

***Foundations,
Excavation &
Shoring
Specialists***

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Foundations

***Excavation &
Shoring***

Slope Stability

Natural Hazards

***Pavement Design
and Management***

***Reinforced Soil
Walls and Slopes***

March 4, 2022

Our File: 21-9236

Via email: davidgarrioch@darchgroup.com

**Tenshi International Holding Ltd.
c/o Diamond Group Architecture Inc.**
Suite 410 – 119 West Pender Street
Vancouver, BC V6B 1S5

Attn: David Garrioch

Re: Preliminary Geotechnical Exploration - Factual Report
Proposed Multi-Family Residential Development
2090 SW Marine Drive, Vancouver, BC

1.0 INTRODUCTION

As requested, Braun Geotechnical Ltd. has carried out a geotechnical exploration for the above-referenced project site. The geotechnical work has been performed in general accordance with the terms and conditions of the Braun Geotechnical Fee Estimate dated October 6, 2021 (our reference no. P21-7656 R1). The scope of work included a subsurface exploration and provision of a factual report summarizing our findings.

Preliminary and detailed civil/architectural design drawings should be forwarded to Braun Geotechnical for review when available. Additionally, Braun Geotechnical should be provided the opportunity to prepare a preliminary Geotechnical Report based on the proposed development concept.

Sampling of soil and groundwater for environmental purposes was beyond the current scope of services.

2.0 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The subject site is located at 2090 SW Marine Drive, in the City of Vancouver, BC. The site is bounded by SW Marine Drive to the east, a residential property to the south, and City of Vancouver property to the west and north. The site is irregularly shaped, with overall dimensions of 50 m x 90 m. The majority of the site is flat-lying, with the exception of the western wedge-shaped portion, which steeply slopes to the west with gradients of up to 1.5H:1V. Existing onsite grades range from approximately El. 11 m to 25 m.

It is understood that the proposed development would comprise a 4-storey high wood framed structure and associated amenity building over one level of below-grade parking.

At the time of exploration, a single-family dwelling (SFD) occupied the site, with an in-ground swimming pool, a small shed, an asphalt paved driveway, and associated grass-covered and landscaped/cultivated areas covering the remainder of the site.

3.0 DESK STUDY INFORMATION

A review of government air photos available for each decade dating back to 1938 was carried out, and the following was noted on or in the immediate vicinity of the site:

- An air photo from 1938 shows what is inferred to be the current SFD and garage in the on the subject site.
- Air photos from 1949 to 1969 do not show significant change over the subject site, except maturation of onsite trees.
- An air photo from 1973 shows light tones inferred to be a possible slope failure or ground disturbance in the area immediately to the north of the existing SFD. The slide appears to have released onto city property adjacent and to the north of the property, and downslope to the west (Arbutus Street ROW).
- A subsequent airphoto from 1978 shows that the slide area has been filled and covered with lawn, inferred by darker tones.
- Subsequent airphotos and Google Earth imagery to the present show little change of the subject site, and no other observed onsite slope movement.

