JECTH Consultants Inc.
Geotechnical & Environmental Engineers

GEOTECHNICAL ENGINEERING REVIEW & ASSESSMENT
PROPOSED TOWNHOUSE DEVELOPMENT

AT

2222 CLARKE STREET
PORT MOODY, BC

FOR

NU-GEN PROJECTS LTD.

PREPARED BY

JECTH CONSULTANTS INC.

JOB NO.: 218N551

DATE: JULY 14, 2018

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

JECTH Consultants Inc.
Geotechnical & Environmental Engineers

Client: Nu-Gen Projects Ltd.
Date: July 14, 2018
Our File No.: 218N551

GEOTECHNICAL REPORT REVIEW & ASSESSMENT
PROPOSED TOWNHOUSE DEVELOPMENT
2222 CLARKE STREET, PORT MOODY, BC

1.0 INTRODUCTION

1.1 AUTHORIZATION

Further to the authorization from Nu-Gen Projects Ltd. on July 3, 2018, as requested, JECTH Consultants Inc. (JCI) had carried out a Geotechnical Review and Assessment Report, based on the latest Architectural plan, for the proposed Townhouse development at 2222 Clarke Street, Port Moody, BC (see Figure 1 - Site Location Plan)

1.2 METHODOLOGY

The Geotechnical Review and Assessment includes:

- Reviewed the Surficial Geological Map from The Geological Survey of Canada (see Figure 2 – Geological Map)
- Reviewed available aerial photo for Port Moody (see Figure 3 – Aerial Photo).
- Evaluate anticipated subsurface soil conditions on site and from our previous experience in the near vicinity
- Conducted a site reconnaissance by our site staff at the subject site and surroundings
- Conducted subsurface investigation by Auger Drilling and DCPT Probing on March 7, 2018
- Assessed the available subsurface soil conditions and profile based on previous experience as well as our local experience within the close vicinity of the subject site (Figure 1A)
- Utilized our previous experience with similar projects.
- Communicated with Architect, Designers, owner representatives and/or construction team members, as required.

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

1.3 OBJECTIVE

This Geotechnical Report summarizes our findings and provides Geotechnical Engineering Comments and Recommendations for the foundation design and construction of the proposed Townhouse

development based on the latest Architectural Plan as required by BC Building Code (2012).

1.4 DESIGN DRAWING

Architectural Plan dated July 2018 prepared by DF Architecture for the Construction of a 3 storey building with a total of 12 units Townhouses including a common underground basement parking. Any further update of the Architectural Plan which may affect the Geotechnical recommendations in this report must be notified to JCI, as such this report can further be updated if required.

2.0 PREVIOUS GEOTECHNICAL ENGINEERING EXPERIENCE

JCI is a firm specializing in Geotechnical Engineering including foundation investigation and design, and design of temporary excavation shoring and underpinning systems. JCI staff members have extensive knowledge and experience in Geotechnical Engineering design and construction for Industrial, Commercial, Institutional, and Residential Project.

JCI's staffs have been retained as Geotechnical Engineer Consultant since 1978. In fact, JCI was retained as Geotechnical Engineer for similar nature near the vicinity of the subject site. (see Figure 1A)

3.0 SITE CONDITIONS AND PROPOSED DEVELOPMENT

3.1 SITE CONDITION

The site is located along the north side of Clarke Street between Douglas Street (to the west) and Elgin Street (to the East), Port Moody, BC, and is bounded by residential properties to the east and west as well as Vintner Street to the north.

The site is rectangular in shape, with approximate dimensions of about 66 ft. ± (east-west) by 132 ft. ± (north-south).

In general, the site slopes down from the South to the North from Clarke Street at about EL. 44.95 ft. ± (EL. 13.7 m. ±) to the northwest corner of the site at about EL. 32.80 ft. ± (EL. 10.0 m. ±) , with a total change in existing grade of about 13 ft. ± (average slope gradient of 10 % ±).

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

3.2 PROPOSED DEVELOPMENT

Based on the provided drawings dated June, 2018 by DF Architecture, the proposed development will include a 3 levels Townhouse complex with north and south buildings and one level of underground parking.

According to the design plan, the lowest level underground parking will have a slab elevation at EL. 10.46 m. and therefore general excavation for foundation construction will be at about elevation EL. 9.86 m. ±. Anticipated excavation along the south building perimeter will likely be up to about 3.5 m. ± for underground parking. For the north building perimeter, the depth of excavation will likely be up to about 1 m. ± for underground parking.

For the foundation excavation, it is anticipated that vertical shoring will be required due to minimal off-set distance for the north, east and west property lines to proposed building lines. Encroachment to the site perimeter properties will not be required if Temporary Excavation Shoring method of using Helical Piles Shoring is implemented.

4.0 FIELD WORK

4.1 SITE EXPLORATION

A subsurface soil field exploration was carried out at the subject site on March 7, 2018, to explore subsurface soil and groundwater condition. The exploration was consisted of:

- A total of two (2) Auger Drillholes, DH-1 and DH-2 were extended to a maximum depth of 30.0 ft. ± from existing site grade. (For obtaining subsurface soil profile and collecting subsurface Soil samples for laboratory testing).
- Two (2) Dynamic Cone Penetration Test (DCPT) probe holes to a maximum depth of 30.0 ft. ±. (For evaluating the density, compressibility and stiffness of subsurface soil encountered).

Both DCPT and auger drilling were carried out using a truck mounted drill rig. The approximate locations of the DCPT and auger drillholes are shown in Figure 3 – Aerial Photo.

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

4.2 SOIL LOGS AND LIMITATIONS

All field work was performed under the full-time supervision of our technical staff who selected the auger hole locations to provide overall site coverage with minimum disruption of the property; all drillholes are logged with samples collected for further identification and for laboratory test. Generally, observations of groundwater levels are at the auger stems obtained during drilling.

The DCPT tests use a dropping weight from a constant height to drive a cone and rod into the ground. The number of blows for each foot of penetration is recorded. It provides general penetration resistance versus depth. The above data was used to identify he inferred soil stratigraphy and to assess various engineering properties and parameters of the subsurface soil encountered.

Subsurface Soil Logs of the auger holes including moisture contents and graphical representations of DCPT data are shown in Appendix "A".

The auger-hole logs and observations indicate subsurface conditions only at the locations of the auger holes. The precision of the subsurface conditions indicated will depend on the methods used, sampling frequency, and uniformity of the subsurface conditions. The methods and sampling frequencies have been selected to meet the needs of this project within the constraints of the budget and schedule.

5.0 ANTICIPATED SUBSURFACE SOIL CONDITIONS

5.1 GEOLOGICAL MAP

According to the available Surficial Geological Survey map prepared by the Geological Survey of Canada, the subject site is located between (i) Capilano sediments which consist of raised marine, deltaic and fluvial raised marine beach, spit, bar, and lag veneer, poorly sorted sand to gravel (except in bar deposits) normally less than 1 m. thick but up to 8 m. thick, and (ii) postglacial and pleistocene which consists of marine shore and fluvial sand up to 8 m. thick.

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

5.2 PREVIOUS EXPERIENCE

According to our experience in the vicinity area, previous creeks and streams might be located at the vicinity of the subject site. It is, therefore, a possibility that debris wash out by stream such as tree trunks might be encountered at the subject site. If encountered, this debris must be excavated and removed from the foundation subgrade. Groundwater table is usually shallow and located at about 5 ft. ± below existing grade.

5.3 SUBSURFACE SOIL CONDITIONS BY SITE EXPLORATION

The following table summarizes the findings of the subsurface soil profile observed from the site exploration by the drilling records at the subject site:

Depth from Existing site Grade	Soil Description	Remark
0 to 2.0 ft. ± (4 ft. of Fill @ DH #2)	**FILL / Top Soil** Dark brown, loose, moist, Organic Soil, with coarse SAND and GRAVEL	Avg. DCPT=7
2.0 to 11 ft. ±	**Silty SAND and GRAVEL with Silt** Grey, medium loose to compact SAND and GRAVEL with SILT	Avg. DCPT=12 Min. 4
11 to 30 ft. ±	**Silty SAND and SAND (With Silt)** Grey with brownish stain, compact dense, wet, with some Gravel and Silt (Silt Pocket - encountered)	Avg. DCPT=25 Min. 7

Based on the Drillhole logs, the findings are confirmed to the prediction of geological map and our experience in vicinity area. A native soil composed of grey, medium loose compact, wet, rounded and medium to coarse Silty SAND and GRAVEL, SAND with some SILT.

Auger Drillhole Logs are enclosed in Appendix "A" – Drillhole Log for reference.

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

5.4 GROUNDWATER CONDITIONS

Based on the Drillhole logs – DH-1 and DH-2, the groundwater level generally is located below 3 to 5 ft. ± below the existing grade. During completion of drilling, the groundwater was measured by tape at about 3.5 ft ± depth at auger drillhole DH-1 location and about 5 ft. ± depth at auger drillholes DH-2.

6.0 CONVENTIONAL SHALLOW FOUNDATION

Convention shallow foundation system will be considered feasible with the following recommendations:

6.1 ALLOWABLE BEARING CAPACITY

Conventional shallow foundations such as stripped and pad footings is recommended to be found on the SAND and Gravel with SILT.

An Allowable Bearing Capacity of 1,500 psf for SLS design and Ultimate Bearing Capacity of 2,250 psf for ULS design can be implemented to the foundation design for footings.

The minimum footing size should be 24 in. for stripped footing and 36 in. for Pad footing. Perimeter footing should be located at least 18 in. below outside grade for confinement and frost protection.

6.2 POTENTIAL LONG-TERM SETTLEMENT

According to the anticipated subsurface soil profile and typical loading schedule of a 3-storey Townhouse at-grade building found on compact SAND and Gravel with SILT or Structural FILL restoring grade, the Potential long-term post-construction settlement is anticipated to be minimal (in the order of 1" total and 0.5" differential settlement across building span). To avoid differential settlement, concentrated load should be avoided and distribution of the building load should be as uniform as possible.

The above settlement analysis is based on assumed typical loading schedule for a typical 3 - Storey townhouse with a basement. Additional settlement assessment must be conducted by JCI to confirm the values when Structural Plan and detail loading schedules are available for review.

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

6.3 SEISMIC CONSIDERATION

6.3.1 SITE CLASS

The proposed development is located within Seismic Zone 4 of the National and B.C. Building Codes of Canada. It is recommended that the structure should be designed using site **Class D** for stiff soil for footing found on SAND and Gravel at vicinity depth of footing as recommended by the 2012 BC Building code.

6.3.2 SPECTRAL ACCELERATION

The design earthquake motions considered in BCBC 2012 has a 2% probability of exceedance in 50 years, or a return period of 2475 year. The BCBC 2012 recommends the use of Peak Ground Acceleration (PGA), Site Classification and the 5% damped spectral response acceleration value Sa (T) for interpretation of acceleration and velocity based site coefficients (Fa and Fv) in Structural Design.

The following tables are obtained from Seismic Hazard values for a **Class C** site by Natural Resource Canada for the subject site Area. (Latitude 49.2779° North, Longitude 122.8626° West) – Details see Appendix "B" – Seismic Design Criteria.

