PATERSON GROUP

Existing Conditions - Geotechnical

Tewin Lands

Ottawa, Ontario

Prepared for Taggart Investments and Algonquins of Ontario

Report PG5827 1 Revision 5 dated September 2024

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Appendices

1.0 Introduction

This geotechnical report is part of a set of technical reports which have been prepared as part of Phase 1 of the Tewin study process. The Tewin Study Area ("Study Area") lands were identified as a future urban development area in the new City of Ottawa Official Plan (2023). The Study Area is located in southeast Ottawa, generally bordered by Leitrim Road to the north, Farmers Way to the east, Thunder Road to the south, and Anderson Road and Ramsayville Road to the west. The Study Area is outlined in Figure 1 below. These technical reports are intended to establish an understanding of the existing physical, social and ecological conditions that characterize the Study Area. Where appropriate, these reports also identify preliminary opportunities to help guide the next phase of the master planning process.

This information will be used to identify opportunities and strategic considerations that will inform the Tewin community design process going forward, as well as frame the preparation of additional site-specific technical studies and recommendation reports. Development at Tewin will explore new approaches to planning, design and development, including alternative strategies and solutions that can successfully implement the key community objectives.

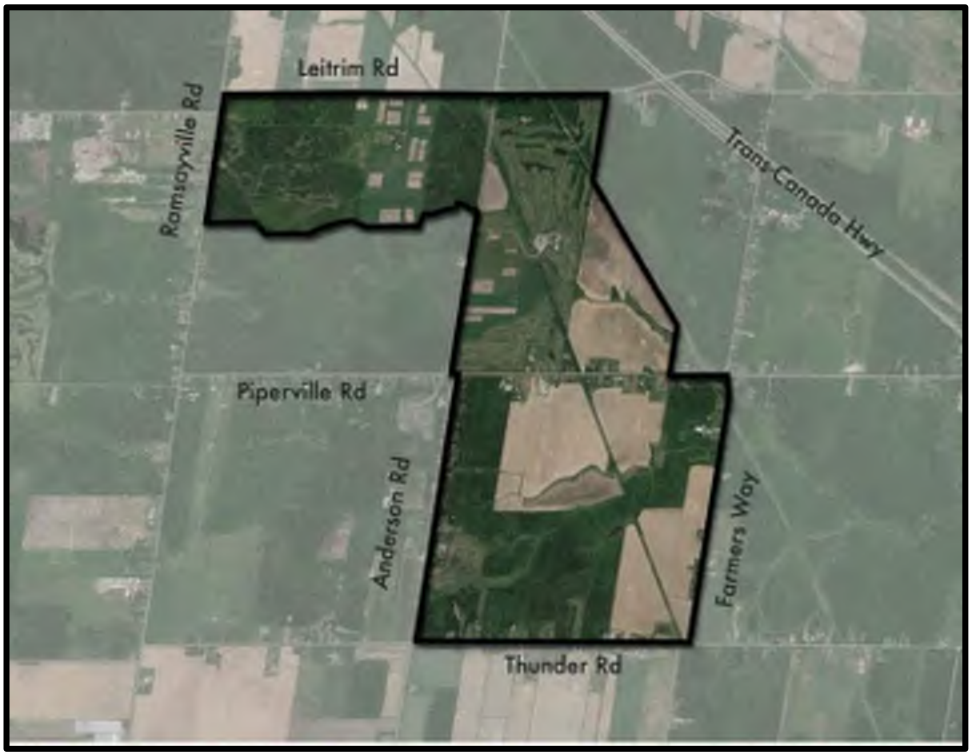


Figure 1: The Tewin Study Area is identified in black outline

1.1 Integrated Master Plan & Municipal Class EA Process

The ambition and scale of Tewin requires ongoing internal and external consultation. The purpose of the integrated Master Plan and Municipal Class EA process is to consolidate the various technical and community planning elements of the project to promote coordinated community engagement through streamlined and aligned decision making. This format will ensure critical partners, consultants and stakeholders are brought together at major milestones to identify and track challenges and opportunities through the development process.

The integrated Master Plan and Municipal Class EA process will include a public consultation strategy and technical study review timeline that achieves the requirements of the Master Plan and Municipal Class EA concurrently. The statutory Municipal Class EA meetings will be timed to align with the development of the community objectives, urban framework, preferred plans, and the draft secondary plan. Additional public and targeted consultations will be planned to complement the statutory consultation requirements. The development of the One Planet Action Plan (OPAP) will occur in parallel, with the final OPAP available at the time of final secondary plan Council approval. One Planet Living endorsement will follow Council approval of the secondary plan.

1.2 Tewin Overview and Community Vision

Tewin is planned to be a community of approximately 45,000 people and thousands of jobs. It will be more compact and denser than existing suburbs in Ottawa, with new urban areas integrated alongside valuable natural areas. Tewin will be an inclusive community, anchored in Algonquin wisdom and placekeeping principles, and welcoming to all. The community will have a meaningful mix of land uses and support active mobility, to achieve a complete, future ready community. The Tewin Project Team and City of Ottawa have committed to exploring appropriate options, alternatives and standards to enable Tewin to become a model of best practices in sustainable and inclusive community design in the North American context.

The integrated Master Plan and Municipal Class EA process will bring together various technical and community planning considerations.

The key objectives for Tewin are to create a community that is:

- Anchored in Algonquin wisdom, principles and placekeeping;
- A benchmark for community design, demonstrating achievement of the 5 Big Moves identified in the Ottawa Official Plan;

- Mobility-oriented and supportive, promoting a broad range of active forms of movement, where personal vehicles are optional;

- Characterized by a meaningful mix of housing, community amenities, jobs and services in order to achieve a complete, future-ready community;

- Designed to protect and integrate alongside valuable natural areas and agricultural lands; and

- Affordable, inclusive, healthy, welcoming and accessible to all.

1.3 Tewin Intent: A Forward-Thinking Framework

Development at Tewin will explore new approaches to planning, design and development, finding successful options and alternatives to implement the key community objectives, in some cases likely going beyond what current development standards would allow for. The Tewin Project Team and the City of Ottawa have articulated these in the “Tewin Intent” which sets out the following:

1. **Bold and Innovative Thinking:**

   Tewin is about creating a new kind of community, a future-focused model for smart, healthy and sustainable development. It will be a people-centred place that seeks to create the conditions for well-being. The Tewin Project Team will be open to bold ideas, innovative approaches, creative solutions, efficient use of land and resources, emerging technologies, smart city infrastructure that advances the City’s goals and objectives, and other future-forward ideas and opportunities that will enable Tewin to reach its full potential.

2. **Integrating Algonquin Values and Principles:**

   Algonquin principles, values and teachings will guide the planning, consultation, design and development process for Tewin. The integration of Algonquin principles and design intentions will ensure the community is nature-based and sensitive to Mother Earth while creating capacity-building and economic development opportunities for the Algonquin people.

3. **Sustainability and Resilience:**

   Tewin will be a model community that will position Ottawa as a leader in integrated sustainable design with the goal of being a resilient and holistic community. Tewin will be guided by the One Planet Living framework and Algonquin values of respect for the earth.

The Community Design Plan will respond to the City's High Performance Development Standard and Climate Change Master Plan and will result in a Community Energy Plan. A Community Energy Plan and performance-based sustainability metrics that address climate mitigation and adaptation, and the other categories of the High-Performance Development Standards will be established from the start and monitored over time.

4. Systems-Based Environmental Planning

Tewin's organization and functions will be designed to respect nature and integrate natural features and landscapes into its form, character, and spirit. To that end, the Tewin Project Team is committed to pursuing a systems-based approach to natural heritage protection, environmental management, and water management in a way that is inclusive and integrated and encourages stewardship and a positive relationship with the natural world. Natural features are regarded as opportunities rather than constraints, will be woven into the fabric of the community, and will be central to its design and character.

5. Alternative Design Solutions

Designing a community of the future requires progressive and forward-thinking infrastructure solutions. The Tewin Project Team is committed to being solutions-oriented and will consider alternative design and engineering standards that prioritize natural systems, pedestrians, cyclists and transit users, and which efficiently use available land and resources.

Surface water management strategies that achieve quality, conveyance and storage objectives will be based on the fundamentals of natural cycles, green/soft infrastructure, and multi-use opportunities that complement the human realm. Infrastructure design will consider the needs of those involved in the construction, operation and maintenance of municipal services to find opportunities to efficiently service the community and showcase sustainable practices while meeting the community's needs.

A framework for assessing alternative design standards will be established to consider and review alternatives against existing standards within the context of goals and objectives for the City and Tewin.

6. Cost-Effectiveness and Efficiency

Tewin will demonstrate best practices in efficient and compact development. As a dense, mixed-use community of scale, Tewin will achieve a critical mass of people and jobs to support new infrastructure investments.

The Tewin Project Team is committed to exploring opportunities to optimize the community's efficiency through a range of strategies, including prioritizing space-efficient modes of transportation, use of technology, green infrastructure, innovative construction practices, shared-use agreements, and mixed-use forms of development that will promote the efficient use and optimization of land; housing affordability; and supporting the long-term financial viability of the community and city resources.

7. **Integrated Planning Process**

We are committed to advancing Tewin through a comprehensive and integrated planning and environmental assessment process where possible or applicable. The process will bring together various planning, environmental, transportation, urban design, infrastructure, economic, financial, social and technical considerations. The process will be underpinned by engagement with the Algonquin people, other stakeholders, and the public.

8. **Collaboration and Problem Solving**

The Tewin Project Team and City of Ottawa Project Team are committed to working collaboratively together to move Tewin forward in an expedited way. We will plan with a spirit of collaboration and joint problem-solving to ensure that the development of Tewin meets the best interests of the City of Ottawa and the Algonquins of Ontario.

9. **Communication and Transparency**

The Tewin Project Team and the City of Ottawa Project Team commit to open and transparent communication throughout the project. This will require proactively sharing information between the groups as decisions are made and ensuring relevant communication materials are distributed in a timely manner.

The Tewin Project Team and the City of Ottawa Project Team will ensure that all parties, including City Council, residents, and other stakeholders, are provided with pertinent details. Effective information sharing will ensure the project achieves outcomes that are, to the greatest extent possible, known by all involved.

1.4 Existing Conditions Technical Reports

A range of specialized consultants have been studying the physical environment of the Study Area to support community design, servicing strategies and the future development of Tewin. This data has been collected and reported on in a set of Existing Conditions and Opportunities Reports, of which this document is one. The full suite of reports includes the following:

- **Tewin Existing Conditions and Preliminary Opportunities Report** dated September 2024 and prepared by Urban Strategies
- **Fluvial Geomorphology Study - Tewin Lands: Existing Conditions Summary Report - Bear Brook and Ramsay Creek Watersheds** dated October 2024 and prepared by GEO Morphix Ltd.
- **Tewin Lands: Existing Conditions Hydrogeological Study** dated September 2024 and prepared by Dillon Consulting
- **Existing Conditions - Geotechnical: Tewin Lands** dated September 2024 and prepared by Paterson Group
- **Tewin Lands: Natural Heritage Preliminary Existing Conditions Report** dated April 2024 and prepared by Kilgour and Associates
- **Tewin Lands: Cumulative Hydrologic Impact Assessment** dated April 2024 and prepared by J.F. Sabourin and Associates
- **Tewin Lands: 2021-22 Field Monitoring Report** dated April 2024 and prepared by J.F. Sabourin and Associates
- **Tewin Lands – Existing Conditions Water Budget** dated October 2024 and prepared by J.F. Sabourin and Associates
- **Stage 1 Archaeological Assessment Tewin Lands** dated July 14, 2023 and prepared by WSP Canada Inc.
- **Tewin Mobility Existing Conditions** dated January2024 and prepared by CGH Transportation

1.5 Framework for Identifying Preliminary Opportunities

Given the unique scale, vision and project goals for Tewin, as well as the shared commitment to exploring new ways of advancing the community design process as expressed in the Tewin Intent, the Phase 1 reports for Tewin include a discussion of potential opportunities to be explored in subsequent stages of the integrated Master Plan and Municipal Class EA process. The identification of preliminary constraints and opportunities, as well as a preliminary community structure, is required in Phase 1 of the integrated Master Plan and Municipal Class EA process as per specific Terms of Reference that were established for each of the Tewin planning, environmental and transportation studies.

The opportunities introduced within these reports are based on a series of key policy directions and strategic considerations, including:

- **Ottawa's new Official Plan**, which promotes the creation of complete, transit-supportive communities;
- **Algonquin values and principles**, underscored by respect for nature, integration of water, and planning the natural environment to achieve long-term vitality over many generations;
- **The Tewin Intent**, which promotes innovative thinking and alternative, performance-based solutions;
- **One Planet Living**, a holistic framework for achieving environmental resiliency, sustainable development, and reduced carbon emissions;
- **Provincial policy** direction focused on supporting housing development and facilitating growth, in order to address the province's housing supply challenges; and,

- **An integrated, systems-based approach** to planning at Tewin that brings together diverse planning, environmental, technical and economic considerations.

1.6 Tewin Lands: Existing Conditions Geotechnical Study Introduction

Paterson Group (Paterson) completed a geotechnical investigation to evaluate the geotechnical conditions of the subsurface profile located throughout the study area. Generally, the subsurface profile encountered consists of a deposit of silty clay overlain by a relatively thin layer of weathered clay or sand and underlain by a deposit of glacial till and further by the bedrock formation.

It is understood the proposed Tewin community will consist of a compact to dense urban area integrated alongside valuable natural features with a meaningful mix of land uses. Overall, the community is expected to be provided with structures ranging between low- to high-rise structures with mixed-use purposes (residential, commercial, institutional, municipal, etc.).

Overall, the proposed community development is considered to be feasible and suitable throughout the study area from a geotechnical perspective. The soil deposit encountered throughout the study area is considered to be the same as deposits encountered in other developed areas and communities in the Ottawa Region. Examples of these communities consist of Half Moon Bay in Barrhaven, Arcadia and Blackstone in Kanata, Cardinal Creek Village, Trailsedge, Petrie’s Landing and Summerside West in Orleans, Riverside South and the majority of the Golden Triangle and Centretown areas.

The soils encountered throughout the subject are typical for the type of deposit encountered throughout the Ottawa area and are the type of soils the City of Ottawa’s *Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa* are based upon. Based on this, the investigation, design and construction methodologies that would be undertaken throughout the proposed Tewin development would be considered conventional and in accordance with the methodologies set out and complete throughout the City of Ottawa.

Based on this, the proposed development is considered feasible and suitable for the study area from a geotechnical perspective.

2.0 Method of Investigation

2.1 Field Investigation

Field Program

The field program for the current study was carried out between March 14 to April 13, 2022, May 26 to June 10, 2022, and December 5 to December 7, 2022. At those times, 98 boreholes were advanced up to a maximum depth of 58.0 m below the existing ground surface. It should be noted that the investigation being undertaken for the study area is on-going at the time of preparing this report. The test hole locations were determined in the field by Paterson personnel, taking into consideration site features.

The test holes were placed in a manner to provide general coverage of the study area taking into consideration site features and underground utilities. The test hole locations for the current investigation are presented on Drawing PG5827-1 - Test Hole Location Plan included in Appendix 2.

Historical investigations by Paterson were undertaken throughout the study area between September 27 and October 4, 2011. During that time, a total of 16 boreholes were advanced to a maximum depth of 9.7 m below ground surface. The soil profiles encountered by Paterson are presented on the Soil Profile and Test Data sheets in Appendix 1.

The boreholes were completed using a track-mounted drill rig operated by a two-person crew. All fieldwork was conducted under the full-time supervision of Paterson personnel under the direction of a senior engineer from the geotechnical division. The testing procedure consisted of augering to the required depths and at the selected locations sampling the overburden.

Sampling and In Situ Testing

Soil samples were either recovered directly from the auger flights (AU), collected using a 50 mm diameter split-spoon (SS) sampler, or 73 mm diameter thin walled (TW) Shelby tubes in conjunction with a piston sampler. Rock cores were obtained using 47.6 mm inside diameter coring equipment. Grab samples (G) were also collected from borehole locations. All soil samples were visually inspected and initially classified on site. The auger, grab and split-spoon samples were placed in sealed plastic bags and the Shelby tubes were sealed at both ends on site and protected from disturbances over the entire process. Rock cores were placed in cardboard boxes.

All samples were transported to our laboratory for further examination and classification. The depths at which the auger, grab, split spoon, Shelby tube samples, and rock core samples were recovered from the test holes are shown as AU, G, SS, TW, and RC, respectively, on the Soil Profile and Test Data sheets presented in Appendix 1.

The Standard Penetration Test (SPT) was conducted in conjunction with the recovery of the split-spoon samples. The SPT results are recorded as “N” values on the Soil Profile and Test Data sheets. The “N” value is the number of blows required to drive the split-spoon sampler 300 mm into the soil after a 150 mm initial penetration using a 63.5 kg hammer falling from a height of 760 mm. Depths at which the split-spoon was pushed through an interval that was previously disturbed by testing using a vane apparatus are indicated as “P” on the Soil Profile and Test Data sheets presented in Appendix 1.

Rock samples were recovered from BH 17-22, BH 23-22, BH 24-22 and BH 72-22 using a core barrel and diamond drilling techniques. A recovery value and a Rock Quality Designation (RQD) value were calculated for each drilled section of bedrock and are shown on the Soil Profile and Test Data sheets in Appendix 1. The recovery value is the ratio, in percentage, of the length of the bedrock sample recovered over the length of the drilled section. The RQD value is the ratio, in percentage, of the total length of intact rock pieces longer than 100 mm in one drilled section over the length of the drilled section. These values are indicative of the bedrock quality.

Undrained shear strength testing was carried out in cohesive soils using a field vane apparatus.

Cone-penetration testing (CPT) was completed at select locations to supplement existing borehole coverage. The CPT hole logs are in Appendix 1 of this report. Monitoring wells were installed at all boreholes to permit monitoring of the groundwater levels subsequent to the completion of the sampling program. The groundwater observations are presented in the Soil Profile and Test Data sheets attached to this report.

Soil samples were recovered from the study area and visually examined in our laboratory to review the results of the field logging.

The subsurface conditions observed in the test holes were recorded in detail in the field. The soil profiles are logged on the Soil Profile and Test Data sheets in Appendix 1 of this report.

Groundwater

All of the test holes from the current investigation have been instrumented with a standard 51 mm diameter PVC monitoring well.

Monitoring wells were installed to allow monitoring of the groundwater level subsequent to the completion of the sampling program. Groundwater observations are discussed in Subsection 3.3 and presented in the Soil Profile and Test Data sheets in Appendix 1.

Monitoring Well Installation

Typical monitoring well construction details are described below:

- Slotted 32 mm diameter PVC screen at the base of each borehole.
- 51 mm diameter PVC riser pipe from the top of the screen to the ground surface.
- No.3 silica sand backfill within annular space around screen.
- Bentonite hole plug directly above PVC slotted screen.
- Clean backfill from top of bentonite plug to the ground surface.

Refer to the Soil Profile and Test Data sheets in Appendix 1 for specific well construction details.

2.2 Field Survey

The test hole locations were selected by Paterson to provide general coverage of the study area, taking into consideration the existing site features and underground utilities. The test hole locations and ground surface elevation at each test hole location were surveyed by Paterson using a high precision, handheld GPS and referenced to a geodetic datum.

The location of the test holes and ground surface elevation at each test hole location are presented on Drawing PG5827-1 - Test Hole Location Plan in Appendix 2.

2.3 Laboratory Testing

Soil and bedrock samples were recovered from the study area and visually examined in our laboratory to review the results of the field logging. Atterberg Limits, hydrometer, consolidation, and shrinkage testing was completed on select samples obtained from the current geotechnical investigation.

Unconfined compressive strength testing was carried out on bedrock samples from boreholes BH 17-22, BH 23-22, BH 24-22 and BH 72-22. Moisture content testing was completed on all retrieved soil samples from the current investigation.

Paterson has also completed 3 Atterberg Limits tests and 18 consolidation tests on select soil samples retrieved during previous investigations.

The results of the current and historical testing are discussed in Subsection 3.2 and are provided in Appendix 1 of this report.

Sample Storage

All samples will be stored in the laboratory for a period of one (1) month after issuance of this report. They will then be discarded unless we are otherwise directed.

2.4 Analytical Testing

Twelve (12) soil samples were submitted for analytical testing to assess the corrosion potential for exposed ferrous metals and the potential of sulphate attacks against subsurface concrete structures by others. The samples were submitted to determine the concentration of sulphate and chloride, the resistivity, and the pH of the samples. The results are discussed further in Subsection 5.3 of this report.

2.5 Permeameter and Hydraulic Conductivity (Slug) Testing

Permeameter Testing

In-situ permeameter testing was conducted using a Pask (Constant Head Well) Permeameter to confirm infiltration rates of the surficial soils at the study area. At select locations, two (2) 83 mm holes, approximately 1.5 m away from each other, were excavated using a Riverside/Bucket auger to a depth of 0.3 to 0.6 m below existing ground surface. All soils from the auger flights were visually inspected and initially classified on-site. The permeameter reservoir was filled with water and inverted into the hole, ensuring that it was relatively vertical and rested on the bottom of the hole.

As the water infiltrated into the soil, the water level of the reservoir was monitored at various time intervals until the rate of fall reached equilibrium, known as “quasi steady state” flow rate. Quasi steady state flow can be considered to have been obtained after measuring 3 to 5 consecutive rate of fall readings with identical values. The values for the steady state rate of fall were recorded for each location. The results of testing are further discussed in Subsection 3.4 of this report.

Hydraulic Conductivity (Slug) Testing

Hydraulic conductivity (slug) testing was conducted at each monitoring well location to estimate anticipated groundwater flow rates within the subsoils at the study area.

The test data was analyzed as per the method set out by Hvorslev (1951). Assumptions inherent in the Hvorslev method include a homogeneous and isotropic aquifer of infinite extent with zero-storage assumption, and a screen length significantly greater than the monitoring well diameter.

The assumption regarding aquifer storage is considered to be appropriate for groundwater inflow through the overburden aquifer. The assumption regarding screen length and well diameter is considered to be met based on a screen length of 1.5 m or 3.0 and a diameter of 0.05 m. While the idealized assumptions regarding aquifer extent, homogeneity, and isotropy are not strictly met in this case (or in any real-world situation), it has been our experience that the Hvorslev method produces effective point estimates of hydraulic conductivity in conditions similar to those encountered at the study area.

The Hvorslev analysis is based on the line of best fit through the field data (hydraulic head recovery vs. time), plotted on a semi-logarithmic scale. In cases where the initial hydraulic head displacement is known with relative certainty, such as in this case where a physical slug has been introduced, the line of best fit is considered to pass through the origin. The semi-log drawdown vs. time plots for rising and falling head at each borehole location are presented in Appendix 1. The results of testing are further discussed in Subsection 3.4 of this report.

3.0 Observations

3.1 Surface Conditions

The study area consists generally of undeveloped agricultural lands with several portions consisting of treed areas and forests. Existing buildings, including residential dwellings and farmstead structures, are present throughout the several of the agricultural land areas. An existing golf course is located at 4175 Anderson Road.

The study area was observed to be intersected by the Smith-Gooding municipal drain centrally throughout the parcels located north of Piperville Road. Parcels located south of Piperville Road were observed to be intersected by the Johnston municipal drain which outlets further into a shallow creek continuing beyond the eastern boundary of the study area and along Farmers Way. Paterson completed an assessment of the stability of the slopes present along these watercourses and is discussed further in Section 6.9 of this report.

The site is bordered by residential properties and/or agricultural lands along the majority of the site boundaries. The ground surface at the study area is relatively flat and approximately at grade with the surrounding roadways and properties.

3.2 Subsurface Profile

Overburden

Generally, the subsurface profile encountered at the test hole locations consisted of topsoil underlain by a layer of silty sand and/or brown silty clay and further by a deep deposit of grey silty clay. The silty clay deposit was observed to be underlain by a glacial till deposit and further by the underlying bedrock formation.

The silty sand layer generally consisted of a loose to compact brown silty sand with varying amounts of clay. The silty sand layer was generally observed to extend up to a depth of 3.7 m below existing ground surface.

A thin and intermediate layer of brown and/or grey silty sand was observed between the brown and grey layers of silty clay at BH 3-22, BH 25-22 BH 26-22, BH 35-22, BH 52-22, BH 53-22, BH 57-22, BH 60-22, BH 63-22, BH 64-22, BH 70-22 and BH 73-22 to BH 75-22. Reference can be made to Drawing PG5827-3 - Surficial Sand Layer Thickness Contour Plan for the test hole locations and approximate sand layer thickness contours based on the depth of surficial sand encountered in the test holes.

The brown silty clay layer generally consisted of very stiff to stiff brown silty clay with varying amounts of sand. The silty sand and/or brown silty clay layer was observed to be underlain by a deep deposit of soft to firm, grey silty clay which became stiff to very stiff with depth. The silty clay deposit was encountered up to a depth of 47.6 m below existing ground surface.

The silty clay deposit was observed to be underlain by a deposit of glacial till deposit which generally consisted of compact to dense, grey silty sand with clay, gravel, cobbles and boulders, and extended up to a depth range between 21.8 and 52.3 m below existing ground surface.

Reference should be made to the Soil Profile and Test Data sheets in Appendix 1 for specific details of the soil profiles encountered at each test hole location.

Grain Size Distribution and Hydrometer Testing

85 sieve analysis and hydrometer tests were completed to classify selected soil samples according to the Unified Soil Classification System (USCS). The results are summarized in Table 1 and are presented on the Grain-Size Distribution and Hydrometer Testing Results sheets in Appendix 1.

Table 1 – Summary of Grain Size Distribution Analysis

Borehole	Sample	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
BH 1-22	AU1	5.0	43.6	37.4	14.0
BH 2-22	SS3	0.0	0.5	24.5	75.0
BH 3-22	SS4	0.0	3.9	28.6	67.5
BH 4-22	SS4	0.0	0.2	29.3	70.5
BH 5-22	SS3	0.0	0.4	30.1	69.5
BH 6-22	SS3	0.0	1.5	26.5	72.0
BH 7-22	SS3	0.0	0.9	45.1	54.0
BH 8-22	SS3	0.0	3.0	41.0	56.0
BH 9-22	SS9	0.0	2.5	28.0	69.5
BH 10-22	SS5	0.0	0.4	42.6	57.0
BH 11-22	SS6	0.0	0.3	36.2	63.5
BH 12-22	SS2	0.0	11.3	35.7	64.0
BH 13-22	SS4	0.0	0.3	44.2	49.5
BH 14-22	SS3	0.0	6.3	31.7	59.5
BH 15-22	SS3	0.4	8.4	36.3	63.0
BH 16-22	SS3	0.0	0.7	37.4	14.0
BH 18-22	SS7	0.0	0.2	37.3	62.5
BH 18A-22	SS3	0.0	0.5	33.0	66.5

Borehole	Sample	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
BH 19-22	SS2	0.0	7.8	34.2	58.0
BH 20-22	SS3	0.0	2.4	31.1	66.5
BH 22-22	SS12	0.0	0.5	39.5	60.0
BH 22A-22	SS2	0.0	5.4	25.6	69.0
BH 23-22	SS3	0.0	0.5	22.5	77.0
BH 24-22	SS3	0.0	5.0	64.5	30.5
BH 25-22	SS5	0.0	2.2	35.8	62.0
BH 26-22	SS5	0.0	3.6	29.4	67.0
BH26A-22	SS2	0.0	92.0	4.0	4.0
BH 27-22	SS6	0.0	3.5	32.0	64.5
BH 28A-22	SS2	0.0	0.7	28.8	70.5
BH 29-22	SS3	0.0	5.8	44.2	50.0
BH 30-22	SS11	0.0	0.3	24.7	75.0
BH 31-22	SS3	0.0	2.5	21.5	76.0
BH 32-22	SS7	0.0	0.6	28.9	70.5
BH 33-22	SS3	0.0	6.5	41.5	52.0
BH 34-22	SS7	0.0	0.8	41.2	58.0
BH 35-22	SS6	0.0	1.5	30.5	68.0
BH 36-22	SS5	0.0	0.7	47.8	51.5
BH 37-22	G3	0.0	7.3	49.7	43.0
BH 38-22	SS3	0.0	0.8	29.7	69.5
BH 38A-22	SS1	0.0	53.9	35.1	11.0
BH 39-22	SS3	0.0	4.2	45.3	50.5
BH 39A-22	SS2	0.0	7.4	31.6	61.0
BH 40-22	SS3	0.0	0.7	28.8	70.5
BH 41-22	SS9	0.0	0.8	31.2	68.0
BH 42-22	SS3	0.0	1.0	37.0	62.0
BH 43-22	SS3	0.0	0.9	33.1	66.0
BH 44-22	SS3	0.0	1.6	38.4	60.0
BH 45-22	SS3	0.0	1.4	37.6	61.0
BH 45A-22	SS1	0.0	19.3	36.7	44.0
BH 46-22	SS10	0.0	0.4	48.1	51.5
BH 47-22	SS1	0.0	71.4	14.6	14.0
BH 48-22	SS3	0.0	27.8	27.2	45.0
BH 49-22	SS8	0.0	0.6	41.4	58.0
BH 49A-22	SS1	1.2	38.3	32.1	28.4
BH 50-22	SS8	0.0	0.2	32.8	67.0
BH 51-22	SS6	0.0	0.6	48.9	50.5
BH 52-22	SS6	0.0	0.7	45.8	53.5
BH 53-22	SS5	0.0	0.8	42.2	57.0
BH 54-22	SS7	0.0	0.7	39.8	59.5
BH 55-22	SS7	0.2	0.7	38.6	60.5

Borehole	Sample	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
BH 56A-22	SS2	0.0	3.7	47.3	49.0
BH 57-22	SS12	0.0	0.6	42.4	57.0
BH 58-22	SS1	0.1	79.1	15.8	5.0
BH 59-22	SS7	0.0	0.4	58.6	41.0
BH 59A-22	SS2	0.0	6.6	33.4	60.0
BH 60-22	SS3	0.0	2.6	43.9	53.5
BH 60A-22	SS1	0.0	86.1	9.4	4.5
BH 61-22	SS3	0.0	1.1	21.7	78.0
BH 62-22	SS6	0.0	0.3	28.5	70.0
BH 63-22	SS3	0.0	1.5	35.9	9.5
BH 63A-22	SS1	0.0	54.6	34.9	63.0
BH 64-22	SS5	0.0	2.1	34.9	59.0
BH 65-22	SS3	0.0	6.1	47.3	49.0
BH 66-23	SS3	0.0	1.8	27.7	70.5
BH 68-22	SS1, SS2	0.0	50.8	31.2	18.0
BH 69-22	SS3	0.0	1.1	63.4	35.5
BH 69A-22	SS1	0.0	1.4	37.6	61.0
BH 70-22	SS7	0.0	0.6	39.4	60.0
BH 71-22	SS4	0.0	2.4	48.1	49.5
BH 72-22	SS4	0.0	2.3	37.2	60.5
BH 73-22	SS2	0.0	55.0	43.5	1.5
BH 74-22	SS4	0.0	94.1	4.9	1.0
BH 74-22	SS9	0.0	0.5	34.0	65.5
BH 75-22	SS6	0.0	1.8	42.2	56.0
BH 76-22	SS3	0.0	5.3	25.7	69.0
BH 77-22	SS5	0.0	0.3	31.7	68.0

Atterberg Limit Tests

62 selected silty clay samples were submitted for Atterberg limits testing. The results are summarized in Table 2 and attached to the end of this report.

Table 2 – Atterberg Limits Results

Borehole	Sample	Depth (m)	LL (%)	PL (%)	PI (%)	Classification
BH 1-22	SS2	1.1	63	28	35	CH
BH 2-22	SS2	1.1	47	20	27	CL
BH 3-22	G3	2.5	32	14	18	CL
BH 4-22	SS2	1.1	58	23	35	CH
BH 5-22	SS2	1.1	53	27	26	CH
BH 6-22	SS3	1.8	60	30	30	CH
BH 7-22	SS2	1.1	58	25	33	CH
BH 8-22	SS2	1.1	50	23	27	CL

Borehole	Sample	Depth (m)	LL (%)	PL (%)	PI (%)	Classification
BH 9-22	SS2	1.1	57	26	31	CH
BH 10-22	SS3	1.8	59	25	34	CH
BH 11-22	SS2	1.1	49	21	28	CL
BH 12-22	SS2	1.1	46	21	25	CL
BH 13A-22	SS1	1.1	58	26	32	CH
BH 14-22	SS2	1.1	50	22	28	CL
BH 15-22	SS2	1.1	54	23	31	CH
BH 16-22	SS2	1.1	56	26	30	CH
BH 17-22	SS3	3.4	82	24	58	CH
BH 18-22	SS2	1.1	60	27	33	CH
BH 19-22	SS4	2.6	58	25	33	CH
BH 20-22	SS2	1.1	53	27	26	CH
BH 22-22	SS2	1.1	63	30	33	CH
BH 23-22	SS2	1.1	61	23	38	CH
BH 24-22	SS2	1.1	68	24	44	CH
BH 25-22	SS3	1.8	60	20	40	CH
BH 26A-22	SS1	0.3	52	22	30	CH
BH 27-22	SS3	1.1	48	22	26	CL
BH 29-22	SS2	1.1	53	23	30	CH
BH 30-22	SS2	1.1	69	32	37	CH
BH 31-22	SS2	1.1	60	27	33	CH
BH 32-22	SS2	1.1	61	28	33	CH
BH 33-22	SS2	1.1	55	24	31	CH
BH 34-22	SS5	3.4	57	26	31	CH
BH 35-22	SS3	1.8	43	27	16	CL
BH 36-22	SS4	2.6	27	15	12	CL
BH 37-22	SS2	1.1	62	29	33	CH
BH 38-22	SS2	1.1	66	33	33	CH-MH
BH 39-22	SS2	1.1	73	37	36	MH
BH 40-22	SS2	1.1	66	31	35	CH
BH 41-22	SS2	1.1	46	21	25	CL
BH 42-22	SS2	1.1	26	17	9	CL
BH 43-22	SS2	1.1	67	32	35	CH
BH 44-22	SS2	1.1	60	28	32	CH
BH 46A-22	SS1	1.1	33	18	15	CL
BH 47-22	SS3	1.8	68	30	38	CH
BH 48-22	SS2	1.1	69	33	36	CH-MH
BH 49-22	SS2	1.1	58	30	28	CH-MH
BH 50-22	SS3	1.8	53	26	27	CH
BH 51-22	SS3	1.8	58	26	32	CH
BH 52-22	SS6	4.1	53	25	28	CH
BH 53-22	SS2	1.1	80	41	39	MH
BH 54-22	SS2	1.1	53	26	27	CH
BH 55-22	SS2	1.1	41	21	20	CL
BH 56-22	SS3	1.8	56	25	31	CH
BH 57-22	SS2	1.1	42	20	22	CL
BH 58-22	SS3	1.8	81	39	42	MH
BH 59-22	SS2	1.1	69	31	38	CH
BH 60-22	AU1	0.5	43	19	24	CL

Borehole	Sample	Depth (m)	LL (%)	PL (%)	PI (%)	Classification
BH 61-22	SS2	1.1	50	27	23	CL
BH 62-22	SS3	1.8	56	25	31	CH
BH 63-22	SS1	0.2	45	21	24	CL
BH 64-22	SS2	1.1	62	28	34	CH
BH 65-22	SS2	1.1	53	24	29	CH
BH 66-23	SS3	1.8	74	23	51	CH
BH 68-22	SS3	1.8	30	17	13	CL
BH 69-22	SS2	1.1	63	28	35	CH
BH 70-22	SS2	1.1	28	11	17	CL
BH 71-22	SS3	2.6	31	16	15	CL
BH 75-22	SS4	2.6	61	19	42	CH
BH 76-22	SS2	1.1	62	20	42	CH

Note: LL: Liquid Limit; PL: Plastic Limit; PI: Plastic Index; CH: Inorganic Clay of High Plasticity; CL: Inorganic Clay of Low Plasticity.

Three selected silty clay samples were submitted for Atterberg limits testing by Paterson in previous investigations. The results of the Atterberg limits are summarized in Table 3 and on the Atterberg Limits Results sheet in Appendix 1.

Table 3 – Historical Atterberg Limits Results

Borehole	LL (%)	PL (%)	PI (%)	Classification
BH 3	77	28	49	CH
BH 8	50	21	29	CL
BH 9	42	20	22	CL

Notes: LL: Liquid Limit; PL: Plastic Limit; PI: Plastic Index; CH: Inorganic Clay of High Plasticity;
CL: Inorganic Clay of Low Plasticity.

Shrinkage Limit

Twelve selected silty clay samples were submitted for shrinkage limits testing. The results are summarized in Table 4 below.

Table 4 – Shrinkage Limit Results

Borehole	Sample	Depth (m)	Shrinkage Limit (%)	Shrinkage Ratio	MC (%)
BH 6A-22	SS2	1.1	19.63	1.853	55.6
BH 18-22	SS4	2.6	26.47	1.600	97.1
BH 31-22	SS2	1.1	22.65	1.734	81.9
BH 38A-22	SS3	1.8	22.49	1.706	115.3
BH 42A-22	SS1	1.8	15.42	1.849	53.0
BH 45A-22	SS2	1.1	18.74	1.836	49.6
BH 49A-22	SS2	1.8	24.35	1.694	37.3
BH 50-22	SS3	1.8	23.15	1.738	72.6
BH 55-22	SS1	0.3	24.41	1.820	64.2
BH 63A-22	SS5	1.8	17.05	1.866	53.3
BH 59-22	SS5	3.4	17.34	1.818	66.6

Borehole	Sample	Depth (m)	Shrinkage Limit (%)	Shrinkage Ratio	MC (%)
BH 70-22	SS5	3.9	24.58	1.692	83.7
BH 71-22	SS5	4.9	21.32	1.745	93.4

Note: MC: Moisture Content

Consolidation Testing

Generally, the potential long-term settlement of a clay deposit may be evaluated based on its compressibility characteristics. A method to evaluate these characteristics is by completing unidimensional consolidation tests on undisturbed soil samples collected from Shelby tube samples. A total of eighteen (18) consolidation tests were completed from Shelby tubes collected during the previous investigation and twenty-four (24) from the present investigation. The results of Paterson's historical and current consolidation testing are presented in Table 5A and Table 5B, respectively, and in Consolidation Testing Results sheet in Appendix 1.

The value for p'_c is the preconsolidation pressure and p'_o is the effective overburden pressure of the test sample. The difference between the values is the available preconsolidation. The values for C_{cr} and C_c are the recompression and compression indices, respectively. These soil parameters are a measure of the compressibility due to stress increases below and above the preconsolidation pressures.

Table 5A – Historical Consolidation Test Results

Borehole	Sample	Depth (m)	p'_c (kPa)	p'_o (kPa)	C_{cr}	C_c
BH 1	TW4	4.36	74.0	44.0	0.027	3.606
BH 2	TW3	3.58	64.0	33.0	0.024	2.803
BH 3	TW3	4.27	66.0	53.0	0.019	3.537
BH 3	TW4	5.87	116.0	63.0	0.020	0.434
BH 4	TW5	4.27	86.0	38.0	0.056	1.228
BH 5	TW3	3.20	67.0	31.0	0.039	2.218
BH 6	TW4	3.61	55.0	34.0	0.050	2.619
BH 6A	TW1	2.04	62.0	24.0	0.032	2.559
BH 7	TW2	2.82	78.0	29.0	0.019	1.127
BH 8	TW3	2.72	60.0	28.0	0.040	2.391
BH 8	TW4	4.36	51.0	38.0	0.046	2.310
BH 9	TW4	3.38	55.0	32.0	0.067	3.811
BH11	TW4	4.29	71.0	45.0	0.051	3.026
BH12A	TW1	3.59	63.0	33.0	0.046	5.112
BH13	TW5	8.91	95.0	82.0	0.032	2.616
BH14	TW3	3.49	90.0	40.0	0.032	3.306
BH15	TW3	5.34	79.0	46.0	0.041	3.160
BH16	TW4	5.03	85.0	49.0	0.041	2.551

Notes: p'_c: Preconsolidation pressure; p'_o: Effective overburden pressure; C_{cr}: Recompression indice; C_c: Compression indice.

Table 5B – Consolidation Test Results

Borehole	Sample	Depth (m)	p'_c (kPa)	p'_o (kPa)	C_{cr}	C_c
BH1A-22	TW1	4.04	52.481	39.53	0.064	3.750
BH5-22	TW4	3.40	102.33	33.29	0.023	2.143
BH6A-22	TW3	2.67	70.0	35.4	0.042	1.152
BH9-22	TW7	9.45	120.23	78.06	0.024	4.794
BH13B-22	TW1	4.19	72.11	43.43	0.025	3.724
BH14-22	TW5	4.14	81.28	38.63	0.020	3.608
BH14-22	TW4	2.62	54.28	29.2	0.051	1.779
BH16-22	TW4	3.35	67.61	34.48	0.020	1.493
BH19-22	TW3	1.93	56.23	27.51	0.017	1.087
BH21-22	TW4	2.59	72.44	35.61	0.047	2.518
BH21-22	TW6	4.11	56.23	45.0	0.037	1.579
BH22A-22	TW1	2.59	53.95	34.9	0.041	1.368
BH27-22	TW4	1.91	53.13	23.37	0.047	2.364
BH28-22	TW5	3.35	67.09	25.69	0.041	1.909
BH30-22	TW10	7.16	81.41	56.33	0.091	3.302
BH34-22	TW4	2.67	50.74	29.3	0.056	1.916
BH36-22	TW5	3.35	70.0	32.97	0.036	2.638
BH37-22	TW15	10.97	112.2	86.41	0.018	1.471
BH38A-22*	TW5	3.35	62.52	39.62	0.052	0.935
BH40-22*	TW8	5.74	54.12	57.28	0.042	0.750
BH42A-22	TW3	4.06	81.91	36.66	0.057	3.000
BH43-22	TW6	5.05	71.34	51.23	0.045	2.250
BH44-22*	TW7	5.82	59.4	59.4	0.018	0.484
BH45-22	TW6	4.12	74.47	45.24	0.033	1.148
BH46A-22*	TW3	7.26	63.1	72.79	0.046	2.000
BH47-22*	TW6	4.67	63.09	50.32	0.055	2.647
BH48-22	TW6	4.22	74.13	44.96	0.033	1.515
BH49A-22	TW3	2.59	54.95	36.74	0.075	2.586
BH49A-22*	TW4	4.75	50.12	50.11	0.043	1.364
BH55-22*	TW8	5.79	57.54	54.71	0.037	1.111
BH56A-22	TW3	2.59	66.07	28.25	0.022	0.409
BH59A-22*	TW3	2.59	63.1	34.92	0.043	0.856
BH61-22	TW6	4.12	54.45	37.69	0.060	4.771
BH62-22	TW5	3.45	48.6	33.6	0.040	1.630
BH64-22	TW4	2.77	77.63	37.57	0.038	1.282
BH64-22	TW6	4.22	69.18	46.53	0.049	2.344

Notes: p'_c: Preconsolidation pressure; p'_o: Effective overburden pressure; C_{cr}: Recompression indice; C_c: Compression indice.

The values of p'_c, p'_o, C_{cr} and C_c are estimates determined from standard engineering test procedures.

Natural variations within the soil deposit will affect the results. The p'_o parameter is directly influenced by the groundwater level. Groundwater levels were measured during the site investigation.

Lowering the groundwater level increases the p'ₒ and reduces the available preconsolidation. Unacceptable settlements could be induced by a significant lowering of the groundwater level. The p'ₒ values for the consolidation tests completed for the previous and present investigations are based on the long-term groundwater level observed at each borehole location.

Bedrock

Bedrock was cored in BH 17-22, BH 23-22, BH 24-22 and BH 72-22 to a maximum depth of 58.0 m. The recorded average RQD value ranged from 34 to 100% while the recovery values were 100% at all boreholes. Based on these results the quality of the bedrock ranges from poor to excellent. Shale with interbedded limestone was encountered at BH 17-22, BH 23-22 and BH 24-22. Red siltstone was encountered at BH 72-22. Based on available geological mapping, the bedrock in the subject area consists of Paleozoic shale of the Carlsbad formation, with an anticipated overburden drift thickness ranging between 25 and 100 m depth.

Unconfined Compressive Strength Testing of Bedrock Core Samples

Six bedrock cores obtained during the current investigation were tested for unconfined compressive strength of the bedrock specimens. The results are summarized in Table 6 below.

Table 6 – Summary of Unconfined Bedrock Compressive Strength Testing

Borehole	Sample	Test Core Depth (m)	Test Core Elevation (m)	Unconfined Compressive Strength (MPa)
BH 17-22	RC4	55.1	27.2	46.2
BH 23-22	RC4	53.0	26.7	87.8
BH 24-22	RC2	35.6	42.7	146.9
BH 24-22	RC4	37.6	40.7	46.2
BH 72-22	RC3	23.9	54.8	57.9
BH 72-22	RC5	29.1	49.6	29.7

3.3 Groundwater

Groundwater levels were recorded at each borehole location instrumented with a monitoring device. The groundwater level readings are presented in the Soil Profile and Test Data sheets in Appendix 1 and in Table 7 on the following page.

Table 7 – Summary of Groundwater Levels

Borehole Number	Observation Method	Ground Surface Elevation (m)	Measured Groundwater Level		Date Recorded
			Depth (m)	Elevation (m)	
BH 1-22	Monitoring Well	79.73	0.24	79.49	May 24, 2022
			0.88	78.85	August 5, 2022
BH 2-22	Monitoring Well	79.64	0.24	79.40	May 24, 2022
			0.75	78.90	August 2, 2022
BH 3-22	Monitoring Well	79.60	0.49	79.11	May 24, 2022
			0.85	78.75	August 3, 2022
			0.91	78.69	December 13, 2022
BH 4-22	Monitoring Well	78.95	0.82	78.12	May 24, 2022
			1.15	77.80	August 3, 2022
BH 5-22	Monitoring Well	78.76	1.02	77.74	May 24, 2022
			1.20	77.56	August 3, 2022
BH 6-22	Monitoring Well	82.11	0.20	79.91	May 27, 2022
			0.73	81.38	July 27, 2022
BH 7-22	Monitoring Well	81.48	0.46	81.02	May 27, 2022
			1.04	80.45	July 29, 2022
BH 8-22	Monitoring Well	80.51	0.23	80.28	May 27, 2022
			0.86	79.65	July 29, 2022
BH 9-22	Monitoring Well	79.24	1.32	77.92	May 27, 2022
			1.31	77.93	August 2, 2022
			1.47	77.77	December 13, 2022
BH 10-22	Monitoring Well	82.47	Monitoring well destroyed by fallen tree.		
BH 11-22	Monitoring Well	81.71	1.17	80.54	May 27, 2022
			1.39	80.33	August 2, 2022
BH 12-22	Monitoring Well	80.02	0.09	79.93	May 27, 2022
			1.24	78.79	July 29, 2022
BH 13-22	Monitoring Well	80.97	0.25	80.72	May 27, 2022
			0.68	80.29	July 28, 2022
BH 13A-22	Monitoring Well	80.97	0.18	80.79	May 27, 2022
			0.67	80.30	July 28, 2022
BH 14-22	Monitoring Well	81.61	0.29	81.32	May 27, 2022
			0.88	80.73	July 27, 2022
BH 15-22	Monitoring Well	81.28	1.51	79.77	May 27, 2022
			1.64	79.64	July 28, 2022
BH 16-22	Monitoring Well	81.30	0.64	80.66	May 27, 2022
			1.20	80.10	July 28, 2022
BH 17-22	Monitoring Well	82.33	8.02	74.31	July 28, 2022
			2.94	79.39	December 15, 2022
BH 18-22	Monitoring Well	78.15	0.44	77.71	June 15, 2022
			0.97	77.18	August 3, 2022
BH 18A-22	Monitoring Well	78.15	0.52	77.63	June 15, 2022
BH 19-22	Monitoring Well	78.47	0.50	77.97	June 15, 2022
			0.81	77.66	August 2, 2022

Borehole Number	Observation Method	Ground Surface Elevation (m)	Measured Groundwater Level		Date Recorded
			Depth (m)	Elevation (m)	
BH 20-22	Monitoring Well	78.65	0.59	78.06	May 25, 2022
			0.87	77.78	August 3, 2022
BH 21-22	Monitoring Well	79.17	0.72	78.45	May 27, 2022
			1.25	77.92	August 3, 2022
BH 22-22	Monitoring Well	78.70	0.16	78.54	May 27, 2022
			0.30	78.40	August 3, 2022
			1.38	77.32	December 13, 2022
BH 22A-22	Monitoring Well	78.70	0.66	78.04	May 27, 2022
			1.43	77.27	August 3, 2022
BH 23-22	Monitoring Well	79.74	1.24	78.50	August 8, 2022
			1.03	78.71	December 15, 2022
BH 24-22	Monitoring Well	78.29	1.61	76.68	August 8, 2022
			1.76	76.53	February 6, 2023
BH 25-22	Monitoring Well	79.36	0.95	78.41	December 13, 2022
BH 26-22	Monitoring Well	79.77	0.50	79.27	May 26, 2022
			0.68	79.10	August 8, 2022
BH 26A-22	Monitoring Well	79.77	0.50	79.27	May 26, 2022
			0.67	79.11	August 8, 2022
BH 27-22	Monitoring Well	79.71	0.87	78.84	May 26, 2022
			1.02	78.70	August 8, 2022
			1.27	76.26	August 5, 2022
BH 28-22	Monitoring Well	77.53	0.89	76.64	May 26, 2022
			1.27	76.26	August 5, 2022
BH 28A-22	Monitoring Well	77.53	0.96	76.57	May 26, 2022
BH 29-22	Monitoring Well	78.73	0.88	77.85	May 26, 2022
			1.01	77.72	August 8, 2022
BH 29A-22	Monitoring Well	78.73	0.92	77.81	May 26, 2022
BH 30-22	Monitoring Well	79.71	1.23	78.48	May 26, 2022
			1.27	78.45	August 8, 2022
BH 31-22	Monitoring Well	78.48	1.24	77.24	August 5, 2022
BH 32-22	Monitoring Well	77.94	1.25	76.69	May 26, 2022
			1.65	76.29	August 5, 2022
BH 33-22	Monitoring Well	78.33	1.02	77.31	May 26, 2022
			1.17	77.17	August 5, 2022
BH 34-22	Monitoring Well	79.05	0.38	78.67	May 24, 2022
			0.55	78.50	August 9, 2022
BH 35-22	Monitoring Well	78.67	0.27	78.40	May 24, 2022
			0.46	78.21	August 9, 2022
BH 35A-22	Monitoring Well	78.65	0.41	78.24	May 24, 2022
			0.43	78.22	August 9, 2022
BH 36-22	Monitoring Well	78.62	0.77	77.85	May 24, 2022
			1.34	77.28	August 9, 2022

Borehole Number	Observation Method	Ground Surface Elevation (m)	Measured Groundwater Level		Date Recorded
			Depth (m)	Elevation (m)	
BH 37-22	Monitoring Well	77.89	2.18	75.71	June 17, 2022
			1.14	76.75	August 9, 2022
			1.15	76.74	December 13, 2022
BH 38-22	Monitoring Well	77.77	0.78	76.99	May 24, 2022
			1.10	76.67	August 9, 2022
			0.73	77.04	December 13, 2022
BH 38A-22	Monitoring Well	77.77	0.72	77.05	May 24, 2022
			0.81	76.96	August 9, 2022
BH 39-22	Monitoring Well	77.69	0.69	77.00	May 24, 2022
			1.22	76.47	August 9, 2022
BH 40-22	Monitoring Well	79.51	0.67	78.84	May 26, 2022
			100	78.51	August 15, 2022
BH 41-22	Monitoring Well	79.37	0.63	78.74	May 26, 2022
			0.81	78.56	August 15, 2022
			0.47	78.90	December 13, 2022
BH 42-22	Monitoring Well	77.61	0.62	76.99	May 26, 2022
			0.71	76.91	August 15, 2022
BH 42A-22	Monitoring Well	77.61	0.84	76.77	May 26, 2022
			0.75	76.86	August 15, 2022
BH 43-22	Monitoring Well	79.91	0.36	79.55	May 27, 2022
BH 44-22	Monitoring Well	79.37	0.43	78.94	May 27, 2022
			1.39	77.98	August 16, 2022
BH 45-22	Monitoring Well	80.19	0.29	79.90	May 27, 2022
			0.84	79.35	August 16, 2022
BH 45A-22	Monitoring Well	80.19	0.13	80.06	May 27, 2022
BH 46-22	Monitoring Well	80.18	0.85	79.33	May 27, 2022
			1.67	78.51	August 16, 2022
			1.03	79.15	December 13, 2022
BH 47-22	Monitoring Well	78.99	0.80	78.19	May 26, 2022
			1.17	77.82	August 15, 2022
			0.85	78.14	December 13, 2022
BH 47A-22	Monitoring Well	78.99	0.92	78.07	May 26, 2022
			1.24	77.75	August 15, 2022
BH 48-22	Monitoring Well	78.81	0.71	78.10	May 26, 2022
			0.89	77.92	August 15, 2022
BH 49-22	Monitoring Well	79.26	0.39	78.87	May 27, 2022
			0.83	78.43	August 15, 2022
BH 49A-22	Monitoring Well	79.26	0.36	78.90	May 27, 2022
			0.81	78.45	August 15, 2022
BH 50-22	Monitoring Well	79.48	0.74	78.74	May 25, 2022
			0.93	78.55	August 10, 2022
BH 51-22	Monitoring Well	79.94	0.92	79.02	August 10, 2022

Borehole Number	Observation Method	Ground Surface Elevation (m)	Measured Groundwater Level		Date Recorded
			Depth (m)	Elevation (m)	
BH 52-22	Monitoring Well	80.24	0.63	79.61	May 25, 2022
			0.58	79.66	August 10, 2022
BH 53-22	Monitoring Well	79.48	0.84	78.62	May 25, 2022
			0.96	78.52	August 10, 2022
BH 54-22	Monitoring Well	80.19	0.15	80.04	May 27, 2022
			0.83	79.36	August 12, 2022
BH 55-22	Monitoring Well	80.24	0.34	79.90	May 27. 2022
			1.14	79.11	August 12, 2022
BH 56-22	Monitoring Well	80.21	0.37	79.84	May 27, 2022
			0.93	79.29	August 12, 2022
			0.58	79.63	December 13, 2022
BH 56A-22	Monitoring Well	80.21	0.20	80.01	May 27, 2022
			0.86	79.36	August 12, 2022
BH 57-22	Monitoring Well	79.91	0.65	79.26	May 25, 2022
			1.03	78.88	August 10, 2022
BH 58-22	Monitoring Well	80.92	0.53	80.39	June 10, 2022
			1.70	79.22	August 12, 2022
			0.96	79.96	December 13, 2022
BH 58A-22	Monitoring Well	80.92	0.40	80.52	June 10, 2022
			1.14	79.78	August 12, 2022
BH 59-22	Monitoring Well	79.31	0.33	78.98	May 25, 2022
			0.81	78.51	August 12, 2022
BH 59A-22	Monitoring Well	79.31	0.18	79.13	May 25, 2022
			1.38	77.93	August 12, 2022
BH 60-22	Monitoring Well	79.74	0.74	79.00	May 25, 2022
			0.96	78.78	August 10, 2022
			0.52	79.22	December 13, 2022
BH 60A-22	Monitoring Well	79.74	0.64	79.10	May 25, 2022
BH 61-22	Monitoring Well	79.20	0.64	78.56	May 25, 2022
			0.96	78.24	August 11, 2022
BH 62-22	Monitoring Well	78.98	0.87	78.11	May 25, 2022
			1.24	77.74	August 11, 2022
BH 63-22	Monitoring Well	78.66	0.66	78.00	May 25, 2022
			1.16	77.50	August 11, 2022
BH 63A-22	Monitoring Well	78.66	0.66	78.00	May 25, 2022
BH 64-22	Monitoring Well	78.83	0.90	77.93	May 25, 2022
			1.24	77.59	August 11, 2022
			0.89	77.94	December 13, 2022
BH 65-22	Monitoring Well	79.14	1.09	78.05	June 10, 2022
			1.90	77.24	August 12, 2022
BH 68-22	Monitoring Well	80.31	0.83	79.48	May 27, 2022
			1.28	79.04	August 12, 2022

Borehole Number	Observation Method	Ground Surface Elevation (m)	Measured Groundwater Level		Date Recorded
			Depth (m)	Elevation (m)	
BH 69-22	Monitoring Well	80.47	0.75	79.72	May 27, 2022
			1.43	79.05	August 12, 2022
			1.09	79.38	December 13, 2022
BH 69A-22	Monitoring Well	80.47	0.16	80.31	May 27, 2022
			0.91	79.56	August 12, 2022
BH 70-22	Monitoring Well	79.42	0.39	79.03	December 13, 2022
BH 71-22	Monitoring Well	78.48	1.03	77.45	June 15, 2022
			1.44	77.05	August 15, 2022
BH 72-22	Monitoring Well	78.71	1.66	77.06	August 15, 2022
			1.58	77.13	February 6, 2023
BH 73-22	Monitoring Well	79.94	1.05	78.89	December 13, 2022
BH 74-22	Monitoring Well	78.97	0.7	78.27	December 13, 2022
BH 75-22	Monitoring Well	78.99	0.95	78.04	December 13, 2022
BH 76-22	Monitoring Well	77.89	0.4	77.49	December 13, 2022
BH 77-22	Monitoring Well	79.00	1.12	77.88	December 13, 2022
Summary of Groundwater Levels – Previous Investigation (PG2466)					
BH 1	Field Observations	78.78	1.5	77.28	September 27, 2011
BH 2		79.62	1.0	78.62	
BH 3		78.74	2.4	76.34	
BH 4		79.97	1.0	78.97	
BH 5		80.39	1.0	79.39	
BH 6		79.76	1.0	78.76	
BH 7		80.10	1.0	79.10	September 29, 2011
BH 8		80.01	0.95	79.06	
BH 9		77.04	1.0	76.04	September 30, 2011
BH 10		78.41	1.5	76.91	
BH 11		79.02	1.6	77.42	
BH 12		78.79	1.0	77.79	October 3, 2011
BH 13		77.67	2.4	75.27	
BH 14		78.76	1.6	77.16	
BH 15		78.56	1.7	76.86	October 4, 2011
BH 16		79.45	1.6	77.85	
Note: The ground surface elevation at each borehole location was surveyed using a high precision GPS unit and referenced to a geodetic datum.					

It should be noted that surface water can become trapped within a backfilled borehole that can lead to higher than typical groundwater level observations.

Paterson field personnel had observed some treed areas with saturated surface conditions at the time of completing the initial portion of the field investigation (March through April 2022) during the peak period of local snowmelt.

Paterson field personnel have further observed that surface saturated conditions had generally subsided throughout the open field and treed areas throughout the study area during the second portion of the field investigation (May and June 2022). Paterson field staff completed additional field reconnaissance between June and August 2022 as part of the slope stability and hydrogeological testing investigations. The majority of the study area had been traversed by our field personnel at that time, including along all notable watercourses intersecting the study area. Surface saturation was not observed throughout treed or farmed portions of the study area at that time. Further, water levels throughout the municipal drains and creeks appeared relatively stagnant and shallow at the time of the slope stability review. Treed areas were not observed to be providing an influx of surface water to the watercourses.

Based on these observations, historical investigation work, moisture content, observed color and consistency of the recovered soil samples, the long-term groundwater table is expected to be located within the unweathered portion of the clay deposit and/or perched within the lowest portion of the sand layer underlain by unweathered, grey silty clay due to its relatively impermeable and saturated state.

Based on these observations, the current pre-development long-term groundwater table is generally located at a depth of approximately **1 to 2** m below ground surface throughout the study area. This depth is expected to vary slightly between individual parcels throughout the site given the variability in the presence and thickness of surficial soil layers influencing the local groundwater table depth. These layers generally consist of unsaturated sand, weathered brown silty clay, saturated sand, and unweathered grey silty clay. Based on this, the local groundwater table depth for a specific parcel within the study area should be evaluated based on the parcel-specific subsurface soil and groundwater conditions from a geotechnical perspective.

Paterson will continue to generally monitor surficial saturation conditions throughout the study area as part of future fieldwork and investigations and from a geotechnical perspective. It should be noted that groundwater levels are subject to seasonal fluctuations and could vary at the time of construction.

3.4 Permeameter and Slug Testing Results

Permeameter Testing Results

A total of 78 permeameter tests were conducted at 39 locations to provide the general coverage of the study area from July 18 to July 26, 2022.

Preparation and testing of this investigation are in accordance with the Canadian Standards Association (CSA) B65-12-Annex E. Field saturated hydraulic conductivity values were determined using the Engineering Technologies Canada (ETC) Ltd. Reference tables provided in the most recent ETC Past Permeameter User Guide dated July 2018.

Infiltration rates have been determined based on approximate relationships provided by the Ontario Ministry of Municipal Affairs and Housing – Supplementary Guidelines to the Ontario Building Code, 1997 – SG-6 – Percolation Time and Soil Descriptions.

Field saturated hydraulic conductivity (K_{fs}) values and estimated infiltration values are presented in Table 8 below.

Table 8 – Summary of Field Saturated Hydraulic Conductivity Testing Results and Estimated Infiltration Rates

Test Hole Location	Infiltration Testing Elevation (m)	Soil Type Tested	K_{fs} (m/second)	Infiltration Rate (mm/hour)
BH1-22	79.43	Brown Silty Sand	1.90E-06	55
	79.13	Brown Silty Sand w/ Clay	1.30E-06	50
BH3-22	79.30	Brown Silty Clay w/ Sand	7.80E-08	23
	79.00	Brown Silty Sand	3.80E-06	66
BH5-22	78.46	Brown Silty Sand w/ Clay	1.30E-06	50
	78.16	Brown Silty Sand	4.70E-07	38
BH6-22	81.81	Brown Silty Clay w/ Sand	1.60E-07	28
	81.51	Brown Silty Clay	8.10E-09	≤13
BH11-22	81.41	Brown Silty Sand	3.10E-06	63
	81.11	Brown Silty Sand	3.80E-05	122
BH12-22	79.72	Brown Silty Sand	6.30E-07	41
	79.42	Brown Silty Sand w/ Clay	6.30E-07	41
BH14-22	81.31	Brown Silty Sand	3.10E-07	34
	81.01	Brown Silty Clay	8.10E-09	≤13
BH15-22	80.98	Brown Silty Sand	3.80E-06	66
	80.68	Brown Coarse Silty Sand	1.40E-05	94
BH17-22	82.03	Brown Silty Sand	8.10E-08	24
	81.73	Brown Silty Sand	2.50E-06	59
BH22-22	78.40	Brown Silty Sand	9.40E-07	45
	78.10	Brown Silty Sand w/ Clay	3.10E-07	34
BH23-22	79.44	Brown Silty Sand	2.50E-06	59
	79.14	Brown Silty Sand	2.50E-06	59

Test Hole Location	Infiltration Testing Elevation (m)	Soil Type Tested	K_{fs} (m/second)	Infiltration Rate (mm/hour)
BH24-22	77.99	Brown Silty Sand	3.10E-07	34
	77.69	Brown Silty Sand	2.50E-06	59
BH29-22	78.43	Brown Silty Sand w/ Clay	6.30E-07	41
	78.13	Brown Silty Sand w/ Clay	1.30E-06	50
BH30-22	79.41	Brown Silty Sand	3.10E-07	34
	79.11	Brown Silty Sand w/ Clay	1.30E-06	50
BH32-22	77.64	Brown Silty Sand	1.30E-06	50
	77.34	Brown Silty Clay	3.10E-07	34
BH33-22	78.03	Brown Silty Sand	1.90E-06	55
	77.73	Brown Silty Sand	1.60E-06	52
BH35-22	78.37	Brown Silty Sand	4.57E-06	70
	78.07	Brown Silty Sand	3.10E-07	34
BH36-22	78.32	Brown Silty Sand	5.00E-06	71
	78.02	Brown Silty Sand	6.30E-06	76
BH39-22	77.39	Brown Silty Sand w/ Clay	1.90E-06	55
	77.09	Brown Silty Clay	7.80E-08	23
BH40-22	79.21	Brown Silty Clay	4.00E-08	20
	78.91	Brown Silty Clay w/ Sand	2.40E-07	32
BH42-22	77.31	Brown Silty Sand w/ Trace Clay	3.10E-07	34
	77.01	Brown Silty Clay w/ Sand	3.10E-07	34
BH45-22	79.89	Brown Silty Sand w/ Clay	9.40E-07	45
	79.59	Brown Silty Clay	1.60E-07	28
BH47-22	78.69	Brown Silty Sand w/ Clay	4.70E-07	38
	78.39	Brown Silty Clay w/ Sand	1.60E-07	28
BH48-22	78.51	Brown Silty Sand w/ Clay	4.19E-07	36
	78.21	Brown Silty Clay w/ Sand	6.30E-07	41
BH49-22	78.96	Brown Silty Sand	6.30E-07	41
	78.66	Brown Silty Sand	2.50E-06	59
BH50-22	79.18	Brown Silty Clay w/ Sand	1.60E-07	28
	78.88	Brown Silty Clay	7.80E-08	23
BH52-22	79.94	Brown Silty Clay w/ Sand	6.50E-08	22
	79.64	Brown Silty Clay w/ Sand	4.00E-08	20
BH53-22	79.18	Brown Silty Clay w/ Sand	1.60E-07	28
	78.88	Brown Silty Clay w/ Sand	4.00E-08	20
BH55-22	79.94	Brown Silty Clay	6.30E-08	22
	79.64	Brown Silty Clay	8.10E-09	≤13
BH57-22	79.61	Brown Silty Clay	8.10E-09	≤13
	79.31	Brown Silty Clay	4.00E-08	20
BH58-22	80.62	Brown Silty Sand	1.30E-06	50
	80.32	Brown Silty Sand w/ Clay	3.10E-07	34

Test Hole Location	Infiltration Testing Elevation (m)	Soil Type Tested	K_{fs} (m/second)	Infiltration Rate (mm/hour)
BH59-22	79.01	Brown Silty Sand	6.30E-07	41
	78.71	Brown Silty Clay	1.60E-07	28
BH60-22	79.44	Brown Silty Clay w/ Sand	1.30E-07	27
	79.14	Brown Silty Clay	3.10E-07	34
BH61-22	78.90	Brown Silty Sand w/ Clay	8.10E-07	44
	78.60	Brown Silty Clay w/ Sand	2.40E-07	32
BH62-22	78.68	Brown Silty Sand	9.40E-07	45
	78.38	Brown Silty Clay w/ Sand	2.40E-07	32
BH63-22	78.36	Brown Silty Clay w/ Sand	8.10E-08	24
	78.06	Brown Silty Clay	1.60E-07	28
BH69-22	80.17	Brown Silty Sand	3.10E-07	34
	79.87	Brown Silty Clay	6.30E-07	41
BH71-22	78.18	Brown Silty Sand	6.30E-05	140
	77.88	Brown Silty Sand	8.20E-06	81
BH72-22	78.41	Brown Silty Clay	8.10E-08	24
	78.11	Brown Silty Sand w/ Clay	1.30E-06	50

Hydraulic Conductivity (Slug) Testing Results

Hydraulic conductivity tests were conducted at 58 monitoring well locations throughout the study area during the month of August and December 2022. The testing results are summarized in Table 9 below.

