KING EPCM
Flexible. Dependable. On-site Engineering.

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GEOTECHNICAL REPORT

AT

37 ANDERSON BLVD
UXBRIDGE, ON

PREPARED FOR:

Paulsan Construction Inc.

Dated: Feb 02, 2022
Revised on Nov 15, 2022

Table of Contents

1. BACKGROUND

King EPCM (the Engineer) was retained by Paulsan Construction Inc. (the Client) to carry out a geotechnical investigation for a proposed industrial building at 37 Anderson Blvd, Uxbridge, Ontario (the site).

The Engineer has received a Surveyor's Real Property Report for the site, completed by Mandarin Surveyors Limited and dated on October 15th, 2021. A pre-application consultation checklist was received by the Engineer. A formal hydrogeology study is not part of this report's scope of work, although groundwater elevations were checked and in-situ infiltration test was completed.

The purpose of this report is to provide recommendations for the design and construction of an industrial building. Initial foundation designs are trench or strip footings with concrete pads in between. This report details King EPCM's borehole drilling program, fieldwork and testing, and design recommendations.

This report was prepared for the Client, Paulsan Construction Inc., for the property owners, and any related site-specific engineers, designers, and contractors. This report is considered an intellectual property of King EPCM, and third party use of this report, including reliance, in-part or full, is prohibited without written consent from King EPCM.

2. SITE DESCRIPTION

2.1. Site Location

The site is located at the municipal address of 37 Anderson Blvd, Uxbridge, ON. The site can also be referenced as Lot 8 of Registered Plan 40M-2336, and PIN 26830-0127 (LT), in the Town of Uxbridge and under the Regional Municipality of Durham.

The site property is considered trapezoidal in shape, and is located at the southeast corner of the Anderson Industrial Complex within the Town of Uxbridge. The property located on an elevated hill north of Durham Regional Highway 47, with a maximum surveyed elevation difference of 11m. There is also a large 10m high soil berm at the eastern property boundary, to act as a visual and acoustic blockade. The remainder of the site is generally considered as shallowly graded northwards toward Anderson Blvd.

2.2. Proposed Project

The purpose of this report is to provide recommendations for the design and construction of an industrial building. The proposed industrial building is currently planned as centrally located, with one elevated building connected to a series of one-storey warehouses. Depending on the final specific design, the building may encroach and abut against the southern slope, or also require cutting into the soil berm along the east property boundary. Private sanitary septic will also need to be designed and constructed for the site.

3. SURFACE INVESTIGATIONS

A surface investigation was conducted on September 1st, 2021, as part of an Environmental Site Assessment (ESA) Phase I Report, which shows the following:

The site property is generally considered as flat / shallowly graded northward towards Anderson Blvd, with the entirety of site absent of any buildings or structures. During the investigation, the site was used by a tenant as a dry storage yard for large metal pipes. There were no underground utilities or services on site, and the majority of the site was covered in a thick layer of cold-rolled asphalt recycle material.

4. SUB-SURFACE INVESTIGATIONS

The sub-surface investigation program was conducted on Jan 5th – Jan 7th, 2022, and consists of six (6) boreholes drilled around the site and an in-situ infiltration test for stormwater management design.

All boreholes were drilled via portable hydraulic soil auger. A static cone penetrometer test was conducted within each distinct layer of soil, and is used to evaluate the bearing capacity of the soil.

The approximate locations of each borehole can be found in Appendix I, while detailed borehole drill logs are found in Appendix II.

4.1.BOREHOLE PROGRAM

Three geotechnical boreholes were drilled at the site, with the following locations:

Table 1 - Borehole Program Summary

	Northing	Easting	Surface Elevation	Relative Position on Site	Maximum Depth
BH101	4,876,129	624,443	349.8	North	1.5m
BH102 & In-Situ Permeameter	4,876,124	642,498	351.3	Northeast	3.2m
BH103	4,876,095	642,475	351.1	Central	1.5m
BH104	4,876,091	642,518	351.8	East	3.2m
BH105	4,876,054	642,441	351.5	Southwest	1.5m
BH106	4,876,046	642,472	351.7	South	1.5m

4.2.STRATIGRAPHY & SOIL PHYSICAL PROPERTIES

In general, the stratigraphy can be described as the following:

Table 2 - Soil Stratigraphy Summary

	Top Layer	Middle Layer	Bottom Layer
From (m)	0 m	0.4 m	1.5 m
To (m)	0.4m	1.5 m	3.2 m
Description	Asphalt & Granular Crush	Glacial till sandy clay	Glacial till sandy clay
Primary Soil	-	Clay	Clay
Secondary Soil	-	Minor sands	Minor sands
Debris / Others	-	Some stones	Some stones
Cone Penetrometer Test	-	1000kPa at less than 1.0cm displacement	1700kPa at less than 1cm of displacement
Comments	Cold compacted asphalt recycle material & granular B / road base	Dry to moist clay, some perched groundwater due to fill berm	Extremely stiff damp to moist clay at depths, presence of stones / boulders

4.3.IN-SITU INFILTRATION TESTING

An in-situ permeability test was conducted at 37 Anderson Blvd, Uxbridge, Ontario, in order to estimate the "field-saturated" hydraulic conductivity, Kfs, using the "Constant Head Well Permeameter" (CHWP) method. This test was done in near borehole BH102 at the study area using ETC slow soils permeameter apparatus.

The "Constant Head Well Permeameter" (CHWP) method (Reynolds, 1993; Elrick and Reynolds, 1986) is based on the observation that when a constant height or "head" of water is ponded in a borehole or "well" augured into unsaturated soil, a "bulb" of field-saturated soil is gradually established around the base of the well. The K_{fs} value achieved through this method can be less than or equal to half of K_s (Saturated hydraulic conductivity) due to partial blocking of soil pores by air bubbles and it is preferred over K_s in the design of on-site stormwater LID infiltration design, because drainage through the soil should be designed to occur at less than complete soil saturation.

