

ORIGINAL

Section - 2

STANDARD FORMS [CONTRACT]

- *Letter of Acceptance*
- *Agreement*
- *Performance Security*
- *Advance Payment Security*
- *Retention Money Guarantee*

Note:

It is the responsibility of the bidders to comply with all the requirements given in the bidding document. Failure to non compliance with any of them may be a reason for rejection of the bid.

Notes on Standard Forms:

- Bidders shall submit the completed Form of Bid Security/Bid Securing Declaration as appropriate in compliance with the requirements of bidding documents.
- Bidders should not complete the Form of Agreement at the time of preparation of bids.
- The successful bidder will be required to sign the Form of Agreement, after the award of contract.
- Any corrections or modifications to the accepted bid resulting from arithmetic corrections, acceptable deviations, or quantity variations in accordance with the requirements of the bidding documents should be incorporated into the Agreement.
- The Form of Performance Security, Form of Advance Payment Security and Form of Retention Money Guarantee should not be completed by the bidders at the time of submission of bids.
- The successful bidder will be required to provide these securities in compliance with the requirements herein or as acceptable to the Employer.

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FORM OF LETTER OF ACCEPTANCE

[Letter heading paper of the procuring entity]

-----[date]

To:-----

[name and address of the Contractor]

This is to notify you that your bid dated -----[insert date] for the construction and remedying defects of the ----- [name of the Contract and identification number] for the Contract price of -----[name of currency] ----- [amount in figures and words] as corrected in accordance with Instructions to Bidders and / or Bidders by a Memorandum of Understanding, is hereby accepted.

The adjudicator shall be -----[name and address of the Adjudicator, if agreed] shall be appointed by the Institute for Construction training and Development (ICTAD).

You are hereby instructed to proceed with the execution of the said Works in accordance with the Contract documents.

The Start Date shall be: ----- (fill the date as per Conditions of Contract).

The amount of performance Security is: ----- (fill as per Conditions of Contract).

The performance Security shall be submitted on or before ----- (fill the date as per Conditions of Contract).

Authorizes Signature : -----

Name and title of Signatory : -----

Name of Agency : -----

STANDARD FORM: AGREEMENT

This AGREEMENT, made the ----- [day] day of -----[month] 20 -----
[year] between the one part, and ----- [name and address of Employer]
(hereinafter called "the Employer") of the one part, and -----
-----[name and address of Contractor] (hereinafter called "the Contractor") of the other part.

WHEREAS the Employer desires that the Contractor execute-----
[name and identification number of Contract] (hereinafter called "the Works") and the Employer
has accepted the bid by the Contractor for the execution and completion of such Works and the
remedying of any defects therein.

NOW THIS AGREEMENT WITNESSETH as follows:

- 1. In this Agreement, words and expression shall have the same meanings as are
respectively assigned to them in the Conditions of Contract hereinafter referred to and
they shall be deemed to form and be read and construed as part to this Agreement.
- 2. In consideration of the payments to be made by the Employer to the Contractor as
hereinafter mentioned, the Contractor hereby covenants with the Employer to execute
and complete the Works and remedy any defects therein in conformity in all respects
with the provisions of the Contract.
- 3. The Employer hereby covenants to pay the Contractor in consideration of the execution
and completion of the Works and the remedying of defects wherein the Contract Price or
such other sum as may become payable under the provisions of the Contract at the times
and in the manner prescribed by the Contract.

In Witness whereof the parties thereto have caused this Agreement to be executed the day and
year aforementioned, in accordance with laws of Sir Lanka.

.....
Authorized signature of Contractor	Authorized signature of Employer
COMMON SEAL	COMMON SEAL

In the presence of:

Witnesses:

- 1. Name and NIC No.
Signature.
Address.
- 2. Name and NIC No.
Signature.
Address.

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FORM OF ADVANCE PAYMENT SECURITY

-----[Name and address of
Agency, and Address of Issuing Branch or Office]

Beneficiary: Municipal Commissioner, Colombo Municipal Council, Town Hall, Colombo 7

Date: -----

ADVANCE PAYMENT GUARANTEE No: -----

We have been informed that -----[name of Contractor]
(hereinafter called "the Contractor") has entered into Contract No: -----
(reference number of the contract) dated -----with you, for -----
----- (Name of contract) (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance
payment in the sum-----[amount in figures] (-----
-----) [amount in words] is to be made against an advance payment guarantee.

At the request of the Contractor, we-----[name of issuing agency]
hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of -
-----[amount in figures] (-----) [amount in
words] upon receipt by us of your first demand in writing accompanied by a written statement
stating that the Contractor is in breach of its obligation in repayment of the Advance payment
under the Contract.

The maximum amount of this guarantee shall be progressively reduced by the amount of the
advance payment repaid by the Contractor.

This guarantee shall expire on ----- [Insert the date, 28 days beyond the
Intended Completion Date]

Consequently, any demand for payment under this guarantee must be received by us at this
office on or before that date.

[signature(s)]

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FORM OF PERFORMANCE SECURITY

(Unconditional)

-----[Issuing
Agency's Name, and Address of Issuing Branch or Office]

Beneficiary: Municipal Commissioner, Colombo Municipal Council, Town Hall, Colombo 7

Date:-----

PERFORMANCE GUARANTEE No.:-----

We have been informed that -----[name of contractor]
(hereinafter called "The contractor") has entered into Contract No. -----
(reference number of the contract) dated ----- with you, for -----
----- (name of contract) (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Contractor, we -----[name of Agency]
hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of -
-----[amount in figures] (-----) [amount in words],
upon receipt by us of your first demand in writing accompanied by a written statement stating
that the Contractor is in breach of its obligation(s) under the Contract, without your needing to
prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire, no later than the Day of -----20-----[insert date, 28
days beyond the Intended Completion Date] and any demand for payment under it must be
received by us at this office on or before that date.

[signature (s)]

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FORM OF RETENTION MONEY GUARANTEE

----- [Issuing Agency's
Name and Address of Issuing Branch or Office]

Beneficiary: Municipal Commissioner, Colombo Municipal Council, Town Hall, Colombo 7.

Date:-----

RETENTION MONEY GUARANTEE No:-----

We have been informed that ----- [name of Contractor]
(hereinafter called "the Contractor") has entered into Contract No. -----
(reference number of contract) dated ----- with you, for the execution of -----
----- (name of contract) (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, when the works have being taken over and the first half of the Retention Money has been certified for payment, payment of the second half of the Retention Money may be made against a Retention Money guarantee.

At the request of the Contractor, we ----- [name of agency]
hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of -
----- [amount in figures] (-----) [amount in words]
upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor has not attended to the defects in accordance with the Contract.

This guarantee shall expire, at the latest, ----- [insert 28 Days after the end of the Defects Liability Period] Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

[signature(s)]

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Section-3

CONDITIONS OF CONTRACT

**Conditions of contract shall be read in conjunction with Section 5-
Contract Data, which shall take precedence over the Conditions of
Contract**

CONDITIONS OF CONTRACT : Conditions of Contract that will be applicable for this Contract is that given in Section – 03 of the Standard Bidding Document – Procurement of Works (ICTAD/SBD/01-2nd Edition , January 2007) & Addendum 01 issued in January 2009 & addendum 02 issued in February 2011 to the ICTAD Publication published by the Institute for Construction Training and Development (ICTAD / CIDA – Construction Industry Development Authority , “Savsiripaya”, 123 , Wijerama Mawatha , Colombo 07.

Section 3, Volume 1 of this publication will not be issued with the Bidding Document and the Bidder is advised to purchase it from ICTAD. (Now CIDA – Construction Industry Development Authority)

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Section - 4

**FORM OF BID AND QUALIFICATION
INFORMATION**

Form of Bid

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Name of Contract: Piling Works for Proposed office, Depot & Quarters Building for Project Division, Direct Labour unit at Campble Park

To: Municipal Commissioner, Colombo Municipal Council, Town Hall, Colombo 7.

Gentleman,

1. Having examined the Standard Bidding Document – Procurement of Works [ICTAD/SBD/01 - Second Edition, January 2007], Specifications, Drawings and Bills of Quantities and Addenda for the execution of the above-named works, we the undersigned, offer to execute and complete such Works and remedy any defect therein in conformity with the aforesaid Conditions of Contract , Specifications, Drawings, Bills of Quantities and addenda nosfor the sum of Sri Lankan Rupees
.....(LKR) or such other sums as may be ascertained in accordance with the said conditions.
2. I/We acknowledge that the Contract Data forms part of our Bid.
3. I/We undertake, if my/our Bid is accepted, to commence the Works as stipulated in the Contract Data, and to complete the whole of the Works comprised in the Contract within the time stated in the Contract Data.
4. I/We agree to abide by this Bid **till 23/05/2022** or for any extended period and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
5. Unless and until a formal agreement is prepared and executed this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.
6. I/We accept I/we do not accept the Adjudicator.
7. I/We understand that you are not bound to accept the lowest or any Bid you may receive.

