NETOOK CROSSING
SE3–33–1–W5M
MOUNTAIN VIEW COUNTY

Geotechnical Assessment

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Reviewer

Prepared For: 1273927 Alberta Ltd.
Date: 2024-08-19
Our File No.: 3903.T01

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TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

1.0 INTRODUCTION

Watt Consulting Group (WATT) was retained by 1273927 Alberta Ltd. to complete a geotechnical assessment to support development within the Netook Crossing subdivision. The objective of the geotechnical assessment was to determine the subsurface ground and groundwater conditions at the project site, and to provide geotechnical comments and recommendations pertinent to project design and construction.

2.0 PROJECT BACKGROUND

The project site, SE3-33-1-W5M, is located east of Olds, Alberta, North of Highway 27, West of Range Road 12, and South of the Olds Golf Club within the municipality of Mountain View County. At the time of investigation, the site was an undeveloped quarter section, used for agriculture activities.

Based on a review of published geological data and our local experience, the subsurface ground conditions at the project site comprise of clay till, underlain by weathered bedrock.

The concept plan for this development involves a residential subdivision with future Business Park at the southern end of the property. A geotechnical investigation is required to support development and building permit applications, and to provide comments and recommendations for foundation design and other development features.

3.0 GEOTECHNICAL INVESTIGATION

3.1 Investigation Methodology

During a previous Geotechnical Investigation by MacIntosh Lalani in 2008, nine boreholes were drilled within the project area. To comply with the County spacing requirements, an additional twenty seven boreholes were completed, representing a total of thirty six boreholes on the subject property. On December 1 and 2, 2023, WATT staff oversaw the drilling of twenty seven geotechnical boreholes at the approximate locations shown on Figure 1 – Borehole Location Plan, attached in Appendix A. Borehole locations were selected based on site access and locations of underground and overhead utilities at time of drilling. Drilling was carried out by Venom Drilling of Blackfalds, Alberta, using a truck mounted solid stem auger drill rig. All boreholes were advanced to the design depth of 6 meters below ground surface (mbgs), with the exception of BH23-04 which reached early refusal. Standard penetration Tests (SPTs) were completed at select intervals, and soil samples were taken from the split spoon sampler and from the auger flight.

The subsurface ground and groundwater conditions were logged in the field by WATT staff as drilling proceeded. The subsurface stratigraphy encountered is shown on the Borehole Records attached in Appendix B. 25 mm diameter standpipe piezometers were installed in each of the boreholes.

Soil samples obtained during drilling were submitted to Solum Consultants Ltd. Geotechnical and Materials Testing Laboratory in Calgary, Alberta. The following soil index tests were completed on select soil samples:

- Moisture content determination (ASTM D2216) – 159 tests;
- Particle size analysis (ASTM D422) – 5 tests;
- Atterberg limits (ASTM D4318) – 6 tests;
- Water soluble sulphate concentrations (CSA A23.1) – 4 tests; and
- California Bearing Ratio (CBR) – 1 test.

The soils laboratory test results are shown on the Borehole Records, are attached in Appendix C, and are discussed in Section 3.2.

3.2 Subsurface Ground Conditions

The subsurface stratigraphy encountered at the discrete borehole locations generally comprised of topsoil underlain by silty clay till, with isolated areas of silty sand encountered throughout the site. The Borehole Records attached to this report present WATT's interpretation of the materials encountered. It is noted that the subsurface stratigraphy may be variable between borehole locations. A description of the subsurface soil strata encountered is provided in the following sections.

3.2.1 Topsoil

Topsoil was encountered in all 27 holes, ranging in depth from 0.2 to 0.3 metres.

3.2.2 Silty Clay Till

Silty clay till was the predominant material encountered in all boreholes. The till was light brown to grey in color, contained some sand and trace gravel. Field records indicate the silty clay is low to medium plasticity and was damp to moist. Oxidized stains were observed at variable depths, indicating groundwater influence or infiltration of surface water.

SPTs completed within the silty clay till stratum resulted in N-values ranging from 7 to 32 blows per 300 mm of penetration, indicating the material is firm to hard. Moisture content tests completed within the silty clay till ranged from 9% to 19%, indicating damp to wet

sample conditions. A summary of particle size distribution and Atterberg Limits Test (plasticity) are shown below:

Table 1: Soils Index Test Results – Silty Clay Till

Borehole ID	Depth (m)	Atterberg Limits			Particle Size			
		Liquid Limit	Plastic Limit	Plasticity Index	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
BH23-03	2.0	26	17	9	-	-	-	-
BH23-04	2.0	32	17	15	-	-	-	-
BH23-06	2.0	38	15	23				
BH23-08	3.0	-	-	-	0	34	48	18
BH23-11	2.0	37	15	22				
BH23-11	3.0	-	-	-	2	31	47	21
BH23-15	2.0	34	14	20	-	-	-	-
BH23-16	1.0	-	-	-	2	36	41	21
BH23-18	2.0	-	-	-	0	32	42	26
BH23-19	2.0	34	14	20	-	-	-	-
BH23-24	3.0	-	-	-	1	34	42	24

3.2.3 Silty Sand

Silty sand was observed in 12 of the 27 boreholes, typically underlying the topsoil. The silty sand was noted to contain traces of clay and gravel and described as light brown, compact and low plasticity.

Three SPTs completed within the silty sand stratum resulted in N-values ranging from 10 to 13 blows per 150 mm, indicating the material is loose to compact. Moisture content

tests completed on SPT and auger samples ranged from 9% to 13%, indicating dry to damp sample conditions.

3.3 Subsurface Groundwater Conditions

During the subsurface investigation on December 1 and 2, 2023, standpipe piezometers were installed in each borehole to monitor groundwater levels. The piezometers were subsequently damaged and unable to be read. To allow determination of the stabilized groundwater elevation, the 27 piezometers were re-installed on February 8, 2024.

Very little groundwater seepage was observed in all boreholes and each borehole was noted to be dry upon the completion of drilling. It should be recognized that groundwater levels vary seasonally and from year to year, and are dependent on many factors including surface drainage, precipitation and the hydrology of the area.

Since standpipe piezometers were re-installed on February 8, 2024, they have continued to be read frequently to determine the groundwater elevation at each location. The groundwater elevation was recorded to be the highest in the NW corner of the site in Boreholes BH23-01 to -04 and BH23-06 to -08, as can be seen by the data provided in Table 2 below. Installed standpipes were damaged due to farming activities and are unable to be read. Based on the low permeability of the encountered soils, the recorded groundwater elevations are not expected to significantly fluctuate further. For preliminary purposes, the coefficient of permeability of the silty clay till may be taken as k~1*10^{-7} m/s.

Table 2: Water Level Readings Summary

Borehole ID	Surface Elevation (masl)	Highest Depth to Water Recorded (m)	Maximum Groundwater Elevation (masl)
BH23-01	1018.8	2.5	1016.3
BH23-02	1019.0	2.7	1016.3
BH23-03	1019.3	4.4	1014.9
BH23-04	1018.3	2.0	1016.3
BH23-05	1020.3	Dry	N/A
BH23-06	1018.6	3.1	1015.5
BH23-07	1018.5	3.5	1015.0

Borehole ID	Surface Elevation (masl)	Highest Depth to Water Recorded (m)	Maximum Groundwater Elevation (masl)
BH23-08	1018.1	2.2	1015.9
BH23-09	1019.4	Dry	N/A
BH23-10	1019.6	4.1	1015.5
BH23-11	1019.5	4.4	1015.1
BH23-12	1018.9	Dry	N/A
BH23-13	1018.7	4.6	1014.1
BH23-14	1020.4	Dry	N/A
BH23-15	1019.5	Dry	N/A
BH23-16	1019.6	5.6	1014.0
BH23-17	1018.8	Dry	N/A
BH23-18	1019.5	Dry	N/A
BH23-19	1018.3	3.9	1014.4
BH23-20	1019.9	5.0	1014.9
BH23-21	1019.4	5.0	1014.4
BH23-22	1018.2	Dry	N/A
BH23-23	1018.9	Dry	N/A
BH23-24	1019.3	Dry	N/A
BH23-25	1018.5	4.7	1013.8
BH23-26	1018.0	Dry	N/A
BH23-27	1019.0	Dry	N/A

4.0 GEOTECHNICAL COMMENTS AND RECOMMENDATIONS

4.1 General Geotechnical Commentary

Design and construction recommendations pertaining to the geotechnical aspects of the proposed development are provided in this report section based on the results of the geotechnical evaluation fieldwork, the laboratory testing carried out, and WATT's understanding of the proposed development at time of report preparation. These recommendations are intended to provide support for various project concepts and specifications as well as insight to determine the most appropriate site-specific construction methodologies. As well, WATT should be retained to review applicable geotechnical aspects of the final design (drawings and specifications) and provide all necessary field reviews.

The subsurface ground and groundwater conditions encountered at the project site are considered suitable for the proposed development. Geotechnical considerations for the project site are summarized as follows:

- Competent foundation materials in the form of silty clay till were encountered at the project site. The materials are suitable to support shallow foundations in form of spread and strip footings.
- While the majority of the site is expected to be below the long-term groundwater level, the NW corner of site may require dewatering effort due to high recorded groundwater elevation.

Detailed design and construction comments and recommendations for the proposed development are provided in the following Sections.

4.2 Site Preparation

All deleterious material such as, but not limited to, surface vegetation and organic soils as well as all fill soils should be sub-excavated to competent, minimum stiff silty clay till subgrade material.

Prior to any development activities, all exposed subgrade surfaces subject to site development should be proof rolled using heavy equipment such as a loaded tandem dump truck. All loose or soft areas must be sub-excavated to competent material and replaced with approved engineered fill. Further recommendations for backfill materials (types, re-use of site soils) and compaction requirements are provided in Section 4.3. The final subgrade surface should be carefully graded to prevent ponding and to direct water away from the building area.

It is recommended to carry out construction during the spring, summer and fall months. If construction is carried out during winter conditions, the subgrade should be protected from freezing. In addition, the subgrade should be protected from wetting or drying, both before and after the placement of engineered fill, granular base material, or concrete. Subgrade surfaces that are allowed to dry or become wet should be scarified, moisture conditioned, and re-compacted.

4.3 Backfill and Compaction

The native silty clay till soils encountered at the project site are generally suitable for re-use as engineered fill. All engineered fill should be placed in lifts not exceeding 200 mm thickness (loose measure) and should be compacted to minimum 98% of Standard Proctor maximum dry density (SPMDD), at a moisture content of 0 to +2% of its optimum moisture content (OMC) for compaction purposes. The maximum lift thickness may vary depending on the compaction equipment used and should be verified through field density testing at time of construction. It is noted that underlying completely weathered silty sand bedrock is likely not suitable for re-use as engineered fill, due to the high silt content and associated difficulty to achieve optimum moisture content for compaction purposes.

Structural fill should comprise of well graded, 25 mm minus crushed gravel. It should be placed in lifts not exceeding 200 mm thickness (loose measure) and should be compacted to minimum 100% of SPMDD, at a moisture content of ±3% of OMC.

All fill must be free from topsoil, organics, fill and otherwise deleterious material, and must not be frozen at time of placement.

4.4 Trench Bedding and Compaction

Trenches shall be excavated to the depths required to provide a uniform and continuous bearing and support for the pipes on solid and undisturbed ground. Any part of the bottom of the trenches excavated below the specified grade shall be backfilled to grade with approved material and thoroughly compacted as directed by the Engineer. The finished sub-grade shall be prepared accurately by means of hand tools.

Where the bottom of the trench is found to be unstable or includes ashes, cinders, refuse, organic, or other material which in the judgment of the Engineer should be removed, the Contractor shall excavate and remove such unsuitable material and backfill with an approved material in 150 mm compacted layers.

Bedding material shall consist of hard durable particles, free from clay lumps, cementation, organic material, frozen material, and other deleterious materials. Bedding

shall be compacted to a minimum 90 to 95% of its Standard Proctor maximum dry density (SPMDD) achieved by means of hand compaction in 150mm lifts, with final densities confirmed by geotechnical testing and documentation.

4.5 Strip and Spread Footings

This Section provides geotechnical design parameters in Limit States Design format as per National Building Code of Canada – 2019 Alberta Edition. As outlined above, conventional spread and strip footings are considered suitable for the proposed building. It is anticipated that footings will be within the silty clay till material.

The following geotechnical foundation design recommendations are based on the foundation dimensions ranging from 0.5 to 2.0 m widths, and a minimum embedment depth of 0.8 m below ground level (measured from ground surface or top of slab-on-grade, whichever is less). Increased embedment depths will be needed to provide adequate soil cover for frost protection purposes (see Section 4.13).

Values for the factored Ultimate Limit States (ULS) and Serviceability Limit States (SLS) geotechnical bearing resistances for bearing capacities for shallow foundations with above noted dimensions may be taken as 200 kPa and 110 kPa respectively. A resistance factor of 0.5 as per Canadian Building Code has been applied to determine the factored bearing resistance at ULS conditions. SLS bearing capacities were determined based on typical tolerable total and differential settlement of 25 mm and 20 mm, respectively.

For larger footings, the geotechnical bearing resistance would generally increase. However, settlement of the footings would also increase and add to the high risk of excessive total and differential settlement for the building structure. WATT would be pleased to complete additional analysis and provide further geotechnical input should footings with more than 2.0 m width be required.

The values presented above are for vertical, concentric loading, as described in the CFEM (2023). For footings subjected to eccentric loads, the following equivalent footing width should be used to calculate the bearing pressure of the footing:

$$B' = B - 2e$$

$$L' = L - 2e$$

Where B' is the equivalent footing width; B is the actual footing width; L' is the equivalent footing length, L is the actual footing length, and e is the eccentricity of the load. Effects of inclined loads, if any, should also be considered as discussed in the CFEM (2023).

The subgrade surfaces beneath building foundations must be free from frozen, loose or soft materials. The base of all footings must be inspected by qualified geotechnical personnel prior to placing concrete to confirm the above design bearing pressures and to ensure there are no disturbances or deleterious materials present.

4.6 Non-Structural Floor Slabs-on-Grade

Non-structural cast-in-place concrete slabs-on-grade, placed on approved subgrade soils, are typically used as floor systems. A 150 mm thick levelling course comprising of 25 mm minus crushed gravel (similar to structural fill, see Section 4.3) should be placed below non-structural slab-on-grades. The crushed gravel levelling course should be placed within ±3% of its optimum moisture content for compaction purposes (OMC) and compacted to minimum 100% of its Standard Proctor maximum dry density (SPMDD). It is recommended to place a non-woven geotextile separation membrane between cohesive engineered fill and granular fill.

Vertical differential movements between non-structural floor slabs-on-grade and structural building elements are inevitable and considered to be acceptable as per the current standard of practice. Slabs should float on the subgrade and only be tied into the foundation walls or grade beams at doorways. To reduce the effects of vertical slab movement (e.g. potential slab cracking, partition wall distortion, cracking of brittle finishing surfaces), the following provisions should be implemented to allow the slab to move independently of the structural components of the building:

- Partition and non-bearing walls should not be rigidly connected to bearing walls or columns;
- Reinforce the concrete and articulate the slab at regular intervals to control cracking;
- Heating ducts placed beneath the floor slab should be insulated to minimize drying and shrinkage of clay fill/till soils; and
- Piping and electrical conduits should permit flexibility and some movement.

4.7 Lateral Earth Pressures

Lateral pressures are to be considered acting on below-grade building perimeter walls. The earth pressures will be induced by new fill placed within basement excavation, which is anticipated to comprise of local silty clay till or imported soil of similar nature.

Active earth pressure conditions should be used in establishing earth pressures acting on the underground structure walls. The lateral pressure applied to subgrade walls is calculated using the following formula:

$$P = K\,(\gamma bH + q)$$

Where:

P = lateral earth pressure (kPa)

K = earth pressure coefficient

γ_b = soil unit weight

H = Height of wall (m)

q = surcharge load (if applicable)

An earth pressure coefficient of K_a = 0.40 may be used for active earth pressure conditions. The soil unit weights for the re-worked silty clay till may be taken as 19 kN/m^3 above the groundwater table.

The equation for lateral earth pressure assumes a horizontal ground surface behind the buried wall. If the ground surface slopes away from the wall, design pressure should be re-evaluated. Hydrostatic pressures acting on below grade walls may also be considered in design, depending on the selected waterproofing/dewatering method (see Section 4.9).

4.8 Temporary Excavation and Dewatering

Temporary excavations (estimated duration of less than 6 months) will be required to construct the basement and for utility trenches. The excavations for this project site are anticipated to be primarily within native silty clay till soil.

All excavations should follow Alberta Occupational Health and Safety Code Standards, Chapter 32 “Excavation and Tunneling”. The subsurface soils encountered at the project site are to be classified as “likely to crack or crumble soil”. Excavations of up to 1.5 m depth may be cut vertically into the soil strata. Excavations with greater depth may be sloped to within 1.5 m of the bottom of the excavation at an angle of not less than 45º measured from the vertical. It is anticipated that excavation depths will not exceed approximately 4.0 mbgs. Excavations of greater depth should be subject to a slope stability assessment.

Seepage into the excavation at the project site may occur, depending on the groundwater conditions encountered during construction. Although the boreholes were noted to be dry

during drilling, the stabilized groundwater elevation may help to determine the risk of seepage during excavations.

Due to the fine-grained nature of the water bearing ground stratum, temporary excavation side slopes may not be stable without prior lowering of the groundwater level. A suitable dewatering method for the subsurface ground conditions at the project site comprises of a series of vacuum-assisted wellpoints. The wellpoint system should be designed by a qualified dewatering designer/contractor, who may also provide dewatering alternatives based on local experience.

Prior to allowing workers to enter the construction excavations, a thorough inspection should be undertaken for evidence of instability (cracks, bulging, sloughing, seepage, or else). Any loose/unstable soils or cobbles should be scaled from the excavations prior to worker entry. All unsupported excavations should be monitored daily for evidence of slope movements such as slumping, bulging, or else. Any such movements should be reported to WATT and remedial stability measures undertaken immediately.

Stockpiles of construction materials, excavated soil, construction equipment, or traffic should be kept away from the slope crest/edge by a distance equal to the depth of excavation. The vibration created from heavy machinery operations or compaction processes can destabilize a slope; hence, use of heavy machinery within proximity to excavated slopes should be minimized.

Temporary shoring will be required if the excavation geometry cannot be facilitated, or deeper excavations are required for construction aspects. A qualified shoring consultant/contractor should be retained to design a suitable shoring system for the project site, if required.

4.9 Site Grading, Drainage and Dewatering

To provide proper drainage for the proposed development and to direct surface water to areas away from proposed structures, final site landscaping grades should be sloped away from building perimeter walls to mitigate the potential of surficial water ponding in localized areas adjacent to structures. Minimum final site grades draining away from building structures of 1.0% in paved areas, 1.5% in non-paved areas, and 3.0% within 2.0 m laterally of structures adjacent to landscaped areas are recommended.

All downspouts should be directed away from the building structure to a site gradient that promotes positive surficial drainage away from the attached building. Downspouts should not be directed into the perimeter drain or weeping tile system (if constructed).

Based on the groundwater level measurements, groundwater levels may impact typical construction practices in the NW corner of site (location of Boreholes BH23-01 through BH23-08). In this area, weeping tiles are recommended to prevent seepage build-up around basement walls. Weeping tiles may include a sump pump system with designed overland drainage away from foundations or may be designed with positive drainage towards a stormwater system. Basement walls should be damp proofed according to Building Code requirements.

4.10 Pavement Design Considerations

Recommendations for asphaltic concrete structures placed on suitably prepared subgrade soils as outlined in Section 4.2 are provided in the following table:

Table 3: Recommended Asphaltic Concrete Pavement Structure

Material	Minimum Design Thickness (mm)			
	Paved Lane	Residential Local		Residential Collector
Asphalt Concrete	75	75*	90	100
25 mm Crushed Gravel Base	100	150	150	175
80 mm Crushed Granular Subbase	300	300	200	300

*Red Deer County Specifications require a minimum depth of asphaltic concrete on local roads and primary access lanes with deep utility services of 90mm.

