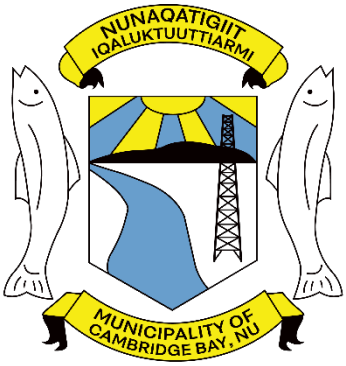

Hamlet of Cambridge Bay

DEVELOPMENT PROPOSAL CALL

Phase 1 Commercial Area Lot Disposal

ISSUE DATE:	March 26, 2021 at 4 pm local (Cambridge Bay) time
PROPOSALS DUE:	April 23, 2021, 4 pm local (Cambridge Bay) time

DEVELOPMENT PROPOSAL CALL
Parcels A1, A2, A7, A17, A18 & A19 as shown in Phase 1 Commercial Area Survey Sketch
HAMLET OF CAMBRIDGE BAY

1. THE DEVELOPMENT PROPOSAL CALL

The Hamlet is seeking proposals from applicants wishing to enter into an equity lease with the Hamlet for certain lots within the Phase 1 Commercial Area being the lands described as:

> Parcels A1, A2, A7, A17, A18 & A19 as shown in the Phase 1 Commercial Area Survey Sketch

(also referred to as "the Properties" or "the Lots"). The equity lease shall be for a term of 30 years, with a right of renewal for an additional term of 30 years.

All procedures for this Proposal Call are outlined in the Sections to follow.

2. ADMINISTRATION

The Proposal Call will be administered by the Chief Administrative Officer.

3. SITE DESCRIPTION & ZONING

Lots are located in the Phase 1 Commercial Area (Appendix 'A'). The area contains a number of surveyed lots and unsurveyed lands. A Survey Sketch was approved by the Government of Nunavut in September 2020 (see Appendix 'H'). Lot areas in the Approved Survey Sketch are approximate. The area will be resurveyed as per the Approved Survey Sketch in spring 2021. The lot areas on the Final Registered Survey Plan may contain minor lot area adjustments. Note that due to vehicle access restrictions, **Lot A2 may only be included in a Proposal that also includes Lot A1.**

Proposals will be considered based on permitted and conditional uses identified in the "Core Area" Zone as per Zoning Bylaw No. 289. Lots A18 and A19 are currently subject to Community Plan and Zoning Bylaw amendments to rezone and redesignate the lands from "Commercial & Community" to "Core Area". The "Core Area" Zone permits a broader range of uses, including "Hotel". Third reading of the amending bylaws is anticipated in the Fall of 2021. Lots A1, A2, A7 and A17 are currently designated and zoned as "Core Area".

4. ELIGIBILITY

The follow eligibility requirements must be met to submit a proposal:

1. An applicant(s) cannot have any outstanding debts to the Hamlet at the closing date for this proposal;
2. An applicant(s) must be in good standing with the Legal Registry, Department of Justice.

5. PROCEDURE

The Applicant should consider the following requirements in submitting a proposal for consideration under this Proposal Call:

1. Proposal may include development for one or more contiguous lots **with the exception of Lot A2, which may only be leased at this time with Lot A1 due to restricted access**.

2. **Separate proposals must be submitted if the applicant wishes to lease more than one Lot that are not contiguous or consist of separate developments on adjacent lots.**

3. Each proposal shall include the following:
    a. a completed **Land Application** (attached as Appendix 'B') along with a $600.00 non-refundable Application Fee;
    b. a completed **Proposal Form** (attached as Appendix 'C');
    c. Preliminary scaled sketches or drawings of proposed development including, at minimum:
        i. **Site Plan** with building footprint (dimensioned), parking lot with number of parking spaces, drive aisles and access driveway(s);
        ii. **Building Floor Plan(s)**with estimated total floor area (m^2) and/or number of dwellings units;
        iii. **Front Building Elevation.**
4. Proposals shall be submitted to the Hamlet of Cambridge Bay by email: mlimousin@cambridgebay.ca with the subject line "Call for Proposals – Phase 1 Commercial Area" by **April 23, 2021 at 4 pm local time**. Proposal packages greater than 5MB in size should be split into multiple e-mail submissions. In lieu of an electronic submission, a hard copy may be delivered to the Hamlet Offices at 23 Kamotik Road, Attention: Marla Limousin, CAO.
5. Any questions regarding the submission requirements should be sent to: michelle@northernfutures.ca by **4 pm on April 20, 2021**.

6. Members of the Lands Committee and Hamlet Administration will review each proposal against the "Proposal Call Evaluation Criteria*"* in Section 8 and each proposal will be given a point score. The maximum score is 100 points.
7. Proposals not achieving a minimum score of 60 points may be eliminated at the Hamlet's discretion.
8. Late or incomplete proposal packages will not be considered.
9. To ensure access to a limited number of available lots, the Hamlet reserves the right to limit the number of lots awarded to an applicant to three (3) lots. After the Proposal Call process is complete, the Hamlet may choose to issue another Proposal Call at a later date for any unleased lots.

6. SUPPORTING DOCUMENTATION PROVIDED BY THE HAMLET

The Hamlet agrees to make available the following materials:

1. Equity Lease Template (attached to this document as Appendix 'F').
2. Geotechnical Investigation (attached to this document as Appendix 'G').
3. Approved Survey Sketch (attached to this document as Appendix 'H')

7. LOT PRICE

The lots will be leased for the following lot prices:

Lot	Frontage	Lot Area	$/m^2	Lot price
A1	36 m	2,171 m^2	$31.04	$67,379
A2	14 m	2,142 m^2	$31.04	$66,488
A7	29 m	1,830 m^2	$31.04	$56,811
A17	41m	4,095 m^2	$31.04	$127,109
A18	60 m	3,600 m^2	$31.04	$111,744
A19	80 m	3,536 m^2	$31.04	$109,757

8. PROPOSAL EVALUATION CRITERIA

1. **Conformity with the Cambridge Bay Zoning By-law No. 289** including: (30 points)
    a. Core Area Zone requirements including permitted and conditionally permitted uses, building setbacks, building height, etc. in Sections 6.4 to 6.6 (Appendix D);
    b. Parking and access regulations in Sections 5.17 – 5.19 (Appendix D);
    c. Proposed new parking regulations subject to approval by Council (Appendix D);
    d. All other relevant policies and regulations related to the proposed development.

2. **Achieving a desirable density of development** for the size and conditions of the lot, with consideration for the total floor area of a non-residential development and unit count for the residential component of a mixed-use building. Site and Building Plans are required as noted in Section 5 – Procedures, 3.c. (30 points)

3. **Consideration of the goals and objectives of Cambridge Bay Community Plan By-law No. 288** including: (40 points) (see Appendix 'E')
    a. achieving a high quality of building design and site layout (for example, unique architectural design, quality materials, pedestrian walkways, parking layout and access design);
    b. creative or dynamic building and site elements including public art, façade or exterior design elements or other elements related to the cultural heritage of Cambridge Bay.
    c. consideration of climatic factors in building and site design with a focus on snow drifting, which can be considerable in this area;
    d. innovative building technologies and environmentally-friendly materials such as sustainable building materials, energy efficiency measures or building construction solutions;
    e. economic development opportunities including training and employment opportunities generated by the development and final use.

9. CONDITIONS AND REQUIREMENTS

1) The successful applicant will be invited to enter into a land lease for the Lot(s) to which the proposal applies. The lease shall be substantially in the form of the Hamlet's Equity Lease Template, attached hereto as Appendix 'F'.
2) Lots must first be surveyed and titled to the Hamlet prior to leasing, a process that will take approximately 6 months from the date of the legal survey in spring 2021. Once land has been titled to the Hamlet, leases may be issued. Once the lease is provided to the successful applicant, the applicant has 30 days to sign the lease and pay by cash, certified cheque, or a money order a deposit equaling 15% of the Lot Price. If payment is not received within the allotted time, the successful applicant relinquishes any and all first rights to the lot. The Hamlet may choose to issue another Proposal Call for new proposals.
3) The Lot Price, minus the 15% deposit and the land application fee, may be paid in instalments at a rate prescribed in the *Land Administration By-law* (By-law No. 271) which is a 3-year term for businesses and a 5-year term for individuals.
4) The term for all leases is 30 years with annual payments of one dollar ($1.00) once the lease is paid in full.
5) As per the requirements of the *Land Administration By-law*, the municipality may cancel a lease if the lessee is deemed to be non-compliant with the terms and conditions of the lease.

6) Lots are leased on an "AS IS" basis. It is the responsibility of the Lessee to check the zoning of the land and location of services. The Hamlet accepts no responsibility for soil conditions or the location of bedrock on the lots.

7) Lots A18 and A19 are currently under consideration for a rezoning and redesignation to "Core Area". The Hamlet of Cambridge Bay does not guarantee the approval or timing of Zoning Bylaw and Community Plan amendments for these Lots.

8) It will be the responsibility of the successful applicant to acquire all required approvals and permits, including a Development Permit and Building Permit, prior to commencing any construction. Nothing herein waives or reduces the obligations of the successful applicant to comply with all applicable laws and by-laws in development of the Property.

9) Construction of any proposed development must commence within 12 months (1 year) of the execution of the equity lease and shall be completed within a 24-months of the effective date of the lease. A twelve-month extension to construction timelines may be requested and subject to the approval of Council.

10) The Hamlet shall not be obligated to accept any of the proposals submitted and may choose to cancel the Proposal Call at any time.

10. DISCLAIMER

By submitting a Proposal including a Land Application and Proposal Form, the applicant confirms that he/she has read and understands the content and requirements of the Proposal Call including the Conditions and Requirements noted in Section 9.

Despite the preparation and submission of a Proposal by an applicant, the Hamlet of Cambridge Bay reserves the right not to lease the Property even if all the criteria in this Proposal Call are met. The applicant waives all and any claims against the Hamlet of Cambridge Bay relating to and/or arising from this Call for Proposal in the event the Hamlet decides not to enter into an equity lease with the applicant.

Submission of a proposal signals acceptance of the terms of this Proposal Call.

APPENDIX 'A' – SITE CONTEXT

APPENDIX ‘B’ – LAND APPLICATION FORM

OFFICE USE ONLY

Land Application #: _____

Land Application Fee: $ 600.00

LAND APPLICATION

I hereby make application for land under the provisions of the *Land Administration By-law No.271*.

A. LOT LOCATION

Site Address: _____
Lot No.: _____ Block No.: _____ Plan No.: _____
Sketch No.: _____

B. APPLICANT INFORMATION *(this will be the name a Lease falls under)*

Applicant (name or company name): _____
Age 19+? Yes:_____ No:_____
Mailing Address (including community name & postal code): _____
e-mail address: _____
Work Number: _____
Home / Mobile number: _____

Co-Applicant (if applicable): _____
Age 19+? Yes:_____ No:_____
Mailing Address (including community name & postal code): _____
e-mail address: _____
Work Number: _____
Home / Mobile number: _____

Contact Person for Applicant: (If the Applicant is a business, the section is required)

Name (first name, last name): _____
Age 19+? Yes:_____ No:_____
Company position: _____
Mailing Address (including community name & postal code): _____
e-mail address: _____
Work Number: _____
Home / Mobile number: _____

C. DESCRIPTION OF PROPERTY

Current Use: _____

Current Zoning: _____

Any existing improvements on the land? YES_____NO_____

If YES:

- Describe the existing improvements on the land: _____
- Identify the owner of the existing improvements: _____
- Identify the value of existing improvements: $_____
- Will the improvements be removed from the land? Yes_____ No_____
- If improvements are to remain, attach proof of ownership to complete this application. Attached:_____

D. DESCRIPTION OF PROPOSED USE OF LAND

Proposed land use: (circle the use or uses proposed)

Residential Commercial Community Use Industrial

Briefly describe the proposed improvements to be constructed on the land:

_____

_____

Building height (storeys): _____

Estimated Value of Improvements: $_____

Estimated timeline for construction of improvements (# of months): _____

E. SUBMISSION REQUIREMENTS

Only complete applications will be reviewed. A complete application includes the following:

☐ 1) **Application Fee** ($600.00)

☐ 2) **Site Plan**, showing the following minimum information:

a. Scaled drawing in metric units;
b. Legal description of lot and north arrow noted on the Plan;
c. All legal dimensions of lot noted (to download survey plans, go to: https://clss.nrcan-rncan.gc.ca/map-carte-eng.php);
d. Location of proposed and/or existing buildings;
e. Building setbacks from lot lines noted;
f. Demonstration that required parking under the Zoning By-law can be accommodated on the lot;
g. Access driveway location.

F. TERMS & CONDITIONS

If there are buildings and other improvements proposed by the applicant, he/she must, on his/her own responsibility, submit to the GN Office of the Chief Building Official and GN Fire Marshal's Office the required documentation to secure a Building Permit or other approvals as required. It will all be the applicant's responsibility to furnish the same information to the Municipality or Public Health authorities if deemed necessary by them on which to base their recommendation.

The submission of this application and payment of the deposit do not in themselves convey any right to land.

If the application is refused, the deposit will not be refunded. If a lease or agreement is approved but not executed by the applicant, the deposit is forfeited.

All rights to land exclude the following:

a) All mines and minerals whether solid, liquid or gaseous which may be found to exist within, upon or under the land together with the full powers to work the same and for that purpose to enter upon, use and occupy the land or so much thereof and to such an extent as may be necessary for the effectual working and extracting of the said materials;
b) The rights of the recorded holders of mineral claims and any other claims or permits affecting the land;
c) The right to enter upon, work and remove any rock outcrop required for public purposes;
d) Such right or rights-of-way and entry as me be required under the regulations in force in connection with construction, maintenance and use of works for conveyance of water for use in mining operations; and
e) The right to enter upon the land for the purpose of installing and maintaining any public utility.

G. ACKNOWLEDGEMENT & DECLARATION THAT INFORMATION IS ACCURATE

Please Initial:

The undersigned understand the failure to comply with any terms and conditions of the lease will be grounds for cancellation of the said instrument. _____

The undersigned certify that I/We have read and understood the terms conditions listed on this form and am/are in complete agreement with them. _____

The undersigned understand that the information that I/We have given in this application is true and correct. _____

The construction of buildings and improvements will conform to Municipal By-laws and Territorial legislation. _____

Date: _____ Signature of Applicant: _____

Name of applicant: _____

Date: _____ Signature of Co-Applicant _____

Name of Co-Applicant: _____

APPENDIX 'C'-

DEVELOPMENT PROPOSAL CALL FORM

Parcels A1, A2, A7, A17, A18 & A19 as shown in the Phase 1 Commercial Area Survey Sketch

I confirm that I have read and fully understand the content and requirements of the Proposal Call, including Conditions and Requirements in Section 9.

I express my interest in the following lots and am aware of the Lot Prices Non-contiguous lots or separate buildings on adjacent lots require separate applications. *Note: limit 3 Lots per applicant.*

Lot	Price
Lot ___	$
Lot ___	$
Lot ___	$

1. Conformity with Zoning By-law (30 points)

a. Brief Description of Proposed Use(s) of the Property:

_____

_____

_____

b. Confirm that all proposed use(s) are in alignment with the Zoning Bylaw (*if development includes more than one use based on Zoning categories, identify all uses separately and check boxes that apply below*):

Proposed use: _____

☐ Permitted Use ☐ Conditional Use ☐ Meets Parking Requirements (__# of spaces)

Proposed use: _____

☐ Permitted Use ☐ Conditional Use ☐ Meets Parking Requirements (__# of spaces)

Proposed use: _____

☐ Permitted Use ☐ Conditional Use ☐ Meets Parking Requirements (__# of spaces)

2. Density of Development (30 points)

a. Total Gross Floor Area of the building _____ (m^2)

b. Commercial Floor Area _____ (m^2)

c. Institutional Floor Area _____ (m^2)

d. Total Number of dwelling units _____

3. Goals & objectives of the Community Plan (40 points)

Please include a response to each of the 5 elements described below (use space below or attach on a separate page):

a. Explain elements contributing to high quality building and/or site design including unique architectural design, quality materials, pedestrian walkways, site layout or access:

_____

_____

_____

_____

_____

b. Explain elements that contribute to creative or dynamic building and site design including public art, façade design or other elements related to the cultural heritage of Cambridge Bay.

