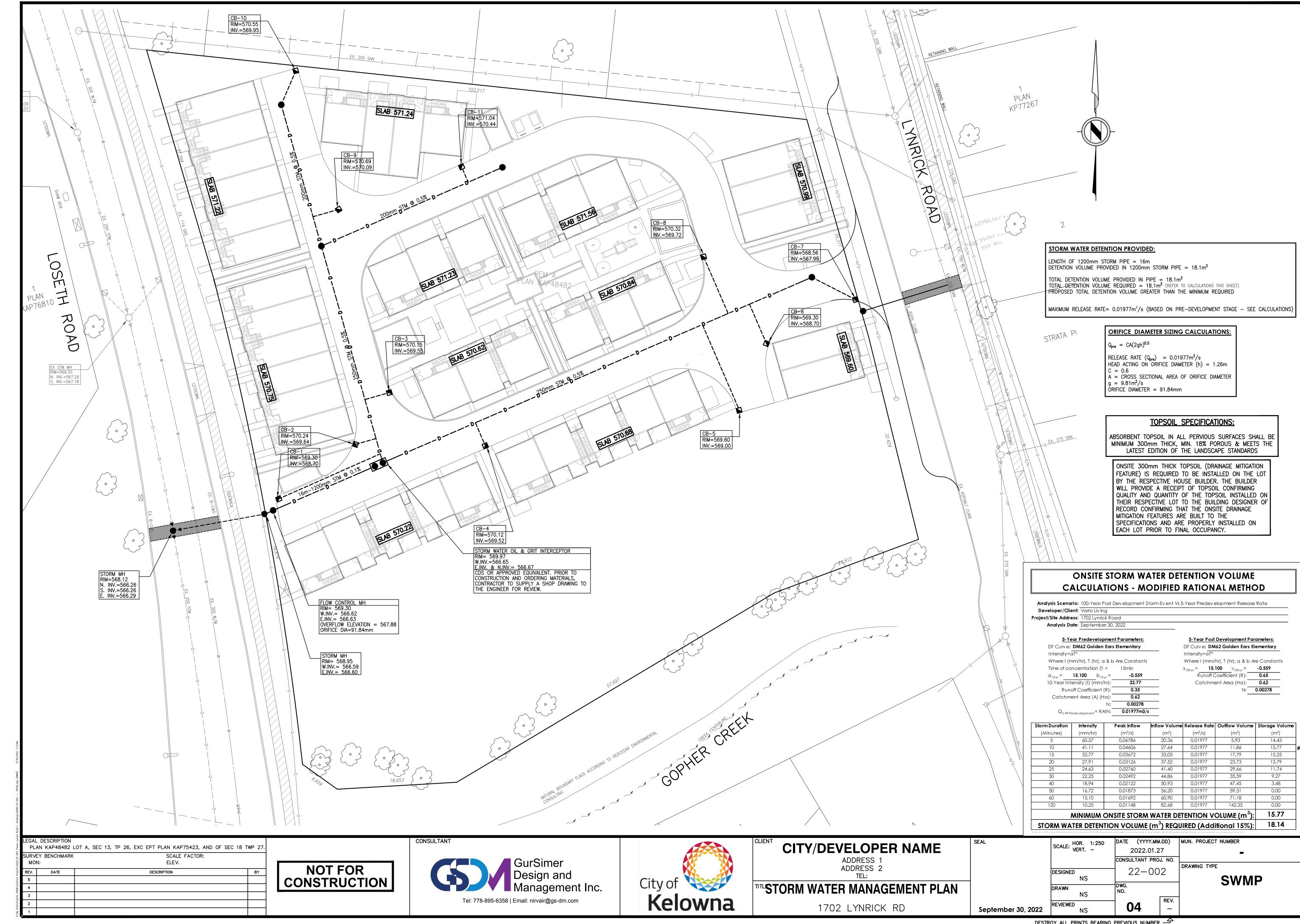


DESTROY ALL PRINTS BEARING PREVIOUS NUMBER 🗲





MATERIALS TESTING • SOILS CONCRETE • ASPHALT • CORING GEOTECHNICAL ENGINEERING

#1 – 1965 MOSS COURT KELOWNA, B.C. V1Y 9L3 250-860-6540 INFO@INTERIORTESTING.COM

Varro Developers Inc. 16783 18B Avenue Surrey, BC V3Z 2A3 February 3, 2022 Job 18.120

Attention: Mr. Pawan Dhaliwal

Re:

Geotechnical Investigation

Proposed Residential Development

1702 Lynrick Road

Kelowna, BC

As requested, Interior Testing Services Ltd. (ITSL) has carried out a geotechnical investigation at the above noted address. Please find attached the following documents

- a site plan with approximate cross sections and schematic logs
- a page of historical contour mapping
- 7 pages of test hole logs
- Three page Appendix D: Landslide Assessment Assurance Statement

Also attached is a copy of our two page "Terms of Engagement" which forms the basis on which we undertake this work, and was previously signed and accepted.

1.0 INTRODUCTION

1.1 Proposed Development

We understand development of the above noted properties is being considered, including construction of low-rise townhomes, site access roads and servicing. We have reviewed historical mapping and understand that significant thicknesses of uncontrolled fills have been placed at the southern half of the site.

1.2 Scope of Work

Our scope of work was to review the surficial fill, underlying natural soil and groundwater conditions with respect to geotechnical comments for safe land use,

feasibility and planning, and provide recommendations regarding development, foundation design, and construction.

We understand that this report may form part of your development application, and we identify the City of Kelowna as authorized users of this report, also subject to the attached "Terms of Engagement."

2.0 SITE DESCRIPTION

The property is currently occupied by a single family house and occasional outbuildings, which we understand would be demolished. The site is generally level, at roughly the same elevation as the adjacent roadways, including Lynrick Road to the east and Loseth Road to the west. Single family homes exist to the north. The surrounding area is generally developed with single family homes, occasional larger rural, residential properties, and occasional multi-family developments.

