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February 18, 2026

Addendum No. 02

File Reference Number: RFP 2025 121

Title: Cochrane Sand Tower Modifications - Catwalk & Stairs

RE: Clarifications/Questions

QUESTIONS/CLARIFICATIONS:

Item 1: Please see attached Auxilliary Locate Sheet dated January 29, 2026, attached at Appendix "A" of this Addendum No. 02.

Item 2: Please also see attached revised Geotechnical Investigation Report of Shaba Testing Services Ltd. dated February 2, 2026, attached at Appendix "B" of this Addendum No. 02.

The RFP Documents have been revised and sections affected are noted below. The revised RFP sections supersede all previous RFP Document versions for the said documents.

Appendix I - Reference Documents

Delete Document:	Replace with Revised Document:
Geotechnical Investigation Report	Geotechnical Investigation Report (Addendum No. 02)

This Addendum hereby forms part of the RFP.

Regards,

Brinda Ranpura
Procurement Contracts Specialist
brinda.ranpura@ontarionorthland.ca

APPENDIX “A”

Auxilliary Locate Sheet

WLADCONSTRUCTION.COM

JOHN WLAD & SONS CONSTRUCTION LTD.
P.O BOX 725, IROQUOIS FALLS A, ONTARIO
P0K 1GO (705) 232-6782 · FAX (705) 232-7106

Utilities Marked	☒ Gas ☐ Water ☒ Hydro ☐ Telecom ☐ Street Lighting ☐ Other _____	Request No.
		Request Date: JAN. 14 2026
Location 326 2nd Street. Cochrane		Date Located: JAN 29 2026

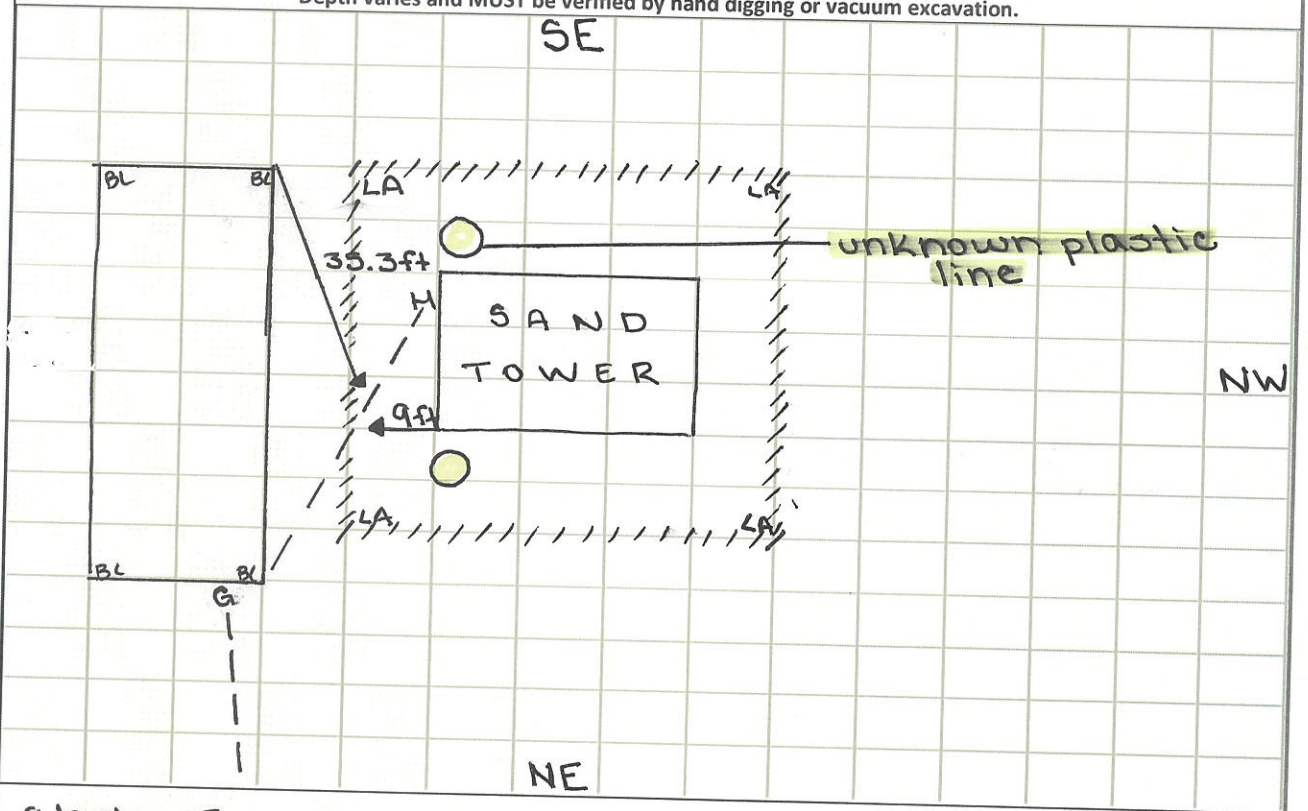
LOCATED AREA: EXCAVATOR SHALL NOT WORK OUTSIDE THE LOCATED AREA WITHOUT OBTAINING ANOTHER LOCATE
LOCATED AREA HAS BEEN ALTERED AS PER: _____

LEGEND

Building Line	— BL—
Fence Line	— FL—
Face of Curb	— CL—
Road Edge	— RE—
Property Line	— PL—
Locate Area	— LA—
Driveway	— DW—
Catch Basin	CB
Sidewalk	SW
Demarcation	DM
Railway	--------
Pole	O
Flush to Grade Pedestal	FTG
Pedestal	X
Bell Buried Cable	— B —
Bell Conduit	— C —
Bell buried Service Wire	—BSW—
Manhole	MH
Gas Main	— GM—
Gas Service	— GS—
Gas Valve	▶◀
Hydrant	O
Transformer	▲
Hydro	— H —
Hydro Pole	X
Street light Cable	— SL—
////// - locate area	

Hand dig cautiously within 1m as measured horizontally from the field markings to avoid damaging the underground utilities. If you damage the plant, you may be held liable.

If you damage underground plant, contact the utitity owner immediately.
Depth varies and MUST be verified by hand digging or vacuum excavation.



Type Of Plant	Shaba Testing - hole drilling for catwalk installation.
Marking	☒ Paint ☐ Stakes ☐ Tape
Given By	Signature: Jon Milutt — Date: JAN. 29 — Time: 1100 am
Notes	48 hours notice required It is understood that the above information has been provided from our records, and represents our knowledge of the approximate location or indicated plant only; the contractor should request stake-outs from other utilities to establish the location of their plant. The responsibility is that of the contractor to exercise caution where mechanical equipment is used in the vicinity of the underground plant and where necessary to locate by hand its actual position; liability for damage rests with the contractor.
Accepted By	Signature — Title Company

APPENDIX “B”

Geotechnical Investigation

ONR Yard -Sand Tower Catwalk and Stairs Foundation -ONR Yard -Cochrane, Ontario

Prepared for:

Mark Dubeault
Facilities Specialist
200 Railway St., PO Box 1926
Cochrane, Ontario

Prepared by:

Shaba Testing Services Ltd.
77 Government Road,
Kirkland Lake, Ontario.

Project No.:

STS 2026-0001 -Rev-01

February 2, 2026

EXECUTIVE SUMMARY

Under the authorization of Mark Dubeault of Ontario Northland, Shaba Testing Services Ltd. conducted a geotechnical investigation at the ONR Yard in Cochrane, Ontario. The purpose of the investigation was to assess geotechnical parameters in the areas where the proposed Sand Tower Catwalk and Stairs foundation will be located.

The scope of work entails the following:

- Conducting a drilling investigation by the advancement of four (4) exploratory geotechnical boreholes.
- Carry out laboratory analyses on selected soil samples to assess the geotechnical parameters
- Presentation of the results of the filed exploration in a geotechnical investigation report with recommendations for bearing capacities and other relevant parameters.

The site visit took place on Monday, February 2, 2026. Four boreholes (BH-01 to BH-04) were excavated within the footprint of the foundation for the Sand Tower catwalk and stairs.. The borehole locations are as identified on the attached sketch of the site plan in appendix B of this report.

The stratigraphic profile encountered with increasing depth in the probes generally consisted of: firm to compact granular fill, and brown to grey firm to stiff silty clay. Bedrock surface was not encountered at the depth of 4.57 meters below grade (mBGS) , (15ft) or 6.0 mBGS, in any of the boreholes.

Dynamic Cone Penetrometer Testing was carried out in BH-01 to a terminal depth of 15 mBGS.

Both granular fill soil and the silty clay soil samples were collected and submitted for laboratory analyses of some or all of the following parameters: Moisture Content, Atterberg Limits, Grain size Analysis, Grain Size Analys – Hydrometer Method for the silty clay, Proctor and Density. The soil observed and collected was similar in all the boreholes.

Slightly wet conditions were encountered, but not ground water table, in some of the silty clay soil samples at deeper elevations in a few boreholes.

Geotechnical design parameters and construction information for foundations and related features will be as provided. Environmental Considerations are not part of the scope of this report.

Table of Contents

Appendices:

Appendix A: Site Photo Gallery.

Appendix B: Sketch of the proposed Sand Tower

Appendix C: Borehole Summary and Borehole Logs

Appendix D: Selected Laboratory Test Results.

Appendix E: OPSD 3090.100 Foundation Frost Penetration Depths in Northern Ontario .

1.0 INTRODUCTION

Under the authorization of Mark Dubeault of Ontario Northland, Shaba Testing Services Ltd. conducted a geotechnical investigation at the Ontario Northland Yard in Cochrane, Ontario. This is the site for the proposed Sand Tower Catwalk and Stairs The purpose of the investigation was to assess geotechnical parameters such as subsoil and groundwater conditions in the areas where the Sand Tower Catwalk and Stairs will be located. The site location and regional topographic features are shown in Appendix B. A site plan sketch of the area ,showing the borehole locations is presented as well. Borehole -01 (BH-01) was advanced to a depth of 6.0 meters below grade(mBGS). BH-02 to BH-04 were advanced to a depth of 4.57 mBGS each.

The two soil strata encountered include compact to dense granular fill – with gravel and sand , and firm to stiff stratum of brown / varved silty clay.

Dynamic Cone Penetration Testing (DCPT) was carried out from the 6.10 mBGS ,(20 ft) auger depth to a terminal depth of 15.0 (mBGS) in BH-01.

1.1 Description of Subject Property

The area for the location of the Catwalk and Stairs is as shown below in Google® Image #1 below.

Image #1- The Sand Tower Catwalk and Stairs Location

Photo #1- Sand Tower area

1.2 Proposed Development

The proposed development for this area is a Sand Tower Catwalk and Stairs. Ground surface elevations were unavailable at the time of this report; hence there was no geodetic reference of the grade and the soil strata. The foundation, still to be finalized, may consist of strip footings, grade beams and slab on grade on compacted granular materials. Other foundation design options are presented here and can be found in section 4 of this report.

2.0 METHODOLOGY

2.1 General

The investigation was conducted in general compliance with the Geotechnical Engineering Practices and subsequent discussions with the project coordinator. Investigation procedures also followed generally accepted geotechnical engineering practices.

2.2 Field Activities

The field activities were carried out on Monday, February 2, 2026, by Shaba Testing Services (STS) crew and Landcore Drilling, Chelmsford, Ontario. Three boreholes were advanced to 4.57 mBGS, and one borehole to 6.10 mBGS. A DCPT was carried out in BH-01 to a depth of 15 mBGS.

Drilling and soil sampling was completed using a truck-mounted drill rig operating under the supervision of experienced STS crew. The boreholes were advanced to the sampling depths by means of continuous flight hollow stem augers until refusal. Standard Penetration Test (SPT) N values were recorded for the sampled intervals as the number of blows required to drive a split spoon sample of 305 mm into the soil, with the aid of 63.5 kg drop hammer falling 750 mm as per the ASTM D 1586 procedure. SPT N values that exceeded 50 blows for 305 mm of penetration would be regarded a refusal.