_____

_____

_____

_____

c. Explain how climatic issues have been considered in building and/or site design including snow drifting, which can be considerable in this area:

_____

_____

_____

_____

_____

d. Explain how the design and site layout of the building will include any innovative building technologies and environmentally-friendly materials:

_____

_____

_____

_____

_____

e. Explain any economic development opportunities including training and employment opportunities during development and final use:

_____

_____

_____

_____

This Proposal Form must be accompanied by a completed Land Application form and a cheque or money order for $600 payable to the Hamlet of Cambridge Bay (or a receipt in the case that payment has been made by credit card) for a non-refundable Application fee as per the Land Administration By-law.

I have read and fully understand the Proposal Call and requirements. I hereby submit a proposal.

_____
Company Name

_____ _____
Print name (authorized signatory) Signature

_____Date

APPENDIX 'D' – ZONING BYLAW NO. 289 REQUIREMENTS

CORE AREA

6.4 Permitted Uses

Commercial Recreation & Entertainment
Commercial Use
Community Centre
Craft Studio
Day Care Centre
Educational Facility
Elders' Facility
Government Service
Group Home
Health Care Facility
Home Occupation
Hotel
Park
Parking Lot
Place of Worship
Restaurant
Retail Store
Service and Repair Shop
Utility Installation

6.5 Conditional Uses

Dwelling Unit(s), in a non-residential building provided that no dwelling units are located on the ground floor

6.6 Zone Requirements

(a) The following provisions applies to all development in the Commercial Zone:

Setbacks (minimum)

Front = 6 m

Rear = 6 m

Side (Exterior) = 4 m

Side (Interior) =4.5 m, or as required by the Fire Marshal

Building Height (maximum)

11 m

(b) A covered or screened area for garbage and trade waste is required.

ZONING BYLAW - PARKING REQUIREMENTS, SECTIONS 5.17 – 5.19

PARKING REQUIREMENTS

5.17 Parking shall be required for any use, building or structure in accordance with the following standards and such parking shall be accessory to a permitted use and located on the same lot as the use:

(a) Residential – 1 parking space per dwelling unit
(b) Residential in a non-Residential building – 1 parking space per 2 dwelling units
(c) Commercial Use – 1 space per 50 m² of gross floor area
(d) Community Use – 1 space per 75 m² of gross floor area
(e) Industrial – 1 space for every 2 people working on site
(f) School – 1 space for every 3 people working on site
(g) Open Space – Discretion of Development Officer or Council.
(h) Other uses not specifically listed shall be determined by the Development Officer in considering similar types of uses and the anticipated parking demands of the proposed development.

5.18 Each required parking space shall be 6.0m in length and 2.7m wide.

5.19 For a required parking area of more than 6 spaces, at least one space for every 25 spaces must be a designated space for persons with disabilities. A space for persons with disabilities shall be 6.0 m in length and 3.7 m wide.

ZONING BYLAW - PARKING REQUIREMENTS (PROPOSED)

The following changes are proposed to Zoning Bylaw, Sections 5.17 – 5.19. Consult with Planning & Lands Administrator regarding the status of proposed parking requirements.

Number of parking spaces - Replace Section 5.15(a) and (b) with the following:

- Single-unit dwelling = 1 space per dwelling unit
- Semi-detached dwelling = 1 space per dwelling unit
- Multi-unit dwelling = 1 per dwelling unit + 1 visitor space per 5 dwelling units
- Dwelling units in a non-residential building = 1 space per 2 dwelling units + 1 visitor space per 5 dwelling units
- Secondary suite dwelling = 0 space per dwelling unit

Accessible parking spaces - Add a new Section 5.16 requiring that for developments that have a total parking requirement of 7 spaces or more, that 1 space for every 25 spaces be dimensioned and designated as an accessible space.

Parking space & aisle width dimensions – Replace Section 5.16 with a new Section 5.17 that identifies the minimum dimensions (length & width) for all types of parking spaces including perpendicular, parallel, angled and accessible. Introduce minimum aisle width requirements to ensure safe and functional movement of vehicles on-site.

Back-out parking spaces – Add new Sections 5.18 and 5.19 that limit the number of back-out spaces on a lot to 3 spaces and that require any development that has a parking requirement of 4 or more spaces to provide all spaces in a dedicated parking area. These provisions are intended to improve safety for pedestrians and to limit the length of culverts to protect drainage systems. Section 5.19 contains the requirement to install boulders or bollards to restrict vehicle movements to the designated parking and drive aisle areas only.

- **Driveway widths** – Add new Section 5.20 to require a minimum width of 3 metres for one traffic lane to a parking area and 6.7 metres for two traffic lanes to a parking area. Parking areas of 6 spaces or less require only one traffic lane for access.
- **Access driveway to lot** – Add new Section 5.21 that limits the width of the access driveway from the road to the lot to 7.5 metres in Residential Zones and 9.0 metres in non-Residential Zones. This will help reduce culvert length and improve walking safety in residential areas.
- **Culvert length & diameter** – Add new Section 5.22 that restricts culvert lengths to 11 metres and with a minimum diameter of 45cm. The regulation gives the Development Officer the discretion to allow culvert lengths up to 14 metres. This will restrict longer culverts that often lead to freeze up and flooding in the spring.

APPENDIX 'E' – CORE AREA POLICIES

5.1.1 'Core Area' Objectives

The **Objectives** of the *Core Area* land use designation are:

(a) To ensure that Cambridge Bay strengthens its role as a regional centre with a diverse mix of uses accommodating commercial, cultural, educational, health and social activities.

(b) To encourage new development in the *Core Area*.

(c) To encourage the mixing of uses within buildings, where appropriate.

(d) To create active and interesting streetscapes, with particular emphasis on the beautification of Omingmak Street.

(e) To maintain the *Core Area* as the focus of retail and community uses.

(f) To ensure a safe and convenient pedestrian environment that encourages walking in the *Core Area*.

(g) To beautify the *Core Area* to create an attractive heart of Cambridge Bay.

(h) To densify and concentrate commercial, civic and community activities in a more compact form to reduce the amount of new land needed, to create a walkable community core, and to make the provision of municipal piped services feasible in the future.

5.1.2 'Core Area' Policies

The **Policies** of the *Core Area* land use designation are:

Permitted & Conditional Uses

(a) Permitted uses include general commercial uses, office and retail uses, institutional and community uses, and parks and recreation uses.

(b) Major community uses that service the entire community will be encouraged to locate in the *Core Area*. These uses may include government offices and major social, educational and cultural facilities.

(c) Residential uses are conditionally permitted within the *Core Area*, provided that the residential uses form part of a non-residential building.

(d) Despite the above Policy (c), special purpose housing, such as Elder's housing, group homes or other types of residential care facilities can be stand-alone uses and not need to form part of a non-residential building, subject to any requirements in the Zoning By-law.

Core Area Development

(e) Council shall encourage and consider providing incentives for the demolition or relocation of old or dilapidated buildings in order to allow redevelopment of key sites in the *Core Area*.

(f) Council shall encourage and facilitate the relocation of the tank farm outside the *Core Area* and revitalize the waterfront area.

(g) A small pond in the *Core Area* designation is proposed to be filled to provide more land for development. The feasibility of filling the pond including any required geotechnical or environmental studies should be undertaken and the necessary approvals secured to acquire the land as Municipal Lands.

Landscaping & Urban Design

(h) The *Core Area* shall have high quality public spaces and a higher standard of architectural design to reflect a unique and attractive Cambridge Bay.

(i) Prepare a Beautification / Streetscaping Plan that seeks to create a vibrant, safe and attractive *Core Area* for visitors and locals to enjoy. The Plan should reflect the natural and cultural heritage of the community and address

elements such as building design and site layout guidelines, derelict building removal, waterfront access, walkway system, public art, seating, parking, native plantings, lighting and banners. The Plan shall include a detailed list of actions and phasing of improvements.

(j) New developments in the *Core Area* will be required to respect the policies and strategies of the Beautification / Streetscaping Plan, as adopted by Council. Financial contributions to support the preparation of the Plan, and/or landscaping works either on-site or off-site may be required as a condition of development permit approval.

(k) The Municipality will maintain a beautification program to give the *Core Area* a pleasant and attractive appearance through streetscape improvements, the rehabilitation and removal of buildings and upgrading existing building facades.

A Walkable Core Area

(l) Existing and proposed Pedestrian Pathways are shown on Schedule 1 – Community Land Use & Zoning Map. Improvements to Pedestrian Pathways in the vicinity of a proposed development may be required as a condition of development permit approval.

(m) The open space surrounding the schools shall be well maintained, as well as other walking infrastructure such as cross-walks and walkways.

(n) The design of buildings and site layouts of new development should consider snow drifting effects and the creation of all-weather environments. Snow studies may be required to accompany development applications for larger scale developments.

APPENDIX ‘F’ - EQUITY LEASE TEMPLATE

Lease #:_____
File #:_____

EQUITY LEASE

The Municipal Corporation of the Hamlet of Cambridge Bay (hereafter called "the **Hamlet**"), being registered owner of an estate in fee simple subject to the encumbrances and interests listed below or which apply under the Land Titles Act, of land described as follows:

The whole of _____ in the Hamlet of Cambridge Bay in Nunavut, according to a plan of survey filed in the Land Titles Office for Nunavut under number _____,

(Hereafter called the "**land**")

Leases to _____(hereafter called the "**Lessee**"), all the **Hamlet's** estate and interest in the land, to be held by ____ as _____, subject to any implied covenants and powers, the following terms and conditions, and any terms, conditions, reservations or exceptions provided or implied by law.

TO HAVE AND TO HOLD for and during the term of **thirty (30)** years, commencing at 12:00 A.M. the 1st day of _____, and ending at 11:59 P.M. the 31st day of _____, ____.

YIELDING AND PAYING THEREFORE the "total rental" in the sum of _____. The total rental shall be paid to the **Hamlet** using the following schedule:

1. Fifteen percent (15%) of the total rental shall be paid upon signing of this lease; thereafter
2. ___ equal annual payments of _____ shall be due on _____ of each year, commencing _____and ending on, with any balance of the said total rental and/or any other amount herein provided then unpaid to be fully due and payable on the date last mentioned.

The total rental is calculated using the area of the land being ____ square metres multiplied by the cost per square metre rate of xxxx dollars and xxxx cents ($xx.xx per m2).

In accordance with the current by-laws and policies of the **Hamlet**, no interest will be charged on unpaid total rental not in arrears; provided that any amount herein provided to be paid, and whether total rental or otherwise, shall bear interest at the rate equal to two per cent (2%) per month, from the time it becomes payable until the time it is paid. Any such interest unpaid for thirty (30) days shall become principal and bear interest at the rate aforesaid. Any interest payable hereunder shall be considered rental payable pursuant hereto, for all lawful purposes. Payments hereunder shall be applied first on account of interest on arrears of interest, secondly on account of interest, thirdly on account of amounts other than total rental payable hereunder, and fourthly on account of total rental.

Initials _____

THE PARTIES FURTHER COVENANT AND AGREE AS FOLLOWS:

DEFINITIONS

1. In this lease "**Mayor** and **Senior Administrative Officer**" means the **Mayor** and **Senior Administrative Officer** of the **Hamlet** and any person authorized in writing by the **Hamlet** to act on behalf of the **Mayor** and the **Senior Administrative Officer.**

COMPLIANCE

2. The **Lessee** agrees in all respects to abide by and comply with all applicable lawful rules, regulations and by-laws of the Federal Government, Territorial Government, **Hamlet** or any other governing body whatsoever that have been or may be enacted and in any manner affect the said **land**.

NON-COMPLIANCE

3. Where any portion of the rental herein is unpaid for more than one hundred twenty (120) days after it is due, whether formally demanded or not, or where the **Lessee** fails to perform or observe any of the covenants or agreements herein contained, the **Hamlet** may give notice in writing of intention to apply to terminate this lease.

PAYMENT

4. The **Lessee** shall during the said term, pay the said rental and all taxes, rates, assessments, and assessments charged upon the land or upon the **Lessee** in respect thereof.

TERMINATION

5. Termination of this lease shall not prejudice the **Hamlet's** right to unpaid rental or any other right with respect to a breach of any covenant or agreement herein contained.

EQUITY

6. Upon receipt of payment in full of the "total rental" including any interest owing, annual rental of **one ($1.00)** dollar per annum shall be considered as paid for the balance of the term.

TITLE

7. The **Hamlet** has advised the **Lessee** that Article 14 of the Nunavut Land Claims Agreement prevents the **Hamlet** from transferring fee simple title in the land to the **Lessee**. If, during the term of the Lease or any renewals or extensions thereof, the **Hamlet** is permitted to transfer fee simple title in the land and there are no legal impediments to doing so, and the **Lessee** has made payment in full of all rent and is otherwise not in default under this Lease, fee simple title to the land shall, as soon as reasonably possible, be transferred to the **Lessee** without the **Lessee** being required to pay any additional consideration except for costs incurred in completing such transfer. The title shall be free and clear of any financial encumbrances except those arising through the **Lessee** but may be subject to encumbrances such as easements, utility rights of way and consents that are normally found registered against property of this nature.

EXTENDED TERM

8. If the **Lessee** duly performs and observes all the covenants and agreements herein, and on the part of the **Lessee** to be performed and observed, at the expiration of the said term, it shall be extended for a further term of **thirty (30) years**, at a rent of one dollar ($1.00) per annum which shall be considered paid**,** subject to the same covenants and agreements as are herein contained and such other covenants and agreements as may generally then be in effect for similar leases, with the exception of this paragraph.

PARTIAL REFUND OF EQUITY

9. Upon surrender of this lease, refunds shall be calculated and paid to the **Lessee** based upon the terms and conditions outlined in the applicable **Hamlet** By-Laws.

Initials _____

BOUNDARIES

10. The **Hamlet** is not responsible for the establishment on the ground of the boundaries of the land.

LAND USE

11. The **Lessee** shall use the land for _____ purposes only, and in accordance with the **Hamlet's** Community Plan and Zoning By-Law.

BUILDING SET-BACKS

12. The **Lessee** shall not erect on the land any building or structure that does not conform to the **Hamlet's** Community Plan and Zoning By-Law.

IMPROVEMENTS

13. The **Lessee** is responsible for ensuring that all improvements to the land are made within the boundaries of the land.

EXISTING IMPROVEMENTS

14. The **Lessee** shall maintain the existing improvements now situated on the land, or any similar improvements which may be constructed, in a manner and condition satisfactory to the **Hamlet**.

REMOVAL OF IMPROVEMENTS

15. If, prior to the expiry of this lease, the **Lessee** removes fifty percent (50%) of the improvements, excluding site development, placed on the land by the **Lessee** or its predecessors, the **Hamlet** may, upon sixty (60) days' notice, give notice of its intention to apply to alter or terminate this lease.

CONSTRUCTION

16. The **Lessee** shall construct the following improvements on the land: _____ with a market value of not less than _____ **($_____)**. Construction of the said improvements shall commence within twelve (12) months of the effective date of this lease, and shall be completed within twenty four (24) months of the effective date of the lease.

NON-CONSTRUCTION

17. The **Hamlet** may apply to terminate this lease for failure to commence or complete construction of the improvements within the time required by Clause #16 of this lease or for failure to conform to local bylaws, construction standards or regulations.

WATER & SEWER

18. The **Lessee** shall at its expense make connections to, and use, existing water and sewer mains, or any such mains as may be extended and made available to the land.

LAND FILL

19. On the termination of this lease, the **Lessee** may sever and remove from the land all structures, fixtures, and improvements, saving and excepting the following: all and any land fill, and without restricting the generality of the foregoing, in the form of soil, topsoil, sod, clay, sand, gravel, rock, crushed rock, glacial till, concrete, grout, asphalt, or any combination thereof, which during the said term were affixed or placed at its expense on the land.

