



CHUNG & VANDER DOELEN
ENGINEERING LTD.

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

June 28, 2019
File No.: G16303

HIP Developments Inc.
700 Rupert Street, Unit A
Waterloo, Ontario N2V 2B5

Attention: Mr. Scott Higgins

Re: Preliminary Geotechnical Assessment
Proposed YMCA and Apartment Sites
50 Bradford Street, Barrie, Ontario

CHUNG & VANDER DOELEN ENGINEERING LTD. (CVD) was retained by HIP Developments Inc. to conduct a geotechnical investigation for the above-noted site. This letter report is written to provide preliminary geotechnical assessment of the soil and groundwater condition on the proposed development.

It is understood that high-rise residential buildings (one 10-storey and two 20-storey with a 5-storey parking podium) and a 3-storey YMCA building are proposed at the site. A preliminary site plan of the proposed development is enclosed in Appendix A.

Field Work

The field work at the site began in July 2016 and concluded in May 2019. The field investigation also covers the lands located to the north of the presently considered land parcel.

The advancement of the boreholes was carried out under the supervision of a member of our engineering team, who logged the subsurface conditions encountered at the boreholes, effected the subsurface sampling and monitored the groundwater conditions. The boreholes were drilled and sampled to depths between 2.90 m and 29.40 m below existing grades to investigate the competence of the soils at lower depths.

The boreholes were advanced to the sampling depths using a track-mounted power auger drilling rig, equipped with continuous flight augers and standard soil sampling g equipment. Standard penetration tests (SPTs) in accordance with ASTM Specification D1586 were carried out at frequent intervals of depth during the advancement of the boreholes. Dynamic cone penetration testing was carried out to establish the density of the granular deposits where hydrostatic pressure may be problematic to SPT

sampling. The undrained shear strength of the cohesive soil deposit was determined on the slightly disturbed SPT samples using a field pocket penetrometer. The compactness condition or consistency of the soil strata has been inferred from these test results.

Monitoring wells were installed in Boreholes 16-2, 16-3, 16-14, 16-18, 17-23, 17-34, 17-35, 17-36, 17-37 and 17-38 at the apartment site and in Boreholes 16-5, 16-19, 17-43 and 17-45 in the YMCA site. The monitoring wells were installed to allow measurement of the stabilized groundwater table and for sampling of the groundwater for analytical testing as part of the Phase Two ESA.

Summary of Findings

Appendix B contains pertinent borehole logs and borehole location plan for the YMCA site, while Appendix C contains pertinent borehole logs and borehole location plan for the apartment site. The following notes are intended to amplify and comment on the subsurface data.

YMCA Site

In general, this property is underlain by loose to compact fill extending to depths of 0.38 to 3.05 m, followed by typically loose to compact sand deposit to at least 9.60 m depth. The sand contains trace to some silt.

Groundwater level was encountered at $2.7\pm$ to $4.2\pm$ m depths below existing ground surface, corresponding to elevations between $220.8\pm$ and $220.9\pm$ m.

Apartment Site

CVD Boreholes reveals that there were $1\pm$ to $3\pm$ m thick mixed fill materials, compressible peat and organic soils to $3\pm$ to $5\pm$ m (near the south property line) in the former school area, then loose to compact sand/silt to $18\pm$ m depth, underlain by dense sand/silt or very stiff silty clay.

Towards the west (in the existing play field area), the subsurface soil typically consists of a thin layer of fill, over loose to compact fine granular deposits (sand, sandy silt, silty sand) which was loose to $3\pm$ to $4\pm$ m, then became compact to dense to depth between $13\pm$ and $21\pm$ m and underlain by firm to very stiff silty clay to $27\pm$ m depth.

Groundwater level was encountered at $1.4\pm$ to $4.6\pm$ m depths, corresponding to elevations between $222.3\pm$ and $220.6\pm$ m, flowing in an easterly direction. It should be cautioned that the groundwater table will fluctuate in response to major weather events. Seasonal fluctuations of the groundwater table are to be expected.



Discussion and Recommendation

Site Servicing

According to the preliminary plans, the site servicing corridor is located between the YMCA building and Apartment Building 1. The proposed sanitary manhole MH1 will be connected to the existing manhole in Bradford Street which has an invert elevation of 218.80 m.

The groundwater table in this area is expected to lie at elevation $220.8\pm$ to $220.9\pm$ m. Given the excavation will be carried out in saturated sand below the groundwater table, dewatering using well-points will be necessary to pre-drain the construction area prior to carrying out excavation.

The storm and watermain are relatively shallow and will likely not require dewatering during their installation.

Foundation for YMCA Site

For the proposed 3-storey YMCA with basement under a portion of the building, conventional spread and strip footings can be constructed to support the proposed structure. In the deep fill area, supporting footings on engineered fill may be an option. Once finished first floor and basement elevations are established, detail foundation design and construction can be provided.

Groundwater level was encountered at $2.7\pm$ to $4.2\pm$ m depths below existing ground surface, corresponding to elevations between $220.8\pm$ and $220.9\pm$ m. Consequently, it is recommended to establish the basement floor at least 0.6 m above the observed groundwater level, at elevation $221.5\pm$ m to ensure that the groundwater table will not affect the normal operating of the YMCA.

Apartment Site

The proposed Building 1 area (southeast corner of site fronting Bradford Street) is underlain by fill and organic materials to a depth of $3\pm$ to $5\pm$ m below existing ground surface. If desired, these materials can be excavated and replaced with engineered fill to support footing or raft foundations. In light of the loose to compact condition of the fine granular deposits, in situ soil improvement will likely be the most economical method to support proposed 20-storey building. It is suggested that a raft foundation supported on stone columns (soil improvement technique) should be considered to provide support and limit settlements. A structural floor slab will be required if the poor fill and organic layers are not removed under the building area.

To the west in the Building 2, Building 3 and the parking podium areas, loose to compact fine granular deposits (sand, sandy silt, silty sand) was encountered to $3\pm$ to $4\pm$ m depths, then became compact to dense. If a basement is to be constructed, the footings can be founded on compact materials. If there is



no basement, engineered fill can be constructed to support the building. Therefore, the grading of these building is an important consideration.

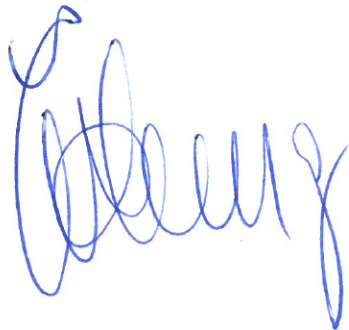
For the 20-storey Building 2, a footing or raft foundation founded at 3.0 to 3.6 m depths will provide adequate foundation support with acceptable settlement. For the 10-storey Building 3, a footing or raft foundation founded at 2.0 to 3.6 m depths will provide adequate foundation support.

Detail analysis of loading condition for the two 20-storey buildings will need to be carried out to determine settlements, and consequently the most economical foundation type for supporting these two buildings.

Should you have any questions regarding this report, please contact our office at your convenience.

Yours truly,

CHUNG & VANDER DOLEN ENGINEERING LTD.



Eric Y. Chung, M.Eng., P.Eng.
Principal Engineer

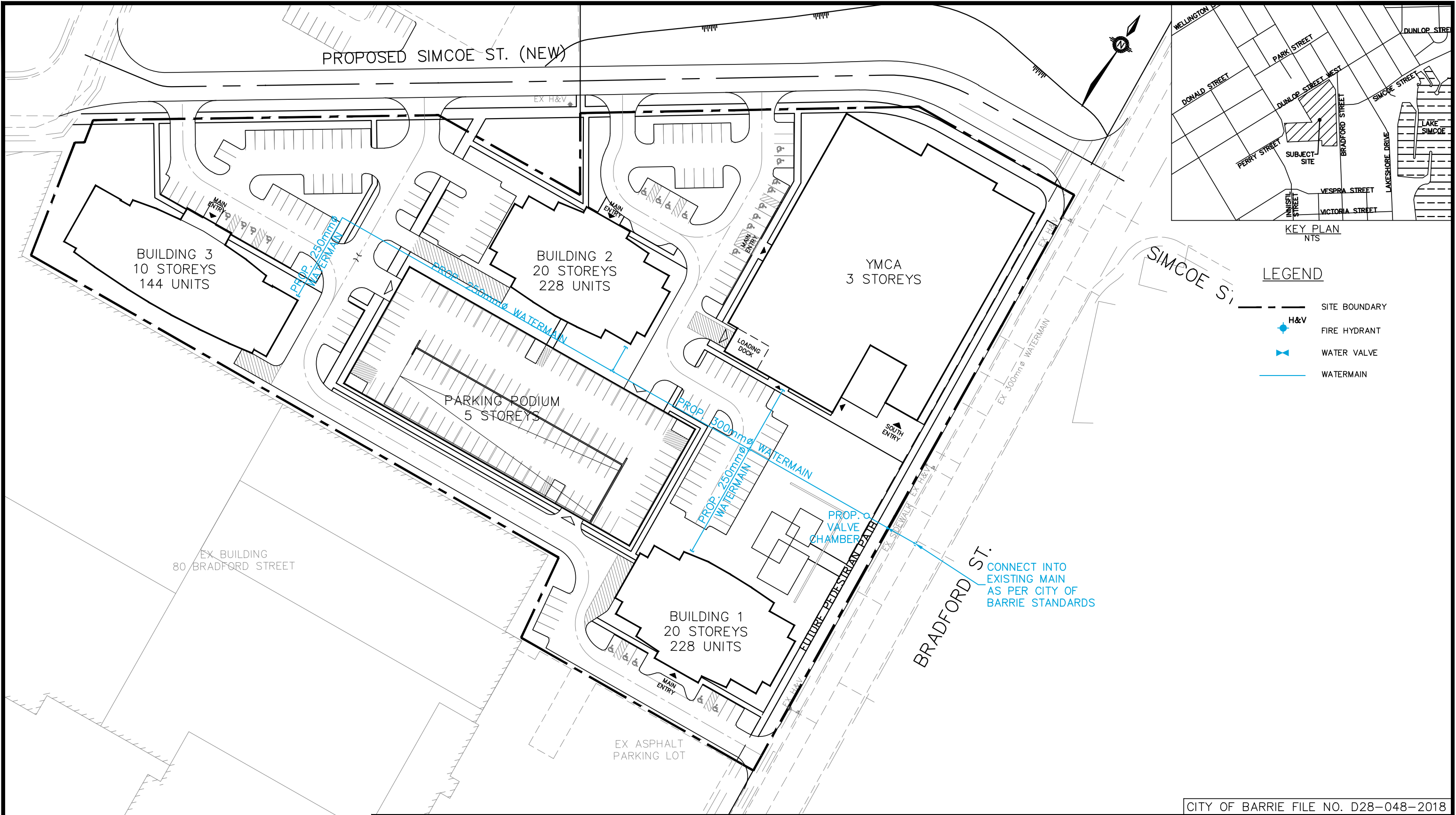


Appendix “A”

Preliminary Site Plan



C:\Users\acleaves\AppData\Local\Temp\AcPublish_111556\19051-BASE.dwg Layout:FIG 2 - WATER Plotted Jun 10, 2019 @ 11:05am by acleaves @ PEARSON ENGINEERING LTD.



BENCHMARK

ELEVATIONS SHOWN HERON AREA GEODETIC AND ARE REFERRED TO A TABLET SET IN THE BARRIE GOVERNMENT WHARF AT THE SE END OF BAYFIELD STREET, 3.8m W OF THE E CORNER OF THE BEND IN THE WHARF AND 4.8m E OF THE W CORNER OF BED. TABLET IS SET FLUSH WITH CONCRETE SURFACE NEAR END OF WHARF. ESTABLISHED BY TOPOGRAPHICAL SURVEY. CONCRETE WHARF HAS BEEN PAVED BUT TABLET IS STILL VISIBLE.
ELEVATION = 220.21

NO.	REVISION NOTE	DATE	BY

HIP BARRIE CENTRAL INC.
34-50 BRADFORD STREET
BARRIE, ON

WATER SERVICING PLAN



**PEARSON
ENGINEERING LTD.**
PEARSONENG.COM PH. 705.719.4785

DESIGNED BY	AMC	HORIZ SCALE	1:1000	PROJECT #	19051
DRAWN BY	AMC	VERT SCALE		DRAWING #	FIG-2
CHECKED BY	MWD	DATE	MAY 2019	REVISION #	0

CITY OF BARRIE FILE NO. D28-048-2018

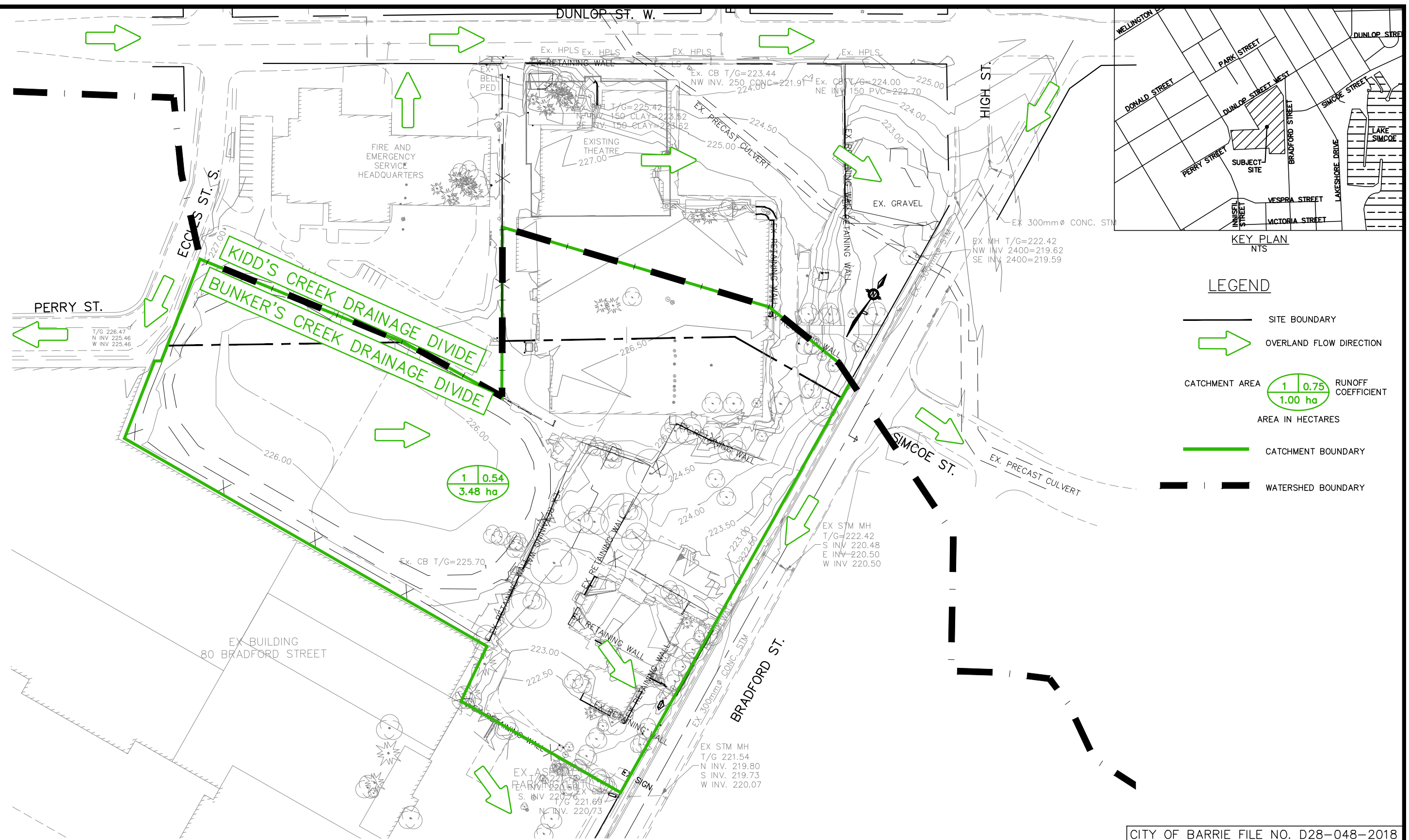
NO.	REVISION NOTE	DATE	BY

SANITARY SERVICING PLAN



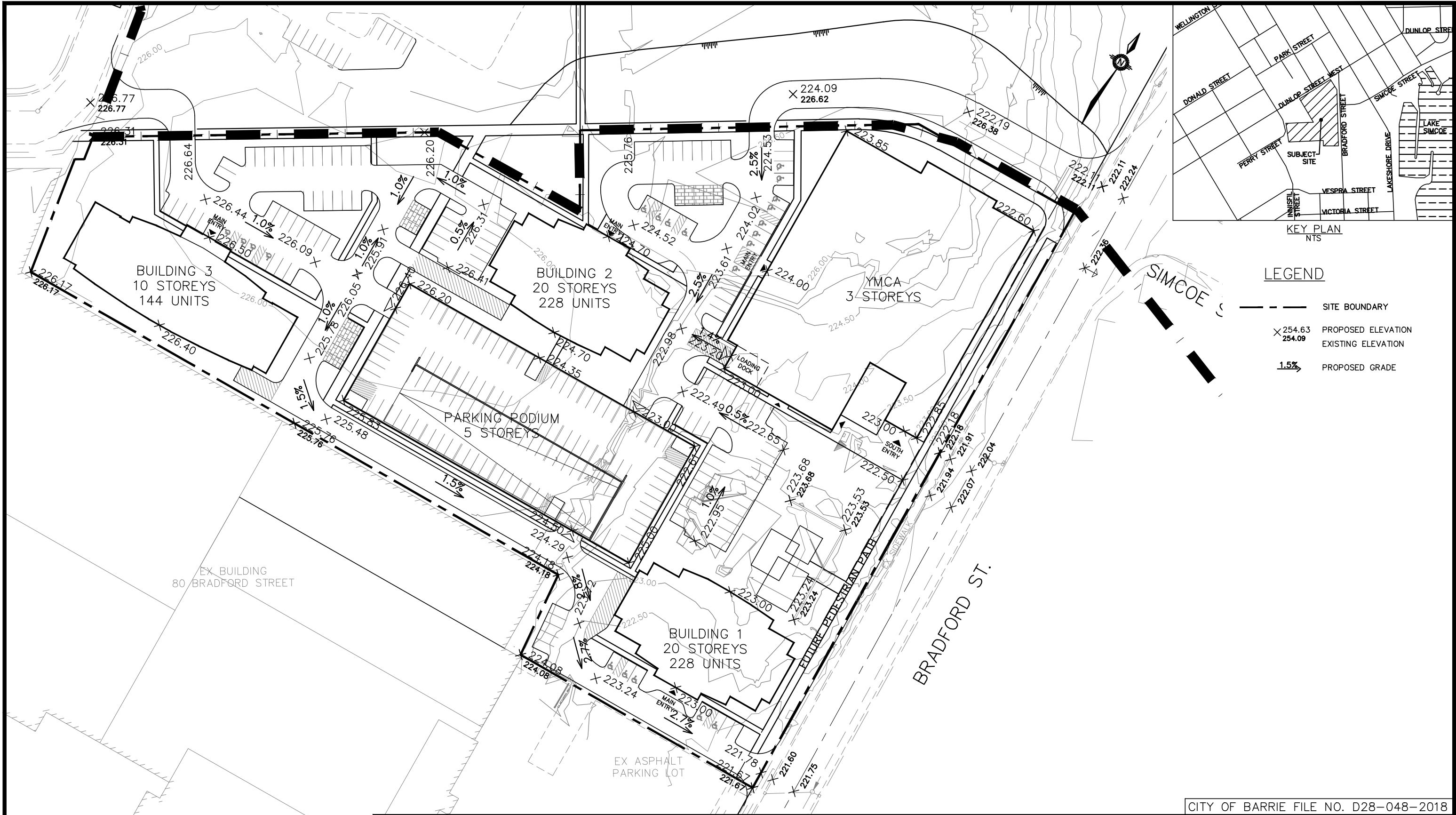
DESIGNED BY	AMC	HORIZ SCALE	1:1000	PROJECT #	19051
DRAWN BY	AMC	VERT SCALE		DRAWING #	FIG-3
CHECKED BY	MWD	DATE	MAY 2019	REVISION #	0

C:\Users\acleaves\AppData\Local\Temp\AcPublish_11556\19051-BASE.dwg Layout:FIG 4 - PRE Plotted Jun 10, 2019 @ 11:05am by acleaves @ PEARSON ENGINEERING LTD.