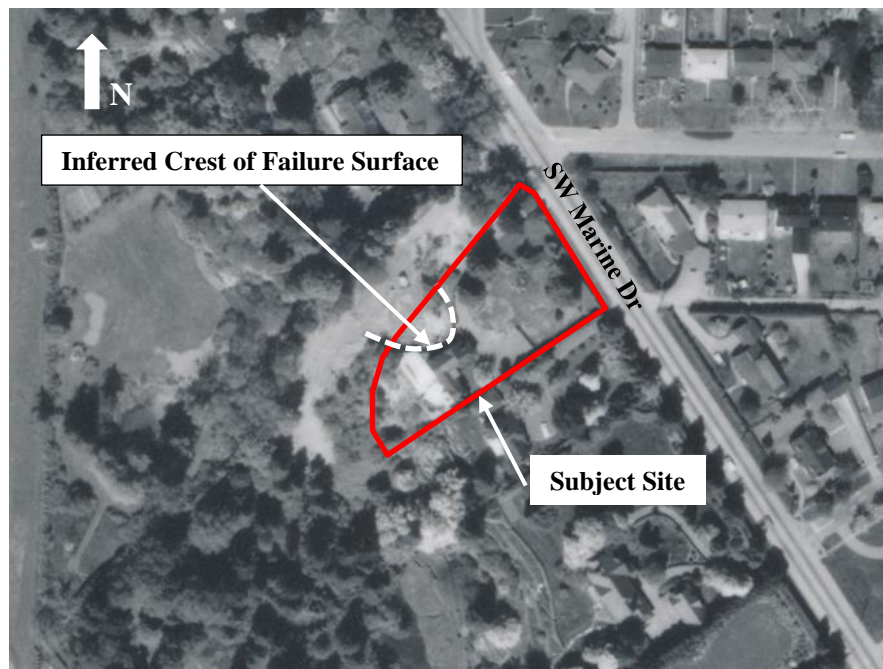


Figure 1: 1973 air photo showing inferred slide area

Braun Geotechnical has submitted a Freedom of Information (FOI) request to the City of Vancouver for any information regarding the possible slope failure/ground disturbance observed on air photos from 1973. At the time of writing, the FOI request has not been fulfilled.

4.0 SITE EXPLORATION & WALKOVER

On October 19, 2021, a track-mounted solid stem auger drill under subcontract to Braun Geotechnical was mobilized to the site. Six test holes (TH21-01 to TH21-06) were advanced to depths of 6.1 m to 9.1 m within accessible areas of the site. Dynamic Cone Penetration Tests (DCPTs) were conducted adjacent to each test hole except TH21-03 to depths of 0.6 m to 6.8 m. Local experience indicates that the DCPT results can be approximately correlated with Standard Penetration Test (SPT) N-values. Subsurface conditions were logged in the field by an engineer

from Braun Geotechnical. Representative disturbed soil samples were returned to our laboratory for routine moisture content testing and visual classification.

In addition to the test holes, one standpipe piezometer (PZ21-01) was installed to a depth of 5.9 m adjacent to test hole TH21-05.

Approximate test locations are shown on the attached Location Plan (Dwg. no. 21-9236-01).

Additional information obtained from the City of Vancouver records (outstanding FOI request) may determine that additional site walkover review and exploration are warranted.

5.0 SOIL AND GROUNDWATER CONDITIONS

5.1 Soil Conditions

A review of available published and in-house geological information indicated that the subject site is underlain by Capilano Sediments (Cb) comprised of raised beach medium to coarse sand up to 5 m thick.

The findings of the test hole exploration were generally consistent with the regional geological information. The findings of the test hole exploration are detailed on the attached test hole logs and should be used in preference to the generalized descriptions provided below. A generalized subsoil profile based on the test hole logs is provided below.

TOPSOIL / FILL

Dark-brown, moist, loose silty SAND with some organics and occasional rootlets (TOPSOIL) was encountered within test holes T21-01, -02, -04, and -06 to depths of 0.3 m to 0.5 m.

Grey to brown, damp, loose to compact SAND & GRAVEL with a trace to some silt (FILL) was encountered within TH21-03 to a depth of 0.5 m.

Dark brown to brown to grey, moist to wet, loose to compact SAND with some silt to silty, some gravel, a trace to some organics, trace of construction debris, and occasional cobbles (FILL) was encountered within test holes TH21-04, -05, and -06 to depths of 3.0 m to 7.6 m. This zone transitioned into dense to very dense silty SAND & GRAVEL (FILL) within TH21-06 below a depth of 6.4 m.

SAND

Rust-brown to grey-brown, moist, loose to compact SAND with a trace to some silt, and a trace of gravel was encountered within TH21-01, -02, and -03 to depths of 0.4 m to 1.1 m.

SILT

Grey to grey-brown, occasionally rust-mottled, moist, firm to stiff SILT with trace sand to sandy and some clay was encountered below within TH21-01 to a depth of 1.2 m. The top 0.2 m of this unit was firm becoming stiff to very stiff with increasing depth.

SAND

Grey to grey-brown, occasionally rust-mottled, moist, compact to very dense SAND with trace to silty, trace gravel, and trace cobbles was encountered below within all test holes except TH21-06, and all terminated within this zone. The upper 0.1 m of the sand was compact becoming dense to very dense with increasing depth.

SILT

Grey, moist, very stiff SILT with some sand was encountered below the fill material within TH21-06 to a depth of 9.1 m.

