	0	9.66	36.37	37.78	158.3	6763.1	15753.0	534.6	9524.5	**6301.21**	**3174.83**
34.00	35.00	34.50	1.00	32.50	19.66	9.66	151.06	3.77	33.0	33.0	1.2	425.46	5853.23	0	1.0	0.0	3562.11	35.0	33.0	0	9.66	36.37	37.78	158.3	6763.1	16178.5	551.6	9966.9	**6471.40**	**3322.30**
35.00	35.50	35.25	0.50	33.00	19.66	9.66	151.06	1.89	33.0	33.0	1.2	212.73	6065.96	0	1.0	0.0	3562.11	35.5	32.6	0	9.47	34.36	35.73	158.3	6384.1	16012.2	560.1	10188.1	**6404.89**	**3396.04**
35.50	37.00	36.25	1.50	34.50	19.47	9.47	151.06	5.66	32.6	32.6	1.1	617.56	6683.52	0	1.0	0.0	3562.11	37.0	32.1	0	7.86	31.84	33.16	158.3	5880.2	16125.9	585.5	10831.1	**6450.35**	**3610.38**
37.00	37.50	37.25	0.50	35.00	17.86	7.86	151.06	1.89	32.1	32.1	1.1	197.45	6880.97	0	1.0	0.0	3562.11	37.5	32.1	0	7.86	31.84	33.16	158.3	5880.2	16323.3	594.0	11037.1	**6529.33**	**3679.03**
37.50	38.50	38.00	1.00	36.00	17.86	7.86	151.06	3.77	32.1	32.1	1.1	394.90	7275.86	0	1.0	0.0	3562.11	38.5	32.3	0	8.33	32.85	34.19	158.3	6077.1	16915.1	611.0	11448.9	**6766.03**	**3816.32**
38.50	40.00	39.25	1.50	37.50	18.33	8.33	151.06	5.66	32.3	32.3	1.1	602.35	7878.22	0	1.0	0.0	3562.11	40.0	32.3	0	8.33	32.85	34.19	158.3	6077.1	17517.4	636.4	12076.8	**7006.97**	**4025.59**
BORE NO: P115A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	18.82	8.82	24.26	1.89	25.5	25.5	1.0	21.82	0	6	1.0	11.3	0	3.0	23.0	0	8.82	8.56	8.68	26.5	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.50	18.82	8.82	30.87	3.77	23.0	23.0	1.0	49.42	0	0	1.0	0.0	0	4.0	9.2	28	8.82	2.33	1.10	35.3	0	0.0	25.5	25.5	**0.00**	**8.49**
4.00	5.00	4.50	1.00	2.50	18.82	8.82	39.69	3.77	9.2	9.2	1.0	24.24	0	28	1.0	105.6	0	5.0	26.9	4	9.86	14.28	15.26	44.1	0	0.0	42.4	42.4	**0.00**	**14.14**
5.00	6.00	5.50	1.00	3.50	19.86	9.86	49.03	3.77	26.9	26.9	1.0	93.81	0	4	1.0	15.1	0	6.0	11.0	52	9.86	2.76	1.51	54.0	0	0.0	59.4	59.4	**0.00**	**19.80**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m^2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
6.00	7.00	6.50	1.00	4.50	19.86	9.86	58.89	3.77	11.0	11.0	1.0	43.17	0	52	1.0	196.1	0	7.0	11.0	52	9.86	2.76	1.51	63.8	0	0.0	76.4	76.4	**0.00**	**25.46**
7.00	8.00	7.50	1.00	5.50	19.86	9.86	68.75	3.77	11.0	11.0	1.0	50.40	0	52	1.0	196.1	0	8.0	11.0	52	10.11	2.76	1.51	73.7	0	0.0	93.3	93.3	**0.00**	**31.11**
8.00	9.00	8.50	1.00	6.50	20.11	10.11	78.74	3.77	11.0	11.0	1.0	57.72	0	52	1.0	196.1	0	9.0	11.0	52	10.11	2.76	1.51	83.8	801.9	801.9	110.3	110.3	**320.75**	**36.77**
9.00	10.00	9.50	1.00	7.50	20.11	10.11	88.85	3.77	11.0	11.0	1.0	65.13	65.13	52	1.0	196.1	196.11	10.0	8.0	43	9.95	2.11	0.91	93.9	668.2	929.4	127.3	388.5	**371.78**	**129.51**
10.00	12.50	11.25	2.50	10.00	19.95	9.95	106.34	9.43	8.0	8.0	1.0	140.91	206.04	43	1.0	405.4	601.54	12.5	12.1	57	10.70	3.09	1.82	118.8	1008.5	1816.1	169.7	977.3	**726.44**	**325.77**
12.50	15.50	14.00	3.00	13.00	20.70	10.70	134.83	11.31	12.1	12.1	1.0	327.03	533.07	57	1.0	644.9	1246.46	15.5	14.5	40	10.70	3.80	2.51	150.9	1073.3	2852.9	220.6	2000.2	**1141.15**	**666.72**
15.50	18.50	17.00	3.00	16.00	20.70	10.70	166.93	11.31	14.5	14.5	1.0	488.43	1021.50	40	1.0	452.6	1699.03	18.5	22.0	10	10.38	7.84	7.59	150.9	1493.6	4214.1	271.5	2992.1	**1685.65**	**997.36**
18.50	20.00	19.25	1.50	17.50	20.38	10.38	166.93	5.66	22.0	22.0	1.0	381.53	1403.03	10	1.0	56.6	1755.60	20.0	10.2	58	10.38	2.53	1.28	150.9	1031.3	4189.9	297.0	3455.6	**1675.97**	**1151.88**
20.00	21.50	20.75	1.50	19.00	20.38	10.38	166.93	5.66	10.2	10.2	1.0	169.91	1572.94	58	1.0	328.1	2083.71	21.5	11.0	58	10.38	2.76	1.51	150.9	1073.0	4729.7	322.5	3979.1	**1891.88**	**1326.37**
21.50	23.00	22.25	1.50	20.50	20.38	10.38	166.93	5.66	11.0	11.0	1.0	183.56	1756.50	58	1.0	328.1	2411.83	23.0	10.5	58	10.55	2.62	1.36	150.9	1047.1	5215.4	347.9	4516.2	**2086.17**	**1505.41**
23.00	24.50	23.75	1.50	22.00	20.55	10.55	166.93	5.66	10.5	10.5	1.0	175.02	1931.52	58	1.0	328.1	2739.94	24.5	30.4	0	10.55	23.27	24.45	150.9	4148.2	8819.6	373.4	5044.8	**3527.85**	**1681.61**
24.50	26.00	25.25	1.50	23.50	20.55	10.55	166.93	5.66	30.4	30.4	1.0	565.11	2496.63	0	1.0	0.0	2739.94	26.0	33.2	0	10.55	37.38	38.80	150.9	6658.7	11895.3	398.8	5635.4	**4758.11**	**1878.47**
26.00	27.50	26.75	1.50	25.00	20.55	10.55	166.93	5.66	33.2	33.2	1.2	716.82	3213.44	0	1.0	0.0	2739.94	27.5	33.7	0	8.96	39.90	41.37	150.9	7062.4	13015.8	424.3	6377.7	**5206.30**	**2125.89**
27.50	29.00	28.25	1.50	26.50	18.96	8.96	166.93	5.66	33.7	33.7	1.2	746.29	3959.73	0	1.0	0.0	2739.94	29.0	33.7	0	8.94	39.90	41.37	150.9	7061.8	13761.5	449.7	7149.4	**5504.60**	**2383.14**
29.00	30.00	29.50	1.00	27.50	18.94	8.94	166.93	3.77	33.7	33.7	1.2	497.53	4457.26	0	1.0	0.0	2739.94	30.0	33.9	0	8.94	40.91	42.39	150.9	7240.0	14437.2	466.7	7663.9	**5774.89**	**2554.64**
30.00	30.50	30.25	0.50	28.00	18.94	8.94	166.93	1.89	33.9	33.9	1.2	252.76	4710.03	0	1.0	0.0	2739.94	30.5	33.7	0	9.23	39.90	41.37	150.9	7070.0	14519.9	475.2	7925.2	**5807.97**	**2641.72**
30.50	32.00	31.25	1.50	29.50	19.23	9.23	166.93	5.66	33.7	33.7	1.2	746.29	5456.32	0	1.0	0.0	2739.94	32.0	33.7	0	9.12	39.90	41.37	150.9	7066.9	15263.1	500.7	8696.9	**6105.25**	**2898.97**
32.00	32.50	32.25	0.50	30.00	19.12	9.12	166.93	1.89	33.7	33.7	1.2	248.76	5705.08	0	1.0	0.0	2739.94	32.5	32.6	0	9.12	34.36	35.73	150.9	6086.1	14531.1	509.1	8954.2	**5812.43**	**2984.72**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 1.13 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
32.50	33.50	33.00	1.00	31.00	19.12	9.12	166.93	3.77	32.6	32.6	1.1	454.95	6160.03	0	1.0	0.0	2739.94	33.5	32.1	0	9.24	31.84	33.16	150.9	5642.9	14542.9	526.1	9426.1	**5817.16**	**3142.03**
33.50	35.00	34.25	1.50	32.50	19.24	9.24	166.93	5.66	32.1	32.1	1.1	654.57	6814.60	0	1.0	0.0	2739.94	35.0	32.1	0	9.25	31.84	33.16	150.9	5643.2	15197.7	551.6	10106.1	**6079.08**	**3368.71**
35.00	36.50	35.75	1.50	34.00	19.25	9.25	166.93	5.66	32.1	32.1	1.1	654.57	7469.17	0	1.0	0.0	2739.94	36.5	32.1	0	9.16	31.84	33.16	150.9	5641.1	15850.2	577.0	10786.1	**6340.10**	**3595.38**
36.50	37.50	37.00	1.00	35.00	19.16	9.16	166.93	3.77	32.1	32.1	1.1	436.38	7905.55	0	1.0	0.0	2739.94	37.5	32.6	0	9.16	34.36	35.73	150.9	6087.0	16732.5	594.0	11239.5	**6693.01**	**3746.50**
37.50	38.00	37.75	0.50	35.50	19.16	9.16	166.93	1.89	32.6	32.6	1.1	227.48	8133.03	0	1.0	0.0	2739.94	38.0	32.9	0	9.08	35.87	37.27	150.9	6352.5	17225.5	602.5	11475.5	**6890.20**	**3825.15**
38.00	40.00	39.00	2.00	37.50	19.08	9.08	166.93	7.54	32.9	32.9	1.1	932.65	9065.68	0	1.0	0.0	2739.94	40.0	32.9	0	9.08	35.87	37.27	150.9	6352.5	18158.2	636.4	12442.0	**7263.26**	**4147.35**
BORE NO: P116A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.62	9.62	26.46	1.89	27.2	27.2	1.0	25.64	0	4	1.0	7.5	0	3.0	25.2	0	9.62	10.45	11.34	28.9	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.50	19.62	9.62	33.67	3.77	25.2	25.2	1.0	59.75	0	0	1.0	0.0	0	4.0	25.2	7	9.62	10.45	11.34	38.5	0	0.0	25.5	25.5	**0.00**	**8.49**
4.00	5.00	4.50	1.00	2.50	19.62	9.62	43.29	3.77	25.2	25.2	1.0	76.83	0	7	1.0	26.4	0	5.0	25.2	7	9.41	10.45	11.34	48.1	0	0.0	42.4	42.4	**0.00**	**14.14**
5.00	6.00	5.50	1.00	3.50	19.41	9.41	52.81	3.77	25.2	25.2	1.0	93.71	0	7	1.0	26.4	0	6.0	26.4	4	9.41	13.15	14.11	57.5	986.7	986.7	59.4	59.4	**394.66**	**19.80**
6.00	7.00	6.50	1.00	4.50	19.41	9.41	62.22	3.77	26.4	26.4	1.0	116.48	116.48	4	1.0	15.1	15.09	7.0	26.4	4	10.45	13.15	14.11	66.9	1136.7	1268.2	76.4	207.9	**507.29**	**69.31**
7.00	9.00	8.00	2.00	6.50	20.45	10.45	77.37	7.54	26.4	26.4	1.0	289.70	406.17	4	1.0	30.2	45.26	9.0	25.4	0	10.45	10.90	11.80	87.8	1166.8	1618.3	110.3	561.7	**647.31**	**187.25**
9.00	10.00	9.50	1.00	7.50	20.45	10.45	93.05	3.77	25.4	25.4	1.0	166.63	572.80	0	1.0	0.0	45.26	10.0	25.4	0	10.45	10.90	11.80	98.3	1295.7	1913.8	127.3	745.3	**765.51**	**248.45**
10.00	11.00	10.50	1.00	8.50	20.45	10.45	103.50	3.77	25.4	25.4	1.0	185.34	758.14	0	1.0	0.0	45.26	11.0	8.2	44	10.23	2.15	0.94	108.7	718.6	1522.0	144.3	947.7	**608.79**	**315.88**
11.00	12.50	11.75	1.50	10.00	20.23	10.23	116.39	5.66	8.2	8.2	1.0	94.88	853.02	44	1.0	248.9	294.17	12.5	8.2	44	9.86	2.15	0.94	124.1	755.6	1902.8	169.7	1316.9	**761.11**	**438.97**
12.50	15.50	14.00	3.00	13.00	19.86	9.86	138.86	11.31	8.2	8.2	1.0	226.39	1079.41	44	1.0	497.8	792.00	15.5	16.7	24	9.86	4.78	3.58	153.6	1098.7	2970.1	220.6	2092.0	**1188.04**	**697.35**
15.50	17.00	16.25	1.50	14.50	19.86	9.86	161.04	5.66	16.7	16.7	1.0	273.32	1352.73	24	1.0	135.8	927.77	17.0	10.5	53	10.50	2.62	1.36	168.4	1048.1	3328.6	246.1	2526.6	**1331.46**	**842.20**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
17.00	18.50	17.75	1.50	16.00	20.50	10.50	176.31	5.66	10.5	10.5	1.0	184.86	1537.59	53	1.0	299.8	1227.60	18.5	30.4	0	10.50	23.27	24.45	168.4	4609.8	7374.9	271.5	3036.7	**2949.98**	**1012.25**
18.50	20.00	19.25	1.50	17.50	20.50	10.50	176.31	5.66	30.4	30.4	1.0	596.88	2134.47	0	1.0	0.0	1227.60	20.0	11.0	38	10.50	2.76	1.51	168.4	924.4	4286.5	297.0	3659.1	**1714.60**	**1219.69**
20.00	21.50	20.75	1.50	19.00	20.50	10.50	176.31	5.66	11.0	11.0	1.0	193.88	2328.35	38	1.0	215.0	1442.57	21.5	11.0	38	9.26	2.76	1.51	168.4	923.2	4694.1	322.5	4093.4	**1877.63**	**1364.46**
21.50	23.00	22.25	1.50	20.50	19.26	9.26	176.31	5.66	11.0	11.0	1.0	193.88	2522.23	38	1.0	215.0	1657.54	23.0	17.0	32	9.94	4.92	3.75	168.4	1289.5	5469.3	347.9	4527.7	**2187.71**	**1509.23**
23.00	24.50	23.75	1.50	22.00	19.94	9.94	176.31	5.66	17.0	17.0	1.0	304.94	2827.17	32	1.0	181.0	1838.57	24.5	31.4	0	8.88	28.31	29.58	168.4	5573.8	10239.5	373.4	5039.1	**4095.80**	**1679.70**
24.50	26.00	25.25	1.50	23.50	18.88	8.88	176.31	5.66	31.4	31.4	1.1	651.44	3478.61	0	1.0	0.0	1838.57	26.0	31.4	0	9.14	28.31	29.58	168.4	5579.0	10896.2	398.8	5716.0	**4358.46**	**1905.34**
26.00	27.50	26.75	1.50	25.00	19.14	9.14	176.31	5.66	31.4	31.4	1.1	651.44	4130.05	0	1.0	0.0	1838.57	27.5	30.0	0	8.82	21.26	22.40	168.4	4185.6	10154.2	424.3	6392.9	**4061.69**	**2130.97**
27.50	29.00	28.25	1.50	26.50	18.82	8.82	176.31	5.66	30.0	30.0	1.0	575.86	4705.90	0	1.0	0.0	1838.57	29.0	27.4	10	8.56	15.40	16.41	168.4	3132.9	9677.3	449.7	6994.2	**3870.94**	**2331.41**
29.00	30.00	29.50	1.00	27.50	18.56	8.56	176.31	3.77	27.4	27.4	1.0	344.67	5050.57	10	1.0	37.7	1876.29	30.0	27.4	10	8.56	15.40	16.41	168.4	3132.9	10059.7	466.7	7393.6	**4023.89**	**2464.52**
30.00	30.50	30.25	0.50	28.00	18.56	8.56	176.31	1.89	27.4	27.4	1.0	172.34	5222.91	10	1.0	18.9	1895.14	30.5	31.8	0	9.18	30.33	31.63	168.4	5976.6	13094.6	475.2	7593.3	**5237.85**	**2531.08**
30.50	32.00	31.25	1.50	29.50	19.18	9.18	176.31	5.66	31.8	31.8	1.1	674.08	5896.99	0	1.0	0.0	1895.14	32.0	31.8	0	9.12	30.33	31.63	168.4	5975.3	13767.4	500.7	8292.8	**5506.96**	**2764.26**
32.00	32.50	32.25	0.50	30.00	19.12	9.12	176.31	1.89	31.8	31.8	1.1	224.69	6121.68	0	1.0	0.0	1895.14	32.5	31.8	0	9.12	30.33	31.63	168.4	5975.3	13992.1	509.1	8526.0	**5596.84**	**2841.99**
32.50	33.50	33.00	1.00	31.00	19.12	9.12	176.31	3.77	31.8	31.8	1.1	449.39	6571.07	0	1.0	0.0	1895.14	33.5	30.8	0	9.48	25.29	26.50	168.4	4990.0	13456.2	526.1	8992.3	**5382.49**	**2997.44**
33.50	35.00	34.25	1.50	32.50	19.48	9.48	176.31	5.66	30.8	30.8	1.0	618.36	7189.43	0	1.0	0.0	1895.14	35.0	31.6	0	9.16	29.32	30.60	168.4	5777.8	14862.3	551.6	9636.1	**5944.93**	**3212.05**
35.00	36.50	35.75	1.50	34.00	19.16	9.16	176.31	5.66	31.6	31.6	1.1	662.70	7852.13	0	1.0	0.0	1895.14	36.5	31.6	0	9.02	29.32	30.60	168.4	5774.8	15522.1	577.0	10324.3	**6208.85**	**3441.43**
36.50	37.50	37.00	1.00	35.00	19.02	9.02	176.31	3.77	31.6	31.6	1.1	441.80	8293.93	0	1.0	0.0	1895.14	37.5	31.4	0	9.02	28.31	29.58	168.4	5576.6	15765.6	594.0	10783.1	**6306.26**	**3594.36**
37.50	38.00	37.75	0.50	35.50	19.02	9.02	176.31	1.89	31.4	31.4	1.1	217.15	8511.07	0	1.0	0.0	1895.14	38.0	32.0	0	9.11	31.33	32.65	168.4	6173.4	16579.6	602.5	11008.7	**6631.85**	**3669.57**
38.00	40.00	39.00	2.00	37.50	19.11	9.11	176.31	7.54	32.0	32.0	1.1	914.10	9425.18	0	1.0	0.0	1895.14	40.0	30.0	0	10.49	21.26	22.40	168.4	4211.0	15531.3	636.4	11956.7	**6212.52**	**3985.58**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
BORE NO: P117A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	18.27	8.27	22.74	1.89	28.2	28.2	1.0	23.00	0	0	1.0	0.0	0	3.0	28.2	0	8.27	17.21	18.25	24.8	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.50	18.27	8.27	28.95	3.77	28.2	28.2	1.0	58.53	0	0	1.0	0.0	0	4.0	26.3	0	8.27	12.93	13.88	33.1	0	0.0	25.5	25.5	**0.00**	**8.49**
4.00	5.00	4.50	1.00	2.50	18.27	8.27	37.22	3.77	26.3	26.3	1.0	69.37	0	0	1.0	0.0	0	5.0	27.7	3	10.03	16.08	17.10	41.4	0	0.0	42.4	42.4	**0.00**	**14.14**
5.00	6.00	5.50	1.00	3.50	20.03	10.03	46.37	3.77	27.7	27.7	1.0	91.80	0	3	1.0	11.3	0	6.0	25.9	0	10.03	12.03	12.95	51.4	0	0.0	59.4	59.4	**0.00**	**19.80**
6.00	7.00	6.50	1.00	4.50	20.03	10.03	56.40	3.77	25.9	25.9	1.0	103.28	0	0	1.0	0.0	0	7.0	11.5	42	10.36	2.91	1.65	61.4	0	0.0	76.4	76.4	**0.00**	**25.46**
7.00	9.00	8.00	2.00	6.50	20.36	10.36	71.77	7.54	11.5	11.5	1.0	110.14	0	42	1.0	316.8	0	9.0	11.5	42	10.36	2.91	1.65	82.1	709.8	709.8	110.3	110.3	**283.91**	**36.77**
9.00	10.00	9.50	1.00	7.50	20.36	10.36	87.31	3.77	11.5	11.5	1.0	66.99	66.99	42	1.0	158.4	158.40	10.0	9.5	66	10.36	2.38	1.14	92.5	929.2	1154.6	127.3	352.7	**461.82**	**117.56**
10.00	11.00	10.50	1.00	8.50	20.36	10.36	97.67	3.77	9.5	9.5	1.0	61.64	128.64	66	1.0	248.9	407.31	11.0	9.6	55	10.64	2.40	1.16	102.9	847.5	1383.4	144.3	680.2	**553.37**	**226.74**
11.00	12.50	11.75	1.50	10.00	20.64	10.64	110.83	5.66	9.6	9.6	1.0	106.05	234.68	55	1.0	311.1	718.46	12.5	9.6	55	10.64	2.40	1.16	118.8	890.8	1843.9	169.7	1122.9	**737.57**	**374.28**
12.50	15.50	14.00	3.00	13.00	20.64	10.64	134.77	11.31	9.6	9.6	1.0	257.91	492.59	55	1.0	622.3	1340.74	15.5	11.4	49	10.50	2.88	1.62	150.7	1001.9	2835.3	220.6	2054.0	**1134.11**	**684.65**
15.50	17.00	16.25	1.50	14.50	20.50	10.50	158.61	5.66	11.4	11.4	1.0	180.92	673.50	49	1.0	277.2	1617.94	17.0	11.4	49	10.50	2.88	1.62	166.5	1053.3	3344.7	246.1	2537.5	**1337.89**	**845.84**
17.00	18.50	17.75	1.50	16.00	20.50	10.50	174.36	5.66	11.4	11.4	1.0	198.88	872.39	49	1.0	277.2	1895.14	18.5	24.0	18	10.50	9.28	9.78	166.5	2001.0	4768.5	271.5	3039.1	**1907.41**	**1013.02**
18.50	20.00	19.25	1.50	17.50	20.50	10.50	174.36	5.66	24.0	24.0	1.0	439.15	1311.54	18	1.0	101.8	1996.97	20.0	10.7	56	10.44	2.68	1.42	166.5	1084.3	4392.8	297.0	3605.5	**1757.13**	**1201.84**
20.00	21.50	20.75	1.50	19.00	20.44	10.44	174.36	5.66	10.7	10.7	1.0	186.37	1497.91	56	1.0	316.8	2313.77	21.5	10.7	56	10.44	2.68	1.42	166.5	1084.3	4896.0	322.5	4134.1	**1958.40**	**1378.05**
21.50	23.00	22.25	1.50	20.50	20.44	10.44	174.36	5.66	10.7	10.7	1.0	186.37	1684.28	56	1.0	316.8	2630.57	23.0	29.1	0	10.44	19.23	20.33	166.5	3766.8	8081.6	347.9	4662.8	**3232.64**	**1554.26**
23.00	24.50	23.75	1.50	22.00	20.44	10.44	174.36	5.66	29.1	29.1	1.0	549.00	2233.28	0	1.0	0.0	2630.57	24.5	29.1	0	10.44	19.23	20.33	166.5	3766.8	8630.6	373.4	5237.2	**3452.24**	**1745.74**
24.50	26.00	25.25	1.50	23.50	20.44	10.44	174.36	5.66	29.1	29.1	1.0	549.00	2782.28	0	1.0	0.0	2630.57	26.0	29.1	0	10.44	19.23	20.33	166.5	3766.8	9179.6	398.8	5811.7	**3671.84**	**1937.23**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
26.00	27.50	26.75	1.50	25.00	20.44	10.44	174.36	5.66	29.1	29.1	1.0	549.00	3331.27	0	1.0	0.0	2630.57	27.5	29.0	0	10.46	19.01	20.10	166.5	3723.0	9684.8	424.3	6386.1	**3873.93**	**2128.71**
27.50	29.00	28.25	1.50	26.50	20.46	10.46	174.36	5.66	29.0	29.0	1.0	546.74	3878.02	0	1.0	0.0	2630.57	29.0	29.0	0	10.46	19.01	20.10	166.5	3723.0	10231.6	449.7	6958.3	**4092.63**	**2319.44**
29.00	30.00	29.50	1.00	27.50	20.46	10.46	174.36	3.77	29.0	29.0	1.0	364.50	4242.51	0	1.0	0.0	2630.57	30.0	29.0	0	10.46	19.01	20.10	166.5	3723.0	10596.1	466.7	7339.8	**4238.42**	**2446.60**
30.00	30.50	30.25	0.50	28.00	20.46	10.46	174.36	1.89	29.0	29.0	1.0	182.25	4424.76	0	1.0	0.0	2630.57	30.5	29.0	0	10.46	19.01	20.10	166.5	3723.0	10778.3	475.2	7530.5	**4311.32**	**2510.18**
30.50	32.00	31.25	1.50	29.50	20.46	10.46	174.36	5.66	29.0	29.0	1.0	546.74	4971.50	0	1.0	0.0	2630.57	32.0	20.9	14	10.46	7.05	6.38	166.5	1515.4	9117.5	500.7	8102.7	**3647.00**	**2700.91**
32.00	32.50	32.25	0.50	30.00	20.46	10.46	174.36	1.89	20.9	20.9	1.0	125.55	5097.05	14	1.0	26.4	2656.97	32.5	20.9	14	10.46	7.05	6.38	166.5	1515.4	9269.4	509.1	8263.2	**3707.78**	**2754.39**
32.50	33.50	33.00	1.00	31.00	20.46	10.46	174.36	3.77	20.9	20.9	1.0	251.10	5348.15	14	1.0	52.8	2709.77	33.5	23.0	10	10.46	8.56	8.68	166.5	1775.9	9833.8	526.1	8584.0	**3933.51**	**2861.35**
33.50	35.00	34.25	1.50	32.50	20.46	10.46	174.36	5.66	23.0	23.0	1.0	418.68	5766.83	10	1.0	56.6	2766.34	35.0	12.3	52	10.39	3.15	1.88	166.5	1135.3	9668.4	551.6	9084.7	**3867.37**	**3028.25**
35.00	36.50	35.75	1.50	34.00	20.39	10.39	174.36	5.66	12.3	12.3	1.0	215.06	5981.89	52	1.0	294.2	3060.51	36.5	12.3	52	10.39	3.15	1.88	166.5	1135.3	10177.7	577.0	9619.4	**4071.07**	**3206.48**
36.50	37.50	37.00	1.00	35.00	20.39	10.39	174.36	3.77	12.3	12.3	1.0	143.37	6125.27	52	1.0	196.1	3256.63	37.5	12.0	50	10.39	3.06	1.79	166.5	1097.8	10479.7	594.0	9975.9	**4191.87**	**3325.30**
37.50	38.00	37.75	0.50	35.50	20.39	10.39	174.36	1.89	12.0	12.0	1.0	69.89	6195.15	50	1.0	94.3	3350.91	38.0	12.0	50	9.33	3.06	1.79	166.5	1096.5	10642.6	602.5	10148.6	**4257.03**	**3382.85**
38.00	40.00	39.00	2.00	37.50	19.33	9.33	174.36	7.54	12.0	12.0	1.0	279.54	6474.69	50	1.0	377.1	3728.06	40.0	12.0	50	9.33	3.06	1.79	166.5	1096.5	11299.2	636.4	10839.2	**4519.70**	**3613.06**
BORE NO: P118A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	17.61	7.61	20.93	1.89	23.6	23.6	1.0	17.24	0	0	1.0	0.0	0	3.0	24.5	9	7.61	9.64	10.33	22.8	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.50	17.61	7.61	26.64	3.77	24.5	24.5	1.0	45.78	0	9	1.0	33.9	0	4.0	24.5	9	9.40	9.64	10.33	30.4	489.6	489.6	25.5	25.5	**195.83**	**8.49**
4.00	6.00	5.00	2.00	3.50	19.40	9.40	39.84	7.54	24.5	24.5	1.0	136.95	136.95	9	1.0	67.9	67.89	6.0	10.6	44	9.40	2.65	1.39	49.2	604.4	809.2	59.4	264.2	**323.68**	**88.08**
6.00	7.00	6.50	1.00	4.50	19.40	9.40	53.94	3.77	10.6	10.6	1.0	38.07	175.02	44	1.0	165.9	233.83	7.0	10.6	44	9.40	2.65	1.39	58.6	632.5	1041.4	76.4	485.2	**416.54**	**161.74**
7.00	8.00	7.50	1.00	5.50	19.40	9.40	63.34	3.77	10.6	10.6	1.0	44.71	219.73	44	1.0	165.9	399.77	8.0	10.6	44	10.21	2.65	1.39	68.0	661.4	1280.9	93.3	712.8	**512.37**	**237.61**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
8.00	9.00	8.50	1.00	6.50	20.21	10.21	73.15	3.77	10.6	10.6	1.0	51.63	271.35	44	1.0	165.9	565.71	9.0	10.6	44	10.21	2.65	1.39	78.3	692.0	1529.1	110.3	947.4	**611.62**	**315.79**
9.00	10.00	9.50	1.00	7.50	20.21	10.21	83.36	3.77	10.6	10.6	1.0	58.83	330.18	44	1.0	165.9	731.66	10.0	10.6	44	10.21	2.65	1.39	88.5	722.6	1784.4	127.3	1189.1	**713.76**	**396.38**
10.00	12.50	11.25	2.50	10.00	20.21	10.21	101.22	9.43	10.6	10.6	1.0	178.61	508.79	44	1.0	414.9	1146.51	12.5	10.9	48	10.83	2.73	1.48	114.0	852.3	2507.6	169.7	1825.0	**1003.05**	**608.34**
12.50	15.50	14.00	3.00	13.00	20.83	10.83	130.23	11.31	10.9	10.9	1.0	283.74	792.54	48	1.0	543.1	1689.60	15.5	10.9	48	10.26	2.73	1.48	146.5	952.3	3434.4	220.6	2702.8	**1373.76**	**900.92**
15.50	18.50	17.00	3.00	16.00	20.26	10.26	161.87	11.31	10.9	10.9	1.0	352.67	1145.21	48	1.0	543.1	2232.69	18.5	11.1	51	10.72	2.79	1.53	146.5	993.4	4371.3	271.5	3649.4	**1748.53**	**1216.48**
18.50	21.50	20.00	3.00	19.00	20.72	10.72	161.87	11.31	11.1	11.1	1.0	359.30	1504.51	51	1.0	577.0	2809.71	21.5	30.1	2	10.17	21.76	22.91	146.5	3785.3	8099.5	322.5	4636.7	**3239.81**	**1545.56**
21.50	24.50	23.00	3.00	22.00	20.17	10.17	161.87	11.31	30.1	30.1	1.0	1066.93	2571.43	2	1.0	22.6	2832.34	24.5	31.7	0	10.17	29.82	31.11	146.5	5157.3	10561.1	373.4	5777.1	**4224.43**	**1925.72**
24.50	26.00	25.25	1.50	23.50	20.17	10.17	161.87	5.66	31.7	31.7	1.1	613.62	3185.05	0	1.0	0.0	2832.34	26.0	31.3	0	10.17	27.81	29.06	146.5	4809.2	10826.6	398.8	6416.2	**4330.64**	**2138.74**
26.00	27.50	26.75	1.50	25.00	20.17	10.17	161.87	5.66	31.3	31.3	1.1	592.94	3777.99	0	1.0	0.0	2832.34	27.5	33.7	0	9.28	39.90	41.37	146.5	6872.7	13483.1	424.3	7034.6	**5393.23**	**2344.87**
27.50	29.00	28.25	1.50	26.50	19.28	9.28	161.87	5.66	33.7	33.7	1.2	723.67	4501.66	0	1.0	0.0	2832.34	29.0	33.7	0	9.39	39.90	41.37	146.5	6875.8	14209.8	449.7	7783.7	**5683.93**	**2594.58**
29.00	30.00	29.50	1.00	27.50	19.39	9.39	161.87	3.77	33.7	33.7	1.2	482.45	4984.10	0	1.0	0.0	2832.34	30.0	33.7	0	9.39	39.90	41.37	146.5	6875.8	14692.3	466.7	8283.2	**5876.91**	**2761.05**
30.00	30.50	30.25	0.50	28.00	19.39	9.39	161.87	1.89	33.7	33.7	1.2	241.22	5225.33	0	1.0	0.0	2832.34	30.5	33.3	0	9.18	37.88	39.32	146.5	6523.2	14580.9	475.2	8532.9	**5832.36**	**2844.29**
30.50	32.00	31.25	1.50	29.50	19.18	9.18	161.87	5.66	33.3	33.3	1.2	700.75	5926.07	0	1.0	0.0	2832.34	32.0	33.4	0	8.02	38.39	39.83	146.5	6578.5	15336.9	500.7	9259.1	**6134.78**	**3086.36**
32.00	32.50	32.25	0.50	30.00	18.02	8.02	161.87	1.89	33.4	33.4	1.2	235.48	6161.55	0	1.0	0.0	2832.34	32.5	33.7	0	8.02	39.90	41.37	146.5	6837.4	15831.2	509.1	9503.0	**6332.50**	**3167.68**
32.50	33.50	33.00	1.00	31.00	18.02	8.02	161.87	3.77	33.7	33.7	1.2	482.45	6644.00	0	1.0	0.0	2832.34	33.5	32.9	0	8.12	35.87	37.27	146.5	6149.7	15626.0	526.1	10002.5	**6250.41**	**3334.15**
33.50	35.00	34.25	1.50	32.50	18.12	8.12	161.87	5.66	32.9	32.9	1.1	678.28	7322.28	0	1.0	0.0	2832.34	35.0	33.1	0	7.88	36.88	38.29	146.5	6316.1	16470.7	551.6	10706.2	**6588.28**	**3568.73**
35.00	36.50	35.75	1.50	34.00	17.88	7.88	161.87	5.66	33.1	33.1	1.2	689.46	8011.74	0	1.0	0.0	2832.34	36.5	32.3	0	8.03	32.85	34.19	146.5	5629.7	16473.8	577.0	11421.1	**6589.53**	**3807.04**
36.50	37.50	37.00	1.00	35.00	18.03	8.03	161.87	3.77	32.3	32.3	1.1	430.30	8442.04	0	1.0	0.0	2832.34	37.5	32.3	0	8.03	32.85	34.19	146.5	5629.7	16904.1	594.0	11868.4	**6761.65**	**3956.13**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
37.50	38.00	37.75	0.50	35.50	18.03	8.03	161.87	1.89	32.3	32.3	1.1	215.15	8657.19	0	1.0	0.0	2832.34	38.0	33.9	0	7.96	40.91	42.39	146.5	7008.2	18497.7	602.5	12092.0	**7399.08**	**4030.67**
38.00	40.00	39.00	2.00	37.50	17.96	7.96	161.87	7.54	33.9	33.9	1.2	980.41	9637.60	0	1.0	0.0	2832.34	40.0	33.9	0	7.96	40.91	42.39	146.5	7008.2	19478.1	636.4	13106.4	**7791.25**	**4368.79**
BORE NO: P119A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.67	9.67	26.59	1.89	26.0	26.0	1.0	24.46	0	2	1.0	3.8	0	3.0	26.0	2	9.67	12.25	13.18	29.0	509.1	509.1	8.5	8.5	**203.62**	**2.83**
3.00	4.00	3.50	1.00	1.50	19.67	9.67	33.85	3.77	26.0	26.0	1.0	62.26	62.26	2	1.0	7.5	7.54	4.0	23.0	8	9.67	8.56	8.68	38.7	513.1	582.9	25.5	95.3	**233.15**	**31.75**
4.00	5.00	4.50	1.00	2.50	19.67	9.67	43.52	3.77	23.0	23.0	1.0	69.66	131.92	8	1.0	30.2	37.71	5.0	25.9	5	9.59	12.03	12.95	48.4	793.2	962.8	42.4	212.1	**385.12**	**70.69**
5.00	6.00	5.50	1.00	3.50	19.59	9.59	53.15	3.77	25.9	25.9	1.0	97.32	229.24	5	1.0	18.9	56.57	6.0	25.9	5	9.59	12.03	12.95	57.9	923.7	1209.5	59.4	345.2	**483.79**	**115.07**
6.00	7.00	6.50	1.00	4.50	19.59	9.59	62.74	3.77	25.9	25.9	1.0	114.89	344.13	5	1.0	18.9	75.43	7.0	28.0	0	9.59	16.76	17.79	67.5	1396.1	1815.6	76.4	495.9	**726.25**	**165.31**
7.00	8.00	7.50	1.00	5.50	19.59	9.59	72.33	3.77	28.0	28.0	1.0	145.03	489.16	0	1.0	0.0	75.43	8.0	15.3	34	9.49	4.09	2.81	77.1	721.0	1285.6	93.3	657.9	**514.24**	**219.31**
8.00	9.00	8.50	1.00	6.50	19.49	9.49	81.87	3.77	15.3	15.3	1.0	84.46	573.63	34	1.0	128.2	203.66	9.0	15.3	34	9.49	4.09	2.81	86.6	764.9	1542.2	110.3	887.6	**616.88**	**295.87**
9.00	10.00	9.50	1.00	7.50	19.49	9.49	91.36	3.77	15.3	15.3	1.0	94.26	667.88	34	1.0	128.2	331.89	10.0	9.0	58	9.49	2.29	1.07	96.1	846.5	1846.2	127.3	1127.1	**738.49**	**375.68**
10.00	11.00	10.50	1.00	8.50	19.49	9.49	100.85	3.77	9.0	9.0	1.0	60.24	728.12	58	1.0	218.7	550.63	11.0	9.0	58	10.59	2.29	1.07	105.6	871.8	2150.6	144.3	1423.0	**860.24**	**474.34**
11.00	12.50	11.75	1.50	10.00	20.59	10.59	113.53	5.66	9.0	9.0	1.0	101.73	829.85	58	1.0	328.1	878.74	12.5	10.2	60	10.60	2.53	1.28	121.5	967.7	2676.3	169.7	1878.3	**1070.52**	**626.10**
12.50	15.50	14.00	3.00	13.00	20.60	10.60	137.38	11.31	10.2	10.2	1.0	279.66	1109.51	60	1.0	678.9	1557.60	15.5	14.0	28	10.60	3.65	2.36	153.3	935.1	3602.2	220.6	2887.7	**1440.89**	**962.58**
15.50	17.00	16.25	1.50	14.50	20.60	10.60	161.23	5.66	14.0	14.0	1.0	227.41	1336.91	28	1.0	158.4	1716.00	17.0	14.2	39	10.36	3.71	2.42	169.2	1123.9	4176.8	246.1	3299.0	**1670.73**	**1099.67**
17.00	18.50	17.75	1.50	16.00	20.36	10.36	176.95	5.66	14.2	14.2	1.0	253.29	1590.21	39	1.0	220.6	1936.63	18.5	12.8	45	10.36	3.29	2.02	169.2	1102.5	4629.3	271.5	3798.4	**1851.73**	**1266.13**
18.50	20.00	19.25	1.50	17.50	20.36	10.36	176.95	5.66	12.8	12.8	1.0	227.42	1817.63	45	1.0	254.6	2191.20	20.0	9.6	55	10.29	2.40	1.16	169.2	1027.1	5036.0	297.0	4305.8	**2014.39**	**1435.28**
20.00	21.50	20.75	1.50	19.00	20.29	10.29	176.95	5.66	9.6	9.6	1.0	169.31	1986.94	55	1.0	311.1	2502.34	21.5	12.6	5	10.29	3.23	1.96	169.2	683.5	5172.8	322.5	4811.7	**2069.11**	**1603.91**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 1.13 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
21.50	24.50	23.00	3.00	22.00	20.29	10.29	176.95	11.31	12.6	9.6	1.0	338.61	2325.55	5	1.0	56.6	2558.91	24.5	26.6	0	11.02	13.60	14.57	169.2	2712.7	7597.2	373.4	5257.8	**3038.88**	**1752.61**
24.50	26.00	25.25	1.50	23.50	21.02	11.02	176.95	5.66	26.6	26.6	1.0	501.27	2826.82	0	1.0	0.0	2558.91	26.0	26.6	0	11.02	13.60	14.57	169.2	2712.7	8098.5	398.8	5784.6	**3239.38**	**1928.19**
26.00	27.50	26.75	1.50	25.00	21.02	11.02	176.95	5.66	26.6	26.6	1.0	501.27	3328.08	0	1.0	0.0	2558.91	27.5	28.4	0	11.02	17.66	18.71	169.2	3519.6	9406.6	424.3	6311.3	**3762.64**	**2103.76**
27.50	30.00	28.75	2.50	27.50	21.02	11.02	176.95	9.43	28.4	28.4	1.0	902.07	4230.15	0	1.0	0.0	2558.91	30.0	29.3	3	10.77	19.68	20.79	169.2	3950.1	10739.1	466.7	7255.8	**4295.66**	**2418.59**
30.00	30.50	30.25	0.50	28.00	20.77	10.77	176.95	1.89	29.3	29.3	1.0	187.25	4417.39	3	1.0	5.7	2564.57	30.5	29.9	0	10.77	21.03	22.17	169.2	4188.3	11170.2	475.2	7457.2	**4468.09**	**2485.72**
30.50	32.00	31.25	1.50	29.50	20.77	10.77	176.95	5.66	29.9	29.9	1.0	575.60	4993.00	0	1.0	0.0	2564.57	32.0	31.5	0	10.77	28.82	30.09	169.2	5735.6	13293.1	500.7	8058.2	**5317.26**	**2686.07**
32.00	32.50	32.25	0.50	30.00	20.77	10.77	176.95	1.89	31.5	31.5	1.1	219.81	5212.80	0	1.0	0.0	2564.57	32.5	31.8	0	9.15	30.33	31.63	169.2	6001.3	13778.7	509.1	8286.5	**5511.47**	**2762.17**
32.50	33.50	33.00	1.00	31.00	19.15	9.15	176.95	3.77	31.8	31.8	1.1	451.00	5663.81	0	1.0	0.0	2564.57	33.5	32.2	0	9.16	32.34	33.68	169.2	6400.0	14628.3	526.1	8754.5	**5851.33**	**2918.16**
33.50	35.00	34.25	1.50	32.50	19.16	9.16	176.95	5.66	32.2	32.2	1.1	699.71	6363.51	0	1.0	0.0	2564.57	35.0	32.3	0	9.41	32.85	34.19	169.2	6505.4	15433.5	551.6	9479.7	**6173.38**	**3159.89**
35.00	36.50	35.75	1.50	34.00	19.41	9.41	176.95	5.66	32.3	32.3	1.1	705.58	7069.09	0	1.0	0.0	2564.57	36.5	32.6	0	9.26	34.36	35.73	169.2	6800.8	16434.5	577.0	10210.7	**6573.79**	**3403.56**
36.50	37.50	37.00	1.00	35.00	19.26	9.26	176.95	3.77	32.6	32.6	1.1	482.26	7551.35	0	1.0	0.0	2564.57	37.5	32.6	0	9.26	34.36	35.73	169.2	6800.8	16916.7	594.0	10709.9	**6766.70**	**3569.98**
37.50	38.00	37.75	0.50	35.50	19.26	9.26	176.95	1.89	32.6	32.6	1.1	241.13	7792.48	0	1.0	0.0	2564.57	38.0	33.1	0	8.80	36.88	38.29	169.2	7287.1	17644.1	602.5	10959.5	**7057.65**	**3653.18**
38.00	40.00	39.00	2.00	37.50	18.80	8.80	176.95	7.54	33.1	33.1	1.2	1004.92	8797.40	0	1.0	0.0	2564.57	40.0	33.1	0	8.80	36.88	38.29	169.2	7287.1	18649.1	636.4	11998.4	**7459.62**	**3999.47**
BORE NO: P120A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.55	9.55	26.26	1.89	26.5	26.5	1.0	24.69	0	3	1.0	5.7	0	3.0	25.7	6	9.55	11.58	12.49	28.7	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.50	19.55	9.55	33.43	3.77	25.7	25.7	1.0	60.67	0	6	1.0	22.6	0	4.0	25.7	6	9.86	11.58	12.49	38.2	0	0.0	25.5	25.5	**0.00**	**8.49**
4.00	6.00	5.00	2.00	3.50	19.86	9.86	48.06	7.54	25.7	25.7	1.0	174.46	0	6	1.0	45.3	0	6.0	25.7	6	9.86	11.58	12.49	57.9	0	0.0	59.4	59.4	**0.00**	**19.80**
6.00	7.00	6.50	1.00	4.50	19.86	9.86	62.85	3.77	25.7	25.7	1.0	114.08	0	6	1.0	22.6	0	7.0	25.7	6	9.86	11.58	12.49	67.8	1032.5	1032.5	76.4	76.4	**412.99**	**25.46**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
7.00	8.00	7.50	1.00	5.50	19.86	9.86	72.71	3.77	25.7	25.7	1.0	131.97	131.97	6	1.0	22.6	22.63	8.0	12.3	44	9.97	3.15	1.88	77.6	737.1	891.7	93.3	247.9	**356.67**	**82.65**
8.00	9.00	8.50	1.00	6.50	19.97	9.97	82.63	3.77	12.3	12.3	1.0	67.94	199.92	44	1.0	165.9	188.57	9.0	9.2	52	9.97	2.33	1.10	87.6	767.5	1156.0	110.3	498.8	**462.39**	**166.27**
9.00	10.00	9.50	1.00	7.50	19.97	9.97	92.60	3.77	9.2	9.2	1.0	56.56	256.48	52	1.0	196.1	384.69	10.0	9.2	52	10.56	2.33	1.10	97.6	794.2	1435.3	127.3	768.4	**574.13**	**256.15**
10.00	12.50	11.25	2.50	10.00	20.56	10.56	110.78	9.43	9.2	9.2	1.0	169.17	425.65	52	1.0	490.3	874.97	12.5	9.2	52	10.56	2.33	1.10	124.0	863.6	2164.3	169.7	1470.3	**865.71**	**490.11**
12.50	15.50	14.00	3.00	13.00	20.56	10.56	139.82	11.31	9.2	9.2	1.0	256.22	681.87	52	1.0	588.3	1463.31	15.5	12.0	29	10.35	3.06	1.79	155.7	846.5	2991.6	220.6	2365.8	**1196.66**	**788.60**
15.50	17.00	16.25	1.50	14.50	20.35	10.35	163.42	5.66	12.0	12.0	1.0	196.51	878.38	29	1.0	164.1	1627.37	17.0	11.7	48	10.35	2.97	1.71	171.2	1076.0	3581.7	246.1	2751.8	**1432.69**	**917.28**
17.00	18.50	17.75	1.50	16.00	20.35	10.35	178.95	5.66	11.7	11.7	1.0	209.64	1088.02	48	1.0	271.5	1898.91	18.5	11.7	48	9.85	2.97	1.71	171.2	1075.4	4062.3	271.5	3258.5	**1624.93**	**1086.16**
18.50	21.50	20.00	3.00	19.00	19.85	9.85	178.95	11.31	11.7	11.7	1.0	419.29	1507.31	48	1.0	543.1	2442.00	21.5	8.7	64	10.75	2.24	1.02	171.2	1092.2	5041.5	322.5	4271.8	**2016.61**	**1423.92**
21.50	24.50	23.00	3.00	22.00	20.75	10.75	178.95	11.31	8.7	8.7	1.0	309.82	1817.13	64	1.0	724.1	3166.11	24.5	28.1	0	10.75	16.98	18.02	171.2	3420.4	8403.7	373.4	5356.6	**3361.48**	**1785.54**
24.50	27.50	26.00	3.00	25.00	20.75	10.75	178.95	11.31	28.1	28.1	1.0	1081.07	2898.20	0	1.0	0.0	3166.11	27.5	29.5	0	9.10	20.13	21.25	171.2	4030.8	10095.1	424.3	6488.6	**4038.05**	**2162.87**
27.50	30.00	28.75	2.50	27.50	19.10	9.10	178.95	9.43	29.5	29.5	1.0	954.58	3852.78	0	1.0	0.0	3166.11	30.0	29.0	0	9.10	19.01	20.10	171.2	3805.6	10824.5	466.7	7485.6	**4329.80**	**2495.20**
30.00	30.50	30.25	0.50	28.00	19.10	9.10	178.95	1.89	29.0	29.0	1.0	187.05	4039.83	0	1.0	0.0	3166.11	30.5	28.6	0	9.10	18.11	19.17	171.2	3625.5	10831.4	475.2	7681.1	**4332.56**	**2560.38**
30.50	32.50	31.50	2.00	30.00	19.10	9.10	178.95	7.54	28.6	28.6	1.0	735.92	4775.75	0	1.0	0.0	3166.11	32.5	28.6	0	10.93	18.11	19.17	171.2	3649.3	11591.1	509.1	8451.0	**4636.46**	**2817.00**
32.50	33.50	33.00	1.00	31.00	20.93	10.93	178.95	3.77	28.6	28.6	1.0	367.96	5143.71	0	1.0	0.0	3166.11	33.5	30.4	0	10.93	23.27	24.45	171.2	4689.3	12999.1	526.1	8835.9	**5199.65**	**2945.31**