Dated thisday of20.....in the capacity ofduly authorized to sign tenders for and on behalf of (IN BLOCK CAPITALS)

Signature : Name:

Designation : Address :

Witness Signature: Name, Address, NIC number:

Qualification Information

ICTAD REGISTRATION	
Registration number	<i>(attach copies of relevant pages from the registration book)</i>
Grade	
Specialty	
Expiry Date	
Blacklisted Contractors	
Have you been declared as a defaulted contractor by NPA or any other Agency? (Yes/No)	
If yes provide details	
VAT Registration Number	
Construction Program	<i>(attach as annex)</i>
Legal status	<i>(attach relevant status copies, as annex)</i>
Value of Construction works performed in last 5 years	
Year	<i>(attach copies of Certificate of Completion etc and other documents such as profit-loss and income expenditure statement)</i>
Year	
Year	
Year	
Year	
Value of similar works completed in last 5 year (indicate only the three largest projects)	
1. Value _____	Year
2. Value _____	Year
3. Value _____	Year
<i>(attach copies of certificate of completion etc., as annex)</i>	
Major items of construction equipment proposed	
1. Type.....	Capacity.....
2. Type.....	Capacity.....
3. Type.....	Capacity.....
4. Type.....	Capacity.....
5. Type.....	Capacity.....

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Qualification and experience of Technical Staff at site	Technical: 1. Qualified geotechnical Engineer with IESL membership and having MSc. In Geotechnical Engineering have at least 3years experience in similar construction work on pile foundation. 2. A qualified Technical Officer in the relevant field (attach educational, professional, experience certificates of each person)
--	---

(To be completed and submitted by the bidder, with the

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Section - 5

BIDDING DATA AND CONTRACT DATA

G. Bidding Data

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Instructions to Bidders

Clause Reference

(1.1) The Employer is

Name : Colombo Municipal Council

Address : Town Hall, Colombo 7.

The Work consists of: Piling Works for Proposed office, Depot & Quarters Building for (Contract number ME/ME/BN/296/2021) located at: Project Division, Direct Labour unit at Campble Park

Intended Completion Date is **90 Days** from the start Date.

(1.2) The office for collection of bid form is:

Projects Management Division, Town Hall, Colombo 7.

The non-refundable fee is Rs.5400.00 (including VAT)

The Bid forms will be issued **till 10.00 hours 23/11/2021**

(2.1) The source of funds is: **Colombo Municipal Council**

(4.2) The registration required

Specialty: **Piling Works**

Grade: **CIDA Grade GP-B1**

(4.3) The following information shall be provided in section 4:

- ❖ CIDA Registration;
 Registration number
 Grade
 Specialty
 Expiry Date
- ❖ VAT Registration number
- ❖ Construction Programme
- ❖ Legal Status (Sole Proprietor, Partnership, Company etc.)
- ❖ Qualifications and experience of key site management and technical personnel proposed for the Contract;

(4.4) * Average annual volume of construction work performed Within last 5 years shall be Rs. 175 Million.

*shall have experience at least 02 number of similar nature piling projects each cost Rs. 30 million during last 5 years. (Copies of verifying documents such as Letters of Acceptance, completion certificates, certificates on successful on- going projects etc. shall be submitted with the bid)

* Following technical & managerial Staff:

1. Bidder shall assign a qualified geotechnical Engineer with IESL membership and having MSc. In Geotechnical Engineering have at least 3 years experience in similar construction work on pile foundation.
2. A qualified Technical Officer in a related field with experience of similar nature work.

* The minimum amount of liquid assets and/or credit facilities net of other contractual commitments and exclusive of any advance payments which may be made under the contract shall be not less than Rs.30 Million.

(9.1) Employer's address for the purpose of clarification is;

Name: Director Engineering (Projects)
Address: Projects Management Division, Colombo
Municipal Council, Town Hall, Colombo 07.
Fax: 0112692403
E-mail: dirproj@colombo.mc.gov.lk

(11.1) The language of the bidding document shall be English.

(12.0) Any other information required to be completed and submitted with the bid.

Proof documents pertained with invitation for bids and with above 4.3, 4.4

(13.3) VAT component shall not be included in the rates. The amount written in the Form of Bid shall be without VAT. However VAT component shall be shown separately at the end of the BOQ.

(13.4) The Contract is **not subjected to price adjustment** in accordance with Clause 47 of the Conditions of Contract.

(15.1) **The Bid shall be valid till 23/05/2022.**

(16.1) Bid shall include a Bid Security using the form included in Section 9.

(16.2) **Bid Security shall be:**

- For an amount **Rs 700,000.00**
- **Valid until -22/06/2022**
- Issued by a reputed Bank or Insurance Company registered to undertake businesses in Sri Lanka using the form for bid security (unconditional on demand guarantee) included in Section 9, Standard Forms.

(19.2) **a.** The Employer's address for the purpose of Bid submission is
Municipal Commissioner, Colombo Municipal Council,
Town Hall, Colombo 7.

(19.2) b. Contract name: Piling Works for Proposed office, Depot & Quarters Building for Project Division, Direct Labour unit at Campble Park
Contract no: ME/ME/BN/296/2021

(20.1) The deadline for submission of Bids shall be till 10.00 hours on 24/11/2021

(34.0) The performance security shall be **5%** of the Initial Contract Price mentioned in the Letter of Acceptance or as per the Public Finance Circular 03/2020(i) v. dated 11.01.2021

(36.0) The process of appointment of the Adjudicator shall be executed in accordance with the conditions of contract at a date during the contract when parties agree such an appointment is worthwhile.

Fees and types of reimbursable expenses to be paid to the Adjudicator shall be on a case to case and shall be shared by the Contractor and the Employer.

Contract Data

(Please note that the Clause nos, given hereunder are that of Conditions of Contract)

(1.0) The Employer is

Name: Colombo Municipal Council

Address: Town Hall, Colombo 7.

Name of Authorized Representative: Municipal Commissioner, Colombo
Municipal Council.

(1.0) The Engineer is

Name : Deputy Municipal Commissioner (Engineering Services)

Address : Municipal Engineers' Department, Colombo Municipal Council,
Town Hall, Colombo 7.

Name of Engineer's Representative: Director Engineering (Projects),
Colombo Municipal Council.

**(1.0) The works consists of Piling Works for Proposed office, Depot & Quarters Building for Project Division, Direct Laboure unit at Campble Park
Contract number is ME/ME/BN/296/202
The Site is Located at Campble Park**

(1.0) The Start Data shall be 21 days from the Letter of Acceptance

**(2.2) Sectional Completion of work is specified as follows.
Not applicable**

(2.3) The following documents also form part of the Contract: Not applicable

(8.1) Schedule of other contractors: None

(9.1) Schedule of key personnel:

Minimum persons with qualifications and experience to be defined,

- 1. A qualified Geotechnical Engineer with IESL member ship and having MSc. In Geotechnical Engineering have at least 3years experience in similar construction work on pile foundation.**
- 2. A qualified Technical Officer in a related field with experience of similar nature work.**

(13.1) The minimum insurance covers shall be (shall be valid till the end of defect liability period of the contract. It is the responsibility of the contractor to extend the validities of insurance covers for any extended time of defect liability period without any notification by the employer):

- (a) * The minimum cover for insurance of the Works and of plant and Materials is 110% of Initial Contract Price
 - The maximum deductible for insurance of the Works and of Plant and Materials is 5% of Initial Contract Price
- (b) * The minimum cover for loss or damage to Equipment is 5% of Initial Contract Price
 - The maximum deductible for insurance of Equipment is 5% of Minimum cover.
- (c) * The minimum cover for insurance of other property (other than the site) is 5% of Initial Contract Price.
- (d) The minimum cover for personal injury or death,
 - * for third party and employees of the Employer and other Persons engaged by the Employer in the Works is Rs. 200,000.00 per event.

(13.2) The minimum cover for personal injury or death shall be (shall be valid till the end of defect liability period of the contract. It is the responsibility of the contractor to extend the validities of insurance covers for any extended time of defect liability period without any notification by the employer)

- for the Contractor's workmen is Rs. 200,000.00 per event
- Contractor's employees other than workmen are Rs. 200,000.00 per event.