				HIP BARRIE CENTRAL INC. 34-50 BRADFORD STREET BARRIE, ON	 PEARSON ENGINEERING LTD. PEARSONENG.COM PH. 705.719.4785					
				PRE-DEVELOPMENT STORM DRAINAGE PLAN	DESIGNED BY	AMC	HORIZ SCALE	1:1500	PROJECT #	19051
					DRAWN BY	AMC	VERT SCALE		DRAWING #	FIG-4
					CHECKED BY	MWD	DATE	MAY 2019	REVISION #	0
NO.	REVISION NOTE			DATE	BY					

C:\Users\acleaves\AppData\Local\Temp\AcPublish_111556\19051-BASE.dwg Layout:FIG 6 - GRADING ALTERNATIVE Plotted Jun 10, 2019 @ 11:05am by acleaves @ PEARSON ENGINEERING LTD.



BENCHMARK

ELEVATIONS SHOWN HERON AREA GEODETIC AND ARE REFERRED TO A TABLET SET IN THE BARRIE GOVERNMENT WHARF AT THE SE END OF BAYFIELD STREET, 3.8m W OF THE E CORNER OF THE BEND IN THE WHARF AND 4.8m E OF THE W CORNER OF BED. TABLET IS SET FLUSH WITH CONCRETE SURFACE NEAR END OF WHARF. ESTABLISHED BY TOPOGRAPHICAL SURVEY. CONCRETE WHARF HAS BEEN PAVED BUT TABLET IS STILL VISIBLE.
ELEVATION = 220.21

NO.	REVISION NOTE	DATE	BY

HIP BARRIE CENTRAL INC.
34-50 BRADFORD STREET
BARRIE, ON

ALTERNATIVE DRIVEWAY ENTRANCES
SITE GRADING PLAN

CITY OF BARRIE FILE NO. D28-048-2018

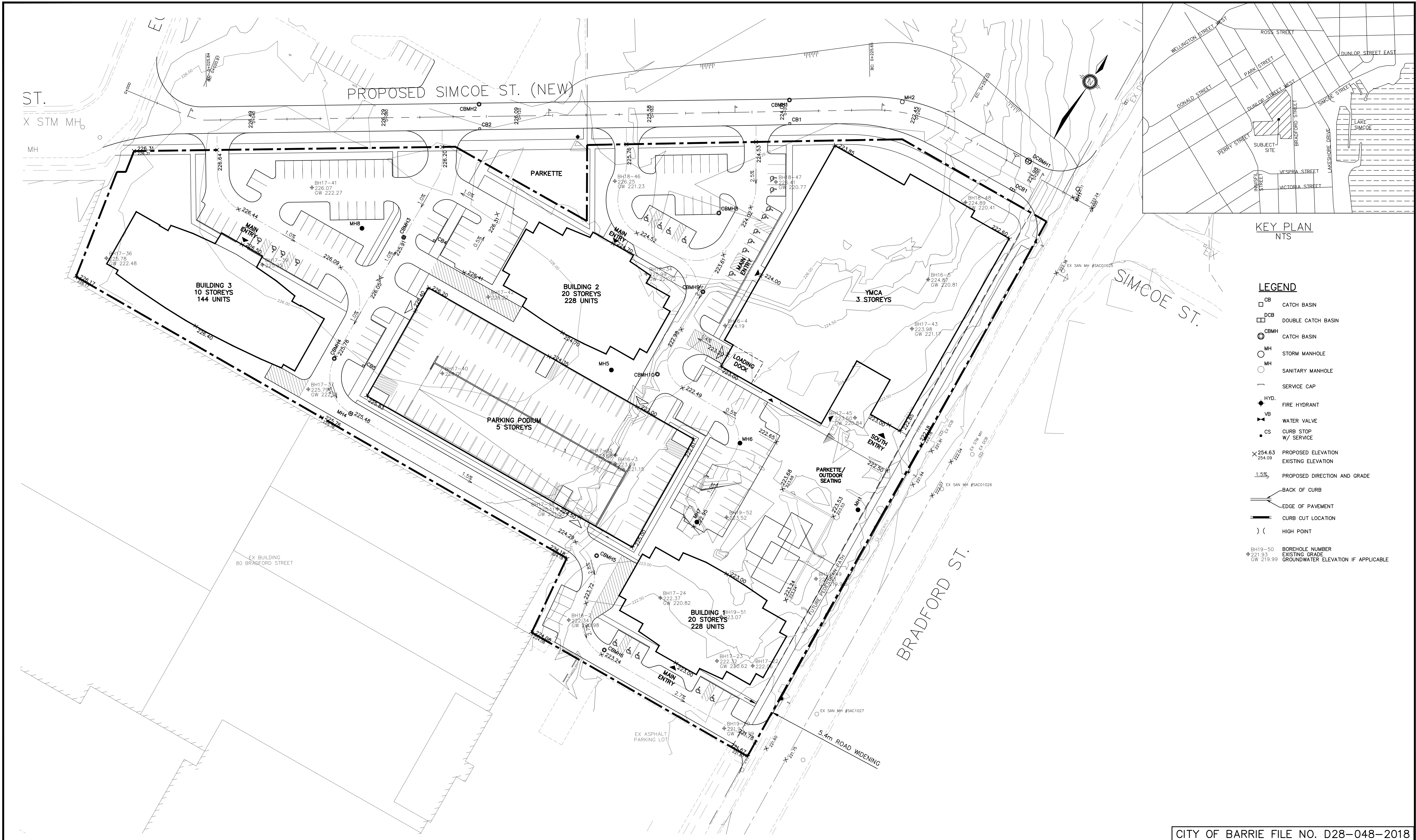


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PEARSONENG.COM PH. 705.719.4785

DESIGNED BY	AMC	HORIZ SCALE	1:1000	PROJECT #	19051
DRAWN BY	AMC	VERT SCALE		DRAWING #	FIG-6
CHECKED BY	MWD	DATE	MAY 2019	REVISION #	0

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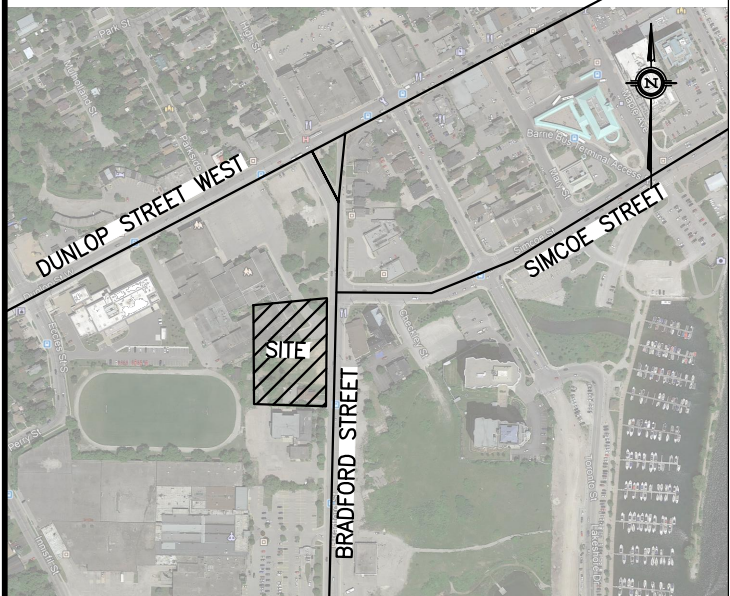
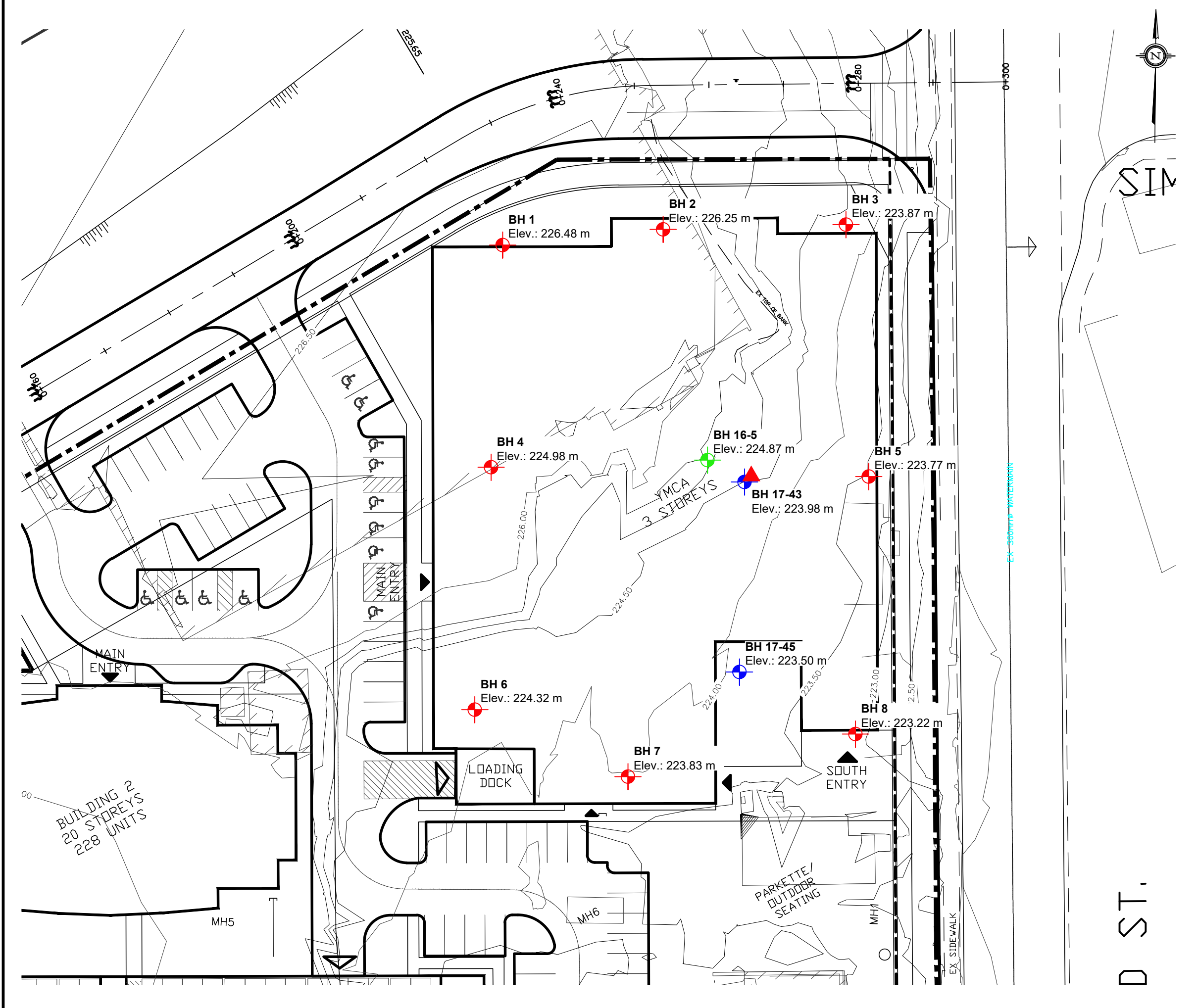
CITY OF BARRIE FILE NO. D28-048-2018

				BENCHMARK: ELEVATIONS SHOWN HERON AREA GEODETIC AND ARE REFERRED TO A TABLET SET IN THE BARRIE GOVERNMENT WHARF AT THE SE END OF BAYFIELD STREET, 3.8m W OF THE E CORNER OF THE BEND IN THE WHARF AND 4.8m E OF THE W CORNER OF BED. TABLET IS SET FLUSH WITH CONCRETE SURFACE NEAR END OF WHARF. ESTABLISHED BY TOPOGRAPHICAL SURVEY. CONCRETE WHARF HAS BEEN PAVED BUT TABLET IS STILL VISIBLE. ELEVATION = 220.21	 BARRIE CENTRAL DOWNTOWN SINCE 1843 RESIDENCES	HIP BARRIE CENTRAL INC. 34-50 BRADFORD STREET BARRIE, ON	 PEARSON ENGINEERING LTD. PEARSONENG.COM PH. 705.719.4785				
						SITE GRADING PLAN		DESIGNED BY AMC HORIZ SCALE 1:500 PROJECT # 19051			
								DRAWN BY AMC VERT SCALE DRAWING # SG-1			
								CHECKED BY MWD DATE MAY 2019 REVISION # 0			
NO.	REVISION NOTE			DATE	BY						

Appendix “B”

Borehole Logs and Borehole Location Plan YMCA Site





KEY PLAN SOURCE: Google Earth

LEGEND

- TBM: Top of well casing of monitoring well in center of property (CVD BH 17-43)
Elevation: 223.98 m
- CVD Borehole Location - 2019
- CVD Borehole Location - 2017
- CVD Borehole Location - 2016

BOREHOLE LOCATION PLAN

Proposed YMCA

Bradford Street
Barrie, Ontario



CHUNG & VANDER DOELEN
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KITCHENER / ONTARIO / N2H 5E1 / 519-742-8979

Drawn By: AB	Date: June, 2019	File No.: G19773
Checked By: EYC	Scale: 1:500	Drawing No.: 1

FILE No: G16303**BOREHOLE No. 16-05**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Jul 05 - 16 TO Jul 05 - 16**

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 _p W W _L ↗ ○ ↖						
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10 20 30						
223.35 1.52	50 mm of ASPHALT															flush mount cover set in concrete	
	loose to compact, brown FILL, sand trace silt, trace gravel contains cinders, moist	0.5		1	SS	19											
		1.0		2	SS	5											bentonite seal from 0.76 to 1.83 m depth
		1.5															50 mm diameter PVC riser from 2.29 m depth to surface
		2.0		3	SS	6											sand screen from 1.83 to 5.33 m depth
		2.5		4	SS	8											
		3.0															
		3.5		5	SS	19											
218.94 5.93	loose to compact brown SAND trace to some silt moist to saturated	4.0		6	SS	28										50 mm diameter PVC slotted screen from 2.29 m to 5.33 m depth	
		4.5															
		5.0		7	SS	28											
		5.5		8	SS	23											
		6.0															
		6.5															
		7.0															
	End of Borehole	7.5															
	8.0																
	8.5																
	9.0																
	9.5																
	10.0														water in monitoring well at 4.06 m depth on July 13, 2016		
	10.5																
	11.0														water in monitoring well at 4.16 m depth on October 4, 2016		
	11.5																
	12.0																
	12.5																
	13.0																
	13.5																

PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
ENGINEERING LTD.**311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

FILE No: G16303**BOREHOLE No. 16-19**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-50T**Method: **Solid Stem Augers**Size: **150 mm O.D.**Date: **Sep 29 - 16 TO Sep 29 - 16**

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 _p W W _L ↔ — ○ — ↔							
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10 20 30							
221.84 2.20	200 mm of TOPSOIL	0.5		1	SS	14	●						○				flush mount cover set in concrete bentonite seal from 0.46 to 1.22 m depth	
	loose to compact dark brown to brown	1.0		2	SS	6	●						○					
	FILL, sand trace to some silt contains organics	1.5		3	SS	7	●						○					
	218.86 5.18	damp	2.0		4	SS	20	●						○				50 mm diameter PVC riser from 1.52 m depth to surface sand screen from 1.22 to 4.57 m depth
		compact to dense brown	2.5		5	SS	36	●						○				
		SAND trace to some silt, trace gravel	3.0		6	SS	17	●						○				
		moist to saturated	4.0		7	SS	16	●						○				
		4.5																
End of Borehole	5.0																	
		5.5																
		6.0																
		6.5																
		7.0																
		7.5																
		8.0																
		8.5																
		9.0																
		9.5																
		10.0														water in monitoring well at 3.35 m depth on Septemehr 28, 2016		
		10.5																
		11.0														water in monitoring well at 3.37 m depth on October 4, 2016		
		11.5																
		12.0																
		12.5																
		13.0																
		13.5																

PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

BOREHOLE No. 17-43



Location: **50 Bradford Street, Barrie, Ontario**

Machine: **Diedrich D-120**
Method: **Hollow Stem Auger**
Size: **105 mm I.D.**
Date: **Aug 31 - 17 TO Aug 31 - 1**

