GEOTECHNICAL INVESTIGATION FOR PROPOSED CHANCERY BUILDING FOR THE INDIAN HIGH COMMISSION BUILDING AT EBENE

Instructions to Tenderers

1. Introduction

Tenders for Geotechnical Investigation are being invited for the proposed Chancery and staff residences for the High Commission of India at Ebene.

The Tenderer is advised to read carefully these instructions and to ensure that he has complied herewith in all respects on submitting his Tender.

2. Scope of Work

The works consist of carrying out Geotechnical Investigation works: excavation of trial pits, drilling of borehole, plate bearing test, in situ and laboratory soil tests and submission of a comprehensive Geotechnical Report including all test results, all as described in the Specifications and Bills of Quantities.

3. Contract Period

The Contract Period for the Geotechnical Investigation works including submission of test results is 60 calendar days including 7 calendar days of mobilisation.

4. Mode of Pricing

The Contractor shall be required to price all the items in the Bills of Quantities.

5. Precautions to be taken

The Contractor must allow in his price for all precautions to be taken as regards to the safety of the neighbouring plots, working within limited noise levels to avoid any nuisance and all other necessary precautions prescribed in Mauritius laws in compliance with relevant authorities for the proper execution of the Geotechnical Investigation works.

6. Insurances

The Contractor shall be required to submit an All Risks Insurance Policy for carrying out the whole of the Geotechnical Investigation works. An insurance cover of Rs 5,000,000/- for any one accident or series of accidents arising out of any one event (unlimited in aggregate) in respect of injury or damage to property arising out of or

in the course of or by reason of the carrying out of the works and caused by any negligence, omission or default of the Contractor, his servants or agents.

7. Fixed Price

The Contractor shall quote a fixed lump sum price and no fluctuation in price shall be allowed.

8. Statutory Obligations, Notices, Fees and Charges

The Contractor must allow for paying all legally demandable fees, charges, rates or taxes more specially Municipality fees, charges or taxes including those of temporary site offices, stores, occupation of pavement, etc. and no adjustment of the Contract Amount will be made in respect of such payments.

9. Visit of Site

The Contractor must visit the site before quoting and make himself thoroughly acquainted with the nature of the site, the extent of the Geotechnical Investigation work, the means of access, the general nature of the work involved and all matters which may in any way affect his price. No claim made by the Contractor on the ground of want of knowledge or any or all such matters will be entertained by the Client.

10. Access to the Site

Contractor is to obtain permission from relevant authorities before mobilization on site.

11. Storage Shed, Temporary Office

The Contractor shall make his own arrangements at his own cost for providing his site office and other facilities. These shall be removed by the Contractor on completion of the work at site.

12. Plant, Tools, Scaffolding, etc.

The Contractor shall provide all the necessary plant, tools, equipment, vehicles, etc. that may be required for the efficient and expeditious execution of the works and at or before completion clear same from the site.

13. Personnel and Supervision

The Contractor shall keep constantly on the works a competent person on site and any direction or explanation given by the Client's representative/s to such person shall be deemed to have been given to the Contractor.

The Contractor is to supply suitable personnel to conduct the Geotechnical investigation and such personnel are to be qualified, experienced and skilled in the work required by the Contract. The work is to be done under the proper supervision of a supervisor fully qualified in their respective duties with regard to making borings, taking samples, identifying soils and carrying out tests on soils at site and in the laboratory.

The Contractor shall at all times maintain a register on site for the Client's representative/s to issue orders on the spot.

14. Government Ordinance and Regulations

The Contractor must comply with all governing laws and regulations of Mauritius, more especially those related to the building industry.

15. Light, Power, Watching, Protection, etc

The Contractor must provide at his own cost light and power necessary for the Geotechnical Investigation works and to ensure adequate watching and protection of the works, materials, etc.

16. Areas Available for the Works

All necessary arrangements shall be made by the Contractor with the Employer with regard to entry and use of a suitable working area to accommodate his temporary site office, stores, etc. No labour will be allowed to stay within the Site and the Contractor shall have to operate with his labour residing outside the Site. The Contractor shall carry out all negotiations, arrange all temporary wayleaves and deal with any claims for compensation which may arise out of the normal use of an access to the working areas by the Contractor.

