GEOTECHNICAL INVESTIGATION REPORT

ELS SI 4473

Geotechnical Investigation for Proposed Five Story Health Office Building with roof top at Colombo Port

for

International Organization of Migration

June 24th, 2024

			Document No:		ELS/4473
0	24/06/2024	Geotechnical Investigation at Colombo Port	Eng. Nilanthi Ranathunga	Professor H.S. Thilakasiri	Eng. R. Mahinda Rathnasiri
Rev	**Date**	**Description**	**Prepared By**	**Foundation Recommendation Given By**	**Approved By**

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LIST OF ABBREVIATIONS

The following is the list of symbols used throughout the text.

ASTM	American Society for Testing and Materials
BH	Bore Hole
BS	British Standard
c	Cohesion of Soil
CR	Core Recovery
E	Modulus of Elasticity
EGL	Existing Ground Level
GWT	Groundwater Table
N	SPT blow count
RQD	Rock Quality Designation
SPT	Standard Penetration Test
ϕ	Friction Angle

Chapter 01: Factual Report

Geotechnical Investigation for Proposed Five Story Health Office Building with Roof Top at Colombo Port

1.0 Introduction

A comprehensive geotechnical assessment has been conducted by **M/s. Engineering and Laboratory Services (Pvt) Ltd** for **International Organization of Migration** to determine the geotechnical conditions present within the investigated area.

Objectives of a soil investigation are;

- To evaluate geotechnical parameters of soil/rock at the proposed borehole locations.
- To assess the engineering parameters and to estimate bearing capacity of soil.
- To recommend suitable foundation system for the proposed construction.

This report includes the work carried out by Engineering and Laboratory Services (Pvt) Ltd in determining the sub soil conditions and ground water conditions along with laboratory investigation at the site, which is performed in arriving design parameters for the foundations from the recommended safe bearing of foundation soil.

The field geotechnical investigations consisted of conducting of two boreholes at the locations specified by the client. It is proposed to construct a five story heath office building with roof top (G+4+roof top) within the investigated area.

The field investigation was carried out according to BS5930:2015

1.1 Site Description

The investigation was carried out inside the premises of Colombo Port. Investigated premises can be accessed via port access road and multi-story buildings are located on the surrounding area. Right and rear boundaries of the investigated premises are bounded by a boundary wall, while the left boundary is secured by a fence. Investigation was carried out in a sunny weather condition and ground water level was encountered at around 0.5 m depth from the existing ground level during the investigated period. Two boreholes were advanced for the investigation and investigated area is shown in the Figure1.

