

CALCULATIONS FOR CORRECTED SPT (N) VALUES

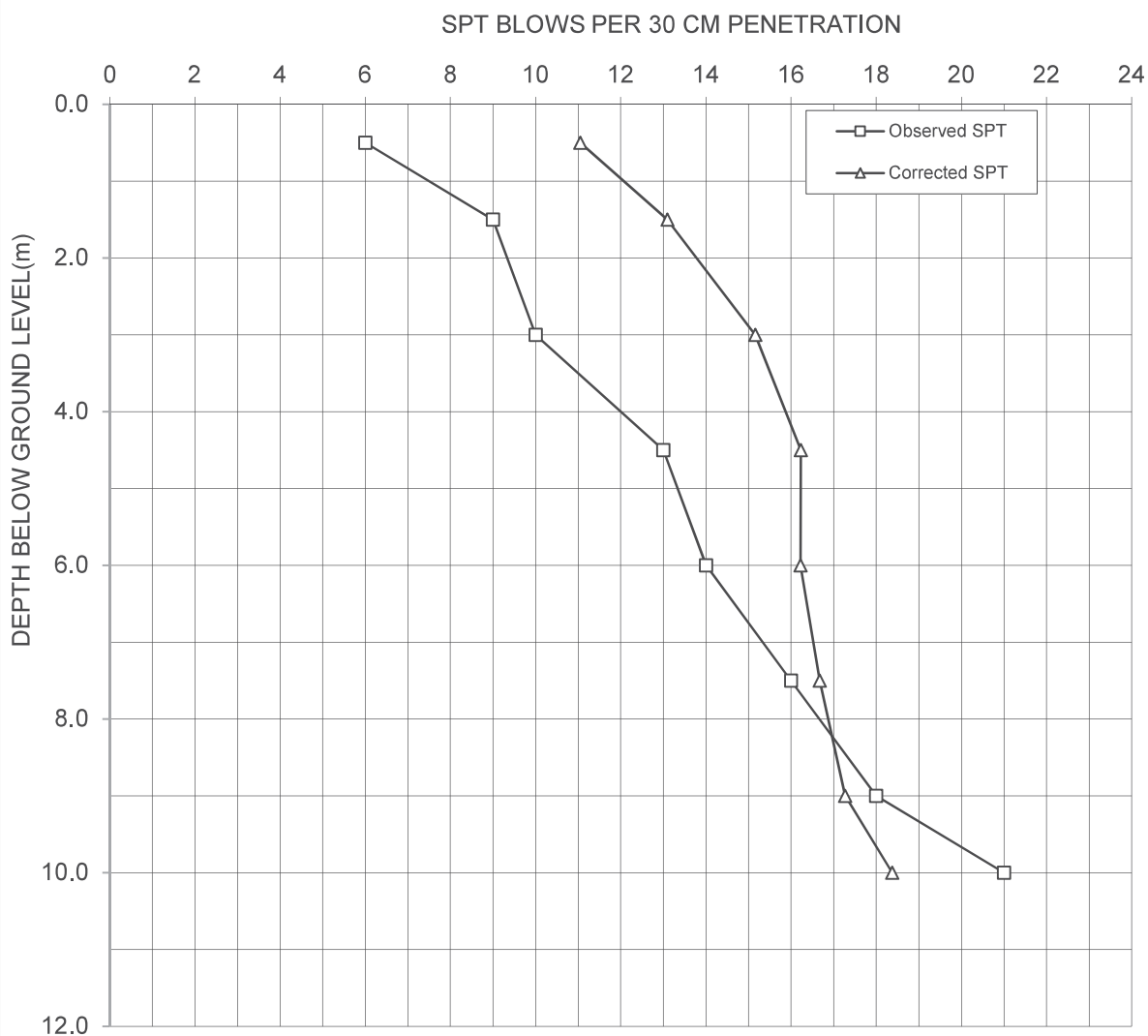
Project: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BOREHOLE NO. BH- 01

WATER TABLE :- 2.80 m

DEPTH OF SAMPLE	TYPE OF SOIL	OBSERVED SPT 'N' VALUE	CORRECTED SPT (N') VALUE (FOR OVERBURDEN)	FINAL CORRECTED VALUE AFTER DILATANCY CORRECTION (N'')
0.50	Non Plastic	6	11	11
1.50	Non Plastic	9	13	13
3.00	Non Plastic	10	15	15
4.50	Non Plastic	13	17	16
6.00	Non Plastic	14	17	16
7.50	Non Plastic	16	18	17
9.00	Non Plastic	18	20	17
10.00	Non Plastic	21	22	18

* SPT value restricted to 300.



Typical Computation of Liquefaction Potential as per IRC:SP: 114 / IS: 1893

Project: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO: 20

BOREHOLE NO.

BH-01

SECTION: CHITAUNI-MADHUBANI

Water table assumed for Calculation: 0.00 m

Depth below EGL, m	Type of Strata	Observed SPT Value	Saturated density (t/m^3)	Submerged Density (t/m^3)	Fine Content (%)	Earthquake Zone	Peak ground acceleration a_{max}/g	Earth quake magnitude (Mw)	Stress reduction coefficient (rd)	Total overburden pressure (σ_o), t/m^2	Effective overburden (σ'_o), t/m^2	Cyclic Stress ratio (CSR)	C_N	CE or CHT	CH or CHW	CB or CBD	CR or CRL	CS or CSS	SPT corrected (N_1) ₆₀	α	β	(N_1) _{60cs}	$CRR_M = 7.5$	Relative Density, Dr%	f	K_σ	K_α	MSF	CRR	FOS	Conclusion
0.50	ML-NP	6	1.75	0.75	68	IV	0.24	7.00	1.00	0.88	0.38	0.36	1.70	1.33	1.000	1.05	0.75	1.00	10.68	5.00	1.20	17.82	0.19	21.54	0.89	1.00	1.00	1.19	0.23	0.62	Liquefiable
1.50	ML-NP	9	1.75	0.75	68	IV	0.24	7.00	0.99	2.63	1.13	0.36	1.70	1.33	1.000	1.05	0.75	1.00	16.02	5.00	1.20	24.23	0.28	33.56	0.83	1.00	1.00	1.19	0.33	0.92	Liquefiable
3.00	SM	10	2.01	1.01	25	IV	0.24	7.00	0.98	5.25	2.25	0.36	1.70	1.33	1.000	1.05	0.85	1.00	20.18	4.29	1.12	26.79	0.33	42.90	0.79	1.00	1.00	1.19	0.40	1.12	Non Liquefiable
4.50	SM	13	2.01	1.01	25	IV	0.24	7.00	0.97	8.27	3.77	0.33	1.63	1.33	1.000	1.05	0.95	1.00	28.11	4.29	1.12	35.63	NA	60.74	0.70	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
6.00	SM	14	2.02	1.02	28	IV	0.24	7.00	0.95	11.28	5.28	0.32	1.38	1.33	1.000	1.05	0.95	1.00	25.56	4.56	1.14	33.65	NA	55.01	0.72	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
7.50	SM	16	2.02	1.02	28	IV	0.24	7.00	0.94	14.31	6.81	0.31	1.21	1.33	1.000	1.05	0.95	1.00	25.72	4.56	1.14	33.84	NA	55.38	0.72	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
9.00	SM	18	2.03	1.03	32	IV	0.24	7.00	0.93	17.34	8.34	0.30	1.10	1.33	1.000	1.05	1	1.00	27.53	4.83	1.17	37.06	NA	59.43	0.70	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
10.00	SM	21	2.03	1.03	32	IV	0.24	7.00	0.91	19.37	9.37	0.29	1.03	1.33	1.000	1.05	1	1.00	30.30	4.83	1.17	40.31	NA	65.30	0.67	1.00	1.00	1.19	NA	>1.0	Non Liquefiable

Note: Values of all Parameters are as per IRC:SP: 114 / IS 1893: 2016

C_E or C_{HT} (Correction for hammer energy ratio) = $ER/60$, ER for Rope and pully System = 80 % , Hence $C_E = 80/60 = 1.33$

C_H or C_{HW} (Correction for hammer) = 1.00

Borehole Diameter = 150 mm , Hence C_B or C_{BD} (Correction for Borehole diameter), = 1.05

C_s or C_{ss} (Correction for Standard sampler) = 1.00

K_σ Correction for high overburden stress (for effective oberburden pressure>10 T/m2)

K_α Correction for static shear stress is required only for sloping ground



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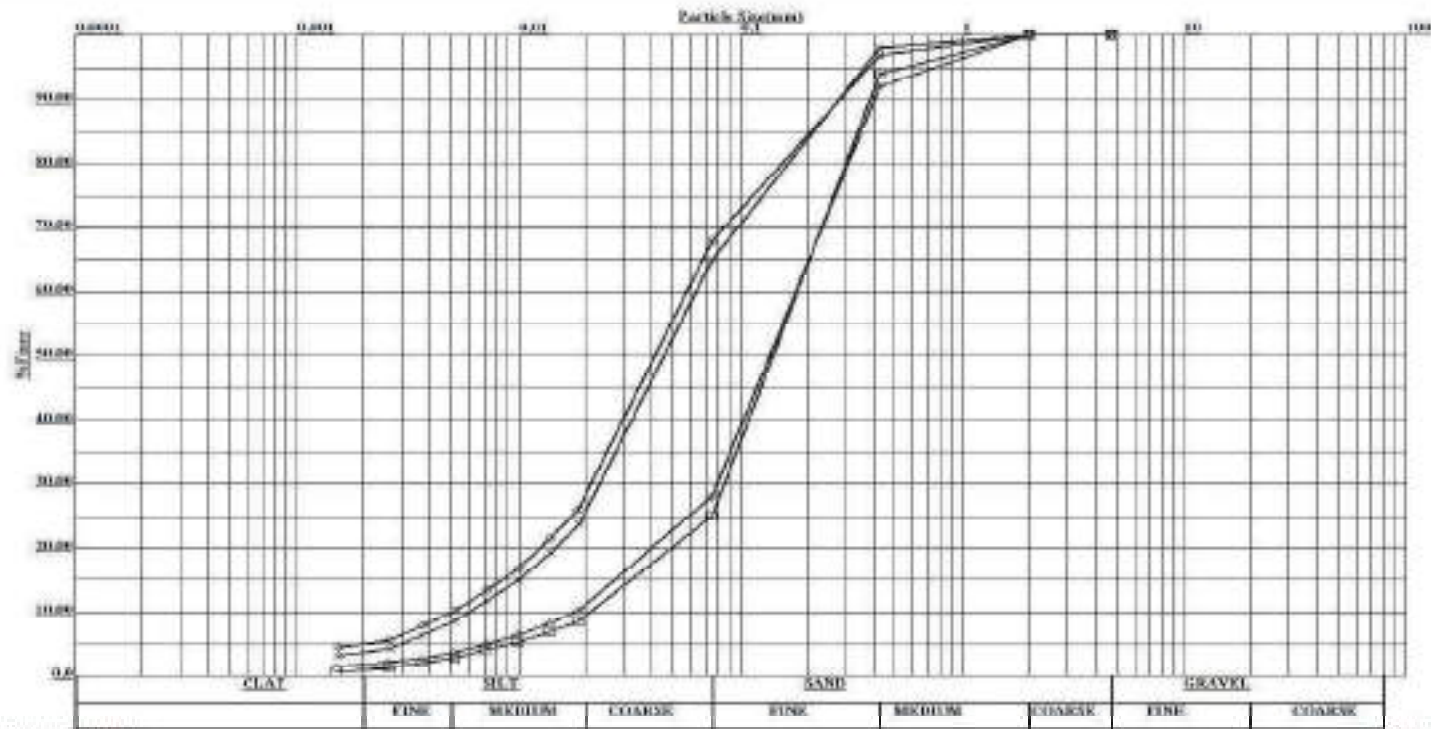
PROJECT: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO. - 20

BOREHOLE NO. - 01

SECTION:CHITAUNI TO MADHUBANI

GRAIN SIZE ANALYSIS



Symbol	Depth, m	Soil Description	Gravel	Sand	Silt	Clay	C_u	C_c
			(%)	(%)	(%)	(%)		
x	0.0	MEDIUM DENSE, LITE BROWN, SANDY SILT (ML)	0.00	35.00	61.00	4.00	10.55	1.41
○	0.5		0.00	32.00	63.00	5.00	11.32	1.56
□	3.0	MEDIUM DENSE, LITE GREY, SILTY SAND (SM)	0.00	75.00	24.00	1.00	8.64	1.91
◇	6.0		0.00	72.00	26.00	2.00	9.79	1.93



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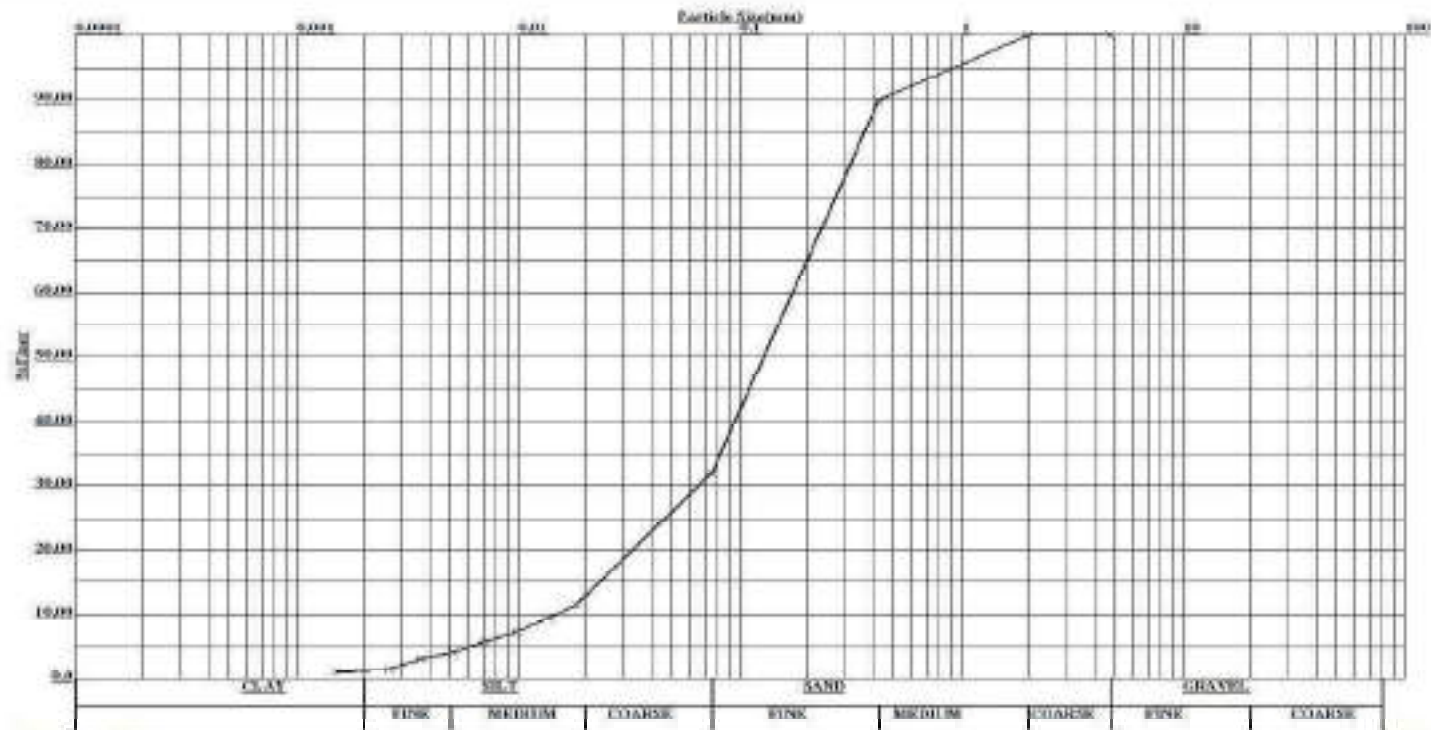
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BRIDGE NO. - 20

BOREHOLE NO. - 01

SECTION:CHITAUNI TO MADHUBANI

GRAIN SIZE ANALYSIS



Symbol	Depth, m	Soil Description	Gravel	Sand	Silt	Clay	C_u	C_c
			(%)	(%)	(%)	(%)		
x	9.0	MEDIUM DENSE, LITE GREY,SILTY SAND (SM)	0.00	68.00	31.00	1.00	11.58	1.65

COMPUTATION OF WEIGHTED MEAN DIAMETER OF PARTICLES AND SILT FACTOR

Project: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO. BR-20

BOREHOLE NO- 1

Section : CHITAUNI - MADHUBANI

Sl.No.	Borehole No.	Depth (m)		Description of the Soil Strata	IS Classification	Percentage Retained							Mean Particle Size (mm)							Sandy Strata		Clayey Soil			
		From	To			5.60 to 4.00	4.00 to 2.80	2.80 to 1.00	1.00 to 0.425	0.425 to 0.180	0.180 to 0.075	0.075 to 0	4.8	3.4	1.9	0.7125	0.3025	0.1275	0.0375	Mean Particle Size (dm)	Silt Factor in the layer= 1.76 x sqrt(dm)	Average Cohesion Intercept - c (kg/sqcm)	Average Angle of Internal Friction (°)	F	Silt Factor = K _{sf} c = F x (1 + sqrt(c))
1	BH-1	0.50	0.95	SANDY SILT	ML	0.0	0.0	0.0	3.0	21.0	8.0	68.0	0.00	0.00	0.00	2.14	6.35	1.02	2.550	0.121	0.611	-	-	-	-
2		3.00	3.45	SILTY SAND	SM	0.0	0.0	0.0	6.0	48.0	21.0	25.0	0.00	0.00	0.00	4.28	14.52	2.68	0.938	0.224	0.833	-	-	-	-
3		6.00	6.45	SILTY SAND	SM	0.0	0.0	0.0	8.0	42.0	22.0	28.0	0.00	0.00	0.00	5.70	12.71	2.81	1.050	0.223	0.830	-	-	-	-



NORTH EASTERN RAILWAY

**FINAL LOCATION SURVEY FOR NEW B.G RAILWAY LINE
PROJECTS (770.00 KM.) AND FINAL LOCATION SURVEY
FOR CONSTRUCTION OF DOUBLING/THIRD LINE/ 3RD &
4TH LINE (252.00 KM.) OF NORTH EASTERN RAILWAY
(TOTAL 1022.00 KM)**