RESTORATION

20. On termination or surrender of this lease, the **Lessee** shall deliver up possession of the land in a condition satisfactory to the **Hamlet**

EASEMENTS

Initials _____

21. The **Hamlet** may, where it deems it necessary in the public interest, establish easements through, under or over any portion of the land for any public utility purpose, but said easements shall not unreasonably interfere with the rights granted to the **Lessee** hereunder or with any improvements made by the **Lessee** on the land.

DITCHES

22. The **Lessee** shall permit free access at all times to the drainage ditch located on the land.

DRAINAGE

23. The **Lessee** shall ensure that the lot is properly drained and drainage improvements do not cause any adverse effects on the neighboring lots.

ROAD CONSTRUCTION

24. The **Hamlet** may re-enter and occupy any portion of the land for construction of roads or other public works, but such construction shall not unreasonably interfere with the rights granted to the **Lessee** hereunder, or with any improvements made by the **Lessee** on the land.

MUNICIPAL SERVICES

25. The **Hamlet** will not provide municipal services of any type or description without in any way limiting the generality of the foregoing, the provision of electric power, water delivery, sewage and garbage pick-up, school bus, road construction or maintenance shall be only as arranged on the **Lessee** own initative and entirely at the **Lessee's** own expense.

ENVIRONMENT

26. Notwithstanding anything herein to the contrary, the **Lessee** shall, at all times, keep the land in a condition satisfactory to the **Hamlet**.

DISCHARGE OF WASTE

27. The **Lessee** shall not discharge or deposit any refuse or other waste materials in any lake, river, stream, creek, or on the banks thereof, which will, in the opinion of the **Hamlet**, impair the quality of the waters or the natural envioronment. Any areas designated for waste disposal shall not be located within thirty-point-five (30.5) metres (100 feet) of the ordinary high water mark of any waterbody.

FLOODING

28. The **Lessee** shall not be entitled to compensation from the **Hamlet** by reason of the land or any portion thereof being submerged, damaged by erosion or otherwise affected by flooding.
29. The **Lessee** hereby acknowldges that the subject parcel of land is located within a zone that may be subject to periodic flooding. In consideration of the permission to occupy through this Lease, the subject parcel of land hereby granted to the **Lessee**: the **Lessee** hereby releases and forever discharges and releases the **Hamlet**, its employees, officers and agents of and from all claims, demands, damages, actions or causes of action arising oe which may arise from or by reason of the said parcel of land being flooded or subjected to flooding.

SUBLEASE REQUIREMENT

30. The **Lessee** shall not sublet the land without the consent of the **Hamlet.**

ASSIGNMENT REQUIREMENT

31. The **Lessee** may not assign this lease without the consent of the **Hamlet** in writing; and the **Lessee** acknowledges that any such consent may be conditional upon execution and delivery of an Assignment in a form acceptable to the **Hamlet**, pursuant to which the Assignee unconditionally undertakes the fulfilment of all of the **Lessee's** covenants hereunder or pursuant hereto.

ACCESS

Initials _____

32. It shall be lawful for the **Hamlet** or any person duly authorized at all reasonable times to enter upon the land for the purpose of examining the condition thereof.

TIME

33. **Time** shall be of the essence in this agreement.

WAIVER

34. Unless a waiver is given in writing by the **Hamlet,** it shall not be deemed to have waived any breach by the **Lessee** of any of the covenants or agreements herein contained, and a waiver relates only to the specific breach to which it refers.

BENEFIT OF LEASE

35. This lease is for the benefit of and is binding upon the **Hamlet** and the **Lessee**, and their respective successors, assigns and representatives.

ADDRESS FOR NOTICES

36. Wherever in this lease it is required or permitted that notice or demand be given or served by any party to this lease to or on the other, such notice or demand shall be given or served in writing and forwarded by registered mail if posted, addressed as follows:

To the **Hamlet**:
Hamlet of Cambridge Bay
P.O. Box 16
Cambridge Bay, NU
X0B 0C0

To the **Lessee** at:

(ADDRESS)

or to such other address as either of the parties may from time to time notify the other in writing in the manner provided herein.
References herein in gender or number shall be read and construed in grammatical conformity with the party or parties in reference; and all covenants given by more then one party shall be joint and several.
No variation or amendment hereof shall be binding unless the same be in writing and appropriately executed by all parties hereto.

IN WITNESS WHEREOF the parties have executed this agreement as of the date and year first below written.

DATED at the Hamlet of Cambridge Bay in Nunavut this _____ day of _____2021.

THE MUNICIPAL CORPORATION OF THE HAMLET OF CAMBRIDGE BAY

Per: _____
Mayor (seal)

Per: _____
Senior Administrative Officer

Initials _____

ACCEPTANCE

I, _____**,** accepts this lease of the land described in this lease, to be held by _____ as _____, subject to the conditions, restrictions and covenants expressed or implied in the lease.

_____
(Lessee name)

STATEMENT OF AGE

I,_____, the Lessee in the attached instrument, am of the full age of nineteen (19) years.

_____ _____
Date (Signature)

AFFIDAVIT OF ATTESTATION

I, _____ of the Hamlet of Cambridge Bay in Nunavut, make oath and say that:

1. I was present and saw _____**,** the person named in the instrument who is known to me sign the instrument for the purposes named in it.

2. The instrument was signed at the Hamlet of Cambridge Bay in Nunavut and I am the subscribing witness to the instrument.

3. I know _____ and that he/she is in my belief of the full age of nineteen years.

Sworn before me at the Hamlet of Cambridge Bay)
in the Nunavut Territory this ____day,)
of _____, 2021.)
)
)
)
)
)
_____) _____
A Commissioner for Oaths) Witness Signature
or Notary Public in and for Nunavut)
)
My Commission expires:_____)
)
Print Name:_____)

Initials _____

FAMILY LAW ACT AFFIDAVIT

I, _____**,** of the Hamlet of Cambridge Bay in Nunavut,

MAKE OATH AND SAY AS FOLLOWS:

1. That I am entitled to be the registered owner of a leasehold interest in the land described as follows:

Lot
Block
Plan
Cambridge Bay, Nunavut

2. (ADD STATUS)

Sworn before me at the Hamlet of Cambridge Bay)
in the Nunavut Territory this ____day,)
of _____, 2021.)
)
)
)
)
_____) _____
A Commissioner for Oaths) (Lessee name)
or Notary Public in and for Nunavut)
)
My Commission expires:_____)
)
Print Name:_____)

Initials _____

APPENDIX ‘G’ - GEOTECHNICAL INVESTIGATION

PIN/TAYLOR ARCHITECTS

GEOTECHNICAL EVALUATION FOR HAMLET OFFICE CAMBRIDGE BAY, NU

REPORT

OCTOBER 2011
ISSUED FOR USE
EBA FILE: Y14101389

creating & delivering | BETTER SOLUTIONS

eba
A TETRA TECH COMPANY

LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Pin-Taylor Architects and their agents. EBA, A Tetra Tech Company, does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Pin-Taylor Architects, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in EBA's Services Agreement. EBA's General Conditions are provided in Appendix A of this report.

EBA, A Tetra Tech Company
PO Box 2244, 201, 4916 - 49 Street
Yellowknife, NT X1A 2P7 CANADA
p. 867.920.2287 f. 867.873.3324

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1.0 INTRODUCTION

EBA, A Tetra Tech Company (EBA) was retained by Pin/Taylor Architects (Pin/Taylor) to conduct a geotechnical evaluation for a new hamlet office at Cambridge Bay, NU.

The objectives of this evaluation were to assess the subsurface soil conditions and to develop appropriate recommendations for the design and construction of suitable foundations for the buildings. This report presents the results of the site investigation and geotechnical recommendations.

This project was completed in general accordance with EBA's proposal submitted to Pin/Taylor on April 21, 2011. Authorization to proceed with the project was given by Mr. Simon Taylor of Pin/Taylor to Mr. Ed Hoeve, P.Eng., of EBA on June 30, 2011.

2.0 PROJECT DETAILS

It is understood that the Government of Nunavut (GN), Department of Community and Government Services retained the services of Pin/Taylor as consultants for the provision of Architectural/Engineering consulting services for the new hamlet office at Cambridge Bay, NU. EBA was retained as a sub-consultant to provide geotechnical services for the project.

The locations and approximate building footprints for three potential sites for the new hamlet office were provided by Pin-Taylor. Site A was located on the north side of Mitik Street on the west side of the hamlet. Site C is located southwest of the junction between Ihungak and Ugyuk Roads on the south side of the hamlet. Site B was located in the centre of the hamlet but was not evaluated as Pin-Taylor considered it too small during a site visit prior to the geotechnical site investigation. Figure 1 shows the locations of sites A and C.

3.0 SCOPE OF WORK

Based on EBA's proposal, the following tasks were conducted for this project:

- Conducted a site investigation by monitoring the drilling of seven probeholes using a track-mounted air-rotary drill;
- Collected disturbed samples of the soils encountered to conduct laboratory analysis for soil classification;
- Installed ground temperature monitoring instruments in two of the probeholes;
- Conducted laboratory testing on samples collected during the site investigation; and
- Prepared an evaluation report, including photos, that present findings from the site investigation and provides recommendations for foundation design and construction and for general site development.

4.0 METHOD OF INVESTIGATION

4.1 Initial Briefing

An initial meeting was held in Pin/Taylor's office on June 30, 2011, to discuss the objectives of the geotechnical evaluation and considerations for site selection. There were 3 sites originally being considered, but Pin/Taylor had visited the community the week before last and had ruled out Site B as being too small and not feasible.

The Hamlet's preference is Site C. It is surrounded by a tank farm, warehouses, and the meat plant, so industrial land use. The site is littered with paint cans and oil drums, etc. Another challenge with Site C is that it is quite steep, with about a 5 m drop across it, and an embankment along the north edge. The site surface conditions comprise boulders, litter and some exposed original ground.

Site A is a relatively unblemished site, from an environmental perspective. The engineering challenges with this site are that it has lots of snow drifting and is low-lying. There will be a 30 m setback from the lake imposed on development at this site.

Both sites are being considered for development; each has their difficulties. Both sites were to be investigated. The preferred foundation type is rock-socket steel pipe piles, provided bedrock is present within reasonable depth. There would still be an air space under the building, to allow air to move under the building and reduce snow drifting.

4.2 Site Investigation

The site investigation was completed between August 16 to 19, 2011 by Dr. Kumari Karunaratne of EBA.

EBA retained Bernie's Ltd., of Yellowknife, to conduct the drilling. The air-rotary track-mounted drill was equipped with a 180 mm bit and percussion hammer supported by an air compressor. Seven probeholes were drilled to depths ranging between 3.0 to 6.3 m, below grade, with bedrock encountered in all but one probeholes. Four probeholes were drilled at Site A and three probeholes were drilled at Site C. The probehole locations were recorded with hand-held GPS and are shown in Figure 1. Photos of the sites drilling work are presented at the photographs section of this report.

The stratigraphy at each probehole was logged by observing the drill cuttings recovered and from discussions between EBA's site representative and the operator, with respect to the operation of the drill. This included visual classification of soils, observation of ground ice conditions, and interpretation of subsurface moisture conditions and soil stratigraphy. Samples of drill cuttings recovered at the surface were collected for laboratory analysis and further examination. Probehole logs are presented in Appendix B. The probeholes were backfilled with drill cuttings following the completion of drilling.

Single-bead thermistor cables were installed to measure ground temperatures. In Probehole 3, cables were installed with sensors placed at depths of 3 and 5 m from the surface. In Probehole 7, cables were installed with sensors placed at depths of 2.5 and 3.5 m from the surface. The thermistors were read by EBA on 19 August 2011 by Dr. Karunaratne.

Drilling at Site C was challenging because of the slope and because the active layer was wet. This necessitated the use of casing, and still there was substantial sloughing into the probeholes.

4.3 Laboratory Testing

Samples collected during the site investigation were returned to EBA's Yellowknife and Edmonton laboratories. The samples were tested for the purposes of soil classification and determining engineering properties. Tests included soil moisture content, particle size analyses, and porewater salinity. The results of the laboratory testing are presented with the probehole logs in Appendix B.

5.0 SITE DESCRIPTION

5.1 Location and Geology

The hamlet of Cambridge Bay is located on the southeastern coast of Victoria Island at latitude 69° 07' N and longitude 105° 03' W. It is the largest community in the Kitikmeot Region of Nunavut and is approximately 1,000 km northeast of Yellowknife.

The community of Cambridge Bay is underlain by sedimentary bedrock of Paleozoic age. Outcrops of dolomite and shale occur sporadically throughout the area. The overburden material generally consists of glacial till, glaciofluvial sands, cobbles, and gravel, primarily derived from the local bedrock. Eskers and raised beaches are common features in the Cambridge Bay region.

5.2 Climate

Environment Canada maintains a weather station in Cambridge Bay, NU, and has records available since 1929 (Environment Canada 2011). However, before 1949, complete annual precipitation records are not available.

The mean annual (1971-2009) air temperature for Cambridge Bay is -14.4 °C. The annual mean air temperatures have increased over the duration of the record, however this increase has occurred predominately in the last 30 years. There was no clear trend in annual mean air temperature between 1949 and 1979, and a warming of 0.05 C° per year between 1980 and 2010. Five of the warmest years on record occurred in the last 10 years. The increase in annual mean air temperatures has resulted from warmer winters with summer temperatures remaining relatively constant.

The mean annual (1971-2009) freezing and thawing indices for Cambridge Bay are 5784 and 555 C°-days respectively. There was no clear trend in either the freezing or thawing index between 1949 and 1979, but between 1980 and 2010 the freezing index decreased by 14 C°-days per year, while the thawing index increased by only 4 C°-days per year.

The mean annual (1971-2009) total precipitation for Cambridge Bay is 139 mm, with 82 cm of snowfall. Trends in precipitation over the period of record were not identified.

5.3 Surface Conditions

Cambridge Bay lies north of the northern limit of trees. The surface is characterized by numerous shallow lakes and tundra vegetation including moss and lichen, short shrubs and herbaceous plants. The vegetation was limited to short grasses at both sites that were investigated.

Site A was a relatively undisturbed site situated between Mitik Street and a small pond. The area was flat with less than 0.5 m microtopography, and drained to a low lying sedge-wetland east of the nearby pond. The ground surface consisted of dry compact silt with scattered boulders and cobbles, and the drill and support vehicles easily drove over the surface at Site A. See Photos 1 to 3.

Site C was a highly disturbed site near the tank farm on the south side of the hamlet. The site had an approximate 1:10 slope and drained south. The ground surface consisted of exposed and disturbed silt and was littered with boulders, oil drums, and metal/wood scraps. See Photos 4 to 6.

5.4 Subsurface Stratigraphy

Probehole logs of the encountered subsurface materials are presented in Appendix B. It should be noted that the drilling technique used returns highly disturbed cuttings of soil/rock encountered to the ground surface. Therefore the descriptions and boundaries indicated on the probehole logs should be considered approximate. A general description of the soil types is presented below.

SILT and SAND (Till): Generally, the overburden was composed of silt and sand, with variable proportions of angular gravel. A review of previous reports on subsurface conditions in Cambridge Bay suggests that cobbles and boulders maybe encountered on this site. They could not be easily identified because of limitations imposed by the drilling technique used, which will have pulverized cobbles/boulders that may have been encountered. The sand encountered had grain sizes varying from fine to coarse, and the sand fraction increased in depth.

Although the samples were described in the field as moist to very wet, when tested in the laboratory gravimetric moisture contents of most of the samples were low. Measured moisture contents ranged between 1 and 15%, and the majority of the samples tested had moisture contents of about 5%. These results may be misleadingly low because drilling technique used makes it difficult to collect truly representative samples.

Water flooded Probeholes 5 and 7 at depths below the thawed layer. This excess water made collection of representative samples challenging. The water could have originated at the frozen/unfrozen interface or from the melting of ground ice. Descriptions of ground ice were not possible as the samples were thawed when collected at the surface. The depth of the active layer was estimated by the drillers from changes in drill behaviour.

