



## TECHNICAL MEMORANDUM

File: 1755

Date: January 27, 2025

Attn: Mr. Wes Hordyk  
HIP Developments  
74 Grand Avenue South, Suite 201  
Cambridge, Ontario  
N1S 0B7

**Re: Groundwater Level Monitoring Program – Preliminary Summary**  
**Proposed Residential Development**  
**105 Elmira Road North, Guelph, Ontario**

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### Project Overview

CHUNG & VANDER DOELEN ENGINEERING LTD. (CVD) was retained by HIP Developments (“Client”) to complete a ‘scoped’ hydrogeological investigation involving a seasonal monitoring program of groundwater level fluctuations at 105 Elmira Road North in Guelph, Ontario (hereinafter referred to as the “Site”). The purpose of this investigation is to assess the seasonal high groundwater elevation at the Site to support the proposed construction of a 6-storey residential development, with a finished floor elevation (FFE) of 324.30 m, as shown in the Site Grading Plan (MTE Consultants, January 16, 2025) included in Appendix B.

This report presents a summary of preliminary findings gathered from September to December 2024 as part of the CVD Geotechnical Investigation. This technical memorandum should be read in conjunction with the CVD Geotechnical Investigation report, dated October 21, 2024, and the CVD Insitu Permeameter Testing report, dated December 23, 2024.

As part of the CVD geotechnical investigation, fifteen (15) boreholes (Enclosures 1 to 15) were drilled to depths between 3.5 and 11.13 m below ground surface (bgs) across the Site as shown in the CVD Borehole Location Plan included in Appendix B. Of the boreholes, three (3) were converted into monitoring wells (labelled BHs 6, 9, and 13). Each monitoring well was developed using Waterra™ polyethylene tubing, foot-valve and hand pumps.

### Groundwater Level Monitoring Program

At the time of this summary, water level readings have been manually taken on five (5) occasions between September and December 2024 at all accessible monitoring wells.

Van Essen DI801 10 m TD-Diver automated data loggers were installed on September 20, 2024, in all three (3) monitoring wells to provide continuous water level measurements at 2-hr intervals during the monitoring period, which is ongoing. A barometric pressure data logger was also installed to compensate for atmospheric noise and pressure at the ground surface. Results to date are also included in Table 1 and visually shown on the hydrograph.

Furthermore, two (2) single well response test (SWRT) analyses were performed at monitoring wells BH 6 and 9. Hydraulic conductivities for the monitoring wells were calculated from  $2.6 \times 10^{-2}$  m/s to  $5.5 \times 10^{-2}$  m/s, which corresponds with the values expected from a fine to coarse sand which the monitoring wells screen. The hydraulic conductivity values were generated using the Constant-Head Method, and the results of these tests are included in both Appendix D and summarized in Table 1.

Table 1 in Appendix C summarize the depths and elevations of the on-site water table as well as the fluctuations in the water table compared to a baseline reading taken September 6, 2024. Additionally, a hydrograph, which visually presents the water table elevations shown in Table 1, is also included in Appendix C.

## Hydrogeological Assessment

Based on the results of the current monitoring period, water levels elevations across the Site and across all visits varied from 319.42 to 319.92 m, corresponding to depths between 3.14 and 4.42 m bgs, with maximum water levels measured on September 6, 2024, and varying from 319.78 to 319.92 masl. The maximum fluctuation between the high point (September 6, 2024) and the low water table mark (December 23, 2024) was measured at 0.39 m, and the overall variation between the individual wells varied from 0.02 to 0.14 m across all measurements.

As shown in Figure 1 (included in Appendix C), the overall shallow groundwater flow direction travels southwards, and only an approximately  $0.3 \pm$  m gradient in water contours exists across the Site.

Subject to the aforementioned results, and considering the proposed FFE of 324.30 m, groundwater should not pose an issue during construction.

## Recommendations

It is recommended seasonal water level monitoring continue at all three (3) monitoring wells in order to record the high watermark during the upcoming spring freshet, as well as to satisfy the stipulations required by the City of Guelph.



## Closing

This assessment has been prepared for the exclusive use of the Client and their assigns for specific application to this project property.

The assessment was conducted in accordance with the verbal and written requests from the Client, and generally accepted assessment practices. Performance of this assessment is intended to reduce, but not eliminate, uncertainty regarding the hydrogeological conditions encountered at the project site, given reasonable limits of time and cost. No other warranty, expressed or implied, is made.

We trust this report is sufficient for your immediate requirements. If you have any questions, please do not hesitate to contact the undersigned.

Respectfully submitted,

**CHUNG & VANDER DOELEN ENGINEERING LTD.**



Yaroslav Chudin, EIT  
Geotechnical Engineering Intern



Peter Dao, M.Sc., P.Geo.  
Project Hydrogeologist



## **APPENDIX A**

### **Limitations of Report**





## STATEMENT OF LIMITATIONS

1. The work performed in this report was carried out in accordance with the Standard Terms of Conditions made part of our contract. The conclusions presented herein are based solely upon the scope of services and time and budgetary limitations described in our contract.
2. The report has been prepared in accordance with generally accepted hydrogeological study and/or engineering practices. No other warranties, either expressed or implied, are made as to the professional services provided under the terms of our contract and included in this report.
3. The services performed and outlined in this report were based, in part, upon visual observations of the site and attendant structures. Our opinion cannot be extended to portions of the site which were unavailable for direct observation, reasonably beyond the control of CHUNG & VANDER DOELEN ENGINEERING LTD.
4. The objective of this report was to assess hydrogeological conditions at the site, within the context of our contract and hydrogeological assessment guidelines within the applicable jurisdiction. Evaluating compliance of past or future owners with applicable local, provincial and federal government laws and regulations was not included in our contract for services.
5. CHUNG & VANDER DOELEN ENGINEERING LTD. has relied in good faith on information and services provided by others while conducting the record search. We accept no responsibility for any deficiency, misstatements or inaccuracies contained in this report as a result of omission, misinterpretation or fraudulent acts of the services used.
6. It should be noted that the observations and recommendations presented in this report are limited to the actual locations explored. The information presented in terms of the thickness and types of the subsoils encountered, groundwater levels, and chemical testing results, etc., are only applicable to the actual locations explored. Variations may be present between these locations. Should significant variation become apparent during later investigations, it may be necessary to reevaluate the findings of this report.
7. The conclusions of this report are based in part, on the information provided by others. The possibility remains that unexpected environmental conditions may be encountered at the site in locations not specifically investigated. Should such an event occur, CHUNG & VANDER DOELEN ENGINEERING LTD. must be notified in order that we may determine if modifications to our conclusions are necessary.



