

GEOTECHNICAL ASSESSMENT

**Lot 1 Block 4, Lot 19 and 20 Block 10, and Lot 6 Block 4
Plan 19794 LTO**

Lot 16 Block 18, Plan 22642 LTO

Lot 16 Block 26, Plan 40721 LTO

Haines Junction, YT

Prepared For:

**Yukon Government Community Services
Land Development Branch**

January 24, 2024

CAP File: WEC0012

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1. INTRODUCTION

CAP Engineering (CAP) was retained by Yukon Government (YG), Department of Community Services - Land Development Branch under a standing offer agreement (SOA 2021/22-260-3), to conduct a desktop geotechnical assessment for Lot 1 Block 4, Lot 19 Block 10, and Lot 6 Block 4, Plan 19794 LTO, Lot 20 Block 10, Plan 19795 LTO, Lot 16 Block 18, Plan 22642 LTO, Lot 20 Block 10, Plan 40721 LTO of Haines Junction, which is 158 km west of Whitehorse. The purpose of the assessment is to provide geotechnical analysis and familiarization on the ground to determine the lots' suitability for construction of a residential dwelling on the residential zoned lots and commercial structures on the commercial zoned lots.

Authorization to proceed with the work was granted on July 17th, 2023, by Ibrahim Taleb, YG Project Manager.

2. METHODOLOGY

2.1 Literature Review

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

- Gartner Lee Limited – Yukon Groundwater and Ground Source Heat Potential Inventory – 2003
- Tetra Tech – Geotechnical Evaluation – Sewer and Water Infrastructure Geotechnical Evaluation, Haines Junction, YT – 2016
- Tetra Tech – Geotechnical Evaluation – Residential Area 1 (Willow Acres Infill Area) – 2016
- Government of Yukon – Design Requirements and Technical Standards – 2017
- Wood Preservation Canada – Permanent Wood Foundation – 2023
- National Building Code of Canada – 2015
- 2020 National Building Code of Canada Seismic Hazard Tool (<https://seismescanada.rncan.gc.ca/hazard-alea/interpolat/nbc2020-cnb2020-en.php>)
- GeoYukon
 - **[uTrB1]** – Bear Creek Assemblage – intermediate to mafic metavolcanic rocks
 - Bedrock Geology: Major Rock Type – Greenstone
 - Water Wells: Several points on GeoYukon are located near the lots in Haines Junction where water well drilling, or investigations took place (See Figure A).
 - Contaminated Sites:
 - Two excavations were conducted by an environmental consulting firm to remedy a heating fuel spill in 2008 approximately 140 m Southeast of Lot 16 Block 26. The initial excavation conducted in 2009 indicated that the soil remaining on site contained PHC-contaminated soil above the applicable standard. The final excavation in 2010 removed and relocated ~16 m³ of PHC contaminated material. Confirmatory sample results from 2010 indicate that the soil remaining on site is below the applicable standards.
 - In June 2010, ~200 L of diesel was spilled because of a leak in the residential fuel tank approximately 50 m West of Lot 16 Block 18. An environmental consultant guided the removal and relocation of an estimated 50 m³ of impacted soil. Soil sample results indicated residual contamination under the northwest foundation of the house. Records show no further remedial efforts were made under the northwest corner of the building.
 - In July 1999 a limited Phase I and II Environmental Site Assessment (ESA) was conducted approximately 50 m southwest of Lot 19 & 20 Block 10. Four boreholes were drilled to a depth greater than the fuel tanks on site. Contaminated soils above applicable standards

were identified in three of the four boreholes, starting at the ground surface, and extending to 6 m in depth. In May 2000, indoor air quality monitoring was completed. Detectable concentrations were found inside the building; however, all were below permissible exposure limits. In 2001 approximately 100 m³ of soil was removed. Contaminated soil above applicable standards was still present on site in the excavation wall that bordered the existing fuel tank nest. It was estimated that 30 to 60 m³ of contaminated soil remained on site under the tank nest on lots 8 and 9 in 2001. In February 2003, a Phase III ESA was conducted. The ESA involved a test pitting program, which estimated that a total of 1,800 m³ of contaminated soil remained on site. Additional remediation work was undertaken in 2009 to remove the fuel tanks and excavate all remaining contaminated soils. Approximately 2,400 m³ of contaminated soil was removed from the site. Confirmatory soil sample results indicated that the soil remaining on site was below applicable standards.

3. SITE CONDITIONS

3.1 Site Description

The six lots are situated within the Village of Haines Junction, and some are currently characterized by trees covering the land. Based on the projection of the lots' corner elevations, it appears that these lots have a relatively minimal elevation change with ideal slopes for construction.

The areas and slope of each lot are as follows:

- Lot 1 Block 4 (Residential): 413 m² with slope of 3.5% from alleyway towards Hume Street.
- Lot 6 Block 4 (Residential): 465 m² with slope of 4.5% from alleyway towards Hume Street.
- Lot 16 Block 26 (Residential): 758 m² with slope of 1.8% from Alsek Crescent towards the back of the lot.
- Lot 16 Block 18 (Residential): 465 m² with slope of 1.9% from St. Elias Street towards the back of the lot.
- Lot 19 Block 10 (Commercial): 465 m² with slope of 3.1% from the back of the lot towards Lucania Street.
- Lot 20 Block 10 (Commercial): 465 m² with slope of 3.1% from the back of the lot towards Lucania Street.

For a visual reference, please refer to Appendix A for more detailed information about the lots.

The village of Haines Junction features diverse vegetation influenced by its northern climate and varied ecosystems. Notably, the Kluane National Park and Reserve encompassing the region showcases different vegetation zones: boreal forests with spruce, pine, and birch trees at lower elevations, transitioning into subalpine meadows with wildflowers, shrubs, and alpine tundra with low-growing plants at higher elevations. Riparian areas along water bodies display willows and alders, while wetlands exhibit sedges, grasses, and aquatic plants.

The forest within the Haines Junction community zone is a mixture of even-aged pure spruce patches through to pure trembling aspen patches, including mixes of the two primary types.

3.2 Subsurface Soil Conditions and Water Table Summary

According to the above-noted references, Haines Junction is situated on a softly rolling plateau overlooking the Dezadeash River. The presence of shallow lakebed soils across Haines Junction can be attributed to the activity of the Lowell Glacier, which blocked the Alsek River. The silt and clay soils from Lake Alsek, covering much of the Haines Junction town, vary in thickness and rest atop previously laid silt till. Additionally, there are sand and gravel deposits scattered in the region, indicating former beach terraces as Lake Alsek retreated. For specific soil information at individual borehole and test pit sites, please refer to Appendix B.

Data from water well records reveal the presence of slim layers of coarse-textured river sediment beneath the floodplain of the Dezadeash River. The majority of the nearby shallow water wells are constructed within these sediment layers. Loose materials, primarily comprising till, continue down to depths exceeding 380 m below the village.

Test pits and boreholes have been conducted extensively in the Haines Junction village, covering different plots within the area. Based on the information from the boreholes and test pits, groundwater was not encountered in any of the nearby boreholes or test pits.

Lot 16 Block 26

The subsurface characteristics of this lot was summarized using six nearby boreholes. The topmost layer consists of lacustrine clay soils up to 2.5 m deep, which overlay a till deposit described primarily as a silt with some sand and gravel. This till layer typically extended to the bottom of the holes but in two of the holes there was a sand layer below the till between 3 m and 9 m below ground surface (bgs). Seasonal frost was found approximately 2.5 m deep along the roadway of Joe Street, but no permafrost was present in any of the borehole data. There is no nearby water well data for this lot; however, one borehole log shows that the water level is around 6.6 m bgs.

Lots 1 and 6 Block 4

The subsurface characteristics of these lots were summarized using five nearby boreholes and one water well. The topmost layer consists of lacustrine clay soils up to 1.5 m deep, which overlay a till deposit described primarily as a silt with some sand and gravel. This till layer typically extended to the bottom of the holes but in one hole there was a sand/gravel layer below the till 7.5 m bgs. No data about the seasonal frost and permafrost was provided in these borehole logs. The water level in this area, based on the nearby water well data, is 7.3 m bgs.

Lot 16 Block 18

The subsurface characteristics of this lot was summarized using four nearby boreholes and one test pit. The topmost layer consists of lacustrine clay soils up to 3.0 m deep, which overlay a till deposit described primarily as a silt or sand with some gravel. This till layer extended to the bottom of the holes in this area up to 5.7 m bgs. Seasonal frost was found approximately 0.3 m to 0.9 m along the roadway of Aishihik Street, but no permafrost was present in the borehole data. No nearby water well data was available for this lot and none of the test sites show a water table, so it assumed it is deeper than 5.7 m in this area.

Lot 19 and 20 Block 10

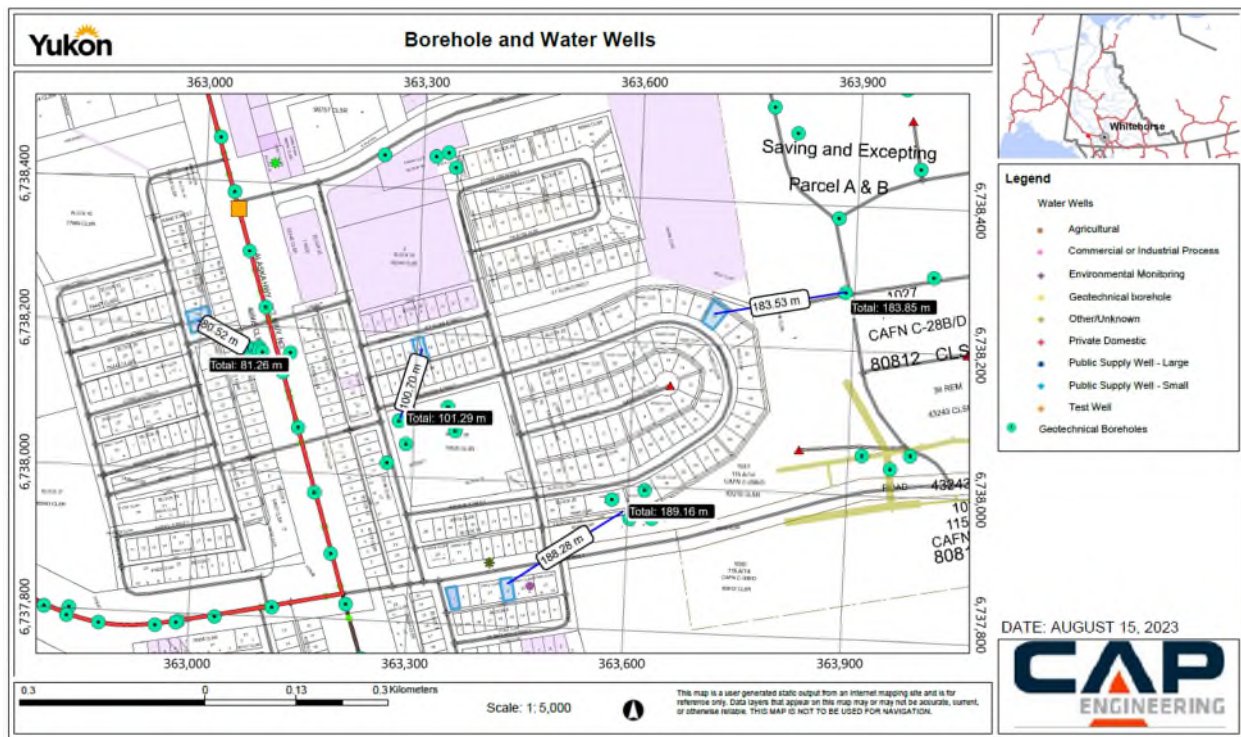
The subsurface characteristics of this lot was summarized using four nearby boreholes and one test pit. The topmost layer consists of lacustrine clay soils up to 4.6 m deep, which overlay a till deposit described

primarily as a silt or sand with some gravel. This till layer extended to the bottom of the holes in this area up to 12.2 m bgs. There was frost found as deep as 4.6m in this area indicating the possibility of shallow permafrost in this area. There is no nearby water well data for this lot; however, one borehole shows that the water level could be around 11 m bgs based on damp sand conditions at this depth.

