

GEOTECHNICAL ASSESSMENT

**Mendenhall Single Lot
Whitehorse, YT**

**Prepared For:
Yukon Government
Community Services
Land Development Branch**

November 10, 2022

CAP File: WM00058

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1. INTRODUCTION

CAP Engineering (CAP) was retained by Yukon Government, Department of Community Services - Land Development Branch under a standing offer agreement (SOA 2020-12-287-3), to conduct a desktop geotechnical assessment for a proposed lot in the Mendenhall subdivision, which is located about 70 km west of Whitehorse, Yukon along the Alaska Highway. The purpose of the assessment was to characterize the subsurface conditions at the site and formulate geotechnical recommendations for foundation design and site development.

Authorization to proceed with the work was granted on September 14th, 2022 by Hannah McDonald, YG Project Manager.

2. METHODOLOGY

2.1 Literature Review

The following information was reviewed as part of the geotechnical evaluation:

- Chilkoot Geological Engineers LTD – Geotechnical Evaluation – Proposed Water Treatment Plan Mendenhall Subdivision, Yukon – 2015
- J.R. Paine & Associates – Geotechnical Investigation Proposed Mendenhall Subdivision Expansion km 1549, RHS, Alaska Highway, Yukon – 1998
- J.R. Paine & Associates – Mendenhall Subdivision Site Sustainability Study, Km 1549, Alaska Highway, Yukon - 1987
- GeoYukon
 - Surficial Geology Map: Unconsolidated glacial, glaciofluvial and glaciolacustrine deposits
 - Bedrock Geology: Major Rock Type – Granodiorite/quartz, monzonite/quartz, diorite/diorite/porphyry
 - Contaminated Site: In February 2013, a home heating fuel tank leaked spilling approximately 100 L. A relocation permit was issued, and 20 cubic meters of soil was relocated to a LTF. Confirmatory samples were taken; however, the samples were not collected in accordance with CSR protocols and results for these samples were not submitted. Civic Address of the spill was Lot 37 Mendenhall.
 - Water Wells: There are 16 points on GeoYukon for sites within the Mendenhall Subdivision where water well drilling, or investigations took place. One of which includes a Yukon Water Supply Protection Study conducted by Tetra Tech in March 2017.

2.2 Subsurface Soil Conditions and Water Table Summary

The Lithology of the Mendenhall area generally consists of sand, silt, gravel, and cobbles overlying bedrock. The depth of bedrock varies from 3 m to 30 m below ground surface (bgs) (Tetra Tech 2017). There was data for nine wells drilled for household applications in the Mendenhall subdivision. The average static water depth was 24 m and average depth drilled to have sufficient flow for a well was 65 m. The well data can be found in Appendix A.

The soil profile determined from five boreholes at the proposed water treatment plant by Chilkoot summarized the soil conditions as glaciofluvial deposits overlying morainal till deposits. The glaciofluvial soils are comprised of interbedded sands and silts with trace amounts of gravel. The till deposits were comprised of an unsorted mixture of silt, sand, and gravel, which contained cobbles and potentially

boulder sized material. Both materials were classified as hard based on SPT 'N' values. Boreholes from the water treatment plant geotechnical investigation were terminated at an average depth of 5.2 m in the till deposits. (Chilkoot 2015)

The J.R. Paine & Associates Geotechnical Investigations in 1986 and 1998 encountered the same layers as Chilkoot, but the thickness of these layers varied. The J.R. report also found frozen layers and was suspect of permafrost in the area. However, recent geotechnical investigations from 2015 and water well drilling data show no indication of permafrost in this area. There were two test pits (9-86 and 5-98) dug south/southwest of the proposed lot. Both pits show clay/silt deposits to the bottom (4 m to 5 m) with no indication of a till layer. The data from these holes can be found in Appendix B.

No test holes were conducted in the past or for the purposes of this report within the boundaries of the proposed lot, so the data acknowledged above will be used to make recommendations for this site.

2.3 Site Visit

A site inspection was completed by CAP on September 17, 2022. No bedrock or standing water was visible at the surface anywhere within the lot boundaries. Site gradients were measured with a clinometer and most areas are sloped at 3-4%. There is a small area in the southeast corner of lot that has grades up to 10% sloping towards the back of the lot. The lot was treed with spruce, aspen, and willow trees throughout the property. It appears that the lot has been fire smarted, but still has dense trees throughout. Site maps of the lot are included in Appendix C. The boundaries of the lot are approximate, since the lot has not yet been surveyed at the time of this report.

2.4 Site Drainage

The front half of the property slopes gently towards the road. The back of the lot is where some of the steeper grades (up to 10%) are evident and there may be some small areas where water could pond. The southeast rear corner of the lot has the lowest elevation of approximately 740 m. There are high spots up to 759 m in the front half of the lot. The elevations were taken from a handheld GPS device and are subject to errors up to 5 m.

3. RESIDENTIAL FOUNDATION AND SEPTIC RECOMMENDATIONS

3.1 Permanent Wood Foundations

It is common to construct foundations using permanent wooden foundation systems. As per CSA406-16, the base below the wooden structure shall consist of clean crushed stone or clean gravel which will pass through a 40 mm sieve and contain not more than 10% of fine material that will pass a 4 mm sieve. If native material passes this requirement, it is not required to haul in material; however, this is not expected to be the case for this lot. The granular layer will promote drainage and shall be installed under all wood footings and under floors of permanent wood foundations. The thickness of the granular layer is dependent on the proposed building structure and should extend at least 300 mm beyond the footings plate. CSA406-16 should be consulted for thickness of the gravel layer required. All material placed within 600 mm of the foundation walls shall be free of deleterious debris, frozen clumps, and boulders larger 150 mm in diameter.

To encourage drainage below this gravel structure and away from the building footprint, it may be advantageous to install a sump and drain the sump to a final disposal location outside the building footprint. Weeping tile is not recommended for permanent wood foundations due to risk of subsoil

erosion, blockage, and failure. The drainage in this region should be carefully controlled as the till materials are moisture sensitive and subject to a loss of strength if they become wet or saturated. (Chilkoot 2015)

To reduce maintenance on this type of building structure it is recommended to excavate to non frost susceptible material or below the seasonal frost layer and reconstruct with a granular structure designed for the proposed building structure. It is recommended that a geotechnical professional make an assessment during construction to determine an appropriate granular structure.

3.2 Concrete Foundation Recommendations

Concrete footings supporting walls or columns shall be sized and constructed in accordance with the appropriate building codes.

The footings should be excavated down to non frost susceptible material or below the seasonal frost layer and a granular structure designed for the proposed building constructed to prevent frost heaving and cracking of the concrete elements. The excavated areas should be backfilled with non frost susceptible fill materials. The depth and types of backfill material are dependent on the proposed building structure to be constructed on the property. At a minimum there should be 125 mm of granular material below the concrete footings and extending 300 mm beyond the outside edge of the footings.

Unless it can be shown to be unnecessary, the bottom of every exterior foundation wall shall be drained by drainage tile or pipe laid around the exterior of the foundation or by a layer of gravel in conformance with section 9.14 of the National Building Code of Canada 2020 (NBC 2020). If gravel is used to drain below the foundation it shall be graded to a sump.

It is recommended that the in-situ soil conditions be assessed in order to design a granular structure and drainage appropriate for the proposed building structure.

3.3 Perimeter Insulation and Lot Grading

It is common practice in the Yukon to install frost protection to an equivalent of 2.5 m depth for heated structures. This means consideration for additional insulation should be considered when there is less than 2.5 m of foundation wall backfill. A general rule for insulation is 25 mm (1") of rigid (SM Styrofoam) insulation is equivalent to 300 mm (1') of soil cover. When considering unheated structures built on shallow foundations it is common to see an equivalent of 3 m of frost protection depending on the type of structure.

