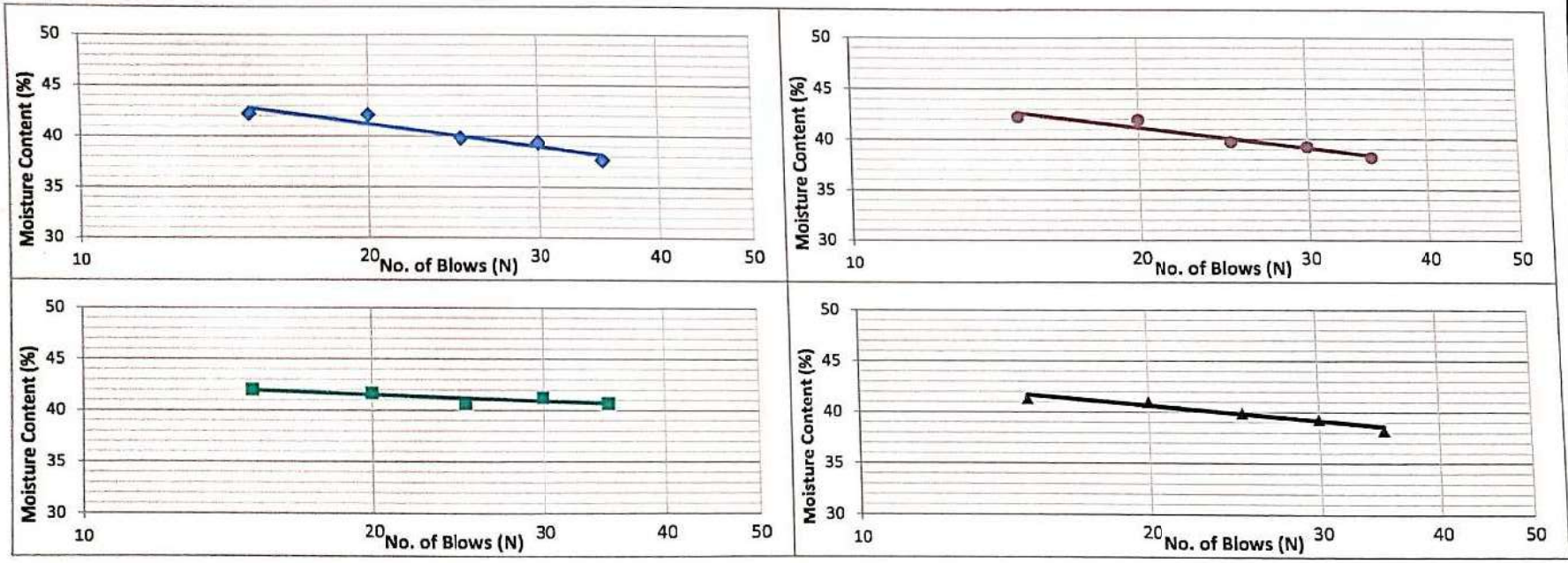
LIQUID LIMIT & PLASTIC LIMIT

Test Result

Project Geotechnical Investigation for Residential Building
Client Forteress Holdings Limited
Location Plot #2731, Road #20/A, Block-M, Bashundhara R/A, Dhaka, Bangladesh

Borehole No. 3
Date : 22/09/2021 to 23/09/2021
Sheet No. 1 of 1



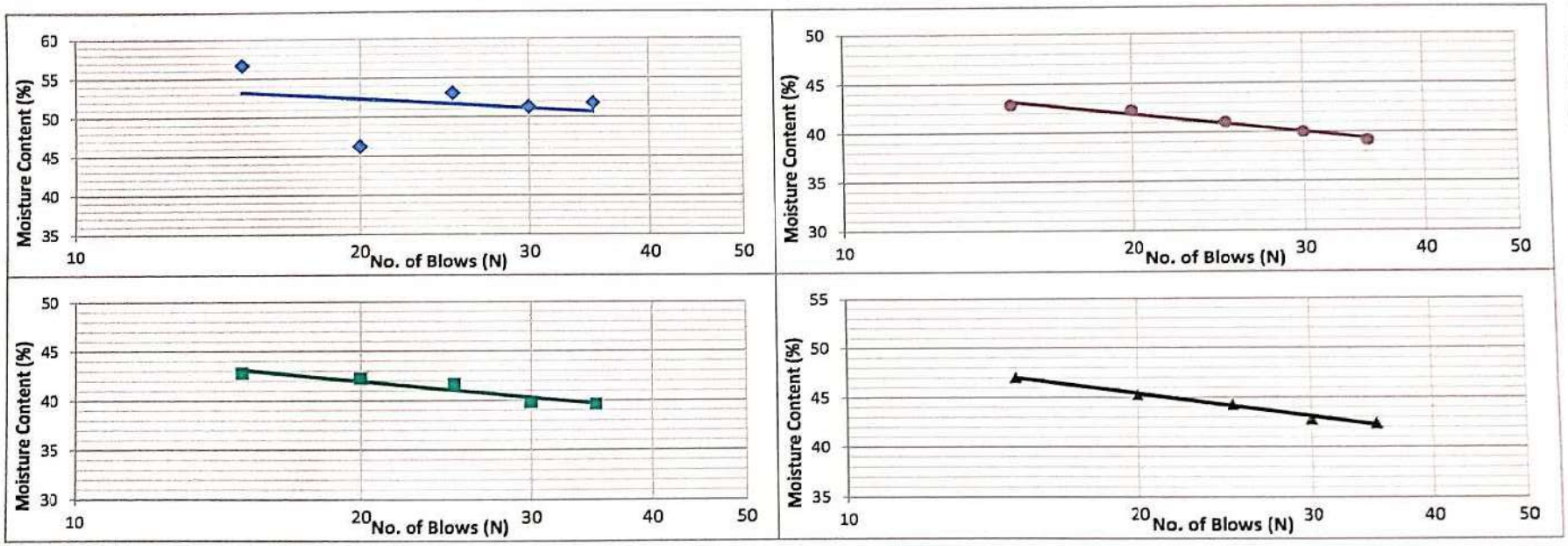
Symbol	Bore Hole No.	Sample ID	Depth (m)	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Classification
◆	003	D-6,7,8,9	9.0-13.5	40	23	17	Lean CLAY
●	003	D-10,11,12,13	15.0-19.5	40	23	17	Lean CLAY
■	003	D-14,15,16,17	21.0-25.5	41	23	18	Lean CLAY
▲	003	D-18,19	27.0-28.5	40	22	18	Lean CLAY

LIQUID LIMIT & PLASTIC LIMIT

Test Result

Project Geotechnical Investigation for Residential Building
Client Forteress Holdings Limited
Location Plot #2731, Road #20/A, Block-M, Bashundhara R/A, Dhaka, Bangladesh

Borehole No. 4
Date : 23/09/2021 to 24/09/2021
Sheet No. 1 of 1



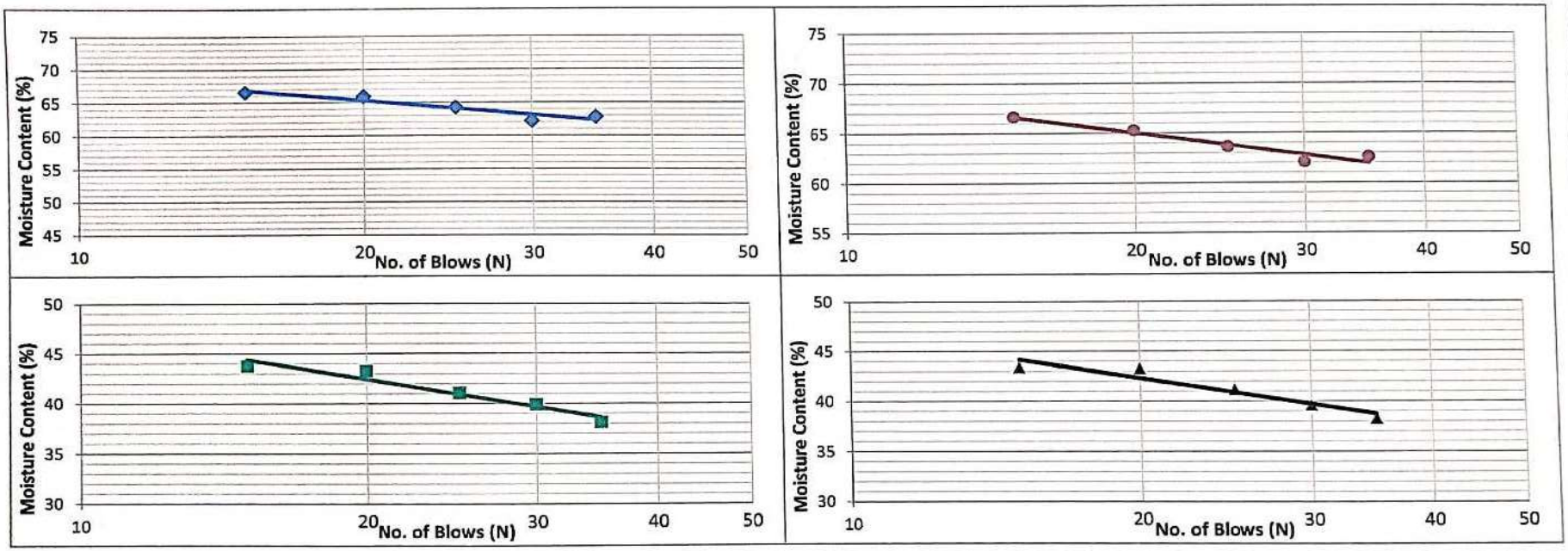
Symbol	Bore Hole No.	Sample ID	Depth (m)	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Classification
—◆—◆—	004	D-06	9.0	52	27	25	Fat CLAY
—●—●—	004	D-7,8,9,10	10.5-15.0	41	26	15	Lean CLAY
—■—■—	004	D-11,12,13,14	16.5-21.0	41	23	18	Lean CLAY
—▲—▲—	004	D-15,16,17,18	22.5-27.0	44	23	21	Lean CLAY

