

**- INTERIOR -
TESTING SERVICES
- LTD. -**

MATERIALS TESTING • SOILS
CONCRETE • ASPHALT • CORING
GEOTECHNICAL ENGINEERING

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

Kofoed Contracting Ltd
11925 McGowan Road
Kelowna, BC V4V 1J2

March 2, 2021
Job 21.094

Attention: Mr Merlin Kofoed

Dear Sir;

Re: **Preliminary Geotechnical Report
Proposed Residential Subdivision
7025 Herbert Road
Vernon, BC**

As requested, and further to our email proposal dated February 22, 2021, Interior Testing Services Ltd (ITSL) has carried out a preliminary geotechnical investigation for the proposed residential subdivision. Please find the following information attached to this letter report:

- Site Plan : Drawing 21.094-1
- Typed Test Pit Soil Logs : Drawings 21.094-2 to 21.094-5
- Preliminary Subdivision Layout Plan : Drawings 21.094-6

At the end of this letter report, we attach a copy of our standard two-page "Terms of Engagement" that governs our work on this project, previously accepted and signed.

We understand this report is to be submitted to the City of Vernon as part of your permit application. We identify the City of Vernon as an authorized user of this preliminary report, subject to the attached "Terms of Engagement".

1.0 INTRODUCTION

As per our proposal, and as shown on the attached preliminary subdivision layout plan (Drawing 21.094-6), ITSL understands that currently a total of 46 units are proposed for the subject property. In addition, onsite roads, driveways and site servicing will also be constructed as part of the overall development of the site.

From their email of February 19, 2021, ITSL understands that the City of Vernon requires a preliminary report discussing the feasibility of the development from a geotechnical perspective.

The purpose of our investigation was to identify the underlying soil and groundwater conditions with respect to preliminary geotechnical comments with respect to site suitability for development. The following report presents our investigation and laboratory results, along with recommendations for further investigations and preliminary site suitability comments.

2.0 SITE DESCRIPTION

The subject site is located at 7025 Herbert Road in Vernon, BC. The property is irregularly shaped and it is our understanding that it is approximately 2 hectares (4.9 acres) in plan area. The middle or west-middle of the site is generally the local highpoint, with the topography typically sloping down in all directions. There are two homes on the property, one of which (off Bates Road) appears to have been built up locally with fill. The other home, to the east end (off Herbert Road), may have been constructed after some excavation into the existing slope.

There are a variety of local bushes onsite and several areas of mature trees. The northeast corner of the site is low relative to the adjacent roadways, and likely acts as a collection area for drainage and storm water. No readily or easily visible drainage infrastructure was observed in this area.

The subject property is bordered by roadways to the west, north and east and private property to the south.

3.0 GEOTECHNICAL INVESTIGATION

On February 25, 2021, a tracked excavator provided by the client was used to advance a total of four test pits (TP) across the site to as deep as roughly 3 m below the existing site surface grades. The soil profile of each test pit was continuously logged in the field by ITSL staff and occasional, representative samples were recovered and returned to our laboratory for additional analysis. In addition, one standpipe piezometer was installed within TP2 to allow for future groundwater monitoring.

Locations of the test pits are approximately shown on the attached site plan (Drawing 21.094-1) which was adapted from the City of Vernon online mapping resource.

4.0 RESULTS

4.1 Soil Profile and Groundwater Conditions

The detailed soil descriptions are shown on the attached test pit logs (Drawings 21.094-2 to 21.094-5), which are to be used in preference to the generalized soil descriptions that follow.

In general, the site appears to be covered with a layer of topsoil materials and / or silty overburden. Following the topsoil material, natural, silty SANDs and GRAVELs were typically encountered to the base of each test pit. These natural, silty materials were difficult to dig through and were noted in the field as compact to very dense, and often described as "till-like".

No groundwater or seepage was observed in any of the test pits at the time of the investigation. As a general comment, groundwater levels may vary seasonally and will likely be affected by drainage and infiltration conditions. Moreover, as mentioned above, the northeast section of the site may collect storm and drainage water as it is below the adjacent road grades, and no readily visible drainage infrastructure was observed during our field visit.

4.2 Laboratory Work – Moisture Content

Given the preliminary nature of this scope of work, the samples recovered were only tested for moisture content. The oven-dried samples had moisture contents ranging from 5 to 12%.

5.0 GEOTECHNICAL RECOMMENDATIONS

5.1 Additional Geotechnical Investigations and Analysis

In order to confirm that the site is safe for the use intended, ITSL recommends a follow up geotechnical investigation be completed.

The follow up geotechnical investigation should include a site review to further evaluate potential geotechnical hazards and at least 4 additional test pits should be advanced. Additional sampling of the soils is recommended so that adequate laboratory analysis can be carried out with respect to re-using the natural materials as fill, the subgrade strength of the existing materials, and the potential bearing pressures to be preliminarily used for residential foundation design. Other geotechnical items to be addressed include but are not necessarily limited to, site stripping, engineered fill materials and slope finishing.