The Contractor shall not use any portion of the Site for any purpose not connected with the Works unless prior written permission has been obtained from the Employer.

The Contractor shall exercise every care in gaining access to the various working areas and in setting up and operating his plant so as to avoid damage to property. If instructed by the Consulting Engineer, the Contractor shall remove any plant, etc. or other obstruction within his control, promptly and at his own expense.

The Contractor shall keep all plant, equipment, materials and the areas of the site in reasonably good order and tidy to the satisfaction of the Consulting Engineer throughout the course of the Works. Upon completion of his operations in any working area, the Contractor shall fill in, and consolidate the excavated areas, remove all arising and make good any damage caused by his operations at his own expense and to the satisfaction of the Consulting Engineer.

17. Payment

Payment shall be made in two installments. The first installment shall be paid when works on site is completed. The second and final payment shall be made at the practical completion after submission of the test results, trial pit logs, photographs and the comprehensive Geotechnical Report.

Payment certificate will be certified by the Engineer and the payment will be effected by the Client within 30 days after certification.

Item No	Description	Unit	Qty	Rate	Rs	Cs
	BIIL NO. 1					
1	**PRELIMINARIES**					
	Allow for Preliminaries and Generals to cover but not limited to the followings:					
A	Insurance of Works (C.A.R. Policy) for the full value of the Contract Sum with a third party liability of Rs 5,000,000.00 at any one or series of accident	Sum				
B	Tender Bond to the value of Rs 25,000/-	Sum				
C	Performance Bond to the value of 10% of the Contract Sum	Sum				
D	Site administration and supervision of works including Government ordinances, regulations, etc.	Sum				
E	All tools, plant, equipment, etc.	Sum				
F	Temporary store for the Contractor for storage of materials, etc.	Sum				
G	Allow for light, power, water and protection of the works and existing buildings	Sum				
H	Any other items that the Contractor may require for the works but not included above	Sum				
I	Provisional sum for cost of testing at the Testing Laboratory of the Approved Testing Laboratory	Sum			15,000	00
J	Submission of Geotechnical Report	LS	4			
	CARRIED TO COLLECTION					

Item No	Description	Unit	Qty	Rate	Rs	Cs
	BILL No 2: FIELD AND LABORATORY TESTS					
A	Trial Pits including (a) shoring strutting of sides for access, inspection of the bottom, (b) dewatering when necessary and (c) backfilling of trial pits in well compacted layers not exceeding 300 mm thickness	No.	5			
	2.0 m x 2.0 m x 3.0 m deep	LS				
B	Preparation and submission of trial pit logs and photographs					
C	10 no. large and small samples in bags, i.e. 2 from each trial pit as directed by the Engineer for laboratory tests and transport of the samples to the Testing Laboratory of the University of Mauritius or other approved soil laboratory.	LS				
D	Tests and submission of test results:					
	(a) Natural moisture content	No.	3			
	(b) Sieve analysis with particle size distribution including hydrometer.	No.	3			
	(c) In situ density tests at 1.0 m depth.	No.	3			
	(d) Atterberg Limits	No.	3			
	(e) Proctor Test using 2.5 kg rammer	No.	3			
	(f) CBR Test (soaked)	No.	2			
	(g) One-dimensional consolidation tests-maximum of 10 loadings	No.	2			
	(h) Consolidated undrained triaxial test with measurement of pore water pressure and saturated under back pressure.	No.	2			
E	Plate bearing tests at 1.0 m below ground level.	No.	2			
F	Percolation tests (set of 3 tests at each location) as described in Annex I to Specifications	Set	3			
	CARRIED TO COLLECTION					

Item No	Description	Unit	Qty	Rate	Rs	Cs
	BILL NO. 3					
	BOREHOLE					
A	Transport of the Drilling Equipment to the site and placing machine on vertical borehole no. 1	LS				
B	Drilling minimum 76 diameter borehole down to a depth of 18 m approximately, including casing where necessary, and submitting the borehole logs with photographs	m				
C	Making Standard Penetration Test after U Sampling as and when required	No.	6			
D	U2 undisturbed samples in 50 mm diameter sampler as and when required including transport to the Approved Testing Laboratory	No.	3			
E	Recovering of samples, storing in core boxes, each containing 2 x 1.0 m cores and transporting to Engineer's office	LS.				
F	Water trucking to site	LS				
	CARRIED TO MAIN SUMMARY					

GEOTECHNICAL INVESTIGATION FOR PROPOSED CHANCERY BUILDING FOR THE INDIAN HIGH COMMISSION AT EBENE

MAIN SUMMARY OF TENDER

		Amount (Mauritian Rupees) (MUR)
Bill No. 1	Preliminaries	.....
Bill No. 2	Field and Laboratory Tests	.....
Bill No. 3	Borehole	.....
	Total (exclusive of VAT)	.....
Add	15% VAT	.....
	Total Amount	.....