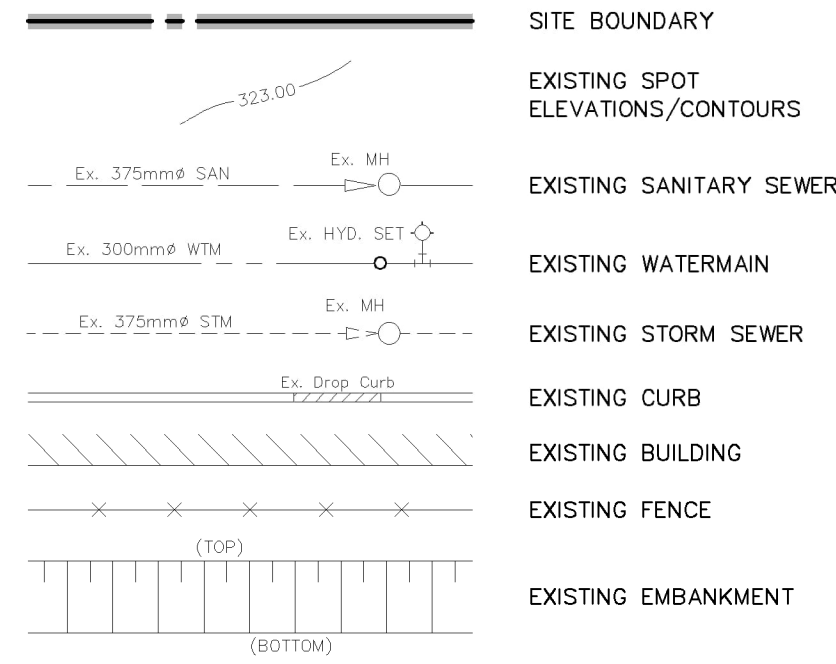
## **APPENDIX B**

### **Site Grading Plan (MTE) & CVD Borehole Location Plan**

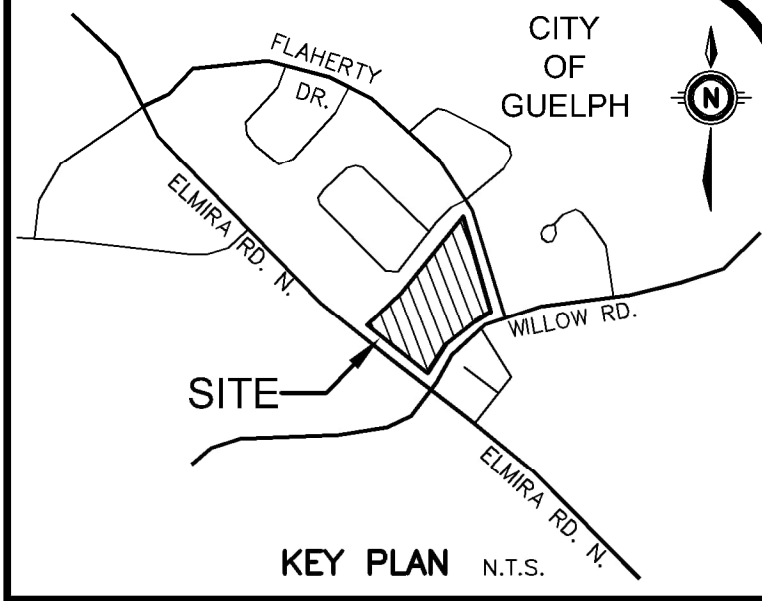
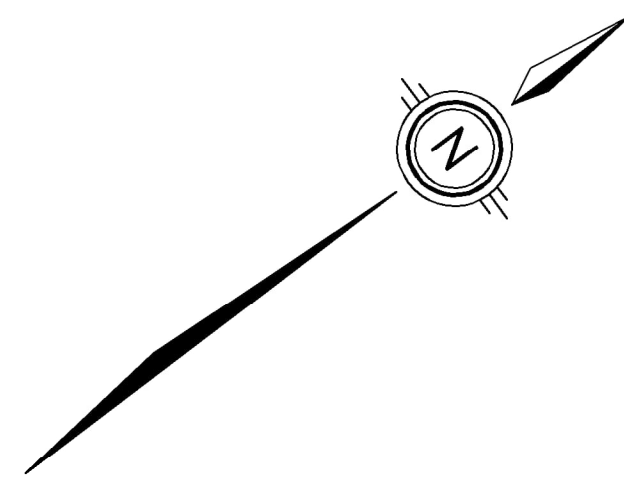
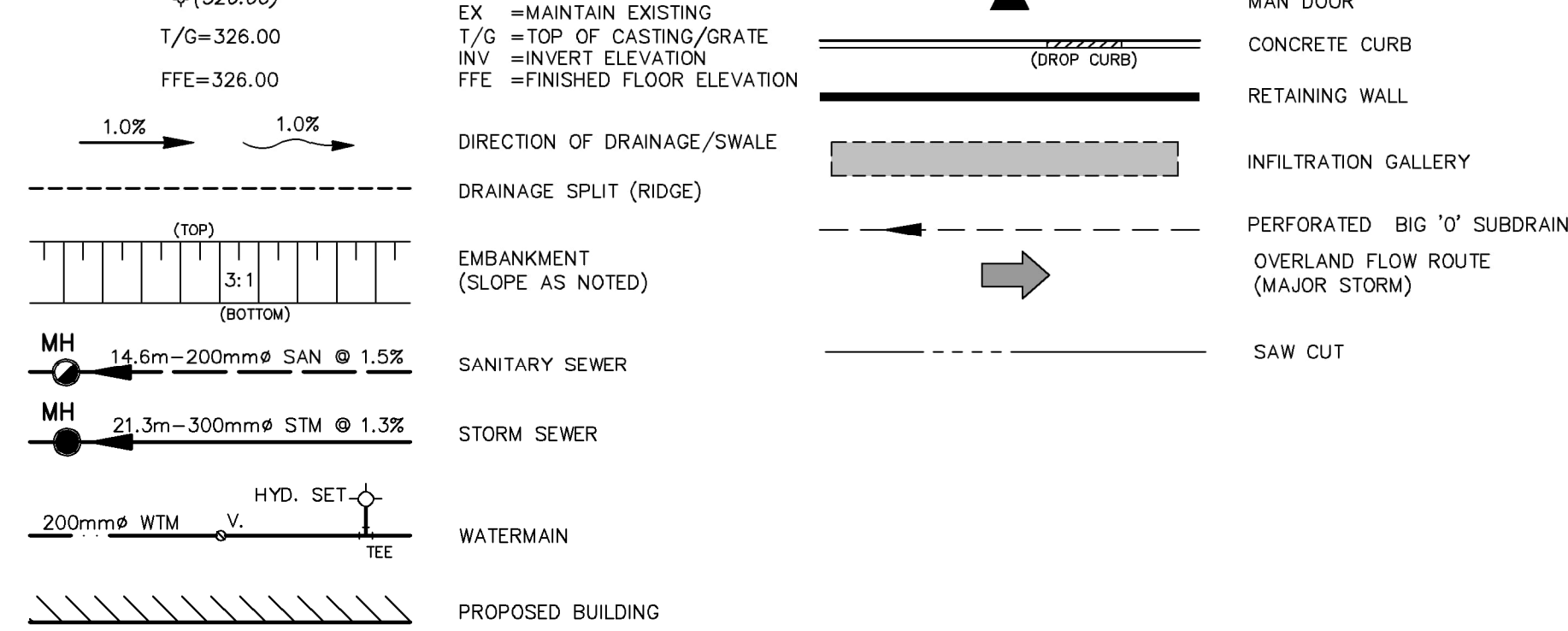




# LEGEND OF EXISTING FEATURES



# LEGEND OF PROPOSED FEATURES



GEODETIC BM ELEV. = 325.076m  
 MTE POINT #5, TOP NUT FH EAST CORNER OF SITE, ALONG WILLOW ROAD

SITE BENCHMARK ELEV. = m

NOTE TO CONTRACTOR :  
 DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.

- NOTE:
- PROPERTY LINE IS APPROXIMATE ONLY AND SHOULD NOT BE USED FOR DETERMINING SETBACKS OR LAYOUT.
  - EXISTING TOPOGRAPHICAL INFORMATION PROVIDED BY MTE DATED MARCH 13 2024.
  - INVERTS DENOTED WITH "±" ARE TAKEN FROM AS-RECORDED PLAN AND PROFILE DRAWINGS COMPLETED BY AQUAFOR BEECH LIMITED, DATED APRIL 16, 2004, AND ARE CONSIDERED APPROXIMATE ONLY. CONTRACTOR TO FIELD VERIFY AND REPORT ANY DISCREPANCIES TO ENGINEER.

8.		
7.		
6.		
5.		
4.		
3.		
2.	ISSUED FOR OPA/ZBA	JPL 2025-01-16
1.	ISSUED FOR SPA PRE-CONSULTATION	JPL 2024-11-15
NO. REVISION		BY YYYY-MM-DD