Table 9 – Summary of Hydraulic Conductivity (Slug) Testing Results

Borehole ID	Screened Soil	Hydraulic Conductivity, K (m/sec)
BH1-22	Grey Silty Clay	8.11E-08
BH4-22	Grey Silty Clay, trace Sand	1.93E-08
BH5-22	Grey Silty Clay, trace Sand	8.41E-08
BH6-22	Grey Silty Clay, trace Sand	8.32E-08
BH7-22	Grey Silty Clay	2.06E-08
BH8-22	Grey Silty Clay	3.23E-08
BH9-22	Grey Silty Clay, trace Sand	8.70E-09
BH11-22	Grey Silty Clay, trace Sand	8.40E-09
BH12-22	Grey Silty Clay, trace Sand	2.68E-08
BH13-22	Grey Silty Clay, trace Sand	2.03E-08
BH13A-22	Grey/Brown Silty Clay, trace Sand	1.97E-05
BH14-22	Grey Silty Clay, trace Sand	1.89E-08
BH15-22	Grey Silty Clay	5.32E-08
BH16-22	Grey Silty Clay	6.43E-09
BH17-22	Bedrock	4.49E-06

Borehole ID	Screened Soil	Hydraulic Conductivity, K (m/sec)
BH18-22	Grey/Brown Silty Clay	2.48E-08
BH19-22	Grey Silty Clay	1.49E-08
BH22-22	Grey Silty Clay, Some Sand Seams	1.03E-08
BH26-22	Grey Silty Clay, trace Sand	3.25E-07
BH27-22	Grey Silty Clay	3.60E-07
BH28-22	Grey Silty Clay, trace Sand	1.05E-08
BH29-22	Grey Silty Clay	4.09E-08
BH31-22	Grey Silty Clay	9.95E-09
BH32-22	Grey Silty Clay	4.52E-08
BH33-22	Grey Silty Clay	4.67E-07
BH34-22	Grey Silty Clay	2.16E-07
BH35-22	Grey Silty Clay	8.81E-07
BH36-22	Grey Silty Clay	4.89E-08
BH37-22	Grey Silty Clay	9.32E-09
BH38-22	Grey Silty Clay	6.26E-08
BH39-22	Grey Silty Clay	5.03E-08
BH40-22	Grey Silty Clay	4.29E-06
BH41-22	Grey Silty Clay, trace Sand	1.05E-07
BH42-22	Grey Silty Clay with Sand Seams	1.82E-07
BH44-22	Grey Silty Clay with Sand Seams	5.56E-07
BH45-22	Grey Silty Clay with Sand Seams	1.32E-07
BH46-22	Grey Silty Clay with Sand Seams	3.38E-08
BH47-22	Grey Silty Clay	4.03E-07
BH48-22	Grey Silty Clay with Sand Seams	6.46E-08
BH49-22	Grey Silty Clay with Sand Seams	2.64E-06
BH50-22	Grey Silty Clay	2.59E-06
BH51-22	Grey Silty Clay	1.35E-07
BH53-22	Grey Silty Clay	1.69E-07
BH54-22	Grey Silty Clay, trace Sand	1.66E-07
BH55-22	Grey Silty Clay with Sand Seams	9.94E-08
BH56-22	Grey Silty Clay	1.49E-07
BH57-22	Grey Silty Clay	4.27E-08
BH58-22	Grey Silty Clay with Sand Seams	2.69E-07
BH59-22	Grey Silty Clay with Sand Seams	1.54E-07
BH60-22	Grey Silty Clay	2.74E-07
BH61-22	Grey Silty Clay	2.63E-07
BH62-22	Grey Silty Clay	1.29E-07
BH63-22	Grey Silty Clay with Sand Seams	9.91E-06
BH64-22	Grey Silty Clay	1.70E-07
BH65-22	Grey Silty Clay	2.11E-07
BH68-22	Grey Silty Clay with Sand Seams	1.61E-08
BH69-22	Grey Silty Clay	2.03E-07
BH71-22	Grey Silty Clay	4.83E-08

Summary of Results

Based on the results of our field testing and sampling associated with the permeameter testing, two types of grain-size distribution of sand were encountered at the time of testing. These generally consisted of (i) brown coarse silty sand to silty sand and (ii) brown silty sand containing trace to some clay.

Permeameter testing throughout the brown coarse silty sand to silty sand layer yielded hydraulic conductivity rates between approximately 6.3x10^{-5} and 8.1x10^{-8} m/s. Further, infiltration rates for this layer were observed to range between approximately 24 to up to 140 mm/hour. Permeameter testing throughout the brown silty sand containing trace to some clay yielded hydraulic conductivity rates between approximately 1.9x10^{-6} and 3.1x10^{-7} m/s. Further, infiltration rates for this layer were observed to range between 34 to up to 54 mm/hour.

Slug testing conducted at monitoring wells screened within the brown silty clay layer yielded hydraulic conductivity values ranging between approximately 2.0x10^{-5} to 2.5x10^{-8} m/s. The higher conductivity measured at BH 13A-22 is expected to be attributed to the presence of sand within the screened soil horizons and is not considered reflective of the hydraulic conductivity for weathered, brown silty clay. Permeameter testing throughout the brown silty clay yielded hydraulic conductivity rates between approximately 6.3x10^{-7} and 8.1x10^{-9} m/s. Further, infiltration rates for this deposit were observed to range between approximately less than 13 to up to 41 mm/hour.

Slug testing conducted at monitoring wells screened within the grey silty clay layer yielded hydraulic conductivity values ranging between approximately 9.9x10^{-6} to 6.4x10^{-9} m/s. Slug testing conducted at the monitoring well installed at BH 17-22 and screened within the bedrock formation yielded a hydraulic conductivity value of approximately 4.5x10^{-6} m/s.

These values are generally consistent with similar material Paterson has encountered on other sites and typical published values for silty clay and silty sand. It should be noted that the range in testing results noted above can be attributed to the variability in composition and consistency of the layers encountered where the monitoring well screens and permeameter inverts were located.

It is important to note that the infiltration rates derived from the K_{fs} values in the above-noted tables are unfactored and should not be used for design purposes without prior discussion with Paterson. Infiltration-based low impact development (LID) strategies using the above-noted infiltration rates should be adjusted with an appropriate safety correction factor.

The safety correction factor that would be considered at the time of future parcel- and system-specific designs would be dependent on the size and invert depth of those systems relative to the infiltration rates observed within 1.5 m below their bases.

4.0 Discussion

4.1 Geotechnical Assessment

The study area is considered suitable for the proposed development from a geotechnical perspective. Since detailed design details of the future development are not known at this time, geotechnical design information provided in this report may only be considered preliminary.

Once preliminary design plans have been developed for the study area, parcel- and development-specific recommendations and other geotechnical considerations may be provided at that time. Further, supplemental geotechnical field investigation will be required in support of future low-, mid- and/or high-rise structures. The appropriate foundation support system for buildings is dependent on the building-type, loading and founding depth. Several foundation support options are listed below and discussed in the following sections:

- Low- to mid-rise conventional wood-framed residential dwellings and low to mid-rise steel-framed commercial-style structures are anticipated to be supported by a conventional spread footing foundation placed on an approved fill and/or native and undisturbed in-situ stiff silty clay or silty sand bearing surface.

- Mid-rise concrete-framed structures imposing higher stress conditions onto the underlying bearing mediums are anticipated to be supported using a raft slab placed on a stiff to firm grey silty clay bearing surface.

- Mid to high-rise buildings that exceed the load bearing capacity of the aforementioned foundations would require raft foundations or deep foundations, such as end bearing piled foundations that extend down to a clean, surface sounded bedrock bearing surface.

Due to the presence of the silty clay deposit throughout the study area, a permissible grade raise restriction will be required for the proposed grading. Our recommendations for grade raise restrictions are considered preliminary at the time of issuing this report and are subject to change upon completion of future investigations and site-specific settlement monitoring programs.

If higher than permissible grade raises are required, preloading with or without a surcharge, lightweight fill and/or other measures should be investigated to reduce the risks of unacceptable long-term post construction total and differential settlements. The above and other considerations are discussed in the following sections.

4.2 Permissible Grade Raise Recommendations

Based on the results of the field investigation, a permissible grade raise restriction of 0.5 to 0.6 m above the existing and original ground surface may be considered as a preliminary recommendation for grading throughout the majority of the subject site. It should be understood that the currently recommended range is preliminary and is not considered representative of the restriction that would apply to the entirety of the subject site. Adjustments to the currently recommended grade raise restriction are subject to supplemental investigation findings and settlement monitoring programs. Localized zones throughout the subject site are also expected to be able to support higher grade raise restrictions, which will be evaluated during the design phase of the development. Therefore, it should be noted that a re-evaluation of the permissible grade raise recommendations by Paterson is required once details of the proposed development are finalized.

If higher than permissible grade raises are required, preloading with or without a surcharge, lightweight fill, and/or other measures should be investigated to reduce the risks of unacceptable long-term post construction total and differential settlements. Provided sufficient time is available to induce the required settlements, consideration could be given to surcharging the study area (i.e., anticipating 2 to 3 years of surcharging where undertaken). Alternatively, consideration could also be given to undertaking a test fill pile program (similar timeline as surcharging) to assess the suitability to raise the currently recommended permissible grade raise recommendations in conjunction with a supplemental investigation.

Consideration can be given to integrating wick-drains for these programs to reduce timelines for achieving sufficient settlement prior to construction, however, these types of measures are typically undertaken by a specialized ground improvement contractor with proprietary installation methodologies and products. Based on this, reductions in the amount of time that could be allotted for undertaking surcharge programs in conjunction with wick drains throughout the subject site should be advised upon by Paterson after a coordinated review with a specialized ground improvement contractor that would be retained by the developer. The coordinated discussions would be intended to understand the methodology considered by the specialized contractor and to provide their designers with appropriate geotechnical parameters for guiding their wick-drain system designs, if sought by the developer.

A post-development groundwater lowering of 0.5 m within the underlying clay deposit was assumed for our calculations where the groundwater table was interpreted to be located with the silty clay deposit.

A post-development groundwater lowering anticipated to be the thickness of existing saturated sand was considered where the groundwater table was interpreted to be perched above the sand-clay interface. It should be noted that the current pre-development and future post-construction groundwater conditions are not considered to be the same, such that permissible grade raise recommendations should not depend on the current pre-development groundwater levels measured at piezometers and monitoring wells.

4.3 Design for Earthquakes

The site class for seismic site response can be taken as **Class E** for foundations bearing over the overburden identified throughout the study area. The soils underlying the study area are not susceptible to liquefaction or cyclic softening. Reference should be made to the latest revision of the Ontario Building Code for a full discussion of the earthquake design requirements.

5.0 Design and Construction Considerations

5.1 Excavation Side Slopes

Excavations for buildings and services can be carried out using conventional excavation techniques and in accordance with the Occupational Health and Safety Act, Regulations for Construction projects. The side slopes of excavations in the overburden materials should be either cut back at acceptable slopes or should be retained by shoring systems from the start of the excavation until the structure is backfilled. These systems may consist of conventional systems such as soldier pile and lagging or interlocking sheet piling. These systems and their affiliated support systems would be explored on a block-specific basis. Further, consideration should be given to undertaking supplemental investigation during future stages of design and development to confirm Soil Types in accordance with OHSA regulations when excavation depths would be better understood.

Unsupported Side Slopes

The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be cut back to 1H:1V or flatter. The flatter slope is required for excavation below groundwater level. The majority of the subsoil at this site is considered to be mainly Type 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.

It is recommended that Paterson review drawings considering excavations prior to construction and tendering to verify adequate subsoil conditions have been considered as part of the design process from a geotechnical perspective. Further, it is recommended that Paterson review servicing plans and profiles considering excavations to verify appropriate soil types considered in *Ontario Regulation 213/91: Construction Projects* have been incorporated from a geotechnical perspective.

Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should be kept away from the excavation sides. Slopes in excess of 3 m in height should be periodically inspected by Paterson in order to detect if the slopes are exhibiting signs of distress. Excavation side slopes should also be protected from erosion by surface water and rainfall events by the use of tarpaulins or other means of erosion protection along their footprint in conjunction with dry conditions at the slope toes. It is recommended that a trench box be used at all times to protect personnel working in trenches. It is expected that services will be installed by “cut and cover” methods and excavations will not be left open for extended periods of time. Grey clay soils sub-excavated from service trenches are not anticipated to be able to be re-used for service trench reinstatement.

Excavation Base Stability

The base of supported excavations can fail by three (3) general modes:

- Shear failure within the ground caused by inadequate resistance to loads imposed by grade difference inside and outside of the excavation,
- Piping from water seepage through granular soils, and
- Heave of layered soils due to water pressures confined by intervening low permeability soils.

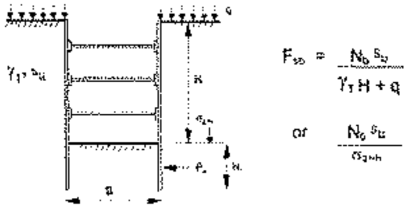
The factor of safety with respect to base heave, FS_b, is:

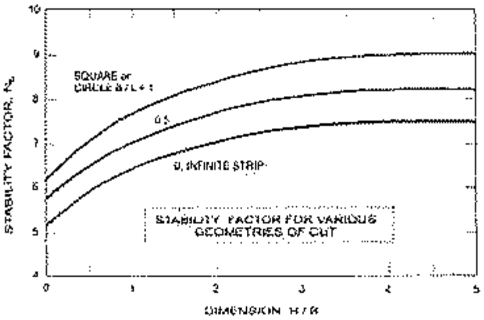
$$FS_b = N_b s_u / \sigma_z$$

where:

N_b - stability factor dependent upon the geometry of the excavation and given in Figure 1 on the following page.
s_u - undrained shear strength of the soil below the base level.
σ_z - total overburden and surcharge pressures at the bottom of the excavation.

Shear failure of excavation bases is typically rare in granular soils if adequate lateral support is provided. Inadequate dewatering can cause instability in excavations made through granular or layered soils. The potential for base heave in cohesive soils should be determined for stability of flexible retaining systems. As a preliminary precaution, service trench excavations exceeding 4 to 5 m in depth should be assessed for excavation base stability during the design phase to verify the suitability of conventional cut-and-cover excavation techniques.





Trenchless Excavations for Service Infrastructure

Considering the study area is underlain by a relatively firm deposit of silty clay, conditions may be favourable for the use of trenchless excavation methods for service installations. Current trenchless techniques generally consist of horizontal direction drilling, jack and boring, pipe jacking using a tunnel-boring-machine and/or microtunnelling. Trenchless excavation techniques are advantageous to conventional open-cut methods since they mitigate potential for basal instability and reduce the volume of excess soil and imported trench backfill. However, these techniques are not as economical as compared to conventional open-cut techniques.

Typically, the above-noted methods will require the use of entry and exit shafts supported by temporary shoring systems. Excavations extending below the sand-to-clay interface should be planned to mitigate high levels of influx into the excavation from this interface. Below this interface, groundwater infiltration is expected to be low and controllable using conventional sump pumps.

Subsurface conditions that could be encountered during the trenchless installation would consist of flowable soils, which could further result in settlement of the overlying ground surface. Given the predominantly clayey nature of the subsoils located throughout the study area, this is not expected to occur for trenchless excavations undertaken below the sand-to-clay interface. However, given that surficial sand located upon the clay layer surface is in a saturated state, flowable sand may be encountered should the trench alignment intersect this interface.

As a general precaution, where flowable soils could be potentially encountered, a soil plug would be implemented in the lead casing by setting back the augers from the leading edge of the casing. The soil plug would prevent soils from flowing into the casing, thus mitigating settlement at the ground surface. This would be coordinated between Paterson and the trenchless excavation contractor at an earlier stage in the planning of these types of installations.

It is recommended that all plans considering the use of trenchless excavation techniques and/or installation of services within the unweathered, grey silty clay be reviewed at a planning stage by Paterson. Paterson may provide appropriate design and construction recommendations based on the depth and alignment of these types of servicing works once they are known at that time.

Temporary Shoring

Depending on the depth of future underground levels, if considered, temporary shoring systems may be required to support the overburden soil to complete the required excavations where insufficient room is available for open cut methods.

If a temporary shoring system is considered, the design and implementation of these temporary systems will be the responsibility of the excavation contractor and their design team. The shoring requirements designed by a structural engineer specializing in those works will depend on the depth of the excavation, the proximity of the adjacent structures and the elevation of the adjacent building foundations and underground services. Inspections and approval of the temporary system will also be the responsibility of the designer.

It is the responsibility of the shoring contractor to ensure that the temporary shoring system is in compliance with safety requirements, designed to avoid any damage to adjacent structures and include dewatering control measures. In the event that subsurface conditions differ from the approved design during the actual installation, it is the responsibility of the shoring contractor to commission the required experts to re-assess the design and implement the required changes.

The temporary shoring system could consist of a soldier pile and lagging system or interlocking steel sheet piling. Any additional loading due to street traffic, neighbouring buildings, construction equipment, adjacent structures, and facilities, etc., should be included to the earth pressures described below.

Furthermore, the design of the temporary shoring systems should take into consideration a full hydrostatic condition which can occur during significant precipitation events. These systems could be cantilevered, anchored, or braced. The shoring system is recommended to be adequately supported to resist toe failure, if required, but means of extending the piles into the bedrock through pre-augered holes if a soldier pile and lagging system is the preferred method. The earth pressures acting on the temporary shoring system may be provided by Paterson during the design stage of excavations that would require the use of soil retention systems such as temporary shoring systems.

As a general note, the active earth pressure should be calculated where wall movements are permissible while the at-rest pressure should be calculated if no movement is permissible. The dry unit weight should be calculated above the groundwater level while the effective unit weight should be calculated below the groundwater level.

The hydrostatic groundwater pressure should be included to the earth pressure distribution wherever the effective unit weight is calculated for earth pressures. If the groundwater level is lowered, the dry unit weight for the soil/bedrock should be calculated full weight, with no hydrostatic groundwater pressure component.

For design purposes, the minimum factor of safety of 1.5 should be calculated.

5.2 Groundwater Control

Based on our observations, pumping from open sumps should be sufficient to control the groundwater influx through the sides of shallow excavations. It is anticipated that groundwater infiltration into the excavations should be low to moderate and controllable using open sumps throughout the clay overburden.

Initially high rates of infiltration will be experienced in excavations crossing below the sand to clay interface where sand is present in the overlying surficial soils. Further, excavations terminating within the saturated portion of the sand layer may require the use of well points to dewater the excavation perimeter in conjunction with other techniques to cut-off influx from the excavation sides and base.

However, stabilized infiltration rates are anticipated to be controllable using conventional open sump techniques. The contractor should be prepared to direct water away from all bearing surfaces and subgrades, regardless of the source, to prevent disturbance to the founding medium.

Permit to Take Water

A temporary Ministry of the Environment, Conservation and Parks (MECP) permit to take water (PTTW) will be required if more than 400,000 L/day of ground and/or surface water is to be pumped during the construction phase. A minimum 4 to 5 months should be allowed for completion of the PTTW application package and issuance of the permit by the MECP. For typical ground or surface water volumes being pumped during the construction phase, typically between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR).

A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Person as stipulated under O.Reg. 63/16.

Impacts on Neighbouring Structures

It is imperative that all precautions be considered during the design phase to mitigate the long-term dewatering of the underlying clay deposit to mitigate potential for higher-than-tolerable amounts of settlement to be experienced by the deposit and the overlying structures. Detailed recommendations will be provided by Paterson for structure-specific considerations at a later stage of design.

As a preliminary recommendation, future building foundations located below the long-term groundwater table should be provided with a groundwater suppression system to mitigate potential to drain the local groundwater table which the structure would be founded within. Further, the implementation of techniques such as clay seals for service trenches and restricting tree setbacks to building foundations, among other techniques, would be advised to be implemented during the design phase and as is routinely undertaken throughout the City of Ottawa. Therefore, provided appropriate and conventional measures are taken to limit long-term dewatering of the underlying deposit, future development is not anticipated to negatively impact local groundwater conditions for neighbouring existing buildings that would result in negative impacts.

Feasibility of Development and Current Water Levels

It is our experience that the pre-development water levels measured at the monitoring wells are not considered representative of groundwater conditions that would be encountered during the post-development phase of the subject site. Our interpretation noted in *Section 3.3 – Groundwater* of this report suggest that the long-term groundwater table is expected to be located within the unweathered portion of the clay deposit and/or perched within the lowest portion of the sand layer underlain by unweathered, grey silty clay due to its relatively impermeable and saturated state.

Long-term post-development dewatering resulting from undertaking service excavations, creating high densities of impermeable surfaces (roofs, paved roads, etc.) will result in a long-term lowering of the pre-development groundwater table, and as expected and advised upon in the City of Ottawa's *Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa*. Based on that, the pre-development groundwater levels measured within the monitoring wells should not be considered representative of constraints associated with depths which structures may be limited to being founded within during the design phase. It is recommended that long-term groundwater conditions should be considered during the design phase of the development and as based on the depth which soils transition to from weathered to unweathered and as advised by Paterson during the design phase of the proposed development.

5.3 Corrosion Potential and Sulphate

The results of analytical testing show that the sulphate content is less than 0.1%. This result is indicative that Type 10 Portland cement (normal cement) would be appropriate for this site. The chloride content and the pH of the sample indicate that they are not significant factors in creating a corrosive environment for exposed ferrous metals at this site, whereas the resistivity is indicative of an aggressively corrosive environment.

5.4 Landscaping Considerations

Tree Planting Considerations

Due to the presence of the aforementioned clay deposit, the location of street trees will be governed by the potential for soil volume change where trees and houses are located above a clay deposit. Setbacks between street trees and building foundations should be assessed in accordance with the latest version of City of Ottawa's *Tree Planting in Sensitive Marine Clay Soils* during the planning and design phases of the proposed development.

The soil volume change potential and setback of trees from building foundations has been preliminarily assessed in accordance with the City of Ottawa's *Tree Planting in Sensitive Marine Clay Soils* (2017 Guidelines). Based on the current testing results, the plasticity index for the majority of the tested clay samples was found to be less than 40%, which would indicate the presence of a clay with low to medium potential for soil volume change.

Based on the current guidelines, large trees (mature height over 14 m) can be planted within the subject site provided a tree to foundation setback equal to the full mature height of the tree can be provided (e.g., in a park or other green space).

Tree planting setback limits may be reduced to **4.5 m** for small (mature tree height up to 7.5m) and medium size trees (mature tree height 7.5 m to 14 m) provided that the conditions noted below are met:

- ☐ The underside of footing (USF) is 2.1 m or greater below the lowest finished grade must be satisfied for footings within 10 m from the tree, as measured from the center of the tree trunk and verified by means of the Grading Plan.
- ☐ A small tree must be provided with a minimum of 25 m^3 of available soils volume while a medium tree must be provided with a minimum of 30 m^3 of available soil volume, as determined by the Landscape Architect. The developer is to ensure that the soil is generally un-compacted when backfilling in street tree planting locations.

- ☐ The tree species must be small (mature tree height up to 7.5 m) to medium size (mature tree height 7.5 m to 14 m) as confirmed by the Landscape Architect.

- ☐ The foundation walls are to be reinforced at least nominally (minimum of two upper and two lower 15M bars in the foundation wall).

- ☐ Grading surrounding the tree must promote drainage to the tree root zone (in such a manner as not to be detrimental to the tree), as noted on the subdivision Grading Plan.

It is expected that tree planting setback recommendations will be assessed on a development-specific basis as grading plans are made available for the future development and based on area-specific current and future geotechnical investigation information.

5.5 Slope Stability Assessment

Summary of Assessment

Paterson completed a desktop assessment and field review of the subject site. The slope stability assessment was conducted in accordance with the City of Ottawa's *Slope Stability Guidelines for Development Application in the City of Ottawa* (2004) and the Ontario Ministry of Natural Resource *Technical Guide – River and Stream Systems: Erosion Hazard Limit* (2002). The desktop assessment consisted of evaluating the LiDAR and topographical maps to verify slope height, steepness, valley floor width and other features associated with slope stability. The field review consisted of assessing the current slope conditions. The review was completed by Paterson field personnel as part of the geotechnical investigation between June 2022 to August 2022. The slopes forming the channel sidewalls along the length of the following watercourses were reviewed at that time:

- ☐ Smith-Gooding municipal drain in the northwest and northeast portions of the study area,
- ☐ Ramsey Creek crossing the parcel located at the southwest corner of Leitrim Road and Anderson Road
- ☐ Johnston municipal drain located in the east of Anderson Road
- ☐ Several tributaries located throughout the lands bound by Piperville Road, Farmers Way, Thunder Road, and Anderson Road.

The field review generally consisted of observing surface conditions along the length of the channel including identifying the presence of vegetation, erosion and other features associated with slope stability. Paterson field personnel verified subsurface information and in-situ shear strength of cohesive soils at select slope sections using a hand-auger and field vane apparatus, respectively.

Water levels and flow within the watercourses were generally observed, including identifying signs of recent high-water marks or other signs of previous rises in the water levels. The top of slope alignment was determined in the field by Paterson personnel based on our field observations and assessed using a high-precision handheld GPS unit.

Overall, a total of thirty-six (36) slope cross sections throughout the above-noted locations were analyzed as part of the slope stability analysis. The locations for the slope sections were chosen conservatively to evaluate the worst-case scenarios (i.e., areas with steepest topography, lesser stiff cohesive soils, proximity between the toe of the bank and edge of the watercourse, potential active erosion, and height of slope among other considerations determined at the desktop and re-assessed during the field evaluation stages) as well as represent the variability of the subsurface conditions, signs of erosion, and other features that could impact the slope stability analysis.

Topographic surface elevations were measured at select cross-sections in combination with LiDAR information to evaluate the corresponding slope. The select slope locations were analyzed using SLIDE, a computer program for two-dimensional slope stability analysis.

Based on the results of our desktop analysis, field observations and slope stability analysis, a Limit of Hazard Lands was assigned from the top of slope for the above-noted sections of the study areas watercourses. The cross-section locations and associated Limit of Hazard Lands setbacks are presented on Drawings PG5827-4 through PG5827-8 in Appendix 2. Photographs of the subject slopes have been also attached to the present report.

Summary of Field Observations

The following section is a summary of our observations during the time of our field review of the subject slopes:

Smith-Gooding Municipal Drain – West of Anderson Road (Section A to Section H and Section LL)

The existing slope bordering the western portion of the Smith-Gooding Municipal Drain located between Ramsayville Road and Anderson Road is generally heavily vegetated with brush and mature trees. The majority of the abutting table lands are heavily treed, however, the northern half of the channel intersecting the southern portion of 4640 Leitrim Road consists of farmed agricultural lands.

The slope profile across the watercourse was observed to range between approximate steepness’ of 0.6H:1V to 2.7H:1V. Further, the slopes were observed to be between 1.4 to 2.2 m in height. The width of the watercourse was noted to be between approximately 1 and 5 m wide. At the time of our visit, the depth of the water ranged between 0.5 to 2 m in depth. The variability was generally observed to be caused by beaver dams. The water level was observed to be stagnant across the majority of the channel at the time of our review.

The majority of the slope appeared to consist of stiff, brown silty clay, which was underlain by firm, grey silty clay in close proximity to the water level. Some erosion had been observed throughout the length of the watercourse. This generally consisted of some erosion of the bank face resulting in minor undercutting along the channels edge at some locations. Occasionally shallow and low slip surfaces restricted to close proximity to the water level were observed in areas with sharp bends in the channel alignment. Overall, vegetation was observed to be intact and mature across the majority of the channel length.

Reference should be made to Drawing PG5827-4 - Limit of Hazard Lands Plan in Appendix 2 which depicts the above-noted section of the watercourse and the associated slope stability cross-sections and setback information.

Smith-Gooding Municipal Drain – East of Anderson Road (Section K to Section R and Section II)

The existing slope bordering the eastern portion of the Smith-Gooding Municipal Drain located between Anderson Road and the eastern boundary of 5055 Piperville Road is generally well-vegetated with brush and patches of mature trees. The majority of the abutting table lands consist of landscaped (4175 Anderson Road) or agricultural lands (5055 Piperville Road).

The slope profile across the watercourse was observed to range between approximate steepness of 0.9H:1V to 3.5H:1V. Further, the slopes were observed to be between 1.3 to 3.0 m in height. The width of the watercourse was noted to be between approximately 1 and 3 m wide. At the time of our visit, the depth of the water ranged between 0.5 to 1.2 m in depth with signs of the high-water mark being approximately 300 mm above the water level at the time of our review. The variability was generally observed to be caused by beaver dams. The majority of the channel was observed to contain stagnant water with the exception of areas immediately beyond beaver dam footprints. Relatively low-speed flow was observed in areas immediately beyond beaver dams.

The majority of the slope appeared to consist of stiff, brown silty clay, which was underlain by firm, grey silty clay in close proximity to the water level. Some erosion had been observed throughout the length of the watercourse. This generally consisted of erosion of the bank face resulting in some undercutting along the channels edge at several locations. The bank face in areas of active erosion was observed to consist of bare soil and did not contain mature vegetation or brush. Recent shallow slip surface was not observed at the time of our site visit for this portion of the watercourse. Overall, vegetation was observed to be intact and mature across the majority of the channel lengths table land, valley sidewalls and valley corridors.

Reference should be made to Drawing PG5827-6 - Limit of Hazard Lands Plan in Appendix 2 which depicts the above-noted section of the watercourse and the associated slope stability cross-sections and setback information.

Ramsey Creek – Leitrim Road to Anderson Road (Section I and Section J)

The existing slope bordering the eastern portion of Ramsay Creek located between Leitrim Road and Anderson Road is generally heavily vegetated with brush and mature trees. It should be noted that several mature trees in proximity to the channel had recently fallen due to a heavy storm producing high winds during the Summer of 2022. However, the fallen trees were not observed to have impacted the slope’s stability at the time of our review.

The bank face profile along the watercourse was observed to range between approximate steepness’ of 3.2H:1V to 4.8H:1V. Further, the bank faces were observed to be between 0.5 to 0.6 m in height. The width of the watercourse was noted to be between approximately 1 and 5 m wide. At the time of our visit, the depth of the water ranged between 0.5 to 1.5 m in depth.

The majority of the slope appeared to consist of stiff, brown silty clay, which was underlain by firm, grey silty clay in close proximity to the current water level. Some erosion had been observed throughout the length of the watercourse. This generally consisted of some erosion of the bank face resulting in minor undercutting along the channels edge at some locations. Overall, vegetation was observed to be intact and mature across the majority of the channel length.

Reference should be made to Drawing PG5827-5 - Limit of Hazard Lands Plan in Appendix 2 which depicts the above-noted section of the watercourse and the associated slope stability cross-sections and setback information.

Johnston Municipal Drain – East of Anderson Road (Section GG and Section HH)

The existing slope bordering the eastern portion of the Johnston Municipal Drain located east of Anderson Road is generally heavily vegetated with brush and mature trees. The slope profile across the watercourse was observed to range between approximate steepness' of 1.3H:1V to 1.5H:1V. Further, the slopes were observed to be between 1.3 to 1.5 m in height. The width of the watercourse was noted to be between approximately 1.5 and 2 m wide. At the time of our visit, the depth of the water ranged between 0.5 to 1 m in depth.

The majority of the slope appeared to consist of stiff, brown silty clay, which was underlain by firm, grey silty clay in close proximity to the water level. No notable erosion had been observed throughout the length of the watercourse. Overall, vegetation was observed to be intact and mature across the majority of the channel length.

Reference should be made to Drawing PG5827-8 - Limit of Hazard Lands Plan in Appendix 2, which depicts the above-noted section of the watercourse and the associated slope stability cross-sections and setback information.

Creek East of Johnston Municipal Drain and Other Ditches (Section S to Section EE, Section JJ and Section KK)

Several channels, including a channel extending further downstream and east of the Johnston Municipal Drain, were reviewed as part of this assessment. Two of these channels consist of tributary branches extending from the main channel. The main channel consists of watercourse connecting between the eastern extent of the Johnston Municipal Drain and outletting further east and across Farmers Way.

The slope profile across these watercourses were observed to range between approximate steepness' of 1.3H:1V to greater than 7H:1V. Further, the slopes were observed to be between 1.0 to 4.8 m in height. The width of the watercourse was noted to be between approximately 1 and nearly 10 m wide. At the time of our visit, the depth of the water ranged between 0.3 to 0.8 m in depth. The variability was generally observed to be caused by beaver dams. The majority of the channel was observed to contain water which appeared stagnant in heavily vegetated wide-valley areas and with low-speed in areas where the channel became constricted in width.

The majority of the slope appeared to consist of stiff, brown silty clay, which was underlain by firm, grey silty clay in close proximity to the water level. Some erosion had been observed throughout the length of the watercourse. This generally consisted of erosion of the bank face resulting in some undercutting along the channels edge at several locations. The bank face in areas of active erosion was observed to consist of bare soil and did not contain mature vegetation or brush. Some recent shallow slip failures had been observed in areas with the highest slopes and in proximity to several closely-spaced meanders in the watercourses alignment and west of Farmers Way. Overall, vegetation was observed to be intact and mature across the majority of the channel lengths table land, valley sidewalls and valley corridors.

Reference should be made to Drawing PG5827-7 - Limit of Hazard Lands Plan in Appendix 2 which depicts the above-noted section of the watercourse and the associated slope stability cross-sections and setback information. Further, a summary of the analyzed sections is presented in Table 11.

Table 11 - Summary of Slope Section Geometry

Slope Section ID	Slope Height (m)	Approximate Inclination
A	2.0	2.1H:1V
B	1.4	0.6H:1V
C	1.5	1.1H:1V
D	2.1	2.0H:1V
E	2.1	1.7H:1V
F	1.6	2.7H:1V
G	1.5	2.1H:1V
H	1.5	1.1H:1V
I	0.6	3.2H:1V
J	0.5	4.8H:1V
K	0.6	1.9H:1V
L	0.5	1.0H:1V
M	0.6	1.8H:1V
N	0.5	1.3H:1V
O	0.5	0.8H:1V
P	0.8	1.6H:1V
Q	3.0	3.5H:1V
R	0.9	0.9H:1V
S	0.1	15.9H:1V
T	0.6	5.4H:1V
U	1.9	3.6H:1V
W	0.6	2.3H:1V
X	0.5	13.1H:1V
Y	0.5	1.3H:1V
Z	0.6	2.5H:1V
AA	4.8	5.5H:1V
BB	4.0	2.3H:1V
CC	4.1	2.6H:1V
DD	4.4	4.5H:1V
EE	5.1	1.1H:1V
GG	2.4	2.4H:1V
HH	1.3	1.3H:1V
II	1.3	0.9H:1V
JJ	1.8	2.1H:1V
KK	1.7	7.1H:1V
LL	2.2	1.0H:1V

Slope Stability Assessment

Based on the above-noted field observations, and in accordance with Table 4.2 of the Ontario Ministry of Natural Resource *Technical Guide – River and Stream Systems: Erosion Hazard Limit* (2002), it has been determined that all slope sections present a slope instability rating value exceeding 35. Therefore, the slopes were assessed using the methodology provided by the MNR for slopes in confined channels with “moderate potential for instability” and in accordance with the City of Ottawa’s *Slope Stability Guidelines for Development Application in the City of Ottawa* (2004).

The analyses of the stability of the slopes were carried out using SLIDE, a computer program which permits a two-dimensional slope stability analysis using several methods including the Bishop’s method, which is a widely used and accepted analysis method. The program calculates a factor of safety, which represents the ratio of the forces resisting failure to those favoring failure. Theoretically, a factor of safety of 1.0 represents a condition where the slope is stable.

However, due to intrinsic limitations of the calculation methods and the variability of the subsoil and groundwater conditions, a factor of safety greater than one is usually required to ascertain that the risks of failure are acceptable. A minimum factor of safety of 1.5 is generally recommended for conditions where the failure of the slope would endanger permanent structures.

The cross-sections were analyzed based on the existing conditions observed during our site visit and review of the subgrade information collected during our geotechnical investigation. The slope profiles were modeled based on topographic information obtained by Paterson field personnel using a high-precision handheld GPS unit and supplemented with publicly available LiDAR information.

The location of the cross-sections was conservatively chosen to analyze the worst-case scenarios encountered throughout the subject site, from a slope stability perspective. Further, observations included in the *Fluvial Geomorphology Study – Tewin Lands: Existing Conditions Summary Report – Bear Brook and Ramsay Creek Watersheds* dated September 18, 2024 and prepared by GEO-Morphix were also considered as part of our analysis and review. It should be noted that meander belt widths provided in the GEO-Morphix report are depicted on Drawing PG5827-4 through PG5827-8 – Limit of Hazard Lands Plan.

The slope stability analysis was completed at each slope cross-section under worst-case-scenario by assigning cohesive soils under fully saturated conditions. Subsoil conditions at the cross-sections were inferred based on boreholes nearest to the analyzed slope sections and general knowledge of the area's geology.

The effective strength soil parameters used for static analysis were chosen based on the subsoil information recovered during the geotechnical investigation. The effective strength soil parameters used for static analysis are presented in Table 12.

Table 12 - Effective Strength Soil and Material Parameters (Static Analysis)

Soil Layer	Unit Weight (kN/m^3)	Friction Angle (degrees)	Cohesion (kPa)
Brown Silty Clay	17	33	5
Grey Silty Clay	16	33	10

The total strength parameters for seismic analysis were chosen based on the in situ, undrained shear strengths recovered within the boreholes completed at the time of our geotechnical investigation and based on our general knowledge of the geology in the area. The strength parameters used for seismic analysis at the slope cross-sections are presented in Table 13 below.

Table 13 - Total Strength Soil and Material Parameters (Seismic Analysis)

Soil Layer	Unit Weight (kN/m^3)	Friction Angle (degrees)	Undrained Shear Strength (kPa)
Brown Silty Clay	17	-	80
Grey Silty Clay	16	-	20

The parameters selected are considered conservative of strength estimates for the subsoil profiles present throughout the subject site. Relatively low and consistent shear strengths were selected for undrained analysis of slopes in seismic loading scenarios. Typical and appropriate parameters were selected for drained/static loading analysis of the subject slopes. Based on this, although the parameters are relatively uniform for the sections, they are considered appropriate and conservative for analyzing the subject slopes from a geotechnical perspective.

Static Loading Analysis

The factor of safety was found to be greater than 1.5 at the majority of slope section with the exception of Section B located along the Smith-Gooding Municipal Drain and Section BB located along the Johnston Municipal Drain. As such, a stable slope setback of 2 m was provided to each of these sections to provide the minimum distance to attain a factor of safety of 1.5 for the static loading scenario.

Seismic Loading Analysis

An analysis considering seismic loading and the groundwater at ground surface was also completed. A horizontal acceleration of 0.16g was considered for all slopes. This acceleration is considered as half of the peak (horizontal) ground acceleration (PGA) of 0.32g. A factor of safety of 1.1 is considered to be satisfactory for stability analyses including seismic loading.

The results indicated the factor of safety exceeded 1.1 at all slope sections analyzed for stability analyses considering seismic loading.

Limit of Hazard Lands

Based on our review, the slopes evaluated as part of this assessment are considered stable from a geotechnical perspective. Since the slopes are in close proximity to active watercourses, toe erosion is considered to be a major factor impacting slope stability. The majority of the watercourse alignments did not appear to be impacted by active erosion. However, some signs of active erosion were observed during the field assessment.

Severity of erosion generally depended on channel geometry and alignment that would be favorable to be producing more turbulent flow patterns along the channels when water levels would be at their highest. Less severe erosion was observed along relatively straight and long portions of channels and consisted of occasional small patches of loss of vegetation along the bank face.

This was mostly observed throughout the Smith-Gooding municipal drain west of 5055 Piperville Road, the Johnston municipal drain and ditches throughout 4828 Piperville Road.

Notable erosion was observed in areas where several consecutive sharp meander bends in the watercourse alignment occurred within a relatively short distance. This was generally observed throughout the creek west of Farmers Way (area of Sections Y, Z, AA, BB, CC, DD, EE, JJ, KK) and consisted of some undercutting at the toe of slope or edge of the bank along the watercourse. This was also observed as areas where a relatively shallow portion of the bank sidewalls along the channel would consist of relatively bare soil with a small amount of mature vegetation. Some undercutting was observed where the watercourse extended much deeper than the top of the abutting bank throughout the area of the Smith-Gooding municipal drain throughout 5055 Piperville Road.

Based on these observations, channel measurements and the results of slope stability analysis, Paterson assigned a Limit of Hazard Lands setback from the observed top of slope alignment. The Limit of Hazard Lands is a setback formed by a combination of allowances considering stable slope, toe erosion and erosion access. The allowances were selected based on our field observations and in accordance with the City of Ottawa's *Slope Stability Guidelines for Development Applications* (2004) and the Ministry of Natural Resource's *Technical Guide – River and Stream Systems: Erosion Hazard Limit* (2002).

Where the subject slopes have been identified to form unconfined systems by the project geomorphologist, the erosion hazard limit is recommended to consist of the greater of the Limit of Hazard Lands setback provided herein, the meander belt width provided by the project geomorphologist, or other setback exceeding the aforementioned erosion hazard limits.

The Limit of Hazard Lands setbacks assigned by Paterson provided for each slope section is summarized in Table 14.

Table 14 – Summary of Limit of Hazard Lands Setbacks

Smith-Gooding Municipal Drain – West of Anderson Road

Cross Section ID	Stable Slope Allowance (m)	Toe Erosion Allowance (m)	Erosion Access Allowance (m)	Limit of Hazard Lands Setback (m)
A, C, D, E, F, G, H, LL	0	8	6	14
B	2	8	6	16

Smith-Gooding Municipal Drain – East of Anderson Road

Cross Section ID	Stable Slope Allowance (m)	Toe Erosion Allowance (m)	Erosion Access Allowance (m)	Limit of Hazard Lands Setback (m)
K, L, M, N, O, P, Q, R, II	0	8	6	14

Ramsey Creek – Leitrim Road to Anderson Road

Cross Section ID	Stable Slope Allowance (m)	Toe Erosion Allowance (m)	Erosion Access Allowance (m)	Limit of Hazard Lands Setback (m)
I, J	0	5	6	11

Johnston Municipal Drain – East of Anderson Road

Cross Section ID	Stable Slope Allowance (m)	Toe Erosion Allowance (m)	Erosion Access Allowance (m)	Limit of Hazard Lands Setback (m)
GG, HH	0	8	6	14

Other Ditches and Creek East of Johnston Municipal Drain

Cross Section ID	Stable Slope Allowance (m)	Toe Erosion Allowance (m)	Erosion Access Allowance (m)	Limit of Hazard Lands Setback (m)
S, T, U, V, X, Y, Z	0	5	6	11
W, AA, CC, DD, EE, JJ, KK	0	8	6	14
BB	2	8	6	16

Notes: Reference should be made to Drawings PG5827-4 to PG5827-8 for the location of the Limit of Hazard Lands setback provided to the watercourses and slopes reviewed as part of this assessment.

The existing vegetation on the slope faces should not be removed as it contributes to the stability of the slope and reduces erosion. Based on our current assessment of the existing slopes and watercourse conditions, the Limit of Hazard Lands setback may be reduced by several considerations such as the re-shaping of unstable slopes/table lands, implementation of erosion protection systems, founding of structures below the zone of influence of unstable slopes and re-construction or re-alignment of the channels.

These strategies may be explored in further detail once future development plans are prepared and the proximity of development may be assessed against the existing Limit of Hazard Lands setback. It should be noted that the current Limit of Hazard Lands setback is based on existing conditions. Based on this, future proposed conditions such as grade raise height and building loads should be accounted for in a revised slope stability analysis where development will be in proximity to the current Limit of Hazard Lands setback. Further, future development conditions may adjust the existing slope conditions impacting the current Limit of Hazard Lands setback such that currently provided setback values may be adjusted to omit or increase current setback values.

Preliminary Landslide Risk Review

Paterson has completed a preliminary and for-information-purposes-only review of the expected level of study that may be required to be undertaken for future landslide hazard and risk assessments for slopes located throughout the subject site. However, it should be acknowledged that the nature of any future site-specific landslide study would be determined by City of Ottawa and/or associated review agencies/authorities and is not to the discretion of Paterson.

The site characteristics that impact landslide susceptibility for slopes comprised of marine clay generally consists of the proximity to mapped historic landslides, slope height and topographic relief, proximity to watercourses, overburden drift thickness, the presence of potential artesian groundwater conditions, the geometry and fluvial characteristics of watercourses and associated table valley corridors, and the sensitivity of the clay located throughout the area of the subject slopes.

Based on our review of the above-mentioned factors, it is our opinion that there are no criteria triggering retrogressive landslide risk concerns within the study area. Once the City has established their City-wide set of guidelines related to landslide risks, any mitigation requirements for downstream lands relating to the Tewin development would be considered and implemented where required through future phases of the development approvals process.

5.6 Low-Impact Development (LID) Design Considerations

Based on the results of our investigation, two relatively shallow subsurface conditions are present throughout the study area from an LID perspective. One condition consists of an approximately 0.5 to 3.7 m thick layer of mostly saturated silty sand overlying unweathered, impermeable, and saturated grey silty clay. The other consists of relatively impermeable weathered, partially saturated brown silty clay underlain by unweathered, impermeable, and saturated grey silty clay.

Due to the observed relatively low permeability and saturated nature of the majority of the soils located throughout the study area, infiltration-based LID measures are not expected to be generally adequate from a hydrogeological perspective. However, an evaluation of the effectiveness of LID measures is required once the development plans are further advanced.

While small amounts of groundwater recharge and discharge could potentially take place on a localized scale within the clay deposit, neither the topographical or geological conditions are suitable for recharge or discharge to be occurring on a large scale at the study area.

Based on this, there are limited surface techniques, such as rear yard catch basins, bioswales, amended topsoil finishes and other measures that can be used in conjunction with soak-away pits that may be considered suitable if designed in accordance with the hydrogeological soil parameters that Paterson can provide.

Stormwater retention systems, such as ponds and basins, are generally considered suitable for use throughout the study area given the relatively impervious nature of the subsoils. Stormwater ponds will naturally retain stormwater and will not generally require improvement by commercial impermeable liner products. Sandier subsoil sidewalls, if encountered, would likely require improvement to retain stormwater by the use of an impermeable clay liner or other liner products.

It is generally recommended Paterson advise on suitable LID strategies during the early stages of design of the future development. This would mitigate incorporating strategies that may be incompatible with the soils encountered at the study area prior to detailed design stages.

6.0 Recommendations

It is recommended that the following be carried out once preliminary and future details pertaining to site plans are prepared for the study area:

- Assess the requirement to undertake supplemental investigations and monitoring programs once future development designs have been established.
- Review preliminary and detailed grading and servicing plan(s) from a geotechnical perspective. This would include the potential for the use of LID's and other stormwater management facilities considered throughout the study area.
- Review all plans and drawings considering excavation works that would take place throughout the study area to assess suitability of existing coverage from a geotechnical perspective.
- Review the pertinence of findings and recommendations provided in this report for future works concerning soil and/or subsurface works and evaluate the consideration for supplemental investigations.

The following are generally recommended to be completed by Paterson at the time of future construction works throughout the study area:

- Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
- Observation of all subgrades prior to backfilling materials and placement of mud slabs.
- Field density tests to determine the level of compaction achieved.
- Sampling and testing of the bituminous concrete including mix design reviews.

A report confirming that these works have been conducted in general accordance with our recommendations could be issued upon the completion of a satisfactory inspection program by Paterson.

All excess soil must be handled as per *Ontario Regulation 406/19: On-Site and Excess Soil Management*.

7.0 Statement of Limitations

The recommendations provided are in accordance with the present understanding of the project. Paterson requests permission to review the recommendations when the drawings and specifications are completed.

A soils investigation is a limited sampling of a site. Should any conditions at the site be encountered which differ from those at the test locations, Paterson requests immediate notification to permit reassessment of our recommendations.

The recommendations provided herein should only be used by the design professionals associated with this project. They are not intended for contractors bidding on or undertaking the work. The latter should evaluate the factual information provided in this report and determine the suitability and completeness for their intended construction schedule and methods. Additional testing may be required for their purposes.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Taggart Investments and Algonquins of Ontario or their agents is not authorized without review by Paterson for the applicability of our recommendations to the alternative use of the report.

Paterson Group Inc.

Drew Petahtegoose, P. Eng.

David J. Gilbert, P.Eng.

LICENSED PROFESSIONAL ENGINEER
September 27, 2024
D. J. PETAHTEGOOSE
100563013
PROVINCE OF ONTARIO

Report Distribution:

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APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

CONE PENETRATION TEST HOLE PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

SUMMARY OF UNDRAINED SHEAR STRENGTH MEASUREMENTS

GRAIN SIZE DISTRIBUTION AND HYDROMETER TESTING RESULTS

ATTERBERG LIMITS TESTING RESULTS

SUMMARY OF CONSOLODATION TESTING RESULTS

CONSOLIDATION TESTING RESULTS

ANALYTICAL TESTING RESULTS

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

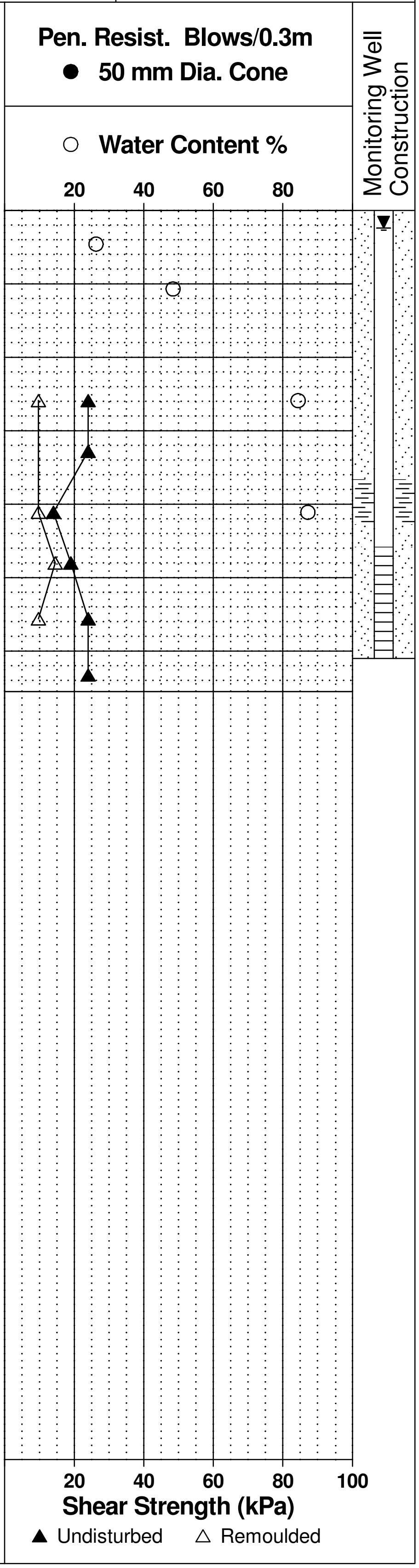
DATE March 14, 2022

FILE NO. PG5827

HOLE NO. BH 1-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD
GROUND SURFACE					
TOPSOIL 0.25		AU	1		
Brown **SILTY CLAY** with sand 0.69		SS	2	75	3
Very stiff to stiff, brown **SILTY CLAY**		TW	3	96	
- grey by 1.8m depth		SS	4	92	P
		SS	5	92	P
6.55		G	6		
End of Borehole (GWL @ 0.24m - May 24, 2022)					

DEPTH (m)	ELEV. (m)
0	79.73
1	78.73
2	77.73
3	76.73
4	75.73
5	74.73
6	73.73



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE March 14, 2022

FILE NO. PG5827

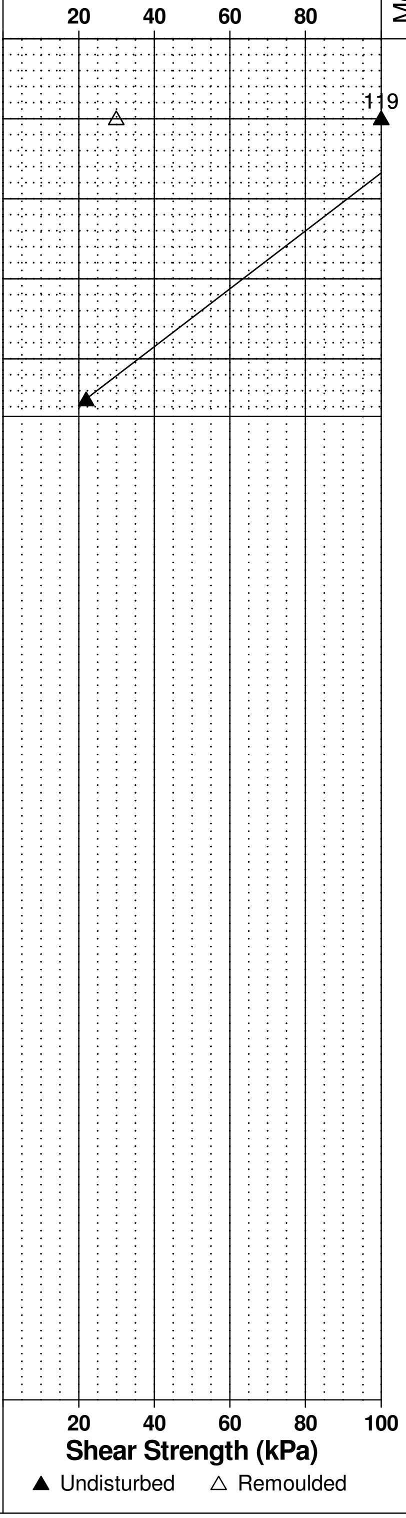
HOLE NO. BH 1A-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD
GROUND SURFACE					
TOPSOIL 0.25					
Brown **SILTY CLAY** with sand 0.69					
Very stiff to stiff, brown **SILTY CLAY** - grey by 1.8m depth		TW	1	92	
4.72					
End of Borehole					

DEPTH (m)	ELEV. (m)
0	79.73
1	78.73
2	77.73
3	76.73
4	75.73

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone

○ Water Content %



Monitoring Well Construction

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

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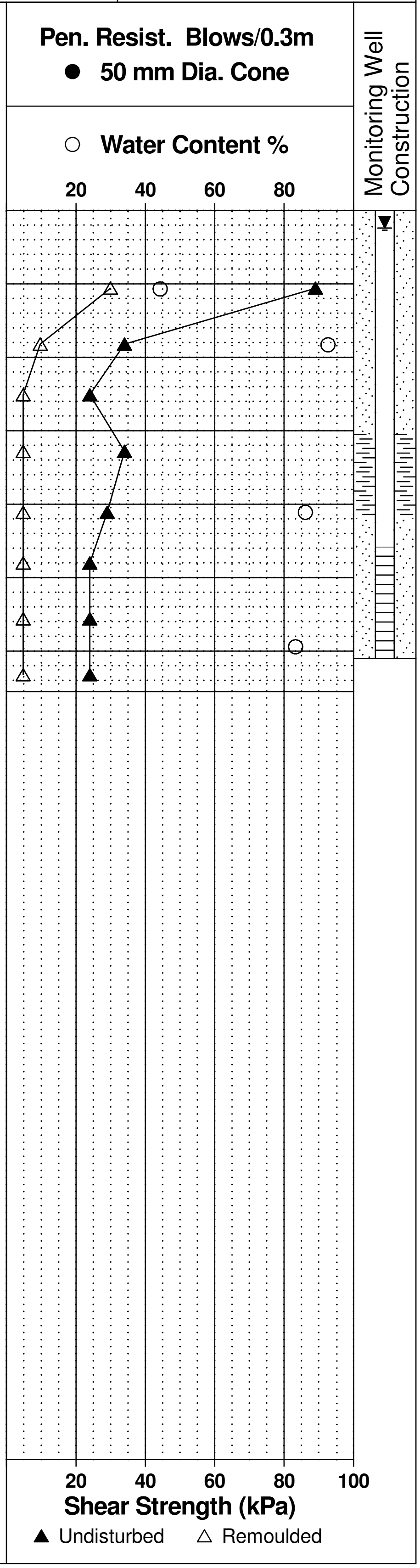
BORINGS BY CME-55 Low Clearance Drill

DATE March 14, 2022

FILE NO. **PG5827**

HOLE NO. **BH 2-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	79.64
TOPSOIL 0.30							
Brown **SILTY SAND** with clay 0.69		AU	1				
Very stiff to stiff, brown **SILTY CLAY**		SS	2	42	P	1	78.64
		SS	3	75	P	2	77.64
- firm to soft and grey by 1.5m depth							
						3	76.64
		SS	4	83	P	4	75.64
						5	74.64
		G	5			6	73.64
6.55							
End of Borehole							
(GWL @ 0.24m - May 24, 2022)							



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SOIL PROFILE AND TEST DATA

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Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE March 15, 2022

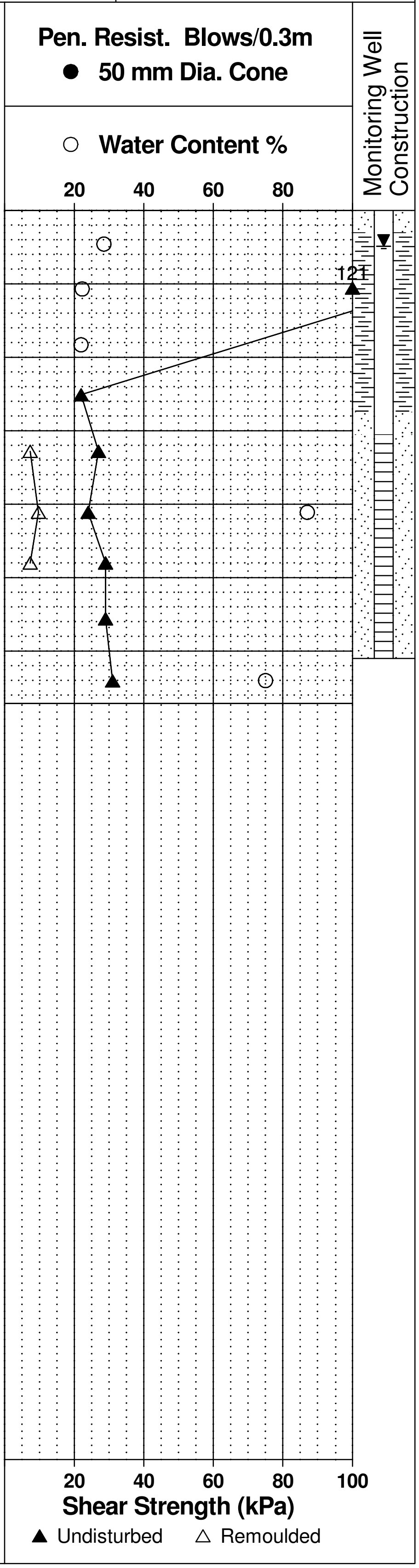
FILE NO. PG5827

HOLE NO. BH 3-22

SOIL DESCRIPTION	Depth to base (m)
GROUND SURFACE	
TOPSOIL	0.25
Very stiff, reddish brown **SILTY CLAY,** trace sand	1.07
Loose to compact, brown **SILTY SAND** - grey by 1.5m depth	1.98
Soft to firm, grey **SILTY CLAY**	6.71
End of Borehole (GWL @ 0.49m - May 24, 2022)	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	42	P
SS	3	58	26
SS	4	83	P
SS	5	92	P

DEPTH (m)	ELEV. (m)
0	79.60
1	78.60
2	77.60
3	76.60
4	75.60
5	74.60
6	73.60



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

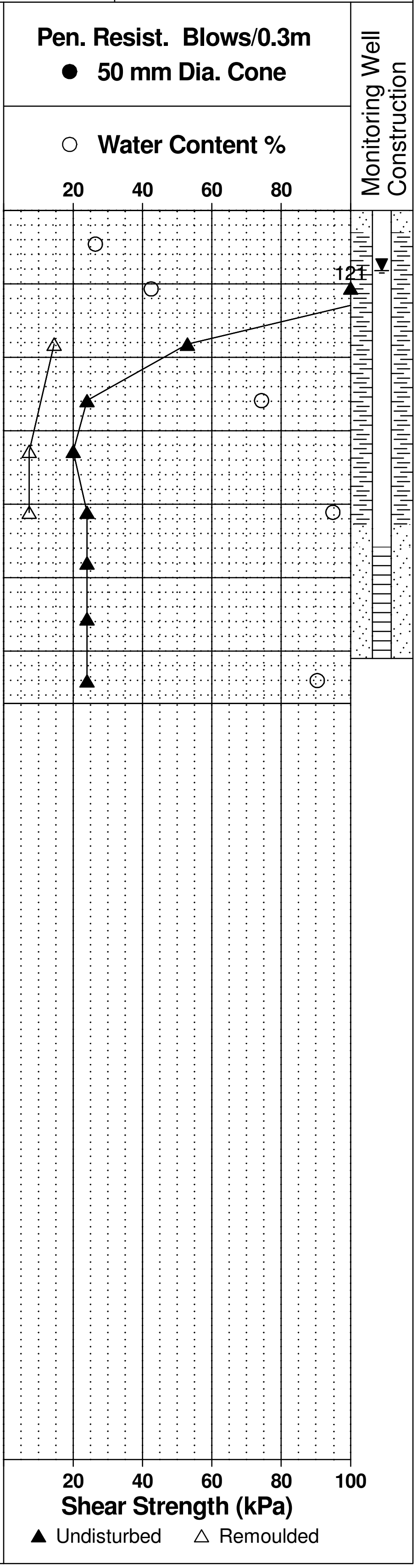
DATE March 15, 2022

FILE NO. PG5827

HOLE NO. BH 4-22

SOIL DESCRIPTION	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE				
TOPSOIL 0.28	AU	1		
Very stiff to stiff, brown **SILTY CLAY,** trace sand - soft and grey by 2.3m depth	SS	2	63	P
	SS	3	63	P
	SS	4	58	P
	SS	5	83	P
6.71	SS	6	83	P
End of Borehole (GWL @ 0.82m - May 24, 2022)				

DEPTH (m)	ELEV. (m)
0	78.95
1	77.95
2	76.95
3	75.95
4	74.95
5	73.95
6	72.95



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

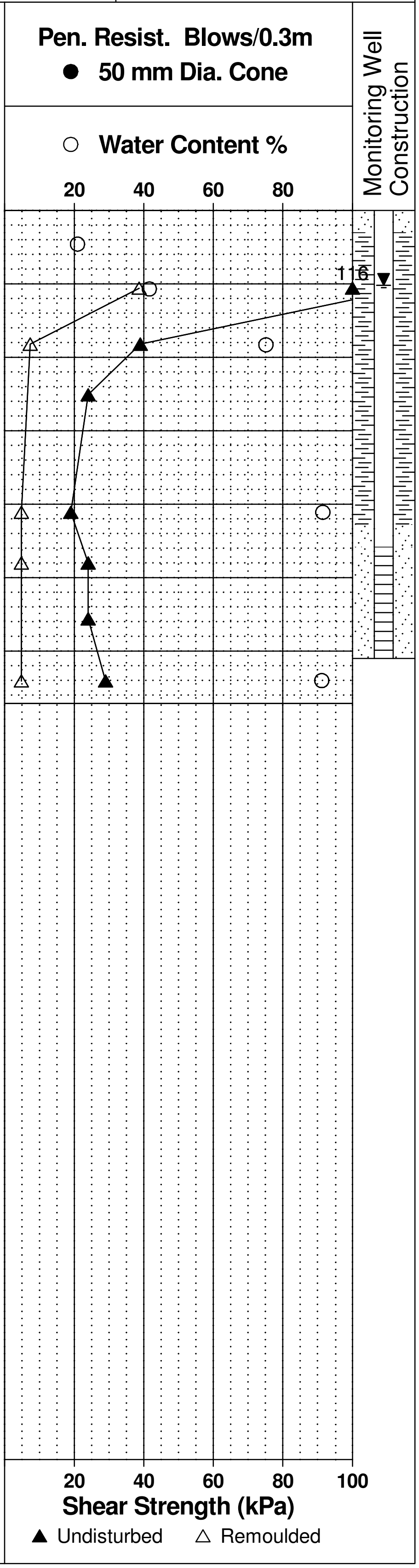
BORINGS BY CME-55 Low Clearance Drill

DATE March 15, 2022

FILE NO. **PG5827**

HOLE NO. **BH 5-22**

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	78.76
TOPSOIL 0.20	AU	1				
Loose, brown **SILTY SAND,** some clay 0.91	SS	2	58	P	1	77.76
Very stiff to stiff, brown **SILTY CLAY,** trace sand	SS	3	83	P	2	76.76
- firm to soft and grey by 1.5m depth					3	75.76
	TW	4	96			
	SS	5	67	P	4	74.76
					5	73.76
					6	72.76
6.71	SS	6	83	P		
End of Borehole						
(GWL @ 1.02m - May 24, 2022)						