Soil samples were obtained using SPT procedures at selected intervals with a 50 mm diameter split spoon sampler. Groundwater conditions in the open boreholes were observed throughout the drilling operations.

The boreholes were advanced to the depths indicated to refusal as shown in our borehole logs. See also Photos #2 to #4 below. Two soil strata were encountered. They are granular materials of sand with gravel, with trace of organics, compact to dense in consistency, and grey/brown silty clay soil, firm to stiff in consistency, at the termination depths indicated on the borehole logs.

In addition, bagged soil samples of the granular fill and the silty clay were recovered from each of the boreholes. They were texturally classified in the field. The samples were packaged and transported to our laboratory for further analysis. No bedrock was encountered in any of the boreholes. See Appendix C for the borehole logs and Table 2.2 below for termination depth summary.

Photo #2- Drilling through granular Fill- BH-02.

Consistent with the requirements of Geotechnical Engineering practices, all boreholes were barricaded during drilling. After drilling, all boreholes were backfilled with a bentonite meeting the requirements of the Ministry of Environment, Conservation and Parks Regulation 903.

Table 2.2 – Termination Depth Summary

Bore hole #	**Ground Elevation**	**Drill Depth**		**DCPT**
	(m)	**(m)**	**(ft)**	**(m)**
BH-01	Not Provided	6.10	20.0	To 15.0. mBGS
BH-02	Not Provided	4.57	15.0	N/A
BH-03	Not Provided	4.57	15.0’	N/A
BH-04	Not Provided	4.57	15.0’	N/A

Photo #3- SPT ‘N’ in progress – BH-03.

Photo #4- Granular fill in BH-04

2.3 Laboratory Analyses

All soil samples were analyzed for moisture content, visual classifications and description of all soil samples in accordance with the Unified Soil Classification System (USCS). Grain size analyses, proctor determination and Atterberg Limits were performed on various samples. The minimum number of laboratory tests was set at 25 percent of the samples collected. Low complexity soil tests were completed at our laboratory. A summary of the Test Methods and Procedures are shown in Table 2.3.

Table 2.3 - Test Methods and Procedures

Test	ASTM Standard	Number of samples/test pits
Natural Moisture Content	ASTM D-2216	4
Grain Size Analysis	ASTM D-422	4
Hydrometer Analysis	ASTM D-422	4
Atterberg' Limits	ASTM D-4318	2
Direct Shear Strength	ASTM D -2166	0
Consolidation Test	ASTM D-2435/D-2435M-11	0
Moisture Density	ASTM D-698	2

3.0 FINDINGS

3.1 Geology

The geology of this site was not investigated during this field investigation.

3.2 Stratigraphy, Groundwater Conditions and Laboratory Test Results

Detailed stratigraphic description, field test results, soil moisture contents, and Atterberg Limits are presented in the test pit logs in Appendix C.

The stratigraphic profile encountered with increasing depth in the bore holes generally consisted of compact to dense granular fill and firm to stiff silty clay.

3.2.1 Granular Fill

The surface layer in all BHs consisted of 0.0 m to 2.44 (mBGS)m (0-ft to 8 ft) of compact to dense granular fill of silty sand and gravel. The SPT " N " values measured in the granular fill

deposit ranged from 23- 54 blows per 0.3 m of penetration indicating these materials are in a compact to very dense state. See photo #5 below.

The Standard Proctor Maximum Dry Density is 2348 kg/m^3 at 6.1 % kg/ m^3 ; the granular fill gradation is indicated in Table 3.1 below.

Table 3.1- Results of Grain Size Analyses for Silty Sand with Gravel

Borehole No.	Sample Depth./ (Elevation, m)	Grain Size Distribution		
		% Gravel	% Sand	%silt & Clay
BH-01	1.4 m	49.0	43.0	13
BH-03	1.2 m	51.0	40.0	9.0

The Atterberg's limits tests for two samples, one from BH-01 and one from BH-04 , the granular fill yielded the following

Liquid limit (W_L)	Non plastic
Plastic Limit (W_P)	Non plastic
Plasticity Index (I_P)	Non plastic

From the USCS Classification Chart, the samples may be classified as GP- not well graded gravel.

Wet conditions, and ground water table, were encountered not at all termination depths as shown on the bore hole logs in appendix C of this report.

Photo #5- Granular fill

3.2.2 Silty Clay (2.44 m – 4.57 and 6.10 m BH-01)

Underlying the granular fill, in all boreholes, was a layer of brown and/or gray silty silt. This layer was encountered at a depth of 2.44 to 6.10 mBG) in BH-01, and 2.44 to 4.57 mBGS in BH-02, BH-03 and BH-04.The sample gradation is shown in Table 3 .1 below. The inferred Standard Penetration Test (SPT) "N" was in the range of 4 to 1 per 0.3 m of penetration. Based on the SPT "N" values and manual examination of the silty clay soil, the silty clay is firm to stiff consistency.

Atterberg Limits were carried out on a single sample of the silty clay. The results yielded a Liquid limit of 28.3%, Plastic Limit of 19.8 %, and plasticity Index of 8.5 %. This is CL-Inorganic clay of medium plasticity. Results are shown in Appendix D of this report.

The moisture content is the range of 22.0 % to 24.3 %. The Standard Proctor Maximum dry density is 1648 kg/m at 22.3 % moisture content.

Undrained unconfined shear strength was determined by the Unconfined Direct Shear Tests, which ranged from 60 to 120 kPa for the lab test, indicating the consistency of the moist silty clay deposit to be firm to stiff at 4.57 m depth.

Photo #6- Brown silty clay sample – BH-04

3.3 Dynamic Cone Penetration Test (DCPT) –(6.10 m to 15.0 m)

Dynamic Cone Penetration Testing(DCPT) was carried out in BH-01 location. It was advanced from 6.10 mBGS to 15 mBGS depth. The values indicate soft to firm silty clay from 6.10 m mBgs to 8.10 mBGS, and from 8 mBGS to 15 mBGS, the silty clay has firm to stiff consistency.

3.4 Groundwater Conditions

Groundwater conditions were not observed in any of the boreholes at the time of tis field exploration. However, it should be noted that groundwater levels may fluctuate seasonally, and in response to climatic conditions.

4.0 DESIGN AND CONSTRUCTION RECOMMENDATIONS

4.1 General Design Parameters

Soil conditions and recommended parameters for general design are summarized in the following Table 4.1 below.

Table 4.1- General Design Parameters for soil samples

Summarized Soil Conditions			Design Parameters		
Description	**Depth (m)**	**Minimum SPT "N" Value**	**Cohesion C_u (kPa)**	**Friction Angle A (degrees)**	**Density (kg/m^3)**
Granular Fill	<2.44	28	0	31	2348
Silty Clay	> 2.4	9	15	26	1664

4.2 Foundations

The soil conditions and bedrock on the site is ideal for shallow foundation design. The foundation could bear on granular backfill or the silty clay till with modification.

4.2.1 Shallow Foundation - Footing on Compacted Subgrade & Conventional Spread or Strip Footing.

Pending final grades, Spread or strip footing can be constructed on engineered fill soils overlying the silty clay deposit. Such footings founded on engineered fill can be designed with a

factored geotechnical resistance at ULS of 220 kPa using a geotechnical resistance factor of 0.5 in accordance with the Canadian Foundations Engineering Manual, 4th Edition - table 8.1 on page 139. An SLS resistance of 100 kPa is recommended. Such footings are expected to settle less than 25 mm (1 in) total and 20 mm (¾ in) differential.

The general subgrade recommendations for footings on compacted subgrade are as follows:

- Excavate and remove the entire existing and underlying fill within the zone of influence of the foundation to a depth of 1.8 m (6.0 ft) or until the compacted fill or the native silty clay is encountered.
- Once exposed, the fill / or silt subgrade must be inspected and confirmed by our engineer.
- Some areas may require deeper excavations to remove any deleterious materials and achieve an acceptable silty sand subgrade.
- The granular fill or the brown silty clay encountered on the site may have to be covered with geotextile filter fabric. The geotextile filter fabric should be over lapped be approximately 0.30 m (1 ft) at the joints.
- Place approximately 150 mm of granular A- to be proof –rolled only.
- The granular A must conform to OPSS SP110S13 (formerly Form 1010)
- For the conventional footing construction, i.e., strip foundation, the footing can bear on the compacted granular A material. An allowable bearing capacity of 220 kPa at the frost protection depth will suffice for footings 0.2.0 m (2 ft to 6 ft) wide.
- These footings should be underlain by a minimum of 1.2 m (4 ft) of fill, and have widths in the range of 0.5 to 1.0 m (1.5 ft to 3 ft).
- The vertical Modulus of Subgrade Reaction for the dense granular fill is estimated 80 Mpa/m.
- Any granular material to be used as engineered fill on this site must be tested.
- The fill must extend beyond the edge of the footing for a distance equal to the fill depth.
- Adequate drainage must be provided-that is, perimeter weeping tile.
- Also, adequate frost protection is essential in this part of the north. The frost depth is typically 2.4 m in Cochrane.
- Perimeter insulation should be provided to prevent frost penetration, especially for slab on grade. For every 25 mm (1 in) of SM, it translates into 300 mm (1 ft) of frost protection.

- Two layers of insulation (high-density polystyrene, HI 40 SM) is recommended. One layer to be 1.8 m (6 ft) out, the top layer to be 1.2 m (4 ft) out from the foundation structure.
- Excavations may encounter some seepage from low lying areas of the site, and this water should be removed with continuous pumping action while backfilling.
- Excavations should be constructed in accordance with the Occupational Health and Safety Act, taking into account the possibility of any unstable fill materials.
- Backfill against the foundation wall should be free draining, engineering fill that conforms to the Ontario Provincial Standards Specifications (OPSS) 1010.

4.2.2 Foundation of Bedrock (if required)

Although bedrock was not encountered in any of the boreholes, the following are presented just in case. Where the bedrock surface is encountered and it is to be utilized, the footings for the piers can bear on the bedrock directly. Footings bearing on the rock or grouted rock anchors or rock dowels would be a suitable foundation system. Rock anchors, if installed, should be sleeved in the upper 1 m (3 ft) to prevent adhesion through this zone. The maximum allowable bearing pressure for footings founded on sound bedrock would be 2 MPa **(WSD)** as indicated in Table 4.2.2 below. The maximum allowable adhesion for rock anchors in compression or tension would be 700 KPa (14600 psf). In accordance with Table 9.3 on page 147 of the Canadian Foundation Engineering Manual.

For rock anchors, the required bond length (L) is the most critical calculation. The length, L, in meters is a function of the core hole diameter (d), and the equation for calculation as a s follows:

$$L = P / (\prod \times d \times \zeta)$$

L= embedment length (m)

P= Load capacity of rock anchors, (kN)

$\prod = 3.14$

The d = core hole diameter (m)

The ζ = allowable adhesion stress (Kpa)

An example to determine the embedment required for #35 M bar in 50 mm diameter hole will be calculated as follows:

$$T_{r35\ M} = 0.85 \times (1000\ mm^2) \times 400Mpa / 1000 = 340\ kN\ (7100\ psf)$$

340 kN is the resistance of the 35 M bar. (1 ¼ in)

$C = \prod x\ d = \prod x\ (50\ mm)^2 = 157\ mm = 0.157\ m\ (6\ in)$

Embedment Required = L = 340 kN/ (700 Kpa x (0.157 m) = 3.1 m. (1 ft)

Pull out tests are normally required during construction of rock anchors, and they are strongly recommended here.