519-743-6500

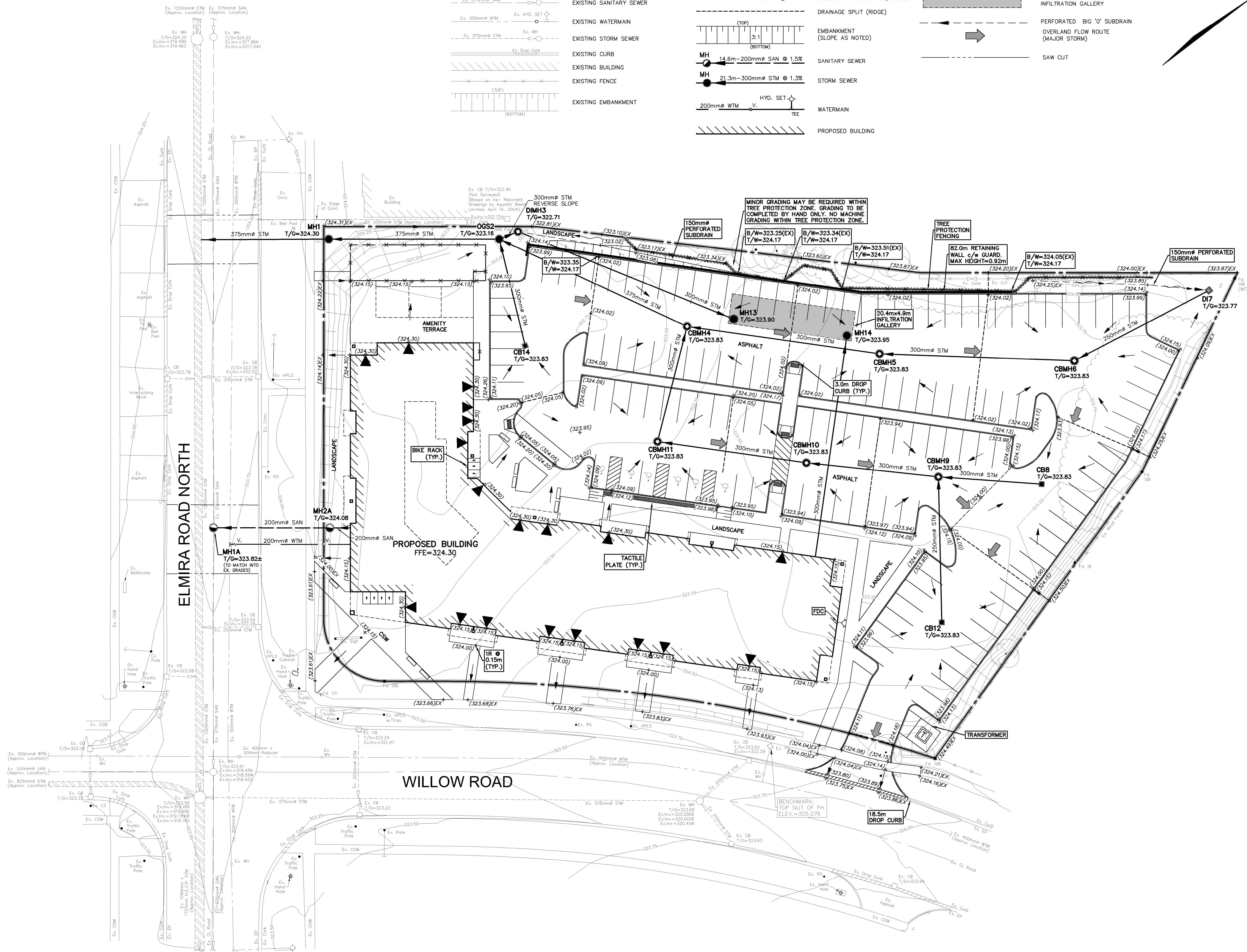


CLIENT  
 HIP DEVELOPMENTS INC.  
 74 GRAND AVENUE SOUTH - SUITE 201 CAMBRIDGE

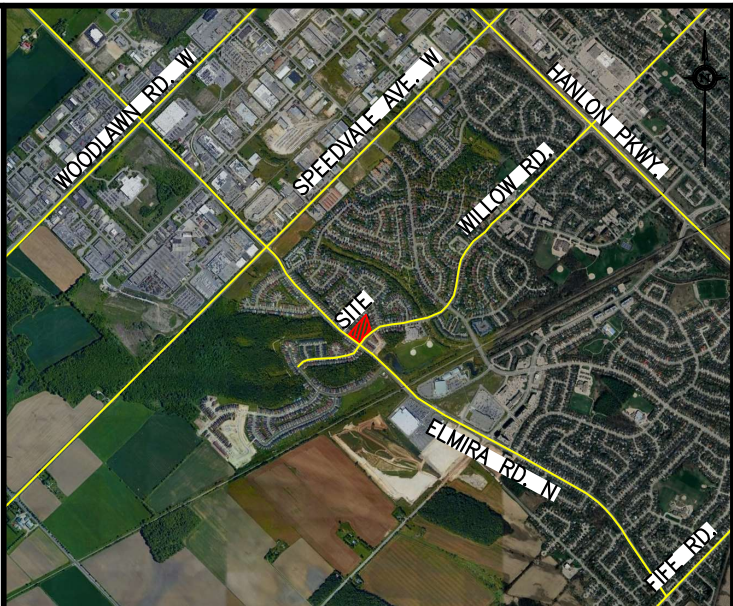
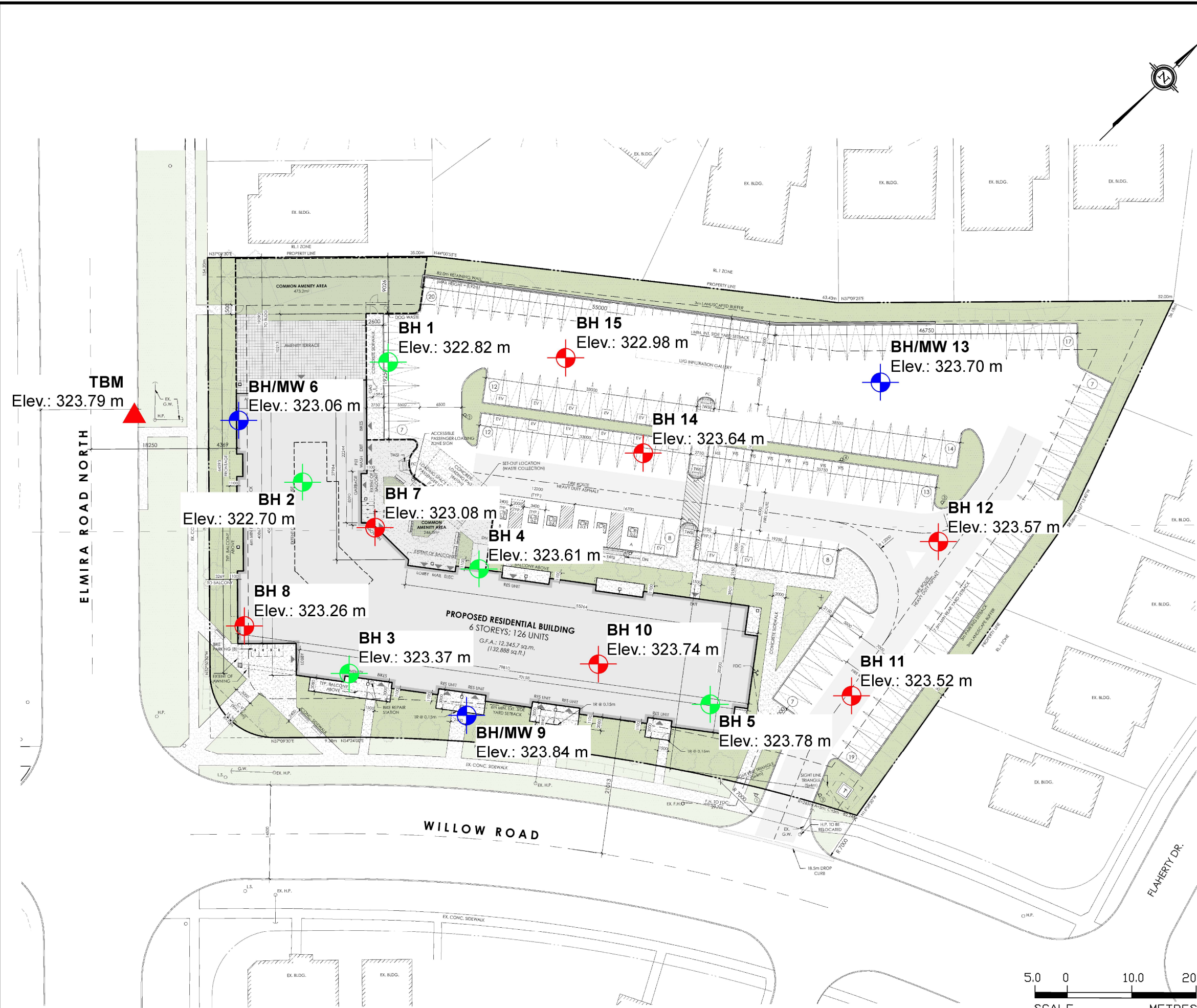
PROJECT  
 105 ELMIRA ROAD NORTH  
 GUELPH

DRAWING  
 FUNCTIONAL SITE GRADING & SERVICING PLAN

Project Manager	J. LERCH	Project No.	54937-102
Design By	MLW	Checked By	CAD
Drawn By	DAC/TXT	Checked By	MLW
Surveyed By	MTE	Drawing No.	
Date	Oct.22/24		<b>C2.1</b>
Scale	1:300	Sheet 2 of 2	







KEY PLAN SOURCE: Google Earth  
LEGEND

- TBM: Catch basin in northbound lane of Elmira Road North, 50 m north of intersection with Willow Street. Elev.: 323.79 m (Geodetic)
- Borehole Location - May 2024
- Borehole Location - September 2024
- Borehole and Monitoring Well Location - September 2024

Elev. Ref.: The borehole locations and associated ground surface elevations were surveyed using a Network RTK Global Navigation Satellite System (GNSS) Receiver. The survey data was collected using UTM Zone 17N Projection, NAD83(CSRS)v7-2010 datum and Canada Geoid Model HT2\_2010v70 (CGVD28).

DWG. Ref.: ABA Architects Inc., "105 Elmira Road", "Site Plan", Project No. 2024-069; Drawing Number: SP-1; 2025-01-24

BOREHOLE LOCATION PLAN  
Proposed Residential Development  
105 Elmira Road North  
Guelph, Ontario



311 VICTORIA STREET NORTH  
KITCHENER / ONTARIO / N2H 5E1 / 519-742-8979

Drawn By: JR/YC	Date: January 2025	File No.: 1755
Checked By: EYC	Scale: 1:600	Drawing No.: 1

## **APPENDIX C**

### **Table 1, Hydrograph, & Figure 1**



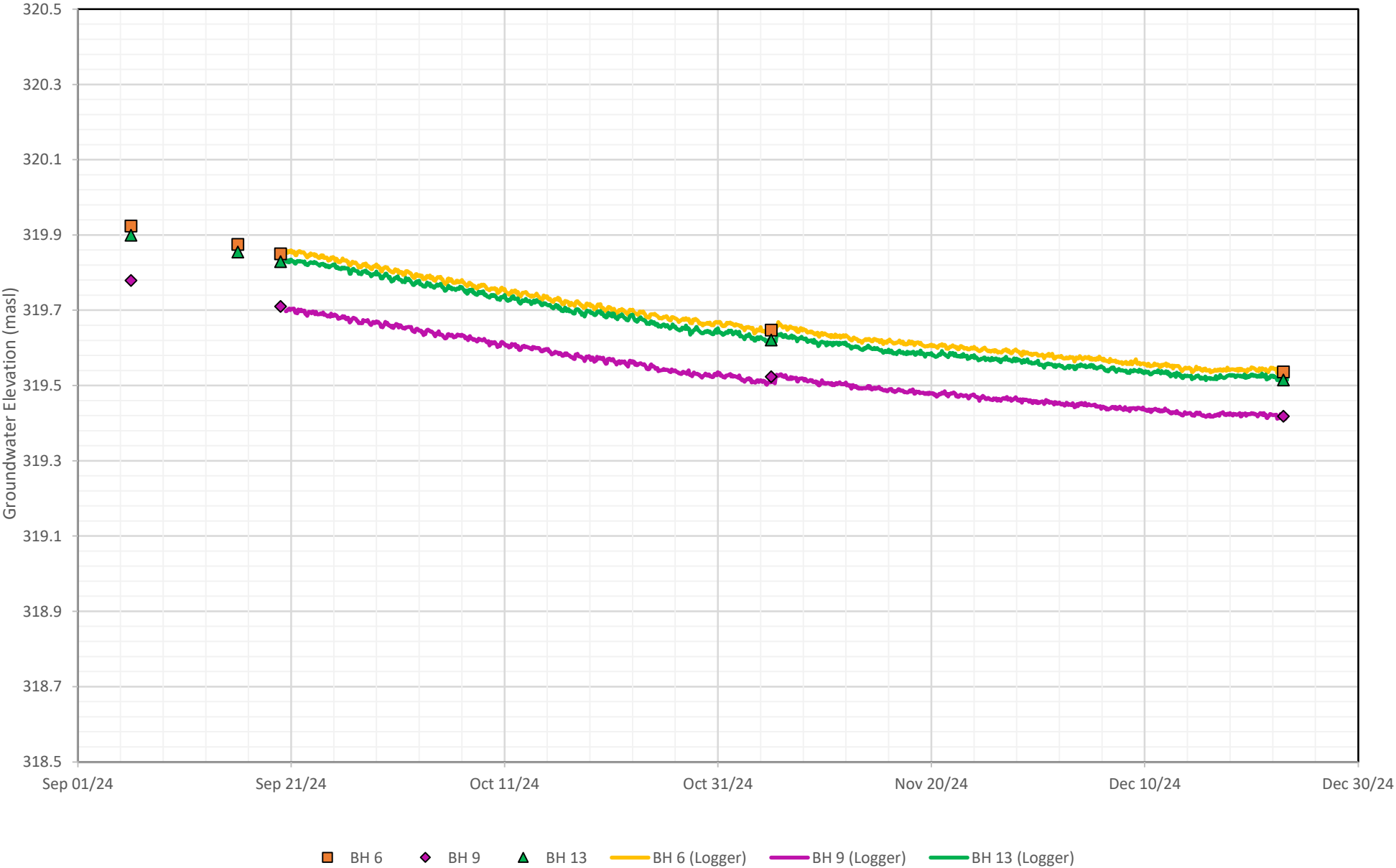
Table 1 - Summary of Water Levels, Elevations & Fluctuations