The in-situ measurements were done by the ETC Slow Soils Pask Permeameter, is an extended single-head analysis method and calculations procedure used here are based on the work of W.D. Reynolds and D.E. Elrick formerly of the University of Guelph, Ontario, Canada.

The ETC Pask Permeameter is a convenient and easy to use apparatus for ponding a constant head of water in a well, and simultaneously measuring the flow into the soil. The rate of fall (R) of the water level in the permeameter reservoir and reservoir cross-sectional area (X) allows determination of quasi steady water flow rate (Q) into the soil (i.e Q = XR). K_{fs} is then calculated using Equation 1 (Reynolds, 1993):

$K_{fs} = CQ / [2\pi H^2 + C\pi a^2 + (2\pi H/\alpha^*)]$ (Eq. 1)

In which:

K_{fs} = the calculated permeability from the field test

Table 1. Parameters used

Soil Texture Factor (α^*)	Compacted, structureless, clayey materials such as landfill caps and liners, lacustrine or marine sediments.	0.01 cm^{-1}
R	Quasi steady state (constant) rate of fall of water in permeameter reservoir (Measured in the site)	0.1 cm/min
μ_k/μ_a	Temperature Correction Factor ($t=6^{\circ c}$)	0.942
X	Cross-sectional area of permeameter reservoir	12.80 cm^2
C	Shape factor	1.27
H	Height of air inlet hole from bottom of the test hole	15 cm
a	Well hole radus	4.15 cm

Based on data described in the above table and using Pask Permeameter ETC Quick Field Reference Tables for slow soils, the K_{fs} was calculated as:

K_{fs}= 2.5E-8 m/sec

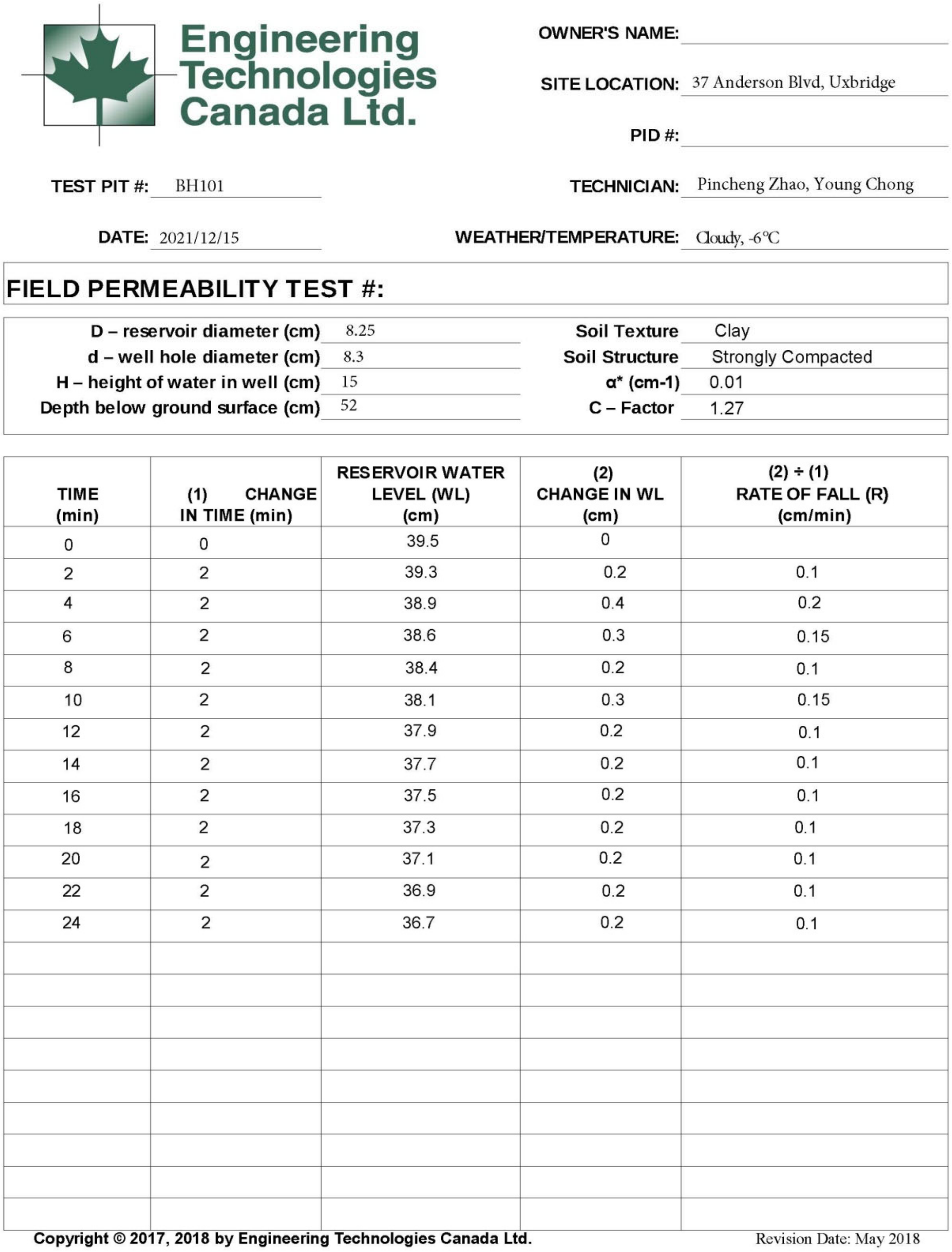
And then the temperature corrected permeability would be calculated using equation 2 as follows:

$K_a = K_{fs} \times \mu_k/\mu_a$ (Eq. 2)

In which:
K_a = corrected permeability adjusted for design temperature conditions.