The location of the lots and boreholes/test pits/wells, along with the borehole/test pit logs and well data used for this report is included in Appendix B. The borehole and water well data selected is relevant to the study, verifying that the information obtained was sufficiently close to the lots mentioned in this report.

For a visual representation of the locations of the boreholes and water wells, please refer to Figure A below.

Figure A: Plan Borehole and Water Well Locations



3.2.1 Bedrock

No bedrock was encountered in any of the boreholes, which was anticipated for these specific lots.

3.2.2 Permafrost and Seasonal Frost

Based on the typical climate information and the soil composition at the location, the seasonal frost penetrates the ground approximately 3.0 m below the surface in regions where the snow cover remains intact. Nevertheless, in specific areas, the seasonal frost will likely reach even greater depths, surpassing 3.0 m.

According to the borehole records, there was frost up to 4.6 m bgs around Lots 19 and 20. It was located in the fine grained upper lacustrine layer. This borehole was drilled in July indicating this frost may be

year-round (i.e. permafrost). There is no information if this lot was treed or cleared at the time of drilling. Nonetheless, areas with substantial organic ground cover and dense forests are more prone to having permafrost. This variability makes it challenging to anticipate where permafrost might or might not be present within the study zone. To accurately determine the presence of permafrost in this area, it is recommended to perform geotechnical site assessments and borehole tests in the vicinity of the lots to confirm.

3.2.3 Potential for Frost Heave

The primary issue regarding underground utilities and shallow foundation buildings in the Haines Junction region is the susceptibility of the underlying soils to frost heave. The clay and silt soils near the surface are frost susceptible, making the risk of frost heave considerable. This risk becomes even greater if there is unregulated infiltration of surface water around foundation components. Allowing surface water to penetrate the soil near foundations substantially elevates the likelihood of frost heave. Consequently, it is crucial to ensure proper site drainage away from all infrastructure foundations and that structures are properly insulated from the frost heave effects.

3.2.4 Climate

Located at an elevation of 611 m above sea level, Haines Junction has a Tundra climate (Classification: ET). The district's yearly average temperature is -3.15°C which is 5.24°C lower than the national average. Haines Junction typically receives about 15.24 mm of precipitation and has 27.83 rainy days annually (7.62% of the time).

3.2.5 Limitations of Data

None of the boreholes and test pits referenced in this report are situated within the boundaries of the specific lots being considered. The data acquired from the boreholes, test pits and water wells, as outlined in Appendix B, were utilized to formulate geotechnical recommendations in the report.

3.3 Seismic Consideration

National Building Code of Canada (NBCC) 2020 Part 9 only requires structures to have a site classification for a single-family dwelling when $S_a(0.2)$ is above 1.2. The online Canada Seismic Hazard Tool designates the $S_a(0.2)$ for the following lots in Haines Junction:

- The $S_a(0.2)$ value for Lot 1 Block 4 is 1.27.
- The $S_a(0.2)$ value for Lot 6 Block 4 is 1.27.
- The $S_a(0.2)$ value for Lot 16 Block 26 is 1.27.
- The $S_a(0.2)$ value for Lot 16 Block 18 is 1.27.
- The $S_a(0.2)$ value for Lot 19 Block 10 is 1.27.
- The $S_a(0.2)$ value for Lot 20 Block 10 is 1.27.

Residential Lots - Lot 1 Block 4, Lot 6 Block 4, Lot 16 Block 26, & Lot 16 Block 18

As mentioned above it is best practice to consider the site classification for residential construction when $S_a(0.2)$ is above 1.2. Based on the National Building Code 2020 Table 4.1.8.4-B, which considers the density and wave speed of soils in the upper 30 m to determine site classification, one can determine the site classification for seismic design. There was no Standard Penetration Test (SPT) or Cone Penetration Data (CPT) data available for the purposes of this report for the residential lots, so site classification is

estimated based on soil stratigraphy. Due to the presence of dense till in all boreholes, it can be estimated the soils in the forementioned residential lots may be classified as Site Class D. This will also be the intended subgrade for the proposed structure. To confirm this site classification, it would be necessary to perform a site-specific investigation using SPT, CPT, or other related testing.

Commercial Lots - Lot 19 & 20 Block 10

It is best practice to perform a site-specific site investigation for commercial zoned lots, which would assist in determining the site classification for these lots. The type of structure will dictate the necessity for a site-specific investigation, which will be determined by the owners and professionals involved in developing the lot.

Based on the National Building Code 2020 Table 4.1.8.4-B, which considers the density and wave speed of soils in the upper 30 m to determine site classification, one can determine the site classification for seismic design. There was no SPT or CPT data available for the purposes of this report for the commercial lots, so site classification is estimated based on soil stratigraphy. Due to the presence of dense till in all boreholes, it can be estimated the soils in the forementioned commercial lots may be classified as Site Class D. To confirm this site classification, it would be necessary to perform a site-specific investigation using SPT, CPT, or other related testing.

4. RECOMMENDATIONS

4.1 Site Suitability

Lot 1 Block 4, Lot 6 Block 4, Lot 16 Block 26, and Lot 16 Block 18 are deemed suitable for future residential construction and Lot 19 Block 10 and Lot 20 Block 10 for future commercial development purposes as per the zoning outlined by YG methods and standards are adhered to, especially considering the presence of potential permafrost for the commercial lots. A single-family residential dwelling (for residential lots) and commercial infrastructure development (for commercial lots) would be recommended based on lot size and the neighborhood. A monolithic foundation, strip and pad foundation, and permanent wood foundation for lots with no permafrost and basic pad foundation, space frame foundation, screw jacks, or pad-wedge foundation for lots with permafrost are suitable for these locations.

It is essential to ensure compliance with the applicable building standards to guarantee the feasibility of the construction. Adhering to specific guidelines and building codes for permafrost area will help mitigate potential risks and ensure the longevity of the structures.

Furthermore, the excavation depth below the building will depend on the encountered materials during the construction process. The till layer encountered around Haines Junction at a depth of approximately 0 to 5 m bgs would be an adequate founding soil for a foundation, but it will depend how deep it is in the lot as it may not be economical to excavate to this depth. Careful examination of the subsurface conditions will aid in determining the appropriate depth for excavation, ensuring a solid foundation, and minimizing disturbances to the permafrost layer.

Due the presence of fine grained silt and clay soils in all the test sites around the forementioned lots, it will be necessary to ensure proper measures are taken to protect the foundation elements from frost heave effects using non frost susceptible soils and/or insulation.

By implementing these construction methods and adhering to relevant standards, the sites can be developed effectively and sustainably, considering the challenges posed by the presence of potential permafrost around the area of the commercial lots.

For any parking areas, a gravel structure is assumed for this area. For a concrete or paved driveway, it is recommended that a geotechnical firm be consulted to ensure proper base preparation and pavement structure, as permafrost areas require special considerations.

It is recommended to consult a geotechnical engineer during the planning of the commercial lots to determine whether the intended structure requires a site-specific investigation. This investigation would help determine in-situ soils, bearing capacities for the intended structures and determine whether permafrost is present in these lots.

Consequently, it is recommended to clear such forested lots with suspected permafrost and wait for approximately one year before proceeding with construction, aligning with common practice in mitigating potential permafrost-related issues.

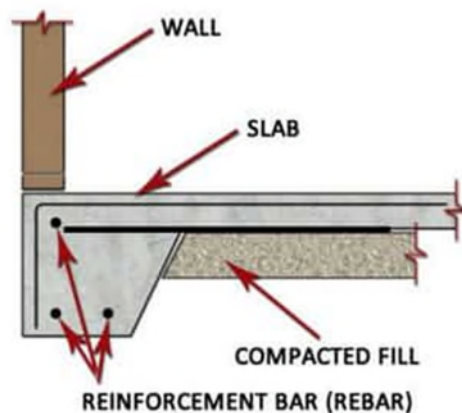
4.2 Foundation Recommendations

There are various foundation solutions that may be viable for development of this lot depending on the actual soil conditions encountered and the intended structure(s) to be constructed. In the case no permafrost is encountered, or the presence of permafrost is mitigated it would be possible to use monolithic slab, strip and pad or a permanent wood foundation. In the case permafrost is encountered on the lot and the frost is not removed or melted then it is recommended to use an adjustable type of foundation such as space frame, screw jacks, or pad-wedge type foundations. Details about these foundation types can be found below.

Monolithic Foundation

A monolithic slab refers to a type of concrete slab that is cast as a single unit and usually maintains a consistent thickness throughout its entire depth. Nonetheless, variations can occur based on the locality, where the outer portion might be constructed with increased thickness to counter frost heaving and offer improved structural support for external walls. See Figure B.

Figure B: Monolithic Foundation



Strip and Pad/Spread Foundations

Strip foundations are versatile and can be used for various subsoils, but they are most effective for soils with decent bearing capacity. They work well for structures with relatively light loads, such as many residential buildings with a few stories. In these cases, mass concrete strip foundations can be used. However, if the situation is different and requires stronger support, reinforced concrete may be required.

Pad foundations are generally shallow, but their depth can be adjusted based on the ground conditions. These foundations are spread-out platforms made of concrete in shapes such as rectangles, squares, or circles. They are designed to carry specific point loads, like the weight of columns or groups of columns in a building's structure. The load is then spread out by the foundation to the soil or rock below. It is also worth noting that pad foundations can also be used to support ground beams in some cases. See Figures C and D.

Figure C: Strip Foundation

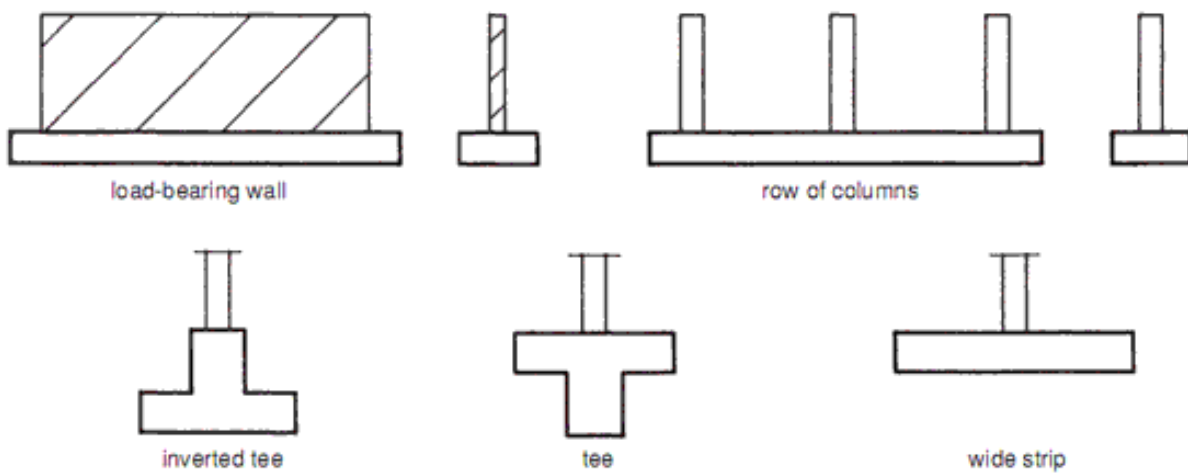
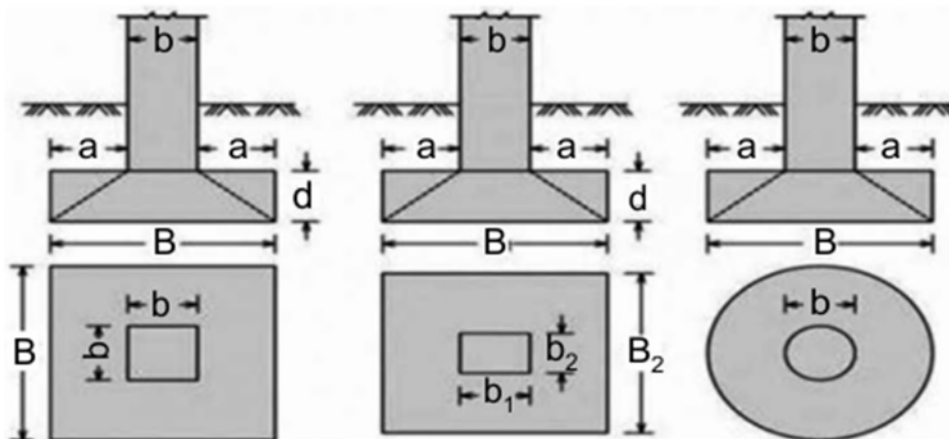