Minimum thicknesses have been designed based on a soaked CBR of 3.1%.

All materials used to construct asphaltic concrete pavement structures should comply with the Mountain View County Standard Specifications (current edition). Test results verifying materials properties should be provided to WATT to confirm compliance with the specifications prior to use and placement on site.

4.11 Concrete Exposure Class

Four sulphate (SO_4) in groundwater samples, mg/L resulted in sulphate concentrations ranging from 521 to 918 mg/L. The test result indicated moderate exposure to concrete in contact with the subsurface soils. Accordingly, concrete placed in contact with the soil

can comprise of Type MS cement. In addition, all concrete must be designed in accordance with CSA A23.1-04 i.e. air-entraining agents are required in freeze/thaw zones. Any imported fill to be placed in contact with concrete should also be tested for water-soluble sulphate content and the above recommendations re-evaluated.

4.12 Seismic Considerations

Seismic design for residential structures is based on the National Building Code of Canada (NBCC). The primary objective of the NBCC earthquake resistant design requirements is to protect the life and safety of the building occupants as the building responds to strong ground shaking. Structures designed in conformance with the NBCC provisions may undergo extensive structural damage during strong ground shaking but should not collapse. Collapse is defined to be a state where occupants can no longer exit the building because of structural failure. This implies that supporting foundations necessary to ensure the building's post-earthquake stability must be protected against excessive movement under strong ground shaking.

Based on the results of the field investigation, it is appropriate to classify the ground conditions at the project site as a Class C Site for seismic site response.

4.13 Frost Protection

Minimum soil cover of 1.5 and 2.0 m should be provided for heated and unheated structures, respectively. Alternatively, rigid insulation may be used to provide equivalent frost protection. Grade beams that do not have adequate soil cover for frost protection should be constructed with a minimum 100 mm void space below the grade beam. It is noted that the frost penetration depths provided above are based on the native, cohesive soils at the project site. Greater frost depths are to be considered if native materials are being replaced, e.g. if granular fill is used to backfill temporary excavations or utility trenches.

Concrete flatwork should be designed with anticipation of some frost heave occurring. Concrete sidewalks should be dowelled into footings or grade beams in threshold areas where heave of concrete panels would obstruct the proper opening of doors and present tripping hazards. As the outside of edge of these panels will still heave, the panel should either be properly jointed to control crack locations or reinforced by placement of adequate reinforcing steel. Alternatively, rigid insulation may be placed below flatwork to prevent frost formation in the underlying subgrade. WATT can provide detailed recommendations for such insulation if required.

4.14 Review, Testing and Field Inspection

WATT should be given the opportunity to review details of the design and specifications related to geotechnical aspects of this project prior to construction. The recommendations provided in this report should be supported by an adequate scope of field review during construction. All construction should be undertaken by an experienced contractor for the foundation and earthworks construction. As a minimum, an adequate scope of field review is as follows:

- Shallow Foundations → Observation of all bearing surfaces prior to fill or concrete placement;
- Floor Slab-on-Grades → Observation of all subgrades prior to fill or concrete placement;
- Engineered Fill Placement → Full-time monitoring and compaction testing during fill placement;

All geotechnical field reviews must be carried out by a qualified geotechnical engineer or technician independent of the contractor. Failure to provide an adequate level of field review for construction of the foundations may be in contradiction of the Alberta Building Code requirements.

5.0 LIMITATIONS

The recommendations provided in this geotechnical evaluation report are based on the interpreted findings encountered within geotechnical boreholes drilled across the project site. The subsurface soil and groundwater conditions observed during borehole drilling are anticipated to be reasonably representative of the project site; however, it should be noted that innate variable conditions may be encountered at the time of various construction aspects. WATT should be notified and given the opportunity to re-evaluate current information, if required, should geotechnical conditions other than those reported herein be identified at any stage of development.

This report has been prepared with accepted geotechnical soil and foundation engineering practices/principles for the project details specified within this report. The recommendations presented herein are subject to an adequate level of inspection during construction and any relevant Alberta Building Code requirements, or their validity may be jeopardized. No other warranty is expressed or implied.

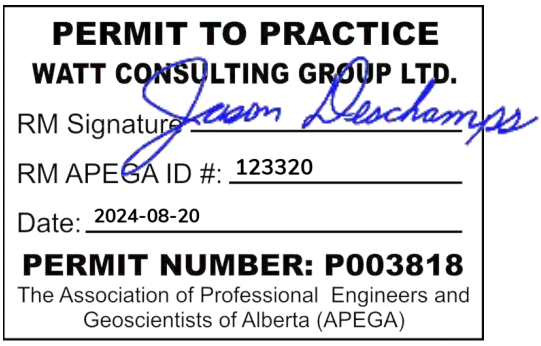
6.0 CLOSURE

We trust that the information contained in this report meets your present requirements. Please do not hesitate to contact the undersigned with any questions, or should you require further geotechnical input on this project.

Sincerely,

WATT Consulting Group

2024-08-19
ID: 160941

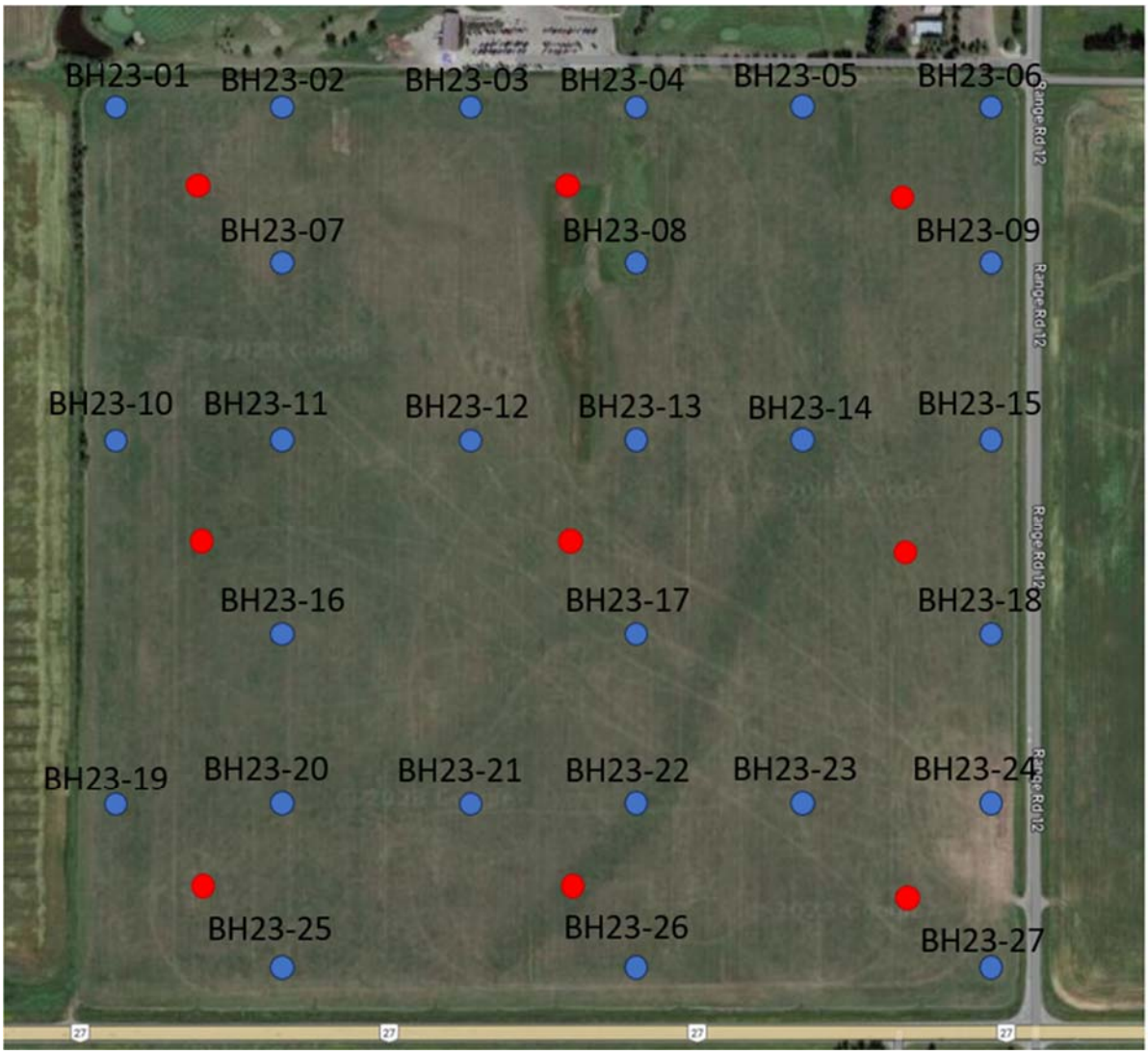


Joel Rombough, *P.Eng.*

Geotechnical Lead

T 403-462-0718

APPENDIX A:
FIGURE 1 – BOREHOLE LOCATION PLAN



APPENDIX B:
BOREHOLE RECORDS

WELL NUMBER BH23-01

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 2/12/23 **COMPLETED** 2/12/23 **GROUND ELEVATION** 1018.8 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** 2.50 m / Elev 1016.30 m

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		0.25 (OH) Topsoil 1018.55	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 16%	ML		(ML) Silty sand, trace clay and gravel. Brown, damp, compact, low plasticity. 1.50 1017.30	
2	SPT 1	3-5-7 (12)	MC = 16%	CL-ML		(CL-ML) Silty clay till, trace sand and gravel. Low to medium plastic, brown, damp, stiff to very stiff.	
3						3.00 1015.80	
	SPT 2	3-6-9 (15)	MC = 16%	CL-ML		(CL-ML) Silty clay till, trace sand and gravel. Low to medium plastic, light grey, damp, very stiff.	
4			MC = 16%				
5	SPT 3	3-6-11 (17)	MC = 16%				
6							
	SPT 4	3-9-10 (19)	MC = 16%			6.45 1012.35	

Bottom of hole at 6.45 m.

GENERAL BH / TP / WELL NETOOK CROSSING.GPJ GINT STD CANADA LAB.GDT 19/3/24

WELL NUMBER BH23-02

WATT Consulting Group

CLIENT 1273929 Alberta Ltd.
PROJECT NAME Netook Crossing
PROJECT NUMBER 3903.T01
PROJECT LOCATION Netook
DATE STARTED 2/12/23 **COMPLETED** 2/12/23
GROUND ELEVATION 1019 m **HOLE SIZE** 6" Auger
DRILLING CONTRACTOR Venom Environmental Drilling
GROUND WATER LEVELS:
DRILLING METHOD Truck Mounted Auger
AT TIME OF DRILLING ---
LOGGED BY GS **CHECKED BY** JR
AT END OF DRILLING ---
NOTES
AFTER DRILLING 2.70 m / Elev 1016.30 m

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		0.20 (OH) Topsoil 1018.80	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 15%			(CL-ML) Silty clay till, trace sand. Low to medium plastic, brown to grey, damp, stiff to very stiff.	
2	SPT 1	3-3-4 (7)	MC = 16%				
3							
4	SPT 2	3-4-6 (10)	MC = 16%	CL-ML			
5	SPT 3	3-6-7 (13)	MC = 14% MC = 13%				
6	SPT 4	3-5-9 (14)	MC = 15%			6.45 1012.55	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-03

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 2/12/23 **COMPLETED** 2/12/23 **GROUND ELEVATION** 1019.3 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** 4.40 m / Elev 1014.90 m

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		0.20 (OH) Topsoil 1019.10	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 15%			(CL-ML) Silty clay till, trace sand and gravel. Low to medium plastic, brown to grey, damp, stiff to very stiff.	
2	SPT 1	3-3-4 (7)	MC = 14%				
3							
	SPT 2	3-5-7 (12)	MC = 15%	CL-ML			
4			MC = 17%				
5	SPT 3	4-6-9 (15)	MC = 16%				
6							
	SPT 4	4-6-12 (18)	MC = 16%			6.45 1012.85	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-04

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 1/12/23 **COMPLETED** 1/12/23 **GROUND ELEVATION** 1018.3 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** 2.00 m / Elev 1016.30 m

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		(OH) Topsoil 0.25 / 1018.05	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 16%	CL-ML		(CL-ML) Silty clay till, trace sand. Low to medium plastic, brown to grey, damp, stiff to very stiff. Auger refusal due to rock or large boulder.	
2	SPT 1	4-6-9 (15)	MC = 17%				
3						3.00 / 1015.30	

Bottom of hole at 3.00 m.

WELL NUMBER BH23-05

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 1/12/23 **COMPLETED** 1/12/23 **GROUND ELEVATION** 1020.3 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		(OH) Topsoil 0.25 1020.05	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 14%	CL-ML		(CL-ML) Silty clay till, trace sand. Low to medium plastic, brown to grey, damp, stiff to very stiff.	
2	SPT 1	4-6-8 (14)	MC = 15%				
3							
4	SPT 2	5-8-11 (19)	MC = 15%				
5	SPT 3	5-8-10 (18)	MC = 15% MC = 16%				
6							
	SPT 4	5-7-13 (20)	MC = 15%			6.45 1013.85	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-06

WATT Consulting Group

CLIENT 1273929 Alberta Ltd.
PROJECT NAME Netook Crossing
PROJECT NUMBER 3903.T01
PROJECT LOCATION Netook
DATE STARTED 1/12/23 **COMPLETED** 1/12/23
GROUND ELEVATION 1018.6 m **HOLE SIZE** 6" Auger
DRILLING CONTRACTOR Venom Environmental Drilling
GROUND WATER LEVELS:
DRILLING METHOD Truck Mounted Auger
AT TIME OF DRILLING ---
LOGGED BY GS **CHECKED BY** JR
AT END OF DRILLING ---
NOTES
AFTER DRILLING 3.10 m / Elev 1015.50 m

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		(OH) Topsoil	Casing Top Elev: (m)
						0.30 / 1018.30	Casing Type: 1" PVC
1			MC = 14%			(CL-ML) Silty clay till, trace sand. Low to medium plastic, brown to grey, damp, stiff to very stiff.	
2	SPT 1	4-7-9 (16)	MC = 16%				
3							
	SPT 2	3-6-7 (13)	MC = 16%	CL-ML			
4			MC = 15%				
5	SPT 3	4-8-15 (23)	MC = 16%				
6							
	SPT 4	5-8-12 (20)	MC = 16%			6.45 / 1012.15	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-07

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 2/12/23 **COMPLETED** 2/12/23 **GROUND ELEVATION** 1018.5 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** 3.50 m / Elev 1015.00 m

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		0.20 (OH) Topsoil 1018.30	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 16%			(CL-ML) Silty clay till, trace sand. Medium plastic, light brown to grey, damp, stiff to very stiff.	
2	SPT 1	3-4-5 (9)	MC = 16%				
3							
4	SPT 2	3-6-9 (15)	MC = 16%	CL-ML			
5	SPT 3	3-5-7 (12)	MC = 16%				
6							
	SPT 4	3-6-11 (17)	MC = 16%			6.45 1012.05	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-08

WATT Consulting Group

CLIENT 1273929 Alberta Ltd.
PROJECT NAME Netook Crossing
PROJECT NUMBER 3903.T01
PROJECT LOCATION Netook
DATE STARTED 1/12/23 **COMPLETED** 1/12/23
GROUND ELEVATION 1018.1 m **HOLE SIZE** 6" Auger
DRILLING CONTRACTOR Venom Environmental Drilling
GROUND WATER LEVELS:
DRILLING METHOD Truck Mounted Auger
AT TIME OF DRILLING ---
LOGGED BY GS **CHECKED BY** JR
AT END OF DRILLING ---
NOTES
AFTER DRILLING 2.20 m / Elev 1015.90 m

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		(OH) Topsoil	Casing Top Elev: (m)
						0.30 / 1017.80	Casing Type: 1" PVC
1			MC = 16%	CL-ML		(CL-ML) Silty clay till, trace sand. Low to medium plastic, dark grey, damp, stiff to very stiff.	
2	SPT 1	3-4-6 (10)	MC = 18%				
3							
4	SPT 2	3-5-7 (12)	MC = 17%				
5	SPT 3	4-6-9 (15)	MC = 16%				
6			MC = 16%				
	SPT 4	5-8-10 (18)	MC = 16%			6.45 / 1011.65	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-09

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 1/12/23 **COMPLETED** 1/12/23 **GROUND ELEVATION** 1019.4 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		(OH) Topsoil	Casing Top Elev: (m)
						0.30 1019.10	Casing Type: 1" PVC
						(CL-ML) Silty clay till, trace sand. Low to medium plastic, brown to grey, damp, stiff to very stiff.	
1			MC = 11%				
2	SPT 1	4-6-9 (15)					
3							
	SPT 2	4-6-10 (16)		CL-ML			
4			MC = 15%				
	SPT 3	4-8-9 (17)					
5			MC = 15%				
6							
	SPT 4	4-8-10 (18)	MC = 16%			6.45 1012.95	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-10

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 2/12/23 **COMPLETED** 2/12/23 **GROUND ELEVATION** 1019.6 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** 4.10 m / Elev 1015.50 m

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		(OH) Topsoil 0.25 / 1019.35	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 10%	CL-ML		(CL-ML) Silty clay till, trace sand and gravel. Low to medium plastic, brown to grey, damp, stiff to very stiff.	
2	SPT 1	3-4-7 (11)	MC = 14%				
3							
4	SPT 2	4-6-7 (13)	MC = 12%				
5	SPT 3	3-5-9 (14)	MC = 14%				
6			MC = 13%				
	SPT 4	3-6-11 (17)	MC = 14%			6.45 / 1013.15	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-11

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 2/12/23 **COMPLETED** 2/12/23 **GROUND ELEVATION** 1019.5 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** 4.40 m / Elev 1015.10 m

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		0.20 (OH) Topsoil 1019.30	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 16%			(CL-ML) Silty clay till, trace sand and gravel. Low to medium plastic, brown to grey, damp, stiff to very stiff.	
2	SPT 1	3-3-6 (9)	MC = 15%				
3							
	SPT 2	3-5-8 (13)	MC = 16%	CL-ML			
4			MC = 16%				
5	SPT 3	4-5-7 (12)	MC = 16%				
6							
	SPT 4	4-7-10 (17)	MC = 16%			6.45 1013.05	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-12

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 2/12/23 **COMPLETED** 2/12/23 **GROUND ELEVATION** 1018.9 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		0.20 (OH) Topsoil 1018.70	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 14%	CL-ML		(CL-ML) Silty clay till, trace sand. Low to medium plastic, brown to grey, damp, stiff to very stiff.	
2	SPT 1	3-3-4 (7)	MC = 14%				
3							
4	SPT 2	3-6-10 (16)	MC = 15%				
5	SPT 3	4-6-8 (14)	MC = 15%				
6			MC = 14%				
	SPT 4	4-8-11 (19)	MC = 14%			6.45 1012.45	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-13

WATT Consulting Group

CLIENT 1273929 Alberta Ltd.
PROJECT NAME Netook Crossing
PROJECT NUMBER 3903.T01
PROJECT LOCATION Netook
DATE STARTED 1/12/23 **COMPLETED** 1/12/23
GROUND ELEVATION 1018.7 m **HOLE SIZE** 6" Auger
DRILLING CONTRACTOR Venom Environmental Drilling
GROUND WATER LEVELS:
DRILLING METHOD Truck Mounted Auger
AT TIME OF DRILLING ---
LOGGED BY GS **CHECKED BY** JR
AT END OF DRILLING ---
NOTES
AFTER DRILLING 4.60 m / Elev 1014.10 m

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		(OH) Topsoil 0.25 / 1018.45	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 15%	CL-ML		(CL-ML) Silty clay till, trace gravel. Low to medium plastic, brown to grey, damp, stiff to very stiff.	
2	SPT 1	3-3-7 (10)	MC = 16%				
3							
4	SPT 2	3-5-7 (12)	MC = 16%				
5	SPT 3	4-7-8 (15)	MC = 15%				
6			MC = 14%				
	SPT 4	5-8-12 (20)	MC = 16%			6.45 / 1012.25	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-14

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 1/12/23 **COMPLETED** 1/12/23 **GROUND ELEVATION** 1020.4 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		0.20 (OH) Topsoil 1020.20	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 13%	ML		(ML) Silty sand, trace clay and gravel. Brown, damp, compact, low plasticity.	
2	SPT 1	3-4-6 (10)	MC = 12%				
3						3.00 1017.40	
	SPT 2	3-5-7 (12)	MC = 11%	CL-ML		(CL-ML) Silty clay till, trace sand and gravel. Low to medium plastic, dark grey, damp, very stiff.	
4			MC = 12%				
5	SPT 3	4-7-9 (16)	MC = 12%				
6							
	SPT 4	5-8-12 (20)	MC = 14%			6.45 1013.95	

Bottom of hole at 6.45 m.