(14.1) The following site investigation reports are annexed as Appendices:

No appendices

(17.1) The intended Completion Date for the whole of works shall be **90 days**

(21.1) The site Possession Date shall be **14 Days** from Letter of Acceptance

(27.1) The Contractor shall submit a programme for the works within **14 days** of delivery of the Letter of Acceptance.

(27.3) The Contractor shall submit updated program of work for every ----- days.
Not applicable

(27.4) Withholding amount for not complying with above 27.1 & 27.3. Not applicable

(35.1) The Defects Liability Period is **365 Days**

(39.2) Engineer may order variations in such a way that contract value of the project is not exceeded.

- (47.1) The contract price is **not subjected to price adjustment**
- (48.1) The retention from each payment shall be **10%** of the certified work done.
The limit of retention shall be **5%** of the Initial Contract price.
- (49.1) The liquidated damages for the whole of the works shall be **0.05%** of Initial Contract Price per Day. The maximum amount of liquidated damage for the whole of the Works shall be **10%** of the Contract price.
- (51.1) Contractor shall be paid an advance payment only on submission of an unconditional Bank Guarantee obtained from a reputed Bank registered in Central Bank of Sri Lanka. The value of the Bank guarantee shall be equivalent to the eligible amount calculated as per conditions of contract and it shall be valid till the end of intended completion date or an extension of intended completion date. Contractor shall extend the validity of the Bank guarantee for extension of intended completion date without any notification by the employer. Employer shall demand the advance payment guarantee for such failure of the contractor to extend its validity without any notification to the contractor.
- (52.1) The performance security shall be **5%** or as per the Public Finance Circular 03/2020(i) v. of the Initial Contract Price. This security shall be unconditional on demand and of the Initial Contract Price. This security shall be unconditional on demand and valid till 28 days beyond the intended completion date or any extended intended completion date. Contractor shall extend the validity of performance security for any extension of intended completion date without any notification by the employer. Employer shall demand the performance security for such failure of the contractor to extend its validity without any notification to the contractor.
- (60.1) The percentage to apply to the value of the work not completed, representing the Employer's additional cost for completing the Works, is **25%**

Section - 6

SPECIFICATIONS

**(General specifications have been mentioned in drawings
and Bills of Quantities)**

Municipal Commissioner

28/10/2021

Deputy Municipal Commissioner (Eng Services)

Deans Road Market Building and the Operation of Direct Labour Unit attached to Project management Division

As you are aware the direct labour unit attached to project management division is operating from Deans Road market. Currently the Deans Road market building has been occupied by the following department for their functions.

Public Assistant Department

Ayurvedic Dispensary Deans Road, Maradana

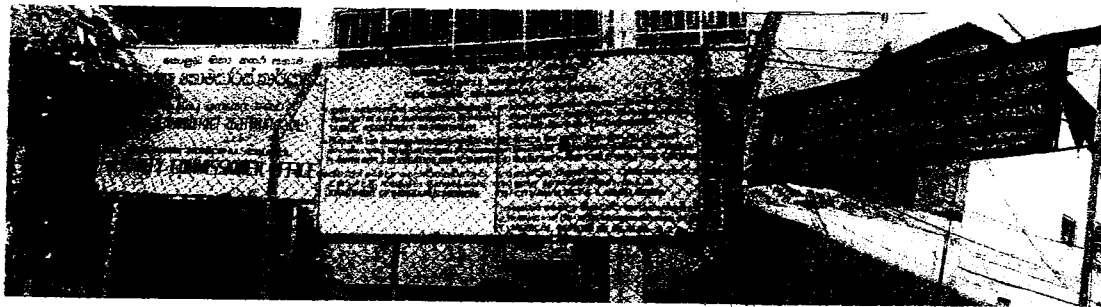
Department of Indegineous Medicine

Central Food Control Unit and City Analysists Laboratory

Maternity and Child Health Division and MOH Office 2B



Deans Road Market Building

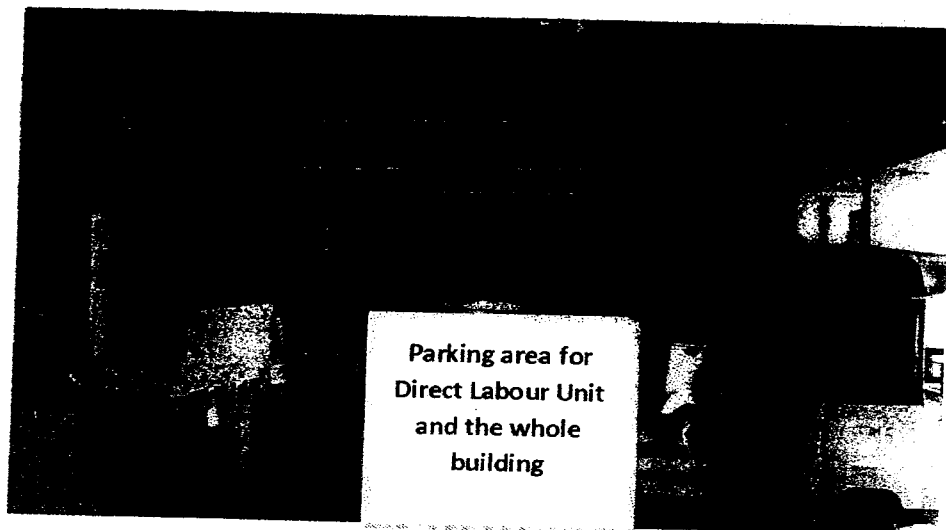
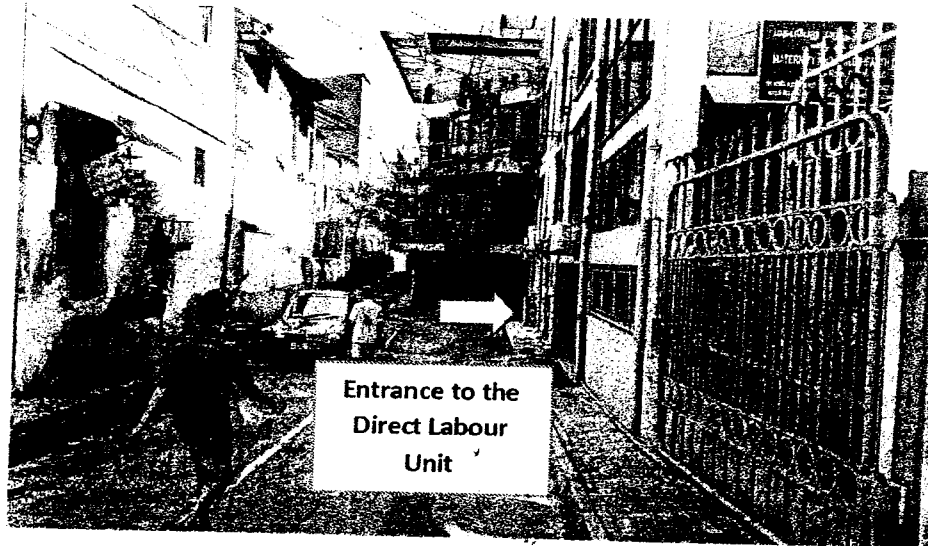


Public Assistant Department, Ayurvedic Dispensary Deans Road, Maradana



Department of Indegineous Medicine, Central Food Control Unit, Maternity and Child Health Division

The direct labour unit attached to Project Management Division is currently operating from Deans road market and which has an approved cadre of 170 in total. The unit is managed by a Deputy Director Engineering and one Engineer and Technical Staff as per the approved cadre.



The space available at Deans road market for direct labour unit is not sufficient to carry out the operational work of due to the congestion and lack of space inside the allocated office space and also limited and restricted external common facility available. Specially the material storage and the labour management including the basic facility of them has become very critical considering the space available for office work and the handling of field staff also no proper ventilation at the existing facility for workers.

The space allocated at the existing office at Deans road market and consequences due to the very limited facilities are as follows.

No	Requirement	Available Facility	Remarks
1	Deputy Director Engineering Room	No such Facility and Deputy Director has not been provided an office space	Deputy Director is solely responsible for the overall operations and the forecasted annual target of the work programme is approximately Rs 500.00 Million
2	Room for one Engineer	Only 3.00x3.00 m Room is available	Space is not any way adequate because the engineer himself has to maintained the required records and document and available space is not adequate
3	Room for six Technical Officers	Only 4.00x3.00 m Room is available	Space allocated is not adequate and always operate with difficulties when the full staff is available
4	Other requirement 1.The document stores for whole Project Division) 2.Material stores, rest room for workers, carpentry yard	Not at all a proper arrangement is available and required space No material store & carpentry yard	This storage facility is for both outsourced(Contract Division Files) and Direct Labour document Storage facility for materials,& carpentry yard is essential

Hence a budget in 2021 contains a provision for construction of a new building for direct labour unit at the available land at Campbell Park. The architectural designs are in progress and the draft copy of the same is attached and the following information are of the proposed building for your reference. The extent of the land available is adequate for accommodation of the proposed building.