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

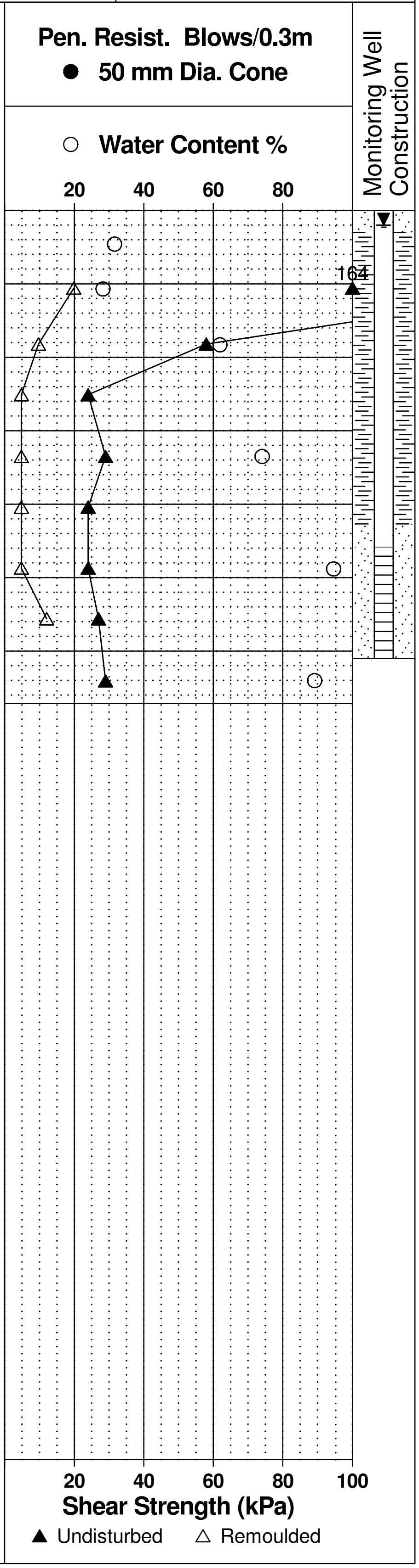
BORINGS BY CME-55 Low Clearance Drill

DATE March 16, 2022

FILE NO. **PG5827**

HOLE NO. **BH 6-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	82.11
TOPSOIL 0.25		AU	1				
Very stiff to stiff, brown **SILTY CLAY,** trace sand		SS	2	17	P	1	81.11
		SS	3	100	P	2	80.11
- sand seams from 0.7 to 1.5m depth						3	79.11
- firm and grey by 2.2m depth		SS	4	100	P	4	78.11
		SS	5	67	P	5	77.11
						6	76.11
6.71		SS	6	67	P		
End of Borehole							
(GWL @ 0.20m - May 27, 2022)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

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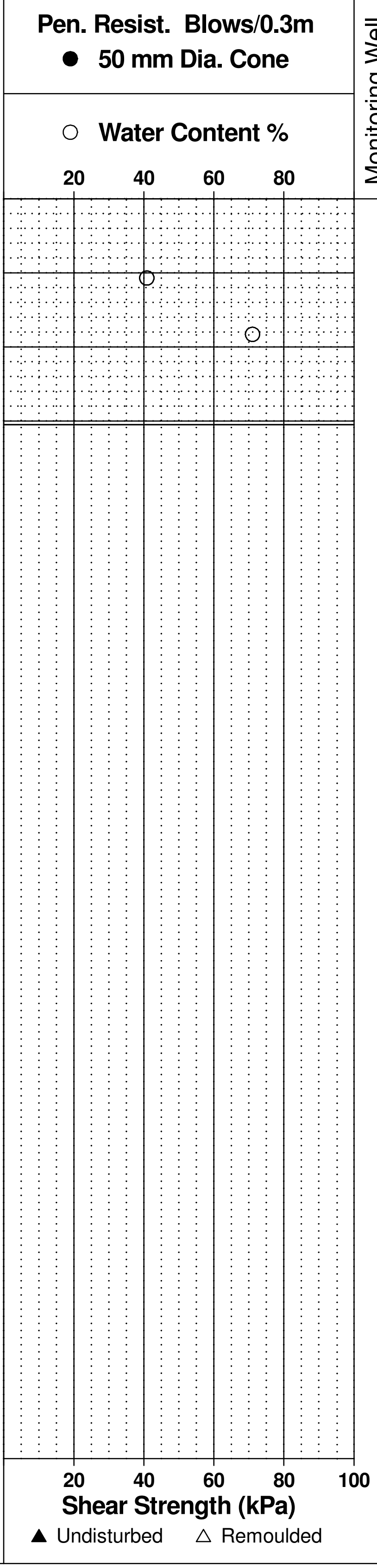
BORINGS BY CME-55 Low Clearance Drill

DATE March 16, 2022

FILE NO. PG5827

HOLE NO. BH 6A-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Monitoring Well Construction
GROUND SURFACE						0	82.11	
TOPSOIL 0.25								
Very stiff to stiff, brown **SILTY CLAY,** trace sand		SS	1	50	8	1	81.11	
- sand seams from 0.7 to 1.5m depth		SS	2	58	2	2	80.11	
		TW	3	88				
- firm and grey by 2.2m depth 3.05						3	79.11	
End of Borehole								



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5827

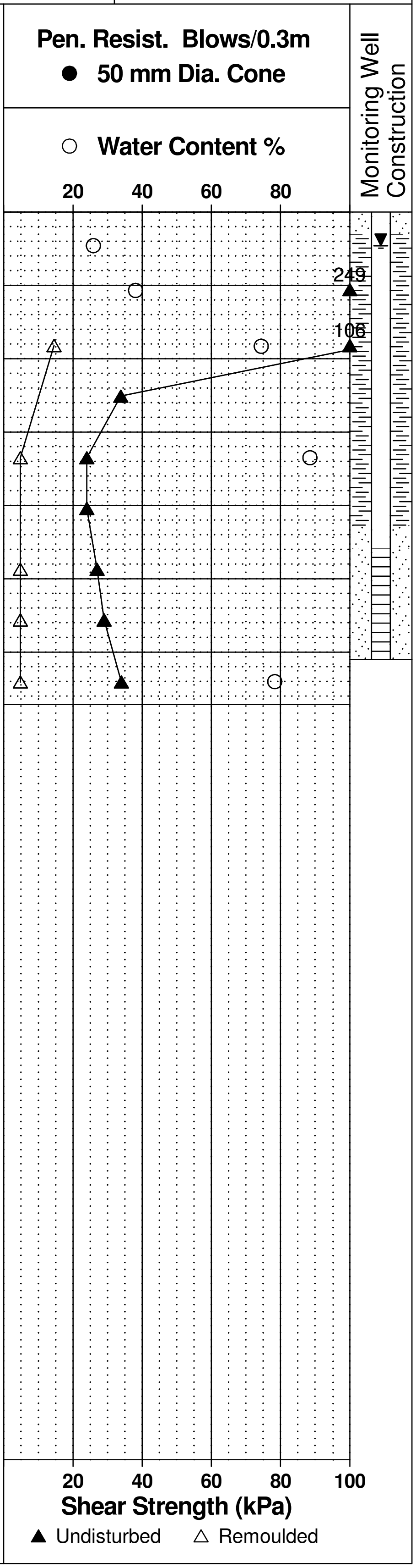
REMARKS

HOLE NO. BH 7-22

BORINGS BY CME-55 Low Clearance Drill

DATE March 16, 2022

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	81.48
TOPSOIL 0.28		AU	1				
Hard to stiff, brown **SILTY CLAY,** trace sand		SS	2	58	P	1	80.48
		SS	3	100	P	2	79.48
- some sand seams from 0.3 to 1.4m depth						3	78.48
- soft to firm and grey by 2.2m depth		SS	4	67	P	4	77.48
		SS	5	0	P	5	76.48
						6	75.48
6.71		SS	6	67	P		
End of Borehole							
(GWL @ 0.46m - May 27, 2022)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

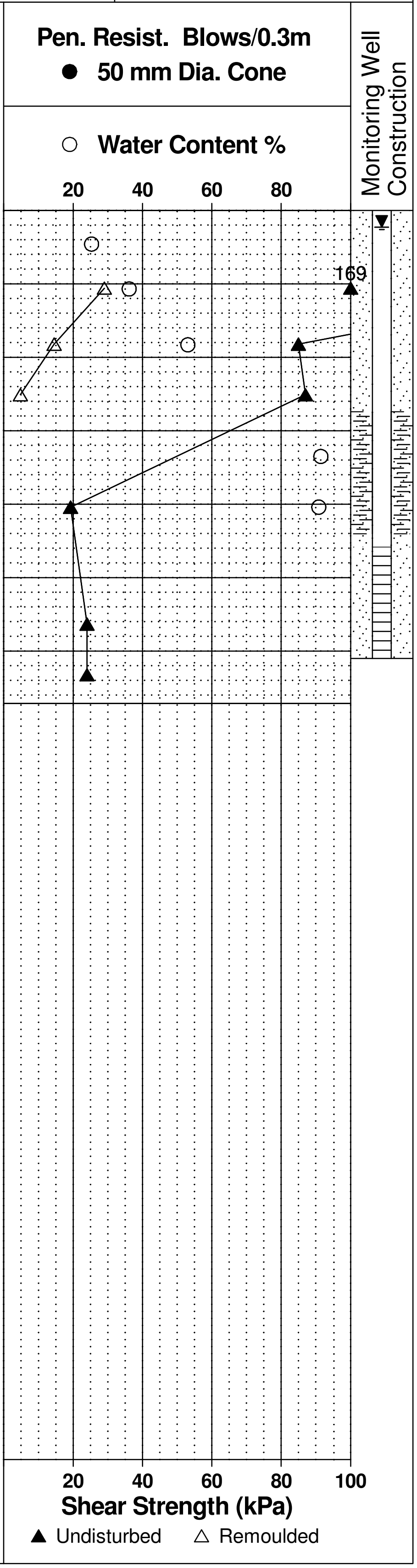
BORINGS BY CME-55 Low Clearance Drill

DATE March 17, 2022

FILE NO. PG5827

HOLE NO. BH 8-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	80.51
TOPSOIL 0.20							
Brown **SILTY SAND,** some clay 0.69		AU	1				
		SS	2	50	P	1	79.51
		SS	3	58	P	2	78.51
Very stiff to stiff, brown **SILTY CLAY,** trace sand						3	77.51
		TW	4	100			
- soft and grey by 3.8m depth						4	76.51
		TW	5			5	75.51
		SS	6	100	P	6	74.51
		G	7				
6.71							
End of Borehole							
(GWL @ 0.23m - May 27, 2022)							



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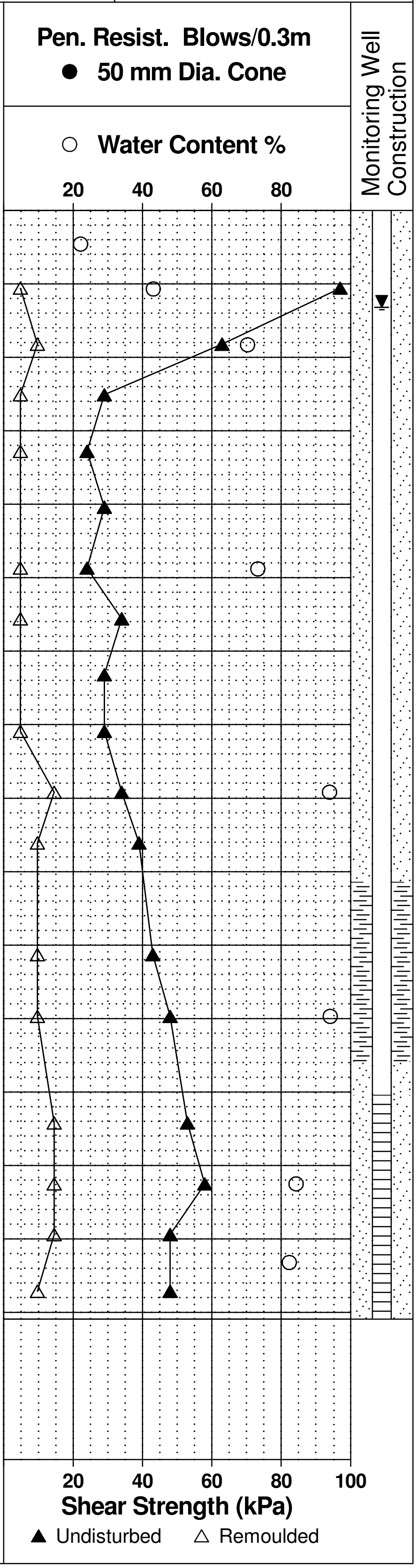
SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic
REMARKS
BORINGS BY CME-55 Low Clearance Drill
DATE March 18, 2022
FILE NO. **PG5827**
HOLE NO. **BH 9-22**

SOIL DESCRIPTION		SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	79.24
TOPSOIL	0.15	AU	1				
Loose to compact, brown **SILTY SAND** with clay	0.69	SS	2	12	P	1	78.24
Very stiff to stiff, brown **SILTY CLAY,** trace sand		SS	3	83	P	2	77.24
- firm and grey by 2.2m depth						3	76.24
						4	75.24
		SS	4	83	P	5	74.24
						6	73.24
						7	72.24
		SS	5	83	P	8	71.24
						9	70.24
		TW	6	92		10	69.24
		SS	7	83	P	11	68.24
		TW	8	100		12	67.24
		SS	9	83	P	13	66.24
		G	10			14	65.24
End of Borehole	15.09					15	64.24

(GWL @ 1.32m - May 24, 2022)



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE March 21, 2022

FILE NO. **PG5827**

HOLE NO. **BH10-22**

SOIL DESCRIPTION

GROUND SURFACE

TOPSOIL 0.15

Loose, reddish brown to brown **SILTY SAND**
- some clay by 1.4m depth 1.60

Very stiff to stiff, brown **SILTY CLAY**

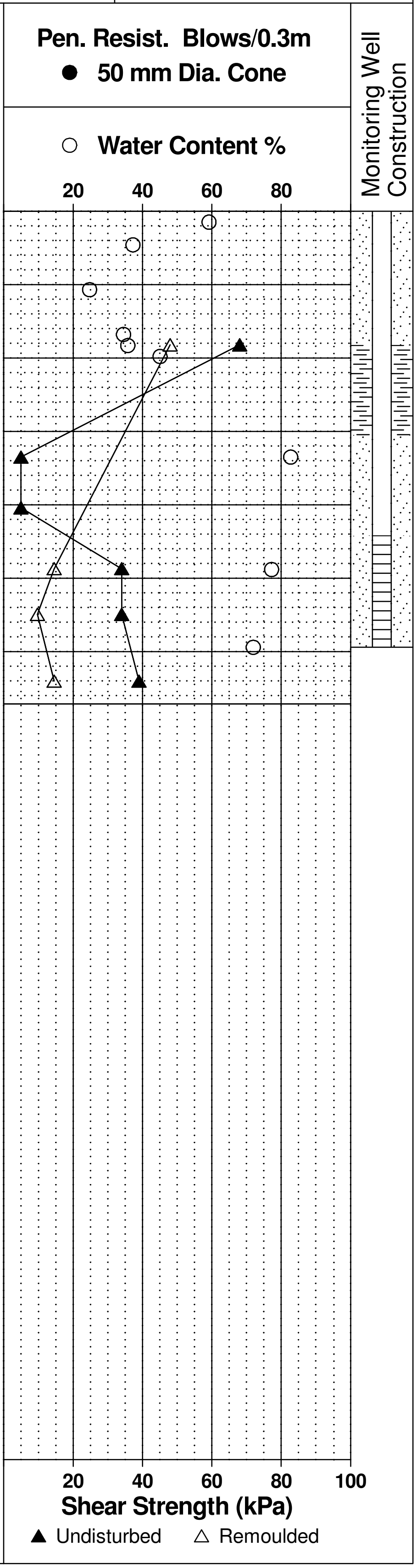
- very soft to firm and grey by 2.2m depth

6.71

Dynamic Cone Penetration Test commenced at 6.71m depth. Cone pushed up to 22.5m depth, borehole terminated.

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	42	1
SS	2	42	7
SS	3	100	P
TW	4	96	
SS	5	100	P
SS	6	100	P
G	7		

DEPTH (m)	ELEV. (m)
0	82.47
1	81.47
2	80.47
3	79.47
4	78.47
5	77.47
6	76.47



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

FILE NO. **PG5827**

REMARKS

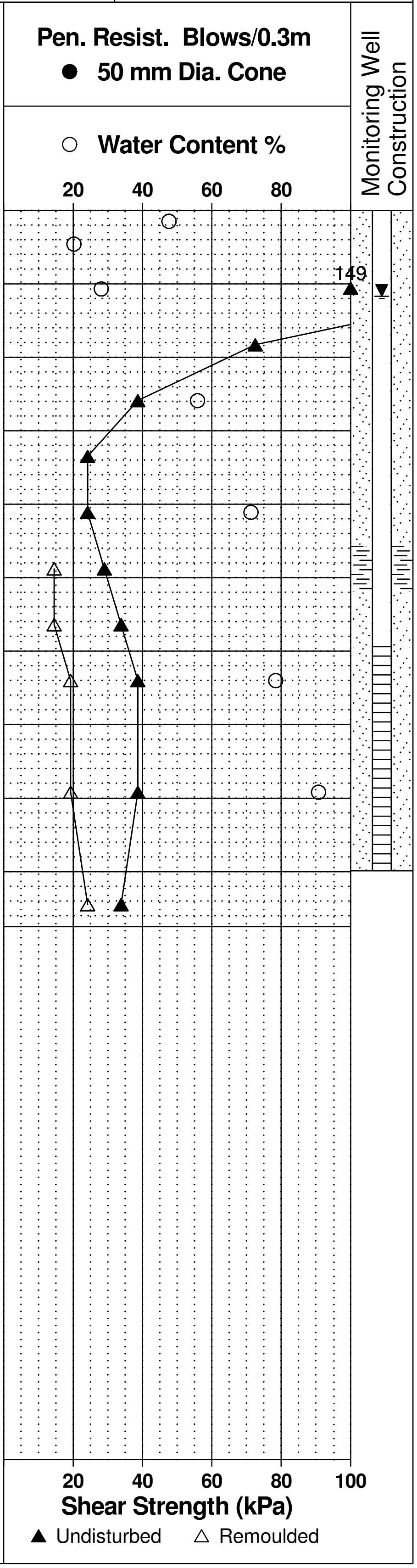
HOLE NO. **BH11-22**

BORINGS BY CME-55 Low Clearance Drill **DATE** March 21, 2022

SOIL DESCRIPTION	Depth (m)
GROUND SURFACE	
TOPSOIL	0.15
Loose, reddish brown to brown **SILTY SAND**	0.60
Very stiff to stiff, brown **SILTY CLAY,** trace sand - firm and grey by 2.2m depth	9.75
End of Borehole (GWL @ 1.17m - May 27, 2022)	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	42	5
SS	2	58	P
SS	3	100	P
SS	4	100	P
SS	5	100	P
TW	6	96	
SS	7	67	P
TW	8	100	

DEPTH (m)	ELEV. (m)
0	81.71
1	80.71
2	79.71
3	78.71
4	77.71
5	76.71
6	75.71
7	74.71
8	73.71
9	72.71



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE March 22, 2022

FILE NO. PG5827

HOLE NO. BH12-22

SOIL DESCRIPTION

GROUND SURFACE

TOPSOIL 0.20

Loose, reddish brown to brown **SILTY SAND** 0.69

Very stiff to stiff, brown **SILTY CLAY,** some to trace sand

- firm to soft and grey by 1.8m depth

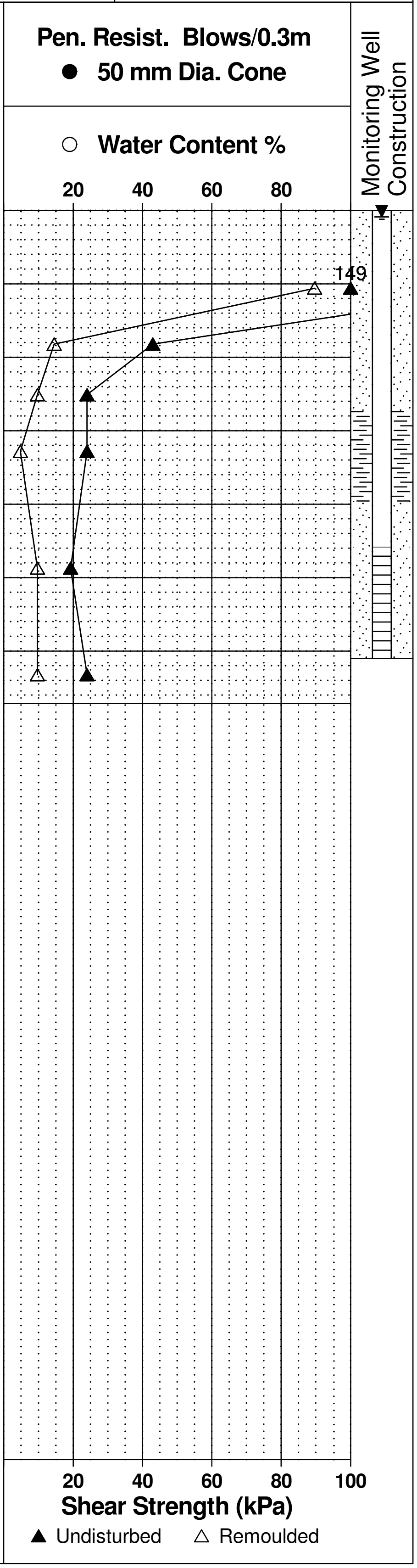
6.71

Dynamic Cone Penetration Test commenced at 6.71m depth. Cone pushed up to 13.5m depth, borehole terminated.

(GWL @ 0.09m - May 27, 2022)

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	8	3
SS	2	12	2
SS	3	75	P
TW	4	100	
SS	5	100	P
TW	6	100	
G	7		

DEPTH (m)	ELEV. (m)
0	80.02
1	79.02
2	78.02
3	77.02
4	76.02
5	75.02
6	74.02



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SOIL PROFILE AND TEST DATA

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Proposed Mixed-Use Community Development
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DATUM Geodetic

REMARKS

BORINGS BY Track-Mount Power Auger

DATE March 28, 2022

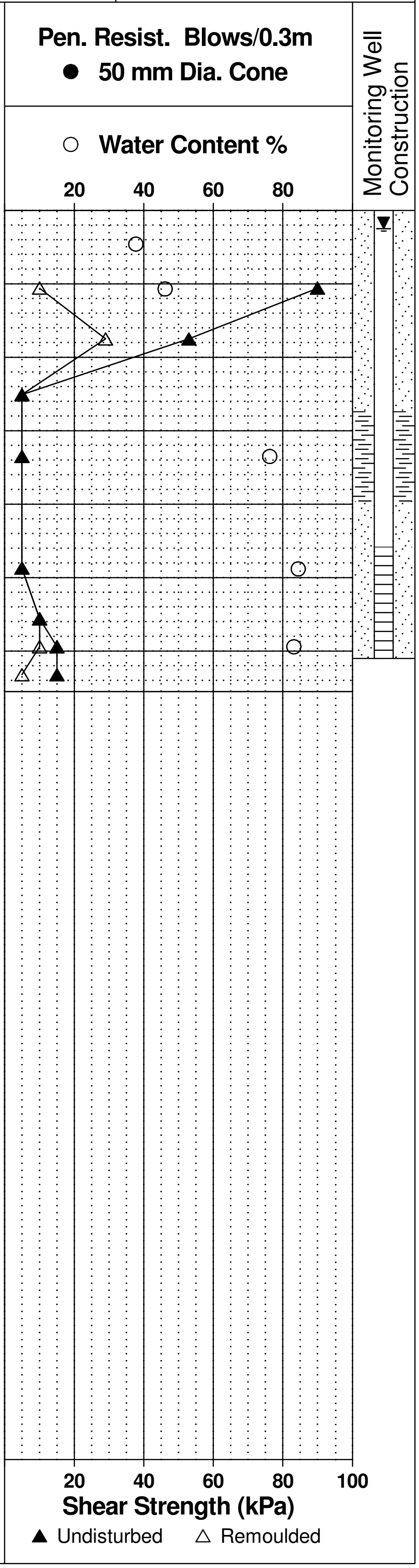
FILE NO. PG5827

HOLE NO. BH13-22

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	80.97
TOPSOIL 0.20						
Brown **SILTY SAND** with clay 0.76	G	1				
Very stiff to stiff, brown **SILTY CLAY,** trace sand	SS	2	67	P	1	79.97
- very soft to soft and grey by 2.0m depth					2	78.97
	SS	3	75	P	3	77.97
					4	76.97
	SS	4	100	P	5	75.97
	G	5			6	74.97
6.55						

End of Borehole

(GWL @ 0.25m - May 27, 2022)



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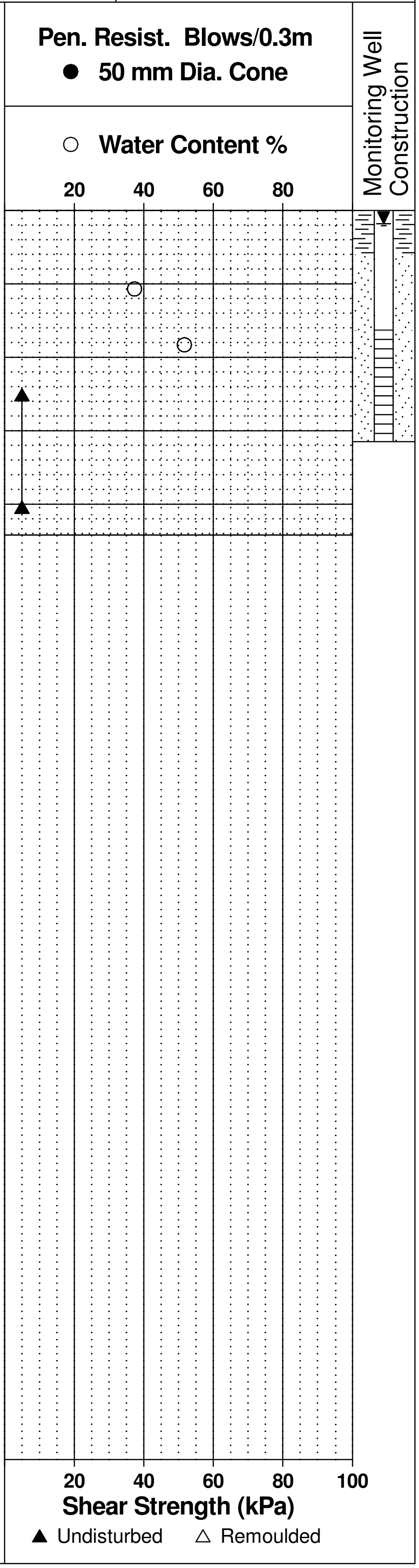
BORINGS BY Track-Mount Power Auger

DATE March 28, 2022

FILE NO. **PG5827**

HOLE NO. **BH13A-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	80.97
TOPSOIL 0.20							
Brown **SILTY SAND** with clay 0.76							
		SS	1	42	P	1	79.97
		SS	2	83	P	2	78.97
Very stiff to stiff, brown **SILTY CLAY,** trace sand - very soft to soft and grey by 2.0m depth						3	77.97
		TW	3	92		4	76.97
4.42							
End of Borehole (GWL @ 0.18m - May 27, 2022)							



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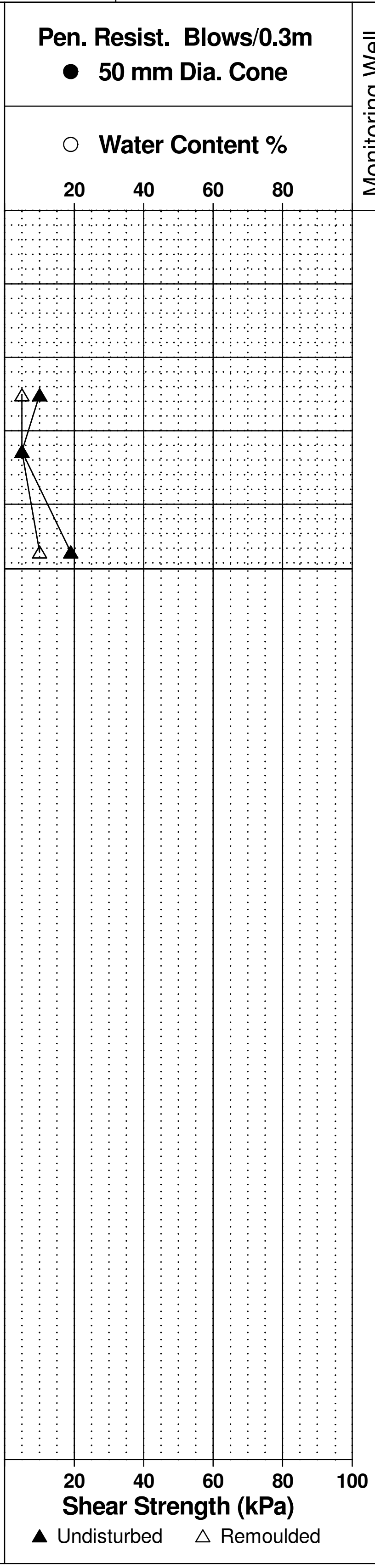
BORINGS BY Track-Mount Power Auger

DATE March 30, 2022

FILE NO. **PG5827**

HOLE NO. **BH13B-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Monitoring Well Construction
GROUND SURFACE						0	80.97	
OVERBURDEN						1	79.97	
2.29						2	78.97	
Very soft, grey **SILTY CLAY**	▨					3	77.97	
	▨	TW	1	100		4	76.97	
4.88 End of Borehole								



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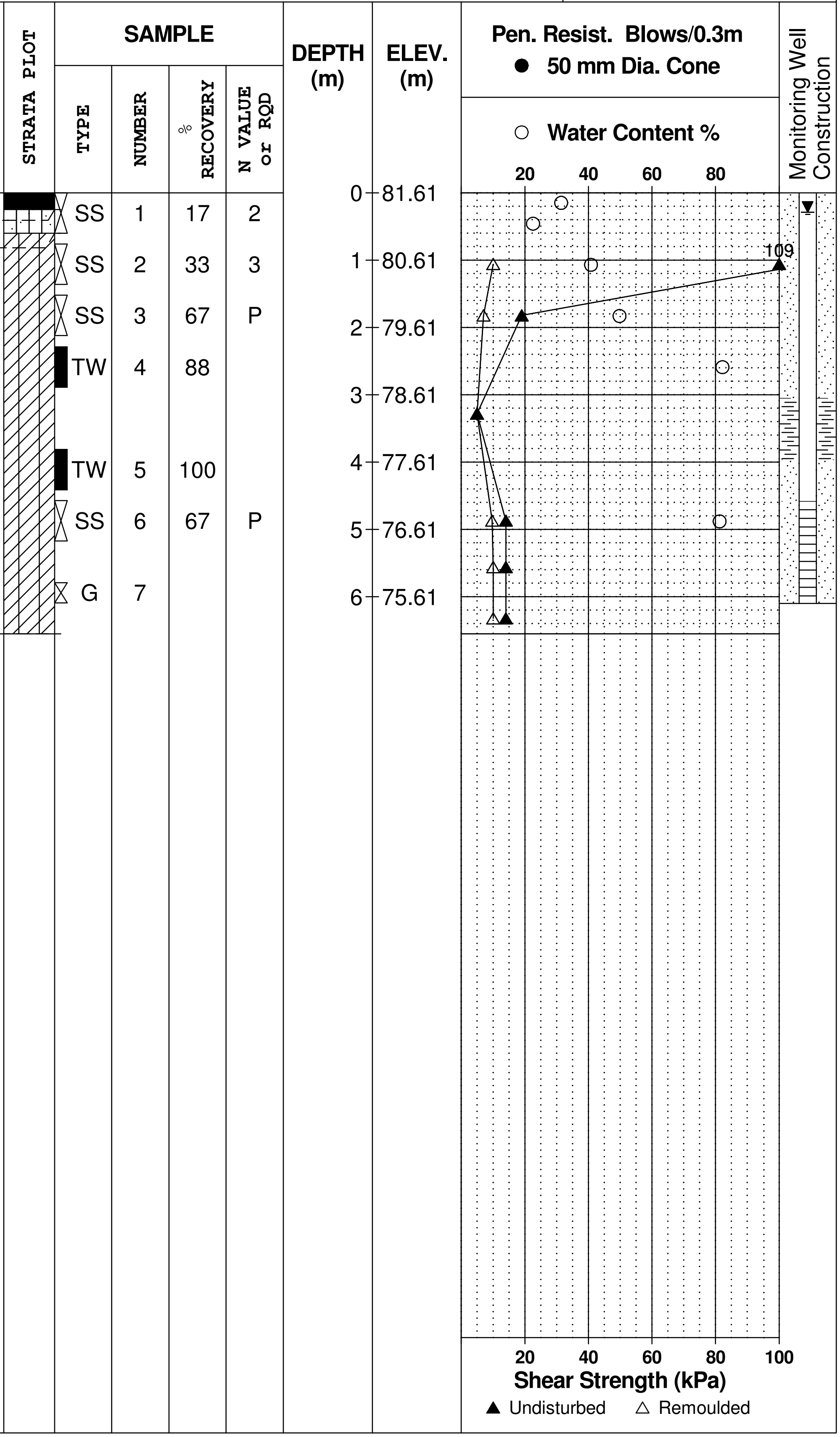
BORINGS BY Track-Mount Power Auger

DATE March 29, 2022

FILE NO. PG5827

HOLE NO. BH14-22

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						
TOPSOIL 0.25	SS	1	17	2	0	81.61
Brown **SILTY SAND,** trace clay 0.60						
Very stiff to stiff, brown **SILTY CLAY,** some sand	SS	2	33	3	1	80.61
	SS	3	67	P	2	79.61
- soft to very soft and grey by 1.6m depth	TW	4	88			
					3	78.61
	TW	5	100		4	77.61
	SS	6	67	P	5	76.61
	G	7			6	75.61
6.55						
End of Borehole						
(GWL @ 0.29m - May 27, 2022)						



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BORINGS BY Track-Mount Power Auger

DATE March 29, 2022

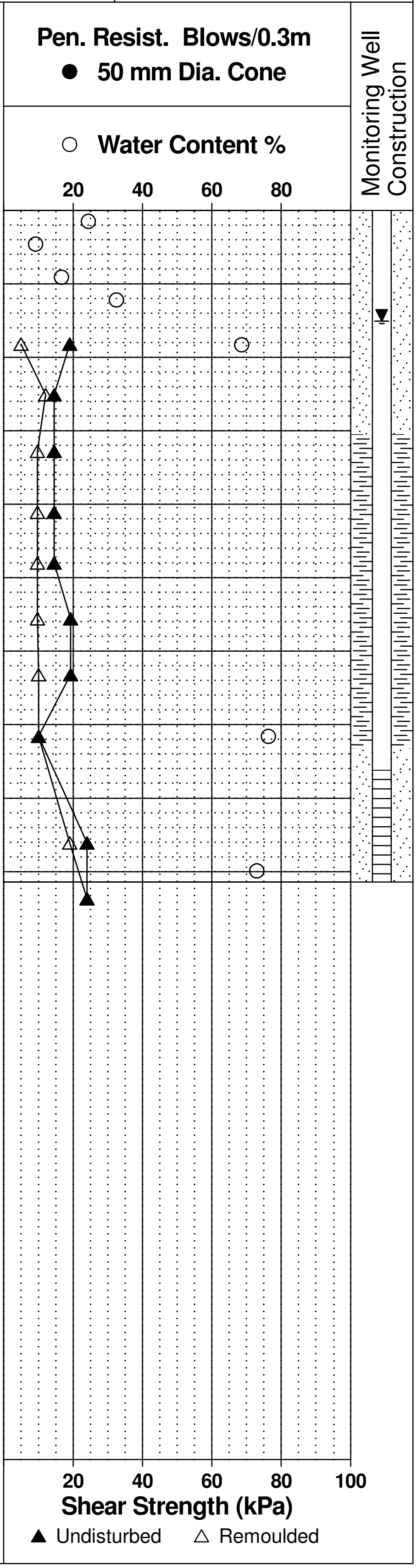
FILE NO. PG5827

HOLE NO. BH15-22

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	81.28
TOPSOIL 0.20	SS	1	25	6		
Loose, brown **SILTY SAND** 1.07	SS	2	50	4	1	80.28
Firm, brown **SILTY CLAY** - grey by 1.4m depth	SS	3	75	P	2	79.28
					3	78.28
	SS	4	8	P	4	77.28
					5	76.28
					6	75.28
	SS	5	100	P	7	74.28
	TW	6	100		8	73.28
9.14	G	7			9	72.28

Dynamic Cone Penetration Test commenced at 9.14m depth. Cone pushed up to 26.77m depth, borehole terminated.

(GWL @ 1.51m - May 27, 2022)



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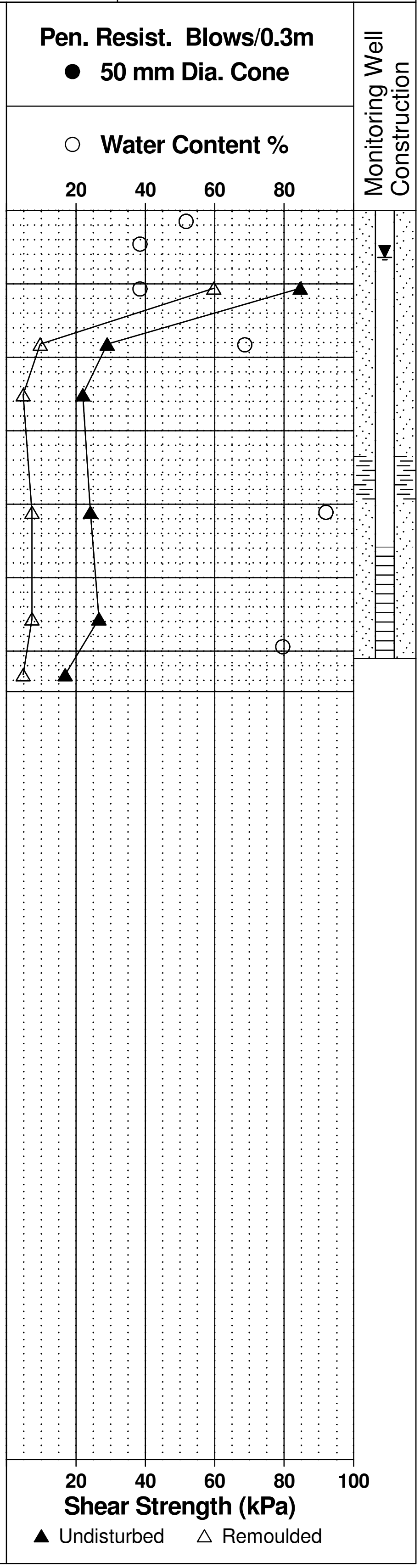
BORINGS BY Track-Mount Power Auger

DATE March 30, 2022

FILE NO. PG5827

HOLE NO. BH16-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	81.30
TOPSOIL 0.20		SS	1	50	2		
Brown **SILTY SAND** 0.25							
Very stiff to stiff, brown **SILTY CLAY**		SS	2	58	P	1	80.30
		SS	3	50	P	2	79.30
- firm and grey by1.7m depth							
						3	78.30
		TW	4	92			
		SS	5	67	P	4	77.30
		TW	6	96			
						5	76.30
		G	7			6	75.30
6.55							
End of Borehole							
(GWL @ 0.64m - May 27, 2022)							



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BORINGS BY Track-Mount Power Auger

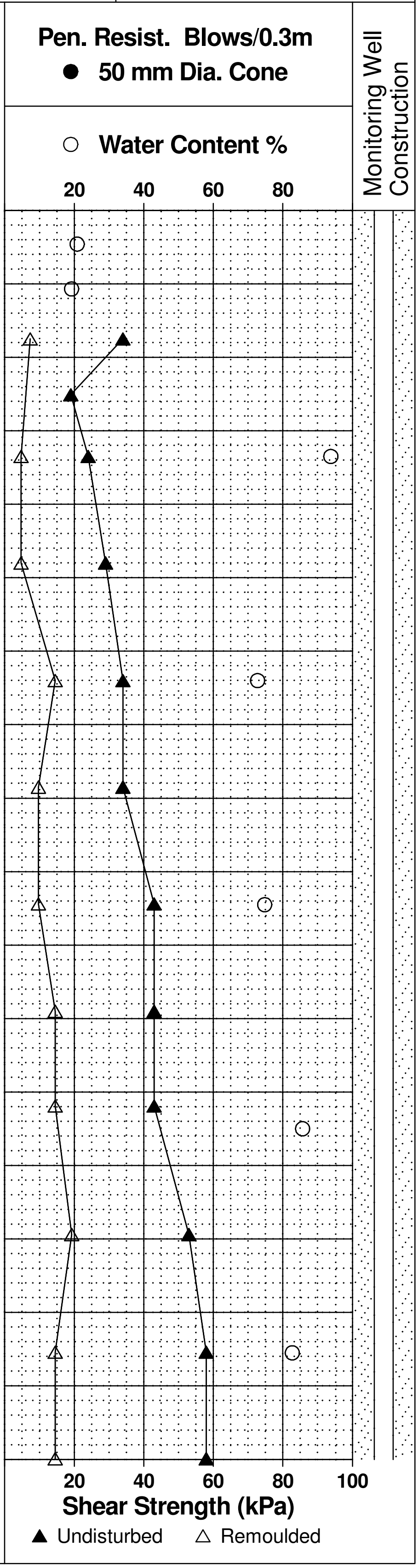
DATE June 9, 2022

FILE NO. **PG5827**

HOLE NO. **BH17-22**

SOIL DESCRIPTION	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE				
TOPSOIL 0.28				
Loose to compact, brown **SILTY SAND** with clay, trace gravel - grey by 0.7m depth 1.45	AU	1		
	AU	2		
Firm to stiff, grey **SILTY CLAY**	SS	3	100	P
	SS	4	100	P
	SS	5	0	P
	SS	6	100	P
	SS	7	83	P

DEPTH (m)	ELEV. (m)
0	82.33
1	81.33
2	80.33
3	79.33
4	78.33
5	77.33
6	76.33
7	75.33
8	74.33
9	73.33
10	72.33
11	71.33
12	70.33
13	69.33
14	68.33
15	67.33
16	66.33
17	65.33



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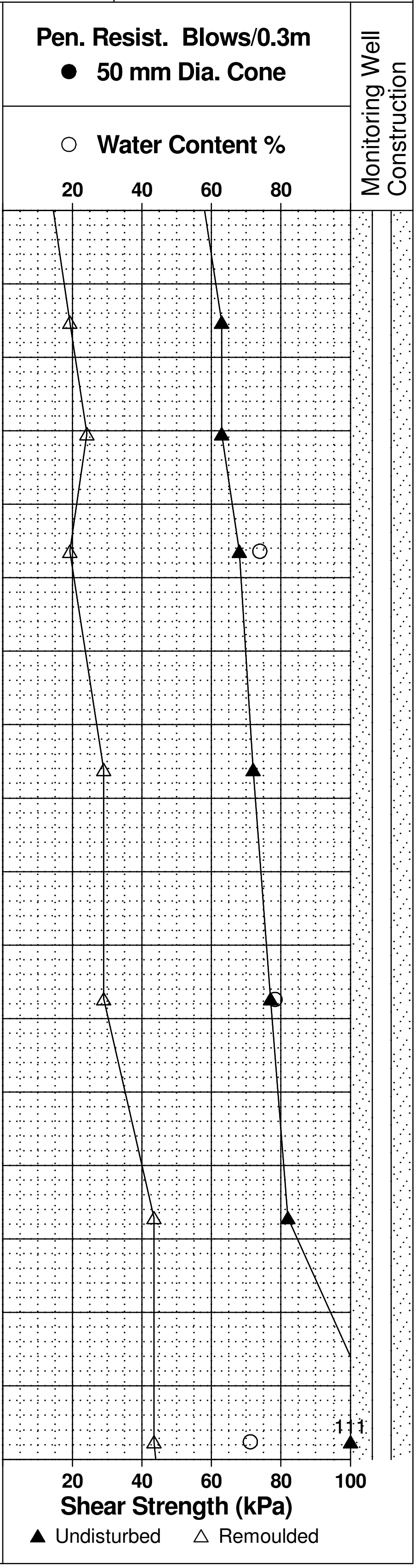
FILE NO. PG5827

HOLE NO. BH17-22

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					17	65.33
					18	64.33
					19	63.33
					20	62.33
					21	61.33
	SS	8	100	P		
					22	60.33
					23	59.33
					24	58.33
Firm to stiff, grey **SILTY CLAY**					25	57.33
					26	56.33
					27	55.33
	SS	9	100	P		
					28	54.33
					29	53.33
					30	52.33
					31	51.33
					32	50.33
					33	49.33
	G	10				
					34	48.33



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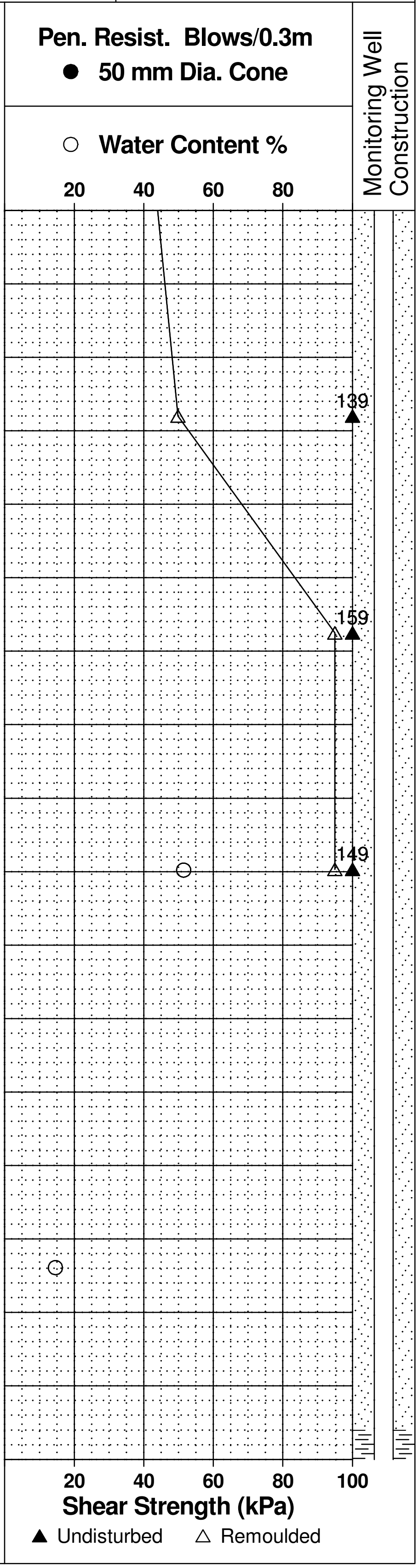
FILE NO. PG5827

HOLE NO. BH17-22

SOIL DESCRIPTION GROUND SURFACE	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
Stiff to very stiff, grey **SILTY CLAY**						34	48.33
						35	47.33
						36	46.33
						37	45.33
						38	44.33
						39	43.33
						40	42.33
						41	41.33
						42	40.33
		SS	11	67	P	43	39.33
						44	38.33
						45	37.33
46.23						46	36.33
GLACIAL TILL: Very dense, grey silty clay with sand, gravel, cobbles and boulders						47	35.33
						48	34.33
		SS	12	75	50+		
						49	33.33
						50	32.33
51.03						51	31.33



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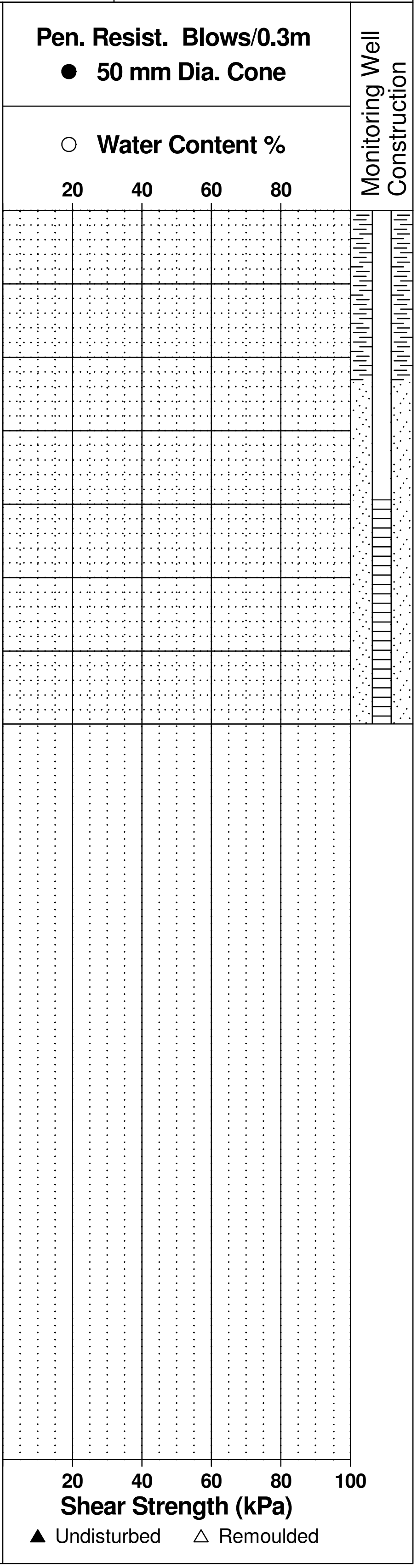
DATE June 9, 2022

FILE NO. PG5827

HOLE NO. BH17-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						51	31.33
BEDROCK: Very poor quality, black shale 51.97		RC	1	100	0	52	30.33
BEDROCK: Very good quality, black shale interbedded with grey limestone		RC	2	100	92	53	29.33
		RC	3	100	93	54	28.33
						55	27.33
		RC	4	100	100	56	26.33
		RC	5	100	95	57	25.33
57.99 End of Borehole							



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BORINGS BY Track-Mount Power Auger

DATE April 12, 2022

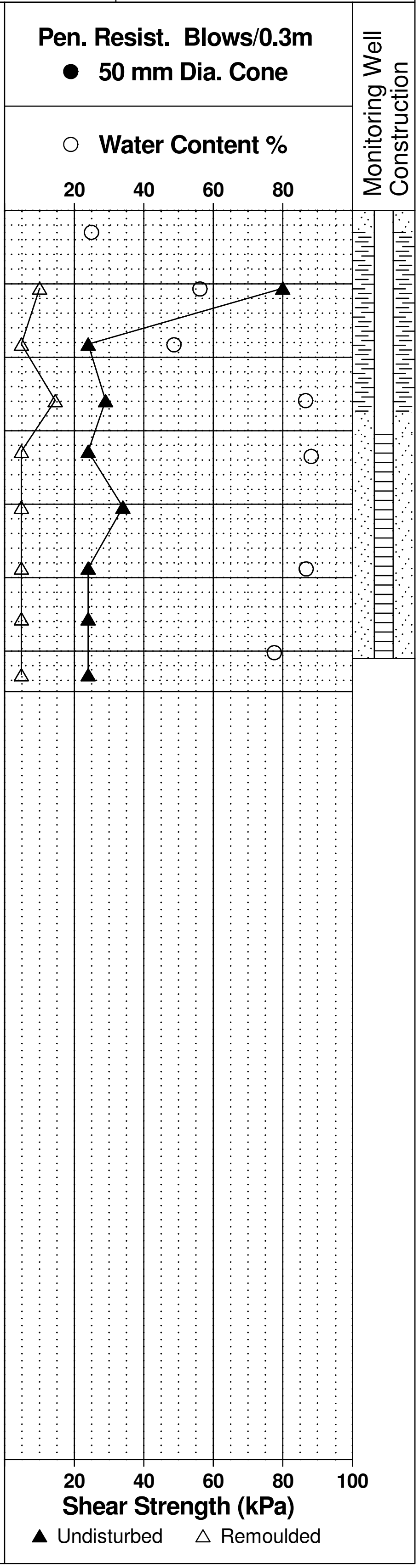
FILE NO. **PG5827**

HOLE NO. **BH18-22**

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	78.15
TOPSOIL 0.30	SS	1	42	3		
Very loose, brown **SILTY SAND** 0.69						
Stiff to firm, brown **SILTY CLAY**	SS	2	67	P	1	77.15
	SS	3	50	P	2	76.15
- soft to firm and grey by 1.4m depth	SS	4	100	P		
					3	75.15
	G	5				
	G	6			4	74.15
	SS	7	100	P	5	73.15
	G	8				
	G	9			6	72.15
6.55						

Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 13.84m depth, borehole terminated.

(GWL @ 0.44m - June 15, 2022)



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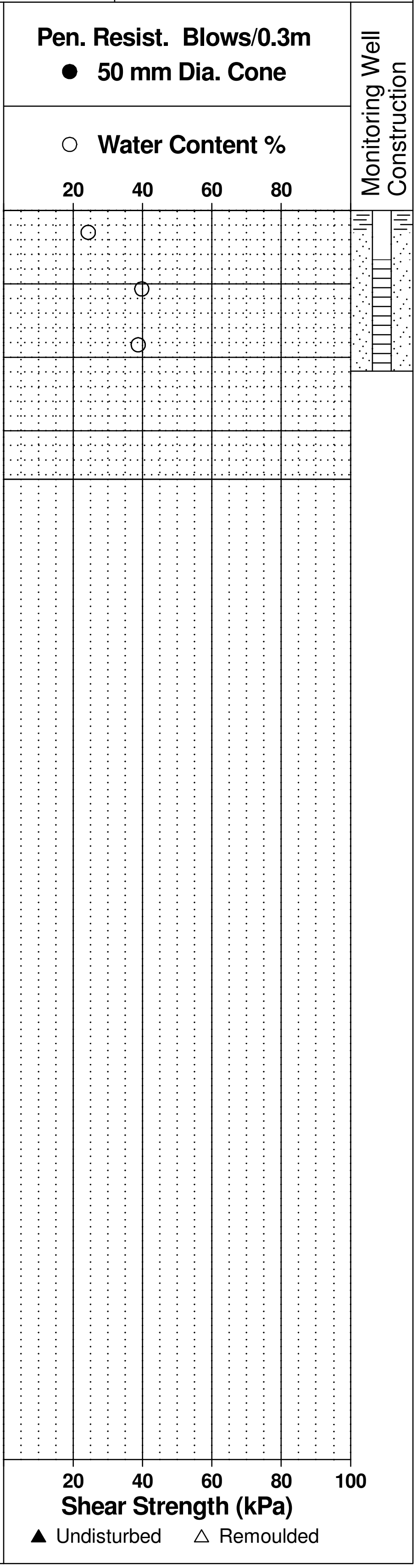
BORINGS BY Track-Mount Power Auger

DATE April 12, 2022

FILE NO. **PG5827**

HOLE NO. **BH18A-22**

SOIL DESCRIPTION	SAMPLE				DEPTH (m)	ELEV. (m)
	TYPE	NUMBER	% RECOVERY	N VALUE or RQD		
GROUND SURFACE					0	78.15
TOPSOIL 0.30	SS	1		3		
Very loose, brown **SILTY SAND** 0.69						
Stiff to firm, brown **SILTY CLAY**	SS	2	25	P	1	77.15
- soft to firm and grey by 1.4m depth	SS	3		P	2	76.15
					3	75.15
3.66	TW	4	62			
End of Borehole						
(GWL @ 0.52m - June 15, 2022)						



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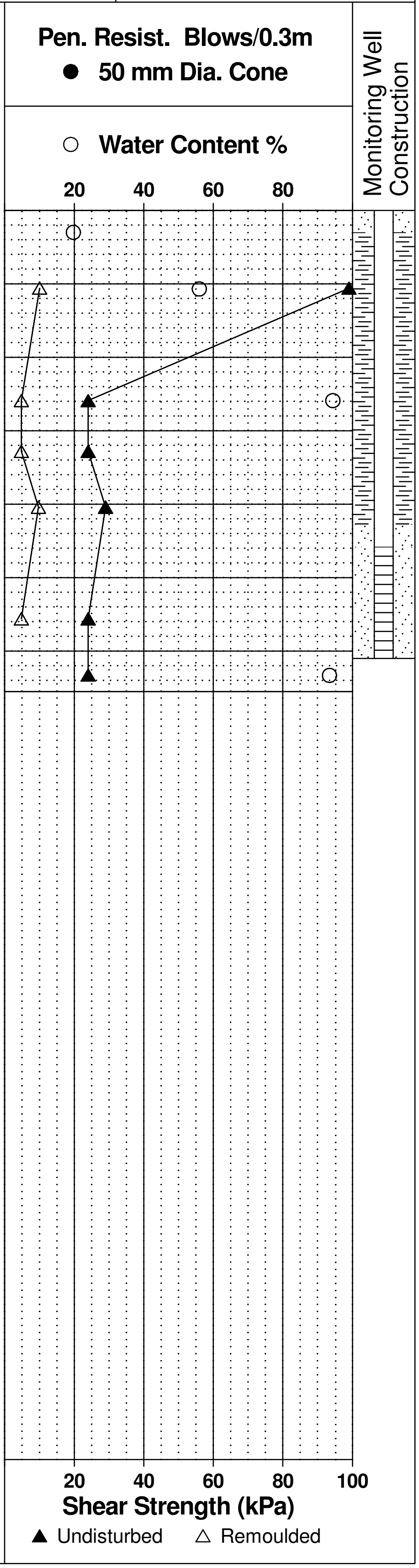
BORINGS BY Track-Mount Power Auger

DATE April 11, 2022

FILE NO. PG5827

HOLE NO. BH19-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	78.47
TOPSOIL 0.15		SS	1	33	2		
Very loose, brown **SILTY SAND** 0.69							
Stiff, brown **SILTY CLAY** with sand seams		SS	2	25	P	1	77.47
1.83		TW	3	100		2	76.47
Soft, grey **SILTY CLAY**		SS	4	100	P	3	75.47
		G	5				
		G	6			4	74.47
		TW	7	100		5	73.47
		G	8			6	72.47
6.55		G	9				
End of Borehole							
(GWL @ 0.50m - June 15, 2022)							



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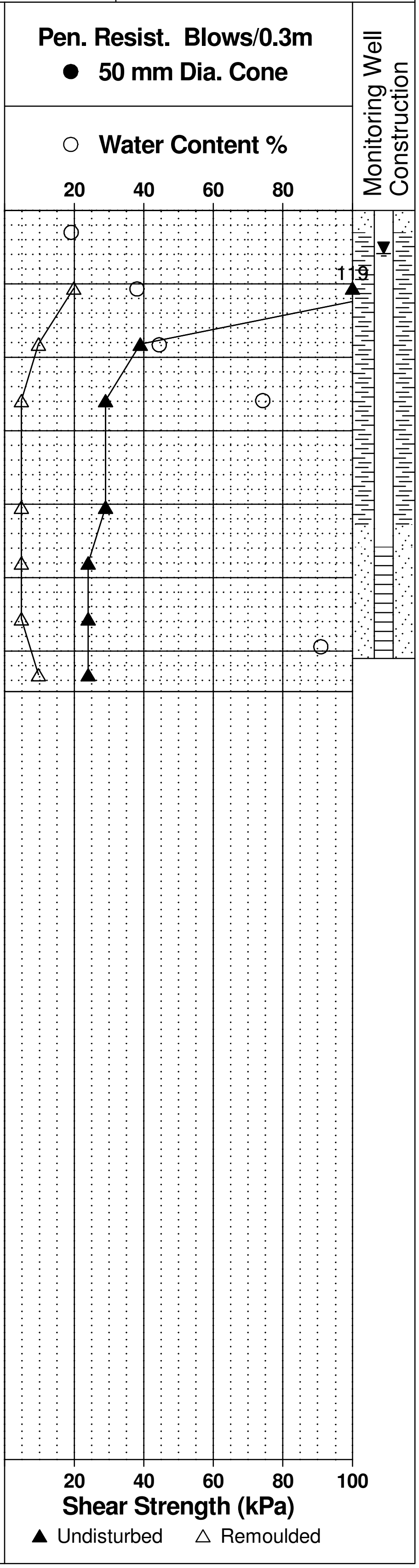
DATE April 12, 2022

FILE NO. **PG5827**

HOLE NO. **BH20-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	78.65
TOPSOIL 0.25		SS	1	58	4		
Loose, brown **SILTY SAND** 0.69							
Very stiff to stiff, brown **SILTY CLAY**		SS	2	58	P	1	77.65
		SS	3	100	P	2	76.65
- firm to soft and grey by 1.4m depth		SS	4	100	P		
		TW	5	100		3	75.65
		G	6			4	74.65
		G	7			5	73.65
		G	8				
		G	9			6	72.65
6.55							
End of Borehole							
(GWL @ 0.59m - May 25, 2022)							



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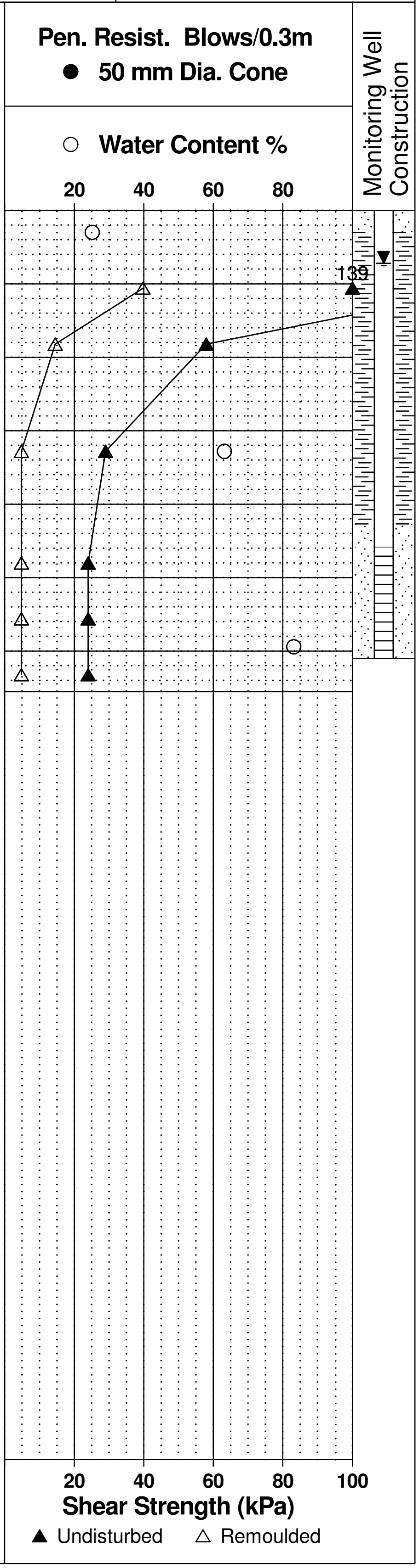
BORINGS BY Track-Mount Power Auger

DATE April 11, 2022

FILE NO. PG5827

HOLE NO. BH21-22

SOIL DESCRIPTION	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	79.17
TOPSOIL 0.25	SS	1	42	3		
Very loose, brown **SILTY SAND** 0.69						
Very stiff to stiff, brown **SILTY CLAY**	SS	2	0	P	1	78.17
	SS	3	0	P	2	77.17
- firm to soft and grey by 2.2m depth	TW	4	100			
	G	5			3	76.17
	TW	6	100		4	75.17
	G	7			5	74.17
	G	8				
6.55	G	9			6	73.17
End of Borehole						
(GWL @ 0.72m - May 27, 2022)						



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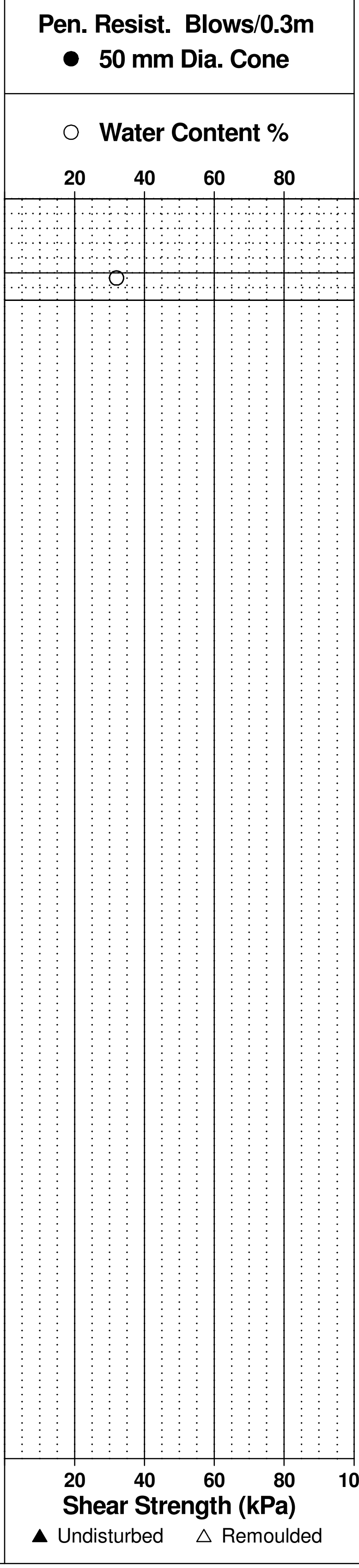
DATE April 12, 2022

FILE NO. PG5827

HOLE NO. BH21A-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Monitoring Well Construction
GROUND SURFACE						0	79.17	
TOPSOIL 0.25								
Very loose, brown **SILTY SAND** 0.69								
Very stiff to stiff, brown **SILTY CLAY** 1.37		SS	1	75	5	1	78.17	
End of Borehole								



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BORINGS BY Track-Mount Power Auger

DATE April 8, 2022

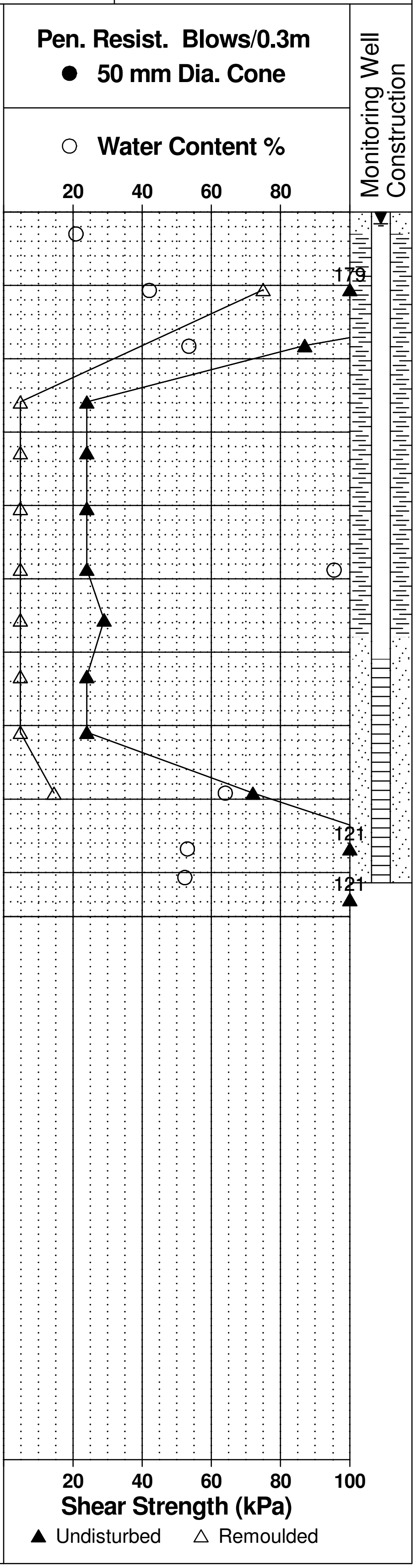
FILE NO. **PG5827**

HOLE NO. **BH22-22**

SOIL DESCRIPTION	Depth of change (m)
GROUND SURFACE	
TOPSOIL	0.15
Loose, brown **SILTY SAND**	0.69
Very stiff to stiff, brown **SILTY CLAY,** some sand seams - soft to firm and grey by 2.2m depth - stiff to very stiff by 7.6m depth	9.60
End of Borehole (GWL @ 0.16m - May 27, 2022)	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	12	4
SS	2	83	P
SS	3	100	P
SS	4	0	P
G	5		
G	6		
SS	7	100	P
G	8		
G	9		
G	10		
SS	11	100	P
SS	12	100	P
G	13		