In summary, the following design parameters are recommended:

Table 4.2.2- Foundation Design Parameters

PARAMETER	VALUE[I]
N, c_u, and density	See table above
Allowable design bearing pressure for spread or augered footing / piers on bedrock (if encountered)	2 MPa
Allowable design bearing pressure for compacted sub grade	(100 kPa) (WSD) OR
Design bearing pressure for compacted sub grade in ULS	220 kPa (ULS)
Design bearing pressure for compacted sub grade in SLS	100 kPa (SLS)
Recommended Geotechnical Resistance factor	0.5 for SLS
Frost Penetration Depth	2.4 m

4.3 Seismic Design

With respect to seismic design and the 2024 Ontario Building Code (O. Reg. 350/06 under the Building Codes Act), Table 4.1.8.4.A, which covers average properties in the upper 30 m, the site would be considered as Class D – Stiff Soil. The four values of the Spectra response acceleration Sa (T) for different periods and the Peak Ground Acceleration (PGA) can be obtained from 2012 Building Code for housing Supplementary Standard SB-1 Table 1.2. The

design values of Fa and Fv for the project site should be calculated in accordance with Table 4.1.8.4 B and C.

The minimum earthquake force V calculation, as provided by the Ontario Building Code, is stated below:

V = v. S.I.F. W.

From a geotechnical point of view, the factors of importance, v and F, at this site can be taken as 0.05 and 1.0, respectively. However, these values be reviewed by the structural engineer.

4.3.1 Snow Load Design

With respect to the snow load, the climatic data for 1/50-year snow load for Cochrane, Ontario is as follows: The ground snow load is 2.8 kPa , rain load is 0.3 kPa,

4.3.2 Slab–on-Grade/ Grade Beam Design Considerations

For the construction of slabs-on-grade and/or grade beam , the engineering fill encountered on site would be suitable as subbase. Slab on grade can be constructed on engineered fill, hence. the slab on grade founded on engineered fill can be designed with a factored geotechnical resistance at ULS of 220 kPa using a geotechnical resistance factor of 0.5. An SLS resistance of 100 kPa may be used. In working stress design (WSD) the allowable bearing capacity will be 150 kPa .The expected settlements will be less than 25 mm total and 20 mm differential.

All required fill below the slab and/or grade beam must be of granular B type I or type II to be placed in a lift not exceeding 0.60 m (2 ft). All engineered fills must conform to Ontario Provincial Standards (OPSS) 1010. The granular B must be compacted to 98 % Standard Proctor Maximum Dry Density (SPMDD) with a moisture content not deviating by 2 % from the Optimum Moisture Content (OMC). The granular A must be compacted to 100 percent SPMDD. All engineering fill must extend 1.5 m laterally, beyond the edge of the foundation and with a slope of one vertical to three horizontal (1V:3V).

In areas where special floor systems, such as tiles, are utilized, or where floor coverings use adhesives, a vapor barrier may be required.

4.3.3 Lateral Earth Pressures

Any foundation and walls must be designed to resist lateral earth pressure. For initial design, the lateral earth pressures P in kPa at any depth h of a permanent retaining wall is given by the following expression:

$P = k (\gamma h + q) + y_w h$

P = lateral earth pressure in kPa

K = coefficient of earth pressure 9 active or passive) Rankine or Coulomb

γ = Gamma = the unit weight of backfill (kN/m^3)

y_w = unit weight of water (9.81 kN/m^3)

h = depth to point of interest, m

q = surcharge load in kPa acting adjacent to the wall at the ground surface

Table 4.3.3 below is the list of various estimated earth pressure.

Table 4.3.3 - Typical backfill Properties.

Soil Type	Angle Of internal Friction, Degrees,Θ	Soil Unit Weight kN/m^3	Earth Pressure Coefficient, k		
			Active k_a	Passive k_p	At rest k_o
Granular A	37	22	0.25	4.0	0.38
Granular B Type I	34	21	0.28	3.7	0.42
Granular B Type II	37	21	0.24	4.2	0.38

4.3.4 Site Drainage

Slab-on-grade or raft /mat structures with the floor level at or above the surrounding ground surface, and the ground surface sloping away from the structure, will not require perimeter tile drains.

4.3.5 Insulation

The degree days below 18 °C is 6400 in Cochrane, Ontario. There is a potential for up to 2.5 m of frost penetration to occur in unprotected areas during winter months. See OPSD 3090.100-Foundation Frost Penetration Depths for Northern Ontario in Appendix E of this report. Those

areas include roadways and parking lot. Foundation for heated structures should be provided with a minimum of 2.0 m of earth cover. Alternatively, the exterior of the foundation wall, grade beam /pile caps must be insulated with two layers of insulation (i.e. Styrofoam HI-35 or equivalent), extended 1.2 m (4ft) outwards and another layer extended outward for1.8 m (6 ft.).

4.3.6 Pipe Bedding and Trenching for Pipes (If required)

If required, the depth of services installation to be in order of 1.3 to 1.5 m below the existing grades or as required by the local by-laws. The entirety of the trench will be in the moist grey-to brown sandy silt zone. The sandy silt should provide a reasonable structural support for the trench, the bedding, cover and pipe installation. Bedding and pipe installations are to be in accordance with the relevant OPSDs and /or municipal bedding detail specifications and standards in the tender document. In most cases, either Class C or Class B bedding will be adequate. Typically, granular A materials are used for bedding up to the spring-line and sometimes 300mm above the crown of the pipe. The rest of the fill can be backfilled with granular B-Type I up to the grade. The contractor should review the relevant Ontario Provincial Standard Drawings (OPSDS) for more information.

The side slopes of conventional unsupported trench excavations would be dependent on the local soil conditions. In general, it is recommended side slopes be cut back to a minimum 1H:1V from the base of excavation. If seepage zone or saturated silty clay soils are encountered, the flatter side slopes may be required. For utility trenches within the roadway, the trench side slopes can be reduced to 5H:1V if possible, to provide gradual transition. See the Frost Protection Section.

Where super saturated or weaker soils are encountered, the use of sheet pile shoring, as an alternative, may be required to help stabilize the trench. Weaker soils can be modified by using geogrid such as TBX 1500 and/or geotextile such as Terrafix 300 R or equivalent.

For an area or part thereof subjected to rising ground water table, the buoyancy effects must be of interest and design consideration. In this instance, the submerged soil unit weight can be taken as 9.0 kN/m^3. A plan of action or techniques must be in place for the potential for uncontrolled water that would be likely trapped in the service trenches. Such technique could involve the use of impervious collars or bentonite with cement /sand mixture.

The degree of stability of a steeply cut excavated trench wall decreases with time and, therefore, construction should be directed at minimizing the length of time service trenches are left open. Ground water seepage from the sides of the trenches and from the base of excavation

is to be expected, but marginal. Conventional dewatering of excavated trenches using collection sumps and pumps may be necessary for trenches extending below the depth of the ground water table (GWT, or into saturated silty clay.

Under no circumstances should the native contaminated soil be used as backfill under the foundation or any other structures. However, it is expected that in-situ silty clay will be used at this site as backfill in other non-structural located areas for economic reasons (although, we strongly recommend granular materials). These in-situ soils will likely consist of a mix of granular materials and silty clay . For the most part, the soils are marginally suitable for use as trench backfill above the spring-line, if they can be moisture-conditioned to achieve specified levels of compaction during placement. Soil used as trench backfill should be free of organics, and be placed in thin lifts with a nominal thickness of 200 mm. It should be uniformly compacted, with a packer, to a minimum of 90 percent of the SPMDD. Generally, settlement of 1 to 2 percent of the fill thickness is expected for soils compacted to 95 percent of SPMDD.

4.3.7 Recommended Design for Access Roads and Parking Lots (If required)

All deleterious surficial materials (i.e., contaminated fill, disturbed soil, etc.) should be stripped from below the area of influence of the pavement structure down to about 1.5 m. Once the site is stripped of deleterious materials down to approved subgrade, place a layer of geotextile, 360 R or equivalent, on the subgrade. Proceed with granular B-Type II in lifts not exceeding 300 mm and compacted to at least 98 % SPMDD up to the design grade elevation. Provided the subgrade is properly prepared and is uniform, we recommend the following pavement structure.

Table 4.3.7 Recommended Design for Pavement Structures

Pavement Structure	Access Routes	Parking Area
SP 12.5 Coarse	--	40 mm
SP 12.5 Binder	40 mm	40 mm
Base Granular A	150 mm (6”)	150 mm (6”)
Subbase Granular B-Type II	900 mm (36 “)	600 mm (24”)

4.3.8 Pavement Design Consideration for Access Roads and Parking lot

The design frost depth of this part of Northern Ontario ranges between 2.2 to 2.4 m. Good practice will dictate that parking lot and any road base design be constructed to at least half of

this depth with granular material, which will be well drained, to reduce frost action and minimize damage to the pavements. Our borehole results reveal that the granular layer and grey silty-clay underlay at the proposed area of the property will be suitable. The silty clay, if exposed, will have to be covered with a material, non-woven, geotextile (Terrafix 360 R or equivalent) before backfilling with granular materials.

4.3.9 Hydraulic Conductivity

The estimated hydraulic conductivity**," k",** of the soils at this site may be estimated as follows in the table 4.3.9 below.

Table 4.3.9-Hydraulic Conductivity Table

Material Type	**Estimated Hydraulic Conductivity in cm/s**
Sandy Silt	$< 10^{-6}$
Granular Fill	Variation based on composition

4.4 General Construction Information

4.4.1 Excavation Slopes

Based on the encountered conditions, however, we suspect the surficial granular fill and sandy silt would be Type 1 soil under the *Ontario Occupational Health and Safety Act and Regulations for Construction Projects* (O. Reg. 213/91).

4.4.2 Groundwater Seepage

Groundwater conditions were not encountered. Furthermore, seepage and sloughing are not expected in excavations below a depth of 3.0 m. Sumps and pumps are expected to be adequate in small, temporary excavations should seepage be encountered..

4.4.3 Excavation Equipment

It is expected that excavations of this site can be carried out using regular earthwork equipment.

4.4.4 Backfill Material

The granular B-Type I or granular II should be considered back fill material on top of the undisturbed silty clay or granular fill. However, granular A material materials would be needed for the final subgrade.

5.0 SUMMARY

Four (4) boreholes were advanced to depths ranging from 4.57 mBGS to 6.10 mBGS. Two distinct soil strata – engineering fill and silty clay were encountered and logged. Soil samples were collected and submitted for laboratory analyses of some or all the following parameters: moisture content, Grain size analysis, Proctor and density.

Dynamic Cone Penetration Testing was carried out in BH-01, the results revealed granular fill of compact to dense consistency, and silty clay with firm to stiff consistency.

Wet surface conditions and ground water were not encountered in some boreholes.

Geotechnical design parameters and construction information for foundations and related features are provided herein.

6.0 CLOSURE

This report has been prepared in accordance with generally accepted geotechnical engineering practices for the exclusive use of Ontario Northland, Cochrane, Ontario for the Sand Tower Catwalk and Stairs project.

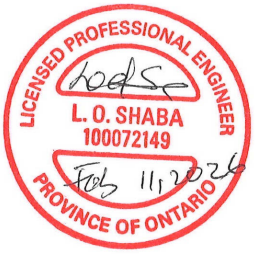
Information collected herein was obtained while conducting an authorized geotechnical investigation at the properties designated above. Note that the data collected at specific locations and subsurface conditions may vary at other locations.

This report and all portions thereof shall be treated as confidential and shall not be used in any manner or for any purpose or be provided to any third party without the express written consent of Ontario Northland or its consultants.

