ROCKY VIEW COUNTY

PLANNING

TO:	Subdivision and Development Appeal Board		
DATE:	June 27, 2022	**DIVISION:** 1	
FILE:	03908020	**APPLICATION**: PRDP20221241	
SUBJECT:	Development Item - Construction of two accessory buildings (shop and shed), relaxation of the top of bank setback requirement		

APPLICATION: construction of two accessory buildings (shop and shed), relaxation of the top of bank setback requirement

GENERAL LOCATION: located approximately 1.61 kilometres (1 mile) south of Township Road 232 and on the west side of Forestry Road

LAND USE DESIGNATION: Agricultural, Small Parcel District p.8.1 (A-SML)

EXECUTIVE SUMMARY: This application was applied for concurrently with PRDP20221236 on March 21, 2022, and was conditionally-approved by administration on May 17, 2022. The applicant is seeking to establish a home-based business (PRDP20221236) on the parcel and has identified that this accessory building (shop) would contain the materials, supplies and equipment required for the proposed business. The parcel itself is heavily sloped – with much of the parcel exceeding a 15% grade.

The proposed accessory building would be 222.97 sq. m. (2,400.00 sq. ft.) in footprint, which is within the permitted accessory building size of 930.00 sq. m. (10,010.40 sq. ft.) that the County's Land Use Bylaw C-8000-2020 (LUB) permits for A-SML zoned properties. This Development was required to apply for for a Development Permit due to the close proximity of the proposed structure to a slope exceeding a 15% grade. As per Section 189 of LUB, *Buildings shall be located at least 20.0 m (65.62 ft.) back from the top-of-bank of an escarpment where the grade exceeds fifteen percent (15%)* however the subsequent section, Section 190 identifies that, *the Development Authority may, at their discretion, reduce the setback requirements if the applicant provides a Geotechnical Study, prepared by a qualified engineer, that provides satisfactory proof of bank stability*. The applicant has provided such a study, and Administration determined that the report contains recommendations sufficient to allow for the safe construction of the proposed structure. Administration conditionally approved the application on May 17, 2022 as the proposed building aligned with the allowances granted by the LUB and could be safely constructed as illustrated by the Geotechnical Study provided by the applicant at the time of application.

On June 7, 2022, an appeal was filed by multiple appellants against the decision of Administration, for several reasons, including reasons related to the size of the shop and the proposed use of the shop to house a Home-Based Business Type II.

DECISION: Conditionally-Approved

DEVELOPMENT / SUBDIVISION AUTHORITY: Administration

DECISION DATE:	**APPEAL DATE:**	**ADVERTISED DATE:**
May 17, 2022	June 7, 2022	May 17, 2022

Administration Resources
Evan Neilsen, Planning and Development Services

ROCKY VIEW COUNTY

AIR PHOTO & DEVELOPMENT CONTEXT:

VARIANCE SUMMARY:

Regulation	Requirement	Proposed	Variance
Land Use Bylaw Section 189	Buildings shall be located at least 20.0 m (65.62 ft.) back from the top-of-bank of an escarpment where the grade exceeds fifteen percent (15%)	0.00 m	100%

APPLICATION EVALUATION:

The application was evaluated based on the technical reports submitted with the application and the applicable policies and regulations.

APPLICABLE POLICY AND REGULATIONS:	**Technical Reports Submitted:**
• *Municipal Government Act;* • Municipal Development Plan; • Greater Bragg Creek Area Structure Plan; • Land Use Bylaw; and • County Servicing Standards.	• Geotechnical Investigation prepared by PrairieGEO Engineering dated May 3, 2022
DISCRETIONARY USE: • Accessory Building located closer than 20.00 m to a slope exceeding 15.00 %	**DEVELOPMENT VARIANCE AUTHORITY:** • Administration

APPEAL:

See attached report and exhibits.

ROCKY VIEW COUNTY

Respectfully submitted,

"Justin Rebello"

Supervisor
Planning and Development Services

EN/llt

ROCKY VIEW COUNTY

APPLICATION INFORMATION

APPLICANT: Peter Haar	**OWNER:** Nick & Louise Haar
DATE APPLICATION RECEIVED: March 22, 2022	**DATE DEEMED COMPLETE:** April 11, 2022
ADMINISTRATION DECISION DATE: May 17, 2022	
APPELLANTS: Blaine & Angela Townsend; Daniel & Chris Patton	
GROSS AREA: ± 7.90 hectares (±19.52 acres)	**LEGAL DESCRIPTION:** Block 3 Plan: 7711440 (231031 Forestry Way)
APPEAL BOARD: Subdivision and Development Appeal Board	

HISTORY:

Building Permits:

- August 12, 1992 **1991-BP-2417**: Building Permit for Single Family Dwelling

Development Permits

- March 21, 2022 **PRDP20221236**: Application for a Home-Based Business, Type II, for a woodworking shop.

PUBLIC & AGENCY SUBMISSIONS:

The application was circulated to 10 adjacent landowners. At the time this report was prepared, no letters were received in support or objection to the application, excepting the appeals.

ROCKY VIEW COUNTY

PROPOSED DEVELOPMENT PERMIT CONDITIONS

Description:

1. That an accessory building (shop) may be constructed on the subject land in general accordance with the drawings submitted with application.
    i. That the top of bank setback requirement is relaxed in accordance with the recommendations and site plan detailed in the *Geotechnical Investigation prepared by PrairieGEO Engineering (File no. PGE21-62, Dated May 3, 2022) in perpetuity.*

Prior to Release:

2. That prior to issuance of this permit, the Applicant/Owner shall contact County Road Operations with haul details for materials and equipment needed during construction/site development to confirm if Road Use Agreements or permits will be required for any hauling along the County road system and to confirm the presence of County road ban restriction
    i. The Applicant/Owner shall also confirm if any improvements are required to the existing approach for this parcel from Forestry Way.
    ii. Written confirmation shall be received from County Road Operations confirming the status of this condition. Any required agreement or permits shall be obtained unless otherwise noted by County Road Operations
3. That prior to release of this permit the Applicant/Owner shall submit a detailed Erosion and Sedimentation Control Plan, prepared by a qualified professional, in accordance with Rocky View Servicing Standards and best management practices.

Permanent:

4. That the Applicant/Owner shall adhere to the recommendations outlined in the *Geotechnical Investigation prepared by PrairieGEO Engineering (File no. PGE21-62, Dated May 3, 2022) in perpetuity.*
5. That the accessory building shall be adequately serviced in accordance with the County Servicing Standards and Policy C-407.
6. That the accessory building shall not be used for for commercial purposes at any time unless approved through a separate Development Permit.
7. That there shall be no more than 2.00 m (6.56 ft.) of excavation or 1.00 m (3.28 ft.) of fill adjacent to or within 15.00 m (49.21 ft.) of the proposed building under construction, unless a separate Development Permit has been issued for additional fill.
8. That no topsoil shall be removed from the site. All topsoil shall be retained on-site and shall be seeded after building construction is complete, as part of site restoration.
9. That the existing trees and terrain shall be retained except as required to meet conditions of this permit and any disturbed areas shall be replanted with vegetation similar to existing predevelopment ground cover in accordance with the replanting plan submitted with the Application.
10. The Applicant/Owner shall be responsible for rectifying any adverse effect on adjacent lands from any drainage alteration as a result of the subject development.
11. That if the development authorized by this Development Permit is not commenced within reasonable diligence within 12 months from the date of issue, and completed within 24 months of the issue, the permit is deemed to be null and void, unless an extension to this permit shall first have been granted by the Development Authority.

ROCKY VIEW COUNTY

12. That if the Development Permit is not issued by **December 31, 2022** or the approved extension date, then this approval is null and void and the Development Permit shall not be issued.

Advisory:

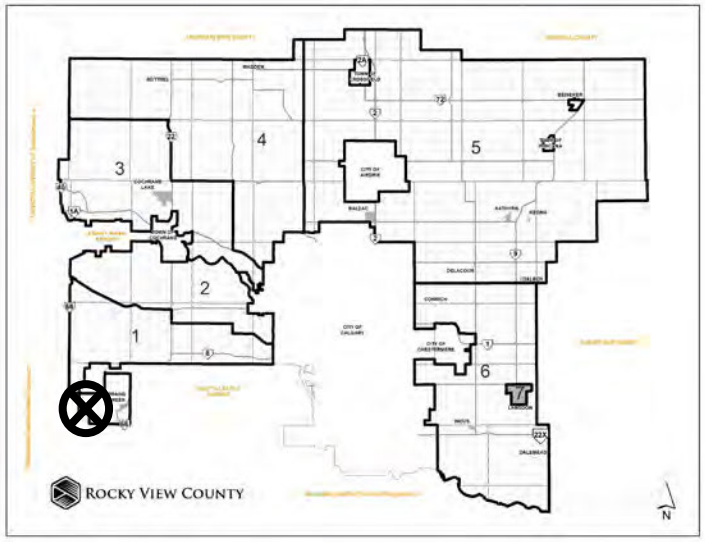
- That a Building Permit and applicable subtrade permits shall be obtained from Building Services, prior to construction and shall include any requirements noted within the *Building Code Comments for Proposed Development, dated April 26, 2022*.
- That during construction, any required temporary fencing should be erected no more than 3.00 m (9.84 ft.) from the proposed building, to help prevent disturbance of the existing trees and native vegetation.
- That the site shall remain free of restricted and noxious weeds and maintained in accordance with the *Alberta Weed Control Act [Statutes of Alberta, 2008 Chapter W-5.1, December 2017*].
- That *the* site shall be maintained in compliance with County Bylaw No. C-7690-2017, the "Nuisance and Unsightly Property Bylaw", at all times.
- That any other government permits, approvals or compliances are the sole responsibility of the Applicant/Owner.

ROCKY VIEW COUNTY

Location & Context

Development Proposal

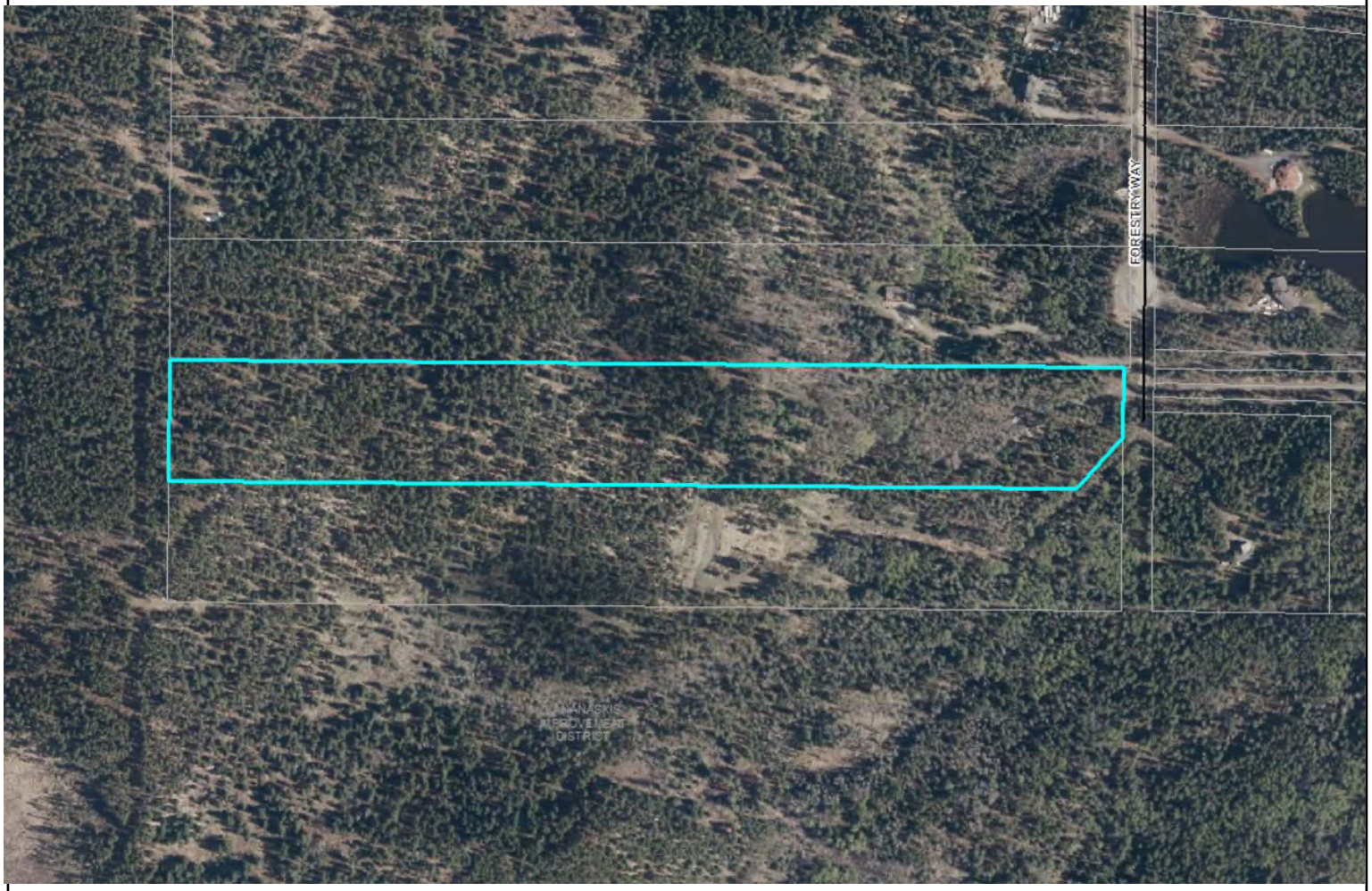
construction of two (2) accessory buildings (shop and shed), relaxation of the top of bank setback requirement



Division: 1
Roll: 03908020
File: PRDP20221236/1241
Printed: June 9, 2022
Legal: Block:3 Plan:7711440 within SW-08-23-05-W05M

ROCKY VIEW COUNTY

Aerial Imagery



Development Proposal

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ROCKY VIEW COUNTY

Cover Letter

Development Proposal

construction of two (2) accessory buildings (shop and shed), relaxation of the top of bank setback requirement

March 20, 2022

Peter Haar,
[redacted]

This application is for the above property which I would like to build a new shop 40'x60' and operate my small custom woodworking business from. Home based business type two. Forest Creek Fine wood working has been in Business for two years now, and along with my business partner we have one other employee. My business partner largely does site work and our employee works about 50/50 between the shop and site. We operate between the hours of 8 am and 6 pm Monday through Friday, and occasionally Saturdays as well. The majority of our projects are custom woodworking furniture, kitchens, millwork, closets, etc. Please do not hesitate to call or email me for questions or concerns.

Sincerely yours,

Peter Haar

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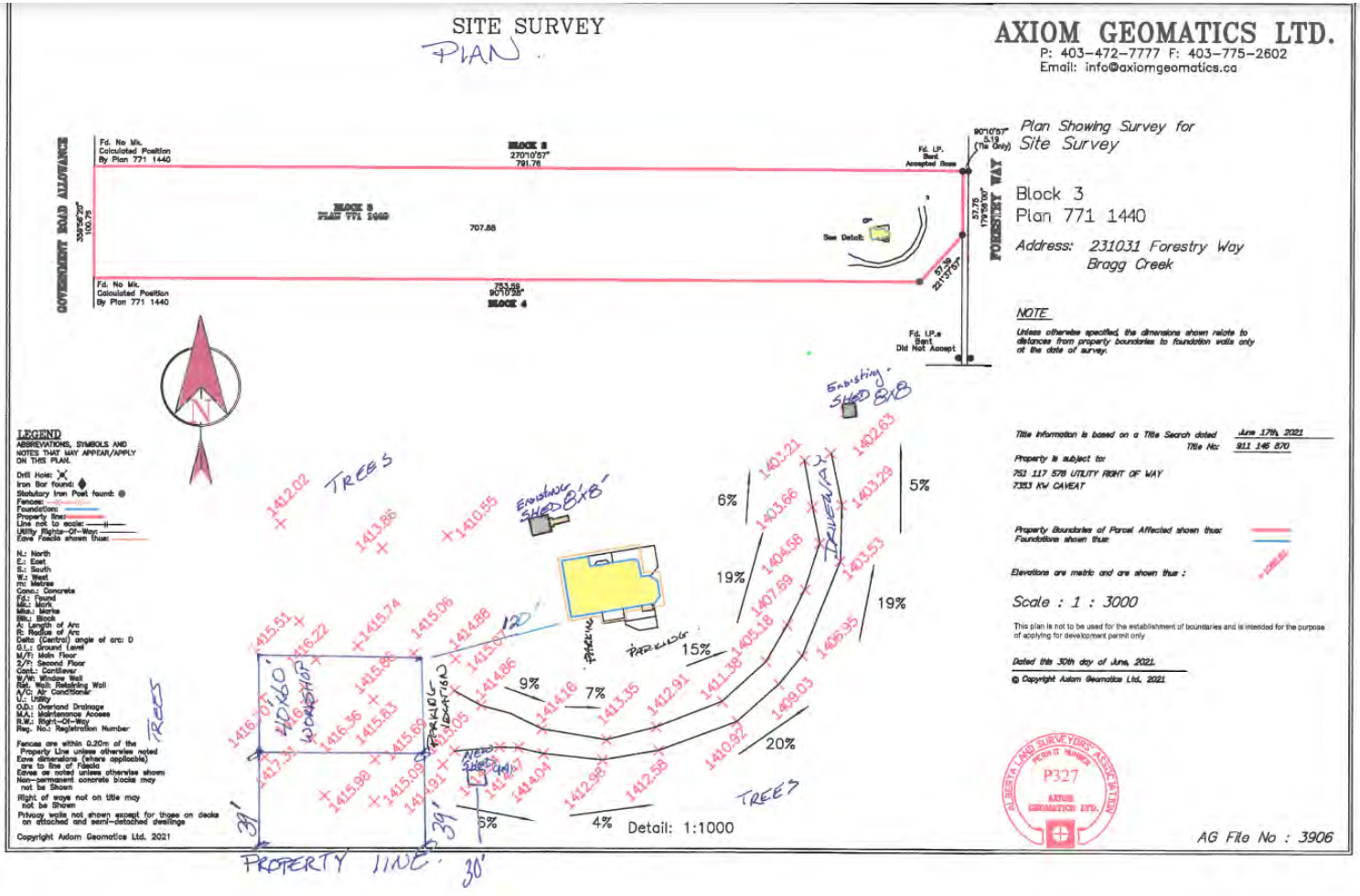
ROCKY VIEW COUNTY