Soil in contact with shallow foundations can freeze to the foundation, developing a substantial adfreeze bond. Backfill soil that is frost susceptible can heave and transmit uplift forces to the foundation. It is best practice to backfill foundation walls with a non frost susceptible material and ensure this material is well drained to reduce or eliminate any uplift forces.

The rigid insulation sheets should be placed with minimum soil cover of 300 mm on top and extend at least 1.2 m out from the structure. A sheet of vertical insulation should be fastened to the exterior wall above the horizontal insulation up to the insulated exterior wall.

The City of Whitehorse Standard Detail Drawings D2.0 and D2.1 show lot drainage requirements for houses on lots less than and more than 6% overall lot slope. These drawings are included in Appendix D and should be considered during the design phase.

Site grading is to be carried out and maintained to ensure water is directed away from all building structures to prevent accumulation of surface water at the building in accordance with the National Building Code of Canada.

3.4 Sewage Disposal Systems

On site sewage disposal systems are used to treat wastewater from a building not connected to a municipal sewer system. As per the Design Specifications for Sewage Disposal Systems put forth by Government of Yukon, “No person shall construct, install, enlarge, rebuild, substantially repair, or connect to an existing system, any sewage disposal system or any thereof, or cause the same to be done, without first obtaining a written permit from a health officer.”

The size of the required field will be dependent on the number of bedrooms and the percolation rate of water into the soil. It is necessary to dig test hole(s) where the system is intended to be built. Within the test hole a sample is collected, and a percolation test conducted at the elevation where the water is expected to drain into the ground. The steps for installing an approved sewage disposal system in the Yukon is attached in Appendix E.

Based on the percolation test program conducted by J.R. Paine & Associates in 1986 and 1998 there is a large range of percolation rates in this area depending on material encountered. There are rates ranging from 7.8 to 120+ minutes/25 mm. The tests were conducted at 1.5 to 2.0 m below the surface and the variance is based on the material encountered. Higher clay content results in slower absorption rates. The test pit 9-86 is at the south side of proposed lot as shown in Appendix E. The percolation rates in 9-86 were determined to be 120+ minutes. If these percolation rates are encountered at the proposed lot, it will be necessary to use a holding tank or have a septic field designed by an engineer. If percolation rates faster than 60 minutes per 25 mm are encountered, a soil absorption system as shown in the design specifications for Yukon sewage disposal systems may be used.

4. CONCLUSION AND LIMITATIONS

Recommendations for construction on this property were made using the provided reports, info from GeoYukon, and relevant building codes/manuals. There was no borehole data for this specific site that were assessed. A site visit was conducted to assess any ground conditions that was not consistent with the available data for this site. Based on this desktop assessment, from a geotechnical perspective it is feasible to build on the proposed lot in Mendenhall.

A 4 m+ layer of frost susceptible material is expected to be found on this property based on nearby test pit data. Building structure foundations will need to be constructed in a manner to reduce or eliminate the affects of this frost prone soil. Options include excavating below the frost line and reconstructing with non frost susceptible material, construction with a combination of non frost susceptible material and insulation, or use of a wooden foundation with the minimum granular structure, which would likely have ongoing maintenance due to frost effects below the building footprint.

From nearby percolation tests conducted in the past, a soil absorption system may not be suitable for this lot. A holding tank or an engineered soil absorption system should be considered by the site developer. To confirm this, a percolation test would need to be conducted in the proposed septic field site.

Based on well data in the area, it appears to be feasible to drill a water well on this property. The average depth to drill to find an acceptable flow is 65 m based on nine wells drilled in the Mendenhall area. An alternative to this is to haul water from the nearby water treatment plant.

It would be beneficial for the builder to consult a qualified geotechnical engineer during design and construction to confirm ground conditions and to ensure the proposed design meets the construction standards in the Yukon.

This report and its contents are intended for the sole use of Yukon Government and their agents. CAP Engineering does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained in the report when the report is used or relied upon by any other party than Yukon Government, or for any project other than the area where the samples were tested. Any such unauthorized use of this report is at the sole risk of the user. CAP has exercised a fair level of care and skill consistent with that put into practice by members of the engineering and science professions currently practising under similar conditions, subject to time limits and physical constraints applicable to this report.

Prepared by:

Reviewed by:



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APPENDIX A

WELL DATA

Y279

WATER WELL DRILLERS FORM

Well ID:

To be assigned by Dept. Of Environment

Metric Imperial

INSTRUCTIONS FOR COMPLETING THE FORM

- Additional information is provided at the bottom of this form on page 2.
- Question can be directed to Water Resources at 867 667-3171.
- All well construction measurements shall be reported to 0.1 m or 0.3 ft.
- Please print clearly in blue or black ink.
- Completion and submission of this form is the responsibility of the drilling contractor.
- Please specify metric or imperial units for all measurements.

WELL LOCATION AND OWNER'S INFORMATION

A1 Well Name: Optional (i.e. City Well No. 2)

A2 Drilled For: Company / Department / Organization:

A3 Street Address of Well Location:

A4 Town / Village / Area / Lot #:

A5 UTM Coordinates (using handheld GPS): NAD Zone

Easting Northing

A6 Elevation of Top of Casing: m / ft ASL

A7 Accuracy of GPS: +/- m / ft

A8 Purpose of Wells

- Domestic Test Well Irrigation Environmental (Quality)
 Commercial Municipal Observation - Water Level Other (please identify use)
 Industrial Agricultural Public/Recreational

Sketch of Well Location
In sketch, indicate distances from property line, septic field, fuel tank(s) and building. Please include North arrow.

115A16
SV
435381 E
6737681 N
±100-300

LOG OF OVERBURDEN AND BEDROCK MATERIALS (All depths are below ground surface, circle appropriate units, use descriptors provided)

EXAMPLE ONLY →		(brown, grey, green, black, redish, beige, olive, yellowish)	CLAY, SILT, SAND, GRAVEL, COBBLES, BOULDERS, BEDROCK	"trace" <10% (i.e. SILT trace gravel) "some" 10-20% (i.e. SAND some gravel) "silty / sandy / gravelly" 20-30% (i.e. silty SAND) "and sand" or "and gravel" 35-50%	MOISTURE: dry / moist / saturated (wet) HARDNESS: soft / hard / very hard
		brown	SAND	trace gravel some silt	soft and saturated
Depth (m / ft)	B4 General Colour	B5 Most Common Material	B6 Secondary Materials	B7 General Description	
B2 From: 0	B3 To: 5	brown	Sand	and silt	
5	18	grey	Sand clay		
18	28	grey	Sand		
28	43	grey	Sand	and gravel	
	43	black + grey	Bedrock		
43	248	black grey white	Bedrock		saturated 245ft + beyond

B8 Permafrost Encountered: NO YES If yes, indicated depth (m / ft): from: to:

WELL CONSTRUCTION (Continues on Page 2)

Date Well Completed
Y Y Y Y M M D D

Example: 2005 01 31

C1 Drilling Method Air Rotary (Conventional) Dug Other (please specify)
 Reverse Air Rotary Cable Tool
 Mud Rotary Auger (Hollow / Solid Stem)

C2 Well Type: In what geological material is the water producing zone located?
 OVERBURDEN BEDROCK

C3 Outside Diameter (cm / in)
 C4 Casing Material Steel Plastic Other
 C5 Casing Wall Thickness (cm / in)
 C6 Casing Depth to: (m / ft)

C7 Other Comments Regarding Casing:

Surface / Environmental Seal (depth below ground surface, please circle appropriate units)

C8 Seal Material Type: Bentonite (i.e. Bentonite)
 C9 Diameter of Seal: 10 (cm/in)
 C10 Seal Depth from: 10.9 (m/R)
 C11 Seal Depth to: 11 (m/ft)
 C12 Volume Placed: _____ (m³/ft³)