Respectfully submitted,

Lad Shaba

Lad Shaba, B.Sc., M.A (Ed), CET, P. Eng.
Principal/ Senior Structural & Geotechnical Engineer
SHABA TESTING SERVICES LIMITED



Appendix A: Site Photos

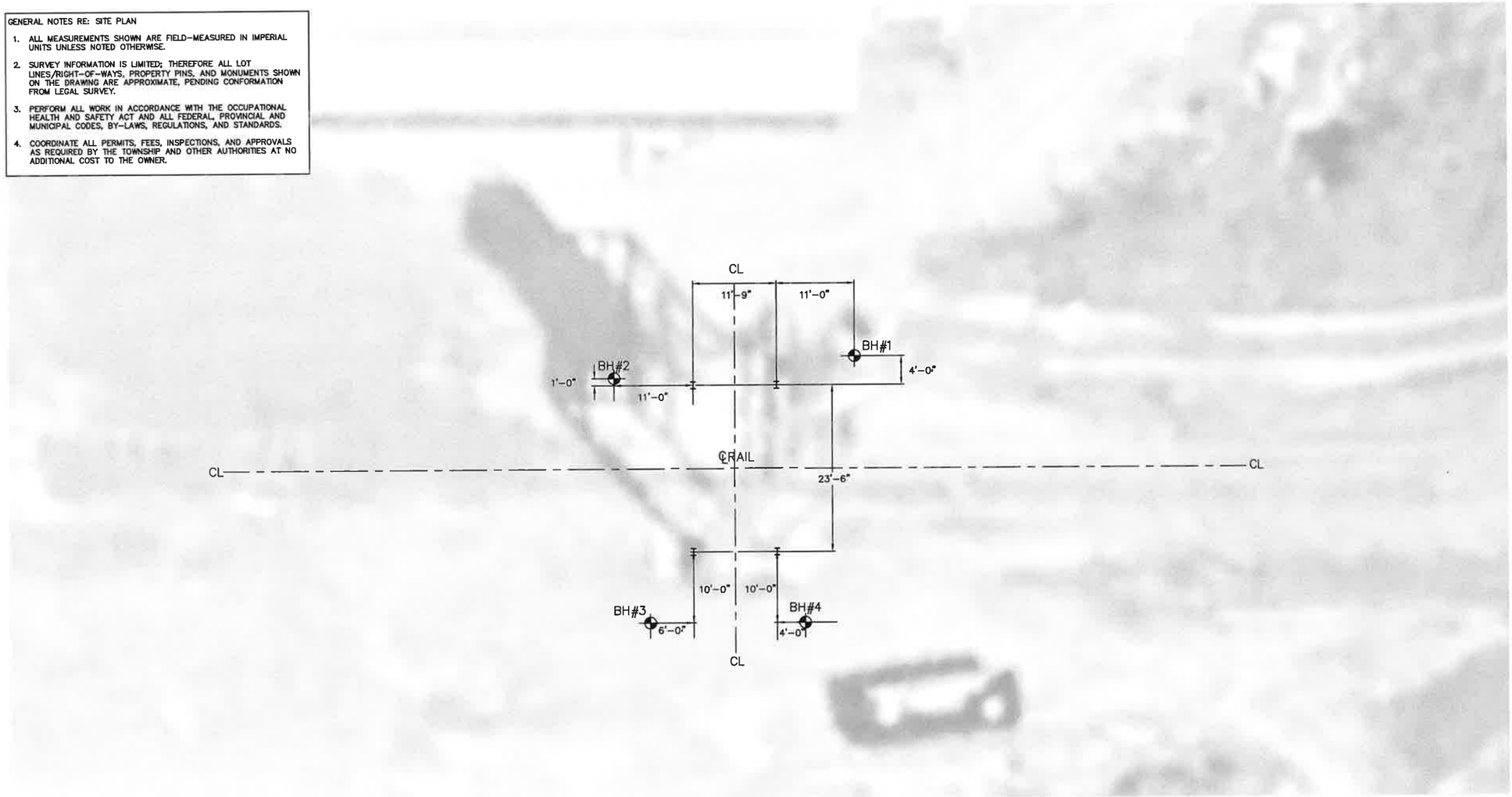
Augering the Granular Fill

SPT"N" on the granular fill layer

Appendix B: Site Sketch

GENERAL NOTES RE: SITE PLAN

1. ALL MEASUREMENTS SHOWN ARE FIELD-MEASURED IN IMPERIAL UNITS UNLESS NOTED OTHERWISE.
2. SURVEY INFORMATION IS LIMITED; THEREFORE ALL LOT LINES/RIGHT-OF-WAYS, PROPERTY PINS, AND MONUMENTS SHOWN ON THE DRAWING ARE APPROXIMATE, PENDING CONFORMATION FROM LEGAL SURVEY.
3. PERFORM ALL WORK IN ACCORDANCE WITH THE OCCUPATIONAL HEALTH AND SAFETY ACT AND ALL FEDERAL, PROVINCIAL AND MUNICIPAL CODES, BY-LAWS, REGULATIONS, AND STANDARDS.
4. COORDINATE ALL PERMITS, FEES, INSPECTIONS, AND APPROVALS AS REQUIRED BY THE TOWNSHIP AND OTHER AUTHORITIES AT NO ADDITIONAL COST TO THE OWNER.



ORIENTATION

SHEET No 1

NOTWITHSTANDING THOSE UTILITIES AND STRUCTURES SPECIFICALLY DESIGNATED FOR REMOVALS OR RELOCATION, THE LOCATION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWING, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION AND MATERIAL TYPE AS NECESSARILY OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

LEGEND

⊕ PROPOSED BOREHOLE LOCATION (TO BE CONFIRMED BY CLIENT)

No	DATE	REVISION	BY
1	2/11/26	Issued as part of Geotechnical Report	S.L

CLIENT

SAND TOWER

PROJECT No STS 2026-001

DRAWING TITLE

GEOTECHNICAL INVESTIGATION
BOREHOLE LOCATIONS
ONTC COCHRANE

ENGINEERS SEAL

SCALES	SHEET No
HOR. 1:200	1
DESIGN: L.S.	PLAN No: N/A
DRAWN: S.L	FIELD NOTES: N/A
CHECKED: L.S.	DATE: FEBRUARY 2026

STS SHABA TESTING SERVICES LTD.
Geotechnical Engineering Services, Materials Testing, Quality Control and Inspection
38 LAKESHORE ROAD, P.O. BOX 2524, NEW LISKEARD, ONT. P0J 1P0
TELEPHONE 1-(705)-647-9871 FAX 1-(705)-567-4171

Appendix C: Borehole Explanation Form and Borehole Logs

BOREHOLE LOG EXPLANATION FORM

This explanatory section provides the background to assist in the use of the borehole logs. Each of the headings used on the borehole log is briefly explained.

DEPTH

This column gives the depth of interpreted geologic contacts in metres below ground surface.

STATIGRAPHIC DESCRIPTION

This column gives a description of the soil based on a tactile examination of the samples and/or laboratory test results. Each stratum is described according to the following classification and terminology.

Soil Classification*		Terminology	Proportion
Clay	<0.002 mm		
Silt	0.002 to 0.06 mm	"trace" (e.g. trace sand)	<10%
Sand	0.06 to 2 mm	"some" (e.g. some sand)	10% - 20%
Gravel	2 to 60 mm	adjective (e.g. sandy)	20% - 35%
Cobbles	60 to 200 mm	"and" (e.g. and sand)	35% - 50%
Boulders	>200 mm	noun (e.g. sand)	>50%

*Extension of MIT Classification system unless otherwise noted.

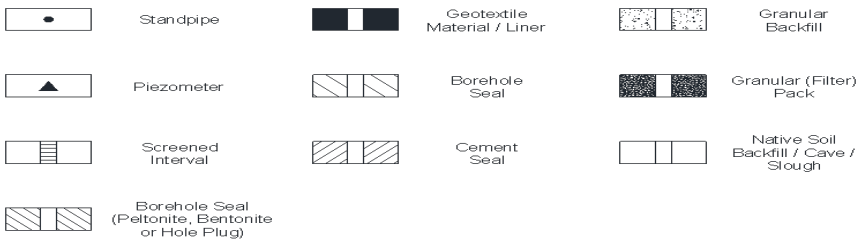
The use of the geologic term "till" implies that both disseminated coarser grained (sand, gravel, cobbles, or boulders) particles and finer grained (silt and clay) particles may occur within the described matrix.

The compactness of cohesionless soils and the consistency of cohesive soils are defined by the following:

COHESIONLESS SOIL		COHESIVE SOIL		
Compactness	Standard Penetration Resistance "N", Blows / 0.3 m	Consistency	Standard Penetration Resistance "N", Blows / 0.3 m	Undrained Shear Strength (cu) (kPa)
Very Loose	0 to 4	Very Soft	0 to 2	0 to 12
Loose	4 to 10	Soft	2 to 4	12 to 25
Compact	10 to 30	Firm	4 to 8	25 to 50
Dense	30 to 50	Stiff	8 to 15	50 to 100
Very Dense	Over 50	Very Stiff	15 to 30	100 to 200
		Hard	Over 30	Over 200

The moisture conditions of cohesionless and cohesive soils are defined as follows:

COHESIONLESS SOILS		COHESIVE SOILS		
Dry		DTPL	-	Drier Than Plastic Limit
Moist		APL	-	About Plastic Limit
Wet		WTPL	-	Wetter Than Plastic Limit
Saturated		MWTPL	-	Much Wetter Than Plastic Limit



STRATIGRAPHY

Symbols may be used to pictorially identify the interpreted stratigraphy of the soil and rock strata.

MONITOR DETAILS

This column shows the position and designation of standpipe and/or piezometer ground water monitors installed in the borehole. Also, the water level may be shown for the date indicated.
When monitors are placed in separate boreholes, these are shown individually in the "Monitor Details" column. Otherwise, monitors are in the same borehole. For further data regarding seals, screens, etc., the reader is referred to the summary of monitor details table.

SAMPLE

These columns describe the sample type and number, the "N" value, the water content, the percentage recovery, and Rock Quality Designation (RQD) of each sample obtained from the borehole where applicable. The information is recorded at the approximate depth at which the sample was obtained. The legend for sample type is explained below.

SS = Split Spoon	GS = Grab Sample
TW = Thin Walled Shelby Tube	CS = Channel Sample
AS = Auger Flight Sample	WS = Wash Sample
CC = Continuous Core	RC = Rock Core
PH = TW Advanced Hydraulically	

$$\% \text{ Recovery} = \frac{\text{Length of Core Recovered Per Run}}{\text{Total Length of Run}} \times 100$$

Where rock drilling was carried out, the term RQD (Rock Quality Designation) is used. The RQD is an indirect measure of the number of fractures and soundness of the rock mass. It is obtained from the rock cores by summing

the length of core recovered, counting only those pieces of sound core than are 100 mm or more in length. The RQD value is expressed as a percentage and is the ratio of the summed core lengths to the total length of core run. The classification based on the RQD value is given below.

RQD Classification	RQD (%)
Very poor quality	<25
Poor quality	25 - 50
Fair quality	50 - 75
Good quality	75 - 90
Excellent quality	90 - 100

TEST DATA

The central section of the log provides graphs which are used to plot selected field and laboratory test results at the depth at which they were carried out. The plotting scales are shown at the head of the column.

Dynamic Penetration Resistance – The number of blows required to advance a 51 mm diameter, 60° steel cone fitted to the end of 45 mm OD drill rods, 0.3 m into the subsoil. The cone is driven with a 63.5 kg hammer over a fall of 750 mm.

Standard Penetration Resistance – Standard Penetration Test (SPT) "N" Value – The number of blows required to advance a 51 mm diameter standard split-spoon sampler 300 mm into the subsoil, driven by means of a 63.6 kg hammer falling freely a distance of 750 mm. In cases where the split spoon does not penetrate 300 mm, the number of blows over a distance of actual penetration in millimetres is shown as

$$\frac{x\text{Blows}}{\text{mm}}$$

Water Content – The ratio of the mass of water to the mass of oven-dry solids in the soil expressed as a percentage.

