GEMS®
Groundwater Environmental Management Services

Geotechnical Investigation Report

2343 Eglinton Avenue West
Toronto, Ontario

Project No. 24-0022

December 18, 2024

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1.0 Introduction and Background

Groundwater Environmental Management Services Inc. (GEMS) has been retained by 1764174 Ontario Inc. (the Client) to carry out a geotechnical investigation for a high-rise development proposed at 2343 Eglinton Avenue West, Toronto (the Site). Authorization to proceed with this study was given by Mr. Brian Tafler of 1764174 Ontario Inc.

The original design concept for the proposed development consisted of demolishing the existing buildings at the Site and redeveloping the Site with mixed-use buildings ranging to 25-storeys above grade, constructed over an underground parking garage. The depth of the underground parking garage was not known at the time of preparing the Geotechnical Investiation scope of work, but is was assumed the parking garage would be two levels extending approximately 6 m below grade.

Based on the proposed development scheme, GEMS recommended that a total of five (5) boreholes be advanced across the site for general coverage extended to depths ranging from 20 to 40 meters below grade (mbg), with Pressuremeter (PMT) testing in one of the deep boreholes. It was anticipated that the proposed 25 storey building would be founded using spread and strip footings or a raft foundation that would be supported on the native soils at a shallow depth.

Following the completion of the drilling fieldwork, the height of the proposed buildings were revised to 12 and 43 storeys with a 6 storey podium separating the two buildings. The buildings would be constructed over two levels of underground parking garage, with the P2 floor slab set at Elevation 151.20 m; approximately 7 to 8 mbg.

Based on the loads that are anticipated to be applied by the 43 storey tower, it may now be necessary to support the tower on caisson foundations extending to bedrock. The depth to bedrock was not investigated during the initial drilling program, and accordingly deeper boreholes are likely to be required to be advanced at the Site to obtain information required for caisson foundations.

This report presents the findings of the geotechnical investigation undertaken for the original development proposal and recommendations for the design of the proposed development using the available information.

The geotechnical investigation was carried out in conjunction with the hydrogeological investigation, reported under separate cover.

This report presents the results of the investigation performed in accordance with the general terms of reference outlined above and is intended for the guidance of the owner and the design architects or engineers only. It is assumed that the design will be in accordance with the applicable building codes and standards.

2.0 Fieldwork

The fieldwork for this study was carried out during the period September 26 to October 11, 2023. It consisted of five (5) boreholes advanced by a drilling contractor commissioned by GEMS utilizing conventional drilling techniques. The boreholes are designated as MW1 through MW5 and were advanced to depths ranging between 20 and 40 m below ground surface (mbg).

All boreholes were instrumented with monitoring wells to facilitate field testing for the hydrogeological study. These wells were screened to depths ranging from 8 to 20 mbg.

The locations of the boreholes are shown on the Borehole Location Plan in Appendix A. It should be noted that Boreholes MW1 and MW2 were proposed to be drilled further north for site coverage, however their positions needed to be moved south due to the presence of critical utilities along Eglinton Avenue West to satisfy a minimum setback required by the utility company.

Standard penetration tests were carried out in the course of advancing the boreholes to take representative soil samples and to measure penetration index values (N-values) to characterize the condition of the various soil materials. The number of blows of the striking hammer required to drive the split spoon sampler through 300 mm depth increments was recorded and these are presented on the logs in Appendix B as penetration index values.

The subsurface soil information at the Site was complemented with the results of Pressuremeter (PMT) testing carried out in Borehole MW5 extending from approximately 3.5 to 40 mbg at 3 m depth intervals. The PMT is an in situ stress-strain test performed on the wall of a predrilled borehole using a cylindrical probe that is expanded radially. Based on the interpretation of the test data, an estimation of soil shear strength and deformation properties including elastic modulus, drained friction angle, as well as an interpretation of the engineering behaviour of the soil material under test are determined. The PMT results and interpreted data are enclosed with this report in Appendix D.

Groundwater level observations were made in the boreholes during their advancement and subsequently in the monitoring wells on August 29, September 10 and 27, October 9 and 23, and November 4, 2023.

The ground surface elevations at the locations of the boreholes were established utilizing a TopCon HiPer V GNSS positioning device.

The fieldwork for this project was carried out under the supervision of an experienced technician from this office who laid out the positions of the boreholes in the field; arranged locates of buried services; effected the drilling, sampling and in situ testing; observed groundwater conditions; and prepared field borehole log sheets.

3.0 Laboratory Tests

The soil samples recovered from the split spoon sampler were properly sealed, labelled and brought to our laboratory for detailed examination. They were visually classified and water content tests were conducted on all samples retained from Borehole MW1, MW3, and MW5. The results of the classification and water content tests are presented on the borehole log sheets in Appendix B.

Grain-size analyses were carried out on four (4) soil samples, and two (2) of the samples was subjected to Atterberg Limits test. The results of these tests are enclosed in Appendix C of this report.

4.0 Site and Subsurface Conditions

Full details of the subsurface and groundwater conditions at the site are given on the Borehole Log Sheets attached in Appendix B of this report.

The following paragraphs present a description of the site and a commentary on the engineering properties of the various soil materials contacted in the boreholes.

It should be noted that the boundaries of soil types indicated on the borehole logs are inferred from non-continuous soil sampling and observations made during drilling. These boundaries are intended to reflect transition zones for the purpose of geotechnical design, and therefore, should not be construed as exact planes of geological change.

4.1 Site Description

The Site is located on the southwest corner of the intersection of Eglinton Avenue West and Caledonia Road in Toronto. It has an approximate area of 4,100 m^2 and is currently developed with a single storey commercial building, with one basement level underneath a portion of the building footprint. The building is operating as a Shoppers Drug Mart.

The Site is bounded by Eglinton Avenue West to the north with commercial buildings then residential homes beyond, Caledonia Road to the east with a residential homes beyond , residential homes to the south, and Gilbert avenue to the west with a parkette beyond . The Eglinton Crosstown LRT tunnel is located under Eglinton Avenue north of the Site. The tunnel is believed to be located approximately 15 mbg.

The ground surface topography of the site is relatively flat with a gentle downward slope from east to west. The ground surface elevations at the locations of the boreholes range between 159.14 at MW4 and 158.11 at MW2.

4.2 Surface Cover

Asphaltic concrete is present at the ground surface in all boreholes. It ranges in thickness from 70 mm to 75 mm.

4.3 Fill Material

Fill material is present below the asphaltic concrete in all boreholes. It consists of gravelly sand, silty sand with some clay pockets, and clayey silt with some sand and trace gravel. The fill extends to depths ranging from 0.2 mbg in MW2 and MW5 to 0.9 mbg in MW1.

The fill is brown and dark brown in colour and moist in appearance. The water content of the samples of fill obtained from Boreholes MW1, MW3 and MW5 are 14 and 23% by weight. SPT in the fill provided N-values ranging from 4 to 10 indicating a loose compactness condition or firm consistency.

4.4 Native Soil

The native soils present below the fill material at all borehole locations consist of sandy clayey silt glacial till deposit, underlain by sands and silts, further underlain by clayey silt.

4.4.1 Clayey Sandy Silt (Till)

Clayey sandy silt (till), with trace gravel is present in all boreholes below the fill materials. It extends to depths ranging from approximately 5.5 to 9.2 mbg.

The clayey sandy silt (till) is brown in colour and moist in apperance. The water content of samples of clayey sandy silt (till) obtained from Boreholes MW1, MW3, and MW5 range from 5 to 23% by weight.

SPT carried out in the clayey sandy silt (till) provided N-values ranging from 8 to over 100 blows for 300 mm of penetration indicating a firm to hard consistency: more typically being very stiff to hard.

Grain size analysis and Atterberg Limits test was carried out on one (1) sample of clayey sandy silt (till) obtained from Borehole MW5; Sample 4 at 2.4 m depth. The test results are enclosed in Appendix C as Figures C-1 and C-5 and reveal that the material consists of 47.4% silt, 32.2% sand, 15.0% clay, and 5.4% gravel, and possesses a liquid limit of 20.8 and a plastic limit of 15.2.

The soil classification, according to the plasticity chart on Figure C-5 in Appendix C is inorganic clay of low plasticity.

Based on the results of the grain size analysis, the Coefficient of Permeability (k) of the clayey sandy silt (till) is estimated to be less than 10^{-8} cm/sec, corresponding to very low relative permeability.

4.4.2 Sands and Silts

Sands and silts with varying compositions are present below the sandy clayey silt (till) in all boreholes extending to depths ranging from approximately 24.5 to 25.5 mbg. Boreholes MW2, MW3, and MW4 were terminated in the sands and silts at an approximate depth of 20 m.

The sand and silt materials consist of fine sand and silt, sand with trace to some silt, silt with some sand and trace clay, sand and silt with some clay and trace gravel, sand with some silt to silty, and fine sandy silt with trace clay and trace gravel with occasional thin layers of clayey silt.

The sands and silts are brown in colour and moist in appearance, becoming grey and wet at depths ranging from approximately 10.2 to 14.8 mbg. The water content of the samples of sand and silt obtained from Boreholes MW1, MW3, and MW5 range from 5 to 18% by weight.

SPT carried out in the sands and silts provided N-values ranging from 36 to more than 100 blows for 300 mm of penetration. Based on findings of SPT tests the compactness condition of the sands and silts ranges from dense to very dense; more typically being very dense.

Grain size analyses were carried out on three (3) samples of sands and silts obtained from Borehole MW1; Sample 18 at 21.5 m depth, Borehole MW2; Sample 9 at 9.2 m depth, and Borehole MW5; Sample 11 at 15.4 m depth. Atterberg Limits tests were conducted on the sample from Borehole MW1. The test results are enclosed in Appendix C as Figures C-2 through C-5 and are summarized in the following table.

Table 1. Results of Grain Size Analysis

Borehole No.	Sample Depth (mbgs) and No.	Sample Description	Gravel %	Sand %	Silt %	Clay %
MW2	9.2, Sample 9	SAND and SILT some clay, trace gravel	7.6	36.1	38.3	18.0
MW5	15.2, Sample 11	fine SANDY SILT, trace clay	0.0	23.3	68.3	8.4
MW1	21.5, Sample 18	SILT, some sand, trace clay	0.0	14.6	80.2	5.2

Based on the results of the grain size analyses, the Coefficient of Permeability (k) of the sands and silts are estimated to range from 1.6 x 10^{-4} to 10^{-6} cm/sec, corresponding to medium relative permeability.

The Atterberg Limits test performed on Borehole MW1; Sample 18 revealed that the soil is not plastic.

4.4.3 Clayey Silt

Clayey silt with frequent layers of silt is present below the sands and silts in Boreholes MW1 and MW5. The clayey silt extends to the explored depth in both boreholes at 40 mbg.

The clayey silt is grey in colour and moist in apperance. The water content of samples of the layers of clayey silt obtained from Boreholes MW1 and MW5 range from 18 to 25% by weight.

SPT carried out in the layers of sands and silts provided N-values ranging from 24 to over 100 blows for 300 mm of penetration indicating a very stiff to hard consistency: more typically being hard.

4.5 Groundwater

Groundwater measurements made by GEMS in the monitoring wells installed in the boreholes during the period between August 29 and November 4, 2023 are summarized in the following table.

Table 2. Groundwater Levels

BH No.	Ground Surface Elevation (m)	Date	Groundwater Depth (mbg)	Groundwater Elevation (m)
MW1	159.04	August 29, 2023	7.83	151.21
		September 10, 2023	Dry	-
		September 27, 2023	7.82	151.22
		October 9, 2023	7.83	151.21
		October 23, 2023	7.84	151.20
		November 4, 2023	7.83	151.21
MW2	158.12	August 29, 2023	6.54	151.58
		September 10, 2023	6.71	151.41
		September 27, 2023	6.79	151.33
		October 9, 2023	6.80	151.32
		October 23, 2023	6.86	151.26
		November 4, 2023	6.87	151.25
MW3	158.69	August 29, 2023	6.59	152.10
		September 10, 2023	Dry	-
		September 27, 2023	6.59	152.10
		October 9, 2023	6.60	152.09
		October 23, 2023	6.61	152.08
		November 4, 2023	6.61	152.08
MW4	159.14	August 29, 2023	13.38	145.76
		September 10, 2023	13.35	145.79
		September 27, 2023	-	-
		October 9, 2023	13.20	145.94
		October 23, 2023	13.31	145.83
		November 4, 2023	13.33	145.81
MW5	158.21	August 29, 2023	6.97	151.24
		September 10, 2023	7.33	150.88
		September 27, 2023	7.72	150.49
		October 9, 2023	7.74	150.47
		October 23, 2023	7.73	150.48
		November 4, 2023	7.73	150.48

MW4 was not accessible on September 24, 2023, and accordingly no groundwater level could be measured.

It should be noted that groundwater levels are subject to seasonal fluctuations.

5.0 Discussion and Recommendations

The following discussions and recommendations are based on the factual data obtained from the boreholes advanced at the site by GEMS and are intended for use by the client and design architects and engineers only.

We understand that it is proposed to demolish the existing buildings at the Site and redevelop the Site with 12 and 43 storey buildings with a 6 storey podium separating the two buildings, constructed over two levels of underground parking garage which will extend to the property limits. The P2 floor slab Elevation will be 151.20 m; approximately 7 to 8 mbg.

Contractors bidding on this project or conducting work associated with this project should make their own interpretation of the factual data and/or carry out their own investigations.

5.1 Excavation

Based on the field results, excavations for the foundations are not expected to pose any unusual difficulty. Excavation of the soils at this site can be carried out with hydraulic excavators.

It should be noted that the native soils at this site include glacial deposits, non-sorted sediment and therefore may contain boulders. Provisions must be made in the excavation and foundation installation contracts for the removal of possible boulders.

All excavations must be carried out in accordance with the Occupational Health and Safety Act (OHSA). With respect to the OHSA, the fill materials are expected to conform to Type 3 soils. The Clayey Sandy Silt (till) and the sands and silts above the water table are expected to conform to Type 2 soils.

Temporary excavation side-walls in Type 3 soils should not exceed 1.0 horizontal to 1.0 vertical. Temporary excavation side-walls in Type 2 soils should not exceed a 1.2 m vertical wall at the excavation bottom then not exceed 1.0 horizontal to 1.0 vertical.

In the event very loose and/or soft soils are encountered at shallow depths or within zones of persistent seepage, it will be necessary to flatten the side slopes to achieve stable conditions.

Excavation side-slopes should not be unduly left exposed to inclement weather.

Where workers must enter excavations extending deeper than 1.2 m below grade, the excavation sidewalls must be suitably sloped and/or braced in accordance with the Occupational Health and Safety Act and Regulations for Construction Projects.

Given the proposed depth of basement, and the proximity to the property limits, it will be necessary to shore the basement perimeter excavation walls. Shoring recommendations are provided in Section 5.7 of this report.

5.2 Groundwater Control

Based on observations made during drilling of the boreholes, and close examination of the soil samples extracted from the boreholes, significant groundwater seepage is not expected within the anticipated depths of the excavation for the underground structure and foundations. Any groundwater that may seep into excavations is expected to be minimal and it will be possible to maintain the excavations functionally free of water by means of sump pumps situated at the base of excavations. Surface water should be directed away from open excavations.

Excavations extending into the wet sandy and silty soils may encounter moderate groundwater flows that may require active dewatering.

The Hydrogeological Assessment Report prepared by GEMS should be referred to for further recommendations for groundwater control, the anticipated dewatering volumes during construction and during the service life of the building, as well as for requirements for Environmental Activity and Sector Registry (EASR) or Permit to Take Water (PTTW).

5.3 Reuse of On-Site Excavated Soil

On-site excavated inorganic soils, and soils free of construction debris and other deleterious materials are considered suitable for reuse as backfill provided their water content is within 2% of their optimum water contents (OWC) as determined by Standard Proctor test, and the materials are effectively compacted with a heavy compactor.

While the quality of the on-site soils is considered suitable for backfilling; the moisture content of the soils and the lift thickness for compaction must be properly controlled during backfilling. Measured water content of the fill and native soils within the anticipated excavation depth range from approximately 7 to 23%, more typically being around 10% which is close to the OWC of the material.

On-site soils that are wetter than their OWC should be dried sufficiently prior to use as fill to achieve the specified degree of compaction.

5.4 Foundation Design

The proposed development will consist of a 12 and 43 storey buildings separated by a 6 storey podium constructed over 2 levels of underground parking garage. The floor slab of the lowest parking garage level will be situated at Elevation 151.2 m.

As long term dewatering is no longer permitted by the City, it will not be possible to utilize perimeter and sub-floor drainage systems, it will be necessary to waterproof the underground floor slab and walls and accordingly use a raft slab to resist the hydrostatic uplift forces. It is anticipated that the base of the raft foundation will be situated approximately 2.5 m below the lowest parking garage floor slab at about Elevation 148.5 m. It will be necessary to maintain the water table below the base of the excavation at all times during construction of the foundation.

Based on the findings of the boreholes, the soil at the proposed base of the raft will consist of very dense, moist sand and silt.

In order to determine the magnitude of settlement resulting from the stress applied to the soil by the raft foundation, PMT testing was carried out in Borehole MW5. A settlement analysis was carried out using the GEO5 software package utilizing the soil data obtained from the PMT tests. Based on the results of the settlement analysis, settlements resulting from stresses of 350 and 550 kPa applied by the raft are estimated to be 25 and 50 mm, respectively. For the structural design of the raft foundation, an average modulus of subgrade reaction value of 12 MPa/m can be used.

If the raft foundation system does not satisfy the design criteria alone, a composite foundation system comprising raft and piles (known as a piled raft) can be considered. This system is comprised of conventional piles and a rigid raft which acts as a pile cap. The main advantage of the piled raft is, it can limit settlement, bending, and tilting of the foundation bodies to a tolerable scale for the serviceability of the building. It can also prevent the settlement gaps between the foundation elements of the 43 storey tower and the surrounding parking garage structure and the 22 storey building . Consideration should also be given to settlement induced by the raft foundation on adjacent structures, specially the Eglinton Crosstown LRT tunnel to the north. A piled raft will minimize the effect of settlement on adjacent structures.

It is anticipated that the piles (caissons) will require to be founded in the bedrock anticipated to be situated approximately 45 m below grade. Accordingly, it will be necessary to advance additional boreholes at the Site to determine the depth to bedrock as well as the quality and strength of the bedrock.

It is anticipated that caissons founded a minimum of 1.5 m into sound shale bedrock, can be designed based on end bearing resistance at Ultimate Limit States (ULS) of 7 to 10 MPa.

The caisson installation must be inspected by a qualified geotechnical engineer to ensure that the caissons are constructed in accordance with the design intent. The contractor must take into consideration the drilling method to be used through soft and water bearing soils (continuous liners, mud drilling, etc.) and the concreting technique for installing caissons in accordance with good construction practice.

Caissons should be advanced to the top of sound shale bedrock and confirmed by the Geotechnical Engineer based on field observations. The caisson should then be further advanced 1.5 m into the sound shale. The caisson hole base should be cleaned using the auger and observed and approved by the Geotechnical Engineer.

Concrete should be placed to a minimum thickness of 600 mm in the caisson hole and mixed with the auger. The concrete should then be extracted from the caisson hole and disposed. Concrete placement for the caisson foundation may then proceed.

In the event that more than 150 mm of water is present in the base of the hole, it will be necessary to place concrete using the tremie method to ensure proper placement of the concrete in water.

5.5 Basement Floor Slab

As a raft foundation will be implemented, the floor slab will likely have to be constructed over a 500 to 600 mm thick layer of granular material such as 19 mm clear stone placed directly over the raft foundation to permit placement of sub-floor drainage piping and other utility lines.

5.6 Lateral Earth Pressure

Parameters used in the determination of earth pressure acting on structures subject to unbalanced pressures are defined below.

Table 2. Soil Parameters

Parameter	Definition	Units
Φ’	Angle of internal friction	Degrees
γ	Bulk unit weight of soil	kN/m^3
Ka	Active earth pressure coefficient (Rankine)	Dimensionless
Ko	At-rest earth pressure coefficient (Rankine)	Dimensionless
Kp	Passive earth pressure coefficient (Rankine)	Dimensionless

The appropriate un-factored values for use in the design of structures subject to unbalanced earth pressures at this site are tabulated as follows:

Table 3. Soil Parameter Values

Soil Description	Φ’	γ	Ka	Kp	Ko
Fill Material	28°	20.0	0.36	2.77	0.53
Very stiff to hard Clayey Sandy Silt Till	32°	21.0	0.31	3.25	0.47
Silty Sand, Sandy Silt, Sand, Silty Sand Till, Silt	34°	19.0	0.28	3.54	0.44

Notes:

1. *Temporary and/or permanent surcharges at the ground surface should be considered in accordance with the applicable Soil Mechanics methods.*

Walls or bracings subject to unbalanced earth pressures must be designed to resist a pressure that can be calculated based on the following formula:

$P = K(\gamma h + q)$

where P = lateral pressure in kPa acting at a depth h (m) below ground surface
K = applicable lateral earth pressure coefficient (Use Ko for basement wall design)
γ = bulk unit weight of backfill (kN/m3)
h = height at any point along the interface (m)
q = the complete surcharge loading (kPa)

This equation assumes that free-draining backfill and positive drainage is provided behind the basement walls.

Subsurface walls that are subject to unbalanced earth and hydrostatic pressures must be designed to resist a pressure that can be calculated based on the following formula:

$$\mathbf{P = K (\gamma (h - h_w) + \gamma ' h_w + q] + \gamma_w h_w}$$

where P = lateral pressure in kPa acting at a depth h (m) below ground surface

K = applicable lateral earth pressure coefficient

H = height at any point along the interface (m)

h_w = depth below the groundwater level at point of interest (m)

γ = bulk unit weight of backfill (kN/m^3)

γ' = the submerged unit weight (kN/m3) of exterior soil ($\gamma ' = \gamma - \gamma w$)

Resistance to sliding of earth retaining structures is developed by friction between the base of the footing and the soil. This friction (R) depends on the normal load on the soil contact (N) and the frictional resistance of the soil (tan Φ') expressed as: $R = N \tan \Phi'$. This is an ultimate resistance value and does not contain a factor of safety.

5.7 Shoring Design

Given the proposed depth of the excavation, and that the basement walls of the proposed development will extend close to the property limits, it will not be possible to slope the banks of the excavation, and it will be necessary to shore the basement excavation walls.

The design of temporary shoring for the support of the excavation walls must account for the presence of structures and buried services on the adjacent properties, and the existing subsurface conditions at the site.

The lateral restraining force for the shoring system may be provided by employing either rakers or tieback anchors. The latter is favorable because they do not protrude into the excavations as is the case with rakers. The use of tieback anchors will depend on whether permission is obtained to extend the anchors to the required distance on to the neighboring properties.

Provisions should be made to install temporary liners for the excavation of the soldier pile holes. The shoring contractor must also provide construction method(s) to overcome any groundwater seepage into the pile holes during excavation and subsequent concreting of the piles to comply with good construction practice.

The shoring design should be based on the procedure detailed in the latest edition of the Canadian Foundation Engineering Manual.

The earth pressure coefficients applicable for the design of the shoring system are:

= **K_o** the ‘at rest’ earth pressure coefficient, applicable where no movement in the retained soil can be permitted, such as the presence of buried services or foundations close to the wall, = 0.45

= **K_a** the active pressure coefficient,

= 0.3 - where adjacent building footings or buried services fall outside an envelope formed by a 60^o line drawn from the base of the excavation wall to the ground surface

= 0.25 - where adjacent building footings or buried services are outside an envelope formed by a 45^o line drawn from the base of the excavation wall to the ground surface

The minimum depth of penetration (d) of soldier piles may be estimated from the following expression:

$\mathbf{R = NB\ (\frac{1}{2}\gamma d^2 K_p)}$

where **R** = required toe resistance

K_p = passive earth pressure coefficient

N = factor according to three-dimensional effect around an isolated pile,

B = diameter of concrete filled hole

d = required penetration depth

γ = bulk unit weight of soil

Raker footings should be designed in accordance with the design principles for shallow foundations subject to inclined loading. All raker footings should be located outside the zone of influence of the buried portion of soldier piles, and at no less than 1.5D from the piles, where D = Depth of penetration of the piles below the base of the excavation. No excavation should be made within two footing widths of the raker footings, on the side opposite the rakers.

Anchors extended into the sandy clayey silt till and silty and sandy soils may be designed based on soil/grout bond value of 50 kPa. This value depends on the anchor installation method and grouting procedures Gravity poured concrete can result in low bond values, while pressure grouted anchors will give higher values and produce a more satisfactory anchor.

It will be necessary to perform load tests on the tiebacks to confirm the bond stresses assumed in the design of anchors.

Movement of the shoring system is inevitable. Vertical movements will result from the vertical loads on the soldier piles resulting from the inclined tiebacks and inward horizontal movement will result from the earth and water pressures. The magnitude of this movement can be controlled by sound construction practices. The lateral and vertical movement of the shoring system must be monitored especially at locations in which settlement sensitive structures are present, to ensure that movements are kept within an acceptable range.

5.8 Pavement Design

It is anticipated that the majority of the pavement at the site will be situated on the parking garage roof slab. In this regard, the pavement may be comprised of a minimum of 75 mm thick layer of Granular ‘A’ topped with asphaltic concrete having a minimum thickness of 80 mm (40 mm HL8 and 40 mm HL3).

Pavement which will be supported by soil subgrade should comprise a minimum 300 mm compacted depth of OPSS Granular B Type I sub-base, followed by a minimum 150 mm compacted depth of Granular A base material, 50 mm of HL8 asphaltic concrete base course, and 40 mm of HL3 asphaltic concrete surface course.

The long-term performance of the proposed pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure that uniform subgrade moisture and density conditions are achieved as much as is practical, and that the subgrade is not disturbed and weakened after it is exposed.

The subgrade must be compacted to at least 98% of the materials standard Proctor maximum dry density (SPMDD). The granular base and sub-base materials should be compacted to a minimum of 100% SPMDD.

The asphaltic concrete materials should be compacted to a minimum of 97% of the materials bulk relative Marshall density.

The gradation and physical properties of the asphaltic concrete and granular materials shall conform to the OPSS standards. The asphaltic concrete materials should be rolled and compacted in accordance with OPSS 310 requirements.

The critical section of pavement will be at the transition between the pavement on subgrade and the pavement above the garage roof slab. In order to alleviate the detrimental effects of dynamic loading / settlement / pavement depression in the backfill to the rigid garage roof structure, it is recommended that an approach type slab be constructed at the entrance/exit points, by extending the granular sub-base to greater depths along the exterior garage wall.

Control of surface water is a significant factor in achieving good pavement life. Grading adjacent to the pavement areas must be designed so that water is not allowed to pond adjacent to the outside edges of the pavement or curb. In addition, the need for adequate drainage cannot be over-emphasized.

5.9 Earthquake Design Parameters

The Ontario Building Code (2012) stipulates the methodology for earthquake design analysis, as set out in Subsection 4.1.8.7. The determination of the type of analysis is predicated on the importance of the structure, the spectral response acceleration and the site classification.

The parameters for determination of the Site Classification for Seismic Site Response are set out in Table 4.1.8.4.A of the Ontario Building Code (2012). The classification is based on the determination of the average shear wave velocity in the top 30 metres of the site stratigraphy, where shear wave velocity (vs) measurements have been taken. In the absence of such measurements, the classification is estimated on the basis of empirical analysis of undrained shear strength or penetration resistance. The applicable penetration resistance is that which has been corrected to a rod energy efficiency of 60% of the theoretical maximum or the (N60) value.

Based on the borehole information, the subsurface stratigraphy generally comprises very stiff to hard clayey sandy silt till followed by very dense non-cohesive soils, underlain by hard clayey silt. Accordingly the site designation for seismic analysis is Class C.

The site specific 5% damped spectral acceleration coefficients, and the peak ground acceleration factors are provided in the 2012 Ontario Building Code - Supplementary Standard SB-1, Table 1.2, location Toronto, Ontario.

6.0 Limitations and Review of Final Design and Construction

GEMS has prepared this report for our client and its agents exclusively. GEMS accepts no responsibility for any damages that may be suffered by third parties as a result of decisions or actions based on this report.

The findings and conclusions are site-specific and were developed in a manner consistent with that level of care and skill normally exercised by professionals currently practicing under similar conditions in the area. The report should not be used after that without GEMS review/approval.

The project has been conducted according to our instructions and work program. Additional conditions, and limitations on our liability are set forth in our work program/contract. No warranty, expressed or implied, is made.

The conclusions and recommendations in this report are based on information determined at the inspection locations. Soil and groundwater conditions between and beyond the test holes by differ from those encountered at the test hole locations, and conclusions may become apparent during construction which could not be detected or anticipated at the time of the soil investigation.

The design recommendations given in this report are applicable to the project described in the text, and then only if constructed substantially in accordance with details of alignmentand elevations stated in the report. Since all of the details of the design may not be known to us, in our analysis certain assumptions had to be made as set out in this report. The actual conditions may, however, vary from those assumed, in which case changes and modifications may be required to our recommendations.

We recommend that we be retained during the final design stage to review the design drawings and to verify that they area consistent with our recommendations or the assumptions made in our analysis. We recommend also that we be retained during construction to confirm that the subsurface conditions throughout the site do not deviate materially from those encountered in the test holes. In cases where these recommendations are not followed, the company's responsibility is limited to accurately interpreting the conditions encountered at the test hole locations.

The comments given in this report on potential construction problems and possible methods are intended for the guidance of the design engineers and architects, only. The number of inspection locations may not be sufficient to determine all the factors that may affect construction methods and costs. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work.

7.0 Closing

We trust this information will meet your current requirements. Please do not hesitate to contact the undersigned should you have any questions or require additional information.

Yours truly,

Groundwater Environmental Management Services Inc.

Prepared By:

Kellen Campbell, C.Tech.
Director of Geotechnical Services

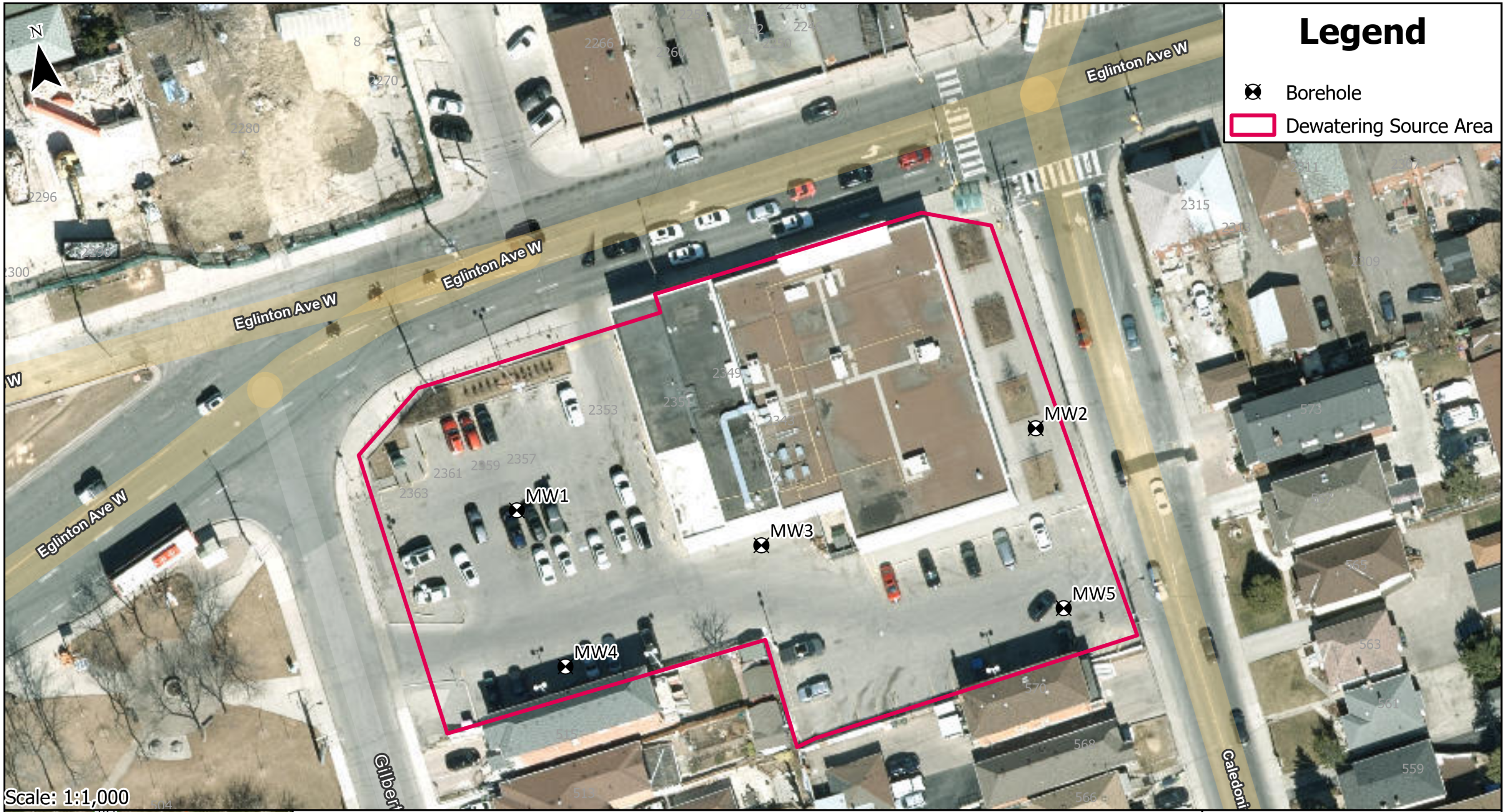
Reviewed By:

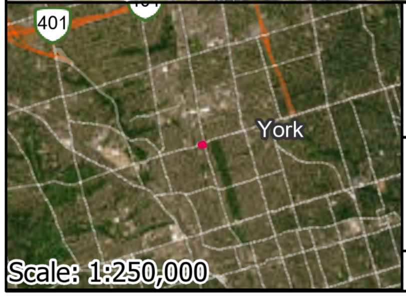
LICENSED PROFESSIONAL ENGINEER
V. NERSESIAN
33778705
February 7, 2025
PROVINCE OF ONTARIO

Vic Nersesian, P.Eng.
Principal Geotechnical Engineer

Appendix A

Figure 1 – Borehole Location Plan





Borehole Location Plan
2343 Eglinton Avenue West, Toronto

Client: 1764174 Ontario Inc.	Project # 24-0022	Created by: G.Hogan

Date Saved: 2024-12-12

Figure 1 of 1

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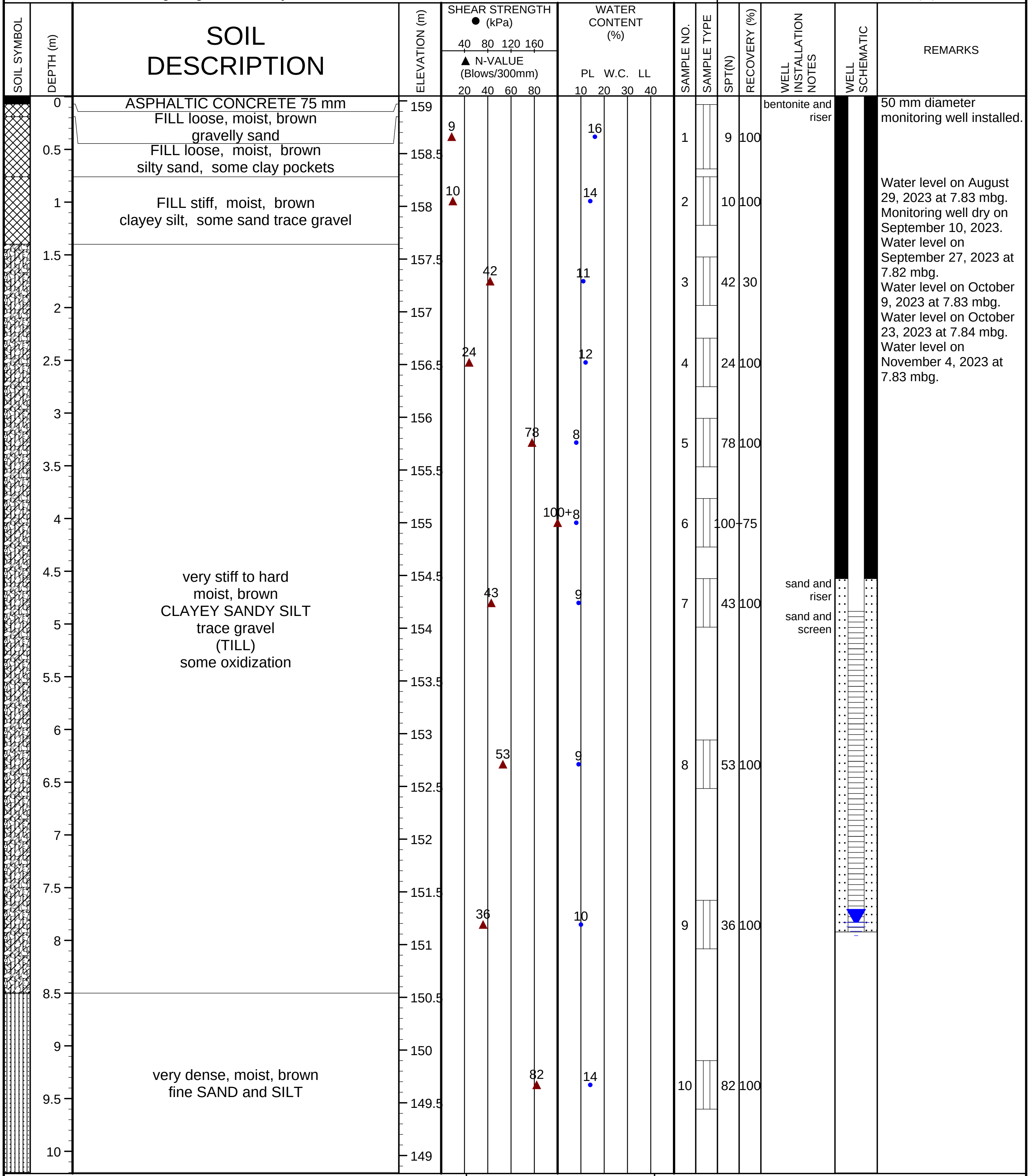
Meters

City of Toronto, ON, Maxar, Microsoft, Earthstar Geographics, City of Toronto, ON, Maxar, Esri Canada

Appendix B

Borehole Log Sheets

CLIENT: 1764174 Ontario Inc.	PROJECT NO.: 24-0022	**BOREHOLE NO. : MW1**
PROJECT: Proposed High-Rise Development		
LOCATION: 2343 Eglinton Avenue West, Toronto	NORTHING (m): 4838871.57	EASTING (m): 623858.028 ELEV. (m) 159.04
DRILLING CONTRACTOR: Drilltech Drilling Ltd.	BOREHOLE DIAMETER (cm): 10	WELL DIAMETER (cm): 5
DRILLING METHOD: Augering, Mud Rotary		TOTAL DEPTH OF BOREHOLE (m): 40.1



SOIL DESCRIPTION	DEPTH (m)
ASPHALTIC CONCRETE 75 mm	0
FILL loose, moist, brown gravelly sand	
FILL loose, moist, brown silty sand, some clay pockets	
FILL stiff, moist, brown clayey silt, some sand trace gravel	
very stiff to hard moist, brown CLAYEY SANDY SILT trace gravel (TILL) some oxidization	
very dense, moist, brown fine SAND and SILT	

SAMPLE NO.	N-VALUE	W.C. (%)	SPT(N)	RECOVERY (%)
1	9	16	9	100
2	10	14	10	100
3	42	11	42	30
4	24	12	24	100
5	78	8	78	100
6	100+	8	100+	75
7	43	9	43	100
8	53	9	53	100
9	36	10	36	100
10	82	14	82	100

WELL INSTALLATION NOTES

bentonite and riser

sand and riser

sand and screen

REMARKS

50 mm diameter monitoring well installed.