SECTION: CHITAUNI-MADHUBANI

Chainage	Br. No	Type of Crossing	Type of Bridge	Borehole No.	Easting (m)	Northing (m)	Reduced Level (m)
14240.000	22	WATERWAY	MINOR	BH-01	202532	2997084	109.59

SUBMITTED BY:

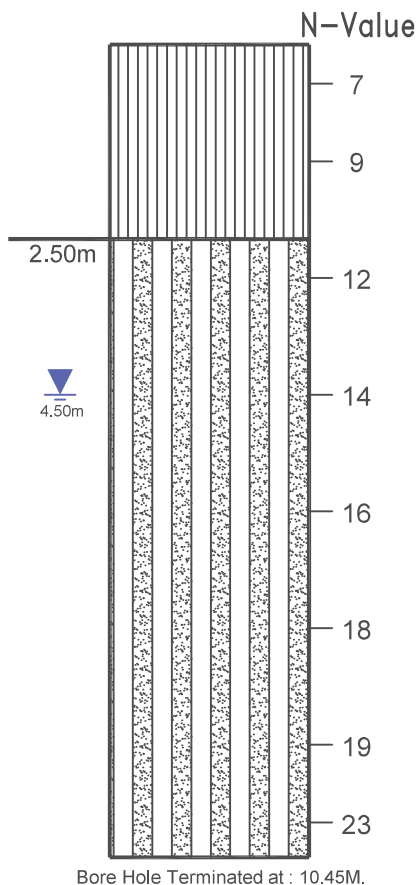


BOREHOLE PROFILE

SECTION: CHITAUNI - MADHUBANI

IR BRIDGE NO.- BR-22

BOREHOLE NO.: BH- 01



LEGENDS



Sandy Silt (ML)






Silty Sand (SM)



Ground Water Table



Project: FINAL LOCATION SURVEY FOR NEW B.G RAILWAY LINE PROJECTS (770.00 KM.) AND FINAL LOCATION SURVEY FOR CONSTRUCTION OF DOUBLING/THIRD LINE/ 3RD & 4TH LINE (252.00 KM.) OF NORTH EASTERN RAILWAY (TOTAL 1022.00 KM)

BRIDGE NO. 22 BOREHOLE NO. BH- 01										GWT: 4.50 m		DATE STARTED : 25/01/2025																								
FIELD TEST RESULTS										LABORATORY TEST RESULTS																										
ELEVATION IN METERS	DEPTH IN METERS BELOW REFERENCE	NATURE OF SAMPLING	SAMPLE REFERENCE NO.	LEVEL OF WATER TABLE /LWL	SPT TEST RESULTS					SYMBOLIC REPRESENTATION	DESCRIPTION OF SOIL WITH I.S. CLASSIFICATION	TYPE OF TEST CONDUCTED IN THE LABORATORY	GRAIN SIZE ANALYSIS				LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	BULK DENSITY (gm/cc)	DRY DENSITY (gm/cc)	MOISTURE CONTENT (%)	FREESWELL INDEX (%)	SPECIFIC GRAVITY	SUBMERGED DENSITY (gm/cc)	SHEAR STRENGTH CHARACTERISTICS		CONSOLIDATION CHARACTERISTICS	Chemical Analysis Result							
					DEPTH IN METERS	NO. OF BLOWS	PENETRATION (CM)	N VALUE (Recorded)	N VALUE (Corrected)				GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)										Cohesion, C _v (kg/cm ²)	Angle of friction (Degrees)		Compression Index(C _c)	SOIL SAMPLE			WATER SAMPLE			
-0.50	0.5	DS	1		0,00	0,50	DS	-	-	-		MEDIUM DENSE, LITE BROWN, SANDY SILT (ML)	-	0	45	50	5	NON-PLASTIC			-	-	-	-	-	-	-	-	-	-	7,16	0,03	NIL	-	-	-
	1.0	SPT	1		0,50	0,95	7	30	7	13			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7,36	0,01	NIL	-	-	-	
	2.0	SPT	2		1,50	1,95	9	30	9	13			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7,20	0,03	NIL	-	-	-	
-3.00	3.0	UD	1		2.50	2.80	-					MEDIUM DENSE, LITE GREY, SILTY SAND (SM)	-	0	68	31	1	NON-PLASTIC			2,00	-	-	-	2,56	-	0	30°	-	-	-	-	-	-		
	4.0	SPT	3		3,00	3,45	12	30	12	14			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	5.0	SPT	4		4,50	4,95	14	30	14	19			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
-6.00	6.0	DS	2		5,50	5,80	UDS SLIPPED						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	7.0	SPT	5		6,00	6,45	16	30	16	17			-	0	65	33	2	NON-PLASTIC			-	-	-	2,55	-	-	-	-	-	-	-	-	-	-	-	
	8.0	SPT	6		7,50	7,95	18	30	18	18			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
-9.00	9.0	DS	3		8,50	8,80	UDS SLIPPED						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	10.0	SPT	7		9,00	9,45	19	30	19	18			-	0	62	37	1	NON-PLASTIC			-	-	-	2,54	-	-	-	-	-	-	-	-	-	-	-	
	11.0	SPT	8		10,00	10,45	23	30	23	19			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
CLASSIFICATION OF SOIL AS PER IS : 1498 ABBREVIATION USED : DS = DISTURBED SAMPLE , SPT = STANDARD PENETRATION TEST, UDS = UNDISTURBED SAMPLE, DST = DIRECT SHEAR TEST, UC : UNCONFINED COMPRESSION TEST UU : UNCONSOLIDATED UNDRAINED TRIAXIAL TEST * UCS BASED ON POINT LOAD TEST													Project: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)															SECTION: CHITAUNI-MADHUBANI								

CALCULATIONS FOR CORRECTED SPT (N) VALUES

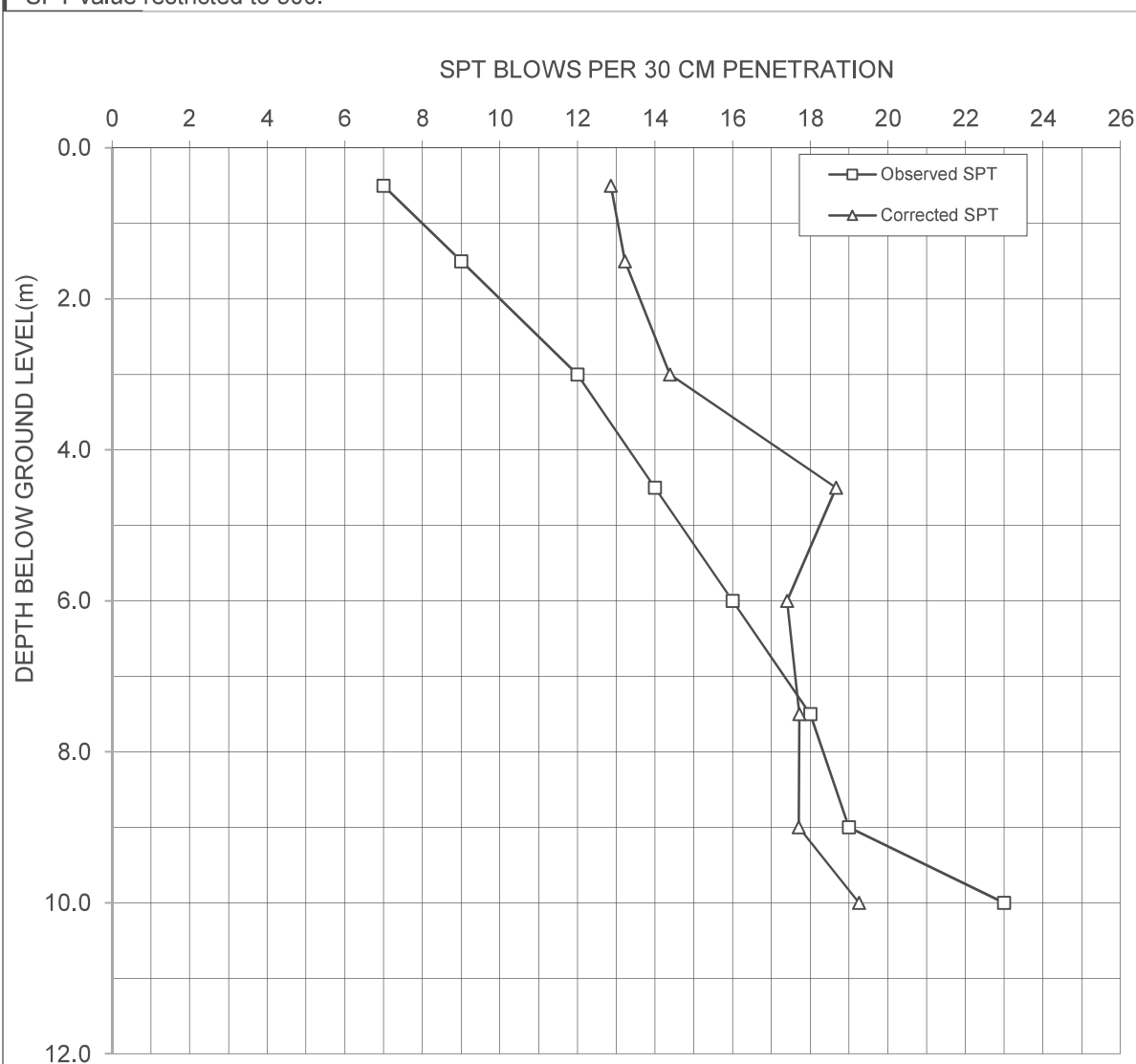
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BOREHOLE NO. BH- 01

WATER TABLE IN METER:-4.50m

DEPTH OF SAMPLE	TYPE OF SOIL	OBSERVED SPT 'N' VALUE	CORRECTED SPT (N') VALUE (FOR OVERBURDEN)	FINAL CORRECTED VALUE AFTER DILATANCY CORRECTION (N'')
0.50	Non Plastic	7	13	13
1.50	Non Plastic	9	13	13
3.00	Non Plastic	12	14	14
4.50	Non Plastic	14	19	19
6.00	Non Plastic	16	20	17
7.50	Non Plastic	18	20	18
9.00	Non Plastic	19	20	18
10.00	Non Plastic	23	24	19

* SPT value restricted to 300.



Typical Computation of Liquefaction Potential as per IRC:SP: 114 / IS: 1893

Project: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO: 22

BOREHOLE NO.

BH-01

SECTION: CHITAUNI-MADHUBANI

Water table assumed for Calculation: 0.00 m

Depth below EGL, m	Type of Strata	Observed SPT Value	Saturated density (t/m^3)	Submerged Density (t/m^3)	Fine Content (%)	Earthquake Zone	Peak ground acceleration a_{max}/g	Earth quake magnitude (Mw)	Stress reduction coefficient (rd)	Total overburden pressure (σ_o), t/m^2	Effective overburden (σ_o), t/m^2	Cyclic Stress ratio (CSR)	C_N	CE or CHT	CH or CHW	CB or CBD	CR or CRL	CS or CSS	SPT corrected (N_1) ₆₀	α	β	$(N_1)_{60cs}$	$CRR_M = 7.5$	Relative Density, Dr%	f	K_σ	K_u	MSF	CRR	FOS	Conclusion
0.50	ML	7	1.72	0.72	58	IV	0.24	7.00	1.00	0.86	0.36	0.37	1.70	1.33	1.000	1.05	0.75	1.00	12.46	5.00	1.20	19.96	0.21	NA	NA	1.00	1.00	1.19	0.26	>1.0	Non Liquefiable
1.50	ML	9	1.72	0.72	58	IV	0.24	7.00	0.99	2.58	1.08	0.37	1.70	1.33	1.000	1.05	0.75	1.00	16.02	5.00	1.20	24.23	0.28	NA	NA	1.00	1.00	1.19	0.33	>1.0	Non Liquefiable
3.00	SM	12	2.00	1.00	32	IV	0.24	7.00	0.98	5.16	2.16	0.36	1.70	1.33	1.000	1.05	0.85	1.00	24.22	4.83	1.17	33.18	NA	51.98	0.74	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
4.50	SM	14	2.00	1.00	32	IV	0.24	7.00	0.97	8.16	3.66	0.34	1.65	1.33	1.000	1.05	0.95	1.00	30.70	4.83	1.17	40.78	NA	65.70	0.67	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
6.00	SM	16	2.01	1.01	35	IV	0.24	7.00	0.95	11.16	5.16	0.32	1.39	1.33	1.000	1.05	0.95	1.00	29.55	5.00	1.20	40.46	NA	63.99	0.68	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
7.50	SM	18	2.01	1.01	35	IV	0.24	7.00	0.94	14.18	6.68	0.31	1.22	1.33	1.000	1.05	0.95	1.00	29.23	5.00	1.20	40.07	NA	63.26	0.68	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
9.00	SM	19	2.04	1.04	38	IV	0.24	7.00	0.93	17.19	8.19	0.30	1.10	1.33	1.000	1.05	1	1.00	29.32	5.00	1.20	40.18	NA	63.47	0.68	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
10.00	SM	23	2.04	1.04	38	IV	0.24	7.00	0.91	19.23	9.23	0.29	1.04	1.33	1.000	1.05	1	1.00	33.43	5.00	1.20	45.12	NA	68.43	0.66	1.00	1.00	1.19	NA	>1.0	Non Liquefiable

Note: Values of all Parameters are as per IRC:SP: 114 / IS 1893: 2016

C_E or C_{HT} (Correction for hammer energy ratio) = $ER/60$, ER for Rope and pully System = 80 % , Hence $C_E = 80/60 = 1.33$

C_H or C_{HW} (Correction for hammer) = 1.00

Borehole Diameter = 150 mm , Hence C_B or C_{BD} (Correction for Borehole diameter), = 1.05

C_S or C_{SS} (Correction for Standard sampler) = 1.00

K_σ Correction for high overburden stress (for effective oberburden pressure > 10 T/m²)

K_u Correction for static shear stress is required only for sloping ground



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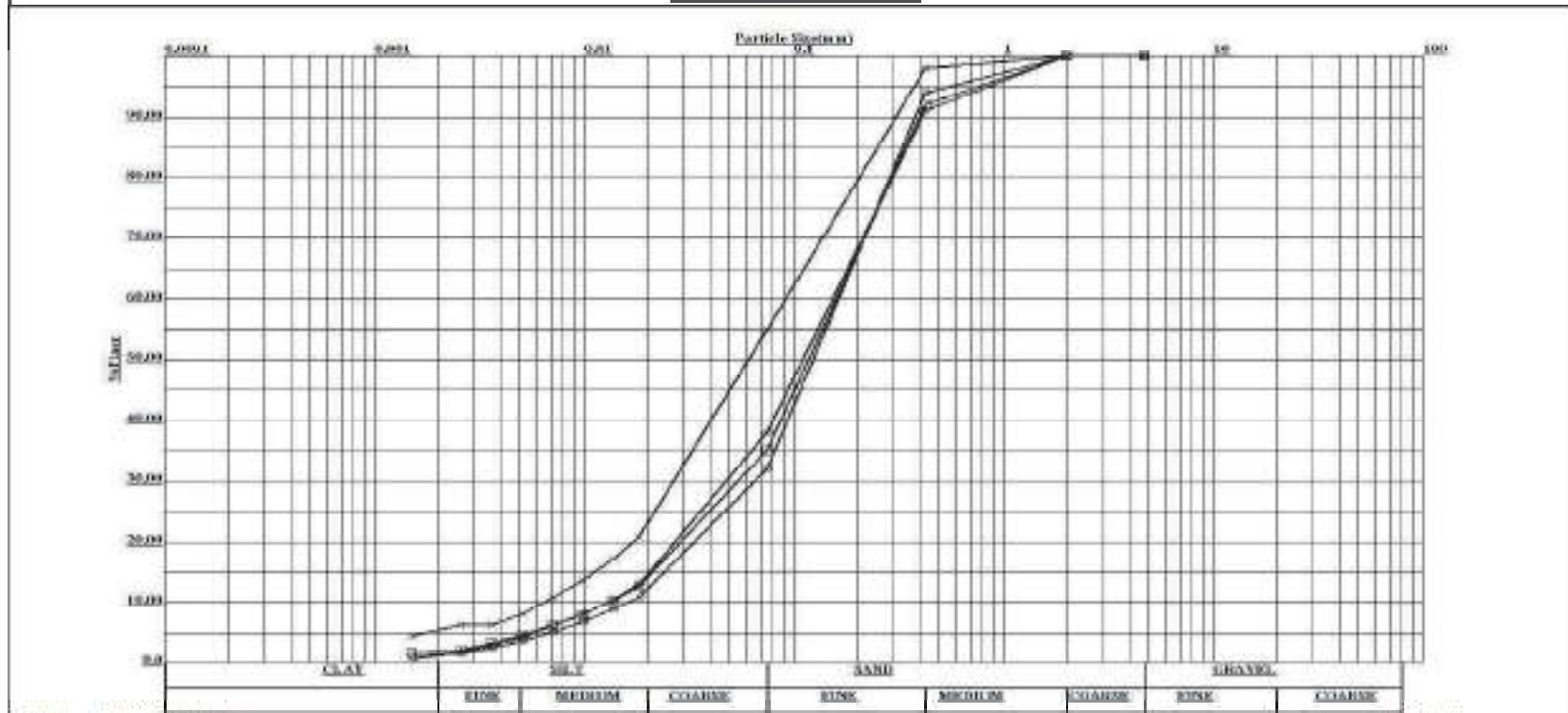
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BRIDGE NO. - 22

BOREHOLE NO. -01

SECTION:CHITAUNI TO MADHUBANI

GRAIN SIZE ANALYSIS



Symbol	Depth, m	Soil Description	Gravel	Sand	Silt	Clay	C_u	C_c
			(%)	(%)	(%)	(%)		
×	0.0	MEDIUM DENSE, LITE BROWN,SANDY SILT (ML)	0.00	45.00	50.00	5.00	14.23	1.22
○	2.5	MEDIUM DENSE, LITE GREY,SILTY SAND (SM)	0.00	68.00	31.00	1.00	10.14	1.62
□	6.0		0.00	65.00	33.00	2.00	12.14	1.42
◇	9.0		0.00	62.00	37.00	1.00	11.95	1.16



