

CLIENT: MC GRATH REAL STATE

REPORT ON SUB-SOIL INVESTIGATION WORKS

FOR THE

**"CONSTRUCTION OF G+9 STORIED RESIDENTIAL BUILDING WITH
1 BASEMENT "**

AT 15,17 SANTIBAG, MALIBAG, DHAKA.

JULY: 2023

Prepared by:

DIGITAL SURVEY SOLUTION

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1.1. INTRODUCTION AND BACK GROUND

BSO ASSOCIATES LTD were commissioned for carrying out sub soil investigation works and geotechnical features of the following project:

Client	:	Mc Grath Real Estate
Name of Project	:	Construction of G+9-Storied Residential Building with 1 Basement
Site Location	:	15/17, Santibag, Malibag, Dhaka.

DIGITAL SURVEY SOLUTION located at Suit #21, Navana Tower,45, Gulshan South Avenue (Circle-1), Dhaka-1212 is a well-known firm & has been entrusted to engage with the geotechnical investigation work for the above-mentioned site by the concerned authority.

Technical soil data obtained from the field investigations (subsoil conditions and groundwater condition) are presented in this report along with the analyses of bearing capacity of foundations of a different range of size and depth & different laboratory test results. This report is being written to provide guidelines for foundation design.

The tests and terminologies used in this report are according to BNBC-2006, AASHTO/ASTM, ACI code and other standard codes. The site investigations generally follow accepted practices for geotechnical engineering. The format and contents are guided by the client specific needs and economics.

1.2. PURPOSE OF THE STUDY

The purpose of investigation is to determine the existing soil profiles and engineering characteristics of the subsurface conditions at the site and to provide the designer with comments on the following:

- Suitable footing types, founding depths and geotechnical design parameters which will be required for a safe and economic design and excavation of the engineering works, such as the soil bearing capacity, expected foundation settlement, side slope stability, hydrological conditions at the site and other special recommendation which depends on the nature of the site.
- Methods of construction of foundation and footings, site seismicity characters, groundwater conditions, quality control requirements and outdoor subgrade and soil retaining parameters.



1.3. SCOPE OF WORKS

The scope of investigation for this study comprises the following:-

- Collecting information such as geological and geotechnical maps related to the project site, public services, and land use maps.
- Making visits for site reconnaissance in order to collect information about site nature, topography of the site, geological features and other properties concerning the project site.
- Drilling boreholes and collecting soil samples from field at desired intervals for subsequent observation and laboratory testing.
- The soil investigation both in the field and laboratory were carried out in detail to evaluate the mechanical, physical and geotechnical properties of safe and economic foundation with a view to recommend the safe and economic foundation for the proposed structures to be constructed within the investigation site.
- The report contained the works program, methodology of the field and laboratory investigation works, discussions on physical and engineering properties of sub-soil formation encountered during investigation, evaluation of laboratory test data, analysis of bearing capacities, foundation recommendations and charts and graphs representing the field and laboratory test results.

The laboratory test results, analysis, discussion and recommendations which are presented in this report are valid only for the locations where the actual investigations have carried out.

1.4. LIMITATION

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after GSS's field testing has been completed.

GSS's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by GSS in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by GSS. This is because this report has been written as advice and opinion rather than instructions for construction.



1.5. SEISMOLOGY

Bangladesh has been divided into three seismic zones with different levels of ground motion. A map of Bangladesh showing the boundaries of the three zones is provided in Appendix B. It indicates the seismic zoning map of Bangladesh. Each zone has a seismic zone coefficient (Z) which represents the maximum considered Peak Ground Acceleration (PGA) on very stiff soil/rock. The zone coefficients of the three zones are:

- Z = 0.12 (Zone 1)
- Z = 0.20 (Zone 2)
- Z = 0.28 (Zone 3)
- Z = 0.36 (Zone 4)

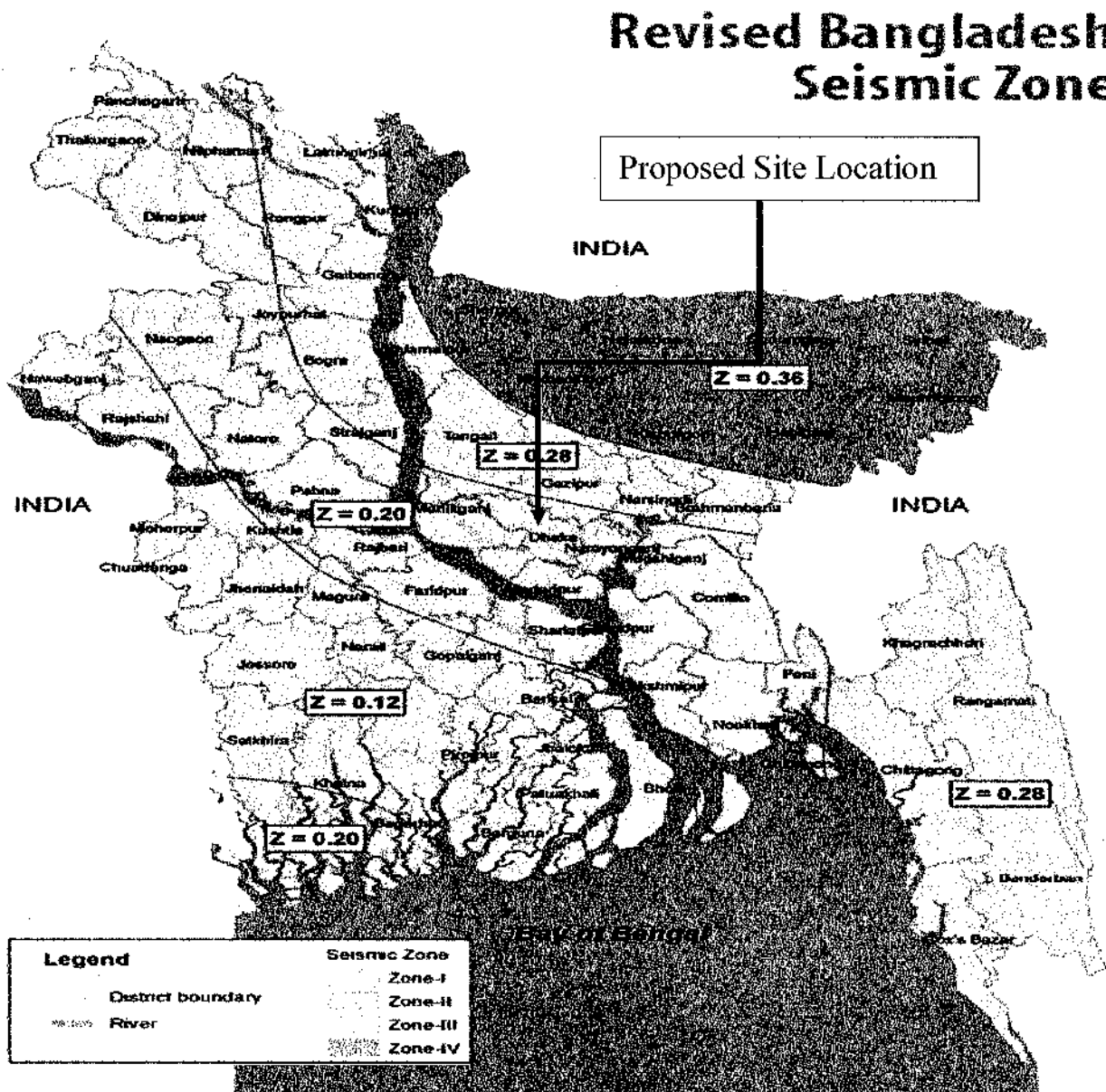


Fig No 1.1: Seismic Zoning Map of Bangladesh (As per BNBC 2020)

2. INVESTIGATION PROGRAM

To appraise the required geotechnical parameters for foundation design of the proposed structure, the investigation program has been set into the following steps:

- i) Field Investigation works and
- ii) Laboratory Tests.

2.1 FIELD INVESTIGATION WORKS

The actual field investigation work was started on 18/07/2023 and was completed on 21/07/2023.					
Number of Boring	:	05	Depth of Boring	:	18.0 m (max)
SPT Execution	:	60	Interval of SPT execution	:	1.5 m
Disturbed sample	:	60	Undisturbed Sample	:	Nil
Compaction Test	:	Nil	Water Table Level below	:	1.82 m
Permeability Tests	:	N/A	Other Tests	:	N/A

2.2 Execution of Borings

The boring was conducted using 100 mm diameter casing. The method consists in first driving a casing through which a hollow drill rod with a sharp chisel or chopping bit at the lower end is inserted. Water is forced under pressure through the drill rod which is alternatively raised and dropped, and also rotated. The soil cuttings are forced upto the dropped and also rotated. The soil cuttings are forced upto the ground in the drilled rod and casing. Before taking SPT and collection of disturbed and undisturbed soil samples, the bore hole is cleaned with repeated circulation of mud slurry.

2.3 Standard Penetration Tests (SPT)

The standard Penetration Tests (SPT) was performed in all the bore holes locations. Standard Penetration Test was conducted in the boreholes at intervals of 1.5 m to 3.0 m depth or at change of strata whichever is earlier using a splits poon sampler. The split spoon sampler used is of a standard design having an outer diameter 50.8 mm and inner diameter of 35 mm.

In SPT testing, the rope-and-pulley (R-P) method would be used. This consisted of a hollow cylindrical mass sliding over a steel rod. It is operated by lifting the mass with a rope over a cat head. The tests were executed by using 63.5 kg hammer falling freely from a constant height of 760 mm. a record of the number of blows required to penetrate every 15 cms to a maximum depth of 45 cms was made. The first 15 cm of drive are considered to be seating drive and are neglected. The SPT value (N-value) was taken as the summation of blows required in 2nd and 3rd 15 cm of penetration of sampler.

On completion of a test the split spoon sampler was opened and soil specimens were preserved in polythene bags for logging purpose. The SPT values (N-values) are shown on the borehole logs against the respective interval of tests.



- The Standard Penetration Tests provide a fair knowledge on the density and consistency of the soil layer encountered and in addition yields disturbed/ semi-disturbed soil samples from within the split spoon sampler used during the tests.

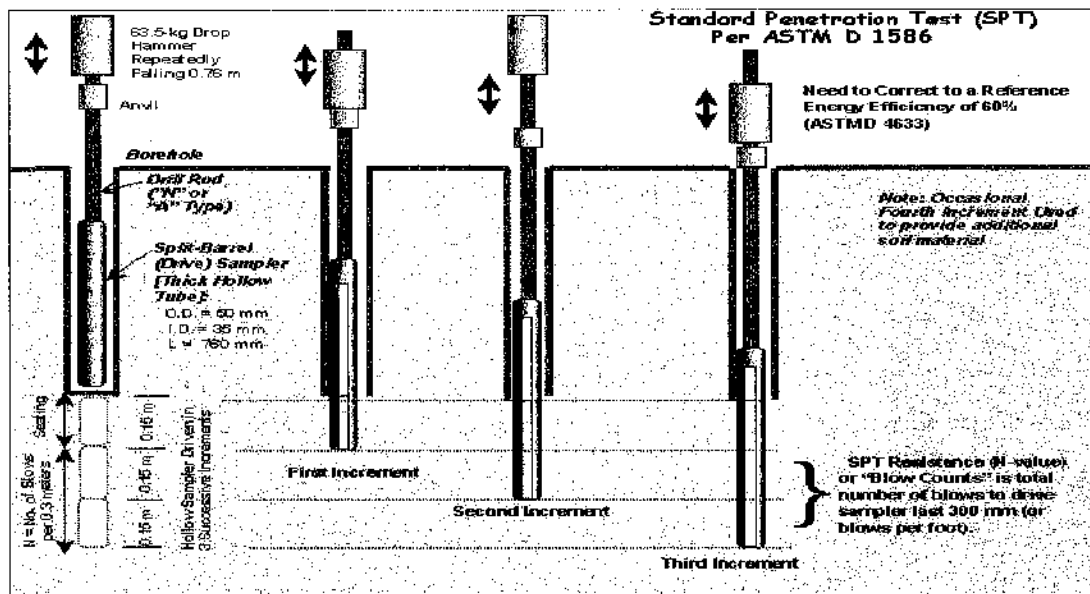


Figure for Standard Penetration Tests

2.4 Disturbed Sample Collection

The disturbed samples were collected with the help of split spoon sampler used during Standard Penetration Tests. The collected samples were classified in-situ and were preserved in water tight polythene bags with proper identification marks for onward transmission to the laboratory for further analysis.

The disturbed samples were also used to reconstruct depth wise stratification of bore holes depending on its classifications.

2.5 Undisturbed Sample Collection

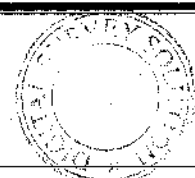
The undisturbed samples were collected whenever feasible from the cohesive layers with the help of thin walled Shelby tubes 76 mm diameter thin walled Shelby tubes are penetrated into the undisturbed soil formation at the bottom of the borehole by applying rapid but continuous force. The samples recovered within the Shelby tubes were wax sealed at both ends and transmitted to the laboratory with proper identification marks.

2.6 Recording of Ground Water Table

Groundwater is one element that affects in the stability and foundation analyses. Groundwater affects many elements of the foundation design and construction, so that the ground water level was generally assessed from borehole during drilling. The ground water table was recorded in each of the boreholes by rope/rod sounding after 24 hours of completion of the drilling and sampling operation.

2.7 Other Field Tests

Any other field tests if necessary, which were conducted at site was done as per AASHTO / ASTM standard specifications.