33.50	35.00	34.25	1.50	32.50	20.93	10.93	178.95	5.66	30.4	30.4	1.0	605.81	5749.52	0	1.0	0.0	3166.11	35.0	30.6	0	10.93	24.28	25.48	171.2	4892.0	13807.7	551.6	9467.2	**5523.07**	**3155.74**
35.00	36.50	35.75	1.50	34.00	20.93	10.93	178.95	5.66	30.6	30.6	1.0	616.65	6366.17	0	1.0	0.0	3166.11	36.5	29.8	0	8.84	20.81	21.94	171.2	4162.0	13694.3	577.0	10109.3	**5477.73**	**3369.77**
36.50	37.50	37.00	1.00	35.00	18.84	8.84	178.95	3.77	29.8	29.8	1.0	386.51	6752.68	0	1.0	0.0	3166.11	37.5	29.6	0	8.84	20.36	21.48	171.2	4072.1	13990.9	594.0	10512.8	**5596.34**	**3504.27**
37.50	38.00	37.75	0.50	35.50	18.84	8.84	178.95	1.89	29.6	29.6	1.0	191.69	6944.38	0	1.0	0.0	3166.11	38.0	30.0	0	8.48	21.26	22.40	171.2	4246.6	14357.1	602.5	10713.0	**5742.83**	**3570.99**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
38.00	40.00	39.00	2.00	37.50	18.48	8.48	178.95	7.54	30.0	30.0	1.0	779.29	7723.67	0	1.0	0.0	3166.11	40.0	0.0	0	0.00	1.00	0.00	171.2	193.7	11083.5	636.4	11526.2	**4433.39**	**3842.07**
BORE NO: P121A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.61	9.61	26.43	1.89	27.8	27.8	1.0	26.27	26.27	2	1.0	3.8	3.77	3.0	27.8	2	9.61	16.31	17.33	28.8	665.3	695.3	8.5	38.5	**278.14**	**12.84**
3.00	4.00	3.50	1.00	1.50	19.61	9.61	33.64	3.77	27.8	27.8	1.0	66.88	93.16	2	1.0	7.5	11.31	4.0	27.0	0	9.61	14.50	15.49	38.4	731.8	836.3	25.5	129.9	**334.53**	**43.31**
4.00	5.00	4.50	1.00	2.50	19.61	9.61	43.25	3.77	27.0	27.0	1.0	83.10	176.26	0	1.0	0.0	11.31	5.0	25.6	8	9.86	11.35	12.26	48.1	780.6	968.2	42.4	230.0	**387.29**	**76.67**
5.00	6.00	5.50	1.00	3.50	19.86	9.86	52.98	3.77	25.6	25.6	1.0	95.73	271.99	8	1.0	30.2	41.49	6.0	25.6	8	9.86	11.35	12.26	57.9	907.3	1220.8	59.4	372.9	**488.30**	**124.29**
6.00	7.00	6.50	1.00	4.50	19.86	9.86	62.84	3.77	25.6	25.6	1.0	113.55	385.54	8	1.0	30.2	71.66	7.0	25.6	8	9.86	11.35	12.26	67.8	1033.9	1491.1	76.4	533.6	**596.44**	**177.86**
7.00	8.00	7.50	1.00	5.50	19.86	9.86	72.70	3.77	25.6	25.6	1.0	131.37	516.91	8	1.0	30.2	101.83	8.0	27.2	4	10.14	14.95	15.95	77.6	1464.0	2082.7	93.3	712.1	**833.09**	**237.36**
8.00	9.00	8.50	1.00	6.50	20.14	10.14	82.70	3.77	27.2	27.2	1.0	160.29	677.20	4	1.0	15.1	116.91	9.0	10.6	40	10.14	2.65	1.39	87.8	679.7	1473.8	110.3	904.4	**589.52**	**301.48**
9.00	10.00	9.50	1.00	7.50	20.14	10.14	92.84	3.77	10.6	10.6	1.0	65.53	742.73	40	1.0	150.9	267.77	10.0	10.6	40	10.14	2.65	1.39	97.9	710.1	1720.6	127.3	1137.8	**688.22**	**379.26**
10.00	11.00	10.50	1.00	8.50	20.14	10.14	102.98	3.77	10.6	10.6	1.0	72.68	815.41	40	1.0	150.9	418.63	11.0	10.6	61	10.41	2.65	1.39	108.1	954.5	2188.6	144.3	1378.3	**875.42**	**459.43**
11.00	12.50	11.75	1.50	10.00	20.41	10.41	115.86	5.66	10.6	10.6	1.0	122.66	938.07	61	1.0	345.1	763.71	12.5	11.5	56	10.41	2.91	1.65	123.7	989.2	2691.0	169.7	1871.5	**1076.39**	**623.83**
12.50	14.00	13.25	1.50	11.50	20.41	10.41	131.47	5.66	11.5	11.5	1.0	151.32	1089.39	56	1.0	316.8	1080.51	14.0	25.3	9	10.51	10.68	11.57	139.3	1856.5	4026.4	195.2	2365.1	**1610.57**	**788.36**
14.00	15.50	14.75	1.50	13.00	20.51	10.51	147.16	5.66	25.3	25.3	1.0	393.53	1482.92	9	1.0	50.9	1131.43	15.5	25.3	9	10.51	10.68	11.57	155.0	2046.9	4661.3	220.6	2835.0	**1864.51**	**944.99**
15.50	17.00	16.25	1.50	14.50	20.51	10.51	162.93	5.66	25.3	25.3	1.0	435.69	1918.61	9	1.0	50.9	1182.34	17.0	10.8	40	10.66	2.71	1.45	170.8	940.6	4041.6	246.1	3347.0	**1616.62**	**1115.68**
17.00	18.50	17.75	1.50	16.00	20.66	10.66	178.81	5.66	10.8	10.8	1.0	192.96	2111.57	40	1.0	226.3	1408.63	18.5	17.2	37	10.66	5.02	3.86	170.8	1375.3	4895.5	271.5	3791.7	**1958.19**	**1263.91**
18.50	21.50	20.00	3.00	19.00	20.66	10.66	178.81	11.31	17.2	17.2	1.0	626.24	2737.80	37	1.0	418.6	1827.26	21.5	28.3	6	10.80	17.43	18.48	170.8	3565.4	8130.4	322.5	4887.5	**3252.17**	**1629.17**
21.50	24.50	23.00	3.00	22.00	20.80	10.80	178.81	11.31	28.3	28.3	1.0	1089.30	3827.10	6	1.0	67.9	1895.14	24.5	30.7	0	10.80	24.79	25.99	170.8	4980.6	10702.9	373.4	6095.6	**4281.14**	**2031.87**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	∑Qi	c	α	α.c.Asi	∑Qi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
24.50	26.00	25.25	1.50	23.50	20.80	10.80	178.81	5.66	30.7	30.7	1.0	621.62	4448.73	0	1.0	0.0	1895.14	26.0	31.8	0	10.80	30.33	31.63	170.8	6092.8	12436.7	398.8	6742.7	**4974.68**	**2247.57**
26.00	27.50	26.75	1.50	25.00	20.80	10.80	178.81	5.66	31.8	31.8	1.1	683.62	5132.34	0	1.0	0.0	1895.14	27.5	31.3	0	9.23	27.81	29.06	170.8	5556.3	12583.8	424.3	7451.8	**5033.51**	**2483.92**
27.50	29.00	28.25	1.50	26.50	19.23	9.23	178.81	5.66	31.3	31.3	1.1	654.99	5787.34	0	1.0	0.0	1895.14	29.0	31.8	0	9.08	30.33	31.63	170.8	6055.9	13738.4	449.7	8132.2	**5495.35**	**2710.74**
29.00	30.00	29.50	1.00	27.50	19.08	9.08	178.81	3.77	31.8	31.8	1.1	455.75	6243.08	0	1.0	0.0	1895.14	30.0	31.8	0	9.08	30.33	31.63	170.8	6055.9	14194.1	466.7	8604.9	**5677.65**	**2868.31**
30.00	30.50	30.25	0.50	28.00	19.08	9.08	178.81	1.89	31.8	31.8	1.1	227.87	6470.95	0	1.0	0.0	1895.14	30.5	31.0	0	9.32	26.30	27.53	170.8	5256.3	13622.4	475.2	8841.3	**5448.95**	**2947.10**
30.50	32.00	31.25	1.50	29.50	19.32	9.32	178.81	5.66	31.0	31.0	1.1	638.18	7109.13	0	1.0	0.0	1895.14	32.0	32.0	0	9.12	31.33	32.65	170.8	6257.8	15262.1	500.7	9504.9	**6104.84**	**3168.31**
32.00	32.50	32.25	0.50	30.00	19.12	9.12	178.81	1.89	32.0	32.0	1.1	231.76	7340.89	0	1.0	0.0	1895.14	32.5	32.0	0	9.12	31.33	32.65	170.8	6257.8	15493.8	509.1	9745.2	**6197.54**	**3248.39**
32.50	33.50	33.00	1.00	31.00	19.12	9.12	178.81	3.77	32.0	32.0	1.1	463.52	7804.41	0	1.0	0.0	1895.14	33.5	32.0	0	8.96	31.33	32.65	170.8	6254.3	15953.8	526.1	10225.7	**6381.53**	**3408.56**
33.50	35.00	34.25	1.50	32.50	18.96	8.96	178.81	5.66	32.0	32.0	1.1	695.28	8499.69	0	1.0	0.0	1895.14	35.0	32.0	0	9.58	31.33	32.65	170.8	6268.0	16662.8	551.6	10946.4	**6665.14**	**3648.80**
35.00	36.50	35.75	1.50	34.00	19.58	9.58	178.81	5.66	32.0	32.0	1.1	695.28	9194.96	0	1.0	0.0	1895.14	36.5	31.0	0	9.14	26.30	27.53	170.8	5252.9	16343.0	577.0	11667.1	**6537.21**	**3889.05**
36.50	37.50	37.00	1.00	35.00	19.14	9.14	178.81	3.77	31.0	31.0	1.1	425.45	9620.41	0	1.0	0.0	1895.14	37.5	31.0	0	9.14	26.30	27.53	170.8	5252.9	16768.5	594.0	12109.6	**6707.39**	**4036.52**
37.50	38.00	37.75	0.50	35.50	19.14	9.14	178.81	1.89	31.0	31.0	1.1	212.73	9833.14	0	1.0	0.0	1895.14	38.0	31.0	0	8.16	26.30	27.53	170.8	5234.6	16962.9	602.5	12330.8	**6785.16**	**4110.26**
38.00	40.00	39.00	2.00	37.50	18.16	8.16	178.81	7.54	31.0	31.0	1.1	850.90	10684.04	0	1.0	0.0	1895.14	40.0	31.0	0	8.16	26.30	27.53	170.8	5234.6	17813.8	636.4	13215.6	**7125.52**	**4405.20**
BORE NO: P122A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	20.00	10.00	27.50	1.89	28.7	28.7	1.0	28.39	0	0	1.0	0.0	0	3.0	26.0	6	10.00	12.25	13.18	30.0	566.5	566.5	8.5	8.5	**226.58**	**2.83**
3.00	4.00	3.50	1.00	1.50	20.00	10.00	35.00	3.77	26.0	26.0	1.0	64.38	64.38	6	1.0	22.6	22.63	4.0	26.0	6	10.00	12.25	13.18	40.0	705.1	792.1	25.5	112.5	**316.84**	**37.49**
4.00	5.00	4.50	1.00	2.50	20.00	10.00	45.00	3.77	26.0	26.0	1.0	82.78	147.16	6	1.0	22.6	45.26	5.0	26.0	6	9.75	12.25	13.18	50.0	841.5	1033.9	42.4	234.8	**413.55**	**78.28**
5.00	6.00	5.50	1.00	3.50	19.75	9.75	54.88	3.77	26.0	26.0	1.0	100.94	248.10	6	1.0	22.6	67.89	6.0	26.0	6	9.75	12.25	13.18	59.8	976.6	1292.6	59.4	375.4	**517.04**	**125.13**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 1.13 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
6.00	7.00	6.50	1.00	4.50	19.75	9.75	64.63	3.77	26.0	26.0	1.0	118.87	366.97	6	1.0	22.6	90.51	7.0	26.7	0	9.75	13.83	14.80	69.5	1185.3	1642.8	76.4	533.9	**657.12**	**177.95**
7.00	9.00	8.00	2.00	6.50	19.75	9.75	79.25	7.54	26.7	26.7	1.0	300.65	667.62	0	1.0	0.0	90.51	9.0	14.0	35	10.34	3.65	2.36	89.0	740.5	1498.7	110.3	868.4	**599.47**	**289.48**
9.00	10.00	9.50	1.00	7.50	20.34	10.34	94.17	3.77	14.0	14.0	1.0	88.55	756.17	35	1.0	132.0	222.51	10.0	14.0	35	10.34	3.65	2.36	99.3	783.2	1761.9	127.3	1106.0	**704.77**	**368.66**
10.00	11.00	10.50	1.00	8.50	20.34	10.34	104.51	3.77	14.0	14.0	1.0	98.27	854.44	35	1.0	132.0	354.51	11.0	9.7	57	10.34	2.42	1.17	109.7	888.5	2097.4	144.3	1353.2	**838.97**	**451.07**
11.00	12.50	11.75	1.50	10.00	20.34	10.34	117.44	5.66	9.7	9.7	1.0	113.56	968.00	57	1.0	322.5	676.97	12.5	9.7	50	10.34	2.42	1.17	125.2	859.6	2504.6	169.7	1814.7	**1001.83**	**604.90**
12.50	14.00	13.25	1.50	11.50	20.34	10.34	132.95	5.66	9.7	9.7	1.0	128.56	1096.56	50	1.0	282.9	959.83	14.0	26.1	7	10.75	12.48	13.41	140.7	2155.4	4211.8	195.2	2251.6	**1684.73**	**750.52**
14.00	15.50	14.75	1.50	13.00	20.75	10.75	148.76	5.66	26.1	26.1	1.0	412.28	1508.84	7	1.0	39.6	999.43	15.5	26.1	7	10.75	12.48	13.41	156.8	2383.1	4891.3	220.6	2728.9	**1956.53**	**909.63**
15.50	17.00	16.25	1.50	14.50	20.75	10.75	164.89	5.66	26.1	26.1	1.0	456.97	1965.81	7	1.0	39.6	1039.03	17.0	26.4	2	10.41	13.15	14.11	173.0	2693.8	5698.6	246.1	3250.9	**2279.44**	**1083.64**
17.00	18.50	17.75	1.50	16.00	20.41	10.41	180.76	5.66	26.4	26.4	1.0	507.61	2473.42	2	1.0	11.3	1050.34	18.5	26.4	2	10.41	13.15	14.11	173.0	2693.8	6217.5	271.5	3795.3	**2487.01**	**1265.10**
18.50	21.50	20.00	3.00	19.00	20.41	10.41	180.76	11.31	26.4	26.4	1.0	1015.22	3488.63	2	1.0	22.6	1072.97	21.5	28.8	0	11.01	18.56	19.64	173.0	3778.0	8339.7	322.5	4884.1	**3335.86**	**1628.02**
21.50	23.00	22.25	1.50	20.50	21.01	11.01	180.76	5.66	28.8	28.8	1.0	562.16	4050.80	0	1.0	0.0	1072.97	23.0	9.3	52	11.01	2.34	1.11	173.0	996.5	6120.3	347.9	5471.7	**2448.11**	**1823.89**
23.00	24.50	23.75	1.50	22.00	21.01	11.01	180.76	5.66	9.3	9.3	1.0	167.45	4218.25	52	1.0	294.2	1367.14	24.5	9.3	52	11.01	2.34	1.11	173.0	996.5	6581.9	373.4	5958.8	**2632.76**	**1986.25**
24.50	26.00	25.25	1.50	23.50	21.01	11.01	180.76	5.66	9.3	9.3	1.0	167.45	4385.70	52	1.0	294.2	1661.31	26.0	30.0	0	10.34	21.26	22.40	173.0	4317.3	10364.3	398.8	6445.8	**4145.73**	**2148.61**
26.00	27.50	26.75	1.50	25.00	20.34	10.34	180.76	5.66	30.0	30.0	1.0	590.38	4976.08	0	1.0	0.0	1661.31	27.5	30.0	0	10.34	21.26	22.40	173.0	4317.3	10954.7	424.3	7061.7	**4381.88**	**2353.89**
27.50	29.00	28.25	1.50	26.50	20.34	10.34	180.76	5.66	30.0	30.0	1.0	590.38	5566.47	0	1.0	0.0	1661.31	29.0	30.1	0	10.34	21.76	22.91	173.0	4419.5	11647.3	449.7	7677.5	**4658.90**	**2559.17**
29.00	30.00	29.50	1.00	27.50	20.34	10.34	180.76	3.77	30.1	30.1	1.0	397.15	5963.62	0	1.0	0.0	1661.31	30.0	30.9	0	9.13	25.79	27.01	173.0	5214.7	12839.6	466.7	8091.6	**5135.84**	**2697.22**
30.00	30.50	30.25	0.50	28.00	19.13	9.13	180.76	1.89	30.9	30.9	1.0	213.18	6176.80	0	1.0	0.0	1661.31	30.5	30.9	0	9.25	25.79	27.01	173.0	5216.9	13055.0	475.2	8313.3	**5221.99**	**2771.10**
30.50	32.00	31.25	1.50	29.50	19.25	9.25	180.76	5.66	30.9	30.9	1.0	639.54	6816.33	0	1.0	0.0	1661.31	32.0	30.3	0	8.86	22.77	23.94	173.0	4599.8	13077.4	500.7	8978.3	**5230.97**	**2992.77**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
32.00	32.50	32.25	0.50	30.00	18.86	8.86	180.76	1.89	30.3	30.3	1.0	202.17	7018.50	0	1.0	0.0	1661.31	32.5	30.3	0	8.86	22.77	23.94	173.0	4599.8	13279.6	509.1	9189.0	**5311.83**	**3062.99**
32.50	33.50	33.00	1.00	31.00	18.86	8.86	180.76	3.77	30.3	30.3	1.0	404.34	7422.84	0	1.0	0.0	1661.31	33.5	30.4	0	9.28	23.27	24.45	173.0	4708.4	13792.6	526.1	9610.3	**5517.02**	**3203.42**
33.50	35.00	34.25	1.50	32.50	19.28	9.28	180.76	5.66	30.4	30.4	1.0	611.94	8034.77	0	1.0	0.0	1661.31	35.0	30.9	0	9.12	25.79	27.01	173.0	5214.5	14910.6	551.6	10247.7	**5964.23**	**3415.89**
35.00	36.50	35.75	1.50	34.00	19.12	9.12	180.76	5.66	30.9	30.9	1.0	639.54	8674.31	0	1.0	0.0	1661.31	36.5	30.9	0	9.29	25.79	27.01	173.0	5217.6	15553.2	577.0	10912.7	**6221.29**	**3637.55**
36.50	37.50	37.00	1.00	35.00	19.29	9.29	180.76	3.77	30.9	30.9	1.0	426.36	9100.67	0	1.0	0.0	1661.31	37.5	30.9	0	9.29	25.79	27.01	173.0	5217.6	15979.6	594.0	11356.0	**6391.83**	**3785.33**
37.50	38.00	37.75	0.50	35.50	19.29	9.29	180.76	1.89	30.9	30.9	1.0	213.18	9313.85	0	1.0	0.0	1661.31	38.0	31.4	0	8.83	28.31	29.58	173.0	5717.4	16692.5	602.5	11577.6	**6677.02**	**3859.22**
38.00	40.00	39.00	2.00	37.50	18.83	8.83	180.76	7.54	31.4	31.4	1.1	890.50	10204.34	0	1.0	0.0	1661.31	40.0	31.4	0	8.83	28.31	29.58	173.0	5717.4	17583.0	636.4	12502.1	**7033.22**	**4167.36**
BORE NO: P123A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	18.13	8.13	22.36	1.89	28.2	28.2	1.0	22.61	0	0	1.0	0.0	0	3.0	25.7	8	8.13	11.58	12.49	24.4	469.9	469.9	8.5	8.5	**187.95**	**2.83**
3.00	4.00	3.50	1.00	1.50	18.13	8.13	28.46	3.77	25.7	25.7	1.0	51.65	51.65	8	1.0	30.2	30.17	4.0	25.7	8	8.13	11.58	12.49	32.5	576.4	658.2	25.5	107.3	**263.27**	**35.76**
4.00	5.00	4.50	1.00	2.50	18.13	8.13	36.59	3.77	25.7	25.7	1.0	66.40	118.05	8	1.0	30.2	60.34	5.0	25.7	8	10.82	11.58	12.49	40.7	705.7	884.0	42.4	220.8	**353.62**	**73.61**
5.00	6.00	5.50	1.00	3.50	20.82	10.82	46.06	3.77	25.7	25.7	1.0	83.60	201.65	8	1.0	30.2	90.51	6.0	26.1	6	10.82	12.48	13.41	51.5	886.2	1178.4	59.4	351.6	**471.36**	**117.19**
6.00	7.00	6.50	1.00	4.50	20.82	10.82	56.88	3.77	26.1	26.1	1.0	105.09	306.75	6	1.0	22.6	113.14	7.0	26.1	6	10.82	12.48	13.41	62.3	1039.0	1458.9	76.4	496.3	**583.54**	**165.42**
7.00	8.00	7.50	1.00	5.50	20.82	10.82	67.70	3.77	26.1	26.1	1.0	125.08	431.83	6	1.0	22.6	135.77	8.0	26.1	6	10.65	12.48	13.41	73.1	1190.2	1757.8	93.3	660.9	**703.11**	**220.31**
8.00	9.00	8.50	1.00	6.50	20.65	10.65	78.44	3.77	26.1	26.1	1.0	144.92	576.75	6	1.0	22.6	158.40	9.0	8.6	49	10.65	2.22	1.00	83.8	716.4	1451.6	110.3	845.5	**580.63**	**281.82**
9.00	10.00	9.50	1.00	7.50	20.65	10.65	89.09	3.77	8.6	8.6	1.0	50.81	627.56	49	1.0	184.8	343.20	10.0	8.6	49	10.65	2.22	1.00	94.4	743.1	1713.9	127.3	1098.0	**685.56**	**366.01**
10.00	11.00	10.50	1.00	8.50	20.65	10.65	99.74	3.77	8.6	8.6	1.0	56.89	684.44	49	1.0	184.8	528.00	11.0	8.9	46	10.27	2.27	1.05	105.1	745.8	1958.2	144.3	1356.7	**783.30**	**452.23**
11.00	12.50	11.75	1.50	10.00	20.27	10.27	112.76	5.66	8.9	8.9	1.0	99.89	784.34	46	1.0	260.2	788.23	12.5	12.5	43	10.44	3.20	1.94	120.5	888.3	2460.8	169.7	1742.3	**984.34**	**580.76**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
12.50	15.50	14.00	3.00	13.00	20.44	10.44	136.13	11.31	12.5	12.5	1.0	341.44	1125.78	43	1.0	486.5	1274.74	15.5	12.5	43	10.44	3.20	1.94	151.8	1001.8	3402.3	220.6	2621.2	**1360.93**	**873.72**
15.50	17.00	16.25	1.50	14.50	20.44	10.44	159.62	5.66	12.5	12.5	1.0	200.18	1325.97	43	1.0	243.3	1518.00	17.0	28.8	0	10.84	18.56	19.64	167.4	3660.2	6504.2	246.1	3090.1	**2601.67**	**1030.02**
17.00	18.50	17.75	1.50	16.00	20.84	10.84	175.58	5.66	28.8	28.8	1.0	546.05	1872.01	0	1.0	0.0	1518.00	18.5	25.3	5	10.29	10.68	11.57	167.4	2154.3	5544.3	271.5	3661.6	**2217.71**	**1220.52**
18.50	21.50	20.00	3.00	19.00	20.29	10.29	175.58	11.31	25.3	25.3	1.0	939.02	2811.03	5	1.0	56.6	1574.57	21.5	31.3	0	10.29	27.81	29.06	167.4	5471.3	9856.9	322.5	4708.1	**3942.78**	**1569.35**
21.50	23.00	22.25	1.50	20.50	20.29	10.29	175.58	5.66	31.3	31.3	1.1	643.16	3454.19	0	1.0	0.0	1574.57	23.0	31.2	0	10.29	27.30	28.55	167.4	5372.3	10401.1	347.9	5376.7	**4160.43**	**1792.22**
23.00	24.50	23.75	1.50	22.00	20.29	10.29	175.58	5.66	31.2	31.2	1.1	637.63	4091.82	0	1.0	0.0	1574.57	24.5	31.6	0	7.94	29.32	30.60	167.4	5719.6	11386.0	373.4	6039.8	**4554.38**	**2013.25**
24.50	26.00	25.25	1.50	23.50	17.94	7.94	175.58	5.66	31.6	31.6	1.1	659.94	4751.75	0	1.0	0.0	1574.57	26.0	31.8	0	8.92	30.33	31.63	167.4	5937.0	12263.3	398.8	6725.2	**4905.33**	**2241.72**
26.00	27.50	26.75	1.50	25.00	18.92	8.92	175.58	5.66	31.8	31.8	1.1	671.27	5423.02	0	1.0	0.0	1574.57	27.5	23.5	12	9.31	8.92	9.23	167.4	1870.5	8868.1	424.3	7421.9	**3547.22**	**2473.96**
27.50	29.00	28.25	1.50	26.50	19.31	9.31	175.58	5.66	23.5	23.5	1.0	431.88	5854.90	12	1.0	67.9	1642.46	29.0	15.0	42	9.18	3.94	2.65	167.4	1190.6	8688.0	449.7	7947.1	**3475.20**	**2649.03**
29.00	30.00	29.50	1.00	27.50	19.18	9.18	175.58	3.77	15.0	15.0	1.0	177.43	6032.33	42	1.0	158.4	1800.86	30.0	15.0	42	9.18	3.94	2.65	167.4	1190.6	9023.8	466.7	8299.9	**3609.53**	**2766.63**
30.00	30.50	30.25	0.50	28.00	19.18	9.18	175.58	1.89	15.0	15.0	1.0	88.71	6121.04	42	1.0	79.2	1880.06	30.5	7.4	24	8.69	2.00	0.82	167.4	628.5	8629.6	475.2	8476.3	**3451.84**	**2825.43**
30.50	32.00	31.25	1.50	29.50	18.69	8.69	175.58	5.66	7.4	7.4	1.0	129.00	6250.04	24	1.0	135.8	2015.83	32.0	17.0	60	8.77	4.92	3.75	167.4	1566.1	9832.0	500.7	8766.5	**3932.80**	**2922.18**
32.00	32.50	32.25	0.50	30.00	18.77	8.77	175.58	1.89	17.0	17.0	1.0	101.22	6351.27	60	1.0	113.1	2128.97	32.5	17.0	60	8.77	4.92	3.75	167.4	1566.1	10046.4	509.1	8989.4	**4018.55**	**2996.46**
32.50	33.50	33.00	1.00	31.00	18.77	8.77	175.58	3.77	17.0	17.0	1.0	202.45	6553.71	60	1.0	226.3	2355.26	33.5	17.0	60	9.57	4.92	3.75	167.4	1568.2	10477.1	526.1	9435.1	**4190.86**	**3145.03**
33.50	35.00	34.25	1.50	32.50	19.57	9.57	175.58	5.66	17.0	17.0	1.0	303.67	6857.38	60	1.0	339.4	2694.69	35.0	20.5	45	9.00	6.76	5.94	167.4	1775.2	11327.3	551.6	10103.6	**4530.91**	**3367.88**
35.00	36.50	35.75	1.50	34.00	19.00	9.00	175.58	5.66	20.5	20.5	1.0	371.36	7228.74	45	1.0	254.6	2949.26	36.5	22.5	45	8.68	8.20	8.14	167.4	2059.7	12237.7	577.0	10755.0	**4895.07**	**3585.01**
36.50	37.50	37.00	1.00	35.00	18.68	8.68	175.58	3.77	22.5	22.5	1.0	274.28	7503.02	45	1.0	169.7	3118.97	37.5	22.5	45	8.68	8.20	8.14	167.4	2059.7	12681.7	594.0	11216.0	**5072.66**	**3738.66**
37.50	38.00	37.75	0.50	35.50	18.68	8.68	175.58	1.89	22.5	22.5	1.0	137.14	7640.16	45	1.0	84.9	3203.83	38.0	22.5	45	8.61	8.20	8.14	167.4	2059.3	12903.3	602.5	11446.5	**5161.31**	**3815.49**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
38.00	40.00	39.00	2.00	37.50	18.61	8.61	175.58	7.54	22.5	22.5	1.0	548.56	8188.72	45	1.0	339.4	3543.26	40.0	22.5	45	8.61	8.20	8.14	167.4	2059.3	13791.3	636.4	12368.4	**5516.50**	**4122.80**
BORE NO: P124A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.25	9.25	25.44	1.89	28.6	28.6	1.0	26.15	26.15	2	1.0	3.8	3.77	3.0	28.6	2	9.25	18.11	19.17	27.8	709.3	739.2	8.5	38.4	**295.68**	**12.80**
3.00	4.00	3.50	1.00	1.50	19.25	9.25	32.38	3.77	28.6	28.6	1.0	66.57	92.72	2	1.0	7.5	11.31	4.0	26.0	0	9.25	12.25	13.18	37.0	595.7	699.7	25.5	129.5	**279.89**	**43.17**
4.00	5.00	4.50	1.00	2.50	19.25	9.25	41.63	3.77	26.0	26.0	1.0	76.57	169.29	0	1.0	0.0	11.31	5.0	26.6	5	10.34	13.60	14.57	46.3	865.0	1045.6	42.4	223.0	**418.24**	**74.34**
5.00	6.00	5.50	1.00	3.50	20.34	10.34	51.42	3.77	26.6	26.6	1.0	97.11	266.40	5	1.0	18.9	30.17	6.0	26.6	5	10.34	13.60	14.57	56.6	1024.1	1320.7	59.4	356.0	**528.28**	**118.66**
6.00	7.00	6.50	1.00	4.50	20.34	10.34	61.76	3.77	26.6	26.6	1.0	116.64	383.04	5	1.0	18.9	49.03	7.0	14.8	38	10.49	3.88	2.59	66.9	699.4	1131.5	76.4	508.4	**452.58**	**169.48**
7.00	9.00	8.00	2.00	6.50	20.49	10.49	77.42	7.54	14.8	14.8	1.0	154.29	537.33	38	1.0	286.6	335.66	9.0	8.6	50	10.49	2.22	1.00	87.9	736.9	1609.9	110.3	983.3	**643.96**	**327.77**
9.00	10.00	9.50	1.00	7.50	20.49	10.49	93.16	3.77	8.6	8.6	1.0	53.13	590.47	50	1.0	188.6	524.23	10.0	8.6	54	10.49	2.22	1.00	98.4	804.0	1918.7	127.3	1242.0	**767.46**	**413.99**
10.00	11.00	10.50	1.00	8.50	20.49	10.49	103.65	3.77	8.6	8.6	1.0	59.12	649.58	54	1.0	203.7	727.89	11.0	8.6	54	10.03	2.22	1.00	108.9	830.0	2207.4	144.3	1521.7	**882.98**	**507.24**
11.00	12.50	11.75	1.50	10.00	20.03	10.03	116.41	5.66	8.6	8.6	1.0	99.60	749.18	54	1.0	305.5	1033.37	12.5	8.6	54	10.03	2.22	1.00	123.9	867.7	2650.3	169.7	1952.3	**1060.11**	**650.76**
12.50	14.00	13.25	1.50	11.50	20.03	10.03	131.46	5.66	8.6	8.6	1.0	112.47	861.65	54	1.0	305.5	1338.86	14.0	25.2	13	8.49	10.45	11.34	139.0	1841.0	4041.5	195.2	2395.7	**1616.61**	**798.56**
14.00	15.50	14.75	1.50	13.00	18.49	8.49	145.35	5.66	25.2	25.2	1.0	386.92	1248.57	13	1.0	73.5	1412.40	15.5	25.2	13	8.49	10.45	11.34	151.7	1991.6	4652.6	220.6	2881.6	**1861.03**	**960.53**
15.50	17.00	16.25	1.50	14.50	18.49	8.49	158.08	5.66	25.2	25.2	1.0	420.82	1669.40	13	1.0	73.5	1485.94	17.0	26.8	0	9.72	14.05	15.03	164.5	2714.0	5869.3	246.1	3401.4	**2347.73**	**1133.81**
17.00	18.50	17.75	1.50	16.00	19.72	9.72	171.74	5.66	26.8	26.8	1.0	490.77	2160.17	0	1.0	0.0	1485.94	18.5	26.8	0	9.72	14.05	15.03	164.5	2714.0	6360.1	271.5	3917.7	**2544.04**	**1305.88**
18.50	20.00	19.25	1.50	17.50	19.72	9.72	171.74	5.66	26.8	26.8	1.0	490.77	2650.93	0	1.0	0.0	1485.94	20.0	21.6	43	10.69	7.55	7.15	164.5	1894.9	6031.8	297.0	4433.9	**2412.70**	**1477.96**
20.00	21.50	20.75	1.50	19.00	20.69	10.69	171.74	5.66	21.6	21.6	1.0	384.67	3035.60	43	1.0	243.3	1729.20	21.5	21.6	43	10.69	7.55	7.15	164.5	1894.9	6659.7	322.5	5087.3	**2663.87**	**1695.75**
21.50	23.00	22.25	1.50	20.50	20.69	10.69	171.74	5.66	21.6	21.6	1.0	384.67	3420.27	43	1.0	243.3	1972.46	23.0	30.4	0	10.69	23.27	24.45	164.5	4508.0	9900.7	347.9	5740.6	**3960.28**	**1913.55**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
23.00	24.50	23.75	1.50	22.00	20.69	10.69	171.74	5.66	30.4	30.4	1.0	581.41	4001.68	0	1.0	0.0	1972.46	24.5	30.8	0	10.16	25.29	26.50	164.5	4888.2	10862.4	373.4	6347.5	**4344.94**	**2115.84**
24.50	27.50	26.00	3.00	25.00	20.16	10.16	171.74	11.31	30.8	30.8	1.0	1204.66	5206.34	0	1.0	0.0	1972.46	27.5	30.7	0	10.16	24.79	25.99	164.5	4791.0	11969.8	424.3	7603.1	**4787.90**	**2534.36**
27.50	29.00	28.25	1.50	26.50	20.16	10.16	171.74	5.66	30.7	30.7	1.0	597.06	5803.40	0	1.0	0.0	1972.46	29.0	30.7	0	10.16	24.79	25.99	164.5	4791.0	12566.8	449.7	8225.6	**5026.73**	**2741.87**
29.00	30.00	29.50	1.00	27.50	20.16	10.16	171.74	3.77	30.7	30.7	1.0	398.04	6201.44	0	1.0	0.0	1972.46	30.0	31.6	0	8.91	29.32	30.60	164.5	5640.4	13814.3	466.7	8640.6	**5525.71**	**2880.20**
30.00	30.50	30.25	0.50	28.00	18.91	8.91	171.74	1.89	31.6	31.6	1.1	215.17	6416.61	0	1.0	0.0	1972.46	30.5	31.9	0	8.80	30.83	32.14	164.5	5928.5	14317.5	475.2	8864.3	**5727.01**	**2954.76**
30.50	32.00	31.25	1.50	29.50	18.80	8.80	171.74	5.66	31.9	31.9	1.1	662.19	7078.81	0	1.0	0.0	1972.46	32.0	31.6	0	8.85	29.32	30.60	164.5	5639.1	14690.4	500.7	9551.9	**5876.15**	**3183.97**
32.00	32.50	32.25	0.50	30.00	18.85	8.85	171.74	1.89	31.6	31.6	1.1	215.17	7293.98	0	1.0	0.0	1972.46	32.5	31.6	0	8.85	29.32	30.60	164.5	5639.1	14905.6	509.1	9775.6	**5962.22**	**3258.53**
32.50	33.50	33.00	1.00	31.00	18.85	8.85	171.74	3.77	31.6	31.6	1.1	430.35	7724.33	0	1.0	0.0	1972.46	33.5	30.0	0	8.75	21.26	22.40	164.5	4088.7	13785.5	526.1	10222.9	**5514.18**	**3407.63**
33.50	35.00	34.25	1.50	32.50	18.75	8.75	171.74	5.66	30.0	30.0	1.0	560.93	8285.26	0	1.0	0.0	1972.46	35.0	30.6	0	8.78	24.28	25.48	164.5	4669.8	14927.5	551.6	10809.3	**5971.02**	**3603.10**
35.00	36.50	35.75	1.50	34.00	18.78	8.78	171.74	5.66	30.6	30.6	1.0	591.81	8877.07	0	1.0	0.0	1972.46	36.5	31.6	0	8.68	29.32	30.60	164.5	5635.6	16485.1	577.0	11426.6	**6594.05**	**3808.85**
36.50	37.50	37.00	1.00	35.00	18.68	8.68	171.74	3.77	31.6	31.6	1.1	430.35	9307.42	0	1.0	0.0	1972.46	37.5	31.8	0	8.68	30.33	31.63	164.5	5829.1	17109.0	594.0	11873.9	**6843.59**	**3957.96**
37.50	38.00	37.75	0.50	35.50	18.68	8.68	171.74	1.89	31.8	31.8	1.1	218.87	9526.29	0	1.0	0.0	1972.46	38.0	31.5	0	8.91	28.82	30.09	164.5	5543.5	17042.3	602.5	12101.2	**6816.91**	**4033.74**
38.00	40.00	39.00	2.00	37.50	18.91	8.91	171.74	7.54	31.5	31.5	1.1	853.37	10379.66	0	1.0	0.0	1972.46	40.0	15.0	42	8.91	3.94	2.65	164.5	1176.8	13528.9	636.4	12988.5	**5411.56**	**4329.51**
BORE NO: P125A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	20.65	10.65	29.29	1.89	28.9	28.9	1.0	30.49	0	0	1.0	0.0	0	3.0	30.0	1	9.82	21.26	22.40	32.0	928.0	928.0	8.5	8.5	**371.21**	**2.83**
3.00	5.00	4.00	2.00	2.50	19.82	9.82	41.77	7.54	30.0	30.0	1.0	181.90	181.90	1	1.0	7.5	7.54	5.0	12.8	34	9.82	3.29	2.02	51.6	551.8	741.3	42.4	231.9	**296.51**	**77.29**
5.00	6.00	5.50	1.00	3.50	19.82	9.82	56.50	3.77	12.8	12.8	1.0	48.41	230.31	34	1.0	128.2	135.77	6.0	27.5	3	9.57	15.63	16.64	61.4	1224.6	1590.7	59.4	425.5	**636.28**	**141.83**
6.00	8.00	7.00	2.00	5.50	19.57	9.57	70.98	7.54	27.5	27.5	1.0	278.71	509.02	3	1.0	22.6	158.40	8.0	23.6	0	9.57	8.99	9.34	80.6	880.2	1547.6	93.3	760.8	**619.05**	**253.59**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
8.00	9.00	8.50	1.00	6.50	19.57	9.57	85.34	3.77	23.6	23.6	1.0	140.61	649.63	0	1.0	0.0	158.40	9.0	10.0	46	10.39	2.47	1.22	90.1	728.9	1536.9	110.3	918.3	**614.76**	**306.11**
9.00	11.00	10.00	2.00	8.50	20.39	10.39	100.51	7.54	10.0	10.0	1.0	133.68	783.31	46	1.0	347.0	505.37	11.0	10.0	46	10.39	2.47	1.22	110.9	786.9	2075.6	144.3	1432.9	**830.25**	**477.65**
11.00	12.00	11.50	1.00	9.50	20.39	10.39	116.10	3.77	10.0	10.0	1.0	77.20	860.51	46	1.0	173.5	678.86	12.0	11.9	41	10.50	3.03	1.76	121.3	845.7	2385.1	161.2	1700.6	**954.02**	**566.87**
12.00	14.50	13.25	2.50	12.00	20.50	10.50	134.42	9.43	11.9	11.9	1.0	267.07	1127.58	41	1.0	386.6	1065.43	14.5	26.4	5	10.66	13.15	14.11	147.5	2348.6	4541.6	203.7	2396.7	**1816.64**	**798.89**
14.50	17.50	16.00	3.00	15.00	20.66	10.66	163.53	11.31	26.4	26.4	1.0	918.46	2046.04	5	1.0	56.6	1122.00	17.5	26.1	5	10.66	12.48	13.41	179.5	2682.3	5850.3	254.6	3422.6	**2340.12**	**1140.87**
17.50	19.00	18.25	1.50	16.50	20.66	10.66	163.53	5.66	26.1	26.1	1.0	453.21	2499.25	5	1.0	28.3	1150.29	19.0	9.5	53	10.26	2.38	1.14	179.5	1031.1	4680.6	280.0	3929.6	**1872.24**	**1309.85**
19.00	20.50	19.75	1.50	18.00	20.26	10.26	163.53	5.66	9.5	9.5	1.0	154.81	2654.06	53	1.0	299.8	1450.11	20.5	9.5	53	10.26	2.38	1.14	179.5	1031.1	5135.2	305.5	4409.7	**2054.10**	**1469.89**
20.50	22.00	21.25	1.50	19.50	20.26	10.26	163.53	5.66	9.5	9.5	1.0	154.81	2808.87	53	1.0	299.8	1749.94	22.0	9.5	53	10.26	2.38	1.14	179.5	1031.1	5589.9	330.9	4889.8	**2235.95**	**1629.92**
22.00	23.50	22.75	1.50	21.00	20.26	10.26	163.53	5.66	9.5	9.5	1.0	154.81	2963.68	53	1.0	299.8	2049.77	23.5	32.5	0	9.09	33.85	35.22	179.5	7093.3	12106.8	356.4	5369.9	**4842.72**	**1789.95**
23.50	25.00	24.25	1.50	22.50	19.09	9.09	163.53	5.66	32.5	32.5	1.1	663.03	3626.71	0	1.0	0.0	2049.77	25.0	32.5	0	8.76	33.85	35.22	179.5	7085.5	12761.9	381.9	6058.3	**5104.78**	**2019.45**
25.00	26.50	25.75	1.50	24.00	18.76	8.76	163.53	5.66	32.5	32.5	1.1	663.03	4289.75	0	1.0	0.0	2049.77	26.5	32.3	0	9.24	32.85	34.19	179.5	6885.9	13225.4	407.3	6746.8	**5290.15**	**2248.94**
26.50	27.50	27.00	1.00	25.00	19.24	9.24	163.53	3.77	32.3	32.3	1.1	434.73	4724.47	0	1.0	0.0	2049.77	27.5	32.3	0	9.24	32.85	34.19	179.5	6885.9	13660.1	424.3	7198.5	**5464.04**	**2399.51**
27.50	28.00	27.75	0.50	25.50	19.24	9.24	163.53	1.89	32.3	32.3	1.1	217.36	4941.83	0	1.0	0.0	2049.77	28.0	32.9	0	8.51	35.87	37.27	179.5	7500.6	14492.2	432.8	7424.4	**5796.88**	**2474.79**
28.00	29.50	28.75	1.50	27.00	18.51	8.51	163.53	5.66	32.9	32.9	1.1	685.26	5627.10	0	1.0	0.0	2049.77	29.5	31.5	0	8.69	28.82	30.09	179.5	6030.4	13707.2	458.2	8135.1	**5482.90**	**2711.70**
29.50	30.00	29.75	0.50	27.50	18.69	8.69	163.53	1.89	31.5	31.5	1.1	203.14	5830.24	0	1.0	0.0	2049.77	30.0	31.5	0	8.69	28.82	30.09	179.5	6030.4	13910.4	466.7	8346.7	**5564.15**	**2782.24**
30.00	31.00	30.50	1.00	28.50	18.69	8.69	163.53	3.77	31.5	31.5	1.1	406.29	6236.52	0	1.0	0.0	2049.77	31.0	31.5	0	7.44	28.82	30.09	179.5	6004.8	14291.1	483.7	8770.0	**5716.45**	**2923.33**
31.00	32.50	31.75	1.50	30.00	17.44	7.44	163.53	5.66	31.5	31.5	1.1	609.43	6845.95	0	1.0	0.0	2049.77	32.5	31.5	0	7.48	28.82	30.09	179.5	6005.7	14901.4	509.1	9404.9	**5960.55**	**3134.96**
32.50	34.00	33.25	1.50	31.50	17.48	7.48	163.53	5.66	31.5	31.5	1.1	609.43	7455.38	0	1.0	0.0	2049.77	34.0	31.9	0	7.44	30.83	32.14	179.5	6424.5	15929.6	534.6	10039.8	**6371.85**	**3346.58**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
34.00	35.00	34.50	1.00	32.50	17.44	7.44	163.53	3.77	31.9	31.9	1.1	420.36	7875.74	0	1.0	0.0	2049.77	35.0	31.9	0	7.44	30.83	32.14	179.5	6424.5	16350.0	551.6	10477.1	**6539.99**	**3492.36**
35.00	35.50	35.25	0.50	33.00	17.44	7.44	163.53	1.89	31.9	31.9	1.1	210.18	8085.92	0	1.0	0.0	2049.77	35.5	30.4	0	7.79	23.27	24.45	179.5	4856.7	14992.4	560.1	10695.7	**5996.95**	**3565.25**
35.50	37.00	36.25	1.50	34.50	17.79	7.79	163.53	5.66	30.4	30.4	1.0	553.62	8639.53	0	1.0	0.0	2049.77	37.0	15.0	70	8.21	3.94	2.65	179.5	1527.8	12217.1	585.5	11274.8	**4886.86**	**3758.27**
37.00	37.50	37.25	0.50	35.00	18.21	8.21	163.53	1.89	15.0	15.0	1.0	82.63	8722.16	70	1.0	132.0	2181.77	37.5	15.0	70	8.21	3.94	2.65	179.5	1527.8	12431.8	594.0	11497.9	**4972.71**	**3832.64**
37.50	38.50	38.00	1.00	36.00	18.21	8.21	163.53	3.77	15.0	15.0	1.0	165.26	8887.41	70	1.0	264.0	2445.77	38.5	15.0	70	8.22	3.94	2.65	179.5	1527.9	12861.0	611.0	11944.2	**5144.42**	**3981.39**
38.50	40.00	39.25	1.50	37.50	18.22	8.22	163.53	5.66	15.0	15.0	1.0	247.88	9135.30	70	1.0	396.0	2841.77	40.0	15.0	70	8.22	3.94	2.65	179.5	1527.9	13504.9	636.4	12613.5	**5401.97**	**4204.50**
BORE NO: P126A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	18.89	8.89	24.45	1.89	26.5	26.5	1.0	22.99	0	5	1.0	9.4	0	3.0	27.6	2	8.89	15.85	16.87	26.7	600.6	600.6	8.5	8.5	**240.24**	**2.83**
3.00	4.00	3.50	1.00	1.50	18.89	8.89	31.12	3.77	27.6	27.6	1.0	61.35	61.35	2	1.0	7.5	7.54	4.0	27.6	2	9.40	15.85	16.87	35.6	765.9	834.8	25.5	94.3	**333.93**	**31.45**
4.00	6.00	5.00	2.00	3.50	19.40	9.40	44.96	7.54	27.6	27.6	1.0	177.29	238.64	2	1.0	15.1	22.63	6.0	27.6	2	9.40	15.85	16.87	54.4	1103.2	1364.4	59.4	320.7	**545.78**	**106.89**
6.00	7.00	6.50	1.00	4.50	19.40	9.40	59.06	3.77	27.6	27.6	1.0	116.45	355.09	2	1.0	7.5	30.17	7.0	26.8	0	9.40	14.05	15.03	63.8	1109.7	1495.0	76.4	461.6	**597.98**	**153.88**
7.00	8.00	7.50	1.00	5.50	19.40	9.40	68.46	3.77	26.8	26.8	1.0	130.42	485.51	0	1.0	0.0	30.17	8.0	12.1	44	9.68	3.09	1.82	73.2	715.6	1231.2	93.3	609.0	**492.49**	**203.01**
8.00	9.00	8.50	1.00	6.50	19.68	9.68	78.00	3.77	12.1	12.1	1.0	63.06	548.57	44	1.0	165.9	196.11	9.0	12.1	44	9.68	3.09	1.82	82.8	749.4	1494.1	110.3	855.0	**597.62**	**285.00**
9.00	10.00	9.50	1.00	7.50	19.68	9.68	87.68	3.77	12.1	12.1	1.0	70.89	619.46	44	1.0	165.9	362.06	10.0	12.1	48	10.22	3.09	1.82	92.5	824.6	1806.1	127.3	1108.8	**722.44**	**369.60**
10.00	12.50	11.25	2.50	10.00	20.22	10.22	105.30	9.43	12.1	12.1	1.0	212.83	832.30	48	1.0	452.6	814.63	12.5	26.5	6	10.02	13.38	14.34	118.1	1945.7	3592.7	169.7	1816.6	**1437.06**	**605.55**
12.50	15.50	14.00	3.00	13.00	20.02	10.02	133.10	11.31	26.5	26.5	1.0	750.83	1583.13	6	1.0	67.9	882.51	15.5	23.0	18	10.02	8.56	8.68	148.1	1677.0	4142.6	220.6	2686.3	**1657.06**	**895.42**
15.50	18.50	17.00	3.00	16.00	20.02	10.02	163.16	11.31	23.0	23.0	1.0	783.60	2366.72	18	1.0	203.7	1086.17	18.5	29.0	0	10.56	19.01	20.10	148.1	3329.7	6782.6	271.5	3724.4	**2713.04**	**1241.48**
18.50	20.00	19.25	1.50	17.50	20.56	10.56	163.16	5.66	29.0	29.0	1.0	511.64	2878.36	0	1.0	0.0	1086.17	20.0	25.0	11	10.56	10.00	10.88	148.1	1866.0	5830.5	297.0	4261.5	**2332.21**	**1420.51**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m — Factor of Safety in Compression: 2.5 — Area of Pile: 1.13 m^2