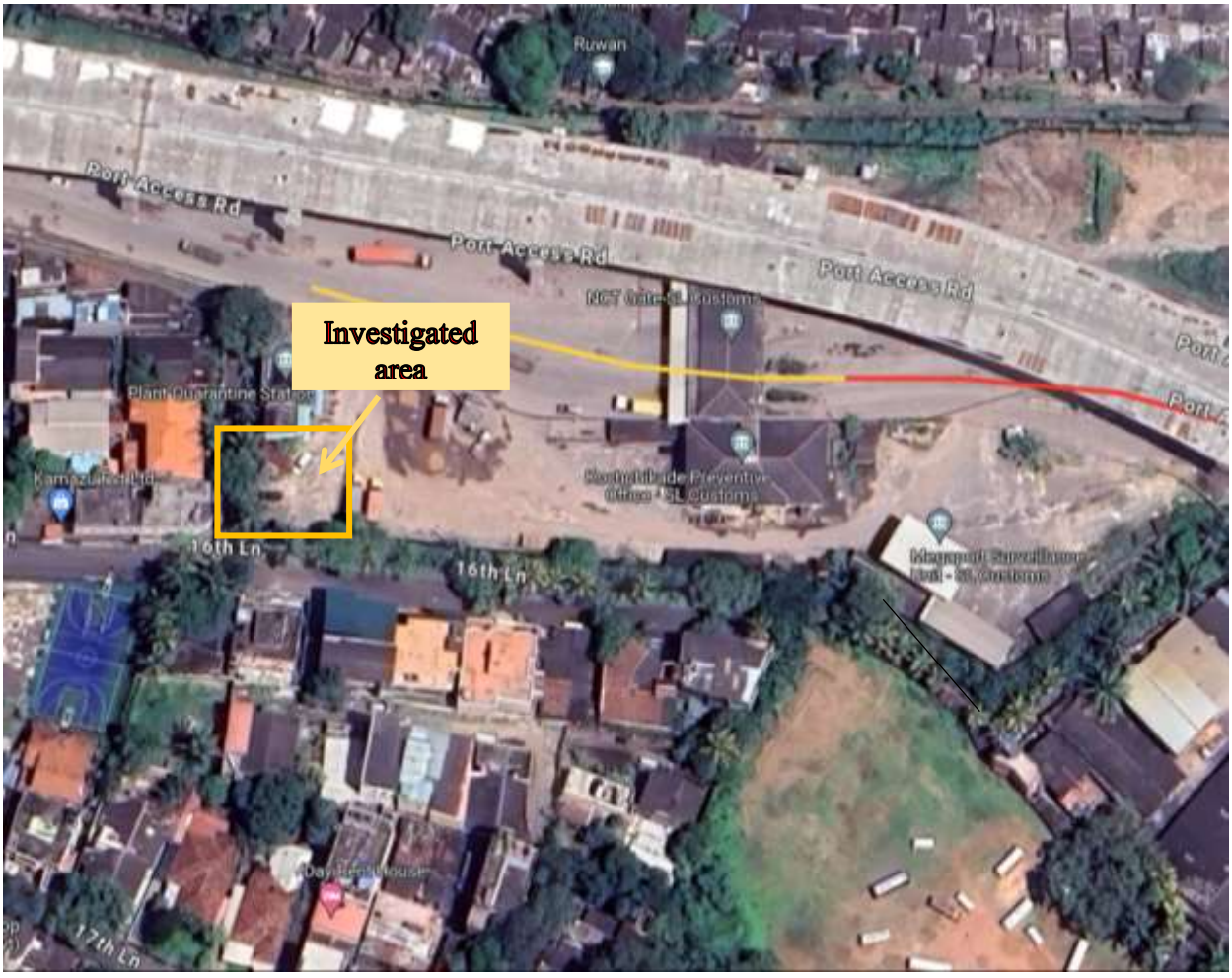


Figure 1: Investigated Area

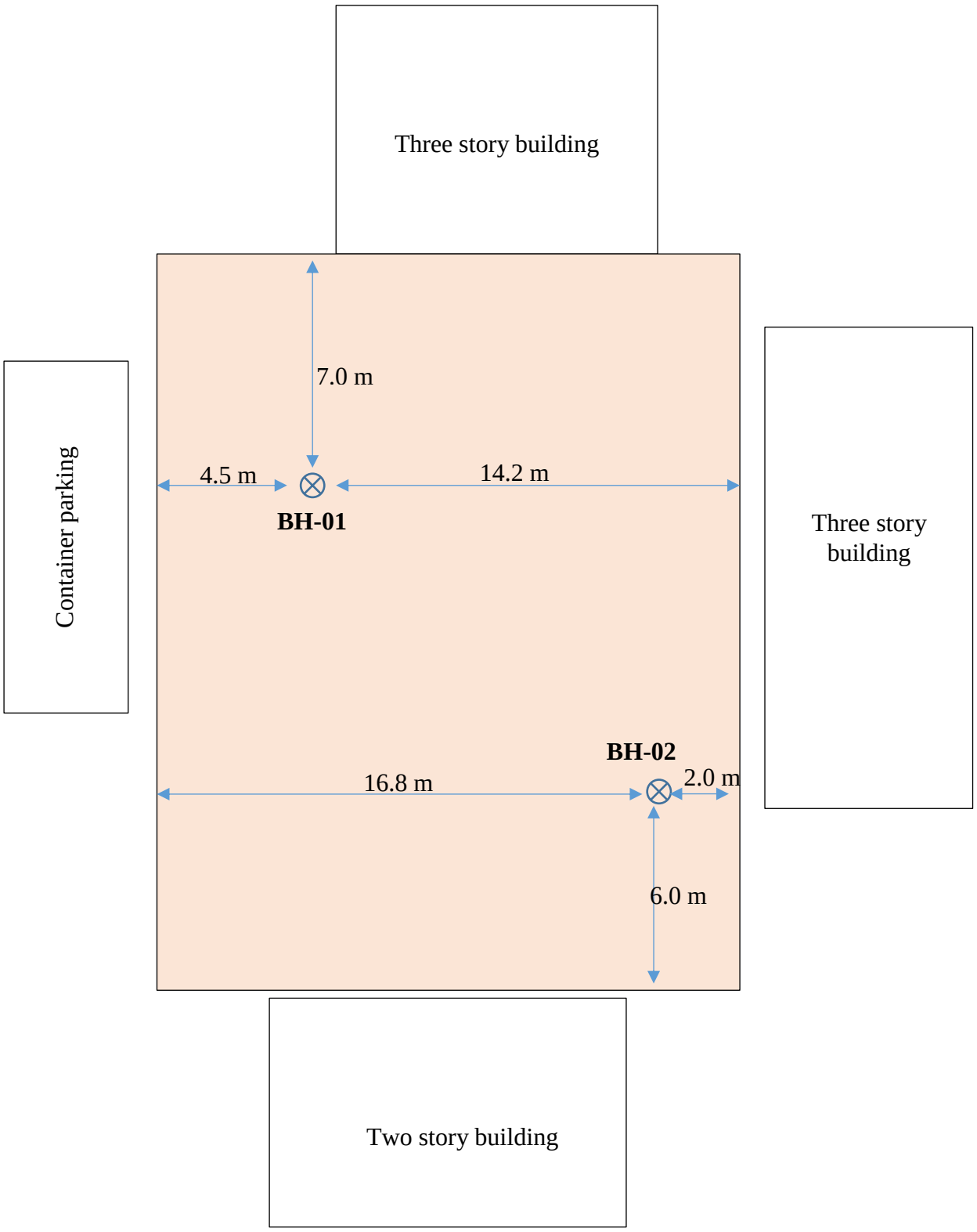


Figure 2: Layout Map

Figure 3: Investigated area

1.2 Field Investigation

1.2.1 Borehole Investigation

The field investigation was consisted of advancing two boreholes at the locations shown in Figure 2. The field investigation was commenced on 05th May 2024 and completed on 08th May 2024. The summary of the borehole investigations are given in the table below.