COMPUTATION OF WEIGHTED MEAN DIAMETER OF PARTICLES AND SILT FACTOR

Project: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO. BR-22

BOREHOLE NO- 1

Section : CHITAUNI - MADHUBANI

Sl.No.	Borehole No.	Depth (m)		Description of the Soil Strata	IS Classification	Percentage Retained							Mean Particle Size (mm)							Sandy Strata		Clayey Soil			
		From	To			5.60 to 4.00	4.00 to 2.80	2.80 to 1.00	1.00 to 0.425	0.425 to 0.180	0.180 to 0.075	0.075 to 0	4.8	3.4	1.9	0.7125	0.3025	0.1275	0.0375	Mean Particle Size (dm)	Silt Factor in the layer= 1.76 x sqrt(dm)	Average Cohesion Intercept - c (kg/sqcm)	Average Angle of Internal Friction (°)	F	Silt Factor
1	BH-1	0.00	0.50	SANDY SILT	ML	0.0	0.0	0.0	2.0	29.0	14.0	55.0	0.00	0.00	0.00	1.43	8.77	1.79	2.063	0.140	0.660	-	-	-	-
2		2.50	2.80	SILTY SAND	SM	0.0	0.0	0.0	6.0	41.0	21.0	32.0	0.00	0.00	0.00	4.28	12.40	2.68	1.200	0.206	0.798	-	-	-	-
3		6.00	6.45	SILTY SAND	SM	0.0	0.0	0.0	8.0	39.0	18.0	35.0	0.00	0.00	0.00	5.70	11.80	2.30	1.313	0.211	0.809	-	-	-	-



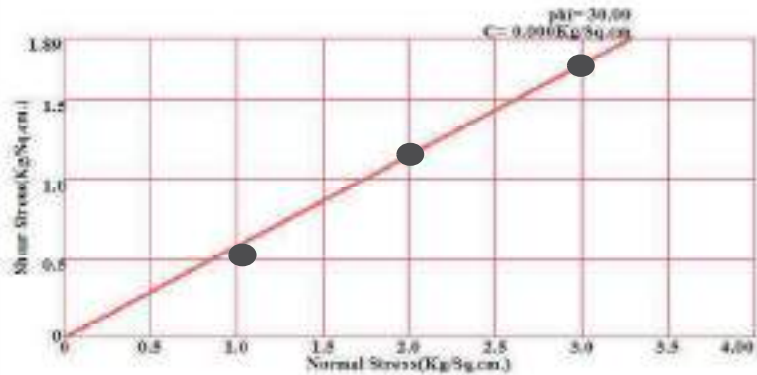
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architects engineers & consultants pvt. ltd.

PROJECT: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BOREHOLE NO. - 22

SECTION:CHITAUNI TO MADHUBANI

TRIAxIAL & DIRECT SHEAR GRAPH



Bore Hole No. = 1(BR.22)
Sample No. = A-1/UD1
Depth = 1.560000M
Type of Test = C.D.



NORTH EASTERN RAILWAY

FINAL LOCATION SURVEY FOR NEW B.G RAILWAY LINE PROJECTS (770.00 KM.) AND FINAL LOCATION SURVEY FOR CONSTRUCTION OF DOUBLING/THIRD LINE/ 3RD & 4TH LINE (252.00 KM.) OF NORTH EASTERN RAILWAY (TOTAL 1022.00 KM)

SECTION: CHITAUNI-MADHUBANI

Chainage	Br. No	Type of Crossing	Type of Bridge	Borehole No.	Easting (m)	Northing (m)	Reduced Level (m)
14763.710	24	WATERWAY	MAJOR	BH-01	202937	2996768	109.52
				BH-02	202945	2996762	107.59
				BH-03	202952	2996756	107.75

SUBMITTED BY:



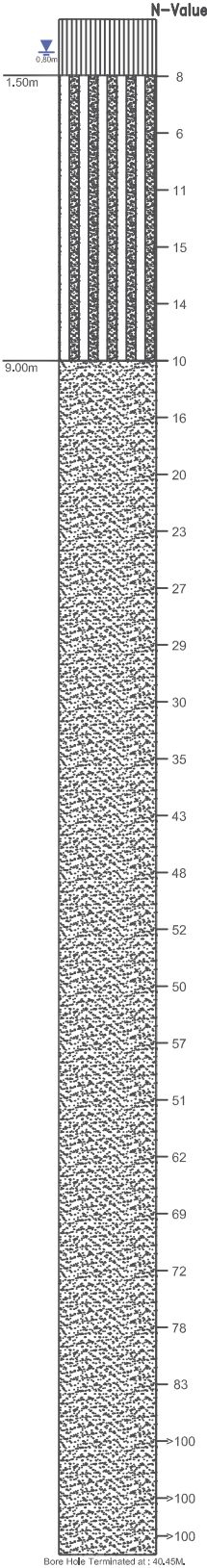
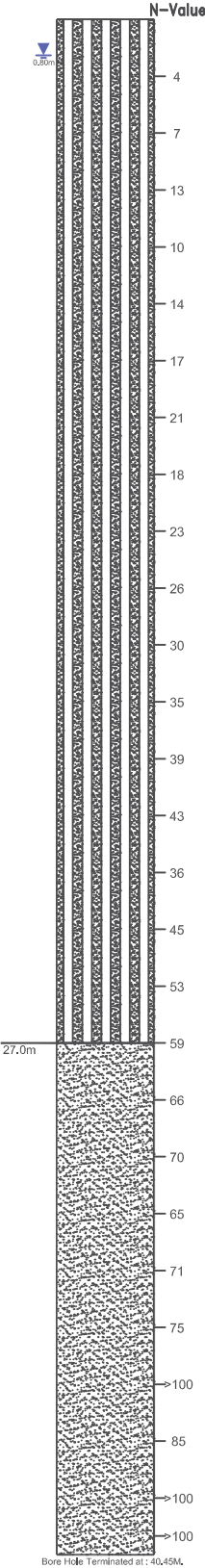
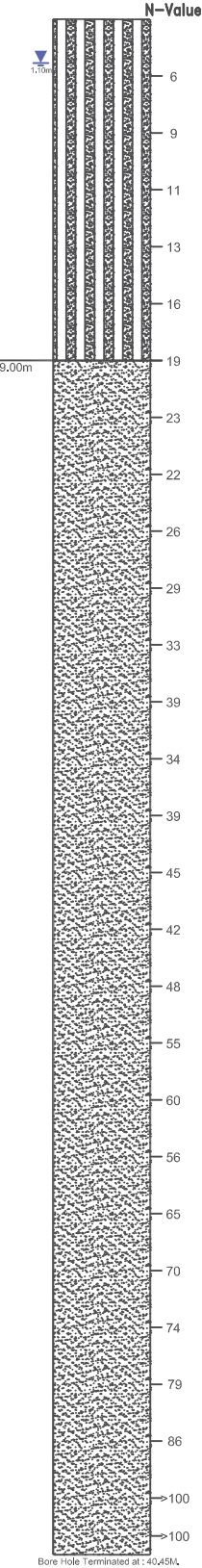
BOREHOLE PROFILE
SECTION: CHITAUNI TO MADHUBANI

BRIDGE NO.: 24

BOREHOLE NO.: 01

BOREHOLE NO.: 02

BOREHOLE NO.: 03



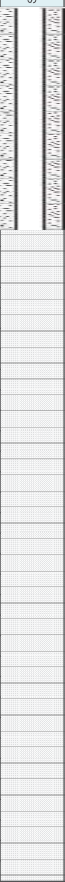




LEGENDS


- SANDY-SILT (ML)
- SILTY SAND (SM)
- POORLY GRADED SAND (SP)
- Ground Water Table



Project: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO:24 BOREHOLE NO. BH- 1										GWT: 1.10 m		DATE STARTED : 06-01-2025																							
		DATE COMPLETED : 07-01-2025																																	
FIELD TEST RESULTS										CONSOLIDATED LOGS INCLUDING LABORATORY TEST RESULTS OF SOIL																									
										LABORATORY TEST RESULTS																									
ELEVATION IN METERS	DEPTH IN METERS BELOW REFERENCE	NATURE OF SAMPLING	SAMPLE REFERENCE NO.	LEVEL OF WATER TABLE / L.W.L	SPT TEST RESULTS					SYMBOLIC REPRESENTATION	DESCRIPTION OF SOIL WITH I.S. CLASSIFICATION	TYPE OF TEST CONDUCTED IN THE LABORATORY	GRAIN SIZE ANALYSIS				LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	BULK DENSITY (gm /cc)	DRY DENSITY (gm/cc)	MOISTURE CONTENT (%)	FREESWELL INDEX (%)	SPECIFIC GRAVITY	SUBMERGED DENSITY (gm /cc)	SHEAR STRENGTH CHARACTERISTICS		CONSOLIDATION CHARACTERISTICS	Chemical Analysis Result						
					DEPTH IN METERS		NO. OF BLOWS	PENETRATION (CM)	N VALUE (Recorded)				N VALUE (Corrected)	GRAVEL (%)	SAND (%)	SILT (%)										CLAY (%)	Cohesion C _v (kg/cm ²)		Angle of friction (Degrees)	Compression Index(Cc)	pH	Chloride, %	Sulphate, %	pH	Chloride, mg/l
-1.00	1.0	DS	1	 1.10 m	0.00	1.00	DS	-	-	-		LOOSE MEDIUM DENSE LITE GREY SILTY SAND (SM)	-	0.00	68.00	31.00	1.00	NON-PLASTIC				-	-	-	-	-	-	-	-	7.10	0.03	NIL	-	-	-
	2.0	SPT	1		1.50	1.95	6	30	6	10			-	0.00	66.00	32.00	2.00	NON-PLASTIC				-	-	-	2.55	-	-	-	-	7.12	0.03	NIL	-	-	-
	3.0	DS	2		2.50	2.80	UDS SLIPPED						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.16	0.02	NIL	-	-	-		
	4.0	SPT	2		3.00	3.45	9	30	9	13			-	0.00	65.00	34.00	1.00	NON-PLASTIC				-	-	-	2.54	-	-	-	-	-	-	-	-	-	
-5.00	5.0	SPT	3		4.50	4.95	11	30	11	14			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	6.0	DS	3		5.50	5.80	UDS SLIPPED						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	7.0	SPT	4		6.00	6.45	13	30	13	15			-	0.00	67.00	31.00	2.00	NON-PLASTIC				-	-	-	2.57	-	-	-	-	-	-	-	-	-	
	8.0	SPT	5		7.50	7.95	16	30	16	16			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9.0	DS	4		8.50	8.80	UDS SLIPPED						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
-10.00	10.0	SPT	6		9.00	9.45	19	30	19	17			-	0.00	99.00	1.00	0.00	NON-PLASTIC				-	-	-	2.59	-	-	-	-	-	-	-	-	-	-
	11.0	SPT	7		10.50	10.95	23	30	23	19			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12.0	DS	5		11.50	11.80	UDS SLIPPED						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	13.0	SPT	8		12.00	12.45	22	30	22	18			-	0.00	98.00	2.00	0.00	NON-PLASTIC				-	-	-	2.55	-	-	-	-	-	-	-	-	-	-
	14.0	SPT	9		13.50	13.95	26	30	26	19			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-15.00	15.0	DS	6		14.50	14.80	UDS SLIPPED						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	16.0	SPT	10		15.00	15.45	29	30	29	20			-	0.00	97.00	3.00	0.00	NON-PLASTIC				-	-	-	2.58	-	-	-	-	-	-	-	-	-	-
	17.0	SPT	11		16.50	16.95	33	30	33	21			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18.0	DS	7		17.50	17.80	UDS SLIPPED						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	19.0	SPT	12		18.00	18.45	39	30	39	23			-	0.00	98.00	2.00	0.00	NON-PLASTIC				-	-	-	2.54	-	-	-	-	-	-	-	-	-	-
-20.00	20.0	SPT	13		19.50	19.95	34	30	34	21			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21.0	DS	8		20.50	20.80	UDS SLIPPED						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	22.0	SPT	14		21.00	21.45	39	30	39	22			-	0.00	97.00	3.00	0.00	NON-PLASTIC				-	-	-	2.60	-	-	-	-	-	-	-	-	-	-
	23.0	SPT	15		22.50	22.95	45	30	45	24			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	24.0	DS	9		23.50	23.80	UDS SLIPPED						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
-25.00	25.0	SPT	16		24.00	24.45	42	30	42	22			-	0.00	98.00	2.00	0.00	NON-PLASTIC				-	-	-	2.54	-	-	-	-	-	-	-	-	-	-
	26.0	SPT	17		25.50	25.95	48	30	48	24			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	27.0	DS	10		26.50	26.80	UDS SLIPPED						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	28.0	SPT	18		27.00	27.45	55	30	55	26			-	0.00	97.00	3.00	0.00	NON-PLASTIC				-	-	-	2.55	-	-	-	-	-	-	-	-	-	-
	29.0	SPT	19		28.50	28.95	60	30	60	27			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-30.00	30.0	DS	11		29.50	29.80	UDS SLIPPED						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	31.0	SPT	20		30.00	30.45	56	30	56	25			-	0.00	96.00	4.00	0.00	NON-PLASTIC				-	-	-	2.54	-	-	-	-	-	-	-	-	-	-
	32.0	SPT	21		31.50	31.95	65	30	65	27			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	33.0	DS	12		32.50	32.80	UDS SLIPPED						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							

BRIDGE NO:24					GWT: 0.80 m		DATE STARTED : 06-01-2025		 aarvee associates architects engineers & consultants pvt. ltd.																											
BOREHOLE NO. BH- 2							DATE COMPLETED : 08-01-2025		CONSOLIDATED LOGS INCLUDING LABORATORY TEST RESULTS OF SOIL																											
FIELD TEST RESULTS										LABORATORY TEST RESULTS																										
ELEVATION IN METERS	DEPTH IN METERS BELOW REFERENCE	NATURE OF SAMPLING	SAMPLE REFERENCE NO.	LEVEL OF WATER TABLE / L.W.L	SPT TEST RESULTS						SYMBOLIC REPRESENTATION	DESCRIPTION OF SOIL WITH I.S. CLASSIFICATION	TYPE OF TEST CONDUCTED IN THE LABORATORY	GRAIN SIZE ANALYSIS				LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	BULK DENSITY (gm/cc)	DRY DENSITY (gm/cc)	MOISTURE CONTENT (%)	FREESWELL INDEX (%)	SPECIFIC GRAVITY	SUBMERGED DENSITY (gm/cc)	SHEAR STRENGTH CHARACTERISTICS		CONSOLIDATION CHARACTERISTICS	Chemical Analysis Result						
					DEPTH IN METERS	NO. OF BLOWS	PENETRATION (CM)	N VALUE (Recorded)	N VALUE (Corrected)	GRAVEL (%)				SAND (%)	SILT (%)	CLAY (%)	COHESION, C _v (kg/cm ²)										ANGLE OF FRICTION (Degrees)	pH		CHLORIDE %	SULPHATE, %	pH	CHLORIDE mg/l	SULPHATE mg/l		
-1.00	1.0	DS	1	0.80 m	0.00	1.00	DS	-	-		LOOSE MEDIUM DENSE LITE GREY SILTY SAND (SM)	-	0.00	68.00	30.00	2.00	NON-PLASTIC				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2.0	SPT	1		1.50	1.95	4	30	4			7	-	0.00	67.00	32.00	1.00	NON-PLASTIC				-	-	-	2.53	-	-	-	-	-	-	-	-	-	-	-
	3.0	DS	2		2.50	2.80	UDS SLIPPED					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	4.0	SPT	2		3.00	3.45	7	30	7			10	-	0.00	65.00	33.00	2.00	NON-PLASTIC				-	-	-	2.55	-	-	-	-	-	-	-	-	-	-	-
-5.00	5.0	SPT	3		4.50	4.95	13	30	13			16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6.0	DS	3		5.50	5.80	UDS SLIPPED					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	7.0	SPT	4		6.00	6.45	10	30	10			12	-	0.00	64.00	35.00	1.00	NON-PLASTIC				-	-	-	2.57	-	-	-	-	-	-	-	-	-	-	-
	8.0	SPT	5		7.50	7.95	14	30	14			15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9.0	DS	4		8.50	8.80	UDS SLIPPED					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
-10.00	10.0	SPT	6		9.00	9.45	17	30	17			16	-	0.00	65.00	33.00	2.00	NON-PLASTIC				-	-	-	2.56	-	-	-	-	-	-	-	-	-	-	-
	11.0	SPT	7		10.50	10.95	21	30	21			18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12.0	DS	5		11.50	11.80	UDS SLIPPED					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	13.0	SPT	8		12.00	12.45	18	30	18			16	-	0.00	66.00	33.00	1.00	NON-PLASTIC				-	-	-	2.58	-	-	-	-	-	-	-	-	-	-	-
-15.00	14.0	SPT	9		13.50	13.95	23	30	23			18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15.0	DS	6		14.50	14.80	UDS SLIPPED					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	16.0	SPT	10		15.00	15.45	26	30	26			19	-	0.00	67.00	31.00	2.00	NON-PLASTIC				-	-	-	2.58	-	-	-	-	-	-	-	-	-	-	-
	17.0	SPT	11		16.50	16.95	30	30	30			20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18.0	DS	7		17.50	17.80	UDS SLIPPED					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	19.0	SPT	12		18.00	18.45	35	30	35			22	-	0.00	66.00	33.00	1.00	NON-PLASTIC				-	-	-	2.54	-	-	-	-	-	-	-	-	-	-	-
-20.00	20.0	SPT	13		19.50	19.95	39	30	39			23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21.0	DS	8		20.50	20.80	UDS SLIPPED					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	22.0	SPT	14		21.00	21.45	43	30	43			24	-	0.00	67.00	31.00	2.00	NON-PLASTIC				-	-	-	2.55	-	-	-	-	-	-	-	-	-	-	-
	23.0	SPT	15		22.50	22.95	36	30	36			21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	24.0	DS	9		23.50	23.80	UDS SLIPPED					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
-25.00	25.0	SPT	16		24.00	24.45	45	30	45			23	-	0.00	65.00	34.00	1.00	NON-PLASTIC				-	-	-	2.56	-	-	-	-	-	-	-	-	-	-	-
	26.0	SPT	17		25.50	25.95	53	30	53			26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	27.0	DS	10		26.50	26.80	UDS SLIPPED					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	28.0	SPT	18		27.00	27.45	59	30	59			27	-	0.00	99.00	1.00	0.00	NON-PLASTIC				-	-	-	2.60	-	-	-	-	-	-	-	-	-	-	-
	29.0	SPT	19		28.50	28.95	66	30	66			29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-30.00	30.0	DS	11		29.50	29.80	UDS SLIPPED					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	31.0	SPT	20		30.00	30.45	70	30	70			29	-	0.00	98.00	2.00	0.00	NON-PLASTIC				-	-	-	2.55	-	-	-	-	-	-	-	-	-	-	-
	32.0	SPT	21		31.50	31.95	65	30	65			27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	33.0	DS	12		32.50	32.80	UDS SLIPPED					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	34.0	SPT	22		33.00	33.45	71	30	71			28	-	0.00	99.00	1.00	0.00	NON-PLASTIC				-	-	-	2.57	-	-	-	-	-	-	-	-	-	-	-
-35.00	35.0	SPT	23		34.50	34.95	75	30	75			29	-	-	-	-	-	-	-	-	-	-	-	-	-	-										