Sa (0.2)	**Sa (0.5)**	**Sa (1.0)**	**Sa (2.0)**	**PGA**
0.935 g	0.627 g	0.322 g	0.169 g	0.464 g

The above value may be used as a general reference for interpretation of **Class D** for stiff soil in 2012 Building Code Table 4.1.8.4 b and c to obtain Fa and Fv value appropriately for design purpose. Search result print out for the seismic hazard values is shown in Appendix "B" – Seismic Design Criteria.

A linear interpretation of Table 4.1.8.4 for Fa value and Table 4.1.8.4c under a PGA of 0.464 g. are presented as follows:

	Sa (0.2)	Sa (0.2)	Sa (0.2)
	0.75 g.	1.0 g.	0.935 g.
Fa	1.1	1.1	**1.1**

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

	Sa (1.0)	Sa (1.0)	Sa (1.0)
	0.3 g	0.4 g	0.322 g.
Fv	1.2	1.1	**1.18**

Based on the linear interpretation, of the obtained Fa and Fv respectively are **1.1** and **1.18** for **Class D** site.

6.3.3 LIQUEFACTION POTENTIAL

Subsurface soil liquefaction potential of the site is considered to be low and unlikely to occur due to the presence of non-liquefiable Sand and gravel at vicinity depth below footings.

6.3.4 SEISMIC BEARING CAPACITY

The Allowable Bearing Capacity can increase $^1/_3$ for seismic design under a short term seismic event.

7.0 LATERAL PRESSURE

7.1 STATIC DESIGN -BASEMENT WALL

For foundation wall (assume Rigid) of the proposed semi-basement, a triangle lateral earth pressure of $0.4\gamma H$ (lb/ft) as base of the triangular force distribution (γ: bulk density of soil; H: earth retaining wall height in ft.) should be used at the below grade structural wall under static design condition. Alternatively, a 24H equivalent rectangular lateral pressure can be applied with resultant force locate at $^1/_3$ height of wall.

7.2 SEISMIC DESIGN – BASEMENT WALL

Under seismic design conditions, foundation walls should be designed for an additional horizontal invert triangular dynamic pressure ($Ka\gamma H$). It is recommended to use the active earth pressure coefficient (Ka = 0.3) since the building and surrounding soil will be moved together in seismic condition and not as rigid in the static case. A total, 40H equivalent rectangular lateral pressure can be applied in seismic design condition with result locate at ½ height of wall.

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

7.3 HYDROSTATIC DESIGN

It is assumed that drain conditions will be applied to the underground parking basement wall at the subject site by provision of granular backfill and foundation drainage. As such, hydrostatic pressure will not be required to implement into the design. Also, foundation perimeter drainage system must be implemented to the foundation system of all basement walls.

8.0 FOUNDATION SUBGRADE PREPARATION

8.1 TEMPORARY DE-WATERING

Perch groundwater seepage will likely encounter during foundation excavation for removal of the poorly graded SAND and Gravel with Silt Pocket. Quantity of groundwater removal should not be substantial as perched water can be dried out in the process. It is estimated that temporary de-watering can be achieved by 1 or 2 nos. of construction sump pump.

All seepage water must be collected and removed by pumping during construction stage. Temporary de-watering the site can be achieved by intermediate stages as excavation advancing. Water removed from the excavation will require to divert into a temporary sump protected with gravel, and subsequently filtered by sediment trap or sedimentation tank before discharge into public storm water system.

The requirement of sedimentation control is outside the scope of this report. JCI can provide a sedimentation control upon the request by the owner's representative.

8.2 FOUNDATION SUBGRADE PROTECTION

The native foundation subgrade of native Sand and gravel can be disturbed by moisture and construction traffic. It is, therefore, recommended that the exposed subgrade surface must be protected by a minimum of 4 to 6 in. thick of ¾ in. minus clear crushed gravel for protection against moisture and construction traffic.

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

9.0 FOUNDATION DRAINAGE SYSTEM

9.1 SITE RECONNAISSANCE

According to the available information, the site is within a sloping topography. It is anticipated that both surface and subsurface runoff might migrate to the Foundation System of the proposed building.

9.2 GROUNDWATER CONDITION IN LONG TERM

Since part of the site at South property line will likely excavate into the SAND and Gravel water bearing soil stratum, groundwater will likely draw down by foundation drainage locally near basement wall.

9.3 SUBSURFACE DRAINAGE

Foundation drainage will be required for the common underground parking floor to protect the foundation as well as to prevent moisture migrates to the underground parking floor slab. A perimeter drainage system is recommended at approximate footing level along the exterior basement wall.

The perimeter drainage system consists of a 6 in. diameter Perforated PVC pipe (with a minimum 2 in. of crushed gravel bedding) and protect with minimum 6 in. of crushed gravel around the pipe. The drain pipe must be connected to the City's storm drainage system by gravity fall. In the case that connection to the City's storm system is located higher than the foundation drainage system, sump pump design will be required by Mechanical Engineer.

Underslab Drainage system will be required if excessive groundwater is encountered at the subject site. This will be confirmed during site review and inspection. The amount of seepage will be estimated during construction for underslab drainage design (if required).

All finished site grade around the building perimeter must be sloped down and away from the proposed building perimeter footprint as such run-off water can flow away from building. This will avoid excessive surface water to migrate to foundation drainage system.

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

10.0 SLAB-ON-GRADE

For the Slab-On-Grade for underground parking floor, Underslab FILL will be required. Prior to placement of Underslab FILL, all unsuitable soil (Silt pocket, if any) or construction debris should be removed from the base of the excavation. Underslab FILL must consist of a minimum of 6 in. thick of Sand and Gravel which must compact to a minimum of 100 % of Standard Proctor Maximum Dry Density laboratory and field density test must be conducted by Certificated Testing Company.

Polyethylene sheet (Poly sheet) must be provided to minimize moisture migration to the parking floor slab.

11.0 STRUCTURAL FILL

Structural FILL, if required to restore foundation grade due to over excavation or removal of unsuitable soil, must consist of pit run Sand and Gravel with less than 5% silt (or material approved by Geotechnical Engineer in record) placed and compacted to a minimum of 100% of Standard Proctor Maximum Dry Density.

Structural FILL must be placed in maximum 12 in. loose lifts. Prior to placement of the Structural FILL, all topsoil, organic, random FILL, and other unsuitable material etc. should be removed.

A density-testing program must be carried out by certified laboratory and JCI will review the result to ensure that compaction requirements are satisfied. **The native Silty soil excavated during foundation construction will not be suitable as Structural FILL.**

12.0 TEMPORARY SHORING AND EXCAVATION

Excavation for the proposed underground parking will involve possible vertical shoring along all site perimeters except at the north site perimeter. It is anticipated that up to maximum excavation depth of 12 ft. ± will be excavated in the Silty SAND and Gravel with Silt.

Open excavation, if applicable, should have temporary excavation slope not steeper than with 1.5H:1V at the Silty SAND and Gravel and the underlain compact Silty SAND and SAND.

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

As reviewed with the owner representative and the construction team, it is understood that the temporary Vertical Shoring with non-encroachment Helical Pile method will be implemented along the site perimeters.

Details of the temporary shoring and excavation is beyond the scope of this report. JCI will prepare the Excavation and Shoring Drawing if requested.

13.0 BURIED UTILITIES

Excavations for newly installed utilities such as storm and sanitary sewer, telephone line, gas line and electrical cable etc., will likely encounter poorly graded SAND and Gravel near ground surface. Excavation side slopes must be sloped back no steeper than 1.5H:1V or suitable trench shields should be provided for protection of the workmen in the trench.

Backfill for utility trenches should consist of clean, well-graded sand and gravel compacted to at least 100 % of its Standard Proctor Maximum Dry Density.

Utilities should stay away from a 1H:1V stress zone if install below footing elevation of near-by footing to avoid undermine of adjacent foundation footing. This is to avoid disturbance and de-stabilize the footing in long term.

14.0 GEOTECHNICAL ENGINEERING FIELD REVIEW

JCI will provide Field Review (Geotechnical Engineering) according to the 2012 BC Building Code and Letter of Assurance (Schedule "B" –BCBC 2012). A Standard Geotechnical Field Inspection Requirement is attached in Appendix "C" as a guideline for Field Review. In addition, Work Safe requirements will be followed for temporary excavation requirements.

The following general field reviews (Require 48-hour notification) are required prior to and during construction stage:

- Temporary Excavation and stability at proposed site perimeter area.
- Shoring stability review on site
- Work Safe Inspection for excavation as required by the City
- Foundation Bearing Capacity (confirmation and Certification)
- Temporary Dewatering (Perched water occur between different type of soil and temp sedimentation control)
- Compaction of Structural FILL (FILL under Building Foundation and proposed roadway)

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

- Compaction of Underslab FILL (FILL under Slab and Driveway pavement)
- Perimeter backfill (Material requirements, compaction and Drainage)
- Others site specified as specified in BC Building Code
- Unforeseen subsurface soil and groundwater conditions as encountered prior to, during and after construction stage.
- Other Geotechnical Related Issues.

Other Geotechnical Engineering technical requirements and in-situ testing will be performed by certified laboratory/testing company and will be reviewed by JCI during construction stage.

Specific Site Geotechnical Engineering and/or other geotechnical related issues must be addressed by JCI prior to and during construction stage.

15.0 FINAL FOUNDATION DESIGN REVIEW

JCI should be given an opportunity to review.

1. The detail and final Architectural, Structural Engineering Drawing must be reviewed by JCI prior to Building Permit Application such that the above comments and recommendations can be confirmed and modified.

2. Any other Electrical and Mechanical as well as Civil Engineering and Landscape Architect Drawings, which will likely affect the foundation design and construction, must be reviewed and approved by JCI.

3. A consultant coordination meeting must be arranged prior to Building Permit Application or prior to construction start such that all design team members can confirm all design parameters for the project.

4. JCI will review the exposed subsurface soil and groundwater conditions prior to and during construction stage. It is possible that the Geotechnical recommendations provided in this report be modified due to unforeseen circumstances and change in subsurface soil as well as groundwater condition.

This will allow JCI to confirm the comments and recommendations in this report.

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

16.0 FIELD INSPECTIONS AND PRE-CONSTRUCTION MEETING

A pre-construction meeting must be organized between the site superintendent/contractor representatives and JCI at a minimum of two weeks before **any site construction activities**. A list of inspection requirement is shown in Appendix "C" – Standard Field Inspection Requirements.

JCI must be notified (24 hours) of all fieldwork **prior to any site work** in particular before site clearing, stripping and preparation. This will allow JCI to provide final comments for the project with respect to Geotechnical Engineering.

17.0 CLOSURE

We trust that this report should satisfy the immediate requirements. If you have any questions, please contact the undersigned at (604) 299-6617.

JECTH Consultants Inc.

Harrison Mak, M.Eng. P.Eng.

