1772-R0-Part-1_NMRC January 20th, 2020

GEO TECHNICAL INVESTIGATION REPORT

ULR No.:TC695819000000042P

AT THE SITE FOR

PROPOSED METRO RAIL CORRIDOR FROM NOIDA SECTOR-51 TO GREATER NOIDA SECTOR-2

SUBMITTED TO

NOIDA METRO RAIL CORPORATION LIMITED, NOIDA

BY

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ACKNOWLEDGEMENTS

We feel pleasure to submit the part-1 report of Sub soil investigation conducted at site for proposed metro rail corridor form Noida sector-51 to Greater Noida sector -2, Noida.

We convey hereby our sincere thanks to Mr. V.V. Reddy, Dy. General Manager/ Civil-1, NOIDA Metro Rail Corporation limited, NOIDA for his trust shown to us by awarding the work of soil investigation. We also grateful to Mr. Siddharth, Site Engineer, NOIDA Metro Rail Corporation Limited, NOIDA, for their co-operation and help rendered during and prior to the investigation work.

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

for Techpro Engineers Pvt. Ltd

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Principal Consultant &
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1. INTRODUCTION:

This part-1 report deals with Geo-technical investigation at the site for proposed metro rail corridor form Noida sector-51 to Greater Noida sector -2, Noida. The work of conducting the detailed Geotechnical Investigation has been awarded to us via work order No. NMRC/GEO.INV/F.NO.T-97/2019/6189 on dated 04-12-2019, which scope of includes investigation in field, laboratory testing of bulk samples collected from the site and submission of the test report.

Geotechnical investigation carried out, with the locations which were planned by the client. Purpose of the investigation is to determine the nature and properties of soil strata in 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 level suitable for foundation, proneness of site to artesian conditions, seismic disturbance and other engineering properties of soil.

This part of 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 required for design of foundation and suggesting suitable type of foundation with safe allowable bearing capacity for safe and strong foundation.

For the purpose of ease in data handling, the geotechnical investigation report has been split into 2 parts for the structures. A summarised table with part number of report and reference of boreholes notation is given below

Part No.	Reference of bore holes
1	BH-1, BH-2, BH-3, BH-4, BH-5, BH-6, BH-7, BH-8 & BH-9.
2	BH-10, BH-11, BH-12, BH-13, BH-14, BH-15, BH-16, BH-17, BH-18, BH-19 & BH-20

2. SCOPE OF WORK:

For the proposed metro corridor structures, it is required to determine the safe allowable bearing capacity together with necessary engineering characteristics of underlying soil strata and rock formations. Since the safe bearing capacity of soils must be evaluated on the considerations covering shear failure and permissible settlement of sub-

soil strata as per IS: 6403-1981, IS: 1904-1978 and IS: 8009 (part-I)-1976 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 150mm diameter bore holes through soil deposits and 75 mm diameter in rock formations within the proposed area of construction up to required depth.

2.3. Collection of disturbed soil samples at an interval of 1.50 meter in all the bore holes.

2.4. Collection of undisturbed soil samples at every 2.50 m interval or at change of stratum from all the boreholes.

2.5. Conducting the six number of field permeability test.

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

2.7. Conducting the Standard Penetration Test (SPT) at an interval of 1.50 m or noticeable change of stratum in soil deposits in all bore holes.

2.8. Transporting all the disturbed and undisturbed soils and rock core samples collected during the field investigation to our Geo-tech Engineering laboratory in Delhi.

2.9. Conducting the laboratory tests on all the soil samples, collected during field investigation for determination of their engineering characteristics.

2.10. Compilation of field and laboratory test results, working out the safe allowable bearing capacity and preparing the report including detailed recommendations and necessary precautions.

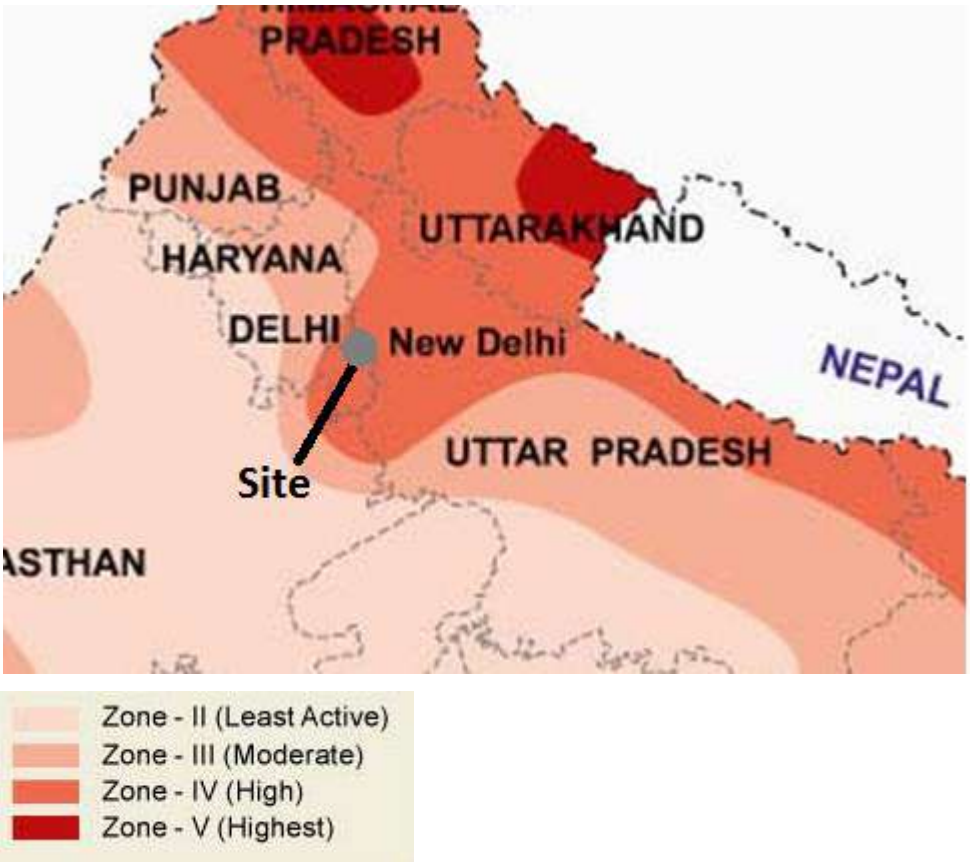
3. GEOLOGICAL INFORMATION OF THE REGION:

3.1. Geology:

The geological formations of are mainly the alluvial plains formed by river Ganga and Yamuna. Part of the Noida city consists of Yamuna flood plains.

3.2. Seismicity:

The seismic zone of NOIDA is the High Damage Risk Zone and covers areas liable to MSK VIII. The IS code assigns zone factor of 0.24 for Zone 4.



3.3. Geography:

Noida is located in the Gautam Budh Nagar district of the state of Uttar Pradesh. It is a part of the national capital region and is just 14.0 km from the heart of Delhi, Connaught place. The administrative headquarters are located in Greater Noida about 20.0 Km form the city. It is connected to Maharani Bagh in Delhi via the 550.0 meters long, eight lane DND toll which is built over Yamuna River.

Noida is bound by NH-24 by-pass in the North; Hindon River is the east and Yamuna in the west. In the south, the city is bound by the meeting point of the two rivers, Yamuna and Hindon.

3.4. Climate:

The climate of Noida is typically hot and dry. It is characteristic north Indian climate. Summers are hot and dry with temperatures ranging from maximum 48

degrees Celcius to minimum 28 degrees Celcius. Monsoons are usually witnessed in the months between June and September.

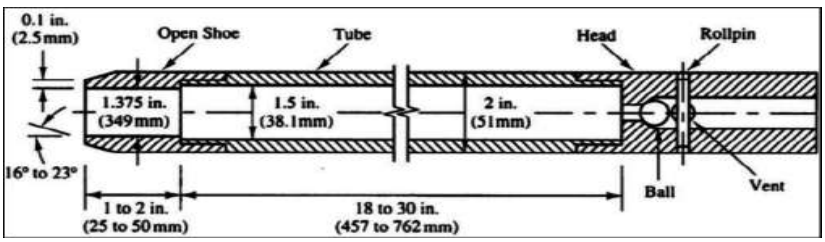
Winters are excessively cold because of the cold waves from the Himalayan region. During peak winters the temperature falls to a minimum of 3 to 4 degrees Celcius. The month of January is usually characterized by fog and smog, which prove to be a major hassle

4. FIELD INVESTIGATION:

The field investigation work at this site was carried out from December 20th; 2019 to January 03th; 2020. The following investigation work was carried out:

4.1. Nine numbers of **boreholes** of diameter 150 mm were made within the proposed layout of the metro corridor. The boreholes were progressed using power operated winch under percussion method of drilling. Casing was used to keep the borehole stable. The records of achieved depth of bore holes have been given in Para No. 6 and locations of boreholes have been reported in "BOREHOLES LOCATION PLAN" in Appendix A.

4.2. **Standard Penetration Tests** were conducted at 1.50 metre as per the procedure in IS 2131-1981 in all the bore holes. 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 affect each 15 cm of penetration was recorded. The first 15 cm of drive is considered to be seating drive.



Structure of SPT Sampler

The SPT Samplers used were without liner type and with no space for liner

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 blows count for 15 cm seating penetration and for remaining portion of penetration is also given.

SPT 'N' values are correlated with relative of 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 materiel. In hard formations, the testing is discontinued if 'N' value is found to be more than 100. It is termed as refusal.

'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.

Terzaghi and peck have recommended a correction for 'N' values in case of saturated silty and fine sand when the 'N' observed in the field is higher than

Modified value 'N'= 15+ (N-15)/2.

Soil sample obtained from standard spoon sampler for all above standard penetration tests were collected in the polythene bags of suitable size. These samples were property seal, labelled, record and carefully transported to the laboratory for testing. The results have been reported in Table 1 to 9 of Appendix B under the title "SUMMARY OF TEST RESULTS"

4.3. Disturbed soil samples were collected at every 1.50 metre interval and at significant change of stratum. Soil from cutting edge of SPT samplers and retained in split spoon sampler, 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 9 of Appendix B under the title "SUMMARY OF TEST RESULTS".

4.4. Undisturbed soil samples were collected in accordance with IS: 2132-1986. Undisturbed soil samples (UDS) was obtained at every 2.50 metre interval. Undisturbed samples were collected using 100 mm dia and 450 mm long MS tubes provided with sampler head with ball check arrangement. 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 a tube, the adopter head was removed along with the disturbed material. The visible ends of the samples shall each be trimmed off any wet disturbed soil. The ends will then be coated alternately with four layers of just molten wax. More molten wax will then be added to give a total thickness of not less than 25mm.Thelaboratory test results have been reported in Table 1 to 9 of Appendix B.

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)-2010. The results have been reported in table 1 to 9 "SUMMARY OF TEST RESULTS" of Appendix B.

5.2. **Bulk density** of soil strata were obtained using Shelby tubes in accordance with IS 2720 (part XXIX)-1975. The results have been reported in table 1 to 9: "SUMMARY OF TEST RESULTS" of Appendix B.

5.3. **Mechanical sieve analysis** test were performed in accordance with IS 2720 (Part IV) - 2010, 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 9 "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) - 1965 on the part of soil samples obtained after the sieve analysis. The results have been reported in table 1 to 9 "SUMMARY OF TEST RESULTS" of appendix B.

5.5. **Atterbergs' limits tests** were performed in accordance with IS 2720 (part V)-2010 and results have been reported in table 1 to 9 "SUMMARY OF TEST RESULTS" of Appendix B.

5.6. **Specific gravity tests** were performed in accordance with IS 2720 (part III-sec. 1) - 2011 and the results have been reported in table 1 to 9 "SUMMARY OF TEST RESULTS" of Appendix B.

5.7. **Consolidation tests** were performed on cohesive soil samples in accordance with IS: 2720 (part XV)-2011. The results have been reported Table 1 to 9 "SUMMARY OF TEST RESULTS" of Appendix B.

5.8. **Direct shear tests** were performed as per IS 2720 (part XIII)-2016, on the undisturbed soil samples obtained during the field investigation. The results and the density of samples have been reported in table 1 to 9 "SUMMARY OF TEST RESULTS" of Appendix B.

5.9. **Tri-axial Compression Test** under Unconsolidated Un-drained (UU) conditions as per IS: 2720 (Part-XI)-2011 were performed on the undisturbed soil samples obtained during the field investigation. The results have been reported in table 1 to 9 "SUMMARY OF TEST RESULTS" of Appendix B.

5.10. Shrinkage Limit tests were performed in accordance with IS 2720 (part-VI) -1972 and the results have been reported in table 1 to 9 "SUMMARY OF TEST RESULTS" of Appendix B.

5.11. Free Swell Index were performed in accordance with IS 2720 (part-XL) -1977 and the results have been reported in table 1 to 9 "SUMMARY OF TEST RESULTS" of Appendix B.

5.12. Chemical analysis on soil were performed in accordance with relevant standard and results have been reported inTable-5, **Appendix B** under the title "CHEMICAL TEST ON SOIL SAMPLE"

6. GROUND WATER TABLE:

The water table at this site was not encountered during the boring operation up to the depth of exploration.

Borehole No.	Location	Global Co-ordinate		Depth of Borehole (m)	Water Table (m)
		Northing	Easting		
BH-1	Near Makah dham	28.5905530	77.3788840	30.00	Not Encountered
BH-2	Near Anthurium	28.5928880	77.3834400	30.00	
BH-3	Near Bhagute garden	28.5944370	77.3886200	30.00	
BH-4	Near Sever plant, noida	28.5961910	77.3929640	30.00	
BH-5	Near Noida international school	28.5966500	77.3978650	30.00	
BH-6	Near Parthla khanjarpur, Noida	28.5985380	77.4029810	30.00	
BH-7	Near Parthla chowk, Noida	28.5991650	77.4079450	30.00	
BH-8	Near Pusta road, Noida	28.6007580	77.4124240	30.00	
BH-9	Near Bhoomi cricket ground, Noida	28.6017440	77.4176180	30.00	

7. DETAILS OF SOIL STRATA:

The classification of soil stratum have been done with the help of soil characteristics obtained in laboratory tests as per IS 1498-1978. The detailed nature of the soil strata have been reported in table 1 to 9: "SUMMARY OF TEST RESULTS" of Appendix B and represented through Lithological plots in Appendix D.

Lithological graphs are enclosed in Appendix D, however borehole wise description of the formations have been given in the following para.

8. CALCULATIONS AND RESULTS:

For the construction of pillars of the proposed Metro Rail, two types of foundations, namely isolated footings (open foundation) and deep foundations (bored cast-in-situ RCC pile footings) have been considered for computation of load bearing capacity of the underlying soil strata. The safe allowable bearing capacity for the open foundations have been calculated on the shear failure criteria suggested as per IS 6403-1981, IS: 1904-1995 and settlement criteria as per IS: 8009 (part-I & II)-1976. 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.

8.1. ISOLATED FOOTINGS:

8.1.1. Shear Failure Criteria:

Type of shear failure	=	Mixed (Interpolation in between General and Local shear failure)
Factor of safety (F.S.)	=	2.50
Depth of critical water table	=	0.00 metre (at Natural Ground Level)
Net allowable bearing capacity:	=	q_{na}(kN/m^2)

$$q_{na} = (1 / F.S.) [0.667c N_c S_c d_c + q (N_q - 1) S_q d_q + 0.5 B \gamma N_\gamma S_\gamma d_\gamma W']$$

Where,

B = Width of footing (metre)

D = Depth of footing (metre)

ϕ = Angle of shearing resistance (degree)

c = Cohesion intercept (kN/m^2)

γ = Bulk density of soil above the base of footing (kN/m^3)

q = γd = Effective overburden (kN/m^2)

N_c, N_q, N_γ = Bearing capacity coefficient based on initial void ratio e_0

d_c, d_q, d_γ = depth factors

W' = Water tale correction factor

Shape Factors:

S_c = 1.30

S_q = 1.20

S_γ = 0.80

Calculations based on Shear failure criteria have been provided in **Appendix-J**

8.2 SETTLEMENT CRITERA:

Soil strata at this site mainly consists of silty sands, hence the settlement of the soil layers below the base of footing has been calculated on the basis of SPT values obtained during the field Investigation

Settlement for applied pressure (S_f) = (q_s x S_u x d_f)/ (W'x100)

Where:

q_s=Permissible pressure (kN/m^2)

S_u=Settlement for unit pressure of 1.00 kg/cm^2

W'=Water table correction factor

N =Corrected average SPT value

B =Base width

D =Depth of footing

d_f = depth factor

The calculated values of settlements have been kept within the permissible limits of 50 mm for Square footings.

Calculations based on Settlement criteria have been provided in Table-2 of **Appendix –J**

8.3 COMPUTATION OF LOAD CAPACITY FOR PILE:

Since the proposed structure may be constructed on pile foundation. Calculations have also been made for cast-in-situ bored RCC piles as per IS: 2911 (part-1, section-2)-2010. Load bearing capacities in compression, uplift and lateral load of RCC piles of diameter 1000 mm and 1200 mm have been worked out. The cut-off level has been considered at 2.0 metre depth below the existing ground level.

S. No.	Parameter	Value
1	K (Coefficient of earth pressure)	As per code (Varies from 1.00 to 1.50 for different stratum)
2	Overburden pressure to calculate the shaft resistance and end bearing resistance of pile	Maximum overburden pressure at bottom of pile for calculation of shaft resistance and bearing resistance is limited to overburden pressure at depth equal to 15 times diameter of pile considered from existing ground level.
3	Depth of Water table	Ground water is considered 0.00 meter level.
4	Other parameters	As per IS: 2911 (Part-1/Sec 2)
5	Factor of safety	2.50

The detailed calculations of pile load carrying capacity in compression, uplift and lateral load have been reported in table-1 to 3 of Appendix-K

9 LIQUEFACTION ANALYSIS:

Liquefaction is the sudden loss of shear strength of the loose fine-grained sands due to earthquake-induced vibration under saturated conditions. Liquefaction generally takes place in loose fine-grained 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 8.0** having **peak ground acceleration a_{max} = 0.18 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 from the SPT data and peak ground acceleration likely to occur at the site for a horizontal ground surface

In this method, cyclic shear stress likely to be induced in the foundation strata by Design Basis Earthquake (DBE) 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 τ_{av}likely to be induced in the foundation material due to an earthquake is calculated by using the equation

$\tau_{av} = 0.65 * \gamma * h * (a_{max} / g) * r_d$

τ_{av} = equivalent average of shear stress to be induced by DBE

γ = Unit weight of foundation material

h = depth at which cyclic shear stress is calculated

a_{max} = maximum surface acceleration *(Zone factor for zone - IV=0.16 Importance factor=1.50, Design ground celebration =(0.16/2)*1.5=0.12g)*

r_d = Stress reduction factor

1.0 – 0.00765*h if h < 9.15m

1.174 – 0.0267*h if h = 9.15 m to 23m

0.744 – 0.008*h if h = 23.0 m to 30.0m

0.50 if h > 30.0m

If the equivalent average of shear stress τavis normalized with the initial effective overburden pressure (σ_o), the term is called seismic demand of soil layer or cyclic stress ratio (CSR).

$$CSR=0.65 * (\sigma_o / \sigma_o')* (a_{max} / g)*r_d$$

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 %.

The corrected blow count $(N_1)_{60}$ is determined as follows. $(N_1)_{60}=N_m C_N C_E C_B C_R C_S$

Where,

N_m = Uncorrected SPT blow count

C_E = Correction factor for hammer energy ratio = 1.00

C_B=Correction factor for borehole dia = 1.05 for 150 mm dia borehole

C_R= Correction factor for rod length = 0.75 for 3.0m to 4.0m
= 0.85 for 4.0 m to 6.0 m
= 0.95 for 6.0 m to 10.0 m
= 1.0 for 10.0 m to 30.0 m

C_S= Correction factor for standard sampler=1.0

Correction factor for effective overburden pressure (C_N) is given by the following relation.

$$C_N= Sqrt (P_a/\sigma_o')$$

Where P_a = Atmospheric pressure

The value of SPT blow count for soil with fines content (FC) can be adjusted to the equivalent clean sand value of $(N_1)_{60CS}$asfollows:

$$(N_1)_{60CS}=\alpha + \beta(N_1)_{60}$$

Where, α and β can be determined as follows.

$\alpha = 0.0$ and $\beta = 1.0$ for FC <= 5.0%

$\alpha = e_{xp}\,[(1.76 - (190/FC^2)]$ for 5.0 % < FC < 35.0 %

$\beta = [0.99 + (FC^{1.5}/1000)]$

$\alpha = 5.0$ and $\beta = 1.20$ for FC >= 35.0 %

CRR_M=7.5 is given by the following equation.

$$CRR_{M=7.5}=[1/(34-(N_1)_{60CS})] + [(N_1)_{60CS}/135]+[50/\{10*(N_1)_{60CS} + 45\}^2]-[1/200]$$

Hence the CRR for a particular earthquake magnitude is determined as

$$CRR=CRR_{M=7.5} * MSF * K_\sigma$$

The MSF value is 1.0 for earthquake of magnitude 7.5. K_σ is taken as 1.

The factor of safety against liquefaction, FS_L, is given as

$$FS_L = CRR/CSR$$

The value of CSR and CRR are computed at different depth and depth susceptible to liquefaction is determined.

Liquefaction is probable when FS_L is less than 1.0.

The Calculations of Liquefaction have been reported in table 1 to 9 of Appendix I.

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 Pile foundation:

Cast-In-Situ Bored RCC Piles shall be provided for the proposed metro rail corridor structure. The selection of diameter and length of pile shall be selected from the table below.

10.1.1 For Pile diameter 1000 mm

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral
BH-1	15.00	1150.00	950.00	105.00
	17.50	1450.00	1250.00	
	20.00	1800.00	1650.00	
	22.50	2250.00	2050.00	
	25.00	2600.00	2450.00	
	27.50	3000.00	2850.00	
BH-2	15.00	1700.00	1100.00	140.00
	17.50	1750.00	1400.00	
	20.00	1900.00	1650.00	
	22.50	2100.00	1950.00	
	25.00	2550.00	2350.00	
	27.50	3000.00	2950.00	
BH-3	15.00	1900.00	1300.00	105.00
	17.50	2250.00	1600.00	
	20.00	2500.000	1950.00	
	22.50	2800.00	2250.00	
	25.00	3100.00	2550.00	
	27.50	3350.00	2850.00	
BH-4	15.00	1450.00	950.00	115.00
	17.50	2050.00	1300.00	
	20.00	2300.00	1650.00	
	22.50	2600.00	2000.00	
	25.00	2850.00	2300.00	
	27.50	3150.00	2600.00	
BH-5	15.00	2050.00	1500.00	100.00
	17.50	2300.00	1750.00	
	20.00	2600.00	2100.00	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral
	22.50	2900.00	2350.00	
	25.00	3200.00	2650.00	
	27.50	3500.00	3000.00	
BH-6	15.00	2100.00	1500.00	120.00
	17.50	2200.00	1650.00	
	20.00	2500.00	1950.00	
	22.50	1900.00	2100.00	
	25.00	2700.00	2200.00	
	27.50	2150.00	2400.00	
BH-7	15.00	1700.00	1150.00	95.00
	17.50	1950.00	1450.00	
	20.00	2200.00	1700.00	
	22.50	2450.00	2000.00	
	25.00	2700.00	2250.00	
	27.50	3000.00	2550.00	
BH-8	15.00	1850.00	1500.00	110.00
	17.50	2100.00	1750.00	
	20.00	2250.00	2050.00	
	22.50	2850.00	2350.00	
	25.00	2250.00	2450.00	
	27.50	2250.00	2500.00	
BH-9	15.00	1950.00	1350.00	100.00
	17.50	2250.00	1650.00	
	20.00	2550.00	2000.00	
	22.50	2100.00	2300.00	
	25.00	2100.00	2300.00	
	27.50	2950.00	2450.00	

10.1.2 For Pile diameter 1200 mm

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral
BH-1	15.00	1500.00	1200.00	170.00
	17.50	1850.00	1600.00	
	20.00	2350.00	2050.00	
	22.50	2900.00	2550.00	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral
	25.00	3350.00	3050.00	
	27.50	3850.00	3550.00	
BH-2	15.00	2500.00	1400.00	220.00
	17.50	2400.00	1850.00	
	20.00	2700.00	2200.00	
	22.50	2850.00	2600.00	
	25.00	3450.00	3100.00	
	27.50	4000.00	3650.00	
BH-3	15.00	2150.00	1150.00	170.00
	17.50	2700.00	1600.00	
	20.00	3050.00	2050.00	
	22.50	3450.00	2500.00	
	25.00	3900.00	2950.00	
	27.50	4300.00	3400.00	
BH-4	15.00	1900.00	1050.00	185.00
	17.50	2900.00	1550.00	
	20.00	3200.00	2000.00	
	22.50	3700.00	2550.00	
	25.00	4000.00	3050.00	
	27.50	4500.00	3500.00	
BH-5	15.00	1800.00	800.00	160.00
	17.50	2300.00	1250.00	
	20.00	2650.00	1650.00	
	22.50	3050.00	2100.00	
	25.00	3500.00	2550.00	
	27.50	3900.00	3000.00	
BH-6	15.00	1800.00	850.00	195.00
	17.50	2050.00	1050.00	
	20.00	2450.00	1500.00	
	22.50	1350.00	1600.00	
	25.00	2800.00	1850.00	
	27.50	1800.00	2100.00	
BH-7	15.00	2000.00	1200.00	155.00
	17.50	2500.00	1600.00	
	20.00	2850.00	2000.00	
	22.50	3250.00	2400.00	

Borehole No.	Pile Length (m)	Load carrying Capacity (kN)		
		Compression	Uplift	Lateral
	25.00	3650.00	2800.00	
	27.50	4000.00	3200.00	
BH-8	15.00	1300.00	700.00	180.00
	17.50	1700.00	1050.00	
	20.00	2350.00	1350.00	
	22.50	2700.00	1800.00	
	25.00	1700.00	1950.00	
	27.50	1700.00	2000.00	
BH-9	15.00	1800.00	800.00	160.00
	17.50	2350.00	1250.00	
	20.00	2750.00	1750.00	
	22.50	2000.00	2200.00	
	25.00	2000.00	2200.00	
	27.50	3350.00	2450.00	

10.2 **Isolated footing** may also be provided for proposed metro rail corridor structures. The suitable depth and corresponding allowable bearing capacity shall be read from the table below:

Bore hole No.	Founding Depth (m)	Safe allowable bearing capacity (kN/m^2)			
		B=5.0 m	B=6.0 m	B=7.0 m	B=8.0 m
BH-1	3.00	NA	NA	NA	NA
	4.00	NA	NA	NA	NA
	5.00	NA	NA	NA	NA
	6.00	NA	NA	NA	NA
BH-2	3.00	NA	NA	NA	NA
	4.00	NA	NA	NA	NA
	5.00	160.00	165.00	170.00	175.00
	6.00	190.00	195.00	200.00	205.00
BH-3	3.00	NA	NA	NA	NA
	4.00	NA	NA	NA	NA
	5.00	NA	NA	NA	NA
	6.00	NA	NA	NA	NA
BH-4	3.00	NA	NA	NA	NA

Bore hole No.	Founding Depth (m)	Safe allowable bearing capacity (kN/m^2)			
		B=5.0 m	B=6.0 m	B=7.0 m	B=8.0 m
	4.00	NA	NA	NA	NA
	5.00	160.00	155.00	210.00	200.00
	6.00	165.00	160.00	215.00	210.00
BH-5	3.00	NA	NA	NA	NA
	4.00	NA	NA	NA	NA
	5.00	NA	NA	NA	NA
	6.00	NA	NA	NA	NA
BH-6	3.00	140.00	135.00	135.00	130.00
	4.00	150.00	145.00	140.00	150.00
	5.00	175.00	170.00	165.00	160.00
	6.00	185.00	175.00	175.00	170.00
BH-7	3.00	NA	NA	NA	NA
	4.00	NA	NA	NA	NA
	5.00	NA	NA	NA	NA
	6.00	140.00	135.00	130.00	125.00
BH-8	3.00	NA	NA	NA	NA
	4.00	140.00	135.00	130.00	130.00
	5.00	145.00	145.00	140.00	140.00
	6.00	155.00	155.00	150.00	145.00
BH-9	3.00	NA	NA	NA	NA
	4.00	115.00	125.00	120.00	125.00
	5.00	135.00	130.00	135.00	130.00
	6.00	140.00	135.00	140.00	140.00

NA indicates: Not admissible due to liquefaction potential.

10.3 All depth referred in recommendation of SBC, have been measured from existing level of ground.

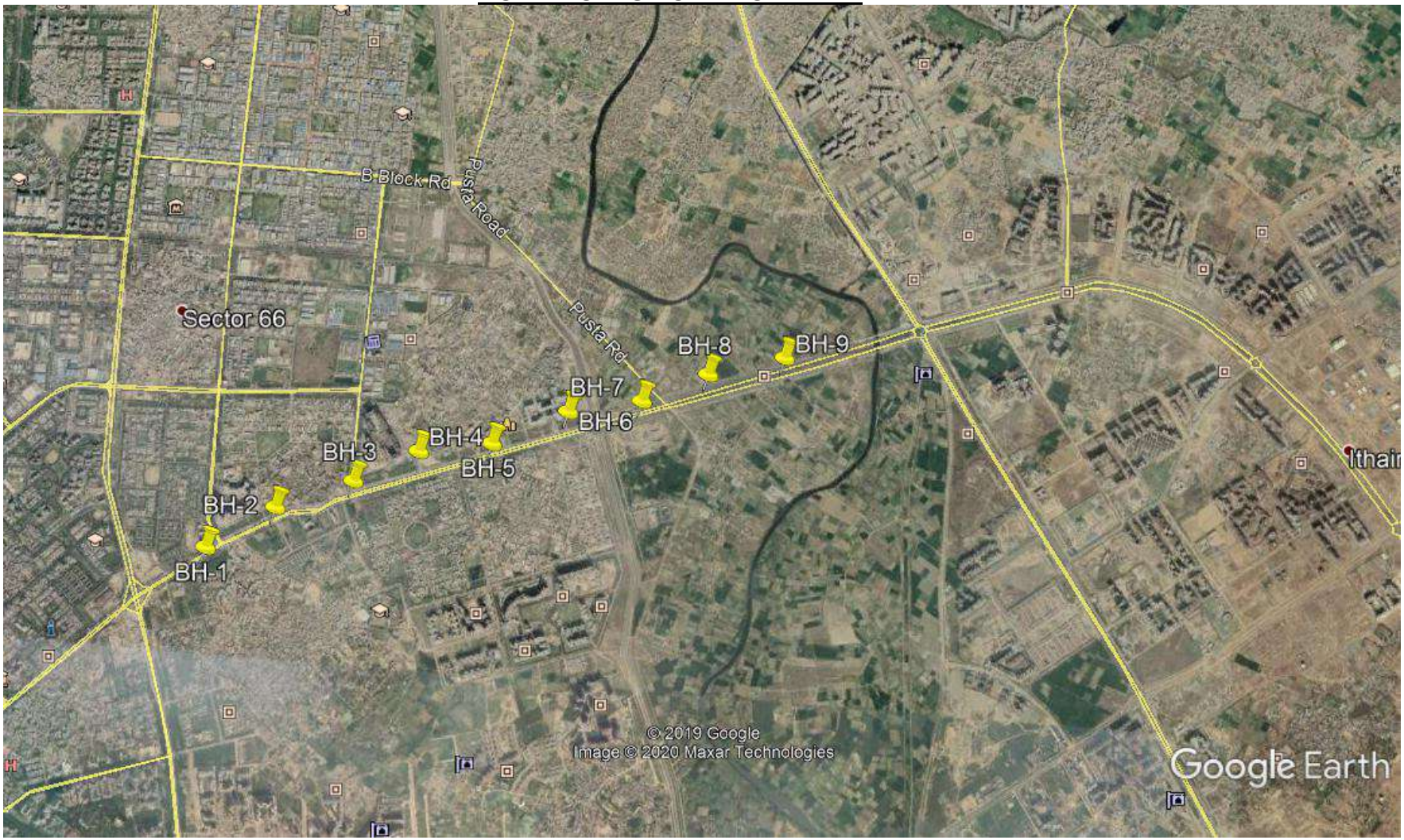
10.4 Since all the locations incorporated in this report does not consist of harmful chemicals, ordinary Portland cement may be used for all civil constructions.

10.5 If any loose pocket strata are found during the excavation, the foundation shall be laid only after ensuring that the same has been cleared and appropriate remedial measures have been adopted

for Techpro Engineers Pvt Ltd

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

APPENDIX – A
BORE HOLES LOCATION PLAN



APPENDIX "B"

SUMMARY OF TEST RESULTS

Bore No : 01	**Ground Elevation : 20 CM ABOVE ROAD**	**Method of drilling : Percussion**	**Depth of Water : Not Encountered**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 20/12/2019**	
Location / Chainage : MAKAH DHAM	**Casing Lowered : 20.00 m**	**Ending Date : 21/12/2019**	

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 (Correct N)	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 Gs	Type of Test	Cohesion C (kN/m2)	Angle of Friction (Deg)	Consolidation Index	Void Ratio	Preconsolidation 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	U.C.S (Mpa)	Porosity	Hardness	Modulus of Elasticity	Abrasion Loss(%)
																							Description of ROCK									Description of SOIL											
	1.50	D	1	2	3	3	6	8.76	ML	0	0	0	16	80	4	17.40	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	2.50	U	2	-	-	-	-	-	SP-SM	0	0	0	88	12	0	10.60	1.69	1.53	Non Plastic			2.63	DST	0.0	29.8	-	0.719	-	-	-	-												
	3.00	D	3	3	6	8	14	17.21	SP-SM	-	-	-	-	-	-	12.60	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Poorly Graded Sands with inorganic Silts of low plasticity											
	4.50	D	4	3	6	7	13	14.21	SP-SM	-	-	-	-	-	-	19.80	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	5.00	U	5	-	-	-	-	-	SM	0	1	3	81	15	0	13.90	1.77	1.55	Non Plastic			2.64	DST	0.0	30.2	-	0.703	-	-	-	-												
	6.00	D	6	3	6	8	14	13.90	SM	-	-	-	-	-	-	5.45	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	7.50	D	7	3	8	8	16	14.20	SM	-	-	-	-	-	-	13.60	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	8.00	D	8	-	-	-	-	-	SP-ML	0	1	3	87	9	0	15.40	-	-	Non Plastic			2.62	-	-	-	-	-	-	-	-	-												
	9.00	D	9	4	8	11	19	14.53	SP-SM	-	-	-	-	-	-	9.17	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Poorly Graded Sands with inorganic Silts of low plasticity											
	10.50	D	10	6	9	12	21	14.36	SP-SM	-	-	-	-	-	-	19.70	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	11.00	D	11	-	-	-	-	-	SP	34	11	10	42	3	0	18.20	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	12.00	D	12	7	10	10	20	13.11	SP	-	-	-	-	-	-	19.50	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Poorly Graded Sands											
	13.50	D	13	8	16	19	35	17.74	SP	-	-	-	-	-	-	11.30	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	14.00	D	14	-	-	-	-	-	GP	60	17	10	11	2	0	9.83	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Poorly Graded Sands and mixed with gravel											
	15.00	D	15	10	19	28	47	20.93	SW-ML	37	22	22	11	8	0	8.50	-	-	Non Plastic			2.63	-	-	-	-	-	-	-	-	-	Well Graded Sands with inorganic Silts of low plasticity as Binder											
	16.50	D	16	11	23	30	53	21.72	SM	0	0	1	85	14	0	27.20	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	17.00	D	17	-	-	-	-	-	SM	-	-	-	-	-	-	22.50	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

APPENDIX "B"

SUMMARY OF TEST RESULTS

Bore No : 01	**Ground Elevation : 20 CM ABOVE ROAD**	**Method of drilling : Percussion**	**Depth of Water : Not Encountered**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 20/12/2019**	
Location / Chainage : MAKAH DHAM	**Casing Lowered : 20.00 m**	**Ending Date : 21/12/2019**	

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 (Correct N)	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 Gs	Type of Test	Cohesion C (kN/m2)	Angle of Friction (Deg)	Consolidation Index	Void Ratio	Preconsolidation 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	U.C.S (Mpa)	Porosity	Hardness	Modulus of Elasticity	Abrasion Loss(%)
																							Description of ROCK									Description of SOIL											
	18.00	D	18	11	24	28	52	20.38	SM	-	-	-	-	-	-	17.30	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	19.50	D	19	12	28	30	58	21.16	SP-ML	2	3	5	80	10	0	18.60	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Poorly Graded Sands with inorganic Silts of low plasticity											
	20.00	U	20	-	-	-	-	-	CL	7	1	2	7	68	15	20.40	1.95	1.62	33	19	14	2.67	UU	78.0	7.0	-	0.648	-	0	-	-	Inorganic clays of low plasticity											
	21.00	D	21	13	26	34	61	21.01	CL	-	-	-	-	-	-	15.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	22.50	D	22	13	26	37	63	20.61	CL	-	-	-	-	-	-	21.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.00	D	23	-	-	-	-	-	CL	8	6	1	9	63	13	19.40	1.97	1.65	30	18	11	2.66	UU	96.0	6.6	-	0.612	-	-	-	-												
	24.00	D	24	15	30	36	66	20.46	CL	-	-	-	-	-	-	19.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	25.50	D	25	18	28	39	67	19.83	CL	3	1	1	9	72	14	21.10	-	-	33	21	12	-	-	-	-	-	-	-	-	-	-												
	26.00	U	26	-	-	-	-	-	CL	0	0	0	38	54	8	16.80	2.07	1.77	25	16	8.8	2.65	UU	99.0	10.6	-	0.497	-	-	-	-												
	27.00	D	27	25	40	48	88	23.80	CL	-	-	-	-	-	-	16.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	28.50	D	28	34	57	-	R	0.00	SM	0	0	0	68	32	0	18.30	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	29.00	D	29	-	-	-	-	-	SM	0	0	0	63	37	0	19.50	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	30.00	D	30	30	80	-	R	0.00	SM	-	-	-	-	-	-	13.90	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, RUU= Unconsolidated Undrained Tri-axial compression Test on Remoulded disturbed Samples, DST=Direct Shear Test on Undisturbed samples, RDST=Direct Shear Test on remoulded samples,

APPENDIX "B"

SUMMARY OF TEST RESULTS

Bore No : 02	**Ground Elevation : SAME AS ROAD LEVEL**	**Method of drilling : Percussion**	**Depth of Water : Not encountered**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 23/12/2019**	
Location / Chainage : ANTHURIUM	**Casing Lowered : 30.00 m**	**Ending Date : 24/12/2019**	

FIELD TEST RESULT — LABORATORY TEST RESULT

RL in Meter	Depth Below NGL (Meter)	Nature of Sample	Sample Reference No.	SPT Test Result: N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Soil Classification	Grain Size Analysis: Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	Index Property: Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Specific Gravity Gs	Shear Strength Parameters: Type of Test	Cohesion C (kN/m2)	Angle of Friction (Deg)	Consolidation Characteristic: Consolidation Index	Void Ratio	Preconsolidation Pressure (Kg/cm2)	Shrinkage: Free Swell Index	Shrinkage Limit	Swell Pressure	Test on Rock Specimen: Core Recovery %	R.Q.D %	Density (gm /cc)	Specific gravity	Moisture content (%)	Water absorption (%)	Point load	U.C.S (Mpa)	Porosity	Hardness	Modulus of Elasticity	Abrasion Loss(%)
																							Description of ROCK									Description of SOIL											
	0.50	D	1	-	-	-	-	-	ML	6	2	2	34	52	4	5.25	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	1.50	D	2	2	3	5	8	12.00	CL	0	0	2	12	72	14	8.00	-	-	33	21	12	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	2.50	U	3	-	-	-	-	-	SM	0	0	0	66	34	0	5.80	1.61	1.52	Non Plastic			2.65	DST	6.0	24.8	-	0.743	-	-	-	-	Silty Sands											
	3.00	D	4	3	4	5	9	11.21	SM	-	-	-	-	-	-	23.80	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	4.50	D	5	6	8	10	18	18.31	SM	-	-	-	-	-	-	10.30	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	SM	0	0	3	53	44	0	10.20	1.70	1.54	Non Plastic			2.65	DST	6.0	25.0	-	0.721	-	-	-	-												
	6.00	D	7	12	14	26	40	27.74	SM	-	-	-	-	-	-	4.54	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	7.50	D	8	16	20	28	48	29.34	SM	-	-	-	-	-	-	16.00	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	ML	7	2	1	29	57	4	19.50	1.86	1.54	Non Plastic			2.65	DST	14.0	23.8	-	0.721	-	-	-	-	Inorganic Silts of low plasticity											
	9.00	D	10	14	18	22	40	23.74	ML	-	-	-	-	-	-	21.20	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	10.50	D	11	12	16	20	36	20.57	ML	0	0	4	26	67	3	21.10	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	11.00	D	12	-	-	-	-	-	SM	0	0	0	64	36	0	19.00	-	-	Non Plastic			2.64	-	-	-	-	-	-	-	-	-	Silty Sands											
	12.00	D	13	16	20	28	48	23.95	SM	0	0	1	72	27	0	11.20	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	13.50	D	14	17	24	28	52	24.03	SM	-	-	-	-	-	-	17.70	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	14.00	D	15	-	-	-	-	-	SM	9	2	2	53	34	0	20.80	-	-	Non Plastic			2.64	-	-	-	-	-	-	-	-	-												
	15.00	D	16	18	28	33	61	25.83	SM	-	-	-	-	-	-	15.70	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	16.50	D	17	20	26	35	61	24.54	SM	-	-	-	-	-	-	16.40	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	17.00	D	18	-	-	-	-	-	SP-ML	9	2	3	77	9	0	20.20	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Poorly Graded Sands with inorganic Silts of low plasticity											
	18.00	D	19	17	28	32	60	23.06	SP-ML	0	0	2	87	11	0	17.30	-	-	Non Plastic			2.62	-	-	-	-	-	-	-	-	-												

APPENDIX "B"

SUMMARY OF TEST RESULTS

Bore No : 02	**Ground Elevation : SAME AS ROAD LEVEL**	**Method of drilling : Percussion**	**Depth of Water : Not encountered**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 23/12/2019**	
Location / Chainage : ANTHURIUM	**Casing Lowered : 30.00 m**	**Ending Date : 24/12/2019**	

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 (Correct N)	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 Gs	Type of Test	Cohesion C (kN/m2)	Angle of Friction (Deg)	Consolidation Index	Void Ratio	Preconsolidation 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	U.C.S (Mpa)	Porosity	Hardness	Modulus of Elasticity	Abrasion Loss(%)
																							Description of ROCK									Description of SOIL											
	19.50	D	20	15	25	30	55	20.55	SP-SM	-	-	-	-	-	-	15.00	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	20.00	D	21	-	-	-	-	-	SM	2	1	1	64	32	0	20.80	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	21.00	D	22	17	30	34	64	22.10	CL	0	2	2	11	73	12	23.50	-	-	30	20	10	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	22.50	D	23	14	22	30	52	17.90	CL	-	-	-	-	-	-	21.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.00	U	24	-	-	-	-	-	ML	6	0	1	35	55	3	23.20	1.96	1.59	Non Plastic			2.65	DST	15.0	24.6	-	0.667	-	-	-	-	Inorganic Silts of low plasticity											
	24.00	D	25	12	26	30	56	18.14	ML	-	-	-	-	-	-	23.10	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	25.50	D	26	17	24	29	53	16.62	ML	-	-	-	-	-	-	21.10	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	26.00	U	27	-	-	-	-	-	CL	10	7	4	27	41	11	20.20	1.95	1.62	32	19	12	2.66	UU	91.0	8.5	-	0.642	-	-	-	-	Inorganic clays of low plasticity											
	27.00	D	28	20	28	32	60	17.57	CL	-	-	-	-	-	-	16.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	28.50	D	29	26	31	34	65	17.97	CL	-	-	-	-	-	-	27.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.00	U	30	-	-	-	-	-	CI	8	7	3	24	31	27	17.20	1.97	1.68	49	25	24	2.68	UU	118.0	8.2	-	0.595	-	-	-	-	Inorganic clays of Intermediate plasticity											
	30.00	D	31	26	28	38	66	17.45	CI	-	-	-	-	-	-	26.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, RUU= Unconsolidated Undrained Tri-axial compression Test on Remoulded disturbed Samples, DST=Direct Shear Test on Undisturbed samples, RDST=Direct Shear Test on remoulded samples,

APPENDIX "B"

SUMMARY OF TEST RESULTS

Bore No : 03 | **Ground Elevation : SAME ROAD LEVEL** | **Method of drilling : Percussion** | **Depth of Water : Not Encountered**

Diameter of Bore Hole : 150 mm | **Bore Retained using : Casing** | **Starting Date : 25/12/2019**

Location / Chainage : BHAGUTE GARDEN | **Casing Lowered : 22.00 m** | **Ending Date : 27/12/2019**

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 (Correct N)	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 (Deg)	Consolidation Index	Void Ratio	Preconsolidation 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	U.C.S (Mpa)	Porosity	Hardness	Modulus of Elasticity	Abrasion Loss(%)
																							Description of ROCK									Description of SOIL											
	1.00	D	1	-	-	-	-	-	CI	0	0	0	3	69	28	28.60	-	-	46	24	22	-	-	-	-	-	-	-	-	-	-												
	1.50	D	2	3	3	4	7	10.01	CI	-	-	-	-	-	-	27.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic clays of Intermediate plasticity											
	2.50	U	3	-	-	-	-	-	CI	0	0	0	2	68	30	20.40	1.85	1.54	48	26	23	2.68	UU	87.0	8.6	-	0.740	-	-	-	-												
	3.00	D	4	3	4	4	8	9.59	SM	0	0	0	60	40	0	11.00	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	4.50	D	5	5	7	8	15	15.95	SM	-	-	-	-	-	-	21.80	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	5.00	D	6	-	-	-	-	-	SP-ML	3	3	3	86	5	0	24.70	-	-	Non Plastic			2.61	-	-	-	-	-	-	-	-	-												
	6.00	D	7	5	6	8	14	13.52	SP-SM	-	-	-	-	-	-	21.10	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Poorly Graded Sands with inorganic Silts of low plasticity											
	7.50	D	8	6	8	10	18	14.71	SP-SM	-	-	-	-	-	-	19.90	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	CL	10	3	2	22	52	11	17.30	1.84	1.57	30	18	12	2.66	UU	54.0	10.9	-	0.694	-	0	-	-												
	9.00	D	10	6	10	10	20	14.54	CL	-	-	-	-	-	-	19.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	10.50	D	11	7	12	12	24	15.21	CL	-	-	-	-	-	-	16.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	SM	0	0	1	82	17	0	18.40	1.84	1.55	Non Plastic			2.64	DST	0.0	30.6	-	0.703	-	-	-	-												
	12.00	D	13	12	19	24	43	21.33	SM	-	-	-	-	-	-	12.10	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	13.50	D	14	14	22	28	50	22.63	SM	-	-	-	-	-	-	21.80	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	14.00	D	15	-	-	-	-	-	SP-ML	0	0	1	91	8	0	21.80	-	-	Non Plastic			2.62	-	-	-	-	-	-	-	-	-												
	15.00	D	16	17	25	31	56	23.42	SP-SM	-	-	-	-	-	-	19.70	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Poorly Graded Sands with inorganic Silts of low plasticity											
	16.50	D	17	20	22	36	58	22.82	SP-SM	-	-	-	-	-	-	25.60	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	17.00	D	18	-	-	-	-	-	SP-SM	-	-	-	-	-	-	21.10	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Poorly Graded Sands with inorganic Silts of low plasticity											

APPENDIX "B"

SUMMARY OF TEST RESULTS

Bore No : 03 | **Ground Elevation : SAME ROAD LEVEL** | **Method of drilling : Percussion** | **Depth of Water : Not Encountered**

Diameter of Bore Hole : 150 mm | **Bore Retained using : Casing** | **Starting Date : 25/12/2019**

Location / Chainage : BHAGUTE GARDEN | **Casing Lowered : 22.00 m** | **Ending Date : 27/12/2019**

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 (Correct N)	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 (Deg)	Consolidation Index	Void Ratio	Preconsolidation 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	U.C.S (Mpa)	Porosity	Hardness	Modulus of Elasticity	Abrasion Loss(%)
																							Description of ROCK									Description of SOIL											
	18.00	D	19	22	24	36	60	22.27	SP-ML	0	0	2	90	8	0	26.90	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	19.50	D	20	23	34	37	61	21.48	SP-SM	-	-	-	-	-	-	25.90	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	20.00	D	21	-	-	-	-	-	SP-SM	-	-	-	-	-	-	25.50	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	21.00	D	22	21	26	39	65	21.57	SP	8	6	4	79	3	0	24.20	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Poorly Graded Sands											
	22.50	D	23	23	28	41	69	21.64	CI	0	0	1	14	65	20	23.40	-	-	38	22	16	-	-	-	-	-	-	-	-	-	-	Inorganic clays of Intermediate plasticity											
	23.00	D	24	-	-	-	-	-	CI	-	-	-	-	-	-	23.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	24.00	D	25	20	30	40	70	20.99	CI	-	-	-	-	-	-	18.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	25.50	D	26	21	29	42	71	20.32	ML	0	0	0	43	54	3	24.00	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity											
	26.00	D	27	-	-	-	-	-	CI	0	0	0	14	70	16	22.80	-	-	35	19	17	-	-	-	-	-	-	-	-	-	-	Inorganic clays of Intermediate plasticity											
	27.00	D	28	22	31	43	74	20.17	CL-CI	-	-	-	-	-	-	20.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	28.50	D	29	22	33	45	78	20.16	CL-CI	-	-	-	-	-	-	30.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.00	D	30	-	-	-	-	-	CL-CI	-	-	-	-	-	-	24.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	30.00	D	31	23	35	47	82	20.13	CL	0	0	1	19	65	15	29.80	-	-	35	20	15	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, RUU= Unconsolidated Undrained Tri-axial compression Test on Remoulded disturbed Samples, DST=Direct Shear Test on Undisturbed samples, RDST=Direct Shear Test on remoulded samples,

APPENDIX "B"

SUMMARY OF TEST RESULTS

Bore No : 04	**Ground Elevation : Same as Road Level**	**Method of drilling :Percussion**	**Depth of Water : Not Encountered**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 26/12/2019**	
Location / Chainage : Sever Plant, Noida	**Casing Lowered : 20.00 m**	**Ending Date : 28/12/2019**	

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 (Correct N)	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 Gs	Type of Test	Cohesion C (kN/m2)	Angle of Friction (Deg)	Consolidation Index	Void Ratio	Preconsolidation 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	U.C.S (Mpa)	Porosity	Hardness	Modulus of Elasticity	Abrasion Loss(%)
																							Description of ROCK									Description of SOIL										
	1.00	D	1	-	-	-	-	-	CL	0	0	0	46	45	9	6.70	-	-	26	16	9.8	2.65	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity										
	1.50	D	2	3	3	3	6	9.00	-	-	-	-	-	-	-	5.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	2.50	U	3	-	-	-	-	-	SP-ML	0	0	0	91	9	0	6.29	1.63	1.53	Non Plastic			2.60	DST	0.0	29.7	-	0.699	-	-	-	-	Poorly Graded Sands with inorganic Silts of low plasticity										
	3.00	D	4	3	5	6	11	13.66	-	-	-	-	-	-	-	5.20	-	-	Non Plastic			-	-	-	-	-	-	-	-	-												
	4.50	D	5	4	8	10	18	18.25	-	-	-	-	-	-	-	6.21	-	-	Non Plastic			-	-	-	-	-	-	-	-	-												
	5.00	U	6	-	-	-	-	-	SP-ML	0	0	3	88	9	0	7.22	1.65	1.54	Non Plastic			2.61	DST	0.0	30.1	-	0.695	-	-	-	-												
	6.00	D	7	6	8	12	20	17.65	-	-	-	-	-	-	-	17.40	-	-	Non Plastic			-	-	-	-	-	-	-	-	-												
	7.50	D	8	5	8	10	18	15.40	-	-	-	-	-	-	-	16.10	-	-	Non Plastic			-	-	-	-	-	-	-	-	-												
	8.00	U	9	-	-	-	-	-	CL	6	1	5	13	65	10	18.10	1.88	1.59	29	20	8.6	2.66	DST	16.0	23.5	-	0.673	-	-	-	-	Inorganic clays of low plasticity										
	9.00	D	10	8	12	14	26	17.72	-	-	-	-	-	-	-	16.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	10.50	D	11	10	14	16	30	18.16	CL	0	4	4	16	65	11	14.20	-	-	29	18	11	-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	ML	0	0	0	12	84	4	18.90	1.95	1.64	Non Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity										
	12.00	D	13	12	16	18	34	18.53	-	-	-	-	-	-	-	22.60	-	-	Non Plastic			-	-	-	-	-	-	-	-	-												
	13.50	D	14	14	16	20	36	18.17	-	-	-	-	-	-	-	28.00	-	-	Non Plastic			-	-	-	-	-	-	-	-	-												
	14.00	D	15	-	-	-	-	-	SP-ML	0	1	2	88	9	0	20.40	1.88	1.56	Non Plastic			2.61	DST	0.0	30.9	-	0.673	-	-	-	-	Poorly Graded Sands with inorganic Silts of low plasticity										
	15.00	D	16	18	38	42	80	32.06	-	-	-	-	-	-	-	14.80	-	-	Non Plastic			-	-	-	-	-	-	-	-	-												
	16.50	D	17	22	39	46	85	32.06	-	-	-	-	-	-	-	14.50	-	-	Non Plastic			-	-	-	-	-	-	-	-	-												
	17.00	D	18	-	-	-	-	-	SP-ML	0	0	2	88	10	0	16.50	-	-	Non Plastic			2.62	-	-	-	-	-	-	-	-	-												
	18.00	D	19	22	40	47	87	31.25	-	-	-	-	-	-	-	9.00	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	Poorly Graded Sands with inorganic Silts of low plasticity										

APPENDIX "B"

SUMMARY OF TEST RESULTS

Bore No : 04	**Ground Elevation : Same as Road Level**	**Method of drilling :Percussion**	**Depth of Water : Not Encountered**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 26/12/2019**	
Location / Chainage : Sever Plant, Noida	**Casing Lowered : 20.00 m**	**Ending Date : 28/12/2019**	

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 (Correct N)	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 Gs	Type of Test	Cohesion C (kN/m2)	Angle of Friction (Deg)	Consolidation Index	Void Ratio	Preconsolidation 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	U.C.S (Mpa)	Porosity	Hardness	Modulus of Elasticity	Abrasion Loss(%)
																							Description of ROCK									Description of SOIL										
	19.50	D	20	23	41	47	88	30.23	-	-	-	-	-	-	-	6.72	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-											
	20.00	D	21	-	-	-	-	-	SP-ML	0	2	2	87	9	0	9.16	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-											
	21.00	D	22	24	42	48	90	29.55	-	-	-	-	-	-	-	7.96	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-											
	22.50	D	23	24	42	47	89	28.11	-	-	-	-	-	-	-	6.76	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-											
	23.00	D	24	-	-	-	-	-	CI	0	0	0	5	69	26	29.00	-	-	41	24	17	-	-	-	-	-	-	-	0	18	-										
	24.00	D	25	26	43	48	91	27.32	-	-	-	-	-	-	-	29.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
	25.50	D	26	25	44	49	93	26.59	-	-	-	-	-	-	-	27.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
	26.00	D	27	-	-	-	-	-	CI	0	0	2	13	59	26	25.00	-	-	42	23	20	-	-	-	-	-	-	-	-	-	-										
	27.00	D	28	26	39	42	81	22.60	-	-	-	-	-	-	-	27.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
	28.50	D	29	28	42	46	88	23.24	-	-	-	-	-	-	-	23.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
	29.00	D	30	-	-	-	-	-	CI	0	1	3	14	62	20	21.60	-	-	36	21	16	-	-	-	-	-	-	-	-	-	-										
	30.00	D	31	30	46	48	94	23.55	-	-	-	-	-	-	-	27.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										

Inorganic clays of Intermediate plasticity

Notations: UU= Unconsolidated Undrained Tri-axial compression Test on Undisturbed Sample, RUU= Unconsolidated Undrained Tri-axial compression Test on Remoulded disturbed Samples, DST=Direct Shear Test on Undisturbed samples, RDST=Direct Shear Test on remoulded samples,

APPENDIX "B"

SUMMARY OF TEST RESULTS

Bore No : 05	**Ground Elevation : Same as Road Level**	**Method of drilling :Percussion**	**Depth of Water : Not Encountered**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 28/12/2019**	
Location / Chainage : Noida International School	**Casing Lowered : 23.00 m**	**Ending Date : 29/12/2019**	

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 (Correct N)	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 Gs	Type of Test	Cohesion C (kN/m2)	Angle of Friction (Deg)	Consolidation Index	Void Ratio	Preconsolidation 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	U.C.S (Mpa)	Porosity	Hardness	Modulus of Elasticity	Abrasion Loss(%)
																							Description of ROCK									Description of SOIL										
	0.50	D	1	-	-	-	-	-	CL	0	0	0	17	72	11	19.50	-	-	28	18	10	-	-	-	-	-	-	-	-	-											
	1.00	D	2	-	-	-	-	-	-	-	-	-	-	-	-	15.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity										
	1.50	D	3	2	3	3	6	8.60	CL	0	0	0	16	71	13	19.70	-	-	31	18	13	2.67	-	-	-	-	-	-	-	-	-											
	2.50	U	4	-	-	-	-	-	ML	0	1	1	37	57	4	20.70	1.83	1.52	Non Plastic			2.65	DST	7.0	25.2	-	0.743	-	-	-	-											
	3.00	D	5	4	6	6	12	14.42	-	-	-	-	-	-	-	4.90	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity										
	4.50	D	6	4	5	6	11	11.72	-	-	-	-	-	-	-	22.40	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-											
	5.00	D	7	-	-	-	-	-	SP-ML	0	0	0	93	7	0	15.60	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-											
	6.00	D	8	4	6	9	15	14.49	-	-	-	-	-	-	-	23.90	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-											
	7.50	D	9	5	7	9	16	13.77	-	-	-	-	-	-	-	20.90	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-											
	8.00	D	10	-	-	-	-	-	SP-ML	8	8	7	72	5	0	15.30	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Poorly Graded Sands with inorganic Silts of low plasticity										
	9.00	D	11	6	9	11	20	14.48	-	-	-	-	-	-	-	16.90	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-											
	10.50	D	12	7	13	15	28	16.65	-	-	-	-	-	-	-	21.50	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-											
	11.00	U	13	-	-	-	-	-	CL	8	3	2	14	61	12	16.40	1.92	1.65	32	21	11	2.66	UU	88.0	11.5	-	0.612	-	-	-	-	Inorganic clays of low plasticity										
	12.00	D	14	6	15	18	33	17.50	ML	0	0	0	35	61	4	20.90	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity										
	13.50	D	15	6	16	19	35	17.22	-	-	-	-	-	-	-	17.40	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-											
	14.00	D	16	-	-	-	-	-	SM	0	0	0	82	18	0	19.70	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-											
	15.00	D	17	8	18	19	37	16.99	-	-	-	-	-	-	-	18.50	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands										
	16.50	D	18	8	19	21	40	17.10	-	-	-	-	-	-	-	17.80	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-											
	17.00	D	19	-	-	-	-	-	SM	0	1	4	77	18	0	18.20	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands										