Site Plan



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ROCKY VIEW COUNTY

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Development Proposal

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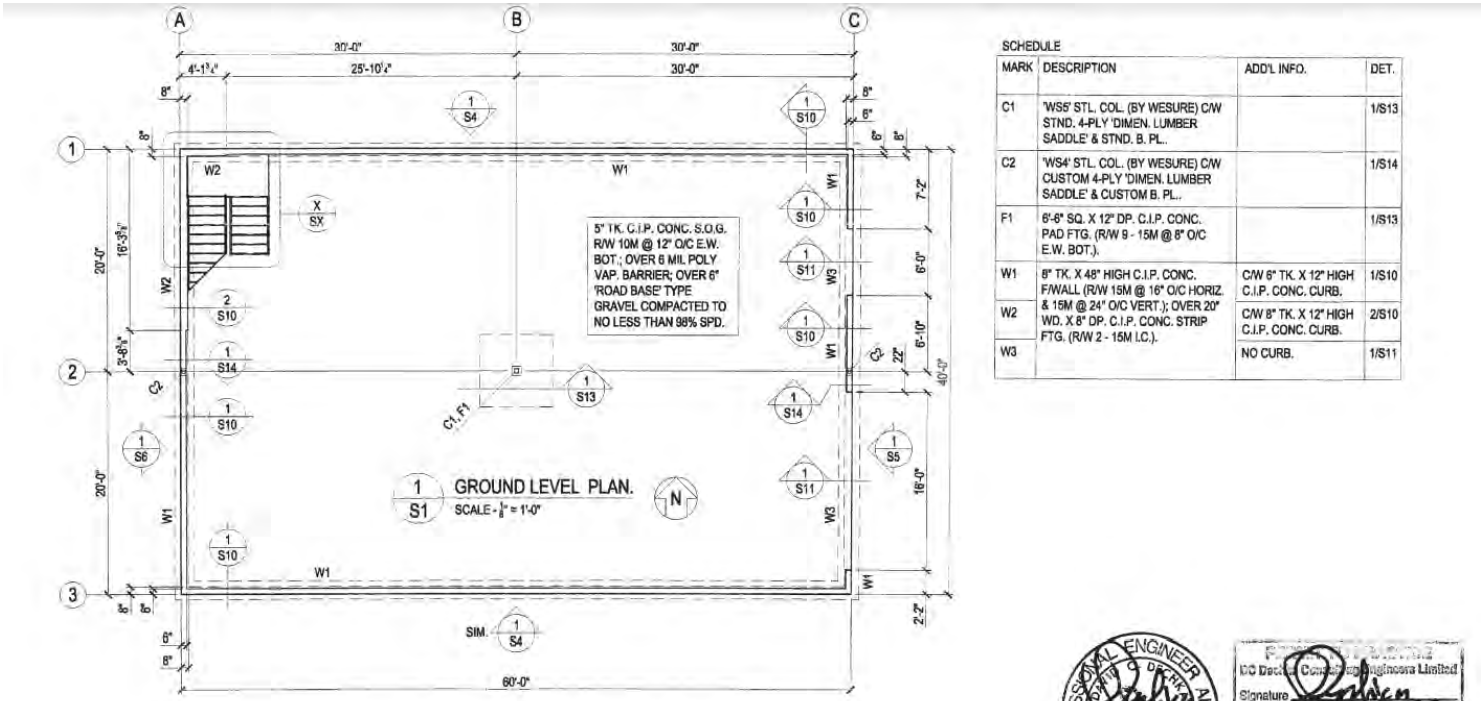


SCHEDULE

MARK	DESCRIPTION	ADD'L INFO.	DET.
C1	'WS5' STL. COL. (BY WESURE) C/W STND. 4-PLY 'DIMEN. LUMBER SADDLE' & STND. B. PL..		1/S13
C2	'WS4' STL. COL. (BY WESURE) C/W CUSTOM 4-PLY 'DIMEN. LUMBER SADDLE' & CUSTOM B. PL..		1/S14
F1	6'-6" SQ. X 12" DP. C.I.P. CONC. PAD FTG. (R/W 9 - 15M @ 8" O/C E.W. BOT.).		1/S13
W1	8" TK. X 48" HIGH C.I.P. CONC. F/WALL (R/W 15M @ 16" O/C HORIZ. & 15M @ 24" O/C VERT.); OVER 20" WD. X 8" DP. C.I.P. CONC. STRIP FTG. (R/W 2 - 15M I.C.).	C/W 6" TK. X 12" HIGH C.I.P. CONC. CURB.	1/S10
W2		C/W 8" TK. X 12" HIGH C.I.P. CONC. CURB.	2/S10
W3		NO CURB.	1/S11

PROFESSIONAL ENGINEER DONALD C. DECHKA ALBERTA

D.C. Dechka Consulting Engineers Limited
Signature
Date 27 Jan. 2022
PERMIT NUMBER: P 7859
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

REV.	DESCRIPTION	DATE
0	ISSUED FOR CONSTRUCTION	27 JAN. 2022

D.C. DECHKA CONSULTING ENGINEERS LIMITED
27 Silverview Place N.W., Calgary, AB, T3B 3K5
Phone: (403) 204 - 2234
E-mail: dechka@telus.net

VERTEX SHOP
231031 FORESTRY WAY, BRAGG CREEK

GROUND LEVEL PLAN

PROJECT NUMBER:	21-101-01
DATE:	27 JAN. 2022
SCALE:	AS SHOWN
DRAWN:	D.C.
CHECKED:	D.D.

DRAWING NUMBER: S1

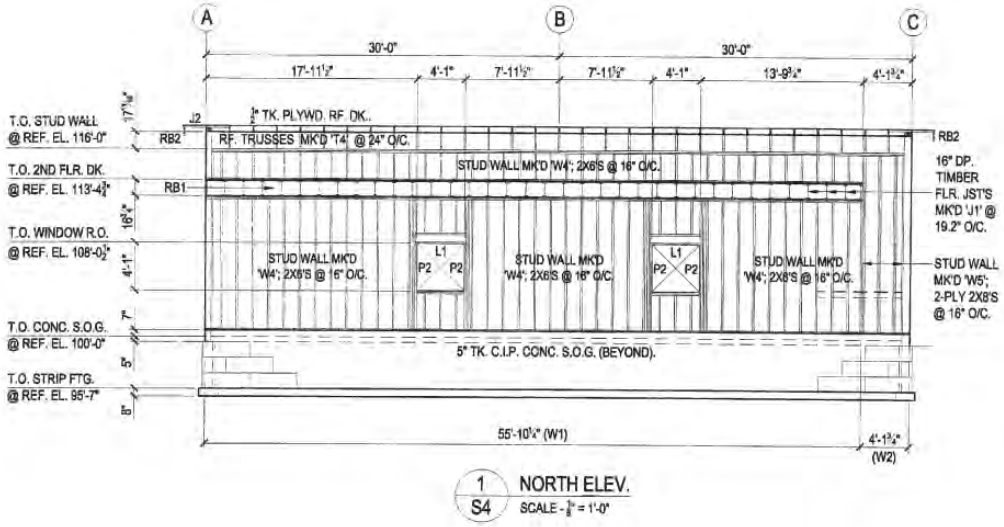
Division: 1
Roll: 03908020
File: PRDP20221236/1241
Printed: June 9, 2022
Legal: Block:3 Plan:7711440 within SW-08-23-05-W05M

ROCKY VIEW COUNTY

Site Plan

Development Proposal

construction of two (2) accessory buildings (shop and shed), relaxation of the top of bank setback requirement



1 / S4 NORTH ELEV.
SCALE - ¾" = 1'-0"

SCHEDULE

MARK	DESCRIPTION	ADD'L INFO.	DET.
J1	16" DP. TIMBER FLR. JST..		
J2	2X6 CANT. RF. JST. (ON FLAT).		
L1	2-PLY 2X8 LINTEL.		
P2	3-PLY 2X6 POST (1J, 2K).		
RB1	1½" WD. X 16" DP. LSL RIM BOARD.		
RB2	2X6 FASCIA BOARD.		
T4	'SLOPING FLAT' STYLE OPEN-WEB TIMBER RF. TRUSS.		1/S7
W1	8" TK. X 48" HIGH C.I.P. CONC. F/WALL (R/W 15M @ 16" O/C HORIZ. & 15M @ 24" O/C VERT.); OVER 20" WD. X 8" DP. C.I.P. CONC. STRIP FTG. (R/W 2 - 15M I.C.).	C/W 6" TK. X 12" HIGH C.I.P. CONC. CURB.	1/S10
W2		C/W 8" TK. X 12" HIGH C.I.P. CONC. CURB.	2/S10
W4	STUD WALL; 2X6'S @ 16" O/C.		
W5	STUD WALL; 2-PLY 2X8'S @ 16" O/C.		

PROFESSIONAL ENGINEER ALBERTA

DC Dechka Consulting Engineers Limited
Signature
Date 27 Jan. 2022
PERMIT NUMBER: P 7869
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

REV.	DESCRIPTION	DATE
0	ISSUED FOR CONSTRUCTION	27 JAN. 2022

D.C. DECHKA CONSULTING ENGINEERS LIMITED
27 Silverview Place N.W., Calgary, AB, T3B 3K5
Phone: (403) 204 - 2234
E-mail: dechka@telus.net

VERTEX SHOP
231031 FORESTRY WAY, BRAGG CREEK

ELEVATION

PROJECT NUMBER:	21-161-01
DATE:	27 JAN. 2022
SCALE:	AS SHOWN
DRAWN:	D.C.
CHECKED:	D.D.

DRAWING NUMBER: S4

Division: 1
Roll: 03908020
File: PRDP20221236/1241
Printed: June 9, 2022
Legal: Block:3 Plan:7711440 within SW-08-23-05-W05M

ROCKY VIEW COUNTY

Site Plan

Development Proposal

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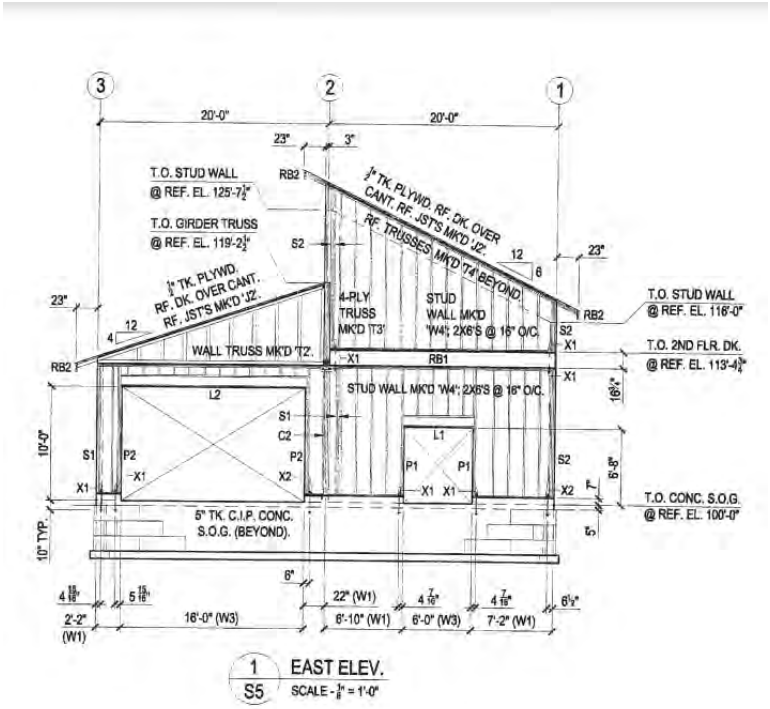
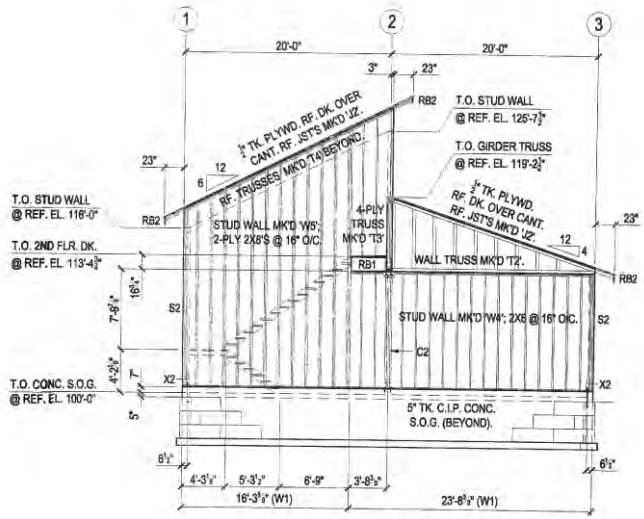


1 S5 EAST ELEV.
SCALE - ⅛" = 1'-0"



1 S6 WEST ELEV.
SCALE - ⅛" = 1'-0"

REV.	DESCRIPTION	DATE
0	ISSUED FOR CONSTRUCTION	27 JAN. 2022

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23

Division: 1
Roll: 03908020
File: PRDP20221236/1241
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Legal: Block:3 Plan:7711440 within SW-08-23-05-W05M

ROCKY VIEW COUNTY

Photos – Submitted by Applicant

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ROCKY VIEW COUNTY

Photos – Taken by Administration

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Printed: June 9, 2022
Legal: Block:3 Plan:7711440 within SW-08-23-05-W05M

ROCKY VIEW COUNTY
Cultivating Communities

Notice of Appeal

Subdivision and Development Appeal Board
Enforcement Appeal Committee

Appellant Information			
Name of Appellant(s) Daniel and Chris Patton			
Mailing Address [redacted]	Municipality [redacted]	Province [redacted]	Postal Code [redacted]
Main Phone # [redacted]	Alternate Phone # [redacted]	Email Address [redacted]	

Site Information	
Municipal Address 231031 Forestry Way	Legal Land Description (lot, block, plan OR quarter-section-township-range-meridian) Block3, Plan 7711440, SW-08-23-05-05
Property Roll # 03908020	Development Permit, Subdivision Application, or Enforcement Order # PRDP20221241

I am appealing: (check one box only)

Development Authority Decision	Subdivision Authority Decision	Decision of Enforcement Services
☑ Approval	☐ Approval	☐ Stop Order
☐ Conditions of Approval	☐ Conditions of Approval	☐ Compliance Order
☐ Refusal	☐ Refusal	

Reasons for Appeal (attach separate page if required)

See attached letter

This information is collected for Rocky View County's Subdivision and Development Appeal Board or Enforcement Appeal Committee under section 33(c) of the Freedom of Information and Protection of Privacy Act (FOIP Act) and will be used to process your appeal and create a public record of the appeal hearing. Your name, legal land description, street address, and reasons for appeal will be made available to the public in accordance with section 40(1)(c) of the FOIP Act. Your personal contact information, including your phone number and email address, will be redacted prior to your appeal being made available to the public. If you have questions regarding the collection or release of this information, please contact the Municipal Clerk at 403-230-1401.

Appellant's Signature

6/2/2022
Date

Received by Legislative and Intergovernmental Services
June 2, 2022

Notice of Appeal

Application Number PRDP20221241 Division 1

PRDP20221236

Chris and I purchased our home at 231036 Forestry Way, West Bragg Creek February 2016. Our decision to move there was based on a quite secluded neighborhood far away from the distraction of the city. The ongoing changes in the hamlet of Bragg Creek have been beneficial to all in the hamlet and surrounding areas, most residents would concur and hope for additional improvements. West Bragg Creek is different, it's a residential area and not apart of the business district of Bragg Creek, our subdivision is an area removed from the business congestion, noise, pollution, potential fire hazard, and truck traffic that most certainly will damage our roads and endanger our children. We are struggling to understand how the fabrication and operation of a commercial scale woodworking, cabinetry/millwork manufacturing/fabrication shop fits in with the established norms of our subdivision.

Based on a review of the business homepage (and Facebook page) of the proposed Forest Creek Fine Woodworking business, significant custom millwork, fabrication, and painting/staining/gluing is being proposed, in a scale that supports commercial contractor levels. Home-based-businesses (type II) are expected to be secondary to the residential use of the parcel as per the Rockyview County definitions. Given the proposed shop size is significant (40' x 60'), exceeding the footprint of the residential home, as well as the fact that the homeowner is not involved in the business, (and to the best of our knowledge – the applicant is not currently a resident) - would suggest that the proposal is not secondary to residential usage.

It is important to note that we do not have any concerns with a neighbour building a large shop for personal use. However, we do have concerns with the operation of this type of business in our neighbourhood as it is inconsistent with the established norms.

Some of these concerns can be mitigated through following appropriate county, provincial, and federal regulations, and codes – but not all. Our concerns are as follows:

- Fire Hazard. We live in the middle of a forest. Woodworking, Millwork, and Cabinetry shops present a higher risk of fire due to the generation of flammable wood dust, the storage and use of flammable paints, stains, solvents and diluents, potential for accumulation of oily rags and other flammable refuse, as well as the use of glues that have highly flammable vapour. An article from the WoodWorking Network (https://www.woodworkingnetwork.com/best-practices-guide/plant-production-software/staying-safe-top-four-risks-woodworking) articulates some of these risks well.

  According to the Greater Bragg Creek Wildfire Mitigation Strategy (https://www.rockyview.ca/Portals/0/Files/Fire/Greater-Bragg-Creek-FireSmart-Mitigation-Strategy.pdf) – the proposed shop/business location is in an area that is flagged as having

'extreme' wildfire behavior potential (see below extract from page 10 of the link above). Similarly, the Area Hazard (30-100m+ impact) for Forestry Way is also listed as 'extreme'.

- Noise Pollution. Woodworking and millwork tools (planers, jointers, mitre saws, sawmills) operate typically more than 100 decibels. Even if the tools are operated in a standard shop – it is likely the neighbouring homes will hear these tools when in use, in addition to the noise of increased traffic: ongoing deliveries of raw materials and subsequent shipping and receiving of fabricated products, as well as employee and partner traffic. Similarly – external dust collection systems or paint booth ventilation or large HVAC units could present additional noise pollution.

- Impacts to Property, including changes to valuation, reduced ability to sell, and changing the overall neighbourhood established norms as a quiet, forested residential area. Local realtors indicated at a professional level and perspective on this – and he provided documentation indicating that he believed the installation of a commercial woodworking/cabinetry/millwork business in proximity would negatively impact property value by 10-15%. Based on current real estate and assessed values, this is a significant impact.