Gravel Pack (depth below ground surface, please circle appropriate units)

C13 Gravel Pack: NO YES If yes, indicated depth (m/ft):
 from: _____ to: _____ indicate diameter of material: _____ (mm/inches) Material type: _____ (i.e. silica)

Well Screen Information (depth below ground surface, please circle appropriate units)

C14 Outside Diameter (cm/in): _____
 C15 Screen Material: Stainless Steel Steel Plastic N/A Other: _____
 C16 Screen Type: Continuous Wire Wrap Louver Screen Perforated Slotted Open Hole
 C17 Depth from: _____ (m/ft) _____ (m/ft) _____ (m/ft)
 Screen 1. _____ (m/ft) _____ (m/ft) _____ (m/ft) Thou./mm/inches
 Screen 2. _____ (m/ft) _____ (m/ft) _____ (m/ft) Thou./mm/inches
 Screen 3. _____ (m/ft) _____ (m/ft) _____ (m/ft) Thou./mm/inches
 C19 Screen Comments: _____

WELL DEVELOPMENT AND STATUS

D1 Well Developed by: Surge Block Water Jetting Air Jetting / Air Lifting Bailing Pumping Other: _____
 D2 Well Head Completion: Well House Pitless Adaptor (Depth of adaptor: _____ (m/ft)) Well Pit (NOT PERMITTED) None (well not completed)
 D3 Well Head Stick-up (above ground surface): 2 (m/ft) (Use negative if below grade)
 D4 Static Water Level (below top of casing): 55 (m/ft) (Use negative if below grade)
 D5 Well Yield Estimate: 18 (Lps/gpm)
 D6 Final Well Status: Water Supply (in use) Stand by (Back-up) Observation Not in use Deepened Other: _____ Abandoned (if well was abandoned, please give reason: _____) Dry Poor Quality Insufficient Yield Artesian conditions
 D7 Well Abandonment Status: Was the well properly decommissioned with bentonite grout? YES NO If YES, indicate Date: _____
 D8 Method Used to Estimate Well Yield: Air Lifting Bailing Pumping Test (if test conducted, complete Pumping Test Record)

PUMPING TEST RECORD AND GROUNDWATER QUALITY

(All depths below ground, circle appropriate units)

E1 Pumping Test Information

Pumping Test Start Date: _____
 Y Y Y Y M M D D

Static Water Level (SWL): _____ (m/ft)

Pump Intake Set at: _____ (m/ft)

Duration of pumping: _____ hrs _____ min

Final Water Level (FWL) at end of Pumping Test: _____ (m/ft)

G1: GROUNDWATER QUALITY

Field Data
 Date Measurements Taken: _____
 Y Y Y Y M M D D

Electrical Conductivity: _____ uS
 pH: _____
 Temperature: _____ °C

Groundwater Type
 Salty
 Sulphur / Egg Odour
 Organic Taste / Odour
 Metallic Taste
 Other: _____

RECOMMENDATIONS

Recomm. Pump Depth: _____ (m/ft)
 Recomm. Pumping Rate: _____ (Lps/gpm)
 If flowing, provide rate: _____ (Lps/gpm)

Turbidity/Sand Content
 Clear
 Slightly turbid/cloudy
 Moderately turbid/cloudy
 Turbid/cloudy
 Trace sand present
 No sand present

Well Disinfection
 Was the well disinfected upon completion of the pump installation? YES NO
 Briefly describe method of well disinfection: _____

F1 Well Water Level Drawdown/Recovery DATA

Drawdown		Recovery	
Time (min)	Water Level (m/ft)	Time (min)	Water Level (m/ft)
0 (SWL)		0 (FWL)	
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Bacteria Testing
 Was a sample taken? YES NO If yes, indicate the name of the laboratory:
 Date Sample Taken: _____

Chemical Analysis of Water
 Was a sample taken? YES NO If yes, indicate the name of the laboratory:
 Date Sample Taken: _____

Clear Form **Print Form**

WELL CONTRACTOR

H1 Name of Contractor / Drilling Company: CADWATER WATER
 H2 Name of Driller(s): _____
 H3 Address: _____
 Y Y Y Y M M D D
 Date Submitted to Dept. Of Environment

CONSULTANT (if applicable)

I1 Company Name: _____
 I2 Company Address: _____
 I3 Report Reference: _____
 I4 Report Date: _____
 Y Y Y Y M M D D

ADDITIONAL INSTRUCTIONS

Upon completing this form, please mail or fax it to:

Please feel free to contact us at:
 Phone: (867) 667-3171, Toll free (in Yukon): (1-800) 661-0408, local 3171)
 Fax: (867) 667-3195 E-mail: Water.Resources@gov.yk.ca

Water Resources Section (V310),
 Department of Environment,
 Government of Yukon Box 2703,
 Whitehorse, Yukon, Canada Y1A 2C8

Personal information contained on this form is collected under the authority of the Access to Information and Protection of Privacy (ATIP) Act, Section 29 (c) and will be used to compile a public database of well and ground water information. For further information contact the Manager of Hydrology, Water Resources at (867) 667-3223, toll free within Yukon 1-800-661-0408 Ext 3223.

I have read the above clause and understand the purpose for collection of personal information.

Signature of Well Owner



Field Report

13 MacDONALD ROAD
 WHITEHORSE, YUKON
 Y1A 4L1
 PHONE (867) 633-3070
 FAX (867) 633-5758

105 A 16
 # 201160004
 Started June 19 2003

Completed June 23 2003

NAME & ADDR. OF CLIENT	DESCRIPTION OF WORK	LOCATION OF WORK
[REDACTED]	Water Well	Lot 14'
Lot 14 Mendenhall	03-9-5	Mendenhall Subdivision

FORMATION LOG			DESCRIPTION OF WORK	TIME			
FROM	TO	FORMATION		DATE	FROM	TO	HOURS
0	20'	sand, gravel	MOVE + warmup trucks	06/19/03	700	830	1.5
20'	40'	sand, gravel, boulders	- Discuss where hole should be.		830	930	1
40'	60'	sand, gravel, boulders	- Setup		930	100	3.5
60'	70'	Bedrock	- Drill 0-60' odx casing.		100	600	5
70'	323'	Bedrock	- Fuel up; drive back to shop.		600	700	1
			- Warmup trucks; drive to site.	06/20/03	700	830	1.5
			- Warmup rig 9; load + weld casing.		830	930	1
			- Change over to Dth; drill.		930	230	5
			- Shank bit trip; drive to shop.		230	430	2
			- Build tool; drive back to site.		430	630	2
			- Fish out bit; drive back shop		630	845	2.15
			- Load; drive to site.	06/23/03	800	830	1.5
			- Warmup rig 9; trip in.		930	1030	1
			- Drill from 143' to 323'.		1030	430	6
			- Develop.		430	600	1.5
			- Trip; load up; demob; to shop.		600	830	2.5

RECORD OF CASING & PIPE				REMARKS:
SIZE	TYPE	SIZE	TYPE	
6 5/8"	odx welded casing	4 1/2"	con. drill	6 - 6 1/2 GPM
				H2O TEMP
				Depth of casing: 70'
FEET	INCH	FEET	INCH	Depth of hole: 323'
70'		323'		Casing stickup: 1'6" * 1 odx shoe 140 mm
				* 80' of 6 5/8" odx welded casing
				* 3 4 1/2" x 7" diverter rubbers
				Note: 5 1/2" bit w/ DownHole Hammer.
				STATIC LEVEL
				TOTAL RIG TIME hrs
				GROUND LEVEL 13.6 M
				TOTAL STANDBY hrs
				TOP OF CASING 14.1 M
				DRILLING MUD bags

SIGNATURES

MIDNIGHT SUN [REDACTED]