BEDROCK (Dolomitic Sandstone): The silt and sand grades abruptly from light brown to grey, dolomitic sandstone at depths ranging from 2.4 to 4.5 m below the ground surface. This is clearly distinguished from the overlying light to dark brown silt and sand by a colour change to light grey. Evidence of bedrock weathering was not observed in the samples collected from any of the probeholes. The samples of bedrock had evidence of mechanical fractures only and no alternation was observed.

5.5 Porewater Salinity

Select samples from both sites were tested for porewater salinity, with results shown in Table 1.

Table 1: Porewater Salinity Testing Results

Site	Probehole	Depth (m)	Salinity (ppt)
A	1	2.5	12
	2	2.0	12
	3	2.0	17
	4	2.0	13
C	5	3.0	8
	7	2.0	5

At Site C, seepage of water from the active layer may have diluted the porewater, resulting in the lower salinity values observed. Therefore, the higher values observed at Site A will be considered for analysis at both sites. An average value of 14 parts-per-thousand (ppt) has been used.

5.6 Permafrost

Cambridge Bay lies in the continuous permafrost zone, with mean annual ground temperatures of about -12 °C (Heginbottom et al. 1995). At the time of drilling, the ground was unfrozen at the surface and frozen at depth. Frozen ground was identified, by changes to the drill behavior, at depths of approximately 1.5 m at Site A and 1.2 m at Site C (Appendix B). These thaw depths are considered to be close to the active-layer thickness given that the majority of the thaw season had lapsed at the time of the site investigations. Although samples of frozen ground to assess ground ice content were not recovered, a substantial amount of water was encountered once the drill had penetrated the frozen ground. As stated above, this water could have originated from excess ground ice.

The ground temperature at Sites A and C was measured by Dr. Karunaratne on 18 August 2011, the day after the ground temperature cables were installed. Table 2 presents the ground temperature measurements. All sensors were within the range of seasonal ground temperature fluctuations, so do not provide an approximation of the mean annual ground temperature.

Table 2: Summary of Measured Ground Temperatures

Probehole	Depth (m)	Ground Temperature (°C) August 18, 2011
3	3.0	-0.6
3	5.0	-6.9
7	2.5	+3.9
7	3.5	-1.6

5.7 Groundwater

Ground water was encountered in Probeholes 05 and 07 at depths greater than the seasonal thaw layer. As stated above, this water could have originated as ground ice, or within a thawed zone above the bedrock.

6.0 RECOMMENDATIONS

6.1 General

Both Site A and Site C and considered to be suitable for the proposed development. EBA recommends the use of a deep foundation for the proposed hamlet office, either rock socket steel pipe piles, or adfreeze steel pipe piles. Rocket socket piles are considered the preferred alternative, offering these advantages:

- Rock socket piles are capable of achieving higher single pile capacities than adfreeze piles, therefore potentially reducing the number of piles required;
- Rock socket piles are less vulnerable to impacts of potential climate change, and uncertainties around site hydrology, than adfreeze piles; and
- The use of rock socket piles would also permit the use of a temperate crawl space below the building, but that is understood to not be a consideration for the present development.

However, the requirements for grout and cutting slots in the piles make rock socket piles more costly to install than adfreeze piles.

Because bedrock has been encountered at relatively shallow depth at the sites, it should be feasible to include end-bearing in the pile capacity, if testing was conducted to quantify the amount mobilized. This would increase the efficiency of adfreeze piles. Recommendations for an approach to validate the use of end-bearing are described in a later section.

The use of piles for a building foundation requires that the floors be structurally supported. If grade supported floors are required, it may be necessary to consider an alternative foundation type, such as slab-on-grade with thermosyphons and insulation. The analysis required to develop recommendations for this foundation type is considered to be outside of the presently authorized scope of work. EBA will prepare a proposal to address this foundation type, if requested.

The use of other shallow foundation types, such as grade supported footings or buried footings are not recommended for this development because of their increased vulnerability to potential climate change impacts.

6.2 Climate Change Considerations

The impacts of potential climate change should be considered in the design of the Hamlet Office. The Canadian Standards Association (CSA 2010) provides guidance for screening the vulnerability of a development to climate change.

The sensitivity of the site to climate change is governed by the ice content of the subsurface soils and the anticipated ground temperature at the end of the service life of the building. Based on the observations from the site investigation, the current mean annual ground temperature is estimated to be -7 °C.

The CSA gives guidance on the potential implications of climate change on ground temperature. Under a high green-house gas scenario, warming of about 1.7 °C can be expected over an assumed 30-year design life. This gives an approximation of the mean annual ground temperature of about -5 °C at the end of the assumed service life of the building.

While there may be some excess ice, the silt soils (till) recovered from the site may were generally not ice-rich. Therefore, the sensitivity of the site to potential climate change is considered to be "low".

For adfreeze piles, the consequences of a warming climate, and associated permafrost warming would be a decrease in adfreeze pile capacity. The practical implications of this could be greater or more rapid settlement than assumed in design. Settlement may result in increased end-bearing since the piles will be seated on bedrock and this mechanism would be somewhat self-correcting.

Another consequence of a warming climate would be a deepening of the active layer. This could result in increased seasonal frost-jacking. Failures of adfreeze or rock socket piles with respect to frost-jacking would result in differential movements that could crack finishes, impact operation of doors and windows, and potentially compromise the building envelope. These consequences are considered "major".

Considering the site sensitivity and the associated consequences together results in a risk level "C", as defined by CSA. This level of risk warrants a qualitative analysis and the use of expert judgement to develop design parameters for a project with a routine foundation, such as adfreeze or rock socket steel pipe piles. This level of analysis and judgement has been employed to develop the recommendations provided in the following sections.

6.3 Rock Socket Steel Pipe Piles

Bedrock was encountered within a depth range where it will be feasible to install rock socket steel pipe piles with the type of drilling equipment available in Cambridge Bay. It is recommended that pile installation occur in the late spring or early summer, when air temperatures are moderate, but the active layer is still frozen. This will reduce the potential for seepage and sloughing, and permit clean dry rock sockets to be drilled.

It should be noted that difficult drilling conditions, specifically seepage and sloughing, were encountered at Site C in the late summer. The use of temporary casing to control the seepage and sloughing was only marginally successful. If the project schedule evolves so that piles cannot be installed when recommended in the foregoing, it may be necessary to mobilize a specialized drilling system to the community, and a contractor familiar with its operation. EBA can provide additional recommendations on this alternative, if determined to be necessary at a later stage in the project.

A typical rock socket steel pipe pile installation is shown in Figure 2. Rock-socket steel pipe piles should be designed and constructed in accordance with the following recommendations:

- The allowable grout to pile bond can be related to the compressive strength of the grout backfill. An allowable grout to steel bond of 300 kPa may be assumed if the unconfined compressive strength of the grout is at least 20 MPa. The same ratio (i.e. 1.5%) can be assumed if higher strength grouts are used. Therefore, the use of grout with an unconfined compressive strength of 35 MPa would yield an allowable grout to rock bond of 500 kPa. The bond can be assumed to resist either compression or tension loads.
- An allowable end-bearing of 10 MPa may be assumed for steel pipe piles seated on the bottom of the rock socket. This end-bearing may be applied to the cross-sectional area of the steel, not the gross end area of the pipe. End-bearing applies to compression loads only. A geotechnical engineer or

technician should monitor pile installations, on a full-time basis, to verify that piles are seated on competent bedrock for end-bearing to apply.

- The upper 1 m of bedrock is assumed to be weathered, and should not be considered for the pile capacity. It should be left ungrouted unless monitoring reveals that either more or less bedrock should be discounted.
- If end-bearing is to be relied upon, the diameter of the drilled hole should be at least 50 mm larger than the outside diameter of the pipe. If the pile hole is not straight, even a 50 mm annulus will sometimes not allow for easy pile installation.
- For pile groups, rock socket piles should be spaced a minimum of three pile diameters apart, centre to centre.
- Piles should be designed to resist frost jacking forces, if no means is provided to prevent the ground around the piles from freezing. A frost jacking force, at the soil to pipe interface, of 150 kPa should be assumed for the overburden soil. Frost jacking can be considered to be exerted to a depth of 2.0 m below finished grade, or to competent bedrock, whichever is shallowest. Loads resulting from frost jacking should be added to any other tension loads. For example a pile installed with 20 MPa grout should have a minimum rock socket length of 1.0 m to resist frost jacking even if that embedment is not required to support compression loads.
- For the purpose of structural design, the piles can be assumed to be laterally restrained from the bottom of the pile to the top of the grouted interval within the bedrock. The length of the pile within the overburden layer should be considered to be supported by earth pressure at rest, which can be taken as 50% of the effective vertical stress. If additional lateral capacity is required, battered piles, concrete-filled piles, or additional grout on the outside of the pile, can be considered. EBA can provide additional information on this matter, if requested.
- Grout holes should be cut on opposite sides of the piles to ensure the grout fills the annulus between the steel pipe pile and wall of the probehole. The grout holes also provide mechanical interlock between the grout and the steel, which contributes to the specified allowable bond strength. The holes should be approximately 50 mm wide by 100 mm long and be spaced at a frequency of four holes per meter of pile length, within the rock-socket bond zone.
- After drilling, the pile hole should be free of water, mud, and slough and any other deleterious materials prior to installation of the pile and grout. For piles installed where overburden is present, particularly if installation takes place during the thaw season, it may be necessary for the contractor to use casing through the overburden soil to reduce seepage and sloughing into the rock socket.
- Loose material, preservatives, or oil and grease should be completely cleaned off the bond length of the pile immediately before installation. The pipe pile should be installed and backfilled with grout as soon as possible after completion of the pile hole. These procedures are important for obtaining a good bond between the grout and the pile, and between the grout and the rock.
- A nonshrink, permafrost grout is recommended. 20 MPa grout is normally recommended because it should be readily achievable with the relatively crude methods often employed to mix grout. As the specified strength for grout increases, attention to quality control becomes increasingly important.

EBA should be permitted to review the contractor's proposed grout mix and construction schedule. It is recommended that the adequacy of the proposed grout mix be verified by trial batches in advance of construction. The mixing water should be warmed so that the temperature of the grout mix will be approximately 20 to 25 °C when placed. The grout should be prepared and placed with an integral mechanical mixer/pump with a shearing type action.

- Once the pile and grout has been placed, it should be vibrated with the drill to develop a good seat on the rock at the base, and to consolidate the grout. The pile should be supported centrally within the hole, using bracing at ground surface for plumb piles, or downhole centralizers for inclined piles, for a period of 24 hours to allow setting of the grout. Load should not be applied to the pile for three days after installation.
- After the grout has been allowed to set, the remainder of the pile annulus should be backfilled with clean dry sand.

It is recommended that a qualified geotechnical engineer or technologist monitor pile installations. The geotechnical engineer can monitor grout temperatures, test the grout to verify that the mix is performing acceptably, and document the pile installations.

6.4 Adfreeze Steel Pipe Piles

6.4.1 Conventional Adfreeze Steel Pipe Piles

Adfreeze steel pipe piles are typically applicable in areas of continuous permafrost. A minimum air space of 1 m below the building is recommended to maintain permafrost and reduce snow drifting.

The allowable adfreeze bonds are dependent on the pile configuration, the nature of the load being supported, and subsurface conditions. It is understood that 141 mm outside diameter steel pipe piles are typically used for non-residential construction in Nunavut communities.

The allowable bondshave been calculated considering the following:

- Porewater salinity of 14 ppt;
- Active layer thickness of 2.0 m after 30 years;
- A mean annual ground temperature after 30 years of – 5.0 °C;
- Pile outside diameter 141 mm;
- A factor of safety of 1.5 for slotted piles and 2.0 for unslotted piles;
- Allowable long-term settlement of 30 mm in 30 years;
- Allowable short-term movements of 2 mm in 4 months.

The allowable bonds for Site A and Site C are presented in the following Table 3.

Table 3: Allowable Shaft Stress for Adfreeze Steel Pipe Piles

Pile Description	Long Term Load (kPa)	Combined Short-Term and Long-Term Load (kPa)	Minimum Embedment (below grade) (m)
Ø 141 mm, slotted	28	51	8.0
Ø 141 mm, unslotted	21	38	10.0

Long-term loads refer to dead load and sustained live load, such as occupancy load. Short-term loads refer to environmental loads, such as snow load and wind load. The allowable bonds provided are intended to be applied to working loads or unfactored loads.

The recommended minimum embedments in Table 3 are to resist a frost-jacking force of 150 kPa within the active layer. Resistance provided by the load on the pile has been neglected to develop this embedment recommendation.

Reference is made in Table 3 to slotted and unslotted piles. Figure 3 illustrates the concept of the slots. While significantly higher bond values are given for slots, this requires the use of cutting gases, which are difficult and expensive to get into the communities in Nunavut. Therefore, it is typically more economical overall to leave the pipes unslotted and install longer or more piles. EBA does not have pile load information, but typically the pile design lengths should be kept to 12 m or less, to permit pipe handling with locally available equipment.

Adfreeze piles in groups should be spaced at least 4 pile diameters, on-centre, apart.

The piles can be taken as laterally restrained from the bottom of the pile to the top of the permafrost. The soil in the active layer can be relied upon to provide some lateral support to the piles. Earth pressure at rest can be assumed. An active earth pressure coefficient of 0.5 can be used to compute lateral support within the active layer.

Adfreeze steel pipe piles should be installed in accordance with the following recommendations:

- Piles are best installed while the ground is still frozen, but with moderate air temperatures (March to June). This permits good access and clean holes to be drilled.
- If slots are used, holes 50 mm by 100 mm should be cut on both sides of the pile at 500 mm intervals to ensure that the sand slurry fills the hole, both inside and outside the pipe. The first set of these holes should be located below the active layer at about 2.5 m below grade.
- Any soil, loose material, oil, grease, or any other material adhering to the pile should be removed before installation. Factory sealants should be removed from the pile.
- Pile holes should be drilled to a diameter at least 50 mm larger than the outside diameter (OD) of the piles. For example, if 141 mm OD piles are used, a hole diameter of 190 mm is recommended.
- Sand slurry should be placed into the pile hole between the soil and the steel pipe pile. It should be mixed to a consistency of a wet paste such that it will flow down the hole. It should not have more water than necessary. The sand should not contain particles over 5 mm in diameter and should have no more than 10 percent fines passing the No. 200 sieve size (silt and clay sizes). In addition, the sand

slurry should have a salinity of less than 5 ppt. The use of a coarser backfill could be considered but the recommended drill hole size would also be increased, to reduce the potential for backfill arching in the annulus. The pile should be vibrated with the drill, or by other means to ensure the formation of a continuous column of sand slurry around the outside of the pile. The inside of the pile should also be filled with sand slurry up to approximately 1 m below the pile cutoff elevation.

- Water used for slurry production should be fresh potable water. The placement temperature should not exceed 10 °C to reduce disturbance and freeze-back time.
- Structural loads should not be applied to the pile for at least one week after installation, unless ground temperature measurements confirm that the backfill is completely frozen.

It is recommended that a qualified geotechnical engineer or technologist monitor the pile installations. In general, pile monitoring will include observations and/or measurements for each pile installation including pile plumbness, length, installation depth, volumes of sand slurry, ground temperatures and soil/bedrock descriptions.

6.4.2 End Bearing Option

The standard method of adfreeze pile installation involves dropping the pile in the drilled hole and vibrating the top of the pipe with a down-hole hammer. It has been difficult to quantify the amount of end-bearing mobilized by this vibration, so it is typically neglected, even when bedrock is present. This results in a potentially overly conservative pile design.

EBA has previously conducted a test program to measure the end-bearing mobilized by piles installed into bedrock with an air track drill (EBA 2006). That project was in Iqaluit, in granite, and with different equipment than is likely to be used in Cambridge Bay, so is not considered directly applicable to the present development. However a similar approach could be used to determine how much end-bearing can be incorporated into the design of either adfreeze or rock socket steel pipe piles.

The end-bearing was measured by fabricating a simple drop hammer that could be operated by a loader, driving the pile, and using a pile driving analyzer (PDA) to measure the end-bearing mobilized. Depending on who is awarded the foundation installation work, it may be possible to conduct the testing using a diesel hammer.

