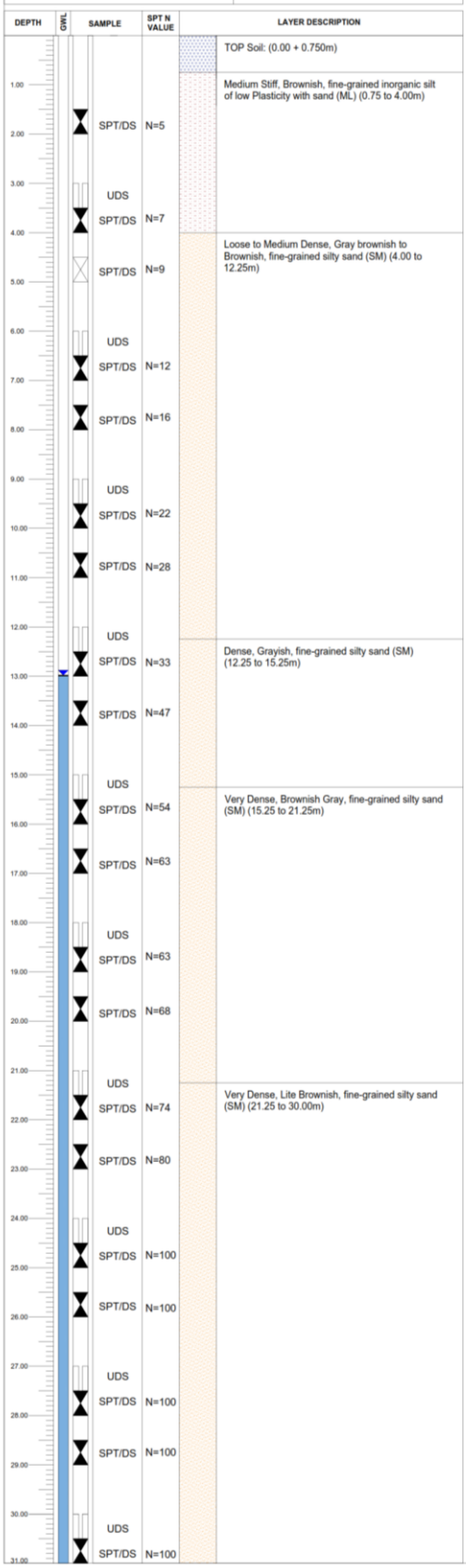
NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (0-000 km TO 0-900 km)

BH ID : BH-(-8) | **Chainage** : 0-174 KM

Groundwater Level : 13.00 M | **Location** :Lat. 28.564666, Long. 77.333096



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

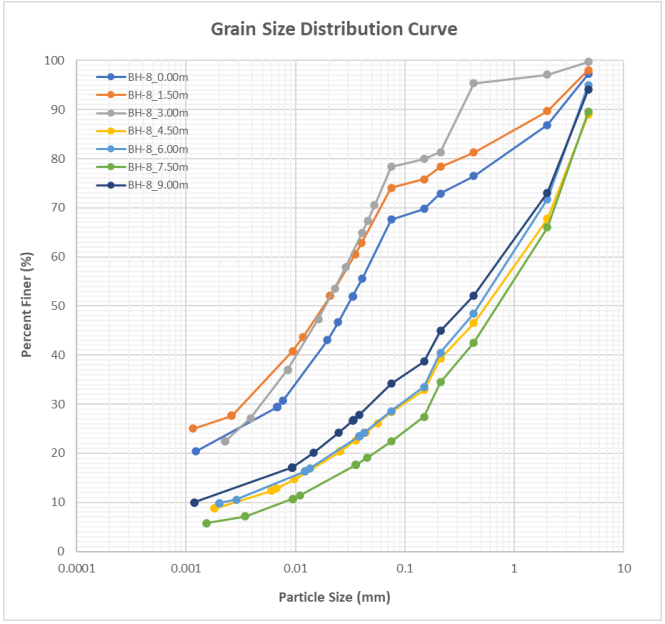
Soil

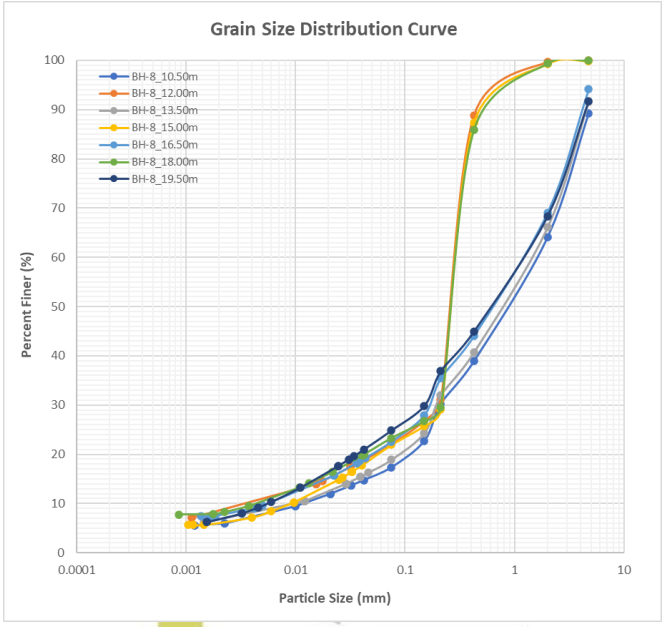
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

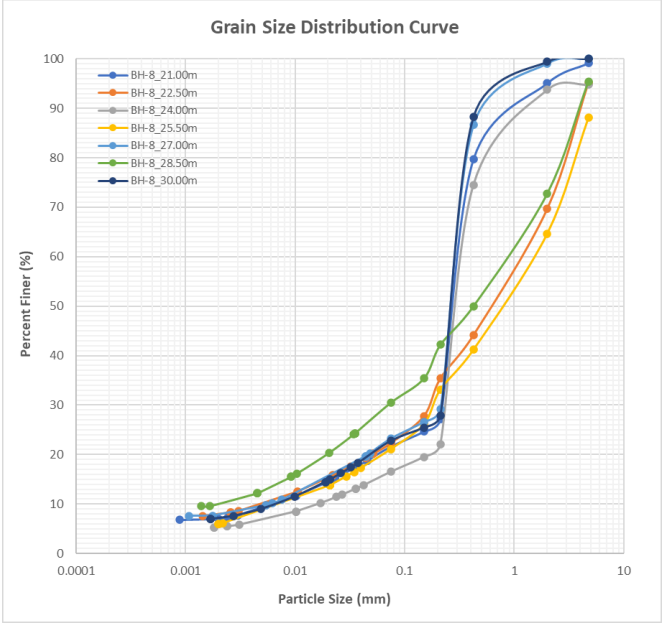
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-(-08)	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	0-174	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	12-03-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	195.4	**End Date:**	12-03-2026
Project Code:	158_R01_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	13.65	**Location:**	Lat. 28.564666 , Long. 77.333096

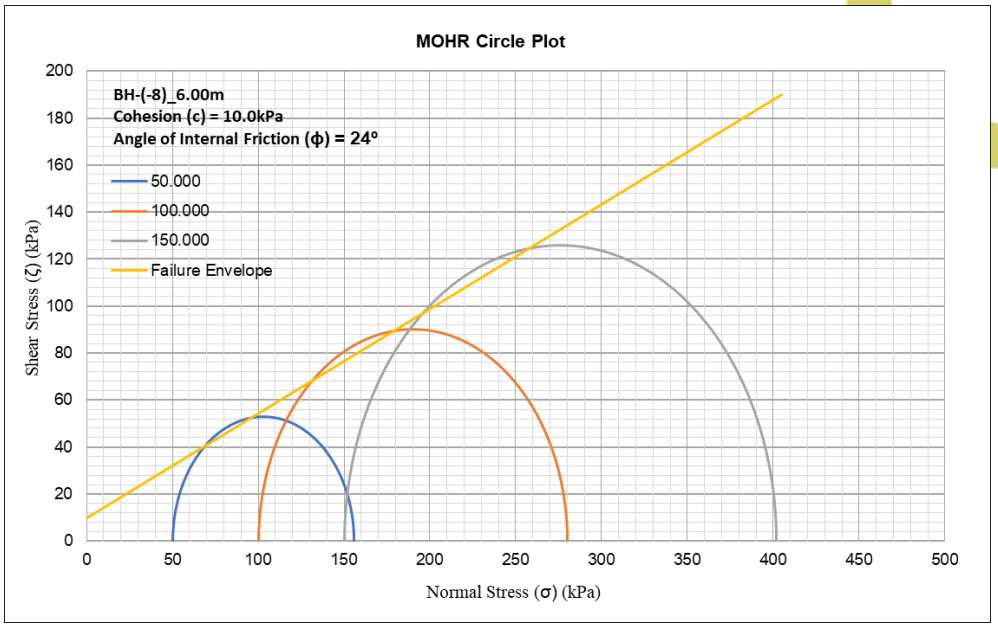
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil	-	-	-	0	0	2.8	29.6	44.6	23.0	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Medium Stiff, Brownish, fine-grained inorganic silt of low Plasticity with sand(ML)	2	2	3	5	7	1.9	24.0	47.3	26.8	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							0.3	21.4	57.6	20.7	21	NP	NP	16.61	1.63	1.40	2.69	F	0.08	21	-	-	-	-	-	-	-
3.50	SPT/DS		2	3	4	7	8	-																				
4.50	SPT/DS	Loose to Medium Dense, Gray brownish to Brownish, fine-grained silty sand (SM)	3	4	5	9	9	11.0	60.6	19.3	9.1	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS							5.0	66.4	28.6	0.0	23	NP	NP	14.63	1.88	1.64	2.638	F	0.02	23	UU	10	24	-	-	-	-
6.50	SPT/DS		4	5	7	12	11	-																				
7.50	SPT/DS		5	7	9	16	15	10.5	67.2	16.2	6.2	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							6.0	59.8	22.4	11.8	27	NP	NP	18.90	1.9	1.60	2.67	F	0.03	25	UU	7	27	-	-	-	-
9.50	SPT/DS		7	10	12	22	19	-																				
10.50	SPT/DS		10	13	15	28	23	10.7	71.9	11.5	5.9	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							0.0	78.0	13.4	8.6	26	NP	NP	18.12	-	-	2.63	F	0.04	27	-	-	-	-	-	-	-
12.50	SPT/DS	Dense, Grayish, fine-grained silty sand (SM)	13	15	18	33	25	-																				
13.50	SPT/DS		17	21	26	47	34	8.5	72.6	12.0	6.8	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.1	78.0	15.8	6.1	26	NP	NP	21.65	-	-	2.66	F	0.03	29	-	-	-	-	-	-	-
15.50	SPT/DS	Very Dense, Brownish Gray, fine-grained silty sand (SM)	20	24	30	54	26	-																				
16.50	SPT/DS		23	29	34	63	29	5.9	71.6	14.9	7.7	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS							0.0	76.7	15.2	8.1	25	NP	NP	17.95	-	-	2.77	F	0.08	29	-	-	-	-	-	-	-
18.50	SPT/DS		25	29	34	63	28	-																				
19.50	SPT/DS		29	31	37	68	29	8.3	66.9	18.0	6.8	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							0.9	77.5	14.6	7.0	28	NP	NP	17.52	-	-	2.68	F	0.02	30	-	-	-	-	-	-	-
21.50	SPT/DS	Very Dense, Lite Brownish, fine-grained silty sand (SM)	30	35	39	74	30	-																				
22.50	SPT/DS		34	38	42	80	32	4.9	72.8	14.3	8.0	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							5.2	78.3	11.2	5.3	24	NP	NP	5.18	-	-	2.71	F	0.00	32	-	-	-	-	-	-	-
24.50	SPT/DS		45	(50/11 cm)	-	100	37	-																				
25.50	SPT/DS		48	(50/10 cm)	-	100	36	11.9	67.0	13.4	7.7	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							0.0	76.8	15.3	7.9	27	NP	NP	20.30	-	-	2.69	F	0.05	31	-	-	-	-	-	-	-
27.50	SPT/DS		46	(50/11 cm)	-	100	36	-																				
28.50	SPT/DS		49	(50/9 cm)	-	100	35	4.6	64.9	20.4	10.1	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.0	77.2	15.6	7.2	29	NP	NP	20.97	-	-	2.70	F	0.03	32	-	-	-	-	-	-	-
30.50	SPT/DS		(50/12 cm)	-	-	100	34	-																				

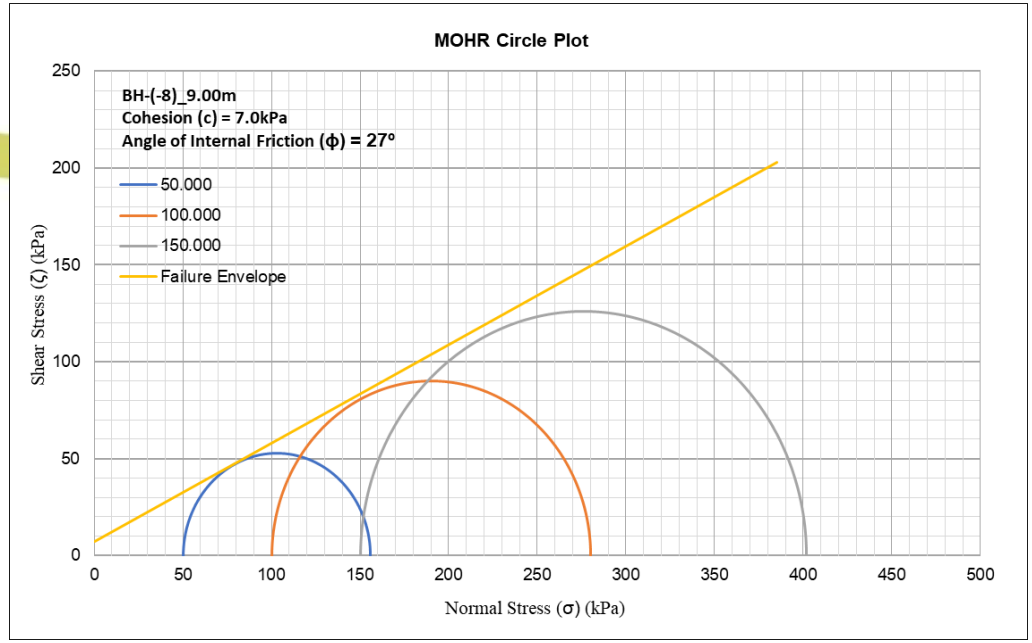
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

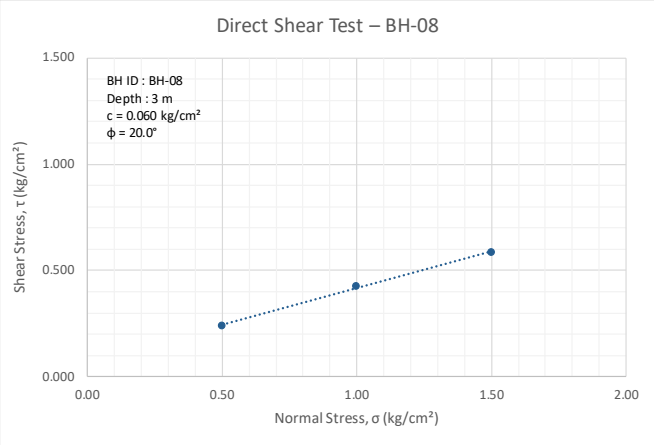

Grain Size Distribution Curve
BH-8_0.00m
BH-8_1.50m
BH-8_3.00m
BH-8_4.50m
BH-8_6.00m
BH-8_7.50m
BH-8_9.00m
Percent Finer (%)
Particle Size (mm)

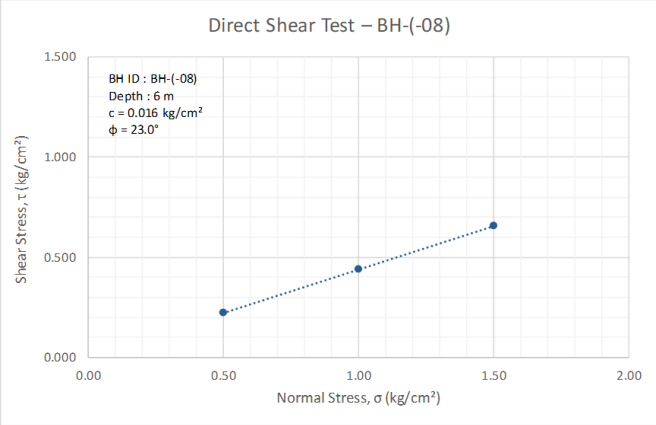

Grain Size Distribution Curve
BH-8_10.50m
BH-8_12.00m
BH-8_13.50m
BH-8_15.00m
BH-8_16.50m
BH-8_18.00m
BH-8_19.50m
Percent Finer (%)
Particle Size (mm)

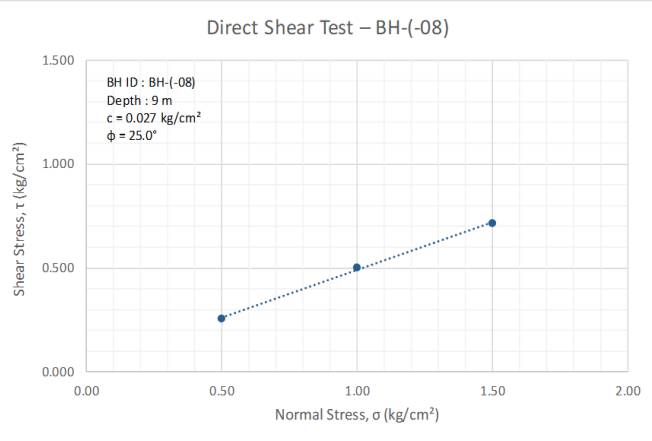

Grain Size Distribution Curve
BH-8_21.00m
BH-8_22.50m
BH-8_24.00m
BH-8_25.50m
BH-8_27.00m
BH-8_28.50m
BH-8_30.00m
Percent Finer (%)
Particle Size (mm)

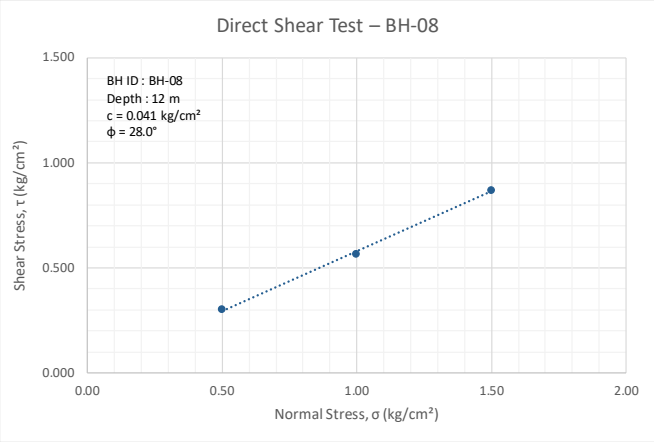

MOHR Circle Plot
BH-(-8)_6.00m
Cohesion (c) = 10.0kPa
Angle of Internal Friction (ϕ) = 24°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

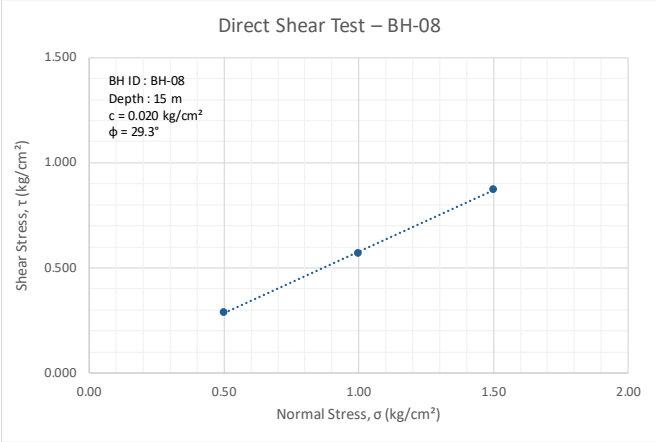

MOHR Circle Plot
BH-(-8)_9.00m
Cohesion (c) = 7.0kPa
Angle of Internal Friction (ϕ) = 27°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

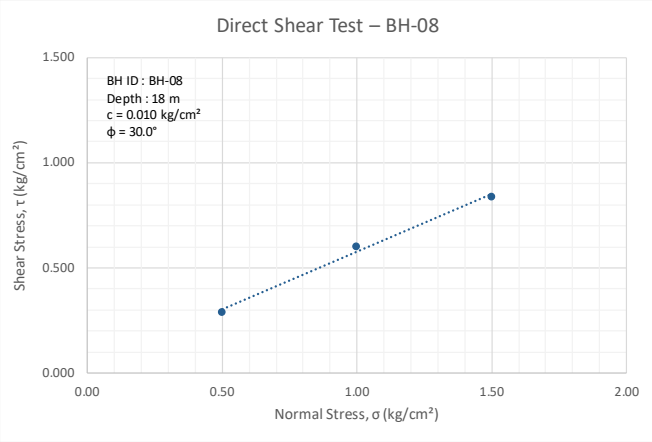

Direct Shear Test – BH-08
BH ID : BH-08
Depth : 3 m
c = 0.060 kg/cm²
ϕ = 20.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

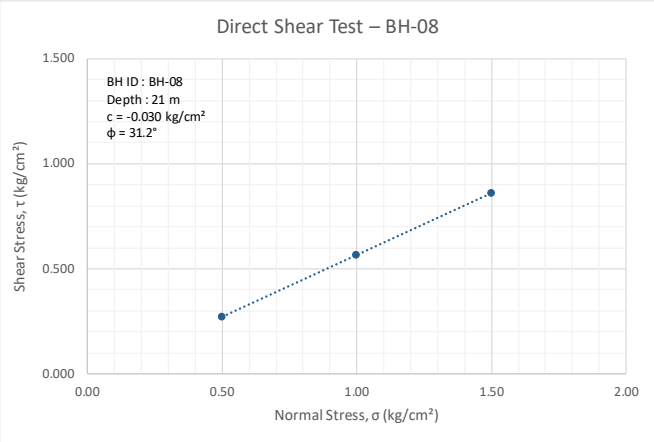

Direct Shear Test – BH-(-08)
BH ID : BH-(-08)
Depth : 6 m
c = 0.016 kg/cm²
ϕ = 23.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

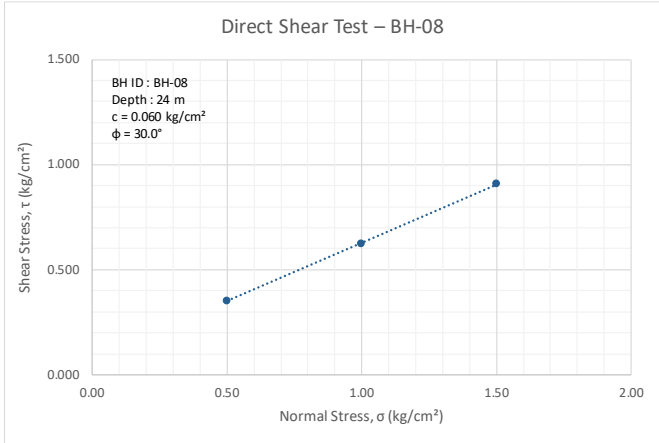

Direct Shear Test – BH-(-08)
BH ID : BH-(-08)
Depth : 9 m
c = 0.027 kg/cm²
ϕ = 25.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

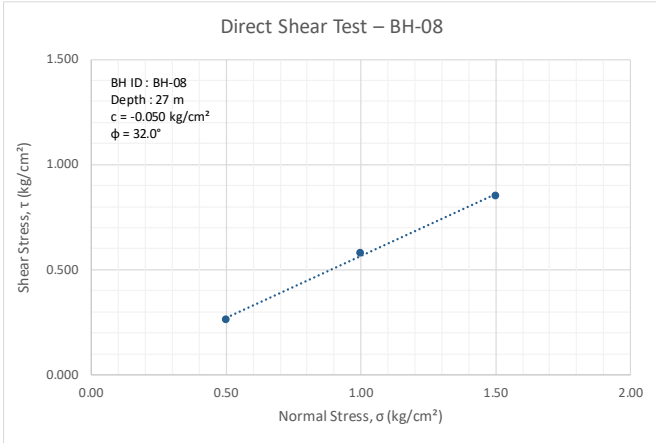

Direct Shear Test – BH-08
BH ID : BH-08
Depth : 12 m
c = 0.041 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

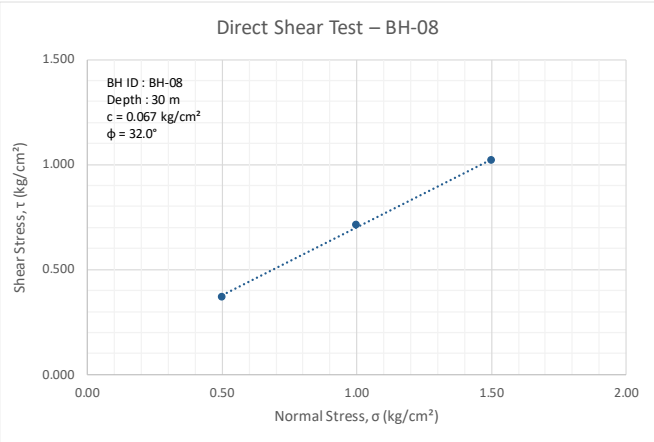

Direct Shear Test – BH-08
BH ID : BH-08
Depth : 15 m
c = 0.020 kg/cm²
ϕ = 29.3°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-08
BH ID : BH-08
Depth : 18 m
c = 0.010 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-08
BH ID : BH-08
Depth : 21 m
c = -0.030 kg/cm²
ϕ = 31.2°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-08
BH ID : BH-08
Depth : 24 m
c = 0.060 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-08
BH ID : BH-08
Depth : 27 m
c = -0.050 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

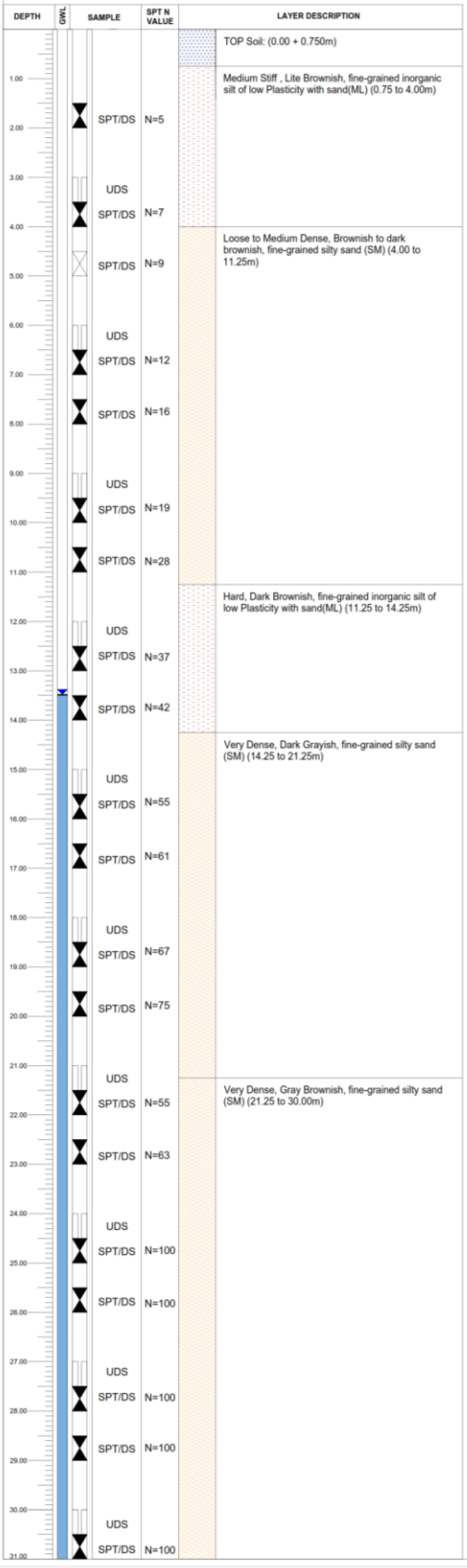

Direct Shear Test – BH-08
BH ID : BH-08
Depth : 30 m
c = 0.067 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (0-000 km TO 0-900 km)

BH ID : BH-(-6) | **Chainage** : 0-015 KM

Groundwater Level : 13.50 M | **Location** :Lat. 28.562889, Long. 77.333568



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

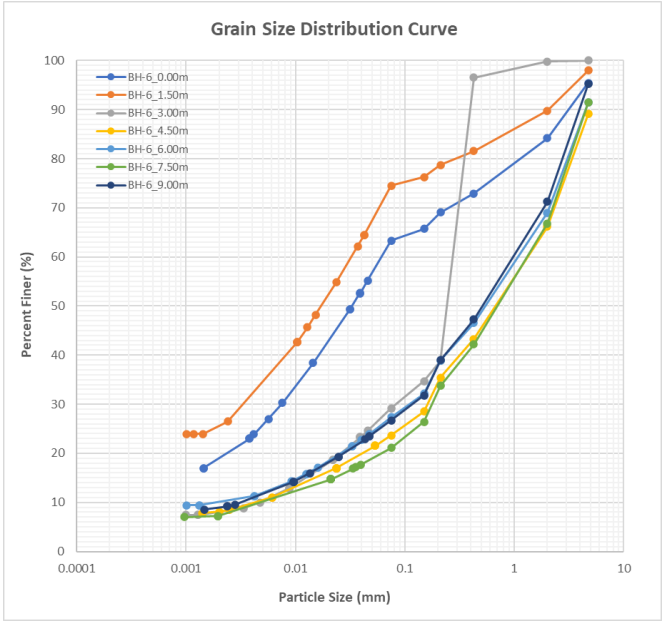
Soil

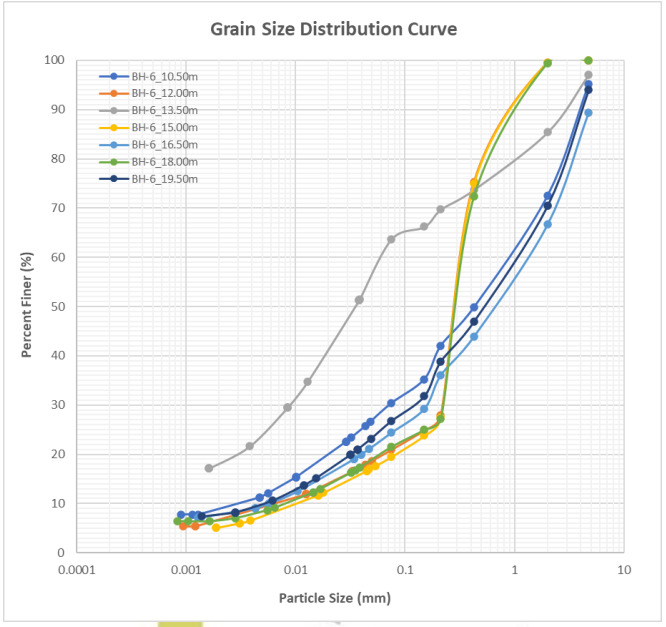
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

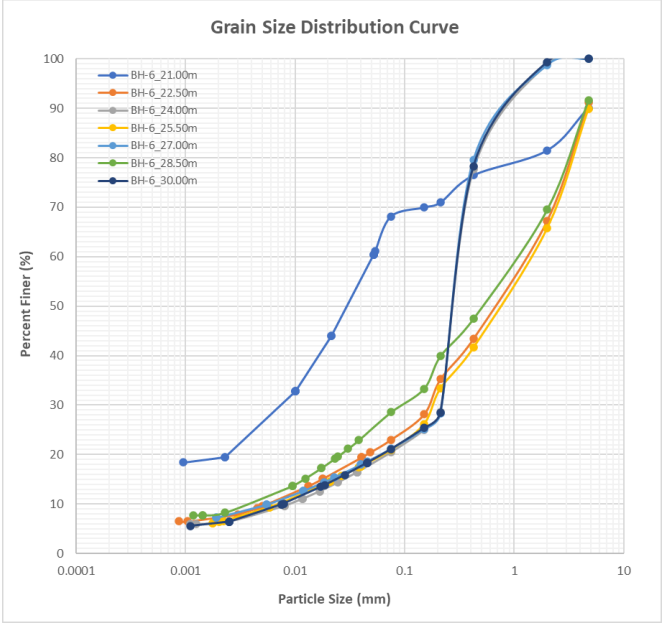
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-(-06)	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	0-015	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	09-03-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	198.2	**End Date:**	10-03-2026
Project Code:	158_R01_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	13.50	**Location:**	Lat. 28.562889, Long. 77.333568

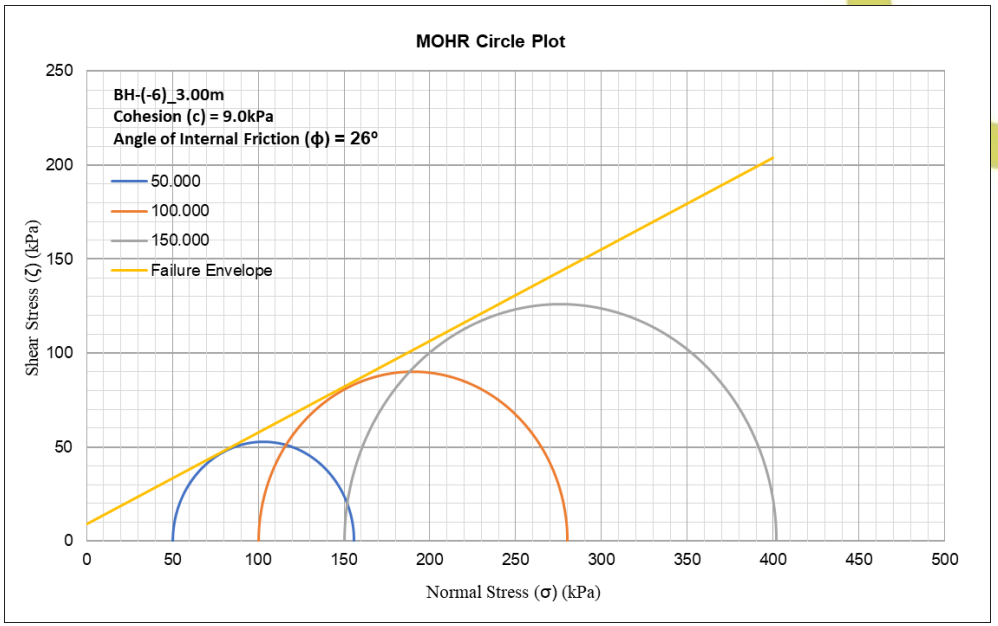
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						4.6	32.1	44.3	19.0	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Medium Stiff, Lite Brownish, fine-grained inorganic silt of low Plasticity with sand(ML)	2	2	3	5	7	2.0	23.5	48.9	25.6	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							0.0	70.8	21.1	8.1	26	NP	NP	16.32	1.86	1.60	2.63	F	0.05	20	UU	9	26	-	-	-
3.50	SPT/DS		2	3	4	7	8	-																			
4.50	SPT/DS	Loose to Medium Dense, Brownish to dark brownish, fine-grained silty sand (SM)	3	4	5	9	9	10.9	65.5	15.5	8.1	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	DS							8.6	64.1	17.2	10.1	26	NP	NP	17.60	-	-	2.61	F	0.02	23	-	-	-	-	-	-
6.50	SPT/DS		4	5	7	12	11	-																			
7.50	SPT/DS		3	7	9	16	15	8.6	70.3	13.8	7.3	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							4.8	68.6	17.7	8.9	28	NP	NP	18.53	1.93	1.63	2.63	F	0.02	25	UU	8	27	-	-	-
9.50	SPT/DS		7	9	10	19	16	-																			
10.50	SPT/DS		10	13	15	28	23	4.8	64.8	21.5	8.9	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS	Hard, Dark Brownish, fine-grained inorganic silt of low Plasticity with sand(ML)						0.0	79.1	14.1	6.8	21	NP	NP	18.58	-	-	2.76	F	0.08	26	-	-	-	-	-	-
12.50	SPT/DS		13	17	20	37	28	-																			
13.50	SPT/DS		15	19	23	42	23	2.9	33.3	45.4	18.3	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS	Very Dense, Dark Grayish, fine-grained silty sand (SM)						0.0	80.5	14.3	5.2	28	NP	NP	17.94	-	-	2.74	F	0.04	28	-	-	-	-	-	-
15.50	SPT/DS		20	25	30	55	26	-																			
16.50	SPT/DS		23	27	34	61	28	10.6	65.0	16.6	7.8	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS							0.0	78.5	14.8	6.7	24	NP	NP	16.99	-	-	2.67	F	0.01	29	-	-	-	-	-	-
18.50	SPT/DS		25	31	36	67	29	-																			
19.50	SPT/DS		29	35	40	75	32	6.0	67.2	19.0	7.8	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							9.9	21.9	48.8	19.3	27	NP	NP	21.47	-	-	2.71	F	0.00	30	-	-	-	-	-	-
21.50	SPT/DS	Very Dense, Gray Brownish, fine-grained silty sand (SM)	20	25	30	55	25	-																			
22.50	SPT/DS		24	29	34	63	27	8.9	68.1	15.7	7.4	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.0	79.5	14.2	6.3	28	NP	NP	15.64	-	-	2.64	F	0.00	31	-	-	-	-	-	-
24.50	SPT/DS		35	(50/12 cm)	-	100	37	-																			
25.50	SPT/DS		42	(50/10 cm)	-	100	37	10.1	69.0	14.5	6.4	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							0.0	78.8	13.8	7.3	24	NP	NP	14.85	-	-	2.69	F	0.06	30	-	-	-	-	-	-
27.50	SPT/DS		44	(50/9 cm)	-	100	36	-																			
28.50	SPT/DS		(50/13 cm)	-	-	100	35	8.4	63.0	20.5	8.1	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.0	78.9	14.9	6.2	28	NP	NP	14.77	-	-	2.63	F	0.03	31	-	-	-	-	-	-
30.50	SPT/DS		(50/11 cm)	-	-	100	34	-																			

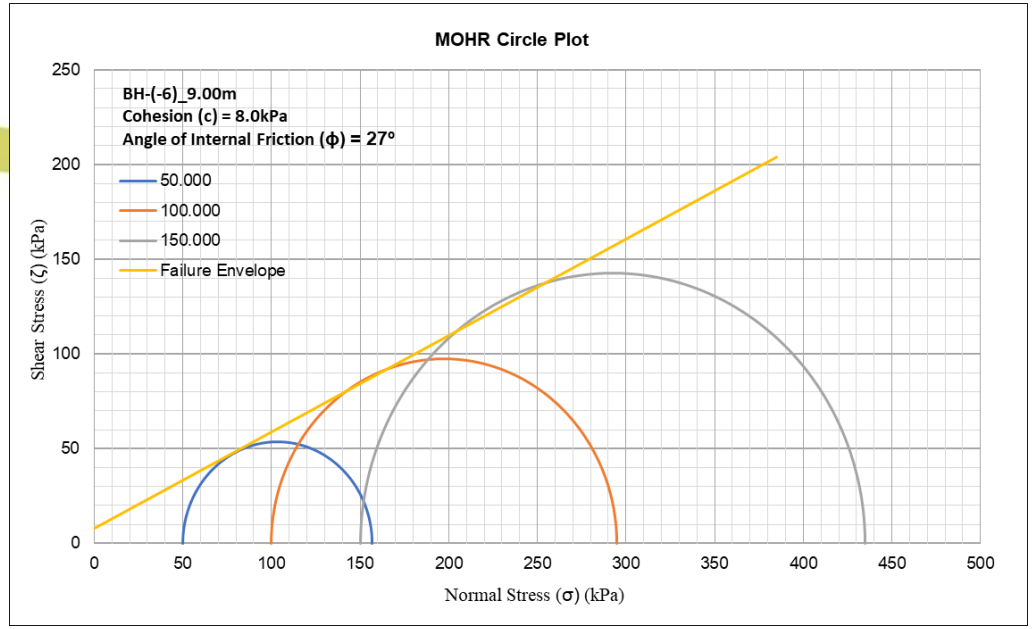
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

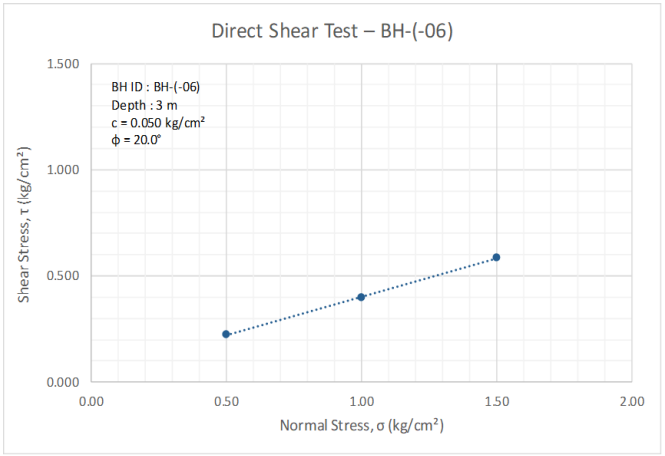

Grain Size Distribution Curve
BH-6_0.00m
BH-6_1.50m
BH-6_3.00m
BH-6_4.50m
BH-6_6.00m
BH-6_7.50m
BH-6_9.00m
Percent Finer (%)
Particle Size (mm)

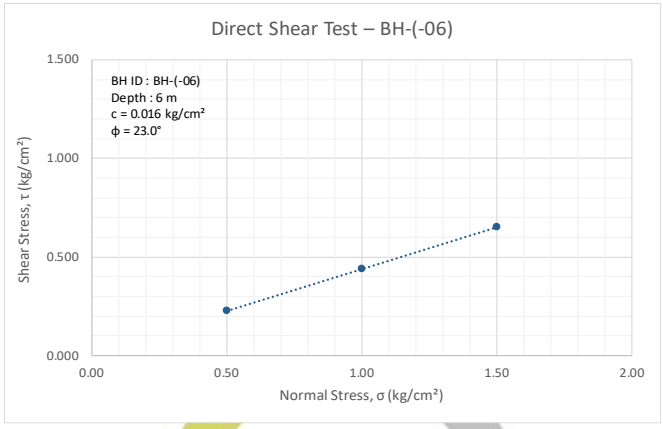

Grain Size Distribution Curve
BH-6_10.50m
BH-6_12.00m
BH-6_13.50m
BH-6_15.00m
BH-6_16.50m
BH-6_18.00m
BH-6_19.50m
Percent Finer (%)
Particle Size (mm)

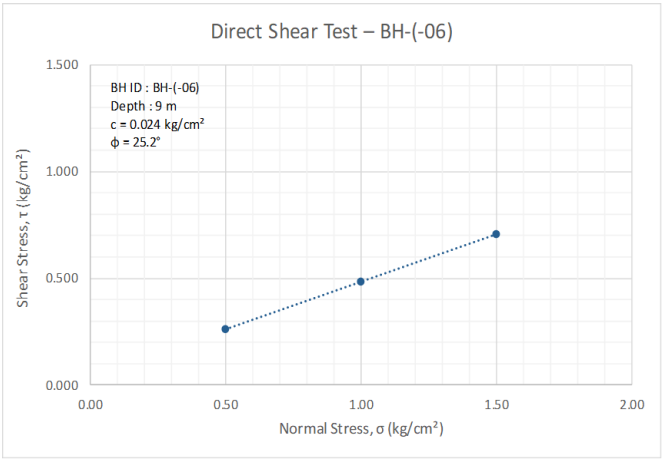

Grain Size Distribution Curve
BH-6_21.00m
BH-6_22.50m
BH-6_24.00m
BH-6_25.50m
BH-6_27.00m
BH-6_28.50m
BH-6_30.00m
Percent Finer (%)
Particle Size (mm)

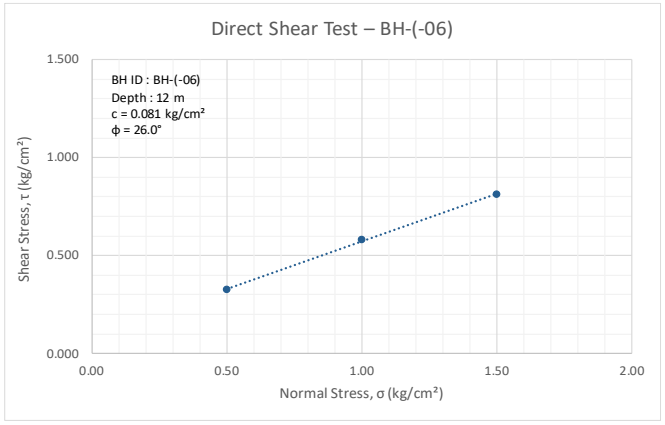

MOHR Circle Plot
BH-(-6)_3.00m
Cohesion (c) = 9.0kPa
Angle of Internal Friction (ϕ) = 26°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

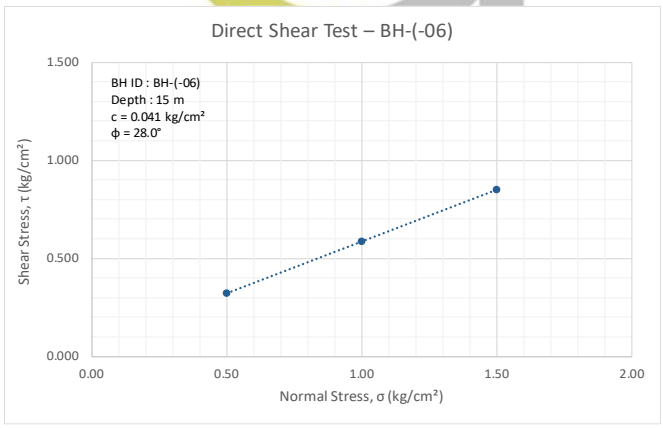

MOHR Circle Plot
BH-(-6)_9.00m
Cohesion (c) = 8.0kPa
Angle of Internal Friction (ϕ) = 27°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

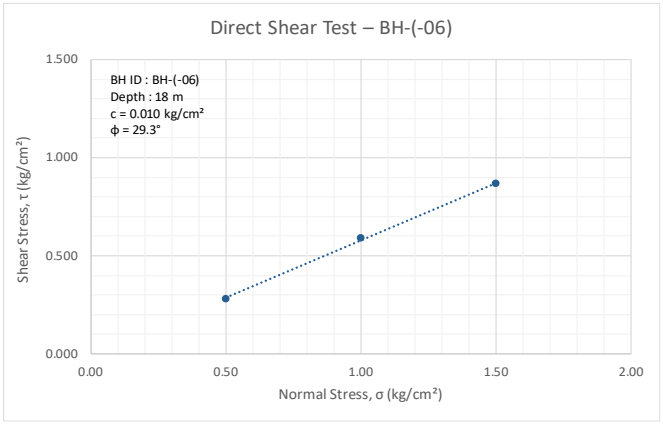

Direct Shear Test – BH-(-06)
BH ID : BH-(-06)
Depth : 3 m
c = 0.050 kg/cm²
ϕ = 20.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

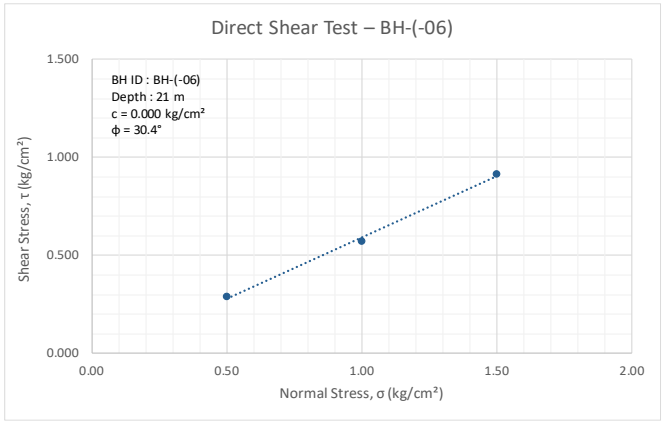

Direct Shear Test – BH-(-06)
BH ID : BH-(-06)
Depth : 6 m
c = 0.016 kg/cm²
ϕ = 23.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

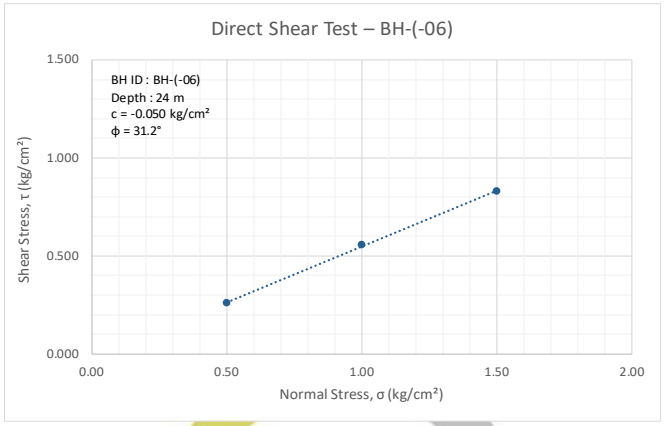

Direct Shear Test – BH-(-06)
BH ID : BH-(-06)
Depth : 9 m
c = 0.024 kg/cm²
ϕ = 25.2°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

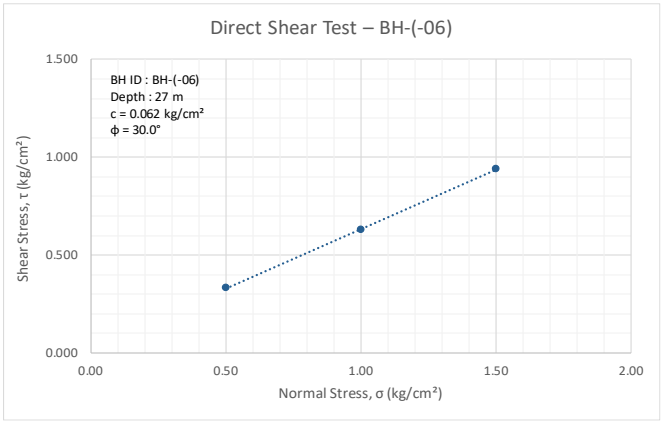

Direct Shear Test – BH-(-06)
BH ID : BH-(-06)
Depth : 12 m
c = 0.081 kg/cm²
ϕ = 26.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

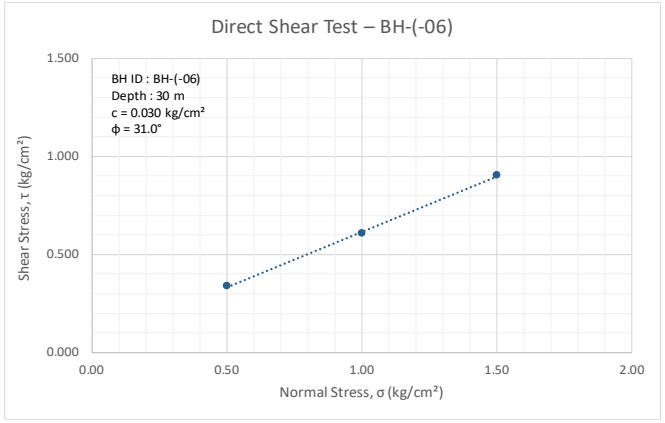

Direct Shear Test – BH-(-06)
BH ID : BH-(-06)
Depth : 15 m
c = 0.041 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-(-06)
BH ID : BH-(-06)
Depth : 18 m
c = 0.010 kg/cm²
ϕ = 29.3°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-(-06)
BH ID : BH-(-06)
Depth : 21 m
c = 0.000 kg/cm²
ϕ = 30.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-(-06)
BH ID : BH-(-06)
Depth : 24 m
c = -0.050 kg/cm²
ϕ = 31.2°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-(-06)
BH ID : BH-(-06)
Depth : 27 m
c = 0.062 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-(-06)
BH ID : BH-(-06)
Depth : 30 m
c = 0.030 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (0-000 km TO 0-900 km)

BH ID : BH-(-5) | **Chainage** : 0+094 KM

Groundwater Level : 13.50 M | **Location** :Lat. 28.563618, Long. 77.335657

DEPTH	GWL	SAMPLE	SPT N VALUE	LAYER DESCRIPTION
				TOP Soil: (0.00 + 0.750m)
1.00				Loose, Brownish, fine-grained silty sand (SM) (0.75 to 7.00m)
2.00		SPT/DS	N=6	
3.00		UDS		
4.00		SPT/DS	N=7	
5.00		SPT/DS	N=9	
6.00		UDS		
7.00		SPT/DS	N=10	
8.00		SPT/DS	N=16	Medium Dense, Brownish to yellowish, fine-grained silty sand with gravel (SM) (7.00 to 10.00m)
9.00		UDS		
10.00		SPT/DS	N=23	
11.00		SPT/DS	N=31	Dense to very Dense , Brownish to yellowish, fine-grained silty sand with gravel (SM) (10.00 to 20.25m)
12.00		UDS		
13.00		SPT/DS	N=35	
14.00		SPT/DS	N=43	
15.00		UDS		
16.00		SPT/DS	N=44	
17.00		SPT/DS	N=56	
18.00		UDS		
19.00		SPT/DS	N=41	
20.00		SPT/DS	N=56	
21.00		UDS		Very Dense, Brownish Gray to Brownish , fine-grained silty sand and Gravel (SM) (20.25 to 30.00m)
22.00		SPT/DS	N=59	
23.00		SPT/DS	N=66	
24.00		UDS		
25.00		SPT/DS	N=100	
26.00		SPT/DS	N=100	
27.00		UDS		
28.00		SPT/DS	N=100	
29.00		SPT/DS	N=100	
30.00		UDS		
31.00		SPT/DS	N=100	

LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

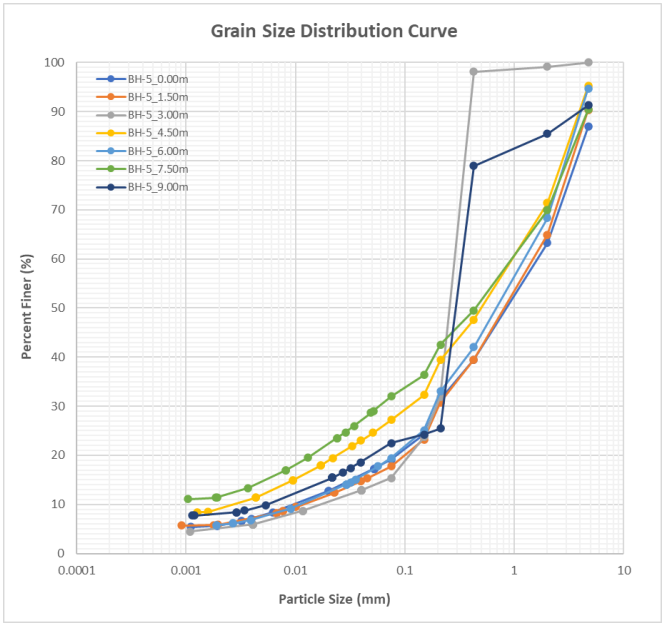
Soil

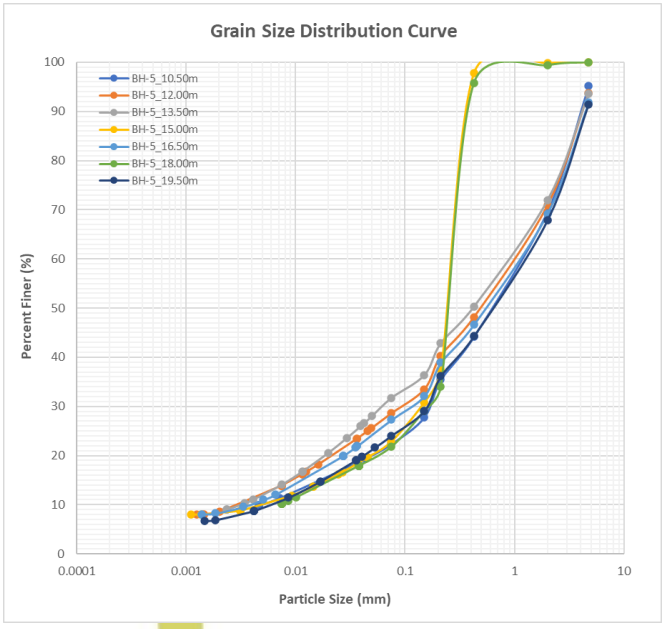
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

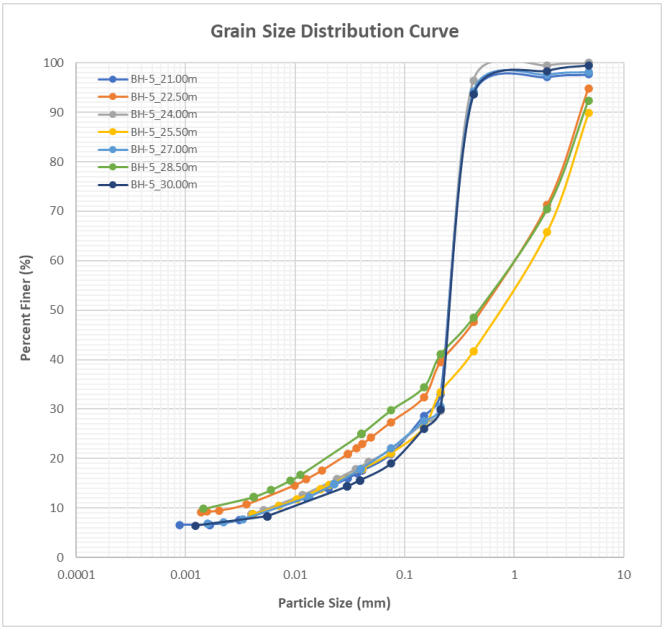
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-(-05)	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	0+094	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	13-03-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	200.2	**End Date:**	14-03-2026
Project Code:	158_R01_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	13.26	**Location:**	Lat. 28.563613, Long. 77.335658

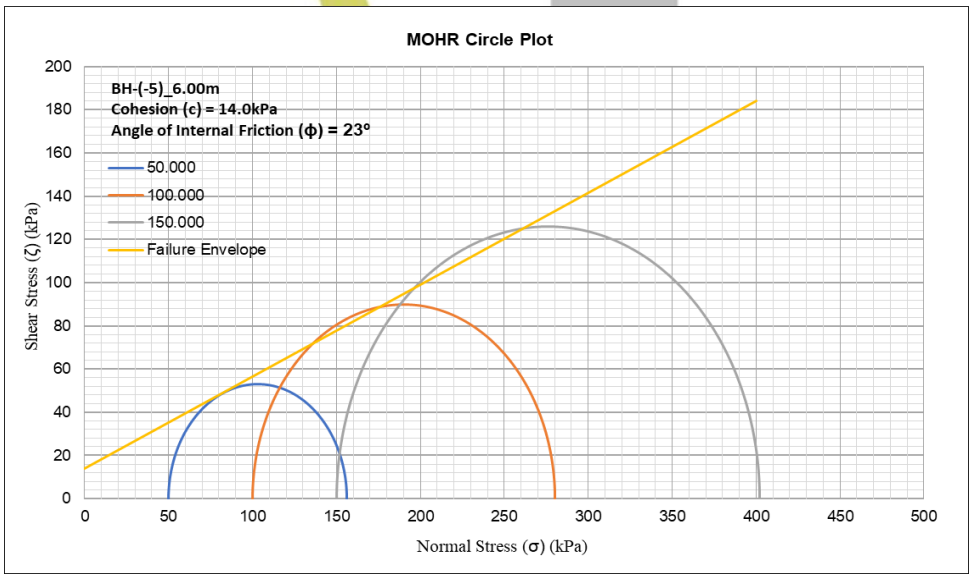
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						13.0	67.8	13.4	5.7	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Loose, Brownish, fine-grained silty sand (SM)	2	3	3	6	8	9.7	72.6	11.8	5.9	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							0.0	84.7	10.2	5.2	23	NP	NP	6.12	1.60	1.51	2.63	F	0.05	21	-	-	-	-	-	-
3.50	SPT/DS		2	3	4	7	8	-																			
4.50	SPT/DS		2	4	5	9	9	4.8	68.0	18.0	9.2	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS							5.3	75.2	13.6	5.8	28	NP	NP	9.31	1.88	1.72	2.64	F	0.04	23	UU	14	23	-	-	-
6.50	SPT/DS		3	4	6	10	9	-																			
7.50	SPT/DS	Medium Dense, Brownish to yellowish, fine-grained silty sand with gravel (SM)	4	7	9	16	15	9.6	58.4	20.5	11.5	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							8.7	68.8	14.4	8.1	26	NP	NP	15.26	1.79	1.56	2.67	F	0.03	26	-	-	-	-	-	-
9.50	SPT/DS		7	10	13	23	20	-																			
10.50	SPT/DS	Dense to very Dense, Brownish to yellowish, fine-grained silty sand with gravel (SM)	9	14	17	31	25	4.9	72.8	15.2	7.1	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	UDS							6.3	65.2	20.0	8.6	27	NP	NP	19.54	1.92	1.61	2.61	F	0.04	28	UU	11	25	-	-	-
12.50	SPT/DS		12	15	20	35	26	-																			
13.50	SPT/DS		14	19	24	43	31	6.4	61.9	23.2	8.5	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.0	77.1	14.6	8.3	21	NP	NP	21.16	-	-	2.61	F	0.03	29	-	-	-	-	-	-
15.50	SPT/DS		17	20	24	44	22	-																			
16.50	SPT/DS		20	25	31	56	26	8.2	64.5	18.9	8.4	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS							0.0	78.2	17.1	4.7	26	NP	NP	14.54	-	-	2.76	F	0.07	29	-	-	-	-	-	-
18.50	SPT/DS		15	19	22	41	21	-																			
19.50	SPT/DS		19	23	27	50	23	8.5	67.4	17.0	7.1	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS	Very Dense, Brownish Gray to Brownish, fine-grained silty sand and Gravel (SM)						2.3	76.8	14.0	6.9	23	NP	NP	15.54	-	-	2.68	F	0.02	30	-	-	-	-	-	-
21.50	SPT/DS		23	27	32	59	26	-																			
22.50	SPT/DS		26	31	35	66	27	5.1	67.5	17.9	9.5	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.0	78.1	15.2	6.7	21	NP	NP	14.97	-	-	2.72	F	0.00	31	-	-	-	-	-	-
24.50	SPT/DS		38	(50/6 cm)	-	100	37	-																			
25.50	SPT/DS		(50/7 cm)	-	-	100	36	10.2	68.7	16.0	5.1	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							1.9	76.1	14.9	7.1	27	NP	NP	14.17	-	-	2.63	F	0.06	30	-	-	-	-	-	-
27.50	SPT/DS		42	(50/10 cm)	-	100	36	-																			
28.50	SPT/DS		46	(50/9 cm)	-	100	35	7.6	62.6	19.2	10.6	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.5	80.5	11.9	7.0	26	NP	NP	14.86	-	-	2.62	F	0.03	32	-	-	-	-	-	-
30.50	SPT/DS		(50/5 cm)	-	-	100	34	-																			

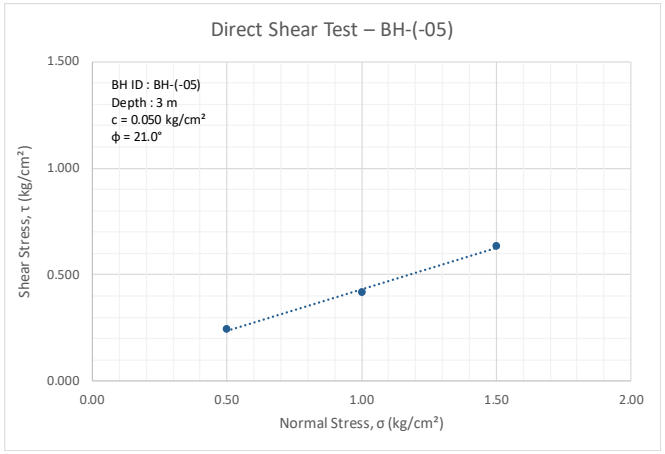
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

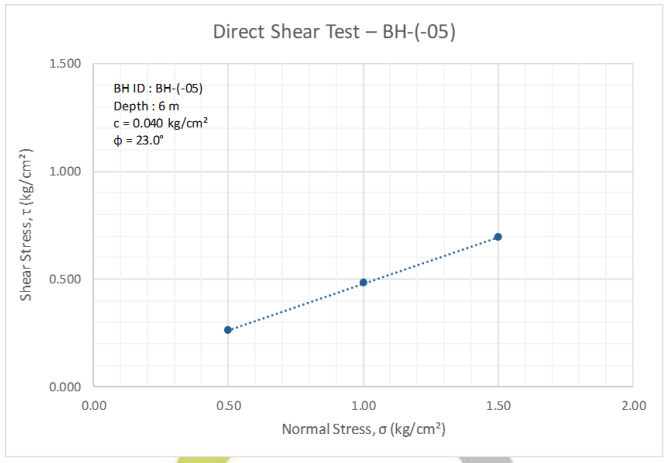

Grain Size Distribution Curve
BH-5_0.00m
BH-5_1.50m
BH-5_3.00m
BH-5_4.50m
BH-5_6.00m
BH-5_7.50m
BH-5_9.00m
Percent Finer (%)
Particle Size (mm)

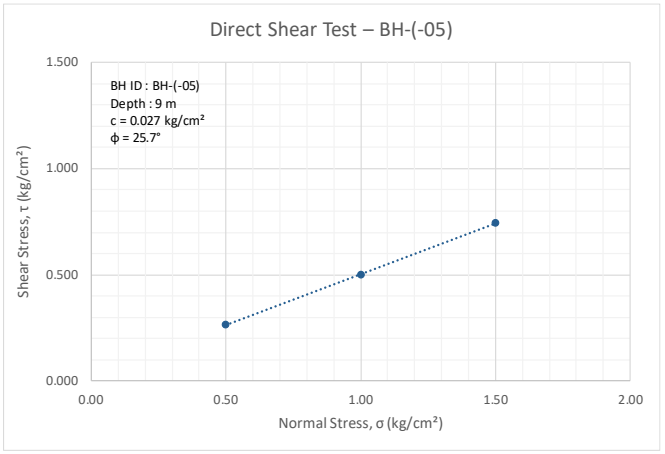

Grain Size Distribution Curve
BH-5_10.50m
BH-5_12.00m
BH-5_13.50m
BH-5_15.00m
BH-5_16.50m
BH-5_18.00m
BH-5_19.50m
Percent Finer (%)
Particle Size (mm)

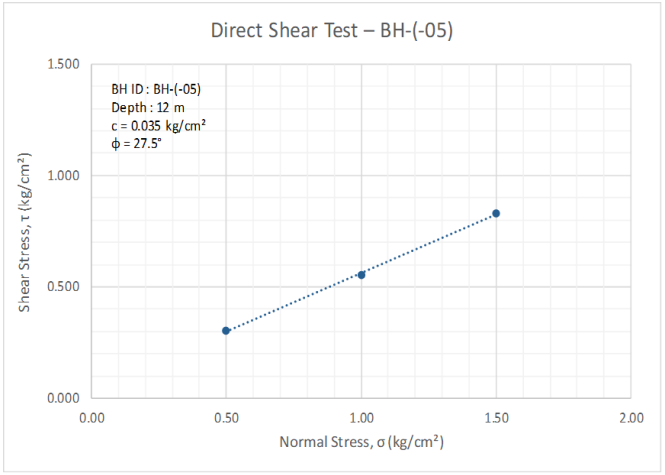

Grain Size Distribution Curve
BH-5_21.00m
BH-5_22.50m
BH-5_24.00m
BH-5_25.50m
BH-5_27.00m
BH-5_28.50m
BH-5_30.00m
Percent Finer (%)
Particle Size (mm)

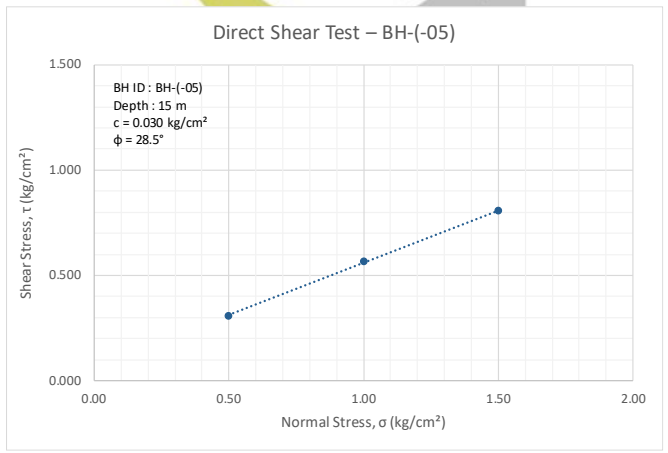

MOHR Circle Plot
BH-(-5)_6.00m
Cohesion (c) = 14.0kPa
Angle of Internal Friction (ϕ) = 23°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

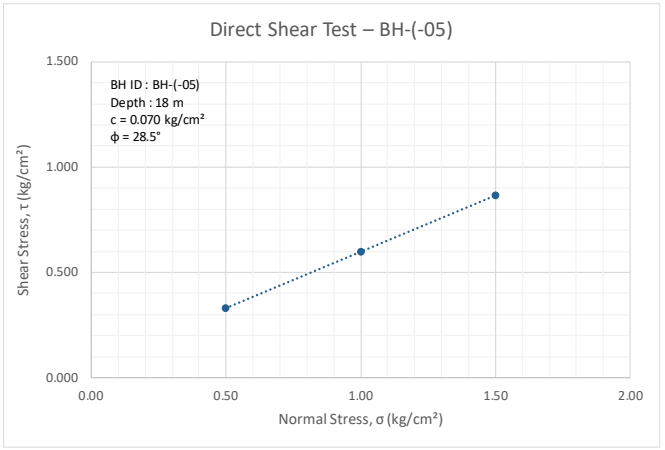

Direct Shear Test – BH-(-05)
BH ID : BH-(-05)
Depth : 3 m
c = 0.050 kg/cm²
ϕ = 21.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

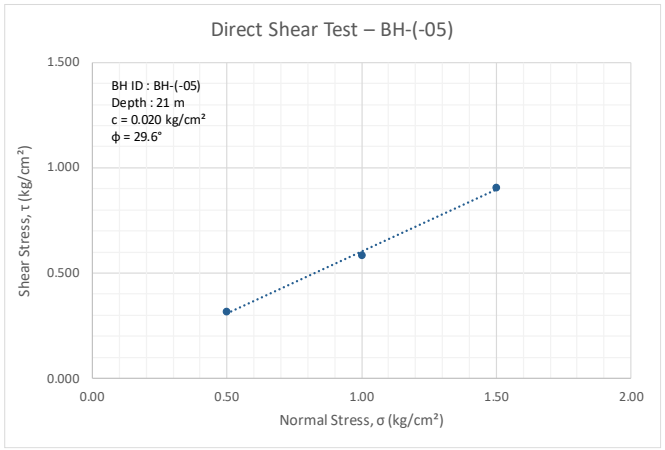

Direct Shear Test – BH-(-05)
BH ID : BH-(-05)
Depth : 6 m
c = 0.040 kg/cm²
ϕ = 23.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

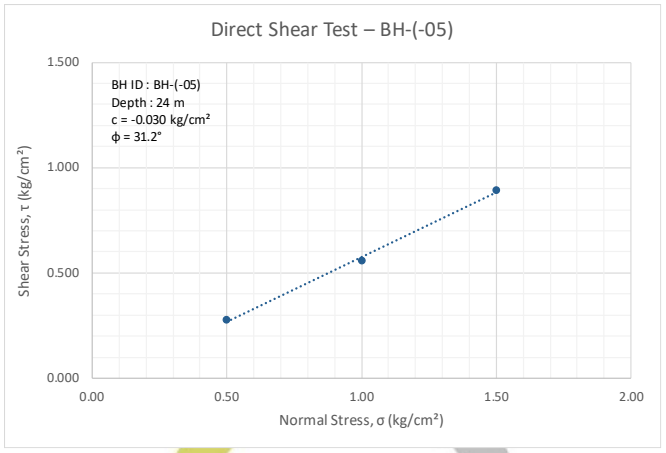

Direct Shear Test – BH-(-05)
BH ID : BH-(-05)
Depth : 9 m
c = 0.027 kg/cm²
ϕ = 25.7°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

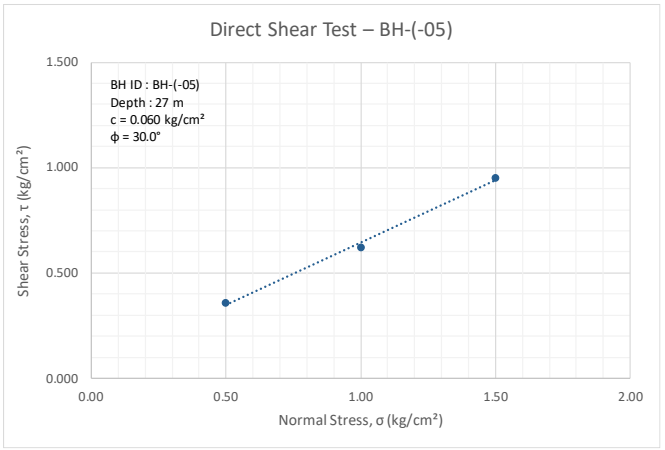

Direct Shear Test – BH-(-05)
BH ID : BH-(-05)
Depth : 12 m
c = 0.035 kg/cm²
ϕ = 27.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

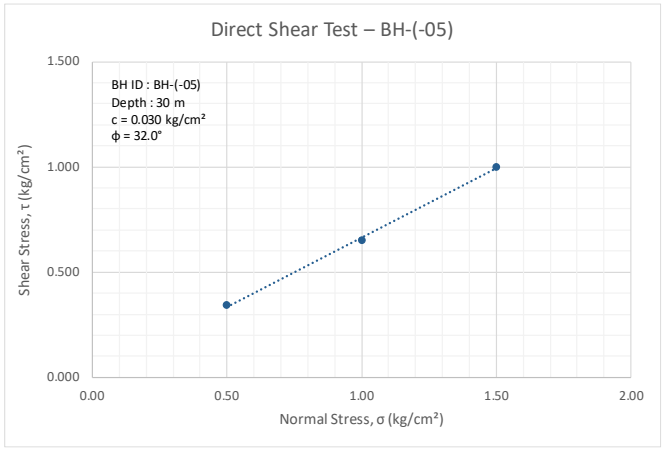

Direct Shear Test – BH-(-05)
BH ID : BH-(-05)
Depth : 15 m
c = 0.030 kg/cm²
ϕ = 28.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-(-05)
BH ID : BH-(-05)
Depth : 18 m
c = 0.070 kg/cm²
ϕ = 28.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-(-05)
BH ID : BH-(-05)
Depth : 21 m
c = 0.020 kg/cm²
ϕ = 29.6°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-(-05)
BH ID : BH-(-05)
Depth : 24 m
c = -0.030 kg/cm²
ϕ = 31.2°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-(-05)
BH ID : BH-(-05)
Depth : 27 m
c = 0.060 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

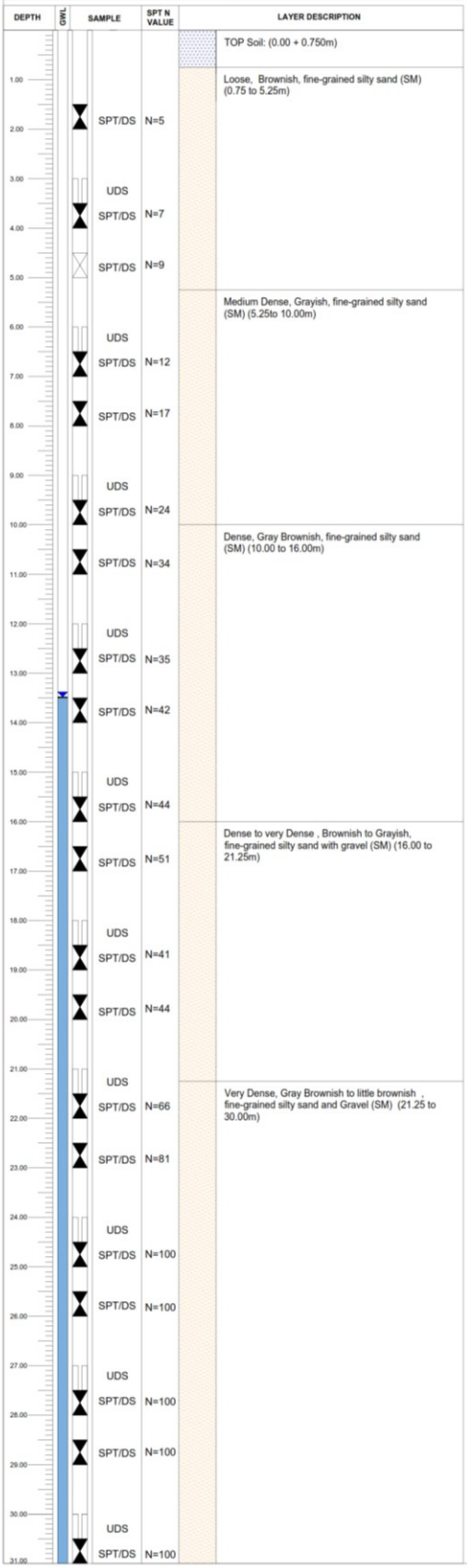

Direct Shear Test – BH-(-05)
BH ID : BH-(-05)
Depth : 30 m
c = 0.030 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (0-000 km TO 0-900 km)

BH ID : BH-(-3) | **Chainage** : 0+344 KM

Groundwater Level : 13.50 M | **Location** :Lat. 28.562115, Long. 77.337382



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

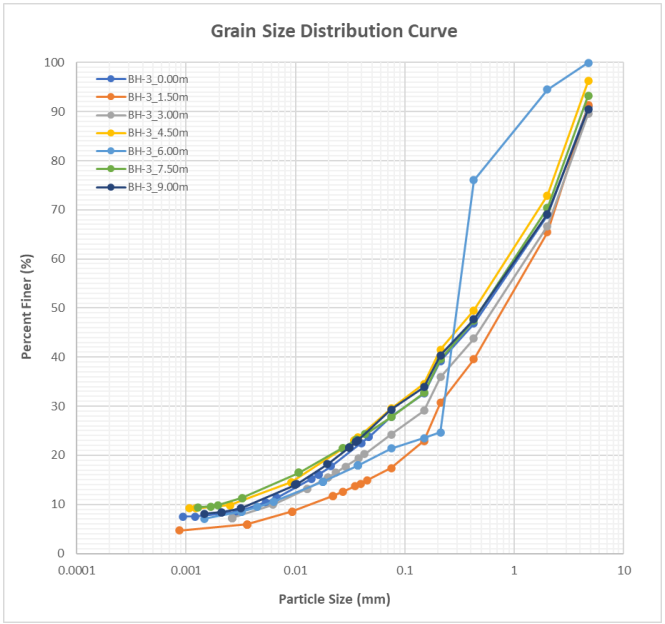
Soil

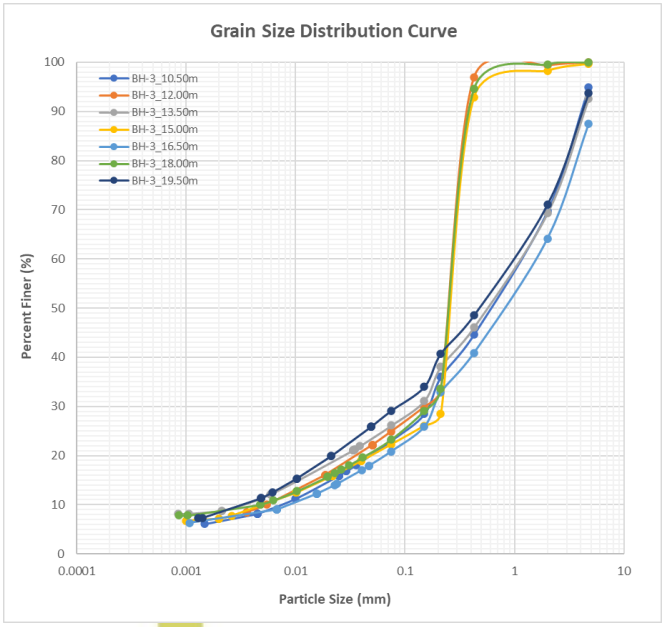
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

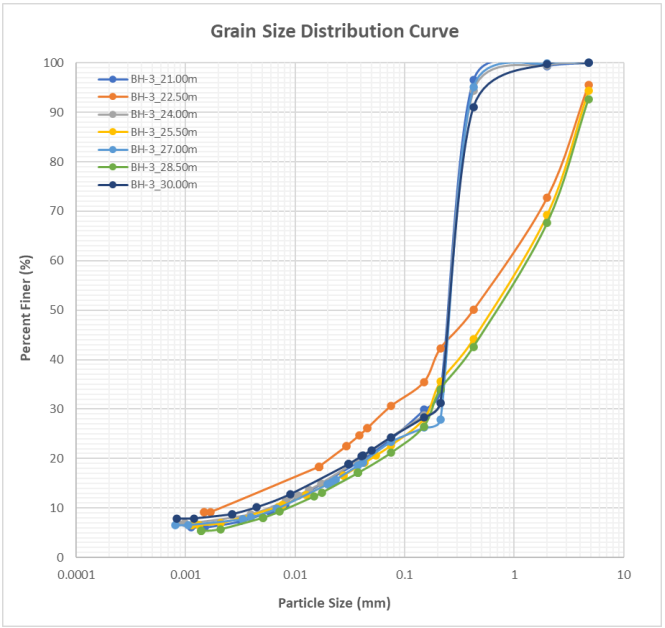
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-(-03)	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	0+344	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	14-03-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	197.7	**End Date:**	14-03-2026
Project Code:	158_R01_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	13.50	**Location:**	Lat. 28.562119, Long. 77.337383

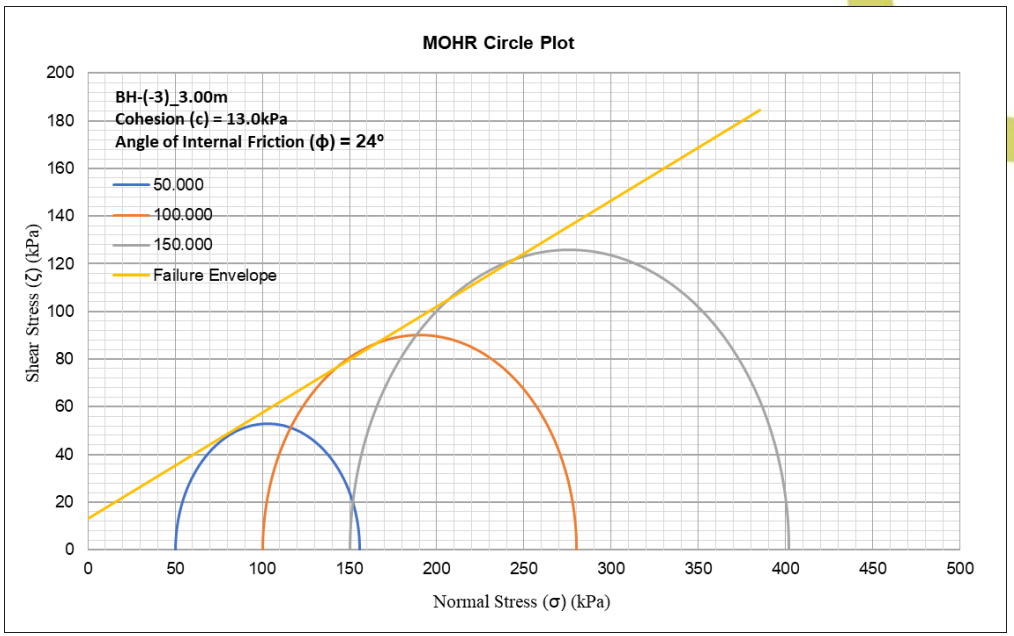
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						9.0	63.1	19.8	8.0	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Loose, Brownish, fine-grained silty sand (SM)	2	2	3	5	7	8.7	73.9	12.0	5.4	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							10.5	65.3	23.2	1.0	24	NP	NP	14.9	1.85	1.61	2.62	F	0.05	20	UU	13	24	-	-	-
3.50	SPT/DS		2	3	4	7	8	-																			
4.50	SPT/DS		3	4	5	9	9	3.8	66.7	19.9	9.6	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	DS	Medium Dense, Grayish, fine-grained silty sand (SM)						0.1	78.5	13.7	7.7	29	NP	NP	17.30	-	-	2.74	F	0.02	22	-	-	-	-	-	-
6.50	SPT/DS		4	5	7	12	11	-																			
7.50	SPT/DS		5	7	10	17	15	6.8	65.4	17.9	9.9	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							9.5	61.2	21.0	8.3	29	NP	NP	18.33	1.87	1.58	2.69	F	0.03	25	UU	12	26	-	-	-
9.50	SPT/DS		7	10	14	24	20	-																			
10.50	SPT/DS	Dense, Gray Brownish, fine-grained silty sand (SM)	10	15	19	34	28	5.1	71.8	16.4	6.7	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							0.0	75.1	15.6	9.3	24	NP	NP	20.55	-	-	2.69	F	0.02	27	-	-	-	-	-	-
12.50	SPT/DS		12	15	20	35	26	-																			
13.50	SPT/DS		14	19	23	42	30	7.5	66.4	17.5	8.7	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.3	77.4	15.1	7.2	27	NP	NP	18.87	-	-	2.65	F	0.03	28	-	-	-	-	-	-
15.50	SPT/DS		15	20	24	44	22	-																			
16.50	SPT/DS	Dense to very Dense, Brownish to Grayish, fine-grained silty sand with gravel (SM)	17	22	29	51	25	12.5	66.7	13.6	7.2	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS							0.0	76.7	14.5	8.8	28	NP	NP	32.57	-	-	2.62	F	0.06	29	-	-	-	-	-	-
18.50	SPT/DS		12	19	22	41	21	-																			
19.50	SPT/DS		15	20	24	44	21	6.3	64.6	20.7	8.5	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							0.0	76.0	17.4	6.6	27	NP	NP	20.20	-	-	2.73	F	0.01	30	-	-	-	-	-	-
21.50	SPT/DS	Very Dense, Gray Brownish to little brownish, fine-grained silty sand and Gravel (SM)	24	30	36	66	28	-																			
22.50	SPT/DS		30	37	44	81	32	4.5	64.9	20.7	9.9	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.0	75.7	16.6	7.8	23	NP	NP	19.12	-	-	2.66	F	0.05	30	-	-	-	-	-	-
24.50	SPT/DS		40	(50/13 cm)	-	100	37	-																			
25.50	SPT/DS		46	(50/11 cm)	-	100	36	5.7	71.7	15.8	6.9	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							0.0	76.7	16.2	7.2	26	NP	NP	19.91	-	-	2.64	F	0.06	31	-	-	-	-	-	-
27.50	SPT/DS		48	(50/8 cm)	-	100	36	-																			
28.50	SPT/DS		(50/12 cm)	-	-	100	35	7.3	71.5	15.5	5.7	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.0	75.7	15.9	8.4	24	NP	NP	21.62	-	-	2.77	F	0.00	32	-	-	-	-	-	-
30.50	SPT/DS		(50/10 cm)	-	-	100	34	-																			

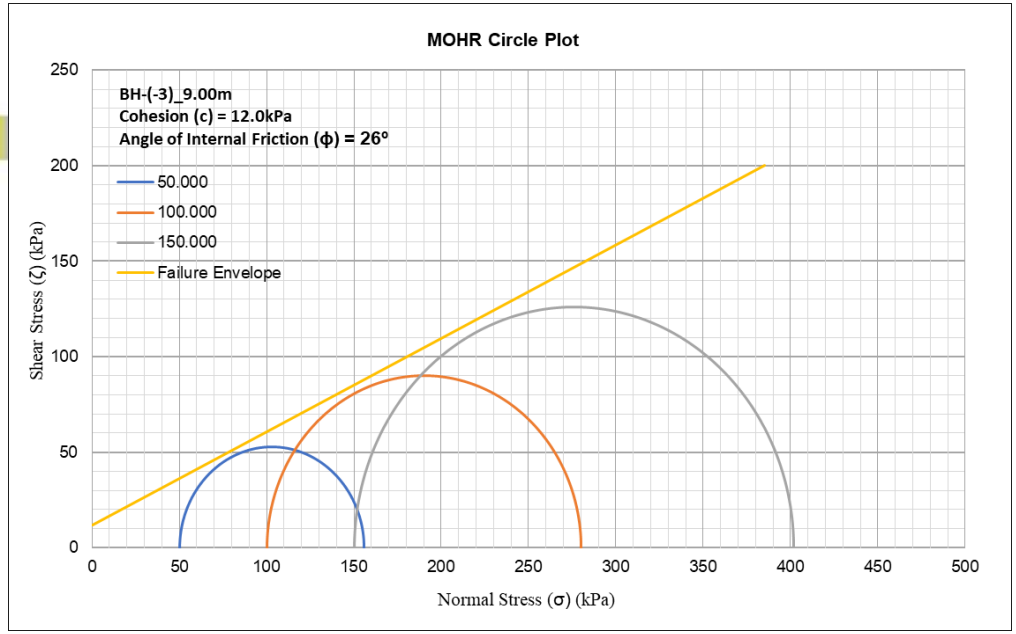
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

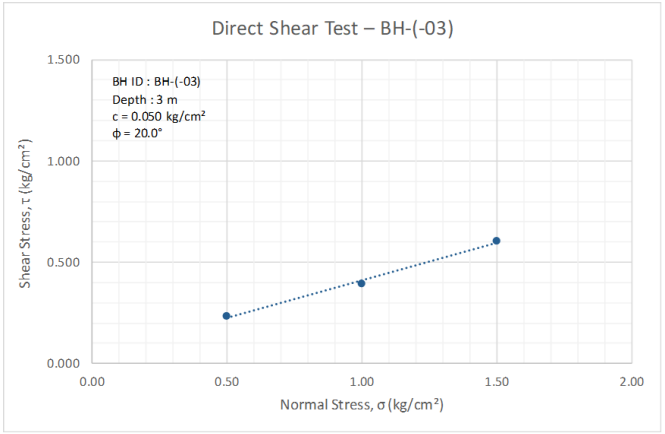

Grain Size Distribution Curve
BH-3_0.00m
BH-3_1.50m
BH-3_3.00m
BH-3_4.50m
BH-3_6.00m
BH-3_7.50m
BH-3_9.00m
Percent Finer (%)
Particle Size (mm)

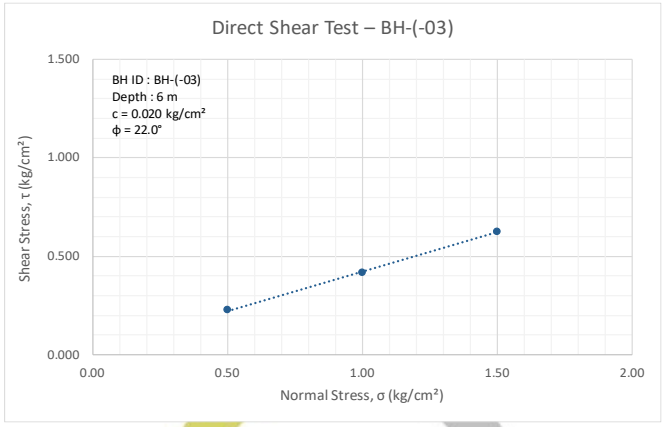

Grain Size Distribution Curve
BH-3_10.50m
BH-3_12.00m
BH-3_13.50m
BH-3_15.00m
BH-3_16.50m
BH-3_18.00m
BH-3_19.50m
Percent Finer (%)
Particle Size (mm)

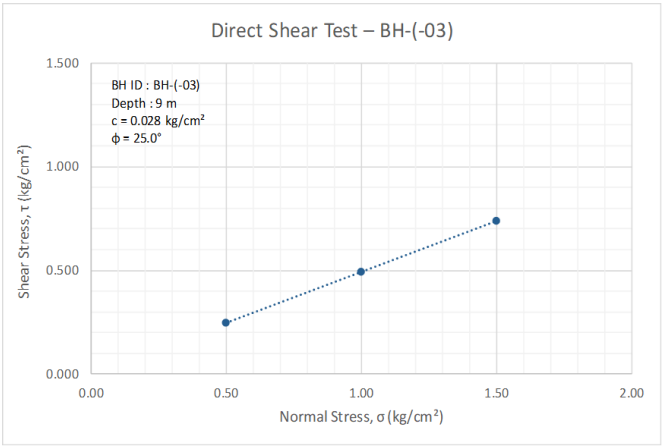

Grain Size Distribution Curve
BH-3_21.00m
BH-3_22.50m
BH-3_24.00m
BH-3_25.50m
BH-3_27.00m
BH-3_28.50m
BH-3_30.00m
Percent Finer (%)
Particle Size (mm)

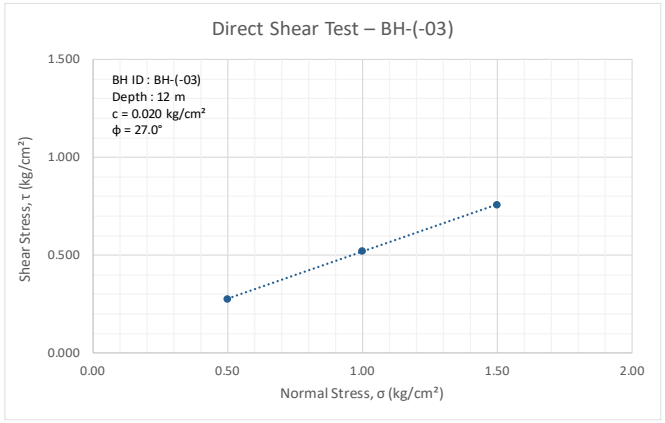

MOHR Circle Plot
BH-(-3)_3.00m
Cohesion (c) = 13.0kPa
Angle of Internal Friction (ϕ) = 24°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

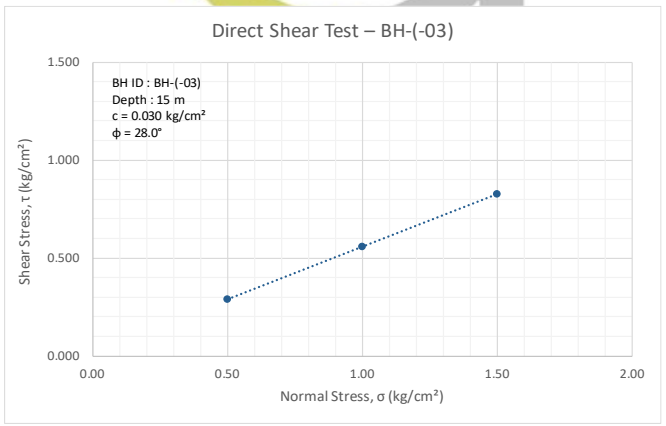

MOHR Circle Plot
BH-(-3)_9.00m
Cohesion (c) = 12.0kPa
Angle of Internal Friction (ϕ) = 26°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

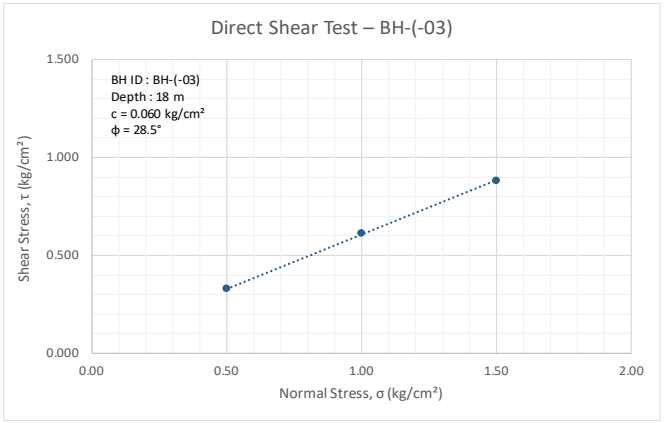

Direct Shear Test – BH-(-03)
BH ID : BH-(-03)
Depth : 3 m
c = 0.050 kg/cm²
ϕ = 20.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

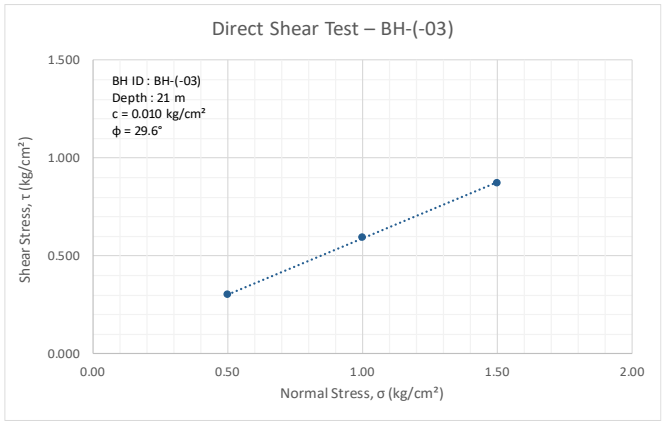

Direct Shear Test – BH-(-03)
BH ID : BH-(-03)
Depth : 6 m
c = 0.020 kg/cm²
ϕ = 22.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