At the south side of the roughly 2.5 acre property, the site slopes down steeply to Gopher Creek. Based on review of 1970 contour mapping, the south portion of the site historically sloped down at gradual grades towards the creek, and significant depths of fills (upwards of roughly 10 to 12 m) were placed on the site to create the current roughly level conditions. Roughly half of the property is expected to contain surface fills in excess of roughly 5 m deep. We understand the fills were in part placed during construction of Loseth Road at the southwest corner of the subject site. At this area of Loseth Road, we understand that the roadway is constructed on roughly 10 m (or more) of fill.

3.0 METHODOLOGY

3.1 Desk Review

A desk review was carried out which included examination of aerial photographs and topographic maps of the area, including contour mapping from the 1970's. Based on the historic and current contour mapping, approximate cross sections were produced to attempt to estimate the depth of fill on the site. The approximate cross sections are shown on Drawing 18.120-1, and suggest the total volume of fill to be on the order of roughly 50,000 cubic meters.

3.2 Field Review

On April 17 and 18, 2018, a field review of the property was carried out. The property was traversed to view the existing surface soil and general drainage

conditions, and identify probable fill areas as well as other potential hazards concerning to the proposed development. A test pit program was also carried out, which included excavation of 3 test pits. The test pits ranged in depth from 1.1 to 2.4 m below the ground surface using a 50 series tracked excavator operated by A.G. Appel Enterprises. Two of the test pits were terminated in the surface fills; however natural soils were encountered at TP3 where percolation testing was carried out at roughly 1 m below surrounding grade.

On April 18, 2019, a drilling instigation was carried out to provide additional information with respect to the fill depth, condition and extent, as well as review the underlying natural soils. Adjacent to three of the auger holes, Dynamic Cone Penetration Testing (DCPT) was conducted to provide information of the relative density of the fill soils. These tests are typically comparable to Standard Penetration Test 'N' values, which are commonly used in geotechnical design.

The approximate locations and schematic logs of the test holes are shown on the attached site plan (Drawing 18.120-1). Detailed soil descriptions are provided on the attached test hole logs (Drawings 18.120-2 to 18.120-8).

4.0 INVESTIGATION RESULTS

4.1 Soil Conditions

Detailed soil descriptions are shown on the attached test hole logs (Drawings 18.120-2 to 18.120-8), which should be used in preference to the generalized soil descriptions that follow.

Surface fills were encountered to roughly 4.7 to 6.1 m depth within AH2 and AH4, respectively at the south half of the property. The surface fills were unbounded in Auger Hole 1 (AH1) at the southwest corner of the site at 11.3 m depth. The fills were also unbounded in TP1 and TP2 at 2.4 m below grade.

The fill materials were typically mixtures of SILT, SAND, and GRAVEL, with occasional SILT/CLAY layers. Notable garbage was not encountered in our test holes. DCPT blow counts in the surface fills were between 4 and 112 blows/300mm which suggests variable compaction. In their existing condition, the fill soils are not suitable for conventional foundation support, as significant settlements would be anticipated.

Beneath the surface FILL, and at the north portion of the site the underlying natural soils are expected to be variable glacial washout deposits, including silt, sand, and gravel soils ('till-like'), overlying bedrock. The natural soils appear competent for the proposed development.

4.2 Groundwater Conditions

Groundwater is expected to be significantly deep and therefore not of significant geotechnical concern for the proposed development. Groundwater levels and runoff are expected to vary seasonally and will be affected by drainage and infiltration conditions.

Percolation testing was attempted adjacent to TP3 at roughly 1 m below grade within the silty SAND and GRAVEL soils which are expected to be the predominant natural soil type on the site. However the test was abandoned given the relatively impermeable conditions. Given the presence of significant fill and dense natural soils, disposal of site generated storm water to ground does not appear feasible for this site.

4.3 Topography and Slopes

Given the hillside nature of the property, slope stability is of primary importance for geotechnical design for the proposed development. The underlying natural sloping condition is estimated based on the historical contour mapping to have been roughly 3 Horizontal to 1 Vertical (3H:1V). The filled condition has resulted in steep slopes at the south property line, on the order of 1.5H:1V with localized steeper conditions. At the southwest corner a previous slump or instability appears to have occurred.

5.0 SITE PREPARATION & FOUNDATION DESIGN OPTIONS

Given the steep slopes and significant fill depths, development of the south, roughly 20% of the property is expected to be very challenging. This area is approximately shown on the attached site plan as the "deep fill and slope area." To that end, we suggest building construction not be contemplated in this area; although if desired, complete removal of the fills and/or deep foundations could be contemplated and additional geotechnical guidance could be provided. The following discussion and recommendations are based on our assumption that the "deep fill and slope area" is not to be developed.

As noted above, the total fill volume on the site is approximately estimated as 50,000 cubic meters. If the "deep fill and slope area" is not included, the fill estimate reduces to roughly 30,000 cubic meters.

Based on the geotechnical challenges present on the site, several foundation options were considered for the remaining fill area where the fill depths are shallower, including completely removing the old fills and replacing as structural FILL for support of the proposed development, supporting the buildings on piles and tolerating movement of the surrounding infrastructure, or surface treatment of the fills by means of Rapid Impact Compaction (RIC) and robust raft slab foundations for building support. These foundation options are discussed further below.

At the northeast corner of the site, natural soils are expected at relatively shallow grades, below the surface topsoil and any shallow fills. Conventional strip foundations and construction methods appear suitable for development in the area.

5.1 Over-Excavation & Replacement with Structural Fill

With some sorting, the existing non-structural FILL materials generally appear suitable for re-use as structural FILL. Although given the poorer-quality nature of the material, limiting the fill depth below the building to 3 m or less is recommended. This is anticipated to be feasible by developing areas with 6 m of surfaces fills (or less) below the proposed site grades, and constructing the buildings with full basements. Daylight basement conditions could be achieved by cutting down the fill area south of the buildings.

The fills should be completely removed to expose the underlying natural soils. To reestablish the basement foundation grades, structural fills should then be placed and compacted in maximum 300 mm lifts to at least 95% Modified Proctor Density (MPD) and within 2% of optimum moisture content.

Particle diameters within the fill material should be maintained at 250 mm maximum. Additional care will be required to 'key' the structural fills into the natural slope, a distance of at least 600 mm from the inside face of the slope.