- Air pollution. With the size and scale of the painting, staining, and gluing for this business, we are concerned for the potential for not only odours, but the negative effects of long-term mild exposure (trouble breathing after COVID pneumonia in both lungs). If the development was approved – this could likely be mitigated through following both local, provincial, and federal laws associated with commercial scale paint booths that require an engineered system, stamped by a certified engineer from Alberta.

- Environmental Damage. There are several tributaries to the Elbow River in the area, including a seasonal creek that runs along our property line for several months of the year, as well as a year-round creek to the north of the property that drains into a lake on the east side of Forestry way. The water table in the area is very shallow (our well is 30' deep). The concern would be that any pollutants (millwork dust/glue, solvents, diluents, etc.) work their way into the water table and into the tributaries or riparian. Note that the slope of these lots is quite steep – with natural drainage that would eventually end up in the riparian area, or in a small creek or water table. **Additionally, our concern hits extremely close to home, our lake will most certainly collect the runoff contaminants and destroy the fish and plant life directly in front of our home.**

- Increased traffic in the area due to ongoing deliveries of raw materials and subsequent shipping and delivery of fabricated products, as well as employee and partner traffic. As noted above – Forestry Way is a dead-end road, and the proposed shop/business location is at the very end of the dead-end road. The increased traffic would impact all Forestry Way, especially those near the end of the street. Currently Forestry Way has very little traffic, and this would represent a significant change. Commercial trucking will create potential danger to all our small children, pets, and wildlife within our area.

- Precedence is a slippery slope, if this business is allowed to move forward drastically changing our way of living, we fear many additional businesses will follow crowding, damaging, and creating devastation our neighbor beyond repair.

Regards,

Daniel and Chris Patton

231036 Forestry Way

Bragg Creek, Alberta T0L0K0

[redacted]

ROCKY VIEW COUNTY
Cultivating Communities

Notice of Appeal

Subdivision and Development Appeal Board
Enforcement Appeal Committee

Appellant Information

Name of Appellant(s)			
Blaine and Angela Townsend			
Mailing Address [redacted]	Municipality Bragg Creek	Province AB	Postal Code T0L 0K0
Main Phone # [redacted]	Alternate Phone # [redacted]	Email Address [redacted]	

Site Information

Municipal Address	Legal Land Description (lot, block, plan OR quarter-section-township-range-meridian)
231031-Forestry-Way	Block 3, Plant 7711440, SW-08-23-05-05
Property Roll #	**Development Permit, Subdivision Application, or Enforcement Order #**
03908020	PRDP20221236 41

I am appealing: (check one box only)

Development Authority Decision	Subdivision Authority Decision	Decision of Enforcement Services
☑ Approval	☐ Approval	☐ Stop Order
☐ Conditions of Approval	☐ Conditions of Approval	☐ Compliance Order
☐ Refusal	☐ Refusal	

Reasons for Appeal (attach separate page if required)

See Attached

Appealing Development Permit Approval for ~~Home Based Business Type II~~ Accessory Building

ROCKY VIEW COUNTY
RECEIVED
JUN 06 2022
LEGISLATIVE AND INTERGOVERNMENTAL SERVICES

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Blaine Townsend
Appellant's Signature

June 5, 2022
Date

A Townsend

June 5, 2022

Last updated: 2020 August 07

Like many in West Bragg Creek, we moved out of the city to the end of West Bragg Creek to get away from the pollution (noise / air / etc), and raise our family in a natural environment. We absolutely love Bragg Creek and the surrounding area, and though we recognize there will be changes and development over time for the betterment of the community, we are struggling to reconcile how the fabrication and operation of a commercial scale woodworking, cabinetry/millwork manufacturing/fabrication shop fits in with the established norms on our sleepy road.

Based on a review of the business homepage https://forestcreekfinewoodworking.ca/ (and facebook page), the proposed development will include custom millwork, fabrication, and painting/staining/gluing, in a scale that could support commercial contractor levels. Home-based-businesses (type II) are expected to be secondary to the residential use of the parcel as per the Rockyview County definitions. Given the proposed shop size is significant (40' x 60'), exceeding the footprint of the residential home, as well as the fact that the homeowner is not involved in the business, (and to the best of our knowledge – the applicant is not currently a resident) - would suggest that the proposal is not secondary to residential usage.

It is important to note that we do not have any concerns with a neighbour building a large shop for personal use. However, we do have concerns with the operation of this type of business in our neighbourhood as it is inconsistent with the established norms.

Some of these concerns can be mitigated through following appropriate county, provincial, and federal regulations and codes – but not all. Our concerns are as follows:

- Fire Hazard. We live in the midst of a beautiful forest. Woodworking, Millwork, and Cabinetry shops present a higher risk of fire due to the generation of flammable wood dust, the storage and use of flammable paints, stains, solvents and diluents, potential for accumulation of oily rags and other flammable refuse, as well as the use of glues that have highly flammable vapour. An article from the WoodWorking Network (https://www.woodworkingnetwork.com/best-practices-guide/plant-production-software/staying-safe-top-four-risks-woodworking) articulates some of these risks well.

  According to the Greater Bragg Creek Wildfire Mitigation Strategy (https://www.rockyview.ca/Portals/0/Files/Fire/Greater-Bragg-Creek-FireSmart-Mitigation-Strategy.pdf) – the proposed shop/business location is in an area that is flagged as having 'extreme' wildfire behavior potential. Similarly, the Area Hazard (30-100m+ impact) for Forestry Way is also listed as 'extreme'.

  The development permit and associated conditions are silent on this risk or mitigations.

- Noise Pollution. Woodworking and millwork tools (planers, jointers, mitre saws, sawmills) operate typically in excess of 100 decibels. Even if the tools are operated indoors – it is likely the neighbouring homes will hear these tools when in use. In addition, there will be noise due to increased traffic: ongoing deliveries of raw materials and subsequent loading, shipping and delivery of fabricated products, as well as employee and partner traffic.

Similarly – external dust collection systems or paint booth ventilation or large HVAC units could present additional noise pollution. Many people in the neighbourhood (including our household) have family members at home during the day – and the noise from the proposed development would have a significant negative impact.

- Impacts to Property, including changes to valuation, reduced ability to sell, and changing the overall neighbourhood established norms as a quiet, forested residential area. Moving out here was a financial stretch, and we could be driven to relocate due to this development. We reached out to a local realtor to understand a professional perspective on the impacts to Property – and he provided documentation indicating that he believed the installation of a commercial woodworking/cabinetry/millwork business in close proximity would negatively impact property value by 10-15%, and reduce the number of potential buyers. Based on current real estate and assessed values, these are significant impacts.

- Increased traffic in the area due to ongoing deliveries of raw materials and subsequent shipping and delivery of fabricated products, as well as employee and partner traffic. As noted above – Forestry Way is a dead-end road and the proposed shop/business location is at the very end of the dead end road. The increased traffic would impact all Forestry Way, though the greatest impacts would be for those near the end of the street. Currently Forestry Way has very little traffic, and this could represent a significant change.

- Air pollution. With the size and scale of the painting, staining, and gluing for this business, we are concerned for the potential for not only odours, but the negative effects of long term mild exposure (our son has asthma). If the development was approved – this could likely be mitigated through following both local, provincial, and federal laws associated with commercial scale paint booths that require an engineered system, stamped by a certified engineer from Alberta.

- Environmental Damage. There are several tributaries to the Elbow river in the area, including a seasonal creek that runs along our property line for several months of the year, as well as a year-round creek to the north of the property that drains into a lake on the east side of Forestry way. The water table in the area is very shallow (our well is 30' deep). The concern would be that any pollutants (millwork dust/glue, solvents, diluents, etc) work their way into the water table and into the tributaries or riparian. Note that the slope of these lots is quite steep – with natural drainage that would eventually end up in the riparian area, or in a small creek or water table.

ROCKY VIEW COUNTY

262075 Rocky View Point
Rocky View County, AB, T4A 0X2

403-230-1401
questions@rockyview.ca
www.rockyview.ca

THIS IS NOT A DEVELOPMENT PERMIT

Please note that the appeal period *must* end before this permit can be issued and that any Prior to Issuance conditions (if listed) *must* be completed.

N O T I C E O F D E C I S I O N

Peter Haar
[redacted]

Tuesday, May 17, 2022

Roll: 03908020

RE: Development Permit #PRDP20221241

Block 3 Plan 7711440, SW-08-23-05-05; (231031 FORESTRY WAY)

The Development Permit application for construction of an accessory building (shop) and relaxation of the top of bank setback requirement has been **conditionally-approved** by the Development Officer subject to the listed conditions below **(PLEASE READ ALL CONDITIONS)**:

Description:

1. That an accessory building (shop) may be constructed on the subject land in general accordance with the drawings submitted with application.

    i. That the top of bank setback requirement is relaxed in accordance with the recommendations and site plan detailed in the *Geotechnical Investigation prepared by PrairieGEO Engineering (File no. PGE21-62, Dated May 3, 2022) in perpetuity.*

Prior to Release:

2. That prior to issuance of this permit, the Applicant/Owner shall contact County Road Operations with haul details for materials and equipment needed during construction/site development to confirm if Road Use Agreements or permits will be required for any hauling along the County road system and to confirm the presence of County road ban restriction

3. The Applicant/Owner shall also confirm if any improvements are required to the existing approach for this parcel from Forestry Way.

    i. Written confirmation shall be received from County Road Operations confirming the status of this *condition*. Any required agreement or permits shall be obtained unless otherwise noted by County Road Operations

4. That prior to release of this permit the Applicant/Owner shall submit a detailed Erosion and Sedimentation Control Plan, prepared by a qualified professional, in accordance with Rocky View Servicing Standards and best management practices.

Permanent:

5. That the Applicant/Owner shall adhere to the recommendations outlined in the *Geotechnical Investigation prepared by PrairieGEO Engineering (File no. PGE21-62, Dated May 3, 2022) in perpetuity.*

6. That the accessory building shall be adequately serviced in accordance with the County Servicing Standards and Policy C-407.

ROCKY VIEW COUNTY
262075 Rocky View Point
Rocky View County, AB, T4A 0X2
403-230-1401
questions@rockyview.ca
www.rockyview.ca

7. That the accessory building shall not be used for for commercial purposes at any time unless approved through a separate Development Permit.

8. That there shall be no more than 2.00 m (6.56 ft.) of excavation or 1.00 m (3.28 ft.) of fill adjacent to or within 15.00 m (49.21 ft.) of the proposed building under construction, unless a separate Development Permit has been issued for additional fill.

9. That no topsoil shall be removed from the site. All topsoil shall be retained on-site and shall be seeded after building construction is complete, as part of site restoration.

10. That the existing trees and terrain shall be retained except as required to meet conditions of this permit and any disturbed areas shall be replanted with vegetation similar to existing predevelopment ground cover in accordance with the replanting plan submitted with the Application.

11. The Applicant/Owner shall be responsible for rectifying any adverse effect on adjacent lands from any drainage alteration as a result of the subject development.

12. reasonable diligence within 12 months from the date of issue, and completed within 24 months of the issue, the permit is deemed to be null and void, unless an extension to this permit shall first have been granted by the Development Authority.

13. That if the Development Permit is not issued by **December 31, 2022** or the approved extension date, then this approval is null and void and the Development Permit shall not be issued.

Advisory:

14. That a Building Permit and applicable subtrade permits shall be obtained from Building Services, prior to construction and shall include any requirements noted within the *Building Code Comments for Proposed Development, dated April 26, 2022*.

15. That during construction, any required temporary fencing should be erected no more than 3.00 m (9.84 ft.) from the proposed building, to help prevent disturbance of the existing trees and native vegetation.

16. That the site shall remain free of restricted and noxious weeds and maintained in accordance with the *Alberta Weed Control Act [Statutes of Alberta, 2008 Chapter W-5.1, December 2017*].

17. That the site shall be maintained in compliance with County Bylaw No. C-7690-2017, the "Nuisance and Unsightly Property Bylaw", at all times.

18. That any other government permits, approvals, or compliances are the sole responsibility of the Applicant/Owner.

If Rocky View County does not receive any appeal(s) from you or from an adjacent/nearby landowner(s) by **Tuesday, June 7, 2022** , a Development Permit may be issued, unless there are specific conditions which need to be met prior to issuance. If an appeal is received, then a Development Permit will not be issued unless and until the decision to approve the Development Permit has been determined by the Development Appeal Committee.

Regards,

Development Authority
Phone: 403-520-8158
Email: development@rockyview.ca

THIS IS NOT A DEVELOPMENT PERMIT

ROCKY VIEW COUNTY

DEVELOPMENT PERMIT
APPLICATION

FOR OFFICE USE ONLY	
APPLICATION NO.	PRDP20221241
ROLL NO.	03908020
RENEWAL OF	
FEES PAID	$585.00
DATE OF RECEIPT	March 22, 2022

APPLICANT/OWNER

Applicant Name: PETER HAAR | Email: ~~PETER@VERTEXCARPENTRY.CA~~

Business/Organization Name (if applicable): FOREST CREEK FINE Woodworking.

Mailing Address: 240001 RANGE ROAD 42 Calgary Ab | Postal Code: T3Z-2X2

Telephone (Primary): 403-4170-0850 | Alternative:

Landowner Name(s) per title (if not the Applicant): Nick + LOUISE HAAR

Business/Organization Name (if applicable):

[redacted]

LEGAL LAND DESCRIPTION - Subject site

All/part of: SW ¼	Section: 8	Township: 23	Range: 5	West of: 5	Meridian	Division: 44	
All parts of Lot(s)/Unit(s):		Block: 3	Plan: 7711440			Parcel Size (acha): 28.52.	
Municipal Address: 231031 FORESTRY WAY.				Land Use District: SMALL Ag.			

APPLICATION FOR - List use and scope of work

New Woodworking SHOP. BUSINESS and Accessory Building

Variance Rationale included: ☐ YES ☐ NO ☑ N/A **DP Checklist Included:** ☑ YES ☐ NO

SITE INFORMATION

a. Oil or gas wells present on or within 100 metres of the subject property(s) ☐ YES ☑ NO
b. Parcel within 1.5 kilometres of a sour gas facility (well, pipeline or plant) ☐ YES ☑ NO
c. Abandoned oil or gas well or pipeline present on the property ☐ YES ☑ NO
(Well Map Viewer: https://extmapviewer.aer.ca/AERAbandonedWells/Index.html)
d. Subject site has direct access to a developed Municipal Road (accessible public roadway) ☐ YES ☐ NO

AUTHORIZATION

I, PETER HAAR (Full name in Block Capitals), **hereby certify** (initial below): PH

___ That I am the registered owner **OR** ✓ That I am authorized to act on the owner's behalf.

✓ That the information given on this form and related documents, is full and complete and is, to the best of my knowledge, a true statement of the facts relating to this application.

✓ That I provide consent to the public release and disclosure of all information, including supporting documentation, submitted/contained within this application as part of the review process. I acknowledge that the information is collected in accordance with s.33(c) of the *Freedom of Information and Protection of Privacy Act.*

✓ **Right of Entry:** I authorize/acknowledge that Rocky View County may enter the above parcel(s) of land for purposes of investigation and enforcement related to this application in accordance with Section 542 of the Municipal Government Act.

Applicant Signature _____ Date MARCH 15 2022

Landowner Signature _____ Date Mar 15/22

ROCKY VIEW COUNTY

ACCESSORY BUILDING(s)
INFORMATION SHEET

FOR OFFICE USE ONLY	
APPLICATION NO.	PRDP20221241
ROLL NO.	03908020
DISTRICT	A-SML p8.1

DETAILS		
Building total floor area (footprint)	2400	(m² / ft.²)
Height of building		(m / ft.)
Total area of all accessory buildings (For Residential/Agricultural parcels)	2500sq	(m² / ft.²)

USE TYPE

- ☐ * Residential
- ☐ Agricultural
- ☑ Related to *Home-Based Business (HBB), Type II* (attach *HBB Information Sheet*)
- ☐ Other (specify):

BUILDING DESCRIPTION

Purpose/use of building (workshop, studio, storage etc.): Workshop

Building material(s): WOOD FRAME, CONCRETE FOUNDATION.

Exterior colour(s): GREY + BROWN

Age of building(s), if permits not issued/available: No Permits ISSUED

BUILDING TYPE

- ☐ Storage Shed
- ☑ Barn
- ☐ Quonset
- ☐ Farm Building
- ☐ Detached Garage
- ☐ Gazebo
- ☐ ** Shipping Container (Seacan)
- ☐ Personal Greenhouse/Nursery
- ☐ Horse Shelter/Stable
- ☐ Tent (covered)
- ☑ Other (specify): ~~POLE BARN~~ WOODWORKING SHOP

VARIANCE(s) REQUESTED (If applicable)

Describe variances requested: HOME BASED BUISNESS TYPE II

Describe reasons for variances (location, storage needs, etc.): HOME BASED BUSINESS TYPE II HOME WOOD SHOP

NOTE: Application must include a Site Plan identifying dimensions, area, and location of the building (including setbacks), floor plan(s), elevations, and requirements of the Development Permit Checklist.