5.2 Groundwater Levels

Groundwater seepage was encountered within test holes TH21-05 and TH21-06 between depths of approximately 3.4 m and 5.2 m bgs at the time of exploration. Note that groundwater levels measured during drilling or shortly thereafter are typically influenced by the disturbance caused during drilling.

A standpipe piezometer was installed adjacent to TH21-05 to a depth of approximately 5.9 m (19.5 ft) to monitor groundwater levels. A semi-static water level was measured at approximately 3.6 m bgs on November 5, 2021.

Groundwater levels and near-surface run-off flows are expected to fluctuate seasonally and with drainage conditions.

The subsurface and groundwater conditions described above were encountered at the test hole locations only. Subsurface conditions at other locations could vary.

6.0 CLOSURE

This factual report should be considered preliminary. Pending the results of the FOI request to the City of Vancouver and our site walkover, a geotechnical design report would be issued at a later date. The geotechnical report would include geotechnical comments and recommendations for site preparation and foundation design.

This factual report was prepared for the exclusive use of Tenshi International Holding Ltd c/o Diamond Group Architecture Inc. and their designated representatives and may not be used by other parties without the written permission of Braun Geotechnical Ltd. The City of Vancouver may also rely on the findings of this report.

The use of this factual report is subject to the conditions on the attached Report Interpretation and Limitations sheet. The reader's attention is drawn specifically to those conditions, as it is considered essential that they be followed for proper use and interpretation of this report.

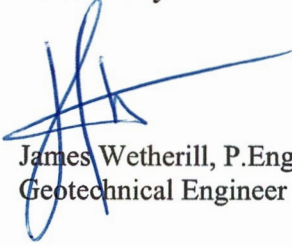
We hope the above meets with your requirements. Should any questions arise, please do not hesitate to contact the undersigned.

Yours truly,

Braun Geotechnical Ltd.

Reviewed by:

Silas Neels, EIT
Geotechnical Engineer


James Wetherill, P.Eng.
Geotechnical Engineer



Gunther Yip, P.Eng.
Geotechnical Engineer



Enclosures: Report Interpretation and Limitations
Location Plan
Test Hole Logs (4)

X:\2021 Projects\21-9236 Multi-Family Development - 2090 SW Marine Drive, Vancouver,
BC\Report\21-9236 Geotechnical Report 2022-03-04 (factual report).docx

REPORT INTERPRETATION AND LIMITATIONS

1. STANDARD OF CARE

Braun Geotechnical Ltd. (Braun) has prepared this report in a manner consistent with generally accepted engineering consulting practices in this area, subject to the time and physical constraints applicable. No other warranty, expressed or implied, is made.

2. COMPLETENESS OF THIS REPORT

This Report represents a summary of paper, electronic and other documents, records, data and files and is not intended to stand alone without reference to the instructions given to Braun by the Client, communications between Braun and the Client, and/or to any other reports, writings, proposals or documents prepared by Braun for the Client relating to the specific site described herein.

This report is intended to be used and quoted in its entirety. Any references to this report must include the whole of the report and any appendices or supporting material. Braun cannot be responsible for use by any party of portions of this report without reference to the entire report.

3. BASIS OF THIS REPORT

This report has been prepared for the specific site, development, design objective, and purpose described to Braun by the Client or the Client's Representatives or Consultants. The applicability and reliability of any of the factual data, findings, recommendations or opinions expressed in this document pertain to a specific project as described in this report and are not applicable to any other project or site, and are valid only to the extent that there has been no material alteration to or variation from any of the descriptions provided to Braun. Braun cannot be responsible for use of this report, or portions thereof, unless we were specifically requested by the Client to review and revise the Report in light of any alterations or variations to the project description provided by the Client.

If the project does not commence within 18 months of the report date, the report may become invalid and further review may be required.

The recommendations of this report should only be used for design. The extent of exploration including number of test pits or test holes necessary to thoroughly investigate the site for conditions that may affect construction costs will generally be greater than that required for design purposes. Contractors should rely upon their own explorations and interpretation of the factual data provided for costing purposes, equipment requirements, construction techniques, or to establish project schedule.