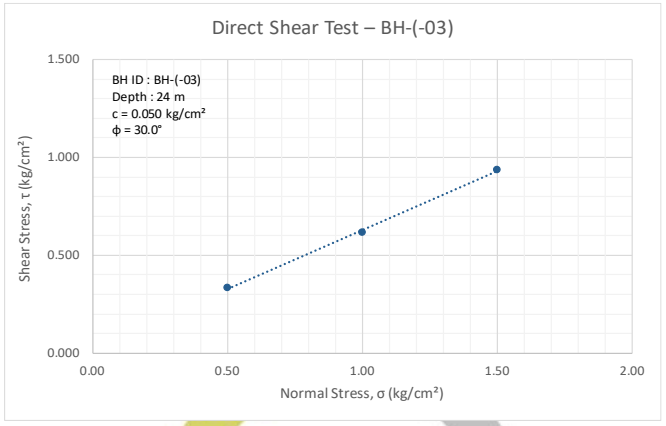

Direct Shear Test – BH-(-03)
BH ID : BH-(-03)
Depth : 9 m
c = 0.028 kg/cm²
ϕ = 25.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

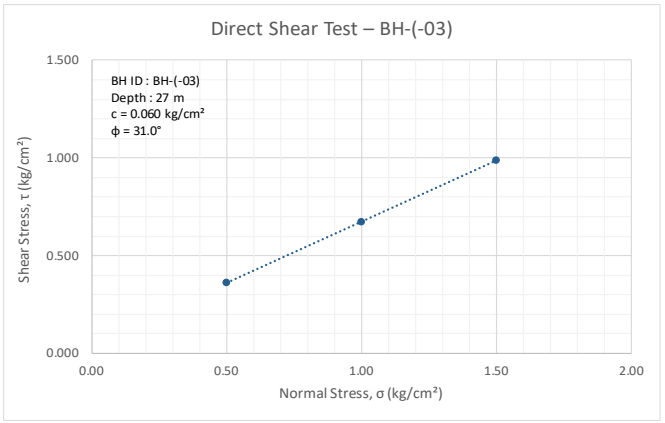

Direct Shear Test – BH-(-03)
BH ID : BH-(-03)
Depth : 12 m
c = 0.020 kg/cm²
ϕ = 27.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

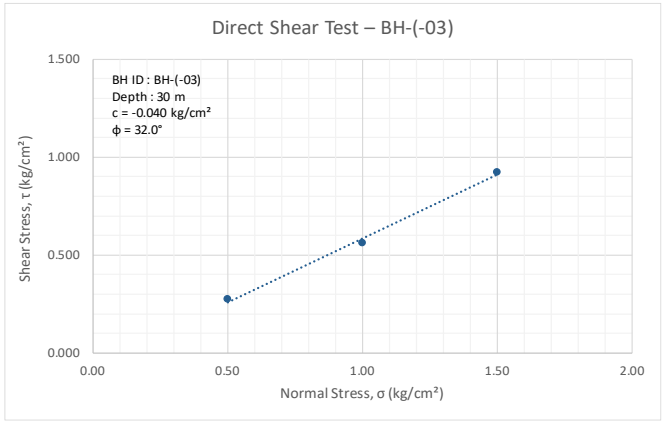

Direct Shear Test – BH-(-03)
BH ID : BH-(-03)
Depth : 15 m
c = 0.030 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-(-03)
BH ID : BH-(-03)
Depth : 18 m
c = 0.060 kg/cm²
ϕ = 28.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-(-03)
BH ID : BH-(-03)
Depth : 21 m
c = 0.010 kg/cm²
ϕ = 29.6°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-(-03)
BH ID : BH-(-03)
Depth : 24 m
c = 0.050 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-(-03)
BH ID : BH-(-03)
Depth : 27 m
c = 0.060 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

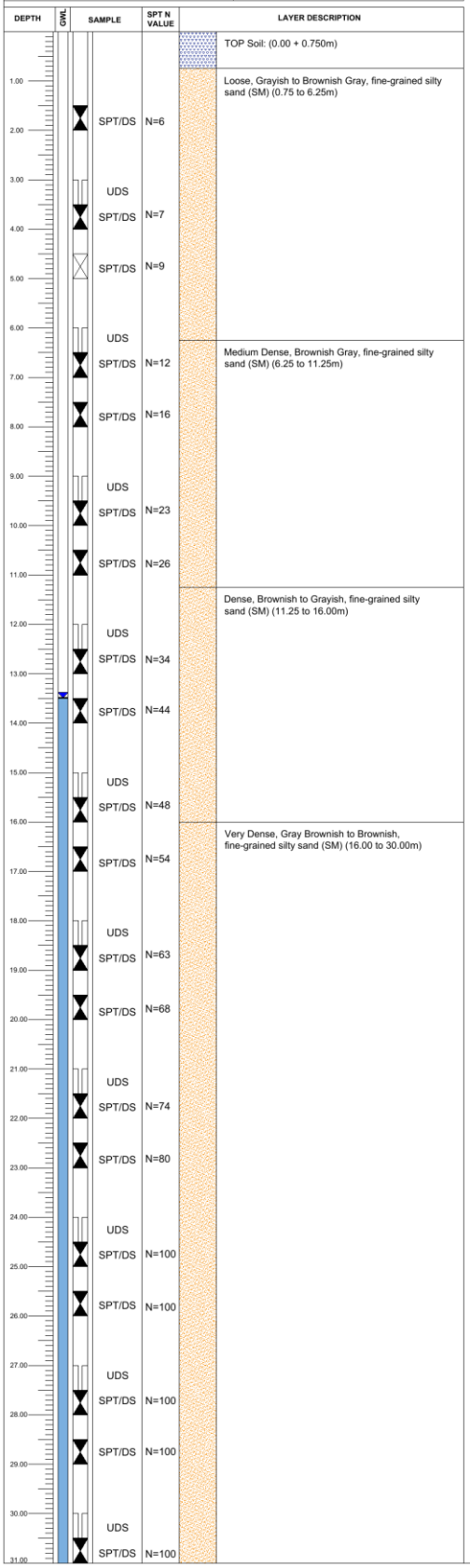

Direct Shear Test – BH-(-03)
BH ID : BH-(-03)
Depth : 30 m
c = -0.040 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (0-000 km TO 0-900 km)

BH ID : BH-(-2) | **Chainage** : 0+499 KM

Groundwater Level : 13.5 M | **Location** :Lat. 28.560881, Long. 77.337345



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

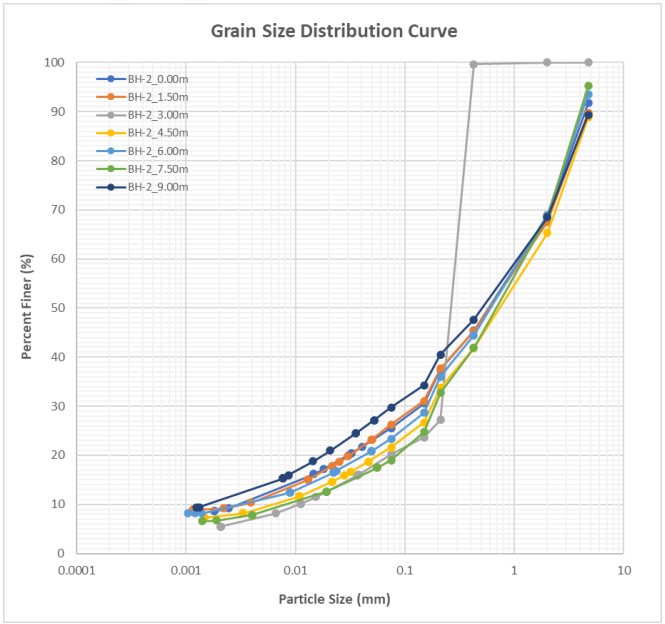
Soil

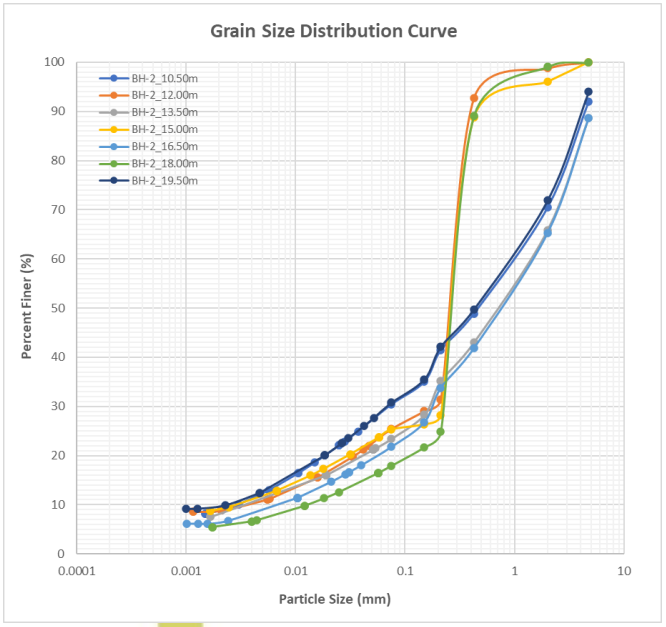
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

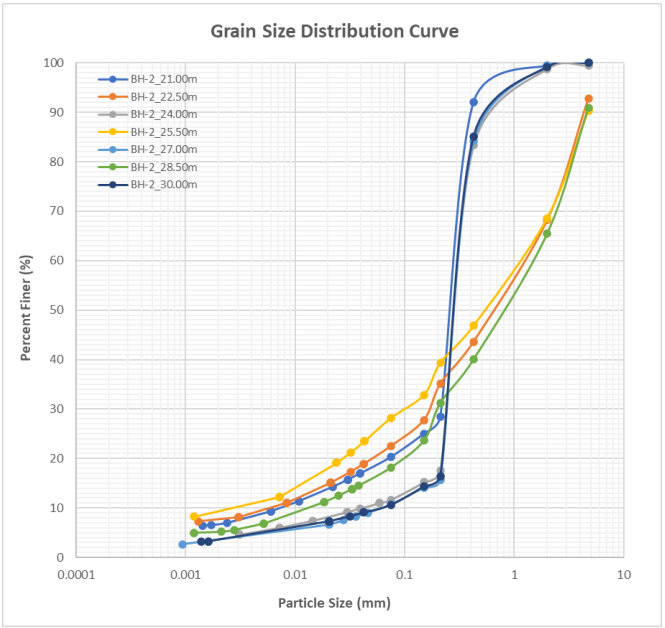
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-(-02)	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	0+499	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	12-03-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	203.30	**End Date:**	13-03-2026
Project Code:	158_R01_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	13.20	**Location:**	Lat.28.560881 , Long. 77.337345

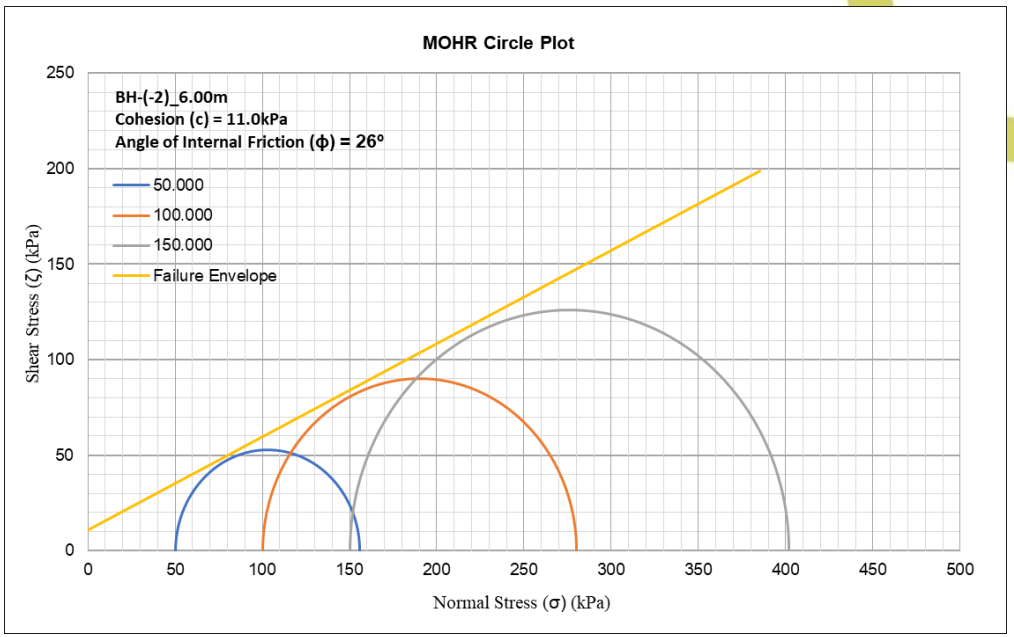
Depth [m]	Sample Type	Descriptions		SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
				N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil	TS						8.3	66.2	16.7	8.8	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Loose, Grayish to Brownish Gray, fine-grained silty sand (SM)	SM	2	3	3	6	8	10.2	63.5	17.1	9.1	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS		SM						0.0	79.7	14.8	5.5	24	NP	NP	24.24	1.65	1.33	2.73	F	0.05	21	-	-	-	-	-	-
3.50	SPT/DS		SM	2	3	4	7	8	-																			
4.50	SPT/DS		SM	3	4	5	9	9	11.2	67.2	14.0	7.7	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS		SM						6.5	70.2	14.4	9.0	22	NP	NP	21.50	1.88	1.55	2.6	F	0.02	23	UU	11	26	-	-	-
6.50	SPT/DS	Medium Dense, Brownish Gray, fine-grained silty sand (SM)	SM1	4	5	7	12	11	-																			
7.50	SPT/DS		SM1	5	7	9	16	15	4.8	76.2	12.3	6.8	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS		SM1						10.7	59.5	19.0	10.8	28	NP	NP	20.84	1.9	1.57	2.63	F	0.03	25	UU	8	27	-	-	-
9.50	SPT/DS		SM1	7	10	13	23	20	-																			
10.50	SPT/DS		SM1	9	11	15	26	21	8.0	61.6	21.6	8.8	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS	Dense, Brownish to Grayish, fine-grained silty sand (SM)	SM2						0.0	74.6	16.6	8.8	23	NP	NP	20.91	-	-	2.62	F	0.02	27	-	-	-	-	-	-
12.50	SPT/DS		SM2	12	15	19	34	26	-																			
13.50	SPT/DS		SM2	15	20	24	44	32	11.3	65.3	15.2	8.2	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS		SM2						0.0	74.7	16.2	9.1	23	NP	NP	19.81	-	-	2.64	F	0.03	28	-	-	-	-	-	-
15.50	SPT/DS		SM2	17	22	26	48	24	-																			
16.50	SPT/DS	Very Dense, Gray Brownish to Brownish, fine-grained silty sand (SM)	SM3	20	24	30	54	26	11.3	67.0	15.3	6.5	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS		SM3						0.0	82.1	12.2	5.7	29	NP	NP	12.74	-	-	2.75	F	0.00	29	-	-	-	-	-	-
18.50	SPT/DS		SM3	25	29	34	63	28	-																			
19.50	SPT/DS		SM3	29	31	37	68	29	6.0	63.3	21.0	9.8	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS		SM3						0.0	79.7	13.6	6.7	26	NP	NP	15.77	-	-	2.69	F	0.01	30	-	-	-	-	-	-
21.50	SPT/DS		SM3	30	35	39	74	30	-																			
22.50	SPT/DS		SM3	34	38	42	80	32	7.2	70.3	14.8	7.7	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS		SM3						0.5	87.8	11.7	0.0	28	NP	NP	6.73	-	-	2.63	F	0.06	31	-	-	-	-	-	-
24.50	SPT/DS		SM3	45	(50/10 cm)	-	100	37	-																			
25.50	SPT/DS		SM3	27	(50/13 cm)	-	100	36	9.7	62.1	18.8	9.4	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS		SM3						0.0	89.3	10.7	0.0	22	NP	NP	6.42	-	-	2.69	F	0.00	32	-	-	-	-	-	-
27.50	SPT/DS		SM3	38	(50/11 cm)	-	100	36	-																			
28.50	SPT/DS		SM3	46	(50/8 cm)	-	100	35	9.1	72.7	13.0	5.2	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS		SM3						0.0	89.4	10.6	0.0	27	NP	NP	6.49	-	-	2.62	F	0.06	31	-	-	-	-	-	-
30.50	SPT/DS		SM3	(50/13 cm)	-	-	100	34	-																			

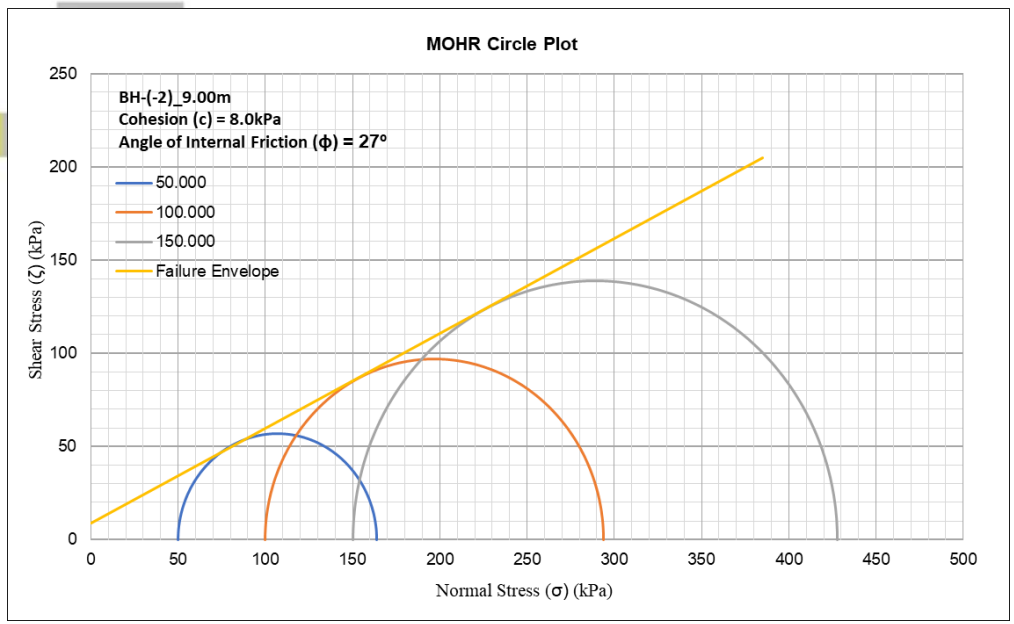
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

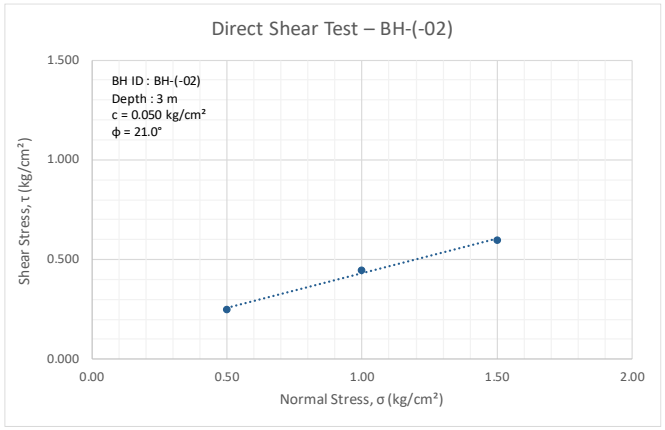

Grain Size Distribution Curve
BH-2_0.00m
BH-2_1.50m
BH-2_3.00m
BH-2_4.50m
BH-2_6.00m
BH-2_7.50m
BH-2_9.00m
Percent Finer (%)
Particle Size (mm)

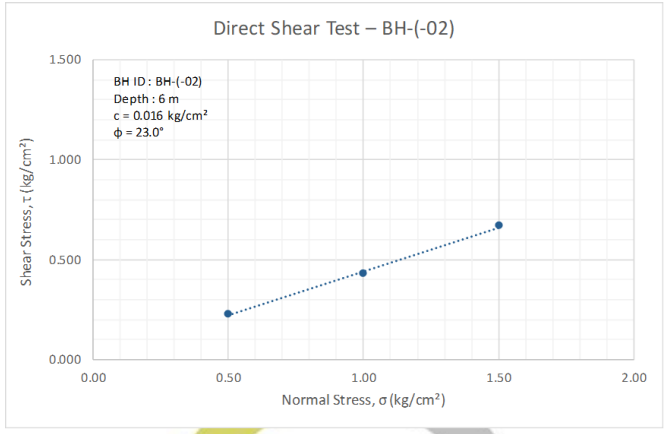

Grain Size Distribution Curve
BH-2_10.50m
BH-2_12.00m
BH-2_13.50m
BH-2_15.00m
BH-2_16.50m
BH-2_18.00m
BH-2_19.50m
Percent Finer (%)
Particle Size (mm)

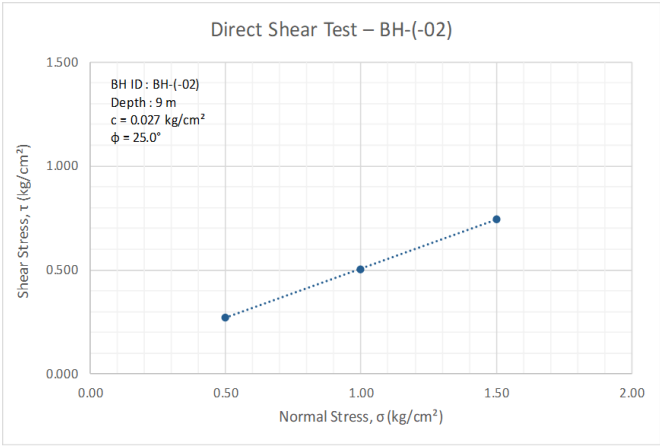

Grain Size Distribution Curve
BH-2_21.00m
BH-2_22.50m
BH-2_24.00m
BH-2_25.50m
BH-2_27.00m
BH-2_28.50m
BH-2_30.00m
Percent Finer (%)
Particle Size (mm)

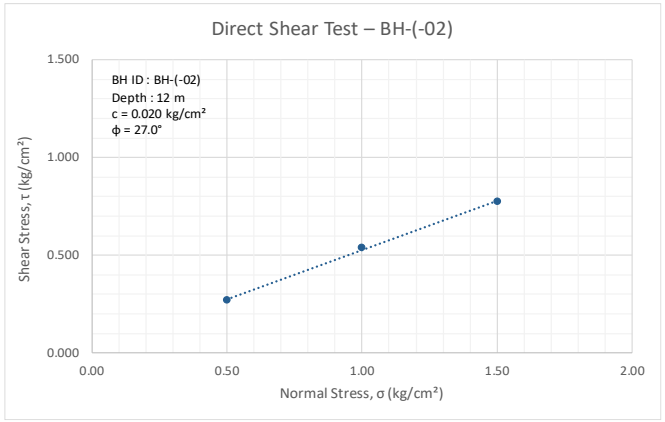

MOHR Circle Plot
BH-(-2)_6.00m
Cohesion (c) = 11.0kPa
Angle of Internal Friction (ϕ) = 26°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

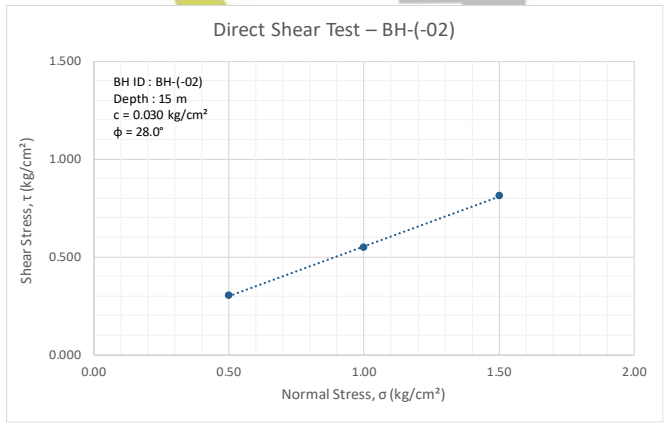

MOHR Circle Plot
BH-(-2)_9.00m
Cohesion (c) = 8.0kPa
Angle of Internal Friction (ϕ) = 27°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

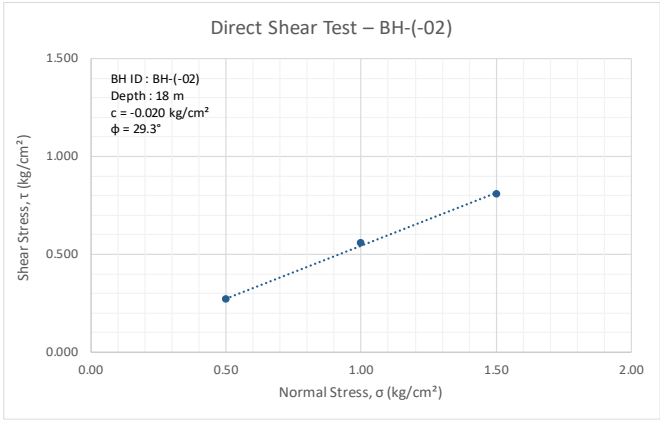

Direct Shear Test – BH-(-02)
BH ID : BH-(-02)
Depth : 3 m
c = 0.050 kg/cm²
ϕ = 21.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

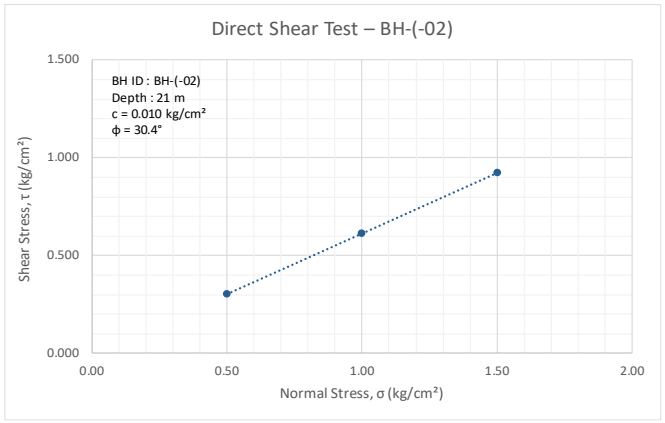

Direct Shear Test – BH-(-02)
BH ID : BH-(-02)
Depth : 6 m
c = 0.016 kg/cm²
ϕ = 23.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

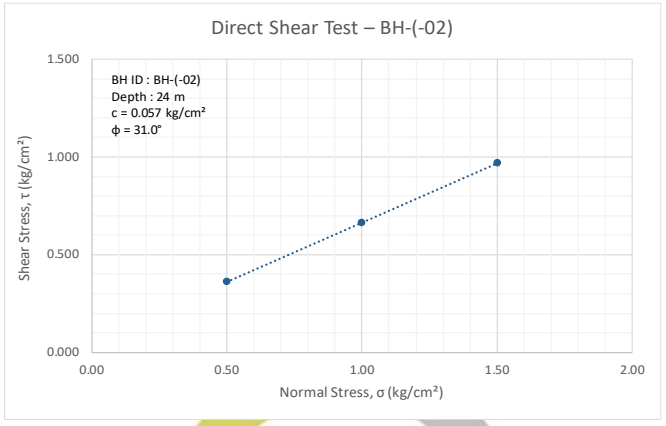

Direct Shear Test – BH-(-02)
BH ID : BH-(-02)
Depth : 9 m
c = 0.027 kg/cm²
ϕ = 25.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

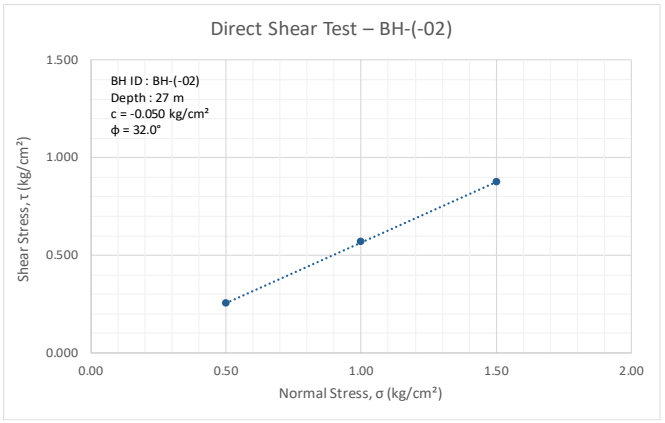

Direct Shear Test – BH-(-02)
BH ID : BH-(-02)
Depth : 12 m
c = 0.020 kg/cm²
ϕ = 27.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

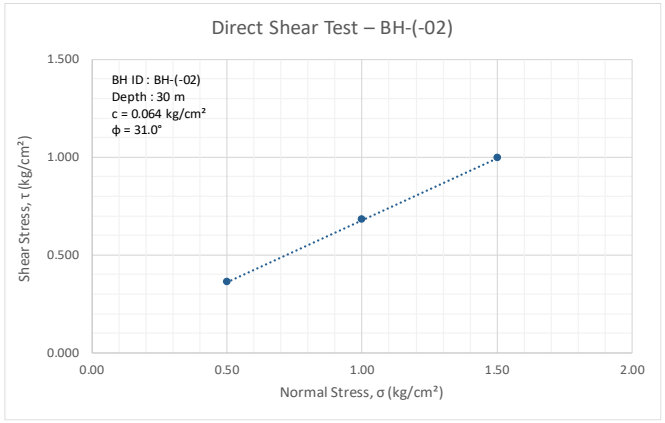

Direct Shear Test – BH-(-02)
BH ID : BH-(-02)
Depth : 15 m
c = 0.030 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-(-02)
BH ID : BH-(-02)
Depth : 18 m
c = -0.020 kg/cm²
ϕ = 29.3°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

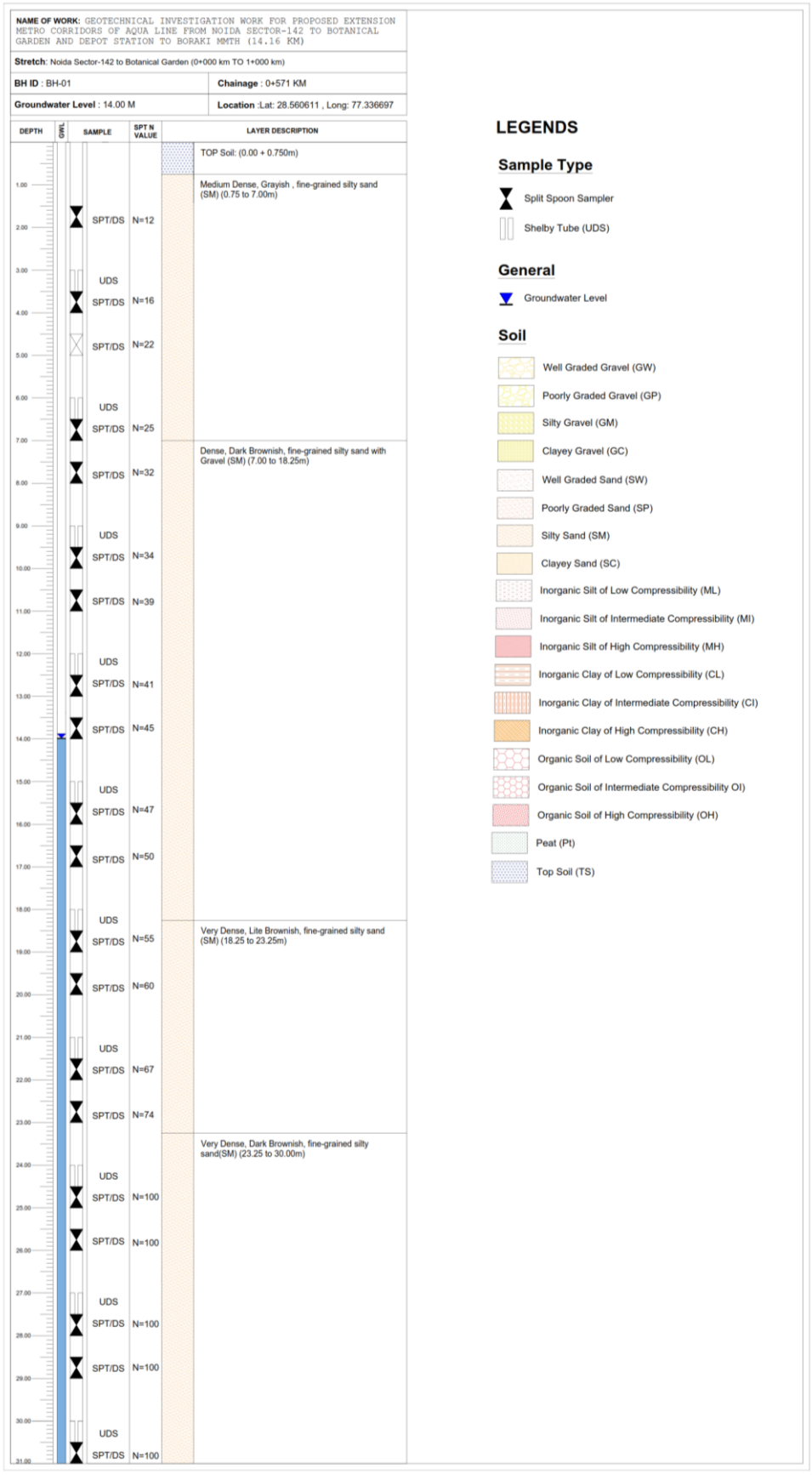

Direct Shear Test – BH-(-02)
BH ID : BH-(-02)
Depth : 21 m
c = 0.010 kg/cm²
ϕ = 30.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-(-02)
BH ID : BH-(-02)
Depth : 24 m
c = 0.057 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-(-02)
BH ID : BH-(-02)
Depth : 27 m
c = -0.050 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-(-02)
BH ID : BH-(-02)
Depth : 30 m
c = 0.064 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

C.2. Zone 2: CH: 0+500 km to 1+450 km (BH-01 to BH-09)

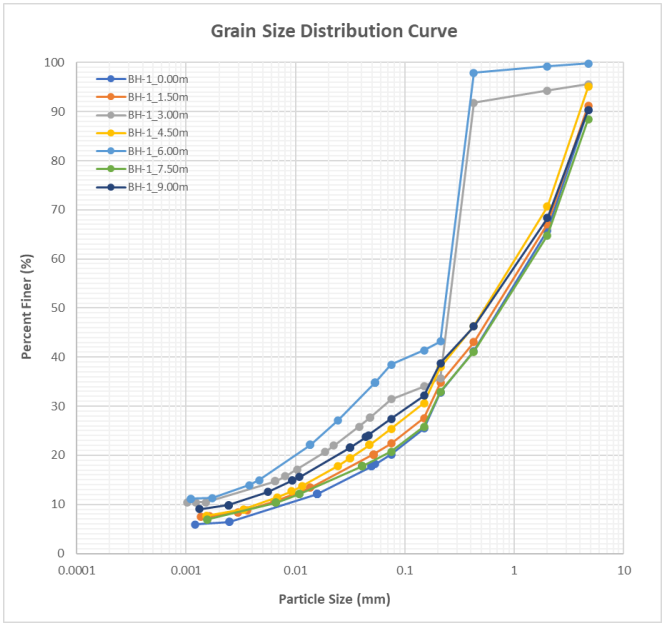


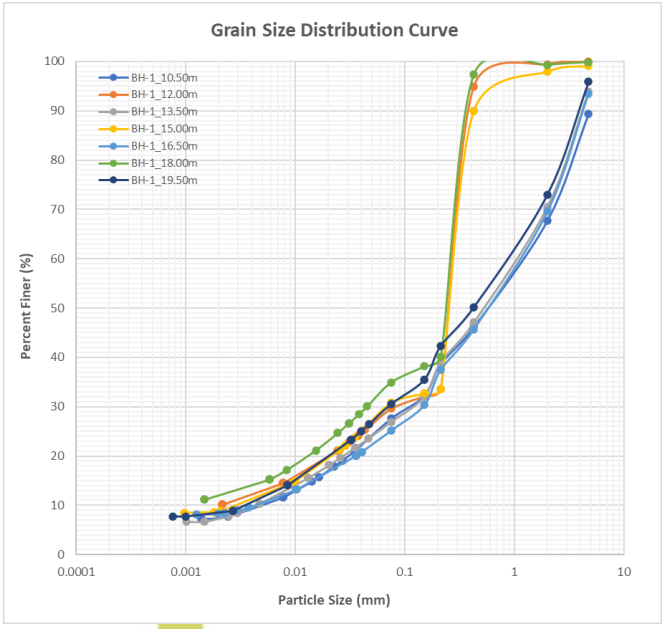
GOMA ENGINEERING AND CONSULTANCY
Quality we put forward

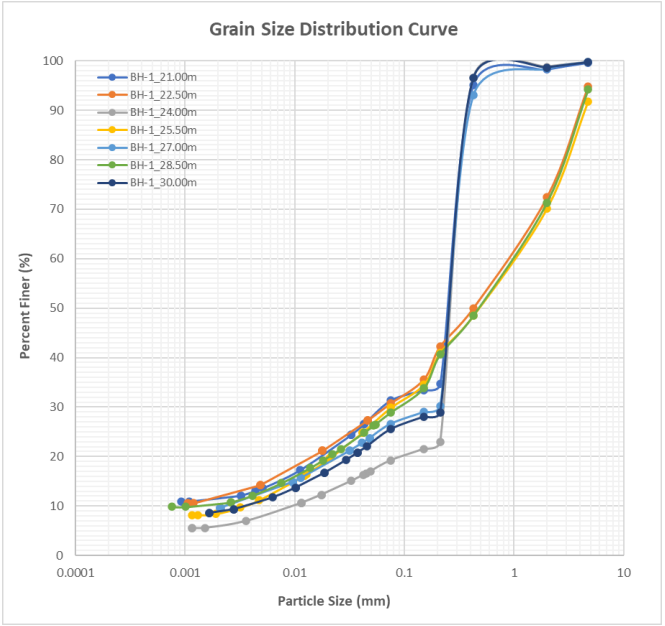
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-01	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	0+571	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	07-03-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	198.7	**End Date:**	08-03-2026
Project Code:	158_R2_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	14.00	**Location:**	Lat. 28.560611, Long. 77.336697

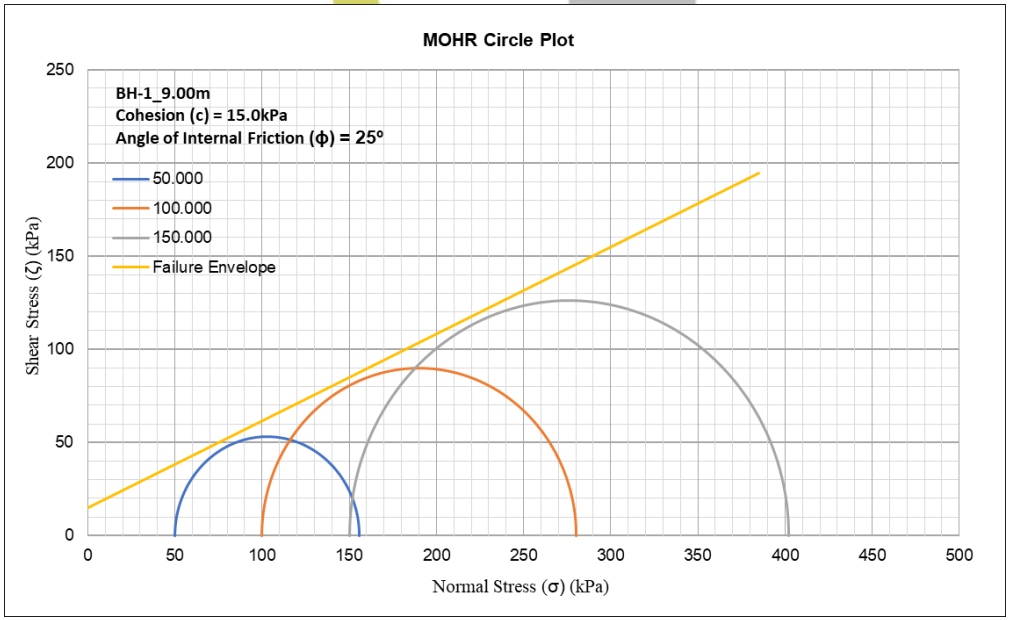
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						9.7	70.2	13.9	6.3	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Medium Dense, Grayish, fine-grained silty sand (SM)	3	5	7	12	17	8.8	68.8	14.5	7.9	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	DS							4.4	64.1	20.2	11.2	26	NP	NP	18.08	-	-	2.75	F	0.03	24	-	-	-	-	-	-
3.50	SPT/DS		5	7	9	16	18	-																			
4.50	SPT/DS		6	10	12	22	22	4.9	69.7	17.3	8.1	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	DS							0.2	61.3	26.7	11.8	29	NP	NP	22.00	-	-	2.67	F	0.01	27	-	-	-	-	-	-
6.50	SPT/DS		9	12	13	25	23	-																			
7.50	SPT/DS	Dense, Dark Brownish, fine-grained silty sand with Gravel (SM)	12	15	17	32	29	11.5	67.7	13.2	7.6	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							9.7	62.9	17.8	9.6	27	NP	NP	18.25	1.90	1.61	2.69	F	0.04	28	UU	15.0	25.0	-	-	-
9.50	SPT/DS		14	16	18	34	29	-																			
10.50	SPT/DS		15	18	21	39	32	10.6	61.7	20.0	7.6	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							0.0	70.4	21.3	8.3	25	NP	NP	19.27	-	-	2.62	F	0.02	29	-	-	-	-	-	-
12.50	SPT/DS		15	19	22	41	31	-																			
13.50	SPT/DS		18	21	24	45	32	6.1	67.0	19.6	7.4	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.9	68.4	22.0	8.8	29	NP	NP	18.16	-	-	2.76	F	0.05	29	-	-	-	-	-	-
15.50	SPT/DS		19	22	25	47	23	-																			
16.50	SPT/DS		21	23	27	50	24	6.5	68.3	16.9	8.3	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS							0.1	64.9	22.9	12.0	25	NP	NP	17.69	-	-	2.65	F	0.00	30	-	-	-	-	-	-
18.50	SPT/DS	Very Dense, Lite Brownish, fine-grained silty sand (SM)	22	25	30	55	25	-																			
19.50	SPT/DS		25	27	33	60	27	4.1	65.3	22.0	8.6	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							0.3	68.3	19.8	11.6	24	NP	NP	14.58	-	-	2.69	F	0.03	31	-	-	-	-	-	-
21.50	SPT/DS		27	32	35	67	28	-																			
22.50	SPT/DS		30	35	39	74	30	5.1	64.1	18.8	12.0	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS	Very Dense, Dark Brownish, fine-grained silty sand(SM)						0.3	80.5	13.2	6.0	29	NP	NP	10.74	-	-	2.73	F	0.06	31	-	-	-	-	-	-
24.50	SPT/DS		32	37	(50/12 cm)	100	37	-																			
25.50	SPT/DS		25	37	(50/11 cm)	100	36	8.2	61.9	21.3	8.5	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							0.2	73.2	19.4	8.2	21	NP	NP	14.16	-	-	2.64	F	0.00	33	-	-	-	-	-	-
27.50	SPT/DS		35	46	(50/9 cm)	100	36	-																			
28.50	SPT/DS		42	(50/12 cm)	-	100	35	5.8	65.3	18.5	10.5	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.3	74.2	16.7	8.8	24	NP	NP	11.82	-	-	2.68	F	0.06	32	-	-	-	-	-	-
30.50	SPT/DS		48	(50/9 cm)	-	100	34	-																			

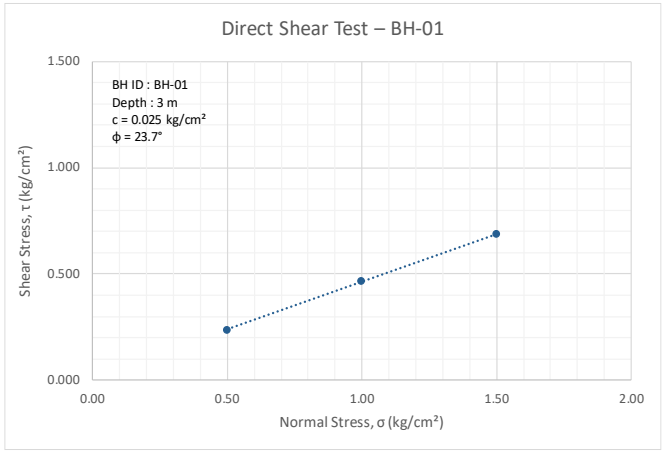
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

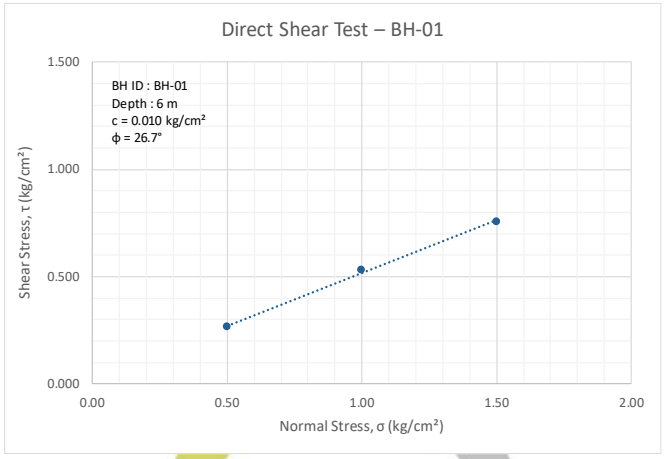

Grain Size Distribution Curve
BH-1_0.00m
BH-1_1.50m
BH-1_3.00m
BH-1_4.50m
BH-1_6.00m
BH-1_7.50m
BH-1_9.00m
Percent Finer (%)
Particle Size (mm)

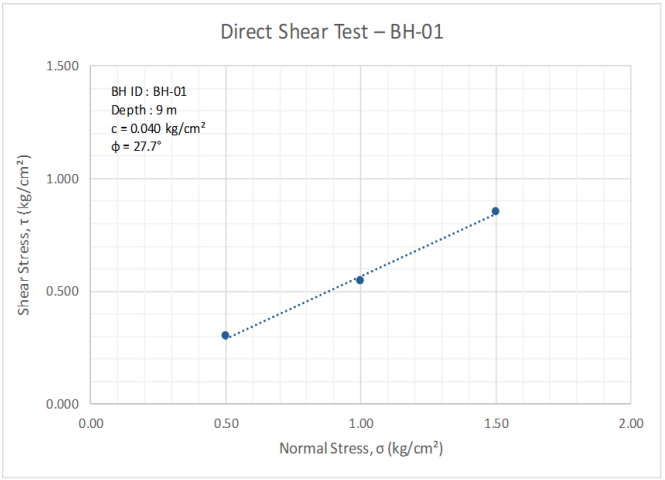

Grain Size Distribution Curve
BH-1_10.50m
BH-1_12.00m
BH-1_13.50m
BH-1_15.00m
BH-1_16.50m
BH-1_18.00m
BH-1_19.50m
Percent Finer (%)
Particle Size (mm)

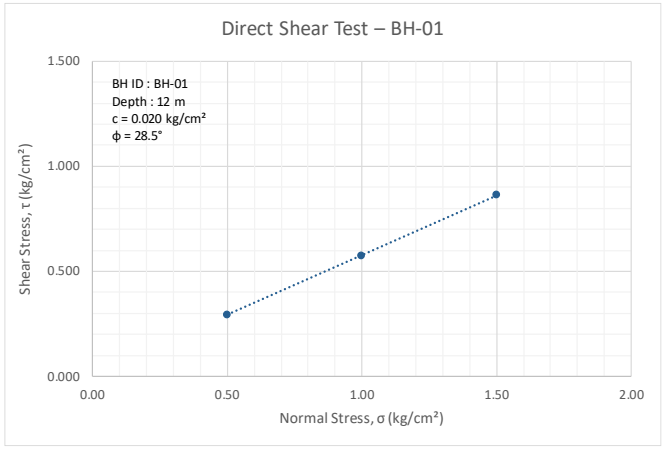

Grain Size Distribution Curve
BH-1_21.00m
BH-1_22.50m
BH-1_24.00m
BH-1_25.50m
BH-1_27.00m
BH-1_28.50m
BH-1_30.00m
Percent Finer (%)
Particle Size (mm)

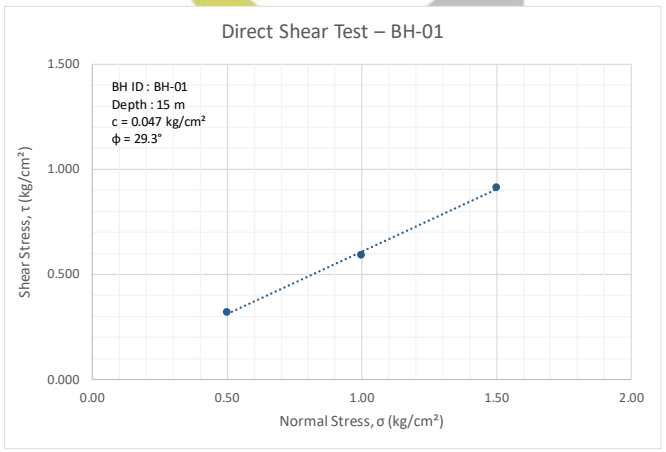

MOHR Circle Plot
BH-1_9.00m
Cohesion (c) = 15.0kPa
Angle of Internal Friction (ϕ) = 25°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

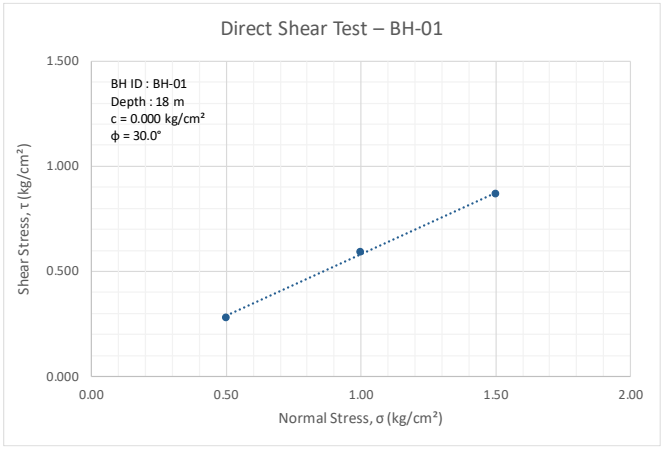

Direct Shear Test – BH-01
BH ID : BH-01
Depth : 3 m
c = 0.025 kg/cm²
ϕ = 23.7°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

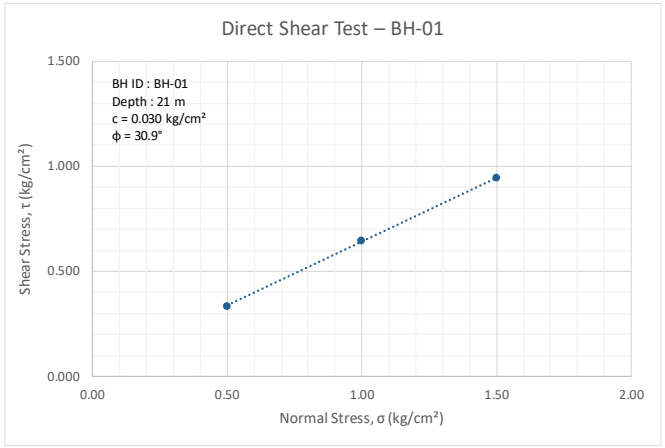

Direct Shear Test – BH-01
BH ID : BH-01
Depth : 6 m
c = 0.010 kg/cm²
ϕ = 26.7°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

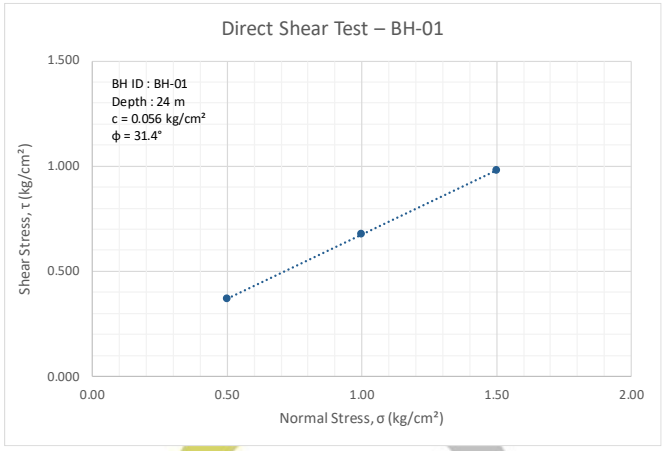

Direct Shear Test – BH-01
BH ID : BH-01
Depth : 9 m
c = 0.040 kg/cm²
ϕ = 27.7°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

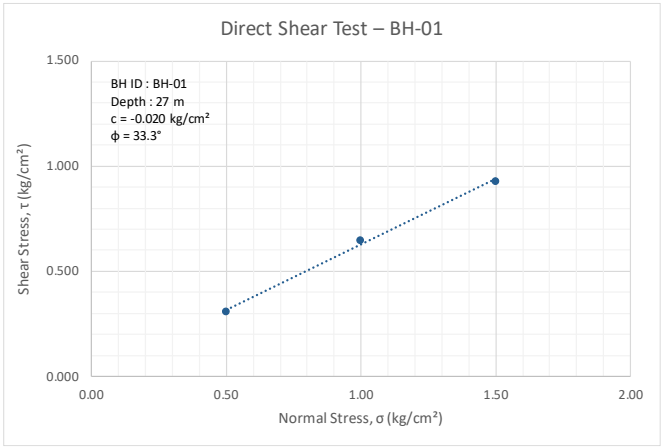

Direct Shear Test – BH-01
BH ID : BH-01
Depth : 12 m
c = 0.020 kg/cm²
ϕ = 28.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

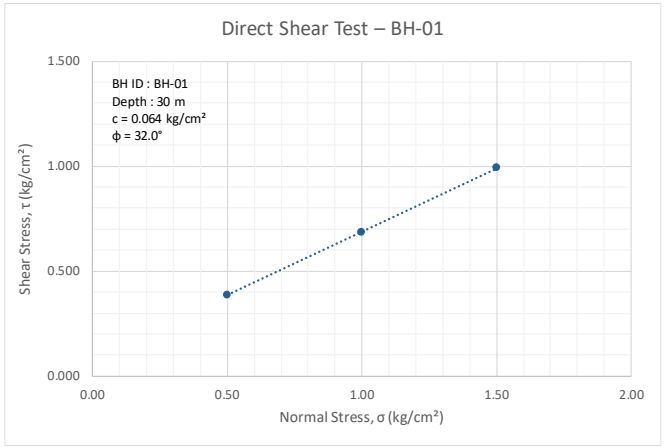

Direct Shear Test – BH-01
BH ID : BH-01
Depth : 15 m
c = 0.047 kg/cm²
ϕ = 29.3°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-01
BH ID : BH-01
Depth : 18 m
c = 0.000 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-01
BH ID : BH-01
Depth : 21 m
c = 0.030 kg/cm²
ϕ = 30.9°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-01
BH ID : BH-01
Depth : 24 m
c = 0.056 kg/cm²
ϕ = 31.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

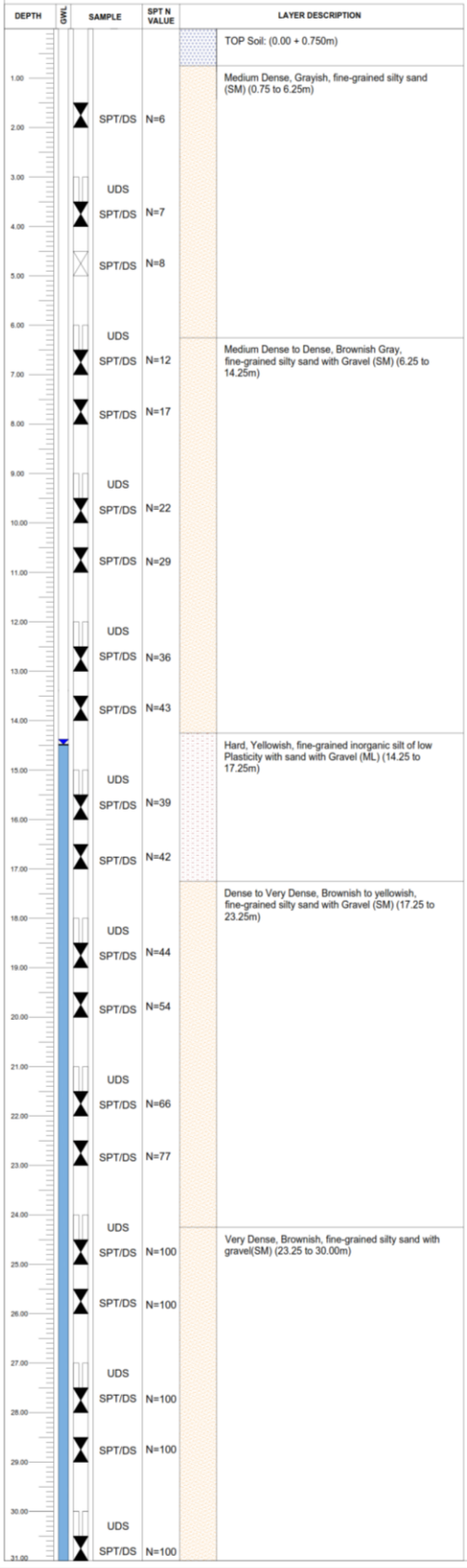

Direct Shear Test – BH-01
BH ID : BH-01
Depth : 27 m
c = -0.020 kg/cm²
ϕ = 33.3°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-01
BH ID : BH-01
Depth : 30 m
c = 0.064 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (0+000 km TO 1+000 km)

BH ID : BH-02	**Chainage** : 0+674 KM
Groundwater Level : 14.50 M	**Location** :Lat. 28.5602 , Long. 77.335759



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

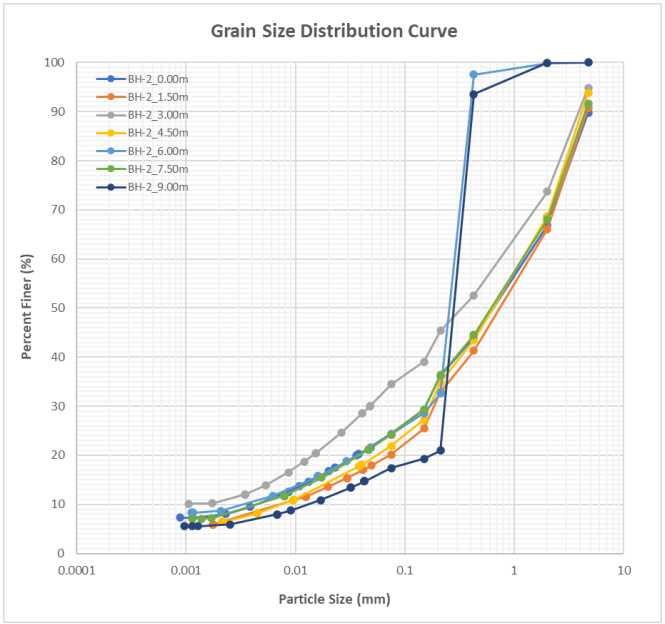
Soil

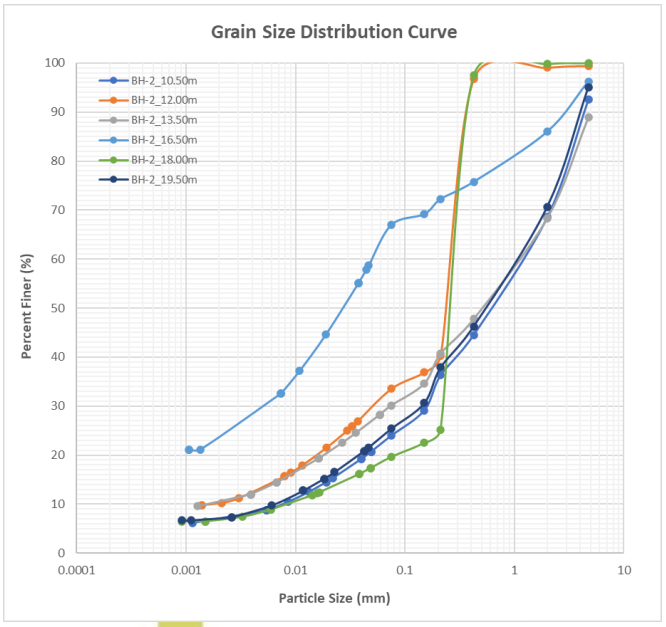
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

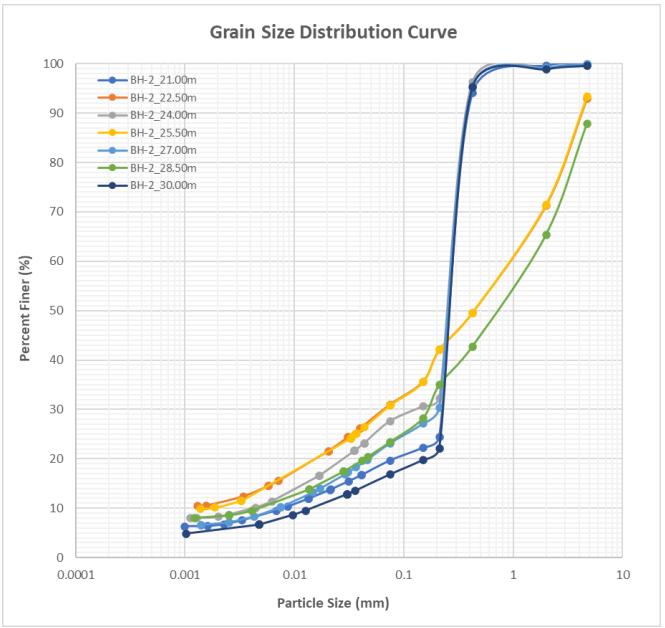
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-02	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	0+674	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	07-03-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	198.8	**End Date:**	08-03-2026
Project Code:	158_R2_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	14.50	**Location:**	Lat. 28.5602 , Long. 77.335759

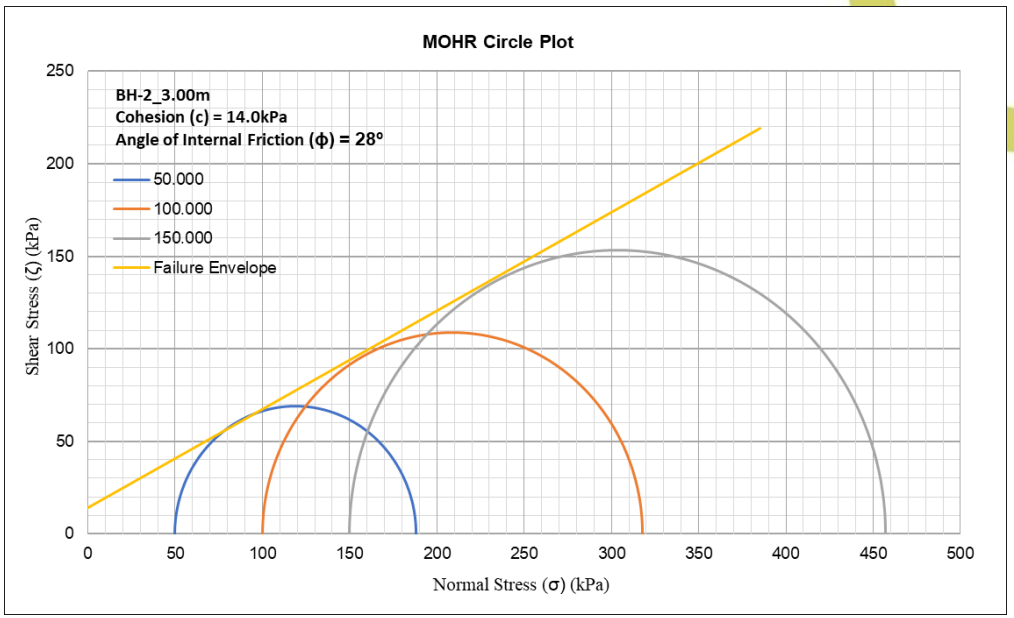
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [^{o}]	Type	Cohesion [kPa]	Angle of Friction [^{o}]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						10.2	65.4	16.5	7.9	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Medium Dense, Grayish, fine-grained silty sand (SM)	2	3	3	6	8	9.2	70.6	13.9	6.3	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							15.2	60.3	24.9	10.6	29	NP	NP	15.21	1.92	1.67	2.64	F	0.01	22	UU	14.0	28.0	-	-	-
3.50	SPT/DS		2	3	4	7	8	-																			
4.50	SPT/DS		2	4	4	8	8	6.1	71.9	14.7	7.2	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	DS							0.0	75.8	15.6	8.7	28	NP	NP	24.50	-	-	2.73	F	0.00	24	-	-	-	-	-	-
6.50	SPT/DS	Medium Dense to Dense, Brownish Gray, fine-grained silty sand with Gravel (SM)	3	5	7	12	11	-																			
7.50	SPT/DS		5	8	9	17	15	8.3	67.4	16.6	7.7	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	DS							0.0	82.6	11.6	5.8	29	NP	NP	14.99	-	-	2.64	F	0.03	26	-	-	-	-	-	-
9.50	SPT/DS		7	10	12	22	19	-																			
10.50	SPT/DS		9	13	16	29	24	7.4	68.6	16.9	7.0	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							0.5	65.9	23.3	10.2	27	NP	NP	20.11	-	-	2.61	F	0.02	28	-	-	-	-	-	-
12.50	SPT/DS		11	15	21	36	27	-																			
13.50	SPT/DS		14	19	24	43	31	11.1	58.7	19.6	10.5	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS	Hard, Yellowish, fine-grained inorganic silt of low Plasticity with sand with Gravel(ML)						1.0	28.6	45.6	24.8	28	NP	NP	17.36	1.93	1.64	2.64	F	0.02	29	UU	13.0	26.0	-	-	-
15.50	SPT/DS		14	18	21	39	21	-																			
16.50	SPT/DS		15	19	23	42	21	3.8	29.3	43.2	23.8	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS	Dense to Very Dense, Brownish to yellowish, fine-grained silty sand with Gravel(SM)						0.0	80.4	12.8	6.8	26	NP	NP	14.25	-	-	2.76	F	0.03	29	-	-	-	-	-	-
18.50	SPT/DS		17	20	24	44	22	-																			
19.50	SPT/DS		21	24	30	54	24	4.9	69.7	18.3	7.1	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							0.1	80.3	13.0	6.6	24	NP	NP	12.14	-	-	2.63	F	0.02	30	-	-	-	-	-	-
21.50	SPT/DS		26	30	36	66	28	-																			
22.50	SPT/DS		30	37	40	77	31	7.1	61.9	19.9	11.1	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.4	72.0	19.4	8.2	28	NP	NP	12.82	-	-	2.61	F	0.00	32	-	-	-	-	-	-
24.50	SPT/DS	Very Dense, Brownish, fine-grained silty sand with gravel(SM)	36	(50/8 cm)	-	100	37	-																			
25.50	SPT/DS		40	(50/7 cm)	-	100	36	6.7	62.5	20.5	10.3	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							0.1	76.8	16.2	6.9	26	NP	NP	15.56	-	-	2.74	F	0.06	31	-	-	-	-	-	-
27.50	SPT/DS		46	(50/10 cm)	-	100	35	-																			
28.50	SPT/DS		48	(50/9 cm)	-	100	35	12.1	64.5	15.0	8.4	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.4	82.8	11.2	5.6	25	NP	NP	11.56	-	-	2.65	F	0.02	32	-	-	-	-	-	-
30.50	SPT/DS		(50/8 cm)	-	-	100	34	-																			

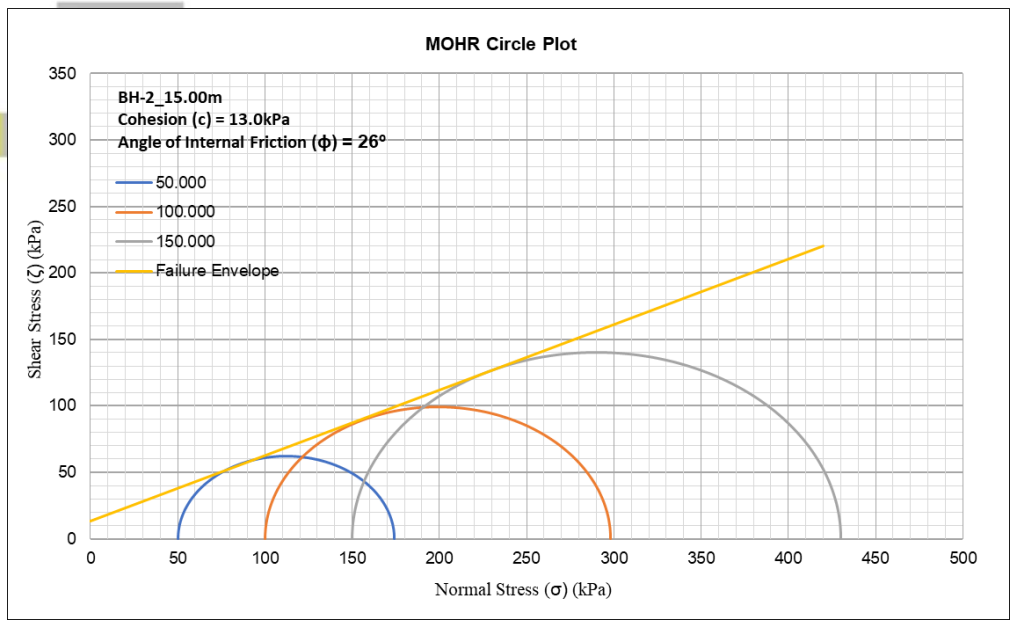
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

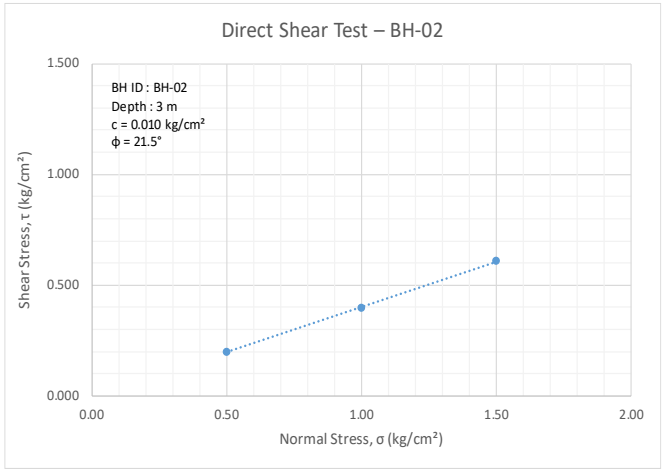

Grain Size Distribution Curve
BH-2_0.00m
BH-2_1.50m
BH-2_3.00m
BH-2_4.50m
BH-2_6.00m
BH-2_7.50m
BH-2_9.00m
Percent Finer (%)
Particle Size (mm)

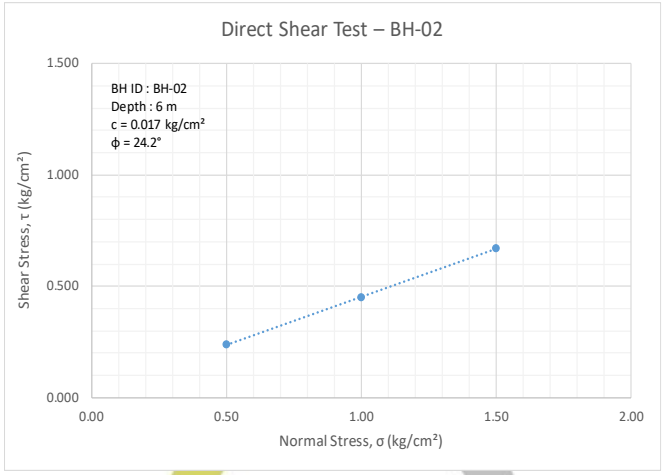

Grain Size Distribution Curve
BH-2_10.50m
BH-2_12.00m
BH-2_13.50m
BH-2_16.50m
BH-2_18.00m
BH-2_19.50m
Percent Finer (%)
Particle Size (mm)

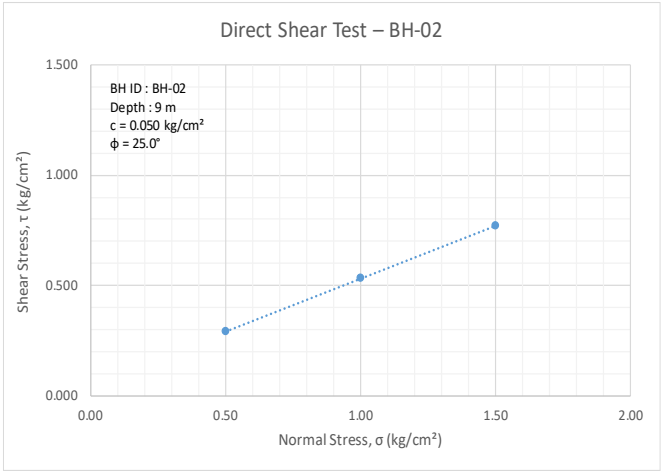

Grain Size Distribution Curve
BH-2_21.00m
BH-2_22.50m
BH-2_24.00m
BH-2_25.50m
BH-2_27.00m
BH-2_28.50m
BH-2_30.00m
Percent Finer (%)
Particle Size (mm)

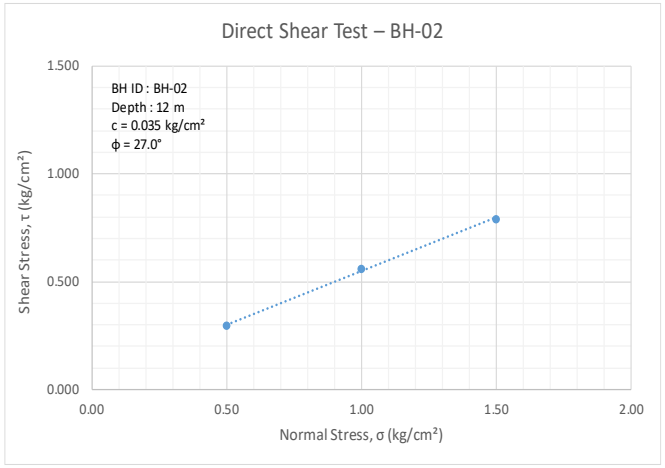

MOHR Circle Plot
BH-2_3.00m
Cohesion (c) = 14.0kPa
Angle of Internal Friction (ϕ) = 28°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

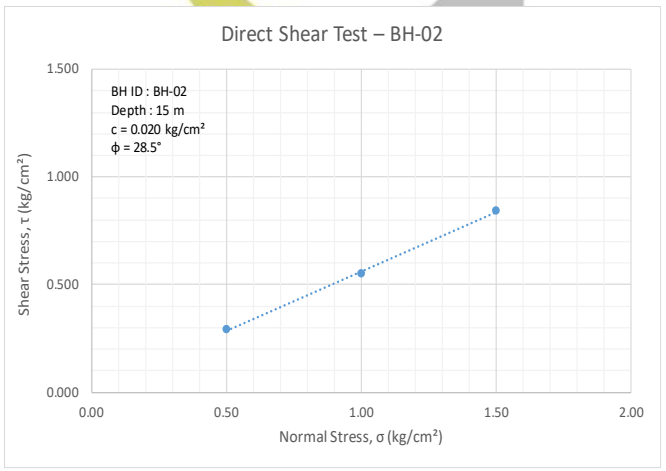

MOHR Circle Plot
BH-2_15.00m
Cohesion (c) = 13.0kPa
Angle of Internal Friction (ϕ) = 26°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

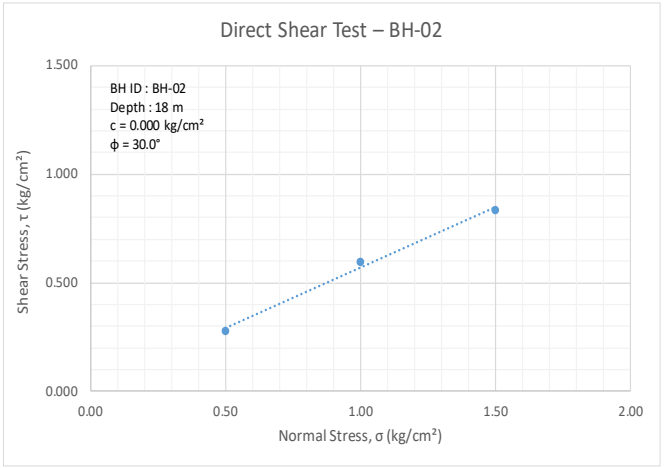

Direct Shear Test – BH-02
BH ID : BH-02
Depth : 3 m
c = 0.010 kg/cm²
ϕ = 21.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

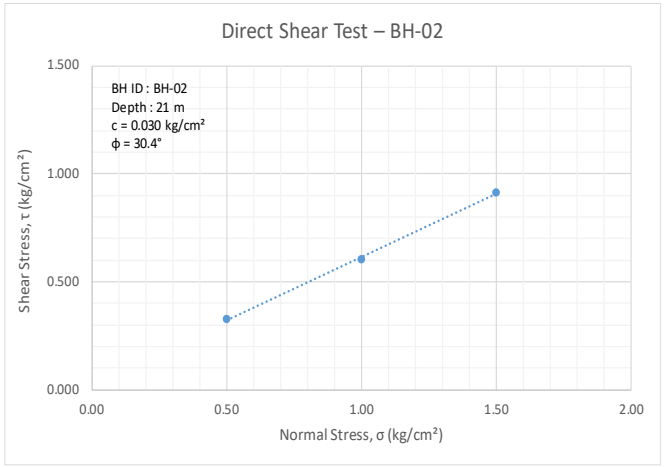

Direct Shear Test – BH-02
BH ID : BH-02
Depth : 6 m
c = 0.017 kg/cm²
ϕ = 24.2°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

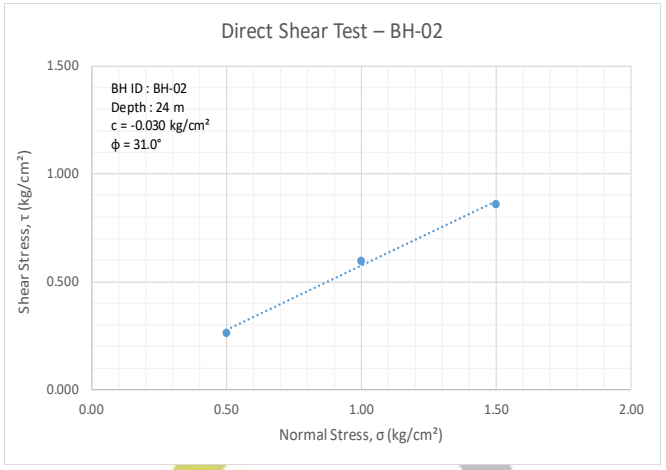

Direct Shear Test – BH-02
BH ID : BH-02
Depth : 9 m
c = 0.050 kg/cm²
ϕ = 25.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

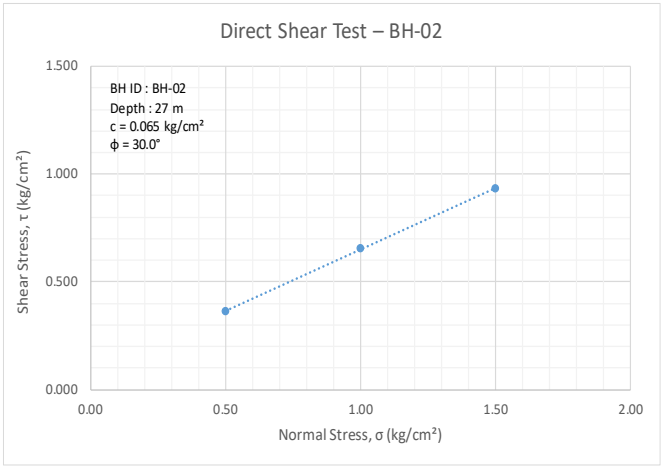

Direct Shear Test – BH-02
BH ID : BH-02
Depth : 12 m
c = 0.035 kg/cm²
ϕ = 27.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

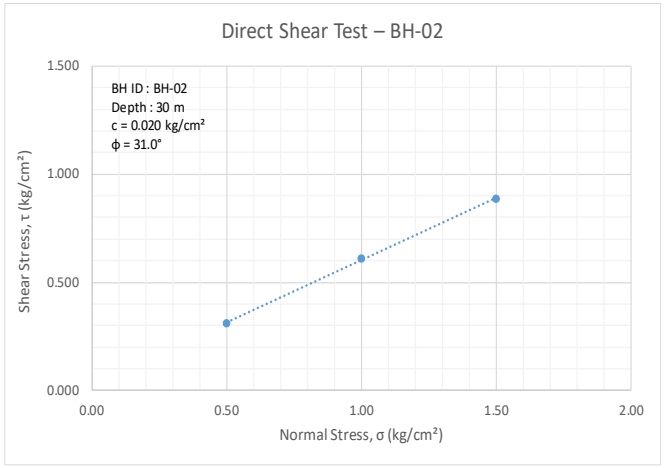

Direct Shear Test – BH-02
BH ID : BH-02
Depth : 15 m
c = 0.020 kg/cm²
ϕ = 28.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-02
BH ID : BH-02
Depth : 18 m
c = 0.000 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-02
BH ID : BH-02
Depth : 21 m
c = 0.030 kg/cm²
ϕ = 30.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-02
BH ID : BH-02
Depth : 24 m
c = -0.030 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-02
BH ID : BH-02
Depth : 27 m
c = 0.065 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

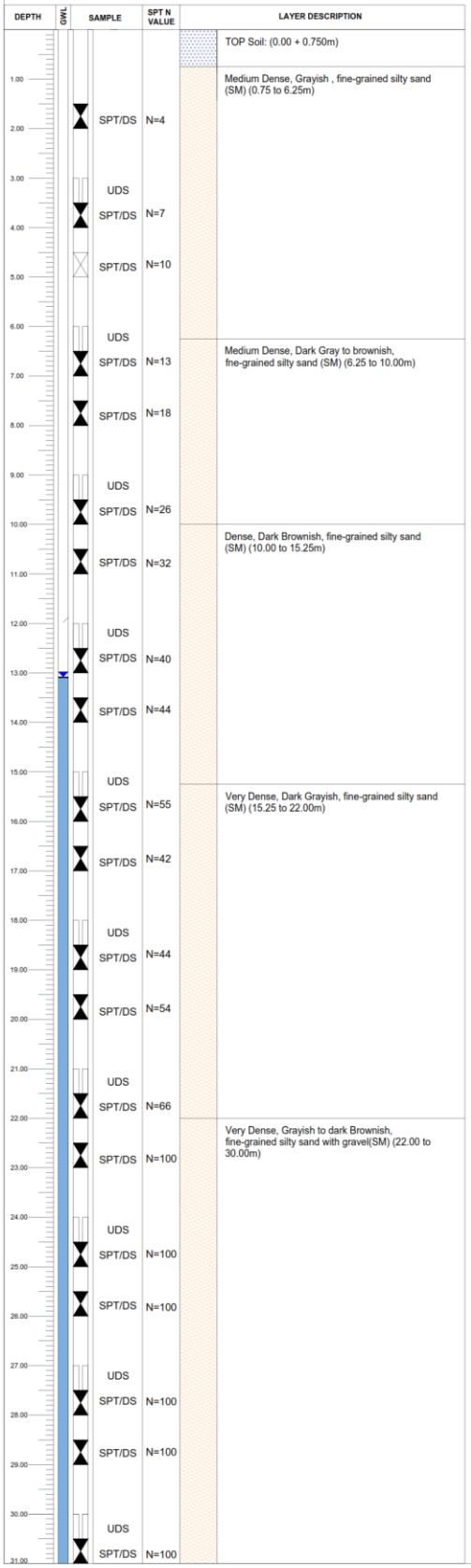

Direct Shear Test – BH-02
BH ID : BH-02
Depth : 30 m
c = 0.020 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (0+000 km TO 1+000 km)

BH ID : BH-03 | **Chainage** : 0+892 KM

Groundwater Level : 13.10 M | **Location** :Lat. 28.560014, Long. 77.33343



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

Soil

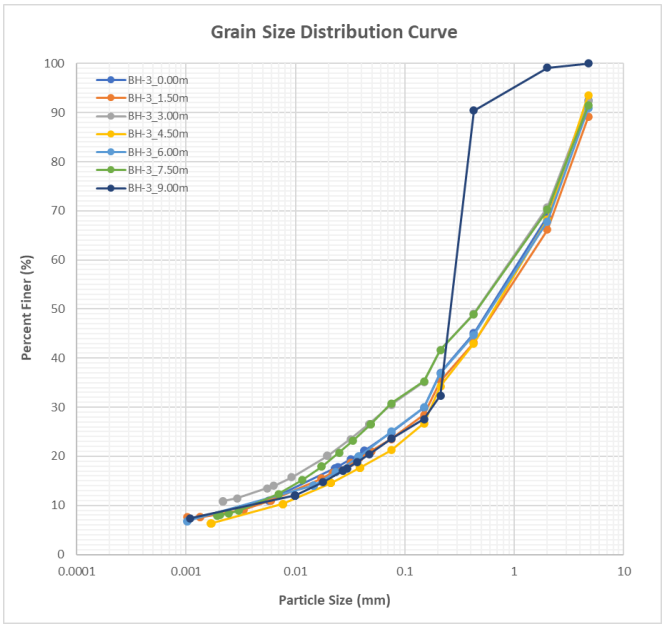
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

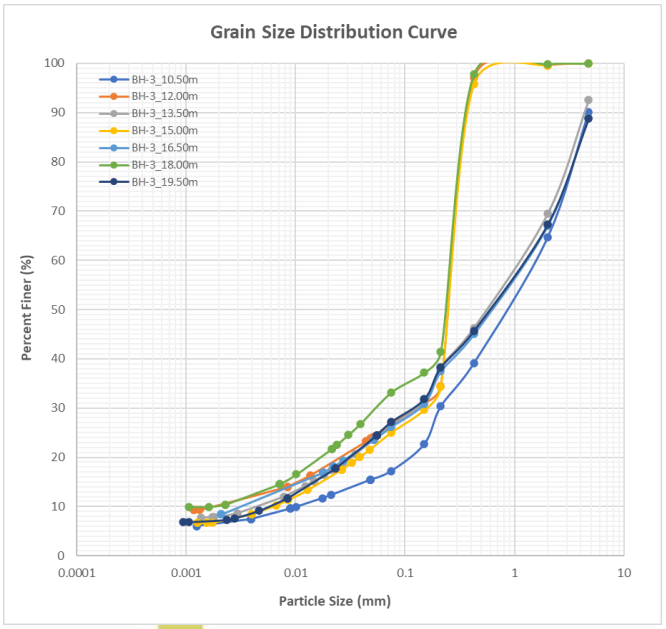
GOMA ENGINEERING AND CONSULTANCY
Quality we put forward

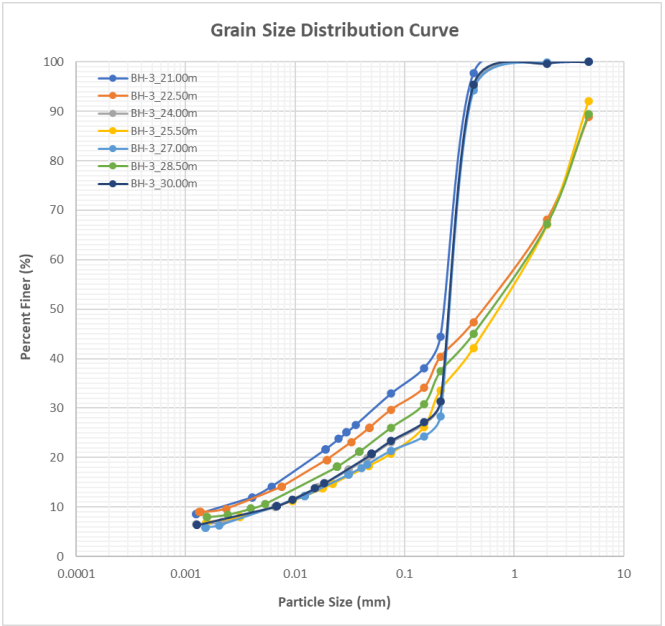
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-03	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	0+892	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	06-03-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	200.9	**End Date:**	06-03-2026
Project Code:	158_R2_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	13.10	**Location:**	Lat. 28.560014, Long. 77.33343

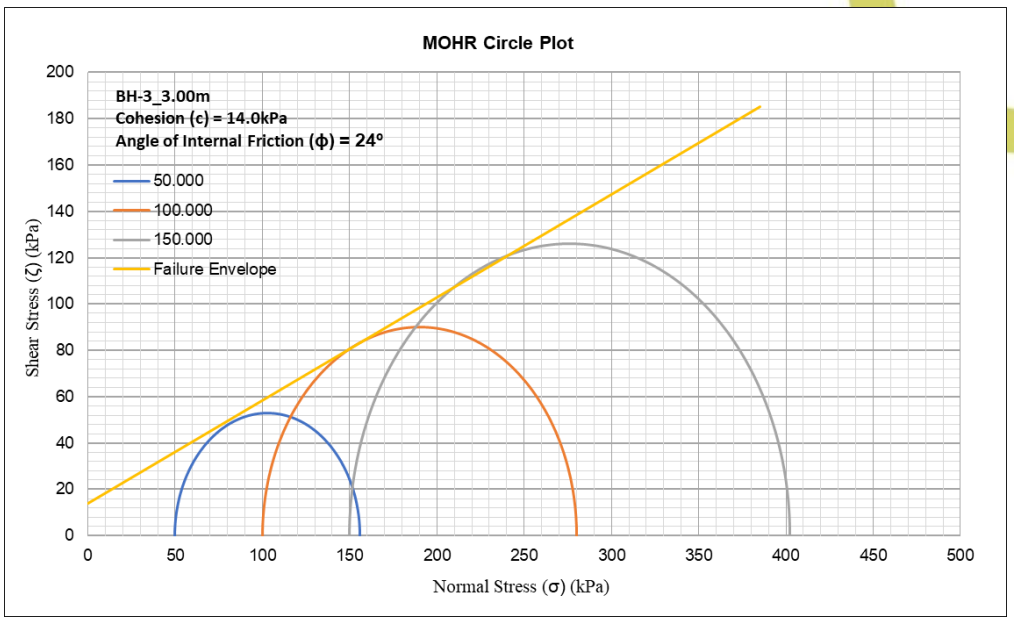
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						7.4	67.8	17.5	7.3	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Medium Dense, Grayish, fine-grained silty sand (SM)	2	2	2	4	6	10.9	65.5	15.3	8.3	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							7.6	61.9	28.2	2.4	21	NP	NP	16.28	1.90	1.63	2.61	F	0.02	23	UU	14.0	24.0	-	-	-
3.50	SPT/DS		2	3	4	7	8	-																			
4.50	SPT/DS		3	4	6	10	10	6.5	72.2	14.5	6.7	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS							9.2	65.8	16.4	8.7	27	NP	NP	19.50	1.91	1.60	2.66	F	0.02	26	UU	11.0	27.0	-	-	-
6.50	SPT/DS	Medium Dense, Dark Grey to brownish, fine-grained silty sand (SM)	4	6	7	13	12	-																			
7.50	SPT/DS		6	8	10	18	16	8.6	60.7	22.8	8.0	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	DS							0.0	76.4	14.9	8.7	26	NP	NP	22.91	-	-	2.76	F	0.05	25	-	-	-	-	-	-
9.50	SPT/DS		8	11	15	26	22	-																			
10.50	SPT/DS	Dense, Dark Brownish, fine-grained silty sand (SM)	10	14	18	32	26	9.8	73.0	10.6	6.6	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							0.0	73.1	16.6	10.4	25	NP	NP	22.32	-	-	2.66	F	0.04	27	-	-	-	-	-	-
12.50	SPT/DS		13	18	22	40	30	-																			
13.50	SPT/DS		15	20	24	44	23	7.4	66.1	18.4	8.0	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.0	75.0	18.0	7.0	27	NP	NP	23.49	-	-	2.66	F	0.02	29	-	-	-	-	-	-
15.50	SPT/DS	Very Dense, Dark Greyish, fine-grained silty sand (SM)	20	25	30	55	27	-																			
16.50	SPT/DS		24	19	23	42	22	11.1	62.7	19.3	6.9	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS							0.0	66.8	23.0	10.2	22	NP	NP	25.50	-	-	2.67	F	0.00	30	-	-	-	-	-	-
18.50	SPT/DS		30	20	24	44	22	-																			
19.50	SPT/DS		32	24	30	54	25	11.2	61.6	20.0	7.2	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							0.0	67.1	23.0	9.9	26	NP	NP	22.66	-	-	2.78	F	0.03	30	-	-	-	-	-	-
21.50	SPT/DS		35	30	36	66	28	-																			
22.50	SPT/DS	Very Dense, Grayish to dark Brownish, fine-grained silty sand with gravel(SM)	40	(50/7 cm)	-	100	38	11.1	59.3	20.2	9.5	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.0	76.9	16.3	6.9	23	NP	NP	17.21	-	-	2.70	F	0.00	31	-	-	-	-	-	-
24.50	SPT/DS		46	(50/7 cm)	-	100	37	-																			
25.50	SPT/DS		48	(50/6 cm)	-	100	37	8.0	71.2	13.5	7.3	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							0.0	78.7	15.1	6.2	29	NP	NP	17.94	-	-	2.66	F	0.07	30	-	-	-	-	-	-
27.50	SPT/DS		(50/13 cm)	-	-	100	36	-																			
28.50	SPT/DS		(50/11 cm)	-	-	100	36	10.6	63.4	17.8	8.3	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.0	76.6	16.0	7.4	27	NP	NP	14.29	-	-	2.78	F	0.02	31	-	-	-	-	-	-
30.50	SPT/DS		(50/8 cm)	-	-	100	35	-																			

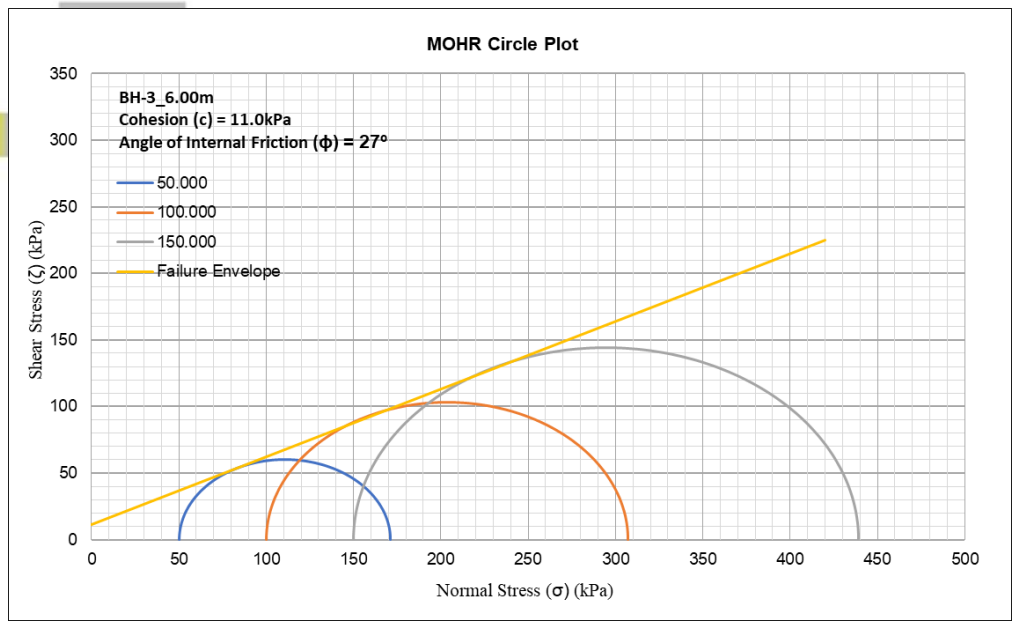
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

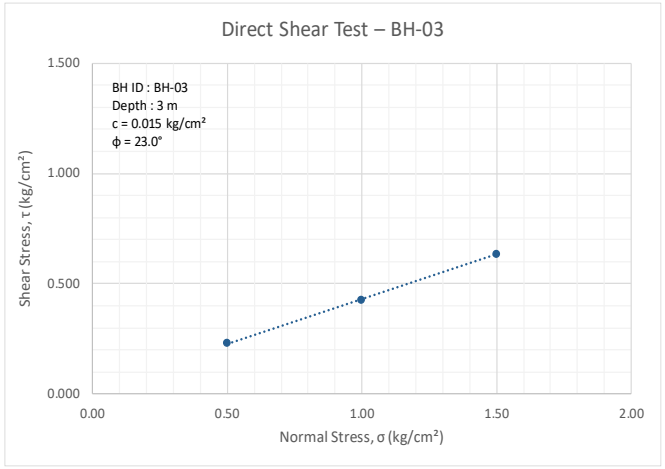

Grain Size Distribution Curve
BH-3_0.00m
BH-3_1.50m
BH-3_3.00m
BH-3_4.50m
BH-3_6.00m
BH-3_7.50m
BH-3_9.00m
Percent Finer (%)
Particle Size (mm)