K_a=2.355E-8 m/sec

Field Permeability Test Sheet



Engineering Technologies Canada Ltd.

OWNER'S NAME:

SITE LOCATION: 37 Anderson Blvd, Uxbridge

PID #:

TEST PIT #: BH101

TECHNICIAN: Pincheng Zhao, Young Chong

DATE: 2021/12/15

WEATHER/TEMPERATURE: Cloudy, -6°C

FIELD PERMEABILITY TEST #:

D – reservoir diameter (cm)	8.25	**Soil Texture**	Clay
d – well hole diameter (cm)	8.3	**Soil Structure**	Strongly Compacted
H – height of water in well (cm)	15	**α* (cm-1)**	0.01
Depth below ground surface (cm)	52	**C – Factor**	1.27

TIME (min)	(1) CHANGE IN TIME (min)	RESERVOIR WATER LEVEL (WL) (cm)	(2) CHANGE IN WL (cm)	(2) ÷ (1) RATE OF FALL (R) (cm/min)
0	0	39.5	0	
2	2	39.3	0.2	0.1
4	2	38.9	0.4	0.2
6	2	38.6	0.3	0.15
8	2	38.4	0.2	0.1
10	2	38.1	0.3	0.15
12	2	37.9	0.2	0.1
14	2	37.7	0.2	0.1
16	2	37.5	0.2	0.1
18	2	37.3	0.2	0.1
20	2	37.1	0.2	0.1
22	2	36.9	0.2	0.1
24	2	36.7	0.2	0.1

Revision Date: May 2018

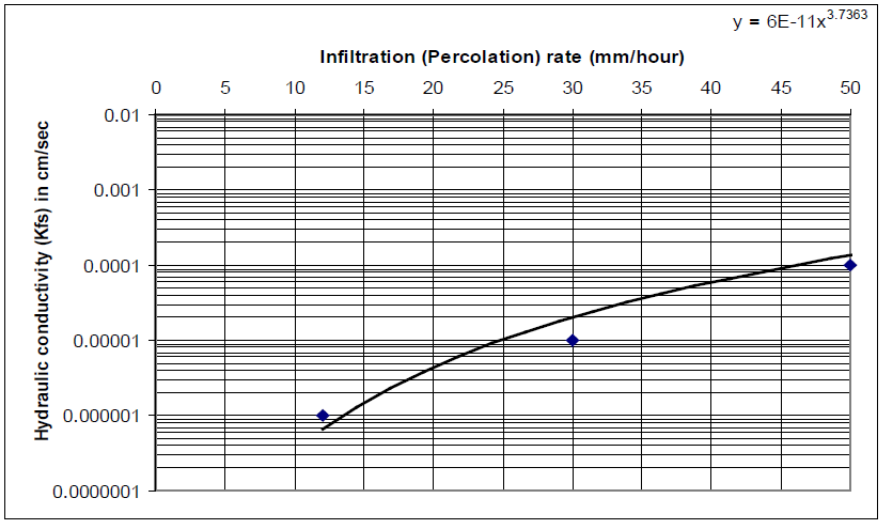
TRCA and other Conservation Authorities reviews design of infiltration basins based on historic empirical tests. Below are two TRCA 2012 design criteria that describe the relationship between K_{fs}, PT, and infiltration rates, based on the 1997 OMMAH supplementary guidelines to OBC 1997.

Table C 2: Approximate relationships between hydraulic conductivity, percolation time and infiltration rate

Hydraulic Conductivity, K_{fs} (centimetres/second)	Percolation Time, T (minutes/centimetre)	Infiltration Rate, 1/T (millimetres/hour)
0.1	2	300
0.01	4	150
0.001	8	75
0.0001	12	50
0.00001	20	30
0.000001	50	12

***Source**: Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997. Supplementary Guidelines to the Ontario Building Code 1997. SG-6 Percolation Time and Soil Descriptions. Toronto, Ontario.*

Figure C 11: Approximate relationship between infiltration rate and hydraulic conductivity



***Source**: Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997. Supplementary Guidelines to the Ontario Building Code 1997. SG-6 Percolation Time and Soil Descriptions. Toronto, Ontario.*

Based on OMMAH extrapolation from Table C2 and Figure C 11 above, the measured K_{fs}/K_a may be interpolated as:

PT = 121.2 min / cm   (Infiltration Rate = 4.95 mm/hour)

For a conservative approach to infiltration speeds for stormwater management purposes, the OMMAH (1997) method shall be used for the calculation of a factored design infiltration rate. PT=121.2 min/cm is equal to an unfactored infiltration rate =4.95 mm/hour. The infiltration rate used to design a stormwater infiltration structure must incorporate a safety correction factor that compensates for potential reductions in soil permeability due to compaction or smearing during construction, gradual accumulation of fine sediments over the lifespan of the infiltration structure and uncertainty in measured values when less permeable soil horizons exist within 1.5 meters below the proposed bottom elevation of the BMP

Based on borehole data, the soil layer remains consistent of sandy clay soil type, including the soil layers 1.5 meters below the proposed bottom of any infiltration structure. This means that based on the below Table C3, the measured infiltration rate should be divided by a safety correction factor of 2.5 to calculate the design infiltration rate.

In summary, the factored engineering design infiltration rate is 2mm/hour.