GENERAL BH / TP / WELL NETOOK CROSSING.GPJ GINT STD CANADA LAB.GDT 19/3/24

WELL NUMBER BH23-15

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 1/12/23 **COMPLETED** 1/12/23 **GROUND ELEVATION** 1019.5 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		(OH) Topsoil 0.30 1019.20	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 14%	ML		(ML) Silty sand, trace clay and gravel. Brown, damp, compact, low plasticity. 1.50 1018.00	
2	SPT 1	4-8-10 (18)	MC = 13%	CL-ML		(CL-ML) Silty clay till, trace sand and gravel. Low to medium plastic, dark grey, damp, very stiff.	
3							
	SPT 2	3-7-10 (17)	MC = 15%				
4			MC = 14%				
	SPT 3	4-8-9 (17)					
5			MC = 15%				
6							
	SPT 4	5-9-14 (23)	MC = 15%			6.45 1013.05	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-16

WATT Consulting Group

CLIENT 1273929 Alberta Ltd.
PROJECT NAME Netook Crossing
PROJECT NUMBER 3903.T01
PROJECT LOCATION Netook
DATE STARTED 2/12/23 **COMPLETED** 2/12/23
GROUND ELEVATION 1019.6 m **HOLE SIZE** 6" Auger
DRILLING CONTRACTOR Venom Environmental Drilling
GROUND WATER LEVELS:
DRILLING METHOD Truck Mounted Auger
AT TIME OF DRILLING ---
LOGGED BY GS **CHECKED BY** JR
AT END OF DRILLING ---
NOTES
AFTER DRILLING 5.60 m / Elev 1014.00 m

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		(OH) Topsoil 0.25 / 1019.35	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 10%	CL-ML		(CL-ML) Silty clay till, trace gravel. Low to medium plastic, brown to grey, damp, stiff to very stiff.	
2	SPT 1	3-5-6 (11)	MC = 13%				
3							
4	SPT 2	3-6-7 (13)	MC = 14%				
5	SPT 3	3-6-11 (17)	MC = 14%				
6	SPT 4	3-6-11 (17)	MC = 14%			6.45 / 1013.15	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-17

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 1/12/23 **COMPLETED** 1/12/23 **GROUND ELEVATION** 1018.8 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		(OH) Topsoil	Casing Top Elev: (m)
						0.30 1018.50	Casing Type: 1" PVC
1			MC = 13%	ML		(ML) Silty sand, trace clay and gravel. Brown, damp, compact, low to medium plasticity.	
2	SPT 1	3-6-7 (13)	MC = 15%				
3						3.00 1015.80	
	SPT 2	4-5-8 (13)	MC = 15%	CL-ML		(CL-ML) Silty clay till, trace sand and gravel. Low to medium plastic, light grey, damp, very stiff.	
4			MC = 15%				
5	SPT 3	4-8-10 (18)	MC = 14%				
6							
	SPT 4	5-7-12 (19)	MC = 16%			6.45 1012.35	

Bottom of hole at 6.45 m.

GENERAL BH / TP / WELL NETOOK CROSSING.GPJ GINT STD CANADA LAB.GDT 19/3/24

WELL NUMBER BH23-18

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 1/12/23 **COMPLETED** 1/12/23 **GROUND ELEVATION** 1019.5 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		(OH) Topsoil	Casing Top Elev: (m)
						0.30 1019.20	Casing Type: 1" PVC
1			MC = 12%	ML		(ML) Silty sand, trace clay. Brown, damp, stiff, low plasticity.	
						1.50 1018.00	
2	SPT 1	4-8-10 (18)	MC = 14%	CL-ML		(CL-ML) Silty clay till, trace sand and gravel. Low to medium plastic, light grey, damp, very stiff.	
3							
	SPT 2	5-8-9 (17)	MC = 15%				
4			MC = 14%				
	SPT 3	5-8-10 (18)					
5			MC = 15%				
6							
	SPT 4	5-8-11 (19)	MC = 14%			6.45 1013.05	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-19

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 2/12/23 **COMPLETED** 2/12/23 **GROUND ELEVATION** 1018.3 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** 3.90 m / Elev 1014.40 m

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		(OH) Topsoil 0.25 / 1018.05	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 15%	ML		(ML) Silty sand, some gravel, trace clay. Brown, damp, compact, low plasticity. 1.50 / 1016.80	
2	SPT 1	4-6-9 (15)	MC = 10%	CL-ML		(CL-ML) Silty clay till, trace gravel. Low to medium plastic, light grey, damp, very stiff.	
3							
4	SPT 2	3-5-7 (12)	MC = 11%				
5	SPT 3	3-5-13 (18)	MC = 11%				
6			MC = 11%				
	SPT 4	3-6-10 (16)	MC = 14%			6.45 / 1011.85	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-20

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 2/12/23 **COMPLETED** 2/12/23 **GROUND ELEVATION** 1019.9 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** 5.00 m / Elev 1014.90 m

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		0.20 (OH) Topsoil 1019.70	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 9%	ML		(ML) Silty sand, some gravel, trace clay. Brown, damp, compact, low plasticity. 1.50 1018.40	
2	SPT 1	3-5-7 (12)	MC = 13%	CL-ML		(CL-ML) Silty clay till, trace gravel. Low to medium plastic, brown to grey, damp, stiff to very stiff.	
3							
	SPT 2	4-7-9 (16)	MC = 12%				
4			MC = 9%				
	SPT 3	4-8-10 (18)					
5			MC = 9%				
6							
	SPT 4	10-16-16 (32)	MC = 6%			6.45 1013.45	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-21

WATT Consulting Group

CLIENT 1273929 Alberta Ltd.
PROJECT NAME Netook Crossing
PROJECT NUMBER 3903.T01
PROJECT LOCATION Netook
DATE STARTED 1/12/23 **COMPLETED** 1/12/23
GROUND ELEVATION 1019.4 m **HOLE SIZE** 6" Auger
DRILLING CONTRACTOR Venom Environmental Drilling
GROUND WATER LEVELS:
DRILLING METHOD Truck Mounted Auger
AT TIME OF DRILLING ---
LOGGED BY GS **CHECKED BY** JR
AT END OF DRILLING ---
NOTES
AFTER DRILLING 5.00 m / Elev 1014.40 m

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		(OH) Topsoil 0.25 / 1019.15	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 11%	ML		(ML) Silty sand, some gravel, trace clay. Brown, damp, compact, low plasticity. 1.50 / 1017.90	
2	SPT 1	3-3-7 (10)	MC = 11%	CL-ML		(CL-ML) Silty clay till, trace sand and gravel. Low to medium plastic, brown, damp, stiff to very stiff.	
3							
	SPT 2	3-5-11 (16)	MC = 17%				
4			MC = 12%				
	SPT 3	4-6-9 (15)					
5			MC = 13%				
6							
	SPT 4	3-8-11 (19)	MC = 19%			6.45 / 1012.95	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-22

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 1/12/23 **COMPLETED** 1/12/23 **GROUND ELEVATION** 1018.2 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		(OH) Topsoil	Casing Top Elev: (m)
						0.25 / 1017.95	Casing Type: 1" PVC
						(CL-ML) Silty clay till, trace gravel and sand. Medium plastic, brown, damp, stiff to very stiff.	
1			MC = 15%				
	SPT 1	3-4-5 (9)					
2			MC = 16%				
3							
	SPT 2	4-6-7 (13)	MC = 17%	CL-ML			
4			MC = 16%				
	SPT 3	3-5-8 (13)					
5			MC = 14%				
6							
	SPT 4	3-7-8 (15)	MC = 16%			6.45 / 1011.75	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-23

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 1/12/23 **COMPLETED** 1/12/23 **GROUND ELEVATION** 1018.9 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		0.20 (OH) Topsoil 1018.70	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 12%	ML		(ML) Silty sand, trace clay. Brown, damp, stiff, low plasticity.	
						1.50 1017.40	
2	SPT 1	3-3-7 (10)	MC = 16%	CL-ML		(CL-ML) Silty clay till, trace gravel. Low to medium plastic, brown to grey, damp, stiff to very stiff.	
3							
	SPT 2	3-5-10 (15)	MC = 16%				
4			MC = 16%				
	SPT 3	4-8-9 (17)					
5			MC = 16%				
6							
	SPT 4	5-8-13 (21)	MC = 17%			6.45 1012.45	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-24

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 1/12/23 **COMPLETED** 1/12/23 **GROUND ELEVATION** 1019.3 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		(OH) Topsoil 0.25 / 1019.05	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 14%	ML		(ML) Silty sand, trace clay. Brown, damp, stiff, low plasticity. 1.50 / 1017.80	
2	SPT 1	4-5-7 (12)	MC = 14%	CL-ML		(CL-ML) Silty clay till, trace gravel. Low to medium plastic, brown to grey, damp, stiff to very stiff.	
3							
	SPT 2	4-6-9 (15)	MC = 15%				
4			MC = 15%				
	SPT 3	5-6-8 (14)					
5			MC = 15%				
6							
	SPT 4	8-8-10 (18)	MC = 15%			6.45 / 1012.85	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-25

WATT Consulting Group

CLIENT 1273929 Alberta Ltd.
PROJECT NAME Netook Crossing
PROJECT NUMBER 3903.T01
PROJECT LOCATION Netook
DATE STARTED 2/12/23 **COMPLETED** 2/12/23
GROUND ELEVATION 1018.5 m **HOLE SIZE** 6" Auger
DRILLING CONTRACTOR Venom Environmental Drilling
GROUND WATER LEVELS:
DRILLING METHOD Truck Mounted Auger
AT TIME OF DRILLING ---
LOGGED BY GS **CHECKED BY** JR
AT END OF DRILLING ---
NOTES
AFTER DRILLING 4.70 m / Elev 1013.80 m

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		(OH) Topsoil	Casing Top Elev: (m)
						0.30 / 1018.20	Casing Type: 1" PVC
1			MC = 13%	CL-ML		(CL-ML) Silty clay till, trace sand. Medium plastic, brown to grey, damp, stiff to very stiff.	
2	SPT 1	4-6-8 (14)	MC = 12%				
3							
	SPT 2	4-5-6 (11)	MC = 15%				
4			MC = 15%				
	SPT 3	3-6-11 (17)					
5			MC = 15%				
6							
	SPT 4	3-6-10 (16)	MC = 15%			6.45 / 1012.05	

Bottom of hole at 6.45 m.

GENERAL BH / TP / WELL NETOOK CROSSING.GPJ GINT STD CANADA LAB.GDT 19/3/24

WELL NUMBER BH23-26

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 1/12/23 **COMPLETED** 1/12/23 **GROUND ELEVATION** 1018 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		0.20 (OH) Topsoil 1017.80	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 15%	ML		(ML) Silty sand, trace clay. Brown, damp, loose to compact, low plasticity. 1.50 1016.50	
2	SPT 1	3-4-6 (10)	MC = 16%	CL-ML		(CL-ML) Silty clay till, trace sand and gravel. Low to medium plastic, dark grey, damp, stiff to very stiff.	
3							
	SPT 2	3-5-8 (13)	MC = 16%				
4			MC = 16%				
	SPT 3	4-6-8 (14)					
5			MC = 16%				
6							
	SPT 4	5-8-9 (17)	MC = 16%			6.45 1011.55	

Bottom of hole at 6.45 m.

WELL NUMBER BH23-27

WATT Consulting Group

CLIENT 1273929 Alberta Ltd. **PROJECT NAME** Netook Crossing

PROJECT NUMBER 3903.T01 **PROJECT LOCATION** Netook

DATE STARTED 1/12/23 **COMPLETED** 1/12/23 **GROUND ELEVATION** 1019 m **HOLE SIZE** 6" Auger

DRILLING CONTRACTOR Venom Environmental Drilling **GROUND WATER LEVELS:**

DRILLING METHOD Truck Mounted Auger **AT TIME OF DRILLING** ---

LOGGED BY GS **CHECKED BY** JR **AT END OF DRILLING** ---

NOTES **AFTER DRILLING** ---

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				OH		(OH) Topsoil 0.25 / 1018.75	Casing Top Elev: (m) Casing Type: 1" PVC
1			MC = 13%	ML		(ML) Silty sand, trace clay and gravel. Light brown, damp, stiff, low plasticity. 1.50 / 1017.50	
2	SPT 1	3-4-6 (10)	MC = 14%	CL-ML		(CL-ML) Silty clay till, trace sand. Low to medium plastic, dark grey, damp, stiff to very stiff.	
3							
	SPT 2	3-6-8 (14)	MC = 16%				
4			MC = 16%				
	SPT 3	4-7-9 (16)					
5			MC = 16%				
6							
	SPT 4	5-8-11 (19)	MC = 15%			6.45 / 1012.55	

Bottom of hole at 6.45 m.

APPENDIX C:
LABORATORY TEST RESULTS

Laboratory Analysis Summary Sheet

Project Info: *BNG23*

Client: *Watt Consulting*

** Note: Soil classification is for the whole sample. Soil classification uses the Atterberg Limits results and the percent fines, percent sand and percent gravel as described in ASTM D2487.

Borehole ID	Sample ID	Depth(m)	MC as Received (%)	Particle Size Analysis				
				Cobble Size (%) (75-300mm)	Gravel Size (%) (4.75-75mm)	Sand Size (%) (0.075-4.5mm)	Silt Size (%) (0.002-0.075 mm)	Clay Size (%) (<0.002mm)
BNG23-1088	BH23-16	1.0 m	7.1	0.0	2.4	35.9	40.8	20.9
BNG23-1085	BH23-18	2.0 m	13.5	0.0	0.0	31.9	41.5	26.6
BNG23-1085	BH23-24	3.0 m	11.5	0.0	0.5	33.9	41.8	23.8

Particle Size Analysis
(ASTM D6913 & D7928)

Project Info: *BNG23*

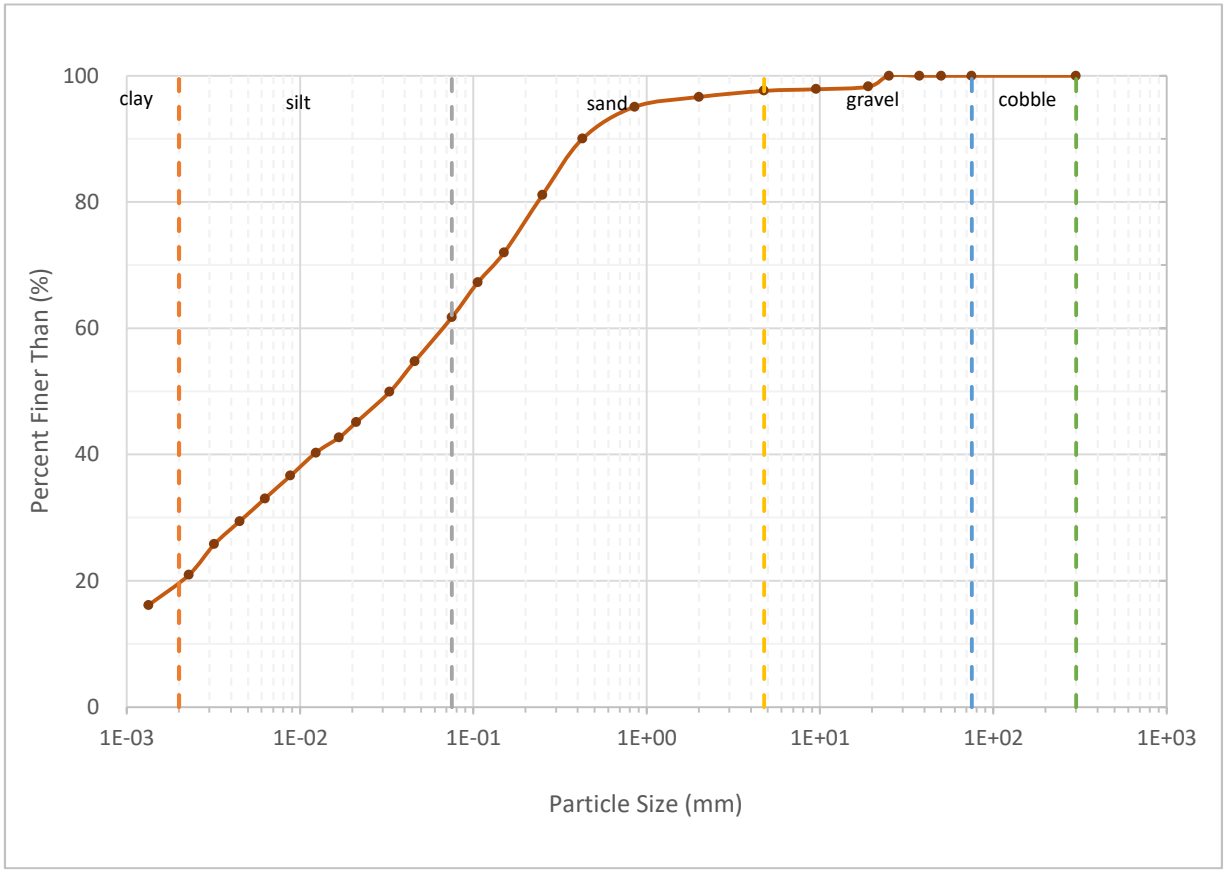
Client: *Watt Consulting*

Sample Info: ***BNG23-1085*** ***BH23-16*** ***1.0 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	98.30
	9.500	97.88
	4.750	97.63
SAND	2.000	96.65
	0.850	95.08
	0.425	90.03
	0.250	81.10
	0.150	71.97
	0.106	67.27
	0.075	61.74
HYDROMETER	0.0458	54.76
	0.0329	49.93
	0.0211	45.10
	0.0168	42.69
	0.0123	40.27
	0.0088	36.65
	0.0063	33.03
	0.0045	29.41
	0.0032	25.79
	0.0023	20.96
	0.0013	16.13

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**2.4**	**35.9**	**40.8**	**20.9**



Particle Size Analysis
(ASTM D6913 & D7928)