Name of Tenderer: .....

Signature: .....

Address: .....

.....

.....

Date: .....

SPECIFICATIONS FOR GEOTECHNICAL INVESTIGATION

1. The Geotechnical Investigations are to be carried out at the site of the proposed Chancery building for the Indian High Commission at Ebène.

2. The location of the proposed borehole and trial pits are shown on sketch no. 08/123/L0 SK01. The Contractor must establish the location of the borehole on site and call the Engineer for approval before works are started.

3. The Contractor is required to employ the services of experienced staff who will ensure:

3.1 The proper logging of trial pits and boreholes

3.2 That samplings and tests are carried out in accordance to the appropriate standard

3.3 Advise on any other matters concerning the site investigations including the preparation of the Geotechnical Report.

4. Trial pits

4.1 One side of each trial pit excavation should be stepped to allow access. Contractor shall provide necessary ladder, etc. for access to steps and to the bottom of the pits.

4.2 The Contractor shall provide adequate shoring and strutting to prevent collapse of the sides and ensure safety of personnel.

4.3 The Contractor shall provide adequate barriers around the pits to ensure safety of the public.

4.4 Trial pits shall be kept free of water by pumping if necessary to allow continuous work for taking of samples and for inspection by the Engineer.

4.5 On completion of the investigations, all trial pits and excavations shall be backfilled by the Contractor. The backfilling shall be done in layers, each of a consolidated thickness not exceeding 300 mm. Compaction shall be done by vibrating roller or by mechanical tampers or hand tampers.

5. Boring

5.1 Boring shall be carried out in accordance with the provisions of BS5930 or equivalent standard with shell and auger, rotary drilling or adopting a method which suits the prevailing conditions. The boreholes shall have a minimum diameter of 76.2 mm and shall be suitably lined throughout. The toe of the lining shall at no time

be more than 1.0 m above the level to which the material has been removed from the borehole.

Before taking any undisturbed samples or making any in-situ test, the lining shall be carried down to the bottom of the borehole.

Auger of proper size shall be used in soft to firm clays and silts to avoid suction. The use of shell-tube shall be restricted only to very stiff to hard clays and sandy strata below water table. The use of a chisel bit shall be permitted only in boulder or rock formation or through local obstructions.

Uncased boreholes may be permitted only up to a depth where the sides of the hole can stand unsupported. In case side falls or squeezing is noticed, steps shall be taken immediately to stabilize the sides of the borehole by casing pipes as directed by the Engineer. Bentonite slurry may be permitted to stabilize the borehole as directed by the Engineer.

Wash boring or any similar methods of boring, employing a water jet and/or a percussion bit may be permitted by the Engineer in case sufficient progress in boring becomes impossible considering the subsoil condition.

No water shall be added while boring through cohesive soils and cohesionless soils above the water table. While boring through cohesionless soil below water table, water level in the casing shall always be maintained at or above the water table. The cutting brought up by the auger, shell or the cutting shoe of the split-spoon or undisturbed sampler shall be carefully examined and the soil description duly recorded after performing field identification tests.

After completion of the boring at any borehole, a bore log shall be prepared in a proforma approved by the Engineer and submitted to the Engineer in duplicate. After observing the position of the water table, backfilling of the borehole shall be carried out in an approved manner as directed by the Engineer.

5.2 Double Barrel Rotary Core Drilling

Double barrel rotary core drilling shall be carried out in boreholes for all rock formations using 76.2 m size bits. Core drilling shall be carried out upto 3 m in rock

till the hard rock is met with or as directed by the Engineer. For defining a hard rock, core recovery shall be minimum 85% along with minimum rock quality designation (RQD) as 75%. To obtain RQD, only those pieces of rock which are 100 mm and longer shall be measured for their total length and shall be divided by length drilled, expressed as percentage.