The boreholes were advanced using a rotary - drilling machine. The drilling was carried out by means of overburden cutting tools and adopting the wash boring process to remove the cuttings from the bottom of the borehole. Representative, disturbed samples were taken at corresponding depths where the SPT was done, using a split barrel, 50 mm outer diameter sampler obtained by 63.5 kg hammer dropping through 760 mm distance. SPT was carried out at regular intervals in the overburden. This test was carried out as specified in BS 1377. Disturbed samples of soil were collected both from the SPT tube and the cuttings collected from the washings.

Double tube core barrels were used for drilling in hard rock and obtained rock cores were evaluated at the site considering the visual observations and parameters of core recovery (CR) and rock quality designation (RQD).

Table 1: Borehole details and drilling records at the site

Borehole No	GWL* (m)	Overburden Drilling (m)	Rock Drilling From Rock Level (m)	Total Depth (m)
BH-01	0.60	13.00	3.00	16.00
BH-02	0.50	8.50	3.00	11.50

*GWL: Ground Water Level

1.2.2 Ground water Conditions

Ground water measurements were obtained from the open borehole where the water level was obtained after a considerable response time. The ground water level obtained can fluctuate with the seasons, periods of precipitation and temperature.

1.2.3 Subsurface Conditions

The subsurface conditions encountered at the site are graphically presented in the borehole logs as shown in Annexure I. The soil horizons identified at the borehole locations shall infer from the samples taken from the borehole locations. Soil horizons/layers generally represent a transition from one soil type to another and that should not be assumed to be representing an exact plane of geological change. Further, the conditions may vary between and beyond the borehole locations.

The subsurface profile is plotted only according to the data obtained from the borehole locations and actual soil profile may vary from this profile.

Chapter 2: Interpretation of the Results of the Site Investigations

1.0 Soil Properties

1.1 Soil strength and compressibility parameters

The energy method of SPT correction (Bowles, 1996) was used to estimate the soil strength parameters of the soil layers. The energy method of SPT correction uses the following relationship to determine the N'_{70} from the field SPT blow counts (N_{Field}):

$$N'_{70} = N_{Field} C_N \eta_1 \eta_2 \eta_3 \eta_4$$

Where

$$C_N = \sqrt{\frac{95.76}{p'_o}}$$

$$\eta_1 = \frac{E_r}{70}$$

P_o' = Effective overburden pressure at the test level
E_r = Efficiency of the hammer used (taken as 55%)
η_i = Modification factors (Bowles, 1996)

The estimated N'_{70} together with the particle size could be used to estimate the soil strength parameters at respective depths. The estimated soil strength parameters are drained (with drainage) parameters for sand and undrained (without drainage) parameters for clay.

From the results of the investigation, following main soil layers and subsoil layers may be identified. The thickness of these layers at the locations of the boreholes with the average SPT blow counts are given in Tables 1. Pl. note that sub-categories *a*, *b*, *c*, *d*, *e* and *f* are used for very soft, soft, firm, stiff, very stiff and hard cohesive soils and sub-categories *a*, *b*, *c*, *d*, and *e* are used for very loose, loose, medium dense, dense and very dense cohesion less soils.

Layer 1 - SAND with gravel/Clayey SAND

- Layer 1c/1d - Medium dense to dense
- Layer 1d - Dense

Layer 2 - Sandy CLAY

- Layer 2a - Soft
- Layer 2c - Firm

Layer 3 - Sady CLAY

Layer 3c/3d - Firm to stiff
Layer 3d - Stiff
Layer 3e - Very stiff

Layer 4 - Sady CLAY (Completely weathered rock)

Layer 4d/4e - stiff to very stiff

Thickness of the different layers at the borehole locations are given in Table 1.

Table 1 - Thickness of the different layers at the borehole locations and the observed SPT

BH 1			BH 2		
Layer	Thickness (m)	SPT	Layer	Thickness (m)	SPT
Layer 1	1.00	-	Layer 1	1.00	-
Layer 2c	1.00	06	Layer 2a	4.50	00 - 01
Layer 2a	1.00	00	Layer 3d	3.00	12 - 17
Layer 1c/1d	3.00	34-46	Layer 4d	1.00	12
Layer 3c/3d	1.50	10			
Layer 3d	1.50	15			
Layer 3e	1.50	25			
Layer 3d	1.50	14			
Layer 4d/4e	1.00	20			

The compressibility properties of different soil layers were estimated based on the SPT blow counts and the estimated shear strength parameters. The estimated shear strength parameters and the compressibility properties are given in Table 2 were used in giving the recommendations. Laboratory consolidation tests were not done on undisturbed samples obtained from cohesive soil layers, and hence consolidation properties of those layers were assumed based on the past experience and SHANSEP procedure. The consolidation properties given in Table 2 were used in giving the recommendations.