Critical water table: 0.00 m — Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
20.00	21.50	20.75	1.50	19.00	20.56	10.56	163.16	5.66	25.0	25.0	1.0	430.41	3308.77	11	1.0	62.2	1148.40	21.5	25.0	11	10.56	10.00	10.88	148.1	1866.0	6323.2	322.5	4779.6	**2529.27**	**1593.21**
21.50	23.00	22.25	1.50	20.50	20.56	10.56	163.16	5.66	25.0	25.0	1.0	430.41	3739.18	11	1.0	62.2	1210.63	23.0	32.2	0	10.92	32.34	33.68	148.1	5670.1	10619.9	347.9	5297.7	**4247.97**	**1765.91**
23.00	24.50	23.75	1.50	22.00	20.92	10.92	163.16	5.66	32.2	32.2	1.1	645.19	4384.38	0	1.0	0.0	1210.63	24.5	32.1	0	10.92	31.84	33.16	148.1	5581.9	11176.9	373.4	5968.4	**4470.75**	**1989.46**
24.50	26.00	25.25	1.50	23.50	20.92	10.92	163.16	5.66	32.1	32.1	1.1	639.80	5024.18	0	1.0	0.0	1210.63	26.0	13.0	40	10.92	3.35	2.08	148.1	984.2	7219.0	398.8	6633.6	**2887.59**	**2211.21**
26.00	27.50	26.75	1.50	25.00	20.92	10.92	163.16	5.66	13.0	13.0	1.0	213.10	5237.28	40	1.0	226.3	1436.91	27.5	30.2	0	8.09	22.27	23.43	148.1	3860.6	10534.8	424.3	7098.5	**4213.90**	**2366.16**
27.50	29.00	28.25	1.50	26.50	18.09	8.09	163.16	5.66	30.2	30.2	1.0	542.58	5779.86	0	1.0	0.0	1436.91	29.0	30.2	0	8.09	22.27	23.43	148.1	3860.6	11077.3	449.7	7666.5	**4430.94**	**2555.51**
29.00	30.00	29.50	1.00	27.50	18.09	8.09	163.16	3.77	30.2	30.2	1.0	361.72	6141.58	0	1.0	0.0	1436.91	30.0	30.2	0	8.09	22.27	23.43	148.1	3860.6	11439.1	466.7	8045.2	**4575.63**	**2681.74**
30.00	30.50	30.25	0.50	28.00	18.09	8.09	163.16	1.89	30.2	30.2	1.0	180.86	6322.44	0	1.0	0.0	1436.91	30.5	31.2	0	8.09	27.30	28.55	148.1	4733.0	12492.3	475.2	8234.6	**4996.94**	**2744.85**
30.50	32.00	31.25	1.50	29.50	18.09	8.09	163.16	5.66	31.2	31.2	1.1	592.54	6914.98	0	1.0	0.0	1436.91	32.0	31.2	0	8.09	27.30	28.55	148.1	4733.0	13084.9	500.7	8852.6	**5233.95**	**2950.85**
32.00	32.50	32.25	0.50	30.00	18.09	8.09	163.16	1.89	31.2	31.2	1.1	197.51	7112.50	0	1.0	0.0	1436.91	32.5	29.2	0	8.09	19.46	20.56	148.1	3374.0	11923.4	509.1	9058.6	**4769.38**	**3019.52**
32.50	33.50	33.00	1.00	31.00	18.09	8.09	163.16	3.77	29.2	29.2	1.0	343.91	7456.40	0	1.0	0.0	1436.91	33.5	14.0	48	9.50	3.65	2.36	148.1	1115.8	10009.1	526.1	9419.4	**4003.63**	**3139.81**
33.50	35.00	34.25	1.50	32.50	19.50	9.50	163.16	5.66	14.0	14.0	1.0	230.13	7686.54	48	1.0	271.5	1708.46	35.0	14.0	45	9.35	3.65	2.36	148.1	1085.0	10480.0	551.6	9946.6	**4191.99**	**3315.52**
35.00	36.50	35.75	1.50	34.00	19.35	9.35	163.16	5.66	14.0	14.0	1.0	230.13	7916.67	45	1.0	254.6	1963.03	36.5	14.0	45	9.59	3.65	2.36	148.1	1085.4	10965.1	577.0	10456.7	**4386.02**	**3485.58**
36.50	37.50	37.00	1.00	35.00	19.59	9.59	163.16	3.77	14.0	14.0	1.0	153.42	8070.10	45	1.0	169.7	2132.74	37.5	14.0	48	9.59	3.65	2.36	148.1	1115.9	11318.7	594.0	10796.8	**4527.50**	**3598.95**
37.50	38.00	37.75	0.50	35.50	19.59	9.59	163.16	1.89	14.0	14.0	1.0	76.71	8146.81	48	1.0	90.5	2223.26	38.0	32.8	0	8.83	35.36	36.75	148.1	6147.3	16517.4	602.5	10972.6	**6606.95**	**3657.52**
38.00	40.00	39.00	2.00	37.50	18.83	8.83	163.16	7.54	32.8	32.8	1.1	904.17	9050.97	0	1.0	0.0	2223.26	40.0	32.8	0	8.83	35.36	36.75	148.1	6147.3	17421.5	636.4	11910.7	**6968.62**	**3970.22**
BORE NO: P127A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	17.70	7.70	21.18	1.89	28.0	28.0	1.0	21.23	21.23	2	1.0	3.8	3.77	3.0	28.0	0	7.70	16.76	17.79	23.1	530.9	555.9	8.5	33.5	**222.37**	**11.16**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction $Quf = \Sigma Ki.Pdi.\tan\delta.Asi$					Ultimate Shaft Cohesion $Quc = \Sigma\alpha.c.Asi$				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
3.00	4.00	3.50	1.00	1.50	17.70	7.70	26.95	3.77	28.0	28.0	1.0	54.04	75.27	0	1.0	0.0	3.77	4.0	29.7	3	9.85	20.58	21.71	30.8	893.0	972.1	25.5	104.5	**388.83**	**34.83**
4.00	6.00	5.00	2.00	3.50	19.85	9.85	40.65	7.54	29.7	29.7	1.0	174.89	250.17	3	1.0	22.6	26.40	6.0	30.5	0	9.85	23.78	24.96	50.5	1525.5	1802.1	59.4	336.0	**720.84**	**111.99**
6.00	7.00	6.50	1.00	4.50	19.85	9.85	55.43	3.77	30.5	30.5	1.0	126.21	376.37	0	1.0	0.0	26.40	7.0	30.5	0	9.96	23.78	24.96	60.4	1792.4	2195.2	76.4	479.1	**878.07**	**159.71**
7.00	9.00	8.00	2.00	6.50	19.96	9.96	70.31	7.54	30.5	30.5	1.0	320.20	696.58	0	1.0	0.0	26.40	9.0	23.4	15	9.96	8.85	9.12	80.3	1018.0	1741.0	110.3	833.3	**696.39**	**277.76**
9.00	10.00	9.50	1.00	7.50	19.96	9.96	85.25	3.77	23.4	23.4	1.0	139.13	835.71	15	1.0	56.6	82.97	10.0	23.4	15	9.96	8.85	9.12	90.2	1117.7	2036.4	127.3	1046.0	**814.56**	**348.65**
10.00	11.00	10.50	1.00	8.50	19.96	9.96	95.21	3.77	23.4	23.4	1.0	155.39	991.09	15	1.0	56.6	139.54	11.0	13.4	43	10.46	3.47	2.19	100.2	846.8	1977.4	144.3	1274.9	**790.97**	**424.96**
11.00	12.50	11.75	1.50	10.00	20.46	10.46	108.04	5.66	13.4	13.4	1.0	145.60	1136.70	43	1.0	243.3	382.80	12.5	13.4	43	10.46	3.47	2.19	115.9	908.4	2427.9	169.7	1689.2	**971.15**	**563.07**
12.50	14.00	13.25	1.50	11.50	20.46	10.46	123.73	5.66	13.4	13.4	1.0	166.75	1303.44	43	1.0	243.3	626.06	14.0	23.5	48	8.69	8.92	9.23	131.6	1871.1	3800.6	195.2	2124.7	**1520.24**	**708.22**
14.00	15.50	14.75	1.50	13.00	18.69	8.69	138.09	5.66	23.5	23.5	1.0	339.67	1643.11	48	1.0	271.5	897.60	15.5	26.4	2	8.22	13.15	14.11	144.6	2251.0	4791.7	220.6	2761.3	**1916.68**	**920.45**
15.50	18.50	17.00	3.00	16.00	18.22	8.22	156.94	11.31	26.4	26.4	1.0	881.42	2524.53	2	1.0	22.6	920.23	18.5	11.0	50	8.22	2.76	1.51	144.6	969.8	4414.5	271.5	3716.3	**1765.81**	**1238.77**
18.50	20.00	19.25	1.50	17.50	18.22	8.22	156.94	5.66	11.0	11.0	1.0	172.57	2697.10	50	1.0	282.9	1203.09	20.0	11.0	50	10.42	2.76	1.51	144.6	972.0	4872.2	297.0	4197.2	**1948.88**	**1399.06**
20.00	21.50	20.75	1.50	19.00	20.42	10.42	156.94	5.66	11.0	11.0	1.0	172.57	2869.67	50	1.0	282.9	1485.94	21.5	29.3	0	10.42	19.68	20.79	144.6	3367.4	7723.0	322.5	4678.1	**3089.21**	**1559.36**
21.50	23.00	22.25	1.50	20.50	20.42	10.42	156.94	5.66	29.3	29.3	1.0	498.21	3367.88	0	1.0	0.0	1485.94	23.0	30.3	0	10.42	22.77	23.94	144.6	3894.9	8748.7	347.9	5201.7	**3499.47**	**1733.91**
23.00	24.50	23.75	1.50	22.00	20.42	10.42	156.94	5.66	30.3	30.3	1.0	526.57	3894.46	0	1.0	0.0	1485.94	24.5	31.0	0	9.14	26.30	27.53	144.6	4473.2	9853.6	373.4	5753.8	**3941.46**	**1917.92**
24.50	26.00	25.25	1.50	23.50	19.14	9.14	156.94	5.66	31.0	31.0	1.1	560.12	4454.57	0	1.0	0.0	1485.94	26.0	31.0	0	9.07	26.30	27.53	144.6	4471.9	10412.5	398.8	6339.3	**4164.98**	**2113.12**
26.00	27.50	26.75	1.50	25.00	19.07	9.07	156.94	5.66	31.0	31.0	1.1	560.12	5014.69	0	1.0	0.0	1485.94	27.5	31.0	0	8.98	26.30	27.53	144.6	4470.3	10970.9	424.3	6924.9	**4388.36**	**2308.31**
27.50	29.00	28.25	1.50	26.50	18.98	8.98	156.94	5.66	31.0	31.0	1.1	560.12	5574.81	0	1.0	0.0	1485.94	29.0	20.0	45	8.98	6.40	5.39	144.6	1538.2	8598.9	449.7	7510.5	**3439.58**	**2503.50**
29.00	30.00	29.50	1.00	27.50	18.98	8.98	156.94	3.77	20.0	20.0	1.0	215.42	5790.23	45	1.0	169.7	1655.66	30.0	20.0	45	8.98	6.40	5.39	144.6	1538.2	8984.1	466.7	7912.6	**3593.63**	**2637.54**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
30.00	30.50	30.25	0.50	28.00	18.98	8.98	156.94	1.89	20.0	20.0	1.0	107.71	5897.95	45	1.0	84.9	1740.51	30.5	20.0	45	8.98	6.40	5.39	144.6	1538.2	9176.7	475.2	8113.7	**3670.66**	**2704.55**
30.50	32.00	31.25	1.50	29.50	18.98	8.98	156.94	5.66	20.0	20.0	1.0	323.13	6221.08	45	1.0	254.6	1995.09	32.0	22.0	20	8.14	7.84	7.59	144.6	1528.3	9744.4	500.7	8716.8	**3897.78**	**2905.61**
32.00	32.50	32.25	0.50	30.00	18.14	8.14	156.94	1.89	22.0	22.0	1.0	119.57	6340.65	20	1.0	37.7	2032.80	32.5	16.5	28	8.14	4.68	3.47	144.6	1069.7	9443.1	509.1	8882.6	**3777.25**	**2960.86**
32.50	33.50	33.00	1.00	31.00	18.14	8.14	156.94	3.77	16.5	16.5	1.0	175.32	6515.96	28	1.0	105.6	2138.40	33.5	9.0	28	8.98	2.29	1.07	144.6	666.3	9320.7	526.1	9180.5	**3728.26**	**3060.16**
33.50	35.00	34.25	1.50	32.50	18.98	8.98	156.94	5.66	9.0	9.0	1.0	140.61	6656.58	28	1.0	158.4	2296.80	35.0	9.0	30	8.98	2.29	1.07	144.6	686.7	9640.0	551.6	9505.0	**3856.01**	**3168.32**
35.00	36.50	35.75	1.50	34.00	18.98	8.98	156.94	5.66	9.0	9.0	1.0	140.61	6797.19	30	1.0	169.7	2466.51	36.5	11.0	62	8.74	2.76	1.51	144.6	1092.5	10356.2	577.0	9840.7	**4142.48**	**3280.25**
36.50	37.50	37.00	1.00	35.00	18.74	8.74	156.94	3.77	11.0	11.0	1.0	115.05	6912.24	62	1.0	233.8	2700.34	37.5	11.0	62	8.74	2.76	1.51	144.6	1092.5	10705.1	594.0	10206.6	**4282.03**	**3402.19**
37.50	38.00	37.75	0.50	35.50	18.74	8.74	156.94	1.89	11.0	11.0	1.0	57.52	6969.77	62	1.0	116.9	2817.26	38.0	14.5	57	8.96	3.80	2.51	144.6	1216.6	11003.6	602.5	10389.5	**4401.44**	**3463.17**
38.00	40.00	39.00	2.00	37.50	18.96	8.96	156.94	7.54	14.5	14.5	1.0	306.14	7275.90	57	1.0	429.9	3247.20	40.0	14.5	57	8.96	3.80	2.51	144.6	1216.6	11739.7	636.4	11159.5	**4695.87**	**3719.84**
BORE NO: P128A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	20.07	10.07	27.69	1.89	29.3	29.3	1.0	29.30	29.30	0	1.0	0.0	0.00	3.0	29.3	0	10.07	19.68	20.79	30.2	814.9	844.2	8.5	37.8	**337.68**	**12.60**
3.00	4.00	3.50	1.00	1.50	20.07	10.07	35.25	3.77	29.3	29.3	1.0	74.59	103.90	0	1.0	0.0	0.00	4.0	27.9	6	10.07	16.53	17.56	40.3	934.5	1038.4	25.5	129.4	**415.36**	**43.12**
4.00	5.00	4.50	1.00	2.50	20.07	10.07	45.32	3.77	27.9	27.9	1.0	90.49	194.39	6	1.0	22.6	22.63	5.0	27.9	6	9.82	16.53	17.56	50.4	1119.9	1336.9	42.4	259.4	**534.75**	**86.48**
5.00	6.00	5.50	1.00	3.50	19.82	9.82	55.26	3.77	27.9	27.9	1.0	110.35	304.73	6	1.0	22.6	45.26	6.0	24.3	0	9.82	9.50	10.11	60.2	713.9	1063.9	59.4	409.4	**425.55**	**136.46**
6.00	7.00	6.50	1.00	4.50	19.82	9.82	65.08	3.77	24.3	24.3	1.0	110.82	415.56	0	1.0	0.0	45.26	7.0	24.3	0	9.82	9.50	10.11	70.0	819.4	1280.2	76.4	537.2	**512.08**	**179.06**
7.00	8.00	7.50	1.00	5.50	19.82	9.82	74.90	3.77	24.3	24.3	1.0	127.54	543.10	0	1.0	0.0	45.26	8.0	12.0	42	10.58	3.06	1.79	79.8	716.7	1305.0	93.3	681.7	**522.02**	**227.23**
8.00	9.00	8.50	1.00	6.50	20.58	10.58	85.10	3.77	12.0	12.0	1.0	68.22	611.32	42	1.0	158.4	203.66	9.0	12.0	42	10.58	3.06	1.79	90.4	753.3	1568.3	110.3	925.3	**627.31**	**308.43**
9.00	10.00	9.50	1.00	7.50	20.58	10.58	95.68	3.77	12.0	12.0	1.0	76.70	688.02	42	1.0	158.4	362.06	10.0	7.5	53	10.72	2.02	0.84	101.0	776.5	1826.6	127.3	1177.4	**730.64**	**392.45**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m
Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0
Area of Pile: 1.13 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
10.00	12.50	11.25	2.50	10.00	20.72	10.72	114.37	9.43	7.5	7.5	1.0	141.97	829.99	53	1.0	499.7	861.77	12.5	24.3	9	10.09	9.50	10.11	127.8	1533.7	3225.4	169.7	1861.5	**1290.17**	**620.49**
12.50	15.50	14.00	3.00	13.00	20.09	10.09	142.91	11.31	24.3	24.3	1.0	730.04	1560.03	9	1.0	101.8	963.60	15.5	29.5	0	9.80	20.13	21.25	158.0	3741.5	6265.1	220.6	2744.3	**2506.04**	**914.75**
15.50	18.50	17.00	3.00	16.00	19.80	9.80	172.74	11.31	29.5	29.5	1.0	1105.76	2665.79	0	1.0	0.0	963.60	18.5	30.4	0	10.02	23.27	24.45	158.0	4328.1	7957.4	271.5	3900.9	**3182.98**	**1300.31**
18.50	21.50	20.00	3.00	19.00	20.02	10.02	172.74	11.31	30.4	30.4	1.0	1169.59	3835.39	0	1.0	0.0	963.60	21.5	30.4	0	10.02	23.27	24.45	158.0	4328.1	9127.0	322.5	5121.4	**3650.81**	**1707.15**
21.50	23.00	22.25	1.50	20.50	20.02	10.02	172.74	5.66	30.4	30.4	1.0	584.80	4420.18	0	1.0	0.0	963.60	23.0	15.3	32	10.27	4.09	2.81	158.0	1076.4	6460.2	347.9	5731.7	**2584.06**	**1910.56**
23.00	24.50	23.75	1.50	22.00	20.27	10.27	172.74	5.66	15.3	15.3	1.0	267.34	4687.52	32	1.0	181.0	1144.63	24.5	15.3	32	10.27	4.09	2.81	158.0	1076.4	6908.5	373.4	6205.5	**2763.41**	**2068.51**
24.50	26.00	25.25	1.50	23.50	20.27	10.27	172.74	5.66	15.3	15.3	1.0	267.34	4954.85	32	1.0	181.0	1325.66	26.0	30.2	0	10.27	22.27	23.43	158.0	4144.9	10425.4	398.8	6679.3	**4170.16**	**2226.45**
26.00	27.50	26.75	1.50	25.00	20.27	10.27	172.74	5.66	30.2	30.2	1.0	574.44	5529.29	0	1.0	0.0	1325.66	27.5	31.0	0	9.20	26.30	27.53	158.0	4874.1	11729.0	424.3	7279.2	**4691.62**	**2426.41**
27.50	29.00	28.25	1.50	26.50	19.20	9.20	172.74	5.66	31.0	31.0	1.1	616.53	6145.82	0	1.0	0.0	1325.66	29.0	13.0	53	9.07	3.35	2.08	158.0	1151.5	8623.0	449.7	7921.2	**3449.19**	**2640.41**
29.00	30.00	29.50	1.00	27.50	19.07	9.07	172.74	3.77	13.0	13.0	1.0	150.41	6296.23	53	1.0	199.9	1525.54	30.0	12.4	53	9.07	3.17	1.91	158.0	1119.1	8940.9	466.7	8288.5	**3576.35**	**2762.83**
30.00	30.50	30.25	0.50	28.00	19.07	9.07	172.74	1.89	12.4	12.4	1.0	71.62	6367.84	53	1.0	99.9	1625.49	30.5	12.5	42	8.69	3.20	1.94	158.0	1012.0	9005.3	475.2	8468.5	**3602.13**	**2822.84**
30.50	32.00	31.25	1.50	29.50	18.69	8.69	172.74	5.66	12.5	12.5	1.0	216.64	6584.49	42	1.0	237.6	1863.09	32.0	12.5	42	8.80	3.20	1.94	158.0	1012.1	9459.7	500.7	8948.2	**3783.89**	**2982.74**
32.00	32.50	32.25	0.50	30.00	18.80	8.80	172.74	1.89	12.5	12.5	1.0	72.21	6656.70	42	1.0	79.2	1942.29	32.5	12.5	42	8.80	3.20	1.94	158.0	1012.1	9611.1	509.1	9108.1	**3844.45**	**3036.04**
32.50	33.50	33.00	1.00	31.00	18.80	8.80	172.74	3.77	12.5	12.5	1.0	144.43	6801.13	42	1.0	158.4	2100.69	33.5	10.4	56	9.05	2.59	1.33	158.0	1041.1	9942.9	526.1	9427.9	**3977.18**	**3142.64**
33.50	35.00	34.25	1.50	32.50	19.05	9.05	172.74	5.66	10.4	10.4	1.0	179.35	6980.48	56	1.0	316.8	2417.49	35.0	10.5	56	9.02	2.62	1.36	158.0	1046.5	10444.5	551.6	9949.5	**4177.80**	**3316.51**
35.00	36.50	35.75	1.50	34.00	19.02	9.02	172.74	5.66	10.5	10.5	1.0	181.12	7161.60	56	1.0	316.8	2734.29	36.5	10.5	49	8.63	2.62	1.36	158.0	974.9	10870.8	577.0	10472.9	**4348.31**	**3490.97**
36.50	37.50	37.00	1.00	35.00	18.63	8.63	172.74	3.77	10.5	10.5	1.0	120.74	7282.34	49	1.0	184.8	2919.09	37.5	10.5	49	8.63	2.62	1.36	158.0	974.9	11176.3	594.0	10795.4	**4470.53**	**3598.48**
37.50	38.00	37.75	0.50	35.50	18.63	8.63	172.74	1.89	10.5	10.5	1.0	60.37	7342.72	49	1.0	92.4	3011.49	38.0	9.0	55	9.05	2.29	1.07	158.0	976.1	11330.3	602.5	10956.7	**4532.11**	**3652.23**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Factor of Safety in Compression: 2.5
Area of Pile: 1.13 m^2
Critical water table: 0.00 m
Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
38.00	40.00	39.00	2.00	37.50	19.05	9.05	172.74	7.54	9.0	9.0	1.0	206.37	7549.08	55	1.0	414.9	3426.34	40.0	9.0	55	9.05	2.29	1.07	158.0	976.1	11951.5	636.4	11611.9	**4780.60**	**3870.62**
BORE NO: P129A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.76	9.76	26.84	1.89	28.7	28.7	1.0	27.71	27.71	0	1.0	0.0	0.00	3.0	28.7	0	9.27	18.33	19.40	29.3	729.4	757.1	8.5	36.2	**302.85**	**12.07**
3.00	5.00	4.00	2.00	2.50	19.27	9.27	38.55	7.54	28.7	28.7	1.0	159.20	186.91	0	1.0	0.0	0.00	5.0	28.7	0	9.27	18.33	19.40	47.8	1114.0	1300.9	42.4	229.3	**520.35**	**76.44**
5.00	6.00	5.50	1.00	3.50	19.27	9.27	52.46	3.77	28.7	28.7	1.0	108.31	295.21	0	1.0	0.0	0.00	6.0	27.2	0	9.27	14.95	15.95	57.1	1066.3	1361.5	59.4	354.6	**544.61**	**118.20**
6.00	7.00	6.50	1.00	4.50	19.27	9.27	61.73	3.77	27.2	27.2	1.0	119.64	414.85	0	1.0	0.0	0.00	7.0	10.6	44	9.93	2.65	1.39	66.4	656.1	1071.0	76.4	491.2	**428.39**	**163.74**
7.00	8.00	7.50	1.00	5.50	19.93	9.93	71.33	3.77	10.6	10.6	1.0	50.34	465.19	44	1.0	165.9	165.94	8.0	10.6	44	9.93	2.65	1.39	76.3	685.9	1317.0	93.3	724.5	**526.80**	**241.49**
8.00	9.00	8.50	1.00	6.50	19.93	9.93	81.26	3.77	10.6	10.6	1.0	57.35	522.54	44	1.0	165.9	331.89	9.0	9.6	49	9.93	2.40	1.16	86.2	740.7	1595.1	110.3	964.7	**638.05**	**321.58**
9.00	10.00	9.50	1.00	7.50	19.93	9.93	91.19	3.77	9.6	9.6	1.0	58.17	580.71	49	1.0	184.8	516.69	10.0	9.6	49	10.15	2.40	1.16	96.2	767.8	1865.2	127.3	1224.7	**746.08**	**408.23**
10.00	11.00	10.50	1.00	8.50	20.15	10.15	101.23	3.77	9.6	9.6	1.0	64.57	645.28	49	1.0	184.8	701.49	11.0	9.6	49	10.15	2.40	1.16	106.3	795.4	2142.1	144.3	1491.0	**856.85**	**497.01**
11.00	12.00	11.50	1.00	9.50	20.15	10.15	111.38	3.77	9.6	9.6	1.0	71.04	716.33	49	1.0	184.8	886.29	12.0	9.6	49	10.15	2.40	1.16	116.5	822.9	2425.5	161.2	1763.8	**970.20**	**587.95**
12.00	13.00	12.50	1.00	10.50	20.15	10.15	121.53	3.77	9.6	9.6	1.0	77.52	793.85	49	1.0	184.8	1071.09	13.0	12.4	44	10.76	3.17	1.91	126.6	916.7	2781.7	178.2	2043.1	**1112.66**	**681.04**
13.00	14.50	13.75	1.50	12.00	20.76	10.76	134.67	5.66	12.4	12.4	1.0	167.50	961.35	44	1.0	248.9	1320.00	14.5	29.3	0	10.76	19.68	20.79	142.7	3330.7	5612.0	203.7	2485.0	**2244.81**	**828.34**
14.50	16.00	15.25	1.50	13.50	20.76	10.76	150.81	5.66	29.3	29.3	1.0	478.77	1440.12	0	1.0	0.0	1320.00	16.0	11.5	53	10.29	2.91	1.65	158.9	1074.5	3834.6	229.1	2989.2	**1533.84**	**996.41**
16.00	17.50	16.75	1.50	15.00	20.29	10.29	166.60	5.66	11.5	11.5	1.0	191.75	1631.86	53	1.0	299.8	1619.83	17.5	28.6	4	10.54	18.11	19.17	174.3	3749.1	7000.7	254.6	3506.3	**2800.30**	**1168.75**
17.50	20.50	19.00	3.00	18.00	20.54	10.54	166.60	11.31	28.6	28.6	1.0	1027.70	2659.56	4	1.0	45.3	1665.09	20.5	28.0	0	10.54	16.76	17.79	174.3	3432.0	7756.6	305.5	4630.1	**3102.64**	**1543.38**
20.50	22.00	21.25	1.50	19.50	20.54	10.54	166.60	5.66	28.0	28.0	1.0	501.12	3160.68	0	1.0	0.0	1665.09	22.0	30.7	0	10.54	24.79	25.99	174.3	5074.3	9900.1	330.9	5156.7	**3960.03**	**1718.90**
22.00	23.50	22.75	1.50	21.00	20.54	10.54	166.60	5.66	30.7	30.7	1.0	579.18	3739.86	0	1.0	0.0	1665.09	23.5	31.5	0	9.14	28.82	30.09	174.3	5869.9	11274.8	356.4	5761.3	**4509.92**	**1920.45**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
23.50	25.00	24.25	1.50	22.50	19.14	9.14	166.60	5.66	31.5	31.5	1.1	620.86	4360.72	0	1.0	0.0	1665.09	25.0	31.5	0	9.10	28.82	30.09	174.3	5869.0	11894.9	381.9	6407.7	**4757.94**	**2135.89**
25.00	26.50	25.75	1.50	24.00	19.10	9.10	166.60	5.66	31.5	31.5	1.1	620.86	4981.58	0	1.0	0.0	1665.09	26.5	31.5	0	9.23	28.82	30.09	174.3	5871.7	12518.4	407.3	7054.0	**5007.35**	**2351.33**
26.50	27.50	27.00	1.00	25.00	19.23	9.23	166.60	3.77	31.5	31.5	1.1	413.91	5395.49	0	1.0	0.0	1665.09	27.5	31.5	0	9.23	28.82	30.09	174.3	5871.7	12932.3	424.3	7484.9	**5172.91**	**2494.95**
27.50	28.00	27.75	0.50	25.50	19.23	9.23	166.60	1.89	31.5	31.5	1.1	206.95	5602.44	0	1.0	0.0	1665.09	28.0	31.5	0	9.05	28.82	30.09	174.3	5868.0	13135.6	432.8	7700.3	**5254.22**	**2566.77**
28.00	29.50	28.75	1.50	27.00	19.05	9.05	166.60	5.66	31.5	31.5	1.1	620.86	6223.30	0	1.0	0.0	1665.09	29.5	31.5	0	9.48	28.82	30.09	174.3	5876.8	13765.2	458.2	8346.6	**5506.08**	**2782.20**
29.50	30.00	29.75	0.50	27.50	19.48	9.48	166.60	1.89	31.5	31.5	1.1	206.95	6430.25	0	1.0	0.0	1665.09	30.0	31.5	0	9.48	28.82	30.09	174.3	5876.8	13972.1	466.7	8562.1	**5588.86**	**2854.02**
30.00	31.00	30.50	1.00	28.50	19.48	9.48	166.60	3.77	31.5	31.5	1.1	413.91	6844.16	0	1.0	0.0	1665.09	31.0	30.9	0	9.29	25.79	27.01	174.3	5257.4	13766.7	483.7	8992.9	**5506.67**	**2997.64**
31.00	32.50	31.75	1.50	30.00	19.29	9.29	166.60	5.66	30.9	30.9	1.0	589.44	7433.59	0	1.0	0.0	1665.09	32.5	29.3	0	8.89	19.68	20.79	174.3	4007.5	13106.1	509.1	9607.8	**5242.46**	**3202.61**
32.50	34.00	33.25	1.50	31.50	18.89	8.89	166.60	5.66	29.3	29.3	1.0	528.89	7962.48	0	1.0	0.0	1665.09	34.0	29.9	0	9.31	21.03	22.17	174.3	4288.6	13916.2	534.6	10162.2	**5566.47**	**3387.39**
34.00	35.00	34.50	1.00	32.50	19.31	9.31	166.60	3.77	29.9	29.9	1.0	361.29	8323.78	0	1.0	0.0	1665.09	35.0	29.9	0	9.31	21.03	22.17	174.3	4288.6	14277.5	551.6	10540.4	**5710.99**	**3513.48**
35.00	35.50	35.25	0.50	33.00	19.31	9.31	166.60	1.89	29.9	29.9	1.0	180.65	8504.42	0	1.0	0.0	1665.09	35.5	25.6	10	9.14	11.35	12.26	174.3	2416.6	12586.2	560.1	10729.6	**5034.46**	**3576.52**
35.50	37.00	36.25	1.50	34.50	19.14	9.14	166.60	5.66	25.6	25.6	1.0	451.55	8955.98	10	1.0	56.6	1721.66	37.0	31.6	0	9.08	29.32	30.60	174.3	5971.2	16648.8	585.5	11263.1	**6659.51**	**3754.38**
37.00	37.50	37.25	0.50	35.00	19.08	9.08	166.60	1.89	31.6	31.6	1.1	208.73	9164.71	0	1.0	0.0	1721.66	37.5	31.6	0	9.08	29.32	30.60	174.3	5971.2	16857.5	594.0	11480.4	**6743.01**	**3826.79**
37.50	38.50	38.00	1.00	36.00	19.08	9.08	166.60	3.77	31.6	31.6	1.1	417.46	9582.17	0	1.0	0.0	1721.66	38.5	31.6	0	9.10	29.32	30.60	174.3	5971.6	17275.4	611.0	11914.8	**6910.16**	**3971.60**
38.50	40.00	39.25	1.50	37.50	19.10	9.10	166.60	5.66	31.6	31.6	1.1	626.19	10208.36	0	1.0	0.0	1721.66	40.0	20.0	35	9.10	6.40	5.39	174.3	1651.9	13582.0	636.4	12566.5	**5432.78**	**4188.82**
BORE NO: P130A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.84	9.84	27.06	1.89	25.2	25.2	1.0	24.01	0	3	1.0	5.7	0	3.0	25.2	3	9.84	10.45	11.34	29.5	0	0.0	8.5	8.5	**0.00**	**2.83**
3.00	4.00	3.50	1.00	1.50	19.84	9.84	34.44	3.77	25.2	25.2	1.0	61.12	0	3	1.0	11.3	0	4.0	25.1	0	9.84	10.23	11.11	39.4	529.6	529.6	25.5	25.5	**211.83**	**8.49**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
4.00	5.00	4.50	1.00	2.50	19.84	9.84	44.28	3.77	25.1	25.1	1.0	78.23	78.23	0	1.0	0.0	0.00	5.0	24.2	6	9.52	9.42	10.00	49.2	650.3	728.6	42.4	120.7	**291.42**	**40.22**
5.00	6.00	5.50	1.00	3.50	19.52	9.52	53.96	3.77	24.2	24.2	1.0	91.46	169.69	6	1.0	22.6	22.63	6.0	27.2	7	9.52	14.95	15.95	58.7	1167.9	1360.2	59.4	251.7	**544.07**	**83.91**
6.00	7.00	6.50	1.00	4.50	19.52	9.52	63.48	3.77	27.2	27.2	1.0	123.04	292.73	7	1.0	26.4	49.03	7.0	27.2	7	10.43	14.95	15.95	68.2	1338.8	1680.6	76.4	418.1	**672.22**	**139.38**
7.00	9.00	8.00	2.00	6.50	20.43	10.43	78.67	7.54	27.2	27.2	1.0	304.96	597.69	7	1.0	52.8	101.83	9.0	26.7	0	10.43	13.83	14.80	89.1	1498.8	2198.3	110.3	809.8	**879.33**	**269.94**
9.00	10.00	9.50	1.00	7.50	20.43	10.43	94.32	3.77	26.7	26.7	1.0	178.90	776.59	0	1.0	0.0	101.83	10.0	14.4	56	10.43	3.77	2.48	99.5	1011.9	1890.3	127.3	1005.7	**756.12**	**335.24**
10.00	11.00	10.50	1.00	8.50	20.43	10.43	104.75	3.77	14.4	14.4	1.0	101.43	878.02	56	1.0	211.2	313.03	11.0	10.6	55	9.89	2.65	1.39	110.0	898.6	2089.7	144.3	1335.3	**835.88**	**445.10**
11.00	12.50	11.75	1.50	10.00	19.89	9.89	117.38	5.66	10.6	10.6	1.0	124.27	1002.29	55	1.0	311.1	624.17	12.5	9.8	57	10.16	2.43	1.19	124.8	932.3	2558.8	169.7	1796.2	**1023.50**	**598.72**
12.50	15.50	14.00	3.00	13.00	20.16	10.16	140.04	11.31	9.8	9.8	1.0	273.67	1275.96	57	1.0	644.9	1269.09	15.5	26.7	4	9.97	13.83	14.80	155.3	2570.3	5115.3	220.6	2765.7	**2046.12**	**921.89**
15.50	18.50	17.00	3.00	16.00	19.97	9.97	170.23	11.31	26.7	26.7	1.0	968.69	2244.65	4	1.0	45.3	1314.34	18.5	26.0	0	9.97	12.25	13.18	155.3	2241.7	5800.7	271.5	3830.5	**2320.27**	**1276.85**
18.50	20.00	19.25	1.50	17.50	19.97	9.97	170.23	5.66	26.0	26.0	1.0	469.69	2714.35	0	1.0	0.0	1314.34	20.0	26.8	4	10.42	14.05	15.03	155.3	2616.0	6644.7	297.0	4325.7	**2657.86**	**1441.90**
20.00	21.50	20.75	1.50	19.00	20.42	10.42	170.23	5.66	26.8	26.8	1.0	486.45	3200.80	4	1.0	22.6	1336.97	21.5	31.5	0	10.42	28.82	30.09	155.3	5275.3	9813.0	322.5	4860.2	**3925.21**	**1620.08**
21.50	23.00	22.25	1.50	20.50	20.42	10.42	170.23	5.66	31.5	31.5	1.1	634.40	3835.20	0	1.0	0.0	1336.97	23.0	30.7	0	10.42	24.79	25.99	155.3	4538.3	9710.4	347.9	5520.1	**3884.17**	**1840.03**
23.00	24.50	23.75	1.50	22.00	20.42	10.42	170.23	5.66	30.7	30.7	1.0	591.81	4427.01	0	1.0	0.0	1336.97	24.5	25.7	9	10.43	11.58	12.49	155.3	2213.9	7977.8	373.4	6137.4	**3191.14**	**2045.78**
24.50	26.00	25.25	1.50	23.50	20.43	10.43	170.23	5.66	25.7	25.7	1.0	463.47	4890.48	9	1.0	50.9	1387.89	26.0	30.5	0	10.43	23.78	24.96	155.3	4354.2	10632.5	398.8	6677.2	**4253.01**	**2225.73**
26.00	27.50	26.75	1.50	25.00	20.43	10.43	170.23	5.66	30.5	30.5	1.0	581.44	5471.92	0	1.0	0.0	1387.89	27.5	30.5	0	10.43	23.78	24.96	155.3	4354.2	11214.0	424.3	7284.1	**4485.59**	**2428.03**
27.50	29.00	28.25	1.50	26.50	20.43	10.43	170.23	5.66	30.5	30.5	1.0	581.44	6053.36	0	1.0	0.0	1387.89	29.0	31.8	0	10.43	30.33	31.63	155.3	5551.8	12993.1	449.7	7891.0	**5197.23**	**2630.33**
29.00	30.00	29.50	1.00	27.50	20.43	10.43	170.23	3.77	31.8	31.8	1.1	433.89	6487.25	0	1.0	0.0	1387.89	30.0	31.8	0	9.03	30.33	31.63	155.3	5521.8	13396.9	466.7	8341.8	**5358.77**	**2780.62**
30.00	30.50	30.25	0.50	28.00	19.03	9.03	170.23	1.89	31.8	31.8	1.1	216.94	6704.19	0	1.0	0.0	1387.89	30.5	16.0	52	8.25	4.43	3.20	155.3	1326.0	9418.1	475.2	8567.3	**3767.25**	**2855.76**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 1.13 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
30.50	32.00	31.25	1.50	29.50	18.25	8.25	170.23	5.66	16.0	16.0	1.0	276.14	6980.33	52	1.0	294.2	1682.06	32.0	16.0	52	7.94	4.43	3.20	155.3	1325.4	9987.8	500.7	9163.0	**3995.10**	**3054.35**
32.00	32.50	32.25	0.50	30.00	17.94	7.94	170.23	1.89	16.0	16.0	1.0	92.05	7072.38	52	1.0	98.1	1780.11	32.5	16.0	52	7.94	4.43	3.20	155.3	1325.4	10177.9	509.1	9361.6	**4071.15**	**3120.55**
32.50	33.50	33.00	1.00	31.00	17.94	7.94	170.23	3.77	16.0	16.0	1.0	184.09	7256.47	52	1.0	196.1	1976.23	33.5	28.8	0	8.86	18.56	19.64	155.3	3378.3	12611.0	526.1	9758.8	**5044.39**	**3252.94**
33.50	35.00	34.25	1.50	32.50	18.86	8.86	170.23	5.66	28.8	28.8	1.0	529.42	7785.89	0	1.0	0.0	1976.23	35.0	25.2	6	9.33	10.45	11.34	155.3	1968.9	11731.0	551.6	10313.7	**4692.40**	**3437.90**
35.00	36.50	35.75	1.50	34.00	19.33	9.33	170.23	5.66	25.2	25.2	1.0	453.16	8239.05	6	1.0	33.9	2010.17	36.5	25.2	6	8.80	10.45	11.34	155.3	1964.8	12214.0	577.0	10826.3	**4885.61**	**3608.75**
36.50	37.50	37.00	1.00	35.00	18.80	8.80	170.23	3.77	25.2	25.2	1.0	302.11	8541.16	6	1.0	22.6	2032.80	37.5	26.0	6	8.80	12.25	13.18	155.3	2292.3	12866.3	594.0	11168.0	**5146.51**	**3722.65**
37.50	38.00	37.75	0.50	35.50	18.80	8.80	170.23	1.89	26.0	26.0	1.0	156.56	8697.73	6	1.0	11.3	2044.11	38.0	26.0	6	9.17	12.25	13.18	155.3	2295.6	13037.5	602.5	11344.3	**5214.98**	**3781.44**
38.00	40.00	39.00	2.00	37.50	19.17	9.17	170.23	7.54	26.0	26.0	1.0	626.26	9323.99	6	1.0	45.3	2089.37	40.0	23.0	15	9.17	8.56	8.68	155.3	1710.6	13124.0	636.4	12049.8	**5249.60**	**4016.60**
BORE NO: P131A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	16.66	6.66	18.32	1.89	27.2	27.2	1.0	17.75	17.75	3	1.0	5.7	5.66	3.0	28.9	1	9.70	18.78	19.87	20.0	565.6	589.0	8.5	31.9	**235.60**	**10.63**
3.00	5.00	4.00	2.00	2.50	19.70	9.70	29.68	7.54	28.9	28.9	1.0	123.58	141.33	1	1.0	7.5	13.20	5.0	28.6	1	9.70	18.11	19.17	39.4	943.2	1097.7	42.4	197.0	**439.10**	**65.65**
5.00	6.00	5.50	1.00	3.50	19.70	9.70	44.23	3.77	28.6	28.6	1.0	90.95	232.28	1	1.0	3.8	16.97	6.0	28.6	1	9.88	18.11	19.17	49.1	1144.3	1393.5	59.4	308.7	**557.41**	**102.88**
6.00	8.00	7.00	2.00	5.50	19.88	9.88	58.96	7.54	28.6	28.6	1.0	242.47	474.75	1	1.0	7.5	24.51	8.0	10.5	36	9.88	2.62	1.36	68.8	579.6	1078.8	93.3	592.6	**431.53**	**197.54**
8.00	9.00	8.50	1.00	6.50	19.88	9.88	73.78	3.77	10.5	10.5	1.0	51.57	526.33	36	1.0	135.8	160.29	9.0	10.5	36	9.59	2.62	1.36	78.7	608.5	1295.2	110.3	796.9	**518.06**	**265.64**
9.00	11.00	10.00	2.00	8.50	19.59	9.59	88.31	7.54	10.5	10.5	1.0	123.46	649.78	36	1.0	271.5	431.83	11.0	10.2	56	9.59	2.53	1.28	97.9	858.7	1940.3	144.3	1225.9	**776.11**	**408.62**
11.00	12.00	11.50	1.00	9.50	19.59	9.59	102.70	3.77	10.2	10.2	1.0	69.69	719.47	56	1.0	211.2	643.03	12.0	10.2	56	10.80	2.53	1.28	107.5	887.1	2249.6	161.2	1523.7	**899.86**	**507.91**
12.00	14.50	13.25	2.50	12.00	20.80	10.80	120.99	9.43	10.2	10.2	1.0	205.26	924.73	56	1.0	528.0	1171.03	14.5	10.2	56	10.80	2.53	1.28	134.5	964.4	3060.2	203.7	2299.4	**1224.06**	**766.47**
14.50	16.00	15.25	1.50	13.50	20.80	10.80	142.59	5.66	10.2	10.2	1.0	145.14	1069.86	56	1.0	316.8	1487.83	16.0	11.9	54	10.08	3.03	1.76	150.7	1078.3	3636.0	229.1	2786.8	**1454.40**	**928.94**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m
Critical water table: 0.00 m