2.8 LABORATORY INVESTIGATION

After classification and carrying out the geological description on the obtained samples, a laboratory tests program was issued; this program contained the required tests on selected samples in order to determine the physical and mechanical properties of the ground materials.

Grain Size Distribution	:	06	Atterberg Limits Test	:	05
Specific Gravity	:	Nil	Moisture Content	:	05
Unconfined Compression Test	:	Nil	Consolidation Test	:	Nil
Direct Shear Test	:	06	Standard Proctor Test	:	Nil
Free Swell Index	:	Nil	Chemical Test	:	Nil

Where applicable, The tests were performed according to American Society for Testing and Materials (ASTM) Standard as follow:

Table No.3: Common Soil Laboratory Tests Used in Geotechnical Engineering

Type of condition	Soil Properties	Specification
Index Test	Classification	ASTM D 2487-93
	Particle size	ASTM D 422-90
	Atterberg limits	ASTM D 4318-95
	Water (or moisture) content	ASTM D 2216-92
	Specific gravity	ASTM D 854-92
	Index Tests Sand equivalent (SE)	ASTM D 2419-95
Settlement	Consolidation	ASTM D 2435-96
	Organic content	ASTM D 2974-95
	Fill compaction: Standard Proctor	ASTM D 698-91
	Fill compaction: Modified Proctor	ASTM D 1557-91
Shear strength for slope movement	Unconfined compressive strength	ASTM D 2166-91
	Unconsolidated undrained	ASTM D 2850-95
	Consolidated undrained.	ASTM D 4767-95
	Direct shear	ASTM D 3080-90

- Other tests will be defined depending on the clients and engineer's requirement if applicable.
- The soils will be also classified based on the Unified Soil Classification System (USCS).



3.1 DETERMINATION OF BEARING CAPACITY OF SOIL FOR FOOTING

The SPT is widely used to obtain the allowable bearing capacity values in the following general equation for sandy soil (for Maximum 25 mm settlement)

A. Cohesive soil:

$$Q_u = 5.14 * C_u * (1 + 0.2 * D_f / B) * (1 + 0.2 * B / L) * B * L ; [Skempton (1951)]$$

B. Cohesionless soil:

i) for $B \leq 4.0$ ft

$$Q_u = (N_{corr} / 2.5) * (F_d * S) * B * L ; [Bowles (1977)]$$

ii) for $B > 4.0$ ft

$$Q_u = (N_{corr} / 4.0) * (F_d * S) * ((B+1)/B)^2 * B * L ; [Bowles (1977)]$$

where,

Q_u = Net Ultimate Bearing Capacity (kip)

C_u = Undrained Cohesion (ksf)

N_{corr} = Corrected SPT for overburden pressure

B = Width of foundation (ft)

L = Length of foundation (ft)

F_d = Depth factor = $1 + 0.33 * (D_f / B) \leq 1.33$

D_f = Depth of foundation from EGL (ft)

S = Tolerable Settlement (inch)

❖ Terzaghi Ultimate Bearing Capacity Theory

$$Q_u = c N_c + \gamma D N_q + 0.5 \gamma B N_\gamma$$

= Ultimate bearing capacity equation for shallow strip footings, (kN/m²) (lb/ft²)

$$Q_u = 1.3 c N_c + \gamma D N_q + 0.4 \gamma B N_\gamma$$

= Ultimate bearing capacity equation for shallow square footings, (kN/m²) (lb/ft²)

$$Q_u = 1.3 c N_c + \gamma D N_q + 0.3 \gamma B N_\gamma$$

= Ultimate bearing capacity equation for shallow circular footings, (kN/m²) (lb/ft²)

❖ Mayerhof's Equation (1963) for Bearing Capacity

$$Q_a = Q_u / F.S. = (c \cdot N_c \cdot s_c \cdot d_c \cdot i_c + 0.5 \cdot \gamma_1 \cdot B \cdot N_r \cdot s_r \cdot d_r \cdot i_r + \gamma_2 \cdot D_f \cdot N_q \cdot s_q \cdot d_q \cdot i_q) / F.S.$$

❖ Hensen's Equation (1970) for Bearing Capacity

$$Q_a = Q_u / F.S. = (c \cdot N_c \cdot s_c \cdot d_c \cdot i_c \cdot g_c \cdot b_c + 0.5 \cdot \gamma_1 \cdot B \cdot N_r \cdot s_r \cdot d_r \cdot i_r \cdot g_r \cdot b_r + \gamma_2 \cdot D_f \cdot N_q \cdot s_q \cdot d_q \cdot i_q \cdot g_q \cdot b_q) / F.S.$$

where

$$N_c = \cot \phi (N_q - 1),$$

$$N_q = e^2 (3\pi/4 - \phi/2) \tan \phi / [2 \cos^2(45 + \phi/2)],$$

k_p = Passive pressure coefficient

$${}^2N_\gamma = (1/2) \tan \phi (k_p / \cos \phi - 1),$$

e = Napier's constant = 2.718...

s_c, s_r, s_q = Shape Factors

d_c, d_r, d_q = Depth Factors

i_c, i_r, i_q = inclination Factors

Allowable net bearing capacity, $Q_{all} = Q_u / (F.S.=3.0)$



3.2 DETERMINATION OF PILE CAPACITY (A SINGLE PILE)

The load applied to a single pile is carried jointly by the soil beneath the tip of the pile (End Bearing) and by soil around the shaft (Skin Friction), with deducting the self-weight of the pile and the maximum load that the pile can support. The pile capacity is given by-

$$Q_{ult} = \text{Base Resistance, } Q_p + \text{Shaft Resistance, } Q_s - \text{Weight of pile} \\ = A_p * E_b + f_s * \pi * D * L - W_p$$

Where,

E_b = end bearing capacity

D = diameter of pile

f_s = shaft resistance (skin friction)

L = length of pile

A_p = area of pile point

Design load capacity, $Q_a = Q_{ult} / F. S.$

where, F.S. , Factor of Safety = 2.5 for all cohesive and cohesionless soil

1. Ultimate Skin Friction

Cohesive soil: $Q_s = \alpha * C_u * A_s$; [Tomlinson Formula (α method)]

where,

Q_s = ultimate skin friction of pile (kip)

α = empirical adhesion factor or friction constant

C_u = undrained cohesion [= N/8 (ksf), where no data is available]

A_s = circumferential area of pile (sft)

Cohesionless soil: $Q_s = 0.02 * N_{corr} * A_s$; [Meyerhof (1976)]

where,

Q_s = ultimate skin friction of pile (kip)

N_{corr} = corrected SPT for overburden pressure

A_s = circumferential area of pile (sft)

2. Ultimate End Bearing Capacity

Cohesive soil: $Q_p = 9 * C_u * A_p$; [Skempton's Formula]

where,

Q_p = ultimate end bearing capacity of pile (kip)

C_u = undrained cohesion [=N/8 (ksf), where no data is available]

A_p = tip area of pile (sft)

Cohesionless soil: $Q_p = 2.66 * N_{corr} * A_p$; [Meyerhof (1976)]

where,

Q_p = ultimate end bearing capacity of pile (kip)

N_{corr} = corrected SPT for overburden pressure

A_p = tip area of pile (sft)



4. CONCLUSION & RECOMMENDATIONS

The Recommendations submitted in this report are prepared on the basis of obtained field SPT & available subsurface Samples from field and subsequent laboratory tests for the exclusive use of the project mentioned below:

Client	:	Mc Grath Real Estate
Name of Project	:	Construction of G+9-Storied Residential Building with 1 Basement
Site Location	:	15/17, Santibag, Malibag, Dhaka.

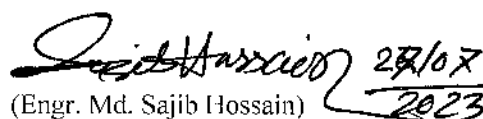
- The sub-soil formation encountered at the proposed site is almost homogeneous and the degree of disintegration varies slightly at places. The sequence of litho logical composition as well as consistency of the soil at different depths has been depicted in the respective bore logs **BH-1**Through to **BH-05** in Appendix A.
- RCC Cast-in-situ piles may be installed below the foundation. **Determining effective length of a pile segment requires engineering judgment.** The Allowable Load Bearing Capacity (Ton) of **20-inch Dia** RCC Cast-in-situ pile for different depth is given below.

Pile Size, inch	Depth From EGL, (ft)	Allowable Load Bearing Capacity (Ton) Considering Factor of Safety = 2.5				
		BH-01	BH-02	BH-03	BH-04	BH-05
20" Cast-in situ	55	99.03	101.48	100.35	103.61	106.10
	60	99.92	102.31	101.21	104.51	106.95

- Soil parameters for foundation design as well as the allowable bearing capacity of soil for shallow and deep foundation is provided in appendices.
 - **Table 1. for shallow foundation design.**
 - **Table 3. for Mat Foundation**
 - **Table 2.1 to Table 3.5 for RCC cast-in-situ pile capacity for different depth & dimensions.**
 - Linear Interpolation is acceptable for intermediate values of these capacities.
 - Laboratories test are enclosed in Appendix B.
- **Bearing Capacity should be confirmed by plate Load Test for shallow foundation or Pile Load Test for Deep Foundation.**
- Moreover considering the magnitude of the structure, column spacing & environmental condition and location of the proposed site, the foundation engineer will put his judgment and experience to select the suitable alternative type & depth of foundation.

The material contained in this report reflects our best judgment in the light of the information available through site visit, field investigation, laboratory test and subsequent calculations.

Recommended by


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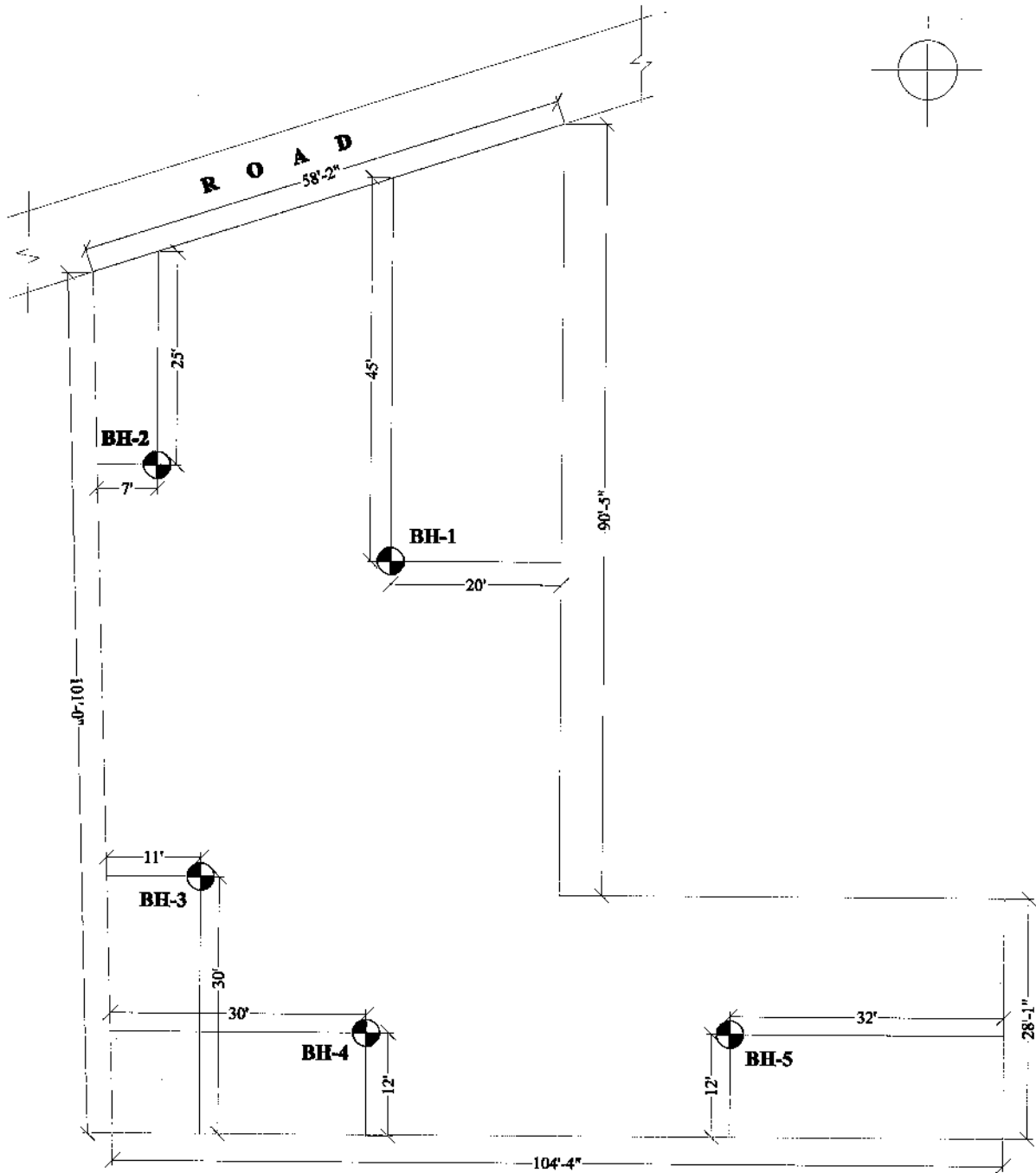
APPENDIX: A

**SITE PLAN
&
BORING LOGS**

DS&S

DIGITAL SURVEY SOLUTION

CLIENT : MC Grath Real Estate
PROJECT : Construction of G+9-Storeyed Residential Building with 1 basement
LOCATION : 15, 17 Santibag, Mallbag, Dhaka.