Water level on August 29, 2023 at 7.83 mbg.
Monitoring well dry on September 10, 2023.
Water level on September 27, 2023 at 7.82 mbg.
Water level on October 9, 2023 at 7.83 mbg.
Water level on October 23, 2023 at 7.84 mbg.
Water level on November 4, 2023 at 7.83 mbg.

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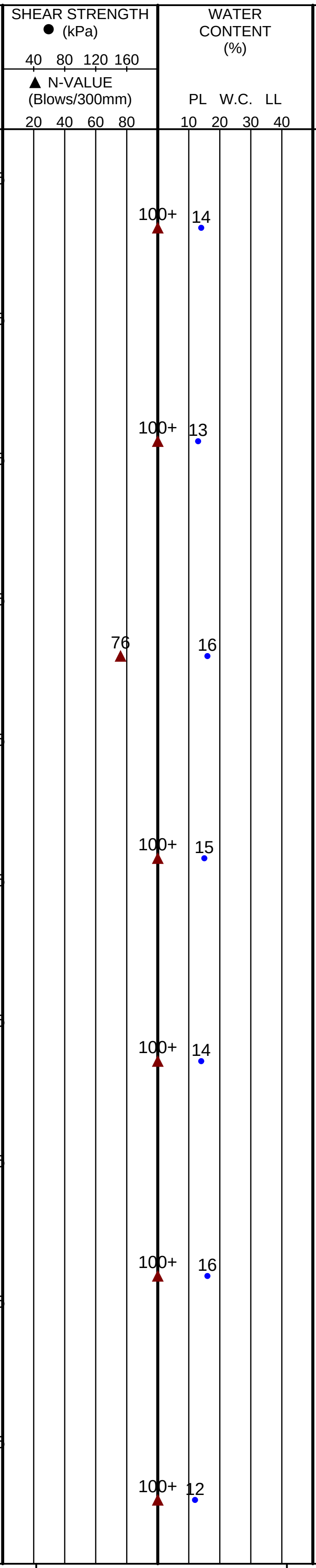
LOGGED BY: AD

REVIEWED BY: KC

DRILLING DATE: September 27 and 28, 2023

CLIENT: 1764174 Ontario Inc.
PROJECT NO.: 24-0022
BOREHOLE NO. : MW1
PROJECT: Proposed High-Rise Development
LOCATION: 2343 Eglinton Avenue West, Toronto
NORTHING (m): 4838871.57
EASTING (m): 623858.028
ELEV. (m) 159.04
DRILLING CONTRACTOR: Drilltech Drilling Ltd.
BOREHOLE DIAMETER (cm): 10
WELL DIAMETER (cm): 5
DRILLING METHOD: Augering, Mud Rotary
TOTAL DEPTH OF BOREHOLE (m): 40.1

DEPTH (m)	SOIL DESCRIPTION	ELEVATION (m)
10.5 – 16	very dense, moist, brown fine SAND and SILT moist ----- wet	148.5 – 143
16 – 19	very dense, wet, brown SAND trace to some silt	143 – 140
19 – 20	very dense, wet, grey SILT some sand, trace clay	140 – 139



SAMPLE NO.	N-VALUE	W.C. (%)	SPT(N)	RECOVERY (%)
11	100+	14	100+	100
12	100+	13	100+	100
13	76	16	76	50
14	100+	15	100+	60
15	100+	14	100+	100
16	100+	16	100+	85
17	100+	12	100+	75

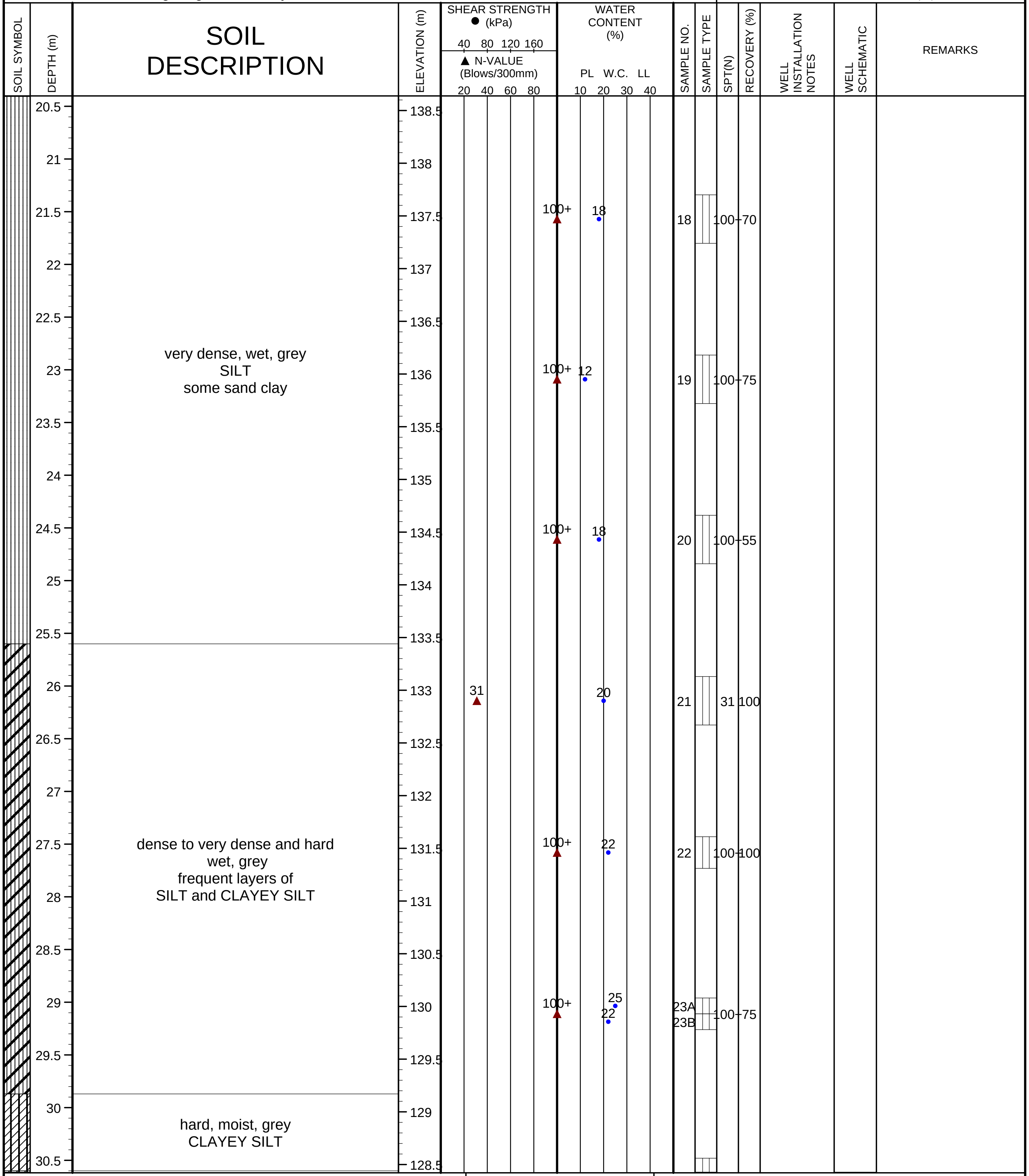
SAMPLE TYPE
WELL INSTALLATION NOTES
WELL SCHEMATIC
REMARKS

GEMS
LOGGED BY: AD
DRILLING DATE: September 27 and 28, 2023
REVIEWED BY: KC

CLIENT: 1764174 Ontario Inc.
PROJECT NO.: 24-0022

BOREHOLE NO. : MW1

PROJECT: Proposed High-Rise Development
LOCATION: 2343 Eglinton Avenue West, Toronto
NORTHING (m): 4838871.57
EASTING (m): 623858.028
ELEV. (m) 159.04
DRILLING CONTRACTOR: Drilltech Drilling Ltd.
BOREHOLE DIAMETER (cm): 10
WELL DIAMETER (cm): 5
DRILLING METHOD: Augering, Mud Rotary
TOTAL DEPTH OF BOREHOLE (m): 40.1



very dense, wet, grey
SILT
some sand clay

dense to very dense and hard
wet, grey
frequent layers of
SILT and CLAYEY SILT

hard, moist, grey
CLAYEY SILT

SAMPLE NO.	N-VALUE	W.C. (%)	SPT(N)	RECOVERY (%)
18	100+	18	100+	70
19	100+	12	100+	75
20	100+	18	100+	55
21	31	20	31	100
22	100+	22	100+	100
23A 23B	100+	25 22	100+	75

GEMS

LOGGED BY: AD
DRILLING DATE: September 27 and 28, 2023
REVIEWED BY: KC

CLIENT: 1764174 Ontario Inc.	PROJECT NO.: 24-0022	**BOREHOLE NO. : MW1**
PROJECT: Proposed High-Rise Development		
LOCATION: 2343 Eglinton Avenue West, Toronto	NORTHING (m): 4838871.57	EASTING (m): 623858.028 ELEV. (m) 159.04
DRILLING CONTRACTOR: Drilltech Drilling Ltd.	BOREHOLE DIAMETER (cm): 10	WELL DIAMETER (cm): 5
DRILLING METHOD: Augering, Mud Rotary		TOTAL DEPTH OF BOREHOLE (m): 40.1

SOIL SYMBOL	DEPTH (m)	SOIL DESCRIPTION	ELEVATION (m)
	31		128
	31.5		127.5
	32		127
	32.5		126.5
	33		126
	33.5		125.5
	34		125
	34.5		124.5
	35	hard and very stiff, moist grey CLAYEY SILT	124
	35.5		123.5
	36		123
	36.5		122.5
	37		122
	37.5		121.5
	38		121
	38.5		120.5
	39		120
	39.5		119.5
	40		119
		END OF BOREHOLE	

SHEAR STRENGTH ● (kPa) 40 80 120 160 ▲ N-VALUE (Blows/300mm) 20 40 60 80	WATER CONTENT (%) PL W.C. LL 10 20 30 40	SAMPLE NO.	SAMPLE TYPE	SPT(N)	RECOVERY (%)	WELL INSTALLATION NOTES	WELL SCHEMATIC	REMARKS
62	20	24		62	100			
100+	15 20	25A 25B		100+	100			
44	19	26		44	70			
36	18	27		36	100			
38	20	28		38	100			
24	21	29		24	100			
30	20	30		30	100			

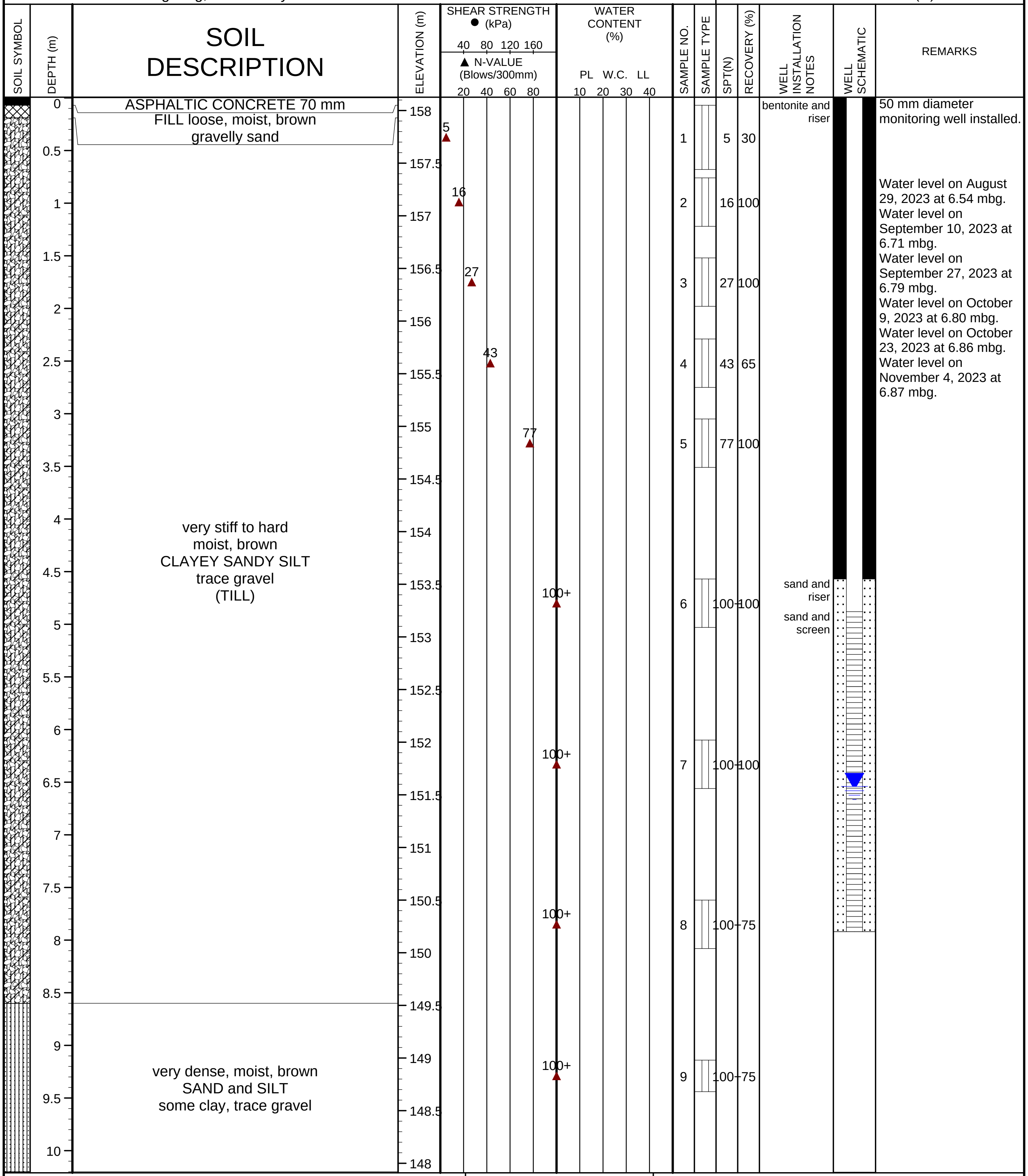
GEMS©

LOGGED BY: AD	DRILLING DATE: September 27 and 28, 2023
REVIEWED BY: KC	PAGE 4 OF 4

CLIENT: 1764174 Ontario Inc.
PROJECT NO.: 24-0022

BOREHOLE NO. : MW2

PROJECT: Proposed High-Rise Development
LOCATION: 2343 Eglinton Avenue West, Toronto
NORTHING (m): 4838883.58
EASTING (m): 623925.98
ELEV. (m) 158.12
DRILLING CONTRACTOR: Drilltech Drilling Ltd.
BOREHOLE DIAMETER (cm): 10
WELL DIAMETER (cm): 5
DRILLING METHOD: Augering, Mud Rotary
TOTAL DEPTH OF BOREHOLE (m): 20.0



ASPHALTIC CONCRETE 70 mm

FILL loose, moist, brown gravelly sand

very stiff to hard
moist, brown
CLAYEY SANDY SILT
trace gravel
(TILL)

very dense, moist, brown
SAND and SILT
some clay, trace gravel

SAMPLE NO.	SPT(N)	RECOVERY (%)
1	5	30
2	16	100
3	27	100
4	43	65
5	77	100
6	100+	100
7	100+	100
8	100+	75
9	100+	75

REMARKS:

50 mm diameter monitoring well installed.

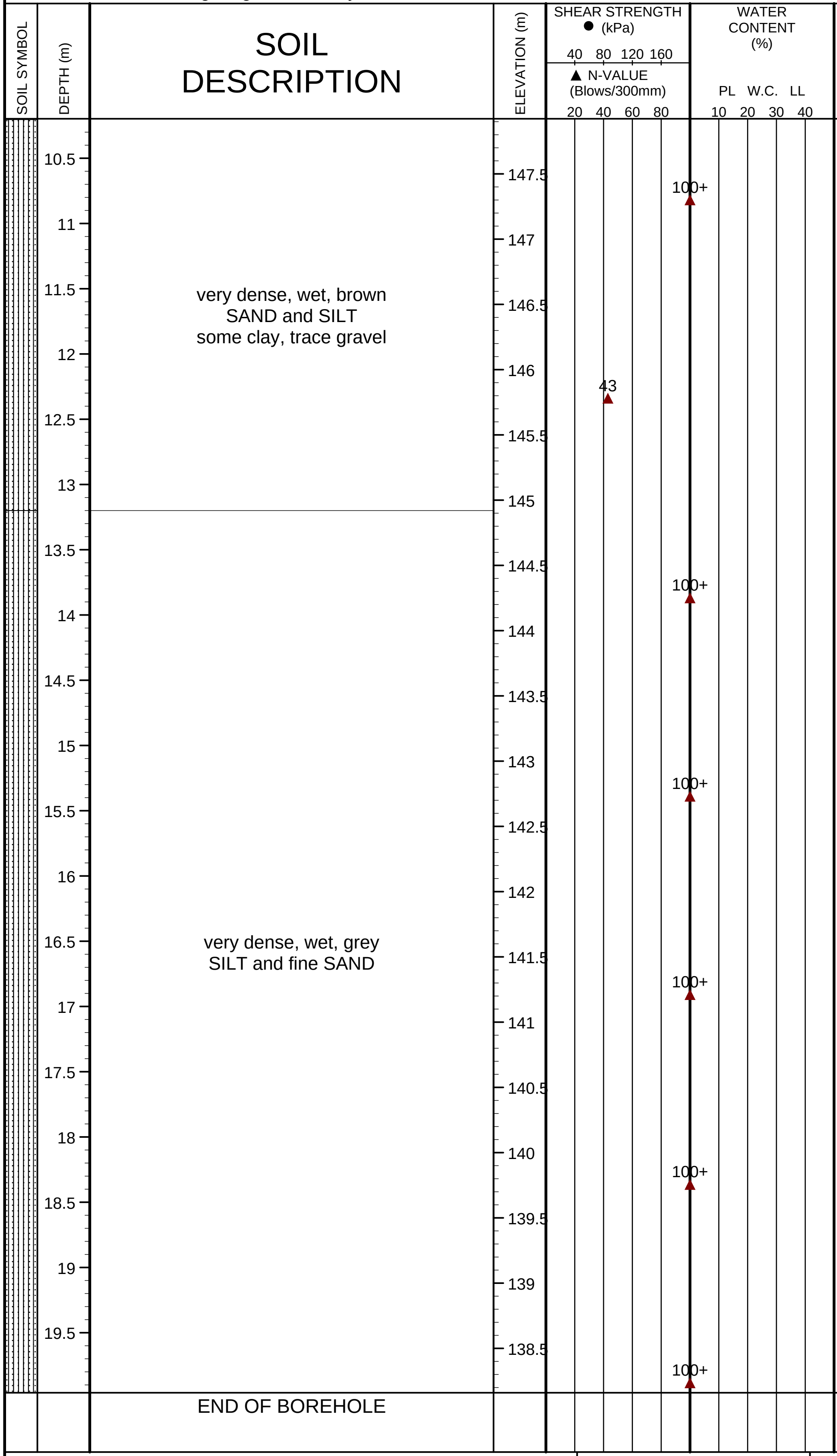
Water level on August 29, 2023 at 6.54 mbg.
Water level on September 10, 2023 at 6.71 mbg.
Water level on September 27, 2023 at 6.79 mbg.
Water level on October 9, 2023 at 6.80 mbg.
Water level on October 23, 2023 at 6.86 mbg.
Water level on November 4, 2023 at 6.87 mbg.

LOGGED BY: AD
DRILLING DATE: October 10-11, 2023
REVIEWED BY: KC

CLIENT: 1764174 Ontario Inc.
PROJECT NO.: 24-0022
PROJECT: Proposed High-Rise Development

BOREHOLE NO. : MW2

LOCATION: 2343 Eglinton Avenue West, Toronto
NORTHING (m): 4838883.58
EASTING (m): 623925.98
ELEV. (m) 158.12
DRILLING CONTRACTOR: Drilltech Drilling Ltd.
BOREHOLE DIAMETER (cm): 10
WELL DIAMETER (cm): 5
DRILLING METHOD: Augering, Mud Rotary
TOTAL DEPTH OF BOREHOLE (m): 20.0



SOIL DESCRIPTION

very dense, wet, brown
SAND and SILT
some clay, trace gravel

very dense, wet, grey
SILT and fine SAND

END OF BOREHOLE

SAMPLE NO.	SAMPLE TYPE	SPT(N)	RECOVERY (%)	WELL INSTALLATION NOTES	WELL SCHEMATIC	REMARKS
10		100+	100			
11		43	75			
12		100+	75			
13		100+	60			
14		100+	75			
15		100+	100			
16		100+	100			

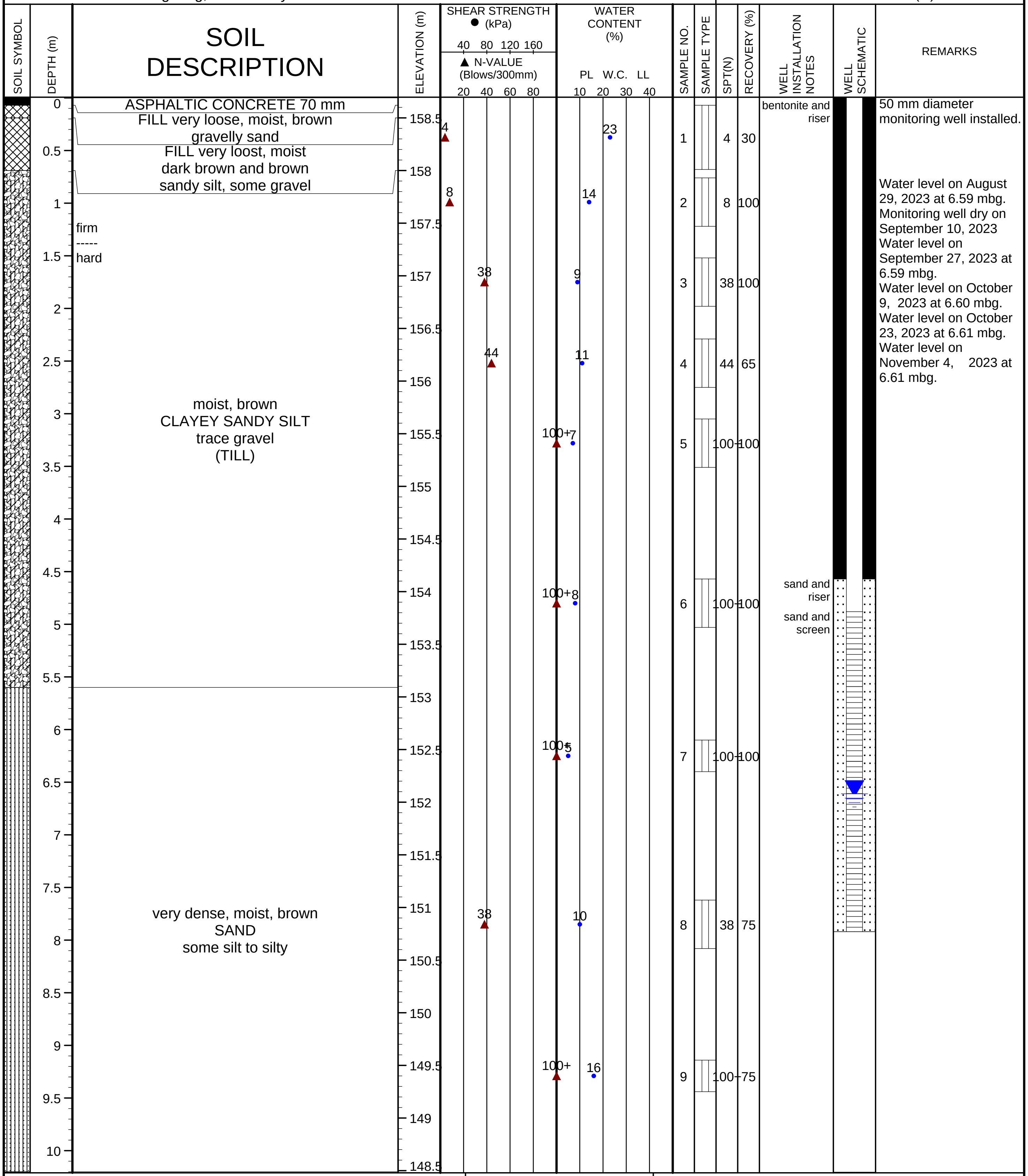
GEMS

LOGGED BY: AD
DRILLING DATE: October 10-11, 2023
REVIEWED BY: KC

CLIENT: 1764174 Ontario Inc.
PROJECT NO.: 24-0022

BOREHOLE NO. : MW3

PROJECT: Proposed High-Rise Development
LOCATION: 2343 Eglinton Avenue West, Toronto
NORTHING (m): 4838867.58
EASTING (m): 623890.25
ELEV. (m) 158.69
DRILLING CONTRACTOR: Drilltech Drilling Ltd.
BOREHOLE DIAMETER (cm): 10
WELL DIAMETER (cm): 5
DRILLING METHOD: Augering, Mud Rotary
TOTAL DEPTH OF BOREHOLE (m): 20.0



SOIL DESCRIPTION

ASPHALTIC CONCRETE 70 mm

FILL very loose, moist, brown gravelly sand

FILL very loost, moist dark brown and brown sandy silt, some gravel

firm
-----
hard

moist, brown
CLAYEY SANDY SILT
trace gravel
(TILL)

very dense, moist, brown
SAND
some silt to silty

SAMPLE NO.	N-VALUE	W.C. (%)	SPT(N)	RECOVERY (%)
1	4	23	4	30
2	8	14	8	100
3	38	9	38	100
4	44	11	44	65
5	100+	7	100+	100
6	100+	8	100+	100
7	100+	5	100+	100
8	38	10	38	75
9	100+	16	100+	75

WELL INSTALLATION NOTES:
bentonite and riser
sand and riser
sand and screen

REMARKS:
50 mm diameter monitoring well installed.

Water level on August 29, 2023 at 6.59 mbg.
Monitoring well dry on September 10, 2023
Water level on September 27, 2023 at 6.59 mbg.
Water level on October 9, 2023 at 6.60 mbg.
Water level on October 23, 2023 at 6.61 mbg.
Water level on November 4, 2023 at 6.61 mbg.

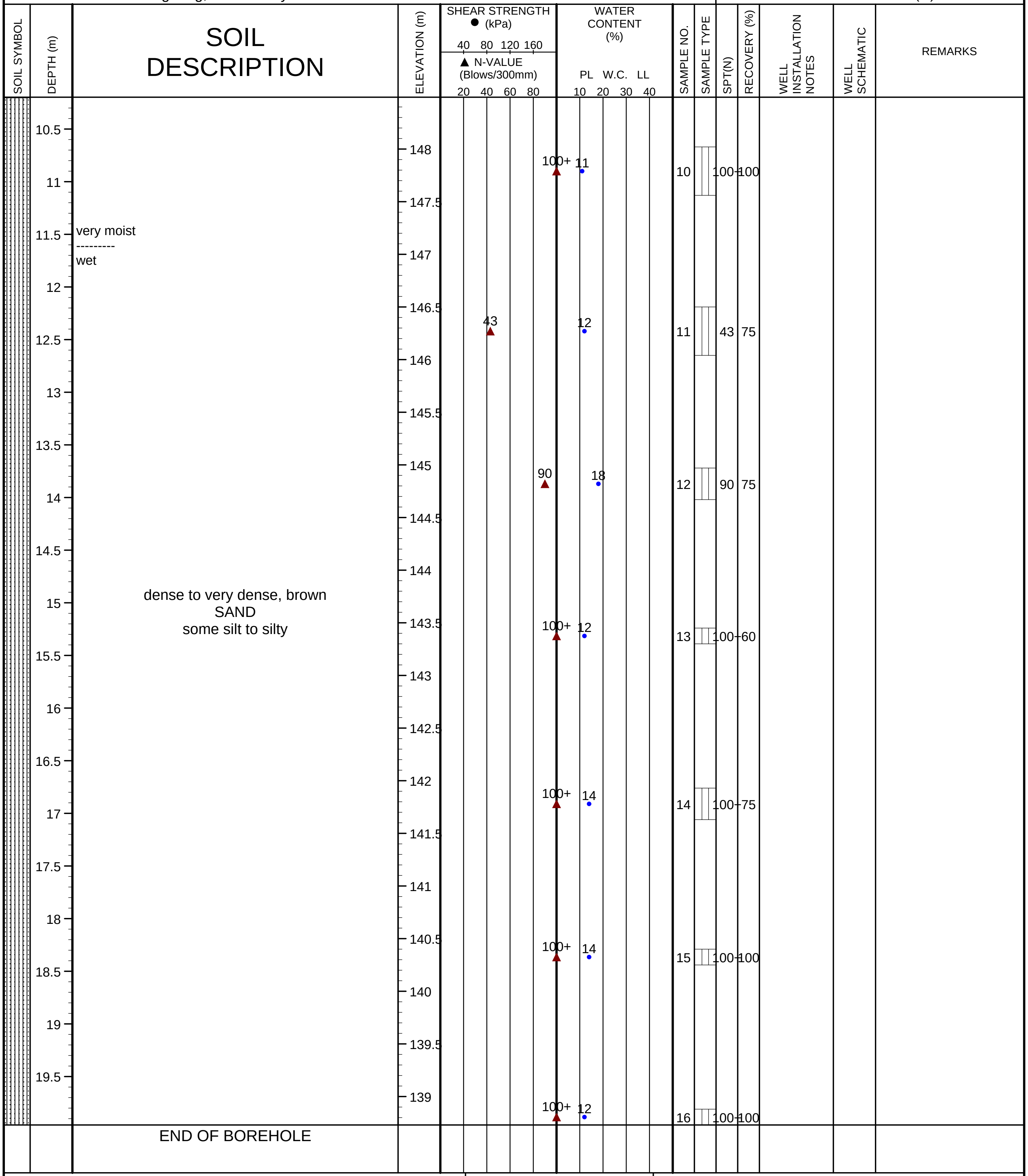
GEMS

LOGGED BY: AD
DRILLING DATE: October 2, 2023
REVIEWED BY: KC

CLIENT: 1764174 Ontario Inc.
PROJECT NO.: 24-0022
PROJECT: Proposed High-Rise Development

BOREHOLE NO. : MW3

LOCATION: 2343 Eglinton Avenue West, Toronto
NORTHING (m): 4838867.58
EASTING (m): 623890.25
ELEV. (m) 158.69
DRILLING CONTRACTOR: Drilltech Drilling Ltd.
BOREHOLE DIAMETER (cm): 10
WELL DIAMETER (cm): 5
DRILLING METHOD: Augering, Mud Rotary
TOTAL DEPTH OF BOREHOLE (m): 20.0



SOIL DESCRIPTION

very moist
----
wet

dense to very dense, brown
SAND
some silt to silty

END OF BOREHOLE

SAMPLE NO.	SAMPLE TYPE	SPT(N)	RECOVERY (%)	WATER CONTENT (%)	WELL INSTALLATION NOTES	WELL SCHEMATIC	REMARKS
10		100+	100	11			
11		43	75	12			
12		90	75	18			
13		100+	60	12			
14		100+	75	14			
15		100+	100	14			
16		100+	100	12			

GEMS

LOGGED BY: AD
DRILLING DATE: October 2, 2023
REVIEWED BY: KC

CLIENT: 1764174 Ontario Inc.

PROJECT NO.: 24-0022

BOREHOLE NO. : MW4

PROJECT: Proposed High-Rise Development

LOCATION: 2343 Eglinton Avenue West, Toronto

NORTHING (m): 4838851.17

EASTING (m): 623864.82

ELEV. (m) 159.14

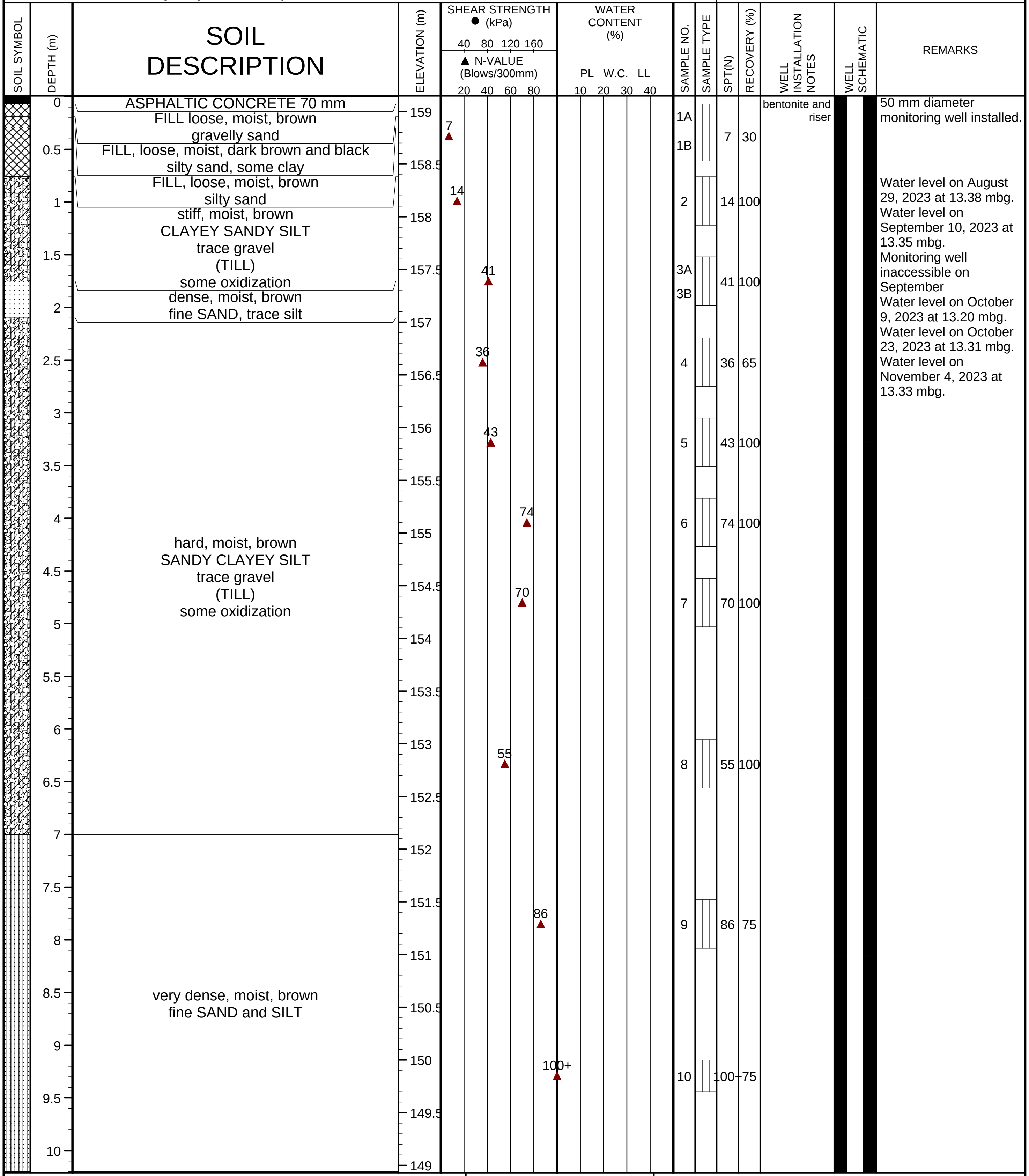
DRILLING CONTRACTOR: Drilltech Drilling Ltd.

BOREHOLE DIAMETER (cm): 10

WELL DIAMETER (cm): 5

DRILLING METHOD: Augering, Mud Rotary

TOTAL DEPTH OF BOREHOLE (m): 20.0



SOIL DESCRIPTION

ASPHALTIC CONCRETE 70 mm

FILL loose, moist, brown
gravelly sand

FILL, loose, moist, dark brown and black
silty sand, some clay

FILL, loose, moist, brown
silty sand

stiff, moist, brown
CLAYEY SANDY SILT
trace gravel
(TILL)
some oxidization

dense, moist, brown
fine SAND, trace silt

hard, moist, brown
SANDY CLAYEY SILT
trace gravel
(TILL)
some oxidization

very dense, moist, brown
fine SAND and SILT

SAMPLE NO.	SPT(N)	RECOVERY (%)
1A		
1B	7	30
2	14	100
3A		
3B	41	100
4	36	65
5	43	100
6	74	100
7	70	100
8	55	100
9	86	75
10	100+	75

WELL INSTALLATION NOTES: bentonite and riser

REMARKS

50 mm diameter monitoring well installed.

Water level on August 29, 2023 at 13.38 mbg.
Water level on September 10, 2023 at 13.35 mbg.
Monitoring well inaccessible on September
Water level on October 9, 2023 at 13.20 mbg.
Water level on October 23, 2023 at 13.31 mbg.
Water level on November 4, 2023 at 13.33 mbg.