APPENDIX "B"

SUMMARY OF TEST RESULTS

Bore No : 05	**Ground Elevation : Same as Road Level**	**Method of drilling :Percussion**	**Depth of Water : Not Encountered**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 28/12/2019**	
Location / Chainage : Noida International School	**Casing Lowered : 23.00 m**	**Ending Date : 29/12/2019**	

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 (Correct N)	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 Gs	Type of Test	Cohesion C (kN/m2)	Angle of Friction (Deg)	Consolidation Index	Void Ratio	Preconsolidation 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	U.C.S (Mpa)	Porosity	Hardness	Modulus of Elasticity	Abrasion Loss(%)
																							Description of ROCK									Description of SOIL											
	18.00	D	20	10	20	22	42	16.87	-	-	-	-	-	-	-	20.60	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	19.50	D	21	10	22	23	45	16.96	-	-	-	-	-	-	-	18.60	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	20.00	D	22	-	-	-	-	-	SM	0	0	6	75	19	0	19.70	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	21.00	D	23	11	23	23	46	16.48	-	-	-	-	-	-	-	18.70	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	22.50	D	24	13	23	25	48	16.29	-	-	-	-	-	-	-	18.10	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	23.00	D	25	-	-	-	-	-	CL	0	0	0	22	66	12	20.20	-	-	31	19	12	2.66	-	-	-	-	-	-	8	19	-	Inorganic clays of low plasticity											
	24.00	D	26	13	25	27	52	16.60	-	-	-	-	-	-	-	19.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	25.50	D	27	14	27	29	56	16.85	-	-	-	-	-	-	-	20.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	26.00	D	28	-	-	-	-	-	-	-	-	-	-	-	-	15.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	27.00	D	29	15	30	31	61	17.32	-	-	-	-	-	-	-	18.10	-	-	32	19	13	-	-	-	-	-	-	-	-	-	-												
	28.50	D	30	17	32	36	68	18.18	-	-	-	-	-	-	-	15.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	29.00	D	31	-	-	-	-	-	CL	6	4	3	15	61	11	17.40	-	-	32	19	13	-	-	-	-	-	-	-	-	-	-												
	30.00	D	32	20	34	40	74	18.74	-	-	-	-	-	-	-	17.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"

SUMMARY OF TEST RESULTS

Bore No : 06	**Ground Elevation : Same as Road Level**	**Method of drilling :Percussion**	**Depth of Water : Not Encountered**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 29/12/2019**	
Location / Chainage : Parthla Khanjarpur, Noida	**Casing Lowered : 25.50 m**	**Ending Date : 30/12/2019**	

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 (Correct N)	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 Gs	Type of Test	Cohesion C (kN/m2)	Angle of Friction (Deg)	Consolidation Index	Void Ratio	Preconsolidation 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	U.C.S (Mpa)	Porosity	Hardness	Modulus of Elasticity	Abrasion Loss(%)
																							Description of ROCK									Description of SOIL										
	1.00	D	1	-	-	-	-	-	ML	0	0	0	30	67	3	13.60	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Inorganic Silts of low plasticity									
	1.50	D	2	4	4	5	9	12.95	-	-	-	-	-	-	-	13.90	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-										
	2.50	U	3	-	-	-	-	-	CL-ML	0	0	0	34	60	6	17.10	1.80	1.54	24	18	6.2	2.65	DST	15.0	23.1	-	0.721	-	-	-	-	Inorganic Silty Clays of low plasticity									
	3.00	D	4	5	6	7	13	15.69	-	-	-	-	-	-	-	15.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
	4.50	D	5	5	5	8	13	13.93	SP	0	0	5	91	4	0	4.50	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Poorly Graded Sands									
	5.00	U	6	-	-	-	-	-	SP-ML	0	3	2	84	11	0	16.60	1.78	1.53	Non Plastic			2.62	DST	0.0	30.1	-	0.712	-	-	-	-	Poorly Graded Sands with inorganic Silts of low plasticity									
	6.00	D	7	7	10	12	22	18.06	-	-	-	-	-	-	-	10.20	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-										
	7.50	D	8	8	12	13	25	18.05	-	-	-	-	-	-	-	17.00	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-										
	8.00	D	9	-	-	-	-	-	SM	0	1	2	74	23	0	19.30	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands									
	9.00	D	10	10	14	16	30	18.89	CL	9	6	2	12	59	12	15.40	-	-	30	19	12	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity									
	10.50	D	11	12	16	18	34	19.24	-	-	-	-	-	-	-	16.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
	11.00	U	12	-	-	-	-	-	CL	3	1	1	21	62	12	16.90	1.91	1.63	30	19	11	2.67	UU	89.0	10.3	-	0.638	-	-	-	-										
	12.00	D	13	13	15	17	32	17.36	-	-	-	-	-	-	-	18.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
	13.50	D	14	15	16	20	36	17.80	-	-	-	-	-	-	-	10.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
	14.00	D	15	-	-	-	-	-	SM	2	1	1	73	23	0	18.00	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands									
	15.00	D	16	17	20	22	42	18.84	-	-	-	-	-	-	-	20.70	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-										
	16.50	D	17	20	22	24	46	19.15	-	-	-	-	-	-	-	20.80	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-										
	17.00	D	18	-	-	-	-	-	SP	3	1	2	92	2	0	22.20	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Poorly Graded Sands									
	18.00	D	19	22	24	27	51	19.72	-	-	-	-	-	-	-	20.50	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-										

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

APPENDIX "B"

SUMMARY OF TEST RESULTS

Bore No : 06 | **Ground Elevation : Same as Road Level** | **Method of drilling :Percussion** | **Depth of Water : Not Encountered**

Diameter of Bore Hole : 150 mm | **Bore Retained using : Casing** | **Starting Date : 29/12/2019**

Location / Chainage : Parthla Khanjarpur, Noida | **Casing Lowered : 25.50 m** | **Ending Date : 30/12/2019**

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 (Correct N)	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 Gs	Type of Test	Cohesion C (kN/m2)	Angle of Friction (Deg)	Consolidation Index	Void Ratio	Preconsolidation 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	U.C.S (Mpa)	Porosity	Hardness	Modulus of Elasticity	Abrasion Loss(%)
																							Description of ROCK									Description of SOIL											
	19.50	D	20	21	23	30	53	19.39	-	-	-	-	-	-	-	18.40	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	20.00	D	21	-	-	-	-	-	SP	7	2	2	86	3	0	20.00	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	21.00	D	22	22	26	28	54	18.80	CL	7	6	2	4	69	12	19.80	-	-	29	19	11	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	22.50	D	23	24	28	30	58	19.03	-	-	-	-	-	-	-	18.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	23.00	U	24	-	-	-	-	-	SM	0	0	1	54	45	0	18.10	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	24.00	D	25	22	26	28	54	17.23	-	-	-	-	-	-	-	19.90	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	25.50	D	26	24	28	30	58	17.47	-	-	-	-	-	-	-	18.90	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	26.00	U	27	-	-	-	-	-	SM	0	0	0	55	45	0	18.00	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	27.00	D	28	26	28	32	60	17.23	-	-	-	-	-	-	-	18.00	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	28.50	D	29	27	30	34	64	17.44	-	-	-	-	-	-	-	16.60	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	29.00	D	30	-	-	-	-	-	SM	0	0	1	52	47	0	18.40	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	30.00	D	31	28	33	36	69	17.82	-	-	-	-	-	-	-	17.60	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												

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Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

APPENDIX "B"

SUMMARY OF TEST RESULTS

Bore No : 07	**Ground Elevation : Same as Road Level**	**Method of drilling :Percussion**	**Depth of Water : Not Encountered**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 30/12/2019**	
Location / Chainage : Parthla Chowk, Noida	**Casing Lowered : 21.00 m**	**Ending Date : 31/12/2019**	

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 (Correct N)	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 Gs	Type of Test	Cohesion C (kN/m2)	Angle of Friction (Deg)	Consolidation Index	Void Ratio	Preconsolidation 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	U.C.S (Mpa)	Porosity	Hardness	Modulus of Elasticity	Abrasion Loss(%)
																							Description of ROCK									Description of SOIL											
	1.00	D	1	-	-	-	-	-	CL-ML	0	2	2	45	45	6	5.36	-	-	24	17	6.8	-	-	-	-	-	-	-	-	-	-	Inorganic Silty Clays of low plasticity											
	1.50	D	2	2	3	2	5	7.12	SM	0	1	1	76	22	0	2.74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Silty Sands											
	2.50	U	3	-	-	-	-	-	CI	0	0	2	12	59	27	20.10	1.89	1.57	46	24	22	2.68	UU	73.0	7.9	-	0.707	-	13	18	-	Inorganic clays of Intermediate plasticity											
	3.00	D	4	3	4	4	8	9.54	SM	0	1	1	75	23	0	2.95	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	4.50	D	5	4	5	6	11	11.62	CL	3	1	1	21	61	13	12.90	-	-	32	19	13	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											
	5.00	D	6	-	-	-	-	-	-	-	-	-	-	-	-	20.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	6.00	D	7	4	6	8	14	13.47	-	-	-	-	-	-	-	19.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.50	D	8	5	7	10	17	14.11	-	-	-	-	-	-	-	27.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	8.00	D	9	-	-	-	-	-	CL	0	0	3	10	73	14	24.40	-	-	32	20	12	-	-	-	-	-	-	-	-	-	-												
	9.00	D	10	5	9	11	20	14.34	SP-SM	0	0	0	88	12	0	22.50	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	10.50	D	11	6	10	12	22	14.23	-	-	-	-	-	-	-	22.60	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	11.00	D	12	-	-	-	-	-	SP-ML	0	0	0	89	11	0	22.70	1.88	1.53	Non Plastic			2.62	DST	0.0	30.1	-	0.712	-	-	-	-	Poorly Graded Sands with inorganic Silts of low plasticity											
	12.00	D	13	7	12	13	25	14.50	-	-	-	-	-	-	-	20.00	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	13.50	D	14	7	14	16	30	15.44	-	-	-	-	-	-	-	16.40	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	14.00	D	15	-	-	-	-	-	-	-	-	-	-	-	-	21.20	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	15.00	D	16	8	15	16	31	14.94	SP-ML	0	0	0	88	12	0	23.50	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	16.50	D	17	9	16	17	33	14.81	-	-	-	-	-	-	-	22.10	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	17.00	D	18	-	-	-	-	-	-	-	-	-	-	-	-	21.40	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"

SUMMARY OF TEST RESULTS

Bore No : 07	**Ground Elevation : Same as Road Level**	**Method of drilling :Percussion**	**Depth of Water : Not Encountered**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 30/12/2019**	
Location / Chainage : Parthla Chowk, Noida	**Casing Lowered : 21.00 m**	**Ending Date : 31/12/2019**	

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 (Correct N)	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 Gs	Type of Test	Cohesion C (kN/m2)	Angle of Friction (Deg)	Consolidation Index	Void Ratio	Preconsolidation 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	U.C.S (Mpa)	Porosity	Hardness	Modulus of Elasticity	Abrasion Loss(%)
																							Description of ROCK									Description of SOIL											
	18.00	D	19	10	18	18	36	15.06	SM	0	0	0	56	44	0	8.80	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	19.50	D	20	11	19	18	37	14.61	-	-	-	-	-	-	-	27.00	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	20.00	D	21	-	-	-	-	-	-	-	-	-	-	-	-	7.67	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	21.00	D	22	12	20	21	41	15.12	-	-	-	-	-	-	-	6.06	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	22.50	D	23	12	20	20	40	14.27	SM	0	0	0	81	19	0	8.20	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	23.00	D	24	-	-	-	-	-	-	-	-	-	-	-	-	9.62	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	24.00	D	25	15	22	23	45	14.97	-	-	-	-	-	-	-	8.05	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	25.50	D	26	17	24	25	49	15.35	SM	0	0	0	87	13	0	11.00	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	26.00	D	27	-	-	-	-	-	-	-	-	-	-	-	-	10.60	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	27.00	D	28	19	25	25	50	15.02	SM	0	0	0	85	15	0	7.15	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	28.50	D	29	20	26	29	55	15.58	-	-	-	-	-	-	-	9.59	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	29.00	D	30	-	-	-	-	-	-	-	-	-	-	-	-	9.55	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	30.00	D	31	23	29	32	61	16.30	SM	0	0	0	83	17	0	8.49	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												

APPENDIX "B"

SUMMARY OF TEST RESULTS

Bore No : 08 | **Ground Elevation : Same as Road Level** | **Method of drilling :Percussion** | **Depth of Water : Not Encountered**

Diameter of Bore Hole : 150 mm | **Bore Retained using : Casing** | **Starting Date : 02/01/2020**

Location / Chainage : Pusta Road, Noida | **Casing Lowered : 21.00 m** | **Ending Date : 03/01/2020**

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 (Correct N)	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 Gs	Type of Test	Cohesion C (kN/m2)	Angle of Friction (Deg)	Consolidation Index	Void Ratio	Preconsolidation 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	U.C.S (Mpa)	Porosity	Hardness	Modulus of Elasticity	Abrasion Loss(%)
																							Description of ROCK									Description of SOIL									
	1.00	D	1	-	-	-	-	-	SM	0	0	0	74	26	0	3.60	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-									
	1.50	D	2	3	4	5	9	12.92	SM	0	2	3	60	35	0	10.30	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands									
	2.50	U	3	-	-	-	-	-	CL	0	0	3	40	51	6	14.70	1.82	1.59	24	16	7.1	2.65	DST	13.0	26.3	-	0.667	-	0	-	-									
	3.00	D	4	3	5	5	10	12.03	-	-	-	-	-	-	-	12.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity									
	4.50	D	5	4	6	7	13	13.88	-	-	-	-	-	-	-	12.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
	5.00	U	6	-	-	-	-	-	CI	0	1	1	9	65	24	22.00	2.04	1.67	39	19	20	2.68	UU	68.0	6.0	-	0.605	-	-	-	-									
	6.00	D	7	5	7	10	17	15.39	-	-	-	-	-	-	-	25.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic clays of Intermediate plasticity									
	7.50	D	8	6	8	12	20	15.43	-	-	-	-	-	-	-	15.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
	8.00	U	9	-	-	-	-	-	CL	0	0	0	37	53	10	19.90	1.94	1.62	27	18	9.5	2.66	-	-	-	-	0.642	-	-	-	-									
	9.00	D	10	6	10	12	22	15.17	-	-	-	-	-	-	-	23.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
	10.50	D	11	8	12	14	26	15.74	-	-	-	-	-	-	-	20.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity									
	11.00	D	12	-	-	-	-	-	CL	0	0	2	18	67	13	19.60	1.88	1.57	31	18	13	2.67	UU	71.0	9.2	-	0.701	-	-	-	-									
	12.00	D	13	10	14	16	30	16.29	-	-	-	-	-	-	-	22.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
	13.50	D	14	12	14	18	32	16.10	CL	7	4	2	32	46	9	17.70	-	-	26	17	9.5	-	-	-	-	-	-	-	-	-	-									
	14.00	D	15	-	-	-	-	-	SM-SC	8	6	8	29	43	6	12.40	1.78	1.58	24	16	7.1	2.65	-	-	-	-	0.677	-	-	-	-									
	15.00	D	16	10	16	21	37	16.96	-	-	-	-	-	-	-	17.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dirty sands with clays of low plasticity									
	16.50	D	17	12	20	22	42	17.74	-	-	-	-	-	-	-	12.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
	17.00	U	18	-	-	-	-	-	CL	10	2	3	34	44	7	15.10	1.88	1.63	25	17	8	2.65	DST	15.0	25.9	-	0.626	-	-	-	-	Inorganic clays of low plasticity									

APPENDIX "B"

SUMMARY OF TEST RESULTS

Bore No : 08	**Ground Elevation : Same as Road Level**	**Method of drilling :Percussion**	**Depth of Water : Not Encountered**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 02/01/2020**	
Location / Chainage : Pusta Road, Noida	**Casing Lowered : 21.00 m**	**Ending Date : 03/01/2020**	

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 (Correct N)	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 Gs	Type of Test	Cohesion C (kN/m2)	Angle of Friction (Deg)	Consolidation Index	Void Ratio	Preconsolidation 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	U.C.S (Mpa)	Porosity	Hardness	Modulus of Elasticity	Abrasion Loss(%)
																							Description of ROCK									Description of SOIL										
	18.00	D	19	14	22	26	48	18.69	-	-	-	-	-	-	-	16.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-											
	19.50	D	20	12	20	28	48	17.85	SM	7	3	3	52	35	0	18.10	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	-	-										
	20.00	U	21	-	-	-	-	-	-	-	-	-	-	-	-	19.70	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	-	-										
	21.00	D	22	16	18	32	50	17.61	-	-	-	-	-	-	-	18.60	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	-	-										
	22.50	D	23	18	21	32	53	17.62	SM	0	0	0	76	24	0	19.70	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	-	-										
	23.00	D	24	-	-	-	-	-	-	-	-	-	-	-	-	20.10	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	-	-										
	24.00	D	25	20	22	34	56	17.62	-	-	-	-	-	-	-	19.90	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	-	-										
	25.50	D	26	22	26	32	58	17.37	SM	0	0	0	79	21	0	18.50	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	-	-										
	26.00	D	27	-	-	-	-	-	-	-	-	-	-	-	-	19.30	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	-	-										
	27.00	D	28	20	30	33	63	17.81	-	-	-	-	-	-	-	19.90	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	-	-										
	28.50	D	29	23	33	36	69	18.42	SM	0	0	0	77	23	0	18.70	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	-	-										
	29.00	D	30	-	-	-	-	-	-	-	-	-	-	-	-	20.30	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	-	-										
	30.00	D	31	26	38	40	78	19.58	SM	0	0	0	76	24	0	20.30	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	-	-	Silty Sands										

APPENDIX "B"

SUMMARY OF TEST RESULTS

Bore No : 09	**Ground Elevation : Same as Road Level**	**Method of drilling :Percussion**	**Depth of Water : Not Encountered**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 02/01/2020**	
Location / Chainage : Bhoomi Cricket Ground, Noida	**Casing Lowered : 22.00**	**Ending Date : 03/01/2020**	

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 (Correct N)	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 Gs	Type of Test	Cohesion C (kN/m2)	Angle of Friction (Deg)	Consolidation Index	Void Ratio	Preconsolidation 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	U.C.S (Mpa)	Porosity	Hardness	Modulus of Elasticity	Abrasion Loss(%)
																							Description of ROCK									Description of SOIL											
	1.00	D	1	-	-	-	-	-	SM	0	0	0	72	28	0	4.40	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	1.50	D	2	2	2	3	5	7.22	-	-	-	-	-	-	-	5.60	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	2.50	U	3	-	-	-	-	-	ML	0	0	0	47	50	3	15.70	1.78	1.54	Non Plastic			2.65	DST	10.0	25.7	-	0.721	-	-	-	-	Inorganic Silts of low plasticity											
	3.00	D	4	3	3	5	8	9.69	-	-	-	-	-	-	-	22.00	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	4.50	D	5	3	4	7	11	11.83	CL	0	0	0	27	59	14	13.90	-	-	34	18	16	-	-	-	-	-	-	-	18	-	-	Inorganic clays of low plasticity											
	5.00	D	6	-	-	-	-	-	-	-	-	-	-	-	-	25.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	6.00	D	7	4	6	9	15	14.64	-	-	-	-	-	-	-	19.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	7.50	D	8	4	7	11	18	14.81	SP-ML	0	0	0	94	6	0	19.20	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Poorly Graded Sands with inorganic Silts of low plasticity											
	8.00	D	9	-	-	-	-	-	-	-	-	-	-	-	-	21.30	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	9.00	D	10	5	8	11	19	14.17	-	-	-	-	-	-	-	20.20	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	10.50	D	11	6	9	13	22	14.41	SP-ML	0	0	0	94	6	0	19.70	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	11.00	U	12	-	-	-	-	-	CL	0	0	0	22	66	12	19.20	1.95	1.64	30	19	11	2.66	UU	74.0	8.5	-	0.622	-	-	-	-	Inorganic clays of low plasticity											
	12.00	D	13	7	10	13	23	13.91	-	-	-	-	-	-	-	16.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	13.50	D	14	7	11	15	26	14.16	-	-	-	-	-	-	-	14.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	14.00	D	15	-	-	-	-	-	-	-	-	-	-	-	-	20.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	15.00	D	16	9	14	17	31	15.08	CL	0	2	2	18	66	12	17.10	-	-	30	17	13	2.66	-	-	-	-	-	-	-	-	-												
	16.50	D	17	10	15	20	35	15.59	-	-	-	-	-	-	-	18.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	17.00	D	18	-	-	-	-	-	-	-	-	-	-	-	-	18.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Inorganic clays of low plasticity											

APPENDIX "B"

SUMMARY OF TEST RESULTS

Bore No : 09	**Ground Elevation : Same as Road Level**	**Method of drilling :Percussion**	**Depth of Water : Not Encountered**
Diameter of Bore Hole : 150 mm	**Bore Retained using : Casing**	**Starting Date : 02/01/2020**	
Location / Chainage : Bhoomi Cricket Ground, Noida	**Casing Lowered : 22.00**	**Ending Date : 03/01/2020**	

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 (Correct N)	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 Gs	Type of Test	Cohesion C (kN/m2)	Angle of Friction (Deg)	Consolidation Index	Void Ratio	Preconsolidation 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	U.C.S (Mpa)	Porosity	Hardness	Modulus of Elasticity	Abrasion Loss(%)
																							Description of ROCK									Description of SOIL											
	18.00	D	19	12	23	25	48	18.70	-	-	-	-	-	-	-	20.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	19.50	D	20	13	24	27	51	18.76	CL	8	2	1	13	63	13	10.70	-	-	31	19	12	2.67	-	-	-	-	-	-	-	-	-												
	20.00	D	21	-	-	-	-	-	-	-	-	-	-	-	-	20.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-												
	21.00	D	22	13	25	29	54	18.80	SM	0	0	0	86	14	0	11.10	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-	Silty Sands											
	22.50	D	23	14	25	30	55	18.30	-	-	-	-	-	-	-	11.50	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	23.00	D	24	-	-	-	-	-	-	-	-	-	-	-	-	11.30	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	24.00	D	25	15	27	31	58	18.34	SM	0	0	0	84	16	0	10.20	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	25.50	D	26	15	28	32	60	18.12	-	-	-	-	-	-	-	10.10	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	26.00	D	27	-	-	-	-	-	-	-	-	-	-	-	-	9.67	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	27.00	D	28	17	30	34	64	18.36	SM	0	0	0	86	14	0	10.10	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	28.50	D	29	20	32	35	67	18.34	-	-	-	-	-	-	-	11.90	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	29.00	D	30	-	-	-	-	-	-	-	-	-	-	-	-	11.70	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												
	30.00	D	31	24	35	38	73	18.96	SM	0	0	0	82	18	0	9.70	-	-	Non Plastic			-	-	-	-	-	-	-	-	-	-												

APPENDIX-B

TABLE 10: CHEMICAL TEST ON SOIL SAMPLE

Location	BH. No.	Depth(m)	Sulphate content (%)	Chloride content (%)	p^H value
MAKAH DHAAM	BH-1	2.50	0.094	0.022	7.3
ANTHURIUM	BH-2	1.50	0.100	0.021	7.3
BHAGUTE GARDEN	BH-3	2.50	0.103	0.019	7.4
Sever plant, Noida	BH-4	2.50	0.105	0.022	7.3
Noida international school	BH-5	2.50	0.108	0.020	7.3
Parthla khanjarpur, Noida	BH-6	1.50	0.102	0.021	7.4
Parthla chowk, Noida	BH-7	2.50	0.098	0.022	7.2
Pusta road, Noida	BH-8	2.50	0.100	0.020	7.3
Bhoomi cricket ground, Noida	BH-9	2.50	0.103	0.021	7.2

APPENDIX-C
CHART-1: FIELD BORE LOG CHART (BH-01)

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

Doc No:	GT/003
Date of issue:	01.04.2018
Rev. No.:	R01
Rev. Date.:	09.01.2019

Project Name: GT work for Proposed Noida Metro (NMRC) — Project Code: 1772

Coordinate: N: 28.5905530 E: 77.3788840 — Location/ Chainage: MAKAN DHAM

Method of Drilling: Percussion — Drilling Equipment: Power winch

Casing Lowered (M): 20m — Bentonite Used: Not used — Bore Hole No.: 01

Ground Elevation: 20cm above Road — Date: From 20/12/19 to 21/12/19 — Water Table (M): Not found

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
20/12/19	0.00	1.00	1.00	–	SX	Drilling			–	–	–	–	Light Grey	filled up
	1.00	1.50	0.50	–	SX	Drilling		–	–	–	–	–	"	Silty Soil
"	1.50	1.95	0.45	DP	–	2	3	3	6	–	–	–	"	"
"	1.50	2.50	1.00	–	SX	Drilling		–	–	–	–	–	"	"
"	2.50	2.95	0.45	U	–	Received		–	–	–	–	–	"	"
"	2.50	3.00	0.50	–	SX	Drilling		–	–	–	–	–	"	Medium Sand with Silt
"	3.00	3.45	0.45	DP	–	3	6	8	14	–	–	–	"	"
"	3.00	4.50	1.50	–	SX	Drilling		–	–	–	–	–	"	"
"	4.50	4.95	0.45	DP	–	3	6	7	13	–	–	–	"	"
"	4.50	5.00	0.50	–	SX	Drilling		–	–	–	–	–	"	"
"	5.00	5.45	0.45	U	–	Received		–	–	–	–	–	"	"
"	5.00	6.00	1.00	–	SX	Drilling		–	–	–	–	–	"	"
"	6.00	6.45	0.45	DP	–	3	6	8	14	–	–	–	"	Fine Sand
"	6.00	7.50	1.50	–	SX	Drilling		–	–	–	–	–	"	"
"	7.50	7.95	0.45	DP	–	3	8	8	16	–	–	–	"	"
"	7.50	8.00	0.50	–	SX	Drilling		–	–	–	–	–	"	"
"	8.00	8.45	0.45	U	–	Not Received			–	–	–	–	"	"
"	8.00	9.00	1.00	–	SX	Drilling		–	–	–	–	–	"	"
"	9.00	9.45	0.45	DP	–	4	8	11	19	–	–	–	"	"
"	9.00	10.50	1.50	–	SX	Drilling		–	–	–	–	–	"	"
"	10.50	10.95	0.45	DP	–	6	9	12	21	–	–	–	"	"
"	10.50	11.00	0.50	–	SX	Drilling		–	–	–	–	–	"	"
"	11.00	11.45	0.45	U	–	Not Received			–	–	–	–	"	"
"	11.00	12.00	1.00	–	SX	Drilling		–	–	–	–	–	"	Coarse Sand with gravel
"	12.00	12.45	0.45	DP	–	7	10	10	20	–	–	–	"	"
"	12.00	13.50	1.50	–	SX	Drilling		–	–	–	–	–	"	"

Supervisor — Rahul Deshwal — Pradeep Gupta 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)

APPENDIX-C
CHART-2: FIELD BORE LOG CHART (BH-01)

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

Doc No:	GT/003
Date of Issue:	01.04.2018
Rev. No.:	R01
Rev. Date.:	09.01.2019
Project Code:	1772

Project Name: GIT work for Proposed Noida Metro (NMRC)
Coordinate: N: 28.590553° E: 77.378840° Location/ Chainage: MOLARBAND DHAAM
Method of Drilling: Percussion Drilling Equipment: Powerwinch
Casing Lowered (M): 20 m Bentonite Used: Not used Bore Hole No.: 01
Ground Elevation: 206.m above Road Date: From 20/12/19 to 21/12/19 Water Table (M): Not found

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
20/12/19	13.50	13.95	0.45	DP	-	8	10	19	35	-	-	-	light grey	gravel with Sand
"	13.50	14.00	0.50	-	SX	Drilling	-	-	-	-	-	-	"	"
"	14.00	14.45	0.45	U	-	Not	Received	-	-	-	-	-	"	"
"	14.00	15.00	1.00	-	SX	Drilling	-	-	-	-	-	-	"	"
"	15.00	15.45	0.45	DP	-	10	19	28	47	-	-	-	"	"
"	15.00	16.50	1.50	-	SX	Drilling	-	-	-	-	-	-	"	"
"	16.50	16.95	0.45	DP	-	11	23	30	53	-	-	-	"	"
"	16.50	17.00	0.50	-	SX	Drilling	-	-	-	-	-	-	"	"
21/12/19	17.00	17.45	0.45	U	-	Not	Received	-	-	-	-	-	"	"
"	17.00	18.00	1.00	-	SX	Drilling	-	-	-	-	-	-	"	"
"	18.00	18.45	0.45	DP	-	11	24	28	52	-	-	-	"	"
"	18.00	19.50	1.50	-	SX	Drilling	-	-	-	-	-	-	"	"
"	19.50	19.95	0.45	DP	-	12	28	30	58	-	-	-	"	"
"	19.50	20.00	0.50	-	SX	Drilling	-	-	-	-	-	-	light yellow	"
"	20.00	20.45	0.45	U	-	Received	-	-	-	-	-	-	"	clayey soil
"	20.00	21.00	1.00	-	SX	Drilling	-	-	-	-	-	-	"	"
"	21.00	21.45	0.45	DP	-	13	26	34	61	-	-	-	"	"
"	21.00	22.50	1.50	-	SX	Drilling	-	-	-	-	-	-	"	"
"	22.50	22.95	0.45	DP	-	13	26	37	63	-	-	-	"	"
"	22.50	23.00	0.50	-	SX	Drilling	-	-	-	-	-	-	"	"
"	23.00	23.45	0.45	U	-	Received	-	-	-	-	-	-	"	"
"	23.00	24.00	1.00	-	SX	Drilling	-	-	-	-	-	-	"	"
"	24.00	24.45	0.45	DP	-	15	30	36	66	-	-	-	"	"
"	24.00	25.50	1.50	-	SX	Drilling	-	-	-	-	-	-	"	"
"	25.50	25.95	0.45	DP	-	18	28	39	67	-	-	-	"	"
"	25.50	26.00	0.50	-	SX	Drilling	-	-	-	-	-	-	"	"

Supervisor — Rahul Deshwal JE (Civil) — Pradeep Gupta 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)

APPENDIX-C
CHART-3: FIELD BORE LOG CHART (BH-01)

TECHPRO ENGINEERS PVT. LTD.

BORE/ DRILL LOG

Doc No: GT/ 003
Date of Issue: 01.04.2018
Rev. No.: R01
Rev. Date.: 09.01.2019

Project Name: GT work for Proposed Nioda metro (NMRC)
Project Code: 1772
Coordinate: N: 28.5905530 E: 77.3788840
Location/ Chainage: Mokah dhaam
Method of Drilling: Percussion
Drilling Equipment: Powerwinch
Casing Lowered (M): 20m
Bentonite Used: Not used
Bore Hole No.: 01
Ground Elevation: 20cm above Road
Date: From 20/12/19 to 21/12/19
Water Table (M): Not found

Date (dd/mm/yy)	Depth/RUN (m) From	Depth/RUN (m) To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
21/12/19	26.00	26.45	0.45	U	–	Received		–	–	–	–	–	Light yellow	Clayey Soil
"	26.00	27.00	1.00	–	Sx	Drilling		–	–	–	–	–	"	"
"	27.00	27.45	0.45	DP	–	25	40	48	88	–	–	–	"	"
"	27.00	28.50	1.50	.	Sx	Drilling			–	–	–	–	"	"
"	28.50	28.95	0.45	DP	-	34	57		R	–	–	-	"	"
"	28.50	29.00	0.50	–	Sx	Drilling		–	–	–	–	–	"	"
"	29.00	29.45	0.45	U	-	Not Received			–	–	–	-	"	"
"	29.00	30.00	1.00	–	Sx	Drilling		–	–	–	–	.	"	"
"	30.00	30.45	0.45	DP	–	30	80		R	–	–	–	"	"

Pankaj
Supervisor

Rahul dhaliwal
JE/Client

Pradeep Gupta
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)

APPENDIXC
CHART-4: FIELD BORE LOG CHART (BH-02)

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

Doc No: GT/003
Date of Issue: 01.04.2018
Rev. No.: R01
Rev. Date.: 09.01.2019

Project Name: GIT work for Proposed Nioda Metro (NMRC) — Project Code: 1772
Coordinate: N: 28.5928880 E: 77.3834400 — Location/ Chainage: ANTHURIUM
Method of Drilling: Percussin — Drilling Equipment: Power winch M/C
Casing Lowered (M): 30.0 m — Bentonite Used: Yes — Bore Hole No.: 02
Ground Elevation: Same Road Level — Date: From 23/12/19 to 24/12/19 — Water Table (M): Not found

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
23/12/19	0.0	1.00	1.00	—	SX	—	Drilling		—	—	—	—	—	Silty Sand Soil
"	1.00	1.50	0.50	—	SX	—	Drilling		—	—	—	—	—	"
"	1.50	1.95	0.45	DIP	—	2	3	5	8	—	—	—	—	"
"	1.50	2.50	1.00	—	SX	—	Drilling		—	—	—	—	—	"
"	2.50	2.95	0.45	UDS	—	Retrived		—		—	—	—	—	"
"	2.50	3.00	0.50	—	SX	—	Drilling		—	—	—	—	—	"
"	3.00	3.45	0.45	DIP	—	3	4	5	9	—	—	—	—	Sand Silty Soil
"	3.00	4.50	1.50	—	SX	—	Drilling		—	—	—	—	—	"
"	4.50	4.95	0.45	DIP	—	6	8	10	18	—	—	—	—	"
"	4.50	5.00	0.50	—	SX	—	Drilling		—	—	—	—	—	"
"	5.00	5.45	0.45	UDS	—	Retrived		—	—	—	—	—	—	"
"	5.00	6.00	1.00	—	SX	—	Drilling		—	—	—	—	—	"
"	6.00	6.45	0.45	DIP	—	12	14	26	40	—	—	—	—	"
"	6.00	7.50	1.50	—	SX	—	Drilling		—	—	—	—	—	"
"	7.50	7.95	0.45	DIP	—	16	20	28	48	—	—	—	—	Silty Clay Soil
"	7.50	8.00	0.50	—	SX	—	Drilling		—	—	—	—	—	"
"	8.00	8.45	0.45	UDS	—	Retrived		—	—	—	—	—	—	"
"	8.00	9.00	1.00	—	SX	—	Drilling		—	—	—	—	—	"
"	9.00	9.45	0.45	DIP	—	14	18	22	40	—	—	—	—	Clay Silty Gravel
"	9.00	10.50	1.50	—	SX	—	Drilling		—	—	—	—	—	"
"	10.50	10.95	0.45	DIP	—	12	16	20	36	—	—	—	—	"
"	10.50	11.00	0.50	—	SX	—	Drilling		—	—	—	—	—	"
"	11.00	11.45	0.45	UDS	—	Slipped			—	—	—	—	—	Sand Soil
"	11.00	12.00	1.00	—	SX	—	Drilling		—	—	—	—	—	"
"	12.00	12.45	0.45	DIP	—	16	20	28	48	—	—	—	—	"
"	12.00	13.50	1.50	—	SX	—	Drilling		—	—	—	—	—	"

Supervisor

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

E - in - C

APPENDIX C
CHART-5: FIELD BORE LOG CHART (BH-02)

TECHPRO ENGINEERS PVT. LTD. — BORE/ DRILL LOG

Doc No:	GT/ 003		
Date of Issue:	01.04.2018		
Rev. No.:	R01		
Rev. Date.:	09.01.2019		
Project Code:	1772		

Project Name: GIT work for Proposed Hindon metro (HMRC)
Coordinate: N: 28.59328880 E: 77.38.31400 Location/ Chainage: ANTHURIUM
Method of Drilling: Percussion Drilling Equipment: Power winch m/c
Casing Lowered (M): 30 m Bentonite Used: Yes Bore Hole No.: 02
Ground Elevation: Same Road Level Date: From 23/12/19 to 24/12/19 Water Table (M): Not found

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
23/12/19	13.00	13.45	0.45	DIP	–	17	24	28	52	–	–	–	–	Sand/ Silty Soil
〃	13.50	14.00	0.50	–	SX	–	Drilling		–	–	–	–	–	〃
〃	14.00	14.45	0.45	UDS	–	Slipped			–	–	–	–	–	〃
〃	14.00	15.00	1.00	–	SX	–	Drilling		–	–	–	–	–	〃
24/12/19	15.00	15.45	0.45	DIP	–	18	28	33	61	–	–	–	–	〃
〃	15.00	16.50	1.50	–	SX	–	Drilling		–	–	–	–	–	〃
〃	16.50	16.95	0.45	DIP	–	20	26	35	61	–	–	–	–	〃
〃	16.50	17.00	0.50	–	SX	–	Drilling		–	–	–	–	–	〃
〃	17.00	17.45	0.45	UDS	–	Slipped			–	–	–	–	–	〃
〃	17.00	18.00	1.00	–	SX	–	Drilling		–	–	–	–	–	〃
〃	18.00	18.45	0.45	DIP	–	17	28	32	60	–	–	–	–	〃
〃	18.00	19.50	1.50	–	SX	–	Drilling		–	–	–	–	–	〃
〃	19.50	19.95	0.45	DIP	–	15	25	30	55	–	–	–	–	〃
〃	19.50	20.00	0.50	–	SX	–	Drilling		–	–	–	–	–	〃
〃	20.00	20.45	0.45	UDS	–	Slipped			–	–	–	–	–	Silty Clay Gravel
〃	20.00	21.00	1.00	–	SX	–	Drilling		–	–	–	–	–	〃
〃	21.00	21.45	0.45	DIP	–	17	30	34	64	–	–	–	–	〃
〃	21.00	22.50	1.50	–	SX	–	Drilling		–	–	–	–	–	〃
〃	22.50	22.95	0.45	DIP	–	14	22	30	52	–	–	–	–	〃
〃	22.50	23.00	0.50	–	SX	–	Drilling		–	–	–	–	–	〃
〃	23.00	23.45	0.45	UDS	–	Recived			–	–	–	–	–	〃
〃	23.00	24.00	1.00	–	SX	–	Drilling		–	–	–	–	–	〃
〃	24.00	24.45	0.45	DIP	–	12	26	30	56	–	–	–	–	〃
〃	24.00	25.50	1.50	–	SX	–	Drilling		–	–	–	–	–	〃
〃	25.50	25.95	0.45	DIP	–	17	24	29	53	–	–	–	–	〃
〃	25.50	26.00	0.50	–	SX	–	Drilling		–	–	–	–	–	〃

Supervisor

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

E - in - C

APPENDIX C
CHART-6: FIELD BORE LOG CHART (BH-02)

TECHPRO ENGINEERS PVT. LTD. — BORE/ DRILL LOG

Doc No:	GT/ 003		
Date of Issue:	01.04.2018		
Rev. No.:	R01		
Rev. Date.:	09.01.2019		
Project Name:	G.T. Work for Proposed Noida metro(NMRC)	Project Code:	1772
Coordinate:	N: 28.5928880 E: 77.3834400	Location/ Chainage:	ANTHURIUM
Method of Drilling:	Percossion	Drilling Equipment:	Power winch m/c
Casing Lowered (M):	30.0 m	Bentonite Used:	Yes
Bore Hole No.:	02		
Ground Elevation:	Same Road Level	Date: From 23/12/19 to 24/12/19	Water Table (M): Not found

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
24/12/19	26.00	26.45	0.45	UDS	–	Recived	—	–	–	–	–	–	–	Clay Silty/Gravel
"	26.00	27.00	1.00	—	SX	–	Drilling	—	–	—	—	—	–	"
"	27.00	27.45	0.45	DIP	–	20	28	32	60	–	–	–	–	"
"	27.00	28.50	1.50	—	SX	–	Drilling	—	–	–	–	–	–	"
"	28.50	28.95	0.45	DIP	–	26	31	34	65	–	–	–	–	"
"	28.50	29.00	0.50	—	SX	–	Drilling	—	–	–	–	–	–	"
"	29.00	29.45	0.45	UDS	–	–	Recived	—	–	–	–	–	–	"
"	29.00	30.00	1.00	—	SX	–	Drilling	—	–	–	–	–	–	"
"	30.00	30.45	0.45	DIP	–	26	28	38	66	–	–	–	–	"

Supervisor

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

E - in - C

APPENDIX C
CHART-7: FIELD BORE LOG CHART (BH-03)

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

Doc No:	GT/003		
Date of Issue:	01.04.2018		
Rev. No.:	R01		
Rev. Date.:	09.01.2019		
Project Name:	GRT: work for Proposed Noida Metro (NMRC)	Project Code:	1772
Coordinate:	N: 28-594437 E: 77-388620	Location/ Chainage:	Bhagwati Garden
Method of Drilling:	Percussin	Drilling Equipment:	Power winch MIC
Casing Lowered (M):	22-0 m	Bentonite Used:	Yes
Ground Elevation:	Same as road level	Date: From 25/12/19 to 27/12/19	Bore Hole No.: 03
			Water Table (M): Not found

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
25/12/19	0.0	1.00	1.00	DS	SX	–	Drilling		–	–	–	–	–	Silty clay
"	1.00	1.50	0.50	–	SX		Drilling		–	–	–	–	–	"
"	1.50	1.95	0.45	DIP	–	3	3	4	7	–	–	–	–	"
"	1.50	2.50	1.00	–	SX	–	Drilling		–	–	–	–	–	"
"	2.50	2.95	0.45	UDS	–	–	Recived		–	–	–	–	–	"
"	2.50	3.00	0.50	–	SX		Drilling		–	–	–	–	–	Sand silty soil
26/12/19	3.00	3.45	0.45	DIP	–	3	4	4	8	–	–	–	–	"
"	3.00	4.50	1.50	–	SX	–	Drilling		–	–	–	–	–	"
"	4.50	4.95	0.45	DIP	–	5	7	8	15	–	–	–	–	"
"	4.50	5.00	0.50	–	SX	–	Drilling		–	–	–	–	–	"
"	5.00	5.45	0.45	UDS	–	–	Slipped		–	–	–	–	–	"
"	5.00	6.00	1.00	–	SX	–	Drilling		–	–	–	–	–	"
"	6.00	6.45	0.45	DIP	–	5	6	8	14	–	–	–	–	"
"	6.00	7.50	1.50	–	SX	–	Drilling		–	–	–	–	–	"
"	7.50	7.95	0.45	DIP	–	6	8	10	18	–	–	–	–	"
"	7.50	8.00	0.50	–	SX	–	Drilling		–	–	–	–	–	"
"	8.00	8.45	0.45	UDS	–	–	Received		–	–	–	–	–	Clay with gravels
"	8.00	9.00	1.00	–	SX	–	Drilling		–	–	–	–	–	"
"	9.00	9.45	0.45	DIP	–	6	10	10	20	–	–	–	–	"
"	9.00	10.50	1.50	–	SX	–	Drilling		–	–	–	–	–	"
"	10.50	10.95	0.45	DIP	–	7	12	12	24	–	–	–	–	"
"	10.50	11.00	0.50	–	SX	–	Drilling		–	–	–	–	–	"
"	11.00	11.45	0.45	UDS	–	–	Received		–	–	–	–	–	Sand silt soil
"	11.00	12.00	1.00	–	SX	–	Drilling		–	–	–	–	–	"
"	12.00	12.45	0.45	DIP	–	12	19	24	43	–	–	–	–	"
"	12.00	13.50	1.50	–	SX	–	Drilling		–	–	–	–	–	"

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)

APPENDIX C
CHART-8: FIELD BORE LOG CHART (BH-03)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R01
		Rev. Date.:	09.01.2019

Project Name: GT work for proposed Noida metro (NMRC) — Project Code: 1772

Coordinate: N: 28.594437 E: 77.388620 — Location/ Chainage: Bhagwtegin Redio

Method of Drilling: Percussin — Drilling Equipment: Power winch m/c

Casing Lowered (M): 22.0m — Bentonite Used: Yes — Bore Hole No.: 03

Ground Elevation: Same as road — Date: From 25/12/19 to 27/12/19 — Water Table (M): Not found

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
26/12/19	13.50	13.95	0.45	DIP	-	14	22	28	50	-	-	-	-	"
"	13.50	14.00	0.50	-	SX	-	Drilling		-	-	-	-	-	"
"	14.00	14.45	0.45	UDS	-	-	Slipped		-	-	-	-	-	"
"	14.00	15.00	1.00	-	SX	-	Drilling		-	-	-	-	-	"
"	15.00	15.45	0.45	DIP	-	17	25	31	56	-	-	-	-	fine sand
"	15.00	16.50	1.50	-	SX	-	Drilling		-	-	-	-	-	"
"	16.50	16.95	0.45	DIP	-	20	22	36	58	-	-	-	-	"
"	16.50	17.00	0.50	-	SX	-	Drilling		-	-	-	-	-	"
"	17.00	17.45	0.45	UDS	-	-	Slipped		-	-	-	-	-	"
"	17.00	18.00	1.00	-	SX	-	Drilling		-	-	-	-	-	"
"	18.00	18.45	0.45	DIP	-	22	24	36	60	-	-	-	-	"
27/12	18.00	19.50	1.50	-	SX	-	Drilling		-	-	-	-	-	"
"	19.50	19.95	0.45	DIP	-	23	24	37	61	-	-	-	-	"
"	19.50	20.00	0.50	-	SX	-	Drilling		-	-	-	-	-	"
"	20.00	20.45	0.45	UDS	-	-	Slipped		-	-	-	-	-	"
"	20.00	21.00	1.00	-	SX	-	Drilling		-	-	-	-	-	"
"	21.00	21.45	0.45	DIP	-	21	26	39	65	-	-	-	-	"
"	21.00	22.50	1.50	-	SX	-	Drilling		-	-	-	-	-	"
"	22.50	22.95	0.45	DIP	-	23	28	41	69	-	-	-	-	Silty clay
"	22.50	23.00	0.50	-	SX	-	Drilling		-	-	-	-	-	"
"	23.00	23.45	0.45	UDS	-	-	Slipped		-	-	-	-	-	"
"	23.00	24.00	1.00	-	SX	-	Drilling		-	-	-	-	-	"
"	24.00	24.45	0.45	DIP	-	20	30	40		-	-	-	-	"
"	24.00	25.50	1.50	-	SX	-	Drilling		-	-	-	-	-	"
"	25.50	25.95	0.45	DIP	-	21	29	42	71	-	-	-	-	"
"	25.50	26.00	0.50	-	SX		-	Drilling	-	-	-	-	-	"

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)

APPENDIX C
CHART-9: FIELD BORE LOG CHART (BH-03)

TECHPRO ENGINEERS PVT. LTD. — BORE/ DRILL LOG

Doc No:	GT/003		
Date of Issue:	01.04.2018		
Rev. No.:	R01		
Rev. Date.:	09.01.2019		
Project Name:	GT- Work for Proposed Noida Metro (NMRC)	Project Code:	1772
Coordinate:	N: 28.594437 E: 77.388620	Location/ Chainage:	Bhagutegharden
Method of Drilling:	Percussin	Drilling Equipment:	Power winch m/c
Casing Lowered (M):	22.0 m	Bentonite Used:	Yes
Bore Hole No.:	03		
Ground Elevation:	Same as road level	Date: From 25/12/19 to 27/12/19	Water Table (M): Not found

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
〃	26.00	26.45	0.45	UDS	—	Slipped			—	—	—	-	-	Silty clay
〃	26.00	27.00	1.00	~~---~~	SX	Drilling			—	—	—	—	-	〃
〃	27.00	27.45	0.45	DIP	—	22	31	43	74	-	—	—	-	〃
〃	27.00	28.50	1.50	—	SX	Drilling			—	—	—	—	-	〃
〃	28.50	28.95	0.45	DIP	—	22	33	45	78	—	—	—		〃
〃	28.50	29.00	0.50	—	SX	Drilling			—	-	—	—	-	〃
〃	29.00	29.45	0.45	UDS	—	Slipped			—	—	—	-	-	〃
〃	29.00	30.00	1.00	—	SX	Drilling			—	-	—	—	-	〃
〃	30.00	30.45	0.45	DIP	—	23	35	47	82	-	—	—	-	〃

Techpro Engineers Pvt. Ltd.

Supervisor

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

E in - C

APPENDIX C
CHART-10: FIELD BORE LOG CHART (BH-04)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No:	GT/ 003
		Date of Issue:	01.04.2018
		Rev. No.:	R01
		Rev. Date.:	09.01.2019

Project Name:	G.I.T. work for Pro Posed Noida metro (NMRC)			Project Code:	1772
Coordinate:	N: 28.596191	E: 77.392964		Location/ Chainage:	Sever Plant
Method of Drilling:	Percuissin		Drilling Equipment:		Powerwinch M/C.
Casing Lowered (M):	20.00 m	Bentonite Used:	Yes	Bore Hole No.:	04
Ground Elevation:	Same Road level	Date: From 26/12/19 to 28/12/19		Water Table (M):	Not found

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
26/12/19	0.0	1.00	1.00	DS	—	—	Drilling		—	-	—	—	—	Silty clay Soil
"	1.00	1.50	0.50	—	SX	—	Drilling		—	—	—	—	—	"
"	1.50	1.95	0.45	DIP	—	3	3	3	6	—	—	—	—	Silty Sand
"	1.50	2.50	1.00	—	SX	—	Drilling		—	—	—	—	—	"
"	2.50	2.95	0.45	UDS	—	—	Recived		—	—	—	—	—	Sand Soil
"	2.50	3.00	0.50	—	SX	—	Drilling		—	—	—	—	—	"
"	3.00	3.45	0.45	DIP	—	3	5	6	11	—	—	—	—	Sand Silty
27/12/19	3.00	4.50	1.50	—	SX	—	Drilling		—	—	—	—	—	"
"	4.50	4.95	0.45	DIP	—	4	8	10	18	—	—	—	-	Silty clay with
"	4.50	5.00	0.50	—	SX	—	Drilling		—	—	—	—	—	Gravel
"	5.00	5.45	0.45	UDS	—	—	Recived		—	—	—	—	-	"
"	5.00	6.00	1.00	—	SX	—	Drilling		—	—	—	—	—	"
"	6.00	6.45	0.45	DIP	—	6	8	12	20	—	—	—	—	"
"	6.00	7.50	1.50	—	SX	—	Drilling		—	—	—	—	—	"
"	7.50	7.95	0.45	DIP	—	5	8	10	18	—	—	—	—	"
"	7.50	8.00	0.50	—	SX	—	Drilling		—	—	—	—	—	"
"	8.00	8.45	0.45	UDS	—	—	Recived		—	—	—	—	—	"
"	8.00	9.00	1.00	—	SX	—	Drilling		—	—	—	—	—	"
"	9.00	9.45	0.45	DIP	—	8	12	14	26	—	—	—	—	"
"	9.00	10.50	1.50	—	SX	—	Drilling		—	—	—	—	—	"
"	10.50	10.95	0.45	DIP	—	10	14	16	30	—	—	—	—	"
"	10.50	11.00	0.50	—	SX	—	Drilling		—	—	—	—	—	"
"	11.00	11.45	0.45	UDS	—	Recived			—	—	—	—	—	Clay Silty Soil
"	11.00	12.00	1.00	—	SX	—	Drilling		—	—	—	—	—	"
"	12.00	12.45	0.45	DIP	—	12	16	18	34	—	—	—	—	"
"	12.00	13.50	1.50	—	SX	—	Drilling		—	—	—	—	—	"

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)

APPENDIX C
CHART-11: FIELD BORE LOG CHART (BH-04)

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

Doc No:	GT/003
Date of Issue:	01.04.2018
Rev. No.:	R01
Rev. Date.:	09.01.2019

Project Name: G/T. work for Proposed Noida metro (NMRC) — Project Code: 1772

Coordinate: N: 28.596791 — E: 77.392964 — Location/ Chainage: Sever Plant

Method of Drilling: Percussih — Drilling Equipment: Power winch M/C

Casing Lowered (M): 20.000 m — Bentonite Used: Yes — Bore Hole No.: 04

Ground Elevation: Same Roadlevel — Date: From 26/12/19 to 28/12/19 — Water Table (M): Not found

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
27/12/19	13.00	13.45	0.45	DIP	—	14	16	20	36	—	—	—	—	clay silty soil
"	13.50	14.00	0.50	—	SX	—	Drilling		—	—	—	—	—	"
"	14.00	14.45	0.45	UDS	—	—	Slipped		—	—	—	—	—	"
"	14.00	15.00	1.00	—	SX	—	Drilling		—	—	—	—	—	"
"	15.00	15.45	0.45	DIP	—	18	38	42	80	—	—	—	—	"
"	15.00	15.50	1.50	—	SX	—	Drilling		—	—	—	—	—	"
"	16.50	16.95	0.45	DIP	—	22	39	46	85	—	—	—	—	"
"	16.50	17.00	0.50	—	SX	—	Drilling		—	—	—	—	—	"
"	17.00	17.45	0.45	UDS	—	—	Slipped		—	—	—	—	—	Fine Sand
"	17.00	18.00	1.00	—	SX	—	Drilling		—	—	—	—	—	"
"	18.00	18.45	0.45	DIP	—	22	40	47	87	—	—	—	—	"
"	18.00	18.50	1.50	—	SX	—	Drilling		—	—	—	—	—	"
27/12/19	19.50	19.95	0.45	DIP	—	23	41	47	88	—	—	—	—	"
"	19.50	20.00	0.50	—	SX	—	Drilling		—	—	—	—	—	"
"	20.00	20.45	0.45	UDS	—	—	Slipped		—	—	—	—	—	"
"	20.00	21.00	1.00	—	SX	—	Drilling		—	—	—	—	—	"
"	21.00	21.45	0.45	DIP	—	24	42	48	90	—	—	—	—	"
"	21.00	22.50	1.50	—	SX	—	Drilling		—	—	—	—	—	"
"	22.50	22.95	0.45	DIP	—	24	42	47	89	—	—	—	—	"
28/12/19	22.50	23.00	0.50	—	SX	—	Drilling		—	—	—	—	—	"
"	23.00	23.45	0.45	UDS	—	—	Slipped		—	—	—	—	—	clay silty soil
"	23.00	24.00	1.00	—	SX	—	Drilling		—	—	—	—	—	"
"	24.00	24.45	0.45	DIP	—	26	43	48	91	—	—	—	—	"
"	24.00	25.50	1.50	—	SX	—	Drilling		—	—	—	—	—	"
"	25.50	25.95	0.45	DIP	—	25	44	49	93	—	—	—	—	"
"	25.50	26.00	0.50	—	SX	—	Drilling		—	—	—	—	—	"

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)

APPENDIX C
CHART-12: FIELD BORE LOG CHART (BH-04)

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

Doc No:	GT/003
Date of Issue:	01.04.2018
Rev. No.:	R01
Rev. Date.:	09.01.2019
Project Code:	1772

Project Name: G.T. work for Proposed Noida metro (NMRC)
Coordinate: N: 28.596191 E: 77.392964 Location/ Chainage: Sever Plant
Method of Drilling: Percussin Drilling Equipment: Power winch m/c
Casing Lowered (M): 20.00m Bentonite Used: Yes Bore Hole No.: 04
Ground Elevation: Same Road Level Date: From 26/12/19 to 28/12/19 Water Table (M): Not found

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
28/12/19	26.00	26.45	0.45	—	—	Slipped	—		—	—	—	—	—	clay silt soil
"	26.00	27.00	1.00	—	SX	—	Drilling	—	—	—	—	—	—	"
"	27.00	27.45	0.45	DIP	—	26	39	42	81	—	—	—	—	"
"	27.00	28.50	1.50	—	SX	—	Drilling	—	—	—	—	—	—	"
"	28.50	28.95	0.45	DIP	—	28	42	46	88	—	—	—	—	"
"	28.50	29.00	0.50	—	SX	—	Drilling	—	—	—	—	—	—	"
"	29.00	29.45	0.45	UDS	—	—	Slipped	—	—	—	—	—	—	Sand soil
"	29.00	30.00	1.00	—	SX	—	Drilling	—	—	—	—	—	—	"
"	30.00	30.45	0.45	DIP	—	30	46	48	94	—	—	—	—	"

Supervisor

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

E - in - C

APPENDIX C
CHART-13: FIELD BORE LOG CHART (BH-05)

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

Doc No:	GT/003
Date of Issue:	01.04.2018
Rev. No.:	R01
Rev. Date.:	09.01.2019

Project Name: GT work for proposed Noida Metro (NMRC) — Project Code: 1772

Coordinate: N: 28.596650 E: 77.397865 — Location/ Chainage: Noida international C

Method of Drilling: Percussion — Drilling Equipment: Power winch

Casing Lowered (M): 23.0 m — Bentonite Used: Yes — Bore Hole No.: 05

Ground Elevation: Same as Road level — Date: From 28/12/19 to 29/12/19 — Water Table (M): Not meet

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
28/12	0.00	1.00	1.0	DS	SX	-Drilling-			-	-	-	-	-	Silty sand
"	1.00	1.50	0.50	—	SX	-Drilling-			-	-	-	-	-	"
"	1.50	1.95	0.45	D/P	-	2	3	3	6	-	-	-	-	"
"	1.50	2.50	1.00	—	SX	-Drilling-			-	-	-	-	-	"
"	2.50	2.95	0.45	UDS	—	Recived			-	-	-	-	-	fmi sand
"	2.50	3.00	0.50	—	SX	-Drilling-			-	-	-	-	-	"
"	3.00	3.45	0.45	D/P	-	4	6	6	12	-	-	-	-	"
"	3.00	4.50	1.50	—	SX	-Drilling-			-	-	-	-	-	"
"	4.50	4.95	0.45	D/P	-	4	5	6	11	-	-	-	-	"
"	4.50	5.00	0.50	—	SX	-Drilling-			-	-	-	-	-	"
"	5.00	5.45	0.45	UDS	-	Slipped			-	-	-	-	-	"
"	5.00	6.00	1.00	-	SX	-Drilling-			-	-	-	-	-	"
"	6.00	6.45	0.45	D/P	-	4	6	9	15	-	-	-	-	"
"	6.00	7.50	1.50	—	SX	-Drilling-			-	-	-	-	-	"
"	7.50	7.95	0.45	D/P	-	5	7	9	16	-	-	-	-	"
"	7.50	8.00	0.50	-	SX	-Drilling-			-	-	-	-	-	"
"	8.00	8.45	0.45	UDS	-	Slipped			-	-	-	-	-	Sand with gravels
"	8.00	9.00	1.00	-	SX	-Drilling-			-	-	-	-	-	"
"	9.00	9.45	0.45	D/P	-	6	9	11	20	-	-	-	-	"
"	9.00	10.50	1.50	-	SX	-Drilling-			-	-	-	-	-	"
"	10.50	10.95	0.45	D/P	-	7	13	15	28	-	-	-	-	"
"	10.50	11.00	0.50	—	SX	-Drilling-			-	-	-	-	-	"
"	11.00	11.45	0.45	UDS	—	Recived			-	-	-	-	-	"
"	11.00	12.00	1.00	—	SX	-Drilling-			-	-	-	-	-	"
"	12.00	12.45	0.45	D/P	-	6	15	18	33	-	-	-	-	fmi sand
"	12.00	13.50	1.50	—	SX	-Drilling-			-	-	-	-	-	"

Supervisor — C - in - C

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

APPENDIX C
CHART-14: FIELD BORE LOG CHART (BH-05)

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

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R01
Rev. Date.:	09.01.2019

Project Name: GT work proposed for Noida metro (NMRC) — Project Code: 1772

Coordinate: N: 28.596650 — E: 77.397865 — Location/ Chainage: Noida international sch