Drawn by: Abdul Awal

**Bore Hole
Layout Plan**

Not to Scale

Date: 25.07.2023

Figure No-01

BOREHOLE LOG

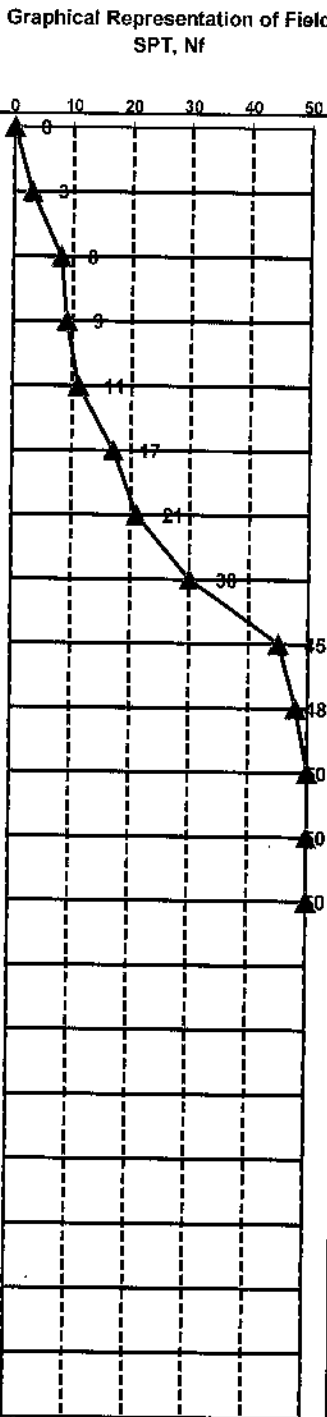
DIGITAL SURVEY SOLUTION

CLIENT : Mc Grath Real Estate
PROJECT : Construction of G+9-Storeyed Residential Building with 1 Basement
LOCATION : 15/17, Santibag, Mailbag, Dhaka.

BORE HOLE # 01

Start Date : 18-Jul-2023 **R. L.** : (-) 0.00 m From Road Level. **Drilling Method**: Wash Boring Method
Finish Date : 18-Jul-2023 **W. L.** : (-) 1.82 m From EGL of borehole **Depth of Bore Hole**: 18.0 m From EGL.

Depth Below EGL (m)	Sample ID	Sample Type	Layer Thickness (m)	Description of Soil Strata Encountered	Soil Profile	SPT interval	Field SPT, N	Graphical Representation of Field SPT, Nf	Fines (%)	Liquid Limit (LL)	Plastic Limit (LL)	N.M.C (%)	Qu (psi)	φ (Degrees)
0.0				RUBBISH.										
1.5	D-1	Disturbed Sample (D)	1.5			1.5	3							
3.0	D-2	Disturbed Sample (D)		Reddish Stiff, CLAY , with trace silt.		3.0	8		28.36	17.5	32			
4.5	D-3	Disturbed Sample (D)	4.5		4.5	9								
6.0	D-4	Disturbed Sample (D)			6.0	11								
7.5	D-5	Disturbed Sample (D)		Reddish brown Spotted Medium Dense, SILTY FINE SAND , with some silt.		7.5	17							
9.0	D-6	Disturbed Sample (D)	4.5		9.0	21								
10.5	D-7	Disturbed Sample (D)			10.5	30								
12.0	D-8	Disturbed Sample (D)		Reddish brown Spotted Dense to Very Dense, FINE SAND , with little silt.		12.0	45		28.43				35	
13.5	D-9	Disturbed Sample (D)			13.5	48								
15.0	D-10	Disturbed Sample (D)	7.5		15.0	50								
16.5	D-11	Disturbed Sample (D)				16.5	50							
18.0	D-12	Disturbed Sample (D)		End of Borehole		18.0	50							
19.5	D-13	Disturbed Sample (D)												
21.0	D-14	Disturbed Sample (D)												
22.5	D-15	Disturbed Sample (D)												
24.0	D-16	Disturbed Sample (D)												
25.5	D-17	Disturbed Sample (D)												
27.0	D-18	Disturbed Sample (D)												
28.5	D-19	Disturbed Sample (D)												
30.0	D-20	Disturbed Sample (D)												



Legend:

- Disturbed Sample (D)
- Non-Cohesive soil
- Cohesive silt
- Undisturbed Sample (UD)
- Cohesive soil
- Non-Cohesive filling

Excel by: Abdul Awal

Figure : BH 01



BOREHOLE LOG

DIGITAL SURVEY SOLUTION

CLIENT : Mc Grath Real Estate
PROJECT : Construction of G+9-Storeyed Residential Building with 1 Basement
LOCATION : 15/17, Santibag, Malibag, Dhaka.

BORE HOLE # 02

Start Date : 19-Jul-2023 **R. L.** : (-) 0.00 m From Road Level. **Drilling Method**: Wash Boring Method
Finish Date : 19-Jul-2023 **W. L.** : (-) 1.52 m From EGL of borehole **Depth of Bore Hole**: 18.0 m From EGL.

Depth Below EGL (m)	Sample ID	Sample Type Layer Thickness (m)	Description of Soil Strata Encountered	Soil Profile	SPT interval	Field SPT, N _f	Graphical Representation of Field SPT, N _f	Fines(%)	Liquid Limit (LL)	Plastic Limit (LL)	N.M.C (%)	Q _u (psi)	φ (Degrees)
0.0			RUBBISH.										
1.5	D-1	1.5			1.5	6							
3.0	D-2		Reddish Stiff, CLAY , with trace silt.		3.0	9							
4.5	D-3	4.5			4.5	11		29.38	15.3	30			
6.0	D-4				6.0	19							
7.5	D-5		Reddish brown Spotted Medium Dense, SILTY FINE SAND , with some silt.		7.5	16							
9.0	D-6	4.5			9.0	19							
10.5	D-7		Reddish brown Spotted Dense to Very Dense, FINE SAND , with little silt.		10.5	31							
12.0	D-8				12.0	35							
13.5	D-9				13.5	41							
15.0	D-10	7.5			15.0	50		22.25					40
16.5	D-11				16.5	50							
18.0	D-12		End of Borehole		18.0	50							
19.5	D-13												
21.0	D-14												
22.5	D-15												
24.0	D-16												
25.5	D-17												
27.0	D-18												
28.5	D-19												
30.0	D-20												

Legend:

- Disturbed Sample (D)
- Non-Cohesive soil
- Cohesive silt
- Undisturbed Sample (UD)
- Cohesive soil
- Non-Cohesive filling

Excel by: Abdul Awal

Figure : BH 02



BOREHOLE LOG

DIGITAL SURVEY SOLUTION

CLIENT : Mc Grath Real Estate
 PROJECT : Construction of G+9-Storeied Residential Building with 1 Basement
 LOCATION : 15/17, Santibag, Malibag, Dhaka.

BORE HOLE # 03

Start Date : 20-Jul-2023 R. L. : (-) 0.00 m From Road Level. Drilling Method: Wash Boring Method
 Finish Date : 20-Jul-2023 W. L. : (-) 1.52 m From EGL of borehole Depth of Bore Hole: 18.0 m From EGL.

Depth Below EGL (m)	Sample ID	Sample Type	Layer Thickness (m)	Description of Soil Strata Encountered	Soil Profile	SPT interval	Field SPT, N	Graphical Representation of Field SPT, Nf	Fines(%)	Liquid Limit (LL)	Plastic Limit (LL)	N.M.C (%)	Qu (psi)	φ (Degree)
0.0			1.5	RUBBISH.			0							
1.5	D-1					1.5	4							
3.0	D-2					3.0	10			27.36	16.4	29		
4.5	D-3		4.5	Reddish Stiff, CLAY, with trace silt.		4.5	12							
6.0	D-4					6.0	13							
7.5	D-5					7.5	18							
9.0	D-6		4.5	Reddish brown Spotted Medium Dense, SILTY FINE SAND, with some silt.		9.0	19							
10.5	D-7					10.5	29							
12.0	D-8					12.0	41							
13.5	D-9					13.5	46							
15.0	D-10		7.5	Reddish brown Spotted Dense to Very Dense, FINE SAND, with little silt.		15.0	50							
16.5	D-11					16.5	50		24.48					40
18.0	D-12					18.0	50							
19.5	D-13			End of Borehole										
21.0	D-14													
22.5	D-15													
24.0	D-16													
25.5	D-17													
27.0	D-18													
28.5	D-19													
30.0	D-20													

Legend:

- Disturbed Sample (D)
- Non-Cohesive soil
- Cohesive silt
- Undisturbed Sample (UD)
- Cohesive soil
- Non-Cohesive filling

Excel by: Abdul Awal

Figure : BH 03



BOREHOLE LOG

DIGITAL SURVEY SOLUTION

CLIENT : Mc Grath Real Estate
 PROJECT : Construction of G+9-Storeyed Residential Building with 1 Basement
 LOCATION : 15/17, Santibag, Malibag, Dhaka.

BORE HOLE # 04

Start Date : 20-Jul-2023 R. L. : (-) 0.00 m From Road Level. Drilling Method: Wash Boring Method
 Finish Date : 20-Jul-2023 W. L. : (-) 1.52 m From EGL of borehole Depth of Bore Hole: 18.0 m From EGL.

Depth Below EGL (m)	Sample ID	Sample Type Layer Thickness (m)	Description of Soil Strata Encountered	Soil Profile	SPT Interval	Field SPT, N	Graphical Representation of Field SPT, Nf	Fines (%)	Liquid Limit (LL)	Plastic Limit (LL)	N.M.C (%)	C _u (psi)	φ (Degrees)
0.0			RUBBISH.										
1.5	D-1	1.5			1.5	5							
3.0	D-2		Reddish Stiff, CLAY, with trace silt.		3.0	12			34.36	22.3	27		
4.5	D-3	4.5			4.5	14							
6.0	D-4				6.0	17							
7.5	D-5		Reddish brown Spotted Medium Dense to Dense, SILTY FINE SAND, with some silt.		7.5	18							
9.0	D-6	4.5			9.0	22							
10.5	D-7				10.5	31							
12.0	D-8		Reddish brown Spotted Dense to Very Dense, FINE SAND, with little silt.		12.0	38		20.81					37
13.5	D-9				13.5	47							
15.0	D-10	7.5			15.0	50							
16.5	D-11				16.5	50							
18.0	D-12				18.0	50							
18.0	D-12		End of Borehole										
19.5	D-13												
21.0	D-14												
22.5	D-15												
24.0	D-16												
25.5	D-17												
27.0	D-18												
28.5	D-19												
30.0	D-20												

Legend:

- Disturbed Sample (D)
- Non-Cohesive soil
- Cohesive silt
- Undisturbed Sample (UD)
- Cohesive soil
- Non-Cohesive filling

Excel by: Abdul Awal

Figure : BH 04



BOREHOLE LOG

DIGITAL SURVEY SOLUTION

CLIENT : Mc Grath Real Estate
 PROJECT : Construction of G+9-Storied Residential Building with 1 Basement
 LOCATION : 15/17, Santibag, Malibag, Dhaka.

BORE HOLE # 05

Start Date : 21-Jul-2023 R. L. : (-) 0.00 m From Road Level. Drilling Method: Wash Boring Method
 Finish Date : 21-Jul-2023 W. L. : (-) 1.52 m From EGL of borehole Depth of Bore Hole: 18.0 m From EGL.

Depth Below EGL (m)	Sample ID	Sample Type Layer Thickness (m)	Description of Soil Strata Encountered	Soil Profile	SPT interval	Field SPT, N	Graphical Representation of Field SPT, Nf	Fines(%)	Liquid Limit (LL)	Plastic Limit (PL)	N.M.C (%)	Qu (psi)	φ (Degrees)
0.0		1.5	RUBBISH.			0							
1.5	D-1				1.5	4							
3.0	D-2		Reddish Stiff to Very Stiff, CLAY, with trace silt.		3.0	10							
4.5	D-3	4.5			4.5	15		32.36	16.2	26			
6.0	D-4				6.0	23							
7.5	D-5	3.0	Reddish brown Spotted Medium Dense, SILTY FINE SAND, with some silt.		7.5	21							
9.0	D-6				9.0	23							
10.5	D-7		Reddish brown Spotted Dense to Very Dense, FINE SAND, with little silt.		10.5	32							
12.0	D-8				12.0	35							
13.5	D-9				13.5	44							
15.0	D-10	9.0			15.0	50							
16.5	D-11				16.5	50		27.25					40
18.0	D-12		End of Borehole		18.0	50							
19.5	D-13												
21.0	D-14												
22.5	D-15												
24.0	D-16												
25.5	D-17												
27.0	D-18												
28.5	D-19												
30.0	D-20												

Legend:

- Disturbed Sample (D)
- Non-Cohesive soil
- Cohesive silt
- Undisturbed Sample (UD)
- Cohesive soil
- Non-Cohesive filling

Excel by: Abdul Awal

Figure : BH 05



APPENDIX: B

LABORATORY TEST RESULTS

Grain Size Analysis Report (Mechanical Sieve)

As Per ASTM D422-63 (2007)

Client : Mc Grath Real Estate
Project : Construction of G+9-Storeyed Residential Building with 1 Basement
Location : 15/17, Santibag, Malibag, Dhaka.
Boring No : BH- 01
Sample ID: D- 07

