# THE CORPORATION OF THE CITY OF VERNON
# REPORT TO COUNCIL

**SUBMITTED BY:** Matt Faucher, Current Planner

**COUNCIL MEETING: REG ☒ COW ☐ I/C ☐**
**COUNCIL MEETING DATE:** August 15, 2022
**REPORT DATE**: August 3, 2022
**FILE**: 3090-20 (DVP00540)

**SUBJECT: DEVELOPMENT VARIANCE PERMIT APPLICATION FOR 7333 TRONSON ROAD**

## PURPOSE:

To review the Development Variance Permit application 00540 (DVP00540) to vary Zoning Bylaw 5000 Section 4.16.1 to permit construction on slopes greater than 30% and Section 6.5.11 to vary the maximum height of a retaining wall from 1.2m to 1.83m at 7333 Tronson Road.

## RECOMMENDATION:

THAT Council support Development Variance Permit application 00540 (DVP00540) to vary Zoning Bylaw 5000 on LT 14, DL 56, ODYD, PL 18373 (7333 Tronson Road), as follows:

a) Section 4.16.1 to allow the construction of buildings, structures and swimming pools on slopes greater than 30%;

b) Section 6.5.11 to increase the maximum height of a retaining wall from 1.2m to 1.83m;

AND FURTHER, that Council's support of DVP00540 is subject to the following:

a) That the site plan, building elevations and cross-sections, intended to illustrate the siting of structures, drive access and retaining wall height (Attachment 1) in the report titled "Development Variance Permit Application for 7333 Tronson Road" dated August 3, 2022 and respectfully submitted by the Current Planner, be attached to and form part of DVP00540 as Schedule 'A';

b) That a memorandum be provided by Beacon Geotechnical Ltd. confirming the correct civic address of the subject property and the findings of their Geotechnical Investigation Report dated January 5, 2017 (Attachment 5), and that both the memorandum and Geotechnical Investigation Report be attached to and form part of DVP00540 as Schedule 'B'; and

c) That issuance of DVP00540 be withheld until a Development Permit for the subject property is authorized to be issued.

## ALTERNATIVES & IMPLICATIONS:

1. THAT Council not support Development Variance Permit application 00540 as outlined in the report titled "Development Variance Permit Application for 7333 Tronson Road) dated August 3, 2022 and respectfully submitted by the Current Planner to vary Zoning Bylaw 5000 on LT 14, DL 56, ODYD, PL 18373 (7333 Tronson Road).

   *Note: This alternative does not support the development variance permit application and would require the applicant and owner to develop the site in compliance with Zoning Bylaw 5000.*

## ANALYSIS:

### A. Committee Recommendations:

At its meeting of July 19, 2022, the Advisory Planning Committee passed the following resolution:

*"THAT Council support Development Variance Permit application 00540 (DVP00540) to vary Zoning Bylaw 5000 on LT 14, DL 56, ODYD, PL 18373 (7333 Tronson Road), as follows:*

*a) Section 4.16.1 to allow the construction of buildings, structures and swimming pools on slopes greater than 30%;*

*b) Section 6.5.11 to increase the maximum height of a retaining wall from 1.2m to 1.83m;*

*AND FURTHER, that Council's support of DVP00540 is subject to the following:*

*a) That the site plan, building elevations and cross-sections, intended to illustrate the siting of structures, drive access and retaining wall height (Attachment 1) in the report titled "Development Variance Permit Application for 7333 Tronson Road" dated July 14, 2022 and respectfully submitted by the Current Planner, be attached to and form part of DVP00540 as Schedule 'A';*

*b) That Geotechnical Investigation Report prepared by Beacon Geotechnical Ltd dated January 5, 2017, be attached to and form part of DVP00540 as Schedule 'B'; and*

c) *That issuance of DVP00540 be withheld until a Development Permit for the subject property is authorized to be issued."*

### B. Rationale:

1. The subject property is located at 7333 Tronson Road (Figures 1 and 2). The property is approximately 1,835m$^2$ (0.45 ac) in size. The surrounding area is predominantly single detached and two family dwellings.

2. The purpose of the application is to review a request to vary two provisions of Zoning Bylaw 5000 in order to construct a five unit multi-family development on the subject property.

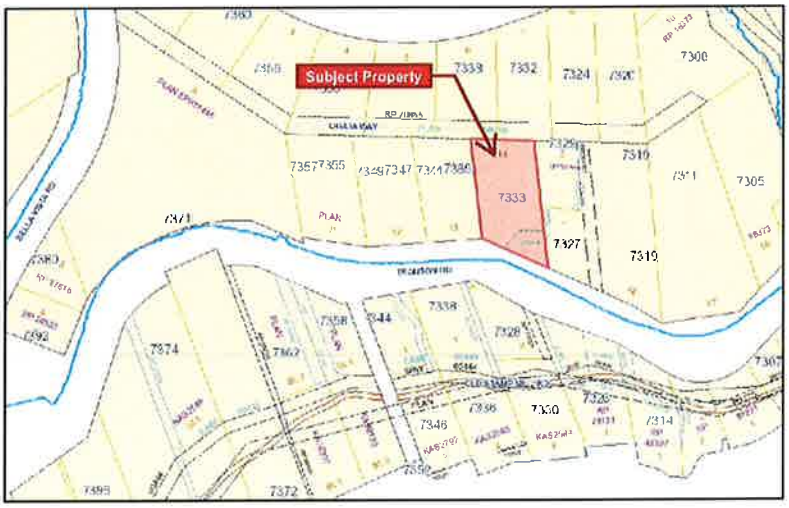



**Figure 1 - Property Location Map**

3. The subject property is zoned R5 – Fourplex Housing Residential (Attachment 2) and the subject application pertains to development regulations within Section 4.16.1 (30% slopes) and Section 6.5.11 (maximum height of a retaining wall) of Zoning Bylaw 5000 (Attachment 3).


**Figure 2: Aerial Photo of Property**

4. The vacant subject property contains fragments of slopes greater than 30% (Attachment 4) and requires approval of a variance to proceed with development of the site.

5. The application proposes to vary Section 4.16.1 of Zoning Bylaw 5000 in order to allow the proposed structures and access drive to be located on slopes exceeding 30% slopes. A geotechnical investigation of the subject property was conducted by the previous owner which reviewed the proposed development of five units on the subject property (Attachment 5). The report notes that "... no significant re-grading of the property will be required to achieve the final design grades on site" and that "Based on our observations, we are satisfied that the property can be safely used for the intended purpose of residential development".

6. The Geotechnical Investigation Report was commissioned by the previous owner of 7333 Tronson Road whom is also the owner of the neighbouring property (7327 Tronson Road). Though the report lists the civic address of the subject property as 7327 Tronson Road, the investigation of the site was conducted on 7333 Tronson Road as illustrated in Appendix A – Test Hole Plan of the report which clearly shows the locations of the test pit and proposed building footprints located on 7333 Tronson Road. Approval of DVP00540 is subject to Beacon Geotechnical providing a memorandum clarifying the subject property's correct civic address, as well as providing conformation of their findings and recommendations.

7. Additionally, the application proposes to vary Section 6.5.11 of Zoning Bylaw 5000 in order to allow the construction of retaining structures to a maximum of 1.83m in height to support the slope post development.

8. As part of the subsequent Development Permit process, the applicant will need to satisfy all bylaw requirements, as well as access and egress requirements of Vernon Fire Rescue.

9. The subject property and surrounding area is predominantly zoned R5 – Fourplex Housing Residential. This zoning has been in place since approximately 2004, upon adoption of Zoning Bylaw 5000.

10. Administration supports the requested variance for the following reasons:

    a) The existing lot is zoned for residential purposes (R5 – Fourplex Housing Residential Zone); and

    b) The applicant has submitted a report from qualified geotechnical engineer assessing the site and providing recommendations (Attachment 5). The engineer has determined that the site is suitable for the proposed development. The applicant will be required to provide review and monitoring of the site during construction.

## C. Attachments:

Attachment 1 – Site plan and elevations
Attachment 2 – R5 – Fourplex Housing Residential Zone
Attachment 3 – Section 4.16.1 and Section 6.5.11 of Zoning Bylaw 5000
Attachment 4 – Map – Slopes greater than 30%
Attachment 5 – Geotechnical Report, prepared by Beacon Geotechnical Ltd. Dated Jan 5, 2017

## D. Council's Strategic Plan 2019 – 2022 Goals/Action Items:

The subject application involves the following goals/action items in Council's Strategic Plan 2019 – 2022:

- N/A

## E. Relevant Policy/Bylaws/Resolutions:

1. The following provision of Zoning Bylaw 5000 is relevant to the subject application:

| | |
|---|---|
| Section 4.16.1 | No construction of a building, structure or swimming pool is permitted on slopes 30% or greater. |
| Section 6.5.11 | Retaining walls on all residential lots, except those required as a condition of subdivision approval, must not exceed a height of 1.2m measured from grade on the lower side, and must be constructed so that multiple retaining walls are spaced to provide at least a 1.2m horizontal separation between them. |

## BUDGET/RESOURCE IMPLICATIONS:

N/A

Prepared by:

X
Signer 1
Matt Faucher, CPT
Planner

X
Signer 2
Kim Flick
Director, Community Infrastructure and Development

Approved for submission to Council:

Will Pearce, CAO

Date: 09. August 2022

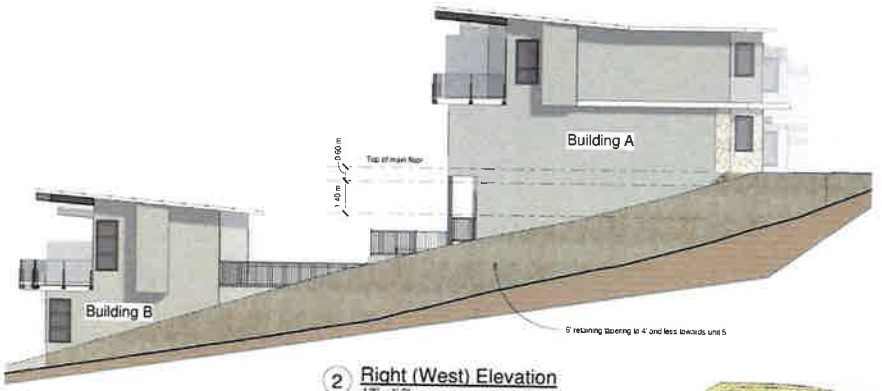
**REVIEWED WITH**

| | | |
|---|---|---|
| ☐ Corporate Services | ☐ Operations | ☒ Current Planning |
| ☐ Bylaw Compliance | ☐ Public Works/Airport | ☒ Long Range Planning & Sustainability |
| ☐ Real Estate | ☐ Facilities | ☒ Building & Licensing |
| ☐ RCMP | ☐ Utilities | ☒ Engineering Development Services |
| ☒ Fire & Rescue Services | ☐ Recreation Services | ☐ Infrastructure Management |
| ☐ Human Resources | ☐ Parks | ☒ Transportation |
| ☐ Financial Services | | ☐ Economic Development & Tourism |
| ☒ COMMITTEE: APC – July 19, 2022 | | |
| ☐ OTHER: | | |

G:\3000-3699 LAND ADMINISTRATION\3090 DEVELOPMENT VARIANCE PERMITS\20 Applications\DVP00540\2 PROC\Rpt\220803_mf_Council Rpt_DVP00540.docx

3 Front (North) Building A
1/8" = 1'-0"

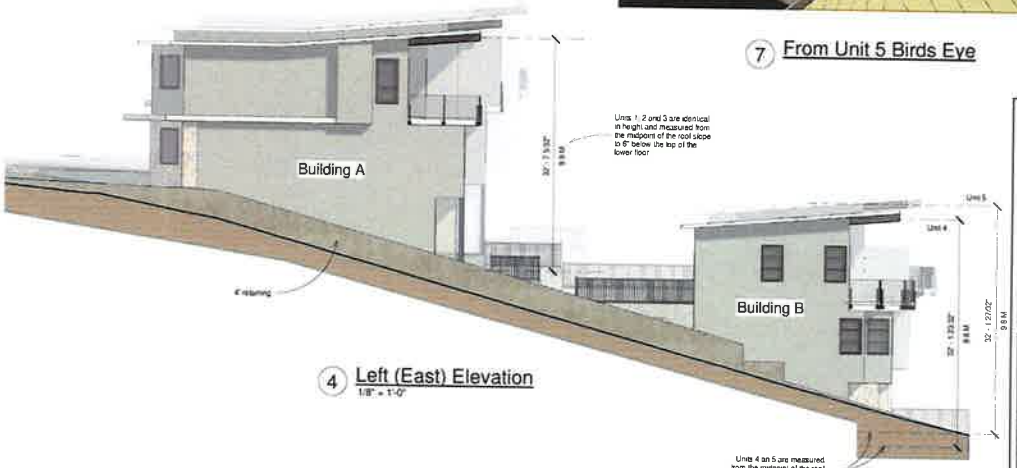
6 Rear (South) Building A
1/8" = 1'-0"




2 Right (West) Elevation
1/8" = 1'-0"

7 From Unit 5 Birds Eye

1 Front (South) Building B
1/8" = 1'-0"




4 Left (East) Elevation
1/8" = 1'-0"

5 Rear (North) Building B
1/8" = 1'-0"

MEYER DESIGNS LTD
600 Mt Tod Drive
Coldstream, BC
V1B 3Y6
250-503-4579
Kelly@MeyerDesigns.ca
MeyerDesigns.ca

Elevations

| | |
|---|---|
| Project number | 2021-014 |
| Date | July 13, 2022 |
| Drawn by | Nathan Meyer |

Proposed Residences
7333 Tronson Road
Vernon, BC

2

For Variance v1.0

# 9.6 R5 : Four-plex Housing Residential

R5

## 9.6.1 Purpose

The purpose is to provide a **zone** for the **development** of a maximum of four ground oriented **dwelling** units in the form of **single detached**, **semi-detached**, **duplex**, **three-plex** or **four-plex housing** on urban services. The R5c sub-zoning district allows for **care centre, major** as an additional use. The R5h sub-zoning district allows for **home based business, major** as an additional use. *(Bylaw 5467)*

## 9.6.2 Primary Uses4

- **care centre, major** *(use is only permitted with the R5c sub-zoning district)*
- **duplex housing**
- **four-plex housing**
- **group home, major**
- **semi-detached housing**
- **single detached housing**
- **three-plex housing**
- **seniors housing**

## 9.6.3 Secondary Uses

- **boarding rooms**
- **care centres, minor**
- **home based businesses, minor**
- **home based businesses, major** (in single detached housing only) (use is only permitted with the R5h sub-zoning district)
- **secondary suites (in single detached housing only)**
- **seniors assisted housing**
- **seniors supportive housing**

## 9.6.4 Subdivision Regulations

- Minimum **lot width** is 20.0m, except it is 22.0m for a **corner lot**.
- Minimum **lot depth** is 30.0m.
- Minimum **lot width** for single detached housing is 14.0m, except it is 16.0m for a **corner lot**.
- Minimum **lot area** for single detached housing is 450m$^2$.
- Minimum **lot area** is 700m$^2$, except it is 800m$^2$ for a **corner lot**, or 10,000m$^2$ if not serviced by a **community sewer system**. *(Bylaw 5339)*

## 9.6.5 Party Wall Subdivision Regulations

| Lot Type | Minimum Lot area | | Minimum Lot Width | |
|---|---|---|---|---|
| | interior | corner | interior | corner |
| Semi-Detached Housing | 350m$^2$ | 400m$^2$ | 10.0m | 12.0m |
| Three-Plex Housing | 235m$^2$ | 285m$^2$ | 7.0m | 9.0m |
| Four-Plex Housing | 175m$^2$ | 225m$^2$ | 7.0m | 9.0m |

## 9.6.6 Development Regulations

- Maximum **site coverage** is 40% and together with driveways, parking areas and **impermeable surfaces** shall not exceed 50%.

- Maximum **floor space ratio** is 0.6.
- Maximum **height** is the lesser of 10.0m or 2.5 **storeys**, except it is 4.5m for **secondary buildings** and **secondary structures**.
- Minimum **front yard** is 4.0m, except it is 6.0m for a garage or **carport** to the back of curb or sidewalk for a front entry garage, or it is 0.6m to the side of the garage and 2.6m to the front building façade for side-entry garage and driveway layouts.
- Minimum **side yard** is 2.0m for a 1 or 1.5 **storey** portion of a **building** or a **secondary building or structure** and 2.5m for a 2 or 2.5 **storey** portion of a **building**, except it is 4.0m from a **flanking street** unless there is a garage accessed from the **flanking street**, it is 4.0m or it is 2.6m to the building for a side-entry garage and driveway from a flanking street and at least 6.0m from the back of curb or sidewalk. Where there is no direct vehicular access to the **rear yard** or to an attached garage or **carport**, one **side yard** shall be at least 3.0m. The minimum **side yard** setback for shared interior **party walls** shall be 0.0m. The minimum **side yard** setback for **single detached housing** is 1.5m, except it is 4.0m from a **flanking street** unless there is a garage accessed from the **flanking street**, it is 4.0m or it is 2.6m to the building for a side-entry garage and driveway from a **flanking street** and at least 6.0m from the back of curb or sidewalk.
- Minimum **rear yard** is 6.0m for a 1 or 1.5 **storey** portion of a **building** and 7.5m for a 2 or 2.5 **storey** portion of a **building**, except it is 1.0m for **secondary buildings**.
- The maximum **height** of any vertical wall element facing a **front**, **flanking** or **rear yard** (including **walkout basements**) is the lesser of 6.5m or 2.5 **storeys**, above which the **building** must be **set back** at least 1.2m.
- Maximum **density** is 30 units per gross hectare (12 units/gross acre).
- Maximum four **dwelling** units located in a **building**, with each unit having a minimum width of 6.5m. *(Bylaw 5339)*

### 9.6.7 Other Regulations

- In order for bareland strata **developments** to be consistent with the character of the surrounding neighborhood, the strata plan shall be considered as one **site** for defining the overall use, **density** and **site coverage**.
- The above noted **subdivision** and **development** regulations shall be applied to each strata **lot** within the strata plan.
- A minimum area of $25m^2$ of **private open space** shall be provided per **dwelling**.
- Where **development** has access to a rear **lane**, vehicular access to the **development** is only permitted from the rear **lane**.
- For **seniors assisted housing, seniors housing and seniors supportive housing,** a safe drop-off area for patrons shall be provided on the **site.**
- For strata developments, common recreation buildings, facilities and amenities may be included in the strata plan. Recreational buildings shall be treated as **secondary buildings** for the purpose of determining the **height** and **setbacks** of the **building** as specified in each **zone**.
- For multi-unit residential housing, one **office** may be operated for the soul purpose of the management and operation of the multi-unit residential **development**.
- In addition to the regulations listed above, other regulations may apply. These include the general **development** regulations of Section 4 (secondary **development**, **yards**, projections into **yards**, lighting, agricultural setbacks, etc.); the specific use regulations of Section 5; the **landscaping** and fencing provisions of Section 6; and, the parking and loading regulations of Section 7.
- As per Section 4.10.2 - All **buildings** and **structures**, **excluding perimeter fencing (garden walls and fences)** on **lots abutting** City Roads as identified on Schedule "B" shall not be sited closer to the City Road than the setback as per the appropriate zone measured from the offset Rights of Way as illustrated on Schedule "B". *(Bylaw 5440)*

## 4.15 Development Covenants

4.15.1 At the time of rezoning, prior to bylaw adoption, City Council may at its discretion require the property owner to register a covenant on the title of the property limiting the permitted uses and/or densities within the approved land use zones, so as to reflect the specific approved development plan.

