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GEOTECHNICAL REPORT
AND SLOPE STABILITY REVIEW

AT

123 Durham Regional Highway 47,
Uxbridge, ON

PREPARED FOR:

Urbanway Development Management Inc.

Dated: Dec 9th, 2023

Table of Contents

1. BACKGROUND

King EPCM (the Engineer) was retained by Urbanway Development Management Inc. (the Client) to carry out a geotechnical and hydrogeology investigation for a proposed industrial sub-division at 123 Durham Regional Highway 47, Uxbridge, ON (the Site).

The purpose of this report is to provide recommendations for the design and construction of a proposed industrial sub-division. Initial foundation designs are conventional strip footings with no basements. This report details King EPCM's borehole drilling program, fieldwork and testing, and design recommendations.

This report was prepared for the Client, Urbanway Development Management 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 123 Durham Regional Highway 47, Uxbridge, ON.

The Site property is considered triangular in shape, and is located east of the major intersection of York-Durham Line and Bloomington Rd / Durham Regional Highway 47 (Hwy 47). The site is currently an agricultural property with rolling hills and multiple driveway access along the north of the property along Hwy 47.

2.2.PROPOSED PROJECT

The purpose of this report is to provide recommendations for the soil capacity, foundation design and construction of an industrial sub-division, including driveway pavement recommendations.

3. SURFACE INVESTIGATIONS

Initial surface investigation was conducted through review of various sources:

- Historic well records from O.Reg 903
- Durham Region Mapping contour lines
- Technical Report in Support of the Duffins Creek and Carruthers Creek Watershed Plan (TRCA, 2003a)
- A Watershed Plan: For Duffins Creek and Carruthers Creek (TRCA, 2003b)
- Hydrogeology of the Oak Ridges Moraine aquifer system (Gerber and Howard, 2002)

From a general desktop review, the Site is on top of a shallow regional aquitard composed of sandy gravelly clay, with Oak Ridges Moraine sands immediately below.

4. SUB-SURFACE INVESTIGATIONS

The sub-surface investigation program was conducted between May and July, 2023, and consists of eight (8) boreholes spread out across the site, as per Figure 1 below.

Figure 1 - Location of geotechnical investigation boreholes

All geotechnical boreholes were drilled via hydraulic constant flight auger drill rig. Due to the combined sandy clay soil profile, a variety of different tests was conducted, including Dynamic Cone Penetrometer (DC), manual Cone Penetrometer Test as well as Shear Vane test. The surveyed locations of each borehole can be found in Appendix I, while detailed borehole drill logs are found in Appendix II.

Additionally, four (4) in-situ constant head well permeameter tests (CHWP) was conducted, as per Figure 2 below. The in-situ infiltration test was conducted to test for septic infiltration values for the proposed industrial sub-division, as well as to correlate a sieve analysis of obtained soil samples versus detailed hydraulic permeability for future Low Intensity Development structure designs.

Figure 2 - Location of in-situ permeameter tests

4.1.BOREHOLE PROGRAM

In general, all boreholes encountered some variation of glacial till of gravelly sandy clay. All eight (8) boreholes were converted into groundwater monitoring wells at the end of the drill program.

4.2.STRATIGRAPHY & SOIL PHYSICAL PROPERTIES

Due to the rolling hill topographic variance of the property, the stratigraphy varies between each borehole by relative depth. However, the general soil can be described as the following:

Table 1 - Soil Stratigraphy

	Higher Elevations	Lower Elevations
From (masl)	337 masl	330 masl
To (masl) +/- 3m	330 masl	325 masl
Description	gravelly sandy clay	silt
Primary Soil	clay	silt
Secondary Soil	sand and gravel, layers	20% sands
Debris / Other Desc.	moist, low plasticity	brown

4.3.GROUNDWATER ELEVATIONS

Groundwater was measured on several dates: Aug 23rd, Oct 4th, and Nov 7th, 2023. In general, the highest groundwater was found early in the season on the Aug 23rd observation day, with shallow groundwater between 1.25 and 3.9m below grade and several boreholes being dry, as per Table 2 below. The autumn of 2023 experienced a significant dry weather pattern with minimal rainfall. As per Section 3 above, the Site is composed of a shallow aquitard near surface, due to the minimal rains in the later half of 2023, several monitoring wells were dry.

Table 2 - Groundwater Elevation Review – Aug 23rd, 2023

	BH101	BH102	BH103	BH104	BH105	BH106	BH107	BH108
Riser above ground (M)	0.81	0.79	0.92	1.07	0.85	0.85	1	0.83
Water level (from riser top) (M)	NW	4.59	4.82	4.2	NW	2.1	NW	NW
Ground Elevation (masl)	336.88	337.56	334.48	334.67	329.93	336.04	332.95	339.34
GW level (mbgl)	NW	3.8	3.9	3.13	NW	1.25	NW	NW
GW Elevation (masl)	NW	333.76	330.58	331.54	NW	334.79	NW	NW

BH101,105,107,108 no groundwater (N/W)

One important area that requires additional review is BH107, where the sub-division proposes to construct a stormwater management dry-pond. The local area around BH107 is low-lying tableland with further valley-lands / elevation drops to the north and east. BH107 groundwater monitoring well was drilled down to 7.5m below grade, with bottom of well at 325.5m elevation. Groundwater was found during drilling at 327.0m, but all subsequent inspections found the well to be dry due to insufficient rains.

It is the Engineer's opinion that for the purposes of establishing seasonal high groundwater elevation for the design of a stormwater management dry-pond, the groundwater is at 327.4m as found during drilling.

5. DESIGN RECOMMENDATIONS

5.1. GEOTECHNICAL MODEL

Based on the borehole information, the following geotechnical model are stated:

- Layer #1, 0 – 0.3m, topsoil

- Layer #2, 0.3 – 6m, native soil, dense glacial till sandy clay
  - Dynamic Cone Penetration Test (DCP) = 0.3 – 1mm blow
  - Equivalent Conversion to Standard Penetration Test (SPT) = 75 ~ 100+ blows / 300mm
  - Shear Vane Test = 130 ~ 240kPa
  - Manual Cone Penetration Test = 700 ~ 1400kPa with less than 0.5cm of displacement
  - SLS = 200kPa
  - ULS = 300kPa
  - $\phi = 30°$
  - Cohesion = 0kPa
  - Unit weight = 21kN/m3

5.2.FROST PROTECTION

All exterior concrete footings exposed to seasonal freezing conditions must have at least 1.5 metres of soil cover / backfill for frost protection, as per OPSD 3090.101, Revision Nov 2010. Alternatively, minimum frost cover depths of 1.2m may be used to satisfy OBC 9.12.2.2 Minimum Depth of Foundation requirements, but would need rigid foam insulation apron around the foundation footings.

5.3.INITIAL FOUNDATION REVIEW

At the time of preparation of this report, design loading requirements have not been made available as the project is still within a proposed sub-division design stage. Conventional strip foundations with SLS soil bearing capacity of 200kPa may be used.

5.4.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 differential settlement. For a large industrial warehouse building, differential settlement is mostly controlled by differences of the native soil from one side to the other, and by having sufficient soil-to-concrete contact area.

Excavation within the proposed work area should not be over-excavated, as overworked wet clay does not have good compaction characteristics, and any significant backfills below a proposed foundation to be either undisturbed native soil, or 98% compaction of OPSS 1010 Granular B, Type II, new (non-recycle).

5.5.SEIZEMIC LOADING

Using the information provided by the site investigation, the general soil profile comprises of “Very dense soil and soft rock – Site Class C” as defined by Table 4.1.8.4.A “Site Classification for Seismic Site Response” of the Ontario Building Code, defined by a very high undrained shear strength of greater than 100kPa and SPT N60>50.

5.6.OHSA SOIL TYPE & TRENCH SUPPORT

Using the information provided by the site investigation, the general soil profile comprises of “Type 2 Soil” as defined Occupational Health and Safety Act (OHSA) O.Reg 213/91, section 226 “Soil Types”.

Type 2 Soil is described as follows:

- Very stiff, dense. You can penetrate it with moderate difficulty by using a smalls harp object but a pick can be driven in easily
- Low to medium natural moisture content, medium degree of internal strength
- Has a damp appearance after it’s excavated

Where personnel must enter a trench greater than 1.2m in depth, appropriate temporary shoring solutions must be installed. For the proposed industrial sub-division with three (3) stories of underground parking, it is recommended that soldier-pile retaining wall combined with tie-back system to be used as temporary retaining wall.