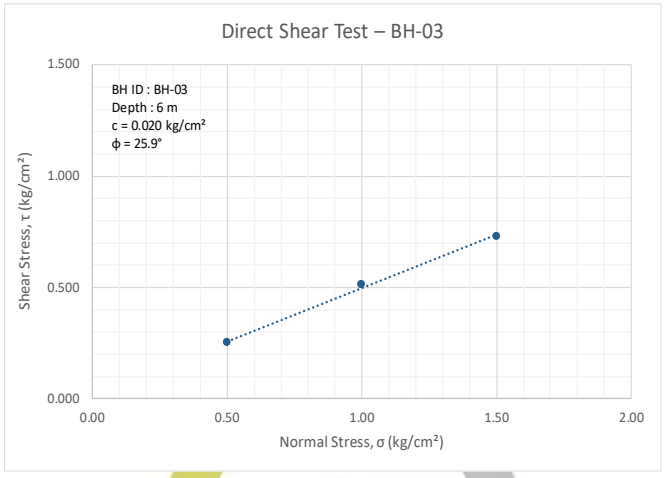

Grain Size Distribution Curve
BH-3_10.50m
BH-3_12.00m
BH-3_13.50m
BH-3_15.00m
BH-3_16.50m
BH-3_18.00m
BH-3_19.50m
Percent Finer (%)
Particle Size (mm)

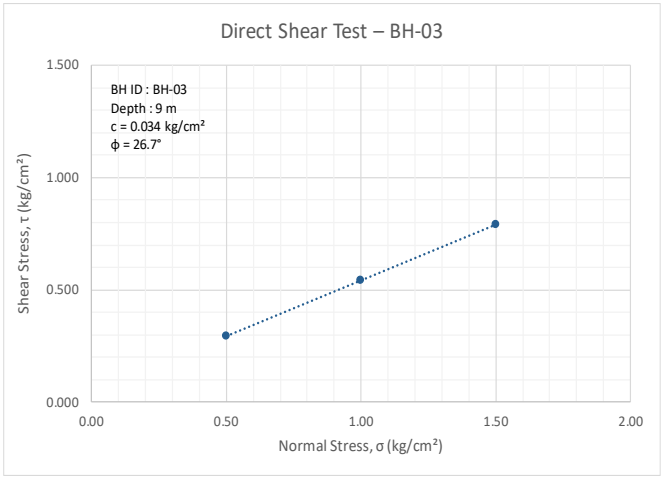

Grain Size Distribution Curve
BH-3_21.00m
BH-3_22.50m
BH-3_24.00m
BH-3_25.50m
BH-3_27.00m
BH-3_28.50m
BH-3_30.00m
Percent Finer (%)
Particle Size (mm)

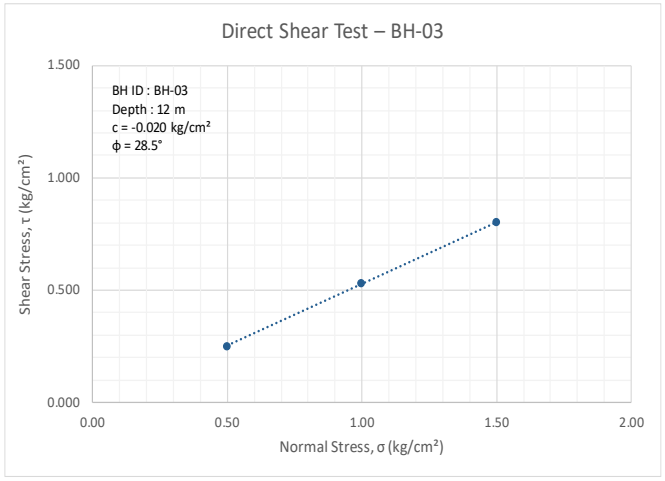

MOHR Circle Plot
BH-3_3.00m
Cohesion (c) = 14.0kPa
Angle of Internal Friction (ϕ) = 24°
50.000
100.000
150.000
Failure Envelope
Shear Stress (Ζ) (kPa)
Normal Stress (σ) (kPa)

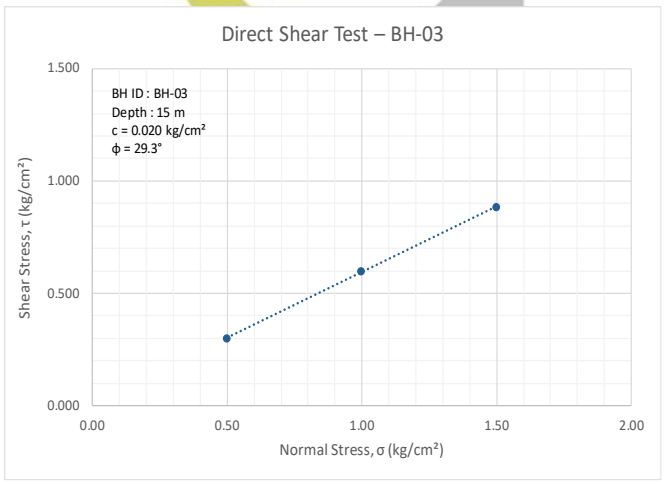

MOHR Circle Plot
BH-3_6.00m
Cohesion (c) = 11.0kPa
Angle of Internal Friction (ϕ) = 27°
50.000
100.000
150.000
Failure Envelope
Shear Stress (Ζ) (kPa)
Normal Stress (σ) (kPa)

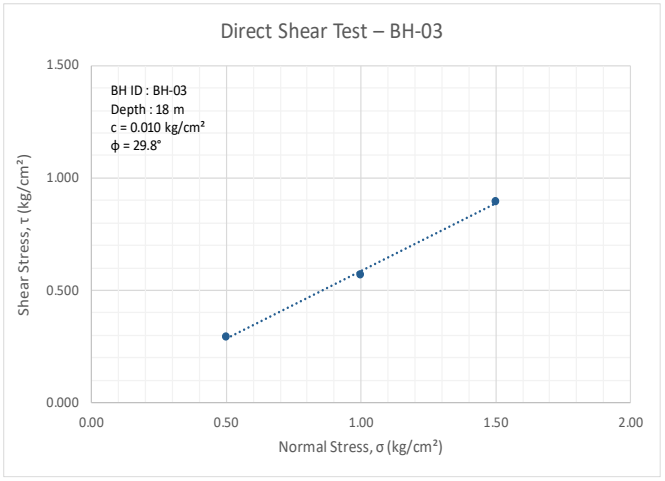

Direct Shear Test – BH-03
BH ID : BH-03
Depth : 3 m
c = 0.015 kg/cm²
ϕ = 23.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

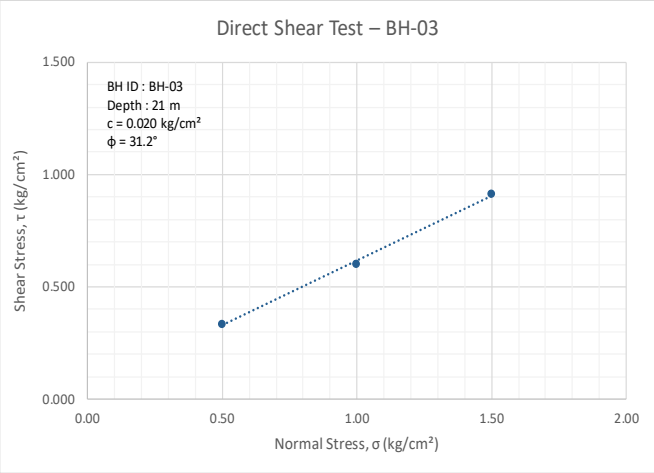

Direct Shear Test – BH-03
BH ID : BH-03
Depth : 6 m
c = 0.020 kg/cm²
ϕ = 25.9°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

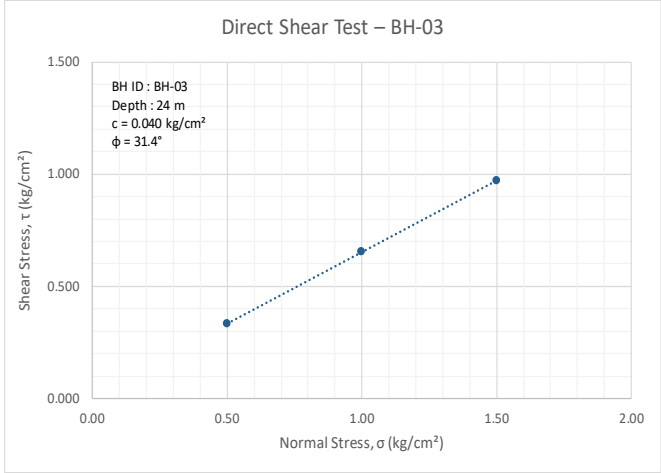

Direct Shear Test – BH-03
BH ID : BH-03
Depth : 9 m
c = 0.034 kg/cm²
ϕ = 26.7°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

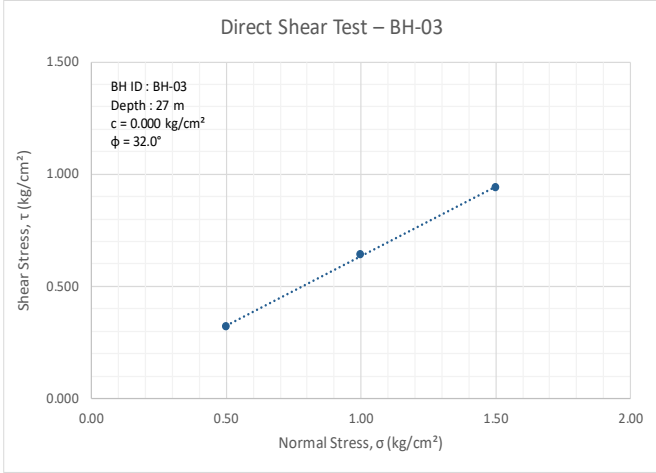

Direct Shear Test – BH-03
BH ID : BH-03
Depth : 12 m
c = -0.020 kg/cm²
ϕ = 28.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

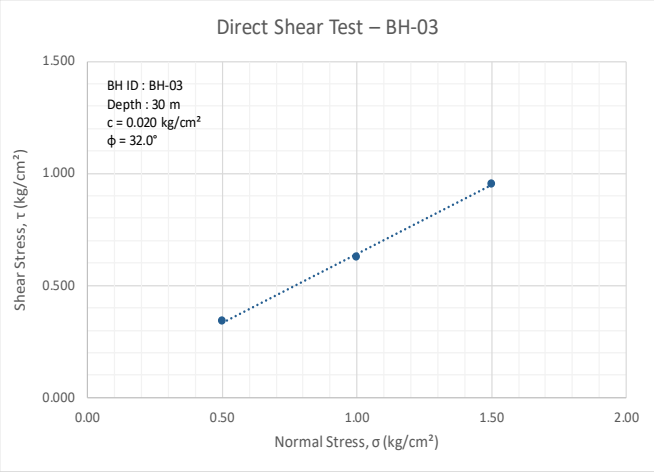

Direct Shear Test – BH-03
BH ID : BH-03
Depth : 15 m
c = 0.020 kg/cm²
ϕ = 29.3°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-03
BH ID : BH-03
Depth : 18 m
c = 0.010 kg/cm²
ϕ = 29.8°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-03
BH ID : BH-03
Depth : 21 m
c = 0.020 kg/cm²
ϕ = 31.2°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-03
BH ID : BH-03
Depth : 24 m
c = 0.040 kg/cm²
ϕ = 31.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-03
BH ID : BH-03
Depth : 27 m
c = 0.000 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

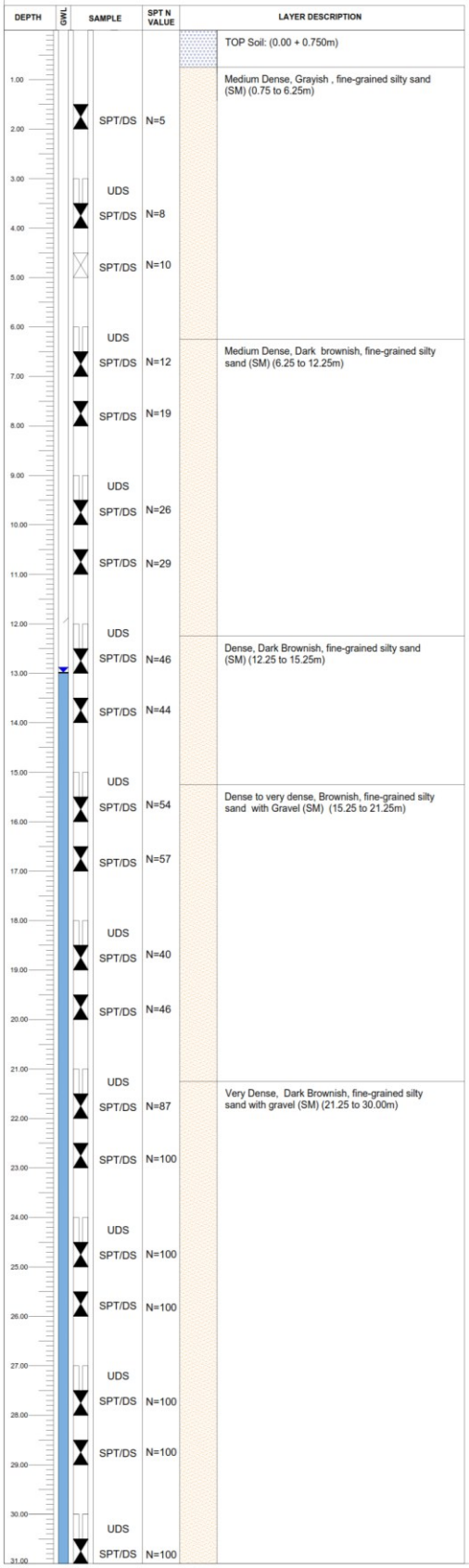

Direct Shear Test – BH-03
BH ID : BH-03
Depth : 30 m
c = 0.020 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (0+000 km TO 1+000 km)

BH ID : BH-04 | **Chainage** : 0+996 KM

Groundwater Level : 13.00 M | **Location** : Lat. 28.55958, Long. 77.332488



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

Soil

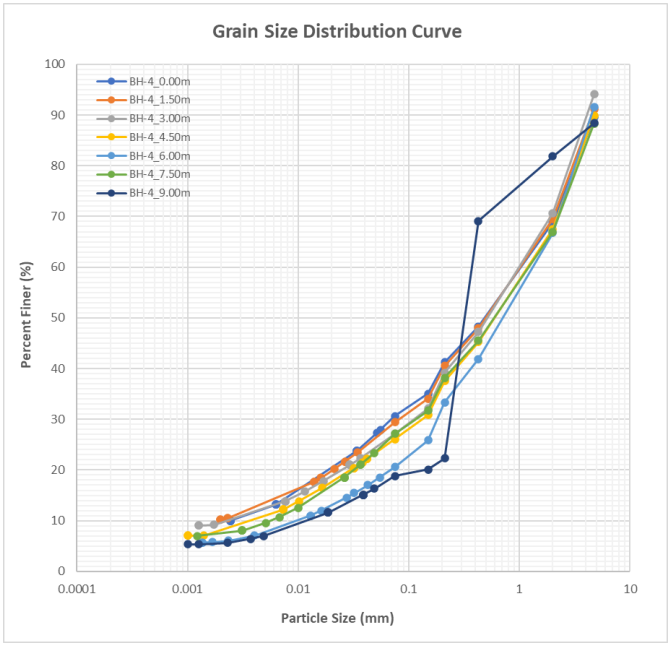
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

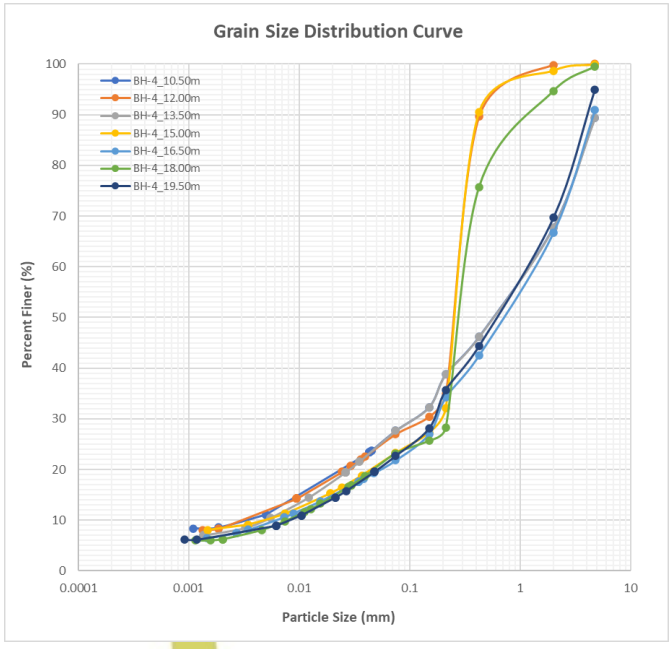
GOMA ENGINEERING AND CONSULTANCY
Quality we put forward

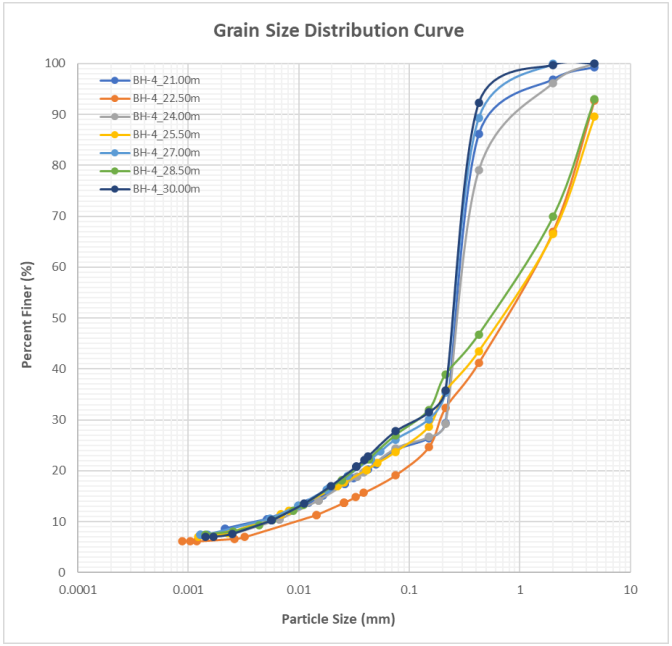
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-04	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	0+996	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	07-03-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	200.7	**End Date:**	07-03-2026
Project Code:	158_R2_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	13.00	**Location:**	Lat. 28.55958, Long. 77.332488

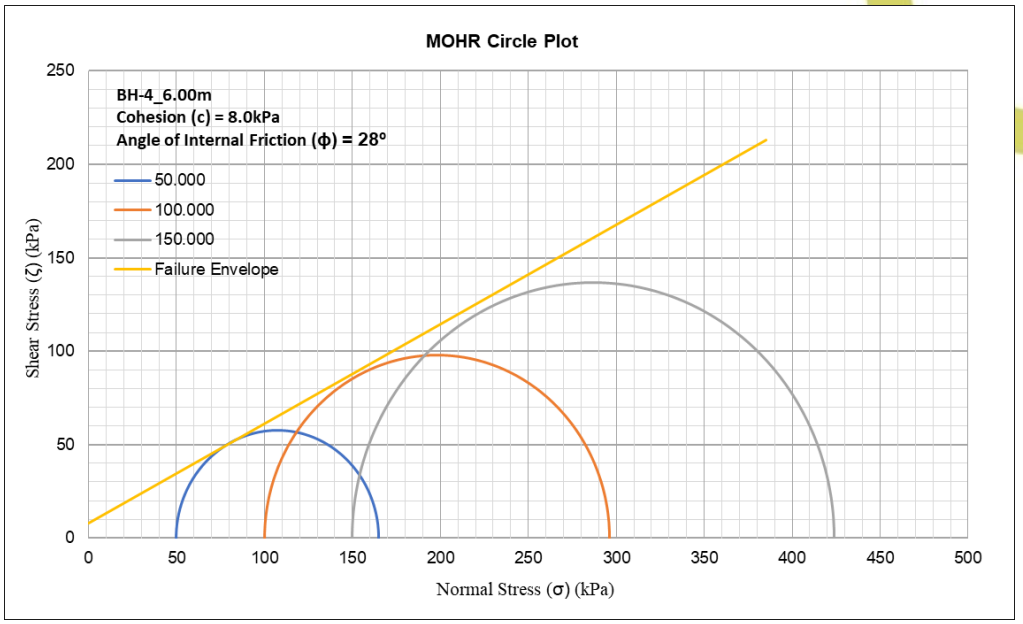
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits								Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						10.5	58.9	21.9	8.8	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Medium Dense, Grayish, fine-grained silty sand (SM)	2	2	3	5	7	8.8	61.8	19.1	10.3	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							5.9	66.9	17.5	9.6	27	NP	NP	13.18	1.59	1.40	2.63	F	0.01	22				-	-	-	-
3.50	SPT/DS		2	3	5	8	9	-																				
4.50	SPT/DS		2	4	6	10	10	10.1	63.9	17.9	8.2	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS							8.4	71.0	14.6	5.9	21	NP	NP	17.31	1.90	1.62	2.63	F	0.00	24	UU	8.0	28.0	-	-	-	-
6.50	SPT/DS	Medium Dense, Dark brownish, fine-grained silty sand (SM)	4	5	7	12	11	-																				
7.50	SPT/DS		6	8	11	19	17	11.6	61.2	19.6	7.5	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							11.6	69.7	13.2	5.5	21	NP	NP	16.85	1.88	1.61	2.60	F	0.03	27	UU	12.0	26.0	-	-	-	-
9.50	SPT/DS		9	11	15	26	22	-																				
10.50	SPT/DS		11	13	16	29	24	10.6	61.8	18.9	8.7	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							0.0	73.0	18.5	8.5	22	NP	NP	22.26	-	-	2.72	F	81.00	28	-	-	-	-	-	-	-
12.50	SPT/DS	Dense, Dark Brownish, fine-grained silty sand (SM)	15	21	25	46	35	-																				
13.50	SPT/DS		17	20	24	44	23	10.6	61.7	20.0	7.7	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.1	76.7	14.8	8.4	23	NP	NP	17.52	-	-	2.61	F	0.00	29	-	-	-	-	-	-	-
15.50	SPT/DS	Dense to very dense, Brownish, fine-grained silty sand with Gravel (SM)	20	24	30	54	26	-																				
16.50	SPT/DS		22	27	30	57	27	9.1	69.1	14.9	7.0	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS							0.4	76.4	17.0	6.2	26	NP	NP	20.77	-	-	2.75	F	0.02	29	-	-	-	-	-	-	-
18.50	SPT/DS		15	18	22	40	21	-																				
19.50	SPT/DS		17	21	25	46	22	5.0	72.3	15.7	7.0	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							0.7	75.3	16.8	7.3	28	NP	NP	21.29	-	-	2.67	F	0.00	30	-	-	-	-	-	-	-
21.50	SPT/DS	Very Dense, Dark Brownish, fine-grained silty sand with gravel(SM)	35	40	47	87	35	-																				
22.50	SPT/DS		40	(50/7 cm)	-	100	38	7.3	73.6	12.6	6.5	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.0	75.6	22.2	5.2	26	NP	NP	19.69	-	-	2.69	F	0.03	30	-	-	-	-	-	-	-
24.50	SPT/DS		46	(50/6 cm)	-	100	38	-																				
25.50	SPT/DS		49	(50/5 cm)	-	100	37	10.4	65.9	16.2	7.5	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							0.0	73.9	18.0	8.2	29	NP	NP	20.90	-	-	2.62	F	0.01	31	-	-	-	-	-	-	-
27.50	SPT/DS		(50/13 cm)	-	-	100	36	-																				
28.50	SPT/DS		(50/11 cm)	-	-	100	36	7.0	66.1	19.2	7.8	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.0	72.3	20.4	7.3	22	NP	NP	21.14	-	-	2.67	F	0.03	32	-	-	-	-	-	-	-
30.50	SPT/DS		(50/8 cm)	-	-	100	35	-																				

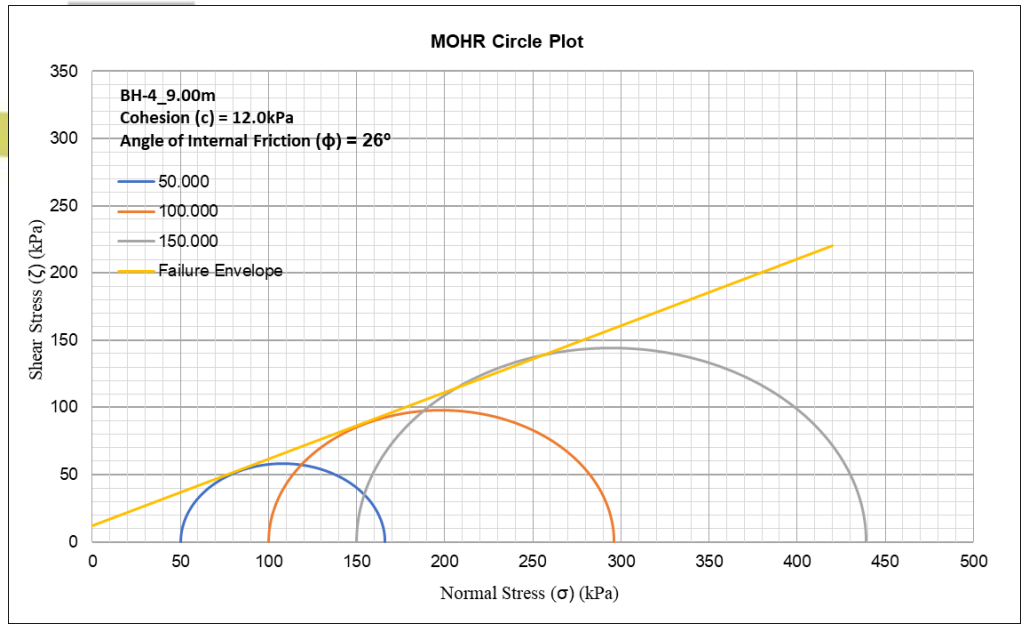
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

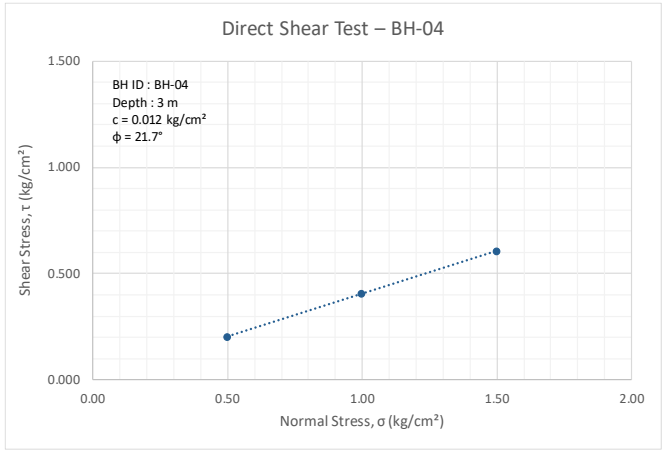

Grain Size Distribution Curve
BH-4_0.00m
BH-4_1.50m
BH-4_3.00m
BH-4_4.50m
BH-4_6.00m
BH-4_7.50m
BH-4_9.00m
Percent Finer (%)
Particle Size (mm)

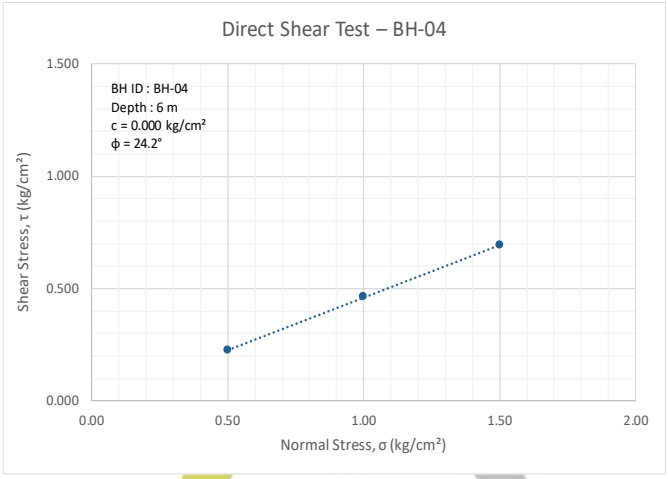

Grain Size Distribution Curve
BH-4_10.50m
BH-4_12.00m
BH-4_13.50m
BH-4_15.00m
BH-4_16.50m
BH-4_18.00m
BH-4_19.50m
Percent Finer (%)
Particle Size (mm)

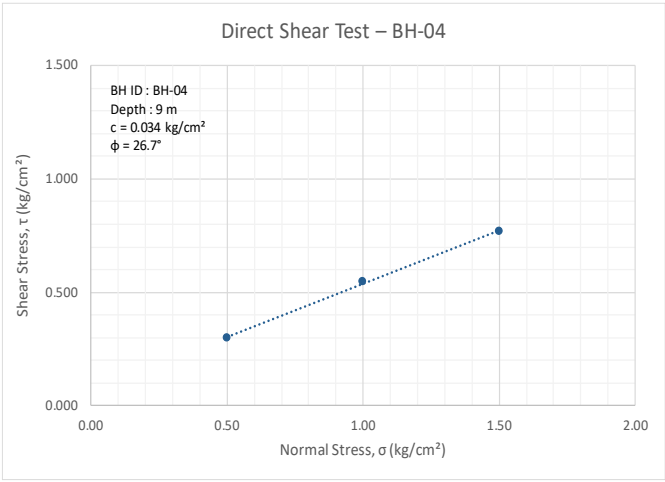

Grain Size Distribution Curve
BH-4_21.00m
BH-4_22.50m
BH-4_24.00m
BH-4_25.50m
BH-4_27.00m
BH-4_28.50m
BH-4_30.00m
Percent Finer (%)
Particle Size (mm)

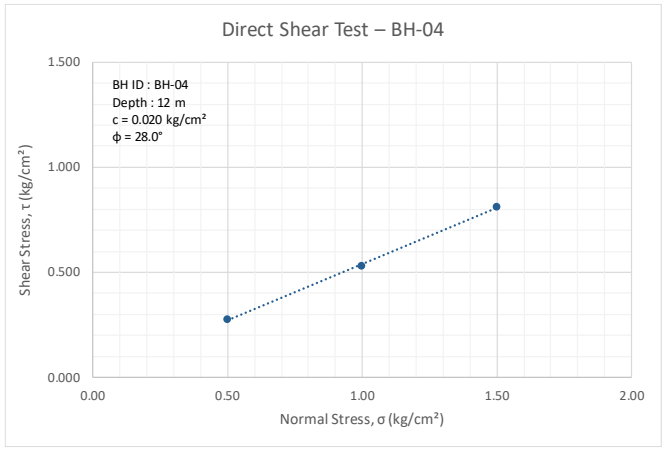

MOHR Circle Plot
BH-4_6.00m
Cohesion (c) = 8.0kPa
Angle of Internal Friction (ϕ) = 28°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

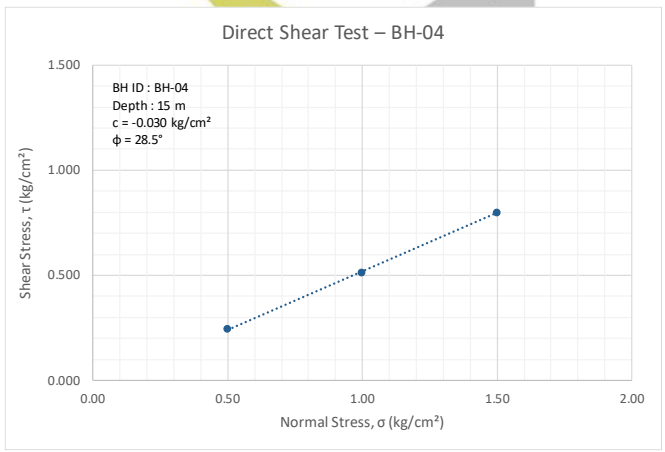

MOHR Circle Plot
BH-4_9.00m
Cohesion (c) = 12.0kPa
Angle of Internal Friction (ϕ) = 26°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

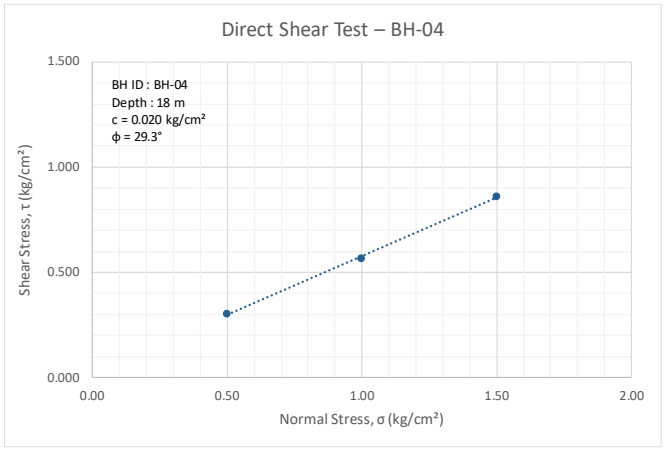

Direct Shear Test – BH-04
BH ID : BH-04
Depth : 3 m
c = 0.012 kg/cm²
ϕ = 21.7°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

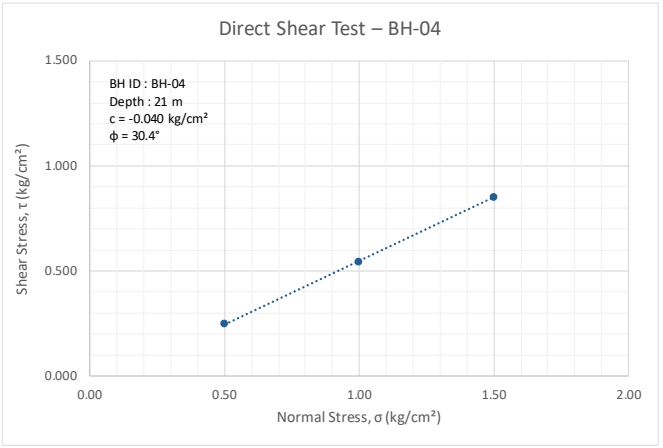

Direct Shear Test – BH-04
BH ID : BH-04
Depth : 6 m
c = 0.000 kg/cm²
ϕ = 24.2°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

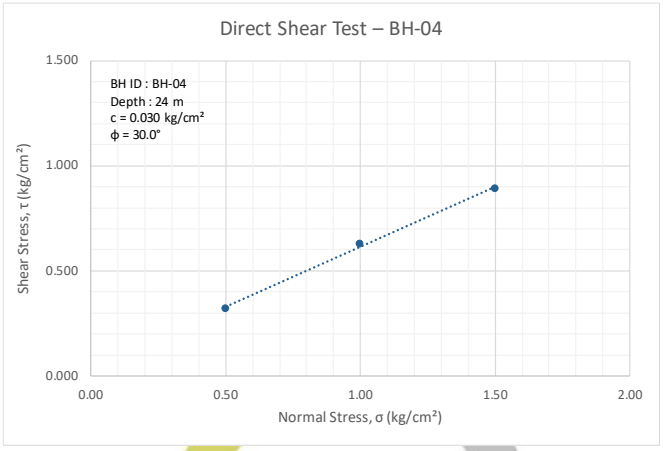

Direct Shear Test – BH-04
BH ID : BH-04
Depth : 9 m
c = 0.034 kg/cm²
ϕ = 26.7°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

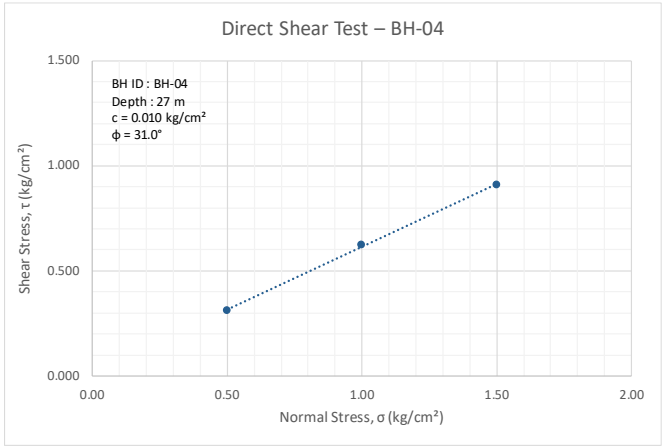

Direct Shear Test – BH-04
BH ID : BH-04
Depth : 12 m
c = 0.020 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

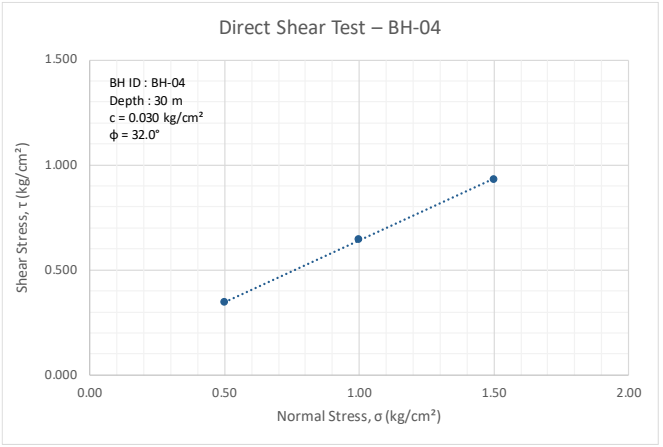

Direct Shear Test – BH-04
BH ID : BH-04
Depth : 15 m
c = -0.030 kg/cm²
ϕ = 28.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-04
BH ID : BH-04
Depth : 18 m
c = 0.020 kg/cm²
ϕ = 29.3°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-04
BH ID : BH-04
Depth : 21 m
c = -0.040 kg/cm²
ϕ = 30.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-04
BH ID : BH-04
Depth : 24 m
c = 0.030 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-04
BH ID : BH-04
Depth : 27 m
c = 0.010 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

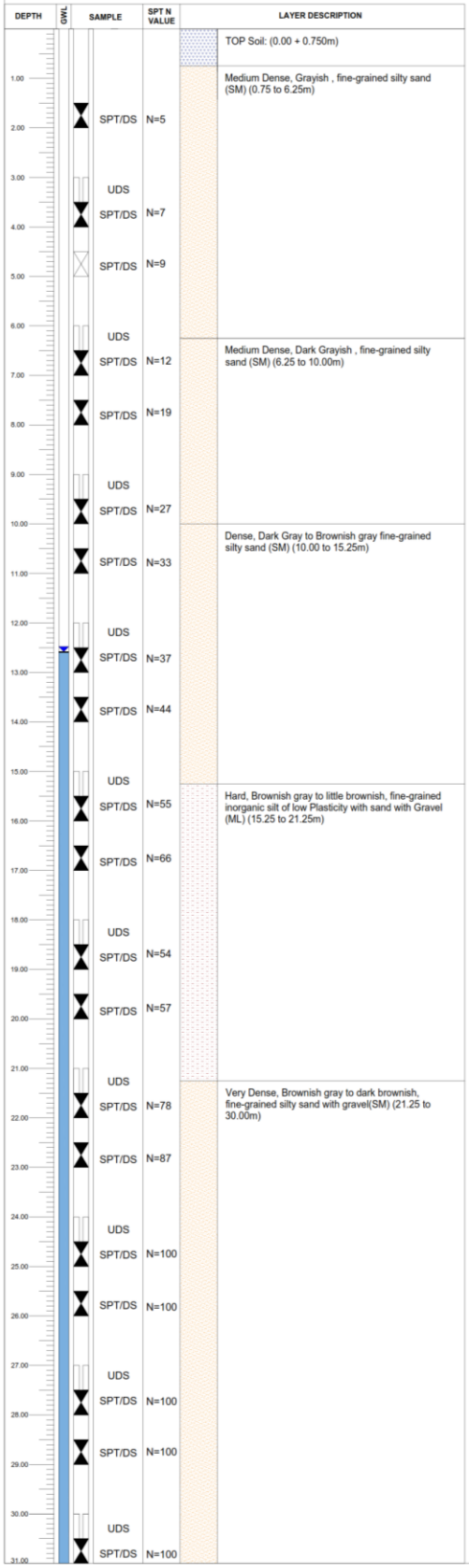

Direct Shear Test – BH-04
BH ID : BH-04
Depth : 30 m
c = 0.030 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (0+000 km TO 1+000 km)

BH ID : BH-05 | **Chainage** : 1+088 KM

Groundwater Level : 12.60 M | **Location** : Lat. 28.559277, Long. 77.331614



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

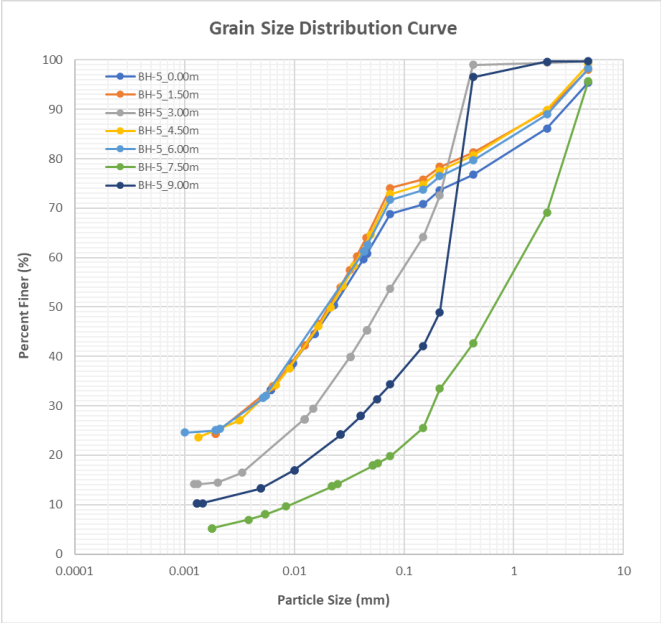
Soil

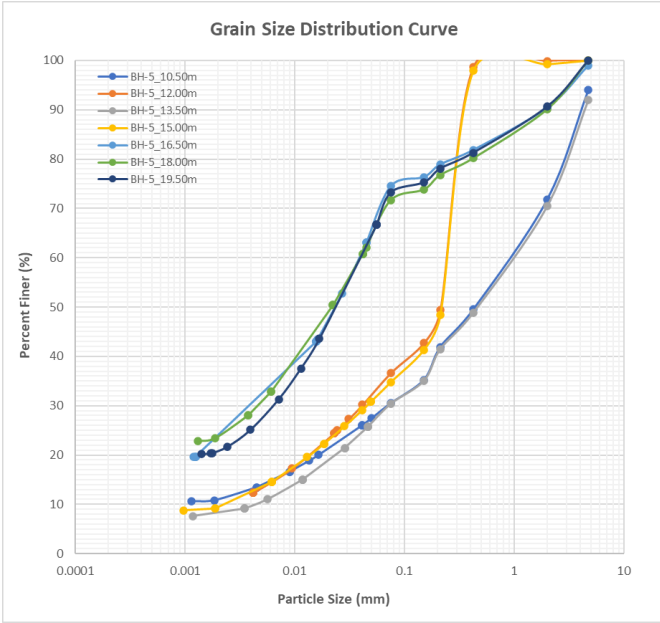
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

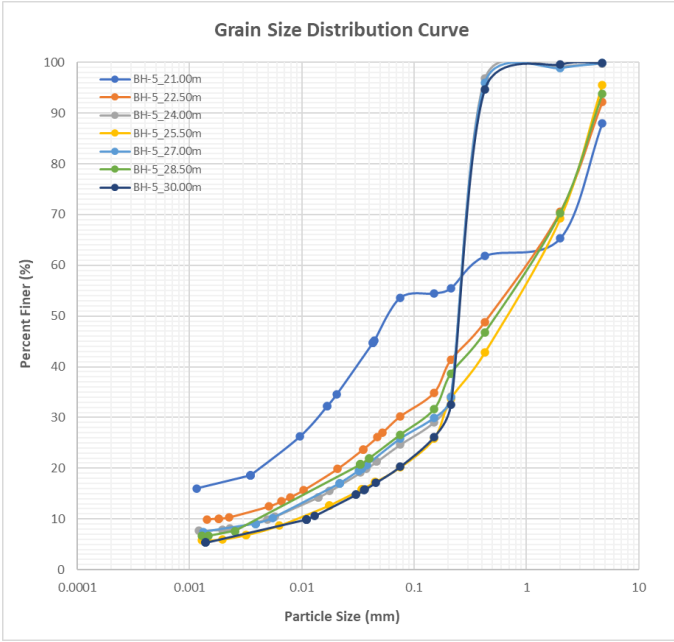
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-05	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	1+088	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	05-03-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	201	**End Date:**	05-03-2026
Project Code:	158_R2_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	12.60	**Location:**	Lat. 28.559277, Long. 77.331614

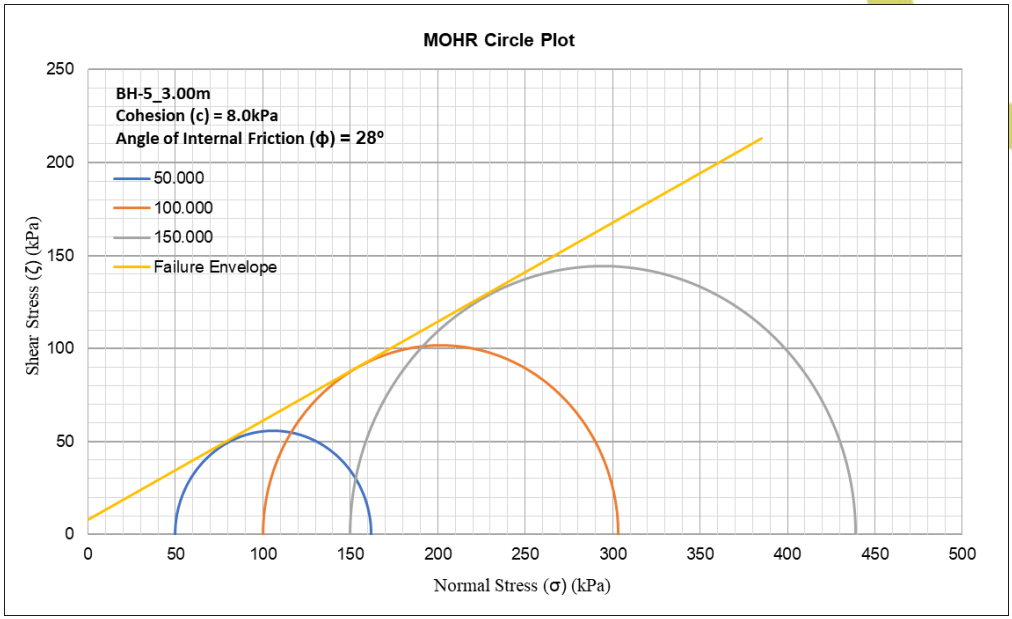
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						4.6	26.6	50.3	18.5	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Medium Dense, Grayish, fine-grained silty sand (SM)	2	2	3	5	7	1.9	24.0	49.4	24.7	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							0.4	45.9	39.2	14.5	22	NP	NP	23.25	1.91	1.55	2.65	F	0.05	21	UU	8.0	28.0	-	-	-
3.50	SPT/DS		2	3	4	7	8	-																			
4.50	SPT/DS		3	4	5	9	9	0.9	26.3	47.6	25.2	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS							1.8	26.5	46.5	25.2	21	NP	NP	12.74	1.87	1.66	2.67	F	0.06	23	UU	12.0	23.0	-	-	-
6.50	SPT/DS	Medium Dense, Dark Grayish, fine-grained silty sand (SM)	4	5	7	12	11	-																			
7.50	SPT/DS		7	9	10	19	17	4.3	75.9	14.4	5.4	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	DS							0.3	65.4	23.2	11.1	26	NP	NP	21.63	-	-	2.63	F	0.03	25	-	-	-	-	-	-
9.50	SPT/DS		9	12	15	27	23	-																			
10.50	SPT/DS	Dense, Dark Gray to Brownish gray, fine-grained silty sand (SM)	10	14	19	33	27	5.9	63.6	19.5	11.0	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							0.0	63.4	24.3	12.3	24	NP	NP	22.10	-	-	2.63	F	0.06	27	-	-	-	-	-	-
12.50	SPT/DS		12	17	20	37	28	-																			
13.50	SPT/DS		15	20	24	44	24	8.0	61.6	22.0	8.4	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.0	65.2	25.3	9.5	29	NP	NP	22.09	-	-	2.74	F	0.04	28	-	-	-	-	-	-
15.50	SPT/DS	Hard, Brownish gray to little brownish, fine-grained inorganic silt of low Plasticity with sand with Gravel(ML)	20	25	30	55	27	-																			
16.50	SPT/DS		24	30	36	66	30	1.0	24.5	50.5	24.0	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS							0.0	28.3	47.8	23.9	22	NP	NP	17.22	-	-	2.67	F	0.09	27				-	-	-
18.50	SPT/DS		20	24	30	54	26	-																			
19.50	SPT/DS		22	25	32	57	26	0.0	26.7	52.4	20.9	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS	Very Dense, Brownish gray to dark brownish, fine-grained silty sand with gravel(SM)						11.9	34.5	36.3	17.3	23	NP	NP	21.82	-	-	2.63	F	0.02	30	-	-	-	-	-	-
21.50	SPT/DS		30	36	42	78	32	-																			
22.50	SPT/DS		35	40	47	87	35	7.8	62.1	20.0	10.2	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.2	75.2	16.8	7.9	26	NP	NP	15.45	-	-	2.65	F	0.00	31	-	-	-	-	-	-
24.50	SPT/DS		40	(50/7 cm)	-	100	38	-																			
25.50	SPT/DS		46	(50/5 cm)	-	100	37	4.4	75.4	14.1	6.0	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							0.2	74.0	17.7	8.1	25	NP	NP	13.34	-	-	2.76	F	0.00	32	-	-	-	-	-	-
27.50	SPT/DS		48	(50/5 cm)	-	100	36	-																			
28.50	SPT/DS		(50/13 cm)	-	-	100	36	6.2	67.3	19.3	7.2	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.1	79.6	14.2	6.2	29	NP	NP	13.30	-	-	2.69	F	0.05	31	-	-	-	-	-	-
30.50	SPT/DS		(50/11 cm)	-	-	100	35	-																			

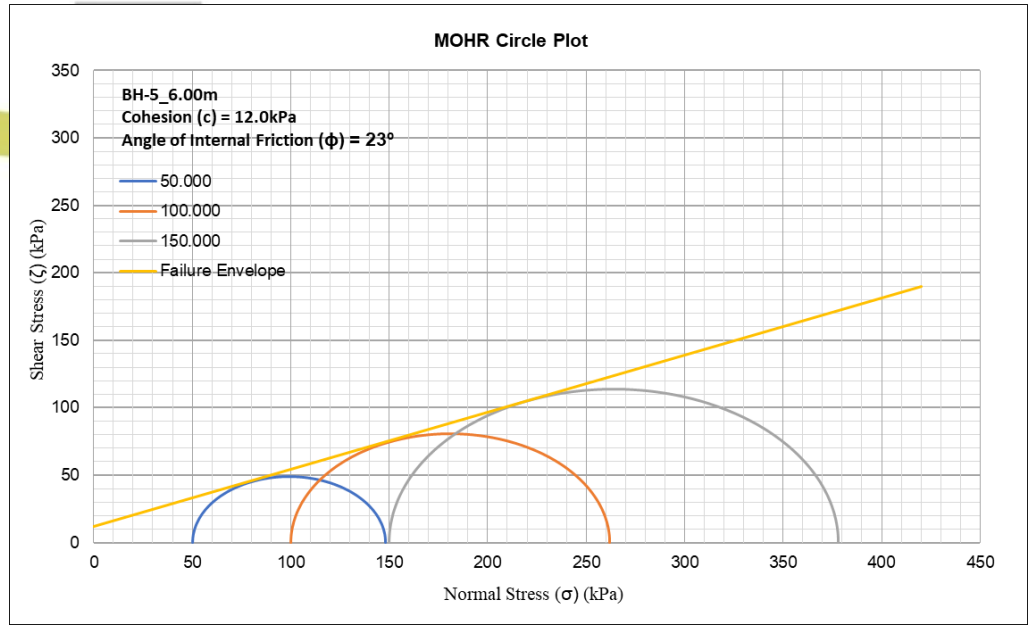
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

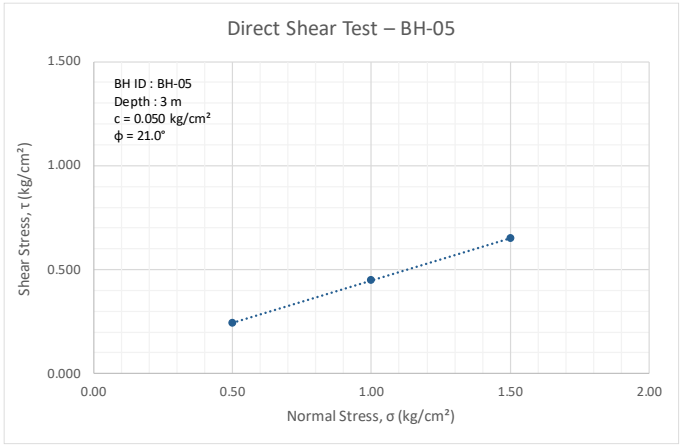

Grain Size Distribution Curve
BH-5_0.00m
BH-5_1.50m
BH-5_3.00m
BH-5_4.50m
BH-5_6.00m
BH-5_7.50m
BH-5_9.00m
Percent Finer (%)
Particle Size (mm)

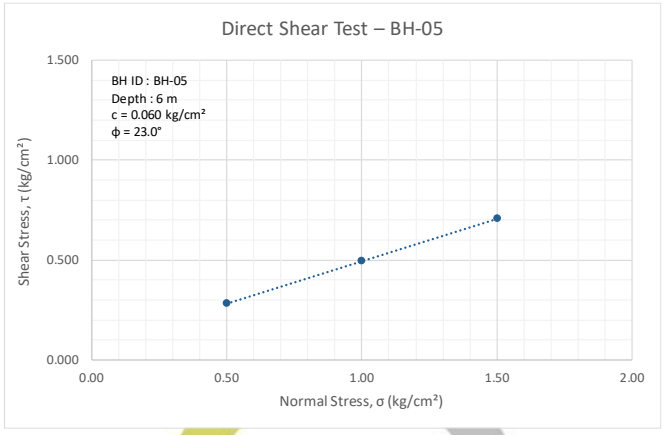

Grain Size Distribution Curve
BH-5_10.50m
BH-5_12.00m
BH-5_13.50m
BH-5_15.00m
BH-5_16.50m
BH-5_18.00m
BH-5_19.50m
Percent Finer (%)
Particle Size (mm)

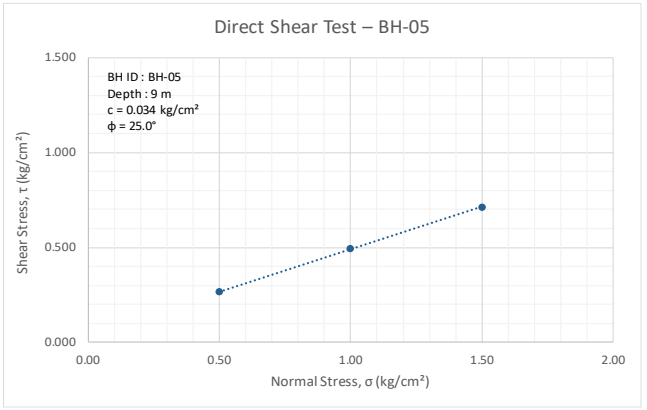

Grain Size Distribution Curve
BH-5_21.00m
BH-5_22.50m
BH-5_24.00m
BH-5_25.50m
BH-5_27.00m
BH-5_28.50m
BH-5_30.00m
Percent Finer (%)
Particle Size (mm)

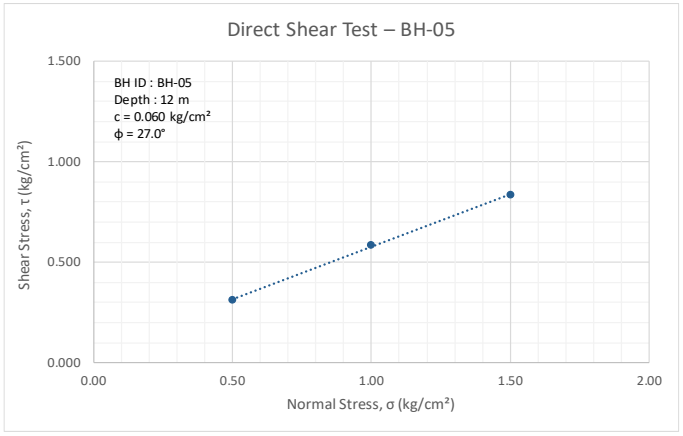

MOHR Circle Plot
BH-5_3.00m
Cohesion (c) = 8.0kPa
Angle of Internal Friction (ϕ) = 28°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

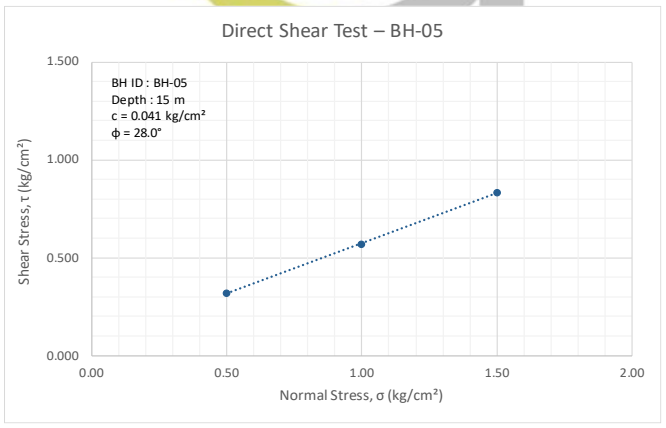

MOHR Circle Plot
BH-5_6.00m
Cohesion (c) = 12.0kPa
Angle of Internal Friction (ϕ) = 23°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

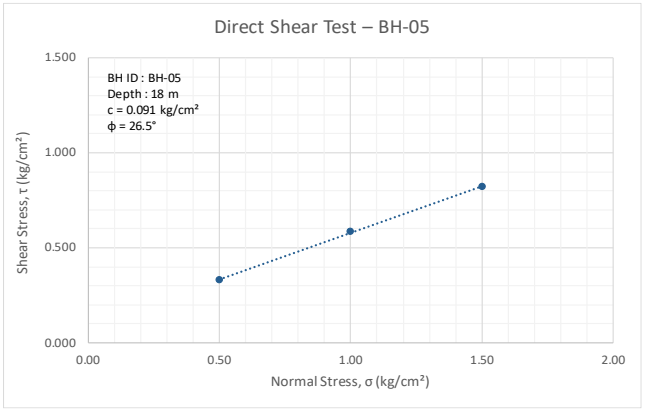

Direct Shear Test – BH-05
BH ID : BH-05
Depth : 3 m
c = 0.050 kg/cm²
ϕ = 21.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

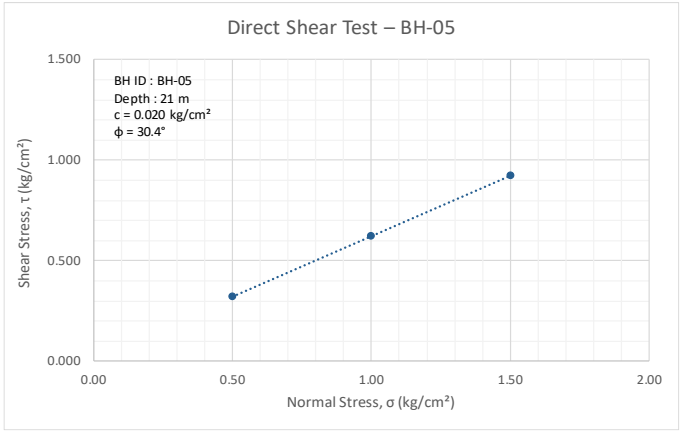

Direct Shear Test – BH-05
BH ID : BH-05
Depth : 6 m
c = 0.060 kg/cm²
ϕ = 23.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

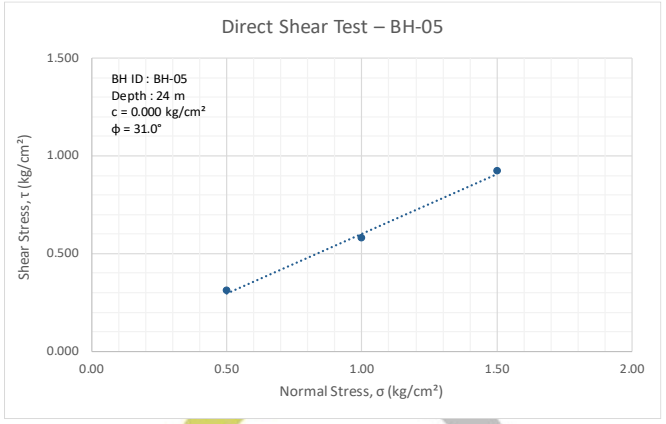

Direct Shear Test – BH-05
BH ID : BH-05
Depth : 9 m
c = 0.034 kg/cm²
ϕ = 25.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

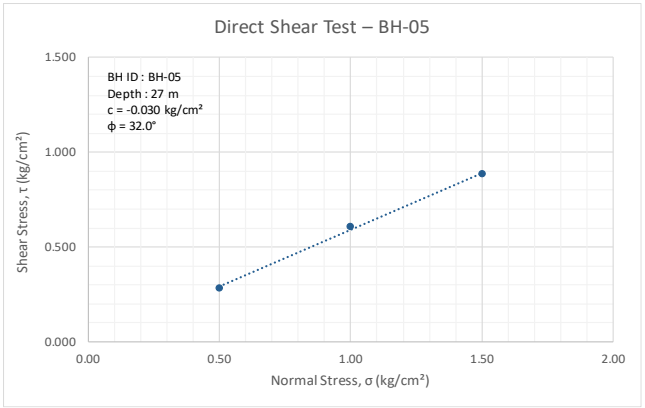

Direct Shear Test – BH-05
BH ID : BH-05
Depth : 12 m
c = 0.060 kg/cm²
ϕ = 27.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

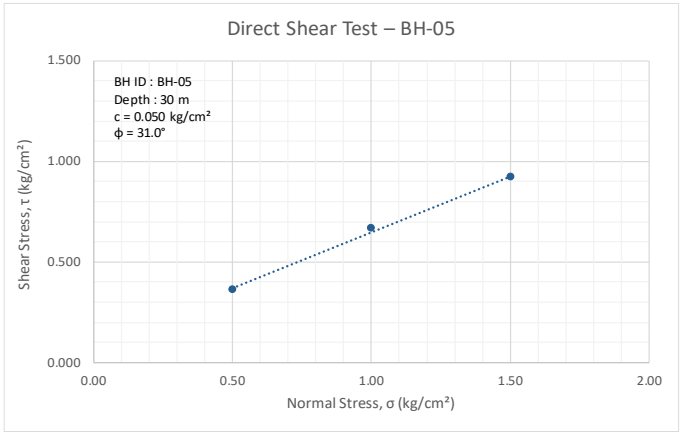

Direct Shear Test – BH-05
BH ID : BH-05
Depth : 15 m
c = 0.041 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-05
BH ID : BH-05
Depth : 18 m
c = 0.091 kg/cm²
ϕ = 26.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-05
BH ID : BH-05
Depth : 21 m
c = 0.020 kg/cm²
ϕ = 30.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-05
BH ID : BH-05
Depth : 24 m
c = 0.000 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-05
BH ID : BH-05
Depth : 27 m
c = -0.030 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

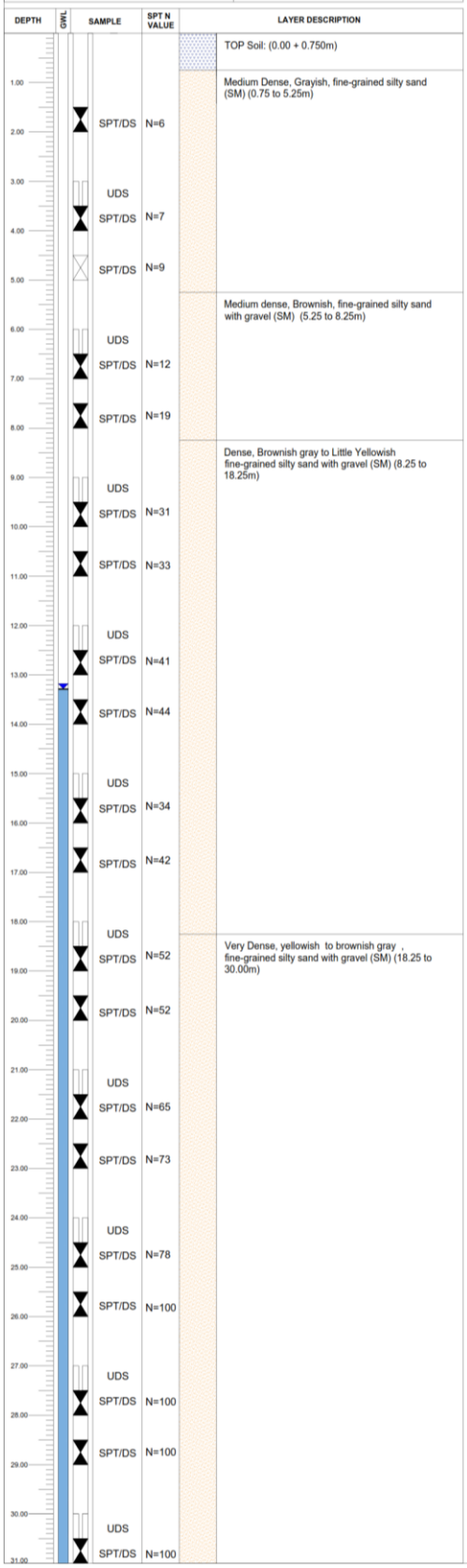

Direct Shear Test – BH-05
BH ID : BH-05
Depth : 30 m
c = 0.050 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (0+000 km TO 1+000 km)

BH ID : BH-06 | **Chainage** : 1+192 KM

Groundwater Level : 13.30 M | **Location** : Lat. 28.558882, Long. 77.330645



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

Soil

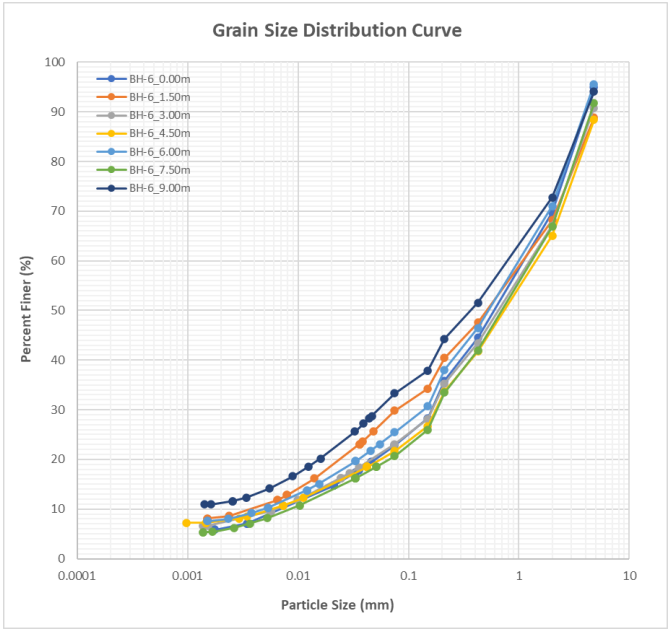
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

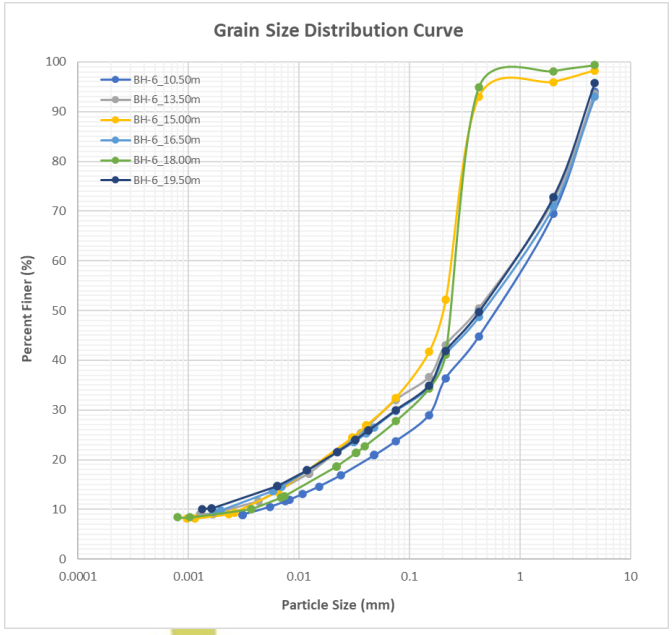
GOMA ENGINEERING AND CONSULTANCY
Quality we put forward

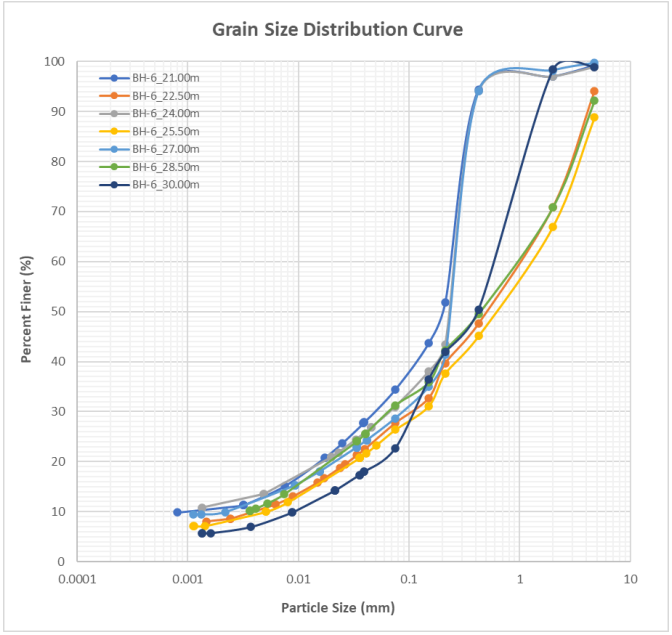
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-06	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	1+192	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	03-03-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	200.1	**End Date:**	03-03-2026
Project Code:	158_R2_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	13.30	**Location:**	Lat. 28.558882, Long. 77.330645

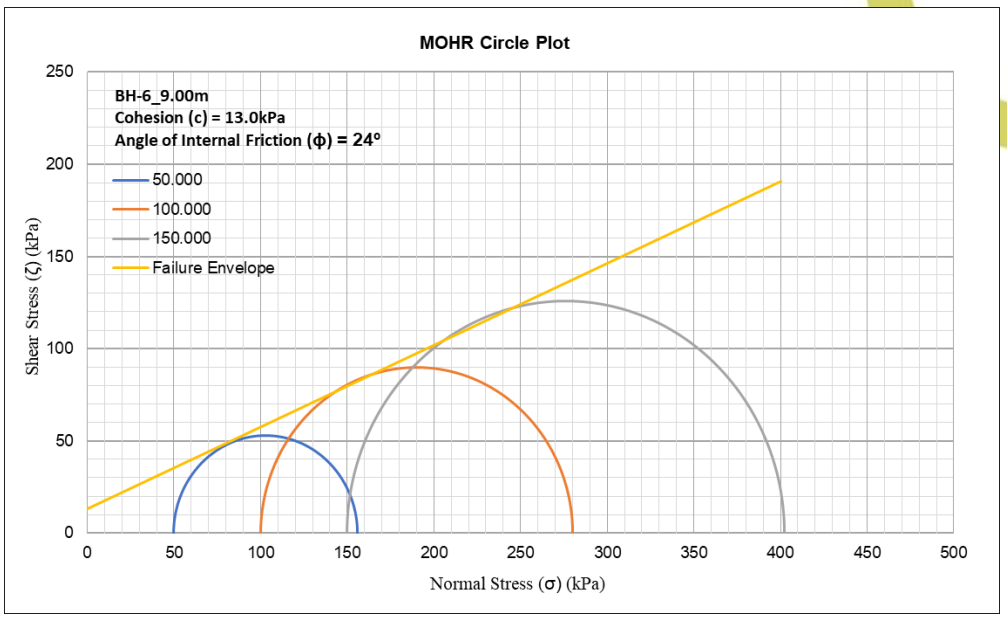
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						5.1	72.0	16.8	6.1	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Medium Dense, Greyish, fine-grained silty sand (SM)	2	3	3	6	8	11.2	59.0	21.4	8.4	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							9.2	67.7	15.9	7.2	24	NP	NP	15.30	1.62	1.41	2.67	F	0.01	23	-	-	-	-	-	-
3.50	SPT/DS		2	3	4	7	8	-																			
4.50	SPT/DS		3	4	5	9	9	11.6	66.7	14.1	7.6	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS	Medium dense, Brownish, fine-grained silty sand with gravel (SM)						4.4	70.2	17.6	7.9	27	NP	NP	16.21	1.67	1.44	2.68	F	0.03	24	-	-	-	-	-	-
6.50	SPT/DS		3	5	7	12	11	-																			
7.50	SPT/DS		6	9	10	19	17	8.3	71.1	14.9	5.7	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS	Dense, Brownish grey to Little Yellowish fine-grained silty sand with gravel (SM)						6.0	60.7	22.1	11.3	23	NP	NP	13.93	1.85	1.62	2.61	F	0.02	26	UU	13.0	24.0	-	-	-
9.50	SPT/DS		7	13	18	31	26	-																			
10.50	SPT/DS		10	15	18	33	27	5.9	70.3	16.8	6.9	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							7.2	71.2	14.2	7.4	24	NP	NP	21.09	1.87	1.54	2.75	F	0.04	27	UU	3.0	29.0	-	-	-
12.50	SPT/DS		13	19	22	41	31	-																			
13.50	SPT/DS		17	20	24	44	23	6.4	61.6	22.4	9.6	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							1.7	65.9	23.6	8.8	26	NP	NP	20.02	-	-	2.66	F	0.00	28	-	-	-	-	-	-
15.50	SPT/DS		12	14	20	34	19	-																			
16.50	SPT/DS		14	19	23	42	22	7.0	63.2	20.0	9.8	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	UDS							0.6	71.6	18.5	9.3	29	NP	NP	17.45	-	-	2.69	F	0.03	29	-	-	-	-	-	-
18.50	SPT/DS	Very Dense, yellowish to Brownish grey, fine-grained silty sand with gravel(SM)	18	23	29	52	25	-																			
19.50	SPT/DS		20	23	29	52	24	4.2	65.8	19.1	10.9	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							0.8	64.7	23.6	10.8	28	NP	NP	19.13	-	-	2.73	F	0.02	30	-	-	-	-	-	-
21.50	SPT/DS		25	30	35	65	28	-																			
22.50	SPT/DS		26	33	40	73	30	5.9	66.4	19.3	8.4	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							1.1	67.9	19.3	11.6	26	NP	NP	18.03	-	-	2.64	F	0.05	30	-	-	-	-	-	-
24.50	SPT/DS		30	36	42	78	31	-																			
25.50	SPT/DS		37	(50/10 cm)	-	100	37	11.2	62.4	18.5	7.9	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							0.3	71.0	18.9	9.8	28	NP	NP	18.92	-	-	2.71	F	0.00	32	-	-	-	-	-	-
27.50	SPT/DS		42	(50/6 cm)	-	100	36	-																			
28.50	SPT/DS		48	(50/4 cm)	-	100	36	7.8	60.9	19.1	12.2	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							1.1	76.2	16.7	6.1	27	NP	NP	23.07	-	-	2.68	F	0.00	34	-	-	-	-	-	-
30.50	SPT/DS		(50/3 cm)	-	-	100	35	-																			

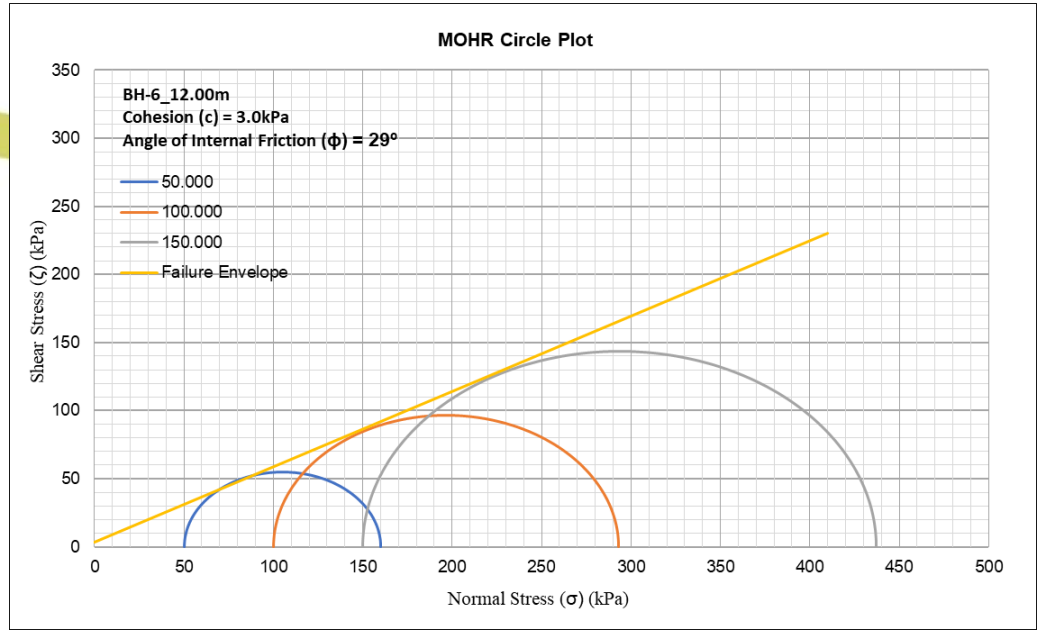
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

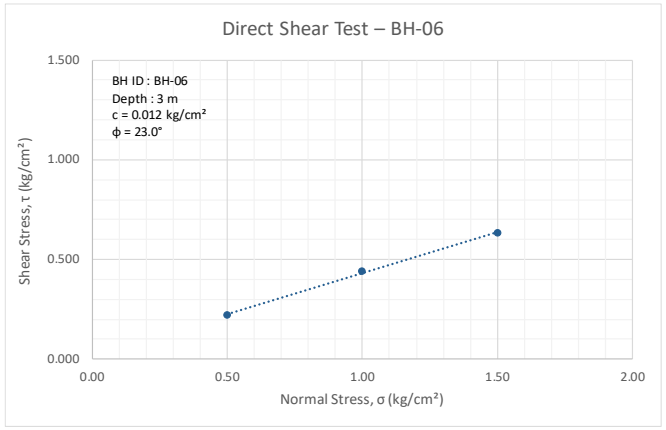

Grain Size Distribution Curve
BH-6_0.00m
BH-6_1.50m
BH-6_3.00m
BH-6_4.50m
BH-6_6.00m
BH-6_7.50m
BH-6_9.00m
Percent Finer (%)
Particle Size (mm)

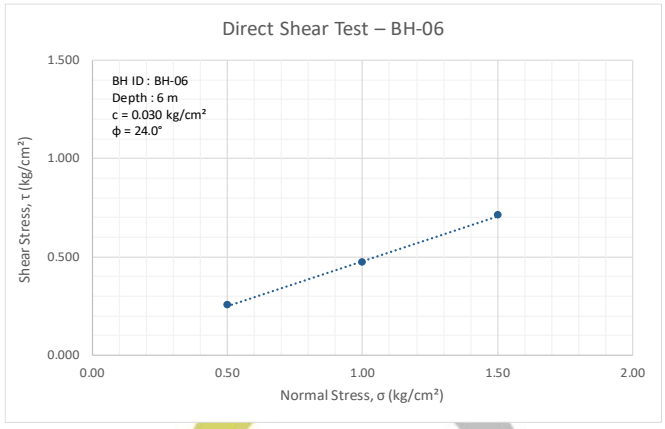

Grain Size Distribution Curve
BH-6_10.50m
BH-6_13.50m
BH-6_15.00m
BH-6_16.50m
BH-6_18.00m
BH-6_19.50m
Percent Finer (%)
Particle Size (mm)

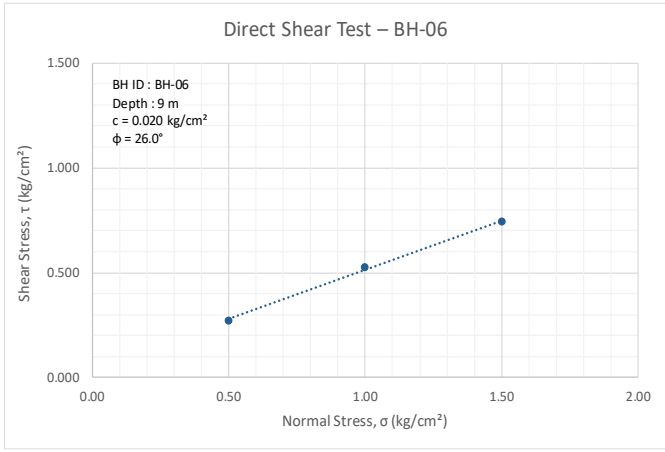

Grain Size Distribution Curve
BH-6_21.00m
BH-6_22.50m
BH-6_24.00m
BH-6_25.50m
BH-6_27.00m
BH-6_28.50m
BH-6_30.00m
Percent Finer (%)
Particle Size (mm)

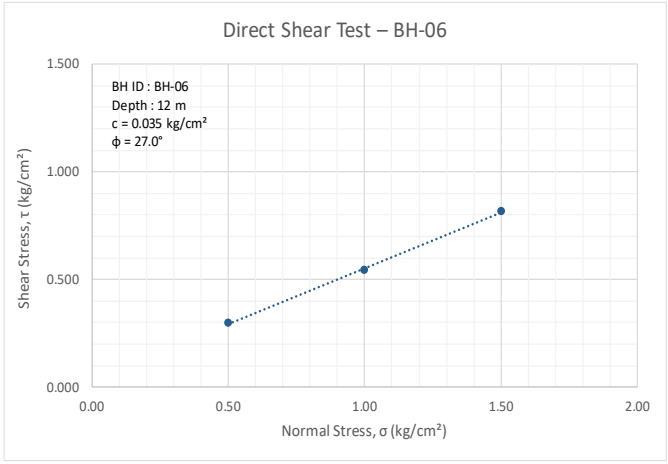

MOHR Circle Plot
BH-6_9.00m
Cohesion (c) = 13.0kPa
Angle of Internal Friction (ϕ) = 24°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

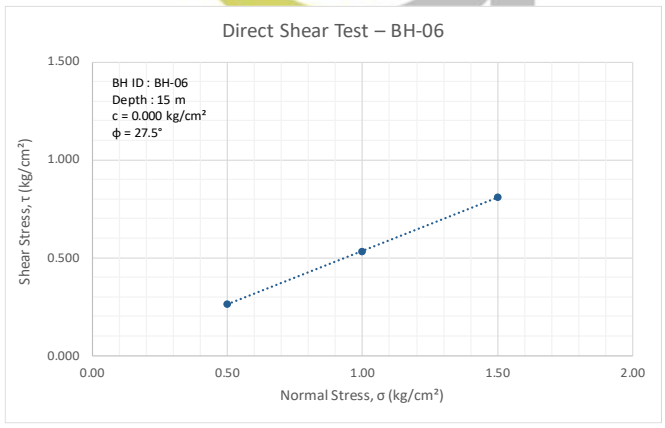

MOHR Circle Plot
BH-6_12.00m
Cohesion (c) = 3.0kPa
Angle of Internal Friction (ϕ) = 29°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

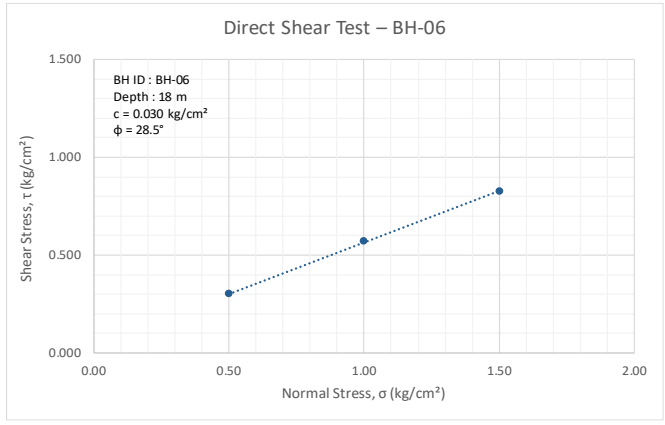

Direct Shear Test – BH-06
BH ID : BH-06
Depth : 3 m
c = 0.012 kg/cm²
ϕ = 23.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

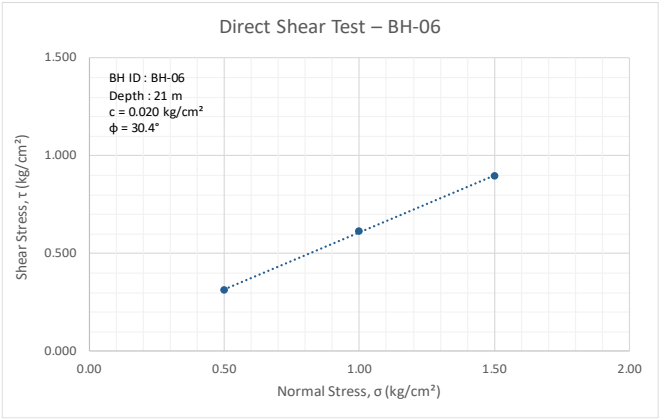

Direct Shear Test – BH-06
BH ID : BH-06
Depth : 6 m
c = 0.030 kg/cm²
ϕ = 24.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

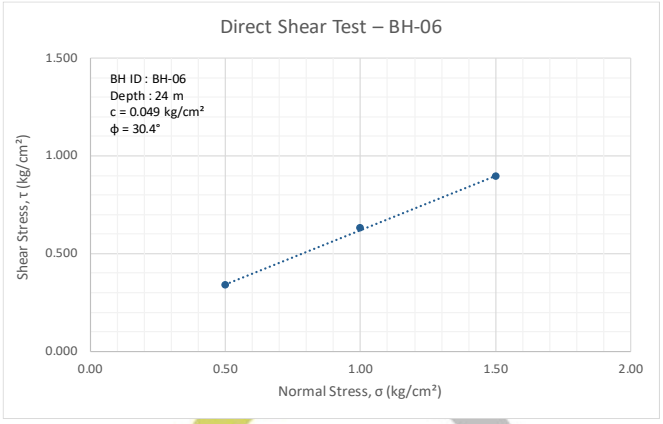

Direct Shear Test – BH-06
BH ID : BH-06
Depth : 9 m
c = 0.020 kg/cm²
ϕ = 26.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

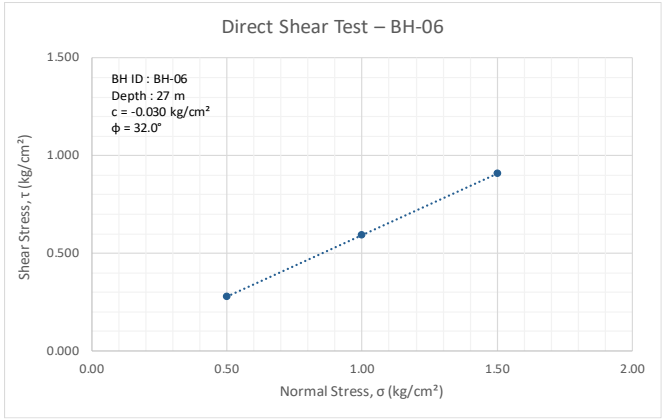

Direct Shear Test – BH-06
BH ID : BH-06
Depth : 12 m
c = 0.035 kg/cm²
ϕ = 27.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

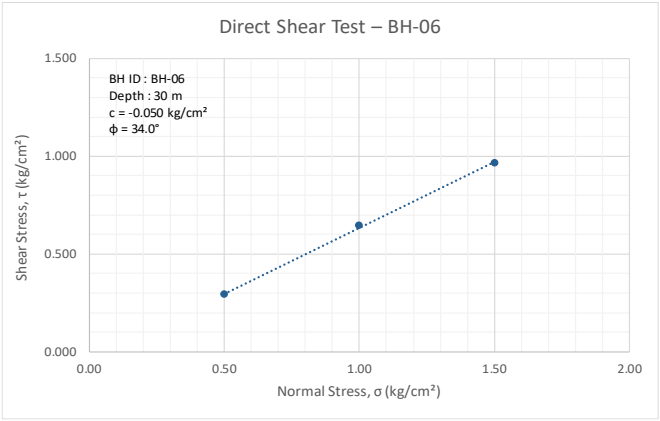

Direct Shear Test – BH-06
BH ID : BH-06
Depth : 15 m
c = 0.000 kg/cm²
ϕ = 27.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-06
BH ID : BH-06
Depth : 18 m
c = 0.030 kg/cm²
ϕ = 28.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-06
BH ID : BH-06
Depth : 21 m
c = 0.020 kg/cm²
ϕ = 30.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-06
BH ID : BH-06
Depth : 24 m
c = 0.049 kg/cm²
ϕ = 30.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-06
BH ID : BH-06
Depth : 27 m
c = -0.030 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

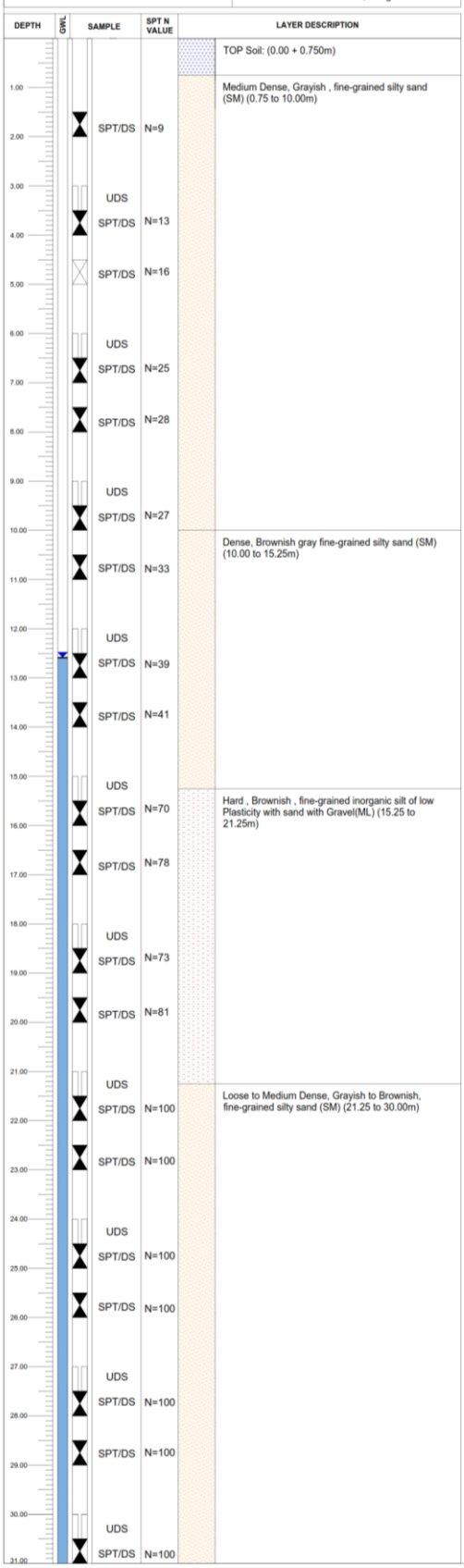

Direct Shear Test – BH-06
BH ID : BH-06
Depth : 30 m
c = -0.050 kg/cm²
ϕ = 34.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (0+000 km TO 1+000 km)

BH ID : BH-07 | **Chainage** : 1+277 KM

Groundwater Level : 12.60 M | **Location** : Lat. 28.558487, Long. 77.32984



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

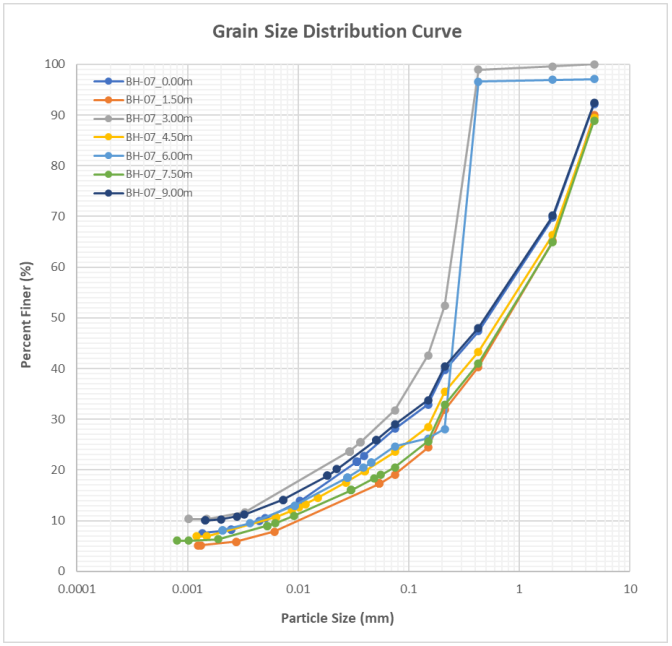
Soil

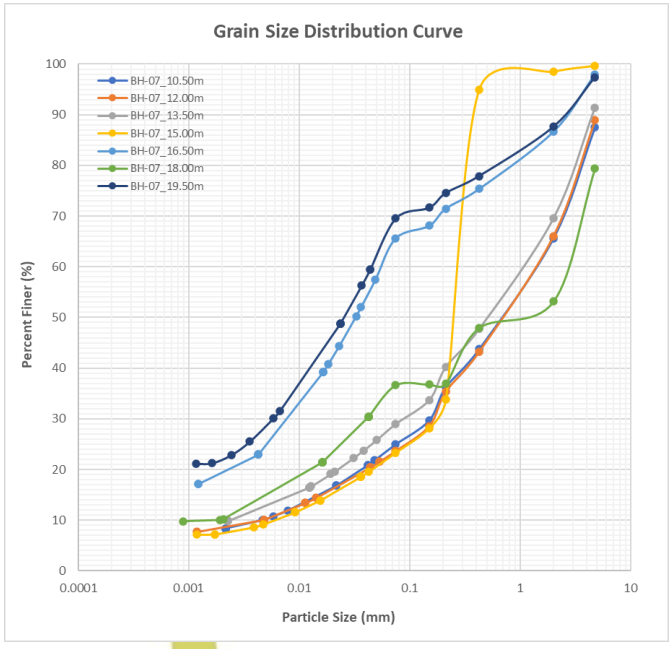
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

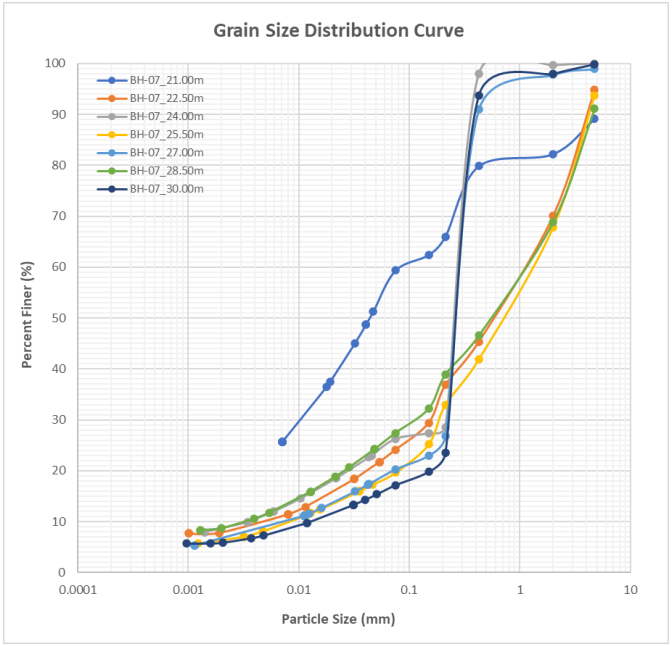
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-07	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	1+277	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	03-03-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	200.4	**End Date:**	03-03-2026
Project Code:	158_R2_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	12.60	**Location:**	Lat. 28.558487, Long. 77.32984