## 4.16 Hillside Development Areas

4.16.1 Vernon's Official Community Plan (OCP) establishes Development Permit Areas (DPAs) for all areas within the City of Vernon. Vernon's Hillside Guidelines and Regulations Policy defines hillsides and provides Goals and Objectives for development of lands on hillsides and slopes under 30%. No construction of a building, structure or swimming pool is permitted on slopes 30% or greater.

4.16.2 No subdivision of land creating lots is permitted where less than 100m$^2$ of contiguous buildable area which meets all bylaw regulations herein for each lot is provided, with the exception of boundary lot adjustments.
*(Bylaw 5433)*

to prevent sagging and to minimize rot. Along sloping ground, the top of wood **fences** shall be horizontal with vertical drops at the posts.

6.5.6 Screening **fences** shall be opaque double-sided **construction**. Where screen **fences** are allowed or required by this Bylaw, they shall be of an opaque or a combination of opaque, translucent or lattice design.

6.5.7 No **fence** constructed at the **natural grade** in residential **zones**, shall exceed 2.0m in **height**, except where **abutting** an **agricultural** or **commercial zone** the maximum **height** is 2.4m. No fence shall have pickets or finials extending above the horizontal rail that may pose a danger to wildlife. *(Bylaw 5890)*

6.5.8 No **fence** in a **commercial** or **industrial zone** shall exceed 2.4m.

6.5.9 **Industrial zones** are to have an opaque 2.4m high **fence** along all **property lines abutting** non-industrial **zones** and around **wrecking yards** that are visible from a **street abutting** the property.

6.5.10 No barbed wire or electrified fencing shall be allowed in any **residential, commercial, public** or **industrial zones** except:

- in RR **zone** for **use** in **livestock** enclosures; and
- in P2 **zone** where the **site** is used for **detention and correctional services**.

Razor wire fences shall not be permitted in any zone.

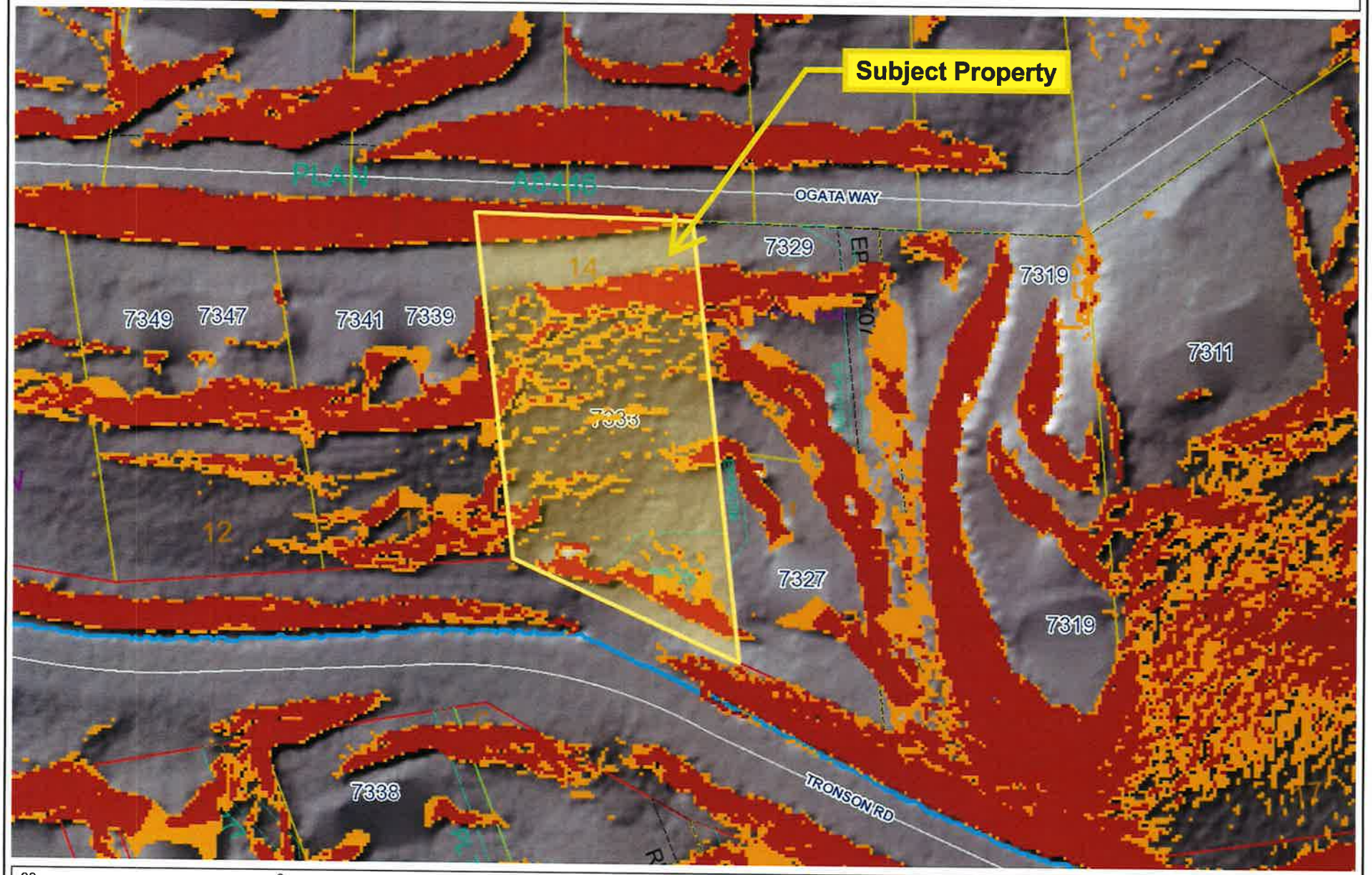
6.5.11 **Retaining walls** on all residential **lots**, except those required as a condition of **subdivision** approval, must not exceed a **height** of 1.2m measured from grade on the lower side, and must be constructed so that multiple **retaining walls** are spaced to provide at least a 1.2m horizontal separation between them.

6.5.12 In the case of a **retaining wall** constructed in accordance with Section 6.5.11, the combined **height** of a **fence** on top of a **retaining wall** at the **property line** or within 1.2m of the **property line** shall not exceed 2.0m, measured from **natural grade** at the **property line** (see Diagram 6.1).

6.5.13 Notwithstanding Section 6.5.11, a **retaining wall** may be higher than 1.2m, measured from grade, where the **natural grade** of the subject property is lower than the **abutting** property (see Diagram 6.2).

6.5.14 In the case of a **retaining wall** constructed in accordance with Section 6.5.13, the maximum **height** of a **fence**, or portion of **retaining wall** extending above the **natural grade** of the **abutting** higher property, or combination thereof, shall be 2.0m, measured from the **natural grade** of the **abutting** higher property (see Diagram 6.2).

# Vernon Essentials Site




38 0 19 38 Meters

1: 750

>30% Slope

>40% Slope



This drawing has been produced by the City of Vernon's Geographic Information System. The data provided is derived from a variety of sources with varying levels of accuracy. The City of Vernon makes no warranty or representation, expressed or implied, with the regard to the correctness, accuracy and/or reliability of the information contained herein.

Attachment 4

# BEACON GEOTECHNICAL LTD.

**GEOTECHNICAL INVESTIGATION**

**PROPOSED MULTI-FAMILY DEVELOPMENT**

**7327 Tronson Road**

**Vernon, B.C.**

Submitted to:

Paul Yu
Vancouver, B.C.

Submitted by:

Beacon Geotechnical Ltd.
Kelowna, B.C.

January 5, 2017

16-J2071

201 – 1889 Spall Road, Kelowna, British Columbia V1Y 4R2
Phone: 250.861.6859 Fax: 250.762.8073 e-mail: beacongeo@telus.net

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## APPENDICES

## 1.0 INTRODUCTION

Beacon Geotechnical Ltd. (Beacon) understands that it is proposed to develop the property located 7327 Tronson Road, Vernon, B.C. As part of the subdivision application process, the City of Vernon has requested, in their memorandum dated November 3rd, 2016, File No: DP000654, that a geotechnical report be prepared on the property to support the subdivision application. Beacon has been retained by Mr.Paul Yu to carry out a detailed geotechnical investigation on the site. The report is to describe the soil conditions, as well as to determine the suitability of the property for development. This report summarizes the results of our investigation and provides comments and recommendations for the development of the property.