July 19, 2018

Attachments:

List of Figures

Figure 1 – Site Location Plan
Figure 1A – Previous Project Location Plan
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List of Appendixes

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Appendix "B" – Seismic Design Criteria
Appendix "C" – Standard Field Inspection Requirements

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.cc
Web: www.jecth.com

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FIGURES

PROPOSED TOWNHOUSE DEVELOPMENT
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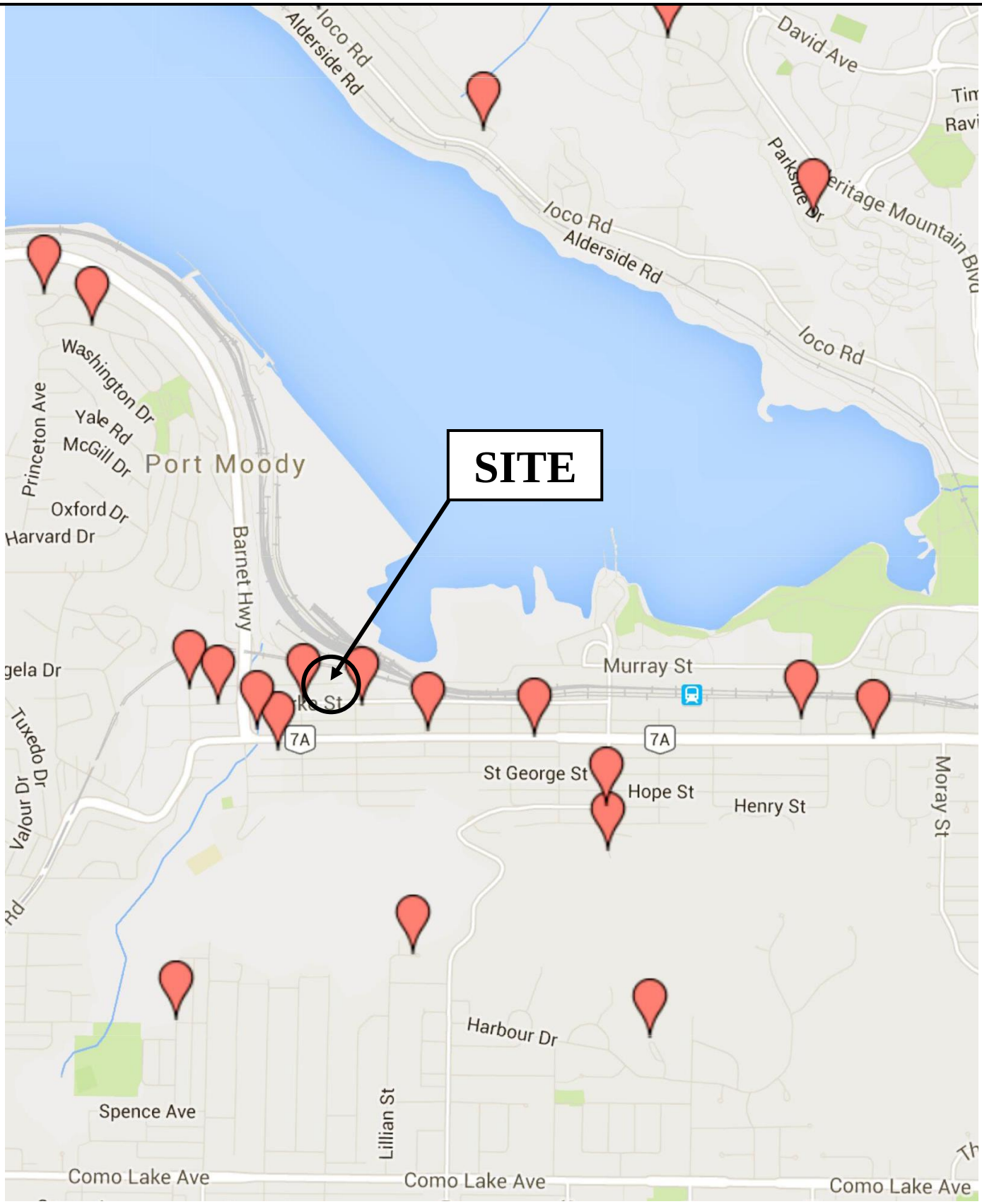
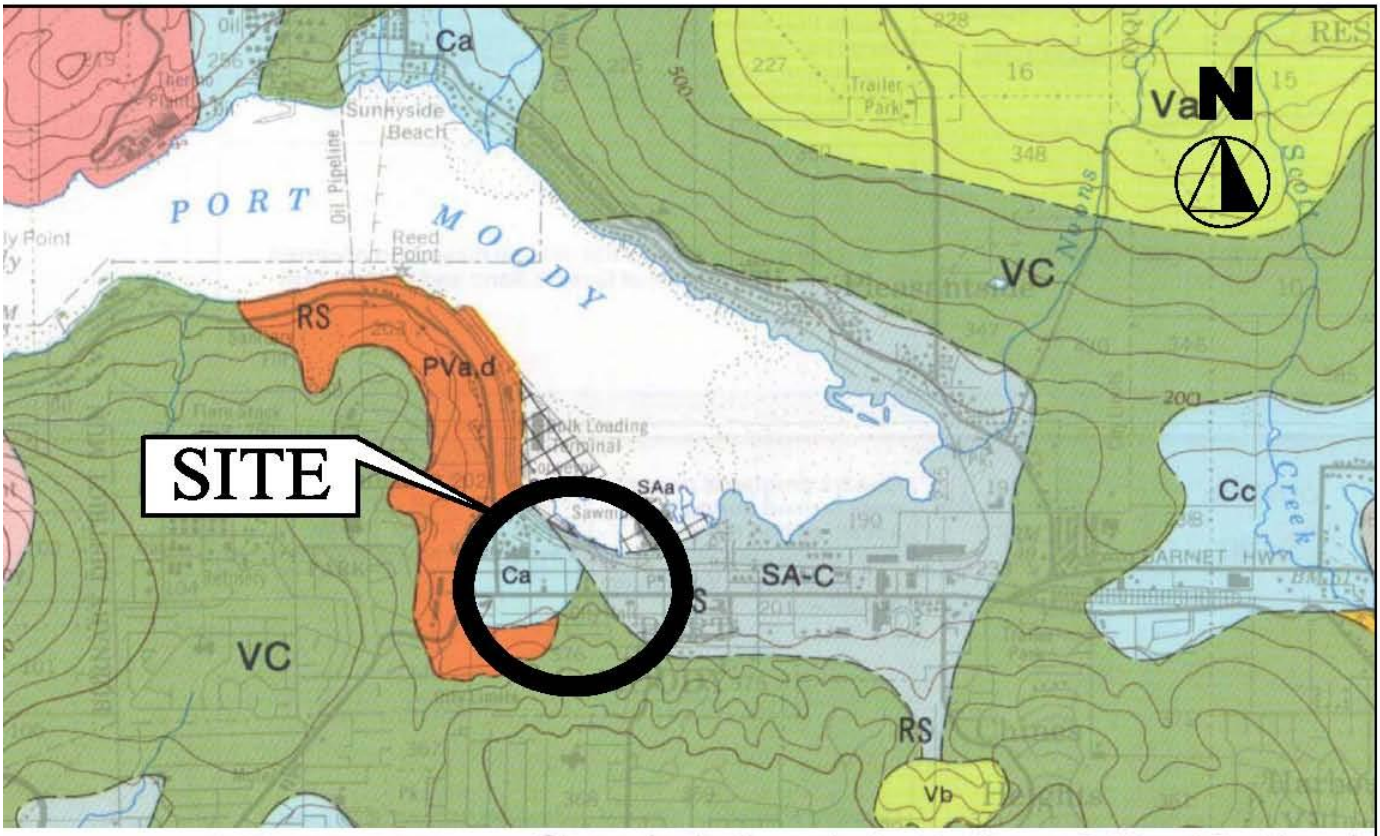
LIST OF FIGURES

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

JECTH Consultants Inc. Suite 122-3823 Henning Drive Burnaby, B.C. Phone: (604) 299-6617	**Site Location Plan** **Proposed Residential Development** **2222 Clarke Street** **Port Moody, BC** **Client: Nu-Gen Projects Ltd.**	Pre. FC	SCALE Not to scale
		Chk. IC	Date: July 2018
		Dwg. No: 218N551 – Fig. 1	



JECTH Consultants Inc. Suite 122-3823 Henning Drive Burnaby, B.C. Phone: (604) 299-6617	**JECTH's Previous Projects Location Plan** **Proposed Townhouse Development** **2222 Clarke Street** **Port Moody, BC** **Client: Nu-Gen Projects Ltd.**	Pre. KW	SCALE Not to scale
		Chk. HKM	Date: July 2018
		Dwg. No:218N551 – Fig. 1A	



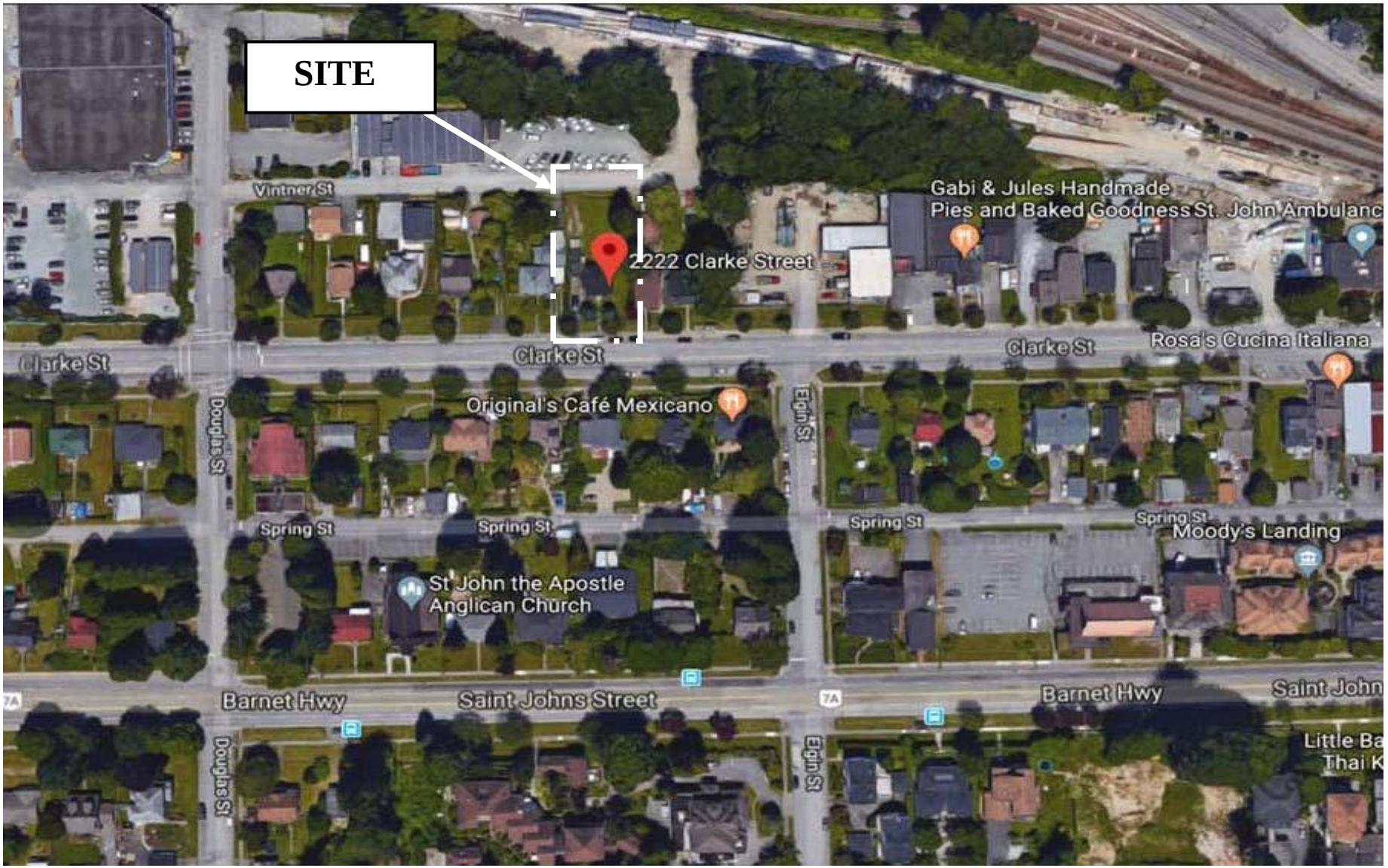
CAPILANO SEDIMENTS *(Chronologically equivalent to Sumas Drift and Fort Langley Formation, see Lithologic Units and Environments of Deposition)*