Figure D: Pad/Spread Foundation

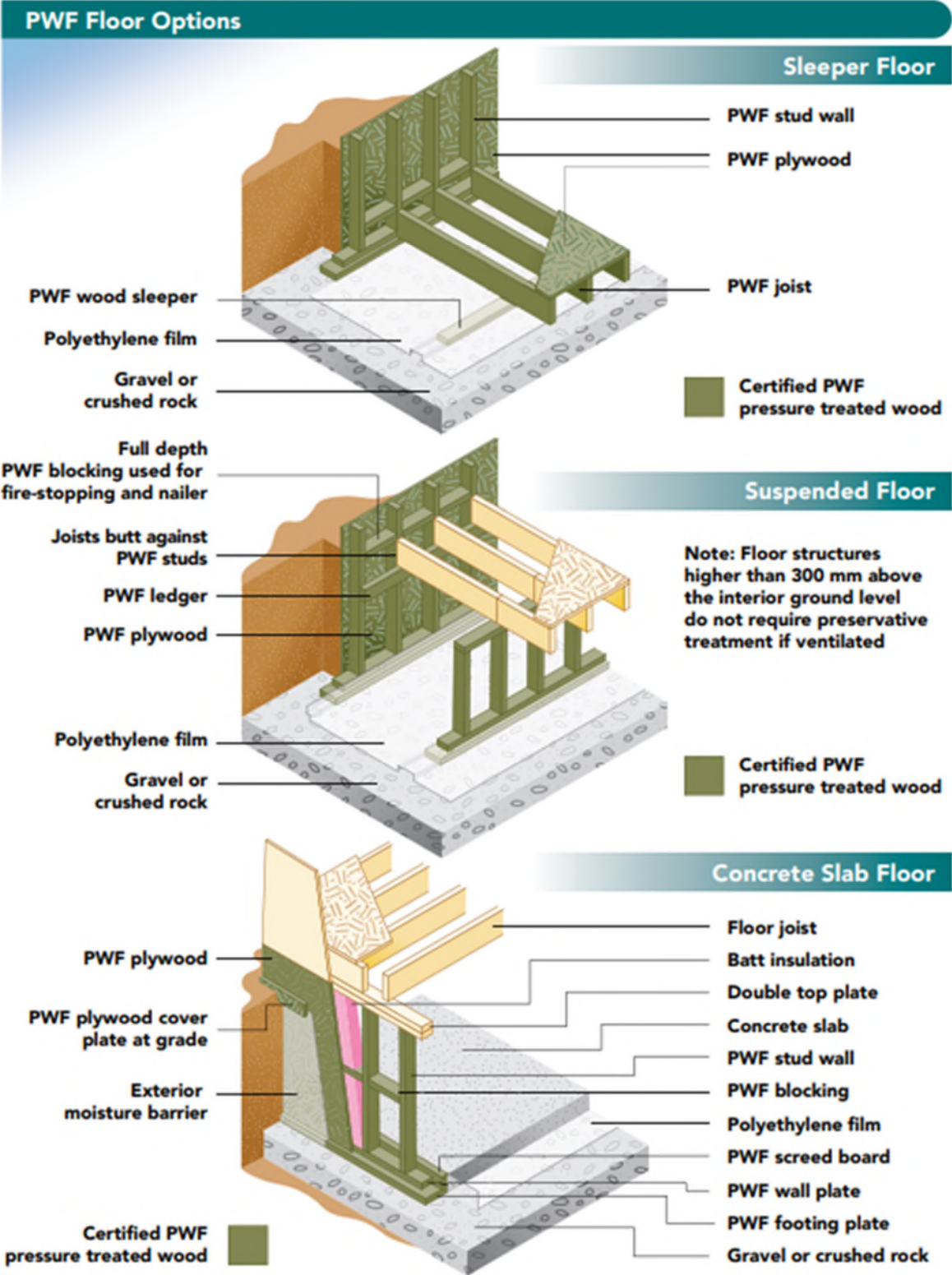


Permanent Wood Foundation

A permanent wood foundation (PWF) is an in-ground engineered construction system designed to turn a home's foundation into useable living space. A below-grade stud wall constructed of preservative treated

plywood and lumber supports the structure and encloses the living space. PWFs are suitable for all types of light-frame construction covered under Part 9 (Housing and Small Buildings) of the National Building Code of Canada, under clauses 9.15.2.4.(1) and 9.16.5.1.(1). This includes single-family detached houses, townhouses, low-rise apartments, and institutional and commercial buildings. In addition, the recently revised CSA S406 standard, Specification of permanent wood foundations for housing and small buildings, allows for three-storey construction supported by PWF. See Figure E.

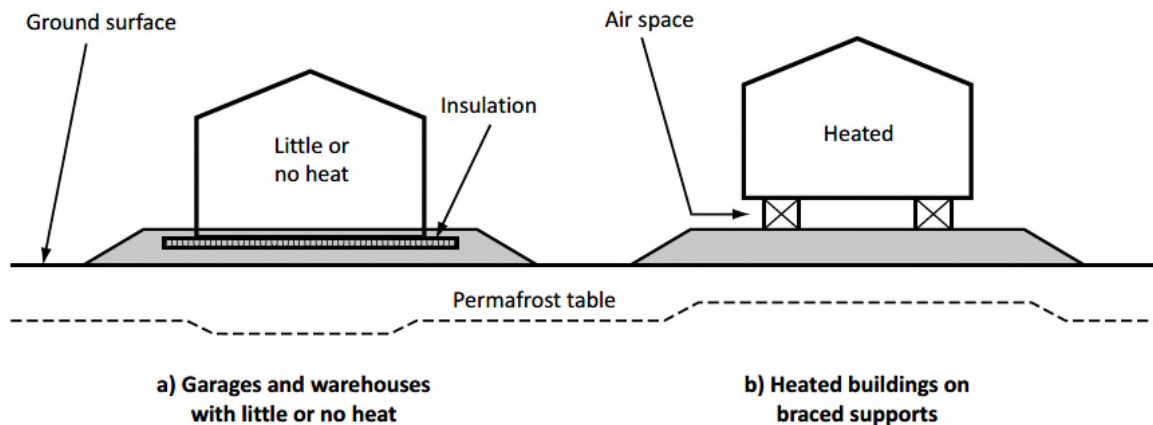
Figure E: Permanent Wood Foundation



Basic Pad Foundations and Spread Footings

A granular material pad is commonly used as a base for building on permafrost. It improves access to the site and protects the underlying permafrost. The pad is made of gravel or crushed rock, designed to stay stable during freezing and thawing cycles. It allows permafrost to grow into the base, joining the frozen ground. To prevent heat transfer, buildings are elevated at least 1 m above the pad, allowing air circulation underneath. If buildings are directly on the pad, alternative heat exchangers are used. This method helps to ensure stable construction and protects the permafrost. See Figure F.

Figure F: Two Basic Pad Foundation Design (CSA 2010)



Space Frame Foundations

Space frame foundations consist of pre-manufactured metal members flattened on each end and connected by welding or bolts. They are commercially available, and custom-made to the building size for which it is to be used. It is assembled directly on-site on a compacted granular foundation.

Screw Jacks and Pad-Wedge Foundation

Surface footing on a granular pad with open space below the building is a commonly used foundation type for construction above permafrost, especially for smaller structures like homes. This type of foundation is designed to move with the ground, allowing it to adjust to differential settlement or heave. To accommodate potential future settlement, especially in areas with known thaw-sensitive permafrost, the foundation is equipped with jacking and shimming mechanisms. In some cases, screw jacks may be permanently installed at each footing to facilitate re-leveling if necessary. This ensures stability and flexibility in the construction to adapt to the changing permafrost conditions.

4.3 Perimeter Insulation and Lot Grading

It is common practice in the Yukon to install frost protection to an equivalent of 2.5 m and 3.0 m depth for heated structures and unheated structures respectively that are in contact with the ground such as slab on grade, strip footings, or basements. For the commercial lots and the potential presence of permafrost, if these types of foundations are desired, then a site-specific geotechnical evaluation is recommended. This means consideration for additional insulation should be considered when there is less than 3.0 m of foundation wall backfill or frost susceptible material within the upper 3.0 m. A general rule for insulation is that 25 mm of rigid (SM Styrofoam) insulation is equivalent to 300 mm of soil cover. When

considering unheated structures built on shallow foundations it is common to see an equivalent of 3.0 m of frost protection depending on the type of structure in this region.

Soil in contact with shallow foundations can freeze to the foundation, developing a substantial ad freeze 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 a 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 Yukon communities do not have standard details for lot drainage; therefore, it is common practice to use the City of Whitehorse Servicing Standard Manual (COWSSM) when constructing and developing in the communities. COWSSM Standard Detail Drawing D2.0 shows lot drainage requirements for houses on lots less than 6% overall lot slope. The detail drawing can also be used for reference when developing the commercial lots. This detail is included in Appendix C and should be considered during the design phase for all the lots.

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

4.4 Sewage Disposal Systems

Based on the information given by the project manager for this project (Community Services, Land Development Branch, YG, November 2023), lots mentioned in this report in the Village of Haines Junction are serviced and lots should be piped to the village main lines. In this case there is no need for special consideration for on site septic systems.

5. CONCLUSION AND LIMITATIONS

In general, Lot 1 Block 4, Lot 6 Block 4, Lot 16 Block 26, and Lot 16 Block 18 are deemed suitable for future residential construction. Lot 19 and Lot 20 on Block 10 are also deemed suitable for future commercial construction and development purposes as per the zoning outlined by YG.

A single-family residential dwelling for residential lots would be recommended based on lot size and the neighborhood.

It is recommended that a qualified geotechnical engineer be consulted during design and construction to confirm the ground conditions and to ensure the proposed design meets Yukon construction standards. This will ensure the foundation type(s) selected for commercial development on the commercial lots are well suited to the insitu ground conditions for the proposed structures. The permafrost near the commercial lots indicates a possibility that these lots may have permafrost, and this should be assessed prior to construction.

By implementing these recommendations and conducting further on-site investigations as needed, the Yukon Government can ensure that any future developments in Haines Junction are well-prepared to handle the challenges posed by permafrost. This proactive approach will result in resilient and sustainable infrastructure that can withstand the unique environmental conditions of the region.

This report and its contents are intended for the sole use of the Yukon Government and its 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 or for projects outside the subject area. 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 practicing under similar conditions, subject to time limits and physical constraints applicable to this report.