LIQUID LIMIT & PLASTIC LIMIT

Test Result

Project Geotechnical Investigation for Residential Building
Client Forteress Holdings Limited
Location Plot #2731, Road #20/A, Block-M, Bashundhara R/A, Dhaka, Bangladesh

Borehole No. 5
Date : 19/09/2021 to 20/09/2021
Sheet No. 1 of 3

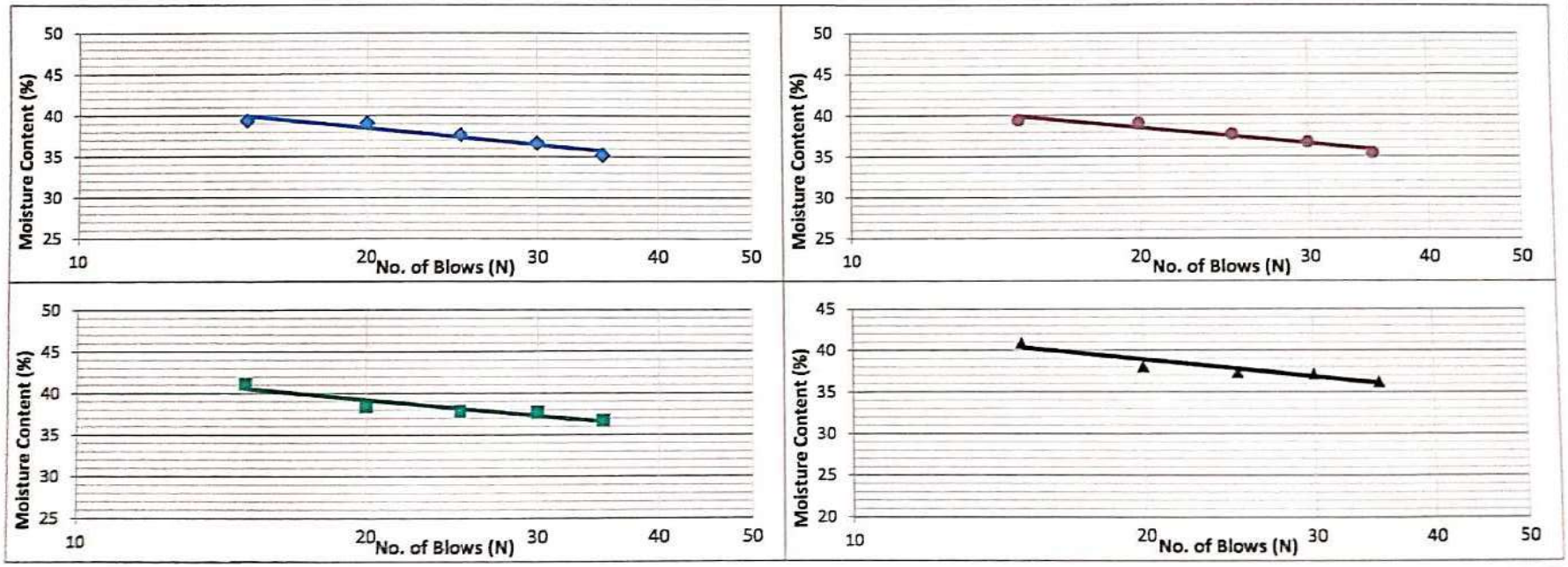


Symbol	Bore Hole No.	Sample ID	Depth (m)	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Classification
◆	005	D-06	9.0	64	31	33	Fat CLAY
●	005	D-07	10.5	64	32	32	Fat CLAY
■	005	D-08	12.0	41	25	16	Lean CLAY
▲	005	D-09	13.5	41	25	16	Lean CLAY

LIQUID LIMIT & PLASTIC LIMIT

Test Result

Project	Geotechnical Investigation for Residential Building	**Borehole No.**	5
Client	Forteress Holdings Limited	**Date**	: 19/09/2021 to 20/09/2021
Location	Plot #2731, Road #20/A, Block-M, Bashundhara R/A, Dhaka, Bangladesh	**Sheet No.**	2 of 3



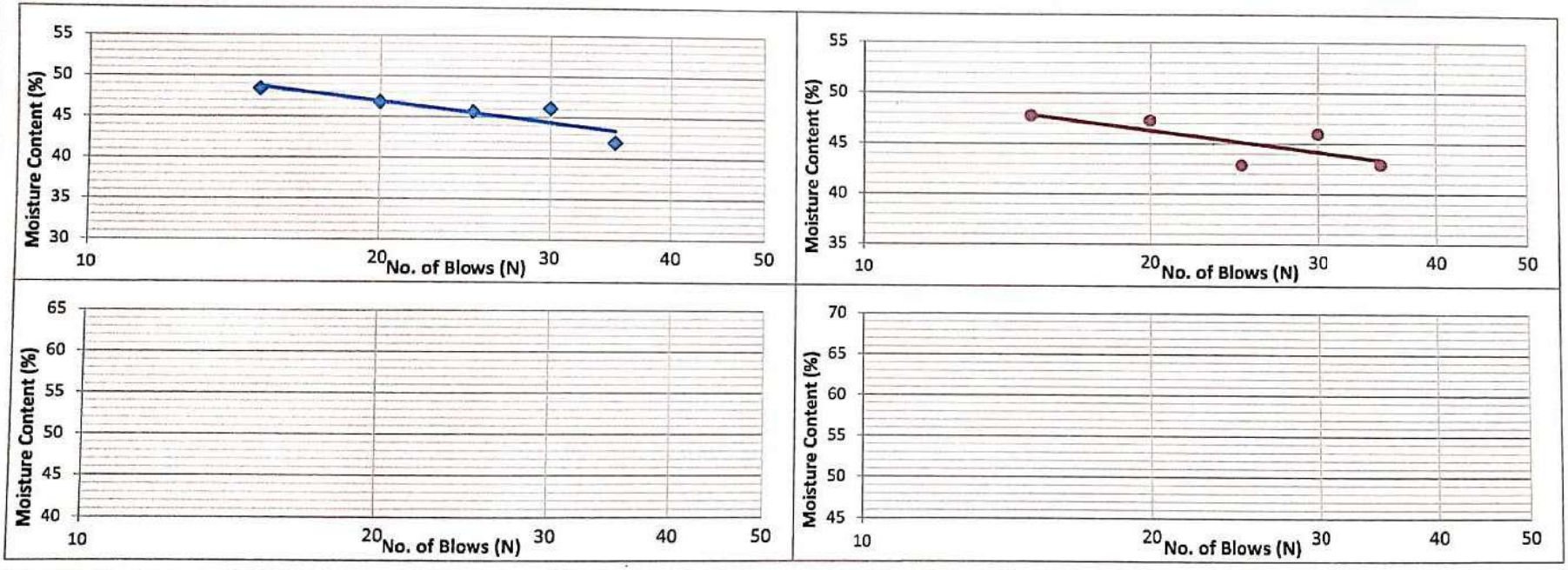
Symbol	Bore Hole No.	Sample ID	Depth (m)	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Classification
◆—◆	005	D-10	15.0	37	24	13	Lean CLAY
●—●	005	D-11	16.5	37	23	14	Lean CLAY
■—■	005	D-12	18.0	38	24	14	Lean CLAY
▲—▲	005	D-13	19.5	38	23	15	Lean CLAY