Project Info: *BNG23*

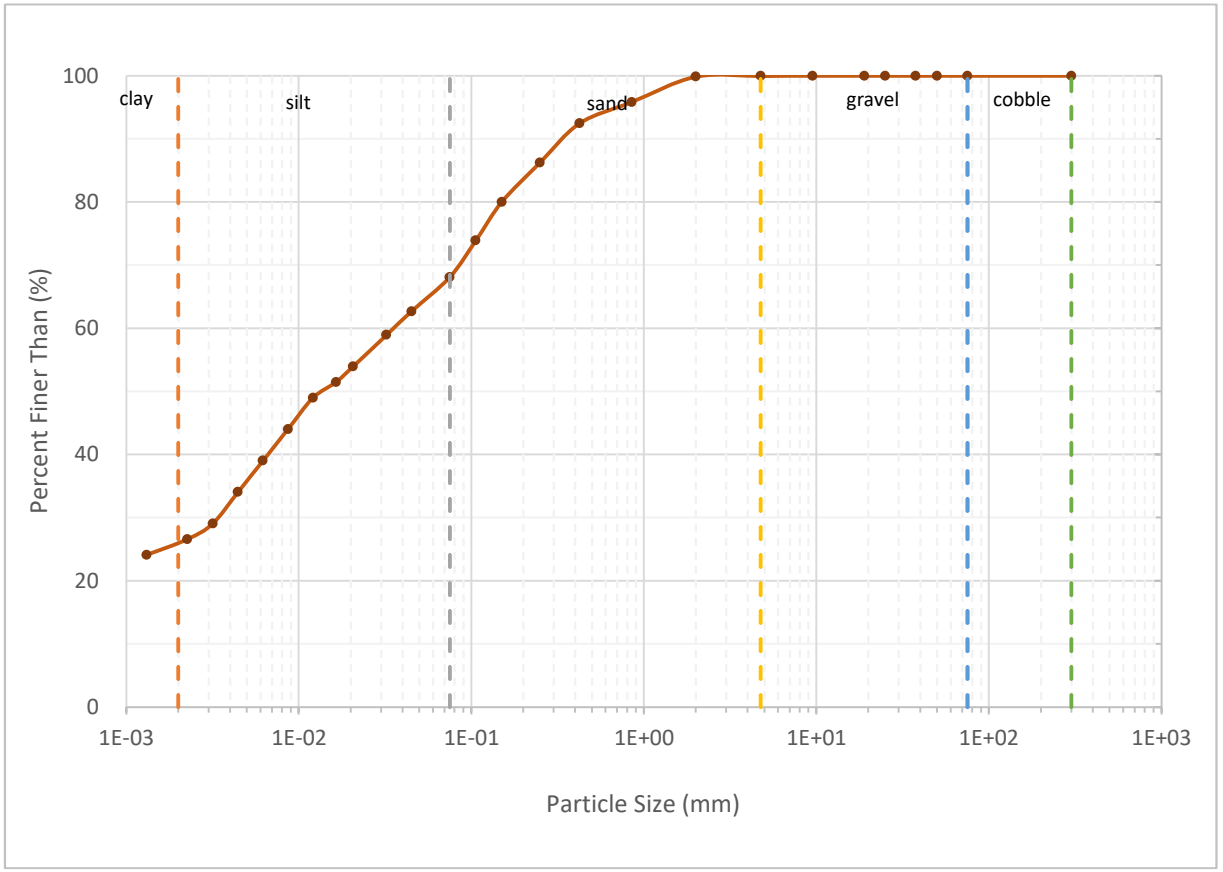
Client: *Watt Consulting*

Sample Info: ***BNG23-1085*** ***BH23-18*** ***2.0 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	99.97
SAND	2.000	99.87
	0.850	95.83
	0.425	92.47
	0.250	86.25
	0.150	80.00
	0.106	73.90
	0.075	68.10
HYDROMETER	0.0450	62.68
	0.0322	58.94
	0.0206	53.97
	0.0164	51.48
	0.0121	48.99
	0.0087	44.01
	0.0062	39.03
	0.0044	34.05
	0.0032	29.07
	0.0023	26.58
	0.0013	24.10

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**0.0**	**31.9**	**41.5**	**26.6**



Particle Size Analysis
(ASTM D6913 & D7928)

Project Info: *BNG23*

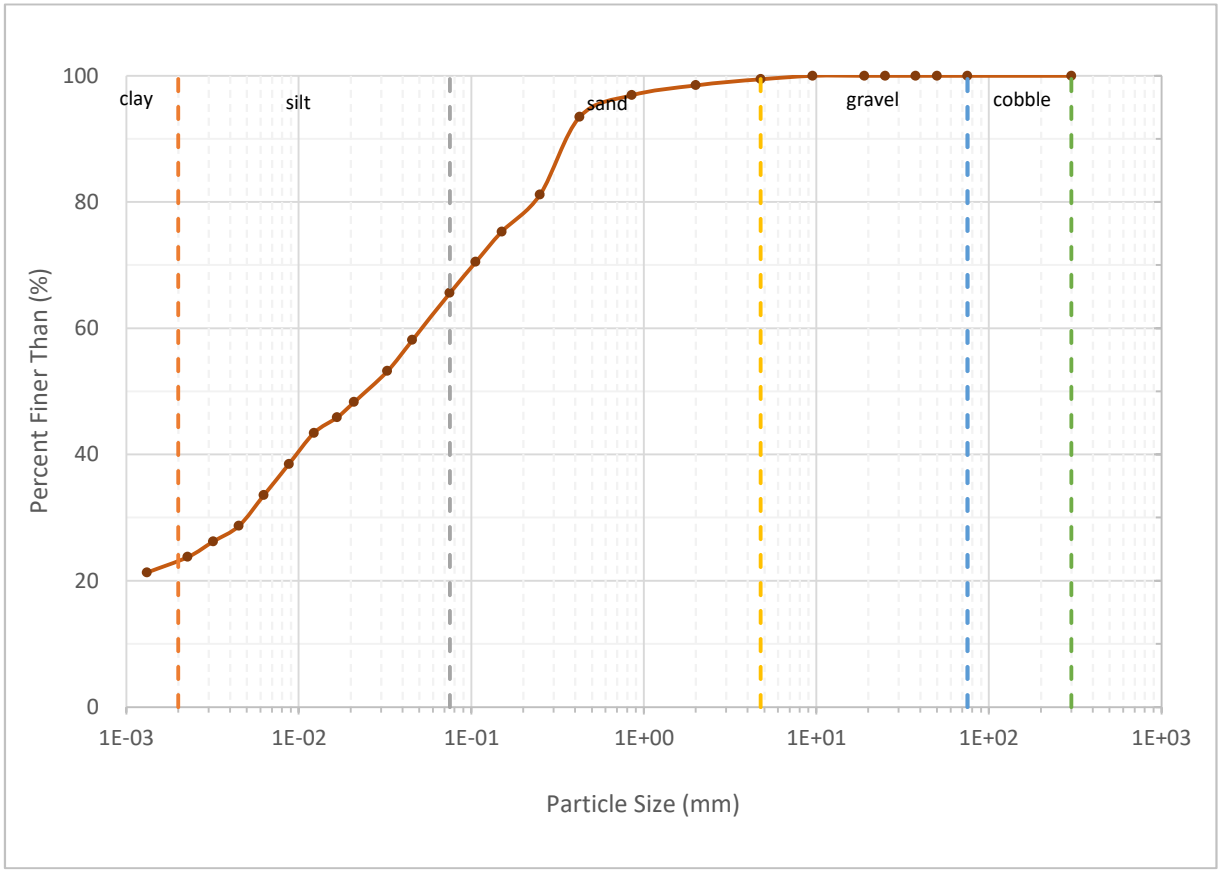
Client: *Watt Consulting*

Sample Info: ***BNG23-1085*** ***BH23-24*** ***3.0 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	99.47
SAND	2.000	98.49
	0.850	96.92
	0.425	93.51
	0.250	81.19
	0.150	75.29
	0.106	70.51
	0.075	65.60
HYDROMETER	0.0455	58.13
	0.0326	53.22
	0.0209	48.31
	0.0166	45.86
	0.0122	43.40
	0.0088	38.49
	0.0063	33.58
	0.0045	28.67
	0.0032	26.22
	0.0023	23.76
	0.0013	21.31

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**0.5**	**33.9**	**41.8**	**23.8**



HYDROMETER ANALYSIS

AR Geotechnical Engineering Ltd

Lab Technician:	Jemal	**Date:**	Jan 18/2024	
Air Dry weight of Spec. (g):	105	Corrected Sample Wt.		99.8
Specific Gravity(Gs):	2.7	Gs correction factor:		0.99
Composite Correction:	5			
k-factor	0.01312	**CLIENT:**	WATT Consultant	
Hydrometer type:	152 - H	**Sample**	2023-08 @10'	

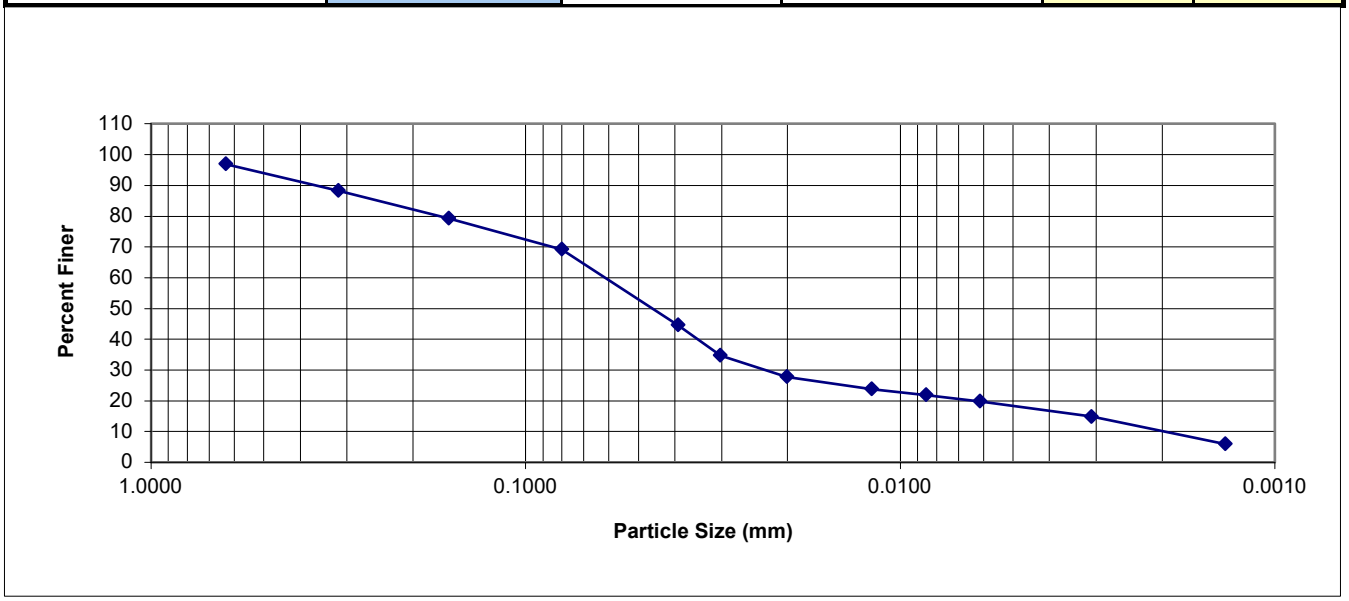
Pan No.:	E
Wt. of Pan + Air Dried (g):	105.3
Wt. of Pan + Oven Dried (g):	100.1
Wt. of Water (g):	5.2
Wt. of Pan (g):	8.2
Wt. of Oven Dried (g):	91.9
Hygroscopic Moisture (%):	5.66

ASTM D422

LIQUID LIMIT	
PLASTIC INDEX	
GRAVEL	0.45
SAND (0.074mm-4.75mm)	34
SILT (0.074mm-0.005mm)	48
CLAY(<0.005mm)	18

Test Data:

Time (1st Four are Sieves) (min)	Hydrometer Reading	Adj. Hydrometer Reading	Effective Depth, L (cm)	Percent Finer	D (mm)
630µm				96.89	0.6300
315µm				88.28	0.3150
160µm				79.26	0.1600
80µm				69.24	0.0800
1	50	45	8.9	44.63	0.0392
2	40	35	10.6	34.71	0.0301
5	33	28	11.7	27.77	0.0201
15	29	24	12.4	23.80	0.0119
30	27	22	12.7	21.82	0.0085
60	25	20	13.0	19.84	0.0061
250	20	15	13.8	14.88	0.0031
1440	11	6	15.3	5.95	0.0014



HYDROMETER ANALYSIS

AR Geotechnical Engineering Ltd

Lab Technician:	Jemal	**Date:**	Jan 18/2024	
Air Dry weight of Spec. (g):	110	Corrected Sample Wt.		104.6
Specific Gravity(Gs):	2.7	Gs correction factor:		0.99
Composite Correction:	5			
k-factor	0.01312	**CLIENT:**	WATT Consultant	
Hydrometer type:	152 - H	**Sample**	2023-11 @10'	

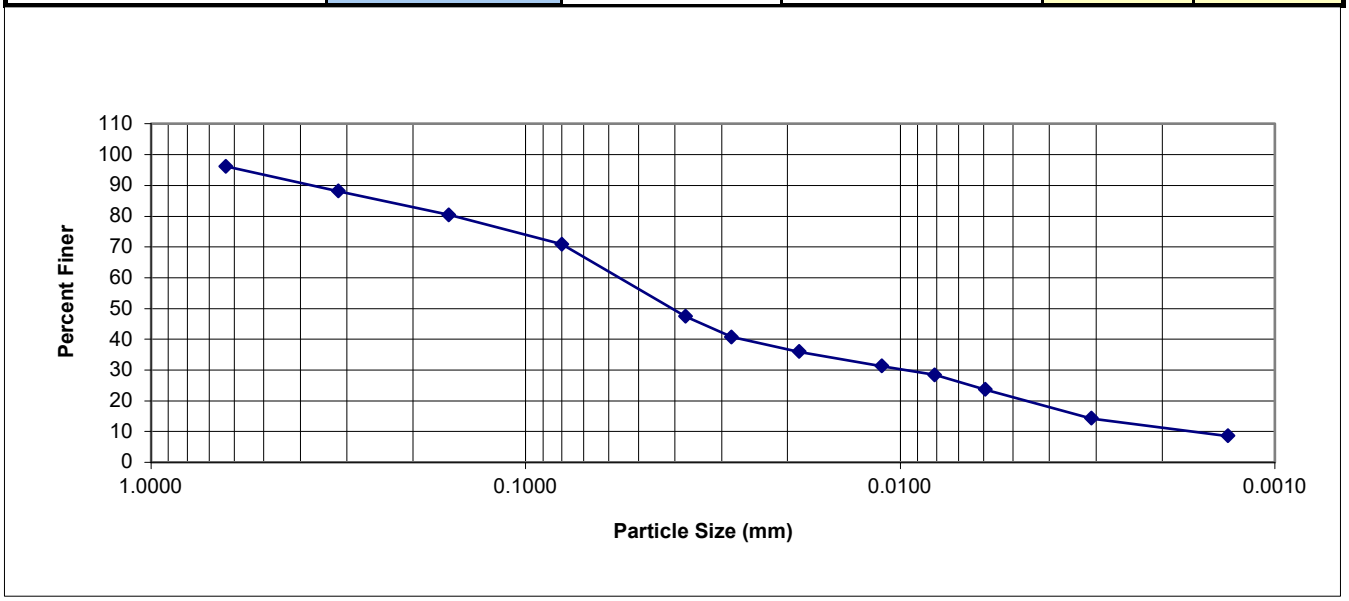
Pan No.:	E
Wt. of Pan + Air Dried (g):	110.3
Wt. of Pan + Oven Dried (g):	104.9
Wt. of Water (g):	5.4
Wt. of Pan (g):	8.2
Wt. of Oven Dried (g):	96.7
Hygroscopic Moisture (%):	5.58

ASTM D422

LIQUID LIMIT	
PLASTIC INDEX	
GRAVEL	1.5
SAND (0.074mm-4.75mm)	31
SILT (0.074mm-0.005mm)	47
CLAY(<0.005mm)	21

Test Data:

Time (1st Four are Sieves) (min)	Hydrometer Reading	Adj. Hydrometer Reading	Effective Depth, L (cm)	Percent Finer	D (mm)
630µm				96.18	0.6300
315µm				88.05	0.3150
160µm				80.40	0.1600
80µm				70.85	0.0800
1	55	50	8.1	47.32	0.0373
2	48	43	9.2	40.69	0.0282
5	43	38	10.1	35.96	0.0186
15	38	33	10.9	31.23	0.0112
30	35	30	11.4	28.39	0.0081
60	30	25	12.2	23.66	0.0059
250	20	15	13.8	14.19	0.0031
1440	14	9	14.8	8.52	0.0013



ATTERBERG LIMITS

PROJECT NUMBER:	WATT Subdivision		
HOLE NUMBER:	BH # 3	**DATE:**	06-Jan-24
DEPTH:	6 ft	**TECHNICIAN:**	Jemal
SAMPLE DESCRIPTION:	Clay and silt		

LIQUID LIMIT (2 TESTS MINIMUM) ASTM D 4318

TEST NUMBER	1	2	3		
TIN NUMBER	16	A	J		
NUMBER OF BLOWS (LIQUID LIMIT)	32	27	28		
WET WEIGHT	39.2	31.7	31.6		
DRY WEIGHT	34.3	28.2	28		
MOISTURE	4.9	3.5	3.6		
TIN WEIGHT	14.2	14.2	14.3		
SOIL WEIGHT	20.1	14	13.7		
WATER CONTENT	24.4%	25.0%	26.3%		

PLASTIC LIMIT ASTM D 4318

TEST NUMBER	1	2			
TIN NUMBER	N	L			
WET WEIGHT	24.5	27.1			
DRY WEIGHT	23	25.2			
MOISTURE	1.5	1.9			
TIN WEIGHT	14.2	14.1			
SOIL WEIGHT	8.8	11.1			
WATER CONTENT	17.0%	17.1%			

NATURAL WATER CONTENT ASTM D 4959

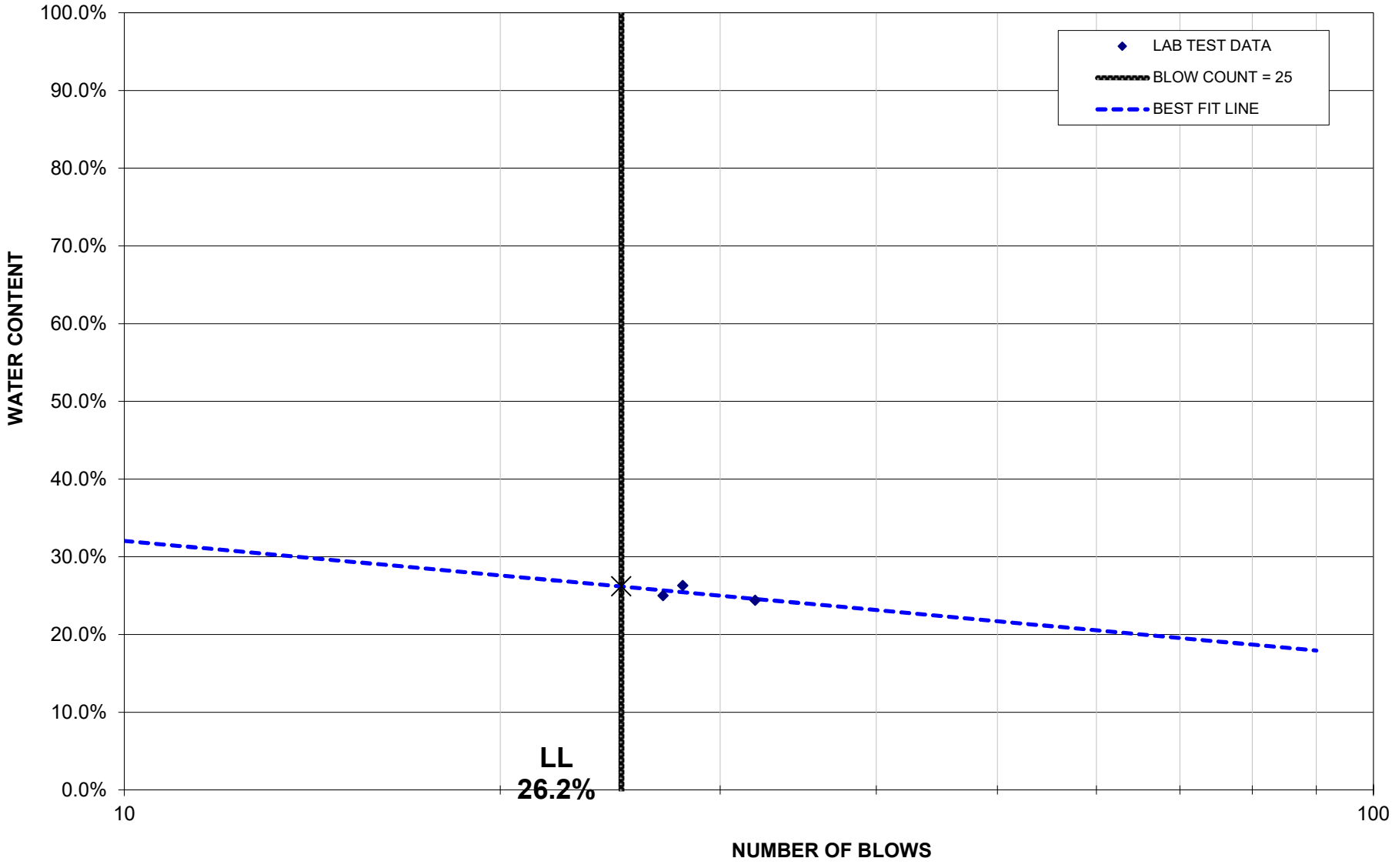
TEST NUMBER					
TIN NUMBER					
WET WEIGHT					
DRY WEIGHT					
MOISTURE					
TIN WEIGHT					
SOIL WEIGHT					
NATURAL WATER CONTENT					