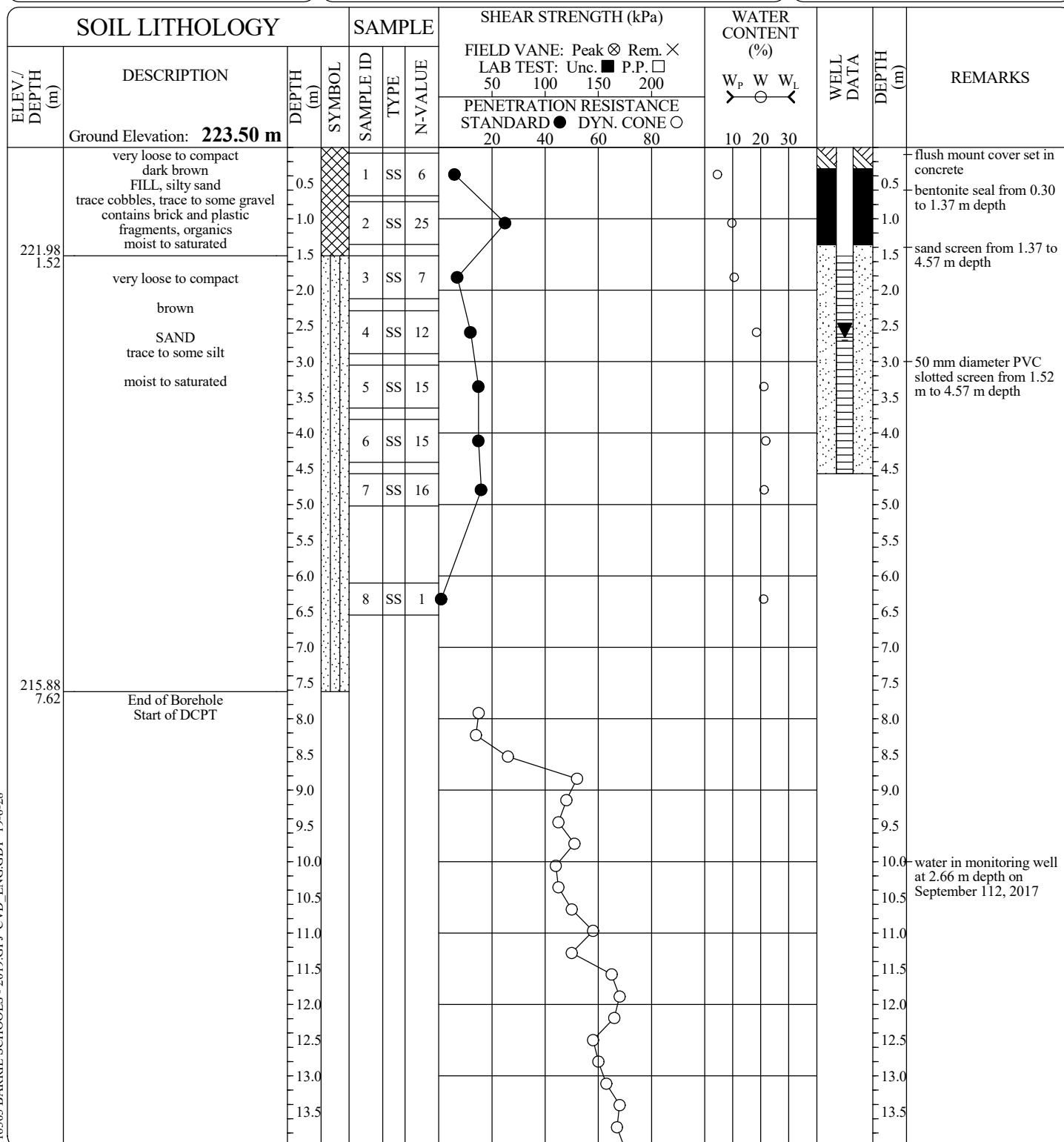
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PROJECT MANAGER: EYC

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CVD BOREHOLE (2017) G16303 BARRIE SCHOOLS - 2019.GPJ CVD ENG.GDT 19-6-28

FILE No: G16303**BOREHOLE No. 17-45**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Aug 31 - 17 TO Aug 31 - 17**PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
ENGINEERING LTD.**311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

FILE No: G16303**BOREHOLE No. 17-45**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Aug 31 - 17 TO Aug 31 - 17**

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. □				PENETRATION RESISTANCE STANDARD ● DYN. CONE ○							W _p W W _L			
							50	100	150	200	20	40	60	80				10	20	30	
	(continued)																				
207.96 15.54		14.5														14.5					
		15.0														15.0					
	End of DCPT	15.5														15.5					
		16.0														16.0					
		16.5														16.5					
		17.0														17.0					
		17.5														17.5					
		18.0														18.0					
		18.5														18.5					
		19.0														19.0					
		19.5														19.5					
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		25.5														25.5					
		26.0														26.0					
		26.5														26.5					
		27.0														27.0					
		27.5														27.5					

PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
ENGINEERING LTD.**311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

BOREHOLE No. 1



Location: **50 Bradford Street, Barrie, Ontario**

Date: **May 10 - 19** TO **May 10 - 19**

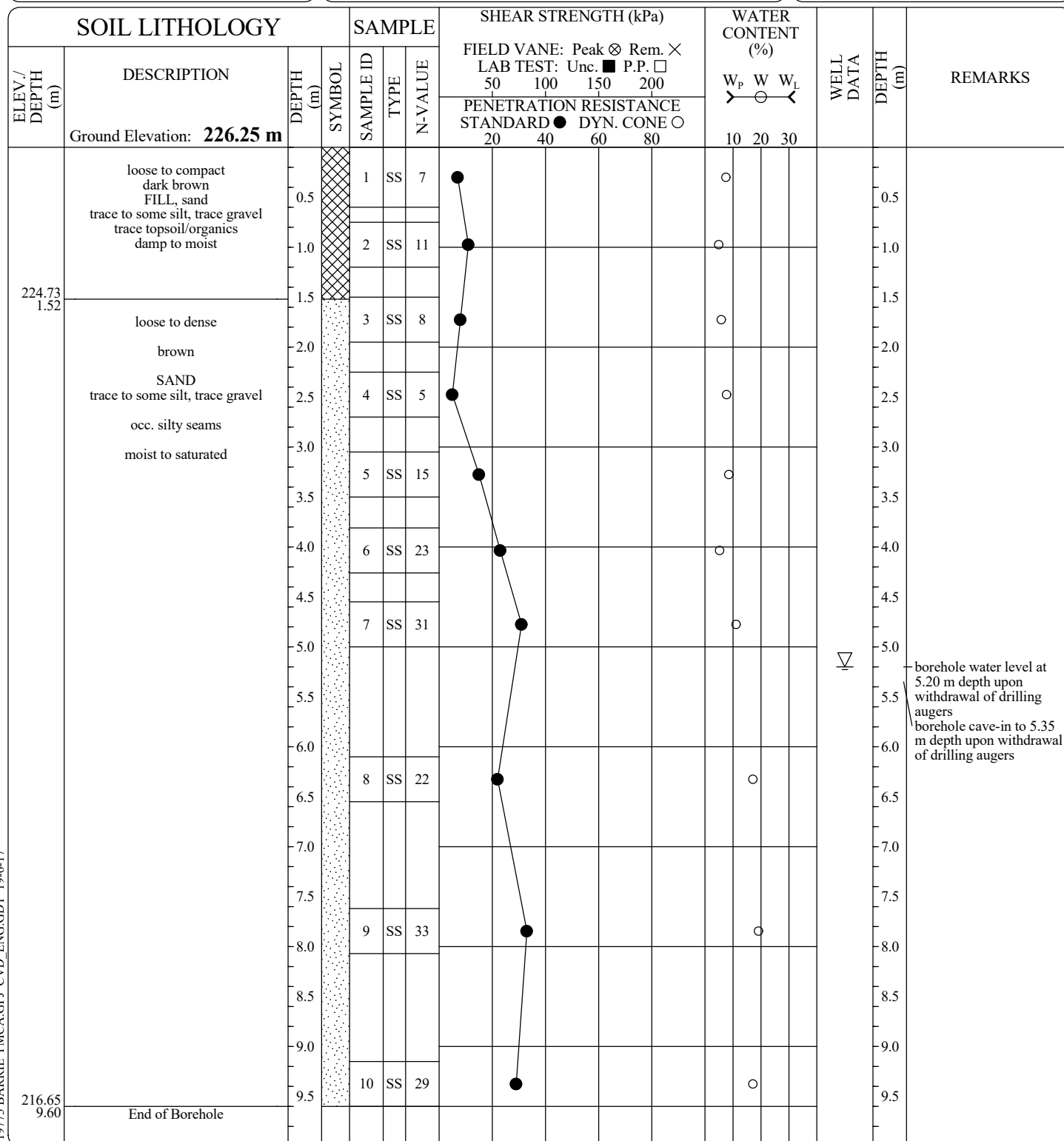
SOIL LITHOLOGY				SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS		
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □				W _p W W _L							
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○				↗ ○ ↖							
Ground Elevation: 226.48 m							20	40	60	80	10	20	30					
	loose to dense brown SAND trace gravel, trace silt occ. silty seams moist to saturated	0.5		1	SS	5	●						○			0.5		
		1.0		2	SS	6	●						○			1.0		
		1.5														1.5		
		2.0		3	SS	4	●							○				2.0
		2.5		4	SS	9	●							○				2.5
		3.0																3.0
		3.5		5	SS	15	●							○				3.5
		4.0		6	SS	25	●							○				4.0
		4.5																4.5
		5.0		7	SS	31	●								○			
5.5															5.5	∇ borehole water level and cave-in at 5.50 m depth upon withdrawal of drilling augers		
6.0															6.0			
6.5	8	SS	35	●									○		6.5			
7.0															7.0			
7.5															7.5			
8.0	9	SS	33	●									○			8.0		
8.5																8.5		
9.0																9.0		
9.5	10	SS	33	●									○			9.5		
216.88 9.60	End of Borehole																	

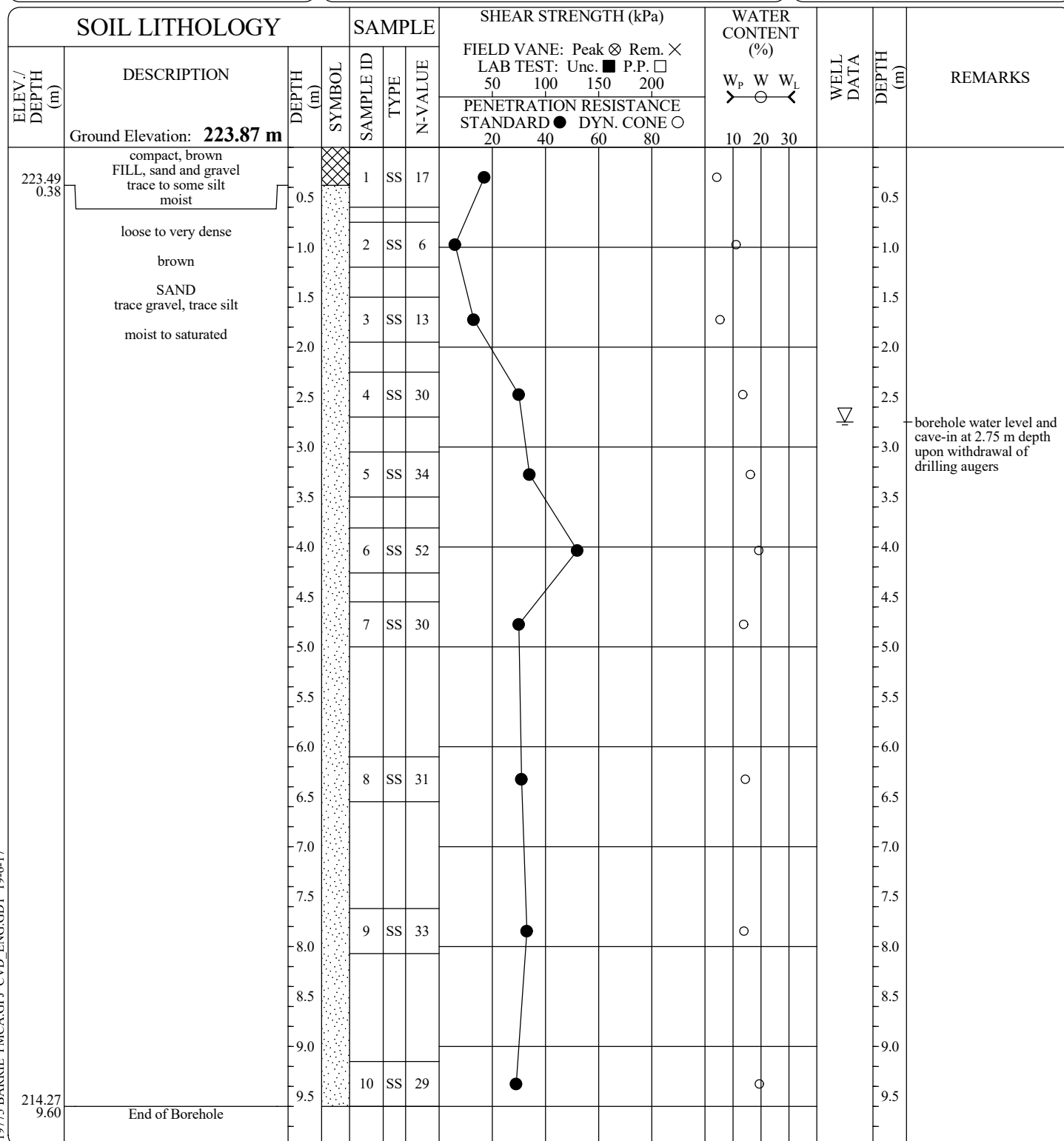
PROJECT MANAGER: EYC

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ph. (519) 742-8979, fx. (519) 742-7739

CVD BOREHOLE (2017) G19773 BARRIE YMCA.GPJ CVD_ENG.GDT 19-6-17

FILE No: G19773**BOREHOLE No. 2**Client: **HIP Developments**Project: **Proposed YMCA**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **D50T**Method: **Hollow Stem Augers**Size: **107mm ID**Date: **May 10 - 19 TO May 10 - 19**PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
ENGINEERING LTD.**
 311 Victoria Street North
 Kitchener, Ontario N2H 5E1
 ph. (519) 742-8979, fx. (519) 742-7739

FILE No: G19773**BOREHOLE No. 3**Client: **HIP Developments**Project: **Proposed YMCA**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **D50T**Method: **Hollow Stem Augers**Size: **107mm ID**Date: **May 10 - 19 TO May 10 - 19**PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
ENGINEERING LTD.**311 Victoria Street North
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BOREHOLE No. 4



Location: **50 Bradford Street, Barrie, Ontario**

EQUIPMENT DATA

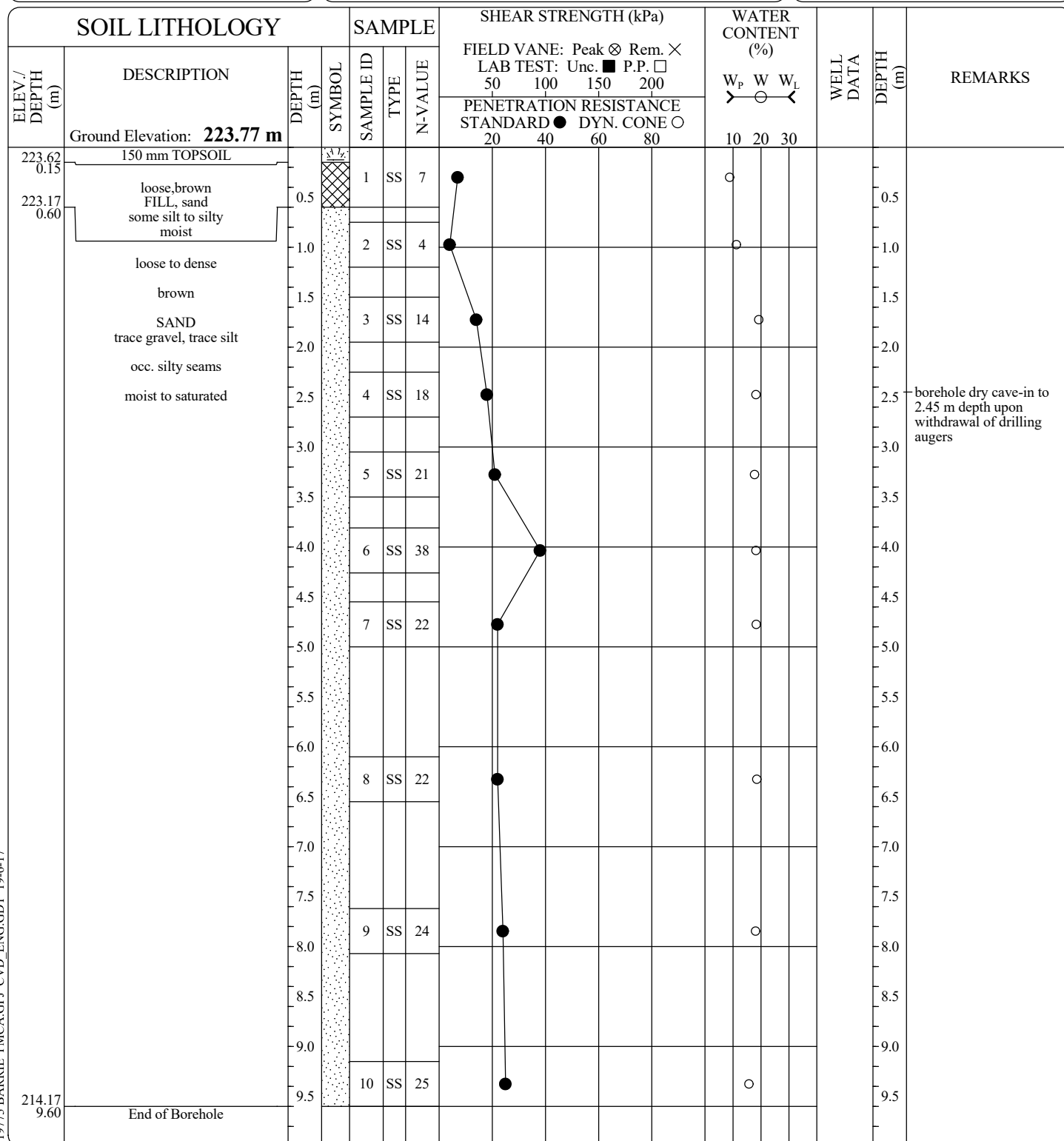
Date: **May 09 - 19** TO **May 09 - 19**