DEPTH (m)	ELEV. (m)
0	78.70
1	77.70
2	76.70
3	75.70
4	74.70
5	73.70
6	72.70
7	71.70
8	70.70
9	69.70



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BORINGS BY Track-Mount Power Auger

DATE April 11, 2022

FILE NO. PG5827

HOLE NO. BH22A-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	78.70
TOPSOIL 0.15		SS	1	50	3		
Loose, brown **SILTY SAND** 0.69							
Very stiff to stiff, brown **SILTY CLAY,** some sand seams		SS	2	67	3	1	77.70
		SS	3	100	P	2	76.70
- soft to firm and grey by 2.2m depth 2.90		TW	4	100			
End of Borehole							
(GWL @ 0.66m - May 27, 2022)							

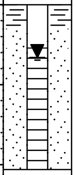
Pen. Resist. Blows/0.3m
● **50 mm Dia. Cone**

○ **Water Content %**

20 40 60 80

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

Monitoring Well Construction



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Track-Mount Power Auger

DATE June 6, 2022

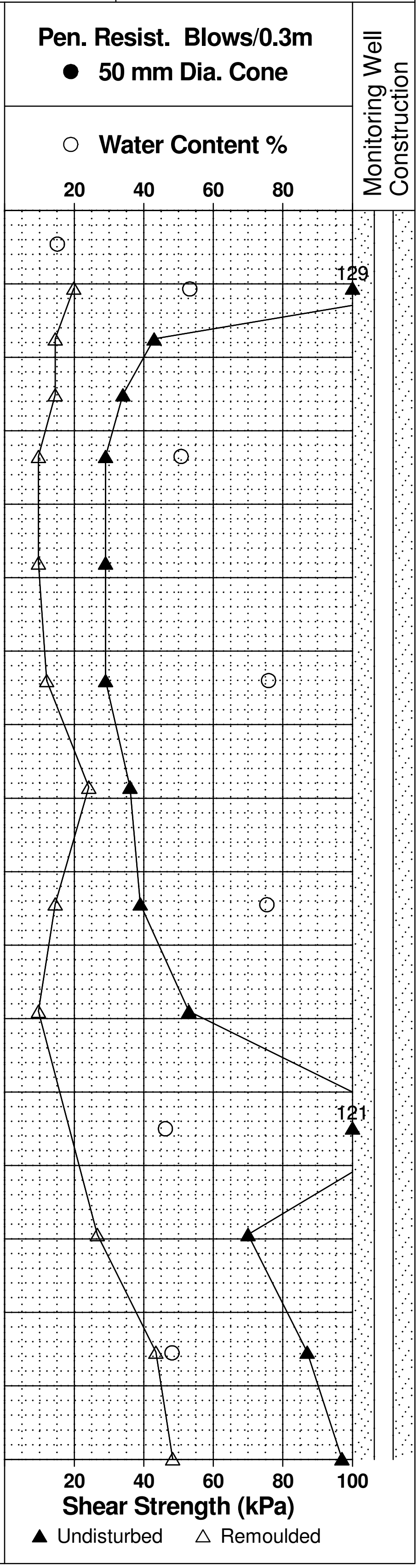
FILE NO. PG5827

HOLE NO. BH23-22

SOIL DESCRIPTION	
GROUND SURFACE	
TOPSOIL	0.20
Loose to compact, brown **SILTY SAND,** some clay	0.69
Very stiff to firm, brown **SILTY CLAY**	2.00
Firm, grey **SILTY CLAY**	
- stiff to very stiff by 10.2m depth	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	92	P
SS	3	42	P
SS	4	100	P
SS	5	100	P
SS	6	100	P
SS	7	100	P

DEPTH (m)	ELEV. (m)
0	79.74
1	78.74
2	77.74
3	76.74
4	75.74
5	74.74
6	73.74
7	72.74
8	71.74
9	70.74
10	69.74
11	68.74
12	67.74
13	66.74
14	65.74
15	64.74
16	63.74
17	62.74



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
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REMARKS

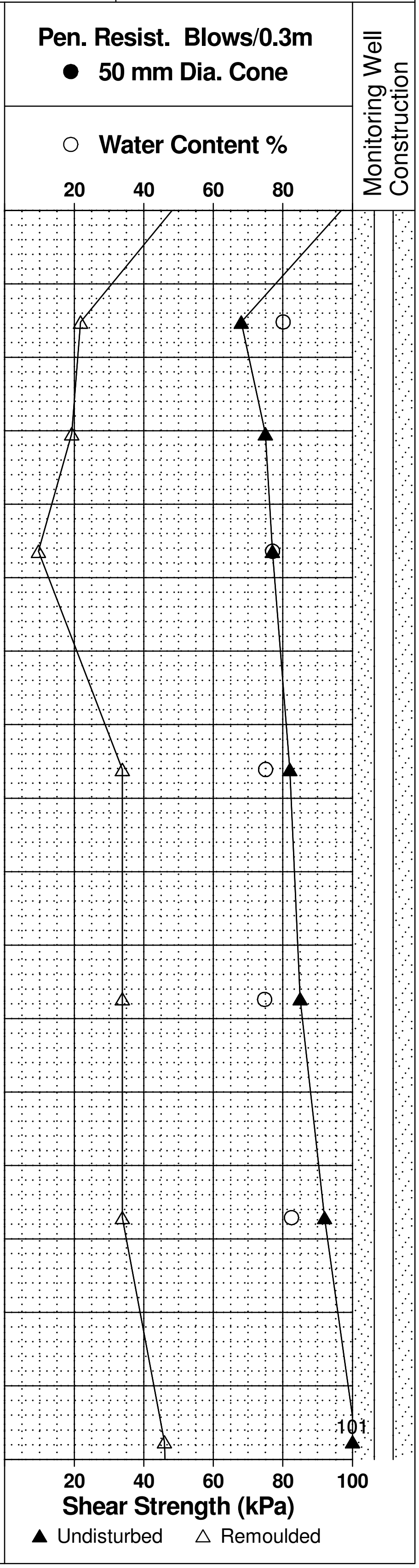
BORINGS BY Track-Mount Power Auger

DATE June 6, 2022

FILE NO. PG5827

HOLE NO. BH23-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Stiff to very stiff, grey **SILTY CLAY**						17	62.74
						18	61.74
		G	8				
						19	60.74
						20	59.74
						21	58.74
		SS	9	100	P		
						22	57.74
						23	56.74
						24	55.74
		G	10				
						25	54.74
						26	53.74
						27	52.74
		SS	11	100	P		
						28	51.74
						29	50.74
						30	49.74
		G	12				
						31	48.74
						32	47.74
						33	46.74
						34	45.74



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SOIL PROFILE AND TEST DATA

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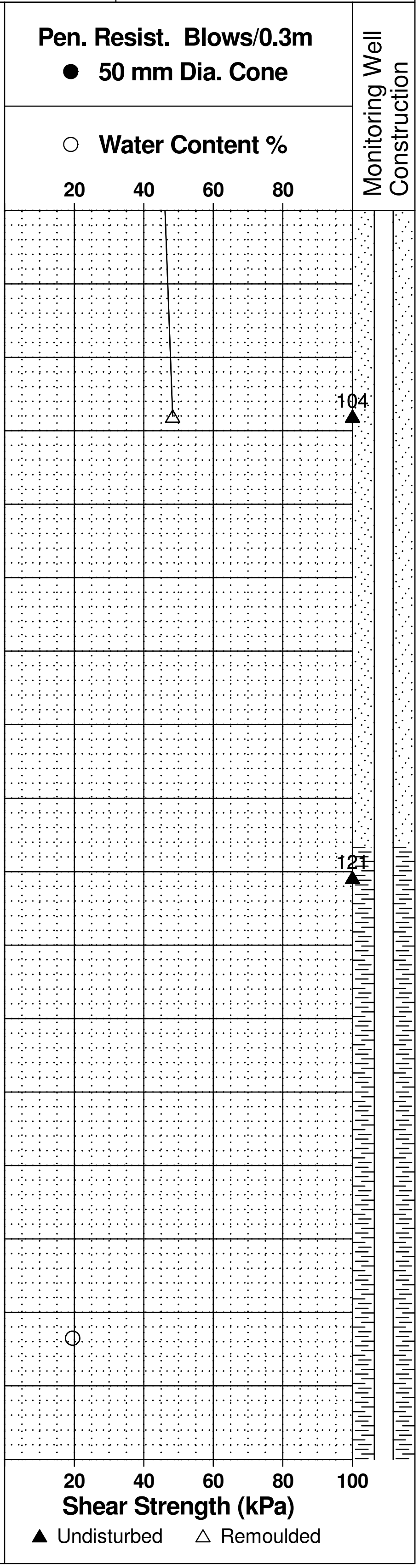
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic
REMARKS
BORINGS BY Track-Mount Power Auger
DATE June 6, 2022
FILE NO. PG5827
HOLE NO. BH23-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD
GROUND SURFACE					
Stiff to very stiff, grey **SILTY CLAY**	▨				
47.63					
GLACIAL TILL: compact to dense, grey silty sand with clay, gravel, cobbles and boulders		RC	1	39	
		RC	2	39	

DEPTH (m)	ELEV. (m)
34	45.74
35	44.74
36	43.74
37	42.74
38	41.74
39	40.74
40	39.74
41	38.74
42	37.74
43	36.74
44	35.74
45	34.74
46	33.74
47	32.74
48	31.74
49	30.74
50	29.74
51	28.74



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REMARKS

BORINGS BY Track-Mount Power Auger

DATE June 6, 2022

FILE NO. PG5827

HOLE NO. BH23-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						51	28.74
GLACIAL TILL: compact to dense, grey silty sand with clay, gravel, cobbles and boulders		RC	3	21		52	27.74
52.33							
BEDROCK: Poor to good quality, grey limestone with black shale		RC	4	100	34	53	26.74
						54	25.74
		RC	5	100	73	55	24.74
55.27							
End of Borehole							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone

○ Water Content %

20 40 60 80

Monitoring Well Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

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REMARKS

BORINGS BY Track-Mount Power Auger

DATE June 1, 2022

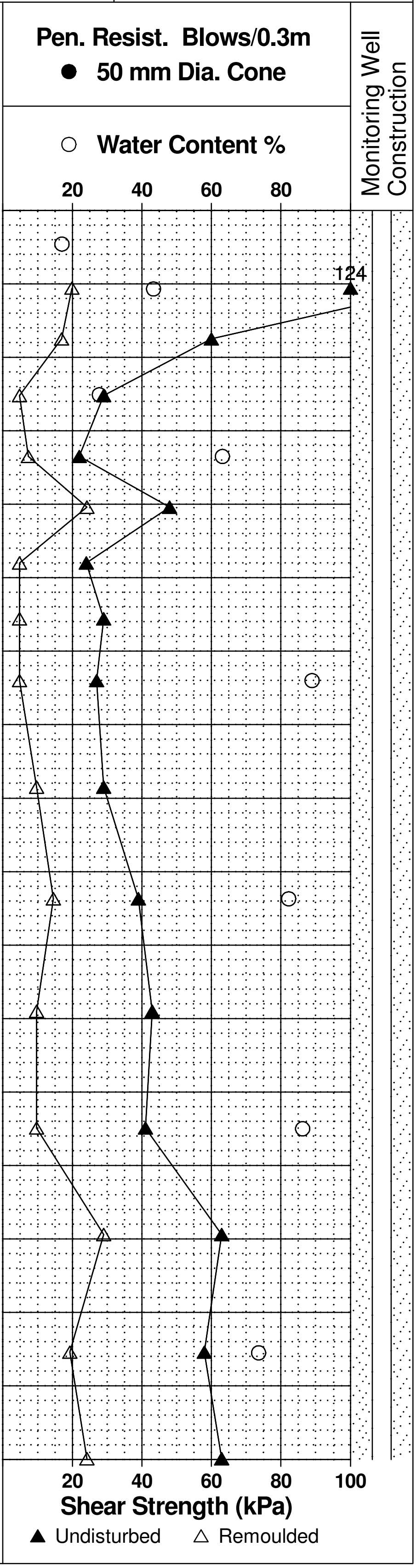
FILE NO. **PG5827**

HOLE NO. **BH24-22**

SOIL DESCRIPTION	
GROUND SURFACE	
TOPSOIL	0.20
Loose to compact, brown **SILTY SAND**	0.69
Very stiff to stiff, brown **SILTY CLAY**	2.13
Firm to stiff, grey **SILTY CLAY**	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	58	P
G	3		
SS	4	75	P
SS	5	92	P
G	6		
SS	7	100	P
SS	8	100	P

DEPTH (m)	ELEV. (m)
0	78.29
1	77.29
2	76.29
3	75.29
4	74.29
5	73.29
6	72.29
7	71.29
8	70.29
9	69.29
10	68.29
11	67.29
12	66.29
13	65.29
14	64.29
15	63.29
16	62.29
17	61.29



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REMARKS

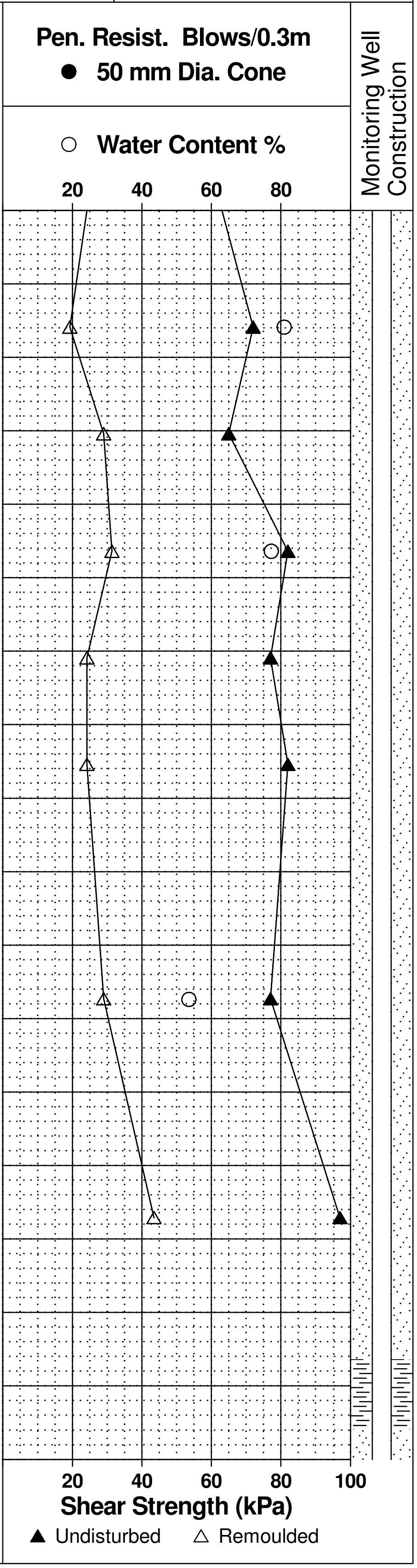
BORINGS BY Track-Mount Power Auger

DATE June 1, 2022

FILE NO. **PG5827**

HOLE NO. **BH24-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD		
GROUND SURFACE						17	61.29
						18	60.29
		SS	9	100	P		
						19	59.29
						20	58.29
						21	57.29
		SS	10	100	P		
						22	56.29
						23	55.29
						24	54.29
Firm to stiff, grey **SILTY CLAY**							
						25	53.29
						26	52.29
						27	51.29
		SS	11	100	P		
						28	50.29
						29	49.29
						30	48.29
						31	47.29
						32	46.29
32.92							
GLACIAL TILL: Dense, grey silty sand with clay, gravel, cobbles and boulders 33.12						33	45.29
		RC	1	100	18		
						34	44.29



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SOIL PROFILE AND TEST DATA

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REMARKS

BORINGS BY Track-Mount Power Auger

DATE June 1, 2022

FILE NO. PG5827

HOLE NO. BH24-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Monitoring Well Construction
GROUND SURFACE						34	44.29		
BEDROCK: Poor to fair quality, grey limestone		RC	2	100	60	35	43.29		
35.79									
BEDROCK: Good to excellent quality, grey limestone interbedded with black shale		RC	3	100	90	36	42.29		
						37	41.29		
		RC	4	100	98	38	40.29		
38.76									
End of Borehole									

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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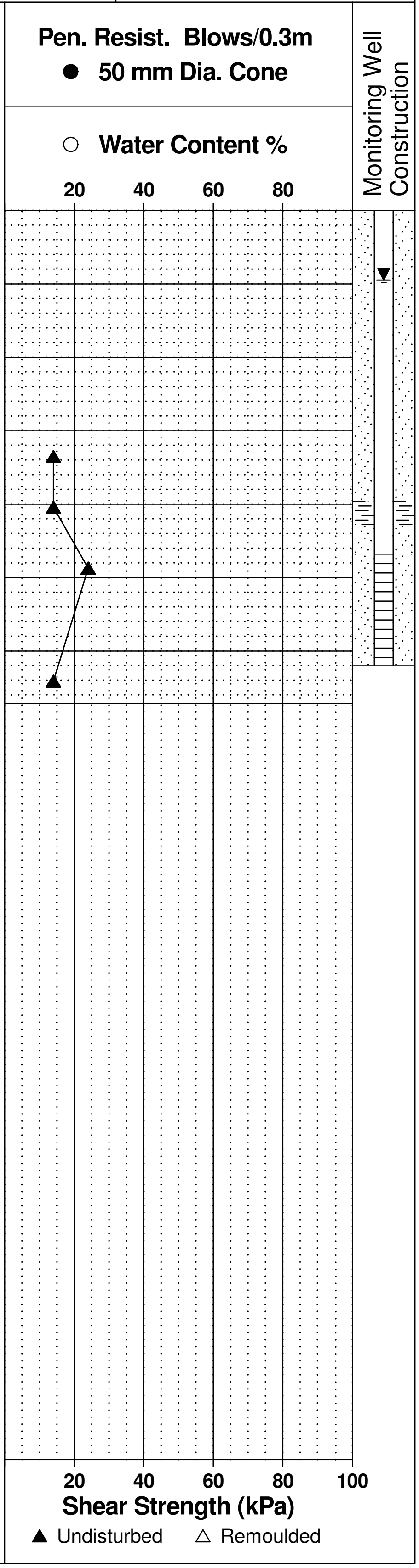
SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic
REMARKS
BORINGS BY CME-55 Low Clearance Drill
DATE December 7, 2022
FILE NO. PG5827
HOLE NO. BH25-22

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	79.36
TOPSOIL 0.10						
FILL: Brown silty clay, some sand 0.86	AU	1				
Compact, brown **SILTY SAND** 1.60	SS	2	50	19	1	78.36
	SS	3	100	3	2	77.36
	TW	4	100		3	76.36
Soft, grey **SILTY CLAY**	SS	5	100	P	4	75.36
	SS	6	100	P	5	74.36
	TW	7	100		6	73.36
6.71	SS	8	100	P		
End of Borehole						
(GWL @ 0.95m - Dec. 13, 2022)						



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE December 7, 2022

FILE NO. **PG5827**

HOLE NO. **BH25A-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	79.36
TOPSOIL 0.10							
FILL: Brown silty clay, some sand 0.86							
Compact, brown **SILTY SAND** 1.60						1	78.36
Soft, grey **SILTY CLAY**						2	77.36
						3	76.36
4.42		TW	1	100		4	75.36
End of Borehole							

Pen. Resist. Blows/0.3m
● **50 mm Dia. Cone**

○ **Water Content %**

20 40 60 80

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

Monitoring Well Construction

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SOIL PROFILE AND TEST DATA

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REMARKS

BORINGS BY Track-Mount Power Auger

DATE April 6, 2022

FILE NO. PG5827

HOLE NO. BH26-22

SOIL DESCRIPTION

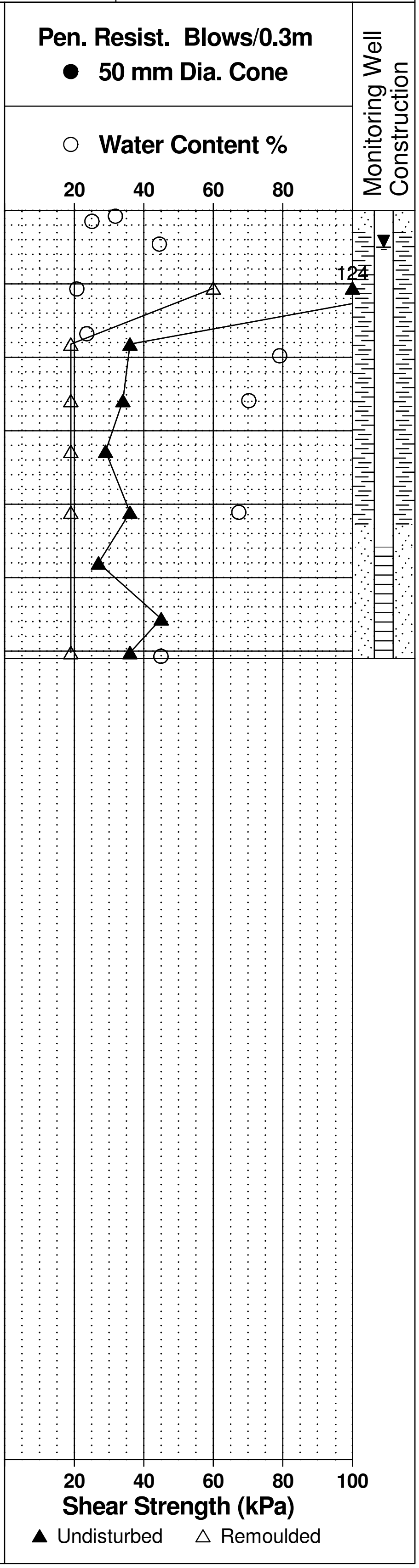
GROUND SURFACE

TOPSOIL	0.15
Loose, brown **SILTY SAND,** trace clay	0.30 0.91
Very stiff, brown **SILTY CLAY**	
Compact, grey **SILTY SAND**	1.83
Firm, grey **SILTY CLAY,** trace sand	6.10
End of Borehole	

(GWL @ 0.50m - May 26, 2022)

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	62	
SS	2	54	28
SS	3	75	P
SS	4	100	P
SS	5	100	P
G	6		

DEPTH (m)	ELEV. (m)
0	79.77
1	78.77
2	77.77
3	76.77
4	75.77
5	74.77
6	73.77



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

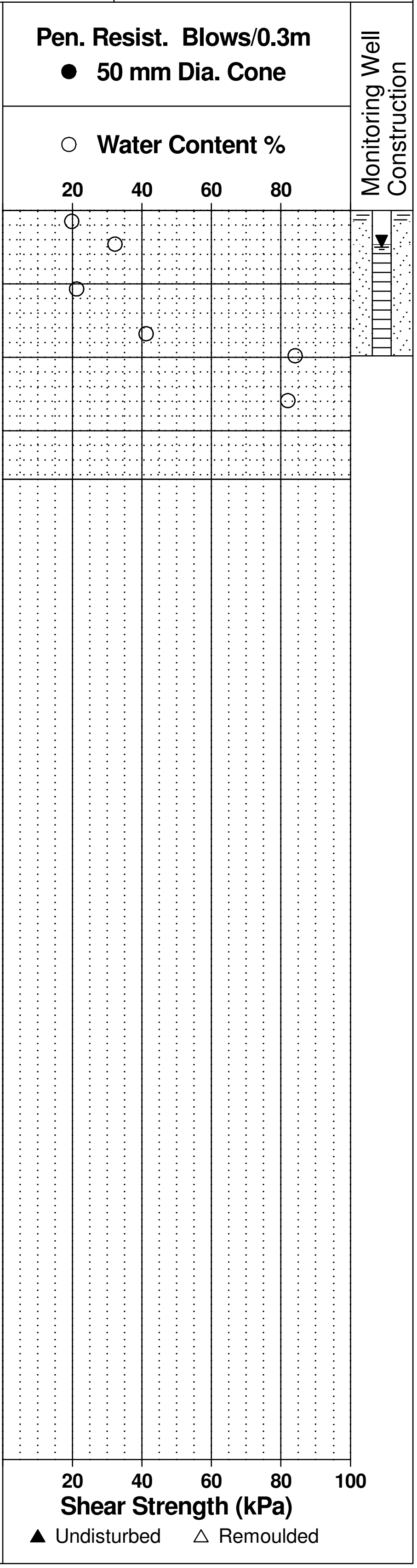
BORINGS BY Track-Mount Power Auger

DATE April 6, 2022

FILE NO. **PG5827**

HOLE NO. **BH26A-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	79.77
TOPSOIL 0.15		SS	1	62	4		
Loose, brown **SILTY SAND,** trace clay 0.30							
Very stiff, brown **SILTY CLAY** 0.91		SS	2	54	28	1	78.77
Compact, grey **SILTY SAND** 1.83		SS	3	100	P		
Firm, grey **SILTY CLAY,** trace sand						2	77.77
		SS	4	100	P	3	76.77
3.66		TW	5	100			
End of Borehole							
(GWL @ 0.50m - May 26, 2022)							



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SOIL PROFILE AND TEST DATA

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BORINGS BY Track-Mount Power Auger

DATE April 6, 2022

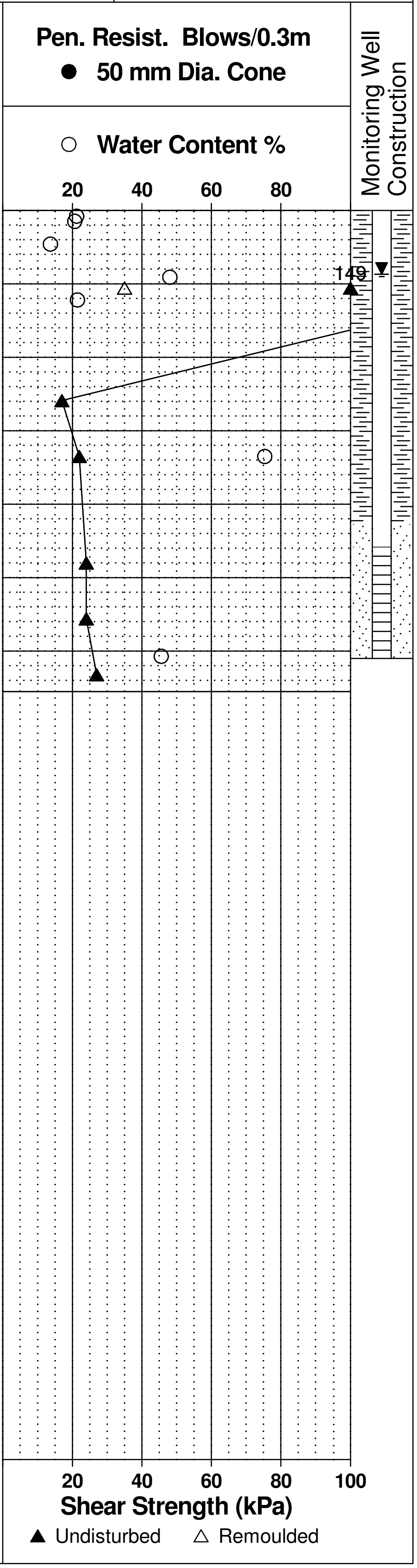
FILE NO. **PG5827**

HOLE NO. **BH27-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	79.71
TOPSOIL 0.18		SS	1		6		
Loose, brown **SILTY SAND** 0.53							
Very stiff to stiff, brown **SILTY CLAY** 1.17		SS	2		P	1	78.71
Compact, brown **SILTY SAND** 1.45							
Soft to firm, grey **SILTY CLAY**		TW	3	100		2	77.71
		SS	4	0	P	3	76.71
		SS	5	83	P		
		TW	6	100		4	75.71
						5	74.71
6.55		G	7			6	73.71

Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 17.48m depth, borehole terminated.

(GWL @ 0.87m - May 26, 2022)



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

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REMARKS

BORINGS BY Track-Mount Power Auger

DATE April 7, 2022

FILE NO. PG5827

HOLE NO. BH28-22

SOIL DESCRIPTION

GROUND SURFACE

TOPSOIL 0.20

Very stiff to stiff, brown **SILTY CLAY,** trace sand

- firm to stiff and grey by 0.9m depth

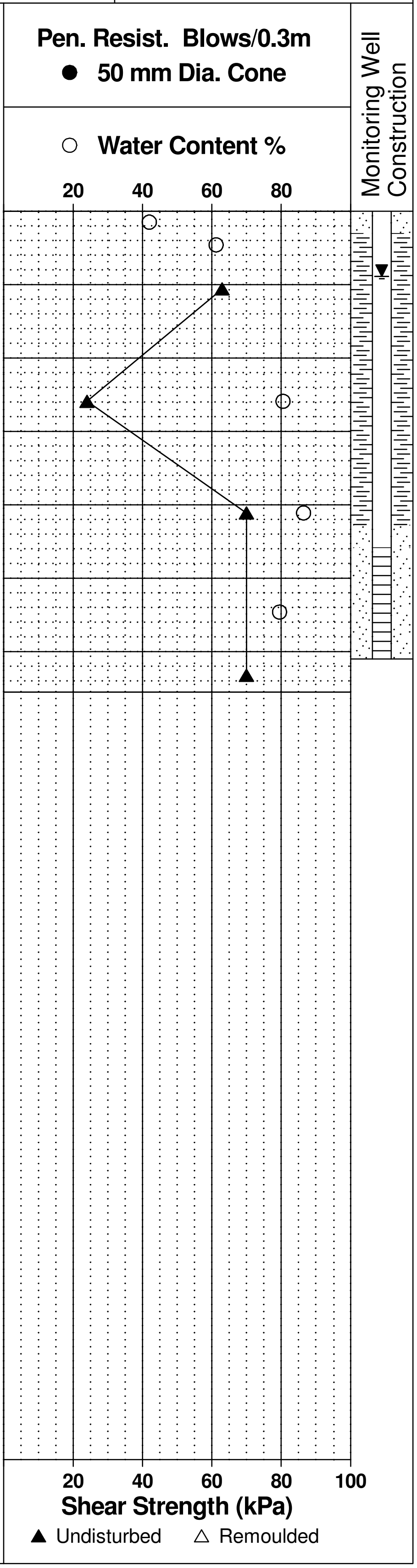
6.55

End of Borehole

(GWL @ 0.89m - May 26, 2022)

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	12	2
SS	2	0	P
SS	3	0	P
SS	4	100	P
TW	5	100	
SS	6	67	P
TW	7	100	
G	8		

DEPTH (m)	ELEV. (m)
0	77.53
1	76.53
2	75.53
3	74.53
4	73.53
5	72.53
6	71.53



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SOIL PROFILE AND TEST DATA

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REMARKS

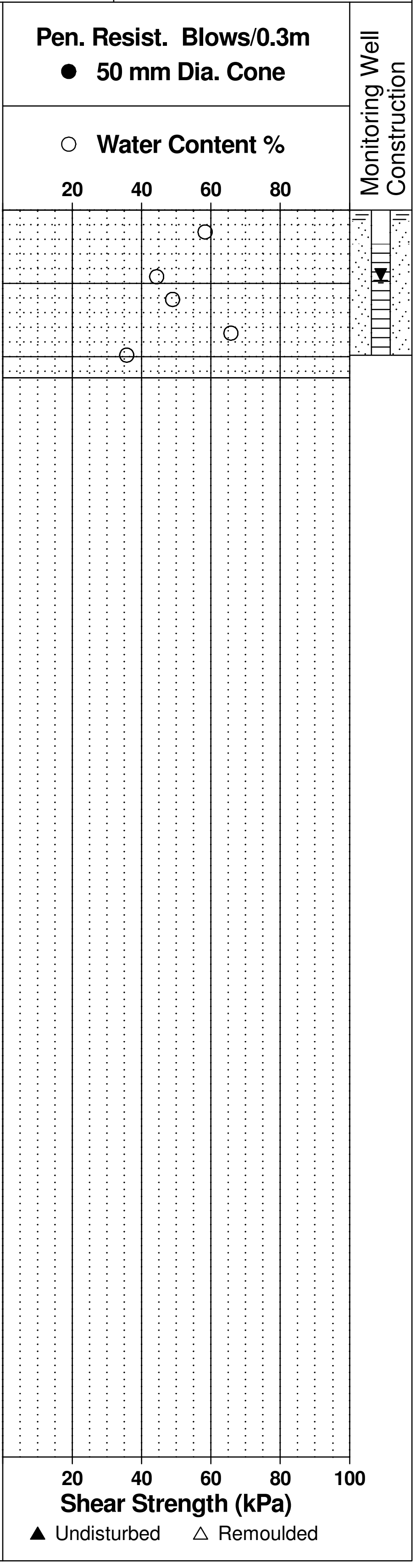
BORINGS BY Track-Mount Power Auger

DATE April 7, 2022

FILE NO. PG5827

HOLE NO. BH28A-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD		
GROUND SURFACE						0	77.53
TOPSOIL 0.20		SS	1	17	2		
Very stiff to stiff, brown **SILTY CLAY**		SS	2	100	2	1	76.53
- firm and grey by 0.9m depth 2.29		SS	3	100	P	2	75.53
End of Borehole							
(GWL @ 0.96m - May 26, 2022)							



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SOIL PROFILE AND TEST DATA

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Proposed Mixed-Use Community Development
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REMARKS

BORINGS BY Track-Mount Power Auger

DATE April 7, 2022

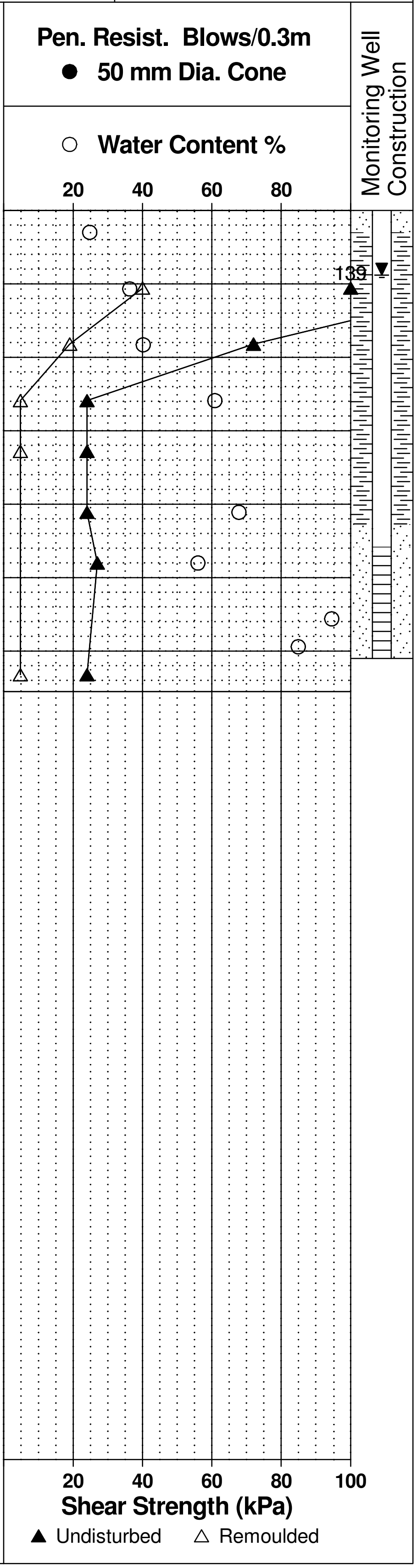
FILE NO. PG5827

HOLE NO. BH29-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	78.73
TOPSOIL 0.25	■	SS	1	25	7		
Brown **SILTY CLAY** with sand 0.69	▨	SS	2	33	P	1	77.73
Very stiff to stiff, brown **SILTY CLAY**	▨	SS	3	100	P	2	76.73
	▨	SS	4	100	P	3	75.73
- soft and grey by 2.2m depth	▨	G	5				
	▨	SS	6	75	P	4	74.73
	▨	G	7			5	73.73
	▨	G	8				
6.55	▨	G	9			6	72.73

Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 13.82m depth, borehole terminated.

(GWL @ 0.88m - May 26, 2022)



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SOIL PROFILE AND TEST DATA

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DATUM Geodetic

REMARKS

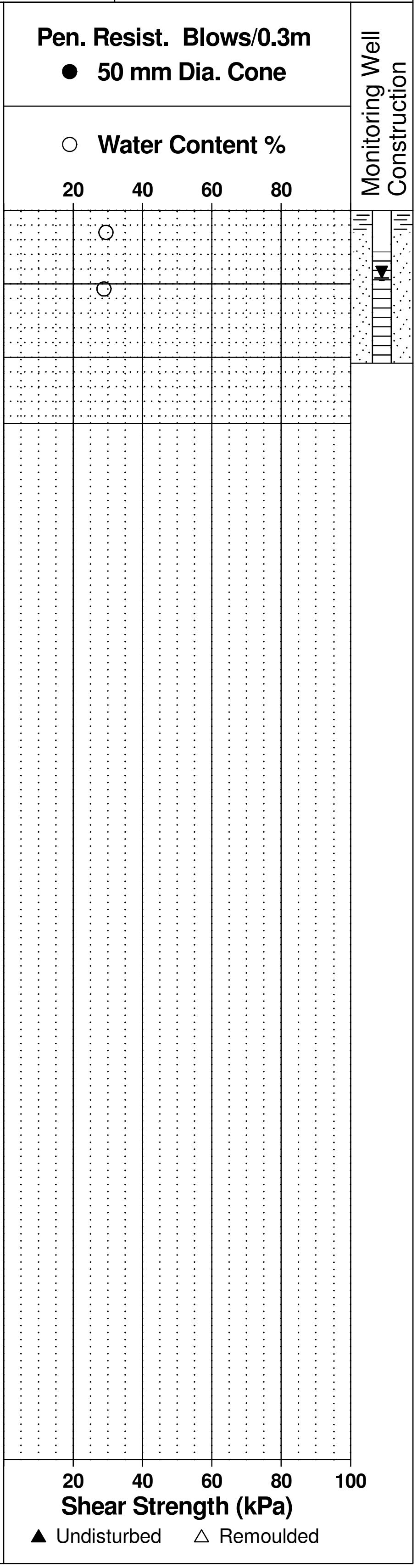
BORINGS BY Track-Mount Power Auger

DATE April 7, 2022

FILE NO. PG5827

HOLE NO. BH29A-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	78.73
TOPSOIL 0.25		SS	1	33			
Brown **SILTY CLAY** with sand 0.69							
Very stiff to stiff, brown **SILTY CLAY**		SS	2	42	6	1	77.73
- soft and grey by 2.2m depth		SS	3	0	0	2	76.73
2.90		SS	4	100	0		
End of Borehole							
(GWL @ 0.92m - May 26, 2022)							



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SOIL PROFILE AND TEST DATA

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REMARKS

BORINGS BY Track-Mount Power Auger

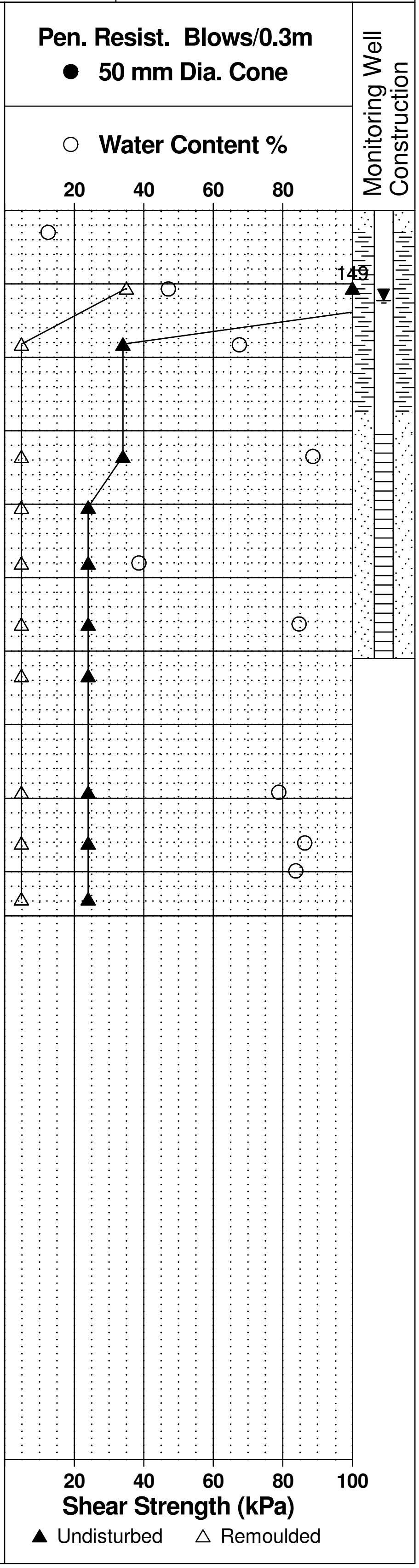
DATE April 7, 2022

FILE NO. **PG5827**

HOLE NO. **BH30-22**

SOIL DESCRIPTION	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE				
TOPSOIL 0.30	SS	1	58	4
Loose, brown **SILTY SAND** 0.69				
Very stiff to stiff, brown **SILTY CLAY**	SS	2	33	P
	SS	3	50	P
- firm to soft and grey by 1.5m depth	TW	4	100	
	SS	5	75	P
	G	6		
	G	7		
	SS	8	100	P
	G	9		
	TW	10	100	
	SS	11	100	P
	G	12		
9.60	G	13		
End of Borehole (GWL @ 1.23m - May 26, 2022)				

DEPTH (m)	ELEV. (m)
0	79.71
1	78.71
2	77.71
3	76.71
4	75.71
5	74.71
6	73.71
7	72.71
8	71.71
9	70.71



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Track-Mount Power Auger

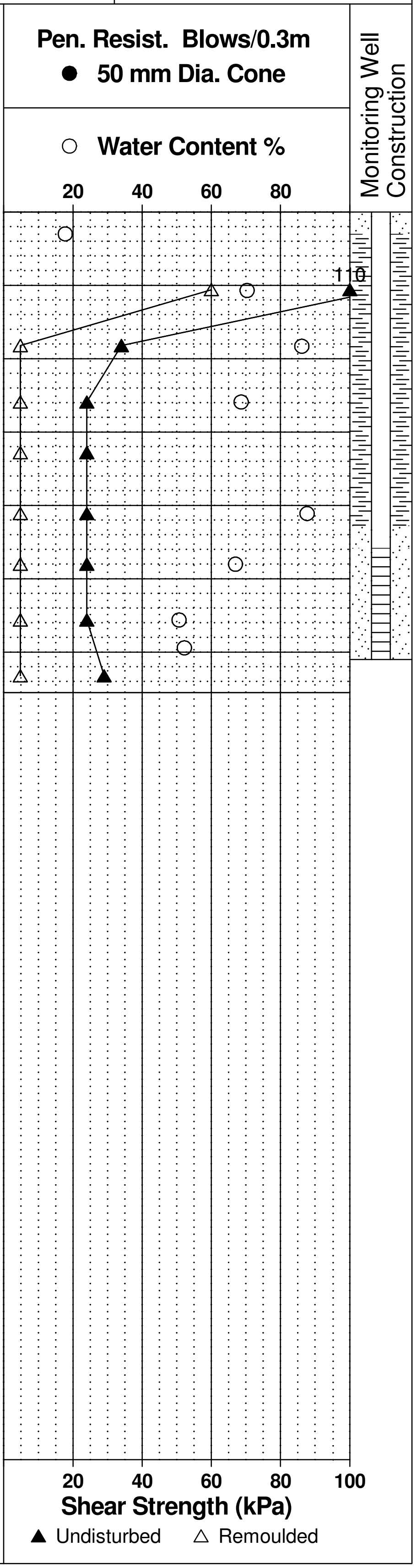
DATE April 6, 2022

FILE NO. PG5827

HOLE NO. BH31-22

SOIL DESCRIPTION	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE				
TOPSOIL 0.23	AU	1		
Loose, brown **SILTY SAND** 0.69				
Very stiff to stiff, brown **SILTY CLAY**	SS	2	92	P
	SS	3	50	P
- soft to firm and grey by 1.5m depth	SS	4	67	P
	G	5		
	SS	6	67	P
	G	7		
	G	8		
6.55	G	9		
End of Borehole				

DEPTH (m)	ELEV. (m)
0	78.48
1	77.48
2	76.48
3	75.48
4	74.48
5	73.48
6	72.48



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REMARKS

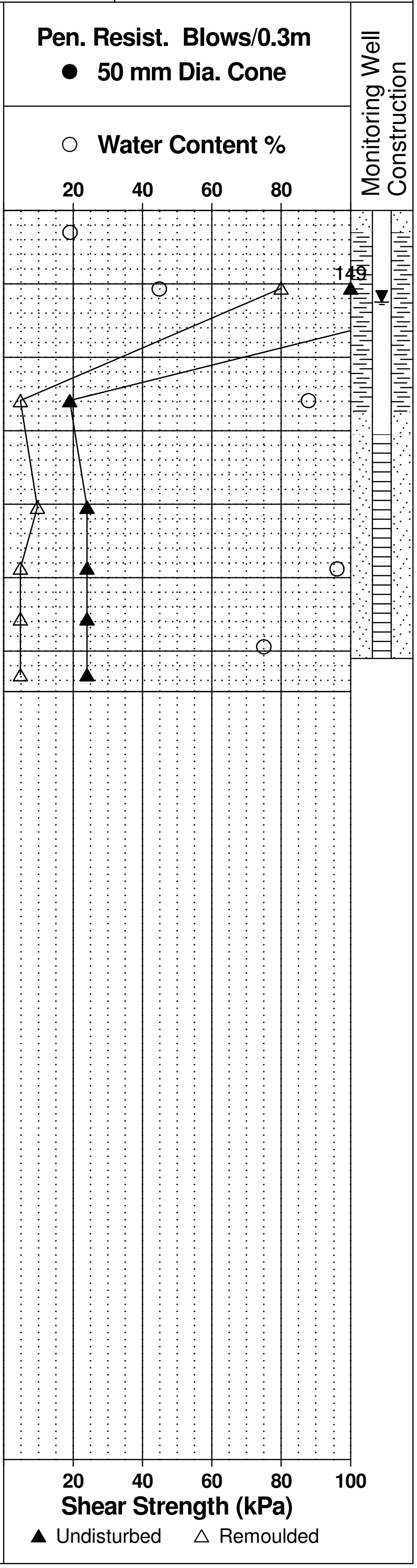
BORINGS BY Track-Mount Power Auger

DATE April 6, 2022

FILE NO. **PG5827**

HOLE NO. **BH32-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	77.94
TOPSOIL 0.20		SS	1	67	6		
Loose, brown **SILTY SAND** 0.69							
Very stiff to stiff, brown **SILTY CLAY**		SS	2	58	P	1	76.94
		TW	3	96			
- firm to soft and grey by 1.5m depth						2	75.94
		SS	4	100	P		
						3	74.94
		TW	5	100			
		G	6			4	73.94
		SS	7	100	P	5	72.94
		G	8				
		G	9			6	71.94
6.55							
End of Borehole							
(GWL @ 1.25m - May 26, 2022)							



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BORINGS BY Track-Mount Power Auger

DATE April 6, 2022

FILE NO. **PG5827**

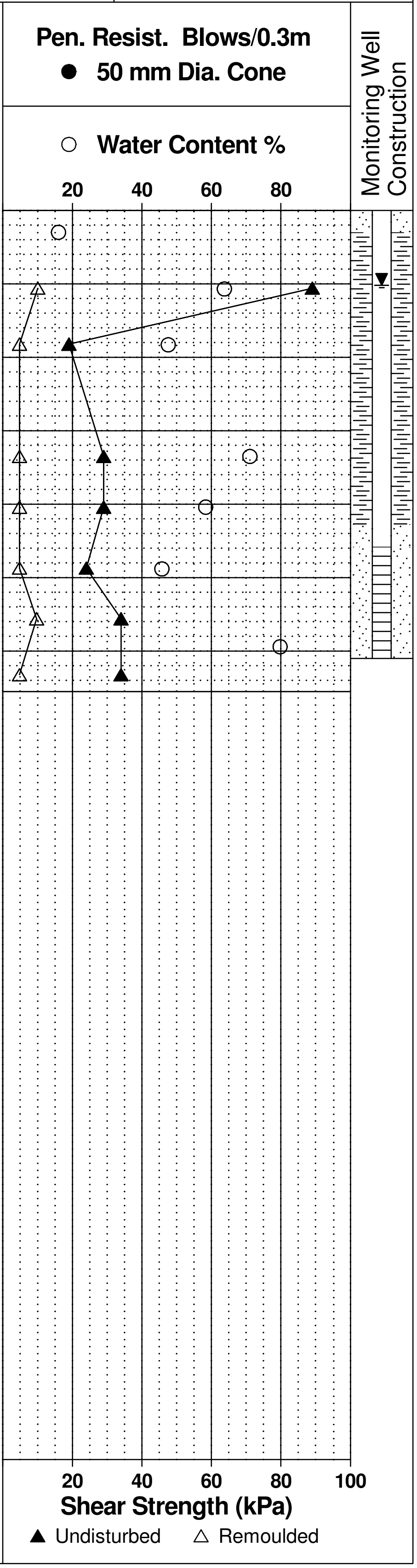
HOLE NO. **BH33-22**

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE				
TOPSOIL 0.20	SS	1	33	7
Loose, brown **SILTY SAND** 0.69				
Stiff to firm, grey **SILTY CLAY**	SS	2	75	P
	SS	3	100	P
- soft to firm by 1.5m depth	TW	4	100	
	SS	5	100	P
	G	6		
	SS	7	42	P
	G	8		
6.55	G	9		

Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 11.02m depth, borehole terminated.

(GWL @ 1.02m - May 26, 2022)

DEPTH (m)	ELEV. (m)
0	78.33
1	77.33
2	76.33
3	75.33
4	74.33
5	73.33
6	72.33



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DATUM Geodetic
REMARKS
BORINGS BY Track-Mount Power Auger
DATE April 5, 2022
FILE NO. PG5827
HOLE NO. BH34-22

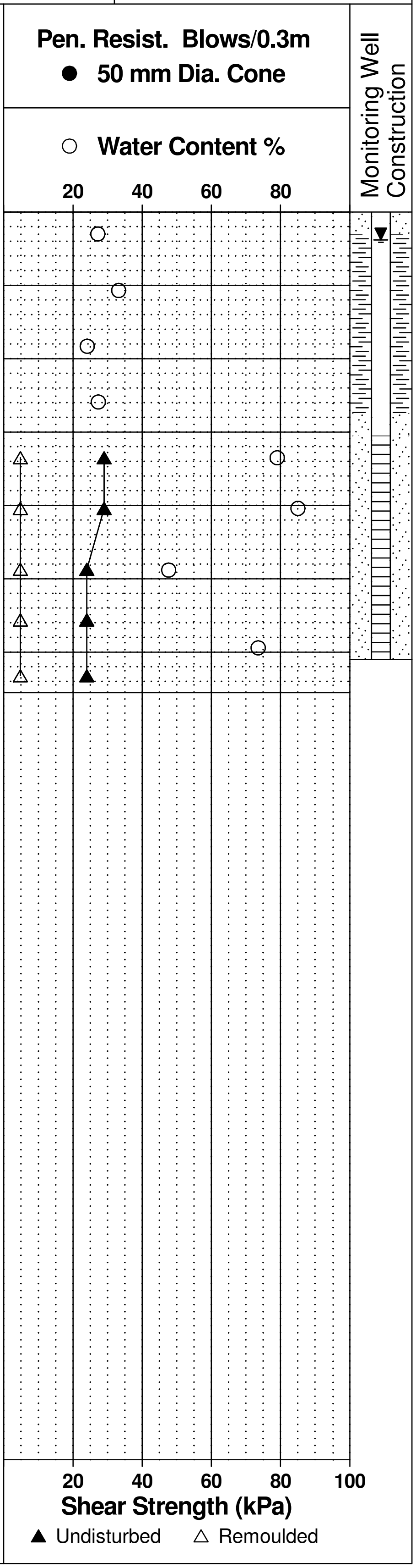
SOIL DESCRIPTION	Depth to base (m)
GROUND SURFACE	
TOPSOIL	0.18
Loose, brown **SILTY SAND** - grey by 1.4m depth	1.98
Firm to soft, grey **SILTY CLAY**	6.55

Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 18.21m depth, borehole terminated.

(GWL @ 0.38m - May 24, 2022)

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	42	4
SS	2	50	P
SS	3	50	P
TW	4	100	
SS	5	100	P
G	6		
SS	7	100	P
G	8		
G	9		

DEPTH (m)	ELEV. (m)
0	79.05
1	78.05
2	77.05
3	76.05
4	75.05
5	74.05
6	73.05



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BORINGS BY Track-Mount Power Auger

DATE April 5, 2022

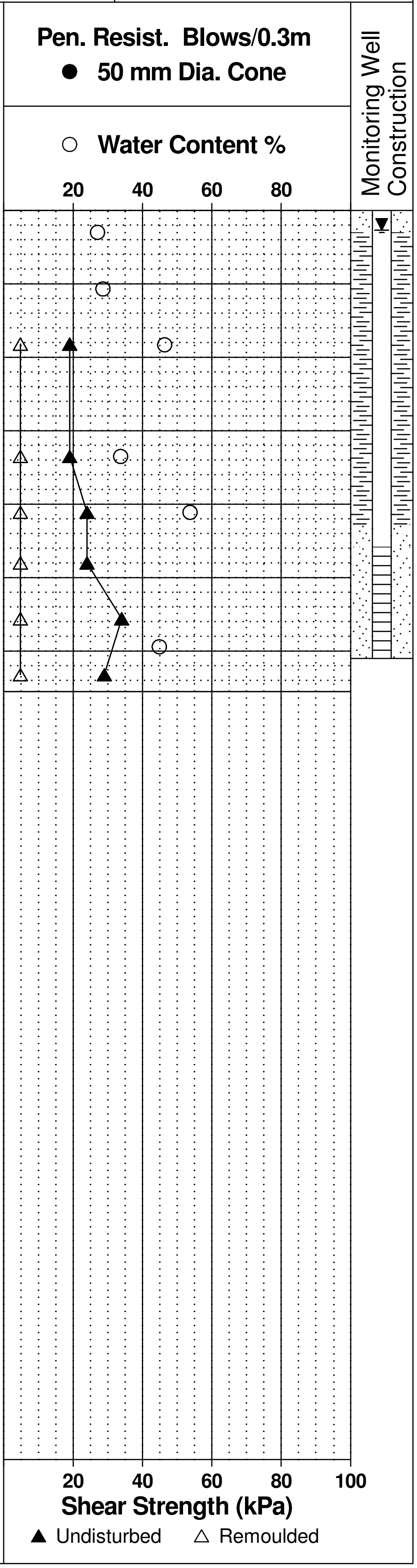
FILE NO. PG5827

HOLE NO. BH35-22

SOIL DESCRIPTION	
GROUND SURFACE	
TOPSOIL	0.15
Loose, brown **SILTY SAND**	1.45
Soft, grey **SILTY CLAY**	2.20
Loose, grey **SILTY SAND,** trace clay	2.97
Soft to firm, grey **SILTY CLAY**	6.55
End of Borehole	
(GWL @ 0.27m - May 24, 2022)	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	50	4
SS	2	58	6
SS	3	50	P
SS	4	100	P
SS	5	8	P
SS	6	100	P
G	7		
G	8		
G	9		

DEPTH (m)	ELEV. (m)
0	78.67
1	77.67
2	76.67
3	75.67
4	74.67
5	73.67
6	72.67



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DATUM Geodetic

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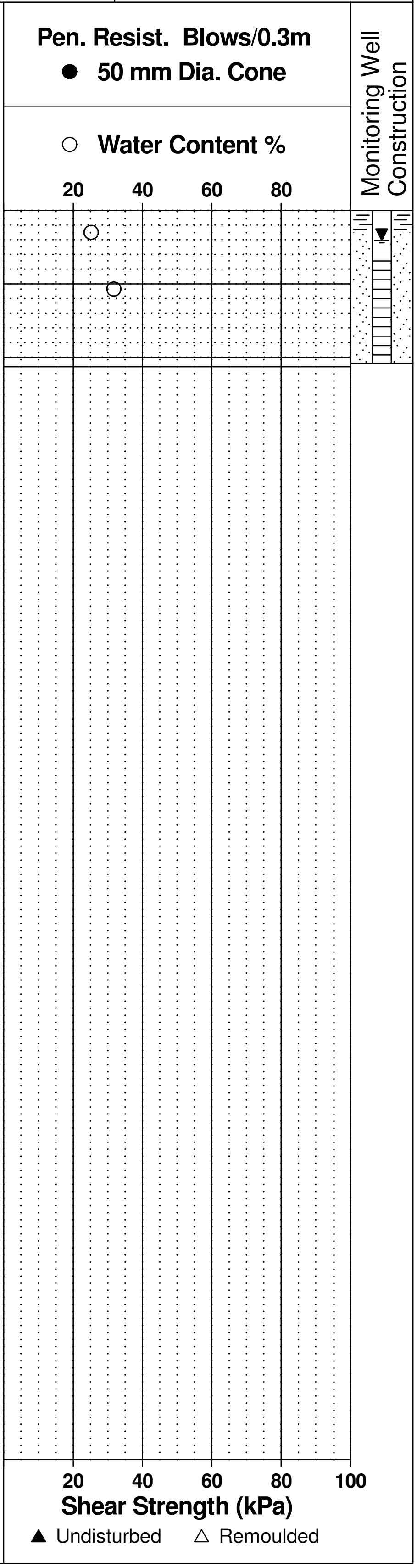
BORINGS BY Track-Mount Power Auger

DATE April 5, 2022

FILE NO. PG5827

HOLE NO. BH35A-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	78.65
TOPSOIL 0.15		SS	1	17	3		
Loose, brown **SILTY SAND** 1.45		SS	2	42	6	1	77.65
Soft, grey **SILTY CLAY** 2.13		TW	3	100		2	76.65
End of Borehole							
(GWL @ 0.41m - May 24, 2022)							



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REMARKS

BORINGS BY Track-Mount Power Auger

DATE April 4, 2022

FILE NO. **PG5827**

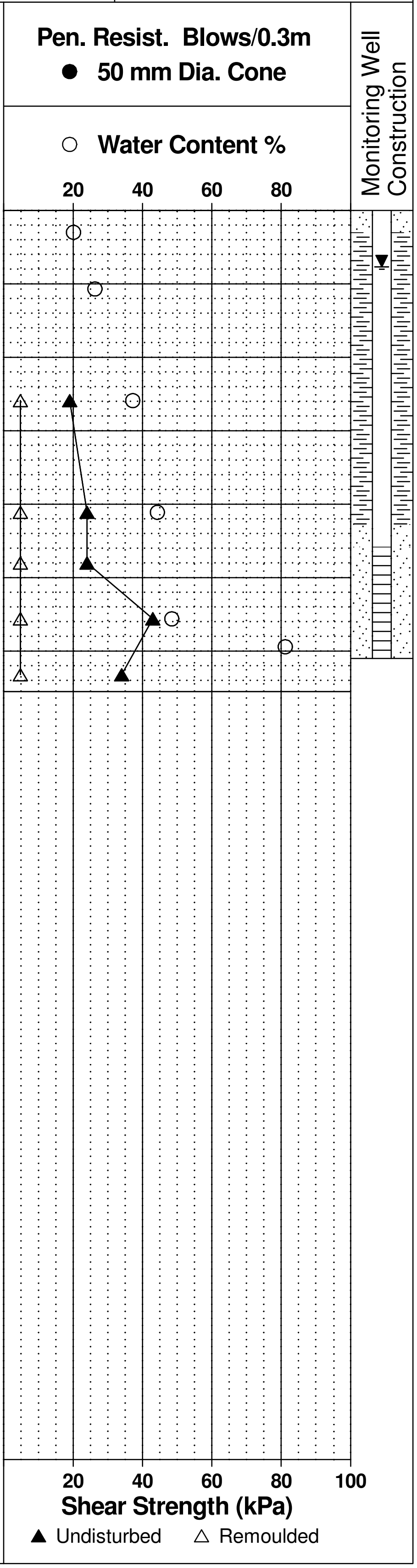
HOLE NO. **BH36-22**

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE				
TOPSOIL 0.25	SS	1	33	15
Compact to loose, brown **SILTY SAND** 1.45	SS	2	17	6
Soft to firm, grey **SILTY CLAY** 6.55	TW	3	100	
	SS	4	25	P
	TW	5	100	
	SS	6	67	P
	G	7		
	G	8		
	G	9		

DEPTH (m)	ELEV. (m)
0	78.62
1	77.62
2	76.62
3	75.62
4	74.62
5	73.62
6	72.62

Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 14.02m depth, borehole terminated.