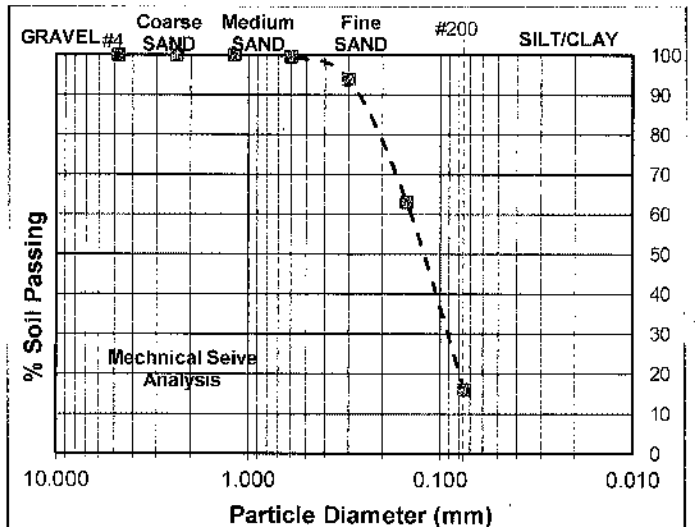
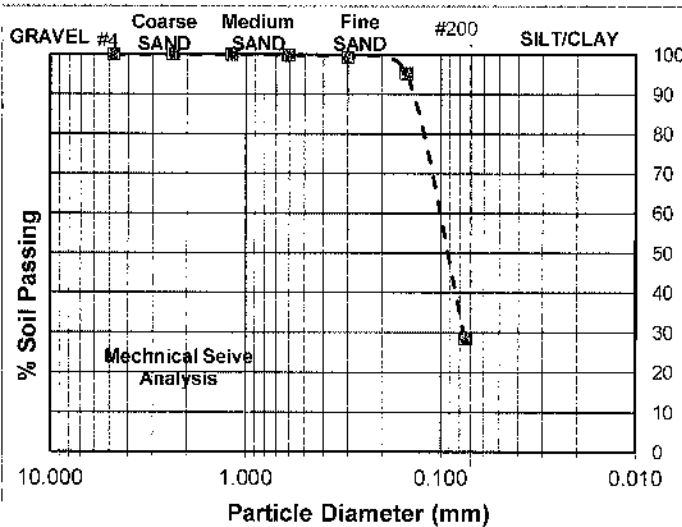
Boring No : BH- 01
Sample ID: D- 09

Sieve Number	Diameter (mm)	Mass of Sieve (gm)	Mass of Sieve & Soil (gm)	Soil Retained (gm)	Soil Retained (%)	Soil Passing (%)
#4	4.750	398.59	398.59	0.00	-	100.00
#8	2.360	375.15	375.15	0.00	-	100.00
#16	1.180	367.89	367.89	0.00	-	100.00
#30	0.600	342.91	343.13	0.22	0.19	99.81
#50	0.300	325.43	326.07	0.64	0.54	99.28
#100	0.150	334.98	339.95	4.97	4.19	95.09
#200	0.075	326.81	405.94	79.13	66.66	28.43
Pan		285.03	318.78	33.75	28.43	

Sieve Number	Diameter (mm)	Mass of Sieve (gm)	Mass of Sieve & Soil (gm)	Soil Retained (gm)	Soil Retained (%)	Soil Passing (%)
#4	4.750	398.59	398.59	0.00	-	100.00
#8	2.360	375.15	375.15	0.00	-	100.00
#16	1.180	367.89	367.89	0.00	-	100.00
#30	0.600	342.91	343.35	0.44	0.55	99.45
#50	0.300	325.43	329.97	4.54	5.63	93.83
#100	0.150	334.98	359.87	24.89	30.86	62.96
#200	0.075	326.81	364.75	37.94	47.04	15.92
Pan		285.03	297.87	12.84	15.92	

USCS Soil Classification: SP-SM - Poorly Graded Sand with Silt

USCS Soil Classification: SP-SM - Poorly Graded Sand with Silt



Grain Size Distribution Curve Results :

% Gravel :	0.00	C_u :	D_{10} :
% Sand :	71.57	C_c :	D_{30} : 0.077 mm
% Fines :	28.43		D_{60} : 0.111 mm
Silt Factor , f :	0.55		D_{50} : 0.099 mm

% Gravel :	0.0	C_u :	D_{10} :
% Sand :	84.1	C_c :	D_{30} : 0.097 mm
% Fines :	15.9		D_{60} : 0.145 mm
Silt Factor , f :	0.63		D_{50} : 0.129 mm

Test Performed by: **Engr. Md. Sajib Hossain**

Countersigned by

M.Sc. Structural Engg. (YU,China)
 B.Sc. in Civil Engg.(SUB)

Figure- GSD 01



Grain Size Analysis Report (Mechanical Sieve)

As Per ASTM D422-63 (2007)

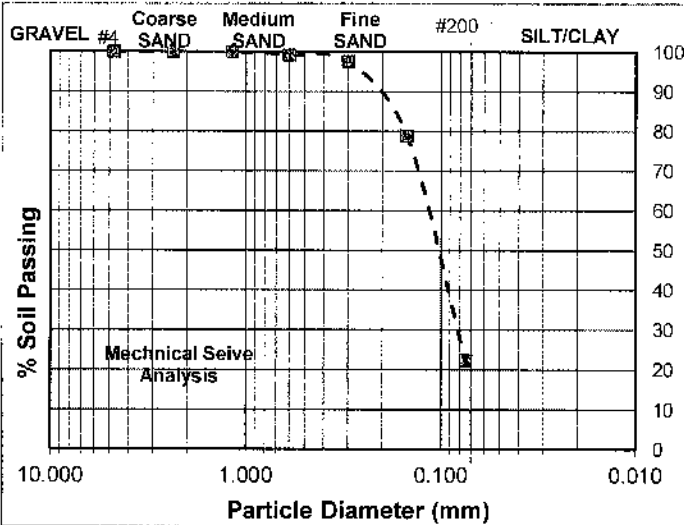
Client : Mc Grath Real Estate
 Project : Construction of G+9-Storey Residential Building with 1 Basement
 Location : 15/17, Santibag, Malibag, Dhaka.
 Boring No : BH- 02
 Sample ID: D- 10

Boring No : BH- 03
 Sample ID: D- 11

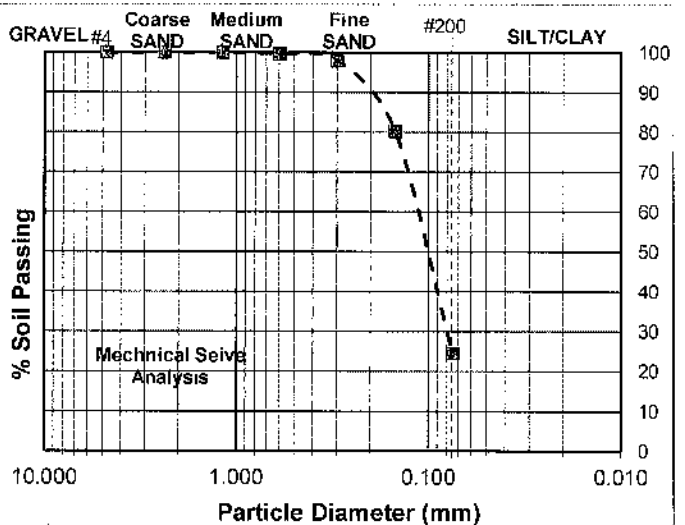
Sieve Number	Diameter (mm)	Mass of Sieve (gm)	Mass of Sieve & Soil (gm)	Soil Retained (gm)	Soil Retained (%)	Soil Passing (%)
#4	4.750	398.59	398.59	0.00	-	100.00
#8	2.360	375.15	375.15	0.00	-	100.00
#16	1.180	367.89	367.89	0.00	-	100.00
#30	0.600	342.91	343.51	0.60	0.87	99.13
#50	0.300	325.43	326.61	1.18	1.70	97.43
#100	0.150	334.98	347.87	12.89	18.60	78.83
#200	0.075	326.81	366.02	39.21	56.58	22.25
Pan		285.03	300.45	15.42	22.25	

Sieve Number	Diameter (mm)	Mass of Sieve (gm)	Mass of Sieve & Soil (gm)	Soil Retained (gm)	Soil Retained (%)	Soil Passing (%)
#4	4.750	398.59	398.59	0.00	-	100.00
#8	2.360	375.15	375.15	0.00	-	100.00
#16	1.180	367.89	367.89	0.00	-	100.00
#30	0.600	342.91	343.24	0.33	0.47	99.53
#50	0.300	325.43	326.57	1.14	1.63	97.89
#100	0.150	334.98	347.33	12.35	17.69	80.21
#200	0.075	326.81	365.72	38.91	55.73	24.48
Pan		285.03	302.12	17.09	24.48	

USCS Soil Classification: SP-SM - Poorly Graded Sand with Silt



USCS Soil Classification: SP-SM - Poorly Graded Sand with Silt



Grain Size Distribution Curve Results :

% Gravel :	0.00	C_u :	D_{10} :
% Sand :	77.75	C_c :	D_{30} : 0.085 mm
% Fines :	22.25		D_{60} : 0.125 mm
Silt Factor , f :	0.59		D_{50} : 0.112 mm

% Gravel :	0.0	C_u :	D_{10} :
% Sand :	75.5	C_c :	D_{30} : 0.082 mm
% Fines :	24.5		D_{60} : 0.123 mm
Silt Factor , f :	0.58		D_{50} : 0.109 mm

Test Performed by: **Engr.Md. Sajib Hossain**

M.Sc. Structural Engg. (YU,China)
 B.Sc. in Civil Engg.(SUB)

Countersigned by

Figure- GSD 02



Grain Size Analysis Report (Mechanical Sieve)

As Per ASTM D422-63 (2007)

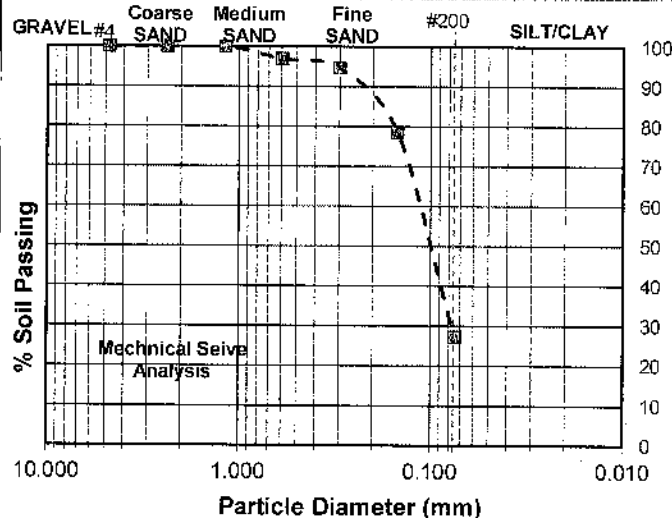
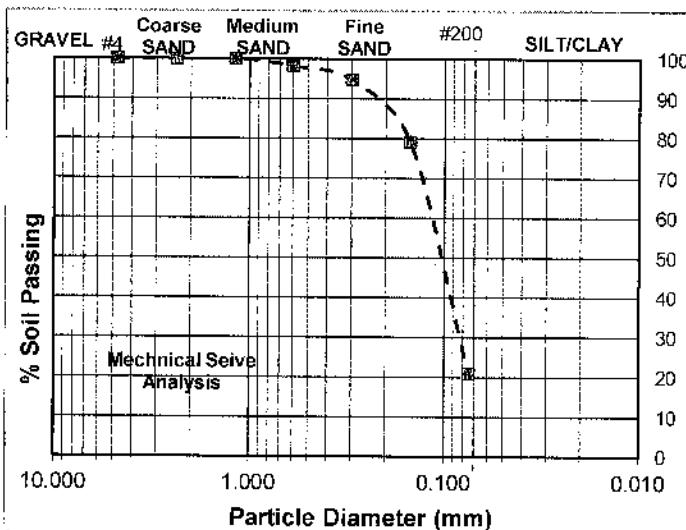
Client :	Mc Grath Real Estate				
Project :	Construction of G+9-Storeyed Residential Building with 1 Basement	Boring No :	BH- 05	Sample ID:	D- 11
Location :	15/17, Santibag, Malibag, Dhaka.				
Boring No :	BH- 04				
Sample ID:	D- 08				

Sieve Number	Diameter (mm)	Mass of Sieve (gm)	Mass of Sieve & Soil (gm)	Soil Retained (gm)	Soil Retained (%)	Soil Passing (%)
#4	4.750	398.59	398.59	0.00	-	100.00
#8	2.360	375.15	375.15	0.00	-	100.00
#16	1.180	367.89	367.89	0.00	-	100.00
#30	0.600	342.91	344.21	1.30	1.80	98.20
#50	0.300	325.43	328.02	2.59	3.60	94.60
#100	0.150	334.98	346.21	11.23	15.59	79.01
#200	0.075	326.81	368.74	41.93	58.20	20.81
Pan		285.03	300.02	14.99	20.81	

Sieve Number	Diameter (mm)	Mass of Sieve (gm)	Mass of Sieve & Soil (gm)	Soil Retained (gm)	Soil Retained (%)	Soil Passing (%)
#4	4.750	398.59	398.59	0.00	-	100.00
#8	2.360	375.15	375.15	0.00	-	100.00
#16	1.180	367.89	367.89	0.00	-	100.00
#30	0.600	342.91	345.27	2.36	3.13	96.87
#50	0.300	325.43	327.14	1.71	2.27	94.60
#100	0.150	334.98	347.12	12.14	16.10	78.51
#200	0.075	326.81	365.47	38.66	51.26	27.25
Pan		285.03	305.58	20.55	27.25	