Accessory Buildings, Land Use Bylaw, C-8000-2020:

* *An Accessory Building on a parcel in a Residential District shall be similar to, and complement, the Principal Building in exterior material, colour and appearance.*

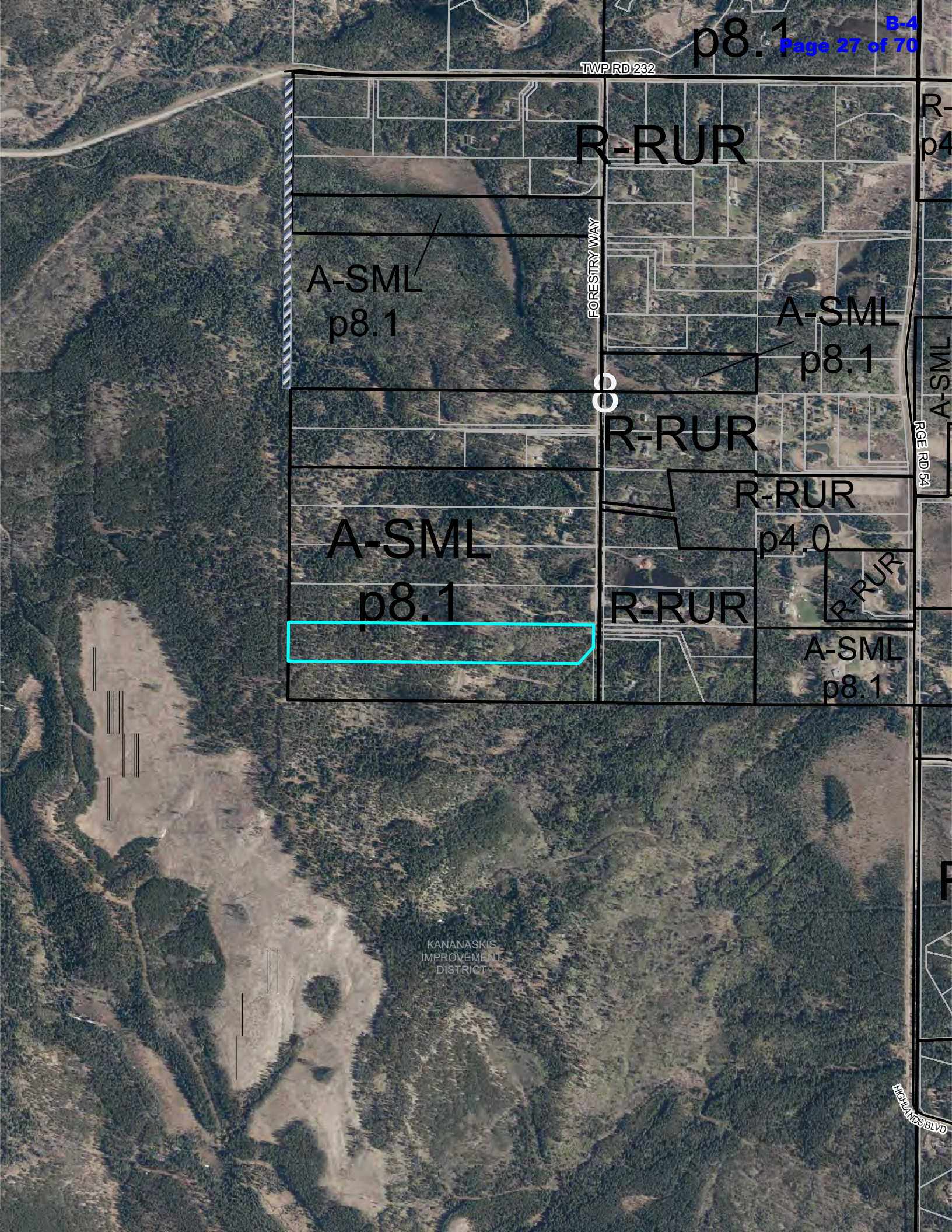
** *Where the Accessory Building is a Shipping Container it:*

a) Shall not be attached, in any way, to a principal building;

b) Shall not be stacked in any Non-Industrial District; and

c) Shall be visually screened from public roads and adjacent properties in a manner which satisfies the Development Authority.

Applicant Signature _____ **Date** MARCH 15/2022


p8.1
TWP RD 232
R-RUR
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A-SML
p8.1
FORESTRY WAY
A-SML
p8.1
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R-RUR
A-SML
RGE RD 54
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KANANASKIS
IMPROVEMENT
DISTRICT
HIGHLANDS BLVD

From: Peter Haar
To: Evan Neilsen
Subject: [EXTERNAL] - Re: PRDP20221236 and PRDP20221241 Application Receipt Letters - Notice of Complete
Date: April 14, 2022 11:47:01 AM
Attachments: DP Application Receipt Letter.pdf
DP Application Receipt Letter (1).pdf

Hello Evan,

There will be no need for any signage or outdoor storage. Aside from myself no one else associated with the business will be living on the property

Thanks,

Peter

Sent from my iPhone

> On Apr 14, 2022, at 10:11 AM, Evan Neilsen <ENeilsen@rockyview.ca> wrote:
>
> Hello Peter,
>
> Please find enclosed application receipt letters for applications PRDP20221236 and PRDP20221241 for your Home-Based Business for a Woodworking Shop and an accessory building, respectively. I have completed my initial review and I am hoping to get clarification on the following aspects of the business as they pertain to regulations within our Land Use Bylaw:
>
> 1. How many employees, or people are otherwise involved in the operations of the business will live on site at 231031 Forestry Way where the business is proposed?
> 2. How much outdoor storage (storage not within a shed, shop or other accessory building) will be required for this business?
> 3. Will the business require any signage?
>
> I am currently working to circulate the files to various internal and external agencies, and should have more feedback as further responses are received. I can also be reached via my direct line at (403) 520 7285 if there are any further questions.
> Thank you once again for your submission, and please let me know if there are any questions.
>
> Best regards,

Evan Neilsen
Development Officer | Planning Services

Rocky View County
262075 Rocky View Point | Rocky View County | AB | T4A 0X2
Phone: 403-520-7285
ENeilsen@rockyview.ca | www.rockyview.ca

GEOTECHNICAL INVESTIGATION

PROPOSED SHOP BUILDING
231031 FORESTRY WAY, BRAGG CREEK, ALBERTA

PRESENTED TO
PETER HAAR & ERIN PHILLIPS
CALGARY, ALBERTA

PREPARED BY
PRAIRIEGEO ENGINEERING LTD.
CALGARY, ALBERTA

FILE NO. PGE21-62

MAY 3, 2022

TABLE OF CONTENTS

TABLES

APPENDICES

1.0 INTRODUCTION

1.1 GENERAL

Peter Haar & Erin Phillips is proposing to build a new shop building at 231031 Forestry Way, Bragg Creek, Alberta. PrairieGEO Engineering Ltd. (PrairieGEO) was requested to perform an investigation and provide slope assessment and geotechnical recommendations for the proposed shop building and access road. This report summarizes results of the field and laboratory testing programs and presents slope assessment and geotechnical recommendations for general site preparation and foundations.

As per County Servicing Standards 2013 prepared by Rocky View County, this report has been prepared for the benefit of Peter Haar & Erin Phillips and their agents in support of the proposed shop development.

1.2 PROJECT DESCRIPTION

It is proposed to construct a new shop building at the south of the existing residential dwelling. The proposed shop will consist of a 223 m^2 (2400 sq.ft) footprint area and 4.9 m (16') in height with no basement. Foundation loads for the shop building is expected to be light to moderate. It is understood that shallow foundations (concrete footings) are preferred foundation option for the proposed shop. It is also proposed to construct a gravel access road from the site entrance to the shop area with a potential culvert placed near the site entrance. The proposed site layout is shown on the Site Plan (Figure 2).

1.3 SCOPE OF WORK

The scope of work for this project was outlined in PrairieGEO's proposal No. PR21-95 dated July 9, 2021. Authorization to proceed with this investigation was given by Mr. Peter Haar of via email on July 12, 2021.

It is understood that a slope stability study is required by the Rocky View County Servicing Standards 2013. The slope assessment in this report is intended to provide the owner and municipality with a reasonable expectation with respect to slope stability and potential for slope movement; and to communicate the technical risks so that informed development decisions can be made relating to this development.

1.4 PREVIOUS INVESTIGATIONS

PrairieGEO was not provided with a previous geotechnical report for review during preparation of this report.

2.0 METHODOLOGY

2.1 FIELD DRILLING PROGRAM

Prior to drilling operation, PrairieGEO personnel requested an Alberta One Call to mark the existing underground utilities.

On July 13, 2021, one Cone Penetration Test (CPT) was conducted at the proposed shop area, near the crest of the slope. Two testholes were drilled to auger refusal at shop and access road areas. Borehole locations were selected by PrairieGEO field engineer. Drilling and CPT operations were performed by competent PrairieGEO's geotechnical personnel. The soil encountered was visually examined during drilling and logged according to the Modified Unified Soil Classification System. Soil samples were collected from auger cuttings to determine the soil/moisture profile and from other selected depths for other testing.

Upon completion of drilling, boreholes were backfilled with auger cuttings. Groundwater table was estimated by using an electronic cone with pore water pressure measurement feature.

The borehole locations were surveyed by PrairieGEO using a Stonex S990A GPS with vertical accuracy of ±5 cm. UTM coordinates and geodetic elevations are provided on the Site Plan and the boreholes logs in Appendix A.

2.2 LABORATORY TEST PROGRAM

Collected soil samples during the field drilling program were returned to PrairieGEO's Calgary laboratory for testing including moisture contents, soil grain size analysis (hydrometer), and water-soluble sulphate content. The results of all laboratory testing are shown on the borehole logs (Appendix A) and individual test results are presented in Appendix B.

3.0 SITE CONDITIONS

3.1 SURFACE CONDITIONS

The proposed residential subdivision is located at 231031 Forestry Way, Bragg Creek, Alberta, as shown on Key Plan, Figure 1. The site is accessible from Forestry Way to the east.

There is an existing single-family residential building located near the toe of the slope. The topography map of the site indicated that the site was sloping down from the south side of the property to the north where the existing house located with an average elevation change of 5.0 m. Slope angles ranged from 6 to 11 degree. The surrounding land use consists of residential acreage lots to the north, east and undeveloped natural forest to the west and south. Site conditions are shown on the Aerial Plan and Site Photographs, Figures 3 and 5. Cross section profiles of the existing slope are shown on Figure 4. Surface elevations ranged from 1415.80 to 1403.75 m at the borehole locations.

3.2 SUBSURFACE CONDITIONS

The general soil profile encountered at the site was relatively uniform at the borehole locations consisted of in descending order: topsoil overlying gravelly clay till. Detailed descriptions of the soil profiles at the borehole locations are provided on the borehole logs in Appendix A. Definitions of the terminology and symbols used on the borehole logs are provided on the explanation sheets, also in Appendix A. The following is a brief description of the main soil types found at the site.

3.2.1 Topsoil

A 0.2 m to 0.4 m thick layer of topsoil was encountered at the Testhole 1 and 2 locations. The topsoil was highly organic, brown and moist. Based on observations and experiences, topsoil thickness is expected to vary and may exist in greater thickness across the site. In general, this topsoil is considered weak and compressible under load.

3.2.2 Clay Till

Clay till was encountered below the topsoil layer at both boreholes and extended to depths of 2.6 m below grade. The clay till was gravelly with some silt. The till was characterized as low to medium plastic, brown, and moist. The estimated undrained shear strength from CPT testing was ranged from 80 to 200 kPa denoting a stiff to very stiff consistency. Moisture contents ranged from 16 to 22 percent with a typical value of 18 percent, which is considered to be slightly above the optimum moisture content (OMC) for this material.

3.2.3 Clayey Gravel

Based on CPT testing results, clayey gravel was encountered at about 2.6 m below grade and cone refusal was encountered within this layer. The gravel deposit is expected to be dense and pore water pressure measurement indicated possible ground water table within this gravel layer.

3.3 WATER SOLUABLE SULPHATE

Soil samples were taken at depth of 0.5 m in Testhole 1 for water soluble sulphate concentration testing which is expressed as a percent of the dry mass of soil. The sulphate concentration was measured to be 0.12 percent which indicates a "moderate potential for sulphate attack on buried concrete in direct contact with soil."

3.4 GROUNDWATER CONDITIONS

Pore water pressure was detected when conducting CPT in the clayey gravel layer which indicated potential ground water table at about 2.6 m below grade. Based on the local soil experience of PrairieGEO personal:

1. Based on previous geotechnical investigation experiences of nearby sites, a relatively shallow groundwater condition near the gravel deposit elevation which is expected at about 2.6 m below grade for this area in the Bragg Creek area.

2. Groundwater levels are expected to be dependent on precipitation infiltration for recharge. Groundwater elevations are expected to fluctuate on a seasonal and annual basis and will be highest after periods of heavy or prolonged precipitation and snow-melt.

3. Groundwater seepage is expected for excavation deeper than 2 m. High flow rates are possible in the permeable gravel layer or fractured bedrock formation. The volumes of groundwater encountered will be dependent on seasonal conditions and the permeability of the soils within the profile.

4.0 ASSESSMENT OF SLOPE STABILITY

A slope stability study was required by the Rocky View County to assess the sensitivity and risk of the local slope impacts on the proposed development and to minimize impacts on the slope and surrounding existing buildings. The stability analysis for this study was carried out using the Slope/W computer program and comply with all the requirements of Rocky View County Servicing Standards, dated May 28th, 2013.

4.1 GENERAL SLOPE STABILITY COMMENTS

Slope stability is described in terms of a factor of safety (FS) against slope failure which is the ratio of total forces resisting failure divided by the sum of forces promoting failure. In general, a FS of less than 1 indicates that failure is expected and a FS of more than 1 indicates that the slope is stable. A steepened slope will slump back over time to establish a stable profile for the existing soil and groundwater conditions. The FS of a slope will increase slightly as vegetation is established on the face to protect the subgrade soil from weathering. Given the possibility of soil variation, groundwater fluctuation, erosion and other factors, slopes with a FS ranging between 1.1 and 1.3 are considered to be marginally stable. A "long term" stable slope is considered to have a FS of over 1.3. For permanent structures such as houses, which represent a higher risk and potential for loss of investment, a FS of at least 1.5 is desired for development on or near slopes.

4.2 DEVELOPMENT SETBACKS AND RESTRICTIONS

General geotechnical practice is to review stability for slopes in the range of 15 percent or steeper (ie. less than about 6.5H:1V). As a visual aid this angle of inclination is roughly the typical side yard slope for a house with full walk-out basement. Many municipalities use this limit as a red flag to trigger the requirement for a geotechnical assessment. Development on slightly steeper slope faces is possible if the slope is stable. On steepened slopes which are not stable, the typical recommendation is to provide buffer areas along the crest and toe of the slope based on the critical failure surface with the appropriate FS for the proposed development feature. A permanent structure would need to be set back an appropriate distance from the crest to provide a safe buffer for the in the structure in the event of a landslide at the site. The FS for the critical failure surface intersecting this structure should at least be 1.5. Less risk sensitive residential development such as yard landscaping and temporary structures (sheds, decks, etc.) would be allowed in marginally stable areas.

4.3 SLOPE PROFILE

Slope profiles for the site were based on elevation survey information provided in drawing prepared by Axiom Geomatics Ltd. of Calgary. The natural slopes at this site were considered to be formed by erosion. There was no evidence of recent land sliding at the site, suggesting subsurface conditions are stable over formation conditions. Examples of the slopes profile at the centre of the site are provided on Figure 4.

4.4 SUBSURFACE PROFILE

The slope profile used for the stability analysis was a shallow layer of clay till overlying gravel deposits. Based on experience in the area, weather bedrock is expected to be present at about 10 m below grade. It was assumed that the topsoil will be removed, and engineered fill will be used for site grading purposes as per recommendations provided in Section 5.3.4.

For slope modelling, conservative groundwater conditions were assumed in the analysis based on estimated peak seasonal groundwater depths below the slope face.

4.5 STABILITY ANALYSIS

A stability analysis was carried out using the *Slope/W* computer program to evaluate the factor of safety for the representative slope profile. Due to the local slope was expected formed by erosion and earthwork activity, but not formed by major landslide events, local experience and file data were used to estimate the soil parameters and groundwater or soil moisture conditions. The following effective strength parameters were used in the analysis.

TABLE 1
SOIL PARAMETERS FOR STABILITY ANALYSIS

Soil	Depth (m)	Unit Weight (kN/m^3)	Undrained Shear Strength (kPa)	Cohesion, c' (kPa)	Phi, φ' (Degrees)
Clay Till	0 - 2.5	19	-	-	28
Gravel	Below 2.5	21	-	-	32

The following table summarizes the results of the slope stability analysis.

TABLE 3
SLOPE STABILITY MODELING RESULTS

Stability Run	Section	CASE	Factor of Safety	Figure
Slope without shop	AA'	Long Term	2.19	A1
Slope with shop	AA'	Long Term	2.19	A2
Proposed Road	BB'	Long Term	2.00	A3
Proposed Road with Surcharge	BB'	Long Term	2.09	A4

Cross section AA was analyzed for the steepest slope between proposed shop and existing house with an inclination of 3.3H:1V. Section BB represented the proposed road profile with a steepest slope about 3.8H:1V. A 100 kPa uniform building / traffic surcharge load is considered to be adequate to conservative for the proposed development.

Representative slope profiles for the analysis are shown in Appendix A. It should be noted that a series of stability runs have be undertaken for both localized failures and global stability and the example runs provided in Appendix A are just samples of typical analysis results for various cases and conditions.

4.6 SLOPE ASSESSMENT

The findings of the slope stability analysis for the slope model and the proposed soil parameters listed in Table 3 were in general agreement with both the assumed formation conditions and local slope experience.

The long-term assessment at this site is that the potential for a major slope movement impacting the proposed development is low under present normal conditions with reasonable variation. The FS against a small shallow “slump-type” failure might fall close to 1.0 if the slope face at the site was subject to grading causing excessive steepening, or if areas of the slope face were to become saturated. However, it would take unusually wet conditions to cause a shallow slumping of the slope face. Saturation of the surficial soils, leading to the regressive slumping of the slope face is considered to be the most likely mode of slope failure at this site. If a large movement were to occur, the failure in the subgrade would be expected to be slow moving and would provide some warning in the form of cracks on the slope face prior to failure.

Similarly, the impact of the proposed development on local slope stability will be minimal as long as the existing slope face remained close to the existing condition. Since the excavation of proposed shop footing area will likely remove soil from the top of the slope, the net loading in this crest area is expected to decrease, which may have a slight stabilizing affect. This assessment is based on the assumption that excavated soil from the house development will be removed from site and will not be placed on the slope face.

The typical roadway maximum slope is about 15 degree (3.7H:1V), which is very close to existing grade along the proposed road, therefore, it is not expected that any more slope steepening will be needed for road grading.

5.0 GEOTECHNICAL RECOMMENDATIONS

5.1 GEOTECHNICAL EVALUATION

The proposed shop building are expected to consist a light to moderate structural load. The site soil conditions are considered to be typical for this area of the Bragg Creek, Foothills areas and will be suitable for the proposed development. The main geotechnical considerations for this development include:

1. The clay till and gravel deposits will provide a suitable bearing strata for the conventional concrete footings and potential culvert. Recommendations for concrete footings are given in Section 5.4. Recommendations on other foundation systems can be provided upon request.

2. A 1.5 to 3 m excavation will be required for the foundation construction. An unsupported excavation is considered feasible if the availability of space on the site to cutback side slopes to stabilize the excavation. Excavation stability should be reviewed once more details regarding the design and construction methods are known.

3. Due to possible fluctuation of ground water table in the area, ground water seepage could be encountered in utility trench excavations. A conventional sump pump system should be sufficient for this excavation.