Ca-e — *Raised marine, deltaic, and fluvial deposits:* Ca, *raised marine beach, spit, bar, and lag veneer, poorly sorted sand to gravel (except in bar deposits) normally less than 1 m thick but up to 8 m thick, mantling older sediments and containing fossil marine shell casts up to 175 m above sea level;* Cb, *raised beach medium to coarse sand 1 to 5 m thick containing fossil marine shell casts;* Cc, *raised deltaic and channel fill medium sand to cobble gravel up to 15 m thick deposited by proglacial streams and commonly underlain by silty to silty clay loam;* Cd, *marine and glaciomarine stony (including till-like deposits) to stoneless silt loam to clay loam with minor sand and silt normally less than 3 m thick but up to 30 m thick, containing marine shells. These deposits thicken from west to east.* Ce, *mainly marine silt loam to clay loam with minor sand, silt, and stony glacio-marine material (see* Cd), *up to 60+m thick. In many of the upland areas sediments mapped as* Cc *and* Cd *are mantled by a thin veneer (less than 1 m) of* Ca

POSTGLACIAL AND PLEISTOCENE

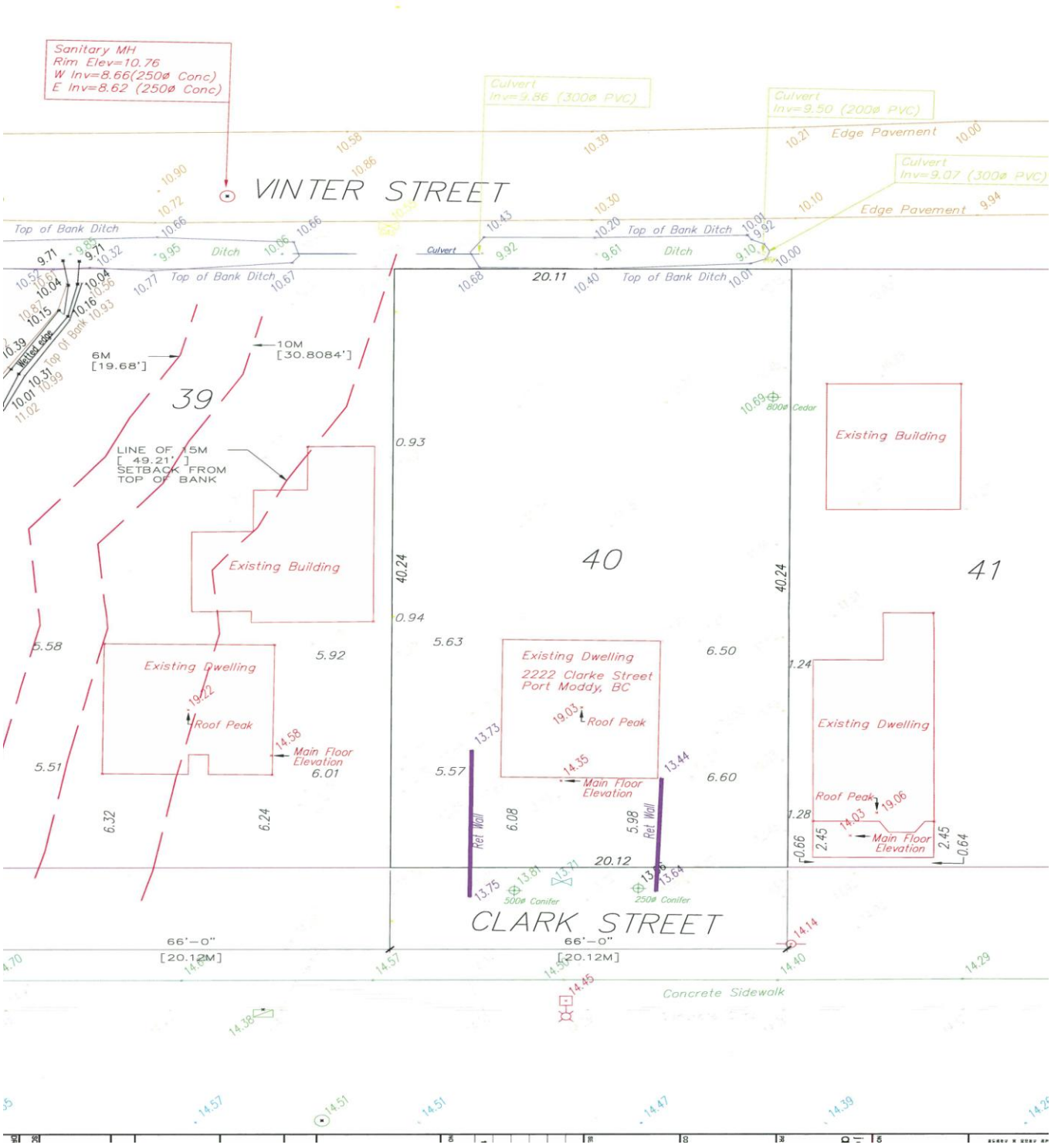
SA-C — *Marine shore and fluvial sand up to 8 m thick,* Cb *in part has been reworked and redeposited by lowland streams* (SAh)

JECTH Consultants Inc. Suite 122-3823 Henning Drive Burnaby, B.C. Phone: (604) 299-6617	**Geological Map** **Proposed Townhouse Development** **2222 Clarke Street** **Port Moody, BC** **Client: Nu-Gen Projects Ltd.**	Pre. FC	SCALE Not to scale
		Chk. IC	Date: July 2018
		Dwg. No: 218N551 – Fig. 2	

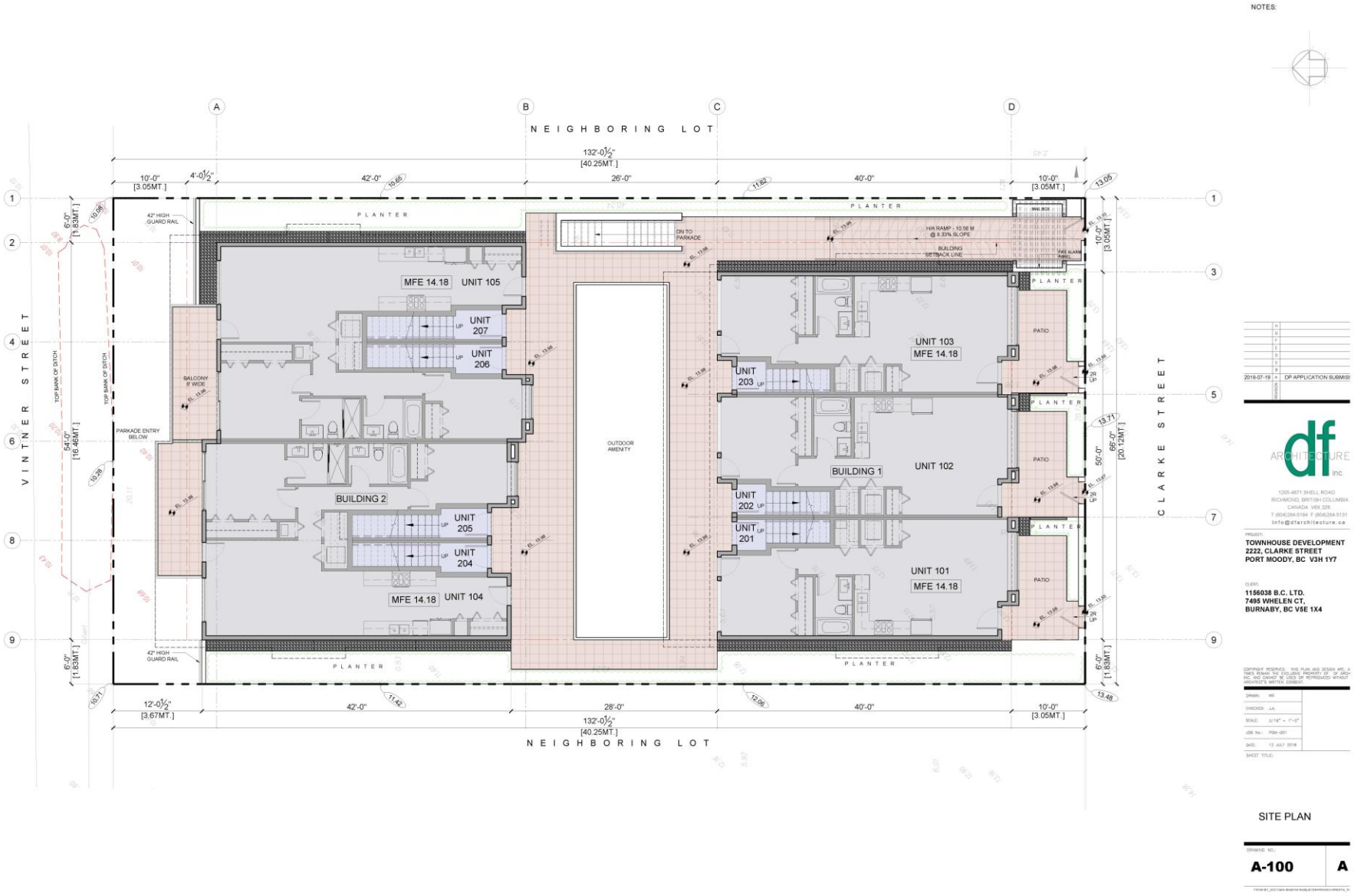


JECTH Consultants Inc. Suite 122, 3823 Henning Drive Burnaby, B.C. V5C 6P3 Phone: (604) 299-6617	**Aerial Photo** **Proposed Residential Development** **2222 Clarke Street, Port Moody, BC** **Client: Nu-Gen Projects Ltd.**	Prepared by: FC	SCALE Not to scale
		Chk. HKM	Date: July 2018
		Dwg. No.: 218N551 – Figure 3	