USCS Soil Classification: SP-SM - Poorly Graded Sand with Silt

USCS Soil Classification: SP-SM - Poorly Graded Sand with Silt



Grain Size Distribution Curve Results :

% Gravel :	0.00	C_u :		D₁₀ :	
% Sand :	79.19	C_c :		D₃₀ :	0.087 mm
% Fines :	20.81			D₆₀ :	0.126 mm
Silt Factor , f :	0.59			D₆₀ :	0.113 mm

% Gravel :	0.0	C_u :		D₁₀ :	
% Sand :	72.8	C_c :		D₃₀ :	0.079 mm
% Fines :	27.2			D₆₀ :	0.123 mm
Silt Factor , f :	0.58			D₆₀ :	0.108 mm

Test Performed by: **Engr. Md. Sajib Hossain**
 M.Sc. Structural Engg. (YU,China)
 B.Sc. in Civil Engg.(SUB)

Countersigned by

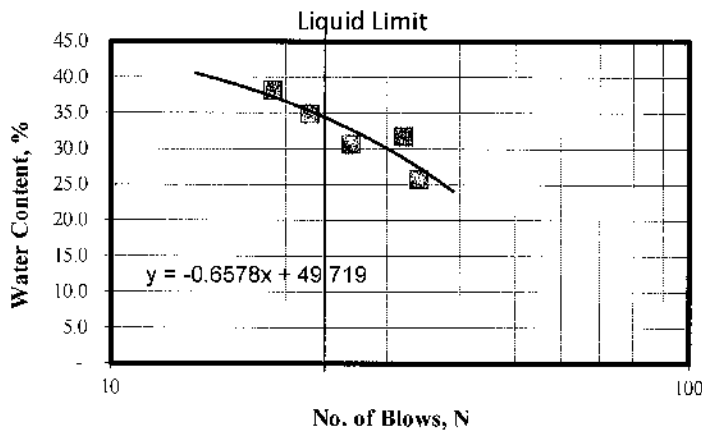
Figure- GSD 04



Client : Mc Grath Real Estate
 Project Name: Construction of G+9-Storeyed Residential Building with 1 Basement
 Location : 15/17, Santibag, Malibag, Dhaka.
 Boring No : BH- 01
 Sample Depth: (-) 3.00 m

Determination of Liquid Limits

Item	Symbol	Units	1	2	3	4	5
No. of Blows	N		19	22	26	32	34
Mass of can	M _c	gm	2	2	2	2	2
Mass of dry soil + can	M _c +M _s	gm	10.35	10.12	9.84	9.57	9.42
Mass of dry soil	M _s	gm	8.35	8.12	7.84	7.57	7.42
Mass of wet soil + can	M _c +M _{s-sat}	gm	13.54	12.95	12.24	11.97	11.33
Mass of Water	M _w	gm	3.19	2.83	2.4	2.4	1.91
Water Content	w	%	38.20	34.85	30.61	31.70	25.74
Liquid Limit	LL	%	28.4				



Laboratory Result :

Sample ID =	D - 2
Liquid Limit, LL =	28.4
Plastic Limit, PL =	17.5
Plasticity Index I_p =	10.8
Natural Water Content =	32.22
Liquidity Index, LI =	1.36

Determination of Plastic Limit

Item	Symbol	Units	1	2	3	4	5
Mass of can	M _c	gm	2	2	2	2	2
Mass of dry soil + can	M _c -M _s	gm	10.35	10.12	9.84	9.57	9.42
Mass of dry soil	M _s	gm	8.35	8.12	7.84	7.57	7.42
Mass of wet soil + can	M _c +M _{s-sat}	gm	11.78	11.68	11.21	10.85	10.67
Mass of Water	M _w	gm	1.43	1.56	1.37	1.28	1.25
Water Content	w	%	17.13	19.21	17.47	16.91	16.85
Plastic Limit	PL	%	17.5				

Test Performed by

Figure No ALT 01

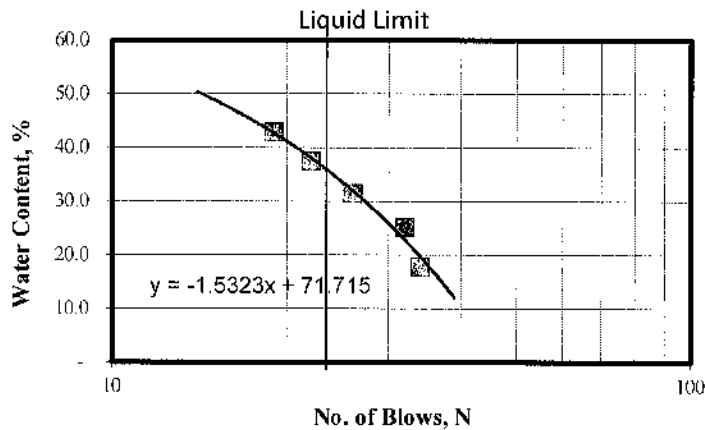
Countersigned by



Client : Mc Grath Real Estate
 Project Name: Construction of G+9-Storied Residential Building with 1 Basement
 Location : 15/17, Santibag, Malibag, Dhaka.
 Boring No : BH- 02
 Sample Depth: (-) 4.50 m

Determination of Liquid Limits

Item	Symbol	Units	1	2	3	4	5
No. of Blows	N		19	22	26	32	34
Mass of can	M_c	gm	2	2	2	2	2
Mass of dry soil + can	$M_c + M_s$	gm	10.18	10	9.73	9.44	9.25
Mass of dry soil	M_s	gm	8.18	8	7.73	7.44	7.25
Mass of wet soil + can	$M_c + M_{s-sat}$	gm	13.69	13	12.16	11.31	10.54
Mass of Water	M_w	gm	3.51	3	2.43	1.87	1.29
Water Content	w	%	42.91	37.50	31.44	25.13	17.79
Liquid Limit	LL	%	29.4				



Laboratory Result :

Sample ID =	D - 3
Liquid Limit, LL =	29.4
Plastic Limit, PL =	15.3
Plasticity Index I_p =	14.0
Natural Water Content =	30.95
Liquidity Index, LI =	1.11

Determination of Plastic Limit

Item	Symbol	Units	1	2	3	4	5
Mass of can	M_c	gm	2	2	2	2	2
Mass of dry soil + can	$M_c + M_s$	gm	10.18	10	9.73	9.44	9.25
Mass of dry soil	M_s	gm	8.18	8	7.73	7.44	7.25
Mass of wet soil + can	$M_c + M_{s-sat}$	gm	11.45	11.22	10.96	10.57	10.32
Mass of Water	M_w	gm	1.27	1.22	1.23	1.13	1.07
Water Content	w	%	15.53	15.25	15.91	15.19	14.76
Plastic Limit	PL	%	15.3				

Test Performed by

Figure No ALT 02

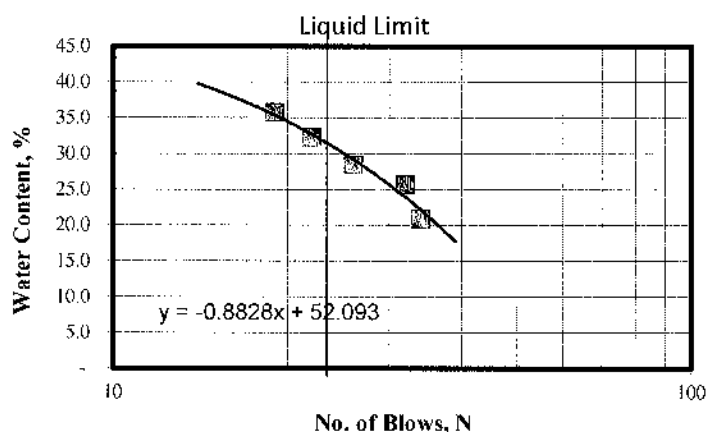
Countersigned by



Client : Mc Grath Real Estate
 Project Name: Construction of G+9-Storied Residential Building with 1 Basement
 Location : 15/17, Santibag, Malibag, Dhaka.
 Boring No : BH- 03
 Sample Depth: (-) 3.00 m

Determination of Liquid Limits

Item	Symbol	Units	1	2	3	4	5
No. of Blows	N		19	22	26	32	34
Mass of can	M_c	gm	2	2	2	2	2
Mass of dry soil + can	$M_c + M_s$	gm	10.31	10.02	9.84	9.58	9.34
Mass of dry soil	M_s	gm	8.31	8.02	7.84	7.58	7.34
Mass of wet soil + can	$M_c + M_{s-sat}$	gm	13.28	12.61	12.07	11.53	10.87
Mass of Water	M_w	gm	2.97	2.59	2.23	1.95	1.53
Water Content	w	%	35.74	32.29	28.44	25.73	20.84
Liquid Limit	LL	%	27.4				



Laboratory Result :

Sample ID =	D - 2
Liquid Limit, LL =	27.4
Plastic Limit, PL =	16.4
Plasticity Index I_p =	11.0
Natural Water Content =	28.61
Liquidity Index, LI =	1.11

Determination of Plastic Limit

Item	Symbol	Units	1	2	3	4	5
Mass of can	M_c	gm	2	2	2	2	2
Mass of dry soil + can	$M_c + M_s$	gm	10.31	10.02	9.84	9.58	9.34
Mass of dry soil	M_s	gm	8.31	8.02	7.84	7.58	7.34
Mass of wet soil + can	$M_c + M_{s-sat}$	gm	11.62	11.4	11.14	10.82	10.52
Mass of Water	M_w	gm	1.31	1.38	1.3	1.24	1.18
Water Content	w	%	15.76	17.21	16.58	16.36	16.08
Plastic Limit	PL	%	16.4				

Test Performed by

Figure No ALT 03

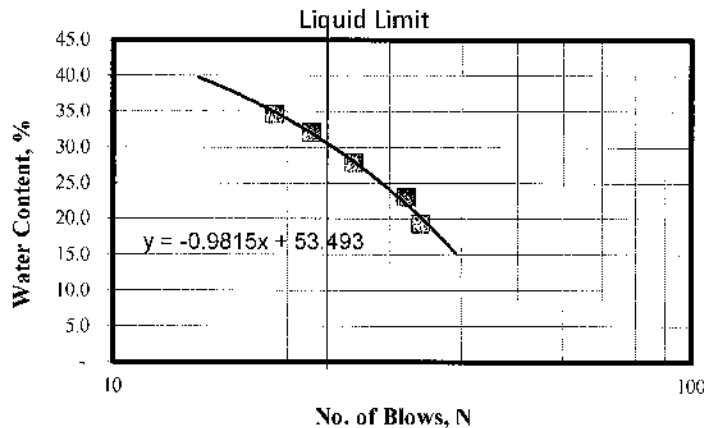
Countersigned by



Client : Mc Grath Real Estate
 Project Name: Construction of G+9-Storied Residential Building with 1 Basement
 Location : 15/17, Santibag, Malibag, Dhaka.
 Boring No : BH- 04
 Sample Depth: (-) 3.00 m

Determination of Liquid Limits

Item	Symbol	Units	1	2	3	4	5
No. of Blows	N		19	22	26	32	34
Mass of can	M _c	gm	2	2	2	2	2
Mass of dry soil + can	M _c +M _s	gm	10.43	10.14	9.82	9.51	9.25
Mass of dry soil	M _s	gm	8.43	8.14	7.82	7.51	7.25
Mass of wet soil + can	M _c +M _{s-sat}	gm	13.35	12.75	12	11.24	10.65
Mass of Water	M _w	gm	2.92	2.61	2.18	1.73	1.4
Water Content	w	%	34.64	32.06	27.88	23.04	19.31
Liquid Limit	LL	%	34.4				



Laboratory Result :

Sample ID =	D - 2
Liquid Limit, LL =	34.4
Plastic Limit, PL =	22.3
Plasticity Index I _p =	12.0
Natural Water Content =	27.39
Liquidity Index, LI =	0.42

Determination of Plastic Limit

Item	Symbol	Units	1	2	3	4	5
Mass of can	M _c	gm	2	2	2	2	2
Mass of dry soil + can	M _c +M _s	gm	10.43	10.14	9.82	9.51	9.25
Mass of dry soil	M _s	gm	8.43	8.14	7.82	7.51	7.25
Mass of wet soil + can	M _c +M _{s-sat}	gm	12.22	12.02	11.54	11.22	10.88
Mass of Water	M _w	gm	1.79	1.88	1.72	1.71	1.63
Water Content	w	%	21.23	23.10	21.99	22.77	22.48
Plastic Limit	PL	%	22.3				

Test Performed by

Figure No ALT 04

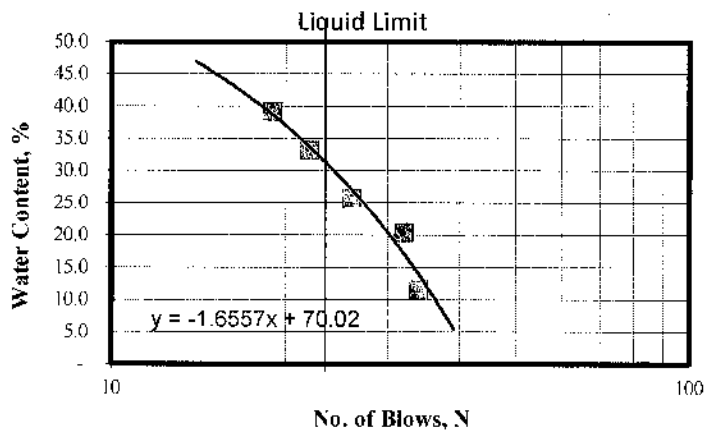
Countersigned by



Client : Mc Grath Real Estate
 Project Name: Construction of G+9-Storeyed Residential Building with 1 Basement
 Location : 15/17, Santibag, Malibag, Dhaka.
 Boring No : BH- 05
 Sample Depth: (-) 4.50 m