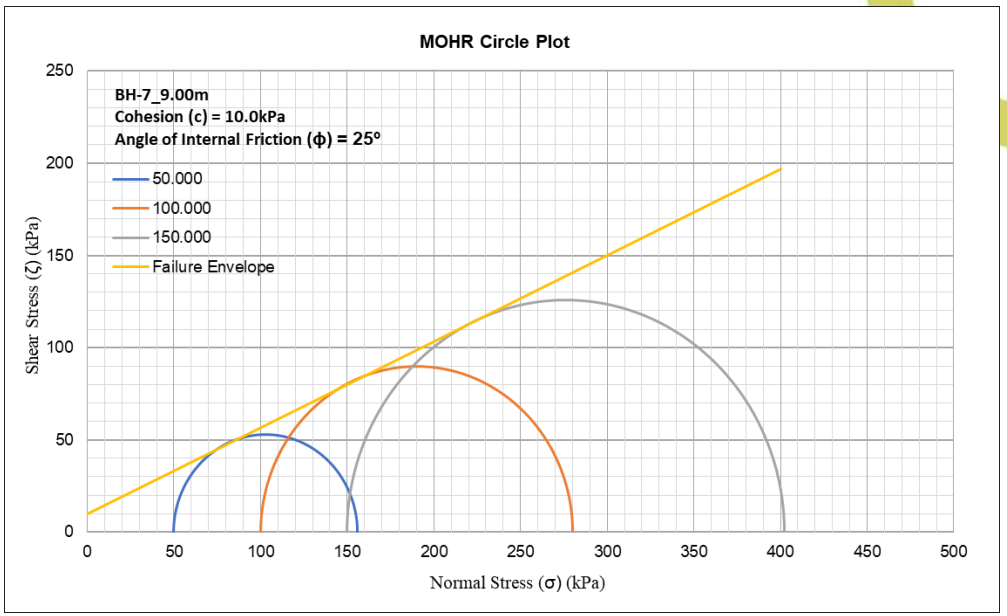
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						7.8	64.1	20.2	8.0	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Medium Dense, Greyish, fine-grained silty sand (SM)	3	4	5	9	13	10.0	70.9	13.6	5.5	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							0.0	68.2	20.9	10.8	24	NP	NP	9.20	1.68	1.54	2.72	F	0.02	23	-	-	-	-	-	-
3.50	SPT/DS		5	6	7	13	14	-																			
4.50	SPT/DS		5	7	9	16	16	10.6	65.9	15.9	7.7	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS							2.9	72.5	16.3	8.3	29	NP	NP	18.40	1.71	1.44	2.67	F	0.03	27	-	-	-	-	-	-
6.50	SPT/DS		9	12	13	25	23	-																			
7.50	SPT/DS		12	13	15	28	26	11.1	68.4	14.0	6.5	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							7.6	63.4	18.7	10.3	21	NP	NP	14.62	1.88	1.64	2.62	F	0.01	28	UU	10.0	25.0	-	-	-
9.50	SPT/DS		8	12	15	27	23	-																			
10.50	SPT/DS	Dense, Brownish grey fine-grained silty sand (SM)	13	15	18	33	27	12.5	62.5	19.7	5.3	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							11.1	65.2	15.1	8.6	28	NP	NP	19.37	1.91	1.60	2.61	F	0.06	28	UU	12.0	24.0	-	-	-
12.50	SPT/DS		15	18	21	39	29	-																			
13.50	SPT/DS		16	19	22	41	23	8.6	62.4	22.8	6.3	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.3	76.4	15.9	7.5	26	NP	NP	20.35	-	-	2.66	F	0.02	30	-	-	-	-	-	-
15.50	SPT/DS	Hard, Brownish, fine-grained inorganic silt of low Plasticity with sand with Gravel(ML)	19	23	47	70	32	-																			
16.50	SPT/DS		20	37	41	78	34	2.0	32.3	46.2	19.4	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	UDS							20.6	42.8	26.5	10.1	28	NP	NP	13.30	-	-	2.76	F	0.09	28	-	-	-	-	-	-
18.50	SPT/DS		22	30	43	73	32	-																			
19.50	SPT/DS		24	35	46	81	34	2.6	27.8	47.5	22.1	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							10.9	29.8	43.7	15.6	24	NP	NP	20.35	-	-	2.69	F	0.05	30	-	-	-	-	-	-
21.50	SPT/DS	Very Dense, Dark Brownish, fine-grained silty sand with gravel (SM)	27	37	(50/12 cm)	100	39	-																			
22.50	SPT/DS		31	38	(50/11 cm)	100	39	5.2	70.7	16.2	7.9	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.0	73.7	17.6	8.7	23	NP	NP	17.48	-	-	2.69	F	0.02	31	-	-	-	-	-	-
24.50	SPT/DS		36	45	(50/8 cm)	100	38	-																			
25.50	SPT/DS		41	(50/13 cm)	-	100	37	6.3	74.1	13.2	6.4	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							1.0	78.7	13.5	6.8	28	NP	NP	11.24	-	-	2.77	F	0.00	32	-	-	-	-	-	-
27.50	SPT/DS		42	(50/11 cm)	-	100	36	-																			
28.50	SPT/DS		46	(50/9 cm)	-	100	36	8.9	63.7	18.7	8.7	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.1	82.7	11.3	5.9	24	NP	NP	11.09	-	-	2.64	F	0.07	31	-	-	-	-	-	-
30.50	SPT/DS		48	(50/8 cm)	-	100	35	-																			

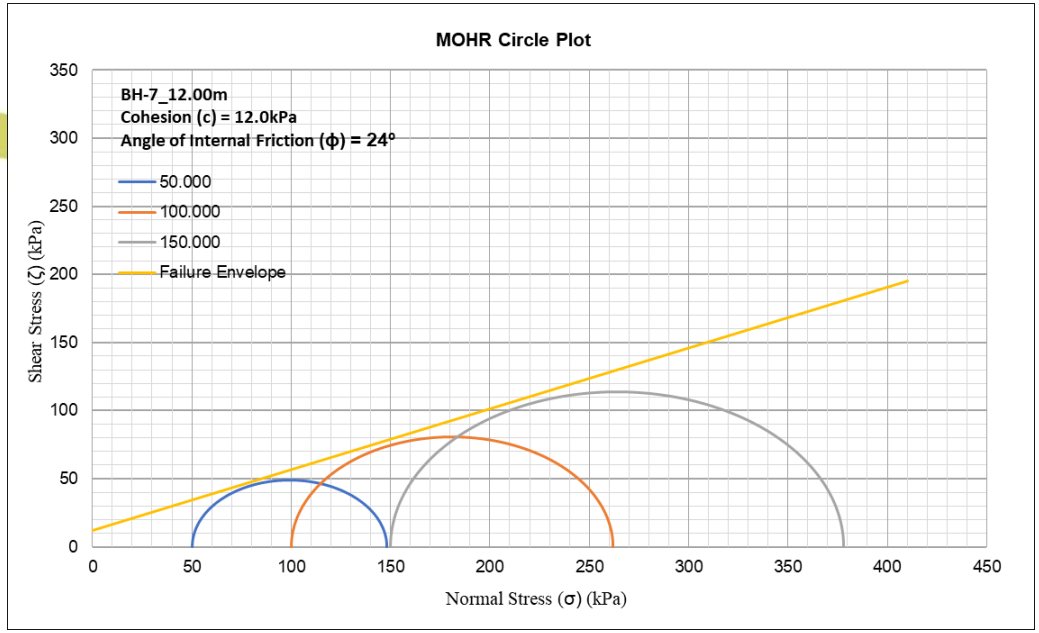
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

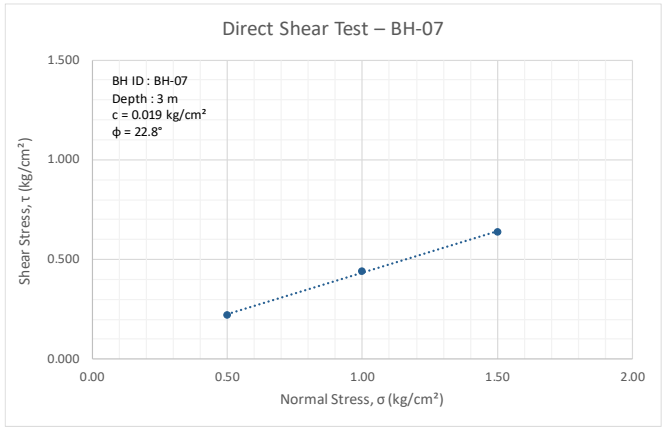

Grain Size Distribution Curve
BH-07_0.00m
BH-07_1.50m
BH-07_3.00m
BH-07_4.50m
BH-07_6.00m
BH-07_7.50m
BH-07_9.00m
Percent Finer (%)
Particle Size (mm)

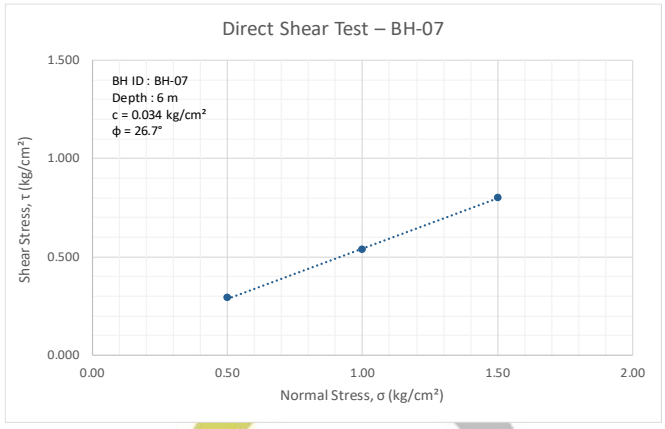

Grain Size Distribution Curve
BH-07_10.50m
BH-07_12.00m
BH-07_13.50m
BH-07_15.00m
BH-07_16.50m
BH-07_18.00m
BH-07_19.50m
Percent Finer (%)
Particle Size (mm)

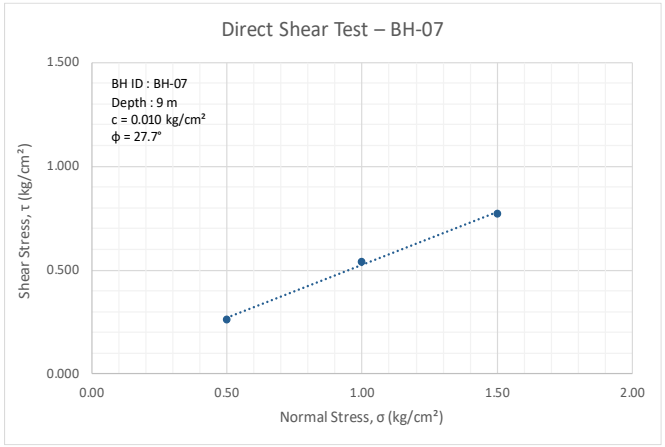

Grain Size Distribution Curve
BH-07_21.00m
BH-07_22.50m
BH-07_24.00m
BH-07_25.50m
BH-07_27.00m
BH-07_28.50m
BH-07_30.00m
Percent Finer (%)
Particle Size (mm)

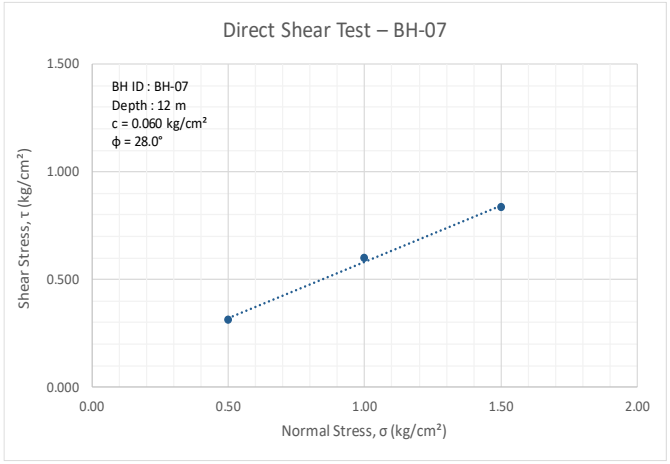

MOHR Circle Plot
BH-7_9.00m
Cohesion (c) = 10.0kPa
Angle of Internal Friction (ϕ) = 25°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

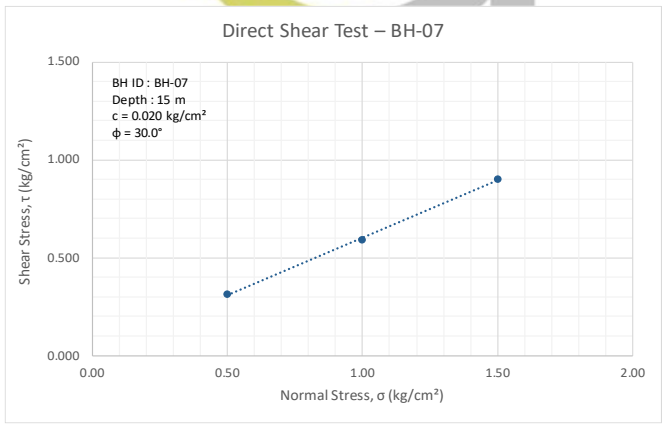

MOHR Circle Plot
BH-7_12.00m
Cohesion (c) = 12.0kPa
Angle of Internal Friction (ϕ) = 24°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

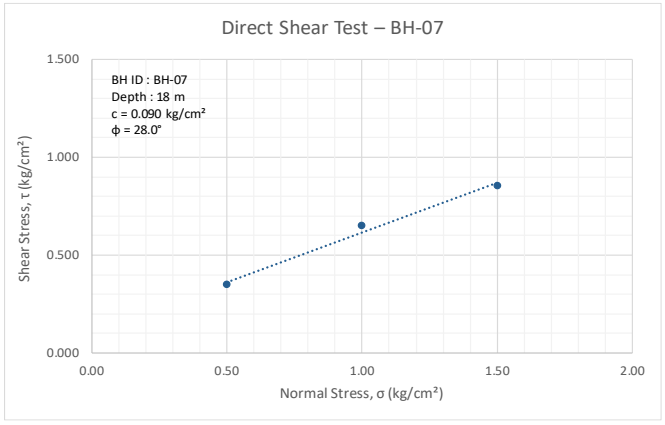

Direct Shear Test – BH-07
BH ID : BH-07
Depth : 3 m
c = 0.019 kg/cm²
ϕ = 22.8°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

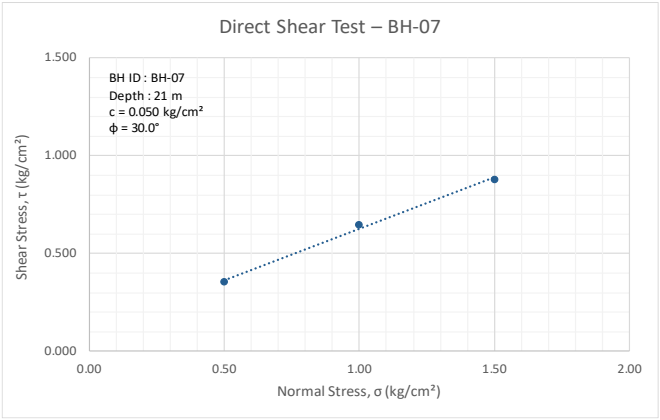

Direct Shear Test – BH-07
BH ID : BH-07
Depth : 6 m
c = 0.034 kg/cm²
ϕ = 26.7°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

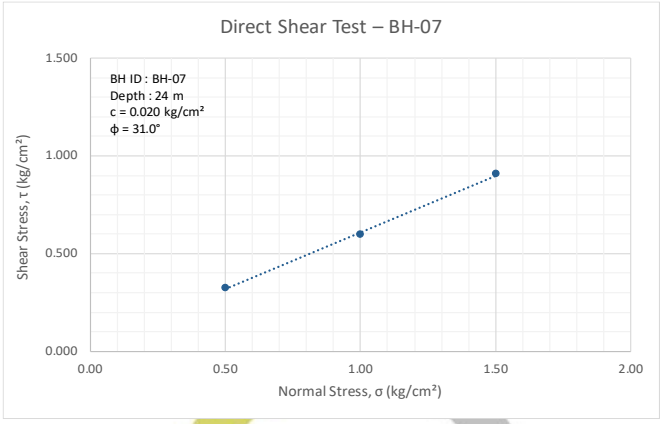

Direct Shear Test – BH-07
BH ID : BH-07
Depth : 9 m
c = 0.010 kg/cm²
ϕ = 27.7°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

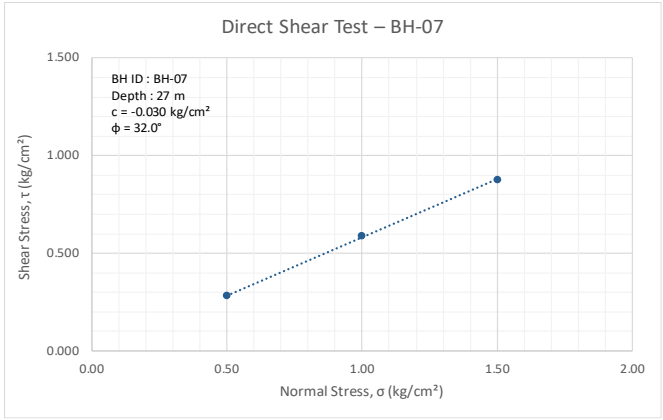

Direct Shear Test – BH-07
BH ID : BH-07
Depth : 12 m
c = 0.060 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

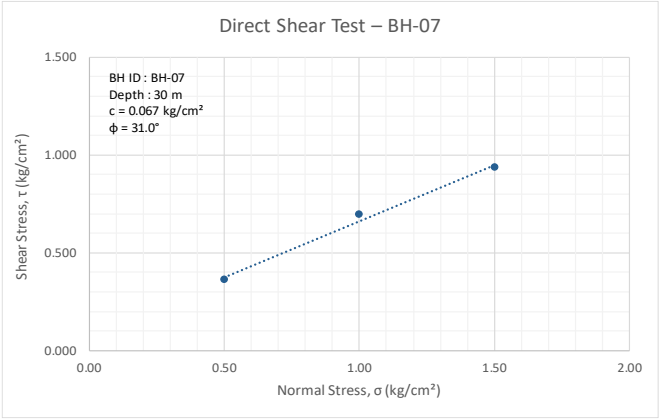

Direct Shear Test – BH-07
BH ID : BH-07
Depth : 15 m
c = 0.020 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-07
BH ID : BH-07
Depth : 18 m
c = 0.090 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-07
BH ID : BH-07
Depth : 21 m
c = 0.050 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-07
BH ID : BH-07
Depth : 24 m
c = 0.020 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-07
BH ID : BH-07
Depth : 27 m
c = -0.030 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

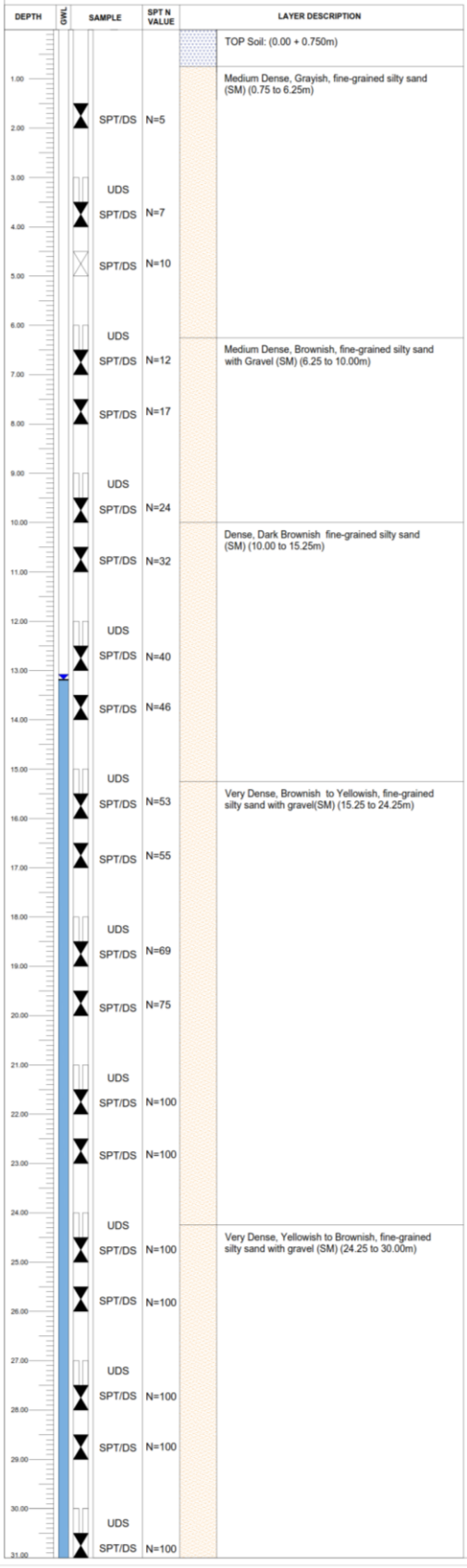

Direct Shear Test – BH-07
BH ID : BH-07
Depth : 30 m
c = 0.067 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (0+000 km TO 1+000 km)

BH ID : BH-08 | **Chainage** : 1+388 KM

Groundwater Level : 13.20 M | **Location** : Lat. 28.558125, Long. 77.328853



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

Soil

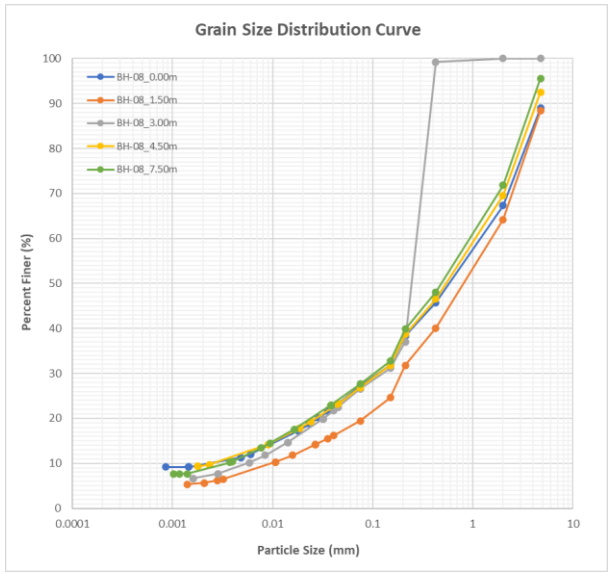
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

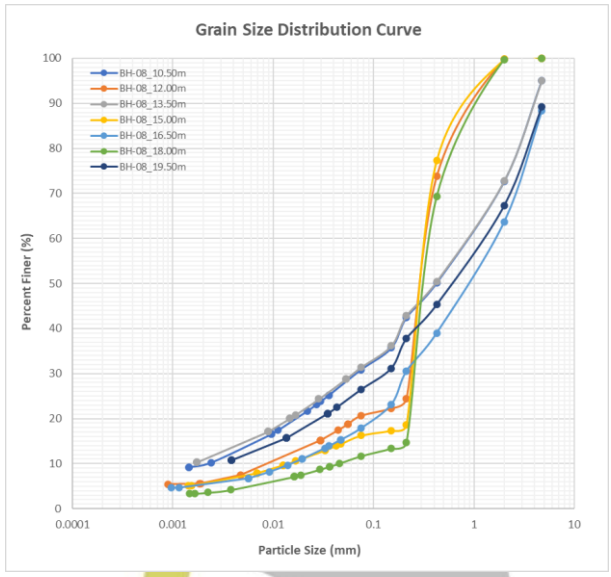
GOMA ENGINEERING AND CONSULTANCY
Quality we put forward

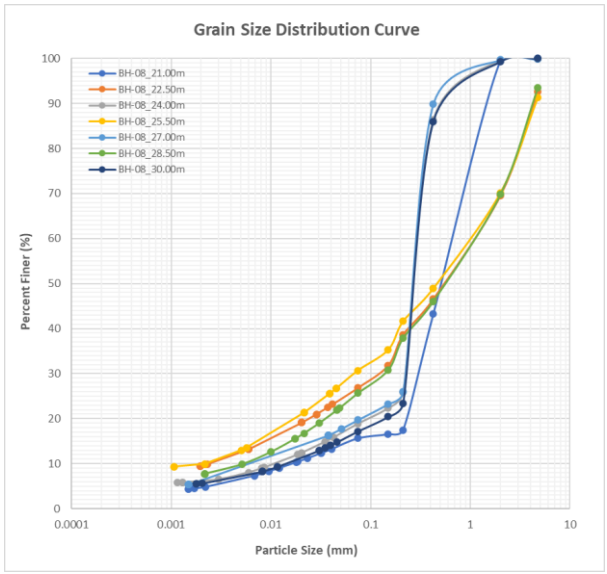
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-08	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	1+388	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	02-03-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	200.3	**End Date:**	02-03-2026
Project Code:	158_R2_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	13.20	**Location:**	Lat. 28.558125, Long. 77.328853

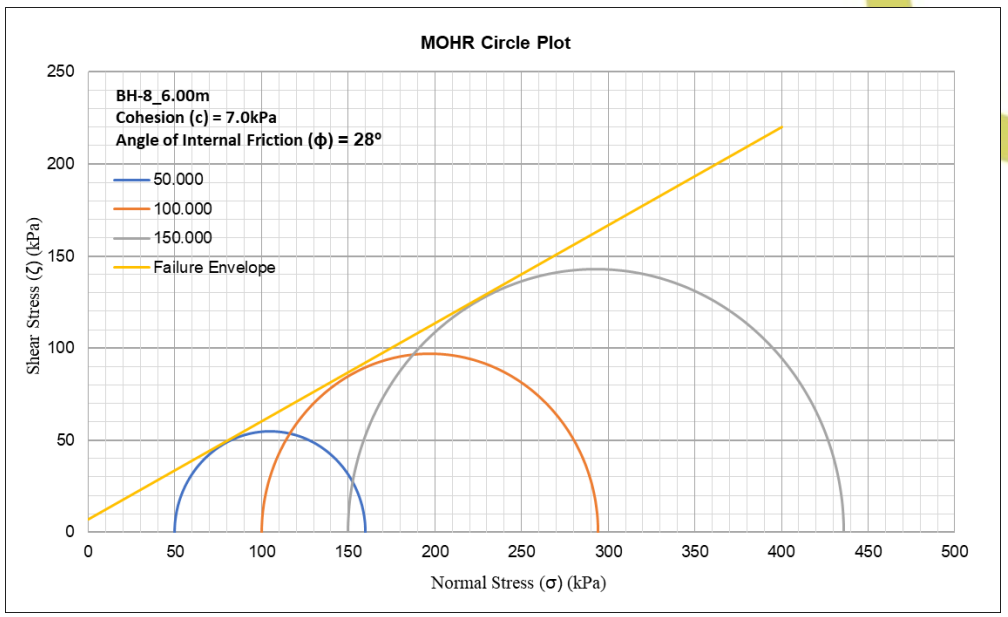
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						11.0	61.8	17.5	9.8	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Medium Dense, Grayish, fine-grained silty sand (SM)	2	2	3	5	7	11.7	68.9	13.8	5.6	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							0.0	73.5	19.5	7.1	26	NP	NP	28.44	1.60	1.25	2.61	F	0.06	20	-	-	-	-	-	-
3.50	SPT/DS		2	3	4	7	8	-																			
4.50	SPT/DS		3	5	5	10	10	7.5	65.7	17.4	9.5	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS							6.9	67.2	18.0	8.0	24	NP	NP	20.74	1.89	1.57	2.69	F	0.05	24	UU	7.0	28.0	-	-	-
6.50	SPT/DS	Medium Dense, Brownish, fine-grained silty sand with Gravel (SM)	4	5	7	12	11	-																			
7.50	SPT/DS		5	8	9	17	15	4.5	67.9	19.1	8.6	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							7.8	68.7	16.9	6.7	27	NP	NP	19.61	1.90	1.59	2.61	F	0.03	26	UU	12.0	25.0	-	-	-
9.50	SPT/DS		7	10	14	24	20	-																			
10.50	SPT/DS	Dense, Dark Brownish fine-grained silty sand (SM)	9	13	19	32	26	4.9	64.2	21.0	9.9	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	UDS							0.0	79.4	14.9	5.7	25	NP	NP	17.67	1.99	1.69	2.78	F	0.04	28	-	-	-	-	-	-
12.50	SPT/DS		12	18	22	40	30	-																			
13.50	SPT/DS		15	20	26	46	24	5.0	63.6	20.5	10.9	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.0	83.7	10.6	5.7	27	NP	NP	11.17	-	-	2.61	F	0.02	29	-	-	-	-	-	-
15.50	SPT/DS	Very Dense, Brownish to Yellowish, fine-grained silty sand with gravel(SM)	17	23	30	53	26	-																			
16.50	SPT/DS		20	24	31	55	26	11.6	70.5	12.5	5.4	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	UDS							0.0	88.3	8.2	3.5	25	NP	NP	8.26	-	-	2.67	F	0.01	30	-	-	-	-	-	-
18.50	SPT/DS		22	30	39	69	30	-																			
19.50	SPT/DS		24	35	40	75	32	10.7	62.8	18.2	8.3	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							0.0	84.4	10.9	4.7	24	NP	NP	9.21	-	-	2.73	F	0.00	31	-	-	-	-	-	-
21.50	SPT/DS		30	35	40	100	39	-																			
22.50	SPT/DS		34	40	47	100	38	7.4	65.7	17.3	9.6	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.1	81.0	12.7	6.2	28	NP	NP	9.91	-	-	2.69	F	0.06	30	-	-	-	-	-	-
24.50	SPT/DS	Very Dense, Yellowish to Brownish, fine-grained silty sand with gravel (SM)	36	(50/11 cm)	-	100	37	-																			
25.50	SPT/DS		39	(50/9 cm)	-	100	37	8.7	60.6	20.9	9.9	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							0.2	80.1	13.4	6.3	21	NP	NP	9.46	-	-	2.68	F	0.00	32	-	-	-	-	-	-
27.50	SPT/DS		42	(50/7 cm)	-	100	36	-																			
28.50	SPT/DS		46	(50/5 cm)	-	100	36	6.4	67.9	18.4	7.3	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.0	82.8	11.6	5.6	23	NP	NP	10.08	-	-	2.77	F	0.07	32	-	-	-	-	-	-
30.50	SPT/DS		(50/4 cm)	-	-	100	35	-																			

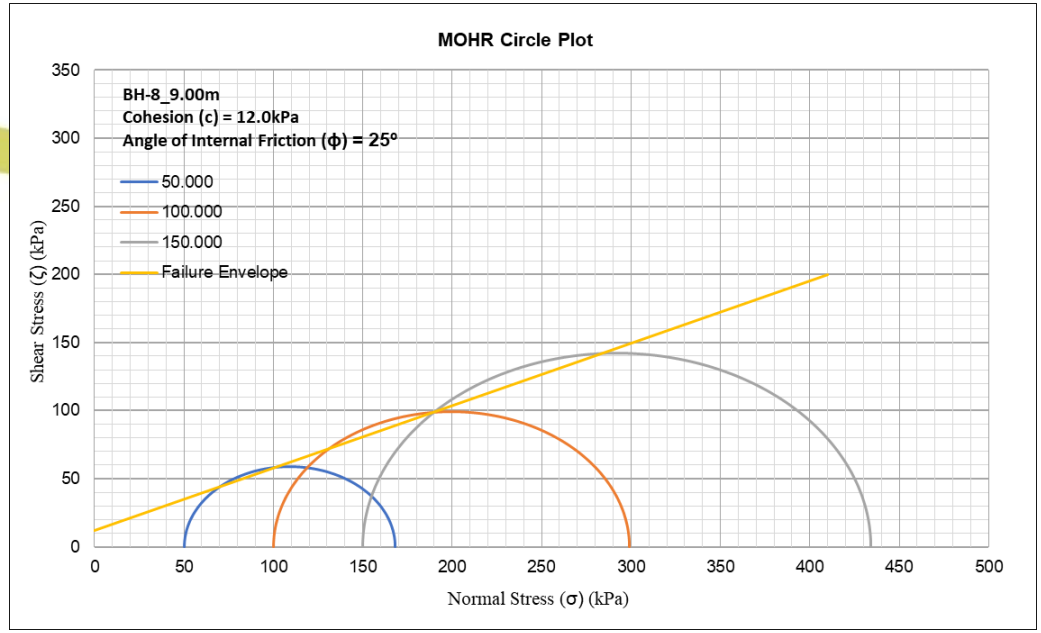
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

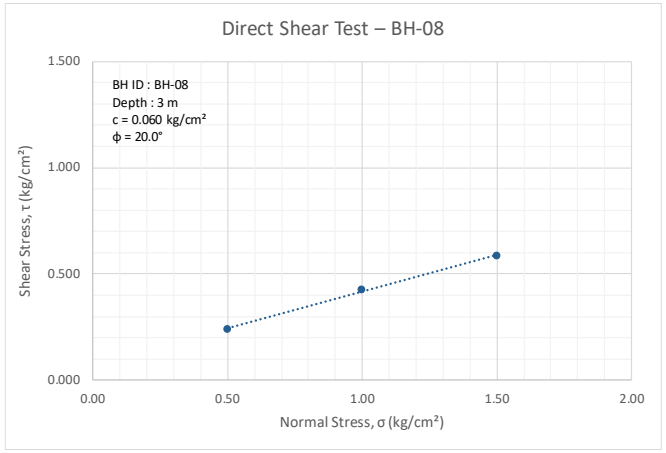

Grain Size Distribution Curve
BH-08_0.00m
BH-08_1.50m
BH-08_3.00m
BH-08_4.50m
BH-08_7.50m
Percent Finer (%)
Particle Size (mm)

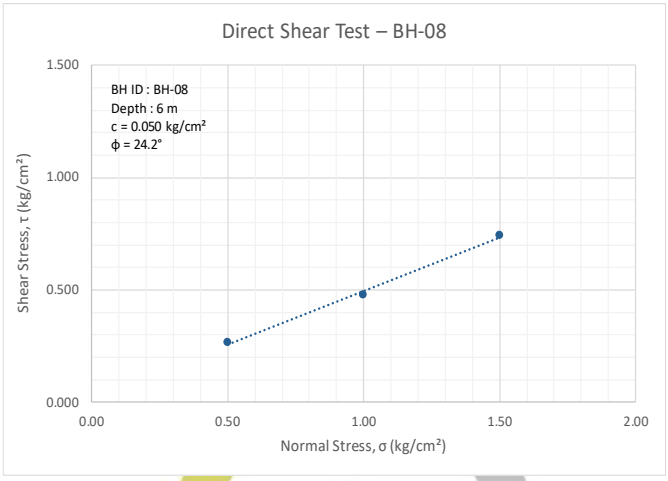

Grain Size Distribution Curve
BH-08_10.50m
BH-08_12.00m
BH-08_13.50m
BH-08_15.00m
BH-08_16.50m
BH-08_18.00m
BH-08_19.50m
Percent Finer (%)
Particle Size (mm)

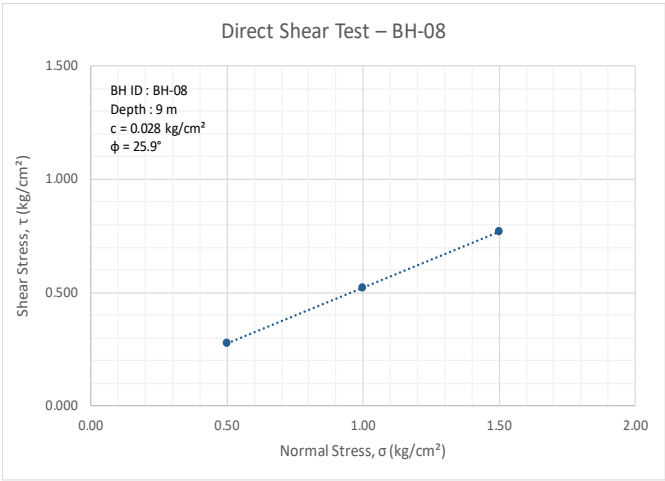

Grain Size Distribution Curve
BH-08_21.00m
BH-08_22.50m
BH-08_24.00m
BH-08_25.50m
BH-08_27.00m
BH-08_28.50m
BH-08_30.00m
Percent Finer (%)
Particle Size (mm)

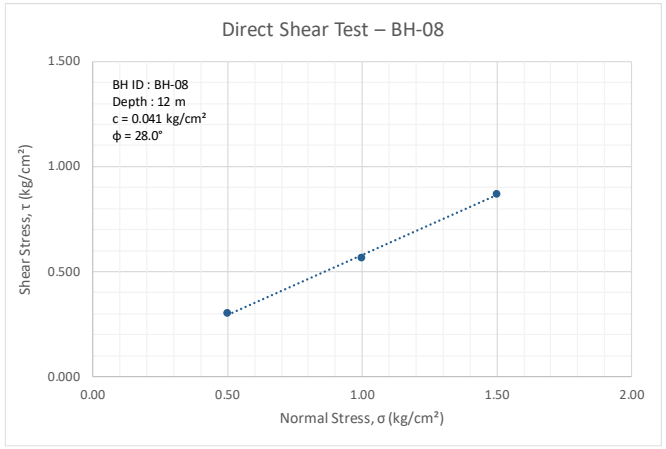

MOHR Circle Plot
BH-8_6.00m
Cohesion (c) = 7.0kPa
Angle of Internal Friction (ϕ) = 28°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

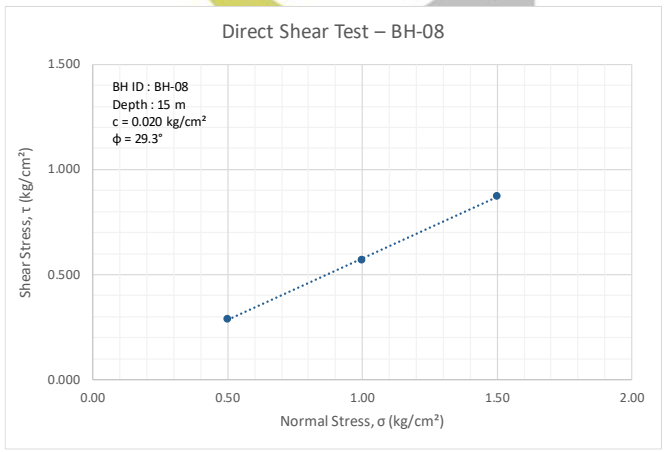

MOHR Circle Plot
BH-8_9.00m
Cohesion (c) = 12.0kPa
Angle of Internal Friction (ϕ) = 25°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

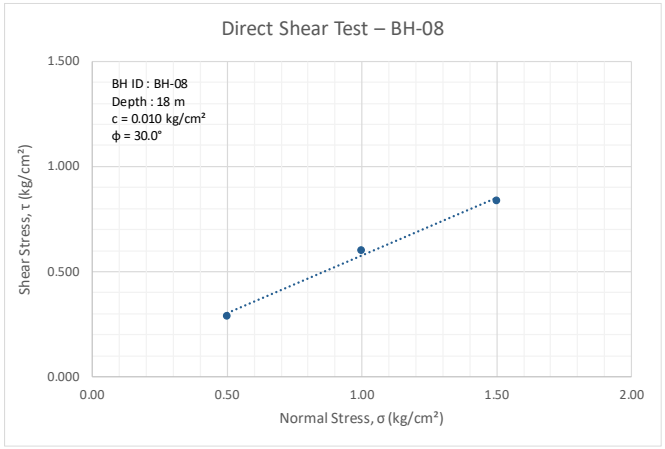

Direct Shear Test – BH-08
BH ID : BH-08
Depth : 3 m
c = 0.060 kg/cm²
ϕ = 20.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

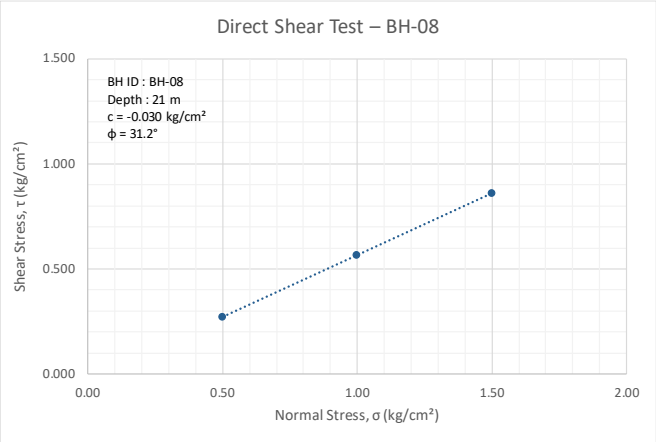

Direct Shear Test – BH-08
BH ID : BH-08
Depth : 6 m
c = 0.050 kg/cm²
ϕ = 24.2°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

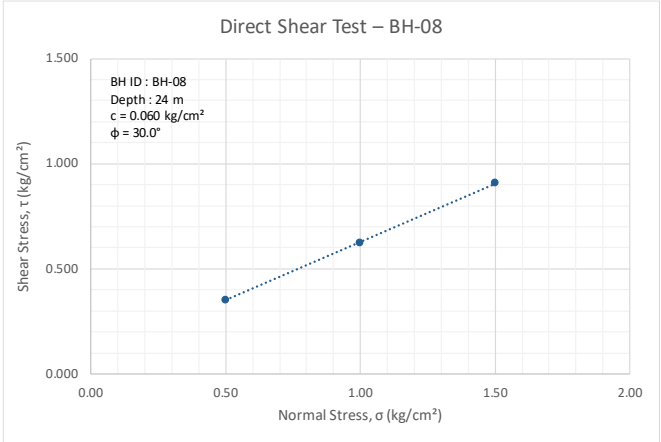

Direct Shear Test – BH-08
BH ID : BH-08
Depth : 9 m
c = 0.028 kg/cm²
ϕ = 25.9°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

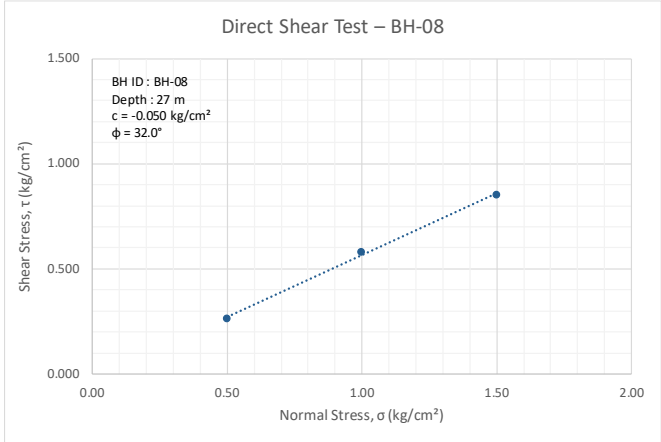

Direct Shear Test – BH-08
BH ID : BH-08
Depth : 12 m
c = 0.041 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

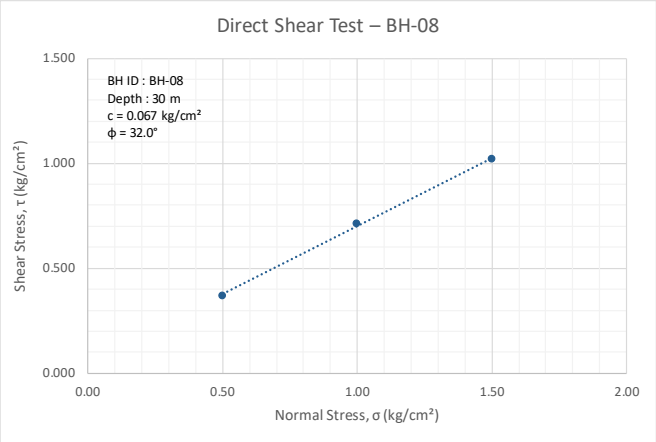

Direct Shear Test – BH-08
BH ID : BH-08
Depth : 15 m
c = 0.020 kg/cm²
ϕ = 29.3°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-08
BH ID : BH-08
Depth : 18 m
c = 0.010 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-08
BH ID : BH-08
Depth : 21 m
c = -0.030 kg/cm²
ϕ = 31.2°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-08
BH ID : BH-08
Depth : 24 m
c = 0.060 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-08
BH ID : BH-08
Depth : 27 m
c = -0.050 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

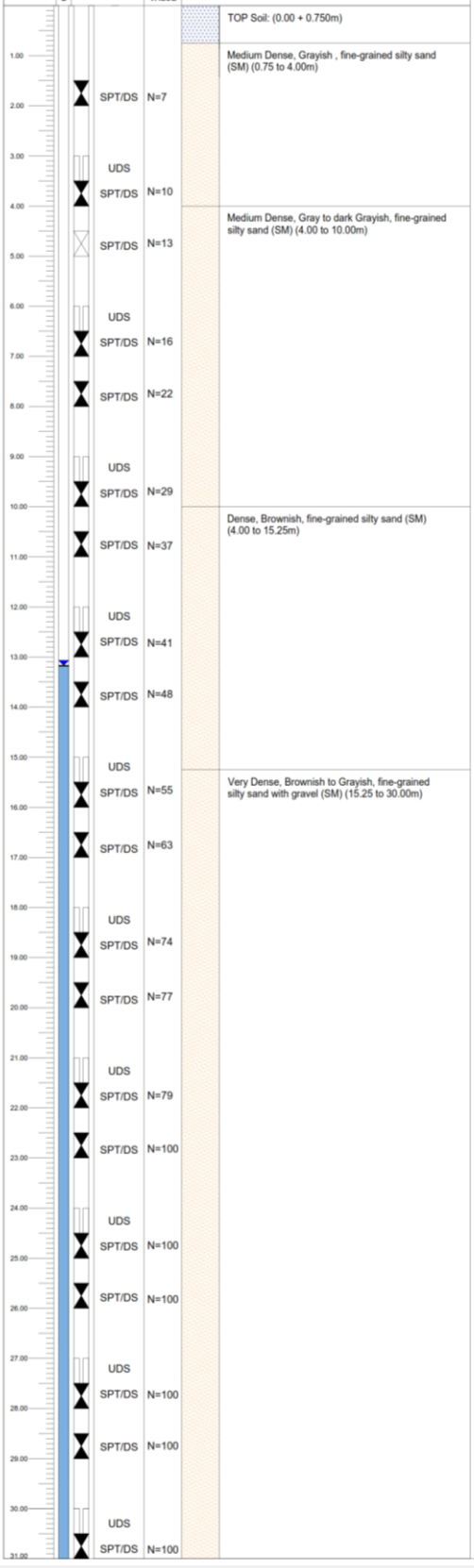

Direct Shear Test – BH-08
BH ID : BH-08
Depth : 30 m
c = 0.067 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (0+000 km TO 1+000 km)

BH ID : BH-09 | **Chainage** : 1+449 KM

Groundwater Level : 13.20 M | **Location** : Lat. 28.557891, Long. 77.328135



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

Soil

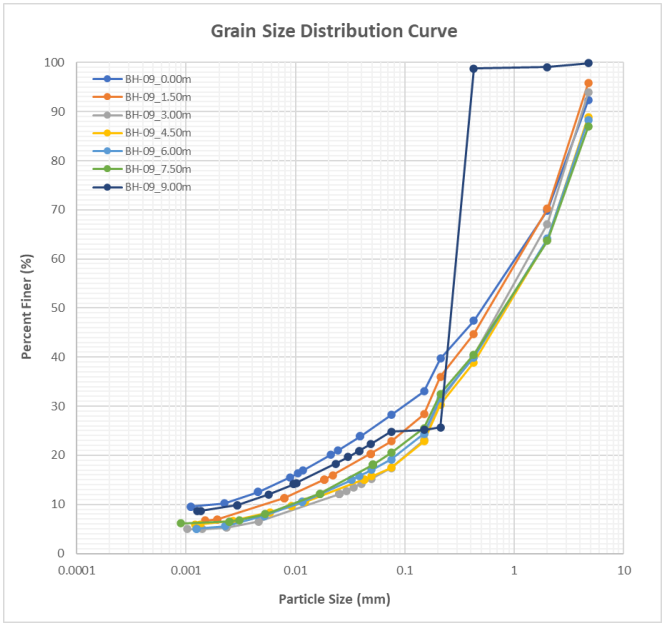
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

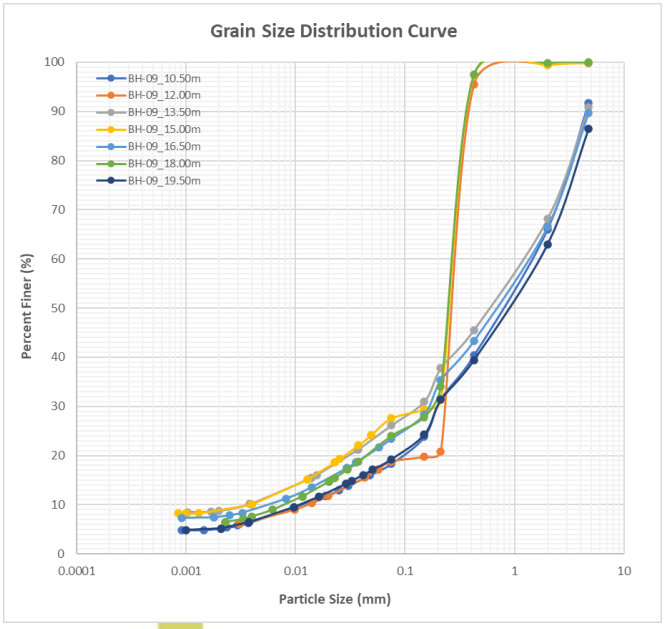
GOMA ENGINEERING AND CONSULTANCY
Quality we put forward

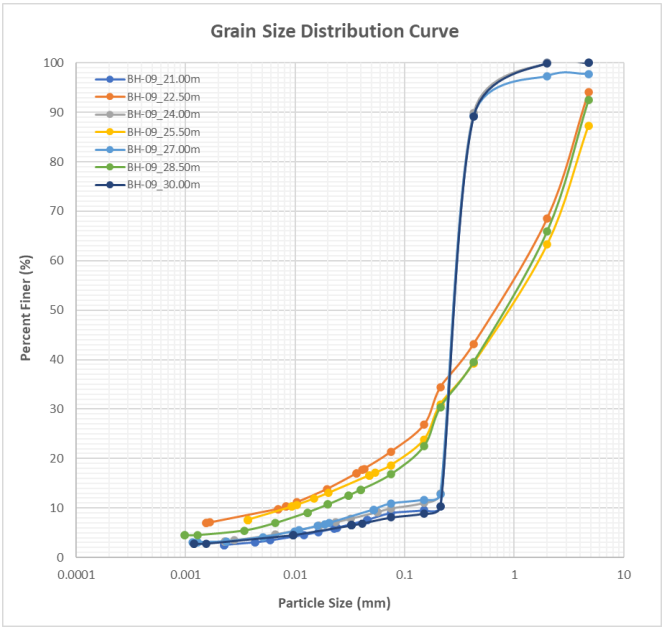
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-09	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	1+449	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	02-03-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	201.2	**End Date:**	02-03-2026
Project Code:	158_R2_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	13.20	**Location:**	Lat. 28.557891, Long. 77.328135

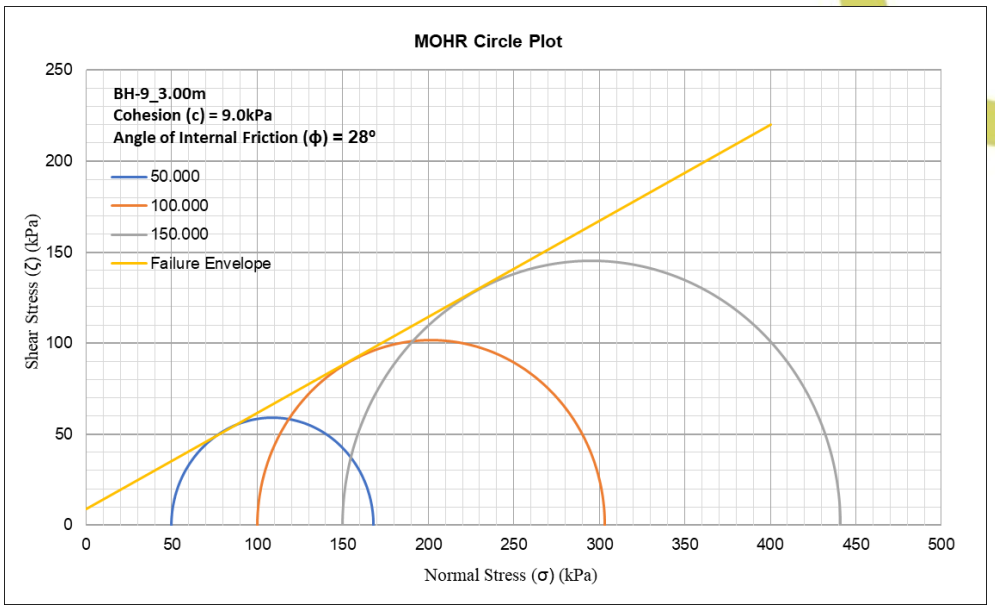
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						7.7	64.1	18.1	10.1	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Medium Dense, Grayish, fine-grained silty sand (SM)	3	4	3	7	10	4.2	72.9	15.8	7.1	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							6.1	76.5	12.2	5.2	25	NP	NP	23.17	1.90	1.54	2.615	F	0.02	22	UU	9.0	28.0	-	-	-
3.50	SPT/DS		5	6	4	10	11	-																			
4.50	SPT/DS	Medium Dense,Gray to dark Grayish, fine-grained silty sand (SM)	7	8	5	13	13	11.1	71.4	11.1	6.3	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS							11.7	69.2	13.7	5.5	27	NP	NP	21.55	1.91	1.57	2.65	F	0.02	24	UU	5.0	29.0	-	-	-
6.50	SPT/DS		8	9	7	16	15	-																			
7.50	SPT/DS		12	13	9	22	20	13.1	66.4	14.1	6.4	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							0.1	75.0	15.6	9.3	26	NP	NP	24.15	-	-	2.76	F	0.03	27	-	-	-	-	-	-
9.50	SPT/DS		13	15	14	29	25	-																			
10.50	SPT/DS	Dense, Brownish fine-grained silty sand (SM)	15	18	19	37	30	8.3	73.4	13.2	5.2	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							0.2	81.0	14.1	4.7	24	NP	NP	20.25	-	-	2.61	F	0.04	28	-	-	-	-	-	-
12.50	SPT/DS		16	19	22	41	31	-																			
13.50	SPT/DS		19	22	26	48	25	9.2	64.6	17.4	8.8	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.1	72.3	18.6	9.0	27	NP	NP	21.58	-	-	2.80	F	0.03	29	-	-	-	-	-	-
15.50	SPT/DS	Very Dense, Brownish to Greyish, fine-grained silty sand with gravel(SM)	24	25	30	55	27	-																			
16.50	SPT/DS		27	32	31	63	29	10.3	66.4	15.8	7.5	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	UDS							0.0	76.0	18.8	5.2	24	NP	NP	16.53	-	-	2.60	F	0.02	30	-	-	-	-	-	-
18.50	SPT/DS		31	35	39	74	32	-																			
19.50	SPT/DS		32	37	40	77	32	13.5	67.3	14.1	5.1	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							0.0	91.1	9.0	0.0	23	NP	NP	5.87	-	-	2.63	F	0.05	30	-	-	-	-	-	-
21.50	SPT/DS		33	39	40	79	32	-																			
22.50	SPT/DS		35	43	(50/10 cm)	100	38	6.0	72.7	14.0	7.4	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.0	90.1	9.9	0.0	26	NP	NP	6.65	-	-	2.76	F	0.00	31	-	-	-	-	-	-
24.50	SPT/DS		45	(50/12 cm)	-	100	37	-																			
25.50	SPT/DS		47	(50/10 cm)	-	100	37	12.7	68.7	13.9	4.7	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							2.2	86.9	7.7	3.2	26	NP	NP	7.25	-	-	2.70	F	0.05	31	-	-	-	-	-	-
27.50	SPT/DS		45	(50/5 cm)	-	100	36	-																			
28.50	SPT/DS		49	(50/5 cm)	-	100	36	7.6	75.6	11.9	4.9	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.0	91.9	8.1	0.0	29	NP	NP	5.34	-	-	2.66	F	0.00	33	-	-	-	-	-	-
30.50	SPT/DS		(50/11 cm)	-	-	100	35	-																			

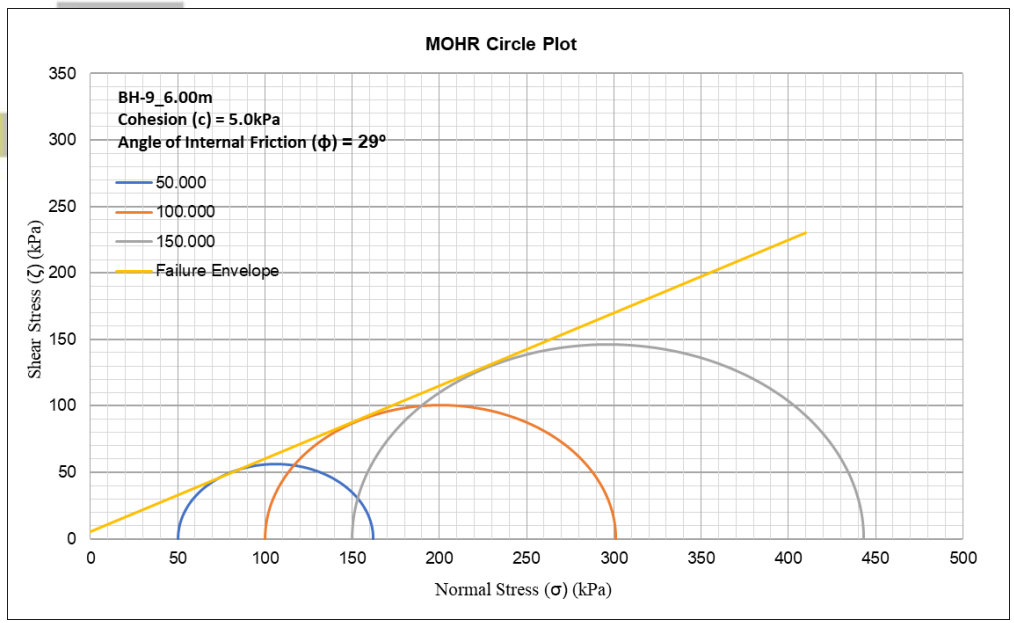
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

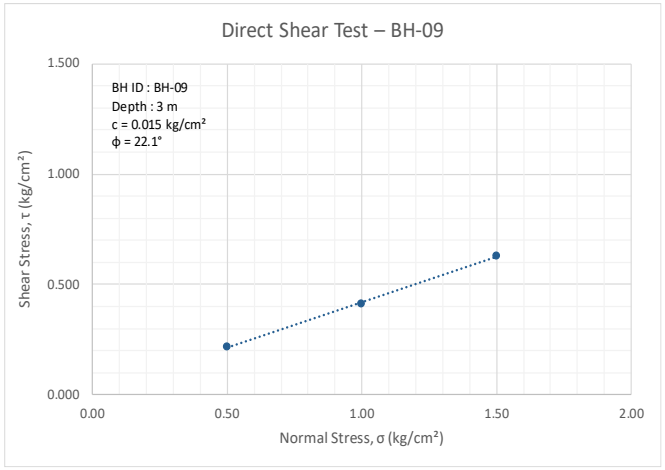

Grain Size Distribution Curve
BH-09_0.00m
BH-09_1.50m
BH-09_3.00m
BH-09_4.50m
BH-09_6.00m
BH-09_7.50m
BH-09_9.00m
Percent Finer (%)
Particle Size (mm)

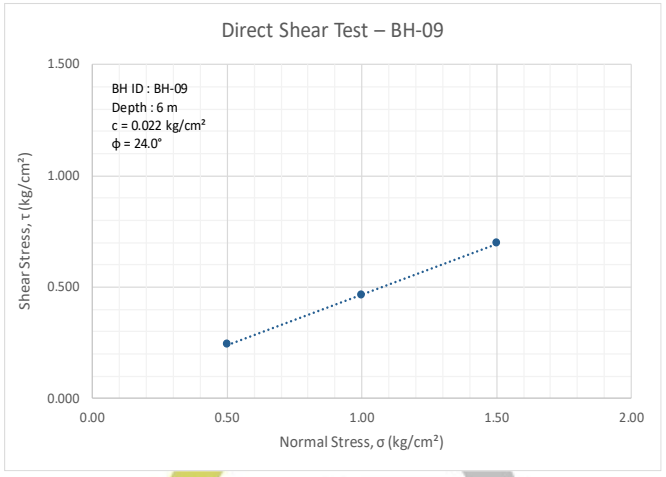

Grain Size Distribution Curve
BH-09_10.50m
BH-09_12.00m
BH-09_13.50m
BH-09_15.00m
BH-09_16.50m
BH-09_18.00m
BH-09_19.50m
Percent Finer (%)
Particle Size (mm)

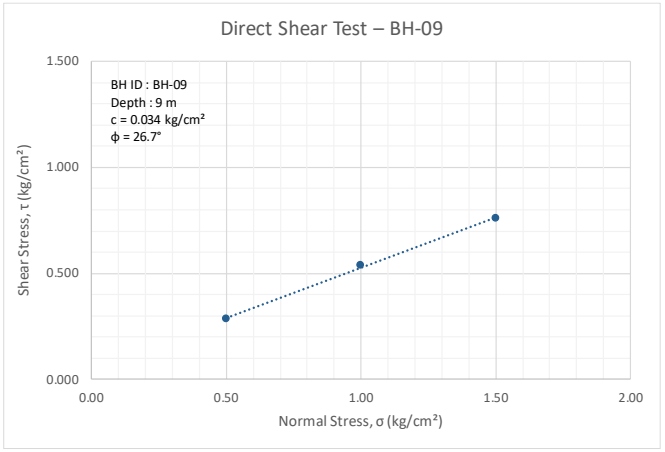

Grain Size Distribution Curve
BH-09_21.00m
BH-09_22.50m
BH-09_24.00m
BH-09_25.50m
BH-09_27.00m
BH-09_28.50m
BH-09_30.00m
Percent Finer (%)
Particle Size (mm)

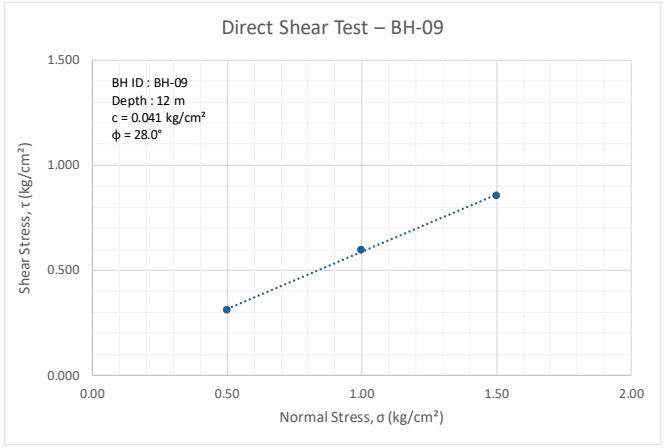

MOHR Circle Plot
BH-9_3.00m
Cohesion (c) = 9.0kPa
Angle of Internal Friction (ϕ) = 28°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

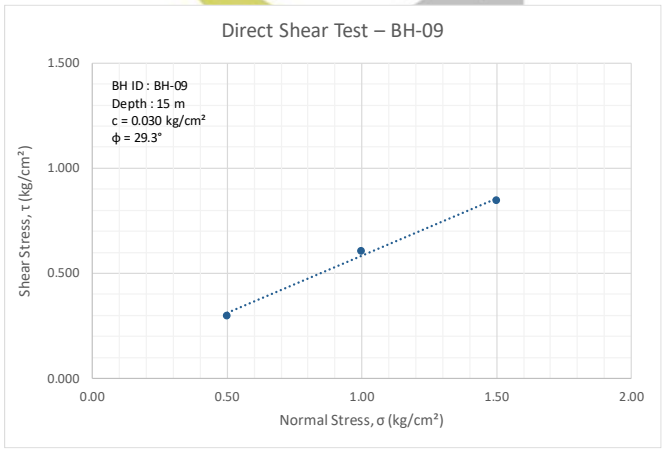

MOHR Circle Plot
BH-9_6.00m
Cohesion (c) = 5.0kPa
Angle of Internal Friction (ϕ) = 29°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

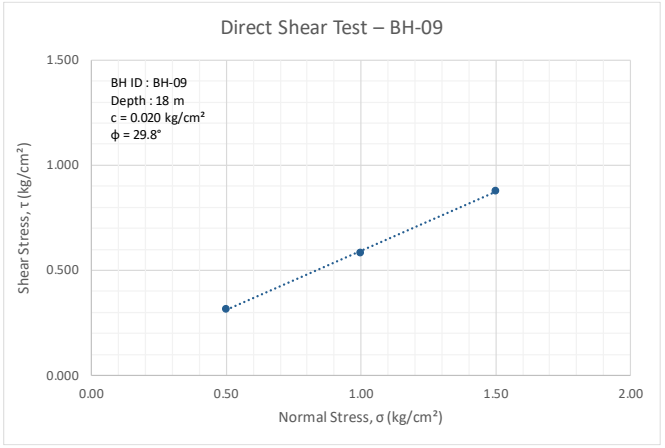

Direct Shear Test – BH-09
BH ID : BH-09
Depth : 3 m
c = 0.015 kg/cm²
ϕ = 22.1°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

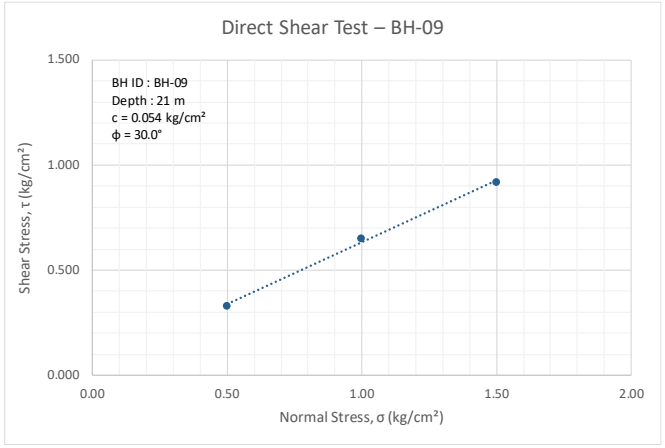

Direct Shear Test – BH-09
BH ID : BH-09
Depth : 6 m
c = 0.022 kg/cm²
ϕ = 24.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

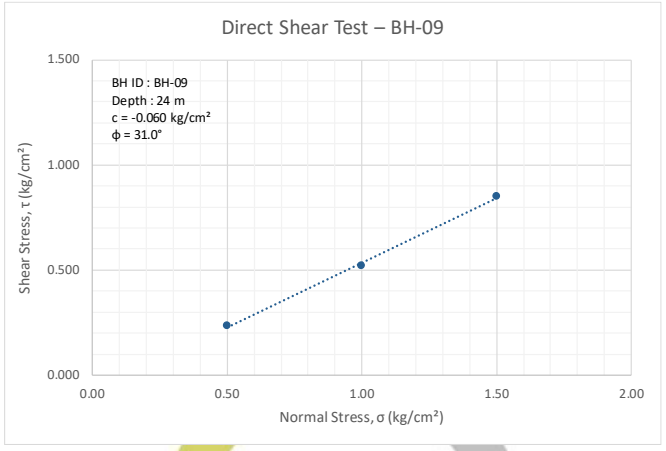

Direct Shear Test – BH-09
BH ID : BH-09
Depth : 9 m
c = 0.034 kg/cm²
ϕ = 26.7°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

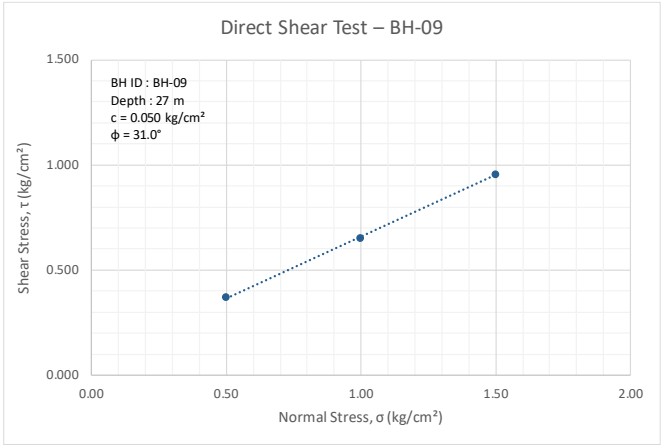

Direct Shear Test – BH-09
BH ID : BH-09
Depth : 12 m
c = 0.041 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

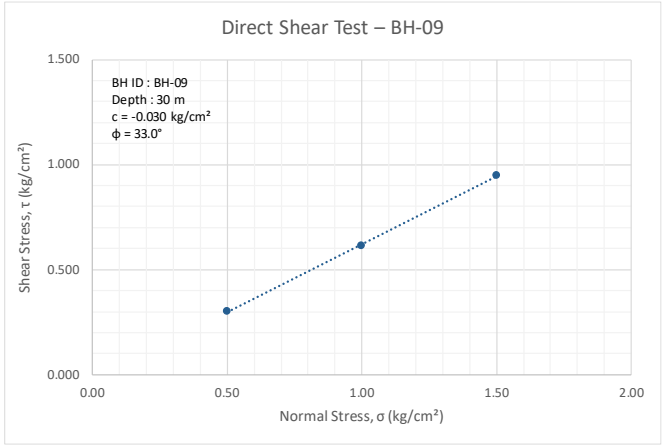

Direct Shear Test – BH-09
BH ID : BH-09
Depth : 15 m
c = 0.030 kg/cm²
ϕ = 29.3°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-09
BH ID : BH-09
Depth : 18 m
c = 0.020 kg/cm²
ϕ = 29.8°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

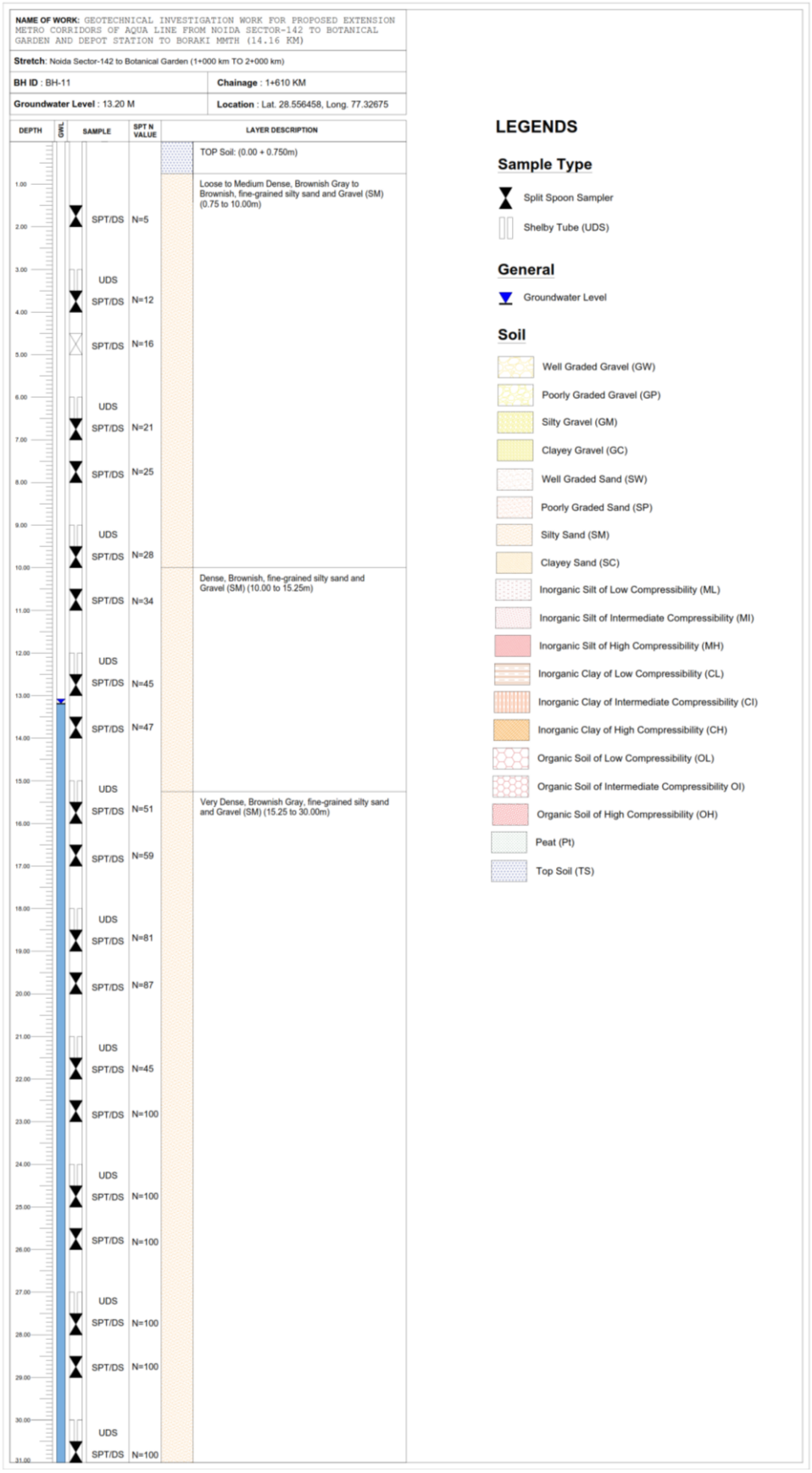

Direct Shear Test – BH-09
BH ID : BH-09
Depth : 21 m
c = 0.054 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-09
BH ID : BH-09
Depth : 24 m
c = -0.060 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-09
BH ID : BH-09
Depth : 27 m
c = 0.050 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-09
BH ID : BH-09
Depth : 30 m
c = -0.030 kg/cm²
ϕ = 33.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

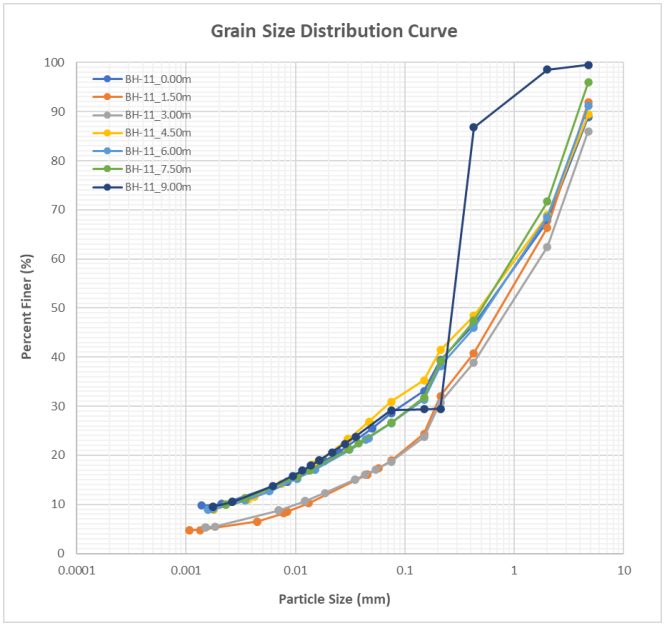
C.3. Zone 3: CH: 1+450 km to 2+515 km (BH-11 to BH-20A)

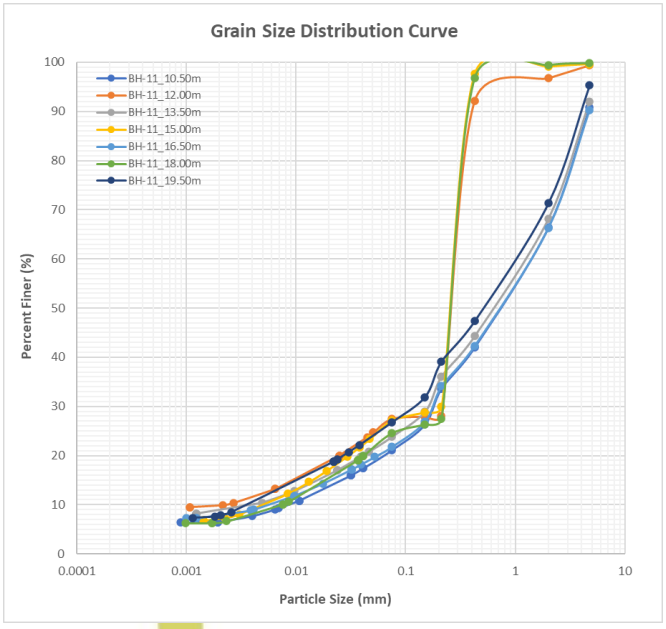


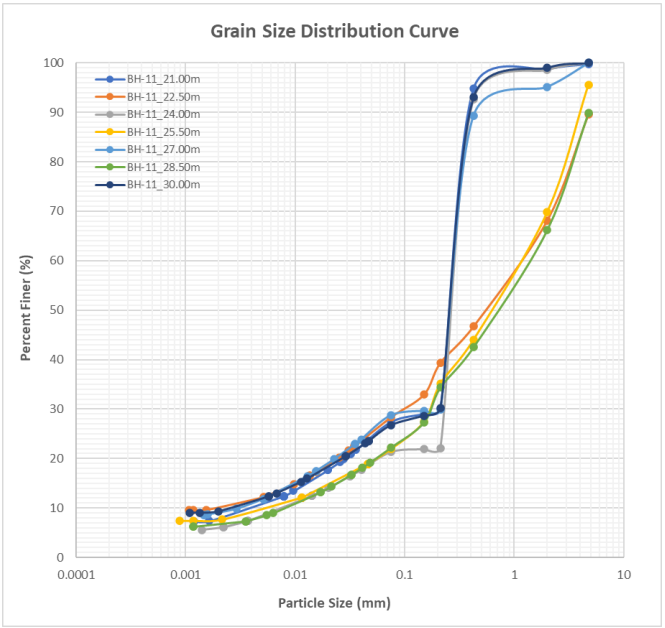
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-11	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	1+610	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	01-03-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	201.70	**End Date:**	01-03-2026
Project Code:	158_R03_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	13.20	**Location:**	Lat. 28.556458, Long. 77.32675

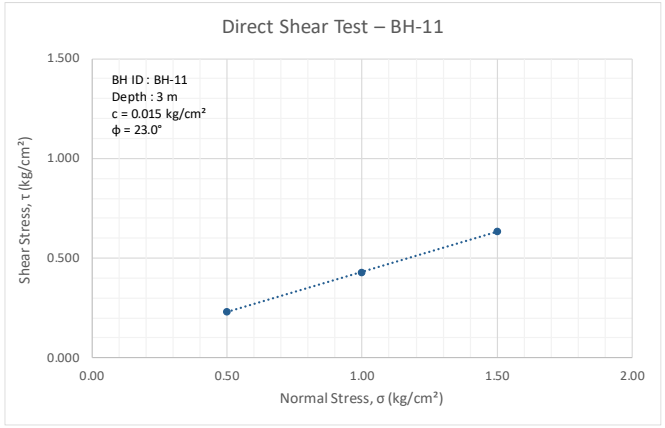
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						11.1	60.3	18.5	10.1	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Loose to Medium Dense, Brownish Gray to Brownish , fine-grained silty sand and Gravel (SM)	2	2	3	5	7	8.1	73.0	13.6	5.3	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	DS							14.0	67.3	13.0	5.7	21	NP	NP	14.14	-	-	2.66	F	0.02	23	-	-	-	-	-	-
3.50	SPT/DS		3	5	7	12	13	-																			
4.50	SPT/DS		4	7	9	16	16	10.6	58.5	21.6	9.3	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	DS							8.9	64.6	17.2	9.4	25	NP	NP	13.18	-	-	2.63	F	0.02	26	-	-	-	-	-	-
6.50	SPT/DS		7	9	12	21	20	-																			
7.50	SPT/DS		10	12	13	25	23	4.0	69.4	26.6	0.0	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	DS							0.5	70.4	19.3	9.9	21	NP	NP	20.90	-	-	2.64	F	0.03	27	-	-	-	-	-	-
9.50	SPT/DS		12	13	15	28	24	-																			
10.50	SPT/DS	Dense, Brownish, fine-grained silty sand and Gravel(SM)	15	16	18	34	28	9.2	69.7	14.6	6.5	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							0.6	72.0	17.6	9.9	27	NP	NP	18.82	-	-	2.63	F	0.00	29	-	-	-	-	-	-
12.50	SPT/DS		18	21	24	45	34	-																			
13.50	SPT/DS		19	22	25	47	24	7.9	68.3	14.8	9.0	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.4	72.5	19.9	7.2	24	NP	NP	20.18	-	-	2.62	F	0.02	29	-	-	-	-	-	-
15.50	SPT/DS	Very Dense, Brownish Gray, fine-grained silty sand and Gravel (SM)	21	24	27	51	25	-																			
16.50	SPT/DS		25	27	32	59	28	9.7	68.5	13.9	7.9	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	UDS							0.2	75.2	18.1	6.5	27	NP	NP	21.61	-	-	2.61	F	0.01	30	-	-	-	-	-	-
18.50	SPT/DS		32	39	42	81	34	-																			
19.50	SPT/DS		33	42	45	87	36	4.7	68.5	19.0	7.8	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							0.2	72.4	19.4	8.0	24	NP	NP	19.84	-	-	2.62	F	0.02	31	-	-	-	-	-	-
21.50	SPT/DS		35	45	(50/9 cm)	45	22	-																			
22.50	SPT/DS		37	47	(50/8 cm)	100	38	10.5	61.2	18.2	10.2	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.0	78.7	15.4	6.0	28	NP	NP	20.99	-	-	2.70	F	0.04	31	-	-	-	-	-	-
24.50	SPT/DS		42	(5011 cm)	-	100	37	-																			
25.50	SPT/DS		45	(50/10 cm)	-	100	37	4.4	73.7	14.3	7.6	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							0.0	71.3	19.6	9.1	24	NP	NP	19.80	-	-	2.68	F	0.00	32	-	-	-	-	-	-
27.50	SPT/DS		47	(50/8 cm)	-	100	36	-																			
28.50	SPT/DS		49	(50/7 cm)	-	100	36	10.2	67.6	15.4	6.8	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.0	73.3	17.4	9.3	24	NP	NP	21.23	-	-	2.63	F	0.02	32	-	-	-	-	-	-
30.50	SPT/DS		(50/12 cm)	-	-	100	35	-																			

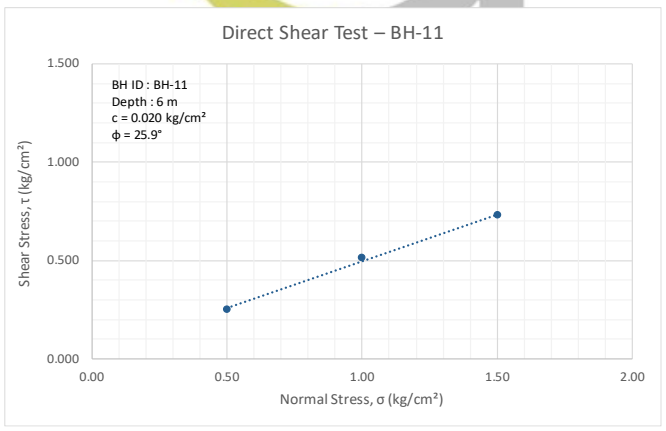
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

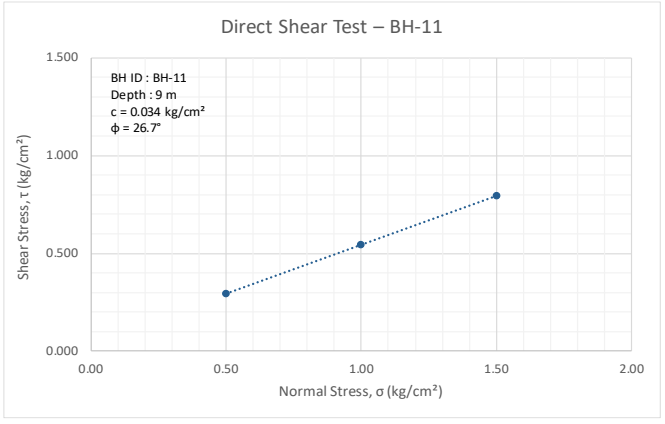

Grain Size Distribution Curve
BH-11_0.00m
BH-11_1.50m
BH-11_3.00m
BH-11_4.50m
BH-11_6.00m
BH-11_7.50m
BH-11_9.00m
Percent Finer (%)
Particle Size (mm)

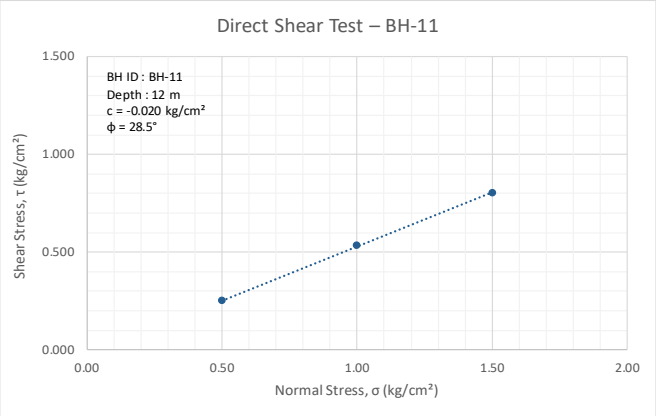

Grain Size Distribution Curve
BH-11_10.50m
BH-11_12.00m
BH-11_13.50m
BH-11_15.00m
BH-11_16.50m
BH-11_18.00m
BH-11_19.50m
Percent Finer (%)
Particle Size (mm)

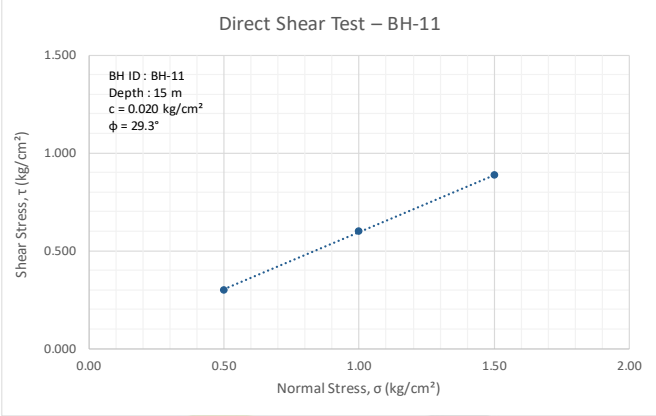

Grain Size Distribution Curve
BH-11_21.00m
BH-11_22.50m
BH-11_24.00m
BH-11_25.50m
BH-11_27.00m
BH-11_28.50m
BH-11_30.00m
Percent Finer (%)
Particle Size (mm)

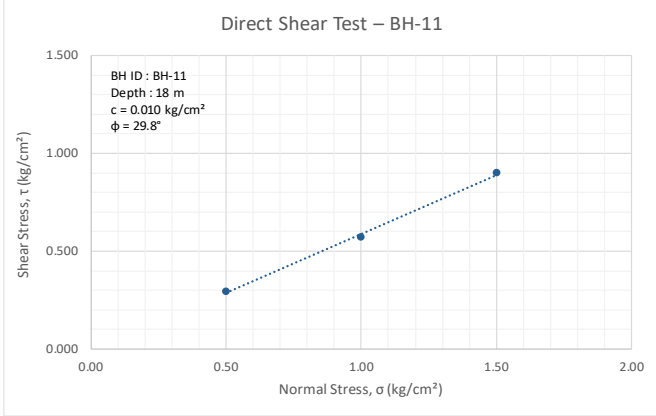

Direct Shear Test – BH-11
BH ID : BH-11
Depth : 3 m
c = 0.015 kg/cm²
ϕ = 23.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)

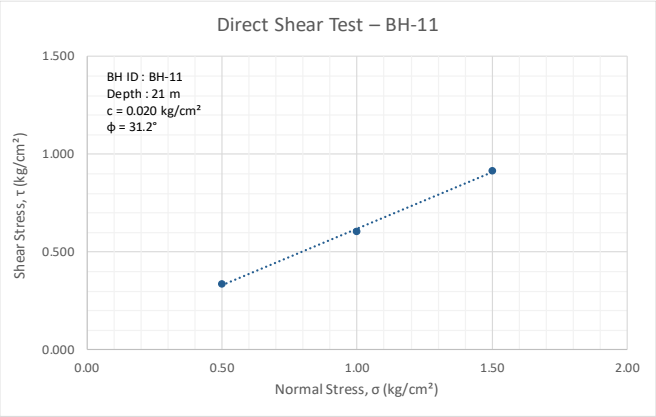

Direct Shear Test – BH-11
BH ID : BH-11
Depth : 6 m
c = 0.020 kg/cm²
ϕ = 25.9°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)

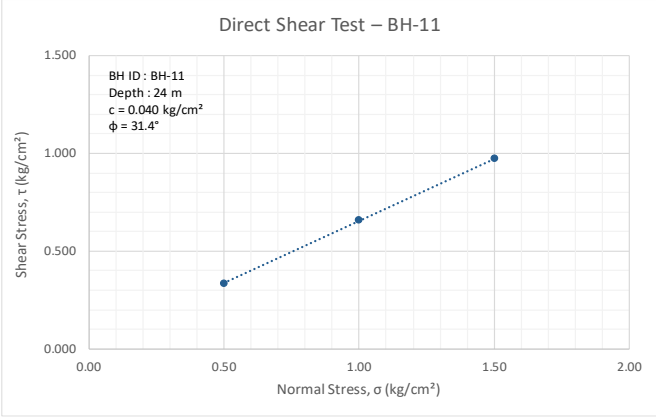

Direct Shear Test – BH-11
BH ID : BH-11
Depth : 9 m
c = 0.034 kg/cm²
ϕ = 26.7°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)

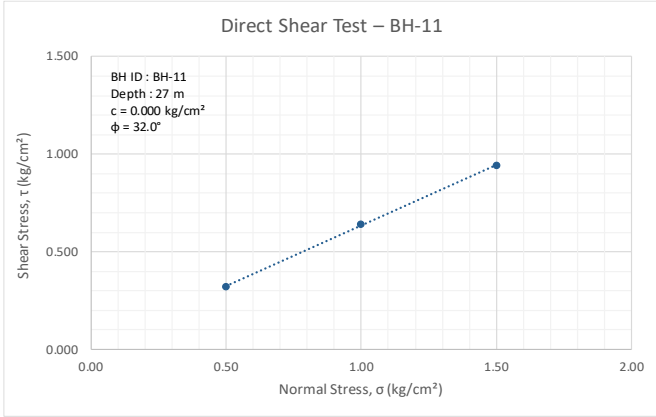

Direct Shear Test – BH-11
BH ID : BH-11
Depth : 12 m
c = -0.020 kg/cm²
ϕ = 28.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

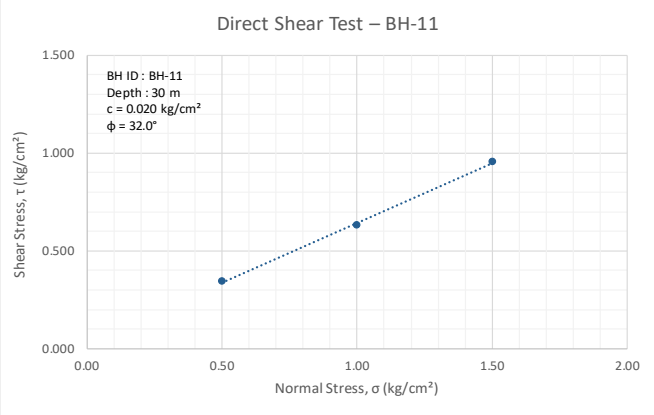

Direct Shear Test – BH-11
BH ID : BH-11
Depth : 15 m
c = 0.020 kg/cm²
ϕ = 29.3°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

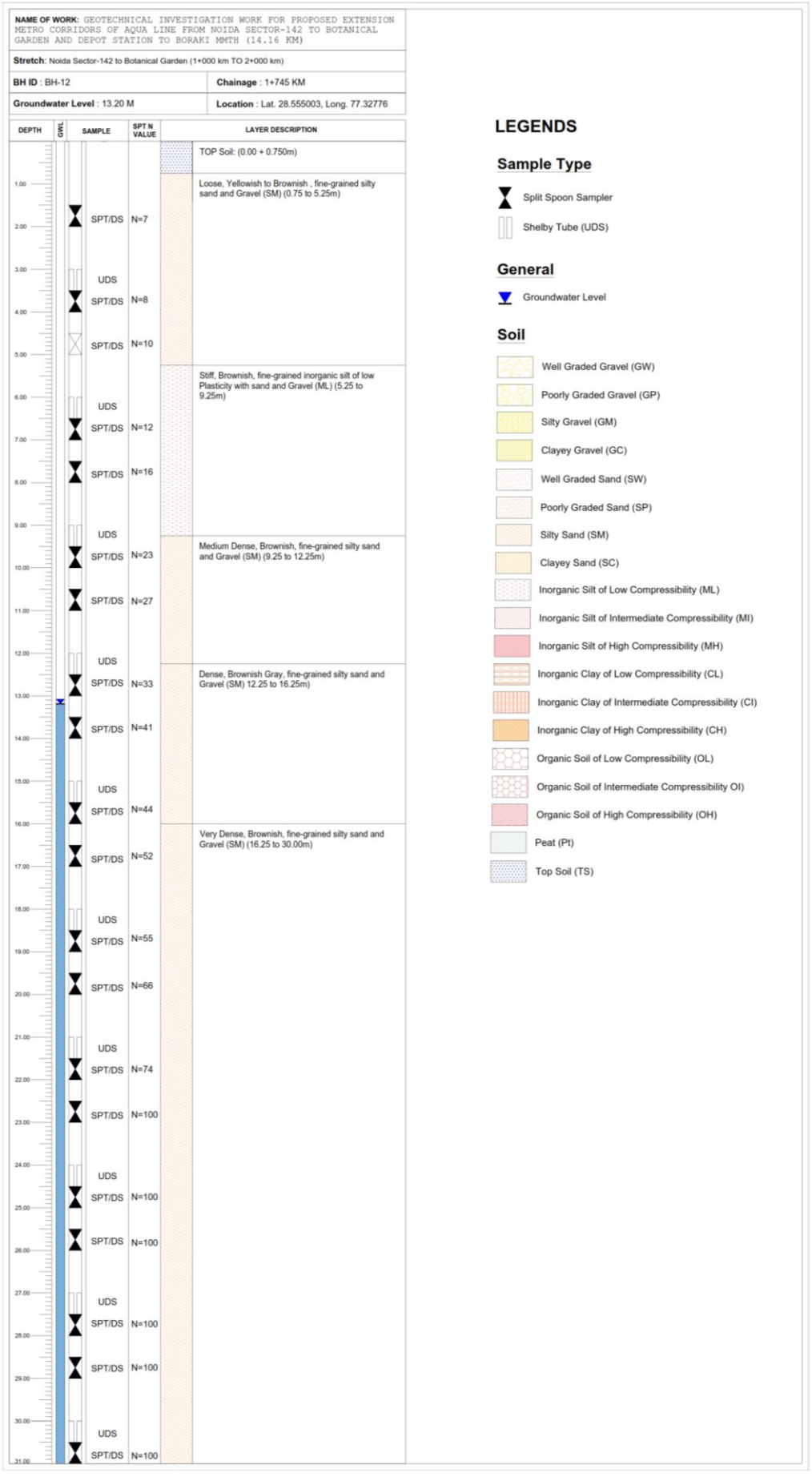

Direct Shear Test – BH-11
BH ID : BH-11
Depth : 18 m
c = 0.010 kg/cm²
ϕ = 29.8°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-11
BH ID : BH-11
Depth : 21 m
c = 0.020 kg/cm²
ϕ = 31.2°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-11
BH ID : BH-11
Depth : 24 m
c = 0.040 kg/cm²
ϕ = 31.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-11
BH ID : BH-11
Depth : 27 m
c = 0.000 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

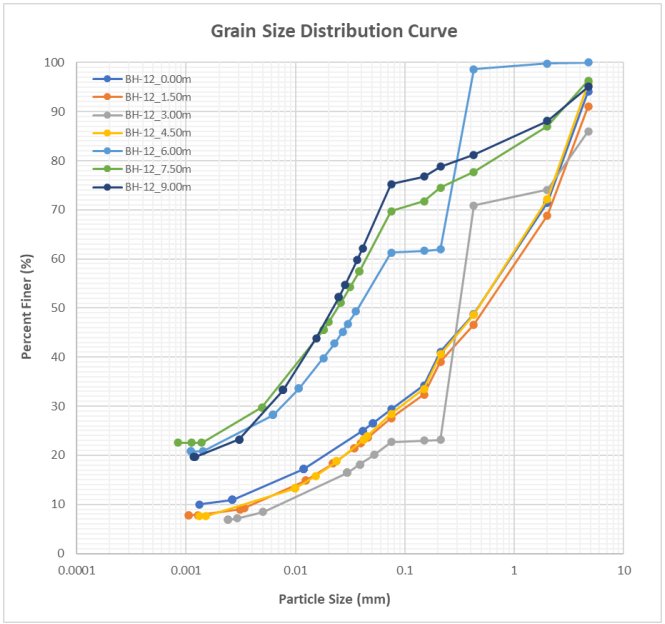

Direct Shear Test – BH-11
BH ID : BH-11
Depth : 30 m
c = 0.020 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