GEMS

LOGGED BY: AD

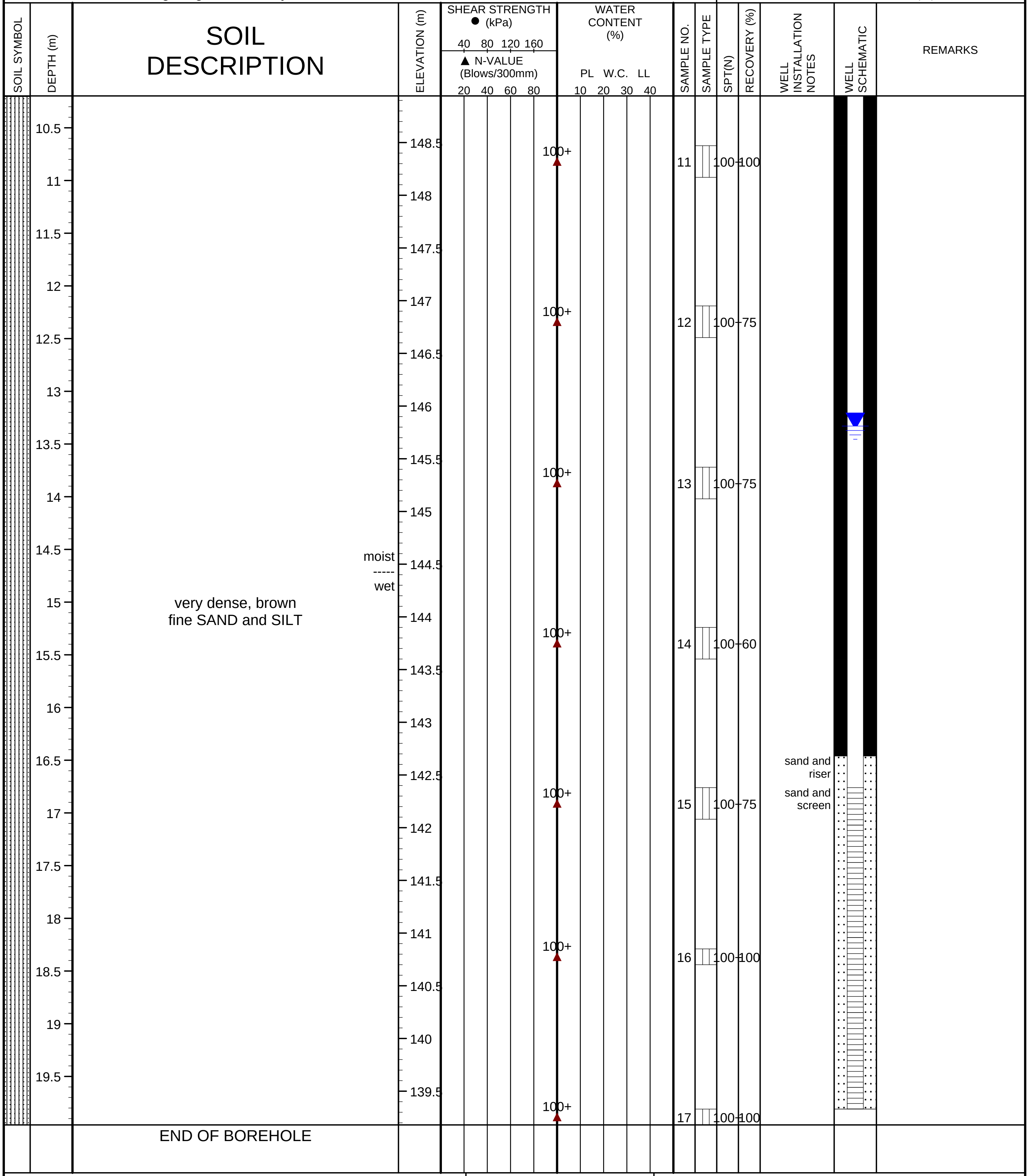
DRILLING DATE: September 26, 2023

REVIEWED BY: KC

CLIENT: 1764174 Ontario Inc.
PROJECT NO.: 24-0022

BOREHOLE NO. : MW4

PROJECT: Proposed High-Rise Development
LOCATION: 2343 Eglinton Avenue West, Toronto
NORTHING (m): 4838851.17
EASTING (m): 623864.82
ELEV. (m) 159.14
DRILLING CONTRACTOR: Drilltech Drilling Ltd.
BOREHOLE DIAMETER (cm): 10
WELL DIAMETER (cm): 5
DRILLING METHOD: Augering, Mud Rotary
TOTAL DEPTH OF BOREHOLE (m): 20.0



very dense, brown
fine SAND and SILT

END OF BOREHOLE

SAMPLE NO.	SPT(N)	RECOVERY (%)
11	100+	100
12	100+	75
13	100+	75
14	100+	60
15	100+	75
16	100+	100
17	100+	100

GEMS

LOGGED BY: AD
DRILLING DATE: September 26, 2023
REVIEWED BY: KC

CLIENT: 1764174 Ontario Inc.

PROJECT NO.: 24-0022

BOREHOLE NO. : MW5

PROJECT: Proposed High-Rise Development

LOCATION: 2343 Eglinton Avenue West, Toronto

NORTHING (m): 4838860.03

EASTING (m): 623930.09

ELEV. (m) 158.21

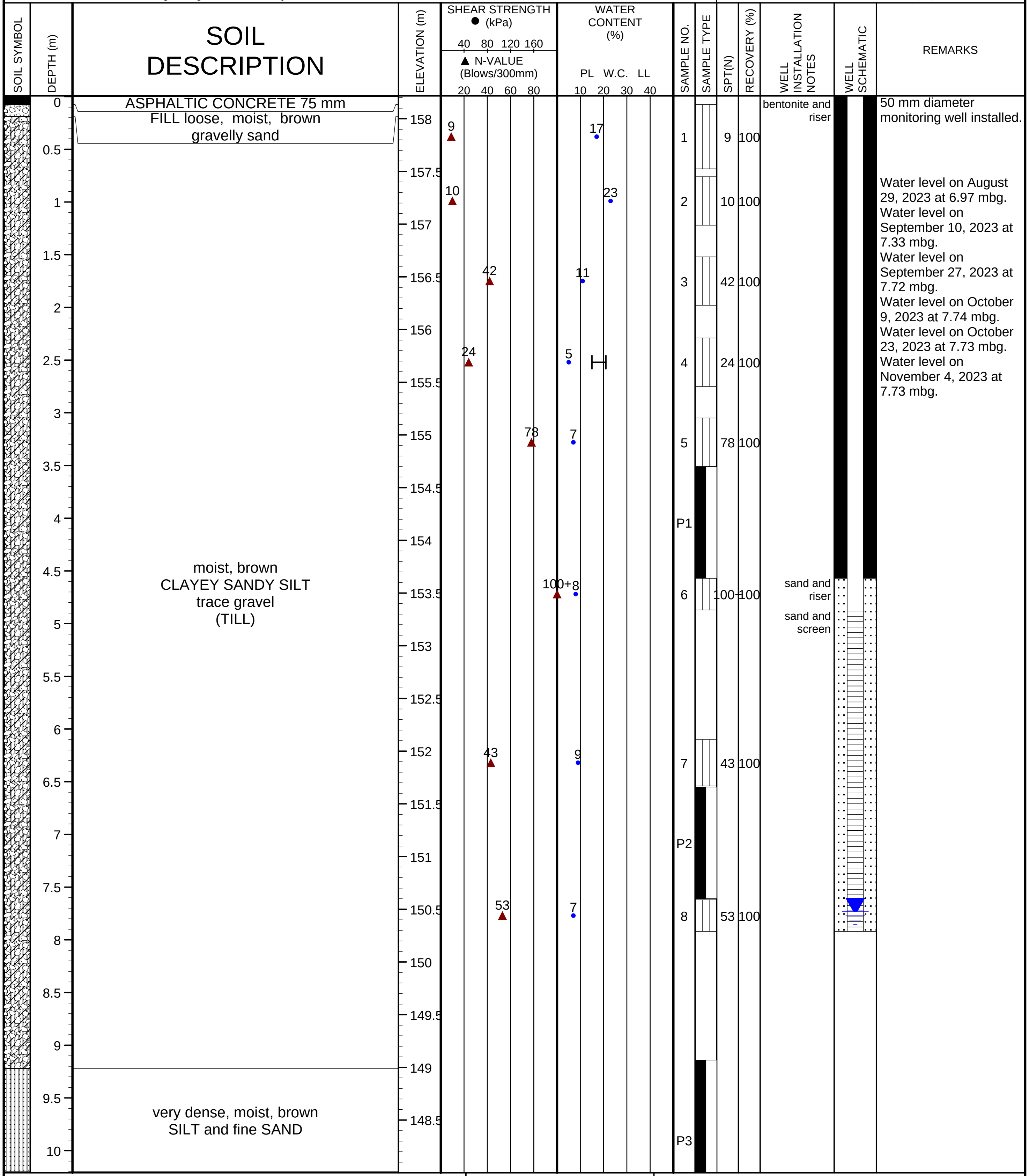
DRILLING CONTRACTOR: Drilltech Drilling Ltd.

BOREHOLE DIAMETER (cm): 10

WELL DIAMETER (cm): 5

DRILLING METHOD: Augering, Mud Rotary

TOTAL DEPTH OF BOREHOLE (m): 40.1



ASPHALTIC CONCRETE 75 mm

FILL loose, moist, brown gravelly sand

moist, brown
CLAYEY SANDY SILT
trace gravel
(TILL)

very dense, moist, brown
SILT and fine SAND

50 mm diameter monitoring well installed.

Water level on August 29, 2023 at 6.97 mbg.
Water level on September 10, 2023 at 7.33 mbg.
Water level on September 27, 2023 at 7.72 mbg.
Water level on October 9, 2023 at 7.74 mbg.
Water level on October 23, 2023 at 7.73 mbg.
Water level on November 4, 2023 at 7.73 mbg.

GEMS

LOGGED BY: AD

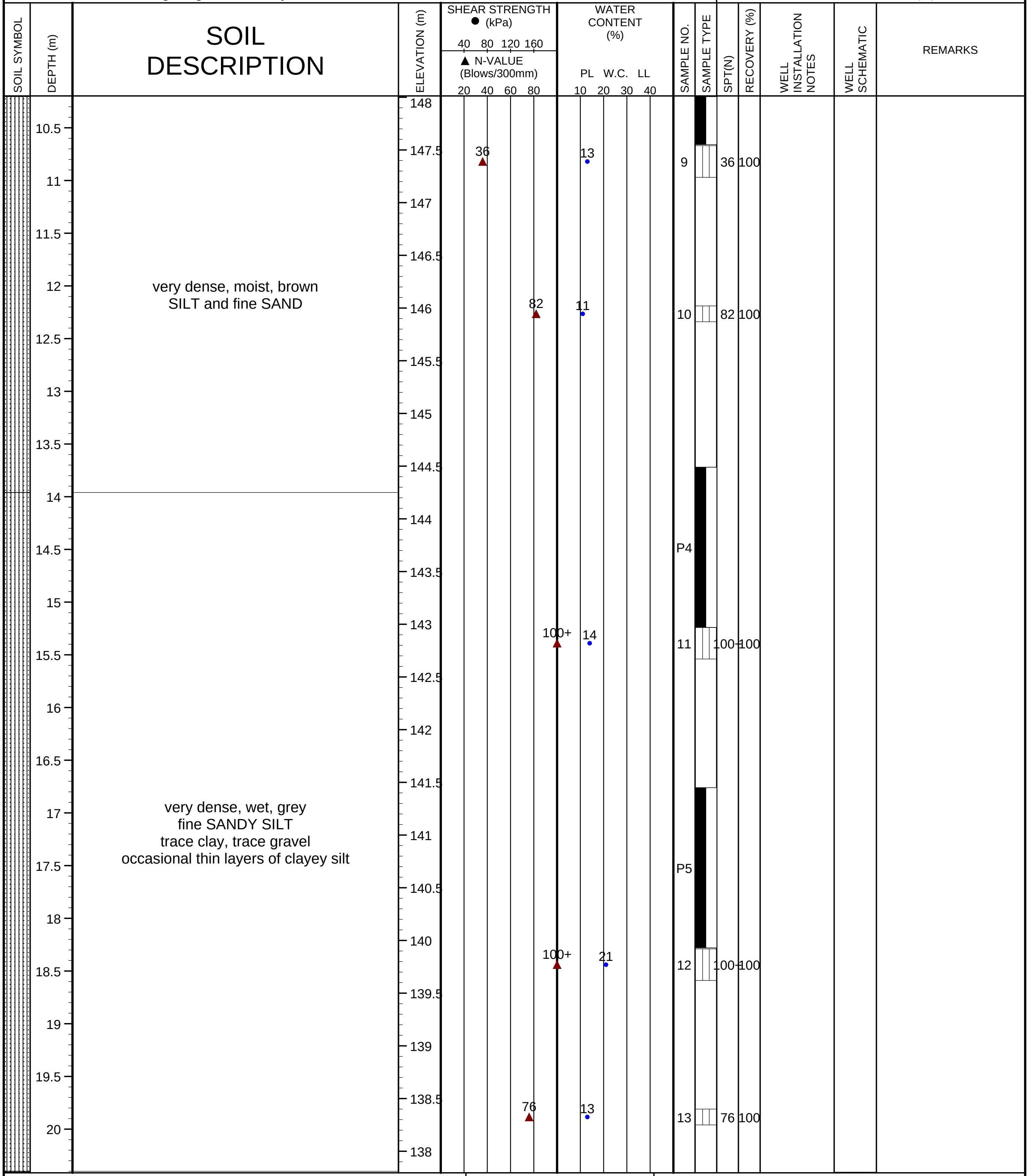
DRILLING DATE: October 4-6, 2023

REVIEWED BY: KC

CLIENT: 1764174 Ontario Inc.
PROJECT NO.: 24-0022

BOREHOLE NO. : MW5

PROJECT: Proposed High-Rise Development
LOCATION: 2343 Eglinton Avenue West, Toronto
NORTHING (m): 4838860.03
EASTING (m): 623930.09
ELEV. (m) 158.21
DRILLING CONTRACTOR: Drilltech Drilling Ltd.
BOREHOLE DIAMETER (cm): 10
WELL DIAMETER (cm): 5
DRILLING METHOD: Augering, Mud Rotary
TOTAL DEPTH OF BOREHOLE (m): 40.1



very dense, moist, brown
SILT and fine SAND

very dense, wet, grey
fine SANDY SILT
trace clay, trace gravel
occasional thin layers of clayey silt

SAMPLE NO.	SPT(N)	RECOVERY (%)	W.C.
9	36	100	13
10	82	100	11
P4			
11	100+	100	14
P5			
12	100+	100	21
13	76	100	13

GEMS

LOGGED BY: AD
DRILLING DATE: October 4-6, 2023
REVIEWED BY: KC

CLIENT: 1764174 Ontario Inc.

PROJECT NO.: 24-0022

BOREHOLE NO. : MW5

PROJECT: Proposed High-Rise Development

LOCATION: 2343 Eglinton Avenue West, Toronto

NORTHING (m): 4838860.03

EASTING (m): 623930.09

ELEV. (m) 158.21

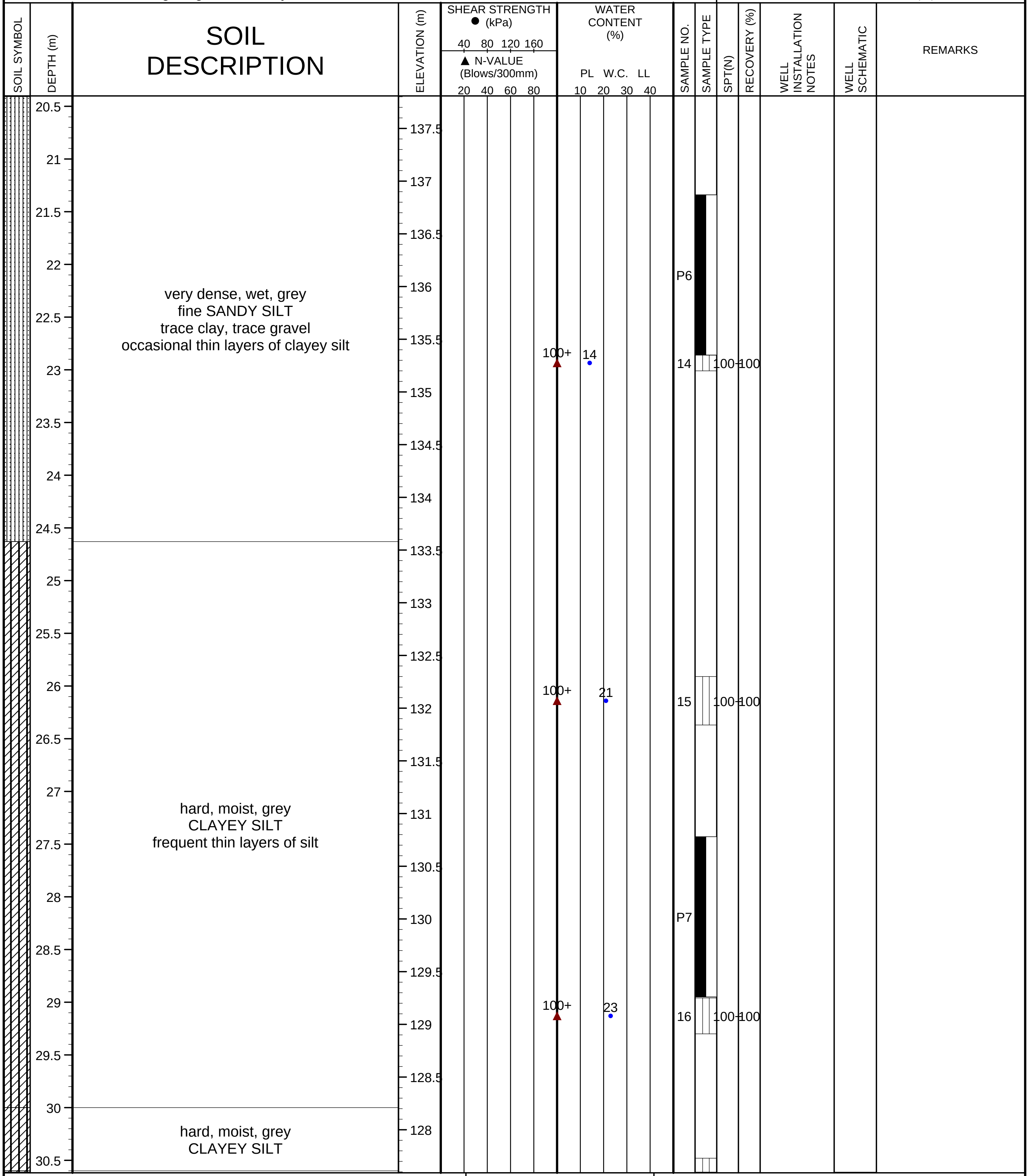
DRILLING CONTRACTOR: Drilltech Drilling Ltd.

BOREHOLE DIAMETER (cm): 10

WELL DIAMETER (cm): 5

DRILLING METHOD: Augering, Mud Rotary

TOTAL DEPTH OF BOREHOLE (m): 40.1



very dense, wet, grey
fine SANDY SILT
trace clay, trace gravel
occasional thin layers of clayey silt

hard, moist, grey
CLAYEY SILT
frequent thin layers of silt

hard, moist, grey
CLAYEY SILT

SAMPLE NO.	N-VALUE	W.C.	SPT(N)	RECOVERY (%)
P6				
14	100+	14	100	100
15	100+	21	100	100
P7				
16	100+	23	100	100

LOGGED BY: AD

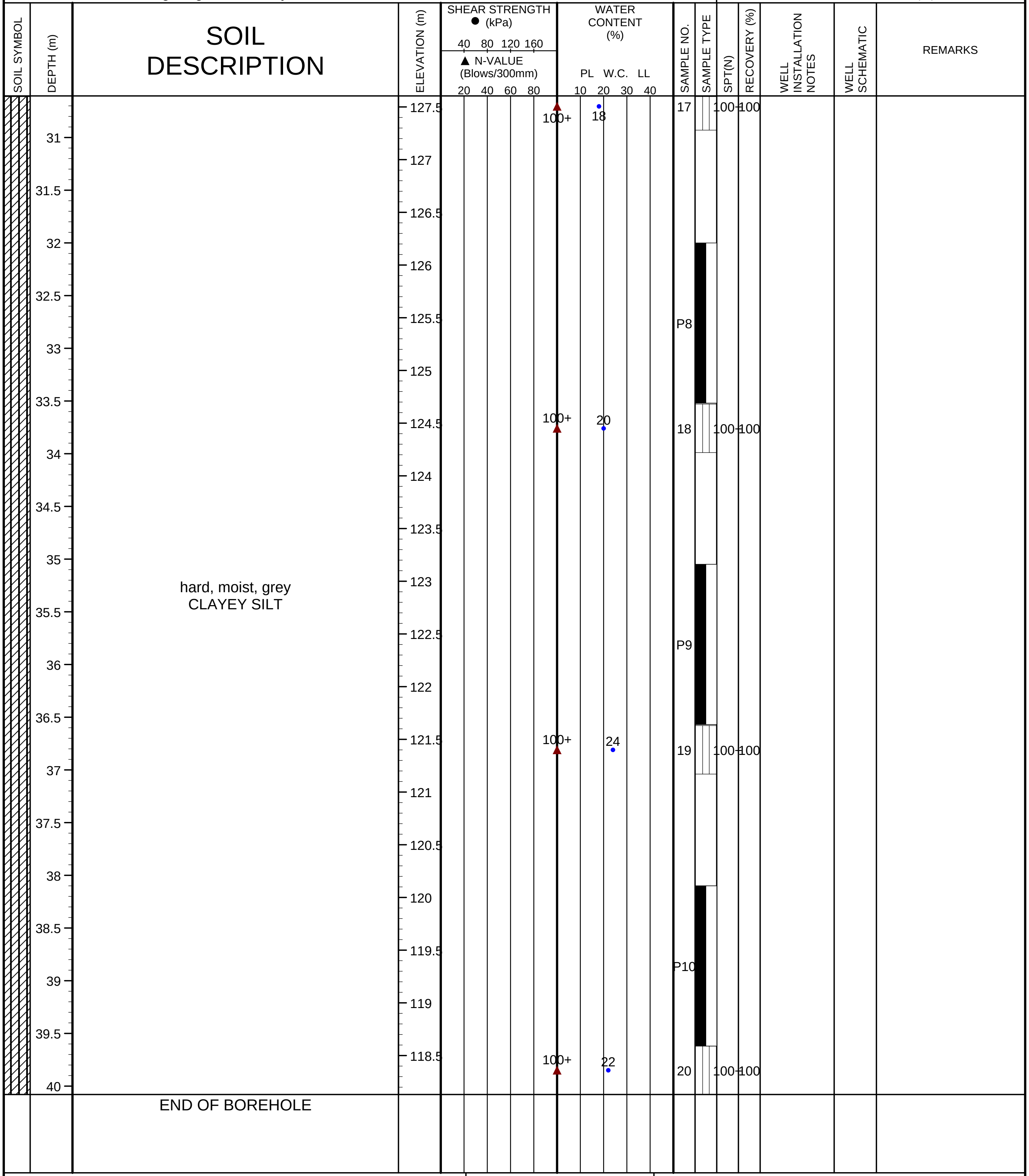
DRILLING DATE: October 4-6, 2023

REVIEWED BY: KC

CLIENT: 1764174 Ontario Inc.
PROJECT NO.: 24-0022

BOREHOLE NO. : MW5

PROJECT: Proposed High-Rise Development
LOCATION: 2343 Eglinton Avenue West, Toronto
NORTHING (m): 4838860.03
EASTING (m): 623930.09
ELEV. (m) 158.21
DRILLING CONTRACTOR: Drilltech Drilling Ltd.
BOREHOLE DIAMETER (cm): 10
WELL DIAMETER (cm): 5
DRILLING METHOD: Augering, Mud Rotary
TOTAL DEPTH OF BOREHOLE (m): 40.1



hard, moist, grey
CLAYEY SILT

SAMPLE NO.	N-VALUE	W.C.	SPT(N)	RECOVERY (%)
17	100+	18	100	100
P8				
18	100+	20	100	100
P9				
19	100+	24	100	100
P10				
20	100+	22	100	100

END OF BOREHOLE

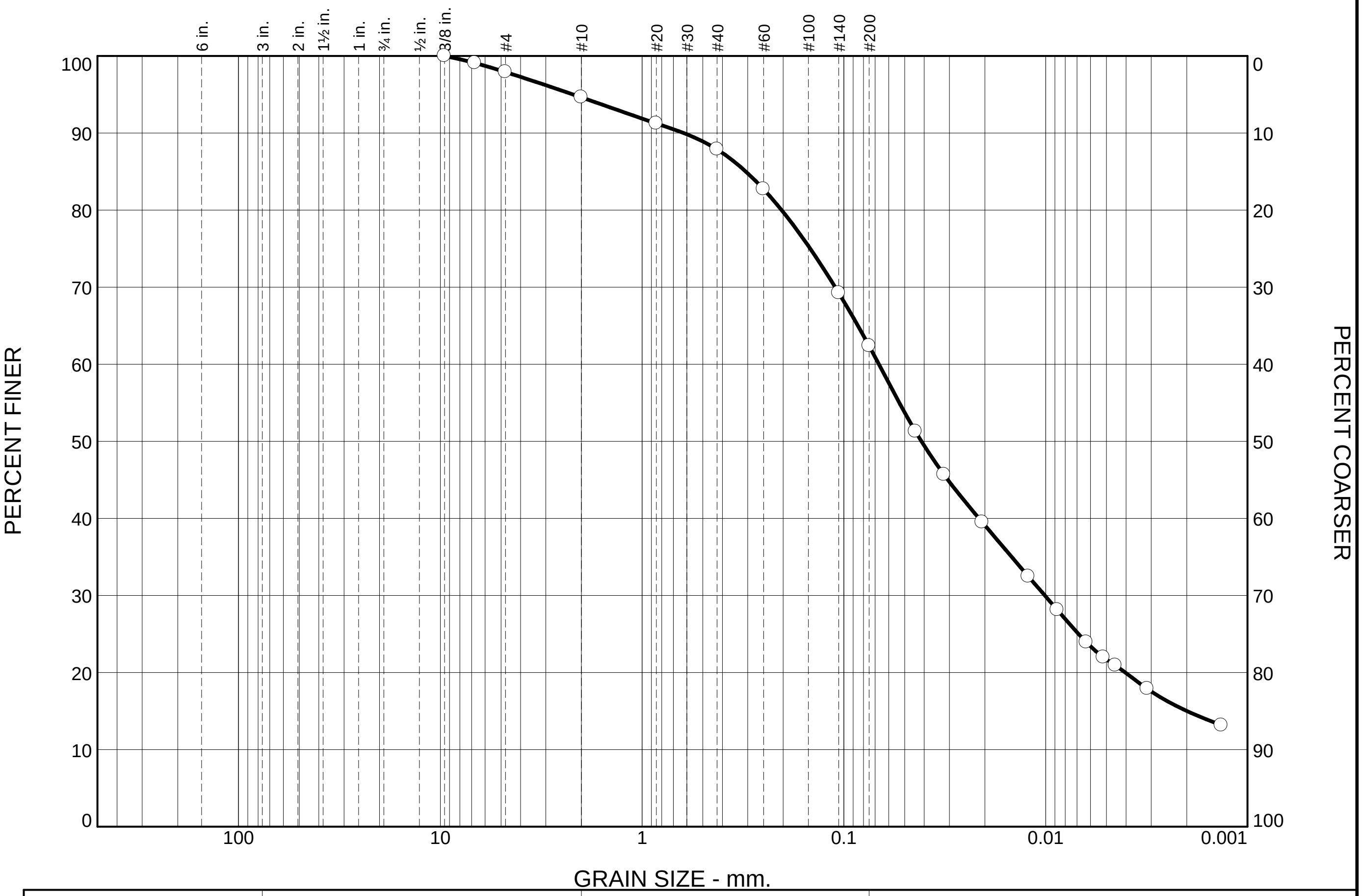
GEMS

LOGGED BY: AD
DRILLING DATE: October 4-6, 2023
REVIEWED BY: KC
PAGE 4 OF 4

Appendix C

Geotechnical Laboratory Testing

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0.0	5.4	6.7	25.5	47.4	15.0

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	20.8	15.2	0.3061	0.0671	0.0413	0.0101	0.0020			

Material Description	USCS	AASHTO
○ SANDY SILT some clay trace gravel	CL-ML	A-4(1)

Project No. CT3834.00 **Client:** GEMS

Project: GEMS Project #24-0022

○ **Sample Number:** MW5-4

Terrapex

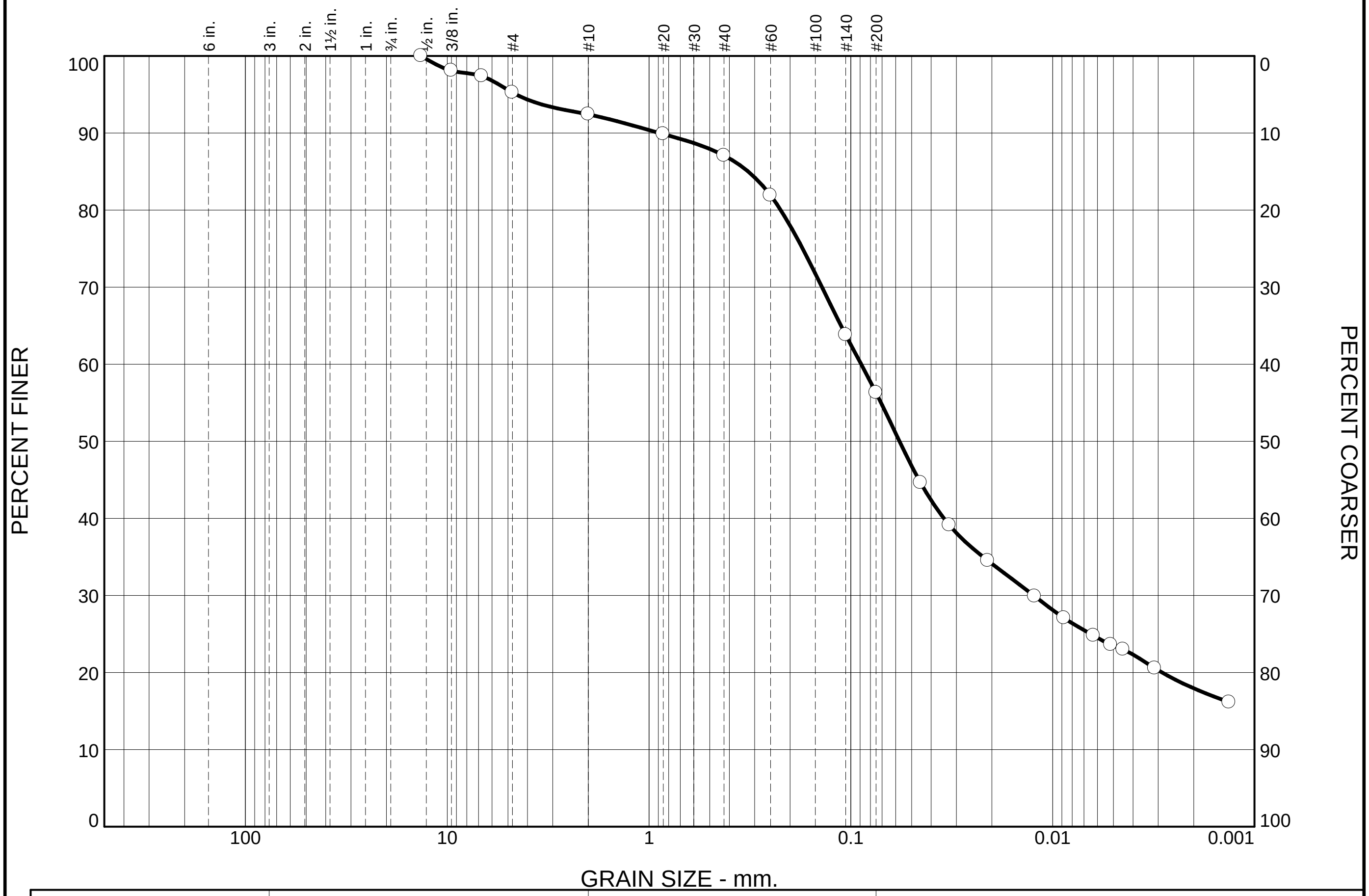
Remarks:

○HYDROMETER DETAILS: Spec. Grav. 2.75(assumed);Vb=53cm^3; L2=13.8cm; L1=10.7cm; hs= 0.16cm/Div; A=30.2cm^2; Mass of Disp. Agent=40g/1 Test Date: Oct.23, 2023

Figure **C-1**

Tested By: SC

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0.0	7.6	5.3	30.8	38.3	18.0

╳	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.3224	0.0888	0.0574	0.0124				

Material Description	USCS	AASHTO
○ SAND AND SILT some clay trace gravel		

Project No. CT3834.00 **Client:** GEMS

Project: GEMS Project #24-0022

○ **Sample Number:** MW2-9

Terrapex

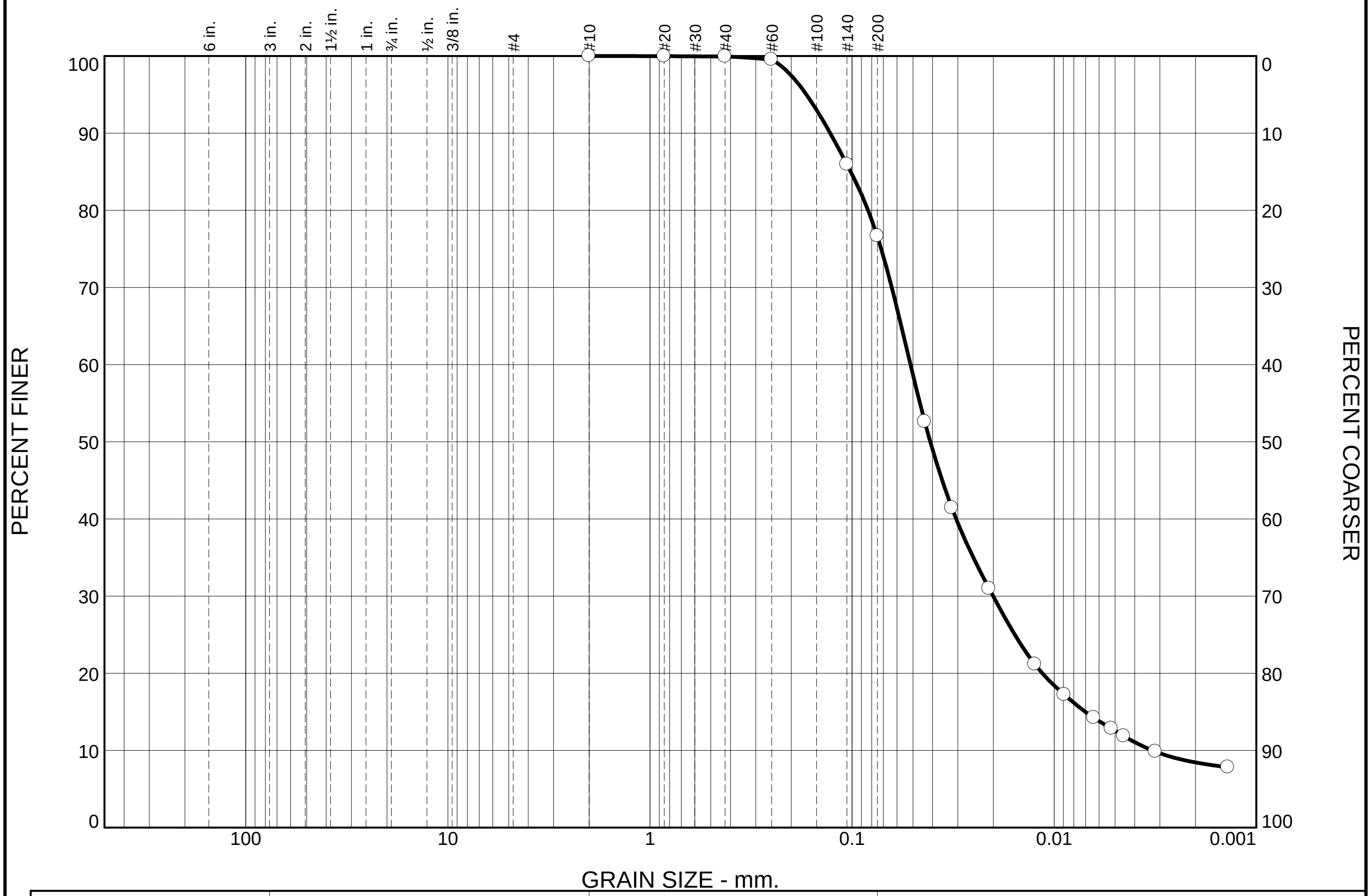
Remarks:

○HYDROMETER DETAILS: Spec. Grav. 2.75(assumed);Vb=53cm^3; L2=13.8cm; L1=10.7cm; hs= 0.16cm/Div; A=30.2cm^2; Mass of Disp. Agent=40g/1 Test Date: Oct.23, 2023

Figure C-2

Tested By: SC

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0.0	0.0	0.1	23.2	68.3	8.4

☒	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.1016	0.0514	0.0410	0.0200	0.0070	0.0033	2.40	15.76

Material Description	USCS	AASHTO
○ SANDY SILT trace clay		

Project No. CT3834.00 **Client:** GEMS

Project: GEMS Project #24-0022

○ **Sample Number:** MW5-11

Remarks:

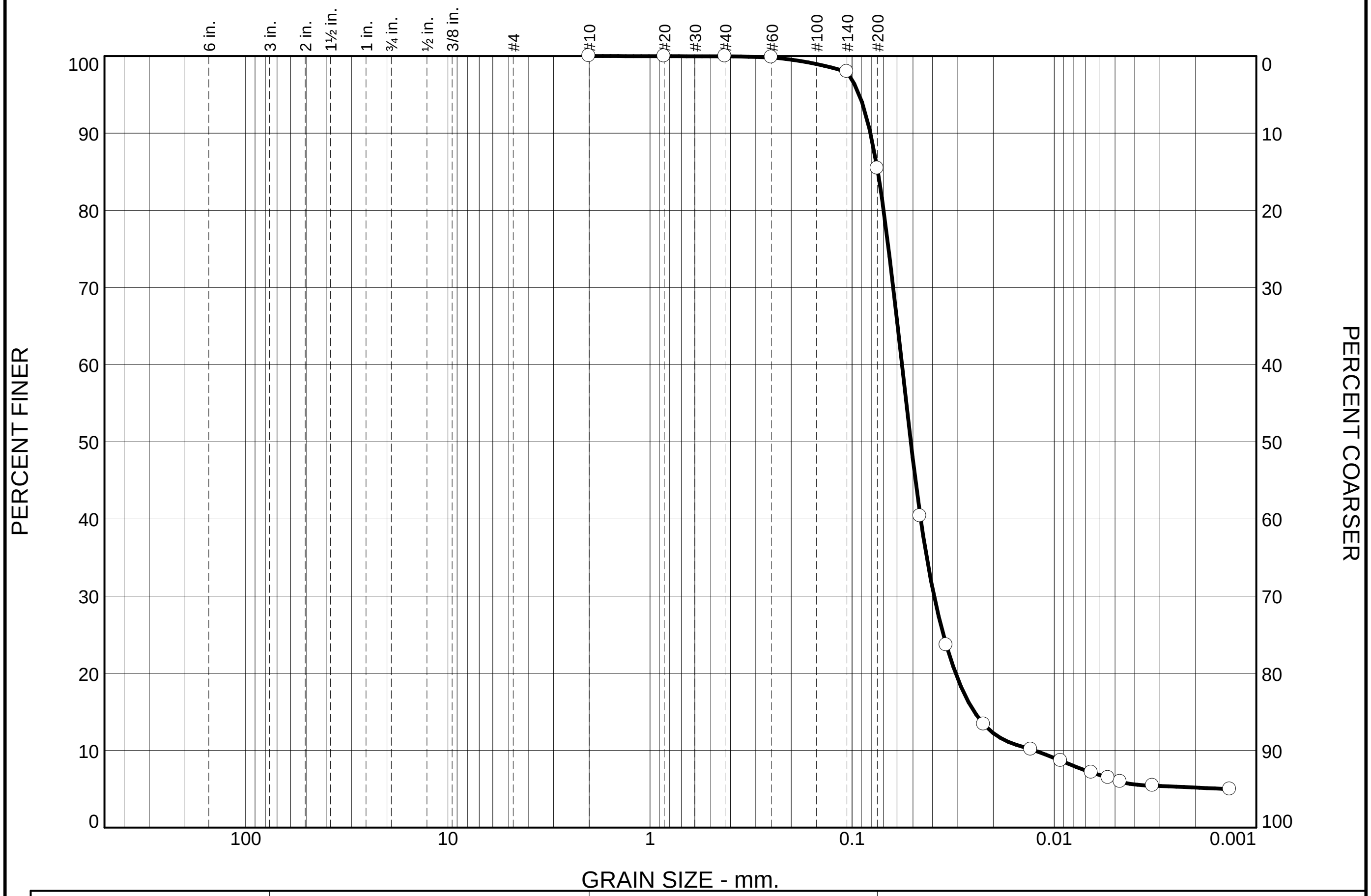
○HYDROMETER DETAILS: Spec. Grav. 2.75(assumed);Vb=53cm^3; L2=13.8cm; L1=10.7cm; hs= 0.16cm/Div; A=30.2cm^2; Mass of Disp. Agent=40g/1 Test Date: Oct.23, 2023

Terrapex

Figure C-3

Tested By: SC

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0.0	0.0	0.0	14.6	80.2	5.2

☒	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NV	NP	0.0745	0.0566	0.0512	0.0393	0.0248	0.0125	2.18	4.52

Material Description	USCS	AASHTO
○ SILT some sand trace clay	ML	A-4(0)

Project No. CT3834.00 **Client:** GEMS

Project: GEMS Project #24-0022

○ **Sample Number:** MW1-18

Terrapex

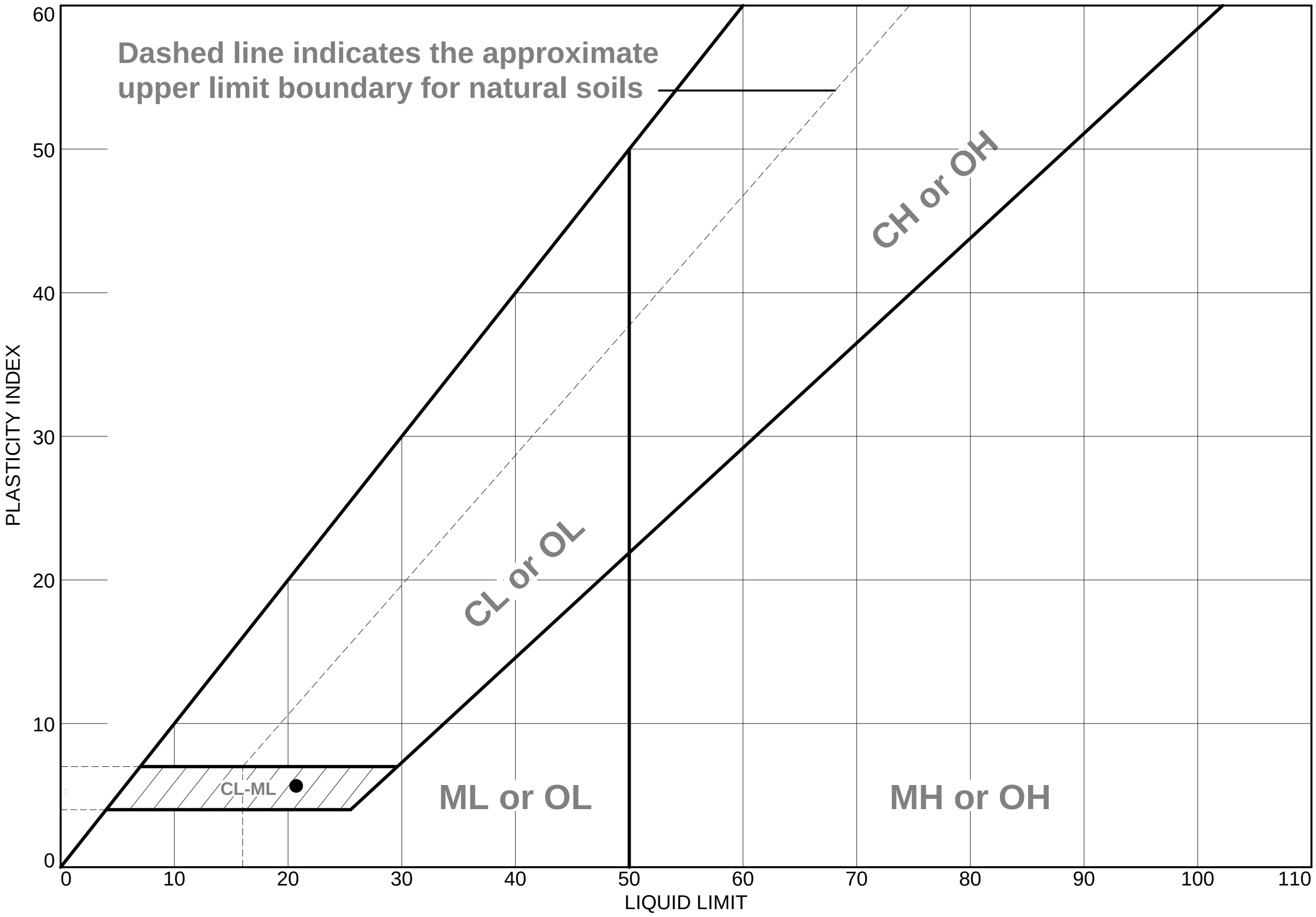
Remarks:

○HYDROMETER DETAILS: Spec. Grav. 2.75(assumed);Vb=53cm^3; L2=13.8cm; L1=10.7cm; hs= 0.16cm/Div; A=30.2cm^2; Mass of Disp. Agent=40g/1 Test Date: Oct.23, 2023

Figure C-4

Tested By: SC

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SANDY SILT some clay trace gravel	20.8	15.2	5.6	87.9	62.4	CL-ML
■	SILT some sand trace clay	NV	NP	NP	100.0	85.4	ML

Project No. CT3834.00 **Client:** GEMS

Project: GEMS Project #24-0022

●**Sample Number:** MW5-4

■**Sample Number:** MW1-18

Remarks:

●Test Date: October 25, 2023

■sandy

Terrapex

Figure **C-5**

Tested By: ○ AM ☐ AR

Appendix D

Pressuremeter Test Results

Project No. IDG 230749

In-Situ Pressuremeter Testing
2343 Eglinton Avenue West, Toronto, Ontario
Borehole No. MW-05-PMT
Revised on November 7th, 2023

Prepared for:
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Gem Services Inc.
9-150 Rivermede Road
Concord, Ontario
M4K 3M8

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20 Ravenscliffe Avenue
Hamilton, Ontario
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Phone: (905) 541 9937
Fax: (877) 624 0140

Table of Contents

1. Introduction

In-Depth Geotechnical Inc. was retained by GEM Services Inc. to conduct Pressuremeter testing in relation to their Geotechnical Investigation for the 2343 Eglinton Avenue West site, in Toronto, Ontario.

This report presents the results of pressuremeter testing (PMT) carried out at one borehole location with the purpose of evaluating specific parameters related to a) shear strength; and b) deformation properties of the encountered soils.

This report includes data obtained by use of a pre-bored pressuremeter system. Inferred characteristics of the data are also presented including initial contact pressure, limit pressure, secant deformation modulus values during loading, unloading and reloading cycles, and yield pressure if and when justified by the data. Multiple methods are available for interpretation of this data to estimate engineering properties of soils but such methods are not discussed or included in this report except for the characteristics of the data plots as described above.

2. Field Testing Procedures

Pressuremeter testing was performed at one borehole location, located on 250 Front St. East, Toronto, as follows:

Borehole	Number of Tests	Ground Elevation (masl)	Water Elevation (masl)	Maximum Depth (m)
MW-05-PMT	5	158.21	145.51	40

Field work was completed on October 5 and 6, 2023.

Drilling procedures were undertaken by Drill Tech Contractor. The borehole was advanced using mud rotary open hole drilling technique, using a track-mounted Diedrich D 50 rig. This borehole was dedicated to PMT as well as SPT testing.

HWP casing (4 inch ID) was installed to a depth of about 3.0 m below the ground surface to prevent soil collapse on the upper part of the boring (collar).

The test sections of the boring were drilled with a tricone. The bit was advanced using continuous circulation of drilling mud to flush soil cuttings, producing a controlled diameter hole for the pressuremeter probe. A positive water head was kept inside the surface casing throughout drilling and in-situ testing procedures. In general, the drilling fluid remained at the top of casing.

Pre-boring pressuremeter testing was completed using a TEXAM unit. The testing procedure was in general accordance with Procedure B, volume-controlled loading, as outlined in the ASTM D 4719-00 Standard Test Method for Pre-bored Pressuremeter Testing of Soils. The testing equipment was calibrated for pressure and volume losses as indicated in the above-mentioned standard. The Records of Calibration for the PMT probes utilized in this job are attached on Appendix Three. The control unit was de-aired prior to every test. Also, checks were completed to ensure that the probe, tubing, and control unit assembly were fully saturated, and that the probe membrane was leakage-free at high pressures. Two readings were taken for each volume step, namely for time delays of 15, and 30 seconds.

Test procedures also included completion of up to two unload-reload cycles per test.

3. Pressuremeter Test Results

3.1 PMT test parameters

Pressuremeter test data is presented in Appendix One, and the summary of test results are illustrated in Table No. 1, below.

Based on pressuremeter test data, we have included subsoil profiles for the tested boring, plotting the distributions of the interpreted PMT parameters. These profiles are shown in the following pages.

3.2 PMT-Inferred soil parameters

A general guideline to interpret and infer soil properties based on available PMT test data is attached to Appendix Two This guideline suggests accepted current procedures to estimate or infer shear strength, deformation properties, and other related soil parameters. These inferred properties are summarized in Table No. 2, below.

It is recognized that the values of in-situ total horizontal stresses, σ_{h0}, presented in this report correspond to best possible estimates. These estimates were obtained using the *corrected pressure* versus *1/Volume* method, and are used in this report to infer values of the at-rest stress ratio k_0. The following subsurface soil conditions were assumed to apply:

- Ground Surface and Ground Water elevations: as indicated on the Table No. 2, below
- Average wet and saturated unit weights: γ_{wet} = 21 kN/m^3 and γ_{sat} = 22 kN/m^3
- Total horizontal stresses taken as direct values of p_0 (PMT test results).

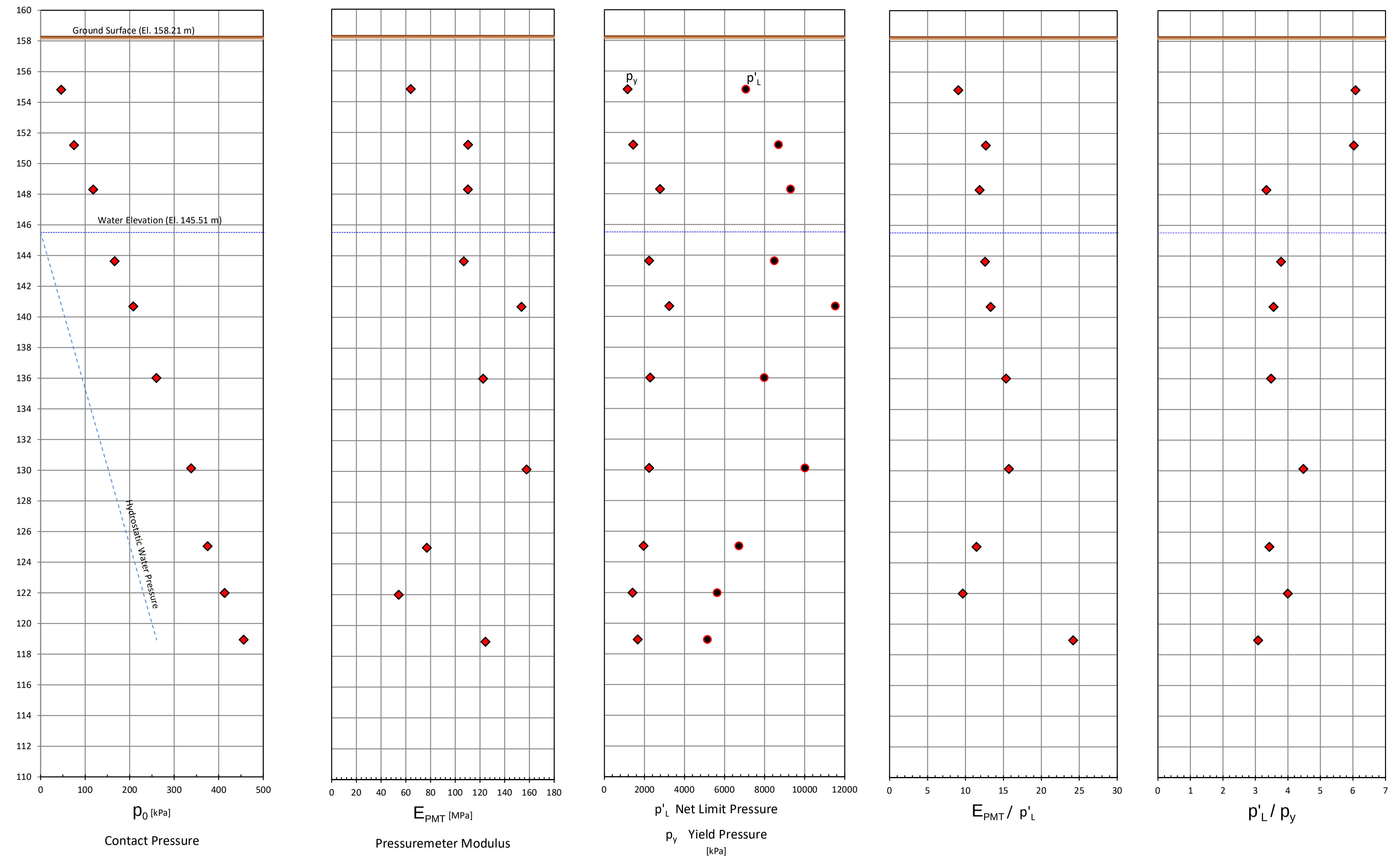
It is considered that stresses within the soil mass are defined by geostatic conditions, that is to say:

1. No surcharges are applied on the surface (structural loads from existing buildings nearby are negligible),
2. Static groundwater conditions (no seepage occurs),
3. Surface topography is horizontal (no slopes or excavations), and
4. Total vertical stresses are defined by the *wet* (unsaturated soils) and *saturated* (submerged soils) unit weights, γ_{wet} and γ_{sat}, respectively.

Using the *Pressiorama* and the associated *Pressiorama Cyclique Charts* inferred values of Young's Moduli (E_Y), Classification Index (I_c), and drained friction angle (ϕ') are also shown in Table Nos. 2a, 2b, and 2c.

TABLE No. 1 Summary of Pressuremeter Test Results Boring No. MW-05-PMT

Test No.	Surface Elevation (m): 158.21		Contact Pressure	PMT Modulus	Unload - Reload Cycles								Yield Pressure	Net Limit Pressure		
					$E_{Unload 1}$	$E_{Reload 1}$	Stresses			Strains $\Delta R/R_0$						
	Depth	Elevation	p_0	E_{PMT}	$E_{Unload 2}$	$E_{Reload 2}$	Point 1	Point 2	Point 3	Point 1	Point 2	Point 3	p_y	p^*_L	E_{PMT} / p^*_L	p^*_L / p_y
	[m]	[m]	[kPa]	[MPa]	[MPa]	[MPa]	[kPa]	[kPa]	[kPa]	[%]	[%]	[%]	[kPa]	[kPa]		
1	3.40	154.8	46	64.0	190.3	133.5	1162.1	445.3	1268.3	11.3	10.8	11.8	1162	7063	9.1	6.1
					403.6	234.3	2207.3	991.5	2274.4	13.8	13.4	14.3				
2	7.01	151.2	75	110.4	417.9	232.7	2009.0	710.2	2088.2	10.3	9.8	10.7	1443	8698	12.7	6.0
					778.7	399.3	3413.2	1589.4	3499.9	12.7	12.4	13.2				
3	9.91	148.3	118	110.3	810.2	442.0	3320.2	1488.8	3443.8	14.5	14.2	15.0	2783	9295	11.9	3.3
					1487.6	533.3	4618.2	2262.1	4612.1	17.0	16.7	17.4				
4	14.58	143.6	166	106.9	618.8	399.3	2793.0	1171.2	2962.2	12.0	11.6	12.4	2239	8487	12.6	3.8
					1050.5	501.7	4147.0	2068.6	4217.1	14.4	14.1	14.8				
5	17.53	140.7	208	153.6	1081.1	629.3	3995.9	1847.1	4233.1	11.7	11.5	12.2	3241	11532	13.3	3.6
6	22.20	136.0	260	122.6	644.1	422.0	2899.9	1210.1	3083.1	10.1	9.7	10.5	2292	7982	15.4	3.5
					1094.4	529.6	4279.1	2133.3	4359.3	12.6	12.3	13.0				
7	28.09	130.1	338	157.7	675.5	468.7	2995.3	1228.8	3238.3	8.3	7.9	8.7	2239	10018	15.7	4.5
					1227.5	586.3	4609.1	2327.3	4709.3	10.7	10.5	11.2				
8	33.17	125.0	375	77.0	374.3	191.6	2228.1	1074.3	2227.2	13.9	13.4	14.3	1960	6722	11.5	3.4
					624.0	315.7	3181.5	1623.3	3214.4	16.4	16.0	16.8				
9	36.22	122.0	413	54.3	254.6	97.9	1666.0	821.2	1521.6	14.0	13.5	14.5	1408	5630	9.6	4.0
					365.7	178.8	2259.4	1160.2	2227.8	16.5	16.1	17.0				
10	39.27	118.9	456	124.5	315.9	208.7	2182.7	1123.9	2275.4	11.2	10.7	11.6	1670	5146	24.2	3.1
					385.2	303.5	3001.9	1823.1	3099.5	13.8	13.3	14.2				



2343 Eglinton Ave. West, Toronto	**Boring No. MW-05-PMT**
Pressuremeter Test Results	
Date: November 7, 2023	Project No.: IDG 230749

In-Depth
Geotechnical Inc.

Table No. 2 PMT-Inferred Parameters Boring No. MW-05-PMT

PMT	z	z_w	Hydrostatic	Total Stresses		Effective Stresses		Stress Ratio	Young's Modulus		Shear Strength		Classification Index
									α	E_Y	Undrained	Drained	
Test	depth	water	Pressure	Vertical	Horizontal	Vertical	Horizontal		Menard's Parameter		Cohesive Behavior	Cohesionless Behavior	I_c
								ko			c_u	ϕ'	
No.	[m]	[m]	[kPa]	[kPa]	[kPa]	[kPa]	[kPa]			[MPa]	[kPa]	[degrees]	
1	3.40	-9.30	0	71	46	71	46	**0.64**	0.24	262	1087	45	3.61
2	7.01	-5.69	0	147	75	147	75	**0.51**	0.31	356	1338	51	3.44
3	9.91	-2.79	0	208	118	208	118	**0.57**	0.33	334	1430	45	3.28
4	14.58	1.88	18	308	166	290	148	**0.51**	0.38	282	1306	44	3.08
5	17.53	4.83	47	373	208	326	161	**0.49**	0.38	402	1774	45	3.11
6	22.20	9.50	93	476	260	383	167	**0.44**	0.48	258	1228	39	2.83
7	28.09	15.39	151	605	338	454	187	**0.41**	0.49	325	1541	39	2.82
8	33.17	20.47	201	717	375	516	174	**0.34**	0.47	164	1034	36	2.65
9	36.22	23.52	231	784	413	554	182	**0.33**	0.46	118	866	35	2.56
10	39.27	26.57	261	851	456	591	195	**0.33**	0.77	162	792	28	2.34

Notes

1. Ground Elevation (m) 158.21 Water Elevation (m) 145.51 Water Depth (m) 12.70

2. Wet unit weight of soil 21.0 [kN/m^3] Saturated unit weight of soil 22.0 [kN/m^3]

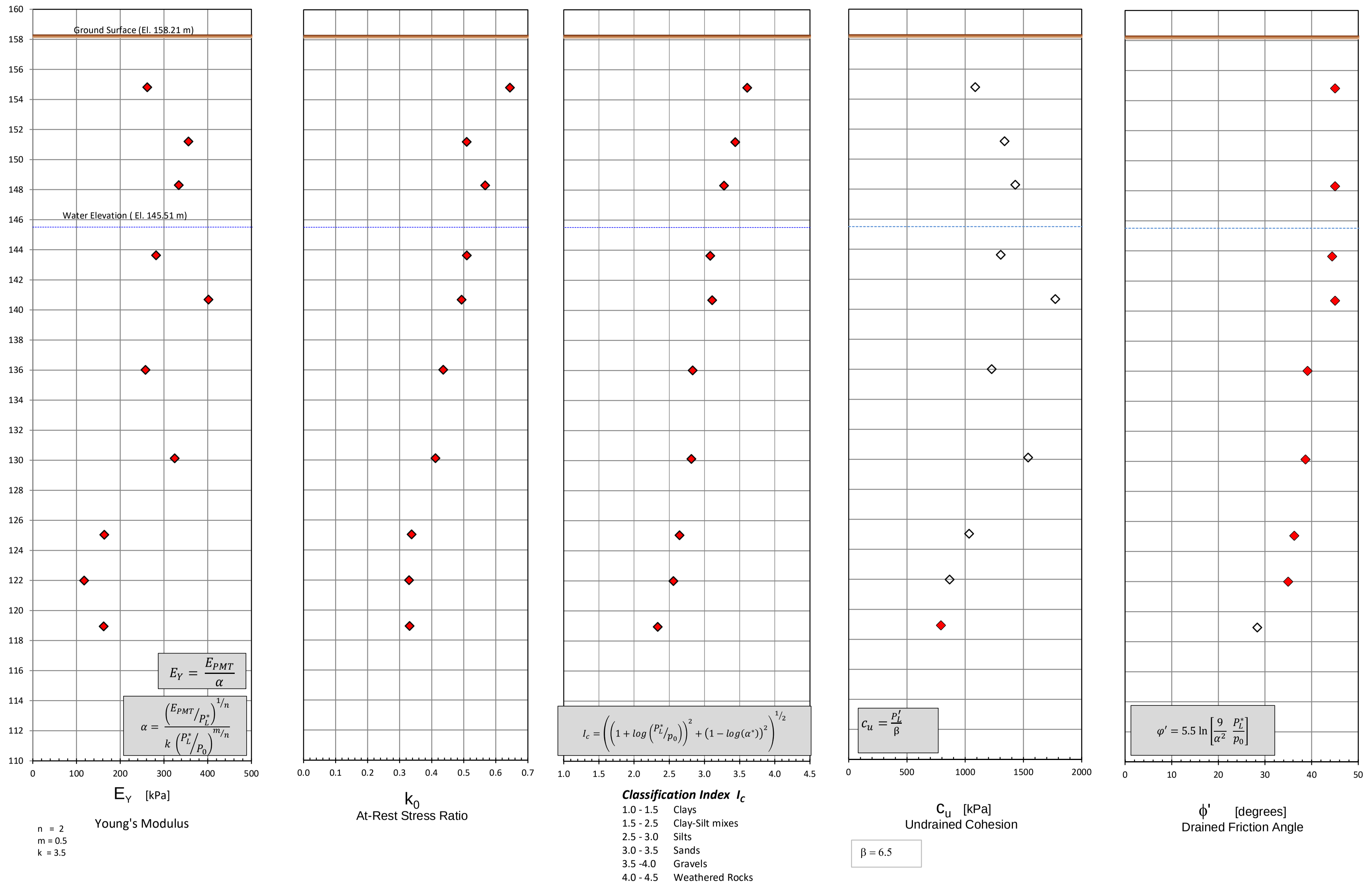
3. Observations on Shear Strength Parameters (SSP):

SSP are considered either for Undrained Conditions (Short Term) or Drained Conditions (Long Term). These two conditions are mutually exclusive.

Undrained Conditions imply cohesion is c_u , and $\phi = 0$. ***Drained Conditions*** imply negligible cohesion or $c'=0$, and $\phi = \phi'$

Based on the Classification Index I_C (Soil Behavior Type), the suggested values of the SSP are highlighted in green (Thick box border)

4. The Classification Index parameter, I_C, is indicative of the soil type of behavior. It does not exactly relate to the Soil Classification types as those obtained via Grain-Size Distribution analyses. I_C varies from 1.0 to 4.5, from soft clays (cohesive) to dense coarse sands (frictional), correspondingly.



$$E_Y = \frac{E_{PMT}}{\alpha}$$

$$\alpha = \frac{\left(E_{PMT}/P_L^*\right)^{1/n}}{k\left(P_L^*/P_0\right)^{m/n}}$$

$$I_c = \left(\left(1 + log\left(P_L^*/p_0\right)\right)^2 + \left(1 - log(\alpha^*)\right)^2\right)^{1/2}$$

$$c_u = \frac{P_L'}{\beta}$$

$$\varphi' = 5.5 \ln\left[\frac{9}{\alpha^2}\frac{P_L^*}{p_0}\right]$$

2343 Eglinton Ave. West, Toronto	**Boring No. MW-05-PMT**
PMT - Inferred Soil Parameters	
Date: November 7, 2023	Project No.: IDG 230749

In-Depth Geotechnical Inc.

4. Closure

The subsoils data presented in this report is based on in-situ PMT testing and interpretation procedures. It should be noted that soil conditions may vary within the site and interpreted data may not be entirely representative of conditions at locations away from the tested boring. Therefore, care should be exercised when extrapolating or inferring subsoil conditions away from the borehole location.

We trust that the present report fulfills your requirements. Should you have any question, please feel free to contact the undersigned.

Sincerely,

In-Depth Geotechnical Inc.

LICENSED PROFESSIONAL ENGINEER
G. SEDRAN
November 7th, 2023
PROVINCE OF ONTARIO

Gabriel Sedran, P.Eng., Ph.D.
President

Appendix One

Pressuremeter Results - Data

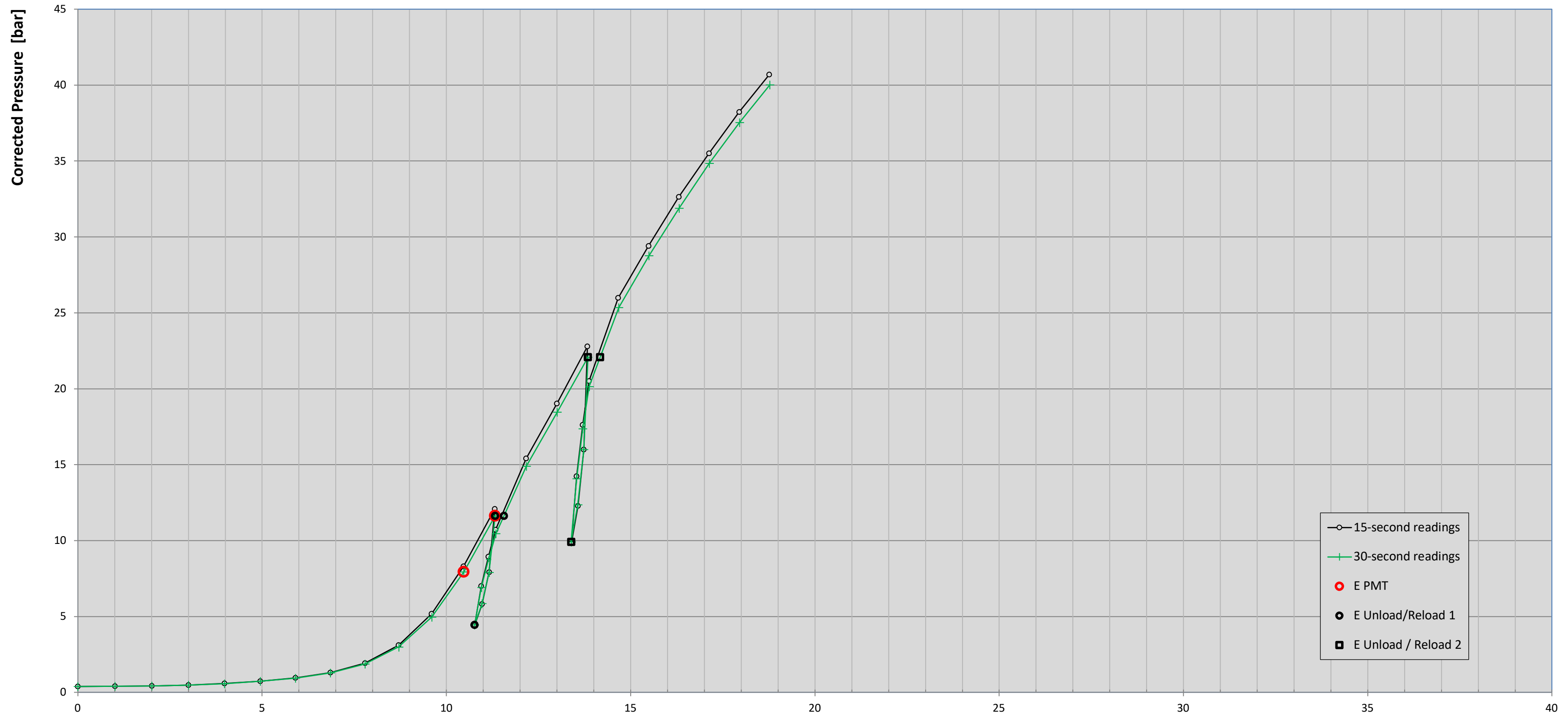
MW-05-PMT pages 1 to 10

GEMS

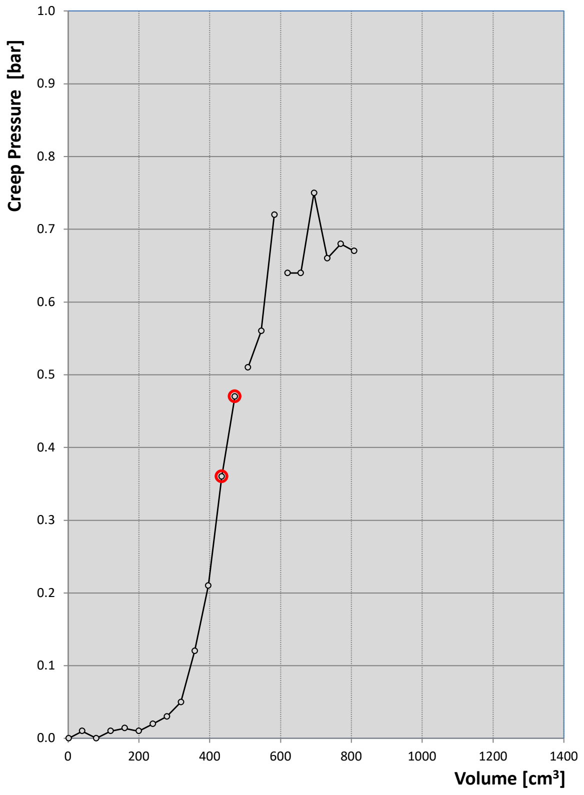
Field Test Data (uncorrected)			Corrected Test data						Creep		Auxiliary Data	
			15-second readings			30-second readings					30 sec	
Volume [cm^3]	Pressure [bar] 15 sec	Pressure [bar] 30 sec	Pressure [bar]	Volume [cm^3]	$\Delta r/r_0$ [%]	Pressure [bar]	Volume [cm^3]	$\Delta r/r_0$ [%]	Volume [cm^3]	Δp_{30-15} [bar]	Pressure [bar]	1 / V
2	0.12	0.12	0.38	2	0.00	0.38	2	0.00	2	0.00	0.38	0.52497
40	0.19	0.18	0.41	39.8	1.01	0.40	39.9	1.01	39.9	0.01	0.40	0.02509
80	0.25	0.25	0.43	79.8	2.01	0.43	79.8	2.01	79.8	0.00	0.43	0.01253
120	0.34	0.33	0.49	119.7	3.00	0.48	119.7	3.00	119.7	0.01	0.48	0.00835
160	0.47	0.46	0.59	159.6	3.98	0.58	159.6	3.98	159.6	0.01	0.58	0.00626
200	0.65	0.64	0.74	199.5	4.95	0.73	199.5	4.95	199.5	0.01	0.73	0.00501
240	0.89	0.87	0.95	239.3	5.91	0.93	239.3	5.91	239.3	0.02	0.93	0.00418
280	1.27	1.24	1.31	279.0	6.85	1.28	279.0	6.85	279.0	0.03	1.28	0.00358
320	1.91	1.86	1.92	318.5	7.79	1.87	318.5	7.79	318.5	0.05	1.87	0.00314
360	3.12	3.00	3.11	357.5	8.71	2.99	357.6	8.71	357.6	0.12	2.99	0.00280
400	5.20	4.99	5.17	395.9	9.60	4.96	396.0	9.60	396.0	0.21	4.96	0.00252
440	8.34	7.98	8.30	433.4	10.46	7.94	433.7	10.47	433.7	0.36	7.94	0.00231
480	12.15	11.68	12.09	470.4	11.31	11.62	470.7	11.32	470.7	0.47	11.62	0.00212
470	7.97	7.95	7.91	463.7	11.16	7.89	463.7	11.16			7.89	0.00216
460	5.86	5.90	5.81	455.4	10.97	5.85	455.3	10.97			5.85	0.00220
450	4.45	4.50	4.40	446.5	10.77	4.45	446.4	10.76			4.45	0.00224
460	7.06	6.96	7.01	454.4	10.95	6.91	454.5	10.95			6.91	0.00220
470	8.99	8.81	8.93	462.9	11.14	8.75	463.0	11.14			8.75	0.00216
480	10.78	10.52	10.72	471.5	11.34	10.46	471.7	11.34			10.46	0.00212
520	15.49	14.98	15.41	507.7	12.16	14.90	508.1	12.17	508.1	0.51	14.90	0.00197
560	19.11	18.55	19.02	544.9	13.00	18.46	545.3	13.01	545.3	0.56	18.46	0.00183
600	22.90	22.18	22.79	581.8	13.83	22.07	582.4	13.84	582.4	0.72	22.07	0.00172
590	16.10	16.09	16.00	577.2	13.73	15.99	577.2	13.73			15.99	0.00173
580	12.39	12.46	12.29	570.2	13.57	12.36	570.1	13.57			12.36	0.00175
570	9.92	10.01	9.82	562.1	13.39	9.91	562.1	13.39			9.91	0.00178
580	14.33	14.18	14.23	568.6	13.53	14.08	568.8	13.54			14.08	0.00176
590	17.72	17.46	17.62	576.0	13.70	17.36	576.2	13.70			17.36	0.00174
600	20.62	20.25	20.51	583.7	13.87	20.14	583.9	13.88			20.14	0.00171
640	26.10	25.46	25.98	619.3	14.66	25.34	619.8	14.67	619.8	0.64	25.34	0.00161
680	29.52	28.88	29.40	656.6	15.49	28.76	657.1	15.50	657.1	0.64	28.76	0.00152
720	32.78	32.03	32.65	694.0	16.31	31.90	694.6	16.32	694.6	0.75	31.90	0.00144
760	35.66	35.00	35.51	731.7	17.13	34.85	732.3	17.14	732.3	0.66	34.85	0.00137
800	38.38	37.70	38.22	769.6	17.95	37.54	770.1	17.96	770.1	0.68	37.54	0.00130
840	40.86	40.19	40.69	807.6	18.76	40.02	808.1	18.77	808.1	0.67	40.02	0.00124