Factor of Safety in Compression: 2.5
Factor of Safety in Tension: 3.0

Area of Pile: 1.13 m^2

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi			
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi
16.00	17.50	16.75	1.50	15.00	20.08	10.08	158.25	5.66	11.9	11.9	1.0	188.66	1258.52	54	1.0	305.5	1793.31
17.50	20.50	19.00	3.00	18.00	20.67	10.67	158.25	11.31	30.0	30.0	1.0	1033.74	2292.26	0	1.0	0.0	1793.31
20.50	22.00	21.25	1.50	19.50	20.67	10.67	158.25	5.66	30.0	30.0	1.0	516.87	2809.13	0	1.0	0.0	1793.31
22.00	23.50	22.75	1.50	21.00	20.67	10.67	158.25	5.66	30.0	30.0	1.0	516.87	3326.00	0	1.0	0.0	1793.31
23.50	25.00	24.25	1.50	22.50	19.15	9.15	158.25	5.66	30.0	30.0	1.0	516.87	3842.87	0	1.0	0.0	1793.31
25.00	26.50	25.75	1.50	24.00	19.04	9.04	158.25	5.66	30.0	30.0	1.0	516.87	4359.73	0	1.0	0.0	1793.31
26.50	27.50	27.00	1.00	25.00	19.39	9.39	158.25	3.77	30.0	30.0	1.0	344.58	4704.31	0	1.0	0.0	1793.31
27.50	28.00	27.75	0.50	25.50	20.37	10.37	158.25	1.89	30.0	30.0	1.0	172.29	4876.60	0	1.0	0.0	1793.31
28.00	29.50	28.75	1.50	27.00	20.37	10.37	158.25	5.66	30.0	30.0	1.0	516.87	5393.47	0	1.0	0.0	1793.31
29.50	30.00	29.75	0.50	27.50	20.37	10.37	158.25	1.89	13.0	13.0	1.0	68.89	5462.37	39	1.0	73.5	1866.86
30.00	31.00	30.50	1.00	28.50	20.37	10.37	158.25	3.77	13.0	13.0	1.0	137.79	5600.15	39	1.0	147.1	2013.94
31.00	32.50	31.75	1.50	30.00	20.37	10.37	158.25	5.66	13.0	13.0	1.0	206.68	5806.84	39	1.0	220.6	2234.57
32.50	34.00	33.25	1.50	31.50	20.37	10.37	158.25	5.66	16.0	16.0	1.0	256.71	6063.54	56	1.0	316.8	2551.37
34.00	35.00	34.50	1.00	32.50	20.37	10.37	158.25	3.77	29.6	29.6	1.0	339.05	6402.59	0	1.0	0.0	2551.37
35.00	35.50	35.25	0.50	33.00	17.85	7.85	158.25	1.89	27.9	27.9	1.0	158.00	6560.59	0	1.0	0.0	2551.37
35.50	37.00	36.25	1.50	34.50	18.89	8.89	158.25	5.66	25.2	25.2	1.0	421.27	6981.86	10	1.0	56.6	2607.94
37.00	37.50	37.25	0.50	35.00	18.76	8.76	158.25	1.89	25.2	25.2	1.0	140.42	7122.29	10	1.0	18.9	2626.80
37.50	38.50	38.00	1.00	36.00	18.76	8.76	158.25	3.77	25.2	25.2	1.0	280.85	7403.13	10	1.0	37.7	2664.51

Layers (m)		Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
16.00	17.50	17.5	30.0	0	10.67	21.26	22.40	165.8	4150.6	7202.4	254.6	3306.4	**2880.97**	**1102.14**
17.50	20.50	20.5	30.0	0	10.67	21.26	22.40	165.8	4150.6	8236.2	305.5	4391.1	**3294.46**	**1463.69**
20.50	22.00	22.0	30.0	0	10.67	21.26	22.40	165.8	4150.6	8753.0	330.9	4933.4	**3501.21**	**1644.46**
22.00	23.50	23.5	30.0	0	9.15	21.26	22.40	165.8	4127.5	9246.8	356.4	5475.7	**3698.71**	**1825.24**
23.50	25.00	25.0	30.0	0	9.04	21.26	22.40	165.8	4125.8	9762.0	381.9	6018.0	**3904.79**	**2006.01**
25.00	26.50	26.5	30.0	0	9.39	21.26	22.40	165.8	4131.1	10284.2	407.3	6560.4	**4113.67**	**2186.79**
26.50	27.50	27.5	30.0	0	10.37	21.26	22.40	165.8	4146.0	10643.7	424.3	6921.9	**4257.46**	**2307.30**
27.50	28.00	28.0	30.0	0	10.37	21.26	22.40	165.8	4146.0	10815.9	432.8	7102.7	**4326.38**	**2367.56**
28.00	29.50	29.5	13.0	39	10.37	3.35	2.08	165.8	1040.2	8227.0	458.2	7645.0	**3290.81**	**2548.34**
29.50	30.00	30.0	13.0	39	10.37	3.35	2.08	165.8	1040.2	8369.5	466.7	7795.9	**3347.78**	**2598.65**
30.00	31.00	31.0	13.0	39	10.37	3.35	2.08	165.8	1040.2	8654.3	483.7	8097.8	**3461.73**	**2699.26**
31.00	32.50	32.5	16.0	56	10.37	4.43	3.20	165.8	1424.2	9465.6	509.1	8550.6	**3786.25**	**2850.18**
32.50	34.00	34.0	29.6	0	10.37	20.36	21.48	165.8	3970.6	12585.5	534.6	9149.5	**5034.19**	**3049.84**
34.00	35.00	35.0	27.9	0	7.85	16.53	17.56	165.8	3194.7	12148.7	551.6	9505.5	**4859.48**	**3168.51**
35.00	35.50	35.5	25.2	10	8.89	10.45	11.34	165.8	2130.8	11242.7	560.1	9672.0	**4497.10**	**3224.01**
35.50	37.00	37.0	25.2	10	8.76	10.45	11.34	165.8	2129.8	11719.6	585.5	10175.3	**4687.84**	**3391.77**
37.00	37.50	37.5	25.2	10	8.76	10.45	11.34	165.8	2129.8	11878.9	594.0	10343.1	**4751.55**	**3447.70**
37.50	38.50	38.5	25.2	10	8.94	10.45	11.34	165.8	2131.2	12198.8	611.0	10678.6	**4879.53**	**3559.54**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
38.50	40.00	39.25	1.50	37.50	18.94	8.94	158.25	5.66	25.2	25.2	1.0	421.27	7824.40	10	1.0	56.6	2721.09	40.0	29.6	0	8.94	20.36	21.48	165.8	3949.7	14495.2	636.4	11181.9	**5798.07**	**3727.31**
BORE NO: P132A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	19.92	9.92	27.28	1.89	28.7	28.7	1.0	28.16	28.16	1	1.0	1.9	1.89	3.0	28.7	1	9.94	18.33	19.40	29.8	758.4	788.4	8.5	38.5	**315.37**	**12.85**
3.00	5.00	4.00	2.00	2.50	19.94	9.94	39.70	7.54	28.7	28.7	1.0	163.94	192.11	1	1.0	7.5	9.43	5.0	28.7	0	9.94	18.33	19.40	49.6	1160.5	1362.1	42.4	244.0	**544.83**	**81.32**
5.00	6.00	5.50	1.00	3.50	19.94	9.94	54.61	3.77	28.7	28.7	1.0	112.76	304.87	0	1.0	0.0	9.43	6.0	28.7	0	9.94	18.33	19.40	59.6	1366.7	1681.0	59.4	373.7	**672.40**	**124.57**
6.00	7.00	6.50	1.00	4.50	19.94	9.94	64.55	3.77	28.7	28.7	1.0	133.28	438.15	0	1.0	0.0	9.43	7.0	12.1	46	11.05	3.09	1.82	69.5	724.9	1172.5	76.4	523.9	**468.99**	**174.65**
7.00	8.00	7.50	1.00	5.50	21.05	11.05	75.05	3.77	12.1	12.1	1.0	60.68	498.83	46	1.0	173.5	182.91	8.0	12.1	46	11.05	3.09	1.82	80.6	763.5	1445.2	93.3	775.1	**578.09**	**258.36**
8.00	9.00	8.50	1.00	6.50	21.05	11.05	86.10	3.77	12.1	12.1	1.0	69.61	568.44	46	1.0	173.5	356.40	9.0	12.1	46	10.51	3.09	1.82	91.6	801.4	1726.3	110.3	1035.1	**690.50**	**345.05**
9.00	11.00	10.00	2.00	8.50	20.51	10.51	102.13	7.54	12.1	12.1	1.0	165.15	733.58	46	1.0	347.0	703.37	11.0	12.1	46	10.51	3.09	1.82	112.6	874.8	2311.8	144.3	1581.2	**924.72**	**527.07**
11.00	12.00	11.50	1.00	9.50	20.51	10.51	117.90	3.77	12.1	12.1	1.0	95.32	828.91	46	1.0	173.5	876.86	12.0	12.1	46	10.51	3.09	1.82	123.2	911.6	2617.3	161.2	1867.0	**1046.93**	**622.33**
12.00	13.00	12.50	1.00	10.50	20.51	10.51	128.41	3.77	12.1	12.1	1.0	103.82	932.72	46	1.0	173.5	1050.34	13.0	29.4	1	9.77	19.91	21.02	133.7	3160.3	5143.3	178.2	2161.3	**2057.33**	**720.42**
13.00	14.50	13.75	1.50	12.00	19.77	9.77	140.99	5.66	29.4	29.4	1.0	449.42	1382.14	1	1.0	5.7	1056.00	14.5	29.4	0	9.77	19.91	21.02	148.3	3480.2	5918.3	203.7	2641.8	**2367.33**	**880.60**
14.50	16.00	15.25	1.50	13.50	19.77	9.77	155.64	5.66	29.4	29.4	1.0	496.13	1878.27	0	1.0	0.0	1056.00	16.0	18.0	28	9.77	5.42	4.29	163.0	1312.3	4246.5	229.1	3163.4	**1698.61**	**1054.46**
16.00	17.50	16.75	1.50	15.00	19.77	9.77	170.30	5.66	18.0	18.0	1.0	313.03	2191.30	28	1.0	158.4	1214.40	17.5	22.5	30	9.50	8.20	8.14	177.6	2005.9	5411.6	254.6	3660.3	**2164.64**	**1220.09**
17.50	19.00	18.25	1.50	16.50	19.50	9.50	170.30	5.66	22.5	22.5	1.0	399.05	2590.35	30	1.0	169.7	1384.11	19.0	24.5	20	9.20	9.64	10.33	177.6	2205.5	6180.0	280.0	4254.5	**2472.00**	**1418.16**
19.00	20.50	19.75	1.50	18.00	19.20	9.20	170.30	5.66	24.5	24.5	1.0	439.05	3029.40	20	1.0	113.1	1497.26	20.5	31.9	0	9.15	30.83	32.14	177.6	6395.7	10922.3	305.5	4832.1	**4368.93**	**1610.71**
20.50	22.00	21.25	1.50	19.50	19.15	9.15	170.30	5.66	31.9	31.9	1.1	656.63	3686.03	0	1.0	0.0	1497.26	22.0	31.9	0	9.16	30.83	32.14	177.6	6395.9	11579.2	330.9	5514.2	**4631.67**	**1838.08**
22.00	23.50	22.75	1.50	21.00	19.16	9.16	170.30	5.66	31.9	31.9	1.1	656.63	4342.66	0	1.0	0.0	1497.26	23.5	31.6	0	9.01	29.32	30.60	177.6	6079.5	11919.4	356.4	6196.3	**4767.76**	**2065.44**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)									Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)												
From	To	Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb	Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
23.50	25.00	24.25	1.50	22.50	19.01	9.01	170.30	5.66	31.6	31.6	1.1	640.10	4982.76	0	1.0	0.0	1497.26	25.0	31.6	0	9.08	29.32	30.60	177.6	6081.0	12561.0	381.9	6861.9	**5024.39**	**2287.29**
25.00	26.50	25.75	1.50	24.00	19.08	9.08	170.30	5.66	31.6	31.6	1.1	640.10	5622.86	0	1.0	0.0	1497.26	26.5	31.9	0	9.29	30.83	32.14	177.6	6398.7	13518.8	407.3	7527.4	**5407.54**	**2509.14**
26.50	27.50	27.00	1.00	25.00	19.29	9.29	170.30	3.77	31.9	31.9	1.1	437.75	6060.61	0	1.0	0.0	1497.26	27.5	31.9	0	9.29	30.83	32.14	177.6	6398.7	13956.6	424.3	7982.2	**5582.64**	**2660.72**
27.50	28.00	27.75	0.50	25.50	19.29	9.29	170.30	1.89	31.9	31.9	1.1	218.88	6279.49	0	1.0	0.0	1497.26	28.0	31.9	0	9.12	30.83	32.14	177.6	6395.0	14171.8	432.8	8209.5	**5668.70**	**2736.51**
28.00	29.50	28.75	1.50	27.00	19.12	9.12	170.30	5.66	31.9	31.9	1.1	656.63	6936.12	0	1.0	0.0	1497.26	29.5	27.9	10	8.71	16.53	17.56	177.6	3527.8	11961.2	458.2	8891.6	**4784.47**	**2963.87**
29.50	30.00	29.75	0.50	27.50	18.71	8.71	170.30	1.89	27.9	27.9	1.0	170.03	7106.15	10	1.0	18.9	1516.11	30.0	27.9	10	8.71	16.53	17.56	177.6	3527.8	12150.1	466.7	9089.0	**4860.03**	**3029.66**
30.00	31.00	30.50	1.00	28.50	18.71	8.71	170.30	3.77	27.9	27.9	1.0	340.06	7446.21	10	1.0	37.7	1553.83	31.0	17.0	50	9.05	4.92	3.75	177.6	1521.7	10521.8	483.7	9483.7	**4208.71**	**3161.24**
31.00	32.50	31.75	1.50	30.00	19.05	9.05	170.30	5.66	17.0	17.0	1.0	294.54	7740.75	50	1.0	282.9	1836.69	32.5	17.0	50	9.00	4.92	3.75	177.6	1521.6	11099.0	509.1	10086.6	**4439.62**	**3362.19**
32.50	34.00	33.25	1.50	31.50	19.00	9.00	170.30	5.66	17.0	17.0	1.0	294.54	8035.29	50	1.0	282.9	2119.54	34.0	17.0	50	8.64	4.92	3.75	177.6	1520.7	11675.5	534.6	10689.4	**4670.21**	**3563.14**
34.00	35.00	34.50	1.00	32.50	18.64	8.64	170.30	3.77	17.0	17.0	1.0	196.36	8231.65	50	1.0	188.6	2308.11	35.0	15.3	45	8.64	4.09	2.81	177.6	1296.2	11836.0	551.6	11091.3	**4734.39**	**3697.11**
35.00	35.50	35.25	0.50	33.00	18.64	8.64	170.30	1.89	15.3	15.3	1.0	87.85	8319.50	45	1.0	84.9	2392.97	35.5	25.2	6	8.95	10.45	11.34	177.6	2230.2	12942.7	560.1	11272.5	**5177.08**	**3757.51**
35.50	37.00	36.25	1.50	34.50	18.95	8.95	170.30	5.66	25.2	25.2	1.0	453.34	8772.84	6	1.0	33.9	2426.91	37.0	25.2	6	8.37	10.45	11.34	177.6	2225.7	13425.5	585.5	11785.3	**5370.20**	**3928.42**
37.00	37.50	37.25	0.50	35.00	18.37	8.37	170.30	1.89	25.2	25.2	1.0	151.11	8923.96	6	1.0	11.3	2438.23	37.5	25.3	10	8.37	10.68	11.57	177.6	2313.0	13675.2	594.0	11956.2	**5470.09**	**3985.40**
37.50	38.50	38.00	1.00	36.00	18.37	8.37	170.30	3.77	25.3	25.3	1.0	303.60	9227.55	10	1.0	37.7	2475.94	38.5	25.3	10	9.03	10.68	11.57	177.6	2318.2	14021.7	611.0	12314.5	**5608.69**	**4104.82**
38.50	40.00	39.25	1.50	37.50	19.03	9.03	170.30	5.66	25.3	25.3	1.0	455.40	9682.95	10	1.0	56.6	2532.51	40.0	25.3	10	9.03	10.68	11.57	177.6	2318.2	14533.7	636.4	12851.9	**5813.48**	**4283.96**
BORE NO: P133A, CUT OFF LENGTH: 2.50 m, Nc= 9																														
2.50	3.00	2.75	0.50	0.50	16.99	6.99	19.22	1.89	28.2	28.2	1.0	19.44	19.44	2	1.0	3.8	3.77	3.0	28.2	2	7.86	17.21	18.25	21.0	526.0	549.2	8.5	31.7	**219.68**	**10.56**
3.00	5.00	4.00	2.00	2.50	17.86	7.86	28.83	7.54	28.2	28.2	1.0	116.60	136.04	2	1.0	15.1	18.86	5.0	29.1	2	7.86	19.23	20.33	36.7	927.2	1082.1	42.4	197.3	**432.85**	**65.77**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ 'at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
5.00	6.00	5.50	1.00	3.50	17.86	7.86	40.62	3.77	29.1	29.1	1.0	85.27	221.30	2	1.0	7.5	26.40	6.0	29.1	2	8.37	19.23	20.33	44.6	1105.3	1353.0	59.4	307.1	**541.20**	**102.37**
6.00	8.00	7.00	2.00	5.50	18.37	8.37	52.92	7.54	29.1	29.1	1.0	222.17	443.48	2	1.0	15.1	41.49	8.0	29.1	2	8.37	19.23	20.33	61.3	1469.6	1954.5	93.3	578.3	**781.81**	**192.77**
8.00	9.00	8.50	1.00	6.50	18.37	8.37	65.48	3.77	29.1	29.1	1.0	137.44	580.92	2	1.0	7.5	49.03	9.0	26.4	0	8.37	13.15	14.11	69.7	1116.8	1746.7	110.3	740.3	**698.69**	**246.75**
9.00	10.00	9.50	1.00	7.50	18.37	8.37	73.85	3.77	26.4	26.4	1.0	138.25	719.17	0	1.0	0.0	49.03	10.0	8.6	53	10.69	2.22	1.00	78.0	742.8	1511.0	127.3	895.5	**604.40**	**298.49**
10.00	11.00	10.50	1.00	8.50	20.69	10.69	83.38	3.77	8.6	8.6	1.0	47.56	766.72	53	1.0	199.9	248.91	11.0	8.6	53	10.69	2.22	1.00	88.7	769.6	1785.3	144.3	1159.9	**714.11**	**386.63**
11.00	12.00	11.50	1.00	9.50	20.69	10.69	94.07	3.77	8.6	8.6	1.0	53.65	820.38	53	1.0	199.9	448.80	12.0	8.6	53	10.69	2.22	1.00	99.4	796.5	2065.6	161.2	1430.4	**826.25**	**476.80**
12.00	13.00	12.50	1.00	10.50	20.69	10.69	104.76	3.77	8.6	8.6	1.0	59.75	880.13	53	1.0	199.9	648.69	13.0	10.0	42	10.28	2.47	1.22	110.1	743.9	2272.7	178.2	1707.0	**909.08**	**569.00**
13.00	14.50	13.75	1.50	12.00	20.28	10.28	117.81	5.66	10.0	10.0	1.0	117.52	997.64	42	1.0	237.6	886.29	14.5	10.0	42	10.28	2.47	1.22	125.5	787.0	2670.9	203.7	2087.6	**1068.36**	**695.86**
14.50	16.00	15.25	1.50	13.50	20.28	10.28	133.23	5.66	10.0	10.0	1.0	132.90	1130.54	42	1.0	237.6	1123.89	16.0	28.7	0	9.89	18.33	19.40	140.9	3053.6	5308.0	229.1	2483.5	**2123.20**	**827.85**
16.00	17.50	16.75	1.50	15.00	19.89	9.89	148.36	5.66	28.7	28.7	1.0	459.49	1590.03	0	1.0	0.0	1123.89	17.5	28.7	0	9.89	18.33	19.40	155.8	3361.3	6075.2	254.6	2968.5	**2430.08**	**989.50**
17.50	19.00	18.25	1.50	16.50	19.89	9.89	148.36	5.66	28.7	28.7	1.0	459.49	2049.53	0	1.0	0.0	1123.89	19.0	28.7	0	9.89	18.33	19.40	155.8	3361.3	6534.7	280.0	3453.4	**2613.87**	**1151.15**
19.00	20.50	19.75	1.50	18.00	19.89	9.89	148.36	5.66	28.7	28.7	1.0	459.49	2509.02	0	1.0	0.0	1123.89	20.5	30.4	0	7.79	23.27	24.45	155.8	4231.4	7864.3	305.5	3938.4	**3145.72**	**1312.80**
20.50	22.00	21.25	1.50	19.50	17.79	7.79	148.36	5.66	30.4	30.4	1.0	502.25	3011.27	0	1.0	0.0	1123.89	22.0	32.0	0	8.94	31.33	32.65	155.8	5720.8	9856.0	330.9	4466.1	**3942.38**	**1488.70**
22.00	23.50	22.75	1.50	21.00	18.94	8.94	148.36	5.66	32.0	32.0	1.1	576.88	3588.15	0	1.0	0.0	1123.89	23.5	32.0	0	9.11	31.33	32.65	155.8	5724.6	10436.6	356.4	5068.4	**4174.64**	**1689.48**
23.50	25.00	24.25	1.50	22.50	19.11	9.11	148.36	5.66	32.0	32.0	1.1	576.88	4165.04	0	1.0	0.0	1123.89	25.0	29.8	0	9.23	20.81	21.94	155.8	3805.0	9094.0	381.9	5670.8	**3637.59**	**1890.26**
25.00	26.50	25.75	1.50	24.00	19.23	9.23	148.36	5.66	29.8	29.8	1.0	480.66	4645.70	0	1.0	0.0	1123.89	26.5	30.9	0	9.14	25.79	27.01	155.8	4713.6	10483.2	407.3	6176.9	**4193.28**	**2058.97**
26.50	27.50	27.00	1.00	25.00	19.14	9.14	148.36	3.77	30.9	30.9	1.0	349.93	4995.63	0	1.0	0.0	1123.89	27.5	30.9	0	9.14	25.79	27.01	155.8	4713.6	10833.1	424.3	6543.8	**4333.26**	**2181.27**
27.50	28.00	27.75	0.50	25.50	19.14	9.14	148.36	1.89	30.9	30.9	1.0	174.97	5170.60	0	1.0	0.0	1123.89	28.0	30.9	0	9.08	25.79	27.01	155.8	4712.5	11007.0	432.8	6727.3	**4402.80**	**2242.42**

APPENDIX-H

TABLE 2: COMPUTATION OF VERTICAL PILE LOAD CAPACITY (Dia.=1200 mm)

Dia. Of Pile: 1.20 m | Factor of Safety in Compression: 2.5 | Area of Pile: 1.13 m^2

Critical water table: 0.00 m | Factor of Safety in Tension: 3.0

Layers (m)		Mean depth (m)	Layer Thickness (m)	Length of Pile (m)	Bulk Unit Weight (kN/m^3)	Eff. Unit Weight (kN/m^3)	Effective Overburden at mid depth	Area of Pile Stem Asi (m^2)	Ultimate Shaft Friction Quf = ΣKi.Pdi.tan δ.Asi					Ultimate Shaft Cohesion Quc= Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5. γ.B. Nγ)								Total Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Total Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)
From	To								ϕ	δ	Ki	Qi	ΣQi	c	α	α.c.Asi	ΣQi	Depth of Pile toe (m)	ϕ ' at pile toe	c at pile toe(kN/m2)	Eff. Unit Weight at pile toe (kN/m^3)	Nq	Nγ	q	Qb					
28.00	29.50	28.75	1.50	27.00	19.08	9.08	148.36	5.66	30.9	30.9	1.0	524.90	5695.50	0	1.0	0.0	1123.89	29.5	28.5	0	8.83	17.88	18.94	155.8	3265.2	10084.6	458.2	7277.6	**4033.82**	**2425.87**
29.50	30.00	29.75	0.50	27.50	18.83	8.83	148.36	1.89	28.5	28.5	1.0	151.90	5847.40	0	1.0	0.0	1123.89	30.0	28.5	0	8.83	17.88	18.94	155.8	3265.2	10236.5	466.7	7438.0	**4094.58**	**2479.33**
30.00	31.00	30.50	1.00	28.50	18.83	8.83	148.36	3.77	28.5	28.5	1.0	303.79	6151.19	0	1.0	0.0	1123.89	31.0	30.1	0	9.00	21.76	22.91	155.8	3975.7	11250.8	483.7	7758.8	**4500.32**	**2586.25**
31.00	32.50	31.75	1.50	30.00	19.00	9.00	148.36	5.66	30.1	30.1	1.0	488.95	6640.14	0	1.0	0.0	1123.89	32.5	30.1	0	9.13	21.76	22.91	155.8	3977.8	11741.8	509.1	8273.2	**4696.71**	**2757.72**
32.50	34.00	33.25	1.50	31.50	19.13	9.13	148.36	5.66	30.1	30.1	1.0	488.95	7129.08	0	1.0	0.0	1123.89	34.0	30.1	0	8.93	21.76	22.91	155.8	3974.6	12227.6	534.6	8787.6	**4891.04**	**2929.19**
34.00	35.00	34.50	1.00	32.50	18.93	8.93	148.36	3.77	30.1	30.1	1.0	325.96	7455.05	0	1.0	0.0	1123.89	35.0	29.7	0	8.93	20.58	21.71	155.8	3759.5	12338.4	551.6	9130.5	**4935.37**	**3043.50**
35.00	35.50	35.25	0.50	33.00	18.93	8.93	148.36	1.89	29.7	29.7	1.0	159.57	7614.62	0	1.0	0.0	1123.89	35.5	30.2	0	9.07	22.27	23.43	155.8	4068.8	12807.3	560.1	9298.6	**5122.90**	**3099.52**
35.50	37.00	36.25	1.50	34.50	19.07	9.07	148.36	5.66	30.2	30.2	1.0	493.36	8107.98	0	1.0	0.0	1123.89	37.0	30.6	0	8.98	24.28	25.48	155.8	4435.0	13666.8	585.5	9817.4	**5466.73**	**3272.46**
37.00	37.50	37.25	0.50	35.00	18.98	8.98	148.36	1.89	30.6	30.6	1.0	170.41	8278.39	0	1.0	0.0	1123.89	37.5	30.6	0	8.98	24.28	25.48	155.8	4435.0	13837.2	594.0	9996.3	**5534.89**	**3332.09**
37.50	38.50	38.00	1.00	36.00	18.98	8.98	148.36	3.77	30.6	30.6	1.0	340.83	8619.22	0	1.0	0.0	1123.89	38.5	30.8	0	9.24	25.29	26.50	155.8	4623.5	14366.6	611.0	10354.1	**5746.62**	**3451.36**
38.50	40.00	39.25	1.50	37.50	19.24	9.24	148.36	5.66	30.8	30.8	1.0	520.32	9139.54	0	1.0	0.0	1123.89	40.0	30.8	0	9.24	25.29	26.50	155.8	4623.5	14886.9	636.4	10899.9	**5954.75**	**3633.28**

APPENDIX-H

TABLE 3: COMPUTATION OF LATERAL PILE LOAD CAPACITY (Dia. 1000 mm)

Bore No.	Dia. of pile (m)	Cut-off length (m)	Scour depth (m)	Concrete Grade	Young's Modulus (kN/m^2)	Moment of Inertia (m^4)	Average SPT	Modulus of sub grade (k_1)	Stiffness Factor (T)	Cantilever length	L_1/T	L_f/T	Permissible deflection (m)	Depth of Fixity (m)	Allowable Load capacity of pile(kN)
P114A	1.00	2.50	0.00	35	29580399	0.0491	19	2696	3.52	2.50	0.71	2.12	0.005	7.47	88
P115A	1.00	2.50	0.00	35	29580399	0.0491	17	2408	3.60	6.50	1.81	1.96	0.005	7.05	35
P116A	1.00	2.50	0.00	35	29580399	0.0491	18	2552	3.56	3.50	0.98	2.08	0.005	7.41	67
P117A	1.00	2.50	0.00	35	29580399	0.0491	17	2408	3.60	6.50	1.81	1.96	0.005	7.05	35
P118A	1.00	2.50	0.00	35	29580399	0.0491	14	1976	3.74	1.50	0.40	2.17	0.005	8.12	98
P119A	1.00	2.50	0.00	35	29580399	0.0491	14	1976	3.74	0.50	0.13	2.21	0.005	8.27	129
P120A	1.00	2.50	0.00	35	29580399	0.0491	19	2696	3.52	4.50	1.28	2.04	0.005	7.17	55
P121A	1.00	2.50	0.00	35	29580399	0.0491	15	2120	3.69	0.00	0.00	2.23	0.005	8.23	156
P122A	1.00	2.50	0.00	35	29580399	0.0491	15	2120	3.69	0.50	0.14	2.21	0.005	8.16	134
P123A	1.00	2.50	0.00	35	29580399	0.0491	14	1976	3.74	0.50	0.13	2.21	0.005	8.27	129
P124A	1.00	2.50	0.00	35	29580399	0.0491	17	2408	3.60	0.00	0.00	2.23	0.005	8.02	169
P125A	1.00	2.50	0.00	35	29580399	0.0491	17	2408	3.60	0.50	0.14	2.21	0.005	7.95	144
P126A	1.00	2.50	0.00	35	29580399	0.0491	19	2696	3.52	0.50	0.14	2.21	0.005	7.77	154
P127A	1.00	2.50	0.00	35	29580399	0.0491	22	3128	3.41	0.00	0.00	2.23	0.005	7.61	197
P128A	1.00	2.50	0.00	35	29580399	0.0491	18	2552	3.56	0.00	0.00	2.23	0.005	7.93	175
P129A	1.00	2.50	0.00	35	29580399	0.0491	18	2552	3.56	0.00	0.00	2.23	0.005	7.93	175
P130A	1.00	2.50	0.00	35	29580399	0.0491	17	2408	3.60	1.50	0.42	2.17	0.005	7.80	108
P131A	1.00	2.50	0.00	35	29580399	0.0491	22	3128	3.41	0.00	0.00	2.23	0.005	7.61	197
P132A	1.00	2.50	0.00	35	29580399	0.0491	23	3272	3.38	0.00	0.00	2.23	0.005	7.55	203
P133A	1.00	2.50	0.00	35	29580399	0.0491	19	2696	3.52	0.00	0.00	2.23	0.005	7.84	180

APPENDIX-H

TABLE 4: COMPUTATION OF LATERAL PILE LOAD CAPACITY (Dia. 1200 mm)

Bore No.	Dia. of pile (m)	Cut-off length (m)	Scour depth (m)	Concrete Grade	Young's Modulus (kN/m^2)	Moment of Inertia (m^4)	Average SPT	Modulus of sub grade (k_1)	Stiffness Factor (T)	Cantilever length	L_1/T	L_f/T	Permissible deflection (m)	Depth of Fixity (m)	Allowable Load capacity of pile(kN)
P114A	1.20	2.50	0.00	35	29580399	0.1018	21	2984	3.99	2.50	0.63	2.14	0.005	8.52	135
P115A	1.20	2.50	0.00	35	29580399	0.1018	18	2552	4.11	6.50	1.58	1.99	0.005	8.20	57
P116A	1.20	2.50	0.00	35	29580399	0.1018	17	2408	4.16	3.50	0.84	2.10	0.005	8.76	98
P117A	1.20	2.50	0.00	35	29580399	0.1018	17	2408	4.16	6.50	1.56	2.00	0.005	8.31	56
P118A	1.20	2.50	0.00	35	29580399	0.1018	15	2120	4.27	1.50	0.35	2.18	0.005	9.30	143
P119A	1.20	2.50	0.00	35	29580399	0.1018	14	1976	4.33	0.50	0.12	2.21	0.005	9.58	176
P120A	1.20	2.50	0.00	35	29580399	0.1018	19	2696	4.07	4.50	1.11	2.06	0.005	8.40	84
P121A	1.20	2.50	0.00	35	29580399	0.1018	16	2264	4.21	0.00	0.00	2.23	0.005	9.40	218
P122A	1.20	2.50	0.00	35	29580399	0.1018	16	2264	4.21	0.50	0.12	2.21	0.005	9.32	191
P123A	1.20	2.50	0.00	35	29580399	0.1018	15	2120	4.27	0.50	0.12	2.21	0.005	9.45	183
P124A	1.20	2.50	0.00	35	29580399	0.1018	18	2552	4.11	0.00	0.00	2.23	0.005	9.18	234
P125A	1.20	2.50	0.00	35	29580399	0.1018	17	2408	4.16	0.50	0.12	2.21	0.005	9.21	197
P126A	1.20	2.50	0.00	35	29580399	0.1018	21	2984	3.99	0.50	0.13	2.21	0.005	8.82	223
P127A	1.20	2.50	0.00	35	29580399	0.1018	22	3128	3.95	0.00	0.00	2.23	0.005	8.81	264
P128A	1.20	2.50	0.00	35	29580399	0.1018	19	2696	4.07	0.00	0.00	2.23	0.005	9.08	242
P129A	1.20	2.50	0.00	35	29580399	0.1018	18	2552	4.11	0.00	0.00	2.23	0.005	9.18	234
P130A	1.20	2.50	0.00	35	29580399	0.1018	17	2408	4.16	1.50	0.36	2.18	0.005	9.06	153
P131A	1.20	2.50	0.00	35	29580399	0.1018	22	3128	3.95	0.00	0.00	2.23	0.005	8.81	264
P132A	1.20	2.50	0.00	35	29580399	0.1018	23	3272	3.92	0.00	0.00	2.23	0.005	8.73	271
P133A	1.20	2.50	0.00	35	29580399	0.1018	19	2696	4.07	0.00	0.00	2.23	0.005	9.08	242