4. The soils at the site should be suitable for use as backfill for service trenches. Over-sized rock (diameter larger than 300 mm should be screened and removed prior to backfilling).

5. Geotechnical issues for the culvert include; foundation preparation, structural backfill for lateral and covering support, cut-offs to reduce piping and entry / exit protection. It has been assumed the new culvert will be constructed with a granular structural backfill. The proposed culvert will need to be structurally capable supporting the overlying access road embankment material.

5.2 SLOPE RECOMMENDATIONS

5.2.1 Slope Development

The proposal to excavate the house and garage at the crest of the slope is considered to be stable. The expected long-term FOS of the slope is higher than 1.5. In addition:

1. The general profile of the slope below the proposed shop should be maintained with no net increase in material (ie. cut / fill should be employed for landscape features such as retaining walls or patios.)

2. Landscape features such as retaining walls may be used, provided and designed by a qualified geotechnical engineer. Retaining walls will need to be checked for internal

stability and global stability related to the overall slope. The preceding slope assessment has not included any detail analysis for retaining walls.

3. Run-off related to the natural slope south of the shop should not discharge uncontrolled or concentrated onto the slope face.

5.2.2 General Slope Care

The slope face below the proposed house may be subject to saturation and minor surficial failures influenced by precipitation, surface erosion, groundwater and soil moisture conditions. It is important that site development does not initiate any detrimental changes to the subsurface conditions and slope geometry. In order to minimize the potential for destabilization that could lead to localized slumping, the crest areas and the top area of the slope faces should be kept away from any water ponding condition. For lower slope face and toe, erosion control and vegetation should be maintained. The following general recommendations are intended as a guide to minimize the impact of the proposed house on the stability of the slope.

1. Site grading carried out should be designed to drain surface water due to rainfall and snowmelt away from the slope. New fills should not be placed at the top of the slope. If fill is required to establish grades around the house; the excavation material from the basement should be utilized.

2. All discharge from roof leaders and possible weeping tile systems should be directed away from the top-of-bank in the vicinity of the house and slope face below the house. Drainage from roof leaders and/or weeping tile sump discharges should not be allowed to flow uncontrolled over the crest or be allowed to pond on the ground surface causing increased water infiltration into the slope.

3. It is suggested that exposed soils around the house footprint should be vegetated soon after site grading is complete. It is suggested that any new vegetation for this site be selected from native species with deep root systems that can grow with a minimum of watering. Leaving graded areas of the site unvegetated for extended periods of time will cause increased infiltration into the slope, resulting in the saturation of the upper soils of the slope. This is especially critical if severe storm is anticipated in this area.

4. Underground sprinkler lines should not be allowed on the slope face. If underground sprinkler system is proposed, the design should be reviewed with respect to impacts on slope stability. This review should be performed by a qualified geotechnical engineer. No pools or below grade ponds should be allowed on this lot without detailed review. If proposed, water features would need secondary containment and controlled discharge design measures.

5. Building contractors often make the mistake of pushing excavation soil from basements out onto the slope face in an attempt to establish larger level backyard areas. This usually results in over loading and steepening of the original slope, resulting in very unstable conditions. Under no circumstances should the basement excavation soil be placed on the slope face.

The general recommendations in this section are considered to be “common sense” actions to undertake or avoid in order to minimize potential disturbance to the slope. It is considered

prudent to follow these recommendations to maintain a low risk to the property (and thereby to the house). It should be noted, that the possibility that future property owners may undertake activities which are detrimental to the stability of the slope is assumed when assessing the factor of safety of the slope. These general recommendations and guidelines may be subject to site specific modifications based on the review of a qualified geotechnical engineer.

5.3 SITE PREPARATION

5.3.1 General Site Stripping

In general, all remaining surficial topsoil, organics, non-engineered fill, or unsuitable soils should be stripped from in the building and pavement areas. Based on drilling observations, surficial topsoil thicknesses or stripping depths are anticipated to average 300 mm below the existing surface. Some areas of the site may require more stripping or undercutting to remove thicker topsoil, or root systems of underbrush or trees. Organic materials should not be mixed with mineral soils. The excavated topsoil and unsuitable materials may be stockpiled at an approved location for future landscaping use.

5.3.2 Subgrade Preparation

Site preparation should be carried out under dry weather conditions to minimize the risk of disturbance and softening. The exposed subgrade should be scarified to a depth of 150 mm and recompacted uniformly to a minimum of 98 percent of Standard Proctor Maximum Dry Density (ASTM D698 – SPMDD). Site preparation measures should be monitored by qualified and experienced geotechnical personnel to identify potential soft areas. The inspection may include a proof-roll test to confirm that deflections are minimal. If adverse weather or groundwater conditions are observed, these recommendations should be reviewed in order to avoid subgrade failure. Soft areas should be sub-cut and replaced with a suitable fill material to a depth sufficient to support construction traffic. Methods to avoid subgrade failure of soft subgrades may include: limiting construction traffic, modification of site preparation procedures (scarification, recompaction, etc.) and sub-cut and replacement with a suitable engineered fill material.

5.3.3 Drainage

Surface water should be drained away from the site as quickly as possible, both during and after construction. Site drainage should be directed away from the foundation walls. A minimum grade of 2 percent is recommended to promote surface runoff and minimize potential saturation and degradation of the parking area subgrade. It is recommended to provide a 5 percent back slope from buildings for a distance of at least 3 m. Roof and other drains should discharge well clear of buildings. Concentrated drainage should be directed away from the slope.

Compliance with the recommendation for compaction of fill in exterior areas is important because poorly compacted backfill adjacent to foundation structures will settle, which may lead to ponding of surface water against foundation walls. The slope of exterior backfill should be checked periodically to verify water is shed away from buildings. If the backfill settles causing

water to pond against foundation walls, the surface should be re-graded. Water should not be allowed to pond adjacent to buildings, equipment, or pavement areas.

5.3.4 Fill Placement and Compaction

Fill material should be placed uniformly to the following compaction specifications.

TABLE 2
RECOMMENDED FILL COMPACTION SPECIFICATIONS

Fill Location	Minimum Compaction (% SPMDD*)	Moisture Content (% of OMC)
Building Areas		
New fill greater than 0.6 m thickness (including trenches)	100%	±2%
New fill less than 0.6 m thick (including trenches)	98%	±2%
Under structural slabs	95%	±3%
Foundation Backfill	95 to 98%	±2%
Other Development Areas		
Subgrade preparation (within 1.0 m of final grade)	98%	±2%
Exterior building area outside of pavement structures	95%	As Required

**SPMDD = Standard Proctor Maximum Dry Density and OMC = Optimum Moisture Content as per ASTM D698.*

The lift thicknesses should be governed by the ability of the selected compaction equipment to uniformly achieve the recommended density. However, it is generally recommended to use lifts with a maximum compacted thickness of 200 mm for granular fill and 150 mm for clay fill. Uniformity is of most importance. Granular fill is best compacted with large smooth drum vibratory rollers while clay fill is best compacted with large vibratory "padfoot" or "sheepsfoot" rollers. In areas which require higher compaction, it is recommended that granular fill be placed at moisture contents 0 to 2 percent below the OMC and that clay fill be placed at moisture contents about 0 to 2 percent above the OMC. This will help reduce compactive effort and potential risk of subgrade disturbance needed to achieve maximum density.

Fill placement and compaction during the winter months is challenging due to the difficulty in moisture conditioning fill soils and obtaining high compaction levels. Materials and methodology should be reviewed prior to construction if cold weather compaction of clay fills is proposed. High compaction levels can only be achieved using fill soils that are unfrozen.

5.4 RESIDENTIAL FOUNDATIONS

5.4.1 Footings

Standard house basement foundations using strip and spread footings will generally be acceptable at this site. Footings based on gravel layer or native clayey gravel within 3 m below grade may be designed based on a maximum allowable bearing pressure of 120 kPa for strip footings and 150 kPa for pad footings placed on undisturbed inorganic soil free from loosened material. The design and construction of residential foundations should conform to all applicable local building codes. In general, excavations should be protected against surface water runoff and ingress of groundwater; footing bases should not be allowed to dry out excessively during construction; and the bearing soil should be protected against freezing during and after construction. If localized soft subgrade areas are encountered, it may be necessary to found footings on an engineered granular mat to distribute the load on the weaker subgrade soils. The decision to construct footings on an engineered gravel mat is best made at the time of construction when footing subgrade soils are exposed.

5.4.2 Grade Supported Slabs

Grade supported basement floor slabs, supported by the native clay till deposits or engineered fill prepared as described in Section 6.4, are expected to perform adequately at this site. The magnitude of the expected vertical slab movements is considered to be within acceptable design tolerance. If proposed, grade supported floor slabs in continuously heated buildings should be designed based on a modulus of subgrade reaction (K_s) of 35,000 kN/m^3 for slabs placed on at least 150 mm of compacted gravel base. The following recommendations should be followed:

1. Lightly loaded (less than 10 kPa) grade supported concrete slabs should be underlain with 150 mm of well graded, free draining; crushed gravel compacted to 95 percent of SPMDD.

2. Concrete flatwork will experience shrinkage cracking and must be placed the floor with a high level of workmanship. Slabs should be provided with construction joints or saw cuts in accordance with local practice. The concrete slab should be reinforced with steel bars and dimensioned in accordance with the structural engineer's requirements.

3. Slabs should be constructed independently of all walls, columns and grade beams. Slab on grade floors should be tied into the grade beam with dowels at doorways. Alternatively, the slab may be tied to grade beams if a construction joint is placed parallel to the wall at a distance of about 2.0 m.

4. Non-load bearing partitions should be designed to accommodate slight vertical movements. Mechanical equipment placed on floor slabs should be designed to permit some relevelling should the equipment be susceptible to small changes in level.

5.5 CULVERT CONSTRUCTION

5.5.1 Foundation Support

The culvert placement near the entrance of the site is expected to be founded on native clay till or clayey gravel deposits. This subgrade is expected to be relatively stable with respect to foundation support to the culvert providing dewatering and grading of access road area is maintained throughout construction to minimize subgrade soil softening. Any signs of excessive softening or zones which might promote preferential pathways for groundwater flow or springs should be subcut down to competent foundation materials.

5.5.2 Culvert Earthworks

The culvert should be designed and constructed with following recommendations:

1. The culvert base should be supported on a competent mat of selected crushed gravel at least 200 mm thick with a minimum width of the culvert diameter.

2. The haunches of the culvert should be supported by compacted gravel at a moisture content 0 to 2 percent below OMC placed in thin lifts and compacted to a nominal density of about 95% of SPMDD. The preferred compaction method is to use hand operated mechanical tamping equipment. The material should be placed to fill all corrugations and provide firm contact with the pipe. Care should be taken to avoid over-compaction which will cause the culvert pipe to deform from the designed shape.

3. The lateral support and bridging cover the culvert pipe should be provided by a rectangular zone of gravel around the pipe. The width of the structural backfill should extend at least one times the pipe diameter to either side of the proposed culvert , and the minimum recommended is 0.6 m above the pipe. The structural backfill should placed in 200 to 300 mm thick lifts and compacted to a nominal density of about 95% of SPMDD.

4. The culvert should be designed to accept earth pressure for the road embankment and potential traffic loads. The manufacture should be consulted with regard to culver installation details; and any manufacture requirements which are stricter than the recommendations given in the preceding discussion should be followed. It is highly recommended that an experienced contractor be commissioned to install this CSP structure since it is assumed that the contractor and manufacturer of the installation will ultimately be held accountable for the performance of the culvert.

5.6 FROST PROTECTION FOR BURIED UTILITIES

Based on the 1 in 25 year return period winter, the average depth of frost penetration at this site is approximately 2.1 m. Therefore, the recommended minimum buried depth for water lines is 2.3 m. Insulation details for buried services can be provided upon request.

5.7 FOUNDATION CONCRETE

Water soluble sulphate concentration results indicates a moderate potential for sulphate attack of subsurface concrete. As per CSA A23.1-19, a high-sulphate-resistant (HS) cement is recommended with a minimum 28-day compressive strength of 32 MPa with a water cement ratio of 0.45. All concrete exposed to a freezing environment either during or after construction should be air entrained.

5.8 INSPECTION

It is recommended that on-site inspection and testing be performed to verify that actual site conditions are consistent with assumed conditions which meet or exceed design criteria. The recommendations provided within this report are dependent on proper quality control of fill placement. Initial site stripping and excavation activities should be monitored by experienced and qualified geotechnical personnel. The placement of an engineered fill should be monitored and tested by a qualified soils technician to verify adequate levels of compaction and design standards are achieved. Based on the National Building Code – Alberta Edition, adequate levels of inspection are considered to be: review of all completed bearing surfaces for footings and full time inspection during construction of deep foundations; and monitoring and compaction testing of engineered fill.

6.0 LIMITATIONS AND CLOSURE

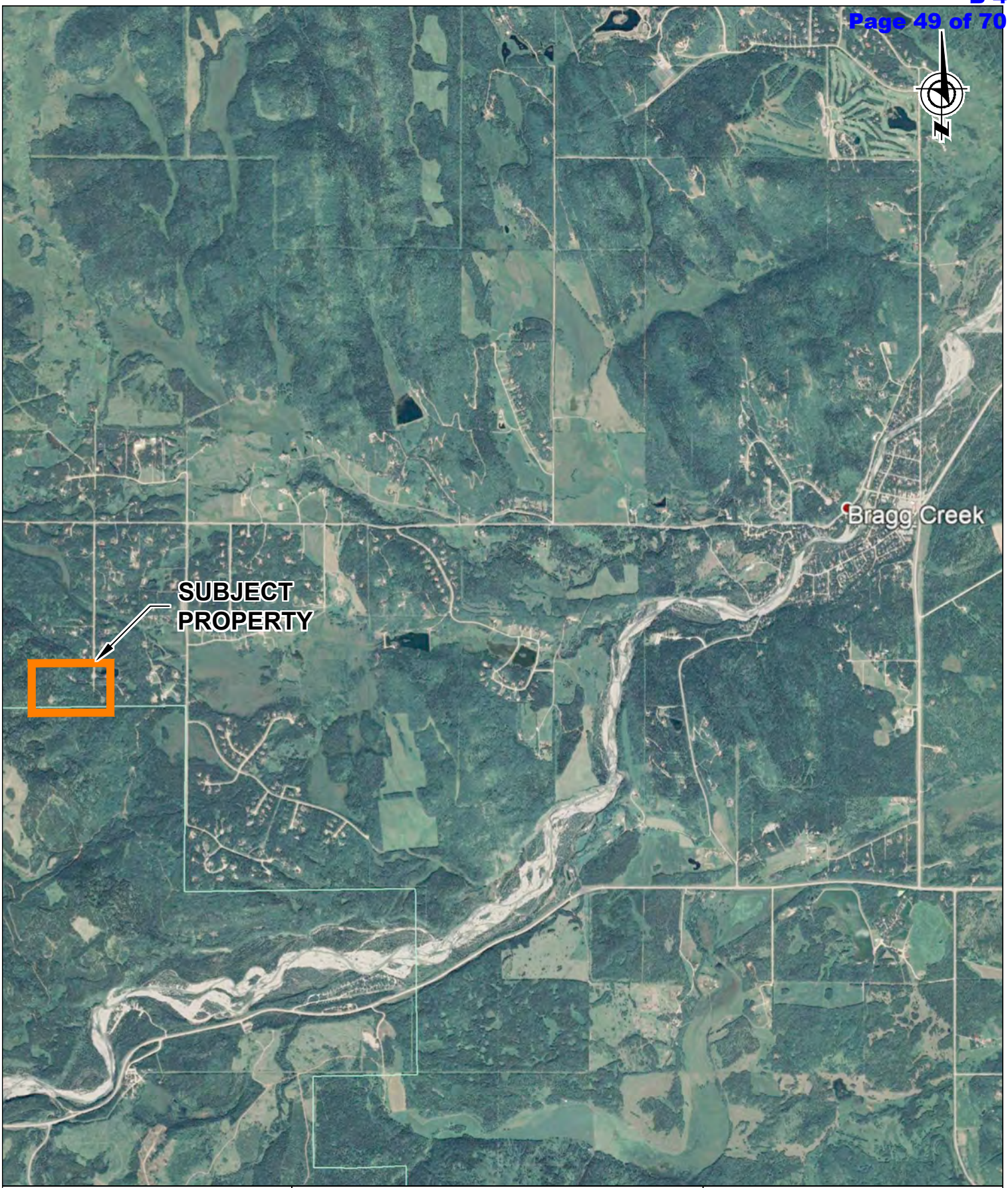
The recommendations presented in this report and any subsequent correspondence, are based on an evaluation of information derived from a CPT and two testholes and additional sources of information referenced in this report. The conditions described are believed to be reasonably representative of the site. If conditions are noted during construction which are believed to be at variance with the conditions described in this report, this office should be contacted immediately.

This report has been prepared for the exclusive use of the **Peter Haar & Erin Phillips**, and their approved agents, for the specified application of the Proposed Shop Building project located at 231031 Forestry Way, Bragg Creek, Alberta in Calgary, Alberta. It has been prepared in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made. Use of the report is subject to acceptance of the General Terms and Conditions provided in Limitation Appendix of this report. We trust this meets with your present needs. If you have any questions or comments regarding this information, please do not hesitate to contact this office.

Respectfully submitted,
PRAIRIEGEO ENGINEERING LTD.