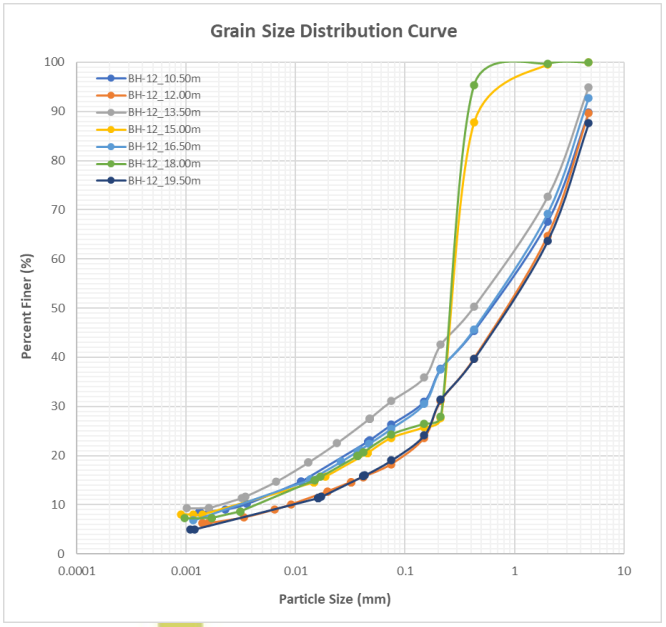

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)
Stretch: Noida Sector-142 to Botanical Garden (1+000 km TO 2+000 km)
BH ID : BH-12
Chainage : 1+745 KM
Groundwater Level : 13.20 M
Location : Lat. 28.555003, Long. 77.32776
DEPTH
GWL
SAMPLE
SPT N VALUE
LAYER DESCRIPTION
TOP Soil: (0.00 + 0.750m)
Loose, Yellowish to Brownish , fine-grained silty sand and Gravel (SM) (0.75 to 5.25m)
Stiff, Brownish, fine-grained inorganic silt of low Plasticity with sand and Gravel (ML) (5.25 to 9.25m)
Medium Dense, Brownish, fine-grained silty sand and Gravel (SM) (9.25 to 12.25m)
Dense, Brownish Gray, fine-grained silty sand and Gravel (SM) 12.25 to 16.25m)
Very Dense, Brownish, fine-grained silty sand and Gravel (SM) (16.25 to 30.00m)
UDS
SPT/DS N=7
SPT/DS N=8
SPT/DS N=10
SPT/DS N=12
SPT/DS N=16
SPT/DS N=23
SPT/DS N=27
SPT/DS N=33
SPT/DS N=41
SPT/DS N=44
SPT/DS N=52
SPT/DS N=55
SPT/DS N=66
SPT/DS N=74
SPT/DS N=100
SPT/DS N=100
SPT/DS N=100
SPT/DS N=100
SPT/DS N=100
LEGENDS
Sample Type
Split Spoon Sampler
Shelby Tube (UDS)
General
Groundwater Level
Soil
Well Graded Gravel (GW)
Poorly Graded Gravel (GP)
Silty Gravel (GM)
Clayey Gravel (GC)
Well Graded Sand (SW)
Poorly Graded Sand (SP)
Silty Sand (SM)
Clayey Sand (SC)
Inorganic Silt of Low Compressibility (ML)
Inorganic Silt of Intermediate Compressibility (MI)
Inorganic Silt of High Compressibility (MH)
Inorganic Clay of Low Compressibility (CL)
Inorganic Clay of Intermediate Compressibility (CI)
Inorganic Clay of High Compressibility (CH)
Organic Soil of Low Compressibility (OL)
Organic Soil of Intermediate Compressibility OI)
Organic Soil of High Compressibility (OH)
Peat (Pt)
Top Soil (TS)

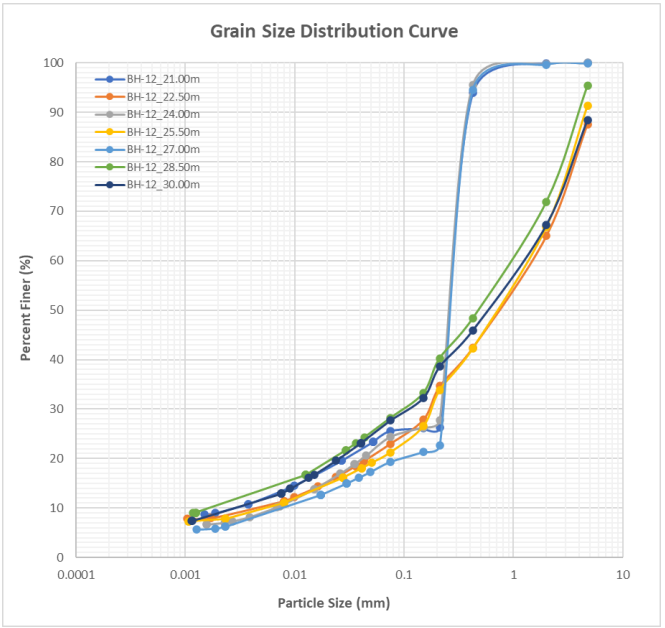
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-12	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	1+745	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	01-03-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	197.10	**End Date:**	01-03-2026
Project Code:	158_R03_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	13.20	**Location:**	Lat. 28.555003, Long. 77.32776

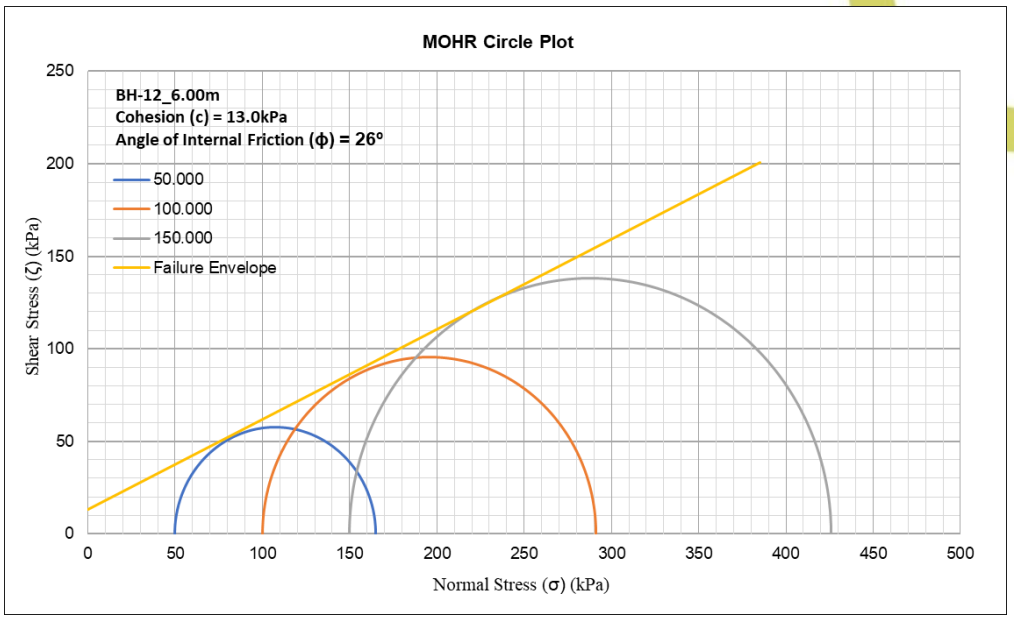
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [^{o}]	Type	Cohesion [kPa]	Angle of Friction [^{o}]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						5.9	64.7	18.8	10.6	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Loose, Yellowish to Brownish, fine-grained silty sand and Gravel (SM)	2	3	4	7	10	9.0	63.4	19.2	8.4	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							14.0	63.3	17.4	5.3	26	NP	NP	17.49	1.70	1.44	2.71	F	0.03	21	-	-	-	-	-	-
3.50	SPT/DS		2	3	5	8	9	-																			
4.50	SPT/DS		3	5	5	10	10	4.3	67.2	20.0	8.4	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS	Stiff, Brownish, fine-grained inorganic silt of low Plasticity with sand and Gravel(ML)						0.0	38.7	38.8	22.5	22	NP	NP	18.40	1.92	1.62	2.60	F	0.04	24	UU	13.0	26.0	-	-	-
6.50	SPT/DS		4	5	7	12	11	-																			
7.50	SPT/DS		5	7	9	16	15	3.7	26.6	45.1	24.7	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							5.0	19.8	53.6	21.6	29	NP	NP	19.68	1.93	1.61	2.68	F	0.03	25	UU	10.0	27.0	-	-	-
9.50	SPT/DS	Medium Dense, Brownish, fine-grained silty sand and Gravel(SM)	7	10	13	23	20	-																			
10.50	SPT/DS		9	12	15	27	22	10.2	63.5	17.4	8.9	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							10.3	71.4	11.7	6.6	29	NP	NP	22.45	-	-	2.60	F	0.02	28	-	-	-	-	-	-
12.50	SPT/DS	Dense, Brownish Gray, fine-grained silty sand and Gravel(SM)	10	14	19	33	25	-																			
13.50	SPT/DS		13	18	23	41	22	5.0	63.9	21.1	10.0	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.0	76.4	14.6	9.0	24	NP	NP	22.21	-	-	2.64	F	0.03	29	-	-	-	-	-	-
15.50	SPT/DS		13	19	25	44	23	-																			
16.50	SPT/DS	Very Dense, Brownish, fine-grained silty sand and Gravel(SM)	16	23	29	52	25	7.3	67.3	16.8	8.6	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS							0.0	75.7	16.6	7.7	22	NP	NP	23.29	-	-	2.71	F	0.03	29	-	-	-	-	-	-
18.50	SPT/DS		19	25	30	55	26	-																			
19.50	SPT/DS		21	30	36	66	29	12.4	68.6	12.7	6.3	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							0.0	74.4	16.5	9.1	26	NP	NP	23.32	-	-	2.69	F	0.02	30	-	-	-	-	-	-
21.50	SPT/DS		24	34	40	74	31	-																			
22.50	SPT/DS		30	45	(50/3 cm)	100	38	12.4	64.6	14.7	8.3	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.0	75.6	17.5	6.9	24	NP	NP	23.18	-	-	2.65	F	0.03	31	-	-	-	-	-	-
24.50	SPT/DS		(50/6 cm)	-	-	100	37	-																			
25.50	SPT/DS		42	(50/7 cm)	-	100	37	8.7	70.1	13.6	7.7	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							0.1	80.6	13.4	6.0	29	NP	NP	16.23	-	-	2.73	F	0.00	32	-	-	-	-	-	-
27.50	SPT/DS		46	(50/6 cm)	-	100	36	-																			
28.50	SPT/DS		47	(50/4 cm)	-	100	36	4.6	67.3	17.6	10.6	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							11.5	60.8	18.7	9.0	28	NP	NP	15.22	-	-	2.64	F	0.00	33	-	-	-	-	-	-
30.50	SPT/DS		(50/4 cm)	-	-	100	35	-																			

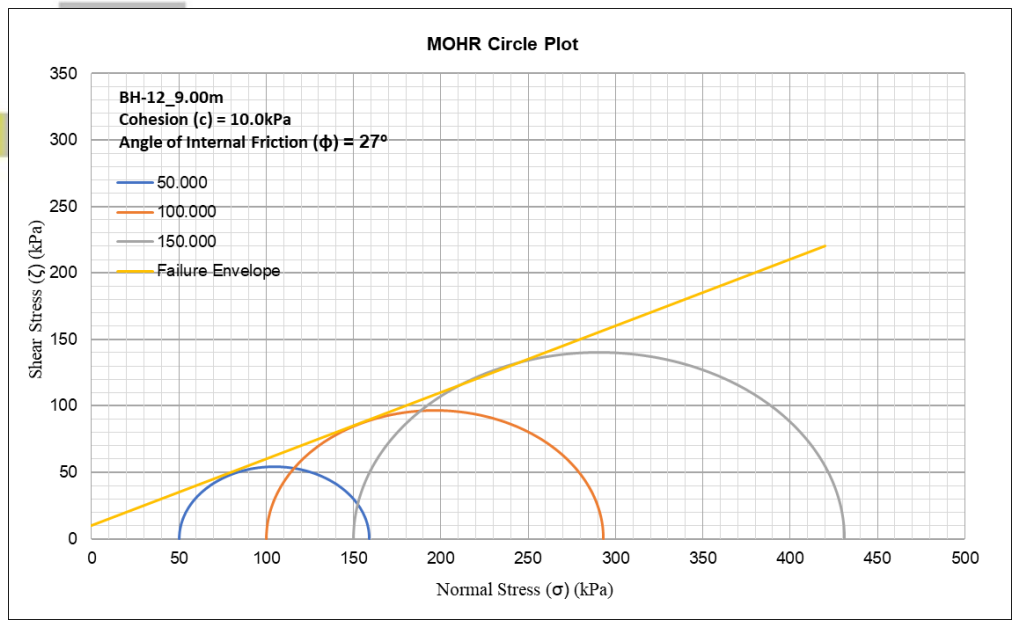
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

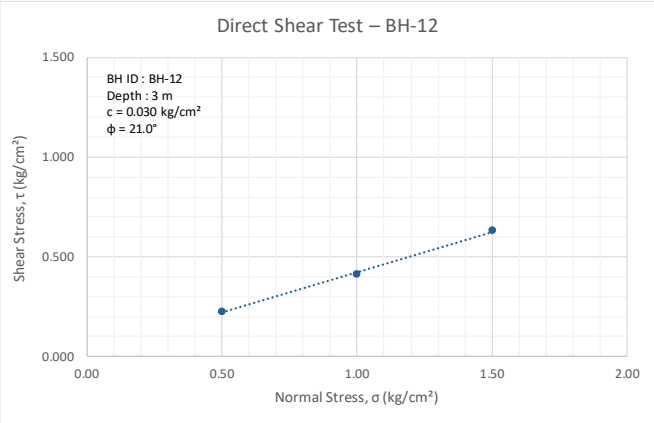

Grain Size Distribution Curve
BH-12_0.00m
BH-12_1.50m
BH-12_3.00m
BH-12_4.50m
BH-12_6.00m
BH-12_7.50m
BH-12_9.00m
Percent Finer (%)
Particle Size (mm)

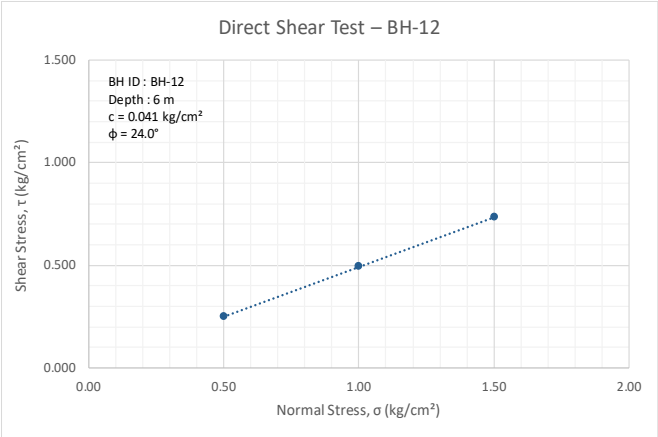

Grain Size Distribution Curve
BH-12_10.50m
BH-12_12.00m
BH-12_13.50m
BH-12_15.00m
BH-12_16.50m
BH-12_18.00m
BH-12_19.50m
Percent Finer (%)
Particle Size (mm)

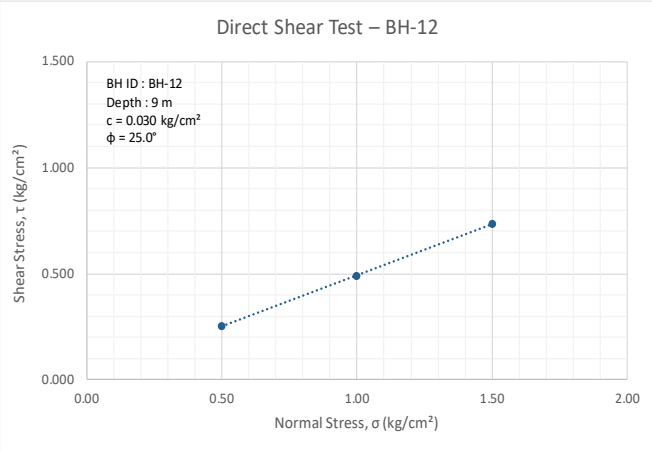

Grain Size Distribution Curve
BH-12_21.00m
BH-12_22.50m
BH-12_24.00m
BH-12_25.50m
BH-12_27.00m
BH-12_28.50m
BH-12_30.00m
Percent Finer (%)
Particle Size (mm)

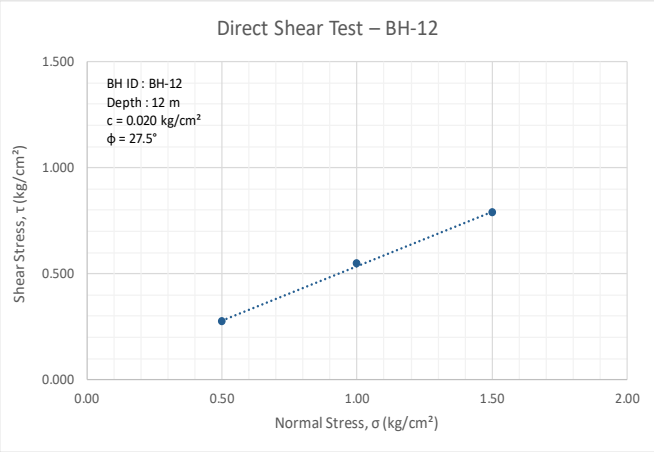

MOHR Circle Plot
BH-12_6.00m
Cohesion (c) = 13.0kPa
Angle of Internal Friction (ϕ) = 26°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

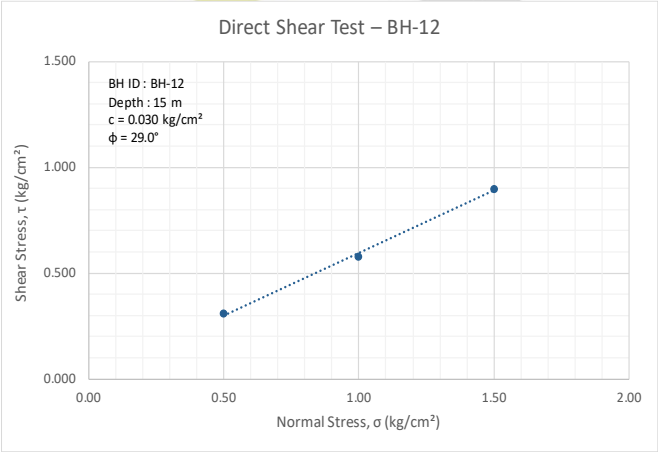

MOHR Circle Plot
BH-12_9.00m
Cohesion (c) = 10.0kPa
Angle of Internal Friction (ϕ) = 27°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

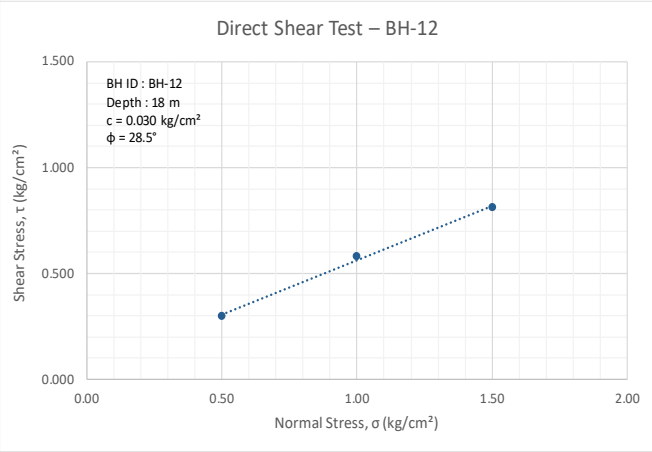

Direct Shear Test – BH-12
BH ID : BH-12
Depth : 3 m
c = 0.030 kg/cm²
ϕ = 21.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

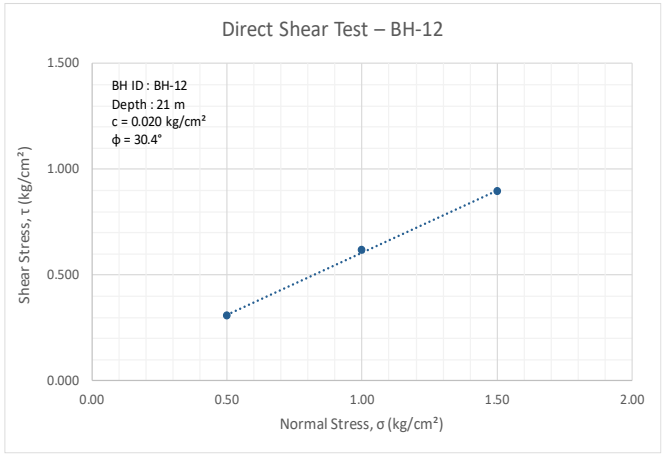

Direct Shear Test – BH-12
BH ID : BH-12
Depth : 6 m
c = 0.041 kg/cm²
ϕ = 24.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

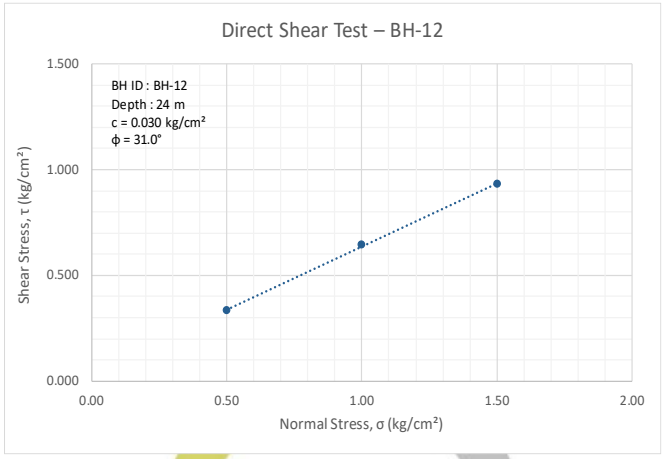

Direct Shear Test – BH-12
BH ID : BH-12
Depth : 9 m
c = 0.030 kg/cm²
ϕ = 25.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

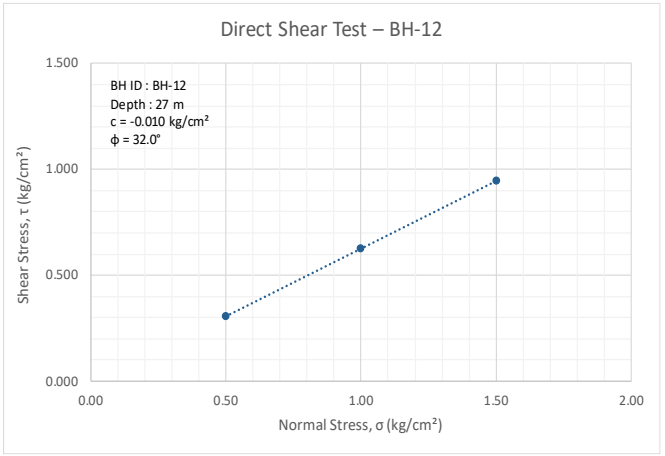

Direct Shear Test – BH-12
BH ID : BH-12
Depth : 12 m
c = 0.020 kg/cm²
ϕ = 27.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

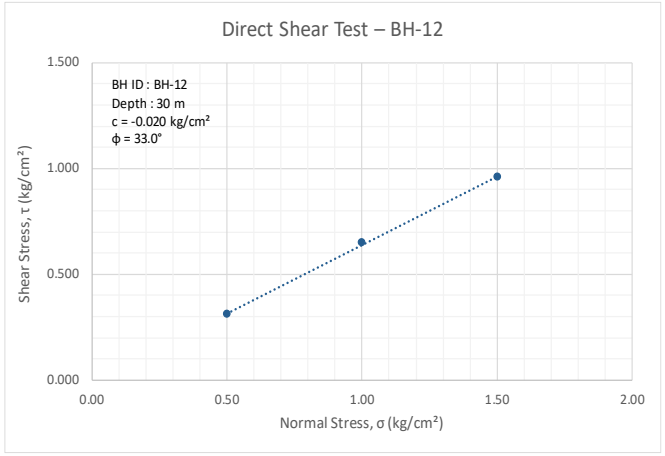

Direct Shear Test – BH-12
BH ID : BH-12
Depth : 15 m
c = 0.030 kg/cm²
ϕ = 29.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-12
BH ID : BH-12
Depth : 18 m
c = 0.030 kg/cm²
ϕ = 28.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-12
BH ID : BH-12
Depth : 21 m
c = 0.020 kg/cm²
ϕ = 30.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-12
BH ID : BH-12
Depth : 24 m
c = 0.030 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-12
BH ID : BH-12
Depth : 27 m
c = -0.010 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

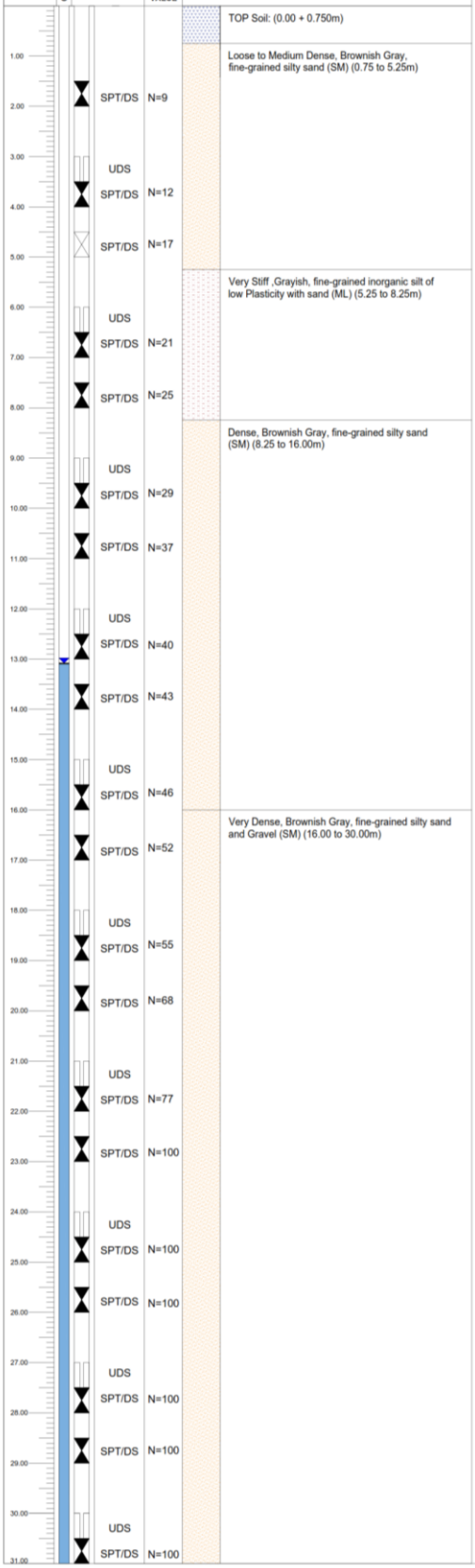

Direct Shear Test – BH-12
BH ID : BH-12
Depth : 30 m
c = -0.020 kg/cm²
ϕ = 33.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (1+000 km TO 2+000 km)

BH ID : BH-13 | **Chainage** : 1+859 KM

Groundwater Level : 13.10 M | **Location** : Lat. 28.554401, Long. 77.328564



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

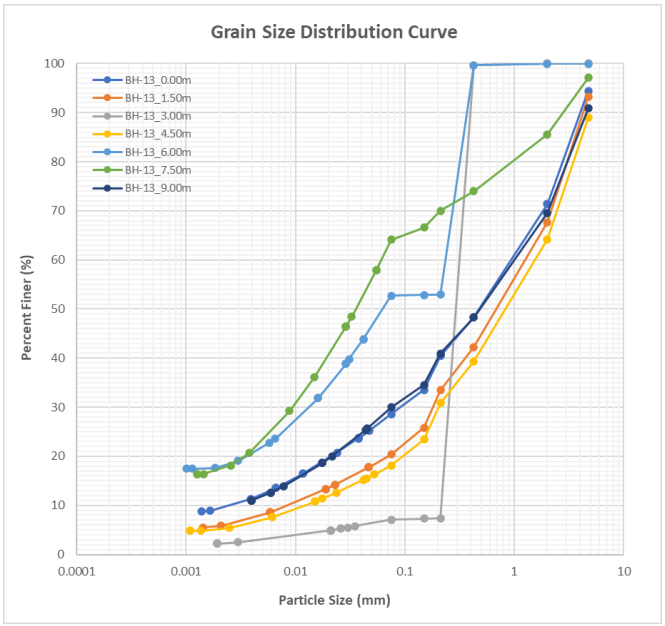
Soil

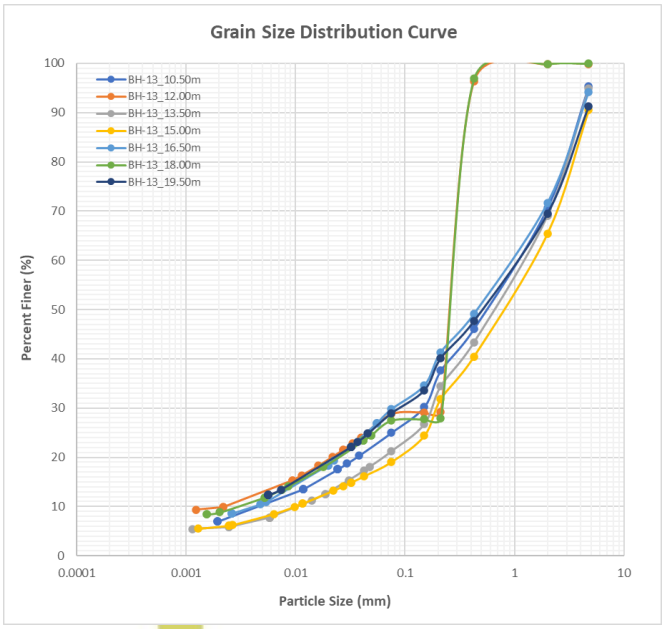
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

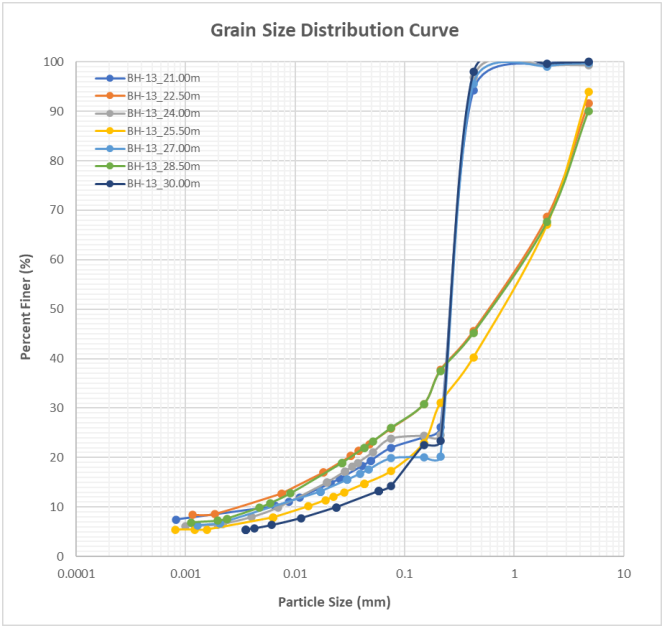
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-13	**Contractor:**	Goma Engineering & Consultancy
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Chainage [km]:**	1+859	**Method of Drilling:**	Rotary Drilling
Stretch:	Noida Sector-142 to Botanical Garden	**Depth [m]:**	30.00	**Start Date:**	28-02-2026
Project Code:	158_R03_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Elevation [m]:**	201.00	**End Date:**	28-02-2026
		Water table Level [m]:	13.10	**Location:**	Lat. 28.554401, Long. 77.328564

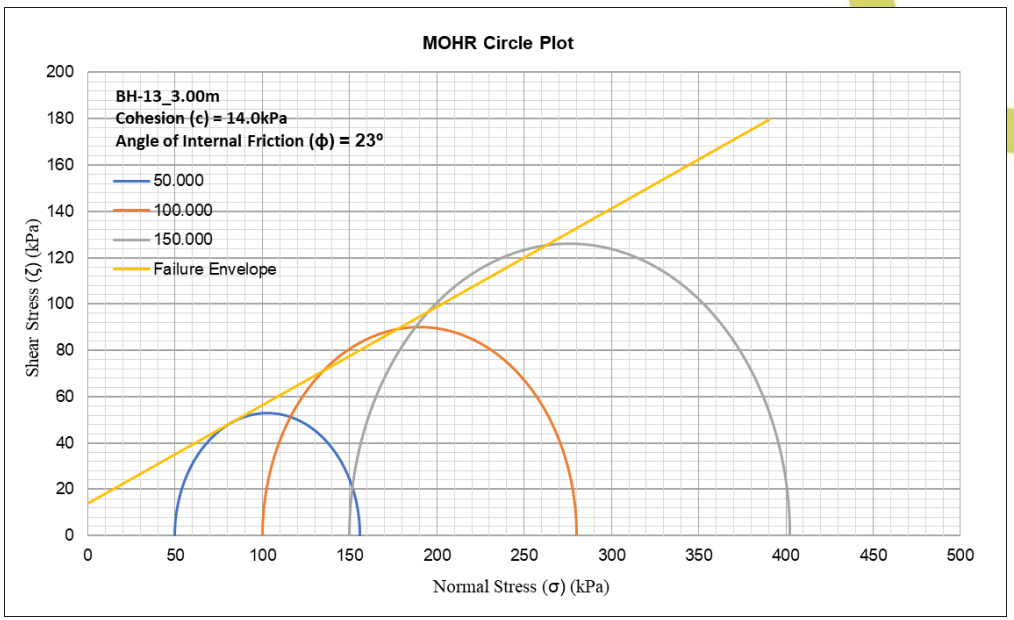
Depth [m]	Sample Type	Descriptions		SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
				N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil	TS						5.6	65.9	19.1	9.4	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Loose to Medium Dense, Brownish Gray, fine-grained silty sand (SM)	SM	3	4	5	9	13	6.8	72.8	14.5	5.8	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS		SM						0.0	92.9	4.9	2.2	22	NP	NP	6.53	1.90	1.78	2.65	F	0.02	23	UU	14.0	23.0	-	-	-
3.50	SPT/DS		SM	4	5	7	12	13	-																			
4.50	SPT/DS		SM	6	8	9	17	17	11.0	70.9	12.9	5.2	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS	Very Stiff,Grayish, fine-grained inorganic silt of low Plasticity with sand (ML)	ML						0.1	47.2	34.8	17.9	24	NP	NP	18.50	1.91	1.61	2.70	F	0.06	25	UU	9.0	27.0	-	-	-
6.50	SPT/DS		ML	7	9	12	21	20	-																			
7.50	SPT/DS		ML	9	12	13	25	23	2.9	33.0	46.7	17.4	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS	Dense, Brownish Gray, fine-grained silty sand (SM)	SM1						9.2	60.8	23.9	6.1	27	NP	NP	8.23	1.85	1.71	2.71	F	0.04	27	-	-	-	-	-	-
9.50	SPT/DS		SM1	13	14	15	29	25	-																			
10.50	SPT/DS		SM1	15	18	19	37	30	4.7	70.3	17.9	7.1	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS		SM1						0.1	71.2	18.9	9.8	26	NP	NP	21.24	-	-	2.65	F	0.02	28	-	-	-	-	-	-
12.50	SPT/DS		SM1	15	19	21	40	30	-																			
13.50	SPT/DS		SM1	18	21	22	43	31	5.1	73.7	15.5	5.7	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	UDS		SM1						9.5	71.4	13.2	5.9	29	NP	NP	15.25	1.94	1.69	2.68	F	0.00	29	-	-	-	-	-	-
15.50	SPT/DS		SM1	19	22	24	46	23	-																			
16.50	SPT/DS	Very Dense, Brownish Gray, fine-grained silty sand and Gravel (SM)	SM2	23	25	27	52	25	5.8	64.5	22.6	7.2	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS		SM2						0.0	72.5	18.7	8.8	25	NP	NP	22.02	-	-	2.69	F	0.00	30	-	-	-	-	-	-
18.50	SPT/DS		SM2	25	25	30	55	25	-																			
19.50	SPT/DS		SM2	28	32	36	68	29	8.7	62.3	23.7	5.3	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS		SM2						0.1	78.0	13.3	8.6	27	NP	NP	16.50	-	-	2.70	F	0.00	30	-	-	-	-	-	-
21.50	SPT/DS		SM2	32	35	42	77	31	-																			
22.50	SPT/DS		SM2	35	45	(50/9 cm)	100	38	8.3	65.8	17.1	8.8	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS		SM2						0.7	75.5	17.4	6.4	29	NP	NP	16.71	-	-	2.66	F	0.02	32	-	-	-	-	-	-
24.50	SPT/DS		SM2	37	46	(50/8 cm)	100	37	-																			
25.50	SPT/DS		SM2	45	50/10 cm	-	100	37	6.0	76.7	11.4	5.9	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS		SM2						0.3	79.9	13.2	6.7	26	NP	NP	11.84	-	-	2.65	F	0.00	34	-	-	-	-	-	-
27.50	SPT/DS		SM2	47	(50/9 cm)	-	100	36	-																			
28.50	SPT/DS		SM2	49	(50/8 cm)	-	100	35	9.9	64.1	18.7	7.2	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS		SM2						0.0	85.7	14.3	0.0	26	NP	NP	14.99	-	-	2.76	F	0.07	33	-	-	-	-	-	-
30.50	SPT/DS		SM2	(50/12 cm)	-	-	100	34	-																			

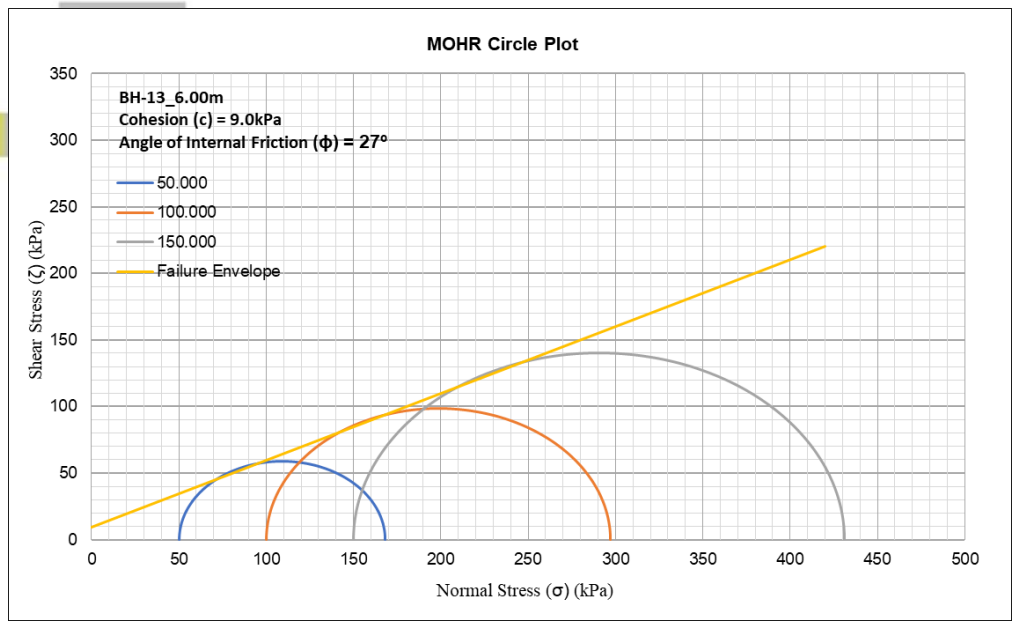
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

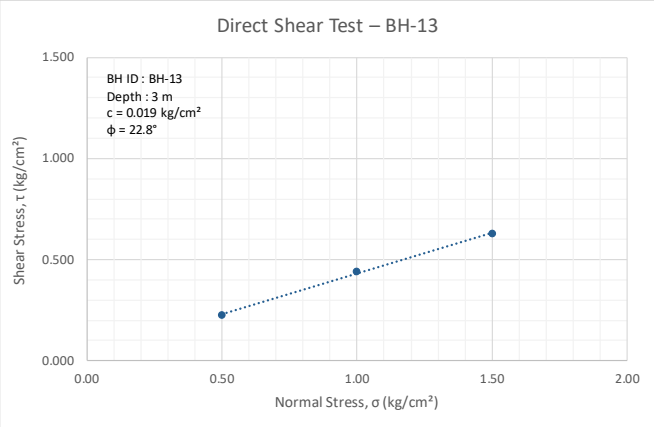

Grain Size Distribution Curve
BH-13_0.00m
BH-13_1.50m
BH-13_3.00m
BH-13_4.50m
BH-13_6.00m
BH-13_7.50m
BH-13_9.00m
Percent Finer (%)
Particle Size (mm)

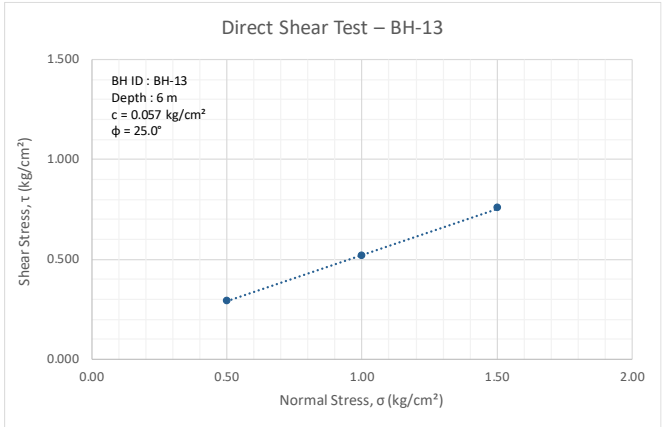

Grain Size Distribution Curve
BH-13_10.50m
BH-13_12.00m
BH-13_13.50m
BH-13_15.00m
BH-13_16.50m
BH-13_18.00m
BH-13_19.50m
Percent Finer (%)
Particle Size (mm)

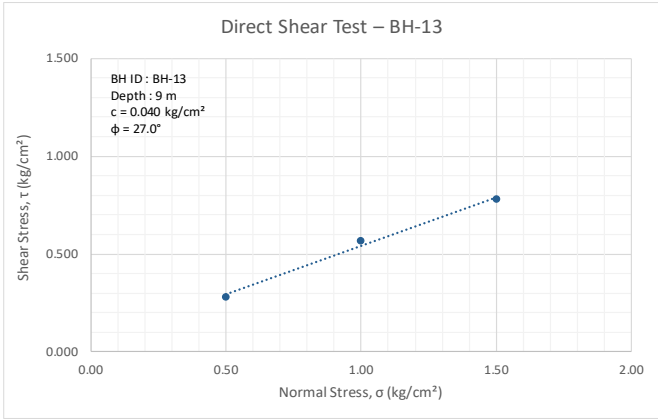

Grain Size Distribution Curve
BH-13_21.00m
BH-13_22.50m
BH-13_24.00m
BH-13_25.50m
BH-13_27.00m
BH-13_28.50m
BH-13_30.00m
Percent Finer (%)
Particle Size (mm)

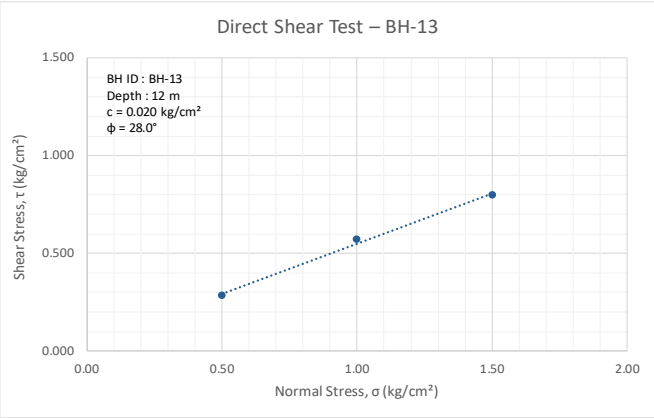

MOHR Circle Plot
BH-13_3.00m
Cohesion (c) = 14.0kPa
Angle of Internal Friction (ϕ) = 23°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

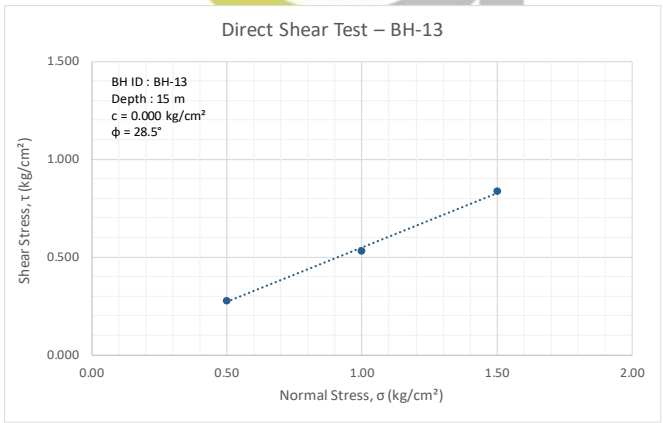

MOHR Circle Plot
BH-13_6.00m
Cohesion (c) = 9.0kPa
Angle of Internal Friction (ϕ) = 27°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

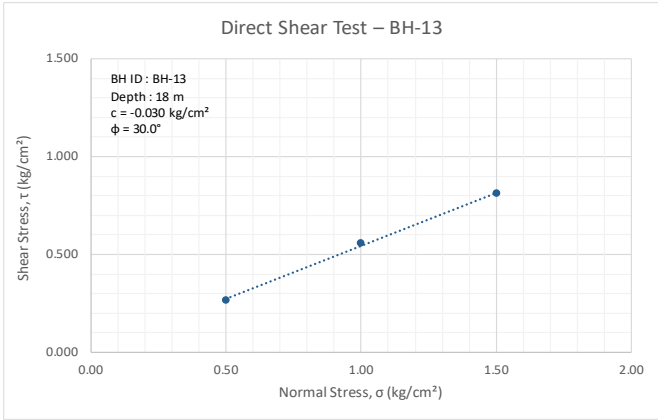

Direct Shear Test – BH-13
BH ID : BH-13
Depth : 3 m
c = 0.019 kg/cm²
ϕ = 22.8°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

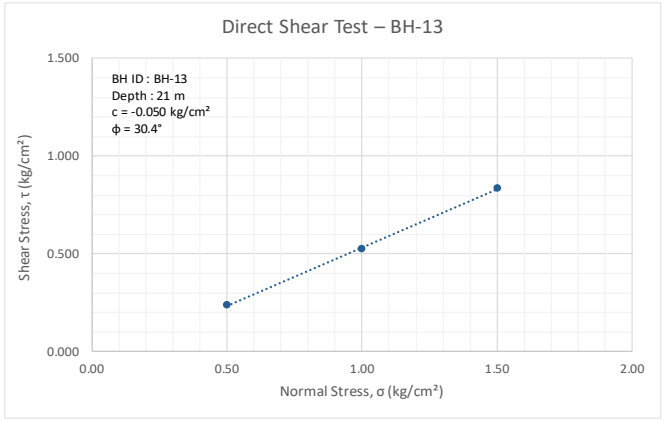

Direct Shear Test – BH-13
BH ID : BH-13
Depth : 6 m
c = 0.057 kg/cm²
ϕ = 25.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

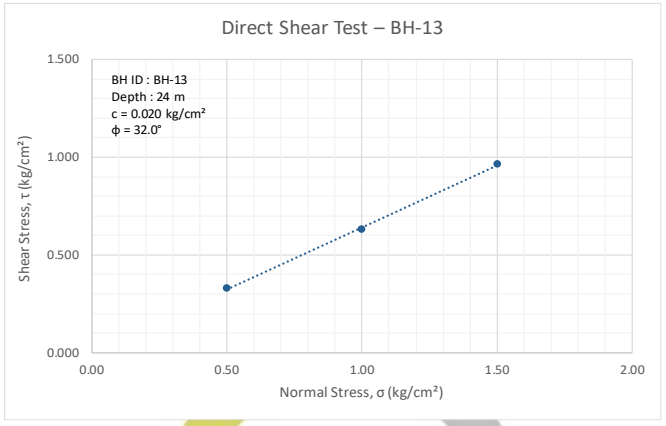

Direct Shear Test – BH-13
BH ID : BH-13
Depth : 9 m
c = 0.040 kg/cm²
ϕ = 27.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

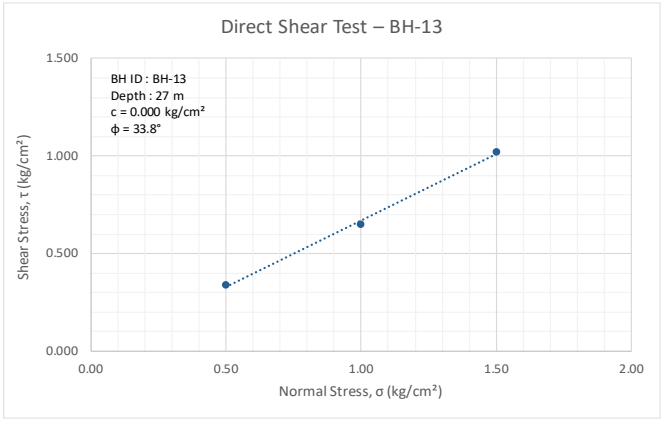

Direct Shear Test – BH-13
BH ID : BH-13
Depth : 12 m
c = 0.020 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

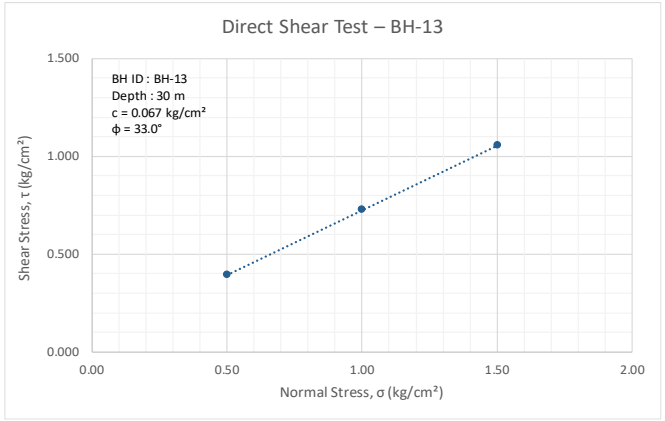

Direct Shear Test – BH-13
BH ID : BH-13
Depth : 15 m
c = 0.000 kg/cm²
ϕ = 28.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-13
BH ID : BH-13
Depth : 18 m
c = -0.030 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-13
BH ID : BH-13
Depth : 21 m
c = -0.050 kg/cm²
ϕ = 30.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-13
BH ID : BH-13
Depth : 24 m
c = 0.020 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-13
BH ID : BH-13
Depth : 27 m
c = 0.000 kg/cm²
ϕ = 33.8°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

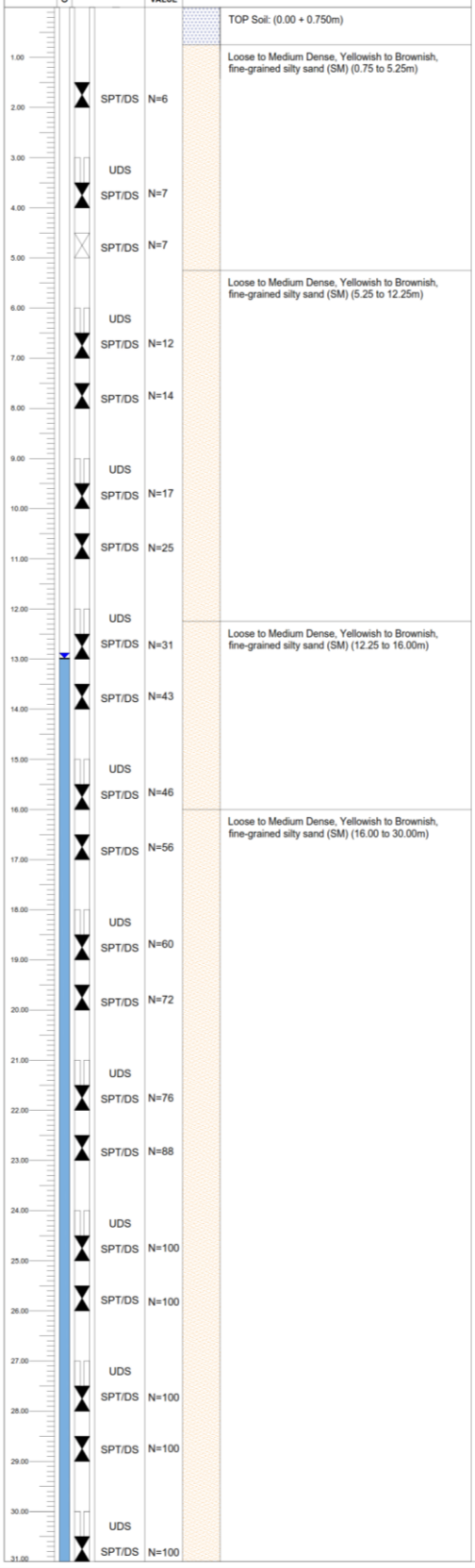

Direct Shear Test – BH-13
BH ID : BH-13
Depth : 30 m
c = 0.067 kg/cm²
ϕ = 33.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (1+000 km TO 2+000 km)

BH ID : BH-14 | **Chainage** : 1+952 KM

Groundwater Level : 13.00 M | **Location** : Lat. 28.553737, Long. 77.329256



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

Soil

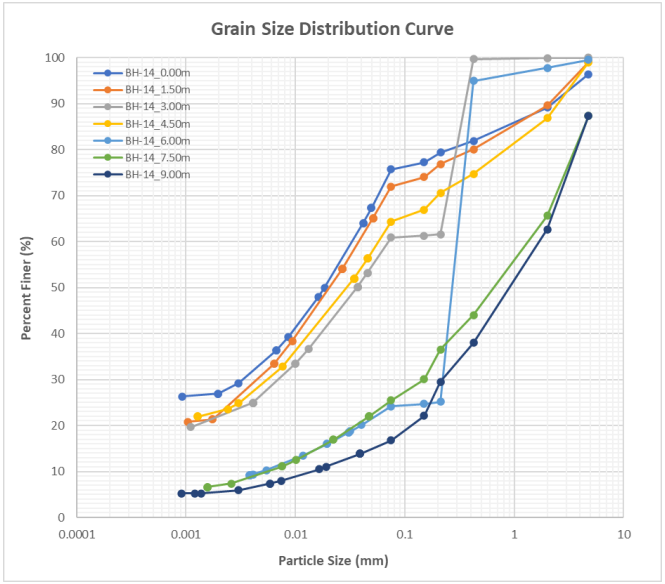
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

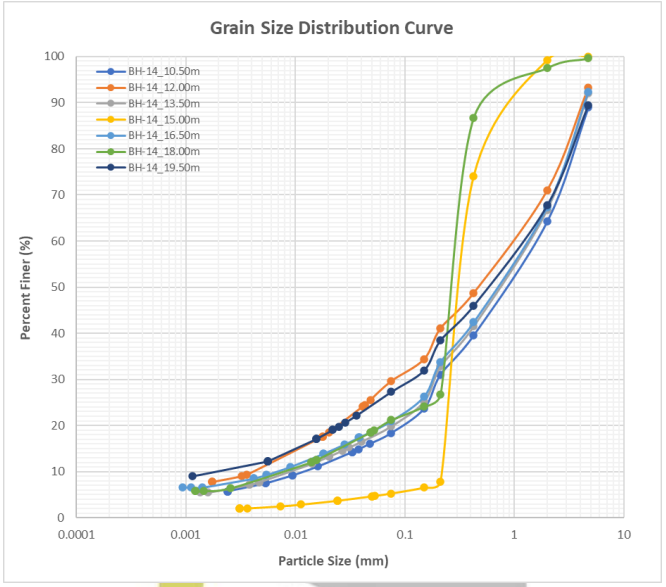
GOMA ENGINEERING AND CONSULTANCY
Quality we put forward

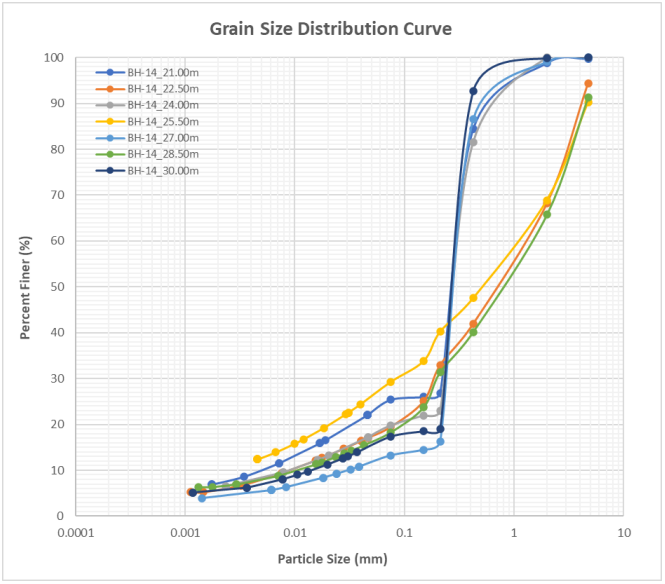
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-14	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	1+952	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	28-02-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	199.50	**End Date:**	28-02-2026
Project Code:	158_R03_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	13.00	**Location:**	Lat. 28.553737, Long. 77.329256

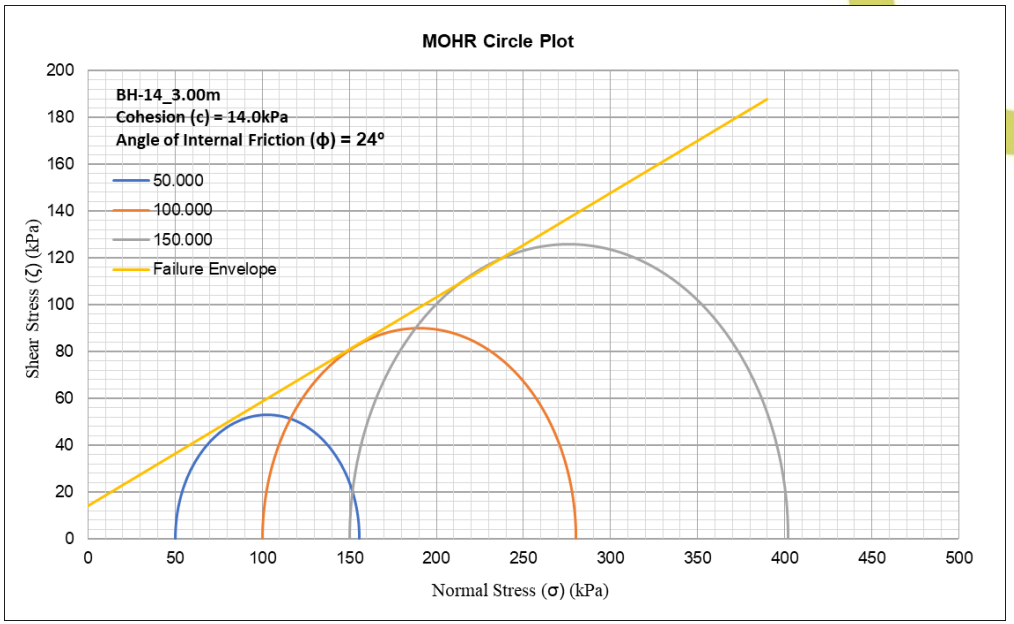
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [^{o}]	Type	Cohesion [kPa]	Angle of Friction [^{o}]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						3.6	20.7	48.7	27.0	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Very Stiff,Grayish, fine-grained inorganic silt of low Plasticity with sand (ML)	2	3	3	6	8	0.9	27.1	49.4	22.6	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							0.0	39.1	38.8	22.0	29	NP	NP	16.85	1.91	1.63	2.61	F	0.02	23	UU	14.0	24.0	-	-	-
3.50	SPT/DS		2	3	4	7	8	-																			
4.50	SPT/DS		3	3	4	7	7	1.0	34.7	41.3	23.1	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS	Medium Dense, Grayish to Brownish Gray, fine-grained silty sand (SM)						0.4	75.4	24.2	0.0	27	NP	NP	22.70	1.92	1.56	2.64	F	0.01	24	UU	11.0	27.0	-	-	-
6.50	SPT/DS		4	5	7	12	11	-																			
7.50	SPT/DS		4	6	8	14	13	12.7	61.9	18.5	6.9	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							12.6	70.6	11.2	5.6	26	NP	NP	23.11	1.88	1.53	2.76	F	0.02	25	-	-	-	-	-	-
9.50	SPT/DS		5	7	10	17	15	-																			
10.50	SPT/DS		7	11	14	25	21	11.0	70.6	12.9	5.5	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							6.7	63.7	21.6	8.0	21	NP	NP	21.54	-	-	2.62	F	0.04	26	-	-	-	-	-	-
12.50	SPT/DS	Dense, Brownish Gray to Grayish, fine-grained silty sand (SM)	10	13	18	31	23	-																			
13.50	SPT/DS		13	19	24	43	23	7.9	72.3	13.9	5.9	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.0	94.7	5.3	0.0	28	NP	NP	20.71	-	-	2.60	F	0.00	28	-	-	-	-	-	-
15.50	SPT/DS		15	20	26	46	24	-																			
16.50	SPT/DS	Very Dense, Brownish Gray, fine-grained silty sand and Gravel (SM)	18	24	32	56	27	7.6	71.4	13.8	7.2	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	UDS							0.3	78.5	15.0	6.2	21	NP	NP	19.39	-	-	2.71	F	0.00	29	-	-	-	-	-	-
18.50	SPT/DS		21	26	34	60	27	-																			
19.50	SPT/DS		25	33	39	72	31	10.5	62.2	17.1	10.1	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							0.3	74.4	18.1	7.3	28	NP	NP	21.79	-	-	2.63	F	0.02	30	-	-	-	-	-	-
21.50	SPT/DS		30	35	41	76	31	-																			
22.50	SPT/DS		33	40	48	88	35	5.6	75.0	13.7	5.8	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.0	80.2	15.0	4.8	25	NP	NP	21.23	-	-	2.69	F	0.00	31	-	-	-	-	-	-
24.50	SPT/DS		50	(50/8 cm)	-	100	38	-																			
25.50	SPT/DS		48	(50/6 cm)	-	100	37	9.8	61.0	21.6	7.7	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							0.0	86.8	8.9	4.3	24	NP	NP	13.55	-	-	2.78	F	0.06	30	-	-	-	-	-	-
27.50	SPT/DS		(50/12 cm)	-	-	100	36	-																			
28.50	SPT/DS		(50/10 cm)	-	-	100	36	8.7	73.1	11.8	6.5	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.0	82.7	11.7	5.7	21	NP	NP	18.95	-	-	2.70	F	0.03	32	-	-	-	-	-	-
30.50	SPT/DS		(50/7 cm)	-	-	100	35	-																			

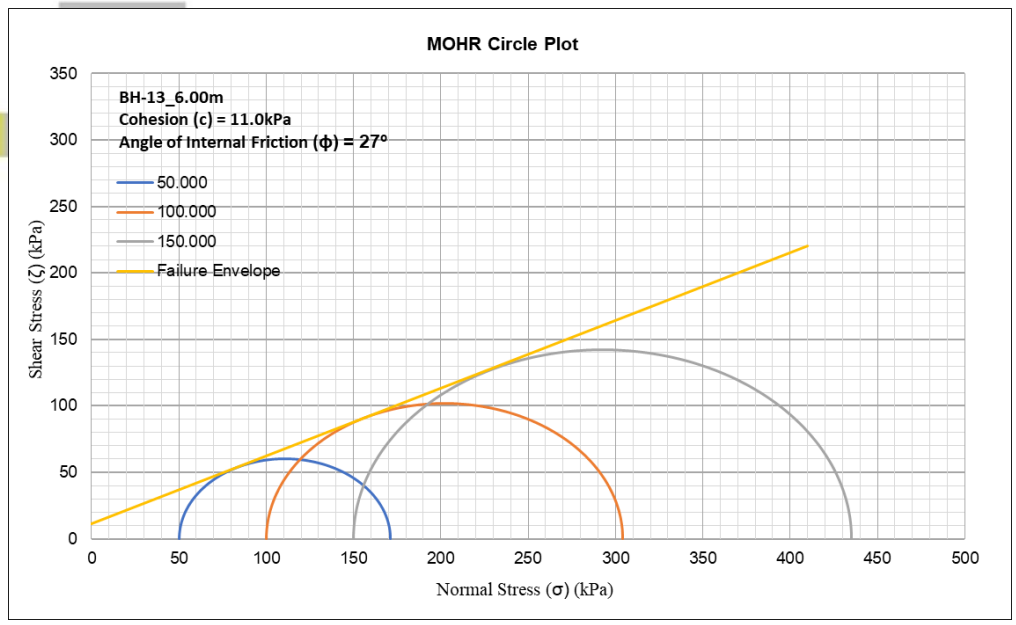
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

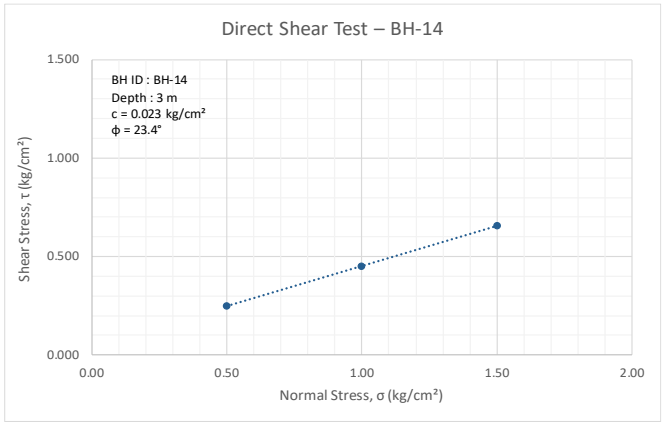

Grain Size Distribution Curve
BH-14_0.00m
BH-14_1.50m
BH-14_3.00m
BH-14_4.50m
BH-14_6.00m
BH-14_7.50m
BH-14_9.00m
Percent Finer (%)
Particle Size (mm)

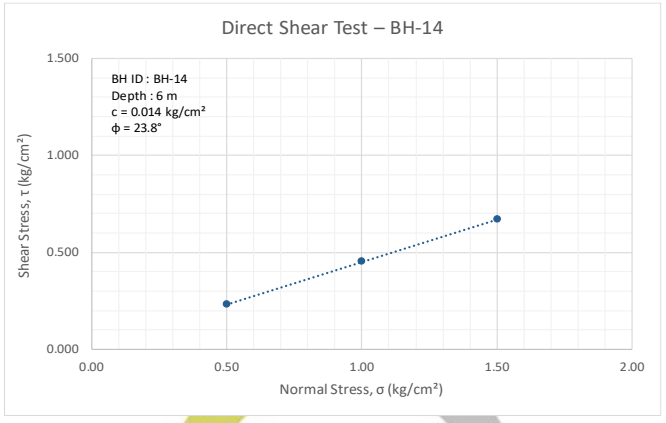

Grain Size Distribution Curve
BH-14_10.50m
BH-14_12.00m
BH-14_13.50m
BH-14_15.00m
BH-14_16.50m
BH-14_18.00m
BH-14_19.50m
Percent Finer (%)
Particle Size (mm)

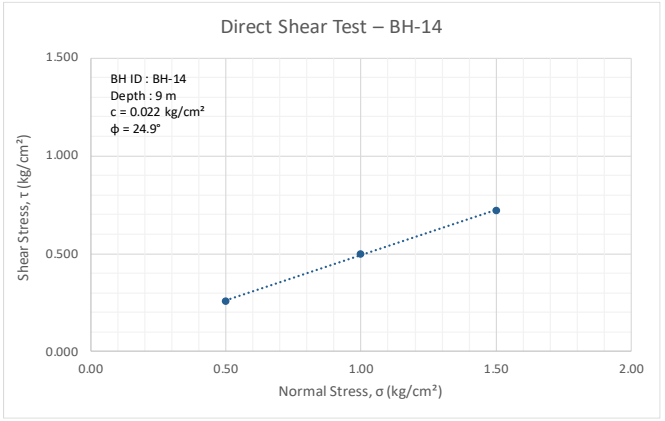

Grain Size Distribution Curve
BH-14_21.00m
BH-14_22.50m
BH-14_24.00m
BH-14_25.50m
BH-14_27.00m
BH-14_28.50m
BH-14_30.00m
Percent Finer (%)
Particle Size (mm)

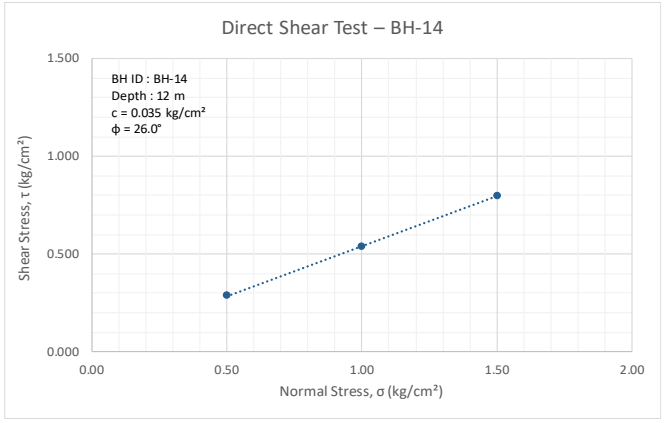

MOHR Circle Plot
BH-14_3.00m
Cohesion (c) = 14.0kPa
Angle of Internal Friction (ϕ) = 24°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

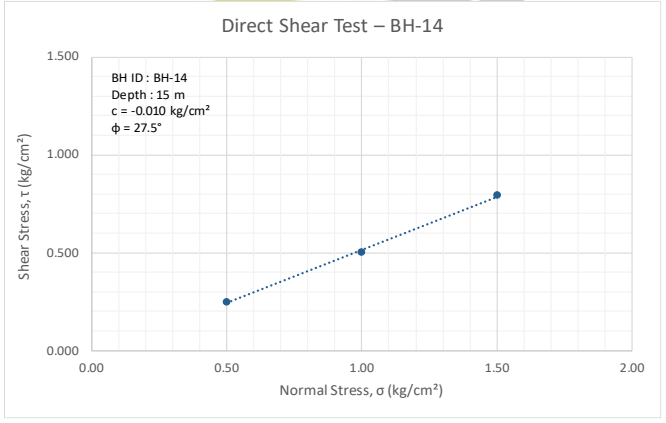

MOHR Circle Plot
BH-13_6.00m
Cohesion (c) = 11.0kPa
Angle of Internal Friction (ϕ) = 27°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

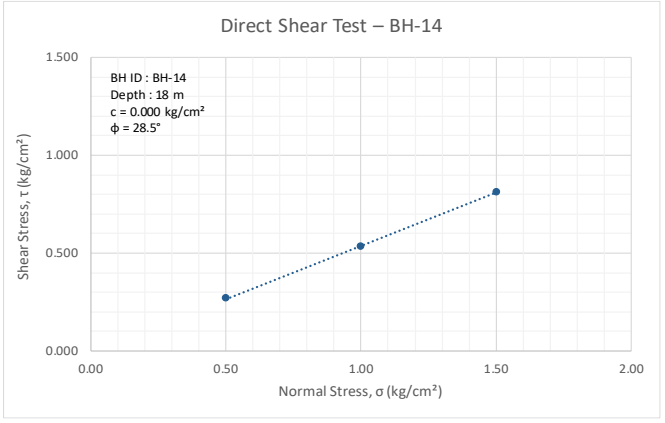

Direct Shear Test – BH-14
BH ID : BH-14
Depth : 3 m
c = 0.023 kg/cm²
ϕ = 23.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

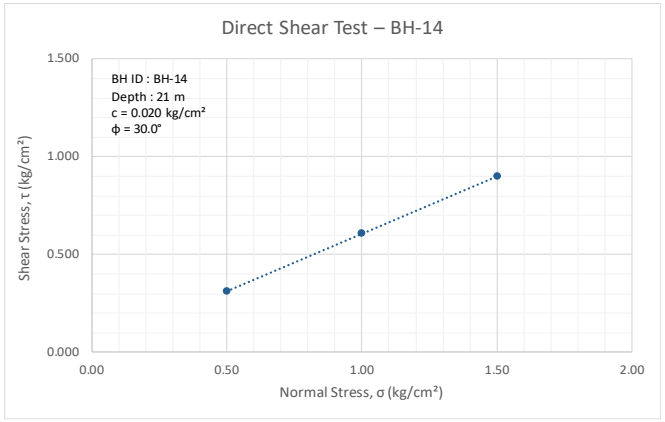

Direct Shear Test – BH-14
BH ID : BH-14
Depth : 6 m
c = 0.014 kg/cm²
ϕ = 23.8°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

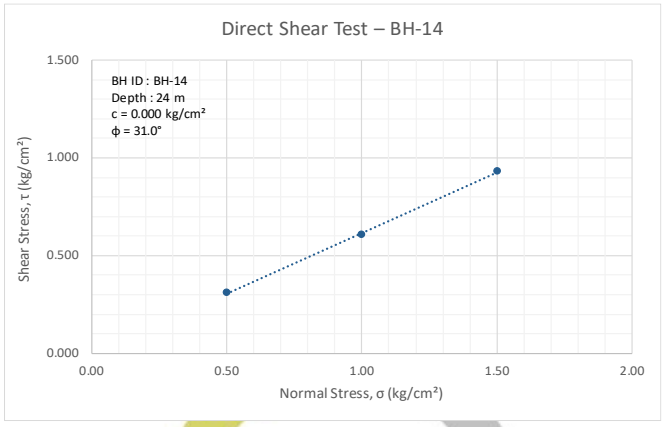

Direct Shear Test – BH-14
BH ID : BH-14
Depth : 9 m
c = 0.022 kg/cm²
ϕ = 24.9°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

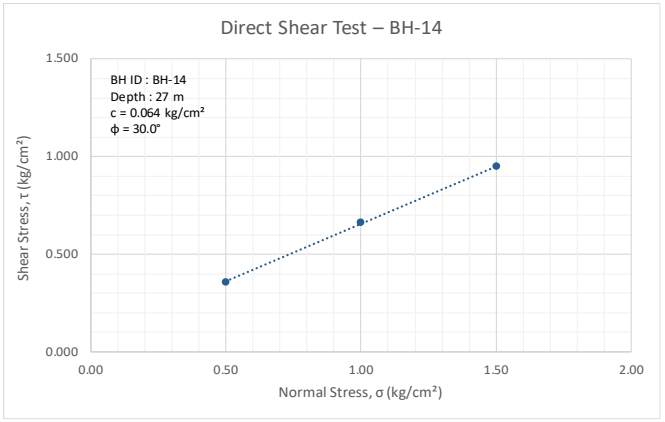

Direct Shear Test – BH-14
BH ID : BH-14
Depth : 12 m
c = 0.035 kg/cm²
ϕ = 26.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

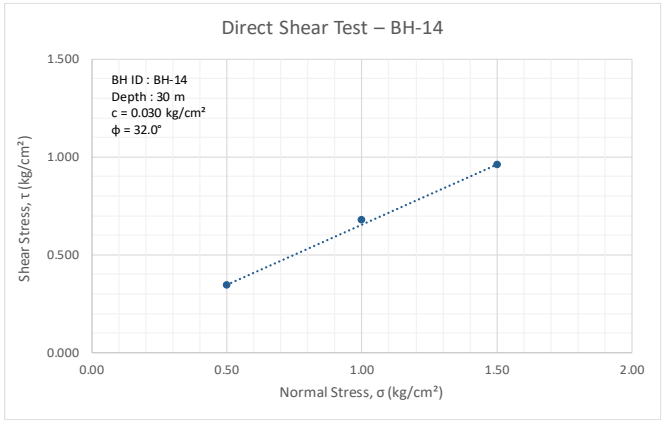

Direct Shear Test – BH-14
BH ID : BH-14
Depth : 15 m
c = -0.010 kg/cm²
ϕ = 27.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-14
BH ID : BH-14
Depth : 18 m
c = 0.000 kg/cm²
ϕ = 28.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-14
BH ID : BH-14
Depth : 21 m
c = 0.020 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-14
BH ID : BH-14
Depth : 24 m
c = 0.000 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-14
BH ID : BH-14
Depth : 27 m
c = 0.064 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

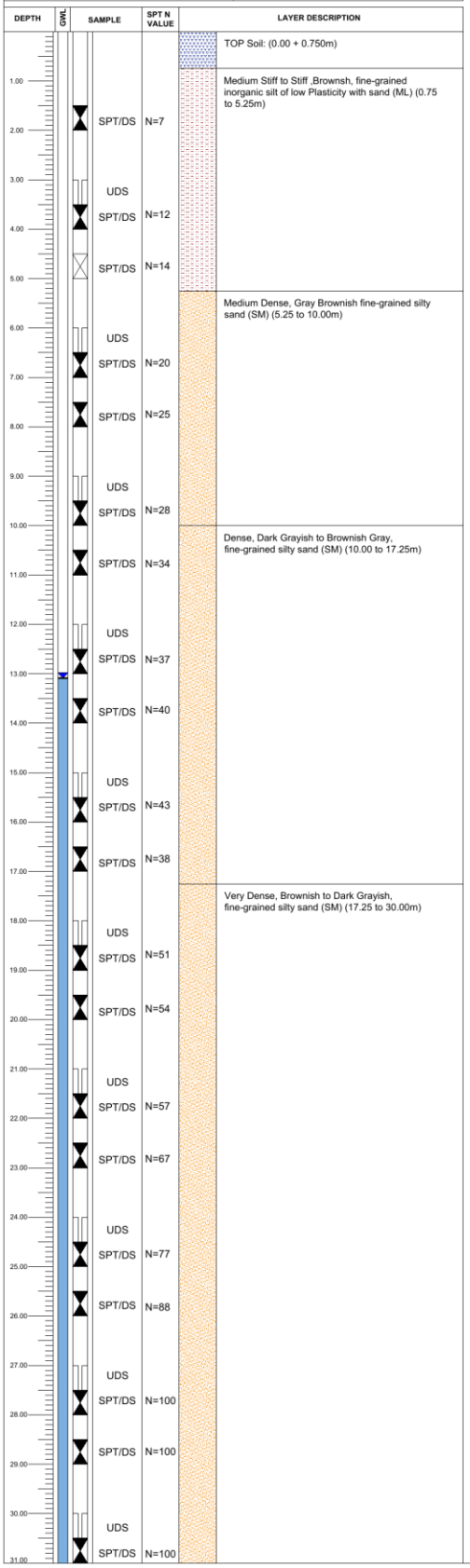

Direct Shear Test – BH-14
BH ID : BH-14
Depth : 30 m
c = 0.030 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (1+000 km TO 2+000 km)

BH ID : BH-15 | **Chainage** : 2+035 KM

Groundwater Level : 13.10 M | **Location** : Lat. 28.553215, Long. 77.329835



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

Soil

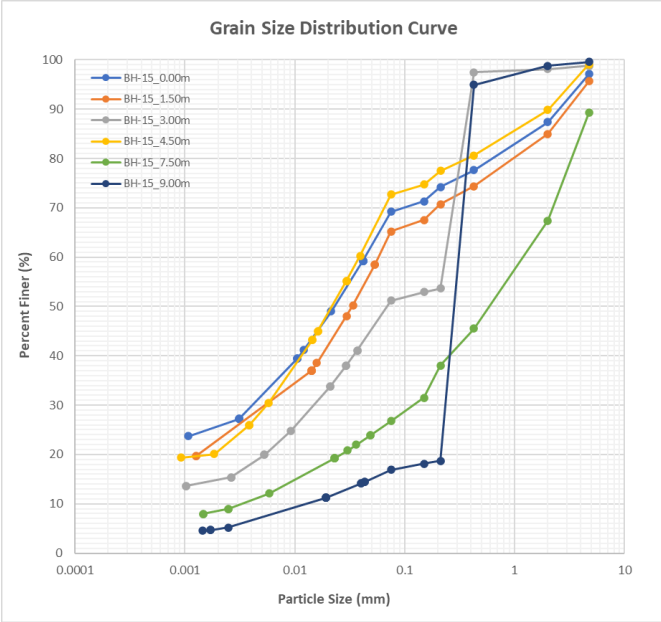
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

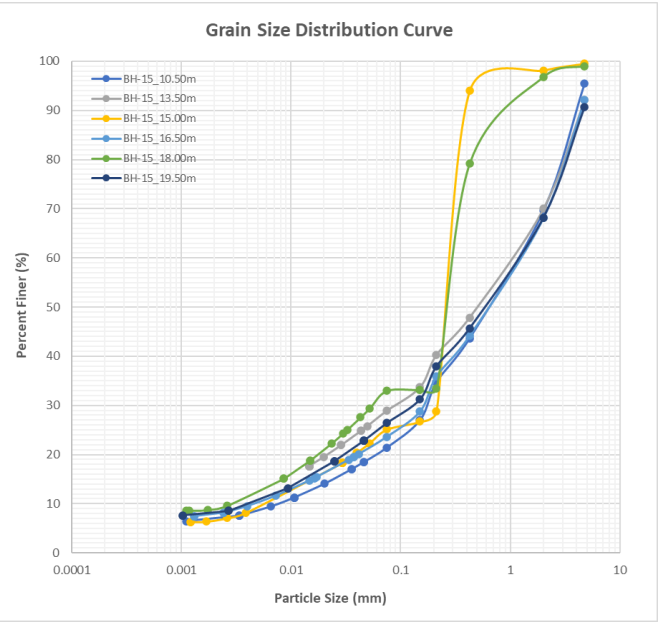
GOMA ENGINEERING AND CONSULTANCY
Quality we put forward

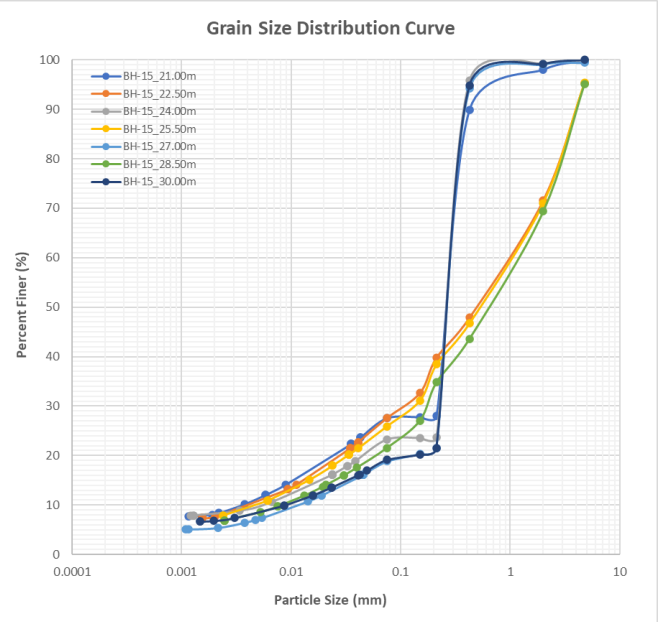
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-15	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	2+035	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	27-02-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	201.70	**End Date:**	27-02-2026
Project Code:	158_R03_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	13.10	**Location:**	Lat. 28.553215, Long. 77.329835

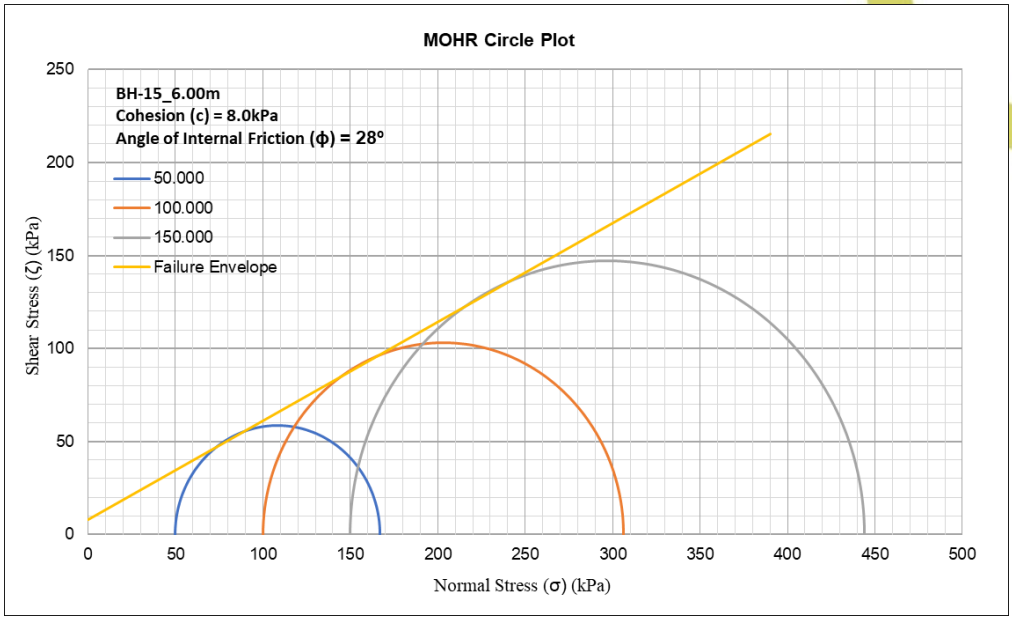
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						2.9	27.9	43.4	25.8	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Medium Stiff to Stiff,Brownsh, fine-grained inorganic silt of low Plasticity with sand (ML)	3	3	4	7	10	4.4	30.4	42.2	23.0	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							1.2	47.6	36.3	14.9	28	NP	NP	16.59	1.74	1.49	2.69	F	0.07	24	-	-	-	-	-	-
3.50	SPT/DS		3	5	7	12	13	-																			
4.50	SPT/DS		4	6	8	14	14	0.9	26.4	52.0	20.7	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS	Medium Dense, Gray Brownish fine-grained silty sand (SM)						8.3	62.4	19.5	9.9	28	NP	NP	19.20	1.91	1.60	2.63	F	0.00	26	UU	8.0	28.0	-	-	-
6.50	SPT/DS		6	9	11	20	19	-																			
7.50	SPT/DS		8	12	13	25	23	10.7	62.5	18.2	8.5	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	DS							0.4	82.7	12.0	4.9	26	NP	NP	14.08	-	-	2.70	F	0.03	27	-	-	-	-	-	-
9.50	SPT/DS		10	13	15	28	24	-																			
10.50	SPT/DS	Dense, Dark Grayish to Brownish Gray, fine-grained silty sand (SM)	14	16	18	34	28	4.5	74.1	14.4	7.1	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	UDS							7.0	74.6	18.4	0.0	21	NP	NP	13.98	1.94	1.70	2.62	F	0.05	27	UU	6.0	29.0	-	-	-
12.50	SPT/DS		14	18	19	37	28	-																			
13.50	SPT/DS		16	19	21	40	22	7.9	63.2	20.6	8.3	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.5	74.4	18.5	6.7	29	NP	NP	15.14	-	-	2.65	F	0.02	28	-	-	-	-	-	-
15.50	SPT/DS		17	21	22	43	22	-																			
16.50	SPT/DS		19	13	25	38	20	7.9	68.5	15.7	7.9	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS	Very Dense, Brownish to Dark Grayish, fine-grained silty sand (SM)						1.0	66.1	23.9	9.1	24	NP	NP	22.94	-	-	2.64	F	0.03	29	-	-	-	-	-	-
18.50	SPT/DS		21	24	27	51	24	-																			
19.50	SPT/DS		22	25	29	54	25	9.3	64.3	18.2	8.3	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							0.2	72.2	19.4	8.2	23	NP	NP	20.56	-	-	2.62	F	0.00	30	-	-	-	-	-	-
21.50	SPT/DS		23	27	30	57	25	-																			
22.50	SPT/DS		25	32	35	67	28	4.8	67.6	20.0	7.7	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.2	76.6	14.9	8.3	26	NP	NP	17.15	-	-	2.72	F	0.02	31	-	-	-	-	-	-
24.50	SPT/DS		27	35	42	77	31	-																			
25.50	SPT/DS		32	43	45	88	33	4.6	69.5	19.7	6.2	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							0.6	80.6	13.5	5.4	28	NP	NP	18.43	-	-	2.61	F	0.04	32	-	-	-	-	-	-
27.50	SPT/DS		33	(50/14 cm)	-	100	36	-																			
28.50	SPT/DS		38	(50/11 cm)	-	100	36	4.9	73.5	16.1	5.5	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.0	80.9	12.3	6.8	24	NP	NP	18.12	-	-	2.76	F	0.03	33	-	-	-	-	-	-
30.50	SPT/DS		46	(50/9 cm)	-	100	35	-																			

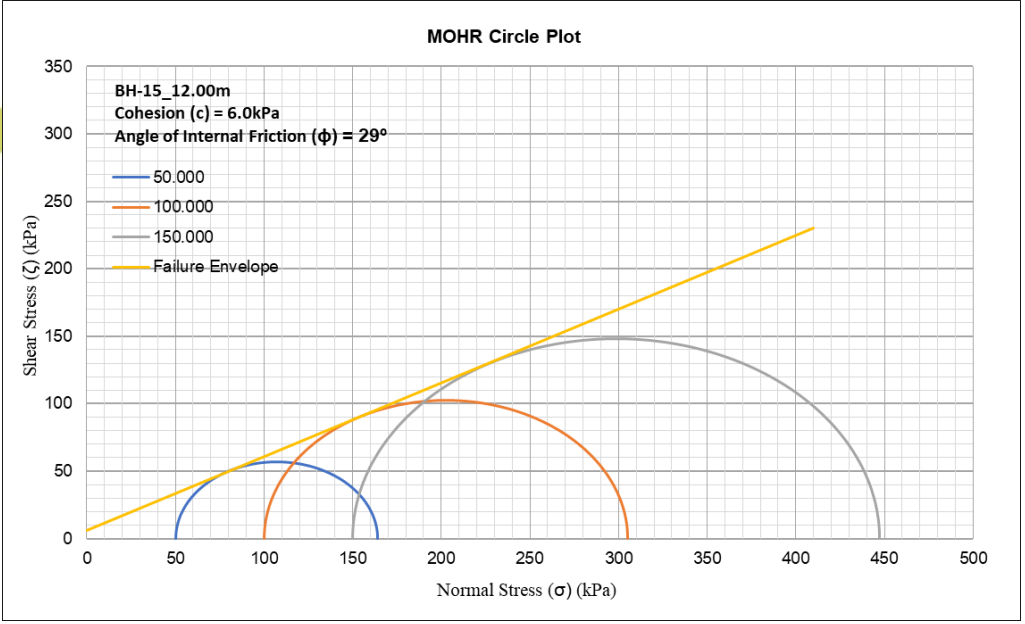
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

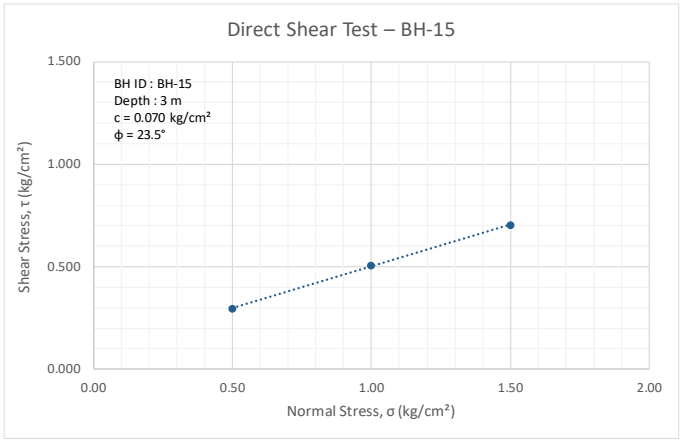

Grain Size Distribution Curve
BH-15_0.00m
BH-15_1.50m
BH-15_3.00m
BH-15_4.50m
BH-15_7.50m
BH-15_9.00m
Percent Finer (%)
Particle Size (mm)

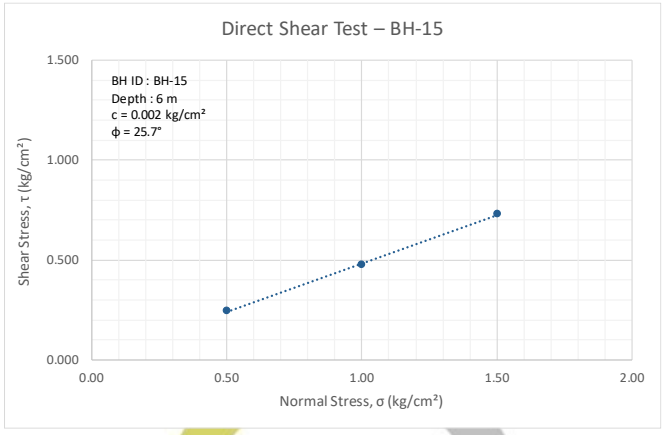

Grain Size Distribution Curve
BH-15_10.50m
BH-15_13.50m
BH-15_15.00m
BH-15_16.50m
BH-15_18.00m
BH-15_19.50m
Percent Finer (%)
Particle Size (mm)

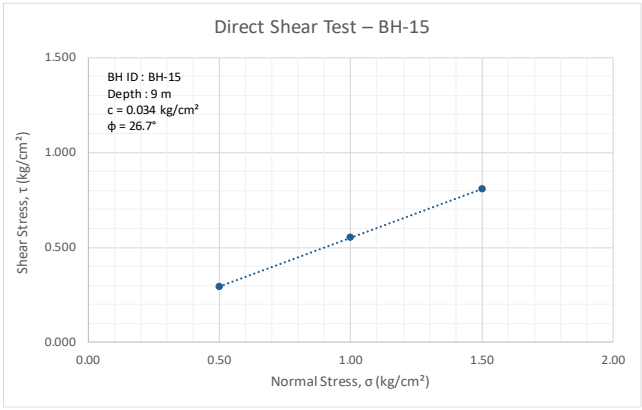

Grain Size Distribution Curve
BH-15_21.00m
BH-15_22.50m
BH-15_24.00m
BH-15_25.50m
BH-15_27.00m
BH-15_28.50m
BH-15_30.00m
Percent Finer (%)
Particle Size (mm)

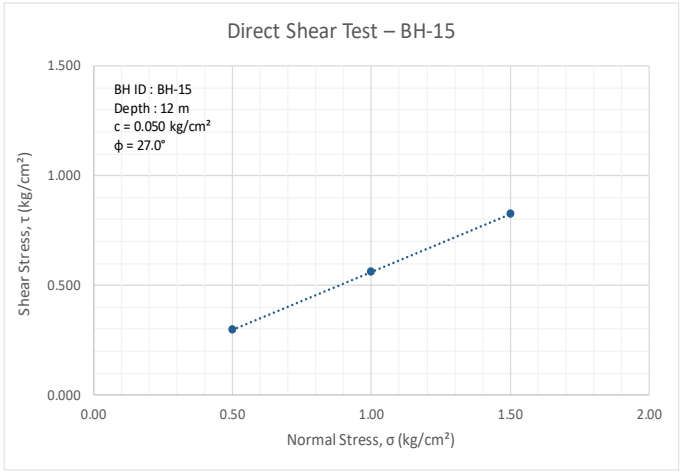

MOHR Circle Plot
BH-15_6.00m
Cohesion (c) = 8.0kPa
Angle of Internal Friction (ϕ) = 28°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

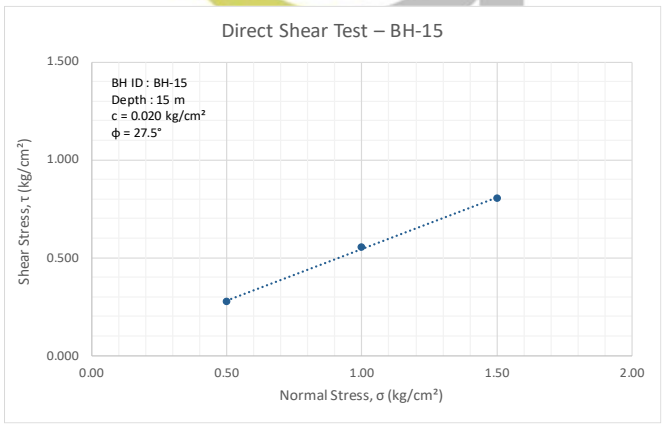

MOHR Circle Plot
BH-15_12.00m
Cohesion (c) = 6.0kPa
Angle of Internal Friction (ϕ) = 29°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

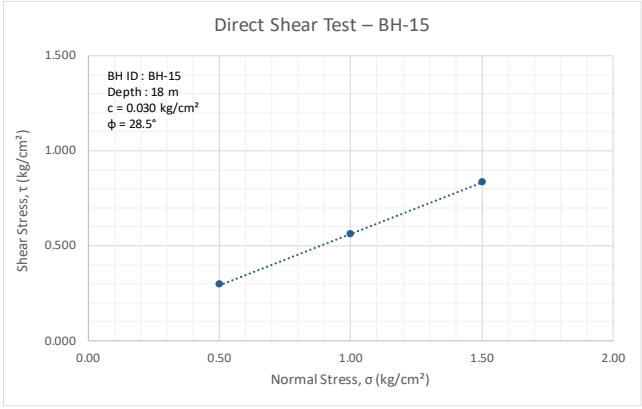

Direct Shear Test – BH-15
BH ID : BH-15
Depth : 3 m
c = 0.070 kg/cm²
ϕ = 23.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