5.7.BACKFILL

Compaction of fill surrounding the outside of any foundation element or roadway should be compacted to at least 98% of the material's Standard Proctor Maximum Dry Density (SPMDD) within 1.0m of the final subgrade elevation, and then compacted to 100% SPMDD up to final grade. Compaction should be completed in multiple layers, using an appropriately sized steel vibrating roller machine. Smaller vibratory compacting machines must compact 75 – 150mm layers (and thus more total layers), while larger machines allow for thicker layers of compaction, at 150 – 300mm. Small confined locations not suitable for roller machines must be compacted by hand-held compaction equipment, such as jumping-jack style compactor. Small-scale landscaping / asphalt compaction plates are not suitable for compaction.

6. CONSTRUCTION DEWATERING

Construction dewatering will generally not be required based on preliminary review. Groundwater elevations as per Table 2 above shows that the highest local location with seasonal high groundwater elevation is 1.25m below grade, with most other boreholes showing groundwater at 3m or more below grade.

7. SOIL INFILTRATION POTENTIAL

Based on a field visit dated June 16, 2023, "field-saturated" hydraulic conductivity (K_{fs}), was achieved using the "Constant Head Well Permeameter" (CHWP) method. K_{fs101} and K_{fs102} were conducted southeast corner near the natural heritage, near BH107 while K_{fs103} at the central portion near the existing dwelling (near BH106) and K_{fs104} at the southwest corner near the BH105 using ETC both Standard and Slow Soils Pask Permeameter Apparatuses. The "Constant Head Well Permeameter" (CHWP) method was described in Appendix III in detail.

It is understood that the in-situ infiltration test was not tested at the actual LID bottom but based on sieve size analysis and borehole soil samples, it is in the Engineer's opinion as a geotechnical engineer that the soils perform similarly in hydrological infiltration potential. 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 K_{fs} was calculated as:
K_{fs101} = 1.4E-6 m/sec= 1.4E-4 cm/sec
K_{fs102} = 2.5E-8 m/sec= 2.5E-6 cm/sec
K_{fs103} = 6.9E-7 m/sec= 6.9E-5 cm/sec
K_{fs104} = 1.4E-6 m/sec= 1.4E-4 cm/sec

Then using the temperature correction factor (for t=18-22$^{\circ c}$) from the Pask manual.

K_{a101} = 8.4E-7 m/sec= 8.4E-5 cm/sec
K_{a102} = 1.7E-8 m/sec= 1.7E-6 cm/sec
K_{a103} = 4.6E-7 m/sec= 4.6E-5 cm/sec
K_{a104} = 8.4E-7 m/sec= 8.4E-5 cm/sec

Correlations between Perc Time (PT) and field-saturated hydraulic conductivity (Kfs) are often used in the development of on-site water recycling and treatment facilities that operate by infiltration into unsaturated soil. Based on OMMAH (1997) interpolation, the measured infiltration rate may be interpolated as:

PT_{101} = 13.6 min / cm (Infiltration Rate = 44.1 mm/hour)
PT_{102} = 38.7 min / cm (Infiltration Rate = 15.5 mm/hour)
PT_{103} = 16 min / cm (Infiltration Rate = 37.6 mm/hour)
PT_{104} = 13.6 min / cm (Infiltration Rate = 44.1 mm/hour)

Due to the rolling hills nature of the large property, each specific testing location may experience localized differences in infiltration rate. Based on the above four testing locations, the proposed Lot 1 – Lot 12 may use a septic infiltration rate T-time of 1<T<20, while Lot 13 – Lot 14 may use a septic infiltration rate T-time of 35<T<50.

8. SLOPE STABILITY REVIEW

Based on Toronto and Region Conservation Authority (TRCA) discussions and site walks, a small area of valley-land was found at the northeast corner of the property. Top of Bank staking exercise was conducted together with TRCA, and additional 2-D computer modelling of global stability analysis was requested by TRCA as part of the submission process. Specifically, there is a proposed driveway and municipal road at the northeast corner of the property, in close proximity to the staked Top of Bank. Additionally, a second 2-D computer modelling of global stability analysis was conducted for the southeast corner of the property, for the proposed stormwater management dry-pond and the proposed discharge location. The 2-D computer models were completed using RocScience Slide V6.0 (now rebranded as Slide2), using Bishop-Janbu Simplified method.

Analysis #1 focused on the northeast corner Top of Bank, combined with geotechnical data from BH108. The analysis found that shallow-depth (less than 5m depth) global stability was generally safe, with Factor of Safety at 3.5 or greater. General geometry of the surveyed valley-lands found that the steepest slopes are at a ratio of 1V:6.4H or approximately 16% grade, while the average slope is at 1V:7.1H or 14% grade. The edge of watercourse at the bottom of the valley-lands were also found to be at a significant distance away, at 35m away. Any potential toe erosion would have minimal effect and would not significantly alter the existing 14% grade slopes. It is in the Engineer's opinion that the physical Top of Bank as staked by TRCA is the same as the Long Term Stable Top of Slope (LTSTOS).

Analysis #2 focused on the southeast corner of the site for a proposed stormwater management dry-pond, combined with geotechnical data from BH107. General geometry of the surveyed rolling hills / valley-lands found that the steepest slopes are at a ratio of 1V:10H or approximately 10% grade. There

is also generally minimal total elevation difference between the proposed top of constructed pond and the bottom of discharge location / edge of watercourse, at a total 5m elevation difference across 80m of horizontal distance.

Although the proposed storm pond berm may have a small component constructed at 1V:3H ratio, it is in the Engineer's opinion that in general, there is no physical feature of "Top of Bank", and instead, the general area is considered a rolling hill at an average grade of 10% or shallower. This is further supported by the fact that TRCA did not conduct Top of Bank staking within the southeast corner of the site during the exercise that staked the area in Analysis #1.

9. POTENTIAL ISSUES DURING CONSTRUCTION

The following issues relating to geotechnical and hydrogeology may arise, and should be fully considered by the Client:

- The proposed industrial sub-division may require top soil stripping, combined with significant amount of cut and fill activities to grade each industrial lot
- Engineered fill must be monitored full-time during cut and fill activities, especially when considering the construction of the proposed road is somewhat higher than the existing elevations, or when compacting large amounts of soil within each lot
- Where excess soil need to be imported from off-site sources, it is mandatory that O.Reg 406/19 Excess Soil Management requirements to be reviewed, and that an efficient work flow to be developed by a Qualified Person (QP)

10. PAVEMENT

In consideration to the sub-surface investigation, the main subgrade soil is dense glacial till sandy clay. The pavement construction would consist of stripping the existing disturbed agricultural topsoil (approx. 0.3m thick), raising the existing grade from the prepared native subgrade surface to the underside of the granular base layer using on-site materials with full-time engineering-reviewed compaction. The granular sub-base is designed 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 soils, and frost-heave expansion.
The proposed asphalt pavement road design is based on Durham Region, Type C arterial roads with AADT over 2,500, as per Table 3 below. All granular thicknesses are based on virgin materials, and if

recycled materials are to be used, then thicknesses should be increased appropriately by through re-design.

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. Note that during construction, test pits may be conducted to evaluate if the existing granular thicknesses achieves the Granular Base / Granular Sub-Base requirements from Table 3.

