DRAFT REPORT

Geotechnical Exploration

Southwest Middlesex WWTP Infrastructure Upgrades, Sanitary Forcemain Twinning, Southwest Middlesex, Ontario

Submitted to:

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CA0020268.9631

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Distribution List

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1.0 INTRODUCTION

This draft report presents the results of the geotechnical exploration and testing program carried out for the design of the proposed sanitary forcemain twinning as part of the Southwest Middlesex WWTP Infrastructure Upgrades in Glencoe, Ontario. The area of the site is shown on the Key Map, Figure 1.

The purpose of this work was to explore the subsurface soil and groundwater conditions at the site and to provide geotechnical engineering recommendations for the design of the proposed works. The work program was carried out in accordance with our proposal 2023CA129631-Rev1, dated January 25, 2024. Written authorization to proceed was provided by Mike Henry of the Municipality of Southwest Middlesex (the Municipality) on January 30, 2024.

This report should be read in conjunction with the attached "Important Information and Limitations of This Report" which comprises an integral part of this document. The reader's attention is specifically drawn to this material, as it is essential for proper use and interpretation of the information presented and discussed herein.

2.0 BACKGROUND

Based on the information provided, the proposed work consists of the design and construction of a secondary sanitary forcemain running parallel to the existing 250-millimetre (mm) diameter sanitary forcemain from the Victoria Pumping Station to the Glencoe Wastewater Treatment Plant on Newbiggen Drive. The proposed alignment is approximately 1,450 metres (m) in length and generally traverses agricultural fields along the existing easement. It is understood that the forcemain is anticipated to be installed at a depth providing about 2.1m of cover. The proposed alignment includes the crossing of Parkhouse Drive, which it is understood will be carried out using conventional open-cut techniques.

3.0 SITE DESCRIPTION AND GEOLOGY

The site lies within the physiographic region of Southwestern Ontario known as Ekfrid Clay Plain. The subsurface soil conditions are characterized by a stratified clay derived from glaciolacustrine deposits.[1] The quaternary geology mapping indicates that the predominant soil at the site consists of silt to sandy silt becoming silt to silty clay towards Lake Erie.[2]

The bedrock underlying the site consists of medium brown microcrystalline limestone of the Dundee Formation of the Hamilton Group of Middle Devonian age[3].

4.0 EXPLORATION AND TESTING PROCEDURES

The field work for the geotechnical exploration and testing program was carried out on April 4 and 5, 2024, during which time seven boreholes, designated as boreholes BH-101 to BH-107 were drilled at the approximate locations as shown on the Borehole Location Plan, Figure 1. The boreholes were drilled using track-mounted drilling equipment supplied and operated by a specialist drilling contractor. The soil stratigraphy encountered in the boreholes are shown on the attached Record of Borehole sheets.

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[1] L. J. Chapman and D.F. Putnam, 1984: The Physiography of Southern Ontario, Third Edition. Ontario Geological Survey, Special Volume 2.

[2] Ontario Geological Survey 2000. Quaternary geology, seamless coverage of the Province of Ontario; Ontario Geological Survey, Data Set 14---Revised.

[3] Sanford B.V., 1969: Geology, Toronto –Windsor Area, Ontario. Geological Survey of Canada, Map 1263A, scale 1:250,000.

Standard penetration testing and sampling was carried out in the boreholes at suitable intervals of depth using 35 millimetre (mm) inside diameter split spoon sampling equipment in accordance with ASTM International standard D1586: “Standard Test Method for Standard Penetration Test (SPT) and Spilt-Barrel Sampling of Soils”. All of the samples obtained during the exploration were transported to our laboratory for further examination and representative testing.

Groundwater conditions in the boreholes were observed throughout the drilling operations. Upon completion of drilling and sampling, the boreholes were backfilled in accordance with the requirements of the Revised Regulations of Ontario (R.R.O.) 1990, Regulation 903 (as amended) of the Ontario Water Resources Act. Four 50-mm diameter monitoring wells were installed in BH 101, BH 103, BH 104 and BH 107 to permit subsequent groundwater level measurements.

Members of our engineering staff designated the borehole locations in the field, obtained clearances for underground utilities, monitored the drilling, logged the boreholes, and cared for the samples obtained.

The ground surface elevations at the borehole locations were surveyed by WSP and referenced to geodetic datum.

5.0 SUBSURFACE CONDITIONS

The subsurface soil and groundwater conditions encountered in the boreholes drilled at the site are shown on the attached Record of Borehole sheets and are summarized in the discussion below. The subsurface conditions have been simplified in terms of major soil strata for the purposes of geotechnical evaluation and design. The soil boundaries have been inferred from non-continuous samples and observations of drilling resistance and typically represent transitions from one soil to type to another rather than exact planes of geological change. Furthermore, subsurface conditions may vary significantly between and beyond the borehole locations.

5.1 Soil Conditions

The soil conditions encountered in the boreholes generally consisted of topsoil underlain by silty clay.

5.1.1 Topsoil

Topsoil was encountered at the ground surface in all of the boreholes. The topsoil was measured to be about 80 to 460 mm thick with an average thickness of about 170 mm.

Materials designated as topsoil in this report were classified solely based on visual and textural evidence. Testing of organic content or for other nutrients was not carried out. Therefore, the use of materials classified as topsoil cannot be relied upon for support and growth of landscaping vegetation.

5.1.2 Silty Clay

A deposit of firm to hard silty clay was encountered beneath the topsoil in all of the boreholes. All of the boreholes were terminated within the silty clay after exploring the stratum for some 3.3 to 5.0 m. Measured SPT N[4] values within the silty clay ranged from 7 to 36 blows per 0.3 m of penetration. Water contents of samples of the silty clay ranged from about 7 to 45 per cent. Grain size distribution curves for four samples of the silty clay are shown on Figure 2. An Atterberg limits test was conducted on a sample of the silty clay, which indicated a liquid limit of

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[4] The SPT N value is defined as the number of blows required by a 63.5-kilogram hammer dropped from a height of 760 millimetres to drive a split spoon sampler a distance of 300 millimetres into the soil after having first penetrated 150 millimetres.

about 47 per cent, a plastic limit of about 19 per cent, and a plasticity index of about 29 per cent. The results of the Atterberg limits test, as shown on Figure 3, indicate that the material is an inorganic silty clay of intermediate plasticity.

5.2 Groundwater Conditions

During drilling, groundwater was not encountered in any of the boreholes. The depth at which the silty clay becomes saturated corresponds to the depth at which the soil colour transitions from brown to grey. Where encountered, the colour transition was observed between depths of about 2.0 to 3.7 m below ground surface (bgs) or about elevations 215.7 to 216.6 m above mean sea level (amsl). Grey soils were not observed in boreholes BH-105 to BH-107.