W_P - Plastic Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

W_L - Liquid Limit of fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

REMARKS

The last column describes pertinent drilling details, field observations, and/or provides an indication of other filed or laboratory tests that were performed.

RECORD OF BOREHOLE No. 1

PAGE: 1 OF 4

PROJECT	ONTC - Cochrane			ENGINEER	LS
CLIENT	Sand Tower		BORING METHOD Auger	LOGGED BY	RA
PROJECT NO.	2026-001	DRILLER Landcore	LOCATION Cochrane, Ontario	COMPILED BY	JM
ELEVATION	0.0m	COORD. n/a	BORING DATE February 2nd, 2026	CHECKED BY	LS

SAMPLE TYPES
AU Auger; BU Bulk; GS Grab; RC Rock Core; SS Split Spoon; TW Thin Walled Open (Shelby); WS Wash Sample

ABBREVIATIONS
P.P. Pocket Penetrometer; U.W. Wet Unit Weight; PT Standard Proctor Test; P.L. Point Load Strength Index (f_{50}); RQD Rock Quality Designation; SCR Solid Core Recovery; k Permeability; C Consolidation; DS Direct Shear; GS Grain Size Analysis

Depth (m) / Depth (ft-in)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	RECOVERY (%)	SPT "N" VALUES or RQD	WELL / PIEZOMETER INSTALLATION	ELEVATION (m)	UNIT WEIGHT (kg/m3)	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0	Ground Surface							0.00		
0	Granular Fill: Gravel and Sand.		1	BU					2348	BH scaled @ 4'-0" per tick Bulk Sample @ 3'-6
			2	SS	42	28		1.22		49 43 9 4
2.44								2.44		
8'-0"	Brown Silty Clay (CL) Some clay, a trace of sand.		3	SS	92	9		3.66	1649	0 2 61 37
			4	SS	75	7		4.88		
6.10			5	SS	100	5		6.10		
20'-0"	End of BH - Start of DCPT @ 22'-0" (6.6m)							7.93		DCPT scaled at 6'-0" (1.8m) per tick
								9.76		
								11.58		
								13.41		
								15.8		

DYNAMIC CONE PENETRATION RESISTANCE PLOT — 20 40 60 80 100

UNDRAINED SHEAR STRENGTH (kPa)
UNCONFINED; FIELD VANE; POCKET PENETR.; LAB VANE
20 40 60 80 100

PLASTIC LIMIT; NATURAL MOISTURE CONTENT; LIQUID LIMIT
W_P W W_L
WATER CONTENT (%)
20 40 60

RECORD OF BOREHOLE No. 2

PROJECT	ONTC - Cochrane			ENGINEER	LS
CLIENT	Sand Tower		BORING METHOD Auger	LOGGED BY	RA
PROJECT NO.	2026-001	DRILLER Landcore	LOCATION Cochrane, Ontario	COMPILED BY	JM
ELEVATION	0.0m	COORD. n/a	BORING DATE February 2nd, 2026	CHECKED BY	LS

SAMPLE TYPES
AU Auger
BU Bulk
GS Grab
RC Rock Core
SS Split Spoon
TW Thin Walled Open (Shelby)
WS Wash Sample

ABBREVIATIONS
P.P. Pocket Penetrometer
U.W. Wet Unit Weight
PT Standard Proctor Test
P.L. Point Load Strength Index (f_{50})
RQD Rock Quality Designation
SCR Solid Core Recovery
k Permeability
C Consolidation
DS Direct Shear
GS Grain Size Analysis

Depth (m) / Depth (ft)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	RECOVERY (%)	SPT "N" VALUES or RQD	WELL / PIEZOMETER INSTALLATION	ELEVATION (m)	UNIT WEIGHT (kg/m3)	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR	SA	SI	CL
0	Ground Surface							0.00		BH scaled @ 4'-0" per tick			
0	Gravel Type II, Trace of Organic		1	SS	25	34		1.22	2348	49	43	9	4
2.44								2.44					
8'-0"	Silty Brown Clay and trace of sand		2	SS	100	8		3.66	1649	0	2	61	37
4.57			3	SS	100	7							
15'-0"	End of Borehole							4.88					
								6.10					

DYNAMIC CONE PENETRATION RESISTANCE PLOT — 20 40 60 80 100

UNDRAINED SHEAR STRENGTH (kPa)
▫ UNCONFINED + FIELD VANE
▪ POCKET PENETR. × LAB VANE
20 40 60 80 100

PLASTIC LIMIT — NATURAL MOISTURE CONTENT — LIQUID LIMIT
W_P — W — W_L
WATER CONTENT (%)
20 40 60

RECORD OF BOREHOLE No. 3

PAGE: 3 OF 4

PROJECT	ONTC - Cochrane			ENGINEER	LS
CLIENT	Sand Tower		BORING METHOD Auger	LOGGED BY	RA
PROJECT NO.	2026-001	DRILLER Landcore	LOCATION Cochrane, Ontario	COMPILED BY	JM
ELEVATION	0.0m	COORD. n/a	BORING DATE February 2nd, 2026	CHECKED BY	LS

SAMPLE TYPES
AU Auger
BU Bulk
GS Grab
RC Rock Core
SS Split Spoon
TW Thin Walled Open (Shelby)
WS Wash Sample

ABBREVIATIONS
P.P. Pocket Penetrometer
U.W. Wet Unit Weight
PT Standard Proctor Test
P.L. Point Load Strength Index (f_{50})
RQD Rock Quality Designation
SCR Solid Core Recovery
k Permeability
C Consolidation
DS Direct Shear
GS Grain Size Analysis

Depth (m) / Depth (ft)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	RECOVERY (%)	SPT "N" VALUES or RQD	WELL / PIEZOMETER INSTALLATION	ELEVATION (m)
0	Ground Surface							0.00
0	Granular fill with Trace of organics		1	BU				
			2	SS	25	33		1.22
2.44								2.44
8'-0"	Brown Silty Clay Some clay, trace of Sand		3	SS	33	2		
4.57			4	SS	100	8		3.66
15'-0"	End of Borehole							4.88
								6.10

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

UNDRAINED SHEAR STRENGTH (kPa)
▫ UNCONFINED + FIELD VANE
▪ POCKET PENETR. × LAB VANE
20 40 60 80 100

PLASTIC LIMIT | NATURAL MOISTURE CONTENT | LIQUID LIMIT
W_P W W_L
WATER CONTENT (%)
20 40 60

UNIT WEIGHT (kg/m3)
2348
1649

REMARKS & GRAIN SIZE DISTRIBUTION (%)

BH scaled @ 4'-0" per tick

Bulk Sample @ 3'-6

GR	SA	SI	CL
51	40	5	4

Field Vane @ 12'-0" - No Shear

GR	SA	SI	CL
0	2	61	37

RECORD OF BOREHOLE No. 4

PAGE: 4 OF 4

PROJECT	ONTC - Cochrane			ENGINEER	LS
CLIENT	Sand Tower		BORING METHOD Auger	LOGGED BY	RA
PROJECT NO.	2026-001	DRILLER Landcore	LOCATION Cochrane, Ontario	COMPILED BY	JM
ELEVATION	0.0m	COORD. n/a	BORING DATE February 2nd, 2026	CHECKED BY	LS

SAMPLE TYPES
AU Auger; BU Bulk; GS Grab; RC Rock Core; SS Split Spoon; TW Thin Walled Open (Shelby); WS Wash Sample

ABBREVIATIONS
P.P. Pocket Penetrometer; U.W. Wet Unit Weight; PT Standard Proctor Test; P.L. Point Load Strength Index (f_{50}); RQD Rock Quality Designation; SCR Solid Core Recovery; k Permeability; C Consolidation; DS Direct Shear; GS Grain Size Analysis

Depth (m) / Depth (ft)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	RECOVERY (%)	SPT "N" VALUES or RQD	WELL / PIEZOMETER INSTALLATION	ELEVATION (m)	UNIT WEIGHT (kg/m3)	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0	Ground Surface									
0	Type II with trace of organics		1	SS	42	44		0.00	2348	BH scaled @ 4'-0" per tick 51 41 4 4
2.44								1.22		
8'-0"	Brown Silty Clay Some clay, traces of sand		2	SS	100	10		2.44	1649	0 2 61 37
4.57			3	SS	100	14		3.66		
15'-0"	End of Borehole							4.88		
								6.10		

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

UNDRAINED SHEAR STRENGTH (kPa): ▫ UNCONFINED + FIELD VANE ▪ POCKET PENETR. × LAB VANE (20 40 60 80 100)

PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT — W_P W W_L

WATER CONTENT (%) (20 40 60)

Appendix D: Selected Laboratory Test Results.

Shaba Testing Services Ltd.

77 Government Road East Kirkland Lake Ontario P2n 1A4
Telephone (705) 567-4187 Fax (705) 567-4171 Cell (705) 567-7992

MOISTURE DETERMINATION

Project No.: STS-2026-0001
Client: ONTC Cochrane Yard
Project: Sand Tower Foundation
Project Location: Cochrane
Soil Type: Clay
Sampled By: Terry of STS

Material Source: BH1 (15-20ft) BH4 (15-17ft)
Bore Hole No.:
Sample No.: 2
Date of Sample: Feb 2/26
Date of Test: Feb 4/26
Tested By: Pierre

Pit Number					
Sample Number	BH 1 (15 to 20ft				
Tin Number	**A6**	**35.0**	**104.0**		
Gross Wet Mass	374.5	377.5	365.1		
Gross Dry Mass	312.4	315.7	304.4		
Moisture Loss	**62.1**	**61.8**	**60.7**		
Mass of Tin	30.3	31.0	31.7		
Dry Soil Mass	**282.1**	**284.7**	**272.7**		
Moisture %	**22.0**	**21.7**	**22.3**		

Sample Number	**BH 4 (15-17ft)**				
Tin Number	**3**	**27**	**B69**		
Gross Wet Mass	301.3	312.3	310.9		
Gross Dry Mass	250.4	254.1	256.2		
Moisture Loss	**50.9**	**58.2**	**54.7**		
Mass of Tin	31.7	31.6	31		
Dry Soil Mass	**218.7**	**222.5**	**225.2**		
Moisture %	**23.3**	**26.2**	**24.3**		

Sample Number					
Tin Number					
Gross Wet Mass					
Gross Dry Mass					
Moisture Loss					
Mass of Tin					
Dry Soil Mass					
Moisture %					
Average Moisture					

Comments:

Technician Signature: Pierre Mercier

E-mail Shabatesting@shabatesting.com

Shaba Engineering &Testing Services Ltd.

GRANULAR AGGREGATE GRADATION REPORT

CLIENT: ONTC
PROJECT: Sand Tower Foundation
LOCATION: Cochrane ONR Yard
MATERIAL TYPE: Granular B2
INTENDED USE
MATERIAL SOURCE: BH # 1
SAMPLE LOCATION: Cochrane

STS REF: STS 2026-001
REPORT 1
ENCLOSURE: 1
SAMPLE NO. 1
SAMPLED BY: Terry of STS
DATE SAMPLED: Feb 2/26
TEST METHOD: LS 602/607/ASTM C136

SIEVE SIZE	CUMULATIVE % PASSING	SPECIFICATIONS[1] GRANULAR TYPE							MEETS SPEC. (✔)
					GRANULAR B[2]			Zone 2 Filter	
		O	A	TYPE I[3]	TYPE II	TYPE III[3]	M		
150 mm				*100*					
106 mm	**100**				**100**				✔
37.5 mm		100						100	
26.5 mm	**91.4**	95-100	*100*	*50-100*	**50-100**	50-100		100	✔
19.0 mm		80-95	*85-100* *87-100*[4]					93 - 100	
16.0 mm									
13.2 mm		60-80	*65-90* *75-95*[4]				100	84 - 100	
9.5 mm		50-70	*50-73* *60-83*[4]				75-95	77 - 100	
4.75 mm	**48.2**	20-45	*35-55* *40-60*[4]	*20-100*	**20-55**	20-90	35-55	60-100	✔
2.36 mm								43 - 80	
1.18 mm	**31.2**	0-15	*15-40*	*10-100*	**10-40**	10-60	15-40	31- 65	✔
600 µm								15 - 45	
300 µm	**17.1**		*5-22*	*2-65*	**5-22**	2-35	5-22	5-30	✔
150 µm								0-20	
75 µm	**7.7**	0-5	*2-8* *2-10*[5]	*0-8* *0-10*[5]	**0-10**	0-8 0-10[5]	2-8 2-10[5]	0-5	✔

NOTES

1. OPSS 1010, Table 2, April 2004 and SP 110F13, August 2007.
2. Where Granular B is used for granular backfill for pipe subdrains, 100 percent of the material shall pass the 37.5mm sieve.
3. Where RAP is blended with Granular B Type I or Type III, 100 percent of the RAP shall pass the 75 µm sieve. Conditions in Note 1 supersede this requirement.
4. Where aggregate is obtained from an iron blast furnace slag source.
5. Where aggregate is obtained from a quarry or blast furnace slag or nickel slag source.