Field density testing should be carried out on every second lift of fill placed (every 600 mm) to confirm adequate compaction is being achieved.

We note that even well-compacted structural FILL has some potential to settle on the order of 1 to 2% of the total fill depth, particularly in the event of water infiltration. Considering a 3 m deep fill, this could translate to 60 mm of movement, which is in excess of standard geotechnical tolerances (on the order of 25 mm (1 inch)). This risk is inherent to construction on fills, and if not tolerable, extraordinary foundations could be contemplated, including piles to bypass the fills, and/construction of robust raft slab foundations.

5.2 Piles

In order to by-pass the fills, piles could be installed for foundation support. Driven steel pipe piles, (say 250 mm diameter) or timber piles, concrete pilasters, or drilled-in, helical pipe piles could be considered to transfer the building loads to the underlying natural soils. To transfer the building loads to the piles, construction of a raft slab may be required. Alternatively, if grade beams are sufficient to span the pile caps, pile support of proposed slab-on-grades would also be required.

If you desire to pursue this foundation option, additional design guidance including pile capacity estimates could be provided for the pile type selected.

One of the drawbacks of pile-supporting the proposed buildings is that it only eliminates settlement potential of the buildings, and significant settlement of the surrounding infrastructure including roads and utilities would still be of design concern. A robust pavement structure could be constructed to attempt to tolerate the settlement as much as possible, and flexible couplings and increased minimum pipe grades would be recommended for utilities; however the risk of settlement would need to be tolerable. Additional design guidance with respect to civil design in the fills could be provided, if piles are selected for building support.

5.3 Rapid Impact Compaction

Rapid Impact Compaction (RIC) is a ground improvement method, involving a hydraulic ram attached to a large track excavator to provide a surface densification treatment. RIC can produce large vibrations, which may be damaging to nearby homes and infrastructure. This risk should be further reviewed and understood, to determine if it is tolerable by the development team.

RIC could be carried out to improve the density of the underlying fills as much as possible. RIC is often effective to depths upwards of 6 m, so that this option would only be practical in fill areas of 6 m or less. Upon completion, additional drilling and DCPTs would be required to review the level of densification achieved.

To tolerate the settlement potential remaining after the surface densification, construction of strong raft slab foundations may be sufficient for building support. Raft slabs are often capable of tolerating settlement upwards of 50 to 100 mm while maintaining building performance. Additional design guidance with respect to foundation design would be provided upon completion of the RIC and additional drilling work.

5.4 Foundation Design

For conventional strip foundations placed on the competent natural soils (anticipated at the northeast corner of the site) or well-compacted structural FILL and/or for preliminary raft slab design, an allowable bearing pressure of 3000 psf (150 kPa) may be assumed, subject to the following conditions.

- Bearing surfaces to be clean, dry and well-compacted.
- ii. Minimum strip footing width to be 400 mm (16 inches).
- iii. Footings to be placed 600 mm (24 inches), or as per local by-law, for frost protection.

We recommend foundations be set below and behind a conventional 2 Horizontal to 1 Vertical plane projected up from the toe of the southern slope.

The above noted allowable bearing capacity can be taken as the serviceability limit state bearing pressure for limit states design. For structural design according to the 2012 BC Building Code, the factored geotechnical bearing resistance can be taken as 4500 psf (225 kPa).

5.5 Site Class

We do not have sufficient soils information to depth with respect to Site Class for seismic design. However, based on our experience in the surrounding area and review of the geology, we anticipate stiff soils to depth, with average undrained shear strength greater than 50 kPa. To that end, a Site Class D appears suitable for the site as taken from Table 4.1.8.4.A of the 2012 BC Building Code.

However, as this is based predominantly on our experience in the area and review of the local geology, this value is expected to be conservative. If more detailed guidance with respect to Site Class is desired, a deeper drilling investigation could be carried out. However this is not expected to be necessary for the development proposed and the cost associated with providing more

detailed comments on Site Class would likely be more expensive than designing and constructing the building to a lower designation.

There is potential for some damage due to earthquake effects. It is typical for low rise buildings to perform quite well in seismic events, even where some seismic induced settlement occurs, and safe exit (the code requirement under the design earthquake) is expected. However, some damage to the building could occur so that consideration should be given to purchasing earthquake insurance.

6.0 SITE DEVELOPMENT AND CIVIL DESIGN ASPECTS

6.1 Site Grading

Where proposed parking and utility areas are planned, it is generally recommended that all topsoil, old fill, and buried structures be completely removed to expose the underlying natural granular soils. At the northeast corner of the site, this would typically involve excavation on the order of 0.5 to 1.5 m; although may locally be deeper particularly at the location of existing buildings. Towards the south and west, deeper fills occur within the developable area, and depending on your desired foundation option for the buildings, the fills may be removed and re-compacted or densified from the surface as best as possible.

Where site grades are desired to be raised, good-quality, granular structural fills (placed and compacted in lifts) are recommended to achieve the desired grades.

If adequately sorted, the existing surface fill materials are anticipated to be suitable for re-use as structural fill, although particle diameters should be maintained at 250 mm maximum. Structural FILL material is to consist of clean, granular soil, preferably well-graded and is to not have more than 8% fines passing the #200 sieve. All proposed structural FILL materials are to be approved by ITSL prior to placement.

Structural fills should be placed and compacted in maximum 300 mm lifts to at least 95% MPD and within 2% of optimum moisture content. Field density testing and/or proof roll observations should be carried out on every second lift of fill placed (every 600 mm).

In addition, structural FILL material is to be placed horizontally beyond the edge of any foundation element a distance at least equal to the total depth placed. For

a 1 m deep FILL, the FILL material is to extend at least 1 m beyond the edge of the foundation to allow for a conventional 1H:1V load spread condition.

We recommend soil cut and structural fill slopes be finished at no steeper than 1.5 Horizontal to 1 Vertical (1.5H:1V) and vegetated by means of hydro-seeding or similar to reduce the potential for surface erosion. All slopes may require some degree of maintenance with the passing of time.

Bedrock cut slopes are not anticipated; although bedrock may be shallow at the northeast corner so that blasting or rock hammering may be locally required within deep service trenches.