Four of the seven boreholes (BH-101, BH-103, BH-104 and BH-107) were completed as monitoring wells with well screens installed predominantly within the silty clay. The monitoring wells were constructed with 1.5- metre long, 50-mm diameter, slot 10 polyvinyl chloride (PVC) well screens threaded to PVC riser pipes. A sand pack consisting of commercially available silica sand was used in the borehole annulus surrounding the well screen. The annulus above the sand pack was filled with bentonite to about ground surface. Monitoring wells were completed with flush mount casings. The monitoring wells were developed using new polyethylene tubing equipped with a Waterra inertial foot valve and surge block. All four monitoring wells were lower yield wells where purging occurred while collecting field parameters (pH, electrical conductivity and temperature) until they went dry.

Details of the monitoring well installations are provided on the Record of Borehole sheets in Appendix A. A summary of encountered groundwater levels is provided in the table below:

Table 1: Summary of Groundwater Levels

Borehole	Date Drilled	Ground Surface Elevation (m amsl)	Encountered Groundwater Level*	Measured Groundwater Level May 7, 2024
			Depth (m bgs) / Elevation (m amsl)	
BH-101	April 4, 2024	218.58	Dry	2.47 / 216.11
BH-102	April 4, 2024	218.98	Dry	--
BH-103	April 4, 2024	218.90	Dry	1.21 / 217.69
BH-104	April 4, 2024	219.33	Dry	4.28 / 215.05
BH-105	April 5, 2024	219.02	Dry	--
BH-106	April 5, 2024	217.62	Dry	--
BH-107	April 5, 2024	216.95	Dry	2.75 / 214.20

* Dry denotes absence of free water

As shown in the above table, groundwater levels measured in the monitoring wells ranged from 1.21 to 4.28 m bgs, with elevations ranging from 217.69 to 214.20 m amsl, respectively. Overall, groundwater is moderately shallow at the Site with the anticipated groundwater flow direction inferred to be a subdued replica of topography, with flow convergence at surface watercourses.

In general, the hydrogeological regime along the site is that of an unconfined (water table) aquifer and consists of variable saturated granular unconsolidated materials. Future levels may differ from those listed herein since groundwater levels are naturally variable, susceptible to seasonality and significant precipitation events. Groundwater elevations should be confirmed and monitored for any future activities.

The available groundwater elevation data in addition to typical hydraulic conductivity values for silty clay deposits as taken from grain size results (Figure 2) and from established literature (typical range from 10^{-7} m/s to 10^{-9} m/s)[5], suggests that little to no dewatering will be required to facilitate construction dewatering; therefore, permitting for dewatering (such as an Environmental Activity Sector Registry (EASR) or a Permit to Take Water (PTTW)) is not deemed necessary for this project.

6.0 DISCUSSION

This section of the report provides our interpretation of the factual geotechnical data obtained during the exploration and it is intended for the guidance of the design engineer. Where comments are made on construction, they are provided only to highlight those aspects which could affect the design of the project. Contractors bidding on or undertaking the works should make their own independent interpretation of the subsurface information provided as it affects their proposed construction methods, equipment selection, pricing, scheduling and the like.

Based on the information provided, the proposed work consists of the installation of an additional 250 mm diameter sanitary forcemain with about 2.1 m of soil cover from the Victoria Pumping Station to the Glencoe Waste Water Treatment Plant on Newbiggen Drive. The proposed alignment is approximately 1,450 m in length and generally traverses agricultural fields along the existing easement. The proposed alignment includes the crossing of Parkhouse Drive, which it is understood will be carried out using conventional open-cut techniques.

6.1 Excavations

Excavations will generally encounter topsoil and silty clay. It is considered that the proposed services can be installed using conventional open cut or supported excavation techniques provided that groundwater is adequately controlled. All unsupported excavations should be carried out in accordance with the current Ontario Health and Safety Act and Regulations for Construction Projects (OHSA) and the excavation side slopes should not exceed an inclination of 1 horizontal to 1 vertical. Care will be required to ensure that adequate support is provided for all existing utilities located within the zone of influence of the excavation as defined by a line drawn upward from the base of the excavation at an inclination of 1 horizontal to 1 vertical.

Although boreholes were not advanced through Parkhouse Drive pavement surface it is anticipated that granular fill materials forming the pavement structure will be encountered during the crossing of Parkhouse Drive.

Based on the current OHSA criteria and results of the boreholes, the silty clay would be classified as Type 2 soils. The temporary excavation side slopes for Type 2 soils should not exceed an inclination of 1 horizontal to 1 vertical.

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[5] Freeze, R., & Cherry, J. (1979). *Groundwater*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

For OHSA compliance, unsupported excavations in Type 2 soils should be sloped to within a maximum of 1.2 m above the base with sidewall slopes inclined no steeper than a gradient of one horizontal to one vertical. During construction, the excavations and exposed soil conditions should be observed and an opinion as to the appropriate OHSA soil type category provided at that time.

If a trench liner box is used to reduce the extent of the excavation, it should be noted that the box only provides protection for the workmen once in place. The liner box does not restrict movement of the excavation walls or prevent soils from flowing due to groundwater seepage. Any voids between the trench liner box and the excavation should be filled immediately to reduce the potential for loss of ground. It is suggested that the trench excavation should be carried out in short sections with the support system installed immediately upon completion of excavation.

Based on the proposed invert depths and results of the boreholes, generally excavations for the proposed sanitary sewer will be above the groundwater level except potentially in the vicinity of BH-101 and BH-103. Considering this and the low permeability of the native silty clay, as mentioned in Section, proactive dewatering and the associated permitting (i.e., EASR or PTTW) are not anticipated to be required for this project. Any minor groundwater inflows can be addressed by pumping from properly filtered sumps located at the base of the excavation. Depending on the timing of construction, seasonal variations resulting in groundwater levels higher than those encountered during the exploration should be anticipated.

6.2 Frost Protection

For frost protection, services must be provided with a minimum of 1.2 m of earth cover or installed with thermal equivalent insulation.

6.3 Bedding

Bedding for the sewers should consist of granular material consistent with the type, size and class of pipe and Southwest Middlesex specifications. All bedding should be placed in maximum 300-mm thick loose lifts and uniformly compacted to at least 95 per cent of standard Proctor maximum dry density (SPMDD). Should a trench liner box be used, care will be required to ensure that the compacted bedding is not disturbed when the liner box is moved.

Should residual groundwater seepage be of sufficient volume that the bedding material cannot be adequately compacted, it may be necessary to use 19-mm crushed stone with a non-woven geotextile surround. A complete non-woven geotextile surround is considered critical with the crushed stone bedding to prevent migration of fines into the bedding which could subsequently result in loss of ground and loss of support of the pipe. Crushed stone bedding might also facilitate pumping from sumps as a supplementary groundwater control measure depending on the contractor's chosen staging and dewatering needs.

6.4 Trench Backfill

Based on the results of this exploration, the excavated materials will consist of topsoil and silty clay. The pavement structure of Parkhouse Drive, anticipated to consist of asphalt and granular fill materials, will be encountered during the excavation for the proposed open cut crossing of Parkhouse Drive. Provided that all deleterious materials such as the existing asphalt, topsoil and existing fill materials are wasted together with any organic or excessively wet materials, much of the remaining portions of the excavated materials are considered suitable for use as trench backfill.