Sample Passed Granular B Type 2 specifications

Date Tested: Feb 4/26

Technician: Pierre Moreau **Signature:**

More Information is available upon request

Shaba Engineering &Testing Services Ltd.

GRANULAR AGGREGATE GRADATION REPORT

CLIENT: ONTC
PROJECT: Sand Tower Foundation
LOCATION: Cochrane ONR Yard
MATERIAL TYPE: Granular B2
INTENDED USE
MATERIAL SOURCE: On Site
SAMPLE LOCATION: Cochrane

STS REF: STS 2026-001
REPORT 1
ENCLOSURE: 1
SAMPLE NO. 1
SAMPLED BY: Terry of STS
DATE SAMPLED: Feb 2/26
TEST METHOD: LS 602/607/ASTM C136

SIEVE SIZE	CUMULATIVE % PASSING	SPECIFICATIONS[1] GRANULAR TYPE						Zone 2 Filter	MEETS SPEC. (✔)
					GRANULAR B[2]				
		O	A	TYPE I[3]	TYPE II	TYPE III[3]	M		
150 mm				*100*					
106 mm	**100**				**100**				✔
37.5 mm		100						100	
26.5 mm	**94.9**	95-100	*100*	*50-100*	**50-100**	50-100		100	✔
19.0 mm		80-95	*85-100* *87-100*[4]					93 - 100	
16.0 mm									
13.2 mm		60-80	*65-90* *75-95*[4]				100	84 - 100	
9.5 mm		50-70	*50-73* *60-83*[4]				75-95	77 - 100	
4.75 mm	**45.5**	20-45	*35-55* *40-60*[4]	*20-100*	**20-55**	20-90	35-55	60-100	✔
2.36 mm								43 - 80	
1.18 mm	**27.6**	0-15	*15-40*	*10-100*	**10-40**	10-60	15-40	31- 65	✔
600 µm								15 - 45	
300 µm	**18.4**		*5-22*	*2-65*	**5-22**	2-35	5-22	5-30	✔
150 µm								0-20	
75 µm	**7.9**	0-5	*2-8* *2-10*[5]	*0-8* *0-10*[5]	**0-10**	0-8 0-10[5]	2-8 2-10[5]	0-5	✔

NOTES

1. OPSS 1010, Table 2, April 2004 and SP 110F13, August 2007.
2. Where Granular B is used for granular backfill for pipe subdrains, 100 percent of the material shall pass the 37.5mm sieve.
3. Where RAP is blended with Granular B Type I or Type III, 100 percent of the RAP shall pass the 75 µm sieve. Conditions in Note 1 supersede this requirement.
4. Where aggregate is obtained from an iron blast furnace slag source.
5. Where aggregate is obtained from a quarry or blast furnace slag or nickel slag source.

Sample Passed Granular B Type 2 specifications

Date Tested: Feb 4/26

Technician: Pierre Moreau **Signature:**

More Information is available upon request

STANDARD PROCTOR DENSITY TEST - ASTM D 698

JOB No.	STS 2026-001	**MATERIAL SOURCE:**	BH 1 (15 - 20ft)
CLIENT:	ONTC Cochrane Yard	**SAMPLE No.:**	1 Bag
PROJECT:	Sand Tower Foundation	**DATE OF TEST:**	Feb 4/26
PROJECT LOCATION:	Cochrane	**TESTED BY:**	Pierre
DESCRIPTION OF SOIL:	Clay		
SAMPLED BY:	Terry of STS		
DATE OF SAMPLE:	Feb 2/26		

Blows/Layer: 56 **No. of Layers:** 3 **Hammer Wt:** 24.5 N

Mold Dimensions **Diameter** 152.4 mm **Height:** 116.4 mm **Volume:** 2124 cm^3

MAX. DRY DENSITY:	1649	**kg/m^3**
OPTIMUM MOISTURE:	22.3%	**%**

Test No.	1	2	3	4	5	6	7	8
WET DENSITY DETERMINATIONS								
Water Added (mL)								
Mass of Mold and Soil (g)	11034.5							
Mass of Mold (g)	6751.1							
Mass of Wet Soil (g)	4283.4							
Wet Density (g/cm^3)	2.017							
MOISTURE CONTENT DETERMINATIONS								
TIN No.	109							
Mass of Tin + Wet Soil (g)	369.7							
Mass of Tin + Dry Soil (g)	308.0							
Moisture Loss (g)	61.7							
Mass of Tin (g)	31.4							
Dry Soil Mass (g)	276.6							
Moisture %	22.3%							
DRY DENSITY DETERMINATIONS								
Dry Density (kg/m^3)	1649							

STONE CORRECTION

TOTAL WT (g)	
WT STONES (>19 mm) (g)	
% STONE	
% FINES	
MDD	1649
CORRECTED MDD	1649 ASTM D4718

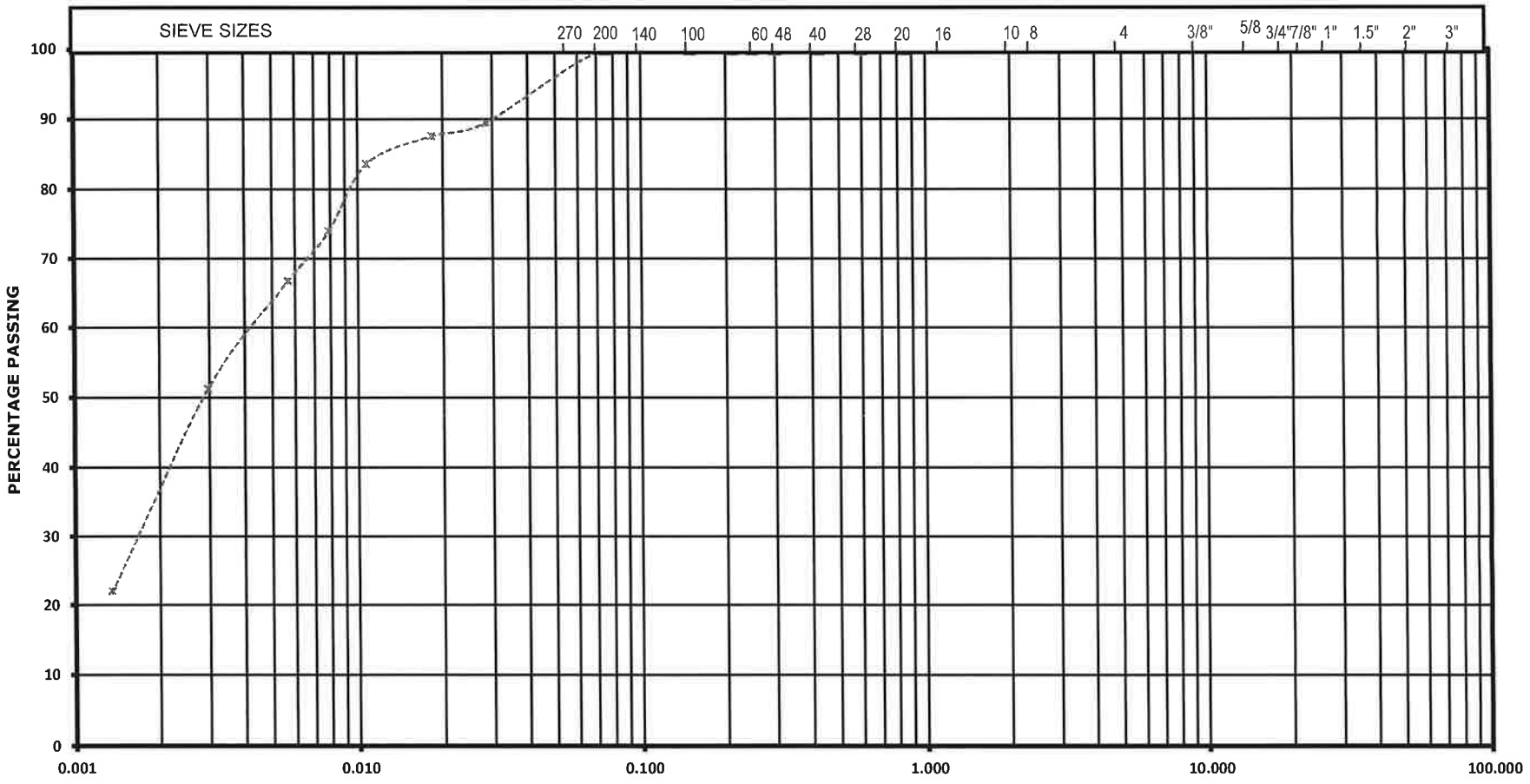
Shaba Testing Services Ltd
CSA Certified to CSA A28.3/Category 0, CCIL Type C
77 Government Rd. E., Kirkland Lake, ON P2N 1A4
Tel/Fax: 705-567-4187

Irene Mercer

Print Date: 2026-02-05 Revision: 0 STS-2011

GRAIN SIZE ANALYSIS

PROJ. No.: STS 2026-001



CLAY 37%	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE
←	SILT 61%			SAND 2%			GRAVEL 0%		