LIQUID LIMIT	26.2%	PLASTIC LIMIT	17.1%
PLASTICITY INDEX	9.1%	NATURAL WATER CONTENT	

Project Number:	WATT Subdivision
Date:	6-Jan-24
Hole Number	BH # 3
Depth:	6 ft
Technician:	Jemal

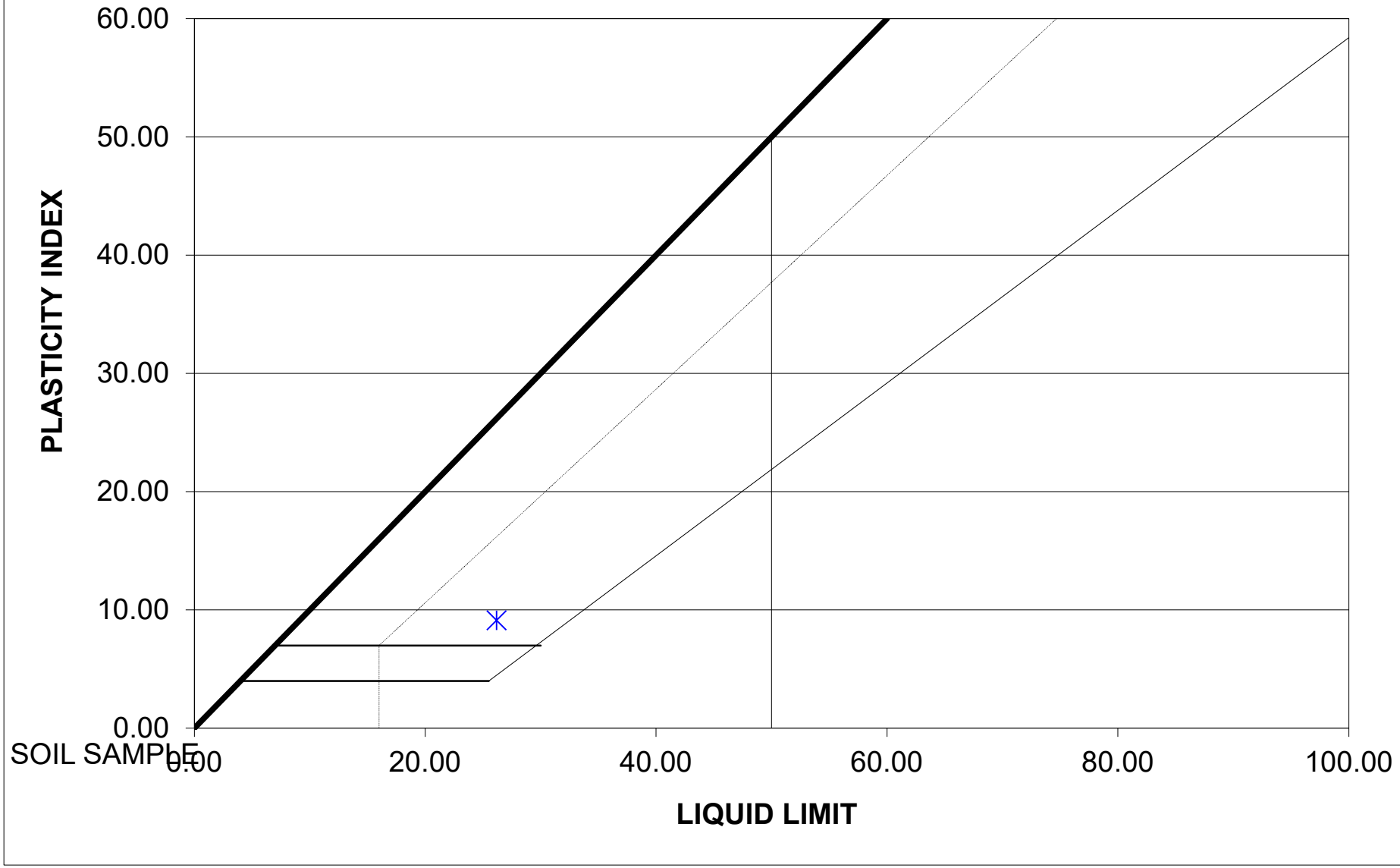
LIQUID LIMIT DETERMINATION

Semi-Log Plot



Project Number:	WATT Subdivision
Date:	6-Jan-24
Hole Number	BH # 3
Depth:	6 ft
Technician:	Jemal

PLASTICITY CHART



ATTERBERG LIMITS

PROJECT NUMBER:	WATT Subdivision		
HOLE NUMBER:	BH # 4	**DATE:**	06-Jan-24
DEPTH:	6 ft	**TECHNICIAN:**	Jemal
SAMPLE DESCRIPTION:	Clay and silt		

LIQUID LIMIT (2 TESTS MINIMUM) ASTM D 4318

TEST NUMBER	1	2	3		
TIN NUMBER	2	E	C		
NUMBER OF BLOWS (LIQUID LIMIT)	34	29	24		
WET WEIGHT	33.7	31.7	31.5		
DRY WEIGHT	29.1	27.6	27.2		
MOISTURE	4.6	4.1	4.3		
TIN WEIGHT	14.2	14.2	14		
SOIL WEIGHT	14.9	13.4	13.2		
WATER CONTENT	30.9%	30.6%	32.6%		

PLASTIC LIMIT ASTM D 4318

TEST NUMBER	1	2			
TIN NUMBER	17	A2			
WET WEIGHT	24.8	26.2			
DRY WEIGHT	23.3	24.4			
MOISTURE	1.5	1.8			
TIN WEIGHT	14.2	14.2			
SOIL WEIGHT	9.1	10.2			
WATER CONTENT	16.5%	17.6%			

NATURAL WATER CONTENT ASTM D 4959

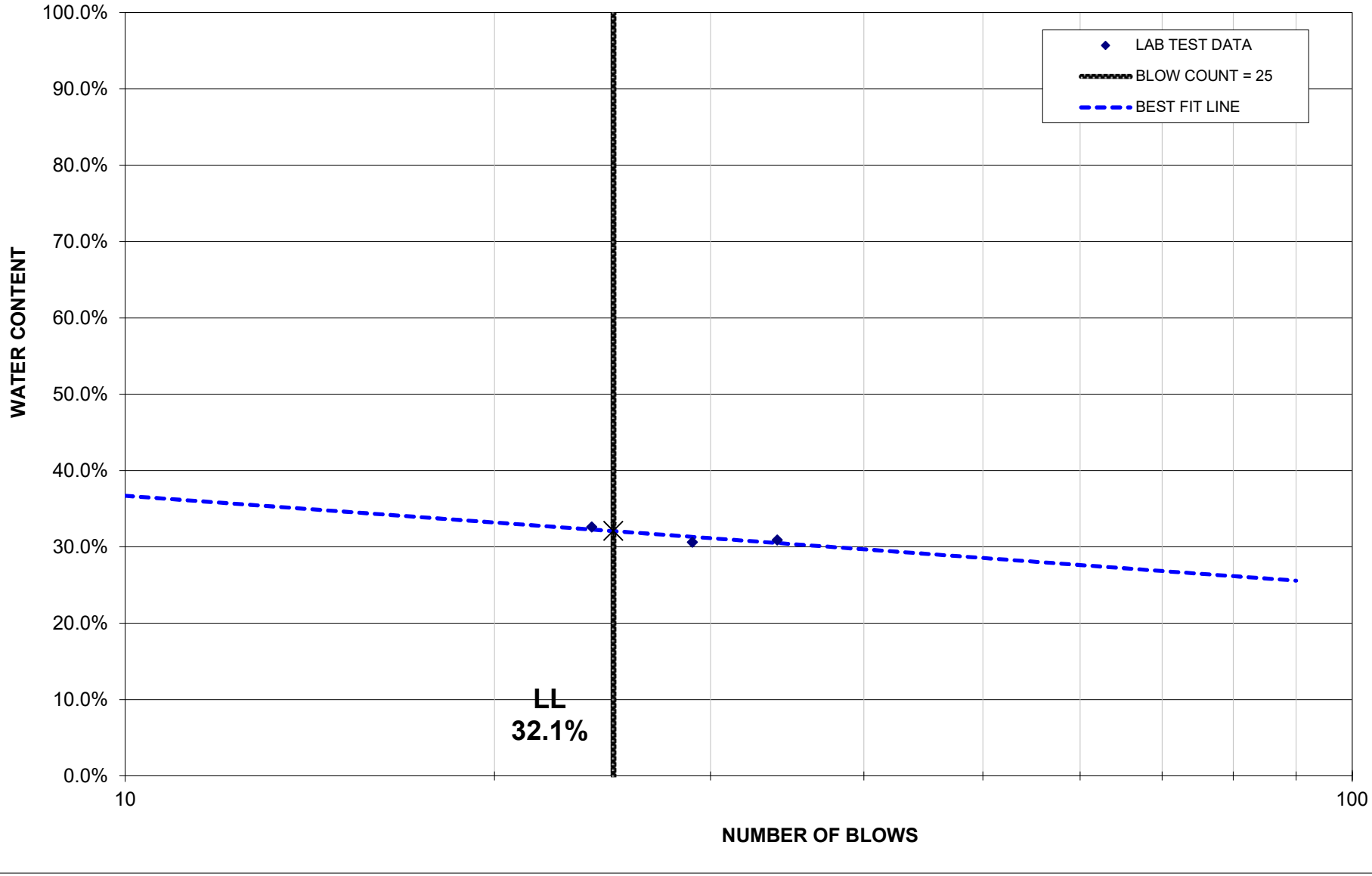
TEST NUMBER					
TIN NUMBER					
WET WEIGHT					
DRY WEIGHT					
MOISTURE					
TIN WEIGHT					
SOIL WEIGHT					
NATURAL WATER CONTENT					

LIQUID LIMIT	32.1%	PLASTIC LIMIT	17.1%
PLASTICITY INDEX	15.0%	NATURAL WATER CONTENT	

Project Number:	WATT Subdivision
Date:	6-Jan-24
Hole Number	BH # 4
Depth:	6 ft
Technician:	Jemal

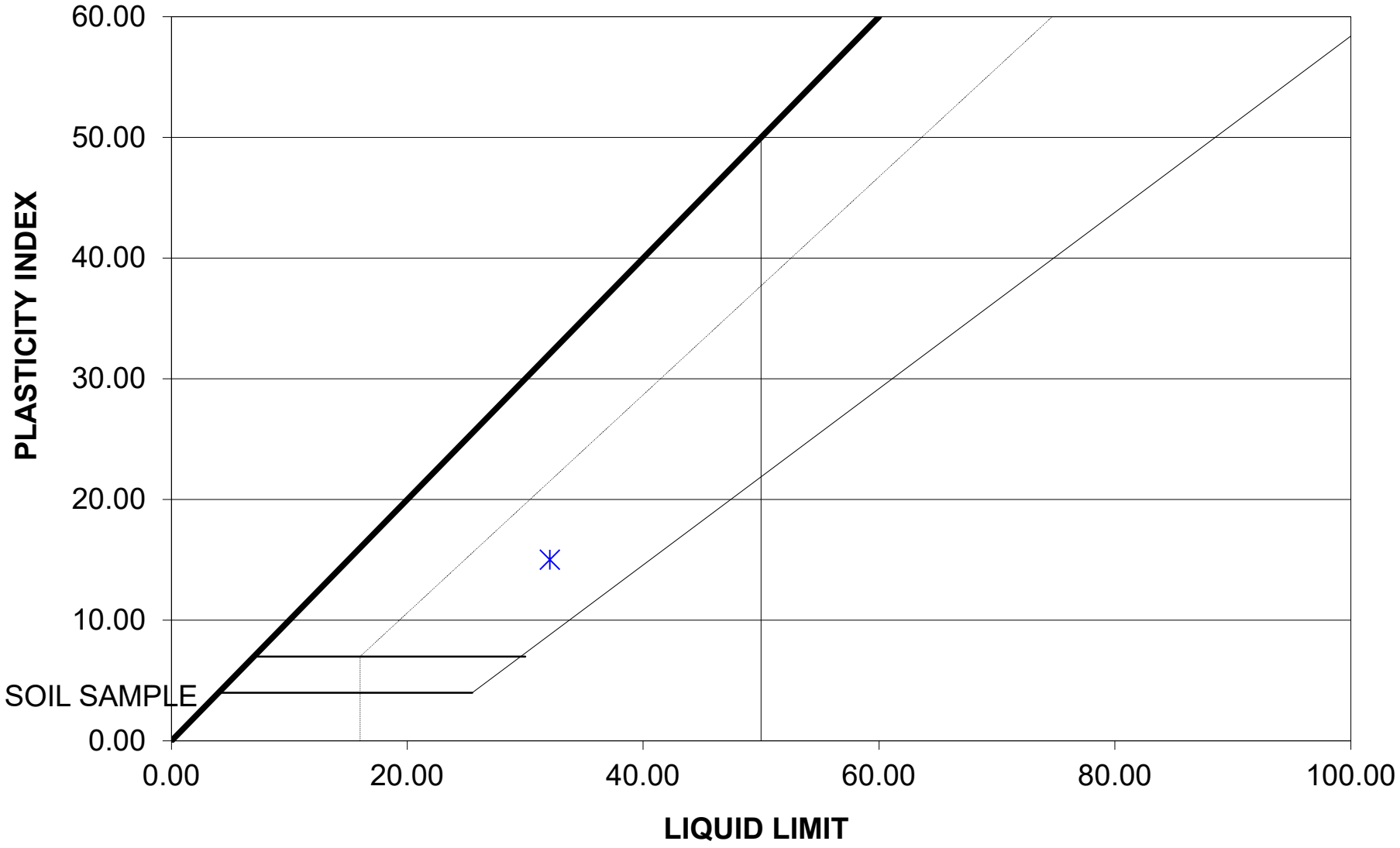
LIQUID LIMIT DETERMINATION

Semi-Log Plot



Project Number:	WATT Subdivision
Date:	6-Jan-24
Hole Number	BH # 4
Depth:	6 ft
Technician:	Jemal

PLASTICITY CHART



ATTERBERG LIMITS

PROJECT NUMBER:	WATT Subdivision		
HOLE NUMBER:	BH # 6	**DATE:**	18-Dec-23
DEPTH:	6 ft	**TECHNICIAN:**	Jemal
SAMPLE DESCRIPTION:	Clay and silt		

LIQUID LIMIT (2 TESTS MINIMUM) ASTM D 4318

TEST NUMBER	1	2	3		
TIN NUMBER	T	15	A6		
NUMBER OF BLOWS (LIQUID LIMIT)	39	30	23		
WET WEIGHT	35.4	35.1	32.3		
DRY WEIGHT	29.9	29.5	27.3		
MOISTURE	5.5	5.6	5		
TIN WEIGHT	14.2	14.1	14.2		
SOIL WEIGHT	15.7	15.4	13.1		
WATER CONTENT	35.0%	36.4%	38.2%		

PLASTIC LIMIT ASTM D 4318

TEST NUMBER	1	2			
TIN NUMBER	F	S			
WET WEIGHT	24.3	24.2			
DRY WEIGHT	23	22.9			
MOISTURE	1.3	1.3			
TIN WEIGHT	13.9	14.2			
SOIL WEIGHT	9.1	8.7			
WATER CONTENT	14.3%	14.9%			

NATURAL WATER CONTENT ASTM D 4959

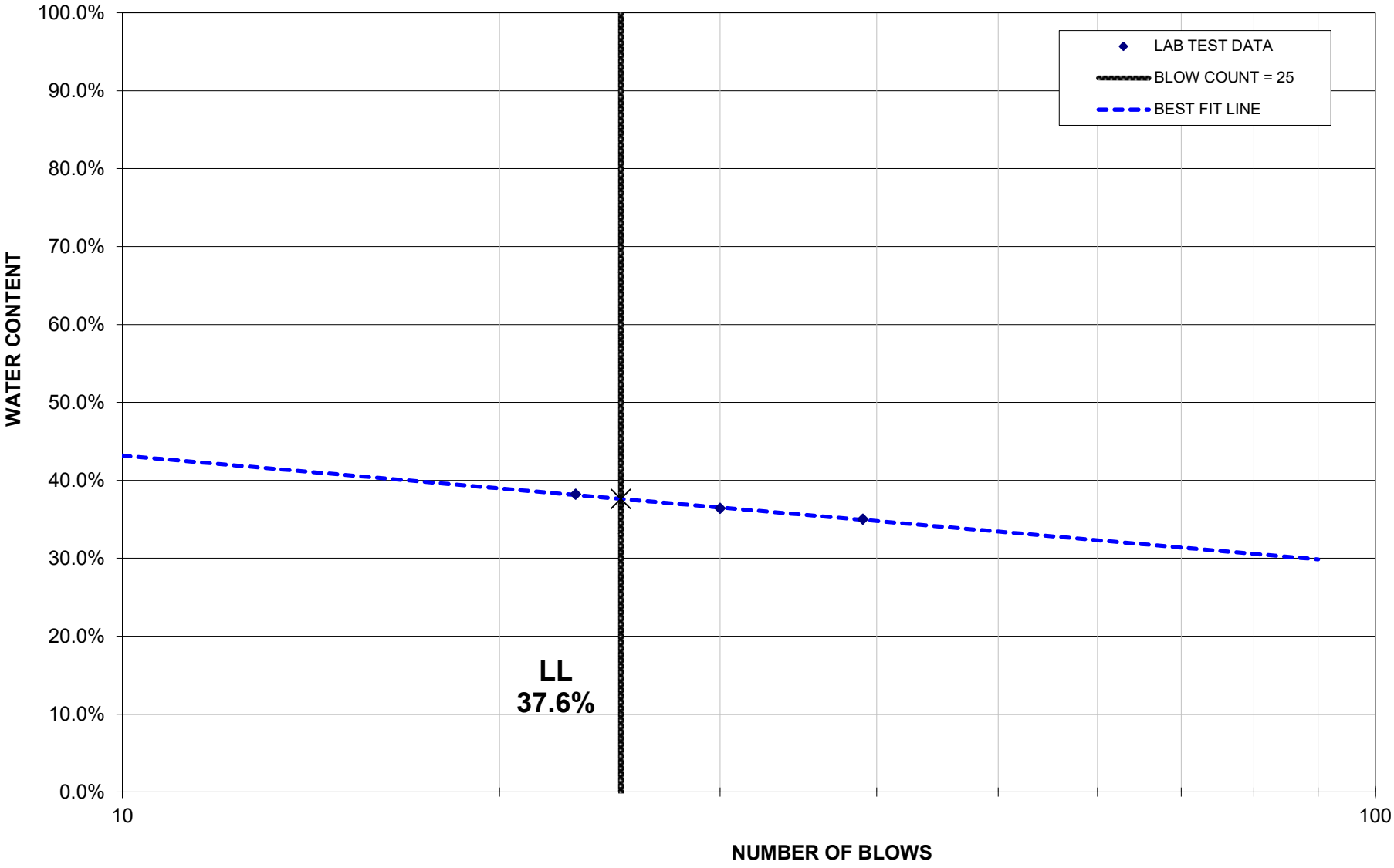
TEST NUMBER					
TIN NUMBER					
WET WEIGHT					
DRY WEIGHT					
MOISTURE					
TIN WEIGHT					
SOIL WEIGHT					
NATURAL WATER CONTENT					