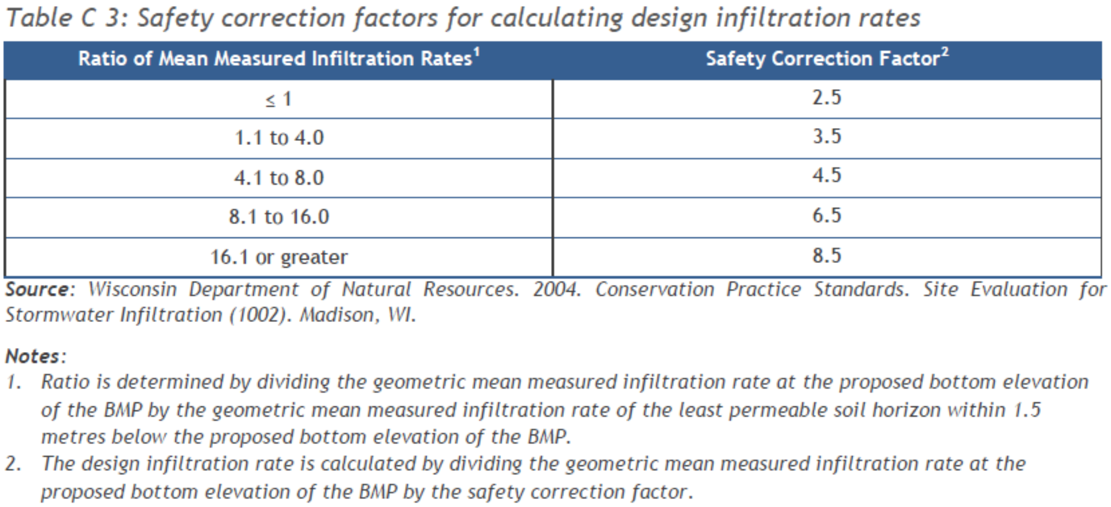


Table C 3: Safety correction factors for calculating design infiltration rates

Ratio of Mean Measured Infiltration Rates[1]	Safety Correction Factor[2]
≤ 1	2.5
1.1 to 4.0	3.5
4.1 to 8.0	4.5
8.1 to 16.0	6.5
16.1 or greater	8.5

***Source**: Wisconsin Department of Natural Resources. 2004. Conservation Practice Standards. Site Evaluation for Stormwater Infiltration (1002). Madison, WI.*

***Notes**:*

1. *Ratio is determined by dividing the geometric mean measured infiltration rate at the proposed bottom elevation of the BMP by the geometric mean measured infiltration rate of the least permeable soil horizon within 1.5 metres below the proposed bottom elevation of the BMP.*
2. *The design infiltration rate is calculated by dividing the geometric mean measured infiltration rate at the proposed bottom elevation of the BMP by the safety correction factor.*

5. DESIGN RECOMMENDATIONS

5.1.GEOTECHNICAL MODEL

Based on the borehole information and the static cone penetration tests performed within each borehole, the following geotechnical model are stated:

- Layer #1, 0 – 0.4m, granular aggregate crush, extremely high bearing capacity

- Layer #2, 0.4 – 3.2m, native glacial till sandy clay soil, dry to moist, very stiff at depths, presence of stones and boulders, undrained shear strength c = 130kPa, $\phi = 0°$

- Soil berm along property boundary – not part of investigative scope of work, but generally can be assumed to be scraped topsoil / sandy clay soil from subject property, based on historical aerial photographs by York Region Maps. Assumed baseline data of 90% compaction from general settlement / natural compaction, reworked shear strength c = 10kPa, $\phi = 25°$, and unit weight of 17.7kN/m3. Additional investigations shall be conducted if required in the future.

5.2.POTENTIAL ISSUES DURING CONSTRUCTION

The proposed building is initially proposed to use strip or trench concrete foundation at 1.2m in depth without any basement structures. The bearing capacity at 1.2m is estimated to be greater than 250kPa, and thus sufficient for most structural engineering designs.

As the main structure is bounded on the east-end by a 10m high soil berm, a suitable retaining wall must be constructed, which drains a significant amount of perched groundwater due to the natural slope and porosity of a disturbed soil stockpile berm.

The structure must also take care not to encroach too close to the southern slope due to global slope stability risks and concerns. It is in the Engineer's opinion that the proposed dwelling should not be closer than 10m to the crest of the south slope, as otherwise a global stability analysis would be recommended.

Finally, due to the native clay soil slow drainage characteristics, backfill of footings and excavations must be carefully controlled. If excavation voids are not property backfilled, air voids may be continuous and introduce a direct channel for surface precipitation to trickle into and below the footing depths.

Therefore, it is suggested that one or more of the following are employed:

1. A granular fill and perforated drainage pipe be installed at the bottom of the concrete footing, in order to drain any accumulated precipitation into the local stormwater sewer system,
2. A trench concrete pour construction method may be employed to reduce the air-voids between the native soil excavation walls and the concrete foundation structure,
3. Concrete sidewalks may be used to move surface water away from the foundation element, or
4. Ensure proper backfill of moist (not dry) native clay soils, including proper compaction at internal corners and edges flush against concrete foundation elements

5.3.FROST PROTECTION

All exterior concrete footings exposed to seasonal freezing conditions must have at least 1.2 metres of soil cover / backfill for frost protection.

5.4.CONVENTIONAL SPREAD OR STRIP FOUNDATION

At the time of preparation of this report, design loading requirements have not been made available. After investigation of the soils found at site, structural footings may be designed on the basis of a geotechnical soil bearing capacity of 250 kPa at the serviceability limit state (SLS), and ultimate limit state (ULS) of 375kPa.

5.5.SETTLEMENT CONSIDERATIONS

In general, soils within the "stress influence zone" beneath all foundation elements of a proposed structure will be consolidated after an extended period of time. This is an important factor to realize, since the SLS is highly impacted by the potential for settlement.

The primary soil layer impacted by the proposed foundation elements are composed of dense glacial till sandy clay, and it is a requirement to reduce long term water accumulation in any backfilled areas. Glacial till soils are also volumetrically larger after disturbance and compaction as compared to undisturbed state, and thus the bottom of all excavation floors should be dug with a toothless bucket to prevent over-digging. Low spots within excavations should be cover completely with concrete (after confirmation from structural engineer for rebar vertical positions), or backfilled with OPSS 1010 Granular B compacted to above 98% SPMDD.