Method of Drilling: Percussion — Drilling Equipment: Power winch

Casing Lowered (M): 23.0m — Bentonite Used: Yes — Bore Hole No.: 05

Ground Elevation: Same as road level — Date: From 28/12/19 to — Water Table (M): Not meet

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
〃	13.50	13.95	0.45	D/P	–	6	16	19	35	–	–	–	–	〃
〃	13.50	14.00	0.50	–	SX	– Drilling			–	–	–	–	–	〃
〃	14.00	14.45	0.45	UDS	–	Slipped			–	–	–	–	–	〃
〃	14.00	15.00	1.00	–	SX	– Drilling			–	–	–	–	–	〃
29/12	15.00	15.45	0.45	D/P	–	8	18	19	37	–	–	–	–	〃
〃	15.00	16.50	1.50	–	SX	– Drilling			–	–	–	–	–	〃
〃	16.50	16.95	0.45	D/P	–	8	19	21	40	–	–	–	–	〃
〃	16.50	17.00	0.50	–	SX	– Drilling			–	–	–	–	–	〃
〃	17.00	17.45	0.45	UDS	–	Slipped			–	–	–	–	–	〃
〃	17.00	18.00	1.00	–	SX	– Drilling			–	–	–	–	–	〃
〃	18.00	18.45	0.45	D/P	–	10	20	22	42	–	–	–	–	〃
〃	18.00	19.50	1.50	–	SX	– Drilling			–	–	–	–	–	〃
〃	19.50	19.95	0.45	D/P	–	10	22	23	45	–	–	–	–	〃
〃	19.50	20.00	0.50	–	SX	– Drilling			–	–	–	–	–	〃
〃	20.00	20.45	0.45	UDS	–	Slipped			–	–	–	–	–	〃
〃	20.00	21.00	1.00	–	SX	– Drilling			–	–	–	–	–	〃
〃	21.00	21.45	0.45	D/P	–	11	23	23	46	–	–	–	–	〃
〃	21.00	22.50	1.50	–	SX	– Drilling			–	–	–	–	–	〃
〃	22.50	22.95	0.45	D/P	–	13	23	25	48	–	–	–	–	〃
〃	22.50	23.00	0.50	–	SX	– Drilling			–	–	–	–	–	〃
〃	23.00	23.45	0.45	UDS	–	Slipped			–	–	–	–	–	Silty clay
〃	23.00	24.00	1.00	–	SX	– Drilling			–	–	–	–	–	〃
〃	24.00	24.45	0.45	D/P	–	13	25	27	52	–	–	–	–	〃
〃	24.00	25.50	1.50	–	SX	– Drilling			–	–	–	–	–	〃
〃	25.50	25.95	0.45	D/P	–	14	27	29	56	–	–	–	–	〃
〃	25.50	26.00	0.50	–	SX	– Drilling			–	–	–	–	–	〃

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)

APPENDIX C
CHART-15: FIELD BORE LOG CHART (BH-05)

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

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R01
Rev. Date.:	09.01.2019
Project Code:	1772

Project Name: GoTwork proposed for Noida Metro (NMRC)

Coordinate: N: 28.596650 E: 77.397865 Location/ Chainage: Noida international scho

Method of Drilling: Percussion Drilling Equipment: Power winch

Casing Lowered (M): 28.0 m Bentonite Used: Yes Bore Hole No.: 05

Ground Elevation: Same as road level Date: From 28/12/19 to Water Table (M): Not meet

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
11	26.00	26.45	0.45	UDS	–	Slipped			–	–	–	–	–	11
11	26.00	27.00	1.00	–	SX	– Drilling			–	–	–	–	–	11
11	27.00	27.45	0.45	DIP	–	15	30	31	61	–	–	–	–	11
11	27.00	28.50	1.50	–	SX	– Drilling			–	–	–	–	–	11
11	28.50	28.95	0.45	DIP	–	17	32	36		–	–	–	–	11
11	28.50	29.00	0.50	–	SX	– Drilling			–	–	–	–	–	11
11	29.00	29.45	0.45	UDS	–	Slipped			–	–	–	–	–	11
11	29.00	30.00	1.00	–	SX	– Drilling			–	–	–	–	–	11
11	30.00	30.45	0.45	DIP	–	20	34	40	74	–	–	–	–	11

Supervisor — In - C

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

APPENDIX C
CHART-16: FIELD BORE LOG CHART (BH-06)

TECHPRO ENGINEERS PVT. LTD.	BORE/ DRILL LOG	Doc No: GT/ 003 Date of Issue: 01.04.2018 Rev. No.: R01 Rev. Date.: 09.01.2019

Project Name:	GIT. work for Proposed Noida metro (NMRC)	Project Code:	1772
Coordinate:	N: 28.598538 E: 77.402981	Location/ Chainage:	Pardhtakhanjarpa
Method of Drilling:	Percussin	Drilling Equipment:	Power winch m/c
Casing Lowered (M):	25.50 m Bentonite Used: Yes	Bore Hole No.:	06
Ground Elevation:	Same Road level Date: From 29/12/19 to 30/12/19	Water Table (M):	Not found

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
29/12/19	0.0	1.00	1.00	DS	–	–	Drilling		–	–	–	–	–	Silty Sand Soil
"	1.00	1.50	0.50	–	SX	–	Drilling		–	–	–	–	–	"
"	1.50	1.95	0.45	DIP	–	4	4	5	9	–	–	–	–	"
"	1.50	2.50	1.00	–	SX	–	Drilling		–	–	–	–	–	"
"	2.50	2.95	0.45	UDS	–	–	Recived		–	–	–	–	–	"
"	2.50	3.00	0.50	–	SX	–	Drilling		–	–	–	–	–	"
"	3.00	3.45	0.45	DIP	–	5	6	7	13	–	–	–	–	"
"	3.00	4.50	1.50	–	SX	–	Drilling		–	–	–	–	–	"
"	4.50	4.95	0.45	DIP	–	5	5	8	13	–	–	–	–	"
"	4.50	5.00	0.50	–	SX	–	Drilling		–	–	–	–	–	"
"	5.00	5.45	0.45	UDS	–	–	Recived		–	–	–	–	–	"
"	5.00	6.00	1.00	–	SX	–	Drilling		–	–	–	–	–	Sand Soil
"	6.00	6.45	0.45	DIP	–	7	10	12	22	–	–	–	–	"
"	6.00	7.50	1.50	–	SX	–	Drilling		–	–	–	–	–	"
"	7.50	7.95	0.45	DIP	–	8	12	13	25	–	–	–	–	"
"	7.50	8.00	0.50	–	SX	–	Drilling		–	–	–	–	–	"
"	8.00	8.45	0.45	UDS	–	–	Slipped		–	–	–	–	–	"
"	8.00	9.00	1.00	–	SX	–	Drilling		–	–	–	–	–	"
"	9.00	9.45	0.45	DIP	–	10	14	16	30	–	–	–	–	Silty clay Gravel
"	9.00	10.50	1.50	–	SX	–	Drilling		–	–	–	–	–	"
"	10.50	10.95	0.45	DIP	–	12	16	18	34	–	–	–	–	"
"	10.50	11.00	0.50	–	SX	–	Drilling		–	–	–	–	–	"
"	11.00	11.45	0.45	UDS	–	Recived			–	–	–	–	–	"
"	11.00	12.00	1.00	–	SX	–	Drilling		–	–	–	–	–	"
30/12/19	12.00	12.45	0.45	DIP	–	13	15	17	32	–	–	–	–	"
"	12.00	13.50	1.50	–	SX	–	Drilling		–	–	–	–	–	"

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)

APPENDIX C
CHART-17: FIELD BORE LOG CHART (BH-06)

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

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R01
Rev. Date.:	09.01.2019

Project Name: G/T. Work for Proposed Noida Metro (NMRC) — Project Code: 1772

Coordinate: N: 28.598538 — E: 77.402981 — Location/ Chainage: Parthla Khanjpur

Method of Drilling: Percussin — Drilling Equipment: Power winch rotc

Casing Lowered (M): 25.50 m — Bentonite Used: Yes — Bore Hole No.: 06

Ground Elevation: Same as Road level — Date: From 29/12/19 to 30/12/19 — Water Table (M): Not found

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
30/12/19	13.50	13.95	0.45	DIP	H	15	16	20	36	-	-	-	-	Silty clay/gravel
"	13.50	14.00	0.50	-	SX	-	Drilling			-	-	-	-	"
"	14.00	14.45	0.45	UDS	-	Slipped				-	-	-	-	Silty Sand Soil
"	14.00	15.00	1.00	-	SX	-	Drilling			-	-	-	-	"
"	15.00	15.45	0.45	DIP	-	17	20	22	42	-	-	-	-	"
"	15.00	16.50	1.50	-	SX	-	Drilling			-	-	-	-	"
"	16.50	16.95	0.45	DIP	-	20	22	24	46	-	-	-	-	"
"	16.50	17.00	0.50	-	SX	-	Drilling			-	-	-	-	Fine Sand Soil
"	17.00	17.45	0.45	UDS	-	-	Slipped			-	-	-	-	"
"	17.00	18.00	1.00	-	SX	-	Drilling			-	-	-	-	"
"	18.00	18.45	0.45	DIP	-	22	24	27	51	-	-	-	-	"
"	18.00	19.50	1.50	-	SX	-	Drilling			-	-	-	-	"
"	19.50	19.95	0.45	DIP	-	21	23	30	53	-	-	-	-	"
"	19.50	20.00	0.50	-	SX	-	Drilling			-	-	-	-	"
"	20.00	20.45	0.45	UDS	-	Slipped				-	-	-	-	"
"	20.00	21.00	1.00	-	SX	-	Drilling			-	-	-	-	"
"	21.00	21.45	0.45	DIP	-	22	26	28	54	-	-	-	-	"
"	21.00	22.50	1.50	-	SX	-	Drilling			-	-	-	-	Silty clay Soil
"	22.50	22.95	0.45	DIP	-	24	28	30	58	-	-	-	-	"
"	22.50	23.00	0.50	-	SX	-	Drilling			-	-	-	-	"
"	23.00	23.45	0.45	UDS	-	Recived				-	-	-	-	"
"	23.00	24.00	1.00	-	SX	-	Drilling			-	-	-	-	"
"	24.00	24.45	0.45	DIP	-	22	26	28	54	-	-	-	-	"
"	24.00	25.50	1.50	-	SX	-	Drilling			-	-	-	-	"
"	25.50	25.45	0.45	DIP	-	24	28	30	58	-	-	-	-	"
"	25.50	26.00	0.50	-	SX	-	Drilling			-	-	-	-	"

Supervisor

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

E - in - C

APPENDIX C
CHART-18: FIELD BORE LOG CHART (BH-06)

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

Doc No: GT/...
Date of Issue: 01.04.2018
Rev. No.: R01
Rev. Date.: 09.01.2019
Project Code: 1772

Project Name: G.T. work for Proposed Noida metro (NMRC)
Coordinate: N: 28.579538 E: 77.402981
Location/ Chainage: Parthla Kalanjarpur
Method of Drilling: Percussih
Drilling Equipment: Power winch DIC
Casing Lowered (M): 25.50 m
Bentonite Used: Yes
Bore Hole No.: 06
Ground Elevation: Same Road level
Date: From 29/12/19 to 30/12/19
Water Table (M): Not found

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
30/12/19	26.00	26.45	0.45	UDS	–	–	Received		–	–	–	–	–	Silty Clay Gravel
"	26.00	27.00	1.00	–	SX	–	Drilling		–	–	–	–	–	"
"	27.00	27.45	0.45	D/P	–	26	28	32	60	–	–	–	–	"
"	27.00	28.50	1.50	–	SX	–	Drilling		–	–	–	–	–	"
"	28.50	28.95	0.45	D/P	–	27	30	34	64	–	–	–	–	"
"	28.50	29.00	0.50	–	SX	–	Drilling		–	–	–	–	–	Silty Sand Soil
"	29.00	29.45	0.45	UDS	–	Skipped			–	–	–	–	–	"
"	29.00	30.00	1.00	–	SX	–	Drilling		–	–	–	–	–	"
"	30.00	30.45	0.45	D/P	–	28	33	36	66	–	–	–	–	"

Supervisor

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

E - In - C

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APPENDIX C
CHART-19: FIELD BORE LOG CHART (BH-07)

TECHPRO ENGINEERS PVT. LTD. — BORE/ DRILL LOG

Doc No:	GT/ 003
Date of Issue:	01.04.2018
Rev. No.:	R01
Rev. Date.:	09.01.2019
Project Code:	1772

Project Name: GIT- work for Proposed Hoida metro (HMRC)
Coordinate: N: 28.599165 E: 77.407945 Location/ Chainage: Parthla chowk
Method of Drilling: Percussin Drilling Equipment: Power winch mic
Casing Lowered (M): 21.00 m Bentonite Used: Yes Bore Hole No.: 07
Ground Elevation: Same as Road level Date: From 30/12/19 to 31/12/19 Water Table (M): Not Meet

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
30/12	0.00	1.00	1.00	DS	—	—	Drilling		—	—	—	—	—	Silty sand
〃	1.00	1.50	0.50	—	SX	—	Drilling		—	—	—	—	—	〃
〃	1.50	1.95	0.45	DIP	—	2	3	2	5	—	—	—	—	〃
〃	1.50	2.50	1.00	—	SX	—	Drilling		—	—	—	—	—	〃
〃	2.50	2.95	0.45	UDS	—		Received			—	—	—	—	〃
〃	2.50	3.00	0.50	—	SX	—	Drilling		—	—	—	—	—	〃
〃	3.00	3.45	0.45	DIP	—	3	4	4	8	—	—	—	—	Clay silt
〃	3.00	4.50	1.50	—	SX	—	Drilling		—	—	—	—	—	〃
〃	4.50	4.95	0.45	DIP	—	4	5	6	11	—	—	—	—	〃
〃	4.50	5.00	0.50	—	SX	—	Drilling		—	—	—	—	—	〃
〃	5.00	5.45	0.45	UDS	—		Slipped		—	—	—	—	—	〃
〃	5.00	6.00	1.00	—	SX	—	Drilling		—	—	—	—	—	〃
〃	6.00	6.45	0.45	DIP	—	4	6	8	14	—	—	—	—	〃
31/12/19	6.00	7.50	1.50	—	SX	—	Drilling		—	—	—	—	—	〃
〃	7.50	7.95	0.45	DIP	—	5	7	10	17	—	—	—	—	〃
〃	7.50	8.00	0.50	—	SX	—	Drilling		—	—	—	—	—	〃
〃	8.00	8.45	0.45	UDS	—		Slipped		—	—	—	—	—	〃
〃	8.00	9.00	1.00	—	SX	—	Drilling		—	—	—	—	—	〃
〃	9.00	9.45	0.45	DIP	—	5	9	11	20	—	—	—	—	〃
〃	9.00	10.50	1.50	—	SX	—	Drilling		—	—	—	—	—	〃
〃	10.50	10.95	0.45	DIP	—	6	10	12	22	—	—	—	—	〃
〃	10.50	11.00	0.50	—	SX	—	Drilling		—	—	—	—	—	〃
〃	11.00	11.45	0.45	UDS	—		Slipped		—	—	—	—	—	〃
〃	11.00	12.00	1.00	—	SX	—	Drilling		—	—	—	—	—	〃
〃	12.00	12.45	0.45	DIP	—	7	12	13	25	—	—	—	—	〃
〃	12.00	13.50	1.50	—	SX	—	Drilling		—	—	—	—	—	〃

Supervisor

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

E - in - C

APPENDIX C
CHART-20: FIELD BORE LOG CHART (BH-07)

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

Doc No:	GT/003		
Date of Issue:	01.04.2018		
Rev. No.:	R01		
Rev. Date.:	09.01.2019		

Project Name: GT. Work for Proposed Noida metro (NMRC) — Project Code: 1772

Coordinate: N: 28.599165 E: 77.407945 — Location/ Chainage: Parthla chowk

Method of Drilling: Percussin — Drilling Equipment: Power winch mic.

Casing Lowered (M): 21.00 — Bentonite Used: Yes — Bore Hole No.: 07

Ground Elevation: Surrounding level — Date: From 30/12/19 to 31/12/19 — Water Table (M): Not meet

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
31/12	13.50	13.95	0.45	D/P	–	7	14	16	30	–	–	–	–	Clay silt
〃	13.50	14.00	0.50	–	SX	–	Drilling		–	–	–	–	–	〃
〃	14.00	14.45	0.45	UDS	–	Slipped			–	–	–	–	–	〃
〃	14.00	15.00	1.00	–	SX	–	Drilling		–	–	–	–	–	〃
〃	15.00	15.45	0.45	D/P	–	8	15	16	31	–	–	–	–	〃
〃	15.00	16.50	1.50	–	SX	–	Drilling		–	–	–	–	–	〃
〃	16.50	16.95	0.45	D/P	–	9	16	17	33	–	–	–	–	〃
〃	16.50	17.00	0.50	–	SX	–	Drilling		–	–	–	–	–	〃
〃	17.00	17.45	0.45	UDS	–	Slipped			–	–	–	–	–	〃
〃	17.00	18.00	1.00	–	SX	–	Drilling		–	–	–	–	–	〃
〃	18.00	18.45	0.45	D/P	–	10	18	18	36	–	–	–	–	〃
〃	18.00	19.50	1.50	–	SX	–	Drilling		–	–	–	–	–	〃
〃	19.50	19.95	0.45	D/P	–	11	19	18	37	–	–	–	–	〃
〃	19.50	20.00	0.50	–	SX	–	Drilling		–	–	–	–	–	〃
〃	20.00	20.45	0.45	UDS	–	Slipped			–	–	–	–	–	〃
〃	20.00	21.00	1.00	–	SX	–	Drilling		–	–	–	–	–	〃
〃	21.00	21.45	0.45	D/P	–	12	20	21	41	–	–	–	–	〃
〃	21.00	22.50	1.50	–	SX	–	Drilling		–	–	–	–	–	Fine sand
〃	22.50	22.95	0.45	D/P	–	12	20	20	40	–	–	–	–	〃
〃	22.50	23.00	0.50	–	SX	–	Drilling		–	–	–	–	–	〃
〃	23.00	23.45	0.45	UDS	–	Slipped			–	–	–	–	–	〃
〃	23.00	24.00	1.00	–	SX	–	Drilling		–	–	–	–	–	〃
〃	24.00	24.45	0.45	D/P	–	15	22	23	45	–	–	–	–	〃
〃	24.00	25.50	1.50	–	SX	–	Drilling		–	–	–	–	–	〃
〃	25.50	25.95	0.45	D/P	–	17	24	25	49	–	–	–	–	〃
	25.50	26.00	0.50	–	SX		Drilling		–	–	–	–	–	〃

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)

APPENDIX C
CHART-21: FIELD BORE LOG CHART (BH-07)

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

Doc No:	GT/003
Date of Issue:	01.04.2018
Rev. No.:	R01
Rev. Date.:	09.01.2019
Project Code:	1772

Project Name: G.T. work for Proposed Noida metro (NMRC)

Coordinate: N: 28.599165 E: 77.407945 Location/ Chainage: Parthla chowk

Method of Drilling: Percussin Drilling Equipment: Power winch rig

Casing Lowered (M): 21.0m Bentonite Used: Yes Bore Hole No.: 07

Ground Elevation: Same as Road level Date: From 30/11/19 to 31/12/19 Water Table (M): Not met

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
3/12/19	26.00	26.45	0.45	UDS	—		Slipped		—	—	—	—	—	Fine sand
4	26.00	27.00	0.50	—	SX	—	Drilling		—	—	—	—	—	4
4	27.00	27.45	0.45	DIP	—	19	25	25	50	—	—	—	—	4
4	27.00	28.50	1.50	—	SX	—	Drilling		—	—	—	—	—	4
4	28.50	28.95	0.45	DIP	—	20	26	29	55	—	—	—	—	4
4	28.50	29.00	0.50	—	SX	—	Drilling		—	—	—	—	—	4
4	29.00	29.45	0.45	UDS	—		Slipped			—	—	—	—	4
4	29.00	30.00	1.00	—	SX	—	Drilling		—	—	—	—	—	4
4	30.00	30.45	0.45	DIP	—	23	29	32	61	—	—	—	—	4

Supervisor

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

E - in - C

APPENDIX C
CHART-22: FIELD BORE LOG CHART (BH-08)

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

Doc No:	GT/003		
Date of Issue:	01.04.2018		
Rev. No.:	R01		
Rev. Date.:	09.01.2019		

Project Name: G.T. Work for Proposed Noida metro (NMRC) — Project Code: 1772

Coordinate: N: 28.600758 — E: 77.412424 — Location/ Chainage: Pusta Road

Method of Drilling: Percussin — Drilling Equipment: Power winch M/C

Casing Lowered (M): 2 | 1.00 m — Bentonite Used: — Bore Hole No.: 08

Ground Elevation: Same Road Lvl — Date: From 02/01/20 to 03/01/20 — Water Table (M): Not found

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
2/1/20	0.0	1.00	1.00	DS	–	–	Driving		–	–	–	–	–	Silty clay Soil
〃	1.00	1.50	0.50	–	SX	–	Driving		–	–	–	–	–	〃
〃	1.50	1.95	0.45	D/P	–	3	4	5	9	–	–	–	–	〃
〃	1.50	2.50	1.00	–	SX	–	Driving		–	–	–	–	–	〃
〃	2.50	2.95	0.45	UDS	–	–	Recived		–	–	–	–	–	〃
〃	2.50	3.00	0.50	–	SX	–	Driving		–	–	–	–	–	Silty Sand Soil
〃	3.00	3.45	0.45	D/P	–	3	5	5	10	–	–	–	–	〃
〃	3.00	4.50	1.50	–	SX	–	Driving		–	–	–	–	–	〃
〃	4.50	4.95	0.45	D/P	–	4	6	7	13	–	–	–	–	〃
〃	4.50	5.00	0.50	–	SX	–	Driving		–	–	–	–	–	〃
〃	5.00	5.45	0.45	UDS	–	–	Recived		–	–	–	–	–	〃
〃	5.00	6.00	1.00	–	SX	–	Driving		–	–	–	–	–	Silty clay soil
〃	6.00	6.45	0.45	D/P	–	5	7	10	17	–	–	–	–	〃
〃	6.00	7.50	1.50	–	SX	–	Driving		–	–	–	–	–	〃
〃	7.50	7.95	0.45	D/P	–	6	8	12	20	–	–	–	–	〃
〃	7.50	8.00	0.50	–	SX	–	Driving		–	–	–	–	–	〃
〃	8.00	8.45	0.45	UDS	–	–	Recived		–	–	–	–	–	〃
〃	8.00	9.00	1.00	–	SX	–	Driving		–	–	–	–	–	〃
〃	9.00	9.45	0.45	D/P	–	6	10	12	22	–	–	–	–	〃
〃	9.00	10.50	1.50	–	SX	–	Driving		–	–	–	–	–	〃
〃	10.50	10.95	0.45	D/P	–	8	12	14	26	–	–	–	–	clay Silty Gravel
03/1/20	10.50	11.00	0.50	–	SX	–	Driving		–	–	–	–	–	〃
〃	11.00	11.45	0.45	UDS	–	–	Slipped		–	–	–	–	–	〃
〃	11.00	12.00	1.00	–	SX	–	Driving		–	–	–	–	–	〃
〃	12.00	12.45	0.45	D/P	–	10	14	16	30	–	–	–	–	〃
〃	12.00	13.50	1.50	–	SX	–	Driving		–	–	–	–	–	〃

Supervisor — 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)

APPENDIX C
CHART-23: FIELD BORE LOG CHART (BH-08)

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

Doc No:	GT/003
Date of Issue:	01.04.2018
Rev. No.:	R01
Rev. Date.:	09.01.2019
Project Code:	1772

Project Name: GT. Work for Proposed Noida metro (NMRC)

Coordinate: N: 28.600758 E: 77.412424 Location/ Chainage: Pusta Road

Method of Drilling: Percussin Drilling Equipment: Power winch m/c

Casing Lowered (M): 21.00 m Bentonite Used: NO Bore Hole No.: 08

Ground Elevation: Same Road Level Date: From 02/01/20 to 31/01/20 Water Table (M): Not found

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
31/1/20	13.50	13.95	0.45	DIP	—	12	14	18	32	—	—	—	—	Silty Clay Soil
〃	13.50	14.00	0.50	—	SX	—	Drilling		—	—	—	—	—	〃
〃	14.00	14.45	0.45	UDS	—	Slipped			—	—	—	—	—	〃
〃	14.00	15.00	1.00	—	SX	—	Drilling		—	—	—	—	—	〃
〃	15.00	15.45	0.45	DIP	—	10	16	21	37	—	—	—	—	clay silty gravel
〃	15.00	16.50	1.50	—	SX	—	Drilling		—	—	—	—	—	〃
〃	16.50	16.95	0.45	DIP	—	12	20	22	42	—	—	—	—	〃
〃	16.50	17.00	0.50	—	SX	—	Drilling		—	—	—	—	—	〃
〃	17.00	17.45	0.45	UDS	—	—	Recived		—	—	—	—	—	〃
〃	17.00	18.00	1.00	—	SX	—	Drilling		—	—	—	—	—	〃
〃	18.00	18.45	0.45	DIP	—	14	22	26	48	—	—	—	—	〃
〃	18.00	19.50	1.50	—	SX	—	Drilling		—	—	—	—	—	〃
〃	19.50	19.95	0.45	DIP	—	12	20	28	48	—	—	—	—	〃
〃	19.50	20.00	0.50	—	SX	—	Drilling		—	—	—	—	—	〃
〃	20.00	20.45	0.45	UDS	—	—	Recived		—	—	—	—	—	〃
〃	20.00	21.00	1.00	—	SX	—	Drilling		—	—	—	—	—	〃
〃	21.00	21.45	0.45	DIP	—	16	18	30	50	—	—	—	—	〃
〃	21.00	22.50	1.50	—	SX	—	Drilling		—	—	—	—	—	Silty Sand Soil
〃	22.50	22.95	0.45	DIP	—	18	21	32	53	—	—	—	—	〃
〃	22.50	23.00	0.50	—	SX	—	Drilling		—	—	—	—	—	〃
〃	23.00	23.45	0.45	UDS	—	—	Slipped		—	—	—	—	—	〃
〃	23.00	24.00	1.00	—	SX	—	Drilling		—	—	—	—	—	〃
〃	24.00	24.45	0.45	DIP	—	20	22	34	56	—	—	—	—	〃
〃	24.00	25.50	1.50	—	SX	—	Drilling		—	—	—	—	—	〃
〃	25.50	25.95	0.45	DIP	—	22	26	32	58	—	—	—	—	〃
〃	25.50	26.00	0.50	—	SX	—	Drilling		—	—	—	—	—	〃

Supervisor

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

E-in-C

APPENDIX C
CHART-24: FIELD BORE LOG CHART (BH-08)

TECHPRO ENGINEERS PVT. LTD. — BORE/ DRILL LOG

Doc No:	GT/003		
Date of Issue:	01.04.2018		
Rev. No.:	R01		
Rev. Date.:	09.01.2019		
Project Code:	1772		

Project Name: G/T. Work for Proposed Noida metro (NMRC)

Coordinate: N: 28.600758 E: 77.412424 Location/ Chainage: Rusta Road

Method of Drilling: Percussin Drilling Equipment: Power winch mic

Casing Lowered (M): 21.00 m Bentonite Used: Nil Bore Hole No.: 08

Ground Elevation: Same Road Level Date: From 02/01/20 to 3/01/20 Water Table (M): Not found

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
3/1/20	26.00	26.15	0.15	UDS	—	—	Slipped		—	—	—	—	—	Silty Sand Soil
1	26.00	27.00	1.00	—	SX	—	Drilling		—	—	—	—	—	"
"	27.00	27.45	0.45	DIP	—	20	30	33	63	—	—	—	—	"
"	27.00	28.50	1.50	—	SX	—	Drilling		—	—	—	—	—	"
"	28.50	28.95	0.45	DIP	—	23	33	36	69	—	—	—	—	"
"	28.50	29.00	0.50	—	SX	—	Drilling		—	—	—	—	—	"
"	29.00	29.15	0.15	UDS	—	Slipped			—	—	—	—	—	"
"	29.00	30.00	1.00	—	SX	—	Drilling		—	—	—	—	—	"
"	30.00	30.45	0.45	DIP	—	26	38	40	78	—	—	—	—	"

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)

APPENDIX C
CHART-25: FIELD BORE LOG CHART (BH-09)

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

Doc No:	GT/003
Date of Issue:	01.04.2018
Rev. No.:	R01
Rev. Date.:	09.01.2019

Project Name: GT. work for Proposed Noida metro (UPMRC) — Project Code: 1772

Coordinate: N: 28.601744 E: 77.417618 — Location/ Chainage: Bhoomi Cricket ground

Method of Drilling: Percussin — Drilling Equipment: Power winch rig

Casing Lowered (M): 22.0m — Bentonite Used: Yes — Bore Hole No.: 09

Ground Elevation: Samiaroad level — Date: From 2/1/20 to 3/1/20 — Water Table (M): Not met

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
2/1/20	0.00	1.00	1.00	DS	—	—	Driving		—	—	—	—	—	Silty sand
〃	1.00	1.50	0.50	—	SX	—	Driving		—	—	—	—	—	〃
〃	1.50	1.95	0.45	D/P	—	2	2	3	5	—	—	—	—	fine sand
〃	1.50	2.50	1.00	—	SX	—	Driving		—	—	—	—	—	〃
〃	2.50	2.95	0.45	UDS	—	Recived			—	—	—	—	—	Silty clay
〃	2.50	3.00	0.50	—	SX	—	Driving		—	—	—	—	—	〃
〃	3.00	3.45	0.45	D/P	—	3	3	5	8	—	—	—	—	〃
〃	3.00	4.50	1.50	—	SX	—	Driving		—	—	—	—	—	〃
〃	4.50	4.95	0.45	D/P	—	3	4	7	11	—	—	—	—	〃
〃	4.50	5.00	0.50	—	SX	—	Driving		—	—	—	—	—	〃
〃	5.00	5.45	0.45	UDS	—	Slipped			—	—	—	—	—	〃
〃	5.00	6.00	1.50	—	SX	—	Driving		—	—	—	—	—	〃
〃	6.00	6.45	0.45	D/P	—	4	6	9	15	—	—	—	—	〃
〃	6.00	7.50	1.50	—	SX	—	Driving		—	—	—	—	—	〃
〃	7.50	7.95	0.45	D/P	—	4	7	11	18	—	—	—	—	fine sand
〃	7.50	8.00	0.50	—	SX	—	Driving		—	—	—	—	—	〃
〃	8.00	8.45	0.45	UDS	—	Slipped			—	—	—	—	—	〃
〃	8.00	9.00	1.00	—	SX	—	Driving		—	—	—	—	—	〃
〃	9.00	9.45	0.45	D/P	—	5	8	11	19	—	—	—	—	〃
〃	9.00	10.50	1.50	—	SX	—	Driving		—	—	—	—	—	〃
〃	10.50	10.95	0.45	D/P	—	6	9	13	22	—	—	—	—	〃
〃	10.50	11.00	0.50	—	SX	—	Driving		—	—	—	—	—	〃
〃	11.00	11.45	0.45	UDS	—	Recived			—	—	—	—	—	Silty sand
〃	11.00	12.00	1.00	—	SX	—	Driving		—	—	—	—	—	〃
〃	12.00	12.45	0.45	D/P	—	7	10	13	23	—	—	—	—	〃
3/1/20	12.00	13.50	1.50	—	SX	—	Driving		—	—	—	—	—	〃

Supervisor

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

APPENDIX C
CHART-26: FIELD BORE LOG CHART (BH-09)

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

Doc No:	GT/003
Date of Issue:	01.04.2018
Rev. No.:	R01
Rev. Date.:	09.01.2019
Project Code:	1772

Project Name: G.T. work for Proposed Noida metro (NMRC)

Coordinate: N: 28.60744 E: 77.417618 Location/ Chainage: Bhoomi Cricket ground

Method of Drilling: Percussin Drilling Equipment: Power winch m/c.

Casing Lowered (M): 22.0 Bentonite Used: Yes Bore Hole No.: 09

Ground Elevation: Same as ~~ground level~~ Date: From 2/1/20 to 3/1/20 Water Table (M): Not met

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
3/1/20	13.00	13.95	0.45	DIP	—	7	11	15	26	"	"	"	"	"
"	13.50	14.00	0.50	—	SX	—	Drilling			"	"	"	"	"
"	14.00	14.45	0.45	UDS	—	Slipped			—	"	"	"	"	"
"	14.00	15.00	1.00	—	SX	—	Drilling			"	"	"	"	"
"	15.00	15.45	0.45	DIP	—	9	14	17	31	"	"	"	"	"
"	15.00	16.50	1.50	—	SX	—	Drilling			"	"	"	"	"
"	16.50	16.95	0.45	DIP	—	10	15	20	35	"	"	"	"	"
"	16.50	17.00	0.50	—	SX	—	Drilling			"	"	"	"	"
"	17.00	17.45	0.45	UDS	—	Slipped			—	"	"	"	"	"
"	17.00	18.00	1.00	—	SX	—	Drilling			"	"	"	"	"
"	18.00	18.45	0.45	DIP	—	12	23	25	48	"	"	"	"	"
"	18.00	19.50	1.50	—	SX	—	Drilling			"	"	"	"	"
"	19.50	19.95	0.45	DIP	—	13	24	27	51	"	"	"	"	"
"	19.00	20.00	0.50	—	SX	—	Drilling			"	"	"	"	"
"	20.00	20.45	0.45	UDS	—	Slipped			—	"	"	"	"	"
"	20.00	21.00	1.00	—	SX	—	Drilling			"	"	"	"	"
"	21.00	21.45	0.45	DIP	—	13	25	29	54	"	"	"	"	"
"	21.00	22.50	1.50	—	SX	—	Drilling			"	"	"	"	"
"	22.50	22.95	0.45	DIP	—	14	25	30	55	"	"	"	"	Fair sand
"	22.50	23.00	0.50	—	SX	—	Drilling			"	"	"	"	"
"	23.00	23.45	0.45	UDS	—	Slipped			—	"	"	"	"	"
"	23.00	24.00	1.00	—	SX	—	Drilling			"	"	"	"	"
"	24.00	24.45	0.45	DIP	—	15	27	31	58	"	"	"	"	"
"	24.00	25.50	1.50	—	SX	—	Drilling			"	"	"	"	"
"	25.50	25.95	0.45	DIP	—	15	28	32	60	"	"	"	"	"
"	25.50	26.00	0.50	—	SX	—	Drilling			"	"	"	"	"

Supervisor

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

E - in - C

APPENDIX C
CHART-27: FIELD BORE LOG CHART (BH-09)

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

Doc No:	GT/003
Date of Issue:	01.04.2018
Rev. No.:	R01
Rev. Date.:	09.01.2019

Project Name: OIT. Work for Proposed Noida metro (NMRC) — Project Code: 1772

Coordinate: N: 28.60744 — E: 77.417618 — Location/ Chainage: bhoomi [illegible] Cricket ground

Method of Drilling: Percussin — Drilling Equipment: Power winch m/c.

Casing Lowered (M): 22.0 — Bentonite Used: Yes — Bore Hole No.: 09

Ground Elevation: Same as Road Level — Date: From 2/1/20 to 3/1/20 — Water Table (M): Not met

Date (dd/mm/yy)	Depth/RUN (m) From	To	Length(m)	Nature of sample	Hole Size	0-15cm	15-30cm	30-45cm	N Value	Core Recovery(%)	RQD(%)	Water Losses (%)	Color of Return Water	Description
1/	26.00	26.45	0.45	UDS	1"	-	Slipped			—	—	—	—	Ami Sand
1/	26.00	27.00	1.00	—	SX	—	Drilling			—	—	—	—	11
1/	27.00	27.45	0.45	DIP	—	17	30	34	64	—	—	—	—	11
1/	27.00	28.50	1.50	—	SX	—	Drilling			—	—	—	—	11
1/	28.50	28.95	0.45	DIP	—	20	32	35	67	—	—	—	—	11
1/	28.50	29.00	0.50	—	SX	—	Drilling			—	—	—	—	11
1/	29.00	29.45	0.45	UDS	—		Slipped			—	—	—	—	11
1/	29.00	30.00	1.00	—	SX	—	Drilling			—	—	-	—	11
1/	30.00	30.45	0.45	DIP	—	24	35	38	73	—	-	—	-	11.

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)

APPENDIX-D
GRAPH-1: LITHOLOGICAL GRAPH (BH-1)

BH-01-MAKAH DHAM

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML		1.50	D	6	-	-
			2.50	U		-	-
-	SP-SM		3.00	D	14	-	-
			4.50	D	13	-	-
			5.00	U		-	-
Silty Sands	SM		6.00	D	14	-	-
			7.50	D	16	-	-
Poorly Graded Sands with inorganic Silts of low plasticity	SP-ML		8.00	D		-	-
			9.00	D	19	-	-
-	SP-SM		10.50	D	21	-	-
			11.00	D		-	-
-	SP		12.00	D	20	-	-
			13.50	D	35	-	-
			14.00	D		-	-
Well Graded Sands with inorganic Silts of low loasticity as Binder	SW-ML		15.00	D	47	-	-
			16.50	D	53	-	-
			17.00	D		-	-
Silty Sands	SM		18.00	D	52	-	-
Poorly Graded Sands with inorganic Silts of low plasticity	SP-ML		19.50	D	58	-	-
			20.00	U		-	-

BH-01-MAKAH DHAM

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			20.00	U		-	-
			21.00	D	61	-	-
			22.50	D	63	-	-
			23.00	D		-	-
Inorganic clays of low plasticity	CL		24.00	D	66	-	-
			25.50	D	67	-	-
			26.00	U		-	-
			27.00	D	88	-	-
			28.50	D	R	-	-
Silty Sands	SM		29.00	D		-	-
			30.00	D	R	-	-

APPENDIX-D
GRAPH-2: LITHOLOGICAL GRAPH (BH-2)

BH-02-ANTHURIUM

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	1.50	D	8	-	-
		2.50	U		-	-
		3.00	D	9	-	-
Silty Sands	SM	4.50	D	18	-	-
		5.00	U		-	-
		6.00	D	40	-	-
		7.50	D	48	-	-
		8.00	U		-	-
Inorganic Silts of low plasticity	ML	9.00	D	40	-	-
		10.50	D	36	-	-
		11.00	D		-	-
		12.00	D	48	-	-
Silty Sands	SM	13.50	D	52	-	-
		14.00	D		-	-
		15.00	D	61	-	-
		16.50	D	61	-	-
		17.00	D		-	-
Poorly Graded Sands with inorganic Silts of low plasticity	SP-ML	18.00	D	60	-	-
-	SP-SM	19.50	D	55	-	-
		20.00	D		-	-

BH-02-ANTHURIUM

DESCRIPTION	I.S. GROUP	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM	20.00	D		-	-
		21.00	D	64	-	-
Inorganic clays of low plasticity	CL	22.50	D	52	-	-
		23.00	U		-	-
Inorganic Silts of low plasticity	ML	24.00	D	56	-	-
		25.50	D	53	-	-
		26.00	U		-	-
Inorganic clays of low plasticity	CL	27.00	D	60	-	-
		28.50	D	65	-	-
Inorganic clays of Intermediate plasticity	CI	29.00	U		-	-
		30.00	D	66	-	-

APPENDIX-D
GRAPH-3: LITHOLOGICAL GRAPH (BH-3)

BH-03-BHAGUTE GARDEN

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of Intermediate plasticity	CI		1.00	D		-	-
			1.50	D	7	-	-
			2.50	U		-	-
Silty Sands	SM		3.00	D	8	-	-
			4.50	D	15	-	-
Poorly Graded Sands with inorganic Silts of low plasticity	SP-ML		5.00	D		-	-
-	SP-SM		6.00	D	14	-	-
			7.50	D	18	-	-
			8.00	U		-	-
Inorganic clays of low plasticity	CL		9.00	D	20	-	-
			10.50	D	24	-	-
			11.00	U		-	-
Silty Sands	SM		12.00	D	43	-	-
			13.50	D	50	-	-
Poorly Graded Sands with inorganic Silts of low plasticity	SP-ML		14.00	D		-	-
-	SP-SM		15.00	D	56	-	-
			16.50	D	58	-	-
			17.00	D		-	-
Poorly Graded Sands with inorganic Silts of low plasticity	SP-ML		18.00	D	60	-	-
-	SP-SM		19.50	D	61	-	-
			20.00	D		-	-

BH-03-BHAGUTE GARDEN

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
-	SP-SM		20.00	D		-	-
Poorly Graded Sands	SP		21.00	D	65	-	-
			22.50	D	69	-	-
Inorganic clays of Intermediate plasticity	CI		23.00	D		-	-
			24.00	D	70	-	-
Inorganic Silts of low plasticity	ML		25.50	D	71	-	-
Inorganic clays of Intermediate plasticity	CI		26.00	D		-	-
			27.00	D	74	-	-
-	CL-CI		28.50	D	78	-	-
			29.00	D		-	-
			30.00	D	82	-	-

APPENDIX-D
GRAPH-4 LITHOLOGICAL GRAPH (BH-4)

BH-04-Sever Plant, Noida

DESCRIPTION	I.S. GROUP	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL	1.00	D		-	-
		1.50	D	6	-	-
		2.50	U		-	-
		3.00	D	11	-	-
		4.50	D	18	-	-
Poorly Graded Sands with inorganic Silts of low plasticity	SP-ML	5.00	U		-	-
		6.00	D	20	-	-
		7.50	D	18	-	-
		8.00	U		-	-
Inorganic clays of low plasticity	CL	9.00	D	26	-	-
		10.50	D	30	-	-
		11.00	U		-	-
Inorganic Silts of low plasticity	ML	12.00	D	34	-	-
		13.50	D	36	-	-
		14.00	D		-	-
		15.00	D	80	-	-
Poorly Graded Sands with inorganic Silts of low plasticity	SP-ML	16.50	D	85	-	-
		17.00	D		-	-
		18.00	D	87	-	-
		19.50	D	88	-	-
		20.00	D		-	-

BH-04-Sever Plant, Noida

DESCRIPTION	I.S. GROUP	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
		20.00	D		-	-
Poorly Graded Sands with inorganic Silts of low plasticity	SP-ML	21.00	D	90	-	-
		22.50	D	89	-	-
		23.00	D		-	-
		24.00	D	91	-	-
		25.50	D	93	-	-
Inorganic clays of Intermediate plasticity	CI	26.00	D		-	-
		27.00	D	81	-	-
		28.50	D	88	-	-
		29.00	D		-	-
		30.00	D	94	-	-

APPENDIX-D
GRAPH-5 LITHOLOGICAL GRAPH (BH-5)

BH-05-Noida International School

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			0.50	D		-	-
Inorganic clays of low plasticity	CL		1.00	D		-	-
			1.50	D	6	-	-
			2.50	U		-	-
			3.00	D	12	-	-
Inorganic Silts of low plasticity	ML						
			4.50	D	11	-	-
			5.00	D		-	-
			6.00	D	15	-	-
			7.50	D	16	-	-
Poorly Graded Sands with inorganic Silts of low plasticity	SP-ML		8.00	D		-	-
			9.00	D	20	-	-
			10.50	D	28	-	-
			11.00	U		-	-
Inorganic clays of low plasticity	CL						
			12.00	D	33	-	-
Inorganic Silts of low plasticity	ML						
			13.50	D	35	-	-
			14.00	D		-	-
			15.00	D	37	-	-
			16.50	D	40	-	-
Silty Sands	SM		17.00	D		-	-
			18.00	D	42	-	-
			19.50	D	45	-	-
			20.00	D		-	-

BH-05-Noida International School

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			20.00	D		-	-
Silty Sands	SM		21.00	D	46	-	-
			22.50	D	48	-	-
			23.00	D		-	-
			24.00	D	52	-	-
			25.50	D	56	-	-
Inorganic clays of low plasticity	CL		26.00	D		-	-
			27.00	D	61	-	-
			28.50	D	68	-	-
			29.00	D		-	-
			30.00	D	74	-	-

APPENDIX-D
GRAPH-6 LITHOLOGICAL GRAPH (BH-6)

BH-06-Parthla Khanjarpur, Noida

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silts of low plasticity	ML		1.00	D		-	-
			1.50	D	9	-	-
			2.50	U		-	-
Inorganic Silty Clays of low plasticity	CL-ML		3.00	D	13	-	-
Poorly Graded Sands	SP		4.50	D	13	-	-
			5.00	U		-	-
Poorly Graded Sands with inorganic Silts of low plasticity	SP-ML		6.00	D	22	-	-
			7.50	D	25	-	-
Silty Sands	SM		8.00	D		-	-
			9.00	D	30	-	-
			10.50	D	34	-	-
Inorganic clays of low plasticity	CL		11.00	U		-	-
			12.00	D	32	-	-
			13.50	D	36	-	-
			14.00	D		-	-
Silty Sands	SM		15.00	D	42	-	-
			16.50	D	46	-	-
			17.00	D		-	-
Poorly Graded Sands	SP		18.00	D	51	-	-
			19.50	D	53	-	-
			20.00	D		-	-

BH-06-Parthla Khanjarpur, Noida

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Poorly Graded Sands	SP		20.00	D		-	-
			21.00	D	54	-	-
Inorganic clays of low plasticity	CL		22.50	D	58	-	-
			23.00	U		-	-
			24.00	D	54	-	-
			25.50	D	58	-	-
Silty Sands	SM		26.00	U		-	-
			27.00	D	60	-	-
			28.50	D	64	-	-
			29.00	D		-	-
			30.00	D	69	-	-

APPENDIX-D
GRAPH-7 LITHOLOGICAL GRAPH (BH-7)

BH-07-Parthla Chowk, Noida

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic Silty Clays of low plasticity	CL-ML		1.00	D		-	-
			1.50	D	5	-	-
Silty Sands	SM						
Inorganic clays of Intermediate plasticity	CI		2.50	U		-	-
			3.00	D	8	-	-
Silty Sands	SM						
			4.50	D	11	-	-
			5.00	D		-	-
			6.00	D	14	-	-
Inorganic clays of low plasticity	CL						
			7.50	D	17	-	-
			8.00	D		-	-
			9.00	D	20	-	-
			10.50	D	22	-	-
			11.00	D		-	-
			12.00	D	25	-	-
Poorly Graded Sands with inorganic Silts of low plasticity	SP-ML						
			13.50	D	30	-	-
			14.00	D		-	-
			15.00	D	31	-	-
			16.50	D	33	-	-
			17.00	D		-	-
			18.00	D	36	-	-
Silty Sands	SM						
			19.50	D	37	-	-
			20.00	D		-	-

BH-07-Parthla Chowk, Noida

DESCRIPTION	I.S. GROUP	HATCH PATTERN	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
			20.00	D		-	-
			21.00	D	41	-	-
			22.50	D	40	-	-
			23.00	D		-	-
			24.00	D	45	-	-
Silty Sands	SM						
			25.50	D	49	-	-
			26.00	D		-	-
			27.00	D	50	-	-
			28.50	D	55	-	-
			29.00	D		-	-
			30.00	D	61	-	-

APPENDIX-D
GRAPH-8 LITHOLOGICAL GRAPH (BH-8)

BH-08-Pusta Road, Noida

DESCRIPTION	I.S. GROUP	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM	1.00	D		-	-
		1.50	D	9	-	-
		2.50	U		-	-
Inorganic clays of low plasticity	CL	3.00	D	10	-	-
		4.50	D	13	-	-
		5.00	U		-	-
Inorganic clays of Intermediate plasticity	CI	6.00	D	17	-	-
		7.50	D	20	-	-
		8.00	U		-	-
		9.00	D	22	-	-
Inorganic clays of low plasticity	CL	10.50	D	26	-	-
		11.00	D		-	-
		12.00	D	30	-	-
		13.50	D	32	-	-
		14.00	D		-	-
		15.00	D	37	-	-
		16.50	D	42	-	-
		17.00	U		-	-
Inorganic clays of low plasticity	CL	18.00	D	48	-	-
Silty Sands	SM	19.50	D	48	-	-
		20.00	U		-	-

BH-08-Pusta Road, Noida

DESCRIPTION	I.S. GROUP	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
		20.00	U		-	-
Silty Sands	SM	21.00	D	50	-	-
		22.50	D	53	-	-
		23.00	D		-	-
		24.00	D	56	-	-
		25.50	D	58	-	-
		26.00	D		-	-
		27.00	D	63	-	-
		28.50	D	69	-	-
		29.00	D		-	-
		30.00	D	78	-	-

APPENDIX-D
GRAPH-9 LITHOLOGICAL GRAPH (BH-9)

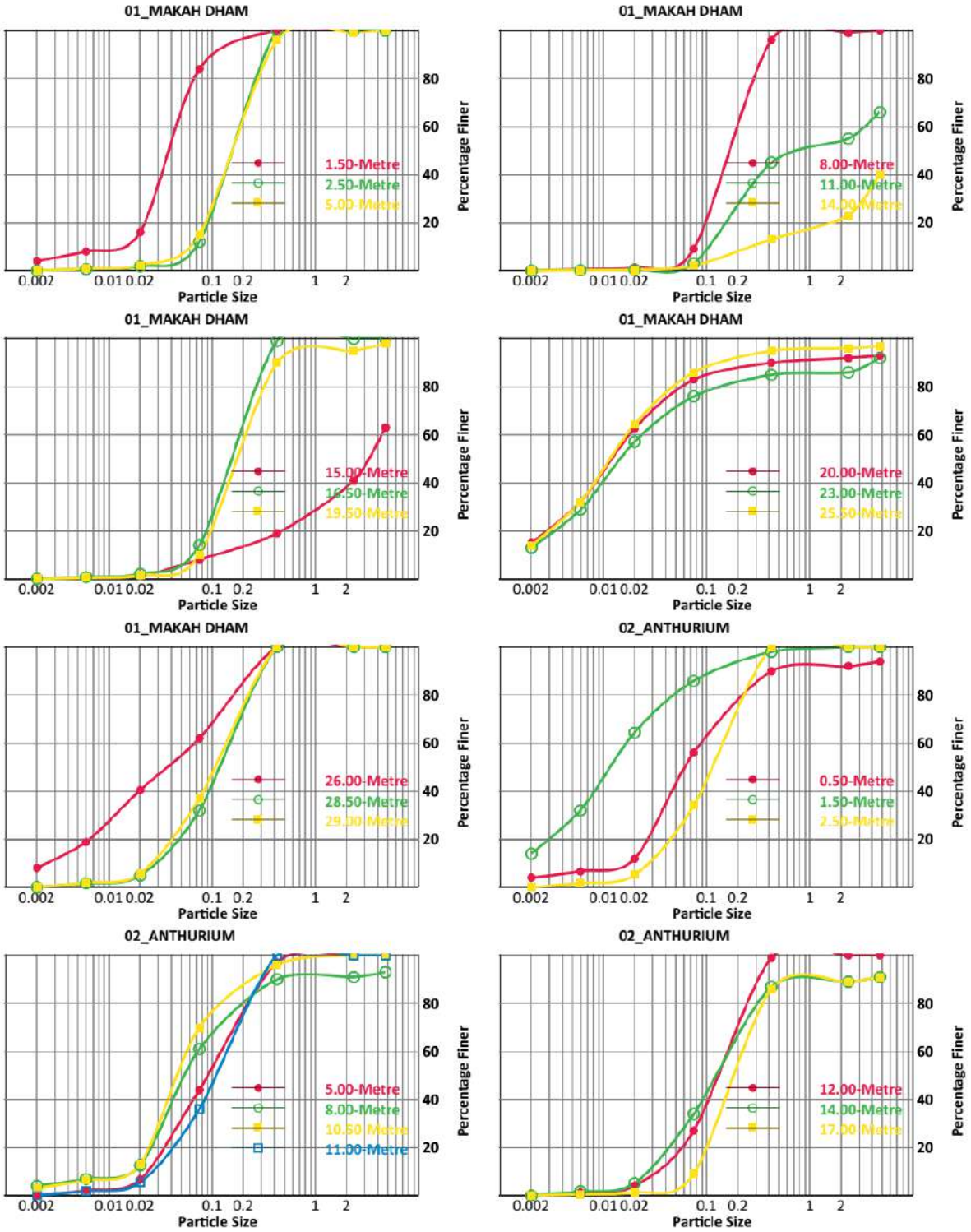
BH-09-Bhoomi Cricket Ground, Noida

DESCRIPTION	I.S. GROUP	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Silty Sands	SM	1.00	D		-	-
		1.50	D	5	-	-
		2.50	U		-	-
Inorganic Silts of low plasticity	ML	3.00	D	8	-	-
		4.50	D	11	-	-
		5.00	D		-	-
Inorganic clays of low plasticity	CL	6.00	D	15	-	-
		7.50	D	18	-	-
		8.00	D		-	-
Poorly Graded Sands with inorganic Silts of low plasticity	SP-ML	9.00	D	19	-	-
		10.50	D	22	-	-
		11.00	U		-	-
		12.00	D	23	-	-
		13.50	D	26	-	-
		14.00	D		-	-
Inorganic clays of low plasticity	CL	15.00	D	31	-	-
		16.50	D	35	-	-
		17.00	D		-	-
		18.00	D	48	-	-
		19.50	D	51	-	-
		20.00	D		-	-

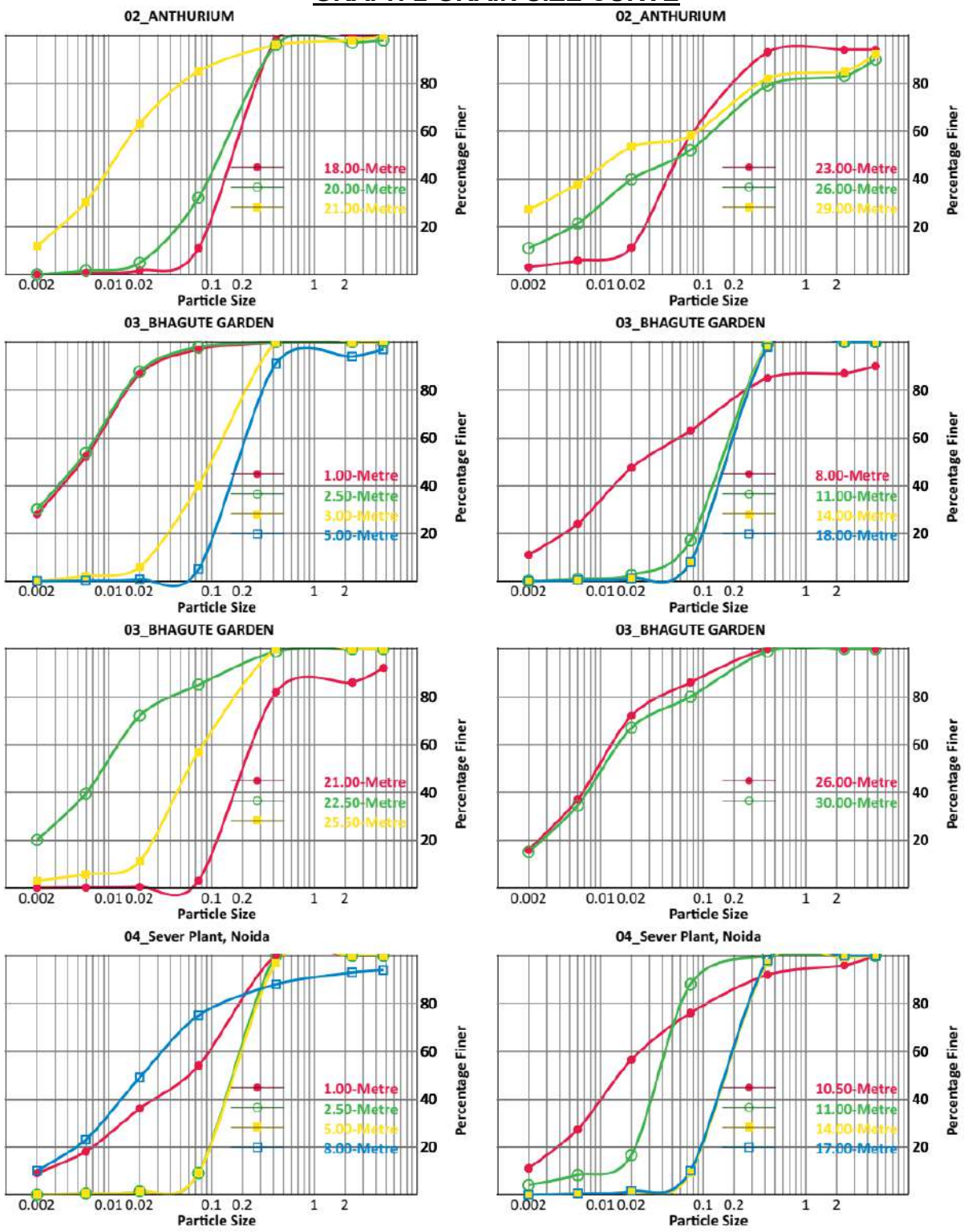
BH-09-Bhoomi Cricket Ground, Noida

DESCRIPTION	I.S. GROUP	DEPTH	TYPE OF SAMPLE	OBSERVED SPT VALUE	CR	RQD
Inorganic clays of low plasticity	CL	20.00	D		-	-
		21.00	D	54	-	-
		22.50	D	55	-	-
		23.00	D		-	-
		24.00	D	58	-	-
Silty Sands	SM	25.50	D	60	-	-
		26.00	D		-	-
		27.00	D	64	-	-
		28.50	D	67	-	-
		29.00	D		-	-
		30.00	D	73	-	-