6.2 Drainage

To reduce saturation induced settlement of the fill soils and/or breakout/instability at the southern slope, control of site drainage to the storm system (designed by others) is strongly recommended for this site.

Standard perimeter and roof drainage should be provided for all structures, and directed to a suitable location for disposal, such as the storm system. Finished grades should be sloped away from the buildings in order to minimize infiltration of water into the backfill zone.

6.3 Pavement Design

Where roadways are expected to be constructed on competent natural soils or shallow thicknesses of well-compacted structural fills, the following pavement structure is recommended which appears suitable from a frost protection perspective as well.

50 mm	ASPHALT
100 mm	base GRAVEL (19 mm minus)
350 mm	subbase GRAVEL (150 mm minus)

Beneath the site entrance areas and where truck traffic is expected, it would be prudent to increase the surface asphalt thickness to 75 mm.

Where deeper fills occur, complete or partial removal and replacement as structural fill could be carried out, or RIC surface densification to compact the fills as best as possible. However, as some risk of settlement would remain (particularly in the event of water infiltration), additional guidance for a thicker

pavement structure and/or inclusion of biaxial or triaxial geogrid reinforcements could be provided to create a more robust pavement structure to attempt to bridge the underlying movement as best as possible. Further design guidance can be provided at the time of civil site design and construction if necessary.

6.4 <u>Utility Installation</u>

Where proposed utility services are anticipated to bear on competent natural and/or shallow thicknesses of structural fill soils, pipe support should be adequate. Where utilities are founded in fill soils, significant settlements may occur depending on the density of the fills. For this site, flexible connections at the buildings and increased minimum pipe grades are recommended for utilities within deep structural fills (ie. in excess of 3 m) and/or fills densified by RIC.

For trench cuts in the natural generally granular soils we anticipate conventional Worksafe BC (WCB) side slopes of 3 Horizontal to 4 Vertical (0.75H:1V) should be satisfactory for cut slopes up to roughly 3 meters in height. We anticipate that slope cuts in excess of 3 meters in dense natural soils would be feasible; however this should be reviewed in the field by ITSL at the time of construction. For trench cuts in fill materials, flatter slopes should be provided depending on the density of the fill material. Additional geotechnical engineering guidance should be provided during construction.

Based on our test holes and laboratory testing, it generally appears reasonable to replace the excavated natural granular soils or structural fills as trench backfill, provided particles in excess of 250 mm are removed. Trench backfill material should be placed and compacted in maximum 300 mm lifts to at least 95% MPD and within 2% of optimum moisture content.

7.0 SITE SUITABILITY

Upon completion of site preparation subject to the recommendations provided in this report, the site is anticipated to be adequate for the proposed residential development and safe building sites are possible on the property.

In reference to Section 86 of the Land Title Act and Sections 919.1 and 920 of the Local Government Act, in our opinion, the land may be used safely for the use intended, conditional to our recommendations provided within this report.

We define "safe" based on the levels of safety adopted by the City of Kelowna, including a 2% probability of failure occurring in a 50 year period (1 in 2475) for slope instability affecting the recommended development area (ie. not the "deep fill and slope area". At the southern steep slope, site re-grading is recommended to flatten the slopes to 1.5H:1V (or flatter). The disturbed slopes should be vegetated by means of hydro-seeding or similar to reduce the potential for surface erosion. A "no-build" covenant on the slope and deep fill area is recommended.

In accordance with the EGBC Guidelines for Legislated Landslide Assessments for Residential Developments, we have included an Appendix D: Landslide Assessment Assurance Statement.

8.0 RECOMMENDATIONS ARE CONCLUSIONS

Results of our field investigation and recommendations for site preparation and foundation design options have been provided in the previous sections of this report. Further design guidance can be provided once the proposed site grades, building locations and elevations, and loading conditions have been determined.

Obviously the site preparation and foundation options have different costs, risks, and performance related aspects. Further design guidance can be provided to assist in choosing the best option or combination of options for the desired outcomes of the project.

Site preparation of parking areas and pavement structure design should be reviewed once site grades and building foundation design options are determined.

We trust this meets your current needs. Please contact our office should you have any questions.

Yours truly,

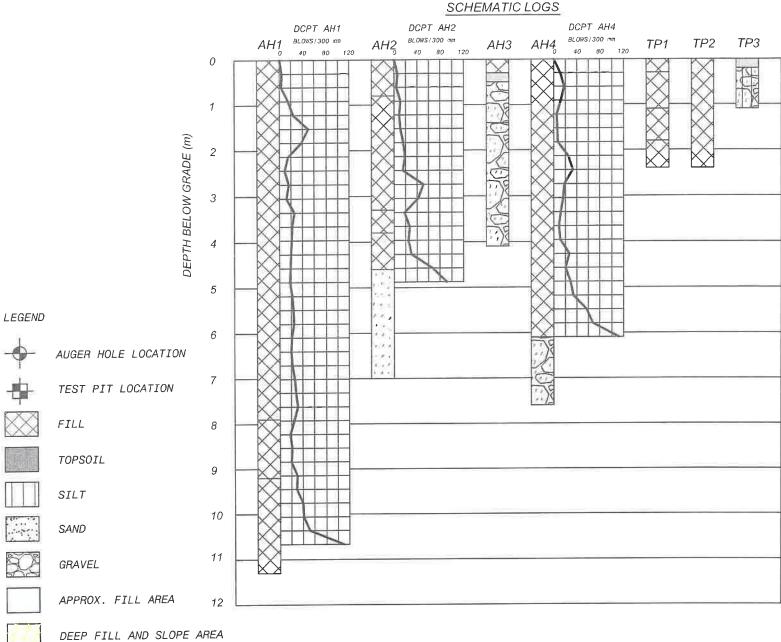
Interior Testing Services Ltd.

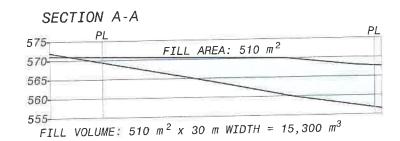
Permit to Practice Number: 1001971

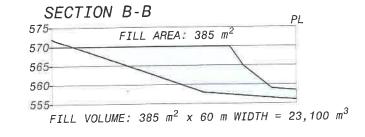
Braden Bouwsema, E.I.T.