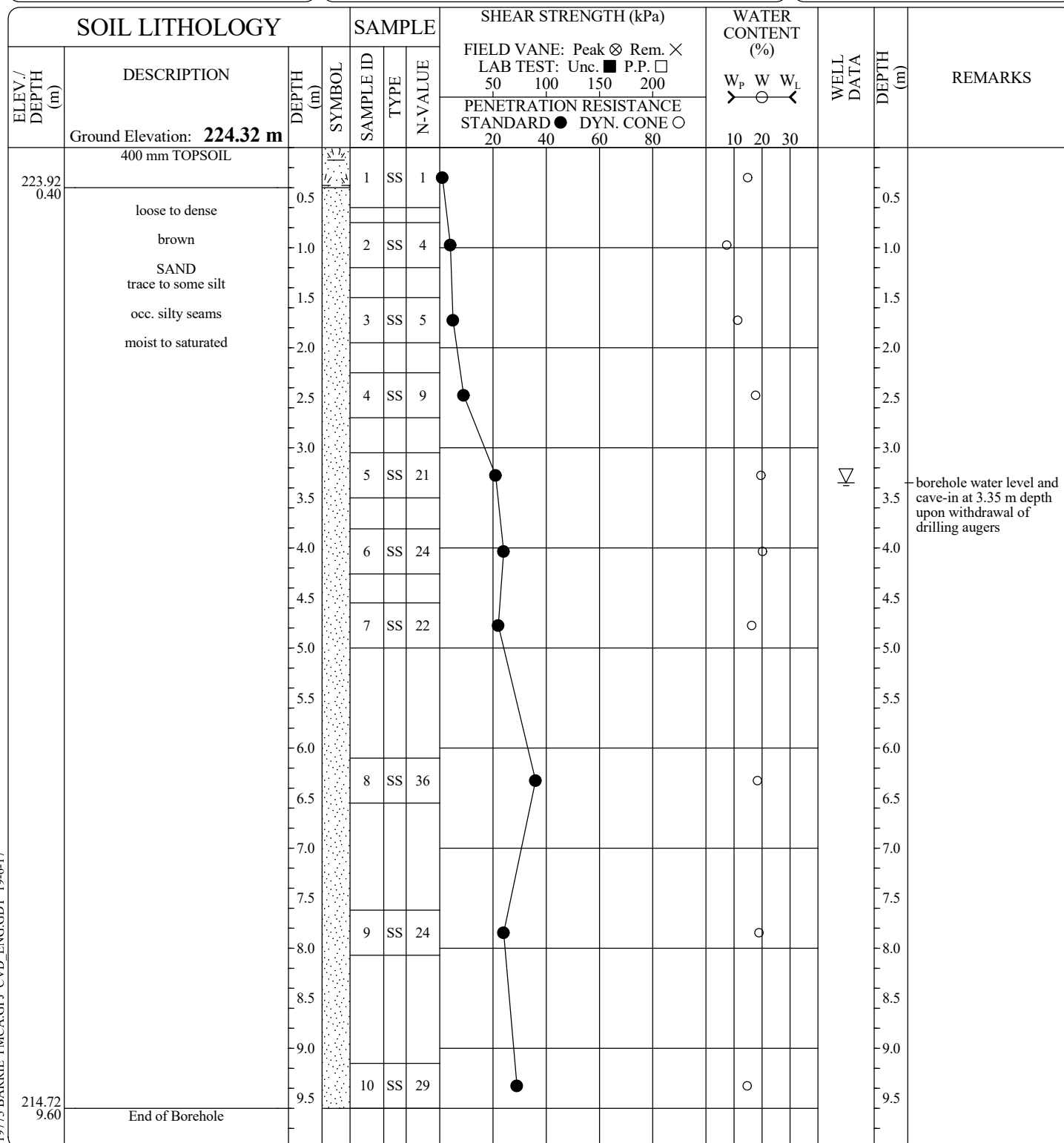
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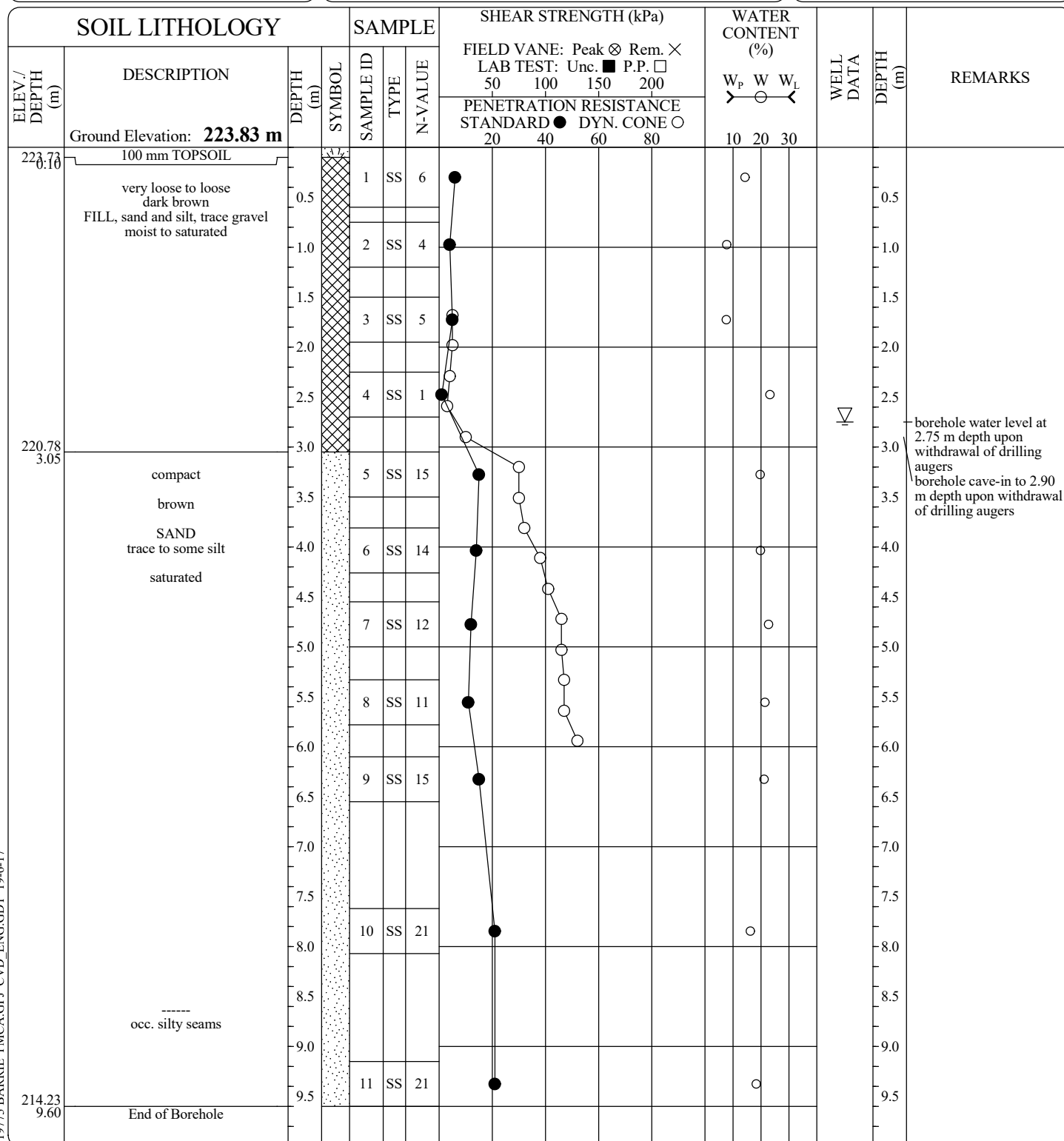
CVD BOREHOLE (2017) G19773 BARRIE YMCA.GPJ CVD ENG.GDT 19-6-17

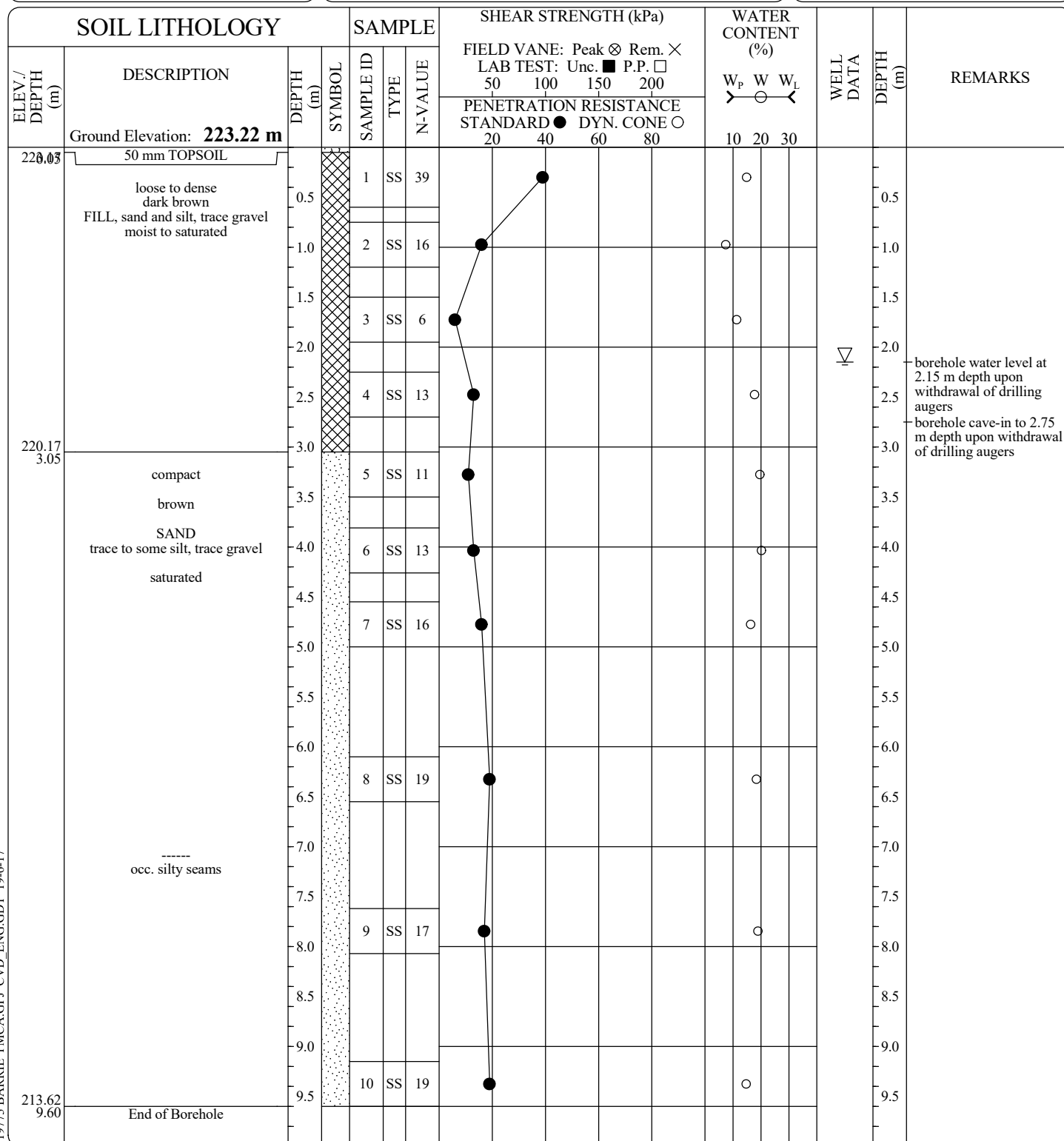
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FILE No: G19773**BOREHOLE No. 5**Client: **HIP Developments**Project: **Proposed YMCA**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **D50T**Method: **Hollow Stem Augers**Size: **107mm ID**Date: **May 10 - 19 TO May 10 - 19**PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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FILE No: G19773**BOREHOLE No. 6**Client: **HIP Developments**Project: **Proposed YMCA**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **D50T**Method: **Hollow Stem Augers**Size: **107mm ID**Date: **May 09 - 19 TO May 09 - 19**PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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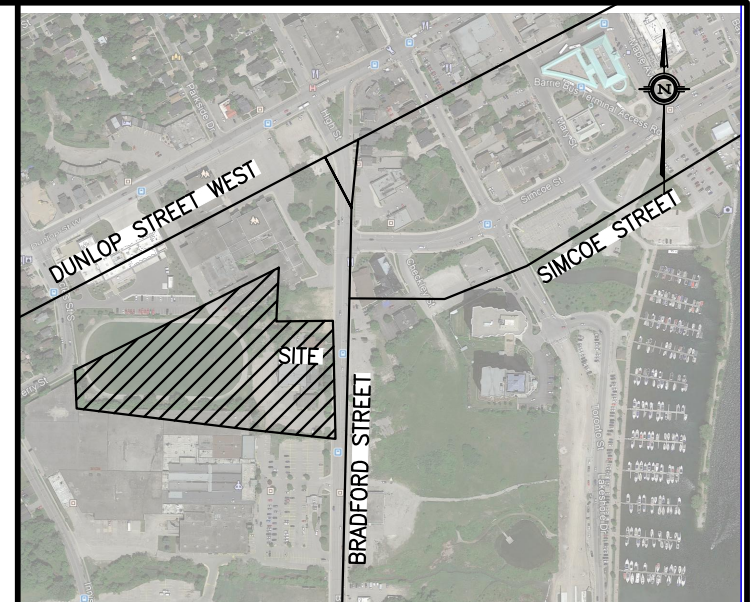
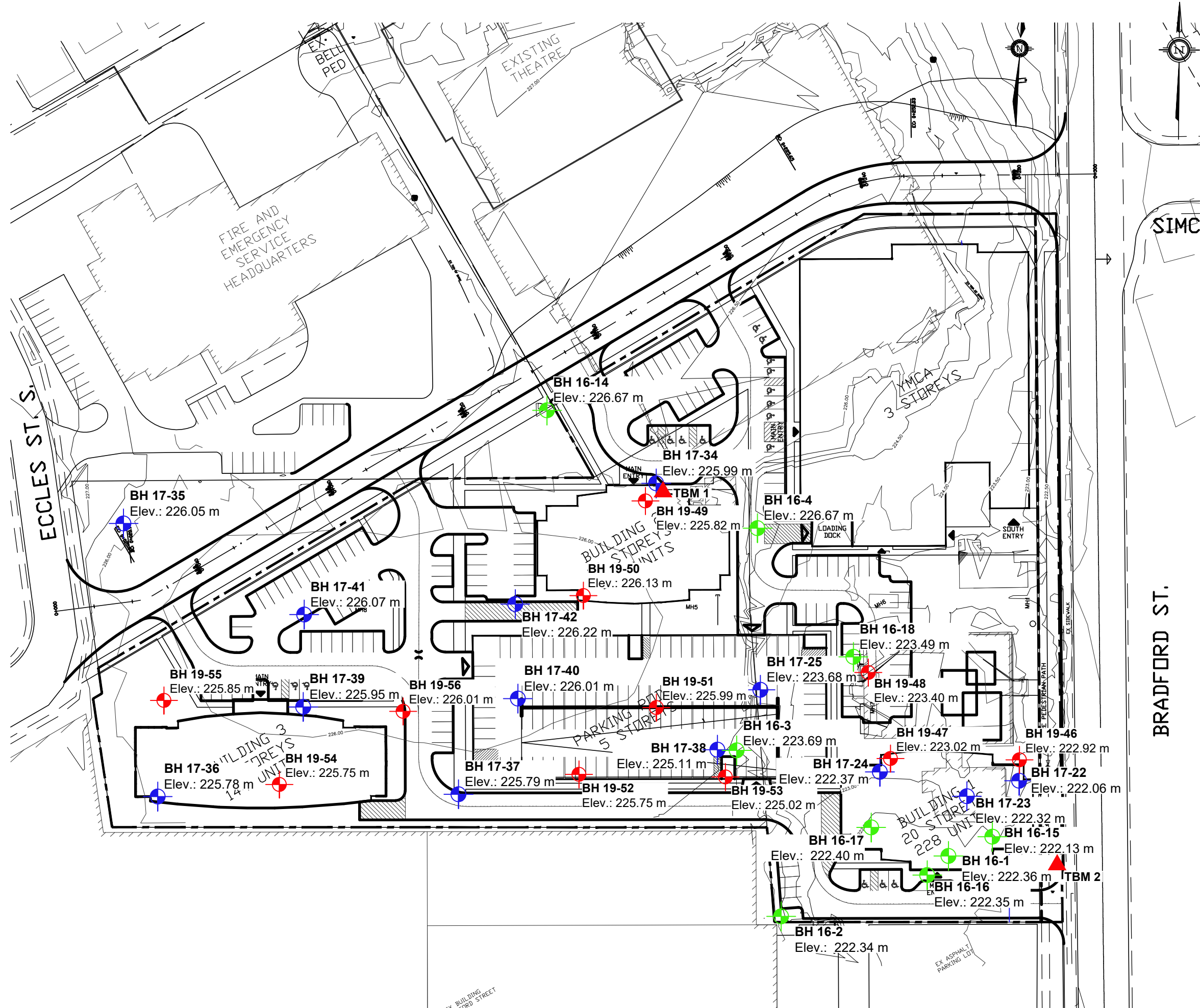
FILE No: G19773**BOREHOLE No. 7**Client: **HIP Developments**Project: **Proposed YMCA**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **D50T**Method: **Hollow Stem Augers**Size: **107mm ID**Date: **May 09 - 19 TO May 09 - 19**PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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 Kitchener, Ontario N2H 5E1
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FILE No: G19773**BOREHOLE No. 8**Client: **HIP Developments**Project: **Proposed YMCA**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **D50T**Method: **Hollow Stem Augers**Size: **107mm ID**Date: **May 09 - 19 TO May 09 - 19**PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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Appendix “C”

Borehole Logs and Borehole Location Plan Apartment Site





KEY PLAN SOURCE: Google Earth

- LEGEND**
- TBM 1 - Top of monitoring well casing in northeast corner of soccer field (BH 17- 34)
Geodetic - 225.99 m
 - TBM 2 - Top of Nut of Fire Hydrant near most southeast corner of site
Geodetic - 222.618 m
 - CVD Borehole Location - 2019
 - CVD Borehole Location - 2017
 - CVD Borehole Location - 2016