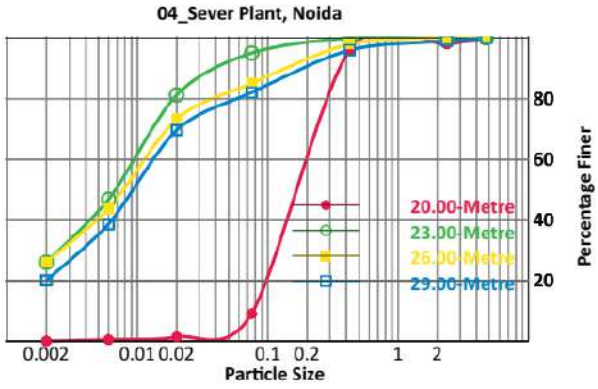
APPENDIX-E
GRAPH-1 GRAIN SIZE CURVE

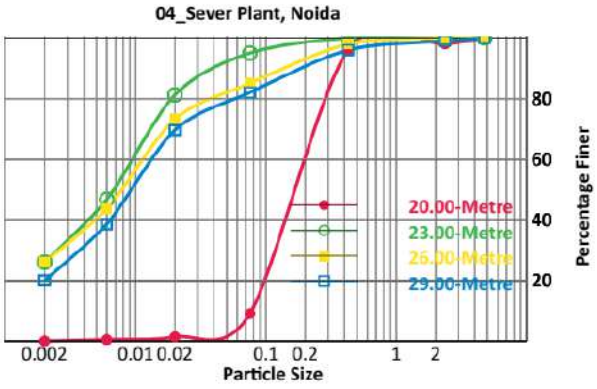


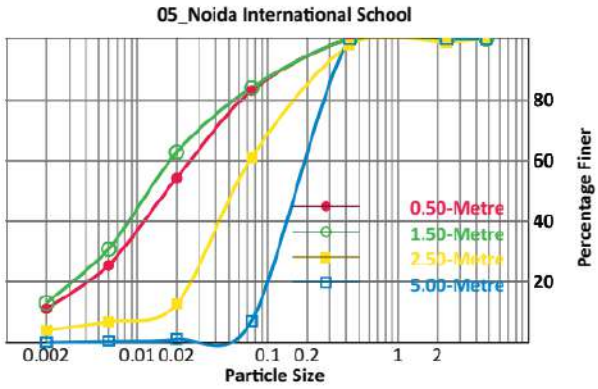
APPENDIX-E
GRAPH-2 GRAIN SIZE CURVE

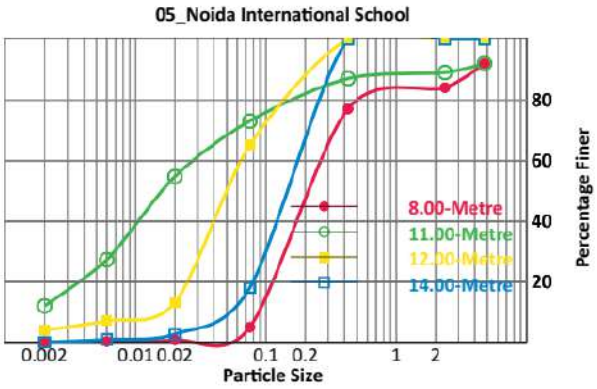


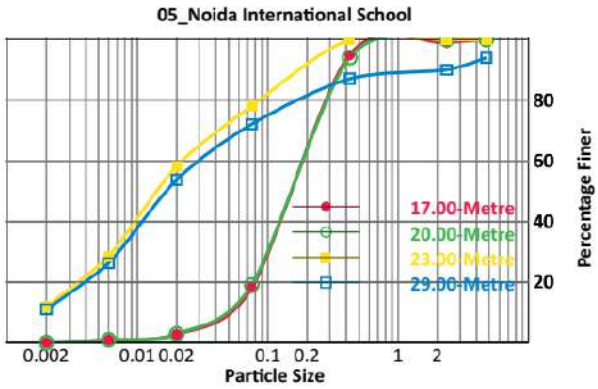
APPENDIX-E
GRAPH-3 GRAIN SIZE CURVE

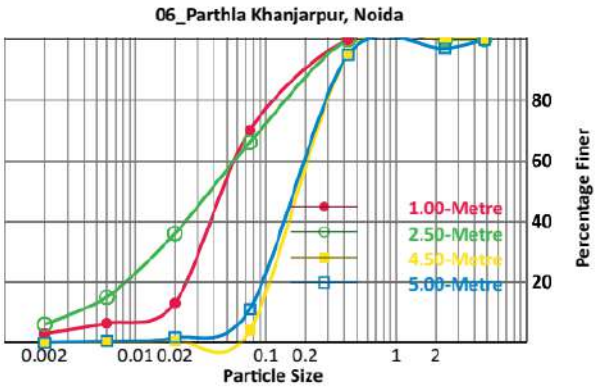


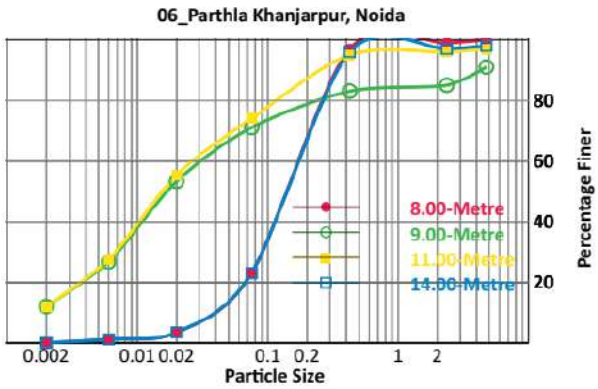


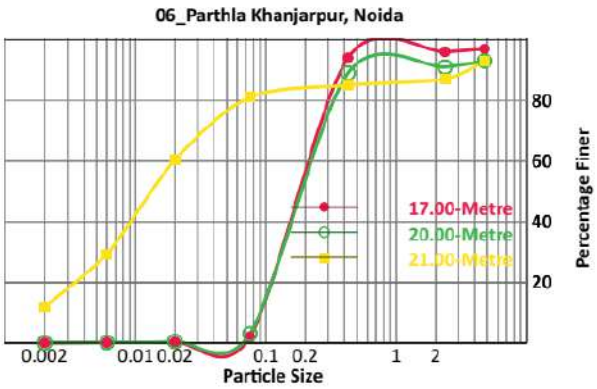




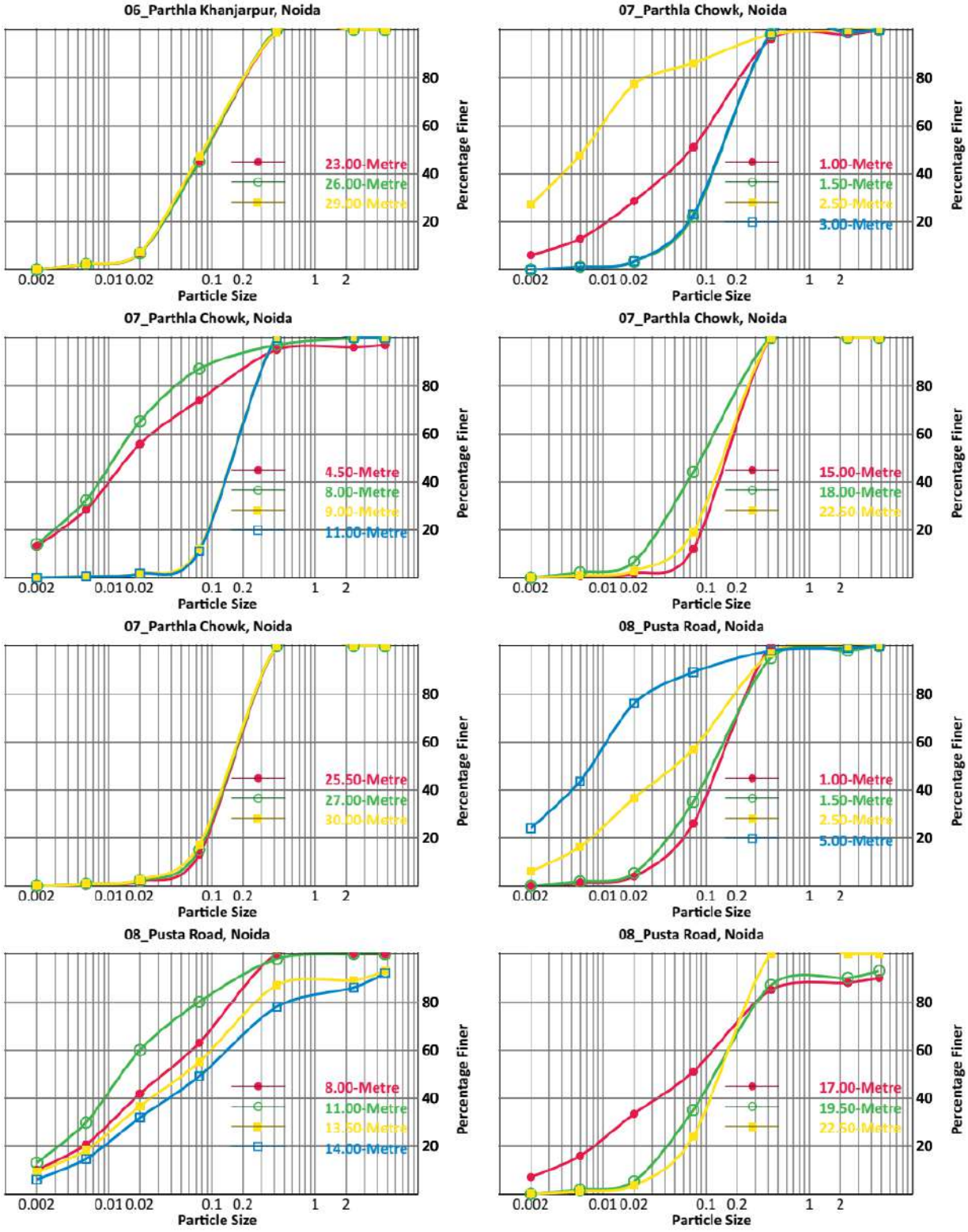




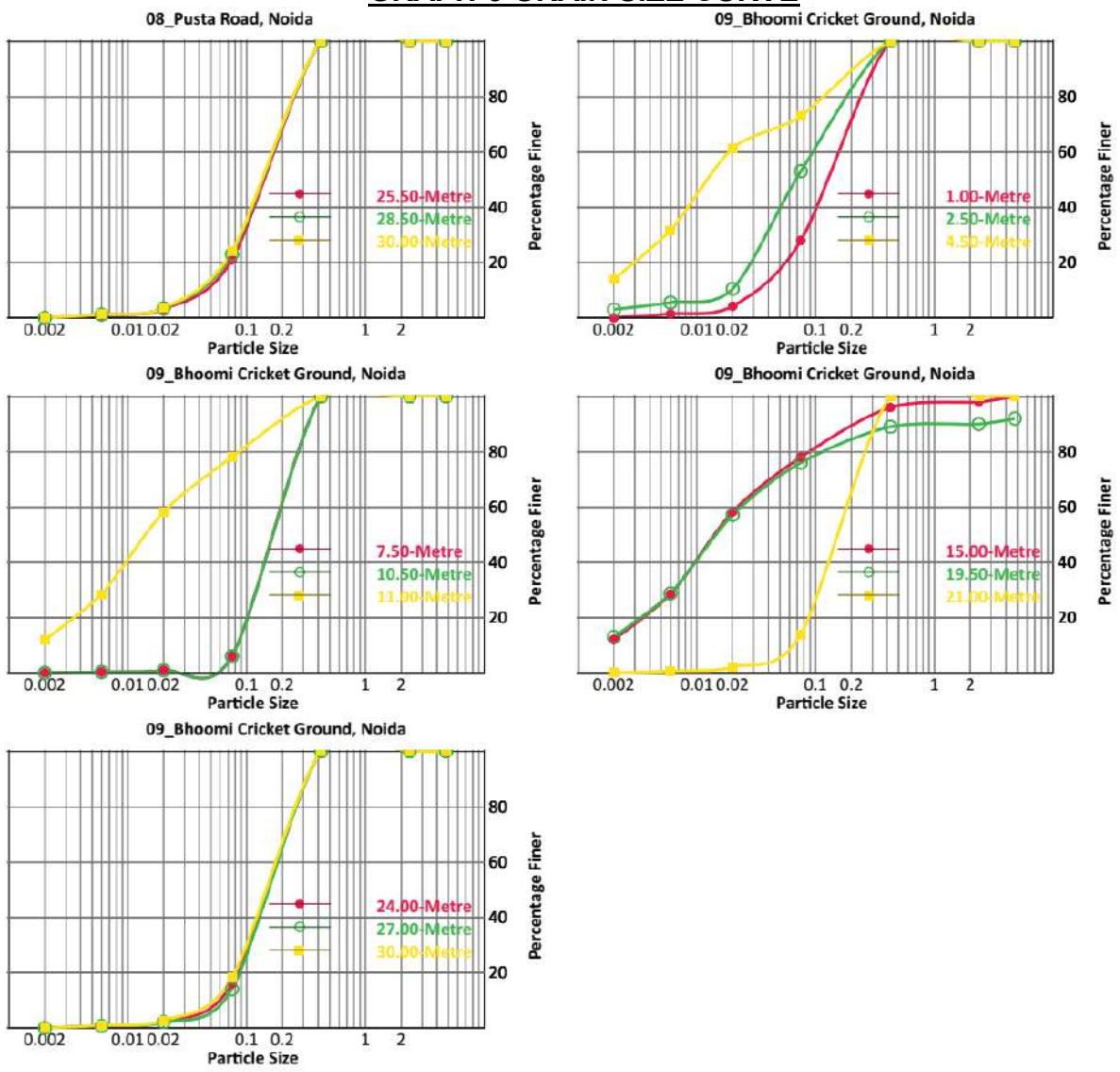




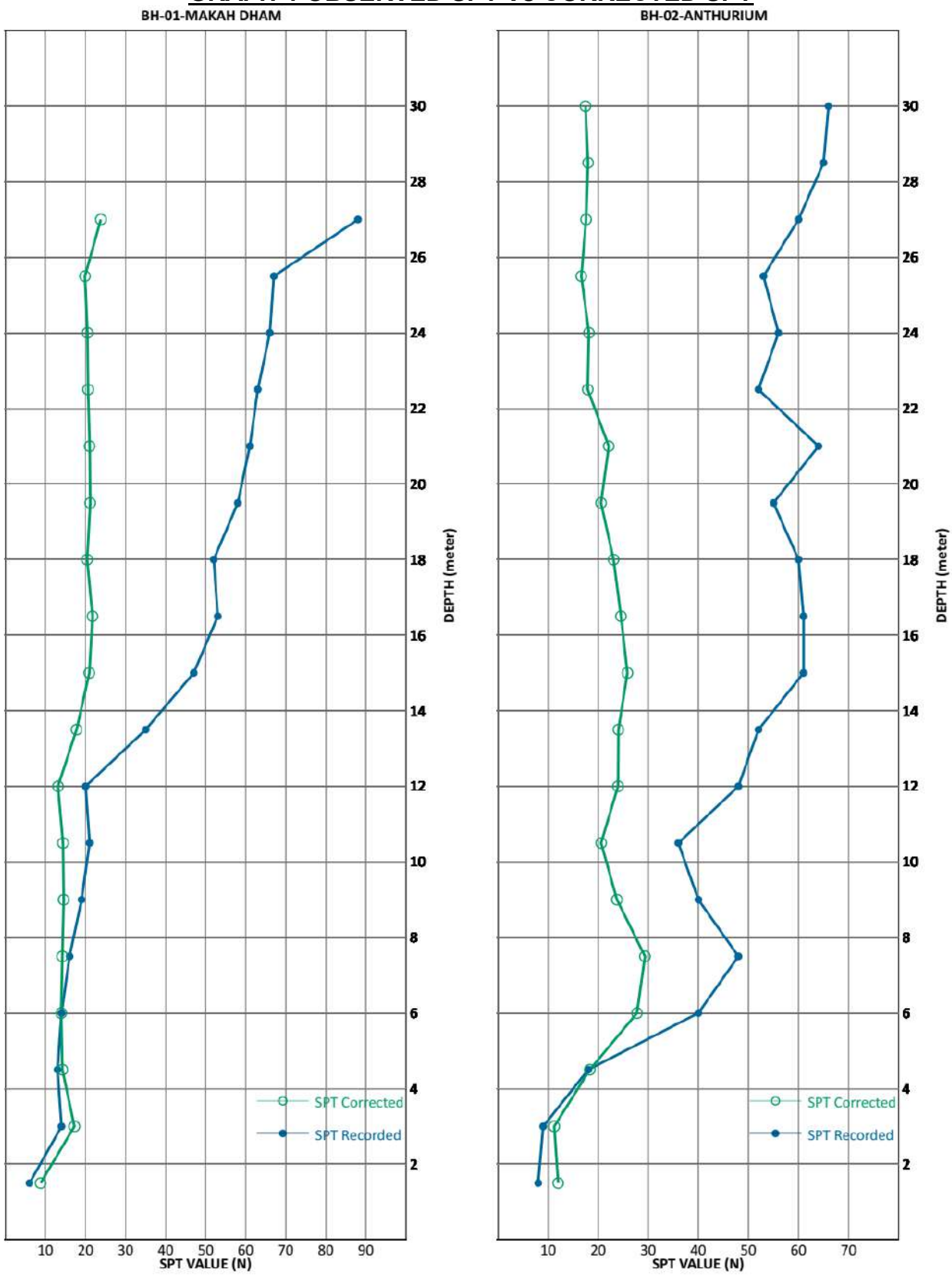
APPENDIX-E
GRAPH-4 GRAIN SIZE CURVE



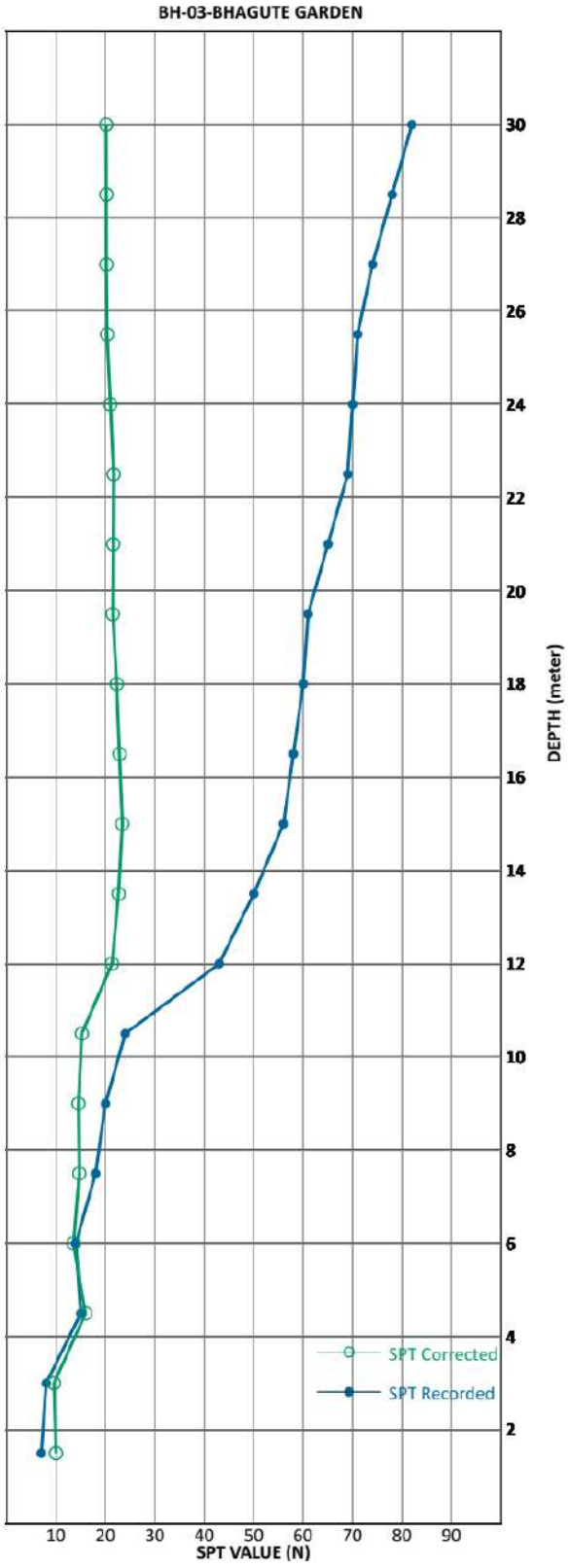
APPENDIX-E
GRAPH-5 GRAIN SIZE CURVE

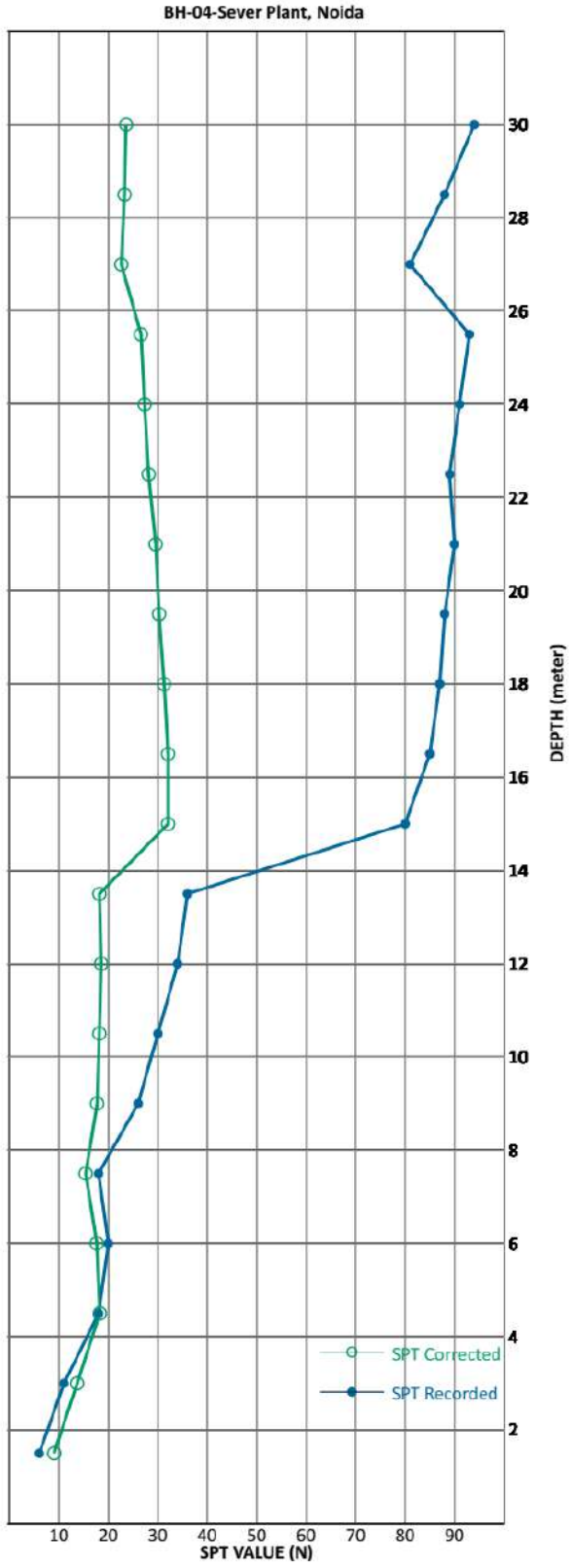


APPENDIX-F
GRAPH-1 OBSERVED SPT Vs CORRECTED SPT

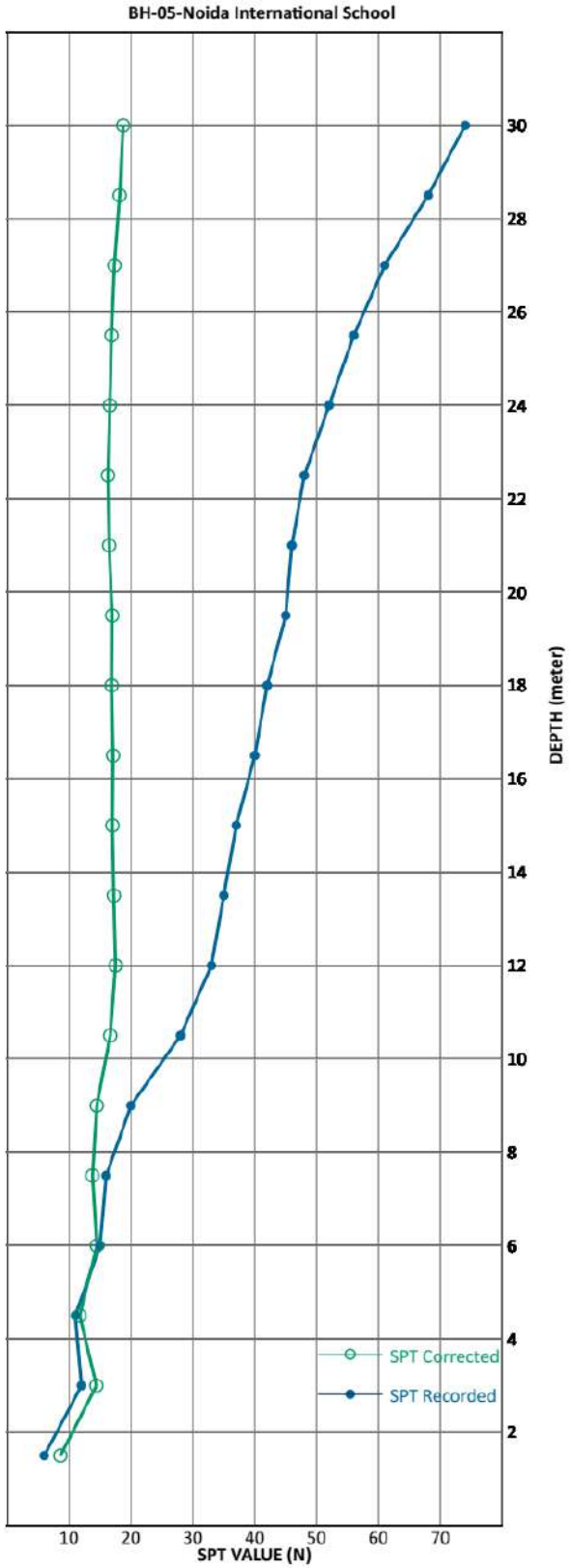


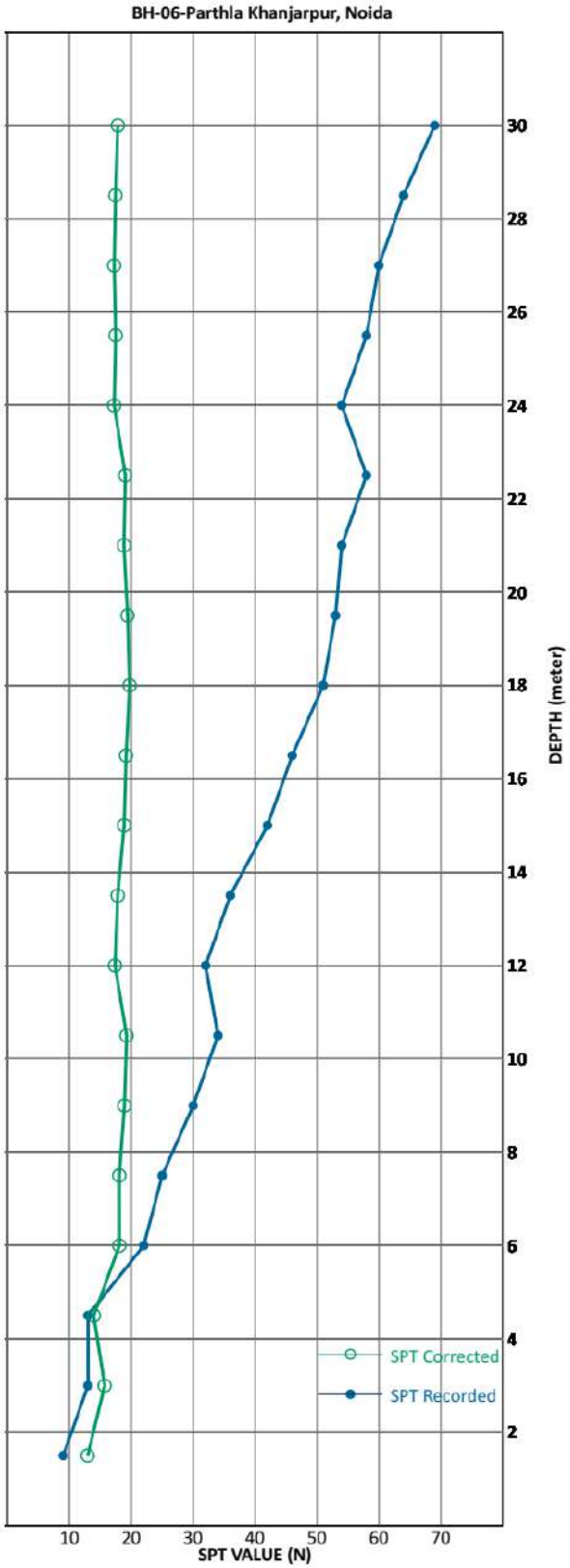
APPENDIX-F
GRAPH-2 OBSERVED SPT Vs CORRECTED SPT



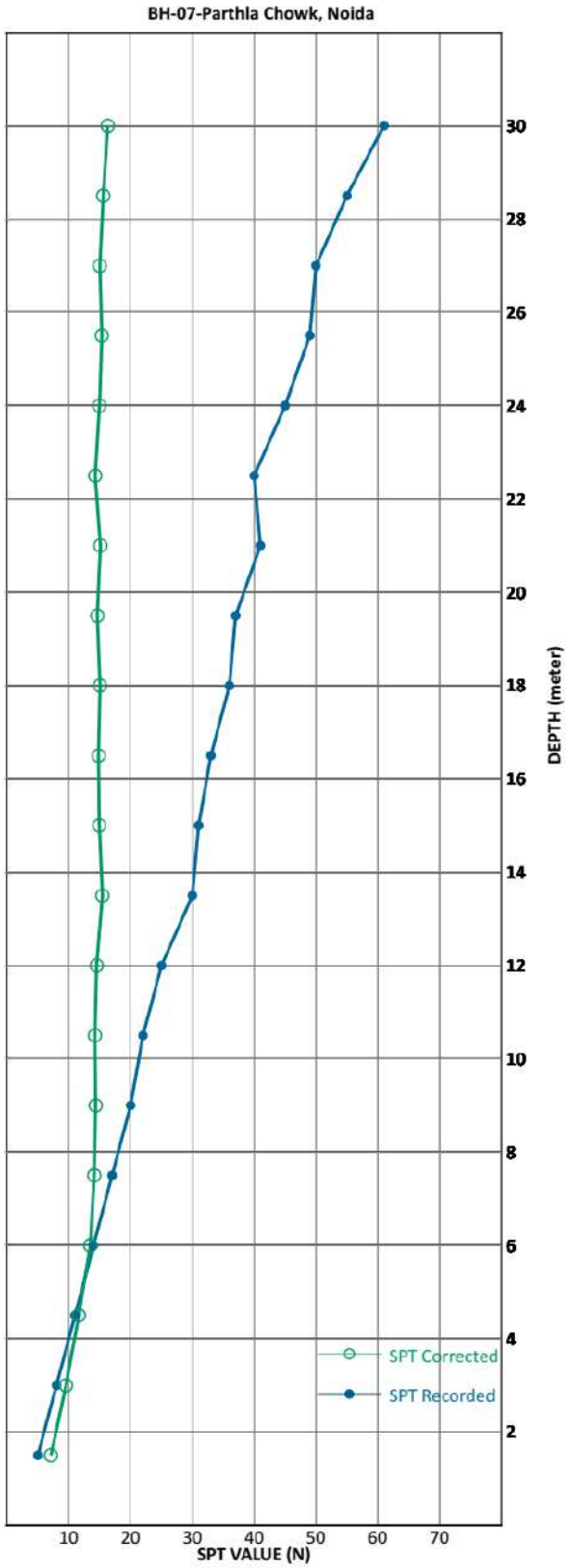


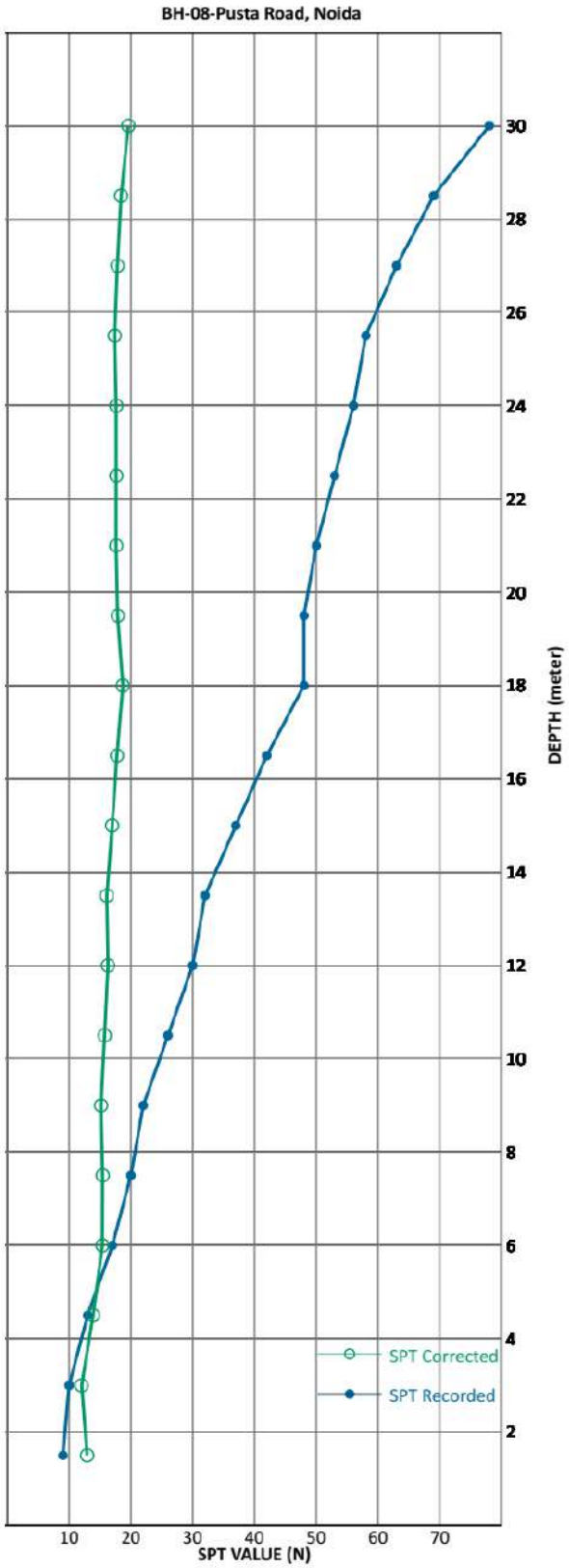
APPENDIX-F
GRAPH-3 OBSERVED SPT Vs CORRECTED SPT



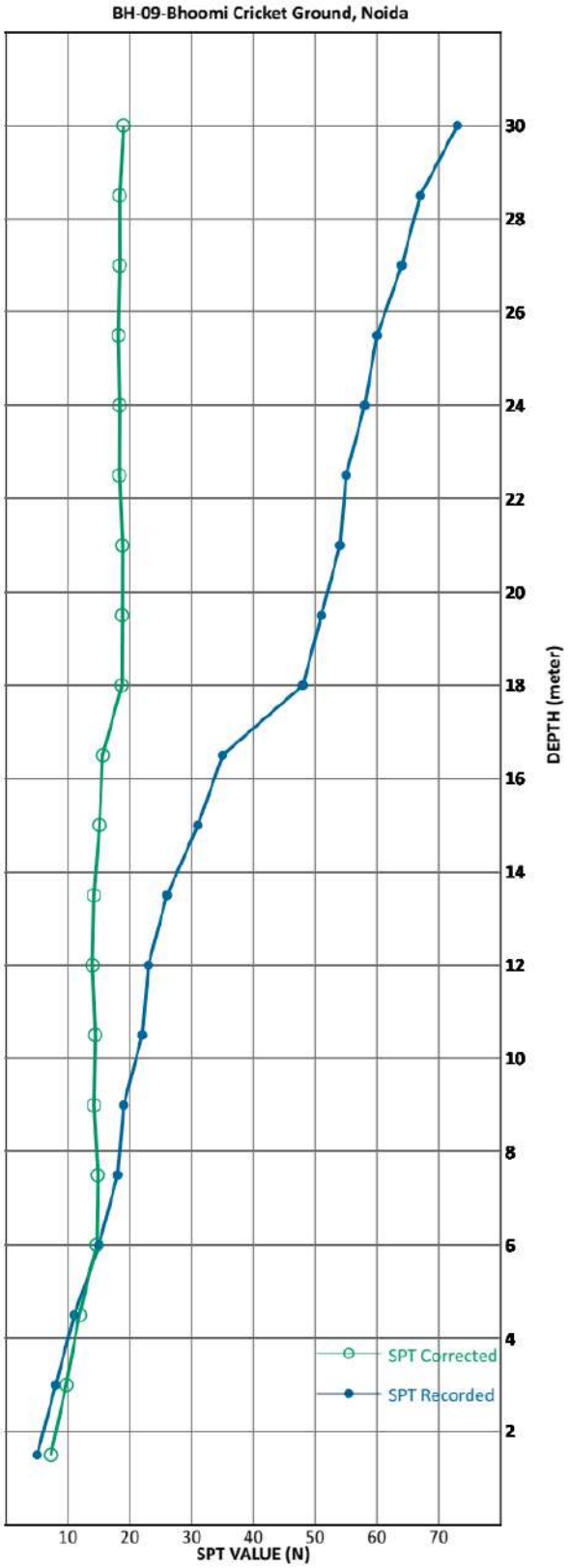


APPENDIX-F
GRAPH-4 OBSERVED SPT Vs CORRECTED SPT

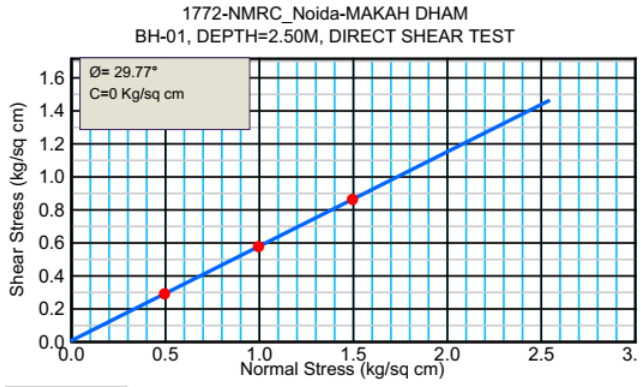


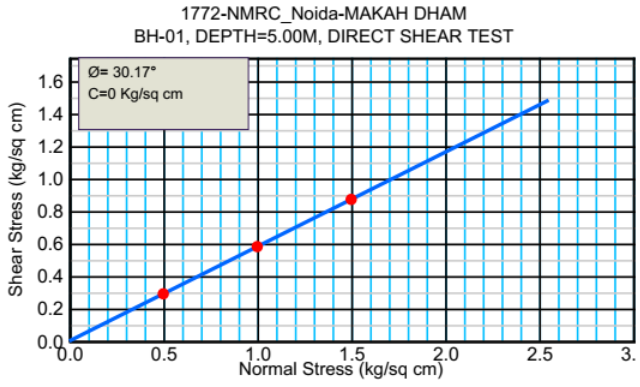


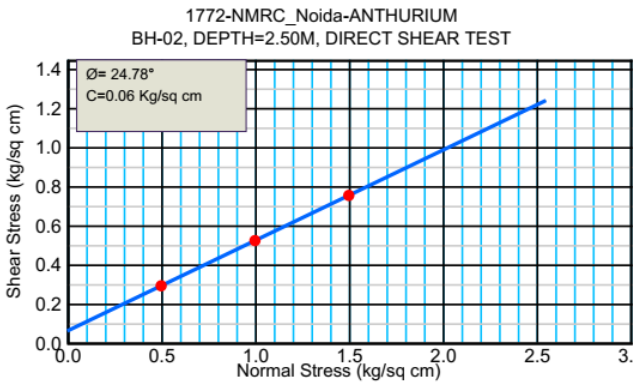
APPENDIX-F
GRAPH-5 OBSERVED SPT Vs CORRECTED SPT