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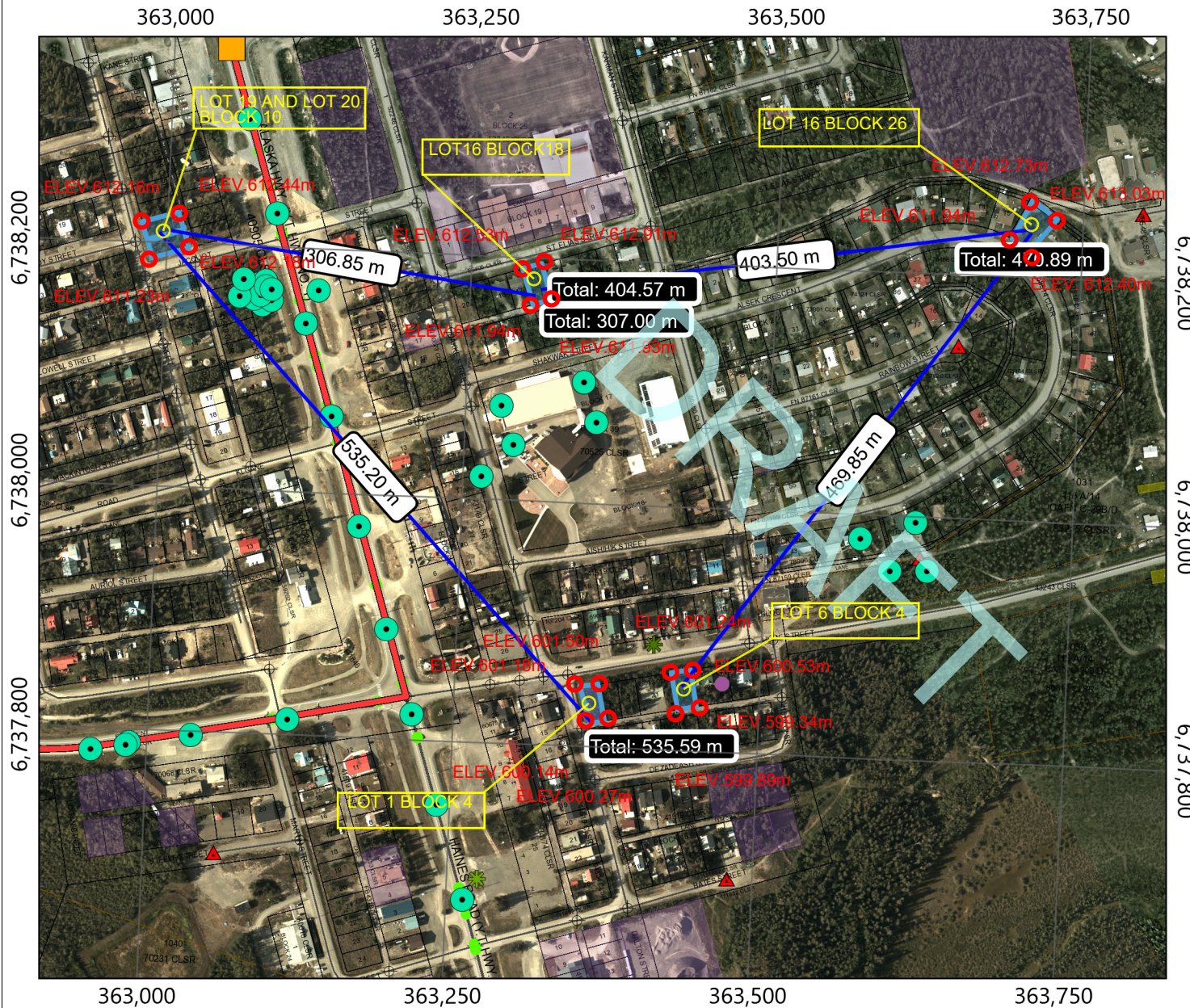
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APPENDIX A

SITE MAP



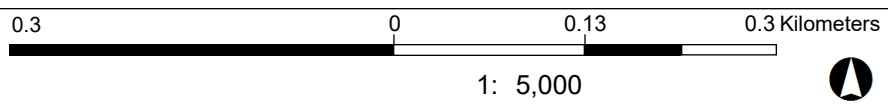
LOT 1&6 BLOCK 4, LOT 16, BLOCK 26, LOT 16 BLOCK 18, LOT 19&20 BLOCK 10



Legend

- LOT BOUNDARY
- ELEVATION

Elevations came from Airborne LiDAR data from year 2015 in GeoYukon



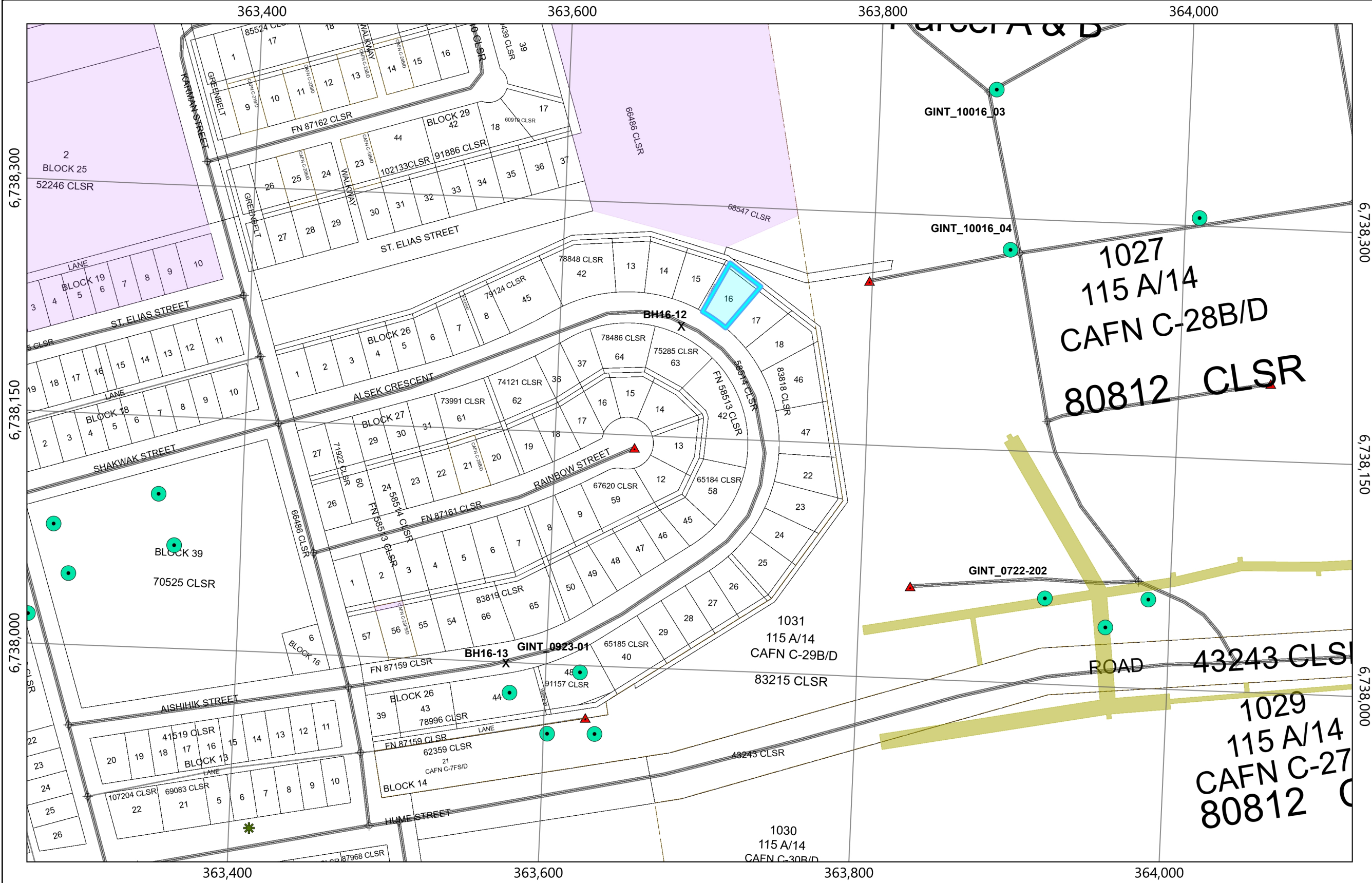
This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

DATE: AUGUST 15, 2023



APPENDIX B

BOREHOLE, TEST PIT, AND WATER WELL DATA



Legend

- Water Wells**
 - Agricultural
 - Commercial or Industrial Process
 - Environmental Monitoring
 - Geotechnical borehole
 - Other/Unknown
 - Private Domestic
 - Public Supply Well - Large
 - Public Supply Well - Small
 - Test Well
- Geotechnical Boreholes
- Geotechnical Reports Point
- Geotechnical Reports Line
- Permafrost Reports Point

Notes



Scale: 1: 2,500



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Date Printed: 08-Jan-2024

Depth (m)	Method	Soil Description	Sample Type	Sample Number	Moisture Content (%)	Moisture Content (%)			Elevation (m)
						Plastic Limit	Moisture Content	Liquid Limit	
0		GRAVEL AND SAND (FILL) - some silt to silty, damp, compact, greyish brown, fine to coarse gravel							
		CLAY (LACUSTRINE) - silty, even parallel laminae, moist, greyish brown		SA53	3.9				611
1				SA54	25.4				610
2	Solid stem auger	SILT (TILL) - sandy, clayey, trace gravel, moist, grey		SA55	22.6				609
				SA56	13.3				609
3		SAND - silty, some gravel, some clay, poorly graded, damp, greyish brown, fine to medium sand		SA57	8.9				608
4									608
4.3		END OF BOREHOLE (4.3 metres) water - dry upon completion							607
5									607



TETRA TECH

Contractor: Donjeck Drilling

Completion Depth: 4.3 m

Drilling Rig Type: Truck Mounted CME75

Start Date: 2016 August 26

Logged By: TM

Completion Date: 2016 August 26

Reviewed By: MP

Page 1 of 1

Associated Engineering Ltd.

Borehole No: BH16-13

Project: Haines Junction Sewer and Water Infrastructure

Project No: ENG.WARC03135-01

Location:

Ground Elev: 610 m

Haines Junction, Yukon

UTM: 363593 E; 6738009 N; Z 8

Depth (m)	Method	Soil Description	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit Moisture Content Liquid Limit			Elevation (m)
						20	40	80	
0		GRAVEL AND SAND (FILL) - silty, well graded, dry, compact, greyish brown, fine to coarse gravel		SA58	7.6				610
		SILT (TILL) - sandy, clayey, trace to some gravel, trace cobbles, moist, brownish grey		SA59	19.8				609
	Solid stem auger	- trace sand, trace gravel, damp		SA60	13.1				608
		- some sand		SA61	11.2				606
4.3		END OF BOREHOLE (4.3 metres) water - dry upon completion							605

DRAFT



TETRA TECH

Contractor: Donjeck Drilling

Completion Depth: 4.3 m

Drilling Rig Type: Truck Mounted CME75

Start Date: 2016 August 26

Logged By: TM

Completion Date: 2016 August 26

Reviewed By: MP

Page 1 of 1

GINT_10016-03

Site id	Project name	Location description	Elevation (m)	Hole depth (m)	Start date	End date	Client
GINT_10016-03	GEOTECHNICAL EVALUATION	WATER AND SEWER SYSTEM INSTALLATION, HAINES JUNCTION INDIAN VILLAGE	615.30	6.00	1989-03-31 00:00:00	1989-03-31 00:00:00	STANLEY ASSOCIATES ENGINEERING



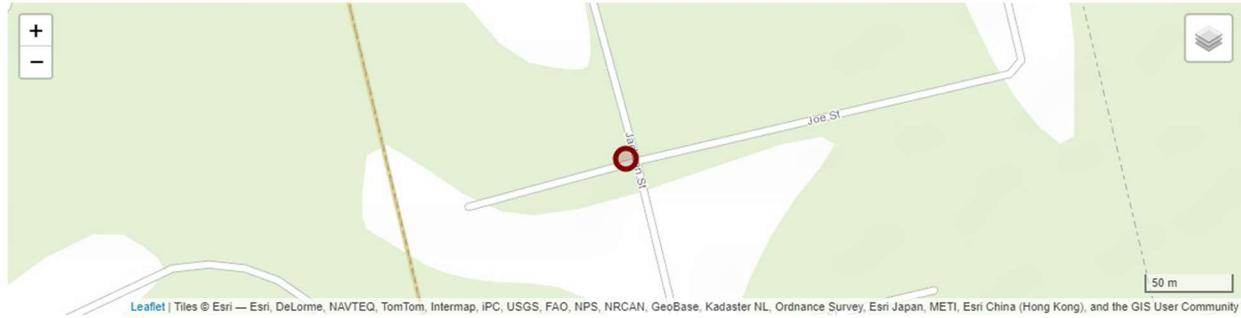
Top depth (m)	Bottom depth (m)	Boundary	Soil description
0.00	0.90	NA	ROAD GRAVEL-classified as SAND(SM)-some gravel, some silt, gravel is fine to medium grained, up to 25 mm in size, subangular, moist when thawed, dark brown
0.90	2.50	0	CLAY(MH)-silty, trace of sand, occasional piece of matrix supported gravel, wet to moist, soft to firm, high plastic, dark olive
2.50	4.50	NA	-seasonally frozen to approximately 2.5 m along roadway
4.50	6.00	NA	-drilling remains easy below seasonal frost line
6.00	6.10	0	NA
6.10	6.10	NA	END OF BOREHOLE 6.0 m

Sample

Sample number	Top depth (m)	Bottom depth (m)	Type	USC code
1	0.00	0.20	G	SM
2	1.30	1.50	G	MH
3	2.80	3.00	G	MH
4	4.30	4.50	G	MH
5	5.80	6.00	G	MH