Jiachen (Jason) Ni, M.Eng., P.Eng.
Principal Geotechnical Engineer

FIGURES



PREPARED BY:

PrairieGEO Engineering

KEY PLAN

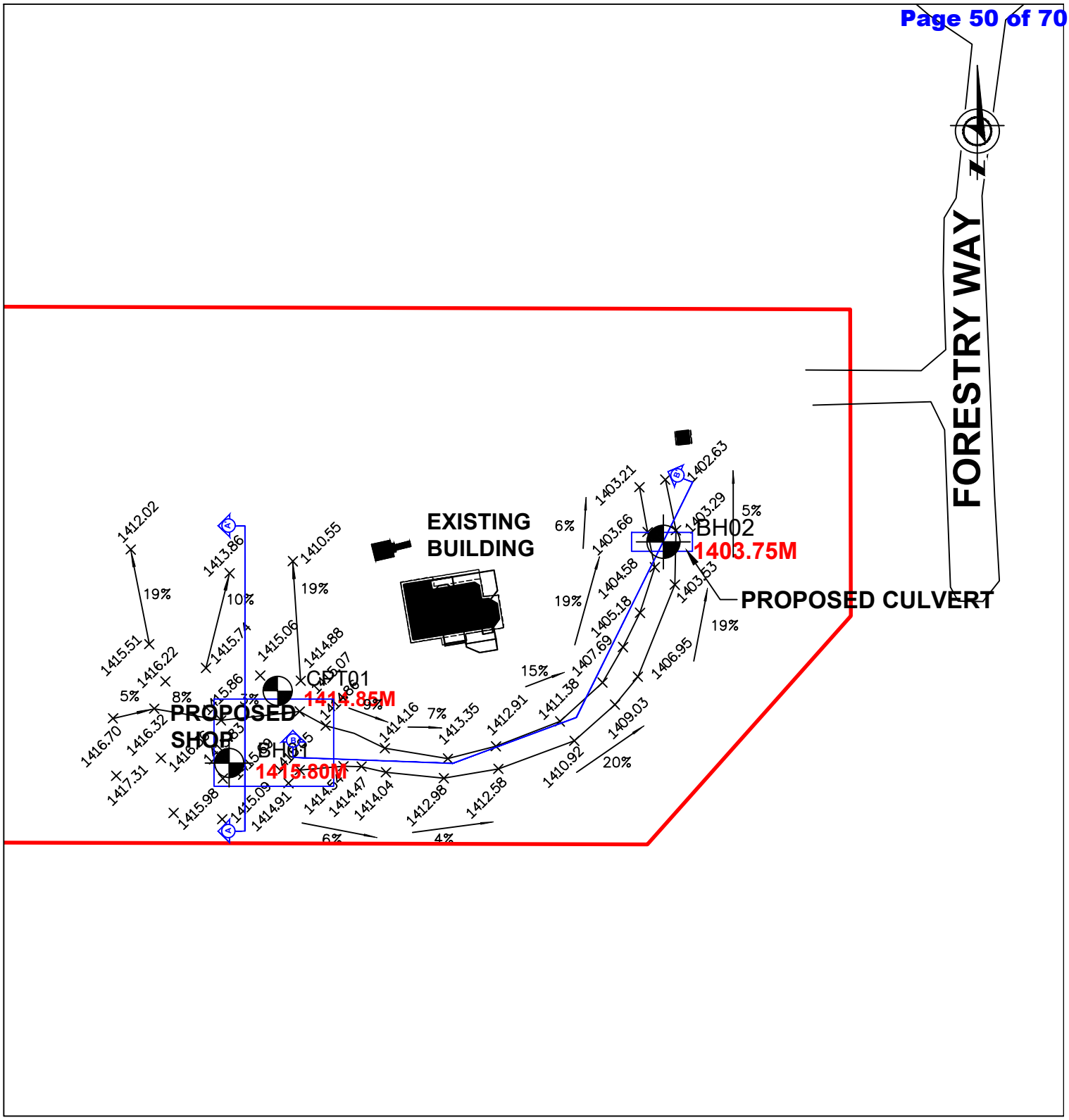
PROPOSED SHOP BUILDING
231031 FORESTRY WAY, BRAGG CREEK, ALBERTA

DRAWN:	REVIEWED:	REV #:	DATE:
JZ	JN	0	JULY 2021

SCALE:	JOB NO.	DRAWING NO.
NTS	PGE21-62	1

PREPARED FOR:

PETER HAAR



ALL BOREHOLE LOCATIONS ARE APPROXIMATE

1035.00M SURFACE ELEVATION

SCALE (metres)

-20 -10 0 10 20 40

PREPARED BY:

PrairieGEO Engineering

SITE AND CROSS SECTION PLAN

PROPOSED SHOP BUILDING
231031 FORESTRY WAY, BRAGG CREEK, ALBERTA

DRAWN:	REVIEWED:	REV #:	DATE:
JZ	JN	0	JULY 2021

SCALE:	JOB NO.	DRAWING NO.
1:1,000	PGE21-62	2

PREPARED FOR:

PETER HAAR

ALL BOREHOLE LOCATIONS ARE APPROXIMATE

1035.00M SURFACE ELEVATION

SCALE (metres)

-20 -10 0 10 20 40

PREPARED BY:

PrairieGEO Engineering

AERIAL PLAN

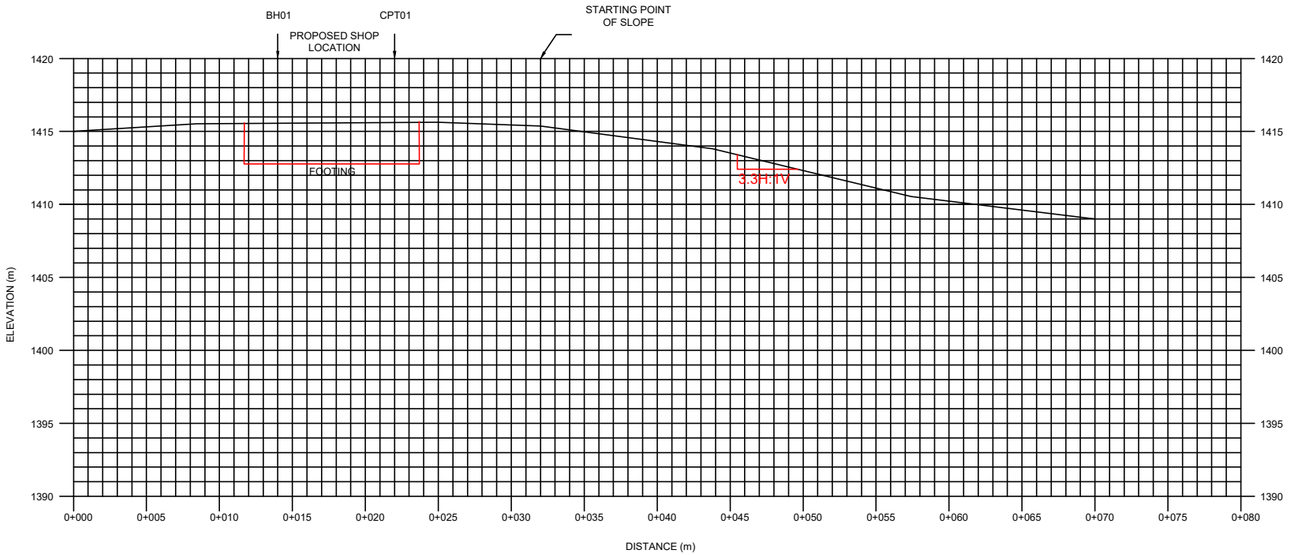
PROPOSED SHOP BUILDING
231031 FORESTRY WAY, BRAGG CREEK, ALBERTA

DRAWN:	REVIEWED:	REV #:	DATE:
JZ	JN	0	JULY 2021

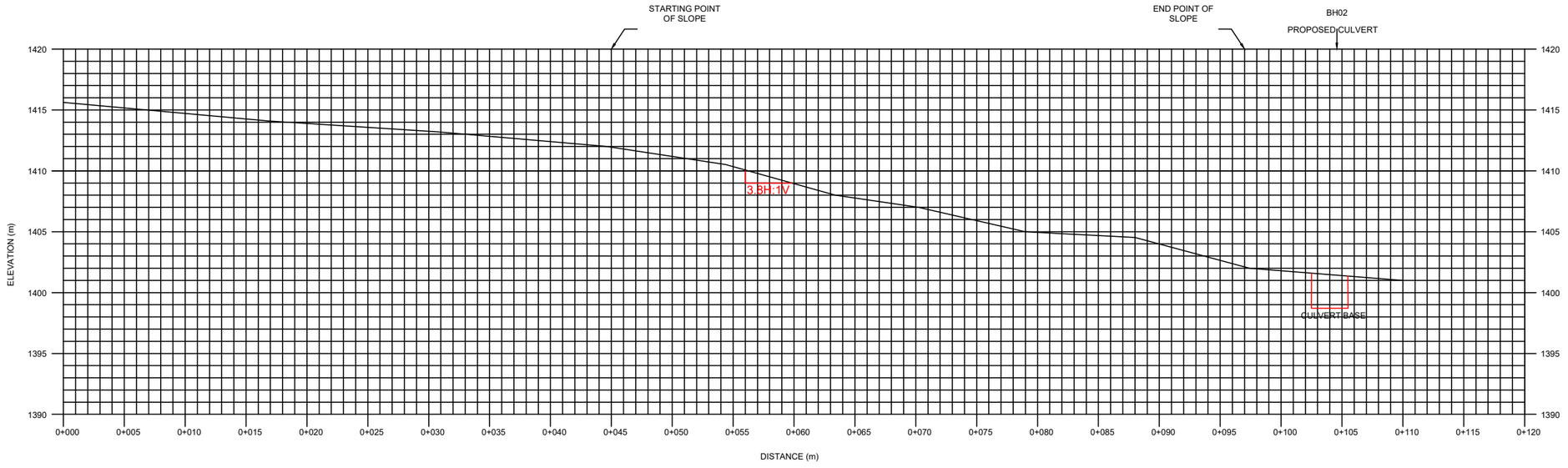
SCALE:	JOB NO.	DRAWING NO.
1:1,000	PGE21-62	3

PREPARED FOR:

PETER HAAR



CROSS SECTION AA'



CROSS SECTION BB'

CLIENT:

PETER HAAR

PREPARED BY:

PrairieGEO Engineering

REV.	REVISION DETAIL	DATE
0	ISSUED FOR REVIEW	JULY 2021

DRAWN:	CHECKED:	APPROVED
JZ	JN	JN

SCALE: AS INDICATED

PROJECT

PROPOSED SHOP BUILDING

231031 FORESTRY WAY
BRAGG CREEK, ALBERTA

DRAWING TITLE

CROSS SECTIONS

PROJECT NO.	DRAWING NO.
PGE21-62	4

JULY 13, 2021 - LOOKING AT THE SLOPE AND AND EXITING BUILDING ON SITE TOWARDS NORTH.

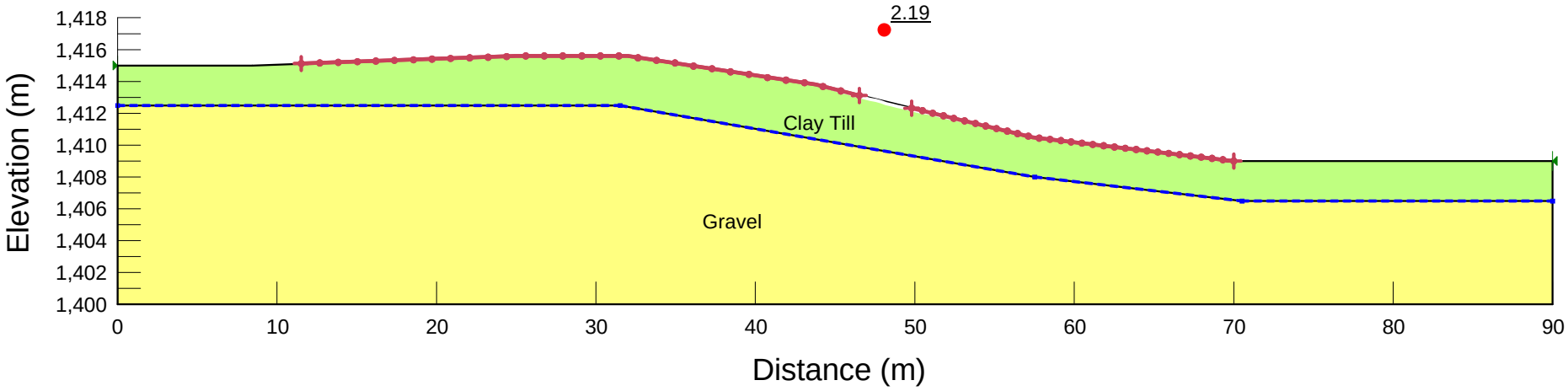
JULY 13, 2021 - LOOKING AT CPT01 AND THE SITE TOWARDS WEST.

PREPARED BY:	PHOTOGRAPH				PREPARED FOR:
PrairieGEO Engineering	PROPOSED SHOP BUILDING 231031 FORESTRY WAY, BRAGG CREEK, ALBERTA				PETER HAAR
	DRAWN: JZ	REVIEWED: JN	REV #: 0	DATE: JULY 2021	
	SCALE: NTS	JOB NO. PGE21-62		DRAWING NO. 5	

APPENDIX A

Slope/W Analysis Results
Testhole Logs (2)
Explanation of Terms and Symbols
CPT Test Results

Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Phi-B (°)	Piezometric Line
	Clay Till	Mohr-Coulomb	19	0	28	0	1
	Gravel	Mohr-Coulomb	21	0	32	0	1



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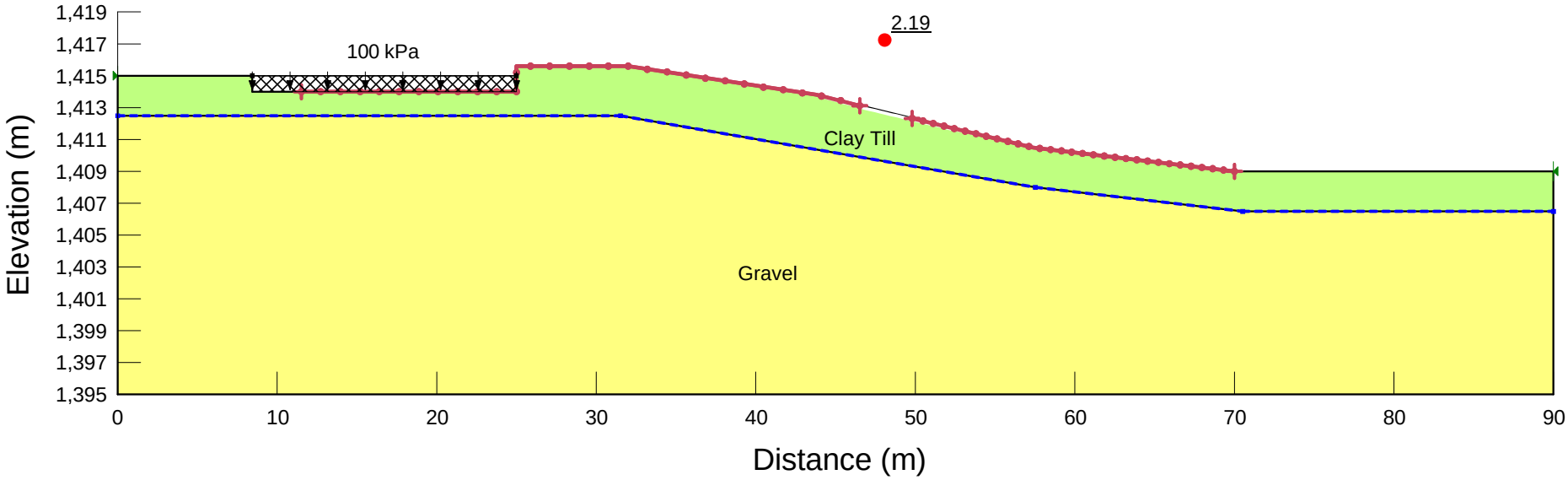
AA' - LONG TERM

PROJECT:	PROPOSED SHOP	**DATE:**	2021-07-22
PROJECT ID:	PGE21-62	**FIGURE:**	A1

Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Phi-B (°)	Piezometric Line
	Clay Till	Mohr-Coulomb	19	0	28	0	1
	Gravel	Mohr-Coulomb	21	0	32	0	1



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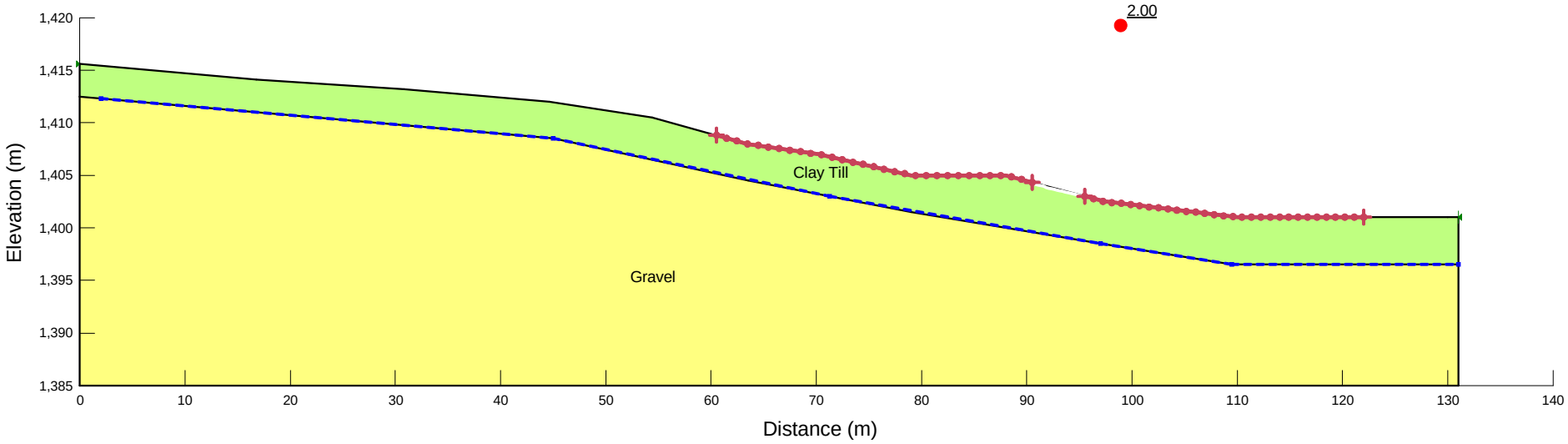
AA' WITH BUILDING - LONG TERM

