TETRA TECH

February 27, 2024

ISSUED FOR USE
FILE: 704-TRN.PAVE03225-05
Via Email: Salem.Bahamdun@gov.bc.ca

Ministry of Transportation and Infrastructure
Suite 310 – 1500 Woolridge Street
Coquitlam, BC V3K 0B8

Attention: Mr. Salem Bahamdun, P.Eng.

Subject: Geotechnical Investigation for Retaining Wall along Fulford Ganges Rd, Salt Spring Island, BC

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained by the Ministry of Transportation and Infrastructure (MoTI) to provide geotechnical and pavement recommendations to assist with the planning and design for the section of Fulford-Ganges Road from Cranberry Road to Seaview Avenue in Salt Spring Island, BC (the Site). The location of the Site is shown on Figure 1. The Site is within the MoTI Maintenance Service Area 1 – South Island region.

Tetra Tech completed an initial scope including site-reconnaissance, subsurface investigation, laboratory testing, analysis of the collected data, preparation of a summary of the collected data, development of geotechnical recommendations, development of pavement rehabilitation recommendations and preparation of a pavement design report (titled “Geotechnical Investigation for Fulford-Ganges Road from Cranberry Road to Seaview Avenue, Salt Spring Island, BC”, issued for use on November 23, 2021).

This additional letter report was completed as part of an additional Geotech Review for construction of a Retaining Wall at Seabreeze Inn. This geotechnical review involved a site visit, and some hand probe holes to confirm the soil types / depths to confirm recommendations for the Geotechnical design of the retaining wall.

Based on Tetra Techs review of the elevation drawings, the retaining wall is expected to be no taller than 3 precast concrete lock blocks with the bottom block half buried (assuming each block will be 0.75 m tall).

2.0 BACKGROUND REVIEW

2.1 Previous Report Geotechnical Exploration

Tetra Tech previously competed geotechnical drilling along Fulford Ganges Road using a B29 Truck Mount Auger Drill owned and operated by Drillwell Enterprise to inform the recommendations in the previous report mentioned in Section 1.0.

Borehole 21BH05 was located on the unpaved road shoulder on Fulford Ganges Rd next to the Seabreeze Inn (located on the west side of the road). Borehole 21BH05 encountered the following stratigraphy:

- 50 mm of Gravel surfacing;
- 0.05 to 0.2 m: Sand (Fill), some gravel, some silt, damp, compact (inferred), brown;

Tetra Tech Canada Inc.
#1 - 4376 Boban Drive
Nanaimo, BC V9T 6A7 CANADA
Tel 250.756.2256 Fax 250.756.2686

- 0.2 to 3.0 m: SILT (Till-like), sandy, trace gravel, damp, compact (inferred), brown;
  - 1.5 m becomes compact to dense; and
- 3.0 m: End of borehole.

No groundwater was observed in the open borehole upon completion prior to backfilling.

3.0 GEOTECHNICAL EXPLORATION

For the additional Geotechnical Review for construction of a Retaining Wall at Seabreeze Inn, Tetra Tech completed a site visit which included some hand probe holes to confirm the soil types / depths to confirm recommendations for the geotechnical design.

Prior to hand probe activities, Tetra Tech completed ground disturbance notifications (i.e., BC 1Call) for the Site. Proposed borehole locations were cleared on-site by Kelly's First Call Locating.

Hand probe locations were selected to investigate the subsurface conditions on the northeast shoulder/slope adjacent to the road along the proposed retaining wall line from Sta 108+92 to Sta 109+62. Drawings were provided by ISL Engineering and Land Services via email on August 18, 2022, that included sections of the proposed retaining wall.

Complete descriptions of conditions encountered are provided in the borehole logs attached in Appendix B. The soil conditions encountered during the drilling investigation are summarized in the Table below.

Table 3-1: Summary of Soil Conditions

Soil/Material Type	HA23-01	HA23-02	HA23-03	HA23-04
SILT (Topsoil)	0 to 0.4 m	0 to 0.2 m	0 to 0.2 m	0 to 0.5 m
SILT, sandy, some gravel, trace clay, trace organics/rootlets	0.4 to 1.3 m	0.2 to 0.6 m	0.2 to 0.7 m	0.5 to 1.3 m
Becomes very stiff based on Wildcat DCPT (unweathered Till-like)	NA	0.5 m	NA	0.9 m

The sandy SILT encountered in all testpits is likely the same as the sandy SILT (Till-like) soil encountered at 0.2 m in 21BH05 (located on the opposite side of the road). Additionally, the wildcat penetrometer testing indicates that the sandy SILT density increases at around 0.5 m depth in HA23-02 (stiff/medium stiff becoming very stiff to hard) and similarly at 0.9 m in HA23-04. This is likely the depth at which the softened sandy Silt soil is grading into a more unweathered till-like horizon.