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
P114A	0.50	SM	41	3	8.00	5.00	3.00	1.00	0.414	1.70	5.10	5.00	1.20	11.12	0.12	1.00	0.147	0.354	Liquefiable
	2.00	SM-SC	44	3	32.00	20.00	12.00	0.98	0.410	1.70	5.10	5.00	1.20	11.12	0.12	1.00	0.147	0.359	Liquefiable
	3.00	SM-SC	44	4	48.00	30.00	18.00	0.98	0.406	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.417	Liquefiable
	4.00	ML	65	4	64.00	40.00	24.00	0.97	0.403	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.420	Liquefiable
	5.00	CL-ML	66	16	92.50	50.00	42.50	0.96	0.327	1.53	24.54	5.00	1.20	34.45	0.52	1.00	-	-	Non-liquefiable
	6.00	CL-ML	66	19	111.00	60.00	51.00	0.95	0.324	1.40	26.61	5.00	1.20	36.93	0.52	1.00	-	-	Non-liquefiable
	7.00	SM	33	19	129.50	70.00	59.50	0.95	0.321	1.30	24.63	4.88	1.18	33.94	0.52	1.00	0.620	1.930	Non-liquefiable
	8.00	ML	61	23	157.60	80.00	77.60	0.94	0.297	1.14	26.11	5.00	1.20	36.33	0.52	1.00	0.620	2.085	Non-liquefiable
	9.00	ML	61	24	177.30	90.00	87.30	0.93	0.295	1.07	25.69	5.00	1.20	35.82	0.52	1.00	0.620	2.102	Non-liquefiable
	11.00	ML	86	28	216.70	110.00	106.70	0.88	0.279	0.97	27.11	5.00	1.20	37.53	0.52	1.00	0.620	2.224	Non-liquefiable
	12.00	CL	86	33	249.60	120.00	129.60	0.85	0.256	0.88	28.99	5.00	1.20	39.79	0.52	1.00	-	-	Non-liquefiable
	14.50	CL	77	23	301.60	145.00	156.60	0.79	0.236	0.80	18.38	5.00	1.20	27.06	0.34	1.00	-	-	Non-liquefiable
	16.00	SM	48	23	331.20	160.00	171.20	0.75	0.225	0.76	17.58	5.00	1.20	26.09	0.32	0.86	0.324	1.439	Non-liquefiable
	17.50	ML	58	31	344.75	175.00	169.75	0.71	0.224	0.77	23.79	5.00	1.20	33.55	0.52	0.86	0.536	2.395	Non-liquefiable
	19.00	CL	73	31	374.30	190.00	184.30	0.67	0.211	0.74	22.83	5.00	1.20	32.40	0.52	0.83	-	-	Non-liquefiable
	20.50	CL	73	34	412.05	205.00	207.05	0.63	0.195	0.69	23.63	5.00	1.20	33.35	0.52	0.80	-	-	Non-liquefiable
	23.50	CL	84	52	472.35	235.00	237.35	0.56	0.174	0.65	33.75	5.00	1.20	45.50	0.52	0.77	-	-	Non-liquefiable
	25.00	SM	30	63	502.50	250.00	252.50	0.56	0.174	0.63	39.65	4.71	1.15	50.47	0.52	0.76	0.469	2.699	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	26.50	SM	25	69	532.65	265.00	267.65	0.56	0.174	0.61	42.18	4.29	1.12	51.32	0.52	0.74	0.461	2.652	Non-liquefiable
	28.00	SM	25	73	562.80	280.00	282.80	0.56	0.174	0.59	43.41	4.29	1.12	52.69	0.52	0.73	0.453	2.609	Non-liquefiable
	29.50	SM	25	75	592.95	295.00	297.95	0.56	0.174	0.58	43.45	4.29	1.12	52.74	0.52	0.72	0.446	2.568	Non-liquefiable
	31.00	SM	33	99	623.10	310.00	313.10	0.56	0.174	0.57	55.95	4.88	1.18	70.88	0.52	0.71	0.440	2.530	Non-liquefiable
	32.50	CL-ML	54	105	653.25	325.00	328.25	0.56	0.174	0.55	57.95	5.00	1.20	74.55	0.52	0.70	-	-	Non-liquefiable
	34.00	SM	22	98	683.40	340.00	343.40	0.56	0.174	0.54	52.88	3.93	1.09	61.74	0.52	0.69	0.428	2.461	Non-liquefiable
	35.50	SM	22	91	713.55	355.00	358.55	0.56	0.174	0.53	48.06	3.93	1.09	56.46	0.52	0.68	0.422	2.429	Non-liquefiable
	37.00	SM	36	87	743.70	370.00	373.70	0.56	0.174	0.52	45.00	5.00	1.20	59.01	0.52	0.67	0.417	2.399	Non-liquefiable
	38.50	SM	36	93	773.85	385.00	388.85	0.56	0.174	0.51	47.16	5.00	1.20	61.59	0.52	0.66	0.412	2.370	Non-liquefiable
	40.00	SM	36	98	804.00	400.00	404.00	0.56	0.174	0.50	48.76	5.00	1.20	63.51	0.52	0.66	0.407	2.343	Non-liquefiable
P115A	0.50	SM-SC	45	4	9.40	5.00	4.40	1.00	0.332	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.510	Liquefiable
P115A	1.00	SM-SC	42	4	18.80	10.00	8.80	0.99	0.331	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.512	Liquefiable
P115A	3.00	ML	55	6	56.40	30.00	26.40	0.98	0.326	1.70	10.20	5.00	1.20	17.24	0.18	1.00	0.219	0.672	Liquefiable
P115A	4.00	CL-ML	84	7	75.20	40.00	35.20	0.97	0.323	1.69	11.80	5.00	1.20	19.16	0.21	1.00	-	-	Non-liquefiable
P115A	5.00	SM	48	7	94.00	50.00	44.00	0.96	0.321	1.51	10.55	5.00	1.20	17.66	0.19	1.00	0.224	0.700	Liquefiable
P115A	6.00	CL-ML	83	10	119.40	60.00	59.40	0.95	0.299	1.30	12.97	5.00	1.20	20.57	0.22	1.00	-	-	Non-liquefiable
P115A	7.00	CL-ML	64	12	139.30	70.00	69.30	0.95	0.297	1.20	14.41	5.00	1.20	22.30	0.25	1.00	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	8.00	ML	81	12	159.20	80.00	79.20	0.94	0.294	1.12	13.48	5.00	1.20	21.18	0.23	1.00	0.275	0.935	Liquefiable
	9.00	ML	81	15	180.90	90.00	90.90	0.93	0.289	1.05	15.73	5.00	1.20	23.88	0.27	1.00	0.324	1.119	Non-liquefiable
	10.00	ML	81	18	201.00	100.00	101.00	0.91	0.282	1.00	17.91	5.00	1.20	26.49	0.32	1.00	0.388	1.377	Non-liquefiable
	12.50	ML	88	20	251.25	125.00	126.25	0.84	0.261	0.89	17.80	5.00	1.20	26.36	0.32	1.00	0.384	1.471	Non-liquefiable
	15.50	CL-ML	71	29	308.45	155.00	153.45	0.76	0.238	0.81	23.41	5.00	1.20	33.09	0.52	0.86	-	-	Non-liquefiable
	18.50	ML	56	40	382.95	185.00	197.95	0.68	0.205	0.71	28.43	5.00	1.20	39.12	0.52	0.78	0.484	2.359	Non-liquefiable
	20.00	CL	84	40	414.00	200.00	214.00	0.64	0.193	0.68	27.34	5.00	1.20	37.81	0.52	0.77	-	-	Non-liquefiable
	21.50	CL-ML	78	44	438.60	215.00	223.60	0.60	0.184	0.67	29.43	5.00	1.20	40.31	0.52	0.75	-	-	Non-liquefiable
	23.00	CL	79	44	469.20	230.00	239.20	0.56	0.171	0.65	28.45	5.00	1.20	39.14	0.52	0.75	-	-	Non-liquefiable
	24.50	SM	47	73	502.25	245.00	257.25	0.56	0.171	0.62	45.51	5.00	1.20	59.62	0.52	0.74	0.457	2.679	Non-liquefiable
	26.00	SM	29	64	533.00	260.00	273.00	0.56	0.171	0.61	38.73	4.64	1.15	49.03	0.52	0.72	0.448	2.628	Non-liquefiable
	27.50	SM	29	59	563.75	275.00	288.75	0.56	0.171	0.59	34.72	4.64	1.15	44.43	0.52	0.71	0.440	2.580	Non-liquefiable
	29.00	SM	29	63	594.50	290.00	304.50	0.56	0.171	0.57	36.10	4.64	1.15	46.02	0.52	0.70	0.433	2.536	Non-liquefiable
	30.50	SM	30	68	625.25	305.00	320.25	0.56	0.171	0.56	38.00	4.71	1.15	48.57	0.52	0.69	0.426	2.495	Non-liquefiable
	32.00	SM	30	70	656.00	320.00	336.00	0.56	0.171	0.55	38.19	4.71	1.15	48.79	0.52	0.68	0.419	2.457	Non-liquefiable
	33.50	SM	29	61	686.75	335.00	351.75	0.56	0.171	0.53	32.52	4.64	1.15	41.92	0.52	0.67	0.413	2.421	Non-liquefiable
	35.00	SM	29	57	717.50	350.00	367.50	0.56	0.171	0.52	29.73	4.64	1.15	38.72	0.52	0.66	0.407	2.386	Non-liquefiable
	36.50	SM	29	59	748.25	365.00	383.25	0.56	0.171	0.51	30.14	4.64	1.15	39.18	0.52	0.65	0.401	2.354	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (µ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	38.00	SM	25	63	779.00	380.00	399.00	0.56	0.171	0.50	31.54	4.29	1.12	39.46	0.52	0.64	0.396	2.324	Non-liquefiable
	40.00	SM	25	62	820.00	400.00	420.00	0.56	0.171	0.49	30.25	4.29	1.12	38.02	0.52	0.63	0.390	2.285	Non-liquefiable
P116A	0.50	SM	47	4	9.80	5.00	4.80	1.00	0.317	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.534	Liquefiable
P116A	1.00	SM	47	4	19.60	10.00	9.60	0.99	0.316	1.70	6.80	5.00	1.20	13.16	0.14	1.00	0.169	0.536	Liquefiable
P116A	3.00	SM	46	7	58.80	30.00	28.80	0.98	0.311	1.70	11.90	5.00	1.20	19.28	0.21	1.00	0.246	0.792	Liquefiable
P116A	4.00	CL-ML	68	9	78.40	40.00	38.40	0.97	0.309	1.61	14.52	5.00	1.20	22.43	0.25	1.00	-	-	Non-liquefiable
P116A	5.00	ML	70	9	98.00	50.00	48.00	0.96	0.306	1.44	12.99	5.00	1.20	20.59	0.22	1.00	0.266	0.868	Liquefiable
P116A	6.00	ML	70	25	116.40	60.00	56.40	0.95	0.307	1.33	33.29	5.00	1.20	44.95	0.52	1.00	0.620	2.019	Non-liquefiable
P116A	7.00	CL-ML	56	27	135.80	70.00	65.80	0.95	0.305	1.23	33.29	5.00	1.20	44.94	0.52	1.00	-	-	Non-liquefiable
P116A	9.00	SM-SC	48	16	174.60	90.00	84.60	0.93	0.300	1.09	17.40	5.00	1.20	25.87	0.31	1.00	0.370	1.234	Non-liquefiable
P116A	10.00	SM-SC	48	19	205.00	100.00	105.00	0.91	0.276	0.98	18.54	5.00	1.20	27.25	0.35	1.00	0.412	1.492	Non-liquefiable
P116A	11.00	CL-ML	88	19	225.50	110.00	115.50	0.88	0.268	0.93	17.68	5.00	1.20	26.22	0.32	1.00	-	-	Non-liquefiable
P116A	12.50	CL-ML	88	16	252.50	125.00	127.50	0.84	0.260	0.89	14.17	5.00	1.20	22.00	0.24	1.00	-	-	Non-liquefiable
P116A	15.50	ML	63	36	313.10	155.00	158.10	0.76	0.235	0.80	28.63	5.00	1.20	39.36	0.52	0.87	0.542	2.310	Non-liquefiable
P116A	17.00	CL	79	36	338.30	170.00	168.30	0.72	0.226	0.77	27.75	5.00	1.20	38.30	0.52	0.83	-	-	Non-liquefiable
P116A	18.50	SM	45	89	379.25	185.00	194.25	0.68	0.207	0.72	63.86	5.00	1.20	81.63	0.52	0.79	0.492	2.377	Non-liquefiable
P116A	20.00	CL-ML	78	52	410.00	200.00	210.00	0.64	0.195	0.69	35.88	5.00	1.20	48.06	0.52	0.77	-	-	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	21.50	CL-ML	78	58	440.75	215.00	225.75	0.60	0.183	0.67	38.60	5.00	1.20	51.32	0.52	0.75	-	-	Non-liquefiable
	23.00	CL-ML	66	54	471.50	230.00	241.50	0.56	0.171	0.64	34.75	5.00	1.20	46.70	0.52	0.74	-	-	Non-liquefiable
	24.50	SM	42	60	502.25	245.00	257.25	0.56	0.171	0.62	37.41	5.00	1.20	49.89	0.52	0.72	0.447	2.619	Non-liquefiable
	26.00	SM	42	74	533.00	260.00	273.00	0.56	0.171	0.61	44.79	5.00	1.20	58.74	0.52	0.71	0.438	2.566	Non-liquefiable
	27.50	SM	49	73	563.75	275.00	288.75	0.56	0.171	0.59	42.96	5.00	1.20	56.55	0.52	0.69	0.429	2.516	Non-liquefiable
	29.00	ML	51	78	594.50	290.00	304.50	0.56	0.171	0.57	44.70	5.00	1.20	58.64	0.52	0.68	0.421	2.470	Non-liquefiable
	30.50	SM	40	80	625.25	305.00	320.25	0.56	0.171	0.56	44.70	5.00	1.20	58.64	0.52	0.67	0.414	2.427	Non-liquefiable
	32.00	SM	40	74	656.00	320.00	336.00	0.56	0.171	0.55	40.37	5.00	1.20	53.44	0.52	0.66	0.407	2.387	Non-liquefiable
	33.50	SM	45	73	686.75	335.00	351.75	0.56	0.171	0.53	38.92	5.00	1.20	51.71	0.52	0.65	0.401	2.349	Non-liquefiable
	35.00	SM	41	79	717.50	350.00	367.50	0.56	0.171	0.52	41.21	5.00	1.20	54.45	0.52	0.64	0.395	2.314	Non-liquefiable
	36.50	SM	41	78	748.25	365.00	383.25	0.56	0.171	0.51	39.84	5.00	1.20	52.81	0.52	0.63	0.389	2.280	Non-liquefiable
	38.00	SM	34	72	779.00	380.00	399.00	0.56	0.171	0.50	36.05	4.93	1.19	47.76	0.52	0.62	0.383	2.249	Non-liquefiable
	40.00	SM	34	69	820.00	400.00	420.00	0.56	0.171	0.49	33.67	4.93	1.19	44.94	0.52	0.61	0.377	2.209	Non-liquefiable
P117A	0.50	SM	44	5	9.15	5.00	4.15	1.00	0.343	1.70	8.50	5.00	1.20	15.20	0.16	1.00	0.193	0.564	Liquefiable
P117A	1.00	SM	44	5	18.30	10.00	8.30	0.99	0.341	1.70	8.50	5.00	1.20	15.20	0.16	1.00	0.193	0.566	Liquefiable
P117A	3.00	SM	30	8	54.90	30.00	24.90	0.98	0.336	1.70	13.60	4.71	1.15	20.40	0.22	1.00	0.263	0.783	Liquefiable
P117A	4.00	SM	30	9	73.20	40.00	33.20	0.97	0.333	1.70	15.30	4.71	1.15	22.37	0.25	1.00	0.295	0.885	Liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	5.00	ML	54	9	91.50	50.00	41.50	0.96	0.331	1.55	13.97	5.00	1.20	21.76	0.24	1.00	0.285	0.861	Liquefiable
	6.00	SM	34	14	120.00	60.00	60.00	0.95	0.298	1.29	18.07	4.93	1.19	26.41	0.32	1.00	0.385	1.294	Non-liquefiable
	7.00	ML	78	11	140.00	70.00	70.00	0.95	0.295	1.20	13.15	5.00	1.20	20.78	0.23	1.00	0.269	0.910	Liquefiable
	9.00	ML	80	22	180.00	90.00	90.00	0.93	0.291	1.05	23.19	5.00	1.20	32.83	0.52	1.00	0.620	2.135	Non-liquefiable
	10.00	ML	80	24	204.00	100.00	104.00	0.91	0.278	0.98	23.53	5.00	1.20	33.24	0.52	1.00	0.620	2.235	Non-liquefiable
	11.00	CL	79	24	224.40	110.00	114.40	0.88	0.269	0.93	22.44	5.00	1.20	31.93	0.52	1.00	-	-	Non-liquefiable
	12.50	CL	79	14	257.50	125.00	132.50	0.84	0.255	0.87	12.16	5.00	1.20	19.59	0.21	1.00	-	-	Non-liquefiable
	15.50	ML	74	30	319.30	155.00	164.30	0.76	0.230	0.78	23.40	5.00	1.20	33.09	0.52	0.86	0.531	2.305	Non-liquefiable
	17.00	CL	53	30	350.20	170.00	180.20	0.72	0.218	0.74	22.35	5.00	1.20	31.82	0.52	0.82	-	-	Non-liquefiable
	18.50	ML	52	43	379.25	185.00	194.25	0.68	0.207	0.72	30.85	5.00	1.20	42.02	0.52	0.80	0.494	2.385	Non-liquefiable
	20.00	CL	76	43	410.00	200.00	210.00	0.64	0.195	0.69	29.67	5.00	1.20	40.61	0.52	0.74	-	-	Non-liquefiable
	21.50	CL	76	40	438.60	215.00	223.60	0.60	0.184	0.67	26.75	5.00	1.20	37.10	0.52	0.72	-	-	Non-liquefiable
	23.00	SM	37	40	469.20	230.00	239.20	0.56	0.171	0.65	25.86	5.00	1.20	36.04	0.52	0.70	0.433	2.526	Non-liquefiable
	24.50	SM	29	65	499.80	245.00	254.80	0.56	0.171	0.63	40.72	4.64	1.15	51.31	0.52	0.68	0.422	2.461	Non-liquefiable
	26.00	SM	29	70	530.40	260.00	270.40	0.56	0.171	0.61	42.57	4.64	1.15	53.43	0.52	0.66	0.411	2.402	Non-liquefiable
	27.50	SM	43	75	561.00	275.00	286.00	0.56	0.171	0.59	44.35	5.00	1.20	58.22	0.52	0.65	0.402	2.347	Non-liquefiable
	29.00	SM	35	66	591.60	290.00	301.60	0.56	0.171	0.58	38.00	5.00	1.20	50.60	0.52	0.63	0.393	2.296	Non-liquefiable
	30.50	SM	38	57	622.20	305.00	317.20	0.56	0.171	0.56	32.00	5.00	1.20	43.41	0.52	0.62	0.385	2.249	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	32.00	ML	64	57	652.80	320.00	332.80	0.56	0.171	0.55	31.25	5.00	1.20	42.49	0.52	0.61	0.378	2.205	Non-liquefiable
	33.50	CL-ML	58	46	686.75	335.00	351.75	0.56	0.171	0.53	24.53	5.00	1.20	34.43	0.52	0.60	-	-	Non-liquefiable
	35.00	CL	76	46	717.50	350.00	367.50	0.56	0.171	0.52	24.00	5.00	1.20	33.79	0.52	0.58	-	-	Non-liquefiable
	36.50	CL	76	63	744.60	365.00	379.60	0.56	0.171	0.51	32.34	5.00	1.20	43.80	0.52	0.58	-	-	Non-liquefiable
	38.00	CL-ML	76	69	775.20	380.00	395.20	0.56	0.171	0.50	34.71	5.00	1.20	46.65	0.52	0.57	-	-	Non-liquefiable
	40.00	CL-ML	76	62	816.00	400.00	416.00	0.56	0.171	0.49	30.40	5.00	1.20	41.48	0.52	0.56	-	-	Non-liquefiable
	0.50	SM	42	7	8.80	5.00	3.80	1.00	0.360	1.70	11.90	5.00	1.20	19.28	0.21	1.00	0.246	0.685	Liquefiable
	1.00	SM	48	7	17.60	10.00	7.60	0.99	0.358	1.70	11.90	5.00	1.20	19.28	0.21	1.00	0.246	0.687	Liquefiable
	3.00	ML	51	6	52.80	30.00	22.80	0.98	0.353	1.70	10.20	5.00	1.20	17.24	0.18	1.00	0.219	0.620	Liquefiable
	4.00	ML	51	10	70.40	40.00	30.40	0.97	0.350	1.70	17.00	5.00	1.20	25.40	0.30	1.00	0.358	1.022	Non-liquefiable
	6.00	ML	51	14	105.60	60.00	45.60	0.95	0.345	1.48	20.73	5.00	1.20	29.88	0.46	1.00	0.548	1.590	Non-liquefiable
P118A	7.00	ML	51	17	135.80	70.00	65.80	0.95	0.305	1.23	20.96	5.00	1.20	30.15	0.48	1.00	0.571	1.873	Non-liquefiable
	8.00	CL-ML	72	17	155.20	80.00	75.20	0.94	0.302	1.15	19.60	5.00	1.20	28.52	0.39	1.00	-	-	Non-liquefiable
	9.00	CL-ML	73	15	181.80	90.00	91.80	0.93	0.288	1.04	15.66	5.00	1.20	23.79	0.27	1.00	-	-	Non-liquefiable
	10.00	CL-ML	73	21	202.00	100.00	102.00	0.91	0.280	0.99	20.79	5.00	1.20	29.95	0.46	1.00	-	-	Non-liquefiable
	12.50	CL	81	25	252.50	125.00	127.50	0.84	0.260	0.89	22.14	5.00	1.20	31.57	0.52	1.00	-	-	Non-liquefiable
	15.50	CL	81	23	313.10	155.00	158.10	0.76	0.235	0.80	18.29	5.00	1.20	26.95	0.34	0.89	-	-	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	18.50	CL	76	34	384.80	185.00	199.80	0.68	0.204	0.71	24.05	5.00	1.20	33.86	0.52	0.80	-	-	Non-liquefiable
	21.50	SM	35	36	436.45	215.00	221.45	0.60	0.184	0.67	24.19	5.00	1.20	34.03	0.52	0.71	0.439	2.382	Non-liquefiable
	24.50	SM	35	47	507.15	245.00	262.15	0.56	0.169	0.62	29.03	5.00	1.20	39.83	0.52	0.71	0.443	2.620	Non-liquefiable
	26.00	SM	39	56	525.20	260.00	265.20	0.56	0.173	0.61	34.39	5.00	1.20	46.27	0.52	0.71	0.441	2.549	Non-liquefiable
	27.50	SM	30	60	555.50	275.00	280.50	0.56	0.173	0.60	35.82	4.71	1.15	46.06	0.52	0.70	0.432	2.499	Non-liquefiable
	29.00	SM	30	80	585.80	290.00	295.80	0.56	0.173	0.58	46.51	4.71	1.15	58.40	0.52	0.68	0.424	2.453	Non-liquefiable
	30.50	SM	30	75	616.10	305.00	311.10	0.56	0.173	0.57	42.52	4.71	1.15	53.79	0.52	0.67	0.417	2.410	Non-liquefiable
	32.00	SM	29	67	646.40	320.00	326.40	0.56	0.173	0.55	37.09	4.64	1.15	47.14	0.52	0.66	0.410	2.370	Non-liquefiable
	33.50	SM	33	69	676.70	335.00	341.70	0.56	0.173	0.54	37.33	4.88	1.18	48.91	0.52	0.65	0.403	2.332	Non-liquefiable
	35.00	SM	33	71	707.00	350.00	357.00	0.56	0.173	0.53	37.58	4.88	1.18	49.21	0.52	0.64	0.397	2.297	Non-liquefiable
	36.50	SM	37	75	737.30	365.00	372.30	0.56	0.173	0.52	38.87	5.00	1.20	51.64	0.52	0.63	0.392	2.263	Non-liquefiable
	38.00	SM	29	75	767.60	380.00	387.60	0.56	0.173	0.51	38.10	4.64	1.15	48.30	0.52	0.62	0.386	2.232	Non-liquefiable
	40.00	SM	35	80	808.00	400.00	408.00	0.56	0.173	0.50	39.61	5.00	1.20	52.53	0.52	0.61	0.379	2.192	Non-liquefiable
P119A	0.50	SM	41	7	9.85	5.00	4.85	1.00	0.316	1.70	11.90	5.00	1.20	19.28	0.21	1.00	0.246	0.781	Liquefiable
P119A	1.00	SM	41	7	19.70	10.00	9.70	0.99	0.314	1.70	11.90	5.00	1.20	19.28	0.21	1.00	0.246	0.784	Liquefiable
P119A	3.00	SM	30	10	59.10	30.00	29.10	0.98	0.310	1.70	17.00	4.71	1.15	24.33	0.28	1.00	0.333	1.076	Non-liquefiable
P119A	4.00	ML	52	11	78.80	40.00	38.80	0.97	0.307	1.61	17.66	5.00	1.20	26.19	0.32	1.00	0.379	1.233	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	5.00	SM	49	11	98.50	50.00	48.50	0.96	0.305	1.44	15.80	5.00	1.20	23.95	0.27	1.00	0.325	1.067	Non-liquefiable
	6.00	SM	49	15	117.60	60.00	57.60	0.95	0.304	1.32	19.76	5.00	1.20	28.72	0.40	1.00	0.474	1.560	Non-liquefiable
	7.00	SM	29	17	137.20	70.00	67.20	0.95	0.301	1.22	20.74	4.64	1.15	28.41	0.38	1.00	0.459	1.522	Non-liquefiable
	8.00	CL-ML	73	17	156.80	80.00	76.80	0.94	0.299	1.14	19.40	5.00	1.20	28.28	0.38	1.00	-	-	Non-liquefiable
	9.00	CL-ML	73	20	175.50	90.00	85.50	0.93	0.298	1.08	21.63	5.00	1.20	30.96	0.52	1.00	-	-	Non-liquefiable
	10.00	CL-ML	73	23	195.00	100.00	95.00	0.91	0.290	1.03	23.60	5.00	1.20	33.32	0.52	1.00	-	-	Non-liquefiable
	11.00	CL	80	23	214.50	110.00	104.50	0.88	0.282	0.98	22.50	5.00	1.20	32.00	0.52	1.00	-	-	Non-liquefiable
	12.50	CL	80	26	257.50	125.00	132.50	0.84	0.255	0.87	22.59	5.00	1.20	32.10	0.52	1.00	-	-	Non-liquefiable
	15.50	ML	57	24	319.30	155.00	164.30	0.76	0.230	0.78	18.72	5.00	1.20	27.47	0.35	0.85	0.358	1.552	Non-liquefiable
	17.00	CL-ML	73	24	350.20	170.00	180.20	0.72	0.218	0.74	17.88	5.00	1.20	26.45	0.32	0.83	-	-	Non-liquefiable
	18.50	CL-ML	73	36	377.40	185.00	192.40	0.68	0.208	0.72	25.95	5.00	1.20	36.14	0.52	0.81	-	-	Non-liquefiable
	20.00	ML	72	36	408.00	200.00	208.00	0.64	0.196	0.69	24.96	5.00	1.20	34.95	0.52	0.74	0.460	2.348	Non-liquefiable
	21.50	ML	72	31	436.45	215.00	221.45	0.60	0.184	0.67	20.83	5.00	1.20	30.00	0.47	0.72	0.403	2.184	Non-liquefiable
	24.50	SM-SC	48	37	497.35	245.00	252.35	0.56	0.172	0.63	23.29	5.00	1.20	32.95	0.52	0.68	0.425	2.468	Non-liquefiable
	26.00	ML	52	37	527.80	260.00	267.80	0.56	0.172	0.61	22.61	5.00	1.20	32.13	0.52	0.71	0.443	2.571	Non-liquefiable
	27.50	SM	46	49	577.50	275.00	302.50	0.56	0.167	0.57	28.17	5.00	1.20	38.81	0.52	0.68	0.425	2.546	Non-liquefiable
	30.50	SM-SC	40	54	640.50	305.00	335.50	0.56	0.167	0.55	29.48	5.00	1.20	40.38	0.52	0.66	0.410	2.457	Non-liquefiable
	32.00	SM	31	57	665.60	320.00	345.60	0.56	0.168	0.54	30.66	4.77	1.16	40.42	0.52	0.65	0.406	2.411	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	33.50	SM	31	60	696.80	335.00	361.80	0.56	0.168	0.53	31.54	4.77	1.16	41.44	0.52	0.64	0.399	2.374	Non-liquefiable
	35.00	SM	33	65	728.00	350.00	378.00	0.56	0.168	0.51	33.43	4.88	1.18	44.32	0.52	0.63	0.393	2.338	Non-liquefiable
	36.50	SM	31	71	759.20	365.00	394.20	0.56	0.168	0.50	35.76	4.77	1.16	46.34	0.52	0.63	0.388	2.305	Non-liquefiable
	38.00	SM	31	72	790.40	380.00	410.40	0.56	0.168	0.49	35.54	4.77	1.16	46.09	0.52	0.62	0.382	2.273	Non-liquefiable
	40.00	SM	32	77	832.00	400.00	432.00	0.56	0.168	0.48	37.05	4.83	1.17	48.21	0.52	0.61	0.376	2.234	Non-liquefiable
	0.50	ML	55	7	9.80	5.00	4.80	1.00	0.317	1.70	11.90	5.00	1.20	19.28	0.21	1.00	0.246	0.777	Liquefiable
	1.00	ML	55	7	19.60	10.00	9.60	0.99	0.316	1.70	11.90	5.00	1.20	19.28	0.21	1.00	0.246	0.780	Liquefiable
	2.00	SM	45	7	39.20	20.00	19.20	0.98	0.314	1.70	11.90	5.00	1.20	19.28	0.21	1.00	0.246	0.786	Liquefiable
	3.00	ML	61	15	58.80	30.00	28.80	0.98	0.311	1.70	25.50	5.00	1.20	35.60	0.52	1.00	0.620	1.993	Non-liquefiable
	4.00	ML	61	11	78.40	40.00	38.40	0.97	0.309	1.61	17.75	5.00	1.20	26.30	0.32	1.00	0.382	1.237	Non-liquefiable
	6.00	ML	67	11	117.60	60.00	57.60	0.95	0.304	1.32	14.49	5.00	1.20	22.39	0.25	1.00	0.295	0.972	Liquefiable
P120A	7.00	ML	67	14	139.30	70.00	69.30	0.95	0.297	1.20	16.82	5.00	1.20	25.18	0.30	1.00	0.352	1.188	Non-liquefiable
	8.00	CL	77	14	159.20	80.00	79.20	0.94	0.294	1.12	15.73	5.00	1.20	23.88	0.27	1.00	-	-	Non-liquefiable
	9.00	CL	85	28	180.00	90.00	90.00	0.93	0.291	1.05	29.51	5.00	1.20	40.42	0.52	1.00	-	-	Non-liquefiable
	10.00	CL	85	33	200.00	100.00	100.00	0.91	0.283	1.00	33.00	5.00	1.20	44.60	0.52	1.00	-	-	Non-liquefiable
	12.50	CL	79	22	250.00	125.00	125.00	0.84	0.262	0.89	19.68	5.00	1.20	28.61	0.39	1.00	-	-	Non-liquefiable
	15.50	CL-ML	68	25	319.30	155.00	164.30	0.76	0.230	0.78	19.50	5.00	1.20	28.40	0.38	0.86	-	-	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (µ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	17.00	CL	82	25	350.20	170.00	180.20	0.72	0.218	0.74	18.62	5.00	1.20	27.35	0.35	0.81	-	-	Non-liquefiable
	18.50	CL	82	32	375.55	185.00	190.55	0.68	0.209	0.72	23.18	5.00	1.20	32.82	0.52	0.79	-	-	Non-liquefiable
	21.50	CL	89	36	436.45	215.00	221.45	0.60	0.184	0.67	24.19	5.00	1.20	34.03	0.52	0.75	-	-	Non-liquefiable
	24.50	SM	45	40	487.55	245.00	242.55	0.56	0.176	0.64	25.68	5.00	1.20	35.82	0.52	0.73	0.451	2.571	Non-liquefiable
	27.50	SM	37	45	569.25	275.00	294.25	0.56	0.169	0.58	26.23	5.00	1.20	36.48	0.52	0.68	0.421	2.492	Non-liquefiable
	30.50	SM	42	48	631.35	305.00	326.35	0.56	0.169	0.55	26.57	5.00	1.20	36.88	0.52	0.76	0.470	2.780	Non-liquefiable
	33.50	SM	45	66	639.85	335.00	304.85	0.56	0.183	0.57	37.80	5.00	1.20	50.36	0.52	0.77	0.477	2.604	Non-liquefiable
	35.00	SM	45	71	731.50	350.00	381.50	0.56	0.167	0.51	36.35	5.00	1.20	48.62	0.52	0.73	0.453	2.704	Non-liquefiable
	36.50	SM	49	75	762.85	365.00	397.85	0.56	0.167	0.50	37.60	5.00	1.20	50.12	0.52	0.72	0.448	2.677	Non-liquefiable
	38.00	SM	49	74	794.20	380.00	414.20	0.56	0.167	0.49	36.36	5.00	1.20	48.63	0.52	0.72	0.444	2.652	Non-liquefiable
	40.00	CL-ML	68	100	836.00	400.00	436.00	0.56	0.167	0.48	47.89	5.00	1.20	62.47	0.52	0.71	-	-	Non-liquefiable
P121A	0.50	SM	45	10	9.80	5.00	4.80	1.00	0.317	1.70	17.00	5.00	1.20	25.40	0.30	1.00	0.358	1.128	Non-liquefiable
	1.00	SM	45	10	19.60	10.00	9.60	0.99	0.316	1.70	17.00	5.00	1.20	25.40	0.30	1.00	0.358	1.132	Non-liquefiable
	2.00	SM-SC	46	10	39.20	20.00	19.20	0.98	0.314	1.70	17.00	5.00	1.20	25.40	0.30	1.00	0.358	1.141	Non-liquefiable
	3.00	SM	37	12	58.80	30.00	28.80	0.98	0.311	1.70	20.40	5.00	1.20	29.48	0.44	1.00	0.519	1.667	Non-liquefiable
	4.00	SM	37	16	78.40	40.00	38.40	0.97	0.309	1.61	25.82	5.00	1.20	35.98	0.52	1.00	0.620	2.009	Non-liquefiable
	5.00	CL-ML	61	16	98.00	50.00	48.00	0.96	0.306	1.44	23.09	5.00	1.20	32.71	0.52	1.00	-	-	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 | **Earthquake Zone= IV** | **a_{max}/g=0.24** | **K(alpha)= 1.00** | **MSF= 1.193** | **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (µ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	6.00	CL-ML	63	17	119.40	60.00	59.40	0.95	0.299	1.30	22.06	5.00	1.20	31.47	0.52	1.00	-	-	Non-liquefiable
	7.00	CL-ML	63	21	139.30	70.00	69.30	0.95	0.297	1.20	25.23	5.00	1.20	35.27	0.52	1.00	-	-	Non-liquefiable
	8.00	SM	39	21	159.20	80.00	79.20	0.94	0.294	1.12	23.60	5.00	1.20	33.32	0.52	1.00	0.620	2.107	Non-liquefiable
	9.00	CL-ML	61	17	180.90	90.00	90.90	0.93	0.289	1.05	17.83	5.00	1.20	26.40	0.32	1.00	-	-	Non-liquefiable
	10.00	CL-ML	61	19	201.00	100.00	101.00	0.91	0.282	1.00	18.91	5.00	1.20	27.69	0.36	1.00	-	-	Non-liquefiable
	11.00	CL	78	19	221.10	110.00	111.10	0.88	0.273	0.95	18.03	5.00	1.20	26.63	0.33	1.00	-	-	Non-liquefiable
	12.50	CL	73	23	255.00	125.00	130.00	0.84	0.257	0.88	20.17	5.00	1.20	29.21	0.42	1.00	-	-	Non-liquefiable
	14.00	CL-ML	76	23	285.60	140.00	145.60	0.80	0.245	0.83	19.06	5.00	1.20	27.87	0.37	1.00	-	-	Non-liquefiable
	15.50	CL-ML	76	25	317.75	155.00	162.75	0.76	0.232	0.78	19.60	5.00	1.20	28.52	0.39	0.85	-	-	Non-liquefiable
	17.00	ML	76	25	348.50	170.00	178.50	0.72	0.219	0.75	18.71	5.00	1.20	27.45	0.35	0.82	0.345	1.574	Non-liquefiable
	18.50	ML	54	31	382.95	185.00	197.95	0.68	0.205	0.71	22.03	5.00	1.20	31.44	0.52	0.79	0.493	2.402	Non-liquefiable
	21.50	ML	57	37	445.05	215.00	230.05	0.60	0.181	0.66	24.39	5.00	1.20	34.27	0.52	0.76	0.469	2.589	Non-liquefiable
	24.50	SM	23	52	507.15	245.00	262.15	0.56	0.169	0.62	32.12	4.06	1.10	39.40	0.52	0.72	0.449	2.655	Non-liquefiable
	26.00	SM	25	70	540.80	260.00	280.80	0.56	0.168	0.60	41.77	4.29	1.12	50.87	0.52	0.71	0.438	2.606	Non-liquefiable
	27.50	SM	25	66	572.00	275.00	297.00	0.56	0.168	0.58	38.30	4.29	1.12	46.99	0.52	0.69	0.430	2.557	Non-liquefiable
	29.00	SM	35	74	603.20	290.00	313.20	0.56	0.168	0.57	41.81	5.00	1.20	55.18	0.52	0.68	0.423	2.512	Non-liquefiable
	30.50	SM	35	66	634.40	305.00	329.40	0.56	0.168	0.55	36.36	5.00	1.20	48.64	0.52	0.67	0.415	2.469	Non-liquefiable
	32.00	SM	29	68	665.60	320.00	345.60	0.56	0.168	0.54	36.58	4.64	1.15	46.56	0.52	0.66	0.409	2.430	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	33.50	SM	30	68	696.80	335.00	361.80	0.56	0.168	0.53	35.75	4.71	1.15	45.97	0.52	0.65	0.403	2.393	Non-liquefiable
	35.00	SM	30	71	728.00	350.00	378.00	0.56	0.168	0.51	36.52	4.71	1.15	46.86	0.52	0.64	0.397	2.358	Non-liquefiable
	36.50	SM	44	78	759.20	365.00	394.20	0.56	0.168	0.50	39.29	5.00	1.20	52.14	0.52	0.63	0.391	2.325	Non-liquefiable
	38.00	SM	44	78	790.40	380.00	410.40	0.56	0.168	0.49	38.50	5.00	1.20	51.20	0.52	0.62	0.386	2.293	Non-liquefiable
	40.00	SM	43	81	832.00	400.00	432.00	0.56	0.168	0.48	38.97	5.00	1.20	51.77	0.52	0.61	0.379	2.254	Non-liquefiable
P122A	0.50	ML	51	8	10.00	5.00	5.00	1.00	0.311	1.70	13.60	5.00	1.20	21.32	0.23	1.00	0.277	0.892	Liquefiable
P122A	1.00	SM	38	8	20.00	10.00	10.00	0.99	0.310	1.70	13.60	5.00	1.20	21.32	0.23	1.00	0.277	0.896	Liquefiable
P122A	3.00	SM	33	10	60.00	30.00	30.00	0.98	0.305	1.70	17.00	4.88	1.18	24.93	0.29	1.00	0.347	1.137	Non-liquefiable
P122A	4.00	SM	33	15	80.00	40.00	40.00	0.97	0.302	1.58	23.72	4.88	1.18	32.86	0.52	1.00	0.620	2.051	Non-liquefiable
P122A	5.00	SM-SC	46	15	100.00	50.00	50.00	0.96	0.300	1.41	21.21	5.00	1.20	30.46	0.50	1.00	0.600	2.000	Non-liquefiable
P122A	6.00	SM-SC	46	16	118.80	60.00	58.80	0.95	0.301	1.30	20.87	5.00	1.20	30.04	0.47	1.00	0.561	1.866	Non-liquefiable
P122A	7.00	SM	40	18	138.60	70.00	68.60	0.95	0.298	1.21	21.73	5.00	1.20	31.08	0.52	1.00	0.620	2.079	Non-liquefiable
P122A	9.00	CL-ML	69	21	178.20	90.00	88.20	0.93	0.293	1.06	22.36	5.00	1.20	31.83	0.52	1.00	-	-	Non-liquefiable
P122A	10.00	CL-ML	69	29	198.00	100.00	98.00	0.91	0.286	1.01	29.29	5.00	1.20	40.15	0.52	1.00	-	-	Non-liquefiable
P122A	11.00	CL	84	29	217.80	110.00	107.80	0.88	0.277	0.96	27.93	5.00	1.20	38.52	0.52	1.00	-	-	Non-liquefiable
P122A	12.50	CL	81	25	253.75	125.00	128.75	0.84	0.258	0.88	22.03	5.00	1.20	31.44	0.52	1.00	-	-	Non-liquefiable
P122A	14.00	CL-ML	64	25	284.20	140.00	144.20	0.80	0.246	0.83	20.82	5.00	1.20	29.98	0.47	1.00	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	15.50	CL-ML	64	35	320.85	155.00	165.85	0.76	0.229	0.78	27.18	5.00	1.20	37.61	0.52	0.87	-	-	Non-liquefiable
	17.00	SM-SC	44	35	351.90	170.00	181.90	0.72	0.217	0.74	25.95	5.00	1.20	36.14	0.52	0.81	0.500	2.299	Non-liquefiable
	18.50	SM-SC	48	32	377.40	185.00	192.40	0.68	0.208	0.72	23.07	5.00	1.20	32.68	0.52	0.79	0.490	2.353	Non-liquefiable
	21.50	SM	35	36	438.60	215.00	223.60	0.60	0.184	0.67	24.08	5.00	1.20	33.89	0.52	0.75	0.464	2.526	Non-liquefiable
	23.00	CL	83	36	469.20	230.00	239.20	0.56	0.171	0.65	23.28	5.00	1.20	32.93	0.52	0.73	-	-	Non-liquefiable
	24.50	CL	87	47	514.50	245.00	269.50	0.56	0.167	0.61	28.63	5.00	1.20	39.36	0.52	0.70	-	-	Non-liquefiable
	26.00	SM	32	47	546.00	260.00	286.00	0.56	0.167	0.59	27.79	4.83	1.17	37.37	0.52	0.68	0.424	2.545	Non-liquefiable
	27.50	SM	25	54	558.25	275.00	283.25	0.56	0.172	0.59	32.09	4.29	1.12	40.06	0.52	0.69	0.426	2.474	Non-liquefiable
	29.00	SM	25	59	588.70	290.00	298.70	0.56	0.172	0.58	34.14	4.29	1.12	42.35	0.52	0.67	0.418	2.426	Non-liquefiable
	30.50	SM	25	71	619.15	305.00	314.15	0.56	0.172	0.56	40.06	4.29	1.12	48.95	0.52	0.66	0.410	2.383	Non-liquefiable
	32.00	SM	29	65	649.60	320.00	329.60	0.56	0.172	0.55	35.80	4.64	1.15	45.67	0.52	0.65	0.403	2.342	Non-liquefiable
	33.50	SM	31	68	680.05	335.00	345.05	0.56	0.172	0.54	36.61	4.77	1.16	47.33	0.52	0.64	0.396	2.303	Non-liquefiable
	35.00	SM	31	76	710.50	350.00	360.50	0.56	0.172	0.53	40.03	4.77	1.16	51.31	0.52	0.63	0.390	2.267	Non-liquefiable
	36.50	SM	32	78	740.95	365.00	375.95	0.56	0.172	0.52	40.23	4.83	1.17	51.94	0.52	0.62	0.384	2.233	Non-liquefiable
	38.00	SM	34	84	771.40	380.00	391.40	0.56	0.172	0.51	42.46	4.93	1.19	55.38	0.52	0.61	0.379	2.201	Non-liquefiable
	40.00	SM	34	76	812.00	400.00	412.00	0.56	0.172	0.49	37.44	4.93	1.19	49.42	0.52	0.60	0.372	2.160	Non-liquefiable
P123A	0.50	SM	34	6	9.05	5.00	4.05	1.00	0.347	1.70	10.20	4.93	1.19	17.05	0.18	1.00	0.216	0.623	Liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	1.00	SM	34	6	18.10	10.00	8.10	0.99	0.346	1.70	10.20	4.93	1.19	17.05	0.18	1.00	0.216	0.625	Liquefiable
	3.00	SM	36	10	54.30	30.00	24.30	0.98	0.341	1.70	17.00	5.00	1.20	25.40	0.30	1.00	0.358	1.051	Non-liquefiable
	4.00	SM	36	12	72.40	40.00	32.40	0.97	0.338	1.70	20.40	5.00	1.20	29.48	0.44	1.00	0.519	1.536	Non-liquefiable
	5.00	SM-SC	39	12	90.50	50.00	40.50	0.96	0.335	1.57	18.86	5.00	1.20	27.63	0.36	1.00	0.426	1.270	Non-liquefiable
	6.00	SM	46	16	124.80	60.00	64.80	0.95	0.287	1.24	19.88	5.00	1.20	28.85	0.40	1.00	0.481	1.678	Non-liquefiable
	7.00	SM-SC	50	18	145.60	70.00	75.60	0.95	0.284	1.15	20.70	5.00	1.20	29.84	0.46	1.00	0.545	1.917	Non-liquefiable
	8.00	SM	37	18	166.40	80.00	86.40	0.94	0.282	1.08	19.36	5.00	1.20	28.24	0.38	1.00	0.451	1.599	Non-liquefiable
	9.00	CL-ML	87	21	185.40	90.00	95.40	0.93	0.282	1.02	21.50	5.00	1.20	30.80	0.52	1.00	-	-	Non-liquefiable
	10.00	CL-ML	87	28	206.00	100.00	106.00	0.91	0.275	0.97	27.20	5.00	1.20	37.64	0.52	1.00	-	-	Non-liquefiable
	11.00	ML	79	28	226.60	110.00	116.60	0.88	0.267	0.93	25.93	5.00	1.20	36.12	0.52	1.00	0.620	2.324	Non-liquefiable
	12.50	ML	79	19	253.75	125.00	128.75	0.84	0.258	0.88	16.74	5.00	1.20	25.09	0.29	1.00	0.350	1.356	Non-liquefiable
	15.50	ML	75	23	314.65	155.00	159.65	0.76	0.234	0.79	18.20	5.00	1.20	26.84	0.33	0.86	0.341	1.460	Non-liquefiable
	17.00	SM	25	23	346.80	170.00	176.80	0.72	0.220	0.75	17.30	4.29	1.12	23.58	0.27	0.82	0.259	1.175	Non-liquefiable
	18.50	ML	56	40	384.80	185.00	199.80	0.68	0.204	0.71	28.30	5.00	1.20	38.96	0.52	0.78	0.484	2.370	Non-liquefiable
	21.50	SM	24	54	447.20	215.00	232.20	0.60	0.180	0.66	35.44	4.18	1.11	43.43	0.52	0.71	0.443	2.459	Non-liquefiable
	23.00	SM	43	72	466.90	230.00	236.90	0.56	0.172	0.65	46.78	5.00	1.20	61.13	0.52	0.71	0.440	2.554	Non-liquefiable
	24.50	SM	40	79	497.35	245.00	252.35	0.56	0.172	0.63	49.73	5.00	1.20	64.68	0.52	0.69	0.429	2.491	Non-liquefiable
	26.00	SM	40	64	527.80	260.00	267.80	0.56	0.172	0.61	39.11	5.00	1.20	51.93	0.52	0.68	0.419	2.433	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	27.50	ML	53	70	558.25	275.00	283.25	0.56	0.172	0.59	41.59	5.00	1.20	54.91	0.52	0.66	0.409	2.379	Non-liquefiable
	29.00	CL	70	82	588.70	290.00	298.70	0.56	0.172	0.58	47.45	5.00	1.20	61.93	0.52	0.65	-	-	Non-liquefiable
	30.50	ML	93	82	619.15	305.00	314.15	0.56	0.172	0.56	46.26	5.00	1.20	60.52	0.52	0.63	0.393	2.283	Non-liquefiable
	32.00	CL	66	62	649.60	320.00	329.60	0.56	0.172	0.55	34.15	5.00	1.20	45.98	0.52	0.62	-	-	Non-liquefiable
	33.50	CL	66	51	680.05	335.00	345.05	0.56	0.172	0.54	27.46	5.00	1.20	37.95	0.52	0.61	-	-	Non-liquefiable
	35.00	CL	59	74	710.50	350.00	360.50	0.56	0.172	0.53	38.97	5.00	1.20	51.77	0.52	0.60	-	-	Non-liquefiable
	36.50	CL	55	71	740.95	365.00	375.95	0.56	0.172	0.52	36.62	5.00	1.20	48.94	0.52	0.59	-	-	Non-liquefiable
	38.00	CL	55	57	771.40	380.00	391.40	0.56	0.172	0.51	28.81	5.00	1.20	39.57	0.52	0.58	-	-	Non-liquefiable
	40.00	CL	62	85	812.00	400.00	412.00	0.56	0.172	0.49	41.88	5.00	1.20	55.25	0.52	0.57	-	-	Non-liquefiable
	0.50	SM	46	10	9.60	5.00	4.60	1.00	0.324	1.70	17.00	5.00	1.20	25.40	0.30	1.00	0.358	1.103	Non-liquefiable
	1.00	SM	46	10	19.20	10.00	9.20	0.99	0.323	1.70	17.00	5.00	1.20	25.40	0.30	1.00	0.358	1.108	Non-liquefiable
	3.00	SM	45	12	57.60	30.00	27.60	0.98	0.318	1.70	20.40	5.00	1.20	29.48	0.44	1.00	0.519	1.631	Non-liquefiable
	4.00	SM	43	16	76.80	40.00	36.80	0.97	0.316	1.65	26.38	5.00	1.20	36.65	0.52	1.00	0.620	1.965	Non-liquefiable
P124A	5.00	ML	54	16	96.00	50.00	46.00	0.96	0.313	1.47	23.59	5.00	1.20	33.31	0.52	1.00	0.620	1.981	Non-liquefiable
	6.00	ML	52	17	121.80	60.00	61.80	0.95	0.293	1.27	21.62	5.00	1.20	30.95	0.52	1.00	0.620	2.114	Non-liquefiable
	7.00	ML	52	21	142.10	70.00	72.10	0.95	0.291	1.18	24.73	5.00	1.20	34.68	0.52	1.00	0.620	2.131	Non-liquefiable
	9.00	ML	83	22	182.70	90.00	92.70	0.93	0.286	1.04	22.85	5.00	1.20	32.42	0.52	1.00	0.620	2.166	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 | **Earthquake Zone= IV** | **a_{max}/g=0.24** | **K(alpha)= 1.00** | **MSF= 1.193** | **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	10.00	ML	83	25	205.00	100.00	105.00	0.91	0.276	0.98	24.40	5.00	1.20	34.28	0.52	1.00	0.620	2.245	Non-liquefiable
	11.00	CL	88	25	225.50	110.00	115.50	0.88	0.268	0.93	23.26	5.00	1.20	32.91	0.52	1.00	-	-	Non-liquefiable
	12.50	CL	88	20	250.00	125.00	125.00	0.84	0.262	0.89	17.89	5.00	1.20	26.47	0.32	1.00	-	-	Non-liquefiable
	14.00	CL-ML	66	20	280.00	140.00	140.00	0.80	0.250	0.85	16.90	5.00	1.20	25.28	0.30	1.00	-	-	Non-liquefiable
	15.50	CL-ML	63	23	286.75	155.00	131.75	0.76	0.258	0.87	20.04	5.00	1.20	29.05	0.41	0.96	-	-	Non-liquefiable
	17.00	SM	48	23	314.50	170.00	144.50	0.72	0.244	0.83	19.13	5.00	1.20	27.96	0.37	0.90	0.394	1.611	Non-liquefiable
	18.50	SM	48	34	364.45	185.00	179.45	0.68	0.215	0.75	25.38	5.00	1.20	35.46	0.52	0.84	0.522	2.423	Non-liquefiable
	20.00	CL-ML	52	34	394.00	200.00	194.00	0.64	0.203	0.72	24.41	5.00	1.20	34.29	0.52	0.76	-	-	Non-liquefiable
	21.50	CL-ML	52	39	445.05	215.00	230.05	0.60	0.181	0.66	25.71	5.00	1.20	35.86	0.52	0.70	-	-	Non-liquefiable
	23.00	SM	33	41	476.10	230.00	246.10	0.56	0.169	0.64	26.14	4.88	1.18	35.71	0.52	0.68	0.424	2.509	Non-liquefiable
	24.50	SM	32	45	507.15	245.00	262.15	0.56	0.169	0.62	27.79	4.83	1.17	37.37	0.52	0.67	0.413	2.443	Non-liquefiable
	27.50	SM	40	52	569.25	275.00	294.25	0.56	0.169	0.58	30.31	5.00	1.20	41.38	0.52	0.69	0.425	2.516	Non-liquefiable
	29.00	SM	40	60	585.80	290.00	295.80	0.56	0.173	0.58	34.89	5.00	1.20	46.86	0.52	0.68	0.424	2.453	Non-liquefiable
	30.50	SM	27	68	616.10	305.00	311.10	0.56	0.173	0.57	38.55	4.48	1.13	48.06	0.52	0.67	0.417	2.410	Non-liquefiable
	32.00	SM	30	75	646.40	320.00	326.40	0.56	0.173	0.55	41.51	4.71	1.15	52.63	0.52	0.66	0.410	2.370	Non-liquefiable
	33.50	SM	45	81	676.70	335.00	341.70	0.56	0.173	0.54	43.82	5.00	1.20	57.58	0.52	0.65	0.403	2.332	Non-liquefiable
	35.00	SM	45	67	707.00	350.00	357.00	0.56	0.173	0.53	35.46	5.00	1.20	47.55	0.52	0.64	0.397	2.297	Non-liquefiable
	36.50	SM	40	74	737.30	365.00	372.30	0.56	0.173	0.52	38.35	5.00	1.20	51.02	0.52	0.63	0.392	2.263	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	38.00	SM	30	79	767.60	380.00	387.60	0.56	0.173	0.51	40.13	4.71	1.15	51.03	0.52	0.62	0.386	2.232	Non-liquefiable
	40.00	CL	68	83	808.00	400.00	408.00	0.56	0.173	0.50	41.09	5.00	1.20	54.31	0.52	0.61	-	-	Non-liquefiable
P125A	0.50	SM	32	9	10.35	5.00	5.35	1.00	0.301	1.70	15.30	4.83	1.17	22.74	0.25	1.00	0.302	1.004	Non-liquefiable
	2.00	SM	23	9	41.40	20.00	21.40	0.98	0.297	1.70	15.30	4.06	1.10	20.89	0.23	1.00	0.271	0.910	Liquefiable
	3.00	SM	27	12	62.10	30.00	32.10	0.98	0.295	1.70	20.40	4.48	1.13	27.54	0.35	1.00	0.422	1.433	Non-liquefiable
	5.00	ML	68	18	103.50	50.00	53.50	0.96	0.290	1.37	24.61	5.00	1.20	34.53	0.52	1.00	0.620	2.137	Non-liquefiable
	6.00	SM	44	24	118.80	60.00	58.80	0.95	0.301	1.30	31.30	5.00	1.20	42.56	0.52	1.00	0.620	2.063	Non-liquefiable
	8.00	ML	54	18	158.40	80.00	78.40	0.94	0.296	1.13	20.33	5.00	1.20	29.39	0.43	1.00	0.513	1.735	Non-liquefiable
	9.00	ML	54	25	176.40	90.00	86.40	0.93	0.297	1.08	26.90	5.00	1.20	37.27	0.52	1.00	0.620	2.091	Non-liquefiable
	11.00	ML	86	30	215.60	110.00	105.60	0.88	0.280	0.97	29.19	5.00	1.20	40.03	0.52	1.00	0.620	2.212	Non-liquefiable
	12.00	ML	91	33	244.80	120.00	124.80	0.85	0.261	0.90	29.54	5.00	1.20	40.45	0.52	1.00	0.620	2.375	Non-liquefiable
	14.50	ML	79	27	295.80	145.00	150.80	0.79	0.241	0.81	21.99	5.00	1.20	31.38	0.52	1.00	0.620	2.576	Non-liquefiable
	17.50	ML	51	33	358.75	175.00	183.75	0.71	0.215	0.74	24.34	5.00	1.20	34.21	0.52	0.78	0.485	2.252	Non-liquefiable
	19.00	CL	56	33	393.30	190.00	203.30	0.67	0.201	0.70	23.14	5.00	1.20	32.77	0.52	0.79	-	-	Non-liquefiable
	20.50	CL	56	68	416.15	205.00	211.15	0.63	0.193	0.69	46.80	5.00	1.20	61.16	0.52	0.79	-	-	Non-liquefiable
	22.00	CL	62	73	446.60	220.00	226.60	0.59	0.180	0.66	48.49	5.00	1.20	63.19	0.52	0.77	-	-	Non-liquefiable
	23.50	SM	25	79	477.05	235.00	242.05	0.56	0.172	0.64	50.78	4.29	1.12	60.91	0.52	0.75	0.466	2.706	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 | **Earthquake Zone= IV** | **a_{max}/g=0.24** | **K(alpha)= 1.00** | **MSF= 1.193** | **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	25.00	SM	25	80	507.50	250.00	257.50	0.56	0.172	0.62	49.85	4.29	1.12	59.88	0.52	0.74	0.457	2.653	Non-liquefiable
	26.50	SM	29	78	537.95	265.00	272.95	0.56	0.172	0.61	47.21	4.64	1.15	58.75	0.52	0.72	0.448	2.603	Non-liquefiable
	28.00	SM	29	90	568.40	280.00	288.40	0.56	0.172	0.59	53.00	4.64	1.15	65.38	0.52	0.71	0.440	2.557	Non-liquefiable
	29.50	SM	30	71	598.85	295.00	303.85	0.56	0.172	0.57	40.73	4.71	1.15	51.72	0.52	0.70	0.433	2.514	Non-liquefiable
	31.00	SM	30	73	629.30	310.00	319.30	0.56	0.172	0.56	40.85	4.71	1.15	51.86	0.52	0.69	0.426	2.474	Non-liquefiable
	32.50	SM	31	75	659.75	325.00	334.75	0.56	0.172	0.55	40.99	4.77	1.16	52.43	0.52	0.68	0.419	2.437	Non-liquefiable
	34.00	SM	31	85	690.20	340.00	350.20	0.56	0.172	0.53	45.42	4.77	1.16	57.58	0.52	0.67	0.413	2.401	Non-liquefiable
	35.50	SM	31	66	720.65	355.00	365.65	0.56	0.172	0.52	34.52	4.77	1.16	44.90	0.52	0.66	0.408	2.368	Non-liquefiable
	37.00	CL	65	63	751.10	370.00	381.10	0.56	0.172	0.51	32.27	5.00	1.20	43.73	0.52	0.65	-	-	Non-liquefiable
	38.50	CL	65	71	781.55	385.00	396.55	0.56	0.172	0.50	35.65	5.00	1.20	47.78	0.52	0.64	-	-	Non-liquefiable
	40.00	CL	72	77	812.00	400.00	412.00	0.56	0.172	0.49	37.94	5.00	1.20	50.52	0.52	0.63	-	-	Non-liquefiable
P126A	0.50	SM	41	9	9.45	5.00	4.45	1.00	0.330	1.70	15.30	5.00	1.20	23.36	0.26	1.00	0.313	0.949	Liquefiable
	1.00	SM	41	9	18.90	10.00	8.90	0.99	0.329	1.70	15.30	5.00	1.20	23.36	0.26	1.00	0.313	0.953	Liquefiable
	3.00	SM	37	12	56.70	30.00	26.70	0.98	0.324	1.70	20.40	5.00	1.20	29.48	0.44	1.00	0.519	1.603	Non-liquefiable
	4.00	SM	37	15	75.60	40.00	35.60	0.97	0.321	1.68	25.14	5.00	1.20	35.17	0.52	1.00	0.620	1.931	Non-liquefiable
	6.00	SM	46	23	113.40	60.00	53.40	0.95	0.316	1.37	31.47	5.00	1.20	42.77	0.52	1.00	0.620	1.962	Non-liquefiable
	7.00	SM	44	24	135.80	70.00	65.80	0.95	0.305	1.23	29.59	5.00	1.20	40.50	0.52	1.00	0.620	2.035	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	8.00	CL-ML	56	24	155.20	80.00	75.20	0.94	0.302	1.15	27.68	5.00	1.20	38.21	0.52	1.00	-	-	Non-liquefiable
	9.00	CL-ML	56	34	177.30	90.00	87.30	0.93	0.295	1.07	36.39	5.00	1.20	48.67	0.52	1.00	-	-	Non-liquefiable
	10.00	ML	75	31	197.00	100.00	97.00	0.91	0.287	1.02	31.48	5.00	1.20	42.77	0.52	1.00	0.620	2.158	Non-liquefiable
	12.50	ML	91	39	246.25	125.00	121.25	0.84	0.266	0.91	35.42	5.00	1.20	47.50	0.52	1.00	0.620	2.330	Non-liquefiable
	15.50	ML	54	43	313.10	155.00	158.10	0.76	0.235	0.80	34.20	5.00	1.20	46.04	0.52	0.86	0.536	2.281	Non-liquefiable
	18.50	SM	47	49	370.00	185.00	185.00	0.68	0.212	0.74	36.03	5.00	1.20	48.23	0.52	0.82	0.509	2.401	Non-liquefiable
	20.00	CL	56	49	400.00	200.00	200.00	0.64	0.200	0.71	34.65	5.00	1.20	46.58	0.52	0.77	-	-	Non-liquefiable
	21.50	CL	56	33	442.90	215.00	227.90	0.60	0.182	0.66	21.86	5.00	1.20	31.23	0.52	0.73	-	-	Non-liquefiable
	23.00	SM-SC	30	33	473.80	230.00	243.80	0.56	0.170	0.64	21.13	4.71	1.15	29.10	0.42	0.64	0.315	1.856	Non-liquefiable
	24.50	SM	38	55	512.05	245.00	267.05	0.56	0.167	0.61	33.66	5.00	1.20	45.39	0.52	0.61	0.377	2.250	Non-liquefiable
	26.00	ML	74	100	543.40	260.00	283.40	0.56	0.167	0.59	59.40	5.00	1.20	76.28	0.52	0.59	0.366	2.183	Non-liquefiable
	27.50	SM	48	100	574.75	275.00	299.75	0.56	0.167	0.58	57.76	5.00	1.20	74.31	0.52	0.57	0.355	2.121	Non-liquefiable
	29.00	SM	48	100	606.10	290.00	316.10	0.56	0.167	0.56	56.25	5.00	1.20	72.49	0.52	0.56	0.346	2.065	Non-liquefiable
	30.50	SM	43	100	637.45	305.00	332.45	0.56	0.167	0.55	54.84	5.00	1.20	70.81	0.52	0.54	0.337	2.013	Non-liquefiable
	32.00	SM	43	100	668.80	320.00	348.80	0.56	0.167	0.54	53.54	5.00	1.20	69.25	0.52	0.53	0.329	1.964	Non-liquefiable
	33.50	CL-ML	72	56	700.15	335.00	365.15	0.56	0.167	0.52	29.31	5.00	1.20	40.17	0.52	0.52	-	-	Non-liquefiable
	35.00	CL-ML	72	62	731.50	350.00	381.50	0.56	0.167	0.51	31.74	5.00	1.20	43.09	0.52	0.51	-	-	Non-liquefiable
	36.50	CL-ML	72	58	762.85	365.00	397.85	0.56	0.167	0.50	29.08	5.00	1.20	39.89	0.52	0.50	-	-	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	38.00	SM	31	70	794.20	380.00	414.20	0.56	0.167	0.49	34.39	4.77	1.16	44.76	0.52	0.49	0.302	1.800	Non-liquefiable
	40.00	SM	29	76	836.00	400.00	436.00	0.56	0.167	0.48	36.40	4.64	1.15	46.35	0.52	0.47	0.294	1.754	Non-liquefiable
P127A	0.50	SM	41	10	8.85	5.00	3.85	1.00	0.357	1.70	17.00	5.00	1.20	25.40	0.30	1.00	0.358	1.002	Non-liquefiable
	1.00	SM	41	10	17.70	10.00	7.70	0.99	0.356	1.70	17.00	5.00	1.20	25.40	0.30	1.00	0.358	1.005	Non-liquefiable
	3.00	SM	38	13	53.10	30.00	23.10	0.98	0.350	1.70	22.10	5.00	1.20	31.52	0.52	1.00	0.620	1.770	Non-liquefiable
	4.00	SM	38	16	70.80	40.00	30.80	0.97	0.348	1.70	27.20	5.00	1.20	37.64	0.52	1.00	0.620	1.784	Non-liquefiable
	6.00	SM	20	28	106.20	60.00	46.20	0.95	0.342	1.47	41.19	3.61	1.08	48.08	0.52	1.00	0.620	1.813	Non-liquefiable
	7.00	SM	20	31	138.60	70.00	68.60	0.95	0.298	1.21	37.43	3.61	1.08	44.02	0.52	1.00	0.620	2.079	Non-liquefiable
	9.00	CL-ML	61	32	178.20	90.00	88.20	0.93	0.293	1.06	34.07	5.00	1.20	45.89	0.52	1.00	-	-	Non-liquefiable
	10.00	CL-ML	61	35	200.00	100.00	100.00	0.91	0.283	1.00	35.00	5.00	1.20	47.00	0.52	1.00	-	-	Non-liquefiable
	11.00	CL	70	35	220.00	110.00	110.00	0.88	0.275	0.95	33.37	5.00	1.20	45.05	0.52	1.00	-	-	Non-liquefiable
	12.50	CL	70	43	256.25	125.00	131.25	0.84	0.256	0.87	37.53	5.00	1.20	50.04	0.52	1.00	-	-	Non-liquefiable
	14.00	ML	53	43	287.00	140.00	147.00	0.80	0.244	0.82	35.47	5.00	1.20	47.56	0.52	1.00	0.620	2.545	Non-liquefiable
	15.50	SM	45	48	289.85	155.00	134.85	0.76	0.255	0.86	41.33	5.00	1.20	54.60	0.52	0.95	0.591	2.317	Non-liquefiable
	18.50	CL	84	37	345.95	185.00	160.95	0.68	0.228	0.79	29.16	5.00	1.20	40.00	0.52	0.93	-	-	Non-liquefiable
	20.00	ML	69	37	364.00	200.00	164.00	0.64	0.222	0.78	28.89	5.00	1.20	39.67	0.52	0.85	0.526	2.376	Non-liquefiable
	21.50	SM	35	53	438.60	215.00	223.60	0.60	0.184	0.67	35.44	5.00	1.20	47.53	0.52	0.77	0.475	2.588	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	23.00	SM	35	69	469.20	230.00	239.20	0.56	0.171	0.65	44.61	5.00	1.20	58.54	0.52	0.75	0.465	2.712	Non-liquefiable
	24.50	SM	31	78	499.80	245.00	254.80	0.56	0.171	0.63	48.86	4.77	1.16	61.58	0.52	0.73	0.455	2.656	Non-liquefiable
	26.00	SM	46	79	530.40	260.00	270.40	0.56	0.171	0.61	48.04	5.00	1.20	62.65	0.52	0.72	0.446	2.604	Non-liquefiable
	27.50	SM	36	103	561.00	275.00	286.00	0.56	0.171	0.59	60.91	5.00	1.20	78.09	0.52	0.71	0.438	2.556	Non-liquefiable
	29.00	CL	58	107	591.60	290.00	301.60	0.56	0.171	0.58	61.61	5.00	1.20	78.93	0.52	0.69	-	-	Non-liquefiable
	30.50	CL	58	102	622.20	305.00	317.20	0.56	0.171	0.56	57.27	5.00	1.20	73.73	0.52	0.68	-	-	Non-liquefiable
	32.00	CL-ML	67	99	652.80	320.00	332.80	0.56	0.171	0.55	54.27	5.00	1.20	70.12	0.52	0.67	-	-	Non-liquefiable
	33.50	ML	82	113	683.40	335.00	348.40	0.56	0.171	0.54	60.54	5.00	1.20	77.65	0.52	0.66	0.410	2.394	Non-liquefiable
	35.00	ML	82	104	714.00	350.00	364.00	0.56	0.171	0.52	54.51	5.00	1.20	70.41	0.52	0.65	0.404	2.360	Non-liquefiable
	36.50	CL	78	84	744.60	365.00	379.60	0.56	0.171	0.51	43.11	5.00	1.20	56.74	0.52	0.64	-	-	Non-liquefiable
	38.00	CL	71	90	775.20	380.00	395.20	0.56	0.171	0.50	45.27	5.00	1.20	59.33	0.52	0.63	-	-	Non-liquefiable
	40.00	CL	71	97	816.00	400.00	416.00	0.56	0.171	0.49	47.56	5.00	1.20	62.07	0.52	0.62	-	-	Non-liquefiable
P128A	0.50	SM	28	12	10.05	5.00	5.05	1.00	0.309	1.70	20.40	4.56	1.14	27.78	0.36	1.00	0.432	1.396	Non-liquefiable
P128A	1.00	SM	28	12	20.10	10.00	10.10	0.99	0.308	1.70	20.40	4.56	1.14	27.78	0.36	1.00	0.432	1.402	Non-liquefiable
P128A	3.00	SM	32	16	60.30	30.00	30.30	0.98	0.303	1.70	27.20	4.83	1.17	36.68	0.52	1.00	0.620	2.045	Non-liquefiable
P128A	4.00	ML	56	22	80.40	40.00	40.40	0.97	0.301	1.57	34.61	5.00	1.20	46.53	0.52	1.00	0.620	2.061	Non-liquefiable
P128A	5.00	CL-ML	52	22	100.50	50.00	50.50	0.96	0.299	1.41	30.96	5.00	1.20	42.15	0.52	1.00	-	-	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	6.00	SM	48	17	118.80	60.00	58.80	0.95	0.301	1.30	22.17	5.00	1.20	31.60	0.52	1.00	0.620	2.063	Non-liquefiable
	7.00	SM	48	15	138.60	70.00	68.60	0.95	0.298	1.21	18.11	5.00	1.20	26.73	0.33	1.00	0.395	1.324	Non-liquefiable
	8.00	ML	81	15	158.40	80.00	78.40	0.94	0.296	1.13	16.94	5.00	1.20	25.33	0.30	1.00	0.356	1.203	Non-liquefiable
	9.00	ML	81	27	185.40	90.00	95.40	0.93	0.282	1.02	27.64	5.00	1.20	38.17	0.52	1.00	0.620	2.197	Non-liquefiable
	10.00	CL	93	24	206.00	100.00	106.00	0.91	0.275	0.97	23.31	5.00	1.20	32.97	0.52	1.00	-	-	Non-liquefiable
	12.50	CL-ML	67	18	257.50	125.00	132.50	0.84	0.255	0.87	15.64	5.00	1.20	23.76	0.27	1.00	-	-	Non-liquefiable
	15.50	SM	34	33	320.85	155.00	165.85	0.76	0.229	0.78	25.62	4.93	1.19	35.38	0.52	0.86	0.532	2.317	Non-liquefiable
	18.50	SM	34	37	371.85	185.00	186.85	0.68	0.211	0.73	27.07	4.93	1.19	37.10	0.52	0.83	0.513	2.428	Non-liquefiable
	21.50	SM	24	49	425.70	215.00	210.70	0.60	0.189	0.69	33.76	4.18	1.11	41.57	0.52	0.78	0.484	2.558	Non-liquefiable
	23.00	ML	60	49	460.00	230.00	230.00	0.56	0.175	0.66	32.31	5.00	1.20	43.77	0.52	0.76	0.470	2.689	Non-liquefiable
	24.50	ML	60	56	497.35	245.00	252.35	0.56	0.172	0.63	35.25	5.00	1.20	47.30	0.52	0.73	0.455	2.645	Non-liquefiable
	26.00	SM	37	55	527.80	260.00	267.80	0.56	0.172	0.61	33.61	5.00	1.20	45.33	0.52	0.72	0.446	2.593	Non-liquefiable
	27.50	SM	37	65	558.25	275.00	283.25	0.56	0.172	0.59	38.62	5.00	1.20	51.35	0.52	0.71	0.438	2.545	Non-liquefiable
	29.00	CL	74	74	588.70	290.00	298.70	0.56	0.172	0.58	42.82	5.00	1.20	56.38	0.52	0.69	-	-	Non-liquefiable
	30.50	CL-ML	75	52	619.15	305.00	314.15	0.56	0.172	0.56	29.34	5.00	1.20	40.21	0.52	0.68	-	-	Non-liquefiable
	32.00	CL-ML	75	73	649.60	320.00	329.60	0.56	0.172	0.55	40.21	5.00	1.20	53.25	0.52	0.67	-	-	Non-liquefiable
	33.50	CL	82	59	680.05	335.00	345.05	0.56	0.172	0.54	31.76	5.00	1.20	43.11	0.52	0.66	-	-	Non-liquefiable
	35.00	CL	79	55	710.50	350.00	360.50	0.56	0.172	0.53	28.97	5.00	1.20	39.76	0.52	0.65	-	-	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	36.50	CL	79	73	740.95	365.00	375.95	0.56	0.172	0.52	37.65	5.00	1.20	50.18	0.52	0.64	-	-	Non-liquefiable
	38.00	CL	84	59	771.40	380.00	391.40	0.56	0.172	0.51	29.82	5.00	1.20	40.79	0.52	0.63	-	-	Non-liquefiable
	40.00	CL	84	70	812.00	400.00	412.00	0.56	0.172	0.49	34.49	5.00	1.20	46.38	0.52	0.62	-	-	Non-liquefiable
P129A	0.50	SM	45	12	9.90	5.00	4.90	1.00	0.314	1.70	20.40	5.00	1.20	29.48	0.44	1.00	0.519	1.653	Non-liquefiable
	2.00	SM	34	12	39.60	20.00	19.60	0.98	0.310	1.70	20.40	4.93	1.19	29.17	0.42	1.00	0.499	1.609	Non-liquefiable
	3.00	SM	21	13	59.40	30.00	29.40	0.98	0.308	1.70	22.10	3.78	1.09	27.78	0.36	1.00	0.432	1.403	Non-liquefiable
	5.00	SM	37	21	99.00	50.00	49.00	0.96	0.303	1.43	30.00	5.00	1.20	41.00	0.52	1.00	0.620	2.046	Non-liquefiable
	6.00	SM	37	19	115.80	60.00	55.80	0.95	0.309	1.34	25.44	5.00	1.20	35.52	0.52	1.00	0.620	2.008	Non-liquefiable
	7.00	ML	83	19	135.10	70.00	65.10	0.95	0.306	1.24	23.55	5.00	1.20	33.26	0.52	1.00	0.620	2.024	Non-liquefiable
	8.00	ML	77	22	159.20	80.00	79.20	0.94	0.294	1.12	24.72	5.00	1.20	34.66	0.52	1.00	0.620	2.107	Non-liquefiable
	9.00	ML	77	24	179.10	90.00	89.10	0.93	0.292	1.06	25.43	5.00	1.20	35.51	0.52	1.00	0.620	2.124	Non-liquefiable
	10.00	CL	86	24	199.00	100.00	99.00	0.91	0.284	1.01	24.12	5.00	1.20	33.95	0.52	1.00	-	-	Non-liquefiable
	11.00	CL	86	21	221.10	110.00	111.10	0.88	0.273	0.95	19.92	5.00	1.20	28.91	0.41	1.00	-	-	Non-liquefiable
	12.00	CL	81	22	241.20	120.00	121.20	0.85	0.265	0.91	19.98	5.00	1.20	28.98	0.41	1.00	-	-	Non-liquefiable
	13.00	ML	73	22	261.30	130.00	131.30	0.83	0.257	0.87	19.20	5.00	1.20	28.04	0.37	1.00	0.442	1.723	Non-liquefiable
	14.50	SM	25	34	301.60	145.00	156.60	0.79	0.236	0.80	27.17	4.29	1.12	34.58	0.52	1.00	0.620	2.624	Non-liquefiable
	16.00	ML	75	34	332.80	160.00	172.80	0.75	0.224	0.76	25.86	5.00	1.20	36.04	0.52	0.87	0.540	2.408	Non-liquefiable