BRIDGE NO:24				DATE STARTED : 08-01-2025		 aarvee associates architects engineers & consultants pvt. ltd.																												
BOREHOLE NO. BH- 3				DATE COMPLETED : 09-01-2025																														
GWT: 0.80 m				CONSOLIDATED LOGS INCLUDING LABORATORY TEST RESULTS OF SOIL																														
FIELD TEST RESULTS					LABORATORY TEST RESULTS																													
ELEVATION IN METERS	DEPTH IN METERS BELOW REFERENCE	NATURE OF SAMPLING	SAMPLE REFERENCE NO.	LEVEL OF WATER TABLE / LWL	SPT TEST RESULTS					SYMBOLIC REPRESENTATION	DESCRIPTION OF SOIL WITH I.S. CLASSIFICATION	TYPE OF TEST CONDUCTED IN THE LABORATORY	GRAIN SIZE ANALYSIS				LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)	BULK DENSITY (gm/cc)	DRY DENSITY (gm/cc)	MOISTURE CONTENT (%)	FREESWELL INDEX (%)	SPECIFIC GRAVITY	SUBMERGED DENSITY (gm/cc)	SHEAR STRENGTH CHARACTERISTICS		CONSOLIDATION CHARACTERISTICS	Chemical Analysis Result					
					DEPTH IN METERS	NO. OF BLOWS	PENETRATION (CM)	N VALUE (Recorded)	N VALUE (Corrected)				Cohesion, C, (kg/cm ²)	Angle of friction (Degrees)	Compression Index(Cc)	pH										Chloride, %	Sulphate, %		pH	Chloride, mg/l	Sulphate, mg/l			
-1.00	1.0	DS	1	0.80 m	0.00	1.00	DS	-	-	-	LOOSE LITE BROWN SANDY SILTY (ML)	--	0.00	45.00	50.00	5.00	NON-PLASTIC		-	-	-	-	-	-	-	-	-	-	7.12	0.03	NIL	--	--	--
	2.0	SPT	1		1.50	1.95	8	30	8	13		--	0.00	65.00	34.00	1.00	NON-PLASTIC		-	-	-	2.54	-	-	-	-	-	-	-	7.18	0.03	NIL	--	--
	3.0	DS	2		2.50	2.80	UDS SLIPPED				LOOSE LITE GREY SILTY SAND (SM)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	4.0	SPT	2	3.00	3.45	6	30	6	8	--		0.00	66.00	32.00	2.00	NON-PLASTIC		-	-	-	2.55	-	-	-	-	-	-	-	-	--	--	--	--	
-5.00	5.0	SPT	3		4.50	4.95	11	30	11	14		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	6.0	DS	3		5.50	5.80	UDS SLIPPED				LOOSE LITE GREY SILTY SAND (SM)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	7.0	SPT	4		6.00	6.45	15	30	15	16		--	0.00	67.00	32.00	1.00	NON-PLASTIC		-	-	-	2.54	-	-	-	-	-	-	-	--	--	--	--	--
	8.0	SPT	5		7.50	7.95	14	30	14	15		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	9.0	DS	4		8.50	8.80	UDS SLIPPED				LOOSE LITE GREY SILTY SAND (SM)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
-10.00	10.0	SPT	6		9.00	9.45	10	30	10	10		--	0.00	99.00	1.00	0.00	NON-PLASTIC		-	-	-	2.58	-	-	-	-	-	-	-	--	--	--	--	--
	11.0	SPT	7		10.50	10.95	16	30	16	15		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	12.0	DS	5		11.50	11.80	UDS SLIPPED				LOOSE LITE GREY SILTY SAND (SM)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	13.0	SPT	8		12.00	12.45	20	30	20	17		--	0.00	98.00	2.00	0.00	NON-PLASTIC		-	-	-	2.56	-	-	-	-	-	-	-	--	--	--	--	--
	14.0	SPT	9		13.50	13.95	23	30	23	18		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
-15.00	15.0	DS	6		14.50	14.80	UDS SLIPPED				LOOSE LITE GREY SILTY SAND (SM)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	16.0	SPT	10		15.00	15.45	27	30	27	19		--	0.00	97.00	3.00	0.00	NON-PLASTIC		-	-	-	2.60	-	-	-	-	-	-	-	--	--	--	--	--
	17.0	SPT	11		16.50	16.95	29	30	29	20		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	18.0	DS	7		17.50	17.80	UDS SLIPPED				LOOSE LITE GREY SILTY SAND (SM)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	19.0	SPT	12		18.00	18.45	30	30	30	19		--	0.00	98.00	2.00	0.00	NON-PLASTIC		-	-	-	2.55	-	-	-	-	-	-	-	--	--	--	--	--
-20.00	20.0	SPT	13		19.50	19.95	35	30	35	21		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	21.0	DS	8		20.50	20.80	UDS SLIPPED				LOOSE LITE GREY SILTY SAND (SM)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	22.0	SPT	14		21.00	21.45	43	30	43	24		--	0.00	97.00	3.00	0.00	NON-PLASTIC		-	-	-	2.56	-	-	-	-	-	-	-	--	--	--	--	--
	23.0	SPT	15		22.50	22.95	48	30	48	25		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	24.0	DS	9		23.50	23.80	UDS SLIPPED				LOOSE LITE GREY SILTY SAND (SM)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
-25.00	25.0	SPT	16		24.00	24.45	52	30	52	26		--	0.00	98.00	2.00	0.00	NON-PLASTIC		-	-	-	2.57	-	-	-	-	-	-	-	--	--	--	--	--
	26.0	SPT	17		25.50	25.95	50	30	50	24		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	27.0	DS	10		26.50	26.80	UDS SLIPPED				LOOSE LITE GREY SILTY SAND (SM)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	28.0	SPT	18		27.00	27.45	57	30	57	26		--	0.00	97.00	3.00	0.00	NON-PLASTIC		-	-	-	2.60	-	-	-	-	-	-	-	--	--	--	--	--
	29.0	SPT	19		28.50	28.95	51	30	51	24		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
-30.00	30.0	DS	11		29.50	29.80	UDS SLIPPED				LOOSE LITE GREY SILTY SAND (SM)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	31.0	SPT	20		30.00	30.45	62	30	62	27		--	0.00	99.00	1.00	0.00	NON-PLASTIC		-	-	-	2.55	-	-	-	-	-	-	-	--	--	--	--	--
	32.0	SPT	21		31.50	31.95	69	30	69	28		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	33.0	DS	12		32.50	32.80	UDS SLIPPED				LOOSE LITE GREY SILTY SAND (SM)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	34.0	SPT	22		33.00	33.45	72	30	72	29		--	0.00	98.00	2.00	0.00	NON-PLASTIC		-	-	-	2.57	-	-	-	-	-	-	-	--	--	--	--	--
-35.00	35.0	SPT	23		34.50	34.95	78	30	78	30		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	36.0	DS	13		35.50	35.80	UDS SLIPPED				LOOSE LITE GREY SILTY SAND (SM)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	37.0	SPT	24		36.00	36.45	83	30	83	31		--	0.00	97.00	3.00	0.00	NON-PLASTIC		-	-	-	2.55	-	-	-	-	-	-	-	--	--	--	--	--
	38.0	SPT	25		37.50	37.95	50	1	>100	>100		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	39.0	DS	14		38.50	38.80	UDS SLIPPED				LOOSE LITE GREY SILTY SAND (SM)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	40.0	SPT	26		39.00	39.45	50	1	>100	>100		--	0.00	99.00	1.00	0.00	NON-PLASTIC		-	-	-	2.55	-	-	-	-	-	-	-	--	--	--	--	--
-40.00	41.0	SPT	27		40.00	40.45	50	1	>100	>100		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CLASSIFICATION OF SOIL AS PER IS : 1498 ABBREVIATION USED : DS = DISTURBED SAMPLE, SPT = STANDARD PENETRATION TEST, UDS = UNDISTURBED SAMPLE, DST = DIRECT SHEAR TEST, UC : UNCONFINED COMPRESSION TEST UU : UNCONSOLIDATED UNDRAINED TRIAXIAL TEST * UCS BASED ON POINT LOAD TEST												Project:Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)																						
												SECTION: CHITAUNI-MADHUBANI																						

CALCULATIONS FOR CORRECTED SPT (N) VALUES

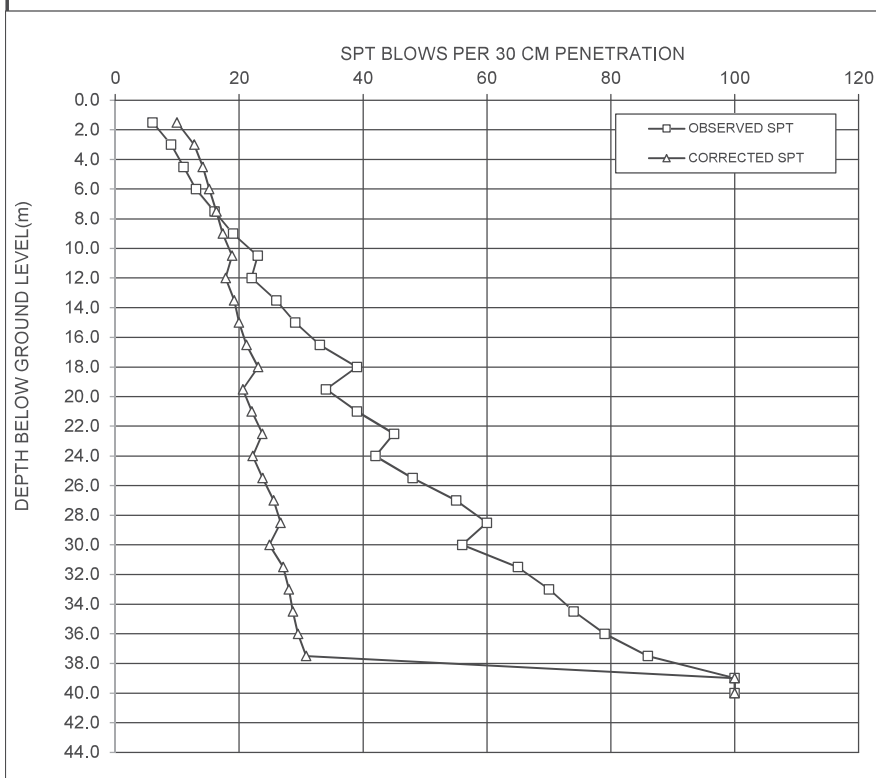
Project: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BOREHOLE NO. BH- 1

WATER TABLE-1.10 m

DEPTH OF SAMPLE	TYPE OF SOIL	OBSERVED SPT 'N' VALUE	CORRECTED SPT (N') VALUE (FOR OVERBURDEN)	FINAL CORRECTED VALUE AFTER DILATANCY CORRECTION (N'')
1.50	Non Plastic	6	10	10
3.00	Non Plastic	9	13	13
4.50	Non Plastic	11	14	14
6.00	Non Plastic	13	15	15
7.50	Non Plastic	16	18	16
9.00	Non Plastic	19	20	17
10.50	Non Plastic	23	23	19
12.00	Non Plastic	22	21	18
13.50	Non Plastic	26	23	19
15.00	Non Plastic	29	25	20
16.50	Non Plastic	33	27	21
18.00	Non Plastic	39	31	23
19.50	Non Plastic	34	26	21
21.00	Non Plastic	39	29	22
22.50	Non Plastic	45	32	24
24.00	Non Plastic	42	29	22
25.50	Non Plastic	48	33	24
27.00	Non Plastic	55	36	26
28.50	Non Plastic	60	38	27
30.00	Non Plastic	56	35	25
31.50	Non Plastic	65	39	27
33.00	Non Plastic	70	41	28
34.50	Non Plastic	74	42	29
36.00	Non Plastic	79	44	29
37.50	Non Plastic	86	47	31
39.00	Non Plastic	100	100	100
40.00	Non Plastic	100	100	100

* SPT value restricted to 300.



CALCULATIONS FOR CORRECTED SPT (N) VALUES

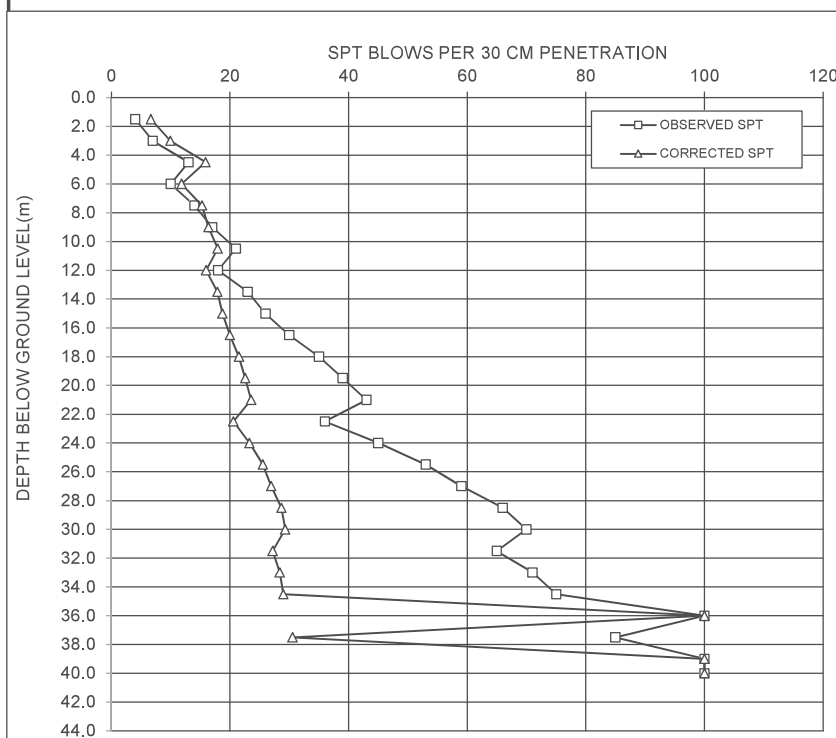
Project: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BOREHOLE NO. BH- 2

WATER TABLE IN METER(m) 0.80 m

DEPTH OF SAMPLE	TYPE OF SOIL	OBSERVED SPT 'N' VALUE	CORRECTED SPT (N') VALUE (FOR OVERBURDEN)	FINAL CORRECTED VALUE AFTER DILATANCY CORRECTION (N'')
1.50	Non Plastic	4	7	7
3.00	Non Plastic	7	10	10
4.50	Non Plastic	13	17	16
6.00	Non Plastic	10	12	12
7.50	Non Plastic	14	16	15
9.00	Non Plastic	17	18	16
10.50	Non Plastic	21	21	18
12.00	Non Plastic	18	17	16
13.50	Non Plastic	23	21	18
15.00	Non Plastic	26	22	19
16.50	Non Plastic	30	25	20
18.00	Non Plastic	35	28	22
19.50	Non Plastic	39	30	23
21.00	Non Plastic	43	32	24
22.50	Non Plastic	36	26	21
24.00	Non Plastic	45	32	23
25.50	Non Plastic	53	36	26
27.00	Non Plastic	59	39	27
28.50	Non Plastic	66	42	29
30.00	Non Plastic	70	44	29
31.50	Non Plastic	65	39	27
33.00	Non Plastic	71	42	28
34.50	Non Plastic	75	43	29
36.00	Non Plastic	100	100	100
37.50	Non Plastic	85	46	31
39.00	Non Plastic	100	100	100
40.00	Non Plastic	100	100	100

* SPT value restricted to 300.