Table 3 - Pavement Recommendations

Road Layer	Material	Specification	Thickness (mm)
Layer #1 Surface Course Asphalt	Asphaltic Material OPSS 1150/310	HL3 Surface Course	40; tack binder below
Layer #2 Base Course Asphalt	Asphaltic Material OPSS 1150/310	HL8 Base Course	100; 2 layers with tack
Layer #3 Granular Base	Granular Material OPSS 1010	Granular A, new	150
Layer #4 Granular Sub-Base	Granular Material OPSS 1010	Granular B - Type I - new	600
Layer #5 Engineered Fill Soils	Native soils, sandy clay	98% SPMDD	Compact in 150 ~ 300mm layers

11. SUMMARY

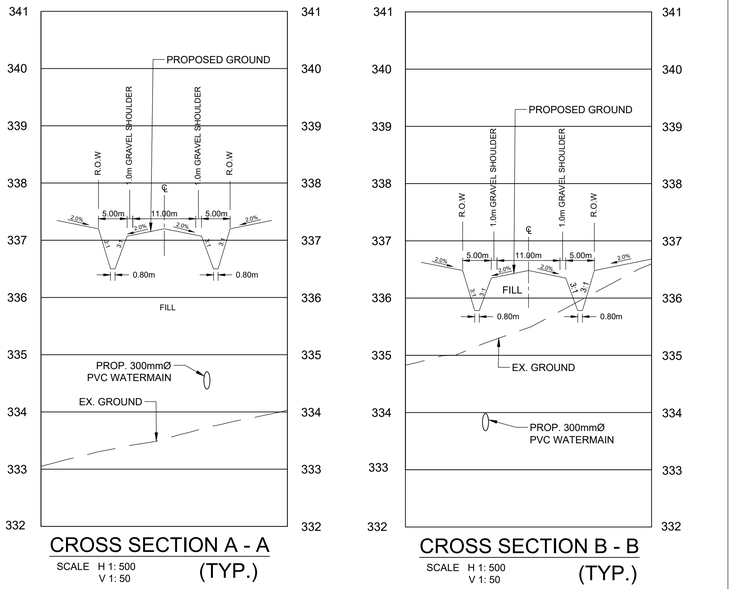
The geotechnical aspects of the final design drawings and specifications should be reviewed by King EPCM prior to tendering and construction, and to confirm that the intent of this report has been met. During construction, full-time engineered fill monitoring and sufficient foundation inspections, subgrade inspections, in-situ density tests and materials testing should be carried out. As the proposed industrial sub-division needs significant amount of cut and fill, especially around the proposed municipal road, appropriate and consistent tests must be carried out to ensure proper compaction.

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

APPENDIX I – SITE PLAN



CROSS SECTION A - A

SCALE H 1: 500
V 1: 50 (TYP.)

CROSS SECTION B - B

SCALE H 1: 500
V 1: 50 (TYP.)

GENERAL NOTES:

- THIS IS NOT A PLAN OF SURVEY. BOUNDARY, PLANS, AND DISTANCES SHOWN HEREON ARE COMPILED FROM REGISTRY OFFICE RECORDS AND BEST FIT TO FIELDWORK USING PREVIOUS TOPOGRAPHIC DETAIL FROM KING EPCM
- ELEVATION AND DISTANCES ARE IN METERS UNLESS OTHERWISE NOTED
- ELEVATIONS ARE GEODETIC HT_2(2010) AND ARE DERIVED FROM CAN-NET VRS NETWORK
- THIS DRAWING IS PREPARED IN UTM NAD 83 ZONE 17 (CSRS 2010). BOUNDARY IS APPROXIMATE AND HAS NOT BEEN CONFIRMED IN THE FIELD
- HORIZONTAL COORDINATES IN THIS DRAWING ARE IN GRID COORDINATES AND CAN BE SCALED UP TO GROUND USING A SCALE FACTOR OF 1.0002. SCALING THE DRAWING UNIFORMLY MAY CAUSE DISCREPANCIES IN ELEVATION DATA
- BACKGROUND IMAGE FROM YORKMAPS AERIAL IMAGERY DATED 2017
- TRCA REGULATED LIMIT DERIVED FROM TRCA REGULATION MAPPING IMAGERY
- DIGITAL DRAWING IS PROVIDED AS-IS AND DOES NOT HAVE ANY GUARANTEE OR WARRANTY FROM KING EPCM
- ORIGINAL TREE CROWNLINE OBSERVED MAY 9, 2023; TRCA STAKING OBSERVED JULY 13, 2023 BY KING EPCM.

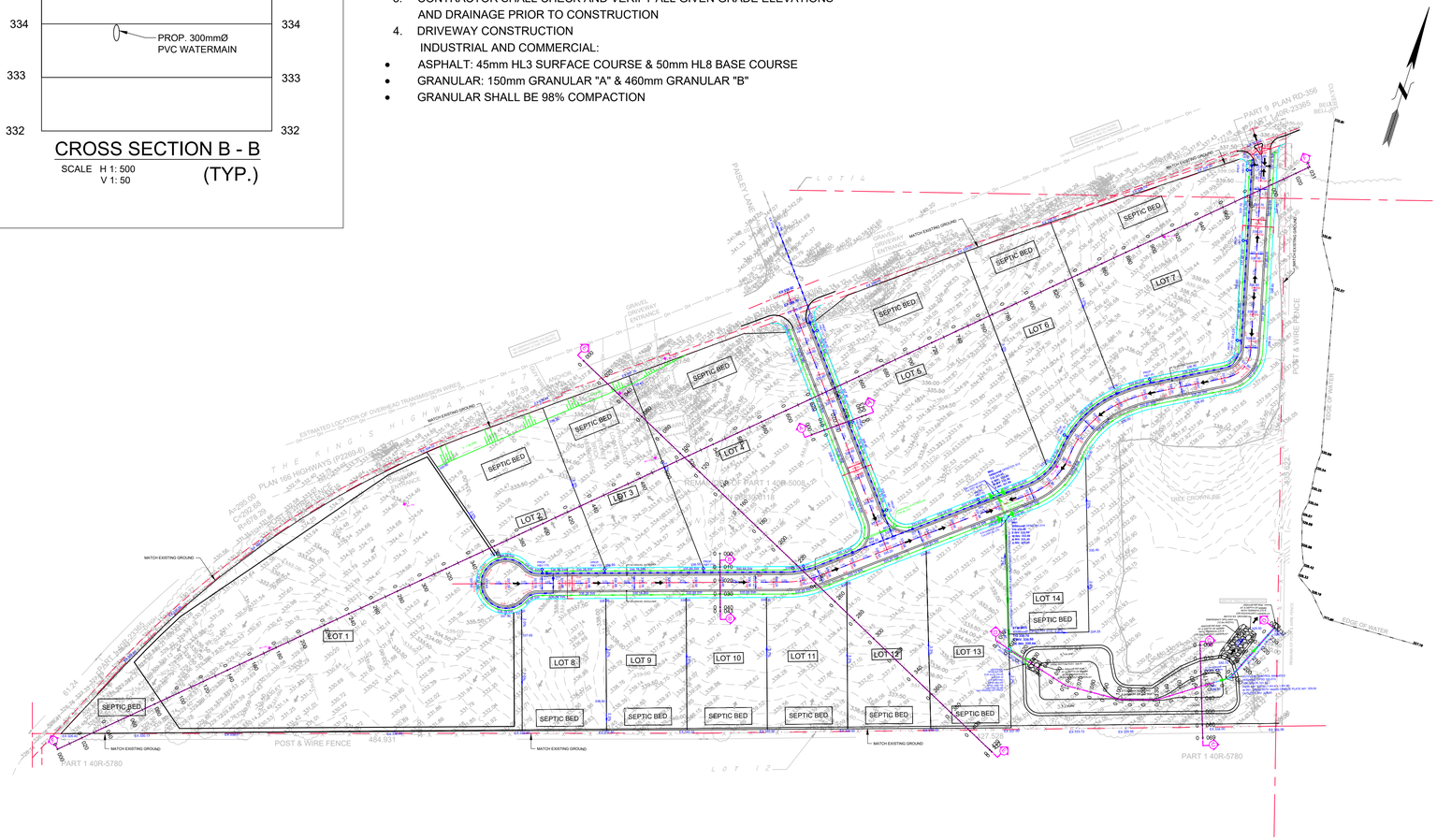
1. CONTRACTOR TO BE RESPONSIBLE TO ENSURE THAT THIS LOT AND ADJOINING AREAS OF SITE ARE KEPT CLEAN AND FREE OF CONSTRUCTION DEBRIS, AND THAT ROADWAYS ARE KEPT CLEAN OF MUD AND DEBRIS
2. ALL MEASUREMENTS STATED IN METERS, PIPE SIZES IN MILLIMETERS, UNLESS OTHERWISE SPECIFIED EQUIVALENTS
3. CONTRACTOR SHALL CHECK AND VERIFY ALL GIVEN GRADE ELEVATIONS AND DRAINAGE PRIOR TO CONSTRUCTION
4. DRIVEWAY CONSTRUCTION

INDUSTRIAL AND COMMERCIAL:

- ASPHALT: 45mm HL3 SURFACE COURSE & 50mm HL8 BASE COURSE
- GRANULAR: 150mm GRANULAR "A" & 460mm GRANULAR "B"
- GRANULAR SHALL BE 98% COMPACTION

LEGEND:

EX 339.20	EXISTING ELEVATION
339.20	PROPOSED ELEVATION
339.20 SW	PROPOSED CL SWALE ELEVATION
INV. 339.20	PROPOSED SWALE INVERT ELEVATION
	EXISTING SURFACE FLOW ROUTE
	PROPOSED SURFACE FLOW ROUTE
339	EXISTING ELEVATION CONTOUR LINES
	R.O.W.
	PROPOSED CENTERLINE SWALE
WATER	PROPOSED WATERMAIN
	PROPOSED HYDRANT
	PROPOSED GATE VALVE
BH 106	BOREHOLE
DICB	DITCH INLET CATCHBASIN
DCB	DOUBLE CATCHBASIN
HP	HYDRO POLE
MH	MANHOLE
HO	OVERHEAD UTILITY WIRE
	GUY ANCHOR
	LEGAL PROPERTY BOUNDARY
	TREE CROWNLINE



SCALE 1:2000
1cm = 20m

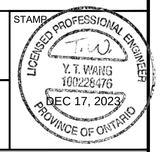
0m 100m 200m

Municipality Notes

DRAWN
K.L.