4.0 DISCUSSION AND RECOMMENDATIONS

The following subsections detail preliminary geotechnical discussion and recommendations. Detailed geotechnical design is outside of the scope of the document; however, Tetra Tech is available to provide detailed geotechnical design, if required.

4.1 Site Preparation

Initial preparation should include stripping topsoil to expose suitable subgrade materials. The unweathered till-like soil is considered a suitable subgrade material and is expected at a depth ranging between 0.5 meters (near HA23-02) and 0.9 m (near HA23-04) below ground surface (mbgs).

Qualified geotechnical personnel should inspect the prepared subgrade to confirm suitability prior to constructing the retaining wall.

4.2 Engineered Fill

Engineered Fill should consist of an approved, well-graded granular soils with a maximum particle size of 75 mm and less than 10% fines, placed in horizontal lifts not exceeding 300 mm and compacted to a minimum of 95% Modified Proctor Maximum Dry Density (MPMDD) at a moisture content ±2% of optimum. Each lift should be tested to confirm adequate compaction before subsequent lifts are placed. Thicker lifts may only be used if test results confirm that materials and equipment used are such that the required density can be achieved.

4.3 Retaining Walls

Tetra Tech understands that retaining walls may be required for road widening purposes. The construction methods, and design specifications of the retaining wall are unknown at the time of writing this report. Regarding the potential use of retaining walls, Tetra Tech can make the following general comments:

- Retaining walls should be founded on the till-like soils or Engineered Fill that is placed directly on till-like soils;
- The following parameters are considered acceptable for preliminary retaining wall design at the Site assuming Site Preparation as described in Section 4.1:
  - At-Rest Earth Coefficient: 0.5;
  - Active Earth Coefficient: 0.3;
  - Unit Weight of Soil: 20 kN/m3;
  - Unconfined Compressive Strength (UCS): 200 kPa;
  - Undrained shear strength (Su): 100 kPa;
  - Any retaining wall design using these parameters should be reviewed by a qualified geotechnical engineer and may require additional site exploration to validate the parameters;
  - The use of free draining backfill and a properly designed drain at the base of the retaining wall is required to ensure that hydrostatic pressures cannot develop, or alternatively these would need to be considered in the retaining wall design; and
  - Note that the parameters presented are unfactored (i.e., characteristic values). Suitable geotechnical resistance (scaling) factors should be applied for Load Resistance Factored Design (LRFD), or the results should be compared to an appropriate Factor of Safety (FoS) for working stress-based design (WSD).

The Engineers and Geoscientists of British Columbia (EGBC) Professional Practice Guidelines for Civil and Transportation Infrastructure Retaining Wall Design (EGBC, 2020) specifies that any retaining walls higher than 1.2 m require detailed geotechnical design unless failure would have the potential to impact life safety. Detailed design is outside of the scope of this document; however, Tetra Tech is available to provide detailed geotechnical design services if required.

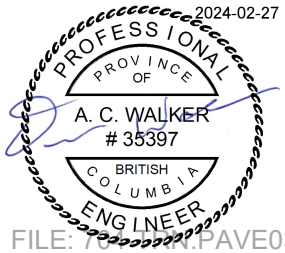
5.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of the Ministry of Transportation and Infrastructure and their agents. Tetra Tech Canada Inc. (operating as Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than the Ministry of Transportation and Infrastructure, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this document is subject to the Limitations on the Use of this Document attached in the Appendix or Contractual Terms and Conditions executed by both parties.

6.0 CLOSURE

We trust this document meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.