**Scope of Work:** The scope of work for this project was presented in our proposal to Mr.Paul Yu, "*Proposal for Geotechnical Consulting Services, Proposed Residential Development – 7327 Tronson Road, Vernon, B.C.*", dated November 16, 2016, File No. 16-P00552. In summary, it was proposed to excavate four testpits within the development to identify the soil profile in the area. Following the field and laboratory work, a geotechnical report would be prepared outlining the results of the investigation and presenting our recommendations for development of the project.

**Authorization:** Authorization to proceed with the test hole investigation was received from Mr. Paul Yu, via email on November 17th, 2016.

**Site Description:** The property is legally described as Lot 14, Plan 18373, DL 56, ODYD. The site is trapezoid in shape and encompasses approximately 1835 square metres. It is bounded to the north by an easement plan, A9281, which is a driveway, along with Ogata Way, to the east and west by single family homes, and the south by Tronson Road. There is also another irregular shaped easement on the property in the lower south east corner, described as easement plan KAP68554. Topographically, the property slopes downward from north to south, with elevations ranging from 378 metres down to 364 metres. At the time of the investigation, the property was vacant and vegetated with grasses, shrubs and some large trees.

**Project Description:** We understand that the project will include the development of a five unit complex comprising of one duplex building and one three-plex building. Both buildings will be three storey wood framed structures over a concrete slab on grade. At this time there are no sanitary or storm sewer connections to the property, however a water service shut off valve was noted adjacent to the driveway on the north end of the property. The remaining portion of the property will be developed with driveways and landscaping.

## 2.0 FIELD WORK

On November 25th, 2016 four test pits were excavated at the approximate locations shown in Appendix A on Figure A.01, under the supervision of the author of this report. The test pits were excavated using a small tracked excavator contracted from On the Mark Locates of Kelowna, to a depth of 2.8 metres below the existing grades. Continuous written logs were maintained in the field and included a description of the soil type, consistency, moisture content, colour and thickness of all soil layers encountered. Four samples were selected for gradation analysis. The results are shown in Appendix C on Figures C.01 through to C.04, while the testpit logs are in Appendix B as Figures B.01 to B.04.

## 3.0 SUBSURFACE CONDITIONS

A total of four test pits were excavated over the project site at the approximate locations shown on Figure A.01, in Appendix A. The subsurface profile encountered at our borehole locations was found to be relatively consistent over the property. The following provides a general description of the soil profile encountered. For a more detailed description of subsurface site profile, refer to the detailed logs shown as Figures B.01 to B.04 in Appendix B.

**Soil Conditions:** The publication, "Late Glacial History and Surficial Deposits of the Okanagan Valley, British Columbia", by Hugh Nasmith (1962), Bulletin 46, Ministry of Energy, Mines, and Petroleum Resources, Province of British Columbia, indicates that the surficial geology in the project area consists of glacial lake sediments.

The site is located on a hillside adjacent to Kin Beach on Okanagan Lake. The soil profile on site was found to consist of topsoil over organic silts over various consistencies of glacial deposits, from sandy silts with trace gravel, to gravelly and silty sand, sand and gravel with some silt, to sandy and silty gravel. The glacial deposits were compact to dense and light brown in color.

The results of the gradation tests are shown as Figures C.01 to C.04, in Appendix C.

**Groundwater:** Groundwater not encountered at any of our testpit locations. We anticipated the groundwater table will be below the proposed construction grades for this project. However, seepage may be encountered along preferential drainage paths within the sand and gravel.

## 4.0 DISCUSSION

We understand that Mr. Paul Yu proposes to develop the property located at 7327 Tronson Road, in Vernon, B.C. The proposed development includes a five unit complex comprising of one duplex building and one three-plex building. Based on our understanding, no significant re-grading of the property will be required to achieve the final design grades on site. The project will be constructed in accordance with the City of Vernon Subdivision and Development Servicing Bylaw #3843.

The soil profile consisted of topsoil over organic silt over various glacial deposits. We anticipate that the elevation of the groundwater be well below the development grades, however seepage or perched groundwater may be encountered on or within the glacial deposits. Bedrock was not encountered any of the test holes on site and the bedrock surface is expected to be well below the existing site grades.

Based on our observations, we are satisfied that the property can be safely used for the intended purpose of residential development. For the purposes of this project, safe is defined as having less than a 2% chance in 50 years of experiencing a geotechnical hazard which would affect the proposed building sites. The following provides our recommendations for development of the site and presents our comments addressing the City of Vernon's requirements.

## 5.0 RECOMMENDATIONS

### 5.1 Site Preparation

**Stripping:** Site preparation within the building footprint should include removal of all vegetation, topsoil and organic silt to expose the underlying glacial deposits of various consistencies of silt, sand and gravel. The exposed subgrade surface should be inspected by Beacon to confirm the bearing capacity of the subgrade and to identify any soft spots. Soft spots, if encountered, should be re-compacted at the direction of the engineer in the field.

**Filling:** If it is required to raise the site grade to accommodate the construction of any of the buildings in the project, we recommend that imported structural fill or blast rock be used. Imported structural fill placed in the building footprint should be placed in lifts not exceeding 300 millimetres in thickness. Each lift should be moisture conditioned and compacted to a minimum of 98% of Standard Proctor maximum dry density in accordance with ASTM D698, and within 2% of optimum moisture content, prior to placing subsequent lifts. We recommend that the compaction of the fill be confirmed with in situ density tests.

Where blast rock is used as structural fill, then we recommend that all boulders greater than 0.2 metres in diameter be removed prior to placement. Due to the coarse nature of the blast rock, in situ density tests cannot be carried out. We therefore recommend that Beacon confirm the compaction of the blast rock by reviewing field compaction methods and proof rolling lifts of blast rock with large construction equipment on a regular basis during fill placement.

## 5.2 Buildings

**Foundation Design:** Based on the results of the investigation, we recommend that the proposed building be founded on conventional strip and pad spread footings. The foundations should be placed directly on the granular glacial deposits. The foundations for the building should be designed on the basis of an allowable soil bearing pressure of **120 kPa**. The frost protection depth should be a minimum of 0.6 metres for all exterior wall or deck footings.

**Slab on Grade:** Prior to placing fill for the slab-on-grade floor, the building footprint should be prepared as outlined in Section 5.1 above. The stripped surface should be inspected prior to placing any fill. Fill placed below the slab should meet the gradation requirements discussed in Section 5.1.

In addition, site preparation for the floor slab should include a rough-in for a subfloor depressurization system to protect from soil gas ingress. The system is described in detail in Section 9.13.4. of the 2012 edition of the B.C. Building Code. Accordingly, a minimum of 100 millimetres of porous granular material, such as pea gravel, should be placed immediately below the slab, and access through the slab should be provided to allow for depressurization for all contiguous areas. A vapour barrier should be placed between the granular fill and the concrete slab to inhibit the migration of moisture and gas through the slab.

**Foundation Perimeter Drains:** We recommend that a perimeter drainage system be constructed around the building with a slab grade below the final site grade. As a minimum, the perimeter drainage system should include a 100 millimetre perforated pipe placed at the toe of all exterior footings. The pipe should be covered with a minimum of 0.3 metres of round drain rock and covered with a filter fabric prior to backfilling. The perforated pipe should drain to the City storm sewer or into dry wells discharging into the glacial deposits. However, if the slab-on-grade floor elevation is at or above the surrounding grade, and that all landscaping, sidewalks and parking lots around the perimeter of the building slope away from the foundation, then we are of the opinion that a perimeter drainage system would not be required for these buildings.

**Roof Drainage:** We recommend that the roof storm water be discharged to the storm service. Where connections to the storm drain are not feasible, then we recommend that the roof drainage be discharged into rock pits into the glacial deposits, or onto splash pads.

**Frost Protection:** We recommend that the footing grade be a minimum of 0.6 metres below the final site grade for protection from frost heave.

### 5.3 Reuse of Existing Soil

Any topsoil, other organic soil and silt on this site is considered **unsuitable** for re-use as structural fill beneath building footprints, as subgrade fill within driveways or as trench fill, but may, however, be used as landscaping fill. The natural glacial deposits may be re-used as structural fill, if they are removed, stored and compacted in optimum conditions.

### 5.4 Slopes

The portions of development will not be within slopes over 30%, the overall current site conditions is at approximately 26%, with localized benches, and a steeper portion for the road fill on the high end for the driveway.

If soil cuts or fill slopes are required we recommend the following based on the soil and groundwater conditions on site:

**Soil Cuts:** Cut slopes excavated in the existing silt, sand or gravel; material should be excavated no steeper than 2(H):1(V).

**Fill Slopes:** If Fill slopes are required, we recommend that permanent fill slopes, constructed with the sand and gravel, compacted to a minimum of 98% of Standard Proctor maximum dry density, be inclined no steeper than 2(H):1(V). Fill slopes constructed of blast rock fill may be inclined at 1.5(H):1(V). All fill slopes should be over built during construction and trimmed to grade after fill placement is complete to ensure adequate compaction of the face of the fill slope.

We recommend that both cut and fill slopes are vegetated as soon as soon as possible to minimize the risk of surface erosion. During construction, we recommend that all exposed soils be continually moistened when required to minimize the amount of dust generated. Based on the type of development planned, we do not anticipate that water erosion would pose a problem for this property; however, we recommend that during site grading that overland drainage be discouraged from discharging over any unprotected slopes.