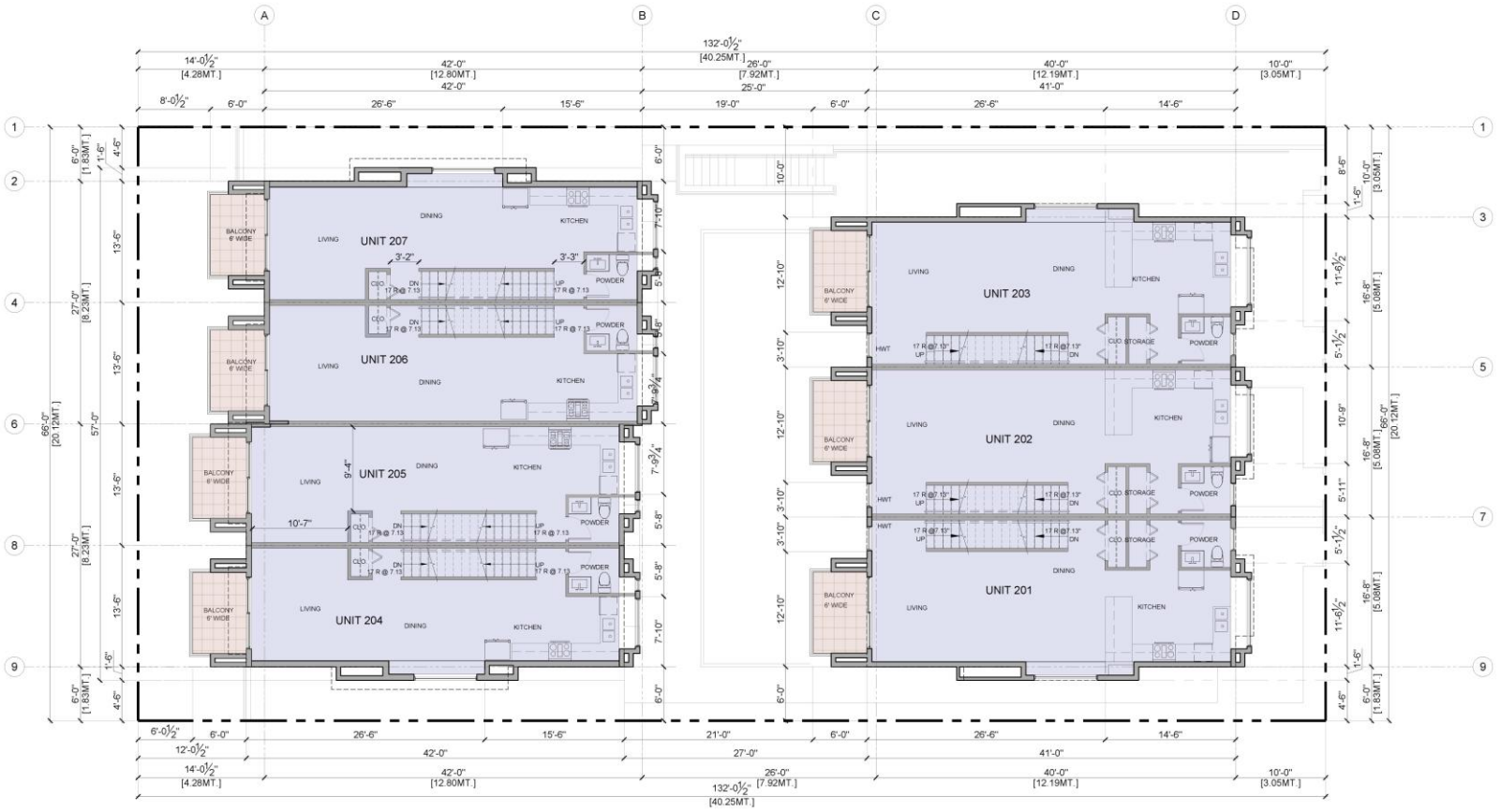
JECTH Consultants Inc. Suite 122, 3823 Henning Drive Burnaby, B.C. V5C 6P3 Phone: (604) 299-6617	**City Of Port Moody GIS Map** **Proposed Townhouse Development** **2222 Clarke Street, Port Moody, BC** **Client: Nu-Gen Projects Ltd.**	Prepared by: FC	SCALE Not to scale
		Chk. HKM	Date: July 2018
		Dwg. No.: 218N551 – Figure 4	



JECTH Consultants Inc. Suite 122-3823 Henning Drive Burnaby, B.C. Phone: (604) 299-6617	**Survey Plan** **Proposed Townhouse Development** **2222 Clarke Street** **Port Moody, BC** **Client: Nu-Gen Projects Ltd.**	Pre. FC	SCALE Not to scale
		Chk. IC	Date: July 2018
		Dwg. No: 218N551 – Fig. 4A	



JECTH Consultants Inc. Suite 122, 3823 Henning Drive Burnaby, B.C. V5C 6P3 Phone: (604) 299-6617	**Architectural Site Plan** **Proposed Townhouse Development** **2222 Clarke Street, Port Moody, BC** **Client: Nu-Gen Projects Ltd.**	Prepared by: FC	SCALE Not to scale
		Chk. HKM	Date: July 2018
		Dwg. No.: 218N551 – Figure 5	



1 SECOND FLOOR PLAN
3/16"=1'-0"

NOTES:

2018-07-19	A	DP APPLICATION SUBMISSION

df ARCHITECTURE Inc.
1205-4871 SHELL ROAD
RICHMOND, BRITISH COLUMBIA
CANADA V6X 3Z6
T (604)284-5184 F (604)284-5131
info@dfarchitecture.ca

PROJECT:
TOWNHOUSE DEVELOPMENT
2222, CLARKE STREET
PORT MOODY, BC V3H 1Y7

CLIENT:
1156038 B.C. LTD.
7496 WHELEN CT.
BURNABY, BC V5E 1X4

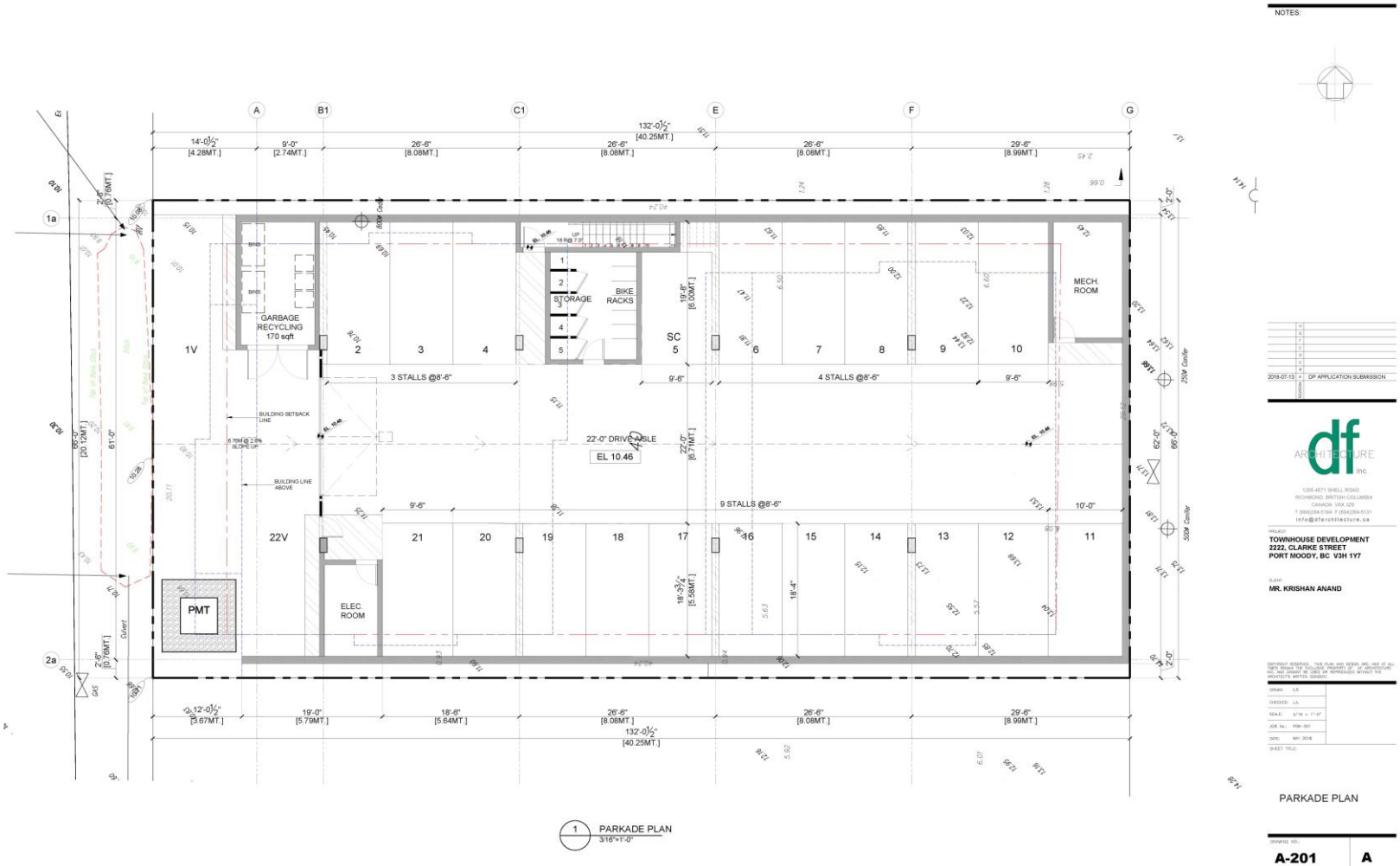
DRAWN: A.S.
CHECKED: J.A.
SCALE: 3/16" = 1'-0"
JOB No.: PDM-001
DATE: 12 JULY 2018

SECOND FLOOR PLAN

DRAWING No.: **A-102** | **A**

JECTH Consultants Inc.	**Building Plan (Second Floor)** **Proposed Townhouse Development** **2222 Clarke Street, Port Moody, BC**
Suite 122, 3823 Henning Drive Burnaby, B.C. V5C 6P3 Phone: (604) 299-6617	**Client: Nu-Gen Projects Ltd.**

Prepared by: FC	SCALE Not to scale
Chk. HKM	Date: July 2018
Dwg. No.: 218N551 – Figure 6	



NOTES:

NO.	DESCRIPTION	DATE
A	DP APPLICATION SUBMISSION	2018-07-13

df ARCHITECTURE inc.

1205-4871 SHELL ROAD
RICHMOND, BRITISH COLUMBIA
CANADA V6X 3Z6
T (604)284-5194 F (604)284-5131
info@dfarchitecture.ca

PROJECT:
TOWNHOUSE DEVELOPMENT
2222, CLARKE STREET
PORT MOODY, BC V3H 1Y7

CLIENT:
MR. KRISHAN ANAND

DRAWN: A.S.
CHECKED: J.A.
SCALE: 3/16" = 1'-0"
JOB No.: PDM-391
DATE: MAY. 2018

SHEET TITLE:
PARKADE PLAN

DRAWING NO.: **A-201** | **A**

JECTH Consultants Inc. Suite 122, 3823 Henning Drive Burnaby, B.C. V5C 6P3 Phone: (604) 299-6617	**Basement Plan** **Proposed Townhouse Development** **2222 Clarke Street, Port Moody, BC** **Client: Nu-Gen Projects Ltd.**

Prepared by: FC	SCALE Not to scale
Chk. HKM	Date: July 2018
Dwg. No.: 218N551 – Figure 7	

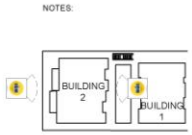
JECTH Consultants Inc. Suite 122, 3823 Henning Drive Burnaby, B.C. V5C 6P3 Phone: (604) 299-6617	**Building Elevation (East)** **Proposed Townhouse Development** **2222 Clarke Street, Port Moody, BC** **Client: Nu-Gen Projects Ltd.**	Prepared by: FC	SCALE Not to scale
		Chk. HKM	Date: July 2018
		Dwg. No.: 218N551 – Figure 8	

1 SOUTH ELEVATION
SCALE: 3/16" = 1'-0"

SCHEDULE OF FINISHES

1. ENDICOTT THIN BRICK
SIZE: 2-5/8"X 9-5/8"
COLOR: RED IRON SPOT
2. HARDIE PANEL BOARD AND BATTEN.
COLOR : JAMES HARDIE SAIL CLOTH
3. JAMES HARDIE SIDING
COLOR: JAMES HARDIE GRAY SLATE
3. JAMES HARDIE SIDING
COLOR: JAMES HARDIE SAIL CLOTH
4. SOLID WOOD DOORS COLOR TO MATCH
JAMES HARDIE GRAY SLATE
5. VINYL WINDOWS
COLOR : WHITE
6. POWDER COATED ALUMINUM RAILING
(COLOR:BM GRAY 2120-10) WITH SAFETY
GLASS
7. ASPHALT SHINGLE ROOF: IKO CAMBRIDGE
DUAL BLACK
8. 2" X 12" FASC COLOR TO MATCH BENJAMIN
MOORE GRAPHITE 1603
9. EXPOSED CONCRETE WITH 1 1/2" X 1 1/2"
GROOVE
10. ALUMINUM GUARDRAIL COLOR TO MATCH
GRAY 2120-10

NOTES:



KEY PLAN

2018-07-19	A	DP APPLICATION SUBMISSION

df ARCHITECTURE Inc.