FILE: 704-TRN.PAVE03225-05
FILE: 704-TRN.PAVE03225-05
FILE: 704-TRN.PAVE03225-05
FILE: 704-TRN.PAVE03225-05
FILE: 704-TRN.PAVE03225-05
FILE: 704-TRN.PAVE03225-05

Prepared by:
Kurt Schluessel, G.I.T.
Engineering Geologist
Direct Line: 250.714.3043
Kurt.Schluessel@tetratech.com

Reviewed by:
Andrew Walker, P. Eng.
Senior Geotechnical Engineer
Direct Line: 778.744.5925
Andrew.Walker@tetratech.com

/dr

Attachments: Figure 1 – Site Location Plan
Appendix A – Tetra Tech's Limitations of the Use of this Document
Appendix B – Borehole Logs

FIGURES

LEGEND

- Borehole from Previous 2021 Investigation
- Hand Dug Testpit
- Hand Dug Testpit with Wildcat Penetrometer Testing

NOTES
Base data source:
Imagery from ESRI; Maxar (2020)

STATUS
ISSUED FOR REVIEW

ADDITIONAL GEOTECHNICAL REVIEW FOR CONSTRUCTION OF RETAINING WALL SEABREEZE INN, SALT SPRING ISLAND, BC

Testhole Location Plan

PROJECTION	DATUM
UTM Zone 10	NAD83

Scale: 1:1,000
20 10 0 20
Metres

FILE NO.
PAVE03225-05_Fig01_TestholePlan.mxd

OFFICE	DWN	CKD	APVD	REV
Tt-VANC	DS	SL	KS	0

DATE
January 17, 2023

PROJECT NO.
TRN.PAVE03225-05

CLIENT
BRITISH COLUMBIA
Ministry of Transportation & Infrastructure

TETRA TECH

Figure 1

Q:\Vancouver\GIS\TRANSPORTATION\PAVE\PAV\E03225-05\Maps\Additional_Review\PAVE03225-05_Fig01_TestholePlan.mxd modified 2023-01-17 by Darren.Schouls

APPENDIX A

TETRA TECH'S LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

GEOTECHNICAL

1.1 USE OF DOCUMENT AND OWNERSHIP

This document pertains to a specific site, a specific development, and a specific scope of work. The document may include plans, drawings, profiles and other supporting documents that collectively constitute the document (the “Professional Document”).

The Professional Document is intended for the sole use of TETRA TECH’s Client (the “Client”) as specifically identified in the TETRA TECH Services Agreement or other Contractual Agreement entered into with the Client (either of which is termed the “Contract” herein). TETRA TECH does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Professional Document when it is used or relied upon by any party other than the Client, unless authorized in writing by TETRA TECH.

Any unauthorized use of the Professional Document is at the sole risk of the user. TETRA TECH accepts no responsibility whatsoever for any loss or damage where such loss or damage is alleged to be or, is in fact, caused by the unauthorized use of the Professional Document.

Where TETRA TECH has expressly authorized the use of the Professional Document by a third party (an “Authorized Party”), consideration for such authorization is the Authorized Party’s acceptance of these Limitations on Use of this Document as well as any limitations on liability contained in the Contract with the Client (all of which is collectively termed the “Limitations on Liability”). The Authorized Party should carefully review both these Limitations on Use of this Document and the Contract prior to making any use of the Professional Document. Any use made of the Professional Document by an Authorized Party constitutes the Authorized Party’s express acceptance of, and agreement to, the Limitations on Liability.

The Professional Document and any other form or type of data or documents generated by TETRA TECH during the performance of the work are TETRA TECH’s professional work product and shall remain the copyright property of TETRA TECH.

The Professional Document is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of TETRA TECH. Additional copies of the Document, if required, may be obtained upon request.

1.2 ALTERNATIVE DOCUMENT FORMAT

Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH’s “Instruments of Professional Service”), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH’s Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH’s Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client’s current or future software and hardware systems.

1.3 STANDARD OF CARE

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

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by third parties other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

1.6 GENERAL LIMITATIONS OF DOCUMENT

This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this document, at or on the development proposed as of the date of the Professional Document requires a supplementary exploration, investigation, and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

1.7 ENVIRONMENTAL AND REGULATORY ISSUES

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

1.8 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems, methods and standards 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. TETRA TECH 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.

1.9 LOGS OF TESTHOLES

The testhole 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.

1.10 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 historical environment. TETRA TECH 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 exploration and review may be necessary.

1.11 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.

1.12 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.

1.13 INFLUENCE OF CONSTRUCTION ACTIVITY

Construction activity can impact 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, and construction sequence are known.

1.14 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, and 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.

1.15 DRAINAGE SYSTEMS

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. Where temporary or permanent drainage systems are installed within or around a structure, these systems must protect the structure from loss of ground due to mechanisms such as internal erosion and must be designed so as to assure continued satisfactory performance of the drains. Specific design details regarding the geotechnical aspects of such systems (e.g. bedding material, surrounding soil, soil cover, geotextile type) should be reviewed by the geotechnical engineer to confirm the performance of the system is consistent with the conditions used in the geotechnical design.