CLIENT _____

TITLE _____

TITLE _____

201160002

Field Report



105 A 16

Started Nov. 6 1989



Completed Nov. 9 1989

PH. 633-3070 TELEX 036-8496
P.O. BOX 4391
WHITEHORSE, YUKON

NAME AND ADDRESS OF CLIENT	DESCRIPTION OF WORK	LOCATION OF WORK
[Redacted]	W/W.	Mendenhall Subdivision
[Redacted]		Lot 15
Whitehorse		

FORMATION LOG			DESCRIPTION OF WORK	TIME			
FROM	TO	FORMATION		DATE	FROM	TO	HOURS
			MOVE				
			Fuel 51	Nov 6	8:00	10:00	2
			Travel to Site.	"	10:00	11:00	1
			Setup.	"	11:00	11:45	45 min
0	65	Cobbles + Silt	fine Sand.	"	11:45		
7	31'6"	B.R.		"			
6"	100'	B.R.		"		6:15	6.5
			Travel to Shop.	"	6:15	7:00	45 min
			Travel to Site	Nov 7	8:00	9:00	1
			Get rig + flatdeck running	"	9:00	10:15	1.25
0'	245'	B.R.		"	10:15	3:30	5.25
			Pack up	"	3:30	4:00	.5
			Travel.	"	4:00	5:00	1
			Travel	Nov 9	8:30	9:30	1
			Get Rig Running	"	9:30	11:00	1.5
15'	265'		Develop. + Tripout.	"	11:00	4:30	5.5
			Travel	"	4:30	5:30	1

Size of Casing & Pipe				Remarks:
Size	Type	Size	Type	
				1 - Screen Size drive shoe
Feet	Inch	Feet	Inch	
24'	0"			265' deep - water at 260'
				5 + GPM.
				Static Level 132'
				Ground Level
				Top Of Casing
				Total Rig Time hrs.
				Total Standby hrs.
				Drilling Mud sacks

SIGNATURES

MIDNIGHT SUN
TITLE.....

CLIENT.....
TITLE.....



105 A 16

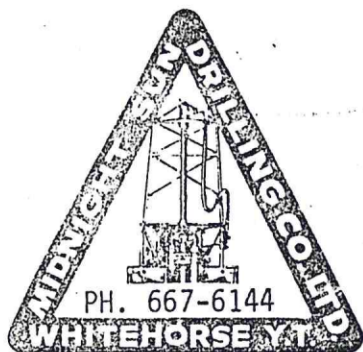
FIELD REPORT



201160003

Started May 29 1995

Completed June 1 1995



P.O. Box 4391

NAME AND ADDRESS OF CLIENT [Redacted] Box 5574 Whitehorse	DESCRIPTION OF WORK W/W	LOCATION OF WORK Lot #24 mendenhall sub div.
--------------------------------------------------------------------	----------------------------	----------------------------------------------------

FORMATION LOG			DESCRIPTION OF WORK	TIME			
FROM	TO	FORMATION		DATE	FROM	TO	HOURS
			MOVE				
			loading	May 29	8:00	5:00	9
			move on set up	30	8:00	11:30	3.5
0	4	Gr. sand & cobs.		"	11:30	4:30	5
4	10	Gr. silt sand-					
10	100	BR.					
			crew travel	"	4:30	5:30	1
			crew travel	May 31	8:00	9:00	1
100	265	BR.		"	9:00	5:30	8.5
			crew travel	"	5:30	6:30	1
			crew travel	June 1	8:00	9:00	1
265	305	BR.		"	9:00	11:30	2.5
			Develop	"	11:30	12:30	1
			move off to shop	"	12:30	4:00	3.5

Rcd. of Casing & Pipe			
Size	Type	Size	Type
6			
Feet	Inch	Feet	Inch
11	6		

Remarks: 1-GPM

1 drive shoe.

STATIC LEVEL
 Ground level 192'
 Top of casing

Total Rig Time hrs.
 Total Standby hrs.
 Drilling Mud sacks

SIGNATURES

MIDNIGHT SUN.....
 TITLE.....

CLIENT.....
 TITLE.....

Surface / Environmental Seal (depth below ground surface, please circle appropriate units)

C8 Seal Material Type: Bentone (i.e. Bentonite) C9 Diameter of Seal: 10 (cm / in) C10 Seal Depth from: 10 (m / ft) C11 Seal Depth to: 18 (m / ft) C12 Volume Placed: 4 Bags (m³ / ft³)

Gravel Pack (depth below ground surface, please circle appropriate units)

C13 Gravel Pack: NO If yes, indicated depth (m / ft): from: to: Indicate diameter of material: (mm / inches) Material type: (i.e. silica)

Well Screen Information (depth below ground surface, please circle appropriate units)

C14 Outside Diameter (cm / in) C15 Screen Material Stainless Steel Steel Plastic N/A Other C16 Screen Type Continuous Wire Wrap Louver Screen Perforated Slotted Open Hole C17 Depth from: C18 Depth to: Slot Size / Perforation Dia: Screen 1, 2, 3. C19 Screen Comments:

WELL DEVELOPMENT AND STATUS

D1 Well Developed by Surge Block Water Jetting Air Jetting / Air Lifting Bailing Pumping Other: D2 Well Head Completion Well House Pitless Adaptor Well Pit (NOT PERMITTED) None D3 Well Head Stick-up (above ground surface) 1.5 (m / ft) D4 Static Water Level (below top of casing) 4.2 (m / ft) D5 Well Yield Estimate 3.5 (Lps / gpm) D6 Final Well Status Water Supply (in use) Stand by (Back-up) Observation Not in use Deepened Other: D7 Well Abandonment Status Was the well properly decommissioned with bentonite grout? YES NO If YES, Indicate Date: D8 Method Used to Estimate Well Yield Air Lifting Bailing Pumping Test

PUMPING TEST RECORD AND GROUNDWATER QUALITY

(All depths below ground, circle appropriate units)

E1 Pumping Test Information Pumping Test Start Date: Y Y Y Y M M D D Static Water Level (SWL): (m / ft) Pump Intake Set at: (m / ft) Duration of pumping: hrs min Final Water Level (FWL) at end of Pumping Test: (m / ft)

RECOMMENDATIONS Recomm. Pump Depth: (m / ft) Recomm. Pumping Rate: (Lps / gpm) If flowing, provide rate: (Lps / gpm)

F1 Well Water Level Drawdown/Recovery DATA

Table with 4 columns: Time (min), Water Level (m / ft), Time (min), Water Level (m / ft). Rows for 0 (SWL), 1, 2, 3, 4, 5, 10, 15, 20, 25, 30, 40, 50, 60.

G1 GROUNDWATER QUALITY

Field Data Date Measurements Taken: Y Y Y Y M M D D Electrical Conductivity: uS pH: Temperature: °C

Turbidity/Sand Content Clear Slightly turbid/cloudy Moderately turbid/cloudy Turbid/cloudy Trace sand present No sand present

Bacteria Testing

Was a sample taken? YES NO If yes, indicate the name of the laboratory. Date Sample Taken: Y Y Y Y M M D D

Chemical Analysis of Water

Was a sample taken? YES NO If yes, indicate the name of the laboratory. Date Sample Taken: Y Y Y Y M M D D

Clear Form Print Form

WELL CONTRACTOR

H1 Name of Contractor / Drilling Company: Anchor Water H2 Name of Driller(s): H3 Address of Driller: Date Submitted to Dept. Of Environment: 2015 05 20

CONSULTANT (if applicable)

I1 Company Name: I2 Company Address: I3 Report Reference: I4 Report Date:

ADDITIONAL INSTRUCTIONS

Upon completing this form, please mail or fax it to: Water Resources Section (V-310), Department of Environment, Government of Yukon Box 2703, Whitehorse, Yukon, Canada Y1A 2C6