### 5.5 Testpits

The testpits were excavated at the approximate locations as indicated on Figure A.01. In the situation where a portion of any proposed building or parking is found to be located over a testpit, we recommend that the testpit be over excavated and re-compacted to a minimum of 98% of Standard Proctor maximum dry density in accordance with ASTM D698 and within 2% of optimum moisture content.

## 6.0 CLOSURE

The recommendations presented in the report were prepared in accordance with the City of Vernon Subdivision and Development Servicing Bylaw #3843. As such, the City of Vernon, being the regulatory development authority, may rely upon the recommendations and use the report as required for the development of the property.

The recommendations contained in this report have been prepared for the proposed five unit complex at 7327 Tronson Road, described in Section 1.0 of this report. Should the intended use for the property, at any time, vary from our understanding of the project, Beacon should be given the opportunity to review the project to ensure that our recommendations are both accurate and sufficient. Use of this report is subject to the Geotechnical Report – General Conditions attached in Appendix D.

It should be noted that geological conditions are innately variable and are seldom spatially uniform. At the time of the report, information on the stratigraphy at the project site was available at four discrete test hole locations. In order to develop recommendations from this information, it is necessary to make some assumptions concerning conditions other than at these locations. Adequate monitoring should be provided during construction to check that these assumptions are reasonable.

Beacon does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used for any project other than the proposed residential development described in Section 1.0. Any such unauthorized use of this report is at the sole risk of the user.

We trust that this report satisfies your present requirements. Should you have any further questions, please feel free to contact our office.

Yours truly,
Beacon Geotechnical Ltd.


Jan. 5/17

Heather Wilkie, P.Eng.
Geotechnical Engineer

Reviewed by,
Beacon Geotechnical Ltd.


Jan 5/17

Chris Wallis, P.Eng.
Geotechnical Engineer

# APPENDIX A

TEST HOLE PLAN

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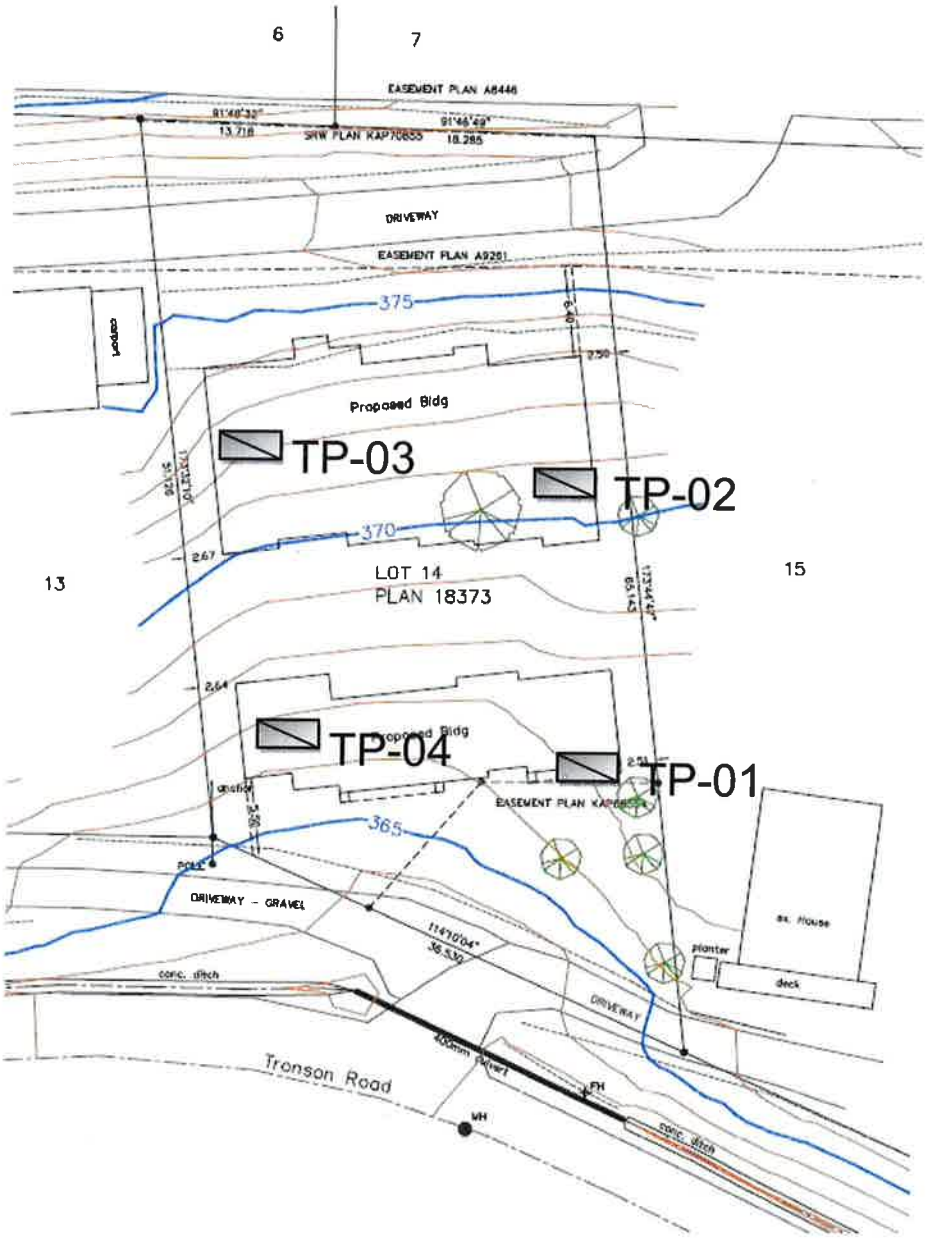



| LEGEND | Beacon Geotechnical Ltd. | | | | |
|---|---|---|---|---|---|
| Approximate Test Pit Location | 7327 TRONSON ROAD – PROPOSED MULTI-FAMILY DEVELOPMENT | | | | |
| | Site Plan | | | | |
| | File No: J16-2071 | Scale: NTS | Drawn By: hnw | Date: Nov. 28, 2016 | Figure: A.01 |

Site Plan Taken From: **Plan provided by russel shortt**

NOTE: ALL LOCATIONS ARE APPROXIMATE

# APPENDIX B

TEST HOLE LOGS

Beacon
geotechnical

**Project:** Multi Family Development
**Location:** 7327 Tronson Road, Vernon, BC
**Client:** Paul Yu
**Beacon Project No:** 16-J2071

# Log of Borehole: TP-01

Beacon geotechnical

| Depth (ft) | Depth (m) | Soil Type | Soil Type | Elevation (m) | Seepage (m) | Number | Type | Moisture Content (Percent) 20 40 60 80 |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | | Ground Surface | 0.00 | | | | |
| | | | ***TOPSOIL***<br>Grass over topsoil, dark brown. | 0.00 | | | | |
| 1 | | | | -0.30 | | | | |
| | | | ***ORGANIC SILT***<br>SILT, organic, stiff, dark brown. | 0.30 | | | | |
| 2 | | | | | | | | |
| 3 | 1 | | | -0.91 | | | | |
| | | | ***FILL***<br>FILL, SILT, SANDY, fine grained, trace GRAVEL, light brown and grey and rust mottled. | 0.91 | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | 1-1 | GS | |
| | | | Refusal on black abs pipe and crush trenches. | | | | | |
| 6 | | | | -1.83 | | | | |
| | 2 | | End of Borehole | 1.83 | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | 3 | | | | | | | |

**Investigation Date:** December 25, 2016
**Contractor:** On the Mark Contracting
**Equipment:** 50g Tracked Excavator
**Logged By:** hnw

**Northing:** 0
**Easting:** 0
**Elevation:** 0
**Figure No:** B.01

**Beacon Geotechnical Ltd.**
#201-1889 Spall Road
Kelowna, B.C.
V1Y 4R2

**Project:** Multi Family Development
**Location:** 7327 Tronson Road, Vernon, BC
**Client:** Paul Yu
**Beacon Project No:** 16-J2071

# Log of Borehole: TP-02

| Depth (ft) | Depth (m) | Soil Type | Soil Type | Elevation (m) | Seepage (m) | Number | Type | Moisture Content (Percent) 20 40 60 80 |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | | Ground Surface | 0.00 | | | | |
| | | | ***TOPSOIL***<br>Grass over topsoil, dark brown. | 0.00 | | | | |
| 1 | | | | -0.30 | | | | |
| | | | ***ORGANIC SILT***<br>SILT, organic, stiff, dark brown. | 0.30 | | | | |
| 2 | | | | -0.61 | | | | |
| | | | ***GRAVEL AND SAND***<br>GRAVEL AND SAND, fine graned, some SILT, occasional COBBLE/BOULDER, dense, light brown. | 0.61 | | | | |
| 3 | 1 | | | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | 2-1 | GS | |
| 6 | | | | | | | | |
| | 2 | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | -2.44 | | | | |
| | | | End of Borehole | 2.44 | | | | |
| 9 | | | | | | | | |
| | 3 | | | | | | | |
| 10 | | | | | | | | |

**Investigation Date:** December 25, 2016
**Contractor:** On the Mark Contracting
**Equipment:** 50g Tracked Excavator
**Logged By:** hnw

**Northing:** 0
**Easting:** 0
**Elevation:** 0
**Figure No:** B.02

**Beacon Geotechnical Ltd.**
#201-1889 Spall Road
Kelowna, B.C.
V1Y 4R2

**Project:** Multi Family Development
**Location:** 7327 Tronson Road, Vernon, BC
**Client:** Paul Yu
**Beacon Project No:** 16-J2071