During the drilling operation dips and strikes of bed rock along with bedding planes shall be observed by the site agent and reported in the bore logs.

Loss of water during drilling, if any and its appropriate rate shall be reported in the proforma enclosed and also in the bore log.

Rock core sample shall be collected and sent to laboratory for specified tests to determine engineering properties.

A set of core samples properly labelled and packed in wooden boxes as per relevant British Standard or equivalent practice shall be handed over to the Engineer.

6. Plate Load Test

Carry out 2 nos. plate load tests at a depth of 1.0 m below the existing ground. The plate load tests (incremental) are to be carried out as specified in BS 1377: Part 9:1990.

7. Undisturbed Samples

Undisturbed samples shall generally be taken from the trial pits or boreholes at every identifiable change of strata unless otherwise instructed by the Engineer.

In case of sandy strata, the intervals of sampling shall be suitably increased. Sampling procedures and samplers for recovering undisturbed samples shall normally conform to BS1377 or equivalent unless otherwise specified and directed by the Engineer.

In the case of cohesive deposits, undisturbed samples shall be taken by an open tube sampler or a piston sampler. The size of the sampler should be such that a

sample having a minimum size of 50 mm diameter and 300 mm long can be recovered.

The Contractor is required to ascertain the diameter and size of sample with the testing laboratory before taking the sample. The sampler shall be pushed strictly by hand or by jacking in soft to firm deposit and no hammering shall be allowed. Where this is not possible the sampler may be driven by the blows of a monkey having sufficient weight. Area ratio of all samplers shall be limited to 10% for soft to firm cohesive deposit and use of thick walled samplers may be permitted in case of deposits having very high consistency, subject to the approval of the Engineer. Recovery ratio shall be observed and reported in the boreholes for every sample.

The samples shall be sealed where necessary by wax packed and properly labelled and transported to the laboratory as laid down in BS1377 or equivalent standard. The top and bottom of a sample must be indicated clearly on the sample tube to facilitate the laboratory testing in proper orientation as specified by the Engineer. The samples which are less than 200 mm long in the sampling tube shall not be paid for.

8. Despatch of Samples

Samples shall be dispatched to the laboratory as soon as possible after being obtained and shall not be allowed to accumulate at Site. If it appears to the Engineer that there is a danger of samples deteriorating through further storage, the Contractor shall despatch such samples as soon as directed by the Engineer. Results of test should be communicated to the Engineer from time to time.

9. Core Boxes

Core boxes should be of sound construction, with hinged lids and shall be to the approval of the Engineer. Cores shall be placed in a systematic manner and the outside of the box should be clearly marked to show the borehole reference and the depth below the surface of the cores.

10. Daily Drilling/Boring Report

Complete record of drilling/boring shall be submitted daily by the Site Agent along with his remarks as per the proforma to be approved by the Engineer for all the boreholes.

11. Laboratory Tests

11.1 *General*

Laboratory tests shall be carried out in consultation with the Engineer and as per BS1377 (relevant parts) or equivalent standard. All laboratory tests will be carried out at the Soil Mechanics laboratory of the University of Mauritius or any other approved Laboratory.

11.2 *Preparation of Test Specimen*

Preparation of test specimens for the various tests shall be carried out as per the procedures laid down in the various relevant BS Codes or equivalent standard.

12. Preliminary Report and Records

On completion of each borehole/trial pit, three copies of a preliminary borehole/trial pit log shall be submitted to the Engineer.

These preliminary bore logs shall show:

- Ground level referred to the Datum on Site
- The locations of the boreholes/trial pits on a plan
- The preliminary description of each stratum (including presence of cavities and fracture patterns in case of rock)
- The thickness of each stratum with the boundaries referred to the Site Datum (including presence of cavities and fracture patterns in case of rock)
- The position, type and identification of each sample and site test with reference to Site Datum
- Any site test results available with reference to Site Datum
- The levels at which each separate ground water level is first encountered at which it comes to rest (standing water level)
- Photographs showing 4 sides of pit excavated.

13. On completion of the investigations, the Contractor shall submit a comprehensive Geotechnical Report including all test results, photographs detailed borehole logs and trial pit logs. The test results borehole and trial pit logs should be in accordance with the British Standards. Borehole logs and trial pit logs should show the ground levels based on the benchmark provided by BPML.