Determination of Liquid Limits

Item	Symbol	Units	1	2	3	4	5
No. of Blows	N		19	22	26	32	34
Mass of can	M_c	gm	2	2	2	2	2
Mass of dry soil + can	M_c+M_s	gm	10.45	10.18	9.94	9.65	9.47
Mass of dry soil	M_s	gm	8.45	8.18	7.94	7.65	7.47
Mass of wet soil + can	M_c+M_{w-sat}	gm	13.76	12.89	11.98	11.21	10.33
Mass of Water	M_w	gm	3.31	2.71	2.04	1.56	0.86
Water Content	w	%	39.17	33.13	25.69	20.39	11.51
Liquid Limit	LL	%	32.4				



Laboratory Result :

Sample ID =	D - 3
Liquid Limit, LL =	32.4
Plastic Limit, PL =	16.2
Plasticity Index I_p =	16.2
Natural Water Content =	25.98
Liquidity Index, LI =	0.60

Determination of Plastic Limit

Item	Symbol	Units	1	2	3	4	5
Mass of can	M_c	gm	2	2	2	2	2
Mass of dry soil + can	M_c+M_s	gm	10.45	10.18	9.94	9.65	9.47
Mass of dry soil	M_s	gm	8.45	8.18	7.94	7.65	7.47
Mass of wet soil + can	M_c+M_{w-sat}	gm	11.83	11.55	11.24	10.88	10.63
Mass of Water	M_w	gm	1.38	1.37	1.3	1.23	1.16
Water Content	w	%	16.33	16.75	16.37	16.08	15.53
Plastic Limit	PL	%	16.2				

Test Performed by

Figure No ALT 05

Countersigned by

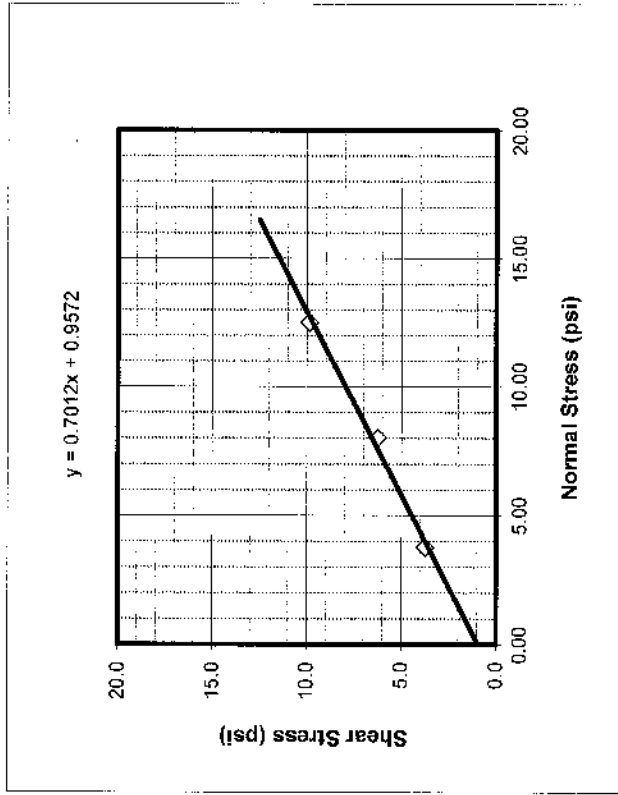


CLIENT: **Mc Grath Real Estate**
 PROJECT: **Construction of G+9-Storeyed Residential Building with 1 Basement**
 LOCATION: **15/17, Santibag, Malibag, Dhaka.**

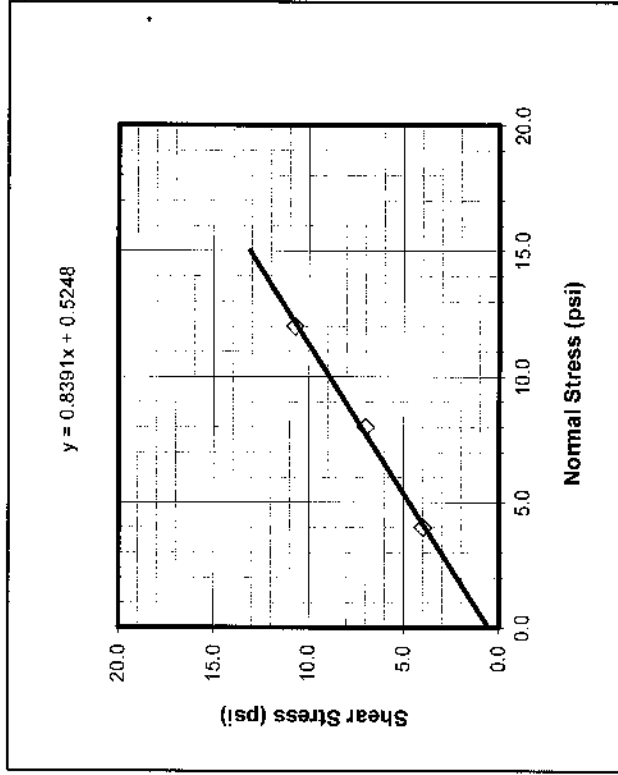
Direct Shear Test

BORE HOLE: **BH-01** DEPTH: **10.5 m**

BORE HOLE: **BH-01** DEPTH: **13.5 m**



Shearing Angle	35°
Cohesion c (psi)	0.96



Shearing Angle	40°
Cohesion c (psi)	0.52

Job Done: **Engr. Md. Sajib Hossain**
 M.Sc. Structural Engg. (YU, China)
 B.Sc. in Civil Engg. (SUB)

DIGITAL SURVEY SOLUTION

Figure : DST 01



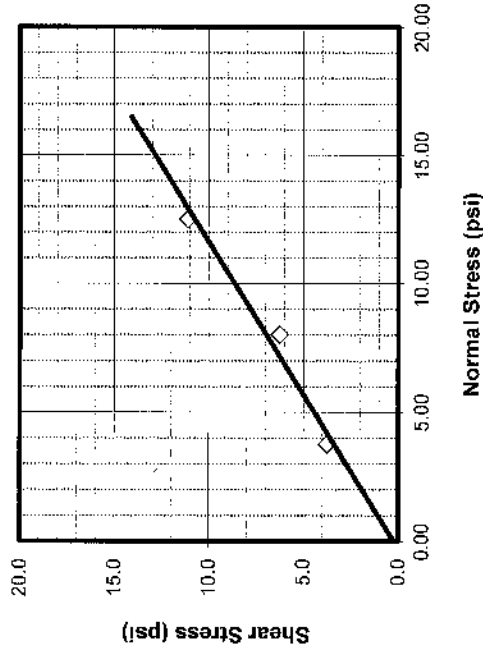
CLIENT: **Mc Grath Real Estate**
 PROJECT: **Construction of G+9-Storeyed Residential Building with 1 Basement**
 LOCATION: **15/17, Santibag, Matibag, Dhaka.**

Direct Shear Test

BORE HOLE: **BH-02** DEPTH: **15.0 m**

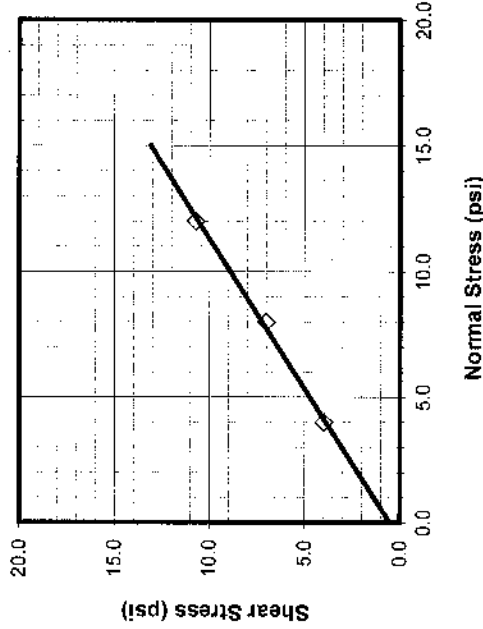
BORE HOLE: **BH-03** DEPTH: **16.5 m**

$y = 0.8414x + 0.2292$



Shearing Angle	40°
Cohesion c (psi)	0.23

$y = 0.8391x + 0.5248$



Shearing Angle	40°
Cohesion c (psi)	0.52

Job Done: **Engr. Md. Sajib Hossain**
 M.Sc. Structural Engg. (YU, China)
 B.Sc. in Civil Engg. (SUB)

DIGITAL SURVEY SOLUTION

Figure : DST 02



CLIENT : **Mc Grath Real Estate**

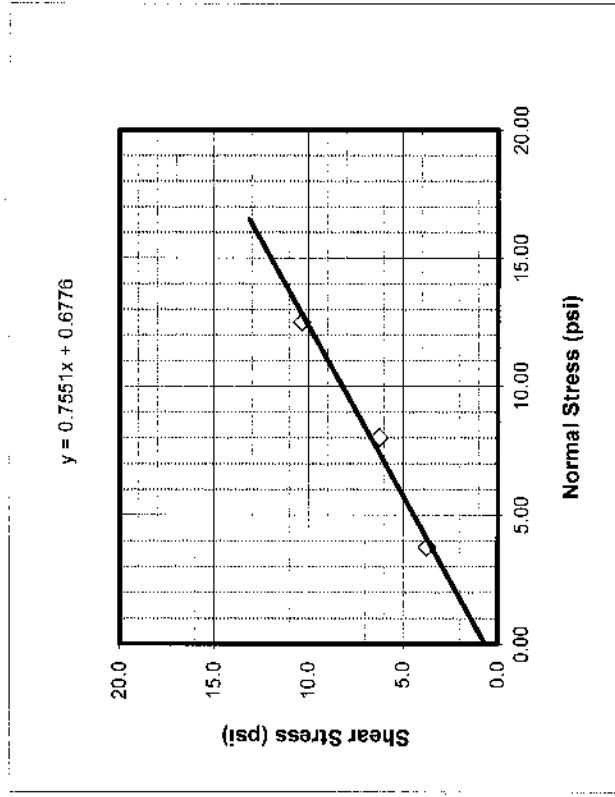
PROJECT : **Construction of G+9-Storeyed Residential Building with 1 Basement**

LOCATION : **15/17, Santibag, Malibag, Dhaka.**

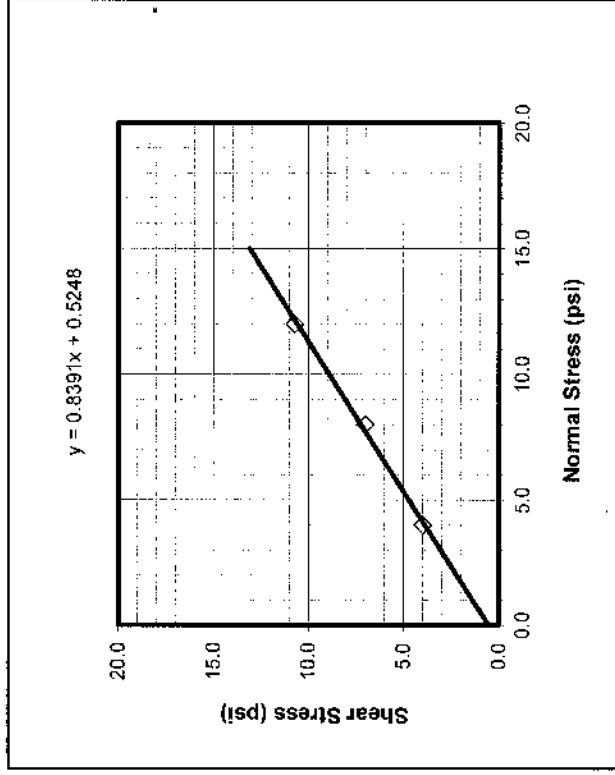
Direct Shear Test

BORE HOLE : **BH-04** DEPTH : **12.0 m**

BORE HOLE : **BH-05** DEPTH : **16.5 m**



Shearing Angle	37°
Cohesion c (psi)	0.68



Shearing Angle	40°
Cohesion c (psi)	0.52

Job Done: **Engr. Md. Sajib Hossain**
M.Sc. Structural Engg. (YU, China)
B.Sc. in Civil Engg. (SUB)

DIGITAL SURVEY SOLUTION

Figure : DST 04



APPENDIX: C

BEARING CAPACITY CALCULATION

CLIENT : Mc Grath Real Estate

PROJECT : Construction of G+9-Storeyed Residential Building with 1 Basement

LOCATION : 15/17, Santibag, Malibag, Dhaka.