1205-4871 SHELL ROAD
RICHMOND, BRITISH COLUMBIA
CANADA V6X 3Z8
T (604)284-5104 F (604)284-5181
info@dfarchitecture.ca

PROJECT:
TOWNHOUSE DEVELOPMENT
2222, CLARKE STREET
PORT MOODY, BC V3H 1Y7

OWNER:
1156038 B.C. LTD.
7495 WHELEN CT,
BURNABY, BC V5E 1X4

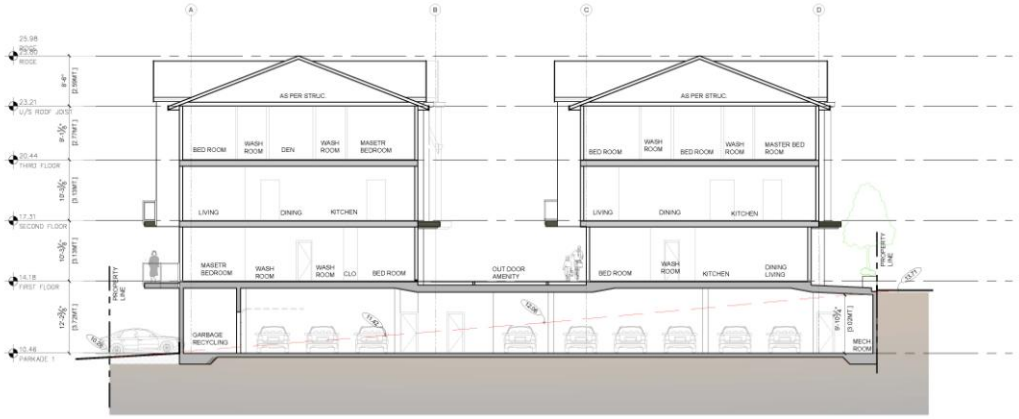
DRAWN: MS
CHECKED: LA
SCALE: 3/16" = 1'-0"
JOB No.: 1804
DATE: 12 JULY 2018
SHEET TITLE:

ELEVATION
BUILDING 2

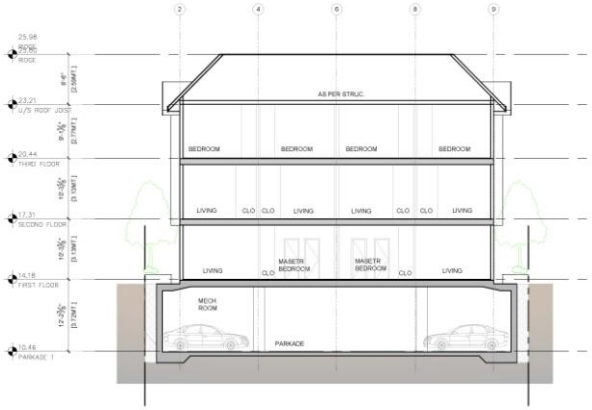
DRAWING NO.: A-302 A

2 NORTH ELEVATION
SCALE: 3/16" = 1'-0"

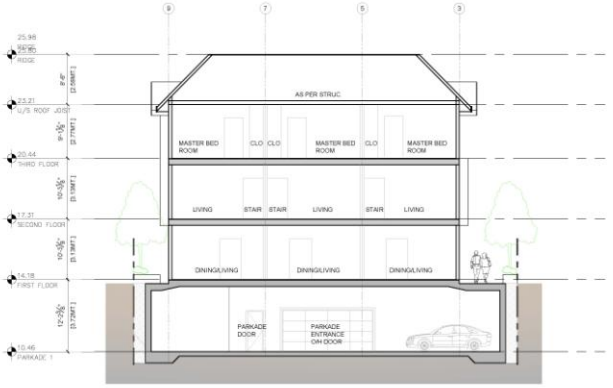
JECTH Consultants Inc. Suite 122, 3823 Henning Drive Burnaby, B.C. V5C 6P3 Phone: (604) 299-6617	**Building Elevation (South and North)** **Proposed Townhouse Development** **2222 Clarke Street, Port Moody, BC** **Client: Nu-Gen Projects Ltd.**	Prepared by: FC Chk. HKM SCALE Not to scale Date: July 2018 Dwg. No.: 218N551 – Figure 9



1 SECTION A
SCALE : 1/8" = 1'-0"



2 SECTION B
SCALE : 1/8" = 1'-0"



3 SECTION C
SCALE : 1/8" = 1'-0"

NOTES:

2018-07-19	A	DP APPLICATION SUBMISSION

df ARCHITECTURE INC.

1055-4871 SHELL ROAD
RICHMOND, BRITISH COLUMBIA
CANADA V6X 3Z6
T (604)284-5164 F (604)284-5121
info@dfarchitecture.ca

PROJECT:
TOWNHOUSE DEVELOPMENT
2222, CLARKE STREET
PORT MOODY, BC V3H 1Y7

CLIENT:
1156038 B.C. LTD.
7495 WHELEN CT,
BURNABY, BC V5E 1X4

DRAWN: MK
CHECKED: J.K.
SCALE: 1/8" = 1'-0"
JOB No.: PO4
DATE: 12 JULY 2018

SHEET TITLE:
SECTIONS

DRAWING NO.: A-401 | REVISION: A

JECTH Consultants Inc. Suite 122, 3823 Henning Drive Burnaby, B.C. V5C 6P3 Phone: (604) 299-6617	**Typical Section (North-South and East-West)** **Proposed Townhouse Development** **2222 Clarke Street, Port Moody, BC** **Client: Nu-Gen Projects Ltd.**

Prepared by: FC	SCALE Not to scale
Chk. HKM	Date: July 2018
Dwg. No.: 218N551 – Figure 10	

JECTH Consultants Inc.
Geotechnical & Environmental Engineers

Client: Nu-Gen Projects Ltd.
Date: July 14, 2018
Our File No.: 218N551

APPENDIX "A"

PROPOSED TOWNHOUSE DEVELOPMENT
2222 CLARKE STREET
PORT MOODY, BC

SOIL LOGS & MOISTURE CONTENT

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

JECTH Consultants Inc. | **TEST HOLE LOG** | **DCPT NO.: DCPT-1**

Job No.:	218N551	Ground Elevation:	EL. 1.3 m ±
Location:	2222 Clarke Street, Port Moody, BC	Driller/Excavator:	Southland Drilling Co. Ltd.
Drilling Date:	March-07-18	Equipment:	Truck Mounted Auger
Weather:	Cloudy	Engineer:	IC Logged IC
			Page: 2 of 2

DEPTH (ft)	SYMBOL	SOIL PROFILE DESCRIPTION	WATER LEVEL	SAMPLE TYPE	SAMPLE NO.	DCPT BLOWS / FEET	DCPT BLOW COUNT (NO.) 0 50 100
20							
21		Greyish brown, dense, wet fine to medium SAND with gravel, occasional pebbles, trace of SILT				31	
22						19	
23				G	1-22.5	9	
24						38	
25		25.0'				34	
26		Greyish brown, dense, wet fine to medium SAND with gravel, occasional pebbles, trace of SILT				40	
27							
28				G	1-27.5		
29							
30		30.0'					
31		Drillhole end at 30 ft. GWT measured at 3.5 ft. by tape					
32							
33							
34							
35							
36							
37							
38							
39							
40							

Legend:
- G - Soil log obtained from DH1
- G - Grab soil sample
- DCPT - Dynamic Cone Penetration Test
- ∇ - Water level

JECTH Consultants Inc. **TEST HOLE LOG** **Drill Hole No.: DH-1**

Job No.:	218N551	Ground Elevation:	EL. 1.3 m ±
Location:	2222 Clarke Street, Port Moody, BC	Driller/Excavator:	Southland Drilling Co. Ltd.
Drilling Date:	March-07-18	Equipment:	Truck Mounted Auger
Weather:	Cloudy	Engineer:	IC
		Logged Staff:	IC
		Page:	1 of 2

DEPTH (ft)	SYMBOL	SOIL PROFILE DESCRIPTION	WATER LEVEL	SAMPLE TYPE	SAMPLE NO.	DCPT BLOWS / FEET	MOISTURE CONTENT (%) 0 50 100
0		**Surface**					
1		Brown, medium loose, dry Silt, Sand and trace of gravel, trace of organics (FILL)				7	
				G	1-1.5		38.0%
2		2.0'		G	1-2	7	31.0%
		Greyish brown, medium loose, moist to wet, fine to medium SAND 2.5'	WL 3.5' ▽			4	
3							
4		Greyish brown, compact, wet silty SAND with gravel, trace of pebble		G	1-4	10	22.2%
5		5.0'				15	
6		Greyish brown, compact, wet silty SAND and gravel, some pebbles				17	
7						21	
				G	1-7.5		70.0%
8						14	
9						4	
10		10.0'				7	
11		Greyish brown, compact, wet silty SAND and gravel, some pebbles 11.0'				8	
12		Greyish brown, compact, wet, fine to medium SAND with trace of gravel, trace of SILT				8	
				G	1-12.5		25.9%
13						16	
14						26	
15		15.0'				29	
16		Greyish brown, dense, wet fine to medium SAND with gravel, occasional pebbles, trace of SILT				32	
17						28	
				G	1-17.5		25.8%
18						32	
19						30	
20		20.0'				32	
		To be continued					

Legend:
- DCPT Log obtained from DCPT-1
- G - Grab soil sample
- DCPT - Dynamic Cone Penetration Test
- ▽ - Water level

JECTH Consultants Inc. | **TEST HOLE LOG** | **Drill Hole No.: DH-1**

Job No.:	218N551	Ground Elevation:	EL. 1.3 m ±
Location:	2222 Clarke Street, Port Moody, BC	Driller/Excavator:	Southland Drilling Co. Ltd.
Drilling Date:	March-07-18	Equipment:	Truck Mounted Auger
Weather:	Cloudy	Engineer:	IC
		Logged Staff:	IC
		Page:	2 of 2