Peter Hanenburg, P. Eng.

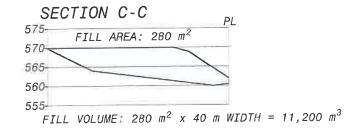








KELOWNA, B.C.



APPROX. TOTAL FILL VOLUME: 49,600 m³ (50,000 m³)

NOTES

- 1. REFERENCE PLAN ADAPTED FROM CITY OF KELOWNA GIS.
- 2. AUGER HOLE/TEST PIT LOCATIONS ARE APPROXIMATE AND MAY VARY FROM THAT SHOWN.
- 3. FOR DETAILED SOIL DESCRIPTIONS REFER TO AUGER HOLE LOGS (DRAWINGS 18.120-2 TO 18.120-8).

VARRO DEVELOPERS INC

GEOTECHNICAL INVESTIGATION
PROPOSED DEVELOPMENT

1702 LYNRICK ROAD

SCHEMATIC LOGS

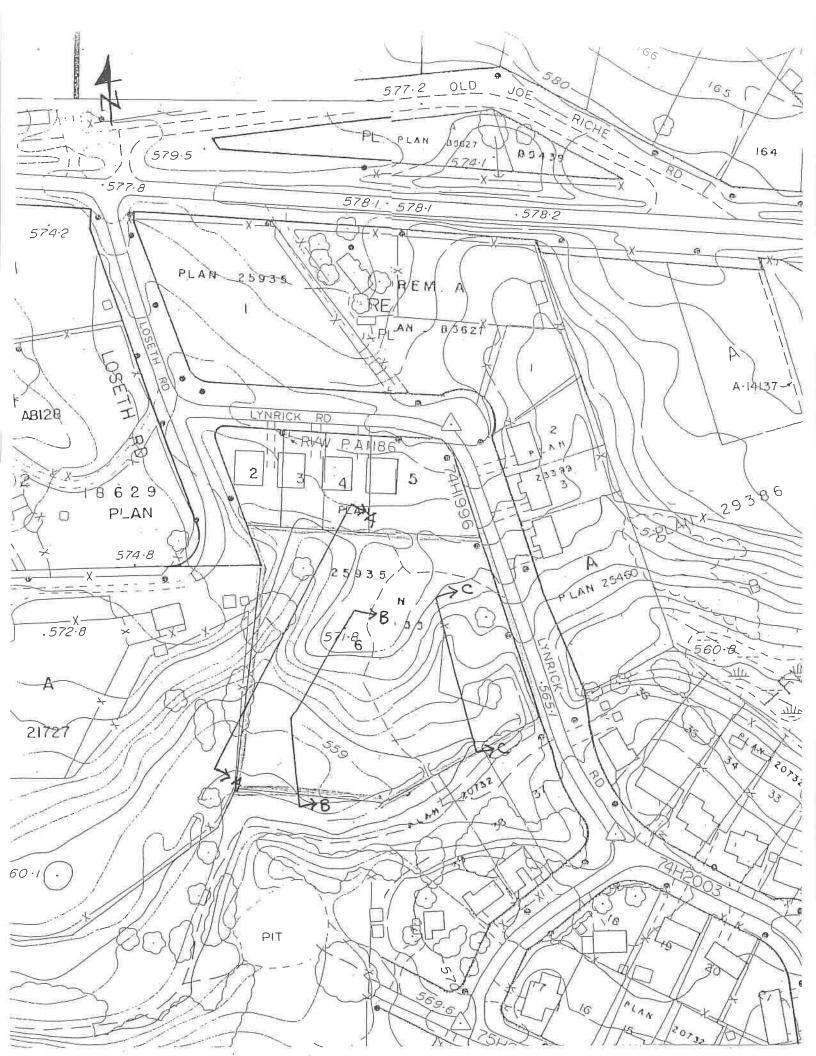
INTERIOR TESTING SERVICES LTD.

1-1965 MOSS COURT, KELOWNA, BC V1Y 9L3

PH: 250-860-6540 email: info@interiortesting.com

DATE OF INVESTIGATION: APRIL 17/18, 2018

JOB NUMBER: 18.120 DRAWING NUMBER: 18.120-1



2	- INTER TESTING S - LTI	RIO SER D.	PR -					LOG OF AUGER HOLE 1	
	Interior Testing 1 - 1965 Mc Kelowna, BC ph: (250) 86 em: info@interio	oss (V1 50 -	Court Y 9L3 6540	Project		4	: Ge : 17 : Ke	Method Solid Stem cotechnical Investigation Operator Mud Bay 02 Lynrick Road Logged By JD clowna, BC Date April 18, 2018 be Dwg, No. 18,120-1	
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1	10%	4 3 15 24 50 38	No groundwat observed.	er		S1		Dark brown, silty, sand and gravel, FILL.	1-
3	7	15 9 16 12 26 22				S2	2		3
5	9%	21 20 19 18 22 24 25				\$3 \$4			5
7-1111111111111111111111111111111111111	10%	21 20 22 26 28 31 25	Trace wood wa			S 5		~	7
9	8%	18 21 20 30				S6		Light brown, gravelly sand, FILL.	9-
10	010%	29 40 41 52	Dynamic Cone Penetration Te 63.5 kg automa hammer, by 18	itic trip		S 7		Dark brown, silty, sand and gravel, FILL.	10
11	∘8%		cone, 25 mm til sides, 38 mm re following.	o, 60°	\otimes	S8		Bottom of auger hole at 11.3m. Refusal on dense soil.	11-
								Drawing No. 18.12	20-2

	- INTER TESTING : - LTI	SER	VIC	CES					LOG OF AUG	SER HOLE 2	2	
	Interior Testing 1 - 1965 M Kelowna, BC ph: (250) 8t em: info@interi	oss (C V1 60 -	Cou Y 9 654	rt L3 0	Project Location			: 170 : Kel	120 otechnical Investigation 02 Lynrick Road owna, BC e Dwg, No, 18,120-1	Method Operator Logged By Date	Solid Stem Mud Bay JD April 18, 2018	
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12			=						<u>.</u>		Drawing No. 18.	120-3