Table 2 – Estimated strength parameters and compressibility properties of Layers

Layer	ϕ'	c' (kPa)	c_u (kPa)	$\frac{C_c}{1+e_o}$	OCR	Elastic modulus, E (kPa)	Poisson's ratio, v
Layer 1	-						
Layer 1c/1d	35-36	3				24000-30000	0.27
Layer 2a			5 - 10			500	0.40
Layer 2c			35	0.25	5.8	2000	0.36
Layer 3c/3d			55	0.15	4.5	7000	0.34
Layer 3d			80-100	0.15	5.7-14.2	6000-12000	0.32-0.34
Layer 3e			130	0.15	8.8	17000	0.30
Layer 4d			65	0.075	5.3	8000	0.33
Layer 4d/4e			100	0.075	4.3	14000	0.32

Static ground water table is encountered 0.5m to 0.6 m depth at the time of investigation.

1.2 Condition of the bedrock

The rock cores obtained from the investigation are classified according to the classification system given in Table 3. The approximate rock mass rating (RMR) was also estimated using the borehole logs and the grade of rock together with the RMR was used to give recommendations regarding the carrying capacity of piles in the bedrock.

Table 3 - Rock classification system used

Grade	Description	Lithology
Grade I	Fresh rock	Clean rock
Grade II	Slightly weathered rock	Increased fractures
Grade III	Moderately weathered rock	Partly changed to soil; rock > soil
Grade IV	Highly weathered rock	Partly changed to soil; rock < soil
Grade V	Completely weathered rock	Some remnant rock structure; completely weathered to soil

Bedrock was found at 6.1m depth from the ground surface level at borehole locations BH 1. But, bedrock was cored at borehole location BH 1 only and the reported core recovery (CR), rock

quality designation (RQD) and the unconfined compression strength (UCS) of rock core are given in Table 4.

Table 4 – Quality of the bedrock

BH-01					
Depth (m)		CR (%)	RQD (%)	UCS (N/mm^2)	Grade
From	To				
13.00	14.50	100	54	-	Grade II
14.50	16.00	100	65	-	Grade II - I
BH 02					
8.50	10.00	80	37	-	Grade II
10.00	11.50	100	76	-	Grade II - I

2.0 Foundation Recommnedation

2.1 Shallow foundation

The proposed structure is a five-storey building with a roof top. The loads coming from the superstructure are not known at the time of writing this report. The allowable bearing capacities of the shallow foundations against compressive forces are estimated based on the shear failure and settlement considerations.

2.1.1 Shear Failure of Soil under compressive forces

The ultimate carrying capacity (q_{ult}) of shallow foundations on sand is estimated using the Hansen bearing capacity equation (Bowles, 1996) assuming general shear failure and vertical applied load.

2.1.2 Estimation of Settlement of Shallow Foundations

The immediate settlement of the subsurface due to the applied load was estimated using the method proposed by Schemertmann (1978) and the consolidation settlement is estimated using Terzaghi's 1D consolidation theory. The elastic modulus values were estimated using the commonly available empirical correlations with SPT N values. The allowable carrying capacities given in this report are estimated based on the following assumptions:

- The clear distance between any two adjacent footings is more than the width of the larger footing.

- No lateral forces and the moments are acting on the foundations, and the ground surface is horizontal upto a distance of at least 2 times foundation width from the edge of individual footings and combined footings, and 5m from the edge of all the raft foundations.
- Recommendations are given assuming that the ground surface is flat. If the ground surface is sloping, the recommended value should be modified according to the ground slope.
- Other slope stability concerns are addressed independently to this by checking the slopes and taking necessary measures.
- As any lab tests are not done on any undisturbed samples, compressibility and consolidation properties given in Table 2 are applicable to corresponding layers; and
- The subsurface profile within the site is represented by the reported borehole investigation results.

2.1.3 Allowable carrying capacities of individual and combined footings

Blackish sand (Probably mixed with peat) and very soft brownish gray sandy clay are present at the borehole locations to depths about 3.0m – 4.5m depths. The layers are completely replaced those layers as ground improvements by a suitable method using ABC/quarry dust. It should be ensured that all the areas with SPT blow counts zero is replaced. Table 5 below gives the allowable carrying capacity. It should be noted that if the building is constructed without ground improvement, it may be subjected to some settlements and therefore, it is not given.

The replacement process may be as given below or any other equivalent method suitable for site conditions may be adopted. Furthermore, dewatering, excavation of foundation pits and soil compaction near existing structures may cause settlement of such structures.

i. Installation of the designed shoring system for the excavation upto the required level.
ii. Removal of the soil upto the required depth at each of the footing location manually or using a backhoe.
iii. Fill the excavation with quarry dust in layers not thicker than 500 mm without lowering the water table and Poker each layer in a 500mm square grid pattern so that further compaction is not possible. The quarry dust fill should be filled as mentioned above up to 1000mm below the bottom level of all the foundation locations.
iv. De-water the partially filled excavations and compact the bottom of the excavation with a Wacker or a plate compactor fill the balance 1000mm below each foundation with ABC/Quarry dust as given below.

v. Fill the balanced excavation in layers not exceeding 300mm thickness compacted to achieve 95% degree of compaction upto the foundation level.