The information provided in this report is based on limited exploration, for a specific project scope. Braun cannot accept responsibility for independent conclusions, interpretations, interpolations or decisions by the Client or others based on information contained in this Report. This restriction of liability includes decisions made to purchase or sell land.

4. USE OF THIS REPORT

The contents of this report, including plans, data, drawings and all other documents including electronic and hard copies remain the copyright property of Braun Geotechnical Ltd. However, we will consider any reasonable request by the Client to approve the use of this report by other parties as "Approved Users." With regard to the duplication and distribution of this Report or its contents, we authorize only the Client and Approved Users to make copies of the Report only in such quantities as are reasonably necessary for the use of this Report by those parties. The Client and "Approved Users" may not give, lend, sell or otherwise make this Report or any portion thereof available to any other party without express written permission from Braun. Any use which a third party makes of this Report – in its entirety or portions thereof – is the sole responsibility of such third parties. BRAUN GEOTECHNICAL LTD. ACCEPTS NO RESPONSIBILITY FOR DAMAGES SUFFERED BY ANY PARTY RESULTING FROM THE UNAUTHORIZED USE OF THIS REPORT.

Electronic media is susceptible to unauthorized modification or unintended alteration, and the Client should not rely on electronic versions of reports or other documents. All documents should be obtained directly from Braun.

5. INTERPRETATION OF THIS REPORT

Classification and identification of soils and rock and other geological units, including groundwater conditions have been based on exploration(s) performed in accordance with the standards set out in Paragraph 1. These tasks are judgemental in nature; despite comprehensive sampling and testing programs properly performed by experienced personnel with the appropriate equipment, some conditions may elude detection. As such, all explorations involve an inherent risk that some conditions will not be detected.

Further, all documents or records summarizing such exploration will be based on assumptions of what exists between the actual points sampled at the time of the site exploration. Actual conditions may vary

significantly between the points investigated and all persons making use of such documents or records should be aware of and accept this risk.

The Client and "Approved Users" accept that subsurface conditions may change with time and this report only represents the soil conditions encountered at the time of exploration and/or review. Soil and ground water conditions may change due to construction activity on the site or on adjacent sites, and also from other causes, including climactic conditions.

The exploration and review provided in this report were for geotechnical purposes only. Environmental aspects of soil and groundwater have not been included in the exploration or review, or addressed in any other way.

The exploration and Report is based on information provided by the Client or the Client's Consultants, and conditions observed at the time of our site reconnaissance or exploration. Braun has relied in good faith upon all information provided. Accordingly, Braun cannot accept responsibility for inaccuracies, misstatements, omissions, or deficiencies in this Report resulting from misstatements, omissions, misrepresentations or fraudulent acts of persons or sources providing this information.

6. DESIGN AND CONSTRUCTION REVIEW

This report assumes that Braun will be retained to work and coordinate design and construction with other Design Professionals and the Contractor. Further, it is assumed that Braun will be retained to provide field reviews during construction to confirm adherence to building code guidelines and generally accepted engineering practices, and the recommendations provided in this report. Field services recommended for the project represent the minimum necessary to confirm that the work is being carried out in general conformance with Braun's recommendations and generally accepted engineering standards. It is the Client's or the Client's Contractor's responsibility to provide timely notice to Braun to carry out site reviews. The Client acknowledges that unsatisfactory or unsafe conditions may be missed by intermittent site reviews by Braun. Accordingly, it is the Client's or Client's Contractor's responsibility to inform Braun of any such conditions.

Work that is covered prior to review by Braun may have to be re-exposed at considerable cost to the Client. Review of all Geotechnical aspects of the project are required for submittal of unconditional Letters of Assurance to regulatory authorities. The site reviews are not carried out for the benefit of the Contractor(s) and therefore do not in any way effect the Contractor(s) obligations to perform under the terms of his/her Contract.

7. SAMPLE DISPOSAL

Braun will dispose of all samples 3 months after issuance of this report, or after a longer period of time at the Client's expense if requested by the Client. All contaminated samples remain the property of the Client and it will be the Client's responsibility to dispose of them properly.