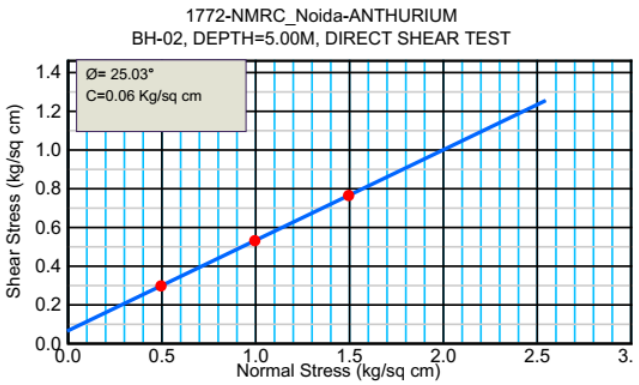


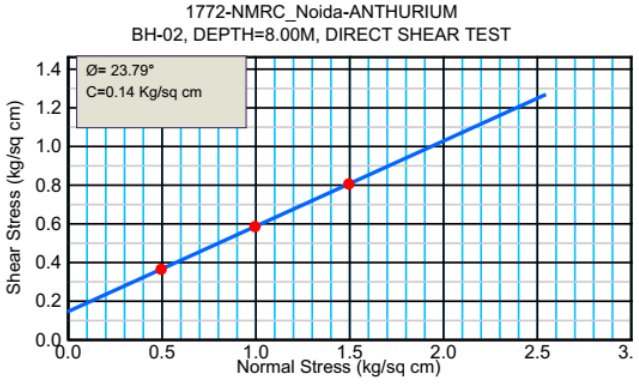
APPENDIX-G
GRAPH-1: DST GRAPH

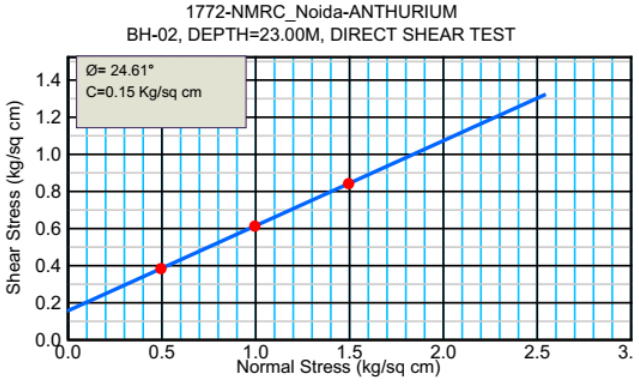


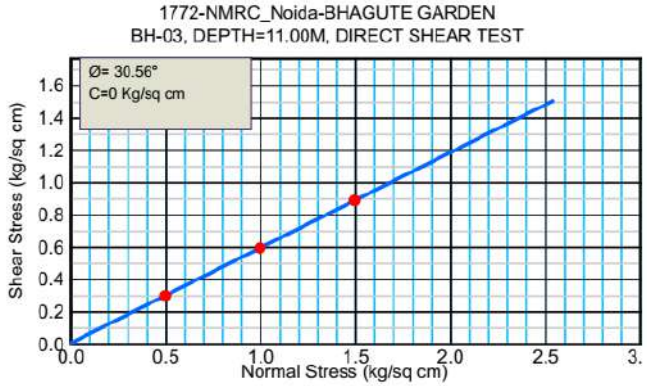




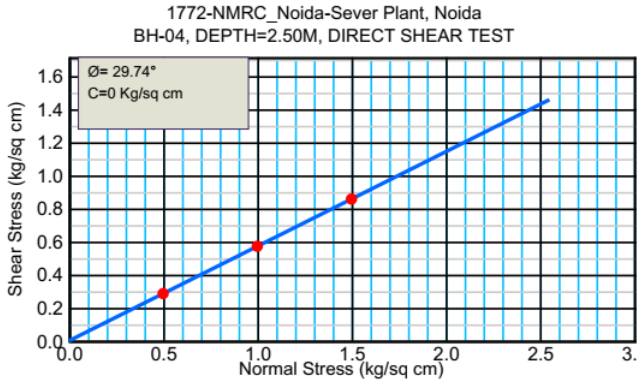


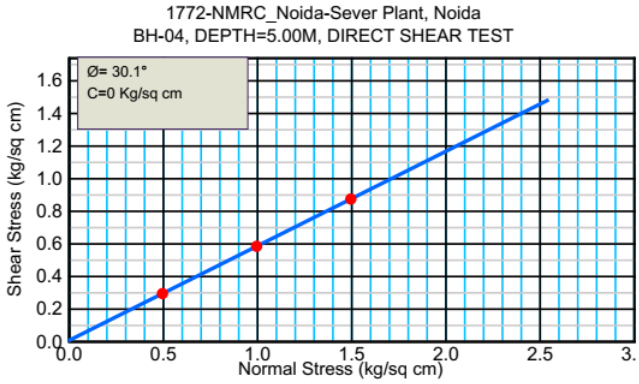


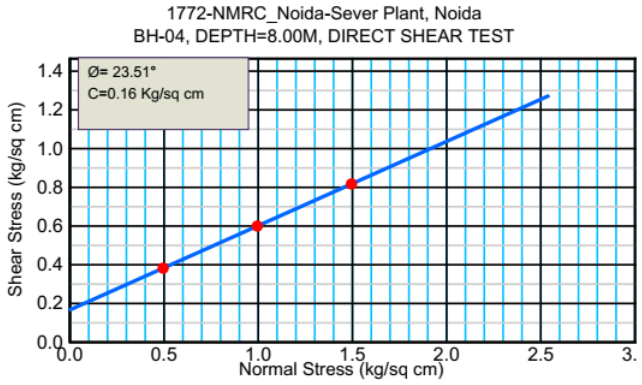


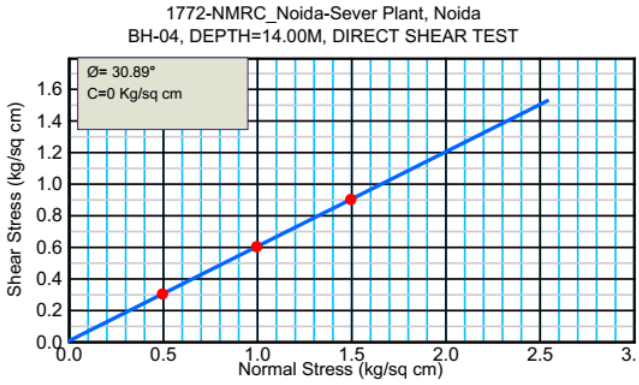


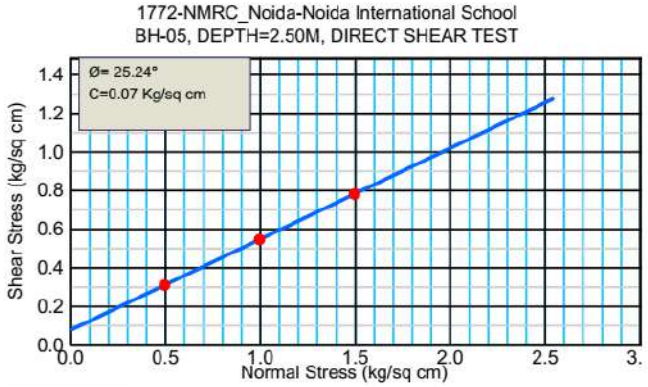
APPENDIX-G
GRAPH-2: DST GRAPH

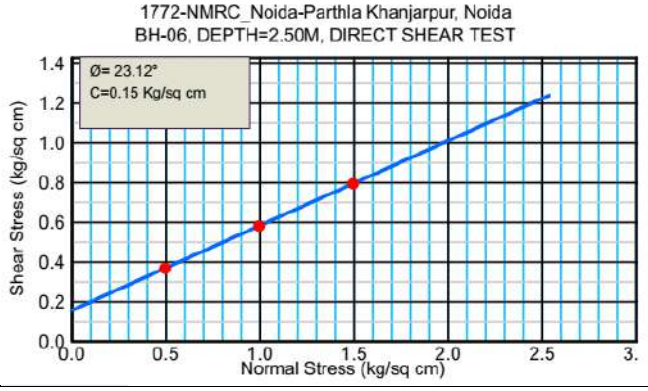


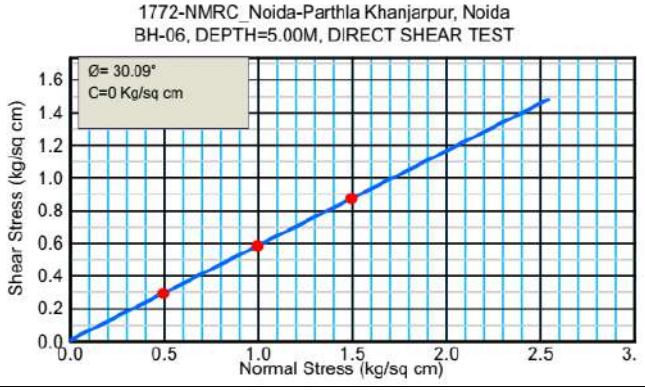




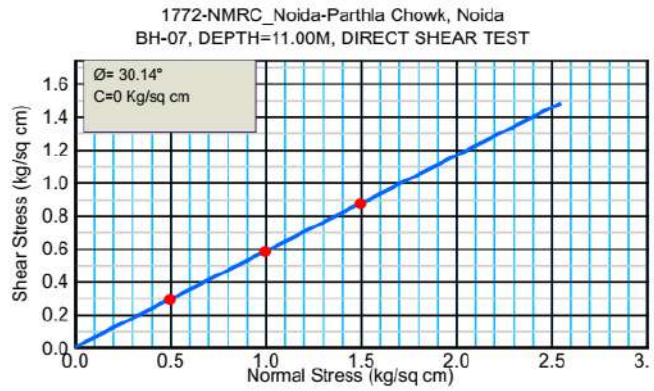


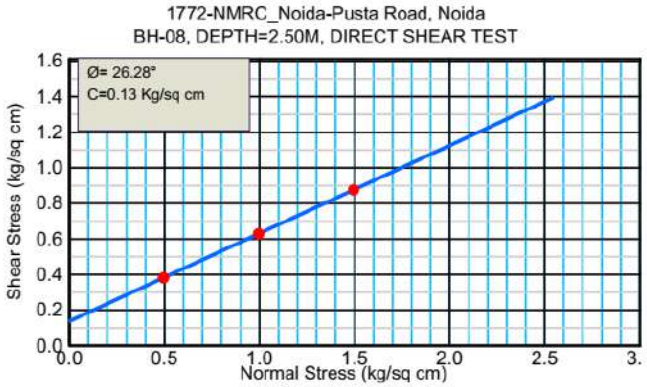


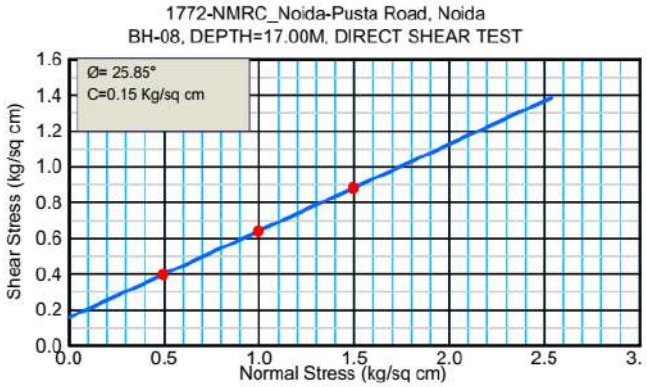


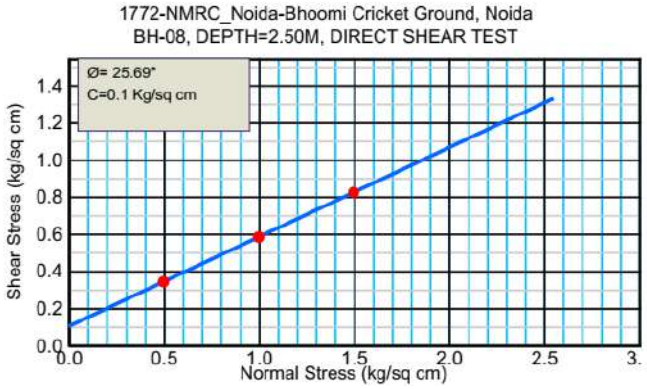


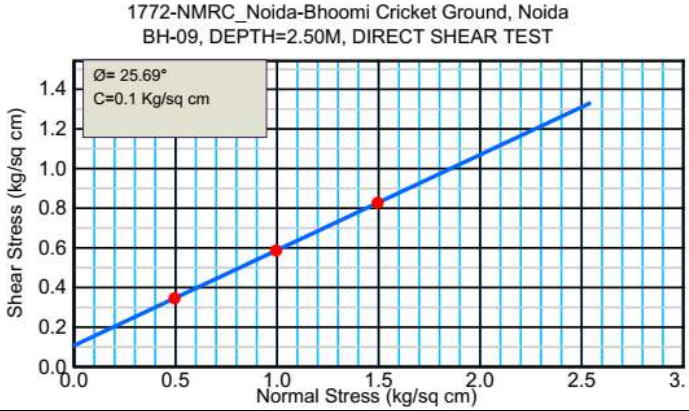
APPENDIX-G
GRAPH-3: DST GRAPH



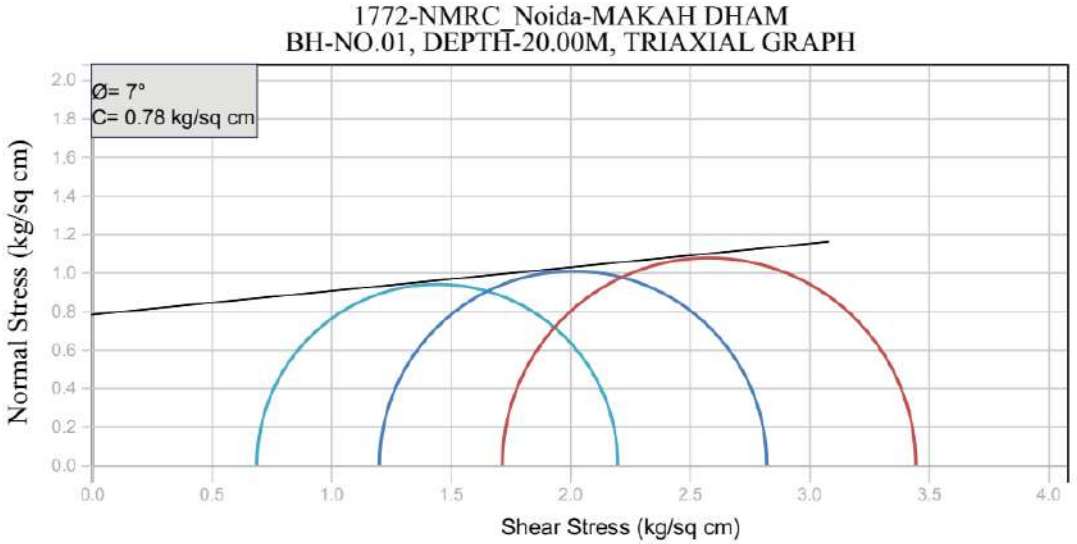


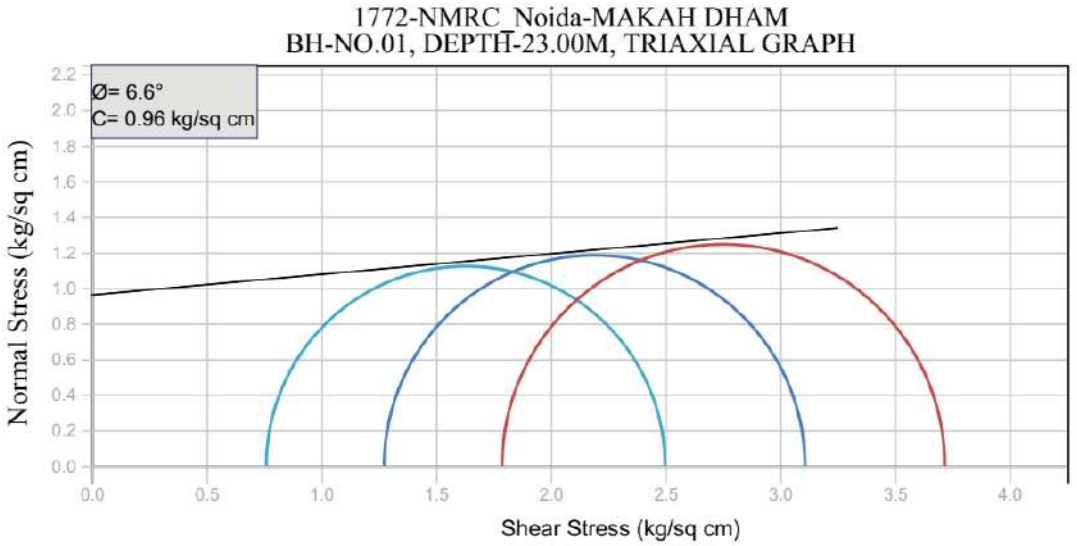


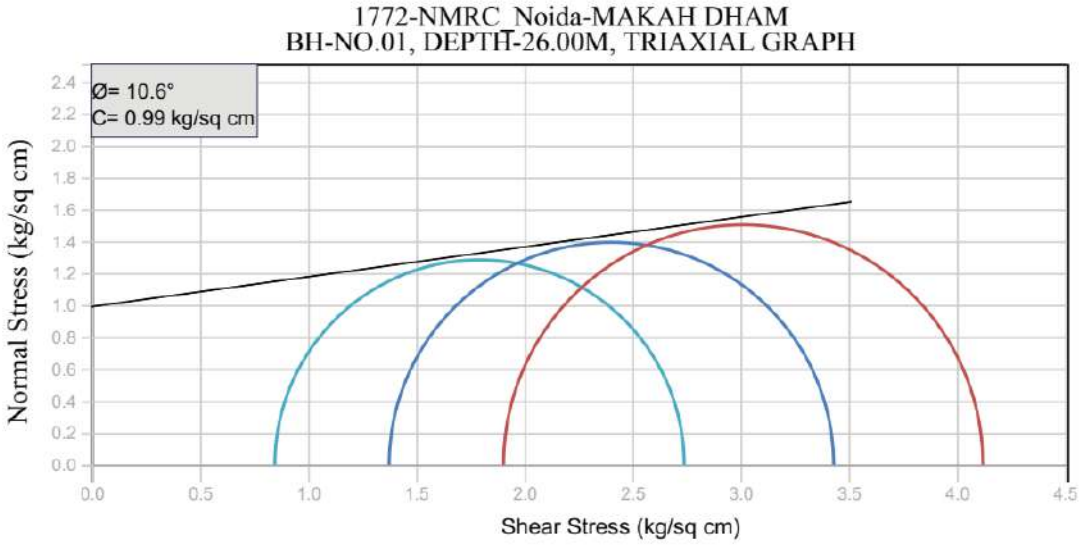




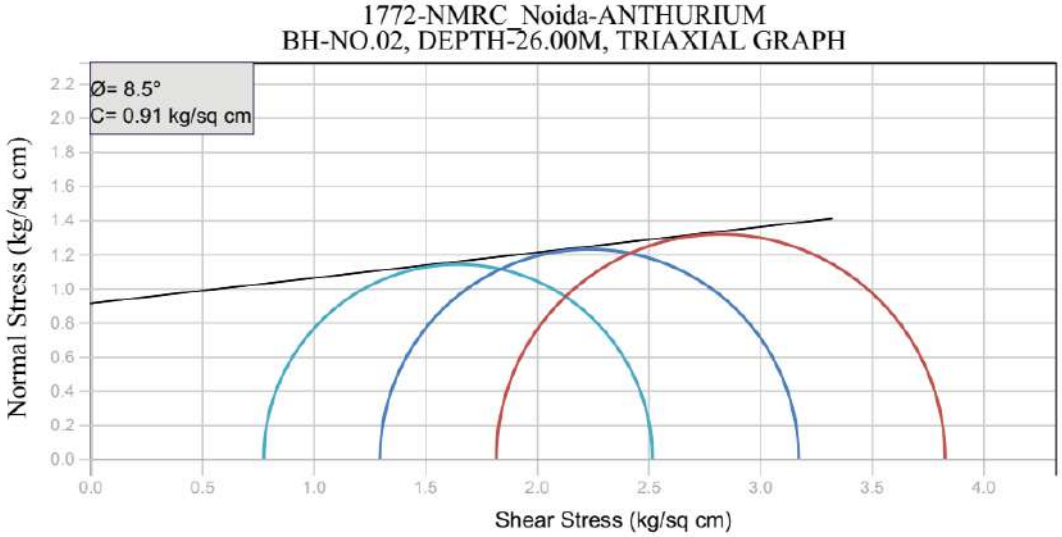
APPENDIX-H
GRAPH-1: UU GRAPH

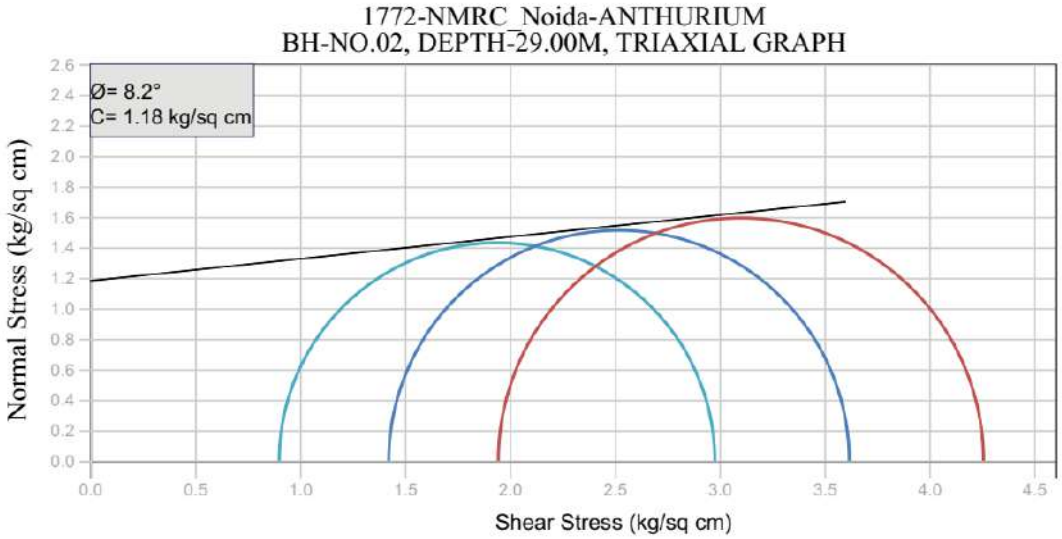




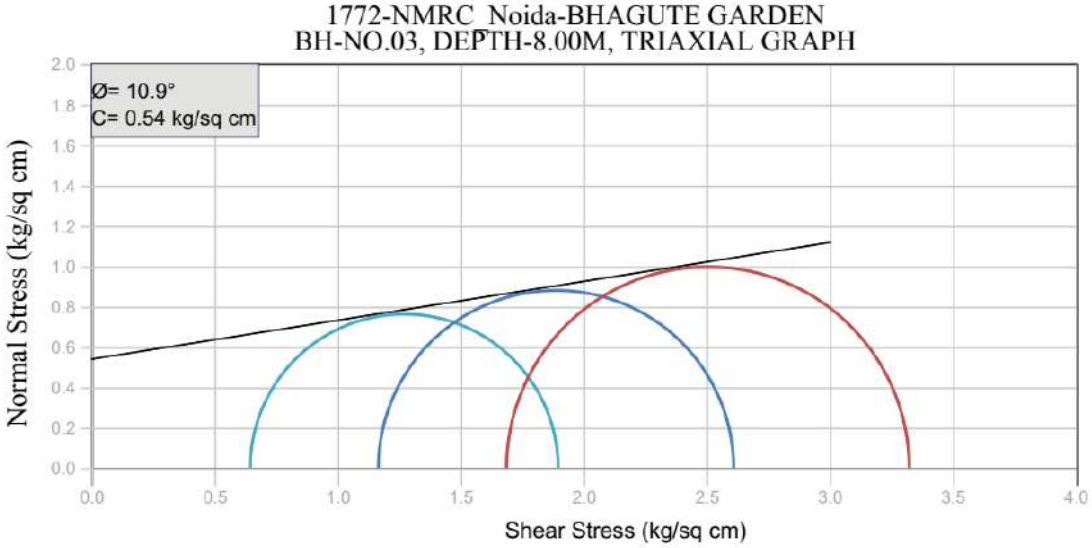


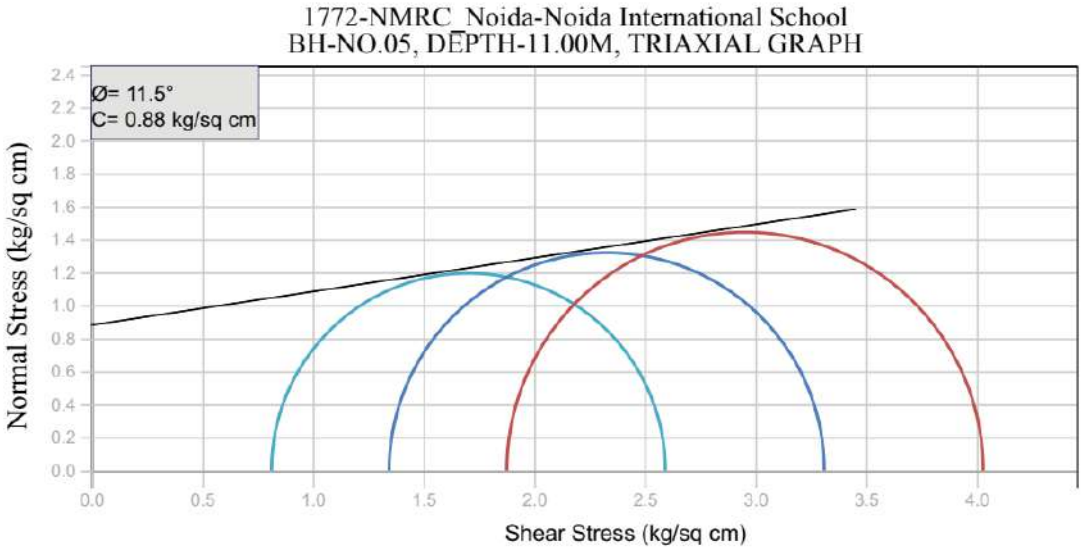
APPENDIX-H
GRAPH-2: UU GRAPH

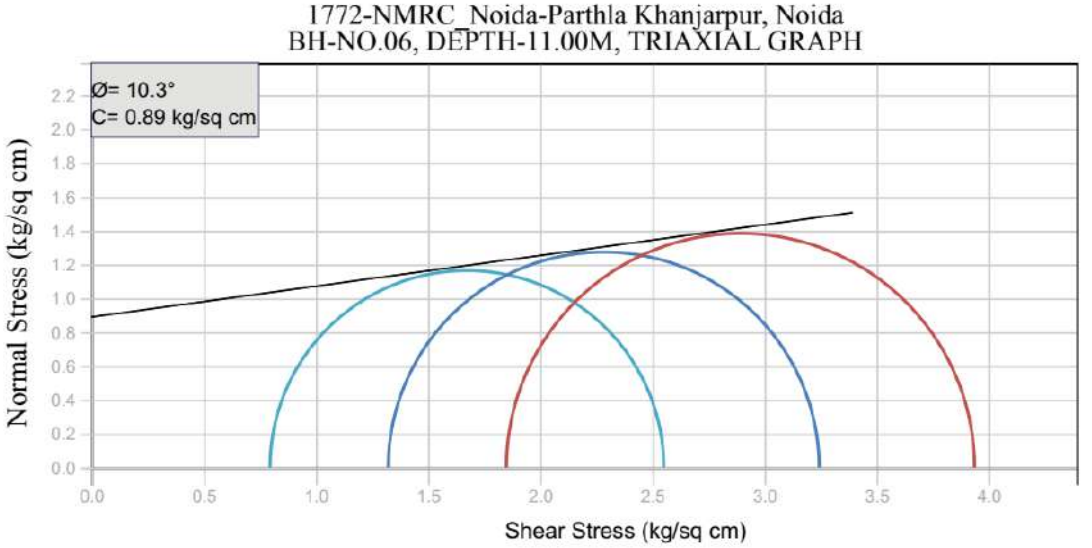




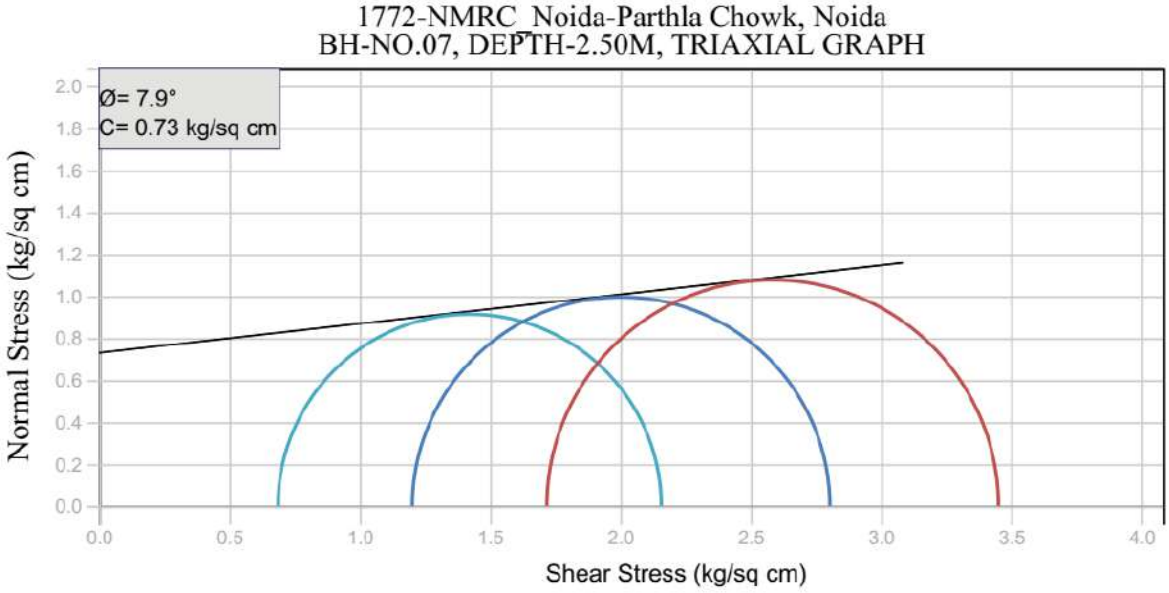
APPENDIX-H
GRAPH-3: UU GRAPH

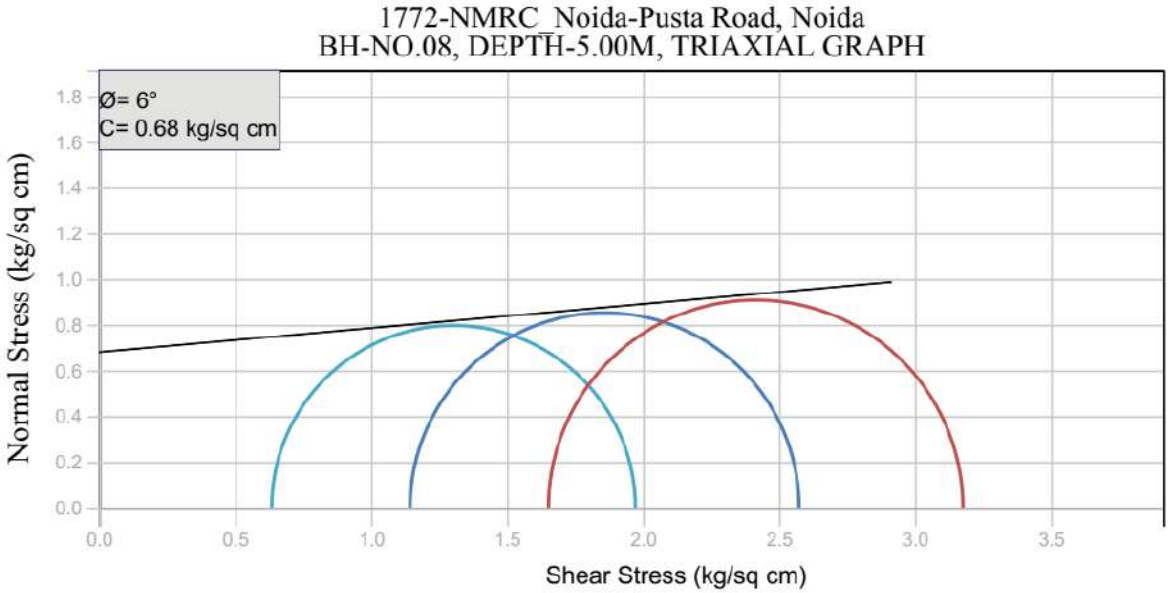




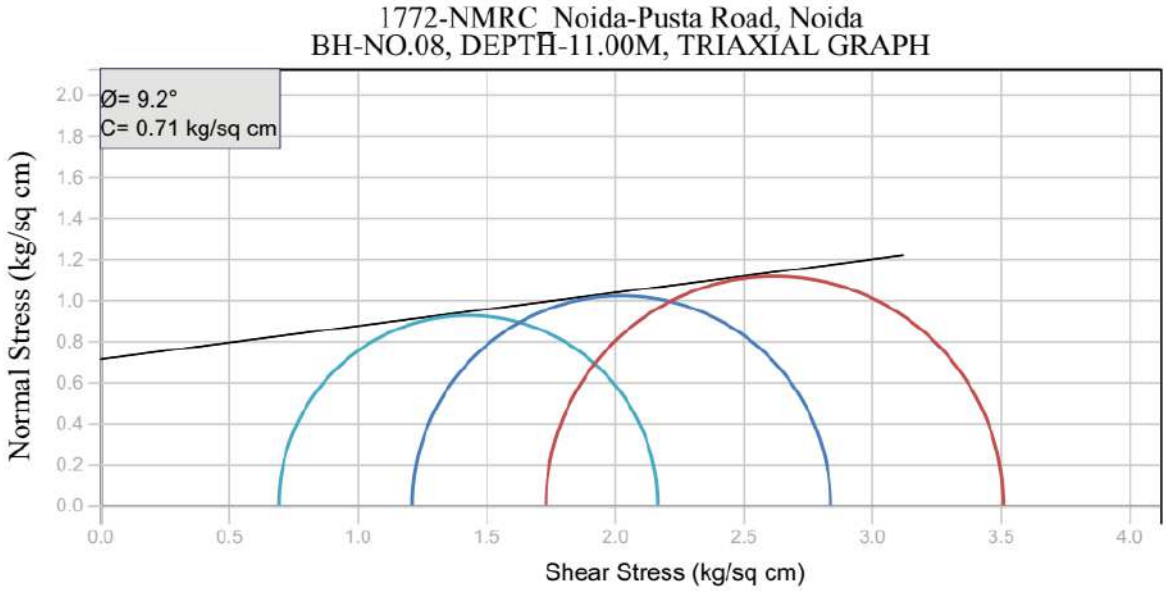


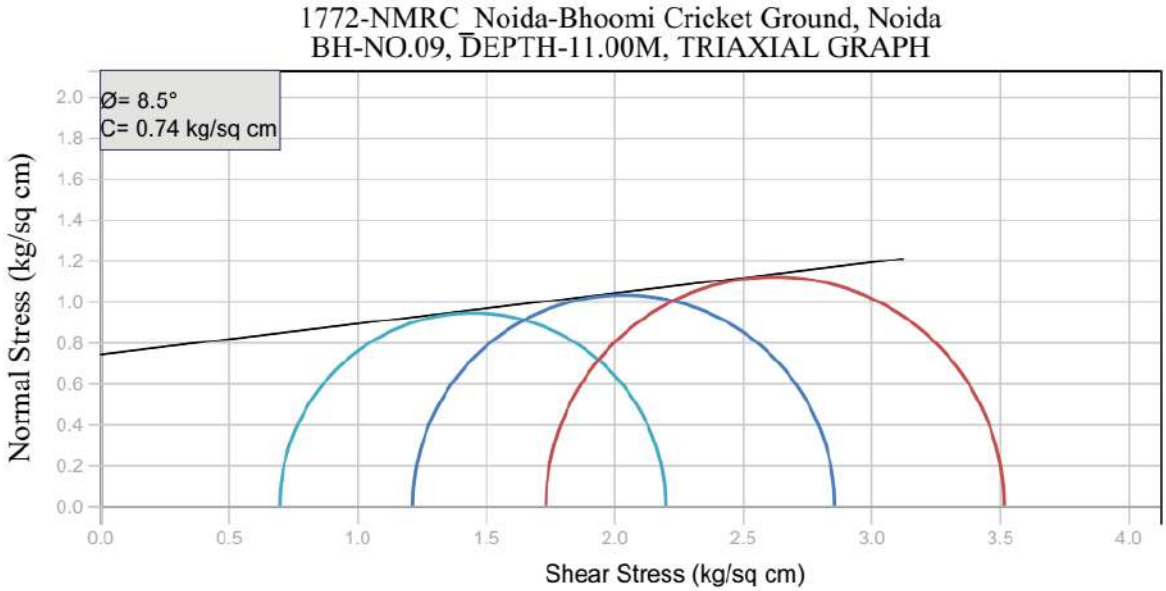
APPENDIX-H
GRAPH-4: UU GRAPH





APPENDIX-H
GRAPH-5: UU GRAPH





APPENDIX-I
TABLE-1 CALCULATION FOR LIQUEFACTION (BH-1)

Depth m	Soil Type	r_d	Cyclic Stress Ratio	Cyclic Stress Ratio, at M = 7.5	K_σ	Cyclic Resistance Ratio, τ_h/σ_v *	Factor of Safety against Liquefaction	Remarks
1.50	C	0.9983	0.2861	0.3267	-	-	-	Cohesive Soil
3.00	G	0.9895	0.2804	0.3201	1.000	0.201	0.6273	Liquefiable
4.50	G	0.9792	0.2725	0.3111	1.000	0.288	0.926	Liquefiable
6.00	G	0.9676	0.2669	0.3047	1.000	0.266	0.8741	Liquefiable
7.50	G	0.9547	0.2620	0.2991	1.000	3.262E-01	1.0907	No Liquefaction
9.00	G	0.9408	0.2573	0.2937	1.000	3.913E-01	1.332	No Liquefaction
10.50	G	0.9259	0.2526	0.2884	1.000	4.901E-01	1.6993	No Liquefaction
12.00	G	0.9101	0.2478	0.2830	1.000	3.721E-01	1.315	No Liquefaction
13.50	G	0.8938	0.2430	0.2775	1.000	9.819E+00	35.385	No Liquefaction
15.00	G	0.8769	0.2382	0.2720	0.557	6.685E+03	24582	No Liquefaction
16.50	G	0.8596	0.2333	0.2664	1.000	2.977E+06	1E+07	No Liquefaction
18.00	G	0.8422	0.2284	0.2608	1.000	2.261E+05	867002	No Liquefaction
19.50	G	0.8248	0.2235	0.2552	1.000	2.342E+08	9E+08	No Liquefaction
22.50	C	0.8076	0.2172	0.248	-	-	-	Cohesive Soil
25.00	C	0.7907	0.2106	0.2405	-	-	-	Cohesive Soil
28.50	C	0.7743	0.2046	0.2336	-	-	-	Cohesive Soil
29.00	C	0.7743	0.2046	0.2336	-	-	-	Cohesive Soil
30.00	C	0.7587	0.199	0.2272	-	-	-	Cohesive Soil

APPENDIX-I
TABLE-2 CALCULATION FOR LIQUEFACTION (BH-2)

Depth m	Soil Type	r_d	Cyclic Stress Ratio	Cyclic Stress Ratio, at M = 7.5	K_σ	Cyclic Resistance Ratio, τ_h/σ_v *	Factor of Safety against Liquefaction	Remarks
1.50	C	0.9983	0.3083	0.3520	-	-	-	Cohesive Soil
3.00	G	0.9895	0.3010	0.3437	1.000	0.153	0.4451	Liquefiable
4.50	G	0.9792	0.2908	0.3321	1.000	0.634	1.9091	No Liquefaction
6.00	G	0.9676	0.2841	0.3244	1.000	1902.693	5866	No Liquefaction
7.50	G	0.9547	0.2784	0.3179	0.328	2.737E+07	9E+07	No Liquefaction
9.00	C	0.9408	0.2690	0.3071	-	-	-	Cohesive Soil
10.50	C	0.9259	0.2595	0.2963	-	-	-	Cohesive Soil
12.00	G	0.9101	0.2515	0.2871	0.677	5.836E+05	2E+06	No Liquefaction
13.50	G	0.8938	0.2443	0.2789	0.976	2.329E+07	8E+07	No Liquefaction
15.00	G	0.8769	0.2376	0.2713	1.000	2.627E+13	1E+14	No Liquefaction
16.50	G	0.8596	0.2314	0.2642	1.000	1.790E+12	7E+12	No Liquefaction
18.00	G	0.8422	0.2255	0.2574	1.000	2.687E+10	1E+11	No Liquefaction
19.50	G	0.8248	0.2198	0.2509	1.000	1.703E+06	7E+06	No Liquefaction
22.50	C	0.8076	0.2137	0.244	-	-	-	Cohesive Soil
25.00	C	0.7907	0.2077	0.2372	-	-	-	Cohesive Soil
28.50	C	0.7743	0.2021	0.2308	-	-	-	Cohesive Soil
29.00	C	0.7743	0.2021	0.2308	-	-	-	Cohesive Soil
30.00	C	0.7587	0.197	0.2249	-	-	-	Cohesive Soil

APPENDIX-I
TABLE-3 CALCULATION FOR LIQUEFACTION (BH-3)

Depth m	Soil Type	r_d	Cyclic Stress Ratio	Cyclic Stress Ratio, at M = 7.5	K_σ	Cyclic Resistance Ratio, τ_h/σ_v *	Factor of Safety against Liquefaction	Remarks
1.50	C	0.9983	0.2542	0.2903	-	-	-	Cohesive Soil
3.00	C	0.9895	0.2520	0.2877	-	-	-	Cohesive Soil
4.50	G	0.9792	0.2493	0.2847	1.000	0.322	1.1324	No Liquefaction
6.00	G	0.9676	0.2464	0.2813	1.000	0.247	0.8766	Liquefiable
7.50	G	0.9547	0.2431	0.2776	1.000	3.667E-01	1.321	No Liquefaction
9.00	C	0.9408	0.2397	0.2737	-	-	-	Cohesive Soil
10.50	C	0.9259	0.2361	0.2696	-	-	-	Cohesive Soil
12.00	G	0.9101	0.2323	0.2652	1.000	1.159E+03	4372.2	No Liquefaction
13.50	G	0.8938	0.2282	0.2605	1.000	2.647E+05	1E+06	No Liquefaction
15.00	G	0.8769	0.2240	0.2557	1.000	1.786E+08	7E+08	No Liquefaction
16.50	G	0.8596	0.2196	0.2508	1.000	7.690E+08	3E+09	No Liquefaction
18.00	G	0.8422	0.2152	0.2458	1.000	4.273E+09	2E+10	No Liquefaction
19.50	G	0.8248	0.2108	0.2407	1.000	4.687E+09	2E+10	No Liquefaction
22.50	G	0.8076	0.2065	0.2357	1.000	2.735E+12	1E+13	No Liquefaction
25.00	G	0.7907	0.2022	0.2309	1.000	5.802E+13	3E+14	No Liquefaction
28.50	C	0.7743	0.198	0.2261	-	-	-	Cohesive Soil
29.00	C	0.7743	0.198	0.2261	-	-	-	Cohesive Soil
30.00	C	0.7587	0.194	0.2216	-	-	-	Cohesive Soil

APPENDIX-I
TABLE-4 CALCULATION FOR LIQUEFACTION (BH-4)

Depth m	Soil Type	r_d	Cyclic Stress Ratio	Cyclic Stress Ratio, at M = 7.5	K_σ	Cyclic Resistance Ratio, τ_h/σ_v *	Factor of Safety against Liquefaction	Remarks
1.50	C	0.9983	0.3022	0.3451	-	-	-	Cohesive Soil
3.00	G	0.9895	0.2986	0.3409	1.000	0.170	0.498	Liquefiable
4.50	G	0.9792	0.2939	0.3356	1.000	0.638	1.9017	No Liquefaction
6.00	G	0.9676	0.2896	0.3307	1.000	0.620	1.8762	No Liquefaction
7.50	G	0.9547	0.2853	0.3258	1.000	4.554E-01	1.3977	No Liquefaction
9.00	C	0.9408	0.2725	0.3111	-	-	-	Cohesive Soil
10.50	C	0.9259	0.2595	0.2963	-	-	-	Cohesive Soil
12.00	C	0.9101	0.2493	0.2846	-	-	-	Cohesive Soil
13.50	G	0.8938	0.2420	0.2763	1.000	1.477E+01	53.442	No Liquefaction
15.00	G	0.8769	0.2354	0.2687	1.000	1.896E+43	7E+43	No Liquefaction
16.50	G	0.8596	0.2291	0.2616	1.000	4.574E+54	2E+55	No Liquefaction
18.00	G	0.8422	0.2232	0.2548	1.000	1.676E+59	7E+59	No Liquefaction
19.50	G	0.8248	0.2175	0.2484	1.000	1.250E+61	5E+61	No Liquefaction
22.50	G	0.8076	0.2121	0.2422	1.000	8.919E+66	4E+67	No Liquefaction
25.00	G	0.7907	0.2069	0.2363	1.000	6.268E+47	3E+48	No Liquefaction
28.50	C	0.7743	0.202	0.2307	-	-	-	Cohesive Soil
29.00	C	0.7743	0.202	0.2307	-	-	-	Cohesive Soil
30.00	C	0.7587	0.1974	0.2254	-	-	-	Cohesive Soil

APPENDIX-I
TABLE-5 CALCULATION FOR LIQUEFACTION (BH-5)

Depth m	Soil Type	r_d	Cyclic Stress Ratio	Cyclic Stress Ratio, at M = 7.5	K_σ	Cyclic Resistance Ratio, τ_h/σ_v *	Factor of Safety against Liquefaction	Remarks
1.50	C	0.9983	0.2575	0.2940	-	-	-	Cohesive Soil
3.00	C	0.9895	0.2552	0.2914	-	-	-	Cohesive Soil
4.50	C	0.9792	0.2526	0.2884	-	-	-	Cohesive Soil
6.00	G	0.9676	0.2496	0.2850	1.000	0.271	0.9503	Liquefiable
7.50	G	0.9547	0.2463	0.2812	1.000	3.012E-01	1.071	No Liquefaction
9.00	G	0.9408	0.2427	0.2771	1.000	3.979E-01	1.4358	No Liquefaction
10.50	G	0.9259	0.2388	0.2727	1.000	1.527E+00	5.5988	No Liquefaction
12.00	C	0.9101	0.2336	0.2668	-	-	-	Cohesive Soil
13.50	C	0.8938	0.2281	0.2604	-	-	-	Cohesive Soil
15.00	G	0.8769	0.2227	0.2543	0.911	7.070E+00	27.8	No Liquefaction
16.50	G	0.8596	0.2175	0.2484	0.846	1.374E+01	55.335	No Liquefaction
18.00	G	0.8422	0.2125	0.2426	0.784	1.876E+01	77.336	No Liquefaction
19.50	G	0.8248	0.2075	0.237	0.676	4.363E+01	184.11	No Liquefaction
22.50	G	0.8076	0.2027	0.2315	0.627	3.946E+01	170.48	No Liquefaction
25.00	G	0.7907	0.1981	0.2262	0.565	4.132E+01	182.65	No Liquefaction
28.50	C	0.7743	0.1937	0.2212	-	-	-	Cohesive Soil
29.00	C	0.7743	0.1937	0.2212	-	-	-	Cohesive Soil
30.00	C	0.7587	0.1895	0.2164	-	-	-	Cohesive Soil

APPENDIX-I
TABLE-6 CALCULATION FOR LIQUEFACTION (BH-6)

Depth m	Soil Type	r_d	Cyclic Stress Ratio	Cyclic Stress Ratio, at M = 7.5	K_σ	Cyclic Resistance Ratio, τ_h/σ_v *	Factor of Safety against Liquefaction	Remarks
1.50	C	0.9983	0.2628	0.3001	-	-	-	Cohesive Soil
3.00	C	0.9895	0.2605	0.2974	-	-	-	Cohesive Soil
4.50	C	0.9792	0.2578	0.2943	-	-	-	Cohesive Soil
6.00	G	0.9676	0.2556	0.2918	1.000	0.647	2.2171	No Liquefaction
7.50	G	0.9547	0.2527	0.2886	1.000	1.376E+00	4.7668	No Liquefaction
9.00	G	0.9408	0.2494	0.2848	1.000	3.266E+00	11.471	No Liquefaction
10.50	C	0.9259	0.2425	0.2769	-	-	-	Cohesive Soil
12.00	C	0.9101	0.2364	0.2699	-	-	-	Cohesive Soil
13.50	C	0.8938	0.2306	0.2632	-	-	-	Cohesive Soil
15.00	G	0.8769	0.2250	0.2569	0.857	8.775E+01	341.55	No Liquefaction
16.50	G	0.8596	0.2197	0.2508	0.654	4.034E+02	1608.4	No Liquefaction
18.00	G	0.8422	0.2145	0.2449	-1.591	-2.634E+04	-1E+05	Liquefiable
19.50	G	0.8248	0.2094	0.2391	1.000	4.199E+04	175612	No Liquefaction
22.50	G	0.8076	0.2045	0.2335	-1.843	-2.412E+04	-1E+05	Liquefiable
25.00	C	0.7907	0.1998	0.2282	-	-	-	Cohesive Soil
28.50	G	0.7743	0.1953	0.223	-1.157	-7.888E+03	-35366	Liquefiable
29.00	G	0.7743	0.1953	0.223	-1.157	-7.888E+03	-35366	Liquefiable
30.00	C	0.7587	0.1911	0.2182	1.000	1.894E+05	867976	No Liquefaction

APPENDIX-I
TABLE-7 CALCULATION FOR LIQUEFACTION (BH-7)

Depth m	Soil Type	r_d	Cyclic Stress Ratio	Cyclic Stress Ratio, at M = 7.5	K_σ	Cyclic Resistance Ratio, τ_h/σ_v *	Factor of Safety against Liquefaction	Remarks
1.50	C	0.9983	0.2480	0.2832	-	-	-	Cohesive Soil
3.00	C	0.9895	0.2458	0.2807	-	-	-	Cohesive Soil
4.50	G	0.9792	0.2433	0.2778	1.000	0.214	0.7701	Liquefiable
6.00	C	0.9676	0.2404	0.2745	-	-	-	Cohesive Soil
7.50	C	0.9547	0.2372	0.2708	-	-	-	Cohesive Soil
9.00	C	0.9408	0.2337	0.2669	-	-	-	Cohesive Soil
10.50	C	0.9259	0.2300	0.2627	-	-	-	Cohesive Soil
12.00	G	0.9101	0.2261	0.2582	0.993	5.861E-01	2.27	No Liquefaction
13.50	G	0.8938	0.2221	0.2536	0.960	1.140E+00	4.4955	No Liquefaction
15.00	G	0.8769	0.2179	0.2488	0.932	1.067E+00	4.2894	No Liquefaction
16.50	G	0.8596	0.2136	0.2439	0.902	1.258E+00	5.158	No Liquefaction
18.00	G	0.8422	0.2093	0.2389	0.861	2.001E+00	8.3761	No Liquefaction
19.50	G	0.8248	0.2049	0.234	0.836	1.936E+00	8.2757	No Liquefaction
22.50	G	0.8076	0.2007	0.2291	0.769	4.486E+00	19.582	No Liquefaction
25.00	G	0.7907	0.1965	0.2243	0.776	2.416E+00	10.772	No Liquefaction
28.50	G	0.7743	0.1924	0.2197	0.661	8.925E+00	40.628	No Liquefaction
29.00	G	0.7743	0.1924	0.2197	0.661	8.925E+00	40.628	No Liquefaction
30.00	C	0.7587	0.1885	0.2152	0.487	3.083E+01	143.22	No Liquefaction

APPENDIX-I
TABLE-8 CALCULATION FOR LIQUEFACTION (BH-8)

Depth m	Soil Type	r_d	Cyclic Stress Ratio	Cyclic Stress Ratio, at M = 7.5	K_σ	Cyclic Resistance Ratio, τ_h/σ_v *	Factor of Safety against Liquefaction	Remarks
1.50	G	0.9983	0.2592	0.2960	1.000	0.153	0.5169	Liquefiable
3.00	C	0.9895	0.2547	0.2908	-	-	-	Cohesive Soil
4.50	C	0.9792	0.2485	0.2837	-	-	-	Cohesive Soil
6.00	C	0.9676	0.2438	0.2784	-	-	-	Cohesive Soil
7.50	C	0.9547	0.2396	0.2736	-	-	-	Cohesive Soil
9.00	C	0.9408	0.2355	0.2689	-	-	-	Cohesive Soil
10.50	C	0.9259	0.2313	0.2641	-	-	-	Cohesive Soil
12.00	C	0.9101	0.2270	0.2592	-	-	-	Cohesive Soil
13.50	C	0.8938	0.2227	0.2543	-	-	-	Cohesive Soil
15.00	C	0.8769	0.2183	0.2493	-	-	-	Cohesive Soil
16.50	C	0.8596	0.2139	0.2442	-	-	-	Cohesive Soil
18.00	C	0.8422	0.2094	0.2391	-	-	-	Cohesive Soil
19.50	C	0.8248	0.205	0.234	-	-	-	Cohesive Soil
22.50	G	0.8076	0.2008	0.2292	0.274	2.058E+02	897.9	No Liquefaction
25.00	G	0.7907	0.1966	0.2245	-0.557	-2.324E+03	-10353	Liquefiable
28.50	G	0.7743	0.1926	0.2199	-27.174	-8.996E+05	-4E+06	Liquefiable
29.00	G	0.7743	0.1926	0.2199	-27.174	-8.996E+05	-4E+06	Liquefiable
30.00	G	0.7587	0.1888	0.2156	1.000	1.224E+05	567695	No Liquefaction

APPENDIX-I
TABLE-9 CALCULATION FOR LIQUEFACTION (BH-9)

Depth m	Soil Type	r_d	Cyclic Stress Ratio	Cyclic Stress Ratio, at M = 7.5	K_σ	Cyclic Resistance Ratio, τ_h/σ_v *	Factor of Safety against Liquefaction	Remarks
1.50	G	0.9983	0.2666	0.3043	1.000	0.122	0.4015	Liquefiable
3.00	C	0.9895	0.2642	0.3016	-	-	-	Cohesive Soil
4.50	C	0.9792	0.2614	0.2985	-	-	-	Cohesive Soil
6.00	C	0.9676	0.2583	0.2950	-	-	-	Cohesive Soil
7.50	C	0.9547	0.2549	0.2911	-	-	-	Cohesive Soil
9.00	G	0.9408	0.2462	0.2812	1.000	3.639E-01	1.2942	No Liquefaction
10.50	G	0.9259	0.2391	0.2730	1.000	5.012E-01	1.8363	No Liquefaction
12.00	C	0.9101	0.2327	0.2657	-	-	-	Cohesive Soil
13.50	C	0.8938	0.2268	0.2590	-	-	-	Cohesive Soil
15.00	C	0.8769	0.2212	0.2526	-	-	-	Cohesive Soil
16.50	C	0.8596	0.2158	0.2464	-	-	-	Cohesive Soil
18.00	C	0.8422	0.2106	0.2405	-	-	-	Cohesive Soil
19.50	C	0.8248	0.2056	0.2347	-	-	-	Cohesive Soil
22.50	C	0.8076	0.2007	0.2292	-	-	-	Cohesive Soil
25.00	G	0.7907	0.1961	0.2239	-8.869	-2.324E+05	-1E+06	Liquefiable
28.50	G	0.7743	0.1916	0.2188	1.000	2.732E+05	1E+06	No Liquefaction
29.00	G	0.7743	0.1916	0.2188	1.000	2.732E+05	1E+06	No Liquefaction
30.00	G	0.7587	0.1874	0.214	1.000	1.159E+06	5E+06	No Liquefaction

APPENDIX-J

TABLE 1: CALCULATIONS BASED ON SHEAR FAILURE CRITERIA

Isolated Footing for (B=5.0 meter)

BORE No.	B	D	CWT	Φ	c	e_0	γ_1	γ_2	q	N_c	N_q	N_γ	d_c	d_q	d_γ	w'	q_{na}
BH-1	5.00	3.00	0.00	29.80	0.00	0.719	16.90	17.70	21.10	18.04	8.86	8.79	1.17	1.08	1.08	0.50	153.52
BH-1	5.00	4.00	0.00	30.20	0.00	0.703	16.90	17.70	28.80	19.67	10.15	10.64	1.23	1.11	1.11	0.50	224.70
BH-1	5.00	5.00	0.00	30.20	0.00	0.703	17.70	17.70	36.50	19.62	10.11	10.59	1.28	1.14	1.14	0.50	267.83
BH-1	5.00	6.00	0.00	30.20	0.00	0.703	17.70	17.70	46.00	19.67	10.15	10.64	1.34	1.17	1.17	0.50	324.53
BH-2	5.00	3.00	0.00	24.80	6.00	0.743	16.10	17.00	18.75	12.89	5.18	4.05	1.15	1.08	1.08	0.50	100.89
BH-2	5.00	4.00	0.00	25.00	6.00	0.721	16.10	17.00	25.75	13.89	5.87	4.91	1.20	1.10	1.10	0.50	137.89
BH-2	5.00	5.00	0.00	25.00	6.00	0.721	17.00	17.00	32.75	13.91	5.88	4.93	1.26	1.13	1.13	0.50	160.71
BH-2	5.00	6.00	0.00	25.00	6.00	0.721	17.00	18.60	41.35	13.89	5.87	4.91	1.31	1.15	1.15	0.50	191.29
BH-3	5.00	3.00	0.00	18.60	0.00	0.662	18.50	18.40	25.45	11.51	4.33	3.14	1.15	1.07	1.07	0.50	68.50
BH-3	5.00	4.00	0.00	19.50	0.00	0.662	18.50	18.40	33.85	12.00	4.63	3.46	1.20	1.10	1.10	0.50	92.82
BH-3	5.00	5.00	0.00	23.20	0.00	0.662	18.50	18.40	42.25	14.74	6.48	5.69	1.26	1.13	1.13	0.50	172.94
BH-3	5.00	6.00	0.00	23.20	0.00	0.694	18.50	18.40	50.65	13.64	5.73	4.77	1.31	1.15	1.15	0.50	172.97
BH-4	5.00	3.00	0.00	29.70	0.00	0.699	16.26	16.51	18.91	19.31	9.86	10.22	1.17	1.08	1.08	0.50	160.47
BH-4	5.00	4.00	0.00	30.10	0.00	0.695	16.26	16.51	25.42	20.09	10.48	11.11	1.23	1.11	1.11	0.50	210.67
BH-4	5.00	5.00	0.00	30.10	0.00	0.695	16.51	16.51	31.94	20.09	10.48	11.11	1.29	1.14	1.14	0.50	249.95
BH-4	5.00	6.00	0.00	30.10	0.00	0.695	16.51	18.78	40.71	20.09	10.48	11.11	1.34	1.17	1.17	0.50	314.82

Isolated Footing for (B=5.0 meter)

BORE No.	B	D	CWT	Φ	c	e_0	γ_1	γ_2	q	N_c	N_q	N_γ	d_c	d_q	d_γ	w'	q_{na}
BH-5	5.00	3.00	0.00	25.20	7.00	0.743	18.35	18.35	25.47	13.13	5.33	4.23	1.15	1.08	1.08	0.50	127.08
BH-5	5.00	4.00	0.00	25.20	7.00	0.743	18.35	19.21	34.68	13.13	5.33	4.23	1.20	1.10	1.10	0.50	153.49
BH-5	5.00	5.00	0.00	23.20	0.00	0.612	18.35	19.21	43.88	16.46	7.66	7.13	1.27	1.13	1.13	0.50	221.20
BH-5	5.00	6.00	0.00	23.20	0.00	0.612	18.35	19.21	53.09	16.46	7.66	7.13	1.32	1.16	1.16	0.50	260.60
BH-6	5.00	3.00	0.00	23.10	15.00	0.721	18.03	17.84	24.00	12.64	5.05	3.95	1.15	1.07	1.07	0.50	156.03
BH-6	5.00	4.00	0.00	23.10	15.00	0.721	18.03	17.84	31.84	12.64	5.05	3.95	1.20	1.10	1.10	0.50	177.93
BH-6	5.00	5.00	0.00	30.10	0.00	0.712	17.84	17.84	39.68	18.86	9.50	9.71	1.28	1.14	1.14	0.50	263.61
BH-6	5.00	6.00	0.00	30.10	0.00	0.712	17.84	19.05	48.74	18.88	9.52	9.72	1.34	1.17	1.17	0.50	319.19
BH-7	5.00	3.00	0.00	20.50	0.00	0.707	18.86	18.86	26.53	11.52	4.33	3.13	1.15	1.07	1.07	0.50	70.86
BH-7	5.00	4.00	0.00	20.70	0.00	0.712	18.86	18.77	35.30	11.50	4.32	3.12	1.20	1.10	1.10	0.50	87.38
BH-7	5.00	5.00	0.00	6.00	61.00	0.712	18.86	18.77	44.07	6.34	1.51	0.41	1.22	1.00	1.00	0.50	176.96
BH-7	5.00	6.00	0.00	6.00	61.00	0.712	18.86	18.77	52.85	6.34	1.51	0.41	1.27	1.00	1.00	0.50	185.07
BH-8	5.00	3.00	0.00	26.30	13.00	0.667	18.24	20.37	25.78	17.50	8.50	8.35	1.16	1.08	1.08	0.50	265.67
BH-8	5.00	4.00	0.00	6.00	68.00	0.605	18.24	20.37	36.15	6.69	1.67	0.54	1.18	1.00	1.00	0.50	201.96
BH-8	5.00	5.00	0.00	6.00	68.00	0.605	20.37	20.37	46.53	6.69	1.67	0.54	1.22	1.00	1.00	0.50	212.38
BH-8	5.00	6.00	0.00	6.00	68.00	0.605	20.37	19.42	55.95	6.69	1.67	0.54	1.27	1.00	1.00	0.50	222.29
BH-9	5.00	3.00	0.00	25.70	10.00	0.721	17.82	17.82	24.32	14.42	6.24	5.38	1.15	1.08	1.08	0.50	165.03

Isolated Footing for (B=5.0 meter)

BORE No.	B	D	CWT	Φ	c	e_0	γ_1	γ_2	q	N_c	N_q	N_γ	d_c	d_q	d_γ	w'	q_{na}
BH-9	5.00	4.00	0.00	25.70	10.00	0.721	17.82	19.55	33.87	14.42	6.24	5.38	1.21	1.10	1.10	0.50	200.80
BH-9	5.00	5.00	0.00	7.00	66.00	0.622	17.82	19.55	43.42	6.94	1.79	0.64	1.23	1.00	1.00	0.50	215.60
BH-9	5.00	6.00	0.00	7.00	66.00	0.622	17.82	19.55	52.97	6.94	1.79	0.64	1.27	1.00	1.00	0.50	226.37

Isolated Footing for (B=6.0 meter)

BORE No.	B	D	CWT	Φ	c	e_0	γ_1	γ_2	q	N_c	N_q	N_γ	d_c	d_q	d_γ	w'	q_{na}
BH-1	6.00	3.00	0.00	29.80	0.00	0.719	16.90	17.70	21.10	18.04	8.86	8.79	1.14	1.07	1.07	0.50	164.86
BH-1	6.00	4.00	0.00	30.20	0.00	0.703	16.90	17.70	28.80	19.67	10.15	10.64	1.19	1.09	1.09	0.50	237.37
BH-1	6.00	5.00	0.00	30.20	0.00	0.703	17.70	17.70	36.50	19.62	10.11	10.59	1.24	1.12	1.12	0.50	279.05
BH-1	6.00	6.00	0.00	30.20	0.00	0.703	17.70	17.70	46.00	19.67	10.15	10.64	1.28	1.14	1.14	0.50	333.87
BH-2	6.00	3.00	0.00	24.80	6.00	0.743	16.10	17.00	18.75	12.89	5.18	4.05	1.13	1.06	1.06	0.50	105.26
BH-2	6.00	4.00	0.00	25.00	6.00	0.721	16.10	17.00	25.75	13.89	5.87	4.91	1.17	1.09	1.09	0.50	142.55
BH-2	6.00	5.00	0.00	25.00	6.00	0.721	17.00	17.00	32.75	13.91	5.88	4.93	1.21	1.11	1.11	0.50	164.55
BH-2	6.00	6.00	0.00	25.00	6.00	0.721	17.00	18.60	41.35	13.89	5.87	4.91	1.26	1.13	1.13	0.50	194.64
BH-3	6.00	3.00	0.00	18.60	0.00	0.662	18.50	18.40	25.45	11.51	4.33	3.14	1.12	1.06	1.06	0.50	72.63
BH-3	6.00	4.00	0.00	19.50	0.00	0.662	18.50	18.40	33.85	12.00	4.63	3.46	1.16	1.08	1.08	0.50	96.94
BH-3	6.00	5.00	0.00	23.20	0.00	0.662	18.50	18.40	42.25	14.74	6.48	5.69	1.22	1.11	1.11	0.50	178.92

Isolated Footing for (B=6.0 meter)

BORE No.	B	D	CWT	Φ	c	e_0	γ_1	γ_2	q	N_c	N_q	N_γ	d_c	d_q	d_γ	w'	q_{na}
BH-3	6.00	6.00	0.00	23.20	0.00	0.694	18.50	18.40	50.65	13.64	5.73	4.77	1.25	1.13	1.13	0.50	177.08
BH-4	6.00	3.00	0.00	29.70	0.00	0.699	16.26	16.51	18.91	19.31	9.86	10.22	1.14	1.07	1.07	0.50	172.83
BH-4	6.00	4.00	0.00	30.10	0.00	0.695	16.26	16.51	25.42	20.09	10.48	11.11	1.19	1.10	1.10	0.50	223.14
BH-4	6.00	5.00	0.00	30.10	0.00	0.695	16.51	16.51	31.94	20.09	10.48	11.11	1.24	1.12	1.12	0.50	261.15
BH-4	6.00	6.00	0.00	30.10	0.00	0.695	16.51	18.78	40.71	20.09	10.48	11.11	1.29	1.14	1.14	0.50	326.21
BH-5	6.00	3.00	0.00	25.20	7.00	0.743	18.35	19.21	25.47	13.13	5.33	4.23	1.13	1.06	1.06	0.50	133.68
BH-5	6.00	4.00	0.00	25.20	7.00	0.743	18.35	19.21	34.68	13.13	5.33	4.23	1.17	1.08	1.08	0.50	157.71
BH-5	6.00	5.00	0.00	23.20	0.00	0.612	18.35	19.21	43.88	16.46	7.66	7.13	1.22	1.11	1.11	0.50	229.03
BH-5	6.00	6.00	0.00	23.20	0.00	0.612	18.35	19.21	53.09	16.46	7.66	7.13	1.27	1.13	1.13	0.50	267.00
BH-6	6.00	3.00	0.00	23.10	15.00	0.721	18.03	17.84	24.00	12.64	5.05	3.95	1.12	1.06	1.06	0.50	159.44
BH-6	6.00	4.00	0.00	23.10	15.00	0.721	18.03	17.84	31.84	12.64	5.05	3.95	1.17	1.08	1.08	0.50	180.35
BH-6	6.00	5.00	0.00	30.10	0.00	0.712	17.84	17.84	39.68	18.86	9.50	9.71	1.23	1.12	1.12	0.50	273.69
BH-6	6.00	6.00	0.00	30.10	0.00	0.712	17.84	19.05	48.74	18.88	9.52	9.72	1.28	1.14	1.14	0.50	328.44
BH-7	6.00	3.00	0.00	20.50	0.00	0.712	18.86	18.77	26.53	11.40	4.25	3.04	1.12	1.06	1.06	0.50	72.98
BH-7	6.00	4.00	0.00	20.70	0.00	0.712	18.86	18.77	35.30	11.50	4.32	3.12	1.16	1.08	1.08	0.50	91.14
BH-7	6.00	5.00	0.00	6.00	61.00	0.712	18.86	18.77	44.07	6.34	1.51	0.41	1.19	1.00	1.00	0.50	172.61
BH-7	6.00	6.00	0.00	6.00	61.00	0.712	18.86	18.77	52.85	6.34	1.51	0.41	1.22	1.00	1.00	0.50	179.73

Isolated Footing for (B=6.0 meter)																	
BORE No.	B	D	CWT	Φ	c	e_0	γ_1	γ_2	q	N_c	N_q	N_γ	d_c	d_q	d_γ	w'	q_{na}
BH-8	6.00	3.00	0.00	26.30	13.00	0.667	18.24	20.37	25.78	17.50	8.50	8.35	1.14	1.07	1.07	0.50	275.85
BH-8	6.00	4.00	0.00	6.00	68.00	0.605	18.24	20.37	36.15	6.69	1.67	0.54	1.15	1.00	1.00	0.50	198.11
BH-8	6.00	5.00	0.00	6.00	68.00	0.605	20.37	20.37	46.53	6.69	1.67	0.54	1.19	1.00	1.00	0.50	207.35
BH-8	6.00	6.00	0.00	6.00	68.00	0.605	20.37	19.42	55.95	6.69	1.67	0.54	1.22	1.00	1.00	0.50	216.04
BH-9	6.00	3.00	0.00	25.70	10.00	0.721	17.82	19.55	24.32	14.42	6.24	5.38	1.13	1.06	1.06	0.50	175.38
BH-9	6.00	4.00	0.00	25.70	10.00	0.721	17.82	19.55	33.87	14.42	6.24	5.38	1.17	1.09	1.09	0.50	206.04
BH-9	6.00	5.00	0.00	7.00	66.00	0.622	17.82	19.55	43.42	6.94	1.79	0.64	1.19	1.00	1.00	0.50	210.64
BH-9	6.00	6.00	0.00	7.00	66.00	0.622	17.82	19.55	52.97	6.94	1.79	0.64	1.23	1.00	1.00	0.50	220.21

Isolated Footing for (B=7.0 meter)																	
BORE No.	B	D	CWT	Φ	c	e_0	γ_1	γ_2	q	N_c	N_q	N_γ	d_c	d_q	d_γ	w'	q_{na}
BH-1	7.00	3.00	0.00	29.80	0.00	0.719	16.90	17.70	21.10	18.04	8.86	8.79	1.12	1.06	1.06	0.50	176.52
BH-1	7.00	4.00	0.00	30.20	0.00	0.703	16.90	17.70	28.80	19.67	10.15	10.64	1.16	1.08	1.08	0.50	250.73
BH-1	7.00	5.00	0.00	30.20	0.00	0.703	17.70	17.70	36.50	19.62	10.11	10.59	1.20	1.10	1.10	0.50	291.34
BH-1	7.00	6.00	0.00	30.20	0.00	0.703	17.70	17.70	46.00	19.67	10.15	10.64	1.24	1.12	1.12	0.50	344.84
BH-2	7.00	3.00	0.00	24.80	6.00	0.743	16.10	17.00	18.75	12.89	5.18	4.05	1.11	1.05	1.05	0.50	109.95
BH-2	7.00	4.00	0.00	25.00	6.00	0.721	16.10	17.00	25.75	13.89	5.87	4.91	1.15	1.07	1.07	0.50	147.79

Isolated Footing for (B=7.0 meter)																	
BORE No.	B	D	CWT	Φ	c	e_0	γ_1	γ_2	q	N_c	N_q	N_γ	d_c	d_q	d_γ	w'	q_{na}
BH-2	7.00	5.00	0.00	25.00	6.00	0.721	17.00	17.00	32.75	13.91	5.88	4.93	1.18	1.09	1.09	0.50	169.20
BH-2	7.00	6.00	0.00	25.00	6.00	0.721	17.00	18.60	41.35	13.89	5.87	4.91	1.22	1.11	1.11	0.50	199.13
BH-3	7.00	3.00	0.00	18.60	0.00	0.662	18.50	18.40	25.45	11.51	4.33	3.14	1.10	1.05	1.05	0.50	76.90
BH-3	7.00	4.00	0.00	19.50	0.00	0.662	18.50	18.40	33.85	12.00	4.63	3.46	1.14	1.07	1.07	0.50	101.34
BH-3	7.00	5.00	0.00	23.20	0.00	0.662	18.50	18.40	42.25	14.74	6.48	5.69	1.19	1.09	1.09	0.50	185.58
BH-3	7.00	6.00	0.00	23.20	0.00	0.694	18.50	18.40	50.65	13.64	5.73	4.77	1.22	1.11	1.11	0.50	182.02
BH-4	7.00	3.00	0.00	29.70	0.00	0.699	16.26	16.51	18.91	19.31	9.86	10.22	1.12	1.06	1.06	0.50	185.53
BH-4	7.00	4.00	0.00	30.10	0.00	0.695	16.26	16.51	25.42	20.09	10.48	11.11	1.16	1.08	1.08	0.50	236.23
BH-4	7.00	5.00	0.00	30.10	0.00	0.695	16.51	16.51	31.94	20.09	10.48	11.11	1.20	1.10	1.10	0.50	273.35
BH-4	7.00	6.00	0.00	30.10	0.00	0.695	16.51	18.78	40.71	20.09	10.48	11.11	1.25	1.12	1.12	0.50	339.11
BH-5	7.00	3.00	0.00	25.20	7.00	0.743	18.35	19.21	25.47	13.13	5.33	4.23	1.11	1.05	1.05	0.50	139.14
BH-5	7.00	4.00	0.00	25.20	7.00	0.743	18.35	19.21	34.68	13.13	5.33	4.23	1.14	1.07	1.07	0.50	162.58
BH-5	7.00	5.00	0.00	23.20	0.00	0.612	18.35	19.21	43.88	16.46	7.66	7.13	1.19	1.10	1.10	0.50	237.74
BH-5	7.00	6.00	0.00	23.20	0.00	0.612	18.35	19.21	53.09	16.46	7.66	7.13	1.23	1.11	1.11	0.50	274.71
BH-6	7.00	3.00	0.00	23.10	15.00	0.721	18.03	17.84	24.00	12.64	5.05	3.95	1.11	1.05	1.05	0.50	163.49
BH-6	7.00	4.00	0.00	23.10	15.00	0.721	18.03	17.84	31.84	12.64	5.05	3.95	1.14	1.07	1.07	0.50	183.69
BH-6	7.00	5.00	0.00	30.10	0.00	0.712	17.84	17.84	39.68	18.86	9.50	9.71	1.20	1.10	1.10	0.50	284.84

Isolated Footing for (B=7.0 meter)																	
BORE No.	B	D	CWT	Φ	c	e_0	γ_1	γ_2	q	N_c	N_q	N_γ	d_c	d_q	d_γ	w'	q_{na}
BH-6	7.00	6.00	0.00	30.10	0.00	0.712	17.84	19.05	48.74	18.88	9.52	9.72	1.24	1.12	1.12	0.50	339.27
BH-7	7.00	3.00	0.00	20.50	0.00	0.712	18.86	18.77	26.53	11.40	4.25	3.04	1.10	1.05	1.05	0.50	77.19
BH-7	7.00	4.00	0.00	20.70	0.00	0.712	18.86	18.77	35.30	11.50	4.32	3.12	1.14	1.07	1.07	0.50	95.17
BH-7	7.00	5.00	0.00	6.00	61.00	0.712	18.86	18.77	44.07	6.34	1.51	0.41	1.16	1.00	1.00	0.50	169.67
BH-7	7.00	6.00	0.00	6.00	61.00	0.712	18.86	18.77	52.85	6.34	1.51	0.41	1.19	1.00	1.00	0.50	176.08
BH-8	7.00	3.00	0.00	26.30	13.00	0.667	18.24	20.37	25.78	17.50	8.50	8.35	1.12	1.06	1.06	0.50	287.01
BH-8	7.00	4.00	0.00	6.00	68.00	0.605	18.24	20.37	36.15	6.69	1.67	0.54	1.13	1.00	1.00	0.50	195.61
BH-8	7.00	5.00	0.00	6.00	68.00	0.605	20.37	20.37	46.53	6.69	1.67	0.54	1.16	1.00	1.00	0.50	204.01
BH-8	7.00	6.00	0.00	6.00	68.00	0.605	20.37	19.42	55.95	6.69	1.67	0.54	1.19	1.00	1.00	0.50	211.81
BH-9	7.00	3.00	0.00	25.70	10.00	0.721	17.82	19.55	24.32	14.42	6.24	5.38	1.11	1.06	1.06	0.50	182.32
BH-9	7.00	4.00	0.00	25.70	10.00	0.721	17.82	19.55	33.87	14.42	6.24	5.38	1.15	1.07	1.07	0.50	212.18
BH-9	7.00	5.00	0.00	7.00	66.00	0.622	17.82	19.55	43.42	6.94	1.79	0.64	1.16	1.00	1.00	0.50	207.37
BH-9	7.00	6.00	0.00	7.00	66.00	0.622	17.82	19.55	52.97	6.94	1.79	0.64	1.19	1.00	1.00	0.50	216.09

Isolated Footing for (B=8.0 meter)																	
BORE No.	B	D	CWT	Φ	c	e_0	γ_1	γ_2	q	N_c	N_q	N_γ	d_c	d_q	d_γ	w'	q_{na}

Isolated Footing for (B=8.0 meter)

BORE No.	B	D	CWT	Φ	c	e_0	γ_1	γ_2	q	N_c	N_q	N_γ	d_c	d_q	d_γ	w'	q_{na}
BH-1	8.00	3.00	0.00	29.80	0.00	0.719	16.90	17.70	21.10	18.04	8.86	8.79	1.10	1.05	1.05	0.50	188.38
BH-1	8.00	4.00	0.00	30.20	0.00	0.703	16.90	17.70	28.80	19.67	10.15	10.64	1.14	1.07	1.07	0.50	264.52
BH-1	8.00	5.00	0.00	30.20	0.00	0.703	17.70	17.70	36.50	19.62	10.11	10.59	1.18	1.09	1.09	0.50	304.31
BH-1	8.00	6.00	0.00	30.20	0.00	0.703	17.70	17.70	46.00	19.67	10.15	10.64	1.21	1.11	1.11	0.50	356.84
BH-2	8.00	3.00	0.00	24.80	6.00	0.743	16.10	17.00	18.75	12.89	5.18	4.05	1.09	1.05	1.05	0.50	114.85
BH-2	8.00	4.00	0.00	25.00	6.00	0.721	16.10	17.00	25.75	13.89	5.87	4.91	1.13	1.06	1.06	0.50	153.39
BH-2	8.00	5.00	0.00	25.00	6.00	0.721	17.00	17.00	32.75	13.91	5.88	4.93	1.16	1.08	1.08	0.50	174.36
BH-2	8.00	6.00	0.00	25.00	6.00	0.721	17.00	18.60	41.35	13.89	5.87	4.91	1.19	1.10	1.10	0.50	204.32
BH-3	8.00	3.00	0.00	18.60	0.00	0.662	18.50	18.40	25.45	11.51	4.33	3.14	1.09	1.05	1.05	0.50	81.25
BH-3	8.00	4.00	0.00	19.50	0.00	0.662	18.50	18.40	33.85	12.00	4.63	3.46	1.12	1.06	1.06	0.50	105.91
BH-3	8.00	5.00	0.00	23.20	0.00	0.662	18.50	18.40	42.25	14.74	6.48	5.69	1.16	1.08	1.08	0.50	192.67
BH-3	8.00	6.00	0.00	23.20	0.00	0.694	18.50	18.40	50.65	13.64	5.73	4.77	1.19	1.10	1.10	0.50	187.48
BH-4	8.00	3.00	0.00	29.70	0.00	0.699	16.26	16.51	18.91	19.31	9.86	10.22	1.11	1.05	1.05	0.50	198.42
BH-4	8.00	4.00	0.00	30.10	0.00	0.695	16.26	16.51	25.42	20.09	10.48	11.11	1.14	1.07	1.07	0.50	249.72
BH-4	8.00	5.00	0.00	30.10	0.00	0.695	16.51	16.51	31.94	20.09	10.48	11.11	1.18	1.09	1.09	0.50	286.17
BH-4	8.00	6.00	0.00	30.10	0.00	0.695	16.51	18.78	40.71	20.09	10.48	11.11	1.21	1.11	1.11	0.50	352.96
BH-5	8.00	3.00	0.00	25.20	7.00	0.743	18.35	19.21	25.47	13.13	5.33	4.23	1.09	1.05	1.05	0.50	144.85