Appropriate quality control procedures should be followed to ensure the quality of the replacement process. The recommended allowable carrying capacities of different size footings without ground improvement and with ground improvement (as outlined in section 2.1.3) as mentioned above or equivalent methods are estimated for an allowable settlement of 25-50mm are given in Table 3 subjected to the assumptions given in section 2.1.2. Further, it should be noted that the secondary consolidation of the un-compacted (or improperly compacted) fill was not considered in Table 5.

Table 5 – Allowable carrying capacities of different size footings at 1.0m depth

Footing	Minimum depth (m)	Allowable carrying capacity (kPa) with ground improvement using replacement
1m x 1m	1.0	175 - 200
2m x 2m	1.0	125
3m x 3m	1.0	100
1m strip foundation	1.0	125 - 150
2m strip foundation	1.0	80

2.2 Allowable carrying capacities of raft foundation

Allowable carrying capacity of a raft foundation placed at 1m depth below the existing ground surface level with ground improvement as described in section 2.1.3 is recommended as 90 kPa for allowable settlement of 75mm subjected to the applicable assumptions to raft foundations mentioned in section 2.1.2.

2.3 Deep foundation

Rock socketed bored and cast in-situ piles may also be used to support the proposed structure. The ultimate skin friction and the allowable end bearing capacities of the soil layers are given below.

2.3.1 Skin friction

The estimated ultimate skin friction of the soil and rock layers are given in Table 6. Layer thicknesses at the borehole locations shall be taken from Table 1.

Table 6 – Estimated ultimate skin friction of soil and rock layers

Layer	Ultimate skin friction (kPa)	Possibility of generation of negative skin friction (NSF)*
Layer 1	10	Yes
Layer 1c/1d	50	No
Layer 2a	10	Yes
Layer 2c	25	Yes
Layer 3c/3d	35	No
Layer 3d	40	No
Layer 3e	65	No
Layer 4d	30	No
Layer 4d/4e	55	No
Grade II	200	No
Grade II - I	250	No

* The NSF shall be considered due to the possible primary and secondary consolidation of the organic or very loose sand and the soft cohesive soil layers. Table 5 states the NSF of individual layers and if there are lay Layers above a certain layer that are subjected to NSF, then the layers above it will be subjected to NSF.

23.2 End bearing

The top level of the bedrock is in a completely to fresh state at the borehole locations BH 01 and BH 02. Bedrock is found at the locations of BH 01 and BH 02 at depths of 13m and 8.5m respectively. Therefore, allowable end bearing capacity of a pile socketed 1.0m or one of the pile diameter, whichever is higher, into the bedrock shall be recommended as given in Table 7.

Table 7 – Allowable end bearing capacity of the bedrock

Grade* of the bedrock	Allowable end bearing capacity (Kpa)
Grade II	5000
Grade II - I	6000

* Grade of the bedrock shall be determined from Table 4

3.0 Summary of Recommendation

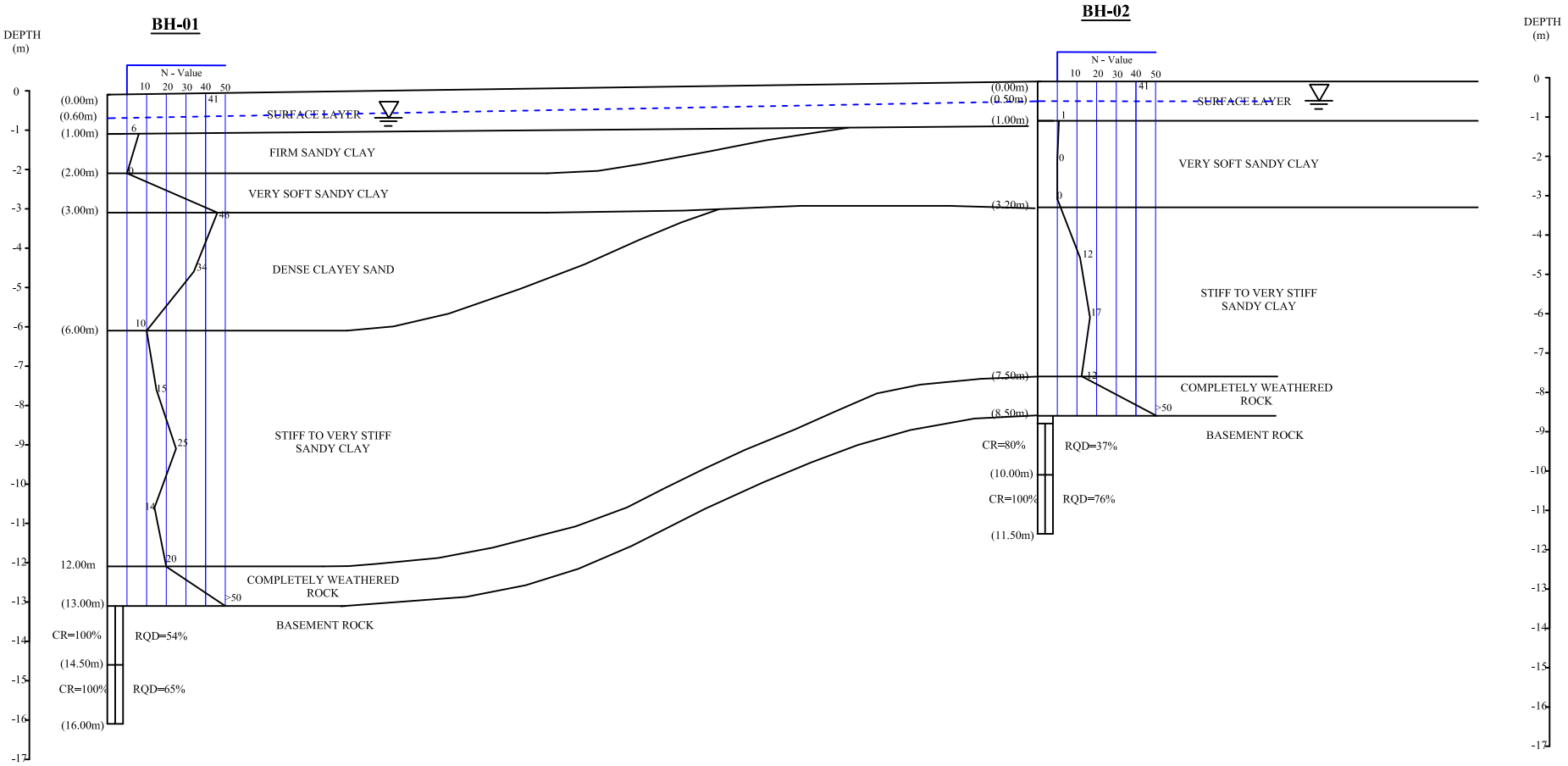
Only a summary of the recommendations are given in this section and the readers are recommended to go through the entire report.