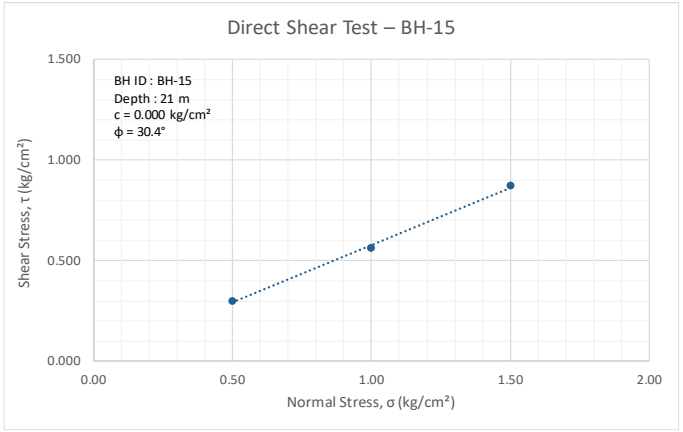

Direct Shear Test – BH-15
BH ID : BH-15
Depth : 6 m
c = 0.002 kg/cm²
ϕ = 25.7°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

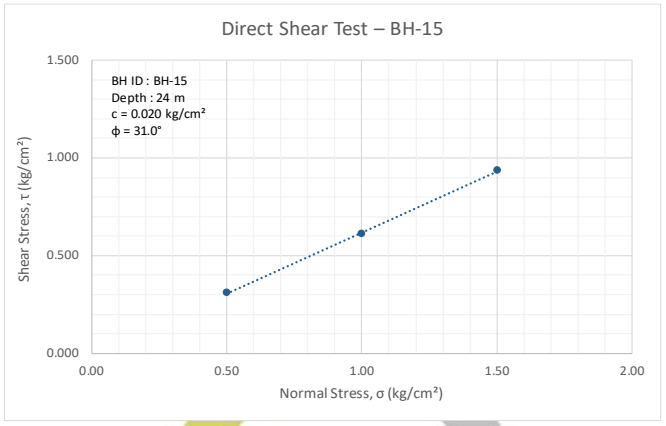

Direct Shear Test – BH-15
BH ID : BH-15
Depth : 9 m
c = 0.034 kg/cm²
ϕ = 26.7°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

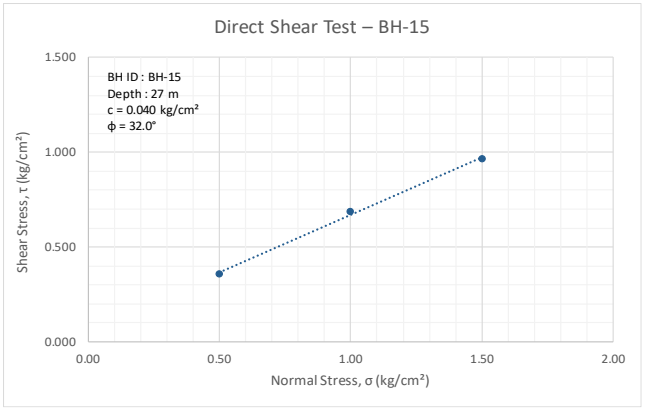

Direct Shear Test – BH-15
BH ID : BH-15
Depth : 12 m
c = 0.050 kg/cm²
ϕ = 27.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

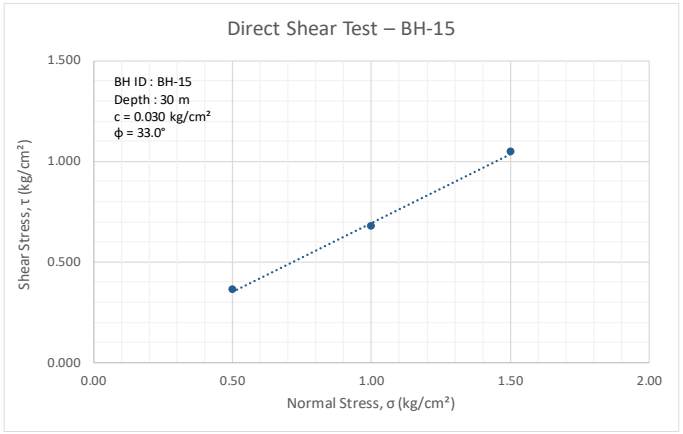

Direct Shear Test – BH-15
BH ID : BH-15
Depth : 15 m
c = 0.020 kg/cm²
ϕ = 27.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-15
BH ID : BH-15
Depth : 18 m
c = 0.030 kg/cm²
ϕ = 28.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-15
BH ID : BH-15
Depth : 21 m
c = 0.000 kg/cm²
ϕ = 30.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-15
BH ID : BH-15
Depth : 24 m
c = 0.020 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-15
BH ID : BH-15
Depth : 27 m
c = 0.040 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

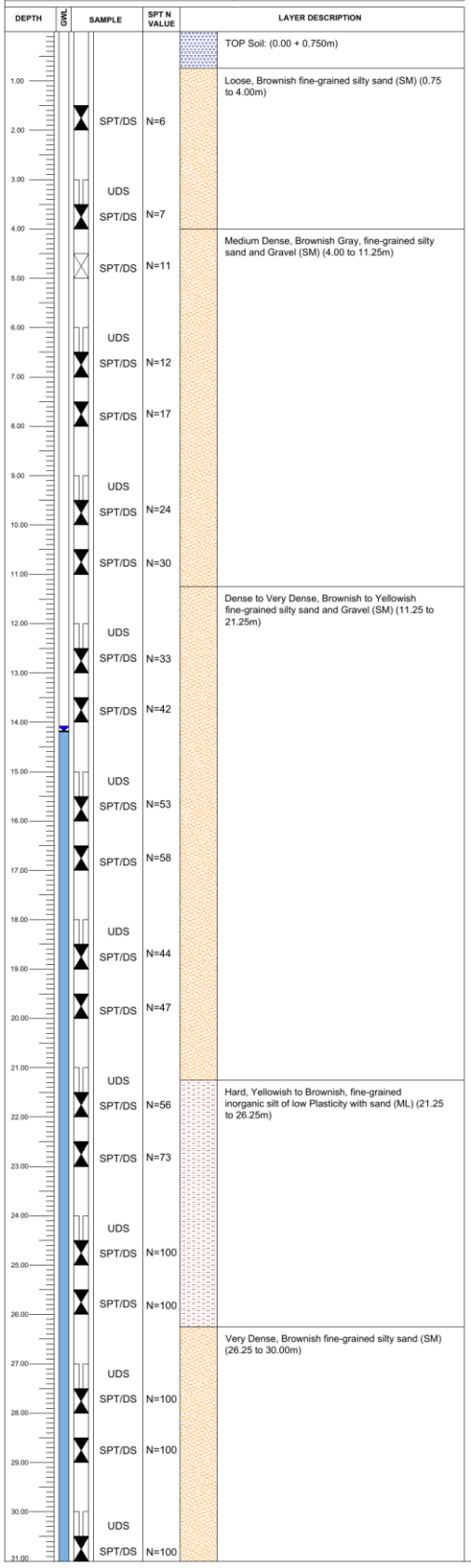

Direct Shear Test – BH-15
BH ID : BH-15
Depth : 30 m
c = 0.030 kg/cm²
ϕ = 33.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (1+000 km TO 2+000 km)

BH ID : BH-16 | **Chainage** : 2+135 KM

Groundwater Level : 14.20 M | **Location** : Lat. 28.552657, Long. 77.330633



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

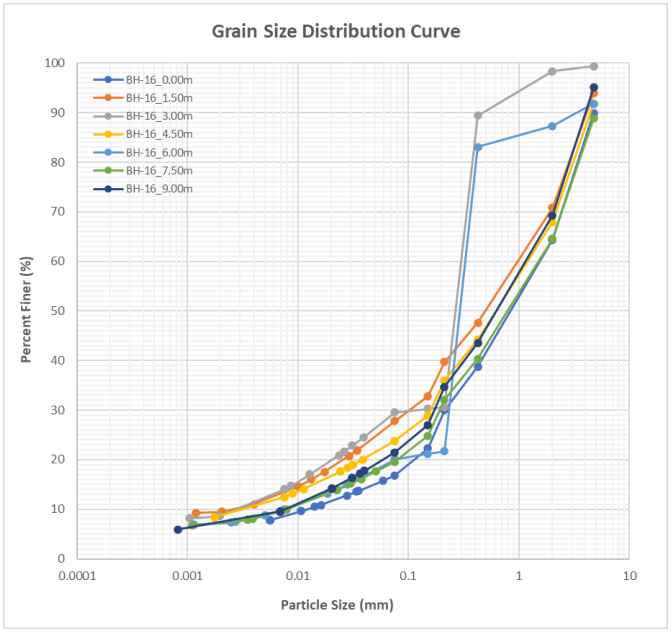
Soil

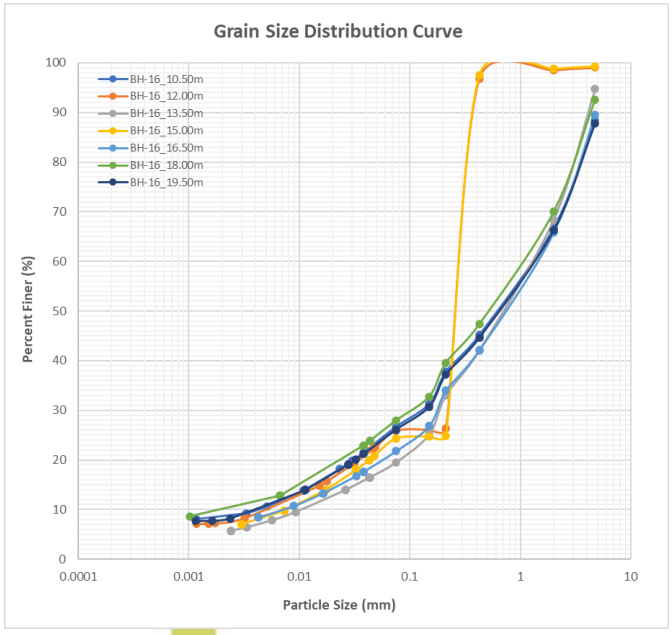
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

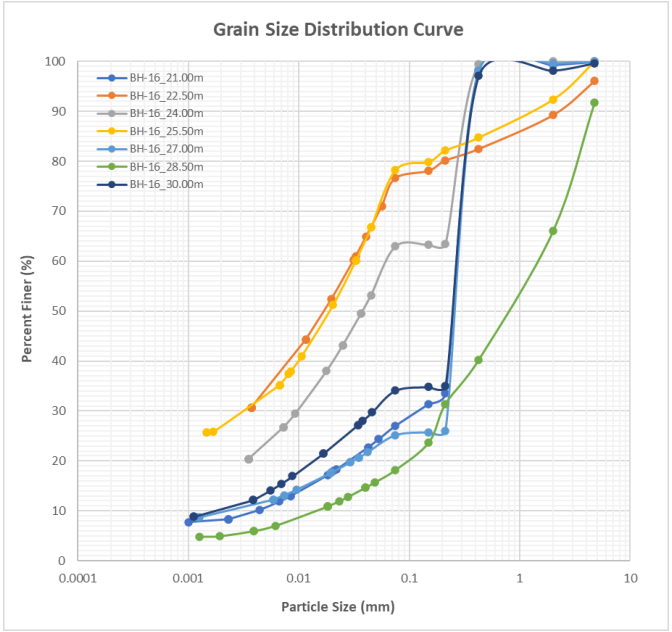
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-16	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	2+135	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	27-02-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	201.60	**End Date:**	27-02-2026
Project Code:	158_R03_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	14.20	**Location:**	Lat. 28.552657, Long. 77.330633

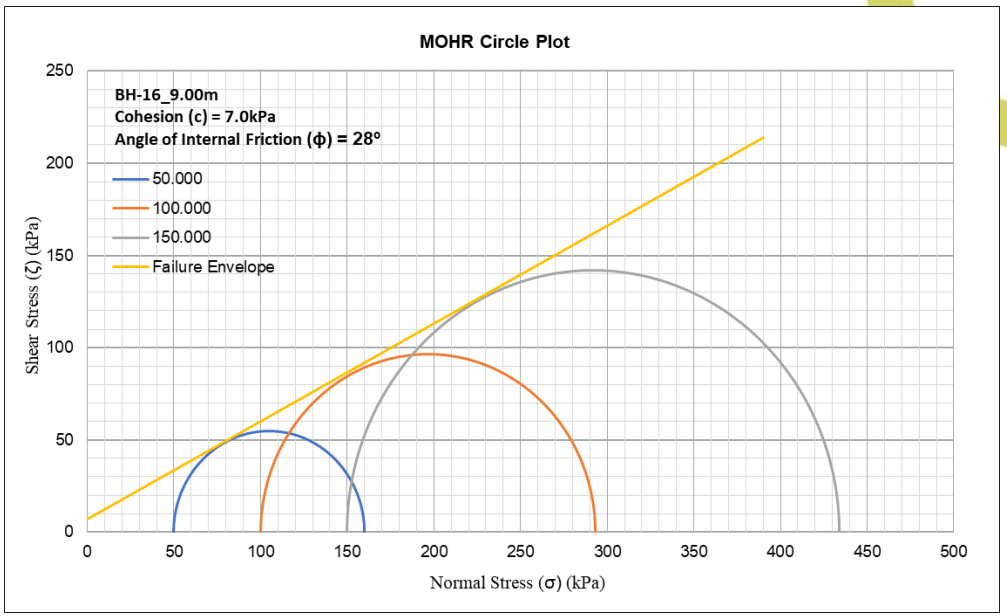
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						10.1	73.1	11.9	4.9	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Loose, Brownish fine-grained silty sand (SM)	2	3	3	6	8	6.1	66.1	18.3	9.5	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							0.6	69.9	20.8	8.7	24	NP	NP	21.68	1.71	1.41	2.75	F	0.01	22	-	-	-	-	-	-
3.50	SPT/DS		2	3	4	7	8	-																			
4.50	SPT/DS	Medium Dense, Brownish Gray, fine-grained silty sand and Gravel (SM)	3	5	6	11	11	8.2	68.0	15.0	8.7	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS							8.2	71.7	12.9	7.2	28	NP	NP	10.50	1.76	1.59	2.67	F	0.05	23	-	-	-	-	-	-
6.50	SPT/DS		4	5	7	12	11	-																			
7.50	SPT/DS		5	8	9	17	15	11.2	69.2	12.2	7.4	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							5.0	73.6	14.0	7.4	21	NP	NP	12.47	1.92	1.71	2.68	F	0.03	26	UU	7.0	28.0	-	-	-
9.50	SPT/DS		7	10	14	24	20	-																			
10.50	SPT/DS		9	13	17	30	25	11.7	61.7	18.0	8.7	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS	Dense to Very Dense, Brownish to Yellowish fine-grained silty sand and Gravel (SM)						0.9	73.1	18.5	7.5	24	NP	NP	18.98	-	-	2.70	F	0.04	27	-	-	-	-	-	-
12.50	SPT/DS		11	15	18	33	25	-																			
13.50	SPT/DS		14	19	23	42	30	5.3	75.2	14.2	5.3	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.7	75.0	16.5	7.8	23	NP	NP	19.10	-	-	2.80	F	0.02	28	-	-	-	-	-	-
15.50	SPT/DS		16	23	30	53	25	-																			
16.50	SPT/DS		19	26	32	58	27	10.5	67.7	15.2	6.6	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	UDS							7.4	64.7	17.8	10.1	22	NP	NP	17.56	1.96	1.67	2.68	F	0.04	29	UU	4.0	29.0	-	-	-
18.50	SPT/DS		14	20	24	44	22	-																			
19.50	SPT/DS		17	21	26	47	22	12.2	61.7	18.1	8.0	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							0.1	72.9	18.8	8.2	24	NP	NP	19.15	-	-	2.68	F	0.03	30	-	-	-	-	-	-
21.50	SPT/DS	Hard,Yellowish to Brownish, fine-grained inorganic silt of low Plasticity with sand (ML)	20	26	30	56	25	-																			
22.50	SPT/DS		26	35	38	73	30	3.9	19.4	53.7	22.6	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.0	37.0	44.7	18.3	26	NP	NP	20.76	-	-	2.64	F	0.11	28	-	-	-	-	-	-
24.50	SPT/DS		35	(50/4 cm)	-	100	37	-																			
25.50	SPT/DS		40	(50/6 cm)	-	100	36	0.0	21.7	51.3	26.9	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS	Very Dense, Brownish fine-grained silty sand (SM)						0.0	74.8	15.4	9.8	23	NP	NP	21.94	-	-	2.70	F	0.02	30	-	-	-	-	-	-
27.50	SPT/DS		46	(50/3 cm)	-	100	35	-																			
28.50	SPT/DS		(50/4 cm)	-	-	100	35	8.2	73.6	13.2	5.0	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.4	65.5	23.7	10.4	23	NP	NP	19.93	-	-	2.61	F	0.04	31	-	-	-	-	-	-
30.50	SPT/DS		(50/5 cm)	-	-	100	34	-																			

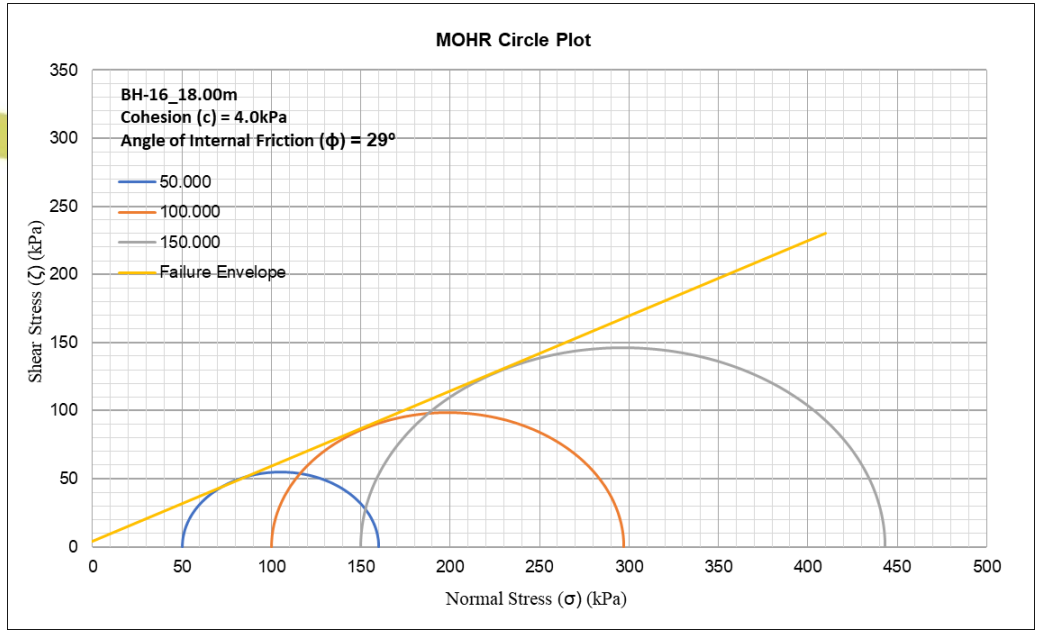
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

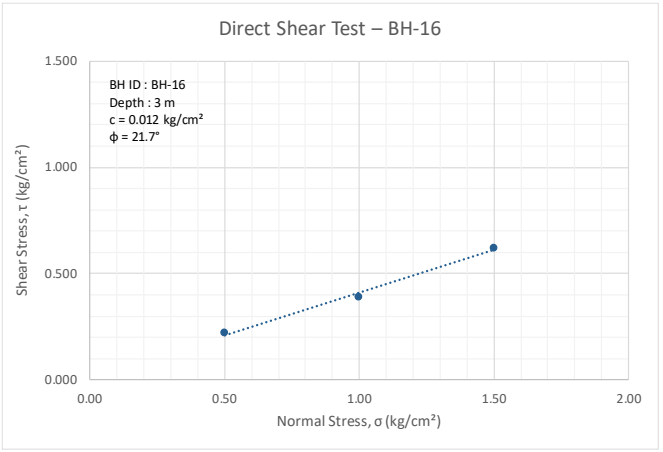

Grain Size Distribution Curve
BH-16_0.00m
BH-16_1.50m
BH-16_3.00m
BH-16_4.50m
BH-16_6.00m
BH-16_7.50m
BH-16_9.00m
Percent Finer (%)
Particle Size (mm)

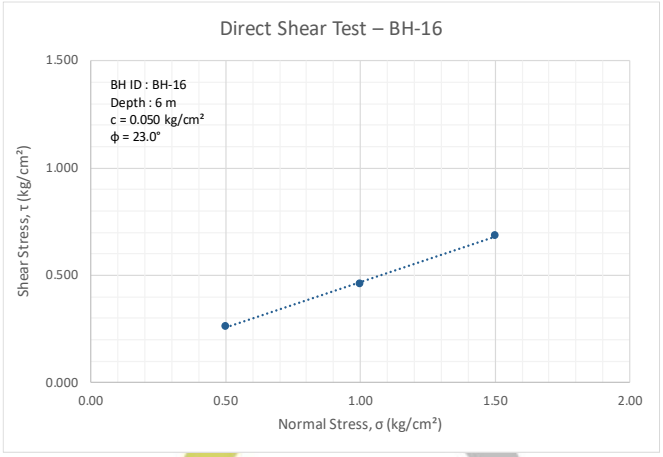

Grain Size Distribution Curve
BH-16_10.50m
BH-16_12.00m
BH-16_13.50m
BH-16_15.00m
BH-16_16.50m
BH-16_18.00m
BH-16_19.50m
Percent Finer (%)
Particle Size (mm)

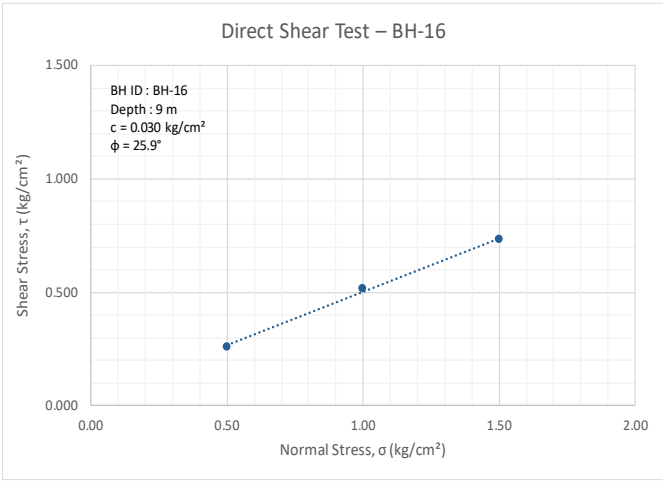

Grain Size Distribution Curve
BH-16_21.00m
BH-16_22.50m
BH-16_24.00m
BH-16_25.50m
BH-16_27.00m
BH-16_28.50m
BH-16_30.00m
Percent Finer (%)
Particle Size (mm)

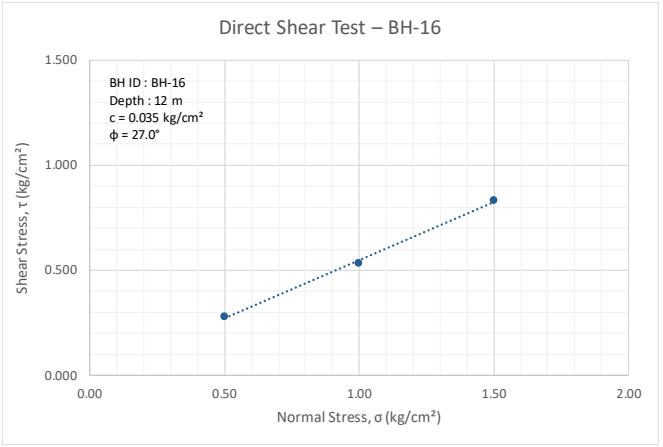

MOHR Circle Plot
BH-16_9.00m
Cohesion (c) = 7.0kPa
Angle of Internal Friction (ϕ) = 28°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

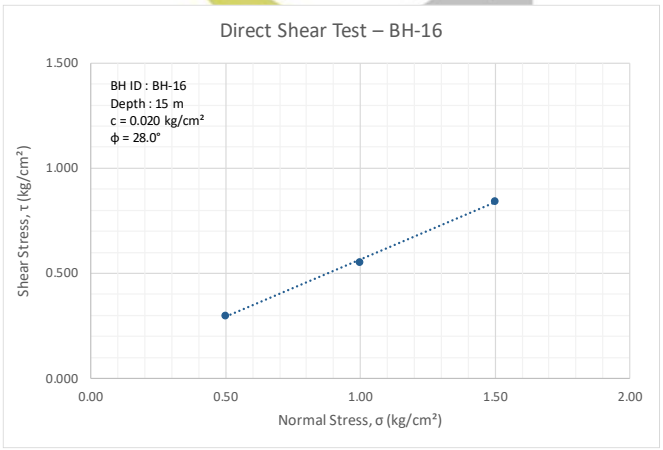

MOHR Circle Plot
BH-16_18.00m
Cohesion (c) = 4.0kPa
Angle of Internal Friction (ϕ) = 29°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

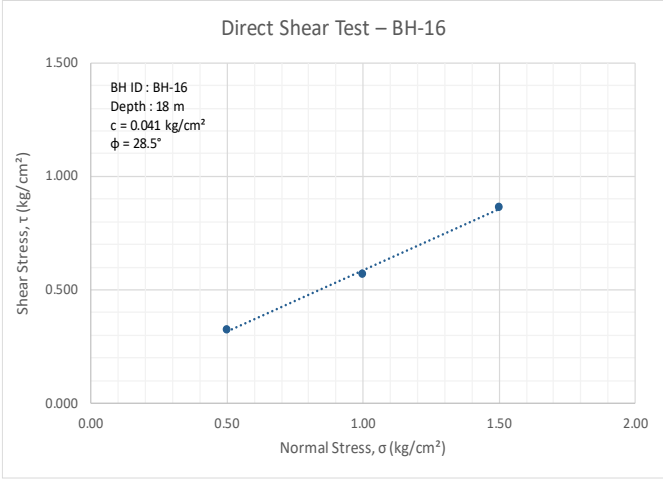

Direct Shear Test – BH-16
BH ID : BH-16
Depth : 3 m
c = 0.012 kg/cm²
ϕ = 21.7°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

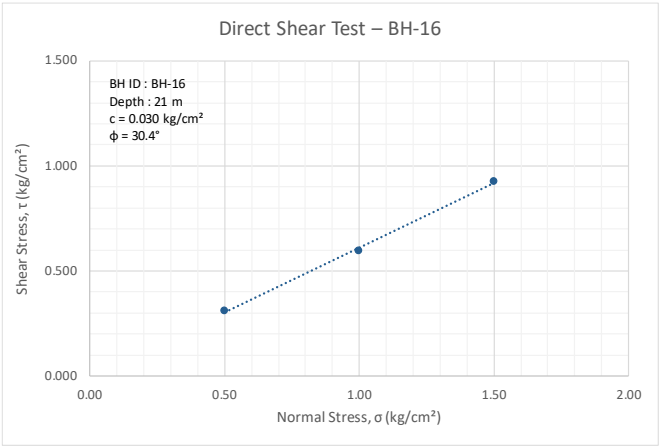

Direct Shear Test – BH-16
BH ID : BH-16
Depth : 6 m
c = 0.050 kg/cm²
ϕ = 23.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

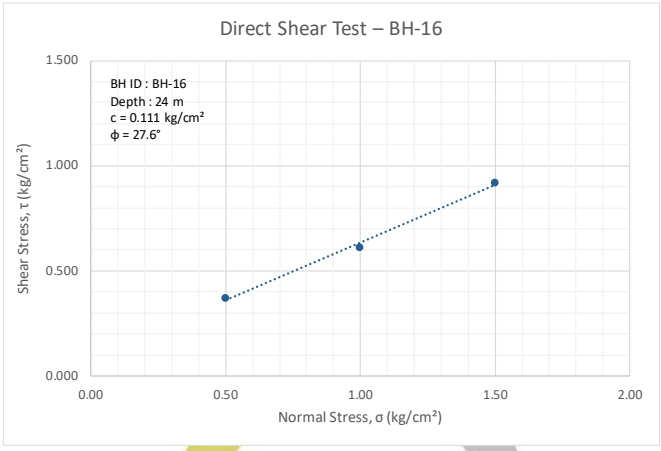

Direct Shear Test – BH-16
BH ID : BH-16
Depth : 9 m
c = 0.030 kg/cm²
ϕ = 25.9°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

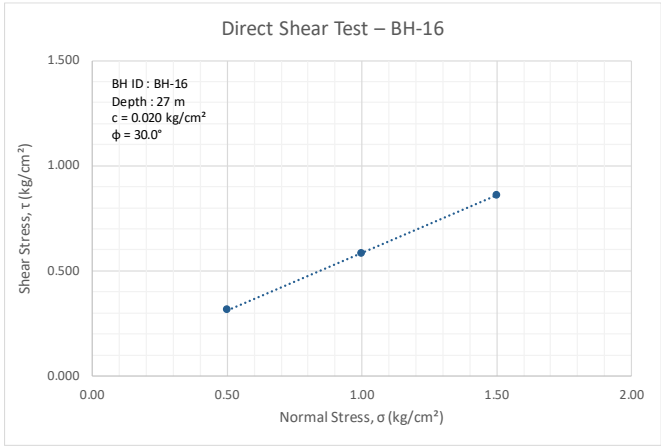

Direct Shear Test – BH-16
BH ID : BH-16
Depth : 12 m
c = 0.035 kg/cm²
ϕ = 27.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

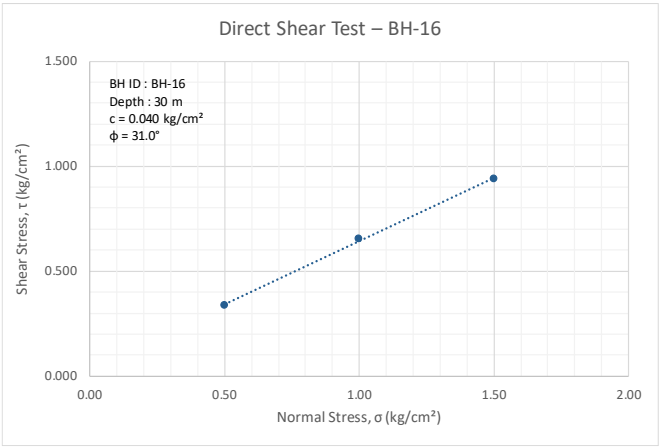

Direct Shear Test – BH-16
BH ID : BH-16
Depth : 15 m
c = 0.020 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-16
BH ID : BH-16
Depth : 18 m
c = 0.041 kg/cm²
ϕ = 28.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-16
BH ID : BH-16
Depth : 21 m
c = 0.030 kg/cm²
ϕ = 30.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-16
BH ID : BH-16
Depth : 24 m
c = 0.111 kg/cm²
ϕ = 27.6°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-16
BH ID : BH-16
Depth : 27 m
c = 0.020 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

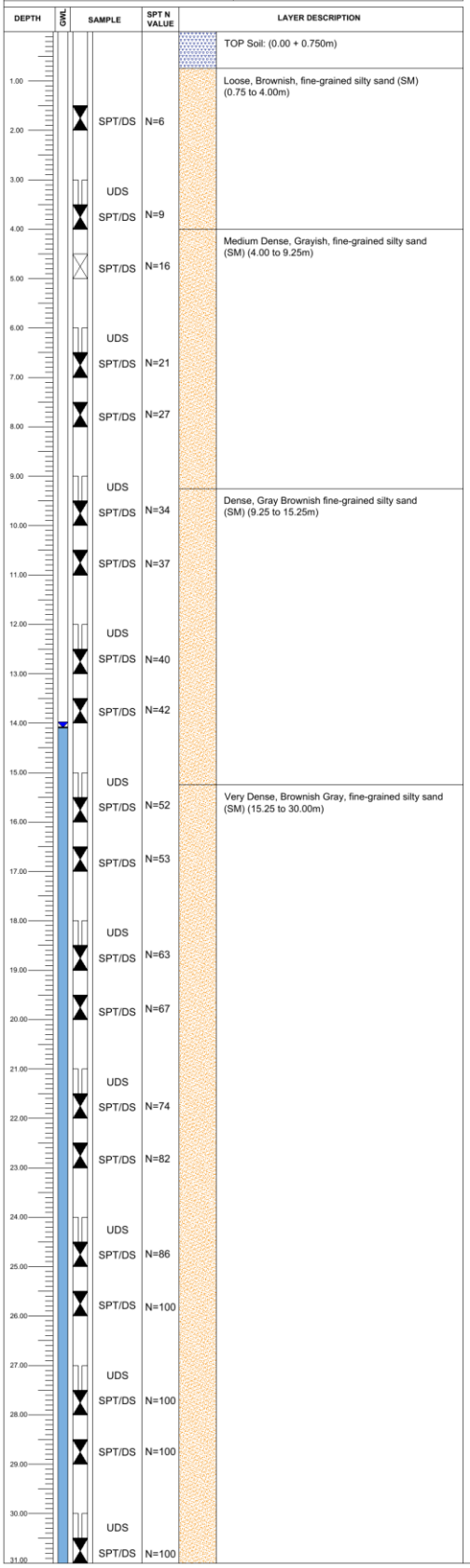

Direct Shear Test – BH-16
BH ID : BH-16
Depth : 30 m
c = 0.040 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (1+000 km TO 2+000 km)

BH ID : BH-17 | **Chainage** : 2+230 KM

Groundwater Level : 14.10 M | **Location** :Lat. 28.551967, Long. 77.331234



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

Soil

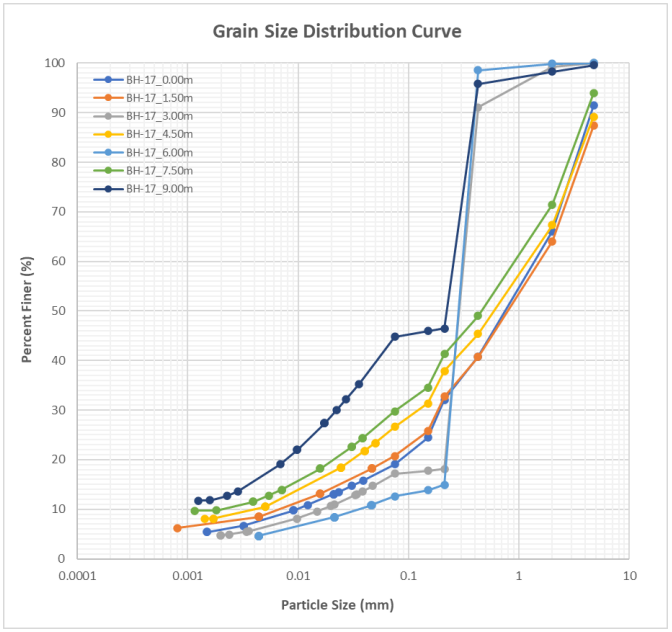
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

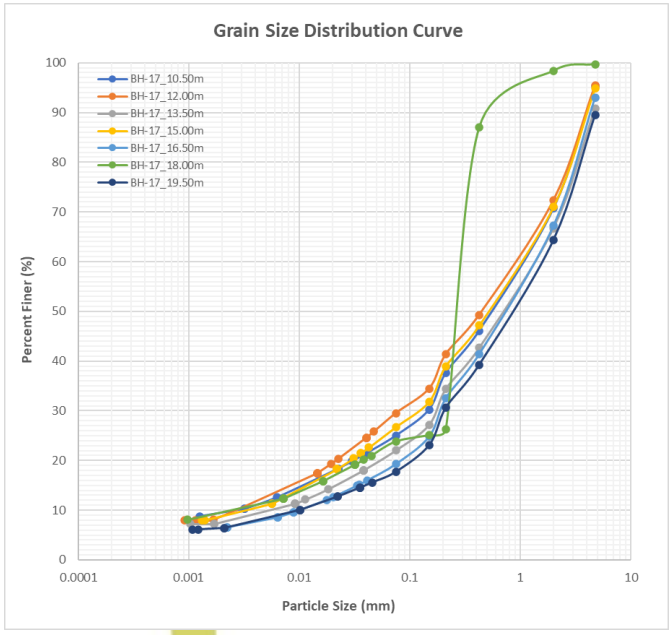
GOMA ENGINEERING AND CONSULTANCY
Quality we put forward

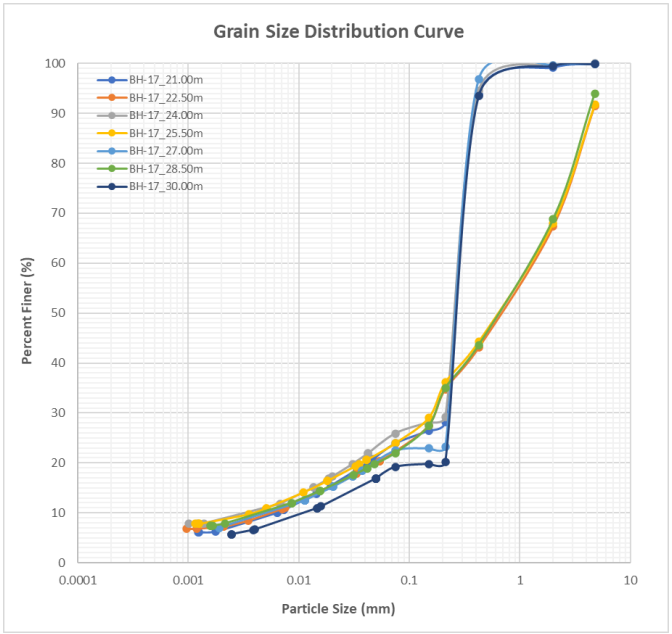
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-17	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	2+230	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	26-02-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	193.60	**End Date:**	26-02-2026
Project Code:	158_R03_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	14.10	**Location:**	Lat. 28.551967, Long. 77.331234

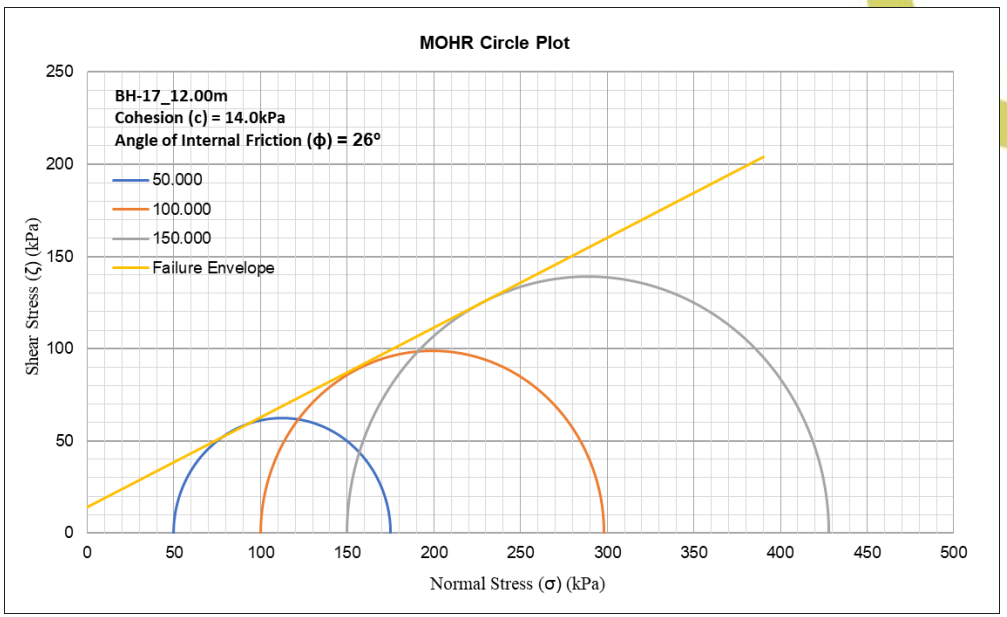
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						8.6	72.4	13.2	5.9	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Loose, Brownish fine-grained silty sand (SM)	2	3	3	6	8	12.6	66.7	13.3	7.4	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							0.0	82.8	12.4	4.8	29	NP	NP	11.04	1.67	1.51	2.67	F	0.01	22	-	-	-	-	-	-
3.50	SPT/DS		3	4	5	9	10	-																			
4.50	SPT/DS	Medium Dense, Grayish fine-grained silty sand (SM)	5	7	9	16	16	10.8	62.5	18.2	8.5	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	DS							0.0	87.4	12.6	0.0	27	NP	NP	5.80	-	-	2.72	F	0.03	24	-	-	-	-	-	-
6.50	SPT/DS		7	9	12	21	20	-																			
7.50	SPT/DS		10	13	14	27	25	6.1	64.1	19.7	10.0	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							0.4	54.8	32.4	12.4	23	NP	NP	19.43	1.85	1.55	2.62	F	0.00	27	-	-	-	-	-	-
9.50	SPT/DS	Dense, Gray Brownish fine-grained silty sand (SM)	14	16	18	34	29	-																			
10.50	SPT/DS		15	18	19	37	30	4.6	70.4	15.5	9.5	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	UDS							4.6	65.9	20.7	8.8	27	NP	NP	12.28	1.93	1.72	2.67	F	0.00	28	UU	14.0	26.0	-	-	-
12.50	SPT/DS		15	19	21	40	30	-																			
13.50	SPT/DS		16	19	23	42	30	9.2	68.8	14.4	7.6	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	UDS							5.2	68.1	17.9	8.8	25	NP	NP	17.53	1.95	1.66	2.67	F	0.04	28	UU	6.0	28.0	-	-	-
15.50	SPT/DS	Very Dense, Brownish Gray, fine-grained silty sand (SM)	22	25	27	52	25	-																			
16.50	SPT/DS		23	24	29	53	25	7.0	73.7	12.1	7.2	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS							0.3	75.9	14.3	9.6	28	NP	NP	16.04	-	-	2.72	F	0.02	29	-	-	-	-	-	-
18.50	SPT/DS		25	30	33	63	28	-																			
19.50	SPT/DS		27	32	35	67	29	10.5	71.8	11.3	6.4	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							0.1	76.0	17.3	6.6	24	NP	NP	22.38	-	-	2.67	F	0.01	30	-	-	-	-	-	-
21.50	SPT/DS		30	35	39	74	30	-																			
22.50	SPT/DS		32	37	45	82	32	8.5	69.2	15.1	7.2	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.0	74.1	17.1	8.8	21	NP	NP	22.29	-	-	2.75	F	0.00	31	-	-	-	-	-	-
24.50	SPT/DS		32	38	48	86	33	-																			
25.50	SPT/DS		33	41	(50/10 cm)	100	36	8.3	67.8	15.3	8.7	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							0.1	77.4	15.3	7.2	26	NP	NP	20.13	-	-	2.66	F	0.03	31	-	-	-	-	-	-
27.50	SPT/DS		45	(50/11 cm)	-	100	35	-																			
28.50	SPT/DS		47	(50/9 cm)	-	100	35	6.0	72.0	14.3	7.7	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.1	80.7	13.1	6.1	27	NP	NP	14.43	-	-	2.70	F	0.00	32	-	-	-	-	-	-
30.50	SPT/DS		(50/12 cm)	-	-	100	34	-																			

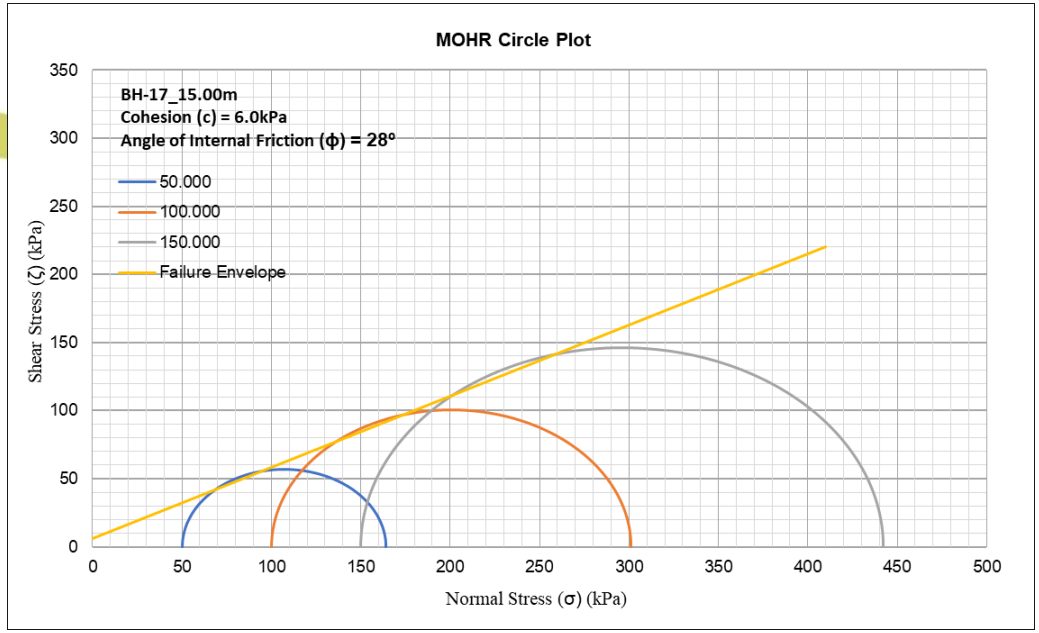
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

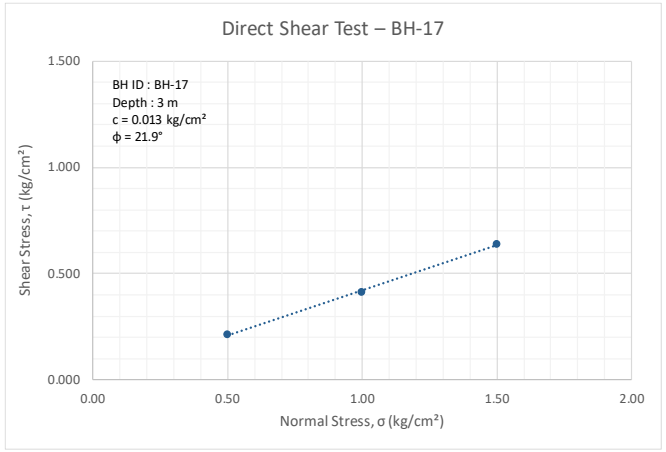

Grain Size Distribution Curve
BH-17_0.00m
BH-17_1.50m
BH-17_3.00m
BH-17_4.50m
BH-17_6.00m
BH-17_7.50m
BH-17_9.00m
Percent Finer (%)
Particle Size (mm)

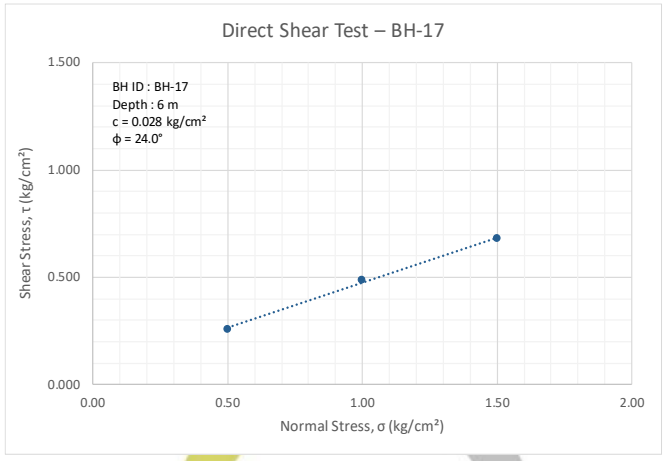

Grain Size Distribution Curve
BH-17_10.50m
BH-17_12.00m
BH-17_13.50m
BH-17_15.00m
BH-17_16.50m
BH-17_18.00m
BH-17_19.50m
Percent Finer (%)
Particle Size (mm)

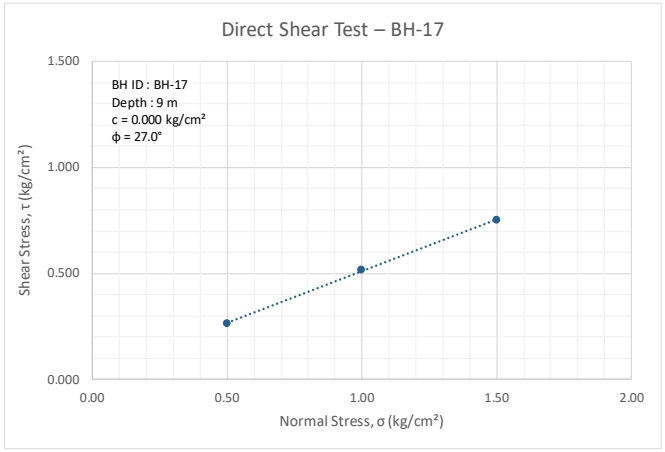

Grain Size Distribution Curve
BH-17_21.00m
BH-17_22.50m
BH-17_24.00m
BH-17_25.50m
BH-17_27.00m
BH-17_28.50m
BH-17_30.00m
Percent Finer (%)
Particle Size (mm)

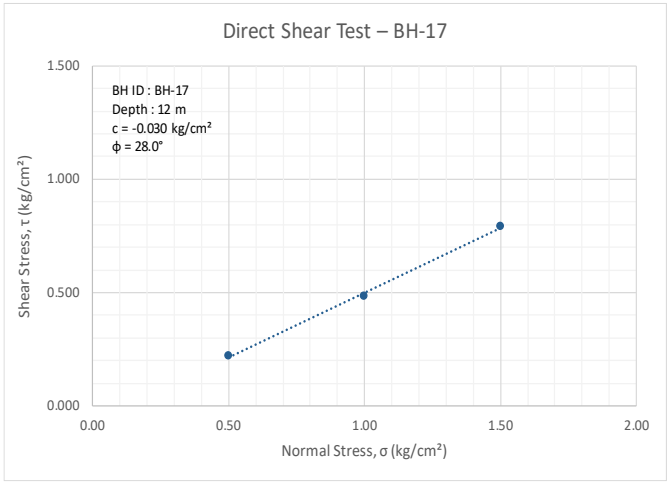

MOHR Circle Plot
BH-17_12.00m
Cohesion (c) = 14.0kPa
Angle of Internal Friction (ϕ) = 26°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

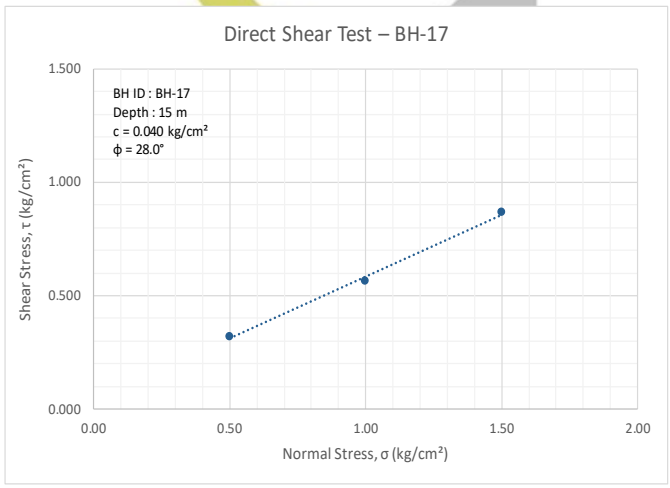

MOHR Circle Plot
BH-17_15.00m
Cohesion (c) = 6.0kPa
Angle of Internal Friction (ϕ) = 28°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

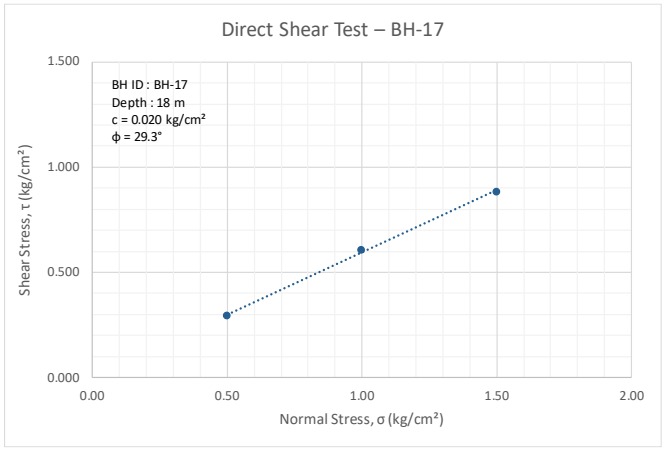

Direct Shear Test – BH-17
BH ID : BH-17
Depth : 3 m
c = 0.013 kg/cm²
ϕ = 21.9°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

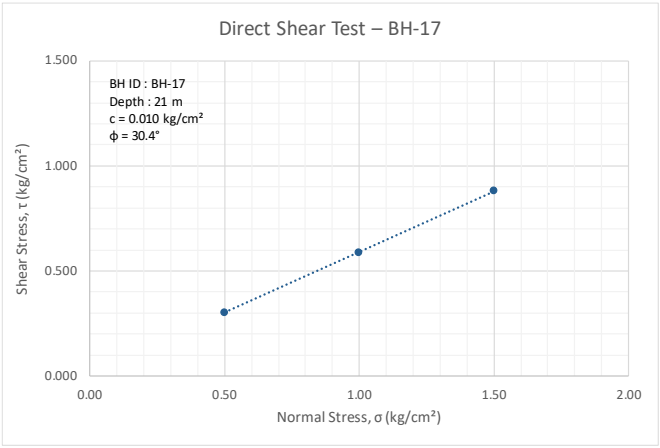

Direct Shear Test – BH-17
BH ID : BH-17
Depth : 6 m
c = 0.028 kg/cm²
ϕ = 24.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

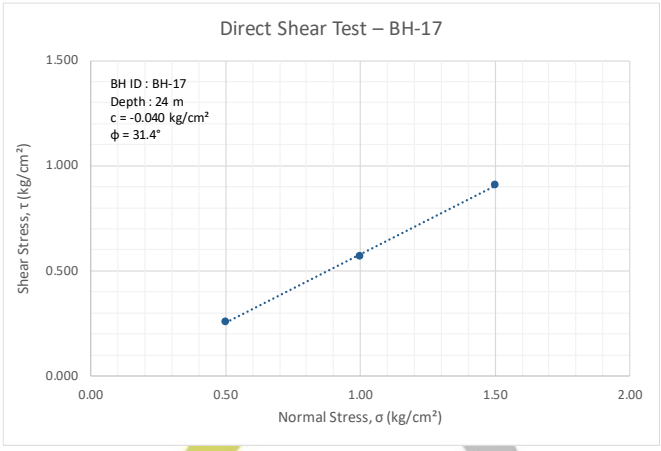

Direct Shear Test – BH-17
BH ID : BH-17
Depth : 9 m
c = 0.000 kg/cm²
ϕ = 27.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

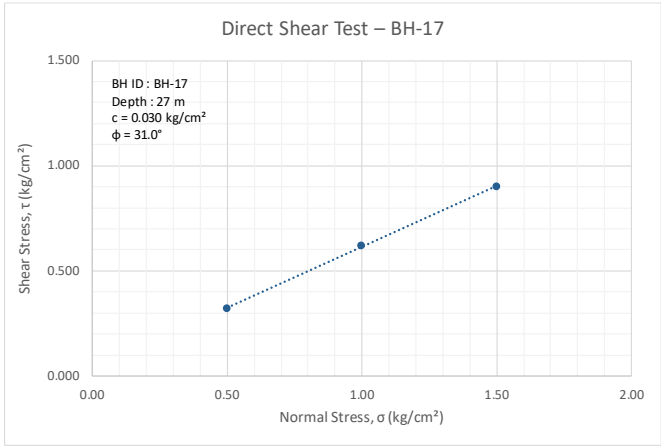

Direct Shear Test – BH-17
BH ID : BH-17
Depth : 12 m
c = -0.030 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

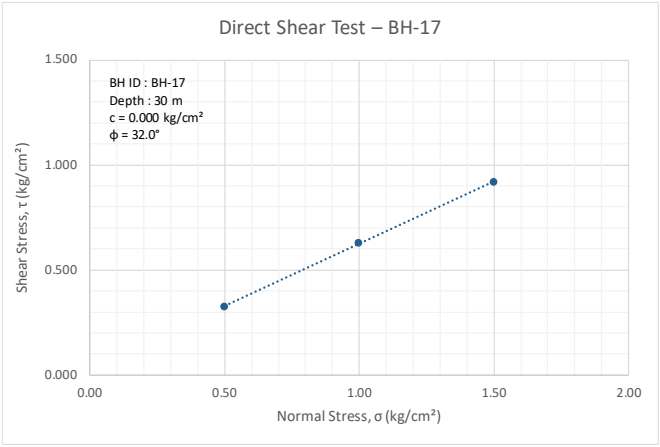

Direct Shear Test – BH-17
BH ID : BH-17
Depth : 15 m
c = 0.040 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-17
BH ID : BH-17
Depth : 18 m
c = 0.020 kg/cm²
ϕ = 29.3°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-17
BH ID : BH-17
Depth : 21 m
c = 0.010 kg/cm²
ϕ = 30.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-17
BH ID : BH-17
Depth : 24 m
c = -0.040 kg/cm²
ϕ = 31.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-17
BH ID : BH-17
Depth : 27 m
c = 0.030 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

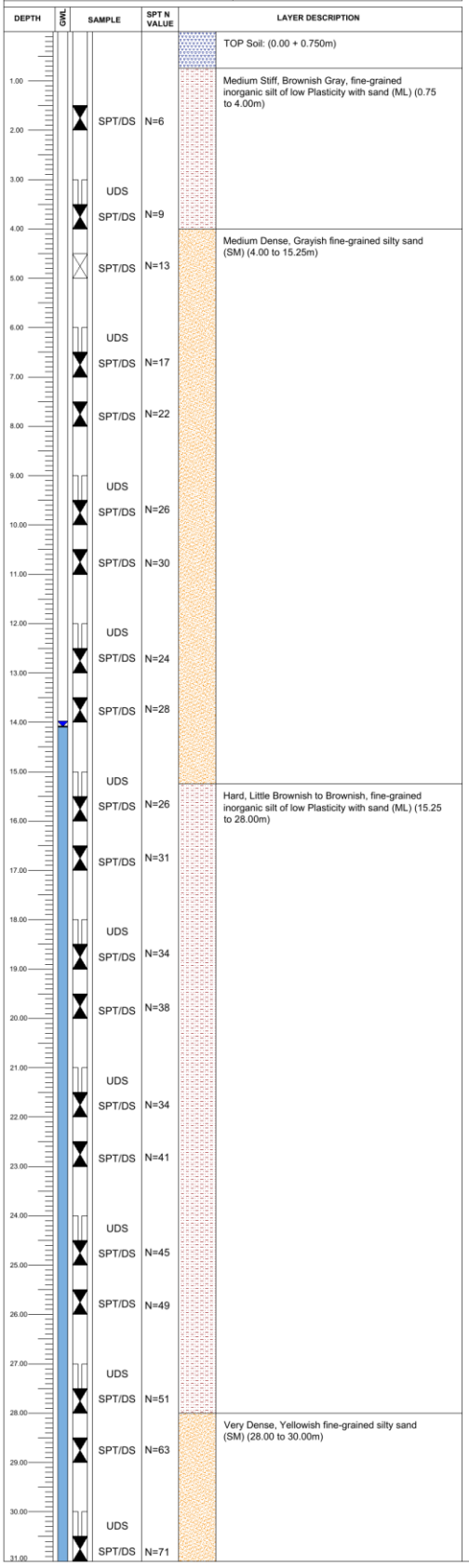

Direct Shear Test – BH-17
BH ID : BH-17
Depth : 30 m
c = 0.000 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (1+000 km TO 2+000 km)

BH ID : BH-18 | **Chainage** : 2+567 KM

Groundwater Level : 14.10 M | **Location** :Lat. 28.551721, Long. 77.335913



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

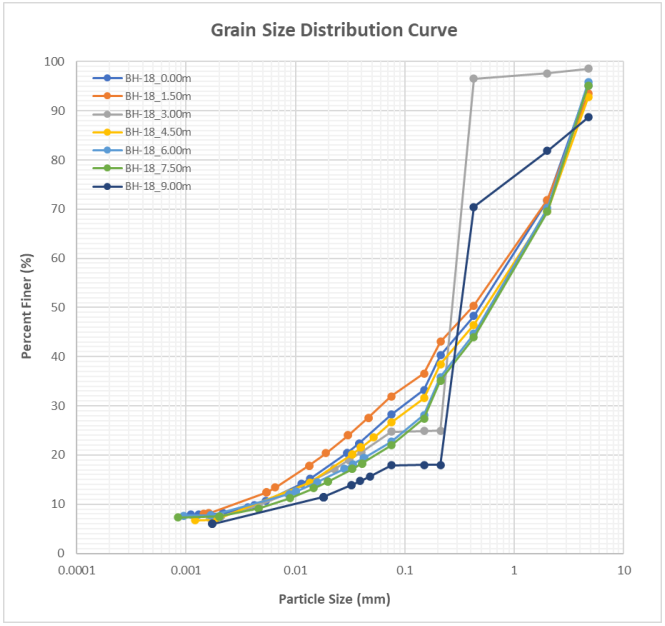
Soil

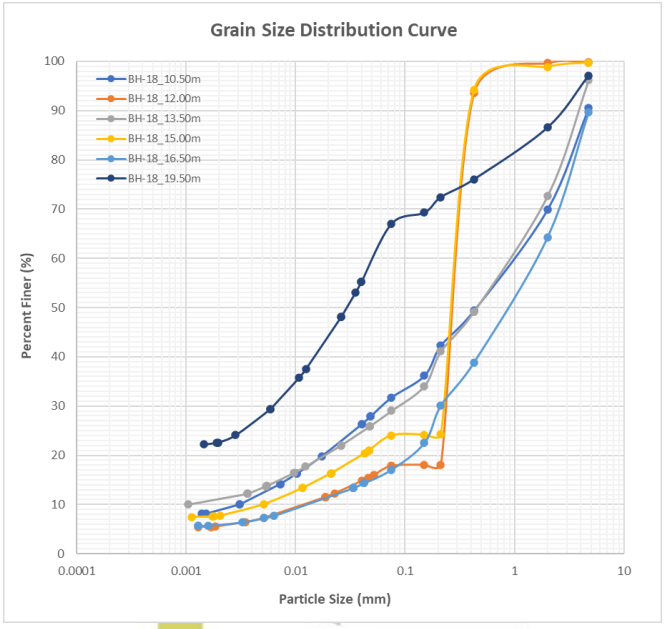
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

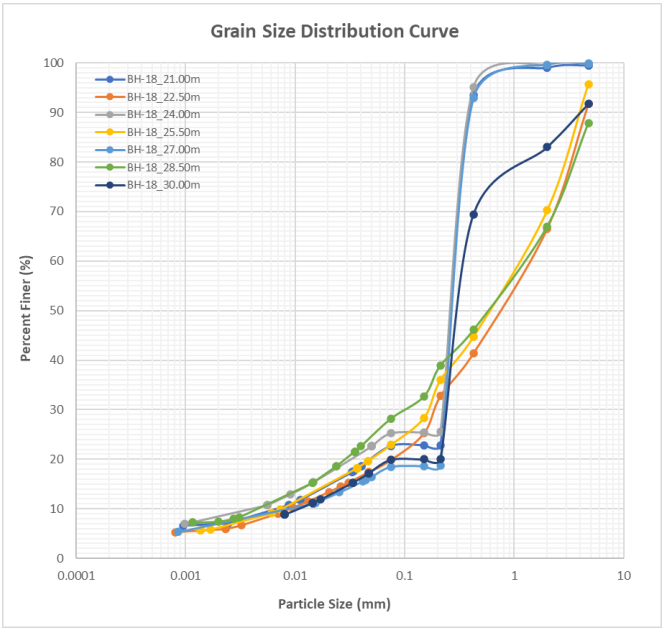
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-18	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	2+567	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	02-02-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	198.10	**End Date:**	03-02-2026
Project Code:	158_R03_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	16.00	**Location:**	Lat. 28.551721, Long. 77.335913

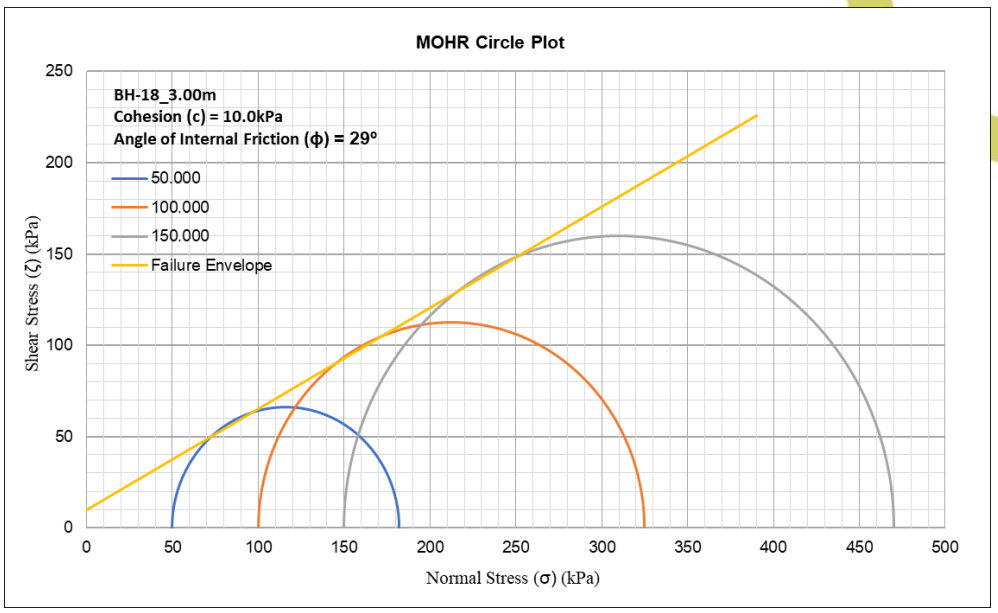
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [^{o}]	Type	Cohesion [kPa]	Angle of Friction [^{o}]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						4.8	66.9	20.1	8.1	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Medium Stiff,Brownish Gray, fine-grained inorganic silt of low Plasticity with sand (ML)	2	3	3	6	8	6.6	61.5	23.0	8.9	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							1.5	73.8	17.3	7.4	25	NP	NP	12.81	1.83	1.62	2.67	F	0.02	23	UU	10.0	29.0	-	-	-
3.50	SPT/DS		3	4	5	9	10	-																			
4.50	SPT/DS	Medium Dense, Grayish fine-grained silty sand (SM)	4	6	7	13	13	7.3	66.1	19.4	7.2	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS							4.2	73.1	14.5	8.2	21	NP	NP	15.80	1.85	1.60	2.60	F	0.02	25	UU	11.0	28.0	-	-	-
6.50	SPT/DS		6	8	9	17	16	-																			
7.50	SPT/DS		8	10	12	22	20	4.9	73.2	14.4	7.5	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	DS							11.4	70.7	11.6	6.3	29	NP	NP	19.12	-	-	2.64	F	0.03	26	-	-	-	-	-	-
9.50	SPT/DS		10	12	14	26	22	-																			
10.50	SPT/DS		12	14	16	30	25	9.5	58.7	22.8	8.9	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							0.1	82.1	12.2	5.6	24	NP	NP	18.54	-	-	2.68	F	0.02	27	-	-	-	-	-	-
12.50	SPT/DS		6	11	13	24	18	-																			
13.50	SPT/DS		8	13	15	28	20	3.8	67.2	17.9	11.2	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.3	75.7	16.3	7.7	26	NP	NP	21.70	-	-	2.64	F	0.05	27	-	-	-	-	-	-
15.50	SPT/DS	Hard,Little Brownish to Brownish, fine-grained inorganic silt of low Plasticity with sand (ML)	6	12	14	26	16	-																			
16.50	SPT/DS		8	14	17	31	18	10.3	72.7	11.1	6.0	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS							4.6	19.1	50.2	26.2	25	NP	NP	15.39	-	-	2.62	F	0.08	25	-	-	-	-	-	-
18.50	SPT/DS		10	16	18	34	18	-																			
19.50	SPT/DS		12	18	20	38	20	2.9	30.1	44.3	22.7	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							0.5	76.8	15.8	7.0	27	NP	NP	18.24	-	-	2.75	F	0.07	26	-	-	-	-	-	-
21.50	SPT/DS		8	16	18	34	18	-																			
22.50	SPT/DS		11	19	22	41	20	8.3	71.9	14.0	5.8	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.1	74.6	16.8	8.5	23	NP	NP	13.21	-	-	2.67	F	0.08	27	-	-	-	-	-	-
24.50	SPT/DS		13	21	24	45	21	-																			
25.50	SPT/DS		14	23	26	49	22	4.2	72.9	16.7	6.2	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							0.1	81.4	11.4	7.0	28	NP	NP	13.55	-	-	2.73	F	0.05	29	-	-	-	-	-	-
27.50	SPT/DS		16	24	27	51	22	-																			
28.50	SPT/DS	Very Dense, Yellowish fine-grained silty sand (SM)	18	29	34	63	25	12.1	59.7	20.8	7.4	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							8.3	71.8	14.6	5.3	27	NP	NP	17.11	-	-	2.64	F	0.02	30	-	-	-	-	-	-
30.50	SPT/DS		16	30	41	71	26	-																			

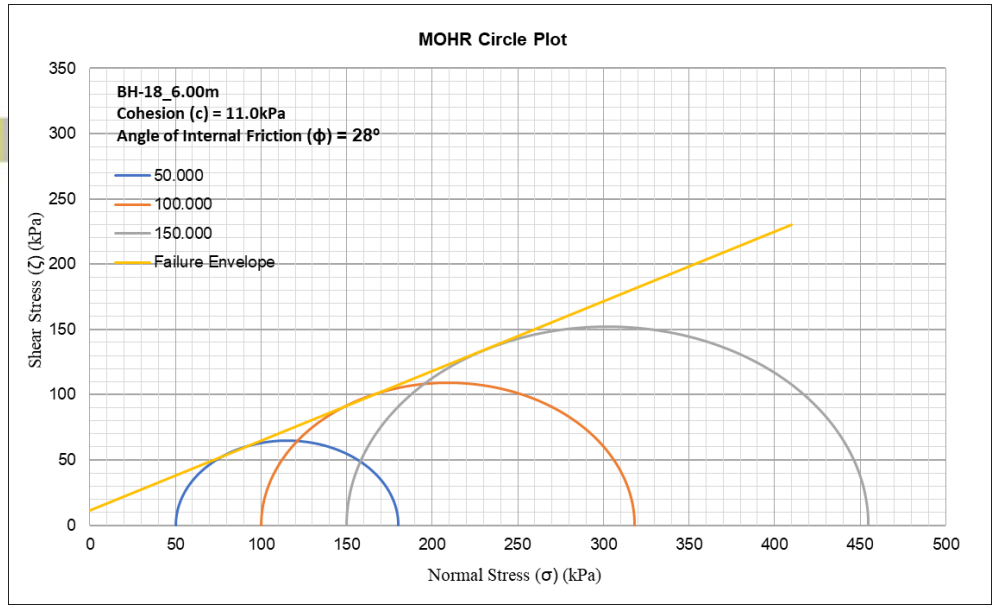
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

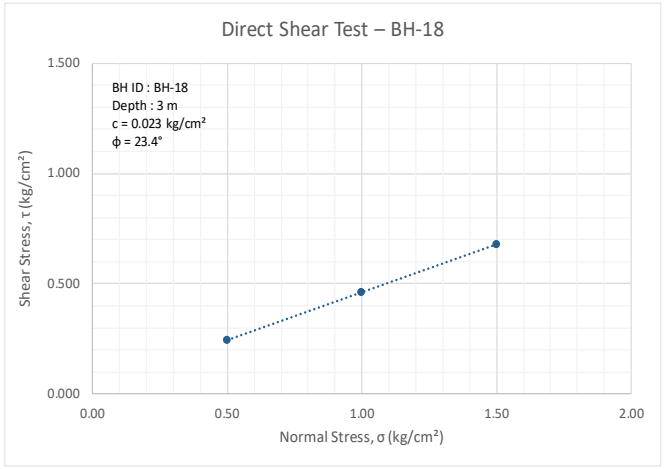

Grain Size Distribution Curve
BH-18_0.00m
BH-18_1.50m
BH-18_3.00m
BH-18_4.50m
BH-18_6.00m
BH-18_7.50m
BH-18_9.00m
Percent Finer (%)
Particle Size (mm)

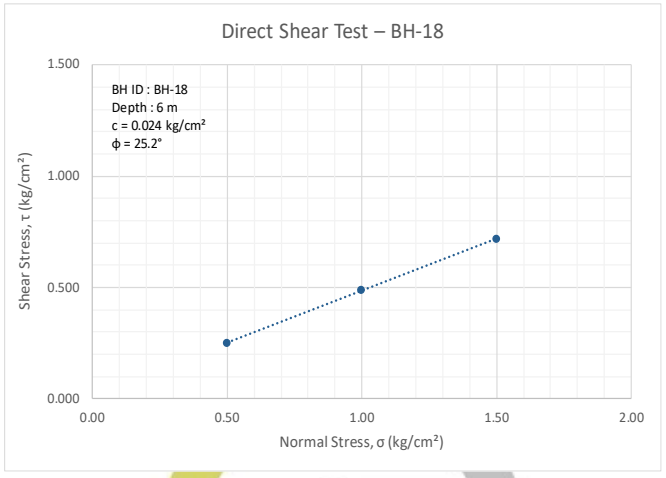

Grain Size Distribution Curve
BH-18_10.50m
BH-18_12.00m
BH-18_13.50m
BH-18_15.00m
BH-18_16.50m
BH-18_19.50m
Percent Finer (%)
Particle Size (mm)

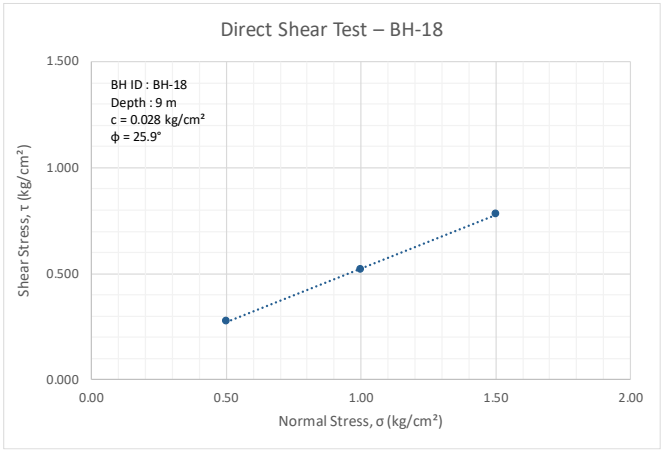

Grain Size Distribution Curve
BH-18_21.00m
BH-18_22.50m
BH-18_24.00m
BH-18_25.50m
BH-18_27.00m
BH-18_28.50m
BH-18_30.00m
Percent Finer (%)
Particle Size (mm)

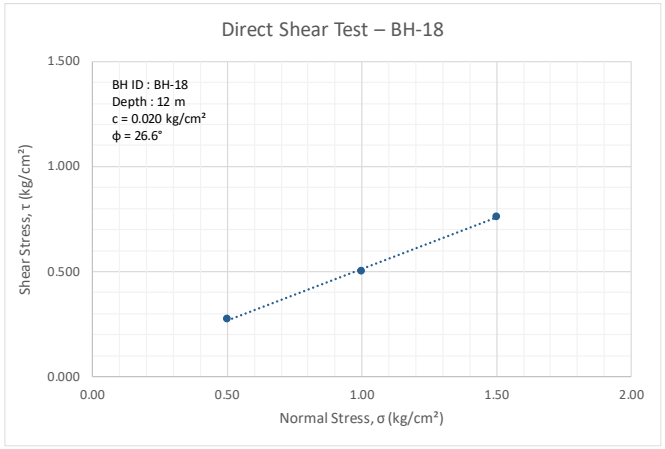

MOHR Circle Plot
BH-18_3.00m
Cohesion (c) = 10.0kPa
Angle of Internal Friction (ϕ) = 29°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

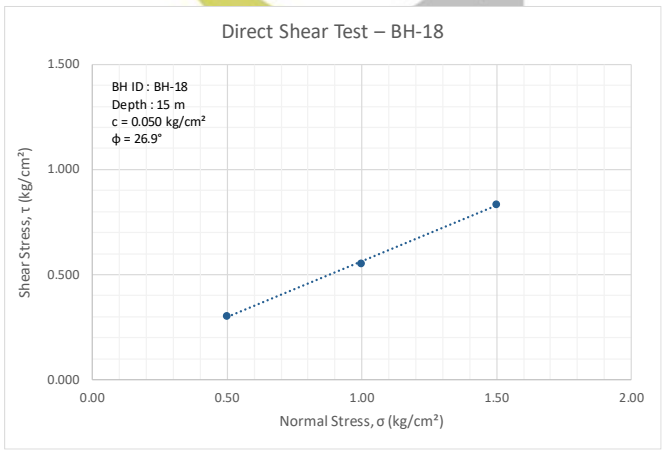

MOHR Circle Plot
BH-18_6.00m
Cohesion (c) = 11.0kPa
Angle of Internal Friction (ϕ) = 28°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

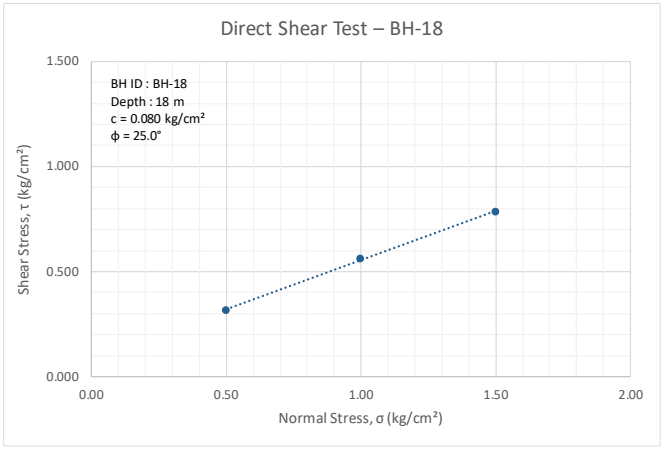

Direct Shear Test – BH-18
BH ID : BH-18
Depth : 3 m
c = 0.023 kg/cm²
ϕ = 23.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

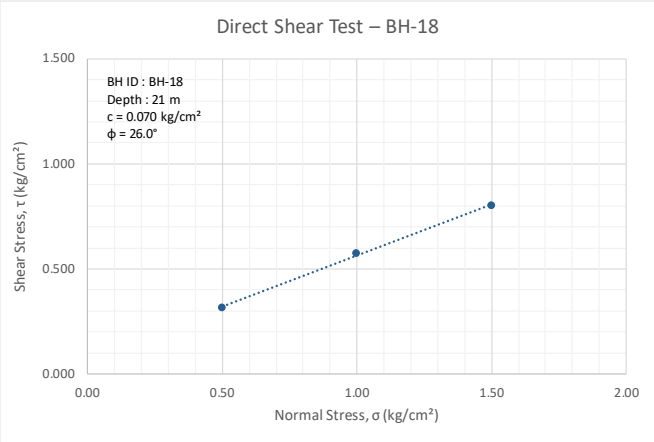

Direct Shear Test – BH-18
BH ID : BH-18
Depth : 6 m
c = 0.024 kg/cm²
ϕ = 25.2°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

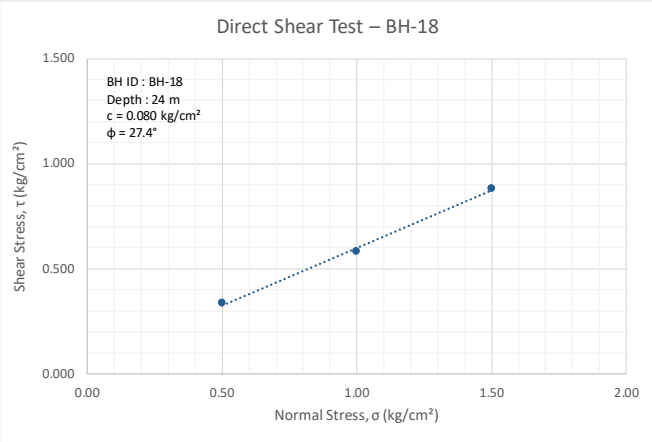

Direct Shear Test – BH-18
BH ID : BH-18
Depth : 9 m
c = 0.028 kg/cm²
ϕ = 25.9°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

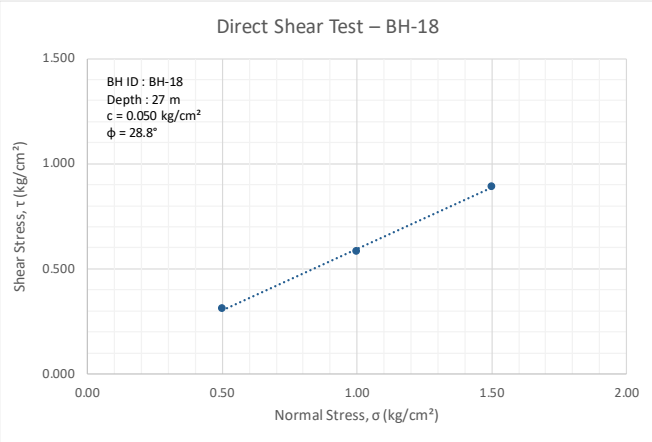

Direct Shear Test – BH-18
BH ID : BH-18
Depth : 12 m
c = 0.020 kg/cm²
ϕ = 26.6°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

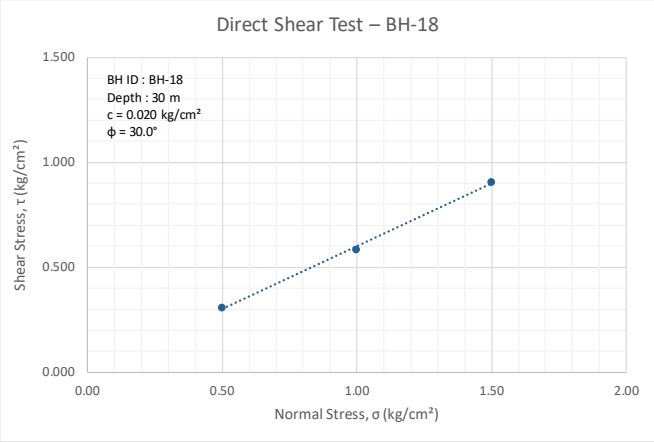

Direct Shear Test – BH-18
BH ID : BH-18
Depth : 15 m
c = 0.050 kg/cm²
ϕ = 26.9°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-18
BH ID : BH-18
Depth : 18 m
c = 0.080 kg/cm²
ϕ = 25.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-18
BH ID : BH-18
Depth : 21 m
c = 0.070 kg/cm²
ϕ = 26.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-18
BH ID : BH-18
Depth : 24 m
c = 0.080 kg/cm²
ϕ = 27.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-18
BH ID : BH-18
Depth : 27 m
c = 0.050 kg/cm²
ϕ = 28.8°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

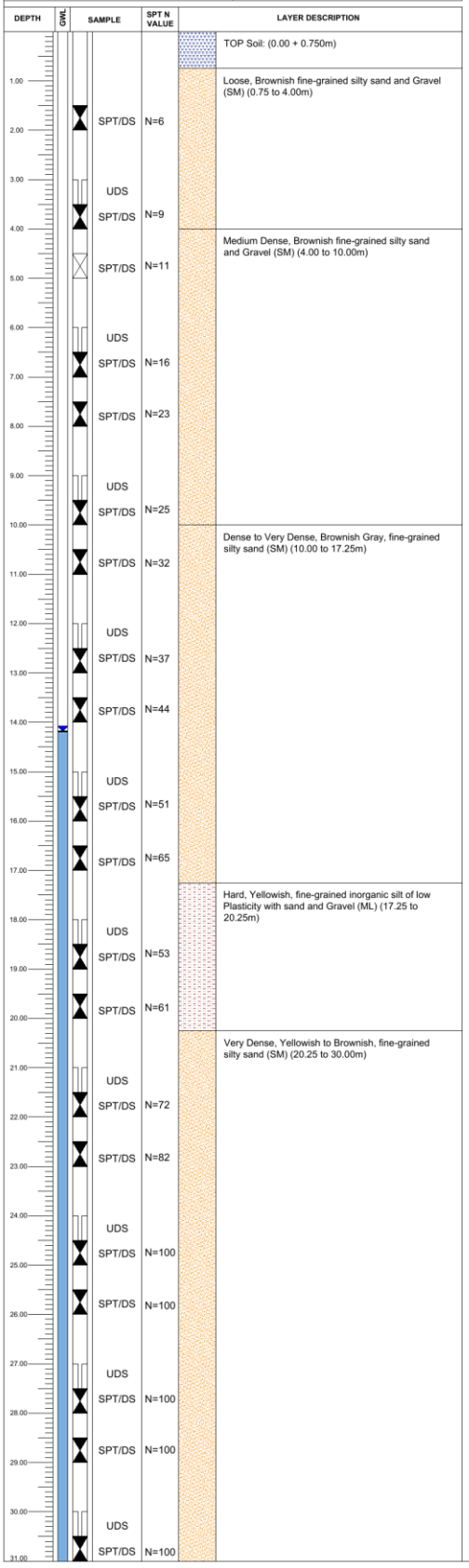

Direct Shear Test – BH-18
BH ID : BH-18
Depth : 30 m
c = 0.020 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (1+000 km TO 2+000 km)

BH ID : BH-18A | **Chainage** : 2+279 KM

Groundwater Level : 14.20 M | **Location** :Lat. 28.551999, Long. 77.331966



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

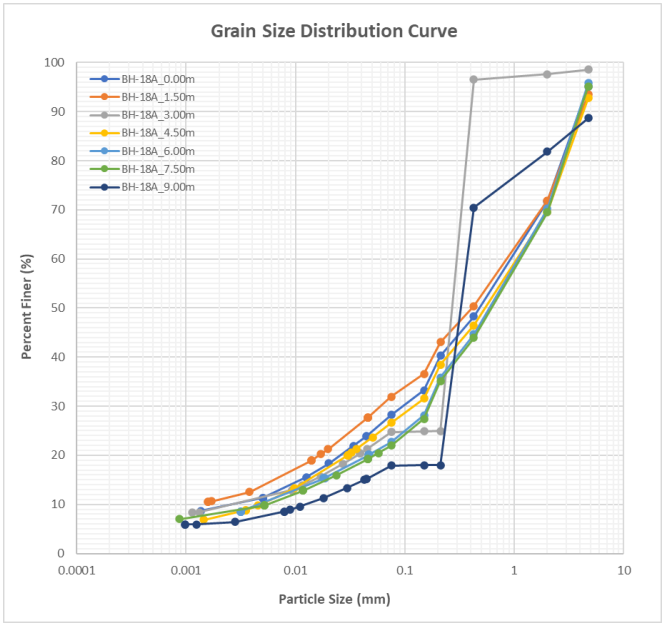
Soil

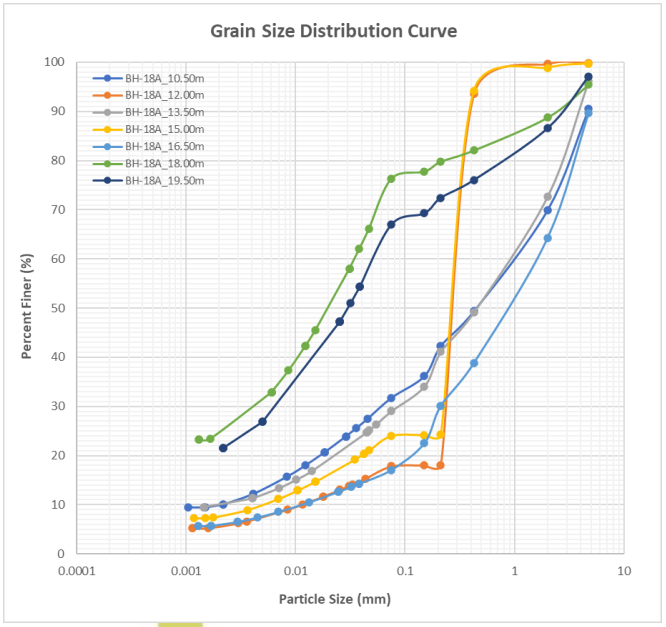
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

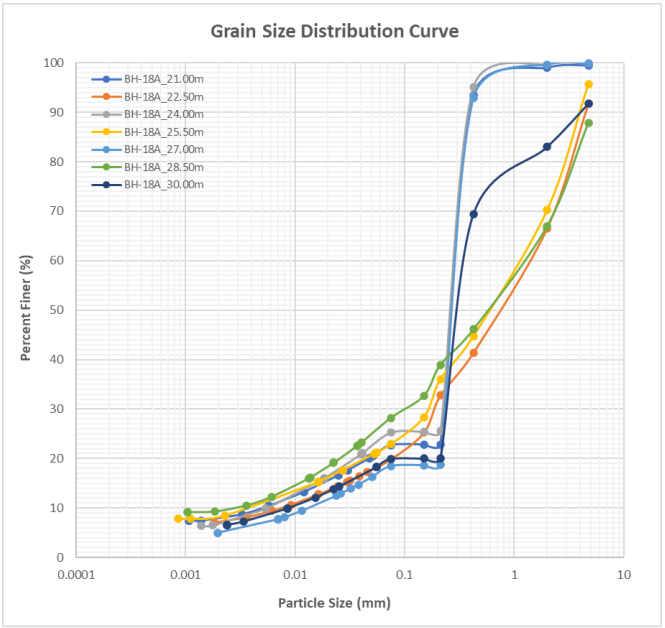
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-18A	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	2+279	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	26-02-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	194.30	**End Date:**	26-02-2026
Project Code:	158_R03_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	14.20	**Location:**	Lat. 28.551999, Long. 77.331966

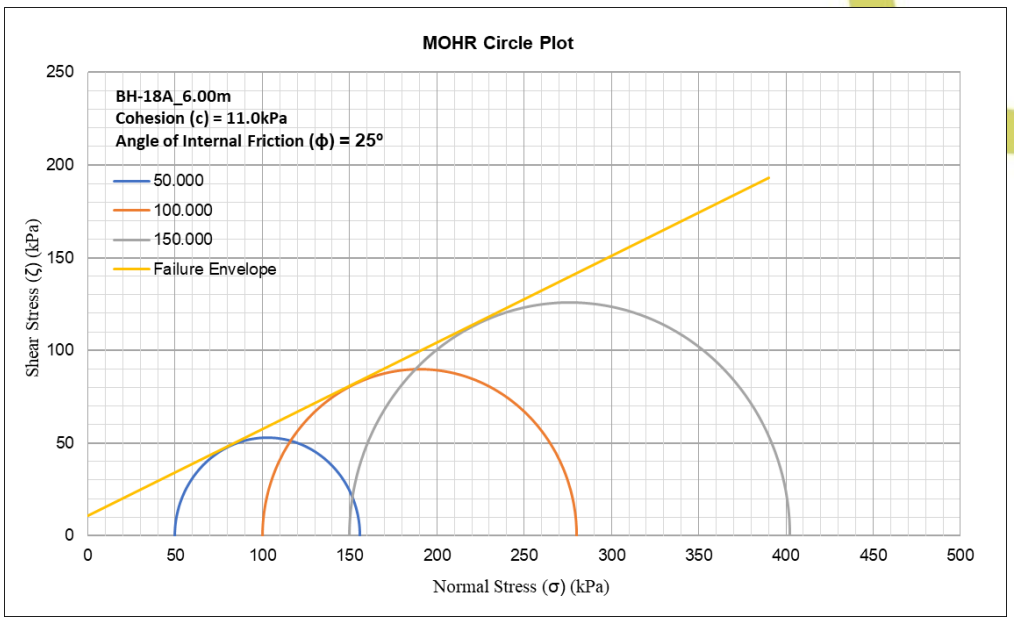
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						4.8	66.9	18.7	9.5	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Loose, Brownish fine-grained silty sand and Gravel(SM)	2	3	3	6	8	6.6	61.5	20.9	11.0	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							1.5	73.8	15.4	9.4	23	NP	NP	11.52	1.62	1.45	2.68	F	0.01	22	-	-	-	-	-	-
3.50	SPT/DS		3	4	5	9	10	-																			
4.50	SPT/DS	Medium Dense, Brownish fine-grained silty sand and Gravel (SM)	3	5	6	11	11	7.3	66.1	19.0	7.6	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS							4.2	73.1	22.7	0.0	21	NP	NP	17.50	1.92	1.63	2.61	F	0.02	25	UU	11.0	25.0	-	-	-
6.50	SPT/DS		5	7	9	16	15	-																			
7.50	SPT/DS		7	10	13	23	21	4.9	73.2	13.7	8.3	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							11.4	70.7	11.7	6.2	26	NP	NP	16.18	1.83	1.58	2.68	F	0.03	26	-	-	-	-	-	-
9.50	SPT/DS		8	11	14	25	21	-																			
10.50	SPT/DS	Dense to Very Dense, Brownish Gray, fine-grained silty sand (SM)	10	14	18	32	26	9.5	58.7	21.8	9.9	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							0.1	82.1	12.2	5.6	22	NP	NP	15.81	-	-	2.69	F	0.00	28	-	-	-	-	-	-
12.50	SPT/DS		12	16	21	37	28	-																			
13.50	SPT/DS		13	19	25	44	32	3.8	67.2	18.9	10.1	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.3	75.7	16.3	7.7	28	NP	NP	22.04	-	-	2.66	F	0.02	29	-	-	-	-	-	-
15.50	SPT/DS		18	23	28	51	25	-																			
16.50	SPT/DS		23	30	35	65	29	10.3	72.7	11.1	6.0	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	UDS	Hard, Yellowish, fine-grained inorganic silt of low Plasticity with sand and Gravel(ML)						4.6	19.1	51.6	24.8	24	NP	NP	18.40	1.96	1.66	2.63	F	0.09	28	UU	7.0	27.0	-	-	-
18.50	SPT/DS		19	24	29	53	25	-																			
19.50	SPT/DS		22	28	33	61	27	2.9	30.1	44.5	22.5	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS	Very Dense, Yellowish to Brownish, fine-grained silty sand (SM)						0.5	76.8	14.7	8.0	23	NP	NP	20.69	-	-	2.72	F	0.00	30	-	-	-	-	-	-
21.50	SPT/DS		25	32	40	72	30	-																			
22.50	SPT/DS		30	37	45	82	32	8.3	71.9	12.7	7.2	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.1	74.6	18.4	6.9	27	NP	NP	21.08	-	-	2.67	F	0.06	30	-	-	-	-	-	-
24.50	SPT/DS		(50/5 cm)	-	-	100	37	-																			
25.50	SPT/DS		42	(50/6 cm)	-	100	36	4.2	72.9	14.6	8.3	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							0.1	81.4	13.5	5.0	27	NP	NP	16.29	-	-	2.72	F	0.02	31	-	-	-	-	-	-
27.50	SPT/DS		43	(50/6 cm)	-	100	35	-																			
28.50	SPT/DS		48	(50/4 cm)	-	100	35	12.1	59.7	18.8	9.4	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							8.3	71.8	13.7	6.2	24	NP	NP	15.67	-	-	2.63	F	0.04	30	-	-	-	-	-	-
30.50	SPT/DS		(50/4 cm)	-	-	100	34	-																			

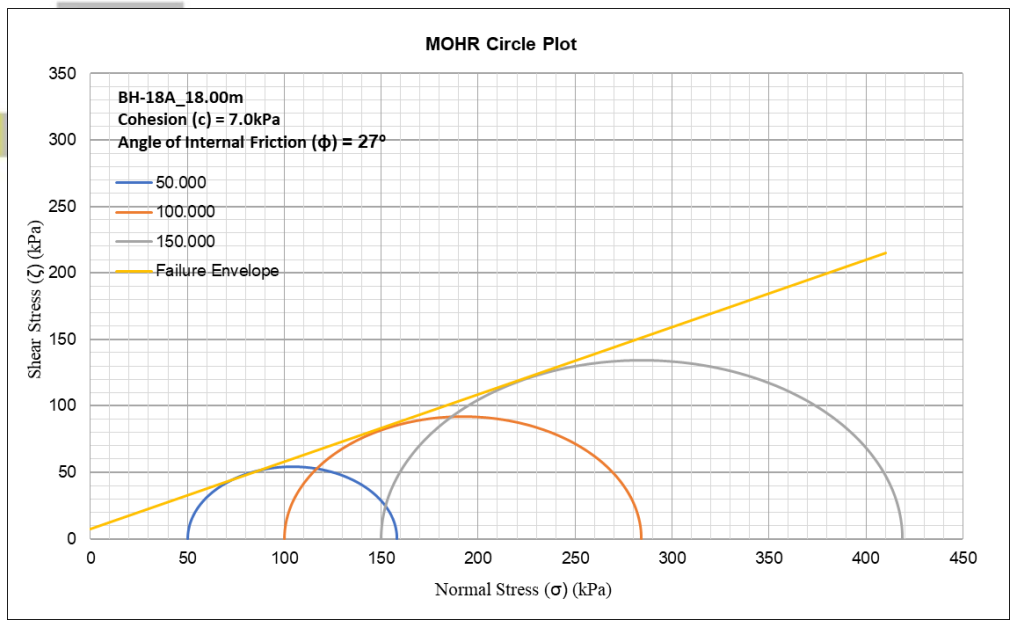
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