Isolated Footing for (B=8.0 meter)

BORE No.	B	D	CWT	Φ	c	e_0	γ_1	γ_2	q	N_c	N_q	N_γ	d_c	d_q	d_γ	w'	q_{na}
BH-5	8.00	4.00	0.00	25.20	7.00	0.743	18.35	19.21	34.68	13.13	5.33	4.23	1.13	1.06	1.06	0.50	167.87
BH-5	8.00	5.00	0.00	23.20	0.00	0.612	18.35	19.21	43.88	16.46	7.66	7.13	1.17	1.08	1.08	0.50	247.01
BH-5	8.00	6.00	0.00	23.20	0.00	0.612	18.35	19.21	53.09	16.46	7.66	7.13	1.20	1.10	1.10	0.50	283.23
BH-6	8.00	3.00	0.00	23.10	15.00	0.721	18.03	17.84	24.00	12.64	5.05	3.95	1.09	1.05	1.05	0.50	167.93
BH-6	8.00	4.00	0.00	23.10	15.00	0.721	18.03	17.84	31.84	12.64	5.05	3.95	1.12	1.06	1.06	0.50	187.60
BH-6	8.00	5.00	0.00	30.10	0.00	0.712	17.84	17.84	39.68	18.86	9.50	9.71	1.17	1.09	1.09	0.50	296.68
BH-6	8.00	6.00	0.00	30.10	0.00	0.712	17.84	19.05	48.74	18.88	9.52	9.72	1.21	1.10	1.10	0.50	351.11
BH-7	8.00	3.00	0.00	20.50	0.00	0.712	18.86	18.77	26.53	11.40	4.25	3.04	1.09	1.05	1.05	0.50	81.49
BH-7	8.00	4.00	0.00	20.70	0.00	0.712	18.86	18.77	35.30	11.50	4.32	3.12	1.12	1.06	1.06	0.50	99.36
BH-7	8.00	5.00	0.00	6.00	61.00	0.712	18.86	18.77	44.07	6.34	1.51	0.41	1.14	1.00	1.00	0.50	167.62
BH-7	8.00	6.00	0.00	6.00	61.00	0.712	18.86	18.77	52.85	6.34	1.51	0.41	1.17	1.00	1.00	0.50	173.50
BH-8	8.00	3.00	0.00	26.30	13.00	0.667	18.24	20.37	25.78	17.50	8.50	8.35	1.10	1.05	1.05	0.50	298.78
BH-8	8.00	4.00	0.00	6.00	68.00	0.605	18.24	20.37	36.15	6.69	1.67	0.54	1.11	1.00	1.00	0.50	193.96
BH-8	8.00	5.00	0.00	6.00	68.00	0.605	20.37	20.37	46.53	6.69	1.67	0.54	1.14	1.00	1.00	0.50	201.72
BH-8	8.00	6.00	0.00	6.00	68.00	0.605	20.37	19.42	55.95	6.69	1.67	0.54	1.17	1.00	1.00	0.50	208.85
BH-9	8.00	3.00	0.00	25.70	10.00	0.721	17.82	19.55	24.32	14.42	6.24	5.38	1.10	1.05	1.05	0.50	189.63
BH-9	8.00	4.00	0.00	25.70	10.00	0.721	17.82	19.55	33.87	14.42	6.24	5.38	1.13	1.06	1.06	0.50	218.90

Isolated Footing for (B=8.0 meter)																	
BORE No.	**B**	**D**	**CWT**	**Φ**	**c**	**e_0**	**γ_1**	**γ_2**	**q**	**N_c**	**N_q**	**N_γ**	**d_c**	**d_q**	**d_γ**	**w'**	**q_{na}**
BH-9	8.00	5.00	0.00	7.00	66.00	0.622	17.82	19.55	43.42	6.94	1.79	0.64	1.14	1.00	1.00	0.50	205.17
BH-9	8.00	6.00	0.00	7.00	66.00	0.622	17.82	19.55	52.97	6.94	1.79	0.64	1.17	1.00	1.00	0.50	213.25

APPENDIX-J
TABLE 2: CALCULATIONS BASED ON SETTLEMENT CRITERIA

Isolated Footing (BH-5)								
BORE No.	**B**	**D**	**N**	**S_u**	**W'**	**q_s**	**d_f**	**s_f**
BH-1	5.00	3.00	14.50	25.00	0.50	120.82	0.83	50
BH-1	5.00	4.00	14.58	25.00	0.50	128.40	0.78	50
BH-1	5.00	5.00	14.64	25.00	0.50	135.73	0.74	50
BH-1	5.00	6.00	15.54	23.00	0.50	153.13	0.71	50
BH-2	5.00	3.00	22.12	15.00	0.50	100.89	0.83	25
BH-2	5.00	4.00	23.95	15.00	0.50	137.89	0.78	32
BH-2	5.00	5.00	24.90	14.00	0.50	160.71	0.74	33
BH-2	5.00	6.00	25.03	13.00	0.50	191.29	0.71	35
BH-3	5.00	3.00	14.98	25.00	0.50	68.50	0.83	28
BH-3	5.00	4.00	16.84	22.00	0.50	92.82	0.78	32
BH-3	5.00	5.00	16.99	22.00	0.50	154.24	0.74	50
BH-3	5.00	6.00	17.91	21.00	0.50	167.67	0.71	50
BH-4	5.00	3.00	17.05	21.00	0.50	143.87	0.83	50
BH-4	5.00	4.00	17.70	21.00	0.50	152.87	0.78	50
BH-4	5.00	5.00	17.61	21.00	0.50	161.55	0.74	50
BH-4	5.00	6.00	17.61	21.00	0.50	167.72	0.71	50
BH-5	5.00	3.00	14.72	25.00	0.50	120.78	0.83	50
BH-5	5.00	4.00	15.12	23.00	0.50	139.59	0.78	50
BH-5	5.00	5.00	15.69	23.00	0.50	147.50	0.74	50
BH-5	5.00	6.00	15.87	23.00	0.50	153.10	0.71	50
BH-6	5.00	3.00	17.32	21.00	0.50	143.83	0.83	50
BH-6	5.00	4.00	17.62	21.00	0.50	152.83	0.78	50
BH-6	5.00	5.00	18.23	19.00	0.50	178.61	0.74	50
BH-6	5.00	6.00	18.32	19.00	0.50	185.39	0.71	50
BH-7	5.00	3.00	13.12	28.00	0.50	70.86	0.83	33
BH-7	5.00	4.00	13.96	28.00	0.50	87.38	0.78	38
BH-7	5.00	5.00	14.35	25.00	0.50	135.76	0.74	50

Isolated Footing (BH-5)								
BORE No.	**B**	**D**	**N**	**S_u**	**W'**	**q_s**	**d_f**	**s_f**
BH-7	5.00	6.00	14.43	25.00	0.50	140.87	0.71	50
BH-8	5.00	3.00	14.85	25.00	0.50	120.87	0.83	50
BH-8	5.00	4.00	15.43	23.00	0.50	139.56	0.78	50
BH-8	5.00	5.00	15.69	23.00	0.50	147.58	0.74	50
BH-8	5.00	6.00	15.87	23.00	0.50	153.09	0.71	50
BH-9	5.00	3.00	13.35	28.00	0.50	107.93	0.83	50
BH-9	5.00	4.00	13.99	28.00	0.50	114.70	0.78	50
BH-9	5.00	5.00	14.35	25.00	0.50	135.70	0.74	50
BH-9	5.00	6.00	14.45	25.00	0.50	140.87	0.71	50

Isolated Footing (BH-6)								
BORE No.	**B**	**D**	**N**	**S_u**	**W'**	**q_s**	**d_f**	**s_f**
BH-1	6.00	3.00	14.91	25.00	0.50	116.36	0.86	50
BH-1	6.00	4.00	15.37	23.00	0.50	134.37	0.81	50
BH-1	6.00	5.00	16.31	22.00	0.50	148.05	0.77	50
BH-1	6.00	6.00	16.31	22.00	0.50	154.27	0.74	50
BH-2	6.00	3.00	22.36	15.00	0.50	105.26	0.86	27
BH-2	6.00	4.00	24.19	14.00	0.50	142.55	0.81	32
BH-2	6.00	5.00	24.97	14.00	0.50	164.55	0.77	35
BH-2	6.00	6.00	24.97	14.00	0.50	194.64	0.74	40
BH-3	6.00	3.00	15.94	23.00	0.50	72.63	0.86	29
BH-3	6.00	4.00	17.66	21.00	0.50	96.94	0.81	33
BH-3	6.00	5.00	18.52	19.00	0.50	171.42	0.77	50
BH-3	6.00	6.00	18.52	19.00	0.50	177.08	0.74	50
BH-4	6.00	3.00	17.19	21.00	0.50	138.43	0.86	50
BH-4	6.00	4.00	17.70	21.00	0.50	147.24	0.81	50
BH-4	6.00	5.00	17.61	21.00	0.50	155.05	0.77	50
BH-4	6.00	6.00	17.61	21.00	0.50	161.61	0.74	50

Isolated Footing (BH-6)								
BORE No.	**B**	**D**	**N**	**S_u**	**W'**	**q_s**	**d_f**	**s_f**
BH-5	6.00	3.00	15.03	23.00	0.50	126.48	0.86	50
BH-5	6.00	4.00	15.35	23.00	0.50	134.41	0.81	50
BH-5	6.00	5.00	16.03	22.00	0.50	148.03	0.77	50
BH-5	6.00	6.00	16.03	22.00	0.50	154.20	0.74	50
BH-6	6.00	3.00	17.38	21.00	0.50	138.44	0.86	50
BH-6	6.00	4.00	17.77	21.00	0.50	147.25	0.81	50
BH-6	6.00	5.00	18.42	19.00	0.50	171.39	0.77	50
BH-6	6.00	6.00	18.42	19.00	0.50	178.54	0.74	50
BH-7	6.00	3.00	13.41	28.00	0.50	72.98	0.86	35
BH-7	6.00	4.00	14.08	25.00	0.50	91.14	0.81	37
BH-7	6.00	5.00	14.48	25.00	0.50	130.31	0.77	50
BH-7	6.00	6.00	14.48	25.00	0.50	135.73	0.74	50
BH-8	6.00	3.00	15.00	23.00	0.50	126.45	0.86	50
BH-8	6.00	4.00	15.62	23.00	0.50	134.41	0.81	50
BH-8	6.00	5.00	16.10	22.00	0.50	148.05	0.77	50
BH-8	6.00	6.00	16.10	22.00	0.50	154.24	0.74	50
BH-9	6.00	3.00	13.45	28.00	0.50	103.88	0.86	50
BH-9	6.00	4.00	14.13	25.00	0.50	123.64	0.81	50
BH-9	6.00	5.00	14.60	25.00	0.50	130.24	0.77	50
BH-9	6.00	6.00	14.60	25.00	0.50	135.71	0.74	50

Isolated Footing (BH-7)								
BORE No.	**B**	**D**	**N**	**S_u**	**W'**	**q_s**	**d_f**	**s_f**
BH-1	7.00	3.00	16.19	22.00	0.50	129.62	0.88	50
BH-1	7.00	4.00	16.08	22.00	0.50	135.93	0.84	50
BH-1	7.00	5.00	16.76	22.00	0.50	142.84	0.80	50
BH-1	7.00	6.00	17.20	21.00	0.50	156.04	0.76	50
BH-2	7.00	3.00	22.93	15.00	0.50	109.95	0.88	29

Isolated Footing (BH-7)								
BORE No.	**B**	**D**	**N**	**S_u**	**W'**	**q_s**	**d_f**	**s_f**
BH-2	7.00	4.00	24.23	14.00	0.50	147.79	0.84	35
BH-2	7.00	5.00	24.76	14.00	0.50	169.20	0.80	38
BH-2	7.00	6.00	24.34	14.00	0.50	199.13	0.76	43
BH-3	7.00	3.00	17.37	21.00	0.50	76.90	0.88	28
BH-3	7.00	4.00	18.24	19.00	0.50	101.34	0.84	32
BH-3	7.00	5.00	18.94	19.00	0.50	165.38	0.80	50
BH-3	7.00	6.00	19.19	18.00	0.50	182.02	0.76	50
BH-4	7.00	3.00	17.19	21.00	0.50	135.83	0.88	50
BH-4	7.00	4.00	17.70	21.00	0.50	142.43	0.84	50
BH-4	7.00	5.00	22.33	15.00	0.50	209.45	0.80	50
BH-4	7.00	6.00	23.12	15.00	0.50	218.51	0.76	50
BH-5	7.00	3.00	15.43	23.00	0.50	124.04	0.88	50
BH-5	7.00	4.00	15.55	23.00	0.50	130.08	0.84	50
BH-5	7.00	5.00	16.12	22.00	0.50	142.84	0.80	50
BH-5	7.00	6.00	16.20	22.00	0.50	149.01	0.76	50
BH-6	7.00	3.00	17.70	21.00	0.50	135.79	0.88	50
BH-6	7.00	4.00	17.92	21.00	0.50	142.49	0.84	50
BH-6	7.00	5.00	18.57	19.00	0.50	165.34	0.80	50
BH-6	7.00	6.00	18.65	19.00	0.50	172.47	0.76	50
BH-7	7.00	3.00	13.70	28.00	0.50	77.19	0.88	38
BH-7	7.00	4.00	14.16	25.00	0.50	95.17	0.84	40
BH-7	7.00	5.00	14.54	25.00	0.50	125.67	0.80	50
BH-7	7.00	6.00	14.55	25.00	0.50	131.08	0.76	50
BH-8	7.00	3.00	15.47	23.00	0.50	124.01	0.88	50
BH-8	7.00	4.00	15.86	23.00	0.50	130.11	0.84	50
BH-8	7.00	5.00	16.39	22.00	0.50	142.81	0.80	50
BH-8	7.00	6.00	16.54	22.00	0.50	149.01	0.76	50
BH-9	7.00	3.00	13.83	28.00	0.50	101.82	0.88	50

Isolated Footing (BH-7)								
BORE No.	**B**	**D**	**N**	**S_u**	**W'**	**q_s**	**d_f**	**s_f**
BH-9	7.00	4.00	14.29	25.00	0.50	119.68	0.84	50
BH-9	7.00	5.00	15.05	23.00	0.50	136.57	0.80	50
BH-9	7.00	6.00	15.42	23.00	0.50	142.49	0.76	50

Isolated Footing (B=8)								
BORE No.	**B**	**D**	**N**	**S_u**	**W'**	**q_s**	**d_f**	**s_f**
BH-1	8.00	3.00	16.57	22.00	0.50	126.18	0.90	50
BH-1	8.00	4.00	16.93	22.00	0.50	132.22	0.86	50
BH-1	8.00	5.00	17.20	21.00	0.50	144.91	0.82	50
BH-1	8.00	6.00	17.55	21.00	0.50	150.54	0.79	50
BH-2	8.00	3.00	22.94	15.00	0.50	114.85	0.90	31
BH-2	8.00	4.00	23.79	15.00	0.50	153.39	0.86	40
BH-2	8.00	5.00	24.34	14.00	0.50	174.36	0.82	40
BH-2	8.00	6.00	24.13	14.00	0.50	204.32	0.79	45
BH-3	8.00	3.00	17.82	21.00	0.50	81.25	0.90	31
BH-3	8.00	4.00	18.90	19.00	0.50	105.91	0.86	35
BH-3	8.00	5.00	19.19	18.00	0.50	168.97	0.82	50
BH-3	8.00	6.00	19.41	18.00	0.50	175.68	0.79	50
BH-4	8.00	3.00	18.75	19.00	0.50	146.12	0.90	50
BH-4	8.00	4.00	22.68	15.00	0.50	193.82	0.86	50
BH-4	8.00	5.00	23.12	15.00	0.50	202.77	0.82	50
BH-4	8.00	6.00	23.71	15.00	0.50	210.76	0.79	50
BH-5	8.00	3.00	15.56	23.00	0.50	120.65	0.90	50
BH-5	8.00	4.00	15.80	23.00	0.50	126.47	0.86	50
BH-5	8.00	5.00	16.20	22.00	0.50	138.31	0.82	50
BH-5	8.00	6.00	16.23	22.00	0.50	143.73	0.79	50
BH-6	8.00	3.00	17.88	21.00	0.50	132.13	0.90	50
BH-6	8.00	4.00	18.22	19.00	0.50	153.00	0.86	50

Isolated Footing (B=8)								
BORE No.	**B**	**D**	**N**	**S_u**	**W'**	**q_s**	**d_f**	**s_f**
BH-6	8.00	5.00	18.65	19.00	0.50	160.08	0.82	50
BH-6	8.00	6.00	18.66	19.00	0.50	166.41	0.79	50
BH-7	8.00	3.00	13.82	28.00	0.50	81.49	0.90	41
BH-7	8.00	4.00	14.28	25.00	0.50	99.36	0.86	43
BH-7	8.00	5.00	14.55	25.00	0.50	121.72	0.82	50
BH-7	8.00	6.00	14.60	25.00	0.50	126.50	0.79	50
BH-8	8.00	3.00	15.77	23.00	0.50	120.68	0.90	50
BH-8	8.00	4.00	16.29	22.00	0.50	132.16	0.86	50
BH-8	8.00	5.00	16.54	22.00	0.50	138.32	0.82	50
BH-8	8.00	6.00	16.63	22.00	0.50	143.75	0.79	50
BH-9	8.00	3.00	14.27	25.00	0.50	111.03	0.90	50
BH-9	8.00	4.00	15.10	23.00	0.50	126.40	0.86	50
BH-9	8.00	5.00	15.42	23.00	0.50	132.27	0.82	50
BH-9	8.00	6.00	15.73	23.00	0.50	137.45	0.79	50

APPENDIX-K
Table-1 Computation of Pile Load Capacity

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq

Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
BH-1	2.0	3.0	2.5	1.0	1.0	16.9	6.9	17.3	3.1	29.8	29.8	1.0	31.0	31.0	0.0	1.0	0.0	0	3.0	30.2	0.0	6.9	13.8	9.3	20.7	0.0	31.0	19.6	50.7	12.4	20.3
	3.0	4.5	3.8	1.5	2.5	16.9	6.9	26.9	4.7	30.2	30.2	1.0	74.5	31.0	0.0	1.0	0.0	0	4.5	30.2	0.0	6.9	13.8	10.6	32.1	0.0	31.0	49.1	80.1	12.4	32.1
	4.5	5.0	4.8	0.5	3.0	16.9	6.9	34.6	1.6	30.2	30.2	1.0	31.9	31.0	0.0	1.0	0.0	0	5.0	30.2	0.0	7.7	13.8	10.6	36.3	0.0	31.0	58.9	89.9	12.4	36.0
	5.0	6.0	5.5	1.0	4.0	17.7	7.7	41.3	3.1	30.2	30.2	1.0	76.2	31.0	0.0	1.0	0.0	0	6.0	30.2	0.0	7.7	13.8	11.7	45.1	0.0	31.0	78.5	109.6	12.4	43.8
	6.0	7.5	6.8	1.5	5.5	17.7	7.7	53.1	4.7	30.2	30.2	1.0	147.2	31.0	0.0	1.0	0.0	0	7.5	30.2	0.0	7.7	13.8	16.1	58.9	691.01	722.1	108.0	139.0	288.8	55.6
	7.5	8.0	7.8	0.5	6.0	17.7	7.7	62.6	1.6	30.2	30.2	1.0	57.8	88.9	0.0	1.0	0.0	0.0	8.0	30.2	0.0	7.7	13.8	16.1	64.6	752.61	841.5	117.8	206.7	336.6	82.7
	8.0	9.0	8.5	1.0	7.0	17.7	7.7	69.8	3.1	30.2	30.2	1.0	128.8	217.7	0.0	1.0	0.0	0.0	9.0	31.2	0.0	6.9	15.0	18.1	73.6	921.53	1139.2	137.4	355.1	455.7	142.0
	9.0	10.5	9.8	1.5	8.5	16.9	6.9	81.6	4.7	31.2	31.2	1.1	246.9	464.6	0.0	1.0	0.0	0.0	10.5	31.2	0.0	8.6	15.0	18.1	86.8	1089.75	1554.4	166.9	631.5	621.7	252.6
	10.5	12.0	11.3	1.5	10.0	18.6	8.6	95.9	4.7	30.9	30.9	1.0	282.6	747.2	0.0	1.0	0.0	0.0	12.0	30.9	0.0	8.5	15.0	17.8	102.3	1271.86	2019.0	196.4	943.5	807.6	377.4
H-	12.0	13.5	12.8	1.5	11.5	18.5	8.5	110.1	4.7	32.1	32.1	1.1	359.7	1106.9	0.0	1.0	0.0	0.0	13.5	32.1	0.0	7.8	16.0	21.5	116.5	1539.08	2646.0	225.8	1332.7	1058.4	533.1

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	13.5	15.0	14.3	1.5	13.0	17.8	7.8	124.4	4.7	33.0	33.0	1.2	437.7	1544.6	0.0	1.0	0.0	0.0	15.0	33.0	0.0	7.4	17.3	24.3	130.2	1850.58	3395.2	255.3	1799.9	1358.1	719.9
	15.0	16.5	15.8	1.5	14.5	17.4	7.4	124.4	4.7	33.3	33.3	1.2	448.5	1993.1	0.0	1.0	0.0	0.0	16.5	7.0	78.0	9.5	1.9	0.6	129.9	754.84	2748.0	284.7	2277.8	1099.2	911.1
	16.5	17.0	16.8	0.5	15.0	19.5	9.5	124.4	1.6	7.0	7.0	1.0	24.0	2017.1	78.0	1.0	122.5	122.5	17.0	7.0	78.0	9.5	1.9	0.6	126.8	750.06	2889.7	294.5	2434.2	1155.9	973.7
	17.0	18.0	17.5	1.0	16.0	19.5	9.5	124.4	3.1	7.0	7.0	1.0	48.0	2065.1	78.0	1.0	245.0	367.6	18.0	7.0	78.0	9.5	1.9	0.6	129.1	753.68	3186.3	314.2	2746.8	1274.5	1098.7
	18.0	19.5	18.8	1.5	17.5	19.5	9.5	124.4	4.7	7.0	7.0	1.0	72.0	2137.1	78.0	1.0	367.6	735.1	19.5	7.0	78.0	9.5	1.9	0.6	131.5	757.30	3629.5	343.6	3215.8	1451.8	1286.3
	19.5	20.0	19.8	0.5	18.0	19.5	9.5	124.4	1.6	7.0	7.0	1.0	24.0	2161.0	78.0	1.0	122.5	857.7	20.0	7.0	78.0	9.5	1.9	0.6	126.8	750.06	3768.8	353.4	3372.1	1507.5	1348.8
	20.0	21.0	20.5	1.0	19.0	19.5	9.5	124.4	3.1	6.6	6.6	1.0	45.2	2206.3	96.0	1.0	301.6	1159.2	21.0	6.6	96.0	9.5	1.8	0.6	129.1	863.34	4228.8	373.1	3738.6	1691.5	1495.4
	21.0	22.0	21.5	1.0	20.0	19.5	9.5	124.4	3.1	6.6	6.6	1.0	45.2	2251.5	96.0	1.0	301.6	1460.8	22.0	6.6	96.0	9.5	1.8	0.6	129.1	863.34	4575.6	392.7	4105.0	1830.3	1642.0
	22.0	22.5	22.3	0.5	20.5	19.5	9.5	124.4	1.6	6.6	6.6	1.0	22.6	2274.1	96.0	1.0	150.8	1611.6	22.5	6.6	96.0	9.5	1.8	0.6	126.8	860.06	4745.8	402.5	4288.2	1898.3	1715.3
	22.5	24.0	23.3	1.5	22.0	19.7	9.7	124.4	4.7	10.6	10.6	1.0	109.7	2383.8	99.0	1.0	466.5	2078.2	24.0	10.6	99.0	9.7	2.5	1.4	131.7	966.11	5428.0	432.0	4893.9	2171.2	1957.6
H-	24.0	24.5	24.3	0.5	22.5	19.7	9.7	124.4	1.6	10.6	10.6	1.0	36.6	2420.3	99.0	1.0	155.5	2233.7	24.5	10.6	99.0	9.7	2.5	1.4	126.8	956.65	5610.6	441.8	5095.8	2244.3	2038.3

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	24.5	25.5	25.0	1.0	23.5	19.7	9.7	124.4	3.1	10.6	10.6	1.0	73.1	2493.4	99.0	1.0	311.0	2544.7	25.5	10.6	99.0	9.7	2.5	1.4	129.2	961.38	5999.5	461.4	5499.5	2399.8	2199.8
	25.5	27.0	26.3	1.5	25.0	20.7	10.7	124.4	4.7	10.6	10.6	1.0	109.7	2603.1	99.0	1.0	466.5	3011.2	27.0	10.6	99.0	10.7	2.5	1.1	132.4	966.74	6581.1	490.9	6105.2	2632.4	2442.1
	27.0	28.5	27.8	1.5	26.5	20.7	10.7	124.4	4.7	10.6	10.6	1.0	109.7	2712.8	99.0	1.0	466.5	3477.8	28.5	10.6	99.0	10.7	2.5	0.8	132.4	965.52	7156.1	520.3	6710.9	2862.4	2684.4
	28.5	29.5	29.0	1.0	27.5	20.7	10.7	124.4	3.1	10.6	10.6	1.0	73.1	2785.9	99.0	1.0	311.0	3788.8	29.5	10.6	99.0	10.7	2.5	0.8	129.7	960.30	7535.0	540.0	7114.7	3014.0	2845.9
	29.5	30.0	29.8	0.5	28.0	20.7	10.7	124.4	1.6	10.6	10.6	1.0	36.6	2822.5	99.0	1.0	155.5	3944.3	30.0	38.5	0.0	8.9	25.8	17.7	127.1	2651.78	9418.6	549.8	7316.6	3767.4	2926.6
BH-2	2.0	2.5	2.3	0.5	0.5	16.1	6.1	13.7	1.6	24.8	24.8	1.0	10.0	10.0	6.0	1.0	9.4	9.4	2.5	24.8	6.0	6.1	10.0	4.1	15.3	172.9	192.3	9.8	29.2	76.9	11.7
	2.5	3.0	2.8	0.5	1.0	16.1	6.1	17.0	1.6	25.0	25.0	1.0	12.5	22.4	6.0	1.0	9.4	18.8	3.0	25.0	6.0	6.1	10.0	4.9	18.5	0.0	41.3	19.6	60.9	16.5	24.4
	3.0	4.5	3.8	1.5	2.5	16.1	6.1	24.0	4.7	25.0	25.0	1.0	52.7	22.4	6.0	1.0	28.3	18.8	4.5	25.0	6.0	6.1	10.0	4.9	28.6	280.2	321.5	49.1	90.3	128.6	36.1
	4.5	6.0	5.3	1.5	4.0	17.0	7.0	34.9	4.7	23.8	23.8	1.0	72.5	95.0	14.0	1.0	66.0	84.8	6.0	23.8	14.0	7.0	9.3	4.3	40.2	405.8	585.5	78.5	258.3	234.2	103.3
BH-2	6.0	7.5	6.8	1.5	5.5	17.0	7.0	47.8	4.7	23.8	23.8	1.0	99.4	194.3	14.0	1.0	66.0	150.8	7.5	23.8	14.0	7.0	9.3	4.3	53.1	500.4	845.4	108.0	453.1	338.2	181.2
	7.5	8.0	7.8	0.5	6.0	17.0	7.0	56.4	1.6	23.8	23.8	1.0	39.1	233.4	14.0	1.0	22.0	172.8	8.0	23.8	14.0	8.6	9.3	4.3	58.2	540.5	946.6	117.8	524.0	378.6	209.6

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	8.0	9.0	8.5	1.0	7.0	18.6	8.6	63.4	3.1	23.8	23.8	1.0	87.8	321.2	14.0	1.0	44.0	216.8	9.0	23.8	14.0	8.6	9.3	6.5	67.7	617.5	1155.4	137.4	675.3	462.2	270.1
	9.0	10.5	9.8	1.5	8.5	18.6	8.6	75.4	4.7	23.8	23.8	1.0	156.6	477.8	14.0	1.0	66.0	282.7	10.5	23.8	14.0	8.6	9.3	6.5	81.8	721.3	1481.7	166.9	927.4	592.7	371.0
	10.5	11.0	10.8	0.5	9.0	18.6	8.6	85.0	1.6	23.8	23.8	1.0	58.9	536.6	14.0	1.0	22.0	304.7	11.0	23.8	14.0	8.6	9.3	6.5	87.1	760.1	1601.4	176.7	1018.0	640.6	407.2
	11.0	12.0	11.5	1.0	10.0	18.6	8.6	92.2	3.1	23.8	23.8	1.0	127.7	664.3	14.0	1.0	44.0	348.7	12.0	33.9	0.0	7.8	18.7	26.2	96.5	1505.4	2518.3	196.4	1209.3	1007.3	483.7
	12.0	13.5	12.8	1.5	11.5	17.8	7.8	104.2	4.7	34.2	34.2	1.2	403.6	1067.9	0.0	1.0	0.0	348.7	13.5	34.2	0.0	8.8	18.7	27.1	110.0	1719.3	3135.9	225.8	1642.4	1254.3	656.9
	13.5	15.0	14.3	1.5	13.0	18.8	8.8	118.6	4.7	34.5	34.5	1.2	470.3	1538.2	0.0	1.0	0.0	348.7	15.0	34.5	0.0	8.5	18.7	30.1	125.2	1950.2	3837.1	255.3	2142.2	1534.9	856.9
	15.0	16.5	15.8	1.5	14.5	18.5	8.5	118.6	4.7	34.2	34.2	1.2	459.4	1997.6	0.0	1.0	0.0	348.7	16.5	34.2	0.0	8.6	18.7	29.1	124.9	1944.7	4291.0	284.7	2631.0	1716.4	1052.4
	16.5	17.0	16.8	0.5	15.0	18.6	8.6	118.6	1.6	33.9	33.9	1.2	149.5	2147.1	0.0	1.0	0.0	348.7	17.0	33.9	0.0	8.6	18.7	28.1	120.7	1878.9	4374.7	294.5	2790.4	1749.9	1116.1
	17.0	18.0	17.5	1.0	16.0	18.6	8.6	118.6	3.1	33.9	33.9	1.2	299.1	2446.2	0.0	1.0	0.0	348.7	18.0	33.9	0.0	8.8	18.7	28.1	122.9	1912.4	4707.3	314.2	3109.1	1882.9	1243.6
BH-2	18.0	19.5	18.8	1.5	17.5	18.8	8.8	118.6	4.7	33.0	33.0	1.2	417.2	2863.4	0.0	1.0	0.0	348.7	19.5	24.6	15.0	9.6	9.3	6.9	125.1	1050.1	4262.2	343.6	3555.7	1704.9	1422.3
	19.5	20.0	19.8	0.5	18.0	19.6	9.6	118.6	1.6	24.6	24.6	1.0	85.3	2948.7	15.0	1.0	23.6	372.3	20.0	24.6	15.0	9.6	9.3	6.5	121.0	1018.1	4339.0	353.4	3674.4	1735.6	1469.7

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	20.0	21.0	20.5	1.0	19.0	19.6	9.6	118.6	3.1	24.6	24.6	1.0	170.5	3119.2	15.0	1.0	47.1	419.4	21.0	24.6	15.0	9.6	9.3	6.5	123.4	1035.7	4574.2	373.1	3911.6	1829.7	1564.6
	21.0	22.0	21.5	1.0	20.0	19.6	9.6	118.6	3.1	24.6	24.6	1.0	170.5	3289.7	15.0	1.0	47.1	466.5	22.0	24.6	15.0	9.6	9.3	6.5	123.4	1035.7	4791.9	392.7	4148.9	1916.7	1659.6
	22.0	22.5	22.3	0.5	20.5	19.6	9.6	118.6	1.6	24.6	24.6	1.0	85.3	3375.0	15.0	1.0	23.6	490.1	22.5	24.6	15.0	9.6	9.3	6.5	121.0	1018.1	4883.1	402.5	4267.5	1953.2	1707.0
	22.5	23.0	22.8	0.5	21.0	19.6	9.6	118.6	1.6	24.6	24.6	1.0	85.3	3460.2	15.0	1.0	23.6	513.6	23.0	24.6	15.0	9.6	9.3	6.5	121.0	1018.1	4991.9	412.3	4386.2	1996.8	1754.5
	23.0	24.0	23.5	1.0	22.0	19.6	9.6	118.6	3.1	8.5	8.5	1.0	55.7	3515.9	91.0	1.0	285.9	799.5	24.0	8.5	91.0	9.6	2.1	0.8	123.4	855.6	5171.0	432.0	4747.3	2068.4	1898.9
	24.0	24.5	24.3	0.5	22.5	19.6	9.6	118.6	1.6	8.5	8.5	1.0	27.8	3543.7	91.0	1.0	142.9	942.4	24.5	8.5	91.0	9.6	2.1	0.8	121.0	851.6	5337.8	441.8	4927.9	2135.1	1971.2
	24.5	25.5	25.0	1.0	23.5	19.6	9.6	118.6	3.1	8.5	8.5	1.0	55.7	3599.4	91.0	1.0	285.9	1228.3	25.5	8.5	91.0	9.6	2.1	0.8	123.4	855.6	5683.3	461.4	5289.1	2273.3	2115.6
	25.5	26.0	25.8	0.5	24.0	19.6	9.6	118.6	1.6	8.5	8.5	1.0	27.8	3627.2	91.0	1.0	142.9	1371.3	26.0	8.5	91.0	9.5	2.1	0.8	121.0	851.6	5850.0	471.2	5469.7	2340.0	2187.9
	26.0	27.0	26.5	1.0	25.0	19.5	9.5	118.6	3.1	8.2	8.2	1.0	53.7	3680.9	118.0	1.0	370.7	1742.0	27.0	8.2	118.0	9.5	2.1	0.9	123.3	1047.7	6470.5	490.9	5913.7	2588.2	2365.5
BH-2	27.0	28.5	27.8	1.5	26.5	19.5	9.5	118.6	4.7	8.2	8.2	1.0	80.5	3761.4	118.0	1.0	556.1	2298.0	28.5	8.2	118.0	9.5	2.1	0.9	125.7	1051.7	7111.0	520.3	6579.7	2844.4	2631.9
	28.5	29.0	28.8	0.5	27.0	19.5	9.5	118.6	1.6	8.2	8.2	1.0	26.8	3788.2	118.0	1.0	185.4	2483.4	29.0	8.2	118.0	9.7	2.1	0.9	120.9	1043.8	7315.4	530.1	6801.7	2926.1	2720.7

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	29.0	29.5	29.3	0.5	27.5	19.7	9.7	118.6	1.6	8.2	8.2	1.0	26.8	3815.0	118.0	1.0	185.4	2668.7	29.5	8.2	118.0	9.7	2.1	0.7	121.0	1043.3	7527.0	540.0	7023.7	3010.8	2809.5
	29.5	30.0	29.8	0.5	28.0	19.7	9.7	118.6	1.6	8.2	8.2	1.0	26.8	3841.9	118.0	1.0	185.4	2854.1	30.0	8.2	118.0	9.7	2.1	0.7	121.0	1043.3	7739.2	549.8	7245.7	3095.7	2898.3
BH-3	2.0	3.0	2.5	1.0	1.0	18.5	8.5	21.3	3.1	8.6	8.6	1.0	10.1	10.1	87.0	1.0	273.3	273.3	3.0	8.6	87.0	8.5	2.1	0.6	25.5	663.1	946.5	19.6	303.1	378.6	121.2
	3.0	4.5	3.8	1.5	2.5	18.5	8.5	31.8	4.7	8.6	8.6	1.0	22.6	32.7	87.0	1.0	410.0	683.3	4.5	10.9	54.0	8.5	2.8	1.0	38.1	470.5	1186.6	49.1	765.1	474.6	306.0
	4.5	5.0	4.8	0.5	3.0	18.5	8.5	40.2	1.6	10.9	10.9	1.0	12.1	44.9	54.0	1.0	84.8	768.1	5.0	10.9	54.0	8.5	2.8	1.0	42.3	479.5	1292.5	58.9	871.9	517.0	348.8
	5.0	6.0	5.5	1.0	4.0	18.5	8.5	46.5	3.1	10.9	10.9	1.0	28.1	73.0	54.0	1.0	169.7	937.8	6.0	10.9	54.0	8.5	2.8	1.0	50.7	0.0	1010.7	78.5	1089.3	404.3	435.7
	6.0	7.5	6.8	1.5	5.5	18.4	8.4	57.0	4.7	10.9	10.9	1.0	51.7	73.0	54.0	1.0	254.5	937.8	7.5	10.9	54.0	8.4	2.8	1.0	63.3	525.2	1010.7	108.0	1118.7	404.3	447.5
	7.5	8.0	7.8	0.5	6.0	18.4	8.4	65.4	1.6	10.9	10.9	1.0	19.8	92.7	54.0	1.0	84.8	1022.6	8.0	10.9	54.0	8.4	2.8	1.0	67.5	534.3	1649.6	117.8	1233.1	659.9	493.3
BH-3	8.0	9.0	8.5	1.0	7.0	18.4	8.4	71.7	3.1	30.6	30.6	1.0	137.1	229.9	0.0	1.0	0.0	1022.6	9.0	30.6	0.0	8.4	13.8	11.4	75.9	864.7	2117.1	137.4	1389.9	846.9	556.0
	9.0	10.5	9.8	1.5	8.5	18.4	8.4	82.2	4.7	30.6	30.6	1.0	235.8	465.7	0.0	1.0	0.0	1022.6	10.5	30.6	0.0	8.4	13.8	11.4	88.5	1002.1	2490.3	166.9	1655.2	996.1	662.1
	10.5	11.0	10.8	0.5	9.0	18.4	8.4	90.6	1.6	30.6	30.6	1.0	86.6	552.3	0.0	1.0	0.0	1022.6	11.0	30.6	0.0	8.4	13.8	11.4	92.7	1047.9	2622.7	176.7	1751.6	1049.1	700.6

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	11.0	12.0	11.5	1.0	10.0	18.4	8.4	96.9	3.1	30.6	30.6	1.0	185.3	737.6	0.0	1.0	0.0	1022.6	12.0	30.6	0.0	8.4	13.8	17.4	101.1	1159.3	2919.5	196.4	1956.6	1167.8	782.6
	12.0	13.5	12.8	1.5	11.5	18.4	8.4	107.4	4.7	30.6	30.6	1.0	308.2	1045.8	0.0	1.0	0.0	1022.6	13.5	30.6	0.0	8.4	13.8	17.4	113.7	1296.7	3365.0	225.8	2294.2	1346.0	917.7
	13.5	14.0	13.8	0.5	12.0	18.4	8.4	115.8	1.6	30.6	30.6	1.0	110.8	1156.5	0.0	1.0	0.0	1022.6	14.0	30.6	0.0	8.4	13.8	17.4	117.9	1342.4	3521.6	235.6	2414.8	1408.6	965.9
	14.0	15.0	14.5	1.0	13.0	18.4	8.4	122.1	3.1	30.6	30.6	1.0	233.6	1390.1	0.0	1.0	0.0	1022.6	15.0	33.9	0.0	9.2	18.7	26.2	126.3	1959.6	4372.3	255.3	2667.9	1748.9	1067.2
	15.0	16.5	15.8	1.5	14.5	19.2	9.2	122.1	4.7	33.6	33.6	1.2	450.9	1841.0	0.0	1.0	0.0	1022.6	16.5	33.6	0.0	10.1	17.3	25.3	128.9	1862.6	4726.2	284.7	3148.3	1890.5	1259.3
	16.5	17.0	16.8	0.5	15.0	20.1	10.1	122.1	1.6	33.6	33.6	1.2	150.3	1991.3	0.0	1.0	0.0	1022.6	17.0	33.6	0.0	10.1	17.3	25.3	124.6	1803.3	4817.2	294.5	3308.4	1926.9	1323.4
	17.0	18.0	17.5	1.0	16.0	20.1	10.1	122.1	3.1	33.6	33.6	1.2	300.6	2291.9	0.0	1.0	0.0	1022.6	18.0	33.6	0.0	10.3	17.3	25.3	127.1	1839.8	5154.4	314.2	3628.7	2061.7	1451.5
	18.0	19.5	18.8	1.5	17.5	20.3	10.3	122.1	4.7	33.3	33.3	1.2	440.1	2732.1	0.0	1.0	0.0	1022.6	19.5	33.3	0.0	10.1	17.3	24.4	129.8	1871.2	5625.8	343.6	4098.3	2250.3	1639.3
BH-3	19.5	21.0	20.3	1.5	19.0	20.1	10.1	122.1	4.7	33.3	33.3	1.2	440.1	3172.2	0.0	1.0	0.0	1022.6	21.0	33.3	0.0	9.9	17.3	24.4	129.7	1867.0	6061.7	373.1	4567.9	2424.7	1827.1
	21.0	22.0	21.5	1.0	20.0	19.9	9.9	122.1	3.1	33.3	33.3	1.2	293.4	3465.6	0.0	1.0	0.0	1022.6	22.0	33.3	0.0	9.9	17.3	20.6	127.0	1815.9	6304.1	392.7	4880.9	2521.6	1952.4
	22.0	22.5	22.3	0.5	20.5	19.9	9.9	122.1	1.6	33.3	33.3	1.2	146.7	3612.3	0.0	1.0	0.0	1022.6	22.5	33.3	0.0	9.7	17.3	20.6	124.5	1781.1	6416.0	402.5	5037.5	2566.4	2015.0

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	22.5	24.0	23.3	1.5	22.0	19.7	9.7	122.1	4.7	33.0	33.0	1.2	429.5	4041.9	0.0	1.0	0.0	1022.6	24.0	33.0	0.0	9.0	17.3	19.9	129.4	1838.4	6902.9	432.0	5496.4	2761.1	2198.6
	24.0	24.5	24.3	0.5	22.5	19.0	9.0	122.1	1.6	33.0	33.0	1.2	143.2	4185.1	0.0	1.0	0.0	1022.6	24.5	33.0	0.0	9.0	17.3	19.9	124.3	1769.2	6976.9	441.8	5649.4	2790.8	2259.8
	24.5	25.5	25.0	1.0	23.5	19.0	9.0	122.1	3.1	33.0	33.0	1.2	286.4	4471.4	0.0	1.0	0.0	1022.6	25.5	33.0	0.0	9.8	17.3	19.9	126.5	1806.7	7300.7	461.4	5955.4	2920.3	2382.2
	25.5	26.0	25.8	0.5	24.0	19.8	9.8	122.1	1.6	33.0	33.0	1.2	143.2	4614.6	0.0	1.0	0.0	1022.6	26.0	33.0	0.0	9.8	17.3	19.9	124.5	1778.9	7416.1	471.2	6108.4	2966.4	2443.4
	26.0	27.0	26.5	1.0	25.0	19.8	9.8	122.1	3.1	33.0	33.0	1.2	286.4	4900.9	0.0	1.0	0.0	1022.6	27.0	33.0	0.0	9.3	17.3	19.9	127.0	1808.2	7731.7	490.9	6414.4	3092.7	2565.8
	27.0	28.5	27.8	1.5	26.5	19.3	9.3	122.1	4.7	33.0	33.0	1.2	429.5	5330.5	0.0	1.0	0.0	1022.6	28.5	33.0	0.0	10.9	17.3	19.9	129.0	1848.8	8201.9	520.3	6873.4	3280.8	2749.4
	28.5	29.5	29.0	1.0	27.5	20.9	10.9	122.1	3.1	33.0	33.0	1.2	286.4	5616.8	0.0	1.0	0.0	1022.6	29.5	33.0	0.0	10.9	17.3	19.9	127.5	1828.3	8467.7	540.0	7179.4	3387.1	2871.7
	29.5	30.0	29.8	0.5	28.0	20.9	10.9	122.1	1.6	33.0	33.0	1.2	143.2	5760.0	0.0	1.0	0.0	1022.6	30.0	33.0	0.0	10.8	17.3	19.9	124.8	1789.9	8572.5	549.8	7332.4	3429.0	2932.9
BH-4	2.0	2.5	2.3	0.5	0.5	16.3	6.3	14.1	1.6	29.7	29.7	1.0	12.6	12.6	0.0	1.0	0.0	0.0	2.5	29.7	0.0	6.3	13.0	10.2	15.7	186.1	198.7	9.8	22.4	79.5	9.0
	2.5	3.0	2.8	0.5	1.0	16.3	6.3	17.3	1.6	30.1	30.1	1.0	15.8	28.4	0.0	1.0	0.0	0.0	3.0	30.1	0.0	6.3	13.8	11.1	18.9	0.0	28.4	19.6	48.1	11.4	19.2
	3.0	4.5	3.8	1.5	2.5	16.3	6.3	23.8	4.7	30.1	30.1	1.0	65.3	28.4	0.0	1.0	0.0	0.0	4.5	30.1	0.0	6.3	13.8	11.1	28.5	338.1	28.4	49.1	77.5	11.4	31.0

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	4.5	6.0	5.3	1.5	4.0	16.5	6.5	34.1	4.7	23.5	23.5	1.0	69.9	98.4	16.0	1.0	75.4	75.4	6.0	23.5	16.0	6.5	8.6	5.6	39.0	391.9	565.7	78.5	252.3	226.3	100.9
	6.0	7.5	6.8	1.5	5.5	16.5	6.5	47.3	4.7	23.5	23.5	1.0	96.9	195.3	16.0	1.0	75.4	150.8	7.5	23.5	16.0	6.5	8.6	5.6	52.2	481.0	827.0	108.0	454.1	330.8	181.6
	7.5	8.0	7.8	0.5	6.0	16.5	6.5	56.1	1.6	23.5	23.5	1.0	38.3	233.6	16.0	1.0	25.1	175.9	8.0	23.5	16.0	8.8	8.6	5.6	57.7	523.3	932.8	117.8	527.3	373.1	210.9
	8.0	9.0	8.5	1.0	7.0	18.8	8.8	63.0	3.1	23.5	23.5	1.0	86.1	319.7	16.0	1.0	50.3	226.2	9.0	23.5	16.0	8.8	8.6	6.7	67.4	593.0	1138.8	137.4	683.3	455.5	273.3
	9.0	10.5	9.8	1.5	8.5	18.8	8.8	74.9	4.7	23.5	23.5	1.0	153.5	473.1	16.0	1.0	75.4	301.6	10.5	30.9	0.0	8.8	15.0	18.7	81.5	1030.5	1805.2	166.9	941.6	722.1	376.6
	10.5	11.0	10.8	0.5	9.0	18.8	8.8	84.4	1.6	30.9	30.9	1.0	82.9	556.0	0.0	1.0	0.0	301.6	11.0	30.9	0.0	9.5	15.0	14.9	86.6	1082.0	1939.6	176.7	1034.3	775.8	413.7
	11.0	12.0	11.5	1.0	10.0	19.5	9.5	91.2	3.1	30.9	30.9	1.0	179.1	735.1	0.0	1.0	0.0	301.6	12.0	30.9	0.0	9.5	15.0	14.9	95.9	1192.4	2229.2	196.4	1233.1	891.7	493.2
	12.0	13.5	12.8	1.5	11.5	19.5	9.5	102.1	4.7	30.9	30.9	1.0	301.0	1036.2	0.0	1.0	0.0	301.6	13.5	30.9	0.0	9.5	15.0	14.9	109.3	1350.7	2688.4	225.8	1563.6	1075.4	625.4
BH-4	13.5	14.0	13.8	0.5	12.0	19.5	9.5	110.9	1.6	30.9	30.9	1.0	109.0	1145.1	0.0	1.0	0.0	301.6	14.0	30.9	0.0	8.8	15.0	14.9	113.3	1394.2	2840.9	235.6	1682.4	1136.4	672.9
	14.0	15.0	14.5	1.0	13.0	18.8	8.8	117.5	3.1	30.9	30.9	1.0	230.9	1376.0	0.0	1.0	0.0	301.6	15.0	30.9	0.0	8.8	15.0	18.4	121.9	1508.1	3185.7	255.3	1932.9	1274.3	773.1
	15.0	16.5	15.8	1.5	14.5	18.8	8.8	117.5	4.7	30.9	30.9	1.0	346.3	1722.3	0.0	1.0	0.0	301.6	16.5	30.9	0.0	8.8	15.0	18.4	124.1	1534.1	3558.0	284.7	2308.6	1423.2	923.5

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
BH-4	16.5	17.0	16.8	0.5	15.0	18.8	8.8	117.5	1.6	30.9	30.9	1.0	115.4	1837.8	0.0	1.0	0.0	301.6	17.0	30.9	0.0	8.8	15.0	18.4	119.7	1482.1	3621.5	294.5	2433.9	1448.6	973.6
	17.0	18.0	17.5	1.0	16.0	18.8	8.8	117.5	3.1	30.9	30.9	1.0	230.9	2068.7	0.0	1.0	0.0	301.6	18.0	36.3	0.0	7.4	21.8	38.7	121.9	2213.0	4583.3	314.2	2684.4	1833.3	1073.8
	18.0	19.5	18.8	1.5	17.5	17.4	7.4	117.5	4.7	36.0	36.0	1.3	523.0	2591.7	0.0	1.0	0.0	301.6	19.5	36.0	0.0	7.1	21.8	36.6	123.1	2222.1	5115.3	343.6	3236.9	2046.1	1294.7
	19.5	21.0	20.3	1.5	19.0	17.1	7.1	117.5	4.7	35.7	35.7	1.3	511.3	3103.0	0.0	1.0	0.0	301.6	21.0	35.7	0.0	7.3	20.0	28.9	122.8	2023.5	5428.0	373.1	3777.6	2171.2	1511.0
	21.0	22.0	21.5	1.0	20.0	17.3	7.3	117.5	3.1	35.4	35.4	1.3	333.2	3436.1	0.0	1.0	0.0	301.6	22.0	35.4	0.0	7.3	20.0	27.2	121.1	1992.0	5729.8	392.7	4130.4	2291.9	1652.2
	22.0	22.5	22.3	0.5	20.5	17.3	7.3	117.5	1.6	35.4	35.4	1.3	166.6	3602.7	0.0	1.0	0.0	301.6	22.5	35.4	0.0	7.1	20.0	27.2	119.3	1961.3	5865.6	402.5	4306.9	2346.2	1722.7
	22.5	23.0	22.8	0.5	21.0	17.1	7.1	117.5	1.6	35.1	35.1	1.3	162.8	3765.5	0.0	1.0	0.0	301.6	23.0	35.1	0.0	7.1	20.0	25.4	119.3	1955.7	6022.8	412.3	4479.5	2409.1	1791.8
	23.0	24.0	23.5	1.0	22.0	17.1	7.1	117.5	3.1	35.1	35.1	1.3	325.6	4091.1	0.0	1.0	0.0	301.6	24.0	35.1	0.0	10.6	20.0	25.4	121.1	2019.4	6412.1	432.0	4824.7	2564.8	1929.9
	24.0	24.5	24.3	0.5	22.5	20.6	10.6	117.5	1.6	34.8	34.8	1.2	159.1	4250.2	0.0	1.0	0.0	301.6	24.5	34.8	0.0	10.6	20.0	24.3	120.2	2000.9	6552.7	441.8	4993.6	2621.1	1997.4
	24.5	25.5	25.0	1.0	23.5	20.6	10.6	117.5	3.1	34.8	34.8	1.2	318.2	4568.4	0.0	1.0	0.0	301.6	25.5	34.8	0.0	10.3	20.0	24.3	122.8	2040.0	6910.0	461.4	5331.4	2764.0	2132.6
	25.5	27.0	26.3	1.5	25.0	20.3	10.3	117.5	4.7	33.6	33.6	1.2	434.1	5002.5	0.0	1.0	0.0	301.6	27.0	33.6	0.0	10.3	17.3	21.4	125.3	1799.2	7103.3	490.9	5795.0	2841.3	2318.0

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	27.0	28.5	27.8	1.5	26.5	20.3	10.3	117.5	4.7	33.9	33.9	1.2	444.7	5447.1	0.0	1.0	0.0	301.6	28.5	33.9	0.0	9.7	18.7	22.1	125.3	1935.2	7683.9	520.3	6269.1	3073.6	2507.6
	28.5	29.5	29.0	1.0	27.5	19.7	9.7	117.5	3.1	33.9	33.9	1.2	296.4	5743.6	0.0	1.0	0.0	301.6	29.5	33.9	0.0	9.7	18.7	22.1	122.4	1892.3	7937.4	540.0	6585.1	3175.0	2634.1
	29.5	30.0	29.8	0.5	28.0	19.7	9.7	117.5	1.6	33.9	33.9	1.2	148.2	5891.8	0.0	1.0	0.0	301.6	30.0	33.9	0.0	10.4	18.7	22.1	119.9	1862.5	8055.9	549.8	6743.2	3222.4	2697.3
BH-5	2.0	2.5	2.3	0.5	0.5	18.4	8.4	18.8	1.6	25.2	25.2	1.0	13.9	13.9	7.0	1.0	11.0	11.0	2.5	25.2	7.0	8.4	10.0	4.2	20.9	228.6	253.5	9.8	34.7	101.4	13.9
	2.5	3.0	2.8	0.5	1.0	18.4	8.4	23.2	1.6	25.2	25.2	1.0	17.1	31.0	7.0	1.0	11.0	22.0	3.0	25.2	7.0	8.4	10.0	5.7	25.3	268.1	321.1	19.6	72.6	128.4	29.1
	3.0	4.5	3.8	1.5	2.5	18.4	8.4	32.4	4.7	25.2	25.2	1.0	71.8	102.8	7.0	1.0	33.0	55.0	4.5	25.2	7.0	8.4	10.0	5.7	38.6	373.8	531.6	49.1	206.9	212.6	82.7
	4.5	5.0	4.8	0.5	3.0	18.4	8.4	41.6	1.6	25.2	25.2	1.0	30.7	133.5	7.0	1.0	11.0	66.0	5.0	25.2	7.0	8.4	10.0	5.7	43.7	413.6	613.1	58.9	258.4	245.2	103.4
BH-5	5.0	6.0	5.5	1.0	4.0	18.4	8.4	48.5	3.1	25.2	25.2	1.0	71.7	205.2	7.0	1.0	22.0	88.0	6.0	25.2	7.0	8.4	10.0	5.7	52.7	0.0	293.2	78.5	371.7	117.3	148.7
	6.0	7.5	6.8	1.5	5.5	19.2	9.2	60.0	4.7	30.9	30.9	1.0	176.8	205.2	0.0	1.0	0.0	88.0	7.5	11.5	88.0	9.2	2.8	1.3	66.9	776.1	1069.3	108.0	401.2	427.7	160.5
	7.5	9.0	8.3	1.5	7.0	19.2	9.2	73.8	4.7	11.5	11.5	1.0	70.8	276.0	88.0	1.0	414.7	502.7	9.0	11.5	88.0	9.2	2.8	1.4	80.7	806.8	1585.4	137.4	916.1	634.2	366.4
	9.0	10.5	9.8	1.5	8.5	19.2	9.2	87.6	4.7	11.5	11.5	1.0	84.0	360.0	88.0	1.0	414.7	917.4	10.5	11.5	88.0	9.2	2.8	1.4	94.5	836.9	2114.2	166.9	1444.2	845.7	577.7

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	10.5	11.0	10.8	0.5	9.0	19.2	9.2	96.8	1.6	11.5	11.5	1.0	30.9	390.9	88.0	1.0	138.2	1055.6	11.0	11.5	88.0	9.2	2.8	1.4	99.1	846.9	2293.4	176.7	1623.2	917.4	649.3
	11.0	12.0	11.5	1.0	10.0	19.2	9.2	103.7	3.1	11.5	11.5	1.0	66.3	457.2	88.0	1.0	276.5	1332.1	12.0	11.5	88.0	9.2	2.8	1.2	108.3	866.1	2655.3	196.4	1985.6	1062.1	794.2
	12.0	13.5	12.8	1.5	11.5	19.2	9.2	115.2	4.7	11.5	11.5	1.0	110.5	567.7	88.0	1.0	414.7	1746.7	13.5	11.5	88.0	9.2	2.8	1.3	122.1	896.6	3211.0	225.8	2540.2	1284.4	1016.1
	13.5	14.0	13.8	0.5	12.0	19.2	9.2	124.4	1.6	11.5	11.5	1.0	39.8	607.4	88.0	1.0	138.2	1885.0	14.0	11.5	88.0	9.2	2.8	1.3	126.7	906.6	3399.0	235.6	2728.0	1359.6	1091.2
	14.0	15.0	14.5	1.0	13.0	19.2	9.2	131.3	3.1	11.5	11.5	1.0	84.0	691.4	88.0	1.0	276.5	2161.4	15.0	31.8	0.0	9.0	16.0	19.9	135.9	1788.6	4641.4	255.3	3108.1	1856.6	1243.2
	15.0	16.5	15.8	1.5	14.5	19.0	9.0	131.3	4.7	32.1	32.1	1.1	429.0	1120.4	0.0	1.0	0.0	2161.4	16.5	32.1	0.0	8.9	16.0	20.8	138.1	1817.6	5099.4	284.7	3566.5	2039.8	1426.6
	16.5	17.0	16.8	0.5	15.0	18.9	8.9	131.3	1.6	31.8	31.8	1.1	139.4	1259.8	0.0	1.0	0.0	2161.4	17.0	31.8	0.0	8.9	16.0	19.9	133.6	1757.5	5178.7	294.5	3715.8	2071.5	1486.3
BH-5	17.0	18.0	17.5	1.0	16.0	18.9	8.9	131.3	3.1	31.8	31.8	1.1	278.9	1538.7	0.0	1.0	0.0	2161.4	18.0	31.8	0.0	9.3	16.0	19.9	135.8	1789.0	5489.1	314.2	4014.3	2195.6	1605.7
	18.0	19.5	18.8	1.5	17.5	19.3	9.3	131.3	4.7	31.8	31.8	1.1	418.3	1956.9	0.0	1.0	0.0	2161.4	19.5	31.8	0.0	9.0	16.0	19.9	138.3	1818.7	5937.1	343.6	4462.0	2374.8	1784.8
	19.5	21.0	20.3	1.5	19.0	19.0	9.0	131.3	4.7	31.8	31.8	1.1	418.3	2375.2	0.0	1.0	0.0	2161.4	21.0	31.8	0.0	9.0	16.0	18.3	138.1	1810.3	6347.0	373.1	4909.7	2538.8	1963.9
	21.0	22.0	21.5	1.0	20.0	19.0	9.0	131.3	3.1	31.8	31.8	1.1	278.9	2654.1	0.0	1.0	0.0	2161.4	22.0	31.8	0.0	9.0	16.0	18.3	135.8	1782.0	6597.5	392.7	5208.2	2639.0	2083.3