- As any lab tests are not done on any undisturbed samples, the soil strength parameters given in Table 2, based on the experience of the undersigned, shall be recommended for the soil layers at different depths for the layers identified in Table 1.
- The allowable capacities of the individual and combined footings are recommended as given in Table 5 subjected to the conditions mentioned in section 2.1.2.
- Allowable carrying capacity of a raft foundation placed at 1m depth below the existing ground surface level without ground improvement is recommended as 90 kPa for allowable settlement of 75 mm subjected to the applicable assumptions to raft foundations mentioned in section 2.1.2.
- The recommendations regarding the deep foundations are given in section 2.3.
- It is highlighted here that the effect of the construction methods or loading of the foundations on the adjacent structures should be given due consideration.

Foundation recommendation given by

Prof. H. S. Thilakasiri,
PhD, C. Eng., FIE(SL)
Geotechnical Engineering Consultant

ANNEXURE I: SOIL PROFILE



Subsurface Across the Borehole BH-01 and BH-02

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NOTES:

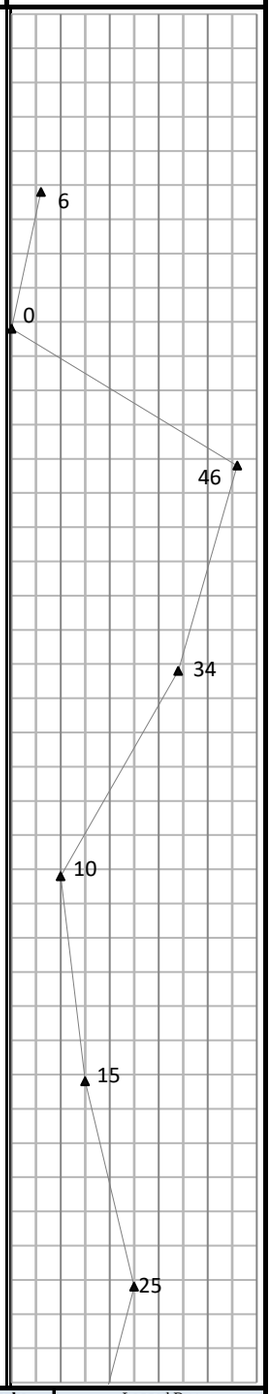
1. Profile is plotted only according to the data obtained from the borehole locations and actual soil profile may vary from this profile.
2. Depths are taken with respect to the level of the existing **ground surface**

ANNEXURE II: BOREHOLE LOGS

ENGINEERING & LABORATORY SERVICES (PVT) LTD. GEOTECHNICAL INVESTIGATIONS DIVISION	NO 62/3, Neelammahara Road, Katuwawala, Sri Lanka. Tel: 0114 309 494	Format No: ELS-SI-02

Project	**Geotechnical Investigation for the Proposed Port Health Office Building at Colombo Port**					**Borehole No**	**BH- 01**	
Client	International Organization of Migration					**Sheet**	1 of 2	
Location	Colombo Port	**Rig**	4005-0021	**Core Diameter (mm)**	54.00	**Ground Water Table (m)**	0.60	
Date of Started	05/05/2024	**Drilling Method**	Rotary	**Casing depth(m)**		**Coordinates**		
Date of Finished	06/05/2024	**Casing Diameter**	76mm	**Elevation (m)**				