Care will be required to ensure that sufficient effort is consistently put into placement and compaction of the trench backfill in order to limit settlements, especially if a trench liner box is used. The general trench backfill should be placed in maximum 300-mm thick lifts and uniformly compacted to at least 95 per cent of SPMDD. The upper 1 m of the trench backfill that will form the new pavement subgrade should be placed in maximum 200-mm lifts and uniformly compacted to at least 98 per cent of SPMDD. Any shortfall in backfill should be addressed using Granular C.

6.5 Pavements

It is anticipated that the pavement on Parkhouse Drive will be fully reconstructed following installation of the sanitary forcemain.

Traffic data including the Annual Average Daily Traffic (AADT) for the subject section of Parkhouse Drive was unavailable, however, for the purposes of pavement design, Parkhouse Drive within this section may be classified as a rural throughfare. For design purposes, the following pavement component thicknesses placed on a competent, properly shaped granular subgrade are recommended:

Component	Thickness (mm)
HL 3	40
HL 8	65
Granular A Base	150
Granular B Type I Subbase	400

The above-noted pavement structure is not intended to support heavy construction traffic. Depending on the actual types of construction equipment used and the prevailing weather conditions during construction, additional Granular B may be required to accommodate the construction traffic.

The exposed subgrade should be proofrolled under the direction of the geotechnical engineer and any excessively soft or poorly performing areas addressed. Any fill, organic or deleterious materials encountered at subgrade level should be removed prior to placement of the subbase material. The Granular A base and Granular B subbase should be placed in maximum 200-mm loose lifts and uniformly compacted to at least 100 per cent of SPMDD. Perforated stub drains should be provided at all catch basins. All new catch basins should be connected to a suitable hydraulic outlet.

The asphaltic materials should be produced, placed and compacted in accordance with the current Ontario Provincial Standard Specification (OPSS) requirements. Milled notches 40 mm deep by 500 mm wide should be provided where the new pavements abut existing pavements and care should be taken to properly tack coat all butt joints and milled surfaces.

Care should be taken to ensure that construction and/or through traffic does not adversely impact the subgrade, roadway granulars and placement of the asphaltic materials.

7.0 GEOTECHNINCAL INSPECTIONS AND TESTING

During design, it would be beneficial for WSP to review the design drawings and specifications for consistency with the recommendations provided in this report. A regular program of geotechnical inspections and materials testing should be carried out during construction to confirm that the conditions being encountered are consistent with the results of the boreholes, to confirm that the intent of the recommendations provided are being met and that the various project and material specifications are being consistently achieved.

8.0 CLOSURE

The factual data, interpretation and recommendations in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. If the project is modified in concept, location or elevation, or if the project is not initiated within eighteen months of the date of the report, WSP should be given an opportunity to confirm that the recommendations are still valid.

We trust that this draft report provides the geotechnical information presently required. Once design information is available, the recommendations in this draft report should be updated, as appropriate. Should any point require clarification, or should you have any questions or comments on this report, please contact this office.

Signature Page

WSP Canada Inc.

DRAFT

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Geotechnical Engineer

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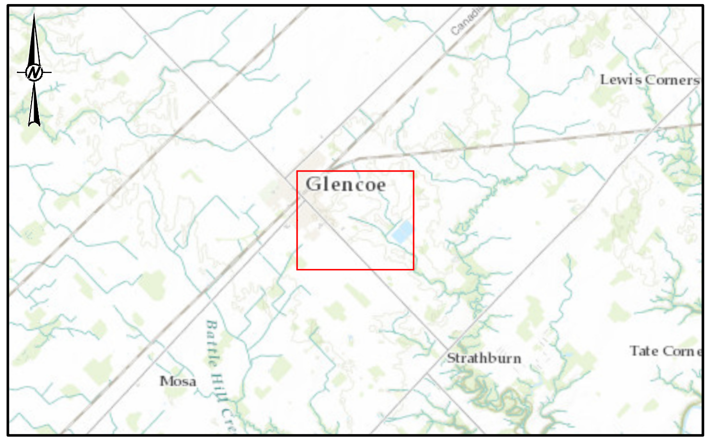
Dirka U. Prout, P.Eng.
Lead Geotechnical Engineer

JAK/STH/DUP/lw

KEY MAP



SCALE 1:150,000

LEGEND

⊕	BOREHOLE LOCATION
—	WATERCOURSE
┼	RAILWAY
▭	WATERBODY

DRAFT

0 75 150 300

1:7,500 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. IMAGERY CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY
3. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT
MUNICIPALITY OF SOUTHWEST MIDDLESEX