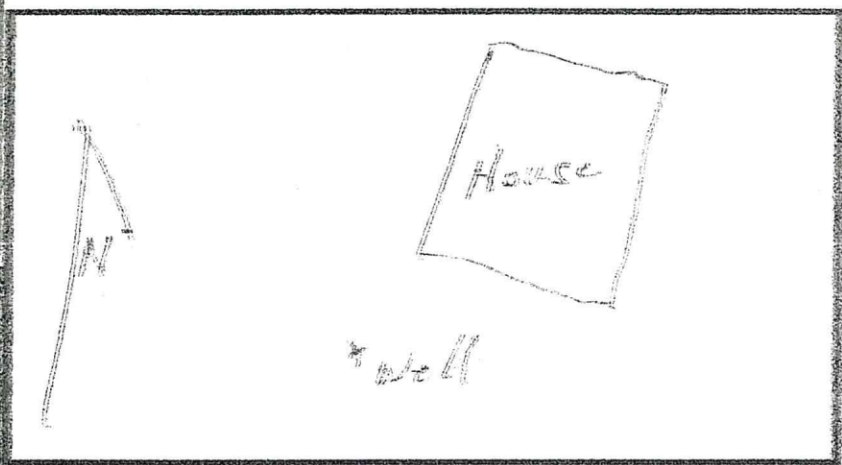
Personal information collected on this form is collected under the authority of the Access to Information and Protection of Privacy (ATIP) Act, Section 29 (c) and will be used to compile a public database of well and ground water information. I have read the above clause and understand the purpose for collection of personal information. Signature of Well Owner

Property owner's name and address

Water Well Log

204140296

[Redacted]
 Whitehorse, VT



Well site address
 1st 40 Mendenhall Sub

Sketch map of well location in the back above

Penetration log	colour	hardness	from	to
clay			0	24
silt + rocks			24	37
boulder			37	39
rocks			39	42
boulder			42	46
silt + rocks			46	62
bedrock	med		62	200
"	soft			
"	med		200	280
Water @ 200' 1-2 gpm				
@ 275' 20+ gpm				

Well depth 280'

Datum point Ground

Use Domestic Industrial

Municipal Monitoring

Other

Method of drilling

Cable tool Air rotary

Other

Casing type steel

welded Drill shoe

shoe ID 5 1/2"

hole diameter

6" to 77'

5 3/8" to 280'

Screen None

Development method duration

Air 1 1/2 hrs

Static Level 62'