(GWL @ 0.77m - May 24, 2022)



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SOIL PROFILE AND TEST DATA

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REMARKS

BORINGS BY Track-Mount Power Auger

DATE April 4, 2022

FILE NO. PG5827

HOLE NO. BH37-22

SOIL DESCRIPTION

GROUND SURFACE

SOIL DESCRIPTION	Depth (m)
TOPSOIL	0.28
Loose, brown **SILTY SAND**	0.69
Very stiff to stiff, brown **SILTY CLAY** - firm to soft by 1.5m depth - grey by 2.1m depth - stiff by 11.4m depth	15.24

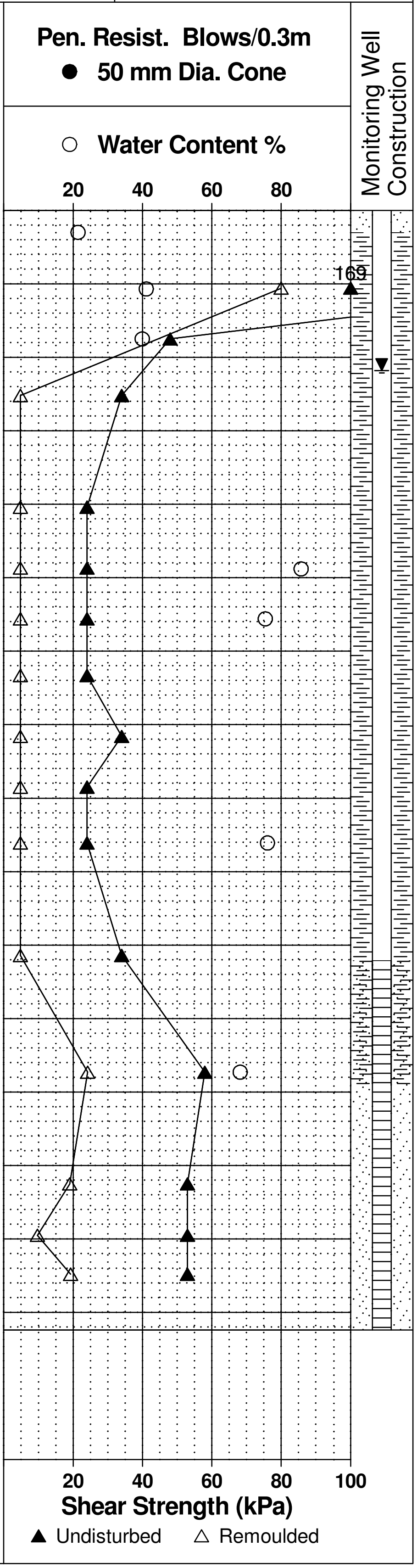
End of Borehole

(GWL @ 2.18m - June 17, 2022)

SAMPLE

TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	50	8
SS	2	42	3
G	3		
G	4		
TW	5	100	
G	6		
SS	7	100	P
G	8		
G	9		
SS	10	100	P
G	11		
G	12		
SS	13	100	P
G	14		
TW	15	100	
SS	16	67	P
TW	17	100	
SS	18	67	P
G	19		
G	20		

DEPTH (m)	ELEV. (m)
0	77.89
1	76.89
2	75.89
3	74.89
4	73.89
5	72.89
6	71.89
7	70.89
8	69.89
9	68.89
10	67.89
11	66.89
12	65.89
13	64.89
14	63.89
15	62.89



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SOIL PROFILE AND TEST DATA

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REMARKS

BORINGS BY Track-Mount Power Auger

DATE April 4, 2022

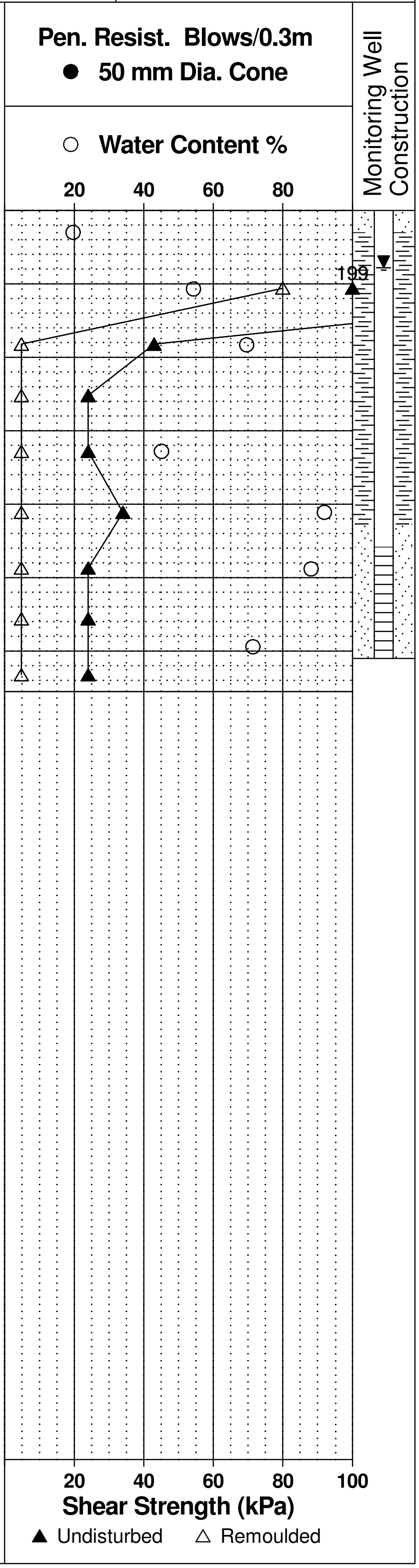
FILE NO. PG5827

HOLE NO. BH38-22

SOIL DESCRIPTION	Depth of base (m)
GROUND SURFACE	
TOPSOIL	0.25
Compact, brown **SILTY SAND**	0.69
Very stiff to stiff, reddish brown **SILTY CLAY** - firm to soft by 1.5m depth - grey by 2.2m depth	6.55
End of Borehole (GWL @ 0.78m - May 24, 2022)	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	67	23
SS	2	83	P
SS	3	83	P
G	4		
G	5		
SS	6	100	P
SS	7	100	P
G	8		
G	9		

DEPTH (m)	ELEV. (m)
0	77.77
1	76.77
2	75.77
3	74.77
4	73.77
5	72.77
6	71.77



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REMARKS

BORINGS BY Track-Mount Power Auger

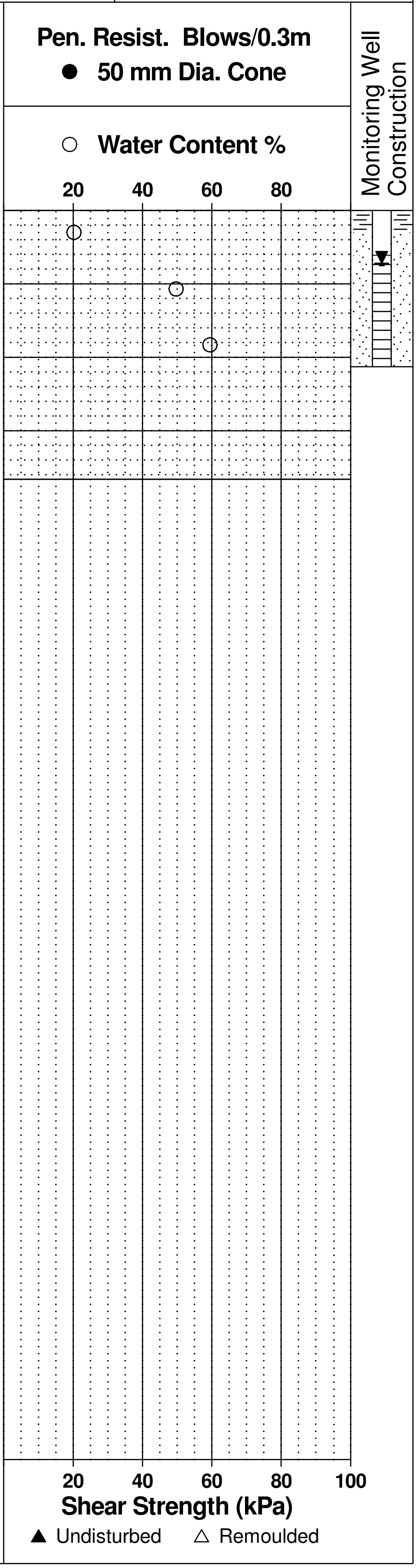
DATE April 1, 2022

FILE NO. PG5827

HOLE NO. BH38A-22

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE				
TOPSOIL 0.25	SS	1	42	24
Compact, brown **SILTY SAND** 0.69				
Very stiff to stiff, reddish brown **SILTY CLAY**	SS	2	100	4
	SS	3	100	P
- firm to soft by 1.5m depth	TW	4	100	
- grey by 2.2m depth	TW	5	100	
3.66				
End of Borehole				
(GWL @ 0.72m - May 24, 2022)				

DEPTH (m)	ELEV. (m)
0	77.77
1	76.77
2	75.77
3	74.77



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BORINGS BY Track-Mount Power Auger

DATE April 1, 2022

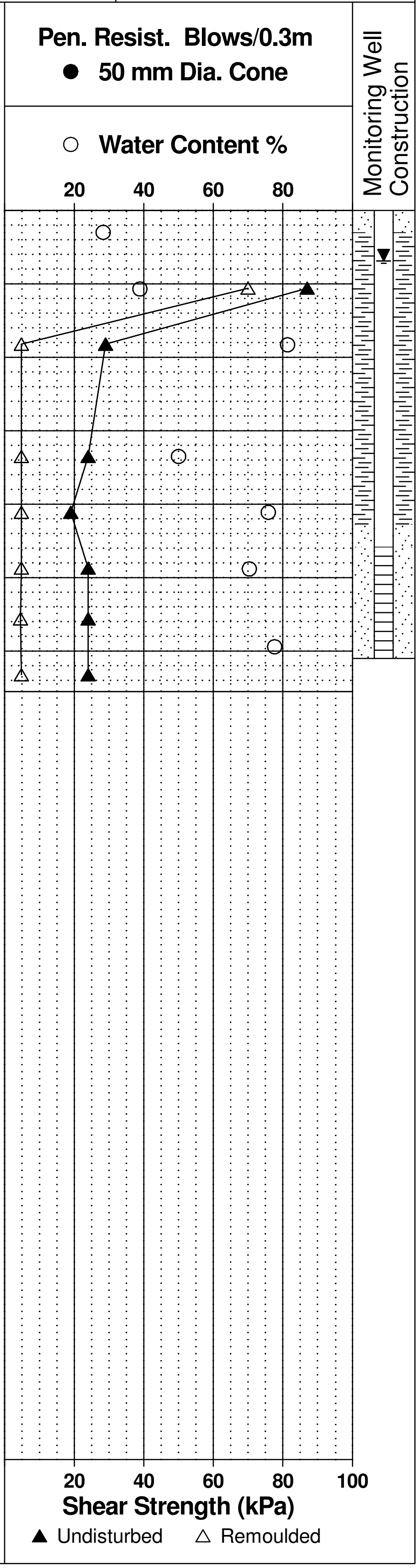
FILE NO. PG5827

HOLE NO. BH39-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD
GROUND SURFACE					
TOPSOIL 0.30		SS	1	50	9
Very stiff to stiff, brown **SILTY CLAY** with sand		SS	2	50	P
		SS	3	75	P
- firm to soft by 1.5m depth		TW	4	100	
- grey by 2.2m depth		SS	5	75	P
		SS	6	100	P
		SS	7	100	P
		G	8		
		G	9		
6.55					
End of Borehole					

(GWL @ 0.69m - May 24, 2022)

DEPTH (m)	ELEV. (m)
0	77.69
1	76.69
2	75.69
3	74.69
4	73.69
5	72.69
6	71.69



SOIL PROFILE AND TEST DATA

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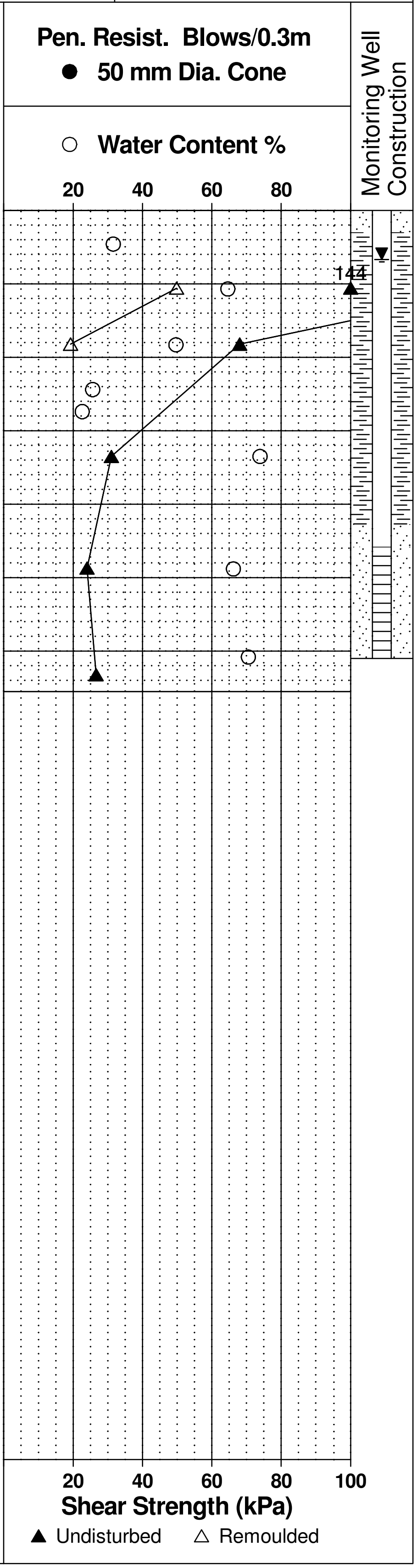
DATUM Geodetic
REMARKS
BORINGS BY Track-Mount Power Auger
DATE March 16, 2022
FILE NO. PG5827
HOLE NO. BH40-22

SOIL DESCRIPTION	Depth (m)
GROUND SURFACE	
TOPSOIL	0.36
Very stiff to stiff, reddish brown **SILTY CLAY,** trace sand	2.44
Compact, grey **SILTY SAND**	2.74
Firm, grey **SILTY CLAY**	6.55
End of Borehole (GWL @ 0.67m - May 26, 2022)	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	58	P
SS	3	100	P
SS	4	67	P
TW	5	96	
SS	6	12	P
TW	7	100	
G	8		

DEPTH (m)	ELEV. (m)
0	79.51
1	78.51
2	77.51
3	76.51
4	75.51
5	74.51
6	73.51



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BORINGS BY Track-Mount Power Auger

DATE March 16, 2022

FILE NO. **PG5827**

HOLE NO. **BH41-22**

SOIL DESCRIPTION

GROUND SURFACE

TOPSOIL 0.30

Loose to compact, reddish brown **SILTY SAND** 0.60

Very stiff to stiff, brown **SILTY CLAY,** some to trace sand

- firm to very soft and grey by 2.8m depth

- stiff by 13.7m depth

14.94

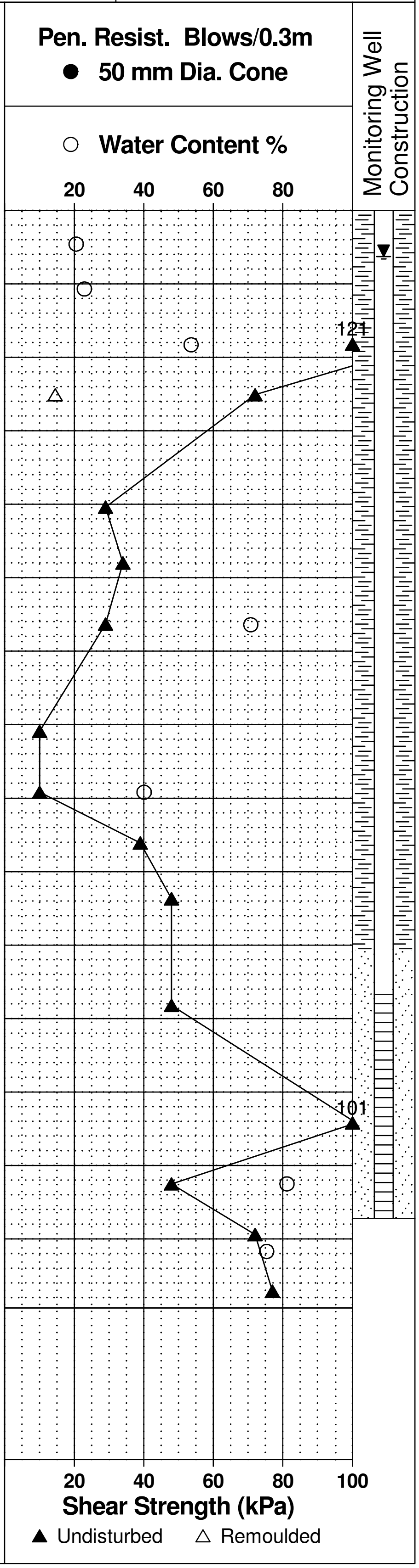
End of Borehole

(GWL @ 0.63m - May 26, 2022)

SAMPLE

TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	67	8
SS	3	100	P
TW	4	100	
SS	5	100	P
SS	6	100	P
TW	7	62	
TW	8	96	
SS	9	100	P
G	10		

DEPTH (m)	ELEV. (m)
0	79.37
1	78.37
2	77.37
3	76.37
4	75.37
5	74.37
6	73.37
7	72.37
8	71.37
9	70.37
10	69.37
11	68.37
12	67.37
13	66.37
14	65.37



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REMARKS

BORINGS BY Track-Mount Power Auger

DATE March 17, 2022

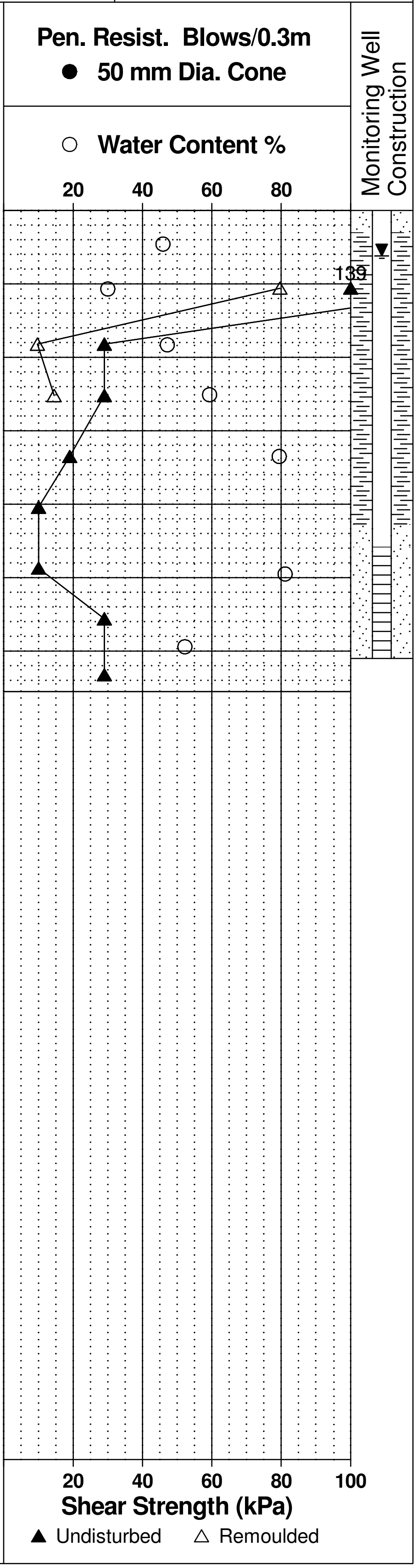
FILE NO. PG5827

HOLE NO. BH42-22

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	77.61
TOPSOIL 0.25						
Very stiff, brown **SILTY CLAY** with intermittent layers of silty sand	AU	1				
	SS	2	33	P	1	76.61
- firm and grey by 1.5m depth	SS	3	100	P		
					2	75.61
	G	4				
					3	74.61
	SS	5	100	P		
	G	6			4	73.61
	SS	7	100	P		
					5	72.61
	G	8				
	G	9			6	71.61
6.55						

End of Borehole

(GWL @ 0.62m - May 26, 2022)



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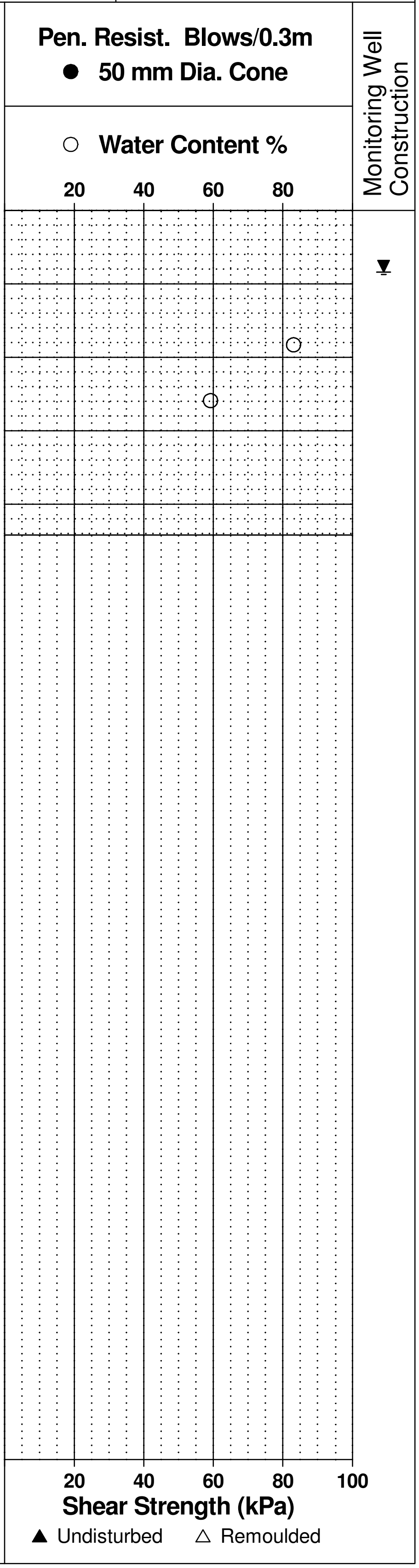
DATE March 17, 2022

FILE NO. **PG5827**

HOLE NO. **BH42A-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	77.61
OVERBURDEN						1	76.61
1.52							
Firm, grey **SILTY CLAY**	▨	SS	1	100	P	2	75.61
	▨	SS	2	100	P	3	74.61
	▨	TW	3	100		4	73.61
4.42							
End of Borehole (GWL @ 0.84m - May 26, 2022)							



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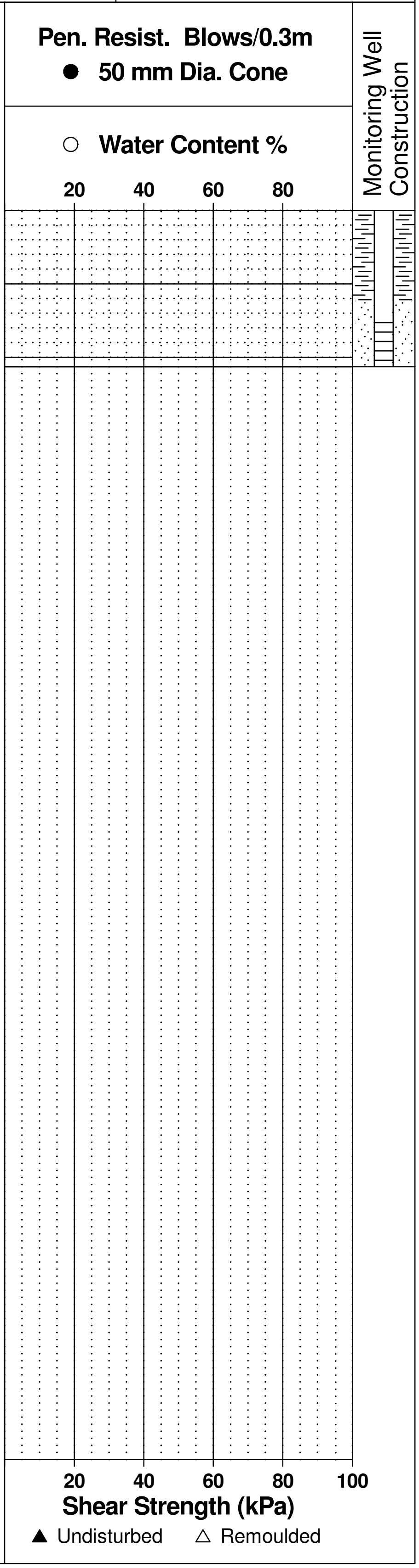
BORINGS BY Track-Mount Power Auger

DATE March 21, 2022

FILE NO. PG5827

HOLE NO. BH42B-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	77.61
OVERBURDEN						1	76.61
2.13						2	75.61
End of Borehole							



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BORINGS BY Track-Mount Power Auger

DATE March 17, 2022

FILE NO. PG5827

HOLE NO. BH43-22

SOIL DESCRIPTION

GROUND SURFACE

TOPSOIL 0.25

Very stiff to stiff, reddish brown **SILTY CLAY** with sand seams

- firm to soft and grey by 2.3m depth

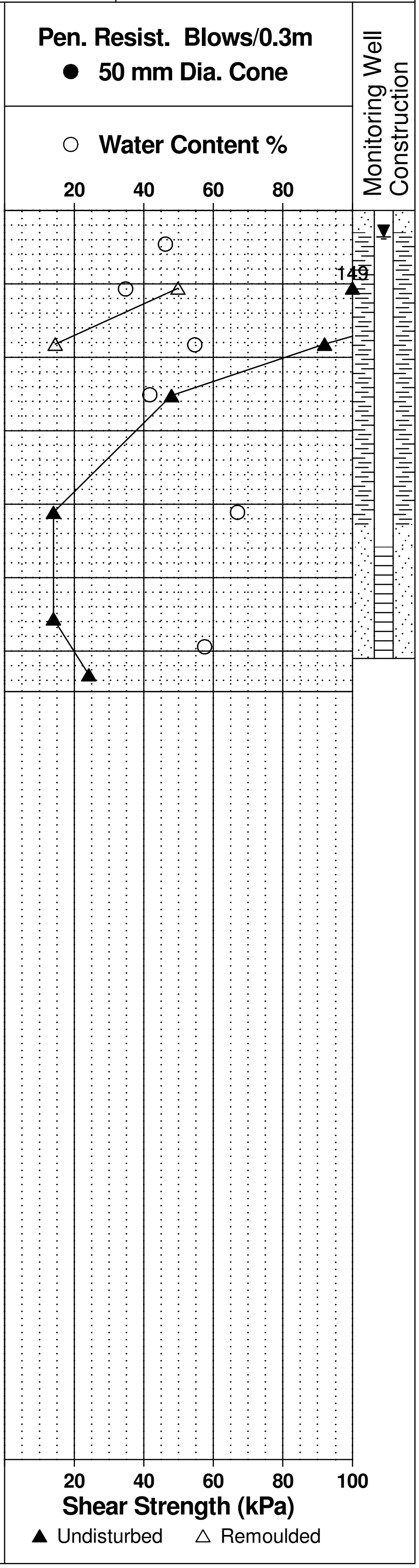
6.55

End of Borehole

(GWL @ 0.36m - May 27, 2022)

TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	33	P
SS	3	100	P
G	4		
TW	5	100	
SS	6	33	P
TW	7	88	
G	8		
G	9		

DEPTH (m)	ELEV. (m)
0	79.91
1	78.91
2	77.91
3	76.91
4	75.91
5	74.91
6	73.91



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BORINGS BY Track-Mount Power Auger

DATE March 17, 2022

FILE NO. **PG5827**

HOLE NO. **BH44-22**

SOIL DESCRIPTION

GROUND SURFACE

TOPSOIL 0.30

Very stiff to stiff, reddish brown **SILTY CLAY** with sand 2.29

Loose to compact, brown **SILTY SAND** 2.59

Soft, grey **SILTY CLAY** with sand seams 6.55

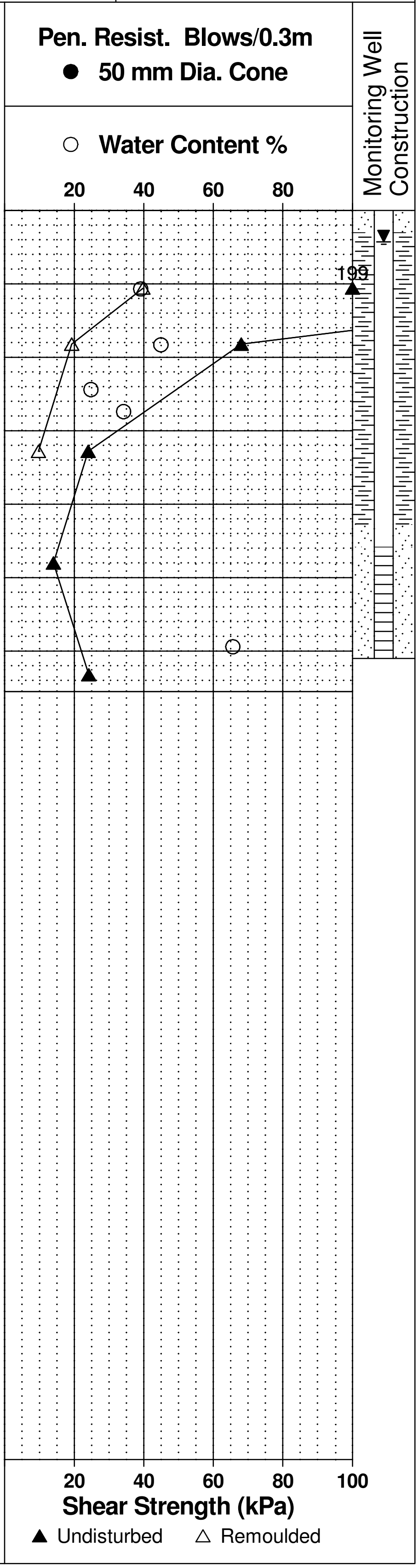
End of Borehole

(GWL @ 0.43m - May 27, 2022)

SAMPLE

TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	67	P
SS	3	67	P
SS	4	67	2
G	5		
TW	6	92	
TW	7	83	
G	8		

DEPTH (m)	ELEV. (m)
0	79.37
1	78.37
2	77.37
3	76.37
4	75.37
5	74.37
6	73.37



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SOIL PROFILE AND TEST DATA

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Proposed Mixed-Use Community Development
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DATUM Geodetic

REMARKS

BORINGS BY Track-Mount Power Auger

DATE March 18, 2022

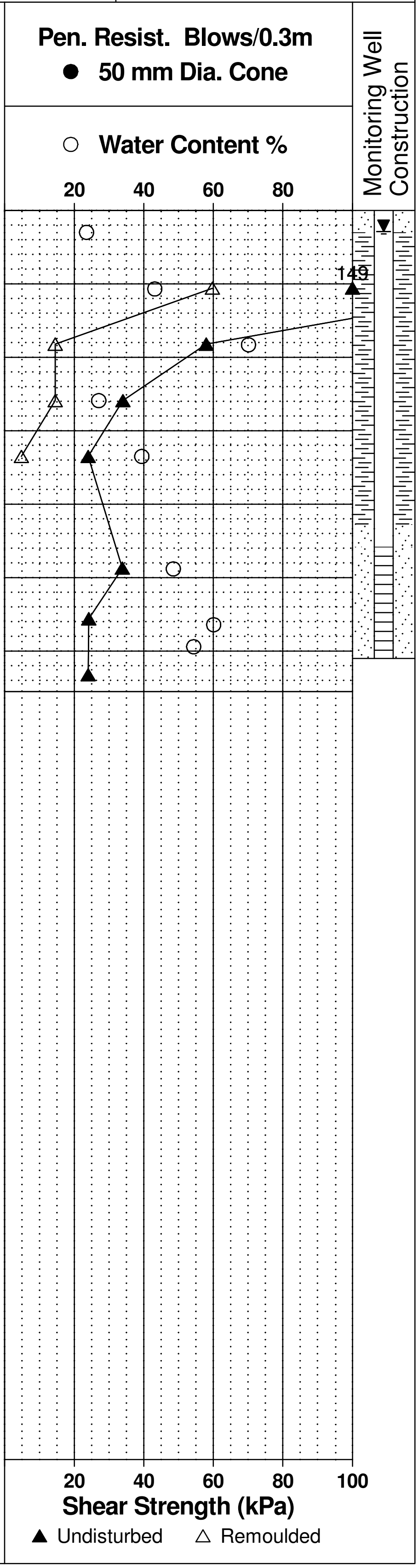
FILE NO. **PG5827**

HOLE NO. **BH45-22**

SOIL DESCRIPTION	
GROUND SURFACE	
TOPSOIL	0.15
Brown **SILTY SAND,** some clay	0.25
Very stiff to stiff, reddish brown **SILTY CLAY**	2.21
Loose, grey **SILTY SAND**	2.74
Soft, grey **SILTY CLAY** with sand seams	6.55
End of Borehole (GWL @ 0.29m - May 27, 2022)	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	8	2
SS	2	67	P
SS	3	100	P
SS	4	42	P
SS	5	100	P
TW	6	100	
SS	7	100	P
G	8		
G	9		

DEPTH (m)	ELEV. (m)
0	80.19
1	79.19
2	78.19
3	77.19
4	76.19
5	75.19
6	74.19



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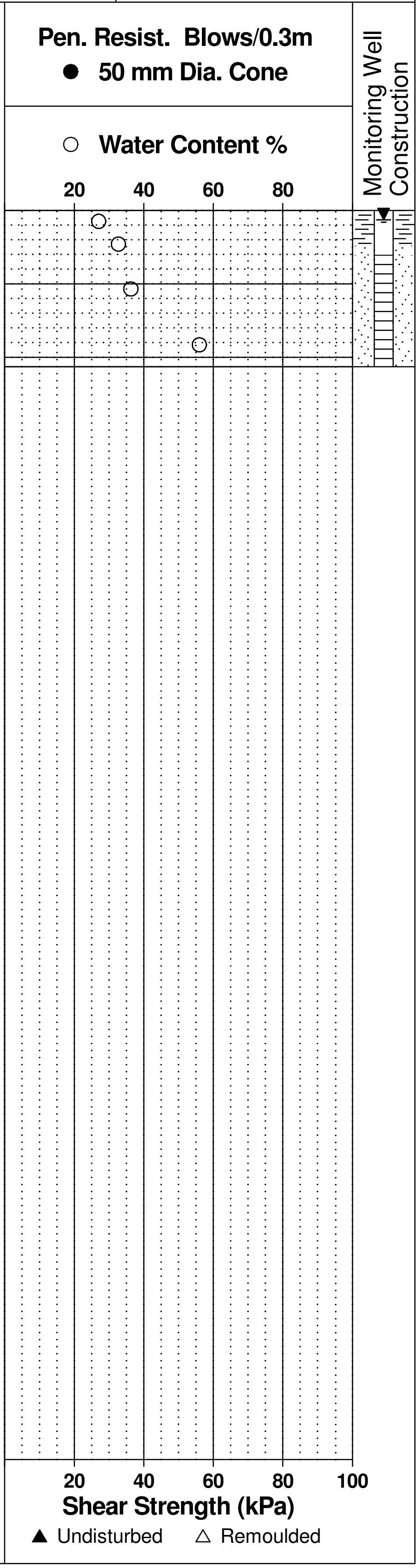
BORINGS BY Track-Mount Power Auger

DATE March 18, 2022

FILE NO. PG5827

HOLE NO. BH45A-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD		
GROUND SURFACE						0	80.19
TOPSOIL 0.15		SS	1	33	2		
Brown **SILTY SAND,** some clay 0.25							
Reddish brown **SILTY CLAY** with sand seams		SS	2	33	7	1	79.19
2.13		SS	3	100	0	2	78.19
End of Borehole							
(GWL @ 0.13m - May 27, 2022)							



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BORINGS BY Track-Mount Power Auger

DATE March 18, 2022

FILE NO. **PG5827**

HOLE NO. **BH46-22**

SOIL DESCRIPTION

GROUND SURFACE

TOPSOIL 0.18

Brown **SILTY SAND,** trace clay 0.30

Very stiff to stiff, reddish brown **SILTY CLAY** with sand seams

- firm to stiff and grey by 3.0m depth

- firm by 5.3m depth

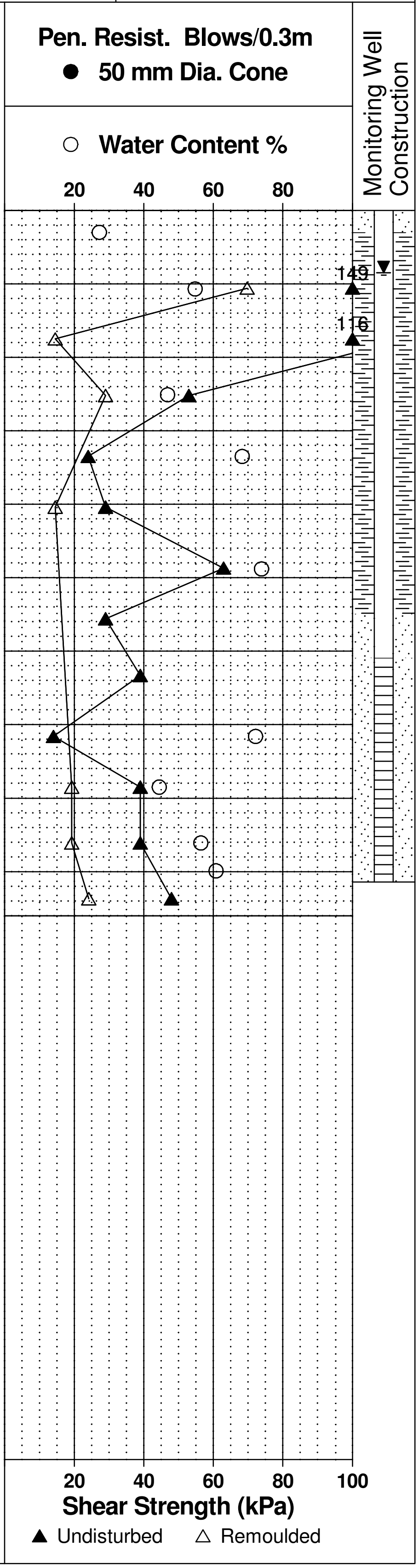
9.60

End of Borehole

(GWL @ 0.85m - May 27, 2022)

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	42	2
SS	2	0	P
G	3		
G	4		
SS	5	100	P
G	6		
SS	7	100	P
G	8		
G	9		
SS	10	100	P
G	11		
G	12		
G	13		

DEPTH (m)	ELEV. (m)
0	80.18
1	79.18
2	78.18
3	77.18
4	76.18
5	75.18
6	74.18
7	73.18
8	72.18
9	71.18



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DATUM Geodetic

REMARKS

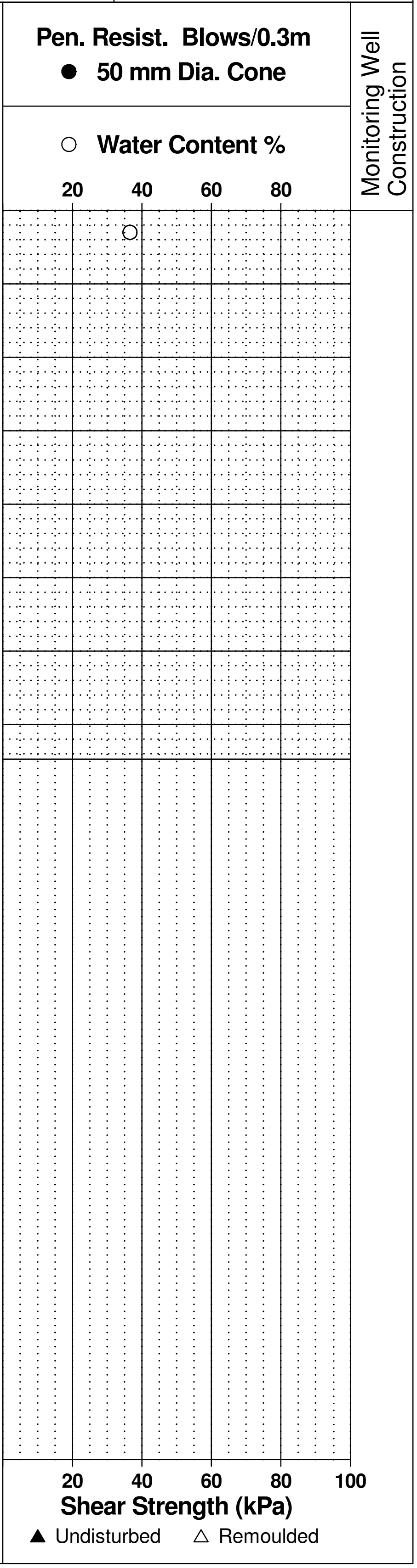
BORINGS BY Track-Mount Power Auger

DATE March 18, 2022

FILE NO. PG5827

HOLE NO. BH46A-22

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	80.18
TOPSOIL 0.18	SS	1		5		
Brown **SILTY SAND,** trace clay 0.30						
					1	79.18
Very stiff to stiff, reddish brown **SILTY CLAY** with sand seams					2	78.18
- soft and grey by 3.0m depth					3	77.18
	TW	2	100			
					4	76.18
					5	75.18
					6	74.18
					7	73.18
7.47	SS	3	100			
End of Borehole						



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Geotechnical Investigation
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REMARKS

BORINGS BY Track-Mount Power Auger

DATE March 21, 2022

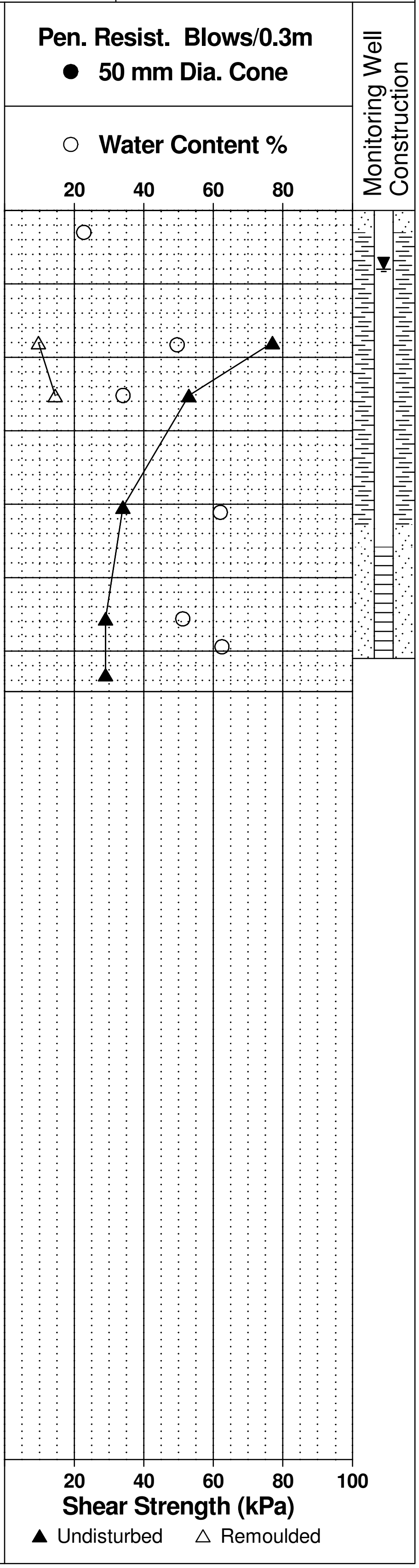
FILE NO. **PG5827**

HOLE NO. **BH47-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD		
GROUND SURFACE						0	78.99
TOPSOIL 0.36		AU	1				
Loose to compact, brown **SILTY SAND** 1.45		SS	2	42	P	1	77.99
Stiff, brown **SILTY CLAY**		SS	3	75	P	2	76.99
		G	4				
- grey by 2.3m depth		TW	5	100		3	75.99
- firm by 3.8m depth		G	6			4	74.99
		TW	7	100		5	73.99
		G	8			6	72.99
6.55		G	9				

Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 18.29m depth, borehole terminated.

(GWL @ 0.80m - May 26, 2022)



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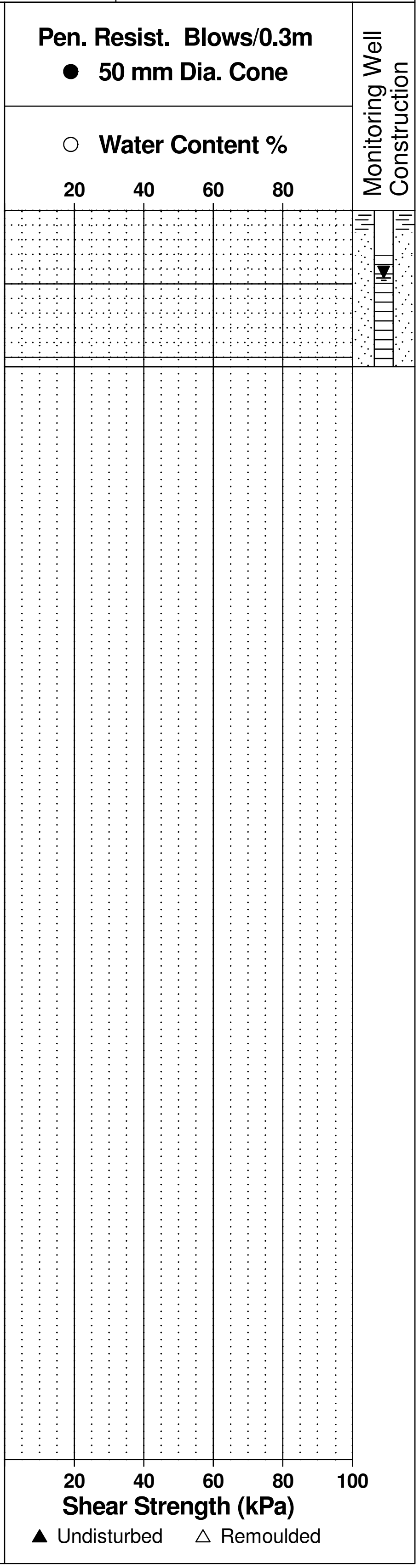
BORINGS BY Track-Mount Power Auger

DATE March 21, 2022

FILE NO. PG5827

HOLE NO. BH47A-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	78.99
OVERBURDEN						1	77.99
2.13						2	76.99
End of Borehole (GWL @ 0.92m - May 26, 2022)							



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REMARKS

BORINGS BY Track-Mount Power Auger

DATE March 21, 2022

FILE NO. **PG5827**

HOLE NO. **BH48-22**

SOIL DESCRIPTION

GROUND SURFACE

TOPSOIL 0.33

Very stiff to stiff, brown **SILTY CLAY** with sand seams

- firm and grey by 2.2m depth

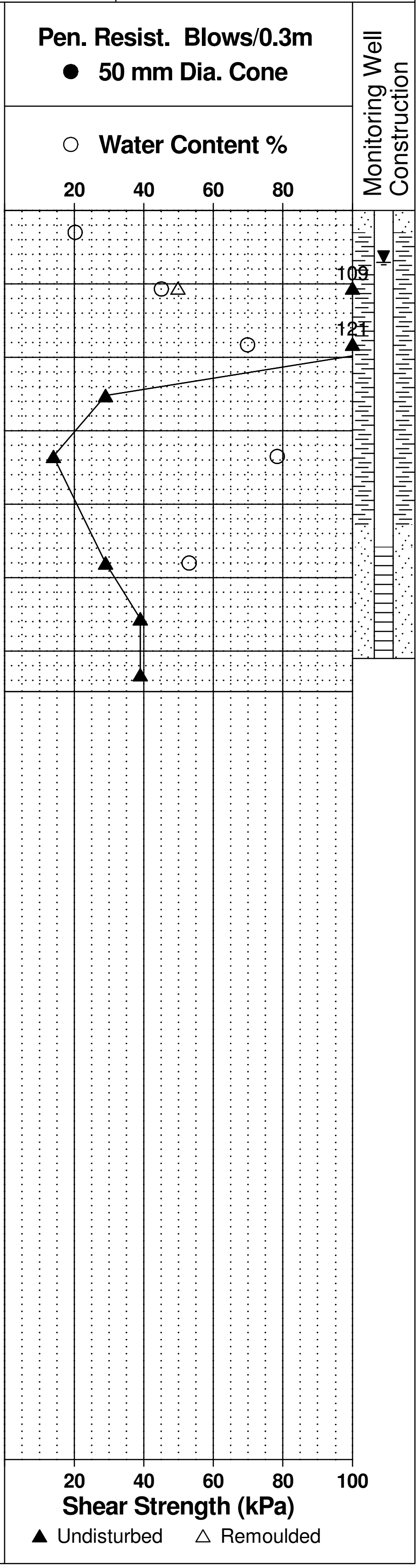
6.55

End of Borehole

(GWL @ 0.71m - May 26, 2022)

TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	67	16
SS	2	42	P
SS	3	17	P
G	4		
SS	5	50	P
TW	6	100	
G	7		
G	8		
G	9		

DEPTH (m)	ELEV. (m)
0	78.81
1	77.81
2	76.81
3	75.81
4	74.81
5	73.81
6	72.81



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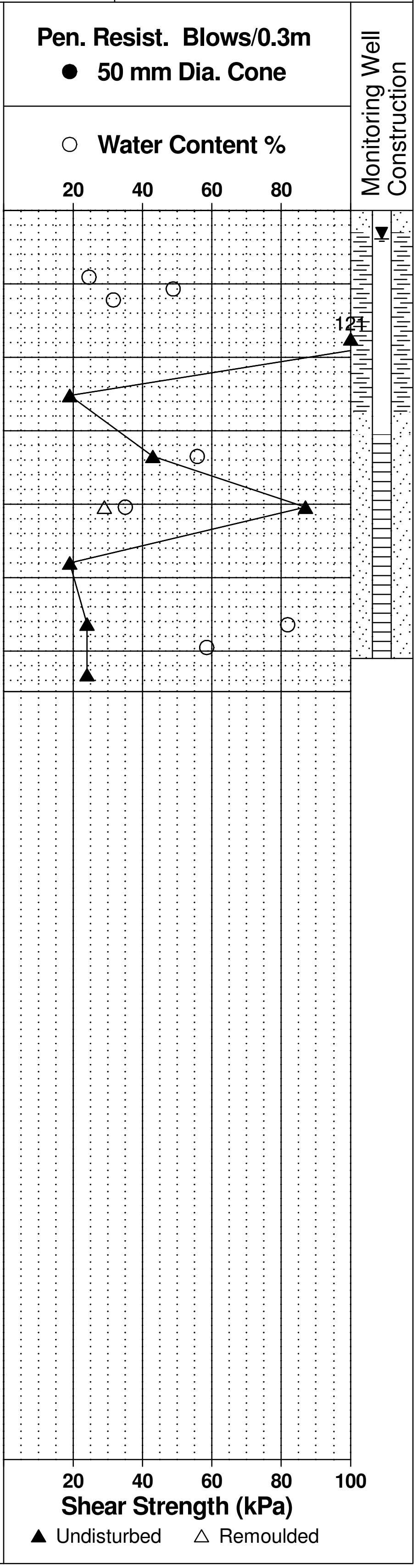
BORINGS BY Track-Mount Power Auger
DATE March 22, 2022
FILE NO. **PG5827**
HOLE NO. **BH49-22**

SOIL DESCRIPTION		SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE					
TOPSOIL	0.25	SS	1	0	3
Compact, brown **SILTY SAND**	1.07	SS	2	83	11
Very stiff to stiff, brown **SILTY CLAY** with sand seams		G	3		
- soft to firm and grey by 2.3m depth		G	4		
		SS	5	100	P
		G	6		
		G	7		
		SS	8	87	P
	6.55	G	9		

Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 10.97m depth, borehole terminated.

(GWL @ 0.39m - May 27, 2022)

DEPTH (m)	ELEV. (m)
0	79.26
1	78.26
2	77.26
3	76.26
4	75.26
5	74.26
6	73.26



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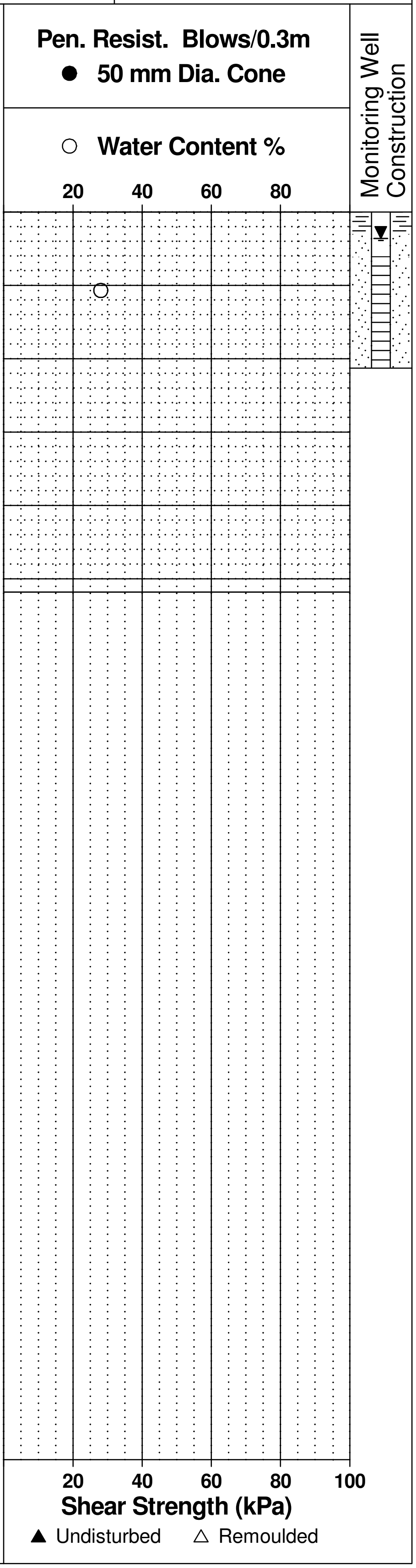
BORINGS BY Track-Mount Power Auger

DATE March 22, 2022

FILE NO. **PG5827**

HOLE NO. **BH49A-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	79.26
Compact, brown **SILTY SAND**							
0.76							
Very stiff to stiff, brown **SILTY CLAY**		SS	1		10	1	78.26
		SS	2				
- firm and grey by 2.3m depth						2	77.26
		TW	3	92			
						3	76.26
						4	75.26
		TW	4	100			
5.18						5	74.26
End of Borehole							
(GWL @ 0.36m - May 27, 2022)							



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BORINGS BY Track-Mount Power Auger

DATE March 23, 2022

FILE NO. **PG5827**

HOLE NO. **BH50-22**

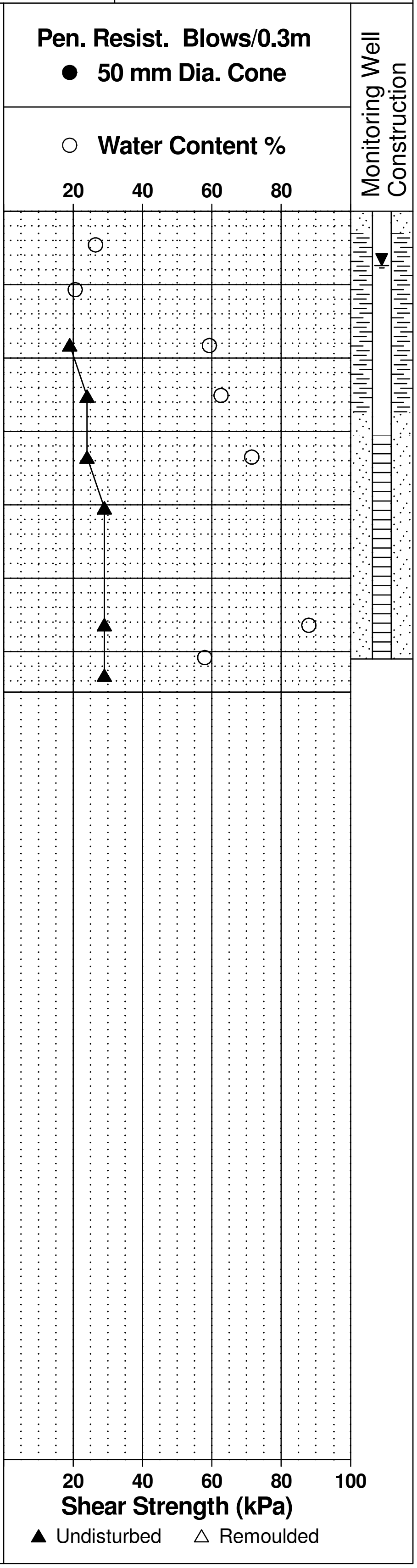
SOIL DESCRIPTION	Depth to base (m)
GROUND SURFACE	
TOPSOIL	0.25
Compact, brown **SILTY SAND**	1.45
Soft to firm, grey **SILTY CLAY**	6.55

Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 13.72m depth, borehole terminated.

(GWL @ 0.74m - May 25, 2022)

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	58	18
SS	3	100	P
G	4		
SS	5	100	P
G	6		
TW	7	100	
SS	8	100	P
G	9		

DEPTH (m)	ELEV. (m)
0	79.48
1	78.48
2	77.48
3	76.48
4	75.48
5	74.48
6	73.48



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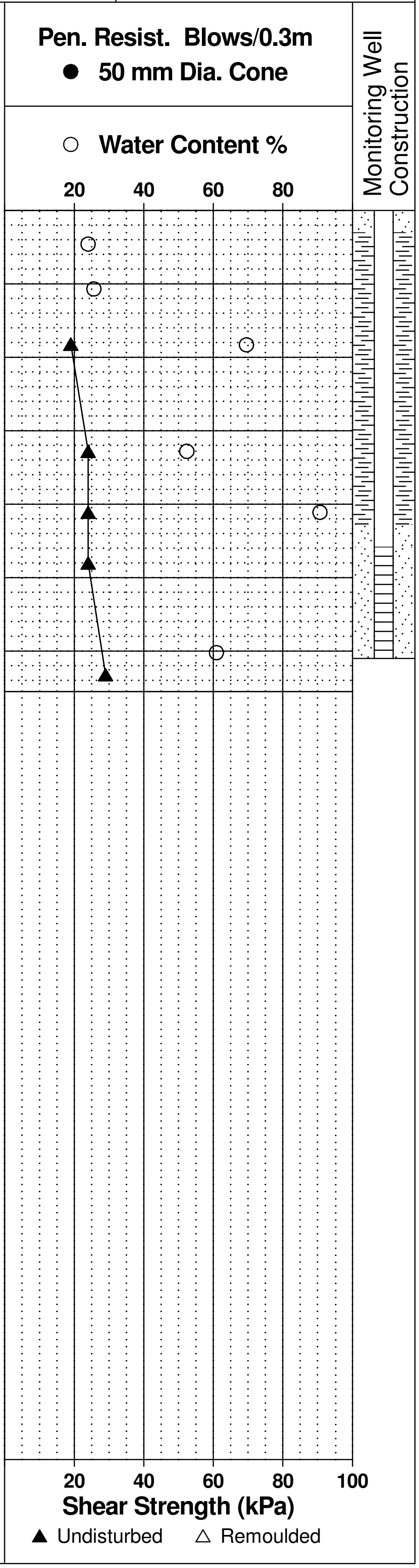
BORINGS BY Track-Mount Power Auger

DATE March 23, 2022

FILE NO. **PG5827**

HOLE NO. **BH51-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	79.94
TOPSOIL 0.28							
Compact, brown **SILTY SAND**		AU	1				
		SS	2	67	15	1	78.94
1.45							
Soft to firm, grey **SILTY CLAY**		SS	3	67	P		
						2	77.94
		TW	4	100			
						3	76.94
		G	5				
		SS	6	100	P	4	75.94
		G	7				
						5	74.94
		TW	8	100			
		G	9			6	73.94
6.55							
Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 14.02m depth, borehole terminated.							



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BORINGS BY Track-Mount Power Auger

DATE March 23, 2022

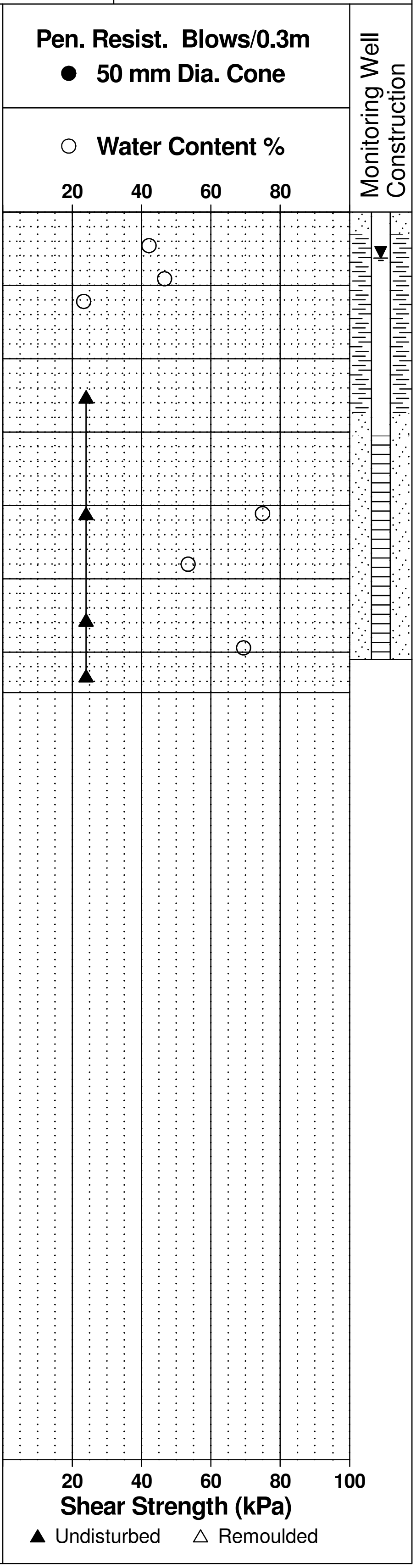
FILE NO. PG5827

HOLE NO. BH52-22

SOIL DESCRIPTION	
GROUND SURFACE	
TOPSOIL	0.30
Very stiff, reddish brown **SILTY CLAY,** trace sand	1.07
Loose, brown **SILTY SAND** - grey by 1.5m depth	1.83
Soft, grey **SILTY CLAY**	6.55
End of Borehole (GWL @ 0.63m - May 25, 2022)	

TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	58	9
SS	3	0	P
G	4		
TW	5	100	
SS	6	100	P
TW	7	100	
G	8		
G	9		

DEPTH (m)	ELEV. (m)
0	80.24
1	79.24
2	78.24
3	77.24
4	76.24
5	75.24
6	74.24



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SOIL PROFILE AND TEST DATA

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DATE March 24, 2022
FILE NO. **PG5827**
HOLE NO. **BH53-22**

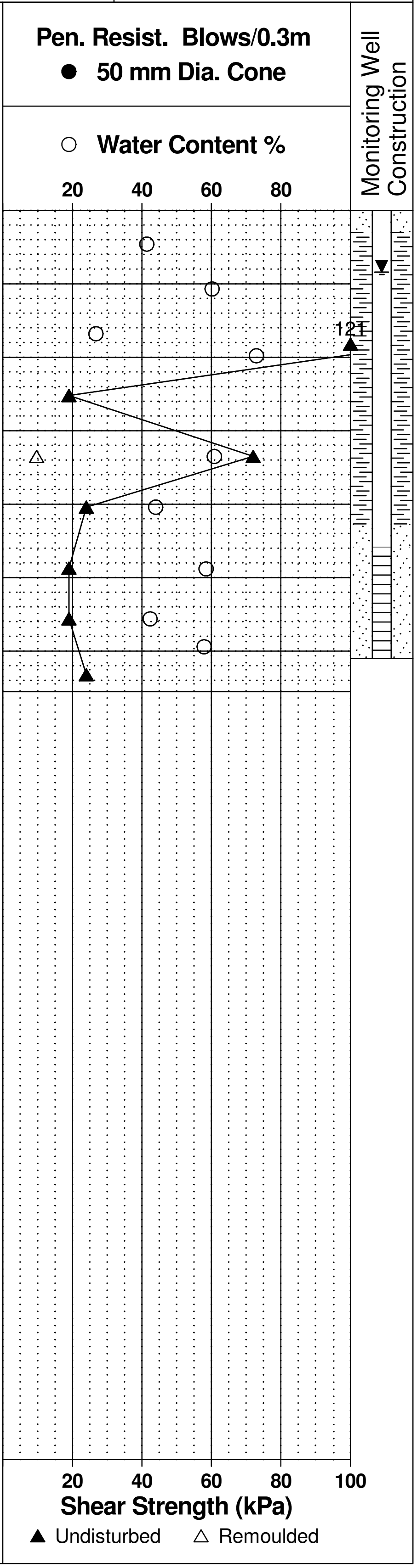
SOIL DESCRIPTION	
GROUND SURFACE	
TOPSOIL	0.28
Very stiff, reddish brown **SILTY CLAY,** trace sand seams	1.45
Compact, grey **SILTY SAND**	1.83
Stiff to soft, grey **SILTY CLAY**	6.55

Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 17.07m depth, borehole terminated.

(GWL @ 0.84m - May 25, 2022)

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	58	7
SS	3	75	P
G	4		
SS	5	100	P
G	6		
SS	7	100	P
G	8		
G	9		

DEPTH (m)	ELEV. (m)
0	79.48
1	78.48
2	77.48
3	76.48
4	75.48
5	74.48
6	73.48



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DATE March 24, 2022

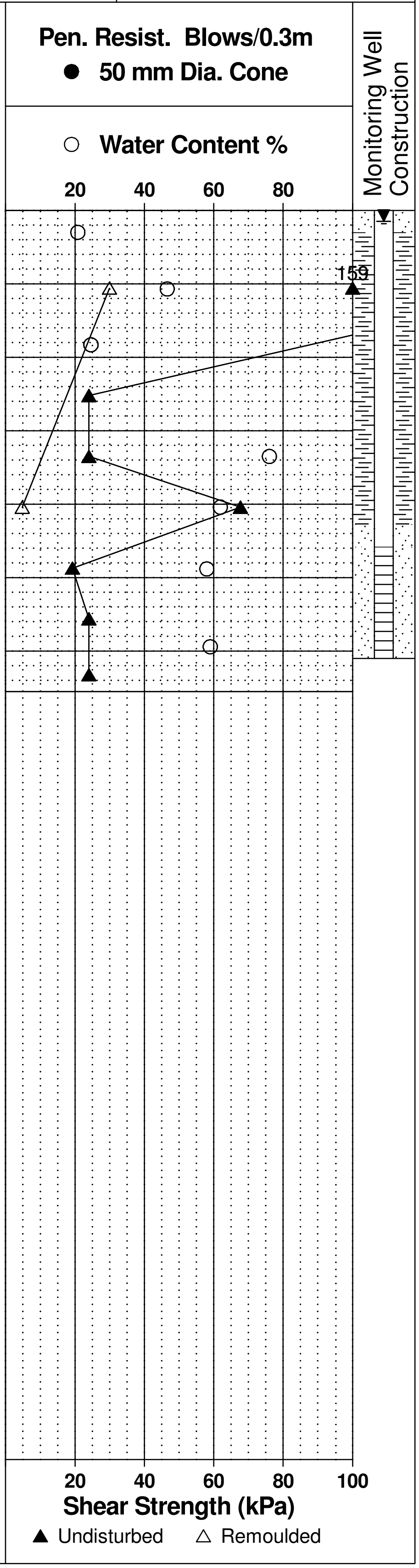
FILE NO. **PG5827**

HOLE NO. **BH54-22**

SOIL DESCRIPTION	STRATA DEPTH (m)	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	80.19
TOPSOIL	0.15	AU	1				
Very stiff, brown **SILTY CLAY** with some sand	1.45	SS	2	67	P	1	79.19
Loose to compact, brown **SILTY SAND**	2.21	SS	3	67	P	2	78.19
Soft, grey **SILTY CLAY,** trace sand		G	4				
		SS	5	8	P	3	77.19
		G	6			4	76.19
		SS	7	100	P	5	75.19
		G	8				
	6.55	G	9			6	74.19

End of Borehole

(GWL @ 0.15m - May 27, 2022)



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BORINGS BY Track-Mount Power Auger

DATE March 24, 2022

FILE NO. PG5827

HOLE NO. BH55-22

SOIL DESCRIPTION

GROUND SURFACE

TOPSOIL 0.20

Very stiff to stiff, brown **SILTY CLAY** with sand and sand seams

- soft and grey by 2.2m depth

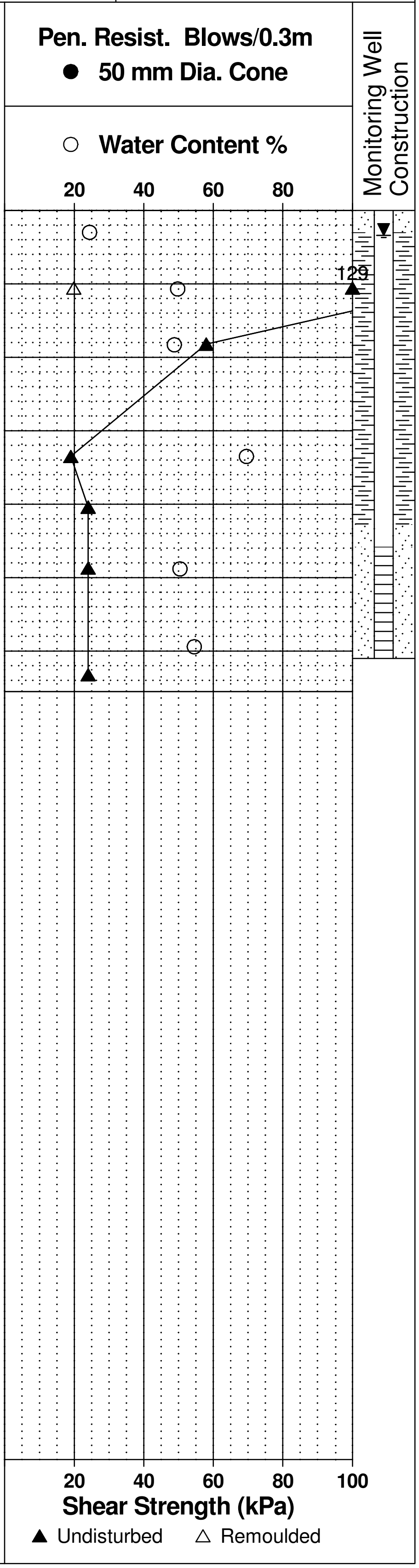
6.55

End of Borehole

(GWL @ 0.34m - May 27, 2022)

TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	33	2
SS	2	33	P
SS	3	25	P
TW	4	96	
SS	5	100	P
G	6		
SS	7	100	P
TW	8	100	
G	9		

DEPTH (m)	ELEV. (m)
0	80.24
1	79.24
2	78.24
3	77.24
4	76.24
5	75.24
6	74.24



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BORINGS BY Track-Mount Power Auger

DATE March 25, 2022

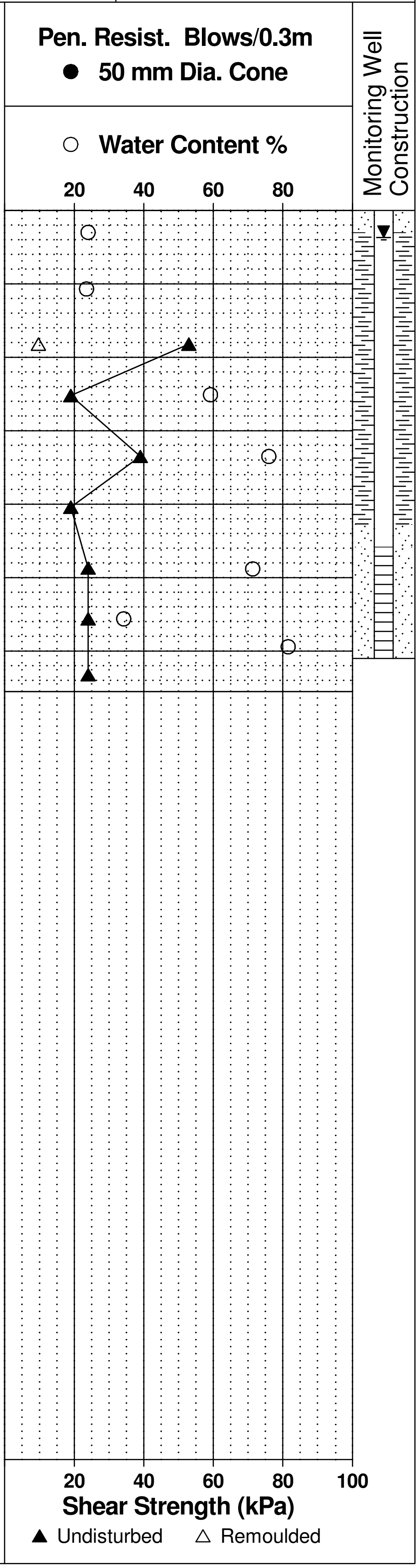
FILE NO. PG5827

HOLE NO. BH56-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	80.21
TOPSOIL 0.18		SS	1	8	2		
Very loose to compact, brown **SILTY SAND** 1.45		SS	2	42	10	1	79.21
Stiff to soft, grey **SILTY CLAY**		SS	3	100	P	2	78.21
		G	4			3	77.21
		SS	5	67	P		
		G	6			4	76.21
		SS	7	67	P	5	75.21
		G	8				
6.55		G	9			6	74.21

Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 14.02m depth, borehole terminated.