105 Elmira Road, Guelph  
CVD Engineering Ltd.  
Project: 1755

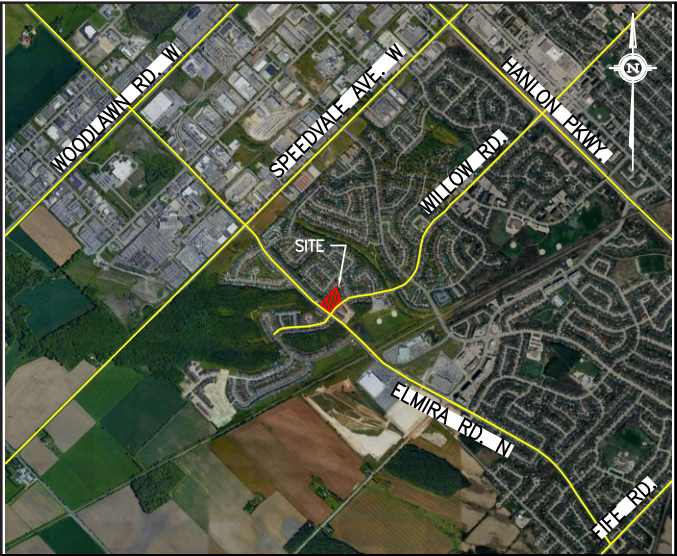
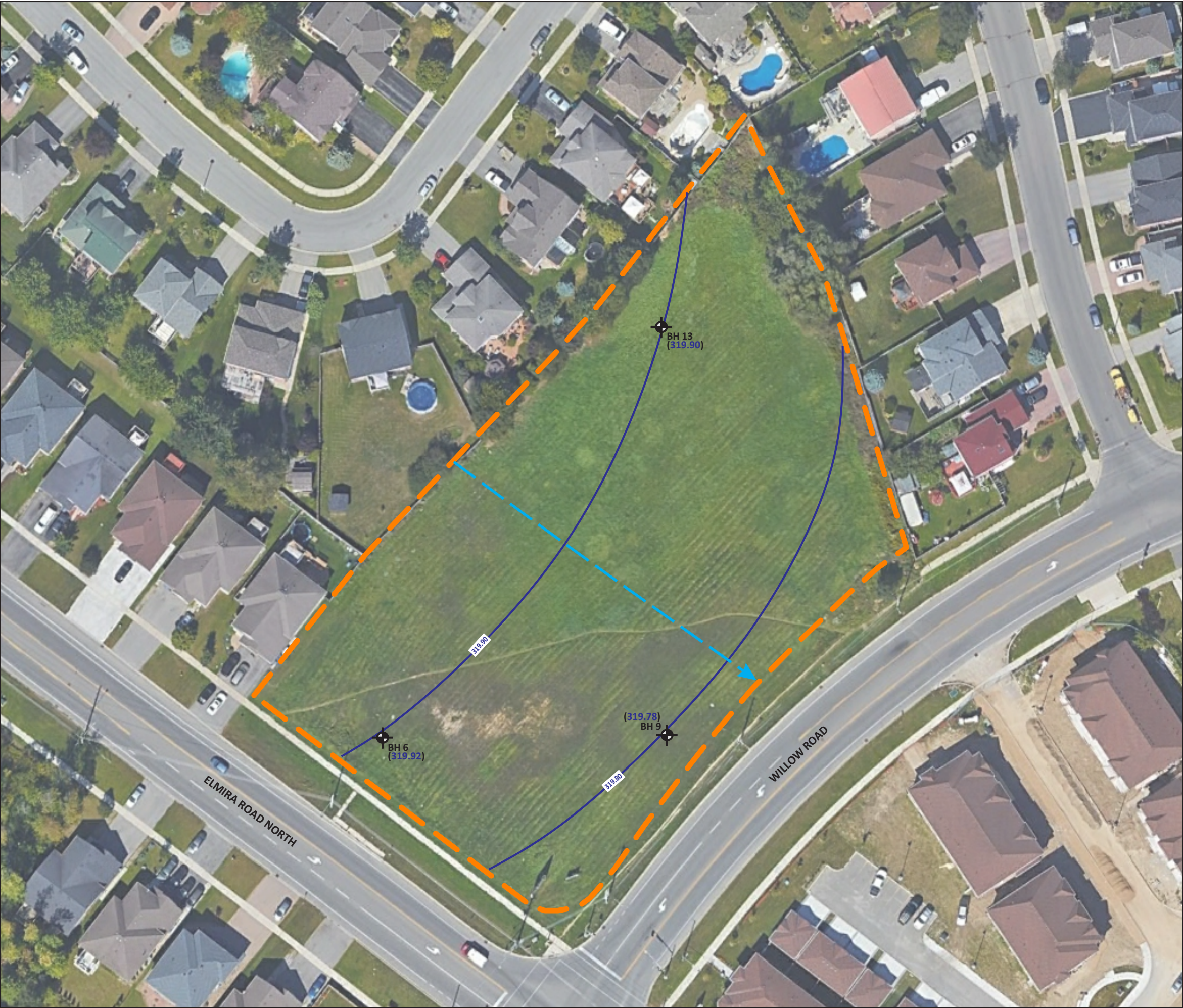
Well	Ground Elevation (mASL)	Top Pipe Elevation (mASL)	Stickup (m)	Hydraulic Conductivity (m/s)	Water Level (m Below Ground)					Water Elevation (m Above Sea Level)					Fluctuation Relative to September 6, 2024 (m)			
					06-Sep-24	16-Sep-24	20-Sep-24	05-Nov-24	23-Dec-24	06-Sep-24	16-Sep-24	20-Sep-24	05-Nov-24	23-Dec-24	16-Sep-24	20-Sep-24	05-Nov-24	23-Dec-24
BH 6	323.06	324.03	0.96	$5.5 \times 10^{-2}$	3.14	3.19	3.21	3.41	3.52	<b>319.92</b>	319.88	319.85	319.65	319.54	-0.05	-0.07	-0.28	-0.39
BH 9	323.84	325.03	1.19	$2.6 \times 10^{-2}$	4.06		4.13	4.32	4.42	<b>319.78</b>		319.71	319.52	319.42		-0.07	-0.26	-0.36
BH 13	323.70	324.78	1.07	-	3.80	3.85	3.87	4.08	4.19	<b>319.90</b>	319.86	319.83	319.62	319.52	-0.04	-0.07	-0.28	-0.38

- Notes:
- 1) All Elevations Referenced to Geodetic Survey by CVD.
  - 2) **Bolded** elevations represent the maximum water table aquifer elvation at each monitoring well, measured throughout all seasons.
  - 3) Negative water level indicates that water level is above ground.
  - 4) : Monitoring well destroyed.
  - 5) Negative fluctuation indicates drop in water level relative to baseline.

1755 Hydrograph - 105 Elmira Road, Guelph - September to December 2024







**LEGEND**

- Property Boundary
- CVD Monitoring Well Location
- Water Table Elevation (mASL)
- 319.90 Interpreted Groundwater Contour (mASL)
- Interpreted Shallow Groundwater Flow Direction

0 10 20 m  
Scale 1:750

Image Reference: Google Earth; Retrieved: January 3, 2025

**Figure 1:**  
**Shallow Groundwater Table Interpretation**  
**(September 6, 2024)**

Limited Hydrogeological Assessment  
Proposed Residential Development

105 Elmira Road North  
Guelph, ON

**CHUNG & VANDER DOELEN**  
**ENGINEERING LTD.**  
311 VICTORIA STREET NORTH  
KITCHENER / ONTARIO / N2H 2E1 / 519-742-8979

Drawn By: YC	Date: January 2025	File No.: 1755
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## **APPENDIX D**

### **Constant Head Tests**



**Hydraulic Conductivity Calculations**  
**Using Hvorslev Constant-Head Method (1951)**

Project #: 1755

	q		D	L	H	k	
	Constant Pumping Rate		Effective Well Diameter	Well Screen Length	Constant Head During Pumping	Hydraulic Conductivity	
Well	(Litres/min)	(cm <sup>3</sup> /s)	(cm)	(cm)	(cm)	(cm/s)	(m/s)
BH 6	3.7	62	5.1	240	0.03	5.5E+00	<b>5.5E-02</b>
BH 9	3.3	55	5.1	155	0.09	2.6E+00	<b>2.6E-02</b>

- Notes:
- 1) k calculated by Hvorslev Case G: Constant Head, Well-Point in Uniform Isotropic Soil as follows:  

$$k = \frac{q \ln \left[ \frac{L}{D} + \sqrt{1 + \left( \frac{L}{D} \right)^2} \right]}{2 \pi L H}$$
  - 2) Constant Head tests conducted on December 23, 2024

**ENCLOSURES**



# Soil Abbreviations and Terms Used on Record of Borehole Sheets

## TERMINOLOGY DESCRIBING COMMON SOIL TYPES:

<b>Topsoil</b>	-	mixture of soil and humus capable of supporting vegetation
<b>Peat</b>	-	mixture of visible and invisible fragments of decayed organic matter
<b>Till</b>	-	unstratified glacial deposit which may range from clay to boulders
<b>Fill</b>	-	soil materials identified as being placed anthropologically

## CLASSIFICATION (UNIFIED SYSTEM)

Clay	<0.002mm
Silt	0.002 to .075mm
Sand	0.075 to 4.75mm
	Fine 0.075 to 0.425 mm
	Medium 0.425 to 2.0 mm
	Coarse 2.0 to 4.75 mm
Gravel	4.75 to 75mm
	Fine 4.75 to 19 mm
	Coarse 19 to 75 mm
Cobbles	75 to 300mm
Boulders	>300mm

## TERMINOLOGY

Soil Composition	% by Weight
"traces"	<10%
"some"(eg. some silt)	10-20%
Adjective (eg. sandy)	20-35%
"and"(eg. sand and gravel)	35-50%

**Standard Penetration Resistance (SPT):** Standard Penetration Resistance ('N' Values) refers to the number of blows required to advance a standard (ASTM D1586) 51 mm Ø (2 inch) split-spoon sampler by the use of a free falling, 63.5 Kg (140lbs) hammer. The number of blows from the drop weight is recorded for every 15 cm (6 inches). The hammer is dropped from a distance of 0.76m (30 inches) providing 474.5 Joules per blow. When the sampler is driven a total of 45 cm (18 inches) into the soil, the standard penetration index ('N' Value) is the total number of blows for the last 30 cm (12 inches).

**Dynamic Cone Penetration Resistance (DCPT):** Dynamic Cone Penetration Resistance is similar to a SPT with the 474.5 Joule/blow impulse provided by the free falling hammer where the split-spoon sampler is replaced by a 51 mm Ø, 60° conical point and the number of blows is recorded continuously for every 30 cm (12 inches).