BOREHOLE LOCATION PLAN

Proposed Redevelopment

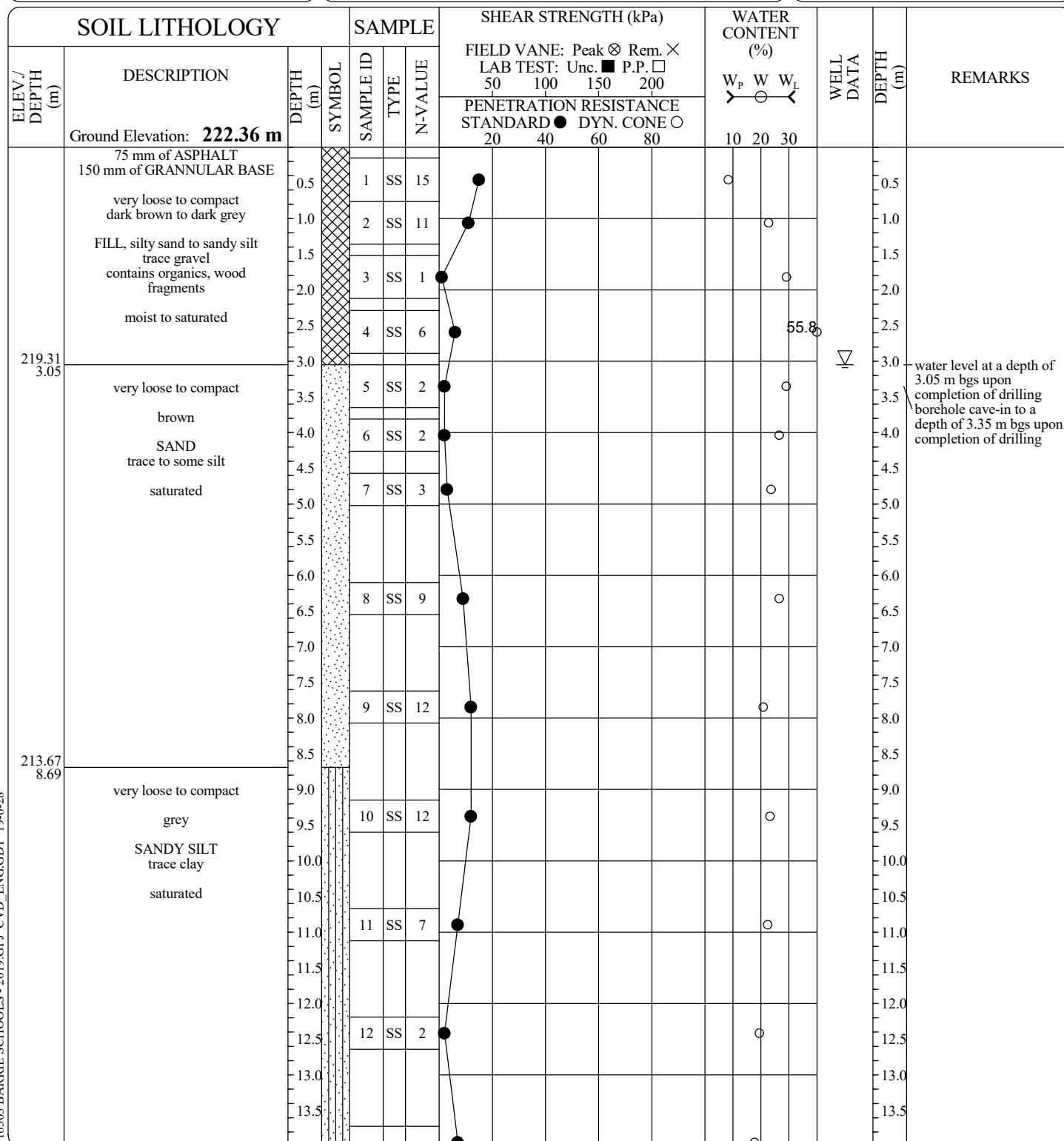
50 Bradford Street
Barrie, Ontario



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

Drawn By: AB	Date: June, 2019	File No.: G16303
Checked By: EYC	Scale: 1:1000	Drawing No.: 1

FILE No: G16303**BOREHOLE No. 16-01**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Jul 05 - 16 TO Jul 05 - 16**PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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FILE No: G16303

BOREHOLE No. 16-01



Client: **HIP Developments**

Project: **Proposed Development**

Location: **50 Bradford Street, Barrie, Ontario**

EQUIPMENT DATA

Machine: **Diedrich D-120**

Method: **Hollow Stem Auger**

Size: **105 mm I.D.**

Date: **Jul 05 - 16 TO Jul 05 - 16**

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 _P W W _L					
							PENETRATION RESISTANCE				↗ ○ ↖					
							STANDARD ● DYN. CONE ○				10 20 30					
	(continued)			13	SS	7										
		14.5													14.5	
		15.0													15.0	
		15.5		14	SS	15	●					○			15.5	
		16.0													16.0	
		16.5													16.5	
		17.0		15	SS	14	●					○			17.0	
		17.5													17.5	
204.53 17.83	compact, grey SAND, trace silt saturated	18.0													18.0	
		18.5		16	SS	17	●					○			18.5	
203.46 18.90	End of Borehole Start of DCPT	19.0													19.0	
		19.5						○							19.5	
		20.0													20.0	
		20.5													20.5	
201.79 20.57	End of DCPT	20.5													20.5	
		21.0													21.0	
		21.5													21.5	
		22.0													22.0	
		22.5													22.5	
		23.0													23.0	
		23.5													23.5	
		24.0													24.0	
		24.5													24.5	
		25.0													25.0	
		25.5													25.5	
		26.0													26.0	
		26.5													26.5	
		27.0													27.0	
		27.5													27.5	

PROJECT MANAGER: **EYC**

**CHUNG & VANDER DOELEN
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FILE No: G16303**BOREHOLE No. 16-02**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Jul 05 - 16 TO Jul 05 - 16**

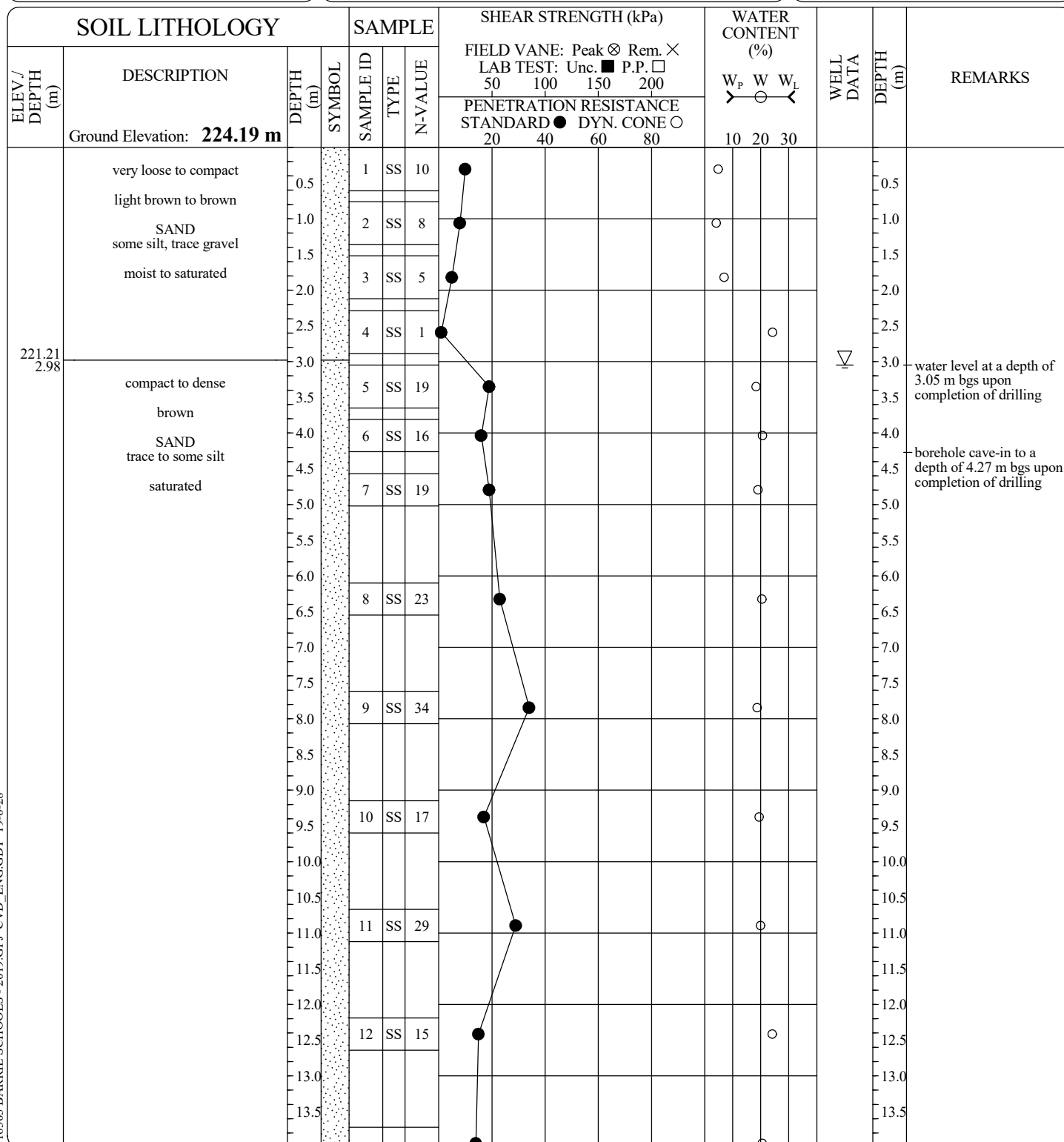
SOIL LITHOLOGY			SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS		
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □				PENETRATION RESISTANCE						
							50	100	150	200	STANDARD ● DYN. CONE ○						
Ground Elevation: 222.34 m							20	40	60	80	W _p	W	W _L				
220.51 1.83	60 mm of ASPHALT 300 mm of GRANULAR BASE	0.5		1	SS	8	●							○		flush mount cover set in concrete	
	very loose to loose, dark brown FILL, silty sand to sandy silt trace gravel	1.0		2	SS	6	●								○		
		moist to saturated		1.5													
219.60 2.74	loose, dark brown PEAT, saturated	2.0	3	SS	2	●								○		bentonite seal from 0.91 to 3.96 m depth	
		2.5	4	SS	5	●								○			
	very loose to loose brown SAND trace to some silt saturated	3.0	5	SS	3	●									○	50 mm diameter PVC riser from 4.57 m depth to surface	
3.5														○			
4.0		6	SS	5	●									○			
4.5																	
5.0		7	SS	7	●									○			
216.85 5.49	compact brown SILTY SAND saturated	5.5														50 mm diameter PVC slotted screen from 4.57 m to 7.62 m depth	
		6.0															
		6.5	8	SS	11	●									○		
214.11 8.23	End of Borehole Start of DCPT	7.0															
		7.5															
		8.0	9	SS	13	●									○		
209.08 13.26	End of DCPT	8.5					○									water in monitoring well at 1.36 m depth on July 13, 2016	
		9.0					○										
		9.5					○										
		10.0					○										
		10.5					○										
		11.0					○										
		11.5					○										
		12.0					○										
		12.5					○										
		13.0					○										
		13.5													water in monitoring well at 1.45 m depth on October 4, 2016		

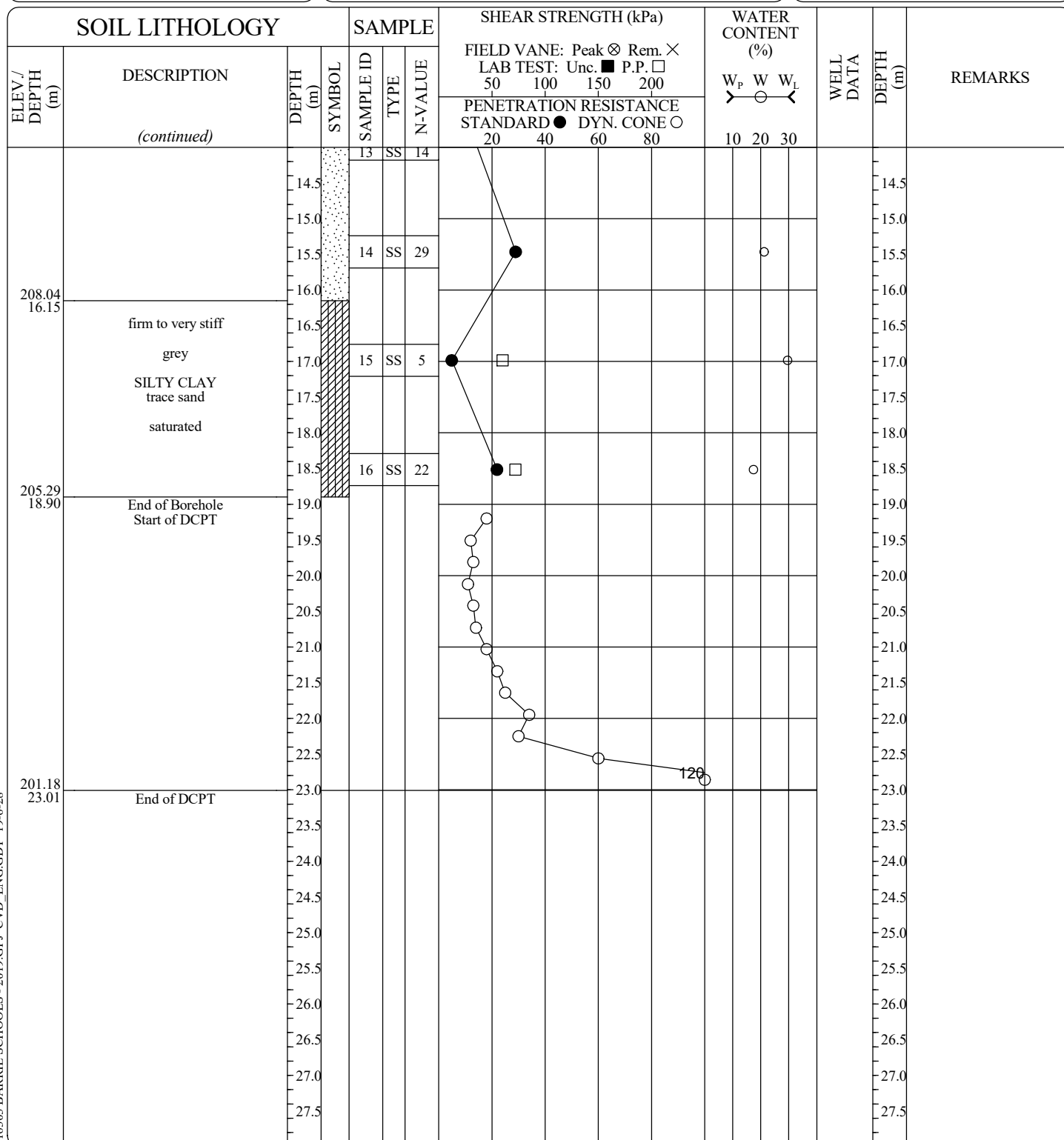
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FILE No: G16303**BOREHOLE No. 16-03**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Jul 04 - 16 TO Jul 04 - 16**

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 _p W W _L ↗ ○ ↖					
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10 20 30					
223.08 0.61	Ground Elevation: 223.69 m 50 mm of ASPHALT 50 mm of GRANNULAR BASE very loose to compact, brown FILL, sand, trace silt, moist very loose to loose brown SAND trace to some silt saturated	0.5		1	SS	7	●									flush mount cover set in concrete bentonite seal from 0.46 to 1.22 m depth 50 mm diameter PVC riser from 1.52 m depth to surface sand screen from 1.22 to 4.57 m depth
		1.0		2	SS	8	●									
		1.5														
		2.0														
		2.5		3	SS	2	●									
		3.0														
		3.5														
		4.0														
		4.5		4	SS	1	●									
		5.0														
		5.5														
		6.0														
		6.5														
		7.0														
		7.5														
		8.0														
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		9.5														
		10.0														
		10.5														
		11.0														
		11.5														
		12.0														
		12.5														
		13.0														
		13.5														
219.12 4.57	End of Borehole															

PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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FILE No: G16303**BOREHOLE No. 16-04**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Jul 04 - 16 TO Jul 04 - 16**PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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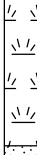
FILE No: G16303**BOREHOLE No. 16-04**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Jul 04 - 16 TO Jul 04 - 16**PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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FILE No: G16303**BOREHOLE No. 16-14**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Jul 07 - 16 TO Jul 07 - 16**

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 _p W W _L					
							20 40 60 80				10 20 30					
Ground Elevation: 226.67 m																
222.86 3.81	50 mm of ASPHALT	0.5		1	SS	14	●						○			flush mount cover set in concrete
	250 mm of GRANULAR BASE	1.0		2	SS	7	●						○			
	loose to compact	1.5											○			
	light brown	2.0											○			bentonite seal from 0.61 to 2.44 m depth
	SAND (fine grain)	2.5											○			50 mm diameter PVC riser from 3.05 m depth to surface
	trace to some silt	3.0														sand screen from 2.44 to 6.10 m depth
	damp	3.5											○			
		4.0											○			
219.96 6.71	compact	4.5														
	light brown to brown	5.0														
	SAND	5.5														
	trace to some silt	6.0														
	damp to saturated	6.5														
		7.0														
		7.5														
		8.0														
End of Borehole		8.5														
		9.0														
		9.5														
		10.0														water in monitoring well at 4.99 m depth on July 13, 2016
		10.5														
		11.0														water in monitoring well at 5.14 m depth on October 4, 2016
		11.5														
		12.0														
		12.5														
		13.0														
		13.5														

PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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FILE No: G16303**BOREHOLE No. 16-15**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-50T**Method: **Solid Stem Augers**Size: **150 mm O.D.**Date: **Sep 28 - 16 TO Sep 28 - 16**

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				WATER CONTENT (%) W _p W W _L						
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80										
	Ground Elevation: 222.13 m																
220.61 1.52	75 mm of ASPHALT 150 mm of GRANNULAR BASE very loose to compact, dark brown FILL, silty sand to sandy silt contains organics, slag and cinders moist	0.5		1	SS	13											
		1.0		2	SS	2											
		1.5															
218.78 3.35	very loose, dark brown SILTY SAND and PEAT (interlayered) contains wood fragments saturated	2.0		3	SS	2											
		2.5		4	SS	2											
		3.0															
216.95 5.18	very loose, brown SAND trace to some silt trace organics saturated	3.5		5	SS	6											
		4.0		6	SS	2											
		4.5															
214.51 7.62	End of Borehole Continuation of DCPT	5.0		7	SS	4											
		5.5															
		6.0															
		6.5															
		7.0															
	End of DCPT	7.5															
		8.0															
		8.5															
		9.0															
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FILE No: G16303**BOREHOLE No. 16-16**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-50T**Method: **Solid Stem Augers**Size: **150 mm O.D.**Date: **Sep 28 - 16 TO Sep 28 - 16**