GINT_10016-04

Site id	Project name	Location description	Elevation (m)	Hole depth (m)	Start date	End date	Client
GINT_10016-04	GEOTECHNICAL EVALUATION	WATER AND SEWER SYSTEM INSTALLATION, HAINES JUNCTION INDIAN VILLAGE	612.80	6.00	1989-03-31 00:00:00	1989-03-31 00:00:00	STANLEY ASSOCIATES ENGINEERING



Top depth (m)	Bottom depth (m)	Boundary	Soil description
0.00	0.60	NA	ROAD GRAVEL classified as SAND(SM)-some gravel, some silt, gravel is fine to medium grained, up to 25 mm in size, subangular, moist when thawed, dark brown
0.60	3.00	0	CLAY(MH)-silty, trace of sand, occasional piece of matrix supported gravel, wet, firm, high plastic, dark olive
3.00	5.80	NA	-seasonally frozen to approximately 3.0 m
5.80	6.00	0	SAND, SILT, and GRAVEL (TILL) (SM)- proportions vary throughout unit, moist, compact (est.), light olive
6.00	6.10	0	NA
6.10	6.10	NA	END OF BOREHOLE 6.0 m

Sample

Sample number	Top depth (m)	Bottom depth (m)	Type	USC code
1	0.00	0.20	G	SM
2	1.30	1.50	G	MH
3	2.80	3.00	G	MH
4	4.30	4.50	G	MH
5	5.80	6.00	G	SM

GINT_0722-202

Site id	Project name	Location description	Elevation (m)	Hole depth (m)	Start date	End date	Client
GINT_0722-202	ADMINISTRATION BUILDING	MARTHA STREET, HAINES JUNCTION, YUKON TERRITORY	30.31	9.44	1974-04-22 00:00:00	1974-04-22 00:00:00	GOVERNMENT OF YUKON



Top depth (m)	Bottom depth (m)	Boundary	Soil description	Comments
0.00	0.15	0	GRAVEL (FILL) - sandy	NA
0.15	3.20	0	CLAY - very silty, moist, firm to stiff, low plastic, medium brown, frozen to 1.4 metres	NA
3.20	3.96	0	SILT - sandy, sand is very fine grained, wet, dense, non plastic, medium brown	NA
3.96	5.33	0	SILT (TILL) - sandy, some fine to medium grained gravel and clay, dry, dense, medium brown	NA
5.33	5.79	NA	NA	- trace of cobbles
5.79	8.54	NA	NA	- reddish iron oxides
8.54	9.45	NA	SAND - sand lenses - fine grained, uniform, (50mm thick)	NA
9.45	9.45	0	END OF BOREHOLE (9.4 metres) slough - 6.7 metres at 0 hrs. water - 6.6 metres at 0 hrs.	NA

Sample

Top depth (m)	Bottom depth (m)	Type
1.52	1.98	D
1.98	2.44	S
3.51	3.96	S
4.57	5.03	D
5.03	5.49	S
6.10	6.55	S
9.14	9.45	S

GINT_0923-01

Site id	Project name	Location description	Hole depth (m)	Start date	End date	Client
GINT_0923-01	APARTMENT BUILDING	HAINES JUNCTION, YUKON, HAINES JUNCTION, YUKON	9.30	1974-09-04 00:00:00	1974-09-04 00:00:00	MILTON DEVELOPMENTS LTD.



Top depth (m)	Bottom depth (m)	Boundary	Soil description	Comments
0.00	0.30	NA	ORGANIC SILT AND TOPSOIL	NA
0.30	1.80	0	CLAY - sandy, silty, some gravel, hard, moist to dry, grey brown, fine rust-coloured specs	NA
1.80	4.57	NA	NA	- low plastic
4.57	7.77	NA	NA	- as above, moist, silty
7.77	9.30	NA	NA	- more 500 mm gravel
9.30	9.30	0	END OF BOREHOLE AT 9.3 m	NA

Sample

Sample number	Top depth (m)	Bottom depth (m)	Type
1	1.52	2.13	SPT
NA	1.52	1.98	S
NA	3.05	3.51	S
2	3.05	3.66	SPT
NA	4.57	5.03	S
3	4.57	5.18	SPT
NA	5.79	6.25	S
4	5.79	6.40	SPT
5	7.01	7.62	SPT
NA	7.62	8.08	S
NA	9.14	9.14	NA

BOREHOLE LOG	PROJECT: ██████████	BOREHOLE: MW07-1 1 of 1
Haines Junction Grader Station Haines Junction, Yukon FOR: YTG Highways and Public Works		DATE: 28 September 2007 LOGGED BY ██████████ GROUND ELEV m ASL

DEPTH (m)	STRATIGRAPHY	STRATIGRAPHIC DESCRIPTION	MONITOR DETAILS & NUMBER	SAMPLE						COMMENTS
				NUMBER	INTERVAL	TYPE	N VALUE	% WATER	% REC	
1		GRAVEL, brown, damp, medium dense, silty gravel, some fine sand.								Paste Cond (uS/cm) CI (mg/L)
1.8						GS				145
2		SILT, brown, moist, medium dense, silt with some gravel and fine sand.								
3						GS				141.1
4										
5						GS				135.5
5.5										
6		SAND, brown, moist, medium dense, sand with some silt and gravel.				GS				453 51
7.3										
7		SAND, brown, wet, dense, medium to coarse grained sand, gravelly with some silt.				GS				262 31
8										
8.8										
9		SAND, brown, wet, dense, fine sand, silty with some gravel.				GS				343 31
9.8										
10		SILT TILL, grey, dry, dense, silt till with occasional gravel.								
10.7		Borehole terminated at 10.7 m in silt till.				GS				147



Associated Engineering Ltd.

Borehole No: BH16-15

Project: Haines Junction Sewer and Water Infrastructure

Project No: ENG.WARC03135-01

Location:

Ground Elev: 609 m

Haines Junction, Yukon

UTM: 363307 E; 6737909 N; Z 8

Depth (m)	Method	Soil Description	Sample Type	Sample Number	Moisture Content (%)	Plastic Limit Moisture Content Liquid Limit			Elevation (m)
						20	40	80	
0		GRAVEL AND SAND (FILL) - some silt to silty, damp, compact, greyish brown, fine to coarse gravel		SA66	6.1				609
		CLAY (LACUSTRINE) - silty, even parallel laminae, moist, greyish brown		SA67	25.5				
1				SA68	24.2				608
		SILT (TILL) - sandy, clayey, trace gravel, damp, grey							
2	Solid stem auger	- some sand		SA69	10.7				607
3									606
4				SA70	10.9				605
		END OF BOREHOLE (4.3 metres) water - dry upon completion							
5									604



Contractor: Donjeck Drilling

Completion Depth: 4.3 m

Drilling Rig Type: Truck Mounted CME75

Start Date: 2016 August 26

Logged By: TM

Completion Date: 2016 August 26

Reviewed By: MP

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Associated Engineering Ltd.

Borehole No: BH16-14

Project: Haines Junction Sewer and Water Infrastructure

Project No: ENG.WARC03135-01

Location:

Ground Elev: 609.5 m

Haines Junction, Yukon

UTM: 363481 E; 6737922 N; Z 8

Depth (m)	Method	Soil Description	Sample Type	Sample Number	Moisture Content (%)	Plasticity Chart			Elevation (m)
						Plastic Limit	Moisture Content	Liquid Limit	
0		GRAVEL AND SAND (FILL) - silty, damp, compact, greyish brown, fine to coarse gravel, (75 mm thick) CLAY (LACUSTRINE) - silty, even parallel laminae, moist, greyish brown				20	40	60	609.5
0.5		SILT (TILL) - sandy, clayey, trace gravel, moist, brownish grey		SA62	21.2				609
1.0		- some sand, damp		SA63	16.8				608
2.0	Solid stem auger	- trace cobbles		SA64	11.1				607
3.0				SA65	10.6				606
4.3		END OF BOREHOLE (4.3 metres) water - dry upon completion							605

DRAFT



TETRA TECH

Contractor: Donjeck Drilling

Completion Depth: 4.3 m

Drilling Rig Type: Truck Mounted CME75

Start Date: 2016 August 26

Logged By: TM

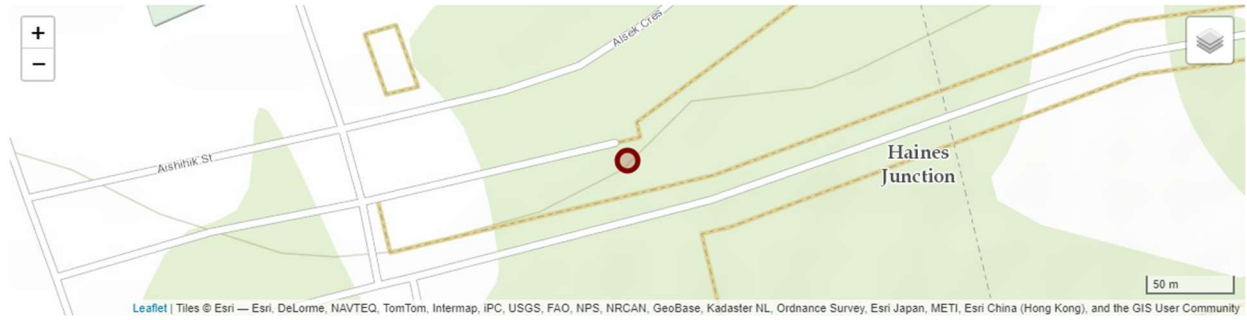
Completion Date: 2016 August 26

Reviewed By: MP

Page 1 of 1

GINT_0923-02

Site id	Project name	Location description	Hole depth (m)	Start date	End date	Client
GINT_0923-02	APARTMENT BUILDING	HAINES JUNCTION, YUKON, HAINES JUNCTION, YUKON	9.60	1974-09-04 00:00:00	1974-09-04 00:00:00	MILTON DEVELOPMENTS LTD.



Top depth (m)	Bottom depth (m)	Boundary	Soil description	Comments
0.00	0.15	NA	ORGANIC SILT AND TOPSOIL	NA
0.15	0.90	0	SILT - dry, non-plastic, powdery, grey- brown	NA
0.90	8.84	0	CLAY AND SILT(TILL) - some gravel and sand, low plastic, grey-brown	NA
8.84	9.60	0	NA	- sandy, moist, low plastic, very stiff
9.60	9.60	0	END OF BOREHOLE AT 9.6 m	NA

Sample

Sample number	Top depth (m)	Bottom depth (m)	Type
1	1.52	2.13	SPT
NA	1.52	1.98	S
2	3.05	3.66	SPT
NA	3.05	3.51	S
NA	6.10	6.55	S
3	6.10	6.71	SPT
NA	9.14	9.60	S
4	9.14	9.60	SPT

GINT_0923-03

Site id	Project name	Location description	Hole depth (m)	Start date	End date	Client
GINT_0923-03	APARTMENT BUILDING	HAINES JUNCTION, YUKON, HAINES JUNCTION, YUKON	9.40	1974-09-04 00:00:00	1974-09-04 00:00:00	MILTON DEVELOPMENTS LTD.