## COHESIVE SOILS CONSISTENCY

	(kPa)	(P.S.F.)	Nominal 'N' Value
Very Soft	<12	<250	0-2
Soft	12-25	250-500	2-4
Firm	25-50	500-1000	4-8
Stiff	50-100	1000-2000	8-15
Very Stiff	100-200	2000-4000	15-30
Hard	>200	>4000	>30

## RELATIVE DENSITY OF COHESIONLESS SOIL

	'N' Value
Very Loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very Dense	>50

## MOISTURE CONDITIONS:

Cohesive Soil
DTPL- Drier than plastic limit
APL- About plastic limit
WTPL- Wetter than plastic limit
MWTPL- Much wetter than plastic limit

Cohesionless Soil
Damp
Moist
Wet
Saturated

## SAMPLE TYPES AND ADDITIONAL FIELD TESTS

<b>SS</b>	Split Spoon Sample (obtained from SPT)	<b>GS</b>	Grab Sample	<b>PP</b>	Pocket Penetrometer
<b>AS</b>	Auger Sample	<b>BS</b>	Bulk Sample	<b>VANE</b>	Peak & Remolded shear
		<b>TW</b>	Thin Wall Sample or Shelby Tube	<b>DMT</b>	Flat Plate Dilatometer

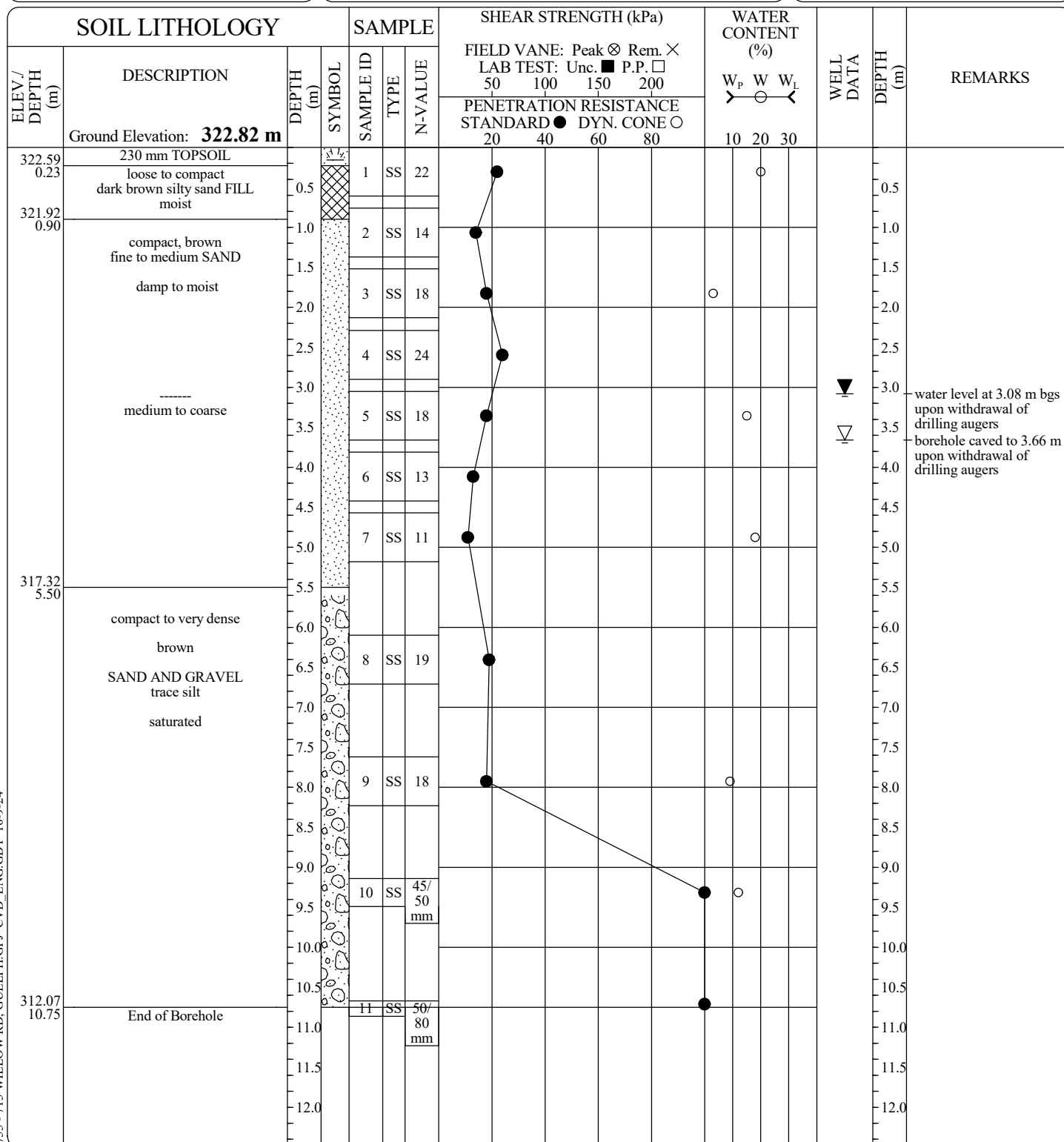
## LABORATORY TESTS

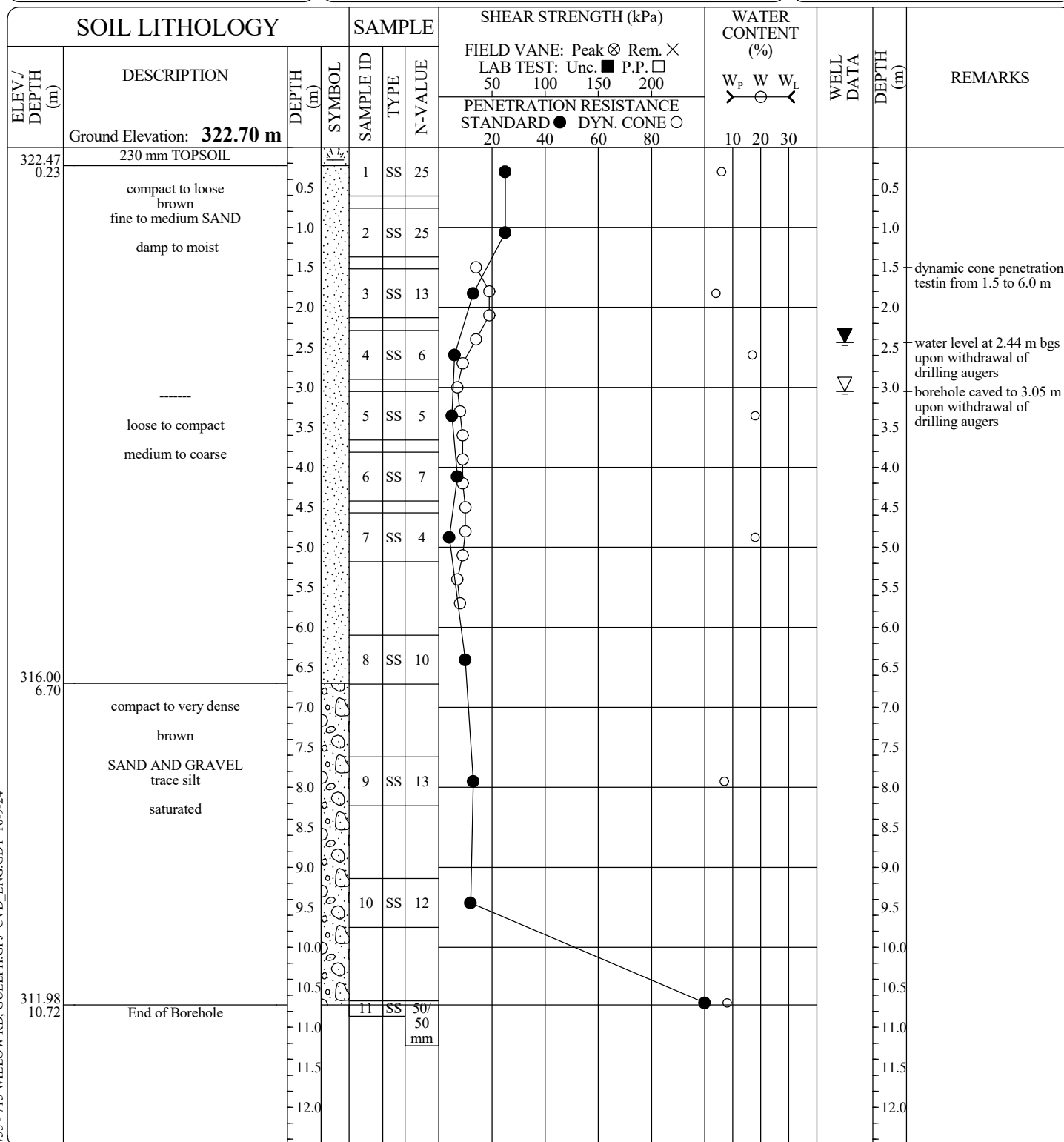
<b>SG</b>	Specific Gravity	<b>S</b>	Sieve Analysis	<b>W</b>	Water Content
<b>H</b>	Hydrometer	<b>P</b>	Field Permeability	<b>K</b>	Lab Permeability
<b>W<sub>p</sub></b>	Plastic Limit	<b>W<sub>l</sub></b>	Liquid Limit	<b>I<sub>p</sub></b>	Plasticity Index
<b>GSA</b>	Grain Size Analysis	<b>C</b>	Consolidation	<b>UNC</b>	Unconfined compression



**CHUNG & VANDER DOELEN**  
ENGINEERING LTD.

**Enclosure A**

**FILE No: 1755****BOREHOLE No. 1**Client: **HIP Developments**Project: **Proposed Mixed-Use Development**Location: **715 Willow Road, Guelph, Ontario****EQUIPMENT DATA**Machine: **CME 55**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **May 30 - 24 TO May 30 - 24**PROJECT MANAGER: **CS****CHUNG & VANDER DOELEN  
ENGINEERING LTD.**311 Victoria Street North  
Kitchener, Ontario N2H 5E1  
ph. (519) 742-8979, fx. (519) 742-7739

**FILE No: 1755****BOREHOLE No. 2**Client: **HIP Developments**Project: **Proposed Mixed-Use Development**Location: **715 Willow Road, Guelph, Ontario****EQUIPMENT DATA**Machine: **CME 55**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **May 31 - 24 TO May 31 - 24**PROJECT MANAGER: **CS****CHUNG & VANDER DOELEN  
ENGINEERING LTD.**311 Victoria Street North  
Kitchener, Ontario N2H 5E1  
ph. (519) 742-8979, fx. (519) 742-7739

**FILE No: 1755****BOREHOLE No. 3**Client: **HIP Developments**Project: **Proposed Mixed-Use Development**Location: **715 Willow Road, Guelph, Ontario****EQUIPMENT DATA**Machine: **CME 55**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **May 31 - 24 TO May 31 - 24**