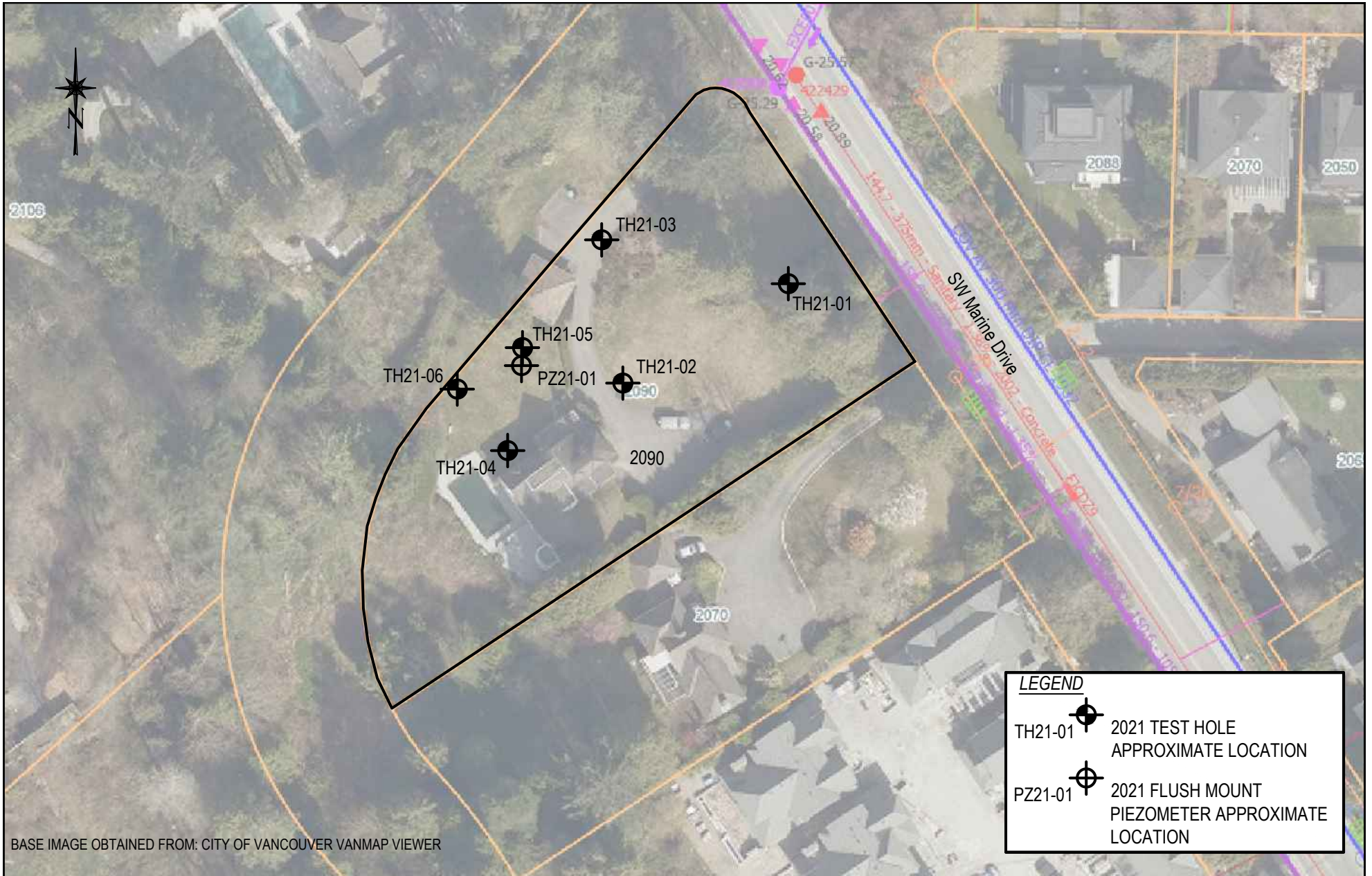
8. SUBCONSULTANTS AND CONTRACTORS

Engineering studies frequently requires hiring the services of individuals and companies with special expertise and/or services which Braun Geotechnical Ltd. does not provide. These services are arranged as a convenience to our Clients, for the Client's benefit. Accordingly, the Client agrees to hold the Company harmless and to indemnify and defend Braun Geotechnical Ltd. from and against all claims arising through such Subconsultants or Contractors as though the Client had retained those services directly. This includes responsibility for payment of services rendered and the pursuit of damages for errors, omissions or negligence by those parties in carrying out their work. These conditions apply to specialized subconsultants and the use of drilling, excavation and laboratory testing services, and any other Subconsultant or Contractor.