Percolation Test as per BS 6297, Clause 15.3.2

A. INTRODUCTION

- Dig pits (minimum) 2m x 2m x depth at which test is required (as per Engineer's recommendations).
- Dig out another small hole 300 x 300 square x 300mm deep at the bottom of the trial pit. Place 50mm thick gravel (14mm size) at the bottom of the test hole.
- Fill the 300 x 300 hole with water and allow it to seep away overnight taking care to avoid splashing and clogging of the side walls.
- The test is performed in the 300 x 300 hole the next day as described below.
- Water level observations can be made using a dip stick as indicated in Figure 1 below.
- Precautions: Take care when making the test to avoid abnormal weather conditions, such as heavy rain and severe drought. Carry out the test at least three times and take the average figure.

B. AIM OF TEST

Observe the **time** in seconds for the water to seep away completely from a depth of at least 250mm.

C. METHODOLOGY

1. The percolation test consists of carrying out the **measurements*** 3 times in the same trial pit.

Results obtained are tabulated as follows:

Trial Pit A

Test No.	Time	Depth measured on top of water surface mm	Vp for Test No. 1 = T s= V1 s/mm 250mm
1	0	0	
	T1=	250	
2	0	0	
	T2=	250	
3	0	0	
	T3=	250	

* Note: a measurement time taken for 250mm of water to seep away completely.

Test No. 2 = $V_p = V_2$ s/mm

Test No. 3 = $V_p = V_3$ s/mm

Average V_p for Trial Pit A = $\frac{V_1 + V_2 + V_3}{3}$

= V_A s/mm

D. CONDITIONS TO BE OBSERVED

1. Trial Pit A

Test No. 1 = V_1 s/mm

Test No. 2 = V_2 s/mm

Test No. 3 = V_3 s/mm

Average = V_A s/mm

50% = $\frac{V_A}{2}$

2. Conditions

2(a) If V_1, V_2 and $V_3 > V_A + \frac{V_A}{2}$

or

2(b) V_1, V_2 and $V_3 < V_A - \frac{V_A}{2}$

then make a further 3 measurements and calculate further average.

3. However, if average V_p obtained is less or equal to 24 s/mm no further tests in the already tested trial pit are needed and by-pass Conditions 2.

4. Tests should be done on a minimum of three different location on the route of the land drain or at least three tests on separate days on the site proposed for a soakaway or leaching field.