CALCULATIONS FOR CORRECTED SPT (N) VALUES

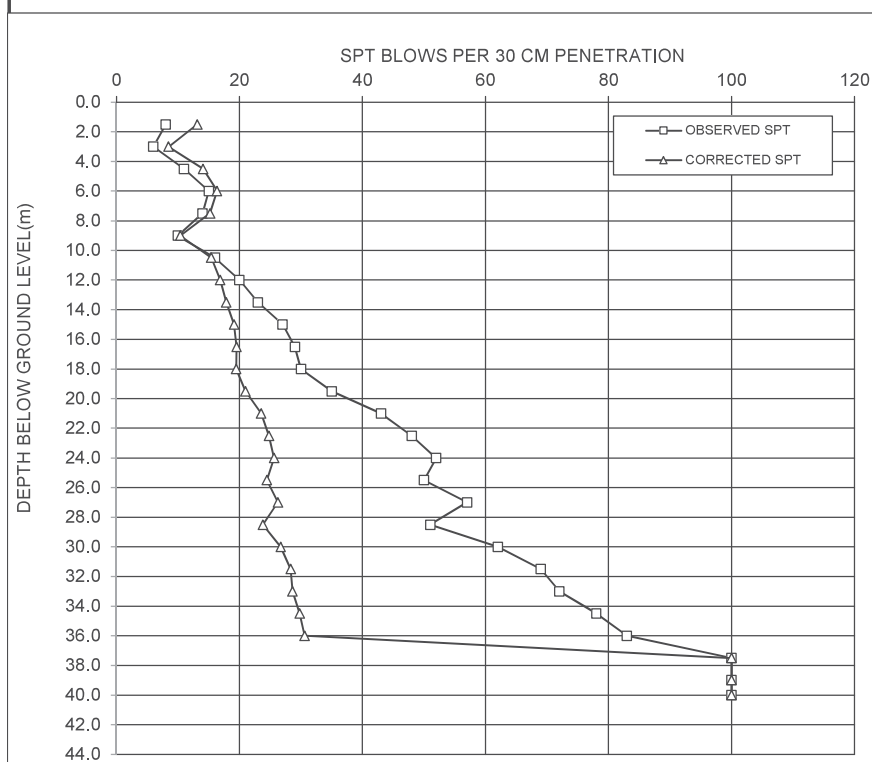
Project: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BOREHOLE NO. BH- 3

WATER TABLE-0.80 m

DEPTH OF SAMPLE	TYPE OF SOIL	OBSERVED SPT 'N' VALUE	CORRECTED SPT (N') VALUE (FOR OVERBURDEN)	FINAL CORRECTED VALUE AFTER DILATANCY CORRECTION (N'')
1.50	Non Plastic	8	13	13
3.00	Non Plastic	6	8	8
4.50	Non Plastic	11	14	14
6.00	Non Plastic	15	18	16
7.50	Non Plastic	14	15	15
9.00	Non Plastic	10	10	10
10.50	Non Plastic	16	16	15
12.00	Non Plastic	20	19	17
13.50	Non Plastic	23	21	18
15.00	Non Plastic	27	23	19
16.50	Non Plastic	29	24	20
18.00	Non Plastic	30	24	19
19.50	Non Plastic	35	27	21
21.00	Non Plastic	43	32	24
22.50	Non Plastic	48	35	25
24.00	Non Plastic	52	36	26
25.50	Non Plastic	50	34	24
27.00	Non Plastic	57	37	26
28.50	Non Plastic	51	33	24
30.00	Non Plastic	62	38	27
31.50	Non Plastic	69	42	28
33.00	Non Plastic	72	42	29
34.50	Non Plastic	78	45	30
36.00	Non Plastic	83	46	31
37.50	Non Plastic	100	100	100
39.00	Non Plastic	100	100	100
40.00	Non Plastic	100	100	100

* SPT value restricted to 300.



Typical Computation of Liquefaction Potential as per IRC:SP: 114 / IS: 1893

Project: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO: 24

BOREHOLE NO.

BH-01

SECTION: CHITAUUNI-MADHUBANI

Water table assumed for Calculation: 0.00 m

Depth below EGL, m	Type of Strata	Observed SPT Value	Saturated density (t/m^3)	Submerged Density (t/m^3)	Fine Content (%)	Earthquake Zone	Peak ground acceleration a_{\max}/g	Earth quake magnitude (Mw)	Stress reduction coefficient (rd)	Total overburden pressure (σ_o), t/m^2	Effective overburden (σ'_o), t/m^2	Cyclic Stress ratio (CSR)	C_N	CE or CHT	CH or CHW	CB or CBD	CR or CRL	CS or CSS	SPT corrected (N_1) ₆₀	α	β	(N_1) _{60cs}	$CRR_{N=7.5}$	Relative Density, Dr%	f	K_c	K_u	MSF	CRR	FOS	Conclusion
1.50	SM	6	1.92	0.92	34	IV	0.24	7.00	0.99	2.88	1.38	0.32	1.70	1.33	1.000	1.05	0.75	1.00	10.68	4.93	1.19	17.63	0.19	21.54	0.89	1.00	1.00	1.19	0.22	0.70	Liquefiable
3.00	SM	9	1.94	0.94	35	IV	0.24	7.00	0.98	5.76	2.76	0.32	1.70	1.33	1.000	1.05	0.85	1.00	18.16	5.00	1.20	26.79	0.33	38.36	0.81	1.00	1.00	1.19	0.40	1.25	Non Liquefiable
4.50	SM	11	1.94	0.94	35	IV	0.24	7.00	0.97	8.67	4.17	0.31	1.55	1.33	1.000	1.05	0.95	1.00	22.60	5.00	1.20	32.12	NA	48.35	0.76	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
6.00	SM	13	2.00	1.00	33	IV	0.24	7.00	0.95	11.58	5.58	0.31	1.34	1.33	1.000	1.05	0.95	1.00	23.09	4.88	1.18	32.12	NA	49.45	0.75	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
7.50	SM	16	2.00	1.00	33	IV	0.24	7.00	0.94	14.58	7.08	0.30	1.19	1.33	1.000	1.05	0.95	1.00	25.23	4.88	1.18	34.64	NA	54.26	0.73	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
9.00	SP	19	2.01	1.01	1	IV	0.24	7.00	0.93	17.58	8.58	0.30	1.08	1.33	1.000	1.05	1	1.00	28.65	0.00	1.00	28.65	0.39	61.95	0.69	1.00	1.00	1.19	0.47	1.58	Non Liquefiable
10.50	SP	23	2.01	1.01	1	IV	0.24	7.00	0.89	20.60	10.10	0.28	1.00	1.33	1.000	1.05	1	1.00	31.97	0.00	1.00	31.97	NA	66.97	0.67	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
12.00	SP	22	2.03	1.03	2	IV	0.24	7.00	0.85	23.61	11.61	0.27	0.93	1.33	1.000	1.05	1	1.00	28.51	0.00	1.00	28.51	0.39	61.65	0.69	0.96	1.00	1.19	0.44	1.64	Non Liquefiable
13.50	SP	26	2.03	1.03	2	IV	0.24	7.00	0.81	26.66	13.16	0.26	0.87	1.33	1.000	1.05	1	1.00	31.66	0.00	1.00	31.66	NA	66.66	0.67	0.91	1.00	1.19	NA	>1.0	Non Liquefiable
15.00	SP	29	2.04	1.04	3	IV	0.24	7.00	0.77	29.70	14.70	0.24	0.82	1.33	1.000	1.05	1	1.00	33.40	0.00	1.00	33.40	NA	68.40	0.66	0.88	1.00	1.19	NA	>1.0	Non Liquefiable
16.50	SP	33	2.04	1.04	3	IV	0.24	7.00	0.73	32.76	16.26	0.23	0.78	1.33	1.000	1.05	1	1.00	36.14	0.00	1.00	36.14	NA	71.14	0.64	0.84	1.00	1.19	NA	>1.0	Non Liquefiable
18.00	SP	39	2.02	1.02	2	IV	0.24	7.00	0.69	35.82	17.82	0.22	0.75	1.33	1.000	1.05	1	1.00	40.80	0.00	1.00	40.80	NA	75.80	0.62	0.80	1.00	1.19	NA	>1.0	Non Liquefiable
19.50	SP	34	2.02	1.02	2	IV	0.24	7.00	0.65	38.85	19.35	0.20	0.72	1.33	1.000	1.05	1	1.00	34.13	0.00	1.00	34.13	NA	69.13	0.65	0.80	1.00	1.19	NA	>1.0	Non Liquefiable
21.00	SP	39	2.03	1.03	3	IV	0.24	7.00	0.61	41.88	20.88	0.19	0.69	1.33	1.000	1.05	1	1.00	37.69	0.00	1.00	37.69	NA	72.69	0.64	0.77	1.00	1.19	NA	>1.0	Non Liquefiable
22.50	SP	45	2.03	1.03	3	IV	0.24	7.00	0.57	44.93	22.43	0.18	0.67	1.33	1.000	1.05	1	1.00	41.97	0.00	1.00	41.97	NA	76.97	0.62	0.73	1.00	1.19	NA	>1.0	Non Liquefiable

Note: Values of all Parameters are as per IRC:SP: 114 / IS 1893: 2016

 C_E or C_{HT} (Correction for hammer energy ratio) = $ER/60$, ER for Rope and pully System = 80 % , Hence $C_E = 80/60 = 1.33$
 C_H or C_{HW} (Correction for hammer) = 1.00

 Borehole Diameter = 150 mm , Hence C_B or C_{BD} (Correction for Borehole diameter), = 1.05

 C_S or C_{SS} (Correction for Standard sampler) = 1.00

 K_o Correction for high overburden stress (for effective oberburden pressure > 10 T/m²)

 K_u Correction for static shear stress is required only for sloping ground

Typical Computation of Liquefaction Potential as per IRC:SP: 114 / IS: 1893

Project: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO: 24

BOREHOLE NO.

BH-02

SECTION: CHITAUUNI-MADHUBANI

Water table assumed for Calculation: 0.00 m

Depth below EGL, m	Type of Strata	Observed SPT Value	Saturated density (t/m^3)	Submerged Density (t/m^3)	Fine Content (%)	Earthquake Zone	Peak ground acceleration a_{\max}/g	Earth quake magnitude (Mw)	Stress reduction coefficient (rd)	Total overburden pressure (σ_o), t/m^2	Effective overburden (σ'_o), t/m^2	Cyclic Stress ratio (CSR)	C_N	CE or CHT	CH or CHW	CB or CBD	CR or CRL	CS or CSS	SPT corrected (N_1) ₆₀	α	β	(N_1) _{1ec5}	$CRR_{N=7.5}$	Relative Density, Dr%	f	K_c	K_u	MSF	CRR	FOS	Conclusion
1.50	SM	4	1.90	0.90	33	IV	0.24	7.00	0.99	2.85	1.35	0.33	1.70	1.33	1.000	1.05	0.75	1.00	7.12	4.88	1.18	13.28	0.14	15.20	0.92	1.00	1.00	1.19	0.17	0.52	Liquefiable
3.00	SM	7	1.95	0.95	35	IV	0.24	7.00	0.98	5.70	2.70	0.32	1.70	1.33	1.000	1.05	0.85	1.00	14.13	5.00	1.20	21.95	0.24	29.28	0.85	1.00	1.00	1.19	0.29	0.89	Liquefiable
4.50	SM	13	1.95	0.95	35	IV	0.24	7.00	0.97	8.63	4.13	0.31	1.56	1.33	1.000	1.05	0.95	1.00	26.85	5.00	1.20	37.22	NA	57.92	0.71	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
6.00	SM	10	1.97	0.97	36	IV	0.24	7.00	0.95	11.55	5.55	0.31	1.34	1.33	1.000	1.05	0.95	1.00	17.81	5.00	1.20	26.37	0.32	37.57	0.81	1.00	1.00	1.19	0.38	1.24	Non Liquefiable
7.50	SM	14	1.97	0.97	36	IV	0.24	7.00	0.94	14.51	7.01	0.30	1.19	1.33	1.000	1.05	0.95	1.00	22.19	5.00	1.20	31.63	NA	47.43	0.76	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
9.00	SM	17	2.00	1.00	35	IV	0.24	7.00	0.93	17.46	8.46	0.30	1.09	1.33	1.000	1.05	1	1.00	25.81	5.00	1.20	35.97	NA	55.57	0.72	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
10.50	SM	21	2.00	1.00	35	IV	0.24	7.00	0.89	20.46	9.96	0.29	1.00	1.33	1.000	1.05	1	1.00	29.39	5.00	1.20	40.26	NA	63.62	0.68	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
12.00	SM	18	2.02	1.02	34	IV	0.24	7.00	0.85	23.46	11.46	0.27	0.93	1.33	1.000	1.05	1	1.00	23.48	4.93	1.19	32.83	NA	50.33	0.75	0.97	1.00	1.19	NA	>1.0	Non Liquefiable
13.50	SM	23	2.02	1.02	34	IV	0.24	7.00	0.81	26.49	12.99	0.26	0.88	1.33	1.000	1.05	1	1.00	28.18	4.93	1.19	38.42	NA	60.91	0.70	0.92	1.00	1.19	NA	>1.0	Non Liquefiable
15.00	SM	26	2.03	1.03	33	IV	0.24	7.00	0.77	29.52	14.52	0.25	0.83	1.33	1.000	1.05	1	1.00	30.13	4.88	1.18	40.42	NA	65.13	0.67	0.89	1.00	1.19	NA	>1.0	Non Liquefiable
16.50	SM	30	2.03	1.03	33	IV	0.24	7.00	0.73	32.57	16.07	0.23	0.79	1.33	1.000	1.05	1	1.00	33.05	4.88	1.18	43.87	NA	68.05	0.66	0.85	1.00	1.19	NA	>1.0	Non Liquefiable
18.00	SM	35	2.02	1.02	34	IV	0.24	7.00	0.69	35.61	17.61	0.22	0.75	1.33	1.000	1.05	1	1.00	36.83	4.93	1.19	48.70	NA	71.83	0.64	0.82	1.00	1.19	NA	>1.0	Non Liquefiable
19.50	SM	39	2.02	1.02	34	IV	0.24	7.00	0.65	38.64	19.14	0.21	0.72	1.33	1.000	1.05	1	1.00	39.37	4.93	1.19	51.71	NA	74.37	0.63	0.79	1.00	1.19	NA	>1.0	Non Liquefiable
21.00	SM	43	2.01	1.01	33	IV	0.24	7.00	0.61	41.67	20.67	0.19	0.70	1.33	1.000	1.05	1	1.00	41.77	4.88	1.18	54.15	NA	76.77	0.62	0.76	1.00	1.19	NA	>1.0	Non Liquefiable
22.50	SM	36	2.01	1.01	33	IV	0.24	7.00	0.57	44.69	22.19	0.18	0.67	1.33	1.000	1.05	1	1.00	33.75	4.88	1.18	44.70	NA	68.75	0.66	0.76	1.00	1.19	NA	>1.0	Non Liquefiable

Note: Values of all Parameters are as per IRC:SP: 114 / IS 1893: 2016

C_E or C_{HT} (Correction for hammer energy ratio) = $ER/60$, ER for Rope and pulley System = 80 % , Hence $C_E = 80/60 = 1.33$

C_H or C_{HW} (Correction for hammer) = 1.00

Borehole Diameter = 150 mm , Hence C_B or C_{BD} (Correction for Borehole diameter), = 1.05

C_S or C_{SS} (Correction for Standard sampler) = 1.00

K_o Correction for high overburden stress (for effective overburden pressure > 10 T/m²)

K_u Correction for static shear stress is required only for sloping ground

Typical Computation of Liquefaction Potential as per IRC:SP: 114 / IS: 1893

Project: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO: 24

BOREHOLE NO.

BH-03

SECTION: CHITAUUNI-MADHUBANI

Water table assumed for Calculation: 0.00 m

Depth below EGL, m	Type of Strata	Observed SPT Value	Saturated density (t/m^3)	Submerged Density (t/m^3)	Fine Content (%)	Earthquake Zone	Peak ground acceleration a_{\max}/g	Earth quake magnitude (Mw)	Stress reduction coefficient (rd)	Total overburden pressure (σ_o), t/m^2	Effective overburden (σ'_o), t/m^2	Cyclic Stress ratio (CSR)	C_N	CE or CHT	CH or CHW	CB or CBD	CR or CRL	CS or CSS	SPT corrected (N_1) ₆₀	α	β	(N_1) _{16cs}	$CRR_{N=7.5}$	Relative Density, Dr%	f	K_c	K_u	MSF	CRR	FOS	Conclusion
1.50	SM	8	1.95	0.95	35	IV	0.24	7.00	0.99	2.93	1.43	0.32	1.70	1.33	1.000	1.05	0.75	1.00	14.24	5.00	1.20	22.09	0.24	29.55	0.85	1.00	1.00	1.19	0.29	0.92	Liquefiable
3.00	SM	6	1.94	0.94	34	IV	0.24	7.00	0.98	5.85	2.85	0.31	1.70	1.33	1.000	1.05	0.85	1.00	12.11	4.93	1.19	19.32	0.21	24.74	0.88	1.00	1.00	1.19	0.25	0.79	Liquefiable
4.50	SM	11	1.94	0.94	34	IV	0.24	7.00	0.97	8.76	4.26	0.31	1.53	1.33	1.000	1.05	0.95	1.00	22.36	4.93	1.19	31.50	NA	47.81	0.76	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
6.00	SM	15	1.97	0.97	33	IV	0.24	7.00	0.95	11.67	5.67	0.31	1.33	1.33	1.000	1.05	0.95	1.00	26.43	4.88	1.18	36.06	NA	56.96	0.72	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
7.50	SM	14	1.97	0.97	33	IV	0.24	7.00	0.94	14.63	7.13	0.30	1.18	1.33	1.000	1.05	0.95	1.00	22.00	4.88	1.18	30.84	NA	47.01	0.76	1.00	1.00	1.19	NA	>1.0	Non Liquefiable
9.00	SP	10	2.01	1.01	1	IV	0.24	7.00	0.93	17.58	8.58	0.30	1.08	1.33	1.000	1.05	1	1.00	15.08	0.00	1.00	15.08	0.16	31.42	0.84	1.00	1.00	1.19	0.19	0.64	Liquefiable
10.50	SP	16	2.01	1.01	1	IV	0.24	7.00	0.89	20.60	10.10	0.28	1.00	1.33	1.000	1.05	1	1.00	22.24	0.00	1.00	22.24	0.25	47.54	0.76	1.00	1.00	1.19	0.29	1.03	Non Liquefiable
12.00	SP	20	2.03	1.03	2	IV	0.24	7.00	0.85	23.61	11.61	0.27	0.93	1.33	1.000	1.05	1	1.00	25.92	0.00	1.00	25.92	0.31	55.82	0.72	0.96	1.00	1.19	0.36	1.32	Non Liquefiable
13.50	SP	23	2.03	1.03	2	IV	0.24	7.00	0.81	26.66	13.16	0.26	0.87	1.33	1.000	1.05	1	1.00	28.00	0.00	1.00	28.00	0.37	60.51	0.70	0.92	1.00	1.19	0.41	1.58	Non Liquefiable
15.00	SP	27	2.02	1.02	3	IV	0.24	7.00	0.77	29.70	14.70	0.24	0.82	1.33	1.000	1.05	1	1.00	31.10	0.00	1.00	31.10	NA	66.10	0.67	0.88	1.00	1.19	NA	>1.0	Non Liquefiable
16.50	SP	29	2.02	1.02	3	IV	0.24	7.00	0.73	32.73	16.23	0.23	0.78	1.33	1.000	1.05	1	1.00	31.79	0.00	1.00	31.79	NA	66.79	0.67	0.85	1.00	1.19	NA	>1.0	Non Liquefiable
18.00	SP	30	2.04	1.04	2	IV	0.24	7.00	0.69	35.76	17.76	0.22	0.75	1.33	1.000	1.05	1	1.00	31.44	0.00	1.00	31.44	NA	66.44	0.67	0.83	1.00	1.19	NA	>1.0	Non Liquefiable
19.50	SP	35	2.04	1.04	2	IV	0.24	7.00	0.65	38.82	19.32	0.20	0.72	1.33	1.000	1.05	1	1.00	35.16	0.00	1.00	35.16	NA	70.16	0.65	0.79	1.00	1.19	NA	>1.0	Non Liquefiable
21.00	SP	43	2.03	1.03	3	IV	0.24	7.00	0.61	41.88	20.88	0.19	0.69	1.33	1.000	1.05	1	1.00	41.56	0.00	1.00	41.56	NA	76.56	0.62	0.75	1.00	1.19	NA	>1.0	Non Liquefiable
22.50	SP	48	2.03	1.03	3	IV	0.24	7.00	0.57	44.93	22.43	0.18	0.67	1.33	1.000	1.05	1	1.00	44.76	0.00	1.00	44.76	NA	79.76	0.60	0.72	1.00	1.19	NA	>1.0	Non Liquefiable

Note: Values of all Parameters are as per IRC:SP: 114 / IS 1893: 2016

 C_E or C_{HT} (Correction for hammer energy ratio) = $ER/60$, ER for Rope and pulley System = 80 % , Hence $C_E = 80/60 = 1.33$
 C_H or C_{HW} (Correction for hammer) = 1.00

 Borehole Diameter = 150 mm , Hence C_B or C_{BD} (Correction for Borehole diameter), = 1.05

 C_S or C_{SS} (Correction for Standard sampler) = 1.00

 K_o Correction for high overburden stress (for effective oberburden pressure > 10 T/m²) ..