DATE
DEC. 15, 2023

STAMP



KEY MAP

N.T.S.

KING EPCM
3780 14th Ave., Unit 211
Markham, ON, L3R 9Y5
www.KingEPCM.com
647-459-5647

CLIENT
123 HWY 47 INC.

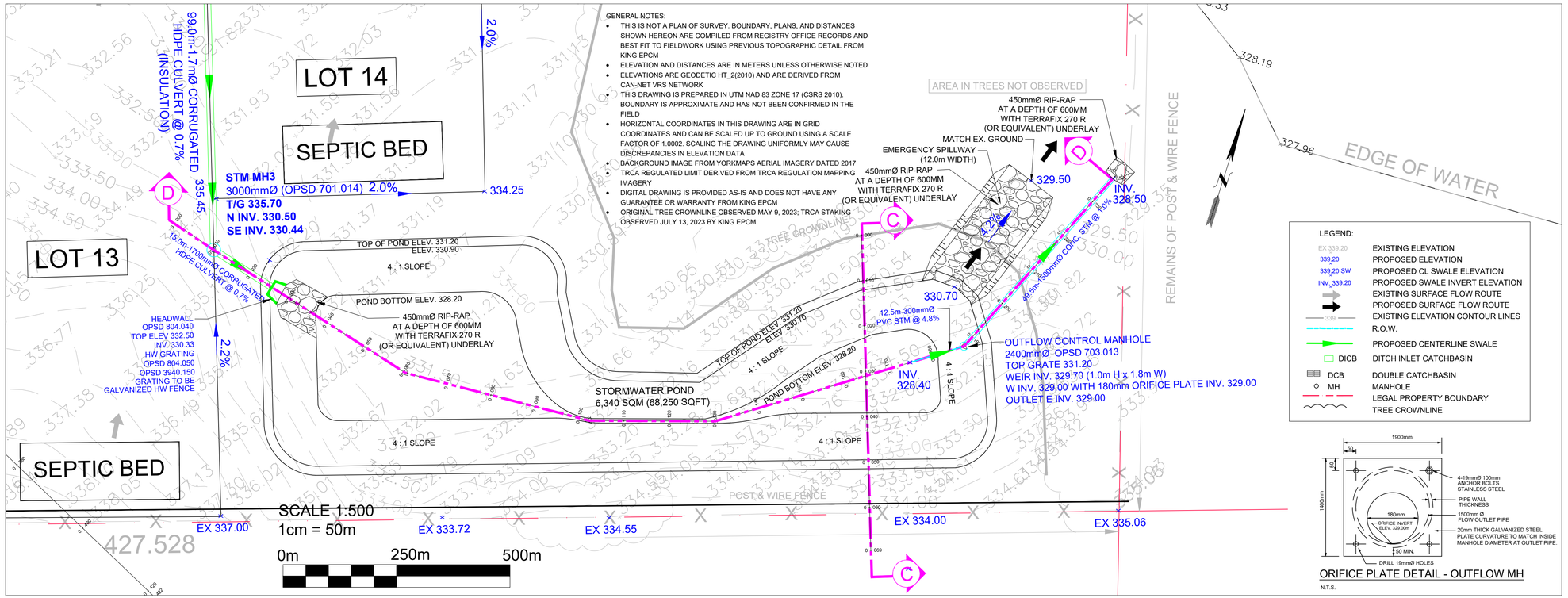
PROJECT NAME
123 HIGHWAY 47

PROJECT LOCATION
123 HIGHWAY 47
LEGAL DESCRIPTION: PT LTS 13 & 14 CON 1 UXBRIDGE PT 1 PL 40R5008 EXCEPT PT 1 PL 40R23365; UXBRIDGE, PIN 26830-0118

PRINT TITLE
SITE GRADING AND SITE SERVICING PLAN

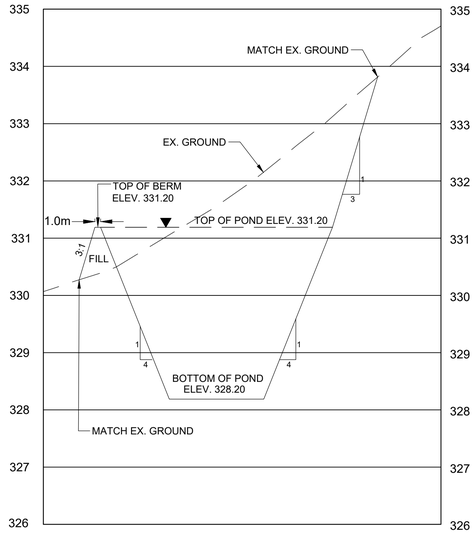
FILE No.
EGR 1.1

No.	ISSUED FOR:	DATE	DRAW BY	CHECK
V16	ISSUED TO CLIENT	DEC 15, 2023	KL	TW



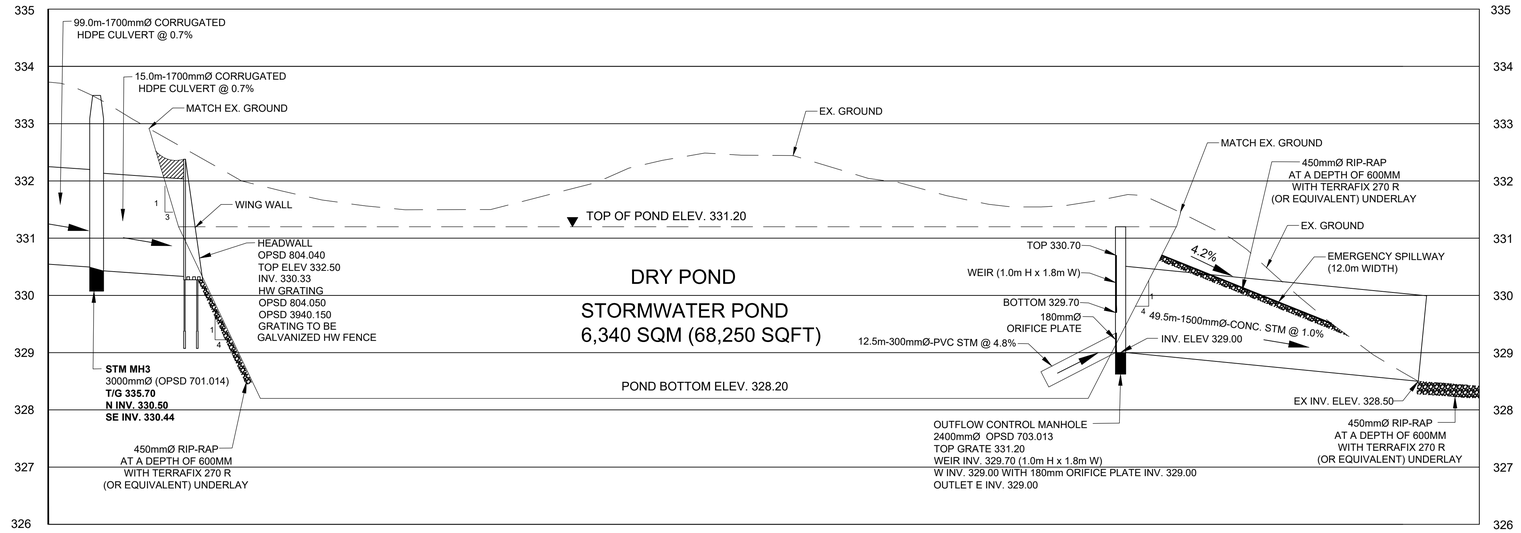
ORIFICE PLATE DETAIL - OUTFLOW MH

N.T.S.