No	Floor	Proposed Occupancy
1	Ground	Vehicle Parking and Main stores
2	First Floor	Sub stores & S.K room+06nos. Technical Officers + 02nos. Work Supervisors+ Carpenters & Drivers rest room
3	Second Floor	Deputy Director Engineering +Two Engineers +T.S.A +Office Staff
4	Third Floor	Record Room For Whole Project Division
5	Fourth Floor	2 Nos Engineers Quarters

The approximate cost of construction is Rs 210.00 Million prior to preparation of the detail engineer's estimate. Sixty million is available in the year 2021 budget and the proposed pile foundation of the building can be constructed using this allocation.

The balance parts of the building can be constructed in stages and once it is completed the currently occupied office at Deans road market can be handed over to other department for their usage. The architectural plans of the proposed building are in attached A3 plans for your reference and approval to proceed with preparation of Tender documents.

Director Engineering (Projects)

Copy: ~~Director Engineering (TDRS)~~ for submission of

28/10/2021

~~Tender Document~~

DD(Stt)

pleas prepare the engineer's estimate based on the financial allocation in the budget. described the stage also.

Qh 11/11/2021 #6

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GEOTECHNICAL ENGINEERING DIVISION



NATIONAL BUILDING RESEARCH ORGANISATION

COLOMBO MUNICIPAL COUNCIL

**SOIL INVESTIGATION FOR PROPOSED DEPORT
BUILDING FOR CRMU AT CAMPBELL PARK**

FINAL REPORT

MAY, 2018


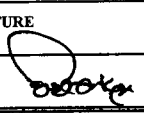

GEOTECHNICAL ENGINEERING DIVISION
NATIONAL BUILDING RESEARCH ORGANISATION
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Tele. +94-11-2588946, Fax. +94-11-2502611
E-mail: nbro@sltnet.lk

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SOIL INVESTIGATION FOR PROPOSED DEPORT BUILDING FOR
CRMU AT CAMPBELL PARK

O: NBRO/GED/2017/30/25848

REPORT	NAME	NAME	NAME
	S.W.B.S. Karunaratna (Engineer)	P. H. K. De Silva (Consultant Engineer)	K. N. Bandara (Director) Geotechnical Engineering Division
	SIGNATURE	SIGNATURE	SIGNATURE
			

SECTION I	NAME	NAME	NAME
	SIGNATURE	SIGNATURE	SIGNATURE

SECTION II	NAME	NAME	NAME
	SIGNATURE	SIGNATURE	SIGNATURE

SECTION III	NAME	NAME	NAME
	SIGNATURE	SIGNATURE	SIGNATURE

and information or advice which it contains, is provided by NBRO solely for internal use and reliance by its Client in performance of NBRO's duties under its contract with the Client. Any advice, opinions, or recommendations within this report should be read and relied upon only in the context of the whole. The advice and opinions in this report are based upon the information made available to NBRO at the date of this report and on the standards, technology and construction practices as at the date of this report. Following final delivery of this report to the Client, NBRO will have no further duty or duty to advise the Client on any matters, including development affecting the information or advice provided in this report. This report has been prepared by NBRO in their professional capacity as Consulting Engineers. The contents of the report do not, in any way, purport to include any manner of legal opinion. This report is prepared in accordance with the terms and conditions of NBRO's contract with the Client. Regard should be had to those terms and conditions when considering and/or placing any reliance on this report. Should the Client wish to release this report to a Third Party for that party's reliance, NBRO, in its discretion, agree to such release provided that:

NBRO's written agreement is obtained prior to such release, and
By release of the report to the Third Party, that Third Party does not acquire any rights, contractual or otherwise, whatsoever against NBRO and NBRO, and NBRO, assume no duties, liabilities or obligations to that Third Party, and
NBRO accepts no responsibility for any loss or damage incurred by the Client or for any conflict of NBRO's interests arising out of the Client's release of the report to the Third Party.



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ORIGINAL

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GEOTECHNICAL ENGINEERING DIVISION

NBRO 

NATIONAL BUILDING RESEARCH ORGANIZATION

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Colombo Municipal Council intends to construct a three storied structure for depot unit at their premises, at Central Road Maintenance Unit (CRMU) at Campbell Park, Borella.

Hence, the Director Engineer, Traffic Design and Road Safety Division of Colombo Municipal Council requested National Building Research Organization (NBRO) to submit a quotation for carrying out Geotechnical investigation for the same by a letter dated 15th September 2017.

Accordingly, NBRO submitted the client a quotation for soil investigation for the same on 20th September 2017 taking into consideration of the information provided by the client.

By accepting the proposal by the client on 31th October 2017, NBRO conducted the field investigation from 22th February 2018 to 26th February 2018 for the locations given by the client.

The suggestions and recommendations given in this report are based on the site reconnaissance, field investigation, laboratory testing and analysis.

The objective of the Geotechnical investigation is to provide information on subsurface conditions at the site and to determine the allowable bearing capacity of the subsoil for, construction of proposed three storied depot building at the site.

The scope of work as per the client is as follows:

- ❖ Advancing two boreholes at the site using core drilling technique to establish the subsurface profile at the site
- ❖ Conducting Standard Penetration Tests (SPT) at 1.0m depth intervals
- ❖ Conducting laboratory tests to determine soil properties
- ❖ Determining parameters required to calculate the bearing capacity
- ❖ Data analysing and preparation of the report with recommendation for foundation

According to the information provided by the Client, it is proposed to construct a three storied building for depot unit at their premises in Campbell Park, Borella.

5.1. LOCATION OF PROPOSED SITE

Sri Lanka lies in the monsoon region of South Asia. The project area is situated on the Western Province of the island and experiences a tropical climate. Proposed site is Situated within Colombo municipality limit and located at the Deport unit at Campbell Park premises at 51, Campbell Avenue, Colombo 08. The site can be accessible through the Park Avenue which is in between the Campbell Park and C.W.W. Kannangara Vidyalaya, Borella. (Ref. Fig. 5.1.)