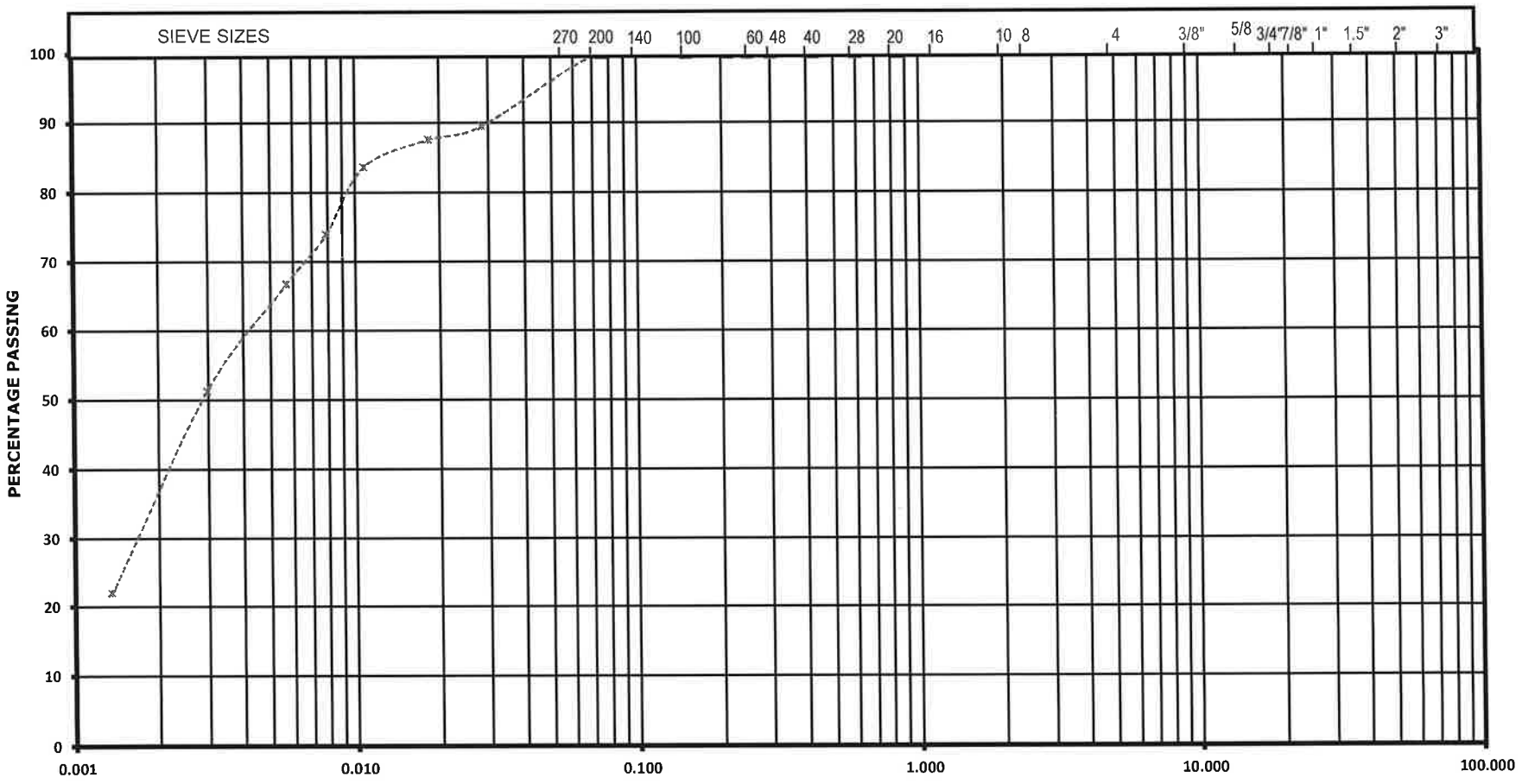
LOCATION	BH : % Clay, % Silt, % Sand BH : % Clay, % Silt, % Sand
GRADING OF SAMPLE	

Pierre Marcen

HYDROMETER for BH 4 Tin B69 15 to 17 ft depth Feb 2 sample ONR

GRAIN SIZE ANALYSIS

PROJ. No.: STS 2026-001



CLAY 37%	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE
	SILT 61%			SAND 2%			GRAVEL 0%		

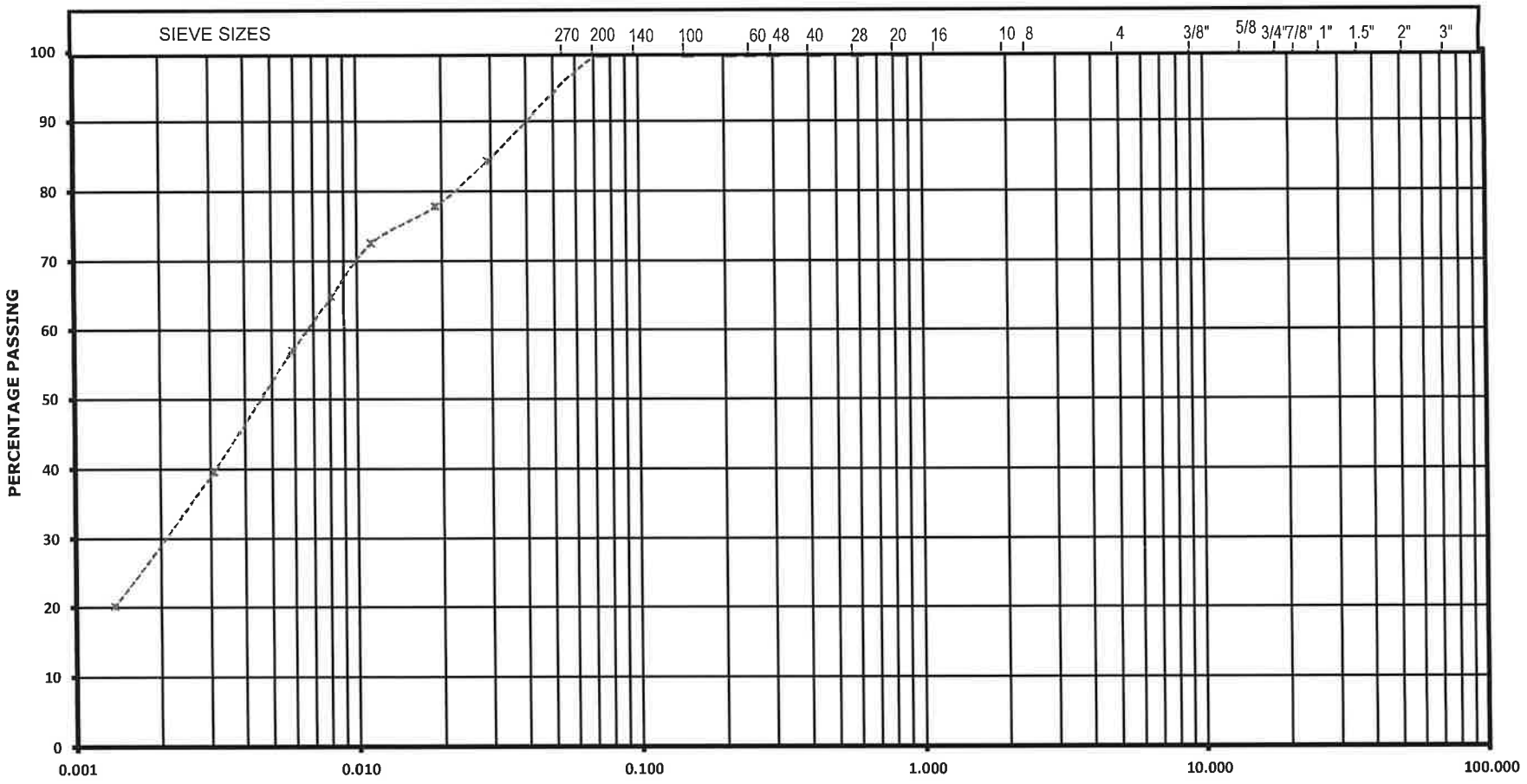
LOCATION	BH : % Clay, % Silt, % Sand BH : % Clay, % Silt, % Sand
GRADING OF SAMPLE	

Pierre Mercier

HYDROMETER for BH 4 Tin 27 15 to 17 ft depth Feb 2 sample ONR

GRAIN SIZE ANALYSIS

PROJ. No.: STS 2026-001



CLAY 29% ←	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE
	SILT 69%			SAND 2%			GRAVEL 0%		

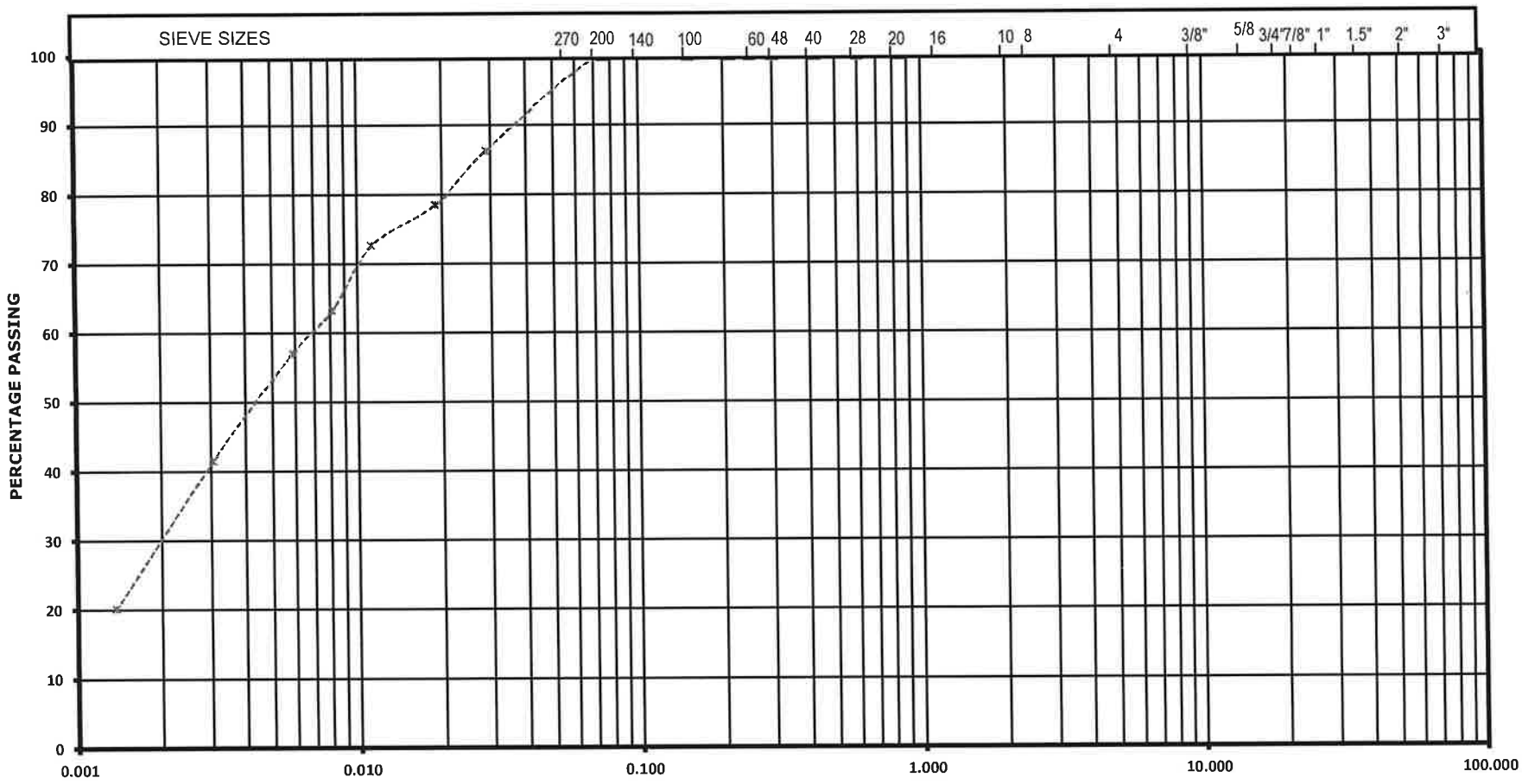
LOCATION	BH : % Clay, % Silt, % Sand BH : % Clay, % Silt, % Sand
GRADING OF SAMPLE	

Pierre Morin

HYDROMETER for BH 1 Tin 3 15 to 20 ft depth Feb 2 sample ONR

PROJ. No.: STS 2026-001

GRAIN SIZE ANALYSIS



CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE
30% ←	SILT 70%			SAND 2%			GRAVEL 0%		

LOCATION	BH : % Clay, % Silt, % Sand BH : % Clay, % Silt, % Sand
GRADING OF SAMPLE	