CROSS SECTION C - C

SCALE H 1: 500
V 1: 50



CROSS SECTION D - D

SCALE H 1: 500
V 1: 50

Municipality Notes

DRAWN: K.L.

DATE: DEC 14, 2023

STAMP: LICENSED PROFESSIONAL ENGINEER Y. T. WANG 100228476 DEC 17, 2023 PROVINCE OF ONTARIO

KEY MAP

N.T.S.

KING EPCM
3780 14th Ave., Unit 211
Markham, ON, L3R 9Y5
www.KingEPCM.com
647-459-5647

CLIENT: 123 HWY 47 INC.

PROJECT NAME: **123 HIGHWAY 47**

PROJECT LOCATION: 123 HIGHWAY 47
LEGAL DESCRIPTION: PT LTS 13 & 14 CON 1 UXBRIDGE PT 1 PL 40R5008 EXCEPT PT 1 PL 40R23365; UXBRIDGE, PIN 26830-0118

PRINT TITLE: **STORMWATER MANAGEMENT FACILITY POND**

FILE No.: EGR 1.2

No.	ISSUED FOR:	DATE	DRAW BY	CHECK
V1	ISSUED TO CLIENT	DEC 14, 2023	KL	TW

APPENDIX II – BOREHOLE DRILL LOG


Stouffville Glass
HANS STEEL CANADA
Anderson Blvd
Bascule Dr
Anderson Blvd
Choko Motorsports
47
BH108
A.T.C. Corral
BH102
BH101
123 Durham Regional Hwy 47
Stanmore Equipment
BH103
BH107
BH106
BH104
30
47
BH105
40
St. Lawrence Grains & Farm Supply Ltd
Lincolnville

KING EPCM
Flexible. Dependable. On-site Engineering.

GROUNDWATER MONITORING Well BH101

PROJECT NUMBER	**DRILLING COMPANY** King EPCM	**COORDINATES** 641617.133 m E, 4875221.249 m N
PROJECT NAME 123 Durham Regional Hwy 47	**DRILLER** Chris, Leng	**COORD SYS** UTM-17
CLIENT	**DRILL RIG** Little Beaver	**SURFACE ELEVATION** 336.888 m
ADDRESS 123 Hwy 47, Stouffville	**DRILLING METHOD** Solid Auger	**WELL TOC** None
DRILLING DATE 07/10/2023	**TOTAL DEPTH** 6.1 m	**LOGGED BY** Chris Chen
LICENCE NO. C-7691	**DIAMETER** 2.5 in	**CHECKED BY** Tony Wang, P Eng, Principal Engineer

COMPLETION | **CASING** 2 inch | **SCREEN** 2 inch

COMMENTS

Depth (m)	Graphic Log	USCS SAMPLES	Material Description	Additional Observations	Well Installation	Elevation (m)
0		PEAT	Top soil, black, moist			336.888
0.5		USCS: CL	Brown sandy clay, dry	Bearing capacity tested at 1.5m deep showing 1400kPa resistance with less than 0.5cm displacement Shear vane tested at minimum 130kPa resistance at 1.5m deep		336.5
1						336
1.5		USCS:CL	Brown sandy clay, moist			335.5
2		USCS:ML	Brown silt	Bearing capacity tested at 3.0m deep showing 1400kPa resistance with less than 0.5cm displacement Shear vane tested at minimum 130kPa resistance at 3.0m deep		335
2.5						334.5
3						334
3.5						333.5
4						333
4.5						332.5
5						332
5.5						331.5
6						331
			Termination Depth at: 6.1 m			330.5

Disclaimer

KING EPCM
Flexible. Dependable. On-site Engineering.

GROUNDWATER MONITORING Well BH102

PROJECT NUMBER	**DRILLING COMPANY** King EPCM	**COORDINATES** 641637.00 m E, 4875246.00 m N
PROJECT NAME 123 Durham Regional Hwy 47	**DRILLER** Chris, Leng	**COORD SYS** UTM-17
CLIENT	**DRILL RIG** Little Beaver	**SURFACE ELEVATION** NEED TO FILL LATER AMSL
ADDRESS 123 Hwy 47, Stouffville	**DRILLING METHOD** Solid Auger	**WELL TOC** None
DRILLING DATE 06/06/2023	**TOTAL DEPTH** 4.6 m	**LOGGED BY** Chris Chen
LICENCE NO. C-7691	**DIAMETER** 2.5 in	**CHECKED BY** Tony Wang, P Eng, Principal Engineer

COMPLETION | **CASING** 2 inch | **SCREEN** 2 inch

COMMENTS

Depth (m)	Graphic Log	USCS SAMPLES	Material Description	Additional Observations	Well Installation	Elevation (m)
0		PEAT	Top soil, black, moist			177.4
0.2						
0.4		USCS: CL	Brown sandy clay, dry			177.2
0.6						177
0.8				Bearing capacity tested at 1.5m deep showing 1400kPa resistance with less than 0.5cm displacement Shear vane tested at minimum 130kPa resistance at 1.5m deep		176.8
1						176.6
1.2						176.4
1.4						176.2
1.6						176
1.8		USCS:GC	Sandy gravelly clay, moist			175.8
2						175.6
2.2						175.4
2.4		USCS:CL	Sandy clay, wet	Bearing capacity tested at 3.0m deep showing 1400kPa resistance with less than 0.5cm displacement Shear vane tested at minimum 130kPa resistance at 3.0m deep		175.2
2.6						175
2.8						174.8
3						174.6
3.2						174.4
3.4						174.2
3.6						174
3.8						173.8
4		USCS:ML	Brown silt			173.6
4.2						173.4
4.4						173.2
4.6			Termination Depth at: 4.6 m			173
4.8						172.8

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GROUNDWATER MONITORING Well BH103

PROJECT NUMBER	**DRILLING COMPANY** King EPCM	**COORDINATES** 641655.03 m E, 4875173.64 m N
PROJECT NAME 123 Durham Regional Hwy 47	**DRILLER** Chris, Leng	**COORD SYS** UTM-17
CLIENT	**DRILL RIG** Little Beaver	**SURFACE ELEVATION** NEED TO FILL LATER AMSL
ADDRESS 123 Hwy 47, Stouffville	**DRILLING METHOD** Solid Auger	**WELL TOC** None
DRILLING DATE 07/07/2023	**TOTAL DEPTH** 4.6 m	**LOGGED BY** Chris Chen
LICENCE NO. C-7691	**DIAMETER** 2.5 in	**CHECKED BY** Tony Wang, P Eng, Principal Engineer

COMPLETION | **CASING** 2 inch | **SCREEN** 2 inch

COMMENTS

Depth (m)	Graphic Log	USCS SAMPLES	Material Description	Additional Observations	Well Installation	Elevation (m)
0		PEAT	Top soil, black, moist			177.4
0.2						
0.4		USCS: CL	Brown sandy clay, dry			177.2
0.6						177
0.8				Bearing capacity tested at 1.5m deep showing 1400kPa resistance with less than 0.5cm displacement Shear vane tested at minimum 130kPa resistance at 1.5m deep		176.8
1						176.6
1.2						176.4
1.4						176.2
1.6		USCS:GC	Sandy gravelly clay, moist			176
1.8		USCS:ML	Brown silt			175.8
2						175.6
2.2						175.4
2.4				Bearing capacity tested at 3.0m deep showing 1400kPa resistance with less than 0.5cm displacement Shear vane tested at minimum 130kPa resistance at 3.0m deep		175.2
2.6						175
2.8						174.8
3						174.6
3.2						174.4
3.4						174.2
3.6						174
3.8						173.8
4						173.6
4.2						173.4
4.4						173.2
4.6			Termination Depth at: 4.6 m			173
4.8						172.8

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GROUNDWATER MONITORING Well BH104