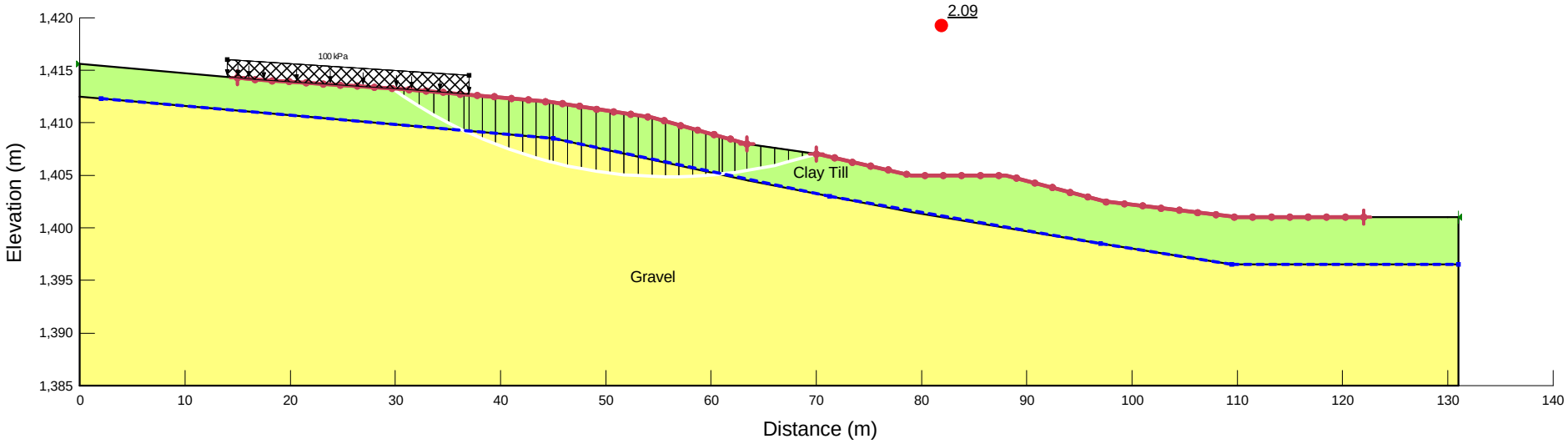
PROJECT:	PROPOSED SHOP	**DATE:**	2021-07-22
PROJECT ID:	PGE21-62	**FIGURE:**	A2

Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Phi-B (°)	Piezometric Line
	Clay Till	Mohr-Coulomb	19	0	28	0	1
	Gravel	Mohr-Coulomb	21	0	32	0	1



PrairieGEO Engineering	BB' - LONG TERM		
	PROJECT: PROPOSED SHOP	**DATE:**	2021-07-22
	PROJECT ID: PGE21-62	**FIGURE:**	A3

Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Phi-B (°)	Piezometric Line
	Clay Till	Mohr-Coulomb	19	0	28	0	1
	Gravel	Mohr-Coulomb	21	0	32	0	1



PrairieGEO Engineering

BB' - LONG TERM WITH BUILDING AND TRAFFIC

PROJECT:	PROPOSED SHOP	**DATE:**	2022-05-03
PROJECT ID:	PGE21-62	**FIGURE:**	A4

PROJECT: Proposed Shop Building	LOCATION: 231031 Forestry Way, Bragg Creek, Alberta	TESTPIT ID: 01
PROJECT NO: PGE21-62	DATE: July 13, 2021	
CLIENT: Peter Haar	DRILLING METHOD: Hand Report	

DEPTH (m)	ELEVATION (m)	SOIL PROFILE	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	Water Content 20 40 60 80	Shear Str (kPa) 50 100 150 200 / Pocket Pen (bar) 1 2 3 4	COMMENT
	1415.600		TOPSOIL, extremely organic, dark, moist to wet.					
			CLAY TILL, silty, little sand, trace gravel, low plastic, sitff to very stiff, brown, moist.	G	1G1	16 18 22		**Grain Size Analysis:** Gravel = 0.0% Sand = 30.0% Silt = 35.4% Clay = 34.6% SO4 = 0.119%
	1415.100		AUGER REFUSAL at 0.7 m due to encounter rocks. Backfilled with auger cuttings. Dry upon completion.					
1.0								
2.0								

PrairieGEO Engineering

Logged by: JZ

Ground Elevation: 1415.80 m

UTM Coordinates: N-5645419 m,E-663993 m

PROJECT: Proposed Shop Building	LOCATION: 231031 Forestry Way, Bragg Creek, Alberta	TESTPIT ID: 02
PROJECT NO: PGE21-62	DATE: July 13, 2021	
CLIENT: Peter Haar	DRILLING METHOD: Hand Report	

DEPTH (m)	ELEVATION (m)	SOIL PROFILE	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	Water Content 20 40 60 80	Shear Str (kPa) 50 100 150 200 / Pocket Pen (bar) 1 2 3 4	COMMENT
0			FILL, silty clay, little sand, trace gravel, low plastic, firm, dark brown, wet.			28		
			Stiff, moist from 0.6 m.			17		
						24		
1.0	1402.750		END OF TESTHOLE. Backfilled with auger cuttings. Dry upon completion.					
2.0								

PrairieGEO Engineering

Logged by: JZ

Ground Elevation: 1403.75 m

UTM Coordinates: N-5645425 m,E-663995 m

EXPLANATION OF TERMINOLOGY AND SYMBOLS

1. **PRINCIPAL SOIL TYPE –** Major soil type

Material	Grain Size
Boulders	Larger than 300 mm
Cobbles	75 mm to 300 mm
Coarse Gravel	19 mm to 75 mm
Fine Gravel	5 mm to 19 mm
Coarse Sand	2 mm to 5 mm
Medium Sand	0.425 mm to 2 mm
Fine Sand	0.075 mm to 0.425 mm
Silt	0.020 to 0.075 mm
Clay	Smaller than 0.020 mm

2. **MINOR SOIL TYPE -** Weight of minor component

Descriptor	Percent
and	35 to 50
some	20 to 35
little	10 to 20
trace	1 to 10

3. **CONSISTENCY OF FINE-GRAINED SOILS** – Terms as per undrained shear strength and Standard Penetration Test (SPT), N value, for blows per 300 mm penetration (ASTM D1586).

Description	Undrained Shear Strength, C_u (kPa)	SPT N Value
Very Soft	Less than 12	Less than 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 150	15 to 30
Hard	Over 150	Over 30

4. **RELATIVE DENSITY OF COARSE-GRAINED SOIL** – The following terms are used relative to Standard Penetration Test (SPT), N value, for blows per 300 mm penetration (ASTM D1586).

Description	SPT N Value
Very Loose	Less than 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	Over 50

5. **TYPICAL SEDIMENTARY BEDROCK TYPES AND CLASSIFICATION** – The following terms are based on visual inspection and field / laboratory identification tests.

Characteristic	Sandstone	Mudrocks			
		Siltstone	Mudstone	Clayshale	Claystone
Composition	>50% Sand $CaCO_3$ or silica binder. Use weak acid to test for $CaCO_3$.	>50% Silt	33% to 66% Silt & 33% to 66% Clay	>50% Clay & <33% Silt	
Bedding	Banding possible Non- Fissile Wackes – dirty sandstone matrix (>15% clay)	Non-Fissile & Non-laminated	Non-Fissile & Non-laminated	Fissile	Non-Fissile

Definitions

Fissile Breaks apart on bedding planes, not fractures.
Shale Only used to describe a fissile clay mudrock.
Slate Hard mudstone exposed to high pressure and temperature.
Limestone Sedimentary rock (i.e. particles) formed from calcium carbonate minerals from skeletal fragments of marine organisms such as coral. Particles generally too small to see with eye.

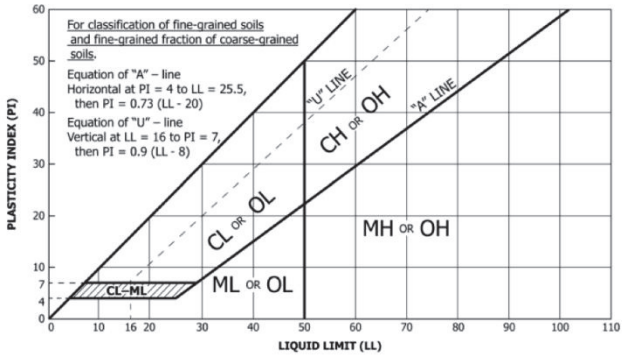
EXPLANATION OF TERMINOLOGY AND SYMBOLS

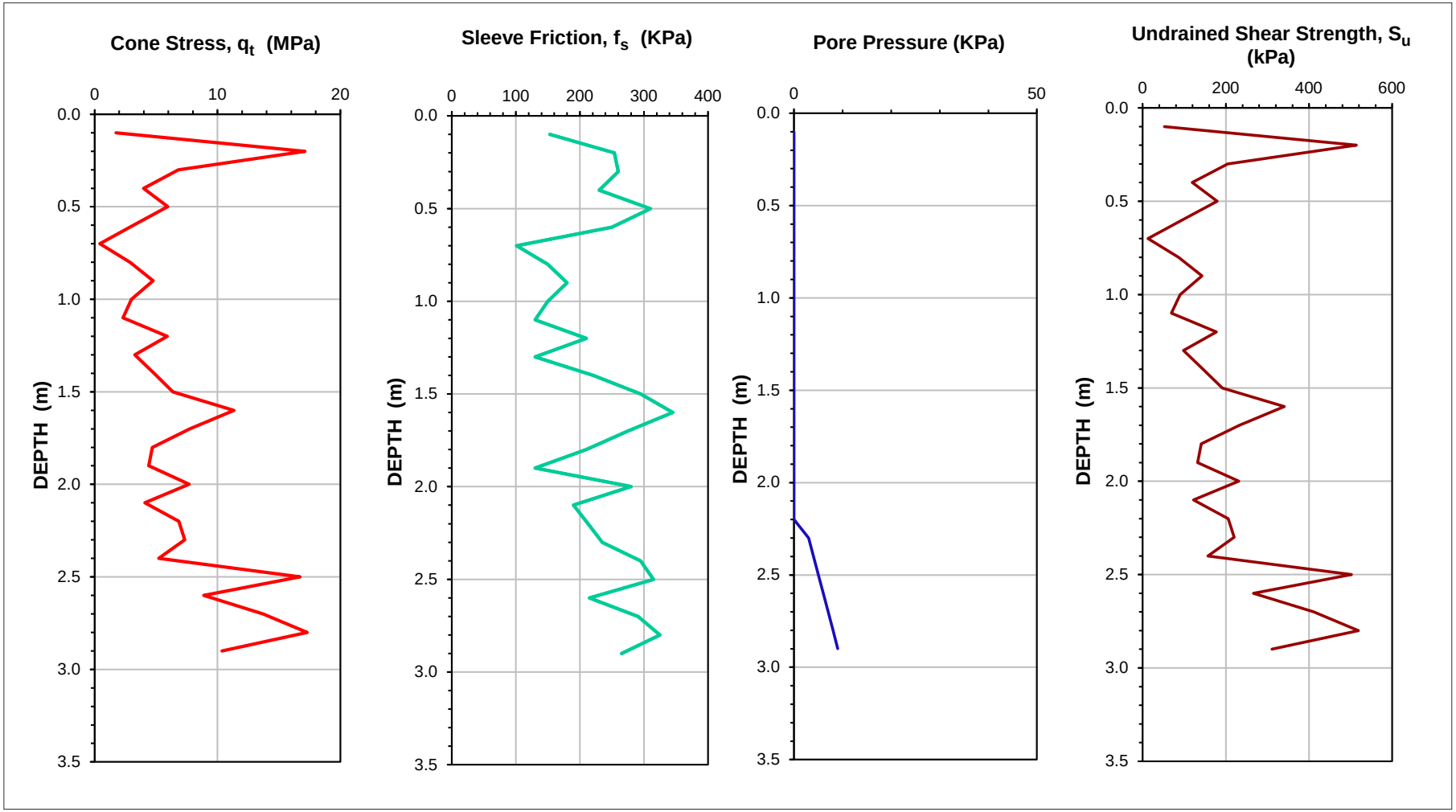
MODIFIED UNIFIED CLASSIFICATION SYSTEM FOR SOILS

MAJOR DIVISION			GROUP SYMBOL	GRAPH SYMBOL	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA	
COARSE GRAINED SOILS (MORE THAN HALF BY WEIGHT LARGER THAN NO. 200 SIEVE)	GRAVELS MORE THAN HALF COARSE GRAINS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)	GW		WELL GRADED GRAVELS, GRAVEL-SAND MIXTURE, LITTLE OR NO FINES	$C_U = \frac{D_{60}}{D_{10}} \geq 4$ AND $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1 \text{ to } 3$	
			GP		POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	NOT MEETING ABOVE REQUIREMENTS	
		DIRTY GRAVELS (WITH SOME FINES)	GM		SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES	CONTENT OF FINES EXCEEDS 12%	ATTERBERG LIMITS BELOW "A" LINE OR P.I. LESS THAN 4
			GC		CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES		ATTERBERG LIMITS ABOVE "A" LINE AND P.I. GREATER THAN 7
	SANDS MORE THAN HALF FINE GRAINS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)	SW		WELL GRADED SANDS, GRAVELLY SANDS WITH LITTLE OR NO FINES	$C_U = \frac{D_{60}}{D_{10}} \geq 6$ AND $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1 \text{ to } 3$	
			SP		POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	NOT MEETING ABOVE REQUIREMENTS	
		DIRTY SANDS (WITH SOME FINES)	SM		SILTY SANDS, SAND-SILT MIXTURES	CONTENT OF FINES EXCEEDS 12%	ATTERBERG LIMITS BELOW "A" LINE OR P.I. LESS THAN 4
			SC		CLAYEY SANDS, SAND-CLAY MIXTURES		ATTERBERG LIMITS ABOVE "A" LINE AND P.I. GREATER THAN 7
FINE-GRAINED SOILS (MORE THAN HALF BY WEIGHT PASSES NO. 200 SIEVE)	SILTS BELOW "A" LINE NEGLIGIBLE ORGANIC CONTENT	$W_L < 50\%$	ML		INORGANIC SILTS & VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	CLASSIFICATION IS BASED UPON PLASTICITY CHART (SEE BELOW)	
		$W_L > 50\%$	MH		INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS		
	CLAYS ABOVE "A" LINE NEGLIGIBLE ORGANIC CONTENT	$W_L < 30\%$	CL		INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY, OR SILTY SOILS		
		$30\% < W_L < 50\%$	CI		INORGANIC CLAYS OF MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS		
		$W_L > 50\%$	CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS		
	ORGANIC SILTS & CLAYS BELOW "A" LINE	$W_L < 50\%$	OL		ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW AND MEDIUM PLASTICITY		
		$W_L > 50\%$	OH		ORGANIC CLAYS OF HIGH PLASTICITY, ORGANIC SILTS		
HIGHLY ORGANIC SOILS			Pt		PEAT AND OTHER HIGHLY ORGANIC SOILS	STRONG COLOR OR ODOR, AND OFTEN FIBROUS TEXTURE	

NOTES ON SOIL CLASSIFICATION AND DESCRIPTION:

1. Soil are classified and described according to their engineering properties and behaviour.
2. Boundary classification for soil with characteristics of two groups are given combined group symbols (e.g. GW-GC is a well graded gravel sand mixture with clay binder between 5 and 12%).
3. Soil classification is in accordance with the Unified Soil Classification System (ASTM D2487) with the exception that an inorganic clay of medium plasticity (CI) is recognized.
4. The use of modifying adjectives may be employed to define the estimated percentage range of minor components.





PROJECT:	Proposed Shop
PROJECT#:	PGE21-62
CLIENT:	Peter Haar & Erin Phillips
CONE NO.	126

CPT ID	CPT-1
TEST DATE:	July 13, 2021
TIP AREA (cm2)	10
SLEEVE AREA (cm2)	150

PrairieGEO Engineering

PROJECT:	Proposed Shop	CPT ID	CPT-1
PROJECT#:	PGE21-62	TEST DATE:	July 13, 2021
CLIENT:	Peter Haar & Erin Phillips	TIP AREA (cm2)	10
CONE NO.	126	SLEEVE AREA (cm2)	150

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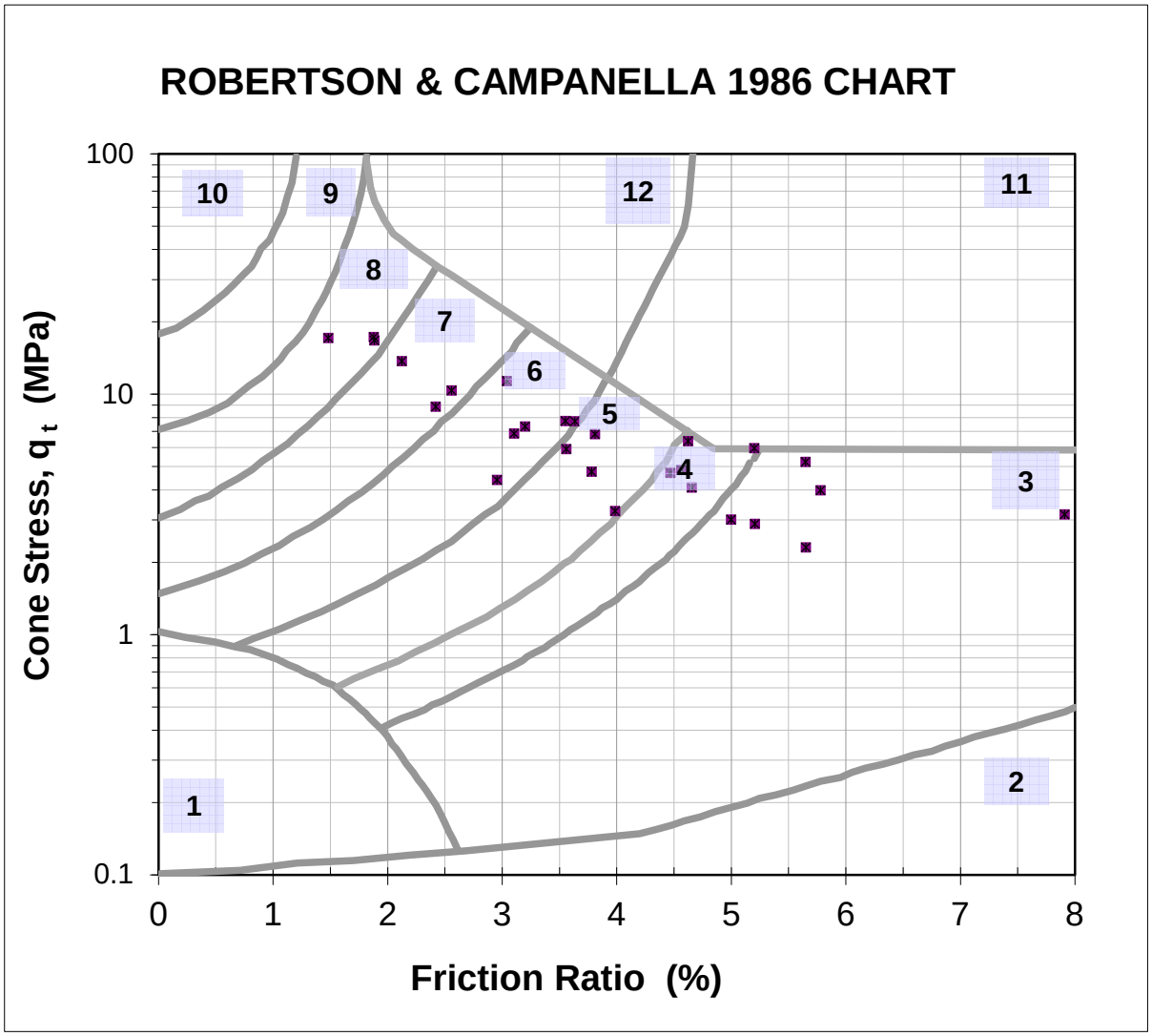