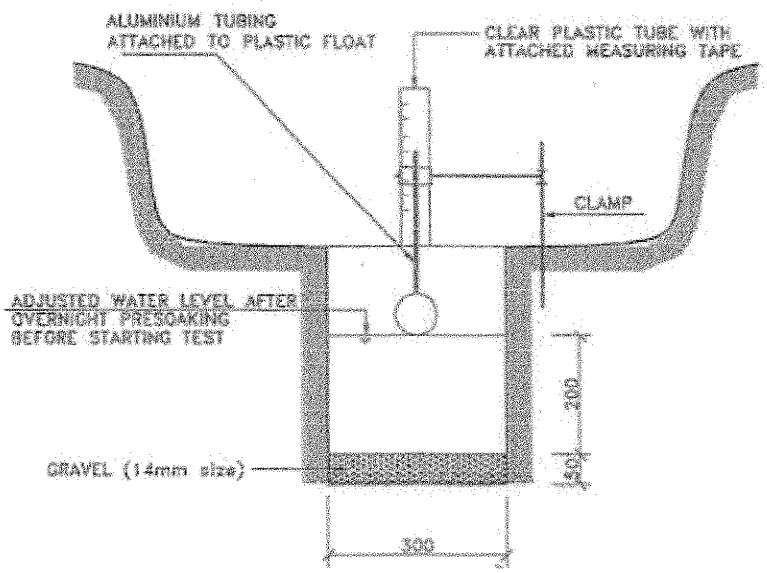
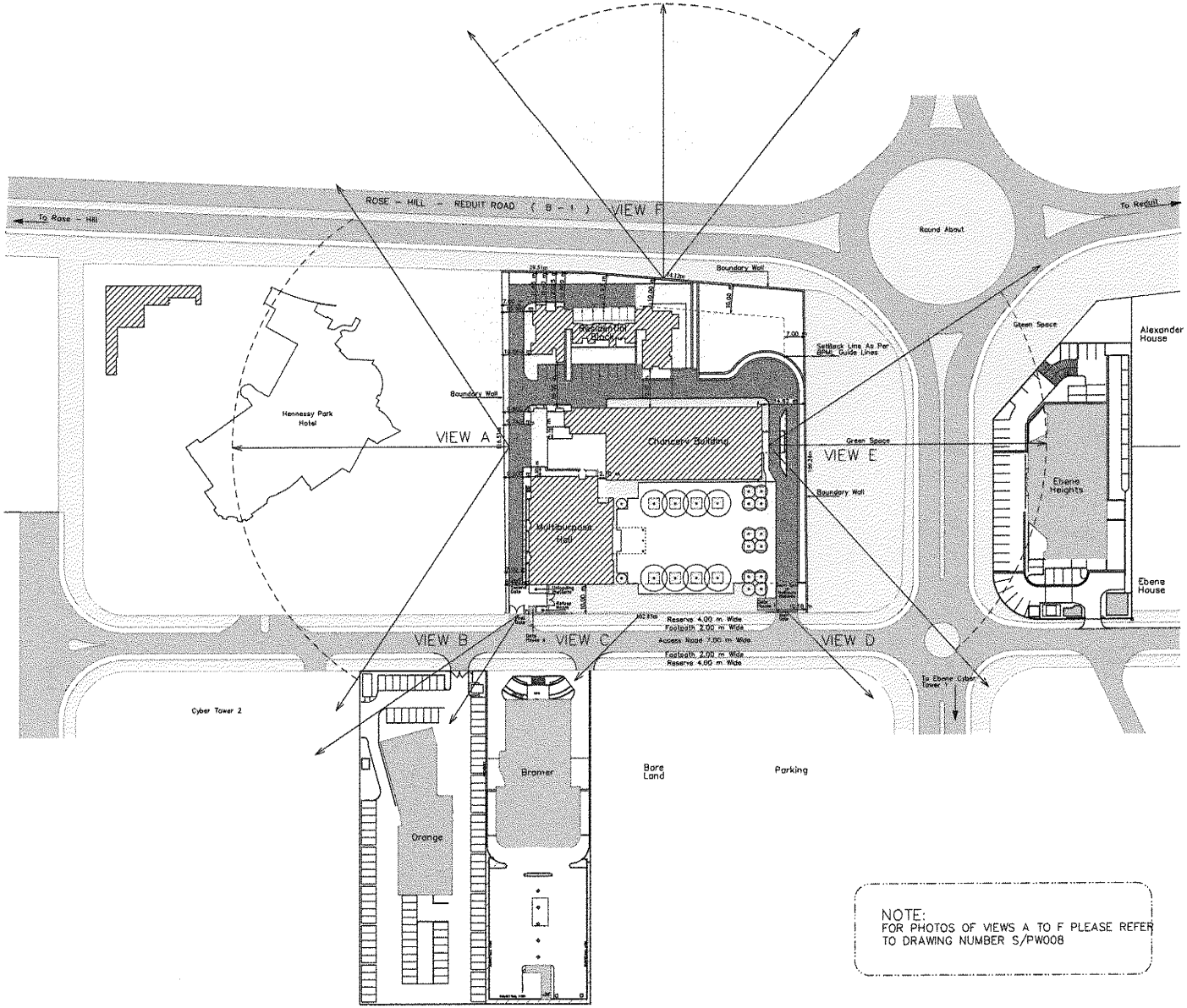