(GWL @ 0.37m - May 27, 2022)



SOIL PROFILE AND TEST DATA

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REMARKS

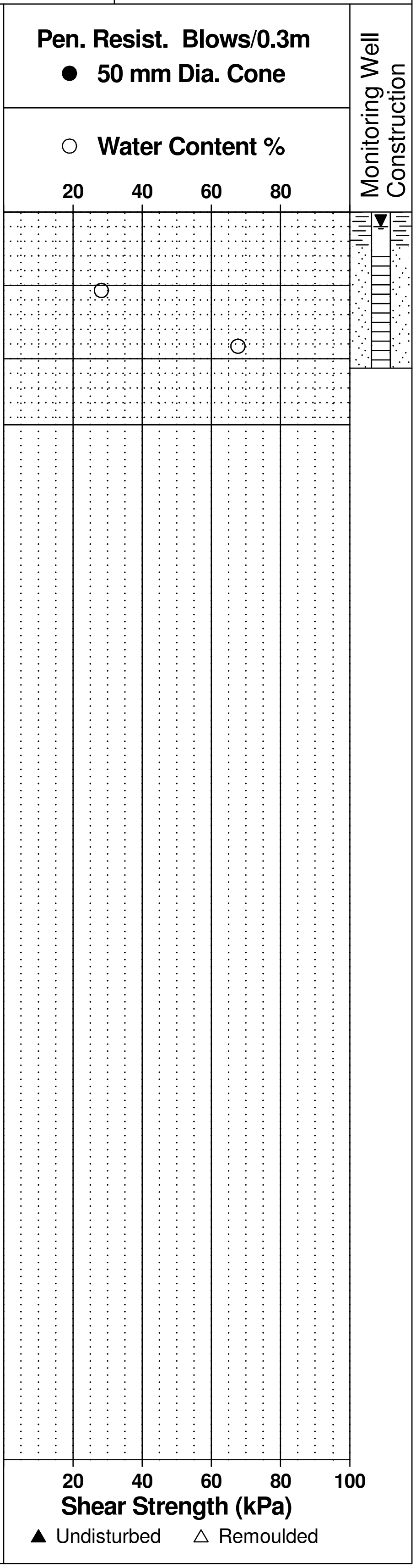
BORINGS BY Track-Mount Power Auger

DATE March 25, 2022

FILE NO. PG5827

HOLE NO. BH56A-22

SOIL DESCRIPTION		SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	80.21
TOPSOIL	0.18						
Very loose to compact, brown **SILTY SAND**		SS	1	50	10	1	79.21
	1.45						
Stiff to soft, grey **SILTY CLAY**		SS	2	100	P	2	78.21
		TW	3	100			
	2.90						
End of Borehole							
(GWL @ 0.20m - May 27, 2022)							



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DATE March 25, 2022

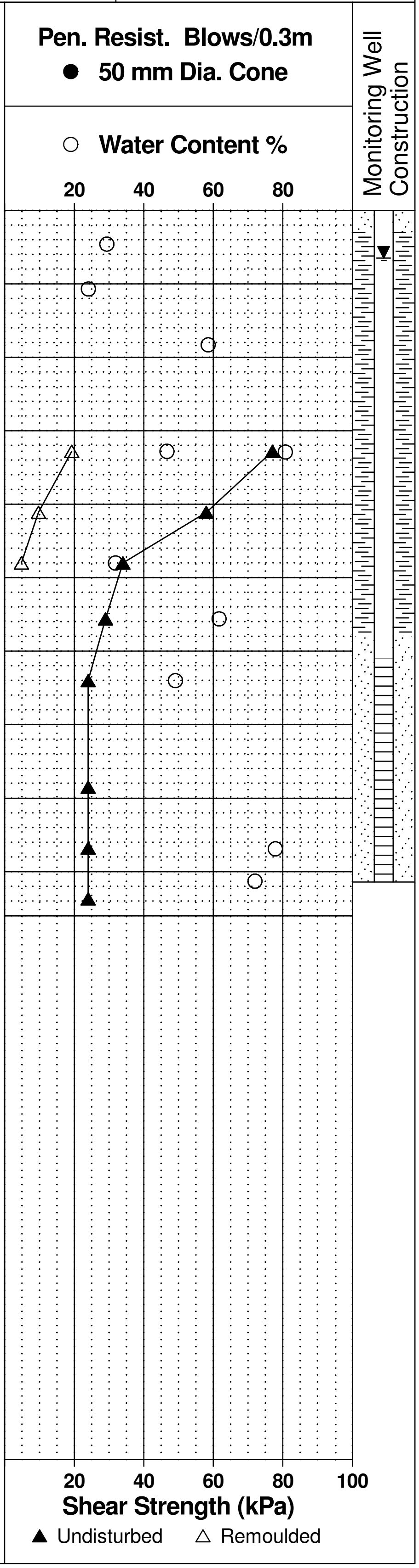
FILE NO. PG5827

HOLE NO. BH57-22

SOIL DESCRIPTION	Depth to base (m)
GROUND SURFACE	
TOPSOIL	0.28
Very stiff, reddish brown **SILTY CLAY** with sand	1.45
Compact, grey **SILTY SAND**	2.21
Stiff to firm, grey **SILTY CLAY** - soft by 6.0m depth	9.60
End of Borehole (GWL @ 0.65m - May 25, 2022)	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	67	6
TW	3	50	
TW	4	100	
G	5		
SS	6	87	P
G	7		
G	8		
SS	9	67	P
TW	10	100	
G	11		
SS	12	100	P
G	13		

DEPTH (m)	ELEV. (m)
0	79.91
1	78.91
2	77.91
3	76.91
4	75.91
5	74.91
6	73.91
7	72.91
8	71.91
9	70.91



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Track-Mount Power Auger

DATE March 28, 2022

FILE NO. **PG5827**

HOLE NO. **BH58-22**

SOIL DESCRIPTION

GROUND SURFACE

TOPSOIL 0.18

Loose, brown **SILTY SAND** 1.45

Stiff to firm, brown **SILTY CLAY** with sand seams

- soft and grey by 2.2m depth

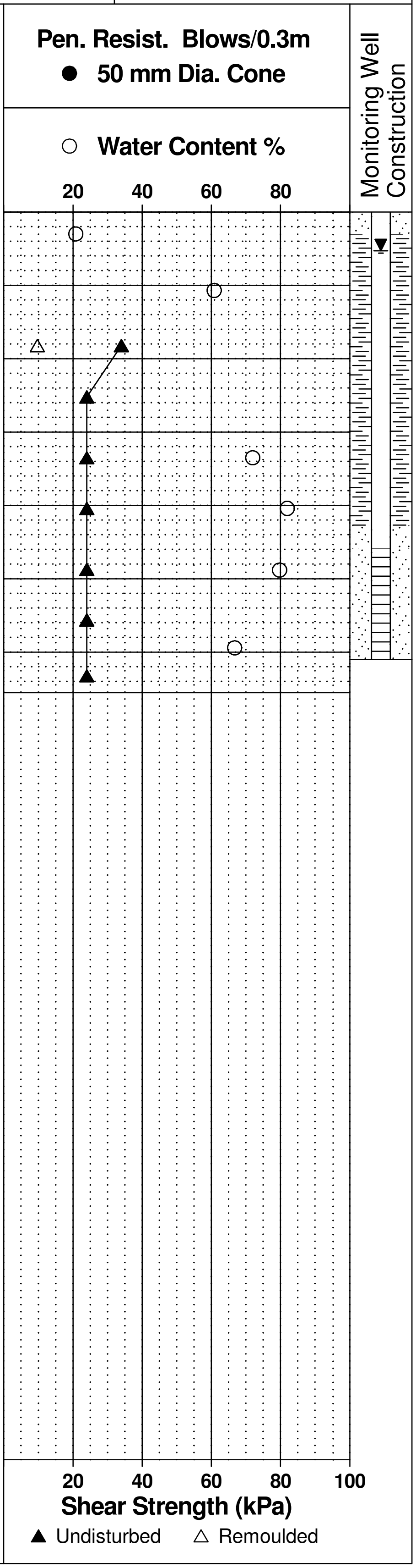
6.55

Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 14.50m depth, borehole terminated.

(GWL @ 0.53m - June 10, 2022)

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	50	6
SS	2	0	P
SS	3	33	P
G	4		
SS	5	100	P
G	6		
SS	7	67	9
G	8		
G	9		

DEPTH (m)	ELEV. (m)
0	80.92
1	79.92
2	78.92
3	77.92
4	76.92
5	75.92
6	74.92



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DATUM Geodetic

REMARKS

BORINGS BY Track-Mount Power Auger

DATE March 28, 2022

FILE NO. **PG5827**

HOLE NO. **BH58A-22**

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	80.92
TOPSOIL 0.18						
Loose, brown **SILTY SAND** 1.45	SS	1	0	P	1	79.92
Stiff to firm, brown **SILTY CLAY** with sand seams - soft and grey by 2.2m depth 4.27	SS	2	0	P	2	78.92
	TW	3	0		3	77.92
	TW	4	83		4	76.92
	TW	5	0			
End of Borehole (GWL @ 0.40m - June 10, 2022)						

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone

○ Water Content %

20 40 60 80

Monitoring Well Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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REMARKS

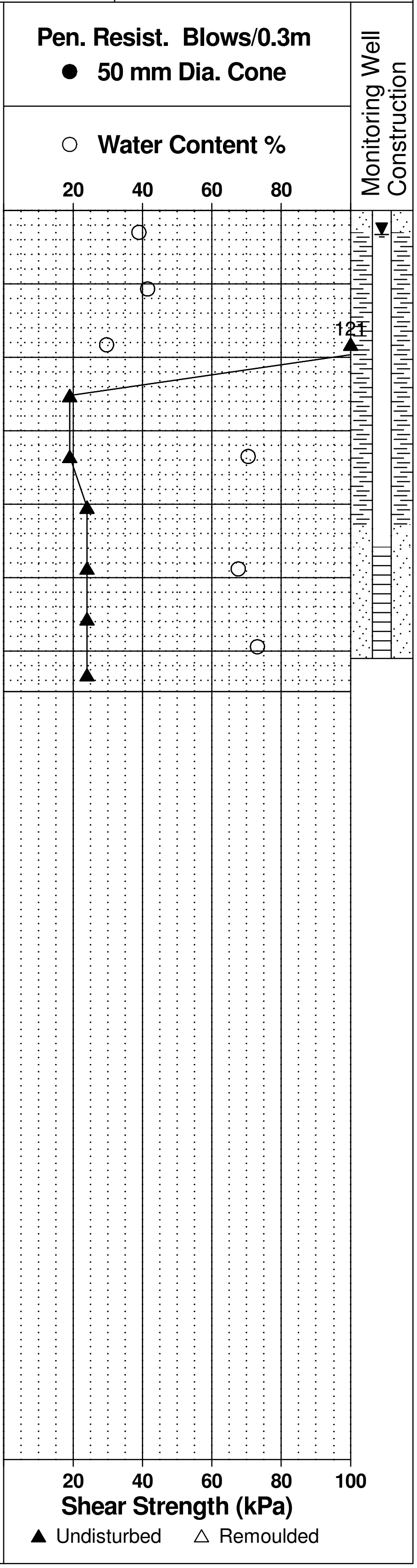
BORINGS BY Track-Mount Power Auger

DATE March 28, 2022

FILE NO. **PG5827**

HOLE NO. **BH59-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	79.31
TOPSOIL 0.15		SS	1	33	4		
Very stiff to stiff, reddish brown to brown **SILTY CLAY** with sand seams		SS	2	42	7	1	78.31
		SS	3	42	P	2	77.31
		G	4				
- soft and grey by 2.2m depth						3	76.31
		SS	5	100	P		
		G	6			4	75.31
		SS	7	100	P	5	74.31
		G	8			6	73.31
		G	9				
6.55							
End of Borehole (GWL @ 0.33m - May 25, 2022)							



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DATUM Geodetic

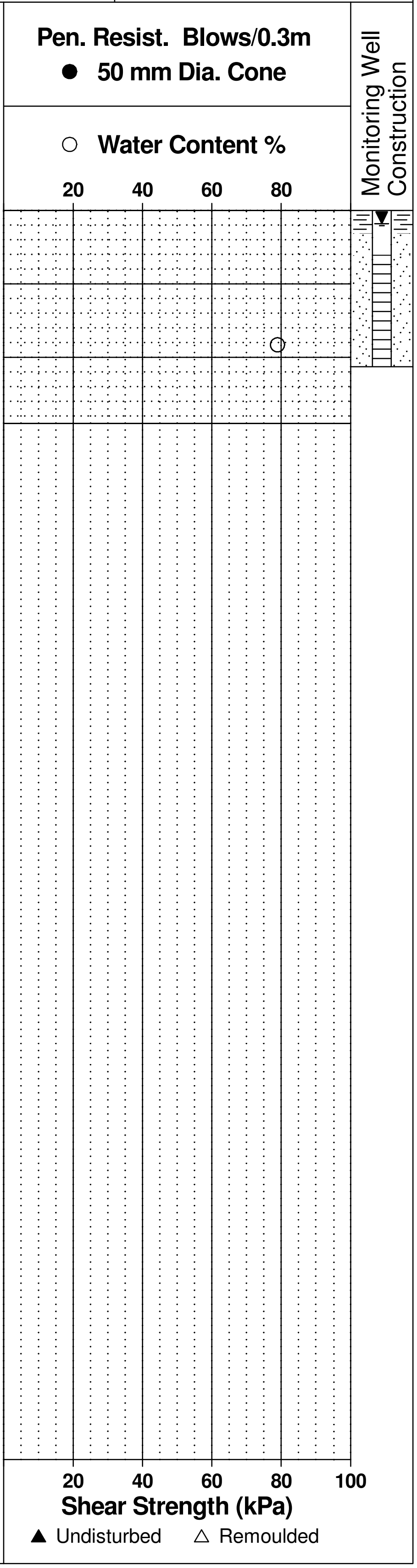
REMARKS

BORINGS BY Track-Mount Power Auger **DATE** March 28, 2022

FILE NO. PG5827

HOLE NO. BH59A-22

SOIL DESCRIPTION	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	79.31
TOPSOIL 0.15						
Very stiff to stiff, reddish brown to brown **SILTY CLAY** with sand seams	SS	1	0	P	1	78.31
	SS	2	42	P	2	77.31
- soft and grey by 2.2m depth 2.90	TW	3	96			
End of Borehole (GWL @ 0.18m - May 25, 2022)						



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DATUM Geodetic

REMARKS

BORINGS BY Track-Mount Power Auger

DATE March 29, 2022

FILE NO. PG5827

HOLE NO. BH60-22

SOIL DESCRIPTION

GROUND SURFACE

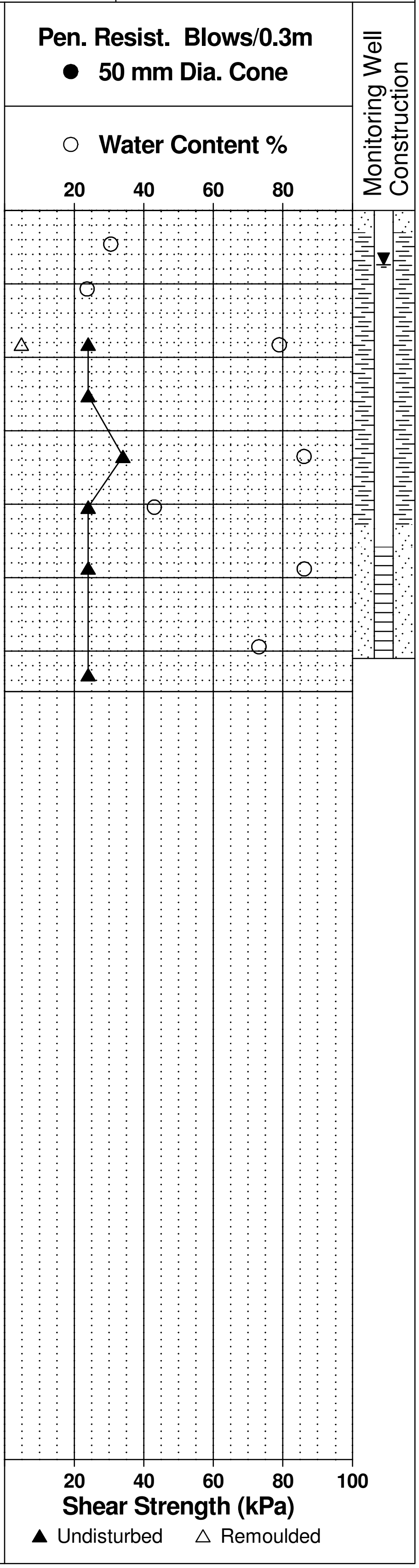
Soil description	Depth to base (m)
TOPSOIL	0.25
Very stiff, brown **SILTY CLAY,** trace sand	0.69
Compact, brown **SILTY SAND**	1.58
Soft, grey **SILTY CLAY**	6.55

End of Borehole

(GWL @ 0.74m - May 25, 2022)

TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	50	15
SS	3	100	P
G	4		
SS	5	100	P
G	6		
SS	7	87	P
TW	8	100	
G	9		

DEPTH (m)	ELEV. (m)
0	79.74
1	78.74
2	77.74
3	76.74
4	75.74
5	74.74
6	73.74



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SOIL PROFILE AND TEST DATA

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DATUM Geodetic

REMARKS

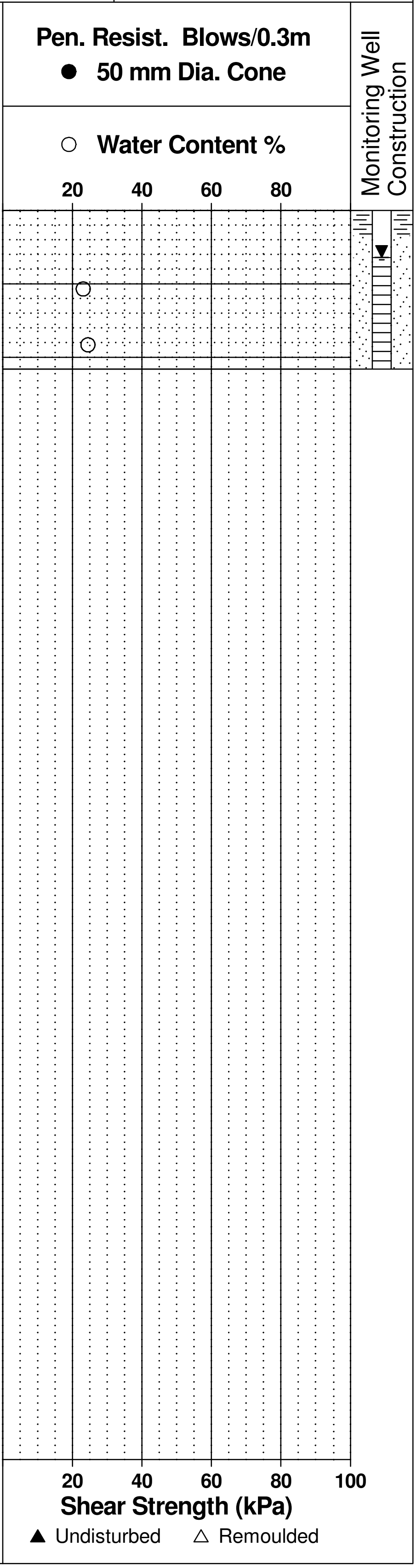
BORINGS BY Track-Mount Power Auger

DATE March 29, 2022

FILE NO. PG5827

HOLE NO. BH60A-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	79.74
TOPSOIL 0.25							
Very stiff, brown **SILTY CLAY,** trace sand 0.69							
Compact, brown **SILTY SAND** 1.58		SS	1	50	22	1	78.74
Soft, grey **SILTY CLAY** 2.13		SS	2	8	P	2	77.74
End of Borehole							
(GWL @ 0.64m - May 25, 2022)							



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DATUM Geodetic

REMARKS

BORINGS BY Track-Mount Power Auger

DATE March 29, 2022

FILE NO. **PG5827**

HOLE NO. **BH61-22**

SOIL DESCRIPTION

GROUND SURFACE

TOPSOIL 0.28

Dense to compact, brown **SILTY SAND** 1.45

- brown silty clay layer from 0.8 to 1.1m depth

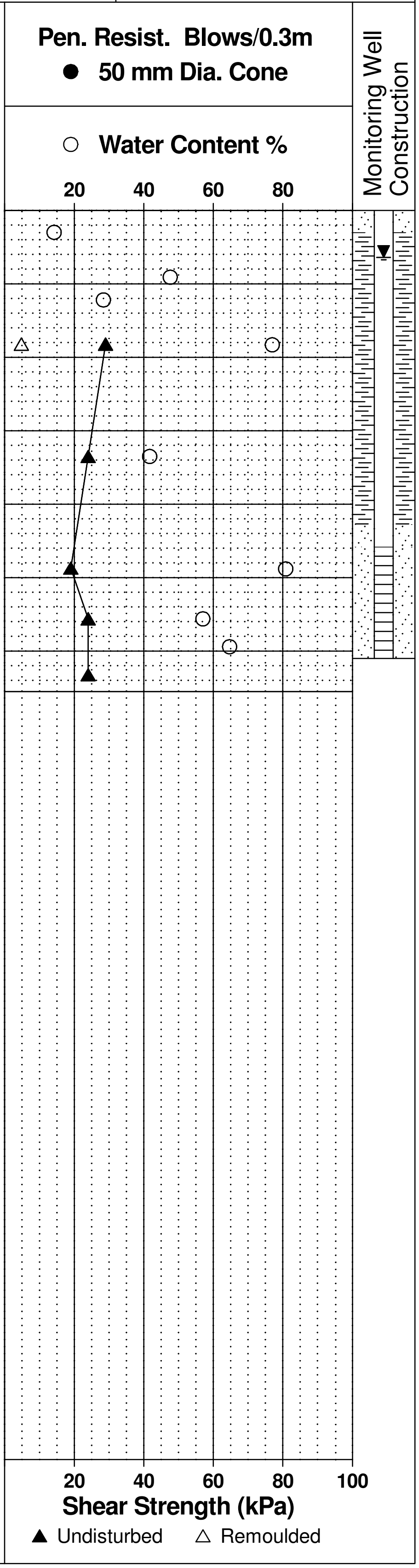
Firm to soft, grey **SILTY CLAY** 6.55

End of Borehole

(GWL @ 0.64m - May 25, 2022)

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	87	31
SS	2	67	11
SS	3	100	P
TW	4	100	
SS	5	100	P
TW	6	100	
SS	7	100	P
G	8		
G	9		

DEPTH (m)	ELEV. (m)
0	79.20
1	78.20
2	77.20
3	76.20
4	75.20
5	74.20
6	73.20



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DATUM Geodetic

REMARKS

BORINGS BY Track-Mount Power Auger

DATE March 30, 2022

FILE NO. **PG5827**

HOLE NO. **BH62-22**

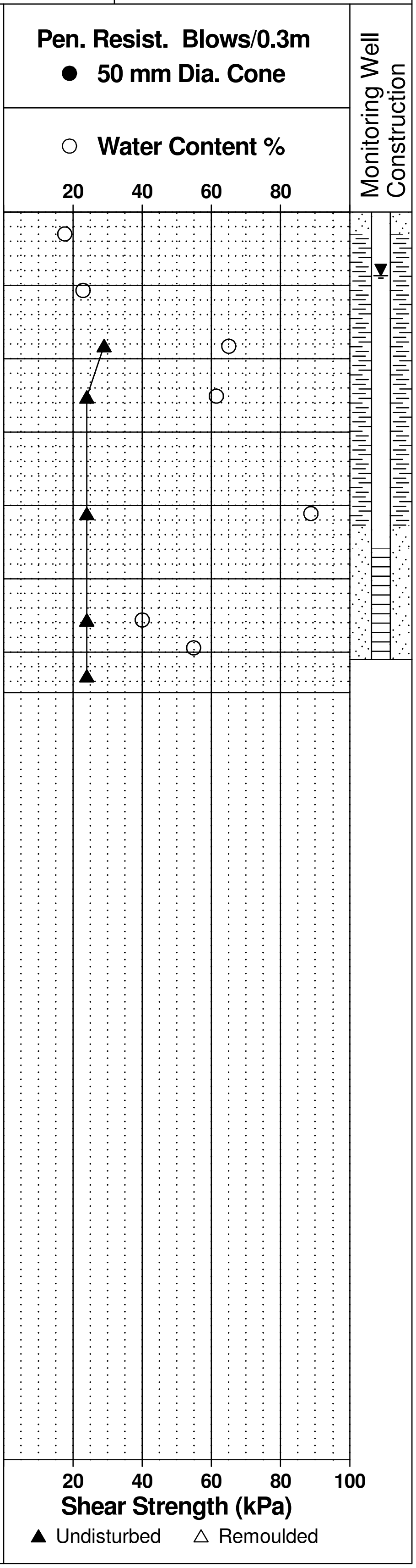
SOIL DESCRIPTION	Bottom depth (m)
GROUND SURFACE	
TOPSOIL	0.30
Compact, brown **SILTY SAND**	1.45
Firm to soft, grey **SILTY CLAY**	6.55

Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 11.00m depth, borehole terminated.

(GWL @ 0.87m - May 25, 2022)

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	42	14
SS	2	58	15
SS	3	67	P
G	4		
TW	5	100	
SS	6	67	P
TW	7	100	
G	8		
G	9		

DEPTH (m)	ELEV. (m)
0	78.98
1	77.98
2	76.98
3	75.98
4	74.98
5	73.98
6	72.98



SOIL PROFILE AND TEST DATA

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Proposed Mixed-Use Community Development
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DATUM Geodetic

REMARKS

BORINGS BY Track-Mount Power Auger

DATE March 30, 2022

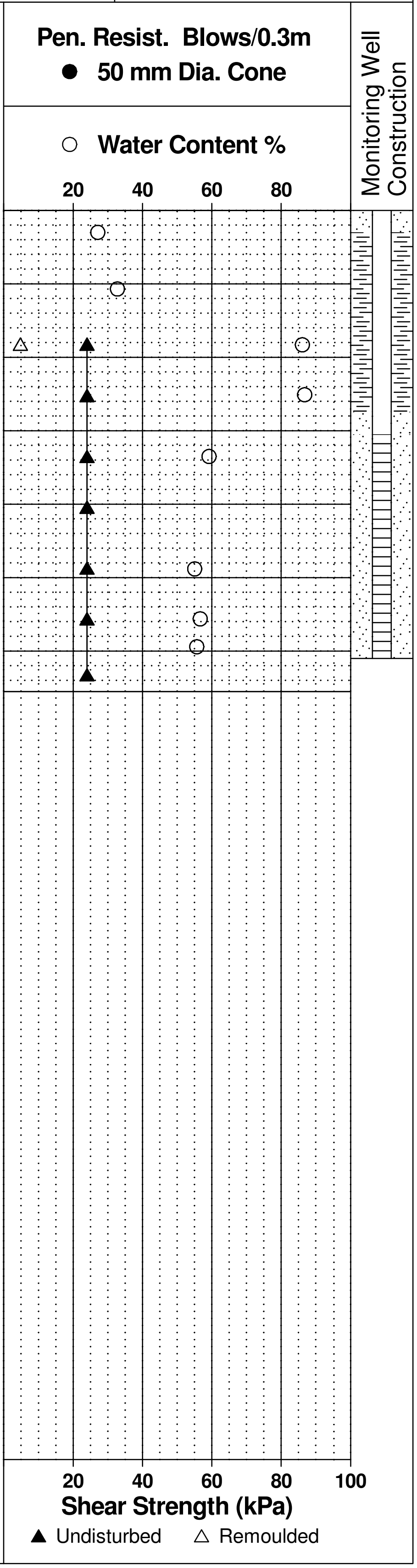
FILE NO. **PG5827**

HOLE NO. **BH63-22**

SOIL DESCRIPTION	Depth to base (m)	STRATA PLOT
GROUND SURFACE		
TOPSOIL	0.30	
Stiff, brown **SILTY CLAY**	0.69	
Loose, brown **SILTY SAND**	1.45	
Soft, grey **SILTY CLAY** with sand seams	6.55	
End of Borehole		
(GWL @ 0.66m - May 25, 2022)		

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	17	5
SS	2	42	7
SS	3	100	P
G	4		
SS	5	100	P
G	6		
SS	7	100	P
G	8		
G	9		

DEPTH (m)	ELEV. (m)
0	78.66
1	77.66
2	76.66
3	75.66
4	74.66
5	73.66
6	72.66



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SOIL PROFILE AND TEST DATA

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DATUM Geodetic

REMARKS

BORINGS BY Track-Mount Power Auger

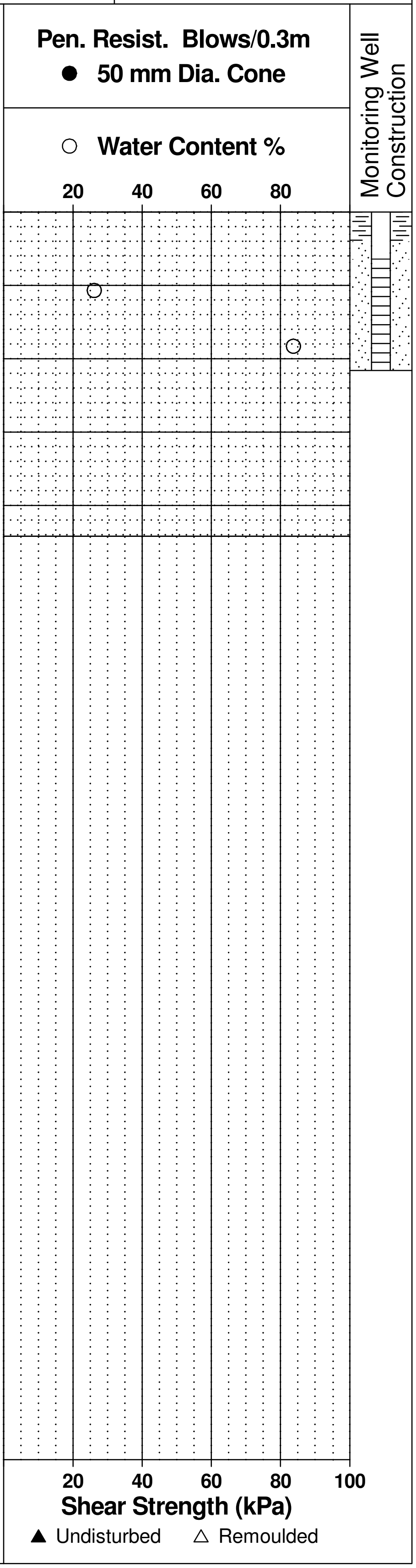
DATE March 30, 2022

FILE NO. **PG5827**

HOLE NO. **BH63A-22**

SOIL DESCRIPTION		SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	78.66
TOPSOIL	0.30						
Stiff, brown **SILTY CLAY**	0.69						
Compact, brown **SILTY SAND**	1.45	SS	1	33	14	1	77.66
Soft, grey **SILTY CLAY** with sand seams		SS	2	33	P	2	76.66
		TW	3	96		3	75.66
	4.42	SS	4	100	0	4	74.66
End of Borehole							

(GWL @ 0.66m - May 25, 2022)



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SOIL PROFILE AND TEST DATA

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Proposed Mixed-Use Community Development
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DATUM Geodetic

REMARKS

BORINGS BY Track-Mount Power Auger

DATE March 30, 2022

FILE NO. PG5827

HOLE NO. BH64-22

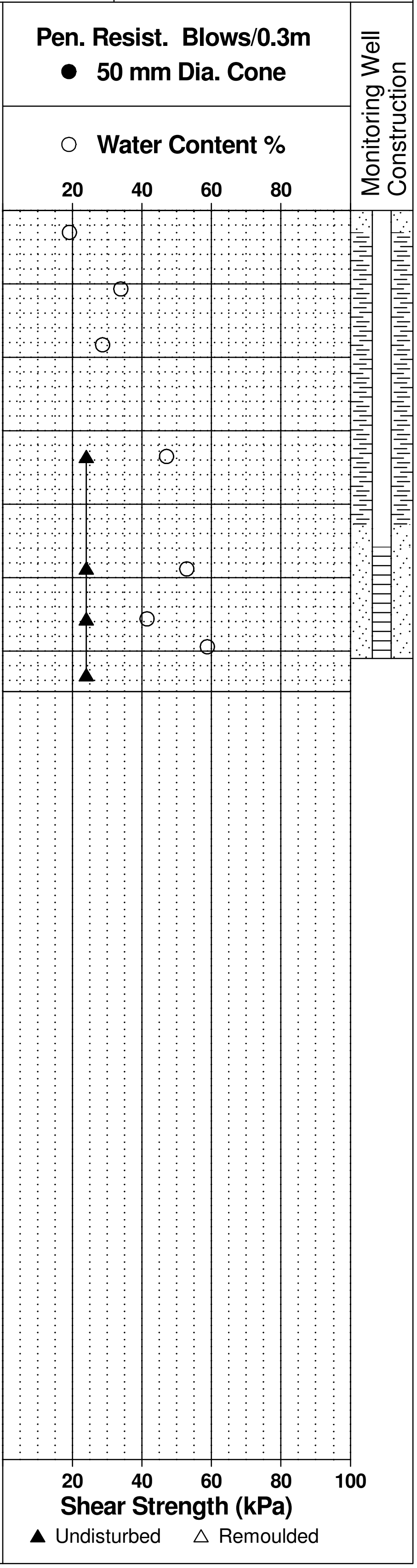
GROUND SURFACE

SOIL DESCRIPTION	Depth (m)
TOPSOIL	0.33
Compact, brown **SILTY SAND**	0.69
Very stiff, reddish brown **SILTY CLAY**	1.45
Loose, brown **SILTY SAND**	2.21
Soft, grey **SILTY CLAY**	6.55
End of Borehole	

(GWL @ 0.90m - May 25, 2022)

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	33	20
SS	2	50	5
SS	3	25	P
TW	4	96	
SS	5	42	P
TW	6	92	
SS	7	67	P
G	8		
G	9		

DEPTH (m)	ELEV. (m)
0	78.83
1	77.83
2	76.83
3	75.83
4	74.83
5	73.83
6	72.83



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
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REMARKS

BORINGS BY Track-Mount Power Auger

DATE March 31, 2022

FILE NO. PG5827

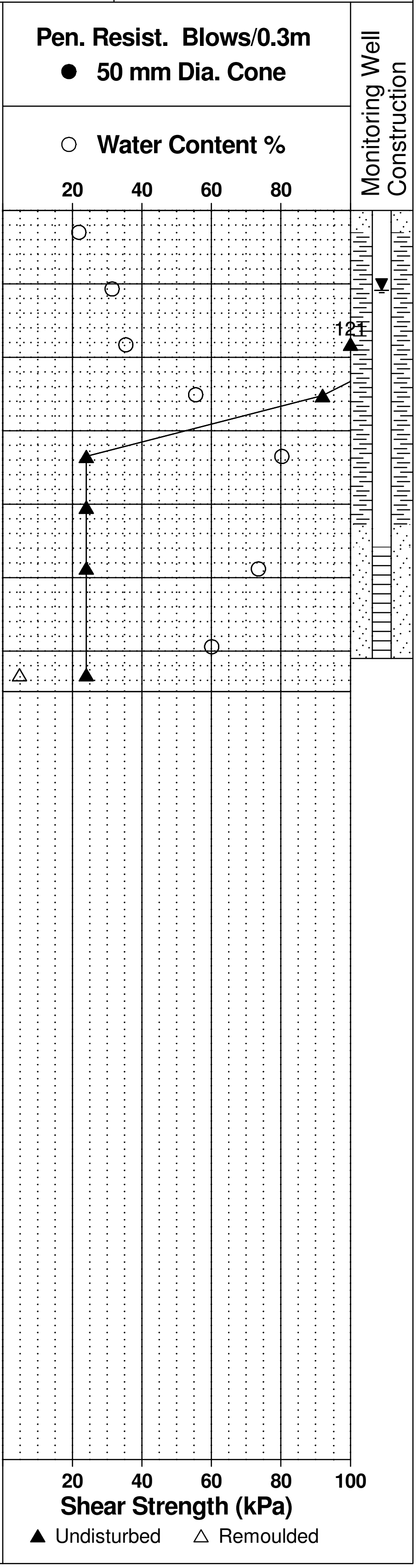
HOLE NO. BH65-22

SOIL DESCRIPTION		SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE					
TOPSOIL	0.15	SS	1	50	4
Loose, brown **SILTY SAND**	0.69				
Very stiff to stiff, reddish brown **SILTY CLAY** - soft and grey by 2.9m depth		SS	2	50	6
		SS	3	100	P
		G	4		
		SS	5	100	P
		G	6		
		SS	7	100	P
		G	8		
	6.55	G	9		

Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 19.91m depth, borehole terminated.

(GWL @ 1.09m - June 10, 2022)

DEPTH (m)	ELEV. (m)
0	79.14
1	78.14
2	77.14
3	76.14
4	75.14
5	74.14
6	73.14



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
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DATUM Geodetic

REMARKS

BORINGS BY Track-Mount Power Auger

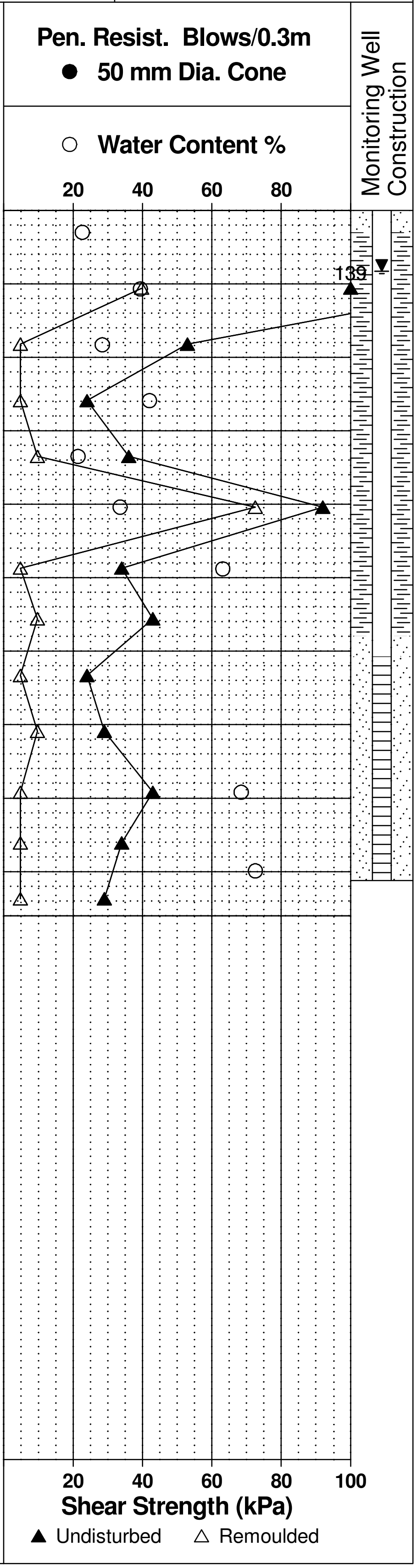
DATE April 13, 2022

FILE NO. **PG5827**

HOLE NO. **BH68-22**

SOIL DESCRIPTION		TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE					
TOPSOIL	0.25	SS	1	87	5
Loose, brown **SILTY SAND**	0.69				
Very stiff to stiff, brown **SILTY CLAY** with sand seams		SS	2	67	P
		SS	3	67	P
- firm to stiff and grey by 2.2m depth		SS	4	50	P
		SS	5	33	P
		G	6		
- firm by 4.6m depth		SS	7	50	P
		G	8		
		G	9		
		G	10		
		SS	11	100	P
		G	12		
		G	13		
	9.60				
End of Borehole					
(GWL @ 0.83m - May 27, 2022)					

DEPTH (m)	ELEV. (m)
0	80.31
1	79.31
2	78.31
3	77.31
4	76.31
5	75.31
6	74.31
7	73.31
8	72.31
9	71.31



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SOIL PROFILE AND TEST DATA

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REMARKS

BORINGS BY Track-Mount Power Auger

DATE April 13, 2022

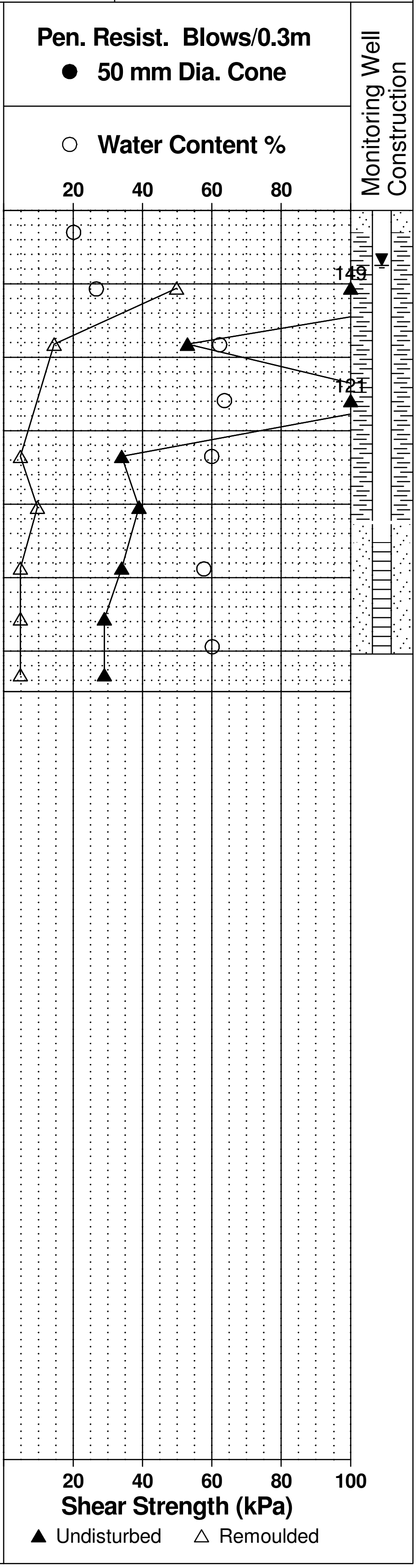
FILE NO. PG5827

HOLE NO. BH69-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	80.47
TOPSOIL 0.20		SS	1	25	3		
Very loose, brown **SILTY SAND** 0.69							
		SS	2	50	P	1	79.47
Very stiff to stiff, brown **SILTY CLAY**		SS	3	100	P	2	78.47
- firm and grey by 2.2m depth		SS	4	83	P	3	77.47
		SS	5	75	P		
		G	6			4	76.47
		SS	7	50	P	5	75.47
		G	8				
		G	9			6	74.47
6.55							

Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 10.97m depth, borehole terminated.

(GWL @ 0.75m - May 27, 2022)



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SOIL PROFILE AND TEST DATA

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REMARKS

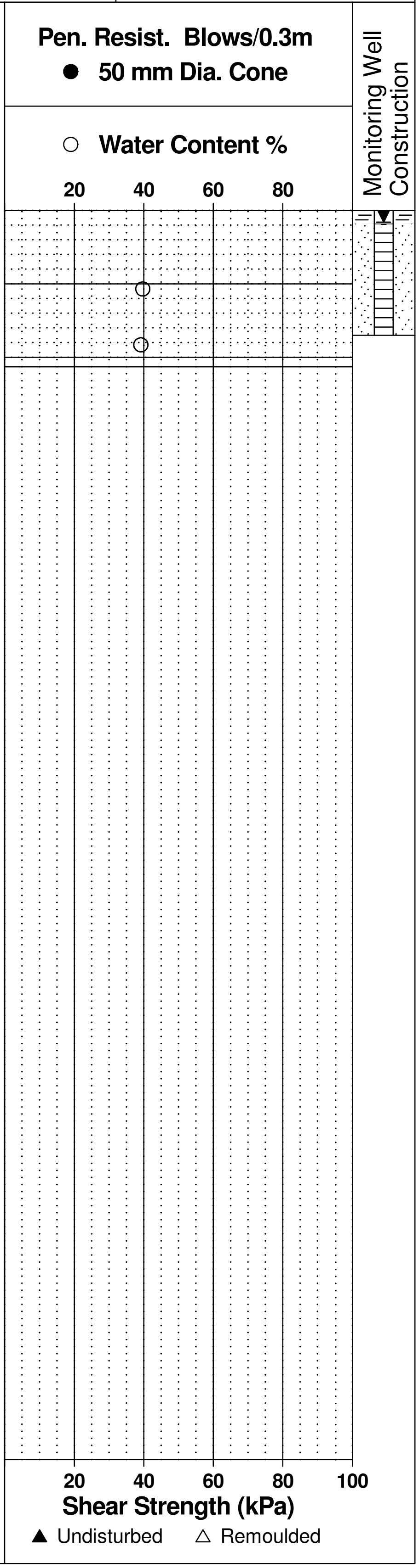
BORINGS BY Track-Mount Power Auger

DATE April 13, 2022

FILE NO. PG5827

HOLE NO. BH69A-22

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	80.47
TOPSOIL 0.20						
Loose, brown **SILTY SAND** 0.69						
Very stiff to stiff, brown **SILTY CLAY**	SS	1	67	4	1	79.47
2.13	SS	2	25	5	2	78.47
End of Borehole						
(GWL @ 0.16m - May 27, 2022)						



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SOIL PROFILE AND TEST DATA

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DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE December 5, 2022

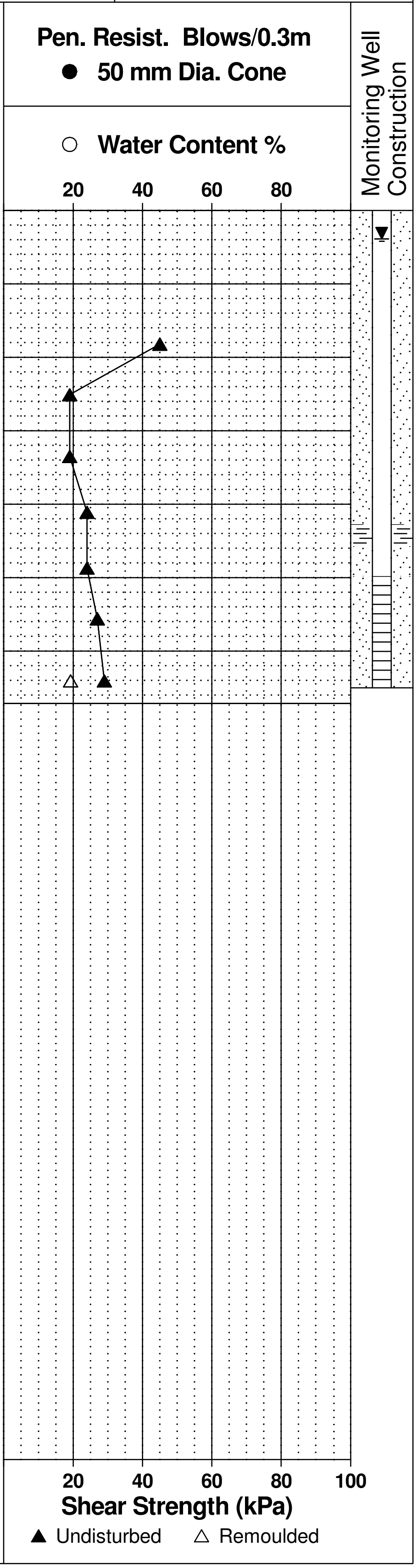
FILE NO. **PG5827**

HOLE NO. **BH70-22**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	79.42
TOPSOIL 0.33		AU	1				
Compact, brown **SILTY SAND** - grey by 0.8m depth 1.45		SS	2	58	12	1	78.42
Firm to soft, grey **SILTY CLAY** with intermittent sand seams to 4.6m depth. 6.71		SS	3	42	P	2	77.42
						3	76.42
		SS	4	100	P	4	75.42
		SS	5	58	P	5	74.42
		SS	6	83	P	6	73.42
		SS	7	83	P		

Dynamic Cone Penetration Test commenced at 6.71m depth. Cone pushed to 30.48m depth, no DCPT refusal encountered, borehole terminated.

(GWL @ 0.39m - Dec. 13, 2022)



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SOIL PROFILE AND TEST DATA

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REMARKS

BORINGS BY CME-55 Low Clearance Drill

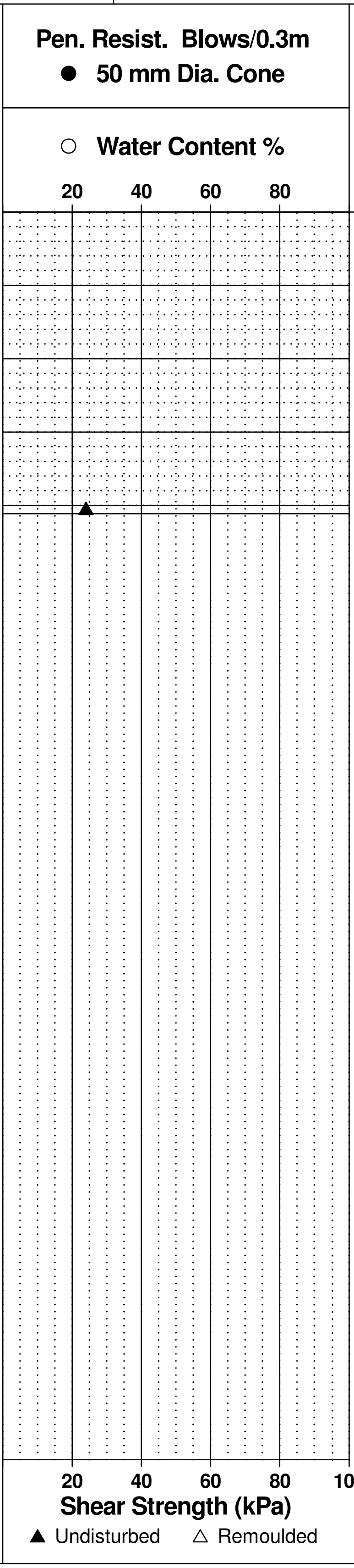
DATE December 6, 2022

FILE NO. PG5827

HOLE NO. BH70A-22

SOIL DESCRIPTION	Strata depth (m)	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE					
TOPSOIL	0.33				
Compact, brown **SILTY SAND** - grey by 0.8m depth	1.45				
Firm to soft, grey **SILTY CLAY**		TW	1	100	
	4.11	TW	2	77	
End of Borehole					

DEPTH (m)	ELEV. (m)
0	79.42
1	78.42
2	77.42
3	76.42
4	75.42



Monitoring Well Construction

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9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Track-Mount Power Auger

DATE June 2, 2022

FILE NO. PG5827

HOLE NO. BH71-22

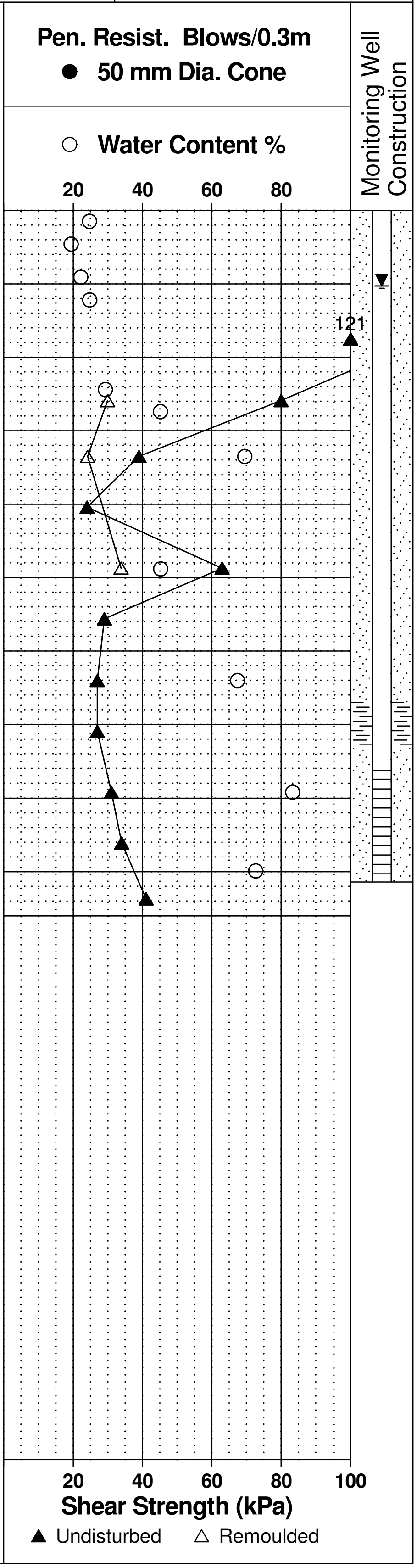
SOIL DESCRIPTION	Depth of base (m)
GROUND SURFACE	
TOPSOIL	0.23
Compact, brown **SILTY SAND**	1.07
Hard to very stiff, brown **SILTY CLAY** with sand	2.13
Stiff to firm, grey **SILTY CLAY**	9.60

Dynamic Cone Penetration Test commenced at 9.60m depth. Cone pushed up to 30.25m depth, borehole terminated.

(GWL @ 1.03m - June 15, 2022)

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	83	5
SS	2	100	13
SS	3	83	P
SS	4	100	P
SS	5	100	P
SS	6	100	P
SS	7	100	P
AU	8		

DEPTH (m)	ELEV. (m)
0	78.48
1	77.48
2	76.48
3	75.48
4	74.48
5	73.48
6	72.48
7	71.48
8	70.48
9	69.48



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Track-Mount Power Auger

DATE May 27, 2022

FILE NO. PG5827

HOLE NO. BH72-22

SOIL DESCRIPTION

GROUND SURFACE

TOPSOIL 0.30

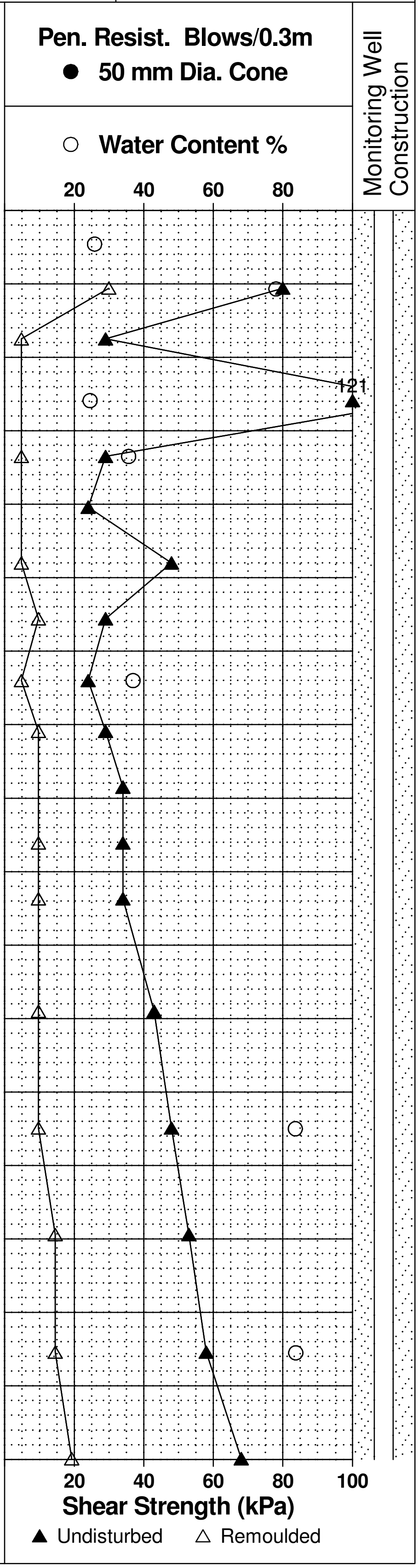
Very stiff to stiff, reddish brown to brown **SILTY CLAY** 1.45

Firm, grey **SILTY CLAY**

- grey silty sand layer from 2.2 to 2.7m depth

TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	100	P
SS	3	42	P
SS	4	42	P
SS	5	100	P
SS	6	100	P
SS	7	100	P

DEPTH (m)	ELEV. (m)
0	78.71
1	77.71
2	76.71
3	75.71
4	74.71
5	73.71
6	72.71
7	71.71
8	70.71
9	69.71
10	68.71
11	67.71
12	66.71
13	65.71
14	64.71
15	63.71
16	62.71
17	61.71



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SOIL PROFILE AND TEST DATA

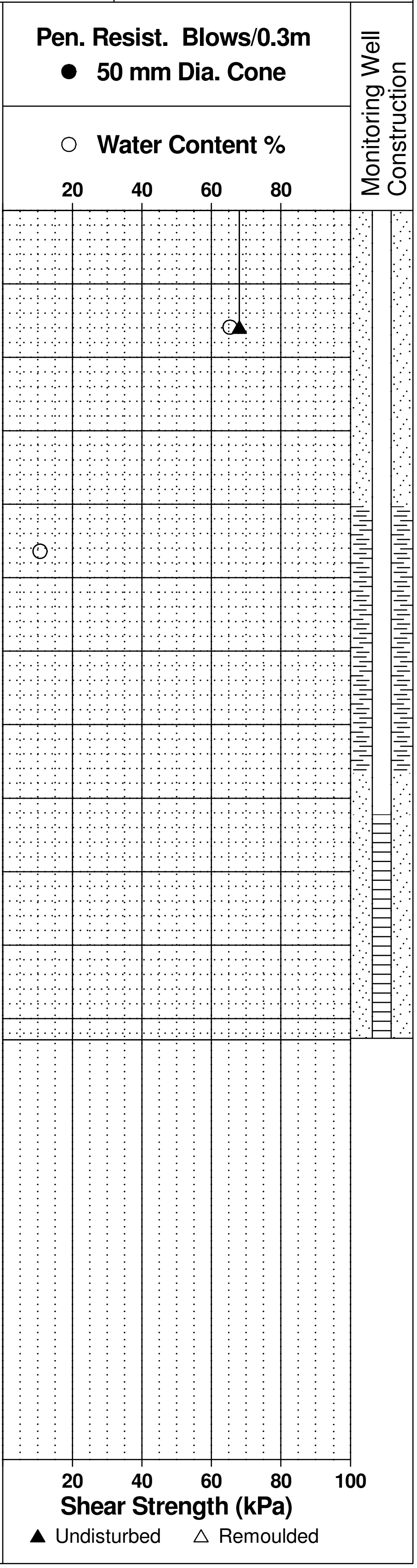
Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic
REMARKS
BORINGS BY Track-Mount Power Auger
DATE May 27, 2022
FILE NO. PG5827
HOLE NO. BH72-22

SOIL DESCRIPTION	Bottom depth (m)
GROUND SURFACE	
Firm to stiff, grey **SILTY CLAY**	19.35
GLACIAL TILL: Compact, red silty sand with gravel, clay, cobbles and boulders	21.82
BEDROCK: Poor to excellent quality, red siltstone	28.29
End of Borehole	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	8	100	P
SS	9	31	27
RC	1	87	0
RC	2	100	41
RC	3	100	74
RC	4	100	77
RC	5	100	100

DEPTH (m)	ELEV. (m)
17	61.71
18	60.71
19	59.71
20	58.71
21	57.71
22	56.71
23	55.71
24	54.71
25	53.71
26	52.71
27	51.71
28	50.71



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

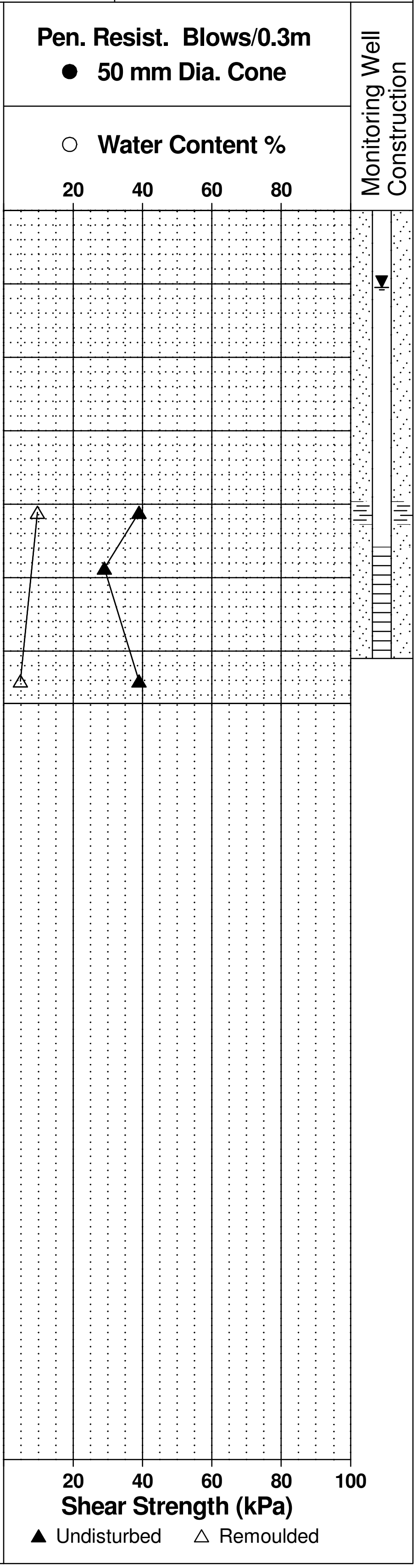
DATE December 5, 2022

FILE NO. PG5827

HOLE NO. BH73-22

SOIL DESCRIPTION		SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE					
TOPSOIL	0.10	AU	1		
Compact, brown **SILTY SAND**		SS	2	4	10
	1.45				
Comapct, grey **SILTY SAND to SANDY SILT**		SS	3	58	12
		SS	4	75	P
	3.73	SS	5	75	P
Firm, grey **SILTY CLAY,** trace sand		SS	6	92	P
		SS	7	100	P
	6.71	SS	8	92	P
End of Borehole					
(GWL @ 1.05m - Dec. 13, 2022)					

DEPTH (m)	ELEV. (m)
0	79.94
1	78.94
2	77.94
3	76.94
4	75.94
5	74.94
6	73.94



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE December 6, 2022

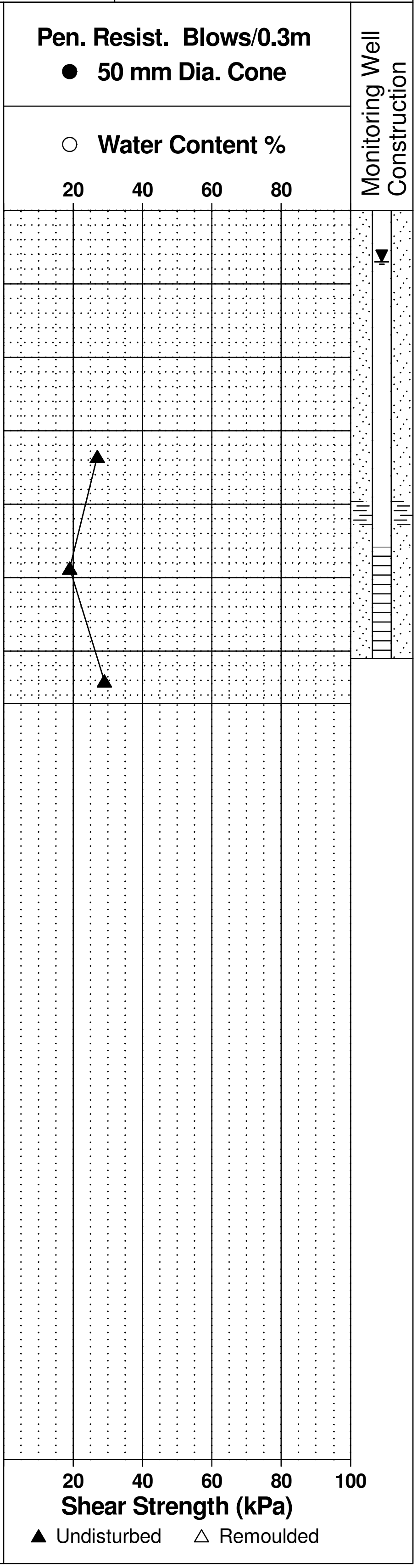
FILE NO. **PG5827**

HOLE NO. **BH74-22**

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	78.97
TOPSOIL 0.36	AU	1				
FILL: Brown silty sand 1.45	SS	2	75	11	1	77.97
Compact to loose, grey **SILTY SAND**	SS	3	58	11	2	76.97
2.97	SS	4	25	6	3	75.97
Firm, grey **SILTY CLAY**	SS	5	50	P		
	TW	6	100		4	74.97
	SS	7	100	P	5	73.97
	TW	8	100		6	72.97
6.71	SS	9	100	P		

End of Borehole

(GWL @ 0.70m - Dec. 13, 2022)