9. SITE SAFETY


Braun Geotechnical Ltd. assumes responsibility for site safety solely for the activities of our employees on the jobsite. The Client or any Contractors on the site will be responsible for their own personnel. The Client or his representatives, Contractors or others retain control of the site. It is the Client's or the Client's Contractors responsibility to inform Braun of conditions pertaining to the safety and security of the site – hazardous or otherwise – of which the Client or Contractor is aware.

Exploration or construction activities could uncover previously unknown hazardous conditions, materials, or substances that may result in the necessity to undertake emergency procedures to protect workers, the public or the environment. Additional work may be required that is outside of any previously established budget(s). The Client agrees to reimburse Braun for fees and expenses resulting from such discoveries. The Client acknowledges that some discoveries require that certain regulatory bodies be informed. The Client agrees that notification to such bodies by Braun Geotechnical Ltd. will not be a cause for either action or dispute.



LEGEND

TH21-01  2021 TEST HOLE APPROXIMATE LOCATION

PZ21-01  2021 FLUSH MOUNT PIEZOMETER APPROXIMATE LOCATION

BASE IMAGE OBTAINED FROM: CITY OF VANCOUVER VANMAP VIEWER



Client		Tenshi International Holding Ltd.			Title			LOCATION PLAN	
Project		Proposed Multifamily Development 2090 Marine Drive, Vancouver							
Project no.	21-9236	Drawn	Design	Checked	Date	Scale	Drawing no.		
		AP	SN	GY	October 7, 2021	1:750	21-9236-01		

Test Hole Log: TH21-01

File: 21-9236
 Project: Proposed Multifamily Development
 Client: Tenshi International Holding Ltd.
 Location: 2090 SW Marine Drive, Vancouver, BC



PTP# 1002594

Depth ft m	Thickness (mm)	Sample	Soil Description	Sample #	Water Cont.	DCPT (Blows per ft)							Remarks
						0	10	20	30	40	50	60	
0	0		GRASS OVER			0	10	20	30	40	50	60	
0		○	dark-brown, moist, loose silty SAND, some organics, occasional rootlets (TOPSOIL)	S1	21%	End of DCPT, Refusal @ 0.6m							
		○	rust-brown, moist, loose SAND, trace silt	S2	19%								
		○	grey, moist, firm sandy SILT	S3	25%								
1		○	grey-brown, occasionally rust-mottled, moist, stiff to very stiff SILT, some clay, trace sand	S4	30%								
5		○	grey-brown, occasionally rust-mottled, moist, dense SAND, some silt - trace gravel below 1.8m	S5	14%								
2		○		S6	12%								
10		○		S7	12%								
4		○		S8	10%								
15			- grey below 5.2m										
20			End of Test Hole @ 6.1m										
25													
30													
35													

Test Hole Log: TH21-02

File: 21-9236
 Project: Proposed Multifamily Development
 Client: Tenshi International Holding Ltd.
 Location: 2090 SW Marine Drive, Vancouver, BC



PTP# 1002594

Depth ft m	Thickness (mm)	Sample	Soil Description	Sample #	Water Cont.	DCPT (Blows per ft)		Remarks
						0	10 20 30 40 50 60	
0	0		GRASS OVER			0		
0		○	dark-brown, moist, loose silty SAND, some organics, occasional rootlets (TOPSOIL)	S1	16%	10		
1		○	grey-brown, moist, compact SAND, some silt, trace gravel	S2	15%	20		
5		○	grey-brown, occasionally rust-mottled, moist, dense silty SAND, trace gravel - grey below 1.5m	S3	13%	30		93
2		○		S4	10%	End of DCPT, Refusal @ 1.6m		25bl / 50mm - difficult drilling below 1.5m
4		○		S5	8%			
15		○	- trace to some silt, some gravel, trace cobbles below 4.6m	S6	11%			
20			End of Test Hole @ 6.1m					- Hole open to 5.2m