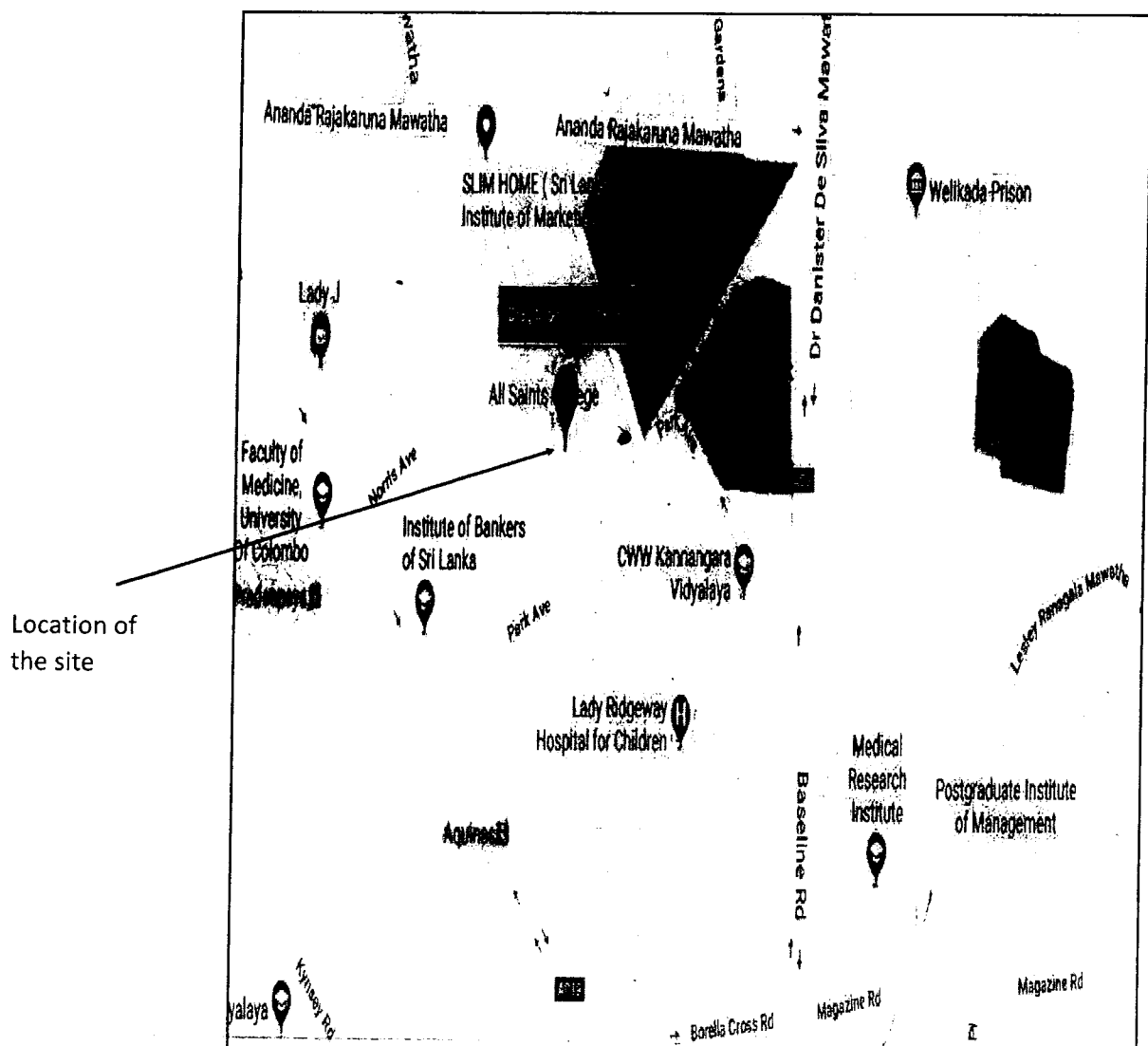


Figure 5.1: Location of the Site

5.2. SITE AND GENERAL ENVIRONMENT

The location of the proposed building site is generally flat and surrounded by existing Car parking area and an existing single storied temporary buildings. As per the information provided by the client, the proposed building is intended to be built after demolishing few existing temporary building. Figure 5.2 shows the site investigations and the general environment of the proposed site.



Figure 5.2: Site investigations and general environment

6.1 CODES AND STANDARDS

All field and laboratory tests were carried out in accordance with the following specifications.

BS 5930 British Standard for Site Investigation

BS 1377 British Standard for Field & Laboratory testing

6.2 LEVEL OF SUPERVISION

The field work for the soil investigation was carried out under the overview of project engineer and technical officer of NBRO who is responsible for nominating & directing all sampling and providing field logs of the soil profiles encountered.

6.3 DRILLING

The objective of the drilling was to obtain geo-technical information and to grasp the sub-soil conditions. Two boreholes (BH 1 & BH 2) were drilled at the locations selected by the client.

Core drilling technique was adapted to advance all the boreholes and bentonite slurry was utilized to eliminate the collapsing of walls of the boreholes. Out of two boreholes, borehole BH 1 was advanced through overburden and remaining borehole (BH 2) was advanced through overburden and thereafter into the fresh rock. Boreholes were supported with NX size casings.

Details of boreholes advanced at the site are summarised in **Table 6.1**. The logs of boreholes are attached in **Appendix II**. The site plan and borehole locations are attached in **Figure I** in **Appendix I**. The assumed vertical subsurface profile through boreholes was drawn and is shown in **Figure II** in **Appendix I**.

Table 6.1: Summary of borehole investigation at the site

Description	Borehole No. (BH)	
	BH 01	BH 02
Date of Drilling	22/02/2018 – 25/02/2018	27/02/2018 – 02/03/2018
Depth of Termination (m)	19.1 m	17 m
Depth of ground water level (m)	2.75 m	2.8 m
Thickness of drilling through overburden (m)	19.1 m	14.0 m
Thickness of drilling through rock (m)	-	3.0 m

6.4 STANDARD PENETRATION TESTS

Standard Penetration Tests (SPTs) were conducted within the boreholes at every 1.0m depth intervals. Log of the borehole along with the explanation sheets describing the terms and symbols used and the graphical representation of SPT values are presented in **Appendix II**.

For the purpose of preparing the log of borehole, compactness/consistency was classified according to the following **Table 6.2** & **Table 6.3**.

Table 6.2 : Cohesion less soil

Compactness	SPT No.
Very loose	0 - 4
Loose	4 - 10
Medium dense	10 - 30
Dense	30 - 50
Very dense	>50

Table 6.3 : Cohesive soil

Consistency	SPT No.
Very soft	0 - 2
Soft	2 - 4
Firm	4 - 8
Stiff	8 - 15
Very Stiff	15 - 30
Hard	>30

6.5 SOIL SAMPLING AND CLASSIFICATION

Disturbed soil samples were collected at every 1.0m depth intervals in borehole by using the split spoon sampler having a sharp cutting edge at its lowered end is forced into the ground by dynamic impact. Visual classification of the soils was done in the field in accordance with British Standard by NBRO personnel.

An undisturbed sample was collected in BH 1 from 3.45m to 3.95m which consist of cohesive soil. Further laboratory tests were carried out using the undisturbed sample.

6.6 GROUND WATER TABLE

Ground water table of the borehole was observed during the period of field investigation. Then, depth of water table was measured from the ground surface and recorded in all borehole logs in **Appendix II**. The level of water table was measured daily and recorded before drilling to be continued next day morning.

6.7 SOIL PROFILE

Logs of the boreholes along with the explanation sheets describing the terms and symbols used are given in **Appendix II**. The borehole logs also include the SPT results from the field. The vertical subsoil profiles through boreholes are given on **Figure II** in **Appendix I**.

All laboratory tests of soil were carried out under the supervision of Laboratory Engineer in accordance with BS standards for representative disturbed soil samples collected during the field investigations.

Following tests were carried out on disturbed soil samples to determine the index properties of the soil encountered at the site.

- Atterberg Limits
- Sieve Analysis
- Moisture Content
- Specific gravity

Following tests were carried out on undisturbed soil samples to determine the properties of the soil encountered at the site.

- Atterberg Limits
- Sieve Analysis
- Moisture Content
- Specific gravity
- Consolidation test

The summary of test results is given in **Table 1** in **Appendix III** and details of the tests results are given in **Appendix IV**.

8.1 SUBSURFACE CONDITION

The layers in the subsurface may be identified as given below. The thickness of different layers at the borehole locations are given in **Table 8.1**.

Layer 1	-	Asphalt pavement on rubble fill
Layer 2	-	Building debris
Layer 3	-	Loose to medium dense silty GRAVEL
Layer 4a	-	Very loose to loose silty SAND/ clayey SAND
Layer 4b	-	Soft sandy CLAY
Layer 5	-	Very dense silty SAND/ clayey SAND
Layer 6	-	Firm to stiff sandy CLAY
Layer 7	-	Loose to medium dense SILT/ clayey SAND
Layer 8	-	Loose to medium dense Sandy SILT
Layer 9	-	Medium dense to very dense silty SAND (Completely weathered rock)
Layer 10a	-	Highly weathered, highly fractured GARNET BIOTITE GNEISS
Layer 10b	-	Moderately weathered, highly fractured GARNET BIOTITE GNEISS

Table 8.1: Thickness of the different layers at the borehole locations and the observed SPT

BH 01				BH 02			
From	To	N _{avg}	Layer	From	To	N _{avg}	Layer
0.00	0.20	-	Layer 1	0.00	0.30	-	Layer 1
0.20	1.00	-	Layer 2	0.30	1.00	-	Layer 2
1.00	2.15	6	Layer 3	1.00	2.00	9	Layer 3
2.15	3.45	8	Layer 4a	2.00	4.15	5	Layer 4
3.45	5.00	4	Layer 4b				
5.00	6.15	7	Layer 5	4.15	5.00	7	Layer 5
6.15	7.00	7	Layer 6	5.00	7.00	8	Layer 6
7.00	8.00	28	Layer 7	7.00	8.50	8	Layer 7
8.00	14.00	17	Layer 8	8.50	11.00	9	Layer 8
14.00	19.15	44	Layer 9	11.00	14.00	33	Layer 9
Borehole terminated at depth of 19.15 m				14.00	15.50	-	Layer 10a
				15.50	17.00	-	Layer 10b
				Borehole terminated at depth of 17.00 m			

The assumed vertical ground profiles through boreholes were drawn and are shown in **Figure II** in **Appendix I**.

8.2 CONDITION OF THE BEDROCK

Bedrock was cored at location of BH 2 and the reported Core Recovery (CR) and Rock Quality Designation (RQD) of the rock are given in **Table 8.2**.