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 _p W W _L					
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10 20 30					
219.76 2.59	75 mm of ASPHALT 50 mm of GRANNULAR BASE	0.5		1	SS	21	●						○			▽ water level and cave-in at a depth of 1.22 m bgs upon completion of drilling
	very loose to compact dark brown to dark grey FILL, silty sand to sandy silt contains organics moist	1.0		2	SS	9	●						○			
		1.5														
		2.0		3	SS	5	●									
	2.5															
	3.0	4		SS	3	●										
	3.5															
218.24 4.11	very loose, dark brown to dark grey SILTY SAND and PEAT (interlayered) contains wood fragments saturated	4.0		5	SS	3	●						○			
	4.5															
217.17 5.18	very loose, brown SAND trace to some silt trace organics saturated	5.0		6	SS	2	●						○			
	5.5												○			
	End of Borehole	5.5														
		6.0														
		6.5														
		7.0														
		7.5														
		8.0														
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		13.5														

PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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FILE No: G16303**BOREHOLE No. 16-17**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-50T**Method: **Solid Stem Augers**Size: **150 mm O.D.**Date: **Sep 28 - 16 TO Sep 28 - 16**

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 _p W W _L					
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80									
Ground Elevation: 222.40 m											10 20 30					
220.80 1.60	75 mm of ASPHALT 75 mm of GRANNULAR BASE very loose to compact, dark brown FILL, silty sand to sandy silt contains organics, slag and cinders moist	0.5		1	SS	10	●	○					○			water level and cave-in at a depth of 1.83 m bgs upon completion of drilling
		1.0		2	SS	4	●	○					○			
		1.5					○									
		2.0	3	SS	9	●	○						○			
		2.5					○									
		3.0	4	SS	4	●	○						○			
217.22 5.18	very loose brown SAND trace to some silt trace organics moist to saturated	3.5		5	SS	1	●	○						○		
		4.0					○									
		4.5					○									
		5.0	6	SS	16	●	○						○			
		5.5					○									
		6.0					○									
214.78 7.62	End of Borehole Continuation of DCPT	6.5					○									
		7.0					○									
		7.5					○									
		8.0														
		8.5														
		9.0														
	9.5															
	10.0															
	10.5															
	11.0															
	11.5															
	12.0															
	12.5															
	13.0															
	13.5															

water level and cave-in at
a depth of 1.83 m bgs
upon completion of
drilling

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

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

FILE No: G16303**BOREHOLE No. 16-18**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-50T**Method: **Solid Stem Augers**Size: **150 mm O.D.**Date: **Sep 28 - 16 TO Sep 28 - 16**

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 _p	W	W _L
							50 100 150 200				PENETRATION RESISTANCE								
							STANDARD ● DYN. CONE ○				20 40 60 80								
Ground Elevation: 223.49 m																			
218.31 5.18	very loose to compact dark brown to brown SAND trace to some silt damp to saturated	0.5		1	SS	6	●							○				0.5	flush mount cover set in concrete bentonite seal from 0.46 to 1.22 m depth 50 mm diameter PVC riser from 1.52 m depth to surface sand screen from 1.22 to 4.57 m depth
		1.0		2	SS	7	●							○		1.0			
		1.5														1.5			
		2.0		3	SS	4	●							○		2.0			
		2.5														2.5			
		3.0		4	SS	3	●								○			3.0	
	----- silty sand layer	3.5															3.5	50 mm diameter PVC slotted screen from 1.52 m to 4.57 m depth	
		4.0															4.0		
		4.5															4.5		
		5.0	6	SS	18	●									○		5.0		
		5.5															5.5		
		6.0															6.0		
		6.5															6.5		
	End of Borehole	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		
		12.5															12.5		
		13.0															13.0		
13.5															13.5				

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ph. (519) 742-8979, fx. (519) 742-7739

FILE No: G16303**BOREHOLE No. 17-22**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Aug 29 - 17 TO Aug 29 - 17**

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 ○ 20 40 60 80							W _p W W _L 10 20 30			
220.46 1.60 <																					

∇

borehole cave-in and water level to 1.83 m bgs upon completion of drilling

PROJECT MANAGER: **EYC**
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ENGINEERING LTD.**

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

FILE No: G16303**BOREHOLE No. 17-23**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Aug 29 - 17 TO Aug 29 - 17**

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 _p W W _L					
							50 100 150 200				PENETRATION RESISTANCE					
							STANDARD ● DYN. CONE ○				20 40 60 80					
Ground Elevation: 222.32 m											10 20 30					
218.21 4.11	75 mm of ASPHALT 150 mm of GRANNULAR BASE	0.5		1	SS	22										flush mount cover set in concrete bentonite seal from 0.30 to 0.46 m depth sand screen from 0.46 to 3.81 m depth
	very loose to compact dark brown to dark grey	1.0		2	SS	8										
	FILL, silty sand to sandy silt trace gravel contains organics, wood fragments	1.5		3	SS	0										
	moist to saturated	2.0		4	SS	3										
		2.5		5	SS	2										
		3.0		6	SS	1										
		3.5		7	SS	10										
217.14 5.18	very loose to compact, brown SAND trace to some silt saturated	4.0														50 mm diameter PVC slotted screen from 0.76 m to 3.81 m depth
	End of Borehole	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														
		12.5														
		13.0														
		13.5														
																water in monitoring well at 1.70 m depth on September 11, 2017

PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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ph. (519) 742-8979, fx. (519) 742-7739

FILE No: G16303**BOREHOLE No. 17-24**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Aug 29 - 17 TO Aug 29 - 17**

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 _P W W _L ↗ ○ ↖					
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10 20 30					
Ground Elevation: 222.37 m																
220.85 1.52	75 mm of ASPHALT 150 mm of GRANNULAR BASE	0.5		1	SS	12	●								flush mount cover set in concrete bentonite seal from 0.30 to 0.46 m depth sand screen from 0.46 to 3.81 m depth	
	very loose to compact, dark brown FILL, silty sand to sandy silt contains organics, slag and cinders moist	1.0		2	SS	4	●									
1.5																
2.0			3	SS	1	●										
2.5			4	SS	4	●										
219.02 3.35	very loose, dark brown to brown SILTY SAND and PEAT (interlayered) contains wood fragments saturated	3.0												50 mm diameter PVC slotted screen from 0.76 m to 3.81 m depth		
		3.5		5	SS	1	●									
217.95 4.42	very loose to loose, brown SAND trace to some silt, trace organics saturated	4.0														
				6	SS	6	●									
End of Borehole																
		4.5														
		5.0														
		5.5														
		6.0														
		6.5														
		7.0														
		7.5														
		8.0														
		8.5														
		9.0														
		9.5														
		10.0													water in monitoring well at 1.55 m depth on September 11, 2017	
		10.5														
		11.0														
		11.5														
		12.0														
		12.5														
		13.0														
		13.5														

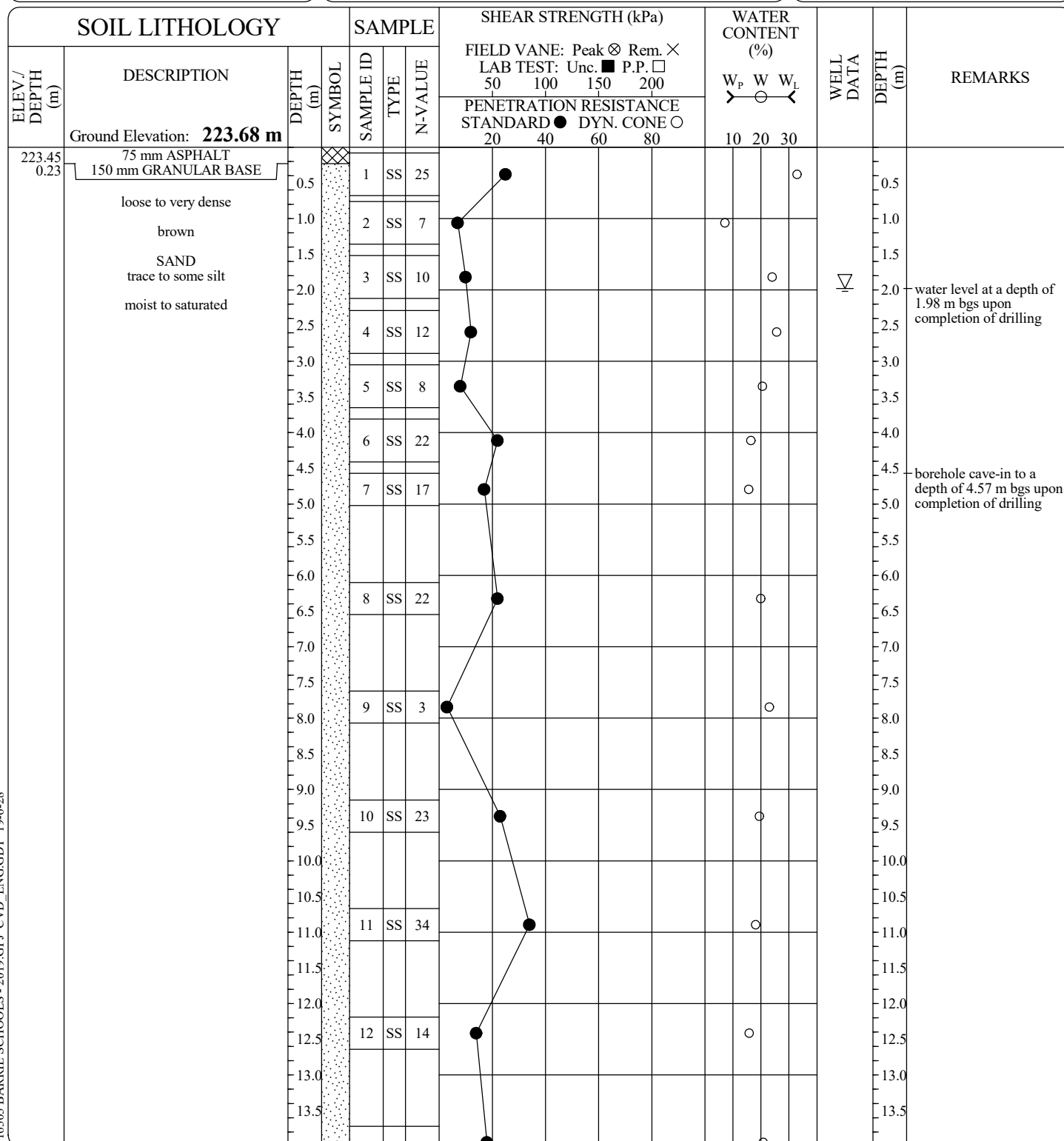
flush mount cover set in concrete
bentonite seal from 0.30 to 0.46 m depth
sand screen from 0.46 to 3.81 m depth

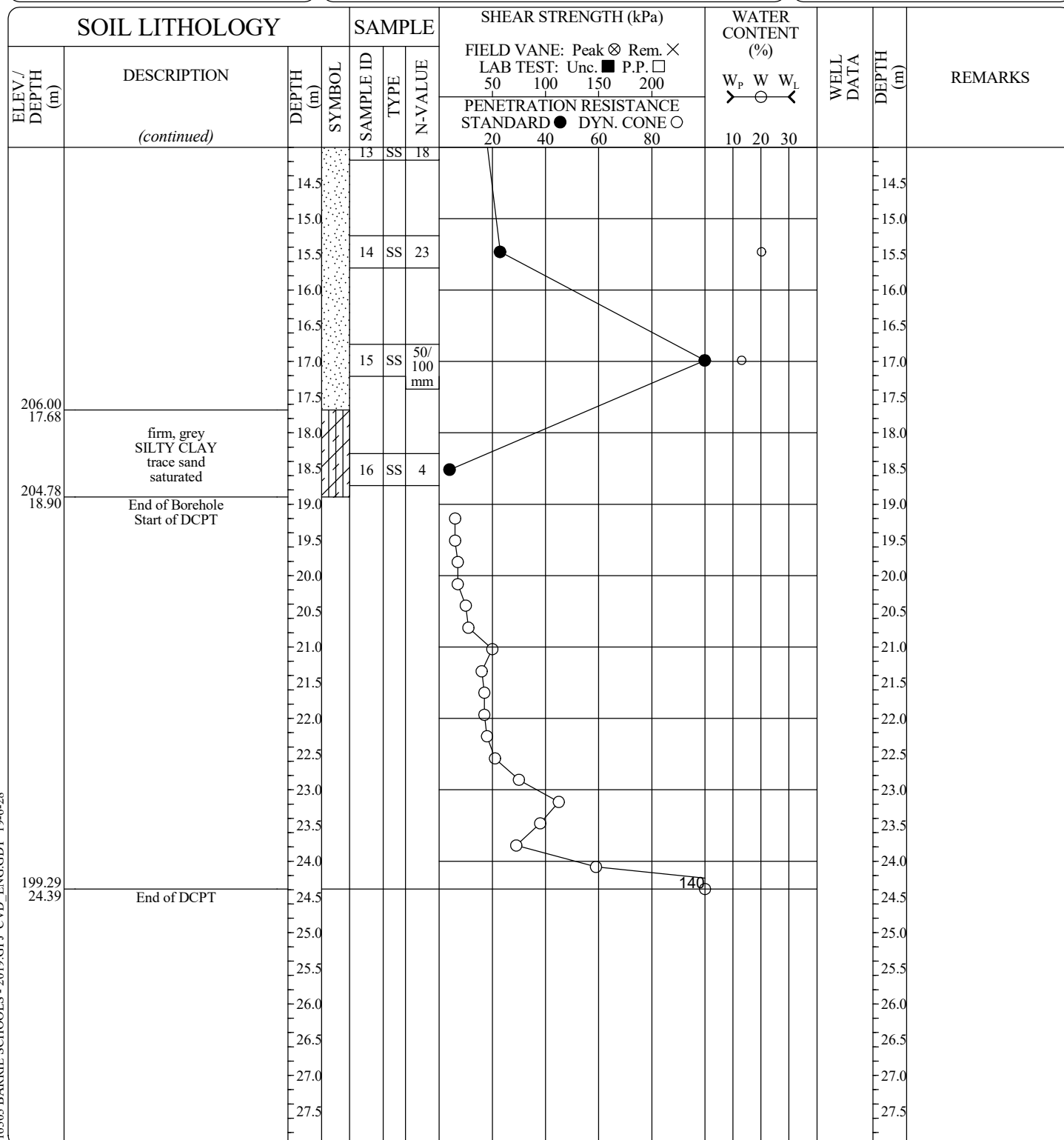
50 mm diameter PVC slotted screen from 0.76 m to 3.81 m depth

water in monitoring well at 1.55 m depth on September 11, 2017

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

FILE No: G16303**BOREHOLE No. 17-25**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Aug 29 - 17 TO Aug 29 - 17**PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

FILE No: G16303**BOREHOLE No. 17-25**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Aug 29 - 17 TO Aug 29 - 17**PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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ph. (519) 742-8979, fx. (519) 742-7739

FILE No: G16303**BOREHOLE No. 17-34**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Sep 19 - 17 TO Sep 19 - 17**

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 ○				20 40 60 80					
							Ground Elevation: 225.99 m						W _p W W _L			
	50 mm TOPSOIL			1	SS	17									flush mount cover set in concrete	
	very loose to compact	0.5														
	light brown to brown	1.0		2	SS	11									bentonite seal from 0.30 to 1.98 m depth	
	SAND (fine grain)	1.5														
	trace to some silt															
	damp	2.0		3	SS	6										
		2.5														
		3.0		4	SS	3									sand screen from 1.98 to 5.33 m depth	
		3.5														
		4.0		5	SS	7										
		4.5														
		5.0		6	SS	11									50 mm diameter PVC slotted screen from 2.29 m to 5.33 m depth	
221.57 4.42	compact, brown SAND	4.5														
220.81 5.18	trace to some silt damp to saturated	5.0		7	SS	25										
	End of Borehole	5.5														
		6.0														
		6.5														
		7.0														
		7.5														
		8.0														
		8.5														
		9.0														
		9.5														
		10.0														
		10.5													water in monitoring well at 4.57 m depth on September 22, 2017	
		11.0														
		11.5														
		12.0														
		12.5														
		13.0														
		13.5														

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FILE No: G16303**BOREHOLE No. 17-35**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Sep 19 - 17 TO Sep 19 - 17**

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 _P W W _L					
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○				10 20 30					
Ground Elevation: 226.05 m																
223.00 3.05	50 mm TOPSOIL	0.5		1	SS	10	●									flush mount cover set in concrete
	very loose to compact	1.0		2	SS	4	●									bentonite seal from 0.30 to 1.98 m depth
	light brown to brown	1.5														
	SAND (fine grain)	2.0		3	SS	2	●									
	trace to some silt	2.5		4	SS	1	●									sand screen from 1.98 to 5.33 m depth
	damp	3.0														
220.87 5.18	compact to dense, brown	3.5		5	SS	22	●									50 mm diameter PVC slotted screen from 2.29 m to 5.33 m depth
	SAND	4.0		6	SS	25	●									
	trace to some silt	4.5														
	saturated	5.0		7	SS	30	●									
	End of Borehole	5.5														
		6.0														
		6.5														
		7.0														
		7.5														
		8.0														
		8.5														
		9.0														
		9.5														
		10.0														water in monitoring well at 3.70 m depth on September 22, 2017
		10.5														
		11.0														
		11.5														
		12.0														
		12.5														
		13.0														
		13.5														

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FILE No: G16303**BOREHOLE No. 17-36**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Sep 01 - 17 TO Sep 01 - 17**

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 _P W W _L ↗ ⊙ ↖					
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10 20 30					
Ground Elevation: 225.78 m																
225.02 0.76	50 mm TOPSOIL loose, brown FILL, sandy silt, some gravel contians asphalt fragments moist	0.5		1	SS	7	●						○			flush mount cover set in concrete
		1.0		2	SS	8	●						○			bentonite seal from 0.30 to 1.98 m depth
	loose to compact light brown to brown	1.5														
	3	SS	7	●									○			
222.73 3.05	SAND (fine grain) trace to some silt damp	2.0														sand screen from 1.98 to 5.33 m depth
		2.5		4	SS	12	●						○			
		3.0														
	5	SS	21	●									○			50 mm diameter PVC slotted screen from 2.29 m to 5.33 m depth
220.60 5.18	compact to dense, brown SAND trace to some silt, trace gravel damp to saturated	3.5					●									
		4.0		6	SS	19	●						○			
		4.5														
	7	SS	33	●									○			
End of Borehole																
		5.5														
		6.0														
		6.5														
		7.0														
		7.5														
		8.0														
		8.5														
		9.0														
		9.5														
		10.0														
		10.5														water in monitoring well at 3.54 m depth on September 11, 2017
		11.0														
		11.5														
		12.0														
		12.5														
		13.0														
		13.5														

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FILE No: G16303**BOREHOLE No. 17-37**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Sep 01 - 17 TO Sep 01 - 17**