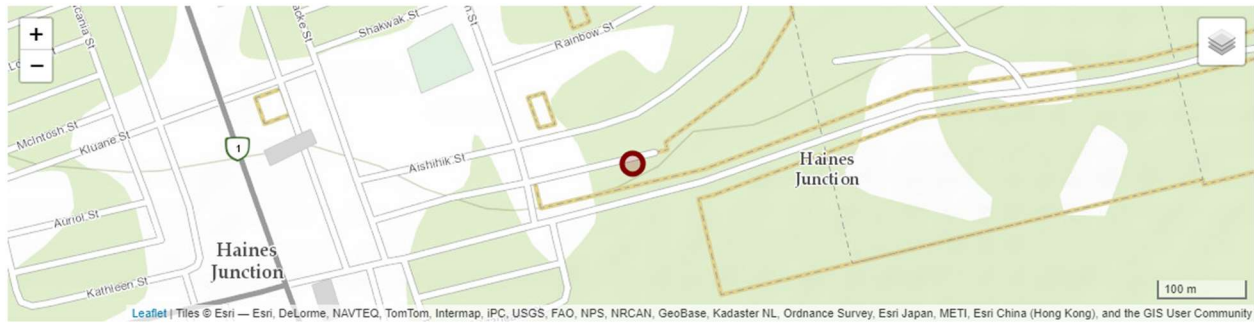
Top depth (m)	Bottom depth (m)	Boundary	Soil description
0.00	0.50	NA	ORGANIC SILT AND TOPSOIL
0.50	7.32	0	CLAY(TILL) - silty, sandy, some fine to medium gravel, low plastic, hard
7.32	7.93	0	GRAVEL - open
7.93	8.54	0	SAND - no recovery
8.54	9.45	0	GRAVEL - medium gravel, sandy(?)
9.45	9.45	0	END OF BOREHOLE AT 9.4 m

Sample

Sample number	Top depth (m)	Bottom depth (m)	Type
1	1.52	2.13	SPT
NA	1.52	1.98	S
NA	3.05	3.51	S
2	3.05	3.66	SPT
NA	4.57	5.03	S
3	4.57	5.18	SPT

GINT_0923-04

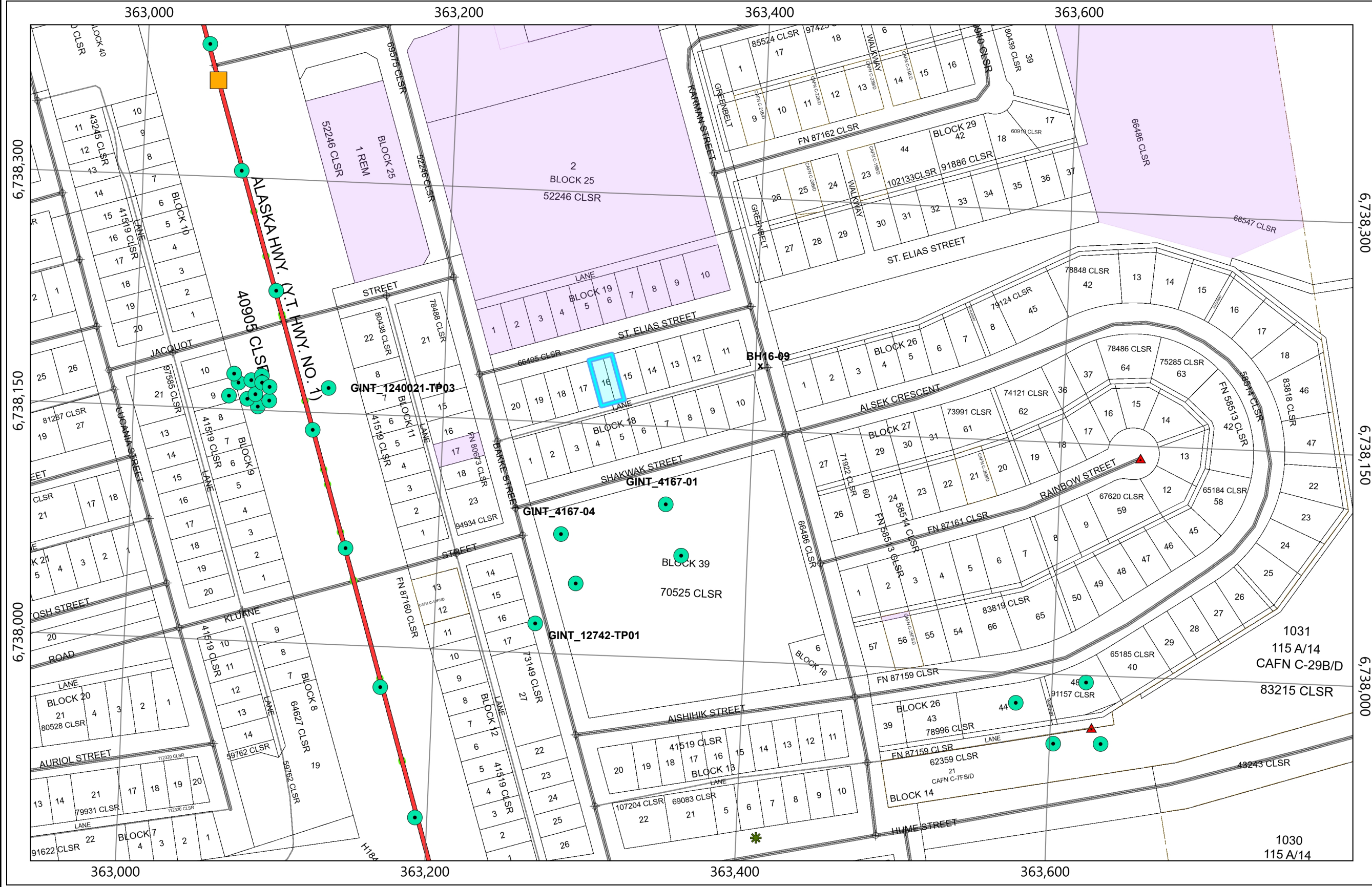
Site id	Project name	Location description	Hole depth (m)	Start date	End date	Client
GINT_0923-04	APARTMENT BUILDING	HAINES JUNCTION, YUKON, HAINES JUNCTION, YUKON	6.20	1974-09-05 00:00:00	1974-09-05 00:00:00	MILTON DEVELOPMENTS LTD.



Top depth (m)	Bottom depth (m)	Boundary	Soil description	Comments
0.00	0.50	NA	ORGANIC SILT AND TOPSOIL	NA
0.50	1.52	0	SILT - uniform dry, grey	NA
1.52	6.10	0	CLAY(TILL) - silty, sandy, some gravel, hard, low plastic, rust specs	NA
6.10	6.25	0	NA	- as above
6.25	6.25	0	END OF BOREHOLE AT 6.2 m	NA

Sample

Sample number	Top depth (m)	Bottom depth (m)	Type
NA	1.68	1.68	NA
NA	3.05	3.51	S
1	3.05	3.66	SPT
2	4.57	5.18	SPT
NA	4.57	5.03	S
NA	5.94	5.94	NA



Legend

Environment Act Permits

- Air Emissions (60)
- Commercial Dump (81)
- Land Treatment Facility (4202-24)
- Ministerial Authorization (4202-21)
- Ozone-Depleting Substances and Other Halocarbons (51)
- Pesticide Service (21)
- Pesticide Use (22)
- Pesticide Vendor (23)
- Risk Assessment (4202-25)
- Solid Waste Disposal Facility (80)
- Special Waste Facility (42)
- Special Waste Generator (41)

Water Wells

- Agricultural
- Commercial or Industrial Process
- Environmental Monitoring
- Geotechnical borehole
- Other/Unknown
- Private Domestic
- Public Supply Well - Large
- Public Supply Well - Small
- Test Well

Geotechnical Boreholes

- Geotechnical Reports Point
- Geotechnical Reports Line
- Permafrost Reports Point
- Permafrost Reports Polygon

Temperature Sensors

- Yes
- No
- Undetermined

Structural Culverts - 25k

- Drainage Culverts - 25k
- Gravel Pits - 25k

Community Road Names

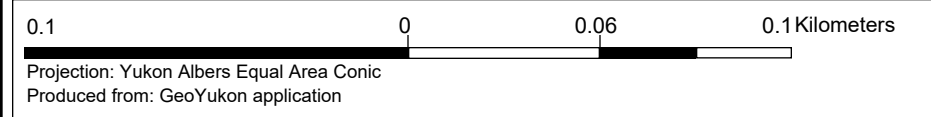
- Roads Blocked - 50k - Canvec
- Road Junctions - 50k - Canvec
- Dead End
- Ferry
- Intersection
- National/Territorial/Municipal Boundary

Yukon Road Network

- Expressway / Highway
- Arterial
- Collector
- Ramp
- Local / Street
- Local / Strata
- Local / Unknown
- Resource / Recreation
- Alleyway / Lane
- Service Lane
- Driveway
- Winter
- Unknown
- Trails - 50k - Canvec
- Trails - 50k - Supplementary
- Limited-use road
- Trail

Other Symbols

- YEC Power Distribution Lines
- YEC Power Lines



Scale: 1: 2,500



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Date Printed: 08-Jan-2024

Notes

Associated Engineering Ltd.

Borehole No: BH16-09

Project: Haines Junction Sewer and Water Infrastructure

Project No: ENG.WARC03135-01

Location:

Ground Elev: 611.6 m

Haines Junction, Yukon

UTM: 363401 E; 6738199 N; Z 8

Depth (m)	Method	Soil Description	Sample Type	Sample Number	Moisture Content (%)	Plastic Moisture Liquid			Elevation (m)	
						Limit	Content	Limit		
0						20	40	60	80	
0 - 0.8	Solid stem auger	GRAVEL (FILL) - sandy, silty, moist to wet, compact, greyish brown, fine to coarse gravel		SA41	20.4					611
0.8 - 3.0		CLAY (LACUSTRINE) - silty, even parallel laminae, moist, greyish brown, organic inclusions to 0.8 metres		SA42	23.9					610
3.0 - 3.3		SILT (TILL) - some sand, trace gravel, moist, grey		SA43	28.7					609
3.3 - 4.3		END OF BOREHOLE (4.3 metres) water - dry upon completion		SA44	17.3					608
4.3 - 5.0										607

DRAFT



TETRA TECH

Contractor: Donjeck Drilling

Completion Depth: 4.3 m

Drilling Rig Type: Truck Mounted CME75

Start Date: 2016 August 25

Logged By: TM

Completion Date: 2016 August 25

Reviewed By: MP

Page 1 of 1

GINT_4167-01

Site id	Project name	Location description	Hole depth (m)	Start date	End date
GINT_4167-01	PROPOSED ARENA - HAINES JUNCTION	HAINES JUNCTION, YUKON	5.70	1984-12-19 00:00:00	1984-12-19 00:00:00



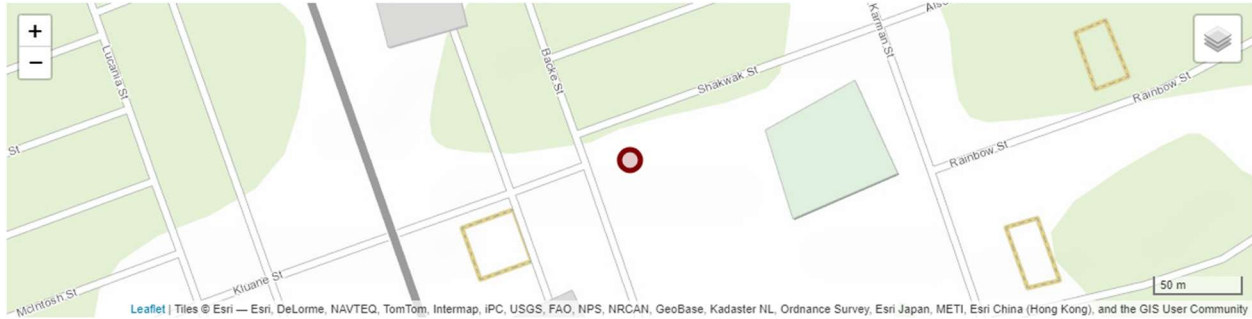
Top depth (m)	Bottom depth (m)	Boundary	Soil description
0.00	1.20	NA	SILT AND CLAY - damp to moist, interbedded olive brown - Seasonal Frost to 0.9 m
1.20	2.30	0	SILT(TILL) - sandy, some gravel, occasional cobbles and boulders, damp, dense, grey-brown
2.30	2.90	NA	- water noted on sampler
2.90	4.50	0	SAND(TILL) - some silt and gravel, occasional cobbles and boulders, dry to damp, very dense, grey-brown
4.50	5.70	NA	- occasional sand lenses
5.70	5.70	0	END OF BOREHOLE AT 5.7 m

Sample

Sample number	Top depth (m)	Bottom depth (m)	Type
1	0.80	1.00	G
2	2.00	2.60	SPT
3	2.90	3.10	SPT
4	3.60	4.10	SPT
5	4.10	4.25	G
6	5.20	5.70	SPT