Depth (m)	Sa. No.	Sa.Type	Reduced level	Depth (m)	Legend	Soil Description	Field Records (SPT) 15cm	15cm	15cm	N	Rock Coring Parameters Cr (%)	RQD (%)	FI No/m
0.00						Ground level							
	1	DS	G.W.T at 0.60m			Blackish gray fine SAND with gravel							
1.00				1.00									
	2	SS				Firm reddish brown fine to medium lateritic sandy CLAY	3	3	3	**6**			
		WS											
2.00				2.00									
	3	SS				Very soft brownish gray sandy CLAY	1	0	0	**0**			
		WS											
3.00				3.00									
	4	SS				Dense yellowish brown fine to medium clayey SAND	3	21	25	**46**			
4.00		WS											
	5	SS					21	14	20	**34**			
5.00													
		WS											
6.00				6.00									
	6	SS				Stiff whitish/yellowish brown fine to medium sandy CLAY	3	4	6	**10**			
7.00		WS											
	7	SS					3	5	10	**15**			
8.00		WS											
9.00				9.00									
	8	SS				Very stiff whitish/yellowish brown fine to medium sandy CLAY	5	10	15	**25**			
10.00		WS											



Sample Key / Test Key

SPT Where full 0.3m penetration has not been achieved the number of blows for the quoted penetration is given (not N-value)
GWL : Ground Water Level observed inside the Borehole, after the
NE :Not Encountered
HB :Hammer Bounce
FD :Free Down

D - Disturbed Sample
SS -SPT Sample
W - Water Sample
WS-Wash Sample
UD- Undisturbed Sample
CS- Core Sample
Cr - Core Recovery (%)
RQD-Rock Quality Designation (%)

Remarks

Existing ground level considered as the zero level

Logged By : Nilanthi
Supervised By: Sarath
Drilled By: Hemantha

Made Ground | Silt | Gravel | lateritic Nodules | Completely Weathered Rock
CLAY | sand | Organic Matter | Silty sand | Highly Weathered Rock | Fresh Rock

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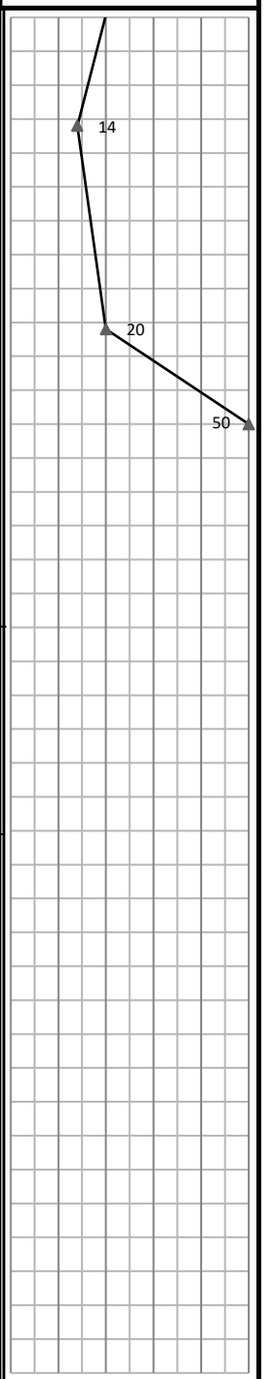
Project	**Geotechnical Investigation for the Proposed Port Health Office Building at Colombo Port**					**Borehole No**	**BH- 01**	
Client	International Organization of Migration					**Sheet**	2 of 2	
Location	Colombo Port	**Rig**	4005-0021	**Core Diameter (mm)**	54.00	**Ground Water Table (m)**	0.60	
Date of Started	05/05/2024	**Drilling Method**	Rotary	**Casing depth(m)**		**Coordinates**		
Date of Finished	06/05/2024	**Casing Diameter**	76mm	**Elevation (m)**				

Depth (m)	Sa. No.	Sa.Type	Reduced level	Depth (m)	Legend	Soil Description	Field Records (SPT) 15cm	15cm	15cm	N	Rock Coring Parameters Cr (%)	RQD (%)	FI No/m
10.00						**Ground level**							
						Same as previous							
	9	SS		10.50			3	6	8	**14**			
11.00						Stiff whitish/yellowish brown fine to medium sandy CLAY							
		WS											
12.00													
	10	SS		12.00		Very stiff whitish / yellowish brown fine sandy CLAY with mica	4	7	13	**20**			
		WS				COMPLETELY WEATHERED ROCK							
13.00	11	SS				**Basement Rock Level**	HB			**>50**			
				13.00									
	1st	CS				Blackish gray fresh moderately fractured Biotite GNEISS					100	54	
14.00													
				14.50									
15.00						Blackish gray fresh moderately fractured Biotite GNEISS					100	65	
	2nd	CS											
16.00													
				16.00		**End of the borehole at 16.00 m depth**							
17.00													
18.00													
19.00													
20.00													