# Log of Borehole: TP-03

Beacon geotechnical

| Depth (ft) | Depth (m) | Soil Type | Soil Type | Elevation (m) | Seepage (m) | Number | Type | Moisture Content (Percent) 20 40 60 80 |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | | Ground Surface | 0.00 | | | | |
| | | | ***TOPSOIL***<br>Grass over topsoil, dark brown. | 0.00 | | | | |
| 1 | | | | -0.30 | | | | |
| | | | ***SANDY GRAVEL***<br>GRAVEL, SANDY, fine graned, SILTY, occasional COBBLE/BOULDER, dense, light brown. | 0.30 | | | | |
| 2 | | | | | | | | |
| 3 | 1 | | | | | | | |
| 4 | | | | | | 3-1 | GS | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | 2 | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | -2.74 | | | | |
| | | | End of Borehole | 2.74 | | | | |
| 10 | 3 | | | | | | | |

**Investigation Date:** December 25, 2016
**Contractor:** On the Mark Contracting
**Equipment:** 50g Tracked Excavator
**Logged By:** hnw

**Northing:** 0
**Easting:** 0
**Elevation:** 0
**Figure No:** B.03

**Beacon Geotechnical Ltd.**
#201-1889 Spall Road
Kelowna, B.C.
V1Y 4R2

**Project:** Multi Family Development
**Location:** 7327 Tronson Road, Vernon, BC
**Client:** Paul Yu
**Beacon Project No:** 16-J2071

# Log of Borehole: TP-04

| Depth (ft) | Depth (m) | Soil Type | Soil Type | Elevation (m) | Seepage (m) | Number | Type | Moisture Content (Percent) 20 40 60 80 |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | | Ground Surface | 0.00 | | | | |
| | | | ***TOPSOIL***<br>Grass over topsoil, dark brown. | 0.00 | | | | |
| 1 | | | | -0.30 | | | | |
| | | | ***SAND***<br>SAND, fine grained, GRAVELLY, SILTY, occasional to some COBBLE/BOULDER, dense, light brown. | 0.30 | | | | |
| 2 | | | | | | | | |
| 3 | 1 | | | | | | | |
| 4 | | | | | | 4-1 | GS | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | 2 | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | -2.74 | | | | |
| | | | End of Borehole | 2.74 | | | | |
| 10 | 3 | | | | | | | |

**Investigation Date:** December 25, 2016
**Contractor:** On the Mark Contracting
**Equipment:** 50g Tracked Excavator
**Logged By:** hnw

**Northing:** 0
**Easting:** 0
**Elevation:** 0
**Figure No:** B.04

**Beacon Geotechnical Ltd.**
#201-1889 Spall Road
Kelowna, B.C.
V1Y 4R2

# APPENDIX C

GRADATION ANALYSIS

Beacon
geotechnical

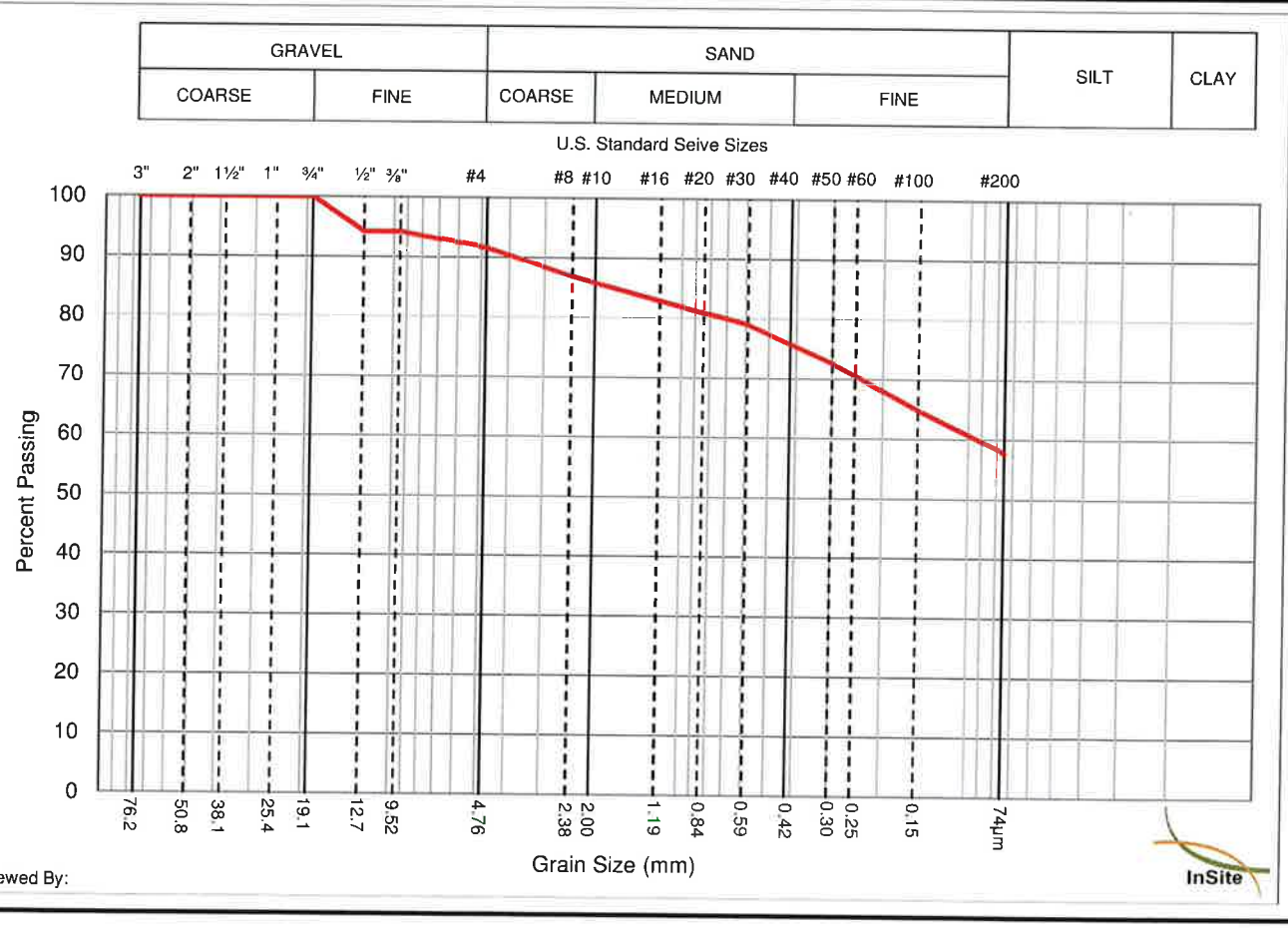
## GRAIN SIZE ANALYSIS RESULTS

| | | | |
|---|---|---|---|
| Project: | Multi-Family Development | Insite File No.: | BEA-2071 |
| Location: | 1327 Tronson, Vernon | Figure No: | C.01 |
| Client: | 0 | cc: | |
| Attention: | 0 | | |

| | | | |
|---|---|---|---|
| Sample Source: | Test Hole | Date Sampled: | November 25,2016 |
| Sample Location: | 1-2 @ 5' | Date Received: | November 28.2016 |
| Specification: | None | Date Tested: | November 28.2016 |
| Material Type: | SILT, sandy, trace gravel | Sampled by: | HW |
| Natural Moisture Content: | 16.0% | Tested by: | JH |
| Sieve Series | 8/16/30/50 | Test Method: | ASTM C117 & C136 |
| Fineness Modulus | 1.28 | | |

| Gravel Sizes | | | | |
|---|---|---|---|---|
| Sieve Sizes | | Percent | Gradation Limits | |
| US Sieve | Metric (mm) | Passing | Min | Max |
| 3" | 76.2 | 100.00 | | |
| 2" | 50.8 | 100.00 | | |
| 1½" | 38.1 | 100.00 | | |
| 1" | 25.4 | 100.00 | | |
| ¾" | 19.1 | 100.00 | | |
| ½" | 12.7 | 94.19 | | |
| ⅜" | 9.5 | 94.19 | | |

| Sand, Silt and Clay Sizes | | | | |
|---|---|---|---|---|
| Sieve Sizes | | Percent | Gradation Limits | |
| US Sieve | Metric (mm) | Passing | Min | Max |
| #4 | 4.75 | 91.51 | | |
| #8 | 2.40 | 86.87 | | |
| #16 | 1.20 | 82.93 | | |
| #30 | 0.60 | 79.12 | | |
| #50 | 0.30 | 72.64 | | |
| #100 | 0.15 | 64.83 | | |
| #200 | 0.075 | 57.76 | | |