PROJECT
GEOTECHNICAL EXPLORATION
SOUTHWEST MIDDLESEX SANITARY FORCEMAIN TWINNING

TITLE
BOREHOLE LOCATION PLAN

CONSULTANT

wsp

YYYY-MM-DD	2024-05-21
DESIGNED	----
PREPARED	AR
REVIEWED	----
APPROVED	----

PROJECT NO.	CONTROL	REV.	FIGURE
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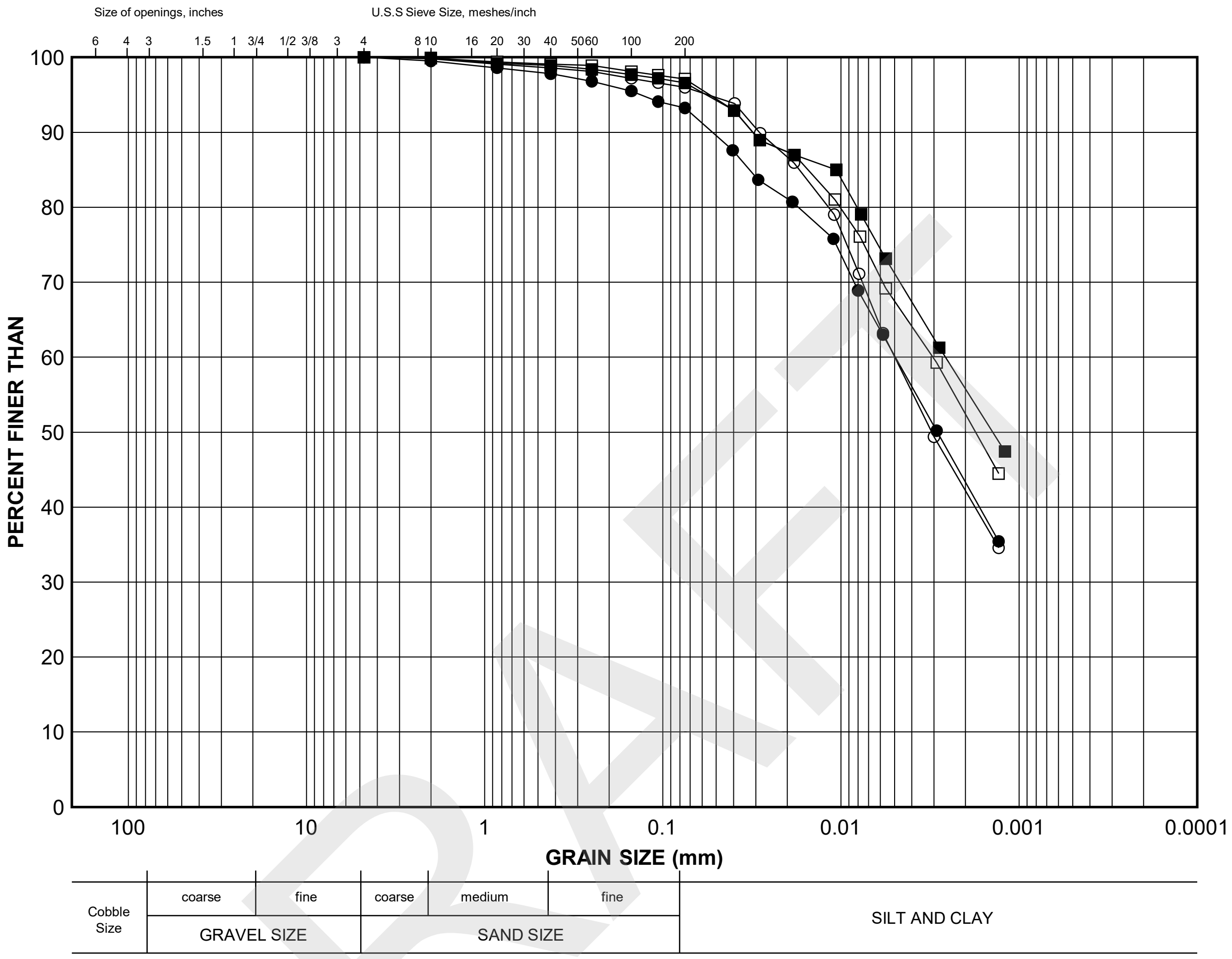

LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEV (m)
○	101	2	216.8
●	103	4	215.6
□	104	3	216.8
■	107	2	215.2

PROJECT
GEOTECHNICAL EXPLORATION
SANITARY FORCEMAIN TWINNING
MUNICIPALITY OF SOUTHWEST MIDDLESEX

TITLE
GRAIN SIZE DISTRIBUTION
(CI) Silty Clay

PROJECT No.		CA0020268.9631	FILE No.	CA0020268.9631 Middlesex, Fig 2.xlsm:Figure 1
			SCALE	N/A REV. 0
DRAWN	JAK	2024-05-17	**FIGURE 2**	
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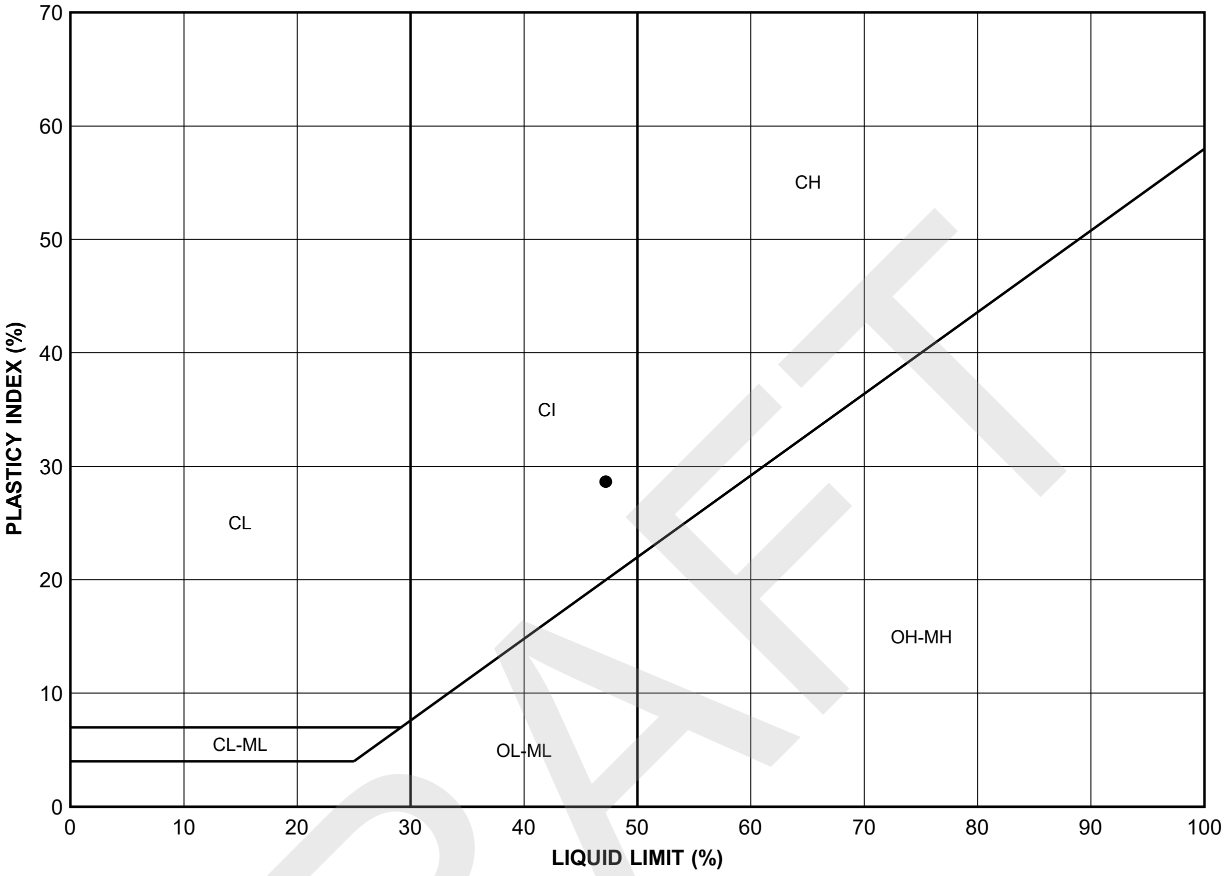

LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEV (m)
●	104	3	216.8

PROJECT

GEOTECHNICAL EXPLORATION
SANITARY FORCEMAIN TWINNING
MUNICIPALITY OF SOUTHWEST MIDDLESEX

TITLE

PLASTICITY CHART

PROJECT No. CA0020268.9631
FILE No. CA0020268.9631-Middlesex, Fig3_Limits.xlsm:Figure 1
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REV. 0
DRAWN JAK 2024-05-17
CHECK

FIGURE 3

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PROJECT: CA0020268.9631
LOCATION: N 4732810.94; E 442312.10

RECORD OF BOREHOLE: BH 101

SHEET 1 OF 1
DATUM: Geodetic

BORING DATE: April 4, 2024
DRILL RIG: Diedrich D50 Mobile (London Soil)