SHALLOW FOUNDATION LOAD BEARING CAPACITY AT DIFFERENT DEPTH

Table - 1.0

Factor of Safety 3

Allowable Settlement 1 inch

Average Unit Weight of Soil = 117.5 pcf
 Unit Weight of Water = 62.4 pcf

LOCATION	Depth (ft)	Field SPT - N	Soil Type	p ₀ ' (kN/m ²)	Correction Factor, C _n			N _{corr}	C _u (psf)	Allowable Capacity, q _{all} (ksf)				Bearing Capacity (ksf)	Bearing Capacity (kN/m ²)
					Liao & Whitman	Heydinger	Bazara a			By Bowles	By Terzaghi	By Mayerhof	By Hansen		
BH-01	5	3	Rabbisi	28.67	1.00	1.00	1.84	3	-	-	1.25	1.33	1.54	-	-
	10	8	Clay	41.47	1.00	1.00	1.49	8	982.56	3.51	2.71	3.16	3.74	2.71	129.76
	15	9	Clay	54.52	1.00	1.00	1.24	9	1,105.38	3.99	3.30	4.37	4.96	3.30	158.17
	20	11	Clay	67.27	1.00	1.00	1.07	11	1,371.49	4.94	4.26	6.26	6.60	4.26	203.78
BH-02	5	6	Rabbisi	28.38	1.00	1.00	1.85	6	-	-	2.17	2.26	2.63	-	-
	10	9	Clay	41.34	1.00	1.00	1.49	9	1,105.38	3.95	3.15	3.72	4.29	3.15	150.73
	15	11	Clay	54.19	1.00	1.00	1.25	11	1,371.49	4.89	3.81	5.03	5.77	3.81	182.21
	20	19	Clay	66.78	1.00	1.00	1.07	19	2,354.05	8.53	6.26	9.21	10.43	6.26	299.85
BH-03	5	4	Rabbisi	28.56	1.00	1.00	1.85	4	-	-	1.55	1.63	1.88	-	-
	10	10	Clay	41.22	1.00	1.00	1.49	10	1,228.20	4.39	3.49	4.14	4.76	3.49	167.29
	15	12	Clay	54.07	1.00	1.00	1.25	12	1,494.31	5.33	4.16	5.54	6.27	4.16	199.37
	20	13	Clay	66.96	1.00	1.00	1.07	13	1,617.13	5.84	4.43	6.50	7.37	4.43	212.16
BH-04	5	5	Rabbisi	28.47	1.00	1.00	1.85	5	-	-	1.90	2.00	2.33	-	-
	10	12	Clay	41.04	1.00	1.00	1.50	12	1,494.31	5.27	4.16	4.93	5.66	4.16	199.37
	15	14	Clay	53.88	1.00	1.00	1.25	14	1,739.95	6.22	4.80	6.40	7.21	4.80	230.02
	20	17	Clay	66.72	1.00	1.00	1.08	17	2,108.41	7.64	5.73	8.46	9.39	5.73	274.29
BH-05	5	4	Rabbisi	28.56	1.00	1.00	1.85	4	-	-	1.55	1.63	1.88	-	-
	10	10	Clay	41.22	1.00	1.00	1.49	10	1,228.20	4.39	3.49	4.14	4.76	3.49	167.29
	15	15	Clay	53.83	1.00	1.00	1.25	15	1,862.77	6.66	5.07	6.73	7.66	5.07	242.79
	20	23	Clay	67.28	1.00	1.00	1.07	23	2,865.80	10.34	7.52	11.05	12.56	7.52	360.02





CLIENT : Mc Grath Real Estate
 PROJECT : Construction of G+9-Storeyed Residential Building with 1 Basement
 LOCATION : 15/17, Santibag, Malibag, Dhaka.

MAT FOUNDATION LOAD BEARING CAPACITY AT 20'-0" DEPTH

Table - 3

BORE HOLE	Depth (ft)	Soil Type	SPT -N	p ₀ ' (kN/m ²)	Correction Factor, C _n			N _{corr}	C _u (psf)	Allowable Load, q _{all} (ksf)				Bearing Capacity (ksf)
					Liao and Whitman	Heydinger	Bazaraa			By Bowles	By Terzaghi	By Mayerhof	By Hansen	
BH-01	15	c	9	40.03	1.00	1.00	1.52	9	1,105.38	2.95	3.32	2.43	2.91	2.43
BH-01	20	c	11	53.38	1.00	1.00	1.26	11	1,371.49	3.95	4.17	3.29	4.03	3.29
BH-02	15	c	11	40.03	1.00	1.00	1.52	11	1,371.49	3.67	3.98	2.82	3.46	2.82
BH-02	20	c	19	53.38	1.00	1.00	1.26	19	2,354.05	6.78	6.60	4.86	6.32	4.86
BH-03	15	c	12	40.03	1.00	1.00	1.52	12	1,494.31	3.99	4.28	3.01	3.72	3.01
BH-03	20	c	13	53.38	1.00	1.00	1.26	13	1,617.13	4.65	4.78	3.68	4.60	3.68
BH-04	15	c	14	40.03	1.00	1.00	1.52	14	1,739.95	4.65	4.89	3.37	4.23	3.37
BH-04	20	c	17	53.38	1.00	1.00	1.26	17	2,108.41	6.07	5.99	4.47	5.75	4.47
BH-05	15	c	15	40.03	1.00	1.00	1.52	15	1,862.77	4.98	5.19	3.55	4.48	3.55
BH-05	20	c	23	53.38	1.00	1.00	1.26	23	2,865.80	8.25	7.87	5.68	7.51	5.68

Factor of Safety 3
 Allowable Settlement 1 inch
 Unit Weight of soil (pcf) = 118
 Unit Weight of Water (pcf) = 62.4

CLIENT : Mc Grath Real Estate

PROJECT : Construction of G+9-Storeied Residential Building with 1 Basement

LOCATION : 15/17, Santibag, Malibag, Dhaka.

Chart for Ultimate Skin Friction & End Bearing Capacity of RCC Cast-in-situ Pile

TABLE - 2.1

Bore Hole - 01

Depth from EGL ft	Field SPT Value	Sample Type	γ_s	γ_w	p'_o	C_n	Corrected SPT, N_{corr}	Ultimate Skin Friction	Ultimate End Bearing (E_b)
			pcf	pcf	psf			tsf	tsf
0.0									
5.0	3	R	120.30	62.40	289.50	1.00	3	0.0000	0.00
10.0	8	C	118.43	62.40	569.66	1.00	8	0.3069	4.50
15.0	9	C	118.16	62.40	848.44	1.00	9	0.3214	5.06
20.0	11	C	117.70	62.40	1,124.95	1.00	11	0.3566	6.19
25.0	17	S	117.12	62.40	1,398.57	1.12	19	0.1905	25.34
30.0	21	S	117.39	62.40	1,673.52	1.06	22	0.2227	29.62
35.0	30	S	119.90	62.40	1,961.02	0.99	30	0.2963	39.41
40.0	45	S	129.95	62.40	2,298.77	0.91	41	0.4105	54.60
45.0	48	S	132.84	62.40	2,650.98	0.85	41	0.4077	54.23
50.0	50	S	134.93	62.40	3,013.64	0.80	40	0.3984	52.98
60.0	50	S	134.93	62.40	3,738.96	0.72	36	0.3576	47.57

Calculation Done :

Engr. Md. Sajib Hossain
M.Sc. Structural Engg. (YU,China)
B.Sc. in Civil Engg.(SUB)

Sample Note:

"C" -- Clayey Silt/ Silty Clay soil
"S" -- Silty Sand/Clayey Sand soil
"R" -- Rubbish "W" -- Water
"O" -- Organic Soil



CLIENT : Mc Grath Real Estate

PROJECT : Construction of G+9-Storeyed Residential Building with 1 Basement

LOCATION : 15/17, Santibag, Malibag, Dhaka.

Chart for RCC Cast-in-situ Pile Capacity at Different Level & Different Diameter

TABLE-3.1

Bore Hole - 01

Depth from EGL	18 inch Dia Bored Pile				20 inch Dia Bored Pile				24 inch Dia Bored Pile			
	Cum Skin Friction	End Bearing	Pile Weight	Allowable Load	Cum Skin Friction	End Bearing	Pile Weight	Allowable Load	Cum Skin Friction	End Bearing	Pile Weight	Allowable Load
ft	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton
	-	-			-	-			-	-		
5.0	-	-	0.66	(0.27)	-	-	0.82	(0.33)	-	-	1.18	(0.47)
10.0	7.23	7.95	1.33	5.54	8.04	9.82	1.64	6.49	9.64	14.14	2.36	8.57
15.0	14.80	8.95	1.99	8.71	16.45	11.04	2.45	10.02	19.74	15.90	3.53	12.84
20.0	23.21	10.93	2.65	12.60	25.79	13.50	3.27	14.41	30.94	19.44	4.71	18.27
25.0	27.70	44.77	3.31	27.66	30.77	55.28	4.09	32.78	36.93	79.60	5.89	44.25
30.0	32.94	52.35	3.98	32.53	36.60	64.63	4.91	38.53	43.93	93.06	7.07	51.97
35.0	39.93	69.64	4.64	41.97	44.36	85.98	5.73	49.84	53.23	123.80	8.25	67.52
40.0	49.60	96.48	5.30	56.31	55.11	119.11	6.54	67.07	66.13	171.52	9.42	91.29
45.0	59.21	95.83	5.96	59.63	65.78	118.31	7.36	70.69	78.94	170.37	10.60	95.48
50.0	68.59	93.63	6.63	62.24	76.21	115.59	8.18	73.45	91.46	166.45	11.78	98.45
60.0	85.89	84.06	7.95	64.80	95.43	103.77	9.82	75.75	114.51	149.43	14.14	99.92

Calculation Done :	Remarks :
<p>Engr. Md. Sajib Hossain M.Sc. Structural Engg. (YU,China) B.Sc. in Civil Engg.(SUB)</p>	<p>Factor of Safety Considered 2.5 Pile Cut-off Level is at the Existing Ground Level Negative Skin Friction is not considered in the calculation</p>



CLIENT : Mc Grath Real Estate

PROJECT : Construction of G+9-Storied Residential Building with 1 Basement

LOCATION : 15/17, Santibag, Malibag, Dhaka.

Chart for Ultimate Skin Friction & End Bearing Capacity of RCC Cast-in-situ Pile

TABLE - 2.2

Bore Hole - 02

Depth from EGL	Field SPT Value	Sample Type	γ_s	γ_w	p'_o	C_n	Corrected SPT, N_{corr}	Ultimate Skin Friction	Ultimate End Bearing (E_b)
ft			pcf	pcf	psf			tsf	tsf
0.0									
5.0	6	R	119.08	62.40	283.41	1.00	6	0.0000	0.00
10.0	9	C	118.16	62.40	562.19	1.00	9	0.3214	5.06
15.0	11	C	117.70	62.40	838.70	1.00	11	0.3566	6.19
20.0	19	C	117.19	62.40	1,112.66	1.00	19	0.5938	10.69
25.0	16	S	117.14	62.40	1,386.35	1.12	18	0.1798	23.91
30.0	19	S	117.19	62.40	1,660.31	1.06	20	0.2020	26.87
35.0	31	S	120.34	62.40	1,950.01	0.99	31	0.3070	40.84
40.0	35	S	122.43	62.40	2,250.18	0.92	32	0.3227	42.92
45.0	41	S	126.55	62.40	2,570.94	0.86	35	0.3537	47.04
50.0	50	S	134.93	62.40	2,933.60	0.81	40	0.4038	53.70
60.0	50	S	134.93	62.40	3,658.92	0.72	36	0.3615	48.08

Calculation Done :

Engr. Md. Sajib Hossain
M.Sc. Structural Engg. (YU,China)
B.Sc. in Civil Engg.(SUB)

Sample Note:

"C" -- Clayey Silt/ Silty Clay soil
"S" -- Silty Sand/Clayey Sand soil
"R" -- Rubbish "W" -- Water
"O" -- Organic Soil



CLIENT : Mc Grath Real Estate

PROJECT : Construction of G+9-Storeyed Residential Building with 1 Basement

LOCATION : 15/17, Santibag, Malibag, Dhaka.

Chart for RCC Cast-in-situ Pile Capacity at Different Level & Different Diameter

TABLE - 3.2

Bore Hole - 02

Depth from EGL	18 inch Dia Bored Pile				20 inch Dia Bored Pile				24 inch Dia Bored Pile			
	Cum Skin Friction	End Bearing	Pile Weight	Allowable Load	Cum Skin Friction	End Bearing	Pile Weight	Allowable Load	Cum Skin Friction	End Bearing	Pile Weight	Allowable Load
ft	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton
	-	-			-	-			-	-		
5.0	-	-	0.66	(0.27)	-	-	0.82	(0.33)	-	-	1.18	(0.47)
10.0	7.57	8.95	1.33	6.08	8.41	11.04	1.64	7.13	10.10	15.90	2.36	9.46
15.0	15.98	10.93	1.99	9.97	17.75	13.50	2.45	11.52	21.30	19.44	3.53	14.88
20.0	29.97	18.89	2.65	18.48	33.30	23.32	3.27	21.34	39.95	33.58	4.71	27.53
25.0	34.20	42.25	3.31	29.26	38.00	52.16	4.09	34.43	45.60	75.11	5.89	45.93
30.0	38.96	47.48	3.98	32.99	43.29	58.62	4.91	38.80	51.95	84.41	7.07	51.72
35.0	46.20	72.16	4.64	45.49	51.33	89.09	5.73	53.88	61.59	128.29	8.25	72.66
40.0	53.80	75.85	5.30	49.74	59.78	93.64	6.54	58.75	71.73	134.84	9.42	78.86
45.0	62.13	83.12	5.96	55.72	69.04	102.62	7.36	65.72	82.84	147.77	10.60	88.01
50.0	71.65	94.90	6.63	63.97	79.61	117.16	8.18	75.43	95.53	168.70	11.78	100.98
60.0	89.14	84.97	7.95	66.46	99.04	104.90	9.82	77.65	118.85	151.06	14.14	102.31

Calculation Done :	Remarks :
Engr. Md. Sajib Hossain M.Sc. Structural Engg. (YU,China) B.Sc. in Civil Engg.(SUB)	Factor of Safety Considered 2.5 Pile Cut-off Level is at the Existing Ground Level Negative Skin Friction is not considered in the calculation



CLIENT : Mc Grath Real Estate

PROJECT : Construction of G+9-Storeyed Residential Building with 1 Basement

LOCATION : 15/17, Santibag, Malibag, Dhaka.