Approx 20+ gpm

Whitewater Resources

Drill

Box 33812

Whitehorse, VT. V1A 5Y5

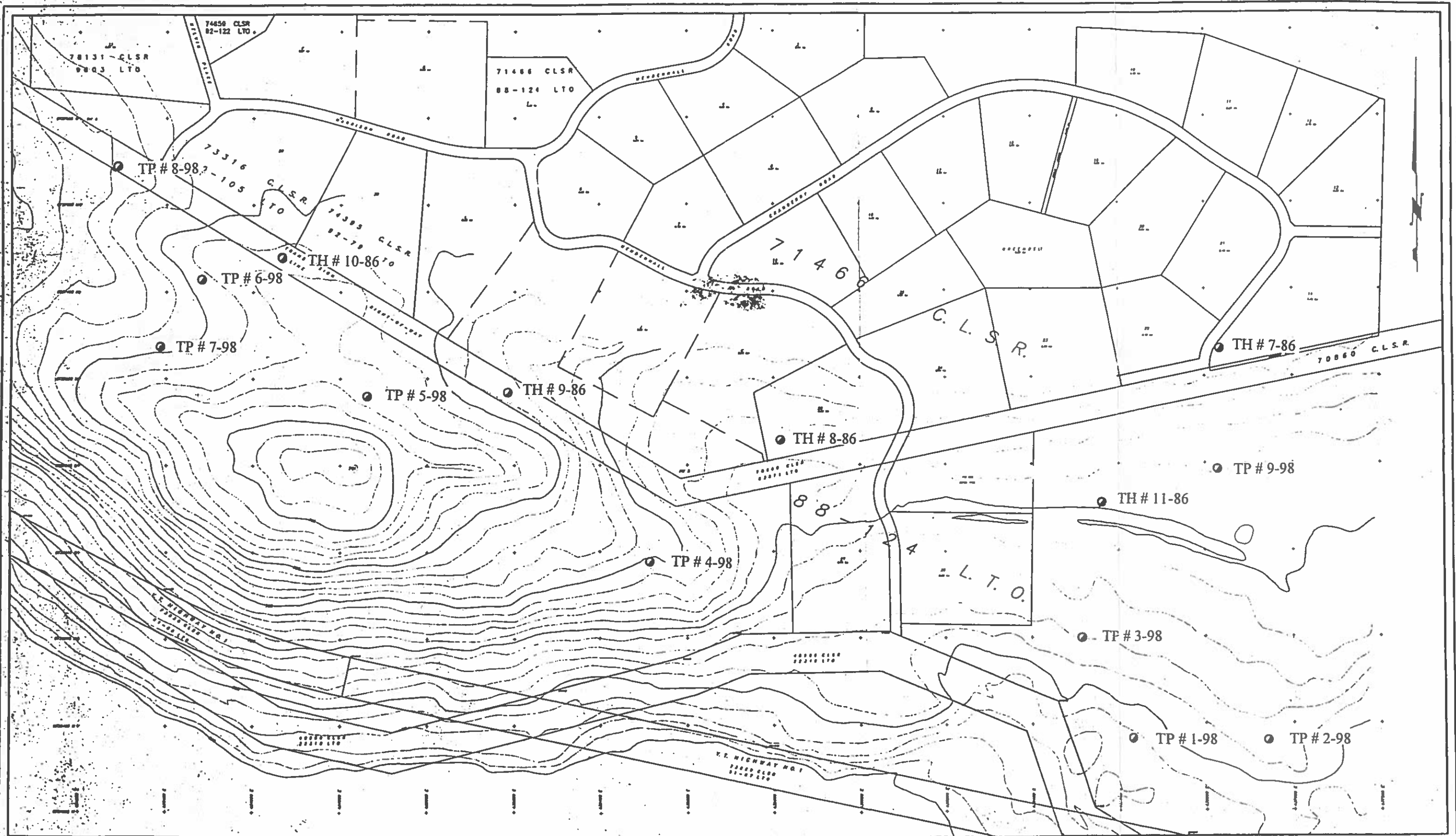
1-(867) 667-6195

Date completed

7/15/01

APPENDIX B

J.R. PAINE & ASSOCIATES TEST HOLE LOGS





J. R. Paine & Associates Ltd.

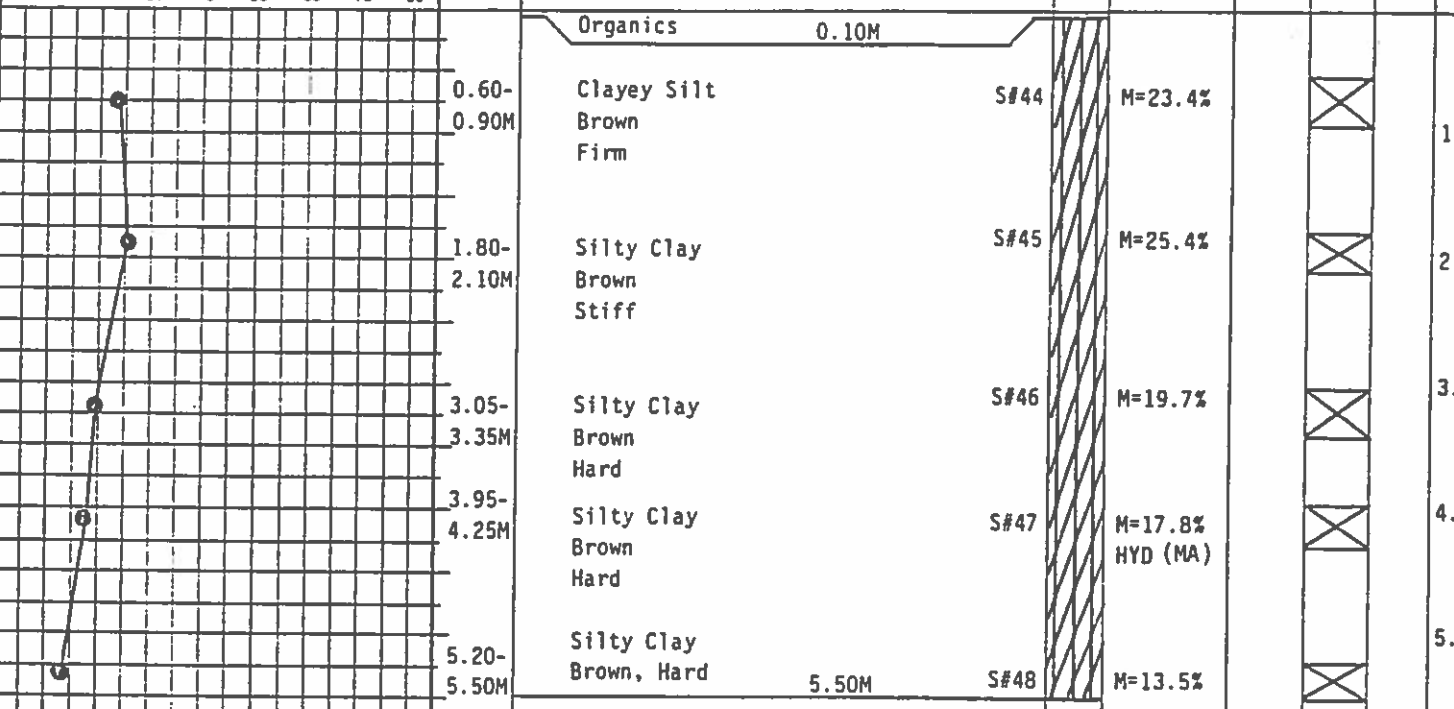
TEST HOLE LOG AND LABORATORY TEST DATA

PROJECT Mendenhall Subdivision

DWN. WCK CKD. JOB NO. 8002-54 DATE 1986.12.03 HOLE NO. 9 PLATE NO. 9

MOISTURE CONTENT LIQUID LIMIT (W L) PLASTIC LIMIT (W P) STANDARD PENETRATION TEST SOIL PROFILE SAMPLES 44 to 50

MOISTURE CONTENT (%) & STAND. PENETRATION (N) ELEV. M. DATUM GROUND SURFACE ELEVATION SOIL SYMBOL OTHER TESTS Unconfined Compressive Strength kPa SAMPLE COND. TYPE DEPTH SCALE



End of Hole Percolation Test Hole 9A, 9B Samples #49, #50

Legend table with columns: SOIL TYPES, CONDITION, SAMPLE TYPE, LABORATORY TEST SYMBOLS, PENETRATION RESISTANCE. Includes symbols for Topsoil, Peat, Fill, Clay, Sand, Silt, Till, Bedrock, and various test symbols.

Arctic Backhoe Ltd.	Inukshuk Planning	TEST PIT NO: 5-98
225 Caterpillar Backhoe	Mendenhall Subdivision Expansion	PROJECT NO: 8102-3
		ELEVATION:

SAMPLE TYPE DISTURBED SPT BULK A-CASING SHELBY TUBE CORE

DEPTH(m)	SAMPLE TYPE	SAMPLE NO	SOIL DESCRIPTION	Liquid Limit			Percent Clay				USC	SOIL SYMBOL	DEPTH(m)	
				10	20	30	40	20	40	60				80
				Plastic Limit			Percent Silt							
				10	20	30	40	20	40	60				80
				PLASTIC		M.C.		LIQUID		Percent Sand		Percent Gravel		
				10	20	30	40	20	40	60	80	20 40 60 80		
0.0			ORGANICS									ORG	0.0	
			SILT 0.25 M -some clay, some rootlets -frozen, grey/brown, weathered											
1.0		22												
			SILT 1.30 M -trace to some clay -frozen, grey/light brown, weathered									ML-CL		
2.0		23												
			FROZEN TO 1.70 M											
3.0		24	SILT 2.70 M -trace sand, trace clay -dry to damp, beige/light brown									ML	3.0	
			SILT 3.10 M -some clay -damp to moist, hard, grey/light brown									ML-CL		
4.0		25												
			END OF HOLE @ 4.10 M											
5.0													5.0	

J. R. Paine & Associates Ltd. Whitehorse, Yukon	LOGGED BY: LK REVIEWED BY: WCK Fig. No:	COMPLETION DEPTH: 4.1 m COMPLETE: 04/29/98
----------------------------------------------------	-----------------------------------------------	-----------------------------------------------





APPENDIX C

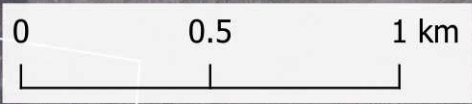
SITE MAP

297000 298000 299000 300000 301000 302000

704000

704000

-  Mendenhall Proposed Lot
-  Land Parcels Surveyed
-  Land Dispositions
-  Alaska Highway



703000

703000

702000

702000

701000

701000

MENDENHALL PROPOSED LOT LOCATION MAP

SCALE:
1 : 20,000

DATE:
September 17th, 2022



EPSG: 3578 - NAD 83 / Yukon Albers

297000 298000 299000 300000 301000 302000

298800

299200

299600



- Mendenhall Proposed Lot
- Land Dispositions
- Land Parcels Surveyed
- Contours (meters)