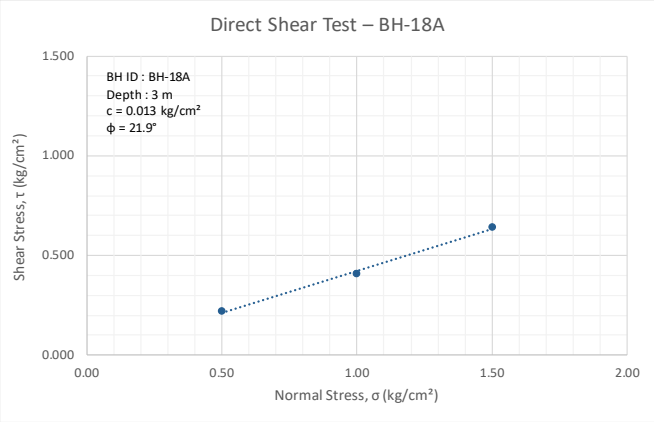

Grain Size Distribution Curve
BH-18A_0.00m
BH-18A_1.50m
BH-18A_3.00m
BH-18A_4.50m
BH-18A_6.00m
BH-18A_7.50m
BH-18A_9.00m
Percent Finer (%)
Particle Size (mm)

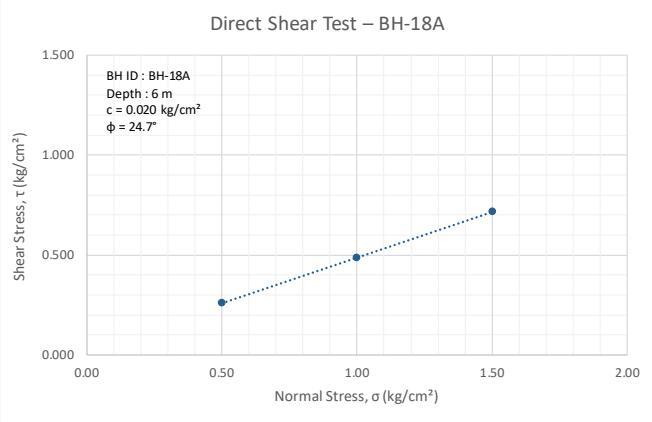

Grain Size Distribution Curve
BH-18A_10.50m
BH-18A_12.00m
BH-18A_13.50m
BH-18A_15.00m
BH-18A_16.50m
BH-18A_18.00m
BH-18A_19.50m
Percent Finer (%)
Particle Size (mm)

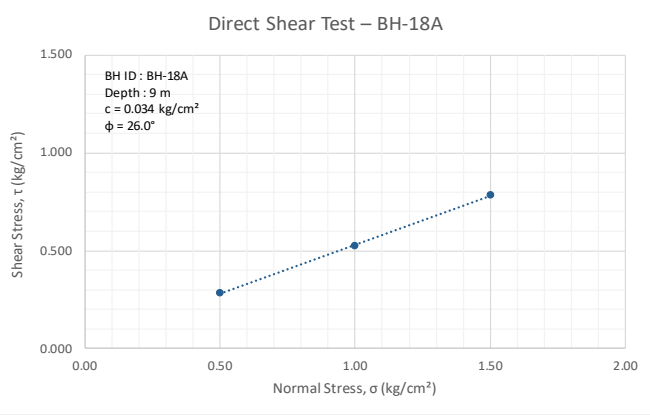

Grain Size Distribution Curve
BH-18A_21.00m
BH-18A_22.50m
BH-18A_24.00m
BH-18A_25.50m
BH-18A_27.00m
BH-18A_28.50m
BH-18A_30.00m
Percent Finer (%)
Particle Size (mm)

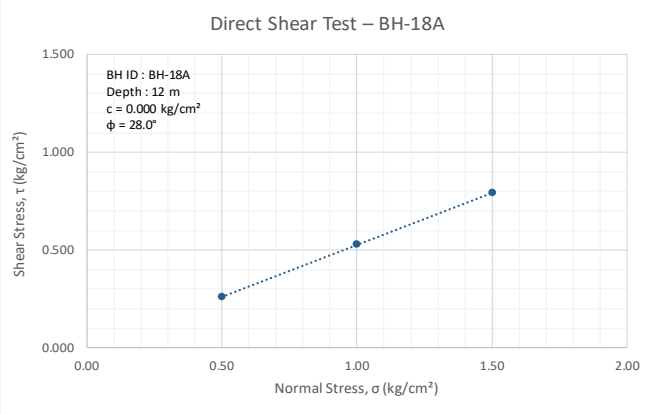

MOHR Circle Plot
BH-18A_6.00m
Cohesion (c) = 11.0kPa
Angle of Internal Friction (ϕ) = 25°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

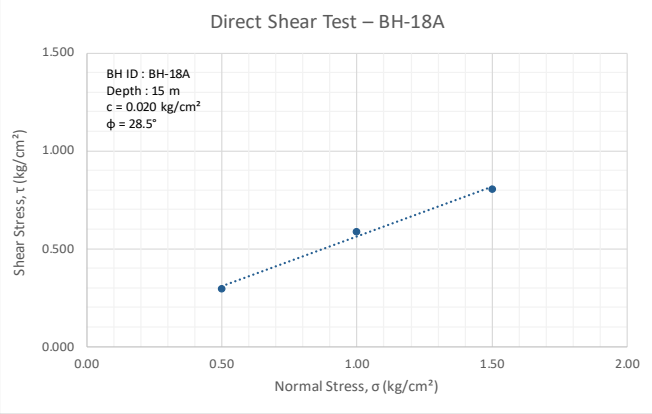

MOHR Circle Plot
BH-18A_18.00m
Cohesion (c) = 7.0kPa
Angle of Internal Friction (ϕ) = 27°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

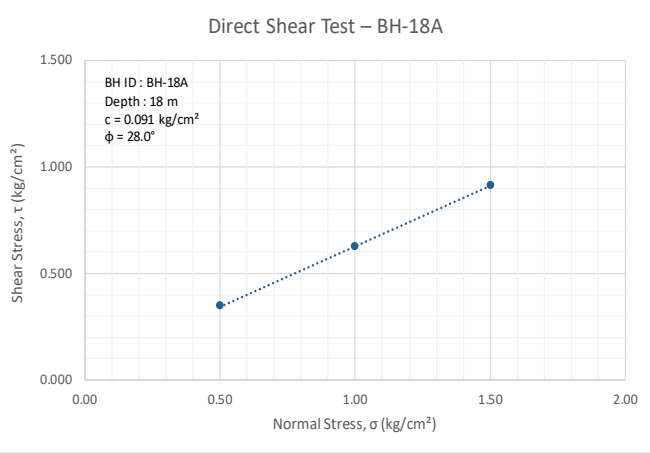

Direct Shear Test – BH-18A
BH ID : BH-18A
Depth : 3 m
c = 0.013 kg/cm²
ϕ = 21.9°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

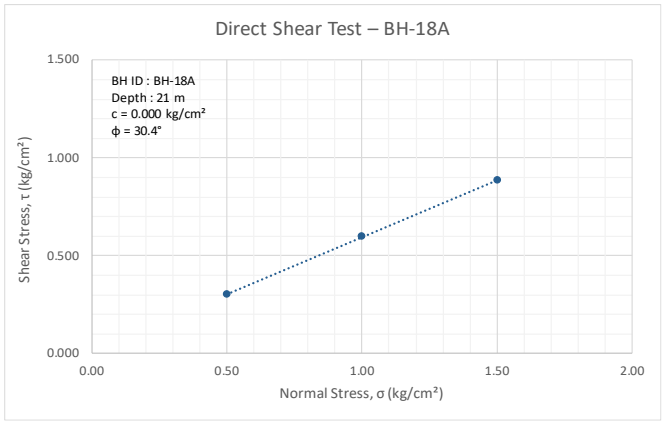

Direct Shear Test – BH-18A
BH ID : BH-18A
Depth : 6 m
c = 0.020 kg/cm²
ϕ = 24.7°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

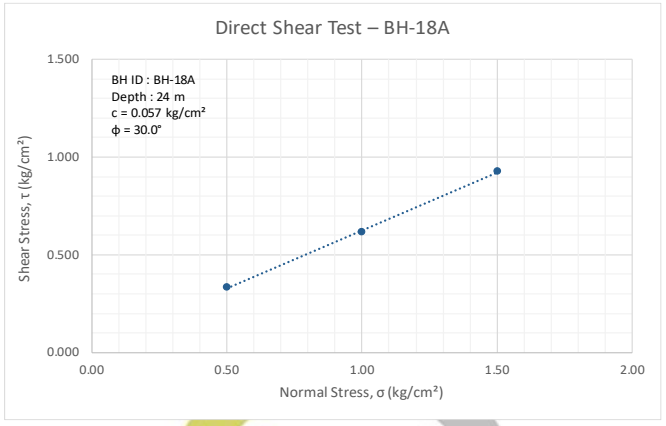

Direct Shear Test – BH-18A
BH ID : BH-18A
Depth : 9 m
c = 0.034 kg/cm²
ϕ = 26.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

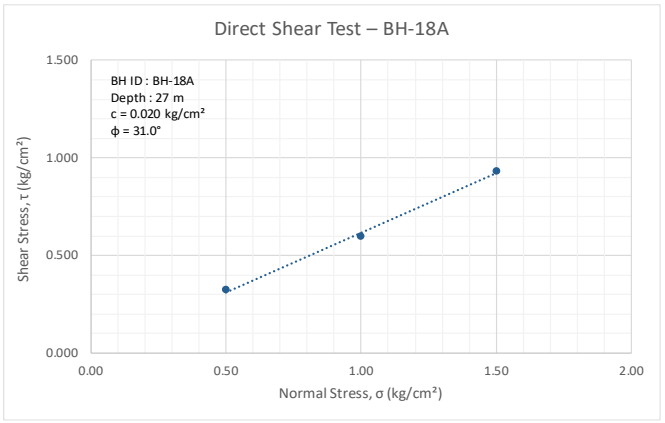

Direct Shear Test – BH-18A
BH ID : BH-18A
Depth : 12 m
c = 0.000 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

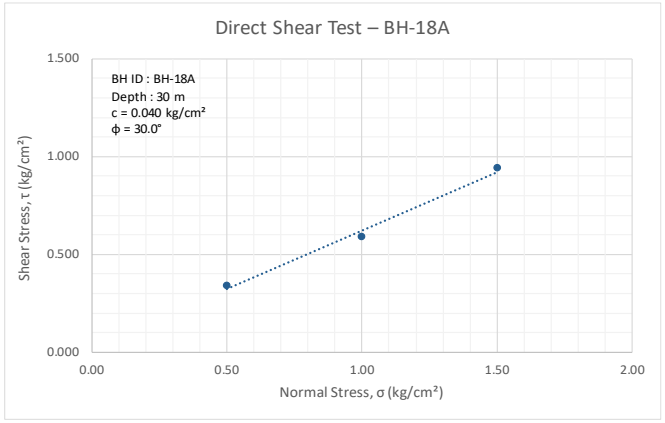

Direct Shear Test – BH-18A
BH ID : BH-18A
Depth : 15 m
c = 0.020 kg/cm²
ϕ = 28.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-18A
BH ID : BH-18A
Depth : 18 m
c = 0.091 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-18A
BH ID : BH-18A
Depth : 21 m
c = 0.000 kg/cm²
ϕ = 30.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-18A
BH ID : BH-18A
Depth : 24 m
c = 0.057 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-18A
BH ID : BH-18A
Depth : 27 m
c = 0.020 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

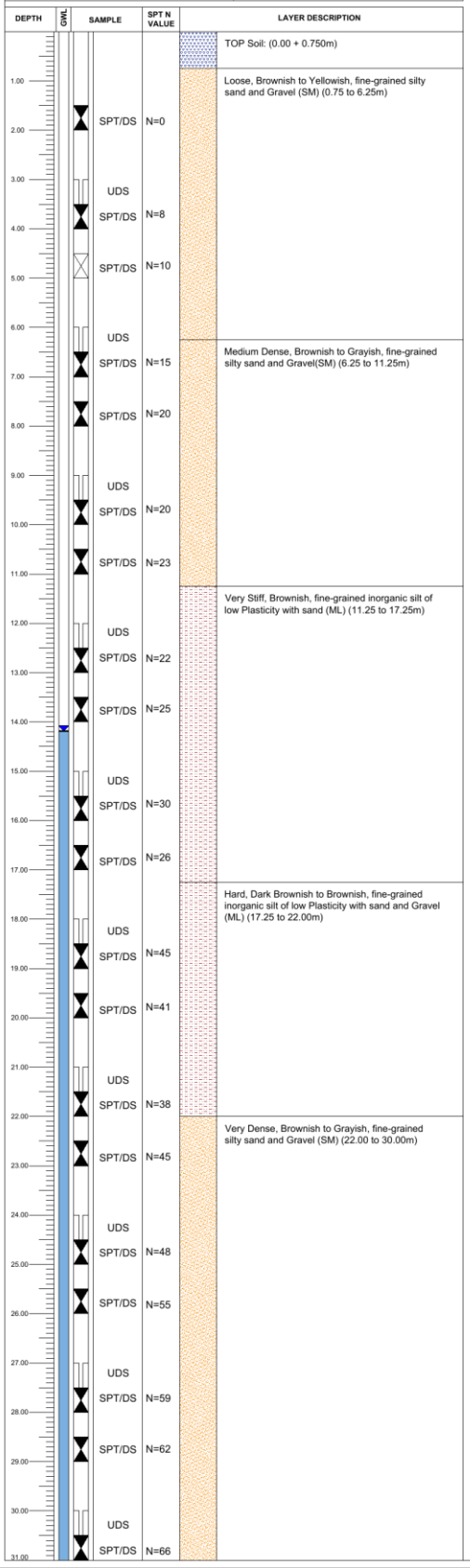

Direct Shear Test – BH-18A
BH ID : BH-18A
Depth : 30 m
c = 0.040 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (1+000 km TO 2+000 km)

BH ID : BH-19 | **Chainage** : 2+591 KM

Groundwater Level : 14.20 M | **Location** :Lat. 28.551209, Long. 77.335667



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

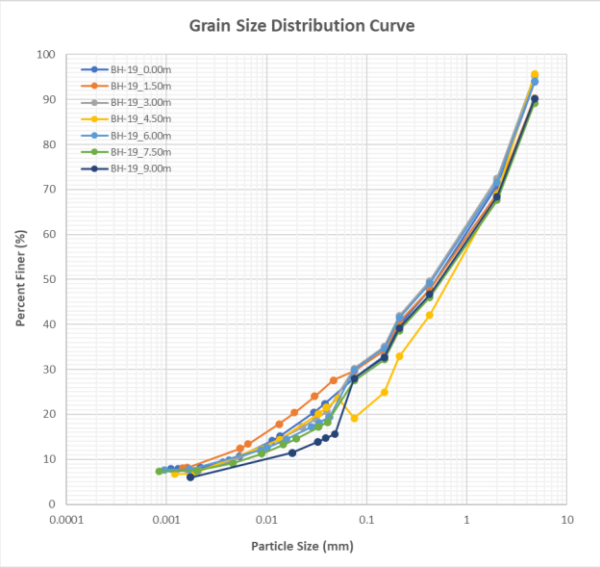
Soil

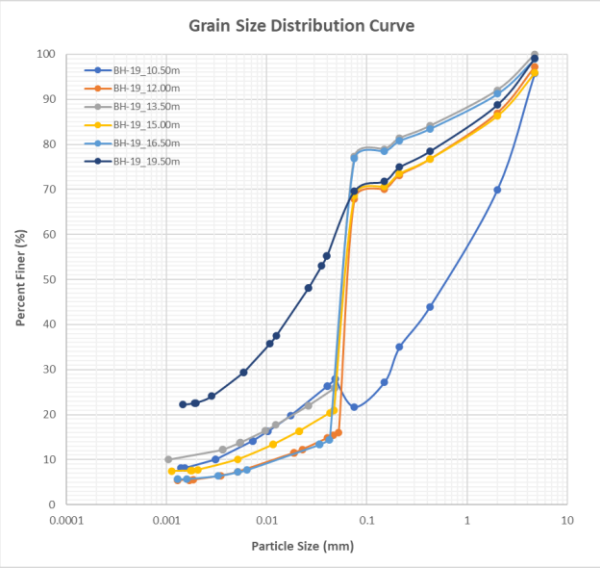
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

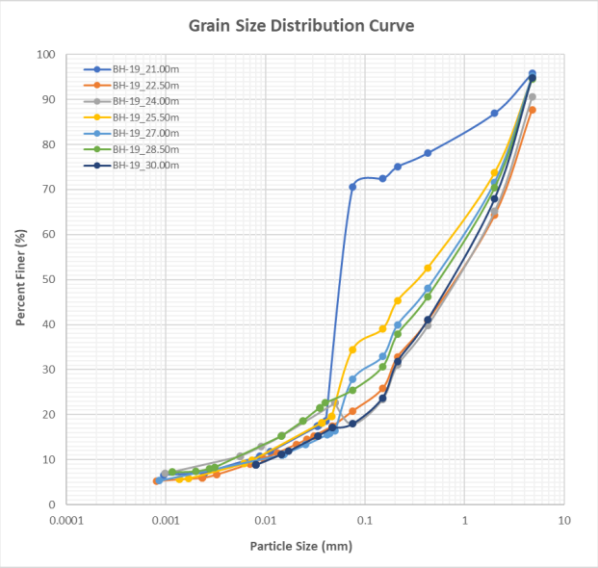
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-19	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	2+591	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	31-01-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	195.80	**End Date:**	01-02-2026
Project Code:	158_R03_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	15.10	**Location:**	Lat. 28.551209, Long. 77.335667

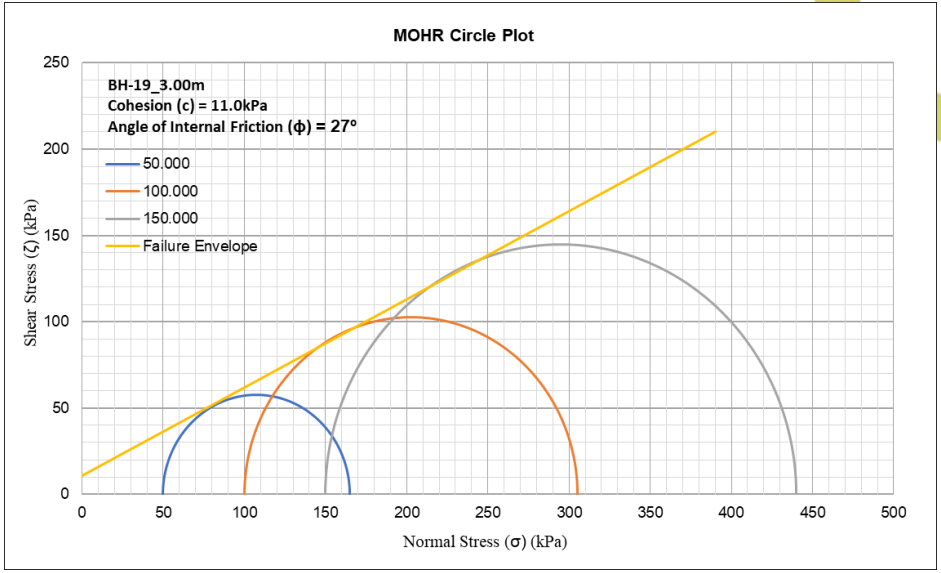
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						8.9	72.4	13.5	5.2	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Loose, Brownish to Yellowish, fine-grained silty sand and Gravel(SM)	-	-	-	0	0	5.9	74.8	12.5	6.8	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							7.3	60.5	23.5	8.8	22	NP	NP	12.85	1.86	1.65	2.64	F	0.05	20	UU	11.0	27.0	-	-	-
3.50	SPT/DS		2	4	4	8	9	-																			
4.50	SPT/DS		3	5	5	10	10	6.0	62.4	21.2	10.4	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS							9.8	63.4	18.5	8.3	21	NP	NP	14.50	1.84	1.61	2.62	F	0.02	23	UU	11.0	27.0	-	-	-
6.50	SPT/DS	Medium Dense, Brownish to Grayish, fine-grained silty sand and Gravel(SM)	4	6	9	15	14	-																			
7.50	SPT/DS		4	9	11	20	18	7.1	62.7	21.8	8.4	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							6.7	70.5	16.0	6.9	28	NP	NP	15.22	1.75	1.52	2.61	F	0.04	25	-	-	-	-	-	-
9.50	SPT/DS		5	9	11	20	17	-																			
10.50	SPT/DS		5	10	13	23	19	8.6	67.2	16.8	7.3	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS	Very Stiff, Brownish, fine-grained inorganic silt of low Plasticity with sand (ML)						2.8	32.1	41.4	23.8	25	NP	NP	13.41	-	-	2.68	F	0.02	26	-	-	-	-	-	-
12.50	SPT/DS		4	9	13	22	17	-																			
13.50	SPT/DS		6	11	14	25	18	2.9	33.3	46.3	17.5	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							1.0	21.9	54.7	22.3	28	NP	NP	17.36	-	-	2.60	F	0.02	28	-	-	-	-	-	-
15.50	SPT/DS		7	13	17	30	18	-																			
16.50	SPT/DS		5	10	16	26	16	4.6	18.2	52.5	24.8	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS	Hard, Dark Brownish to Brownish, fine-grained inorganic silt of low Plasticity with sand and Gravel(ML)						4.9	29.4	46.9	18.8	24	NP	NP	15.61	-	-	2.76	F	0.09	27	-	-	-	-	-	-
18.50	SPT/DS		8	16	29	45	22	-																			
19.50	SPT/DS		7	19	21	40	20	1.7	27.6	43.1	27.6	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							1.0	24.7	47.6	26.6	27	NP	NP	14.44	-	-	2.62	F	0.10	28	-	-	-	-	-	-
21.50	SPT/DS		6	18	20	38	19	-																			
22.50	SPT/DS	Very Dense, Brownish to Grayish, fine-grained silty sand and Gravel(SM)	8	16	29	45	21	11.6	63.6	16.4	8.4	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							6.3	73.2	12.8	7.7	26	NP	NP	15.73	-	-	2.74	F	0.04	30	-	-	-	-	-	-
24.50	SPT/DS		12	21	27	48	21	-																			
25.50	SPT/DS		11	24	31	55	23	12.7	61.9	25.4	0.0	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							5.4	71.2	17.3	6.1	26	NP	NP	17.66	-	-	2.69	F	0.02	31	-	-	-	-	-	-
27.50	SPT/DS		17	25	34	59	24	-																			
28.50	SPT/DS		20	27	35	62	24	11.8	69.1	12.4	6.7	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							10.1	64.7	16.2	9.0	24	NP	NP	13.21	-	-	2.76	F	0.05	31	-	-	-	-	-	-
30.50	SPT/DS		22	30	36	66	25	-																			

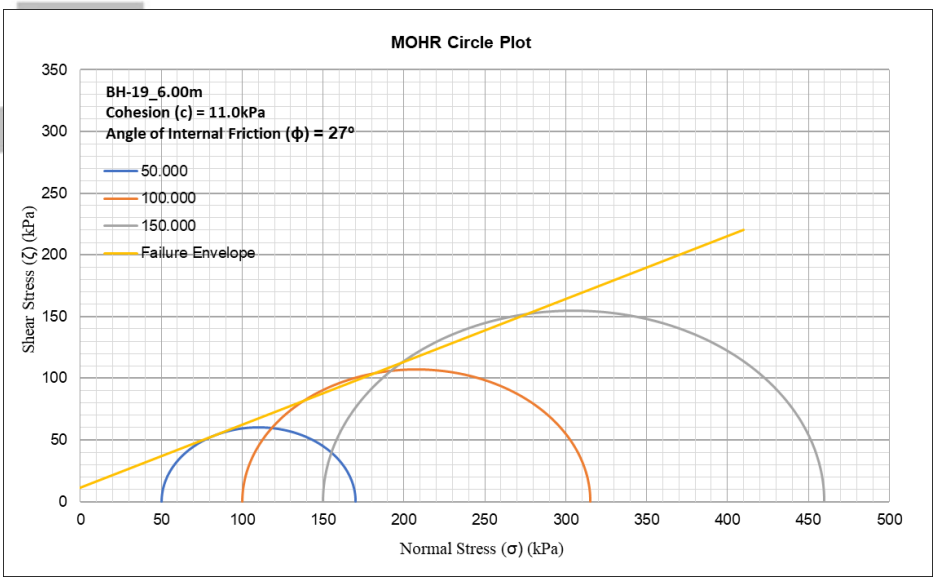
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

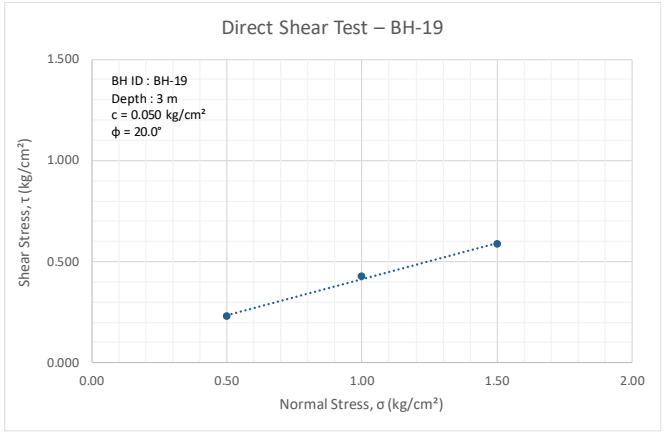

Grain Size Distribution Curve
BH-19_0.00m
BH-19_1.50m
BH-19_3.00m
BH-19_4.50m
BH-19_6.00m
BH-19_7.50m
BH-19_9.00m
Percent Finer (%)
Particle Size (mm)

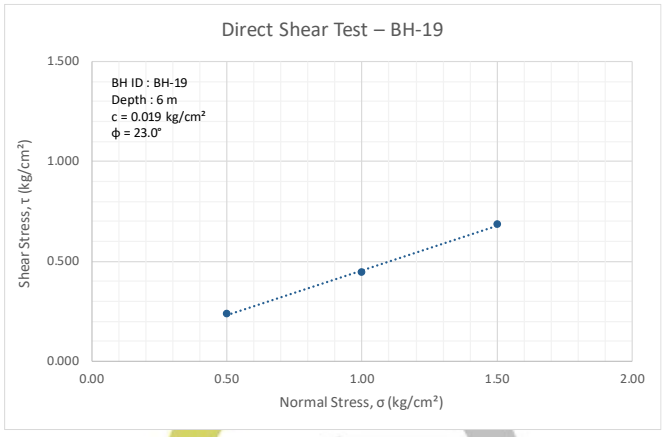

Grain Size Distribution Curve
BH-19_10.50m
BH-19_12.00m
BH-19_13.50m
BH-19_15.00m
BH-19_16.50m
BH-19_19.50m
Percent Finer (%)
Particle Size (mm)

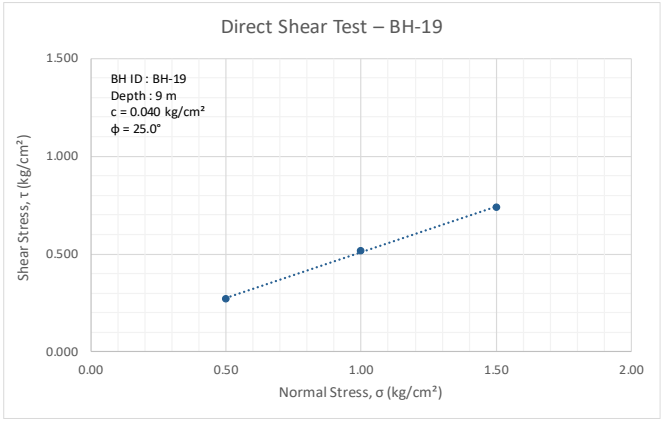

Grain Size Distribution Curve
BH-19_21.00m
BH-19_22.50m
BH-19_24.00m
BH-19_25.50m
BH-19_27.00m
BH-19_28.50m
BH-19_30.00m
Percent Finer (%)
Particle Size (mm)

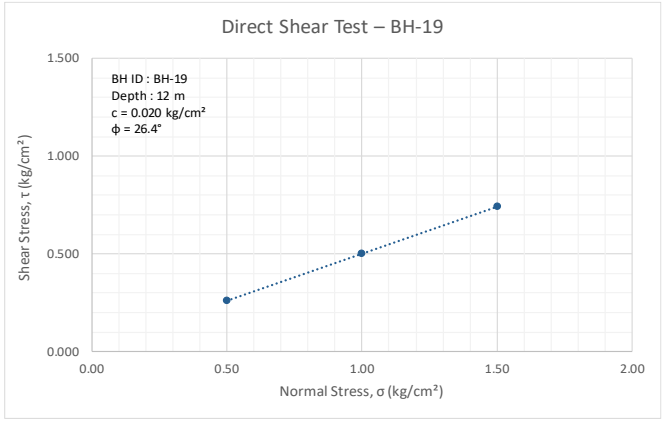

MOHR Circle Plot
BH-19_3.00m
Cohesion (c) = 11.0kPa
Angle of Internal Friction (ϕ) = 27°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

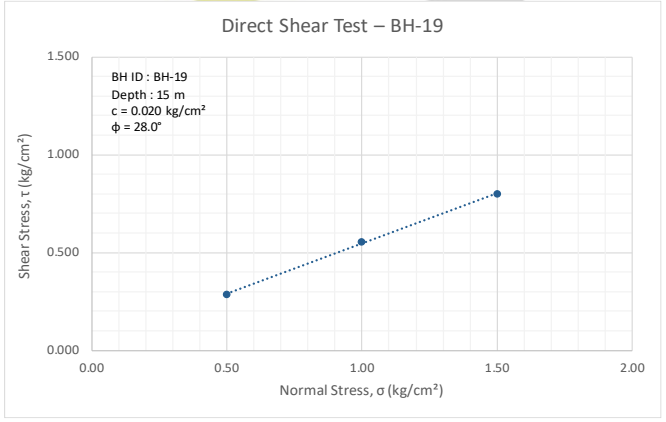

MOHR Circle Plot
BH-19_6.00m
Cohesion (c) = 11.0kPa
Angle of Internal Friction (ϕ) = 27°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

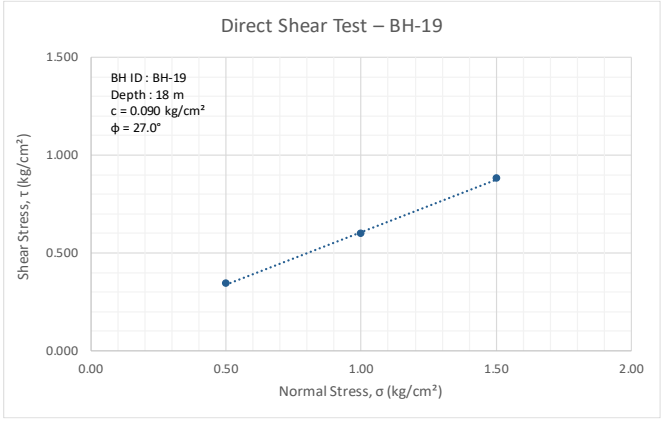

Direct Shear Test – BH-19
BH ID : BH-19
Depth : 3 m
c = 0.050 kg/cm²
ϕ = 20.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

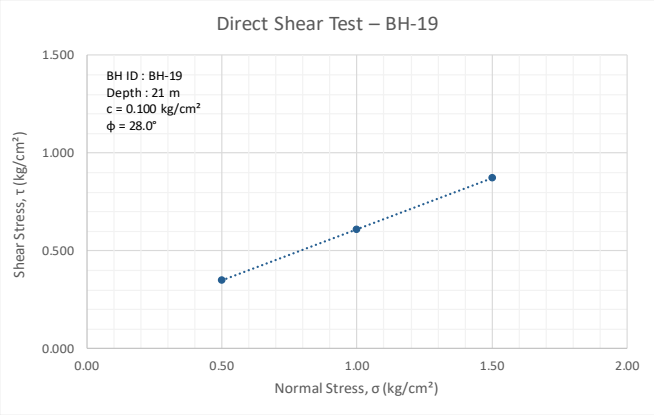

Direct Shear Test – BH-19
BH ID : BH-19
Depth : 6 m
c = 0.019 kg/cm²
ϕ = 23.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

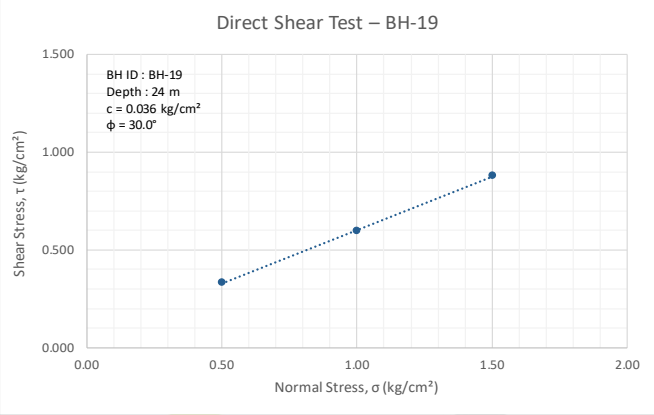

Direct Shear Test – BH-19
BH ID : BH-19
Depth : 9 m
c = 0.040 kg/cm²
ϕ = 25.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

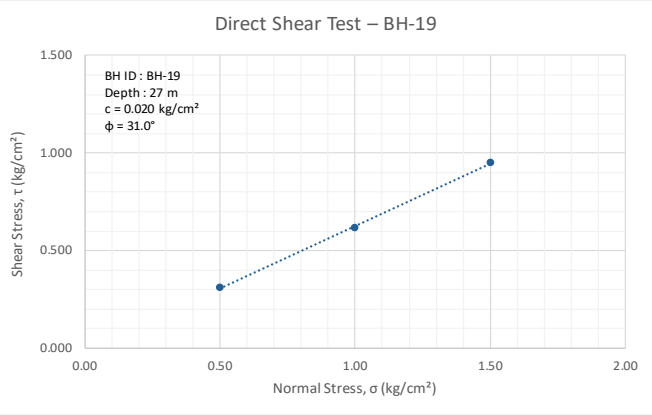

Direct Shear Test – BH-19
BH ID : BH-19
Depth : 12 m
c = 0.020 kg/cm²
ϕ = 26.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

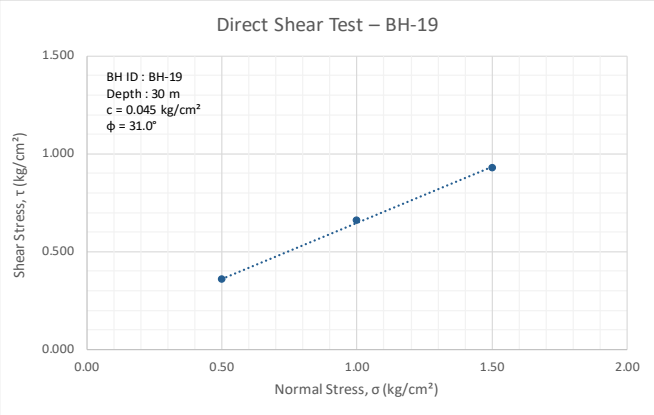

Direct Shear Test – BH-19
BH ID : BH-19
Depth : 15 m
c = 0.020 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-19
BH ID : BH-19
Depth : 18 m
c = 0.090 kg/cm²
ϕ = 27.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-19
BH ID : BH-19
Depth : 21 m
c = 0.100 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-19
BH ID : BH-19
Depth : 24 m
c = 0.036 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-19
BH ID : BH-19
Depth : 27 m
c = 0.020 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

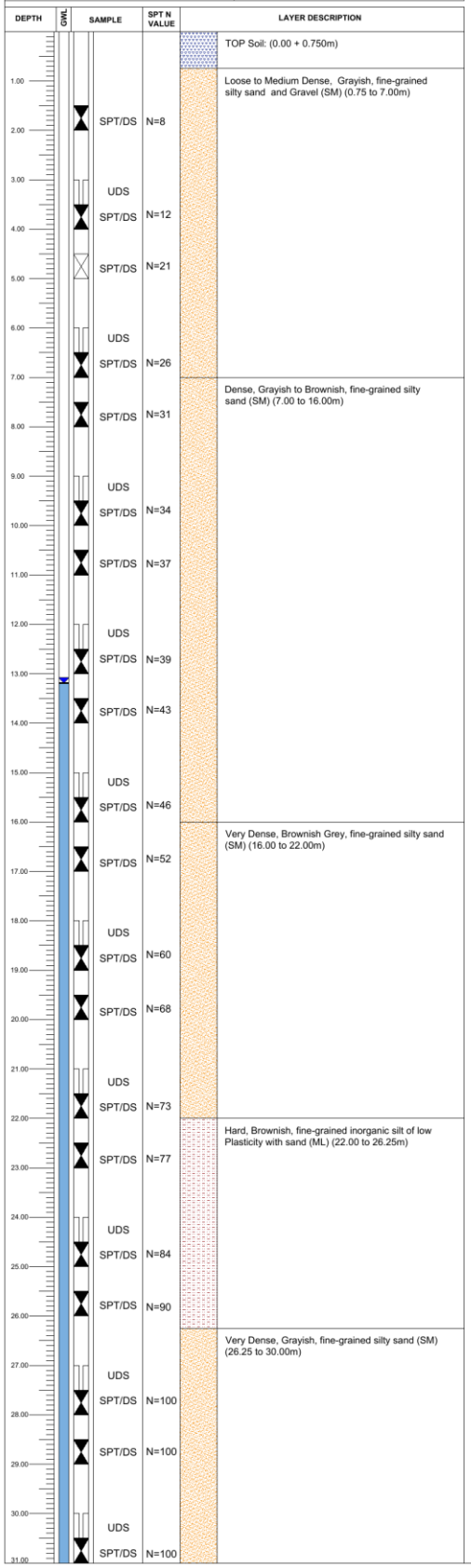

Direct Shear Test – BH-19
BH ID : BH-19
Depth : 30 m
c = 0.045 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (1+000 km TO 2+000 km)

BH ID : BH-19A | **Chainage** : 2+420 KM

Groundwater Level : 13.20 M | **Location** :Lat. 28.550782, Long. 77.33261



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

Soil

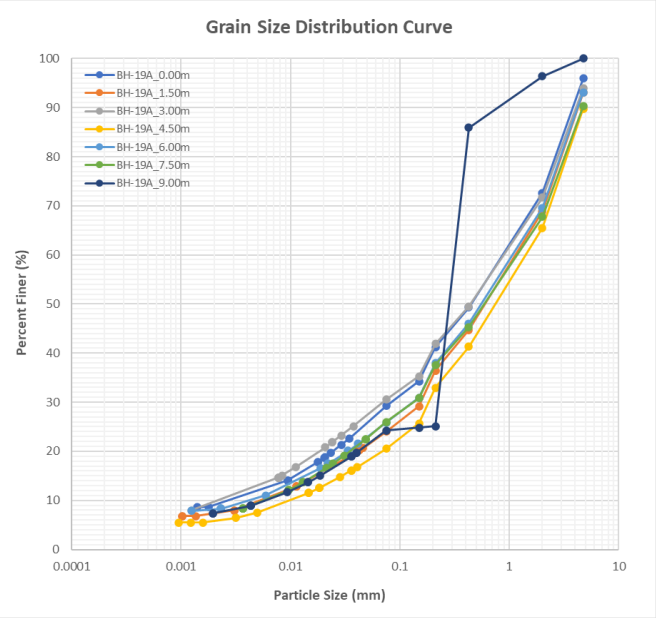
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

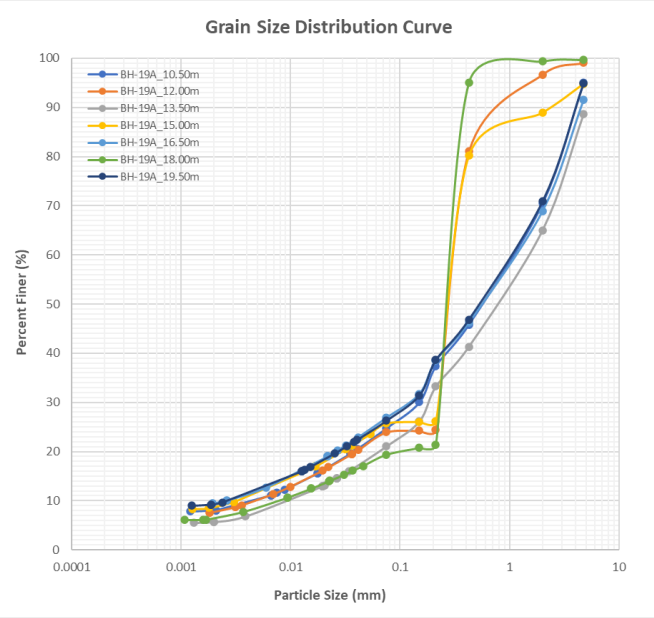
GOMA ENGINEERING AND CONSULTANCY
Quality we put forward

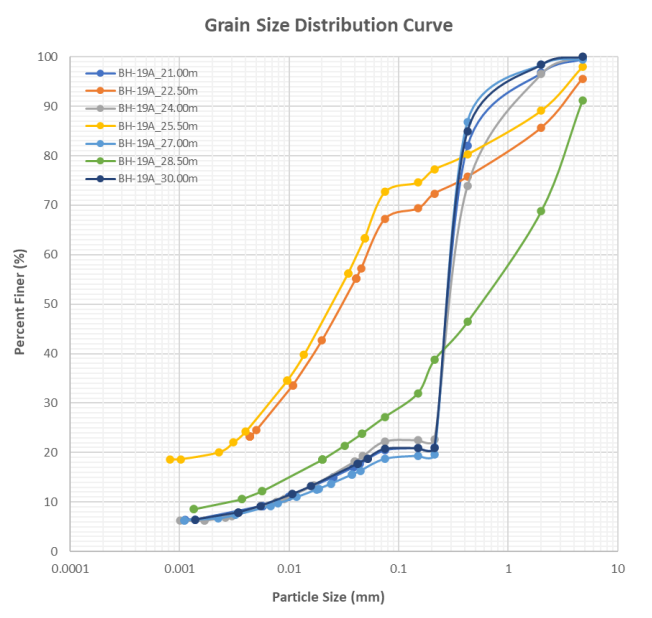
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-19A	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	2+420	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	25-02-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	201.20	**End Date:**	25-02-2026
Project Code:	158_R03_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	13.20	**Location:**	Lat. 28.550782, Long. 77.33261

Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						4.1	66.7	20.2	9.1	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Loose to Medium Dense, Grayish, fine-grained silty sand and Gravel(SM)	3	3	5	8	11	7.0	69.0	16.7	7.3	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							6.1	63.4	20.8	9.7	28	NP	NP	17.58	1.90	1.62	2.67	F	0.02	23	UU	12.0	24.0	-	-	-
3.50	SPT/DS		4	5	7	12	13	-																			
4.50	SPT/DS		7	9	12	21	21	10.3	69.2	14.7	5.8	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS							6.9	67.2	17.7	8.2	21	NP	NP	19.41	1.91	1.60	2.63	F	0.07	26	UU	9.0	26.0	-	-	-
6.50	SPT/DS		9	12	14	26	24	-																			
7.50	SPT/DS	Dense, Grayish to Brownish, fine-grained silty sand (SM)	13	15	16	31	28	9.8	64.2	18.8	7.2	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	DS							0.0	75.8	16.8	7.4	23	NP	NP	20.13	-	-	2.63	F	0.05	27	-	-	-	-	-	-
9.50	SPT/DS		13	16	18	34	29	-																			
10.50	SPT/DS		14	18	19	37	30	5.0	70.3	16.7	8.1	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							0.9	75.2	16.2	7.8	26	NP	NP	18.90	-	-	2.79	F	0.04	28	-	-	-	-	-	-
12.50	SPT/DS		15	18	21	39	29	-																			
13.50	SPT/DS		18	21	22	43	23	11.3	67.7	15.4	5.7	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	UDS							5.2	69.0	17.0	8.8	23	NP	NP	16.82	2.00	1.71	2.63	F	0.02	29	-	-	-	-	-	-
15.50	SPT/DS		19	22	24	46	23	-																			
16.50	SPT/DS	Very Dense, Brownish Grey, fine-grained silty sand (SM)	21	25	27	52	25	8.4	64.7	17.4	9.5	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS							0.3	80.3	12.9	6.5	26	NP	NP	13.42	-	-	2.68	F	0.00	30	-	-	-	-	-	-
18.50	SPT/DS		25	29	31	60	27	-																			
19.50	SPT/DS		27	33	35	68	29	5.1	68.7	16.9	9.3	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							0.4	79.2	13.3	7.1	26	NP	NP	9.19	-	-	2.69	F	0.05	30	-	-	-	-	-	-
21.50	SPT/DS		29	35	38	73	30	-																			
22.50	SPT/DS	Hard, Brownish, fine-grained inorganic silt of low Plasticity with sand (ML)	30	37	40	77	31	4.4	28.3	50.0	17.3	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.0	77.7	15.8	6.5	29	NP	NP	20.79	-	-	2.79	F	0.11	28	-	-	-	-	-	-
24.50	SPT/DS		35	39	45	84	33	-																			
25.50	SPT/DS		36	42	48	90	34	2.0	25.3	52.9	19.8	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS	Very Dense, Grayish, fine-grained silty sand (SM)						0.5	80.8	12.1	6.7	24	NP	NP	18.53	-	-	2.67	F	0.02	31	-	-	-	-	-	-
27.50	SPT/DS		41	(50/12 cm)	-	100	36	-																			
28.50	SPT/DS		45	(50/9 cm)	-	100	36	8.8	64.0	17.9	9.3	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.0	79.3	13.7	7.0	22	NP	NP	20.40	-	-	2.76	F	0.05	31	-	-	-	-	-	-
30.50	SPT/DS		(50/13 cm)	-	-	100	35	-																			

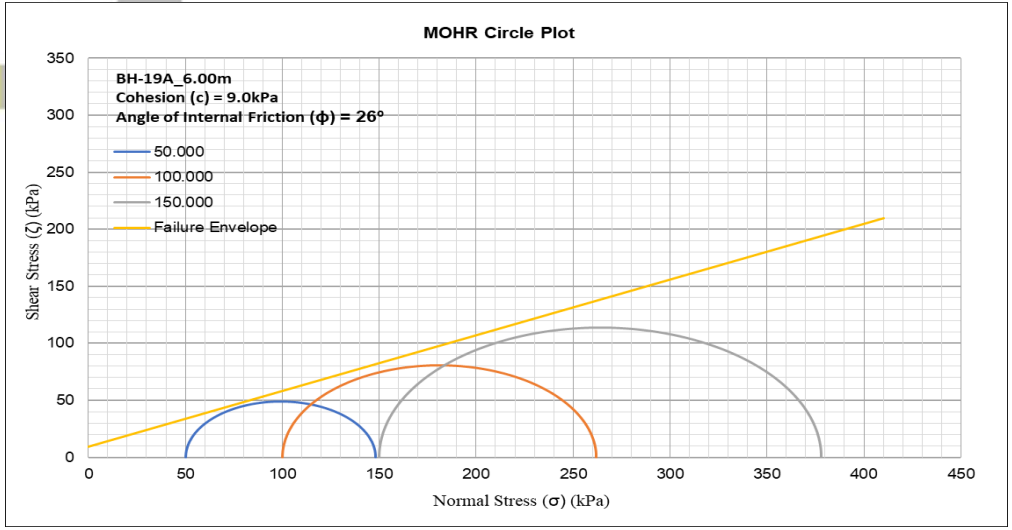
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

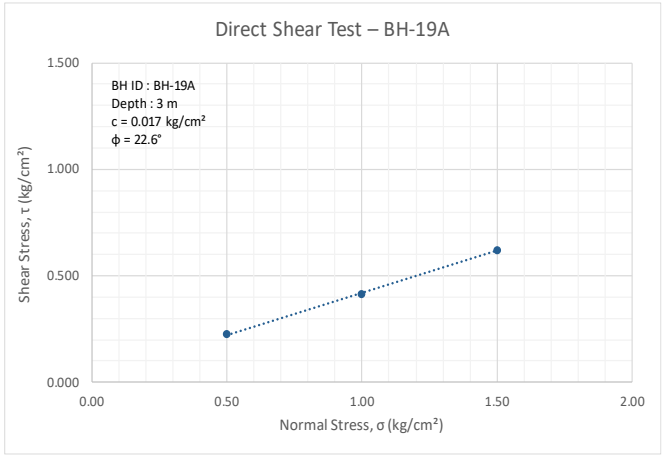

Grain Size Distribution Curve
BH-19A_0.00m
BH-19A_1.50m
BH-19A_3.00m
BH-19A_4.50m
BH-19A_6.00m
BH-19A_7.50m
BH-19A_9.00m
Percent Finer (%)
Particle Size (mm)

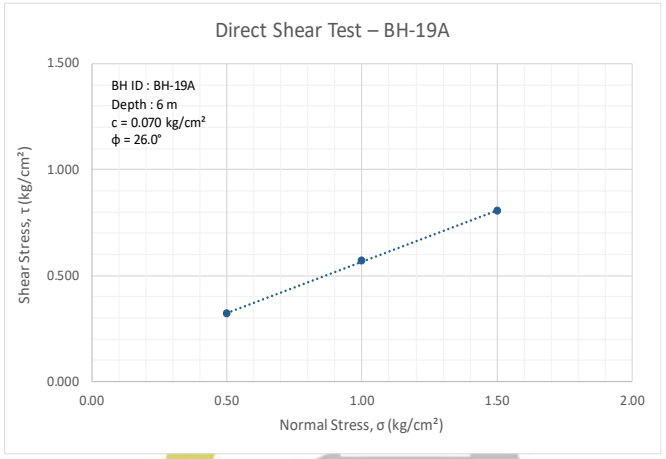

Grain Size Distribution Curve
BH-19A_10.50m
BH-19A_12.00m
BH-19A_13.50m
BH-19A_15.00m
BH-19A_16.50m
BH-19A_18.00m
BH-19A_19.50m
Percent Finer (%)
Particle Size (mm)

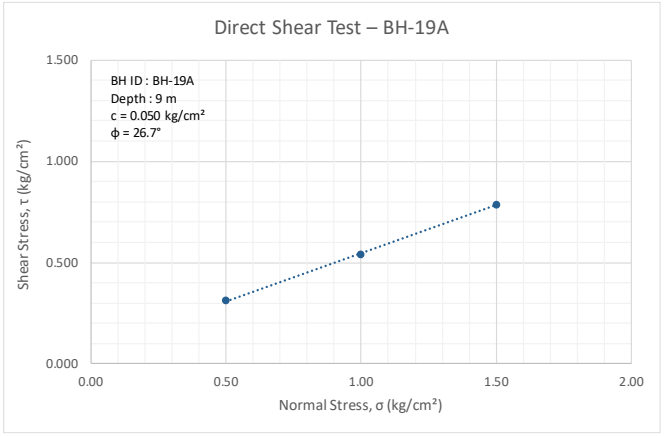

Grain Size Distribution Curve
BH-19A_21.00m
BH-19A_22.50m
BH-19A_24.00m
BH-19A_25.50m
BH-19A_27.00m
BH-19A_28.50m
BH-19A_30.00m
Percent Finer (%)
Particle Size (mm)

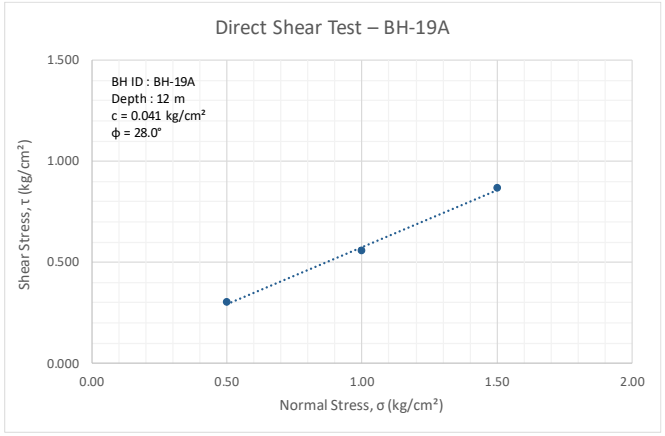

MOHR Circle Plot
BH-19A_3.00m
Cohesion (c) = 12.0kPa
Angle of Internal Friction (ϕ) = 24°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

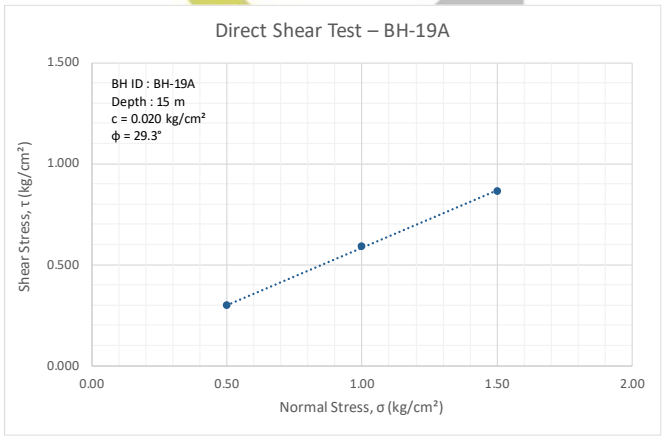

MOHR Circle Plot
BH-19A_6.00m
Cohesion (c) = 9.0kPa
Angle of Internal Friction (ϕ) = 26°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

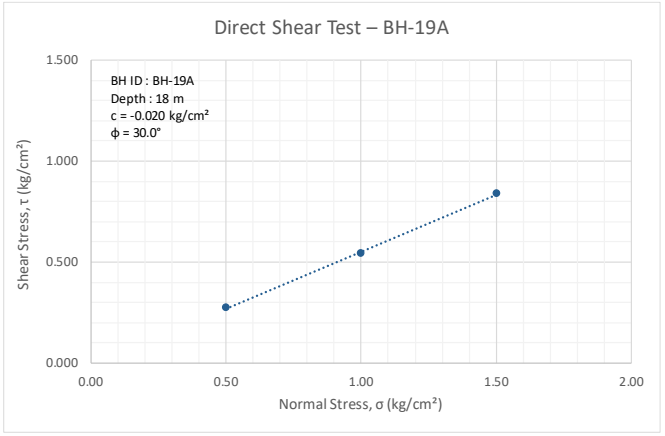

Direct Shear Test – BH-19A
BH ID : BH-19A
Depth : 3 m
c = 0.017 kg/cm²
ϕ = 22.6°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

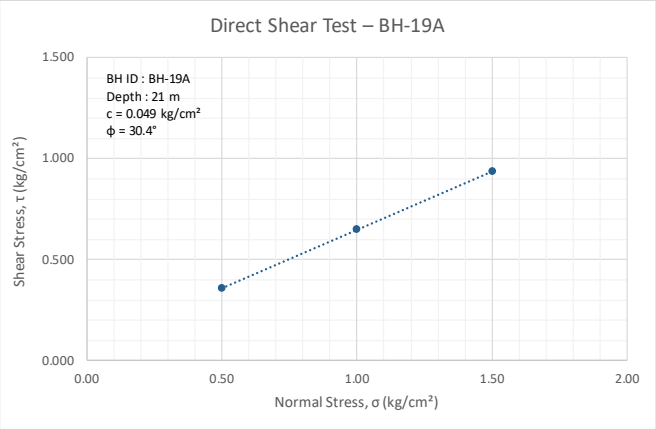

Direct Shear Test – BH-19A
BH ID : BH-19A
Depth : 6 m
c = 0.070 kg/cm²
ϕ = 26.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

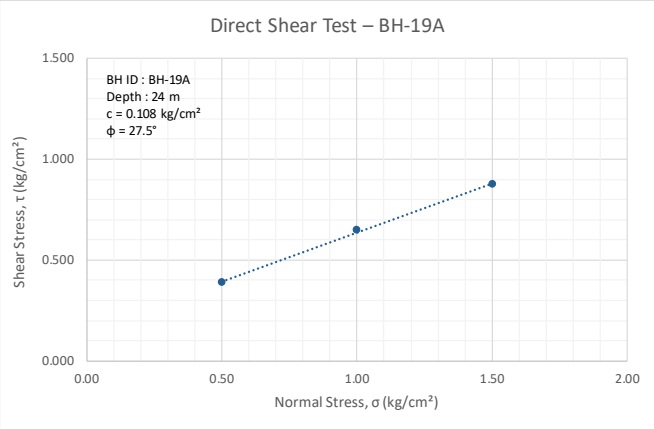

Direct Shear Test – BH-19A
BH ID : BH-19A
Depth : 9 m
c = 0.050 kg/cm²
ϕ = 26.7°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

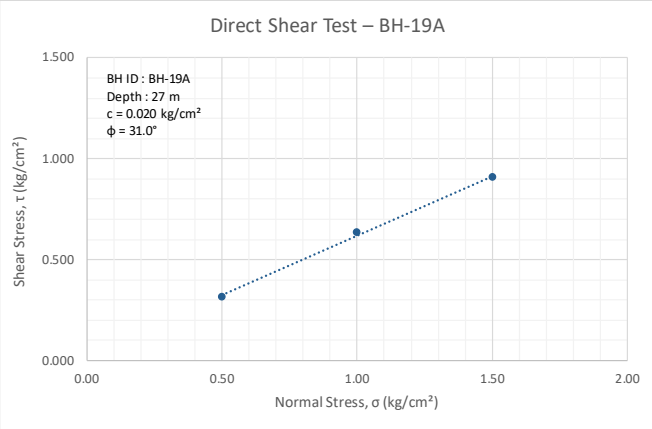

Direct Shear Test – BH-19A
BH ID : BH-19A
Depth : 12 m
c = 0.041 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

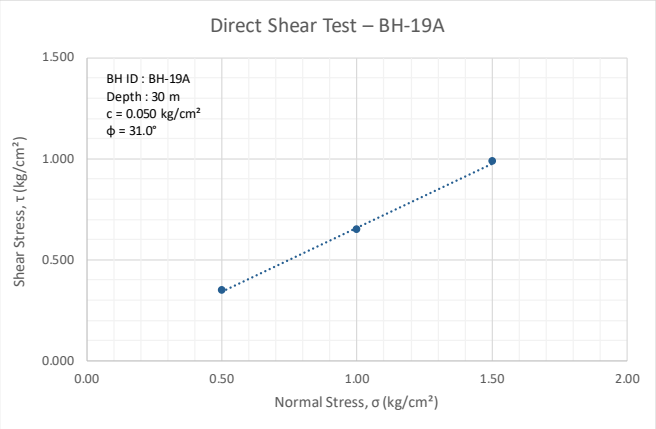

Direct Shear Test – BH-19A
BH ID : BH-19A
Depth : 15 m
c = 0.020 kg/cm²
ϕ = 29.3°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-19A
BH ID : BH-19A
Depth : 18 m
c = -0.020 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-19A
BH ID : BH-19A
Depth : 21 m
c = 0.049 kg/cm²
ϕ = 30.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-19A
BH ID : BH-19A
Depth : 24 m
c = 0.108 kg/cm²
ϕ = 27.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-19A
BH ID : BH-19A
Depth : 27 m
c = 0.020 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

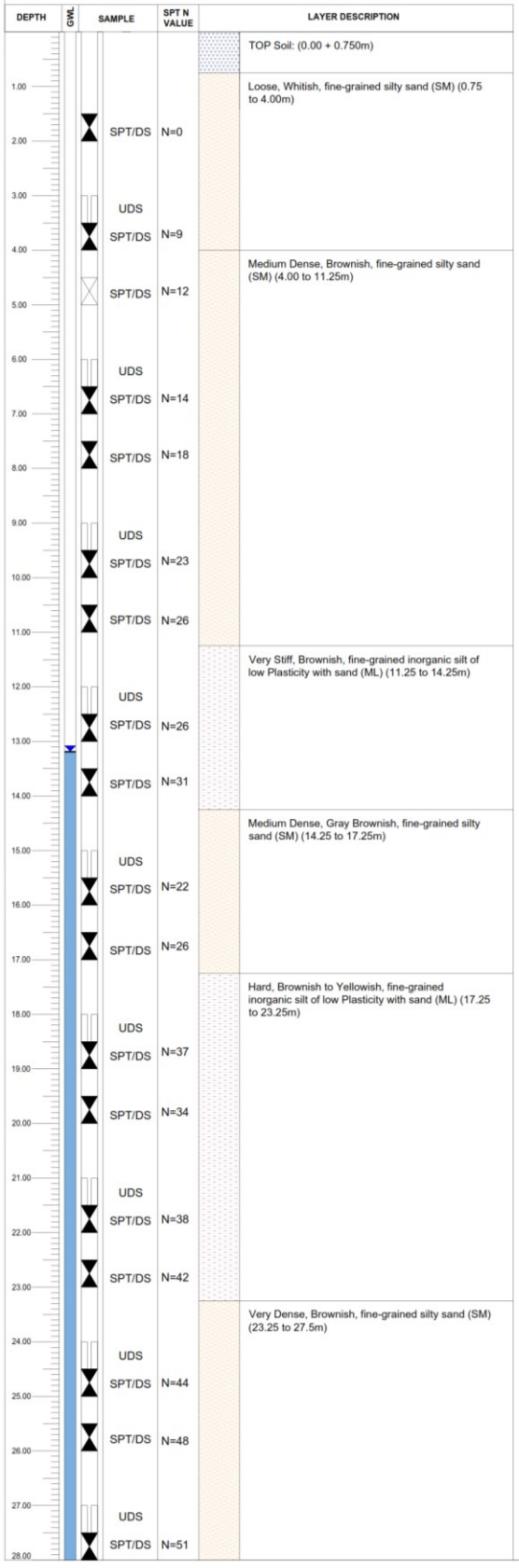

Direct Shear Test – BH-19A
BH ID : BH-19A
Depth : 30 m
c = 0.050 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (1+000 km TO 2+000 km)

BH ID : BH-20 | **Chainage** : 2+541 KM

Groundwater Level : 13.20 M | **Location** :Lat. 28.550972, Long. 77.334642



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

Soil

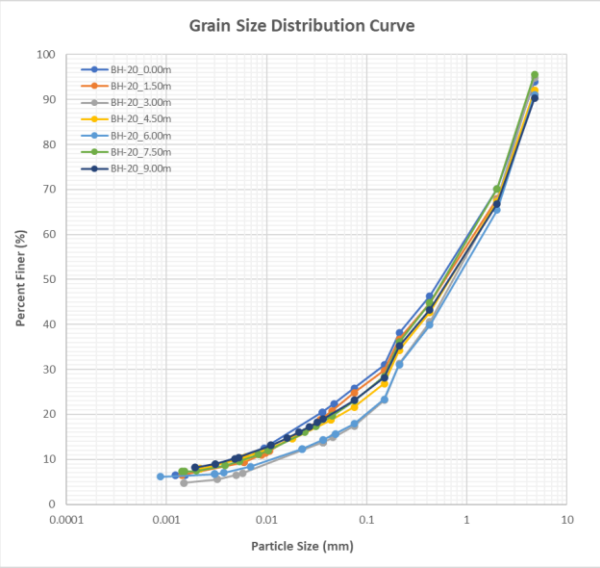
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

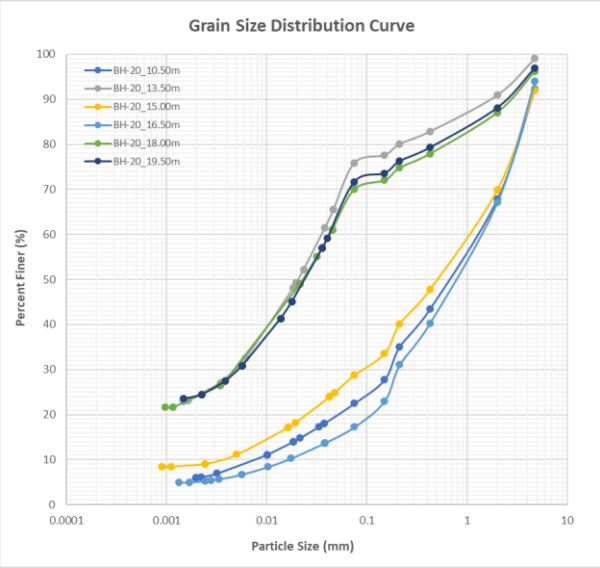
GOMA ENGINEERING AND CONSULTANCY
Quality we put forward

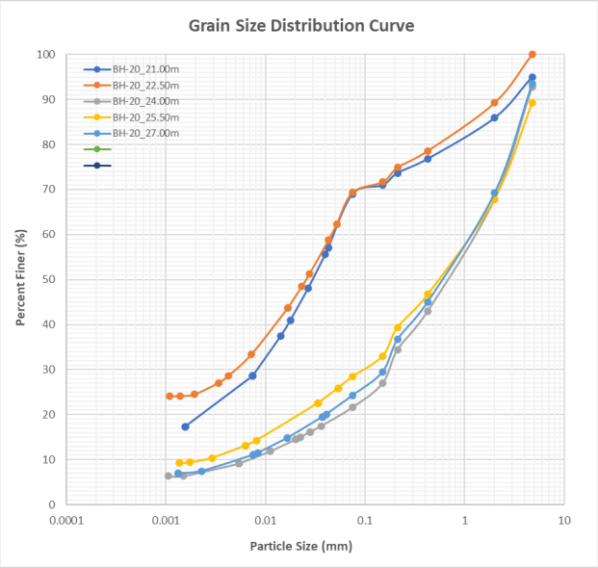
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-20	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	2+541	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	31-01-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	197.80	**End Date:**	01-02-2026
Project Code:	158_R03_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	13.20	**Location:**	Lat. 28.550972, Long. 77.334642

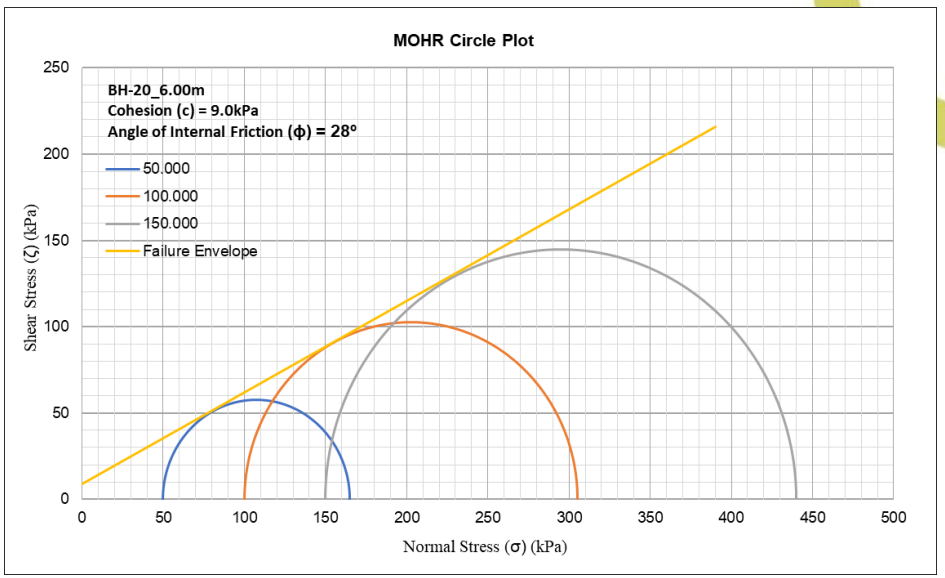
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [^{0}]	Type	Cohesion [kPa]	Angle of Friction [^{0}]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						6.0	68.1	18.5	7.4	21	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Loose, Whiteish, fine-grained silty sand (SM)	-	-	-	0	0	8.8	66.4	17.6	7.2	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							5.2	77.4	12.3	5.1	24	NP	NP	15.27	1.68	1.45	2.65	F	0.01	22	-	-	-	-	-	-
3.50	SPT/DS		3	4	5	9	10	-																			
4.50	SPT/DS	Medium Dense, Brownish, fine-grained silty sand (SM)	4	5	7	12	12	8.0	70.4	13.4	8.2	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS							8.9	73.8	11.4	6.5	22	NP	NP	13.50	1.86	1.64	-	F	0.02	25	UU	9.0	28.0	-	-	-
6.50	SPT/DS		6	7	7	14	13	-																			
7.50	SPT/DS		6	8	10	18	16	4.4	72.6	15.5	7.5	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							9.7	67.2	14.9	8.3	29	NP	NP	20.13	1.80	1.50	2.66	F	0.04	26	-	-	-	-	-	-
9.50	SPT/DS		7	10	13	23	20	-																			
10.50	SPT/DS		5	11	15	26	21	7.8	69.8	16.5	6.0	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS	Very Stiff, Brownish, fine-grained inorganic silt of low Plasticity with sand (ML)						1.8	23.9	52.7	21.7	26	NP	NP	18.90	-	-	2.78	F	0.08	25	-	-	-	-	-	-
12.50	SPT/DS		4	10	16	26	20	-																			
13.50	SPT/DS		7	12	19	31	22	0.9	23.1	51.8	24.2	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	UDS	Medium Dense, Gray Brownish, fine-grained silty sand (SM)						8.0	63.2	19.9	8.9	27	NP	NP	17.69	1.89	1.61	-	F	0.02	27	UU	12.0	26.0	-	-	-
15.50	SPT/DS		8	10	12	22	15	-																			
16.50	SPT/DS		10	12	14	26	16	6.0	76.7	12.1	5.1	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	UDS	Hard, Brownish to Yellowish, fine-grained inorganic silt of low Plasticity with sand (ML)						3.7	26.2	46.0	24.1	28	NP	NP	13.42	1.93	1.70	2.63	F	0.08	26	-	-	-	-	-	-
18.50	SPT/DS		7	19	18	37	19	-																			
19.50	SPT/DS		9	14	20	34	18	3.0	25.3	47.6	24.1	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							5.0	26.0	49.9	19.1	23	NP	NP	9.19	-	-	2.74	F	0.07	27	-	-	-	-	-	-
21.50	SPT/DS		11	16	22	38	19	-																			
22.50	SPT/DS		13	18	24	42	20	0.0	30.6	44.8	24.6	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS	Very Dense, Brownish, fine-grained silty sand (SM)						7.2	71.2	14.7	7.0	24	NP	NP	20.79	-	-	2.65	F	0.04	29	-	-	-	-	-	-
24.50	SPT/DS		16	20	24	44	20	-																			
25.50	SPT/DS		18	22	26	48	21	10.8	60.8	18.8	9.6	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							6.5	69.2	16.9	7.4	23	NP	NP	18.53	-	-	2.76	F	0.01	30	-	-	-	-	-	-
27.50	SPT/DS		20	24	27	51	22	-																			

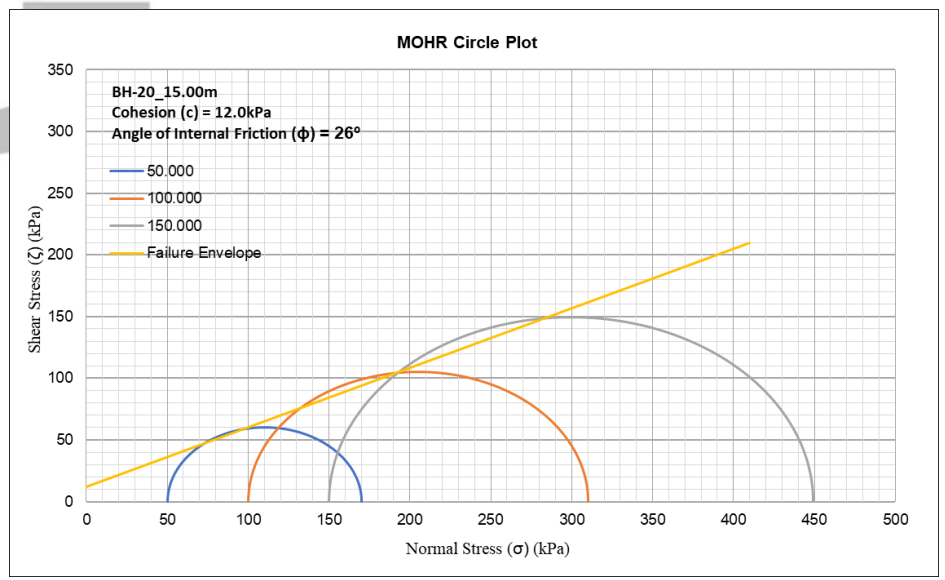
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

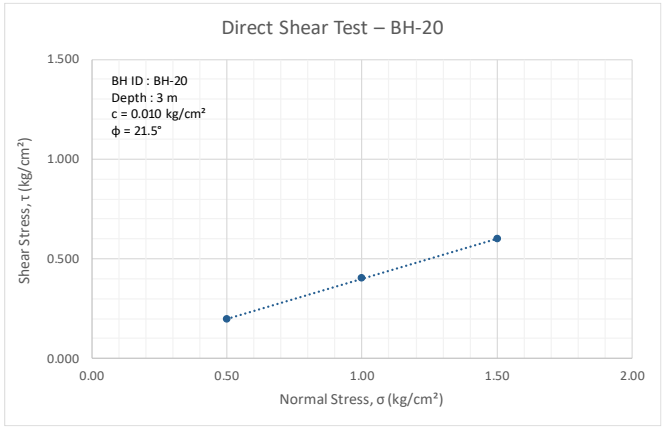

Grain Size Distribution Curve
BH-20_0.00m
BH-20_1.50m
BH-20_3.00m
BH-20_4.50m
BH-20_6.00m
BH-20_7.50m
BH-20_9.00m
Percent Finer (%)
Particle Size (mm)

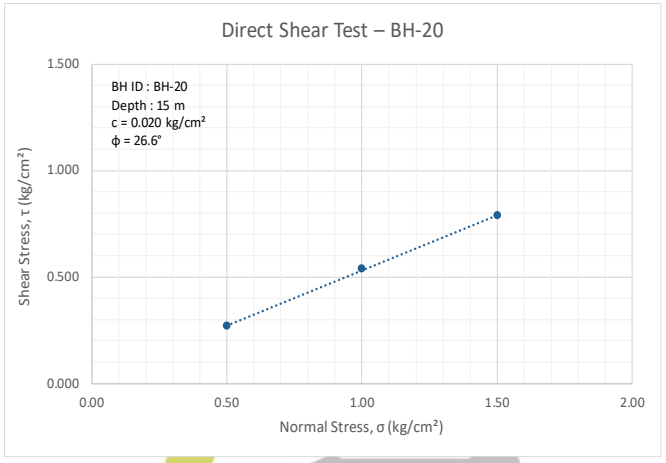

Grain Size Distribution Curve
BH-20_10.50m
BH-20_13.50m
BH-20_15.00m
BH-20_16.50m
BH-20_18.00m
BH-20_19.50m
Percent Finer (%)
Particle Size (mm)

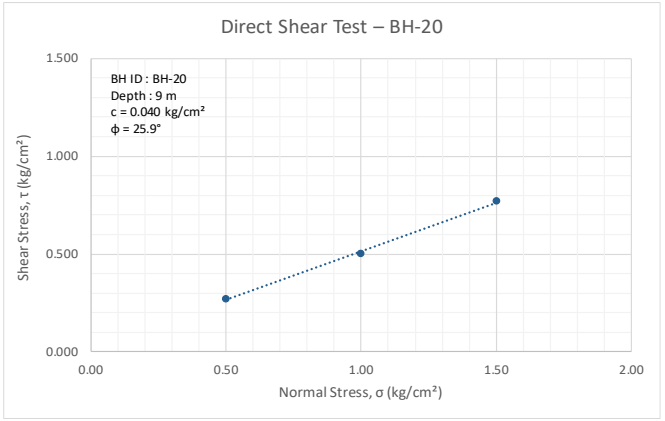

Grain Size Distribution Curve
BH-20_21.00m
BH-20_22.50m
BH-20_24.00m
BH-20_25.50m
BH-20_27.00m
Percent Finer (%)
Particle Size (mm)

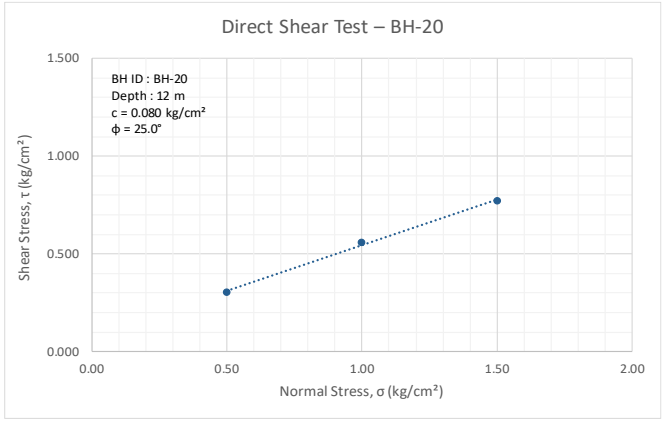

MOHR Circle Plot
BH-20_6.00m
Cohesion (c) = 9.0kPa
Angle of Internal Friction (ϕ) = 28°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

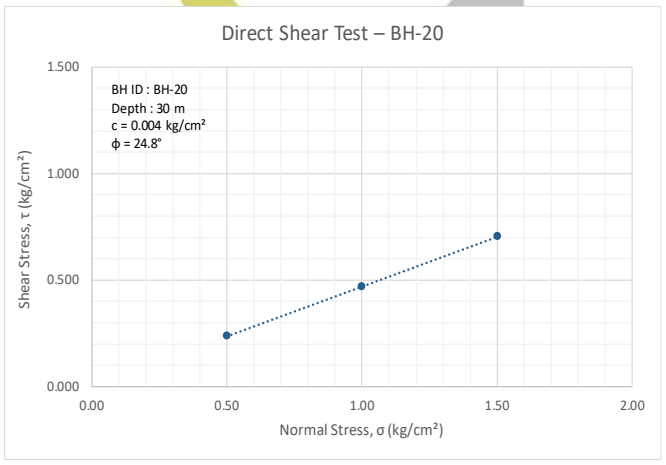

MOHR Circle Plot
BH-20_15.00m
Cohesion (c) = 12.0kPa
Angle of Internal Friction (ϕ) = 26°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

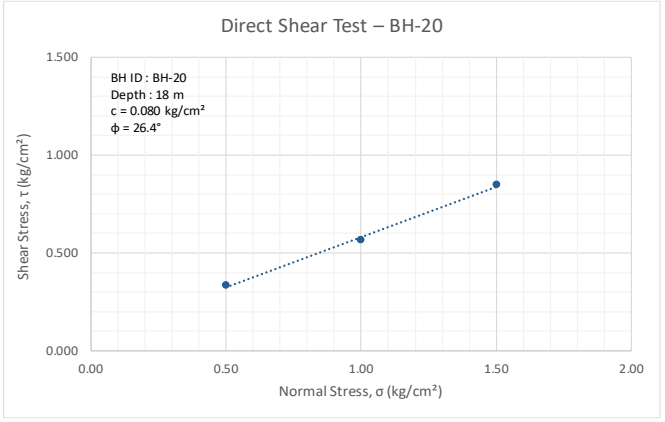

Direct Shear Test – BH-20
BH ID : BH-20
Depth : 3 m
c = 0.010 kg/cm²
ϕ = 21.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

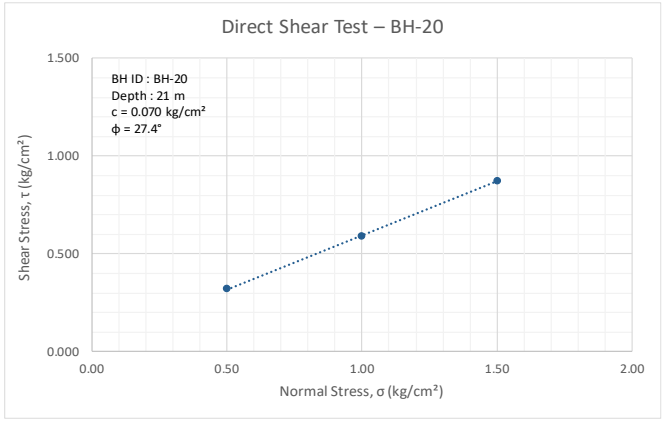

Direct Shear Test – BH-20
BH ID : BH-20
Depth : 15 m
c = 0.020 kg/cm²
ϕ = 26.6°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

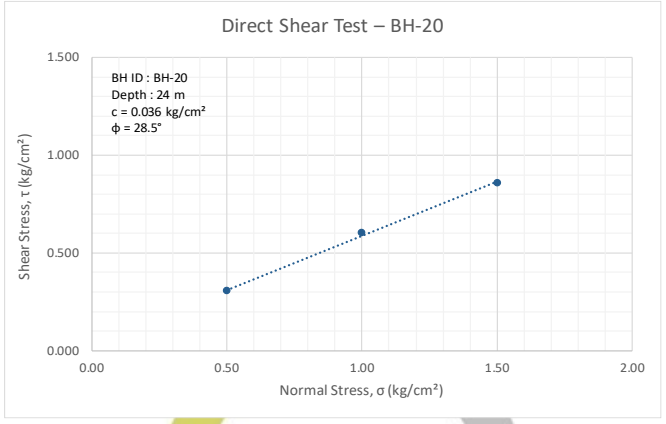

Direct Shear Test – BH-20
BH ID : BH-20
Depth : 9 m
c = 0.040 kg/cm²
ϕ = 25.9°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

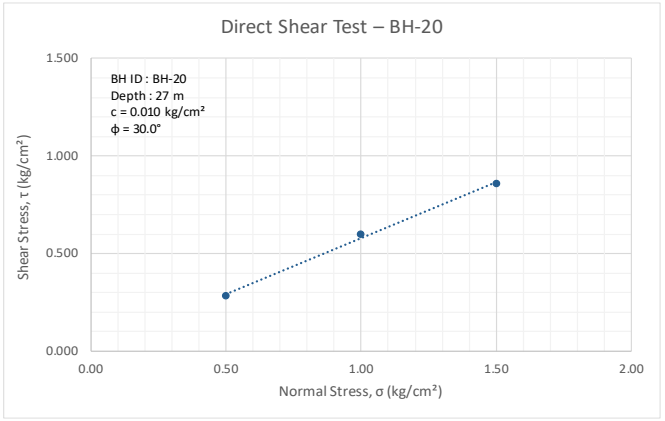

Direct Shear Test – BH-20
BH ID : BH-20
Depth : 12 m
c = 0.080 kg/cm²
ϕ = 25.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-20
BH ID : BH-20
Depth : 30 m
c = 0.004 kg/cm²
ϕ = 24.8°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-20
BH ID : BH-20
Depth : 18 m
c = 0.080 kg/cm²
ϕ = 26.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-20
BH ID : BH-20
Depth : 21 m
c = 0.070 kg/cm²
ϕ = 27.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-20
BH ID : BH-20
Depth : 24 m
c = 0.036 kg/cm²
ϕ = 28.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

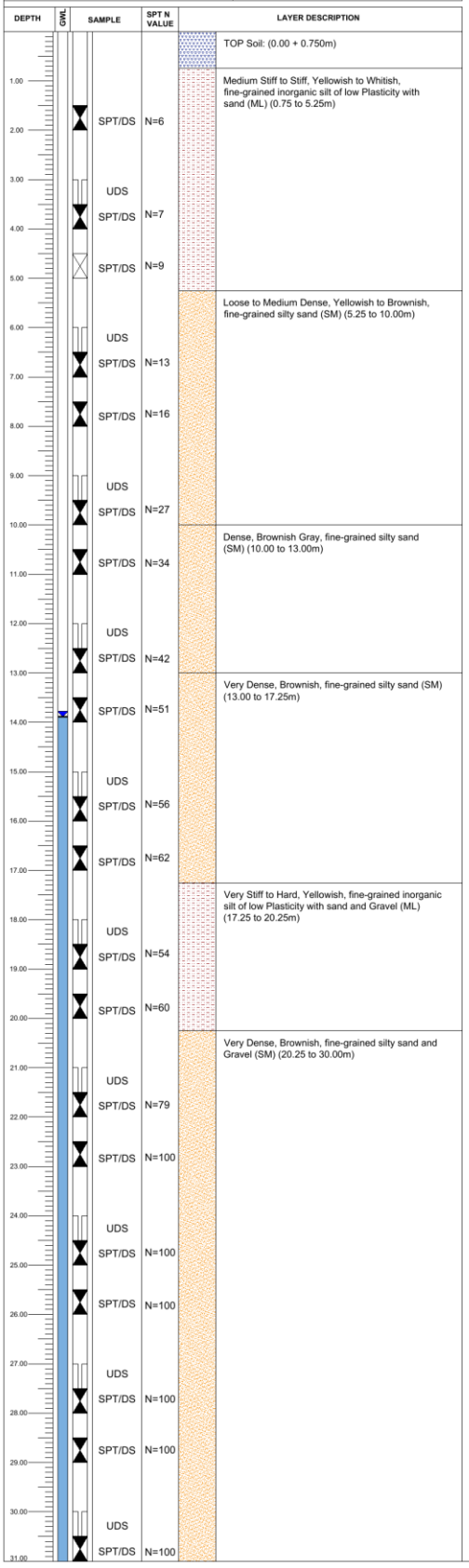

Direct Shear Test – BH-20
BH ID : BH-20
Depth : 27 m
c = 0.010 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (1+000 km TO 2+000 km)

BH ID : BH-20A | **Chainage** : 2+514 KM

Groundwater Level : 13.90 M | **Location** :Lat. 28.550137, Long. 77.333238



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

Soil

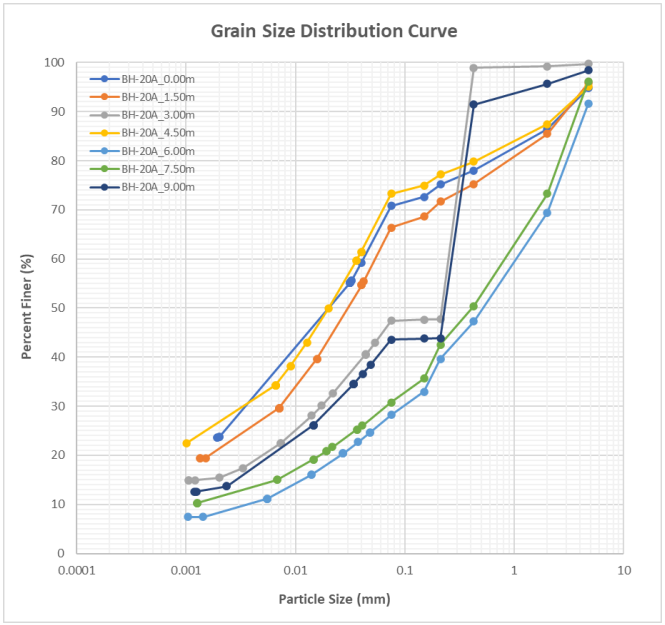
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

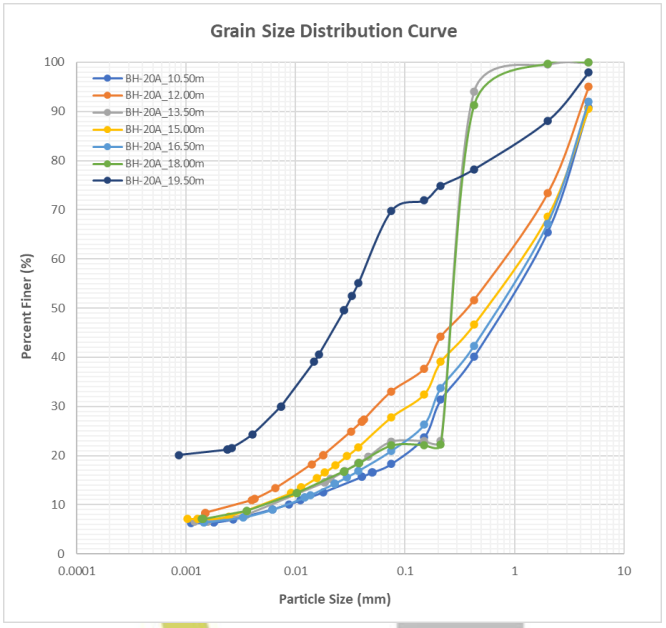
GOMA ENGINEERING AND CONSULTANCY
Quality we put forward

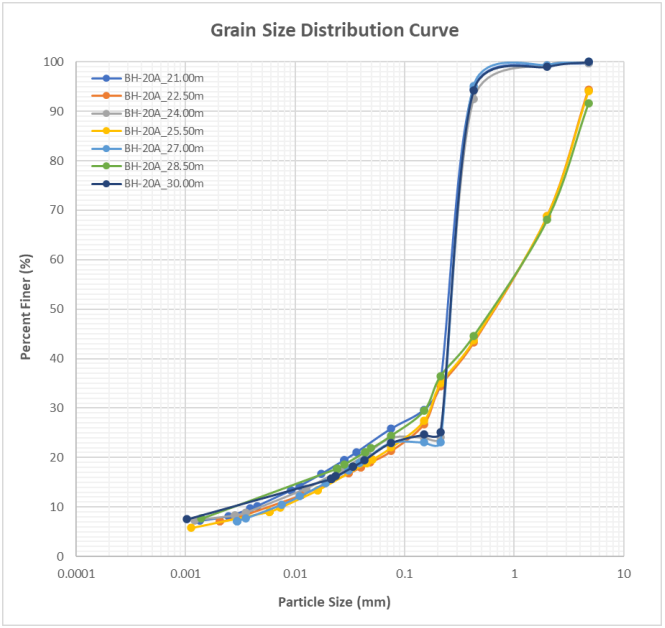
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-20A	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	2+514	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	25-02-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	198.30	**End Date:**	25-02-2026
Project Code:	158_R03_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	13.90	**Location:**	Lat. 28.550137, Long. 77.333238

Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						5.2	24.0	47.1	23.8	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Medium Stiff to Stiff,Yellowish to Whiteish, fine-grained inorganic silt of low Plasticity with sand (ML)	2	3	3	6	8	4.2	29.4	45.1	21.3	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							0.3	52.3	32.0	15.4	24	NP	NP	16.25	1.68	1.45	2.69	F	0.07	21	-	-	-	-	-	-
3.50	SPT/DS		2	3	4	7	8	-																			
4.50	SPT/DS		3	4	5	9	9	5.0	21.8	46.5	26.8	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS	Medium Dense, Brownish, fine-grained silty sand and Gravel (SM)						8.4	63.4	19.9	8.4	22	NP	NP	21.40	1.85	1.52	2.63	F	0.02	23	UU	8.0	27.0	-	-	-
6.50	SPT/DS		4	6	7	13	12	-																			
7.50	SPT/DS		4	7	9	16	15	3.9	65.4	19.2	11.6	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							1.6	54.8	30.1	13.5	24	NP	NP	24.45	1.81	1.45	2.68	F	0.03	25	-	-	-	-	-	-
9.50	SPT/DS		9	11	16	27	23	-																			
10.50	SPT/DS	Dense, Brownish Grey, fine-grained silty sand (SM)	11	15	19	34	28	9.2	72.5	11.7	6.6	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	UDS							5.0	62.0	24.0	9.1	29	NP	NP	19.53	1.87	1.56	2.70	F	0.05	27	UU	13.0	23.0	-	-	-
12.50	SPT/DS		15	18	24	42	32	-																			
13.50	SPT/DS	Very Dense, Brownish, fine-grained silty sand (SM)	17	23	28	51	37	0.0	77.1	15.9	7.0	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							9.5	62.7	20.3	7.5	21	NP	NP	15.92	-	-	2.70	F	0.02	29	-	-	-	-	-	-
15.50	SPT/DS		20	25	31	56	27	-																			
16.50	SPT/DS		22	28	34	62	28	8.0	71.0	14.2	6.8	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS	Very Stiff to Hard,Yellowish, fine-grained inorganic silt of low Plasticity with sand and Gravel (ML)						0.0	78.0	14.3	7.7	29	NP	NP	18.87	-	-	2.61	F	0.10	27	-	-	-	-	-	-
18.50	SPT/DS		20	24	30	54	25	-																			
19.50	SPT/DS		24	23	37	60	27	2.1	28.1	48.8	21.0	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS	Very Dense, Brownish, fine-grained silty sand and Gravel (SM)						0.3	73.9	18.0	7.8	23	NP	NP	31.36	-	-	2.72	F	0.02	30	-	-	-	-	-	-
21.50	SPT/DS		30	37	42	79	32	-																			
22.50	SPT/DS		36	(50/9 cm)	-	100	38	5.6	73.1	15.8	5.5	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.2	75.9	16.1	7.8	29	NP	NP	18.38	-	-	2.66	F	0.05	30	-	-	-	-	-	-
24.50	SPT/DS		40	(50/6 cm)	-	100	37	-																			
25.50	SPT/DS		(50/6 cm)	-	-	100	37	5.9	72.0	15.1	6.9	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							0.0	77.1	16.8	6.2	27	NP	NP	16.43	-	-	2.76	F	0.01	31	-	-	-	-	-	-
27.50	SPT/DS		48	(50/7 cm)	-	100	36	-																			
28.50	SPT/DS		42	(50/3 cm)	-	100	35	8.4	67.2	15.5	8.9	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.0	77.0	13.6	9.3	23	NP	NP	15.20	-	-	2.69	F	0.00	32	-	-	-	-	-	-
30.50	SPT/DS		(50/4 cm)	-	-	100	34	-																			

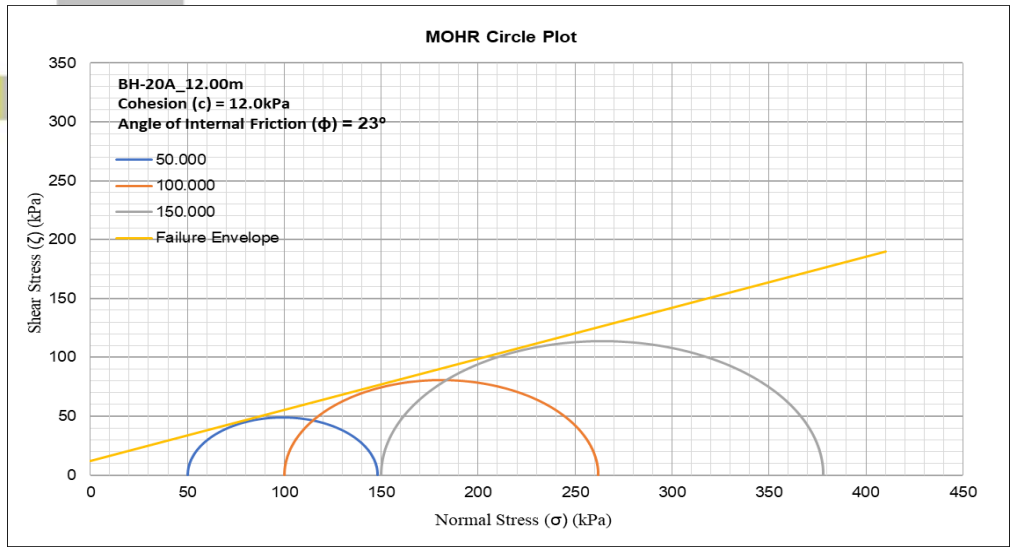
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

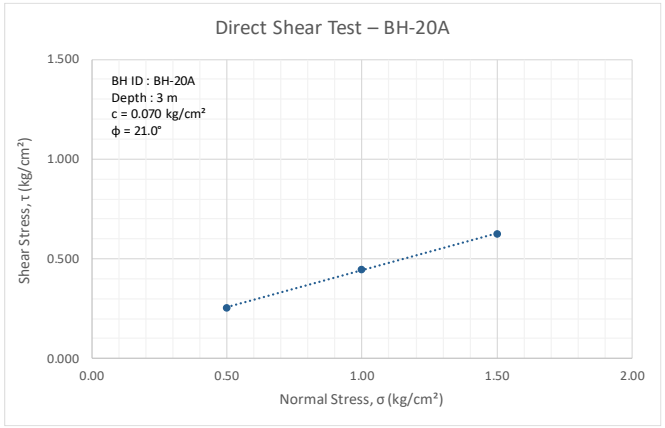

Grain Size Distribution Curve
BH-20A_0.00m
BH-20A_1.50m
BH-20A_3.00m
BH-20A_4.50m
BH-20A_6.00m
BH-20A_7.50m
BH-20A_9.00m
Percent Finer (%)
Particle Size (mm)