In Iqaluit, an allowable end-bearing of 12 MPa over the gross end area of the pipe was confirmed. For a 141 mm diameter pile, this contributed about 180 kN to the allowable pile capacity. A similar magnitude of end-bearing may not be achieved in the lower strength limestone bedrock at Cambridge Bay. For the purpose of assessing whether it is worth conducting the test program, it can be assumed that it should be possible to mobilize at least 5 MPa of end-bearing over the gross end area of the pipe. For a 141 mm diameter pile, this would contribute about 80 kN to the allowable pile capacity. Note that this would also significantly increase the end-bearing component of rock socket piles, which amounts to about 27 kN for a 141 mm diameter pile, when considering the end-bearing recommendations provided in Section 6.3.

It would be most economical to conduct such a test program at the outset of pile installation, rather than in advance of construction. This would require that the design pile embedments be kept flexible and subject

to revision, depending on the findings from the testing. EBA will prepare a proposal to conduct the testing, if requested.

6.5 Site Grading and Drainage

Final site grading should maintain positive drainage in the direction of natural drainage and should direct water away from the building. Improper drainage and ponding of water near or under the structure could initiate foundation failure. Future and existing development should be taken into consideration when directing drainage so as not to divert flow into adjacent developments.

The existing slope on Site C will provide for good surface drainage to the south, with minimal grading required. Site A is relatively flat, and will need to be graded to drain effectively. Surface water at Site A should be directed towards the sedge-wetland east of the nearby pond.

At either site, EBA recommends final grades within 3 m of the building and other structures to be at least 4 percent. It is recommended that gravel or landscaped area beyond this have a minimum grade of 2 percent, and paved areas beyond this have a minimum grade of 1 percent away from the building.

7.0 CLOSURE

We trust this report meets your present requirements. Should you have any questions or comments, please contact the undersigned at your convenience.

EBA, A Tetra Tech Company

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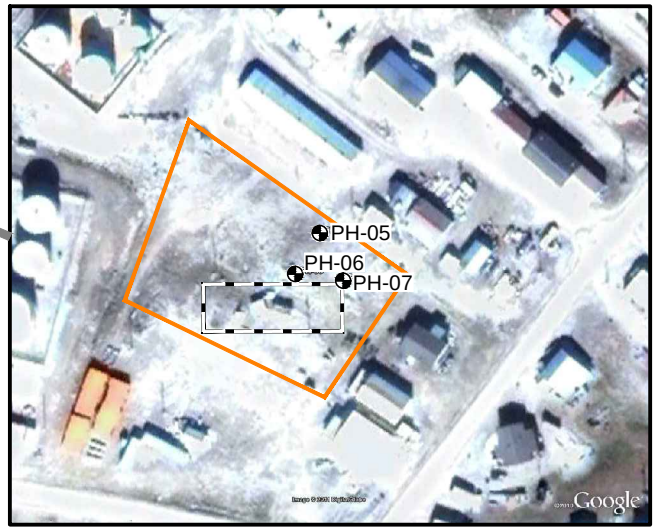
FIGURES

KEY MAP

0 1 000

Scale: 1: 25 000 (metres)



LEGEND:

- PROBEHOLE
- BUILDING LOCATION (Approximate)
- SITE BOUNDARIES (Approximate)

0 100

Scale: 1: 2 500 (metres)

CLIENT

Pin - Taylor Architects

GEOTECHNICAL EVALUATION FOR HAMLET OFFICE CAMBRIDGE BAY, NU

SITE PLAN AND PROBEHOLE LOCATIONS

PROJECT NO.	DWN	CKD	REV
Y14101389	TK	AC	0

OFFICE	DATE
EDM	September 30, 2011

Figure 1

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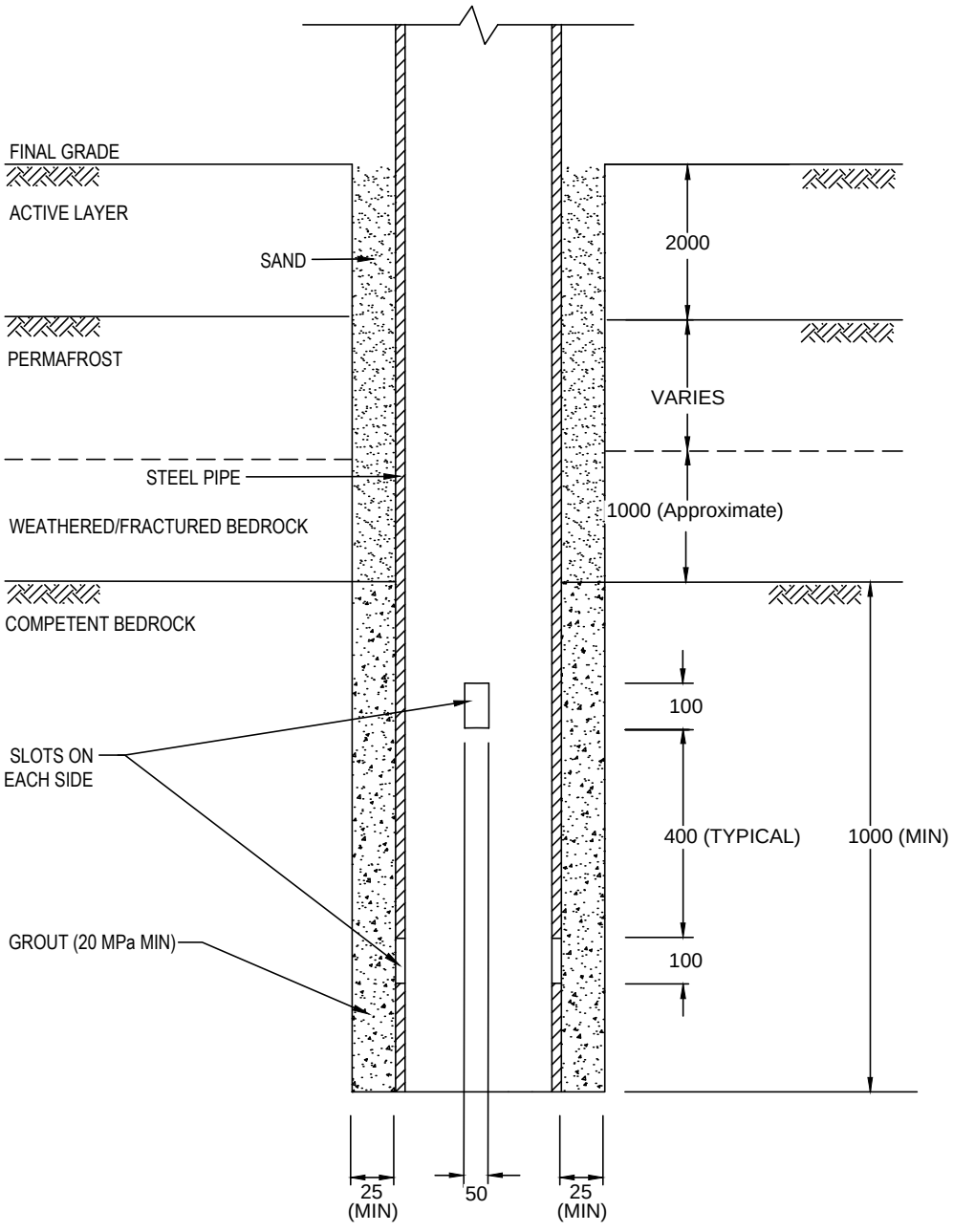

CLIENT

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GEOTECHNICAL EVALUATION FOR HAMLET OFFICE CAMBRIDGE BAY, NU

TYPICAL ROCK SOCKET STEEL PIPE PILE DETAIL

DRAWING NOT TO SCALE

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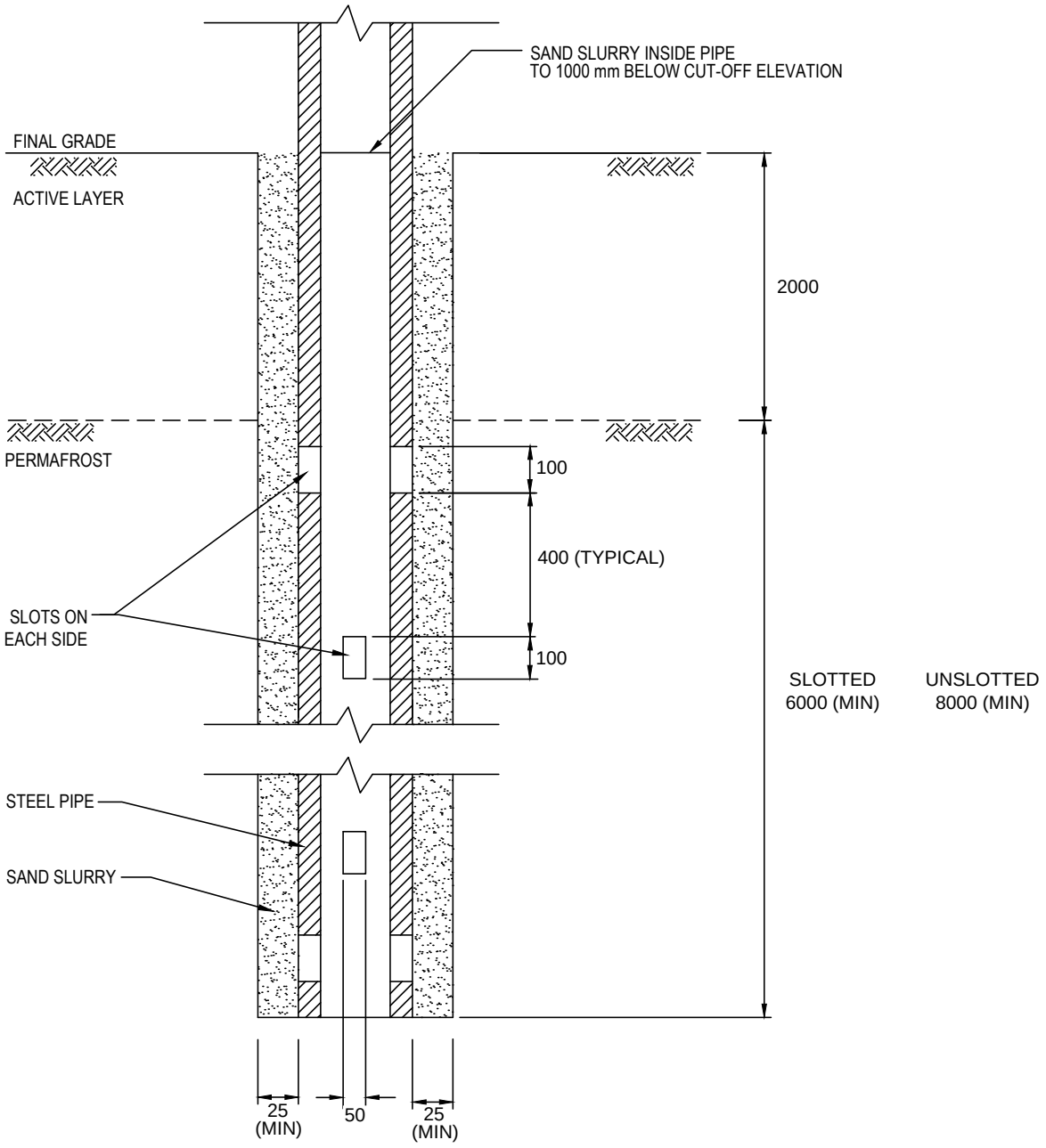
PROJECT NO.	DWN	CKD	REV
Y14101389	TK	AC	0

OFFICE	DATE
EDM	September 30, 2011

Figure 2



DRAWING NOT TO SCALE

CLIENT

Pin - Taylor Architects

GEOTECHNICAL EVALUATION FOR HAMLET OFFICE
CAMBRIDGE BAY, NU

TYPICAL ADFREEZE STEEL PIPE PILE DETAIL

PROJECT NO.	DWN	CKD	REV
Y14101389	TK	AC	0

OFFICE	DATE
EDM	September 29, 2011

Figure 3

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PHOTOGRAPHS

Photo 1	Looking southwest with Site A in midground. Note location of ponds.
Photo 2	Site A looking east towards hamlet.
Photo 3	Air-rotary drill at Site A Probehole 01, looking north.
Photo 4	Site C looking south.
Photo 5	Site C looking west. Note location of tank farm
Photo 6	Air-rotary drill at Site C Probehole 07, looking southwest. Note water on surface discharged during drilling.

Photo 1: Looking southwest with Site A in midground. Note location of ponds.

Photo 2: Site A looking east towards hamlet.

Photo 3: Air-rotary drill at Site A Probehole 01, looking north.

Photo 4: Site C looking south.

Photo 5: Site C looking west. Note location of tank farm.

Photo 6: Air-rotary drill at Site C Probehole 07, looking southwest. Note water on surface discharged during drilling.

APPENDIX A

APPENDIX A EBA'S GENERAL CONDITIONS

GENERAL CONDITIONS

GEOTECHNICAL REPORT

This report incorporates and is subject to these “General Conditions”.

1.0 USE OF REPORT AND OWNERSHIP

This geotechnical report pertains to a specific site, a specific development and a specific scope of work. It is not applicable to any other sites nor should it be relied upon for types of development other than that to which it refers. Any variation from the site or development would necessitate a supplementary geotechnical assessment.

This report and the recommendations contained in it are intended for the sole use of EBA’s Client. EBA does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA’s Client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of EBA. Additional copies of the report, if required, may be obtained upon request.

2.0 ALTERNATE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA’s instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of EBA’s instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. EBA’s instruments of professional service will be used only and exactly as submitted by EBA.

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

3.0 ENVIRONMENTAL AND REGULATORY ISSUES

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

4.0 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems and methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. EBA does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

5.0 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

6.0 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historic environment. EBA does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional investigation and review may be necessary.

7.0 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

8.0 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

9.0 INFLUENCE OF CONSTRUCTION ACTIVITY

There is a direct correlation between construction activity and structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques are known.

10.0 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, as well as the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

11.0 DRAINAGE SYSTEMS

Where temporary or permanent drainage systems are installed within or around a structure, the systems which will be installed must protect the structure from loss of ground due to internal erosion and must be designed so as to assure continued performance of the drains. Specific design detail of such systems should be developed or reviewed by the geotechnical engineer. Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function.

12.0 BEARING CAPACITY

Design bearing capacities, loads and allowable stresses quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition assumed. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions assumed in this report in fact exist at the site.

13.0 SAMPLES

EBA will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

14.0 INFORMATION PROVIDED TO EBA BY OTHERS

During the performance of the work and the preparation of the report, EBA may rely on information provided by persons other than the Client. While EBA endeavours to verify the accuracy of such information when instructed to do so by the Client, EBA accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

APPENDIX B

APPENDIX B PROBEHOLE LOGS AND LABORATORY TEST RESULTS

TERMS USED ON BOREHOLE LOGS

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on 0.075mm sieve): Includes (1) clean gravels and sands, and (2) silty or clayey gravels and sands. Condition is rated according to relative density, as inferred from laboratory or in situ tests.

DESCRIPTIVE TERM	RELATIVE DENSITY	N (blows per 0.3m)
Very Loose	0 TO 20%	0 to 4
Loose	20 TO 40%	4 to 10
Compact	40 TO 75%	10 to 30
Dense	75 TO 90%	30 to 50
Very Dense	90 TO 100%	greater than 50

The number of blows, N, on a 51mm O.D. split spoon sampler of a 63.5kg weight falling 0.76m, required to drive the sampler a distance of 0.3m from 0.15m to 0.45m.

FINE GRAINED SOILS (major portion passing 0.075mm sieve): Includes (1) inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as estimated from laboratory or in situ tests.

DESCRIPTIVE TERM	UNCONFINED COMPRESSIVE STRENGTH (KPA)
Very Soft	Less than 25
Soft	25 to 50
Firm	50 to 100
Stiff	100 to 200
Very Stiff	200 to 400
Hard	Greater than 400

NOTE: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above, because of planes of weakness or cracks in the soil.