Table 8.2: Quality of the bedrock

BH 02				
Depth (m)		CR (%)	RQD (%)	Layer
From	To			
14.00	15.50	33.3	Nil	Layer 10a
15.50	17.00	40	29	Layer 10b

loga1 - 4
25 - 30
10 WEAKS
- 4

Mcd. Wea.
← 22 - hard rock

9.1 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}):

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

Where

$$C_N = \sqrt{\frac{95.76}{p'_o}} \quad \eta_1 = \frac{E_r}{70}$$

- p'_o = Effective overburden pressure at the test level
 E_r = Efficiency of the hammer used (taken as 60%)
 η_i = Modification factors (Bowles, 1996)

The estimated N'_{70} together with the particle size can 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. **Table 9.1** gives the estimated soil strength parameters from the SPT as outlined above with the corresponding observed soil types present at the SPT locations.

Table 9.1: Soil strength parameters with the depth at the locations of the borehole

Depth (m)	BH 01						BH 02					
	Corrected N ₇₀	Drained		Undrained c _u (kPa)	Soil type	State	Corrected N ₇₀	Drained		Undrained c _u (kPa)	Soil type	State
		φ' (deg)	c' (kPa)					φ' (deg)	c' (kPa)			
0.20	-	-	-	-	-	-	-	-	-	-	-	-
1.00	16	33	-	-	GM	M. Dense	9	30	-	-	GM	Loose
2.00	2	28	-	-	GM	M. Dense	6	30	-	-	SM	Loose
3.00	8	30	-	-	SC	V. Loose	5	30	-	-	SC	Loose
4.00	4	-	-	15	CS	Soft	52	50	-	-	SC	V. Dense
5.00	55	50	-	-	SM	V. Dense	6	-	-	25	CS	Firm
6.00	7	-	-	30	CS	Firm	10	-	-	50	CS	Stiff
7.00	28	35	-	-	SC	M. Dense	8	31	-	-	MH	Loose
8.00	5	30	-	-	MS	Loose	5	30	-	-	MH	Loose
9.00	12	32	-	-	MS	M. Dense	6	30	-	-	MS	Loose
10.00	18	37	-	-	MS	M. Dense	11	32	-	-	MS	M. Dense
11.00	12	30	-	-	MS	M. Dense	25	35	-	-	SM	M. Dense
12.00	18	37	-	-	MS	M. Dense	16	35	-	-	SM	M. Dense
13.00	26	35	-	-	MS	Dense	40	44	-	-	SM	V. Dense
14.00	25	35	-	-								
15.00	30	36	-	-								
16.00	30	36	-	-								
17.00	36	45	-	-								
18.00	35	45	-	-								
19.00	34	44	-	-								

10.1 PROPOSED DEVELOPMENT

The proposed development is the construction of a three storied building within an area of 10m×20m. The client verbally informed NBRO that a 2m wide strip footing is currently proposed for the structure to be constructed.

10.2 GEOTECHNICAL ISSUES

Based on the boreholes advanced at the site, the perceived geotechnical issues are as follows:

1. The site is covered with an Asphalt layer followed by ABC and uncontrolled fill comprising concrete fragments up to a depth of 1m. This layer needs to be removed and replaced completely and replaced with the good quality graded material before any shallow foundation options are adopted.
2. Immediately below, a very loose to loose silty gravel layer is found up to a depth of 2.00 to 2.15m from the existing ground level across the site. This layer, in its current density, is not an appropriate founding layer. If shallow foundations, i.e., Pad or Strip foundations, are adopted, either the layer needs to re-compact to increase its density. This could be achieved by excavating to the base of the layer and replacing in layers 250mm loose thickness and compacting to achieve 90% of the maximum dry density.
3. An intermediate to high plastic clay layer occurs within the foundation depth at both borehole locations. Hence, with the development loading exerted at foundation level, this clay layer is likely to undergo consolidation settlement. As the clay layer characteristics and thickness across the site are likely to be variable based on the results of the investigation, some differential settlement could be expected across the building footprint.

If the above are taken into account in the foundation design and construction, shallow foundations could be adopted as follows:

10.3 FOUNDATION OPTIONS

Pad/Strip footings

- 1) Remove the topmost uncontrolled fill layer
- 2) Excavate to the base of gravel layer, place sandy or gravelly fill in compacted layers as mentioned above until 0.5m below the ground level. The excavation width should be 0.25 x B of either side of footing edge, where B is the footing width.

Raft footings:

- 1) Remove the topmost uncontrolled fill layer
- 2) Use a large vibratory roller and in-situ compact the gravel layer (It may not compact the full depth of the gravel layer)
- 3) Place gravelly fill in compacted layers as mentioned above until the base of the proposed raft slab. Excavate for beams in the raft as required.

10.3.1 EXPECTED SETTLEMENT AFTER GROUND IMPROVEMENT

The calculations carried out based on the field and laboratory investigation, suggest that the cohesive layers across the building footprint are in an over consolidated state.

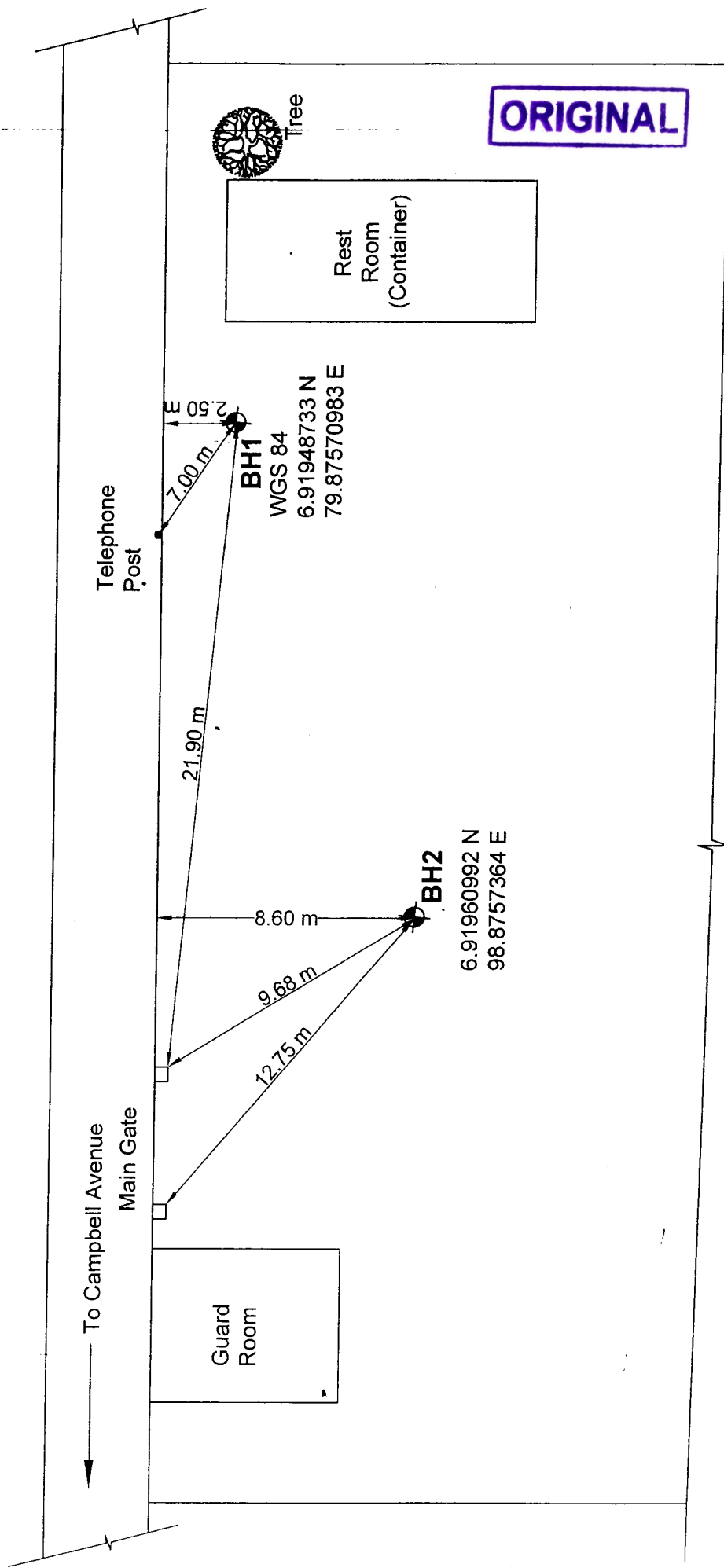
The bearing capacity of 125kPa for Pad/ Strip for 2m wide and 30kPa for a 10m wide raft foundation could be adopted, if the structural footings could be designed to accommodate the anticipated settlement of the order of 80mm to 115mm (based on the borehole locations) for strip/pad foundations and the anticipated settlement of the order of 35mm to 55mm for raft foundations over a 50 year design life. This assumes the pad/strip footings will be placed 0.5m depth from the ground surface and the raft just below the ground surface, and no additional filling to increase the final surface level because that could trigger additional consolidation settlement.