5.6.SEIZEMIC LOADING

Using the information provided by the site investigation, the general soil profile comprises of "Stiff Soil – Site Class D" as defined by Table 4.1.8.4.A "Site Classification for Seismic Site Response" of the Ontario Building Code.

5.7.OHSA SOIL TYPE & TRENCH SUPPORT

Using the information provided by the site investigation, the general soil profile comprises of "Type 1 Soil" as defined Occupational Health and Safety Act (OHSA) O.Reg 213/91, section 226 "Soil Types".

Type 1 Soil is described as follows:
- Is hard, very dense and only able to be penetrated with difficulty by a small sharp object
- Has a low natural moisture content and a high degree of internal strength;
- Has no signs of water seepage; and
- Can be excavated only by mechanical equipment

Where personnel must enter a trench greater than 1.2m in depth, appropriate temporary shoring solutions must be installed. Possible temporary shoring solutions include an appropriate 1:1 gradient of excavation sloping, or the installation of a steel trench box.

Note that a suitable temporary soil support system must be considered when designing the construction of any permanent retaining walls for the east soil berm.

5.8.BACKFILL

On-site excavated, clean inorganic earth may be reused as engineered fill material, provided moisture contents are strictly controlled. Surficial native clay soil ranges between dry to moist, and proper backfill can only use moist clays (due to lower shear strength for backfill purposes). There are significant volumes of existing crushed aggregate / asphalt recycle currently on the property, and these materials may be scraped and stockpiled on site as road-base building materials.

Where native soil has been excavated, compaction of fill surrounding any foundation element or roadway should be compacted to at least 95% of the material's Standard Proctor Maximum Dry Density (SPMDD) within 1.0m of the final subgrade elevation, and then compacted to 98% SPMDD up to final grade. Compaction should be completed by monitoring the moisture content within the soil fill, and using an appropriately sized steel vibrating roller machine. Small confined locations not suitable for roller machines must be compacted by hand-held compaction equipment, such as jumping-jack style compactor.

5.9.PAVEMENT

In consideration to the sub-surface investigation, the main subgrade soil would be primarily composed of dense glacial till sandy clay. Due to the current tenant's usage of the site and the presence of an extremely thick layer of granular fill, a significant portion of the site is already suitable for heavy-duty truck haulage.

Where new roads and hot paved asphalt are designed, the pavement construction would consist of raising the grade from the prepared subgrade surface to the underside of the granular base layer, using well graded granular fill material (OPSS 1010 Granular B – Type I), with the material being laid and compacted in thin lifts to at least 98% SPMDD. Compaction lift height must be appropriately sized for the weight of the compactor roller machine. Appropriate compaction will not be achieved in full depths if the compaction roller machine is too small, or if the lift height is too thick. Appropriate moisture content is mandatory to achieve the target compaction percentage.

Asphalt compaction must observe the industry standards of asphalt temperature, granular base & ambient temperature, rainfall forecasts, and appropriate compaction effort. A thin layer of asphalt tack coating is also recommended to be sprayed to improve binding between two asphalt layers. A deficit in any of the above factors may cause short-term cracking and delamination, while long-term issues include localized potholes, water infiltration into subgrade clay soils, and frost-heave expansion.

Table 3 shows the recommended pavement structures, which will support cars and light trucks, with occasional delivery vehicles. Consistent daily loading of heavy tractor-trailer trucks will require additional pavement thicknesses, and may cause minor ruts to form in areas of high traffic or fully-loaded parking areas. All granular thicknesses are based on virgin materials, and if recycled materials are to be used, then thicknesses should be increased appropriately.

It is a requirement that appropriate quality assurance and quality control be conducted during all phases of the roadway and pavement construction process. Specific testing requirements include: SPMDD, compaction %, moisture %, material validation, and temperature checks.

Table 3 - Pavement Recommendations

Roadway Layer	Material	Specification	Light-Duty Design Thickness (mm)	Heavy-Duty Design Thickness (mm)
Layer #1 (Surface Asphalt)	Asphaltic Material OPSS 1150	HL 3 Surface Course	40	50
Layer #2 (Binder Asphalt)	Asphaltic Material OPSS 1150	HL 8 Binder Course	50	100 (two lifts)
Layer #3 (Base)	Granular Material OPSS 1010	Granular A, new	150	150
Layer #4 (Sub-base)	Granular Material OPSS 1010	Granular B-Type II, new	300	450

6. SUMMARY

The geotechnical aspects of the final design drawings and specifications should be reviewed by King EPCM prior to tendering and construction, and to confirm that the intent of this report has been met. During construction, full-time engineered fill monitoring and sufficient foundation inspections, subgrade inspections, in-situ density tests and materials testing should be carried out. As the main soil type for the proposed foundation elements will be within stiff clay, appropriate and consistent tests must be carried out to ensure uniformity of soil, and to ensure that settlement is appropriately controlled.