GENERAL DESCRIPTIVE TERMS

Slickensided - having inclined planes of weakness that are slick and glossy in appearance.
Fissured - containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.
Laminated - composed of thin layers of varying colour and texture.
Interbedded - composed of alternate layers of different soil types.
Calcareous - containing appreciable quantities of calcium carbonate.;
Well graded - having wide range in grain sizes and substantial amounts of intermediate particle sizes.
Poorly graded - predominantly of one grain size, or having a range of sizes with some intermediate size missing.

ROCK DESCRIPTION TERMS USED ON BOREHOLE LOGS

ESTIMATED MECHANICAL STRENGTH

TERM	UNCONFINED COMPRESSIVE STRENGTH			
Very Low Strength	1	to	4	MPa
Low Strength	4	to	15	MPa
Medium Strength	15	to	50	MPa
High Strength	50	to	200	MPa
Very High Strength	More	than	200	MPa

GRAIN SIZE

NON-CARBONATE DETRITAL SEDIMENTARY ROCKS		OTHER ROCKS	GRAIN SIZE
Conglomerate or Breccia		Very Coarse Grained	More than 80 mm
Conglomerate or Breccia		Coarse Grained	4 to 80 mm
Sandstone[1]		Medium Grained	80 µm to 4 mm
FISSILE	**NON-FISSILE**		
Silt Shale	Siltstone	Fine Grained	>2/3 silt-sized (2 to 80 µm)
Mud Shale	Mudstone	Fine Grained	silt and clay-sized (<80 µm)
Clay Shale	Claystone	Very Fine Grained	>2/3 clay-sized (<2 µm)

DISCONTINUITY SPACING

BEDDING	OTHER DISCONTINUITIES	SPACING
Very thickly Bedded	Very Widely Spaced	More than 2 mm
Thickly Bedded	Widely Spaced	600 mm to 2 m
Medium Bedded	Moderately Widely Spaced	200 to 600 mm
Thinly Bedded	Closely Spaced	60 to 200 mm
Very Thinly Bedded	Very Closely Spaced	20 to 60 mm
Laminated	Extremely Closely Spaced	6 to 20 mm
Thinly Laminated	Extremely Closely Spaced	2 to 6 mm
Fissile	Extremely Closely Spaced	Less than 2 mm

WEATHERED STATE

TERM	DEGREE
Fresh	No visible signs of weathering
Slightly Weathered	Weathering only on open discontinuity surfaces
Moderately Weathered	Rock mass weathered but not friable
Highly Weathered	Rock mass weathered and partly friable
Completely Weathered	Wholly decomposed but texture and structure preserved
Residual Soil	Original rock texture and structure destroyed

CORE RECOVERY

TERM	DESCRIPTION
Total Core Recovery	Total recovery expressed as a percentage of run length
Solid Recovery	Solid recovery expressed as a percentage of run length
Rock Quality Designation (RQD)	Sum of lengths of solid core more than 100 mm long expressed as a percentage of run length
Fracture Index (FI)	Number of breaks per metre of solid core (FI's in excess of 30 denoted as 30+)

ROCK QUALITY

TERM	RQD		
Very Poor Quality	0	to	25
Poor Quality	25	to	50
Fair Quality	50	to	75
Good Quality	75	to	90
Excellent Quality	90	to	100

[1] Sandstone further subdivided where appropriate into fine, medium, coarse

PROJECT: Geotechnical Evaluation for Hamlet Office	CLIENT: Pin/Taylor Architects	PROJECT NO. - BOREHOLE NO.
LOCATION: Site A; See Figure 1	DRILL: Air-rotary track-mounted	Y14101389 - PH01
CITY: Cambridge Bay	7667473N; 497193E; Zone 13	

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	STANDARD PENETRATION (N) 20 40 60 80 / POCKET PEN. (kPa) 100 200 300 400 / PLASTIC M.C. LIQUID 20 40 60 80	GROUND ICE DESCRIPTION	Depth (ft)
0	SAND (Till) - silty, some gravel, trace clay, poorly sorted, fine angular gravel, moist, medium plastic, light brown				UNFROZEN	0
1			1	●		
					FROZEN	5
2	18% gravel, 53% sand, 23% silt, 6% clay		2	●		
			3	●		
	SAND (Till) - silty/clayey, gravely, poorly sorted, coarse sand, subangular gravel, damp, non-plastic, light brown					
3	- 29 % gravel, 45 % sand, 26 % fines (silt/clay) - Salinity: 11 ppt		4	●		10
	BEDROCK - Dolomitic sandstone, dark grey, strong, medium grained, unweathered					
4			5	●		
						15
5			6	●		
			7	●		
	END OF PROBEHOLE (5.6 m)					
6						20
7						25
8						
9						30
10						33

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LOGGED BY: KCK	COMPLETION DEPTH: 5.6 m
REVIEWED BY: TEH	COMPLETE: 8/17/2011
DRAWING NO:	Page 1 of 1

PROJECT: Geotechnical Evaluation for Hamlet Office	CLIENT: Pin/Taylor Architects	PROJECT NO. - BOREHOLE NO.
LOCATION: Site A; See Figure 1	DRILL: Air-rotary track-mounted	Y14101389 - PH02
CITY: Cambridge Bay	7667462N; 497177E; Zone 13	

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	STANDARD PENETRATION (N) 20 40 60 80 / POCKET PEN. (kPa) 100 200 300 400 / PLASTIC M.C. LIQUID 20 40 60 80	GROUND ICE DESCRIPTION	Depth (ft)
0	SILT/CLAY and SAND (Till) - some gravel, poorly sorted, medium sand, fine angular gravel, damp, low plastic, light brown				UNFROZEN	0
1			1	●		
					FROZEN	5
2	- 15 % gravel, 45 % sand, 40 % fines (silt/clay) - Salinity: 12 ppt		2	●		
3			3	●		10
	SILT and SAND (Till) - poorly sorted, coarse sand, wet, soft, medium plastic, light brown					
4			4	●		
	BEDROCK - Dolomitic sandstone, dark grey, strong, medium grained, unweathered					15
5			5	●		
6						20
	END OF PROBEHOLE (6.3 m)					
7						25
8						
9						30
10						33

eba A TETRA TECH COMPANY

LOGGED BY: KCK	COMPLETION DEPTH: 6.3 m
REVIEWED BY: TEH	COMPLETE: 8/17/2011
DRAWING NO:	Page 1 of 1

PROJECT: Geotechnical Evaluation for Hamlet Office	CLIENT: Pin/Taylor Architects	PROJECT NO. - BOREHOLE NO.
LOCATION: Site A; See Figure 1	DRILL: Air-rotary track-mounted	Y14101389 - PH03
CITY: Cambridge Bay	7667477N; 497181E; Zone 13	

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	TEMP (°C)	STANDARD PENETRATION (N) 20 40 60 80 / POCKET PEN. (kPa) 100 200 300 400 / PLASTIC M.C. LIQUID 20 40 60 80	GROUND ICE DESCRIPTION	Depth (ft)
0	BOULDER (Till) - some silt, sub-rounded boulder, damp, non-plastic					UNFROZEN	0
1			1				
	SAND (Till) - silty/clayey, some gravel, poorly sorted, coarse sand, sub-angular fine gravel, moist, low plastic, light brown					FROZEN	5
2	- 20 % gravel, 49 % sand, 31 % fines - Salinity: 17 ppt		2				
	BEDROCK - Dolomitic sandstone, dark grey, strong, medium grained, unweathered						
3			3	-0.6			10
4			4				
							15
5			5	-6.9			
	END OF PROBEHOLE (5.5 m)						
6							20
7							
							25
8							
9							30
10							33

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LOGGED BY: KCK	COMPLETION DEPTH: 5.5 m
REVIEWED BY: TEH	COMPLETE: 8/18/2011
DRAWING NO:	Page 1 of 1

PROJECT: Geotechnical Evaluation for Hamlet Office	CLIENT: Pin/Taylor Architects	PROJECT NO. - BOREHOLE NO.
LOCATION: Site A; See Figure 1	DRILL: Air-rotary track-mounted	Y14101389 - PH04
CITY: Cambridge Bay	7667490N; 497186E; Zone 13	

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	STANDARD PENETRATION (N) 20 40 60 80 / POCKET PEN. (kPa) 100 200 300 400 / PLASTIC M.C. LIQUID 20 40 60 80	GROUND ICE DESCRIPTION	Depth (ft)
0	BOULDER (Till) - some silt, sub-rounded boulder, damp, non-plastic				UNFROZEN	0
1			1	●		
	SAND (Till) - gravely, silty/clayey, poorly sorted, coarse sand, sub-angular fine gravel, moist, low plastic, light brown				FROZEN	5
2			2	●		
	- 28 % gravel, 51 % sand, 21 % fines (silt/clay) - Salinity: 13 ppt					
3			3	●		10
	BEDROCK - Dolomitic sandstone, dark grey, strong, medium grained, unweathered					
4			4	●		
						15
5			5	●		
	END OF PROBEHOLE (5.1 m)					
6						20
7						25
8						
9						30
10						33

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LOGGED BY: KCK	COMPLETION DEPTH: 5.1 m
REVIEWED BY: TEH	COMPLETE: 8/18/2011
DRAWING NO:	Page 1 of 1

YELLOWKNIFE Y14101389.GPJ EBA.GDT 10/27/11

PROJECT: Geotechnical Evaluation for Hamlet Office	CLIENT: Pin/Taylor Architects	PROJECT NO. - BOREHOLE NO.
LOCATION: Site C; See Figure 1	DRILL: Air-rotary track-mounted	Y14101389 - PH05
CITY: Cambridge Bay	7667199N; 497778E; Zone 13	

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	STANDARD PENETRATION (N) 20 40 60 80 / POCKET PEN. (kPa) 100 200 300 400 / PLASTIC M.C. LIQUID 20 40 60 80	GROUND ICE DESCRIPTION	Depth (ft)
0	SILT and COBBLES (Till) - some gravel, poorly sorted, coarse sand, fine angular gravel, damp, light brown				UNFROZEN	0
1			1	●		
					FROZEN	5
2	SAND (Till) - gravely, some silt/clay, poorly sorted, fine angular gravel, damp, compact, light brown/grey		2	●		
3	- 31 % gravel, 52 % sand, 17 % fines - Salinity: 8 ppt		3	●		10
4	SILT (Till) - too wet for recovery, possible ice lenses		4	●		
	BEDROCK - Dolomitic sandstone, dark grey, strong, medium grained, slightly weathered					15
5	END OF PROBEHOLE (4.9 m)					
6						20
7						25
8						
9						30
10						33

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LOGGED BY: KCK	COMPLETION DEPTH: 4.9 m
REVIEWED BY: TEH	COMPLETE: 8/18/2011
DRAWING NO:	Page 1 of 1

YELLOWKNIFE Y14101389.GPJ EBA.GDT 10/27/11

PROJECT: Geotechnical Evaluation for Hamlet Office	CLIENT: Pin/Taylor Architects	PROJECT NO. - BOREHOLE NO.
LOCATION: Site C; See Figure 1	DRILL: Air-rotary track-mounted	Y14101389 - PH06
CITY: Cambridge Bay	7667185N; 497770E; Zone 13	

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	STANDARD PENETRATION (N) 20 40 60 80 / POCKET PEN. (kPa) 100 200 300 400 / PLASTIC M.C. LIQUID 20 40 60 80	GROUND ICE DESCRIPTION	Depth (ft)
0	COBBLES (Till) - sandy, silty, some gravel, poorly sorted, sub-rounded cobbles, wet, medium plastic, medium brown		1		UNFROZEN	0
	37% cobbles, 25% sand, 25% silt, 13% gravel					
1			2		FROZEN	5
2			3			
3	END OF PROBEHOLE (3.0 m)					10
4						
						15
5						
6						20
7						
						25
8						
9						30
10						33

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LOGGED BY: KCK	COMPLETION DEPTH: 3 m
REVIEWED BY: TEH	COMPLETE: 8/18/2011
DRAWING NO:	Page 1 of 1

PROJECT: Geotechnical Evaluation for Hamlet Office	CLIENT: Pin/Taylor Architects	PROJECT NO. - BOREHOLE NO.
LOCATION: Site C; See Figure 1	DRILL: Air-rotary track-mounted	Y14101389 - PH07
CITY: Cambridge Bay	7667183N; 497787E; Zone 13	

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	TEMP (°C)	STANDARD PENETRATION (N) 20 40 60 80 / POCKET PEN. (kPa) 100 200 300 400 / PLASTIC M.C. LIQUID 20 40 60 80	GROUND ICE DESCRIPTION	Depth (ft)
0	SAND (Till) - gravely, some silt/clay, poorly sorted, coarse sand, angular fine gravel, moist, medium plastic, light brown					UNFROZEN	0
1			1		●		
						FROZEN	5
2			2		●		
	SAND (Till) - gravely, some silt/clay, poorly sorted, coarse sand, angular fine gravel, wet, compact, medium plastic, light brown - 32 % gravel, 49 % sand, 19 % fines (silt/clay) - Salinity: 8.0 ppt			3.9			
3	BEDROCK - Dolomitic sandstone, dark grey, strong, medium grained, slightly weathered						10
				-1.6			
4	END OF PROBEHOLE (4.0 m)						15
5							
6							20
7							25
8							
9							30
10							33

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LOGGED BY: KCK	COMPLETION DEPTH: 4 m
REVIEWED BY: TEH	COMPLETE: 8/18/2011
DRAWING NO:	Page 1 of 1

PARTICLE SIZE ANALYSIS TEST REPORT

ASTM C136 & D422

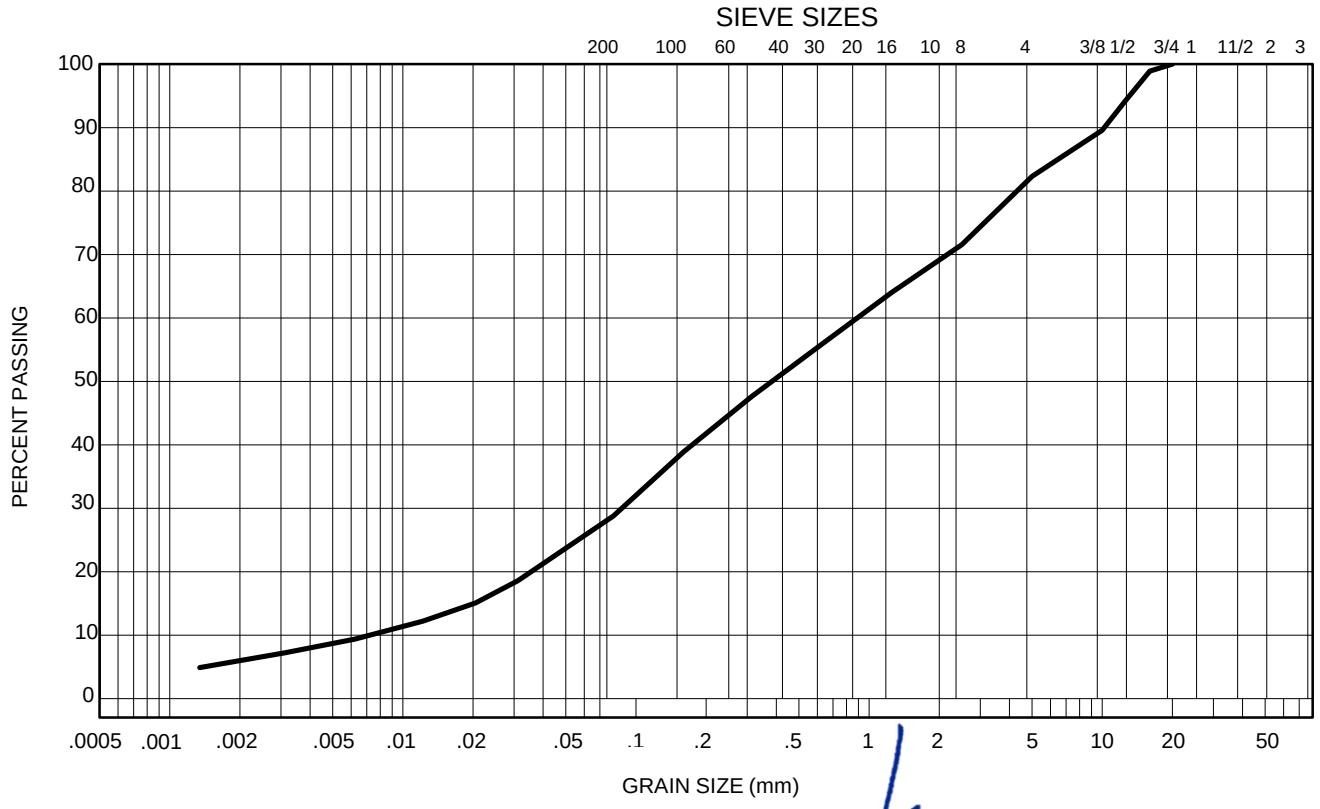
Project:	Geotechnical Evaluation for Hamlet Office, Cambridge Bay
Project No.:	Y14101389
Client:	Pin/Taylor Architects
Attention:	Simon Taylor
Date Tested:	Oct 4-5, 2011
Sample ID:	PH-01, S2
Depth:	1.8-2.0 m
Soil Index:	
Lab Number:	5554
Soil Description:	SAND, silty, some gravel, trace clay
Natural Moisture Content:	16.4%
Remarks:	

* The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The soil description is visually based, subject to EBA description protocols.