Interpreted PMT Test Results

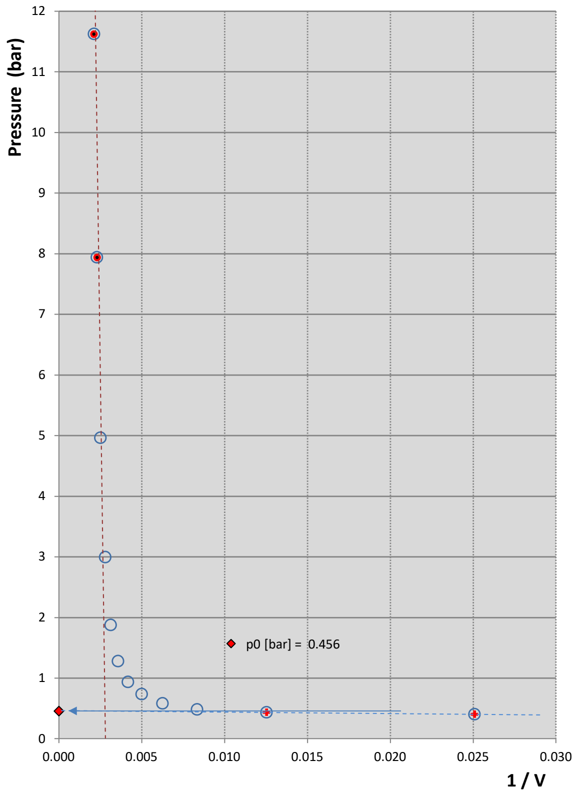
[30-second readings]			volume [cm^3]	radial strain [%]	strain range [%]
p_0	0.46	[bar]	119.7	3.0	
p_L	71.09	[bar]			
p^*_L	70.63	[bar]			
p_Y	11.62	[bar]	471	11.3	
E_{PMT}	640	[bar]	434	10.5	{10.5 - 11.3 %}
E_{PMT} / p^*_L	9.1				
$E_{Unload\ 1}$	1903	[bar]	446	10.8	
$E_{Reload\ 1}$	1335	[bar]			
$E_{Unload\ 2}$	4036	[bar]	562	13.4	
$E_{Reload\ 2}$	2343	[bar]			



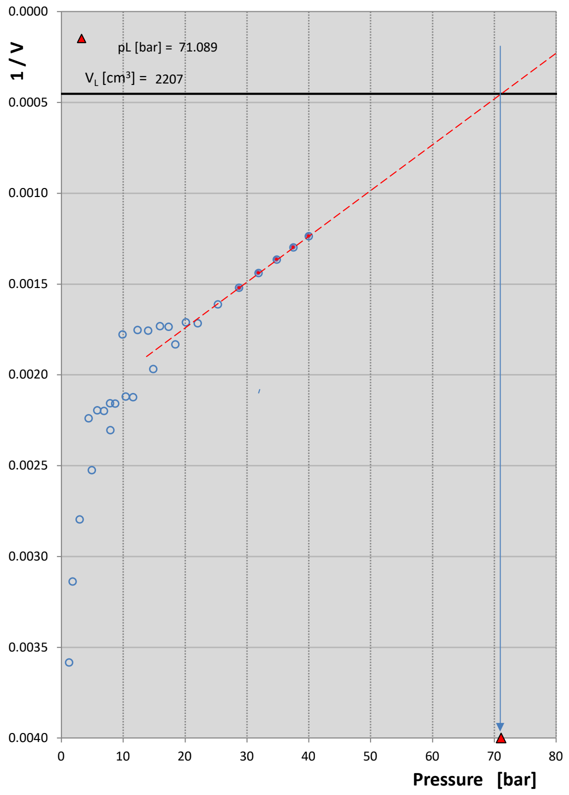
Pressuremeter test results [corrected data] pressure vs radial strain



Pressure difference from 15 to 30 sec. readings $\Delta p_{[15\text{-}30\ sec]}$



Determination of total contact pressure p_0



Determination of Limit Pressure p_L

Pressuremeter Equipment: TEXAM Model
Volume-controlled test as per ASTM D4719
Method B
Volume increments: 40 cm³
Maximum Volume: 1400 cm³
Maximum Pressure: 100 bar

Probe Designation : NX Probe (76 mm OD)
Probe No.: A 512
Calibration Record No.: 1
Tubing Length: 180 [ft]
Probe Lenght: 0.46 [m]
Probe Initial Volume: 1968 cm³

Drilling Method: Mud Rotary Drilling
Drilling Bit: Tricone Bit
Time elapsed from hole drilling to testing
~ 5 minutes
Engineer: Gabriel Sedran, P.Eng., Ph.D.
Operator: Scott Andrew Hall

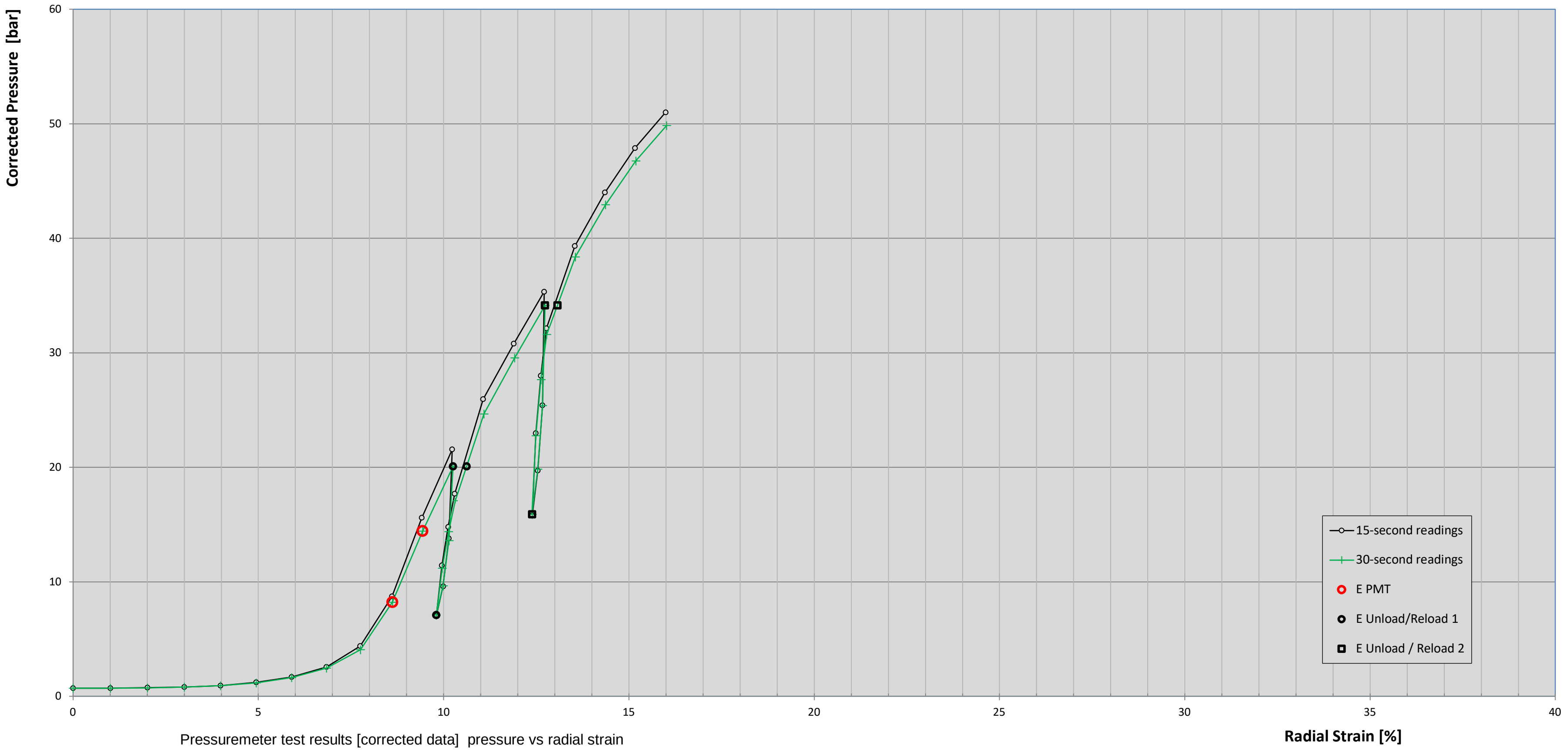
Test Date: October 5, 2023
Test Depth [m]: 3.40 (center of the probe)
Drilling Company: Drill Tech Contractor

Project: **2343 Eglinton Ave. West, Toronto**
Client: GEM Services Inc.
In-Depth Geotechnical Project No.: IDG 230749

PMT TEST No.: 1
Borehole No.: MW-05-PMT

In-Depth
Geotechnical Inc.

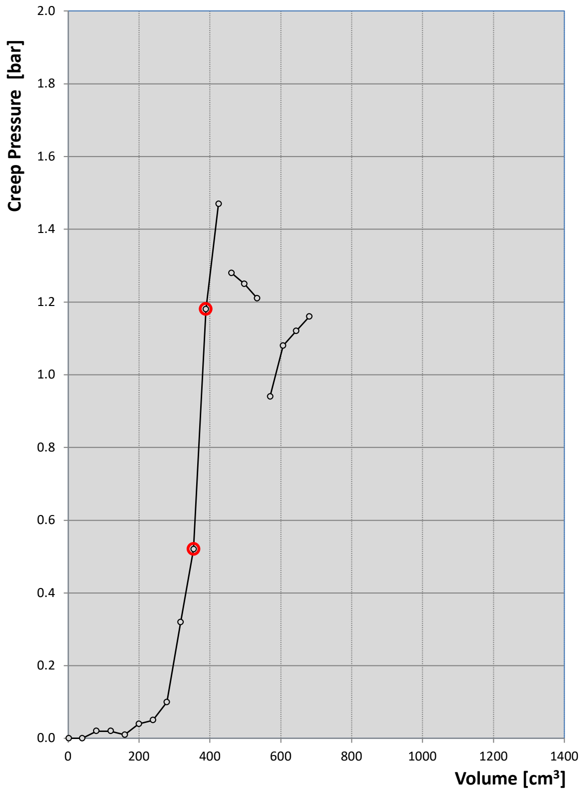
Field Test Data (uncorrected)			Corrected Test data						Creep		Auxiliary Data	
			15-second readings			30-second readings					30 sec	
Volume	Pressure [bar]		Pressure	Volume	$\Delta r/r_0$	Pressure	Volume	$\Delta r/r_0$	Volume	Δp_{30-15}	Pressure	1 / V
[cm^3]	15 sec	30 sec	[bar]	[cm^3]	[%]	[bar]	[cm^3]	[%]	[cm^3]	[bar]	[bar]	
2	0.09	0.09	0.70	2	0.00	0.70	2	0.00	2	0.00	0.70	0.51850
40	0.14	0.14	0.72	39.9	1.01	0.72	39.9	1.01	39.9	0.00	0.72	0.02507
80	0.22	0.20	0.76	79.8	2.01	0.74	79.8	2.01	79.8	0.02	0.74	0.01252
120	0.32	0.30	0.82	119.7	3.00	0.80	119.8	3.00	119.8	0.02	0.80	0.00835
160	0.47	0.46	0.94	159.6	3.98	0.93	159.6	3.98	159.6	0.01	0.93	0.00626
200	0.77	0.73	1.22	199.4	4.94	1.18	199.4	4.95	199.4	0.04	1.18	0.00501
240	1.26	1.21	1.68	239.0	5.90	1.63	239.0	5.90	239.0	0.05	1.63	0.00418
280	2.18	2.08	2.57	278.3	6.84	2.47	278.4	6.84	278.4	0.10	2.47	0.00359
320	4.02	3.70	4.39	316.8	7.75	4.07	317.1	7.76	317.1	0.32	4.07	0.00315
360	8.38	7.86	8.73	353.4	8.61	8.21	353.8	8.62	353.8	0.52	8.21	0.00283
400	15.28	14.10	15.61	387.9	9.41	14.43	388.8	9.43	388.8	1.18	14.43	0.00257
440	21.25	19.78	21.56	423.2	10.23	20.09	424.3	10.26	424.3	1.47	20.09	0.00236
430	13.49	13.28	13.80	419.3	10.14	13.59	419.5	10.14			13.59	0.00238
420	9.30	9.33	9.62	412.6	9.99	9.65	412.6	9.99			9.65	0.00242
410	6.69	6.78	7.01	404.7	9.80	7.10	404.6	9.80			7.10	0.00247
420	11.12	10.88	11.44	411.2	9.95	11.20	411.4	9.96			11.20	0.00243
430	14.48	14.06	14.79	418.5	10.12	14.37	418.9	10.13			14.37	0.00239
440	17.38	16.78	17.69	426.2	10.30	17.09	426.7	10.31			17.09	0.00234
480	25.66	24.38	25.95	459.7	11.07	24.67	460.7	11.09	460.7	1.28	24.67	0.00217
520	30.53	29.28	30.81	495.8	11.89	29.56	496.8	11.91	496.8	1.25	29.56	0.00201
560	35.08	33.87	35.34	532.2	12.71	34.13	533.2	12.74	533.2	1.21	34.13	0.00188
550	25.14	25.12	25.41	530.1	12.67	25.39	530.1	12.67			25.39	0.00189
540	19.45	19.58	19.72	524.6	12.54	19.85	524.5	12.54			19.85	0.00191
530	15.52	15.62	15.79	517.7	12.39	15.89	517.6	12.39			15.89	0.00193
540	22.70	22.50	22.97	522.0	12.48	22.77	522.2	12.49			22.77	0.00192
550	27.74	27.40	28.01	528.0	12.62	27.67	528.3	12.63			27.67	0.00189
560	31.88	31.35	32.14	534.7	12.77	31.61	535.1	12.78			31.61	0.00187
600	39.08	38.14	39.33	569.0	13.54	38.39	569.8	13.56	569.8	0.94	38.39	0.00176
640	43.77	42.69	44.01	605.3	14.35	42.93	606.2	14.37	606.2	1.08	42.93	0.00165
680	47.66	46.54	47.89	642.2	15.17	46.77	643.1	15.19	643.1	1.12	46.77	0.00155
720	50.79	49.63	51.01	679.7	15.99	49.85	680.7	16.01	680.7	1.16	49.85	0.00147



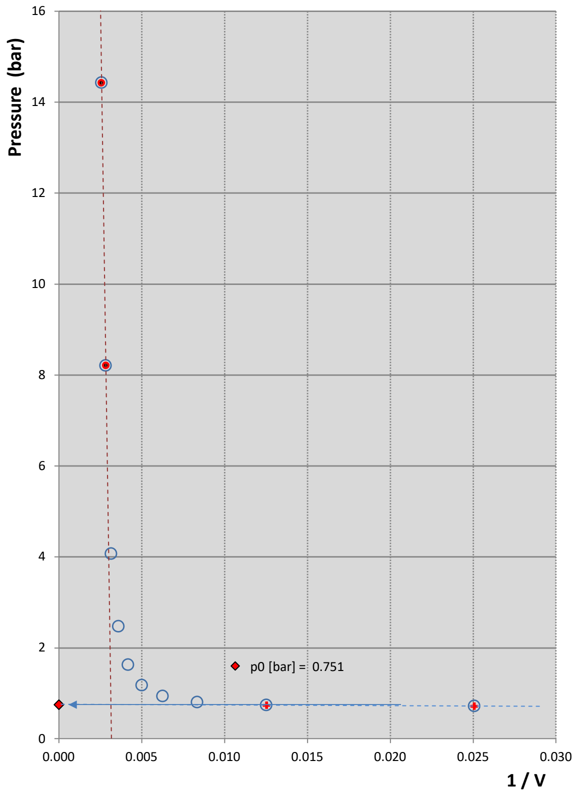
Pressuremeter test results [corrected data] pressure vs radial strain

Interpreted PMT Test Results

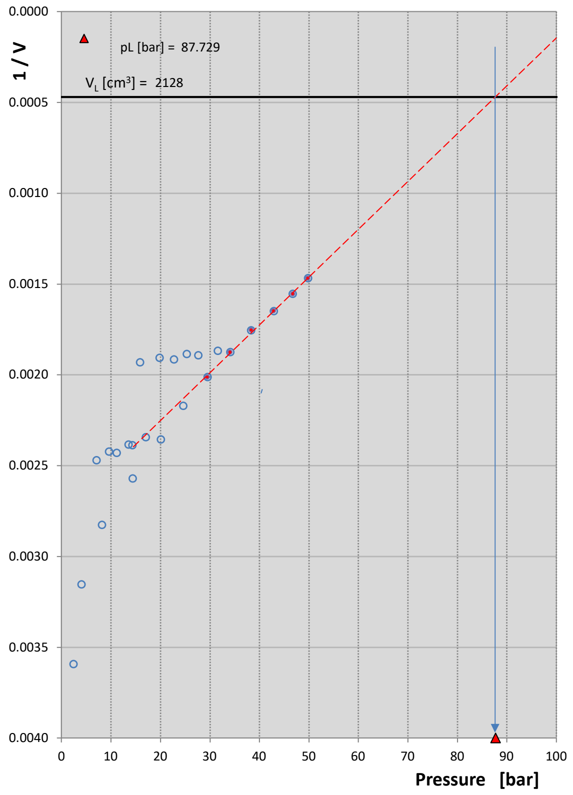
[30-second readings]			volume [cm^3]	radial strain [%]	strain range [%]
p_0	0.75	[bar]	79.8	2.0	
p_L	87.73	[bar]			
p^*_L	86.98	[bar]			
p_Y	14.43	[bar]	389	9.4	
E_{PMT}	1104	[bar]	354	8.6	{8.6 - 9.4 %}
E_{PMT} / p^*_L	12.7				
$E_{Unload\ 1}$	4179	[bar]	405	9.8	
$E_{Reload\ 1}$	2327	[bar]			
$E_{Unload\ 2}$	7787	[bar]	518	12.4	
$E_{Reload\ 2}$	3993	[bar]			



Pressure difference from 15 to 30 sec. readings $\Delta p_{[15\text{-}30\ sec]}$



Determination of total contact pressure p_0



Determination of Limit Pressure p_L

Pressuremeter Equipment: TEXAM Model	Probe Designation : NX Probe (76 mm OD)	Drilling Method: Mud Rotary Drilling Drilling Bit: Tricone Bit	Test Date: October 5, 2023
Volume-controlled test as per ASTM D4719 Method B	Probe No.: A 512 Calibration Record No.: 1	Time elapsed from hole drilling to testing ~ 5 minutes	Test Depth [m]: 7.01 (center of the probe)
Volume increments: 40 cm³ Maximum Volume: 1400 cm³ Maximum Pressure: 100 bar	Tubing Length: 180 [ft] Probe Lenght: 0.46 [m] Probe Initial Volume: 1968 cm³	Engineer: Gabriel Sedran, P.Eng., Ph.D. Operator: Scott Andrew Hall	Drilling Company: Drill Tech Contractor

Project: 2343 Eglinton Ave. West, Toronto

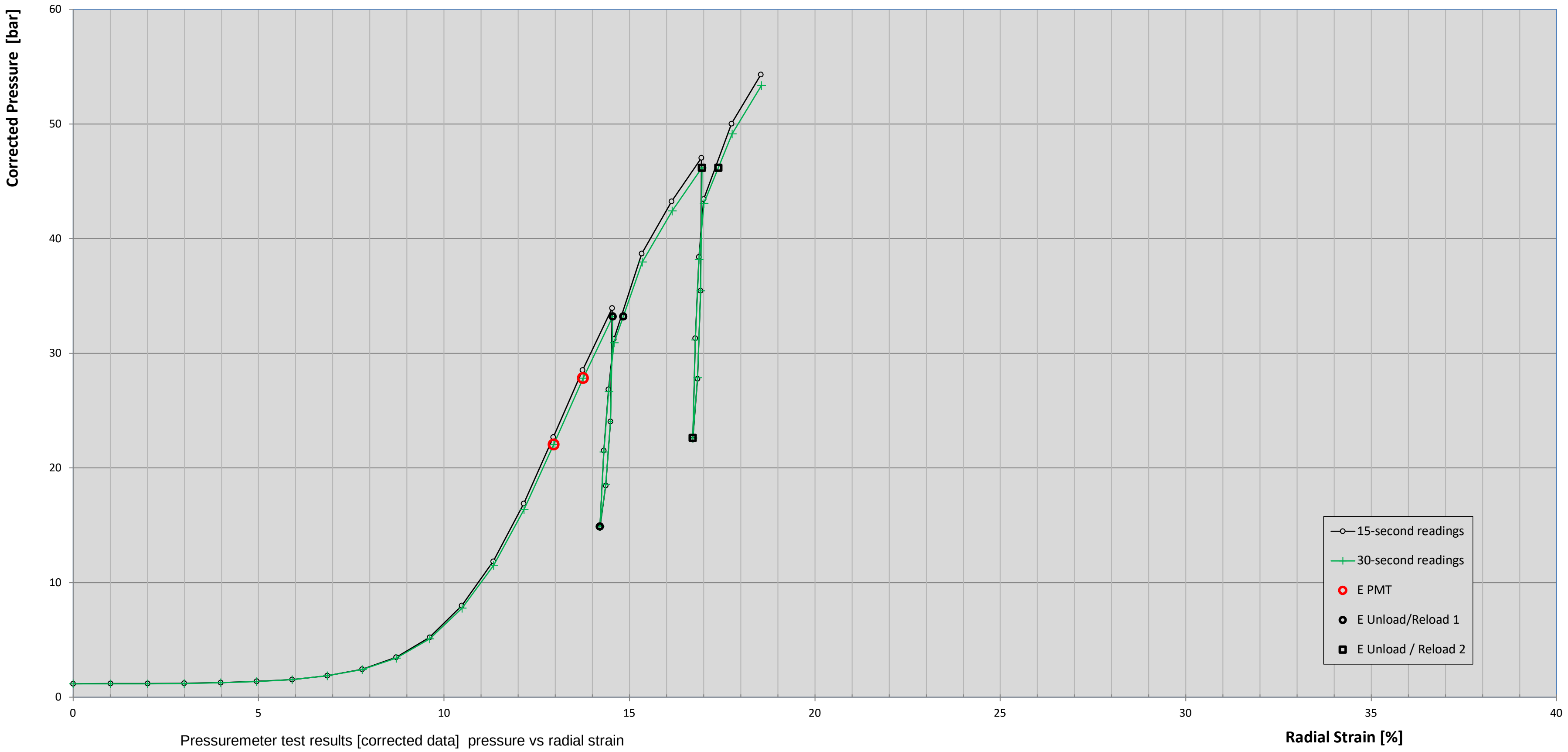
Client: GEM Services Inc.

In-Depth Geotechnical Project No.: IDG 230749

PMT TEST No.: 2

Borehole No.: MW-05-PMT

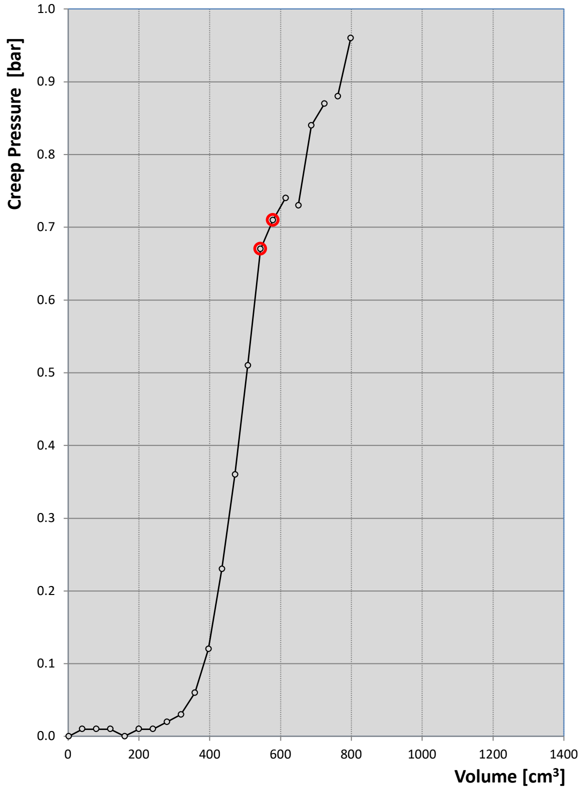
Field Test Data (uncorrected)			Corrected Test data						Creep		Auxiliary Data	
			15-second readings			30-second readings					30 sec	
Volume	**Pressure** [bar]		**Pressure**	**Volume**	$\Delta r/r_0$	**Pressure**	**Volume**	$\Delta r/r_0$	Volume	Δp_{30-15}	Pressure	1 / V
[cm³]	15 sec	30 sec	[bar]	[cm³]	[%]	[bar]	[cm³]	[%]	[cm³]	[bar]	[bar]	
2	0.27	0.27	1.17	2	0.00	1.17	2	0.00	2	0.00	1.17	0.55992
40	0.33	0.32	1.19	39.7	1.00	1.18	39.7	1.00	39.7	0.01	1.18	0.02516
80	0.37	0.36	1.19	79.7	2.01	1.18	79.7	2.01	79.7	0.01	1.18	0.01254
120	0.43	0.42	1.22	119.7	3.00	1.21	119.7	3.00	119.7	0.01	1.21	0.00836
160	0.51	0.51	1.27	159.6	3.98	1.27	159.6	3.98	159.6	0.00	1.27	0.00627
200	0.66	0.65	1.39	199.5	4.95	1.38	199.5	4.95	199.5	0.01	1.38	0.00501
240	0.85	0.84	1.55	239.3	5.91	1.54	239.3	5.91	239.3	0.01	1.54	0.00418
280	1.22	1.20	1.89	279.0	6.86	1.87	279.0	6.86	279.0	0.02	1.87	0.00358
320	1.79	1.76	2.44	318.6	7.79	2.41	318.6	7.79	318.6	0.03	2.41	0.00314
360	2.85	2.79	3.48	357.7	8.71	3.42	357.8	8.71	357.8	0.06	3.42	0.00279
400	4.60	4.48	5.21	396.4	9.61	5.09	396.4	9.61	396.4	0.12	5.09	0.00252
440	7.41	7.18	8.00	434.1	10.48	7.77	434.3	10.49	434.3	0.23	7.77	0.00230
480	11.28	10.92	11.86	471.1	11.33	11.50	471.3	11.33	471.3	0.36	11.50	0.00212
520	16.33	15.82	16.89	507.1	12.15	16.38	507.5	12.16	507.5	0.51	16.38	0.00197
560	22.15	21.48	22.70	542.4	12.95	22.03	543.0	12.96	543.0	0.67	22.03	0.00184
600	28.01	27.30	28.54	577.8	13.74	27.83	578.4	13.75	578.4	0.71	27.83	0.00173
640	33.42	32.68	33.94	613.5	14.53	33.20	614.1	14.55	614.1	0.74	33.20	0.00163
630	23.53	23.53	24.05	611.3	14.49	24.05	611.3	14.49			24.05	0.00164
620	17.96	18.04	18.49	605.8	14.36	18.57	605.7	14.36			18.57	0.00165
610	14.24	14.36	14.77	598.7	14.20	14.89	598.6	14.20			14.89	0.00167
620	21.00	20.88	21.53	603.4	14.31	21.41	603.4	14.31			21.41	0.00166
630	26.34	26.13	26.86	609.1	14.44	26.65	609.3	14.44			26.65	0.00164
640	30.72	30.39	31.24	615.6	14.58	30.91	615.9	14.59			30.91	0.00162
680	38.18	37.45	38.69	649.7	15.33	37.96	650.3	15.35	650.3	0.73	37.96	0.00154
720	42.75	41.91	43.25	686.1	16.13	42.41	686.8	16.15	686.8	0.84	42.41	0.00146
760	46.56	45.69	47.05	723.1	16.94	46.18	723.8	16.95	723.8	0.87	46.18	0.00138
750	34.97	34.97	35.47	722.3	16.92	35.47	722.3	16.92			35.47	0.00138
740	27.29	27.39	27.79	718.4	16.84	27.89	718.3	16.83			27.89	0.00139
730	21.98	22.12	22.48	712.6	16.71	22.62	712.5	16.71			22.62	0.00140
740	30.81	30.68	31.31	715.6	16.78	31.18	715.7	16.78			31.18	0.00140
750	37.91	37.68	38.41	719.9	16.87	38.18	720.1	16.87			38.18	0.00139
760	42.95	42.60	43.44	726.0	17.00	43.09	726.2	17.01			43.09	0.00138
800	49.55	48.67	50.03	760.7	17.75	49.15	761.4	17.77	761.4	0.88	49.15	0.00131
840	53.85	52.89	54.32	797.3	18.54	53.36	798.1	18.56	798.1	0.96	53.36	0.00125



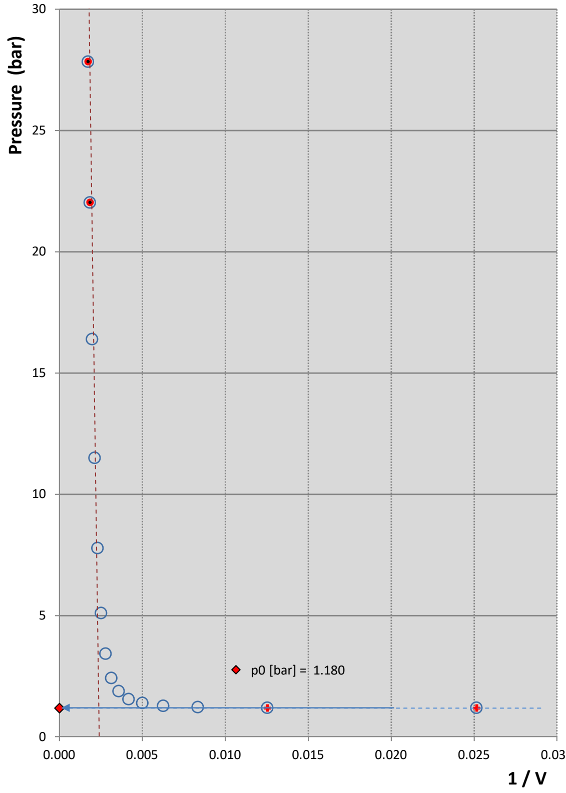
Pressuremeter test results [corrected data] pressure vs radial strain

Interpreted PMT Test Results

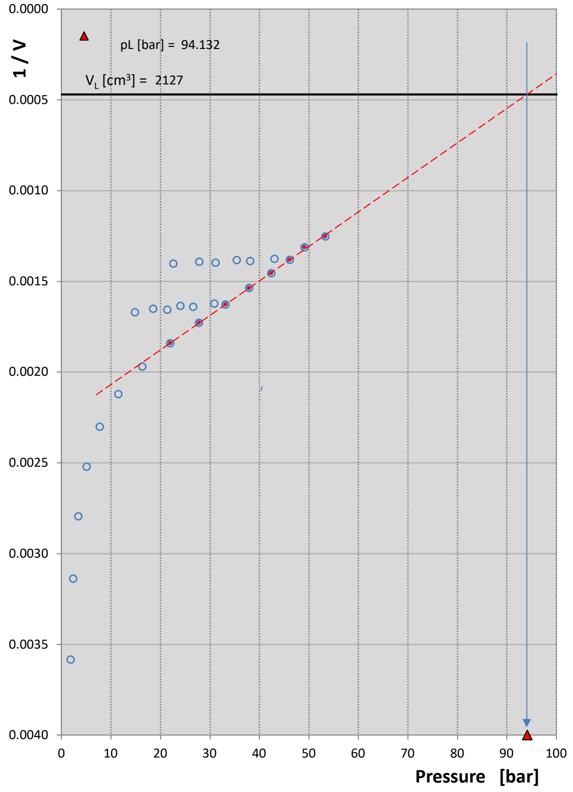
[30-second readings]			volume [cm³]	radial strain [%]	strain range [%]
p_0	1.18	[bar]	79.7	2.0	
p_L	94.13	[bar]			
p^*_L	92.95	[bar]			
p_Y	27.83	[bar]	578	13.8	
E_{PMT}	1103	[bar]	543	13.0	{13.0 - 13.8 %}
E_{PMT} / p^*_L	11.9				
$E_{Unload\ 1}$	8102	[bar]	599	14.2	
$E_{Reload\ 1}$	4420	[bar]			
$E_{Unload\ 2}$	14876	[bar]	712	16.7	
$E_{Reload\ 2}$	5333	[bar]			



Pressure difference from 15 to 30 sec. readings $\Delta p_{[15-30\ sec]}$



Determination of total contact pressure p_0



Determination of Limit Pressure p_L

Pressuremeter Equipment: TEXAM Model	Probe Designation : NX Probe (76 mm OD)	Drilling Method: Mud Rotary Drilling Drilling Bit: Tricone Bit	Test Date: October 5, 2023
Volume-controlled test as per ASTM D4719 Method B	Probe No.: A 512 Calibration Record No.: 1	Time elapsed from hole drilling to testing ~ 5 minutes	Test Depth [m]: 9.91 (center of the probe)
Volume increments: 40 cm³ Maximum Volume: 1400 cm³ Maximum Pressure: 100 bar	Tubing Length: 180 [ft] Probe Lenght: 0.46 [m] Probe Initial Volume: 1968 cm³	Engineer: Gabriel Sedran, P.Eng., Ph.D. Operator: Scott Andrew Hall	Drilling Company: Drill Tech Contractor

Project: **2343 Eglinton Ave. West, Toronto**

Client: GEM Services Inc.

In-Depth Geotechnical Project No.: IDG 230749

PMT TEST No.: 3

Borehole No.: MW-05-PMT

Field Test Data (uncorrected)

Volume [cm³]	Pressure [bar] 15 sec	30 sec
2	0.30	0.30
40	0.34	0.34
80	0.39	0.38
120	0.42	0.42
160	0.51	0.50
200	0.64	0.63
240	0.90	0.89
280	1.45	1.42
320	2.68	2.61
360	5.45	5.33
400	10.03	9.82
440	15.76	15.45
480	21.78	21.35
520	27.34	26.91
510	18.56	18.56
500	13.84	13.88
490	10.62	10.68
500	16.81	16.72
510	21.76	21.63
520	25.60	25.38
560	32.23	31.84
600	36.90	36.40
640	40.89	40.49
630	30.18	30.18
620	24.12	24.18
610	19.63	19.70
620	28.03	27.98
630	34.46	34.28
640	38.72	38.44
680	44.46	43.95
720	48.13	47.60
760	50.91	50.40

Corrected Test data

15-second readings			30-second readings		
Pressure [bar]	Volume [cm³]	$\Delta r/r_0$ [%]	Pressure [bar]	Volume [cm³]	$\Delta r/r_0$ [%]
1.66	2	0.00	1.66	2	0.00
1.66	39.7	1.00	1.66	39.7	1.00
1.67	79.7	2.00	1.66	79.7	2.01
1.66	119.7	3.00	1.66	119.7	3.00
1.73	159.6	3.98	1.72	159.6	3.98
1.83	199.5	4.95	1.82	199.5	4.95
2.06	239.3	5.91	2.05	239.3	5.91
2.58	278.9	6.85	2.55	278.9	6.85
3.79	317.9	7.78	3.72	317.9	7.78
6.54	355.7	8.66	6.42	355.8	8.66
11.10	392.0	9.51	10.89	392.2	9.51
16.81	427.5	10.33	16.50	427.8	10.34
22.82	462.7	11.14	22.39	463.1	11.15
28.36	498.3	11.95	27.93	498.7	11.96
19.58	495.3	11.88	19.58	495.3	11.88
14.87	489.0	11.74	14.91	489.0	11.74
11.65	481.6	11.57	11.71	481.5	11.57
17.84	486.7	11.68	17.75	486.7	11.69
22.78	492.8	11.82	22.65	492.9	11.82
26.62	499.7	11.98	26.40	499.9	11.98
33.23	534.5	12.77	32.84	534.8	12.77
37.89	570.7	13.58	37.39	571.1	13.59
41.87	607.6	14.40	41.47	607.9	14.41
31.16	606.1	14.37	31.16	606.1	14.37
25.10	600.9	14.25	25.16	600.8	14.25
20.62	594.4	14.11	20.69	594.4	14.11
29.01	597.8	14.18	28.96	597.8	14.18
35.44	602.7	14.29	35.26	602.8	14.30
39.70	609.3	14.44	39.42	609.5	14.44
45.43	644.8	15.22	44.92	645.2	15.23
49.09	681.8	16.04	48.56	682.3	16.05
51.86	719.6	16.86	51.35	720.0	16.87

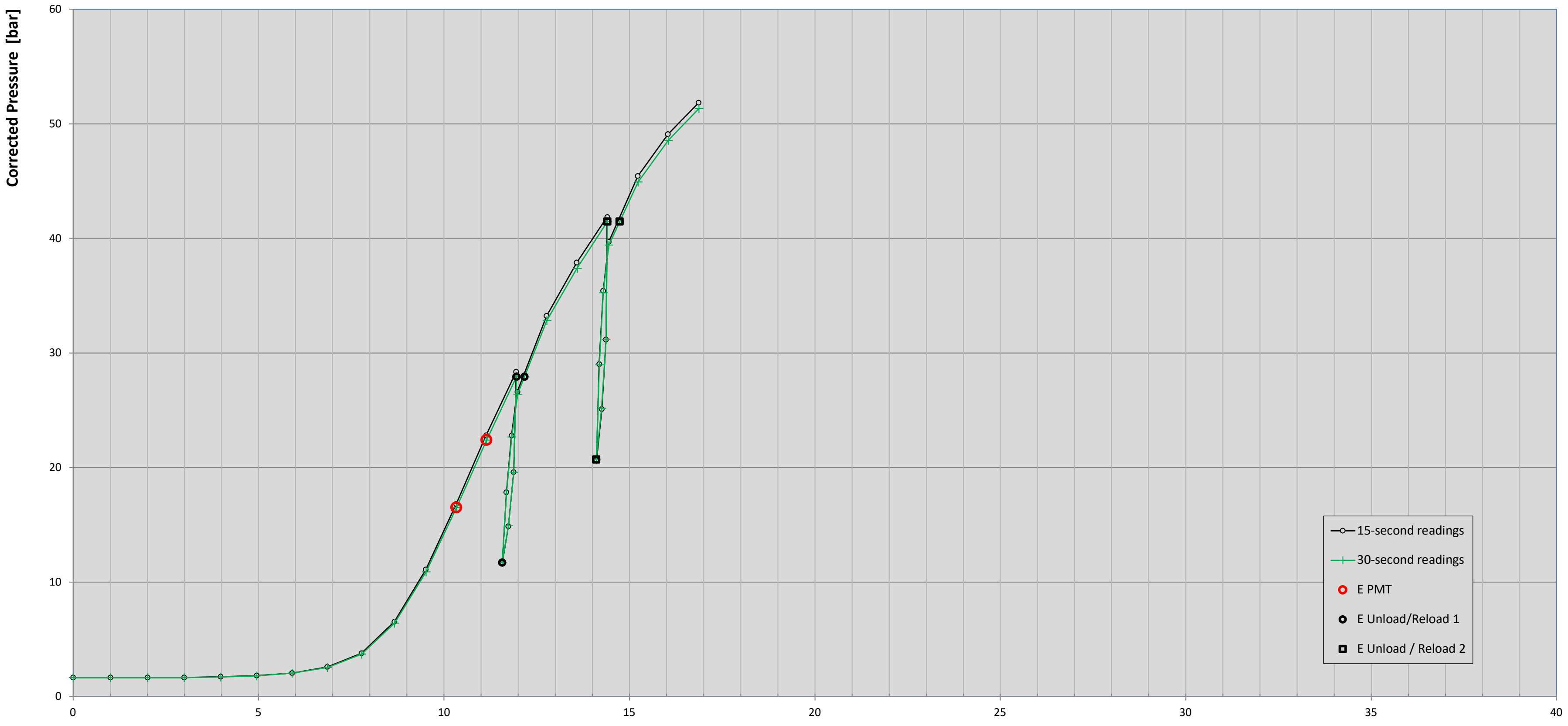
Creep

Volume [cm³]	Δp 30-15 [bar]
2	0.00
39.7	0.00
79.7	0.01
119.7	0.00
159.6	0.01
199.5	0.01
239.3	0.01
278.9	0.03
317.9	0.07
355.8	0.12
392.2	0.21
427.8	0.31
463.1	0.43
498.7	0.43
534.8	0.39
571.1	0.50
607.9	0.40
645.2	0.51
682.3	0.53
720.0	0.51