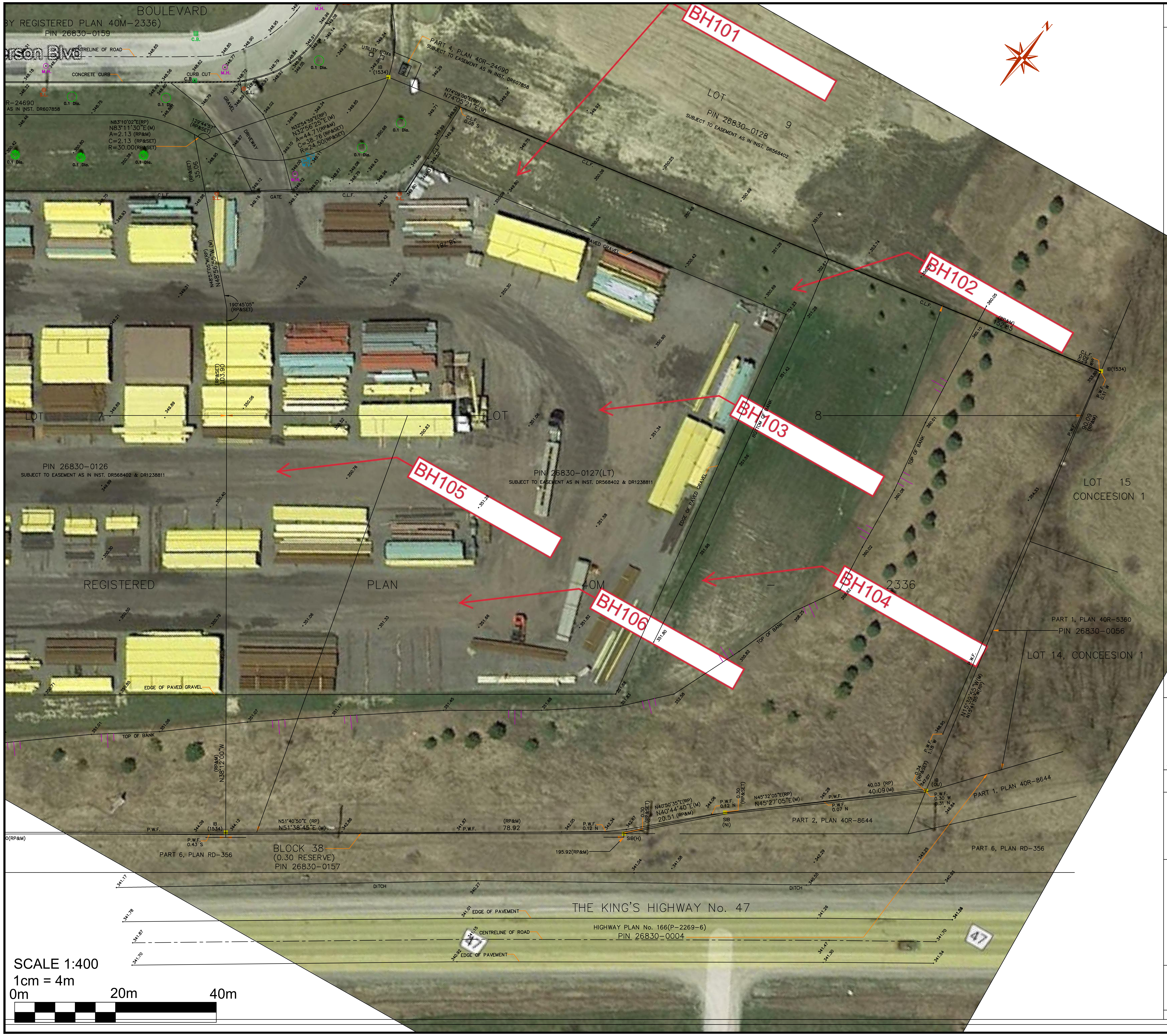
King EPCM appreciates the opportunity to be of service for this project, and trusts that this report provides sufficient geotechnical engineering information for a detailed design of the project. King EPCM looks forward to providing continued service during the construction stage. Please do not hesitate to contact King EPCM at any time if there are any questions regarding this project.

Sincerely,

Tony Wang, P. Eng
Principal Engineer

LICENSED PROFESSIONAL ENGINEER
Y. T. WANG
100228476
Nov 15, 2022
PROVINCE OF ONTARIO

APPENDIX I – SITE PLAN



DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

LEGEND

☐	DENOTES MONUMENT SET
■	DENOTES MONUMENT FOUND
SIB	DENOTES STANDARD IRON BAR
RP	DENOTES REGISTERED PLAN 40M–2336
1511	DENOTES SURVEYOR'S REAL PROPERTY REPORT BY RABIDEAU
H	DENOTES DAVID HORWOOD, O.L.S.
OU	DENOTES ORIGIN UNKNOWN
PIN	DENOTES PROPERTY IDENTIFIER NUMBER
M	DENOTES MEASURED
M.H.	DENOTES MAN HOLE
H.T.	DENOTES HYDRO TRANSFORMER
C.B.	DENOTES CATCH BASIN
S.L.	DENOTES STREET LIGHT
N,S,E,W	DENOTES NORTH, SOUTH, EAST, WEST
P.W.F.	DENOTES POST AND WIRE FENCE
C.L.F.	DENOTES CHAIN LINK FENCE
⋈ W.V.	DENOTES WATER VALVE
✱ 0.2 Dia.	DENOTES CONIFEROUS TREE
○ 0.1 Dia.	DENOTES DECIDUOUS TREE

ALL TIES TO CONCRETE FOUNDATION, UNLESS NOTED OTHERWISE.

BEARINGS SHOWN HEREON ARE ASTRONOMIC AND ARE REFERRED TO THE NORTHERLY LIMIT OF BLOCK 38 AS SHOWN ON REGISTERED PLAN 40M–2336, HAVING A BEARING OF N51°40'50"E.

BENCHMARK NOTE

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO THE TOWN OF WHITCHURCH–STOUFFVILLE BENCHMARK No.13020160016, HAVING AN ELEVATION OF 333.284M, DATUM: CGVD28;78. BRASS TABLET SET IN CONCRETE HEADWALL ON EAST SIDE OF SOMER RUMM COURT, 34.2M SOUTHEAST OF THE MOST SOUTHERLY CORNER OF 35 SOMER RUMM COURT, 11.2M SOUTHEAST OF CHAIN LINK FENCE, 12.9M SOUTHWEST OF THE OUTH END OF A CONCRETE HEADWALL, 26.0M NORTHWEST OF AN IRON BAR, 22.6M NORTHEAST OF A CHAIN LINK FENCE AND 33.3M NORTHEAST OF THE NORTHEAST CORNER OF 27 SOMER RUMM COURT.