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	22.0	22.5	22.3	0.5	20.5	19.0	9.0	131.3	1.6	31.8	31.8	1.1	139.4	2793.5	0.0	1.0	0.0	2161.4	22.5	31.8	0.0	8.9	16.0	18.3	133.6	1753.0	6707.9	402.5	5357.5	2683.2	2143.0
	22.5	23.0	22.8	0.5	21.0	18.9	8.9	131.3	1.6	31.8	31.8	1.1	139.4	2932.9	0.0	1.0	0.0	2161.4	23.0	31.8	0.0	8.9	16.0	18.3	133.6	1752.7	6847.0	412.3	5506.7	2738.8	2202.7
	23.0	24.0	23.5	1.0	22.0	18.9	8.9	131.3	3.1	31.8	31.8	1.1	278.9	3211.8	0.0	1.0	0.0	2161.4	24.0	31.8	0.0	9.2	16.0	16.9	135.8	1777.6	7150.8	432.0	5805.2	2860.3	2322.1
	24.0	24.5	24.3	0.5	22.5	19.2	9.2	131.3	1.6	31.8	31.8	1.1	139.4	3351.2	0.0	1.0	0.0	2161.4	24.5	31.8	0.0	9.2	16.0	16.9	133.6	1750.4	7263.0	441.8	5954.4	2905.2	2381.8
	24.5	25.5	25.0	1.0	23.5	19.2	9.2	131.3	3.1	31.8	31.8	1.1	278.9	3630.1	0.0	1.0	0.0	2161.4	25.5	31.8	0.0	9.3	16.0	16.9	135.9	1780.4	7571.9	461.4	6252.9	3028.8	2501.2
	25.5	27.0	26.3	1.5	25.0	19.3	9.3	131.3	4.7	32.1	32.1	1.1	429.0	4059.1	0.0	1.0	0.0	2161.4	27.0	32.1	0.0	8.9	16.0	17.7	138.3	1810.6	8031.1	490.9	6711.4	3212.5	2684.5
	27.0	28.5	27.8	1.5	26.5	18.9	8.9	131.3	4.7	32.4	32.4	1.1	439.9	4499.0	0.0	1.0	0.0	2161.4	28.5	32.4	0.0	8.5	16.0	18.4	138.0	1806.0	8466.4	520.3	7180.7	3386.5	2872.3
BH-5	28.5	29.5	29.0	1.0	27.5	18.5	8.5	131.3	3.1	32.4	32.4	1.1	293.3	4792.3	0.0	1.0	0.0	2161.4	29.5	32.4	0.0	8.5	16.0	18.4	135.6	1775.1	8728.7	540.0	7493.6	3491.5	2997.5
	29.5	30.0	29.8	0.5	28.0	18.5	8.5	131.3	1.6	32.4	32.4	1.1	146.6	4938.9	0.0	1.0	0.0	2161.4	30.0	32.4	0.0	8.7	16.0	18.4	133.5	1750.4	8850.7	549.8	7650.1	3540.3	3060.0
BH-6	2.0	2.5	2.3	0.5	0.5	18.0	8.0	18.1	1.6	23.1	23.1	1.0	12.1	12.1	15.0	1.0	23.6	23.6	2.5	23.1	15.0	8.0	8.6	4.0	20.1	255.0	290.7	9.8	45.5	116.3	18.2
	2.5	3.0	2.8	0.5	1.0	18.0	8.0	22.0	1.6	30.1	30.1	1.0	20.2	32.3	0.0	1.0	0.0	23.6	3.0	30.1	0.0	8.0	13.8	9.7	24.1	293.1	348.9	19.6	75.5	139.6	30.2

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	3.0	4.5	3.8	1.5	2.5	18.0	8.0	29.9	4.7	30.1	30.1	1.0	82.0	114.3	0.0	1.0	0.0	23.6	4.5	30.1	0.0	8.0	13.8	9.7	35.9	422.3	560.2	49.1	187.0	224.1	74.8
	4.5	5.0	4.8	0.5	3.0	18.0	8.0	37.7	1.6	30.1	30.1	1.0	34.5	148.8	0.0	1.0	0.0	23.6	5.0	30.1	0.0	7.8	13.8	9.7	39.7	463.3	635.7	58.9	231.3	254.3	92.5
	5.0	6.0	5.5	1.0	4.0	17.8	7.8	44.2	3.1	30.1	30.1	1.0	80.9	229.8	0.0	1.0	0.0	23.6	6.0	30.1	0.0	7.8	13.8	14.3	48.1	569.0	822.3	78.5	331.9	328.9	132.7
	6.0	7.5	6.8	1.5	5.5	17.8	7.8	55.5	4.7	30.1	30.1	1.0	152.4	382.2	0.0	1.0	0.0	23.6	7.5	10.3	89.0	7.8	2.5	1.0	61.4	755.7	1161.5	108.0	513.7	464.6	205.5
	7.5	8.0	7.8	0.5	6.0	17.8	7.8	64.6	1.6	10.3	10.3	1.0	18.4	400.6	89.0	1.0	139.8	163.4	8.0	10.3	89.0	7.8	2.5	1.1	66.5	765.9	1329.9	117.8	681.8	532.0	272.7
	8.0	9.0	8.5	1.0	7.0	17.8	7.8	71.4	3.1	10.3	10.3	1.0	40.8	441.4	89.0	1.0	279.6	443.0	9.0	10.3	89.0	9.1	2.5	1.1	75.3	783.5	1667.8	137.4	1021.8	667.1	408.7
BH-6	9.0	10.5	9.8	1.5	8.5	19.1	9.1	82.7	4.7	10.3	10.3	1.0	70.8	512.2	89.0	1.0	419.4	862.4	10.5	10.3	89.0	9.1	2.5	1.1	89.5	811.2	2185.7	166.9	1541.5	874.3	616.6
	10.5	12.0	11.3	1.5	10.0	19.1	9.1	96.3	4.7	10.3	10.3	1.0	82.5	594.7	89.0	1.0	419.4	1281.8	12.0	10.3	89.0	9.1	2.5	1.0	103.1	837.5	2713.9	196.4	2072.8	1085.6	829.1
	12.0	13.5	12.8	1.5	11.5	19.1	9.1	109.9	4.7	10.3	10.3	1.0	94.1	688.7	89.0	1.0	419.4	1701.2	13.5	10.3	89.0	9.1	2.5	1.0	116.6	864.0	3253.9	225.8	2615.7	1301.6	1046.3
	13.5	14.0	13.8	0.5	12.0	19.1	9.1	118.9	1.6	10.3	10.3	1.0	33.9	722.7	89.0	1.0	139.8	1841.0	14.0	10.3	89.0	9.1	2.5	1.0	121.2	872.8	3436.5	235.6	2799.3	1374.6	1119.7
	14.0	15.0	14.5	1.0	13.0	19.1	9.1	125.7	3.1	10.3	10.3	1.0	71.8	794.4	89.0	1.0	279.6	2120.6	15.0	32.4	0.0	9.3	16.0	21.7	130.2	1725.7	4640.7	255.3	3170.3	1856.3	1268.1

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	15.0	16.5	15.8	1.5	14.5	19.3	9.3	125.7	4.7	32.7	32.7	1.1	431.6	1226.1	0.0	1.0	0.0	2120.6	16.5	32.7	0.0	9.3	16.0	22.6	132.7	1760.3	5106.9	284.7	3631.3	2042.8	1452.5
	16.5	17.0	16.8	0.5	15.0	19.3	9.3	125.7	1.6	32.7	32.7	1.1	143.9	1370.0	0.0	1.0	0.0	2120.6	17.0	32.7	0.0	9.3	16.0	22.6	128.0	1701.5	5192.0	294.5	3785.0	2076.8	1514.0
	17.0	18.0	17.5	1.0	16.0	19.3	9.3	125.7	3.1	32.7	32.7	1.1	287.8	1657.7	0.0	1.0	0.0	2120.6	18.0	32.7	0.0	9.3	16.0	22.6	130.4	0.0	3778.3	314.2	4092.4	1511.3	1637.0
	18.0	19.5	18.8	1.5	17.5	19.3	9.3	125.7	4.7	32.7	32.7	1.1	431.6	1657.7	0.0	1.0	0.0	2120.6	19.5	32.7	0.0	8.9	16.0	22.6	132.7	1756.5	5534.8	343.6	4121.9	2213.9	1648.7
	19.5	21.0	20.3	1.5	19.0	18.9	8.9	125.7	4.7	32.4	32.4	1.1	421.0	2078.7	0.0	1.0	0.0	2120.6	21.0	32.4	0.0	9.2	16.0	18.4	132.4	1740.3	5939.6	373.1	4572.4	2375.8	1828.9
	21.0	22.0	21.5	1.0	20.0	19.2	9.2	125.7	3.1	32.7	32.7	1.1	287.8	2366.5	0.0	1.0	0.0	2120.6	22.0	32.7	0.0	9.2	16.0	21.7	130.3	1725.6	6212.6	392.7	4879.7	2485.0	1951.9
BH-6	22.0	22.5	22.3	0.5	20.5	19.2	9.2	125.7	1.6	32.7	32.7	1.1	143.9	2510.4	0.0	1.0	0.0	2120.6	22.5	32.7	0.0	8.9	16.0	21.7	128.0	0.0	4630.9	402.5	5033.4	1852.4	2013.4
	22.5	23.0	22.8	0.5	21.0	18.9	8.9	125.7	1.6	32.1	32.1	1.1	136.9	2510.4	0.0	1.0	0.0	2120.6	23.0	32.1	0.0	8.9	16.0	20.0	127.9	0.0	4630.9	412.3	5043.3	1852.4	2017.3
	23.0	24.0	23.5	1.0	22.0	18.9	8.9	125.7	3.1	32.1	32.1	1.1	273.7	2510.4	0.0	1.0	0.0	2120.6	24.0	32.1	0.0	9.2	16.0	20.0	130.2	0.0	4630.9	432.0	5062.9	1852.4	2025.2
	24.0	24.5	24.3	0.5	22.5	19.2	9.2	125.7	1.6	32.1	32.1	1.1	136.9	2510.4	0.0	1.0	0.0	2120.6	24.5	32.1	0.0	9.2	16.0	20.0	128.0	0.0	4630.9	441.8	5072.7	1852.4	2029.1
	24.5	25.5	25.0	1.0	23.5	19.2	9.2	125.7	3.1	32.1	32.1	1.1	273.7	2510.4	0.0	1.0	0.0	2120.6	25.5	32.1	0.0	9.0	16.0	20.0	130.3	1718.2	6349.1	461.4	5092.3	2539.6	2036.9

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	25.5	27.0	26.3	1.5	25.0	19.0	9.0	125.7	4.7	32.1	32.1	1.1	410.6	2921.0	0.0	1.0	0.0	2120.6	27.0	32.1	0.0	9.2	16.0	20.0	132.5	1747.0	6788.5	490.9	5532.4	2715.4	2213.0
	27.0	28.5	27.8	1.5	26.5	19.2	9.2	125.7	4.7	32.1	32.1	1.1	410.6	3331.6	0.0	1.0	0.0	2120.6	28.5	32.1	0.0	8.7	16.0	20.0	132.6	0.0	5452.1	520.3	5972.5	2180.8	2389.0
	28.5	29.5	29.0	1.0	27.5	18.7	8.7	125.7	3.1	32.1	32.1	1.1	273.7	3331.6	0.0	1.0	0.0	2120.6	29.5	32.1	0.0	8.7	16.0	20.0	130.0	0.0	5452.1	540.0	5992.1	2180.8	2396.8
	29.5	30.0	29.8	0.5	28.0	18.7	8.7	125.7	1.6	32.1	32.1	1.1	136.9	3331.6	0.0	1.0	0.0	2120.6	30.0	32.1	0.0	8.8	16.0	20.0	127.9	1686.0	7138.1	549.8	6001.9	2855.2	2400.8
BH-7	2.0	2.5	2.3	0.5	0.5	18.9	8.9	19.9	1.6	7.9	7.9	1.0	4.3	4.3	73.0	1.0	114.7	114.7	2.5	7.9	73.0	8.9	2.1	0.6	22.1	558.0	677.0	9.8	128.8	270.8	51.5
	2.5	3.0	2.8	0.5	1.0	18.9	8.9	24.3	1.6	7.9	7.9	1.0	5.3	9.6	73.0	1.0	114.7	229.3	3.0	7.9	73.0	8.9	2.1	0.5	26.6	565.0	804.0	19.6	258.6	321.6	103.4
	3.0	4.5	3.8	1.5	2.5	18.9	8.9	33.1	4.7	7.9	7.9	1.0	21.7	31.3	73.0	1.0	344.0	573.3	4.5	7.9	73.0	8.9	2.1	0.5	39.8	0.0	604.6	49.1	653.7	241.9	261.5
	4.5	6.0	5.3	1.5	4.0	18.9	8.9	46.3	4.7	7.9	7.9	1.0	30.3	31.3	73.0	1.0	344.0	573.3	6.0	7.9	73.0	8.9	2.1	0.5	52.9	609.1	1213.7	78.5	683.2	485.5	273.3
	6.0	7.5	6.8	1.5	5.5	18.5	8.5	59.4	4.7	31.2	31.2	1.1	179.8	211.1	0.0	1.0	0.0	573.3	7.5	30.1	0.0	8.8	13.8	12.7	65.8	761.1	1545.5	108.0	892.4	618.2	357.0

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	7.5	9.0	8.3	1.5	7.0	18.8	8.8	72.6	4.7	30.1	30.1	1.0	199.3	410.3	0.0	1.0	0.0	573.3	9.0	30.1	0.0	8.8	13.8	9.7	79.2	896.7	1880.4	137.4	1121.1	752.2	448.4
	9.0	10.5	9.8	1.5	8.5	18.8	8.8	85.7	4.7	30.1	30.1	1.0	235.4	645.7	0.0	1.0	0.0	573.3	10.5	30.1	0.0	8.8	13.8	9.7	92.3	1040.2	2259.3	166.9	1386.0	903.7	554.4
	10.5	11.0	10.8	0.5	9.0	18.8	8.8	94.5	1.6	30.1	30.1	1.0	86.5	732.2	0.0	1.0	0.0	573.3	11.0	30.1	0.0	8.8	13.8	9.7	96.7	1088.0	2393.6	176.7	1482.3	957.4	592.9
	11.0	12.0	11.5	1.0	10.0	18.8	8.8	101.1	3.1	30.1	30.1	1.0	185.0	917.3	0.0	1.0	0.0	573.3	12.0	30.1	0.0	8.8	13.8	14.8	105.5	1201.1	2691.7	196.4	1686.9	1076.7	674.8
	12.0	13.5	12.8	1.5	11.5	18.8	8.8	112.1	4.7	30.1	30.1	1.0	307.7	1224.9	0.0	1.0	0.0	573.3	13.5	30.1	0.0	8.8	13.8	14.8	118.6	1344.6	3142.8	225.8	2024.0	1257.1	809.6
	13.5	15.0	14.3	1.5	13.0	18.8	8.8	125.2	4.7	30.1	30.1	1.0	343.8	1568.7	0.0	1.0	0.0	573.3	15.0	31.2	0.0	9.1	15.0	18.1	131.8	1627.0	3769.1	255.3	2397.3	1507.6	958.9
BH-7	15.0	16.5	15.8	1.5	14.5	19.1	9.1	125.2	4.7	31.2	31.2	1.1	378.8	1947.5	0.0	1.0	0.0	573.3	16.5	31.2	0.0	8.9	15.0	17.4	132.1	1626.6	4147.5	284.7	2805.6	1659.0	1122.2
	16.5	17.0	16.8	0.5	15.0	18.9	8.9	125.2	1.6	31.5	31.5	1.1	129.6	2077.1	0.0	1.0	0.0	573.3	17.0	31.5	0.0	8.9	15.0	18.3	127.5	1574.9	4225.3	294.5	2944.9	1690.1	1178.0
	17.0	18.0	17.5	1.0	16.0	18.9	8.9	125.2	3.1	31.5	31.5	1.1	259.2	2336.2	0.0	1.0	0.0	573.3	18.0	31.5	0.0	7.4	15.0	18.3	129.7	1590.3	4499.9	314.2	3223.7	1800.0	1289.5
	18.0	19.5	18.8	1.5	17.5	17.4	7.4	125.2	4.7	31.2	31.2	1.1	378.8	2715.1	0.0	1.0	0.0	573.3	19.5	31.2	0.0	9.7	15.0	18.1	130.8	1618.9	4907.3	343.6	3632.0	1962.9	1452.8
	19.5	21.0	20.3	1.5	19.0	19.7	9.7	125.2	4.7	31.5	31.5	1.1	388.7	3103.8	0.0	1.0	0.0	573.3	21.0	31.5	0.0	7.0	15.0	19.0	132.5	1622.2	5299.3	373.1	4050.2	2119.7	1620.1

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	21.0	22.0	21.5	1.0	20.0	17.0	7.0	125.2	3.1	31.2	31.2	1.1	252.6	3356.3	0.0	1.0	0.0	573.3	22.0	31.2	0.0	7.0	15.0	18.1	128.7	1574.9	5504.6	392.7	4322.4	2201.8	1729.0
	22.0	22.5	22.3	0.5	20.5	17.0	7.0	125.2	1.6	31.2	31.2	1.1	126.3	3482.6	0.0	1.0	0.0	573.3	22.5	31.2	0.0	6.8	15.0	18.1	127.0	1552.8	5608.8	402.5	4458.5	2243.5	1783.4
	22.5	24.0	23.3	1.5	22.0	16.8	6.8	125.2	4.7	31.2	31.2	1.1	378.8	3861.4	0.0	1.0	0.0	573.3	24.0	31.2	0.0	6.8	15.0	18.1	130.3	1592.2	6027.0	432.0	4866.7	2410.8	1946.7
	24.0	24.5	24.3	0.5	22.5	16.8	6.8	125.2	1.6	31.5	31.5	1.1	129.6	3991.0	0.0	1.0	0.0	573.3	24.5	31.5	0.0	6.8	15.0	19.0	126.9	1554.4	6118.8	441.8	5006.1	2447.5	2002.5
	24.5	25.5	25.0	1.0	23.5	16.8	6.8	125.2	3.1	31.5	31.5	1.1	259.2	4250.2	0.0	1.0	0.0	573.3	25.5	31.5	0.0	7.8	15.0	19.0	128.6	1582.0	6405.5	461.4	5284.9	2562.2	2114.0
	25.5	27.0	26.3	1.5	25.0	17.8	7.8	125.2	4.7	31.5	31.5	1.1	388.7	4638.9	0.0	1.0	0.0	573.3	27.0	31.5	0.0	7.1	15.0	19.0	131.0	1606.3	6818.6	490.9	5703.1	2727.4	2281.2
BH-7	27.0	28.5	27.8	1.5	26.5	17.1	7.1	125.2	4.7	31.5	31.5	1.1	388.7	5027.6	0.0	1.0	0.0	573.3	28.5	31.5	0.0	7.5	15.0	19.0	130.6	1603.7	7204.7	520.3	6121.3	2881.9	2448.5
	28.5	29.5	29.0	1.0	27.5	17.5	7.5	125.2	3.1	31.8	31.8	1.1	265.9	5293.5	0.0	1.0	0.0	573.3	29.5	31.8	0.0	7.5	16.0	19.9	129.0	1689.5	7556.3	540.0	6406.8	3022.5	2562.7
	29.5	30.0	29.8	0.5	28.0	17.5	7.5	125.2	1.6	31.8	31.8	1.1	132.9	5426.4	0.0	1.0	0.0	573.3	30.0	31.8	0.0	7.4	16.0	19.9	127.1	1664.4	7664.1	549.8	6549.6	3065.7	2619.8
BH-8	2.0	2.5	2.3	0.5	0.5	18.2	8.2	18.5	1.6	26.3	26.3	1.0	14.4	0	13.0	1.0	20.4	0	2.5	26.3	13.0	8.2	10.5	8.4	20.6	0.0	0.0	9.8	9.8	0.0	3.9
	2.5	3.0	2.8	0.5	1.0	18.2	8.2	23.2	1.6	6.0	6.0	1.0	3.8	0	68.0	1.0	106.8	0	3.0	6.0	68.0	8.2	1.8	0.5	25.3	520.1	520.1	19.6	19.6	208.1	7.9

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	3.0	4.5	3.8	1.5	2.5	18.2	8.2	33.6	4.7	6.0	6.0	1.0	16.6	16.6	68.0	1.0	320.4	320.4	4.5	6.0	68.0	8.2	1.8	0.5	39.7	540.2	877.2	49.1	386.2	350.9	154.5
	4.5	5.0	4.8	0.5	3.0	18.2	8.2	43.9	1.6	6.0	6.0	1.0	7.3	23.9	68.0	1.0	106.8	427.3	5.0	6.0	68.0	10.4	1.8	0.5	46.0	549.3	1000.4	58.9	510.0	400.2	204.0
	5.0	6.0	5.5	1.0	4.0	20.4	10.4	51.2	3.1	6.0	6.0	1.0	16.9	40.8	68.0	1.0	213.6	640.9	6.0	6.0	68.0	10.4	1.8	0.5	56.4	563.5	1245.2	78.5	760.2	498.1	304.1
	6.0	7.5	6.8	1.5	5.5	20.4	10.4	63.0	4.7	6.0	6.0	1.0	31.2	72.0	68.0	1.0	320.4	961.3	7.5	9.2	71.0	10.4	2.3	0.9	70.8	636.5	1669.8	108.0	1141.3	667.9	456.5
	7.5	8.0	7.8	0.5	6.0	20.4	10.4	72.4	1.6	9.2	9.2	1.0	18.4	90.4	71.0	1.0	111.5	1072.9	8.0	9.2	71.0	9.4	2.3	0.9	75.0	643.8	1807.1	117.8	1281.1	722.8	512.4
BH-8	8.0	9.0	8.5	1.0	7.0	19.4	9.4	79.2	3.1	9.2	9.2	1.0	40.3	130.7	71.0	1.0	223.1	1295.9	9.0	9.2	71.0	9.4	2.3	0.7	83.9	659.4	2086.0	137.4	1564.1	834.4	625.6
	9.0	10.5	9.8	1.5	8.5	19.4	9.4	90.2	4.7	9.2	9.2	1.0	68.8	199.5	71.0	1.0	334.6	1630.5	10.5	9.2	71.0	9.4	2.3	0.7	97.2	683.5	2513.5	166.9	1996.9	1005.4	798.8
	10.5	12.0	11.3	1.5	10.0	18.8	8.8	103.1	4.7	9.2	9.2	1.0	78.7	278.2	71.0	1.0	334.6	1965.1	12.0	9.2	71.0	8.8	2.3	0.8	109.7	706.0	2949.2	196.4	2439.6	1179.7	975.8
	12.0	13.5	12.8	1.5	11.5	18.8	8.8	114.7	4.7	9.2	9.2	1.0	87.6	365.8	71.0	1.0	334.6	2299.6	13.5	25.9	15.0	8.8	10.5	7.4	121.3	1138.6	3804.0	225.8	2891.2	1521.6	1156.5
	13.5	15.0	14.3	1.5	13.0	17.8	7.8	126.6	4.7	25.9	25.9	1.0	289.7	655.4	15.0	1.0	70.7	2370.3	15.0	25.9	15.0	7.8	10.5	9.7	132.4	1234.7	4260.4	255.3	3281.0	1704.2	1312.4
	15.0	16.5	15.8	1.5	14.5	17.8	7.8	126.6	4.7	25.9	25.9	1.0	289.7	945.1	15.0	1.0	70.7	2441.0	16.5	25.9	15.0	7.8	10.5	9.7	132.4	1234.7	4620.8	284.7	3670.9	1848.3	1468.3

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq

Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	16.5	17.0	16.8	0.5	15.0	17.8	7.8	126.6	1.6	25.9	25.9	1.0	96.6	1041.7	15.0	1.0	23.6	2464.6	17.0	25.9	15.0	8.8	10.5	9.7	128.5	1206.3	4712.5	294.5	3800.8	1885.0	1520.3
	17.0	18.0	17.5	1.0	16.0	18.8	8.8	126.6	3.1	25.9	25.9	1.0	193.1	1234.8	15.0	1.0	47.1	2511.7	18.0	25.9	15.0	8.8	10.5	8.4	131.0	1222.0	4968.5	314.2	4060.7	1987.4	1624.3
	18.0	19.5	18.8	1.5	17.5	18.8	8.8	126.6	4.7	25.9	25.9	1.0	289.7	1524.5	15.0	1.0	70.7	2582.4	19.5	25.9	15.0	8.8	10.5	8.4	133.2	1240.2	5347.1	343.6	4450.5	2138.8	1780.2
	19.5	21.0	20.3	1.5	19.0	18.8	8.8	126.6	4.7	25.9	25.9	1.0	289.7	1814.2	15.0	1.0	70.7	2653.1	21.0	32.1	0.0	9.0	16.0	20.0	133.2	1754.2	6221.5	373.1	4840.3	2488.6	1936.1
	21.0	22.0	21.5	1.0	20.0	19.0	9.0	126.6	3.1	32.1	32.1	1.1	275.7	2089.9	0.0	1.0	0.0	2653.1	22.0	32.1	0.0	9.0	16.0	20.0	131.1	1728.0	6470.9	392.7	5135.7	2588.4	2054.3
BH-8	22.0	22.5	22.3	0.5	20.5	19.0	9.0	126.6	1.6	32.1	32.1	1.1	137.8	2227.7	0.0	1.0	0.0	2653.1	22.5	32.1	0.0	9.2	16.0	20.0	128.8	1700.9	6581.7	402.5	5283.3	2632.7	2113.3
	22.5	24.0	23.3	1.5	22.0	19.2	9.2	126.6	4.7	32.1	32.1	1.1	413.5	2641.3	0.0	1.0	0.0	2653.1	24.0	32.1	0.0	9.2	16.0	20.0	133.5	1759.3	7053.6	432.0	5726.3	2821.4	2290.5
	24.0	24.5	24.3	0.5	22.5	19.2	9.2	126.6	1.6	32.1	32.1	1.1	137.8	2779.1	0.0	1.0	0.0	2653.1	24.5	32.1	0.0	9.2	16.0	20.0	128.9	1701.5	7133.6	441.8	5874.0	2853.5	2349.6
	24.5	25.5	25.0	1.0	23.5	19.2	9.2	126.6	3.1	32.1	32.1	1.1	275.7	3054.8	0.0	1.0	0.0	2653.1	25.5	32.1	0.0	9.0	16.0	20.0	131.2	0.0	5707.9	461.4	6169.3	2283.1	2467.7
	25.5	27.0	26.3	1.5	25.0	19.0	9.0	126.6	4.7	32.1	32.1	1.1	413.5	3054.8	0.0	1.0	0.0	2653.1	27.0	32.1	0.0	9.2	16.0	20.0	133.3	0.0	5707.9	490.9	6198.7	2283.1	2479.5
	27.0	28.5	27.8	1.5	26.5	19.2	9.2	126.6	4.7	32.4	32.4	1.1	424.0	3054.8	0.0	1.0	0.0	2653.1	28.5	32.4	0.0	9.0	16.0	20.9	133.5	0.0	5707.9	520.3	6228.2	2283.1	2491.3

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	28.5	29.5	29.0	1.0	27.5	19.0	9.0	126.6	3.1	32.7	32.7	1.1	289.8	3054.8	0.0	1.0	0.0	2653.1	29.5	32.7	0.0	9.0	16.0	21.7	131.1	0.0	5707.9	540.0	6247.8	2283.1	2499.1
	29.5	30.0	29.8	0.5	28.0	19.0	9.0	126.6	1.6	32.7	32.7	1.1	144.9	3054.8	0.0	1.0	0.0	2653.1	30.0	32.7	0.0	9.3	16.0	21.7	128.9	1708.0	5707.9	549.8	6257.6	2283.1	2503.1
BH-9	2.0	2.5	2.3	0.5	0.5	17.8	7.8	17.6	1.6	25.7	25.7	1.0	13.3	0	10.0	1.0	15.7	0	2.5	25.7	10.0	7.8	10.0	5.4	19.6	0.0	0.0	9.8	9.8	0.0	3.9
	2.5	3.0	2.8	0.5	1.0	17.8	7.8	21.9	1.6	25.7	25.7	1.0	16.6	0	10.0	1.0	15.7	0	3.0	25.7	10.0	7.8	10.0	4.2	23.9	272.7	272.7	19.6	19.6	109.1	7.9
BH-9	3.0	4.5	3.8	1.5	2.5	17.8	7.8	31.5	4.7	25.7	25.7	1.0	71.4	71.4	10.0	1.0	47.1	47.1	4.5	25.7	10.0	7.8	10.0	5.1	37.4	381.7	500.3	49.1	167.6	200.1	67.0
	4.5	6.0	5.3	1.5	4.0	17.8	7.8	45.8	4.7	25.7	25.7	1.0	103.9	175.3	10.0	1.0	47.1	94.2	6.0	25.7	10.0	7.8	10.0	6.1	51.7	498.2	767.7	78.5	348.1	307.1	139.2
	6.0	7.5	6.8	1.5	5.5	18.5	8.5	60.1	4.7	31.2	31.2	1.1	181.9	357.2	0.0	1.0	0.0	94.2	7.5	8.5	74.0	9.6	2.1	0.8	66.5	639.9	1091.3	108.0	559.4	436.5	223.8
	7.5	9.0	8.3	1.5	7.0	19.6	9.6	74.5	4.7	8.5	8.5	1.0	52.4	409.6	74.0	1.0	348.7	443.0	9.0	8.5	74.0	9.6	2.1	0.8	81.6	665.3	1517.9	137.4	990.0	607.2	396.0
	9.0	10.5	9.8	1.5	8.5	19.6	9.6	88.8	4.7	8.5	8.5	1.0	62.5	472.1	74.0	1.0	348.7	791.7	10.5	8.5	74.0	9.6	2.1	0.8	95.9	689.2	1953.0	166.9	1430.7	781.2	572.3
	10.5	11.0	10.8	0.5	9.0	19.6	9.6	98.3	1.6	8.5	8.5	1.0	23.1	495.2	74.0	1.0	116.2	907.9	11.0	8.5	74.0	9.6	2.1	0.8	100.7	697.2	2100.3	176.7	1579.8	840.1	631.9
	11.0	12.0	11.5	1.0	10.0	19.6	9.6	105.5	3.1	8.5	8.5	1.0	49.5	544.7	74.0	1.0	232.5	1140.4	12.0	8.5	74.0	9.6	2.1	0.7	110.3	712.7	2397.9	196.4	1881.5	959.1	752.6

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	12.0	13.5	12.8	1.5	11.5	19.6	9.6	117.4	4.7	8.5	8.5	1.0	82.7	627.4	74.0	1.0	348.7	1489.1	13.5	8.5	74.0	9.6	2.1	0.7	124.6	736.6	2853.2	225.8	2342.4	1141.3	936.9
	13.5	15.0	14.3	1.5	13.0	19.6	9.6	131.7	4.7	8.5	8.5	1.0	92.8	720.2	74.0	1.0	348.7	1837.8	15.0	31.5	0.0	8.7	15.0	17.5	138.9	1706.5	4264.5	255.3	2813.3	1705.8	1125.3
	15.0	16.5	15.8	1.5	14.5	18.7	8.7	131.7	4.7	31.5	31.5	1.1	409.0	1129.2	0.0	1.0	0.0	1837.8	16.5	31.5	0.0	8.9	15.0	16.8	138.3	1698.1	4665.1	284.7	3251.7	1866.0	1300.7
	16.5	17.0	16.8	0.5	15.0	18.9	8.9	131.7	1.6	32.4	32.4	1.1	147.1	1276.3	0.0	1.0	0.0	1837.8	17.0	32.4	0.0	8.9	16.0	19.2	134.0	1760.8	4874.9	294.5	3408.6	1950.0	1363.5
BH-9	17.0	18.0	17.5	1.0	16.0	18.9	8.9	131.7	3.1	32.4	32.4	1.1	294.2	1570.5	0.0	1.0	0.0	1837.8	18.0	32.4	0.0	9.3	16.0	19.2	136.2	1792.0	5200.3	314.2	3722.5	2080.1	1489.0
	18.0	19.5	18.8	1.5	17.5	19.3	9.3	131.7	4.7	32.4	32.4	1.1	441.3	2011.7	0.0	1.0	0.0	1837.8	19.5	32.4	0.0	7.7	16.0	19.2	138.7	1811.9	5661.5	343.6	4193.2	2264.6	1677.3
	19.5	21.0	20.3	1.5	19.0	17.7	7.7	131.7	4.7	32.4	32.4	1.1	441.3	2453.0	0.0	1.0	0.0	1837.8	21.0	32.4	0.0	7.8	16.0	21.7	137.5	1804.9	6095.7	373.1	4663.9	2438.3	1865.6
	21.0	22.0	21.5	1.0	20.0	17.8	7.8	131.7	3.1	32.4	32.4	1.1	294.2	2747.2	0.0	1.0	0.0	1837.8	22.0	32.4	0.0	7.8	16.0	21.7	135.6	1781.0	6366.0	392.7	4977.7	2546.4	1991.1
	22.0	22.5	22.3	0.5	20.5	17.8	7.8	131.7	1.6	32.4	32.4	1.1	147.1	2894.3	0.0	1.0	0.0	1837.8	22.5	32.4	0.0	7.8	16.0	21.7	133.7	1756.9	6489.0	402.5	5134.6	2595.6	2053.8
	22.5	24.0	23.3	1.5	22.0	17.8	7.8	131.7	4.7	32.4	32.4	1.1	441.3	3335.5	0.0	1.0	0.0	1837.8	24.0	32.4	0.0	7.6	16.0	21.7	137.6	1804.8	6978.2	432.0	5605.3	2791.3	2242.1
	24.0	24.5	24.3	0.5	22.5	17.6	7.6	131.7	1.6	32.4	32.4	1.1	147.1	3482.6	0.0	1.0	0.0	1837.8	24.5	32.4	0.0	7.6	16.0	21.7	133.7	0.0	5320.5	441.8	5762.3	2128.2	2304.9
	24.5	25.5	25.0	1.0	23.5	17.6	7.6	131.7	3.1	32.4	32.4	1.1	294.2	3482.6	0.0	1.0	0.0	1837.8	25.5	32.4	0.0	7.6	16.0	21.7	135.6	0.0	5320.5	461.4	5781.9	2128.2	2312.8

Dia of Pile : 1.00 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 0.79 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	25.5	27.0	26.3	1.5	25.0	17.6	7.6	131.7	4.7	32.4	32.4	1.1	441.3	3482.6	0.0	1.0	0.0	1837.8	27.0	32.4	0.0	7.6	16.0	21.7	137.5	0.0	5320.5	490.9	5811.3	2128.2	2324.5
	27.0	28.5	27.8	1.5	26.5	17.6	7.6	131.7	4.7	32.4	32.4	1.1	441.3	3482.6	0.0	1.0	0.0	1837.8	28.5	32.4	0.0	7.6	16.0	21.7	137.5	1802.7	7123.2	520.3	5840.8	2849.3	2336.3
	28.5	29.5	29.0	1.0	27.5	17.6	7.6	131.7	3.1	32.4	32.4	1.1	294.2	3776.8	0.0	1.0	0.0	1837.8	29.5	32.4	0.0	7.6	16.0	21.7	135.6	1778.7	7393.4	540.0	6154.6	2957.3	2461.8
	29.5	30.0	29.8	0.5	28.0	17.6	7.6	131.7	1.6	32.4	32.4	1.1	147.1	3923.9	0.0	1.0	0.0	1837.8	30.0	32.4	0.0	7.6	16.0	21.7	133.7	1753.9	7515.7	549.8	6311.5	3006.3	2524.6

APPENDIX-K
Table-2 Computation of Pile Load Capacity (Dia. 1.20 m)

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi	Ultimate Shaft Cohesion Quc = Σα.c.Asi	Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)	Ultimate Load Capacity in Compression (kN)	Self-Weight of Pile (kN)	Ultimate load Capacity in Tension (kN)	Safe Load Capacity in Compression (kN)	Safe Load Capacity in Tension (kN)

										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/m3)	Nq	Nγ	q	Qb				
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
BH-1	2.0	3.0	2.5	1.0	1.0	16.9	6.9	17.3	3.8	29.8	29.8	1.0	37.2	37.2	0.0	1.0	0.0	0	3.0	30.2	0.0	6.9	13.8	9.3	20.7	0.0	37.2	28.3	65.5	14.9	26.2
	3.0	4.5	3.8	1.5	2.5	16.9	6.9	26.9	5.7	30.2	30.2	1.0	89.3	37.2	0.0	1.0	0.0	0	4.5	30.2	0.0	6.9	13.8	10.6	32.1	549.6	586.8	70.7	107.9	234.7	43.2
	4.5	5.0	4.8	0.5	3.0	16.9	6.9	34.6	1.9	30.2	30.2	1.0	38.3	37.2	0.0	1.0	0.0	0	5.0	30.2	0.0	7.7	13.8	10.6	36.3	621.6	658.9	84.8	122.1	263.5	48.8
	5.0	6.0	5.5	1.0	4.0	17.7	7.7	41.3	3.8	30.2	30.2	1.0	91.4	37.2	0.0	1.0	0.0	0	6.0	30.2	0.0	7.7	13.8	11.7	45.1	764.5	801.8	113.1	150.3	320.7	60.1
	6.0	7.5	6.8	1.5	5.5	17.7	7.7	53.1	5.7	30.2	30.2	1.0	176.6	37.2	0.0	1.0	0.0	0	7.5	30.2	0.0	7.7	13.8	16.1	58.9	1002.4	1039.6	155.5	192.8	415.9	77.1
	7.5	8.0	7.8	0.5	6.0	17.7	7.7	62.6	1.9	30.2	30.2	1.0	69.4	106.6	0.0	1.0	0.0	0.0	8.0	30.2	0.0	7.7	13.8	16.1	64.6	1090.5	1197.1	169.7	276.3	478.9	110.5
	8.0	9.0	8.5	1.0	7.0	17.7	7.7	69.8	3.8	30.2	30.2	1.0	154.6	261.2	0.0	1.0	0.0	0.0	9.0	31.2	0.0	6.9	15.0	18.1	73.6	1332.3	1593.5	197.9	459.1	637.4	183.6
	9.0	10.5	9.8	1.5	8.5	16.9	6.9	81.6	5.7	31.2	31.2	1.1	296.3	557.5	0.0	1.0	0.0	0.0	10.5	31.2	0.0	8.6	15.0	18.1	86.8	1576.2	2133.7	240.3	797.8	853.5	319.1
	10.5	12.0	11.3	1.5	10.0	18.6	8.6	95.9	5.7	30.9	30.9	1.0	339.1	896.6	0.0	1.0	0.0	0.0	12.0	30.9	0.0	8.5	15.0	17.8	102.3	1836.3	2732.9	282.7	1179.3	1093.2	471.7
BH-1	12.0	13.5	12.8	1.5	11.5	18.5	8.5	110.1	5.7	32.1	32.1	1.1	431.7	1328.3	0.0	1.0	0.0	0.0	13.5	32.1	0.0	7.8	16.0	21.5	116.5	2220.4	3548.7	325.2	1653.4	1419.5	661.4
	13.5	15.0	14.3	1.5	13.0	17.8	7.8	124.4	5.7	33.0	33.0	1.2	525.3	1853.5	0.0	1.0	0.0	0.0	15.0	33.0	0.0	7.4	17.3	24.3	130.2	2667.3	4520.8	367.6	2221.1	1808.3	888.4
	15.0	16.5	15.8	1.5	14.5	17.4	7.4	138.6	5.7	33.3	33.3	1.2	599.9	2453.4	0.0	1.0	0.0	0.0	16.5	7.0	78.0	9.5	1.9	0.6	144.2	1111.4	3564.8	410.0	2863.4	1425.9	1145.4
	16.5	17.0	16.8	0.5	15.0	19.5	9.5	148.1	1.9	7.0	7.0	1.0	34.3	2487.7	78.0	1.0	147.0	147.0	17.0	7.0	78.0	9.5	1.9	0.6	150.5	1125.3	3760.0	424.1	3058.8	1504.0	1223.5
	17.0	18.0	17.5	1.0	16.0	19.5	9.5	155.3	3.8	7.0	7.0	1.0	71.9	2559.5	78.0	1.0	294.1	441.1	18.0	7.0	78.0	9.5	1.9	0.6	160.0	1146.0	4146.6	452.4	3453.0	1658.7	1381.2
	18.0	19.5	18.8	1.5	17.5	19.5	9.5	155.3	5.7	7.0	7.0	1.0	107.8	2667.3	78.0	1.0	441.1	882.2	19.5	7.0	78.0	9.5	1.9	0.6	162.4	1151.2	4700.7	494.8	4044.3	1880.3	1617.7

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	19.5	20.0	19.8	0.5	18.0	19.5	9.5	155.3	1.9	7.0	7.0	1.0	35.9	2703.3	78.0	1.0	147.0	1029.2	20.0	7.0	78.0	9.5	1.9	0.6	157.6	1140.8	4873.3	508.9	4241.4	1949.3	1696.6
	20.0	21.0	20.5	1.0	19.0	19.5	9.5	155.3	3.8	6.6	6.6	1.0	67.7	2771.0	96.0	1.0	361.9	1391.1	21.0	6.6	96.0	9.5	1.8	0.6	160.0	1296.6	5458.7	537.2	4699.3	2183.5	1879.7
	21.0	22.0	21.5	1.0	20.0	19.5	9.5	155.3	3.8	6.6	6.6	1.0	67.7	2838.7	96.0	1.0	361.9	1753.0	22.0	6.6	96.0	9.5	1.8	0.6	160.0	1296.6	5888.3	565.5	5157.2	2355.3	2062.9
	22.0	22.5	22.3	0.5	20.5	19.5	9.5	155.3	1.9	6.6	6.6	1.0	33.9	2872.6	96.0	1.0	181.0	1934.0	22.5	6.6	96.0	9.5	1.8	0.6	157.6	1291.9	6098.4	579.6	5386.2	2439.4	2154.5
	22.5	24.0	23.3	1.5	22.0	19.7	9.7	155.3	5.7	10.6	10.6	1.0	164.3	3036.9	99.0	1.0	559.8	2493.8	24.0	10.6	99.0	9.7	2.5	1.4	162.5	1469.6	7000.3	622.0	6152.7	2800.1	2461.1
BH-1	24.0	24.5	24.3	0.5	22.5	19.7	9.7	155.3	1.9	10.6	10.6	1.0	54.8	3091.6	99.0	1.0	186.6	2680.4	24.5	10.6	99.0	9.7	2.5	1.4	157.7	1456.1	7228.1	636.2	6408.2	2891.2	2563.3
	24.5	25.5	25.0	1.0	23.5	19.7	9.7	155.3	3.8	10.6	10.6	1.0	109.5	3201.2	99.0	1.0	373.2	3053.6	25.5	10.6	99.0	9.7	2.5	1.4	160.1	1462.8	7717.6	664.5	6919.2	3087.1	2767.7
	25.5	27.0	26.3	1.5	25.0	20.7	10.7	155.3	5.7	10.6	10.6	1.0	164.3	3365.5	99.0	1.0	559.8	3613.5	27.0	10.6	99.0	10.7	2.5	1.1	163.3	1470.3	8449.2	706.9	7685.8	3379.7	3074.3
	27.0	28.5	27.8	1.5	26.5	20.7	10.7	155.3	5.7	10.6	10.6	1.0	164.3	3529.8	99.0	1.0	559.8	4173.3	28.5	10.6	99.0	10.7	2.5	0.8	163.3	1468.2	9171.2	749.3	8452.3	3668.5	3380.9
	28.5	29.5	29.0	1.0	27.5	20.7	10.7	155.3	3.8	10.6	10.6	1.0	109.5	3639.3	99.0	1.0	373.2	4546.5	29.5	10.6	99.0	10.7	2.5	0.8	160.6	1460.7	9646.5	777.5	8963.3	3858.6	3585.3
	29.5	30.0	29.8	0.5	28.0	20.7	10.7	155.3	1.9	10.6	10.6	1.0	54.8	3694.1	99.0	1.0	186.6	4733.1	30.0	38.5	-	8.9	25.8	17.7	157.9	4711.0	13138.2	791.7	9218.9	5255.3	3687.5

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
BH-2	2.0	2.5	2.3	0.5	0.5	16.1	6.1	13.7	1.9	24.8	24.8	1.0	12.0	12.0	6.0	1.0	11.3	11.3	2.5	24.8	6.0	6.1	10.0	4.1	15.3	250.1	273.4	14.1	37.4	109.3	15.0
	2.5	3.0	2.8	0.5	1.0	16.1	6.1	17.0	1.9	25.0	25.0	1.0	14.9	26.9	6.0	1.0	11.3	22.6	3.0	25.0	6.0	6.1	10.0	4.9	18.5	0.0	49.5	28.3	77.8	19.8	31.1
	3.0	4.5	3.8	1.5	2.5	16.1	6.1	24.0	5.7	25.0	25.0	1.0	63.3	26.9	6.0	1.0	33.9	22.6	4.5	25.0	6.0	6.1	10.0	4.9	28.6	404.2	453.7	70.7	120.2	181.5	48.1
	4.5	6.0	5.3	1.5	4.0	17.0	7.0	34.9	5.7	23.8	23.8	1.0	87.0	113.9	14.0	1.0	79.2	101.8	6.0	23.8	14.0	7.0	9.3	4.3	40.2	583.8	799.5	113.1	328.8	319.8	131.5
BH-2	6.0	7.5	6.8	1.5	5.5	17.0	7.0	47.8	5.7	23.8	23.8	1.0	119.2	233.2	14.0	1.0	79.2	181.0	7.5	23.8	14.0	7.0	9.3	4.3	53.1	719.1	1133.2	155.5	569.6	453.3	227.8
	7.5	8.0	7.8	0.5	6.0	17.0	7.0	56.4	1.9	23.8	23.8	1.0	46.9	280.0	14.0	1.0	26.4	207.4	8.0	23.8	14.0	8.6	9.3	4.3	58.2	777.2	1264.6	169.7	657.0	505.9	262.8
	8.0	9.0	8.5	1.0	7.0	18.6	8.6	63.4	3.8	23.8	23.8	1.0	105.3	385.4	14.0	1.0	52.8	260.1	9.0	23.8	14.0	8.6	9.3	6.5	67.7	889.6	1535.1	197.9	843.4	614.0	337.4
	9.0	10.5	9.8	1.5	8.5	18.6	8.6	75.4	5.7	23.8	23.8	1.0	187.9	573.3	14.0	1.0	79.2	339.3	10.5	23.8	14.0	8.6	9.3	6.5	81.8	1038.0	1950.6	240.3	1152.9	780.2	461.2
	10.5	11.0	10.8	0.5	9.0	18.6	8.6	85.0	1.9	23.8	23.8	1.0	70.6	643.9	14.0	1.0	26.4	365.7	11.0	23.8	14.0	8.6	9.3	6.5	87.1	1093.6	2103.2	254.5	1264.1	841.3	505.6
	11.0	12.0	11.5	1.0	10.0	18.6	8.6	92.2	3.8	23.8	23.8	1.0	153.2	797.1	14.0	1.0	52.8	418.5	12.0	33.9	0.0	7.8	18.7	26.2	96.5	2176.3	3391.9	282.7	1498.4	1356.7	599.3
	12.0	13.5	12.8	1.5	11.5	17.8	7.8	104.2	5.7	34.2	34.2	1.2	484.3	1281.5	0.0	1.0	0.0	418.5	13.5	34.2	0.0	8.8	18.7	27.1	110.0	2486.3	4186.2	325.2	2025.1	1674.5	810.0

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	13.5	15.0	14.3	1.5	13.0	18.8	8.8	118.6	5.7	34.5	34.5	1.2	564.4	1845.9	0.0	1.0	0.0	418.5	15.0	34.5	0.0	8.5	18.7	30.1	125.2	2818.5	5082.8	367.6	2631.9	2033.1	1052.8
	15.0	16.5	15.8	1.5	14.5	18.5	8.5	133.0	5.7	34.2	34.2	1.2	618.2	2464.1	0.0	1.0	0.0	418.5	16.5	34.2	0.0	8.6	18.7	29.1	139.3	3114.2	5996.8	410.0	3292.5	2398.7	1317.0
	16.5	17.0	16.8	0.5	15.0	18.6	8.6	142.6	1.9	33.9	33.9	1.2	215.8	2679.9	0.0	1.0	0.0	418.5	17.0	33.9	0.0	8.6	18.7	28.1	144.7	3222.0	6320.4	424.1	3522.5	2528.1	1409.0
	17.0	18.0	17.5	1.0	16.0	18.6	8.6	149.8	3.8	33.9	33.9	1.2	453.3	3133.2	0.0	1.0	0.0	418.5	18.0	33.9	0.0	8.8	18.7	28.1	154.1	3422.6	6974.2	452.4	4004.1	2789.7	1601.6
BH-2	18.0	19.5	18.8	1.5	17.5	18.8	8.8	149.8	5.7	33.0	33.0	1.2	632.4	3765.6	0.0	1.0	0.0	418.5	19.5	24.6	15.0	9.6	9.3	6.9	156.3	1836.7	6020.8	494.8	4678.9	2408.3	1871.6
	19.5	20.0	19.8	0.5	18.0	19.6	9.6	149.8	1.9	24.6	24.6	1.0	129.2	3894.8	15.0	1.0	28.3	446.7	20.0	24.6	15.0	9.6	9.3	6.5	152.2	1790.5	6132.1	508.9	4850.5	2452.8	1940.2
	20.0	21.0	20.5	1.0	19.0	19.6	9.6	149.8	3.8	24.6	24.6	1.0	258.5	4153.3	15.0	1.0	56.6	503.3	21.0	24.6	15.0	9.6	9.3	6.5	154.6	1815.6	6472.2	537.2	5193.8	2588.9	2077.5
	21.0	22.0	21.5	1.0	20.0	19.6	9.6	149.8	3.8	24.6	24.6	1.0	258.5	4411.8	15.0	1.0	56.6	559.8	22.0	24.6	15.0	9.6	9.3	6.5	154.6	1815.6	6787.3	565.5	5537.1	2714.9	2214.8
	22.0	22.5	22.3	0.5	20.5	19.6	9.6	149.8	1.9	24.6	24.6	1.0	129.2	4541.0	15.0	1.0	28.3	588.1	22.5	24.6	15.0	9.6	9.3	6.5	152.2	1790.5	6919.6	579.6	5708.7	2767.8	2283.5
	22.5	23.0	22.8	0.5	21.0	19.6	9.6	149.8	1.9	24.6	24.6	1.0	129.2	4670.2	15.0	1.0	28.3	616.4	23.0	24.6	15.0	9.6	9.3	6.5	152.2	1790.5	7077.1	593.8	5880.4	2830.8	2352.2
	23.0	24.0	23.5	1.0	22.0	19.6	9.6	149.8	3.8	8.5	8.5	1.0	84.4	4754.6	91.0	1.0	343.1	959.4	24.0	8.5	91.0	9.6	2.1	0.8	154.6	1299.1	7013.2	622.0	6336.1	2805.3	2534.4

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	24.0	24.5	24.3	0.5	22.5	19.6	9.6	149.8	1.9	8.5	8.5	1.0	42.2	4796.8	91.0	1.0	171.5	1131.0	24.5	8.5	91.0	9.6	2.1	0.8	152.2	1293.4	7221.2	636.2	6563.9	2888.5	2625.6
	24.5	25.5	25.0	1.0	23.5	19.6	9.6	149.8	3.8	8.5	8.5	1.0	84.4	4881.2	91.0	1.0	343.1	1474.0	25.5	8.5	91.0	9.6	2.1	0.8	154.6	1299.1	7654.3	664.5	7019.7	3061.7	2807.9
	25.5	26.0	25.8	0.5	24.0	19.6	9.6	149.8	1.9	8.5	8.5	1.0	42.2	4923.4	91.0	1.0	171.5	1645.6	26.0	8.5	91.0	9.5	2.1	0.8	152.2	1293.3	7862.3	678.6	7247.5	3144.9	2899.0
	26.0	27.0	26.5	1.0	25.0	19.5	9.5	149.8	3.8	8.2	8.2	1.0	81.4	5004.7	118.0	1.0	444.9	2090.4	27.0	8.2	118.0	9.5	2.1	0.9	154.5	1573.9	8669.0	706.9	7802.0	3467.6	3120.8
BH-2	27.0	28.5	27.8	1.5	26.5	19.5	9.5	149.8	5.7	8.2	8.2	1.0	122.0	5126.7	118.0	1.0	667.3	2757.7	28.5	8.2	118.0	9.5	2.1	0.9	156.9	1579.6	9464.0	749.3	8633.7	3785.6	3453.5
	28.5	29.0	28.8	0.5	27.0	19.5	9.5	149.8	1.9	8.2	8.2	1.0	40.7	5167.4	118.0	1.0	222.4	2980.1	29.0	8.2	118.0	9.7	2.1	0.9	152.1	1568.4	9715.9	763.4	8910.9	3886.3	3564.4
	29.0	29.5	29.3	0.5	27.5	19.7	9.7	149.8	1.9	8.2	8.2	1.0	40.7	5208.1	118.0	1.0	222.4	3202.5	29.5	8.2	118.0	9.7	2.1	0.7	152.2	1567.4	9978.0	777.5	9188.2	3991.2	3675.3
	29.5	30.0	29.8	0.5	28.0	19.7	9.7	149.8	1.9	8.2	8.2	1.0	40.7	5248.8	118.0	1.0	222.4	3424.9	30.0	8.2	118.0	9.7	2.1	0.7	152.2	1567.4	10241.1	791.7	9465.4	4096.4	3786.2
BH-3	2.0	3.0	2.5	1.0	1.0	18.5	8.5	21.3	3.8	8.6	8.6	1.0	12.1	12.1	87.0	1.0	328.0	328.0	3.0	8.6	87.0	8.5	2.1	0.6	25.5	949.0	1289.1	28.3	368.4	515.6	147.3
	3.0	4.5	3.8	1.5	2.5	18.5	8.5	31.8	5.7	8.6	8.6	1.0	27.2	39.3	87.0	1.0	492.0	492.0	4.5	10.9	54.0	8.5	2.8	1.0	38.1	674.0	1205.3	70.7	601.9	482.1	240.8
	4.5	5.0	4.8	0.5	3.0	18.5	8.5	40.2	1.9	10.9	10.9	1.0	14.6	53.8	54.0	1.0	101.8	101.8	5.0	10.9	54.0	8.5	2.8	1.0	42.3	686.8	842.4	84.8	240.5	337.0	96.2

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb				
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	5.0	6.0	5.5	1.0	4.0	18.5	8.5	46.5	3.8	10.9	10.9	1.0	33.7	87.6	54.0	1.0	203.6	0	6.0	10.9	54.0	8.5	2.8	1.0	50.7	0.0	87.6	113.1	200.7	35.0	80.3
	6.0	7.5	6.8	1.5	5.5	18.4	8.4	57.0	5.7	10.9	10.9	1.0	62.0	87.6	54.0	1.0	305.4	305.4	7.5	10.9	54.0	8.4	2.8	1.0	63.3	752.1	1145.0	155.5	548.4	458.0	219.4
	7.5	8.0	7.8	0.5	6.0	18.4	8.4	65.4	1.9	10.9	10.9	1.0	23.7	111.3	54.0	1.0	101.8	101.8	8.0	10.9	54.0	8.4	2.8	1.0	67.5	765.2	978.3	169.7	382.7	391.3	153.1
BH-3	8.0	9.0	8.5	1.0	7.0	18.4	8.4	71.7	3.8	30.6	30.6	1.0	164.5	275.8	0.0	1.0	0.0	0.0	9.0	30.6	0.0	8.4	13.8	11.4	75.9	1247.6	1523.5	197.9	473.7	609.4	189.5
	9.0	10.5	9.8	1.5	8.5	18.4	8.4	82.2	5.7	30.6	30.6	1.0	283.0	558.8	0.0	1.0	0.0	0.0	10.5	30.6	0.0	8.4	13.8	11.4	88.5	1444.1	2002.9	240.3	799.1	801.2	319.6
	10.5	11.0	10.8	0.5	9.0	18.4	8.4	90.6	1.9	30.6	30.6	1.0	104.0	662.8	0.0	1.0	0.0	0.0	11.0	30.6	0.0	8.4	13.8	11.4	92.7	1509.6	2172.4	254.5	917.2	869.0	366.9
	11.0	12.0	11.5	1.0	10.0	18.4	8.4	96.9	3.8	30.6	30.6	1.0	222.4	885.2	0.0	1.0	0.0	0.0	12.0	30.6	0.0	8.4	13.8	17.4	101.1	1674.7	2559.9	282.7	1167.9	1024.0	467.2
	12.0	13.5	12.8	1.5	11.5	18.4	8.4	107.4	5.7	30.6	30.6	1.0	369.8	1255.0	0.0	1.0	0.0	0.0	13.5	30.6	0.0	8.4	13.8	17.4	113.7	1871.2	3126.1	325.2	1580.1	1250.5	632.0
	13.5	14.0	13.8	0.5	12.0	18.4	8.4	115.8	1.9	30.6	30.6	1.0	132.9	1387.9	0.0	1.0	0.0	0.0	14.0	30.6	0.0	8.4	13.8	17.4	117.9	1936.7	3324.5	339.3	1727.1	1329.8	690.9
	14.0	15.0	14.5	1.0	13.0	18.4	8.4	122.1	3.8	30.6	30.6	1.0	280.3	1668.1	0.0	1.0	0.0	0.0	15.0	33.9	0.0	9.2	18.7	26.2	126.3	2830.1	4498.2	367.6	2035.7	1799.3	814.3
	15.0	16.5	15.8	1.5	14.5	19.2	9.2	132.6	5.7	33.6	33.6	1.2	587.6	2255.8	0.0	1.0	0.0	0.0	16.5	33.6	0.0	10.1	17.3	25.3	139.4	2898.3	5154.1	410.0	2665.8	2061.6	1066.3

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	16.5	17.0	16.8	0.5	15.0	20.1	10.1	141.0	1.9	33.6	33.6	1.2	208.3	2464.1	0.0	1.0	0.0	0.0	17.0	33.6	0.0	10.1	17.3	25.3	143.5	2977.8	5441.8	424.1	2888.2	2176.7	1155.3
	17.0	18.0	17.5	1.0	16.0	20.1	10.1	147.3	3.8	33.6	33.6	1.2	435.2	2899.3	0.0	1.0	0.0	0.0	18.0	33.6	0.0	10.3	17.3	25.3	152.3	3153.7	6053.0	452.4	3351.7	2421.2	1340.7
	18.0	19.5	18.8	1.5	17.5	20.3	10.3	147.3	5.7	33.3	33.3	1.2	637.2	3536.5	0.0	1.0	0.0	0.0	19.5	33.3	0.0	10.1	17.3	24.4	155.0	3197.1	6733.6	494.8	4031.3	2693.4	1612.5
BH-3	19.5	21.0	20.3	1.5	19.0	20.1	10.1	147.3	5.7	33.3	33.3	1.2	637.2	4173.7	0.0	1.0	0.0	0.0	21.0	33.3	0.0	9.9	17.3	24.4	154.9	3190.3	7364.0	537.2	4710.9	2945.6	1884.4
	21.0	22.0	21.5	1.0	20.0	19.9	9.9	147.3	3.8	33.3	33.3	1.2	424.8	4598.5	0.0	1.0	0.0	0.0	22.0	33.3	0.0	9.9	17.3	20.6	152.2	3113.0	7711.6	565.5	5164.0	3084.6	2065.6
	22.0	22.5	22.3	0.5	20.5	19.9	9.9	147.3	1.9	33.3	33.3	1.2	212.4	4810.9	0.0	1.0	0.0	0.0	22.5	33.3	0.0	9.7	17.3	20.6	149.7	3063.0	7873.9	579.6	5390.6	3149.6	2156.2
	22.5	24.0	23.3	1.5	22.0	19.7	9.7	147.3	5.7	33.0	33.0	1.2	621.9	5432.8	0.0	1.0	0.0	0.0	24.0	33.0	0.0	9.0	17.3	19.9	154.6	3142.4	8575.2	622.0	6054.8	3430.1	2421.9
	24.0	24.5	24.3	0.5	22.5	19.0	9.0	147.3	1.9	33.0	33.0	1.2	207.3	5640.1	0.0	1.0	0.0	0.0	24.5	33.0	0.0	9.0	17.3	19.9	149.5	3043.5	8683.6	636.2	6276.3	3473.4	2510.5
	24.5	25.5	25.0	1.0	23.5	19.0	9.0	147.3	3.8	33.0	33.0	1.2	414.6	6054.7	0.0	1.0	0.0	0.0	25.5	33.0	0.0	9.8	17.3	19.9	151.7	3099.0	9153.6	664.5	6719.1	3661.4	2687.6
	25.5	26.0	25.8	0.5	24.0	19.8	9.8	147.3	1.9	33.0	33.0	1.2	207.3	6261.9	0.0	1.0	0.0	0.0	26.0	33.0	0.0	9.8	17.3	19.9	149.7	3059.3	9321.2	678.6	6940.5	3728.5	2776.2
	26.0	27.0	26.5	1.0	25.0	19.8	9.8	147.3	3.8	33.0	33.0	1.2	414.6	6676.5	0.0	1.0	0.0	0.0	27.0	33.0	0.0	9.3	17.3	19.9	152.2	3099.8	9776.3	706.9	7383.4	3910.5	2953.3