1.16 DESIGN PARAMETERS

Bearing capacities for Limit States or Allowable Stress Design, strength/stiffness properties and similar geotechnical design parameters 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 used in this report. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions considered in this report in fact exist at the site.

1.17 SAMPLES

TETRA TECH 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.

1.18 APPLICABLE CODES, STANDARDS, GUIDELINES & BEST PRACTICE

This document has been prepared based on the applicable codes, standards, guidelines or best practice as identified in the report. Some mandated codes, standards and guidelines (such as ASTM, AASHTO Bridge Design/Construction Codes, Canadian Highway Bridge Design Code, National/Provincial Building Codes) are routinely updated and corrections made. TETRA TECH cannot predict nor be held liable for any such future changes, amendments, errors or omissions in these documents that may have a bearing on the assessment, design or analyses included in this report.

APPENDIX B

BOREHOLE LOGS

BRITISH COLUMBIA
Ministry of Transportation & Infrastructure

Borehole No: **21BH05**

Project: Geotechnical Investigation	Project No: 704-TRN.PAVE03225-05
Location: Fulford Ganges Road	Ground Elev: 60 m
Saltspring Island, BC	UTM: 463426.4 E; 5410371.64 N; Z 10

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Vane (kPa) Post-Peak / Peak (10 20 30 40); Plastic Limit / Moisture Content / Liquid Limit (20 40 60 80)	Elevation (m)
0								60
	Solid stem auger		GRAVEL, dry, compact (inferred), grey; angular gravel.					
			SAND (FILL), some gravel, some silt, damp, compact (inferred), brown.					
			SILT (TILL-LIKE), sandy, trace gravel, damp, compact (inferred), brown.			G1		
1								59
			At 1.5 m becomes SILT and SAND, trace gravel, dry to damp, compact to dense (inferred), brown; subrounded to subangular gravel, fine to medium sand.					
2						G2		58
3			End of borehole at 3.0 m. - Target depth reached. - No groundwater observed upon completion. - Backfilled with cuttings and patched with cold mix asphalt. - Borehole locations were measured in the field with a handheld GPS and are estimated to be accurate to +/- 5 m. - Borehole elevations were estimated based on Google Earth and are estimated to be accurate to +/- 2 m.					57
4								56
5								55
6								54
7								53
8								52
9								51
10								50

TETRA TECH

Contractor: Drillwell	Completion Depth: 3 m
Drilling Rig Type: B29 Auger	Start Date: 2021 June 23
Logged By: KS	Completion Date: 2021 June 23
Reviewed By: AW	Page 1 of 1

BRITISH COLUMBIA
Ministry of Transportation & Infrastructure

Borehole No: **HA23-01**

Project: RETAINING WALL HAND AUGER EXPLORATION | Project No: 704-TRN.PAVE03225-05

Location: FULFORD GANGES ROAD

SALTSPRING ISLAND, BC

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Vane (kPa) Post-Peak / Peak 10 20 30 40; Plastic Limit / Moisture Content / Liquid Limit 20 40 60 80	Depth (ft)
0								0
	HAND AUGER		SILT (TOPSOIL), some sand, some gravel, trace clay, trace rootlets / organics, moist to wet, soft to firm (inferred), brown; low plastic.			G1		1
			SILT, some sand, some gravel, trace clay, trace rootlets, moist to wet, firm (inferred), light brown and orange mottled; low plastic.			G2		2
1			- Becomes sandy, stiff (inferred).					3
								4
			End of testhole at 1.3 m, refusal of hand auger. - Water observed at 0.35 m in open hole on completion. - Borehole location measured in the field with a handheld GPS device. - Backfilled with cuttings on completion.					5
2								6
								7
								8
								9
3								10
								11
								12
4								13
								14
								15
								16
5								

TETRA TECH

Contractor:	Completion Depth: 1.3 m
Equipment Type: HAND AUGER	Start Date: January 12, 2023
Logged By:	Completion Date: January 12, 2023
Reviewed By:	Page 1 of 1

BRITISH COLUMBIA
Ministry of Transportation & Infrastructure

Borehole No: **HA23-02**

Project: RETAINING WALL HAND AUGER EXPLORATION	Project No: 704-TRN.PAVE03225-05
Location: FULFORD GANGES ROAD	
SALTSPRING ISLAND, BC	