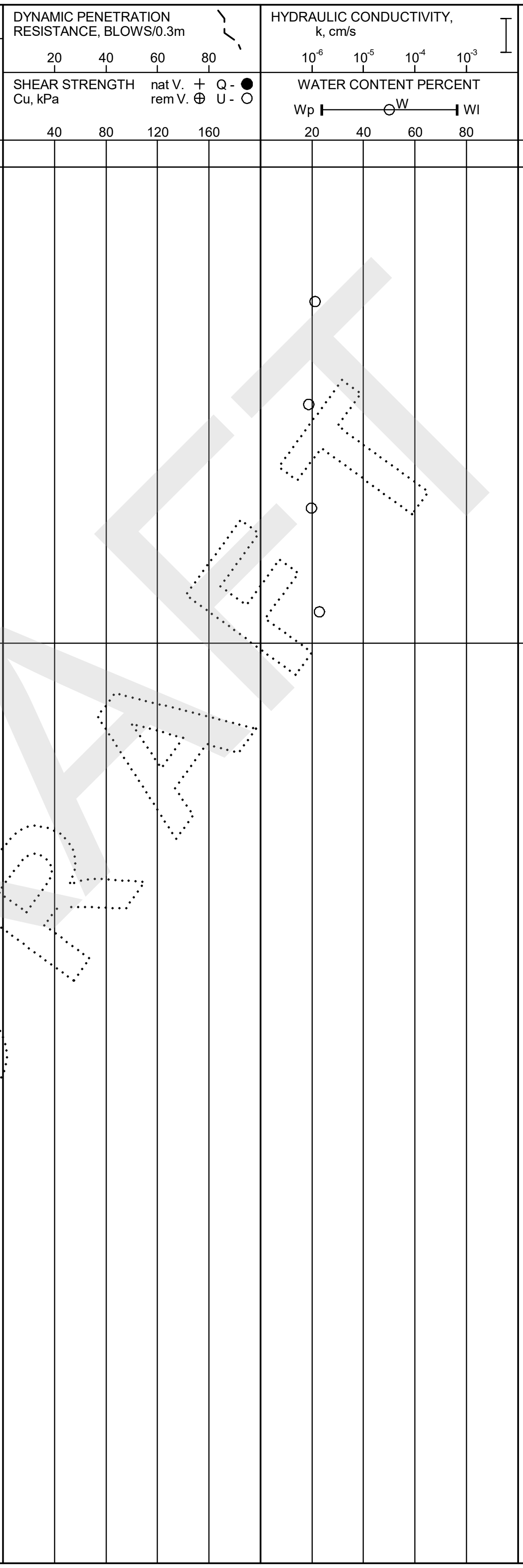
SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm
HAMMER TYPE: AUTOMATIC

BORING METHOD: Power Auger 210 mm Diam. (Hollow Stem)

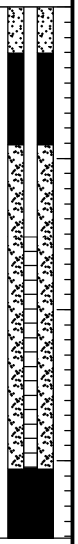
SOIL PROFILE DESCRIPTION	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING
GROUND SURFACE	218.58				
TOPSOIL - SILTY CLAY; dark brown, contains roots; moist	0.00				
(CI) SILTY CLAY, some sand, trace gravel, trace roots; mottled brown, trace topsoil	218.33 0.25				
(CI) SILTY CLAY, trace sand; brown; stiff to very stiff	217.82 0.76	1	SS	13	
		2	SS	22	MH
- becoming grey at 1.98 m					
		3	SS	23	
		4	SS	19	
END OF BOREHOLE	215.07 3.51				

Note(s):

1. Borehole dry upon completion of drilling on April 4, 2024.



PIEZOMETER OR STANDPIPE INSTALLATION



DEPTH SCALE
1 : 50

LOGGED: KB
CHECKED: JAK

PROJECT: CA0020268.9631

LOCATION: N 4732747.77; E 442597.66

RECORD OF BOREHOLE: BH 102

SHEET 1 OF 1

DATUM: Geodetic

BORING DATE: April 4, 2024

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

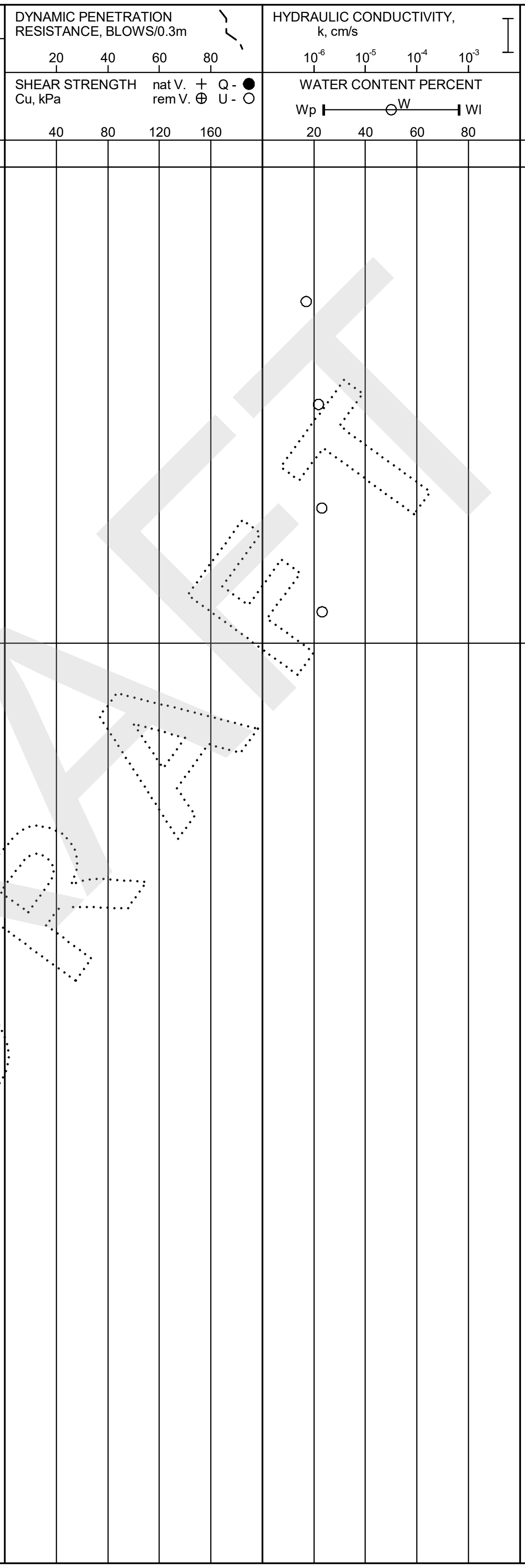
DRILL RIG: Diedrich D50 Mobile (London Soil)