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	27.0	28.5	27.8	1.5	26.5	19.3	9.3	147.3	5.7	33.0	33.0	1.2	621.9	7298.4	0.0	1.0	0.0	0.0	28.5	33.0	0.0	10.9	17.3	19.9	154.2	3161.7	10460.0	749.3	8047.6	4184.0	3219.1
	28.5	29.5	29.0	1.0	27.5	20.9	10.9	147.3	3.8	33.0	33.0	1.2	414.6	7712.9	0.0	1.0	0.0	0.0	29.5	33.0	0.0	10.9	17.3	19.9	152.7	3132.3	10845.2	777.5	8490.5	4338.1	3396.2
	29.5	30.0	29.8	0.5	28.0	20.9	10.9	147.3	1.9	33.0	33.0	1.2	207.3	7920.2	0.0	1.0	0.0	0	30.0	33.0	0.0	10.8	17.3	19.9	150.0	3077.0	10997.3	791.7	8711.9	4398.9	3484.8
BH-4	2.0	2.5	2.3	0.5	0.5	16.3	6.3	14.1	1.9	29.7	29.7	1.0	15.2	15.2	0.0	1.0	0.0	0.0	2.5	29.7	0.0	6.3	13.0	10.2	15.7	273.4	288.5	14.1	29.3	115.4	11.7
	2.5	3.0	2.8	0.5	1.0	16.3	6.3	17.3	1.9	30.1	30.1	1.0	19.0	34.1	0.0	1.0	0.0	0	3.0	30.1	0.0	6.3	13.8	11.1	18.9	0.0	34.1	28.3	62.4	13.7	25.0
	3.0	4.5	3.8	1.5	2.5	16.3	6.3	23.8	5.7	30.1	30.1	1.0	78.4	34.1	0.0	1.0	0.0	0.0	4.5	30.1	0.0	6.3	13.8	11.1	28.5	491.4	525.6	70.7	104.8	210.2	41.9
	4.5	6.0	5.3	1.5	4.0	16.5	6.5	34.1	5.7	23.5	23.5	1.0	83.9	118.1	16.0	1.0	90.5	90.5	6.0	23.5	16.0	6.5	8.6	5.6	39.0	564.7	773.2	113.1	321.6	309.3	128.7
	6.0	7.5	6.8	1.5	5.5	16.5	6.5	47.3	5.7	23.5	23.5	1.0	116.3	234.3	16.0	1.0	90.5	90.5	7.5	23.5	16.0	6.5	8.6	5.6	52.2	692.1	1016.9	155.5	480.3	406.8	192.1
	7.5	8.0	7.8	0.5	6.0	16.5	6.5	56.1	1.9	23.5	23.5	1.0	46.0	280.3	16.0	1.0	30.2	30.2	8.0	23.5	16.0	8.8	8.6	5.6	57.7	754.1	1064.5	169.7	480.1	425.8	192.0
	8.0	9.0	8.5	1.0	7.0	18.8	8.8	63.0	3.8	23.5	23.5	1.0	103.3	383.6	16.0	1.0	60.3	60.3	9.0	23.5	16.0	8.8	8.6	6.7	67.4	854.9	1298.8	197.9	641.8	519.5	256.7
	9.0	10.5	9.8	1.5	8.5	18.8	8.8	74.9	5.7	23.5	23.5	1.0	184.2	567.8	16.0	1.0	90.5	90.5	10.5	30.9	0.0	8.8	15.0	18.7	81.5	1492.6	2150.8	240.3	898.6	860.3	359.4

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	10.5	11.0	10.8	0.5	9.0	18.8	8.8	84.4	1.9	30.9	30.9	1.0	99.5	667.2	0.0	1.0	0.0	0.0	11.0	30.9	0.0	9.5	15.0	14.9	86.6	1563.6	2230.9	254.5	921.7	892.3	368.7
	11.0	12.0	11.5	1.0	10.0	19.5	9.5	91.2	3.8	30.9	30.9	1.0	214.9	882.2	0.0	1.0	0.0	0.0	12.0	30.9	0.0	9.5	15.0	14.9	95.9	1721.6	2603.8	282.7	1164.9	1041.5	466.0
	12.0	13.5	12.8	1.5	11.5	19.5	9.5	102.1	5.7	30.9	30.9	1.0	361.2	1243.4	0.0	1.0	0.0	0.0	13.5	30.9	0.0	9.5	15.0	14.9	109.3	1948.0	3191.4	325.2	1568.6	1276.5	627.4
BH-4	13.5	14.0	13.8	0.5	12.0	19.5	9.5	110.9	1.9	30.9	30.9	1.0	130.8	1374.2	0.0	1.0	0.0	0.0	14.0	30.9	0.0	8.8	15.0	14.9	113.3	2009.0	3383.2	339.3	1713.5	1353.3	685.4
	14.0	15.0	14.5	1.0	13.0	18.8	8.8	117.5	3.8	30.9	30.9	1.0	277.1	1651.2	0.0	1.0	0.0	0.0	15.0	30.9	0.0	8.8	15.0	18.4	121.9	2175.4	3826.6	367.6	2018.8	1530.6	807.5
	15.0	16.5	15.8	1.5	14.5	18.8	8.8	128.5	5.7	30.9	30.9	1.0	454.4	2105.6	0.0	1.0	0.0	0.0	16.5	30.9	0.0	8.8	15.0	18.4	135.1	2398.6	4504.3	410.0	2515.6	1801.7	1006.2
	16.5	17.0	16.8	0.5	15.0	18.8	8.8	137.3	1.9	30.9	30.9	1.0	161.8	2267.4	0.0	1.0	0.0	0.0	17.0	30.9	0.0	8.8	15.0	18.4	139.5	2473.1	4740.5	424.1	2691.6	1896.2	1076.6
	17.0	18.0	17.5	1.0	16.0	18.8	8.8	143.9	3.8	30.9	30.9	1.0	339.2	2606.6	0.0	1.0	0.0	0.0	18.0	36.3	0.0	7.4	21.8	38.7	148.2	3847.0	6453.6	452.4	3059.0	2581.4	1223.6
	18.0	19.5	18.8	1.5	17.5	17.4	7.4	143.9	5.7	36.0	36.0	1.3	768.3	3374.9	0.0	1.0	0.0	0.0	19.5	36.0	0.0	7.1	21.8	36.6	149.4	3856.7	7231.6	494.8	3869.7	2892.6	1547.9
	19.5	21.0	20.3	1.5	19.0	17.1	7.1	143.9	5.7	35.7	35.7	1.3	751.1	4126.1	0.0	1.0	0.0	0.0	21.0	35.7	0.0	7.3	20.0	28.9	149.2	3513.5	7639.6	537.2	4663.3	3055.8	1865.3
	21.0	22.0	21.5	1.0	20.0	17.3	7.3	143.9	3.8	35.4	35.4	1.3	489.5	4615.5	0.0	1.0	0.0	0.0	22.0	35.4	0.0	7.3	20.0	27.2	147.5	3467.1	8082.6	565.5	5181.0	3233.1	2072.4

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
BH-4	22.0	22.5	22.3	0.5	20.5	17.3	7.3	143.9	1.9	35.4	35.4	1.3	244.7	4860.3	0.0	1.0	0.0	0.0	22.5	35.4	0.0	7.1	20.0	27.2	145.7	3422.5	8282.8	579.6	5439.9	3313.1	2176.0
	22.5	23.0	22.8	0.5	21.0	17.1	7.1	143.9	1.9	35.1	35.1	1.3	239.2	5099.4	0.0	1.0	0.0	0.0	23.0	35.1	0.0	7.1	20.0	25.4	145.6	3413.1	8512.6	593.8	5693.2	3405.0	2277.3
	23.0	24.0	23.5	1.0	22.0	17.1	7.1	143.9	3.8	35.1	35.1	1.3	478.3	5577.8	0.0	1.0	0.0	0.0	24.0	35.1	0.0	10.6	20.0	25.4	147.4	3514.5	9092.3	622.0	6199.8	3636.9	2479.9
	24.0	24.5	24.3	0.5	22.5	20.6	10.6	143.9	1.9	34.8	34.8	1.2	233.7	5811.5	0.0	1.0	0.0	0.0	24.5	34.8	0.0	10.6	20.0	24.3	146.5	3486.7	9298.2	636.2	6447.6	3719.3	2579.1
	24.5	25.5	25.0	1.0	23.5	20.6	10.6	143.9	3.8	34.8	34.8	1.2	467.4	6278.8	0.0	1.0	0.0	0.0	25.5	34.8	0.0	10.3	20.0	24.3	149.2	3541.9	9820.7	664.5	6943.3	3928.3	2777.3
	25.5	27.0	26.3	1.5	25.0	20.3	10.3	143.9	5.7	33.6	33.6	1.2	637.8	6916.6	0.0	1.0	0.0	0.0	27.0	33.6	0.0	10.3	17.3	21.4	151.6	3113.5	10030.1	706.9	7623.5	4012.1	3049.4
	27.0	28.5	27.8	1.5	26.5	20.3	10.3	143.9	5.7	33.9	33.9	1.2	653.2	7569.8	0.0	1.0	0.0	0.0	28.5	33.9	0.0	9.7	18.7	22.1	151.6	3349.0	10918.8	749.3	8319.1	4367.5	3327.6
	28.5	29.5	29.0	1.0	27.5	19.7	9.7	143.9	3.8	33.9	33.9	1.2	435.5	8005.3	0.0	1.0	0.0	0.0	29.5	33.9	0.0	9.7	18.7	22.1	148.7	3287.6	11292.9	777.5	8782.8	4517.2	3513.1
	29.5	30.0	29.8	0.5	28.0	19.7	9.7	143.9	1.9	33.9	33.9	1.2	217.7	8223.0	0.0	1.0	0.0	0	30.0	33.9	0.0	10.4	18.7	22.1	146.3	3246.9	11469.9	791.7	9014.7	4588.0	3605.9
BH-5	2.0	2.5	2.3	0.5	0.5	18.4	8.4	18.8	1.9	25.2	25.2	1.0	16.7	16.7	7.0	1.0	13.2	13.2	2.5	25.2	7.0	8.4	10.0	4.2	20.9	331.0	360.8	14.1	44.0	144.3	17.6
	2.5	3.0	2.8	0.5	1.0	18.4	8.4	23.2	1.9	25.2	25.2	1.0	20.6	37.2	7.0	1.0	13.2	13.2	3.0	25.2	7.0	8.4	10.0	5.7	25.3	388.9	439.3	28.3	78.7	175.7	31.5

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	3.0	4.5	3.8	1.5	2.5	18.4	8.4	32.4	5.7	25.2	25.2	1.0	86.2	123.4	7.0	1.0	39.6	39.6	4.5	25.2	7.0	8.4	10.0	5.7	38.6	540.1	703.0	70.7	233.6	281.2	93.5
	4.5	5.0	4.8	0.5	3.0	18.4	8.4	41.6	1.9	25.2	25.2	1.0	36.9	160.2	7.0	1.0	13.2	13.2	5.0	25.2	7.0	8.4	10.0	5.7	43.7	596.9	770.4	84.8	258.3	308.1	103.3
BH-5	5.0	6.0	5.5	1.0	4.0	18.4	8.4	48.5	3.8	25.2	25.2	1.0	86.0	246.3	7.0	1.0	26.4	0	6.0	25.2	7.0	8.4	10.0	5.7	52.7	0.0	246.3	113.1	359.4	98.5	143.7
	6.0	7.5	6.8	1.5	5.5	19.2	9.2	60.0	5.7	30.9	30.9	1.0	212.2	246.3	0.0	1.0	0.0	0.0	7.5	11.5	88.0	9.2	2.8	1.3	66.9	1111.4	1357.7	155.5	401.8	543.1	160.7
	7.5	9.0	8.3	1.5	7.0	19.2	9.2	73.8	5.7	11.5	11.5	1.0	84.9	331.2	88.0	1.0	497.6	497.6	9.0	11.5	88.0	9.2	2.8	1.4	80.7	1155.5	1984.3	197.9	1026.7	793.7	410.7
	9.0	10.5	9.8	1.5	8.5	19.2	9.2	87.6	5.7	11.5	11.5	1.0	100.8	432.0	88.0	1.0	497.6	497.6	10.5	11.5	88.0	9.2	2.8	1.4	94.5	1198.5	2128.1	240.3	1169.9	851.2	468.0
	10.5	11.0	10.8	0.5	9.0	19.2	9.2	96.8	1.9	11.5	11.5	1.0	37.1	469.1	88.0	1.0	165.9	165.9	11.0	11.5	88.0	9.2	2.8	1.4	99.1	1212.9	1847.8	254.5	889.4	739.1	355.8
	11.0	12.0	11.5	1.0	10.0	19.2	9.2	103.7	3.8	11.5	11.5	1.0	79.6	548.6	88.0	1.0	331.8	331.8	12.0	11.5	88.0	9.2	2.8	1.2	108.3	1240.1	2120.4	282.7	1163.1	848.2	465.2
	12.0	13.5	12.8	1.5	11.5	19.2	9.2	115.2	5.7	11.5	11.5	1.0	132.6	681.2	88.0	1.0	497.6	497.6	13.5	11.5	88.0	9.2	2.8	1.3	122.1	1283.7	2462.6	325.2	1504.0	985.0	601.6
	13.5	14.0	13.8	0.5	12.0	19.2	9.2	124.4	1.9	11.5	11.5	1.0	47.7	728.9	88.0	1.0	165.9	165.9	14.0	11.5	88.0	9.2	2.8	1.3	126.7	1298.1	2192.9	339.3	1234.1	877.2	493.6
	14.0	15.0	14.5	1.0	13.0	19.2	9.2	131.3	3.8	11.5	11.5	1.0	100.7	829.7	88.0	1.0	331.8	331.8	15.0	31.8	0.0	9.0	16.0	19.9	135.9	2578.5	3739.9	367.6	1529.0	1496.0	611.6

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	15.0	16.5	15.8	1.5	14.5	19.0	9.0	142.9	5.7	32.1	32.1	1.1	559.9	1389.6	0.0	1.0	0.0	0.0	16.5	32.1	0.0	8.9	16.0	20.8	149.6	2828.7	4218.3	410.0	1799.6	1687.3	719.8
	16.5	17.0	16.8	0.5	15.0	18.9	8.9	152.1	1.9	31.8	31.8	1.1	193.7	1583.3	0.0	1.0	0.0	0.0	17.0	31.8	0.0	8.9	16.0	19.9	154.3	2908.3	4491.5	424.1	2007.4	1796.6	803.0
BH-5	17.0	18.0	17.5	1.0	16.0	18.9	8.9	159.0	3.8	31.8	31.8	1.1	405.0	1988.3	0.0	1.0	0.0	0.0	18.0	31.8	0.0	9.3	16.0	19.9	163.4	3079.1	5067.4	452.4	2440.7	2027.0	976.3
	18.0	19.5	18.8	1.5	17.5	19.3	9.3	159.0	5.7	31.8	31.8	1.1	607.5	2595.8	0.0	1.0	0.0	0.0	19.5	31.8	0.0	9.0	16.0	19.9	165.9	3120.9	5716.7	494.8	3090.6	2286.7	1236.2
	19.5	21.0	20.3	1.5	19.0	19.0	9.0	159.0	5.7	31.8	31.8	1.1	607.5	3203.3	0.0	1.0	0.0	0.0	21.0	31.8	0.0	9.0	16.0	18.3	165.7	3107.4	6310.7	537.2	3740.5	2524.3	1496.2
	21.0	22.0	21.5	1.0	20.0	19.0	9.0	159.0	3.8	31.8	31.8	1.1	405.0	3608.2	0.0	1.0	0.0	0.0	22.0	31.8	0.0	9.0	16.0	18.3	163.5	3066.9	6675.2	565.5	4173.7	2670.1	1669.5
	22.0	22.5	22.3	0.5	20.5	19.0	9.0	159.0	1.9	31.8	31.8	1.1	202.5	3810.7	0.0	1.0	0.0	0.0	22.5	31.8	0.0	8.9	16.0	18.3	161.2	3025.2	6835.9	579.6	4390.4	2734.4	1756.1
	22.5	23.0	22.8	0.5	21.0	18.9	8.9	159.0	1.9	31.8	31.8	1.1	202.5	4013.2	0.0	1.0	0.0	0.0	23.0	31.8	0.0	8.9	16.0	18.3	161.2	3024.8	7038.0	593.8	4607.0	2815.2	1842.8
	23.0	24.0	23.5	1.0	22.0	18.9	8.9	159.0	3.8	31.8	31.8	1.1	405.0	4418.2	0.0	1.0	0.0	0.0	24.0	31.8	0.0	9.2	16.0	16.9	163.4	3059.6	7477.8	622.0	5040.3	2991.1	2016.1
	24.0	24.5	24.3	0.5	22.5	19.2	9.2	159.0	1.9	31.8	31.8	1.1	202.5	4620.7	0.0	1.0	0.0	0.0	24.5	31.8	0.0	9.2	16.0	16.9	161.3	3020.5	7641.3	636.2	5256.9	3056.5	2102.8
	24.5	25.5	25.0	1.0	23.5	19.2	9.2	159.0	3.8	31.8	31.8	1.1	405.0	5025.7	0.0	1.0	0.0	0.0	25.5	31.8	0.0	9.3	16.0	16.9	163.5	3063.8	8089.5	664.5	5690.2	3235.8	2276.1

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq

Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	25.5	27.0	26.3	1.5	25.0	19.3	9.3	159.0	5.7	32.1	32.1	1.1	623.1	5648.8	0.0	1.0	0.0	0.0	27.0	32.1	0.0	8.9	16.0	17.7	166.0	3107.0	8755.8	706.9	6355.7	3502.3	2542.3
	27.0	28.5	27.8	1.5	26.5	18.9	8.9	159.0	5.7	32.4	32.4	1.1	638.9	6287.7	0.0	1.0	0.0	0.0	28.5	32.4	0.0	8.5	16.0	18.4	165.6	3100.1	9387.8	749.3	7037.0	3755.1	2814.8
BH-5	28.5	29.5	29.0	1.0	27.5	18.5	8.5	159.0	3.8	32.4	32.4	1.1	425.9	6713.6	0.0	1.0	0.0	0.0	29.5	32.4	0.0	8.5	16.0	18.4	163.2	3055.9	9769.5	777.5	7491.2	3907.8	2996.5
	29.5	30.0	29.8	0.5	28.0	18.5	8.5	159.0	1.9	32.4	32.4	1.1	213.0	6926.6	0.0	1.0	0.0	0	30.0	32.4	0.0	8.7	16.0	18.4	161.1	3021.2	9947.8	791.7	7718.3	3979.1	3087.3
	2.0	2.5	2.3	0.5	0.5	18.0	8.0	18.1	1.9	23.1	23.1	1.0	14.5	14.5	15.0	1.0	28.3	28.3	2.5	23.1	15.0	8.0	8.6	4.0	20.1	368.3	411.1	14.1	56.9	164.4	22.8
	2.5	3.0	2.8	0.5	1.0	18.0	8.0	22.0	1.9	30.1	30.1	1.0	24.2	38.7	0.0	1.0	0.0	0.0	3.0	30.1	0.0	8.0	13.8	9.7	24.1	428.0	466.7	28.3	67.0	186.7	26.8
	3.0	4.5	3.8	1.5	2.5	18.0	8.0	29.9	5.7	30.1	30.1	1.0	98.5	137.2	0.0	1.0	0.0	0.0	4.5	30.1	0.0	8.0	13.8	9.7	35.9	612.9	750.0	70.7	207.9	300.0	83.2
BH-6	4.5	5.0	4.8	0.5	3.0	18.0	8.0	37.7	1.9	30.1	30.1	1.0	41.4	178.6	0.0	1.0	0.0	0.0	5.0	30.1	0.0	7.8	13.8	9.7	39.7	671.2	849.9	84.8	263.4	339.9	105.4
	5.0	6.0	5.5	1.0	4.0	17.8	7.8	44.2	3.8	30.1	30.1	1.0	97.1	275.7	0.0	1.0	0.0	0.0	6.0	30.1	0.0	7.8	13.8	14.3	48.1	826.5	1102.2	113.1	388.8	440.9	155.5
	6.0	7.5	6.8	1.5	5.5	17.8	7.8	55.5	5.7	30.1	30.1	1.0	182.9	458.6	0.0	1.0	0.0	0.0	7.5	10.3	89.0	7.8	2.5	1.0	61.4	1081.9	1540.5	155.5	614.2	616.2	245.7
	7.5	8.0	7.8	0.5	6.0	17.8	7.8	64.6	1.9	10.3	10.3	1.0	22.1	480.8	89.0	1.0	167.8	167.8	8.0	10.3	89.0	7.8	2.5	1.1	66.5	1096.5	1745.0	169.7	818.2	698.0	327.3

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb				
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	8.0	9.0	8.5	1.0	7.0	17.8	7.8	71.4	3.8	10.3	10.3	1.0	48.9	529.7	89.0	1.0	335.5	335.5	9.0	10.3	89.0	9.1	2.5	1.1	75.3	1121.8	1987.0	197.9	1063.1	794.8	425.2
BH-6	9.0	10.5	9.8	1.5	8.5	19.1	9.1	82.7	5.7	10.3	10.3	1.0	85.0	614.6	89.0	1.0	503.3	503.3	10.5	10.3	89.0	9.1	2.5	1.1	89.5	1161.4	2279.3	240.3	1358.3	911.7	543.3
	10.5	12.0	11.3	1.5	10.0	19.1	9.1	96.3	5.7	10.3	10.3	1.0	98.9	713.6	89.0	1.0	503.3	503.3	12.0	10.3	89.0	9.1	2.5	1.0	103.1	1199.0	2415.8	282.7	1499.6	966.3	599.8
	12.0	13.5	12.8	1.5	11.5	19.1	9.1	109.9	5.7	10.3	10.3	1.0	112.9	826.5	89.0	1.0	503.3	503.3	13.5	10.3	89.0	9.1	2.5	1.0	116.6	1236.9	2566.6	325.2	1654.9	1026.7	662.0
	13.5	14.0	13.8	0.5	12.0	19.1	9.1	118.9	1.9	10.3	10.3	1.0	40.7	867.2	89.0	1.0	167.8	167.8	14.0	10.3	89.0	9.1	2.5	1.0	121.2	1249.5	2284.5	339.3	1374.3	913.8	549.7
	14.0	15.0	14.5	1.0	13.0	19.1	9.1	125.7	3.8	10.3	10.3	1.0	86.1	953.3	89.0	1.0	335.5	335.5	15.0	32.4	0.0	9.3	16.0	21.7	130.2	2491.2	3780.1	367.6	1656.4	1512.0	662.6
	15.0	16.5	15.8	1.5	14.5	19.3	9.3	137.0	5.7	32.7	32.7	1.1	564.6	1517.9	0.0	1.0	0.0	0.0	16.5	32.7	0.0	9.3	16.0	22.6	144.0	2746.3	4264.2	410.0	1927.9	1705.7	771.2
	16.5	17.0	16.8	0.5	15.0	19.3	9.3	146.1	1.9	32.7	32.7	1.1	200.6	1718.6	0.0	1.0	0.0	0.0	17.0	32.7	0.0	9.3	16.0	22.6	148.4	2825.9	4544.5	424.1	2142.7	1817.8	857.1
	17.0	18.0	17.5	1.0	16.0	19.3	9.3	152.9	3.8	32.7	32.7	1.1	419.9	2138.5	0.0	1.0	0.0	0	18.0	32.7	0.0	9.3	16.0	22.6	157.5	0.0	2138.5	452.4	2590.9	855.4	1036.3
	18.0	19.5	18.8	1.5	17.5	19.3	9.3	152.9	5.7	32.7	32.7	1.1	629.9	2138.5	0.0	1.0	0.0	0.0	19.5	32.7	0.0	8.9	16.0	22.6	159.8	3026.4	5164.9	494.8	2633.3	2065.9	1053.3
	19.5	21.0	20.3	1.5	19.0	18.9	8.9	152.9	5.7	32.4	32.4	1.1	614.4	2752.9	0.0	1.0	0.0	0.0	21.0	32.4	0.0	9.2	16.0	18.4	159.6	2999.4	5752.3	537.2	3290.1	2300.9	1316.0

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	21.0	22.0	21.5	1.0	20.0	19.2	9.2	152.9	3.8	32.7	32.7	1.1	419.9	3172.8	0.0	1.0	0.0	0.0	22.0	32.7	0.0	9.2	16.0	21.7	157.5	2981.9	6154.7	565.5	3738.3	2461.9	1495.3
BH-6	22.0	22.5	22.3	0.5	20.5	19.2	9.2	152.9	1.9	32.7	32.7	1.1	210.0	3382.8	0.0	1.0	0.0	0	22.5	32.7	0.0	8.9	16.0	21.7	155.2	0.0	3382.8	579.6	3962.4	1353.1	1585.0
	22.5	23.0	22.8	0.5	21.0	18.9	8.9	152.9	1.9	32.1	32.1	1.1	199.7	3382.8	0.0	1.0	0.0	0	23.0	32.1	0.0	8.9	16.0	20.0	155.1	0.0	3382.8	593.8	3976.5	1353.1	1590.6
	23.0	24.0	23.5	1.0	22.0	18.9	8.9	152.9	3.8	32.1	32.1	1.1	399.5	3382.8	0.0	1.0	0.0	0	24.0	32.1	0.0	9.2	16.0	20.0	157.3	0.0	3382.8	622.0	4004.8	1353.1	1601.9
	24.0	24.5	24.3	0.5	22.5	19.2	9.2	152.9	1.9	32.1	32.1	1.1	199.7	3382.8	0.0	1.0	0.0	0	24.5	32.1	0.0	9.2	16.0	20.0	155.2	0.0	3382.8	636.2	4018.9	1353.1	1607.6
	24.5	25.5	25.0	1.0	23.5	19.2	9.2	152.9	3.8	32.1	32.1	1.1	399.5	3382.8	0.0	1.0	0.0	0.0	25.5	32.1	0.0	9.0	16.0	20.0	157.5	2969.2	6352.0	664.5	4047.2	2540.8	1618.9
	25.5	27.0	26.3	1.5	25.0	19.0	9.0	152.9	5.7	32.1	32.1	1.1	599.2	3982.0	0.0	1.0	0.0	0.0	27.0	32.1	0.0	9.2	16.0	20.0	159.6	3010.7	6992.7	706.9	4688.8	2797.1	1875.5
	27.0	28.5	27.8	1.5	26.5	19.2	9.2	152.9	5.7	32.1	32.1	1.1	599.2	4581.2	0.0	1.0	0.0	0	28.5	32.1	0.0	8.7	16.0	20.0	159.8	0.0	4581.2	749.3	5330.4	1832.5	2132.2
	28.5	29.5	29.0	1.0	27.5	18.7	8.7	152.9	3.8	32.1	32.1	1.1	399.5	4581.2	0.0	1.0	0.0	0	29.5	32.1	0.0	8.7	16.0	20.0	157.2	0.0	4581.2	777.5	5358.7	1832.5	2143.5
	29.5	30.0	29.8	0.5	28.0	18.7	8.7	152.9	1.9	32.1	32.1	1.1	199.7	4581.2	0.0	1.0	0.0	0	30.0	32.1	0.0	8.8	16.0	20.0	155.0	2922.7	7503.8	791.7	5372.9	3001.5	2149.1

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq

Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
BH-7	2.0	2.5	2.3	0.5	0.5	18.9	8.9	19.9	1.9	7.9	7.9	1.0	5.2	5.2	73.0	1.0	137.6	137.6	2.5	7.9	73.0	8.9	2.1	0.6	22.1	798.7	941.5	14.1	157.0	376.6	62.8
	2.5	3.0	2.8	0.5	1.0	18.9	8.9	24.3	1.9	7.9	7.9	1.0	6.4	11.6	73.0	1.0	137.6	137.6	3.0	7.9	73.0	8.9	2.1	0.5	26.6	808.7	957.8	28.3	177.4	383.1	71.0
	3.0	4.5	3.8	1.5	2.5	18.9	8.9	33.1	5.7	7.9	7.9	1.0	26.0	37.6	73.0	1.0	412.8	0	4.5	7.9	73.0	8.9	2.1	0.5	39.8	0.0	37.6	70.7	108.2	15.0	43.3
	4.5	6.0	5.3	1.5	4.0	18.9	8.9	46.3	5.7	7.9	7.9	1.0	36.3	37.6	73.0	1.0	412.8	412.8	6.0	7.9	73.0	8.9	2.1	0.5	52.9	871.8	1322.2	113.1	563.5	528.9	225.4
	6.0	7.5	6.8	1.5	5.5	18.5	8.5	59.4	5.7	31.2	31.2	1.1	215.7	253.3	0.0	1.0	0.0	0.0	7.5	30.1	0.0	8.8	13.8	12.7	65.8	1101.2	1354.5	155.5	408.8	541.8	163.5
	7.5	9.0	8.3	1.5	7.0	18.8	8.8	72.6	5.7	30.1	30.1	1.0	239.1	492.4	0.0	1.0	0.0	0.0	9.0	30.1	0.0	8.8	13.8	9.7	79.2	1292.3	1784.7	197.9	690.3	713.9	276.1
	9.0	10.5	9.8	1.5	8.5	18.8	8.8	85.7	5.7	30.1	30.1	1.0	282.5	774.9	0.0	1.0	0.0	0.0	10.5	30.1	0.0	8.8	13.8	9.7	92.3	1497.5	2272.4	240.3	1015.2	908.9	406.1
	10.5	11.0	10.8	0.5	9.0	18.8	8.8	94.5	1.9	30.1	30.1	1.0	103.8	878.7	0.0	1.0	0.0	0.0	11.0	30.1	0.0	8.8	13.8	9.7	96.7	1565.9	2444.6	254.5	1133.1	977.8	453.3
	11.0	12.0	11.5	1.0	10.0	18.8	8.8	101.1	3.8	30.1	30.1	1.0	222.0	1100.7	0.0	1.0	0.0	0.0	12.0	30.1	0.0	8.8	13.8	14.8	105.5	1732.7	2833.4	282.7	1383.4	1133.4	553.4
	12.0	13.5	12.8	1.5	11.5	18.8	8.8	112.1	5.7	30.1	30.1	1.0	369.2	1469.9	0.0	1.0	0.0	0.0	13.5	30.1	0.0	8.8	13.8	14.8	118.6	1937.9	3407.8	325.2	1795.0	1363.1	718.0

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	13.5	15.0	14.3	1.5	13.0	18.8	8.8	125.2	5.7	30.1	30.1	1.0	412.5	1882.4	0.0	1.0	0.0	0.0	15.0	31.2	0.0	9.1	15.0	18.1	131.8	2345.9	4228.4	367.6	2250.0	1691.3	900.0
BH-7	15.0	16.5	15.8	1.5	14.5	19.1	9.1	138.4	5.7	31.2	31.2	1.1	502.4	2384.8	0.0	1.0	0.0	0.0	16.5	31.2	0.0	8.9	15.0	17.4	145.2	2567.3	4952.1	410.0	2794.8	1980.8	1117.9
	16.5	17.0	16.8	0.5	15.0	18.9	8.9	147.2	1.9	31.5	31.5	1.1	182.7	2567.5	0.0	1.0	0.0	0.0	17.0	31.5	0.0	8.9	15.0	18.3	149.4	2642.9	5210.4	424.1	2991.6	2084.2	1196.7
	17.0	18.0	17.5	1.0	16.0	18.9	8.9	153.7	3.8	31.5	31.5	1.1	381.8	2949.3	0.0	1.0	0.0	0.0	18.0	31.5	0.0	7.4	15.0	18.3	158.2	2773.4	5722.7	452.4	3401.7	2289.1	1360.7
	18.0	19.5	18.8	1.5	17.5	17.4	7.4	153.7	5.7	31.2	31.2	1.1	558.1	3507.4	0.0	1.0	0.0	0.0	19.5	31.2	0.0	9.7	15.0	18.1	159.3	2818.7	6326.1	494.8	4002.2	2530.4	1600.9
	19.5	21.0	20.3	1.5	19.0	19.7	9.7	153.7	5.7	31.5	31.5	1.1	572.7	4080.1	0.0	1.0	0.0	0.0	21.0	31.5	0.0	7.0	15.0	19.0	161.0	2818.6	6898.7	537.2	4617.3	2759.5	1846.9
	21.0	22.0	21.5	1.0	20.0	17.0	7.0	153.7	3.8	31.2	31.2	1.1	372.1	4452.2	0.0	1.0	0.0	0.0	22.0	31.2	0.0	7.0	15.0	18.1	157.2	2750.2	7202.4	565.5	5017.7	2881.0	2007.1
	22.0	22.5	22.3	0.5	20.5	17.0	7.0	153.7	1.9	31.2	31.2	1.1	186.0	4638.2	0.0	1.0	0.0	0.0	22.5	31.2	0.0	6.8	15.0	18.1	155.5	2718.3	7356.5	579.6	5217.8	2942.6	2087.1
	22.5	24.0	23.3	1.5	22.0	16.8	6.8	153.7	5.7	31.2	31.2	1.1	558.1	5196.3	0.0	1.0	0.0	0.0	24.0	31.2	0.0	6.8	15.0	18.1	158.8	2774.5	7970.8	622.0	5818.3	3188.3	2327.3
	24.0	24.5	24.3	0.5	22.5	16.8	6.8	153.7	1.9	31.5	31.5	1.1	190.9	5387.2	0.0	1.0	0.0	0.0	24.5	31.5	0.0	6.8	15.0	19.0	155.4	2721.2	8108.4	636.2	6023.4	3243.3	2409.3
	24.5	25.5	25.0	1.0	23.5	16.8	6.8	153.7	3.8	31.5	31.5	1.1	381.8	5769.0	0.0	1.0	0.0	0.0	25.5	31.5	0.0	7.8	15.0	19.0	157.1	2762.8	8531.8	664.5	6433.4	3412.7	2573.4

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq

Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	25.5	27.0	26.3	1.5	25.0	17.8	7.8	153.7	5.7	31.5	31.5	1.1	572.7	6341.7	0.0	1.0	0.0	0.0	27.0	31.5	0.0	7.1	15.0	19.0	159.6	2796.3	9137.9	706.9	7048.5	3655.2	2819.4
BH-7	27.0	28.5	27.8	1.5	26.5	17.1	7.1	153.7	5.7	31.5	31.5	1.1	572.7	6914.4	0.0	1.0	0.0	0.0	28.5	31.5	0.0	7.5	15.0	19.0	159.1	2793.4	9707.8	749.3	7663.7	3883.1	3065.5
	28.5	29.5	29.0	1.0	27.5	17.5	7.5	153.7	3.8	31.8	31.8	1.1	391.7	7306.1	0.0	1.0	0.0	0.0	29.5	31.8	0.0	7.5	16.0	19.9	157.5	2949.0	10255.1	777.5	8083.6	4102.0	3233.4
	29.5	30.0	29.8	0.5	28.0	17.5	7.5	153.7	1.9	31.8	31.8	1.1	195.9	7501.9	0.0	1.0	0.0	0	30.0	31.8	0.0	7.4	16.0	19.9	155.6	2912.7	10414.6	791.7	8293.6	4165.8	3317.4
BH-8	2.0	2.5	2.3	0.5	0.5	18.2	8.2	18.5	1.9	26.3	26.3	1.0	17.3	0	13.0	1.0	24.5	0	2.5	26.3	13.0	8.2	10.5	8.4	20.6	0.0	0.0	14.1	14.1	0.0	5.7
	2.5	3.0	2.8	0.5	1.0	18.2	8.2	23.2	1.9	6.0	6.0	1.0	4.6	0	68.0	1.0	128.2	128.2	3.0	6.0	68.0	8.2	1.8	0.5	25.3	744.5	872.7	28.3	156.5	349.1	62.6
	3.0	4.5	3.8	1.5	2.5	18.2	8.2	33.6	5.7	6.0	6.0	1.0	20.0	20.0	68.0	1.0	384.5	384.5	4.5	6.0	68.0	8.2	1.8	0.5	39.7	773.2	1177.6	70.7	475.2	471.1	190.1
	4.5	5.0	4.8	0.5	3.0	18.2	8.2	43.9	1.9	6.0	6.0	1.0	8.7	28.7	68.0	1.0	128.2	128.2	5.0	6.0	68.0	10.4	1.8	0.5	46.0	786.3	943.1	84.8	241.7	377.2	96.7
	5.0	6.0	5.5	1.0	4.0	20.4	10.4	51.2	3.8	6.0	6.0	1.0	20.3	49.0	68.0	1.0	256.4	256.4	6.0	6.0	68.0	10.4	1.8	0.5	56.4	806.6	1111.9	113.1	418.4	444.8	167.4
	6.0	7.5	6.8	1.5	5.5	20.4	10.4	63.0	5.7	6.0	6.0	1.0	37.5	86.4	68.0	1.0	384.5	384.5	7.5	9.2	71.0	10.4	2.3	0.9	70.8	911.5	1382.4	155.5	626.5	553.0	250.6
	7.5	8.0	7.8	0.5	6.0	20.4	10.4	72.4	1.9	9.2	9.2	1.0	22.1	108.5	71.0	1.0	133.8	133.8	8.0	9.2	71.0	9.4	2.3	0.9	75.0	921.9	1164.2	169.7	412.0	465.7	164.8

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
BH-8	8.0	9.0	8.5	1.0	7.0	19.4	9.4	79.2	3.8	9.2	9.2	1.0	48.4	156.9	71.0	1.0	267.7	267.7	9.0	9.2	71.0	9.4	2.3	0.7	83.9	943.9	1368.5	197.9	622.5	547.4	249.0
	9.0	10.5	9.8	1.5	8.5	19.4	9.4	90.2	5.7	9.2	9.2	1.0	82.6	239.5	71.0	1.0	401.5	401.5	10.5	9.2	71.0	9.4	2.3	0.7	97.2	978.4	1619.4	240.3	881.3	647.7	352.5
	10.5	12.0	11.3	1.5	10.0	18.8	8.8	103.1	5.7	9.2	9.2	1.0	94.4	333.9	71.0	1.0	401.5	401.5	12.0	9.2	71.0	8.8	2.3	0.8	109.7	1010.6	1746.0	282.7	1018.1	698.4	407.2
	12.0	13.5	12.8	1.5	11.5	18.8	8.8	114.7	5.7	9.2	9.2	1.0	105.1	438.9	71.0	1.0	401.5	401.5	13.5	25.9	15.0	8.8	10.5	7.4	121.3	1636.0	2476.4	325.2	1165.6	990.6	466.2
	13.5	15.0	14.3	1.5	13.0	17.8	7.8	126.6	5.7	25.9	25.9	1.0	347.6	786.5	15.0	1.0	84.8	84.8	15.0	25.9	15.0	7.8	10.5	9.7	132.4	1774.5	2645.8	367.6	1238.9	1058.3	495.6
	15.0	16.5	15.8	1.5	14.5	17.8	7.8	139.7	5.7	25.9	25.9	1.0	383.7	1170.3	15.0	1.0	84.8	84.8	16.5	25.9	15.0	7.8	10.5	9.7	145.6	1930.4	3185.5	410.0	1665.1	1274.2	666.0
	16.5	17.0	16.8	0.5	15.0	17.8	7.8	148.5	1.9	25.9	25.9	1.0	135.9	1306.2	15.0	1.0	28.3	28.3	17.0	25.9	15.0	8.8	10.5	9.7	150.4	1994.9	3329.3	424.1	1758.6	1331.7	703.4
	17.0	18.0	17.5	1.0	16.0	18.8	8.8	155.1	3.8	25.9	25.9	1.0	283.9	1590.0	15.0	1.0	56.6	56.6	18.0	25.9	15.0	8.8	10.5	8.4	159.5	2094.0	3740.6	452.4	2099.0	1496.2	839.6
	18.0	19.5	18.8	1.5	17.5	18.8	8.8	155.1	5.7	25.9	25.9	1.0	425.8	2015.9	15.0	1.0	84.8	84.8	19.5	25.9	15.0	8.8	10.5	8.4	161.6	2120.0	4220.7	494.8	2595.5	1688.3	1038.2
	19.5	21.0	20.3	1.5	19.0	18.8	8.8	155.1	5.7	25.9	25.9	1.0	425.8	2441.7	15.0	1.0	84.8	84.8	21.0	32.1	0.0	9.0	16.0	20.0	161.6	3044.4	5570.8	537.2	3063.7	2228.3	1225.5
	21.0	22.0	21.5	1.0	20.0	19.0	9.0	155.1	3.8	32.1	32.1	1.1	405.2	2846.9	0.0	1.0	0.0	0.0	22.0	32.1	0.0	9.0	16.0	20.0	159.6	3006.8	5853.6	565.5	3412.4	2341.5	1365.0

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
BH-8	22.0	22.5	22.3	0.5	20.5	19.0	9.0	155.1	1.9	32.1	32.1	1.1	202.6	3049.5	0.0	1.0	0.0	0.0	22.5	32.1	0.0	9.2	16.0	20.0	157.3	2968.5	6018.0	579.6	3629.1	2407.2	1451.7
	22.5	24.0	23.3	1.5	22.0	19.2	9.2	155.1	5.7	32.1	32.1	1.1	607.9	3657.4	0.0	1.0	0.0	0.0	24.0	32.1	0.0	9.2	16.0	20.0	161.9	3052.0	6709.3	622.0	4279.4	2683.7	1711.8
	24.0	24.5	24.3	0.5	22.5	19.2	9.2	155.1	1.9	32.1	32.1	1.1	202.6	3860.0	0.0	1.0	0.0	0.0	24.5	32.1	0.0	9.2	16.0	20.0	157.4	2969.2	6829.2	636.2	4496.2	2731.7	1798.5
	24.5	25.5	25.0	1.0	23.5	19.2	9.2	155.1	3.8	32.1	32.1	1.1	405.2	4265.2	0.0	1.0	0.0	0	25.5	32.1	0.0	9.0	16.0	20.0	159.7	0.0	4265.2	664.5	4929.7	1706.1	1971.9
	25.5	27.0	26.3	1.5	25.0	19.0	9.0	155.1	5.7	32.1	32.1	1.1	607.9	4265.2	0.0	1.0	0.0	0	27.0	32.1	0.0	9.2	16.0	20.0	161.8	0.0	4265.2	706.9	4972.1	1706.1	1988.8
	27.0	28.5	27.8	1.5	26.5	19.2	9.2	155.1	5.7	32.4	32.4	1.1	623.3	4265.2	0.0	1.0	0.0	0	28.5	32.4	0.0	9.0	16.0	20.9	162.0	0.0	4265.2	749.3	5014.5	1706.1	2005.8
	28.5	29.5	29.0	1.0	27.5	19.0	9.0	155.1	3.8	32.7	32.7	1.1	426.0	4265.2	0.0	1.0	0.0	0	29.5	32.7	0.0	9.0	16.0	21.7	159.6	0.0	4265.2	777.5	5042.8	1706.1	2017.1
	29.5	30.0	29.8	0.5	28.0	19.0	9.0	155.1	1.9	32.7	32.7	1.1	213.0	4265.2	0.0	1.0	0.0	0	30.0	32.7	0.0	9.3	16.0	21.7	157.3	2980.7	7245.9	791.7	5056.9	2898.4	2022.8
BH-9	2.0	2.5	2.3	0.5	0.5	17.8	7.8	17.6	1.9	25.7	25.7	1.0	16.0	0	10.0	1.0	18.9	0	2.5	25.7	10.0	7.8	10.0	5.4	19.6	0.0	0.0	14.1	14.1	0.0	5.7
	2.5	3.0	2.8	0.5	1.0	17.8	7.8	21.9	1.9	25.7	25.7	1.0	19.9	0	10.0	1.0	18.9	18.9	3.0	25.7	10.0	7.8	10.0	4.2	23.9	393.8	412.6	28.3	47.1	165.0	18.8
H-	3.0	4.5	3.8	1.5	2.5	17.8	7.8	31.5	5.7	25.7	25.7	1.0	85.7	85.7	10.0	1.0	56.6	56.6	4.5	25.7	10.0	7.8	10.0	5.1	37.4	550.5	692.7	70.7	212.9	277.1	85.2

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	4.5	6.0	5.3	1.5	4.0	17.8	7.8	45.8	5.7	25.7	25.7	1.0	124.7	210.3	10.0	1.0	56.6	56.6	6.0	25.7	10.0	7.8	10.0	6.1	51.7	718.1	984.9	113.1	380.0	394.0	152.0
	6.0	7.5	6.8	1.5	5.5	18.5	8.5	60.1	5.7	31.2	31.2	1.1	218.3	428.6	0.0	1.0	0.0	0.0	7.5	8.5	74.0	9.6	2.1	0.8	66.5	916.2	1344.8	155.5	584.1	537.9	233.6
	7.5	9.0	8.3	1.5	7.0	19.6	9.6	74.5	5.7	8.5	8.5	1.0	62.9	491.5	74.0	1.0	418.5	418.5	9.0	8.5	74.0	9.6	2.1	0.8	81.6	952.6	1862.5	197.9	1107.9	745.0	443.2
	9.0	10.5	9.8	1.5	8.5	19.6	9.6	88.8	5.7	8.5	8.5	1.0	75.0	566.5	74.0	1.0	418.5	418.5	10.5	8.5	74.0	9.6	2.1	0.8	95.9	986.7	1971.7	240.3	1225.3	788.7	490.1
	10.5	11.0	10.8	0.5	9.0	19.6	9.6	98.3	1.9	8.5	8.5	1.0	27.7	594.2	74.0	1.0	139.5	139.5	11.0	8.5	74.0	9.6	2.1	0.8	100.7	998.1	1731.8	254.5	988.2	692.7	395.3
	11.0	12.0	11.5	1.0	10.0	19.6	9.6	105.5	3.8	8.5	8.5	1.0	59.4	653.7	74.0	1.0	279.0	279.0	12.0	8.5	74.0	9.6	2.1	0.7	110.3	1020.3	1952.9	282.7	1215.4	781.2	486.1
	12.0	13.5	12.8	1.5	11.5	19.6	9.6	117.4	5.7	8.5	8.5	1.0	99.2	752.9	74.0	1.0	418.5	418.5	13.5	8.5	74.0	9.6	2.1	0.7	124.6	1054.4	2225.8	325.2	1496.5	890.3	598.6
	13.5	15.0	14.3	1.5	13.0	19.6	9.6	131.7	5.7	8.5	8.5	1.0	111.3	864.2	74.0	1.0	418.5	418.5	15.0	31.5	0.0	8.7	15.0	17.5	138.9	2458.2	3740.9	367.6	1650.3	1496.4	660.1
	15.0	16.5	15.8	1.5	14.5	18.7	8.7	146.1	5.7	31.5	31.5	1.1	544.1	1408.4	0.0	1.0	0.0	0.0	16.5	31.5	0.0	8.9	15.0	16.8	152.6	2688.6	4096.9	410.0	1818.3	1638.8	727.3
	16.5	17.0	16.8	0.5	15.0	18.9	8.9	155.6	1.9	32.4	32.4	1.1	208.5	1616.9	0.0	1.0	0.0	0.0	17.0	32.4	0.0	8.9	16.0	19.2	157.8	2969.5	4586.3	424.1	2041.0	1834.5	816.4
H-	17.0	18.0	17.5	1.0	16.0	18.9	8.9	162.8	3.8	32.4	32.4	1.1	436.2	2053.0	0.0	1.0	0.0	0.0	18.0	32.4	0.0	9.3	16.0	19.2	167.2	3144.5	5197.5	452.4	2505.4	2079.0	1002.2

Geotechnical investigation for Metro rail corridor form Noida sector-51 to Greater Noida sector -2

Dia of Pile : 1.20 m
Cut of depth= 2.00 meter

Factor of safety : 2.50

Area of Pile Toe : 1.13 m sq
Critical Water Table = 0.00 meter

Borehole Number	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.tanδ.Asi					Ultimate Shaft Cohesion Quc = Σα.c.Asi				Ultimate Bearing Resistance = Ap *(c.Nc +q.Nq+0.5.g.B.Ng)								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)
										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/m3)	Nq	Nγ	q	Qb					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
	18.0	19.5	18.8	1.5	17.5	19.3	9.3	162.8	5.7	32.4	32.4	1.1	654.3	2707.3	0.0	1.0	0.0	0.0	19.5	32.4	0.0	7.7	16.0	19.2	169.8	3169.5	5876.8	494.8	3202.1	2350.7	1280.8
	19.5	21.0	20.3	1.5	19.0	17.7	7.7	162.8	5.7	32.4	32.4	1.1	654.3	3361.5	0.0	1.0	0.0	0.0	21.0	32.4	0.0	7.8	16.0	21.7	168.6	3161.8	6523.3	537.2	3898.7	2609.3	1559.5
	21.0	22.0	21.5	1.0	20.0	17.8	7.8	162.8	3.8	32.4	32.4	1.1	436.2	3797.7	0.0	1.0	0.0	0.0	22.0	32.4	0.0	7.8	16.0	21.7	166.7	3127.6	6925.3	565.5	4363.2	2770.1	1745.3
	22.0	22.5	22.3	0.5	20.5	17.8	7.8	162.8	1.9	32.4	32.4	1.1	218.1	4015.8	0.0	1.0	0.0	0.0	22.5	32.4	0.0	7.8	16.0	21.7	164.7	3093.3	7109.1	579.6	4595.4	2843.6	1838.2
	22.5	24.0	23.3	1.5	22.0	17.8	7.8	162.8	5.7	32.4	32.4	1.1	654.3	4670.0	0.0	1.0	0.0	0.0	24.0	32.4	0.0	7.6	16.0	21.7	168.7	3161.3	7831.4	622.0	5292.1	3132.5	2116.8
	24.0	24.5	24.3	0.5	22.5	17.6	7.6	162.8	1.9	32.4	32.4	1.1	218.1	4888.1	0.0	1.0	0.0	0	24.5	32.4	0.0	7.6	16.0	21.7	164.7	0.0	4888.1	636.2	5524.3	1955.2	2209.7
	24.5	25.5	25.0	1.0	23.5	17.6	7.6	162.8	3.8	32.4	32.4	1.1	436.2	4888.1	0.0	1.0	0.0	0	25.5	32.4	0.0	7.6	16.0	21.7	166.6	0.0	4888.1	664.5	5552.6	1955.2	2221.0
	25.5	27.0	26.3	1.5	25.0	17.6	7.6	162.8	5.7	32.4	32.4	1.1	654.3	4888.1	0.0	1.0	0.0	0	27.0	32.4	0.0	7.6	16.0	21.7	168.5	0.0	4888.1	706.9	5595.0	1955.2	2238.0
	27.0	28.5	27.8	1.5	26.5	17.6	7.6	162.8	5.7	32.4	32.4	1.1	654.3	4888.1	0.0	1.0	0.0	0.0	28.5	32.4	0.0	7.6	16.0	21.7	168.5	3158.4	8046.5	749.3	5637.4	3218.6	2254.9
	28.5	29.5	29.0	1.0	27.5	17.6	7.6	162.8	3.8	32.4	32.4	1.1	436.2	5324.3	0.0	1.0	0.0	0.0	29.5	32.4	0.0	7.6	16.0	21.7	166.6	3124.0	8448.3	777.5	6101.8	3379.3	2440.7
	29.5	30.0	29.8	0.5	28.0	17.6	7.6	162.8	1.9	32.4	32.4	1.1	218.1	5542.4	0.0	1.0	0.0	0	30.0	32.4	0.0	7.6	16.0	21.7	164.7	3088.3	8630.7	791.7	6334.0	3452.3	2533.6

APPENDIX-K

TABLE 3: Computation of Lateral Load Capacity

Bore No.	Dia of pile (M)	Concerte Grade	Youngs' Modulus	Moment of Inertia	Average SPT	K1	Stiffness Factor	Cantilever lenngth of pile	L1/T	Lf/T	Permissible deflection (m)	length of Fixidity (m)	ultimate Lateral load capacity of pile (kN)	Allowable Load capacity of pile(kN)
BH-1	1.0	25	25000000	0.0491	13.8	1832	3.6747	0	0	2.23	0.01	8.19	268.1	107.3
BH-2		25	25000000	0.0491	20.4	2840	3.3662	0	0	2.23	0.01	7.51	347.8	139.1
BH-3		25	25000000	0.0491	13.1	1832	3.6747	0	0	2.23	0.01	8.19	268.1	107.3
BH-4		25	25000000	0.0491	15.3	2120	3.5689	0	0	2.23	0.01	7.96	292.1	116.8
BH-5		25	25000000	0.0491	12.9	1688	3.7353	0	0	2.23	0.01	8.33	254.8	101.9
BH-6		25	25000000	0.0491	16.3	2264	3.5223	0	0	2.23	0.01	7.85	304.5	121.8
BH-7		25	25000000	0.0491	11.7	1544	3.8025	0	0	2.23	0.01	8.48	241.6	96.62
BH-8		25	25000000	0.0491	14.1	1976	3.6195	0	0	2.23	0.01	8.07	280.3	112.1
BH-9		25	25000000	0.0491	12.1	1688	3.7353	0	0	2.23	0.01	8.33	254.8	101.9
BH-1	1.2	25	25000000	0.1018	13.8	1832	4.2516	0	0	2.23	0.012	9.48	430.2	172.1
BH-2		25	25000000	0.1018	20.4	2840	3.8947	0	0	2.23	0.012	8.69	558.5	223.4
BH-3		25	25000000	0.1018	13.1	1832	4.2516	0	0	2.23	0.012	9.48	430.2	172.1
BH-4		25	25000000	0.1018	15.3	2120	4.1292	0	0	2.23	0.012	9.21	469.1	187.6
BH-5		25	25000000	0.1018	12.9	1688	4.3218	0	0	2.23	0.012	9.64	409.1	163.6
BH-6		25	25000000	0.1018	16.3	2264	4.0753	0	0	2.23	0.012	9.09	487.9	195.2
BH-7		25	25000000	0.1018	11.7	1544	4.3995	0	0	2.23	0.012	9.81	388.2	155.3
BH-8		25	25000000	0.1018	14.1	1976	4.1877	0	0	2.23	0.012	9.34	449.8	179.9
BH-9		25	25000000	0.1018	12.1	1688	4.3218	0	0	2.23	0.012	9.64	409.1	163.6

APPENDIX-L
SITE PHOTOGRAPHS

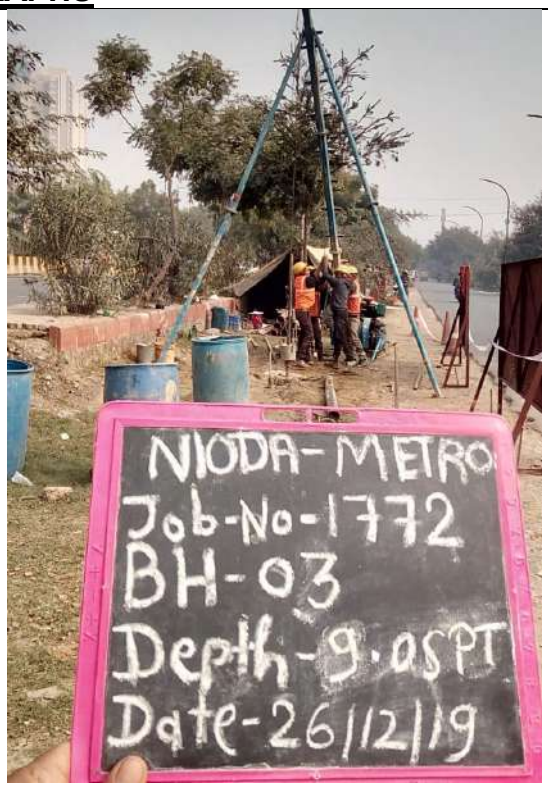
Collecting UDS sample

SPT Sample

Collecting SPT Test

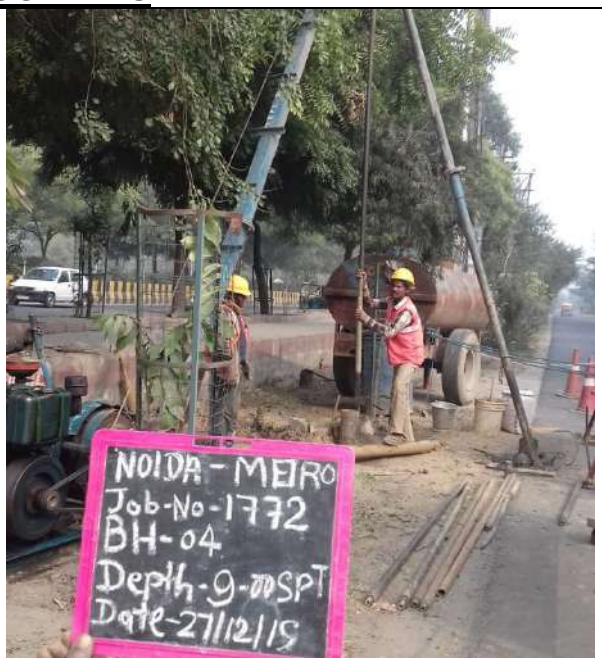
UDS Sample

APPENDIX-L
SITE PHOTOGRAPHS



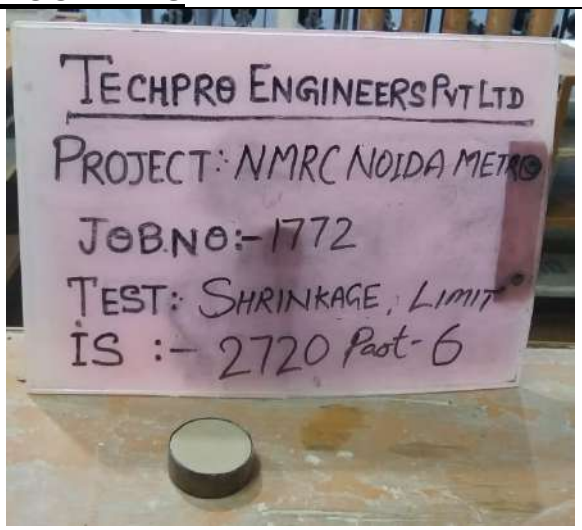
APPENDIX-L
SITE PHOTOGRAPHS

APPENDIX-L
SITE PHOTOGRAPHS



APPENDIX-M
LABORATORY PHOTOGRAPHS

APPENDIX-M
LABORATORY PHOTOGRAPHS



End of Report