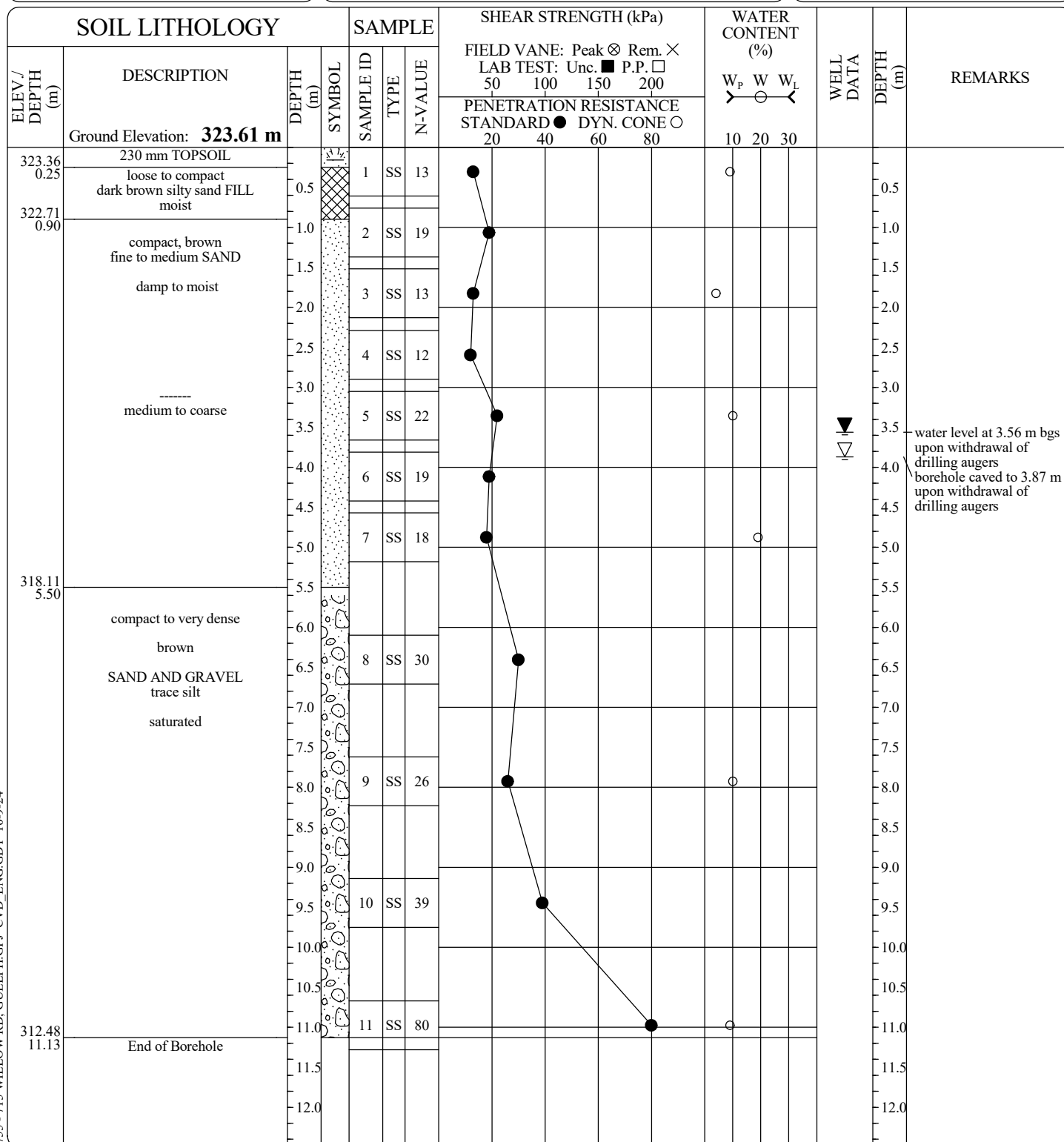
SOIL LITHOLOGY			SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS	
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				W <sub>p</sub> W W <sub>L</sub> 10 20 30					
Ground Elevation: 323.37 m							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80									
323.14 0.23	230 mm TOPSOIL			1	SS	6	●									
322.57 0.80	loose to compact dark brown silty sand FILL moist	0.5														
	loose to compact brown fine to medium SAND damp to moist	1.0		2	SS	23		●								
		1.5														
		2.0		3	SS	9	●					○				
		2.5		4	SS	15		●								
		3.0					○									
	----- loose to compact medium to coarse	3.5		5	SS	12	●					○				
		4.0		6	SS	17		●								
		4.5					○									
		5.0		7	SS	4	●									
		5.5					○									
		6.0					○									
		6.5		8	SS	11	●					○				
		7.0														
		7.5														
		8.0		9	SS	11	●									
314.87 8.50	compact brown SAND AND GRAVEL trace silt saturated	8.5														
		9.0														
		9.5		10	SS	21		●				○				
		10.0														
		10.5														
312.24 11.13	End of Borehole	11.0		11	SS	13	●									
		11.5														
		12.0														

dynamic cone penetration  
testin from 3.0 to 6.0 m  
water level at 3.08 m bgs  
upon withdrawal of  
drilling augers

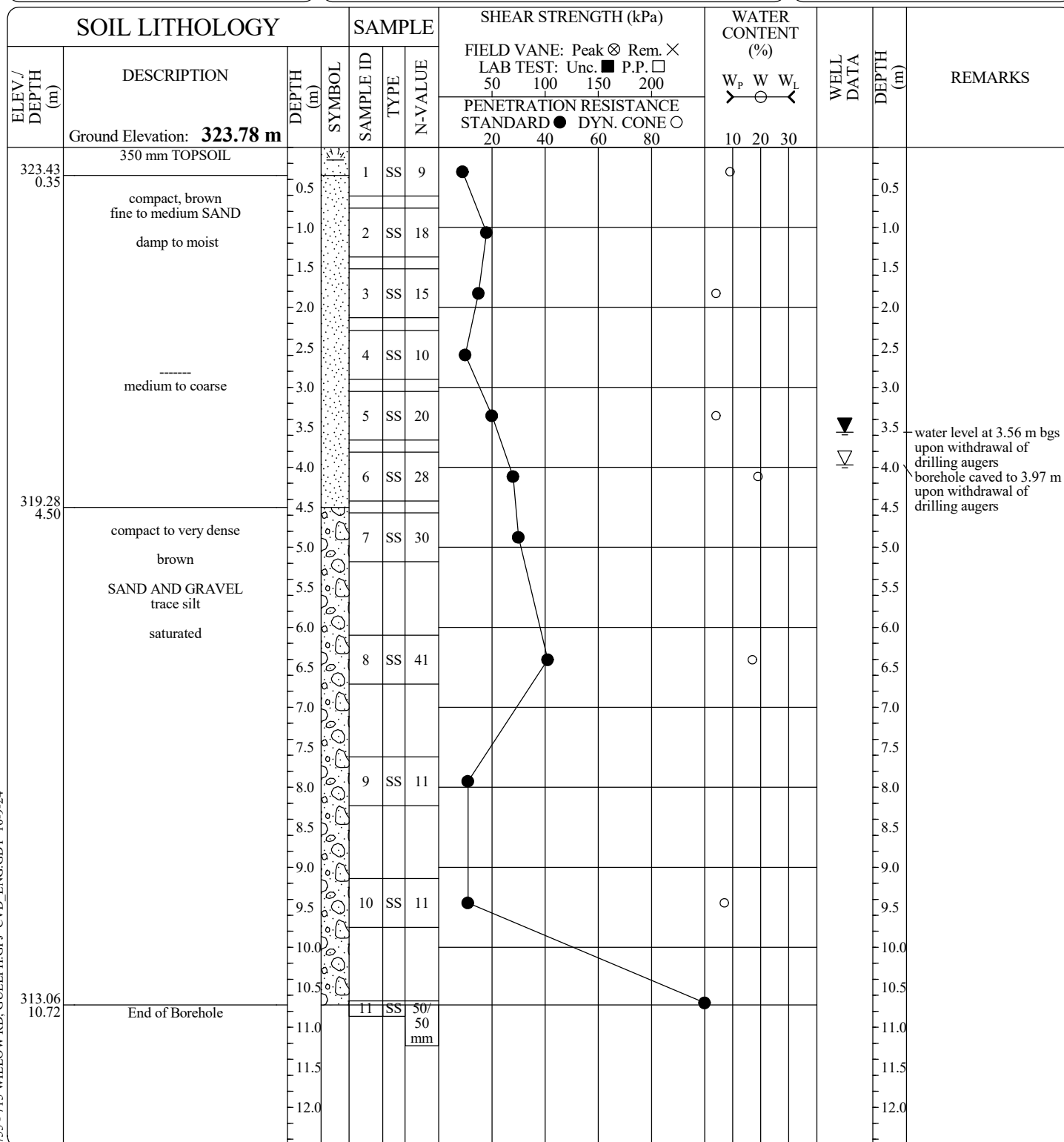
borehole caved to 3.96 m  
upon withdrawal of  
drilling augers

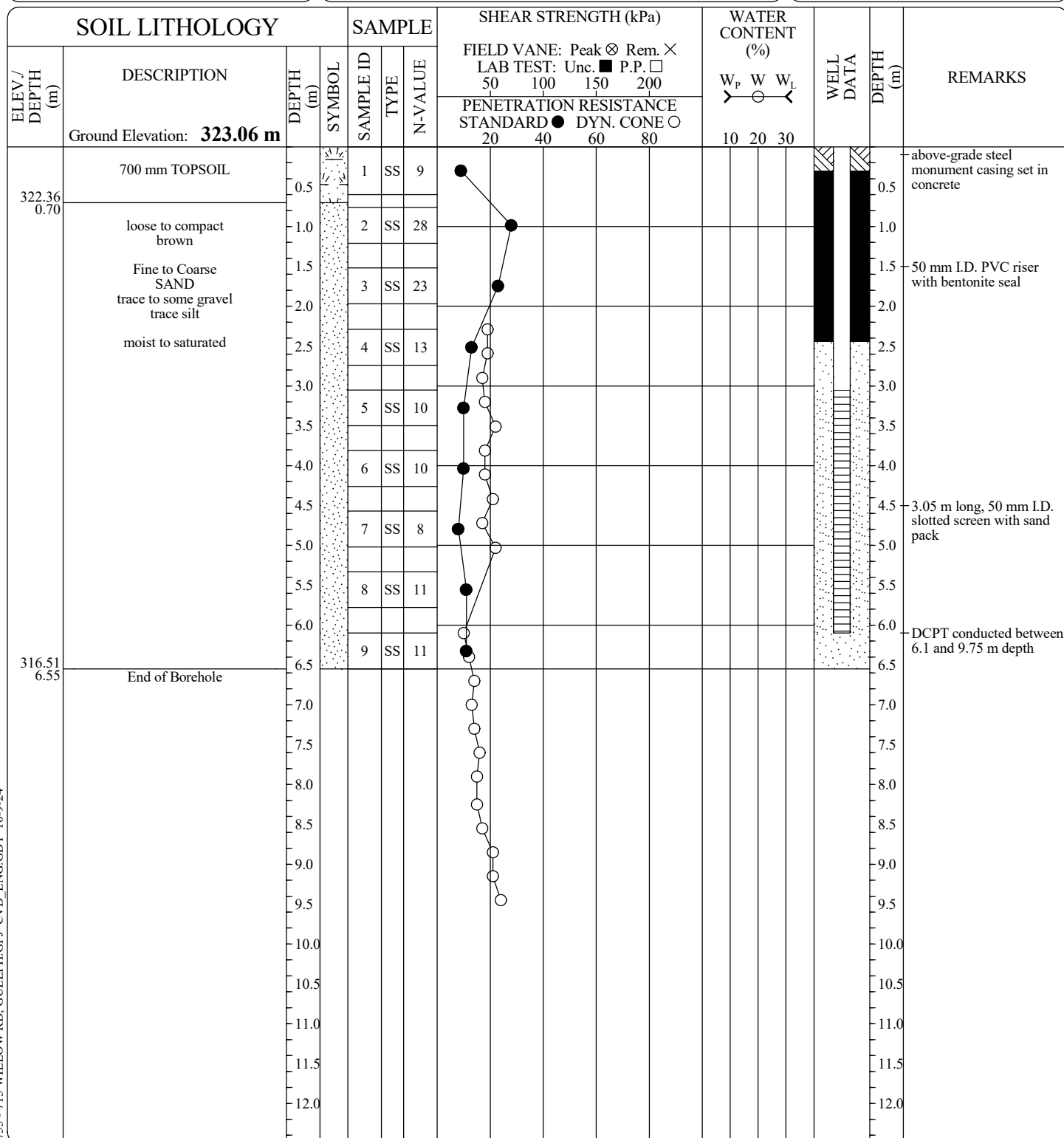
PROJECT MANAGER: **CS**
**CHUNG & VANDER DOELEN  
ENGINEERING LTD.**