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE December 5, 2022

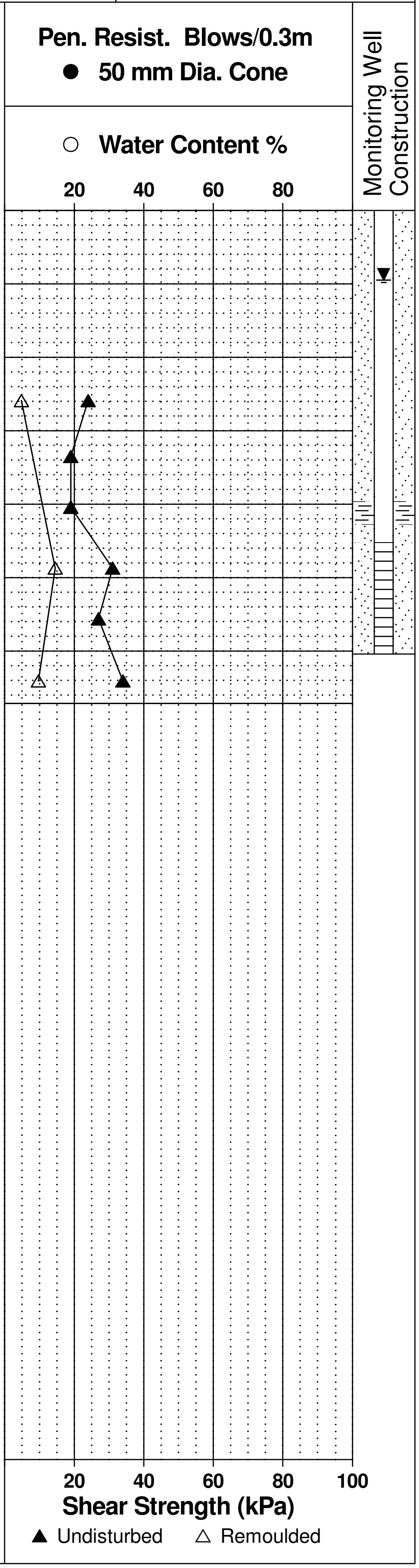
FILE NO. **PG5827**

HOLE NO. **BH75-22**

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	78.99
TOPSOIL 0.10						
Compact, brown **SILTY SAND** 0.69	AU	1				
Compact, grey **SILTY SAND to SANDY SILT**	SS	2	83	15	1	77.99
2.21	SS	3	50	11	2	76.99
Soft to firm, grey **SILTY CLAY**	SS	4	100	P	3	75.99
	SS	5	100	P	4	74.99
	SS	6	92	P	5	73.99
					6	72.99
6.71	SS	7	100	P		

End of Borehole

(GWL @ 0.95m - Dec. 13, 2022)



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE December 6, 2022

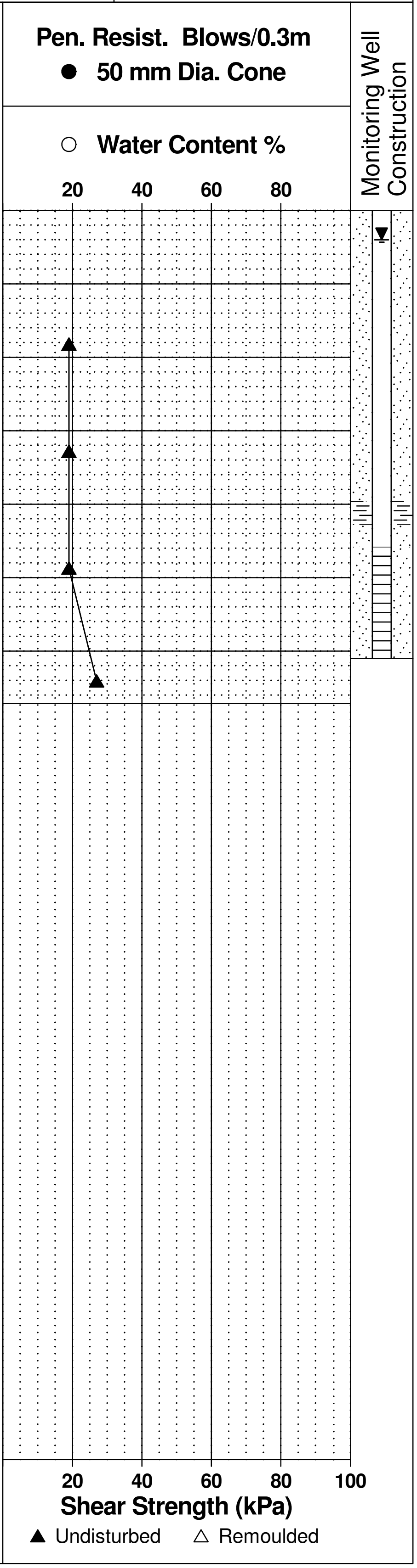
FILE NO. PG5827

HOLE NO. BH76-22

SOIL DESCRIPTION					
GROUND SURFACE					
TOPSOIL	0.10				
FILL: Brown silty sand	0.69				
Soft to firm, grey **SILTY CLAY** with intermittent sand seams to 2.0m depth.	6.71				
End of Borehole					
(GWL @ 0.40m - Dec. 13, 2022)					

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	100	1
SS	3	67	P
TW	4	100	
TW	5	100	
SS	6	83	P
TW	7	100	
SS	8	75	P

DEPTH (m)	ELEV. (m)
0	77.89
1	76.89
2	75.89
3	74.89
4	73.89
5	72.89
6	71.89



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Mixed-Use Community Development
Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE December 5, 2022

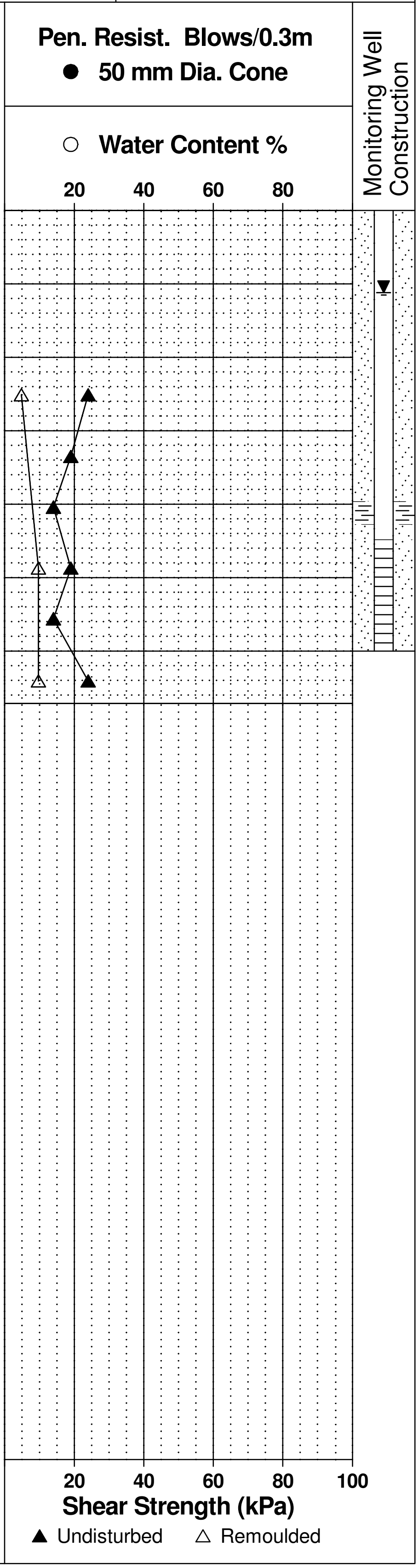
FILE NO. PG5827

HOLE NO. BH77-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	79.00
TOPSOIL 0.30		AU	1				
FILL: Brown silty sand 1.45		SS	2	58	8	1	78.00
FILL: Brown silty clay, some sand 2.03		SS	3	92	4	2	77.00
Soft, grey **SILTY CLAY**						3	76.00
		SS	4	42	P		
						4	75.00
		SS	5	71	P	5	74.00
						6	73.00
6.71		SS	6	71	P		

End of Borehole

(GWL @ 1.12m - Dec. 13, 2022)



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

REMARKS

BORINGS BY CME 55 Power Auger

DATE 27 September 2011

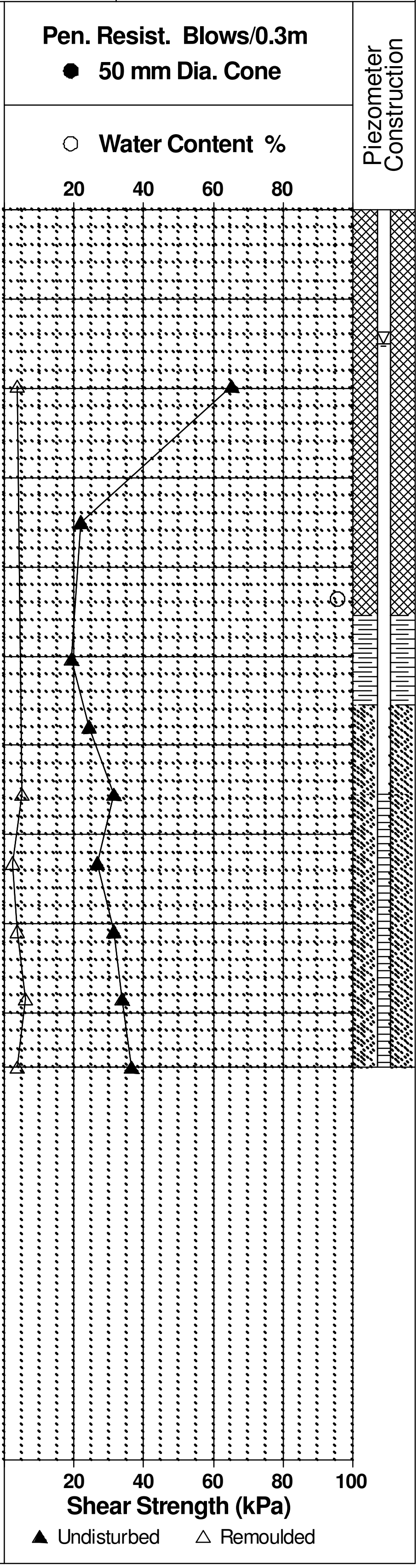
FILE NO. PG2466

HOLE NO. BH 1

SOIL DESCRIPTION	Depth to base (m)
GROUND SURFACE	
TOPSOIL	0.25
Very loose, brown **SILTY SAND**	1.17
Stiff, brown **SILTY CLAY,** some sand seams	2.03
Stiff, grey **SILTY CLAY** - soft to firm by 3.0m depth	9.60
End of Borehole (GWL @ 1.5m depth based on field observations)	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	100	2
TW	3	100	
TW	4	100	

DEPTH (m)	ELEV. (m)
0	78.78
1	77.78
2	76.78
3	75.78
4	74.78
5	73.78
6	72.78
7	71.78
8	70.78
9	69.78



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. **PG2466**

REMARKS

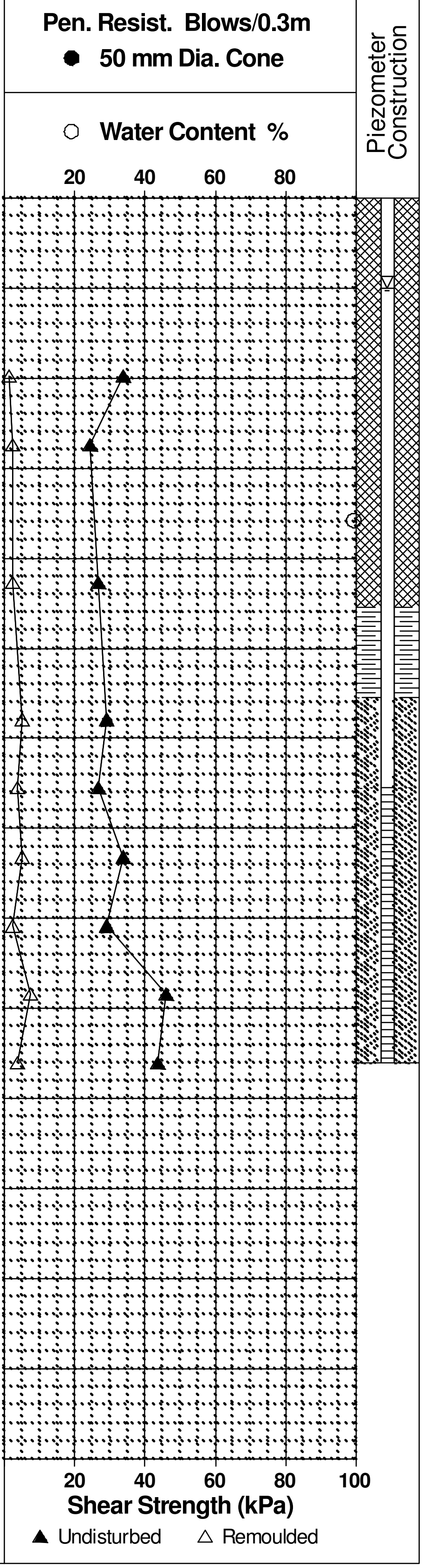
HOLE NO. **BH 2**

BORINGS BY CME 55 Power Auger

DATE 27 September 2011

SOIL DESCRIPTION		SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD
GROUND SURFACE					
Very loose, brown **SILTY SAND**	0.60	AU	1		
Stiff to firm, brown **SILTY CLAY** with sand seams	1.52	SS	2	100	3
Firm, grey **SILTY CLAY**	9.60	TW TW	3 4	100 100	
Dynamic Cone Penetration Test commenced @ 9.60m depth. Cone pushed to 17.0m depth.					

DEPTH (m)	ELEV. (m)
0	79.62
1	78.62
2	77.62
3	76.62
4	75.62
5	74.62
6	73.62
7	72.62
8	71.62
9	70.62
10	69.62
11	68.62
12	67.62
13	66.62
14	65.62



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

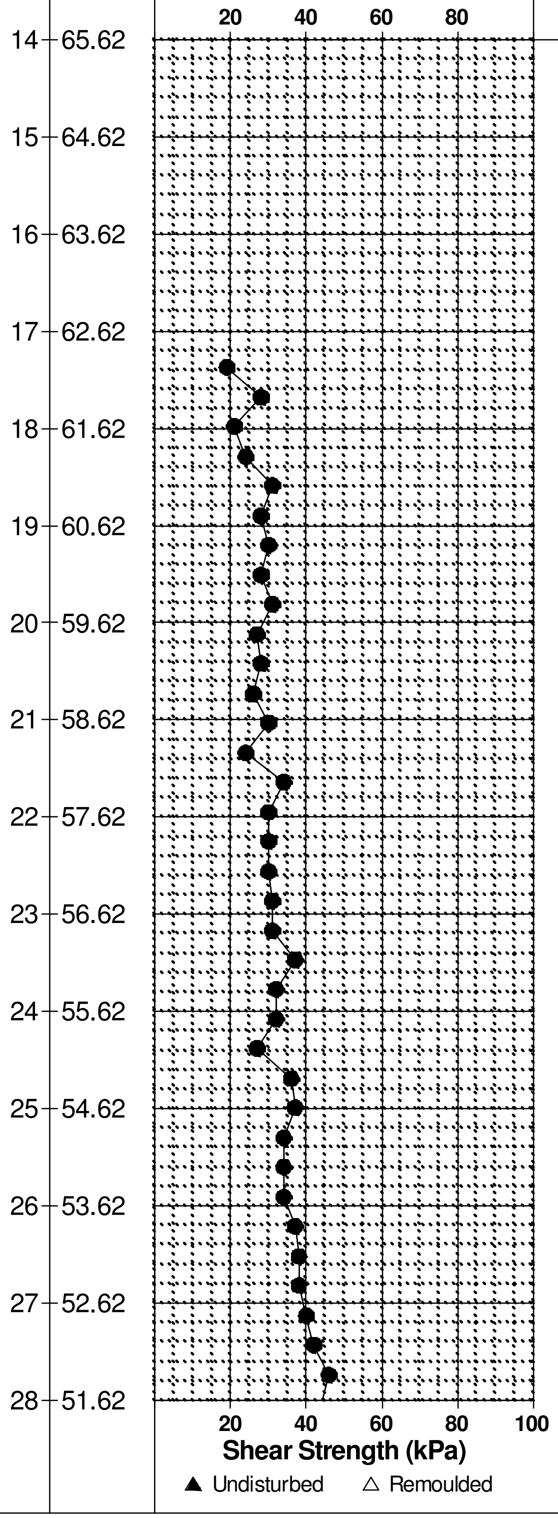
FILE NO. **PG2466**

REMARKS

HOLE NO. **BH 2**

BORINGS BY CME 55 Power Auger **DATE** 27 September 2011

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			20 40 60 80	



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

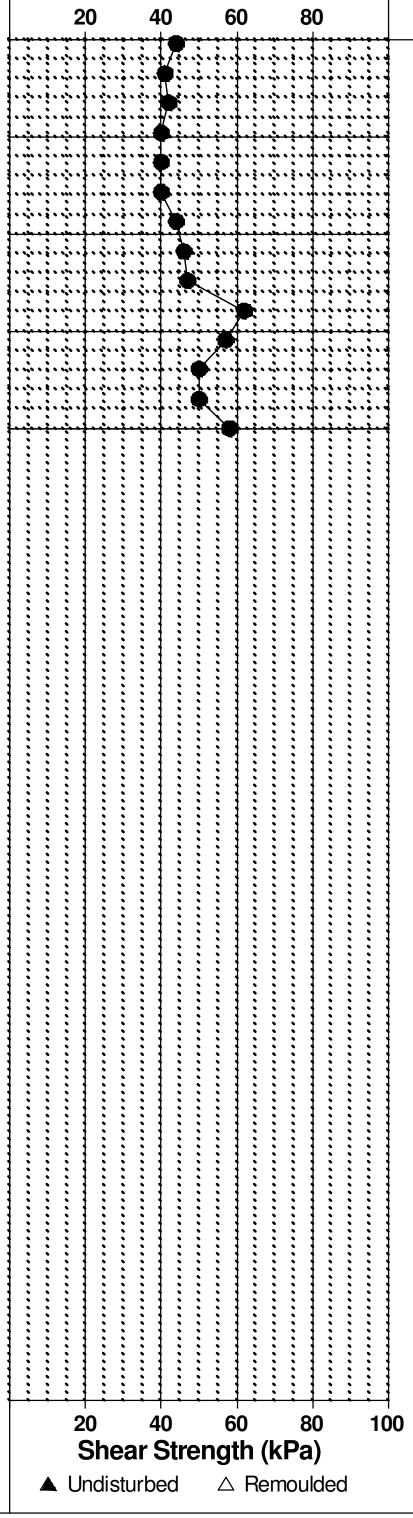
DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. **PG2466**

REMARKS

HOLE NO. **BH 2**

BORINGS BY CME 55 Power Auger **DATE** 27 September 2011

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD				
GROUND SURFACE									
						28	51.62		
						29	50.62		
						30	49.62		
						31	48.62		
32.00						32	47.62		
End of Borehole (GWL @ 1.0m depth based on field observations)									

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

REMARKS

BORINGS BY CME 55 Power Auger

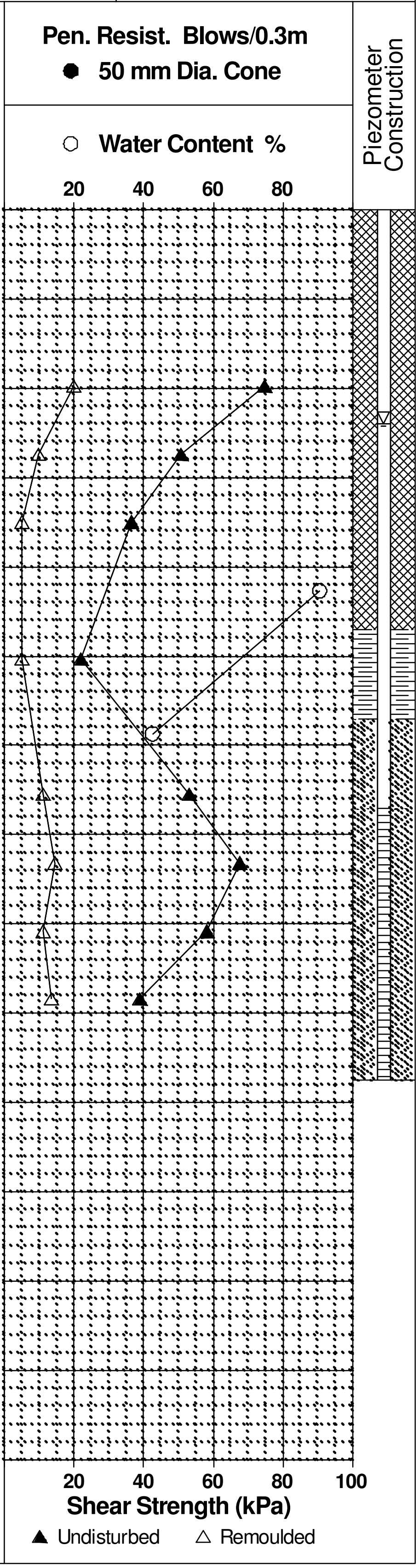
DATE 27 September 2011

FILE NO. PG2466

HOLE NO. BH 3

SOIL DESCRIPTION	STRATA PLOT	TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE					
Loose, brown **SILTY SAND,** some clay	0.69	AU	1		
Stiff, brown **SILTY CLAY**	2.90	SS	2	100	5
Soft to firm, grey **SILTY CLAY**	9.75	TW	3	100	
		TW	4	100	
		TW	5	100	
Dynamic Cone Penetration commenced @ 9.75m depth. Cone pushed 30.56m depth with no resistance.					

DEPTH (m)	ELEV. (m)
0	78.74
1	77.74
2	76.74
3	75.74
4	74.74
5	73.74
6	72.74
7	71.74
8	70.74
9	69.74
10	68.74
11	67.74
12	66.74
13	65.74
14	64.74



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

REMARKS

BORINGS BY CME 55 Power Auger

DATE 27 September 2011

FILE NO. PG2466

HOLE NO. BH 3

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			20 40 60 80	
GROUND SURFACE									
						14	64.74		
						15	63.74		
						16	62.74		
						17	61.74		
						18	60.74		
						19	59.74		
						20	58.74		
						21	57.74		
						22	56.74		
						23	55.74		
						24	54.74		
						25	53.74		
						26	52.74		
						27	51.74		
						28	50.74	20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded	

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG2466

REMARKS

HOLE NO. BH 3

BORINGS BY CME 55 Power Auger **DATE** 27 September 2011

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			20 40 60 80	
GROUND SURFACE									
						28	50.74		
						29	49.74		
						30	48.74		
30.56									
End of Borehole (GWL @ 2.4m depth based on field observations)									

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

REMARKS

BORINGS BY CME 55 Power Auger

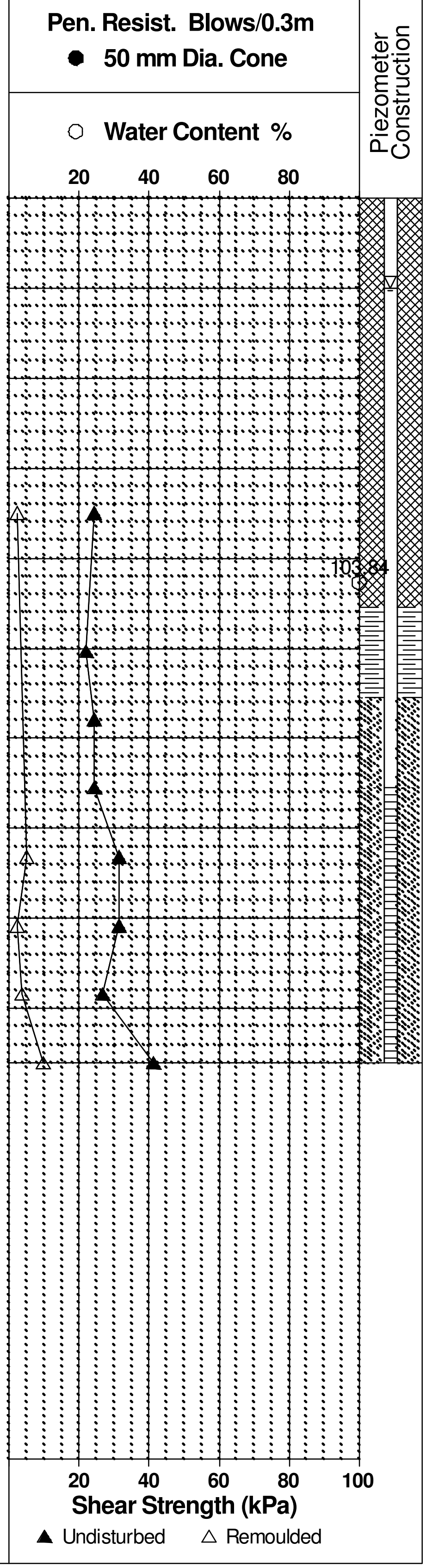
DATE 27 September 2011

FILE NO. PG2466

HOLE NO. BH 4

SOIL DESCRIPTION	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE				
Compact, brown **SILTY SAND,** trace gravel - grey by 1.2m depth	AU	1		
	SS	2	54	18
	SS	3	42	10
2.21				
Soft to firm, grey **SILTY CLAY**	SS	4	50	1
	TW	5	100	
9.60				
End of Borehole (GWL @ 1.0m depth based on field observations)				

DEPTH (m)	ELEV. (m)
0	79.97
1	78.97
2	77.97
3	76.97
4	75.97
5	74.97
6	73.97
7	72.97
8	71.97
9	70.97



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG2466

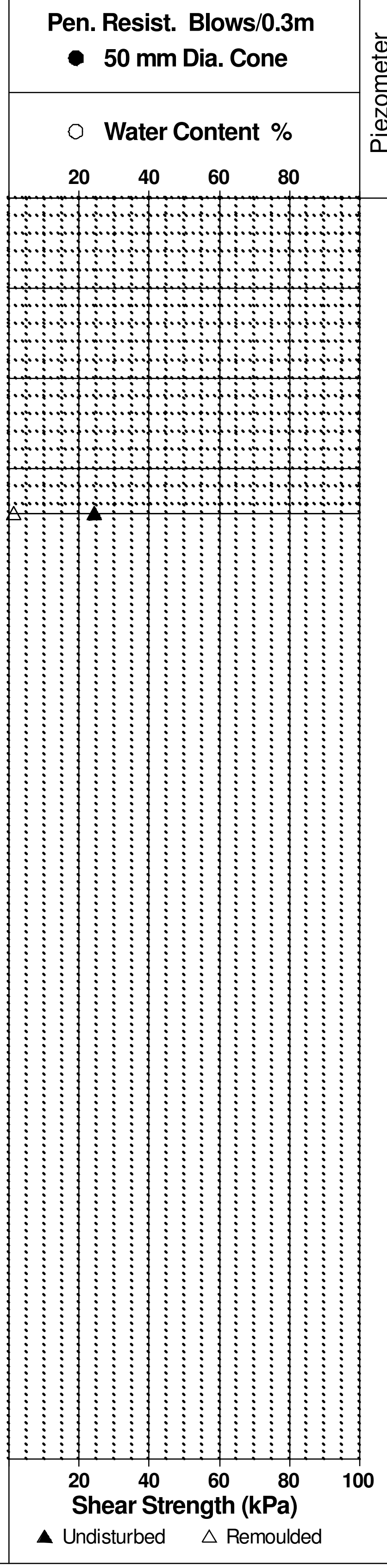
REMARKS

HOLE NO. BH 4A

BORINGS BY CME 55 Power Auger

DATE 27 September 2011

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	79.97
Compact, brown **SILTY SAND,** trace gravel - grey by 1.2m depth						1	78.97
2.21						2	77.97
Soft, grey **SILTY CLAY**		TW	1	100		3	76.97
3.50							
End of Borehole							



Piezometer Construction

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

REMARKS

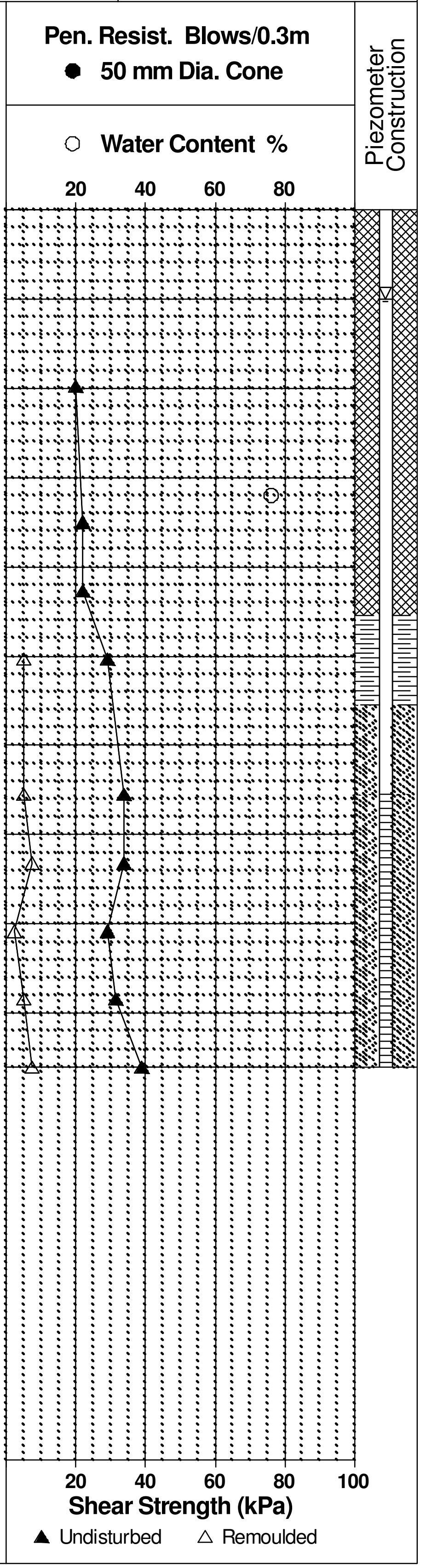
BORINGS BY CME 55 Power Auger

DATE 27 September 2011

FILE NO. **PG2466**

HOLE NO. **BH 5**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	80.39
Loose, brown **SILTY SAND**		AU	1				
		SS	2	75	9	1	79.39
1.45							
Soft to firm, grey **SILTY CLAY**						2	78.39
		TW	3	100			
						3	77.39
		TW	4	100			
						4	76.39
						5	75.39
						6	74.39
						7	73.39
						8	72.39
						9	71.39
9.60							
End of Borehole (GWL @ 1.0m depth based on field observations)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

REMARKS

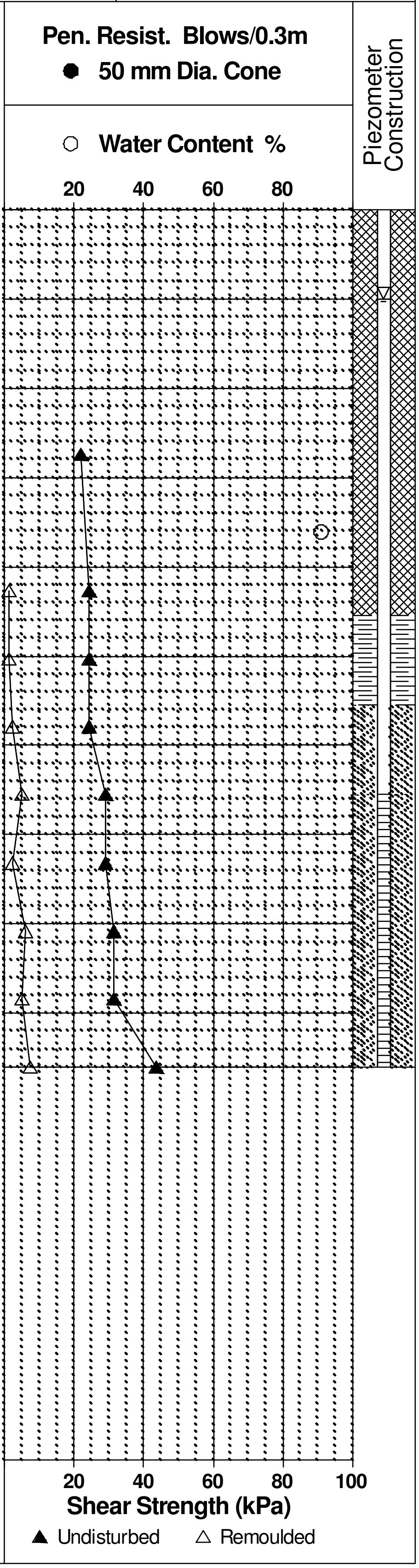
BORINGS BY CME 55 Power Auger

DATE 27 September 2011

FILE NO. **PG2466**

HOLE NO. **BH 6**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	79.76
Compact, brown **SILTY SAND**		AU	1				
		SS	2	62	24	1	78.76
1.45							
		SS	3	100	1		
						2	77.76
						3	76.76
		TW	4	100			
						4	75.76
Soft to firm, grey **SILTY CLAY**						5	74.76
						6	73.76
						7	72.76
						8	71.76
						9	70.76
9.60							
End of Borehole (GWL @ 1.0m depth based on field observations)							



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

REMARKS

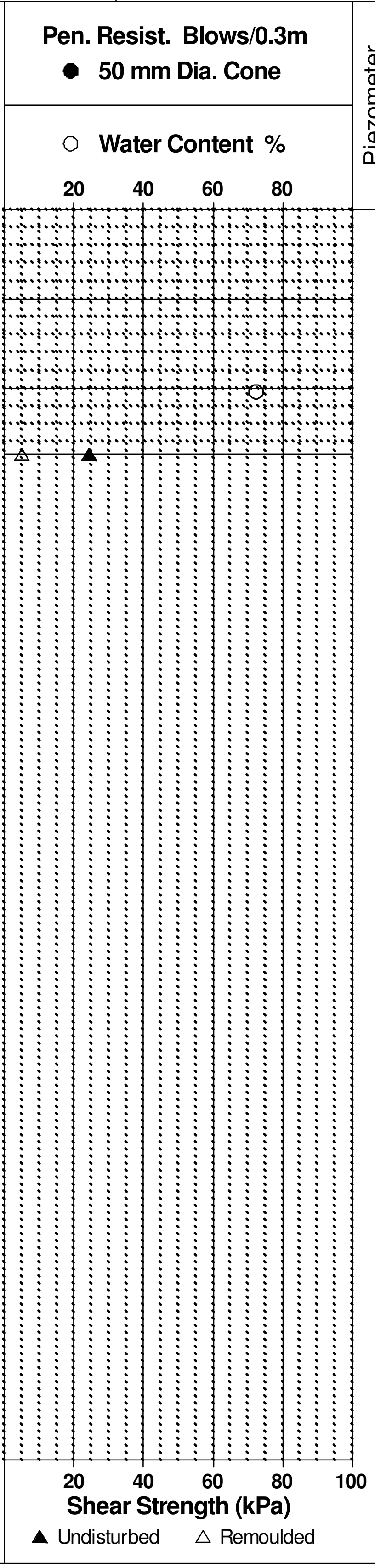
BORINGS BY CME 55 Power Auger

DATE 29 September 2011

FILE NO. PG2466

HOLE NO. BH 6A

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	79.76
Compact, brown **SILTY SAND**						1	78.76
1.45							
Soft, grey **SILTY CLAY**		TW	1	100		2	77.76
2.74							
End of Borehole							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. **PG2466**

REMARKS

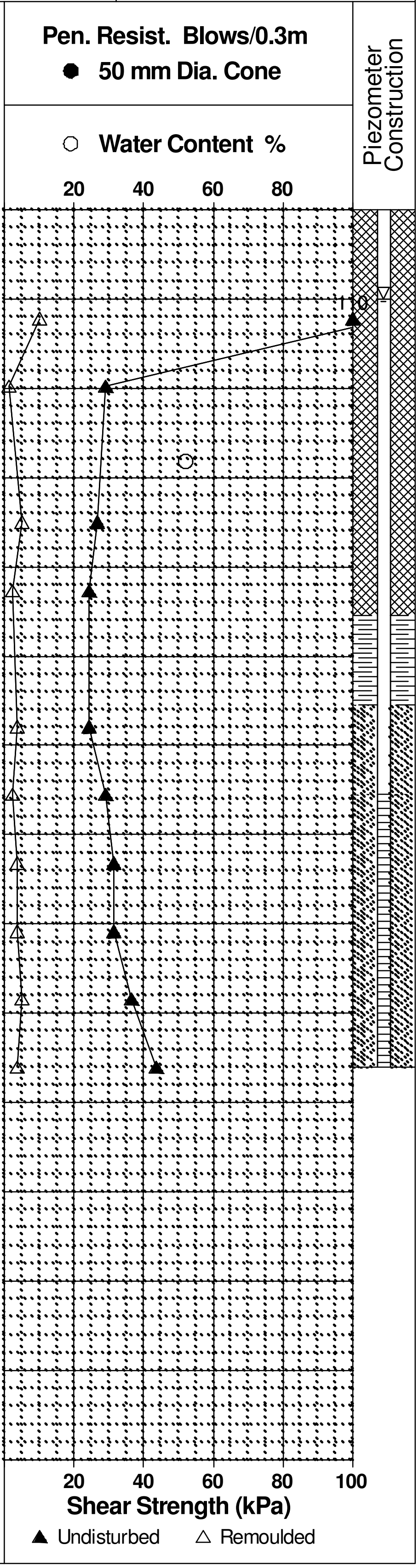
HOLE NO. **BH 7**

BORINGS BY CME 55 Power Auger

DATE 29 September 2011

SOIL DESCRIPTION		SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE					
Loose, brown **SILTY SAND**	0.69	SS	1	42	6
Very stiff, brown **SILTY CLAY**	1.52				
Firm, grey **SILTY CLAY**	9.60	TW	2	100	
		TW	3	100	
Dynamic Cone Penetration Test commenced @ 9.60m depth. Cone pushed to 33.50m depth.					

DEPTH (m)	ELEV. (m)
0	80.10
1	79.10
2	78.10
3	77.10
4	76.10
5	75.10
6	74.10
7	73.10
8	72.10
9	71.10
10	70.10
11	69.10
12	68.10
13	67.10
14	66.10



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

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REMARKS

BORINGS BY CME 55 Power Auger

DATE 29 September 2011

FILE NO. PG2466

HOLE NO. BH 7

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						14	66.10		
						15	65.10		
						16	64.10		
						17	63.10		
						18	62.10		
						19	61.10		
						20	60.10		
						21	59.10		
						22	58.10		
						23	57.10		
						24	56.10		
						25	55.10		
						26	54.10		
						27	53.10		
						28	52.10		

20 40 60 80

20 40 60 80 100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. **PG2466**

REMARKS

HOLE NO. **BH 7**

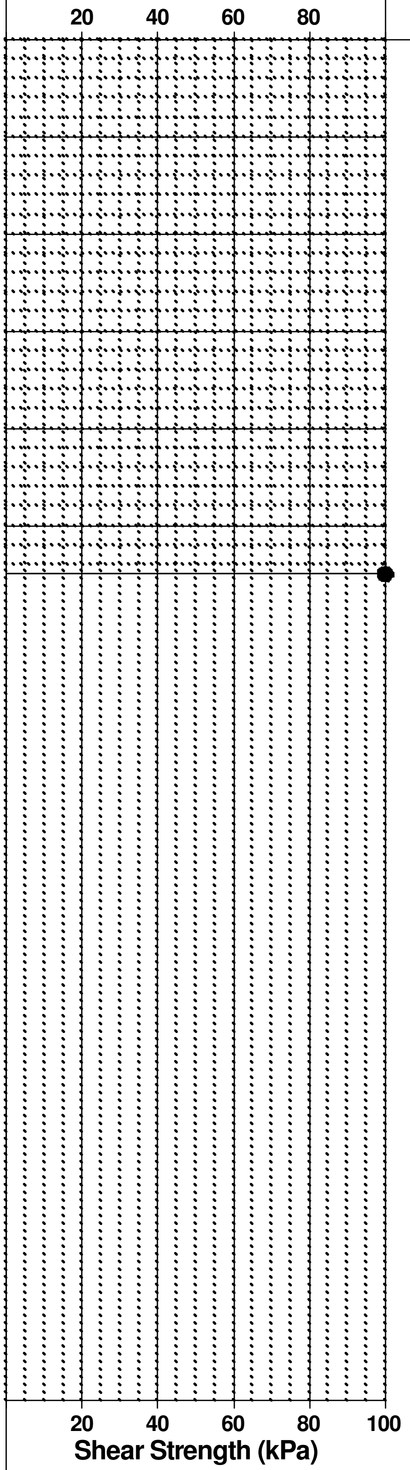
BORINGS BY CME 55 Power Auger

DATE 29 September 2011

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						28	52.10
						29	51.10
						30	50.10
						31	49.10
						32	48.10
						33	47.10
33.50 End of Borehole Practical DCPT refusal @ 33.50m depth (GWL @ 1.0m depth based on field observations)							

Pen. Resist. Blows/0.3m
● **50 mm Dia. Cone**

○ **Water Content %**



Shear Strength (kPa)
▲ Undisturbed △ Remoulded

Piezometer Construction

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SOIL PROFILE AND TEST DATA

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Ottawa, Ontario

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REMARKS

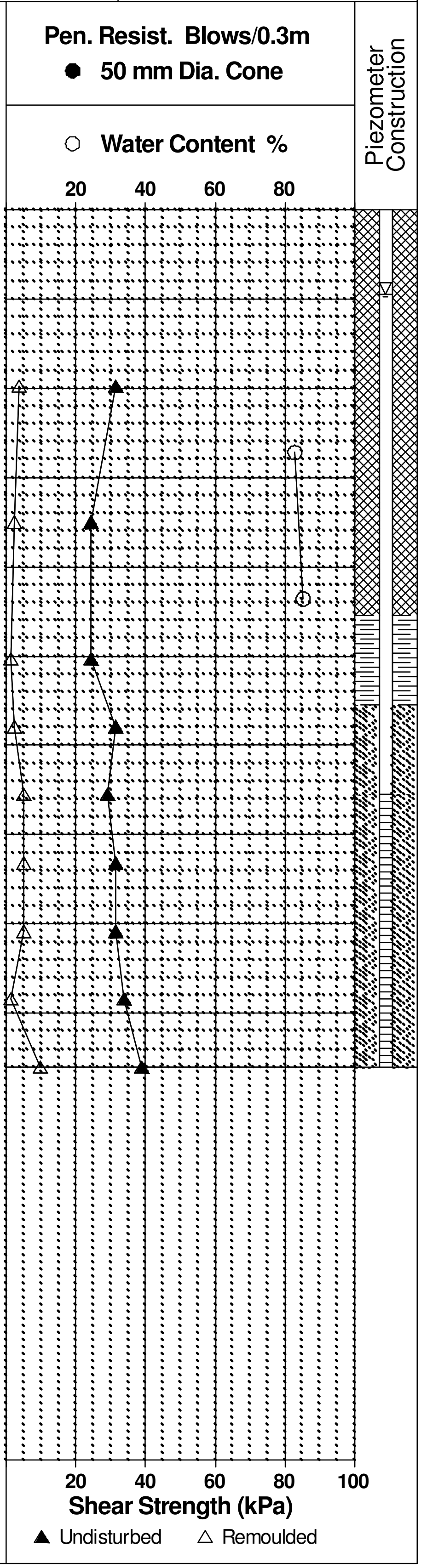
BORINGS BY CME 55 Power Auger

DATE 29 September 2011

FILE NO. PG2466

HOLE NO. BH 8

SOIL DESCRIPTION		SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	80.01
TOPSOIL	0.30						
Compact, brown **SILTY SAND**		AU	1				
		SS	2	42	24	1	79.01
	1.45						
Firm, grey **SILTY CLAY,** some sand	2.13					2	78.01
Soft to firm, grey **SILTY CLAY**		TW	3	100			
						3	77.01
		TW	4	100		4	76.01
						5	75.01
						6	74.01
						7	73.01
						8	72.01
						9	71.01
	9.60						
End of Borehole (GWL @ 0.95m depth based on field observations)							



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SOIL PROFILE AND TEST DATA

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8th Line Road and Anderson Road
Ottawa, Ontario

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REMARKS

BORINGS BY CME 55 Power Auger

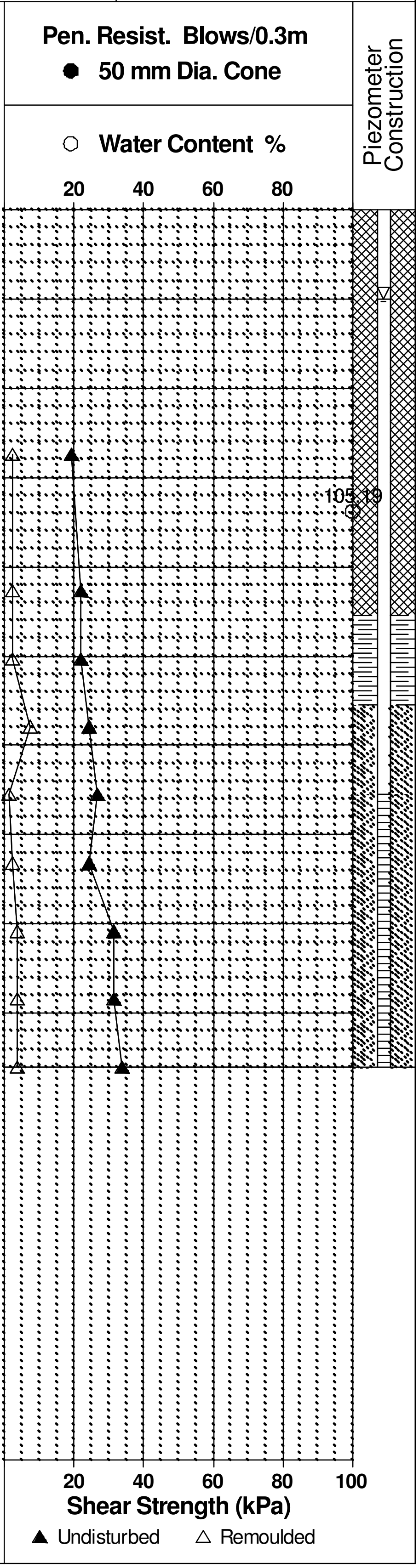
DATE 30 September 2011

FILE NO. PG2466

HOLE NO. BH 9

SOIL DESCRIPTION	Depth	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE					
TOPSOIL	0.15				
Loose, brown **SILTY SAND**	1.22	AU	1		
		SS	2	75	7
Firm, grey **SILTY CLAY** with sand seams	1.45	TW	3	100	
Soft to firm, grey **SILTY CLAY**	9.60	TW	4	100	
End of Borehole					
(GWL @ 1.0m depth based on field observations)					

DEPTH (m)	ELEV. (m)
0	77.04
1	76.04
2	75.04
3	74.04
4	73.04
5	72.04
6	71.04
7	70.04
8	69.04
9	68.04



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

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REMARKS

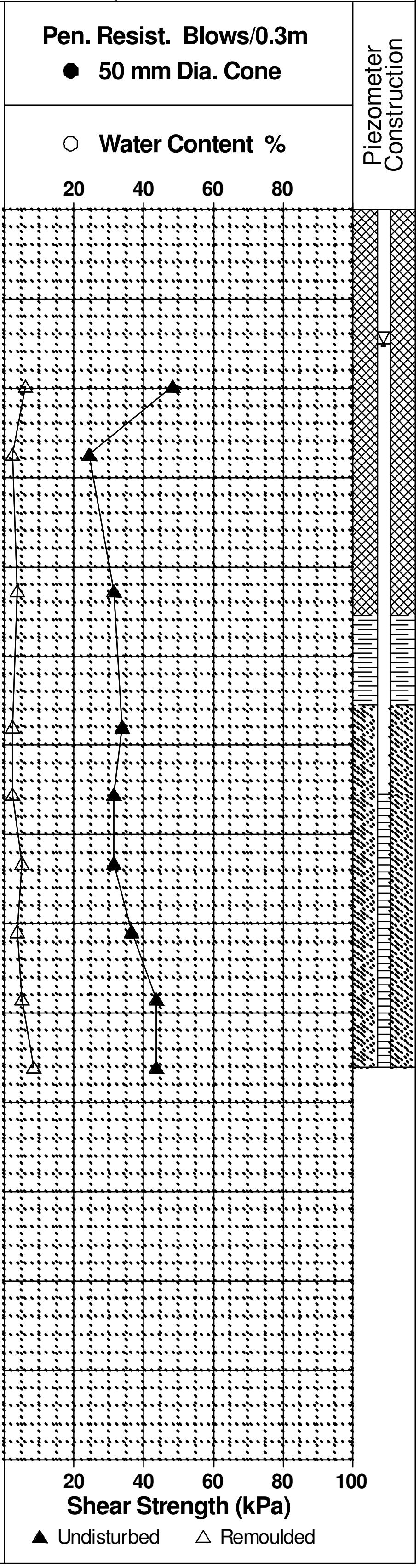
BORINGS BY CME 55 Power Auger

DATE 30 September 2011

FILE NO. PG2466

HOLE NO. BH10

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	78.41
Loose, brown **SILTY SAND** 0.25		AU	1				
Firm, brown **SILTY CLAY,** some sand		SS	2	92	8	1	77.41
2.00						2	76.41
						3	75.41
		TW	3	100			
						4	74.41
		TW	4	100			
						5	73.41
Soft to firm, grey **SILTY CLAY**							
						6	72.41
						7	71.41
						8	70.41
						9	69.41
9.60							
Dynamic Cone Penetraton Test commenced @ 9.60m depth. Cone pushed tp 31.5m depth.							
						10	68.41
						11	67.41
						12	66.41
						13	65.41
						14	64.41



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG2466

REMARKS

HOLE NO. BH10

BORINGS BY CME 55 Power Auger

DATE 30 September 2011

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content % 20 40 60 80	Piezometer Construction
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD				
GROUND SURFACE						14	64.41		
						15	63.41		
						16	62.41		
						17	61.41		
						18	60.41		
						19	59.41		
						20	58.41		
						21	57.41		
						22	56.41		
						23	55.41		
						24	54.41		
						25	53.41		
						26	52.41		
						27	51.41		
						28	50.41		

20 40 60 80 100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

REMARKS

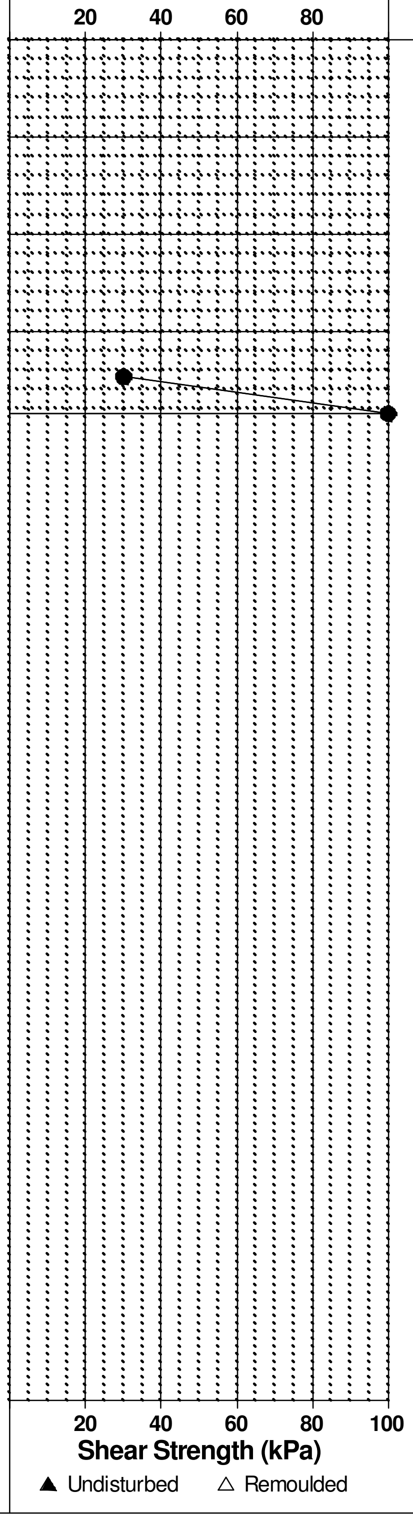
BORINGS BY CME 55 Power Auger

DATE 30 September 2011

FILE NO. PG2466

HOLE NO. BH10

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE									
						28	50.41		
						29	49.41		
						30	48.41		
						31	47.41		
31.85									
End of Borehole Practical DCPT refusal @ 31.85m depth (GWL @ 1.5m depth based on field observations)									



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

REMARKS

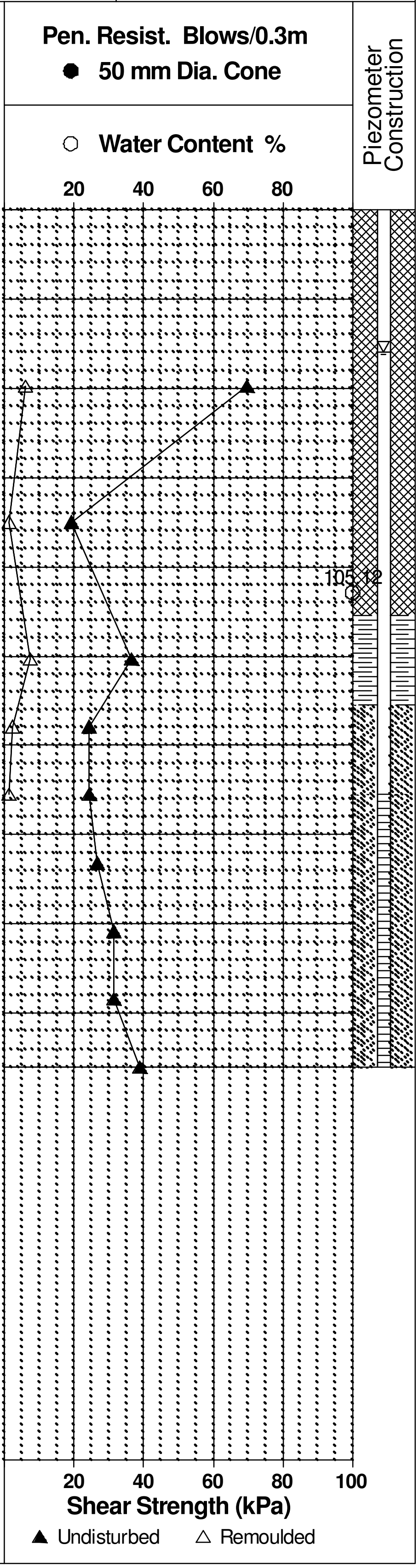
BORINGS BY CME 55 Power Auger

DATE 30 September 2011

FILE NO. **PG2466**

HOLE NO. **BH11**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD		
GROUND SURFACE						0	79.02
Loose, brown **SILTY SAND,** some gravel 0.60		AU	1				
Stiff, brown **SILTY CLAY,** some sand seams		SS	2	92	4	1	78.02
2.13						2	77.02
		TW	3	100			
						3	76.02
		TW	4	100		4	75.02
						5	74.02
Soft to firm, grey **SILTY CLAY**							
						6	73.02
						7	72.02
						8	71.02
						9	70.02
9.60							
End of Borehole (GWL @ 1.6m depth based on field observations)							



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

REMARKS

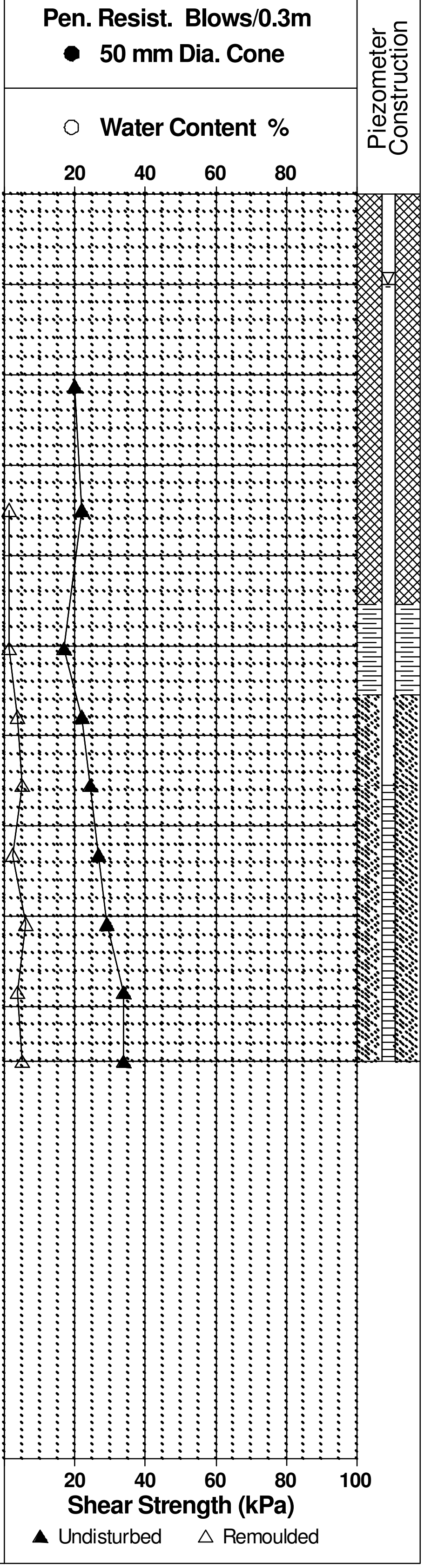
BORINGS BY CME 55 Power Auger

DATE 3 October 2011

FILE NO. **PG2466**

HOLE NO. **BH12**

SOIL DESCRIPTION		SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	78.79
TOPSOIL	0.20	AU	1				
FILL: Brown silty sand, some gravel	0.46						
Compact, brown **SILTY SAND**	1.45	SS	2	42	13	1	77.79
Soft to firm, grey **SILTY CLAY**	9.60					2	76.79
		TW	3	0			
						3	75.79
		TW	4	100			
						4	74.79
						5	73.79
						6	72.79
						7	71.79
						8	70.79
						9	69.79
End of Borehole							
(GWL @ 1.0m depth based on field observations)							



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SOIL PROFILE AND TEST DATA

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8th Line Road and Anderson Road
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REMARKS

BORINGS BY CME 55 Power Auger

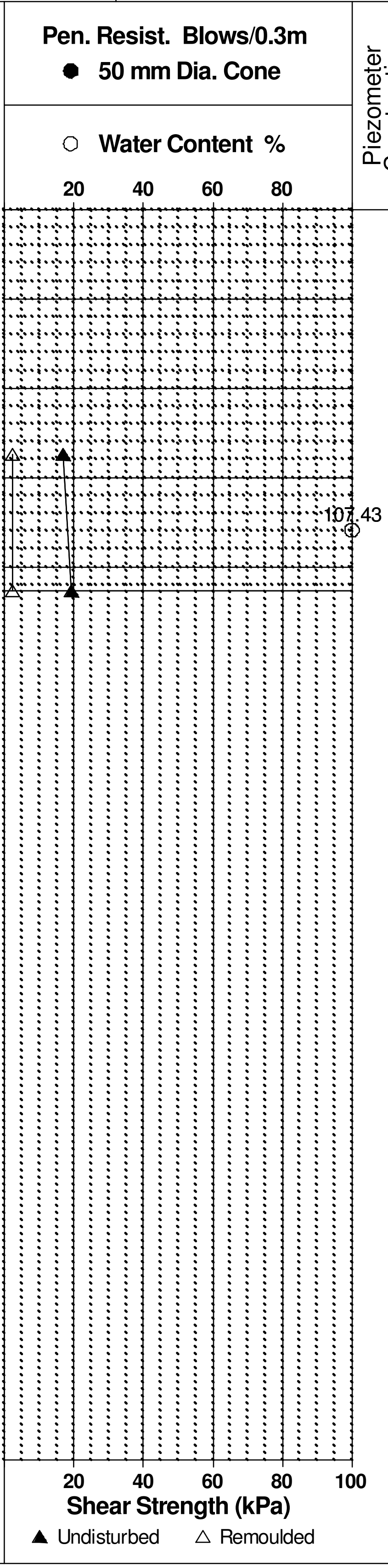
DATE 3 October 2011

FILE NO. **PG2466**

HOLE NO. **BH12A**

SOIL DESCRIPTION		STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD
GROUND SURFACE						
TOPSOIL	0.20					
FILL: Brown silty sand, some gravel	0.46					
Compact, brown **SILTY SAND**	1.45					
Soft, grey **SILTY CLAY**	4.27		TW	1	100	
End of Borehole						

DEPTH (m)	ELEV. (m)
0	78.79
1	77.79
2	76.79
3	75.79
4	74.79



Piezometer Construction

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SOIL PROFILE AND TEST DATA

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8th Line Road and Anderson Road
Ottawa, Ontario

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FILE NO. **PG2466**

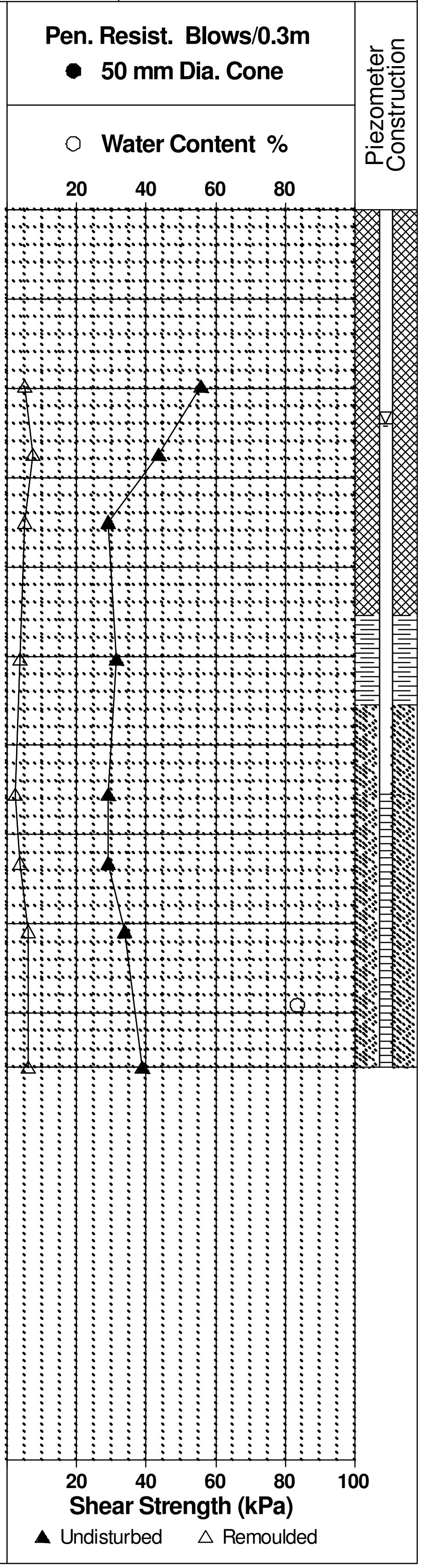
REMARKS

HOLE NO. **BH13**

BORINGS BY CME 55 Power Auger

DATE 3 October 2011

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	77.67
Compact, brown **SILTY SAND**	AU	1				
- some clay by 0.6m depth	SS	2	83	10	1	76.67
1.45						
Stiff to firm, brown **SILTY CLAY**					2	75.67
2.90					3	74.67
	TW	3	100		4	73.67
					5	72.67
	TW	4	100			
Firm, grey **SILTY CLAY**					6	71.67
					7	70.67
					8	69.67
	TW	5	100			
					9	68.67
9.60						
End of Borehole						
(GWL @ 2.4m depth based on field observations)						



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SOIL PROFILE AND TEST DATA

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8th Line Road and Anderson Road
Ottawa, Ontario

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FILE NO. PG2466

REMARKS

HOLE NO. BH14

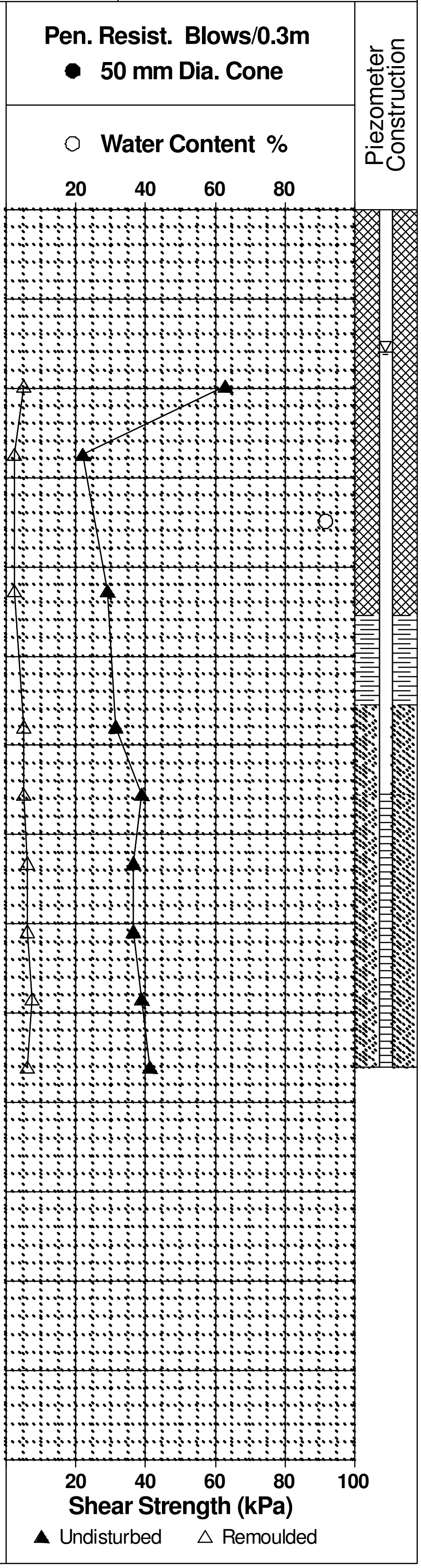
BORINGS BY CME 55 Power Auger

DATE 3 October 2011

SOIL DESCRIPTION	Depth (m)
GROUND SURFACE	
TOPSOIL	0.28
Compact, brown **SILTY SAND**	0.69
Stiff, brown **SILTY CLAY,** some sand seams	2.13
Soft to firm, grey **SILTY CLAY**	9.60
Dynamic Cone Penetration Test commenced @ 9.60m depth. Cone pushed to 33.8m depth.	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	83	11
TW	3	100	
TW	4	100	

DEPTH (m)	ELEV. (m)
0	78.76
1	77.76
2	76.76
3	75.76
4	74.76
5	73.76
6	72.76
7	71.76
8	70.76
9	69.76
10	68.76
11	67.76
12	66.76
13	65.76
14	64.76



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SOIL PROFILE AND TEST DATA

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8th Line Road and Anderson Road
Ottawa, Ontario

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FILE NO. PG2466

REMARKS

HOLE NO. BH14

BORINGS BY CME 55 Power Auger

DATE 3 October 2011

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE								20 40 60 80	
						14	64.76		
						15	63.76		
						16	62.76		
						17	61.76		
						18	60.76		
						19	59.76		
						20	58.76		
						21	57.76		
						22	56.76		
						23	55.76		
						24	54.76		
						25	53.76		
						26	52.76		
						27	51.76		
						28	50.76		