1 = Sensitive Fine-Grained
2 = Organic Soil
3 = Clay
4 = Clay to Silty Clay
5 = Silty Clay to Clayey Silt
6 = Clayey Silt to Sandy Silt
7 = Sandy Silt to Silty Sand
8 = Silty Sand to Sand
9 = Sand
10 = Sand to Gravely Sand
11 = Very Stiff Fine-Grained
12 = Overconsolidated or Cemented Sand to Clayey Sand

APPENDIX B

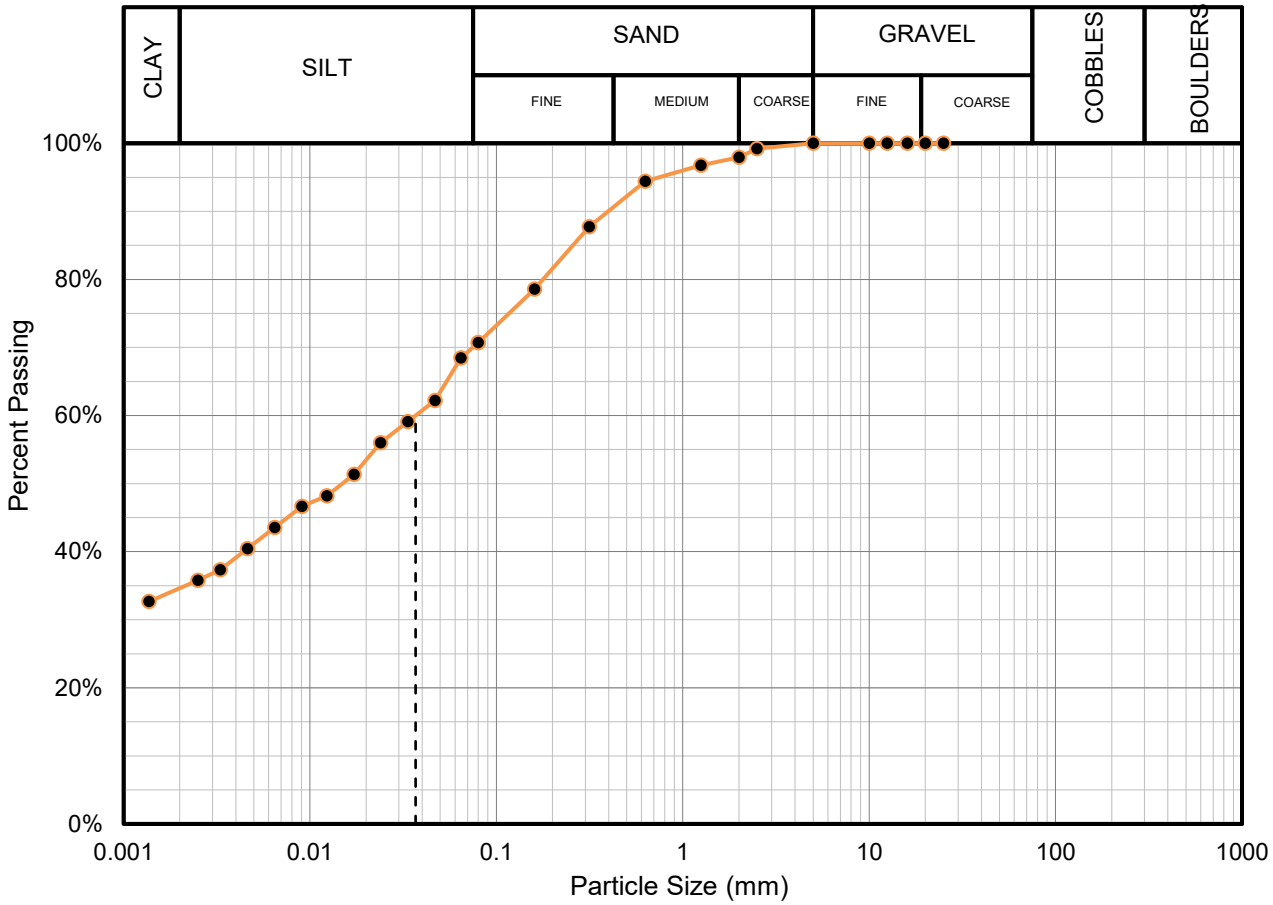
Soil Test Results

PARTICLE-SIZE ANALYSIS, LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY

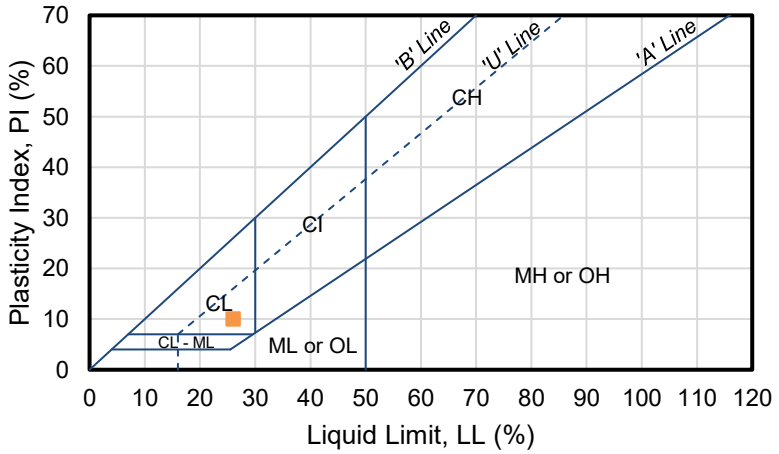
ASTM D422 & ASTM D4318

PrairieGEO Engineering

PROJECT:	Proposed Shop	**SAMPLE DATE:**	July 13, 2021
PROJECT#:	PGE 21-62	**TEST DATE:**	July 16, 2021
CLIENT:	Peter Haar	**SAMPLE ID:**	1G1
SOIL DESCRIPTION:	silt, some clay, some sand	**DEPTH:**	0.5 m



PARTICLE-SIZE ANALYSIS	Gravel	0.0%
	Sand	30.0%
	Silt	35.4%
	Clay	34.6%
	D_{10}	---
	D_{30}	---
	D_{60}	0.0369 mm
	C_U	---
	C_C	---
LIMITS	PL	16
	LL	26
	PI	10



Modified Unified Soil Classification	Group Symbol
Lean clay with sand	CL

TECH: EZ
CHECKED: JZ

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY

ASTM D4318 - Method A: Multi-Point

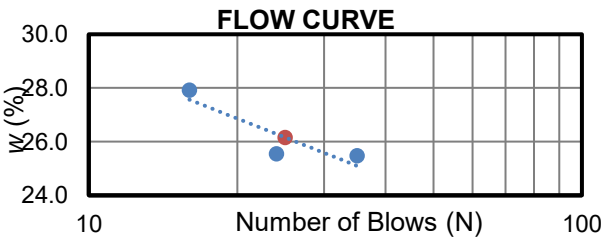
PrairieGEO Engineering

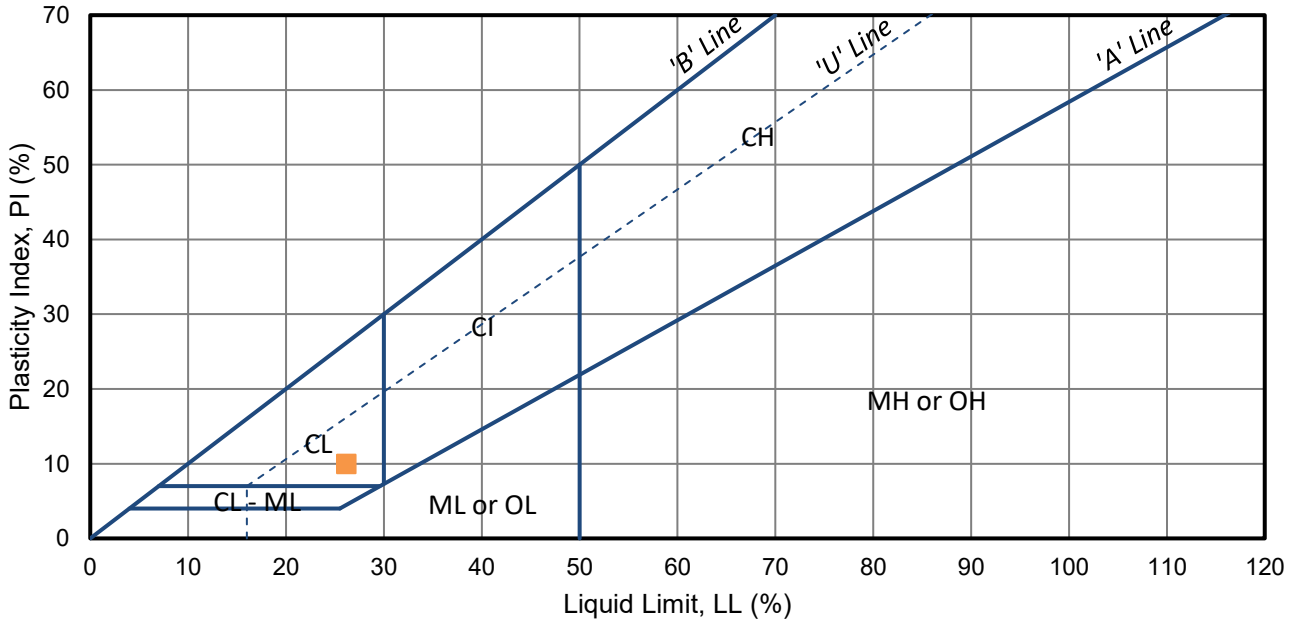
PROJECT:	Proposed Shop	**SAMPLE DATE:**	July 13, 2021
PROJECT#:	PGE 21-62	**TEST DATE:**	July 16, 2021
CLIENT:	Peter Haar	**SAMPLE ID:**	1G1
SOIL DESCRIPTION:	silt, some clay, some sand	**DEPTH:**	0.5 m

PROCEDURE USED: Dry Preparation - Method A: Mult-Point

	AS RECEIVED	PLASTIC LIMIT				LIQUID LIMIT			
		1	2	3	4	1	2	3	4
Number of blows, N						35	24	16	
Container Number									
Tare Container, M_C (g)	165.900	3.610	3.549	3.665		3.636	3.595	3.509	
Wet Sample + Tare, M_{CMS} (g)	574.200	4.859	4.789	5.403		24.391	28.058	25.317	
Dry Sample + Tare, M_{CDS} (g)	510.800	4.688	4.623	5.168		20.176	23.080	20.557	
Dry Sample, M_S (g)	344.900	1.078	1.074	1.503		16.540	19.485	17.048	
Water, M_W (g)	63.400	0.171	0.166	0.235		4.215	4.978	4.760	
Moisture Content, w (%)	18.4	15.9	15.5	15.6		25.5	25.5	27.9	

Plastic Limit, PL or w_P (%)	16
Liquid Limit, LL or w_L (%)	26
Plasticity Index, PI (%)	10
Modified USCS Classification	CL





TECH: EZ
CHECKED: JZ
2 of 2

PrairieGEO Engineering

WATER-SOLUBLE SULPHATE IN SOIL

ASTM C1580

PROJECT: Proposed Shop
PROJECT#: PGE21-62
CLIENT: Peter Haar

SAMPLE DATE: July 13, 2021
TEST DATE: July 16, 2021

Borehole:	1	Borehole:	
Sample #:	1G1	Sample #:	
Depth:	0.5 m	Depth:	
Result (%):	0.119%	Result (%):	
Borehole:		Borehole:	
Sample #:		Sample #:	
Depth:		Depth:	
Result (%):		Result (%):	
Borehole:		Borehole:	
Sample #:		Sample #:	
Depth:		Depth:	
Result (%):		Result (%):	
Borehole:		Borehole:	
Sample #:		Sample #:	
Depth:		Depth:	
Result (%):		Result (%):	

Comments: Range of 0.119 to 0.119 percent. Sulphate Exposure Classification: S-3, Moderate

REQUIREMENTS FOR CONCRETE SUBJECTED TO SULPHATE ATTACK (CAN/CSA-A23.1:19)

EXPOSURE CLASSIFICATION	DEGREE OF EXPOSURE	WATER-SOLUBLE SULPHATE (SO_4) IN SOIL SAMPLE, %	SULPHATE (SO_4) IN GROUNDWATER SAMPLES, mg/L	MINIMUM SPECIFIED 56-DAY COMPRESSIVE STRENGTH, MPa	MAXIMUM WATER-CEMENTING MATERIAL RATIO	PORTLAND CEMENT TO BE USED
S-1	Very Severe	over 2.0	over 10,000	35	0.40	HS
S-2	Severe	0.20 to 2.0	1,500 to 10,000	32	0.45	HS
S-3	Moderate	0.1 to 0.2	150 to 1,500	30	0.50	MS or HS

TECH: EZ
CHECKED: JZ

LIMITATIONS

General Terms and Conditions

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2. **INTERPRETATION OF THE REPORT** - The CLIENT recognizes that subsurface conditions will vary from those encountered at the location where borings, surveys, or explorations are made and that the data, interpretations and recommendation of PrairieGEO are based solely on the information available to him. Classification and identification of soils, rocks, geological units, contaminated materials and contaminant quantities will be based on commonly accepted practices in geotechnical or environmental consulting practice in this area. PrairieGEO will not be responsible for the interpretation by others of the information developed.

3. **SITE INFORMATION** - The CLIENT has agreed to provide all information with respect to the past, present and proposed conditions and use of the Site, whether specifically requested or not. The CLIENT acknowledged that in order for PrairieGEO to properly advise and assist the CLIENT, PrairieGEO has relied on full disclosure by the CLIENT of all matters pertinent to the Site investigation.

4. **COMPLETE REPORT** - The Report is of a summary nature and is not intended to stand alone without reference to the instructions given to PrairieGEO by the CLIENT, communications between PrairieGEO and the CLIENT, and to any other reports, writings or documents prepared by PrairieGEO for the CLIENT relative to the specific Site, all of which constitute the Report. The word "Report" shall refer to any and all of the documents referred to herein. In order to properly understand the suggestions, recommendations and opinions expressed by PrairieGEO, reference must be made to the whole of the Report. PrairieGEO cannot be responsible for use of any part or portions of the report without reference to the whole report. The CLIENT has agreed that "This report has been prepared for the exclusive use of the named CLIENT. 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. PrairieGEO accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report."

   The CLIENT has agreed that in the event that any such report is released to a third party, the above disclaimer shall not be obliterated or altered in any manner. The CLIENT further agrees that all such reports shall be used solely for the purposes of the CLIENT and shall not be released or used by others without the prior written permission of PrairieGEO.

5. **LIMITATIONS ON SCOPE OF INVESTIGATION AND WARRANTY DISCLAIMER**
   There is no warranty, expressed or implied, by PrairieGEO that:
   a) the investigation uncovered all potential geo-hazards, contaminants or environmental liabilities on the Site; or
   b) the Site is entirely free of all geo-hazards or contaminants as a result of any investigation or cleanup work undertaken on the Site, since it is not possible, even with exhaustive sampling, testing and analysis, to document all potential geo-hazards or contaminants on the Site.

   The CLIENT acknowledged that:
   a) the investigation findings are based solely on the information generated as a result of the specific scope of the investigation authorized by the CLIENT;
   b) unless specifically stated in the agreed Scope of Work, the investigation will not, nor is it intended to assess or detect potential contaminants or environmental liabilities on the Site;
   c) any assessment regarding geological conditions on the Site is based on the interpretation of conditions determined at specific sampling locations and depths and that conditions may vary between sampling locations, hence there can be no assurance that undetected geological conditions, including soils or groundwater are not located on the Site;
   d) any assessment is also dependent on and limited by the accuracy of the analytical data generated by the sample analyses;
   e) any assessment is also limited by the scientific possibility of determining the presence of unsuitable geological conditions for which scientific analyses have been conducted; and
   f) the laboratory testing program and analytical parameters selected are limited to those outlined in the CLIENT's authorized scope of investigation; and
   g) there are risks associated with the discovery of hazardous materials in and upon the lands and premises which may inadvertently discovered as part of the investigation. The CLIENT acknowledges that it may have a responsibility in law to inform the owner of any affected property of the existence or suspected existence of hazardous materials and in some cases the discovery of hazardous conditions and materials will require that certain regulatory bodies be informed. The CLIENT further acknowledges that any such discovery may result in the fair market value of the lands and premises and of any other lands and premises adjacent thereto to be adversely affected in a material respect.

6. **COST ESTIMATES** - Estimates of remediation or construction costs can only be based on the specific information generated and the technical limitations of the investigation authorized by the CLIENT. Accordingly, estimated costs for construction or remediation are based on the known site conditions, which can vary as new information is discovered during construction. As some construction activities are an iterative exercise, PrairieGEO shall therefore not be liable for the accuracy of any estimates of remediation or construction costs provided.

7. **LIMITATION OF LIABILITY** - The CLIENT has agreed that to the fullest extent permitted by the law PrairieGEO's total liability to CLIENT for any and all injuries, claims, losses, expenses or damages whatsoever arising out of or in anyway relating to the Project is contractually limited, as outlined in PrairieGEO's standard Consulting Services Agreement. Further, the CLIENT has agreed that to the fullest extent permitted by law PrairieGEO is not liable to the CLIENT for any special, indirect or consequential damages whatsoever, regardless of cause.

8. **INDEMNIFICATION** - To the fullest extent permitted by law, the CLIENT has agreed to defend, indemnify and hold PrairieGEO, its directors, officers, employees, agents and subcontractors, harmless from and against any and all claims, defence costs, including legal fees on a full indemnity basis, damages, and other liabilities arising out of or in any way related to PrairieGEO's work, reports or recommendations.