	- INTERIOR - TESTING SERVICES - LTD				LOG OF AUGER HOLE 3	
	Interior Testing Services Ltd 1 - 1965 Moss Court Kelowna, BC V1Y 9L3 ph: (250) 860 - 6540 em: info@interiortesting.com	Project Location		: 17 : K e	Method Solid Stem otechnical Investigation Operator Mud Bay 02 Lynrick Road Logged By JD lowna, BC Date April 18, 2018 e Dwg, No. 18,120-1	
Depth in Meters	% Moisture REMAR	KS PAR	Sample Number	Sample Type	Legend Water Noted During Drilling Disturbed Sample DESCRIPTION	Depth in Meters
10	No groundwater observed.		\$1 \$2 \$3 \$3			10
					Drawing No. 18.12	20-4

4	- INTEL TESTING - LT	SER	VIC	CES					LOG OF AUC	GER HOLE 4	4	
	Interior Testing 1 - 1965 M Kelowna, BO ph: (250) 8 em: info@interi	oss (C V1 60 -	Cou IY 9 654	rt L3 0	Project Locatio			: 17 : Ke	120 otechnical Investigation 02 Lynrick Road owna, BC e Dwg, No. 18,120-1	Method Operator Logged By Date	Solid Stem Mud Bay JD April 18, 2018	
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											Drawing No. 18.1	20-5

4	- INTERIOR TESTING SERV - LTD	ICES				LOG OF TE	ST PIT 1		
	Interior Testing Service 1 - 1965 Moss Control Kelowna, BC V1Y ph: (250) 860 - 65 em: info@interiortesti	ourt 9L3 540	Project Location		170 Ke	120 otechnical Investigation 02 Lynrick Road lowna, BC e Dwg. No. 18,120-1	Method Operator Logged By Date	Excavator A.G. Appel JD April 17, 2018	
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10- 2- 3- 4- 5- 6- 7- 8- 11-		Trace wood was noted at 0.6 met. No groundwater observed.	ers.	\$1 \$2 \$3 \$3 \$3 \$5 \$5 \$5 \$5		Grey, silty, sand and gr Dark brown, silty, sand, Light brown, silty, sand Bottom of test pit at 2.4	and gravel, occ. confile.	obble, FILL	10
								Drawing No. 18.	

4	- INTERIO TESTING SER' - LTD	R - VICES				LOG OF T	EST PIT 2		
	Interior Testing Serv 1 - 1965 Moss C Kelowna, BC V1' ph: (250) 860 - 6 em: info@interiortes	Court Y 9L3 S540	Project Location	70	: 17 : K e	.120 notechnical Investigation 02 Lynrick Road lowna, BC e Dwg. No. 18,120-1	Method Operator Logged By Date	: Excavator : A.G. Appel : JD : April 17, 2018	
Depth in Meters	% Moisture 0 30 60	Water Level NAMASA	KS G	Sample Number	Sample Type	Legend <u>▼</u> Water Noted Durin	DESCRIPTION	isturbed Sample	Depth in Meters
10	o 10%	No groundwater observed. Trace wood was noted at 1.2 meters	ite ×	S1		Bottom of test pit at 2.		(easy digging)	10 11 12 12 12 12 12 12
								Drawing No. 18	.120-7

- INTERIOR -TESTING SERVICES - LTD. -LOG OF TEST PIT 3 Project : 18.120 Method Excavator Interior Testing Services Ltd 1 - 1965 Moss Court Kelowna, BC V1Y 9L3 A.G. Appel Geotechnical Investigation Operator 1702 Lynrick Road Logged By : JD ph: (250) 860 - 6540 Kelowna, BC Date April 17, 2018 em: info@interiortesting.com Location See Dwg. No. 18,120-1 Legend ▼ Water Noted During Drilling Disturbed Sample Depth in Meters Sample Number Depth in Meters Sample Type Water Level GRAPHIC % Moisture REMARKS **DESCRIPTION** 60 30 0 TOPSOIL. No groundwater Brown, SAND and GRAVEL, some silt. (hard digging) observed. 09% Percolation Test S1 Bottom of test pit at 1.1m. 10 12 **Drawing No. 18.120-8**

APPENDIX D: LANDSLIDE ASSESSMENT ASSURANCE STATEMENT

Note: This Statement is to be read and completed in conjunction with the "APEGBC Guidelines for Legislated Landslide Assessments for Proposed Residential Development in British Columbia", March 2006/Revised September 2008 ("APEGBC Guidelines") and the "2006 BC Building Code (BCBC 2006)" and is to be provided for landslide assessments (not floods or flood controls) for the purposes of the Land Title Act, Community Charter or the Local Government Act. Italicized words are defined in the APEGBC Guidelines.

To: The Approving Authority	Date: FEBRUARY 3, 2022
CITY OF KELOWNA	•
1435 WATER STREET KELL	Aus
Jurisdiction and address	
With reference to (check one): Land Title Act (Section 86) – Subdivision App	roval
□ Local Government Act (Sections 919.1 and 9.	
□ Community Charter (Section 56) – Building P	ermit
 □ Local Government Act (Section 910) – Flood □ Local Government Act (Section 910) – Flood 	
	es 4.1.8.16 (8) and 9.4 4.4.(2) (Refer to BC Building
and Safety Policy Branch Information Bulletin	
For the Property:	
Lot A PLAN 48482 1702 Legal description and civic address of the Property	LYNPICK ROAD
Legal description and civic address of the Property	
The undersigned hereby gives assurance that he/she	is a Qualified Professional and is a Professional
Engineer or Professional Geoscientist.	
Lhave signed spaled and dated and thereby contifies	the attached landalide assessment report on the
I have signed, sealed and dated, and thereby certified Property in accordance with the APEGBC Guidelines.	
Statement. In preparing that report I have:	v
Check to the left of applicable items	
✓ 1. Collected and reviewed appropriate background.	nd information
✓ 2. Reviewed the proposed residential developm	ent on the Property
✓3. Conducted field work on and, if required, beyone	ond the Property
 Z. Reviewed the proposed residential developm Z. Conducted field work on and, if required, beyon Z. Reported on the results of the field work on and Z. Considered any changed conditions on and, if 	nd, if required, beyond the Property
✓ 5. Considered any changed conditions on and, i	f required, beyond the Property
6. For a landslide hazard analysis or landslide ri	Constitution and the second section of the se
6.1 reviewed and characterized, if appropriate	e, any landslide that may affect the Property
$\underline{\checkmark}$ 6.2 estimated the <i>landslide hazard</i>	
6.3 identified existing and anticipated future € Property	lements at risk on and, if required, beyond the
✓ 6.4 estimated the potential consequences to a	those elements at risk
7. Where the Approving Authority has adopted a	
7.1 compared the level of landslide safety administration	opted by the Approving Authority with the findings of
√7.2 made a finding on the level of landslide sage.	
√7.3 made recommendations to reduce landsli	de hazards and/or landslide risks