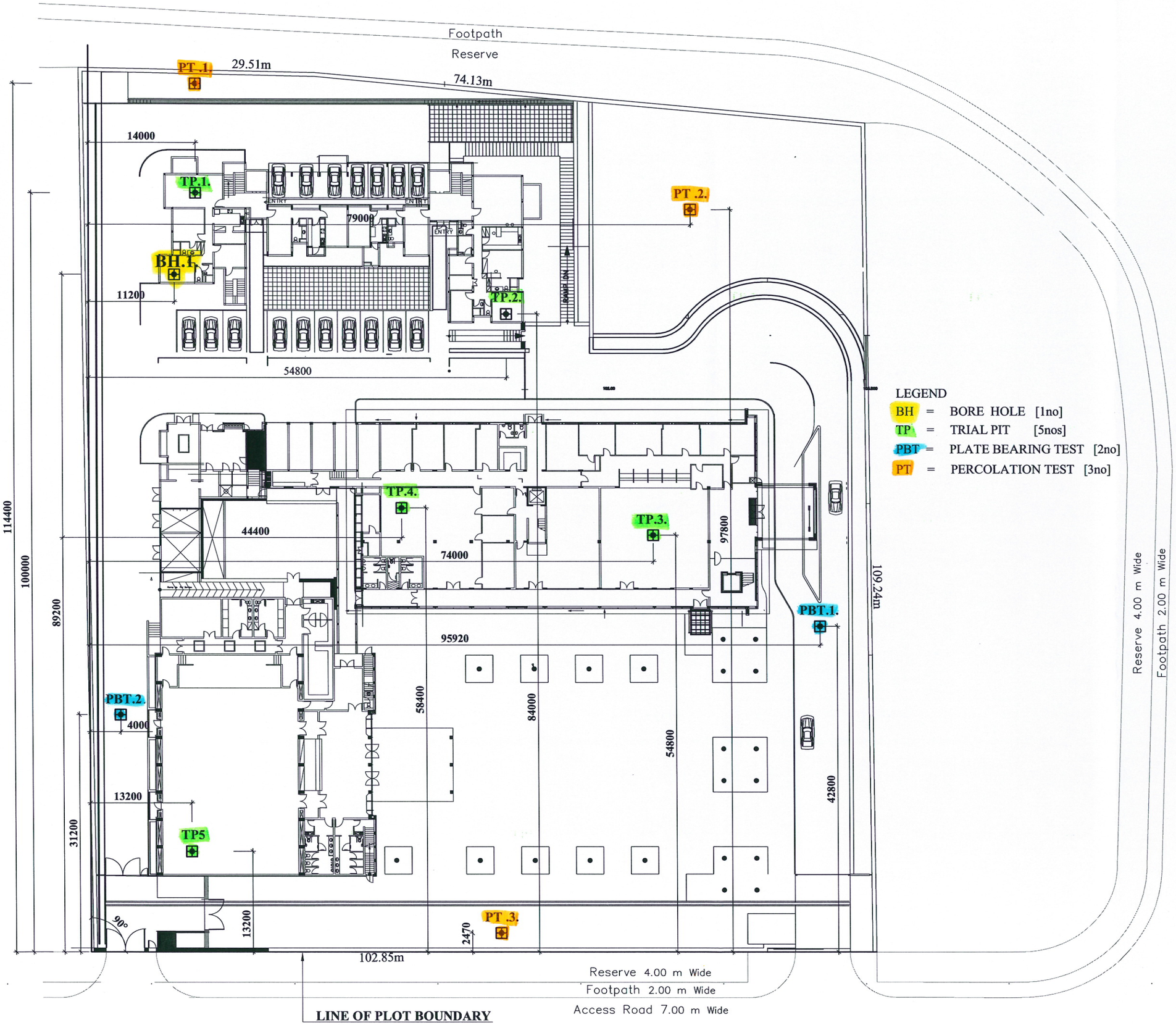
Figure 1 : Percolation Test Set Up

DRAWINGS



NOTE:
FOR PHOTOS OF VIEWS A TO F PLEASE REFER TO DRAWING NUMBER S/PW008

ZAC Associates Ltd	HIGH COMMISSION OF INDIA – CHANCERY AND STAFF RESIDENCES AT MAURITIUS	LOCATION PLAN		SEP 2012	1 : 1000 02



LEGEND

BH = BORE HOLE [1no]
TP = TRIAL PIT [5nos]
PBT = PLATE BEARING TEST [2no]
PT = PERCOLATION TEST [3no]

Rev.	Date	Issue

Rev.	By	Date	Description

NOTES :

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CLIENT: THE HIGH COMMISSION OF INDIA

PROJECT: CHANCERY AND STAFF RESIDENCE AT EBENE

TITTLE: LOCATION FOR TRIAL PITS, BOREHOLE, PLATE BEARING AND PERCOLATION TESTS.

Drawn	H.LOUISON	Scale	1:500
Checked	RG	Date	JUNE 2013

Drawing Number 08-123-SK01

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