Auxiliary Data

30 sec	
Pressure [bar]	1 / V
1.66	0.56748
1.66	0.02517
1.66	0.01255
1.66	0.00836
1.72	0.00627
1.82	0.00501
2.05	0.00418
2.55	0.00359
3.72	0.00315
6.42	0.00281
10.89	0.00255
16.50	0.00234
22.39	0.00216
27.93	0.00201
19.58	0.00202
14.91	0.00205
11.71	0.00208
17.75	0.00205
22.65	0.00203
26.40	0.00200
32.84	0.00187
37.39	0.00175
41.47	0.00165
31.16	0.00165
25.16	0.00166
20.69	0.00168
28.96	0.00167
35.26	0.00166
39.42	0.00164
44.92	0.00155
48.56	0.00147
51.35	0.00139

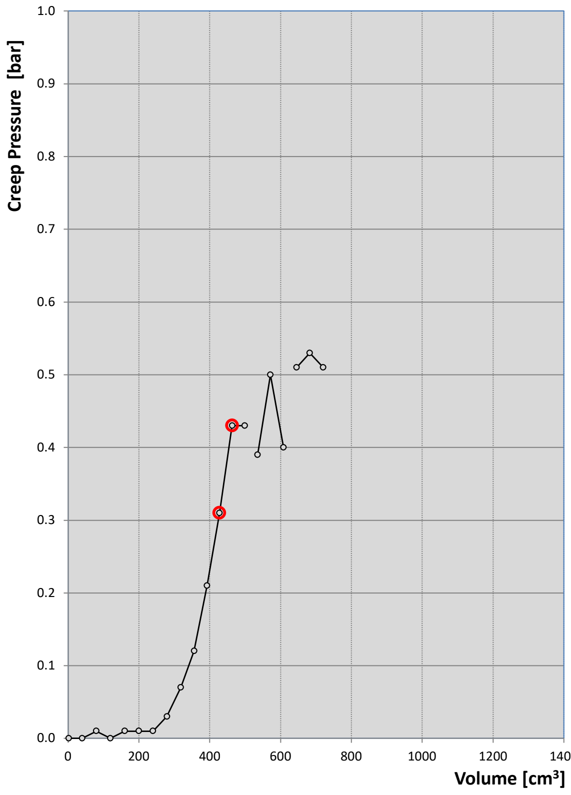
GEMS



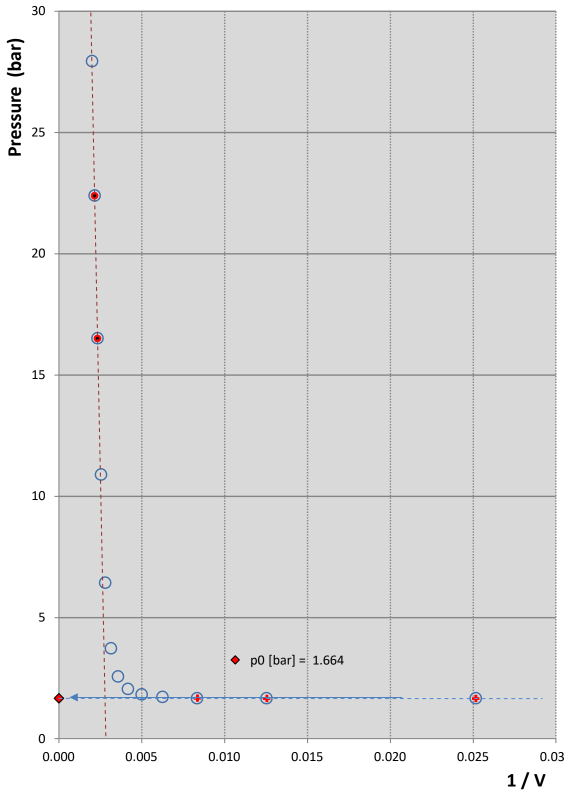
Pressuremeter test results [corrected data] pressure vs radial strain

Interpreted PMT Test Results

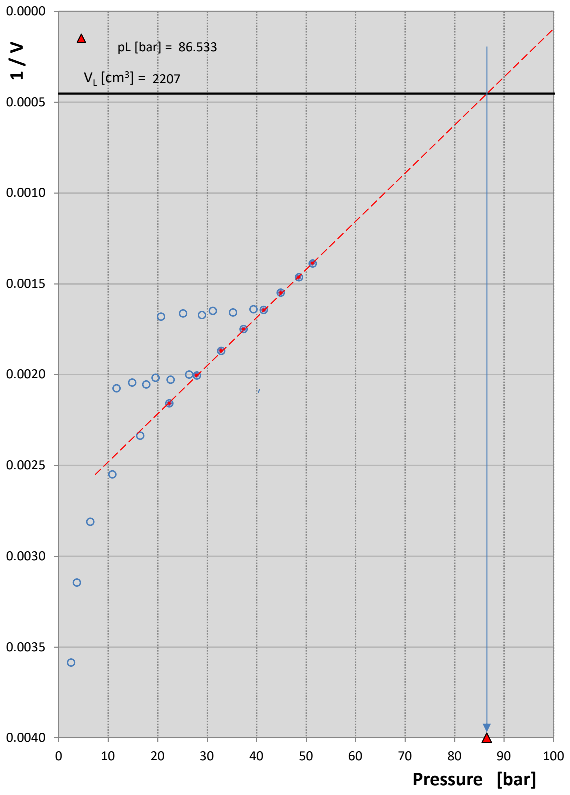
[30-second readings]			volume [cm³]	radial strain [%]	strain range [%]
p_0	1.66	[bar]	119.7	3.0	
p_L	86.53	[bar]			
p^*_L	84.87	[bar]			
p_Y	22.39	[bar]	463	11.1	
E_{PMT}	1069	[bar]	428	10.3	{10.3 - 11.1 %}
E_{PMT} / p^*_L	12.6				
$E_{Unload\ 1}$	6188	[bar]	482	11.6	
$E_{Reload\ 1}$	3993	[bar]			
$E_{Unload\ 2}$	10505	[bar]	594	14.1	
$E_{Reload\ 2}$	5017	[bar]			



Pressure difference from 15 to 30 sec. readings Δp $_{[15\text{-}30\ sec]}$



Determination of total contact pressure p_0



Determination of Limit Pressure p_L

Pressuremeter Equipment: TEXAM Model
Volume-controlled test as per ASTM D4719
Method B
Volume increments: 40 cm³
Maximum Volume: 1400 cm³
Maximum Pressure: 100 bar

Probe Designation : NX Probe (76 mm OD)
Probe No.: A 512
Calibration Record No.: 1
Tubing Length: 180 [ft]
Probe Lenght: 0.46 [m]
Probe Initial Volume: 1968 cm³

Drilling Method: Mud Rotary Drilling
Drilling Bit: Tricone Bit
Time elapsed from hole drilling to testing
~ 5 minutes
Engineer: Gabriel Sedran, P.Eng., Ph.D.
Operator: Scott Andrew Hall

Test Date: October 5, 2023
Test Depth [m]: 14.58 (center of the probe)
Drilling Company: Drill Tech Contractor

Project: **2343 Eglinton Ave. West, Toronto**
Client: GEM Services Inc.
In-Depth Geotechnical Project No.: IDG 230749

PMT TEST No.: 4
Borehole No.: MW-05-PMT

In-Depth
Geotechnical Inc.

Field Test Data (uncorrected)

Volume [cm³]	Pressure [bar] 15 sec	Pressure [bar] 30 sec
2	0.38	0.38
40	0.43	0.42
80	0.49	0.49
120	0.56	0.56
160	0.69	0.67
200	0.89	0.87
240	1.34	1.31
280	2.36	2.31
320	4.67	4.56
360	9.07	8.87
400	15.73	15.30
440	23.58	23.00
480	31.71	31.08
520	39.23	38.65
510	28.28	28.25
500	21.74	21.82
490	17.06	17.15
500	25.10	25.00
510	31.66	31.47
520	36.84	36.56
560	46.13	45.50

Corrected Test data

15-second readings Pressure [bar]	Volume [cm³]	Δr/r$_0$ [%]	30-second readings Pressure [bar]	Volume [cm³]	Δr/r$_0$ [%]
2.03	2	0.00	2.03	2	0.00
2.04	39.7	1.00	2.03	39.7	1.00
2.06	79.6	2.00	2.06	79.6	2.00
2.09	119.6	2.99	2.09	119.6	2.99
2.20	159.5	3.97	2.18	159.5	3.97
2.37	199.3	4.94	2.35	199.3	4.94
2.79	238.9	5.90	2.76	239.0	5.90
3.78	278.1	6.83	3.73	278.2	6.83
6.07	316.3	7.74	5.96	316.4	7.74
10.45	352.8	8.60	10.25	353.0	8.60
17.09	387.5	9.40	16.66	387.9	9.41
24.92	421.3	10.19	24.34	421.8	10.20
33.04	454.9	10.96	32.41	455.4	10.97
40.54	488.9	11.73	39.96	489.4	11.75
29.59	487.6	11.70	29.56	487.6	11.71
23.06	482.8	11.60	23.14	482.7	11.59
18.38	476.5	11.45	18.47	476.4	11.45
26.42	480.1	11.53	26.32	480.2	11.54
32.97	484.9	11.64	32.78	485.1	11.65
38.15	490.8	11.78	37.87	491.0	11.78
47.42	523.4	12.52	46.79	523.9	12.53

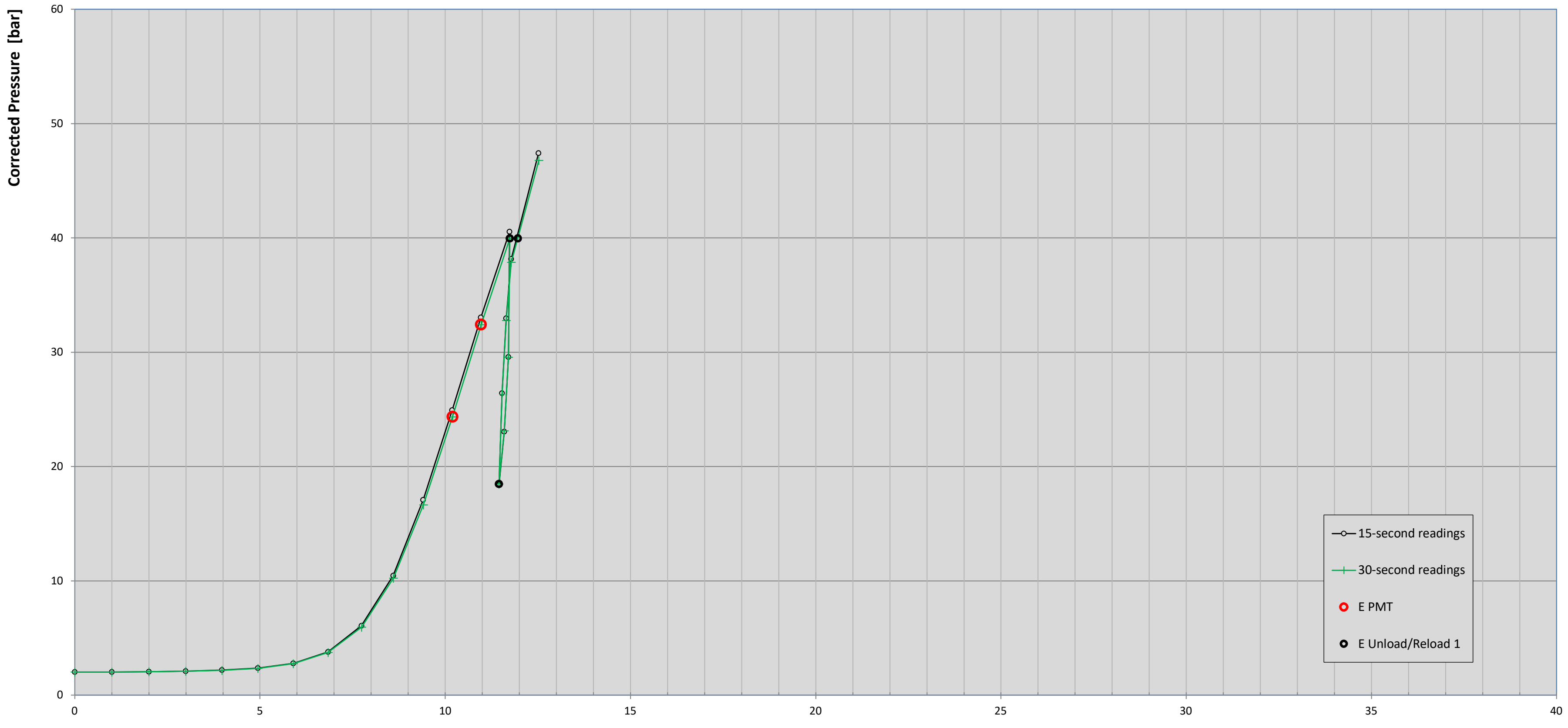
Creep

Volume [cm³]	Δp$_{30-15}$ [bar]
2	0.00
39.7	0.01
79.6	0.00
119.6	0.00
159.5	0.02
199.3	0.02
239.0	0.03
278.2	0.05
316.4	0.11
353.0	0.20
387.9	0.43
421.8	0.58
455.4	0.63
489.4	0.58
523.9	0.63

Auxiliary Data

30 sec Pressure [bar]	1 / V
2.03	0.58866
2.03	0.02521
2.06	0.01256
2.09	0.00836
2.18	0.00627
2.35	0.00502
2.76	0.00418
3.73	0.00359
5.96	0.00316
10.25	0.00283
16.66	0.00258
24.34	0.00237
32.41	0.00220
39.96	0.00204
29.56	0.00205
23.14	0.00207
18.47	0.00210
26.32	0.00208
32.78	0.00206
37.87	0.00204
46.79	0.00191

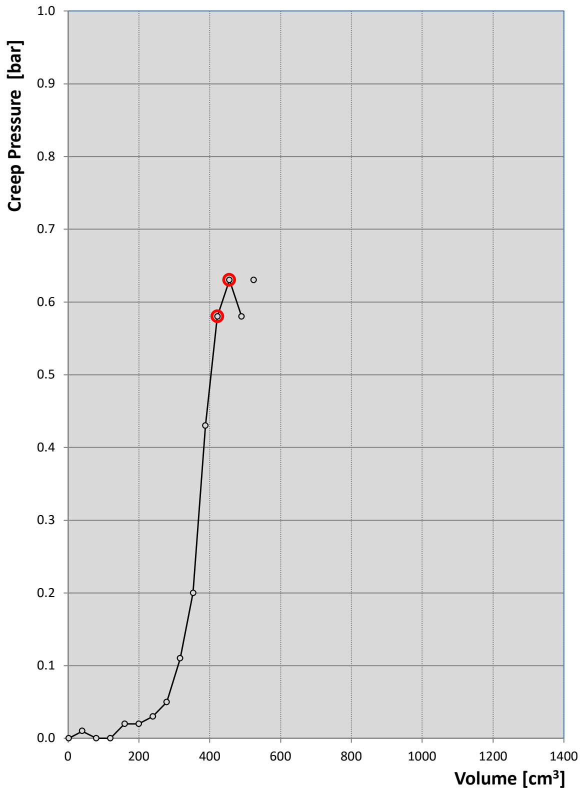
GEMS



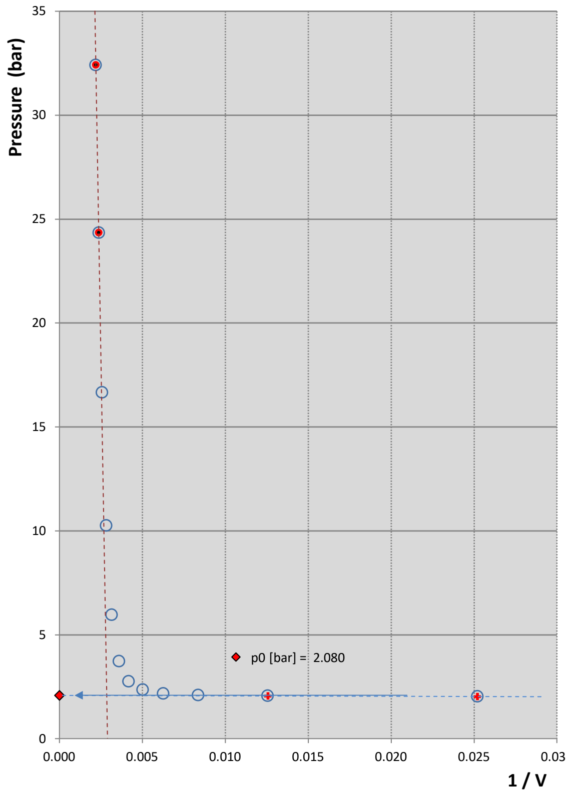
Pressuremeter test results [corrected data] pressure vs radial strain

Interpreted PMT Test Results

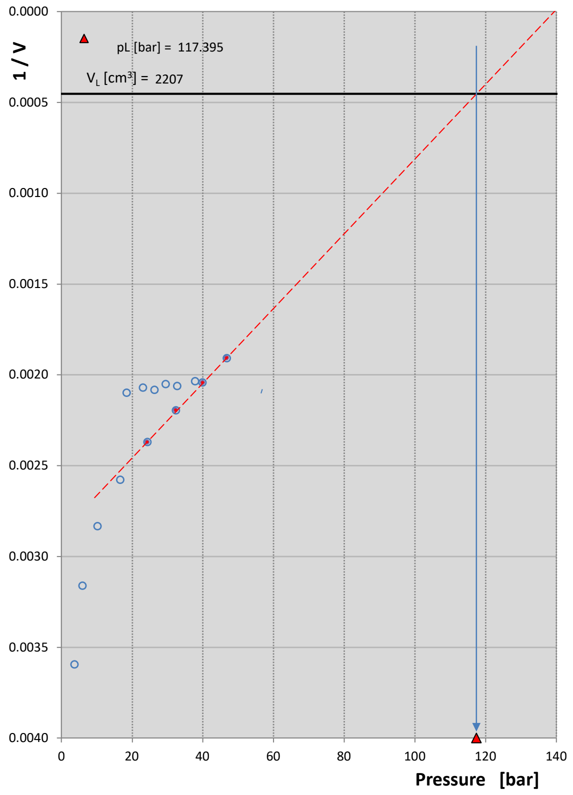
[30-second readings]			volume [cm³]	radial strain [%]	strain range [%]
p_0	2.08	[bar]	119.6	3.0	
p_L	117.40	[bar]			
p^*_L	115.32	[bar]			
p_Y	32.41	[bar]	455	11.0	
E_{PMT}	1536	[bar]	422	10.2	{10.2 - 11.0 %}
E_{PMT} / p^*_L	13.3				
$E_{Unload\ 1}$	10811	[bar]	476	11.5	
$E_{Reload\ 1}$	6293	[bar]			



Pressure difference from 15 to 30 sec. readings Δp $_{[15-30\ sec]}$



Determination of total contact pressure p_0



Determination of Limit Pressure p_L

Pressuremeter Equipment: TEXAM Model
Volume-controlled test as per ASTM D4719
Method B
Volume increments: 40 cm³
Maximum Volume: 1400 cm³
Maximum Pressure: 100 bar

Probe Designation : NX Probe (76 mm OD)
Probe No.: A 512
Calibration Record No.: 1
Tubing Length: 180 [ft]
Probe Lenght: 0.46 [m]
Probe Initial Volume: 1968 cm³

Drilling Method: Mud Rotary Drilling
Drilling Bit: Tricone Bit
Time elapsed from hole drilling to testing
~ 5 minutes
Engineer: Gabriel Sedran, P.Eng., Ph.D.
Operator: Scott Andrew Hall

Test Date: October 5, 2023
Test Depth [m]: 17.53 (center of the probe)
Drilling Company: Drill Tech Contractor

Project: **2343 Eglinton Ave. West, Toronto**
Client: GEM Services Inc.
In-Depth Geotechnical Project No.: IDG 230749

PMT TEST No.: 5
Borehole No.: MW-05-PMT

In-Depth
Geotechnical Inc.

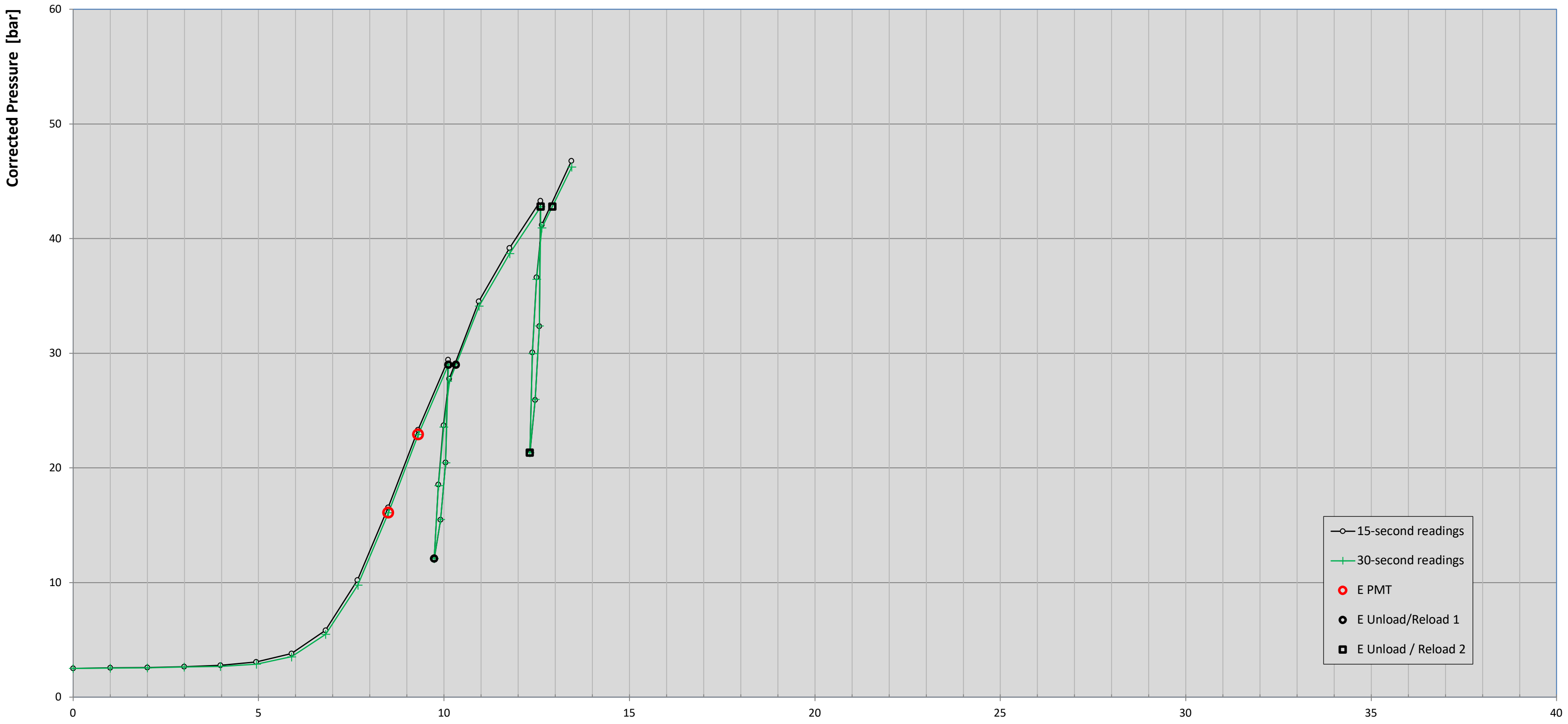
Field Test Data (uncorrected)		
Volume [cm³]	Pressure [bar] 15 sec	Pressure [bar] 30 sec
2	0.42	0.42
40	0.50	0.47
80	0.57	0.55
120	0.68	0.65
160	0.83	0.72
200	1.14	0.95
240	1.91	1.62
280	3.95	3.60
320	8.37	7.91
360	14.72	14.25
400	21.50	21.10
440	27.64	27.20
430	18.67	18.65
420	13.67	13.70
410	10.24	10.29
420	16.75	16.65
430	21.92	21.76
440	25.97	25.76
480	32.74	32.32
520	37.42	36.94
560	41.54	41.04
550	30.61	30.62
540	24.17	24.22
530	19.48	19.57
540	28.32	28.22
550	34.87	34.69
560	39.46	39.19
600	45.05	44.51

Corrected Test data					
15-second readings			30-second readings		
Pressure [bar]	Volume [cm³]	Δr/r₀ [%]	Pressure [bar]	Volume [cm³]	Δr/r₀ [%]
2.52	2	0.00	2.52	2	0.00
2.57	39.6	1.00	2.54	39.6	1.00
2.60	79.5	2.00	2.58	79.6	2.00
2.67	119.5	2.99	2.64	119.5	2.99
2.79	159.3	3.97	2.68	159.4	3.97
3.08	199.1	4.94	2.89	199.2	4.94
3.82	238.5	5.89	3.53	238.7	5.89
5.83	276.9	6.80	5.48	277.1	6.81
10.23	313.4	7.67	9.77	313.7	7.68
16.56	348.3	8.49	16.09	348.7	8.50
23.32	383.0	9.30	22.92	383.3	9.31
29.44	418.1	10.11	29.00	418.4	10.12
20.47	415.2	10.05	20.45	415.2	10.05
15.48	409.2	9.91	15.51	409.1	9.91
12.05	401.9	9.74	12.10	401.8	9.74
18.56	406.7	9.85	18.46	406.8	9.85
23.72	412.6	9.99	23.56	412.8	9.99
27.77	419.4	10.14	27.56	419.6	10.15
34.52	454.0	10.94	34.10	454.4	10.95
39.19	490.3	11.77	38.71	490.7	11.78
43.29	527.1	12.60	42.79	527.5	12.61
32.37	525.7	12.57	32.38	525.7	12.57
25.93	520.8	12.46	25.98	520.8	12.46
21.24	514.6	12.32	21.33	514.5	12.31
30.08	517.5	12.38	29.98	517.6	12.39
36.63	522.4	12.49	36.45	522.5	12.50
41.21	528.7	12.64	40.94	528.9	12.64
46.79	564.3	13.44	46.25	564.7	13.45

Creep	
Volume [cm³]	Δp 30-15 [bar]
2	0.00
39.6	0.03
79.6	0.02
119.5	0.03
159.4	0.11
199.2	0.19
238.7	0.29
277.1	0.35
313.7	0.46
348.7	0.47
383.3	0.40
418.4	0.44
454.4	0.42
490.7	0.48
527.5	0.50
564.7	0.54

Auxiliary Data	
30 sec	
Pressure [bar]	1 / V
2.52	0.59986
2.54	0.02524
2.58	0.01257
2.64	0.00837
2.68	0.00627
2.89	0.00502
3.53	0.00419
5.48	0.00361
9.77	0.00319
16.09	0.00287
22.92	0.00261
29.00	0.00239
20.45	0.00241
15.51	0.00244
12.10	0.00249
18.46	0.00246
23.56	0.00242
27.56	0.00238
34.10	0.00220
38.71	0.00204
42.79	0.00190
32.38	0.00190
25.98	0.00192
21.33	0.00194
29.98	0.00193
36.45	0.00191
40.94	0.00189
46.25	0.00177

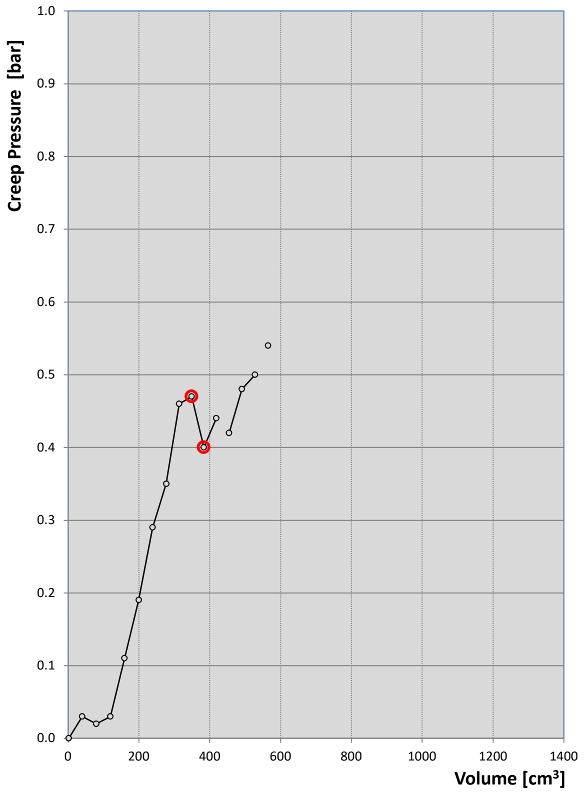
GEMS



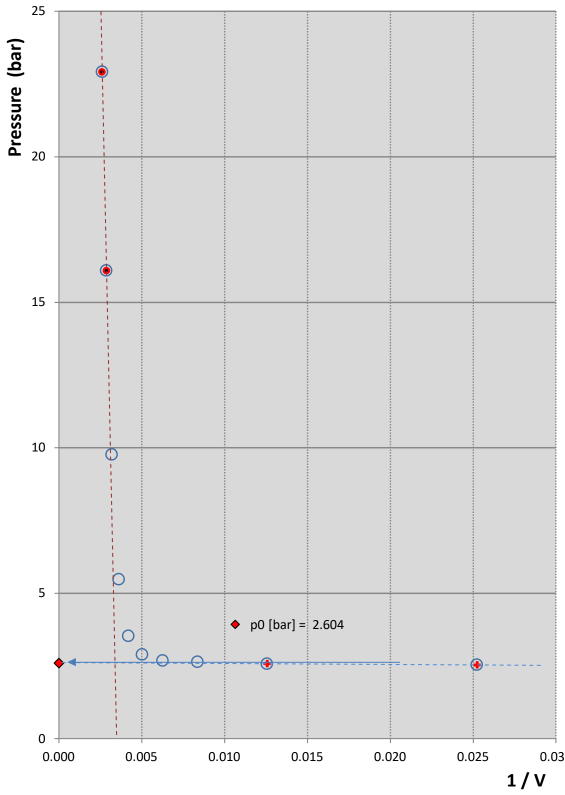
Pressuremeter test results [corrected data] pressure vs radial strain

Interpreted PMT Test Results

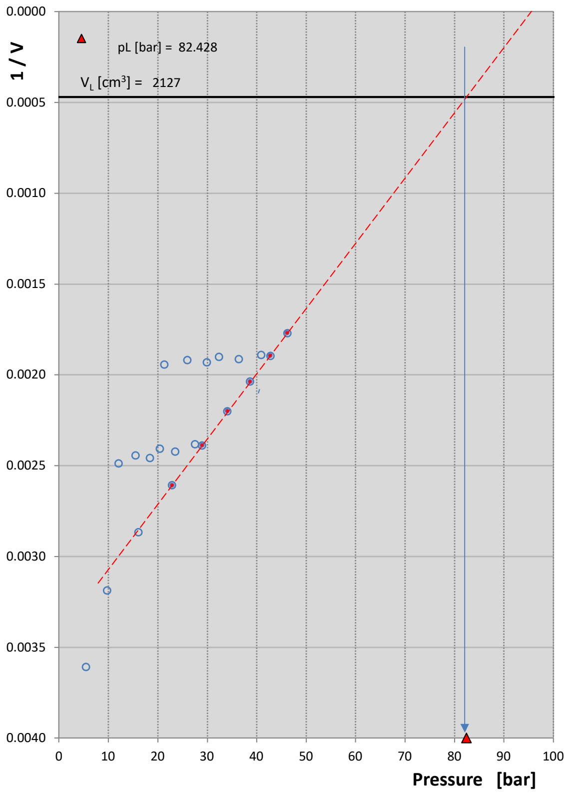
[30-second readings]			volume [cm³]	radial strain [%]	strain range [%]
p_0	2.60	[bar]	79.6	2.0	
p_L	82.43	[bar]			
p^*_L	79.82	[bar]			
p_Y	22.92	[bar]	383	9.3	
E_{PMT}	1226	[bar]	349	8.5	{8.5 - 9.3 %}
E_{PMT} / p^*_L	15.4				
$E_{Unload\ 1}$	6441	[bar]	402	9.7	
$E_{Reload\ 1}$	4220	[bar]			
$E_{Unload\ 2}$	10944	[bar]	514	12.3	
$E_{Reload\ 2}$	5296	[bar]			



Pressure difference from 15 to 30 sec. readings Δp [15-30 sec]



Determination of total contact pressure p_0



Determination of Limit Pressure p_L

Pressuremeter Equipment: TEXAM Model	Probe Designation : NX Probe (76 mm OD)	Drilling Method: Mud Rotary Drilling Drilling Bit: Tricone Bit	Test Date: October 5, 2023	Project: **2343 Eglinton Ave. West, Toronto**	**PMT TEST No.: 6**
Volume-controlled test as per ASTM D4719 Method B	Probe No.: A 512 Calibration Record No.: 1	Time elapsed from hole drilling to testing ~ 5 minutes	Test Depth [m]: 22.20 (center of the probe)	Client: GEM Services Inc.	**Borehole No.: MW-05-PMT**
Volume increments: 40 cm³ Maximum Volume: 1400 cm³ Maximum Pressure: 100 bar	Tubing Length: 180 [ft] Probe Lenght: 0.46 [m] Probe Initial Volume: 1968 cm³	Engineer: Gabriel Sedran, P.Eng., Ph.D. Operator: Scott Andrew Hall	Drilling Company: Drill Tech Contractor	In-Depth Geotechnical Project No.: IDG 230749	In-Depth Geotechnical Inc.