LIQUID LIMIT & PLASTIC LIMIT

Test Result

Project Geotechnical Investigation for Residential Building
Client Forteress Holdings Limited
Location Plot #2731, Road #20/A, Block-M, Bashundhara R/A, Dhaka, Bangladesh

Borehole No. 5
Date : 19/09/2021 to 20/09/2021
Sheet No. 3 of 3



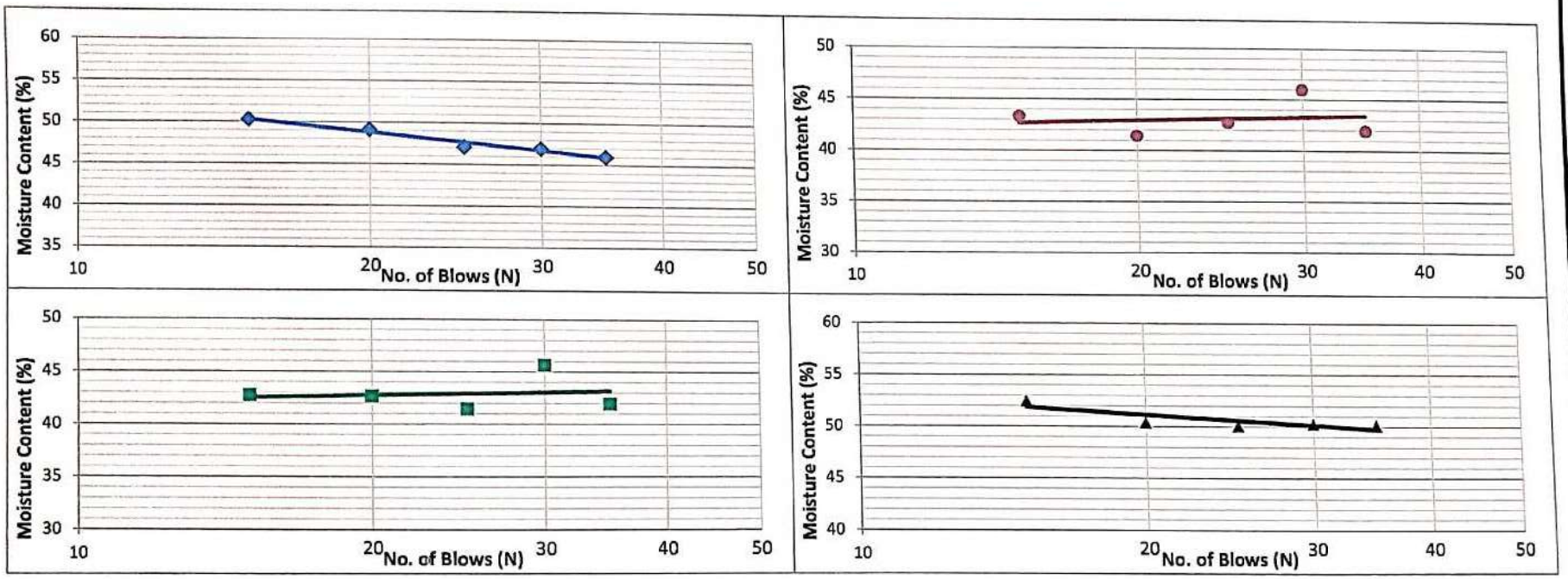
Symbol	Bore Hole No.	Sample ID	Depth (m)	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Classification
—◆—◆—	005	D-14,15,16	21.0-24.0	45	26	19	Lean CLAY
—●—●—	005	D-17,18	25.5-27.0	45	26	19	Lean CLAY
—■—■—	-	-	-	-	-	-	-
—▲—▲—	-	-	-	-	-	-	-

LIQUID LIMIT & PLASTIC LIMIT

Test Result

Project Geotechnical Investigation for Residential Building
Client Forteress Holdings Limited
Location Plot #2731, Road #20/A, Block-M, Bashundhara R/A, Dhaka, Bangladesh

Borehole No. 6
Date : 15/09/2021 to 19/09/2021
Sheet No. 1 of 4



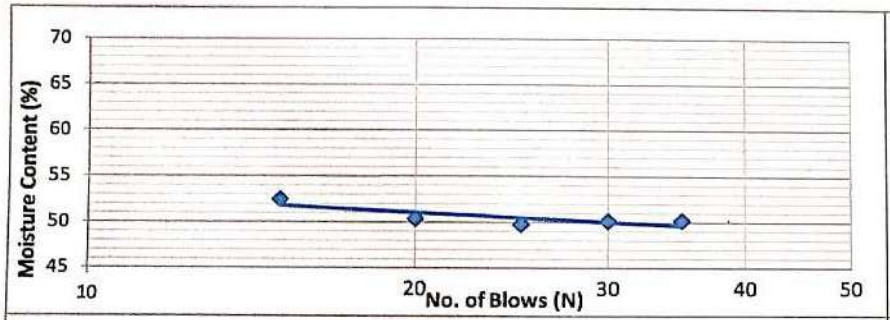
Symbol	Bore Hole No.	Sample ID	Depth (m)	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Classification
—◆—◆—	006	D-6	9.0	48	21	27	Lean CLAY
—●—●—	006	D-7	10.5	43	24	19	Lean CLAY
—■—■—	006	D-8	12.0	43	24	19	Lean CLAY
—▲—▲—	006	D-09	13.5	51	23	28	Fat CLAY

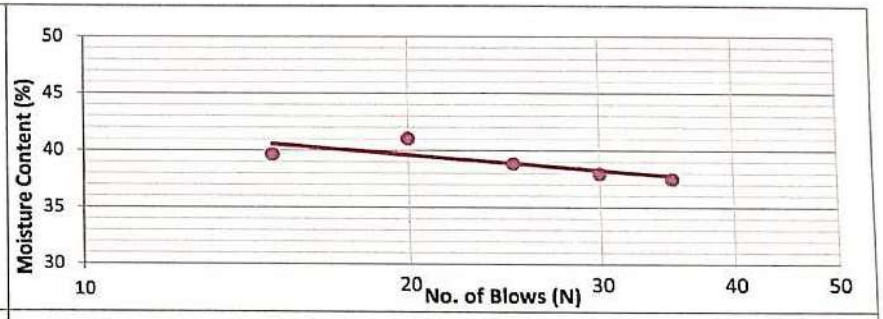
LIQUID LIMIT & PLASTIC LIMIT

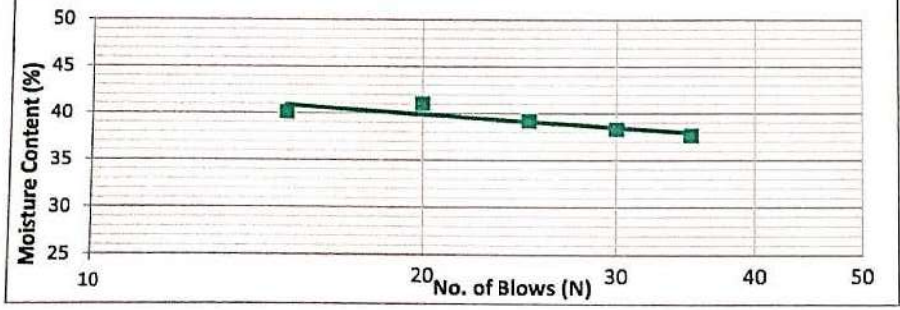
Test Result

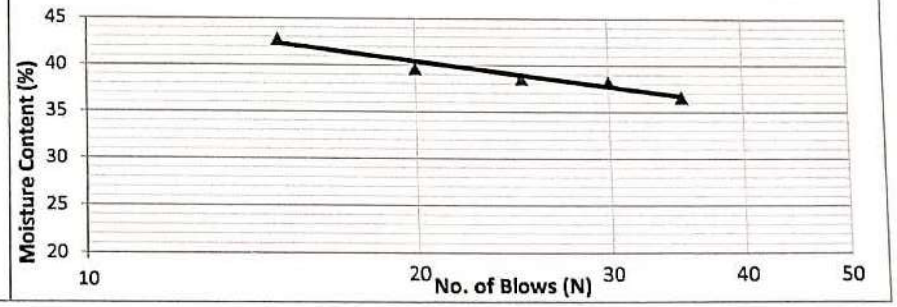
Project Geotechnical Investigation for Residential Building
Client Forteress Holdings Limited
Location Plot #2731, Road #20/A, Block-M, Bashundhara R/A, Dhaka, Bangladesh