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m
		GROUND SURFACE		218.98			
0	Power Auger 160 mm Diam. (Hollow Stem)	TOPSOIL - SILTY CLAY; dark brown, contains roots; moist		0.00			
		(CI) SILTY CLAY; brown to grey, trace to some topsoil, contains roots		0.08			
		(CI) SILTY CLAY, some sand, trace gravel; mottled brown; stiff		218.17 0.81	1	SS	10
		(CI) SILTY CLAY, some sand, trace gravel; brown, occasional wet silt pockets; stiff		217.61 1.37	2	SS	15
					3	SS	14
		- grey at 3.05 m			4	SS	14
		END OF BOREHOLE		215.47 3.51			

Note(s):

1. Borehole dry upon completion of drilling on April 4, 2024.



ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

DEPTH SCALE

1 : 50

LOGGED: KB

CHECKED: JAK

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PROJECT: CA0020268.9631

LOCATION: N 4732575.08; E 442798.62

RECORD OF BOREHOLE: BH 103

SHEET 1 OF 1

DATUM: Geodetic

BORING DATE: April 4, 2024

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG: Diedrich D50 Mobile (London Soil)

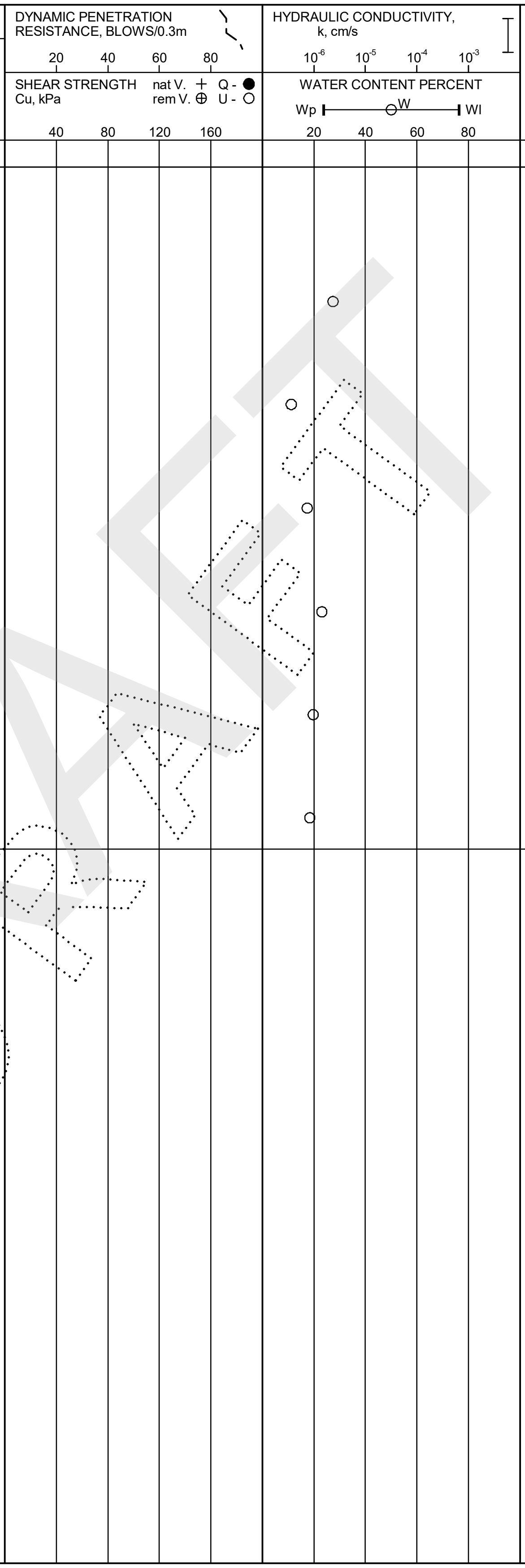
HAMMER TYPE: AUTOMATIC

BORING METHOD: Power Auger, 210 mm Diam. (Hollow Stem)

DESCRIPTION	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
GROUND SURFACE	218.90					
TOPSOIL - SILTY CLAY; dark brown, contains roots	0.00					Concrete
(CI) SILTY CLAY, some sand, trace gravel; mottled, trace topsoil, contains roots	218.44 0.46					Bentonite
(CI) SILTY CLAY, some sand, trace gravel; mottled brown; firm	218.14 0.76	1	SS	8		Sand
(CI) SILTY CLAY, trace to some sand, nil to trace gravel; brown, coarse sand seam; stiff to very stiff	217.38 1.52	2	SS	15		
- seams (wet) at 2.44 m		3	SS	19		Screen
- grey at 3.05 m		4	SS	15	MH	
		5	SS	16		
		6	SS	15		Bentonite
END OF BOREHOLE	213.87 5.03					

Note(s):

1. Borehole dry upon completion of drilling on April 4, 2024.



DEPTH SCALE

1 : 50

LOGGED: KB

CHECKED: JAK

RECORD OF BOREHOLE: BH 104

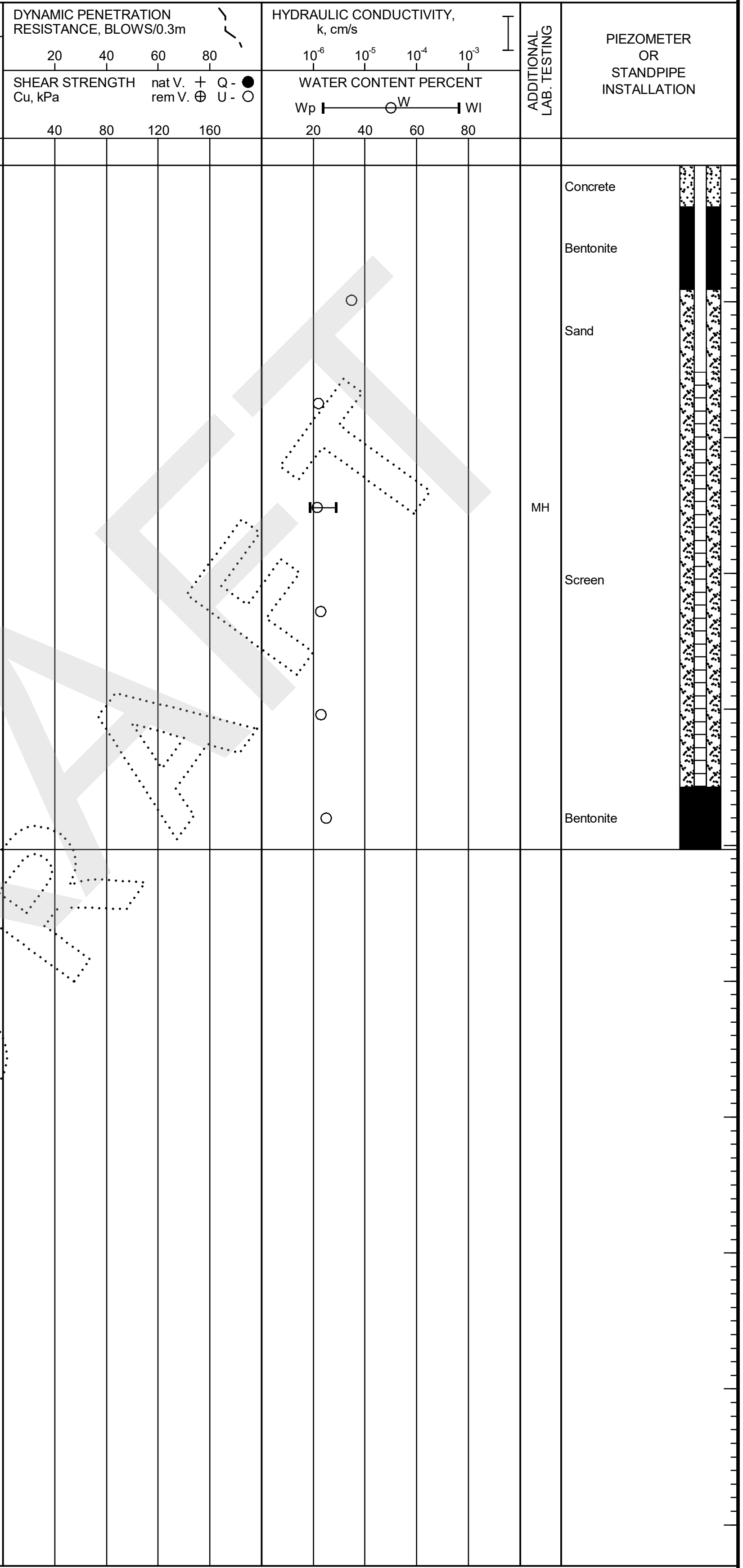
PROJECT: CA0020268.9631
LOCATION: N 4732568.19; E 442848.86
BORING DATE: April 4, 2024
SHEET 1 OF 1
DATUM: Geodetic
SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm
DRILL RIG: Diedrich D50 Mobile (London Soil)
HAMMER TYPE: AUTOMATIC