DEPTH (ft)	SYMBOL	SOIL PROFILE DESCRIPTION	WATER LEVEL	SAMPLE TYPE	SAMPLE NO.	DCPT BLOWS / FEET	MOISTURE CONTENT (%) 0 50 100
20							
21		Greyish brown, dense, wet fine to medium SAND with gravel, occasional pebbles, trace of SILT				31	
22						19	
23				G	1-22.5	9	19.1%
24						38	
25		25.0'				34	
26		Greyish brown, dense, wet fine to medium SAND with gravel, occasional pebbles, trace of SILT				40	
27							
28				G	1-27.5		18.6%
29							
30		30.0'					
31		Drillhole end at 30 ft. GWT measured at 3.5 ft. by tape					
32							
33							
34							
35							
36							
37							
38							
39							
40							

Legend:
- DCPT Log obtained from DCPT-1
- G - Grab soil sample
- DCPT - Dynamic Cone Penetration Test
- ∇ - Water level

JECTH Consultants Inc. | **TEST HOLE LOG** | **DCPT NO.: DCPT-2**

Job No.:	218N551	Ground Elevation:	EL. 1.3 m ±
Location:	2222 Clarke Street, Port Moody, BC	Driller/Excavator:	Southland Drilling Co. Ltd.
Drilling Date:	March-07-18	Equipment:	Truck Mounted Auger
Weather:	Cloudy	Engineer:	IC Logged IC
			Page: 1 of 2

DEPTH (ft)	SYMBOL	SOIL PROFILE DESCRIPTION	WATER LEVEL	SAMPLE TYPE	SAMPLE NO.	DCPT BLOWS / FEET	DCPT BLOW COUNT (NO.) 0 50 100
0		**Surface (asphalt surface 3.5 in. ±)**					
1		Yellowish brown, dry, Sand and gravel (Road base - FILL)				4	
2		2.0'				3	
3		Brown and darkish brown, dry to moist, SILT, SAND, organic soil, trace of garbage (FILL)		G	1-2.5	1	
4		4.0'	WL	G	1-4	2	
5		Greyish brown, loose, moist to wet, silty SAND with gravel (native) 5.0'	5.0' ▽			5	
6		Greyish brown, compact to medium dense, wet silty SAND and gravel, trace of pebbles				8	
7						20	
8				G	1-7.5	25	
9						29	
10		10.0'				23	
11		Greyish brown, compact to medium dense, wet silty SAND and gravel, trace of pebbles, but medium loose				7	
12		12.0'		G	1-11.5	7	
13		Yellowish to greyish brown, medium loose to compact, wet silty SAND, trace of gravel		G	1-13	23	
14		Silt pocket at 14' (6 in. ± thick)				15	
15		15.0'				11	
16		Yellowish to greyish brown, medium loose to compact, wet silty SAND, trace of gravel, but compact				19	
17						20	
18				G	1-17.5	14	
19						16	
20		20.0'				24	
		To be continued					

Legend:
- G - Soil log obtained from DH2
- G - Grab soil sample
- DCPT - Dynamic Cone Penetration Test
- ▽ - Water level

JECTH Consultants Inc. | **TEST HOLE LOG** | **DCPT NO.: DCPT-2**

Job No.:	218N551	Ground Elevation:	EL. 1.3 m ±
Location:	2222 Clarke Street, Port Moody, BC	Driller/Excavator:	Southland Drilling Co. Ltd.
Drilling Date:	March-07-18	Equipment:	Truck Mounted Auger
Weather:	Cloudy	Engineer:	IC Logged IC
			Page: 2 of 2

DEPTH (ft)	SYMBOL	SOIL PROFILE DESCRIPTION	WATER LEVEL	SAMPLE TYPE	SAMPLE NO.	DCPT BLOWS / FEET	DCPT BLOW COUNT (NO.) 0 50 100
20							
21		Greyish brown, dense, wet fine to medium SAND, trace of gravel, trace of SILT				15	
22						35	
23				G	1-22.5	36	
24						28	
25		25.0'				28	
26		Greyish brown, dense, wet fine to medium SAND, trace of gravel, trace of SILT		G	1-26	22	
27		27.0'				17	
28		Yellowish brown, dense, wet SAND with gravel, trace of SILT		G	1-28	37	
29						47	
30		30.0'					
31		Drillhole end at 30 ft. GWT at 5 ft. ± as observed in auger stem					
32							
33							
34							
35							
36							
37							
38							
39							
40							

Legend:
- G - Soil log obtained from DH2
- G - Grab soil sample
- DCPT - Dynamic Cone Penetration Test
- ∇ - Water level

JECTH Consultants Inc. **TEST HOLE LOG** **Drill Hole No.: DH-2**

Job No.:	218N551	Ground Elevation:	EL. 1.3 m ±
Location:	2222 Clarke Street, Port Moody, BC	Driller/Excavator:	Southland Drilling Co. Ltd.
Drilling Date:	March-07-18	Equipment:	Truck Mounted Auger
Weather:	Cloudy	Engineer:	IC
		Logged Staff:	IC
		Page:	1 of 2

DEPTH (ft)	SYMBOL	SOIL PROFILE DESCRIPTION	WATER LEVEL	SAMPLE TYPE	SAMPLE NO.	DCPT BLOWS / FEET	MOISTURE CONTENT (%) 0 50 100
0		**Surface (asphalt surface 3.5 in. ±)**					
1		Yellowish brown, dry, Sand and gravel (Road base - FILL)				4	
2		2.0'				3	
3		Brown and darkish brown, dry to moist, SILT, SAND, organic soil, trace of garbage (FILL)		G	1-2.5	1	120.0%
4		4.0'	WL	G	1-4	2	50.0%
5		Greyish brown, loose, moist to wet, silty SAND with gravel (native) 5.0'	5.0' ▽			5	
6		Greyish brown, compact to medium dense, wet silty SAND and gravel, trace of pebbles				8	
7						20	
8				G	1-7.5	25	20.3%
9						29	
10		10.0'				23	
11		Greyish brown, compact to medium dense, wet silty SAND and gravel, trace of pebbles, but medium loose				7	
12		12.0'		G	1-11.5	7	20.7%
13		Yellowish to greyish brown, medium loose to compact, wet silty SAND, trace of gravel		G	1-13	23	28.8%
14		Silt pocket at 14' (6 in. ± thick)				15	
15		15.0'				11	
16		Yellowish to greyish brown, medium loose to compact, wet silty SAND, trace of gravel, but compact				19	
17						20	
18				G	1-17.5	14	25.0%
19						16	
20		20.0'				24	
		To be continued					

Legend:
- DCPT Log obtained from DCPT-2
- G - Grab soil sample
- DCPT - Dynamic Cone Penetration Test
- ▽ - Water level

JECTH Consultants Inc. | **TEST HOLE LOG** | **Drill Hole No.: DH-2**

Job No.:	218N551	Ground Elevation:	EL. 1.3 m ±
Location:	2222 Clarke Street, Port Moody, BC	Driller/Excavator:	Southland Drilling Co. Ltd.
Drilling Date:	March-07-18	Equipment:	Truck Mounted Auger
Weather:	Cloudy	Engineer:	IC
		Logged Staff:	IC
		Page:	2 of 2

DEPTH (ft)	SYMBOL	SOIL PROFILE DESCRIPTION	WATER LEVEL	SAMPLE TYPE	SAMPLE NO.	DCPT BLOWS / FEET	MOISTURE CONTENT (%) 0 50 100
20							
21		Greyish brown, dense, wet fine to medium SAND, trace of gravel, trace of SILT				15	
22						35	
23				G	1-22.5	36	21.9%
24						28	
25		25.0'				28	
26		Greyish brown, dense, wet fine to medium SAND, trace of gravel, trace of SILT		G	1-26	22	22.4%
27		27.0'				17	
28		Yellowish brown, dense, wet SAND with gravel, trace of SILT		G	1-28	37	16.9%
29						47	
30		30.0'					
31		Drillhole end at 30 ft. GWT at 5 ft. ± as observed in auger stem					
32							
33							
34							
35							
36							
37							
38							
39							
40							

Legend:
- DCPT Log obtained from DCPT-2
- G - Grab soil sample
- DCPT - Dynamic Cone Penetration Test
- ∇ - Water level

JECTH Consultants Inc.
122 - 3823 Henning Dr., Burnaby, B.C. V5C 6P3
Tel: (604) 299-6617 Fax: (604) 299-6641
Web: www.jecth.com Email: jecth@jecth.com

MOISTURE CONTENT

PROJECT NO:	218N551		
LOCATION:	Clarke St, Port Moody		
STATION	OFFSET		
GROUND ELEV.			
BORING No DH-1		METHOD	Drilling
TESTED BY	KW	DATE	Mar7 2018

Hole No.	DH1	DH1	DH1	DH1	DH1	DH1
Depth (ft)	1.5	2	4	7.5	12.5	17.5
Sample No.	1-1.5	1-2	1-4	1-7.5	1-12.5	1-17.5
Container No.						
Mass of Wet Sample + Tare (g)	69	76	77	68	68	83
Mass of Dry Sample + Tare (g)	50	58	63	40	54	66
Tare of Container						
Mass of Water	19	18	14	28	14	17
Mass of Dry Soil	50	58	63	40	54	66
MOISTURE CONTENT	**38.0%**	**31.0%**	**22.2%**	**70.0%**	**25.9%**	**25.8%**

Hole No.	DH1	DH1				
Depth (ft)	22.5	27.5				
Sample No.	1-22.5	1-27.5				
Container No.						
Mass of Wet Sample + Tare (g)	81	70				
Mass of Dry Sample + Tare (g)	68	59				
Tare of Container						
Mass of Water	13	11				
Mass of Dry Soil	68	59				
MOISTURE CONTENT	**19.1%**	**18.6%**				

Hole No.						
Depth (ft)						
Sample No.						
Container No.						
Mass of Wet Sample + Tare (g)						
Mass of Dry Sample + Tare (g)						
Tare of Container						
Mass of Water						
Mass of Dry Soil						
MOISTURE CONTENT						

JECTH Consultants Inc.
122 - 3823 Henning Dr., Burnaby, B.C. V5C 6P3
Tel: (604) 299-6617 Fax: (604) 299-6641
Web: www.jecth.com Email: jecth@jecth.com

MOISTURE CONTENT

PROJECT NO:	218N551		
LOCATION:	Clarke St, Port Moody		
STATION	OFFSET		
GROUND ELEV.			
BORING No DH-2		METHOD	Drilling
TESTED BY	KW	DATE	Mar7 2018

Hole No.	DH2	DH2	DH2	DH2	DH2	DH2
Depth (ft)	2.5	4	7.5	11.5	13	17.5
Sample No.	2-2.5	2-4	2-7.5	2-11.5	2-13	2-17.5
Container No.						
Mass of Wet Sample + Tare (g)	66	69	71	70	76	70
Mass of Dry Sample + Tare (g)	30	46	59	58	59	56
Tare of Container						
Mass of Water	36	23	12	12	17	14
Mass of Dry Soil	30	46	59	58	59	56
MOISTURE CONTENT	**120.0%**	**50.0%**	**20.3%**	**20.7%**	**28.8%**	**25.0%**