 K_u Correction for static shear stress is required only for sloping ground

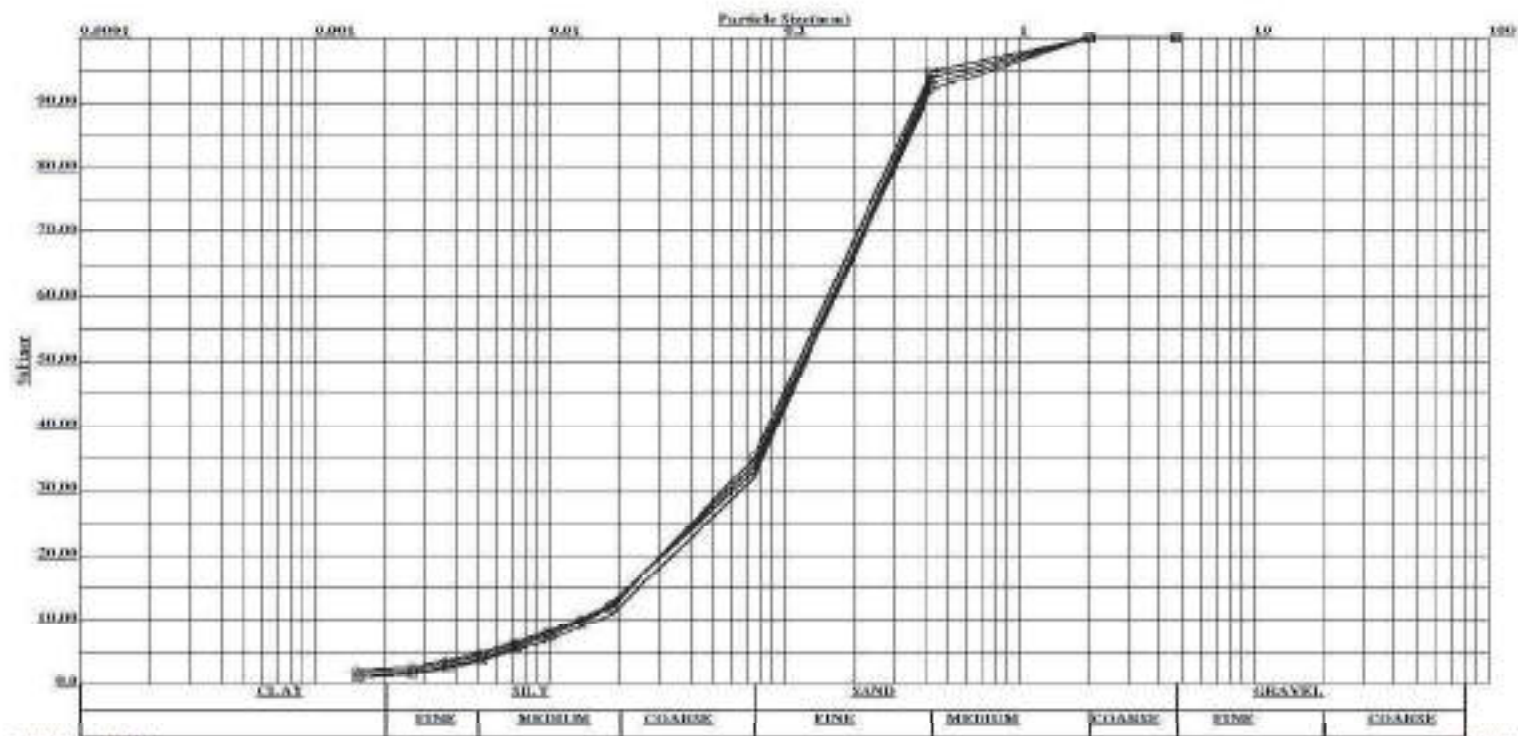
PROJECT: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO. - 24

BOREHOLE NO-BH-01

SECTION:CHITAUNI-MADHUBANI

GRAIN SIZE ANALYSIS



Symbol	Depth, m	Soil Description	Gravel	Sand	Silt	Clay	C_u	C_c
			(%)	(%)	(%)	(%)		
×	0.0	LOOSE MEDIUM DENSE LITE GREY SILTY SAND (SM)	0.00	68.00	31.00	1.00	10.14	1.62
○	1.5		0.00	66.00	32.00	2.00	11.68	1.51
□	3.0		0.00	65.00	34.00	1.00	10.75	1.38
◇	6.0		0.00	67.00	31.00	2.00	12.54	1.70

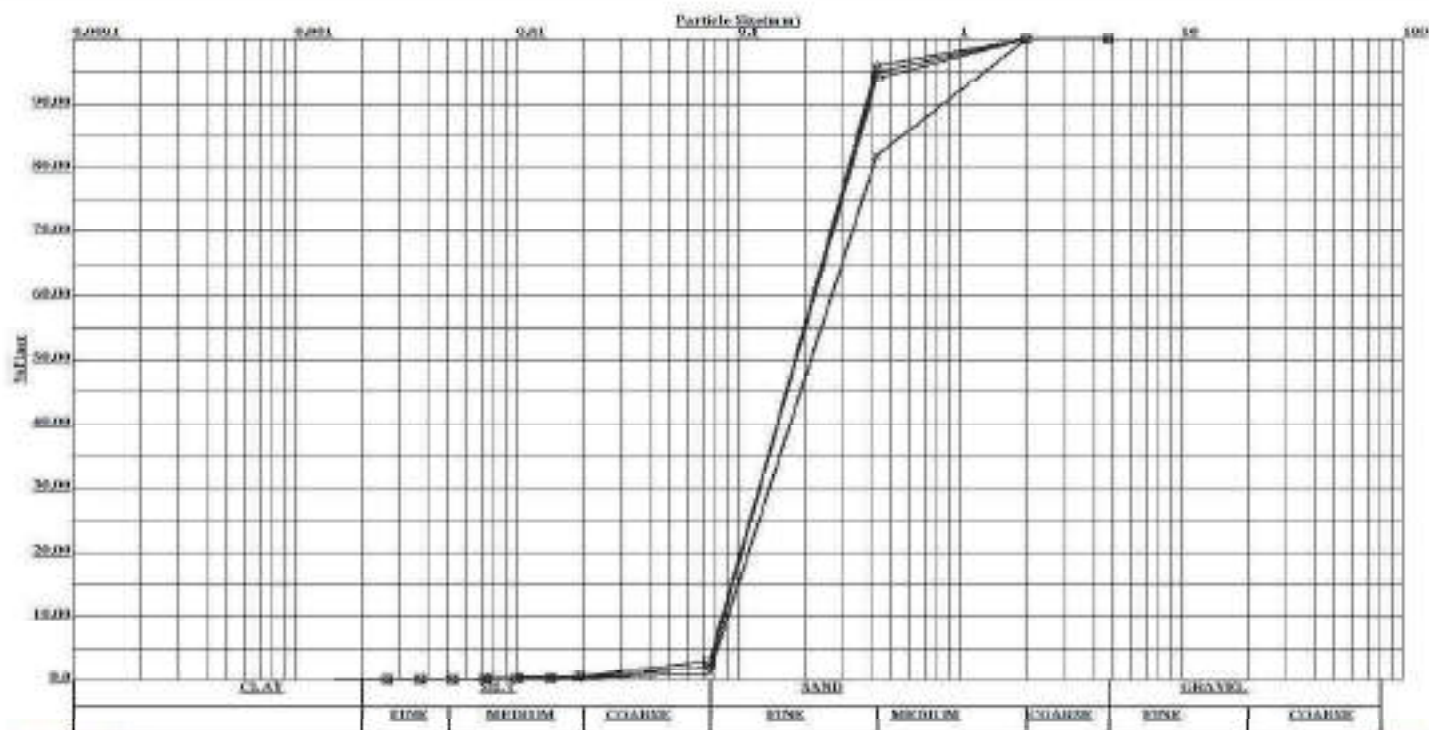


PROJECT: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO. - 24
SECTION:CHITAUNI-MADHUBANI

BOREHOLE NO-BH-01

GRAIN SIZE ANALYSIS



Symbol	Depth, m	Soil Description	Gravel	Sand	Silt	Clay	C_u	C_c
			(%)	(%)	(%)	(%)		
x	9.0	MEDIUM DENSE TO VERY DENSE DARK GREY POORLY GRADED SAND (SP)	0.00	99.00	1.00	0.00	2.92	0.81
○	12.0		0.00	98.00	2.00	0.00	2.52	0.83
□	15.0		0.00	97.00	3.00	0.00	2.59	0.83
◇	18.0		0.00	98.00	2.00	0.00	2.54	0.83



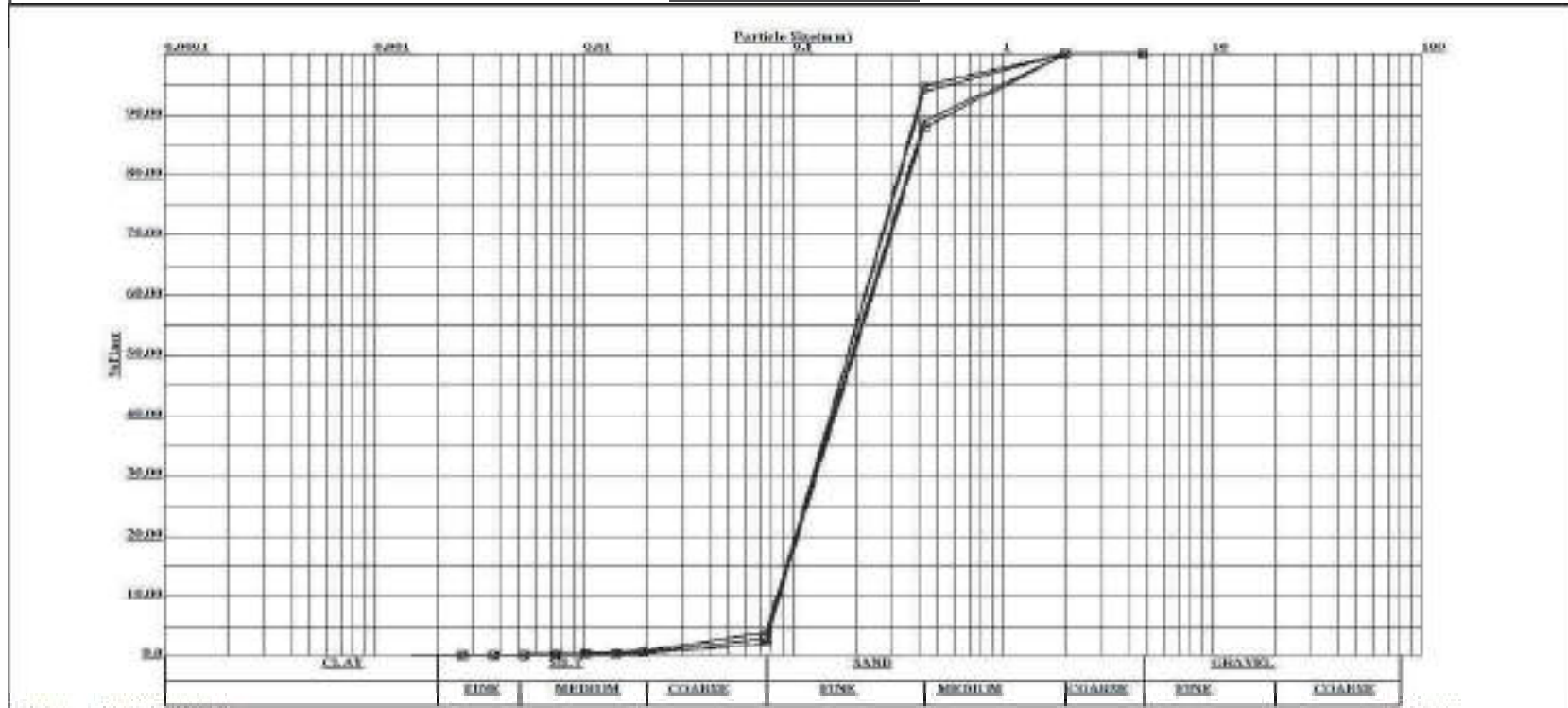
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PROJECT: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO. - 24
SECTION:CHITAUNI-MADHUBANI

BOREHOLE NO-BH-01

GRAIN SIZE ANALYSIS



Symbol	Depth, m	Soil Description	Gravel	Sand	Silt	Clay	C_u	C_c
			(%)	(%)	(%)	(%)		
x	21.0	MEDIUM DENSE TO VERY DENSE DARK GREY POORLY GRADED SAND (SP)	0.00	97.00	3.00	0.00	2.59	0.83
○	24.0		0.00	98.00	2.00	0.00	2.54	0.83
□	27.0		0.00	97.00	3.00	0.00	2.77	0.82
◇	30.0		0.00	96.00	4.00	0.00	2.77	0.82

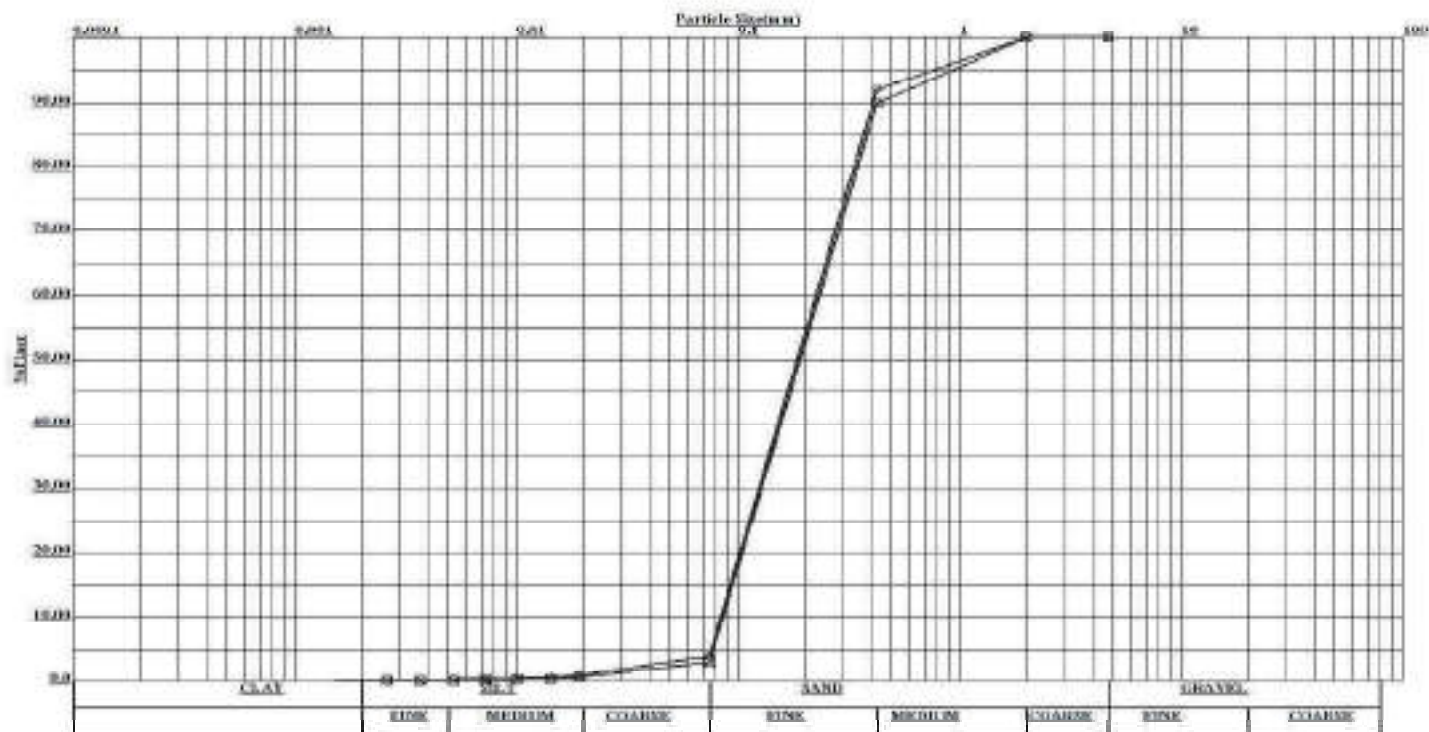


PROJECT: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO. - 24
SECTION:CHITAUNI-MADHUBANI