Field Test Data (uncorrected)

Volume [cm³]	Pressure [bar]	
	15 sec	30 sec
2	0.48	0.48
40	0.51	0.50
80	0.70	0.68
120	1.08	1.03
160	1.58	1.49
200	2.65	2.45
240	5.08	4.79
280	11.63	11.24
320	20.40	19.96
360	27.93	27.54
350	18.51	18.48
340	13.37	13.38
330	9.78	9.86
340	16.53	16.42
350	21.97	21.80
360	26.41	26.20
400	34.21	33.76
440	39.65	39.13
480	44.26	43.73
470	33.01	32.99
460	25.63	25.68
450	20.82	20.90
460	30.09	29.99
470	37.18	37.00
480	42.21	41.82
520	48.23	47.66
560	53.07	52.53
600	57.30	56.77

Corrected Test data

15-second readings			30-second readings		
Pressure [bar]	Volume [cm³]	$\Delta r/r_0$ [%]	Pressure [bar]	Volume [cm³]	$\Delta r/r_0$ [%]
3.16	2	0.00	3.16	2	0.00
3.15	39.6	1.00	3.14	39.6	1.00
3.30	79.4	2.00	3.28	79.5	2.00
3.65	119.1	2.98	3.60	119.2	2.98
4.12	158.7	3.96	4.03	158.8	3.96
5.16	197.9	4.91	4.96	198.1	4.91
7.57	236.0	5.83	7.28	236.2	5.83
14.09	270.8	6.66	13.70	271.1	6.67
22.83	303.8	7.44	22.39	304.2	7.45
30.34	337.9	8.25	29.95	338.2	8.25
20.93	335.3	8.19	20.90	335.4	8.19
15.79	329.4	8.05	15.80	329.4	8.05
12.21	322.2	7.88	12.29	322.2	7.88
18.95	326.9	7.99	18.84	327.0	7.99
24.39	332.6	8.12	24.22	332.7	8.12
28.82	339.1	8.27	28.61	339.2	8.28
36.60	372.9	9.06	36.15	373.2	9.07
42.03	408.6	9.89	41.51	409.0	9.90
46.62	444.9	10.73	46.09	445.3	10.74
35.38	443.8	10.70	35.36	443.8	10.71
28.00	439.7	10.61	28.05	439.6	10.61
23.19	433.5	10.47	23.27	433.4	10.47
32.46	436.1	10.53	32.36	436.2	10.53
39.55	440.5	10.63	39.37	440.7	10.63
44.57	446.5	10.77	44.18	446.8	10.77
50.58	481.8	11.57	50.01	482.2	11.58
55.40	517.9	12.39	54.86	518.4	12.40
59.61	554.6	13.22	59.08	555.0	13.23

Creep

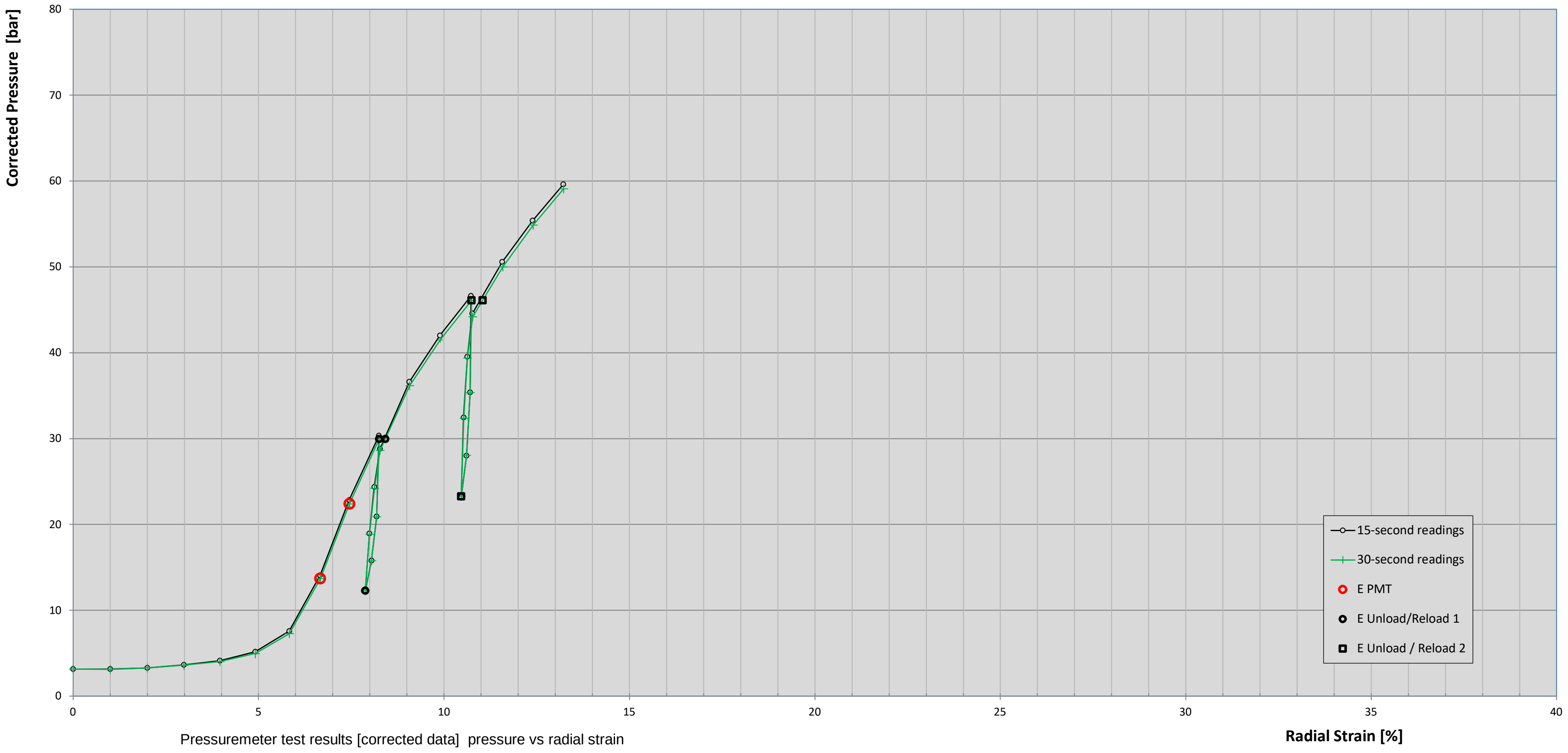
Volume [cm³]	Δp_{30-15} [bar]
2	0.00
39.6	0.01
79.5	0.02
119.2	0.05
158.8	0.09
198.1	0.20
236.2	0.29
271.1	0.39
304.2	0.44
338.2	0.39
373.2	0.45
409.0	0.52
445.3	0.53
482.2	0.57
518.4	0.54
555.0	0.53

Auxiliary Data

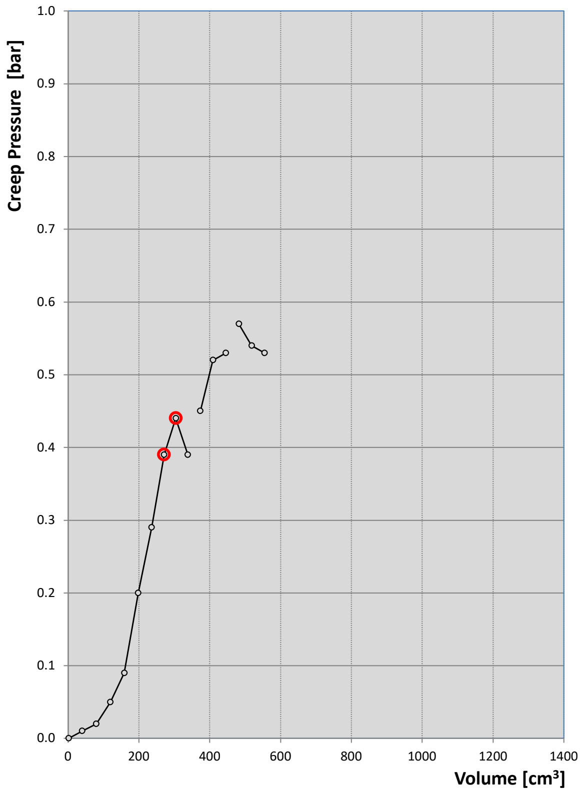
30 sec	
Pressure [bar]	1 / V
3.16	0.61748
3.14	0.02525
3.28	0.01258
3.60	0.00839
4.03	0.00630
4.96	0.00505
7.28	0.00423
13.70	0.00369
22.39	0.00329
29.95	0.00296
20.90	0.00298
15.80	0.00304
12.29	0.00310
18.84	0.00306
24.22	0.00301
28.61	0.00295
36.15	0.00268
41.51	0.00245
46.09	0.00225
35.36	0.00225
28.05	0.00227
23.27	0.00231
32.36	0.00229
39.37	0.00227
44.18	0.00224
50.01	0.00207
54.86	0.00193
59.08	0.00180

Interpreted PMT Test Results

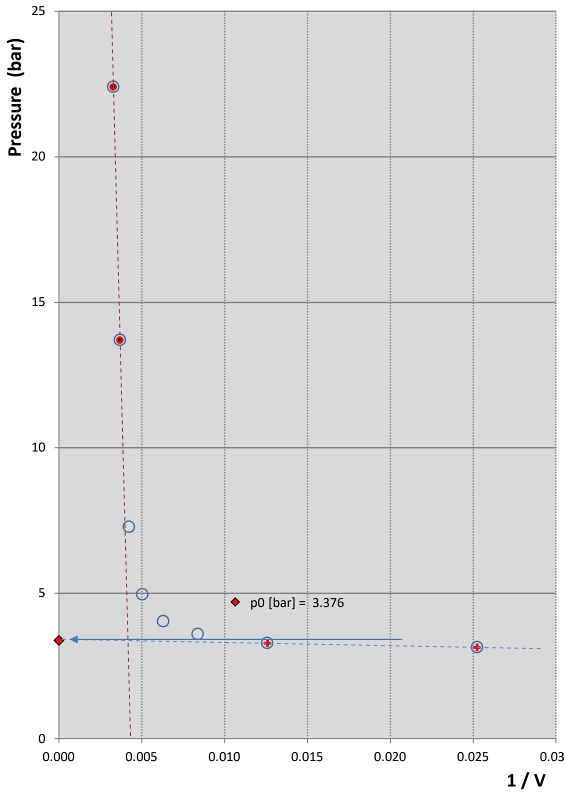
[30-second readings]			volume [cm³]	radial strain [%]	strain range [%]
p_0	3.38	[bar]	79.5	2.0	
p_L	103.55	[bar]			
p^*_L	100.18	[bar]			
p_Y	22.39	[bar]	304	7.5	
E_{PMT}	1577	[bar]	271	6.7	{6.7 - 7.5 %}
E_{PMT} / p^*_L	15.7				
$E_{Unload\ 1}$	6755	[bar]	322	7.9	
$E_{Reload\ 1}$	4687	[bar]			
$E_{Unload\ 2}$	12275	[bar]	433	10.5	
$E_{Reload\ 2}$	5863	[bar]			



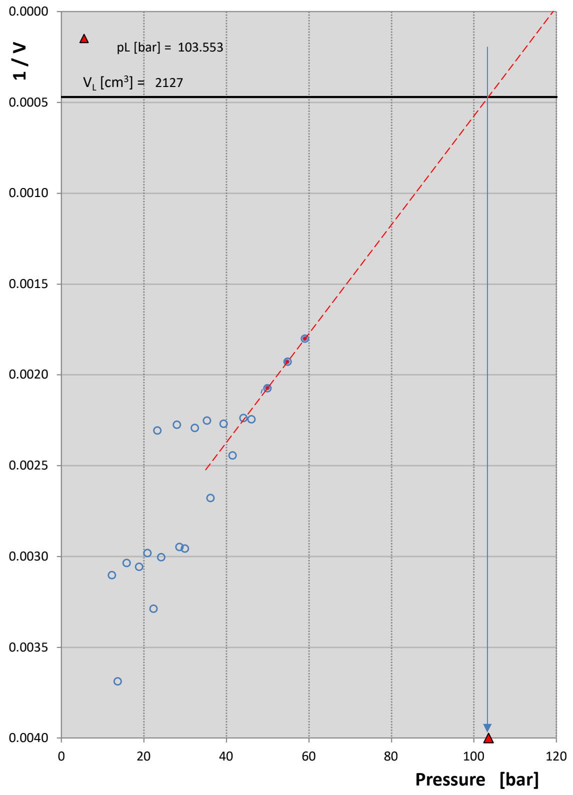
Pressuremeter test results [corrected data] pressure vs radial strain



Pressure difference from 15 to 30 sec. readings $\Delta p_{[15\text{-}30\ sec]}$



Determination of total contact pressure p_0



Determination of Limit Pressure p_L

Pressuremeter Equipment: TEXAM Model		Probe Designation : NX Probe (76 mm OD)			Drilling Method: Mud Rotary Drilling Drilling Bit: Tricone Bit	Test Date:	October 5, 2023	
Volume-controlled test as per ASTM D4719 Method B		Probe No.:	A 512		Time elapsed from hole drilling to testing ~ 5 minutes	Test Depth [m]:	28.09	(center of the probe)
Volume increments:	40 cm³	Tubing Length:	180	[ft]	Engineer: Gabriel Sedran, P.Eng., Ph.D.			
Maximum Volume:	1400 cm³	Probe Lenght:	0.46	[m]	Operator: Scott Andrew Hall			
Maximum Pressure:	100 bar	Probe Initial Volume:	1968	cm³		Drilling Company:	Drill Tech Contractor	

Calibration Record No.: 1

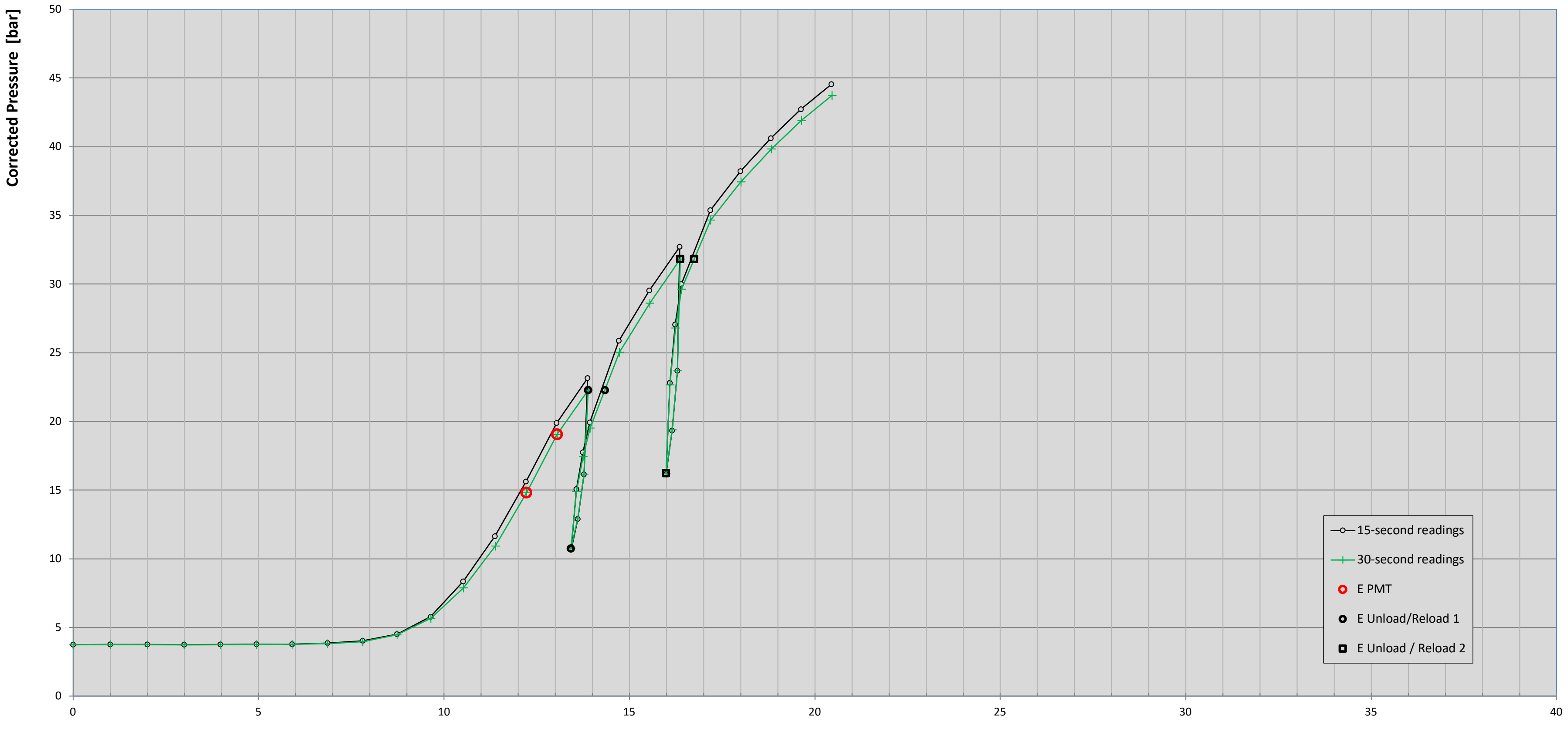
Project:	**2343 Eglinton Ave. West, Toronto**
Client:	GEM Services Inc.
In-Depth Geotechnical Project No.:	IDG 230749

PMT TEST No.: 7

Borehole No.: MW-05-PMT

In-Depth Geotechnical Inc.

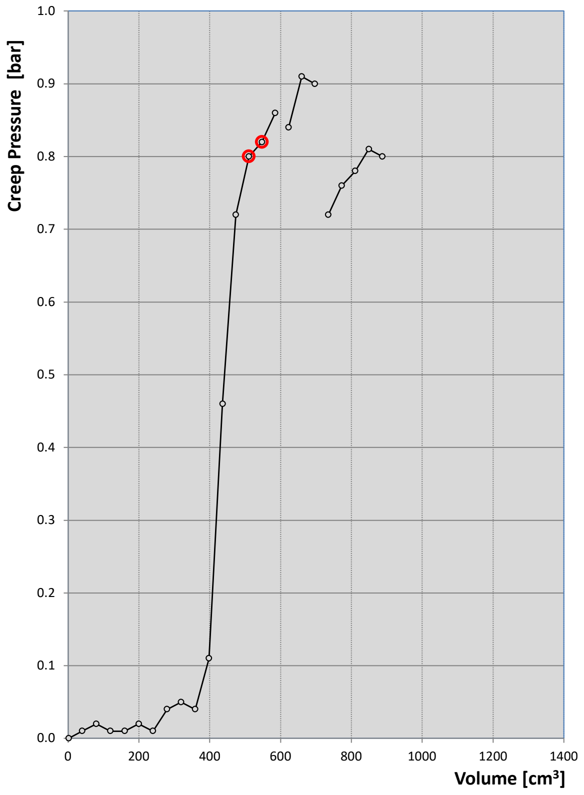
Field Test Data (uncorrected)			Corrected Test data						Creep		Auxiliary Data	
			15-second readings			30-second readings					30 sec	
Volume	Pressure [bar]		Pressure	Volume	$\Delta r/r_0$	Pressure	Volume	$\Delta r/r_0$	Volume	$\Delta p_{30\text{-}15}$	Pressure	1 / V
$[cm^3]$	15 sec	30 sec	[bar]	$[cm^3]$	[%]	[bar]	$[cm^3]$	[%]	$[cm^3]$	[bar]	[bar]	
2	0.56	0.56	3.74	2	0.00	3.74	2	0.00	2	0.00	3.74	0.64264
40	0.63	0.62	3.77	39.5	1.00	3.76	39.5	1.00	39.5	0.01	3.76	0.02531
80	0.66	0.64	3.76	79.5	2.00	3.74	79.5	2.00	79.5	0.02	3.74	0.01258
120	0.68	0.67	3.75	119.5	2.99	3.74	119.5	2.99	119.5	0.01	3.74	0.00837
160	0.72	0.71	3.76	159.4	3.97	3.75	159.4	3.97	159.4	0.01	3.75	0.00627
200	0.77	0.75	3.78	199.4	4.94	3.76	199.4	4.94	199.4	0.02	3.76	0.00501
240	0.80	0.79	3.78	239.4	5.91	3.77	239.4	5.91	239.4	0.01	3.77	0.00418
280	0.91	0.87	3.87	279.3	6.86	3.83	279.3	6.86	279.3	0.04	3.83	0.00358
320	1.09	1.04	4.02	319.1	7.80	3.97	319.2	7.81	319.2	0.05	3.97	0.00313
360	1.61	1.57	4.52	358.7	8.73	4.48	358.8	8.73	358.8	0.04	4.48	0.00279
400	2.89	2.78	5.78	397.7	9.64	5.67	397.8	9.64	397.8	0.11	5.67	0.00251
440	5.47	5.01	8.35	435.7	10.52	7.89	436.0	10.53	436.0	0.46	7.89	0.00229
480	8.79	8.07	11.65	473.0	11.37	10.93	473.6	11.39	473.6	0.72	10.93	0.00211
520	12.77	11.97	15.61	509.9	12.21	14.81	510.5	12.22	510.5	0.80	14.81	0.00196
560	17.05	16.23	19.88	546.5	13.04	19.06	547.1	13.05	547.1	0.82	19.06	0.00183
600	20.33	19.47	23.14	583.9	13.87	22.28	584.6	13.89	584.6	0.86	22.28	0.00171
590	13.33	13.35	16.15	579.4	13.77	16.17	579.4	13.77			16.17	0.00173
580	10.07	10.13	12.89	572.0	13.61	12.95	572.0	13.61			12.95	0.00175
570	7.84	7.92	10.66	563.8	13.42	10.74	563.7	13.42			10.74	0.00177
580	12.26	12.08	15.08	570.3	13.57	14.90	570.4	13.57			14.90	0.00175
590	14.93	14.65	17.75	578.2	13.75	17.47	578.4	13.75			17.47	0.00173
600	17.12	16.70	19.93	586.4	13.93	19.51	586.8	13.94			19.51	0.00170
640	23.07	22.23	25.87	621.7	14.72	25.03	622.4	14.73	622.4	0.84	25.03	0.00161
680	26.73	25.82	29.53	658.8	15.53	28.62	659.5	15.55	659.5	0.91	28.62	0.00152
720	29.93	29.03	32.72	696.3	16.36	31.82	697.0	16.37	697.0	0.90	31.82	0.00143
710	20.89	20.92	23.68	693.4	16.29	23.71	693.4	16.29			23.71	0.00144
700	16.55	16.60	19.34	686.9	16.15	19.39	686.8	16.15			19.39	0.00146
690	13.35	13.44	16.14	679.4	15.99	16.23	679.3	15.98			16.23	0.00147
700	20.01	19.88	22.80	684.1	16.09	22.67	684.2	16.09			22.67	0.00146
710	24.27	24.02	27.06	690.8	16.23	26.81	691.0	16.24			26.81	0.00145
720	27.20	26.85	29.99	698.4	16.40	29.64	698.7	16.41			29.64	0.00143
760	32.60	31.88	35.37	734.2	17.18	34.65	734.7	17.19	734.7	0.72	34.65	0.00136
800	35.45	34.69	38.21	771.9	18.00	37.45	772.5	18.01	772.5	0.76	37.45	0.00129
840	37.87	37.09	40.62	810.0	18.81	39.84	810.6	18.83	810.6	0.78	39.84	0.00123
880	39.99	39.18	42.73	848.3	19.63	41.92	848.9	19.64	848.9	0.81	41.92	0.00118
920	41.81	41.01	44.54	886.9	20.45	43.74	887.5	20.46	887.5	0.80	43.74	0.00113



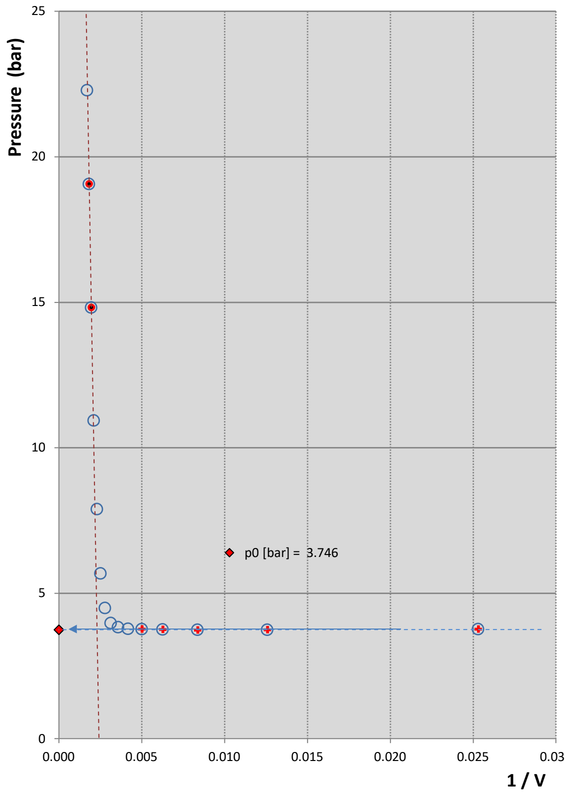
Pressuremeter test results [corrected data] pressure vs radial strain

Interpreted PMT Test Results

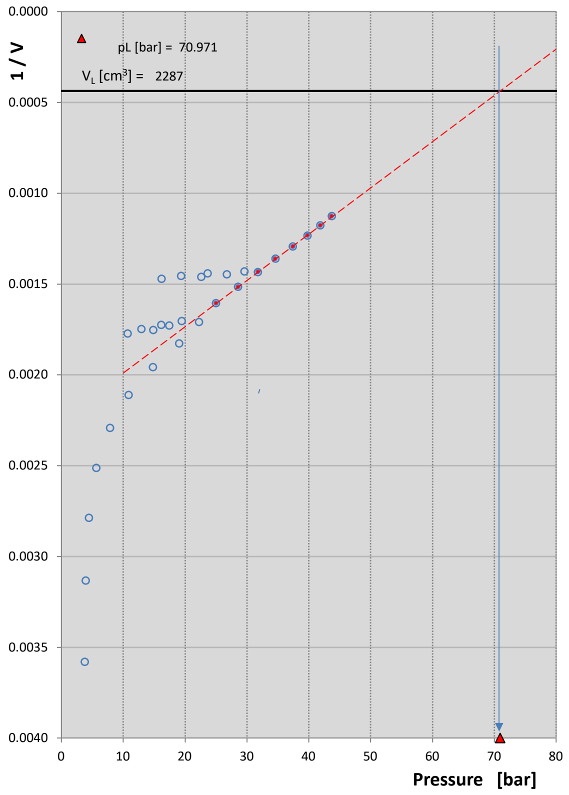
[30-second readings]			volume $[cm^3]$	radial strain [%]	strain range [%]
p_0	3.75	[bar]	159.4	4.0	
p_L	70.97	[bar]			
p^*_L	67.22	[bar]			
p_Y	19.06	[bar]	547	13.1	
E_{PMT}	770	[bar]	511	12.2	{12.2 - 13.1 %}
E_{PMT} / p^*_L	11.4				
$E_{Unload\ 1}$	3743	[bar]	564	13.4	
$E_{Reload\ 1}$	1916	[bar]			
$E_{Unload\ 2}$	6240	[bar]	679	16.0	
$E_{Reload\ 2}$	3157	[bar]			



Pressure difference from 15 to 30 sec. readings $\Delta p_{[15\text{-}30\ sec]}$



Determination of total contact pressure p_0



Determination of Limit Pressure p_L

Pressuremeter Equipment: TEXAM Model
Volume-controlled test as per ASTM D4719
Method B
Volume increments: 40 cm³
Maximum Volume: 1400 cm³
Maximum Pressure: 100 bar

Probe Designation : NX Probe (76 mm OD)
Probe No.: A 512
Calibration Record No.: 1
Tubing Length: 180 [ft]
Probe Lenght: 0.46 [m]
Probe Initial Volume: 1968 cm³

Drilling Method: Mud Rotary Drilling
Drilling Bit: Tricone Bit
Time elapsed from hole drilling to testing
~ 5 minutes
Engineer: Gabriel Sedran, P.Eng., Ph.D.
Operator: Scott Andrew Hall

Test Date: October 6, 2023
Test Depth [m]: 33.17 (center of the probe)
Drilling Company: Drill Tech Contractor

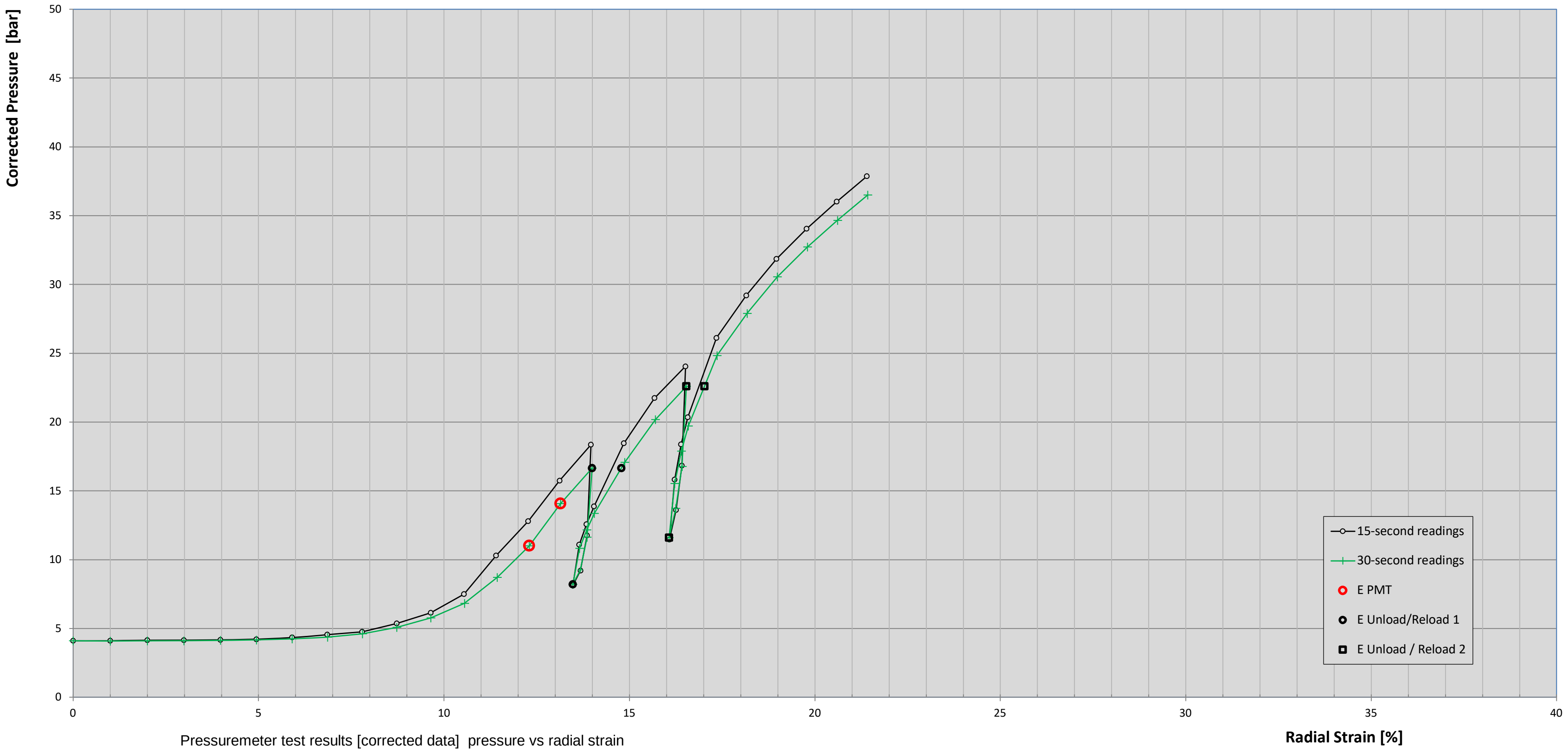
Project: **2343 Eglinton Ave. West, Toronto**
Client: GEM Services Inc.
In-Depth Geotechnical Project No.: IDG 230749

PMT TEST No.: 8
Borehole No.: MW-05-PMT

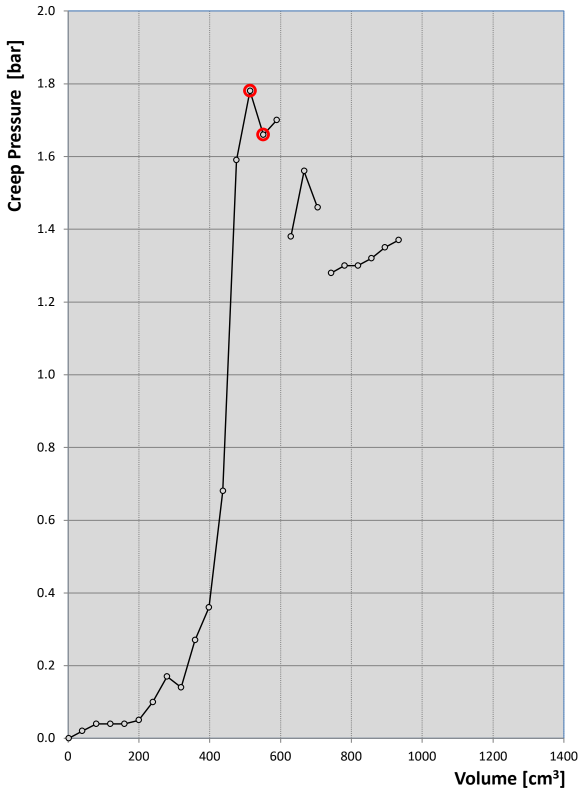
Field Test Data (uncorrected)			Corrected Test data						Creep		Auxiliary Data	
			15-second readings			30-second readings					30 sec	
Volume [cm^3]	Pressure [bar] 15 sec	Pressure [bar] 30 sec	Pressure [bar]	Volume [cm^3]	$\Delta r/r_0$ [%]	Pressure [bar]	Volume [cm^3]	$\Delta r/r_0$ [%]	Volume [cm^3]	Δp_{30-15} [bar]	Pressure [bar]	1 / V
2	0.62	0.62	4.10	2	0.00	4.10	2	0.00	2	0.00	4.10	0.66291
40	0.67	0.65	4.11	39.5	1.00	4.09	39.5	1.00	39.5	0.02	4.09	0.02533
80	0.74	0.70	4.14	79.4	2.00	4.10	79.4	2.00	79.4	0.04	4.10	0.01259
120	0.79	0.75	4.16	119.4	2.99	4.12	119.4	2.99	119.4	0.04	4.12	0.00837
160	0.84	0.80	4.18	159.3	3.97	4.14	159.4	3.97	159.4	0.04	4.14	0.00627
200	0.90	0.85	4.21	199.3	4.94	4.16	199.3	4.94	199.3	0.05	4.16	0.00502
240	1.07	0.97	4.35	239.2	5.90	4.25	239.2	5.90	239.2	0.10	4.25	0.00418
280	1.29	1.12	4.54	279.0	6.85	4.37	279.1	6.86	279.1	0.17	4.37	0.00358
320	1.53	1.39	4.76	318.8	7.80	4.62	318.9	7.80	318.9	0.14	4.62	0.00314
360	2.15	1.88	5.36	358.3	8.72	5.09	358.5	8.73	358.5	0.27	5.09	0.00279
400	2.95	2.59	6.14	397.7	9.64	5.78	397.9	9.65	397.9	0.36	5.78	0.00251
440	4.33	3.65	7.50	436.6	10.54	6.82	437.1	10.55	437.1	0.68	6.82	0.00229
480	7.14	5.55	10.30	474.3	11.40	8.71	475.6	11.43	475.6	1.59	8.71	0.00210
520	9.65	7.87	12.79	512.4	12.27	11.01	513.8	12.30	513.8	1.78	11.01	0.00195
560	12.61	10.95	15.74	550.0	13.12	14.08	551.3	13.15	551.3	1.66	14.08	0.00181
600	15.25	13.55	18.36	587.9	13.96	16.66	589.3	13.99	589.3	1.70	16.66	0.00170
590	8.65	8.53	11.76	583.1	13.86	11.64	583.2	13.86			11.64	0.00171
580	6.08	6.15	9.20	575.2	13.68	9.27	575.1	13.68			9.27	0.00174
570	5.01	5.09	8.13	566.0	13.48	8.21	566.0	13.47			8.21	0.00177
580	7.97	7.71	11.09	573.7	13.65	10.83	573.9	13.65			10.83	0.00174
590	9.45	9.05	12.56	582.5	13.84	12.16	582.8	13.85			12.16	0.00172
600	10.77	10.25	13.88	591.5	14.04	13.36	591.9	14.05			13.36	0.00169
640	15.35	13.97	18.45	627.8	14.85	17.07	628.9	14.87	628.9	1.38	17.07	0.00159
680	18.65	17.09	21.74	665.2	15.67	20.18	666.5	15.70	666.5	1.56	20.18	0.00150
720	20.97	19.51	24.05	703.4	16.51	22.59	704.5	16.54	704.5	1.46	22.59	0.00142
710	13.74	13.68	16.83	699.1	16.42	16.77	699.2	16.42			16.77	0.00143
700	10.52	10.64	13.61	691.7	16.25	13.73	691.6	16.25			13.73	0.00145
690	8.37	8.51	11.46	683.4	16.07	11.60	683.3	16.07			11.60	0.00146
700	12.73	12.45	15.82	689.9	16.22	15.54	690.1	16.22			15.54	0.00145
710	15.29	14.80	18.38	697.9	16.39	17.89	698.3	16.40			17.89	0.00143
720	17.27	16.63	20.35	706.3	16.57	19.71	706.8	16.59			19.71	0.00141
760	23.05	21.77	26.12	741.7	17.34	24.84	742.7	17.37	742.7	1.28	24.84	0.00135
800	26.15	24.85	29.21	779.3	18.15	27.91	780.3	18.18	780.3	1.30	27.91	0.00128
840	28.81	27.51	31.86	817.2	18.97	30.56	818.2	18.99	818.2	1.30	30.56	0.00122
880	31.01	29.69	34.05	855.4	19.78	32.73	856.5	19.80	856.5	1.32	32.73	0.00117
920	32.99	31.64	36.02	893.8	20.59	34.67	894.9	20.62	894.9	1.35	34.67	0.00112
960	34.85	33.48	37.87	932.4	21.40	36.50	933.5	21.42	933.5	1.37	36.50	0.00107

Interpreted PMT Test Results

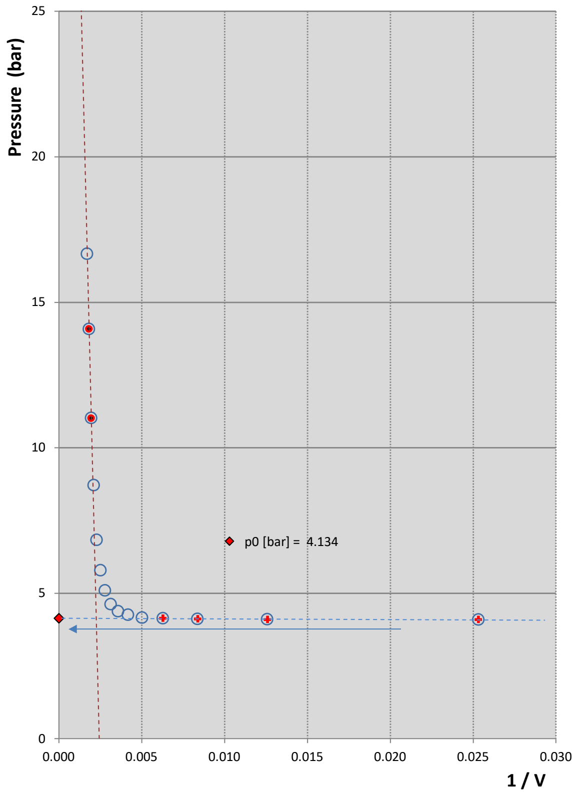
[30-second readings]			volume [cm^3]	radial strain [%]	strain range [%]
p_0	4.13	[bar]	159.4	4.0	
p_L	60.44	[bar]			
p^*_L	56.30	[bar]			
p_Y	14.08	[bar]	551	13.1	
E_{PMT}	543	[bar]	514	12.3	{12.3 - 13.1 %}
E_{PMT} / p^*_L	9.6				
$E_{Unload\ 1}$	2456	[bar]	566	13.5	
$E_{Reload\ 1}$	979	[bar]			
$E_{Unload\ 2}$	3657	[bar]	683	16.1	
$E_{Reload\ 2}$	1788	[bar]			



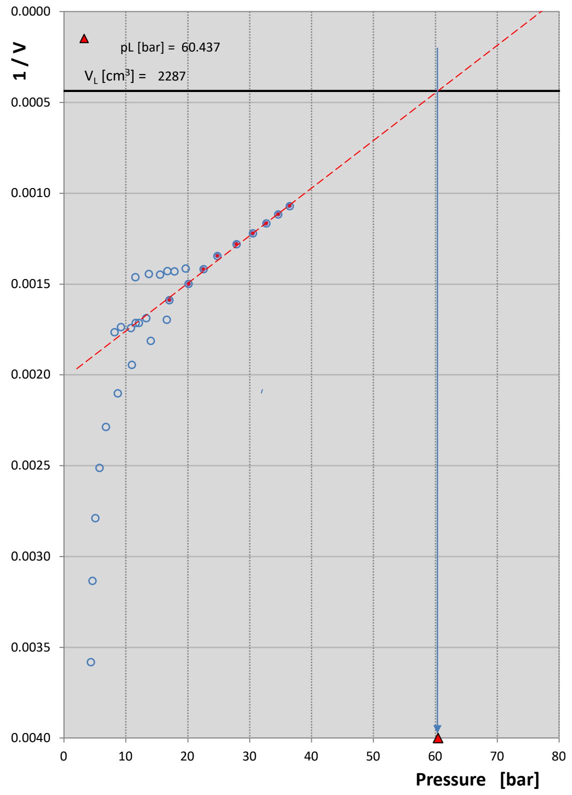
Pressuremeter test results [corrected data] pressure vs radial strain



Pressure difference from 15 to 30 sec. readings $\Delta p_{[15\text{-}30\ sec]}$



Determination of total contact pressure p_0



Determination of Limit Pressure p_L

Pressuremeter Equipment: TEXAM Model
Volume-controlled test as per ASTM D4719
Method B
Volume increments: 40 cm³
Maximum Volume: 1400 cm³
Maximum Pressure: 100 bar

Probe Designation : NX Probe (76 mm OD)
Probe No.: A 512
Calibration Record No.: 1
Tubing Length: 180 [ft]
Probe Lenght: 0.46 [m]
Probe Initial Volume: 1968 cm³

Drilling Method: Mud Rotary Drilling
Drilling Bit: Tricone Bit
Time elapsed from hole drilling to testing
~ 5 minutes
Engineer: Gabriel Sedran, P.Eng., Ph.D.
Operator: Scott Andrew Hall

Test Date: October 6, 2023
Test Depth [m]: 36.22 (center of the probe)
Drilling Company: Drill Tech Contractor

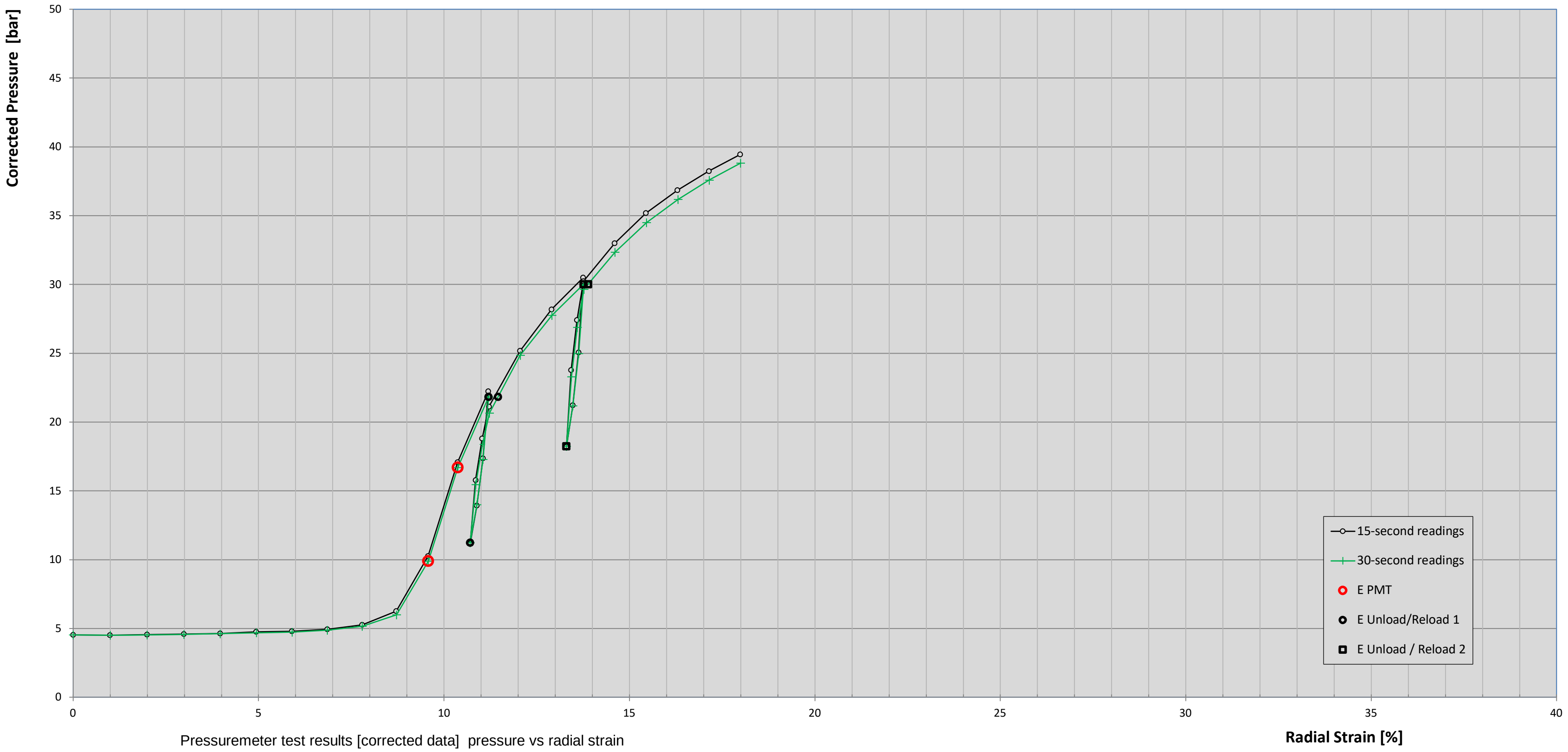
Project: **2343 Eglinton Ave. West, Toronto**
Client: GEM Services Inc.
In-Depth Geotechnical Project No.: IDG 230749

PMT TEST No.: 9
Borehole No.: MW-05-PMT

In-Depth
Geotechnical Inc.