SPT resistance-Blows/final 30cm in SPT



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SPT Where full 0.3m penetration has not been achieved the number of blows for the quoted penetration is given (not N-value)
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W - Water Sample
WS-Wash Sample
UD- Undisturbed Sample
CS- Core Sample
Cr - Core Recovery (%)
RQD-Rock Quality Designation (%)

Remarks

Existing ground level considered as the zero level

~~Logged By :~~
Nilanthi
Supervised By:
Sarath
Drilled By:
Hemantha

Made Ground | Silt | Gravel | lateritic Nodules | Completely Weathered Rock
CLAY | sand | Organic Matter | Silty sand | Highly Weathered Rock | Fresh Rock

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Project	**Geotechnical Investigation for the Proposed Port Health Office Building at Colombo Port**					**Borehole No**	**BH- 02**
Client	International Organization of Migration					**Sheet**	1 of 2
Location	Colombo Port	**Rig**	4005-0021	**Core Diameter (mm)**	54.00	**Ground Water Table (m)**	0.50
Date of Started	07/05/2024	**Drilling Method**	Rotary	**Casing depth(m)**		**Coordinates**	
Date of Finished	08/05/2024	**Casing Diameter**	76mm	**Elevation (m)**			

Depth (m)	Sa. No.	Sa.Type	Reduced level	Depth (m)	Legend	Soil Description	Field Records (SPT) 15cm	15cm	15cm	N	Rock Coring Parameters Cr (%)	RQD (%)	FI No/m	SPT resistance-Blows/final 30cm in SPT
0.00						**Ground level**								
	1	DS	G.W.T at 0.50 m			Blackish gray fine SAND with gravel								
1.00				1.00										
2.00	2	SS				Very soft brownish gray sandy CLAY	1	0	1	**1**				1
		WS												
	3	SS						FD		**0**				0
3.00		WS												
	4	SS						FD		**0**				0
				3.20										
4.00		WS				Stiff yellowish brown fine sandy CLAY								
	5	SS					3	5	7	**12**				12
5.00		WS												
6.00														
	6	SS		6.00		Very stiff yellowish brown fine sandy CLAY	3	8	9	**17**				17
7.00		WS												
	7	SS		7.50		Stiff yellowish brown fine sandy CLAY with mica Completely Weathered Rock	2	6	6	**12**				12
8.00		WS				**Basement Rock Level**	HB			**>50**				50
				8.50										
9.00						Blackish gray moderately weathered moderately fractured Biotite GNEISS					80	37		
	1st	CS												
10.00														

Sample Key / Test Key

SPT Where full 0.3m penetration has not been achieved the number of blows for the quoted penetration is given (not N-value)
GWL : Ground Water Level observed inside the Borehole, after the
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Remarks

Existing ground level considered as the zero level

Logged By : Nilanthi
Supervised By: Sarath
Drilled By: Hemantha

Made Ground | Silt | Gravel | lateritic Nodules | Completely Weathered Rock
CLAY | sand | Organic Matter | Silty sand | Highly Weathered Rock | Fresh Rock

ENGINEERING & LABORATORY SERVICES (PVT) LTD. GEOTECHNICAL INVESTIGATIONS DIVISION	NO 62/3, Neelammahara Road, Katuwawala, Sri Lanka. Tel: 0114 309 494	Format No: ELS-SI-02

Project	**Geotechnical Investigation for the Proposed Port Health Office Building at Colombo Port**					**Borehole No**	**BH- 02**	
Client	International Organization of Migration					**Sheet**	2 of 2	
Location	Colombo Port	**Rig**	4005-0021	**Core Diameter (mm)**	54.00	**Ground Water Table (m)**	0.50	
Date of Started	07/05/2024	**Drilling Method**	Rotary	**Casing depth(m)**		**Coordinates**		
Date of Finished	08/05/2024	**Casing Diameter**	76mm	**Elevation (m)**				

Depth (m)	Sa. No.	Sa.Type	Reduced level	Depth (m)	Legend	Soil Description	Field Records (SPT) 15cm	15cm	15cm	N	Rock Coring Parameters Cr (%)	RQD (%)	FI No/m	SPT resistance-Blows/final 30cm in SPT
10.00						Ground level								
11.00	2nd	CS		10.00		Blackish gray fresh moderately fractured Biotite GNEISS					100	76		
12.00				11.50		**End of the borehole at 11.50 m depth**								
13.00														
14.00														
15.00														
16.00														
17.00														
18.00														
19.00														
20.00														

Sample Key / Test Key

SPT Where full 0.3m penetration has not been achieved the number of blows for the quoted penetration is given (not N-value)
GWL : Ground Water Level observed inside the Borehole, after the
NE :Not Encountered
HB :Hammer Bounce
FD :Free Down

D - Disturbed Sample
SS -SPT Sample
W - Water Sample
WS-Wash Sample
UD- Undisturbed Sample
CS- Core Sample
Cr - Core Recovery (%)
RQD-Rock Quality Designation (%)

Remarks

Existing ground level considered as the zero level

~~Logged By :~~
Nilanthi
Supervised By:
Sarath
Drilled By:
Hemantha

Made Ground | Silt | Gravel | lateritic Nodules | Completely Weathered Rock
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ANNEXURE III: UCS TEST RESULTS