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Field Blowcount (blows/300 mm)	Field Vane (kPa) / Plastic Limit, Moisture Content, Liquid Limit	Depth (ft)
0	HAND AUGER		SILT (TOPSOIL), some sand, trace gravel, trace clay, trace rootlets / organics, moist to wet, soft to firm (inferred), brown; low plastic.		○ DCPT 20 40 60 80	Post-Peak / Peak 10 20 30 40; Plastic Limit / Moisture Content / Liquid Limit 20 40 60 80	0
			SILT, sandy, some gravel, trace clay, trace rootlets, moist to wet, firm (inferred), light brown and orange mottled; low plastic.				1
			- Refusal of hand auger at 0.6 m, Wildcat DCPT continues to 0.8 m.				2
1			End of testhole at 0.8 m, refusal of Wildcat DCPT (50 blows for 70 mm penetration). - Water observed at 0.55 m in open hole on completion. - Borehole location measured in the field with a handheld GPS device. - Wildcat DCPT offset 0.3 m from hand auger hole. - Backfilled with cuttings on completion.				3
							4
							5
2							6
							7
							8
							9
3							10
							11
							12
4							13
							14
							15
5							16

TETRA TECH

Contractor:	Completion Depth: 0.8 m
Equipment Type: HAND AUGER	Start Date: January 12, 2023
Logged By:	Completion Date: January 12, 2023
Reviewed By:	Page 1 of 1

BRITISH COLUMBIA
Ministry of Transportation & Infrastructure

Borehole No: **HA23-03**

Project: RETAINING WALL HAND AUGER EXPLORATION | Project No: 704-TRN.PAVE03225-05

Location: FULFORD GANGES ROAD

SALTSPRING ISLAND, BC

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Sample Type	Sample Number	Field Vane (kPa) Post-Peak 10 20 30 Peak 40 / Plastic Limit 20 Moisture Content 40 60 Liquid Limit 80	Depth (ft)
0	HAND AUGER		SILT (TOPSOIL), some sand, trace gravel, trace clay, trace rootlets / organics, moist to wet, soft to firm (inferred), brown; low plastic.			G1		0
			SILT, sandy, some gravel, trace clay, trace rootlets, moist to wet, firm (inferred), light brown and orange mottled; low plastic.			G2		1
			End of testhole at 0.7 m, refusal of hand auger. - Water observed at 0.65 m in open hole on completion. - Borehole location measured in the field with a handheld GPS device. - Backfilled with cuttings on completion.					2
1								3
								4
								5
2								6
								7
								8
								9
3								10
								11
								12
4								13
								14
								15
								16
5								

TETRA TECH

Contractor: | Completion Depth: 0.7 m

Equipment Type: HAND AUGER | Start Date: January 12, 2023

Logged By: | Completion Date: January 12, 2023

Reviewed By: | Page 1 of 1

BRITISH COLUMBIA
Ministry of Transportation & Infrastructure

Borehole No: **HA23-04**

Project: RETAINING WALL HAND AUGER EXPLORATION	Project No: 704-TRN.PAVE03225-05
Location: FULFORD GANGES ROAD	
SALTSPRING ISLAND, BC	

Depth (m)	Method	Core Diameter (mm)	Soil Description	Graphical Representation	Field Blowcount (blows/300 mm) ○ DCPT 20 40 60 80	Field Vane (kPa) Post-Peak ◇ Peak ◆ 10 20 30 40 / Plastic Limit Moisture Content Liquid Limit 20 40 60 80	Depth (ft)
0							0
	HAND AUGER		SILT (TOPSOIL), some sand, trace gravel, trace clay, trace rootlets / organics, moist to wet, soft to firm (inferred), brown; low plastic.				
			SILT, sandy, some gravel, trace clay, trace rootlets, moist to wet, firm (inferred), light brown and orange mottled; low plastic.				
1							1 2 3 4
			End of testhole at 1.3 m, refusal of hand auger and Wildcat DCPT (50 blows for 40 mm penetration). - Water observed at 0.9 m in open hole on completion. - Borehole location measured in the field with a handheld GPS device. - Wildcat DCPT offset 0.3 m from hand auger hole. - Backfilled with cuttings on completion.				
2							5 6 7 8 9 10 11 12
3							
4							13 14 15 16
5							

TETRA TECH

Contractor:	Completion Depth: 1.3 m
Equipment Type: HAND AUGER	Start Date: January 12, 2023
Logged By:	Completion Date: January 12, 2023
Reviewed By:	Page 1 of 1