BORING METHOD: Power Auger, 210 mm Diam. (Hollow Stem)

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING
	GROUND SURFACE	219.33				
0	TOPSOIL - SILTY CLAY; dark brown, contains roots	0.00				
	(CI) SILTY CLAY, some sand, trace gravel; mottled brown, trace topsoil	0.08				
1	(CI) SILTY CLAY, some sand, trace gravel; mottled brown; firm	218.42 0.91	1	SS	7	
	(CI) SILTY CLAY; brown; stiff to very stiff	217.81 1.52	2	SS	12	
			3	SS	23	MH
			4	SS	19	
	- becoming grey at 3.66 m		5	SS	15	
			6	SS	14	
5	END OF BOREHOLE	214.30 5.03				

Note(s):

1. Borehole dry upon completion of drilling on April 4, 2024.



DEPTH SCALE
1 : 50

LOGGED: KB
CHECKED: JAK

PROJECT: CA0020268.9631

LOCATION: N 4732443.45; E 443218.16

RECORD OF BOREHOLE: BH 105

SHEET 1 OF 1

BORING DATE: April 5, 2024

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG: Diedrich D50 Mobile (London Soil)

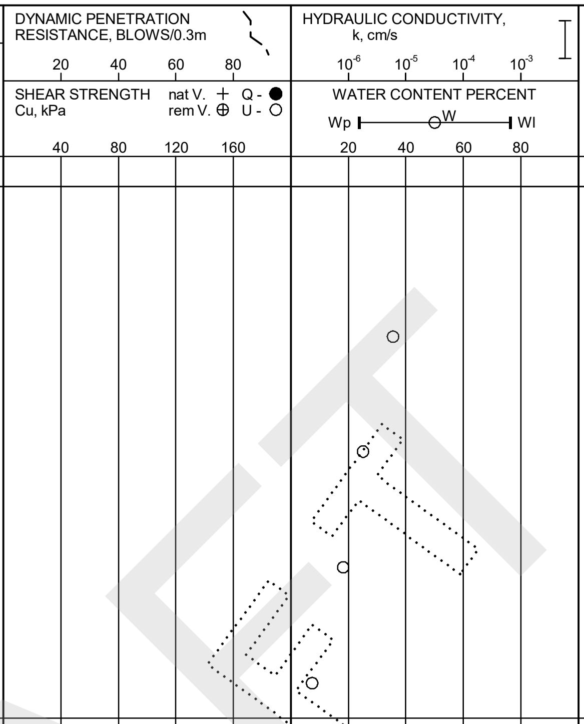
HAMMER TYPE: AUTOMATIC

BORING METHOD: Power Auger, 90 mm Diam. (Hollow Stem)

SOIL PROFILE - DESCRIPTION	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m
GROUND SURFACE	219.02			
TOPSOIL - SILTY CLAY; dark brown, contains roots	0.00			
(CI) SILTY CLAY; trace topsoil, mottled brown	0.08			
(CI) SILTY CLAY, some sand, trace gravel; mottled brown; stiff to hard	218.26 0.76	1	SS	11
		2	SS	9
		3	SS	29
		4	SS	36
END OF BOREHOLE	215.51 3.51			

Note(s):

1. Borehole dry upon completion of drlling.



ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

DEPTH SCALE METRES: 0 1 2 3 4 5 6 7 8 9 10

DEPTH SCALE

1 : 50

LOGGED: KB

CHECKED: JAK

PROJECT: CA0020268.9631

LOCATION: N 4732278.39; E 443510.76

RECORD OF BOREHOLE: BH 106

SHEET 1 OF 1

BORING DATE: April 5, 2024

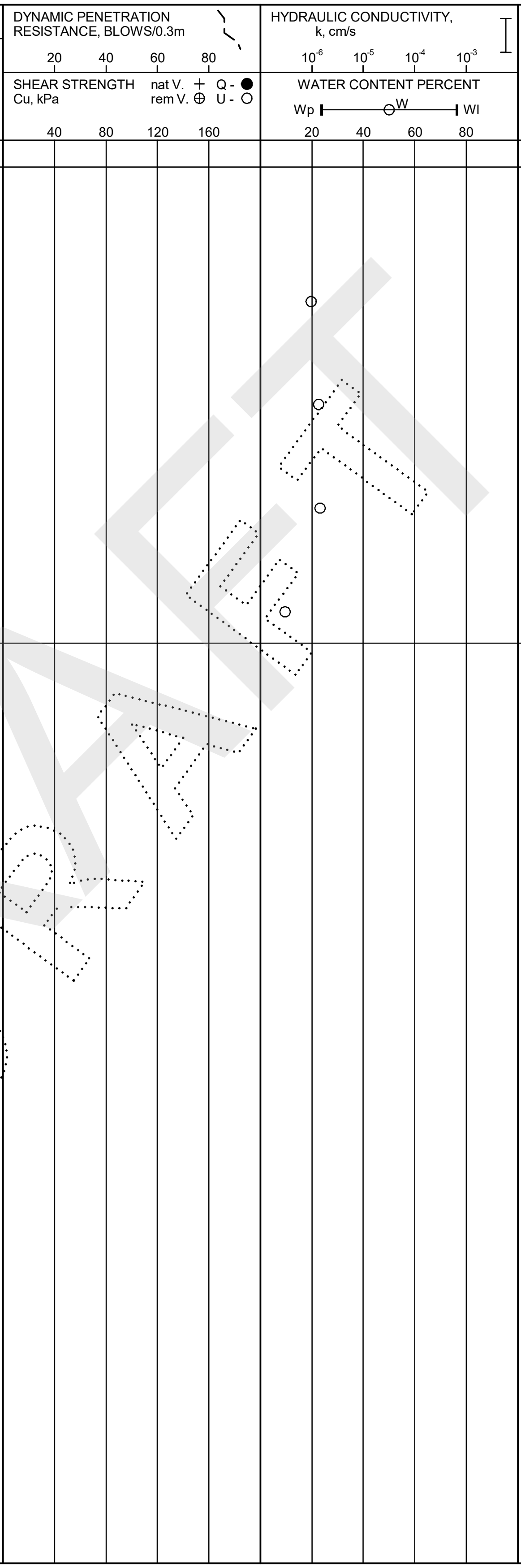
DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG: Diedrich D50 Mobile (London Soil)