10.3.2 OTHER CONSIDERATIONS

- The filling material should be good quality sandy/gravelly material; excavated gravelly material could be re-used. Filling should be carried out in thin layers, not more than 250mm in loose condition, and well compacted (at least to 90% Maximum dry density).
- Compaction in pads and strips would be difficult with machinery and may need to be carried out using manual methods such as using a plate vibrator or a manual rammer.
- If isolated pad foundations are used, the clear distance between any two adjacent footings should be greater than or equal to the width of the larger footing and it is advisable to combine all columns with tie beams at the plinth level to increase the stiffness of building units.
- Excavation in very loose or loose non cohesive soil may require a shoring system such as a sheet pile wall or other appropriate system to support the walls of the excavation.
- It is advisable to carry out the excavation in the dry spell to minimize any dewatering activities.

ORIGINAL

Appendix I - Figures



- ◆ BH - Borehole Location
- * All dimensions are in meters
- Not to scale

Figure 1 :- Borehole location plan
(Soil investigation for proposed depot building for CRMU at Campbell Park)

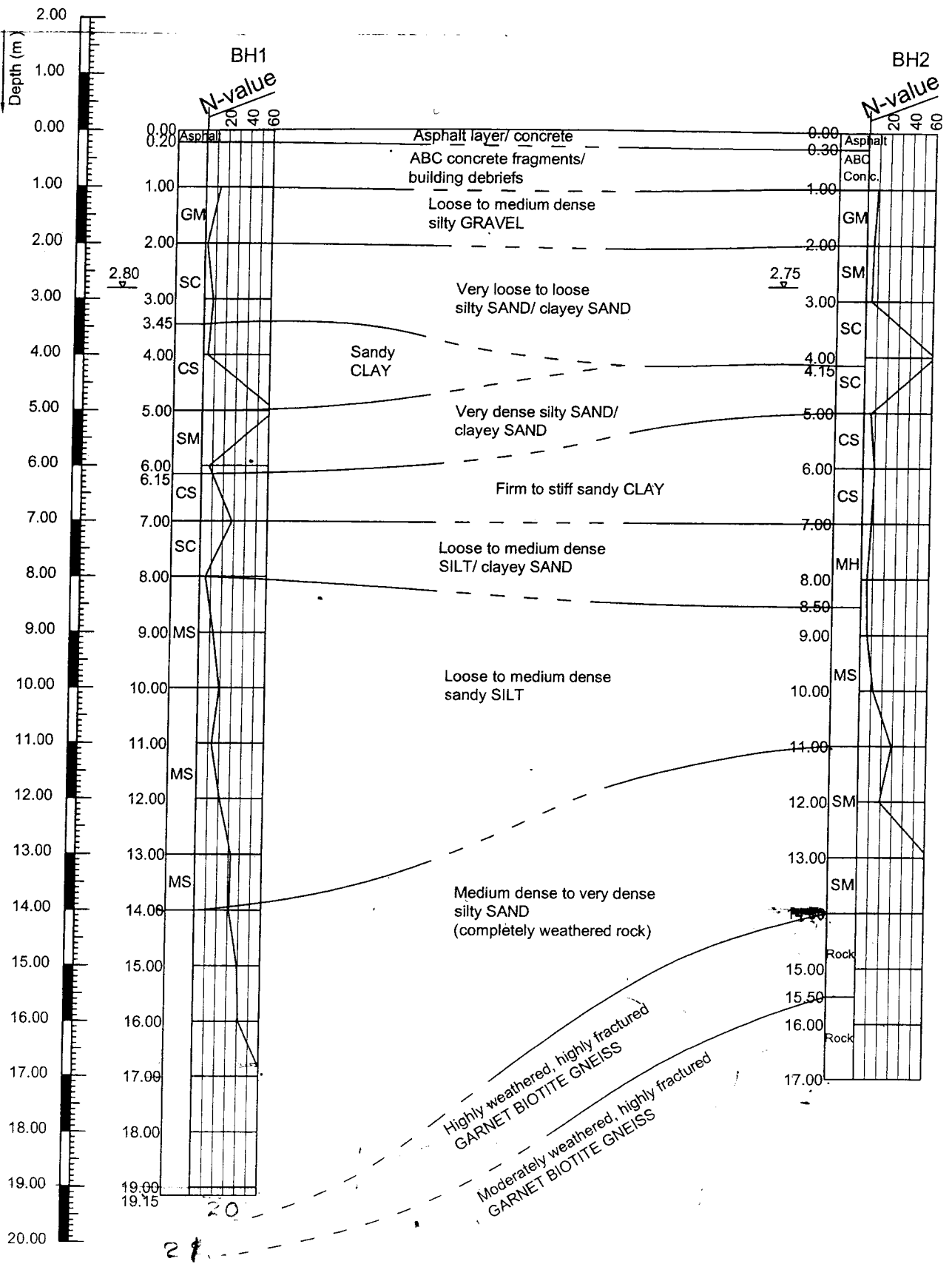


Figure II :- Assumed vertical sub-soil profile through BH 01 and BH 02

(Soil investigation for proposed depot building for Central Road Maintenance Unit (CRMU) at Campbell Park)

ORIGINAL

Appendix II - Logs of boreholes

BOREHOLE LOG



NATIONAL BUILDING RESEARCH ORGANISATION

GEOTECHNICAL ENGINEERING DIVISION

99/1, Jawatta Road, Colombo 05.

SHEET NO.

1 of 2

JECT		SOIL INVESTIGATION FOR PROPOSED DEPOT BUILDING FOR CENTRAL ROAD MAINTAINANCE UNIT (CRMU) AT CAMPBELL PARK			CLIENT	COLOMBO MUNICIPAL COUNCIL	BOREHOLE NO	BH 1
LOCATION		51, CAMPBELL AVENUE, COLOMBO 8			CONTRACT NO	NBRO/GED/2017/30/25848	DEPTH OF HOLE (m)	19.15
DRILLING METHOD		CORE DRILLING			ELEVATION (m RL)		CHAINAGE / OFFSET	-
CORE SIZE [mm]	-	CASING SIZE [mm]	76		CO-ORDINATES	N	DATE COMMENCED	22/2/2018
VANE SIZE [mm*mm]	-	UDS SAMPLER SIZE [mm]			E		DATE COMPLETED	25/2/2018

DEPTH [m]	ELEVATION [m RL]	LAYER THICKNESS [m]	SAMPLE TYPE	SAMPLE NO.	SOIL PROFILE			Y - [g/cm ³]	OTHER TESTS	DEPTH TESTED [m]	STANDARD PENETRATION TEST DATA				MOISTURE CONTENT - %						
					SOIL DESCRIPTION	STRATA	LEGEND				GWL	NUMBER OF BLOWS				UNDRAINED SHEAR STRENGTH - kN/m ²					
												PER 15cm				SPT RESISTANCE - Blows/30 cm					
												1	2	3	'N'	10	20	30	40	50	60
0.00					GROUND LEVEL																
0.20		0.20			Asphalt with concrete slab																
1.00		0.80			Filled with concrete fragments, brick fragments and building debris																
2.00					Silty GRAVEL, medium dense, brown, fine to coarse grained, sub angular, moist			GM													
2.15		1.15			Clayey SAND, very loose to loose, yellowish brown, fine to coarse grained, angular, presence of low to intermediate plastic clay fines, moist			SC													
3.00					Sandy CLAY of high plasticity, soft, orangish brown, fine to coarse grained sand, occasionally presence of gravel, moist			CS													
3.45		1.30																			
4.00																					
5.00		1.55			Silty SAND, very dense, grey, fine to coarse grained, angular, moist			SM													
6.00		1.15			Sandy CLAY, firm, grey, fine to medium grained sand, moist			CS													
7.00		0.85			Clayey SAND, medium dense, grey, fine to medium grained, presence of intermediate plastic clay fines, moist			SC													
8.00		1.00																			
9.00					Sandy SILT, loose to medium dense, reddish brown, fine to coarse grained sand, presence of gravel, moist			MS													