In addition, some site survey sections through the property will also be useful in further identifying potential slope related issues. ITSL also recommends that we be provided with the final subdivision layout schemes, as well as the site grading plans.

As needed, ITSL can prepare a proposal for this scope of work, including budget estimates.

5.2 Preliminary Site Suitability for Development

Subject to the recommendations above and based on our observations of the four test pits that were advanced on February 25, 2021, it appears reasonable in our opinion to preliminarily conclude that the land can likely be used safely for the use intended, which at this time is support of future roadways, servicing infrastructure and typical residential foundations.

At this time, the City of Vernon has not provided a design level of safety for consideration, and to the best of our knowledge there is no generally accepted level of landslide safety in British Columbia. However, ITSL understands that the British Columbia Ministry of Transportation and Infrastructure (MoTI) commonly accepts an assessment of probability of landslide occurrence less than 10% in 50 years (1 in 475), in reference to a landslide that can cause injury to persons or severe damage to the home. This probability of occurrence appears to be reasonable, at this preliminary stage of the design.

Based on the City of Vernon email of February 19, 2021, which notes that the initial report can be preliminary, ITSL anticipates that the above comments will be satisfactory at this time.

6.0 CONCLUSIONS

As requested, ITSL has carried out a geotechnical investigation on the subject property with respect to the proposed residential subdivision. Recommendations for further investigations and analysis have been provided above, and our preliminary comments on site suitability for development are also discussed above.

Please forward the final proposed subdivision layout scheme and the site grading plans.

We trust the above comments are sufficient at this stage. After your review, please feel free to call and discuss if you have any questions.

Best Regards,
Interior Testing Services Ltd

Prepared By:



Jeremy Block, P Eng
Senior Geotechnical Engineer

Reviewed By:



Peter Hanenburg P Eng
Principal Geotechnical Engineer

Revision No.	Date	Comments
1.0	March 2, 2021	Issued for use.



LEGEND



+/- TEST PIT LOCATION

NOTES

1. REFERENCE PLAN ADAPTED FROM THE CITY OF VERNON ONLINE MAPPING RESOURCE.
2. TEST PIT LOCATIONS ARE APPROXIMATE AND MAY VARY FROM THAT SHOWN.
3. FOR DETAILED SOIL DESCRIPTIONS REFER TO TEST PIT LOGS (DRAWINGS 21.094-___ TO 21.094-___).

KOFOED CONTRACTING LTD

PROPOSED SUBDIVISION
7025 HERBERT ROAD
VERNON, BC

SITE PLAN

INTERIOR TESTING SERVICES LTD

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

PH: 250-860-6540 E-MAIL: INFO@INTERIORTESTING.COM

DATE OF INVESTIGATION: FEBRUARY 25, 2021

JOB NUMBER: 21.094

DRAWING NUMBER: 21.094-1

TEST PIT LOGS

February 25, 2021
Job 21.094

**Soil Profile Review
Proposed Subdivision
7025 Herbert Road
Vernon, BC**

Notes:

1. Depths shown are in meters, measured from ground surface at the test pit locations.
 2. All test pits were excavated using an excavator provided by the client on February 25, 2021.
 3. No groundwater was encountered unless otherwise noted below.
-

TP 1 – South End

Sample / Moisture Content

0.0 – 0.15	Topsoils and overburden material.	
0.15 – 3.0	Brown, dense to very dense, silty, fine SAND, some gravel, occasional cobble.	S1 – 0.6 m / 7% S2 – 2.1 m / 7%
<u>3.0</u>	Base of test pit.	



Site Photo 1 – TP1

TEST PIT LOGS

February 25, 2021

Job 21.094

TP 2 – West End

0.0 – 0.45	Brown, silty SAND and GRAVEL.
0.45 – 2.4	Grey, very dense, silty SAND and GRAVEL (till-like).
<u>2.4</u>	Base of test pit.

Sample / Moisture Content

S1 – 0.3 m / 9%

S2 – 0.9 m / 8%

S3 – 2.1 m / 5%



Site Photo 2 – TP2

TEST PIT LOGS

February 25, 2021
Job 21.094

TP 3 – East of Existing Home

Sample / Moisture Content

0.0 – 0.3	Topsoils and overburden material.	
0.3 – 2.4	Brown, dense, silty SAND and GRAVEL, some cobble and boulder sized materials.	S1 – 0.9 m / 5% S2 – 2.1 m / 6%
<u>2.4</u>	Base of test pit.	