PROJECT NUMBER	**DRILLING COMPANY** King EPCM	**COORDINATES** 641513.50m E, 4875068.359m N
PROJECT NAME 123 Durham Regional Hwy 47	**DRILLER** Chris, Leng	**COORD SYS** UTM-17
CLIENT	**DRILL RIG** Little Beaver	**SURFACE ELEVATION** 334.670 m
ADDRESS 123 Hwy 47, Stouffville	**DRILLING METHOD** Solid Auger	**WELL TOC** None
DRILLING DATE 05/18/2023	**TOTAL DEPTH** 4.5 m	**LOGGED BY** Chris Chen
LICENCE NO. C-7691	**DIAMETER** 2.5 in	**CHECKED BY** Tony Wang, P Eng, Principal Engineer

COMPLETION	**CASING** 2 inch	**SCREEN** 2 inch

COMMENTS

Depth (m)	Graphic Log	USCS SAMPLES	Material Description	Additional Observations	Well Installation	Elevation (m)
0		PEAT	Top soil, black, moist			334.6
0.2						334.4
0.4		USCS: CL	Brown sandy clay, dry			334.2
0.6						334
0.8						333.8
1						333.6
1.2						333.4
1.4				DCP test performed at 1.5m		333.2
1.6						333
1.8						332.8
2						332.6
2.2						332.4
2.4						332.2
2.6						332
2.8						331.8
3				DCP test performed at 3.0m		331.6
3.2						331.4
3.4						331.2
3.6						331
3.8		USCS:CL	Brown sandy clay, moist			330.8
4						330.6
4.2						330.4
4.4		USCS:ML	Brown silt			330.2
4.6			Termination Depth at: 4.5 m			330

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GROUNDWATER MONITORING Well BH105

PROJECT NUMBER	**DRILLING COMPANY** King EPCM	**COORDINATES** 641435.399m E, 4874952.450 m N
PROJECT NAME 123 Durham Regional Hwy 47	**DRILLER** Chris, Leng	**COORD SYS** UTM-17
CLIENT	**DRILL RIG** Little Beaver	**SURFACE ELEVATION** 329.933m
ADDRESS 123 Hwy 47, Stouffville	**DRILLING METHOD** Solid Auger	**WELL TOC** None
DRILLING DATE 05/25/2023	**TOTAL DEPTH** 4.5 m	**LOGGED BY** Chris Chen
LICENCE NO. C-7691	**DIAMETER** 2.5 in	**CHECKED BY** Tony Wang, P Eng, Principal Engineer

COMPLETION	**CASING** 2 inch	**SCREEN** 2 inch

COMMENTS

Depth (m)	Graphic Log	USCS SAMPLES	Material Description	Additional Observations	Well Installation	Elevation (m)
0.2		PEAT	Top soil, black, moist			329.8
0.4		USCS: CL	Brown sandy clay, dry			329.6
0.6						329.4
0.8						329.2
1						329
1.2						328.8
1.4				DCP test performed at 1.5m		328.6
1.6						328.4
1.8						328.2
2						328
2.2						327.8
2.4				Bearing capacity tested at3.0m deep showing 700kPa resistance with less than 0.5cm displacement Shear vane tested at minimum 130kPa resistance at 3.0m deep		327.6
2.6						327.4
2.8						327.2
3						327
3.2						326.8
3.4						326.6
3.6						326.4
3.8		USCS:CL	Brown sandy clay, moist, medium plastic			326.2
4						326
4.2						325.8
4.4						325.6
4.6			Termination Depth at: 4.5 m			325.4

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GROUNDWATER MONITORING Well BH106

PROJECT NUMBER	**DRILLING COMPANY** King EPCM	**COORDINATES** 641754.682m E, 641754.682m N
PROJECT NAME 123 Durham Regional Hwy 47	**DRILLER** Chris, Leng	**COORD SYS** UTM-17
CLIENT	**DRILL RIG** Little Beaver	**SURFACE ELEVATION** 336.035m
ADDRESS 123 Hwy 47, Stouffville	**DRILLING METHOD** Solid Auger	**WELL TOC** None
DRILLING DATE 05/24/2023	**TOTAL DEPTH** 4.5 m	**LOGGED BY** Chris Chen
LICENCE NO. C-7691	**DIAMETER** 2.5 in	**CHECKED BY** Tony Wang, P Eng, Principal Engineer

COMPLETION	**CASING** 2 inch	**SCREEN** 2 inch

COMMENTS

Depth (m)	Graphic Log	USCS SAMPLES	Material Description	Additional Observations	Well Installation	Elevation (m)
0.2		PEAT	Top soil, black, moist			336
0.4		USCS: CL	Brown sandy clay, moist, medium plastic			335.8
0.6						335.6
0.8		USCS:CL	Brown sandy clay, wet, medium plastic	Bearing capacity tested at 1.5m deep showing 700kPa resistance with less than 0.5cm displacement Shear vane tested at minimum 130kPa resistance at 1.5m deep		335.4
1						335.2
1.2						335
1.4						334.8
1.6		USCS:ML	Brown silt			334.6
1.8						334.4
2						334.2
2.2						334
2.4				Bearing capacity tested at 3.0m deep showing 700kPa resistance with less than 0.5cm displacement Shear vane tested at minimum 130kPa resistance at 3.0m deep		333.8
2.6						333.6
2.8						333.4
3						333.2
3.2						333
3.4						332.8
3.6						332.6
3.8						332.4
4				Note: Started drilling at site in the afternoon due to morning 5mm rain. Soil surface was very moist due to the rain.		332.2
4.2						332
4.4						331.8
4.6			Termination Depth at: 4.5 m			331.6
						331.4

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GROUNDWATER MONITORING Well BH107

PROJECT NUMBER	**DRILLING COMPANY** King EPCM	**COORDINATES** 641944.829m E, 4875218.014m N
PROJECT NAME 123 Durham Regional Hwy 47	**DRILLER** Chris, Leng	**COORD SYS** UTM-17
CLIENT	**DRILL RIG** Little Beaver	**SURFACE ELEVATION** 332.946m
ADDRESS 123 Hwy 47, Stouffville	**DRILLING METHOD** Solid Auger	**WELL TOC** None
DRILLING DATE 05/30/2023	**TOTAL DEPTH** 7.6 m	**LOGGED BY** Chris Chen
LICENCE NO. C-7691	**DIAMETER** 2.5 in	**CHECKED BY** Tony Wang, P Eng, Principal Engineer

COMPLETION	**CASING** 2 inch	**SCREEN** 2 inch

COMMENTS

Depth (m)	Graphic Log	USCS SAMPLES	Material Description	Additional Observations	Well Installation	Elevation (m)
		PEAT	Top soil, brown, moist			
0.5		USCS: CL	Brown sandy clay, moist, low plastic	Bearing capacity tested at 1.5m deep showing 1400kPa resistance with less than 0.5cm displacement Shear vane tested at minimum 240kPa resistance at 1.5m deep		332.5
1						332
1.5						331.5
2				Bearing capacity tested at 3.0m deep showing 1400kPa resistance with less than 0.5cm displacement Shear vane tested at minimum 240kPa resistance at 3.0m deep		331
2.5						330.5
3						330
3.5						329.5
4						329
4.5						328.5
5						328
5.5						327.5
6		USCS:ML	Brown silt			327
6.5						326.5
7						326
7.5						325.5
			Termination Depth at: 7.6 m			325

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GROUNDWATER MONITORING Well BH108

PROJECT NUMBER	**DRILLING COMPANY** King EPCM	**COORDINATES** NEED TO FILL LATER
PROJECT NAME 123 Durham Regional Hwy 47	**DRILLER** Chris, Leng	**COORD SYS** UTM-17
CLIENT	**DRILL RIG** Little Beaver	**SURFACE ELEVATION** NEED TO FILL LATER AMSL
ADDRESS 123 Hwy 47, Stouffville	**DRILLING METHOD** Solid Auger	**WELL TOC** None
DRILLING DATE 06/05/2023	**TOTAL DEPTH** 4.5 m	**LOGGED BY** Chris Chen
LICENCE NO. C-7691	**DIAMETER** 2.5 in	**CHECKED BY** Tony Wang, P Eng, Principal Engineer

COMPLETION | **CASING** 2 inch | **SCREEN** 2 inch

COMMENTS

Depth (m)	Graphic Log	USCS SAMPLES	Material Description	Additional Observations	Well Installation	Elevation (m)
0.2		PEAT	Top soil, dry			-0.2
0.4		USCS: CL	Brown sandy clay, dry			-0.4
0.6						-0.6
0.8				Bearing capacity tested at 1.5m deep showing 1400kPa resistance with less than 0.5cm displacement Shear vane tested at minimum 240kPa resistance at 1.5m deep		-0.8
1						-1
1.2						-1.2
1.4						-1.4
1.6						-1.6
1.8		USCS:ML	Brown sand, moist			-1.8
2						-2
2.2						-2.2
2.4				Bearing capacity tested at 3.0m deep showing 1400kPa resistance with less than 0.5cm displacement Shear vane tested at minimum 240kPa resistance at 3.0m deep		-2.4
2.6						-2.6
2.8						-2.8
3						-3
3.2						-3.2
3.4						-3.4
3.6			Brown sandy gravelly clay, moist			-3.6
3.8						-3.8
4						-4
4.2						-4.2
4.4						-4.4
4.6			Termination Depth at: 4.5m Auger refusal			-4.6

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APPENDIX III – INFILTRATION TEST DATA


Trofino Door & Trim
A.T.C. Corral
Anderson Blvd
Townline Self Storage
47
123 Durham Regional Hwy 47
Stanmore Equipment
INF102
INF101
INF103
INF104

Engineering Technologies Canada Ltd.