BOREHOLE NO-BH-01

GRAIN SIZE ANALYSIS



Symbol	Depth, m	Soil Description	Gravel	Sand	Silt	Clay	C _u	C _c
			(%)	(%)	(%)	(%)		
x	33.0	MEDIUM DENSE TO VERY DENSE DARK GREY POORLY GRADED SAND (SP)	0.00	97.00	3.00	0.00	2.71	0.82
○	36.0		0.00	96.00	4.00	0.00	2.68	0.82
□	39.0		0.00	97.00	3.00	0.00	2.71	0.82

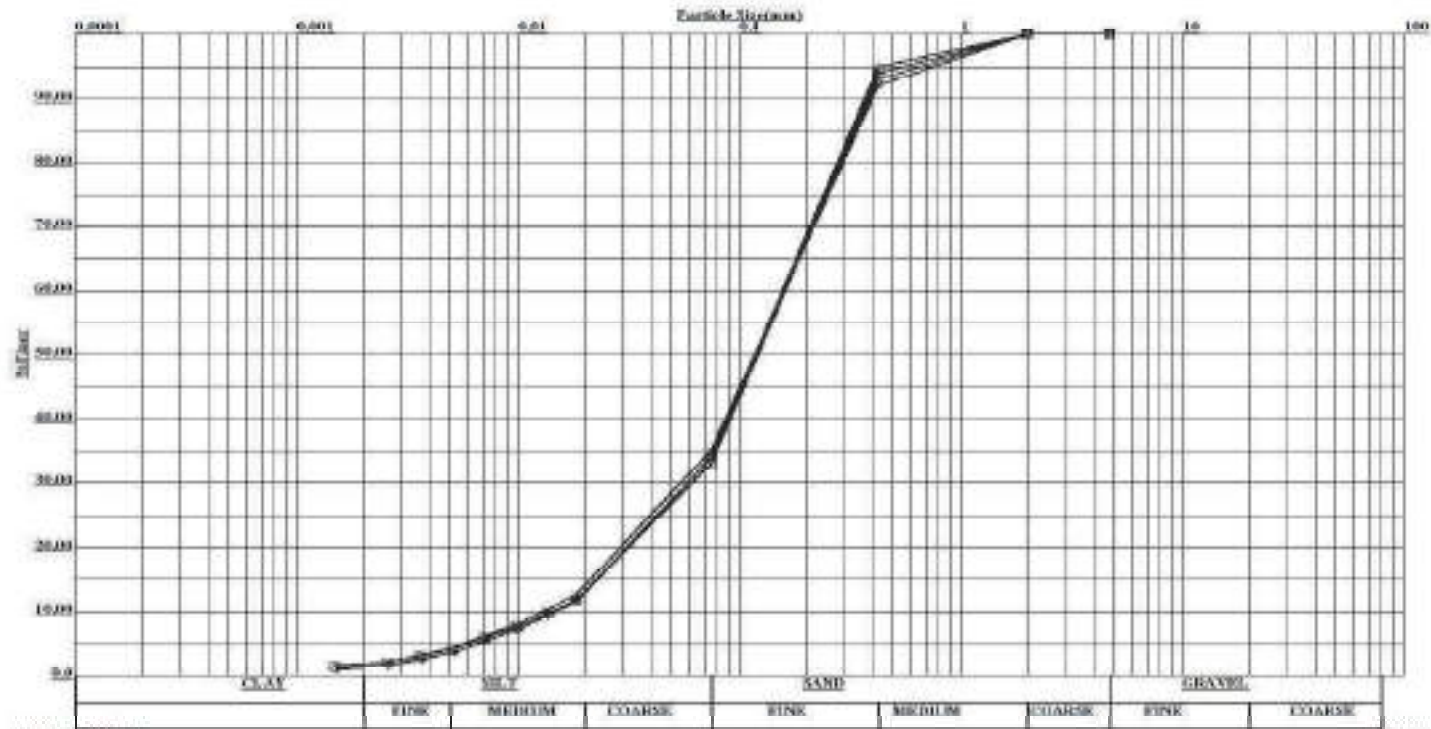


PROJECT: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO. - 24
SECTION:CHITAUNI-MADHUBANI

BOREHOLE NO.-BH-02

GRAIN SIZE ANALYSIS



Symbol	Depth, m	Soil Description	Gravel	Sand	Silt	Clay	C_u	C_c
			(%)	(%)	(%)	(%)		
x	9.0	LOOSE MEDIUM DENSE LITE GREY SILTY SAND (SM)	0.00	65.00	33.00	2.00	12.13	1.42
○	12.0		0.00	66.00	33.00	1.00	10.80	1.42
□	15.0		0.00	67.00	31.00	2.00	11.26	1.63
◇	18.0		0.00	66.00	33.00	1.00	10.53	1.46

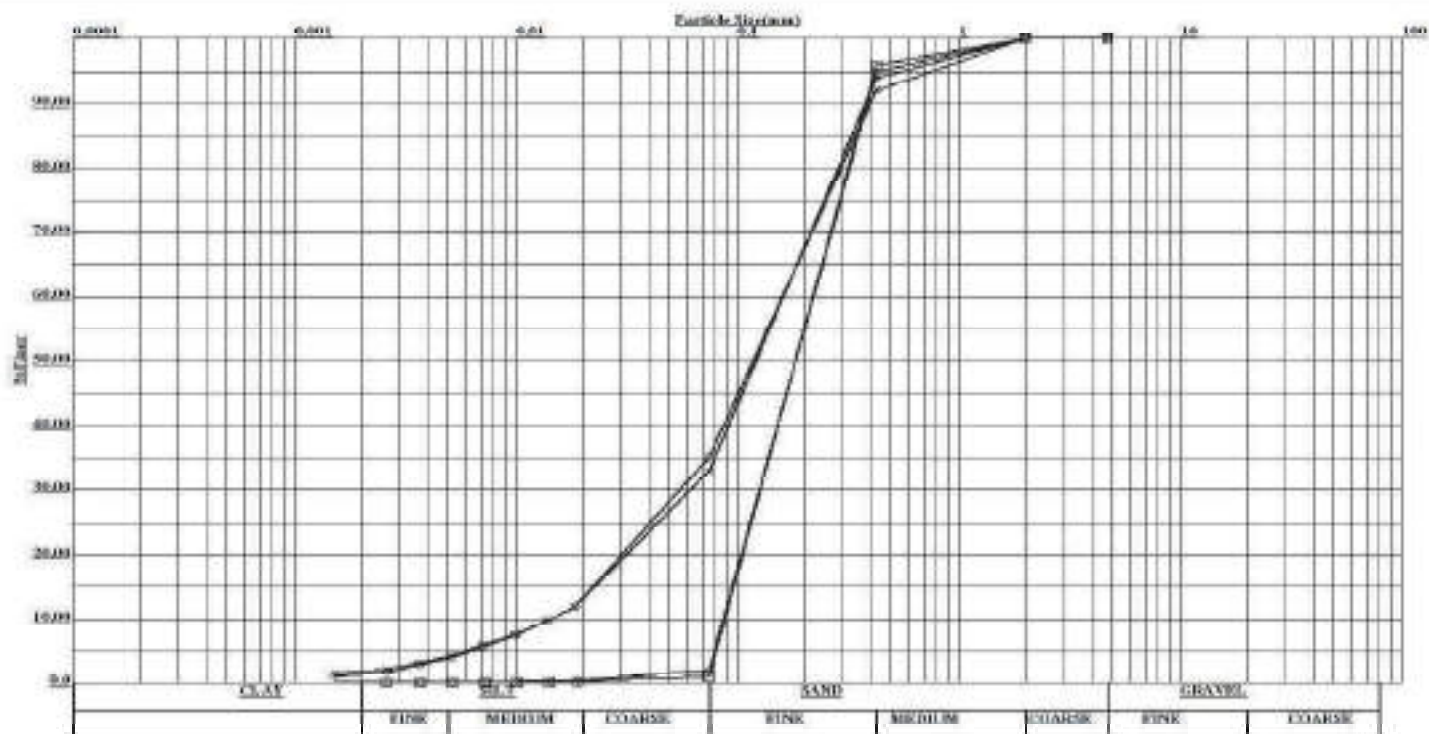


PROJECT: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO. - 24
SECTION:CHITAUNI-MADHUBANI

BOREHOLE NO.-BH-02

GRAIN SIZE ANALYSIS



Symbol	Depth, m	Soil Description	Gravel	Sand	Silt	Clay	C_u	C_c
			(%)	(%)	(%)	(%)		
×	21.0	LOOSE MEDIUM DENSE LITE GREY SILTY SAND (SM)	0.00	67.00	31.00	2.00	11.26	1.63
○	24.0		0.00	65.00	34.00	1.00	11.17	1.33
□	27.0	DENSE TO VERY DENSE DARK GREY POORLY GRADED SAND (SP)	0.00	99.00	1.00	0.00	2.49	0.83
◇	30.0		0.00	98.00	2.00	0.00	2.54	0.83



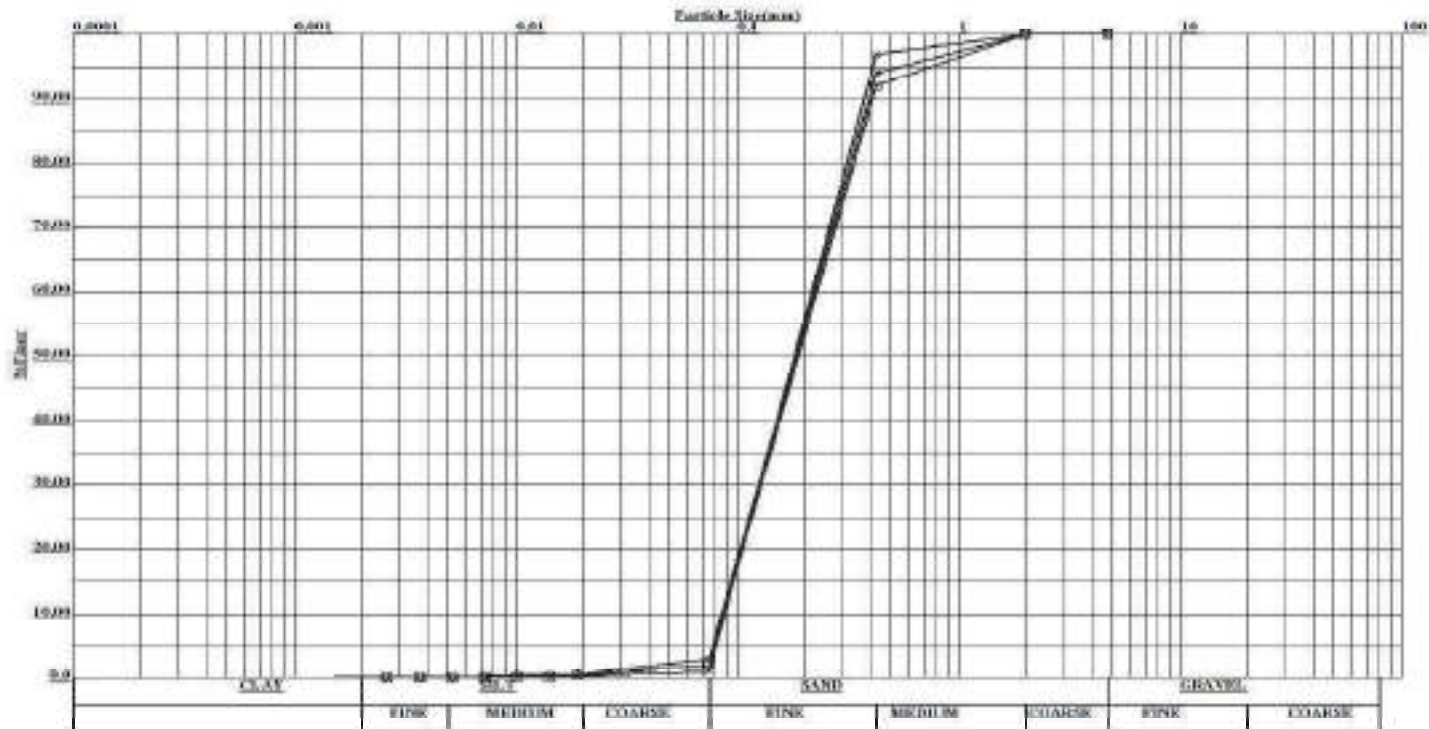
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PROJECT: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO. - 24
SECTION:CHITAUNI-MADHUBANI

BOREHOLE NO.-BH-02

GRAIN SIZE ANALYSIS



Symbol	Depth, m	Soil Description	Gravel	Sand	Silt	Clay	C_u	C_c
			(%)	(%)	(%)	(%)		
x	33.0	DENSE TO VERY DENSE DARK GREY POORLY GRADED SAND (SP)	0.00	99.00	1.00	0.00	2.47	0.83
○	36.0		0.00	97.00	3.00	0.00	2.59	0.83
□	39.0		0.00	98.00	2.00	0.00	2.62	0.82

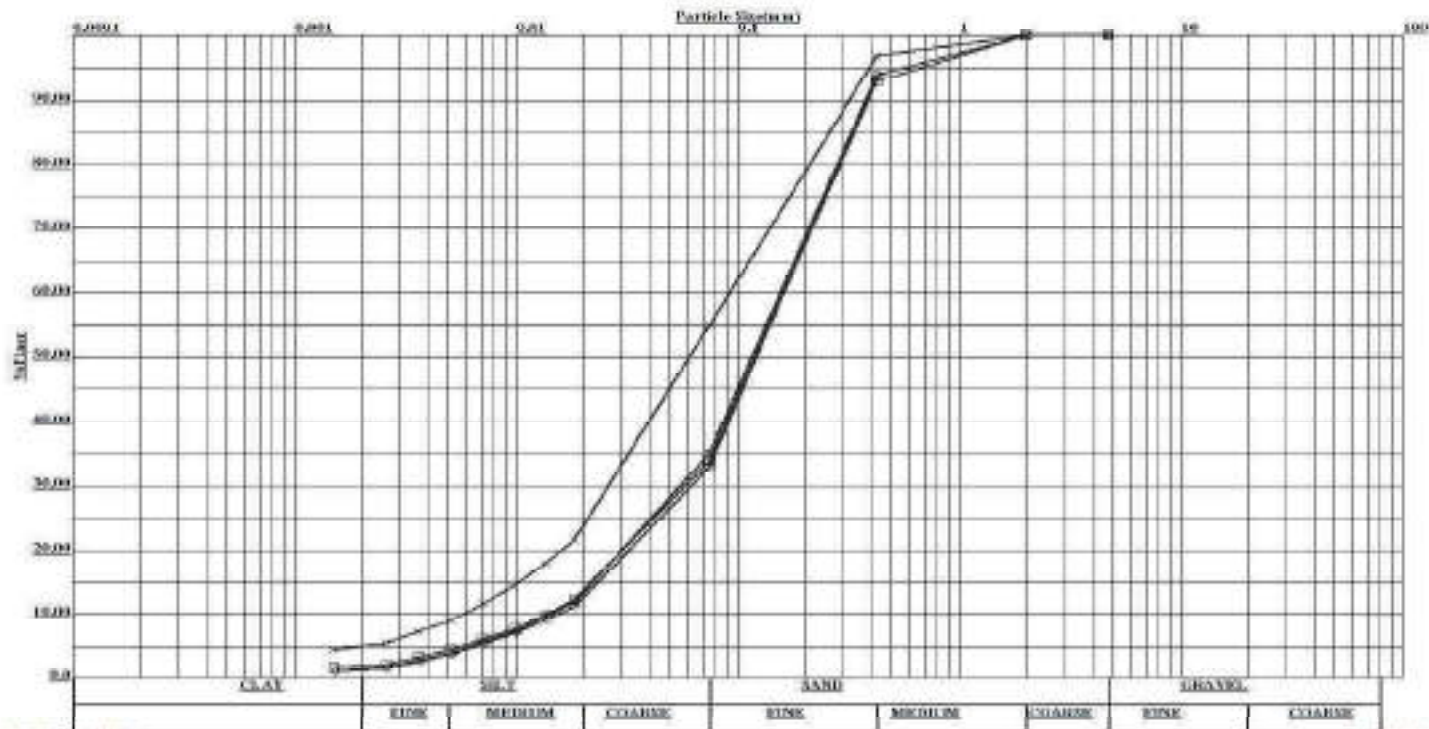


PROJECT: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO. - 24
SECTION:CHITAUNI-MADHUBANI

BOREHOLE NO-BH-03

GRAIN SIZE ANALYSIS



Symbol	Depth, m	Soil Description	Gravel	Sand	Silt	Clay	C_u	C_c
			(%)	(%)	(%)	(%)		
x	0.0	LOOSE LITE BROWN SANDY SILTY (ML)	0.00	45.00	50.00	5.00	16.06	1.28
○	1.5	LOOSE LITE GREY SILTY SAND (SM)	0.00	65.00	34.00	1.00	10.88	1.36
□	3.0		0.00	66.00	32.00	2.00	11.68	1.51
◇	6.0		0.00	67.00	32.00	1.00	10.41	1.52