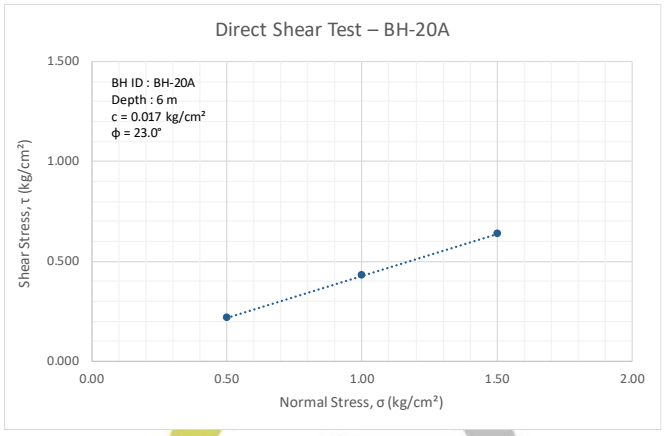

Grain Size Distribution Curve
BH-20A_10.50m
BH-20A_12.00m
BH-20A_13.50m
BH-20A_15.00m
BH-20A_16.50m
BH-20A_18.00m
BH-20A_19.50m
Percent Finer (%)
Particle Size (mm)

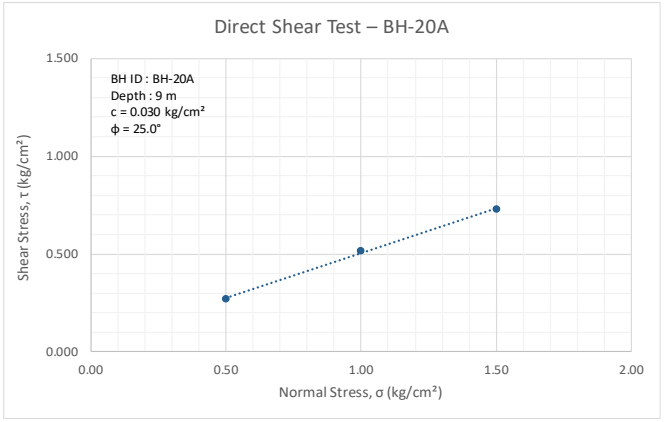

Grain Size Distribution Curve
BH-20A_21.00m
BH-20A_22.50m
BH-20A_24.00m
BH-20A_25.50m
BH-20A_27.00m
BH-20A_28.50m
BH-20A_30.00m
Percent Finer (%)
Particle Size (mm)

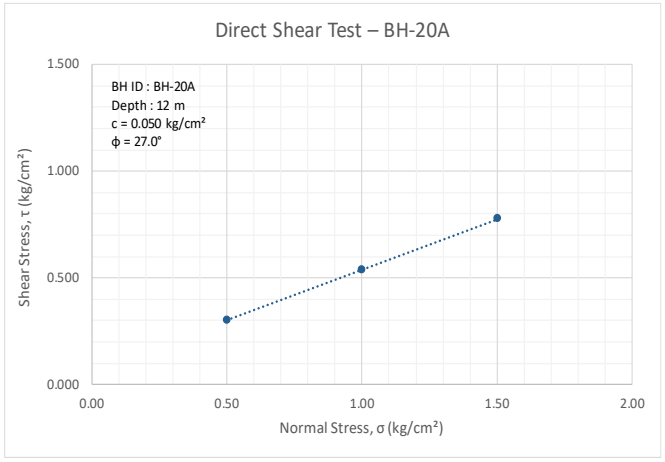

MOHR Circle Plot
BH-20A_6.00m
Cohesion (c) = 8.0kPa
Angle of Internal Friction (ϕ) = 27°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

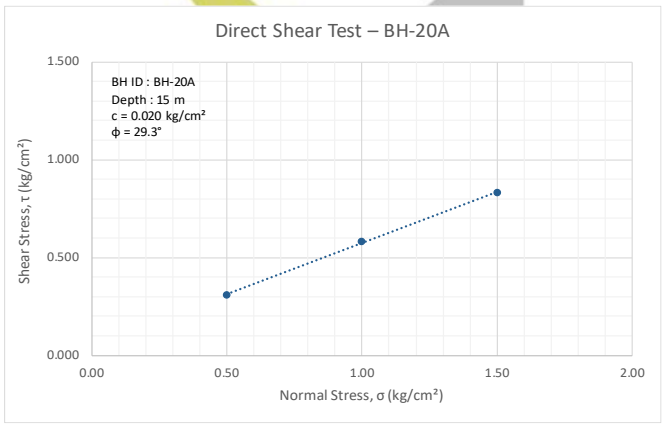

MOHR Circle Plot
BH-20A_12.00m
Cohesion (c) = 12.0kPa
Angle of Internal Friction (ϕ) = 23°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

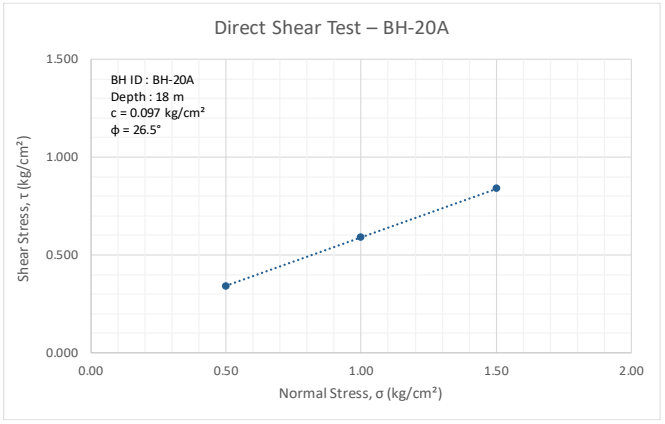

Direct Shear Test – BH-20A
BH ID : BH-20A
Depth : 3 m
c = 0.070 kg/cm²
ϕ = 21.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

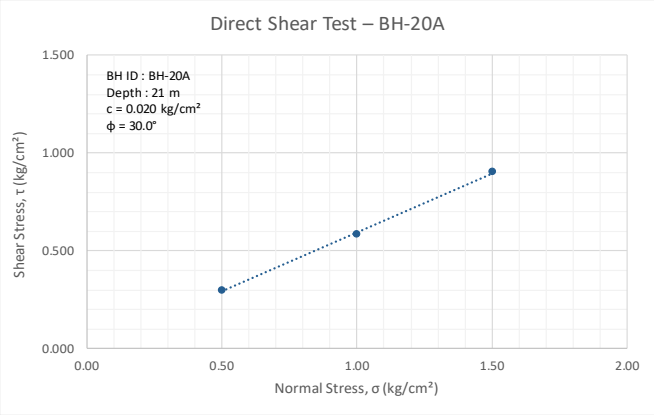

Direct Shear Test – BH-20A
BH ID : BH-20A
Depth : 6 m
c = 0.017 kg/cm²
ϕ = 23.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

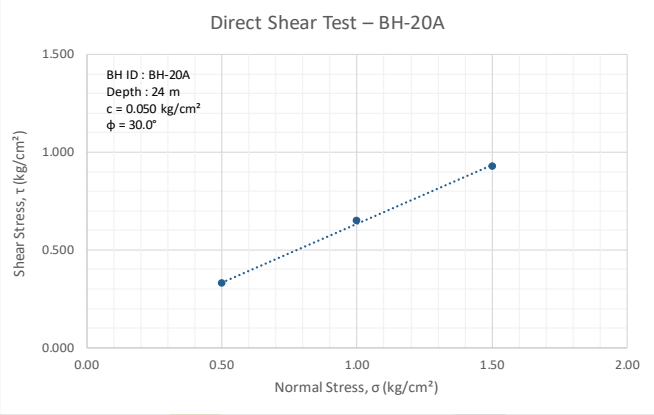

Direct Shear Test – BH-20A
BH ID : BH-20A
Depth : 9 m
c = 0.030 kg/cm²
ϕ = 25.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

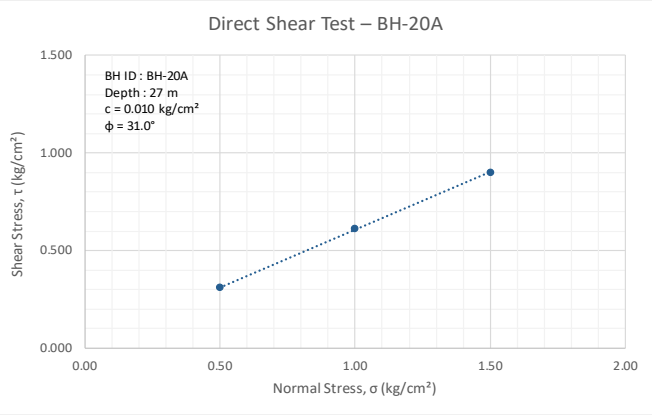

Direct Shear Test – BH-20A
BH ID : BH-20A
Depth : 12 m
c = 0.050 kg/cm²
ϕ = 27.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

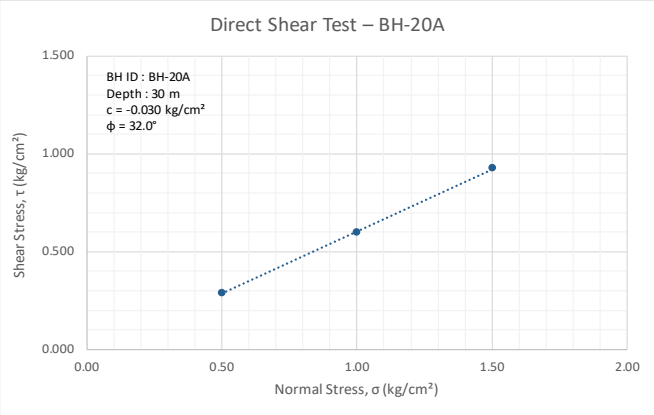

Direct Shear Test – BH-20A
BH ID : BH-20A
Depth : 15 m
c = 0.020 kg/cm²
ϕ = 29.3°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-20A
BH ID : BH-20A
Depth : 18 m
c = 0.097 kg/cm²
ϕ = 26.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

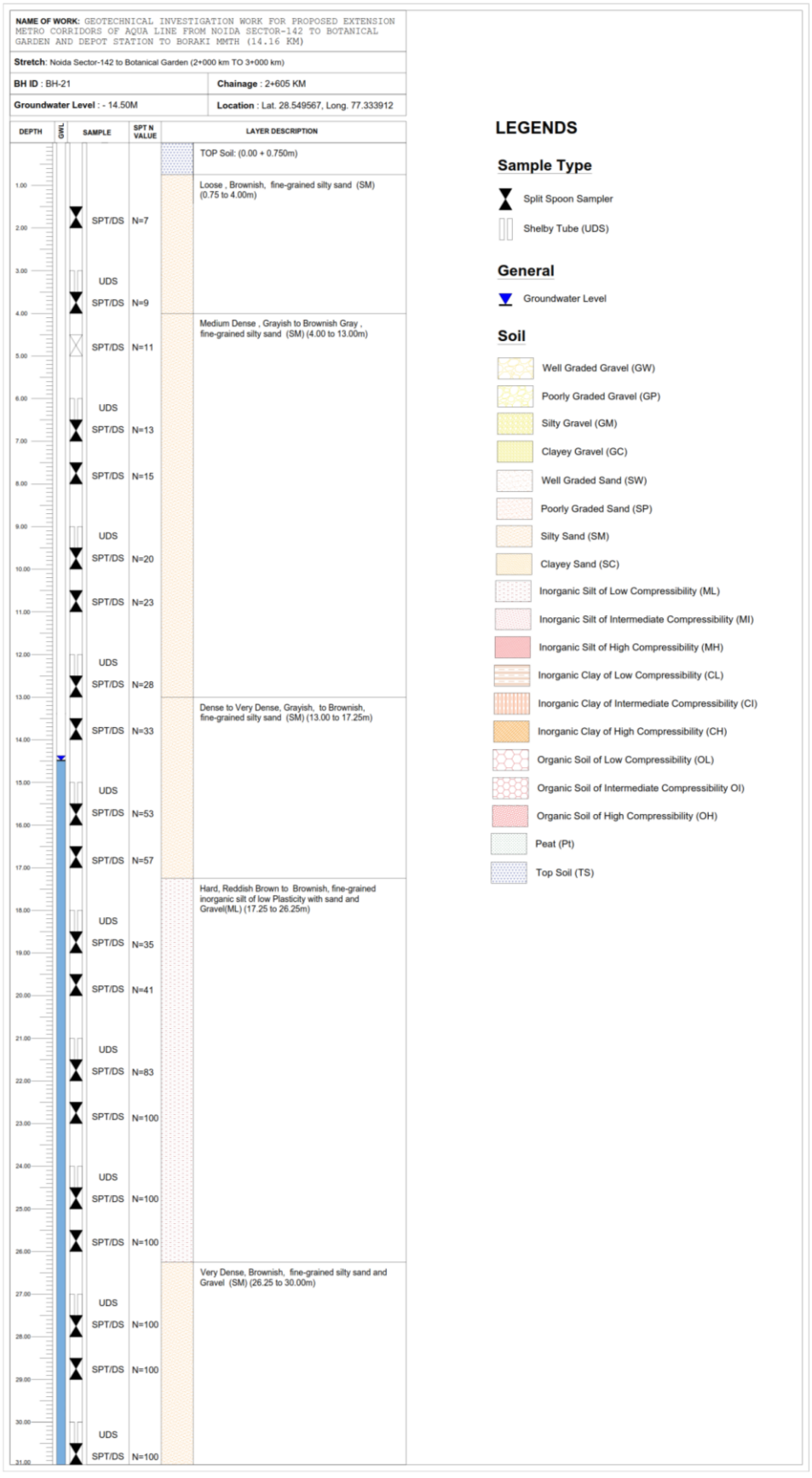

Direct Shear Test – BH-20A
BH ID : BH-20A
Depth : 21 m
c = 0.020 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-20A
BH ID : BH-20A
Depth : 24 m
c = 0.050 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-20A
BH ID : BH-20A
Depth : 27 m
c = 0.010 kg/cm²
ϕ = 31.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-20A
BH ID : BH-20A
Depth : 30 m
c = -0.030 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

C.4. Zone 4: CH: 2+515 km to 3+515 km (BH-21 to BH-30)

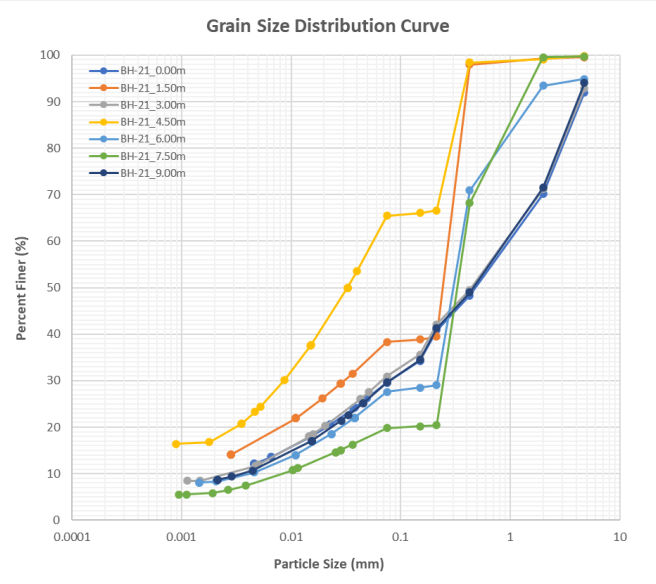


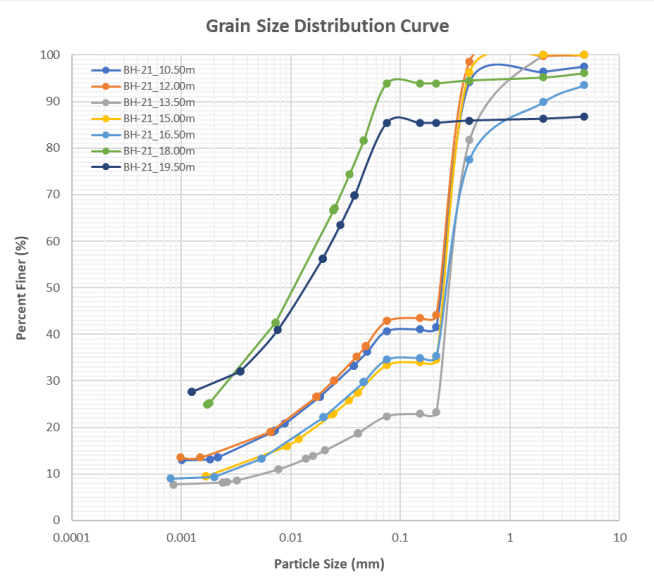
GOMA ENGINEERING AND CONSULTANCY
Quality we put forward

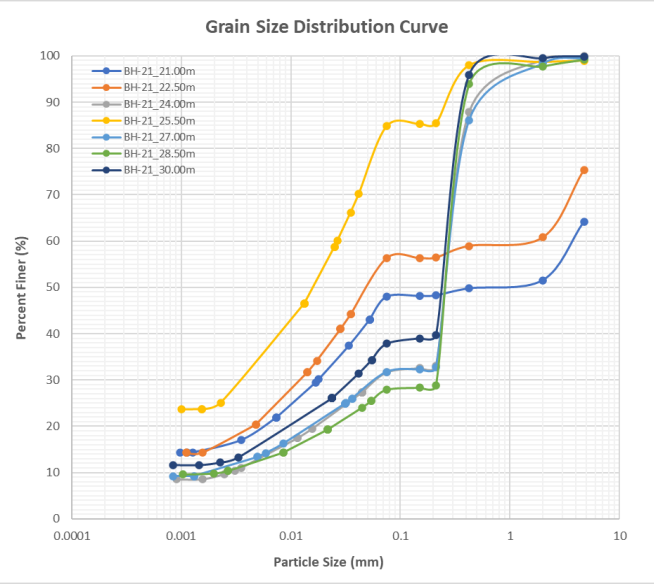
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-21	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	2+605	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	29-01-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	199.5	**End Date:**	29-01-2026
Project Code:	158_R4_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	14.50	**Location:**	Lat. 28.549567, Long. 77.333912

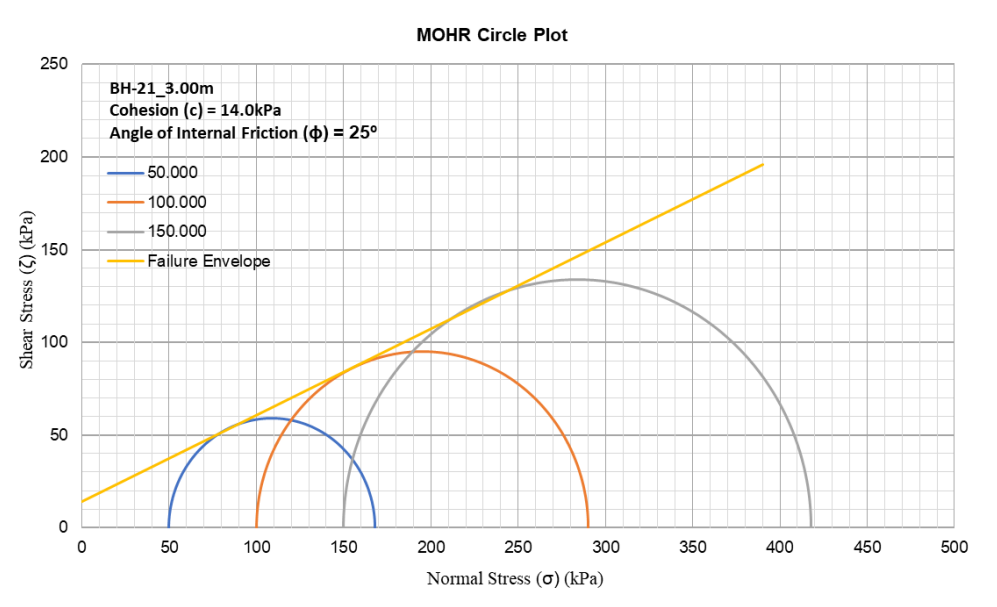
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [°]	Type	Cohesion [kPa]	Angle of Friction [°]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						8.0	62.4	21.9	7.9	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Loose, Brownish, fine-grained silty sand (SM)	3	3	4	7	10	0.5	61.2	27.2	11.1	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							7.1	61.9	21.7	9.3	29	NP	NP	24.23	1.87	1.51	2.62	F	0.01	22	UU	14.0	25.0	-	-	-
3.50	SPT/DS		3	4	5	9	10	-																			
4.50	SPT/DS	Medium Dense, Grayish to Brownish Gray, fine-grained silty sand (SM)	4	5	6	11	11	0.1	34.4	48.0	17.4	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS							5.2	67.3	19.3	8.3	21	NP	NP	29.04	1.78	1.38	2.77	F	0.02	24	-	-	-	-	-	-
6.50	SPT/DS		5	6	7	13	12	-																			
7.50	SPT/DS		5	7	8	15	14	0.3	79.9	13.9	5.9	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							5.9	64.4	29.7	0.0	22	NP	NP	17.56	1.87	1.59	2.61	F	0.02	25	UU	8.0	28.0	-	-	-
9.50	SPT/DS		7	9	11	20	17	-																			
10.50	SPT/DS		8	10	13	23	19	2.5	56.8	27.4	13.4	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							0.0	57.1	28.2	14.6	26	NP	NP	21.75	-	-	2.66	F	0.04	28	-	-	-	-	-	-
12.50	SPT/DS		10	13	15	28	21	-																			
13.50	SPT/DS	Dense to Very Dense, Grayish, to Brownish, fine-grained silty sand (SM)	11	14	19	33	24	0.0	77.6	14.3	8.1	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.0	66.6	23.3	10.2	23	NP	NP	19.97	-	-	2.66	F	0.08	27	-	-	-	-	-	-
15.50	SPT/DS		20	24	29	53	25	-																			
16.50	SPT/DS		22	26	31	57	26	6.4	59.0	25.2	9.4	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	UDS	Hard, Reddish Brown to Brownish, fine-grained inorganic silt of low Plasticity with sand and Gravel(ML)						3.9	2.2	67.4	26.5	28	NP	NP	23.56	1.92	1.56	2.80	F	0.04	29	-	-	-	-	-	-
18.50	SPT/DS		12	15	20	35	19	-																			
19.50	SPT/DS		14	17	24	41	20	13.3	1.3	55.8	29.7	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							35.8	16.2	32.5	15.5	27	NP	NP	22.69	-	-	2.63	F	0.05	30	-	-	-	-	-	-
21.50	SPT/DS		32	38	45	83	33	-																			
22.50	SPT/DS		37	45	(50/10 cm)	100	37	24.6	19.1	40.6	15.7	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.0	68.4	22.5	9.1	29	NP	NP	15.28	-	-	2.67	F	0.02	31	-	-	-	-	-	-
24.50	SPT/DS		40	45	(50/5 cm)	100	37	-																			
25.50	SPT/DS		45	(50/4 cm)	-	100	36	1.0	14.2	60.2	24.6	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS	Very Dense, Brownish, fine-grained silty sand and Gravel (SM)						0.4	67.8	21.2	10.5	26	NP	NP	13.83	-	-	2.69	F	0.03	33	-	-	-	-	-	-
27.50	SPT/DS		49	(50/7 cm)	-	100	35	-																			
28.50	SPT/DS		48	(50/5 cm)	-	100	35	0.8	71.3	18.1	9.8	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.1	62.1	25.8	12.0	24	NP	NP	19.99	-	-	2.64	F	0.00	34	-	-	-	-	-	-
30.50	SPT/DS		50	(50/4 cm)	-	100	34	-																			

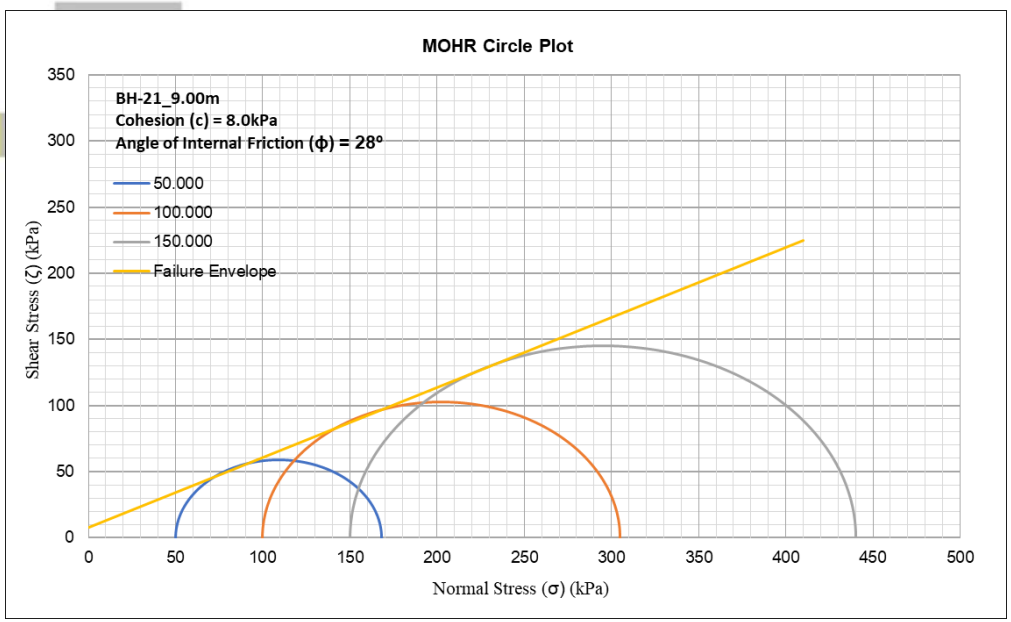
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

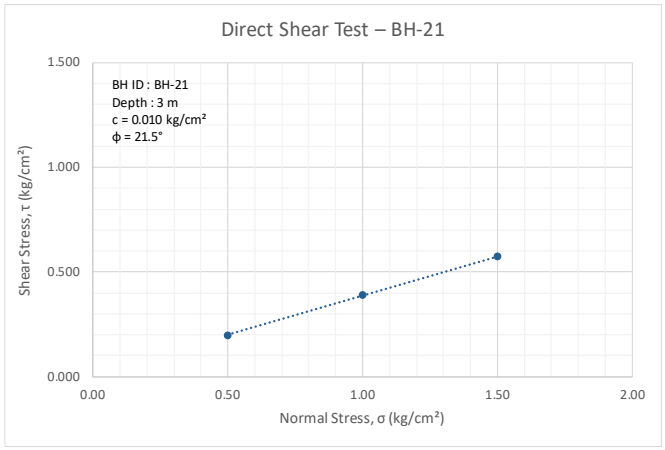

Grain Size Distribution Curve
BH-21_0.00m
BH-21_1.50m
BH-21_3.00m
BH-21_4.50m
BH-21_6.00m
BH-21_7.50m
BH-21_9.00m
Percent Finer (%)
Particle Size (mm)

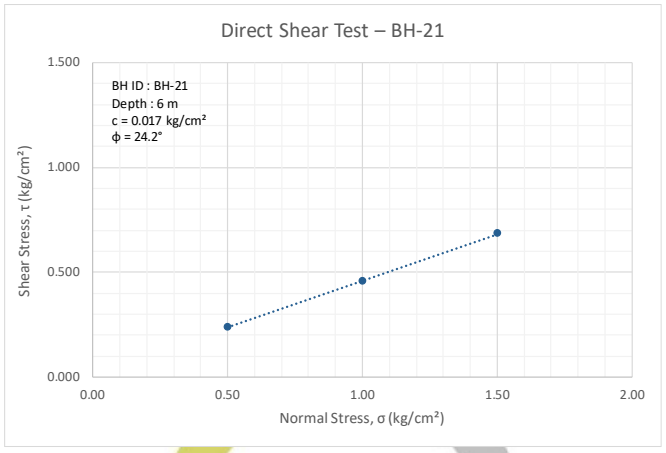

Grain Size Distribution Curve
BH-21_10.50m
BH-21_12.00m
BH-21_13.50m
BH-21_15.00m
BH-21_16.50m
BH-21_18.00m
BH-21_19.50m
Percent Finer (%)
Particle Size (mm)

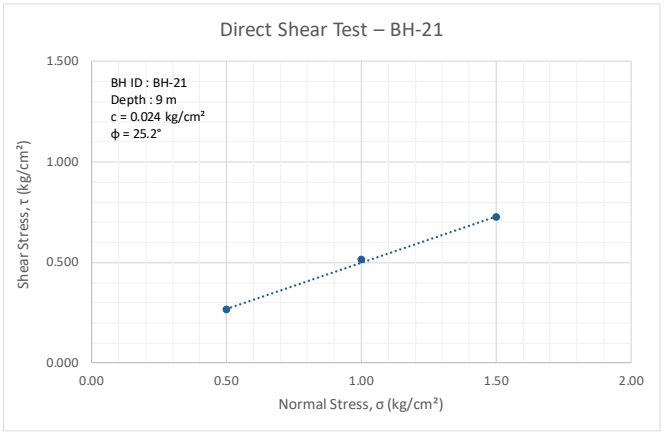

Grain Size Distribution Curve
BH-21_21.00m
BH-21_22.50m
BH-21_24.00m
BH-21_25.50m
BH-21_27.00m
BH-21_28.50m
BH-21_30.00m
Percent Finer (%)
Particle Size (mm)

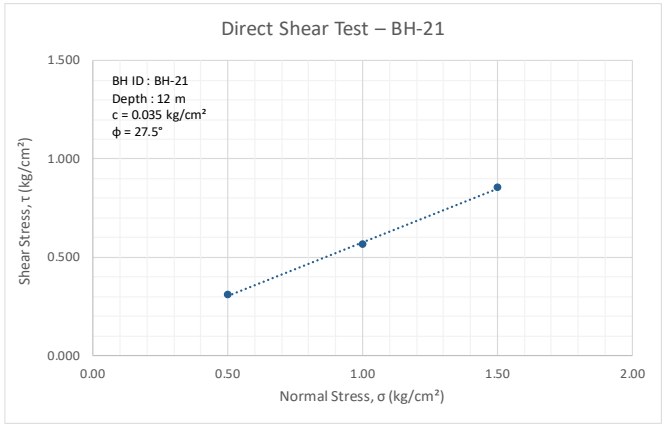

MOHR Circle Plot
BH-21_3.00m
Cohesion (c) = 14.0kPa
Angle of Internal Friction (ϕ) = 25°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

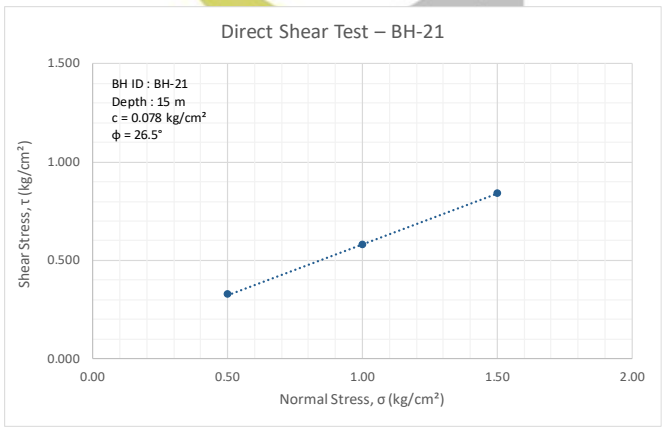

MOHR Circle Plot
BH-21_9.00m
Cohesion (c) = 8.0kPa
Angle of Internal Friction (ϕ) = 28°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

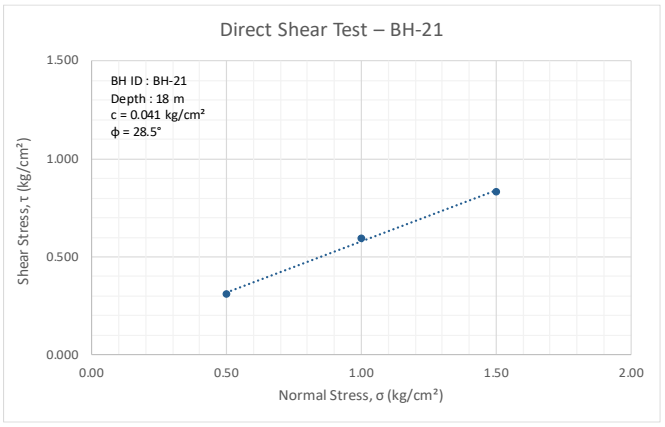

Direct Shear Test – BH-21
BH ID : BH-21
Depth : 3 m
c = 0.010 kg/cm²
ϕ = 21.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

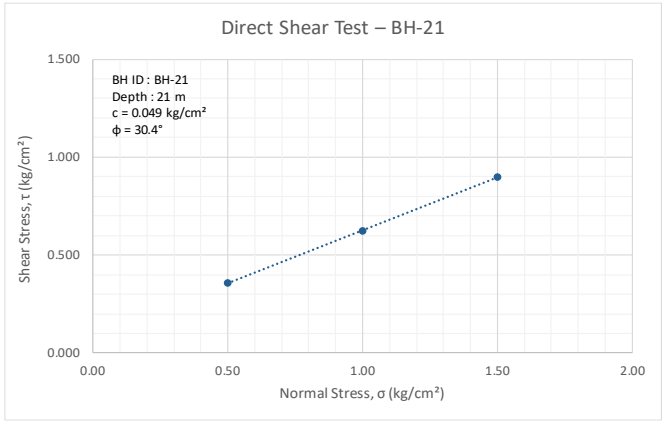

Direct Shear Test – BH-21
BH ID : BH-21
Depth : 6 m
c = 0.017 kg/cm²
ϕ = 24.2°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

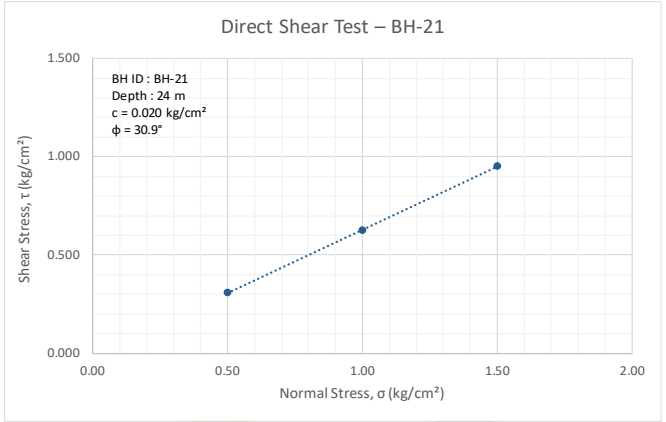

Direct Shear Test – BH-21
BH ID : BH-21
Depth : 9 m
c = 0.024 kg/cm²
ϕ = 25.2°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

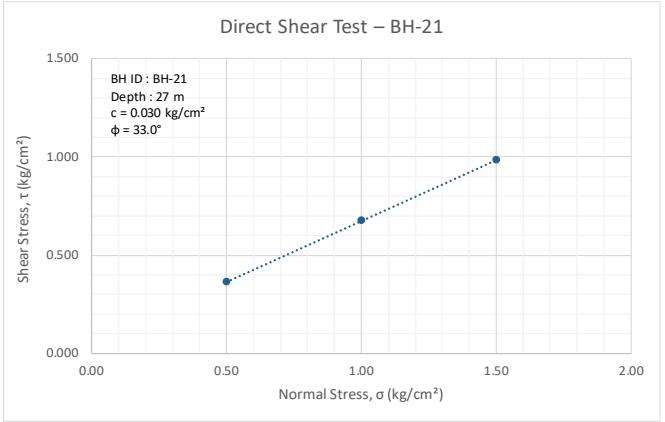

Direct Shear Test – BH-21
BH ID : BH-21
Depth : 12 m
c = 0.035 kg/cm²
ϕ = 27.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

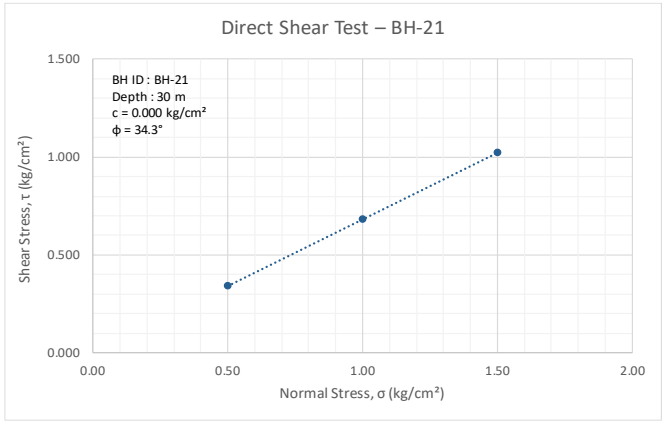

Direct Shear Test – BH-21
BH ID : BH-21
Depth : 15 m
c = 0.078 kg/cm²
ϕ = 26.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-21
BH ID : BH-21
Depth : 18 m
c = 0.041 kg/cm²
ϕ = 28.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-21
BH ID : BH-21
Depth : 21 m
c = 0.049 kg/cm²
ϕ = 30.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-21
BH ID : BH-21
Depth : 24 m
c = 0.020 kg/cm²
ϕ = 30.9°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

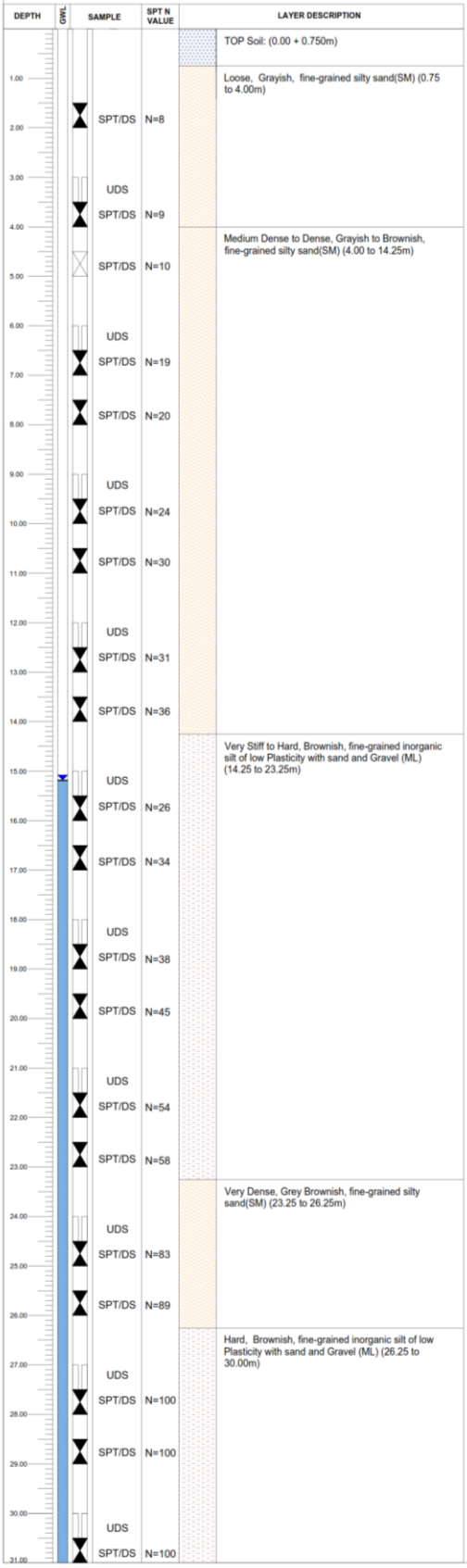

Direct Shear Test – BH-21
BH ID : BH-21
Depth : 27 m
c = 0.030 kg/cm²
ϕ = 33.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-21
BH ID : BH-21
Depth : 30 m
c = 0.000 kg/cm²
ϕ = 34.3°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (2+000 km TO 3+000 km)

BH ID : BH-22	**Chainage** : 2+719 KM
Groundwater Level : - 15.20M	**Location** : Lat. 28.54886 Long. 77.334756



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

Soil

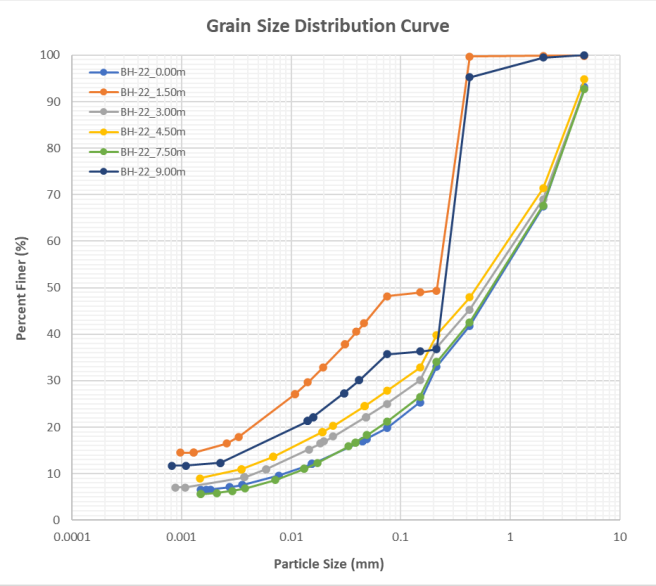
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

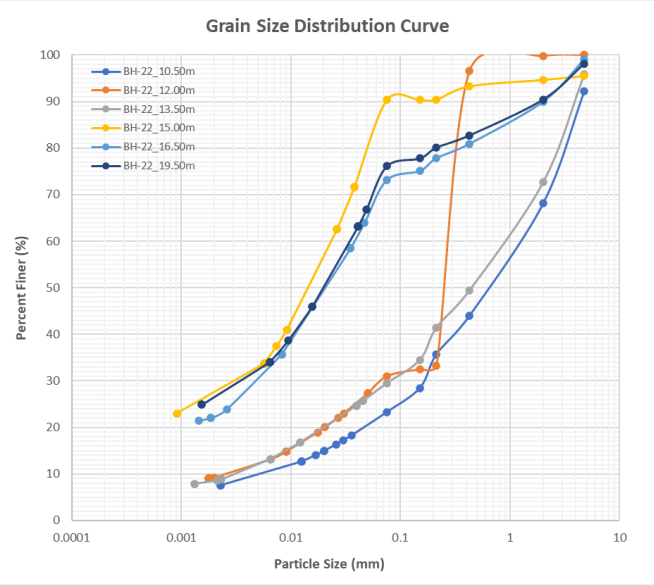
GOMA ENGINEERING AND CONSULTANCY
Quality we put forward

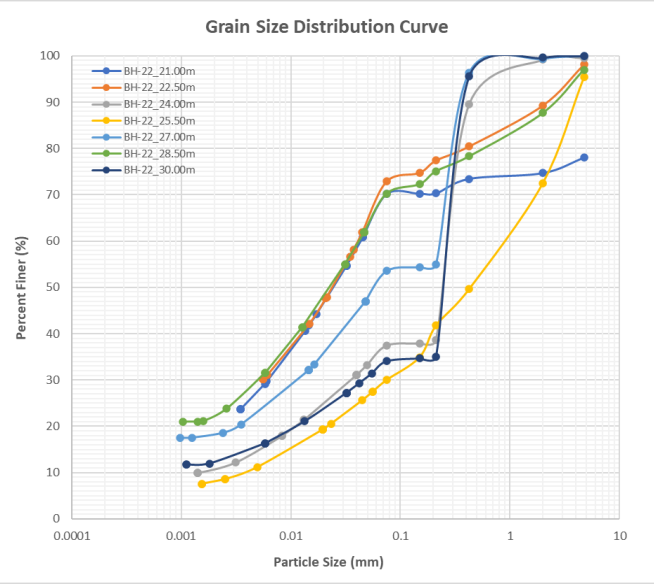
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-22	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	2+719	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	27-01-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	197.7	**End Date:**	28-01-2026
Project Code:	158_R4_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	15.20	**Location:**	Lat. 28.54886 Long. 77.334756

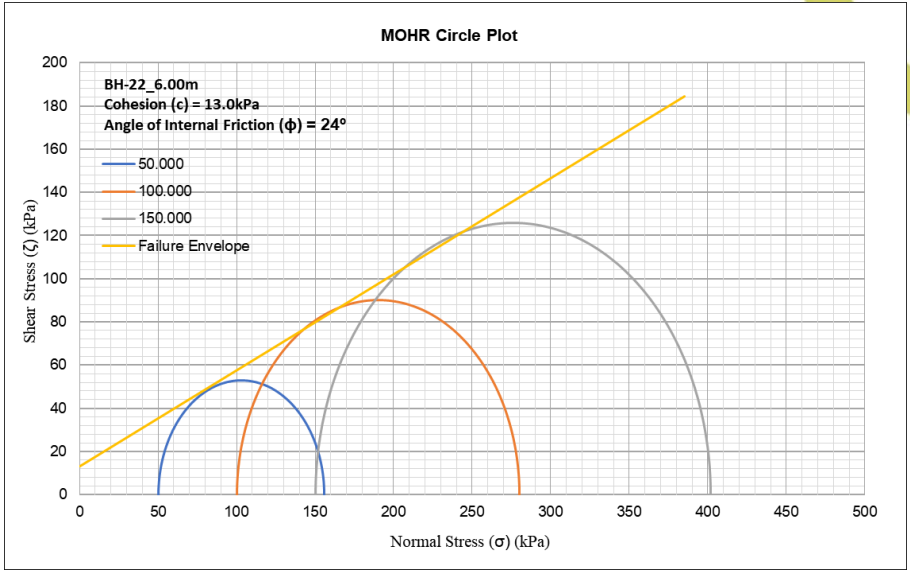
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [^{0}]	Type	Cohesion [kPa]	Angle of Friction [^{0}]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						6.9	73.3	13.1	6.7	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Loose, Grayish, fine-grained silty sand(SM)	3	4	4	8	11	0.1	51.7	32.4	15.8	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							7.3	67.7	16.9	8.1	24	NP	NP	8.19	1.72	1.59	2.78	F	0.01	22	-	-	-	-	-	-
3.50	SPT/DS		3	4	5	9	10	-																			
4.50	SPT/DS	Medium Dense to Dense, Grayish to Brownish, fine-grained silty sand(SM)	4	5	5	10	10	5.2	67.0	18.1	9.7	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS							9.7	65.7	16.1	8.5	26	NP	NP	17.20	1.9	1.63	2.66	F	0.02	24	UU	13.0	24.0	-	-	-
6.50	SPT/DS		7	9	10	19	18	-																			
7.50	SPT/DS		8	9	11	20	18	7.3	71.5	15.4	5.8	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	DS							0.0	64.3	23.5	12.2	24	NP	NP	18.24	-	-	2.62	F	0.03	26	-	-	-	-	-	-
9.50	SPT/DS		9	11	13	24	20	-																			
10.50	SPT/DS		11	14	16	30	25	7.8	68.9	15.6	7.7	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							0.0	69.0	21.7	9.2	26	NP	NP	21.90	-	-	2.71	F	0.04	28	-	-	-	-	-	-
12.50	SPT/DS		12	14	17	31	23	-																			
13.50	SPT/DS		13	17	19	36	26	4.1	66.4	21.0	8.5	21	NP	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS	Very Stiff to Hard, Brownish, fine-grained inorganic silt of low Plasticity with sand and Gravel (ML)						4.5	5.2	62.7	27.6	26	NP	NP	25.67	-	-	2.74	F	0.06	27	-	-	-	-	-	-
15.50	SPT/DS		10	12	14	26	16	-																			
16.50	SPT/DS		12	15	19	34	19	0.9	25.9	50.7	22.4	22	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	UDS							0.9	28.9	50.2	20.0	25	NP	NP	24.37	1.9	1.52	2.67	F	0.11	26	UU	12.0	27.0	-	-	-
18.50	SPT/DS		14	17	21	38	19	-																			
19.50	SPT/DS		16	20	25	45	21	1.8	22.0	49.5	26.6	26	0	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							22.0	7.8	46.4	23.8	27	NP	NP	26.46	-	-	2.79	F	0.07	28	-	-	-	-	-	-
21.50	SPT/DS		21	24	30	54	24	-																			
22.50	SPT/DS		23	27	31	58	25	1.9	25.2	53.2	19.7	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS	Very Dense, Grey Brownish, fine-grained silty sand(SM)						0.4	62.1	26.6	10.9	22	NP	NP	20.36	-	-	2.70	F	0.06	30	-	-	-	-	-	-
24.50	SPT/DS		32	38	45	83	31	-																			
25.50	SPT/DS		35	41	48	89	33	4.6	65.4	21.9	8.1	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS	Hard, Brownish, fine-grained inorganic silt of low Plasticity with sand and Gravel (ML)						0.0	46.5	35.3	18.3	24	NP	NP	21.61	-	-	2.73	F	0.12	29	-	-	-	-	-	-
27.50	SPT/DS		50	(50/4 cm)	-	100	35	-																			
28.50	SPT/DS		50	(50/3 cm)	-	100	34	3.0	26.7	47.9	22.3	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.0	66.0	21.7	12.3	21	NP	NP	19.51	-	-	2.73	F	0.05	30	-	-	-	-	-	-
30.50	SPT/DS		49	(50/2 cm)	-	100	33	-																			

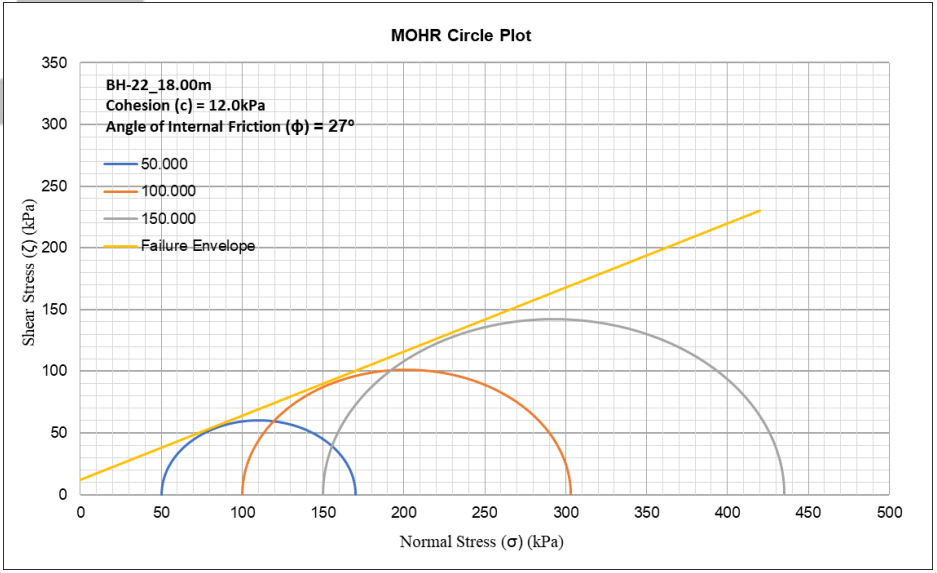
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

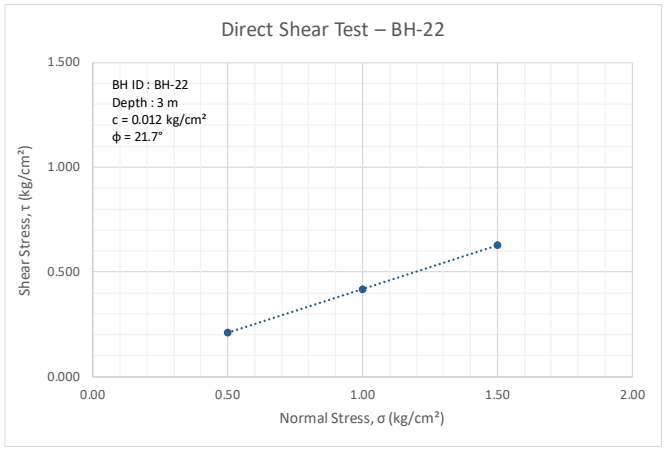

Grain Size Distribution Curve
BH-22_0.00m
BH-22_1.50m
BH-22_3.00m
BH-22_4.50m
BH-22_7.50m
BH-22_9.00m
Percent Finer (%)
Particle Size (mm)

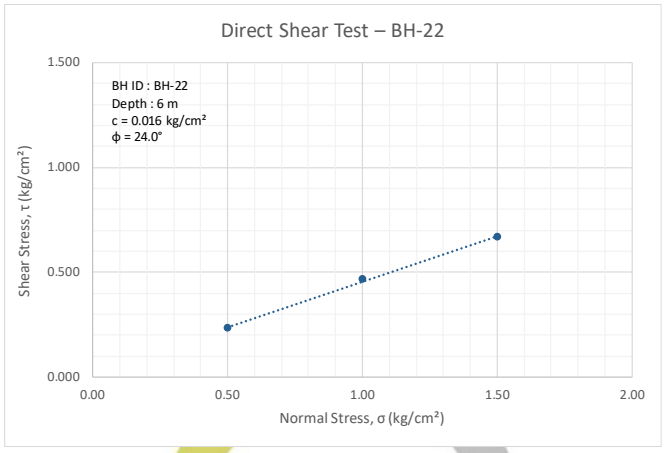

Grain Size Distribution Curve
BH-22_10.50m
BH-22_12.00m
BH-22_13.50m
BH-22_15.00m
BH-22_16.50m
BH-22_19.50m
Percent Finer (%)
Particle Size (mm)

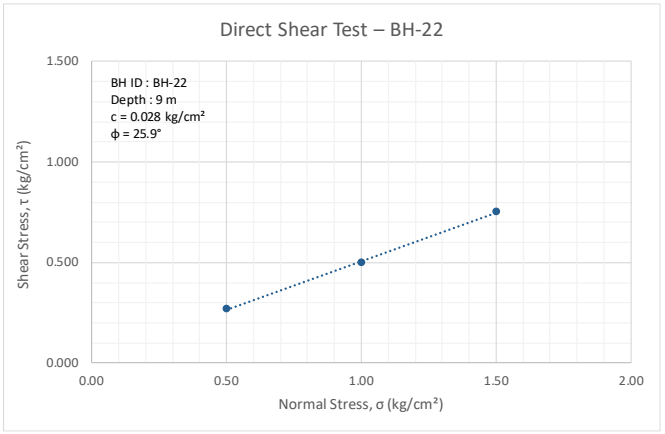

Grain Size Distribution Curve
BH-22_21.00m
BH-22_22.50m
BH-22_24.00m
BH-22_25.50m
BH-22_27.00m
BH-22_28.50m
BH-22_30.00m
Percent Finer (%)
Particle Size (mm)

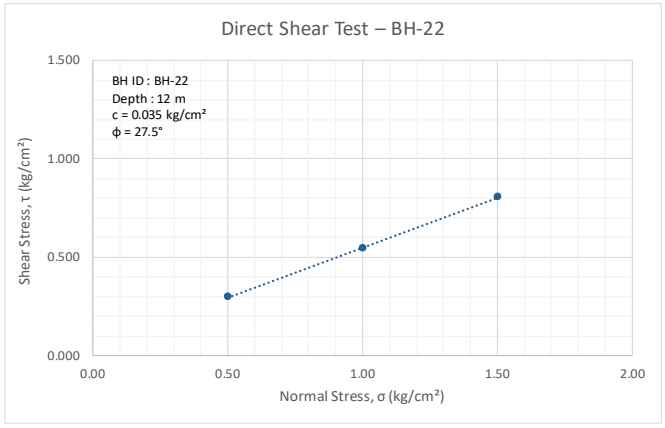

MOHR Circle Plot
BH-22_6.00m
Cohesion (c) = 13.0kPa
Angle of Internal Friction (ϕ) = 24°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

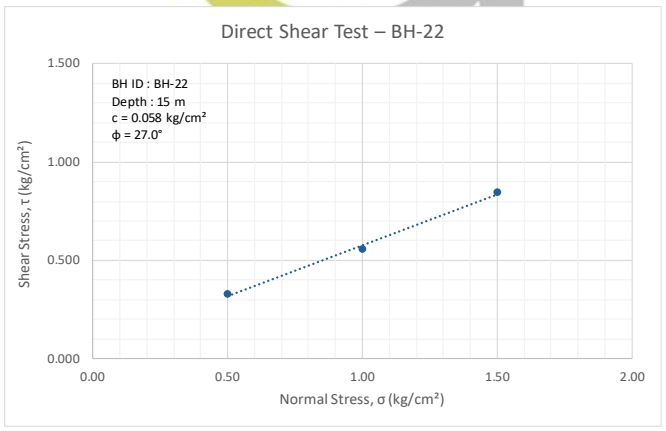

MOHR Circle Plot
BH-22_18.00m
Cohesion (c) = 12.0kPa
Angle of Internal Friction (ϕ) = 27°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

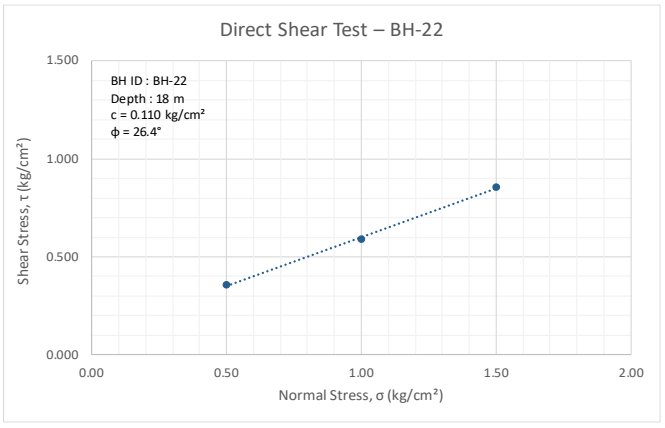

Direct Shear Test – BH-22
BH ID : BH-22
Depth : 3 m
c = 0.012 kg/cm²
ϕ = 21.7°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

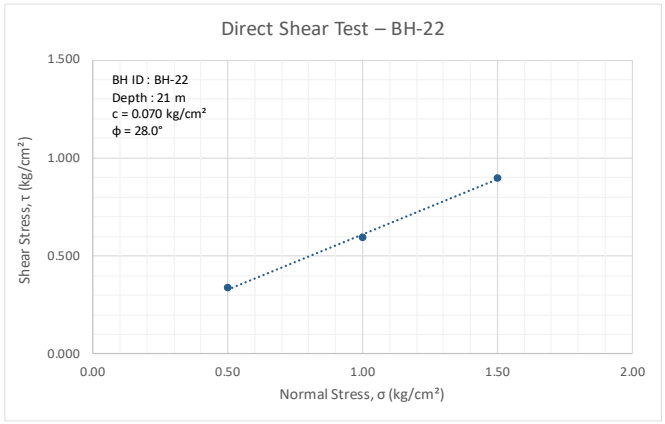

Direct Shear Test – BH-22
BH ID : BH-22
Depth : 6 m
c = 0.016 kg/cm²
ϕ = 24.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

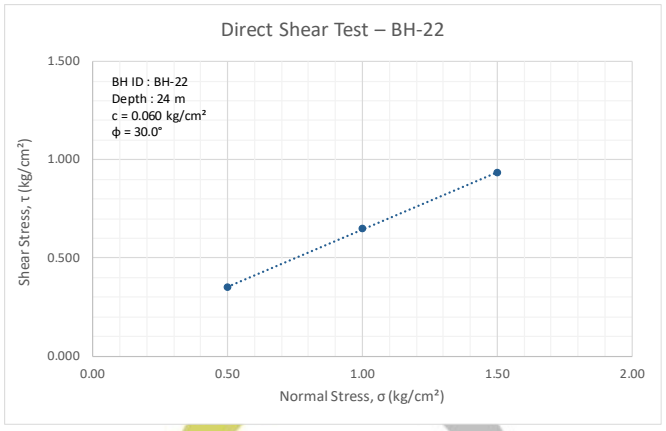

Direct Shear Test – BH-22
BH ID : BH-22
Depth : 9 m
c = 0.028 kg/cm²
ϕ = 25.9°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

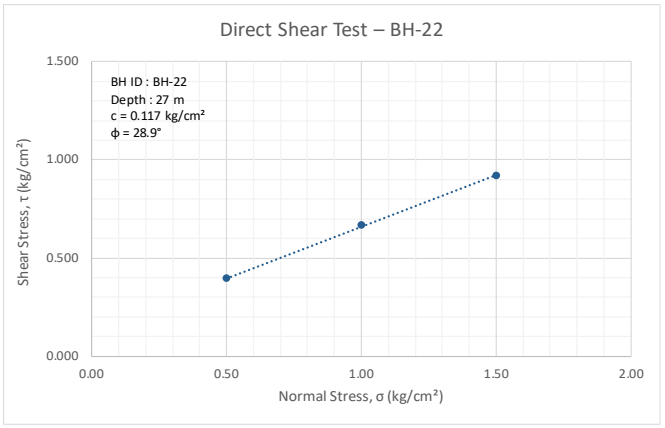

Direct Shear Test – BH-22
BH ID : BH-22
Depth : 12 m
c = 0.035 kg/cm²
ϕ = 27.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

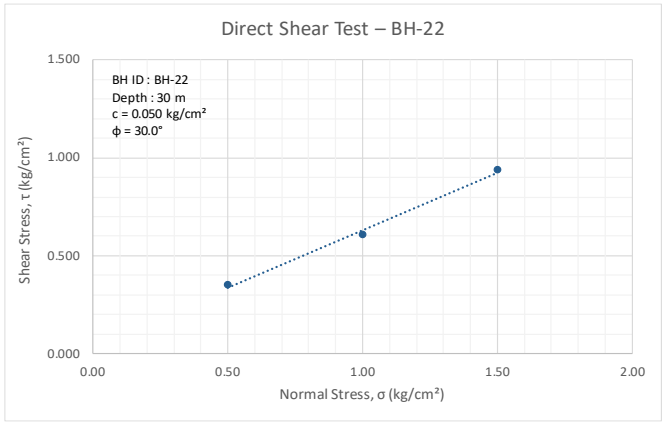

Direct Shear Test – BH-22
BH ID : BH-22
Depth : 15 m
c = 0.058 kg/cm²
ϕ = 27.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-22
BH ID : BH-22
Depth : 18 m
c = 0.110 kg/cm²
ϕ = 26.4°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-22
BH ID : BH-22
Depth : 21 m
c = 0.070 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-22
BH ID : BH-22
Depth : 24 m
c = 0.060 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-22
BH ID : BH-22
Depth : 27 m
c = 0.117 kg/cm²
ϕ = 28.9°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

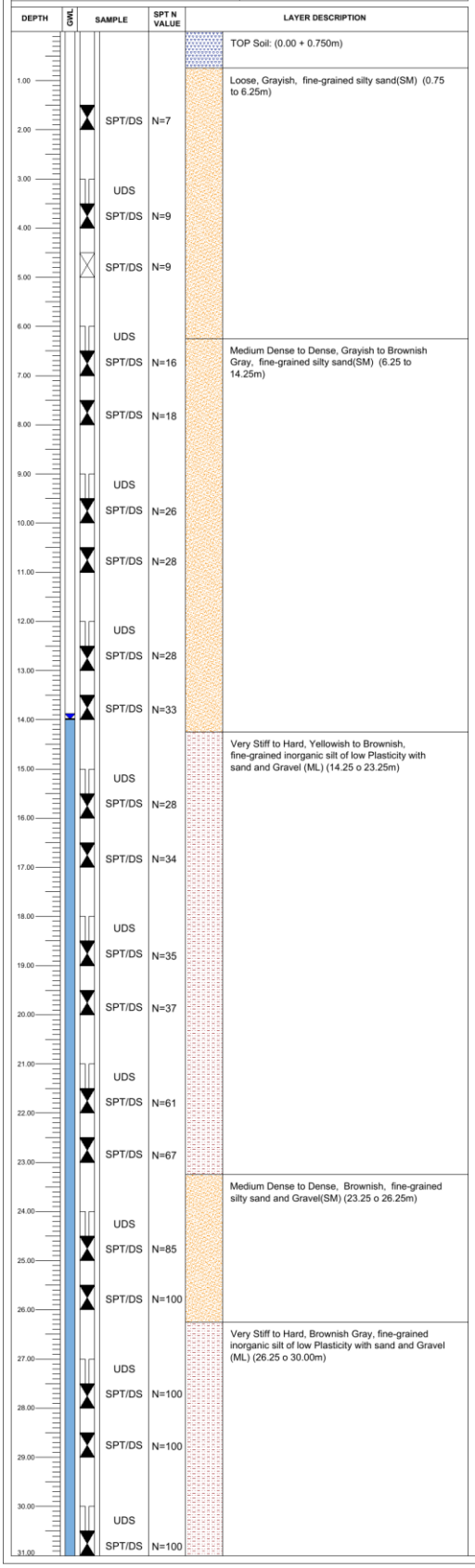

Direct Shear Test – BH-22
BH ID : BH-22
Depth : 30 m
c = 0.050 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
1.500
1.000
0.500
0.000
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (2+000 km TO 3+000 km)

BH ID : BH-23 | **Chainage** : 2+823 KM

Groundwater Level : - 14.00M | **Location** : Lat. 28.548172, Long. 77.335483



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

Soil

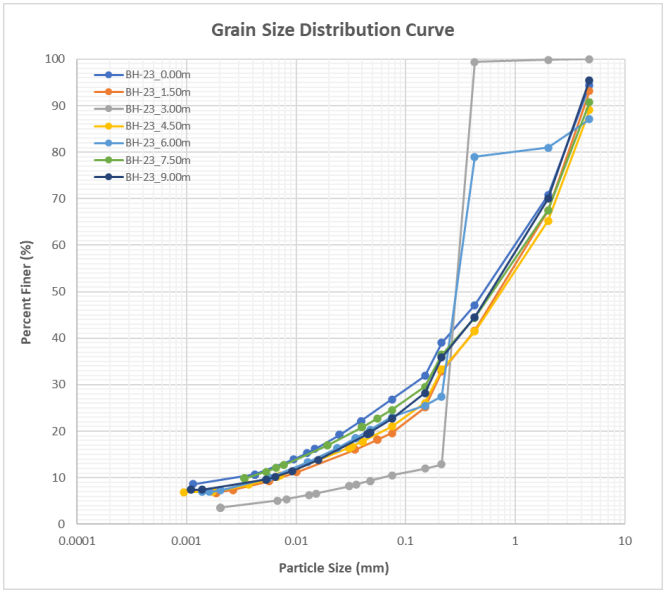
- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

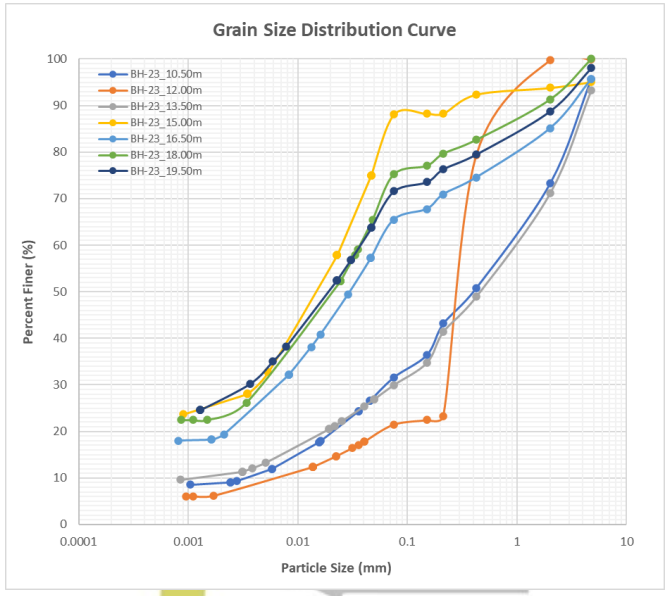
GOMA ENGINEERING AND CONSULTANCY
Quality we put forward

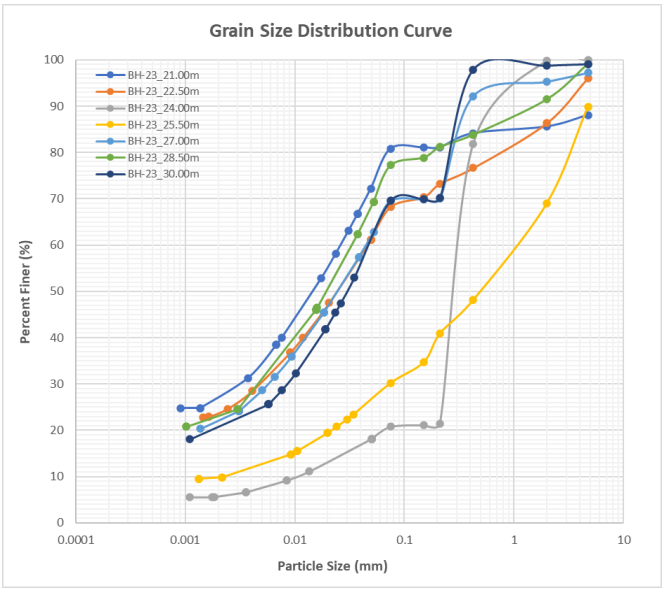
Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-23	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	2+823	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	25-01-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	196.8	**End Date:**	25-01-2026
Project Code:	158_R4_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	14.00	**Location:**	Lat. 28.548172, Long. 77.335483

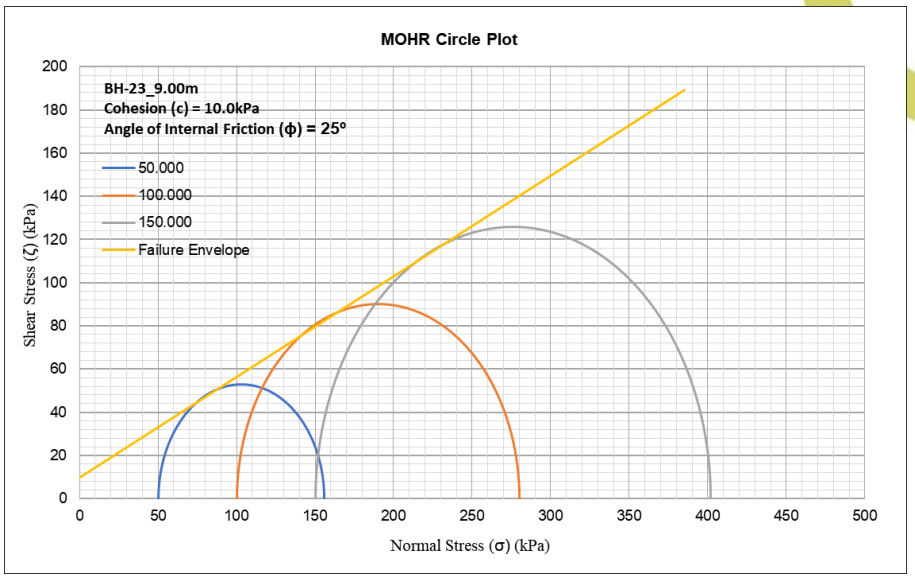
Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [^{o}]	Type	Cohesion [kPa]	Angle of Friction [^{o}]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						5.6	67.6	17.4	9.5	23	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Loose, Grayish, fine-grained silty sand(SM)	3	3	4	7	10	6.9	73.5	12.8	6.8	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							0.0	89.5	10.5	0.0	26	NP	NP	11.28	1.72	1.55	2.66	F	0.01	22	-	-	-	-	-	-
3.50	SPT/DS		3	4	5	9	10	-																			
4.50	SPT/DS		4	4	5	9	9	10.9	68.1	13.8	7.3	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS							12.9	64.0	15.9	7.2	24	NP	NP	14.21	1.76	1.54	2.69	F	0.04	25	-	-	-	-	-	-
6.50	SPT/DS	Medium Dense to Dense, Grayish to Brownish Gray, fine-grained silty sand(SM)	5	7	9	16	15	-																			
7.50	SPT/DS		5	8	10	18	16	9.3	66.1	17.8	6.8	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							4.6	72.7	14.7	8.0	23	NP	NP	12.74	1.88	1.67	2.62	F	0.03	26	UU	10.0	25.0	-	-	-
9.50	SPT/DS		7	11	15	26	22	-																			
10.50	SPT/DS		9	12	16	28	23	4.3	64.1	22.7	9.0	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	DS							0.1	78.4	14.8	6.7	24	NP	NP	13.13	-	-	2.70	F	0.00	28	-	-	-	-	-	-
12.50	SPT/DS		10	13	15	28	21	-																			
13.50	SPT/DS		12	15	18	33	24	6.7	63.3	19.2	10.7	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	UDS	Very Stiff to Hard, Yellowish to Brownish, fine-grained inorganic silt of low Plasticity with sand and Gravel (ML)						4.9	7.0	61.8	26.3	26	NP	NP	12.74	1.92	1.71	2.65	F	0.08	27	-	-	-	-	-	-
15.50	SPT/DS		10	13	15	28	17	-																			
16.50	SPT/DS		12	15	19	34	19	4.3	30.2	46.4	19.1	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	UDS							0.0	24.8	51.4	23.8	27	NP	NP	15.87	1.90	1.64	2.61	F	0.05	28	UU	11.0	23.0	-	-	-
18.50	SPT/DS		11	15	20	35	19	-																			
19.50	SPT/DS		13	17	20	37	19	2.0	26.5	44.6	27.0	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							11.9	7.2	53.6	27.2	24	NP	NP	17.22	-	-	2.68	F	0.00	29	-	-	-	-	-	-
21.50	SPT/DS		20	27	34	61	26	-																			
22.50	SPT/DS		24	30	37	67	28	4.0	27.7	44.5	23.8	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS	Medium Dense to Dense, Brownish, fine-grained silty sand and Gravel(SM)						0.1	79.2	15.0	5.7	24	NP	NP	16.18	-	-	2.60	F	0.02	30	-	-	-	-	-	-
24.50	SPT/DS		35	40	45	85	32	-																			
25.50	SPT/DS		37	47	(50/9cm)	100	36	10.1	59.7	20.4	9.8	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS	Very Stiff to Hard, Brownish Gray, fine-grained inorganic silt of low Plasticity with sand and Gravel (ML)						2.8	27.6	47.5	22.1	26	NP	NP	15.11	-	-	2.63	F	0.05	30	-	-	-	-	-	-
27.50	SPT/DS		40	45	(50/7cm)	100	36	-																			
28.50	SPT/DS		45	(50/10cm)	-	100	35	0.9	21.8	54.1	23.1	28	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							0.9	29.5	48.8	20.8	27	NP	NP	14.45	-	-	2.63	F	0.04	32	-	-	-	-	-	-
30.50	SPT/DS		(50/12cm)	-	-	100	34	-																			

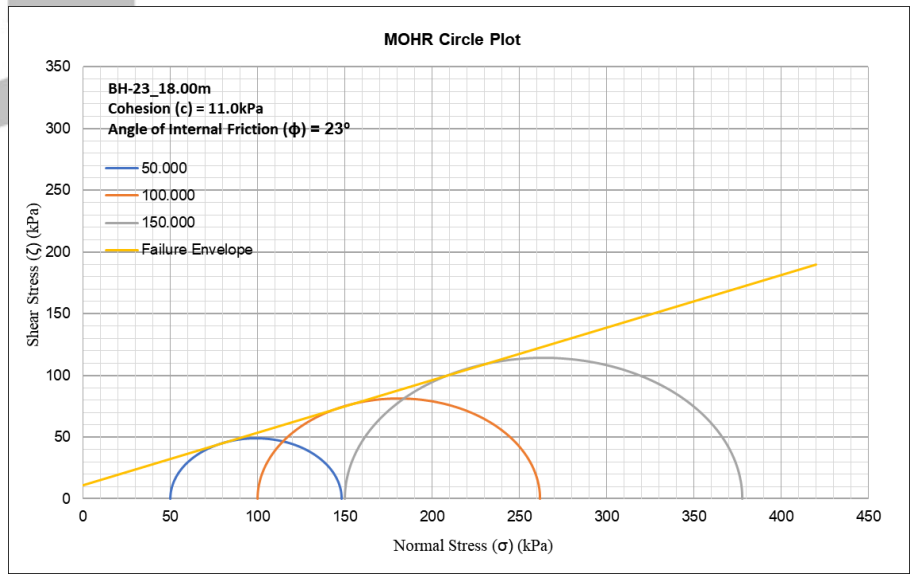
Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.

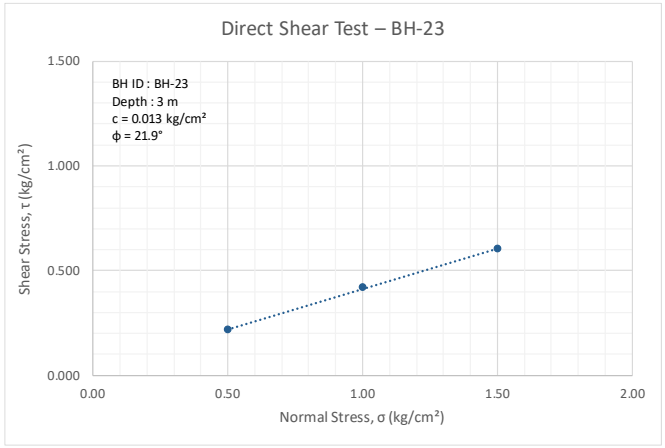

Grain Size Distribution Curve
BH-23_0.00m
BH-23_1.50m
BH-23_3.00m
BH-23_4.50m
BH-23_6.00m
BH-23_7.50m
BH-23_9.00m
Percent Finer (%)
Particle Size (mm)

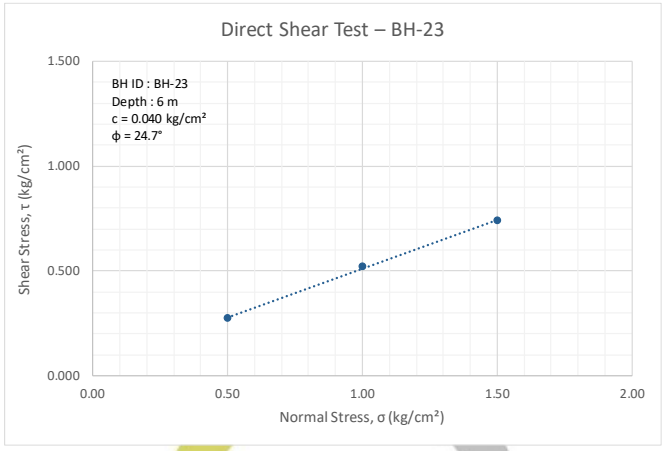

Grain Size Distribution Curve
BH-23_10.50m
BH-23_12.00m
BH-23_13.50m
BH-23_15.00m
BH-23_16.50m
BH-23_18.00m
BH-23_19.50m
Percent Finer (%)
Particle Size (mm)

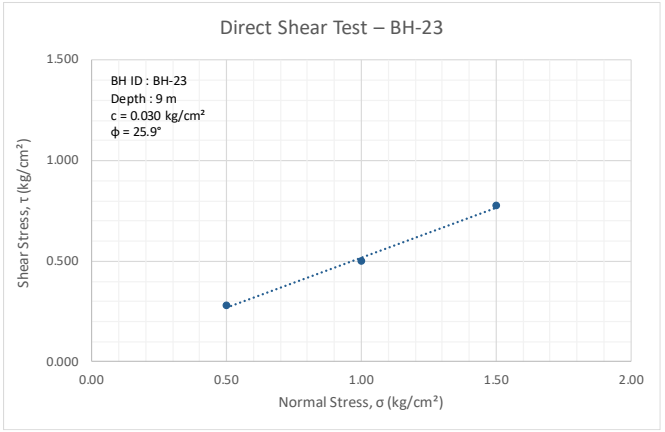

Grain Size Distribution Curve
BH-23_21.00m
BH-23_22.50m
BH-23_24.00m
BH-23_25.50m
BH-23_27.00m
BH-23_28.50m
BH-23_30.00m
Percent Finer (%)
Particle Size (mm)

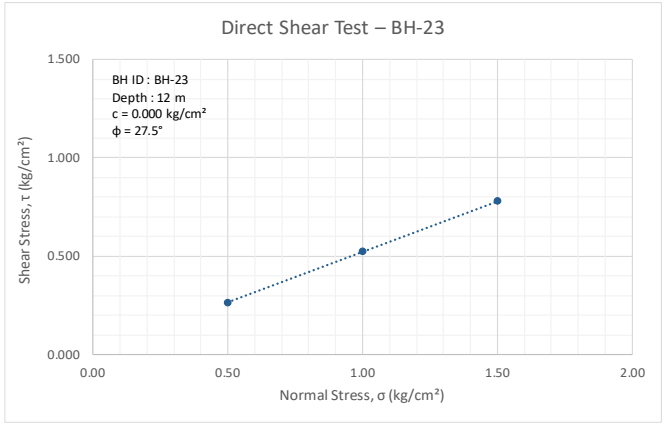

MOHR Circle Plot
BH-23_9.00m
Cohesion (c) = 10.0kPa
Angle of Internal Friction (ϕ) = 25°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

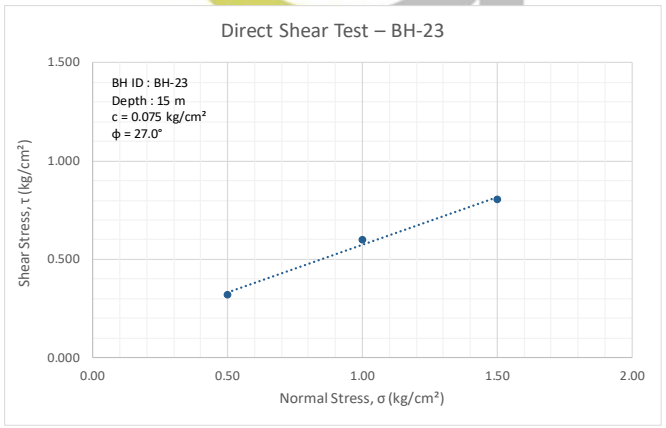

MOHR Circle Plot
BH-23_18.00m
Cohesion (c) = 11.0kPa
Angle of Internal Friction (ϕ) = 23°
50.000
100.000
150.000
Failure Envelope
Shear Stress (ζ) (kPa)
Normal Stress (σ) (kPa)

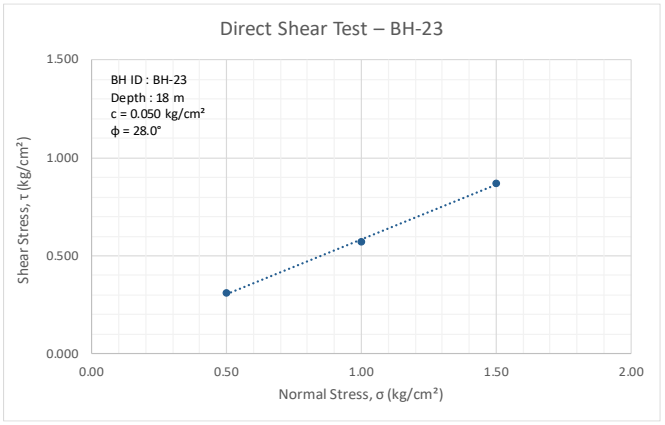

Direct Shear Test – BH-23
BH ID : BH-23
Depth : 3 m
c = 0.013 kg/cm²
ϕ = 21.9°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

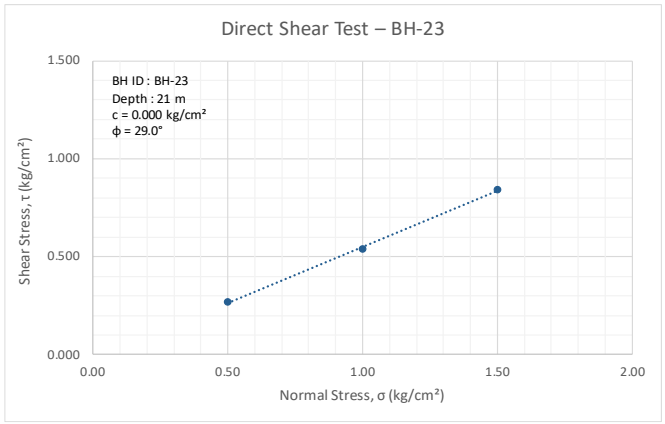

Direct Shear Test – BH-23
BH ID : BH-23
Depth : 6 m
c = 0.040 kg/cm²
ϕ = 24.7°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

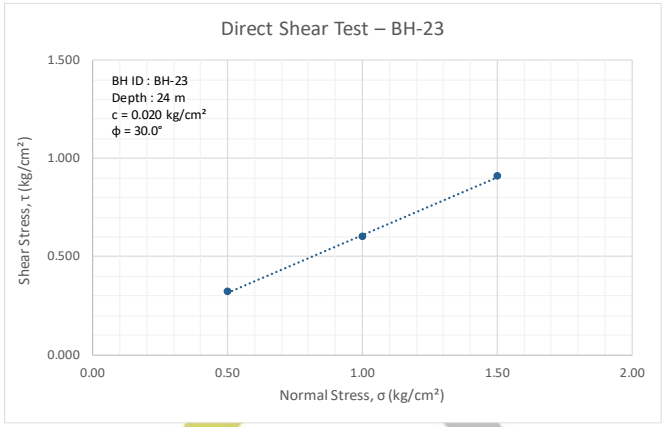

Direct Shear Test – BH-23
BH ID : BH-23
Depth : 9 m
c = 0.030 kg/cm²
ϕ = 25.9°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

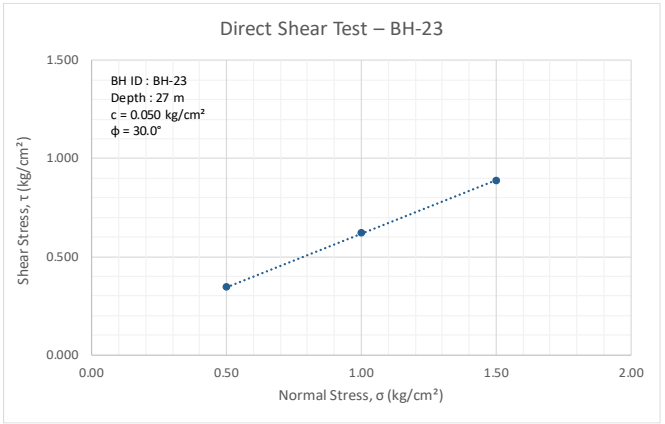

Direct Shear Test – BH-23
BH ID : BH-23
Depth : 12 m
c = 0.000 kg/cm²
ϕ = 27.5°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

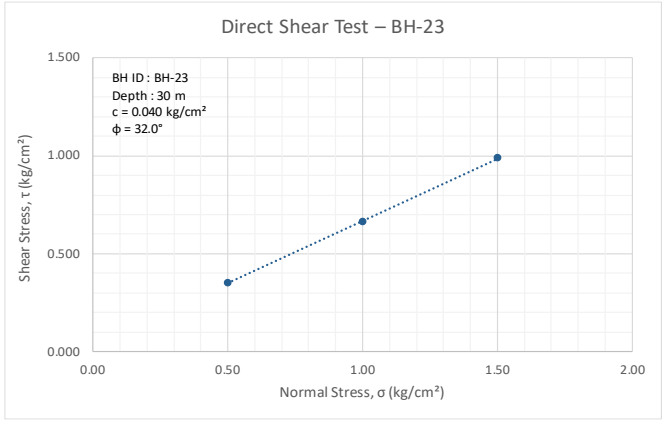

Direct Shear Test – BH-23
BH ID : BH-23
Depth : 15 m
c = 0.075 kg/cm²
ϕ = 27.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-23
BH ID : BH-23
Depth : 18 m
c = 0.050 kg/cm²
ϕ = 28.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-23
BH ID : BH-23
Depth : 21 m
c = 0.000 kg/cm²
ϕ = 29.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-23
BH ID : BH-23
Depth : 24 m
c = 0.020 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

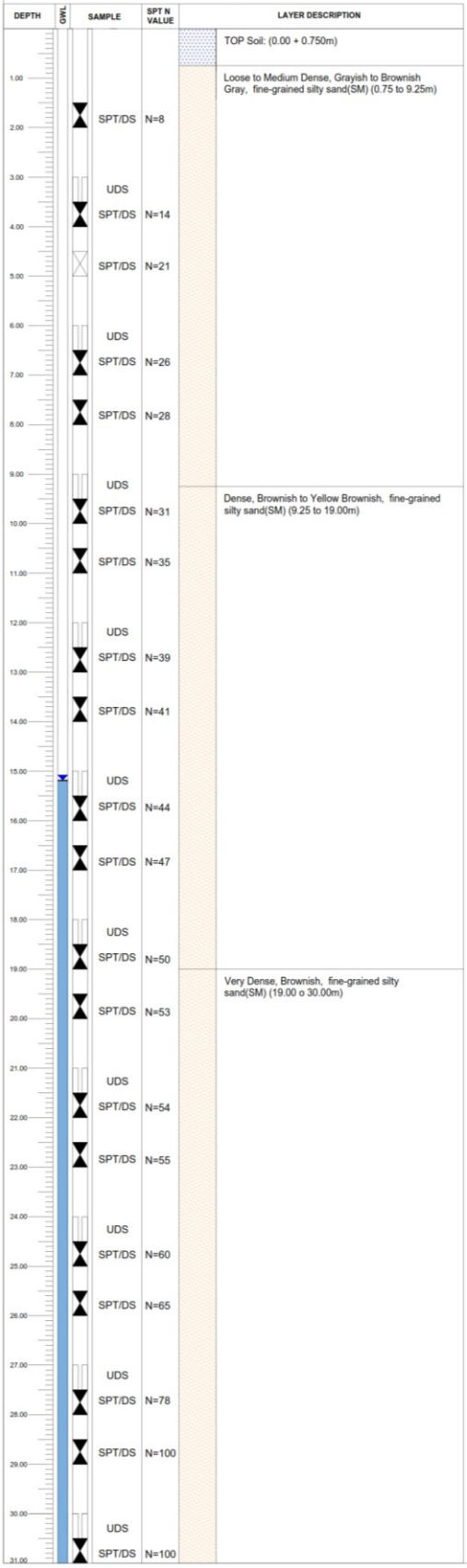

Direct Shear Test – BH-23
BH ID : BH-23
Depth : 27 m
c = 0.050 kg/cm²
ϕ = 30.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00


Direct Shear Test – BH-23
BH ID : BH-23
Depth : 30 m
c = 0.040 kg/cm²
ϕ = 32.0°
Shear Stress, τ (kg/cm²)
Normal Stress, σ (kg/cm²)
0.000
0.500
1.000
1.500
0.00
0.50
1.00
1.50
2.00

NAME OF WORK: GEOTECHNICAL INVESTIGATION WORK FOR PROPOSED EXTENSION METRO CORRIDORS OF AQUA LINE FROM NOIDA SECTOR-142 TO BOTANICAL GARDEN AND DEPOT STATION TO BORAKI MMTH (14.16 KM)

Stretch: Noida Sector-142 to Botanical Garden (2+000 km TO 3+000 km)

BH ID : BH-24	**Chainage** : 2+920 KM
Groundwater Level : - 15.20M	**Location** : Lat. 28.547539, Long. 77.336169



LEGENDS

Sample Type

- Split Spoon Sampler
- Shelby Tube (UDS)

General

- Groundwater Level

Soil

- Well Graded Gravel (GW)
- Poorly Graded Gravel (GP)
- Silty Gravel (GM)
- Clayey Gravel (GC)
- Well Graded Sand (SW)
- Poorly Graded Sand (SP)
- Silty Sand (SM)
- Clayey Sand (SC)
- Inorganic Silt of Low Compressibility (ML)
- Inorganic Silt of Intermediate Compressibility (MI)
- Inorganic Silt of High Compressibility (MH)
- Inorganic Clay of Low Compressibility (CL)
- Inorganic Clay of Intermediate Compressibility (CI)
- Inorganic Clay of High Compressibility (CH)
- Organic Soil of Low Compressibility (OL)
- Organic Soil of Intermediate Compressibility OI)
- Organic Soil of High Compressibility (OH)
- Peat (Pt)
- Top Soil (TS)

GOMA ENGINEERING AND CONSULTANCY
Quality we put forward

Project		Borehole Details		Drilling Details	
Name of Work:	Geotechnical Investigation work for Proposed Extension Metro Corridors of Aqua Line from Noida Sector-142 to Botanical Garden and Depot Station to Boraki MMTH (14.16 km) (E Tender No. NMRC/Civil/Geo. Inv./366/2025)	**BH ID:**	BH-24	**Contractor:**	Goma Engineering & Consultancy
		Chainage [km]:	2+920	**Method of Drilling:**	Rotary Drilling
Client:	Noida Metro Rail Corporation (NMRC) Limited	**Depth [m]:**	30.00	**Start Date:**	25-01-2026
Stretch:	Noida Sector-142 to Botanical Garden	**Elevation [m]:**	201.4	**End Date:**	25-01-2026
Project Code:	158_R4_Noida Sector-142 to Botanical Garden_0-372 km TO 12+130 km	**Water table Level [m]:**	15.20	**Location:**	Lat. 28.547539, Long. 77.336169

Depth [m]	Sample Type	Descriptions	SPT Test Results					Soil Particles				Atterberg Limits			Physical Characteristics				Direct Shear Test			Triaxial Comp Test			Consolidation Test		
			N1 (Seating Drive)	N2 (First Drive)	N3 (Second Drive)	Observed SPT	N (Correct N)	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	Moisture Content [%]	Bulk Density [gm/cm^3]	Dry Density [gm/cm^3]	Specific Gravity	Type	Cohesion [kg/cm^2]	Angle of Friction [^{0}]	Type	Cohesion [kPa]	Angle of Friction [^{0}]	Swelling Index	Consolidation Index	Preconsolidation Pressure [kg/cm^2]
0.00	DS	Top Soil						8.7	70.1	14.2	7.0	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
1.50	SPT/DS	Loose to Medium Dense, Grayish to Brownish Gray, fine-grained silty sand(SM)	3	3	5	8	11	7.8	68.0	17.6	6.6	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
3.00	UDS							9.5	61.1	20.1	9.3	29	NP	NP	13.8	1.88	1.65	2.686	F	0.05	23	UU	12	27	-	-	-
3.50	SPT/DS		4	6	8	14	15	-																			
4.50	SPT/DS		4	9	12	21	21	4.5	67.0	21.1	7.5	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
6.00	UDS							8.6	73.0	12.7	5.7	29	NP	NP	14.61	1.79	1.56	2.65	F	0.01	27	-	-	-	-	-	-
6.50	SPT/DS		7	12	14	26	24	-																			
7.50	SPT/DS		9	13	15	28	26	3.9	65.4	21.4	9.3	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00	UDS							4.7	68.4	18.1	8.8	26	NP	NP	13.84	1.86	1.64	2.67	F	0.03	28	-	-	-	-	-	-
9.50	SPT/DS	Dense, Brownish to Yellow Brownish, fine-grained silty sand(SM)	12	13	18	31	26	-																			
10.50	SPT/DS		14	16	19	35	29	10.2	69.5	15.0	5.4	24	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	UDS							10.2	59.1	21.3	9.4	21	NP	NP	11.96	1.91	1.71	2.69	F	0.02	29	UU	0.8	28	-	-	-
12.50	SPT/DS		15	18	21	39	29	-																			
13.50	SPT/DS		15	19	22	41	29	8.1	65.8	18.6	7.5	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	DS							0.4	72.5	18.2	8.9	29	NP	NP	12.66	-	-	2.62	F	0.00	30	-	-	-	-	-	-
15.50	SPT/DS		16	21	23	44	22	-																			
16.50	SPT/DS		18	22	25	47	23	7.1	63.4	20.9	8.6	25	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
18.00	DS							0.0	67.1	22.2	10.8	23	NP	NP	15.21	-	-	2.65	F	0.04	30	-	-	-	-	-	-
18.50	SPT/DS		19	24	26	50	23	-																			
19.50	SPT/DS	Very Dense, Brownish, fine-grained silty sand(SM)	21	25	28	53	24	10.7	64.1	16.8	8.4	27	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
21.00	DS							0.1	70.6	20.0	9.3	26	NP	NP	14.08	-	-	2.66	F	0.01	32	-	-	-	-	-	-
21.50	SPT/DS		20	25	29	54	24	-																			
22.50	SPT/DS		23	25	30	55	24	9.9	71.2	13.2	5.7	29	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
24.00	DS							0.0	71.6	19.5	8.9	22	NP	NP	15.61	-	-	2.64	F	0.06	31	-	-	-	-	-	-
24.50	SPT/DS		25	27	33	60	25	-																			
25.50	SPT/DS		29	30	35	65	26	10.2	71.2	12.6	6.0	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
27.00	DS							12.0	69.0	20.5	10.5	28	NP	NP	16.18	-	-	2.67	F	0.02	33	-	-	-	-	-	-
27.50	SPT/DS		33	34	44	78	29	-																			
28.50	SPT/DS		34	40	50/9cm	100	34	11.7	66.7	15.8	5.9	26	NP	NP	-	-	-	-	-	-	-	-	-	-	-	-	-
30.00	DS							1.2	70.2	17.3	11.3	29	NP	NP	13.28	-	-	2.63	F	0.03	38	-	-	-	-	-	-
30.5	SPT/DS		37	45	50/6cm	100	33	-																			

Notations: UDS = Undisturbed Sample, DS = Disturbed Sample, RC = Rock Core, F = Fast, S = Slow, UU = Unconsolidated Undrained Tri-axial compression Test, NP = Non Plastic.