LIQUID LIMIT	37.6%	PLASTIC LIMIT	14.6%
PLASTICITY INDEX	23.0%	NATURAL WATER CONTENT	

Project Number:	WATT Subdivision
Date:	18-Dec-23
Hole Number	BH # 6
Depth:	6 ft
Technician:	Jemal

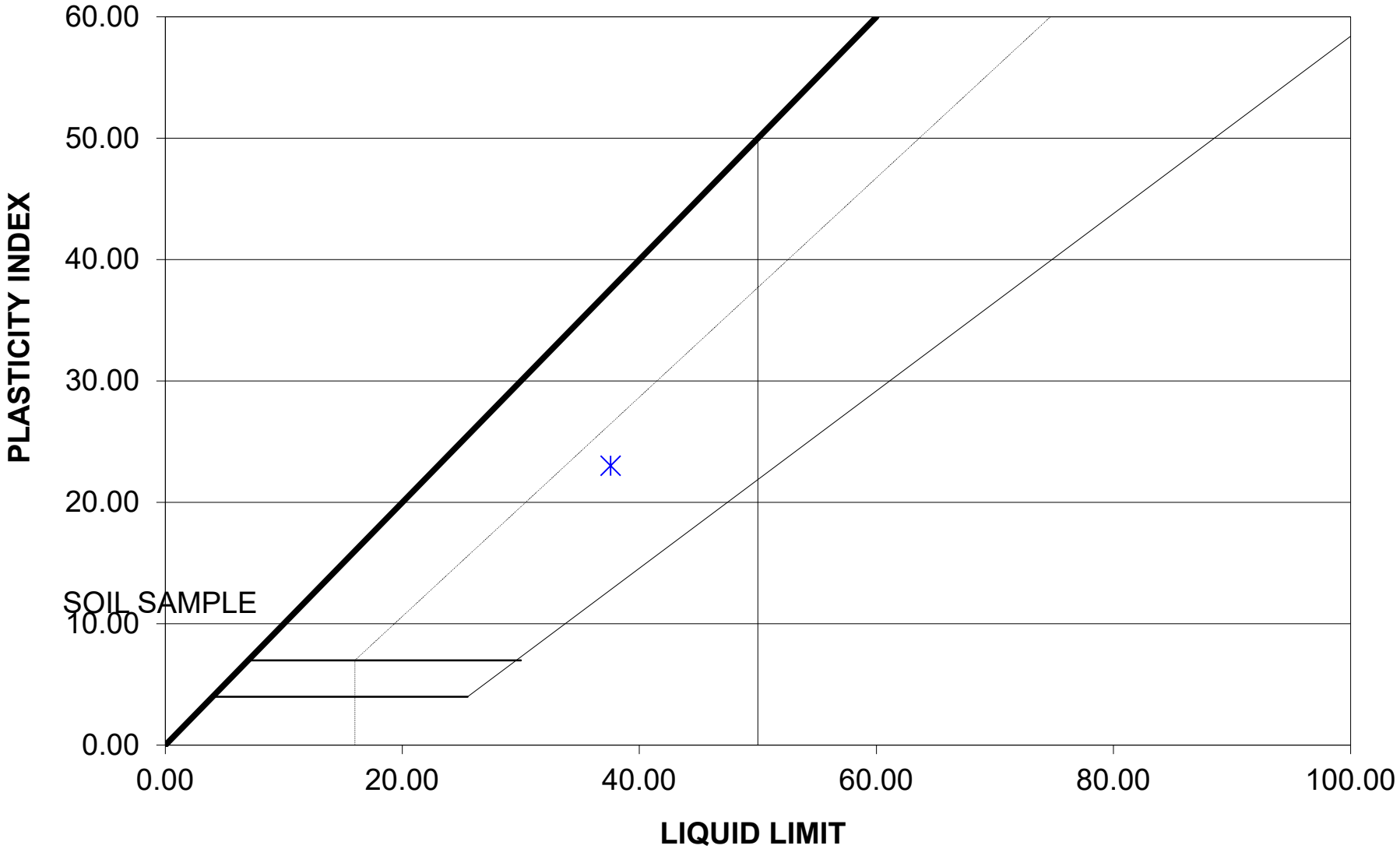
LIQUID LIMIT DETERMINATION

Semi-Log Plot



Project Number:	WATT Subdivision
Date:	18-Dec-23
Hole Number	BH # 6
Depth:	6 ft
Technician:	Jemal

PLASTICITY CHART



ATTERBERG LIMITS

PROJECT NUMBER:	WATT Subdivision		
HOLE NUMBER:	BH # 11	**DATE:**	18-Dec-23
DEPTH:	6 ft	**TECHNICIAN:**	Jemal
SAMPLE DESCRIPTION:	Clay and silt		

LIQUID LIMIT (2 TESTS MINIMUM) ASTM D 4318

TEST NUMBER	1	2	3		
TIN NUMBER	A8	6	A7		
NUMBER OF BLOWS (LIQUID LIMIT)	42	30	26		
WET WEIGHT	33.8	33.3	33.6		
DRY WEIGHT	28.7	28.2	28.4		
MOISTURE	5.1	5.1	5.2		
TIN WEIGHT	14	14.1	14.3		
SOIL WEIGHT	14.7	14.1	14.1		
WATER CONTENT	34.7%	36.2%	36.9%		

PLASTIC LIMIT ASTM D 4318

TEST NUMBER	1	2			
TIN NUMBER	16	11			
WET WEIGHT	24.9	25			
DRY WEIGHT	23.5	23.6			
MOISTURE	1.4	1.4			
TIN WEIGHT	14.2	14.1			
SOIL WEIGHT	9.3	9.5			
WATER CONTENT	15.1%	14.7%			

NATURAL WATER CONTENT ASTM D 4959

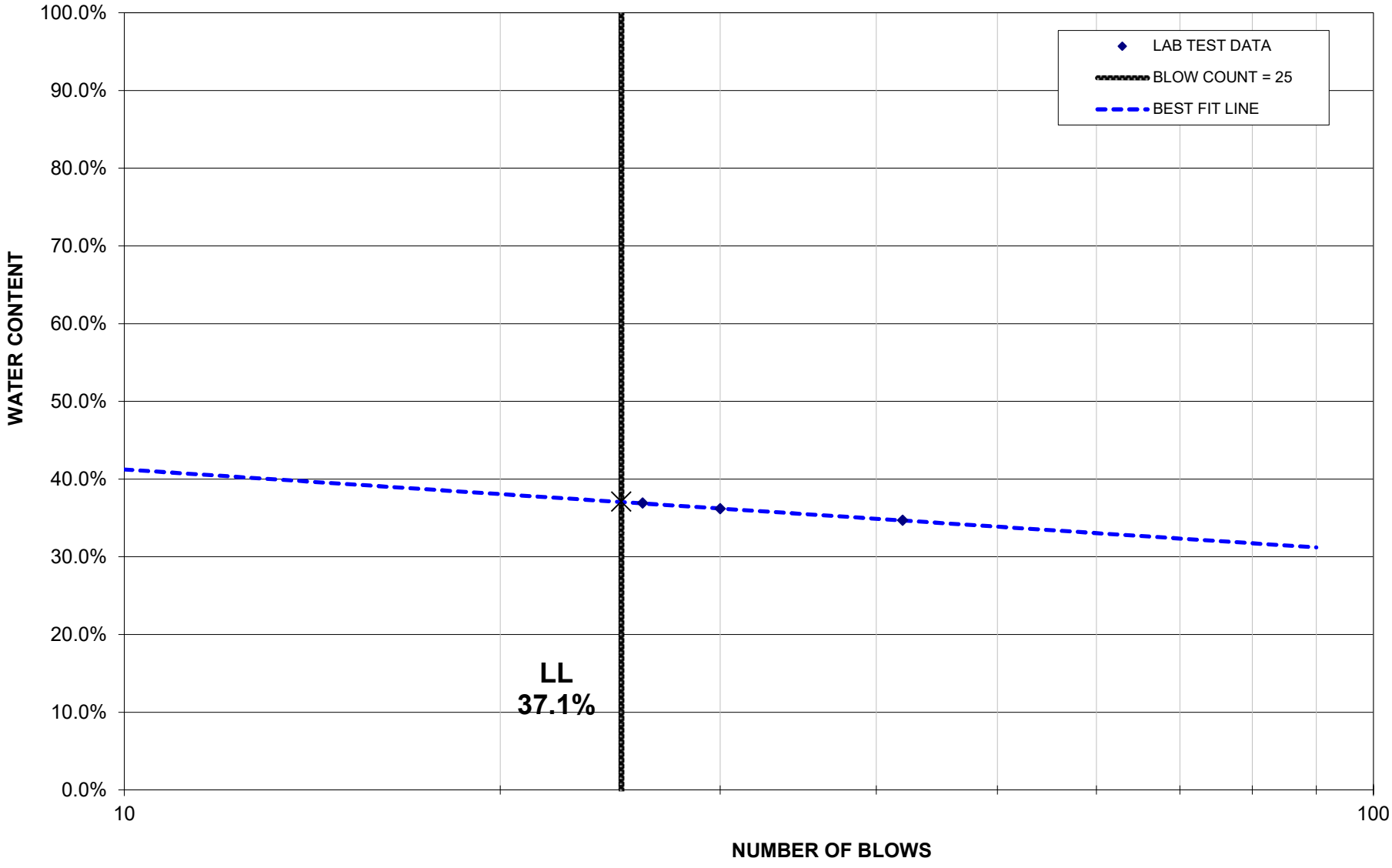
TEST NUMBER					
TIN NUMBER					
WET WEIGHT					
DRY WEIGHT					
MOISTURE					
TIN WEIGHT					
SOIL WEIGHT					
NATURAL WATER CONTENT					

LIQUID LIMIT	37.1%	PLASTIC LIMIT	14.9%
PLASTICITY INDEX	22.2%	NATURAL WATER CONTENT	

Project Number:	WATT Subdivision
Date:	18-Dec-23
Hole Number	BH # 11
Depth:	6 ft
Technician:	Jemal

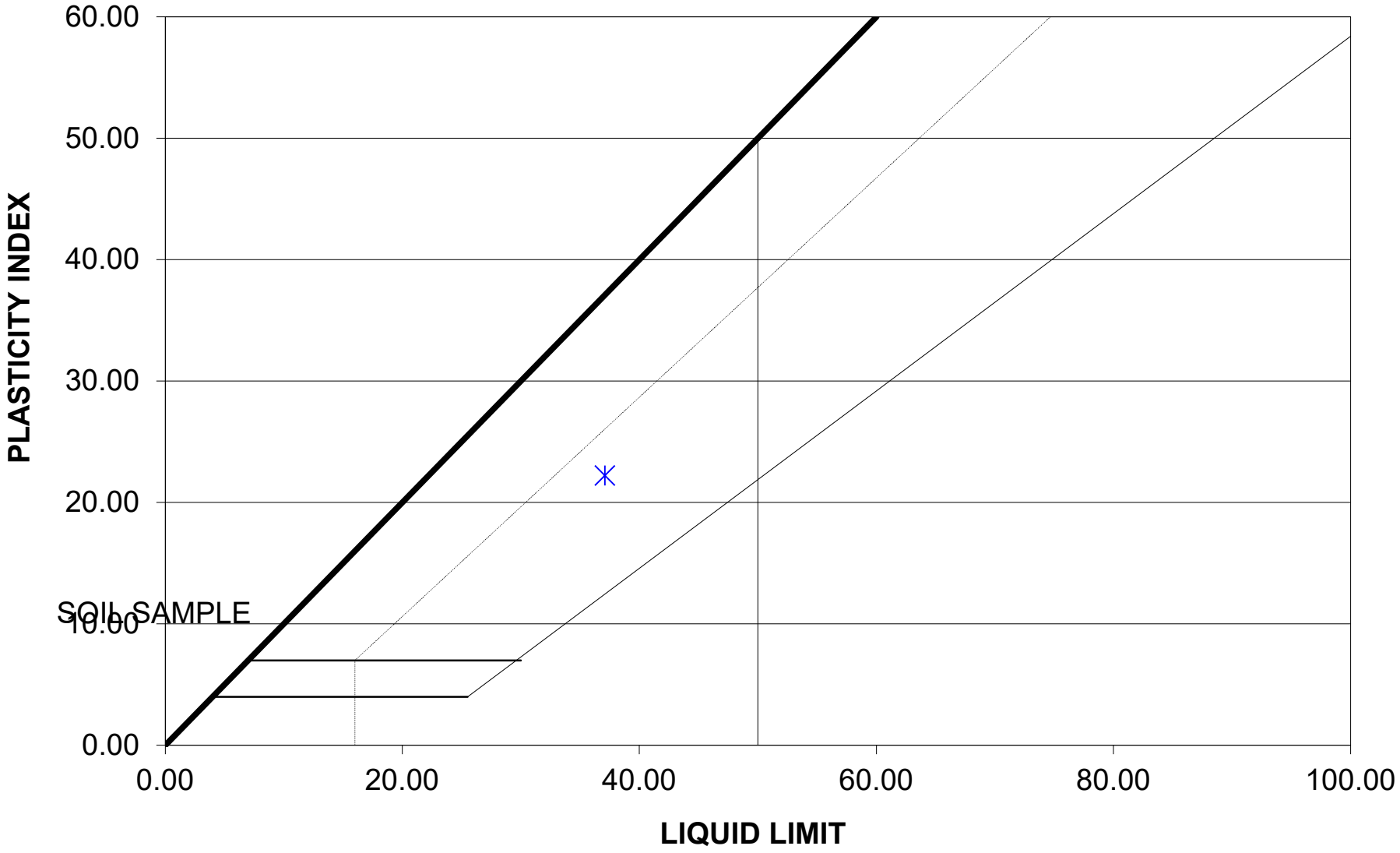
LIQUID LIMIT DETERMINATION

Semi-Log Plot



Project Number:	WATT Subdivision
Date:	18-Dec-23
Hole Number	BH # 11
Depth:	6 ft
Technician:	Jemal

PLASTICITY CHART



ATTERBERG LIMITS

PROJECT NUMBER:	WATT Subdivision		
HOLE NUMBER:	BH # 15	**DATE:**	18-Dec-23
DEPTH:	6 ft	**TECHNICIAN:**	Jemal
SAMPLE DESCRIPTION:	Clay and silt		

LIQUID LIMIT (2 TESTS MINIMUM) ASTM D 4318

TEST NUMBER	1	2	3		
TIN NUMBER	D	B	C		
NUMBER OF BLOWS (LIQUID LIMIT)	41	30	24		
WET WEIGHT	34.1	36.2	35.4		
DRY WEIGHT	29.3	30.8	30		
MOISTURE	4.8	5.4	5.4		
TIN WEIGHT	14.2	14.3	14.3		
SOIL WEIGHT	15.1	16.5	15.7		
WATER CONTENT	31.8%	32.7%	34.4%		

PLASTIC LIMIT ASTM D 4318

TEST NUMBER	1	2			
TIN NUMBER	A2	D2			
WET WEIGHT	23.4	24.2			
DRY WEIGHT	22.2	23			
MOISTURE	1.2	1.2			
TIN WEIGHT	14.1	14.2			
SOIL WEIGHT	8.1	8.8			
WATER CONTENT	14.8%	13.6%			

NATURAL WATER CONTENT ASTM D 4959

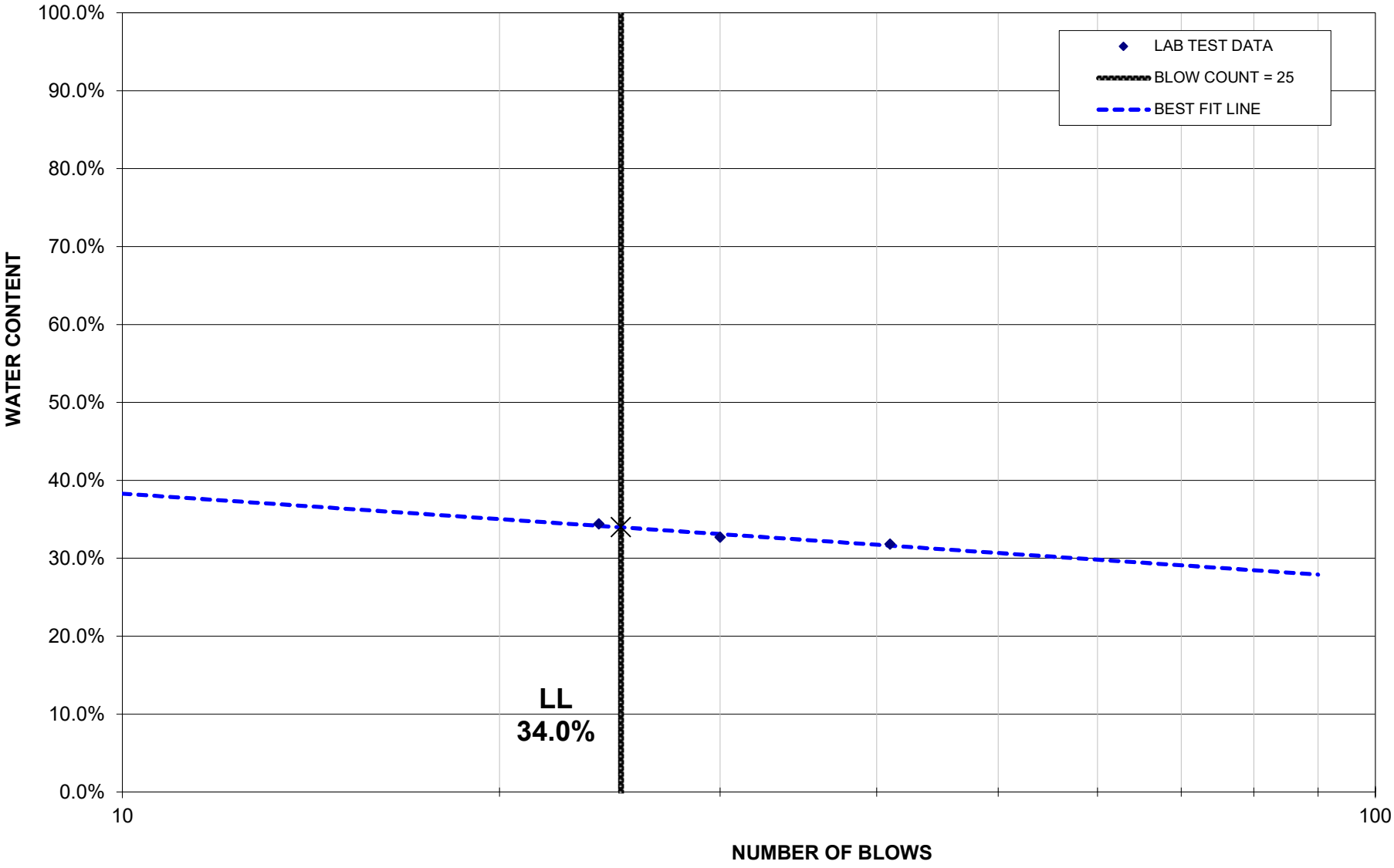
TEST NUMBER					
TIN NUMBER					
WET WEIGHT					
DRY WEIGHT					
MOISTURE					
TIN WEIGHT					
SOIL WEIGHT					
NATURAL WATER CONTENT					