Borehole No. 6
Date : 15/09/2021 to 19/09/2021
Sheet No. 2 of 4









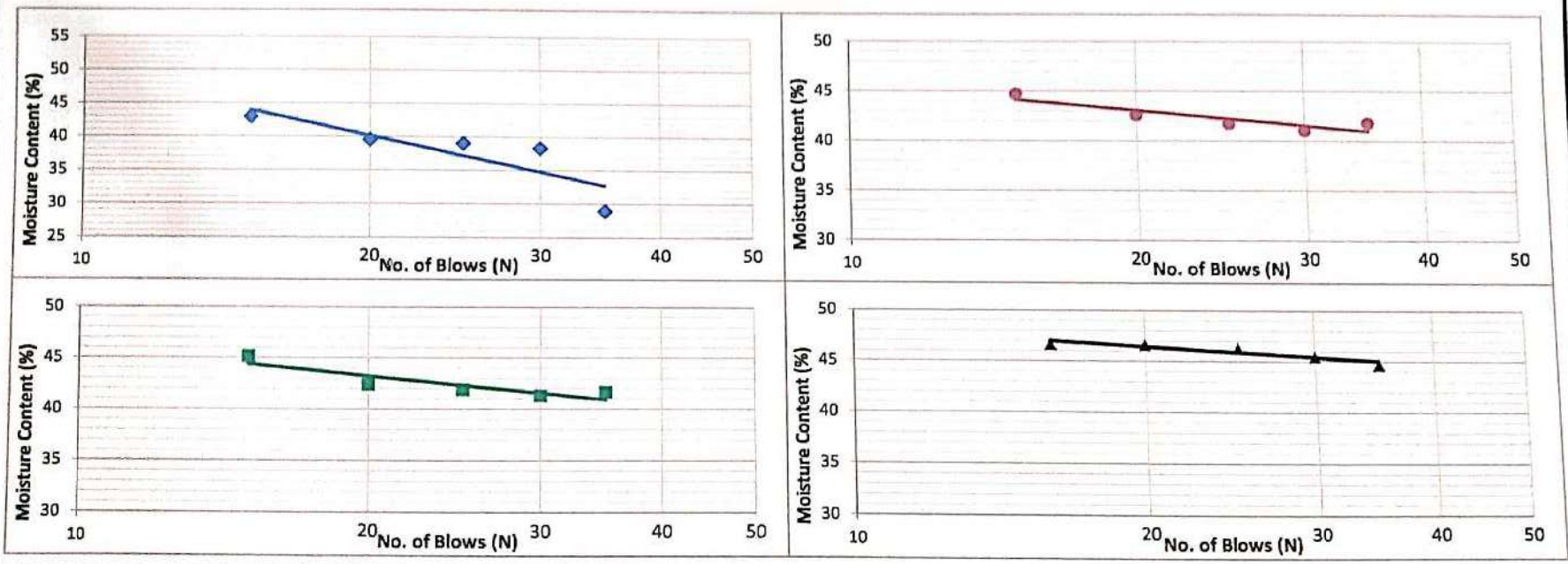
Symbol	Bore Hole No.	Sample ID	Depth (m)	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Classification
◆	222	D-10	15.0	50	24	26	Fat CLAY
●	222	D-11	16.5	39	24	15	Lean CLAY
■	222	D-12	18.0	39	24	15	Lean CLAY
▲	222	D-13	19.5	39	24	15	Lean CLAY

LIQUID LIMIT & PLASTIC LIMIT

Test Result

Project Geotechnical Investigation for Residential Building
Client Forteress Holdings Limited
Location Plot #2731, Road #20/A, Block-M, Bashundhara R/A, Dhaka, Bangladesh

Borehole No. 6
Date : 15/09/2021 to 19/09/2021
Sheet No. 3 of 4



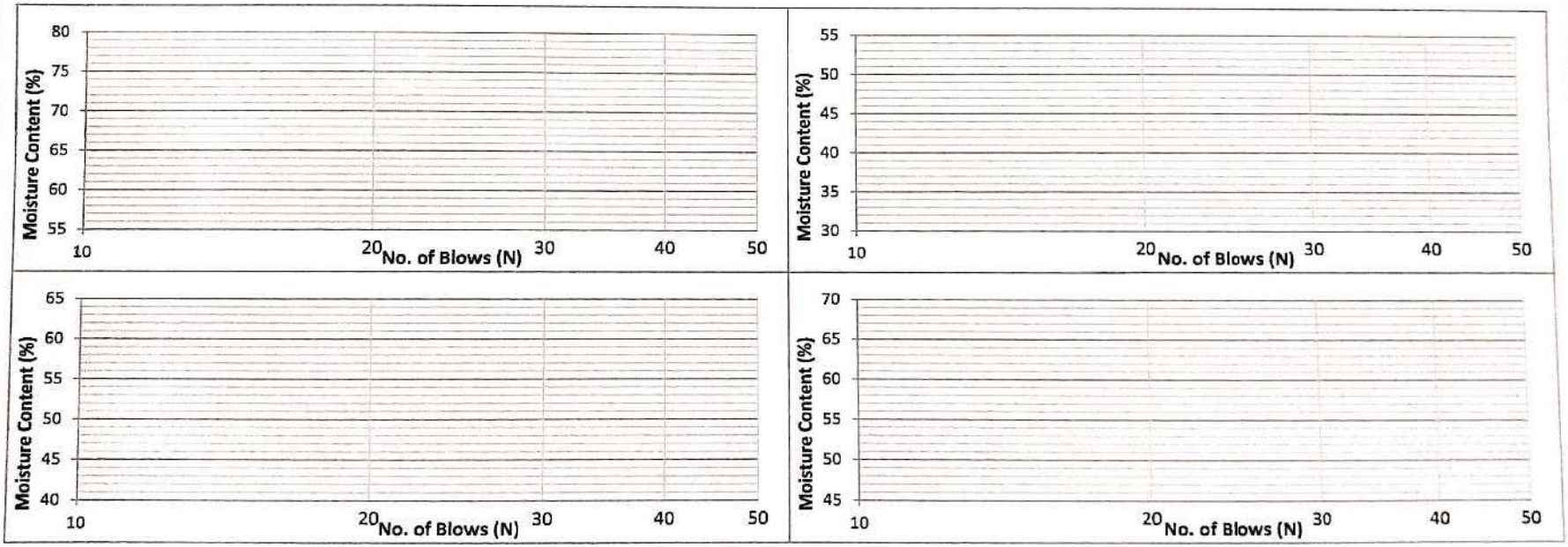
Symbol	Bore Hole No.	Sample ID	Depth (m)	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Classification
◆	222	D-14	21.0	37	24	13	Lean CLAY
●	222	D-15	22.5	42	23	19	Lean CLAY
■	222	D-16	24.0	42	23	19	Lean CLAY
▲	222	D-17	25.5	46	23	23	Lean CLAY

LIQUID LIMIT & PLASTIC LIMIT

Test Result

Project Geotechnical Investigation for Residential Building
Client Forteress Holdings Limited
Location Plot #2731, Road #20/A, Block-M, Bashundhara R/A, Dhaka, Bangladesh

Borehole No. 6
Date : 15/09/2021 to 19/09/2021
Sheet No. 4 of 4



Symbol	Bore Hole No.	Sample ID	Depth (m)	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Classification
◆	006	D-18	27.0	46	27	19	Lean CLAY
●	-	-	-	-	-	-	-
■	-	-	-	-	-	-	-
▲	-	-	-	-	-	-	-