 311 Victoria Street North  
 Kitchener, Ontario N2H 5E1  
 ph. (519) 742-8979, fx. (519) 742-7739

**FILE No: 1755****BOREHOLE No. 4**Client: **HIP Developments**Project: **Proposed Mixed-Use Development**Location: **715 Willow Road, Guelph, Ontario****EQUIPMENT DATA**Machine: **CME 55**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **May 30 - 24 TO May 30 - 24**PROJECT MANAGER: **CS****CHUNG & VANDER DOELEN  
ENGINEERING LTD.**311 Victoria Street North  
Kitchener, Ontario N2H 5E1  
ph. (519) 742-8979, fx. (519) 742-7739



**FILE No: 1755****BOREHOLE No. 5**Client: **HIP Developments**Project: **Proposed Mixed-Use Development**Location: **715 Willow Road, Guelph, Ontario****EQUIPMENT DATA**Machine: **CME 55**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **May 30 - 24 TO May 30 - 24**PROJECT MANAGER: **CS****CHUNG & VANDER DOELEN  
ENGINEERING LTD.**311 Victoria Street North  
Kitchener, Ontario N2H 5E1  
ph. (519) 742-8979, fx. (519) 742-7739

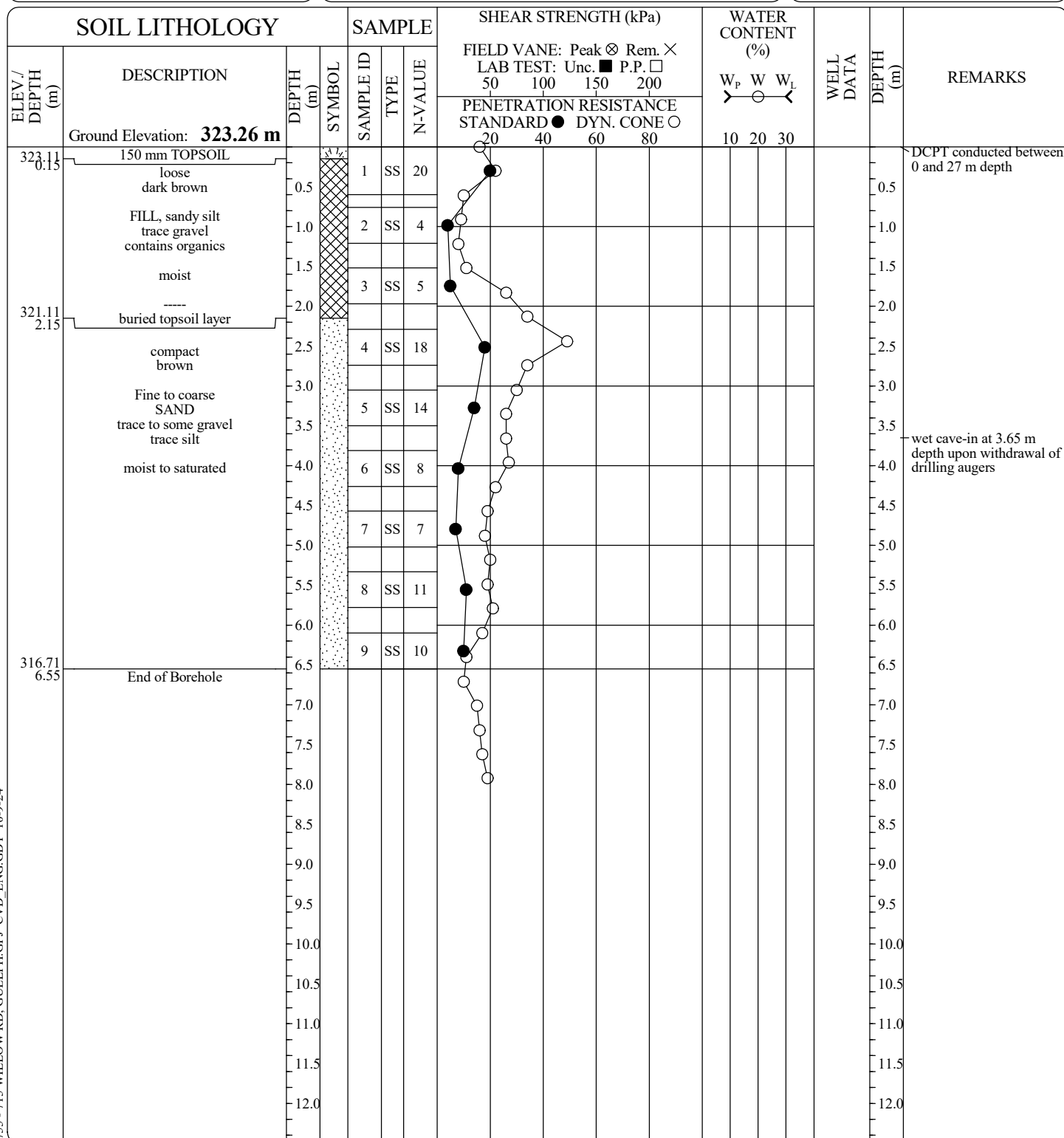
**FILE No: 1755****BOREHOLE No. 6**Client: **HIP Developments**Project: **Proposed Mixed-Use Development**Location: **715 Willow Road, Guelph, Ontario****EQUIPMENT DATA**Machine: **CME 55**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **Sep 05 - 24 TO Sep 05 - 24**PROJECT MANAGER: **CS****CHUNG & VANDER DOELEN  
ENGINEERING LTD.**311 Victoria Street North  
Kitchener, Ontario N2H 5E1  
ph. (519) 742-8979, fx. (519) 742-7739

**FILE No: 1755****BOREHOLE No. 7**Client: **HIP Developments**Project: **Proposed Mixed-Use Development**Location: **715 Willow Road, Guelph, Ontario****EQUIPMENT DATA**Machine: **CME 55**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **Sep 05 - 24 TO Sep 05 - 24**

SOIL LITHOLOGY			SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS		
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				W <sub>p</sub> W W <sub>L</sub> ↗ ○ ↖						
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10 20 30						
322.93 0.13	150 mm TOPSOIL	0.13		1	SS	17	●										
	compact brown  Fine to Coarse SAND trace to some gravel trace silt  mois to saturated	0.5															
		1.0		2	SS	13	●										
		1.5															
		2.0		3	SS	16	●										
		2.5															
		3.0		4	SS	22	●										
		3.5															
		4.0		5	SS	15	●										
		4.5															
		5.0		6	SS	11	●										
		5.5															
		6.0		7	SS	19	●										
		6.5															
316.53 6.55	End of Borehole	6.55		9	SS	10	●										
		7.0					○										
		7.5					○										
		8.0					○										
		8.5															
		9.0															
		9.5															
		10.0															
		10.5															
		11.0															
		11.5															
		12.0															

wet cave-in at 3.35 m depth upon withdrawal of drilling augers

PROJECT MANAGER: **CS****CHUNG & VANDER DOELEN  
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**FILE No: 1755****BOREHOLE No. 8**Client: **HIP Developments**Project: **Proposed Mixed-Use Development**Location: **715 Willow Road, Guelph, Ontario****EQUIPMENT DATA**Machine: **CME 55**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **Sep 05 - 24 TO Sep 05 - 24**PROJECT MANAGER: **CS****CHUNG & VANDER DOELEN  
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**FILE No: 1755****BOREHOLE No. 9**Client: **HIP Developments**Project: **Proposed Mixed-Use Development**Location: **715 Willow Road, Guelph, Ontario****EQUIPMENT DATA**Machine: **CME 55**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **Sep 05 - 24 TO Sep 05 - 24**

SOIL LITHOLOGY				SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □				W <sub>P</sub> W W <sub>L</sub>					
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○				↗ — ○ — ↖					
	Ground Elevation: <b>323.84 m</b>						20	40	60	80	10	20	30			
323.76	100 mm TOPSOIL			1	SS	37										above-grade steel monument casing set in concrete
	dense brown SILTY SAND	0.5														
322.79	some gravel moist	1.0		2	SS	35										50 mm I.D. PVC riser with bentonite seal
1.05																
	compact brown	1.5		3	SS	16										
	Medium to Coarse SAND	2.0														
	trace to some gravel trace silt	2.5		4	SS	19										
		3.0														
	moist to saturated	3.5		5	SS	23										
		4.0														
		4.5														
		5.0		7	SS	14										3.05 m long, 50 mm I.D. slotted screen with sand pack
		5.5														
		6.0														
		6.5		9	SS	13										
317.29	End of Borehole															
6.55		7.0														
		7.5														
		8.0														
		8.5														
		9.0														
		9.5														
		10.0														
		10.5														
		11.0														
		11.5														
		12.0														




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**FILE No: 1755****BOREHOLE No. 10**Client: **HIP Developments**Project: **Proposed Mixed-Use Development**Location: **715 Willow Road, Guelph, Ontario****EQUIPMENT DATA**Machine: **CME 55**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **Sep 05 - 24 TO Sep 05 - 24**