LIQUID LIMIT	34.0%	PLASTIC LIMIT	14.2%
PLASTICITY INDEX	19.8%	NATURAL WATER CONTENT	

Project Number:	WATT Subdivision
Date:	18-Dec-23
Hole Number	BH # 15
Depth:	6 ft
Technician:	Jemal

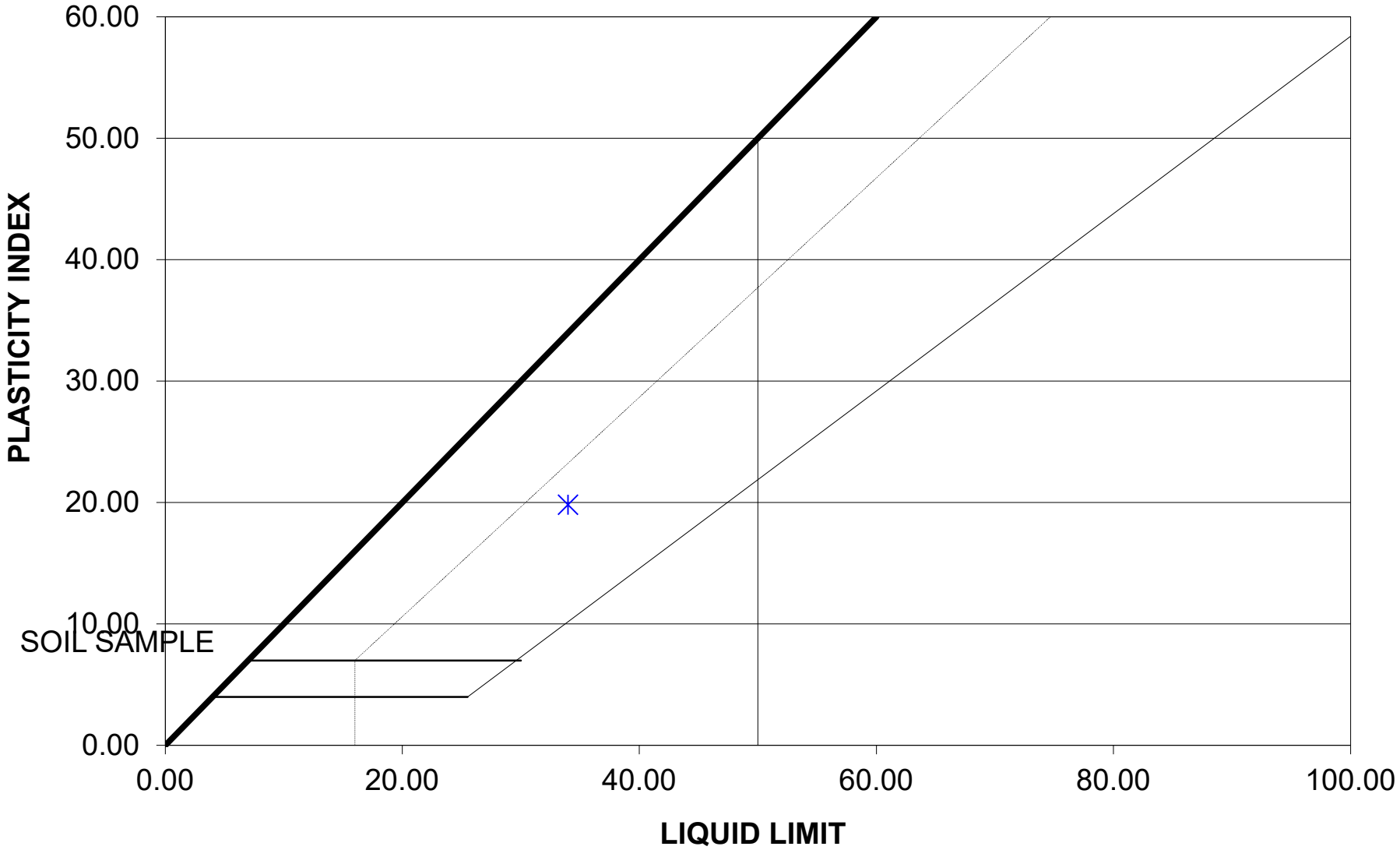
LIQUID LIMIT DETERMINATION

Semi-Log Plot



Project Number:	WATT Subdivision
Date:	18-Dec-23
Hole Number	BH # 15
Depth:	6 ft
Technician:	Jemal

PLASTICITY CHART



ATTERBERG LIMITS

PROJECT NUMBER:	WATT Subdivision		
HOLE NUMBER:	BH # 19	**DATE:**	18-Dec-23
DEPTH:	6 ft	**TECHNICIAN:**	Jemal
SAMPLE DESCRIPTION:	Clay and silt		

LIQUID LIMIT (2 TESTS MINIMUM) ASTM D 4318

TEST NUMBER	1	2	3		
TIN NUMBER	C	A9	A4		
NUMBER OF BLOWS (LIQUID LIMIT)	32	22	17		
WET WEIGHT	35.1	34.1	33.4		
DRY WEIGHT	29.9	29	28.3		
MOISTURE	5.2	5.1	5.1		
TIN WEIGHT	14.2	14	14		
SOIL WEIGHT	15.7	15	14.3		
WATER CONTENT	33.1%	34.0%	35.7%		

PLASTIC LIMIT ASTM D 4318

TEST NUMBER	1	2			
TIN NUMBER	16	11			
WET WEIGHT	24.9	25.4			
DRY WEIGHT	23.6	24			
MOISTURE	1.3	1.4			
TIN WEIGHT	14.1	14.5			
SOIL WEIGHT	9.5	9.5			
WATER CONTENT	13.7%	14.7%			

NATURAL WATER CONTENT ASTM D 4959

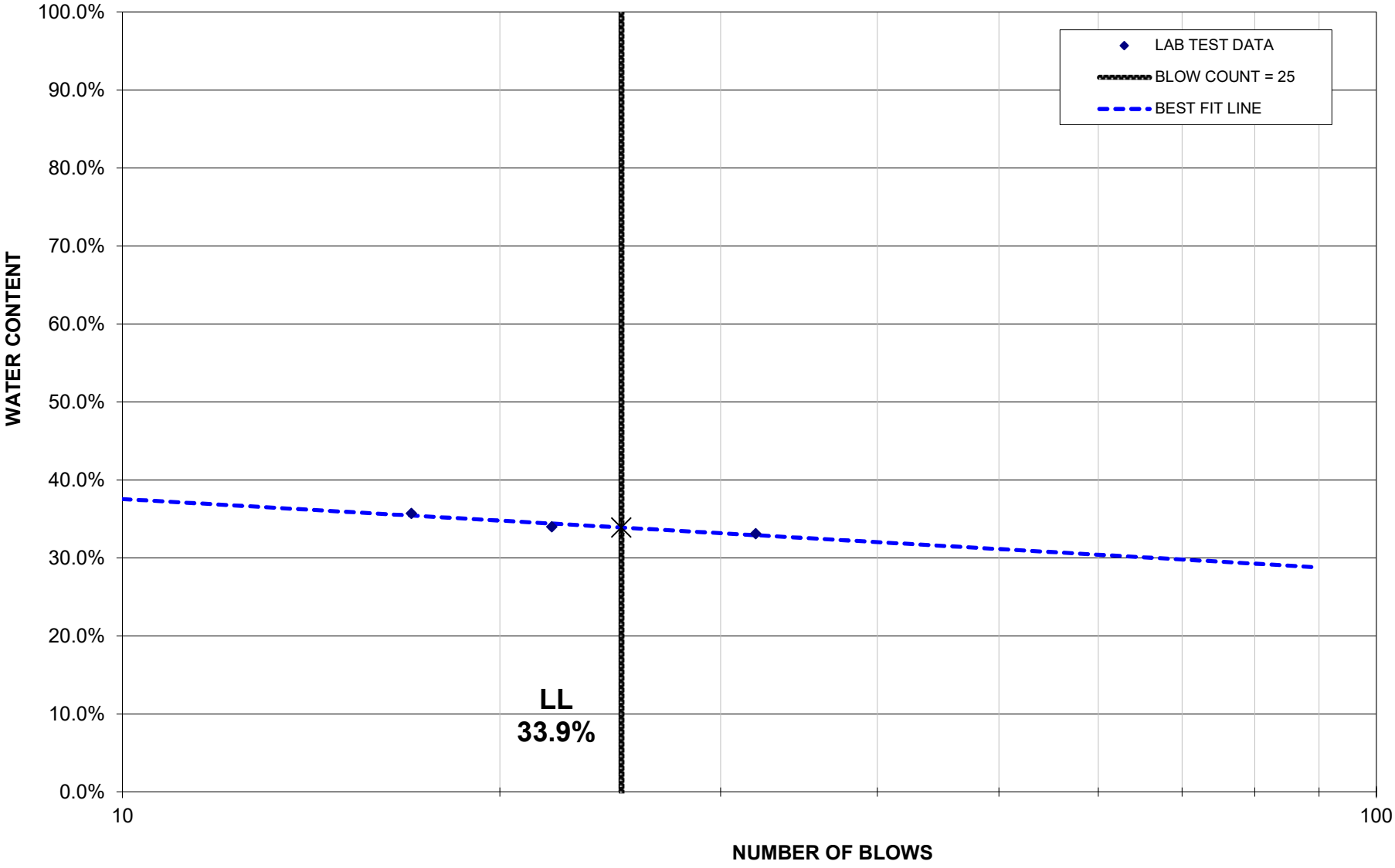
TEST NUMBER					
TIN NUMBER					
WET WEIGHT					
DRY WEIGHT					
MOISTURE					
TIN WEIGHT					
SOIL WEIGHT					
NATURAL WATER CONTENT					

LIQUID LIMIT	33.9%	PLASTIC LIMIT	14.2%
PLASTICITY INDEX	19.7%	NATURAL WATER CONTENT	

Project Number:	WATT Subdivision
Date:	18-Dec-23
Hole Number	BH # 19
Depth:	6 ft
Technician:	Jemal

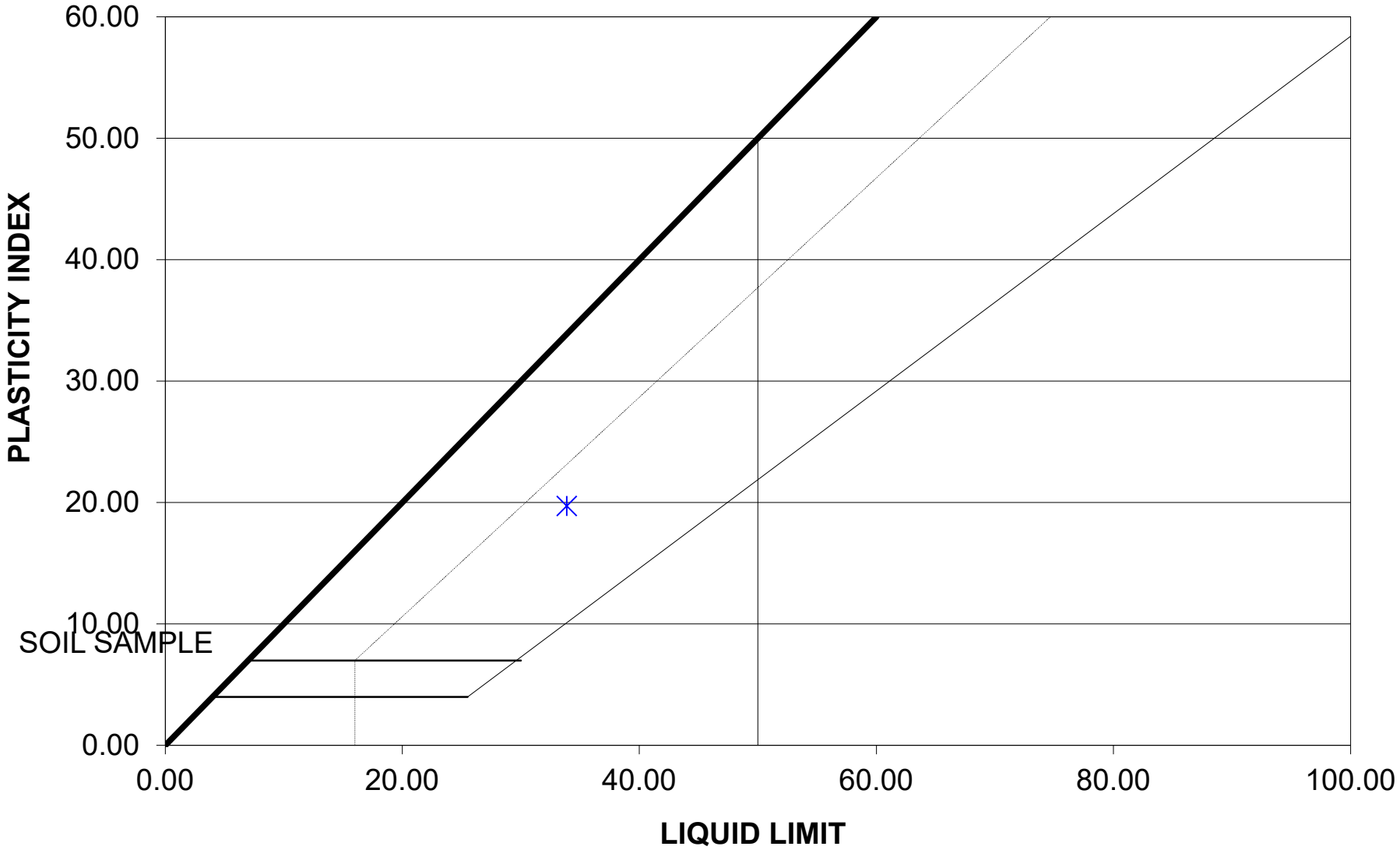
LIQUID LIMIT DETERMINATION

Semi-Log Plot



Project Number:	WATT Subdivision
Date:	18-Dec-23
Hole Number	BH # 19
Depth:	6 ft
Technician:	Jemal

PLASTICITY CHART



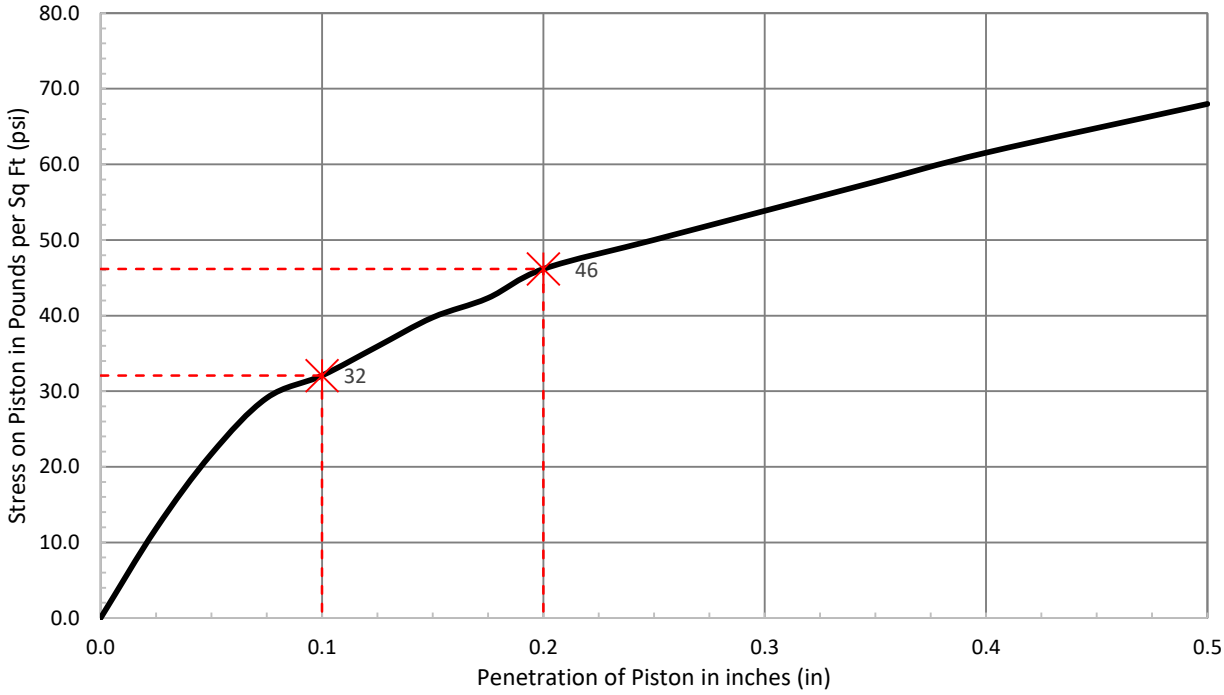
California Bearing Ratio

ASTM D1883-16, Soaking Method

WSP Canada Inc.
1003 53rd Ave NE
Calgary AB T2E 6X9

Type of Preparation	Standard ASTM D698	Sample Preparation	Soaked
Maximum Dry Density	1892 kg/m^3	Soaking time	96 hrs
Optimum Moisture Content	13.3 %	Top 1 Inch Soaked Moisture	17.3 %
Compacted Dry Density	1880 kg/m^3	Bottom 1 Inch Soaked Moisture	16.6 %
Compacted Moisture Content	15.5 %	Average Soaked Moisture	16.5 %
Percent Compaction	99.4 %	Mass of Surcharge	13.6 kg

Corrected Penetration (in.)	Standard Load of Crushed Stone (psi)	Corrected Load (psi)	CBR (%)
0.100	1000	32	**3.2**
0.200	1500	46	**3.1**



Client: Watt

Project: Netook Crossing

Site composite sample at 1.0 to 1.5 m depth

Project No: CA18784.8400_3903.T01

Site Location:

Date: February 26, 2024

Request No: -

Technologist: JCS

Reviewed By: HM

Soil Description: Silty Clay trace Organic

Liquid Limit -

Plastic Limit -

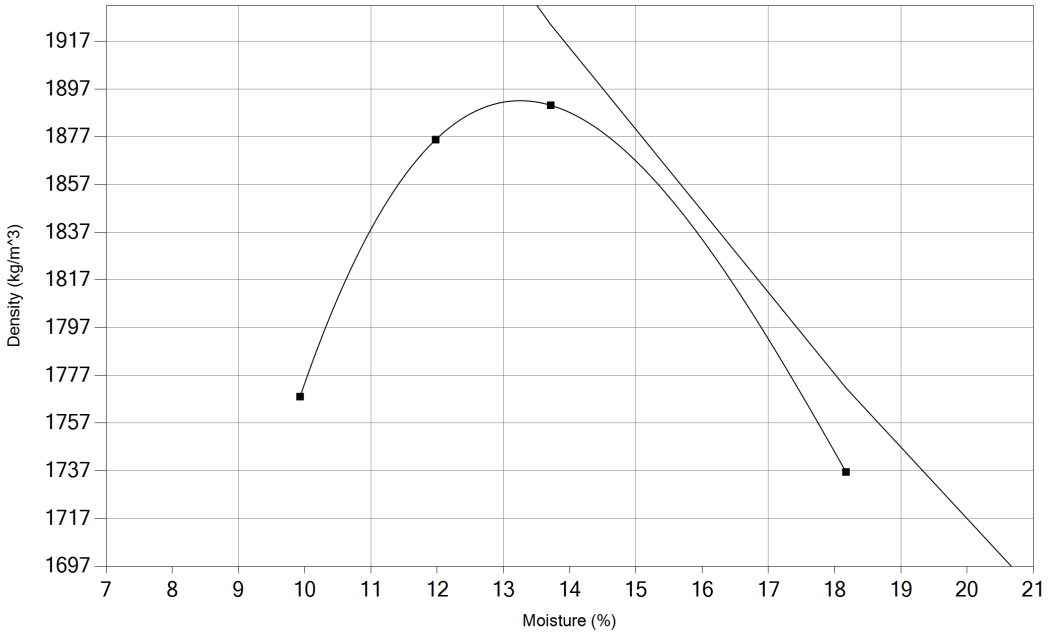
Plasticity Index -

Swell 0.04%

Moisture / Density Relationship

Report Date: March 06, 2024 **Amend Date:** March 06, 2024

Client		Project	
Name:	Watt Consulting Group	**Name:**	(CA18784.8400) Netook Crossing (3903.T01)
Address:	3016 5 Ave NE Calgary, AB T2A 6K4	**Address:**	Calgary, AB
Attention:	Joel Rombough	**Phase:**	**Task:**
PO Number:		**Manager:**	Hamdan Marwasi
Sample Date:	2/22/2024 by Renato Lumawig	**Lab/Ref. #:**	NS666808
Source:	Composite Sample @ 1.0 to 1.5 m depth	**Description:**	Silty Clay trace organic



Moisture Density Relationship: (ASTM D698-12) Method: B

Preparation Method: Dry **Rammer Type:**Mechanical

Maximum Density (kg/m^3): 1892

Optimum Moisture (%): 13.3

Remarks:

Distribution:

Reviewed By: Hamdan Marwasi

Reporting of these test results constitutes a testing service only.