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		217.62					
0	Power Auger 90 mm Diam. (Hollow Stem)	TOPSOIL - SILTY CLAY; dark brown, contains roots; moist		0.00					
		(CI) SILTY CLAY, trace gravel; dark brown, trace to some topsoil, contains roots		0.08					
		(CI) SILTY CLAY, trace to some sand, trace gravel; mottled brown; stiff to very stiff		216.86 0.76					
1					1	SS	9		
2					2	SS	18		
					3	SS	22		
3					4	SS	24		
		END OF BOREHOLE Note(s): 1. Borehole dry upon completion of drilling.		214.11 3.51					
4									
5									
6									
7									
8									
9									
10									



DEPTH SCALE

1 : 50

LOGGED: KB

CHECKED: JAK

PROJECT: CA0020268.9631

LOCATION: N 4732139.94; E 443624.52

RECORD OF BOREHOLE: BH 107

SHEET 1 OF 1

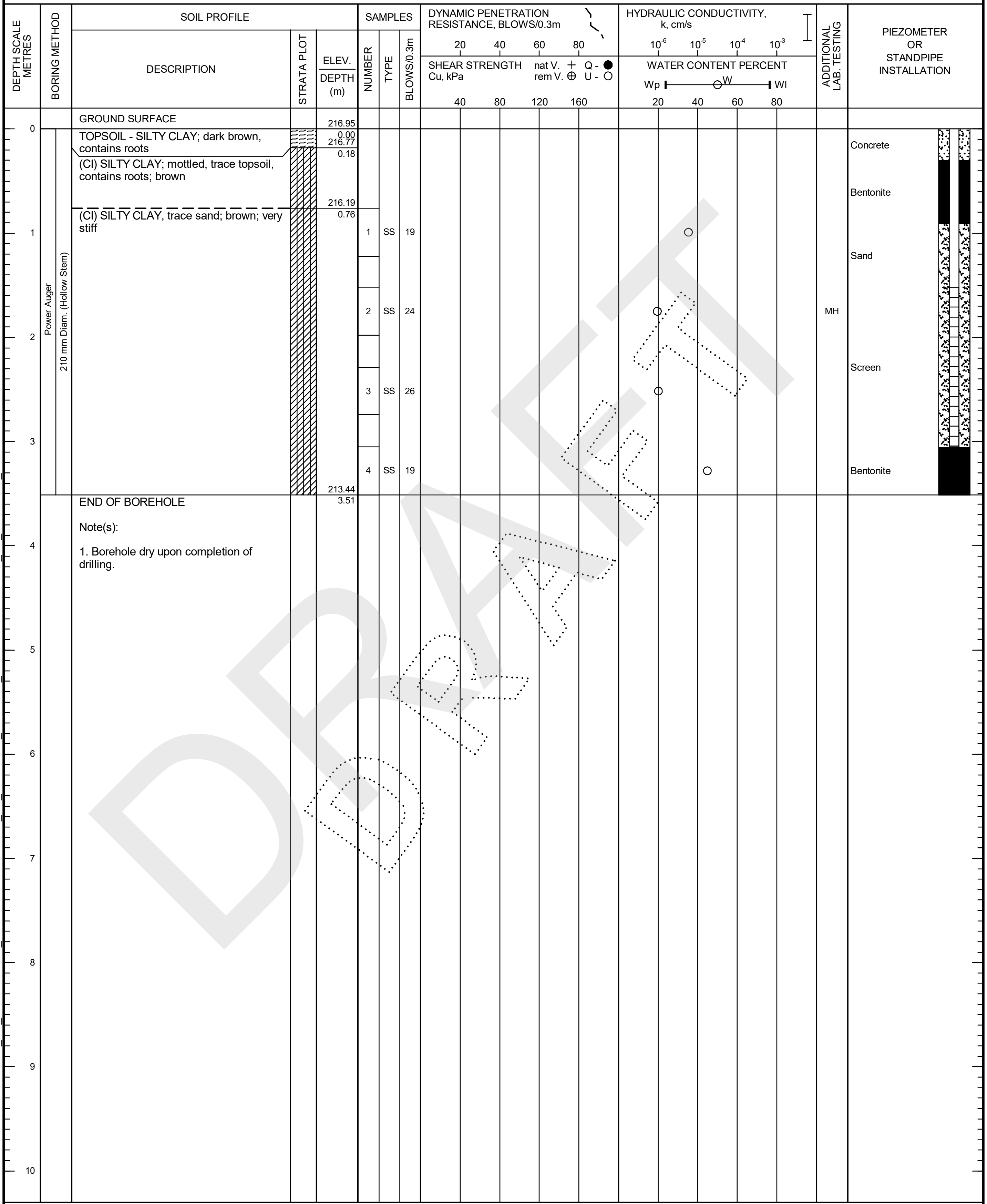
BORING DATE: April 5, 2024

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG: Diedrich D50 Mobile (London Soil)

HAMMER TYPE: AUTOMATIC



DESCRIPTION	ELEV. / DEPTH (m)
GROUND SURFACE	216.95
TOPSOIL - SILTY CLAY; dark brown, contains roots	0.00
(CI) SILTY CLAY; mottled, trace topsoil, contains roots; brown	216.77 0.18
(CI) SILTY CLAY, trace sand; brown; very stiff	216.19 0.76
END OF BOREHOLE	213.44 3.51

BORING METHOD: Power Auger, 210 mm Diam. (Hollow Stem)

NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING
1	SS	19	
2	SS	24	MH
3	SS	26	
4	SS	19	

PIEZOMETER OR STANDPIPE INSTALLATION: Concrete, Bentonite, Sand, Screen, Bentonite

Note(s):

1. Borehole dry upon completion of drilling.

DEPTH SCALE

1 : 50

LOGGED: KB

CHECKED: JAK

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