8.1	described the method of landslide hazard analysis or landslide risk analysis used
8.2	referred to an appropriate and identified provincial, national or international guideline for <i>level</i> of <i>landslide safety</i>
8.3	compared this guideline with the findings of my investigation
8.4	made a finding on the level of landslide safety on the Property based on the comparison
8.5	made recommendations to reduce landslide hazards and/or landslide risks
	orted on the requirements for future inspections of the Property and recommended who should luct those inspections.
Based on n	ny comparison between
Check or	
	the findings from the investigation and the adopted <i>level of landslide safety</i> (item 7.2 above) the appropriate and identified provincial, national or international guideline for <i>level of landslide safety</i> (item 8.4 above)
I hereby g assessmen	give my assurance that, based on the conditions ^[1] contained in the attached <i>landslide</i> it report,
Check or	
	for <u>subdivision approval</u> , as required by the Land Title Act (Section 86), "that the land may be used safely for the use intended"
	Check one ☐ with one or more recommended registered covenants. ☐ without any registered covenant.
₫	for a <u>development permit</u> , as required by the Local Government Act (Sections 919.1 and 920), my report will "assist the local government in determining what conditions or requirements under [Section 920] subsection (7.1) it will impose in the permit".
	for a <u>building permit</u> , as required by the Community Charter (Section 56), "the land may be used safely for the use intended"
	Check one ☐ with one or more recommended registered covenants. ☐ without any registered covenant.
	for flood plain bylaw variance, as required by the "Flood Hazard Area Land Use Management Guidelines" associated with the Local Government Act (Section 910), "the development may occur safely".
	for flood plain bylaw exemption, as required by the Local Government Act (Section 910), "the land may be used safely for the use intended".
<u>JENNIF</u> Name (print)	ER ANDERSON, P.ENG. FEBRUARY 3, 2022
at-	por-
Signature	

^[1] When seismic slope stability assessments are involved, level of landslide safety is considered to be a "life safety" criteria as described in the National Building Code of Canada (NBCC 2005), Commentary on Design for Seismic Effects in the User's Guide, Structural Commentaries, Part 4 of Division B. This states:

[&]quot;The primary objective of seismic design is to provide an acceptable level of safety for building occupants and the general public as the building responds to strong ground motion; in other words, to minimize loss of life. This implies that, although there will likely be extensive structural and non-structural damage, during the DGM (design ground motion), there is a reasonable degree of confidence that the building will not collapse nor will its attachments break off and fall on people near the building. This performance level is termed 'extensive damage' because, although the structure may be heavily damaged and may have lost a substantial amount of its initial structure and existence of the structure initial strength and stiffness, it retains some margin of resistance against collapse".

1965 Moss Covrt Address

KELOWNA, BC VIY 913

250 860 - 6540 Telephone



If the Qualified Professional is a member of a firm, complete the following.

I am a member of the firm INTEROR TESTING SERVICES

and I sign this letter on behalf of the firm. (Print name of firm)

TERMS OF ENGAGEMENT

GENERAL

Interior Testing Services Ltd. (ITSL) shall render the Services performed for the Client on this Project in accordance with the following Terms of Engagement. ITSL may, at its discretion and at any stage, engage subconsultants to perform all or any part of the Services. Unless specifically agreed in writing, these Terms of Engagement shall constitute the entire Contract between ITSL and the Client.

COMPENSATION

Charges for the Services rendered will be made in accordance with ITSL's Schedule of Fees and Disbursements in effect from time to time as the Services are rendered. All Charges will be payable in Canadian Dollars. Invoices will be due and payable by the Client within thirty (30) days of the date of the invoice without hold back. Interest on overdue accounts is 18% per annum, compounded monthly (19.6%)

REPRESENTATIVES

Each party shall designate a representative who is authorized to act on behalf of that party and receive notices under this Agreement.

TERMINATION

Either party may terminate this engagement without cause upon thirty (30) days' notice in writing. On termination by either party under this paragraph, the Client shall forthwith pay ITSL its Charges for the Services performed, including all expenses and other charges incurred by ITSL for this Project.

If either party breaches this engagement, the non-defaulting party may terminate this engagement after giving seven (7) days' notice to remedy the breach. On termination by ITSL under this paragraph, the Client shall forthwith pay to ITSL its Charges for the Services performed to the date of termination, including all fees and charges for this Project.

ENVIRONMENTAL

ITSL's field investigation, laboratory testing and engineering recommendations will not address or evaluate pollution of soil or pollution of groundwater. ITSL will co-operate with the Client's environmental consultant during the field work phase of the investigation.

PROFESSIONAL RESPONSIBILITY

In performing the Services, ITSL will provide and exercise the standard of care, skill and diligence required by customarily accepted professional practices and procedures normally provided in the performance of the Services contemplated in this engagement at the time when and the location in which the Services were performed. ITSL makes no warranty, representation or guarantee, either express or implied as to the professional services rendered under this agreement.