APPENDIX 2D: SUMMARY

Table 1: Summary Table of Test Results of BH001

Sample ID	Depth (m)	SPT N value (No. of Blow)	Colour	Moisture Content (%)	Specific Gravity, G_s	Grain Size Analysis			Liquid Limit & Plastic Limit			USCS Classification	
						Gravel (%)	Sand (%)	Fines (%)	Liquid Limit	Plastic Limit	Plasticity Index	Classification	Group Symbol
D-01	1.5	1	Gray	27.3	-	0	88	12	NP	NP	NP	Silty SAND (NP)	SM
D-02	3.0	2	Gray	32.8	-	0	91	9	NP	NP	NP	Poorly Graded SAND with Silt (NP)	SP-SM
D-03	4.5	2	Gray	27.3	-	0	90	10	NP	NP	NP	Poorly Graded SAND with Silt (NP)	SP-SM
D-04	6.0	5	Gray	29.8	-	0	95	5	NP	NP	NP	Poorly Graded SAND with Silt (NP)	SP-SM
D-05	7.5	3	Gray	29.5	-	0	89	11	NP	NP	NP	Poorly Graded SAND with Silt (NP)	SP-SM
D-06	9.0	1	Gray	44.3	-	0	0	0	48	25	23	Lean CLAY	CL
D-07	10.5	1	Gray	44.9	-	0	0	0	48	24	24	Lean CLAY	CL
D-08	12.0	2	Gray	43.8	-	0	0	0	39	24	15	Lean CLAY	CL
D-09	13.5	3	Gray	42.3	-	0	0	0	38	24	14	Lean CLAY	CL
D-10	15.0	2	Gray	42.6	-	0	0	0	38	24	14	Lean CLAY	CL
D-11	16.5	3	Gray	40.7	-	0	0	0	38	24	14	Lean CLAY	CL
D-12	18.0	4	Gray	42.2	-	0	0	0	40	23	17	Lean CLAY	CL
D-13	19.5	8	Gray	43.5	-	0	0	0	40	22	18	Lean CLAY	CL
D-14	21.0	5	Gray	44.6	-	0	0	0	42	24	18	Lean CLAY	CL
D-15	22.5	4	Gray	45.7	-	0	0	0	42	25	17	Lean CLAY	CL
D-16	24.0	6	Gray	43.3	-	0	0	0	45	24	21	Lean CLAY	CL
D-17	25.5	14	Gray	42.0	-	0	0	0	45	24	21	Lean CLAY	CL
D-18	27.0	12	Gray	41.7	-	0	0	0	44	24	20	Lean CLAY	CL
D-19	28.5	12	Gray	40.6	-	0	0	0	44	24	20	Lean CLAY	CL
D-20	30.0	49	Gray	15.4	-	0	83	17	NP	NP	NP	Silty SAND (NP)	SM
D-21	31.5	50	Brown	17.1	-	0	88	12	NP	NP	NP	Silty SAND (NP)	SM
D-22	33.0	50	Brown	10.9	-	0	71	29	NP	NP	NP	Silty SAND (NP)	SM
D-23	34.5	50	Brown	17.4	-	0	41	59	NP	NP	NP	Silty SAND (NP)	SM

Table 1: Summary Table of Test Results of BH002

Sample ID	Depth (m)	SPT N value (No. of Blow)	Colour	Moisture Content (%)	Specific Gravity, G_s	Grain Size Analysis			Liquid Limit & Plastic Limit			USCS Classification	
						Gravel (%)	Sand (%)	Fines (%)	Liquid Limit	Plastic Limit	Plasticity Index	Classification	Group Symbol
D-01	1.5	1	Gray	22.4	-	0	83	17	NP	NP	NP	Silty SAND (NP)	SM
D-02	3.0	3	Gray	22.7	-	0	85	15	NP	NP	NP	Silty SAND (NP)	SM
D-03	4.5	4	Gray	24.4	-	0	89	11	NP	NP	NP	Poorly Graded SAND with Silt (NP)	SP-SM
D-04	6.0	7	Gray	23.0	-	0	90	10	NP	NP	NP	Poorly Graded SAND with Silt (NP)	SP-SM
D-05	7.5	2	Gray	43.6	-	0	0	0	47	25	22	Lean CLAY	CL
D-06	9.0	2	Gray	40.2	-	0	0	0				Lean CLAY	CL
D-07	10.5	1	Gray	39.9	-	0	0	0	40	22	18	Lean CLAY	CL
D-08	12.0	3	Gray	40.9	-	0	0	0				Lean CLAY	CL
D-09	13.5	3	Gray	40.1	-	0	0	0				Lean CLAY	CL
D-10	15.0	1	Gray	38.9	-	0	0	0				Lean CLAY	CL
D-11	16.5	5	Gray	44.1	-	0	0	0	40	22	18	Lean CLAY	CL
D-12	18.0	5	Gray	41.8	-	0	0	0				Lean CLAY	CL
D-13	19.5	9	Gray	43.8	-	0	0	0				Lean CLAY	CL
D-14	21.0	6	Gray	44.9	-	0	0	0				Lean CLAY	CL
D-15	22.5	5	Gray	43.5	-	0	0	0	45	27	18	Lean CLAY	CL
D-16	24.0	5	Gray	41.6	-	0	0	0				Lean CLAY	CL
D-17	25.5	7	Gray	41.9	-	0	0	0				Lean CLAY	CL
D-18	27.0	8	Gray	41.9	-	0	0	0				Lean CLAY	CL
D-19	28.5	41	Gray	21.3	-	0	69	31	NP	NP	NP	Silty SAND (NP)	SM
D-20	30.0	50	Gray	11.5	-	0	77	23	NP	NP	NP	Silty SAND (NP)	SM
D-21	31.5	50	Brown	10.9	-	0	75	25	NP	NP	NP	Silty SAND (NP)	SM
D-22	33.0	50	Brown	11.2	-	0	71	29	NP	NP	NP	Silty SAND (NP)	SM

Table 3: Summary Table of Test Results of BH003

Sample ID	Depth (m)	SPT N value (No. of Blow)	Colour	Moisture Content (%)	Specific Gravity, G_s	Grain Size Analysis			Liquid Limit & Plastic Limit			USCS Classification	
						Gravel (%)	Sand (%)	Fines (%)	Liquid Limit	Plastic Limit	Plasticity Index	Classification	Group Symbol
D-01	1.5	2	Gray	20.8	-	0	64	36	NP	NP	NP	Silty SAND (NP)	SM
D-02	3.0	2	Gray	18.0	-	0	76	24	NP	NP	NP	Silty SAND (NP)	SM
D-03	4.5	4	Gray	17.5	-	0	72	28	NP	NP	NP	Silty SAND (NP)	SM
D-04	6.0	6	Gray	17.3	-	0	74	26	NP	NP	NP	Silty SAND (NP)	SM
D-05	7.5	4	Gray	23.4	-	0	83	17	NP	NP	NP	Silty SAND (NP)	SM
D-06	9.0	2	Gray	66.5	-	0	0	0	40	23	17	Lean CLAY	CL
D-07	10.5	2	Gray	42.4	-	0	0	0				Lean CLAY	CL
D-08	12.0	1	Gray	40.3	-	0	0	0				Lean CLAY	CL
D-09	13.5	2	Gray	40.5	-	0	0	0				Lean CLAY	CL
D-10	15.0	3	Gray	41.3	-	0	0	0	40	23	17	Lean CLAY	CL
D-11	16.5	4	Gray	45.8	-	0	0	0				Lean CLAY	CL
D-12	18.0	5	Gray	44.3	-	0	0	0				Lean CLAY	CL
D-13	19.5	5	Gray	39.7	-	0	0	0				Lean CLAY	CL
D-14	21.0	6	Gray	44.4	-	0	0	0	41	23	18	Lean CLAY	CL
D-15	22.5	5	Gray	42.7	-	0	0	0				Lean CLAY	CL
D-16	24.0	4	Gray	38.3	-	0	0	0				Lean CLAY	CL
D-17	25.5	6	Gray	44.2	-	0	0	0				Lean CLAY	CL
D-18	27.0	9	Gray	44.2	-	0	0	0	40	22	18	Lean CLAY	CL
D-19	28.5	11	Gray	37.4	-	0	0	0				Lean CLAY	CL
D-20	30.0	34	Brown	18.0	-	0	63	37	NP	NP	NP	Silty SAND (NP)	SM
D-21	31.5	50	Brown	16.1	-	0	73	27	NP	NP	NP	Silty SAND (NP)	SM
D-22	33.0	50	Brown	12.4	-	0	69	31	NP	NP	NP	Silty SAND (NP)	SM
D-23	34.5	50	Brown	10.7	-	0	0	0	NP	NP	NP	SILT (NP)	ML

Table 4: Summary Table of Test Results of BH004

Sample ID	Depth (m)	SPT N value (No. of Blow)	Colour	Moisture Content (%)	Specific Gravity, G_s	Grain Size Analysis			Liquid Limit & Plastic Limit			USCS Classification	
						Gravel (%)	Sand (%)	Fines (%)	Liquid Limit	Plastic Limit	Plasticity Index	Classification	Group Symbol
D-01	1.5	2	Gray	26.5	-	0	88	12	NP	NP	NP	Silty SAND (NP)	SM
D-02	3.0	2	Gray	25.2	-	0	84	14	NP	NP	NP	Silty SAND (NP)	SM
D-03	4.5	3	Gray	26.0	-	0	87	13	NP	NP	NP	Silty SAND (NP)	SM
D-04	6.0	5	Gray	27.4	-	0	81	19	NP	NP	NP	Silty SAND (NP)	SM
D-05	7.5	5	Gray	29.3	-	0	90	10	NP	NP	NP	Poorly Graded SAND with Silt (NP)	SP-SM
D-06	9.0	3	Gray	50.0	-	0	0	0	52	27	25	Fat CLAY	CH
D-07	10.5	2	Gray	41.8	-	0	0	0	41	26	18	Lean CLAY	CL
D-08	12.0	1	Gray	42.7	-	0	0	0				Lean CLAY	CL
D-09	13.5	3	Gray	41.8	-	0	0	0				Lean CLAY	CL
D-10	15.0	3	Gray	43.2	-	0	0	0				Lean CLAY	CL
D-11	16.5	2	Gray	41.9	-	0	0	0	41	23	18	Lean CLAY	CL
D-12	18.0	4	Gray	40.3	-	0	0	0				Lean CLAY	CL
D-13	19.5	5	Gray	38.7	-	0	0	0				Lean CLAY	CL
D-14	21.0	5	Gray	44.6	-	0	0	0				Lean CLAY	CL
D-15	22.5	4	Gray	42.9	-	0	0	0	44	23	21	Lean CLAY	CL
D-16	24.0	3	Gray	41.0	-	0	0	0				Lean CLAY	CL
D-17	25.5	5	Gray	42.6	-	0	0	0				Lean CLAY	CL
D-18	27.0	7	Gray	41.9	-	0	0	0				Lean CLAY	CL
D-19	28.5	28	Brown	26.9	-	0	0	0	NP	NP	NP	SILT (NP)	ML
D-20	30.0	50	Brown	9.0	-	0	0	0	NP	NP	NP	SILT (NP)	ML
D-21	31.5	50	Brown	7.8	-	0	80	20	NP	NP	NP	Silty SAND (NP)	SM
D-22	33.0	50	Brown	9.3	-	0	80	20	NP	NP	NP	Silty SAND (NP)	SM