Chart for Ultimate Skin Friction & End Bearing Capacity of RCC Cast-in-situ Pile

TABLE - 2.3

Bore Hole - 03

Depth from EGL ft	Field SPT Value	Sample Type	γ_s	γ_w	p'_o	C_n	Corrected SPT, N_{corr}	Ultimate Skin Friction	Ultimate End Bearing (E_b)
			pcf	pcf	psf			tsf	tsf
0.0									
5.0	4	R	119.86	62.40	287.31	1.00	4	0.0000	0.00
10.0	10	C	117.91	62.40	564.87	1.00	10	0.3402	5.63
15.0	12	C	117.52	62.40	840.49	1.00	12	0.3756	6.75
20.0	13	C	117.38	62.40	1,115.39	1.00	13	0.4063	7.31
25.0	18	S	117.14	62.40	1,389.09	1.12	20	0.2021	26.88
30.0	19	S	117.19	62.40	1,663.05	1.06	20	0.2019	26.85
35.0	29	S	119.49	62.40	1,948.50	0.99	29	0.2873	38.22
40.0	41	S	126.55	62.40	2,269.26	0.92	38	0.3764	50.07
45.0	46	S	130.88	62.40	2,611.67	0.86	39	0.3937	52.36
50.0	50	S	134.93	62.40	2,974.33	0.80	40	0.4010	53.33
60.0	50	S	134.93	62.40	3,699.65	0.72	36	0.3595	47.82

Calculation Done :

Engr. Md. Sajib Hossain
M.Sc. Structural Engg. (YU, China)
B.Sc. in Civil Engg. (SUB)

Sample Note:

"C" -- Clayey Silt/ Silty Clay soil
"S" -- Silty Sand/Clayey Sand soil
"R" -- Rubbish "W" -- Water
"O" -- Organic Soil



CLIENT : Mc Grath Real Estate

PROJECT : Construction of G+9-Storied Residential Building with 1 Basement

LOCATION : 15/17, Santibag, Malibag, Dhaka.

Chart for RCC Cast-in-situ Pile Capacity at Different Level & Different Diameter

TABLE - 3.3

Bore Hole - 03

Depth from EGL	18 inch Dia Bored Pile				20 inch Dia Bored Pile				24 inch Dia Bored Pile			
	Cum Skin Friction	End Bearing	Pile Weight	Allowable Load	Cum Skin Friction	End Bearing	Pile Weight	Allowable Load	Cum Skin Friction	End Bearing	Pile Weight	Allowable Load
ft	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton
	-	-			-	-			-	-		
5.0	-	-	0.66	(0.27)	-	-	0.82	(0.33)	-	-	1.18	(0.47)
10.0	8.01	9.94	1.33	6.65	8.91	12.27	1.64	7.82	10.69	17.67	2.36	10.40
15.0	16.86	11.93	1.99	10.72	18.74	14.73	2.45	12.40	22.49	21.21	3.53	16.06
20.0	26.44	12.92	2.65	14.68	29.37	15.95	3.27	16.82	35.25	22.97	4.71	21.40
25.0	31.20	47.50	3.31	30.16	34.66	58.65	4.09	35.69	41.60	84.45	5.89	48.06
30.0	35.96	47.46	3.98	31.77	39.95	58.59	4.91	37.45	47.94	84.36	7.07	50.09
35.0	42.73	67.53	4.64	42.25	47.47	83.38	5.73	50.05	56.97	120.06	8.25	67.51
40.0	51.60	88.47	5.30	53.91	57.33	109.23	6.54	64.00	68.79	157.29	9.42	86.66
45.0	60.87	92.53	5.96	58.97	67.64	114.23	7.36	69.80	81.16	164.50	10.60	94.02
50.0	70.32	94.24	6.63	63.17	78.13	116.35	8.18	74.52	93.76	167.54	11.78	99.81
60.0	87.71	84.50	7.95	65.70	97.46	104.32	9.82	76.79	116.95	150.23	14.14	101.21

Calculation Done :

Engr. Md. Sajib Hossain
M.Sc. Structural Engg. (YU,China)
B.Sc. in Civil Engg.(SUB)

Remarks :

Factor of Safety Considered 2.5
Pile Cut-off Level is at the Existing Ground Level
Negative Skin Friction is not considered in the calculation



CLIENT : Mc Grath Real Estate

PROJECT : Construction of G-9-Storeyed Residential Building with 1 Basement

LOCATION : 15/17, Santibag, Malibag, Dhaka.

Chart for Ultimate Skin Friction & End Bearing Capacity of RCC Cast-in-situ Pile

TABLE - 2.4

Bore Hole - 04

Depth from EGL ft	Field SPT Value	Sample Type	γ_s	γ_w	p'_o	C_n	Corrected SPT, N_{corr}	Ultimate Skin Friction	Ultimate End Bearing (E_b)
			pcf	pcf	psf			tsf	tsf
0.0									
5.0	5	R	119.46	62.40	285.28	1.00	5	0.0000	0.00
10.0	12	C	117.52	62.40	560.90	1.00	12	0.3756	6.75
15.0	14	C	117.27	62.40	835.23	1.00	14	0.4375	7.88
20.0	17	C	117.12	62.40	1,108.85	1.00	17	0.5313	9.56
25.0	18	S	117.14	62.40	1,382.55	1.12	20	0.2024	26.92
30.0	22	S	117.54	62.40	1,658.25	1.06	23	0.2340	31.12
35.0	31	S	120.34	62.40	1,947.95	0.99	31	0.3072	40.86
40.0	38	S	124.35	62.40	2,257.68	0.92	35	0.3498	46.52
45.0	47	S	131.85	62.40	2,604.90	0.86	40	0.4028	53.57
50.0	50	S	134.93	62.40	2,967.57	0.80	40	0.4014	53.39
55.0	50	S	134.93	62.40	3,330.23	0.76	38	0.3790	50.40
60.0	50	S	134.93	62.40	3,692.89	0.72	36	0.3599	47.86

Calculation Done :

Engr. Md. Sajib Hossain
M.Sc. Structural Engg. (YU, China)
B.Sc. in Civil Engg. (SUB)

Sample Note:

"C" -- Clayey Silt/ Silty Clay soil
"S" -- Silty Sand/Clayey Sand soil
"R" -- Rubbish "W" -- Water
"O" -- Organic Soil



CLIENT : Mc Grath Real Estate

PROJECT : Construction of G-9-Storeyed Residential Building with 1 Basement

LOCATION : 15/17, Santibag, Malibag, Dhaka.

Chart for RCC Cast-in-situ Pile Capacity at Different Level & Different Diameter

TABLE - 3.4

Bore Hole - 04

Depth from EGL	18 inch Dia Bored Pile				20 inch Dia Bored Pile				24 inch Dia Bored Pile			
	Cum Skin Friction	End Bearing	Pile Weight	Allowable Load	Cum Skin Friction	End Bearing	Pile Weight	Allowable Load	Cum Skin Friction	End Bearing	Pile Weight	Allowable Load
ft	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton
-	-	-	-	-	-	-	-	-	-	-	-	-
5.0	-	-	0.66	(0.27)	-	-	0.82	(0.33)	-	-	1.18	(0.47)
10.0	8.85	11.93	1.33	7.78	9.83	14.73	1.64	9.17	11.80	21.21	2.36	12.26
15.0	19.16	13.92	1.99	12.43	21.29	17.18	2.45	14.40	25.54	24.74	3.53	18.70
20.0	31.67	16.90	2.65	18.37	35.19	20.86	3.27	21.11	42.23	30.04	4.71	27.02
25.0	36.44	47.57	3.31	32.28	40.49	58.73	4.09	38.05	48.59	84.57	5.89	50.91
30.0	41.96	55.00	3.98	37.19	46.62	67.90	4.91	43.84	55.94	97.77	7.07	58.66
35.0	49.20	72.20	4.64	46.70	54.66	89.14	5.73	55.23	65.59	128.36	8.25	74.28
40.0	57.44	82.21	5.30	53.74	63.82	101.50	6.54	63.51	76.58	146.15	9.42	85.32
45.0	66.93	94.66	5.96	62.25	74.36	116.87	7.36	73.55	89.24	168.29	10.60	98.77
50.0	76.39	94.35	6.63	65.64	84.87	116.48	8.18	77.27	101.85	167.74	11.78	103.12
55.0	85.32	89.07	7.29	66.84	94.79	109.96	9.00	78.30	113.75	158.34	12.96	103.65
60.0	93.79	84.58	7.95	68.17	104.22	104.42	9.82	79.53	125.06	150.36	14.14	104.51

Calculation Done :

Engr. Md. Sajib Hossain
M.Sc. Structural Engg. (YU, China)
B.Sc. in Civil Engg. (SUB)

Remarks :

Factor of Safety Considered 2.5
Pile Cut-off Level is at the Existing Ground Level
Negative Skin Friction is not considered in the calculation



CLIENT : Mc Grath Real Estate

PROJECT : Construction of G+9-Storied Residential Building with 1 Basement

LOCATION : 15/17, Santibag, Malibag, Dhaka.

Chart for Ultimate Skin Friction & End Bearing Capacity of RCC Cast-in-situ Pile

TABLE - 2.5

Bore Hole - 05

Depth from EGL ft	Field SPT Value	Sample Type	γ_s	γ_w	p'_o	C_n	Corrected SPT, N_{corr}	Ultimate Skin Friction	Ultimate End Bearing (E_b)
			pcf	pcf	psf			tsf	tsf
0.0									
5.0	4	R	119.86	62.40	287.31	1.00	4	0.0000	0.00
10.0	10	C	117.91	62.40	564.87	1.00	10	0.3402	5.63
15.0	15	C	117.19	62.40	838.80	1.00	15	0.4688	8.44
20.0	23	C	117.72	62.40	1,115.40	1.00	23	0.7188	12.94
25.0	21	S	117.39	62.40	1,390.35	1.12	24	0.2357	31.35
30.0	23	S	117.72	62.40	1,666.95	1.06	24	0.2442	32.48
35.0	32	S	120.81	62.40	1,959.02	0.99	32	0.3162	42.06
40.0	35	S	122.43	62.40	2,259.19	0.92	32	0.3221	42.83
45.0	44	S	129.05	62.40	2,592.45	0.86	38	0.3780	50.27
50.0	50	S	134.93	62.40	2,955.11	0.80	40	0.4023	53.50
55.0	50	S	134.93	62.40	3,317.77	0.76	38	0.3797	50.50
60.0	50	S	134.93	62.40	3,680.43	0.72	36	0.3605	47.94

Calculation Done :

Engr. Md. Sajib Hossain
M.Sc. Structural Engg. (YU,China)
B.Sc. in Civil Engg.(SUB)

Sample Note:

"C" -- Clayey Silt/ Silty Clay soil
"S" -- Sandy Silt/ Sandy Clay soil
"R" -- Rubbish "W" -- Water
"O" -- Organic Soil



CLIENT : Mc Grath Real Estate

PROJECT : Construction of G+9-Storeyed Residential Building with 1 Basement

LOCATION : 15/17, Santibag, Malibag, Dhaka.

Chart for RCC Cast-in-situ Pile Capacity at Different Level & Different Diameter

TABLE - 3.5

Bore Hole - 05

Depth from EGL	18 inch Dia Bored Pile				20 inch Dia Bored Pile				24 inch Dia Bored Pile			
	Cum Skin Friction	End Bearing	Pile Weight	Allowable Load	Cum Skin Friction	End Bearing	Pile Weight	Allowable Load	Cum Skin Friction	End Bearing	Pile Weight	Allowable Load
ft	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton
	-	-			-	-			-	-		
5.0	-	-	0.66	(0.27)	-	-	0.82	(0.33)	-	-	1.18	(0.47)
10.0	8.01	9.94	1.33	6.65	8.91	12.27	1.64	7.82	10.69	17.67	2.36	10.40
15.0	19.06	14.91	1.99	12.79	21.18	18.41	2.45	14.85	25.41	26.51	3.53	19.35
20.0	35.99	22.86	2.65	22.48	39.99	28.23	3.27	25.98	47.99	40.64	4.71	33.57
25.0	41.55	55.41	3.31	37.46	46.17	68.40	4.09	44.19	55.40	98.50	5.89	59.20
30.0	47.30	57.40	3.98	40.29	52.56	70.87	4.91	47.41	63.07	102.05	7.07	63.22
35.0	54.75	74.32	4.64	49.77	60.84	91.75	5.73	58.75	73.01	132.13	8.25	78.75
40.0	62.34	75.70	5.30	53.09	69.27	93.45	6.54	62.47	83.12	134.57	9.42	83.31
45.0	71.25	88.83	5.96	61.65	79.17	109.67	7.36	72.59	95.00	157.93	10.60	96.93
50.0	80.73	94.55	6.63	67.46	89.70	116.73	8.18	79.30	107.64	168.09	11.78	105.58
55.0	89.67	89.23	7.29	68.65	99.64	110.16	9.00	80.32	119.56	158.64	12.96	106.10
60.0	98.17	84.72	7.95	69.97	109.07	104.60	9.82	81.54	130.89	150.62	14.14	106.95

Calculation Done :

Engr. Md. Sajib Hossain
M.Sc. Structural Engg. (YU,China)
B.Sc. in Civil Engg.(SUB)

Remarks :

Factor of Safety Considered 2.5
Pile Cut-off Level is at the Existing Ground Level
Negative Skin Friction is not considered in the calculation