LIMITATION OF LIABILITY

ITSL shall not be responsible for:

- (a) the failure of a contractor, retained by the Client, to perform the work required in the Project in accordance with the applicable contract documents;
- (b) the design of or defects in equipment supplied or provided by the Client for incorporation into the Project;
- (c) any cross-contamination resulting from subsurface investigations;
- (d) any damage to subsurface structures and utilities;
- (e) any Project decisions made by the Client if the decisions were made without the advice of ITSL or contrary to or inconsistent with ITSL's advice;
- (f) any consequential loss, injury or damages suffered by the Client, including but not limited to loss of use, earnings and business interruption;
- (g) the unauthorized distribution of any confidential document or report prepared by or on behalf of ITSL for the exclusive use of the Client.

The total amount of all claims the Client may have against ITSL under this engagement, including but not limited to claims for negligence, negligent misrepresentation and breach of contract, shall be strictly limited to the lesser of our fees or \$50,000.00.

No claim may be brought against ITSL in contract or tort more than two (2) years after the Services were completed or terminated under this engagement.

PERSONAL LIABILITY

For the purposes of the limitation of liability provisions contained in the Agreement of the parties herein, the Client expressly agrees that it has entered into this Agreement with ITSL, both on its own behalf and as agent on behalf of its employees and principals.

The Client expressly agrees that ITSL's employees and principals shall have no personal liability to the Client in respect of a claim, whether in contract, tort and/or any other cause of action in law. Accordingly, the Client expressly agrees that it will bring no proceedings and take no action in any court of law against any of ITSL's employees or principals in their personal capacity.

THIRD PARTY LIABILITY

This report was prepared by ITSL for the account of the Client. The material in it reflects the judgement and opinion of ITSL in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. ITSL accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This report may not be used or relied upon by any other person unless that person is specifically named by us as a beneficiary of the Report. The Client agrees to maintain the confidentiality of the Report and reasonably protect the report from distribution to any other person.

INDEMNITY

The client shall indemnify and hold harmless ITSL from and against any costs, damages, expenses, legal fees and disbursements, expert and investigation costs, claims, liabilities, actions, causes of action and any taxes thereon arising from or related to any claim or threatened claim by any party arising from or related to the performance of the Services.

DOCUMENTS

All of the documents prepared by ITSL or on behalf of ITSL in connection with the Project are instruments of service for the execution of the Project. ITSL retains the property and copyright in these documents, whether the Project is executed or not. These documents may not be used on any other project without the prior written agreement of ITSL.

FIELD SERVICES

Where applicable, field services recommended for the Project are the minimum necessary, in the sole discretion of ITSL, to observe whether the work of a contractor retained by the Client is being carried out in general conformity with the intent of the Services.

DISPUTE RESOLUTION

If requested in writing by either the Client or ITSL, the Client and ITSL shall attempt to resolve any dispute between them arising out of or in connection with this Agreement by entering into structured non-binding negotiations with the assistance of a mediator on a without prejudice basis. The mediator shall be appointed by agreement of the parties. If a dispute cannot be settled within a period of thirty (30) calendar days with the mediator, the dispute shall be referred to and finally resolved by an arbitrator appointed by agreement of the parties.

CONFIRMATION OF PROFESSIONAL LIABILITY INSURANCE

As required by by-laws of Engineers & Geoscientists British Columbia (EGBC), it is required that our firm advises whether or not Professional Liability Insurance is held. It is also required that a space for you to acknowledge this information be provided.

Our professional liability insurance is not project specific for the project and should not be regarded as such. If you require insurance for your project you should purchase a project specific insurance policy directly.

Accordingly, this notice serves to advise you that ITSL carries professional liability insurance. Please sign and return a copy of this form as an indication of acceptance and agreement to the contractual force of these Terms of Engagement.

PRINT NAME:	DATE:
ACKNOWLEDGEMENT:	

TITLE SEARCH PRINT 2022-09-26, 17:27:06

File Reference: Requestor: Pawan Dhaliwal

Declared Value \$2900000

CURRENT INFORMATION ONLY - NO CANCELLED INFORMATION SHOWN

Land Title District KAMLOOPS
Land Title Office KAMLOOPS

Title Number CA9888571 From Title Number KW49383

Application Received 2022-04-28

Application Entered 2022-05-02

Registered Owner in Fee Simple

Registered Owner/Mailing Address: VARRO DEVELOPERS INC., INC.NO. BC1285726

16783 18B AVE SURREY, BC V3Z 1A2

Taxation Authority Kelowna, City of

Black Mountain Irrigation District

Description of Land

Parcel Identifier: 017-993-245

Legal Description:

LOT A SECTION 13 TOWNSHIP 26 AND OF SECTION 18 TOWNSHIP 27 OSOYOOS DIVISION

YALE DISTRICT PLAN KAP48482 EXCEPT PLAN KAP75423

Legal Notations NONE

Charges, Liens and Interests

Nature: UNDERSURFACE RIGHTS

Registration Number: 33578E

Registration Date and Time: 1946-05-13 10:43

Registered Owner: THE DIRECTOR OF SOLDIER SETTLEMENT

Remarks: INTER ALIA

PART FORMER LOT C PLAN B6106 OF LOT 15 PLAN 1991

DD 108450F OTHER THAN THOSE EXCEPTED

BY THE CROWN

Nature: STATUTORY RIGHT OF WAY

Registration Number: KE12096

Registration Date and Time: 1991-02-26 13:27 Registered Owner: CITY OF KELOWNA

Title Number: CA9888571 TITLE SEARCH PRINT Page 1 of 2

TITLE SEARCH PRINT 2022-09-26, 17:27:06

File Reference: Requestor: Pawan Dhaliwal

Declared Value \$2900000

Nature: MORTGAGE
Registration Number: CA9888652
Registration Data and Time: 2022 04 28 4

Registration Date and Time: 2022-04-28 14:52

Registered Owner: FATHER AND SON RETIREMENT GP INC.

INCORPORATION NO. BC1278775

Remarks: INTER ALIA

Nature: ASSIGNMENT OF RENTS

Registration Number: CA9888653 Registration Date and Time: 2022-04-28 14:52

Registered Owner: FATHER AND SON RETIREMENT GP INC.

INCORPORATION NO. BC1278775

Remarks: INTER ALIA

Duplicate Indefeasible Title NONE OUTSTANDING

Transfers NONE

Pending Applications NONE

Title Number: CA9888571 TITLE SEARCH PRINT Page 2 of 2