Table 5: Summary Table of Test Results of BH005

Sample ID	Depth (m)	SPT N value (No. of Blow)	Colour	Moisture Content (%)	Specific Gravity, G_s	Grain Size Analysis			Liquid Limit & Plastic Limit			USCS Classification	
						Gravel (%)	Sand (%)	Fines (%)	Liquid Limit	Plastic Limit	Plasticity Index	Classification	Group Symbol
D-01	1.5	1	Gray	22.8	-	0	83	17	NP	NP	NP	Silty SAND (NP)	SM
D-02	3.0	2	Gray	12.8	-	0	84	16	NP	NP	NP	Silty SAND (NP)	SM
D-03	4.5	3	Gray	22.9	-	0	89	11	NP	NP	NP	Poorly Graded SAND with Silt (NP)	SP-SM
D-04	6.0	4	Gray	24.3	-	0	88	12	NP	NP	NP	Silty SAND (NP)	SM
D-05	7.5	4	Gray	23.1	-	0	88	12	NP	NP	NP	Silty SAND (NP)	SM
D-06	9.0	1	Gray	44.3	-	0	0	0	64	31	33	Fat CLAY	CH
D-07	10.5	2	Gray	44.6	-	0	0	0	64	32	32	Fat CLAY	CH
D-08	12.0	3	Gray	47.3	-	0	0	0	41	25	16	Lean CLAY	CL
D-09	13.5	2	Gray	43.6	-	0	0	0	41	25	16	Lean CLAY	CL
D-10	15.0	4	Gray	41.8	-	0	0	0	37	24	13	Lean CLAY	CL
D-11	16.5	3	Gray	47.1	-	0	0	0	18	23	14	Lean CLAY	CL
D-12	18.0	5	Gray	39.7	-	0	0	0	38	24	14	Lean CLAY	CL
D-13	19.5	5	Gray	41.2	-	0	0	0	38	23	15	Lean CLAY	CL
D-14	21.0	6	Gray	45.1	-	0	0	0	45	26	19	Lean CLAY	CL
D-15	22.5	7	Gray	43.6	-	0	0	0				Lean CLAY	CL
D-16	24.0	3	Gray	42.4	-	0	0	0				Lean CLAY	CL
D-17	25.5	4	Gray	40.9	-	0	0	0	45	26	19	Lean CLAY	CL
D-18	27.0	5	Gray	42.4	-	0	0	0				Lean CLAY	CL
D-19	28.5	41	Brown	9.8	-	0	73	27	NP	NP	NP	Silty SAND (NP)	SM
D-20	30.0	50	Brown	10.0	-	0	76	24	NP	NP	NP	Silty SAND (NP)	SM
D-21	31.5	50	Brown	8.5	-	0	75	25	NP	NP	NP	Silty SAND (NP)	SM
D-22	33.0	50	Brown	9.5	-	0	75	25	NP	NP	NP	Silty SAND (NP)	SM

Table 6: Summary Table of Test Results of BH006

6Sample ID	Depth (m)	SPT N value (No. of Blow)	Colour	Moisture Content (%)	Specific Gravity, G_s	Grain Size Analysis			Liquid Limit & Plastic Limit			USCS Classification	
						Gravel (%)	Sand (%)	Fines (%)	Liquid NP Limit	Plastic Limit	Plasticity Index	Classification	Group Symbol
D-01	1.5	1	Gray	9.1	-	0	79	21	NP	NP	NP	Silty SAND (NP)	SM
D-02	3.0	2	Gray	20.5	-	0	52	48	NP	NP	NP	Silty SAND (NP)	SM
D-03	4.5	2	Gray	17.6	-	0	60	40	NP	NP	NP	Silty SAND (NP)	SM
D-04	6.0	4	Gray	33.1	-	0	0	0	NP	NP	NP	SILT (NP)	ML
D-05	7.5	5	Gray	33.8	-	0	0	0	NP	NP	NP	SILT (NP)	ML
D-06	9.0	2	Gray	40.4	-	0	0	0	48	21	27	Lean CLAY	CL
D-07	10.5	3	Gray	43.7	-	0	0	0	43	24	19	Lean CLAY	CL
D-08	12.0	4	Gray	42.5	-	0	0	0	43	24	19	Lean CLAY	CL
D-09	13.5	2	Gray	40.9	-	0	0	0	51	23	28	Fat CLAY	CH
D-10	15.0	2	Gray	42.6	-	0	0	0	50	24	26	Fat CLAY	CH
D-11	16.5	3	Gray	42.0	-	0	0	0	39	24	15	Lean CLAY	CL
D-12	18.0	4	Gray	41.8	-	0	0	0	39	24	15	Lean CLAY	CL
D-13	19.5	3	Gray	40.6	-	0	0	0	39	24	15	Lean CLAY	CL
D-14	21.0	5	Gray	43.1	-	0	0	0	37	24	13	Lean CLAY	CL
D-15	22.5	6	Gray	33.4	-	0	0	0	42	23	19	Lean CLAY	CL
D-16	24.0	6	Gray	40.7	-	0	0	0	42	23	19	Lean CLAY	CL
D-17	25.5	4	Gray	41.5	-	0	0	0	46	23	23	Lean CLAY	CL
D-18	27.0	7	Gray	41.7	-	0	0	0	46	27	19	Lean CLAY	CL
D-19	28.5	38	Gray	11.7	-	0	73	27	NP	NP	NP	Silty SAND (NP)	SM
D-20	30.0	50	Brown	12.7	-	0	70	30	NP	NP	NP	Silty SAND (NP)	SM
D-21	31.5	50	Brown	10.8	-	0	77	23	NP	NP	NP	Silty SAND (NP)	SM
D-22	33.0	50	Brown	10.4	-	0	75	25	NP	NP	NP	Silty SAND (NP)	SM

APPENDIX 3: CALCULATION OF BEARING CAPACITY

APPENDIX 3A: AXIAL CAPACITY OF SINGLE BORED PILE

Smart Development Engineering (SDE) Limited

Project: Soil Investigation for Standard Penetration Test (SPT) for Fortress Holdings Limited	Axial Capacity of Single Pile	Location: Block # M, Plot: 2731, Road # 20/A, Bashundhara R/A., Dhaka