THIS REPORT WAS PREPARED FOR TOM ZHENG AND THE UNDERSIGNED ACCEPTS NO RESPONSIBILITY FOR ITS USE BY OTHER PARTIES.

PART 2 (SURVEY REPORT)

1. REGISTERED EASEMENTS AND/OR RIGHT OF WAYS:
   SUBJECT TO EASEMENT AS IN INST. DR568402 & DR1238811.
2. ADDITIONAL COMMENTS: NOTE THE LOCATION OF THE FENCES AROUND THE NORTHERLY, EASTERLY AND SOUTHERLY LIMITS OF THE SUBJECT PROPERTY.
3. THIS PLAN DOES NOT CERTIFY COMPLIANCE WITH ZONING BY–LAWS.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 1st DAY OF OCTOBER , 2021

OCTOBER 15 , 2021
DATE

Z. ZENG
ONTARIO LAND SURVEYOR

MANDARIN SURVEYORS LIMITED
ONTARIO LAND SURVEYOR CANADA LANDS SURVEYOR
WWW.MANDARINSURVEYOR.COM
TORONTO, ONTARIO, M1S 1X7 E–MAIL: MANDARINSURVEYOR@GMAIL.COM
2400 MIDLAND AVENUE #121 PHONE: (647)430–1366 FAX: (647)799–4068

SURVEY BY: Y.C. | CAD No: 21–261SRPR | JOB No: 2021–261

D:\Dropbox\Dropbox\PRO

KEY MAP
N.T.S.

DRAWN
TW

STAMP

DATE
FEB 02, 2022

KING EPCM

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204-304 Toronto Street South
Uxbridge, ON, L9P 1Z7
www.KingEPCM.com
647-459-5647
General@KingEPCM.com

CLIENT
PAULSAN CONSTRUCTION INC.

PROJECT NAME
CONSTRUCTION OF INDUSTRIAL WAREHOUSE

PROJECT LOCATION
37 ANDERSON BLVD
UXBRIDGE, ON

PRINT TITLE
BOREHOLE SITE PLAN

FILE No.
BHL - 1.1

No.	ISSUED FOR:	DATE	DRAW BY	CHECK
V1	INTERNAL REVIEW	FEB 02, 2022	TW	TW

APPENDIX II – BOREHOLE DRILL LOG

KING EPCM
Flexible. Dependable. On-site Engineering.

GROUNDWATER LOG BH101

PROJECT NUMBER
PROJECT NAME 37 Anderson Industrial Warehou
CLIENT Paulsan Construction Inc.
ADDRESS 37 Anderson Blvd, Uxbridge, ON
LICENCE NO.

DRILLING DATE Jan 5 - Jan 7, 2022
TOTAL DEPTH 1.5m
DIAMETER 64mm
CASING
SCREEN

COORDINATES 624,443E, 4,876,129N
COORD SYS UTM Zone 17
COMPLETION
SURFACE ELEVATION 349.8 amsl
WELL TOC

COMMENTS

LOGGED BY YC
CHECKED BY TW

Depth (m)	Graphic Log	Material Description	Additional Observations	Elevation (m)
	≈	TOPSOIL: minor snow, grassy lawn & brown topsoil		
0.2				349.6
0.4	▨	USCS: CL - SANDY CLAY: dark yellow dry stiff clay, presence of stones / boulders		349.4
0.6			Static Cone Penetration Test - 0.75m - 1600kPa < 1cm displacement	349.2
0.8				349
1				348.8
1.2				348.6
1.4			Static Cone Penetration Test - 1.5m - 1200kPa < 0.5cm displacement	348.4
1.6		Termination Depth at:1.5m No groundwater encountered		348.2
1.8				348
2				347.8
2.2				347.6
2.4				347.4
2.6				347.2
2.8				347
3				346.8
3.2				346.6
3.4				346.4

Disclaimer

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Flexible. Dependable. On-site Engineering.

GROUNDWATER LOG BH102

PROJECT NUMBER
PROJECT NAME 37 Anderson Industrial Warehou
CLIENT Paulsan Construction Inc.
ADDRESS 37 Anderson Blvd, Uxbridge, ON
LICENCE NO.

DRILLING DATE Jan 5 - Jan 7, 2022
TOTAL DEPTH 3.2m
DIAMETER 64mm
CASING
SCREEN

COORDINATES 624,498E, 4,876,145N
COORD SYS UTM Zone 17
COMPLETION
SURFACE ELEVATION 351.3 amsl
WELL TOC

COMMENTS

LOGGED BY YC
CHECKED BY TW

Depth (m)	Graphic Log	Material Description	Additional Observations	Elevation (m)
0.2 0.4	∿	TOPSOIL: minor snow, grassy lawn & brown topsoil		351.2 351
0.6 0.8 1 1.2 1.4 1.6 1.8 2 2.2 2.4 2.6 2.8 3 3.2	▨	USCS: CL - SANDY CLAY: dark brown moist stiff clay	Static Cone Penetration Test - 0.75m - 1100kPa < 0.5cm displacement Static Cone Penetration Test - 1.5m - 1000kPa < 0.5cm displacement Static Cone Penetration Test - 3.0m - 1700kPa < 1cm displacement	350.8 350.6 350.4 350.2 350 349.8 349.6 349.4 349.2 349 348.8 348.6 348.4 348.2
3.4		Termination Depth at:3.2m No groundwater encountered		348

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GROUNDWATER LOG BH103

PROJECT NUMBER
PROJECT NAME 37 Anderson Industrial Warehou
CLIENT Paulsan Construction Inc.
ADDRESS 37 Anderson Blvd, Uxbridge, ON
LICENCE NO.