APPENDIX-H

TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	17.50	ML	51	38	355.25	175.00	180.25	0.71	0.217	0.74	28.30	5.00	1.20	38.96	0.52	0.86	0.534	2.460	Non-liquefiable
	20.50	ML	54	67	416.15	205.00	211.15	0.63	0.193	0.69	46.11	5.00	1.20	60.33	0.52	0.78	0.482	2.499	Non-liquefiable
	22.00	SM	39	57	451.00	220.00	231.00	0.59	0.179	0.66	37.50	5.00	1.20	50.00	0.52	0.75	0.467	2.614	Non-liquefiable
	23.50	SM	39	68	481.75	235.00	246.75	0.56	0.171	0.64	43.29	5.00	1.20	56.95	0.52	0.74	0.457	2.678	Non-liquefiable
	25.00	SM	27	70	512.50	250.00	262.50	0.56	0.171	0.62	43.20	4.48	1.13	53.31	0.52	0.72	0.447	2.623	Non-liquefiable
	26.50	SM	18	56	543.25	265.00	278.25	0.56	0.171	0.60	33.57	3.23	1.07	39.03	0.52	0.71	0.439	2.572	Non-liquefiable
	28.00	SM	18	60	574.00	280.00	294.00	0.56	0.171	0.58	34.99	3.23	1.07	40.55	0.52	0.69	0.430	2.524	Non-liquefiable
	29.50	SM	18	90	604.75	295.00	309.75	0.56	0.171	0.57	51.14	3.23	1.07	57.76	0.52	0.68	0.423	2.480	Non-liquefiable
	31.00	SM	16	53	635.50	310.00	325.50	0.56	0.171	0.55	29.38	2.77	1.05	33.73	0.52	0.67	0.416	2.439	Non-liquefiable
	32.50	SM	30	52	666.25	325.00	341.25	0.56	0.171	0.54	28.15	4.71	1.15	37.20	0.52	0.66	0.409	2.400	Non-liquefiable
	34.00	SM	25	58	697.00	340.00	357.00	0.56	0.171	0.53	30.70	4.29	1.12	38.52	0.52	0.65	0.403	2.363	Non-liquefiable
	35.50	ML	53	63	727.75	355.00	372.75	0.56	0.171	0.52	32.63	5.00	1.20	44.16	0.52	0.64	0.397	2.329	Non-liquefiable
	37.00	SM	28	59	758.50	370.00	388.50	0.56	0.171	0.51	29.93	4.56	1.14	38.63	0.52	0.63	0.392	2.297	Non-liquefiable
	38.50	SM	31	60	789.25	385.00	404.25	0.56	0.171	0.50	29.84	4.77	1.16	39.46	0.52	0.62	0.386	2.266	Non-liquefiable
	40.00	CL-ML	70	79	820.00	400.00	420.00	0.56	0.171	0.49	38.55	5.00	1.20	51.26	0.52	0.61	-	-	Non-liquefiable
P130A	0.50	SM	45	8	9.90	5.00	4.90	1.00	0.314	1.70	13.60	5.00	1.20	21.32	0.23	1.00	0.277	0.883	Liquefiable
	1.00	SM	45	8	19.80	10.00	9.80	0.99	0.313	1.70	13.60	5.00	1.20	21.32	0.23	1.00	0.277	0.887	Liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **a_{max}/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	3.00	SM	44	8	59.40	30.00	29.40	0.98	0.308	1.70	13.60	5.00	1.20	21.32	0.23	1.00	0.277	0.901	Liquefiable
	4.00	SM	44	13	79.20	40.00	39.20	0.97	0.306	1.60	20.76	5.00	1.20	29.92	0.46	1.00	0.551	1.803	Non-liquefiable
	5.00	CL-ML	61	13	99.00	50.00	49.00	0.96	0.303	1.43	18.57	5.00	1.20	27.29	0.35	1.00	-	-	Non-liquefiable
	6.00	CL-ML	61	16	117.00	60.00	57.00	0.95	0.306	1.32	21.19	5.00	1.20	30.43	0.50	1.00	-	-	Non-liquefiable
	7.00	CL-ML	61	19	136.50	70.00	66.50	0.95	0.303	1.23	23.30	5.00	1.20	32.96	0.52	1.00	-	-	Non-liquefiable
	9.00	SM	50	20	175.50	90.00	85.50	0.93	0.298	1.08	21.63	5.00	1.20	30.96	0.52	1.00	0.620	2.080	Non-liquefiable
	10.00	CL	64	25	204.00	100.00	104.00	0.91	0.278	0.98	24.51	5.00	1.20	34.42	0.52	1.00	-	-	Non-liquefiable
	11.00	ML	90	25	224.40	110.00	114.40	0.88	0.269	0.93	23.37	5.00	1.20	33.05	0.52	1.00	0.620	2.303	Non-liquefiable
	12.50	CL	91	24	248.75	125.00	123.75	0.84	0.263	0.90	21.57	5.00	1.20	30.89	0.52	1.00	-	-	Non-liquefiable
	15.50	ML	55	27	308.45	155.00	153.45	0.76	0.238	0.81	21.80	5.00	1.20	31.16	0.52	0.88	0.548	2.299	Non-liquefiable
	18.50	ML	61	30	373.70	185.00	188.70	0.68	0.210	0.73	21.84	5.00	1.20	31.21	0.52	0.82	0.507	2.415	Non-liquefiable
	20.00	SM	48	30	400.00	200.00	200.00	0.64	0.200	0.71	21.21	5.00	1.20	30.46	0.50	0.75	0.448	2.243	Non-liquefiable
	21.50	SM	37	71	438.60	215.00	223.60	0.60	0.184	0.67	47.48	5.00	1.20	61.98	0.52	0.71	0.441	2.405	Non-liquefiable
	23.00	SM	37	60	469.20	230.00	239.20	0.56	0.171	0.65	38.79	5.00	1.20	51.55	0.52	0.69	0.429	2.504	Non-liquefiable
	24.50	ML	73	56	499.80	245.00	254.80	0.56	0.171	0.63	35.08	5.00	1.20	47.10	0.52	0.67	0.418	2.438	Non-liquefiable
	26.00	SM	39	56	530.40	260.00	270.40	0.56	0.171	0.61	34.06	5.00	1.20	45.87	0.52	0.70	0.431	2.518	Non-liquefiable
	27.50	SM	34	60	561.00	275.00	286.00	0.56	0.171	0.59	35.48	4.93	1.19	47.09	0.52	0.68	0.423	2.467	Non-liquefiable
	29.00	SM	34	80	591.60	290.00	301.60	0.56	0.171	0.58	46.07	4.93	1.19	59.67	0.52	0.67	0.415	2.420	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	30.50	CL	68	64	622.20	305.00	317.20	0.56	0.171	0.56	35.93	5.00	1.20	48.12	0.52	0.66	-	-	Non-liquefiable
	32.00	CL	68	62	652.80	320.00	332.80	0.56	0.171	0.55	33.99	5.00	1.20	45.78	0.52	0.64	-	-	Non-liquefiable
	33.50	SM	45	80	683.40	335.00	348.40	0.56	0.171	0.54	42.86	5.00	1.20	56.43	0.52	0.63	0.393	2.295	Non-liquefiable
	35.00	ML	53	60	714.00	350.00	364.00	0.56	0.171	0.52	31.45	5.00	1.20	42.74	0.52	0.62	0.387	2.259	Non-liquefiable
	36.50	ML	62	60	744.60	365.00	379.60	0.56	0.171	0.51	30.80	5.00	1.20	41.95	0.52	0.61	0.381	2.225	Non-liquefiable
	38.00	ML	62	74	775.20	380.00	395.20	0.56	0.171	0.50	37.22	5.00	1.20	49.67	0.52	0.61	0.376	2.192	Non-liquefiable
	40.00	CL-ML	60	51	816.00	400.00	416.00	0.56	0.171	0.49	25.00	5.00	1.20	35.01	0.52	0.59	-	-	Non-liquefiable
P131A	0.50	SM	29	18	8.35	5.00	3.35	1.00	0.387	1.70	30.60	4.64	1.15	39.71	0.52	1.00	0.620	1.601	Non-liquefiable
P131A	2.00	SM	27	18	33.40	20.00	13.40	0.98	0.383	1.70	30.60	4.48	1.13	39.07	0.52	1.00	0.620	1.620	Non-liquefiable
P131A	3.00	SM	27	15	50.10	30.00	20.10	0.98	0.380	1.70	25.50	4.48	1.13	33.30	0.52	1.00	0.620	1.633	Non-liquefiable
P131A	5.00	SM	44	27	83.50	50.00	33.50	0.96	0.374	1.70	45.90	5.00	1.20	60.08	0.52	1.00	0.620	1.659	Non-liquefiable
P131A	6.00	SM	44	26	118.20	60.00	58.20	0.95	0.302	1.31	34.08	5.00	1.20	45.90	0.52	1.00	0.620	2.052	Non-liquefiable
P131A	8.00	CL-ML	81	19	157.60	80.00	77.60	0.94	0.297	1.14	21.57	5.00	1.20	30.88	0.52	1.00	-	-	Non-liquefiable
P131A	9.00	CL-ML	81	42	179.10	90.00	89.10	0.93	0.292	1.06	44.49	5.00	1.20	58.39	0.52	1.00	-	-	Non-liquefiable
P131A	11.00	ML	81	14	218.90	110.00	108.90	0.88	0.276	0.96	13.42	5.00	1.20	21.10	0.23	1.00	0.274	1.000	Non-liquefiable
P131A	12.00	ML	81	19	235.20	120.00	115.20	0.85	0.272	0.93	17.70	5.00	1.20	26.24	0.32	1.00	0.380	1.399	Non-liquefiable
P131A	14.50	ML	71	20	284.20	145.00	139.20	0.79	0.251	0.85	16.95	5.00	1.20	25.34	0.30	1.00	0.356	1.422	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	16.00	CL-ML	75	20	332.80	160.00	172.80	0.75	0.224	0.76	15.21	5.00	1.20	23.26	0.26	0.85	-	-	Non-liquefiable
	17.50	SM	42	42	351.75	175.00	176.75	0.71	0.219	0.75	31.59	5.00	1.20	42.91	0.52	0.85	0.526	2.398	Non-liquefiable
	20.50	SM	19	85	412.05	205.00	207.05	0.63	0.195	0.69	59.07	3.43	1.07	66.81	0.52	0.75	0.468	2.405	Non-liquefiable
	22.00	SM	19	68	455.40	220.00	235.40	0.59	0.177	0.65	44.32	3.43	1.07	50.98	0.52	0.72	0.445	2.514	Non-liquefiable
	23.50	SM	29	60	486.45	235.00	251.45	0.56	0.169	0.63	37.84	4.64	1.15	48.01	0.52	0.70	0.434	2.568	Non-liquefiable
	25.00	SM	32	62	517.50	250.00	267.50	0.56	0.169	0.61	37.91	4.83	1.17	49.22	0.52	0.68	0.424	2.507	Non-liquefiable
	26.50	SM	32	74	548.55	265.00	283.55	0.56	0.169	0.59	43.95	4.83	1.17	56.29	0.52	0.67	0.414	2.451	Non-liquefiable
	28.00	SM	32	80	579.60	280.00	299.60	0.56	0.169	0.58	46.22	4.83	1.17	58.95	0.52	0.65	0.405	2.399	Non-liquefiable
	29.50	ML	55	82	610.65	295.00	315.65	0.56	0.169	0.56	46.15	5.00	1.20	60.39	0.52	0.64	0.397	2.351	Non-liquefiable
	31.00	SC	49	82	641.70	310.00	331.70	0.56	0.169	0.55	45.02	5.00	1.20	59.03	0.52	0.67	0.414	2.453	Non-liquefiable
	32.50	CL	64	78	663.00	325.00	338.00	0.56	0.171	0.54	42.43	5.00	1.20	55.91	0.52	0.66	-	-	Non-liquefiable
	34.00	SM	50	76	693.60	340.00	353.60	0.56	0.171	0.53	40.42	5.00	1.20	53.50	0.52	0.65	0.406	2.367	Non-liquefiable
	35.50	ML	56	60	724.20	355.00	369.20	0.56	0.171	0.52	31.23	5.00	1.20	42.47	0.52	0.64	0.400	2.333	Non-liquefiable
	37.00	ML	56	60	754.80	370.00	384.80	0.56	0.171	0.51	30.59	5.00	1.20	41.70	0.52	0.64	0.394	2.301	Non-liquefiable
	38.50	ML	56	62	785.40	385.00	400.40	0.56	0.171	0.50	30.98	5.00	1.20	42.18	0.52	0.63	0.389	2.271	Non-liquefiable
	40.00	SM	44	60	816.00	400.00	416.00	0.56	0.171	0.49	29.42	5.00	1.20	40.30	0.52	0.62	0.384	2.242	Non-liquefiable
P132A	0.50	SM	17	21	9.95	5.00	4.95	1.00	0.312	1.70	35.70	3.01	1.06	40.86	0.52	1.00	0.620	1.986	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 | **Earthquake Zone= IV** | **a_{max}/g=0.24** | **K(alpha)= 1.00** | **MSF= 1.193** | **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	2.00	SM	19	21	39.80	20.00	19.80	0.98	0.309	1.70	35.70	3.43	1.07	41.73	0.52	1.00	0.620	2.009	Non-liquefiable
	3.00	SM	19	25	59.70	30.00	29.70	0.98	0.306	1.70	42.50	3.43	1.07	49.03	0.52	1.00	0.620	2.024	Non-liquefiable
	5.00	SM	37	31	99.50	50.00	49.50	0.96	0.302	1.42	44.06	5.00	1.20	57.87	0.52	1.00	0.620	2.057	Non-liquefiable
	6.00	SM	37	33	119.40	60.00	59.40	0.95	0.299	1.30	42.82	5.00	1.20	56.38	0.52	1.00	0.620	2.073	Non-liquefiable
	7.00	ML	72	33	139.30	70.00	69.30	0.95	0.297	1.20	39.64	5.00	1.20	52.57	0.52	1.00	0.620	2.090	Non-liquefiable
	8.00	ML	75	17	168.00	80.00	88.00	0.94	0.280	1.07	18.12	5.00	1.20	26.75	0.33	1.00	0.395	1.414	Non-liquefiable
	9.00	ML	75	23	189.00	90.00	99.00	0.93	0.277	1.01	23.12	5.00	1.20	32.74	0.52	1.00	0.620	2.237	Non-liquefiable
	11.00	ML	77	26	231.00	110.00	121.00	0.88	0.262	0.91	23.64	5.00	1.20	33.36	0.52	1.00	0.620	2.366	Non-liquefiable
	12.00	ML	87	24	246.00	120.00	126.00	0.85	0.260	0.89	21.38	5.00	1.20	30.66	0.52	1.00	0.620	2.386	Non-liquefiable
	13.00	SM	28	24	266.50	130.00	136.50	0.83	0.252	0.86	20.54	4.56	1.14	27.94	0.37	1.00	0.438	1.741	Non-liquefiable
	14.50	SM	28	52	287.10	145.00	142.10	0.79	0.248	0.84	43.62	4.56	1.14	54.21	0.52	1.00	0.620	2.501	Non-liquefiable
	16.00	ML	64	58	316.80	160.00	156.80	0.75	0.235	0.80	46.32	5.00	1.20	60.58	0.52	0.88	0.546	2.321	Non-liquefiable
	17.50	CL-ML	55	60	346.50	175.00	171.50	0.71	0.223	0.76	45.82	5.00	1.20	59.98	0.52	0.86	-	-	Non-liquefiable
	19.00	ML	51	58	376.20	190.00	186.20	0.67	0.210	0.73	42.50	5.00	1.20	56.01	0.52	0.84	0.520	2.476	Non-liquefiable
	20.50	SM	31	90	405.90	205.00	200.90	0.63	0.198	0.71	63.50	4.77	1.16	78.59	0.52	0.82	0.509	2.579	Non-liquefiable
	22.00	SM	31	56	435.60	220.00	215.60	0.59	0.185	0.68	38.14	4.77	1.16	49.11	0.52	0.80	0.499	2.700	Non-liquefiable
	23.50	SM	31	82	465.30	235.00	230.30	0.56	0.176	0.66	54.03	4.77	1.16	67.59	0.52	0.79	0.490	2.777	Non-liquefiable
	25.00	SM	41	82	495.00	250.00	245.00	0.56	0.176	0.64	52.39	5.00	1.20	67.87	0.52	0.78	0.482	2.729	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	26.50	SM	26	83	524.70	265.00	259.70	0.56	0.176	0.62	51.50	4.39	1.12	62.21	0.52	0.76	0.474	2.684	Non-liquefiable
	28.00	SM	26	74	554.40	280.00	274.40	0.56	0.176	0.60	44.67	4.39	1.12	54.54	0.52	0.75	0.466	2.643	Non-liquefiable
	29.50	SM-SC	50	54	584.10	295.00	289.10	0.56	0.176	0.59	31.76	5.00	1.20	43.11	0.52	0.74	0.460	2.604	Non-liquefiable
	31.00	CL	66	63	613.80	310.00	303.80	0.56	0.176	0.57	36.14	5.00	1.20	48.37	0.52	0.73	-	-	Non-liquefiable
	32.50	CL	66	73	643.50	325.00	318.50	0.56	0.176	0.56	40.90	5.00	1.20	54.09	0.52	0.72	-	-	Non-liquefiable
	34.00	CL	66	60	673.20	340.00	333.20	0.56	0.176	0.55	32.87	5.00	1.20	44.44	0.52	0.71	-	-	Non-liquefiable
	35.50	ML	53	57	702.90	355.00	347.90	0.56	0.176	0.54	30.56	5.00	1.20	41.67	0.52	0.70	0.436	2.471	Non-liquefiable
	37.00	ML	53	60	732.60	370.00	362.60	0.56	0.176	0.53	31.51	5.00	1.20	42.81	0.52	0.69	0.431	2.443	Non-liquefiable
	38.50	ML	58	60	762.30	385.00	377.30	0.56	0.176	0.51	30.89	5.00	1.20	42.07	0.52	0.69	0.426	2.415	Non-liquefiable
	40.00	ML	58	72	792.00	400.00	392.00	0.56	0.176	0.51	36.37	5.00	1.20	48.64	0.52	0.68	0.422	2.389	Non-liquefiable
P133A	0.50	SM	28	12	8.50	5.00	3.50	1.00	0.377	1.70	20.40	4.56	1.14	27.78	0.36	1.00	0.432	1.144	Non-liquefiable
P133A	2.00	SM	26	12	34.00	20.00	14.00	0.98	0.373	1.70	20.40	4.39	1.12	27.29	0.35	1.00	0.413	1.108	Non-liquefiable
P133A	3.00	SM	29	14	51.00	30.00	21.00	0.98	0.370	1.70	23.80	4.64	1.15	31.92	0.52	1.00	0.620	1.676	Non-liquefiable
P133A	5.00	SM	22	20	85.00	50.00	35.00	0.96	0.364	1.69	33.81	3.93	1.09	40.88	0.52	1.00	0.620	1.702	Non-liquefiable
P133A	6.00	SM	22	23	107.40	60.00	47.40	0.95	0.337	1.45	33.41	3.93	1.09	40.45	0.52	1.00	0.620	1.839	Non-liquefiable
P133A	8.00	SM	27	18	143.20	80.00	63.20	0.94	0.332	1.26	22.64	4.48	1.13	30.07	0.47	1.00	0.564	1.699	Non-liquefiable
P133A	9.00	SM	42	22	165.60	90.00	75.60	0.93	0.318	1.15	25.30	5.00	1.20	35.36	0.52	1.00	0.620	1.949	Non-liquefiable

APPENDIX-H
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (μ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	10.00	CL	86	22	184.00	100.00	84.00	0.91	0.310	1.09	24.00	5.00	1.20	33.80	0.52	1.00	-	-	Non-liquefiable
	11.00	CL	86	20	227.70	110.00	117.70	0.88	0.266	0.92	18.43	5.00	1.20	27.12	0.34	1.00	-	-	Non-liquefiable
	12.00	CL	86	23	248.40	120.00	128.40	0.85	0.258	0.88	20.30	5.00	1.20	29.36	0.43	1.00	-	-	Non-liquefiable
	13.00	ML	79	23	269.10	130.00	139.10	0.83	0.250	0.85	19.50	5.00	1.20	28.40	0.38	1.00	0.459	1.838	Non-liquefiable
	14.50	ML	79	40	294.35	145.00	149.35	0.79	0.242	0.82	32.73	5.00	1.20	44.28	0.52	1.00	0.620	2.564	Non-liquefiable
	16.00	SM	31	40	324.80	160.00	164.80	0.75	0.230	0.78	31.16	4.77	1.16	41.00	0.52	0.85	0.528	2.298	Non-liquefiable
	17.50	SM	31	55	348.25	175.00	173.25	0.71	0.222	0.76	41.79	4.77	1.16	53.35	0.52	0.84	0.519	2.342	Non-liquefiable
	19.00	SM	31	54	378.10	190.00	188.10	0.67	0.209	0.73	39.37	4.77	1.16	50.54	0.52	0.82	0.505	2.418	Non-liquefiable
	20.50	SM	45	58	407.95	205.00	202.95	0.63	0.197	0.70	40.71	5.00	1.20	53.86	0.52	0.80	0.493	2.510	Non-liquefiable
	22.00	SM	16	60	437.80	220.00	217.80	0.59	0.184	0.68	40.66	2.77	1.05	45.62	0.52	0.78	0.482	2.621	Non-liquefiable
	23.50	SM	16	59	467.65	235.00	232.65	0.56	0.176	0.66	38.68	2.77	1.05	43.54	0.52	0.76	0.472	2.688	Non-liquefiable
	25.00	SM	35	53	497.50	250.00	247.50	0.56	0.176	0.64	33.69	5.00	1.20	45.43	0.52	0.75	0.463	2.634	Non-liquefiable
	26.50	SM	25	63	527.35	265.00	262.35	0.56	0.176	0.62	38.90	4.29	1.12	47.66	0.52	0.73	0.454	2.585	Non-liquefiable
	28.00	SM	25	60	557.20	280.00	277.20	0.56	0.176	0.60	36.04	4.29	1.12	44.47	0.52	0.72	0.446	2.539	Non-liquefiable
	29.50	SM	50	59	587.05	295.00	292.05	0.56	0.176	0.59	34.52	5.00	1.20	46.43	0.52	0.71	0.438	2.497	Non-liquefiable
	31.00	SM	41	59	616.90	310.00	306.90	0.56	0.176	0.57	33.68	5.00	1.20	45.41	0.52	0.70	0.431	2.457	Non-liquefiable
	32.50	SM	41	60	646.75	325.00	321.75	0.56	0.176	0.56	33.45	5.00	1.20	45.14	0.52	0.69	0.425	2.420	Non-liquefiable
	34.00	SM	41	62	676.60	340.00	336.60	0.56	0.176	0.55	33.79	5.00	1.20	45.55	0.52	0.68	0.419	2.385	Non-liquefiable