WSP E&I Canada Ltd. - 1003 53rd Avenue NE - Calgary, AB - T2E 6X9

AR Geotechnical Engineering

Sulphate Test

http://www.argeoeng.com

CLIENT NAME: Watt Consulting **ATTENTION TO: Ayoub Ramadan**

SAMPLING SITE: Olds Subdivision **SAMPLED BY: Getu**

Soil Analysis - Sulfate

DATE RECEIVED: 2024-01-21 **DATE REPORTED: 2024-01-29**

Parameter	Unit	SAMPLE DESCRIPTION:	BH23-25 (GB-1m)	BH23-16 (GB-2m)	BH23-08 (GB-2m)	BH23-08 (GB-2m)
		SAMPLE TYPE:	Soil	Soil	Soil	Soil
		DATE SAMPLED:	2024-01-21	2024-01-21	2024-01-21	2024-01-21
			5608878	5608880	5608882	5608884
Saturation Percentage	%		32	38	36	33
Sulfate (SO4-S), Soluble	mg/L		918	521	625	890
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		19.1	10.8	14.5	18.8

Moisture Content Worksheet

AR Geotechnical Engineering

Project: Netook Crossing

Technician: Jemal/Haile

BH # 1						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	A7	A8	A9	B1	B2	B3
Wt. Sample Wet + Tare (g)	259.9	287.1	285.3	262.9	286.3	268.8
Wt. Sample Dry + Tare (g)	224.1	247.9	247.2	228.1	248.0	231.9
Wt. Water (g)	35.8	39.2	38.1	34.8	38.3	36.9
Tare Container (g)	4.1	4.1	4.2	4.4	4.3	4.3
Wt. Dry Sample (g)	220.0	243.8	243.0	223.7	243.7	227.6
Moist Content	16.3%	16.1%	15.7%	15.6%	15.7%	16.2%

BH # 2						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	36.0	29.0	103.0	12.0	19.0	37.0
Wt. Sample Wet + Tare (g)	250.6	297.8	240.8	249.2	222.8	242.6
Wt. Sample Dry + Tare (g)	218.7	258.3	208.9	218.8	197.3	210.7
Wt. Water (g)	31.9	39.5	31.9	30.4	25.5	31.9
Tare Container (g)	4.4	4.4	4.4	4.4	4.4	4.4
Wt. Dry Sample (g)	214.3	253.9	204.5	214.4	192.9	206.3
Moist Content	14.9%	15.6%	15.6%	14.2%	13.2%	15%

BH # 3						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	33.0	41.0	13.0	44.0	20.0	22.0
Wt. Sample Wet + Tare (g)	298.2	286.8	261.5	283.3	271.0	276.9
Wt. Sample Dry + Tare (g)	259.7	251.6	227.5	243.6	233.8	238.9
Wt. Water (g)	38.5	35.2	34.0	39.7	37.2	38.0
Tare Container (g)	4.0	4.0	4.3	4.5	4.4	4.3
Wt. Dry Sample (g)	255.7	247.6	223.2	239.1	229.4	234.6
Moist Content	15.1%	14.2%	15.2%	16.6%	16.2%	16.2%

BH # 4						
Depth	1	2				
Tare No.	23.0	38.0				
Wt. Sample Wet + Tare (g)	241.7	230.3				
Wt. Sample Dry + Tare (g)	209.0	198.0				
Wt. Water (g)	32.7	32.3				
Tare Container (g)	4.3	4.3				
Wt. Dry Sample (g)	204.7	193.7				
Moist Content	16.0%	16.7%				

Moisture Content Worksheet

AR Geotechnical Engineering

Project: Netook Crossing

Technician: Jemal/Haile

BH # 5						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	28A	4A	55.0	9.0	19A	2A
Wt. Sample Wet + Tare (g)	259.8	282.4	247.0	257.4	242.5	275.0
Wt. Sample Dry + Tare (g)	227.7	245.6	215.1	223.9	210.6	239.8
Wt. Water (g)	32.1	36.8	31.9	33.5	31.9	35.2
Tare Container (g)	4.4	4.4	4.4	4.4	4.4	4.4
Wt. Dry Sample (g)	223.3	241.2	210.7	219.5	206.2	235.4
Moist Content	14.4%	15.3%	15.1%	15.3%	15.5%	15%

BH # 6						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	61.0	40.0	45.0	15.0	11.0	27.0
Wt. Sample Wet + Tare (g)	252.7	237.2	252.4	221.4	246.1	258.5
Wt. Sample Dry + Tare (g)	222.5	204.9	218.6	193.3	212.2	223.9
Wt. Water (g)	30.2	32.3	33.8	28.1	33.9	34.6
Tare Container (g)	4.3	4.4	4.3	4.5	4.4	4.3
Wt. Dry Sample (g)	218.2	200.5	214.3	188.8	207.8	219.6
Moist Content	13.8%	16.1%	15.8%	14.9%	16.3%	15.8%

BH # 7						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	35.0	16.0	18.0	14.0	46.0	30.0
Wt. Sample Wet + Tare (g)	225.9	237.5	282.2	266.3	273.9	276.4
Wt. Sample Dry + Tare (g)	195.0	205.5	243.6	230.3	236.6	239.2
Wt. Water (g)	30.9	32.0	38.6	36.0	37.3	37.2
Tare Container (g)	4.3	4.4	4.3	4.3	4.3	4.3
Wt. Dry Sample (g)	190.7	201.1	239.3	226.0	232.3	234.9
Moist Content	16.2%	15.9%	16.1%	15.9%	16.1%	15.8%

BH # 8						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	11.0	27.0	61.0	40.0	15.0	45.0
Wt. Sample Wet + Tare (g)	245.9	275.0	288.8	251.3	268.5	272.0
Wt. Sample Dry + Tare (g)	212.5	234.5	248.5	216.6	232.4	236.0
Wt. Water (g)	33.4	40.5	40.3	34.7	36.1	36.0
Tare Container (g)	4.4	4.4	4.4	4.4	4.4	4.4
Wt. Dry Sample (g)	208.1	230.1	244.1	212.2	228.0	231.6
Moist Content	16.0%	17.6%	16.5%	16.4%	15.8%	16%

Moisture Content Worksheet

AR Geotechnical Engineering

Project: Netook Crossing

Technician: Jemal/Haile

BH # 9						
Depth	1	4	5	6 SPT		
Tare No.	60.0	32.0	28.0	34.0		
Wt. Sample Wet + Tare (g)	246.9	266.7	264.6	257.5		
Wt. Sample Dry + Tare (g)	222.8	232.6	230.4	223.5		
Wt. Water (g)	24.1	34.1	34.2	34.0		
Tare Container (g)	4.5	4.5	4.3	4.3		
Wt. Dry Sample (g)	218.3	228.1	226.1	219.2		
Moist Content	11.0%	14.9%	15.1%	15.5%		

BH # 10						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	A6	A4	A1	A3	A2	A5
Wt. Sample Wet + Tare (g)	257.9	300.2	269.4	274.5	289.7	284.8
Wt. Sample Dry + Tare (g)	234.2	263.4	240.3	241.8	256.9	250.5
Wt. Water (g)	23.7	36.8	29.1	32.7	32.8	34.3
Tare Container (g)	4.4	4.3	4.2	4.4	4.3	4.3
Wt. Dry Sample (g)	229.8	259.1	236.1	237.4	252.6	246.2
Moist Content	10.3%	14.2%	12.3%	13.8%	13.0%	13.9%

BH # 11						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	104.0	2.0	17.0	64.0	3.0	29A
Wt. Sample Wet + Tare (g)	219.4	233.1	225.7	236.8	227.0	220.8
Wt. Sample Dry + Tare (g)	190.3	202.6	195.2	205.3	196.8	190.7
Wt. Water (g)	29.1	30.5	30.5	31.5	30.2	30.1
Tare Container (g)	4.4	4.4	4.4	4.4	4.4	4.4
Wt. Dry Sample (g)	185.9	198.2	190.8	200.9	192.4	186.3
Moist Content	15.7%	15.4%	16.0%	15.7%	15.7%	16%

BH # 12						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	B4	B5	B6	B7	B8	B9
Wt. Sample Wet + Tare (g)	269.5	282.0	271.6	290.7	276.5	284.8
Wt. Sample Dry + Tare (g)	237.2	248.3	236.1	252.4	242.9	251.0
Wt. Water (g)	32.3	33.7	35.5	38.3	33.6	33.8
Tare Container (g)	4.1	4.0	4.1	4.1	4.1	4.1
Wt. Dry Sample (g)	233.1	244.3	232.0	248.3	238.8	246.9
Moist Content	13.9%	13.8%	15.3%	15.4%	14.1%	13.7%

Moisture Content Worksheet

AR Geotechnical Engineering

Project: Netook Crossing

Technician: Jemal/Haile

BH # 13						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	28.0	23.0	32.0	38.0	60.0	34.0
Wt. Sample Wet + Tare (g)	281.6	276.2	263.9	269.4	271.2	267.4
Wt. Sample Dry + Tare (g)	244.9	238.2	228.9	234.9	238.1	230.7
Wt. Water (g)	36.7	38.0	35.0	34.5	33.1	36.7
Tare Container (g)	4.4	4.3	4.3	4.3	4.3	4.3
Wt. Dry Sample (g)	240.5	233.9	224.6	230.6	233.8	226.4
Moist Content	15.3%	16.2%	15.6%	15.0%	14.2%	16.2%

BH # 14						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	36.0	103.0	37.0	19.0	12.0	29.0
Wt. Sample Wet + Tare (g)	289.8	264.9	248.0	287.9	286.4	276.6
Wt. Sample Dry + Tare (g)	258.1	236.1	223.1	257.8	256.7	243.5
Wt. Water (g)	31.7	28.8	24.9	30.1	29.7	33.1
Tare Container (g)	4.4	4.4	4.4	4.4	4.4	4.4
Wt. Dry Sample (g)	253.7	231.7	218.7	253.4	252.3	239.1
Moist Content	12.5%	12.4%	11.4%	11.9%	11.8%	14%

BH # 15						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	44.0	13.0	33.0	22.0	20.0	41.0
Wt. Sample Wet + Tare (g)	237.9	242.7	249.1	232.1	231.1	239.0
Wt. Sample Dry + Tare (g)	209.2	215.0	218.2	204.6	200.9	208.6
Wt. Water (g)	28.7	27.7	30.9	27.5	30.2	30.4
Tare Container (g)	4.3	4.4	4.6	4.3	4.3	4.3
Wt. Dry Sample (g)	204.9	210.6	213.6	200.3	196.6	204.3
Moist Content	14.0%	13.2%	14.5%	13.7%	15.4%	14.9%

BH # 16						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	A7	A8	A9	B1	B2	B3
Wt. Sample Wet + Tare (g)	255.0	284.1	274.1	285.2	276.0	277.9
Wt. Sample Dry + Tare (g)	232.5	252.6	241.0	251.6	243.4	245.3
Wt. Water (g)	22.5	31.5	33.1	33.6	32.6	32.6
Tare Container (g)	4.4	4.3	4.3	4.3	4.3	4.3
Wt. Dry Sample (g)	228.1	248.3	236.7	247.3	239.1	241.0
Moist Content	9.9%	12.7%	14.0%	13.6%	13.6%	13.5%

Moisture Content Worksheet

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Project: Netook Crossing

Technician: Jemal/Haile

BH # 17						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	46.0	30.0	18.0	35.0	16.0	14.0
Wt. Sample Wet + Tare (g)	277.5	293.8	275.0	275.2	281.2	282.9
Wt. Sample Dry + Tare (g)	245.5	254.9	239.0	239.9	246.5	245.5
Wt. Water (g)	32.0	38.9	36.0	35.3	34.7	37.4
Tare Container (g)	4.4	4.4	4.4	4.4	4.4	4.4
Wt. Dry Sample (g)	241.1	250.5	234.6	235.5	242.1	241.1
Moist Content	13.3%	15.5%	15.3%	15.0%	14.3%	16%

BH # 18						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	25.0	39.0	42.0	47.0	31.0	55.0
Wt. Sample Wet + Tare (g)	221.4	235.0	236.3	211.6	241.9	234.7
Wt. Sample Dry + Tare (g)	198.0	207.2	206.3	185.8	211.5	206.5
Wt. Water (g)	23.4	27.8	30.0	25.8	30.4	28.2
Tare Container (g)	4.4	4.4	4.3	4.3	4.3	4.6
Wt. Dry Sample (g)	193.6	202.8	202.0	181.5	207.2	201.9
Moist Content	12.1%	13.7%	14.9%	14.2%	14.7%	14.0%

BH # 19						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	A1	A2	A3	A4	A5	A6
Wt. Sample Wet + Tare (g)	252.3	253.1	279.7	276.7	280.7	277.9
Wt. Sample Dry + Tare (g)	219.4	230.3	252.4	249.9	252.9	244.7
Wt. Water (g)	32.9	22.8	27.3	26.8	27.8	33.2
Tare Container (g)	4.4	4.3	4.3	4.3	4.3	4.3
Wt. Dry Sample (g)	215.0	226.0	248.1	245.6	248.6	240.4
Moist Content	15.3%	10.1%	11.0%	10.9%	11.2%	13.8%

BH # 20						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	2A	28A	19A	4A	55.0	9.0
Wt. Sample Wet + Tare (g)	201.0	262.0	253.9	241.1	274.2	259.8
Wt. Sample Dry + Tare (g)	185.1	233.0	226.6	220.9	251.5	244.5
Wt. Water (g)	15.9	29.0	27.3	20.2	22.7	15.3
Tare Container (g)	4.4	4.4	4.4	4.4	4.4	4.4
Wt. Dry Sample (g)	180.7	228.6	222.2	216.5	247.1	240.1
Moist Content	8.8%	12.7%	12.3%	9.3%	9.2%	6%

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Project: Netook Crossing

Technician: Jemal/Haile

BH # 21						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	37.0	7.0	5.0	21.0	111.0	1.0
Wt. Sample Wet + Tare (g)	279.4	265.2	264.4	291.3	271.0	275.9
Wt. Sample Dry + Tare (g)	251.5	239.0	225.9	259.7	240.9	233.3
Wt. Water (g)	27.9	26.2	38.5	31.6	30.1	42.6
Tare Container (g)	4.4	4.4	4.3	4.3	4.3	4.6
Wt. Dry Sample (g)	247.1	234.6	221.6	255.4	236.6	228.7
Moist Content	11.3%	11.2%	17.4%	12.4%	12.7%	18.6%

BH # 22						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	C1	C2	C3	C4	C5	C6
Wt. Sample Wet + Tare (g)	268.8	285.2	286.7	272.2	279.0	268.4
Wt. Sample Dry + Tare (g)	234.7	246.7	246.2	236.3	244.3	231.9
Wt. Water (g)	34.1	38.5	40.5	35.9	34.7	36.5
Tare Container (g)	4.1	4.0	4.1	4.1	4.1	4.1
Wt. Dry Sample (g)	230.6	242.7	242.1	232.2	240.2	227.8
Moist Content	14.8%	15.9%	16.7%	15.5%	14.4%	16.0%

BH # 23						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	47.0	55.0	25.0	31.0	39.0	42.0
Wt. Sample Wet + Tare (g)	219.4	227.3	276.4	250.5	243.1	273.2
Wt. Sample Dry + Tare (g)	196.4	197.4	239.8	217.1	210.3	234.3
Wt. Water (g)	23.0	29.9	36.6	33.4	32.8	38.9
Tare Container (g)	4.4	4.5	4.4	4.3	4.4	4.4
Wt. Dry Sample (g)	192.0	192.9	235.4	212.8	205.9	229.9
Moist Content	12.0%	15.5%	15.5%	15.7%	15.9%	17%

BH # 24						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	37.0	21.0	111.0	7.0	5.0	1.0
Wt. Sample Wet + Tare (g)	241.9	205.5	243.7	232.0	234.5	233.8
Wt. Sample Dry + Tare (g)	212.6	180.4	212.0	202.8	205.1	203.2
Wt. Water (g)	29.3	25.1	31.7	29.2	29.4	30.6
Tare Container (g)	4.4	4.4	4.3	4.3	4.3	4.6
Wt. Dry Sample (g)	208.2	176.0	207.7	198.5	200.8	198.6
Moist Content	14.1%	14.3%	15.3%	14.7%	14.6%	15.4%

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BH # 25						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	43.0	52.0	24.0	100.0	8.0	47A
Wt. Sample Wet + Tare (g)	243.0	275.1	281.5	258.0	238.2	296.8
Wt. Sample Dry + Tare (g)	215.6	246.5	245.3	225.8	208.0	259.4
Wt. Water (g)	27.4	28.6	36.2	32.2	30.2	37.4
Tare Container (g)	4.3	4.5	4.3	4.1	4.3	4.4
Wt. Dry Sample (g)	211.3	242.0	241.0	221.7	203.7	255.0
Moist Content	13.0%	11.8%	15.0%	14.5%	14.8%	14.7%

BH # 26						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	8.0	24.0	43.0	52.0	48.0	47A
Wt. Sample Wet + Tare (g)	281.5	288.8	264.3	280.3	256.6	263.8
Wt. Sample Dry + Tare (g)	244.8	249.4	227.7	241.4	221.0	227.7
Wt. Water (g)	36.7	39.4	36.6	38.9	35.6	36.1
Tare Container (g)	4.3	4.3	4.3	4.5	4.5	4.4
Wt. Dry Sample (g)	240.5	245.1	223.4	236.9	216.5	223.3
Moist Content	15.3%	16.1%	16.4%	16.4%	16.4%	16%

BH # 27						
Depth	1	2	3 SPT	4	5	6 SPT
Tare No.	3.0	64.0	2.0	104.0	29A	17.0
Wt. Sample Wet + Tare (g)	269.7	282.6	264.4	275.8	288.8	266.6
Wt. Sample Dry + Tare (g)	238.5	249.4	228.2	238.7	249.8	231.5
Wt. Water (g)	31.2	33.2	36.2	37.1	39.0	35.1
Tare Container (g)	4.4	4.5	4.3	4.4	4.3	4.3
Wt. Dry Sample (g)	234.1	244.9	223.9	234.3	245.5	227.2
Moist Content	13.3%	13.6%	16.2%	15.8%	15.9%	15.4%