OWNER'S NAME: _____

SITE LOCATION: 123 Durham Regional Hwy 47

PID #: _____

TEST PIT#: INF101

TECHNICIAN: Leng

DATE: June 16 2023

WEATHER/TEMPERATURE: Cloudy, 22C

FIELD PERMEABILITY TEST #:

D - reservoir diameter (cm)	Standard	Soil Texture	Clayey sand
d - well hole diameter (cm)		Soil Structure	
H - height of water in well (cm)		α*(cm-1)	
Depth below ground surface(cm)		C - Factor	

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		39.9		
1	1	39.7	0.2	0.2
2	1	39.5	0.2	0.2
3	1	39.3	0.2	0.2
4	1	39	0.3	0.3
5	1	38.8	0.2	0.2
6	1	38.6	0.2	0.2
7	1	38.3	0.3	0.3
8	1	38.1	0.2	0.2
9	1	37.9	0.2	0.2
10	1	37.7	0.2	0.2

uasi Steady-State Rate of Fall(R) = 0.2 cm/min

Engineering Technologies Canada Ltd.

OWNER'S NAME: _____

SITE LOCATION: 123 Durham Regional Hwy 47

PID #: _____

TEST PIT#: INF102

TECHNICIAN: Leng

DATE: June 16 2023

WEATHER/TEMPERATURE: Cloudy, 18C

FIELD PERMEABILITY TEST #:

D - reservoir diameter (cm)	Slow tube	Soil Texture	Sandy clay
d - well hole diameter (cm)		Soil Structure	
H - height of water in well (cm)		α*(cm-1)	
Depth below ground surface(cm)		C - Factor	

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		24.7		
5	5	24.9	-0.2	0.0
10	5	24.5	0.4	0.08
15	5	24.2	0.3	0.06
20	5	24.1	0.1	0.02
25	5	24	0.1	0.02
30	5	23.9	0.1	0.02
35	5	23.8	0.1	0.02
40	5	23.7	0.1	0.02
45	5	23.6	0.1	0.02
50	5	23.5	0.1	0.02
55	5	23.4	0.1	0.02
60	5	23.3	0.1	0.02

uasi Steady-State Rate of Fall(R) = 0.02 cm/min

Engineering Technologies Canada Ltd.

OWNER'S NAME: _____

SITE LOCATION: 123 Durham Regional Hwy 47

PID #: _____

TEST PIT#: INF103

TECHNICIAN: Leng

DATE: June 16 2023

WEATHER/TEMPERATURE: Cloudy, 18C

FIELD PERMEABILITY TEST #:

D - reservoir diameter (cm)	Standard	Soil Texture	Clayey sand
d - well hole diameter (cm)		Soil Structure	
H - height of water in well (cm)		α*(cm-1)	
Depth below ground surface(cm)		C - Factor	

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		42.9		
1	1	42.8	0.1	0.1
2	1	42.7	0.1	0.1
3	1	42.6	0.1	0.1
4	1	42.5	0.1	0.1
5	1	42.4	0.1	0.1
6	1	42.3	0.1	0.1
7	1	42.2	0.1	0.1
8	1	42.1	0.1	0.1
9	1	42	0.1	0.1
10	1	41.9	0.1	0.2
11	1	41.9	0.0	0.0
12	1	41.8	0.1	0.1
13	1	41.7	0.1	0.1
14	1	41.6	0.1	0.1
15	1	41.5	0.1	0.1

uasi Steady-State Rate of Fall(R) = 0.1 cm/min

Engineering Technologies Canada Ltd.

OWNER'S NAME: _____

SITE LOCATION: 123 Durham Regional Hwy 47

PID #: _____

TEST PIT#: INF104

TECHNICIAN: Leng

DATE: June 16 2023

WEATHER/TEMPERATURE: Cloudy, 22C

FIELD PERMEABILITY TEST #:

D - reservoir diameter (cm)	Standard	Soil Texture	Clayey sand
d - well hole diameter (cm)		Soil Structure	
H - height of water in well (cm)		α*(cm-1)	
Depth below ground surface(cm)		C - Factor	

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		32		
1	1	31.9	0.1	0.1
2	1	31.7	0.2	0.2
3	1	31.5	0.2	0.2
4	1	31.3	0.2	0.2
5	1	31.1	0.2	0.2
6	1	30.9	0.2	0.2

uasi Steady-State Rate of Fall(R) = 0.2 cm/min

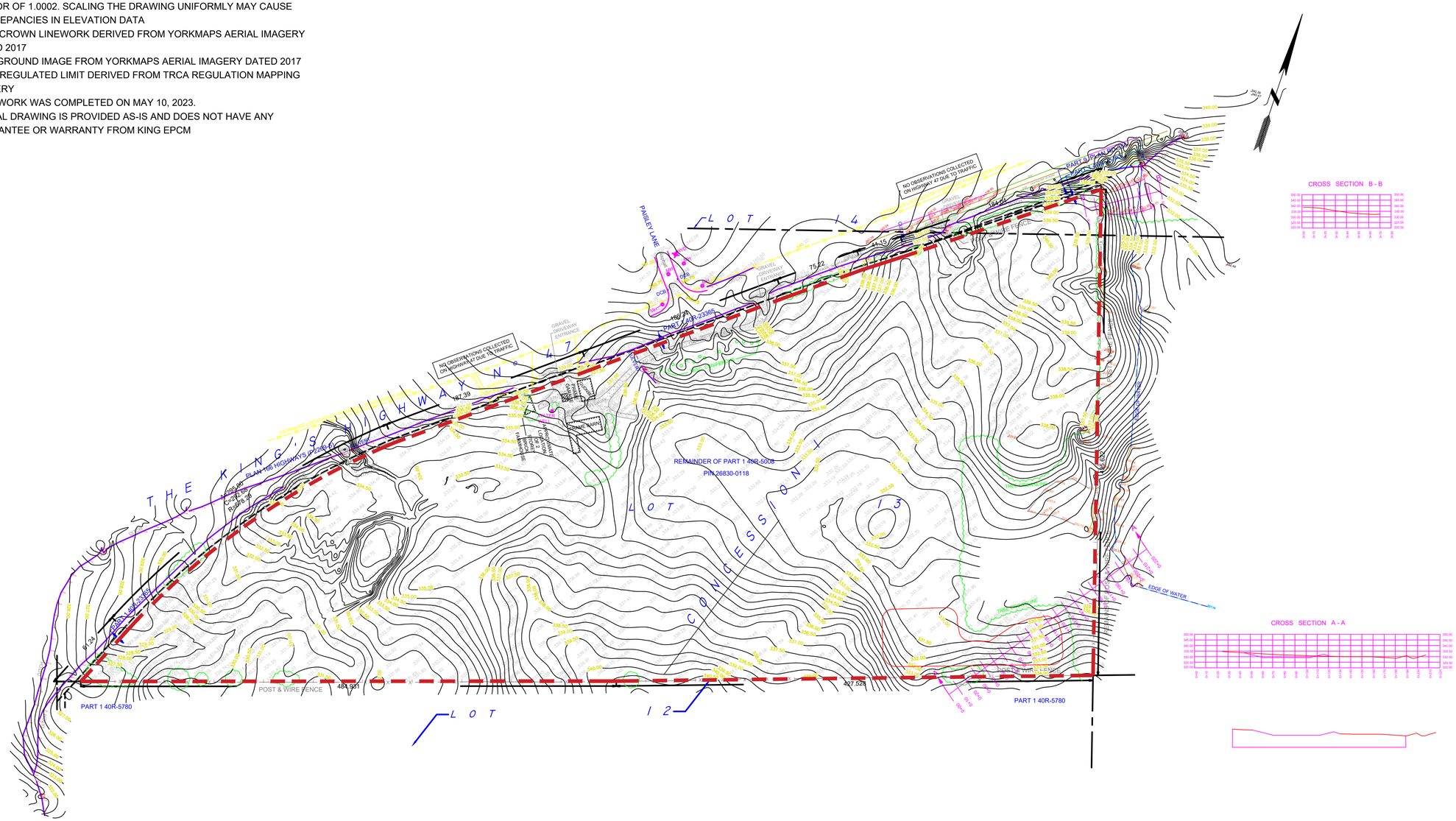
APPENDIX IV – SLOPE STABIILTY ANALYSIS

GENERAL NOTES:

- THIS IS NOT A PLAN OF SURVEY. BOUNDARY, PLANS, AND DISTANCES SHOWN HEREON ARE COMPILED FROM REGISTRY OFFICE RECORDS AND BEST FIT TO FIELDWORK
- ELEVATION AND DISTANCES ARE IN METERS UNLESS OTHERWISE NOTED
- ELEVATIONS ARE GEODETIC HT_2(2010) AND ARE DERIVED FROM CAN-NET VRS NETWORK
- THIS DRAWING IS PREPARED IN UTM NAD 83 ZONE 17 (CSRS 2010). BOUNDARY IS APPROXIMATE AND HAS NOT BEEN CONFIRMED IN THE FIELD
- HORIZONTAL COORDINATES IN THIS DRAWING ARE IN GRID COORDINATES AND CAN BE SCALED UP TO GROUND USING A SCALE FACTOR OF 1.0002. SCALING THE DRAWING UNIFORMLY MAY CAUSE DISCREPANCIES IN ELEVATION DATA
- TREE CROWN LINEWORK DERIVED FROM YORKMAPS AERIAL IMAGERY DATED 2017
- BACKGROUND IMAGE FROM YORKMAPS AERIAL IMAGERY DATED 2017
- TRCA REGULATED LIMIT DERIVED FROM TRCA REGULATION MAPPING IMAGERY
- FIELDWORK WAS COMPLETED ON MAY 10, 2023.
- DIGITAL DRAWING IS PROVIDED AS-IS AND DOES NOT HAVE ANY GUARANTEE OR WARRANTY FROM KING EPCM

LEGEND:

DCB	DOUBLE CATCHBASIN
HP	HYDRO POLE
HYD	HYDRANT
MH	MANHOLE
HO	OVERHEAD UTILITY WIRE
	GUY ANCHOR
	LEGAL PROPERTY BOUNDARY
	TREE CROWNLINE



SCALE 1:2000
1cm = 20m

0m 100m 200m

Municipality Notes

DRAWN **SL**

STAMP

DATE **DEC. 1, 2023**

KEY MAP

N.T.S.

KING EPCM
3780 14th Ave, Unit 211
Markham, ON, L3R 9Y5
www.KingEPCM.com
647-459-5647

CLIENT

123 HWY 47 INC.

PROJECT NAME

123 HIGHWAY 47

PROJECT LOCATION

123 HIGHWAY 47
LEGAL DESCRIPTION: PT LTS 13 & 14 CON 1 UXBRIDGE PT 1 PL 40R5008 EXCEPT PT 1 PL 40R23365; UXBRIDGE, PIN 26830-0118

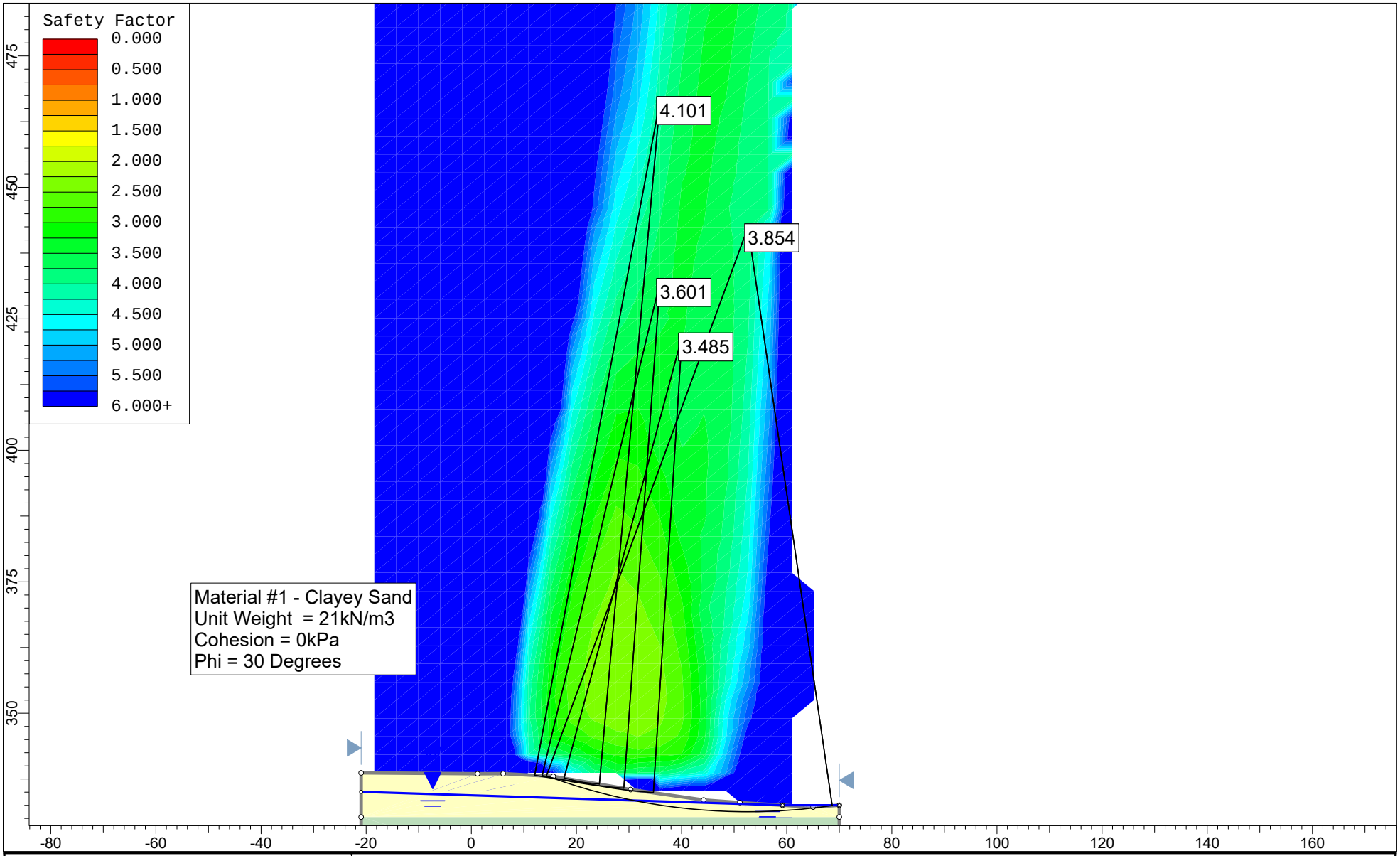
PRINT TITLE

TOPOGRAPHIC PLAN

FILE No.

SVY 1.1

No.	ISSUED FOR:	DATE	DRAW BY	CHECK
V1	INTERNAL REVIEW	MAY 17, 2023	DH	TW
V2	INTERNAL REVIEW	NOV 21, 2023	SL	TW
V3	INTERNAL REVIEW	DEC 1, 2023	SL	TW



rocscience	Project: 123 Highway 47, Uxbridge		
	Analysis Description: Northern Driveway Entrance		
	Drawn By:	Scale: 1:1021.9	Company:
	Date: 2023-12-09, 12:10:55 PM		File Name: Section B-B 123 hwy 47 Roads.slim

SLIDEINTERPRET 6.005