APPENDIX-H

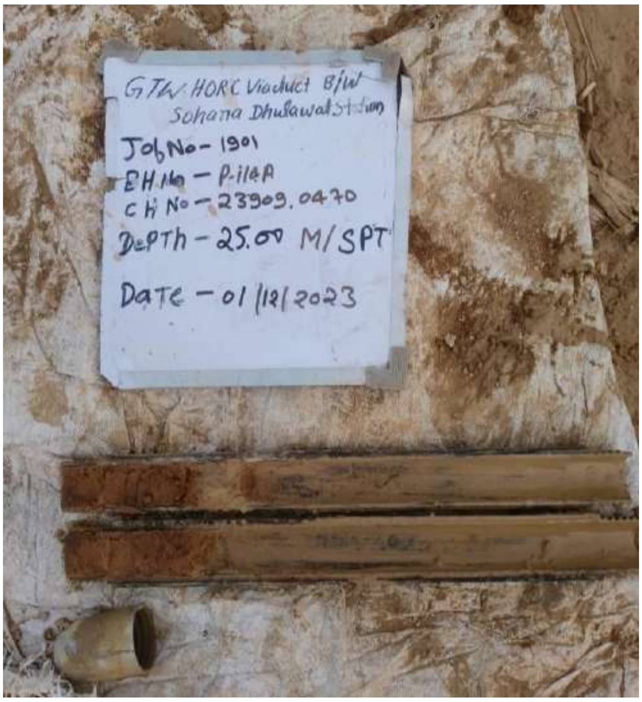
TABLE 5: LIQUEFACTION ANALYSIS

Magnitude of earthquake (Mw)=7 **Earthquake Zone= IV** **amax/g=0.24** **K(alpha)= 1.00** **MSF= 1.193** **Critical Water Table (m)=0.00 m**

BH No.	Depth (m)	Soil Type	Fines Content (FC), %	Corrected N Value N60	Total Overburden Stress (S_{v0}) kN/m^2	Pore Water Pressure (µ) kN/m^2	Effective Overburden Stress (S_{v0}'), kN/m^2	Stress Reduction Factor (r_d)	Cyclic Stress Ratio (CSR)	Overburden Correction factor (C_N)	Corrected SPT for Overburden $(N_1)_{60}$	Coefficient (α)	Coefficient (β)	Corrected SPT for fines content $(N_1)_{60CS}$	Cyclic Resistance Ratio ($CRR_{7.5}$)	K_σ	Cyclic Resistance Ratio (CRR)	Factor of Safety against Liquefaction (FS)	Status of Liquefaction
	35.50	SM	32	60	706.45	355.00	351.45	0.56	0.176	0.53	32.01	4.83	1.17	42.31	0.52	0.67	0.413	2.352	Non-liquefiable
	37.00	SM	24	72	736.30	370.00	366.30	0.56	0.176	0.52	37.62	4.18	1.11	45.85	0.52	0.66	0.407	2.320	Non-liquefiable
	38.50	SM	24	80	766.15	385.00	381.15	0.56	0.176	0.51	40.98	4.18	1.11	49.56	0.52	0.65	0.402	2.291	Non-liquefiable
	40.00	SM	29	70	796.00	400.00	396.00	0.56	0.176	0.50	35.18	4.64	1.15	44.96	0.52	0.64	0.397	2.263	Non-liquefiable

APPENDIX-I
SITE PHOTOGRAPHS

SPT at depth 14.50m



SPT sample at depth 25.00m

SPT at depth 7.00m

SPT at depth 30.50m

APPENDIX-I
SITE PHOTOGRAPHS

UDS at depth 5.00 m

SPT sample at depth 20.00 m

SPT at depth 27.50m

SPT at depth 35.00m

APPENDIX-I
SITE PHOTOGRAPHS

SPT at depth 10.00 m

SPT at depth 10.00 m

SPT sample at depth 21.50 m


UDS at depth 17.00 m

APPENDIX-I
SITE PHOTOGRAPHS

SPT at depth 29.00 m

SPT sample at depth 38.00 m


SPT at depth 10.00 m

SPT sample at depth 20.50 m

APPENDIX-I
SITE PHOTOGRAPHS

SPT sample at depth 9.00 m

SPT at depth 29.00 m

SPT at depth 30.50 m

SPT at depth 23.50 m

APPENDIX-I
SITE PHOTOGRAPHS

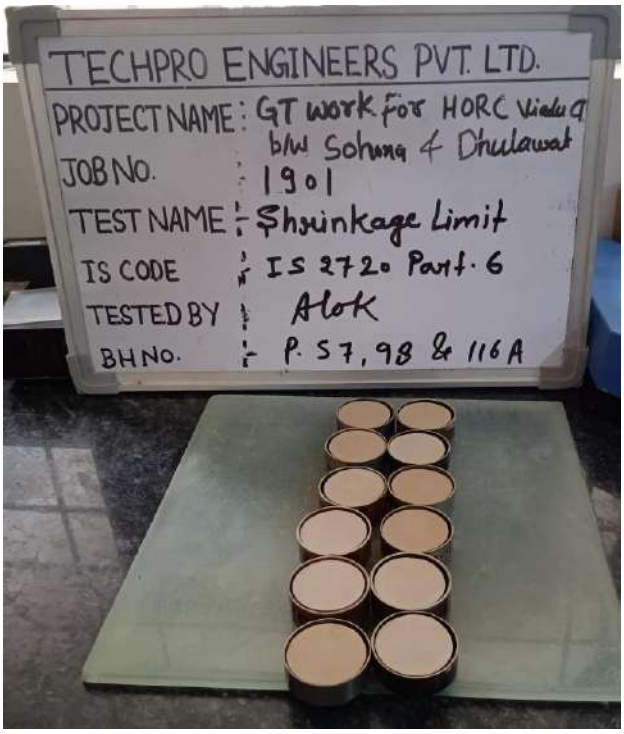
SPT at depth 29.00 m

SPT at depth 40.00 m

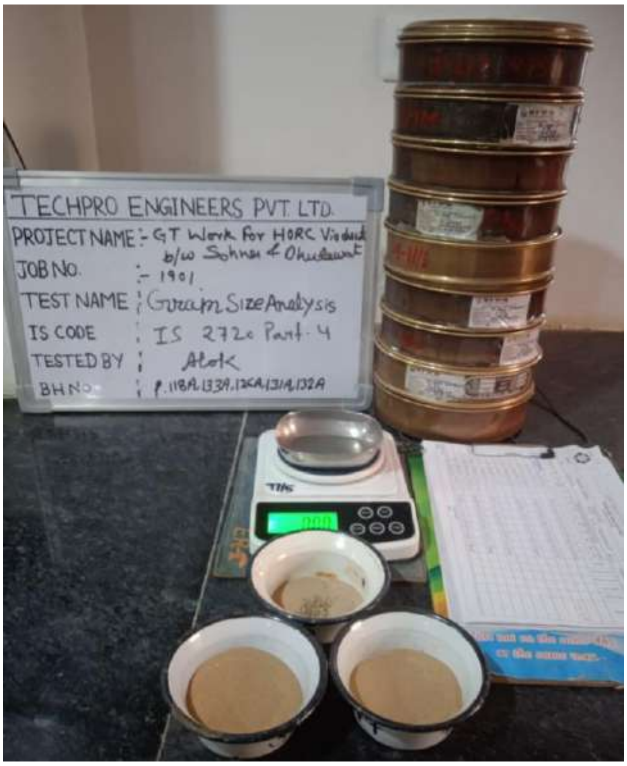
SPT at depth 11.00 m

SPT at depth 29.50 m

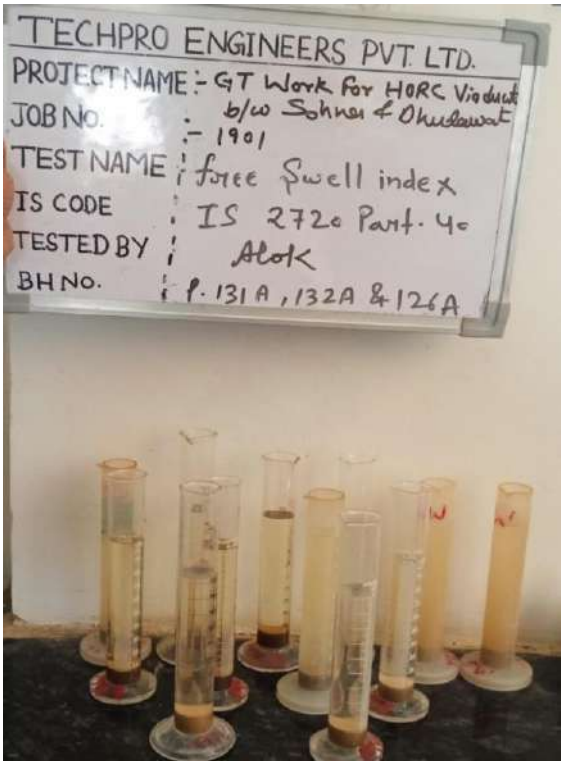
APPENDIX-J
LABORATORY PHOTOGRAPHS

 Atterberg's limit test	 Shrinkage limit test
 Tri-axial test	 Direct shear test

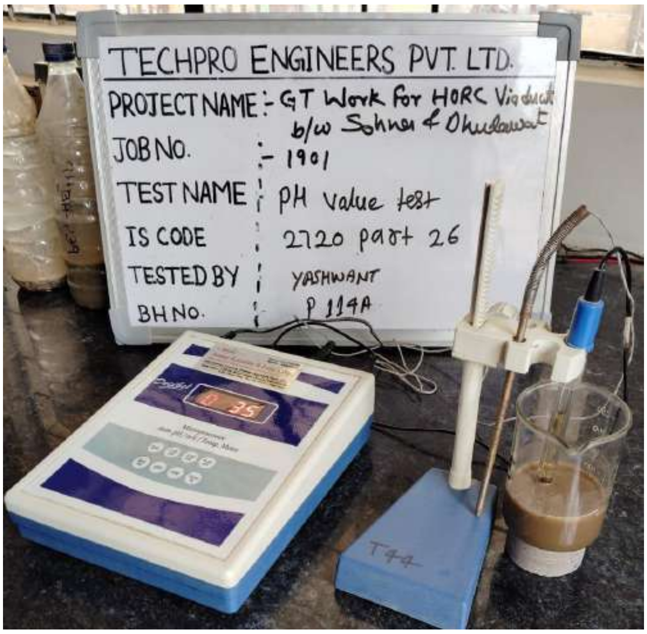
APPENDIX-J
LABORATORY PHOTOGRAPHS



Grain size analysis



Free swell index



pH value test

Moisture Content test

APPENDIX-K
CHART 1: FIELD BORELOG CHARTS (P114A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name: GTW For HORC Viaduct B/w Sohana Dhulawat station		Project Code:	1901
Coordinate: N: 3120845.201	E: 700988.908	Location/ Chainage:	23909.0470
Method of Drilling: Percussion	Drilling Equipment: Manual Percussion	Bore No.:	P114A
Casing Lowered (M): 19.00 Bentonite Used: Yes	Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation: RL-195.095	Date: From 30/11/2023 to 02/12/2023	Water Table (M):	2.30

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
30/11/23	0.00	0.50	0.45	DS	SX	colleted				–	–	–	–	–	–	Non cohesive soil
"	1.00	1.45	0.45	U	"	Received				–	–	–	–	–	–	—do—
"	2.00	2.45	0.45	DP	"	1	1	2	3	–	–	–	–	–	–	—do—
"	3.00	3.45	0.45	DP	"	1	2	2	4	–	–	–	–	–	–	—do—
"	4.00	4.45	0.45	U	"	Slipped				–	–	–	–	–	–	—do— /DS collected
"	5.00	5.45	0.45	DP	"	4	7	9	16	–	–	–	–	–	–	cohesive soil with gravel
"	6.00	6.45	0.45	DP	"	6	8	11	19	–	–	–	–	–	–	—do—
"	7.00	7.45	0.45	U	"	Received				–	–	–	–	–	–	Non cohesive soil
"	8.00	8.45	0.45	DP	"	5	10	13	23	–	–	–	–	–	–	cohesive soil with gravel
"	9.00	9.45	0.45	DP	"	7	11	13	24	–	–	–	–	–	–	—do—
"	10.00	10.45	0.45	U	"	Received				–	–	–	–	–	–	—do—
"	11.00	11.45	0.45	DP	"	6	13	15	28	–	–	–	–	–	–	—do—
"	12.00	12.45	0.45	DP	"	8	16	17	33	–	–	–	–	–	–	—do—
"	13.00	13.45	0.45	U	"	Received				–	–	–	–	–	–	—do—
"	14.50	14.95	0.45	DP	"	7	10	13	23	–	–	–	–	–	–	cohesive soil
"	16.00	16.45	0.45	U	"	Received				–	–	–	–	–	–	—do—
"	17.50	17.95	0.45	DP	"	10	14	17	31	–	–	–	–	–	–	—do—
"	19.00	19.45	0.45	U	"	Received				–	–	–	–	–	–	—do—
01/12/23	20.50	20.95	0.45	DP	"	11	15	19	34	–	–	–	–	–	–	—do—
"	22.00	22.45	0.45	U	"	Slipped				–	–	–	–	–	–	—do—
"	23.50	23.95	0.45	DP	"	14	19	33	52	–	–	–	–	–	–	—do— /DS collected
"	25.00	25.45	0.45	DP	"	17	28	35	63	–	–	–	–	–	–	Non cohesive soil
"	26.50	26.95	0.45	DP	"	20	31	38	69	–	–	–	–	–	–	—do—
"	28.00	28.45	0.45	DP	"	22	33	40	73	–	–	–	–	–	–	—do—

Supervisor

Techpro Engineers Pvt. Ltd.

E-In-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 2: FIELD BORELOG CHARTS (P114A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW For HORC Viaduct B/W Sohana Dhulawat station			Project Code:	1901
Coordinate:	N: 2120845.201	E: 700988.908		Location/ Chainage:	23909.0470
Method of Drilling:	Percussion	Drilling Equipment:	Mohanlal Powerrunner	Bore No.:	P-114A
Casing Lowered (M):	19.00	Bentonite Used: YES	Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation:	R.L-195.095	Date: From 30/11/2023 to 02/12/2023		Water Table (M):	2.30

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
01/12/23	29.50	29.95	0.45	DP	SX	20	34	41	75	—	—	—	—	—	—	Non cohesive soil
"	31.00	31.45	0.45	DP	"	28	41	58	99	—	—	—	—	—	—	— do —
02/12/23	32.50	32.95	0.45	DP	"	22	40	65	105	—	—	—	—	—	—	cohesive soil
"	34.00	34.45	0.45	DP	"	20	38	60	98	—	—	—	—	—	—	— do —
"	35.50	35.95	0.45	DP	"	20	36	55	91	—	—	—	—	—	—	Non cohesive soil
"	37.00	37.45	0.45	DP	"	19	35	52	87	—	—	—	—	—	—	— do —
"	38.50	38.95	0.45	DP	"	21	37	56	93	—	—	—	—	—	—	Non cohesive soil
"	40.00	40.45	0.45	DP	"	22	40	58	93	—	—	—	—	—	—	— do —

Supervisor

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

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APPENDIX-K
CHART 3: FIELD BORELOG CHARTS (P115A)

TECHPRO ENGINEERS PVT. LTD. — **BORE/ DRILL LOG**

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date.:	28.12.2021

Project Name: GT.W. for HORC Viaduct B/w Sohana & Dhulawat Station				**Project Code:**	1901
Coordinate:	N: 3120871.363	E: 700987.943	**Location/ Chainage:** 23935.2970		
Method of Drilling:	Percussion	**Drilling Equipment:** manual powerwinch		**Bore No.:**	P-115A
Casing Lowered (M): 22.00	**Bentonite Used:** Yes	**Standard Sampler:** Yes		**Barrel Type:**	N/A
Ground Elevation:	RL-195.148	**Date: From** 29/11/2023 **to** 01/12/2023		**Water Table (M):**	2.35

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
29/11/23	0.00	0.50	0.50	D	SX	Collected				–	–	–	–	–	–	Non cohesive soil
"	1.00	1.45	0.45	DP	–	2	2	2	4	–	–	–	–	–	–	-do-
"	2.00	2.45	0.45	U	–		Slipped			–	–	–	–	–	–	-do- DS collected
"	3.00	3.45	0.45	DP	–	2	3	3	6	–	–	–	–	–	–	-do-
"	4.00	4.45	0.45	DP	–	2	3	4	7	–	–	–	–	–	–	-do-
"	5.00	5.45	0.45	U	–	Received				–	–	–	–	–	–	-do-
"	6.00	6.45	0.45	DP	–	4	4	6	10	–	–	–	–	–	–	-do-
"	7.00	7.45	0.45	DP	–	5	4	8	12	–	–	–	–	–	–	-do-
"	8.00	8.45	0.45	U	–	Received				–	–	–	–	–	–	cohesive soil with gravel
"	9.00	9.45	0.45	DP	–	5	6	9	15	–	–	–	–	–	–	-do-
"	10.00	10.45	0.45	DP	–	5	7	11	18	–	–	–	–	–	–	-do-
"	11.00	11.45	0.45	U	–	Received				–	–	–	–	–	–	cohesive soil
"	12.50	12.95	0.45	DP	–	4	8	12	20	–	–	–	–	–	–	-do-
"	14.00	14.45	0.45	U	–	Received				–	–	–	–	–	–	cohesive soil with gravel
"	15.50	15.95	0.45	DP	–	7	12	17	29	–	–	–	–	–	–	-do-
"	17.00	17.45	0.45	U	–	Slipped				–	–	–	–	–	–	-do- DS collected
"	18.50	18.95	0.45	DP	–	11	18	22	40	–	–	–	–	–	–	Non cohesive soil with gravel
"	20.00	20.45	0.45	U	–	Received				–	–	–	–	–	–	-do-
"	21.50	21.95	0.45	DP	–	13	19	25	44	–	–	–	–	–	–	-do-
30/11/23	23.00	23.45	0.45	U	–	Received				–	–	–	–	–	–	-do-
"	24.50	24.95	0.45	DP	–	23	28	45	73	–	–	–	–	–	–	-do-
"	26.00	26.45	0.45	DP	–	20	26	38	64	–	–	–	–	–	–	-do-
"	27.50	27.95	0.45	DP	–	11	20	39	59	–	–	–	–	–	–	-do-
"	29.00	29.45	0.45	DP	–	15	23	40	63	–	–	–	–	–	–	-do-

Supervisor

Techpro Engineers Pvt. Ltd. Kanpur

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 4: FIELD BORELOG CHARTS (P115A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	G.T.W. for HORC viaduct B/w Sohana & Dhulawat station			Project Code:	1901
Coordinate:	N: 3120871.363	E: 700987.943	Location/ Chainage:	23935.2470	
Method of Drilling:	Percussion	Drilling Equipment:	Manual/ Power winch	Bore No.:	P115A
Casing Lowered (M):	22.00 Bentonite Used: Yes	Standard Sampler:	Yes	Barrel Type:	N/A
Ground Elevation:	R.L-195.148	Date: From 29/11/2023 to 01/11/2023		Water Table (M):	2.35.00

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
30/11/23	30.50	30.95	0.45	DP	SX	18	25	43	68	—	—	—	—	—	—	Non cohesive soil
〃	32.00	32.45	0.45	DP	—	19	27	43	70	—	—	—	—	—	—	—do—
〃	33.50	33.95	0.45	DP	—	16	24	37	61	—	—	—	—	—	—	—do—
〃	35.00	35.45	0.45	DP	—	15	22	35	57	—	—	—	—	—	—	—do—
01/12/23	36.50	36.95	0.45	DP	—	17	23	36	59	—	—	—	—	—	—	—do—
〃	38.00	38.45	0.45	DP	—	18	25	38	63	—	—	—	—	—	—	—do—
〃	40.00	40.45	0.45	DP	—	21	28	34	62	—	—	—	—	—	—	Non chesive soil

Supervisor

Engineer-In-Charge

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

Techpro Engineers Pvt. Ltd.

APPENDIX-K
CHART 5: FIELD BORELOG CHARTS (P116A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW-HORC Viaduct b/w Sohana Dhulawat station	Project Code:	1901
Coordinate:	N:3120097.53 E:700986.631	Location/ Chainage:	23961.4470
Method of Drilling:	Percussion; Drilling Equipment: Mannual Powerwinch	Bore No.:	P-116A
Casing Lowered (M):	24.00; Bentonite Used: NO; Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation:	R.L-195.485; Date: From 31/10/23 to 1/11/23	Water Table (M):	1.90

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
31/10/23	0.00	0.50	0.50	D.S	SX	collected										Non-cohesive soil
"	1.00	1.45	0.45	DP	"	1	2	2	4							— do —
"	2.00	2.45	0.45	U	"	Received										— do —
"	3.00	3.45	0.45	DP	"	2	3	4	7							— do —
"	4.00	4.45	0.45	DP	"	3	4	5	9							— do —
"	5.00	5.45	0.45	U	"	Received										Non-cohesive soil with gravel
"	6.00	6.45	0.45	DP	"	5	11	14	25							— do —
"	7.00	7.45	0.45	DP	"	6	12	15	27							— do —
"	8.00	8.45	0.45	U	"	Slipped										cohesive soil
"	9.00	9.45	0.45	DP	"	4	7	9	16							cohesive soil with gravel
"	10.00	10.45	0.45	DP	"	5	9	10	19							— do —
"	11.00	11.45	0.45	U	"	Received										— do —
"	12.50	12.95	0.45	DP	"	5	7	9	16							— do —
"	14.00	14.45	0.45	U	"	Received										— do —
"	15.50	15.95	0.45	DP	"	8	15	21	36							Non-cohesive soil with gravel
"	17.00	17.45	0.45	U	"	Received										Non-cohesive soil
"	18.50	18.95	0.45	DP	"	16	36	53	89							— do —
"	20.00	20.45	0.45	DP	"	13	24	28	52							Cohesive soil with gravel
"	21.50	21.95	0.45	DP	"	15	26	32	58							— do —
"	23.00	23.45	0.45	DP	"	11	23	31	54							Non-cohesive soil
"	24.50	24.95	0.45	DP	"	13	25	35	60							— do —
"	26.00	26.45	0.45	DP	"	24	32	42	74							— do —
1/11/23	27.50	27.95	0.45	DP	"	23	30	43	73							— do —
"	29.00	29.45	0.45	DP	"	26	33	45	78							— do —

Nitesh

Supervisor

S.E - Civil

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 6: FIELD BORELOG CHARTS (P116A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW-HORC Viaduct b/w Sohana Dhulawat station			Project Code:	1901
Coordinate:	N:3120897·53	E:700986·631		Location/ Chainage:	23961·4470
Method of Drilling:	Percussion	Drilling Equipment:	Manual Pococrusch	Bore No.:	P-116A
Casing Lowered (M):	24.00	Bentonite Used: NO	Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation:	R·L-195·485	Date: From 31/10/23	to 3/11/23	Water Table (M):	1.90

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
1/11/23 "	30.50	30.95	0.45	DP	SX	27	37	43	80							Non-cohesive soil
"	32.00	32.45	0.45	DP	"	30	34	40	74							— do —
2/11/23	33.50	33.95	0.45	DP	"	29	31	42	73							— do —
"	35.00	35.45	0.45	DP	"	32	35	44	79							— do —
3/11/23	36.50	36.95	0.45	DP	"	33	36	42	78							— do —
"	38.00	38.45	0.45	DP	"	30	32	40	72							— do —
"	40.00	40.45	0.45	DP	"	28	30	39	69							— do —

Nitesh
Supervisor

Techpro Engineers Kanpur

S.E.-civil
E-in-C

Abbreviation Used: U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 7: FIELD BORELOG CHARTS (P117A)

TECHPRO ENGINEERS PVT. LTD. — **BORE/ DRILL LOG**

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date.:	28.12.2021

Project Name:	GT. W FOR HORC Viaduct B/w Sohana Dhulawat station			Project Code:	1901
Coordinate:	N: 3120923.677	E: 700984.973	Location/ Chainage: 22987.6470		
Method of Drilling:	Percussion	Drilling Equipment	Autofall Powerwinch	Bore No.:	P117A
Casing Lowered (M):	24.00	Bentonite Used: Yes	Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation:	R.L-195.522	Date: From 22/11/23 to 26/11/23		Water Table (M):	3.40 –

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
23/11/23	0.0	0.50	0.50	DS	SX	Received										Non cohesive soil
"	1.00	1.45	0.45	DP	"	1	2	3	5							— do —
24/11/23	2.00	2.45	0.45	U	"	Received										— do —
	3.00	3.45	0.45	DP	"	2	3	5	8							– do —
"	4.00	4.45	0.45	DP	"	3	3	6	9							– do —
"	5.00	5.45	0.45	U	"	Received										– do —
"	6.00	6.45	0.45	DP	"	4	6	8	14							–do –
"	7.00	7.45	0.45	DP	"	3	4	7	11							cohesive soil with
"	8.00	8.45	0.45	U	"	Received										Gravel soil
"	9.00	9.45	0.45	DP	"	5	9	13	22							– do –
"	10.0	10.45	0.45	DP	"	6	9	15	24							– do –
"	11.0	11.45	0.45	U	"	Received										– do –
"	12.50	12.95	0.45	DP	"	5	6	8	14							– do –
"	14.0	14.45	0.45	U	"	Slipped										– do –
"	15.50	15.95	0.45	DP	"	6	13	17	30							– do –
"	17.00	17.45	0.45	U	"	Received										– do –
"	18.50	18.95	0.45	DP	"	11	17	26	43							– do –
"	20.0	20.45	0.45	U	"	Received										– do –
"	21.50	21.95	0.45	DP	"	10	16	24	40							Non cohesive soil
25/11/23	23.0	23.45	0.45	U	"	Slipped										with Gravel soil
	24.50	24.95	0.45	DP	"	12	27	38	65							— do —
"	26.0	26.45	0.45	DP	"	14	30	40	70							– do —
"	27.50	27.95	0.45	DP	"	16	33	42	75							– do —
"	29.0	29.45	0.45	DP	"	15	30	36	66							– do —

Supervisor

E - in - C

Abbreviation Used :- U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 8: FIELD BORELOG CHARTS (P117A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GT(W)-HORC Viaduct b/w Sohana Dhulawat station			Project Code:	1901
Coordinate:	N: 3120923.677	E: 700984.973		Location/ Chainage:	23987.6470
Method of Drilling:	Percussion	Drilling Equipment:	Autotrip Power winch	Bore No.:	P117A
Casing Lowered (M):	24.00	Bentonite Used: Yes	Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation:	R.L-195.522	Date: From 23/11/23 to 26/11/23		Water Table (M):	3.40

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
25/11/23	30.50	30.95	0.45	DP	SX	17	23	34	57							Cohesive soil with
"	32.0	32.45	0.45	U	"	Slipped										Gravel
"	33.50	33.95	0.45	DP	"	14	20	26	46							- do -
"	35.0	35.45	0.45	U	"	Slipped										- do -
"	36.50	36.95	0.45	DP	"	17	30	33	63							Non cohesive soil
26/11/23	38.0	38.45	0.45	DP	"	18	33	36	69							- do -
"	40.0	40.45	0.45	DP	"	19	30	32	62							- do -

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Supervisor

E-in-C

Abbreviation Used :-U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K

CHART 9: FIELD BORELOG CHARTS (P118A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW-HORC Viaduct b/w Sohana Dhulawat Station			Project Code:	1901
Coordinate:	N:3120949.8	E:700982.969	Location/ Chainage: 24013.8470		
Method of Drilling:	Percussion	Drilling Equipment:	Auto trip Power winch	Bore No.:	P-118A
Casing Lowered (M):	24.60	Bentonite Used: Yes	Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation:	R.L-195.811	Date: From 27/11/23 to 29/11/23		Water Table (M):	4.60

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
27/11/23	0.00	0.50	0.50	DS	8X	collected										Non-cohesive soil
	1.00	1.45	0.45	SPT	11	3	3	4	7							— do —
11	2.00	2.45	0.45	UDS	11	slipped										-do-DS collected
11	3.00	3.45	0.45	SPT	11	2	3	3	6							Non-cohesive soil
11	4.00	4.45	0.45	SPT	11	4	4	6	10							— do —
11	5.00	5.45	0.45	UDS	11	Received										Non-cohesive soil with gravel
11	6.00	6.45	0.45	SPT	11	5	6	8	14							Non-cohesive soil
11	7.00	7.45	0.45	SPT	11	6	7	10	17							— do —
11	8.00	8.45	0.45	UDS	11	Received										Non-cohesive soil with gravel
11	9.00	9.45	0.45	SPT	11	4	6	9	15							cohesive soil
11	10.00	10.45	0.45	SPT	11	5	9	12	21							— do —
11	11.00	11.45	0.45	UDS	11	slipped										-do-DS collected
11	12.50	12.95	0.45	SPT	11	7	11	14	25							cohesive soil
11	14.00	14.45	0.45	UDS	11	slipped										-do-DS collected
11	15.50	15.95	0.45	SPT	11	8	10	13	23							cohesive soil
11	17.00	17.45	0.45	UDS	11	Received										cohesive soil with gravel
11	18.50	18.95	0.45	SPT	11	11	15	19	34							— do —
11	20.00	20.45	0.45	UDS	11	Received										— do —
28/11/23	21.50	21.95	0.45	SPT	11	12	14	22	36							Non-cohesive soil
	23.00	23.45	0.45	UDS	11	slipped										-do-DS collected
11	24.50	24.95	0.45	SPT	11	13	21	26	47							Non-cohesive soil
11	26.00	26.45	0.45	SPT	11	10	15	41	56							— do —
11	27.50	27.95	0.45	SPT	11	10	28	32	60							— do —
11	29.00	29.45	0.45	SPT	11	16	33	47	80							— do —

Nitesh
Supervisor

Techpro Engineers Pvt. Ltd.

SE-Civil
E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K

CHART 10: FIELD BORELOG CHARTS (P118A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW-HORC Viaduct b/w Sohana Dhulawat Station			Project Code:	1901
Coordinate:	N:3120949.8	E:700982.969	Location/ Chainage: 24013.8470		
Method of Drilling:	Percussion	Drilling Equipment	Automatic Powerwinch	Bore No.:	P118A
Casing Lowered (M):	24.00	Bentonite Used: Yes	Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation:	R.L-195.811	Date: From 27/11/23 to 29/11/23		Water Table (M):	4.00

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
28/11/23	30.50	30.95	0.45	SPT	SX	18	30	45	75							Non-cohesive soil
"	32.00	32.45	0.45	SPT	"	20	26	41	67							— do —
"	33.50	33.95	0.45	SPT	"	21	29	40	69							— do —
"	35.00	35.45	0.45	SPT	"	23	32	39	71							— do —
29/11/23	36.50	36.95	0.45	SPT	"	27	35	40	75							— do —
"	38.00	38.45	0.45	SPT	"	30	34	41	75							— do —
"	40.00	40.45	0.45	SPT	"	31	36	44	80							— do —

Nitesh

Supervisor

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 11: FIELD BORELOG CHARTS (P119A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW-HORC Viaduct b/w Sohana Dhulawat station	Project Code:	1901
Coordinate:	N: 3120975.894 E: 700980.62	Location/ Chainage:	24040.047
Method of Drilling:	Percussion; Drilling Equipment: Power winch	Bore No.:	P119A
Casing Lowered (M):	2400; Bentonite Used: NO; Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation:	R.L-195.917; Date: From 25/11/23 to 27/11/23	Water Table (M):	5.00M

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
25/11/23	0.00	0.50	0.50	DS	SX	Collected										Non-cohesive soil
	1.00	1.45	0.45	DP	〃	2	3	4	7							— do —
〃	2.00	2.45	0.45	U	〃	Received										Non-cohesive soil with gravel
〃	3.00	3.45	0.45	DP	〃	3	4	6	10							Non-cohesive soil
〃	4.00	4.45	0.45	DP	〃	4	5	6	11							— do —
〃	5.00	5.45	0.45	U	〃	Received										— do —
〃	6.00	6.45	0.45	DP	〃	4	6	9	15							— do —
〃	7.00	7.45	0.45	DP	〃	5	7	10	17							— do —
〃	8.00	8.45	0.45	U	〃	slipped										-do- DS collected
〃	9.00	9.45	0.45	DP	〃	7	9	11	20							Non-cohesive soil
〃	10.00	10.45	0.45	DP	〃	6	10	13	23							— do —
〃	11.00	11.45	0.45	U	〃	Received										— do —
〃	12.50	12.95	0.45	DP	〃	8	12	14	26							— do —
〃	14.00	14.45	0.45	U	〃	Received										— do —
26/11/23	15.50	15.95	0.45	DP	〃	9	11	13	24							Non-cohesive soil with gravel
	17.00	17.45	0.45	U	〃	slipped										-do- DS collected
〃	18.50	18.95	0.45	DP	〃	10	16	20	36							Non-cohesive soil with gravel
〃	20.00	20.45	0.45	U	〃	Received										— do —
〃	21.50	21.95	0.45	DP	〃	10	13	18	31							— do —
〃	23.00	23.45	0.45	U	〃	slipped										-do- DS collected
〃	24.50	24.95	0.45	DP	〃	12	16	21	37							Non-cohesive soil
〃	26.00	26.45	0.45	U	〃	slipped										-do- DS collected
〃	27.50	27.95	0.45	DP	〃	15	20	29	49							Non-cohesive soil
〃	29.00	29.45	0.45	U	〃	slipped										-do- DS collected

Nitesh
Supervisor

Techpro Engineers Pvt. Ltd.

E-in-C

Abbreviation Used: U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 12: FIELD BORELOG CHARTS (P119A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTN-HORC Viaduct b/w Sohana Dhulawat Station			Project Code:	1901
Coordinate:	N:3130975.894	E:706900.62	Location/ Chainage: 94040.047		
Method of Drilling:	Percussion	Drilling Equipment:	Autotrip Percussion winch	Bore No.:	P119A
Casing Lowered (M): 24.00	Bentonite Used: NO	Standard Sampler:	Yes	Barrel Type:	N/A
Ground Elevation:	R.L-195.917	Date: From 25/11/23 to 27/11/23		Water Table (M):	5.00m

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
25/11/23	30.50	30.95	0.45	DP	SX	18	23	31	54							Non-cohesive soil with gravel
	32.00	32.45	0.45	DP	"	21	25	32	57							Non-cohesive soil
"	33.50	33.95	0.45	DP	"	19	26	34	60							— do —
"	35.00	35.45	0.45	DP	"	22	30	35	65							— do —
27/11/23	36.50	36.95	0.45	DP	"	26	34	37	71							— do —
"	38.00	38.45	0.45	DP	"	30	32	40	72							— do —
"	40.00	40.45	0.45	DP	"	29	33	44	77							— do —

Nitesh

Supervisor

Techpro Engineers Pvt. Ltd.

S.E.(Geo)

Abbreviation Used: U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard ... E ...
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K

CHART 13: FIELD BORELOG CHARTS (P120A)

TECHPRO ENGINEERS PVT. LTD.	**BORE/ DRILL LOG**	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW-HORC Viaduct b/w Sohana Dhulawat Station			**Project Code:**	1901
Coordinate:	N: 3191001·95	E: 700970·032	**Location/ Chainage:** 24066·247		
Method of Drilling:	Percussion	**Drilling Equipment:**	Mannual Powerwinch	**Bore No.:**	P120A
Casing Lowered (M):	21·00 **Bentonite Used:** Yes	**Standard Sampler :**	Yes	**Barrel Type :**	N/A
Ground Elevation:	R·L-196·008	**Date: From** 18/11/23 **to** 21/11/23		**Water Table (M):**	5·00M

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
18/11/23	0·00	0·50	0·50	DS	SX	collected										Non-cohesive soil
	1·00	1·45	0·45	DP	"	2	3	4	7							— do —
"	2·00	2·45	0·45	U	"	Received										— do —
"	3·00	3·45	0·45	DP	"	5	7	8	15							Non-cohesive soil with gravel
"	4·00	4·45	0·45	DP	"	3	5	6	11							Non-cohesive soil
"	5·00	5·45	0·45	U	"	Received										— do —
"	6·00	6·45	0·45	DP	"	4	5	6	11							— do —
"	7·00	7·45	0·45	DP	"	4	6	8	14							— do —
"	8·00	8·45	0·45	U	"	Received										— do —
"	9·00	9·45	0·45	DP	"	5	10	18	28							Cohesive soil with gravel
"	10·00	10·45	0·45	DP	"	6	13	20	33							— do —
"	11·00	11·45	0·45	U	"	Received										— do —
19/11/23	12·50	12·95	0·45	DP	"	6	9	13	22							— do —
	14·00	14·45	0·45	U	"	slipped										-do- DS collected
	15·50	15·95	0·45	DP	"	10	12	13	25							Non-cohesive soil with gravel
"	17·00	17·45	0·45	U	"	Received										— do —
"	18·50	18·95	0·45	DP	"	12	14	18	32							— do —
"	20·00	20·45	0·45	U	"	slipped										-do- DS collected
"	21·50	21·95	0·45	DP	"	13	15	21	36							Non-cohesive soil with gravel
"	23·00	23·45	0·45	U	"	slipped										— do —
"	24·50	24·95	0·45	DP	"	14	17	23	40							Non-cohesive soil
"	26·00	26·45	0·45	U	"	slipped										-do- DS collected
"	27·50	27·95	0·45	DP	"	16	20	25	45							Non-cohesive soil
"	29·00	29·45	0·45	U	"	Received										— do —

Supervisor

Techpro Engineers Pvt. Ltd. Kanpur

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 14: FIELD BORELOG CHARTS (P120A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No: GT/003 Date of Issue: 01.04.2018 Rev. No.: R03 Rev. Date: 28.12.2021

Project Name: GTL-HORC Viaduct b/w Sohana Dhulawat Station		Project Code:	1901
Coordinate: N: 3121001.95	E: 700978.032	Location/ Chainage:	24066.247
Method of Drilling: Percussion	Drilling Equipment: Manual Percussion	Bore No.:	P120A
Casing Lowered (M): 21.00 Bentonite Used: Yes	Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation: R.L-196.008	Date: From 18/11/23 to 21/11/23	Water Table (M):	5.00 M

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
20/11/23	30.50	30.95	0.45	DP	SX	17	21	27	48							Non-cohesive soil
"	32.00	32.45	0.45	U	"	slipped										-do- D.S collected
"	33.50	33.95	0.45	DP	"	22	30	36	66							Non-cohesive soil with gravel
"	35.00	35.45	0.45	DP	"	27	33	38	71							— do —
21/11/23	36.50	36.95	0.45	DP	"	29	35	40	75							— do —
"	38.00	38.45	0.45	DP	"	28	32	42	74							— do —
"	40.00	40.45	0.45	DP	"	46	56	-	R							— do —

Nitesh
Supervisor

E-in-C

Abbreviation Used : U- Undisturbed Sample, C- Core Sample, D- Disturbed Sample, P- Standard Penetration Test, R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 15: FIELD BORELOG CHARTS (P121A)

TECHPRO ENGINEERS PVT. LTD. — BORE/ DRILL LOG

Doc No:	GT/001
Date of Issue	01.04.2018
Rev No:	R01
Rev Date:	28.12.2021

Project Name: GTW-HORC Viaduct b/w Sohana Dhulawat station — Project Code: 1901
Coordinate: N:3121027.982 E:700974.887 — Location/ Chainage: 24092.4470
Method of Drilling: Percussion — Drilling Equipment: Manual Powerwinch — Bore No.: P121A
Casing Lowered (M): 19.5 — Bentonite Used: Yes — Standard Sampler: Yes — Barrel Type: N/A
Ground Elevation: R.L-196.463 — Date: From 1/12/23 to 5/12/23 — Water Table (M): 5.00M

Day	From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Start	End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
1/12/23	0.00	0.50	0.50	DS	SX	collected										cohesive soil
"	1.00	1.45	0.45	DP	"	3	4	6	10							cohesive soil with gravel
"	2.00	2.45	0.45	U	"	Received										cohesive soil
"	3.00	3.45	0.45	DP	"	4	5	7	12							Non-cohesive soil
"	4.00	4.45	0.45	DP	"	5	7	9	16							— do —
"	5.00	5.45	0.45	U	"	Received										— do —
"	6.00	6.45	0.45	DP	"	4	8	9	17							Non-cohesive soil with gravel
"	7.00	7.45	0.45	DP	"	5	9	12	21							— do —
"	8.00	8.45	0.45	U	"	Received										— do —
"	9.00	9.45	0.45	DP	"	4	7	10	17							— do —
"	10.00	10.45	0.45	DP	"	6	8	11	19							— do —
"	11.00	11.45	0.45	U	"	slipped										-do- DS collected
"	12.50	12.95	0.45	DP	"	7	10	13	23							Non-cohesive soil with gravel
3/12/23	14.00	14.45	0.45	U	"	Received										— do —
"	15.50	15.95	0.45	DP	"	9	11	14	25							— do —
"	17.00	17.45	0.45	U	"	Received										— do —
"	18.50	18.95	0.45	DP	"	13	15	16	31							Non-cohesive soil
"	20.00	20.45	0.45	U	"	slipped										-do- DS collected
"	21.50	21.95	0.45	DP	"	10	17	20	37							Non-cohesive soil
"	23.00	23.45	0.45	U	"	slipped										-do- DS collected
"	24.50	24.95	0.45	DP	"	15	21	31	52							Non-cohesive soil
"	26.00	26.45	0.45	DP	"	17	30	40	70							— do —
"	27.50	27.95	0.45	DP	"	12	28	38	66							— do —
"	29.00	29.45	0.45	DP	"	17	33	41	74							— do —

Nifesh
Supervisor

Techpro Engineers Pvt. Ltd. Kanpur

S.F. Moris
E - In - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K

CHART 16: FIELD BORELOG CHARTS (P121A)

TECHPRO ENGINEERS PVT. LTD.

BORE/ DRILL LOG

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date.:	28.12.2021

Project Name: GTW HORC Viaduct b/w Sohana Dhulawat station | Project Code: 1901

Coordinate: N: 3121027.983 | E: 700974.887 | Location/ Chainage: 24092.4470

Method of Drilling: Percussion | Drilling Equipment: Mannual Power winch | Bore No.: P121A

Casing Lowered (M): 19.5 | Bentonite Used: Yes | Standard Sampler: Yes | Barrel Type: N/A

Ground Elevation: R.L-196.463 | Date: From 1/12/23 to 3/12/23 | Water Table (M): 5.00

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
02/12/23	30.50	30.95	0.45	DP	SX	19	27	39	66							Non-cohesive soil
〃	32.00	32.45	0.45	DP	〃	20	26	42	68							—do—
03/12/23	33.50	33.95	0.45	DP	〃	22	28	40	68							—do—
〃	35.00	35.45	0.45	DP	〃	24	30	41	71							—do—
〃	36.50	36.95	0.45	DP	〃	26	34	44	78							—do—
〃	38.00	38.45	0.45	DP	〃	29	36	42	78							—do—
〃	40.00	40.45	0.45	DP	〃	30	35	46	81							—do—

Nitesh
Supervisor

Techpro Engineers Pvt. Ltd.

S.E. Civil
E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 17: FIELD BORELOG CHARTS (P122A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW-HORC Viaduct b/w Sohana Dhulawat station			Project Code:	1901
Coordinate:	N:3121054.001	E:700971.747	Location/ Chainage: 24118.6470		
Method of Drilling:	Percussion	Drilling Equipment:	Manual Powerwinch	Bore No.:	P122A
Casing Lowered (M):	24.00 Bentonite Used: Yes	Standard Sampler:	Yes	Barrel Type:	N/A
Ground Elevation:	R.L-196.901	Date: From 4/12/23 to 6/12/23		Water Table (M):	5.20

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
04/12/23	0.00	0.50	0.50	DS	SX	collected										Non-cohesive soil
"	1.00	1.45	0.45	DP	"	2	3	5	8							Non-cohesive soil with gravel
"	2.00	2.45	0.45	U	"	Received										— do —
"	3.00	3.45	0.45	DP	"	4	4	6	10							Non-cohesive soil
"	4.00	4.45	0.45	DP	"	5	7	8	15							— do —
"	5.00	5.45	0.45	U	"	Received										— do —
"	6.00	6.45	0.45	DP	"	6	7	9	16							— do —
"	7.00	7.45	0.45	DP	"	5	8	10	18							— do —
"	8.00	8.45	0.45	U	"	slipped										-do- DS collected
"	9.00	9.45	0.45	DP	"	7	9	12	21							Non-cohesive soil
"	10.00	10.45	0.45	DP	"	10	13	16	29							— do —
"	11.00	11.45	0.45	U	"	Received										Cohesive soil with gravel
"	12.50	12.95	0.45	DP	"	8	11	14	25							cohesive soil
"	14.00	14.45	0.45	U	"	Received										—do— with gravel
"	15.50	15.95	0.45	DP	"	12	16	19	35							Non-cohesive soil with gravel
"	17.00	17.45	0.45	U	"	Received										— do —
"	18.50	18.95	0.45	DP	"	12	15	17	32							— do —
"	20.00	20.45	0.45	U	"	slipped										-do- DS collected
05/12/23	21.50	21.95	0.45	DP	"	11	16	20	36							Non-cohesive soil
"	23.00	23.45	0.45	U	"	slipped										cohesive soil with gravel
"	24.50	24.95	0.45	DP	"	13	19	28	47							— do —
"	26.00	26.45	0.45	U	"	slipped										Non-cohesive soil
"	27.50	27.95	0.45	DP	"	16	23	31	54							— do —
"	29.00	29.45	0.45	DP	"	12	25	34	59							— do —

Supervisor

Techpro Engineers Pvt. Ltd.