GINT_4167-04

Site id	Project name	Location description	Hole depth (m)	Start date	End date
GINT_4167-04	PROPOSED ARENA - HAINES JUNCTION	HAINES JUNCTION, YUKON	5.70	1984-12-19 00:00:00	1984-12-19 00:00:00



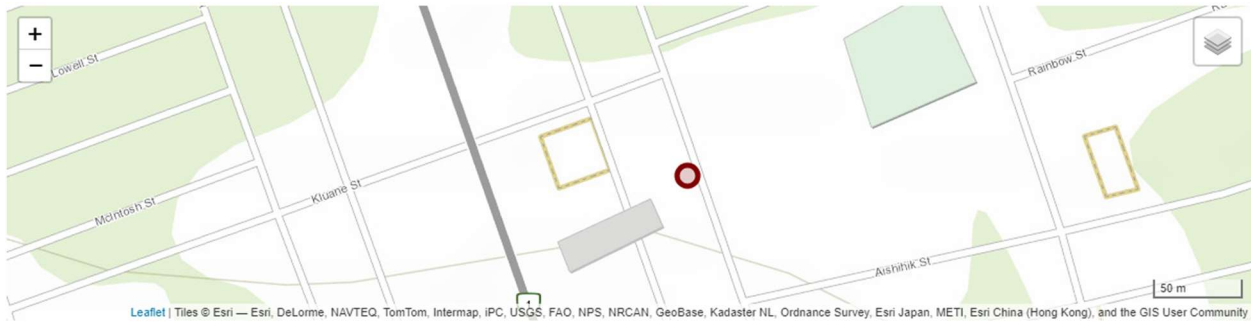
Top depth (m)	Bottom depth (m)	Boundary	Soil description
0.00	1.20	NA	SILT AND CLAY - damp, silty lenses and and grey - Seasonal Frost to 0.9 m laminations, mottled olive brown
1.20	2.60	0	SILT(TILL) - sandy, some gravel, occasional cobbles and boulders, damp, dense, grey-brown
2.60	3.20	NA	- occasional sand lenses
3.20	4.50	0	SAND(TILL) - some silt and gravel, occasional cobbles and boulders, dry to damp, very dense, grey-brown
4.50	5.70	NA	- occasional cobbles and boulders
5.70	5.70	0	END OF BOREHOLE AT 5.7 m

Sample

Sample number	Top depth (m)	Bottom depth (m)	Type
1	0.90	1.10	G
2	2.10	2.60	SPT
3	3.90	4.10	G
4	5.30	5.70	SPT

GINT_12742-TP01

Site id	Project name	Location description	Hole depth (m)	Start date	End date	Client
GINT_12742-TP01	Geotechnical Evaluation	New Frosty Freeze, Haines Junction, Yukon	4.20	1997-05-02 00:00:00	1997-05-02 00:00:00	Northern Cadworks



Top depth (m)	Bottom depth (m)	Boundary	Soil description
0.00	0.05	0	ORGANIC ROOT MAT
0.05	0.20	0	SILT & SAND - trace to some clay, finegrained uniform sand, low to medium.plasticity, stiff, moist, grey
0.20	0.30	NA	- Pocket Penetration = 2.8 TSF @ 0.2 m
0.30	1.00	NA	- seasonally frozen below 0.3 m
1.00	2.30	0	CLAY- some silt, trace of sand, fine tograined uniform, sand, low to medium.plasticity, grey, seasonal frozen
2.30	2.70	NA	- moist, very stiff, unfrozen below 2.3 m
2.70	3.00	NA	- Pocket Penetration = 6.0 TSF @ 2.5 m
3.00	3.80	NA	- Pocket Penetration = 5.2 TSF @ 3.0 m
3.80	4.20	NA	- becomes gravelly occasional cobbles, fine to medium grained below 3.8 m
4.20	4.20	0	END OF TESTPIT (4.2 m)- no water- no sloughing

Sample

Sample number	Top depth (m)	Bottom depth (m)	Type
1	0.30	0.50	G
2	1.00	1.20	G
3	2.00	2.20	G
4	3.00	3.20	G
5	4.00	4.20	G

GINT_1240021-TP03

Site id	Project name	Location description	Hole depth (m)	Start date	End date	Client
GINT_1240021-TP03	Phase 3 ESA	License of Occupation #531 Lands, Haines Junction, YT	4.80	2002-10-30 00:00:00	2002-10-30 00:00:00	Heka Enterprises



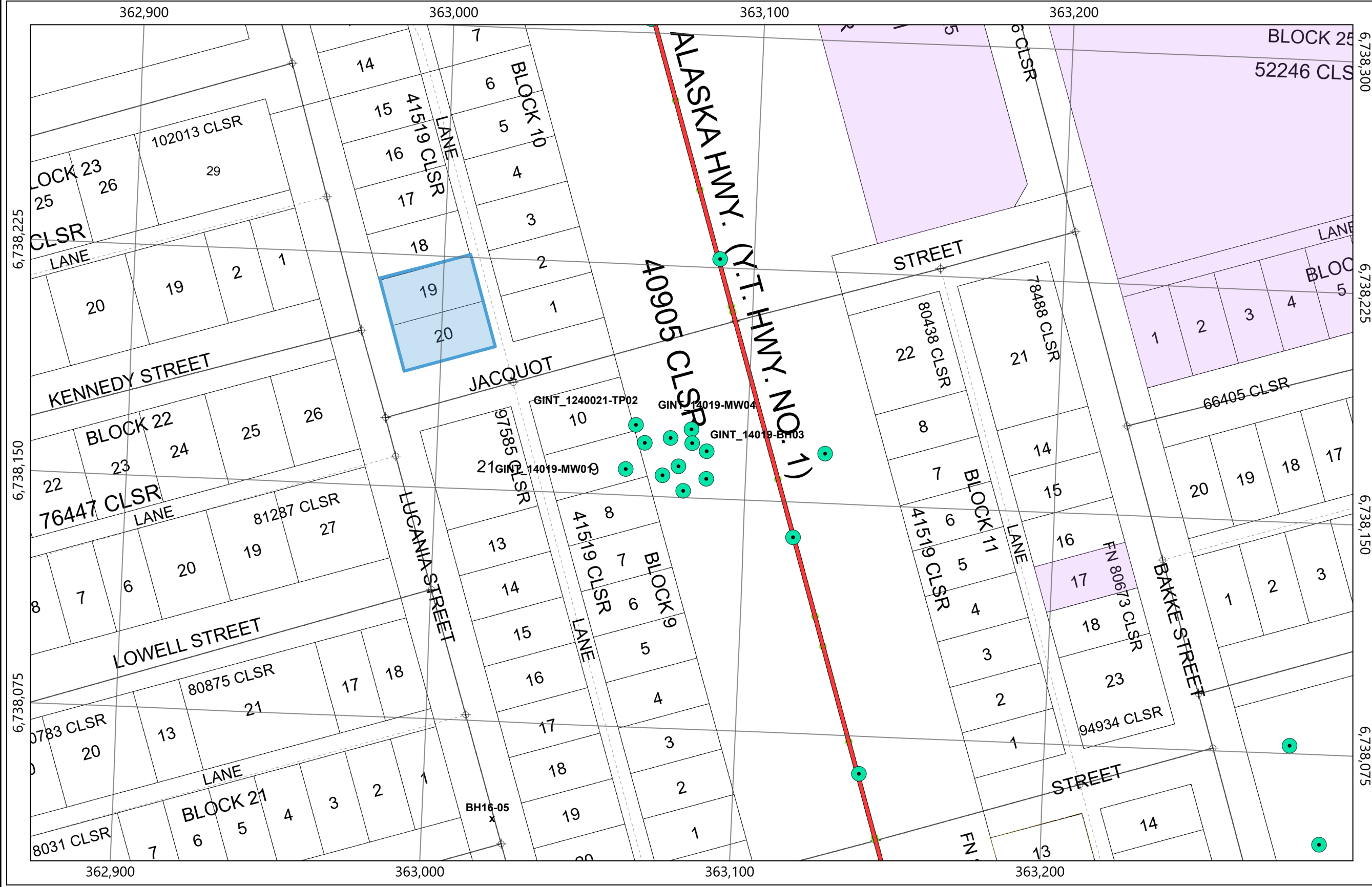
Top depth (m)	Bottom depth (m)	Boundary	Soil description
0.00	0.45	NA	GRAVEL (FILL) - some sand; damp; grey; no hydrocarbon odour- seasonal frost to 0.1 m
0.45	4.50	0	- organic horizon lineSILT (TILL) - some clay, trace of sand, trace of gravel; well graded; dense; moist; grey brown; strong hydrocarbon odour
4.50	4.80	NA	- cobble layer
4.80	4.80	0	END OF TESTPIT @ 4.8 mNo groundwater encountered.

Show Ice code descriptions

Top depth (m)	Bottom depth (m)
0.90	1.00
1.80	1.90
2.70	2.80
3.70	3.80
4.60	4.70

Sample

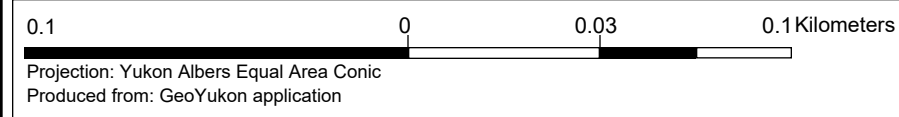
Top depth (m)	Bottom depth (m)	Type
0.90	1.00	G
1.80	1.90	G
2.70	2.80	G
3.70	3.80	G
4.60	4.70	G



Legend

- Water Wells**
 - Agricultural
 - Commercial or Industrial Process
 - Environmental Monitoring
 - Geotechnical borehole
 - Other/Unknown
 - Private Domestic
 - Public Supply Well - Large
 - Public Supply Well - Small
 - Test Well
- Geotechnical Boreholes** (Green circle)
- Geotechnical Reports Point** (Yellow square)
- Geotechnical Reports Line** (Red line)
- Permafrost Reports Point** (Blue square)

Notes



Scale: 1: 1,250



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Date Printed: 11-Jan-2024

Depth (m)	Method	Soil Description	Sample Type	Sample Number	Moisture Content (%)	Moisture Content (%)			Elevation (m)
						Plastic Limit	Moisture Content	Liquid Limit	
0						20	40	80	610
	Solid stem auger	GRAVEL AND SAND (FILL) - some silt to silty, damp, compact, greyish brown, fine to coarse sand		SA22	3.7				
		CLAY (LACUSTRINE) - silty, even parallel laminae, moist, dark brown and greyish brown, trace organic inclusions to 1.2 metres		SA23	16.5				609
		SILT (TILL) - sandy, clayey, trace gravel, damp, brownish grey		SA24	10.3				608
		SAND (TILL) - some silt, some clay, poorly graded, damp, dense, greyish brown, fine to medium sand		SA25	11.4				607
		- compact		SA26	4.6				606
4.3		END OF BOREHOLE (4.3 metres) water - dry upon completion							605



GINT_14019-BH03

Site id	Project name	Location description	Hole depth (m)	Start date	End date	Client
GINT_14019-BH03	LIMITED PHASE 1 & 11 E.S.A.	MOUNTAIN VIEW MOTOR INN & SERVICE STAT., HAINES JUNCTION, YT	7.60	1999-07-09 00:00:00	1999-07-09 00:00:00	HEKA ENTERPRISES



Top depth (m)	Bottom depth (m)	Boundary	Soil description
0.00	0.10	0	GRAVEL (FILL) - some sand, damp, grey, hydrocarbon odour
0.10	1.50	0	SILT (TILL) - sandy, some sand, damp, brown, strong hydrocarbon odour
1.50	2.00	NA	- seasonally frost from 1.5 m to 3.0 m
2.00	3.00	0	SILT - clayey, grey, hydrocarbon odour
3.00	5.50	0	CLAYEY SILT (TILL) - trace to some gravel, fine grained, dense, hydrocarbon odour
5.50	6.00	NA	- damp, light brown, slight hydrocarbon odour
6.00	7.00	NA	- trace to some gravel, fine grained, dense, hydrocarbon odour
7.00	7.60	NA	- damp, light brown, slight hydrocarbon odour
7.60	7.60	0	END OF BOREHOLE @ 7.6 m