DRILLING DATE Jan 5 - Jan 7, 2022
TOTAL DEPTH 1.5m
DIAMETER 64mm
CASING
SCREEN

COORDINATES 624,475E, 4,876,095N
COORD SYS UTM Zone 17
COMPLETION
SURFACE ELEVATION 351.1 amsl
WELL TOC

COMMENTS

LOGGED BY YC
CHECKED BY TW

Depth (m)	Graphic Log	Material Description	Additional Observations	Elevation (m)
0.2	■	ASPHALT: cold compacted asphalt and highly compacted granular fill		351 350.8
0.4 0.6	▨	USCS: CL - SANDY GRAVELLY CLAY: dark brown gravelly clay, dry and stiff clay	Static Cone Penetration Test - 0.75m - 1000kPa < 0.5cm displacement	350.6 350.4
0.8 1 1.2 1.4	▨	USCS: CL - SANDY CLAY: dark brown moist stiff clay	Static Cone Penetration Test - 1.5m - 1200kPa < 0.5cm displacement	350.2 350 349.8 349.6
1.6 1.8 2 2.2 2.4 2.6 2.8 3 3.2 3.4		Termination Depth at:1.5m No groundwater encountered		349.4 349.2 349 348.8 348.6 348.4 348.2 348 347.8

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GROUNDWATER LOG BH104

PROJECT NUMBER
PROJECT NAME 37 Anderson Industrial Warehou
CLIENT Paulsan Construction Inc.
ADDRESS 37 Anderson Blvd, Uxbridge, ON
LICENCE NO.

DRILLING DATE Jan 5 - Jan 7, 2022
TOTAL DEPTH 3.2m
DIAMETER 64mm
CASING
SCREEN

COORDINATES 624,518E, 4,876,091N
COORD SYS UTM Zone 17
COMPLETION
SURFACE ELEVATION 351.8 amsl
WELL TOC

COMMENTS

LOGGED BY YC
CHECKED BY TW

Depth (m)	Graphic Log	Material Description	Additional Observations	Elevation (m)
	≀	TOPSOIL: minor snow, grassy lawn & brown topsoil		
0.2	≀			351.6
0.4	▨	USCS: CL - SANDY CLAY: yellow moist stiff clay		351.4
0.6	▨		Static Cone Penetration Test - 0.75m - 1200kPa < 1cm displacement	351.2
0.8	▨			351
1	▨			350.8
1.2	▨			350.6
1.4	▨		Static Cone Penetration Test - 1.5m - 1000kPa < 1cm displacement	350.4
1.6	▨			350.2
1.8	▨			350
2	▨			349.8
2.2	▨			349.6
2.4	▨			349.4
2.6	▨			349.2
2.8	▨		Static Cone Penetration Test - 3.0m - 1700kPa < 2cm displacement	349
3	▨			348.8
3.2		Termination Depth at:3.2m No groundwater encountered		348.6
3.4				348.4

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KING EPCM

Flexible. Dependable. On-site Engineering.

GROUNDWATER LOG BH105

PROJECT NUMBER

PROJECT NAME 37 Anderson Industrial Warehou

CLIENT Paulsan Construction Inc.

ADDRESS 37 Anderson Blvd, Uxbridge, ON

LICENCE NO.

DRILLING DATE Jan 5 - Jan 7, 2022

TOTAL DEPTH 1.5m

DIAMETER 64mm

CASING

SCREEN

COORDINATES 624,441E, 4,876,054N

COORD SYS UTM Zone 17

COMPLETION

SURFACE ELEVATION 351.5 amsl

WELL TOC

COMMENTS

LOGGED BY YC

CHECKED BY TW

Depth (m)	Graphic Log	Material Description	Additional Observations	Elevation (m)
0.2	■	ASPHALT: cold compacted asphalt and highly compacted granular fill		351.4 351.2
0.4 0.6	▨	USCS: CL - SANDY GRAVELLY CLAY: dark brown gravelly clay, dry and stiff clay	Static Cone Penetration Test - 0.75m - 1500kPa < 0.5cm displacement	351 350.8
0.8 1 1.2 1.4	▨	USCS: CL - SANDY CLAY: dark brown moist stiff clay	Static Cone Penetration Test - 1.5m - 1200kPa < 0.5cm displacement	350.6 350.4 350.2
1.6 1.8 2 2.2 2.4 2.6 2.8 3 3.2 3.4		Termination Depth at:1.5m No groundwater encountered		350 349.8 349.6 349.4 349.2 349 348.8 348.6 348.4 348.2

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GROUNDWATER LOG BH106

PROJECT NUMBER
PROJECT NAME 37 Anderson Industrial Warehou
CLIENT Paulsan Construction Inc.
ADDRESS 37 Anderson Blvd, Uxbridge, ON
LICENCE NO.

DRILLING DATE Jan 5 - Jan 7, 2022
TOTAL DEPTH 1.5m
DIAMETER 64mm
CASING
SCREEN

COORDINATES 624,472E, 4,876,046N
COORD SYS UTM Zone 17
COMPLETION
SURFACE ELEVATION 351.7 amsl
WELL TOC

COMMENTS

LOGGED BY YC
CHECKED BY TW

Depth (m)	Graphic Log	Material Description	Additional Observations	Elevation (m)
0.2	■	ASPHALT: cold compacted asphalt and highly compacted granular fill		351.6 351.4
0.4 0.6	▨	USCS: CL - SANDY GRAVELLY CLAY: dark brown gravelly clay, dry and stiff clay		351.2
	▨		Static Cone Penetration Test - 0.75m - 1200kPa < 0.5cm displacement	351
0.8 1 1.2 1.4	▥	USCS: CL - SANDY CLAY: dark brown moist stiff clay		350.8 350.6 350.4
	▥		Static Cone Penetration Test - 1.5m - 1200kPa < 0.5cm displacement	
1.6 1.8 2 2.2 2.4 2.6 2.8 3 3.2 3.4		Termination Depth at:1.5m No groundwater encountered		350.2 350 349.8 349.6 349.4 349.2 349 348.8 348.6 348.4