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 ○					
	Ground Elevation: 225.79 m						20	40	60	80	10	20	30			
225.03 0.76	50 mm TOPSOIL compact, dark brown FILL, silt, some gravel moist	0.5		1	SS	20										flush mount cover set in concrete
	loose to compact light brown to brown	1.0		2	SS	7										bentonite seal from 0.30 to 1.98 m depth
1.5																
2.0		SAND (fine grain) trace to some silt		3	SS	7										sand screen from 1.98 to 5.33 m depth
222.74 3.05	damp	2.5		4	SS	12										
	compact, brown SAND trace to some silt damp to saturated	3.0														
		3.5		5	SS	29										50 mm diameter PVC slotted screen from 2.29 m to 5.33 m depth
4.0			6	SS	27											
220.61 5.18		4.5														
		5.0		7	SS	29										
	End of Borehole	5.5														
		6.0														
		6.5														
		7.0														
		7.5														
		8.0														
		8.5														
		9.0														
		9.5														
		10.0														
		10.5														water in monitoring well at 4.01 m depth on September 11, 2017
		11.0														
		11.5														
		12.0														
		12.5														
		13.0														
		13.5														

PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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FILE No: G16303**BOREHOLE No. 17-38**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Sep 19 - 17 TO Sep 19 - 17**

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 _p W W _L ↗ ○ ↖					
Ground Elevation: 225.11 m							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10 20 30					
223.74 1.37	100 mm TOPSOIL			1	SS	5	●									flush mount cover set in concrete
	compact, brown FILL, sand, trace silt contians organics moist	0.5														bentonite seal from 0.30 to 1.37 m depth
222.82 2.29	very loose, light brown to brown SAND (fine grain) trace to some silt moist	1.0		2	SS	4	●									
		1.5														sand screen from 1.37 to 4.57 m depth
220.69 4.42	very loose to loose, brown SAND trace to some silt moist to saturated	2.0		3	SS	7	●									
		2.5		4	SS	5	●									
		3.0														50 mm diameter PVC slotted screen from 1.52 m to 4.57 m depth
		3.5		5	SS	5	●									
		4.0		6	SS	3	●									
	End of Borehole	4.5														
		5.0														
		5.5														
		6.0														
		6.5														
		7.0														
		7.5														
		8.0														
		8.5														
		9.0														
		9.5														
		10.0														water in monitoring well at 4.01 m depth on September 22, 2017
		10.5														
		11.0														
		11.5														
		12.0														
		12.5														
		13.0														
		13.5														

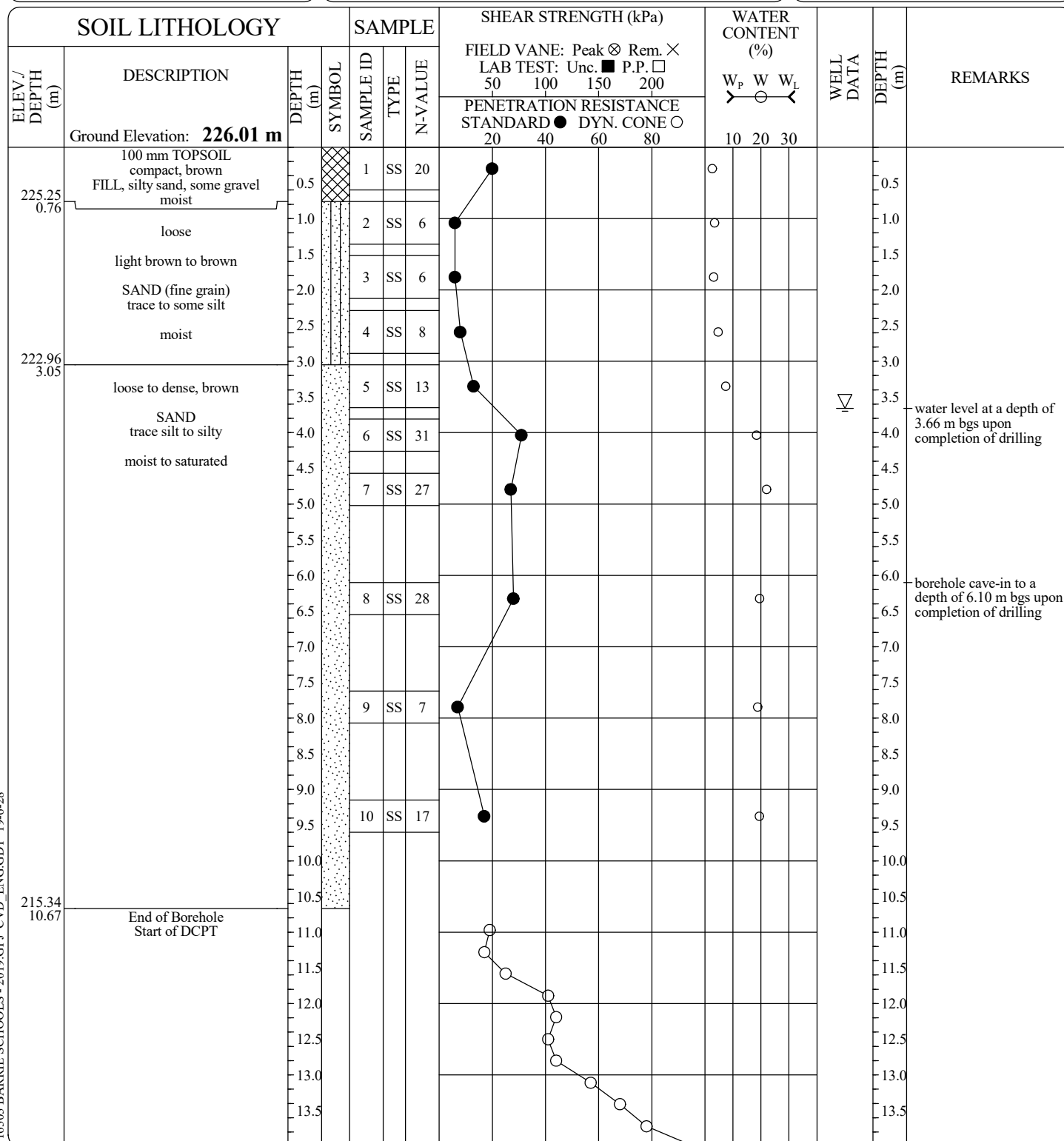
PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
ENGINEERING LTD.**311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

FILE No: G16303**BOREHOLE No. 17-39**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Sep 19 - 17 TO Sep 19 - 17**

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 _P W W _L ↗ ○ ↖						
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10 20 30						
Ground Elevation: 225.95 m																	
224.43 1.52	300 mm TOPSOIL			1	SS	11											borehole open and dry to 2.90 m bgs upon completion of drilling
	loose to compact dark brown to brown FILL, silty sand to sandy silt trace to some gravel contains organics moist	0.5														0.5	
		1.0	2	SS	6										1.0		
		1.5													1.5		
223.05 2.90	loose, brown SAND trace to some silt moist			3	SS	6											2.0
		2.0														2.0	
		2.5	4	SS	8										2.5		
		3.0														3.0	
	End of Borehole	3.0															
		3.5															
		4.0															
		4.5															
		5.0															
		5.5															
		6.0															
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		13.5															

borehole open and dry to 2.90 m bgs upon completion of drilling

PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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FILE No: G16303**BOREHOLE No. 17-40**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Aug 31 - 17 TO Aug 31 - 17**PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
ENGINEERING LTD.**311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

FILE No: G16303**BOREHOLE No. 17-40**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Aug 31 - 17 TO Aug 31 - 17**

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. □				PENETRATION RESISTANCE STANDARD ● DYN. CONE ○							W _P W W _L		
							20	40	60	80	20	40	60	80				10	20	30
208.33 17.68	(continued)	14.5														14.5				
		15.0														15.0				
		15.5														15.5				
		16.0														16.0				
		16.5														16.5				
		17.0														17.0				
		17.5														17.5				
		18.0														18.0				
		18.5														18.5				
		19.0														19.0				
		19.5														19.5				
		20.0														20.0				
	20.5														20.5					
	21.0														21.0					
	21.5														21.5					
	22.0														22.0					
	22.5														22.5					
	23.0														23.0					
	23.5														23.5					
	24.0														24.0					
	24.5														24.5					
	25.0														25.0					
	25.5														25.5					
	26.0														26.0					
	26.5														26.5					
	27.0														27.0					
	27.5														27.5					

PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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FILE No: G16303**BOREHOLE No. 17-41**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Sep 19 - 17 TO Sep 19 - 17**

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 _P W W _L ↗ — ○ — ↖						
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○				10 20 30						
Ground Elevation: 226.07 m																	
224.55 1.52	100 mm TOPSOIL			1	SS	11	●										
	compact, dark brown FILL, silty sand, trace gravel contians organics moist	0.5															
		1.0		2	SS	8	●										
223.02 3.05	very loose to loose, brown SAND (fine grain) trace to some silt moist	1.5															
		2.0		3	SS	2	●										
	2.5		4	SS	4	●											
222.41 3.66	very loose, brown SAND trace to some silt moist	3.0															
		3.5		5	SS	4	●										
	End of Borehole	4.0														borehole open and dry to 3.66 m bgs upon completion of drilling	
		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															
		12.5															
		13.0															
		13.5															

borehole open and dry to 3.66 m bgs upon completion of drilling

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FILE No: G16303**BOREHOLE No. 17-42**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D-120**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **Sep 19 - 17 TO Sep 19 - 17**

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 _P W W _L					
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10 20 30					
225.46 0.76 																

borehole open and dry to 4.42 m bgs upon completion of drilling

PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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FILE No: G16303**BOREHOLE No. 19-46**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D50T**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **May 23 - 19 TO May 23 - 19**

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. □				PENETRATION RESISTANCE STANDARD ● DYN. CONE ○						
							50	100	150	200	W _p	W				W _L	
Ground Elevation: 222.92 m							20	40	60	80	10	20	30				
219.72 3.20	loose to compact dark brown FILL, silty sand, trace gravel moist to saturated	0.5		1	SS	8	●						○				
	1.0	2		SS	9	●							○				
				3	SS	20		●					○				
	2.5	4	SS	4	●								○				
	3.0																
				5	SS	7	●							○			
	4.0	6	SS	3	●									○			
	4.5																
214.37 8.55	very loose to loose brown SAND trace to some silt occ. silty seams saturated	5.0		7	SS	7	●							○			
	5.5	8	SS	6	●									○			
	6.0																
				9	SS	9	●							○			
	7.0																
	7.5																
	8.0	10	SS	9	●									○			
	8.5																
	209.82 13.10	loose to compact brown to grey SANDY SILT saturated ----- occ. clayey seams	9.0														
9.5		11	SS		13		●								○		
10.0																	
10.5																	
11.0		12	SS		9	●											
12.0																	
12.5	13	SS	6	●										○			
13.0																	
13.5																	

PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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FILE No: G16303**BOREHOLE No. 19-46**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D50T**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **May 23 - 19 TO May 23 - 19**

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 _P W W _L					
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○									
	(continued)						20	40	60	80	10	20	30			
207.52 15.40	firm to very stiff, grey SILTY CLAY trace to some sand saturated	14.5		14	SS	4										
		15.0														
206.02 16.90	compact, brown to grey SAND and SILT occ. sand seams saturated	15.5		15	SS	27	●					○				
		16.0														
		16.5														
		17.0														
204.17 18.75	ver dense, grey SAND some silt occ. silty seams saturated	17.5														
		18.0														
		18.5		16	SS	53			●				○			
		18.5														
	End of Borehole	19.0														
		19.5														
		20.0														
		20.5														
		21.0														
		21.5														
		22.0														
		22.5														
		23.0														
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26.5																
27.0																
27.5																

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FILE No: G16303**BOREHOLE No. 19-47**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D50T**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **May 22 - 19 TO May 22 - 19**

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 _P W W _L						
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○				10 20 30						
222.12 0.90	dark brown, compact FILL, sand and gravel some silt trace topsoil/organics contains brick, concrete fragments moist	0.5		1	SS	23	●					○			0.5		
		1.0		2	SS	6	●						○			1.0	
		1.5														1.5	
		2.0						●						○		2.0	
		2.5						●						○		2.5	
		3.0														3.0	
		3.5						●						○		3.5	
		4.0						●						○		4.0	
	4.5														4.5		
	5.0						●						○		5.0		
	5.5						●						○		5.5		
	6.0														6.0		
	217.08 5.94	compact, brown SILTY SAND occ. sand seams saturated	6.5		9	SS	12	●						○		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			
12.5							●						○		12.5		
211.42 11.60	loose to very dense grey SANDY SILT trace clay occ. clayey seams saturated	13.0													13.0		
		13.5													13.5		

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FILE No: G16303**BOREHOLE No. 19-47**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D50T**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **May 22 - 19 TO May 22 - 19**

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 _P W W _L						
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○										
(continued)							20	40	60	80	10	20	30				
201.97 21.05	----- occ. sand seams/layers	14.5		14	SS	8									14.5		
		15.0														15.0	
		15.5		15	SS	25										15.5	
		16.0														16.0	
		16.5														16.5	
		17.0		16	SS	27										17.0	
		17.5														17.5	
	18.0														18.0		
	18.5		17	SS	50/ 100 mm										18.5		
	19.0														19.0		
	19.5														19.5		
	20.0														20.0		
	20.5														20.5		
	21.0														21.0		
	21.5		18	SS	9										21.5		
	22.0														22.0		
	196.22 26.80	stiff grey SILTY CLAY trace gravel, trace to some sand moist	22.5													22.5	
23.0															23.0		
23.5															23.5		
24.0															24.0		
24.5				19	SS	9									24.5		
25.0															25.0		
25.5															25.5		
26.0															26.0		
26.5															26.5		
27.0															27.0		
27.5		20	SS	59									27.5				

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PROJECT MANAGER: **EYC**

FILE No: G16303**BOREHOLE No. 19-47**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D50T**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **May 22 - 19 TO May 22 - 19**

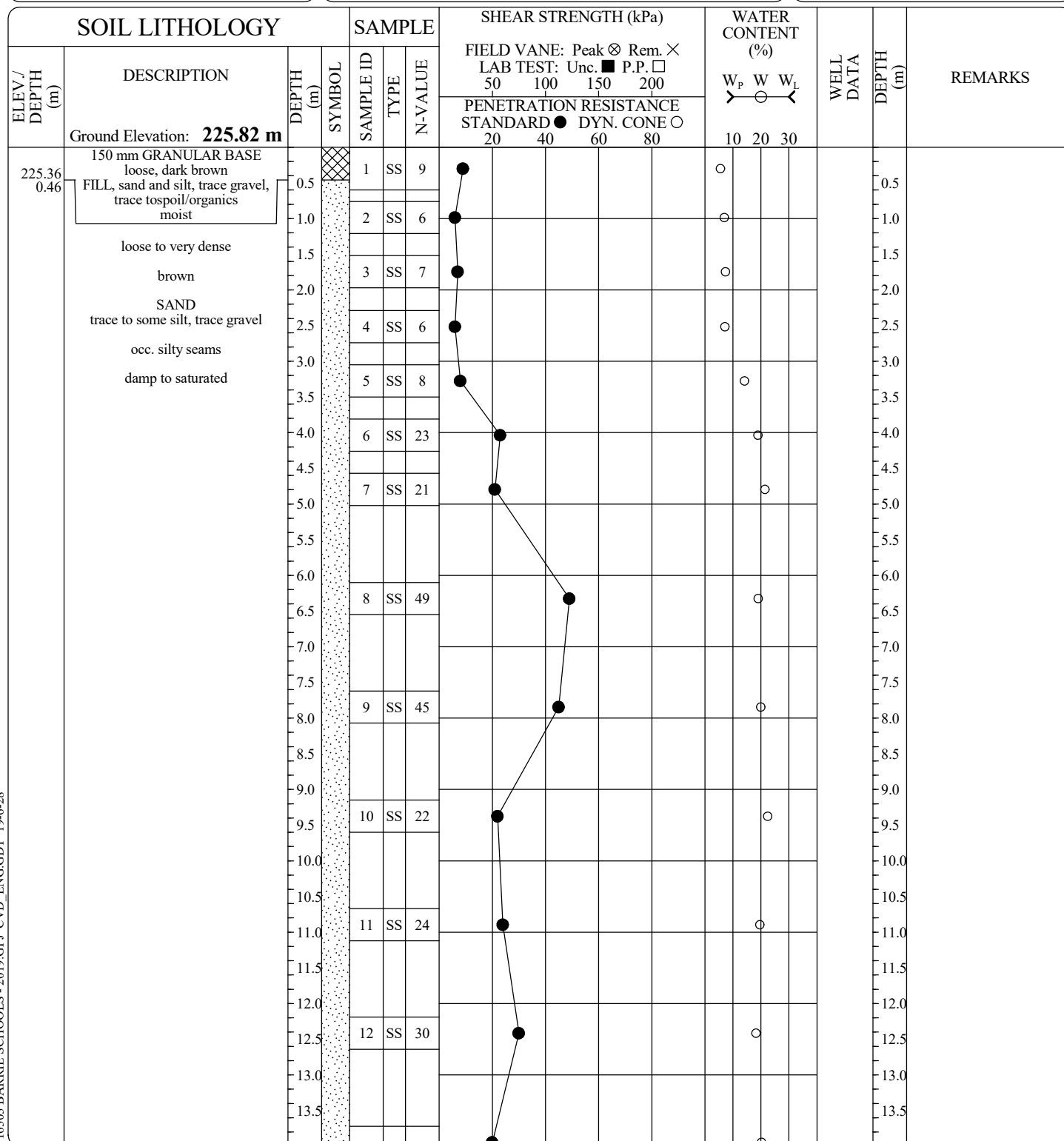
SOIL LITHOLOGY				SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)				WELL DATA	DEPTH (m)	REMARKS
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □				WATER CONTENT (%)						
							50	100	150	200	W _p	W	W _L				
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○										
	(continued)						20	40	60	80		10	20	30			
193.62 29.40		28.5														28.5	
		29.0		21	SS	62								○		29.0	
	End of Borehole	29.5														29.5	
		30.0														30.0	
		30.5														30.5	
		31.0														31.0	
		31.5														31.5	
		32.0														32.0	
		32.5														32.5	
		33.0														33.0	
		33.5														33.5	
		34.0														34.0	
		34.5														34.5	
		35.0														35.0	
		35.5														35.5	
		36.0														36.0	
		36.5														36.5	
		37.0														37.0	
		37.5														37.5	
		38.0														38.0	
		38.5														38.5	
		39.0														39.0	
		39.5														39.5	
		40.0														40.0	
		40.5														40.5	
		41.0														41.0	
		41.5														41.5	

PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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FILE No: G16303**BOREHOLE No. 19-48**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D50T**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **May 14 - 19** TO **May 14 - 19**

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 _p W W _L ↗ ○ ↖					
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10 20 30					
Ground Elevation: 223.40 m																
222.05 1.35	loose to compact dark brown FILL, sand and gravel contains brick fragments moist	0.5		1	SS	12	●						○		0.5	borehole water level and cave-in at 2.15 m bgs upon completion of drilling start of DCPT at 3.05 m bgs
		1.0		2	SS	7	●						○		1.0	
218.83 4.57	very loose to loose dark brown FILL, sand and silt, trace gravel moist to saturated	1.5											○		1.5	
		2.0		3	SS	4	●							○	2.0	
		2.5		4	SS	4	●							○	2.5	
		3.0													3.0	
		3.5	5	SS	4	●	○						○	3.5		
		4.0	6	SS	8	●	○						○	4.0		
213.80 9.60	compact brown SAND trace to some silt saturated	4.5					○							4.5		
		5.0		7	SS	14	●	○					○	5.0		
		5.5		8	SS	16	●	○					○	5.5		
		6.0						○						6.0		
		6.5		9	SS	18	●	○					○	6.5		
		7.0													7.0	
	----- occ. silty seams/layers	7.5												7.5		
		8.0	10	SS	19	●							○	8.0		
		8.5												8.5		
		9.0												9.0		
		9.5	11	SS	20	●							○	9.5		
		10.0												10.0		
End of Borehole														10.5		
														11.0		
														11.5		
														12.0		
														12.5		
														13.0		
														13.5		

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FILE No: G16303**BOREHOLE No. 19-49**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D50T**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **May 24 - 19 TO May 24 - 19**PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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FILE No: G16303**BOREHOLE No. 19-49**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D50T**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **May 24 - 19 TO May 24 - 19**

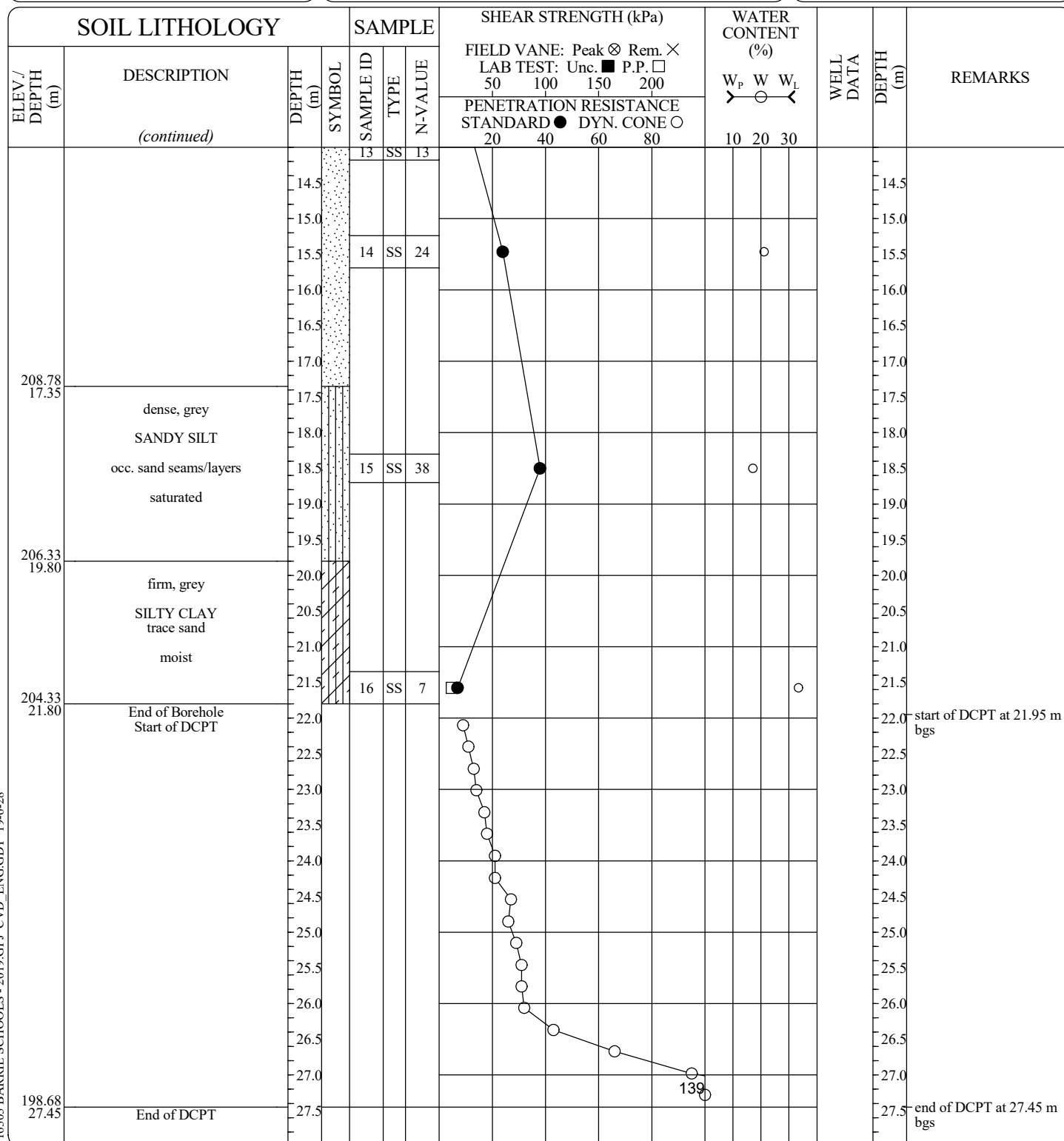
SOIL LITHOLOGY				SAMPLE			SHEAR STRENGTH (kPa)				WATER CONTENT (%)			WELL DATA	DEPTH (m)	REMARKS
ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200				W _P W W _L ↗ ○ ↖					
(continued)							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○				10 20 30					
208.92 16.90		14.5		13	SS	20										
		15.0														
		15.5		14	SS	53								○		
		16.0														
		16.5														
	stiff, grey SILTY CLAY trace to some sand, trace gravel moist	17.0														
		17.5														
		18.0														
		18.5		15	SS	8	●							○		
		19.0														
205.72 20.10	dense, grey SILT trace sand, trace clay freq. clayey seams/layers saturated	19.5														
		20.0														
		20.5														
		21.0														
		21.5		16	SS	32	●							○		
204.02 21.80	End of Borehole	22.0														
		22.5														
		23.0														
		23.5														
		24.0														
		24.5														
		25.0														
		25.5														
		26.0														
		26.5														
		27.0														
		27.5														

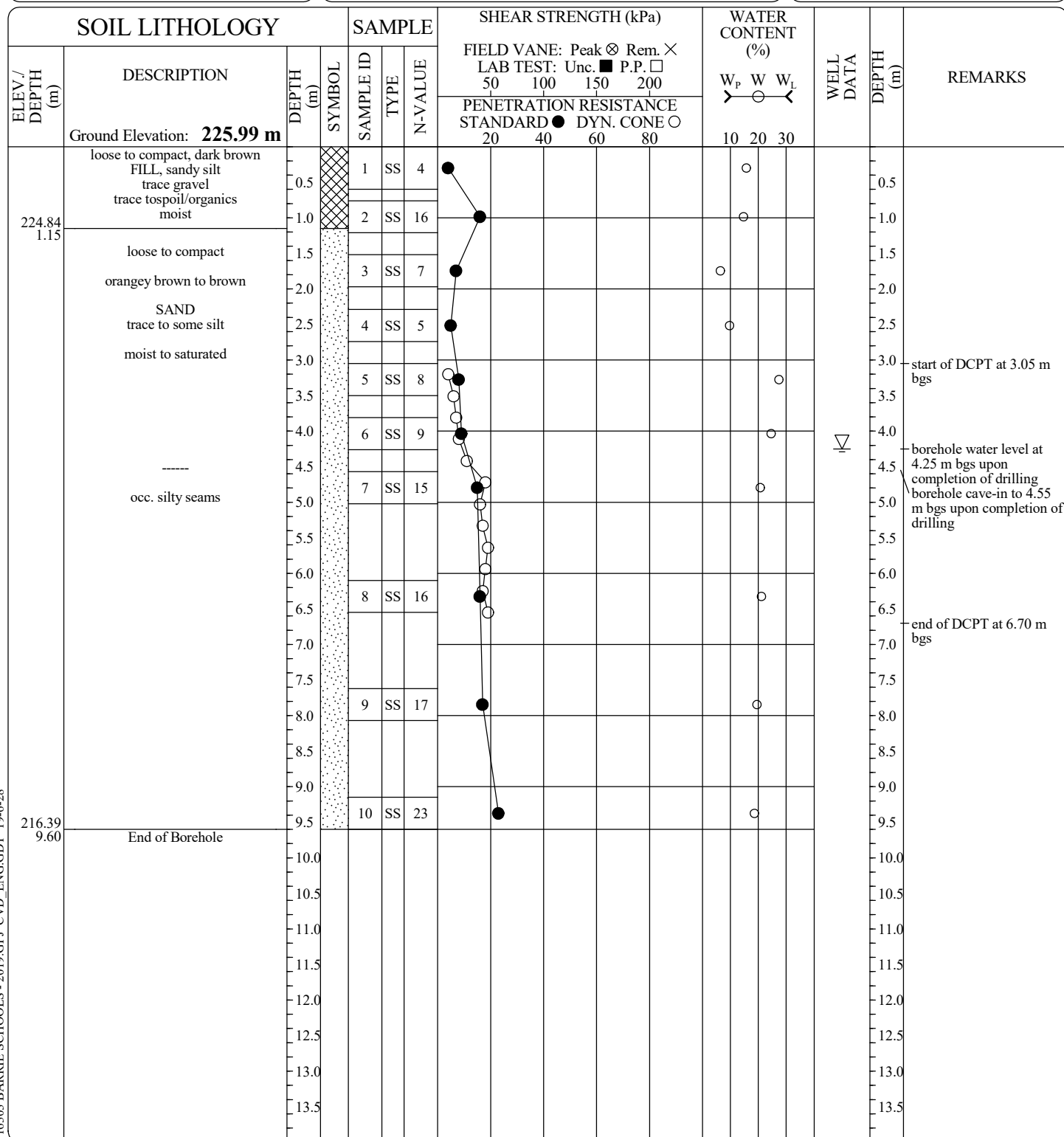
PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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FILE No: G16303**BOREHOLE No. 19-50**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D50T**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **May 23 - 19 TO May 23 - 19**

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 _p W W _L							
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10 20 30							
225.75 0.38	375 mm TOPSOIL	0.38		1	SS	14	●						○					
	very loose to loose brown SAND trace to some silt, trace gravel occ. silty seams damp to saturated	0.5					●							○				
		1.0		2	SS	9	●							○				
		1.5						●						○				
		2.0			3	SS	7	●						○				
		2.5			4	SS	8	●						○				
		3.0						●							○			
		3.5			5	SS	10	●							○			
		4.0			6	SS	12	●							○			
		4.5														○		
		5.0			7	SS	39									○		
		5.5																
		6.0																
		6.5		8	SS	29		●							○			
7.0																		
7.5																		
8.0			9	SS	25		●							○				
8.5																		
9.0																		
9.5			10	SS	20		●							○				
10.0																		
10.5																		
11.0			11	SS	21		●							○				
11.5																		
12.0																		
12.5			12	SS	30		●							○				
13.0																		
13.5							●								○			

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FILE No: G16303**BOREHOLE No. 19-50**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D50T**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **May 23 - 19 TO May 23 - 19**PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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FILE No: G16303**BOREHOLE No. 19-51**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D50T**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **May 14 - 19** TO **May 14 - 19**PROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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ph. (519) 742-8979, fx. (519) 742-7739

FILE No: G16303**BOREHOLE No. 19-52**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D50T**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **May 14 - 19 TO May 14 - 19**

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 _P W W _L ↗ ○ ↖						
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80										
223.46 2.29	loose, dark brown FILL, sand and silt some gravel organics in the top 0.6 m moist	0.5		1	SS	8	●							○			▽ borehole water level at 3.95 m bgs upon completion of drilling borehole cave-in to 4.25 m bgs upon completion of drilling
		1.0		2	SS	8	●							○			
		1.5															
		2.0		3	SS	8	●							○			
		2.5		4	SS	14	●							○			
		3.0															
		3.5		5	SS	14	●							○			
		4.0		6	SS	17	●							○			
		4.5															
		5.0		7	SS	19	●								○		
216.15 9.60	compact brown SAND trace to some silt occ. silty seams moist to saturated	5.5															
		6.0															
		6.5		8	SS	19	●							○			
		7.0															
		7.5															
		8.0		9	SS	22	●							○			
		8.5															
		9.0															
		9.5		10	SS	23	●							○			
		10.0															
	End of Borehole	10.5															
		11.0															
		11.5															
		12.0															
		12.5															
		13.0															
		13.5															

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FILE No: G16303**BOREHOLE No. 19-53**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D50T**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **May 14 - 19** TO **May 14 - 19**

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 _p W W _L					
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○				20 40 60 80			10 20 30		
224.87 0.15	150 mm TOPSOIL			1	SS	8	●						○			
	loose, dark brown FILL, sand and silt, trace gravel moist	0.5														
		1.0		2	SS	4	●						○			
		1.5														
223.17 1.85		2.0		3	SS	7	●						○			
	compact orangey brown to brown SAND trace to some silt moist to saturated	2.5		4	SS	4	●						○			
		3.0														
		3.5		5	SS	5	●								○	
		4.0		6	SS	5	●								○	
220.60 4.42	compact brown SILTY SAND saturated	4.5		7	SS	11	●								○	
		5.0														
		5.5		8	SS	14	●									○
		6.0														
		6.5		9	SS	19	●								○	
		7.0														
		7.5														
		8.0		10	SS	22	●								○	
		8.5														
		9.0														
215.42 9.60	End of Borehole	9.5		11	SS	19	●								○	
		10.0														
		10.5														
		11.0														
		11.5														
		12.0														
		12.5														
		13.0														
		13.5														

borehole water level at 3.35 m bgs upon completion of drilling
borehole cave-in to 3.50 m bgs upon completion of drilling

∇ borehole water level at
3.35 m bgs upon
completion of drilling
borehole cave-in to 3.50
m bgs upon completion of
drilling

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FILE No: G16303**BOREHOLE No. 19-54**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D50T**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **May 13 - 19 TO May 13 - 19**

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 _P W W _L					
							PENETRATION RESISTANCE				↗ — ○ — ↖					
							STANDARD ● DYN. CONE ○				10 20 30					
225.35 0.40	Ground Elevation: 225.75 m															
	50 mm GRANULAR BASE compact, dark brown FILL, sand and silt, some gravel trace to spoil/organics moist	0.5	⊗	1	SS	11	●						○			
		1.0		2	SS	6	●						○			
	loose to dense	1.5														
	orangey brown to brown	2.0		3	SS	5	●						○			
	SAND	2.5		4	SS	15	●						○			
	trace to some silt, trace gravel	3.0														
	saturated	3.5		5	SS	19	●						○			
		4.0		6	SS	20	●							○		
		4.5														
		5.0		7	SS	17	●							○		
			5.5													
	-----	6.0														
	occ. silty seams	6.5		8	SS	15	●							○		
		7.0														
	-----	7.5														
		8.0		9	SS	25	●							○		
		8.5														
		9.0														
		9.5		10	SS	20	●							○		
		10.0														
		10.5														
		11.0		11	SS	23	●							○		
		11.5														
		12.0														
		12.5		12	SS	49	●							○		
213.10 12.65	End of Borehole	13.0														
		13.5														

▽ borehole water level and
cave-in at 4.25 m bgs
upon completion of
drilling

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FILE No: G16303**BOREHOLE No. 19-55**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D50T**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **May 13 - 19 TO May 13 - 19**

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 _P W W _L							
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80				10 20 30							
Ground Elevation: 225.85 m																		
375 mm TOPSOIL																		
225.47	very loose to loose, dark brown FILL, silty sand, trace gravel trace topsoil/organics moist loose to dense orangey brown to brown SAND trace to some silt, trace gravel moist to saturated ----- occ. silty seams -----	0.5		1	SS	6	●									○		
0.38		1.0		2	SS	2	●										○	
225.05		1.5		3	SS	4	●										○	
0.80		2.0		4	SS	19		●									○	
		2.5		5	SS	25			●									○
		3.0		6	SS	17		●										○
		3.5		7	SS	21			●									○
		4.0																
		4.5																
		5.0																
		5.5																
		6.0		8	SS	30			●									○
	6.5																	
	7.0																	
	7.5																	
	8.0		9	SS	21			●									○	
	8.5																	
	9.0																	
	9.5		10	SS	26			●									○	
	10.0																	
	10.5																	
	11.0		11	SS	26			●									○	
	11.5																	
	12.0																	
	12.5		12	SS	29			●									○	
213.20	End of Borehole	12.5																
12.65		13.0																
		13.5																

borehole water level and cave-in at 4.55 m bgs upon completion of drilling

borehole water level and
cave-in at 4.55 m bgs
upon completion of
drillingPROJECT MANAGER: **EYC****CHUNG & VANDER DOELEN
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FILE No: G16303**BOREHOLE No. 19-56**Client: **HIP Developments**Project: **Proposed Development**Location: **50 Bradford Street, Barrie, Ontario****EQUIPMENT DATA**Machine: **Diedrich D50T**Method: **Hollow Stem Auger**Size: **105 mm I.D.**Date: **May 13 - 19 TO May 13 - 19**

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 _P W W _L					
							PENETRATION RESISTANCE STANDARD ● DYN. CONE ○				10 20 30					
225.63 0.38	375 mm TOPSOIL	0.5		1	SS	8	●						○			
	loose to dense orangey brown to brown SAND trace to some silt, trace gravel occ. silty seams moist to saturated	1.0		2	SS	6	●							○		
		1.5		3	SS	6	●							○		
		2.0		4	SS	3	●							○		
		2.5		5	SS	4	●							○		
		3.0		6	SS	24								○		
		3.5		7	SS	19	●							○		
		4.0		8	SS	22	●							○		
		4.5		9	SS	23	●							○		
		5.0		10	SS	37	●							○		
		5.5		11	SS	28	●							○		
	6.0		12	SS	28	●							○			
213.36 12.65	End of Borehole	13.0														

▽ borehole water level and
cave-in at 4.25 m bgs
upon completion of
drilling

PROJECT MANAGER: **EYC**
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ph. (519) 742-8979, fx. (519) 742-7739