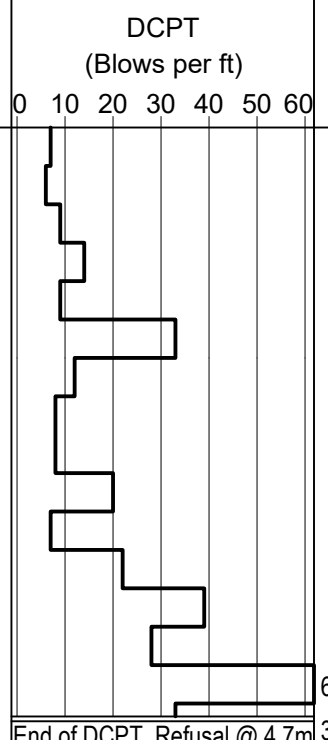
Test Hole Log: TH21-04

File: 21-9236
 Project: Proposed Multifamily Development
 Client: Tenshi International Holding Ltd.
 Location: 2090 SW Marine Drive, Vancouver, BC



PTP# 1002594

Depth ft m	Thickness (mm)	Sample	Soil Description	Sample #	Water Cont.	DCPT (Blows per ft)		Remarks
						0	10 20 30 40 50 60	
0	0		GRASS OVER					
0		○	brown, moist, loose silty SAND, some organics, occasional rootlets (FILL)	S1	14%			
1		○	dark-brown to grey, moist, loose to compact silty SAND, some gravel, trace construction debris, occasional cobbles (FILL)	S2	16%			
5								
2		○		S3	27%			
10								
4		○	grey-brown, moist, compact silty SAND - trace silt below 4.3m - dense to very dense below 4.6m	S4	13%			
15								
5		○		S5	14%			
20			End of Test Hole @ 6.1m					- Hole open to 5.0m
7								
25								
8								
30								
9								
10								
35								
11								



Test Hole Log: TH21-05

File: 21-9236
 Project: Proposed Multifamily Development
 Client: Tenshi International Holding Ltd.
 Location: 2090 SW Marine Drive, Vancouver, BC



PTP# 1002594

Depth ft m	Thickness (mm)	Sample	Soil Description	Sample #	Water Cont.	DCPT (Blows per ft)		Remarks
						0 10 20 30 40 50 60		
0	0		GRASS OVER					
0		○	dark-brown to brown, moist, loose SAND, some silt, some gravel, some organics (FILL)	S1	17%			1" PVC Standpipe Piezometer, 2.7m to 4.3m sealed with bentonite pellets
1		○	- grey-brown, silty below 1.0m	S2	20%			
2		○	- rust-brown @ 2.1m	S3	19%			
3		○		S4	22%			
3		○	grey, moist, dense to very dense fine SAND, trace silt	S5	17%		130	
4		○	- some silt to silty, trace gravel below 4.0m	S6	20%			
5		○		S7	11%			
6			End of Test Hole @ 6.1m					SAND to 4.3m SCREEN from 4.5m to 5.9m
								- minor seepage @ 5.2m

Test Hole Log: TH21-06

File: 21-9236
 Project: Proposed Multifamily Development
 Client: Tenshi International Holding Ltd.
 Location: 2090 SW Marine Drive, Vancouver, BC



PTP# 1002594

Depth ft m	Thickness (mm)	Sample	Soil Description	Sample #	Water Cont.	DCPT (Blows per ft)		Remarks
						0	10 20 30 40 50 60	
0	0		GRASS OVER					
0		○	brown, moist, loose silty SAND, some organics, occasional rootlets (FILL)	S1	21%			
1		○	dark-brown, moist, compact silty SAND, some gravel, trace organics, trace construction debris, occasional cobbles (FILL)	S2	18%			
2		○		S3	22%			
3		○		S4	24%			Water Level (at time of drilling)
4		○	- wet below 4.0m - rust-brown @ 4.1m	S5	19%			
5		○		S6	17%			
6		○	- dense to very dense silty SAND & GRAVEL below 6.4m	S7	19%			- Hydrocarbon odour 28bl / 100mm
7		○						
8		○	grey, moist, very stiff SILT, some sand					
9			End of Test Hole @ 9.1m					- Hole open to 3.7m
10								
11								