MENDENHALL PROPOSED LOT DETAILED MAP

SCALE:
1 : 5000

DATE:
September 17th, 2022



EPSG: 3578 - NAD 83 / Yukon Albers

702400

702400

702000

702000

298800

299200

299600

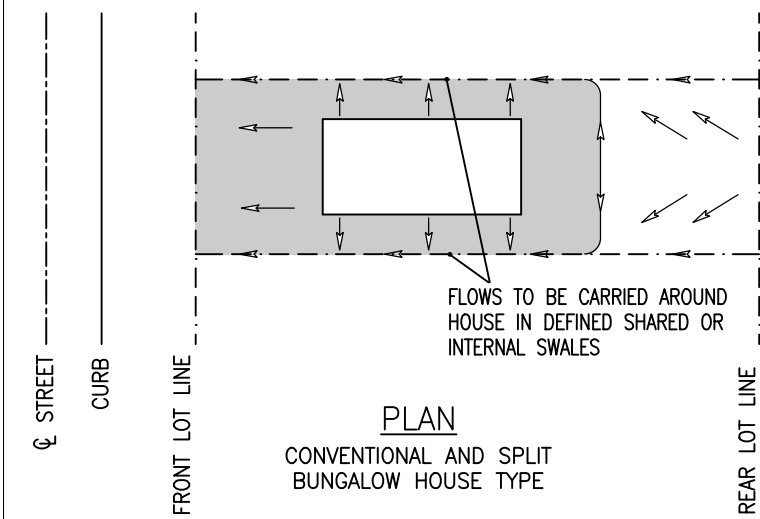
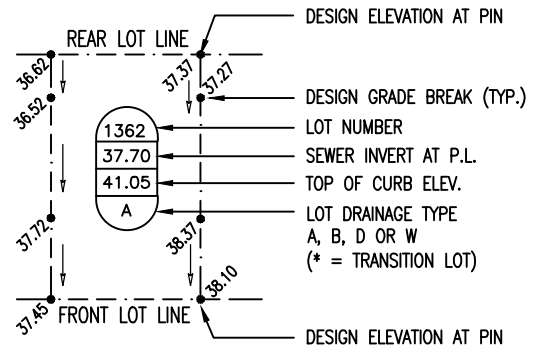
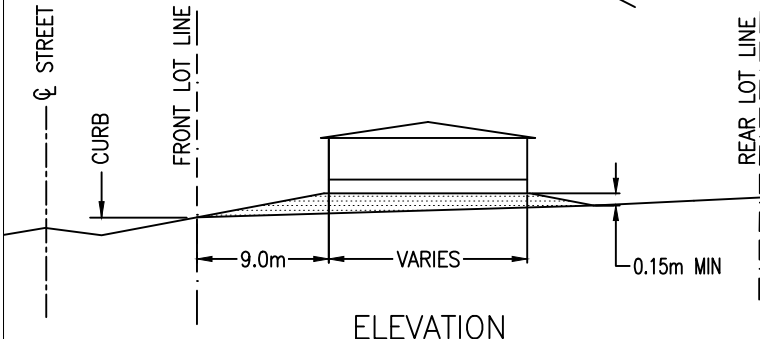
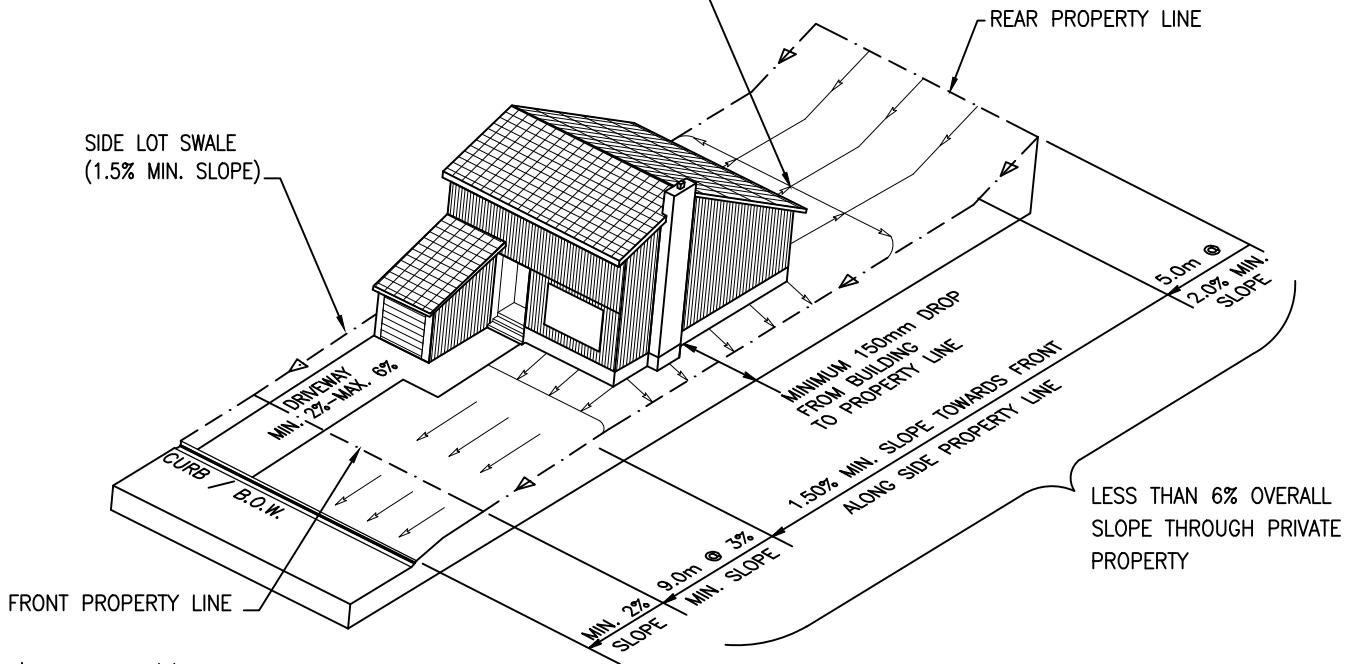


* Approximate Boundaries of the Proposed Lot Outlined in Red
Looking Southeast*

APPENDIX D

CITY OF WHITEHORSE LOT DRAINAGE DETAIL DRAWINGS

TYPICAL RELATIVE HIGH POINT ACROSS YARD (DRAINAGE MAY BE SPLIT FROM CENTRE OR ALL SLOPED TO LOW SIDE)
TYPICAL 1.5% MIN. CROSS YARD SLOPES.



NOTES:

1. SITE GRADING TO BE CARRIED OUT AND MAINTAINED TO ENSURE WATER IS DIRECTED AWAY FROM ALL BUILDINGS TO PREVENT ACCUMULATION OF SURFACE WATER AT THE BUILDING STRUCTURE IN ACCORDANCE WITH THE NATIONAL BUILDING CODE OF CANADA.
2. LANDSCAPING TO BE INSTALLED IN A MANNER THAT MAINTAINS MINIMUM SITE GRADES.
3. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
4. ALL ROOF LEADERS ARE TO BE DIRECTED TOWARDS THE FRONT OF THE LOT.
5. ALL DESIGN ELEVATIONS ARE TO BE INDICATED AT LOT CORNERS AND GRADE BREAKS ALONG PROPERTY LINE.



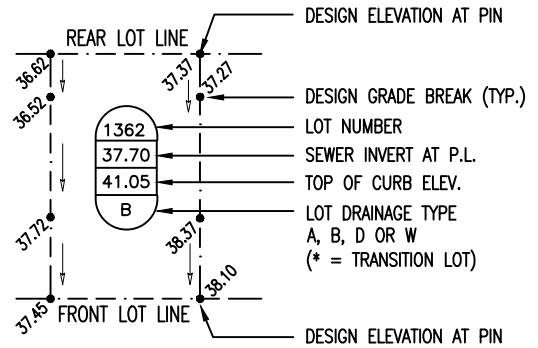
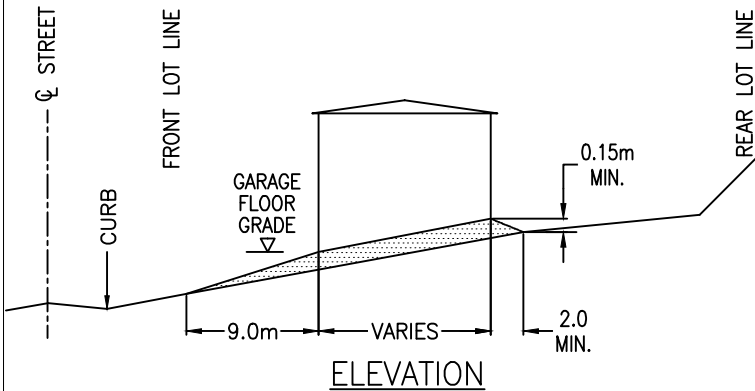
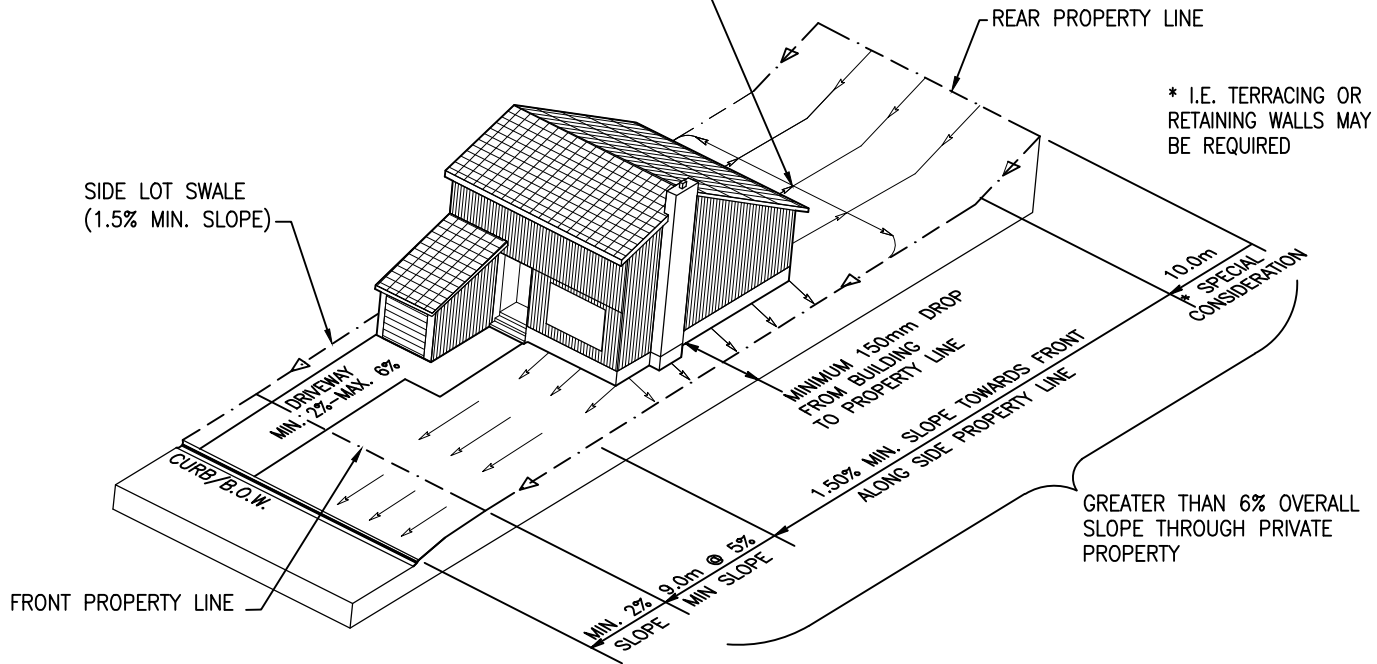
**TYPICAL URBAN LOT DRAINAGE
TYPE 'A' – REAR TO FRONT DRAINAGE
LESS THAN 6% OVERALL LOT SLOPE**