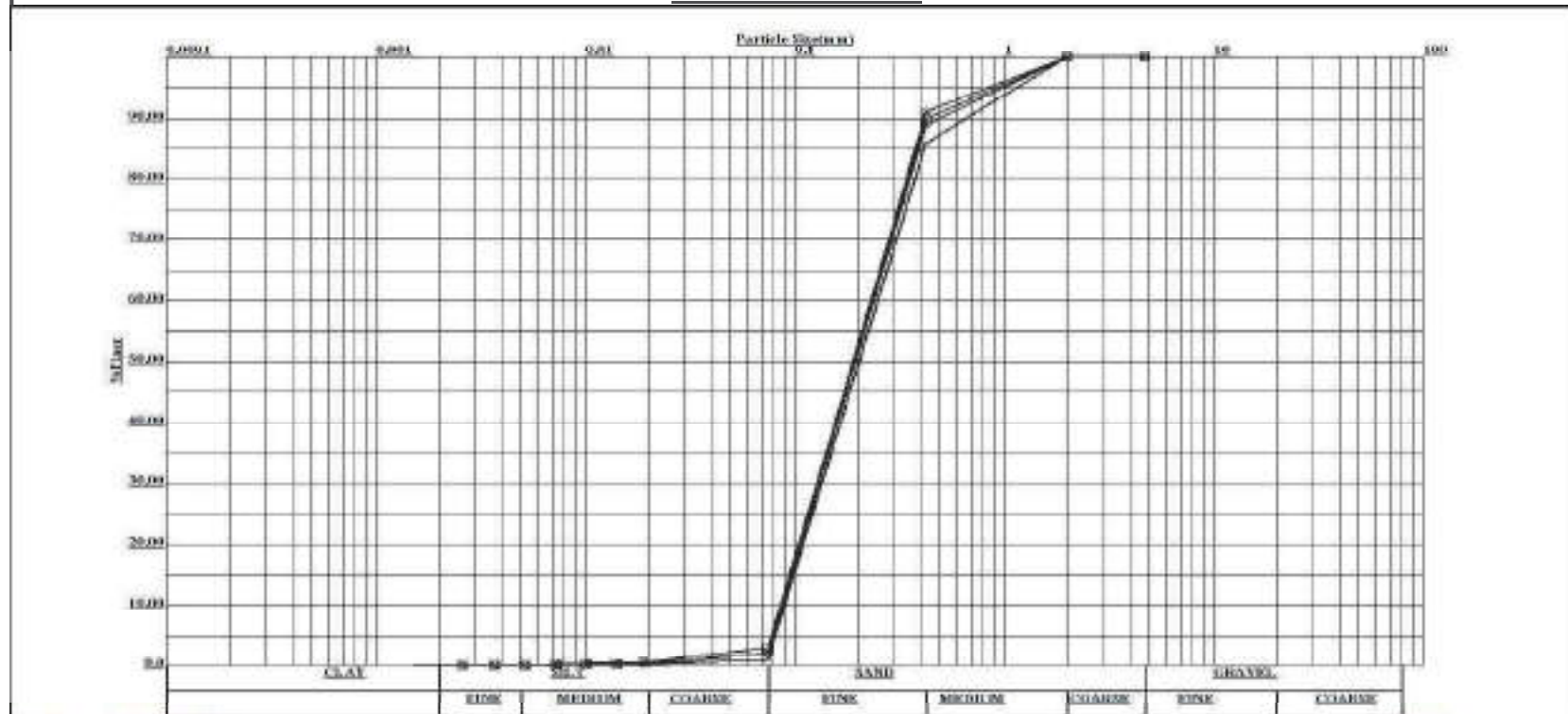
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PROJECT: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO. - 24
SECTION:CHITAUNI-MADHUBANI

BOREHOLE NO-BH-03

GRAIN SIZE ANALYSIS



Symbol	Depth, m	Soil Description	Gravel	Sand	Silt	Clay	C_u	C_c
			(%)	(%)	(%)	(%)		
x	9.0	LOOSE TO VERY DENSE DARK GREY POORLY GRADED SAND (SP)	0.00	99.00	1.00	0.00	2.77	0.82
○	12.0		0.00	98.00	2.00	0.00	2.71	0.82
□	15.0		0.00	97.00	3.00	0.00	2.71	0.82
◇	18.0		0.00	98.00	2.00	0.00	2.65	0.82



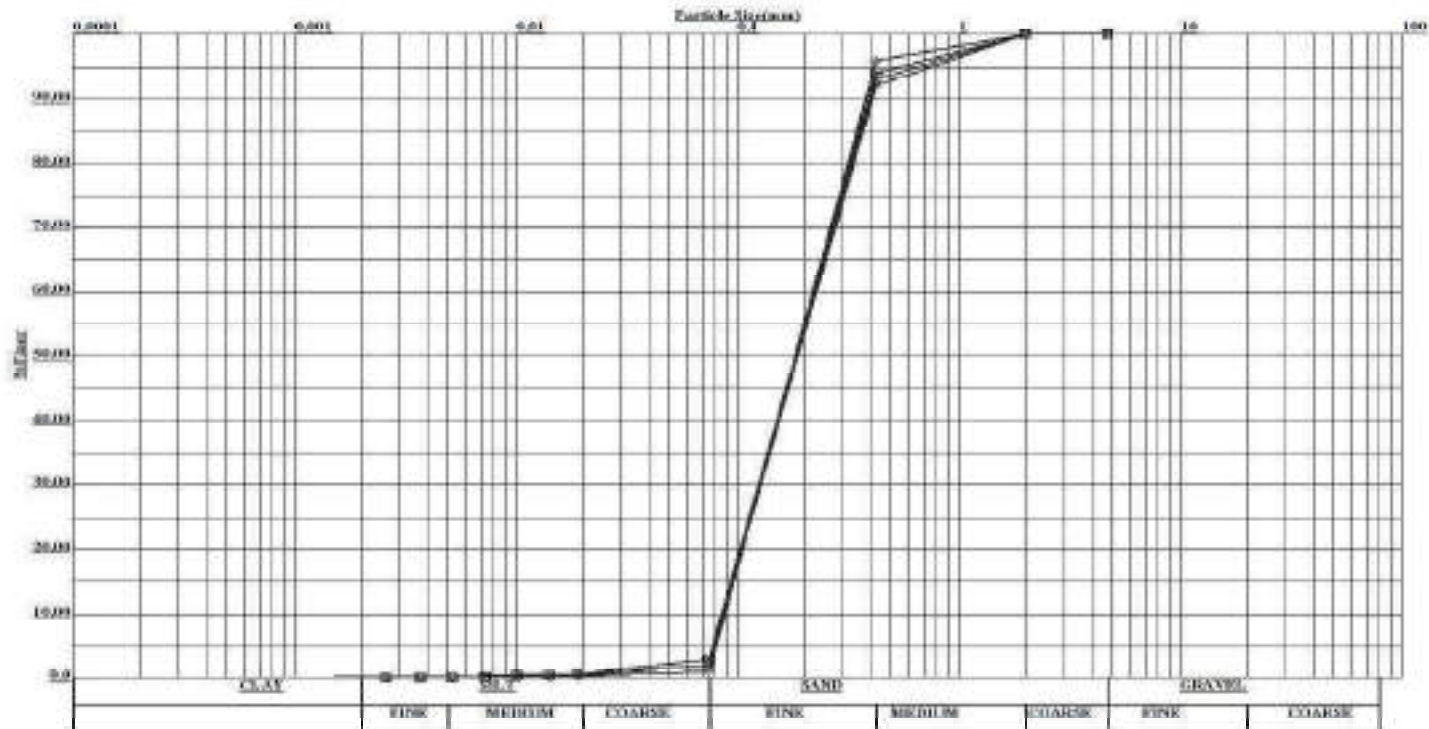
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PROJECT: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO. - 24
SECTION:CHITAUNI-MADHUBANI

BOREHOLE NO-BH-03

GRAIN SIZE ANALYSIS



Symbol	Depth, m	Soil Description	Gravel	Sand	Silt	Clay	C_u	C_c
			(%)	(%)	(%)	(%)		
x	21.0	LOOSE TO VERY DENSE DARK GREY POORLY GRADED SAND (SP)	0.00	97.00	3.00	0.00	2.65	0.82
○	24.0		0.00	98.00	2.00	0.00	2.59	0.83
□	27.0		0.00	97.00	3.00	0.00	2.59	0.83
◇	30.0		0.00	99.00	1.00	0.00	2.49	0.83

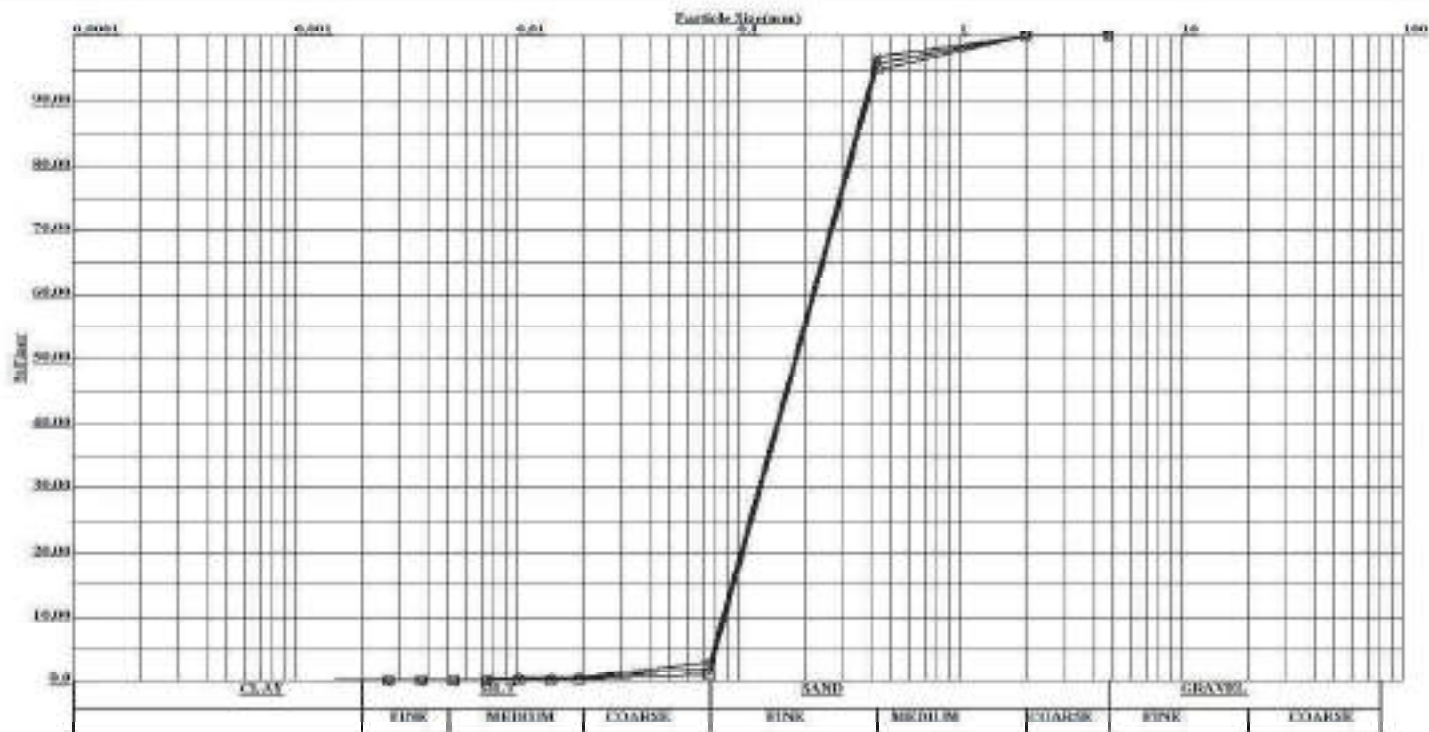


PROJECT: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO. - 24
SECTION:CHITAUNI-MADHUBANI

BOREHOLE NO-BH-03

GRAIN SIZE ANALYSIS



Symbol	Depth, m	Soil Description	Gravel	Sand	Silt	Clay	C_u	C_c
			(%)	(%)	(%)	(%)		
x	33.0	LOOSE TO VERY DENSE DARK GREY POORLY GRADED SAND (SP)	0.00	98.00	2.00	0.00	2.49	0.83
○	36.0		0.00	97.00	3.00	0.00	2.54	0.83
□	39.0		0.00	99.00	1.00	0.00	2.52	0.83



COMPUTATION OF WEIGHTED MEAN DIAMETER OF PARTICLES AND SILT FACTOR

Project: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO.- 24				BOREHOLE NO-BH-01										Section : CHITAUNI-MADHUBANI												
Sl.No.	Borehole No.	Depth (m)		Description of the Soil Strata	IS Classification	Percentage Retained							Mean Particle Size (mm)							Sandy Strata		Clayey Soil				
		From	To			5.60 to 4.00	4.00 to 2.80	2.80 to 1.00	1.00 to 0.425	0.425 to 0.180	0.180 to 0.075	0.075 to 0	4.8	3.4	1.9	0.7125	0.3025	0.1275	0.0375	Mean Particle Size (dm)	Silt Factor in the layer= 1.76 x sqrt(dm)	Average Cohesion Intercept - c (t/sqm)	Average Angle of Internal Friction (°)	F	Silt Factor = $\frac{K_{sf}c}{F \times (1 + \sqrt{c/10})}$	
1	BH-01	1.50	1.95	SILTY SAND	SM	0.0	0.0	0.0	6.0	38.0	22.0	34.0	0.00	0.00	0.00	4.28	11.50	2.81	1.275	0.199	0.784	-	-	-	-	
2		6.00	6.45	SILTY SAND	SM	0.0	0.0	0.0	7.0	39.0	21.0	33.0	0.00	0.00	0.00	4.99	11.80	2.68	1.238	0.207	0.801	-	-	-	-	
3		9.00	9.45	POORLY GRADED SAND	SP	0.0	0.0	0.0	18.0	59.0	22.0	1.0	0.00	0.00	0.00	12.83	17.85	2.81	0.038	0.335	1.019	-	-	-	-	
4		12.00	12.45	POORLY GRADED SAND	SP	0.0	0.0	2.0	4.0	68.0	24.0	2.0	0.00	0.00	3.80	2.85	20.57	3.06	0.075	0.304	0.970	-	-	-	-	
4		15.00	15.45	POORLY GRADED SAND	SP	0.0	0.0	3.0	5.0	62.0	27.0	3.0	0.00	0.00	5.70	3.56	18.76	3.44	0.113	0.316	0.989	-	-	-	-	



COMPUTATION OF WEIGHTED MEAN DIAMETER OF PARTICLES AND SILT FACTOR

Project: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO.- 24				BOREHOLE NO-BH-02										Section : CHITAUNI-MADHUBANI													
Sl.No.	Borehole No.	Depth (m)		Description of the Soil Strata	IS Classification	Percentage Retained							Mean Particle Size (mm)							Sandy Strata		Clayey Soil					
		From	To			5.60 to 4.00	4.00 to 2.80	2.80 to 1.00	1.00 to 0.425	0.425 to 0.180	0.180 to 0.075	0.075 to 0	4.8	3.4	1.9	0.7125	0.3025	0.1275	0.0375	Mean Particle Size (dm)	Silt Factor in the layer= 1.76 x sqrt(dm)	Average Cohesion Intercept - c (t/sqm)	Average Angle of Internal Friction (°)	F	Silt Factor = $\frac{K_{sf}c}{F \times (1 + \sqrt{c/10})}$		
1	BH-02	1.50	1.95	SILTY SAND	SM	0.0	0.0	1.0	5.0	42.0	19.0	33.0	0.00	0.00	1.90	3.56	12.71	2.42	1.238	0.218	0.822	-	-	-	-		
2		3.00	3.45	SILTY SAND	SM	0.0	0.0	2.0	6.0	33.0	24.0	35.0	0.00	0.00	3.80	4.28	9.98	3.06	1.313	0.224	0.834	-	-	-	-		
3		6.00	6.45	SILTY SAND	SM	0.0	0.0	2.0	5.0	40.0	17.0	36.0	0.00	0.00	3.80	3.56	12.10	2.17	1.350	0.230	0.844	-	-	-	-		
4		12.00	12.45	SILTY SAND	SM	0.0	0.0	0.0	7.0	35.0	24.0	34.0	0.00	0.00	0.00	4.99	10.59	3.06	1.275	0.199	0.785	-	-	-	-		
5		15.00	15.45	SILTY SAND	SM	0.0	0.0	2.0	4.0	41.0	20.0	33.0	0.00	0.00	3.80	2.85	12.40	2.55	1.238	0.228	0.841	-	-	-	-		



COMPUTATION OF WEIGHTED MEAN DIAMETER OF PARTICLES AND SILT FACTOR

Project: Final location survey for New B.G Railway line projects (770.00 km.) and Final location survey for construction of Doubling/Third line/ 3rd & 4th line (252.00 km.) of North Eastern Railway (Total 1022.00 km)

BRIDGE NO- 24				BOREHOLE NO-BH-03										Section : CHITAUNI-MADHUBANI												
Sl.No.	Borehole No.	Depth (m)		Description of the Soil Strata	IS Classification	Percentage Retained							Mean Particle Size (mm)							Sandy Strata		Clayey Soil				
		From	To			5.60 to 4.00	4.00 to 2.80	2.80 to 1.00	1.00 to 0.425	0.425 to 0.180	0.180 to 0.075	0.075 to 0	4.8	3.4	1.9	0.7125	0.3025	0.1275	0.0375	Mean Particle Size (dm)	Silt Factor in the layer= 1.76 x sqrt(dm)	Average Cohesion Intercept - c (t/sqm)	Average Angle of Internal Friction (°)	F	Silt Factor = $\frac{K_{sf}c}{F \times (1 + \frac{c}{10})}$	
1	BH-03	1.50	1.95	SILTY SAND	SM	0.0	0.0	0.0	5.0	42.0	18.0	35.0	0.00	0.00	0.00	3.56	12.71	2.30	1.313	0.199	0.785	-	-	-	-	
2		3.00	3.45	SILTY SAND	SM	0.0	0.0	1.0	7.0	38.0	20.0	34.0	0.00	0.00	1.90	4.99	11.50	2.55	1.275	0.222	0.829	-	-	-	-	
3		6.00	6.45	SILTY SAND	SM	0.0	0.0	1.0	5.0	34.0	27.0	33.0	0.00	0.00	1.90	3.56	10.29	3.44	1.238	0.204	0.795	-	-	-	-	
4		12.00	12.45	POORLY GRADED SAND	SP	0.0	0.0	2.0	10.0	61.0	25.0	2.0	0.00	0.00	3.80	7.13	18.45	3.19	0.075	0.326	1.006	-	-	-	-	
5		15.00	15.45	POORLY GRADED SAND	SP	0.0	0.0	1.0	9.0	58.0	29.0	3.0	0.00	0.00	1.90	6.41	17.55	3.70	0.113	0.297	0.959	-	-	-	-	
6		18.00	18.45	POORLY GRADED SAND	SP	0.0	0.0	2.0	8.0	67.0	21.0	2.0	0.00	0.00	3.80	5.70	20.27	2.68	0.075	0.325	1.004	-	-	-	-	