Show Ice code descriptions

Top depth (m)	Bottom depth (m)
3.00	3.20

Sample

Sample number	Top depth (m)	Bottom depth (m)	Type
S6	0.00	0.20	G
18	1.00	1.20	G
19	2.00	2.20	G
20	3.00	3.20	G
21	4.00	4.20	G
22	5.00	5.20	G
23	6.00	6.20	G
24	7.00	7.20	G
S7	7.40	7.60	G

GINT_14019-MW04

Site id	Project name	Location description	Hole depth (m)	Start date	End date	Client
GINT_14019-MW04	LIMITED PHASE 1 & 11 ESA	MOUNTAIN VIEW MOTOR INN & SERVICE STAT., HAINES JUNCTION, YT	7.60	1999-07-09 00:00:00	1999-07-09 00:00:00	HEKA ENTERPRISES



Top depth (m)	Bottom depth (m)	Boundary	Soil description
0.00	0.15	0	GRAVEL (FILL) - some sand, damp, grey, strong gasoline smell from surface
0.15	1.50	0	SILT AND SAND (TILL) - trace to some gravel, damp, strong hydrocarbon odour
1.50	3.00	0	SILT - clayey, seasonal frost from 1.5 to 3.0 m, stiff low plasticity grey-brown, strong hydrocarbon odour
3.00	5.00	0	SILT AND SAND (TILL) - gravelly, fine grained sand, fine to medium grained gravel, damp, hydrocarbon odour
5.00	6.00	NA	- uniform, damp, greyish brown, strong hydrocarbon odour
6.00	7.00	NA	- trace to some gravel, fine grained, hydrocarbon odour
7.00	7.60	NA	- uniform, dry, greyish brown, hydrocarbon odour
7.60	7.60	0	END OF BOREHOLE @ 7.6 m

Show Ice code descriptions

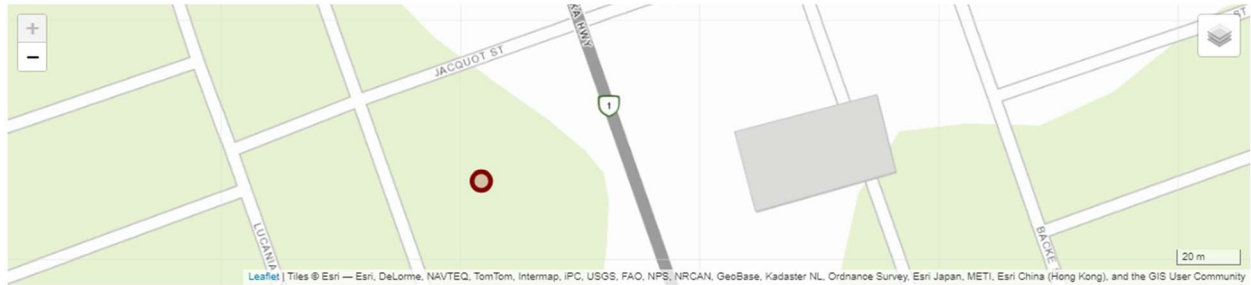
Top depth (m)	Bottom depth (m)
1.50	1.55
1.55	1.60
1.60	1.65

Sample

Sample number	Top depth (m)	Bottom depth (m)	Type
S8	1.00	1.20	G
NA	1.50	1.55	NA
NA	1.55	1.60	NA
NA	1.60	1.65	NA
25	2.00	2.20	G
26	3.00	3.20	G
27	4.00	4.20	G
28	5.00	5.20	G
29	6.00	6.20	G
30	7.00	7.20	G
S9	7.40	7.60	G

GINT_14019-MW01

Site id	Project name	Location description	Hole depth (m)	Start date	End date	Client
GINT_14019-MW01	LIMITED PHASE 1 & 11 E.S.A.	MOUNTAIN VIEW MOTOR INN & SERVICE STAT., HAINES JUNCTION, YT	12.20	1999-07-09 00:00:00	1999-07-09 00:00:00	HEKA ENTERPRISES



Top depth (m)	Bottom depth (m)	Boundary	Soil description
0.00	0.80	0	SAND & GRAVEL (FILL) - trace of silt, fine to medium grained, damp, grey and brown, no odour
0.80	2.00	0	CLAY - silty, stiff, low plasticity, grey-brown, slight hydrocarbon odour
2.00	4.60	NA	- frozen from 2.0 to 4.6 m
4.60	7.60	0	SILT (TILL) - trace to some sand, trace to some gravel, damp, very dense, brown, strong solvent like odour
7.60	10.00	NA	- trace to some sand, dry, dense, grey brown, solvent like odour
10.00	10.70	NA	- some gravel, damp, very dense, brown, hydrocarbon odour
10.70	12.20	NA	- trace to some sand, damp dense, grey brown, slight hydrocarbon odour
12.20	12.20	0	END OF BOREHOLE @ 12.2 m

Sample

Sample number	Top depth (m)	Bottom depth (m)	Type
1	1.00	1.20	G
NA	2.00	2.05	NA
2	2.00	2.20	G
NA	2.05	2.10	NA
NA	2.10	2.15	NA
3	3.00	3.20	G
4	3.40	3.60	G
S1	4.00	4.20	G
5	6.10	6.30	G
6	6.40	6.60	G
7	7.60	7.80	G
8	8.10	8.30	G
9	9.00	9.20	G
10	10.10	10.30	G
11	11.00	11.20	G
S2	12.20	12.40	G

Show Ice code descriptions

Top depth (m)	Bottom depth (m)
2.00	2.05
2.00	2.20
2.05	2.10
2.10	2.15

GINT_1240021-TP02

Site id	Project name	Location description	Hole depth (m)	Start date	End date	Client
GINT_1240021-TP02	Phase 3 ESA	License of Occupation #531 Lands, Haines Junction, YT	4.00	2002-10-30 00:00:00	2002-10-30 00:00:00	Heka Enterprises



Top depth (m)	Bottom depth (m)	Boundary	Soil description
0.00	2.00	NA	SILT (TILL) - some sand, trace of gravel; well graded; dense; moist; grey brown; mild hydrocarbon odour- seasonal frost to 0.1 m
2.00	4.00	0	SILT - clayey; non-plastic; firm; moist; no hydrocarbon odour
4.00	4.00	0	END OF TESTPIT @ 4.0 m No groundwater encountered.

Show Ice code descriptions

Top depth (m)	Bottom depth (m)
0.90	1.00
1.80	1.90
2.70	2.80
3.70	3.80

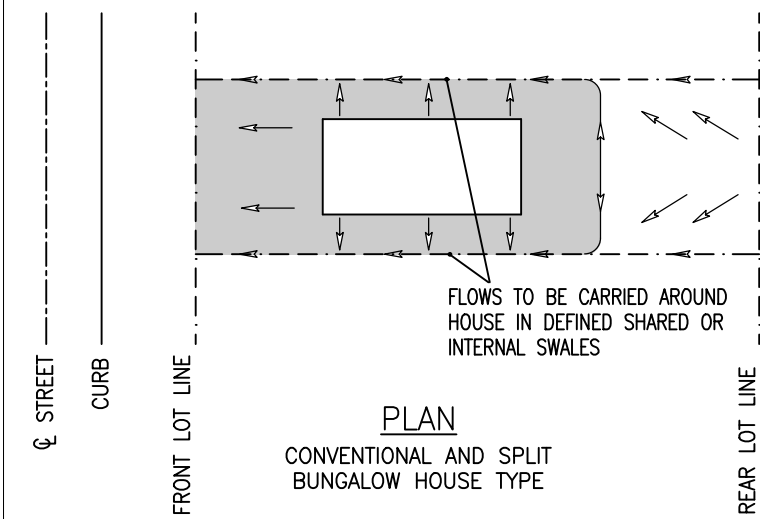
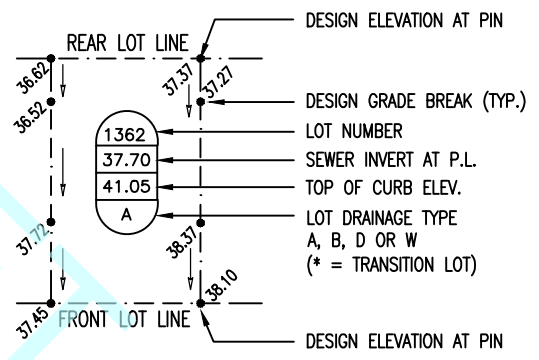
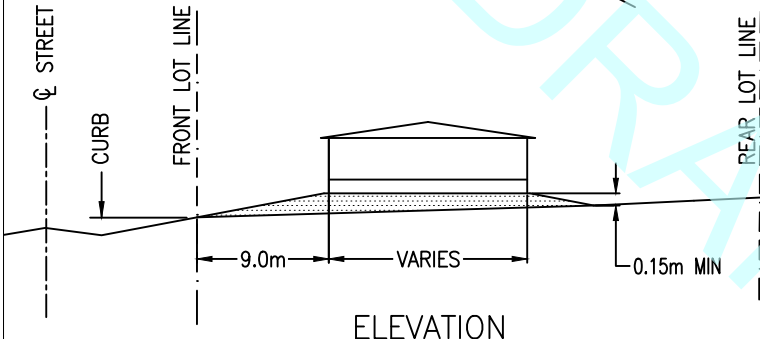
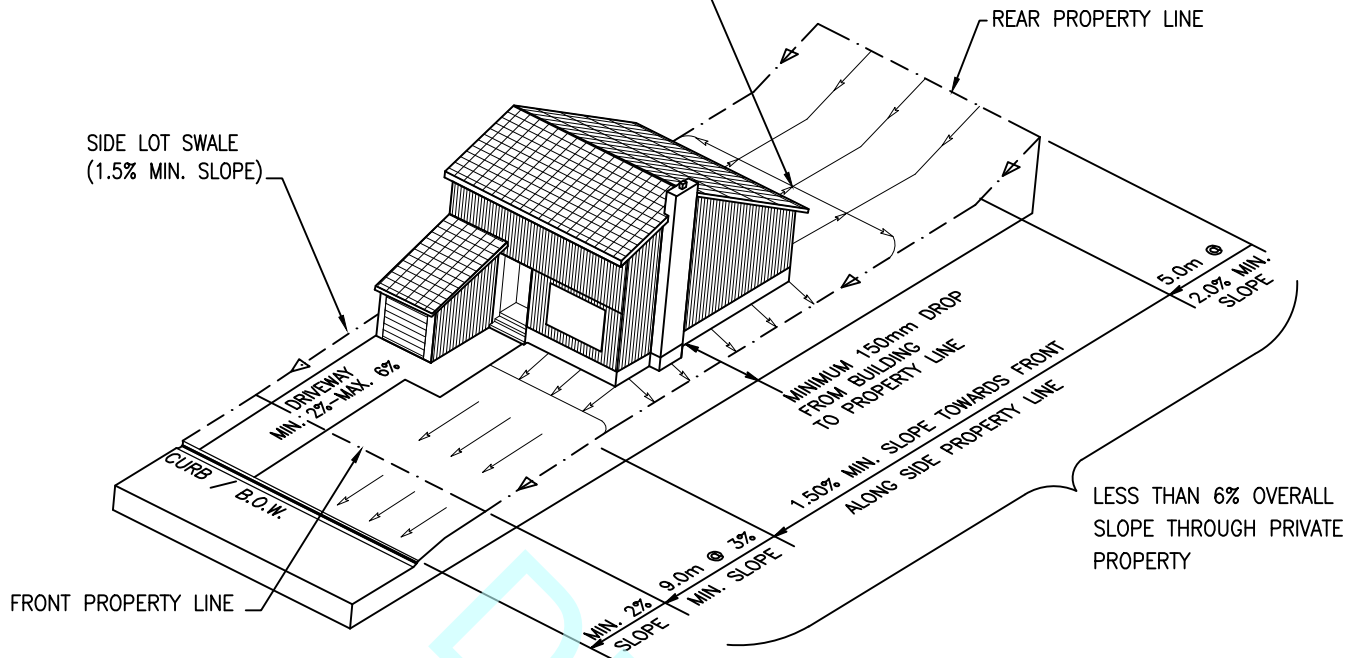
Sample

Top depth (m)	Bottom depth (m)	Type
0.90	1.00	G
1.80	1.90	G
2.70	2.80	G
3.70	3.80	G

APPENDIX C

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