DATE: JANUARY, 2020

STD DWG

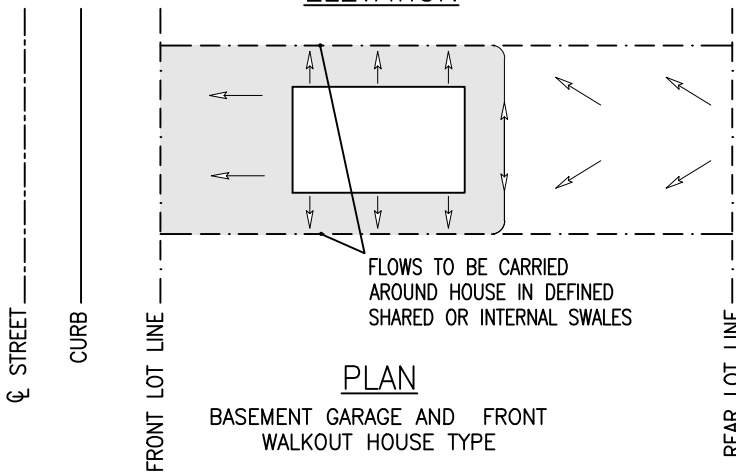
D2.0

TYPICAL RELATIVE HIGH POINT ACROSS YARD (DRAINAGE MAY BE SPLIT FROM CENTRE OR ALL SLOPED TO LOW SIDE)
TYPICAL 1.5% MIN. CROSS YARD SLOPES.



NOTES:

1. SITE GRADING TO BE CARRIED OUT AND MAINTAINED TO ENSURE WATER IS DIRECTED AWAY FROM ALL BUILDINGS TO PREVENT ACCUMULATION OF SURFACE WATER AT THE BUILDING STRUCTURE IN ACCORDANCE WITH THE NATIONAL BUILDING CODE OF CANADA.
2. LANDSCAPING TO BE INSTALLED IN A MANNER THAT MAINTAINS MINIMUM SITE GRADES.
3. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
4. ALL ROOF LEADERS ARE TO BE DIRECTED TOWARDS THE FRONT OF THE LOT.
5. ALL DESIGN ELEVATIONS ARE TO BE INDICATED AT LOT CORNERS AND GRADE BREAKS ALONG PROPERTY LINE.



TYPICAL URBAN LOT DRAINAGE
TYPE 'B' – REAR TO FRONT DRAINAGE
GREATER THAN 6% OVERALL LOT SLOPE

STD DWG

D2.1



Engineering Department

DATE: JANUARY, 2020

APPENDIX E

STEPS FOR INSTALLING AN APPROVED SEWAGE DISPOSAL SYSTEM IN THE YUKON

Installing an Approved Sewage Disposal System in the Yukon

Under the *Public Health and Safety Act* all sewage must be disposed of into an approved sewage disposal system. Sewage means any waste water, human sullage or waste of a like nature discharging from kitchen, bathing, toilet, laundry or similar facilities. The following document provides an overview of the process that must be followed in order to install an approved septic system.

Step 1: Apply for a Permit

A **permit is required** before any person can construct, install, repair or modify a sewage disposal system. The necessary application form and supporting information is available online at http://www.hss.gov.yk.ca/sewage_install.php or you may visit or contact us directly to request an application package.

Important Reminders

- Refer to the “Design Specifications for Sewage Disposal Systems” document before completing the application
- All relevant sections of the application must be completed before the application is reviewed
- The soils description and percolation data are critical to the system design. Inaccurate or incomplete data will result in the application being returned to you unprocessed
- The location diagram must be clear and depict all information described in the application
- When scheduling the work, please allow **48 hours** for the review of the application

Step 2: Obtain Permit

A permit fee of \$50.00 must be paid before a permit is issued and the permit must be issued prior to installation of the sewage disposal system. A permit will be issued once the application has been reviewed and the proposed installation meets all of the requirements under the current “Design Specifications for Sewage Disposal Systems”.

Step 3: Install Sewage Disposal System

The sewage disposal system can be installed once a permit has been issued. **The system must be installed as described in the application submitted and approved.** If, during installation, departures from the approved application are necessary, the changes must be submitted in writing and approved by the Health Officer who issued the permit.

**** Please notify Environmental Health Services 72 hours before back-filling the installation as an inspection may be required.**

< TURN OVER – THE PROCESS IS NOT COMPLETE! >

Step 4: Submit All Required Documentation

Within 30 days of the time of installation you are required to submit the following documentation for review:

- A complete photographic record of the stages of the installation (see checklist)
- Notification of Installation and Undertaking to Maintain a Sewage System Form
- Septic Tank and Sewage Holding Tank Installation Declaration Form
- Notification of Abandonment and Reclamation of a Sewage Disposal System Form (if applicable)
- Other documentation as requested by the health officer (e.g. proof of electrical connection of high level alarm, CSA certificate, as-built diagrams)

Once the necessary documentation is received a Health Officer will review the entire package and ensure all requirements have been met. If all requirements are met final written "Approval to Use" will be issued.

Step 5: Receive Final Approval Letter

A final "Approval to Use" letter received from our office indicates that the system appears to have been installed according to the application, the system meets all current design specifications and all submission requirements have been met. The "Approval to Use" letter is the final stage of the process and you are now legally permitted to use the newly installed sewage disposal system.

Step 6: Use and Maintain the Legally Approved Sewage Disposal System

As a component of your home or business, your sewage disposal system requires care and maintenance. The "Operation and Maintenance of a Septic System" document provides many helpful tips, and is available online at http://www.hss.gov.yk.ca/sewage_docs.php, or you may visit or contact us directly to request a copy.