Prepared by

HYDROMETER for BH 1 Tin 104 15 to 20 ft depth Feb 2 sample ONR

Shaba Testing Services Ltd.
77 Government Rd. E. Kirkland Lake ON P2N 1A4

ATTERBERG LIMITS DETERMINATION

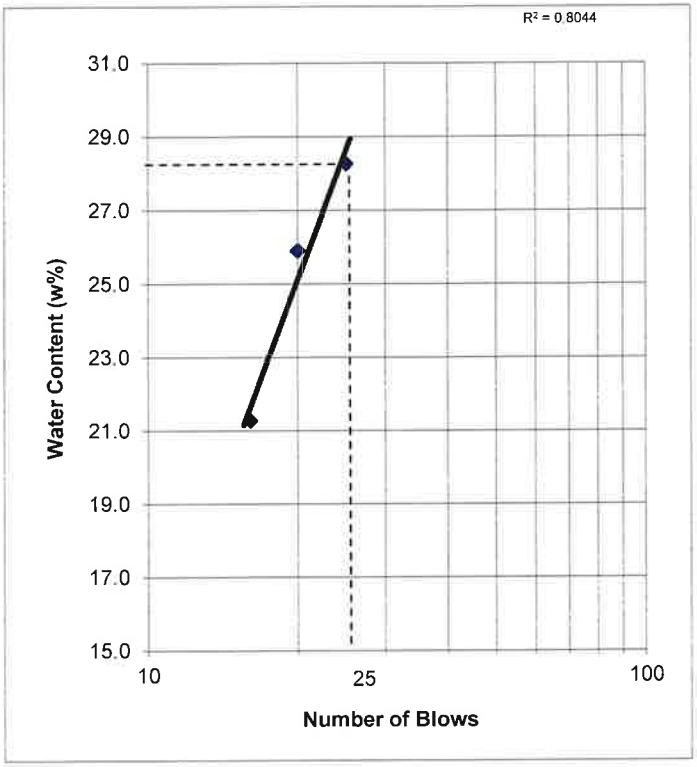
PROJECT No.:	STS 2026-001	**BORING No.:**	BH 1 15-20 FT
CLIENT:	ONR	**SAMPLE DEPTH:**	N/A
PROJECT:	Sand Tower Foundation	**SAMPLE No.:**	1
PROJECT LOCATION:	Cochrane	**DATE SAMPLED:**	Feb 2/26
DESCRIPTION OF SOIL:	Clay	**DATE TESTED:**	Feb 5/26
SAMPLED BY:	Terry of STS	**TESTED BY:**	Lad

Liquid Limit:	28.3 %	**Plastic Limit:**	19.8 %	**Plasticity Index:**	8.5

SPECIMEN PREPARATION			
Wet		Washed on #40 Sieve	
Dry (Air)		Dry Sieved on #40 Sieve	√
Dry (Oven)	√	Mechanically Pushed Through #40 Sieve	
Mixed on Glass Plate and Removed Medium Plus Sand Particles			

AS-RECEIVED WATER CONTENT (OVEN DRIED	
Container No.	35
Mass of Soil & Container (g)	377.5
Mass of Dry Soil & Container (g)	315.7
Mass of Container (g)	31
Water Content (%)	21.7

TESTING EQUIPMENT USED		
Plastic Limit	Hand Rolled	√
	Mechanical Rolling Device	
Liquid Limit	Manual	√
	Mechanical	
Grooving Tool	Metal	√
	Plastic	



PLASTIC LIMIT			
Container No.	108.0	A12	
Mass of Soil & Container (g)	36.4	33.5	
Mass of Dry Soil & Container (g)	35.8	33.0	
Mass of Container (g)	32.6	30.6	Average
Water Content (%)	18.8	20.8	19.8

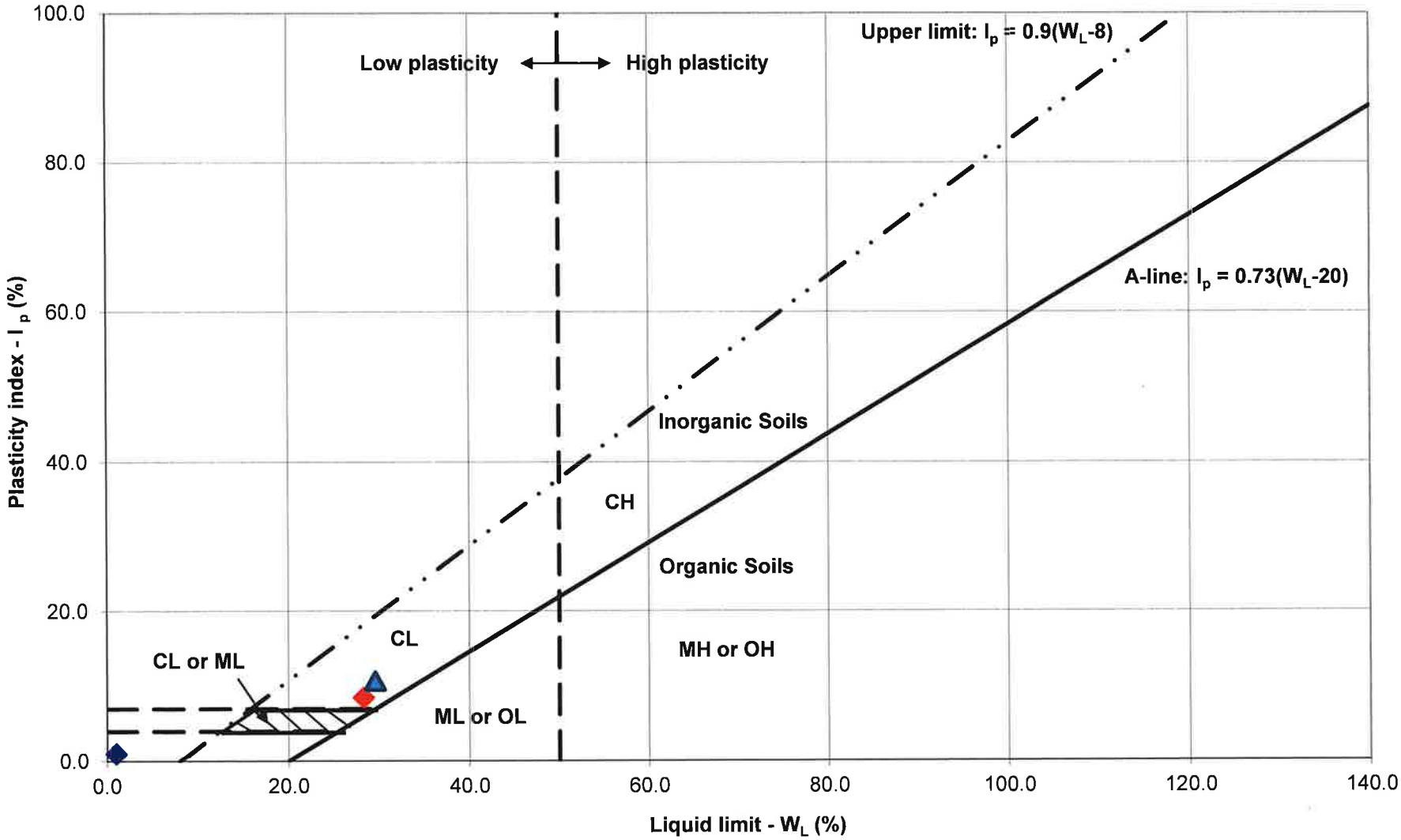
LIQUID LIMIT			
Container No.	A14	42	A14
Mass of Soil & Container (g)	66.6	63.2	60.6
Mass of Dry Soil & Container (g)	60.3	56.8	53.9
Mass of Container (g)	30.7	32.1	30.2
Water Content (%)	21.3	25.9	28.3
Number of Blows	16	20	25

Recommeded range of Blow Count for Multiple Point Method A:
15 to 25, 20 to 30, 25 to 35

LL = 28.3%

PROJ. No.: **STS-2026-001-ONR Yard**

Plasticity Chart



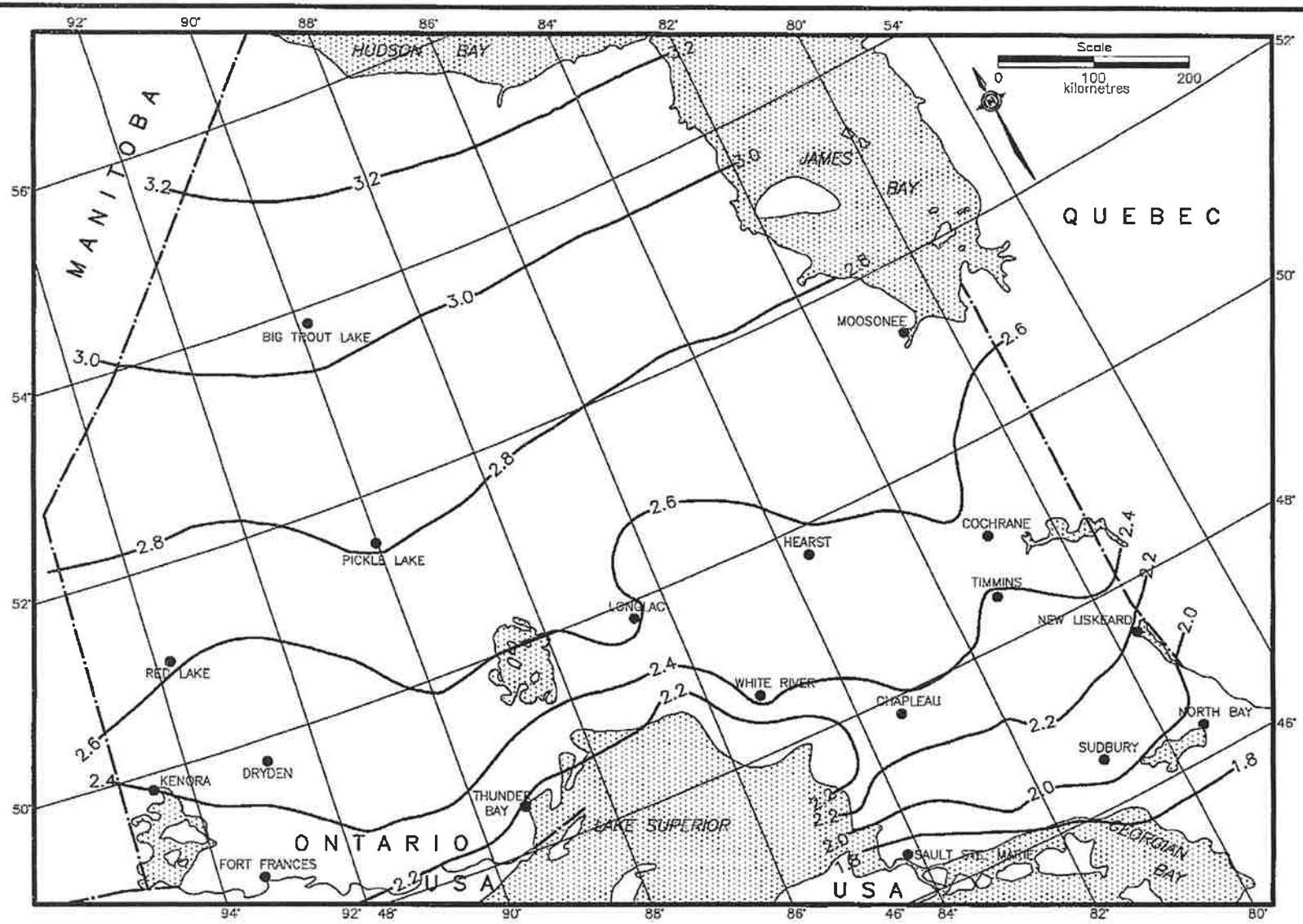
Appendix E: OPSD 3090.100 Foundation Frost Penetration Depths in Northern Ontario .

FOUNDATION
FROST PENETRATION DEPTHS
FOR NORTHERN ONTARIO

ONTARIO PROVINCIAL STANDARD DRAWING

OPSD 3090.100

Nov 2010 | Rev 1



NOTES:

A These values are approximate and should only be used where the recommendations of a geotechnical engineer are not available.

B This information is based on the Ministry of Transportation and Communications Research Publication RR225 "Aspects of Prolonged Exposure of Pavements to Sub–Zero Temperatures" dated December 1981.

C Values between contours should be interpolated. If interpolation is not possible, use the adjacent contour with the greater depth.

D Frost penetration depths are in metres.