SOIL LITHOLOGY				SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS	
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				PENETRATION RESISTANCE STANDARD ● DYN. CONE ○						W <sub>p</sub> W W <sub>L</sub> 10 20 30
							Ground Elevation: 323.74 m										
323.59 0.13	150 mm TOPSOIL			1	SS	24											
323.04 0.70	compact, brown FILL, sandy silt trace gravel, trace rootlets moist	0.5															
		1.0		2	SS	23											
	compact brown	1.5															
	Fine to Coarse SAND	2.0		3	SS	19											
	trace to some gravel trace silt	2.5															
	moist to saturated	3.0			4	SS	15										
		3.5															
		4.0			5	SS	21										
		4.5															
		5.0															
		5.5		7	SS	13											
318.44 5.30		6.0															
	dense brown SAND AND GRAVEL trace silt saturated	6.5															
317.19 6.55	End of Borehole	6.5		9	SS	30											
		7.0															
		7.5															
		8.0															
		8.5															
		9.0															
		9.5															
		10.0															
		10.5															
		11.0															
		11.5															
		12.0															




wet cave-in at 3.65 m  
depth upon withdrawal of  
drilling augersPROJECT MANAGER: **CS****CHUNG & VANDER DOELEN  
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**FILE No: 1755****BOREHOLE No. 11**Client: **HIP Developments**Project: **Proposed Mixed-Use Development**Location: **715 Willow Road, Guelph, Ontario****EQUIPMENT DATA**Machine: **CME 55**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **Sep 06 - 24 TO Sep 06 - 24**

SOIL LITHOLOGY				SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS	
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50    100    150    200				W <sub>P</sub> W   W <sub>L</sub> ↗   ○   ↖						
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20    40    60    80				10   20   30						
Ground Elevation: <b>323.52 m</b>																	
323.27 0.25	250 mm TOPSOIL			1	SS	17	●					○					
	compact brown	0.5													0.5		
	FILL, sandy silt	1.0		2	SS	16	●						○			1.0	
	trace gravel	1.5														1.5	
	trace clay	2.0															
	moist	1.5		3	SS	15	●							○	1.5		
321.67 1.85	buried topsoil	2.0													2.0		
	compact brown	2.5		4	SS	17	●					○			2.5		
	Fine to Medium SAND	3.0													3.0		
	trace gravel	3.5		5	SS	16	●					○			3.5		
320.02 3.50	trace silt																
	moist	4.0														Borehole open and dry upon withdrawal of drilling augers	
	End of Borehole	4.0															
		4.5													4.5		
		5.0													5.0		
		5.5													5.5		
		6.0													6.0		
		6.5													6.5		
		7.0													7.0		
		7.5													7.5		
		8.0													8.0		
		8.5													8.5		
		9.0													9.0		
		9.5													9.5		
		10.0													10.0		
		10.5													10.5		
		11.0													11.0		
		11.5													11.5		
		12.0													12.0		

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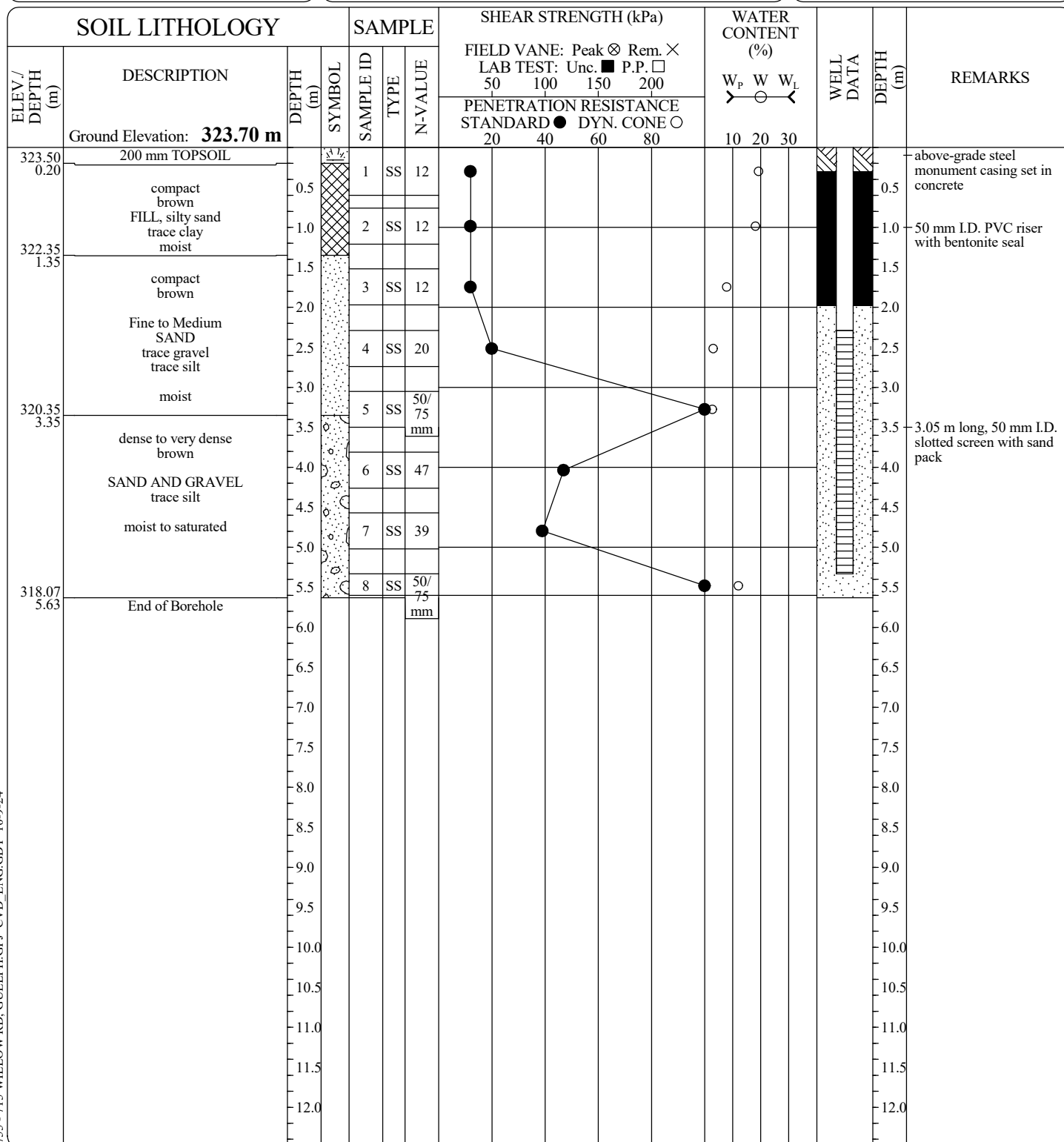
**FILE No: 1755****BOREHOLE No. 12**Client: **HIP Developments**Project: **Proposed Mixed-Use Development**Location: **715 Willow Road, Guelph, Ontario****EQUIPMENT DATA**Machine: **CME 55**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **Sep 06 - 24 TO Sep 06 - 24**

SOIL LITHOLOGY				SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50    100    150    200				W <sub>p</sub> W   W <sub>L</sub> ↗   ○   ↖					
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20    40    60    80				10   20   30					
Ground Elevation: <b>323.57 m</b>																
323.32 0.25	250 mm TOPSOIL			1	SS	9	●						○			
	loose to compact dark brown	0.5														0.5
	FILL, silty sand trace gravel trace clay moist	1.0		2	SS	10	●						○			1.0
		1.5														1.5
		2.0		3	SS	9	●						○			2.0
321.42 2.15	--- buried topsoil	2.0														2.0
	compact brown	2.5		4	SS	21		●					○			2.5
	Fine to Medium SAND	3.0														3.0
320.07 3.50	trace gravel trace silt moist	3.5		5	SS	17		●					○			3.5
	End of Borehole	4.0														4.0
		4.5														4.5
		5.0														5.0
		5.5														5.5
		6.0														6.0
		6.5														6.5
		7.0														7.0
		7.5														7.5
		8.0														8.0
		8.5														8.5
		9.0														9.0
		9.5														9.5
		10.0														10.0
		10.5														10.5
		11.0														11.0
		11.5														11.5
		12.0														12.0
																Borehole open and dry upon withdrawal of drilling augers



Borehole open and dry upon withdrawal of drilling augers

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**FILE No: 1755****BOREHOLE No. 13**Client: **HIP Developments**Project: **Proposed Mixed-Use Development**Location: **715 Willow Road, Guelph, Ontario****EQUIPMENT DATA**Machine: **CME 55**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **Sep 06 - 24 TO Sep 06 - 24**PROJECT MANAGER: **CS****CHUNG & VANDER DOELEN  
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**FILE No: 1755****BOREHOLE No. 14**Client: **HIP Developments**Project: **Proposed Mixed-Use Development**Location: **715 Willow Road, Guelph, Ontario****EQUIPMENT DATA**Machine: **CME 55**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **Sep 06 - 24 TO Sep 06 - 24**

SOIL LITHOLOGY				SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS	
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				W <sub>P</sub> W W <sub>L</sub>						
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10 20 30						
323.44 0.20	200 mm TOPSOIL																
	loose brown	0.5		1	SS	7	●						○				
	FILL, sandy silt trace caly trace gravel contains organics	1.0		2	SS	9	●							○			
	moist	2.0		3	SS	8	●							○			
321.49 2.15	compact brown	2.5		4	SS	15	●						○				
	Fine to Medium SAND trace silt	3.0															
	moist	3.5		5	SS	18	●							○			
320.14 3.50	End of Borehole															Borehole open and dry upon withdrawal of drilling augers	
		4.0															
		4.5															
		5.0															
		5.5															
		6.0															
		6.5															
		7.0															
		7.5															
		8.0															
		8.5															
		9.0															
		9.5															
		10.0															
		10.5															
		11.0															
		11.5															
		12.0															

Borehole open and dry upon withdrawal of drilling augers

PROJECT MANAGER: **CS****CHUNG & VANDER DOELEN  
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**FILE No: 1755****BOREHOLE No. 15**Client: **HIP Developments**Project: **Proposed Mixed-Use Development**Location: **715 Willow Road, Guelph, Ontario****EQUIPMENT DATA**Machine: **CME 55**Method: **Hollow Stem Auger**Size: **108 mm I.D.**Date: **Sep 06 - 24 TO Sep 06 - 24**

SOIL LITHOLOGY				SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)				WELL DATA	DEPTH (m)	REMARKS
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				W <sub>P</sub> W W <sub>L</sub> ↗ ○ ↖						
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10 20 30						
322.73 0.25	250 mm TOPSOIL																
	compact brown  Fine to Coarse SAND trace to some gravel trace silt  moist to saturated	0.5		1	SS	12	●							○			
		1.0		2	SS	8	●							○			
		1.5															
		2.0		3	SS	14	●							○			
		2.5															
		3.0		4	SS	19	●							○			
		3.5															
		3.5		5	SS	19	●								○		
		3.50	End of Borehole														
		4.0															
		4.5															
		5.0															
		5.5															
		6.0															
		6.5															
		7.0															
		7.5															
		8.0															
		8.5															
		9.0															
		9.5															
		10.0															
		10.5															
		11.0															
		11.5															
		12.0															

Borehole open and dry upon withdrawal of drilling augers

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