GEMS

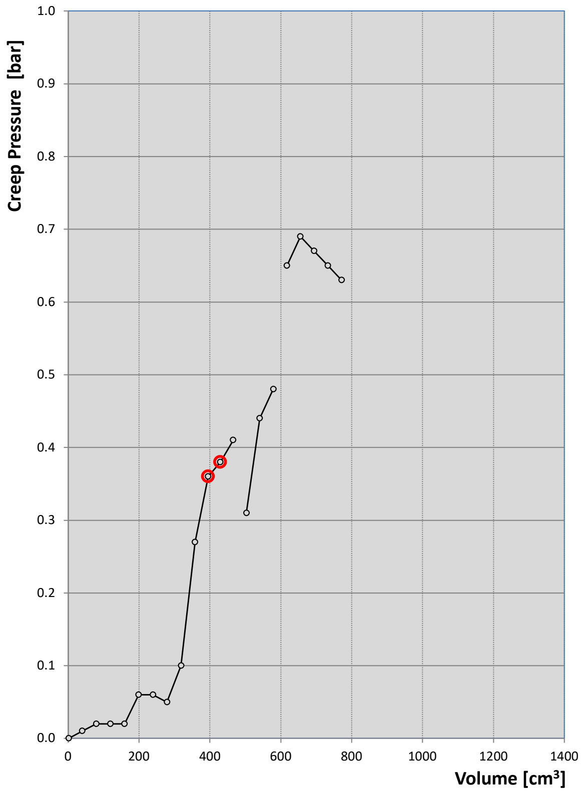
Field Test Data (uncorrected)			Corrected Test data						Creep		Auxiliary Data	
			15-second readings			30-second readings					30 sec	
Volume [cm³]	Pressure [bar] 15 sec	30 sec	Pressure [bar]	Volume [cm³]	$\Delta r/r_0$ [%]	Pressure [bar]	Volume [cm³]	$\Delta r/r_0$ [%]	Volume [cm³]	Δp_{30-15} [bar]	Pressure [bar]	1 / V
2	0.75	0.75	4.53	1	0.00	4.53	1	0.00	1	0.00	4.53	0.71152
40	0.78	0.77	4.52	39.4	1.00	4.51	39.4	1.00	39.4	0.01	4.51	0.02539
80	0.86	0.84	4.56	79.3	2.00	4.54	79.3	2.00	79.3	0.02	4.54	0.01260
120	0.93	0.91	4.59	119.3	2.99	4.57	119.3	2.99	119.3	0.02	4.57	0.00838
160	0.99	0.97	4.63	159.2	3.97	4.61	159.2	3.97	159.2	0.02	4.61	0.00628
200	1.14	1.08	4.75	199.1	4.94	4.69	199.1	4.94	199.1	0.06	4.69	0.00502
240	1.21	1.15	4.79	239.0	5.90	4.73	239.1	5.90	239.1	0.06	4.73	0.00418
280	1.38	1.33	4.93	278.9	6.85	4.88	278.9	6.85	278.9	0.05	4.88	0.00358
320	1.74	1.64	5.27	318.6	7.79	5.17	318.7	7.79	318.7	0.10	5.17	0.00314
360	2.75	2.48	6.26	357.8	8.71	5.99	358.0	8.72	358.0	0.27	5.99	0.00279
400	6.77	6.41	10.26	394.6	9.57	9.90	394.9	9.58	394.9	0.36	9.90	0.00253
440	13.61	13.23	17.08	429.2	10.37	16.70	429.5	10.38	429.5	0.38	16.70	0.00233
480	18.78	18.37	22.24	465.1	11.19	21.83	465.4	11.20	465.4	0.41	21.83	0.00215
470	13.90	13.83	17.36	459.0	11.05	17.29	459.0	11.05			17.29	0.00218
460	10.47	10.52	13.93	451.7	10.89	13.98	451.7	10.88			13.98	0.00221
450	7.69	7.77	11.16	443.9	10.71	11.24	443.8	10.71			11.24	0.00225
460	12.31	12.00	15.77	450.2	10.85	15.46	450.5	10.86			15.46	0.00222
470	15.35	14.91	18.81	457.8	11.03	18.37	458.2	11.03			18.37	0.00218
480	17.67	17.19	21.13	466.0	11.21	20.65	466.4	11.22			20.65	0.00214
520	21.73	21.42	25.17	502.8	12.05	24.86	503.0	12.06	503.0	0.31	24.86	0.00199
560	24.77	24.33	28.19	540.4	12.90	27.75	540.7	12.91	540.7	0.44	27.75	0.00185
600	27.09	26.61	30.50	578.5	13.75	30.02	578.9	13.76	578.9	0.48	30.02	0.00173
590	21.65	21.57	25.06	572.8	13.63	24.98	572.9	13.63			24.98	0.00175
580	17.80	17.77	21.22	565.9	13.47	21.19	565.9	13.47			21.19	0.00177
570	14.77	14.81	18.19	558.3	13.30	18.23	558.3	13.30			18.23	0.00179
580	20.37	19.87	23.79	563.9	13.43	23.29	564.2	13.44			23.29	0.00177
590	24.01	23.48	27.42	571.0	13.59	26.89	571.4	13.59			26.89	0.00175
600	26.83	26.23	30.24	578.7	13.76	29.64	579.2	13.77			29.64	0.00173
640	29.60	28.95	33.00	616.5	14.60	32.35	617.1	14.61	617.1	0.65	32.35	0.00162
680	31.80	31.11	35.19	654.8	15.45	34.50	655.3	15.46	655.3	0.69	34.50	0.00153
720	33.47	32.80	36.85	693.5	16.29	36.18	694.0	16.31	694.0	0.67	36.18	0.00144
760	34.87	34.22	38.24	732.4	17.14	37.59	732.9	17.15	732.9	0.65	37.59	0.00136
800	36.09	35.46	39.45	771.4	17.98	38.82	771.9	17.99	771.9	0.63	38.82	0.00130



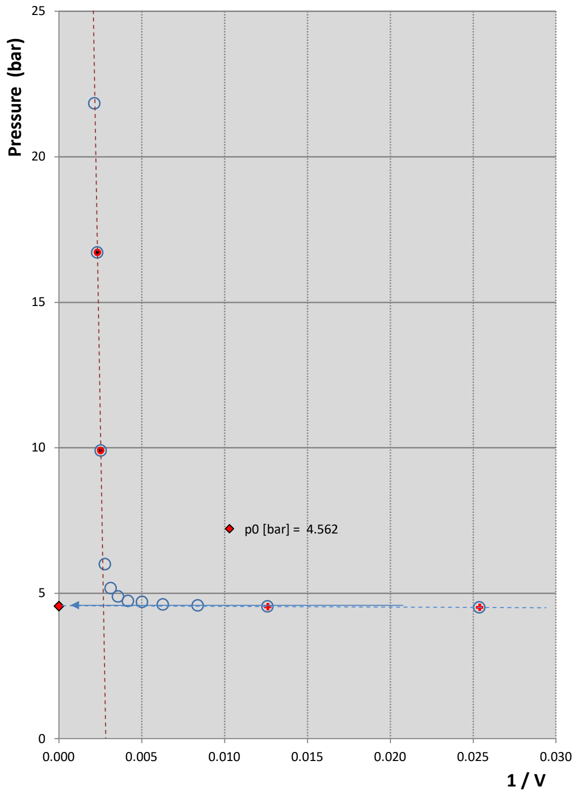
Pressuremeter test results [corrected data] pressure vs radial strain

Interpreted PMT Test Results

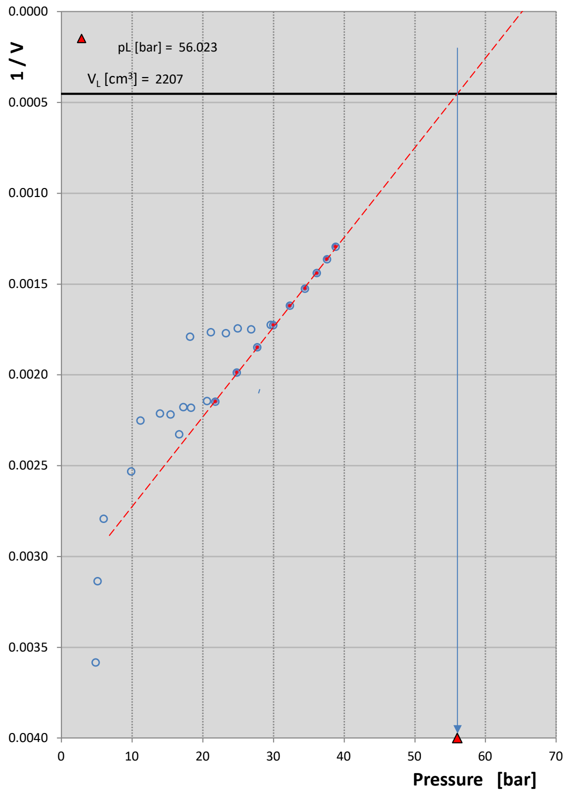
[30-second readings]			volume [cm³]	radial strain [%]	strain range [%]
p_0	4.56	[bar]	119.3	3.0	
p_L	56.02	[bar]			
p^*_L	51.46	[bar]			
p_Y	16.70	[bar]	430	10.4	
E_{PMT}	1245	[bar]	395	9.6	{9.6 - 10.4 %}
E_{PMT} / p^*_L	24.2				
$E_{Unload\ 1}$	3159	[bar]	444	10.7	
$E_{Reload\ 1}$	2087	[bar]			
$E_{Unload\ 2}$	3852	[bar]	558	13.3	
$E_{Reload\ 2}$	3035	[bar]			



Pressure difference from 15 to 30 sec. readings $\Delta p_{[15\text{-}30\ sec]}$



Determination of total contact pressure p_0



Determination of Limit Pressure p_L

Pressuremeter Equipment: TEXAM Model		Probe Designation : NX Probe (76 mm OD)			Drilling Method: Mud Rotary Drilling Drilling Bit: Tricone Bit	Test Date: October 6, 2023
Volume-controlled test as per ASTM D4719 Method B		Probe No.:	A 512		Time elapsed from hole drilling to testing ~ 5 minutes	
		Calibration Record No.:	1			Test Depth [m]: 39.27 (center of the probe)
Volume increments:	40 cm³	Tubing Length:	180	[ft]	Engineer: Gabriel Sedran, P.Eng., Ph.D.	
Maximum Volume:	1400 cm³	Probe Lenght:	0.46	[m]	Operator: Scott Andrew Hall	
Maximum Pressure:	100 bar	Probe Initial Volume:	1968	cm³		Drilling Company: Drill Tech Contractor

Project:	**2343 Eglinton Ave. West, Toronto**	**PMT TEST No.:**	**10**
Client:	GEM Services Inc.		
In-Depth Geotechnical Project No.:	IDG 230749	**Borehole No.:**	**MW-05-PMT**

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Appendix Two

Pressuremeter Data Interpretation

Interpretation of Pressuremeter Test Results

Prebored pressuremeter test results are expressed in terms of applied pressure versus radial strain. Both pressure and strain measurements must be corrected for pressure and volume loses using the corresponding probe and system calibration curves.

The typical pressure versus radial strain curve features up to four distinctive portions which characterize the stress-strain behaviour of the soil, namely:

a) The linear pseudo-elastic stress-strain portion of the deformation curve;
b) The departure from linear elastic conditions starting at the yield pressure p_y;
c) The unload-reload portion of the test (usually two cycles are performed); and
d) The development of soil failure, which is represented by the net limit pressure p^*_L.

Based on these test features the following soil parameters are determined or estimated:

1. Contact Pressure p_o:

When using the prebored TEXAM unit, the initial contact pressure is taken as the pressure at the intersection of the two lines representing the pseudo elastic and the initial expansion portions of the pressure vs. 1/V plot, as shown in the PMT data sheets, in Appendix One.

2. Pressuremeter modulus E_{PMT}:

The pressuremeter modulus is represented by the slope of the pressure versus radial strain curve along its linear portion, and may be calculated as follows:

$$E_{PMT} = (1+\upsilon)(p_2-p_1)\frac{\left(1+\left(\frac{\Delta R}{R_o}\right)_2\right)^2+\left(1+\left(\frac{\Delta R}{R_o}\right)_1\right)^2}{\left(1+\left(\frac{\Delta R}{R_o}\right)_2\right)^2-\left(1+\left(\frac{\Delta R}{R_o}\right)_1\right)^2}$$

where the sub-indices 1 and 2 indicate the beginning and the end of the linear portion of the curve, respectively. These two points are shown in pressuremeter curves with two red oversized circles. For the self-boring probe, the linear portion of the stress-strain response occurs between the very first data point (zero volume increase) and the subsequent two or three data points.

In this determination a value of the Poisson's ratio, typically $\nu = 0.33$ for most soils, must be assumed. For saturated clays a value of $\nu = 0.45$ is suggested.

3. **Yield Pressure** p_y:

The yield pressure indicates the end of the linear pseudo-elastic deformations and the onset of plasticity. This yield pressure is useful in indicating beyond which pressure significant creep deformations may occur.

4. **Unload-Reload Moduli** E_{Unload} and E_{Reload}

The unload and reload moduli are represented by the slope of the unload-reload loop, and they may be used to determine elastic soil deformations upon unloading or reloading conditions such as those typically encountered during excavations.

5. **Net Limit Pressure** p^*_L:

The net limit pressure is a measure of the strength of the soil (either under undrained conditions for cohesive soils, or drained conditions for non-cohesive soils). This parameter is defined as the pressure reached when the soil cavity has been extended to twice its original soil cavity volume V_c (minus the initial total contact pressure p_o).

The limit pressure is not always attained during testing. In such cases, the value of p_L is inferred by plotting pressure versus 1/V for the plastic phase of the deformations. This method of inferring p_L , known as the "upside down curve" method, is described in "*The Pressuremeter and Foundation Engineering*" textbook, by F. Baguelin, J.F. Jezequel, and D.H. Shields, published in 1978 by Trans Tech Publications, Section: Methods of extrapolating pressuremeter curves to p_L. See also ASTM D4719-00, Section 10.6.

It should be noted that radial strains are calculated from the volume of fluid (typically tap water) injected into the probe. In this regard, the radial strains shown in the results are related to the probe expansion, not the cavity's expansion. The cavity initial volume, V_c, is calculate by adding the probe initial volume, V_0, to the volume of water injected into the probe at the initial contact pressure p_0.

6. Some Additional PMT-based Parameters

In addition, two useful ratios, (E_{PMT} / p^*_L) and (p^*_L / p_y), may be used as a general guideline for soil identification, as follows:

for sands	$7 < E_{PMT} / p^*_L < 12$
for clays	$12 < E_{PMT} / p^*_L$

Many PMT tests completed in the glacial tills present in the geology of the Golden Shoe area (Ontario) registered much higher values than those listed above. In many cases, values for E_{PMT} / p^*_L in excess of 30 have been recorded.

The E_{PMT} / p^*_L value is known as the *mechanical ratio*, and it indicates whether a soil mass behaves in a ductile (high value) or brittle (low value) manner after yield stresses have been reached. This ration It is the PMT equivalent of the soil mechanic's Rigidity Index, e.g., G/σ_{max}.

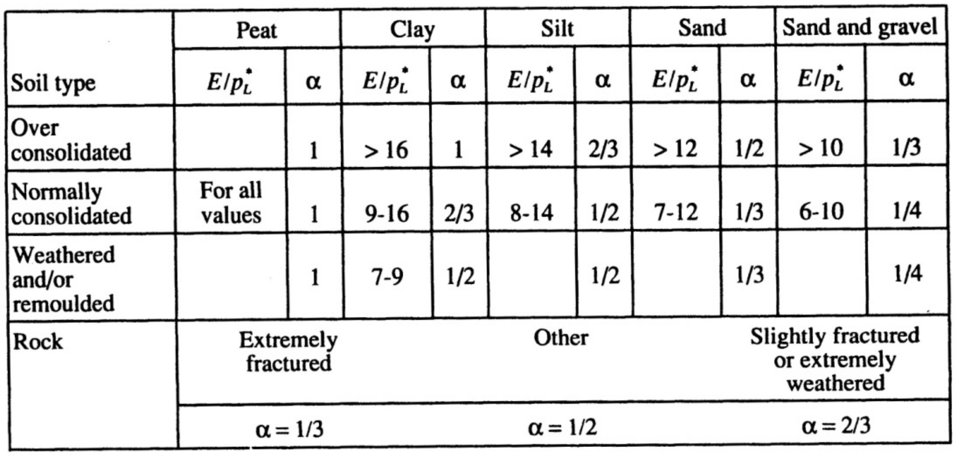
Inferred Soil Parameters

7. Young's Modulus E_Y

The Pressuremeter modulus E_{PMT} corresponds to large strains, namely for radial strains in the 2 to 5 % range, and it is therefore considered to be a relatively low value of the elastic modulus. In practice, the Young's modulus E can be inferred from Pressuremeter testing using the empirical Menard α factor:

$$E_Y = E_{PMT} / \alpha$$

Typical values of the Menard α factor are suggested in the following Table:



	Peat		Clay		Silt		Sand		Sand and gravel	
Soil type	E/p_L^*	α	E/p_L^*	α	E/p_L^*	α	E/p_L^*	α	E/p_L^*	α
Over consolidated		1	> 16	1	> 14	2/3	> 12	1/2	> 10	1/3
Normally consolidated	For all values	1	9-16	2/3	8-14	1/2	7-12	1/3	6-10	1/4
Weathered and/or remoulded		1	7-9	1/2		1/2		1/3		1/4
Rock	Extremely fractured				Other				Slightly fractured or extremely weathered	
	α = 1/3				α = 1/2				α = 2/3	

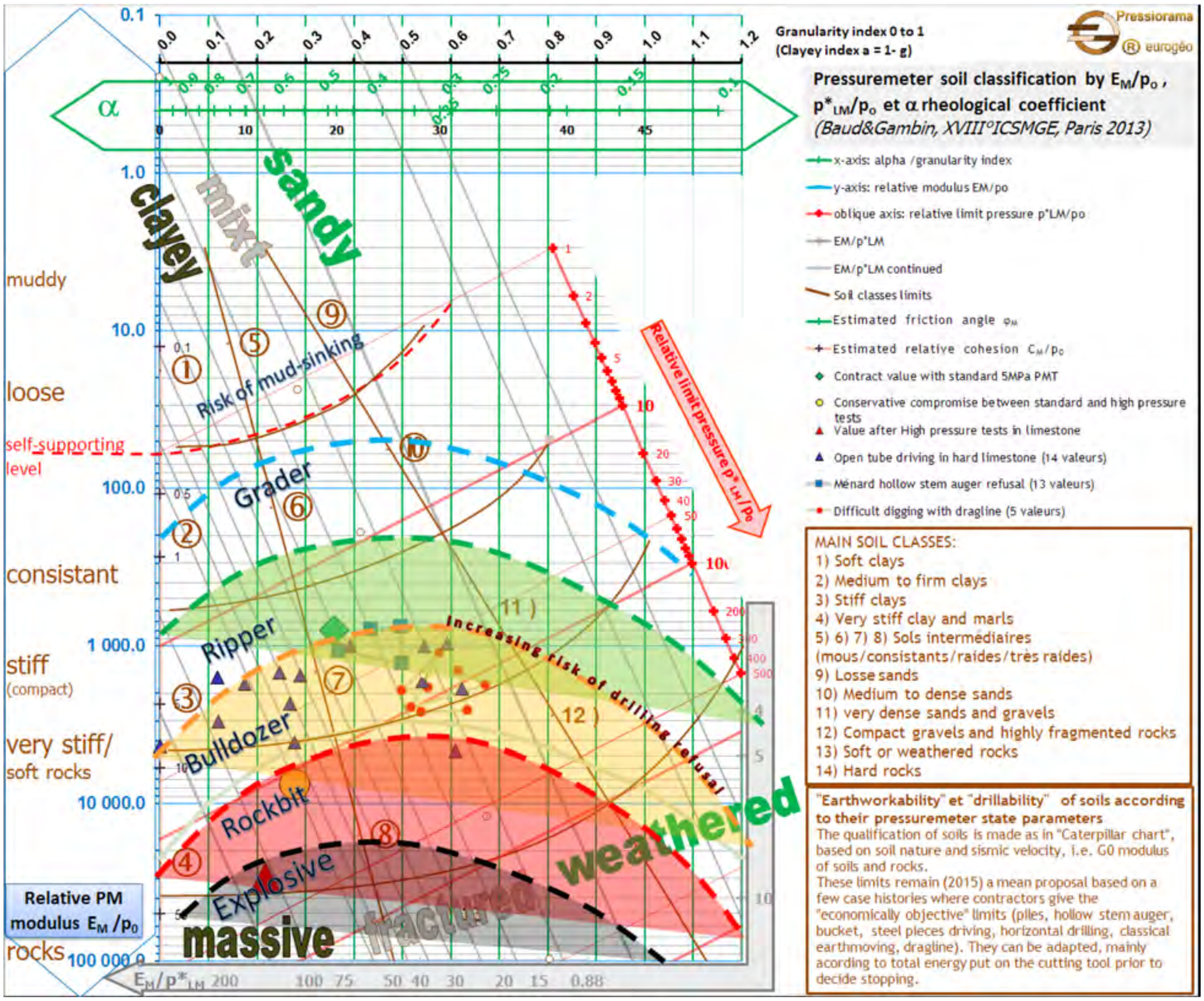
(from 'The Pressuremeter', J.L. Briaud. Balkema, 1992)

Alternatively, better-defined values of the Menard α parameter can be obtained using the following expression, as introduced by J.P. Baud

$$\alpha = \frac{\left({E_{PMT}}/{P_L^*} \right)^{1/n}}{k_E \left(\frac{P_L^*}{p_0} \right)^{m/n}}$$

With $n = 2$; $m = 0.5$; and $k_E = 3.5$.

This expression is based on empirical correlations and may also be visualized in the Pressiorama Chart illustrated in the next page:



MAIN SOIL CLASSES:
1) Soft clays
2) Medium to firm clays
3) Stiff clays
4) Very stiff clay and marls
5) 6) 7) 8) Sols intermédiaires (mous/consistants/raides/très raides)
9) Losse sands
10) Medium to dense sands
11) very dense sands and gravels
12) Compact gravels and highly fragmented rocks
13) Soft or weathered rocks
14) Hard rocks

"Earthworkability" et "drillability" of soils according to their pressuremeter state parameters

The qualification of soils is made as in "Caterpillar chart", based on soil nature and sismic velocity, i.e. G0 modulus of soils and rocks.

These limits remain (2015) a mean proposal based on a few case histories where contractors give the "economically objective" limits (piles, hollow stem auger, bucket, steel pieces driving, horizontal drilling, classical earthmoving, dragline). They can be adapted, mainly acording to total energy put on the cutting tool prior to decide stopping.

Baud J.P., and Gambin M. 2013. *“Détermination du coefficient rhéologique α de Ménard dans le diagramme Pressiorama”*. Proceedings of the 18th International Conference on Soil Mechanics and Geotechnical Engineering. Paris, 2013, Parallel Session ISP 6, International Symposium on the Pressuremeter.

8. Undrained Shear Strength for Cohesive Soil Materials

The undrained shear strength of cohesive soils, c_u or S_u, may be estimated as:

$$c_u = \frac{P_L'}{\beta}$$

where P'_L is the net Limit Pressurea, and a value of $\beta = 6.5$ is used in this report, after J.L. Briaud (‘The Pressuremeter’, Balkema, 1992).

9. Drained Friction Angle for Cohesionless Soil Materials

The drained friction angle of cohesionless soils (for *c'* = 0) may be estimated using the empirical correlations illustrated in the graph shown below. This approach is outlined by Baguelin et.al., in *"The Pressuremeter and Foundation Engineering"* (F. Baguelin; J.F. Jézéquel; and D.H. Shields. TransTech Publications. 1978), and it requires some knowledge on the state or conditions of the cohesionless material. This approach only provides a likely range of friction angles for recorded values of the limit pressure.

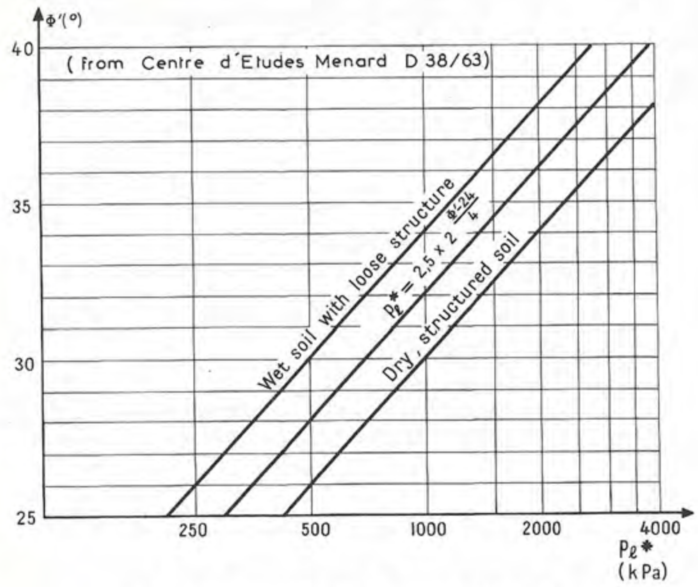


Fig. 6-86: MÉNARD's graph to determine Φ' from p_1^*.

Also alternatively, values of the drained friction angle *ϕ'* can be inferred using the modified Pressiorama Chart (*Pressiorama Cyclique, in French*) as introduced by Baud.

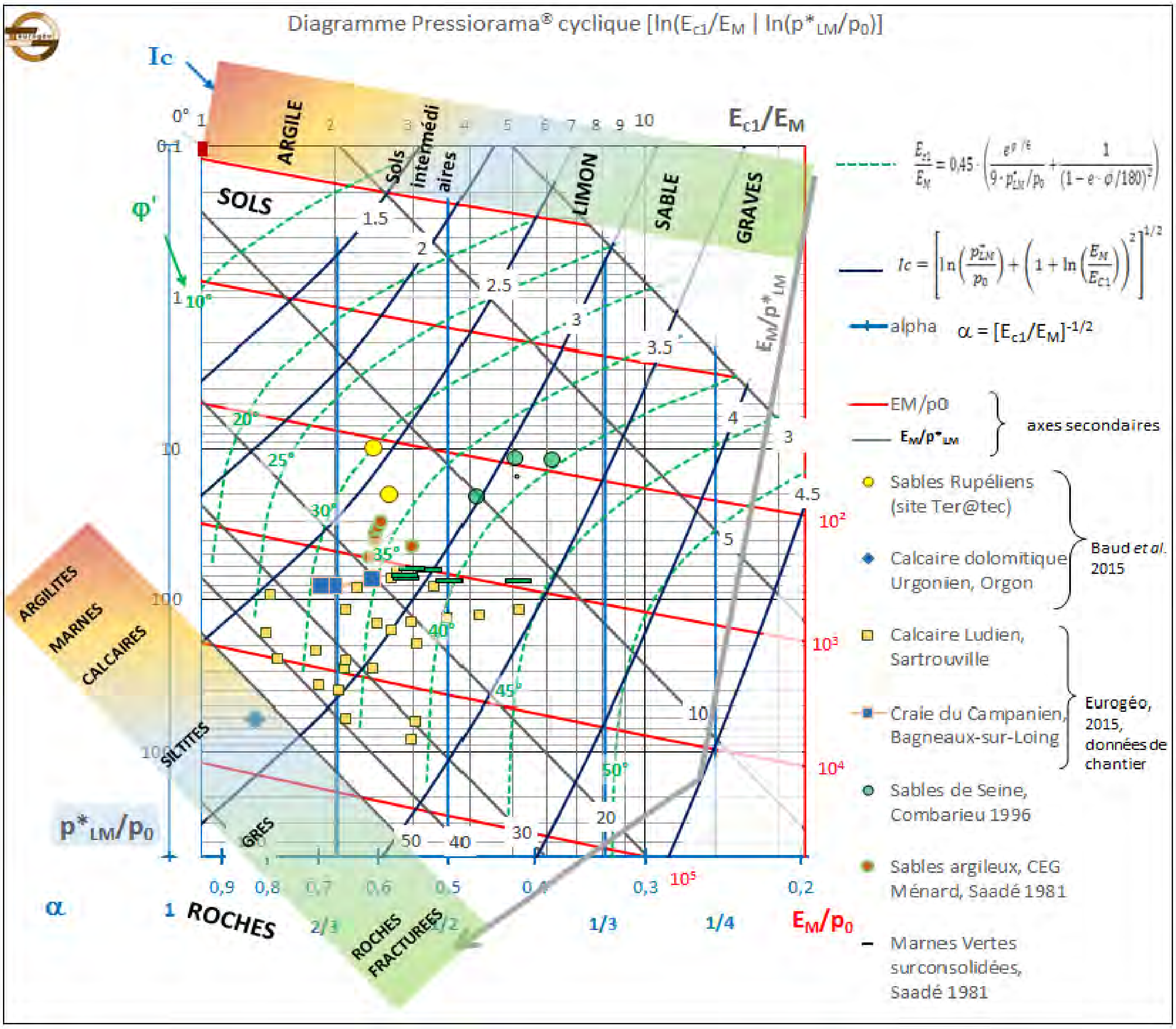


Figure 3. Diagramme Pressiorama® cyclique [ln(Ec1/EM | ln(p*LM/p0].

The values of ϕ' plotted in the modified Pressiorama Chart are calculated with the following expression:

$$\phi' = 5.5\, ln\left(\frac{9}{\alpha^2}\ \frac{P_L^*}{p_0}\right)$$

with values of α calculated/inferred from the modified Pressiorama Chart.

Where this expression provides values of effective friction angle greater than a 45^o, a maximum value of 45^o should be assumed.

This expression was presented by J.P. Baud, in his publication *"Apport de L'Essai Cyclique a la Classification Pressiométrique des Sols et des Roches"*, Journées Nationales de Geotechnique et de Géologie de l'Ingénieur, Nancy, 2016.

Shear strength parameters suggested in Table No. 3, are based on the guidelines provided by the *Pressiorama* and *Cyclique Pressiorama* charts. It should be noted that these guidelines are subject to changes, or improvements, as the correlations between pressuremeter parameters E_M, p'_L, and p_0 are being adjusted by ever increasing amount of field data. As such, care should be used when using these suggested parameters.

10. Soil Classification Index

Based on PMT testing procedures, soil behavior may be characterized as cohesive or frictional (cohesionless). Using the modified Pressiorama Chart, a Soil Classification Index, namely I_c, can be inferred with the following expression:

$$I_c = \left[\left(1 + log\left({P_L^*}/{p_0}\right)\right)^2 + \left(1 - log(\alpha)\right)^2\right]^{1/2}$$

A minimum value of 1 would correspond to a cohesive soil, near its state of liquefaction. Whereas, a value of 4.5 would correspond to coarse gravel materials. A value of $I_c = 2.7$ would apply to a material which behaves mechanically as part frictional (drained for long-term loading conditions) and part cohesive (undrained for the short-term loading conditions). In general, Soil Type Behaviors corresponding to values of the Classification Index I_C are listed as:

1.0 to 1.5	Clays
1.5 to 2.5	Clay-Silt mixes
2.5 to 3.0	Silts
3.0 to 3.5	Sands
3.5 to 4.0	Gravels, and
4.0 to 4.5	Weathered Rocks

Appendix Three

Calibration Data

Calibration Date:	September 28, 2023
Probe Designation:	A 512
Calibration Record No.:	I
Length of Tubing:	180 feet
Calibrated by:	S.H.

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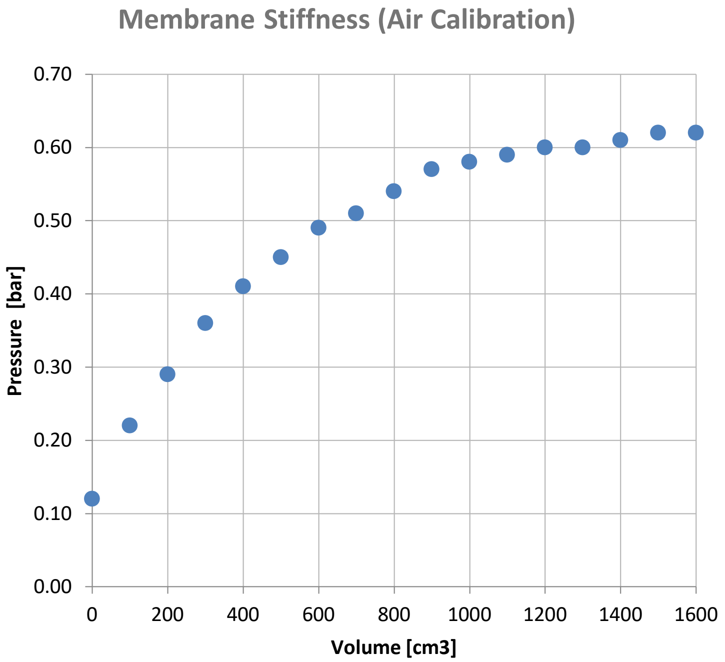
Membrane stiffness calibration

Pressure [bar]	Volume cm³
0.12	0
0.22	100
0.29	200
0.36	300
0.41	400
0.45	500
0.49	600
0.51	700
0.54	800
0.57	900
0.58	1000
0.59	1100
0.60	1200
0.60	1300
0.61	1400
0.62	1500
0.62	1600



Volume calibration

Pressure [bar]	Volume cm³
0	0.0
5	339.4
10	360.6
15	373.3
20	380.0
25	385.2
30	390.2
35	394.6
40	398.4
45	402.0
50	405.4
60	411.9
Reload Cal. Data	
25	384.8
50	405.9