Site Photo 3 – TP3

TEST PIT LOGS

February 25, 2021

Job 21.094

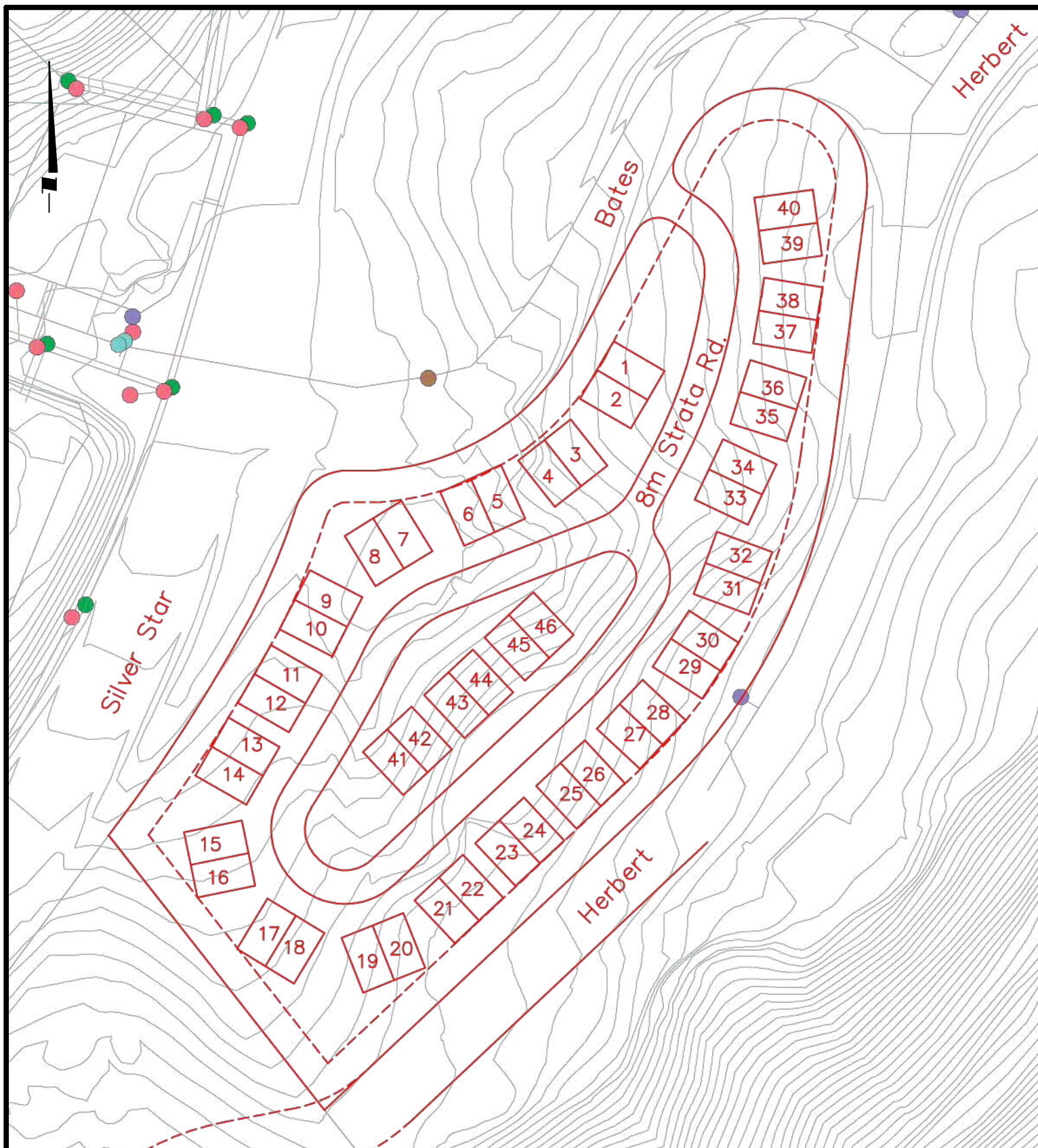
TP 4 – North End

Sample / Moisture Content

0.0 – 0.45	Topsoils and overburden material.	
0.45 – 2.4	Brown, compact to dense, SILT / fine SAND, trace to some gravel.	S1 – 1.8 m / 12%
2.4 – 3.0	Grey, dense, silty SAND and GRAVEL.	S2 – 2.8 m / 10%
<u>3.0</u>	Base of test pit.	



Site Photo 4 – TP4



NOTES

1. REFERENCE PLAN PROVIDED BY CLIENT.
2. FOR GEOTECHNICAL COMMENTS AND RECOMMENDATIONS, PLEASE REFER TO PRELIMINARY GEOTECHNICAL REPORT DATED MARCH 2, 2021.

KOFOED CONTRACTING LTD

PROPOSED SUBDIVISION
7025 HERBERT ROAD
VERNON, BC

PRELIMINARY SUBDIVISION LAYOUT PLAN

INTERIOR TESTING SERVICES LTD

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

PH: 250-860-6540 E-MAIL: INFO@INTERIORTESTING.COM

DATE OF INVESTIGATION: FEBRUARY 25, 2021

JOB NUMBER: 21.094

DRAWING NUMBER: 21.094-6

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 12% per annum.

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 the Association of Professional Engineers and Geoscientists of British Columbia, 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.

ACKNOWLEDGEMENT: _____