Borehole No.: 01

Pile Type:	Bored
Cross-section:	Circular

Pile Diameter (mm):	500
Factor of Safety (FS):	3.00

Depth (m)	N Value	N_{60}	$N_{60,avg}$ for f_{si}	N_{60} for f_b	Skin friction Q_s = Sum of (Q_{si})			End bearing $Q_b = f_b * A_i$		Ultimate Load, $Q_u = Q_s + Q_b$ (kN)	Allowable Load, $Q_a = Q_u/FS$ (kN)
					f_{si} (kPa)	Q_{si} (kN)	Q_s (kN)	f_b (kPa)	Q_b (kN)		
1.5	1	0.98	0.49	1.46	0.49	1.15	1.15	65.81	12.92	14.07	4.69
3.0	2	1.95	1.46	2.08	1.46	3.45	4.59	187.20	36.76	41.35	13.78
4.5	2	2.21	2.08	4.19	2.08	4.90	9.50	565.99	111.13	120.63	40.21
6.0	5	6.18	4.19	4.94	4.19	9.88	19.37	741.00	145.50	164.87	54.96
7.5	3	3.71	4.94	2.47	4.94	11.64	31.01	370.50	72.75	103.76	34.59
9.0	1	1.24	2.47	1.27	2.96	6.98	38.00	31.69	6.22	44.22	14.74
10.5	1	1.30	1.27	1.95	1.52	3.58	41.58	48.75	9.57	51.15	17.05
12.0	2	2.60	1.95	3.25	2.34	5.51	47.09	81.25	15.95	63.05	21.02
13.5	3	3.90	3.25	3.25	3.90	9.19	56.28	81.25	15.95	72.24	24.08
15.0	2	2.60	3.25	3.25	3.90	9.19	65.47	81.25	15.95	81.43	27.14
16.5	3	3.90	3.25	4.55	3.90	9.19	74.66	113.75	22.33	97.00	32.33
18.0	4	5.20	4.55	7.80	5.46	12.86	87.53	195.00	38.29	125.81	41.94
19.5	8	10.40	7.80	8.45	9.36	22.05	109.58	211.25	41.48	151.06	50.35
21.0	5	6.50	8.45	5.85	10.14	23.89	133.47	146.25	28.72	162.19	54.06
22.5	4	5.20	5.85	6.50	7.02	16.54	150.01	162.50	31.91	181.92	60.64
24.0	6	7.80	6.50	13.00	7.80	18.38	168.39	325.00	63.81	232.20	77.40
25.5	14	18.20	13.00	16.90	15.60	36.76	205.15	422.50	82.96	288.11	96.04
27.0	12	15.60	16.90	15.60	20.28	47.78	252.93	390.00	76.58	329.51	109.84
28.5	12	15.60	15.60	39.65	18.72	44.11	297.04	991.25	194.63	491.67	163.89
30.0	49	63.70	39.65	64.35	39.65	93.42	390.46	4000.00	785.40	1175.86	391.95

Smart Development Engineering (SDE) Limited

Project: Soil Investigation for Standard Penetration Test (SPT) for Fortress Holdings Limited	**Axial Capacity of Single Pile**	Location: Block # M, Plot: 2731, Road # 20/A, Bashundhara R/A., Dhaka

Borehole No.: 02

Pile Type:	Bored
Cross-section:	Circular

Pile Diameter (mm):	500
Factor of Safety (FS):	3.00

Depth (m)	N Value	N_{60}	$N_{60,avg}$ for f_{si}	N_{60} for f_b	Skin friction Q_s = Sum of (Q_{si})			End bearing $Q_b = f_b * A_i$		Ultimate Load, $Q_u = Q_s + Q_b$ (kN)	Allowable Load, $Q_a = Q_u/FS$ (kN)
					f_{si} (kPa)	Q_{si} (kN)	Q_s (kN)	f_b (kPa)	Q_b (kN)		
1.5	1	0.98	0.49	1.95	0.49	1.15	1.15	87.75	17.23	18.38	6.13
3.0	3	2.93	1.95	3.67	1.95	4.59	5.74	330.53	64.90	70.64	23.55
4.5	4	4.42	3.67	6.53	3.67	8.65	14.40	881.89	173.16	187.55	62.52
6.0	7	8.65	6.53	5.56	6.53	15.39	29.79	833.63	163.68	193.47	64.49
7.5	2	2.47	5.56	2.47	5.56	13.09	42.88	370.50	72.75	115.63	38.54
9.0	2	2.47	2.47	1.89	2.96	6.98	49.87	47.13	9.25	59.12	19.71
10.5	1	1.30	1.89	2.60	2.26	5.33	55.20	65.00	12.76	67.96	22.65
12.0	3	3.90	2.60	3.90	3.12	7.35	62.55	97.50	19.14	81.69	27.23
13.5	3	3.90	3.90	2.60	4.68	11.03	73.57	65.00	12.76	86.34	28.78
15.0	1	1.30	2.60	3.90	3.12	7.35	80.93	97.50	19.14	100.07	33.36
16.5	5	6.50	3.90	6.50	4.68	11.03	91.95	162.50	31.91	123.86	41.29
18.0	5	6.50	6.50	9.10	7.80	18.38	110.33	227.50	44.67	155.00	51.67
19.5	9	11.70	9.10	9.75	10.92	25.73	136.06	243.75	47.86	183.92	61.31
21.0	6	7.80	9.75	7.15	11.70	27.57	163.63	178.75	35.10	198.73	66.24
22.5	5	6.50	7.15	6.50	8.58	20.22	183.84	162.50	31.91	215.75	71.92
24.0	5	6.50	6.50	7.80	7.80	18.38	202.22	195.00	38.29	240.51	80.17
25.5	7	9.10	7.80	9.75	9.36	22.05	224.28	243.75	47.86	272.14	90.71
27.0	8	10.40	9.75	31.85	11.70	27.57	251.84	796.25	156.34	408.19	136.06
28.5	41	53.30	31.85	59.15	31.85	75.04	326.89	4000.00	785.40	1112.29	370.76
30.0	50	65.00	59.15	65.00	59.15	139.37	466.26	4000.00	785.40	1251.66	417.22

Smart Development Engineering (SDE) Limited

Project: Soil Investigation for Standard Penetration Test (SPT) for Fortress Holdings Limited	**Axial Capacity of Single Pile**	Location: Block # M, Plot: 2731, Road # 20/A, Bashundhara R/A., Dhaka

Borehole No.: 03

Pile Type:	Bored
Cross-section:	Circular

Pile Diameter (mm):	500
Factor of Safety (FS):	3.00

Depth (m)	N Value	N_{60}	$N_{60,avg}$ for f_{si}	N_{60} for f_b	Skin friction Q_s = Sum of (Q_{si})			End bearing $Q_b = f_b * A_i$		Ultimate Load, $Q_u = Q_s + Q_b$ (kN)	Allowable Load, $Q_a = Q_u/FS$ (kN)
					f_{si} (kPa)	Q_{si} (kN)	Q_s (kN)	f_b (kPa)	Q_b (kN)		
1.5	2	1.95	0.98	1.95	0.98	2.30	2.30	87.75	17.23	19.53	6.51
3.0	2	1.95	1.95	3.19	1.95	4.59	6.89	286.65	56.28	63.18	21.06
4.5	4	4.42	3.19	5.92	3.19	7.50	14.40	798.53	156.79	171.19	57.06
6.0	6	7.41	5.92	6.18	5.92	13.94	28.33	926.25	181.87	210.20	70.07
7.5	4	4.94	6.18	3.71	6.18	14.55	42.88	555.75	109.12	152.00	50.67
9.0	2	2.47	3.71	2.54	4.45	10.48	53.36	63.38	12.44	65.80	21.93
10.5	2	2.60	2.54	1.95	3.04	7.17	60.53	48.75	9.57	70.10	23.37
12.0	1	1.30	1.95	1.95	2.34	5.51	66.04	48.75	9.57	75.61	25.20
13.5	2	2.60	1.95	3.25	2.34	5.51	71.55	81.25	15.95	87.51	29.17
15.0	3	3.90	3.25	4.55	3.90	9.19	80.74	113.75	22.33	103.08	34.36
16.5	4	5.20	4.55	5.85	5.46	12.86	93.61	146.25	28.72	122.32	40.77
18.0	5	6.50	5.85	6.50	7.02	16.54	110.15	162.50	31.91	142.05	47.35
19.5	5	6.50	6.50	7.15	7.80	18.38	128.53	178.75	35.10	163.62	54.54
21.0	6	7.80	7.15	7.15	8.58	20.22	148.74	178.75	35.10	183.84	61.28
22.5	5	6.50	7.15	5.85	8.58	20.22	168.96	146.25	28.72	197.67	65.89
24.0	4	5.20	5.85	6.50	7.02	16.54	185.50	162.50	31.91	217.41	72.47
25.5	6	7.80	6.50	9.75	7.80	18.38	203.88	243.75	47.86	251.74	83.91
27.0	9	11.70	9.75	13.00	11.70	27.57	231.44	325.00	63.81	295.26	98.42
28.5	11	14.30	13.00	29.25	15.60	36.76	268.20	731.25	143.58	411.78	137.26
30.0	34	44.20	29.25	54.60	29.25	68.92	337.12	4000.00	785.40	1122.52	374.17

Smart Development Engineering (SDE) Limited

Project: Soil Investigation for Standard Penetration Test (SPT) for Fortress Holdings Limited	Axial Capacity of Single Pile	Location: Block # M, Plot: 2731, Road # 20/A, Bashundhara R/A., Dhaka