SOIL DESCRIPTION		STRATA	LEGEND	GWL	Y - [g/cm ³]	OTHER TESTS	DEPTH TESTED [m]	1	2	3	'N'	10	20	30	40	50	60
Asphalt with concrete slab																	
Filled with concrete fragments, brick fragments and building debris																	
Silty GRAVEL, medium dense, brown, fine to coarse grained, sub angular, moist		GM					1.00	13	7	4	11						
Clayey SAND, very loose to loose, yellowish brown, fine to coarse grained, angular, presence of low to intermediate plastic clay fines, moist		SC					2.00	7	2	0	2						
Sandy CLAY of high plasticity, soft, orangish brown, fine to coarse grained sand, occasionally presence of gravel, moist		CS					3.00	3	4	4	8						
							4.00	2	2	2	4						
Silty SAND, very dense, grey, fine to coarse grained, angular, moist		SM					5.00	17	36	23	>50						
Sandy CLAY, firm, grey, fine to medium grained sand, moist		CS					6.00	14	4	3	7						
Clayey SAND, medium dense, grey, fine to medium grained, presence of intermediate plastic clay fines, moist		SC					7.00	15	16	12	28						
							8.00	1	2	3	5						
Sandy SILT, loose to medium dense, reddish brown, fine to coarse grained sand, presence of gravel, moist		MS					9.00	4	5	8	13						

ORIGINAL

Natural moisture content, Atterberg Limits (LL, PL)

Y - Wet unit weight

W - Wash sample

Drilled By

PA

SPT 'N', blows/ft

G - Grainsize Analysis

SPT - SPT Sample

Logged By

WDBC

Vane shear strength, peak

U - Unconfined compression

Undisturbed sample

Date

5/3/2018

Vane shear strength, residual

CU - Consolidated undrained triaxial

Disturbed Sample

Checked By

DMDS

BOREHOLE LOG



NATIONAL BUILDING RESEARCH ORGANISATION

GEOTECHNICAL ENGINEERING DIVISION

99/1, Jawatta Road, Colombo 05.

SHEET NO

2 of 2

JECT		SOIL INVESTIGATION FOR PROPOSED DEPOT BUILDING FOR CENTRAL ROAD MAINTAINANCE UNIT (CRMU) AT CAMPBELL PARK			CLIENT		COLOMBO MUNICIPAL COUNCIL		BOREHOLE NO		BH 1			
LOCATION		51, CAMPBELL AVENUE, COLOMBO 8			CONTRACT NO		NBRO/GED/2017/30/25848		DEPTH OF HOLE (m)		19.15			
DRILLING METHOD		CORE DRILLING			ELEVATION (m RL)				CHAINAGE / OFFSET		-			
CORE SIZE [mm]		-		CASING SIZE	76		CO-ORDINATES		N		DATE COMMENCED		22/2/2018	
VANE SIZE [mm*mm]		-		UDS SAMPLER SIZE [mm]	-		E				DATE COMPLETED		25/2/2018	

DEPTH [m]	ELEVATION [m RL]	LAYER THICKNESS (m)	SAMPLE TYPE	SAMPLE NO.	SOIL PROFILE				Y - [g/cm ³]	OTHER TESTS	DEPTH TESTED [m]	STANDARD PENETRATION TEST DATA				MOISTURE CONTENT - %				UNDRAINED SHEAR STRENGTH - kN/m ²				SPT RESISTANCE - Blows/30 cm			
					SOIL DESCRIPTION	STRATA	LEGEND	GWL				NUMBER OF BLOWS				10	20	30	40	50	60						
												PER 15cm			'N'												
												1	2	3													
0.00		2.00									10.00	6	9	10	19												
1.00											11.00	6	6	7	13												
2.00											12.00	5	6	15	21												
3.00		3.00									13.00	8	14	18	32												
4.00		1.00									14.00	8	14	17	31												
5.00											15.00	7	17	22	39												
6.00											16.00	12	18	23	41												
7.00											17.00	13	20	35	>50												
8.00											18.00	40	31	HB	>50												
9.00											19.00	33	HB	-	>50												
9.15		5.15									Borehole terminated at 19.15m depth																

Natural moisture content, Atterberg Limits (LL, PL)

γ - Wet unit weight

W - Wash sample

Drilled By

PA

SPT 'N', blows/ft

G - Grainsize Analysis

SPT - SPT Sample

Logged By

WDDB

Vane shear strength, peak

U - Unconfined compression

☐ - Undisturbed sample

Date

5/3/2018

Vane shear strength, residual

CU - Consolidated undrained triaxial

⊗ - Disturbed Sample

Checked By

DMDS

SHEET NO.

1 of 2

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BOREHOLE LOG



NATIONAL BUILDING RESEARCH ORGANISATION
GEOTECHNICAL ENGINEERING DIVISION

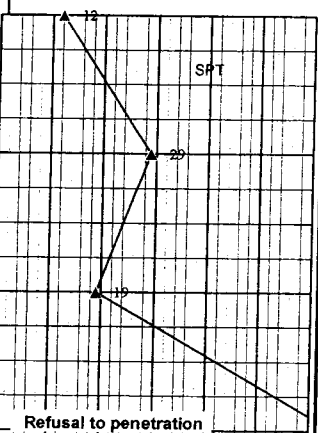
99/1, Jawatta Road, Colombo 05.

SHEET NO.

2 of 2

ECT	SOIL INVESTIGATION FOR PROPOSED DEPOT BUILDING FOR CENTRAL ROAD MAINTAINANCE UNIT (CRMU) AT CAMPBELL PARK			CLIENT	COLOMBO MUNICIPAL COUNCIL	BOREHOLE NO	BH 2
LOCATION	51, CAMPBELL AVENUE, COLOMBO 8			CONTRACT NO	NBRO/GED/2017/30/25848	DEPTH OF HOLE (m)	17.00
DRILLING METHOD	CORE DRILLING			ELEVATION (m RL)		CHAINAGE / OFFSET	-
CORE SIZE [mm]	54	CASING SIZE	76	CO-ORDINATES	N	DATE COMMENCED	27/2/2018
ANNE SIZE [mm*mm]	-	UDS SAMPLER SIZE [mm]	-		E	DATE COMPLETED	2/3/2018

DEPTH [m]	ELEVATION [m RL]	LAYER THICKNESS(m)	SAMPLE TYPE	SAMPLE NO.	SOIL PROFILE			Y - [g/cm ³]	OTHER TESTS	STANDARD PENETRATION TEST DATA				MOISTURE CONTENT - %																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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----- Natural moisture content, Atterberg Limits (LL, PL)

γ - Wet unit weight

W - Wash sample

Drilled By

PA

▲ SPT 'N', blows/ft

G - Grainsize Analysis

SPT - SPT Sample

Logged By

WDDB

→ Vane shear strength, peak

U - Unconfined compression

☐ - Undisturbed sample

Date

5/3/2018

--- Vane shear strength, residual

CU - Consolidated undrained triaxial

⊗ - Disturbed Sample

Checked By

DMDS

ORIGINAL

Appendix III - Summary of Laboratory Tests Results

PROJECT : SOIL INVESTIGATION FOR PROPOSED DEPOT BUILDING FOR CENTRAL ROAD MAINTAINANCE UNIT (CRMU) AT CAMPBELL PARK		Sheet No. 1 of 1 Job Ref. 30/25848															
Laboratory Sample No.																	
GEL/2018/0255	BH 1	2.00-2.45	SC	17	2.73	1	79	20	18	12	6						
GEL/2018/0256		3.00-3.45	SC	24	2.66	37	44	19	50	25	25						
GEL/2018/0257		4.00-4.45	CS	23	2.65	6	56	38	62	31	31						
GEL/2018/0258		7.00-7.45	SC	23	2.57	6	66	28	34	18	16						
GEL/2018/0689	BH 2	2.00-2.45	SC	-	-	24	50	26	42	23	19						
GEL/2018/0259		3.00-3.45	SC	19	2.59	19	53	28	65	30	35						
GEL/2018/0690		4.00-4.45	SC	-	-	7	74	19	28	19	9						
GEL/2018/0260		5.00-5.45	CS	34	2.58	2	58	40	46	24	22						
GEL/2018/0261		7.00-7.45	MH	37	2.48	2	30	68	62	33	29						
GEL/2018/0262		8.00-8.45	MH	42	2.69	1	33	66	54	32	22						
GEL/2018/0263	BH 1 (UDS)	3.50-3.90	CS	23	2.65	0	62	38	62	28	34				0.130	110	
GEL/2018/0264		6.45-7.00	MS/CS	23	-	7	38	55	59	31	28						

DATE : 19/3/2018

CERTIFIED BY : WDBC

CHECKED BY : DR

TESTED BY : WKSIRU

Ruchi