Hole No.	DH2	DH2	DH2			
Depth (ft)	22.5	26	28			
Sample No.	2-22.5	2-26	2-28			
Container No.						
Mass of Wet Sample + Tare (g)	78	71	69			
Mass of Dry Sample + Tare (g)	64	58	59			
Tare of Container						
Mass of Water	14	13	10			
Mass of Dry Soil	64	58	59			
MOISTURE CONTENT	**21.9%**	**22.4%**	**16.9%**			

Hole No.						
Depth (ft)						
Sample No.						
Container No.						
Mass of Wet Sample + Tare (g)						
Mass of Dry Sample + Tare (g)						
Tare of Container						
Mass of Water						
Mass of Dry Soil						
MOISTURE CONTENT						

JECTH Consultants Inc.
Geotechnical & Environmental Engineers

Client: Nu-Gen Projects Ltd.
Date: July 14, 2018
Our File No.: 218N551

APPENDIX "B"

PROPOSED TOWNHOUSE DEVELOPMENT
2222 CLARKE STREET
PORT MOODY, BC

SEISMIC DESIGN CRITERIA

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

2010 National Building Code Seismic Hazard Calculation

INFORMATION: Eastern Canada English (613) 995-5548 français (613) 995-0600 Facsimile (613) 992-8836
Western Canada English (250) 363-6500 Facsimile (250) 363-6565

Requested by: , JECTH Consultants Inc. July 19, 2018

Site Coordinates: 49.2779 North 122.8626 West

User File Reference: 2222 Clarke Street, Port Moody, BC

National Building Code ground motions:
2% probability of exceedance in 50 years (0.000404 per annum)

Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA (g)
0.935	0.627	0.322	0.169	0.464

Notes. Spectral and peak hazard values are determined for firm ground (NBCC 2010 soil class C - average shear wave velocity 360-750 m/s). Median (50th percentile) values are given in units of g. 5% damped spectral acceleration (Sa(T), where T is the period in seconds) and peak ground acceleration (PGA) values are tabulated. Only 2 significant figures are to be used. ***These values have been interpolated from a 10 km spaced grid of points. Depending on the gradient of the nearby points, values at this location calculated directly from the hazard program may vary. More than 95 percent of interpolated values are within 2 percent of the calculated values.*** Warning: You are in a region which considers the hazard from a deterministic Cascadia subduction event for the National Building Code. Values determined for high probabilities (0.01 per annum) in this region do not consider the hazard from this type of earthquake.

Ground motions for other probabilities:

Probability of exceedance per annum	0.010	0.0021	0.001
Probability of exceedance in 50 years	40%	10%	5%
Sa(0.2)	0.217	0.486	0.667
Sa(0.5)	0.148	0.321	0.443
Sa(1.0)	0.077	0.166	0.226
Sa(2.0)	0.039	0.085	0.118
PGA	0.112	0.245	0.332

References

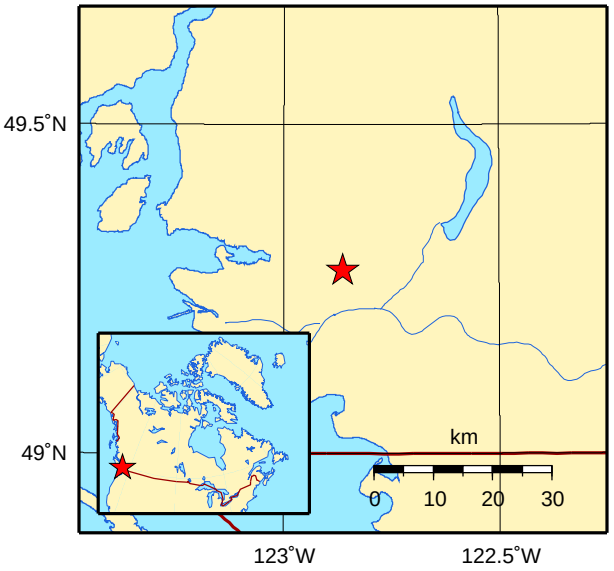
National Building Code of Canada 2010 NRCC no. 53301; sections 4.1.8, 9.20.1.2, 9.23.10.2, 9.31.6.2, and 6.2.1.3
Appendix C: Climatic Information for Building Design in Canada - table in Appendix C starting on page C-11 of Division B, volume 2

User's Guide - NBC 2010, Structural Commentaries NRCC no. 53543 (in preparation)
Commentary J: Design for Seismic Effects

Geological Survey of Canada Open File xxxx
Fourth generation seismic hazard maps of Canada: Maps and grid values to be used with the 2010 National Building Code of Canada (in preparation)

See the websites *www.EarthquakesCanada.ca* and *www.nationalcodes.ca* for more information

Aussi disponible en français



JECTH Consultants Inc.
Geotechnical & Environmental Engineers

Client: Nu-Gen Projects Ltd.
Date: July 14, 2018
Our File No.: 218N551

APPENDIX "C"

PROPOSED TOWNHOUSE DEVELOPMENT
2222 CLARKE STREET
PORT MOODY, BC

STANDARD FIELD INSPECTION REQUIREMENTS

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

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Geotechnical Engineering Field Review and Inspection Requirements
BC Building Code 2012

Based on the BC Building Code 2012, the following Design and field review must be completed by JECTH Consultants Inc. (Geotechnical in Record, **GIR)** such that Letter of Compliance (Schedule "C") required by local municipality for Occupancy Permit can be issued.

7.0 Geotechnical - Temporary

7.1 Excavation

7.1.1 Foundation

Excavation depth more than 4 ft. must be certified by GIR as required by WorkSafe BC ☐

7.1.2 Buildings and Structures

Buildings and Structures within the 1H:1V stress influence line from the bottom of Excavation must be reviewed and approved by GIR ☐

7.1.3 Trench

Excavation for underground utilities for depth more than 4 ft. must be reviewed and approved by GIR ☐

7.1.4 Underground Utilities

All underground utilities (both on-site and off-site) within and along the site perimeter must be identified both on drawing and physical on site prior to any foundation excavation and slope excavation. ☐

7.2 Shoring

7.2.1 Vertical Shoring

Vertical Shoring must be design by GIR to ensure excavation perimeter is stable during foundation excavation before placement of perimeter backfill. ☐

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
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7.2.2 Temporary Shoring

Temporary Shoring such as sheetpile and shotcrete with tie back anchors or other vertical features must be inspected by GIR ☐

7.2.3 Shoring Method

Shoring method such as sheetpile and shotcrete with tie-back anchors wall must be carried out under the supervision of GIR ☐

7.2.4 Underground Utilities

All underground utilities (both on-site and off-site) within and along the site perimeter must be identified both on drawing and physical on site prior to any foundation excavation and shoring work. ☐

7.3 Underpinning

7.3.1 Pre-Excavation

Pre-excavation inspection and Review must be conducted by both Structural and Geotechnical Engineers (both Geotechnical Engineers from the adjacent structures and GIR) prior to underpinning excavation. ☐

7.3.2 Monitoring Survey

Survey monitoring points must be installed at the underpinning building(s) and/any movement sensitive Structural Component before foundation excavation. The survey monitoring system must be conducted prior to any site activities and submit to GIR. ☐

7.3.3 Structural Inspection

Structural Inspection and photographs must be carried out prior to foundation excavation for future records and reference by Structural Engineer retained by either owner of adjacent property or subject property owner. ☐

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
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7.4 Temporary Construction Dewatering

7.4.1 Perched groundwater and Surface Drainage

For perched groundwater and surface Drainage by precipitation, conventional pump can be used to maintain the site in relatively dry condition. □

7.4.2 Well point

Well point and other measure of temporary dewatering will be required if high groundwater level (actual ground water table) is encountered □

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

8.0 Geotechnical - Permanent

8.1 Bearing Capacity of Foundation Subgrade Soil ☐

8.1.1 Foundation Subgrade Excavation

Review exposed foundation subgrade excavation and ensure that all remove all unsuitable soil/material until suitable bearing subgrade is exposed ☐

8.1.2 Foundation Subgrade Protection

In the event that the exposed foundation subgrade soil is sensitive to moisture, foundation subgrade might be protected by a layer granular soil such as crushed gravel due to wet condition and construction traffic. A lean concrete can be used instead of crushed gravel. ☐

8.1.3 Structural FILL

Review Structural Fill if over-excavated or raise of grade is required. Compaction Density test must be conducted by Certified Laboratory and submit to GIR. ☐

8.2 Geotechnical - Deep Foundation

8.2.1 Piling Inspection

Full time piling inspection such as timber and steel pile etc must be conducted by GIR. All piling record for refusal must be available to review such that the pile capacity can be certified. ☐

8.2.2 Sheetpile Installation

Sheetpile installation as temporary / permanent support must be installed and inspected by Geotechnical Engineer ☐

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

8.3 Engineering FILL

8.3.1 Structural FILL

Structural Fill (imported or non-native material) at and below the proposed foundation elevation must be compacted to density as specified by GIR and must be certified by qualified soil laboratory / testing company ☐

8.3.2 Underslab FILL

Underslab fill density must also be tested prior to placement of slab-on-grade concrete to the specified density as required by GIR. ☐

8.4 Slope Stability and Seismic Load

8.4.1 Slope Stability

Evaluate the slope stability along the site and building perimeter for both seismic and static design conditions according to APEBC Guidelines dated November 2010. ☐

8.4.2 Subsurface Stability

Subsurface stability under seismic condition such as densification specified by GIR and tieing of footing structurally must be accommodated by Structural Engineer in Record ☐

8.4.3 Seismic Design Criteria

The acceleration velocity design must be based on Nation Resources of Canada Seismic Hazard Criteria. ☐

8.5 Backfill

8.5.1 Backfill Material

Backfill material for foundation perimeter must be well drained granular soil, such as crushed gravel with waterproof membrance for below grade structure ☐

122-3823 Henning Dr.
Burnaby, B.C. V5C 6P3
Phone: 604-299-6617
Fax: 604-299-6641
Email: jecth@jecth.com
Web: www.jecth.com

8.5.2 Sensitive Structure

If sensitive structure is founded on the Backfill material such as Sand and Gravel compaction density as specified by GIR of the backfill material must be tested by certified testing company ☐

8.6 Permanent Dewatering

8.6.1 Foundation Drainage

For convention foundation drainage, perforated PVC pipe will be used to collect any surface gravity drained to city's storm system migrated and natural groundwater to a sump then ☐

8.6.2 Storm System

If City's storm system is higher than the sump elevation, pumping system must be installed with dual-pump and alarm system and may be with back up generator when power is unavailable during adverse conditions. Mechanical and Civil Engineer must be retained to design the system. ☐

8.6.3 Perforated Drainage

Underslab perforated drainage perforated PVC will be installed to improve the foundation drainage if groundwater table is higher than the slab elevation either seasonally or permanently ☐

8.6.4 Tanking

Tanking is also an option when the pumping system might not be capable to drain all below groundwater or foundation drainage system is not installed. Envelop Consultants must be retained for this option ☐

8.6.5 Retention Tank

Retention Tank with control valve may be required due to City's storm system limitation. Civil Engineer must be retained. ☐

122-3823 Henning Dr.
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8.7 Permanent Underpinning

8.7.1 Underpinning Loading

All underpinning loading must be reviewed and approved by Structural Engineer and GIR. ☐

8.7.2 Separation and Drainage

Bond separation and drainage (above and below grade) at the interface of the underpinning area must be reviewed to ensure no water migrate to the underpinning structure. Envelop Consultant must be retained. ☐

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