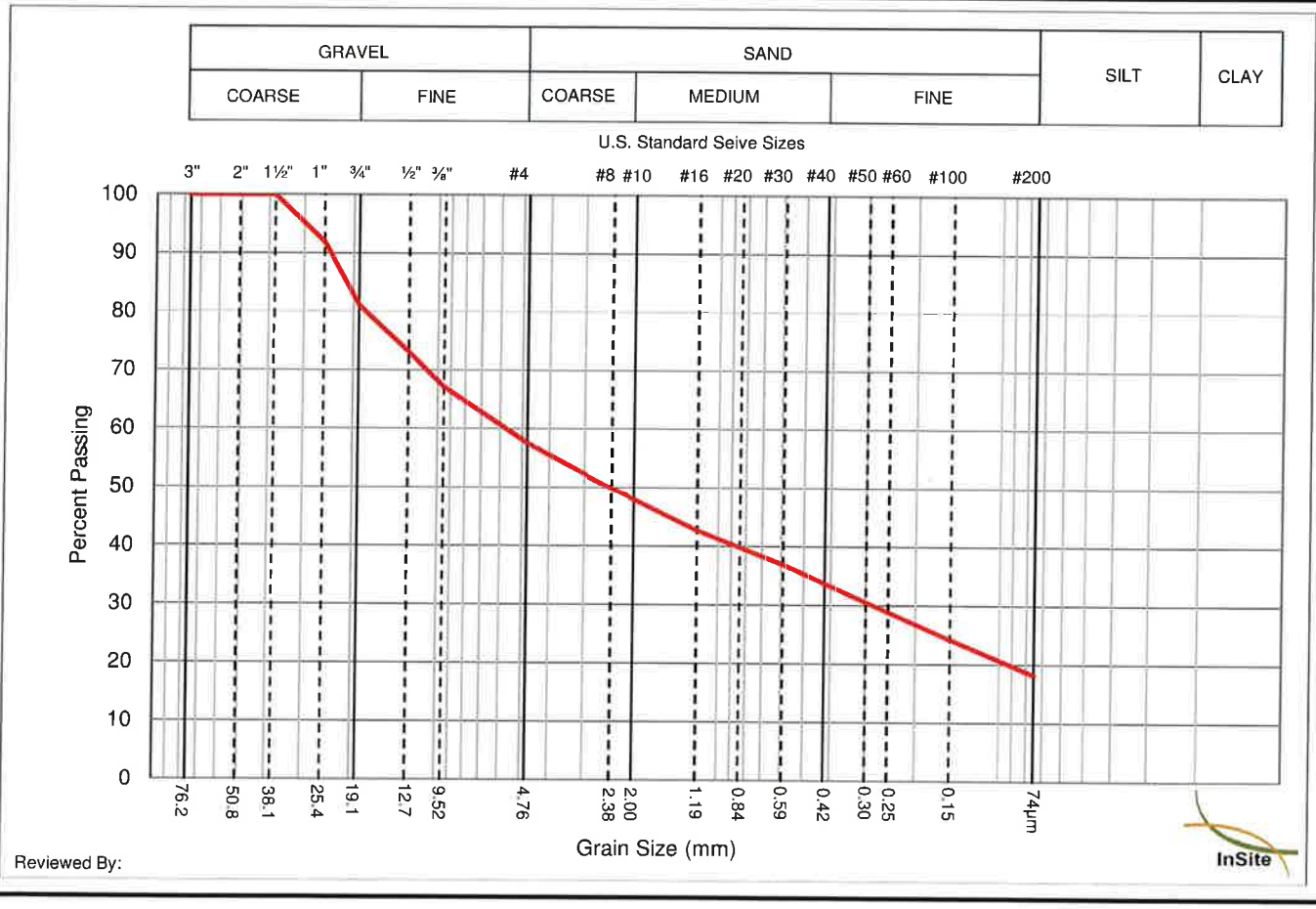

Reviewed By:

## GRAIN SIZE ANALYSIS RESULTS

| | | | |
|---|---|---|---|
| Project: | Multi-Family Development | Insite File No.: | BEA-2071 |
| Location: | 1327 Tronson, Vernon | Figure No: | C.02 |
| Client: | 0 | cc: | |
| Attention: | 0 | | |

| | | | |
|---|---|---|---|
| Sample Source: | Test Hole | Date Sampled: | November 25,2016 |
| Sample Location: | 2-2 @ 5' | Date Received: | November 28.2016 |
| Specification: | None | Date Tested: | November 28.2016 |
| Material Type: | GRAVEL & SAND, some silt | Sampled by: | HW |
| Natural Moisture Content: | 5.3% | Tested by: | JH |
| Sieve Series | 8/16/30/50 | Test Method: | ASTM C117 & C136 |
| Fineness Modulus | 4.10 | | |

| Gravel Sizes | | | | | Sand, Silt and Clay Sizes | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sieve Sizes | | Percent | Gradation Limits | | Sieve Sizes | | Percent | Gradation Limits | |
| US Sieve | Metric (mm) | Passing | Min | Max | US Sieve | Metric (mm) | Passing | Min | Max |
| 3" | 76.2 | 100.00 | | | #4 | 4.75 | 57.43 | | |
| 2" | 50.8 | 100.00 | | | #8 | 2.40 | 49.83 | | |
| 1½" | 38.1 | 100.00 | | | #16 | 1.20 | 42.83 | | |
| 1" | 25.4 | 91.91 | | | #30 | 0.60 | 37.05 | | |
| ¾" | 19.1 | 81.04 | | | #50 | 0.30 | 30.53 | | |
| ½" | 12.7 | 73.07 | | | #100 | 0.15 | 24.24 | | |
| ⅜" | 9.5 | 67.12 | | | #200 | 0.075 | 18.21 | | |



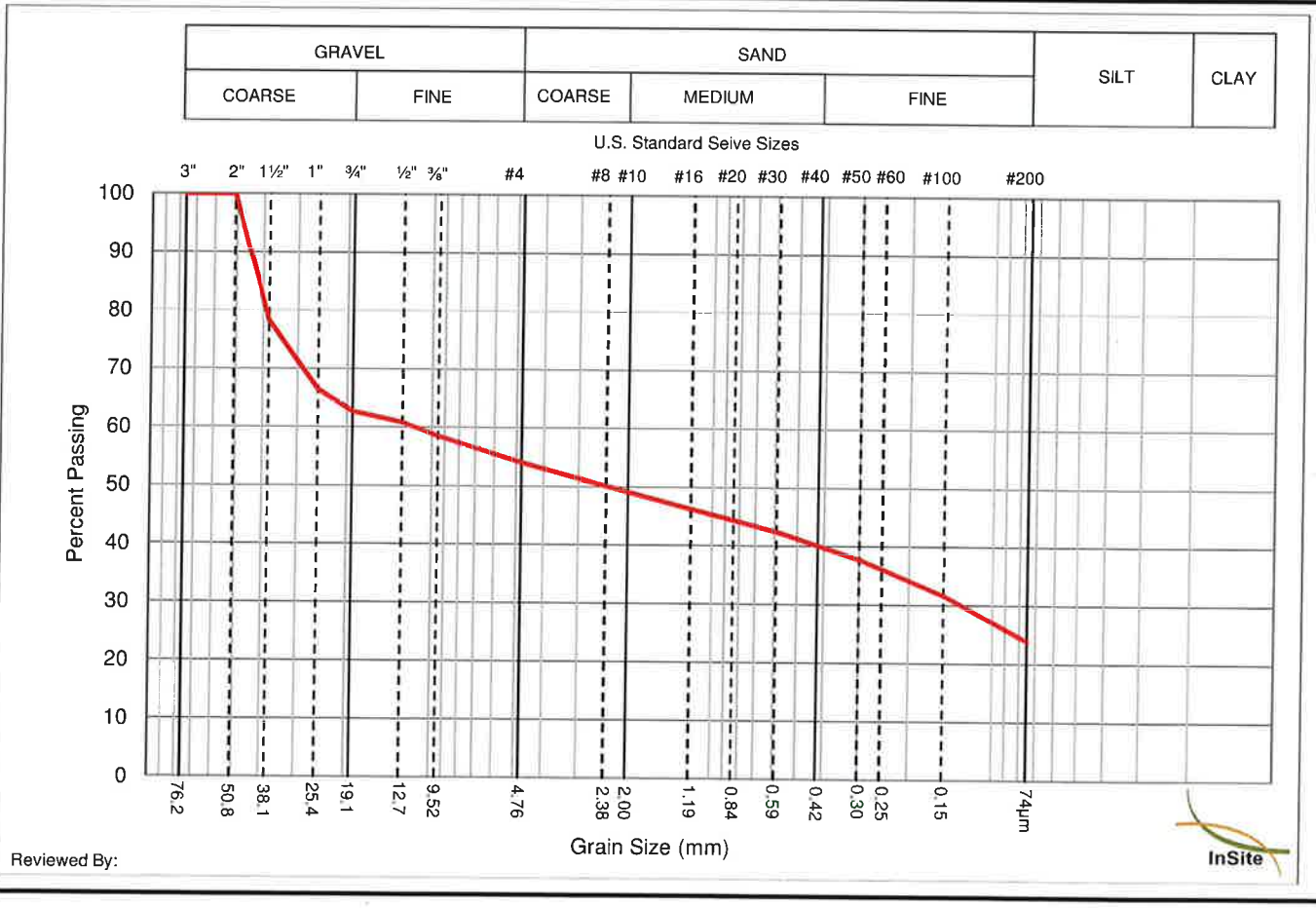

Reviewed By:

## GRAIN SIZE ANALYSIS RESULTS

| | | | |
|---|---|---|---|
| Project: | Multi-Family Development | Insite File No.: | BEA-2071 |
| Location: | 1327 Tronson, Vernon | Figure No: | C.03 |
| Client: | 0 | cc: | |
| Attention: | 0 | | |

| | | | |
|---|---|---|---|
| Sample Source: | Test Hole | Date Sampled: | November 25,2016 |
| Sample Location: | 3-1 @ 9' | Date Received: | November 28.2016 |
| Specification: | None | Date Tested: | November 29.2016 |
| Material Type: | GRAVEL, sandy, silty | Sampled by: | HW |
| Natural Moisture Content: | 4.8% | Tested by: | JH |
| Sieve Series | 8/16/30/50 | Test Method: | ASTM C117 & C136 |
| Fineness Modulus | 4.38 | | |

| Gravel Sizes | | | | | Sand, Silt and Clay Sizes | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sieve Sizes | | Percent | Gradation Limits | | Sieve Sizes | | Percent | Gradation Limits | |
| US Sieve | Metric (mm) | Passing | Min | Max | US Sieve | Metric (mm) | Passing | Min | Max |
| 3" | 76.2 | 100.00 | | | #4 | 4.75 | 53.97 | | |
| 2" | 50.8 | 100.00 | | | #8 | 2.40 | 50.07 | | |
| 1½" | 38.1 | 78.31 | | | #16 | 1.20 | 46.31 | | |
| 1" | 25.4 | 66.47 | | | #30 | 0.60 | 42.56 | | |
| ¾" | 19.1 | 62.65 | | | #50 | 0.30 | 37.71 | | |
| ½" | 12.7 | 60.85 | | | #100 | 0.15 | 31.68 | | |
| ⅜" | 9.5 | 58.50 | | | #200 | 0.075 | 23.90 | | |



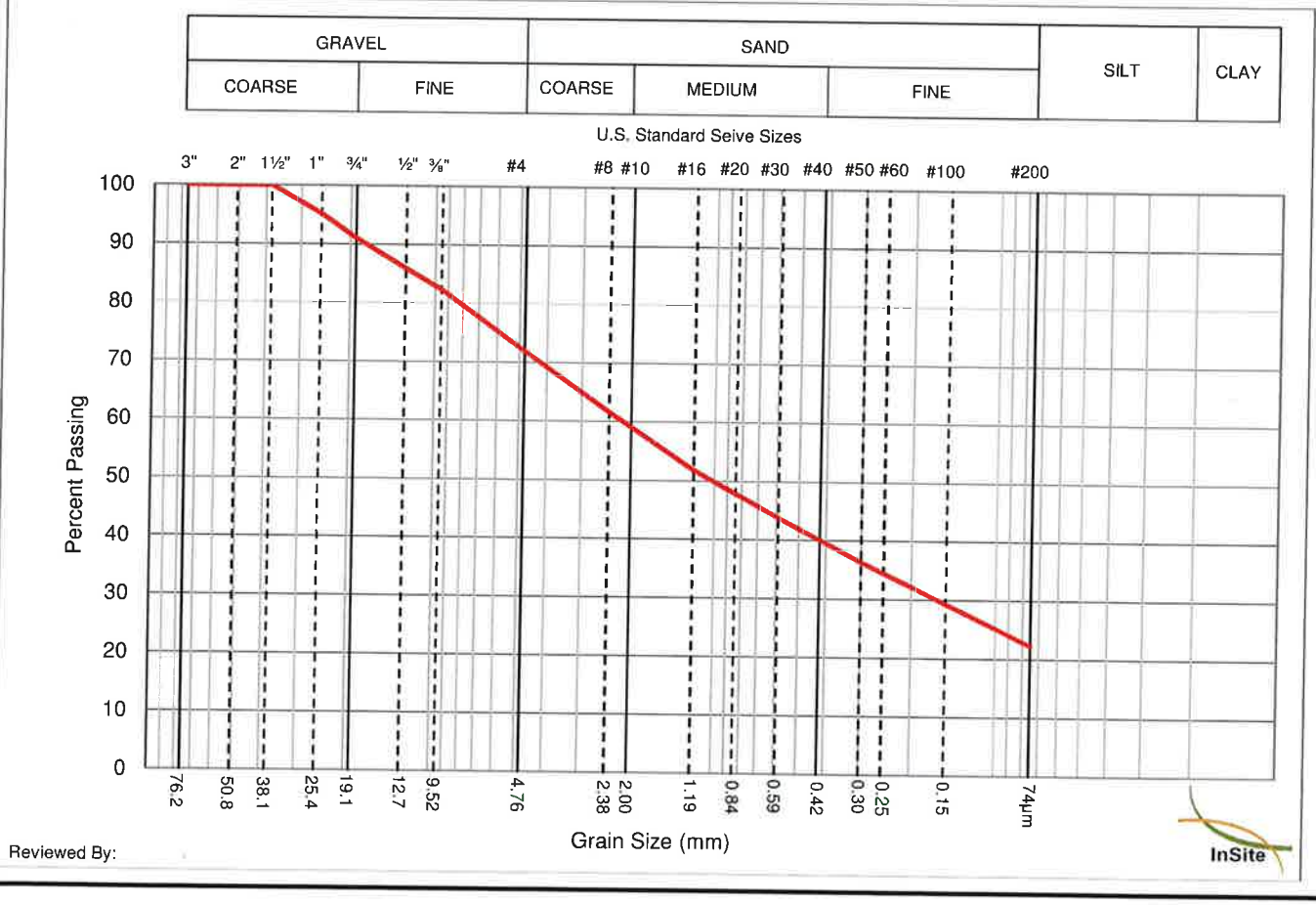

Reviewed By:

## GRAIN SIZE ANALYSIS RESULTS

| | | | |
|---|---|---|---|
| Project: | Multi-Family Development | Insite File No.: | BEA-2071 |
| Location: | 1327 Tronson, Vernon | Figure No: | C.04 |
| Client: | 0 | cc: | |
| Attention: | 0 | | |

| | | | |
|---|---|---|---|
| Sample Source: | Test Hole | Date Sampled: | November 25,2016 |
| Sample Location: | 4-2 @ 9' | Date Received: | November 28.2016 |
| Specification: | None | Date Tested: | November 29.2016 |
| Material Type: | SAND, gravelly, silty | Sampled by: | HW |
| Natural Moisture Content: | 6.9% | Tested by: | JH |
| Sieve Series | 8/16/30/50 | Test Method: | ASTM C117 & C136 |
| Fineness Modulus | 3.32 | | |

| Gravel Sizes | | | | | Sand, Silt and Clay Sizes | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sieve Sizes | | Percent | Gradation Limits | | Sieve Sizes | | Percent | Gradation Limits | |
| US Sieve | Metric (mm) | Passing | Min | Max | US Sieve | Metric (mm) | Passing | Min | Max |
| 3" | 76.2 | 100.00 | | | #4 | 4.75 | 71.75 | | |
| 2" | 50.8 | 100.00 | | | #8 | 2.40 | 61.57 | | |
| 1½" | 38.1 | 100.00 | | | #16 | 1.20 | 51.93 | | |
| 1" | 25.4 | 95.18 | | | #30 | 0.60 | 44.01 | | |
| ¾" | 19.1 | 91.03 | | | #50 | 0.30 | 36.37 | | |
| ½" | 12.7 | 85.89 | | | #100 | 0.15 | 29.31 | | |
| ⅜" | 9.5 | 82.33 | | | #200 | 0.075 | 22.30 | | |




Reviewed By:

# APPENDIX D

GENERAL CONDITIONS

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geotechnical

This report incorporates and is subject to these "General Conditions".

## 1. USE OF REPORT AND OWNERSHIP

This geotechnical report pertains to a specific site, a specific development and a specific scope of work. It is not applicable to any other sites nor should it be relied upon for types of development other than that to which it refers. Any variation from the site or development would necessitate a supplementary geotechnical assessment. This report and the recommendations contained in it are intended for the sole use of Beacon's client. Beacon does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than Beacon's client unless otherwise authorized in writing by Beacon. Any unauthorized use of the report is at the sole risk of the user. This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of Beacon. Additional copies of the report, if required, may be obtained upon request.

## 2. NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems and methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned. Classification and identification of geological units are judgmental in nature as to both type and condition. Beacon does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice. Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

## 3. LOGS OF TEST HOLES

The test hole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

## 4. STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historic environment. Beacon does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional investigation and review may be necessary.

## 5. SURFACE WATER AND GROUNDWATER CONDITIONS

Surface and groundwater conditions mentioned in this report are those observed at the times recorded in the report. These conditions vary with geological detail between observation sites; annual, seasonal and special meteorologic conditions; and with development activity. Interpretation of water conditions from observations and records is judgmental and constitutes an evaluation of circumstances as influenced by geology, meteorology and development activity. Deviations from these observations may occur during the course of development activities.

## 6. PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

## 7. SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

## 8. INFLUENCE OF CONSTRUCTION ACTIVITY

There is a direct correlation between construction activity and structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques are known.

## 9. OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, as well as the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

## 10. DRAINAGE SYSTEMS

Where temporary or permanent drainage systems are installed within or around a structure, the systems which will be installed must protect the structure from loss of ground due to internal erosion and must be designed so as to assure continued performance of the drains. Specific design detail of such systems should be developed or reviewed by the geotechnical engineer. Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function.

## 11. BEARING CAPACITY

Design bearing capacities, loads and allowable stresses quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition assumed. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions assumed in this report in fact exist at the site.

## 12. SAMPLES

Beacon will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the client's expense upon written request, otherwise samples will be discarded.

## 13. STANDARD OF CARE

Services performed by Beacon for this report have been conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practising under similar conditions in the jurisdiction in which the services are provided. Engineering judgement has been applied in developing the conclusions and/or recommendations provided in this report. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of this report.

## 14. ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, Beacon has not been retained to investigate, address or consider and has not investigated, addressed or considered any environmental or regulatory issues associated with development on the subject site.