20 40 60 80 100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

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REMARKS

BORINGS BY CME 55 Power Auger

DATE 3 October 2011

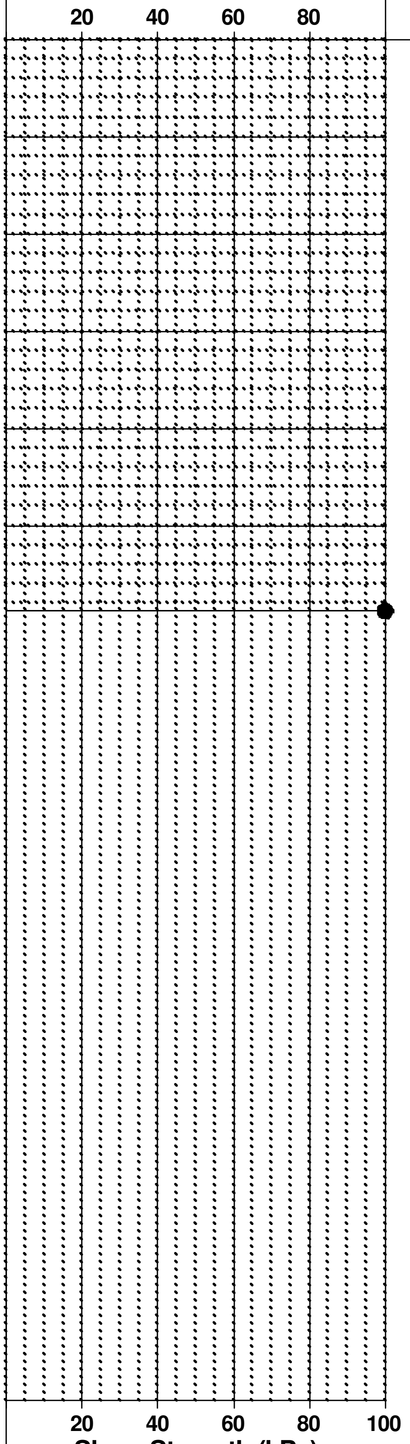
FILE NO. PG2466

HOLE NO. BH14

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						28	50.76
						29	49.76
						30	48.76
						31	47.76
						32	46.76
						33	45.76
33.88							
End of Borehole Practical DCPT refusal @ 33.88m depth (GWL @ 1.6m depth based on field observations)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone

○ Water Content %



Shear Strength (kPa)

▲ Undisturbed △ Remoulded

Piezometer Construction

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SOIL PROFILE AND TEST DATA

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8th Line Road and Anderson Road
Ottawa, Ontario

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REMARKS

BORINGS BY CME 55 Power Auger

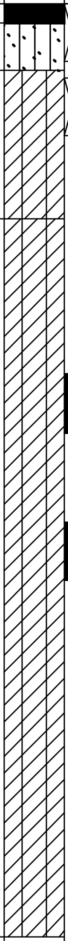
DATE 4 October 2011

FILE NO. PG2466

HOLE NO. BH15

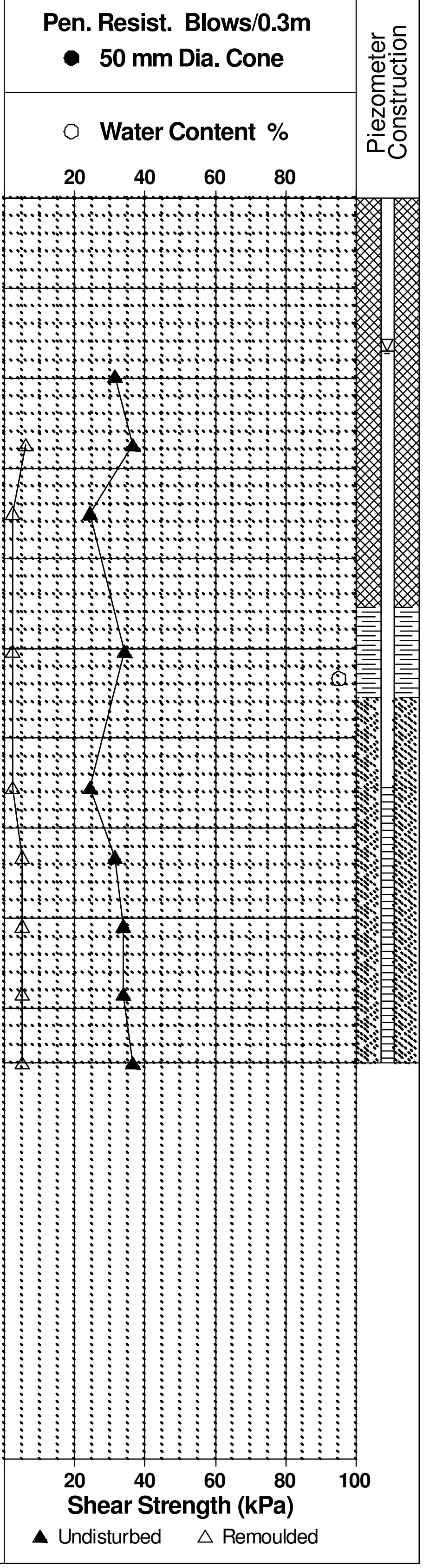
SOIL DESCRIPTION	Depth (m)
GROUND SURFACE	
TOPSOIL	0.20
Loose, brown **SILTY SAND,** some clay	0.69
Stiff to firm, brown **SILTY CLAY** with sand seams	2.21
Firm, grey **SILTY CLAY**	9.60
End of Borehole (GWL @ 1.7m depth based on field observations)	

STRATA PLOT



SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1	50	6
SS	2	75	3
TW	3		
TW	4		

DEPTH (m)	ELEV. (m)
0	78.56
1	77.56
2	76.56
3	75.56
4	74.56
5	73.56
6	72.56
7	71.56
8	70.56
9	69.56



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SOIL PROFILE AND TEST DATA

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8th Line Road and Anderson Road
Ottawa, Ontario

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REMARKS

BORINGS BY CME 55 Power Auger

DATE 4 October 2011

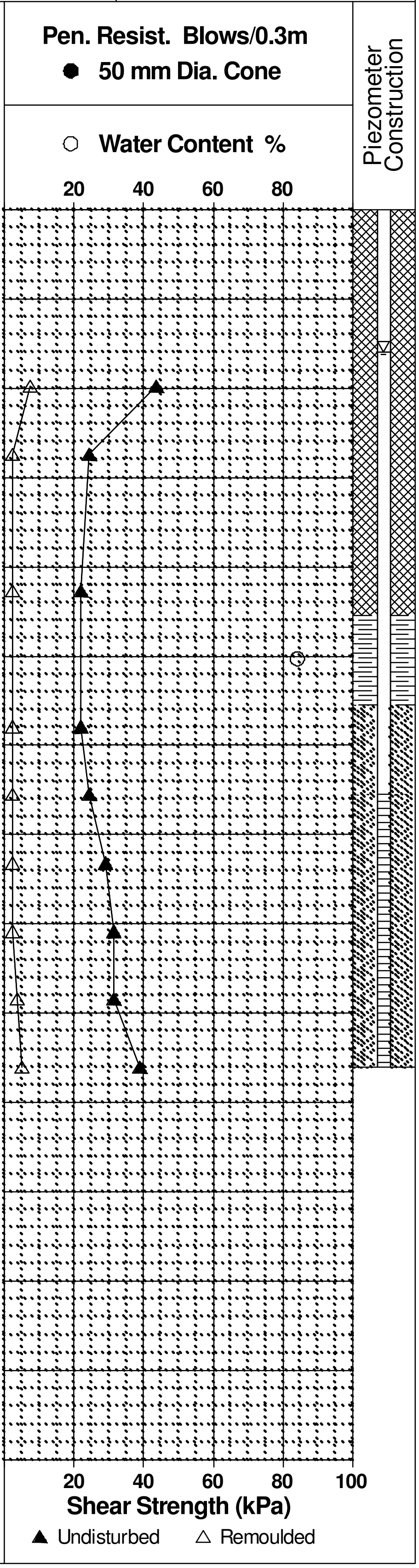
FILE NO. PG2466

HOLE NO. BH16

SOIL DESCRIPTION	
GROUND SURFACE	
TOPSOIL	0.20
Loose, brown **SILTY SAND**	0.60
Stiff to firm, brown **SILTY CLAY** with sand seams	2.13
Soft to firm, grey **SILTY CLAY**	9.60
Dynamic Cone Penetration Test commenced @ 9.60m depth. Cone pushed to 16.5m depth.	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
SS	1		10
SS	2	100	4
TW	3	100	
TW	4	100	

DEPTH (m)	ELEV. (m)
0	79.45
1	78.45
2	77.45
3	76.45
4	75.45
5	74.45
6	73.45
7	72.45
8	71.45
9	70.45
10	69.45
11	68.45
12	67.45
13	66.45
14	65.45



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
8th Line Road and Anderson Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

REMARKS

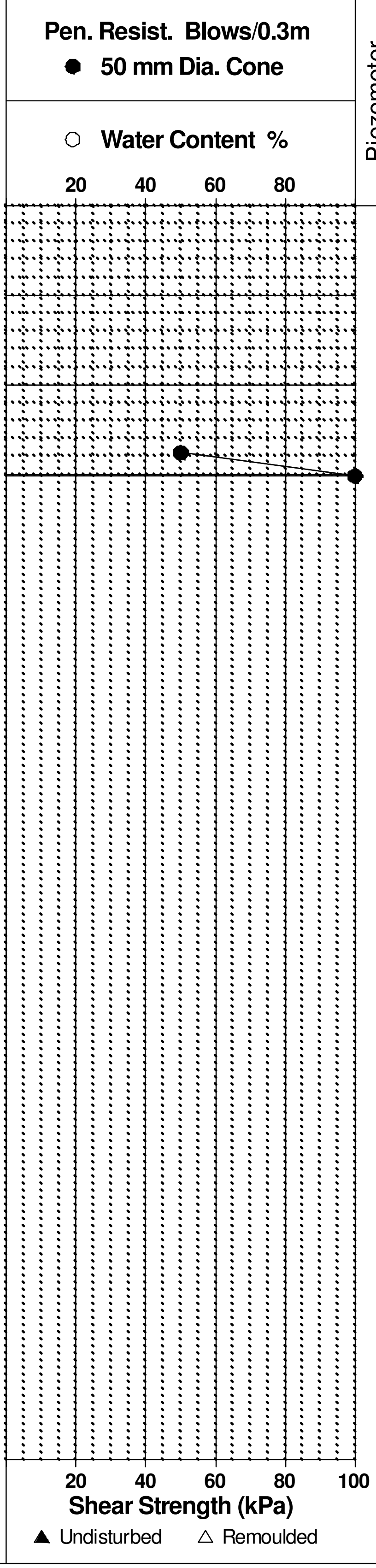
BORINGS BY CME 55 Power Auger

DATE 4 October 2011

FILE NO. PG2466

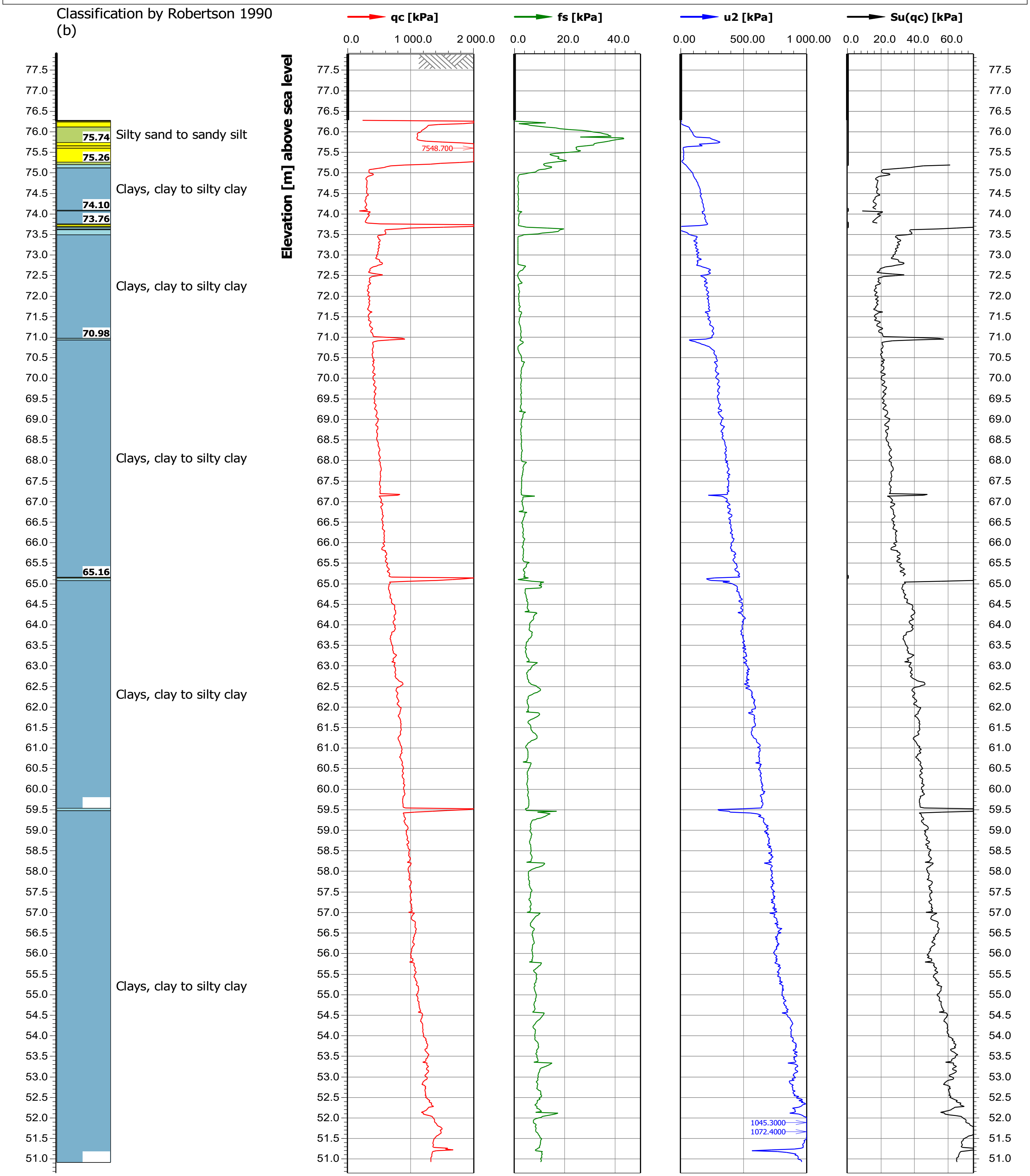
HOLE NO. BH16

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						14	65.45
						15	64.45
						16	63.45
17.02						17	62.45
End of Borehole Practical DCPT refusal @ 17.02m depth (GWL @ 1.6m depth based on field observations)							

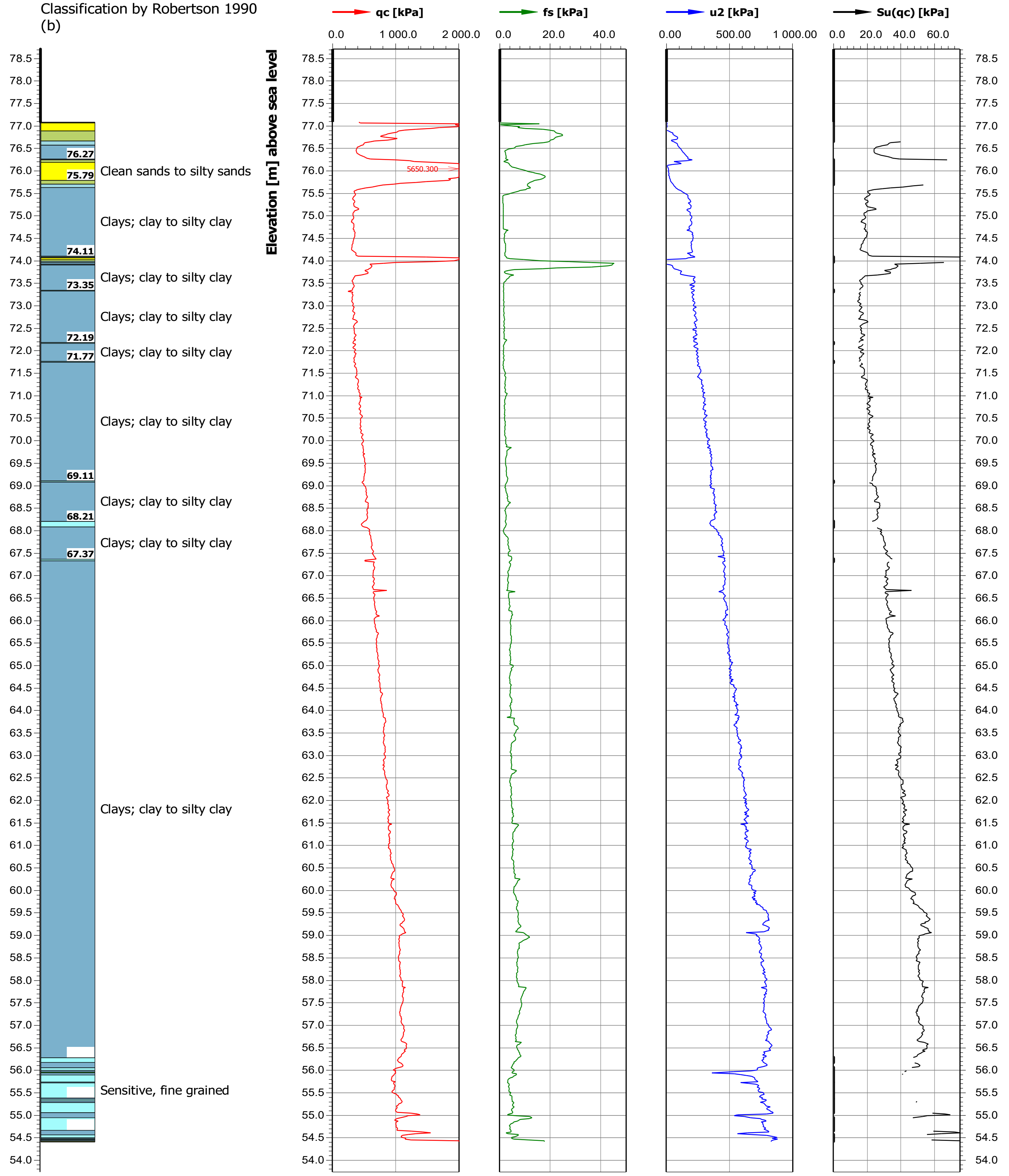


Piezometer Construction

PATERSON GROUP	Geotechnical Investigation	Height system used Geodetic	
	Proposed Mixed-Use Community Development	Elevation [m] 77.90	
Project ID PG5827	Client Taggart Investments and Algonquins of Ontario	Northing [m] 5023301.08	Easting [m] 383197.23
Cone name CPT 1-23	Project location name Tewin Lands, Ottawa, Ontario	Depth [m] 50.93	
Cone type CPT PROBE 15 cm2	Investigation start date 3/23/2023	Scale 1:120	Page 1/1
Remarks1			

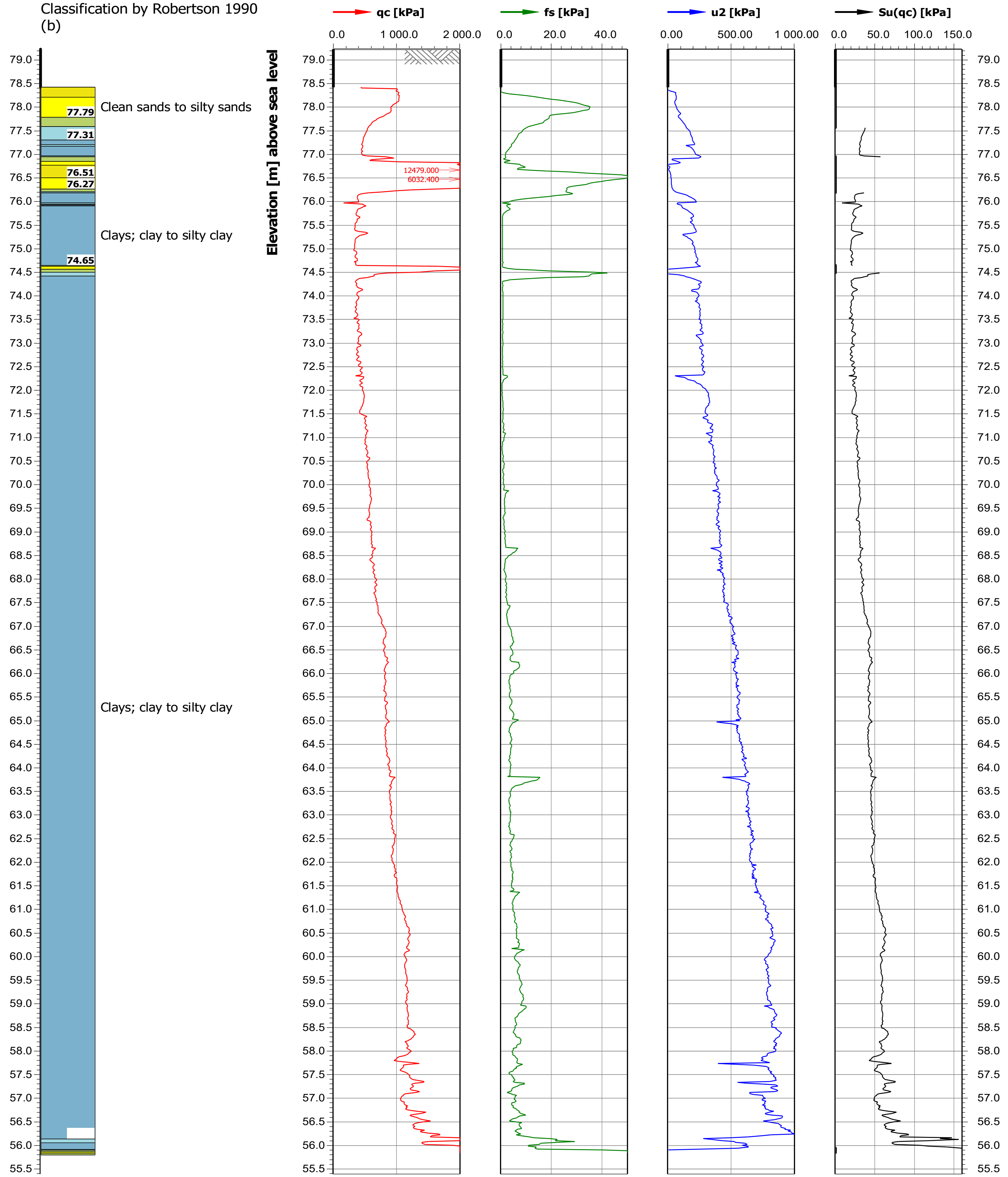


PATERSON GROUP	Geotechnical Investigation	Height system used Geodetic	
	Proposed Mixed-Use Community Development	Elevation [m] 78.71	
Project ID PG5827	Client Taggart Investments and Algonquins of Ontario	Northing [m] 5022805.05	Easting [m] 383245.36
Cone name CPT 2-23	Project location name Tewin Community, Ottawa, Ontario	Depth [m] 54.41	
Cone type CPT PROBE 15 cm2	Investigation start date 3/23/2023	Scale 1:110	Page 1/1
Remarks1			

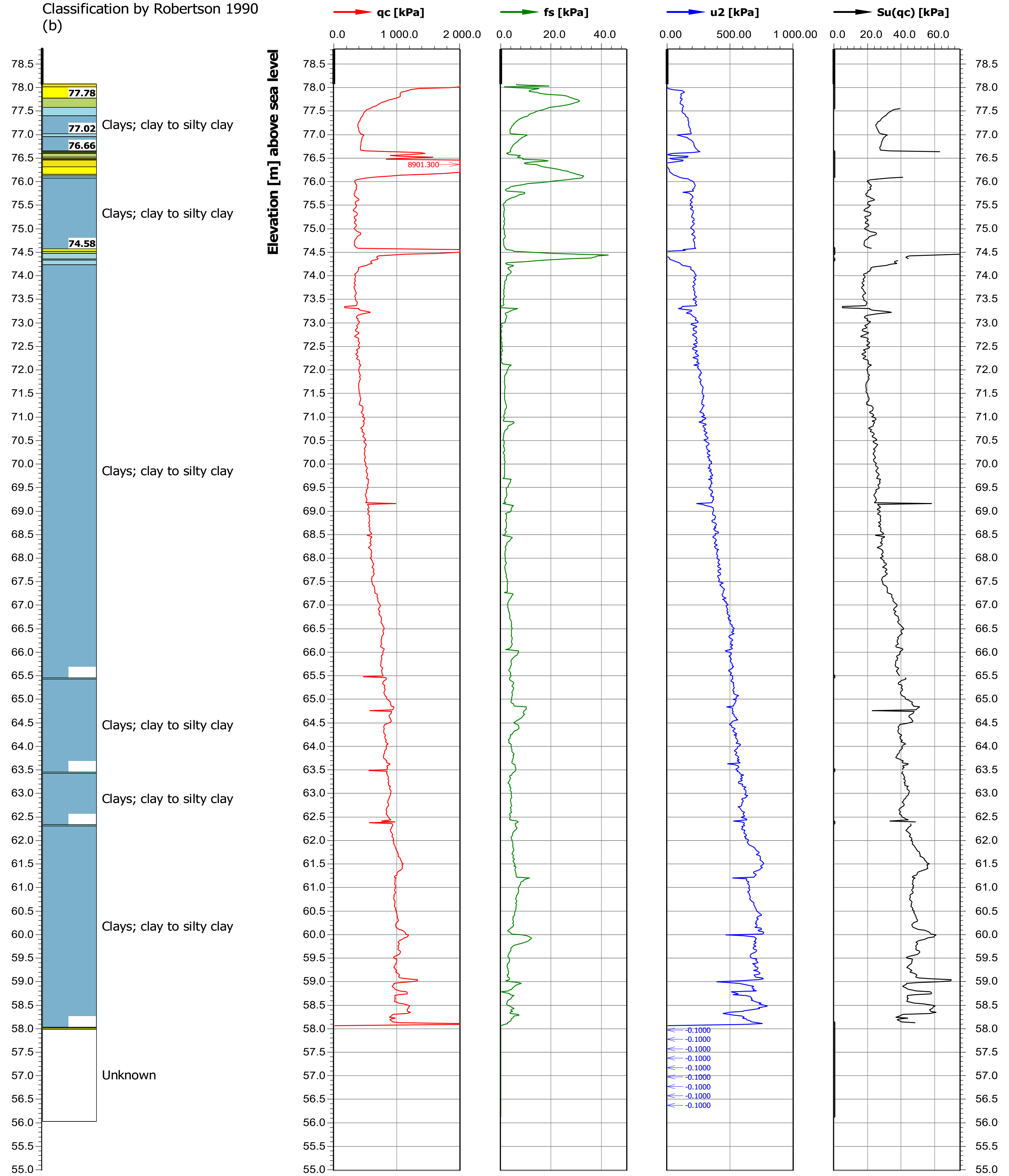


PATERSON GROUP	Geotechnical Investigation	Height system used Geodetic	
	Proposed Mixed-Use Community Development	Elevation [m] 79.23	
Project ID PG5827	Client Taggart Investments and Algonquins of Ontario	Northing [m] 5022386.46	Easting [m] 383107.40
Cone name CPT 2-23	Project location name Tewin Community - Ottawa, Ontario	Depth [m] 55.93	
Cone type CPT PROBE 15 cm2	Investigation start date 3/24/2023	Scale 1:105	Page 1/1
Remarks1			

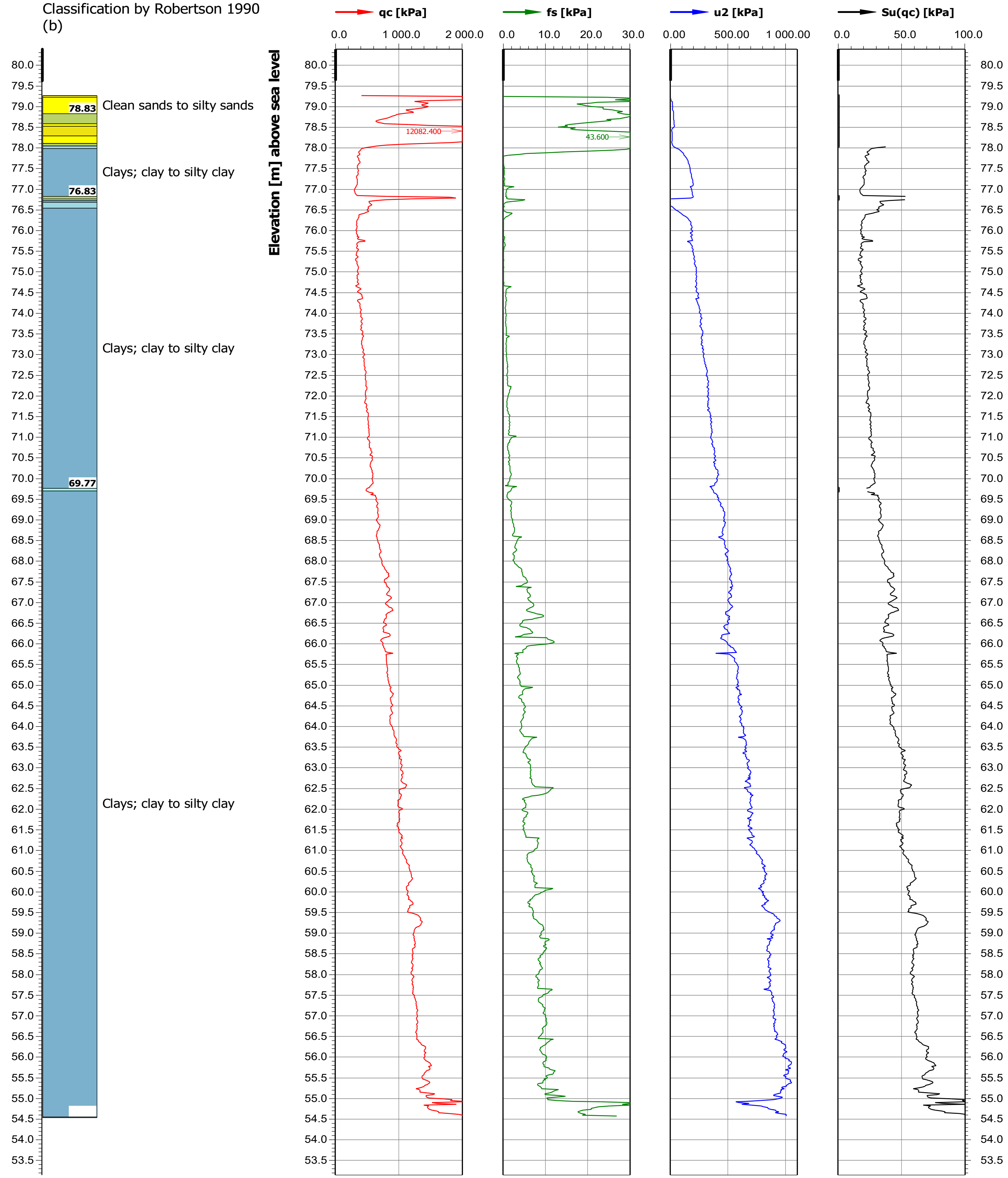
Classification by Robertson 1990 (b)



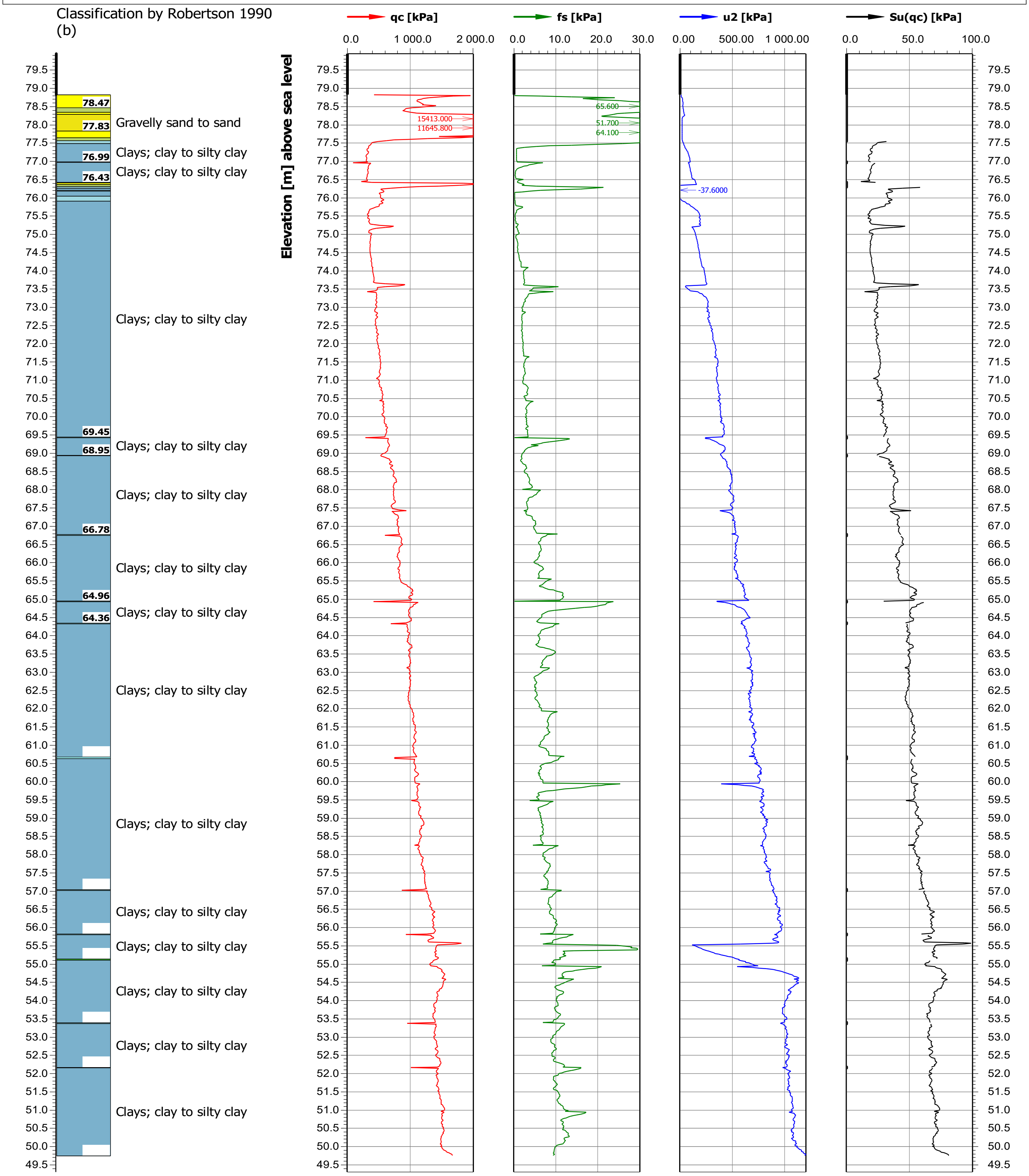
PATERSON GROUP	Geotechnical Investigation	Height system used Geodetic	
	Proposed Mixed-Use Community Development	Elevation [m] 78.82	
Project ID PG5827	Client Taggart Investments and Algonquins of Ontario	Northing [m] 5022278.85	Easting [m] 383609.78
Cone name CPT 4-23	Project location name Tewin Community, Ottawa, Ontario	Depth [m] 56.04	
Cone type CPT PROBE 15 cm2	Investigation start date 3/24/2023	Scale 1:105	Page 1/1
Remarks1			



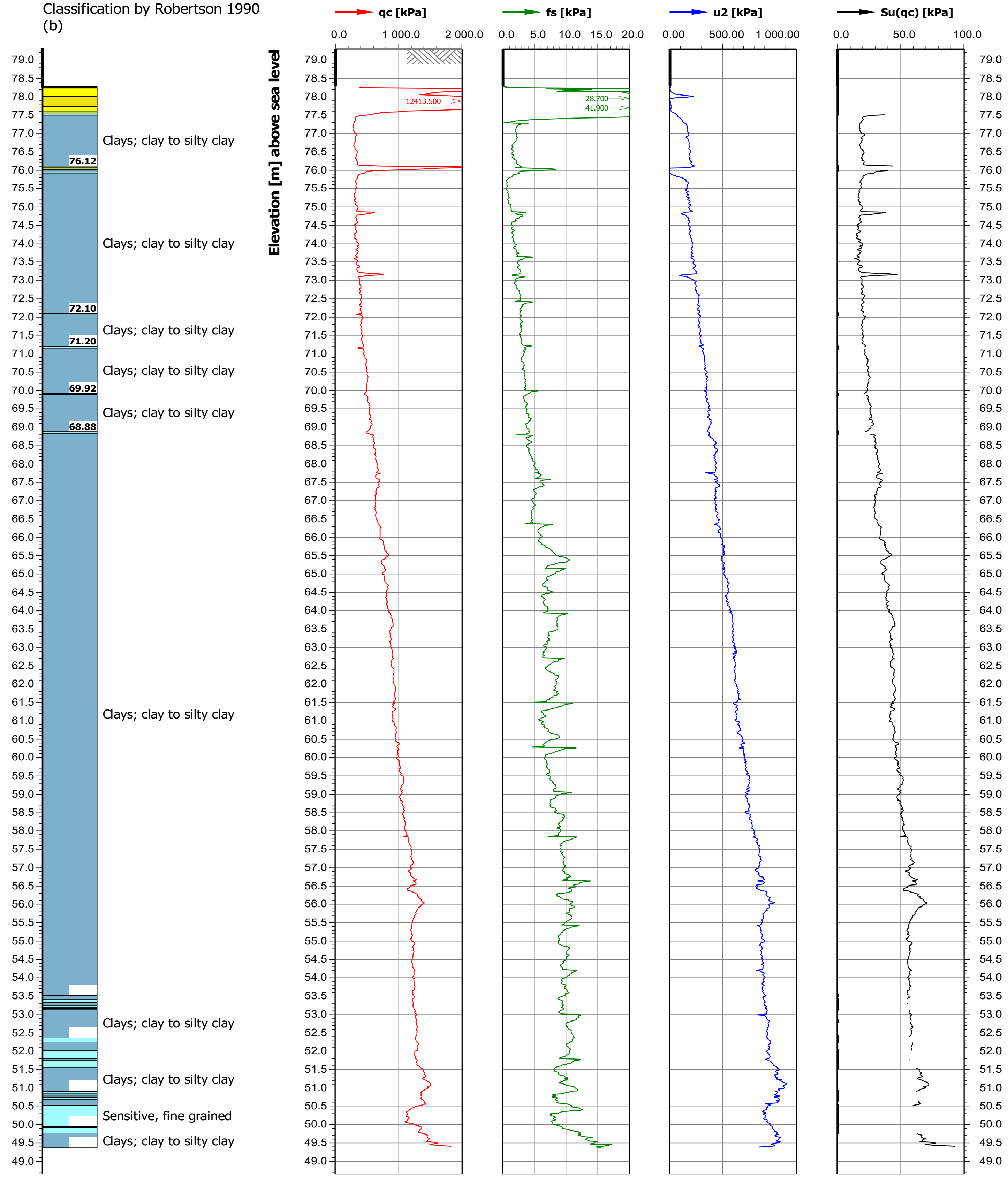
PATERSON GROUP	Geotechnical Investigation	Height system used Geodetic	
	Proposed Mixed-Use Community Development	Elevation [m] 80.39	
Project ID PG5827	Client Taggart Investments and Algonquins of Ontario	Northing [m] 5021950.16	Easting [m] 382323.58
Cone name CPT 5-23	Project location name Tewin Community, Ottawa, Ontario	Depth [m] 54.57	
Cone type CPT PROBE 15 cm2	Investigation start date 3/27/2023	Scale 1:120	Page 1/1
Remarks1			



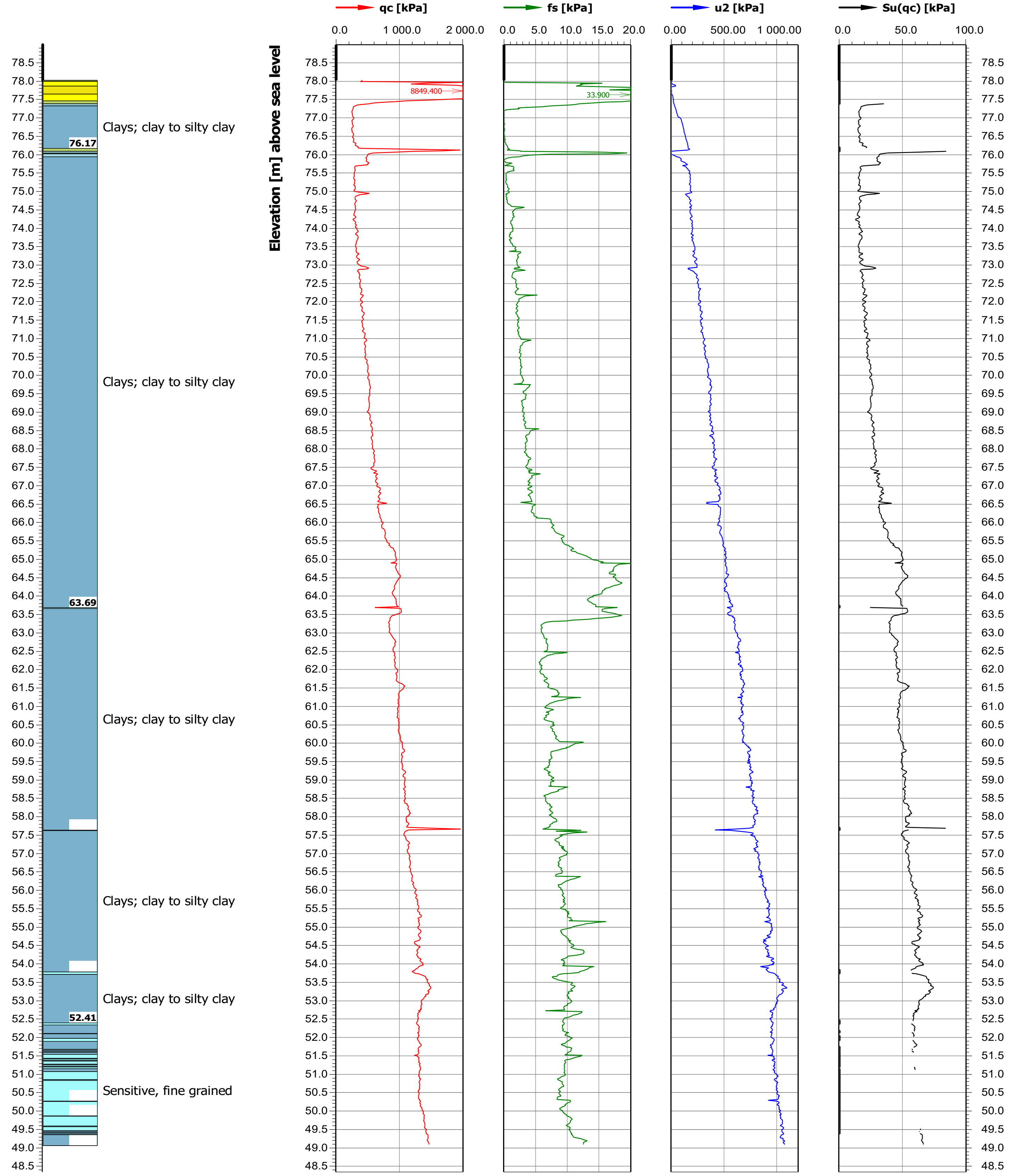
PATERSON GROUP	Geotechnical Investigation	Height system used Geodetic	
	Proposed Mixed-Use Community Development	Elevation [m] 79.95	
Project ID PG5827	Client Taggart Investments and Algonquins of Ontario	Northing [m] 5022493.74	Easting [m] 382026.72
Cone name CPT 6-23	Project location name Tewin Community, Ottawa, Ontario	Depth [m] 49.76	
Cone type CPT PROBE 15 cm2	Investigation start date 3/27/2023	Scale 1:135	Page 1/1
Remarks1			



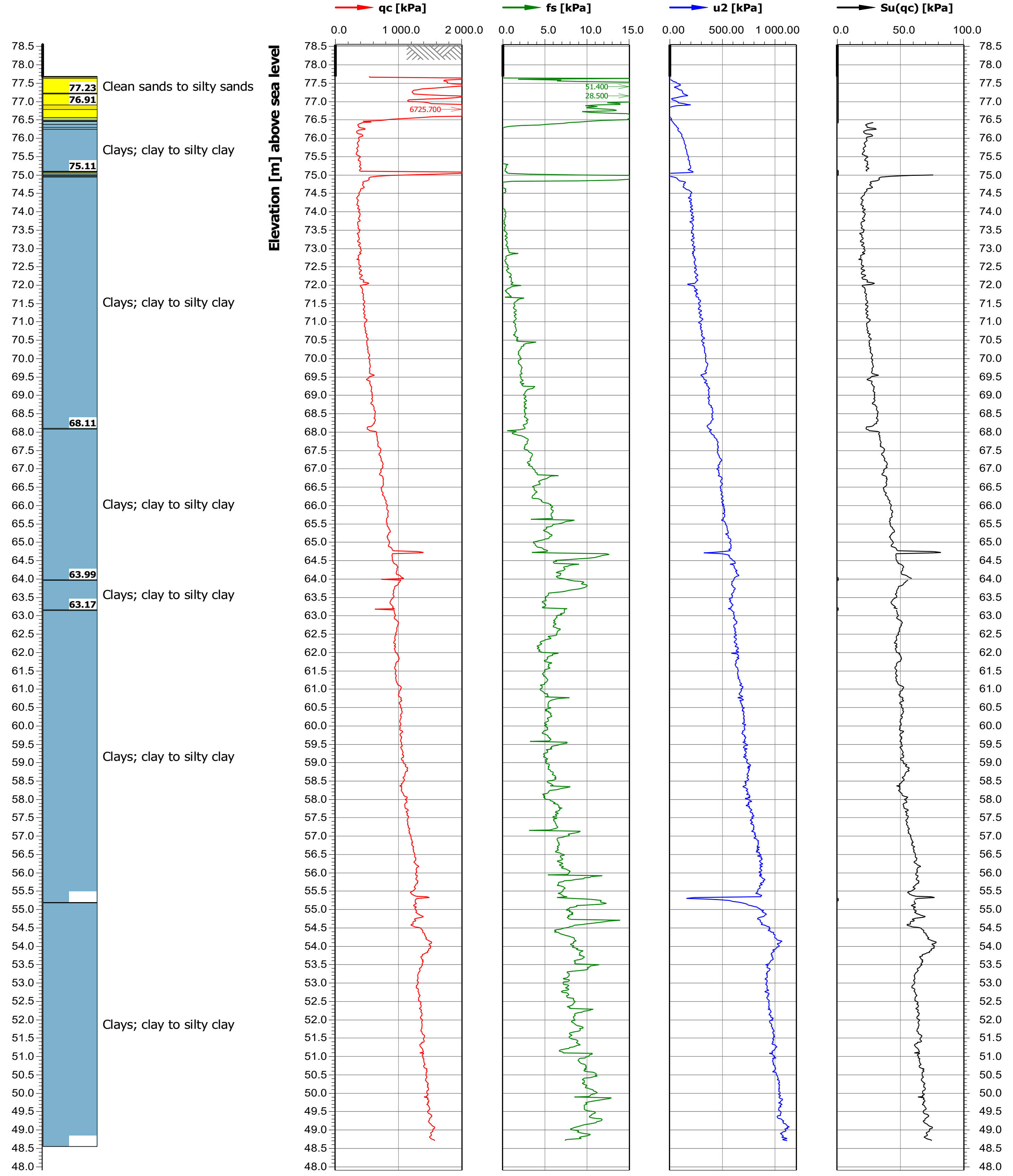
PATERSON GROUP	Geotechnical Investigation	Height system used Geodetic	
	Proposed Mixed-Use Community Development	Elevation [m] 79.30	
Project ID PG5827	Client Taggart Investments and Algonquins of Ontario	Northing [m] 5023027.14	Easting [m] 382405.35
Cone name CPT 7-23	Project location name Tewin Community, Ottawa, Ontario	Depth [m] 49.38	
Cone type CPT PROBE 15 cm2	Investigation start date 3/28/2023	Scale 1:135	Page 1/1
Remarks1			



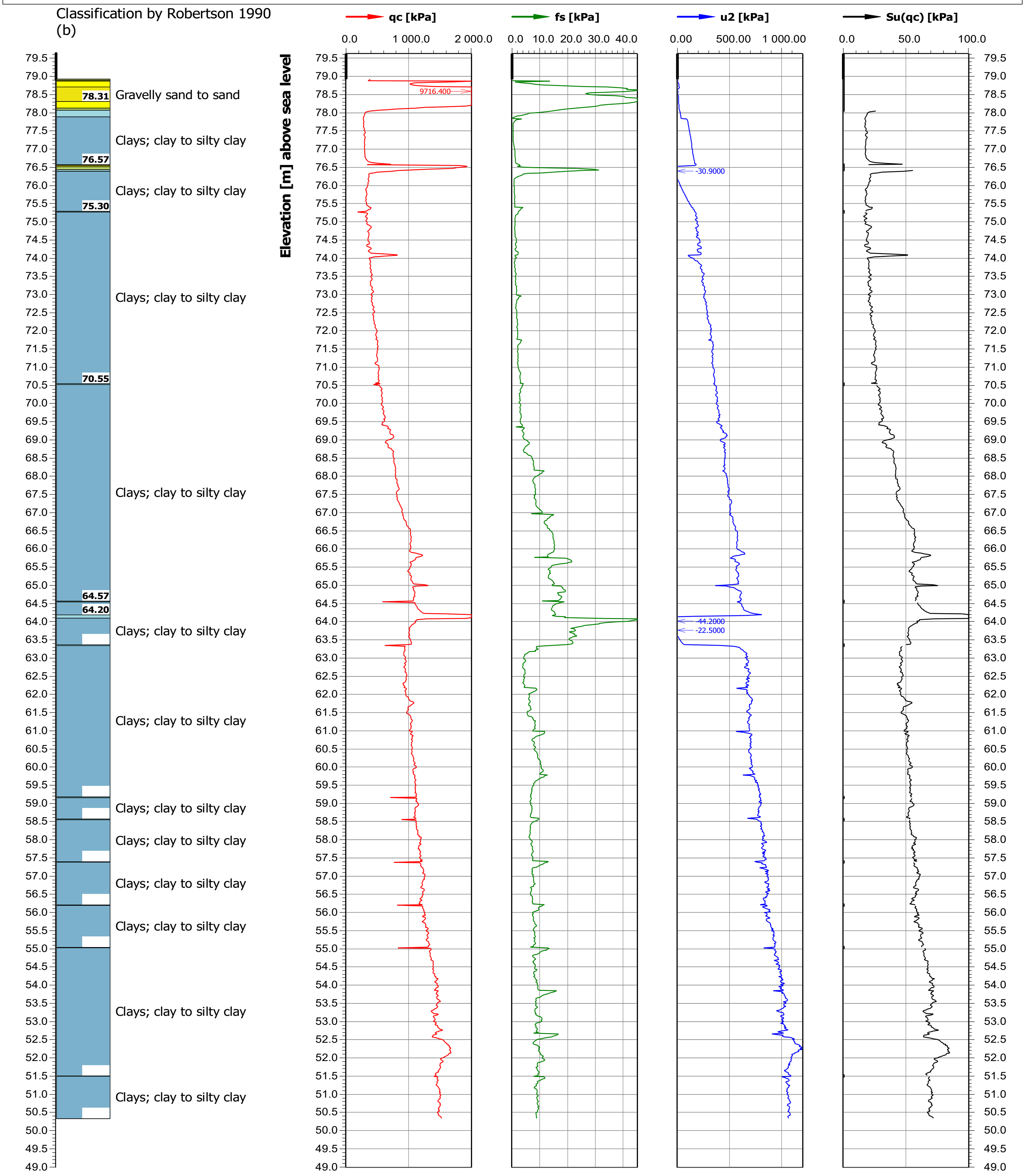
PATERSON GROUP	Geotechnical Investigation	Height system used Geodetic	
	Proposed Mixed-Use Community Development	Elevation [m] 78.99	
Project ID PG5827	Client Taggart Investments and Algonquins of Ontario	Northing [m] 5023365.26	Easting [m] 382517.77
Cone name CPT 8-23	Project location name Tewin Community, Ottawa, Ontario	Depth [m] 49.07	
Cone type CPT PROBE 15 cm2	Investigation start date 3/28/2023	Scale 1:135	Page 1/1
Remarks1			



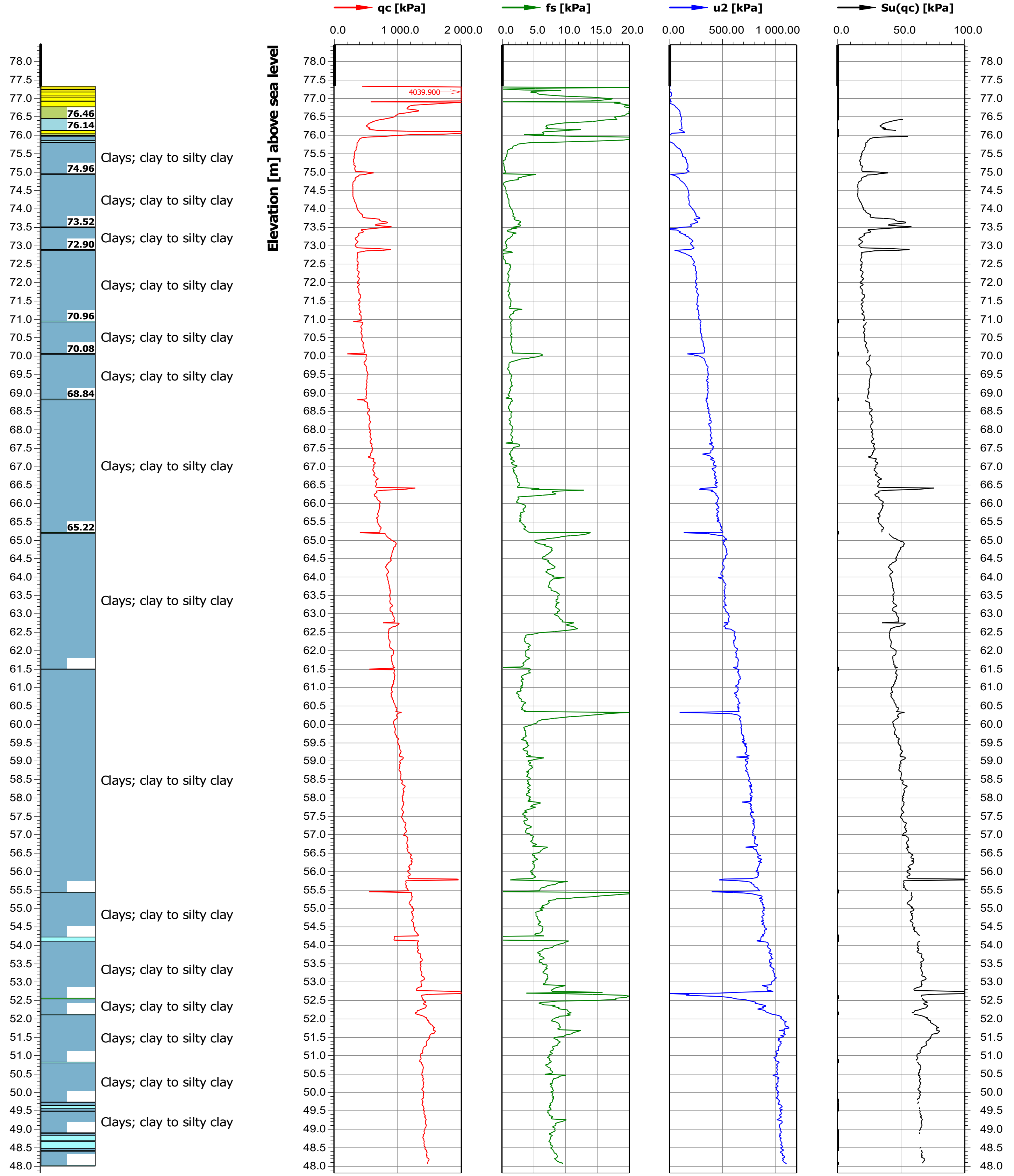
PATERSON GROUP	Geotechnical Investigation	Height system used Geodetic	
	Proposed Mixed-Use Community Development	Elevation [m] 78.55	
Project ID PG5827	Client Taggart Investments and Algonquins of Ontario	Northing [m] 5023110.30	Easting [m] 382735.08
Cone name CPT 9-23	Project location name Tewin Community, Ottawa, Ontario	Depth [m] 48.57	
Cone type CPT PROBE 15 cm2	Investigation start date 3/28/2023	Scale 1:135	Page 1/1
Remarks1			



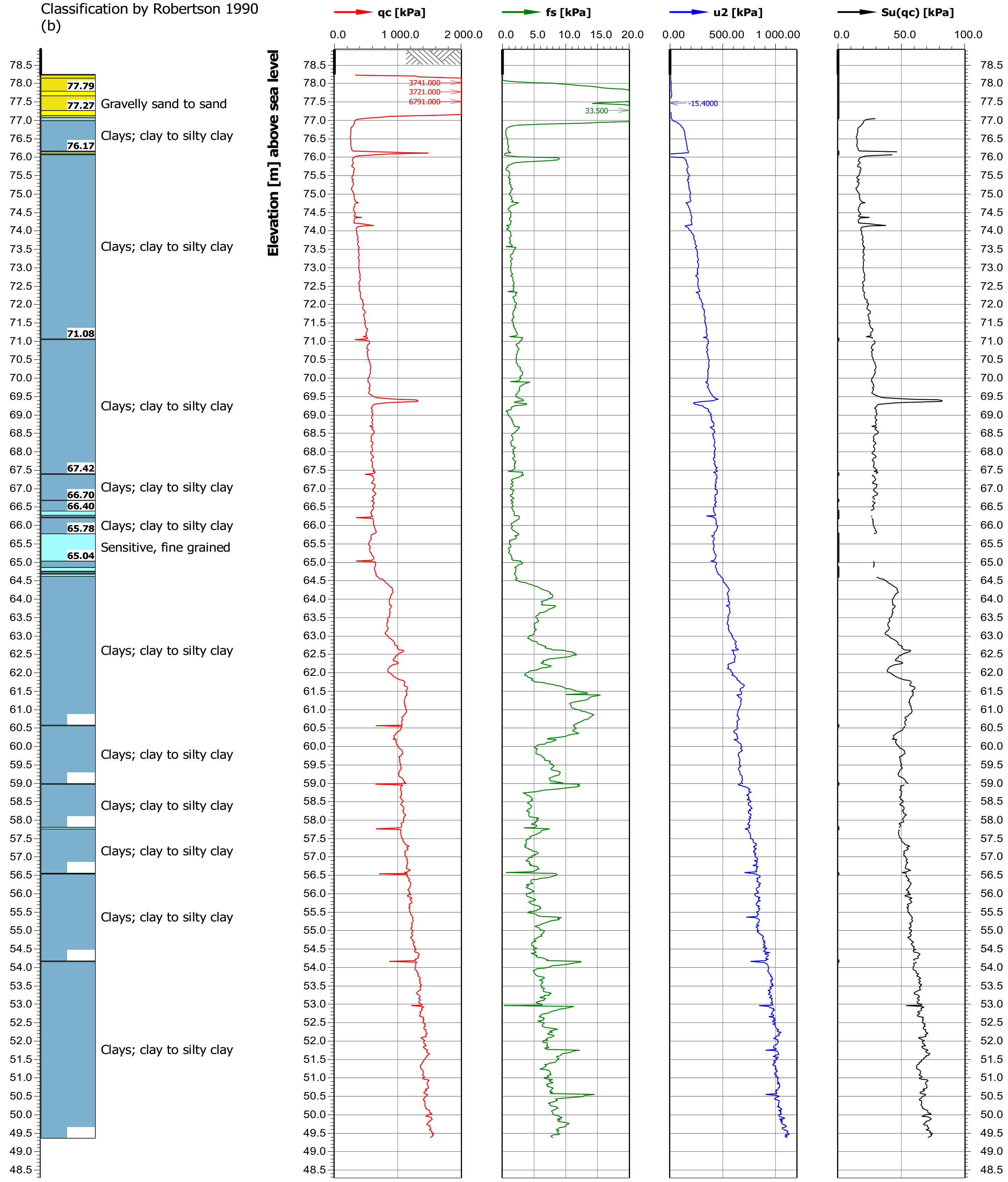
PATERSON GROUP	Geotechnical Investigation	Height system used Geodetic	
	Proposed Mixed-Use Community Development	Elevation [m] 79.63	
Project ID PG5827	Client Taggart Investments and Algonquins of Ontario	Northing [m] 5023135.64	Easting [m] 382017.13
Cone name CPT 10-23	Project location name Tewin Community, Ottawa, Ontario	Depth [m] 49.85	
Cone type CPT PROBE 15 cm2	Investigation start date 3/28/2023	Scale 1:135	Page 1/1
Remarks1			



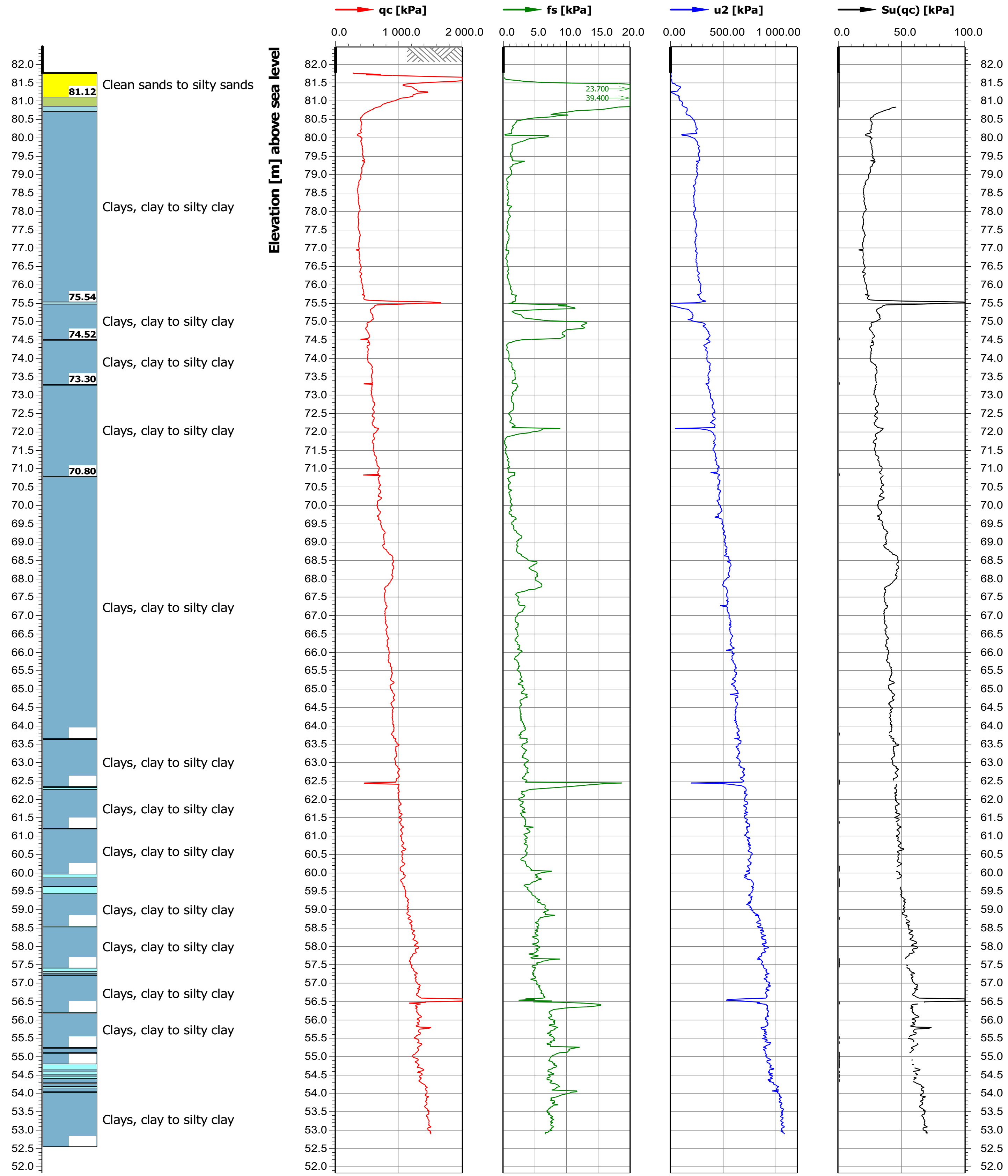
PATERSON GROUP	Geotechnical Investigation	Height system used Geodetic	
	Proposed Mixed-Use Community Development	Elevation [m] 78.46	
Project ID PG5827	Client Taggart Investments and Algonquins of Ontario	Northing [m] 5023694.67	Easting [m] 382296.87
Cone name CPT 11-23	Project location name Tewin Community, Ottawa, Ontario	Depth [m] 48.00	
Cone type CPT PROBE 15 cm2	Investigation start date 3/29/2023	Scale 1:135	Page 1/1
Remarks1			



	Geotechnical Investigation	Height system used Geodetic	
	Proposed Mixed-Use Community Development	Elevation [m] 78.93	
Project ID PG5827	Client Taggart Investments and Algonquins of Ontario	Northing [m] 5024572.22	Easting [m] 381573.70
Cone name CPT 12-23	Project location name Tewin Community, Ottawa, Ontario	Depth [m] 49.21	
Cone type CPT PROBE 15 cm2	Investigation start date 3/29/2023	Scale 1:135	Page 1/1
Remarks1			



	Geotechnical Investigation	Height system used Geodetic	
	Proposed Mixed-Use Community Development	Elevation [m] 82.48	
Project ID PG5827	Client Taggart Investments and Algonquins of Ontario	Northing [m] 5023313.27	Easting [m] 379090.06
Cone name CPT 13-23	Project location name Tewin Community, Ottawa, Ontario	Depth [m] 52.56	
Cone type CPT PROBE 15 cm2	Investigation start date 3/30/2023	Scale 1:135	Page 1/1
Remarks1			



PATERSON GROUP	Geotechnical Investigation	Height system used Geodetic	
	Proposed Mixed-Use Community Development	Elevation [m] 82.48	
Project ID PG5827	Client Taggart Investments and Algonquins of Ontario	Northing [m] 5023307.84	Easting [m] 379086.98
Cone name CPT 14-23	Project location name Tewin Community, Ottawa, Ontario	Depth [m] 52.70	
Cone type CPT PROBE 15 cm2	Investigation start date 3/30/2023	Scale 1:135	Page 1/1
Remarks1