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 18: FIELD BORELOG CHARTS (P122A)

TECHPRO ENGINEERS PVT. LTD. | **BORE/ DRILL LOG**

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date.:	28.12.2021

Project Name:	GTW-HORC Viaduct b/w Sohana Dhulawat station			**Project Code:**	1901
Coordinate:	N: 3121054.001	E: 700971.747	**Location/ Chainage:**	24118.6470	
Method of Drilling:	Percussion	**Drilling Equipment:**	Mannual Power winch	**Bore No.:**	P122A
Casing Lowered (M):	24.00	**Bentonite Used:** Yes	**Standard Sampler :** Yes	**Barrel Type :**	N/A
Ground Elevation:	R.L- 196.901	**Date: From** 4/12/23 **to** 6/12/23		**Water Table (M):**	5.20

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
05/12/23	30.50	30.95	0.45	DP	SX	26	33	38	71							Non-cohesive soil
"	32.00	32.45	0.45	DP	"	24	30	35	65							—do—
"	33.50	33.95	0.45	DP	"	22	32	36	68							—do—
"	35.00	35.45	0.45	DP	"	26	35	41	76							—do—
06/12/23	36.50	36.95	0.45	DP	"	25	33	45	78							—do—
"	38.00	38.45	0.45	DP	"	28	37	47	84							—do—
"	40.00	40.45	0.45	DP	"	26	34	42	76							—do—

Nitesh
Supervisor

E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 19: FIELD BORELOG CHARTS (P123A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name: GTW For HORC Viaduct B/w Sohana Dhulawat station		Project Code:	1901
Coordinate: N: 3121079.896	E: 700967.777	Location/ Chainage:	24144.8470
Method of Drilling: Rotary	Drilling Equipment: Manual Hydraulic	Bore No.:	P123A
Casing Lowered (M): NIL; Bentonite Used: NA	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation: RL-196.824	Date: From 20/11/23 to 24/11/2023	Water Table (M):	5.60M

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
20/11/23	0.00	0.50	0.50	D	SX	collect				—	—	—	—	—	—	Non cohesive soil
"	1.00	1.45	0.45	DP	"	2	3	3	6	—	—	—	—	—	—	do
"	2.00	2.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	3.00	3.45	0.45	DP	"	3	4	6	10	—	—	—	—	—	—	Non cohesive soil
"	4.00	4.45	0.45	DP	"	4	5	7	12	—	—	—	—	—	—	do
"	5.00	5.45	0.45	U	"	Received				—	—	—	—	—	—	Non cohesive soil
"	6.00	6.45	0.45	DP	"	5	7	9	16	—	—	—	—	—	—	do
"	7.00	7.45	0.45	DP	"	4	8	10	18	—	—	—	—	—	—	do
"	8.00	8.45	0.45	U	"	Received				—	—	—	—	—	—	do
21/11/23	9.00	9.45	0.45	DP	"	5	9	12	21	—	—	—	—	—	—	Cohesive soil with Gravel
"	10.00	10.45	0.45	DP	"	9	13	15	28	—	—	—	—	—	—	do
"	11.00	11.45	0.45	U	SX	Received				—	—	—	—	—	—	Cohesive soil
"	12.50	12.95	0.45	DP	"	5	7	12	19	—	—	—	—	—	—	Cohesive soil with Gravel
"	14.00	14.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	15.50	15.95	0.45	DP	"	6	9	14	23	—	—	—	—	—	—	do
"	17.00	17.45	0.45	U/DS	"	slipped				—	—	—	—	—	—	Non cohesive soil
"	18.50	18.95	0.45	DP	"	10	16	24	40	—	—	—	—	—	—	do
"	20.00	20.45	0.45	U	"	Received				—	—	—	—	—	—	Non cohesive soil
22/11/23	21.50	21.95	0.45	DP	"	13	24	30	54	—	—	—	—	—	—	Non cohesive soil with Gravel
"	23.00	23.45	0.45	DP	"	21	30	42	72	—	—	—	—	—	—	do
"	24.50	24.95	0.45	DP	"	17	24	35	79	—	—	—	—	—	—	do
"	26.00	26.45	0.45	DP	"	15	27	37	64	—	—	—	—	—	—	Non cohesive soil
"	27.50	27.95	0.45	DP	"	9	32	38	70	—	—	—	—	—	—	do
"	29.00	29.45	0.45	DP	"	17	32	50	82	—	—	—	—	—	—	do

Supervisor E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

Techpro Engineers Pvt. Ltd.

APPENDIX-K

CHART 20: FIELD BORELOG CHARTS (P123A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name: GTW FOR HORC Viaduct B/w Sohana Dhulawat station		Project Code:	1901
Coordinate: N: 3121079.896	E: 700967.777	Location/ Chainage:	24144.8470
Method of Drilling: Rotery	Drilling Equipment: T/ Manual Mounted	Bore No.:	P-123A
Casing Lowered (M): NIL Bentonite Used: NA	Standard Sampler: Yes.	Barrel Type:	NA
Ground Elevation: R.L-196.824	Date: From 20/11/23 to 24/11/2023	Water Table (M):	5.60

Day	Depth/RUN (m)		Length(m)	Nature of sample	Hole Size	SPT Record				Run Time		C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
	From	To				0-15cm	15-30cm	30-45cm	N Value	Start	End					
23/11/23	30.50	30.95	0.45	DP	SX	17	32	50	82	–	–	–	–	–	–	Non cohesive soil.
"	32.00	32.45	0.45	DP	"	12	25	37	62	–	–	–	–	–	–	Non cohesive soil.
"	33.50	33.95	0.45	DP	"	16	19	32	51	–	–	–	–	–	–	cohesive soil
"	35.00	35.45	0.45	DP	"	2	29	45	74	–	–	–	–	–	–	cohesive soil with Gravel
"	36.50	36.95	0.45	DP	"	14	32	39	71	–	–	–	–	–	–	— do
"	38.00	38.45	0.45	DP	"	16	21	36	57	–	–	–	–	–	–	cohesive soil with Gravel
"	40.00	40.45	0.45	DP	"	23	35	50	85	–	–	–	–	–	–	cohesive soil with Gravel

Supervisor

Techpro Engineers Pvt. Ltd.

S.E. Civil

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 21: FIELD BORELOG CHARTS (P124A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No	GT/003
		Date of Issue	01.04.2018
		Rev No	R03
		Rev Date :	28.12.2021

Project Name:	GTI FOR HORC Viaduct b/w Sohana Dhulawat Stations			Project Code:	1901
Coordinate:	N: 3121105.774	E: 700963.709		Location/ Chainage:	24171.0470
Method of Drilling:	Percussion	Drilling Equipment:	Tripod hammer, Power winch	Bore No.:	P124A
Casing Lowered (M):	2.00	Bentonite Used: NA	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation:	R.L.-196.914	Date: From 05/12/23	to 07/12/23	Water Table (M):	5.70

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
5/12/23	0.00	0.50	0.50	D	SX	collected				—	—	—	—	—	—	Non Cohesive soil
"	1.00	1.45	0.45	DP	"	3	4	6	10	—	—	—	—	—	—	do
"	2.00	2.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	3.00	3.45	0.45	DP	"	4	5	7	12	—	—	—	—	—	—	do
"	4.00	4.45	0.45	DP	"	5	7	9	16	—	—	—	—	—	—	do
"	5.00	5.45	0.45	U	"	Received				—	—	—	—	—	—	Non cohesive soil with Gravel
"	6.00	6.45	0.45	DP	"	4	8	9	17	—	—	—	—	—	—	do
"	7.00	7.45	0.45	DP	"	5	9	12	21	—	—	—	—	—	—	do
"	8.00	8.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	9.00	9.45	0.45	DP	"	5	8	14	22	—	—	—	—	—	—	Cohesive soil
"	10.00	10.45	0.45	DP	"	6	10	15	25	—	—	—	—	—	—	do
"	11.00	11.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	12.50	12.95	0.45	DP	"	7	9	11	20	—	—	—	—	—	—	Cohesive soil
"	14.00	14.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	15.50	15.95	0.45	DP	"	6	10	13	23	—	—	—	—	—	—	do
"	17.00	17.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	18.50	18.95	0.45	DP	"	8	14	20	34	—	—	—	—	—	—	Noncohesive soil
"	20.00	20.45	0.45	U	"	Received				—	—	—	—	—	—	do
6/12/23	21.50	21.95	0.45	DP	SX	7	14	25	39	—	—	—	—	—	—	Cohesive soil with Gravel
"	23.00	23.45	0.45	U	"	8	16	25	41	—	—	—	—	—	—	Noncohesive soil with
"	24.50	24.95	0.45	DP	"	9	18	27	45	—	—	—	—	—	—	do
"	26.00	26.45	0.45	U/DS	"	Slipped				—	—	—	—	—	—	Non Cohesive soil
"	27.50	27.95	0.45	DP	"	11	24	28	52	—	—	—	—	—	—	do
"	29.00	29.45	0.45	DP	"	13	28	32	60	—	—	—	—	—	—	do

Supervisor — S.E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 22: FIELD BORELOG CHARTS (P124A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW FOR HORC Viaduct B/w Sohana Dhulawat station	Project Code:	1901
Coordinate:	N: 3121105.774 E: 700963.709	Location/ Chainage:	24171.0470
Method of Drilling:	Percussion	Drilling Equipment: Tripod Hammer Powerwinch	Bore No.: P124A
Casing Lowered (M):	21.00 Bentonite Used: NA	Standard Sampler: Yes	Barrel Type: NA
Ground Elevation:	R.L-196.914	Date: From 05/12/23 to 07/12/23	Water Table (M): 5.70

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
"	30.50	30.45	0.45	DP	SX	15	32	36	68	—	—	—	—	—	-	Non cohesive soil
7/12/23	32.00	32.45	0.45	DP	"	14	35	40	75	—	—	—	—	-	—	do
"	33.50	33.95	0.45	DP	"	21	38	43	81	—	—	—	—	—	-	do
"	35.00	35.45	0.45	DP	"	14	32	35	67	—	—	—	—	—	—	do
"	36.50	36.95	0.45	DP	"	17	35	39	74	—	—	—	—	—	—	Non cohesive soil
"	38.00	38.45	0.45	DP	"	18	37	42	79	—	-	—	—	—	-	do
"	40.00	40.45	0.45	DP	"	21	38	45	83	—	—	—	-	—	-	cohesive soil

Supervisor

E-in-C

Techpro Engineers Pvt. Ltd. Kanpur

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 23: FIELD BORELOG CHARTS (P125A)

Manual T. Hammer.

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW For HORC Viaduct B/w Sohana Dhulawat			Project Code:	1901
Coordinate:	N: 3121131.6	E: 700959.297		Location/ Chainage:	24197.2476
Method of Drilling:	Rotary	Drilling Equipment:	T/mounted	Bore No.:	P125A
Casing Lowered (M):	NIL	Bentonite Used: NA	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation:	R.L-197.89	Date: From 25/11/2023	to 27/11/23	Water Table (M):	5.65m

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
25/11/23	0.00	0.50	0.45	D	SX	collected				–	–	–	–	–	–	Non cohesive soil
"	1.00	1.45	0.45	U	"	Received				–	–	–	–	–	–	do
"	2.00	2.45	0.45	DP	"	3	4	5	9	–	–	–	–	–	–	do
"	3.00	3.45	0.45	DP	"	4	5	7	12	–	–	–	–	–	–	do
"	4.00	4.45	0.45	U	"	collected				–	–	–	–	–	–	Non cohesive soil
"	5.00	5.45	0.45	DP	"	5	8	10	18	–	–	–	–	–	–	do
"	6.00	6.45	0.45	DP	"	6	11	13	24	–	–	–	–	–	–	do
"	7.00	7.45	0.45	U	"	Received				–	–	–	–	–	–	Non cohesive soil
"	8.00	8.45	0.45	DP	"	7	8	10	18	–	–	–	–	–	–	do
"	9.00	9.45	0.45	DP	"	8	10	15	25	–	–	–	–	–	–	do
"	10.00	10.45	0.45	U	"	Received				–	–	–	–	–	–	do
"	11.00	11.45	0.45	DP	"	9	14	16	30	–	–	–	–	–	–	cohesive soil
"	12.00	12.45	0.45	DP	"	10	15	18	33	–	–	–	–	–	–	do
"	13.00	13.45	0.45	U	SX	Received				–	–	–	–	–	–	do
"	14.50	14.95	0.45	DP	"	7	9	18	27	–	–	–	–	–	–	Cohesive soil.
"	16.00	16.45	0.45	U	"	Received				–	–	–	–	–	–	do
"	17.50	17.95	0.45	DP	"	10	15	18	33	–	–	–	–	–	–	Cohesive soil
26/11/23	19.00	19.45	0.45	U	"	Received				–	–	–	–	–	–	Cohesive soil with Gravel
"	20.50	20.95	0.45	DP	"	11	24	44	68	–	–	–	–	–	–	do
"	22.00	20.45	0.45	DP	"	15	28	45	73	–	–	–	–	–	–	do
"	23.50	23.95	0.45	DP	"	16	33	46	79	–	–	–	–	–	–	Non cohesive soil
"	25.00	25.45	0.45	DP	"	19	35	45	80	–	–	–	–	–	–	do
"	26.50	26.95	0.45	DP	"	17	36	42	78	–	–	–	–	–	–	do
"	28.00	28.45	0.45		"	27	38	52	90	–	–	–	–	–	–	Non cohesive soil with Gravel

Supervisor B Singh

Techpro Engineers Pvt. Ltd.

S.E.-Civil
E - In - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test(N) > 100), Sampler means SPT sampler

APPENDIX-K

CHART 24: FIELD BORELOG CHARTS (P125A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW FOR HORC Viaduct B/W Sohana Dhulawat			Project Code:	1901
Coordinate:	N: 3121131.6	E: 700959.297		Location/ Chainage:	24197.2470
Method of Drilling:	Rotary	Drilling Equipment:	T/Mounted	Bore No.:	P.125A
Casing Lowered (M):	—	Bentonite Used: NA	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation:	R.L-197.89	Date: From 25/11/23 to 27/11/23		Water Table (M):	5.65

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
	29.50	29.95	0.45	DP	SX	15	32	39	71	—	—	—	—	—	—	Non cohesive soil
	31.00	31.45	0.45	DP	"	17	35	38	73	—	—	—	—	—	—	do
	32.50	32.95	0.45	DP	"	21	33	42	75	—	—	—	—	—	—	Non cohesive soil
	34.00	34.45	0.45	DP	"	24	35	50	85	—	—	—	—	—	—	do
	35.50	35.95	0.45	DP	"	19	30	36	66	—	—	—	—	—	—	Non cohesive soil
	37.00	37.45	0.45	DP	"	16	28	35	63	—	—	—	—	—	—	cohesive soil with Gravel
	38.50	38.95	0.45	DP	"	19	32	39	71	—	—	—	—	—	—	do
	40.00	40.45	0.45	DP	"	24	35	42	77	—	—	—	—	—	—	do

Supervisor

S.E.-HORC

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K

CHART 25: FIELD BORELOG CHARTS (P126A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW FOR HORC Viaduct B/w Sohana Dhulawat			Project Code:	1901
Coordinate:	N: 3121157.315	E: 700954.592		Location/ Chainage:	24223.4470
Method of Drilling:	Rotary	Drilling Equipment	Manual Hand T Mountent	Bore No.:	P126A
Casing Lowered (M):	—	Bentonite Used: NA	Standard Sampler : Yes.	Barrel Type :	NA
Ground Elevation:	R.L-197.805	Date: From 6/12/23 to 9/12/23		Water Table (M):	7.25

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
6/12/23	0.00	0.50	0.50	D	Sx	collected				—	—	—	—	—	—	Non cohesive soil
"	1.00	1.45	0.45	DP	"	3	4	5	9	—	—	—	—	—	—	do
"	2.00	2.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	3.00	3.45	0.45	DP	"	4	5	7	12	—	—	—	—	—	—	do
"	4.00	4.45	0.45	DP	"	5	7	8	15	—	—	—	—	—	—	Non cohesive soil
"	5.00	5.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	6.00	6.45	0.45	DP	"	7	10	13	23	—	—	—	—	—	—	do
"	7.00	7.45	0.45	DP	"	9	11	13	24	—	—	—	—	—	—	do
"	8.00	8.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	9.00	9.45	0.45	DP	"	8	13	21	34	—	—	—	—	—	—	cohesive soil
"	10.00	10.45	0.45	DP	"	12	14	17	31	—	—	—	—	—	—	do
"	11.00	11.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	12.50	12.95	0.45	DP	"	9	17	22	39	—	—	—	—	—	—	do
"	14.00	14.45	0.45	U	"	Received				—	—	—	—	—	—	Non cohesive soil
7/12/23	15.50	15.95	0.45	DP	"	11	18	25	43	—	—	—	—	—	—	
"	17.00	17.45	0.45	U/D	"	sillipped				—	—	—	—	—	—	Non cohesive soil
"	18.50	18.95	0.45	DP	"	10	19	30	49	—	—	—	—	—	—	do
"	20.00	20.45	0.45	U	"	Received				—	—	—	—	—	—	cohesive soil
"	21.50	21.95	0.45	DP	"	12	14	19	33	—	—	—	—	—	—	do
"	23.00	23.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	24.50	24.95	0.45	DP	"	17	25	30	55	—	—	—	—	—	—	Cohesive soil with Gravel
"	26.00	26.45	0.45	U	"	21	32	68	100	—	—	—	—	—	—	do
"	27.50	27.95	0.45	DP	"	100	—	—	R	—	—	—	—	—	—	Cohesive soil with Cruesned Rabbles
"	29.00	29.05	0.05	DP	"	30	—	—	R	—	—	—	—	—	—	do

Supervisor   E - In - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 26: FIELD BORELOG CHARTS (P126A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW-FOR HORC VIADUCT B/W Sohana Dhulawat Station			Project Code:	1901
Coordinate:	N: 24223.4470	E: 700954.592	Location/ Chainage: 2422344470		
Method of Drilling:	Rotary.	Drilling Equipment: Manual power T/mounted		Bore No.:	P126A
Casing Lowered (M):	—	Bentonite Used: —	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation:	R.L-197.885	Date: From 6/12/23 to 9/12/23		Water Table (M):	7.25

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
"	30.50	30.60	0.10	DP	SX	100	-	-	R	—	—	—	—	—	—	Non Cohesive soil with crushed Boulder Pieces.
"	32.00	32.07	0.07	DP	"	101	—	—	R	—	—	—	—	—	—	do
8/12/23	33.50	33.95	0.45	DP	"	19	24	32	56	—	—	—	—	—	—	Cohesive soil with Gravel
"	35.00	35.45	0.45	DP	"	23	27	35	62	—	—	—	—	—	—	do
"	36.50	36.95	0.45	DP	"	21	25	33	58	—	—	—	—	—	—	do
"	38.00	38.45	0.45	DP	"	24	32	38	70	—	—	—	—	—	—	Non cohesive soil
"	40.00	40.45	0.45	DP	"	27	33	43	79	—	—	—	—	—	—	do

Supervisor

Techpro Engineers Pvt. Kanpur

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

RE - in - C

APPENDIX-K
CHART 27: FIELD BORELOG CHARTS (P127A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No: GT/ 003 Date of Issue: 01.04.2018 Rev. No.: R03 Rev. Date.: 28.12.2021

Project Name: GTW For HORC Viaduct b/w Sohana Dhulawat Station		Project Code:	1901
Coordinate: N: 3121183.668	E: 700949.451	Location/ Chainage:	242494.6470
Method of Drilling: Rotary	Drilling Equipment: Manual T/mount ent	Bore No.:	P127A
Casing Lowered (M): — Bentonite Used: —	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation: R.L-197.515	Date: From 9/12/23 to 11/12/23	Water Table (M):	7.35 m

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
9/12/23	0.00	0.50	0.50	DS	SX	Collected				—	—	—	—	—	-	Non cohesive soil
"	1.00	1.45	0.45	DP	"	3	4	6	10	—	—	—	—	—	-	do
"	2.00	2.45	0.45	U	"	Received				—	—	—	—	—	-	do
"	3.00	3.45	0.45	DP	"	4	5	8	13	—	—	—	—	—	—	Non cohesive soil
"	4.00	4.45	0.45	DP	"	5	7	9	16	—	—	—	—	-	-	do
"	5.00	5.45	0.45	U	"	Received				—	—	-	-	-	-	do
"	6.00	6.45	0.45	DP	"	9	12	16	28	—	—	—	-	—	-	Non cohesive soil
"	7.00	7.45	0.45	DP	"	8	14	17	31	—	—	—	—	—	-	do
"	8.00	8.45	0.45	U	"	Received				—	—	—	—	—	-	do
"	9.00	9.45	0.45	DP	"	10	13	19	32	—	—	—	-	—	-	Non cohesive soil
"	10.00	10.45	0.45	DP	"	12	15	20	35	—	—	—	-	-	—	do
"	11.00	11.45	0.45	U	"	Received				—	—	—	—	—	—	cohesive soil
"	12.50	12.95	0.45	DP	"	15	18	25	43	—	—	—	—	-	-	do
"	14.00	14.45	0.45	U	"	Received				—	—	—	—	—	—	do
"	15.50	15.95	0.45	DP	"	11	18	30	48	—	—	—	—	—	—	do
"	17.00	17.45	0.45	U	"	Received				—	—	—	-	—	-	cohesive soil
"	18.50	18.95	0.45	DP	"	14	18	19	37	—	—	—	-	—	—	do
10/12/23	20.00	20.45	0.45	DP	"	Received				—	—	—	—	—	—	do
"	21.50	21.95	0.45	DP	"	14	24	29	53	—	—	—	—	—	—	Non cohesive soil with gravel
"	23.00	23.45	0.45	DP	"	18	31	38	69	—	—	—	—	-	-	do
"	24.50	24.95	0.45	DP	"	20	35	43	78	—	—	—	—	—	—	do
"	26.00	26.45	0.45	DP	"	23	37	42	79	—	—	—	—	—	—	do
"	27.50	27.95	0.45	DP	"	25	47	56	103	—	—	—	—	—	—	do
"	29.00	29.45	0.45	DP	"	27	49	58	107	—	—	—	—	—	—	do

Supervisor

Techpro Engineers Pvt. Kanpur

E-in-C

Abbreviation Used : U- Undisturbed Sample, C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K

CHART 28: FIELD BORELOG CHARTS (P127A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW FOR HORC Viaduct B/W Sohana Dhulawat station			Project Code:	P901
Coordinate:	N: 3121183.068	E: 700949451		Location/ Chainage:	24249.6470
Method of Drilling:	Rotery	Drilling Equipment:	manual T/mounten	Bore No.:	P127A
Casing Lowered (M):	— Bentonite Used: —	Standard Sampler:	Yes	Barrel Type:	NA
Ground Elevation:	R.L-197.515	Date: From 9/12/23	to 11/12/23	Water Table (M):	7.35 m

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
11	30.50	30.95	0.45	SP	SX	28	60	62	102	—	—	—	—	—	—	None cohesive soil
11	32.00	32.45	0.45	DP	11	24	44	50	99	—	—	—	—	—	—	do
11 12/…	33.50	33.95	0.45	DP	11	31	53	60	113	—	—	—	—	—	—	do
11	35.00	35.45	0.45	DP	11	32	44	60	104	—	—	—	—	—	—	do
11	36.50	36.95	0.45	DP	11	24	39	45	83	—	—	—	—	—	—	Noncohesive soil
11	38.00	38.45	0.45	DP	11	27	42	48	90	—	—	—	—	—	—	do
11	40.00	40.45	0.45	DP	11	30	43	54	97	—	—	—	—	—	—	do

Supervisor

Techpro Engineers Pvt. Kanpur

E. In - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 29: FIELD BORELOG CHARTS (P128A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name: (4Th)-HORC Viaduct b/w Sohana Dhulawat station		Project Code:	1901
Coordinate: N: 3121208.699	E: 700944.018	Location/ Chainage:	24275.8470
Method of Drilling: Percussion	Drilling Equipment: Auto trip Power winch	Bore No.:	P128A
Casing Lowered (M): 24.00 Bentonite Used: Yes	Standard Sampler: Yes	Barrel Type:	N/A
Ground Elevation: R.L-197.204	Date: From 11/12/23 to 13/12/23	Water Table (M):	8.70

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
11/12/23	0.00	0.50	0.50	DS	SX	collected										Non-cohesive soil
	1.00	1.45	0.45	DP	"	4	5	7	12							—do—
"	2.00	2.45	0.45	U	"	Received										—do—
"	3.00	3.45	0.45	DP	"	5	7	9	16							—do—
"	4.00	4.45	0.45	DP	"	5	8	14	22							—do—
"	5.00	5.45	0.45	U	"	Received										—do—
"	6.00	6.45	0.45	DP	"	6	7	10	17							—do—
"	7.00	7.45	0.45	DP	"	3	6	9	15							—do—
"	8.00	8.45	0.45	U	"	Received										—do—
"	9.00	9.45	0.45	DP	"	6	12	15	27							—do—
"	10.00	10.45	0.45	DP	"	5	10	14	24							—do—
"	11.00	11.45	0.45	U	"	Received										Cohesive soil with gravel
"	12.50	12.95	0.45	DP	"	4	7	11	18							—do—
"	14.00	14.45	0.45	U	"	slipped										-do- DS collected
"	15.50	15.95	0.45	DP	"	8	13	20	33							cohesive soil with gravel
12/12/23	17.00	17.45	0.45	U	"	slipped										-do- DS collected
	18.50	18.95	0.45	DP	"	10	15	22	37							Non-cohesive soil with gravel
"	20.00	20.45	0.45	U	"	Received										—do—
"	21.50	21.95	0.45	DP	"	7	20	29	49							Non-cohesive soil-gravel
"	23.00	23.45	0.45	U	"	slipped										-do- DS collected
"	24.50	24.95	0.45	DP	"	13	25	31	56							Non-cohesive soil with gravel
"	26.00	26.45	0.45	DP	"	15	23	32	55							—do—
13/12/23	27.50	27.95	0.45	DP	"	12	30	35	65							—do—
	29.00	29.45	0.45	DP	"	17	33	41	74							—do—

Nifeab
Supervisor

Techpro Engineers Pvt. Kanpur

E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 30: FIELD BORELOG CHARTS (P128A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GT TL-HORC Viaduct b/w Sohana Dhulawat Station	Project Code:	1901
Coordinate:	N: 3121208.699 E: 707944.018	Location/ Chainage:	94275.8470
Method of Drilling:	Percussion	Drilling Equipment:	Awlob Powerwinch
Bore No.:	P128A		
Casing Lowered (M):	24.00	Bentonite Used:	Yes
Standard Sampler:	Yes	Barrel Type:	N/A
Ground Elevation:	R.L-197.204	Date: From	11/12/23 to 13/12/23
Water Table (M):	8.70		

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
13/12/23	30.50	30.95	0.45	DP	SX	15	24	28	52							Non-cohesive soil
	32.00	32.45	0.45	DP	"	16	31	42	73							— do —
"	33.50	33.95	0.45	DP	"	20	25	34	59							— do —
"	35.00	35.45	0.45	DP	"	14	23	32	55							— do —
"	36.50	36.95	0.45	DP	"	18	33	40	73							— do —
"	38.00	38.45	0.45	DP	"	17	26	33	59							— do —
"	40.00	40.45	0.45	DP	"	15	34	36	70							— do —

Nitesh
Supervisor

Engineer-In-C

Techpro Engineers Pvt. Kanpur

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 31: FIELD BORELOG CHARTS (P129A)

TECHPRO ENGINEERS PVT. LTD. — **BORE/ DRILL LOG**

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date.:	28.12.2021

Project Name:	GI Work for Horc Viaduct B/w Sohana Dhulawat station			Project Code:	1901
Coordinate:	N: 3121234.241	E: 700938.26		Location/ Chainage:	94302.0170
Method of Drilling:	Percussion	Drilling Equipment	manual Powerwinch	Bore No.:	P.129 A
Casing Lowered (M):	31.00	Bentonite Used: Yes	Standard Sampler : Yes	Barrel Type :	NA
Ground Elevation:	R.L-198.472	Date: From 21/11/23	to 24/11/23	Water Table (M):	8.20

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
21/11/23	0.0	0.50	0.50	DS	Sx	Collected										Non Cohesive Soil
"	1.00	1.45	0.45	U	"	Received										do
"	2.00	2.45	0.45	DP	"	3	5	7	12							do
"	3.00	3.45	0.45	DP	"	3	5	8	13							do
"	4.00	4.45	0.45	U	"	Received										do
"	5.00	5.45	0.45	DP	"	5	8	13	21							do
"	6.00	6.45	0.45	DP	"	5	8	11	19							do
"	7.00	7.45	0.45	U	"	Received										do
"	8.00	8.45	0.45	DP	"	6	10	12	22							do
"	9.00	9.45	0.45	DP	"	7	9	15	24							do
"	10.00	10.45	0.45	U	"	Received										Cohesive soil
"	11.00	11.45	0.45	DP	"	7	9	12	21							do
"	12.00	12.45	0.45	DP	"	4	8	14	22							do
"	13.00	13.45	0.45	U	"	Received										do
"	14.50	14.95	0.45	DP	"	8	13	21	34							do
"	16.00	16.45	0.45	U	"	Received										do
"	17.50	17.95	0.45	DP	"	12	15	23	38							Non Cohesive Soil
"	19.00	19.45	0.45	U	"	Slipped										do
22/11/23	20.50	20.95	0.45	DP	"	12	27	40	67							do
"	22.00	22.45	0.45	DP	"	15	25	32	57							do
"	23.50	23.95	0.45	DP	"	16	30	38	68							do
"	25.00	25.45	0.45	DP	"	13	32	38	70							Non Cohesive Soil
"	26.50	26.95	0.45	DP	"	17	25	31	56							do with gravel
"	28.00	28.45	0.45	DP	"	16	28	32	60							do
																Non Cohesive soil

Supervisor Lal Bahadur

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 32: FIELD BORELOG CHARTS (P129A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTC? for horc viaduct B/w Sohana Dhulawat Station	Project Code:	1901
Coordinate:	N: 3121234.241 E: 700938.26	Location/ Chainage:	24302.0470
Method of Drilling:	Percussion; Drilling Equipment: manual Power winch	Bore No.:	P.129 A
Casing Lowered (M):	31.00; Bentonite Used: Yes; Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation:	R.L-198.472; Date: From 21/11/23 to 24/11/23	Water Table (M):	8.20

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
22/11/23	29.50	29.95	0.45	DP	SX	17	40	50	90							Non Cohesive Soil
"	31.00	31.45	0.45	DP	"	16	23	30	53							do
"	32.50	32.95	0.45	DP	"	17	25	27	52							do
23/11/23	34.00	34.05	0.45	DP	"	16	26	32	58							do
"	35.50	35.95	0.45	DP	"	14	28	35	63							Non Cohesive Soil with
"	37.00	37.45	0.45	DP	"	13	25	34	59							do Gravel
24/11/23	38.50	38.95	0.45	DP	"	17	28	32	60							do
"	40.00	40.45	0.45	DP	"	21	36	43	79							do

Supervisor haldar

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

E - in - C

APPENDIX-K
CHART 33: FIELD BORELOG CHARTS (P130A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTI-2-for HORC Viaduct B/w SohanaDhulwal station	Project Code:	1901
Coordinate:	N: 3121259.733 E: 700932.131	Location/ Chainage:	24328.2470
Method of Drilling:	Percussion; Drilling Equipment: Auto Trip Powerwinch	Bore No.:	P.130A
Casing Lowered (M):	23.00; Bentonite Used: Yes; Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation:	R.L-198.948; Date: From 09/12/23 to 12/12/23	Water Table (M):	9.00

Day	Depth/RUN (m) From	To	Length (m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
09/12/23	0.0	0.50	0.50	DS	6"	Collected										
"	1.00	1.45	0.45	DP	"	2	3	5	8							Non Cohesive Soil
"	2.00	2.45	0.45	U	"	Received										do
"	3.00	3.45	0.45	DP	"	3	3	5	8							do
"	4.00	4.45	0.45	DP	"	3	5	8	13							do
"	5.00	5.45	0.45	U	"	Received										do
"	6.00	6.45	0.45	DP	"	5	7	9	16							Non Cohesive Soil
"	7.00	7.45	0.45	DP	"	4	8	11	19							with gravel
"	8.00	8.45	0.45	U	"	Received										Non Cohesive Soil
"	9.00	9.45	0.45	DP	"	8	8	12	20							Non Cohesive Soil with gravel
"	10.00	10.45	0.45	DP	"	8	11	14	25							Non Cohesive Soil
"	11.00	11.45	0.45	U	"	Received										do
10/12/23	12.50	12.95	0.45	DP	"	8	11	13	24							do
"	14.00	14.45	0.45	U	"	Received										Non Cohesive Soil
"	15.50	15.95	0.45	DP	"	9	12	15	27							Non Cohesive Soil with gravel
"	17.00	17.45	0.45	U	"	Received										do
"	18.50	18.95	0.45	DP	"	8	13	17	30							do
"	20.00	20.45	0.45	U	"	Received										Non Cohesive Soil
"	21.50	21.95	0.45	DP	"	15	30	41	71							do
11/12/23	23.00	23.45	0.45	DP	"	13	28	32	60							do
"	24.50	24.95	0.45	DP	"	12	22	34	56							do
"	26.00	26.45	0.45	U	"	Slipped										do
"	27.50	27.95	0.45	DP	"	15	25	35	60							Non Cohesive Soil
"	29.00	29.45	0.45	DP	"	14	35	45	80							do

Supervisor Laldev Yadav

Techpro Engineers Pvt. Ltd. Kanpur

E-In-C

Abbreviation Used : U- Undisturbed Sample, C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 34: FIELD BORELOG CHARTS (P130A)

TECHPRO ENGINEERS PVT. LTD. — BORE/ DRILL LOG

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date.:	28.12.2021

Project Name: GTI for HORC viaduct B/W Sohana Dhulawat Station — Project Code: 1901

Coordinate: N: 3121259.783 — E: 700932.137 — Location/ Chainage: 24328.2470

Method of Drilling: Percussion — Drilling Equipment: Auto Trip Powerwinch — Bore No.: P.130A

Casing Lowered (M): 28.00 — Bentonite Used: Yes — Standard Sampler: Yes — Barrel Type: NA

Ground Elevation: RL-198.948 — Date: From 09/12/23 to 12/12/23 — Water Table (M): 9.00

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
11/12/23	30.00	30.45	0.45	DP	SX	15	29	35	64							Non Cohesive Soil
11	32.00	32.45	0.45	DP	11	12	25	37	62							do
12/12/23	33.50	33.95	0.45	DP	11	14	35	45	80							do
11	35.00	35.45	0.45	DP	11	21	28	32	60							do
11	36.50	36.95	0.45	DP	11	18	24	36	60							do
11	38.00	38.45	0.45	DP	11	24	32	42	74							do
11	40.00	40.45	0.45	DP	11	13	23	28	51							Non Cohesive Soil

Supervisor Caldeepyadav — E-in-C

Abbreviation Used: U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N>100). Sampler means SPT sampler

Techpro Engineers Pvt. Ltd.

APPENDIX-K
CHART 35: FIELD BORELOG CHARTS (P131A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTI for HORC Viaduct B/w Sohana Dhulawat Station	Project Code:	1901
Coordinate: N: 3121285.124	E: 700925.693	Location/ Chainage:	24354.4470
Method of Drilling: Percussion	Drilling Equipment: Auto Trip Powerwinch	Bore No.:	P-131 A
Casing Lowered (M): 20.00 Bentonite Used: Yes	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation: R.L-198.559	Date: From 07/12/23 to 08/12/23	Water Table (M):	10.00

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
07/12/23	0.0	0.50	0.50	DS	Sx	Collected										Non Cohesive Soil
"	1.00	1.45	0.45	U	"	Received										do
"	2.00	2.45	0.45	DP	"	5	8	10	18							do
"	3.00	3.45	0.45	DP	"	4	7	8	15							do
"	4.00	4.45	0.45	U	"	Received										Non Cohesive Soil
"	5.00	5.45	0.45	DP	"	8	11	16	27							do
"	6.00	6.45	0.45	DP	"	10	12	14	26							do
"	7.00	7.45	0.45	U	"	Received										do
"	8.00	8.45	0.45	DP	"	4	8	11	19							Non Cohesive Soil
"	9.00	9.45	0.45	DP	"	8	14	28	42							do with gravel
"	10.00	10.45	0.45	U	"	Received										do
"	11.00	11.45	0.45	DP	"	4	6	8	14							do
"	12.00	12.45	0.45	DP	"	5	8	11	19							do
"	13.00	13.45	0.45	U	"	Received										do
"	14.50	14.95	0.45	DP	"	6	8	12	20							Non Cohesive Soil
"	16.00	16.45	0.45	U	"	Received										do with gravel
08/12/23	17.50	17.95	0.45	DP	"	13	17	25	42							Non Cohesive Soil
"	19.00	19.45	0.45	U	"	Received										do
"	20.50	20.95	0.45	DP	"	16	35	50	85							Non Cohesive Soil
"	22.00	22.45	0.45	DP	"	11	28	40	68							do with gravel
"	23.50	23.95	0.45	DP	"	12	25	35	60							Non Cohesive Soil
"	25.00	25.45	0.45	DP	"	13	26	36	62							do
"	26.50	26.95	0.45	DP	"	18	34	40	74							do
"	28.00	28.45	0.45	DP	"	12	35	45	80							do

Supervisor Laldev Yadav

Techpro Engineers Pvt. Ltd. Kanpur

E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

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CHART 36: FIELD BORELOG CHARTS (P131A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTC for Horc viaduct B/w Sohana Dhulawat Station			Project Code:	1901
Coordinate:	N: 3121285.124	E: 700925.693	Location/ Chainage: 24354.4470		
Method of Drilling:	Percussion	Drilling Equipment	Powerwinch	Bore No.:	P.131A
Casing Lowered (M):	20.00	Bentonite Used: yes	Standard Sampler : yes	Barrel Type :	NA
Ground Elevation:	R.L-198.559	Date: From 07/12/23 to 09/12/23		Water Table (M):	10.00

Day	Depth/RUN (m)		Length(m)	Nature of sample	Hole Size	SPT Record				Run Time		CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
	From	To				0-15cm	15-30cm	30-45cm	N Value	Start	End					
08/12/23	29.50	29.95	0.45	DP	SX	13	34	48	82							Non Cohesive Soil with
"	31.00	31.45	0.45	U	"	Received										do gravel
"	32.50	32.95	0.45	DP	"	18	28	50	78							Non Cohesive soil
9/12/23	34.00	34.45	0.45	DP	"	16	31	45	76							do
"	35.50	35.95	0.45	DP	"	14	28	32	60							do
"	37.00	37.45	0.45	DP	"	13	25	35	60							do
"	38.50	38.95	0.45	DP	"	14	28	34	62							do
"	40.00	40.45	0.45	DP	"	16	25	35	60							Non Cohesive Soil

Supervisor Lalderyadav

E - in - C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) >100). Sampler means SPT sampler

APPENDIX-K

CHART 37: FIELD BORELOG CHARTS (P132A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name: GTW for HORC Viaduct B/w Sohana Dhulawat Station		Project Code:	1901
Coordinate: N: 3121310.434	E: 700918.91	Location/ Chainage:	24380.6470
Method of Drilling: Percussion	Drilling Equipment: Auto Trip Power winch	Bore No.:	P.132A
Casing Lowered (M): 20.00 Bentonite Used: Yes	Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation: R.L-198.507	Date: From 04/12/23 to 08/12/23	Water Table (M):	9.30

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	15-30cm	30-45cm	N Value	Run Time Start	End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
04/12/23	0.0	0.50	0.50	DS	SX	Collected										Non Cohesive Soil
"	1.00	1.45	0.45	U	"	Received										do
"	2.00	2.45	0.45	DP	"	6	9	12	21							do
"	3.00	3.45	0.45	DP	"	6	10	15	25							do
"	4.00	4.45	0.45	U	"	Received										do
"	5.00	5.45	0.45	DP	"	13	13	18	31							do
"	6.00	6.45	0.45	DP	"	13	15	18	33							do
"	7.00	7.45	0.45	U	"	Received										Non Cohesive Soil with
"	8.00	8.45	0.45	DP	"	4	6	11	17							do gravel
"	9.00	9.45	0.45	DP	"	5	10	13	23							do
"	10.00	10.45	0.45	U	"	Received										do
"	11.00	11.45	0.45	DP	"	8	11	15	26							do
"	12.00	12.45	0.45	DP	"	6	10	14	24							do
"	13.00	13.45	0.45	U	"	Received										do
"	14.50	14.95	0.45	DP	"	8	17	35	52							Non Cohesive Soil
"	16.00	16.45	0.45	DP	"	9	20	38	58							with gravel
"	17.50	17.95	0.45	DP	"	14	25	35	60							do
06/12/23	19.00	19.45	0.45	DP	"	13	24	34	58							Non Cohesive Soil
"	20.50	20.95	0.45	DP	"	26	45	45	90							do
"	22.00	22.45	0.45	DP	"	13	24	32	56							do
"	23.50	23.95	0.45	DP	"	11	37	45	82							do
"	25.00	25.45	0.45	DP	"	17	33	49	82							do
"	26.50	26.95	0.45	DP	"	13	33	50	83							Non Cohesive Soil
07/12/23	28.00	28.45	0.45	DP	"	14	32	42	74							do

Supervisor Lakhevyadav

Techpro Engineers Pvt. Ltd. Kanpur (U.P.)

E-in-C

Abbreviation Used: U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test. R- Refusal (Standard Penetration Test(S)- (N)) Sampler means SPT sampler

APPENDIX-K

CHART 38: FIELD BORELOG CHARTS (P132A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GTW for HORC Viaduct B/W Sohana Dhulawat Station	Project Code:	1901
Coordinate:	N: 3121310.434 E: 700918.91	Location/ Chainage:	24380.6470
Method of Drilling:	Percussion; Drilling Equipment: Auto trip Powerwinch	Bore No.:	P.132A
Casing Lowered (M):	20.00; Bentonite Used: Yes; Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation:	R.L-198.507; Date: From 04/12/23 to 08/12/23	Water Table (M):	9.30

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
	29.50	29.95	0.45	DP	SX	13	22	32	54							Non Cohesive Soil
	31.00	31.45	0.45	DP	〃	14	28	35	63							do
	32.50	32.95	0.45	DP	〃	10	27	46	73							do
	34.00	34.45	0.45	DP	〃	12	28	32	60							do
	35.50	35.95	0.45	DP	〃	13	19	38	57							do
	37.00	37.45	0.45	DP	〃	14	25	35	60							do
	38.50	38.95	0.45	DP	〃	16	28	32	60							do
	40.00	40.45	0.45	DP	〃	17	31	41	72							Non Cohesive Soil

Supervisor Laldev yadav

Abbreviation Used: U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100). Sampler means SPT sampler

Techpro Engineers Pvt. Ltd. Kanpur

E-in-C

APPENDIX-K

CHART 39: FIELD BORELOG CHARTS (P133A)

TECHPRO ENGINEERS PVT. LTD. — **BORE/ DRILL LOG**

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R03
Rev. Date:	28.12.2021

Project Name:	HORC Viaduct B/w Sohana Dhulawat Station	Project Code:	1901
Coordinate:	N: 3121335.667 E: 700911.942	Location/ Chainage:	94406.8470
Method of Drilling:	Percussion — Drilling Equipment: Auto trip Power winch	Bore No.:	P133A
Casing Lowered (M):	19.50 — Bentonite Used: Yes — Standard Sampler: Yes	Barrel Type:	NA
Ground Elevation:	RL-199.344 — Date: From 29/11/23 to 04/12/23	Water Table (M):	9.20

Day	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	SPT 0-15cm	SPT 15-30cm	SPT 30-45cm	N Value	Run Time Start	Run Time End	C R (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
29/11/23	0.0	0.50	0.50	DS	SX	Collected										Non Cohesive Soil
"	1.00	1.45	0.45	U	"	Received										do
"	2.00	2.45	0.45	DP	"	5	5	7	12							do
"	3.00	3.45	0.45	DP	"	4	6	8	14							do
"	4.00	4.45	0.45	U	"	Received										do
"	5.00	5.45	0.45	DP	"	6	9	11	20							do
"	6.00	6.45	0.45	DP	"	7	10	13	23							do
"	7.00	7.45	0.45	U	"	Received										Non Cohesive Soil
"	8.00	8.45	0.45	DP	"	6	9	9	18							do
"	9.00	9.45	0.45	DP	"	7	10	12	22							do
"	10.00	10.45	0.45	U	"	Received										Cohesive Soil with gravel
"	11.00	11.45	0.45	DP	"	6	9	11	20							do
"	12.00	12.45	0.45	DP	"	7	10	13	23							do
"	13.00	13.45	0.45	U	"	Received										do
"	14.50	14.95	0.45	DP	"	11	18	22	40							Non Cohesive Soil
"	16.00	16.45	0.45	U	"	Received										do
"	17.50	17.95	0.45	DP	"	12	23	28	55							do
30/11/23	19.00	19.45	0.45	DP	"	13	24	30	54							do
"	20.50	20.95	0.45	DP	"	15	26	32	58							Non Cohesive Soil with gravel
"	22.00	22.45	0.45	DP	"	17	25	35	60							Non Cohesive Soil
"	23.50	23.95	0.45	DP	"	12	22	37	59							do
"	25.00	25.45	0.45	DP	"	13	18	35	53							do
"	26.50	26.95	0.45	DP	"	15	27	36	63							do
"	28.00	28.45	0.45	DP	"	13	28	32	60							do

Supervisor Lakhvinder — E-in-C

Techpro Engineers Pvt. Ltd.

Abbreviation Used : U- Undisturbed Sample, C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N) > 100), Sampler means SPT sampler

APPENDIX-K
CHART 40: FIELD BORELOG CHARTS (P133A)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R03
		Rev. Date.:	28.12.2021

Project Name:	GITD FOR HORC Viaduct B/W Sohana Dhulawat Station			Project Code:	1901
Coordinate:	N: 3121335.667	E: 700911.942	Location/ Chainage: 24406.8470		
Method of Drilling:	Percussion	Drilling Equipment	Auto Trip Powerwinch	Bore No.:	P.133A
Casing Lowered (M):	19.00	Bentonite Used: Yes	Standard Sampler : Yes	Barrel Type :	NA
Ground Elevation:	R.L-199.364	Date: From 29/11/23 to 07/12/23		Water Table (M):	9.30

Day	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	SPT Record 0-15cm	SPT Record 15-30cm	SPT Record 30-45cm	SPT Record N Value	Run Time Start	Run Time End	CR (%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
30/11/23	29.50	29.95	0.45	DP	8X	14	24	35	59							Non Cohesive Soil with gravel
"	31.00	31.45	0.45	DP	"	13	21	38	59							do
"	32.50	32.95	0.45	DP	"	17	28	32	60							do
"	34.00	34.45	0.45	DP	"	16	24	38	62							Non Cohesive Soil
"	35.50	35.95	0.45	DP	"	18	28	32	60							do
01/12/23	37.00	37.45	0.45	DP	"	15	30	42	72							do
"	38.50	38.95	0.45	DP	"	18	35	45	80							do
"	40.00	40.45	0.45	DP	"	17	32	38	70							do

Supervisor Lalden yadav

Techpro Engineers Pvt. Ltd.

E-in-C

Abbreviation Used : U- Undisturbed Sample. C- Core Sample. D- Disturbed Sample. P- Standard Penetration Test.
R- Refusal (Standard Penetration Test (N)>100), Sampler means SPT sampler

End of Report