Borehole No.: 04

Pile Type:	Bored
Cross-section:	Circular

Pile Diameter (mm):	500
Factor of Safety (FS):	3.00

Depth (m)	N Value	N_{60}	$N_{60,avg}$ for f_{si}	N_{60} for f_b	Skin friction Q_s = Sum of (Q_{si})			End bearing $Q_b = f_b * A_i$		Ultimate Load, $Q_u = Q_s + Q_b$ (kN)	Allowable Load, $Q_a = Q_u/FS$ (kN)
					f_{si} (kPa)	Q_{si} (kN)	Q_s (kN)	f_b (kPa)	Q_b (kN)		
1.5	2	1.95	0.98	1.95	0.98	2.30	2.30	87.75	17.23	19.53	6.51
3.0	2	1.95	1.95	2.63	1.95	4.59	6.89	236.93	46.52	53.41	17.80
4.5	3	3.32	2.63	4.75	2.63	6.20	13.09	640.58	125.78	138.87	46.29
6.0	5	6.18	4.75	6.18	4.75	11.18	24.27	926.25	181.87	206.14	68.71
7.5	5	6.18	6.18	4.94	6.18	14.55	38.82	741.00	145.50	184.32	61.44
9.0	3	3.71	4.94	3.15	5.93	13.97	52.79	78.81	15.47	68.27	22.76
10.5	2	2.60	3.15	1.95	3.78	8.91	61.71	48.75	9.57	71.28	23.76
12.0	1	1.30	1.95	2.60	2.34	5.51	67.22	65.00	12.76	79.98	26.66
13.5	3	3.90	2.60	3.90	3.12	7.35	74.57	97.50	19.14	93.71	31.24
15.0	3	3.90	3.90	3.25	4.68	11.03	85.60	81.25	15.95	101.55	33.85
16.5	2	2.60	3.25	3.90	3.90	9.19	94.79	97.50	19.14	113.93	37.98
18.0	4	5.20	3.90	5.85	4.68	11.03	105.81	146.25	28.72	134.53	44.84
19.5	5	6.50	5.85	6.50	7.02	16.54	122.35	162.50	31.91	154.26	51.42
21.0	5	6.50	6.50	5.85	7.80	18.38	140.73	146.25	28.72	169.45	56.48
22.5	4	5.20	5.85	4.55	7.02	16.54	157.27	113.75	22.33	179.61	59.87
24.0	3	3.90	4.55	5.20	5.46	12.86	170.14	130.00	25.53	195.66	65.22
25.5	5	6.50	5.20	7.80	6.24	14.70	184.84	195.00	38.29	223.13	74.38
27.0	7	9.10	7.80	22.75	9.36	22.05	206.89	568.75	111.67	318.57	106.19
28.5	28	36.40	22.75	50.70	22.75	53.60	260.50	4000.00	785.40	1045.90	348.63
30.0	50	65.00	50.70	65.00	50.70	119.46	379.96	4000.00	785.40	1165.35	388.45

Smart Development Engineering (SDE) Limited

Project: Soil Investigation for Standard Penetration Test (SPT) for Fortress Holdings Limited	**Axial Capacity of Single Pile**	Location: Block # M, Plot: 2731, Road # 20/A, Bashundhara R/A., Dhaka

Borehole No.: 05

Pile Type:	Bored	Pile Diameter (mm):	500
Cross-section:	Circular	Factor of Safety (FS):	3.00

Depth (m)	N Value	N_{60}	$N_{60,avg}$ for f_{si}	N_{60} for f_b	Skin friction Q_s = Sum of (Q_{si})			End bearing $Q_b = f_b * A_t$		Ultimate Load, $Q_u = Q_s + Q_b$ (kN)	Allowable Load, $Q_a = Q_u/FS$ (kN)
					f_{si} (kPa)	Q_{si} (kN)	Q_s (kN)	f_b (kPa)	Q_b (kN)		
1.5	1	0.98	0.49	1.46	0.49	1.15	1.15	65.81	12.92	14.07	4.69
3.0	2	1.95	1.46	2.63	1.46	3.45	4.59	236.93	46.52	51.11	17.04
4.5	3	3.32	2.63	4.13	2.63	6.20	10.80	557.21	109.41	120.21	40.07
6.0	4	4.94	4.13	4.94	4.13	9.73	20.52	741.00	145.50	166.02	55.34
7.5	4	4.94	4.94	3.09	4.94	11.64	32.16	463.13	90.93	123.10	41.03
9.0	1	1.24	3.09	1.92	3.71	8.73	40.89	47.94	9.41	50.30	16.77
10.5	2	2.60	1.92	3.25	2.30	5.42	46.31	81.25	15.95	62.27	20.76
12.0	3	3.90	3.25	3.25	3.90	9.19	55.50	81.25	15.95	71.46	23.82
13.5	2	2.60	3.25	3.90	3.90	9.19	64.69	97.50	19.14	83.84	27.95
15.0	4	5.20	3.90	4.55	4.68	11.03	75.72	113.75	22.33	98.05	32.68
16.5	3	3.90	4.55	5.20	5.46	12.86	88.58	130.00	25.53	114.11	38.04
18.0	5	6.50	5.20	6.50	6.24	14.70	103.29	162.50	31.91	135.19	45.06
19.5	5	6.50	6.50	7.15	7.80	18.38	121.66	178.75	35.10	156.76	52.25
21.0	6	7.80	7.15	8.45	8.58	20.22	141.88	211.25	41.48	183.36	61.12
22.5	7	9.10	8.45	6.50	10.14	23.89	165.77	162.50	31.91	197.68	65.89
24.0	3	3.90	6.50	4.55	7.80	18.38	184.15	113.75	22.33	206.49	68.83
25.5	4	5.20	4.55	5.85	5.46	12.86	197.02	146.25	28.72	225.73	75.24
27.0	5	6.50	5.85	29.90	7.02	16.54	213.56	747.50	146.77	360.33	120.11
28.5	41	53.30	29.90	59.15	29.90	70.45	284.01	4000.00	785.40	1069.40	356.47
30.0	50	65.00	59.15	65.00	59.15	139.37	423.38	4000.00	785.40	1208.77	402.92

Smart Development Engineering (SDE) Limited

Project: Soil Investigation for Standard Penetration Test (SPT) for Fortress Holdings Limited	Axial Capacity of Single Pile	Location: Block # M, Plot: 2731, Road # 20/A, Bashundhara R/A., Dhaka

Borehole No.: 06

Pile Type:	Bored
Cross-section:	Circular

Pile Diameter (mm):	500
Factor of Safety (FS):	3.00

Depth (m)	N Value	N_{60}	$N_{60,avg}$ for f_s	N_{60} for f_b	Skin friction Q_s = Sum of (Q_{si})			End bearing Q_b = f_b*A_b		Ultimate Load, $Q_u = Q_s + Q_b$ (kN)	Allowable Load, $Q_a = Q_u/FS$ (kN)
					f_s (kPa)	Q_{si} (kN)	Q_s (kN)	f_b (kPa)	Q_b (kN)		
1.5	1	0.98	0.49	1.46	0.49	1.15	1.15	65.81	12.92	14.07	4.69
3.0	2	1.95	1.46	2.08	1.46	3.45	4.59	187.20	36.76	41.35	13.78
4.5	2	2.21	2.08	3.58	2.08	4.90	9.50	482.63	94.76	104.26	34.75
6.0	4	4.94	3.58	5.56	3.58	8.42	17.92	833.63	163.68	181.60	60.53
7.5	5	6.18	5.56	4.32	5.56	13.09	31.01	648.38	127.31	158.32	52.77
9.0	2	2.47	4.32	3.19	5.19	12.22	43.23	79.63	15.63	58.87	19.62
10.5	3	3.90	3.19	4.55	3.82	9.01	52.24	113.75	22.33	74.58	24.86
12.0	4	5.20	4.55	3.90	5.46	12.86	65.11	97.50	19.14	84.25	28.08
13.5	2	2.60	3.90	2.60	4.68	11.03	76.13	65.00	12.76	88.89	29.63
15.0	2	2.60	2.60	3.25	3.12	7.35	83.48	81.25	15.95	99.44	33.15
16.5	3	3.90	3.25	4.55	3.90	9.19	92.67	113.75	22.33	115.01	38.34
18.0	4	5.20	4.55	4.55	5.46	12.86	105.54	113.75	22.33	127.87	42.62
19.5	3	3.90	4.55	5.20	5.46	12.86	118.40	130.00	25.53	143.93	47.98
21.0	5	6.50	5.20	7.15	6.24	14.70	133.10	178.75	35.10	168.20	56.07
22.5	6	7.80	7.15	7.80	8.58	20.22	153.32	195.00	38.29	191.61	63.87
24.0	6	7.80	7.80	6.50	9.36	22.05	175.38	162.50	31.91	207.28	69.09
25.5	4	5.20	6.50	7.15	7.80	18.38	193.75	178.75	35.10	228.85	76.28
27.0	7	9.10	7.15	29.25	8.58	20.22	213.97	731.25	143.58	357.55	119.18
28.5	38	49.40	29.25	57.20	29.25	68.92	282.89	4000.00	785.40	1068.29	356.10
30.0	50	65.00	57.20	65.00	57.20	134.77	417.66	4000.00	785.40	1203.06	401.02