SIEVE SIZE (mm)	PERCENTAGE PASSING
40	
25	
20	100
16	99
12.5	94
10	90
5	82
2.5	72
1.25	64
0.63	56
0.315	48
0.16	39
0.08	29

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Reviewed By: _____

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PARTICLE SIZE ANALYSIS TEST REPORT

ASTM C136 & D422

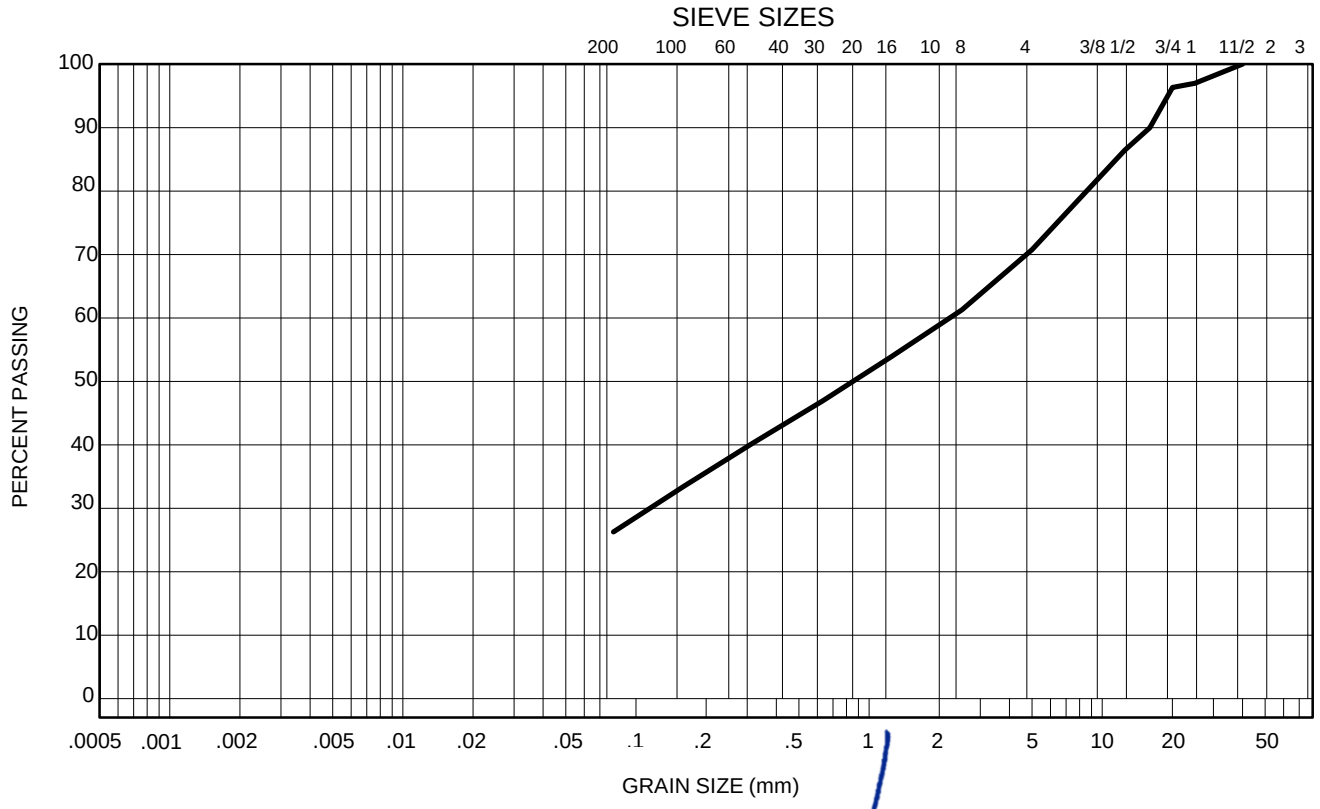
Project:	Geotechnical Evaluation for Hamlet Office, Cambridge Bay
Project No.:	Y14101389
Client:	Pin/Taylor Architects
Attention:	Simon Taylor
Date Tested:	September 1, 2011
Sample ID:	PH01- S03
Depth:	2.3-2.5 m
Soil Index:	
Lab Number:	5554
Soil Description:	SAND, gravely, silty, trace clay
Natural Moisture Content:	7.7%
Remarks:	

* The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The soil description is visually based, subject to EBA description protocols.

SIEVE SIZE (mm)	PERCENTAGE PASSING
40	100
25	97
20	96
16	90
12.5	86
10	83
5	71
2.5	61
1.25	54
0.63	47
0.315	40
0.16	33
0.08	26

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



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PARTICLE SIZE ANALYSIS TEST REPORT

ASTM C136 & D422

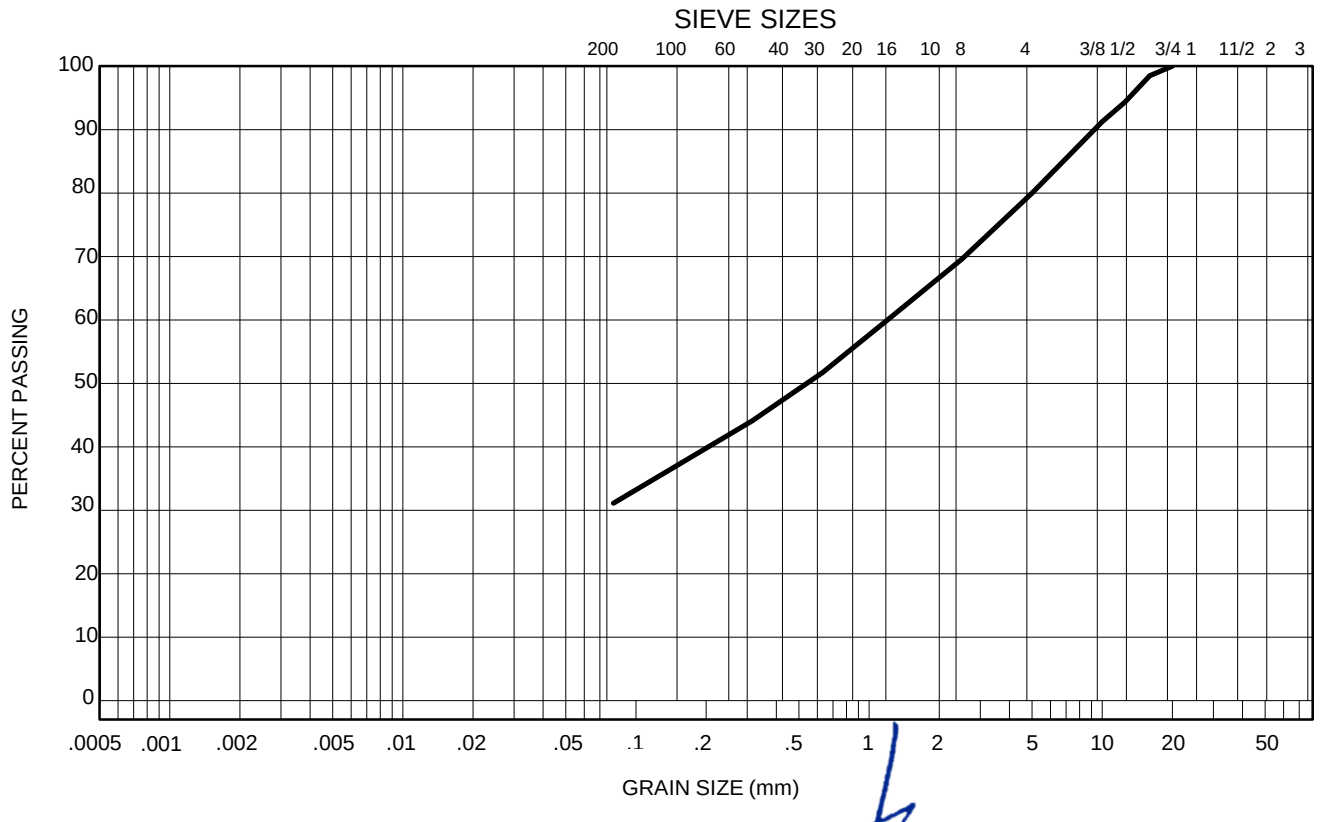
Project:	Geotechnical Evaluation for Hamlet Office, Cambridge Bay
Project No.:	Y14101389
Client:	Pin/Taylor Architects
Attention:	Simon Taylor
Date Tested:	September 2, 2011
Sample ID:	PH03- S02
Depth:	1.8-2.0 m
Soil Index:	
Lab Number:	5554
Soil Description:	SAND, silty, some gravel, trace clay
Natural Moisture Content:	7.7%
Remarks:	

* The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The soil description is visually based, subject to EBA description protocols.

SIEVE SIZE (mm)	PERCENTAGE PASSING
40	
25	
20	100
16	98
12.5	94
10	91
5	80
2.5	70
1.25	61
0.63	52
0.315	44
0.16	38
0.08	31

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



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PARTICLE SIZE ANALYSIS TEST REPORT

ASTM C136 & D422

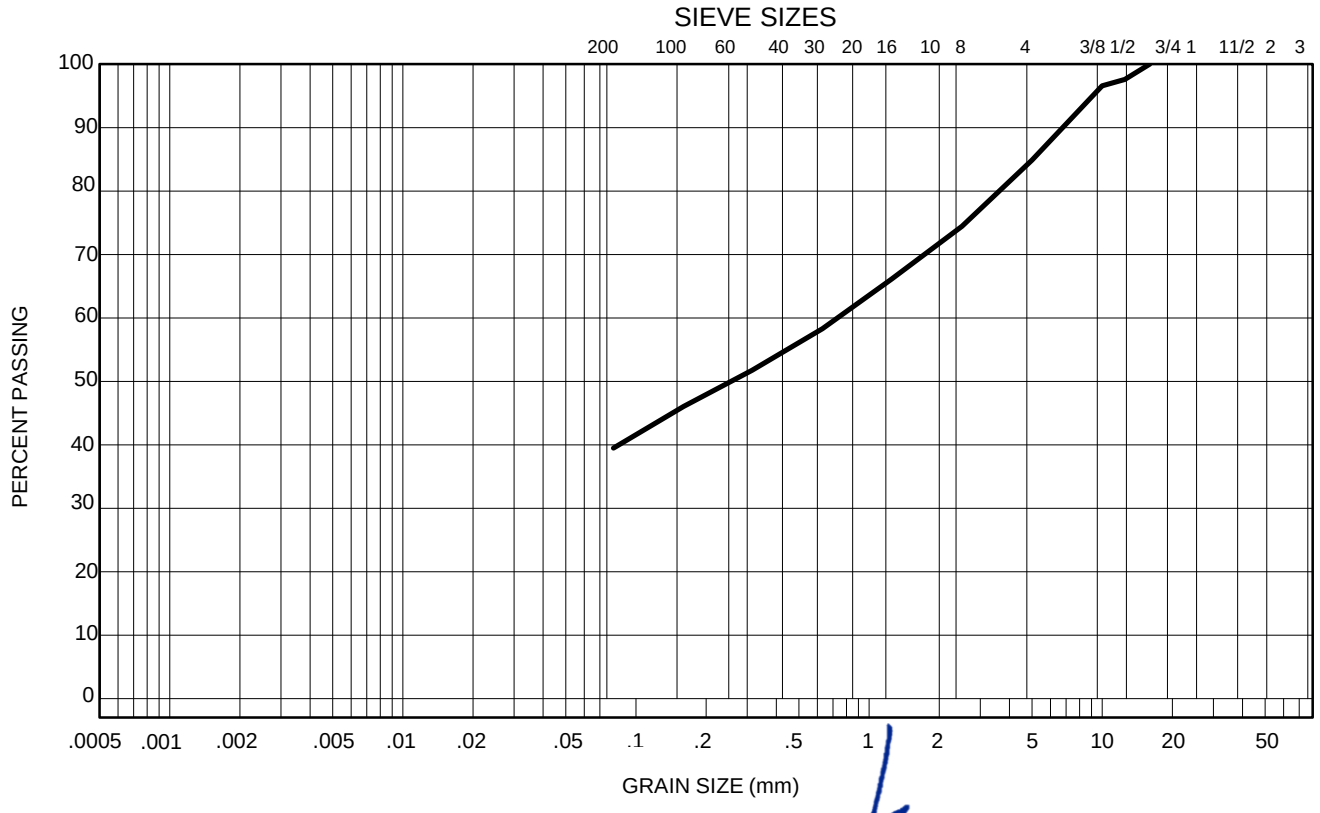
Project:	Geotechnical Evaluation for Hamlet Office, Cambridge Bay
Project No.:	Y14101389
Client:	Pin/Taylor Architects
Attention:	Simon Taylor
Date Tested:	September 1, 2011
Sample ID:	PH02- S02
Depth:	1.8-2.0 m
Soil Index:	
Lab Number:	5554
Soil Description:	SAND and SILT, some clay, some gravel
Natural Moisture Content:	8.8%
Remarks:	

* The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The soil description is visually based, subject to EBA description protocols.

SIEVE SIZE (mm)	PERCENTAGE PASSING
40	
25	
20	
16	100
12.5	98
10	97
5	85
2.5	74
1.25	66
0.63	58
0.315	52
0.16	46
0.08	40

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



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PARTICLE SIZE ANALYSIS TEST REPORT

ASTM C136 & D422

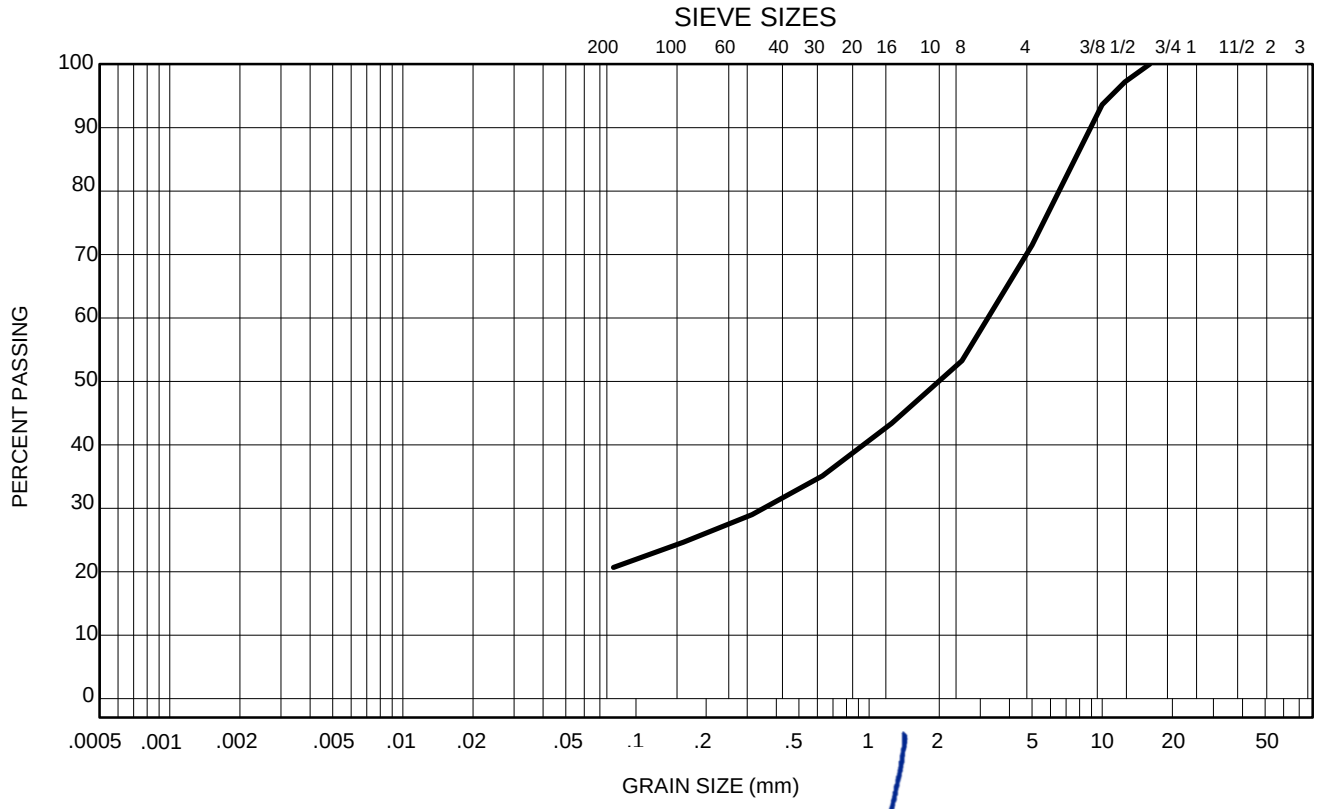
Project:	Geotechnical Evaluation for Hamlet Office, Cambridge Bay
Project No.:	Y14101389
Client:	Pin/Taylor Architects
Attention:	Simon Taylor
Date Tested:	September 2, 2011
Sample ID:	PH04- S02
Depth:	2.8-3.0 m
Soil Index:	
Lab Number:	5554
Soil Description:	SAND, gravely, some silt, trace clay
Natural Moisture Content:	6.3%
Remarks:	

* The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The soil description is visually based, subject to EBA description protocols.

SIEVE SIZE (mm)	PERCENTAGE PASSING
40	
25	
20	
16	100
12.5	97
10	94
5	71
2.5	53
1.25	43
0.63	35
0.315	29
0.16	25
0.08	21

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



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PARTICLE SIZE ANALYSIS TEST REPORT

ASTM C136 & D422

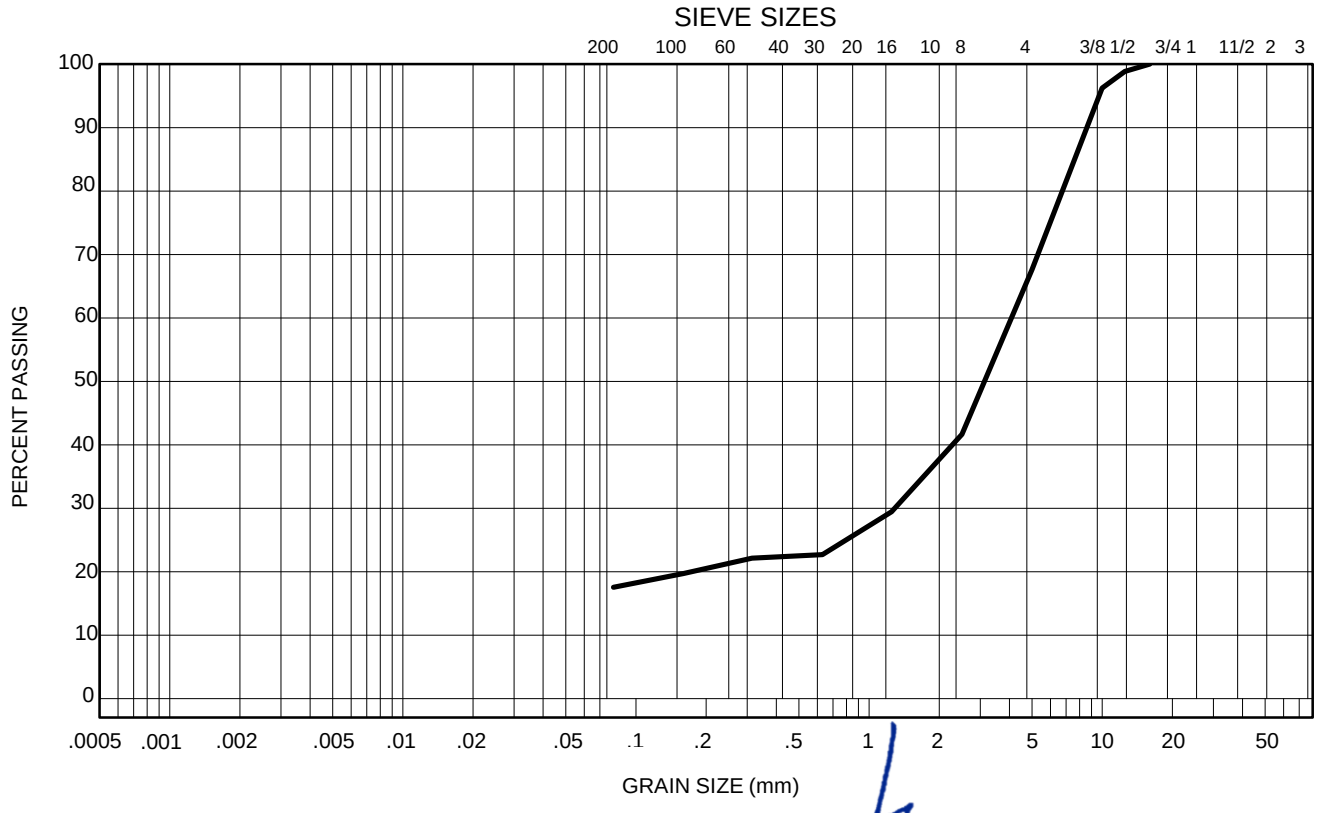
Project:	Geotechnical Evaluation for Hamlet Office, Cambridge Bay
Project No.:	Y14101389
Client:	Pin/Taylor Architects
Attention:	Simon Taylor
Date Tested:	September 2, 2011
Sample ID:	PH05- S03
Depth:	2.8-3.0 m
Soil Index:	
Lab Number:	5554
Soil Description:	SAND, gravely, some silt, some clay
Natural Moisture Content:	5.4%
Remarks:	

* The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The soil description is visually based, subject to EBA description protocols.

SIEVE SIZE (mm)	PERCENTAGE PASSING
40	
25	
20	
16	100
12.5	99
10	96
5	68
2.5	42
1.25	29
0.63	23
0.315	22
0.16	20
0.08	18

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



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PARTICLE SIZE ANALYSIS TEST REPORT

ASTM C136 & D422

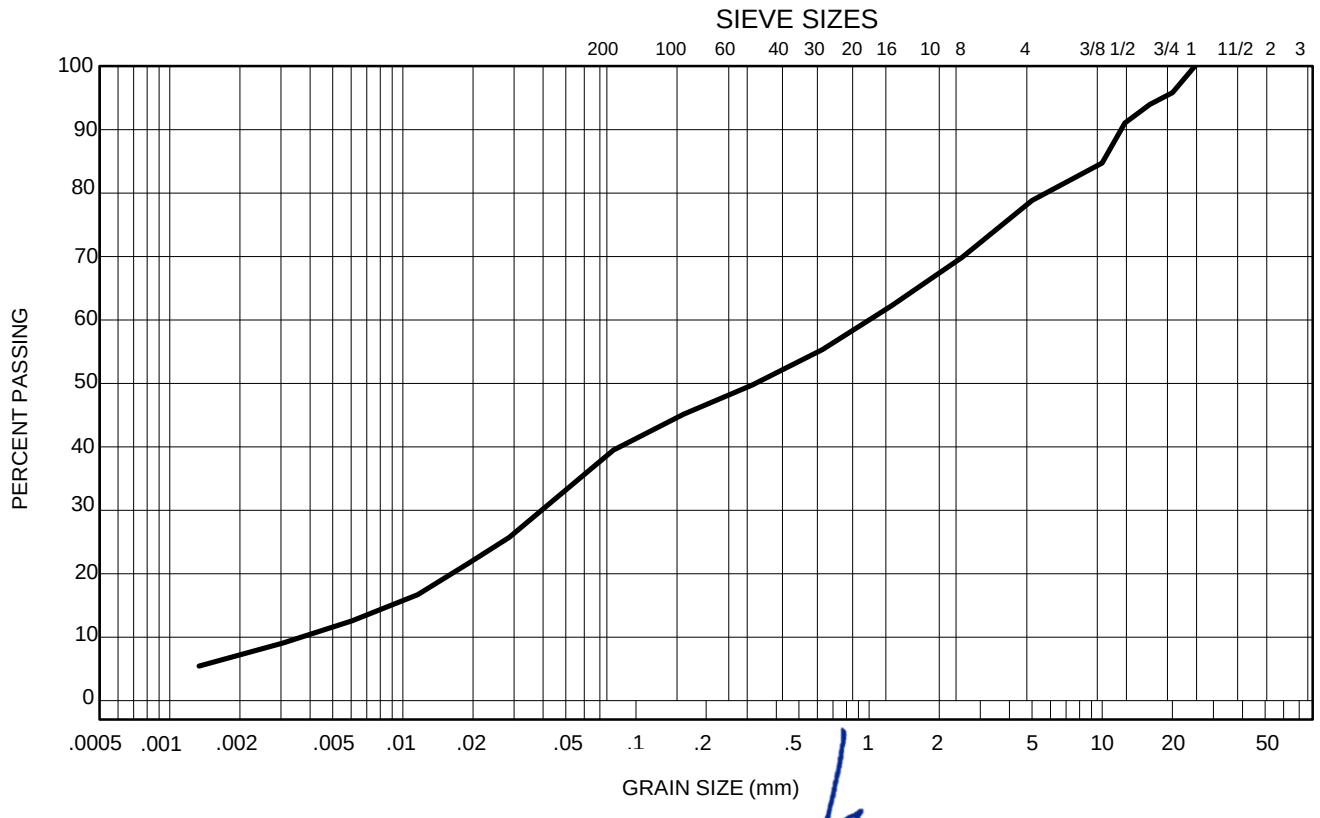
Project:	Geotechnical Evaluation for Hamlet Office, Cambridge Bay
Project No.:	Y14101389
Client:	Pin/Taylor Architects
Attention:	Simon Taylor
Date Tested:	Oct 4-5, 2011
Sample ID:	PH-06, S1
Depth:	0.1- 0.3 m
Soil Index:	
Lab Number:	5554
Soil Description:	SAND, silty, gravelly, trace clay, with org. material
Natural Moisture Content:	9.8%
Remarks:	

* The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The soil description is visually based, subject to EBA description protocols.

SIEVE SIZE (mm)	PERCENTAGE PASSING
40	
25	100
20	96
16	94
12.5	91
10	85
5	79
2.5	70
1.25	62
0.63	55
0.315	50
0.16	45
0.08	40

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



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PARTICLE SIZE ANALYSIS TEST REPORT

ASTM C136 & D422

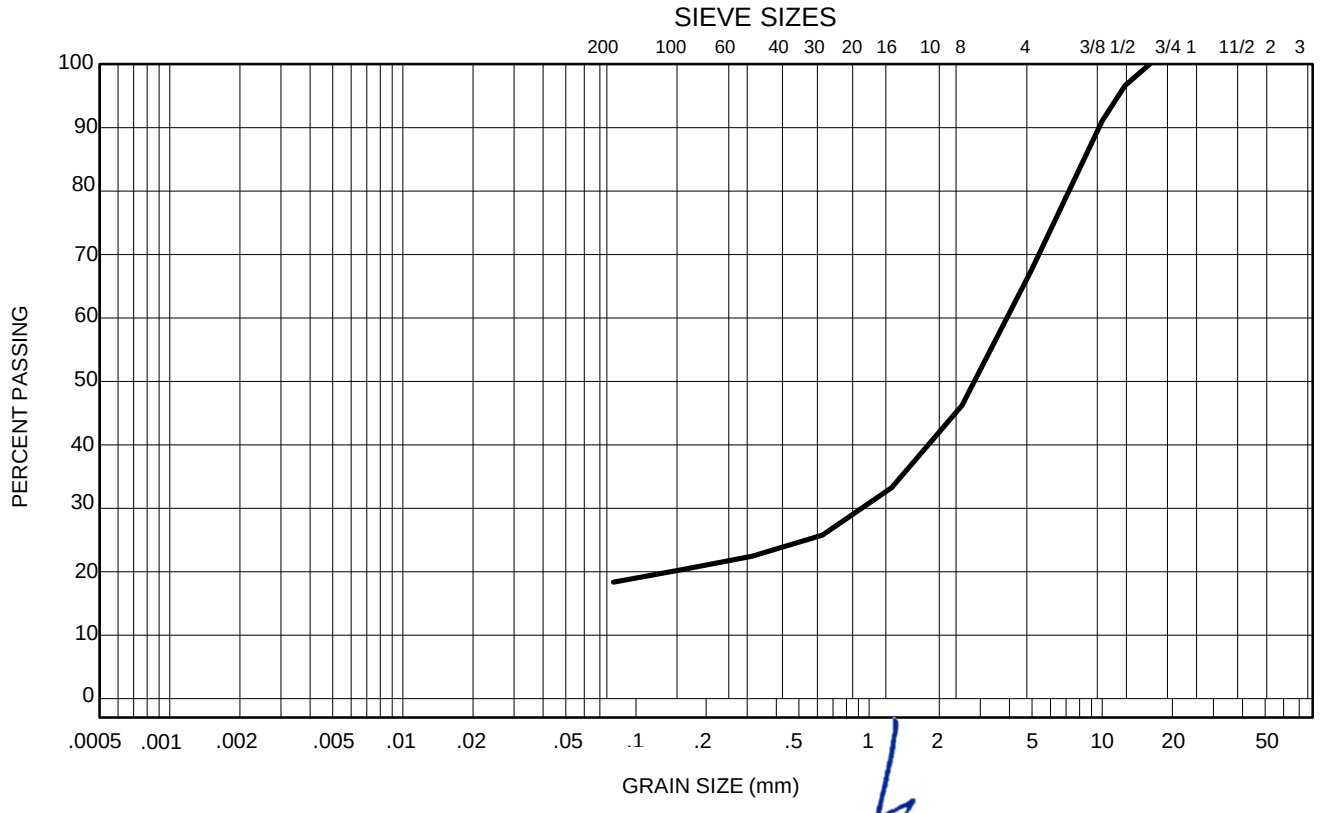
Project:	Geotechnical Evaluation for Hamlet Office, Cambridge Bay
Project No.:	Y14101389
Client:	Pin/Taylor Architects
Attention:	Simon Taylor
Date Tested:	September 1, 2011
Sample ID:	PH07- S02
Depth:	1.8-2.0 m
Soil Index:	
Lab Number:	5554
Soil Description:	SAND, gravely, trace silt, trace clay
Natural Moisture Content:	7.0%
Remarks:	

* The upper clay size of 2 µm is as per the Canadian Foundation Manual.

** The soil description is visually based, subject to EBA description protocols.

SIEVE SIZE (mm)	PERCENTAGE PASSING
40	
25	
20	
16	100
12.5	97
10	91
5	68
2.5	46
1.25	33
0.63	26
0.315	22
0.16	20
0.08	18

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



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APPENDIX ‘H’ - APPROVED SURVEY SKETCH WITH LOTS IDENTIFIED