GEMTEC
www.gemtec.ca

Preliminary Geotechnical Site Investigation
Building A - Base 31 Development
Picton, Prince Edward County, Ontario

GEMTEC Project: 103589.001

GEMTEC
www.gemtec.ca

Submitted to:

PEC Community Partners Inc.
570 Applewood Crescent
Vaughan, Ontario
L4K 4B4

Preliminary Geotechnical Site Investigation
Building A - Base 31 Development
Picton, Prince Edward County, Ontario

September 26, 2024
GEMTEC Project: 103589.001

experience • knowledge • integrity

GEMTEC Consulting Engineers and Scientists Limited
850 Champlain Avenue, Unit 101
Oshawa, ON, Canada
L1J 8C3

September 26, 2024 Project: 103589.001 – Rev0

PECCPI - PEC Community Partners Inc.
570 Applewood Crescent
Vaughan, Ontario
L4K 4B4

Attention: Kathryn Randle

Re: Preliminary Geotechnical Site Investigation
Building A – Base 31 Development
Picton, Prince Edward County, Ontario

Enclosed is our final geotechnical site investigation report in support of the proposed development located at 26-343 Church Street (County Road 22) in Picton, Prince Edward County, Ontario. The report presented herein is based on the scope of work summarized in the proposal dated June 26, 2024. This report was prepared by Rafael Abdulla, M.Eng., P.Eng., PMP and reviewed by Dale Edwards, C.Tech.

Rafael Abdulla, M.Eng., P.Eng., PMP
Senior Geotechnical Engineer

Dale Edwards, C.Tech.
Branch Manager – Oshawa

RA/DBE/sv

\\Lucid\Drawings and Files\Projects\103500\103589.001\03_Submittals\Reports\Geotech\103589.001_RPT_Geotech _Base 31 Building A_2024'09'26_Rev0.docx

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) has been retained by PEC Community Partners Inc. (PECCPI) to carry out a preliminary geotechnical site investigation in support of the design of the proposed mixed-use mid-rise building to be located at 343 County Road 22 (Church Street) in Picton, Prince Edward County, Ontario (herein referred to as the "Site" – Building A).

The purpose of the geotechnical site investigation was to characterize the general subsurface and groundwater conditions at the Site by means of a limited number of boreholes, laboratory tests and monitoring wells. Based on an interpretation of the information obtained, this report provides geotechnical recommendations for the proposed construction and other aspects of the project, including construction considerations, that could influence design decisions. It should be noted that this report addresses only the geotechnical (physical) aspects of the subsurface conditions at the Site. The geo-environmental (chemical) aspects, including the consequences of possible surface and/or subsurface contamination resulting from previous activities or uses of the Site and/or resulting from the introduction onto the Site of materials from off-site sources, are beyond the terms of reference for this assignment and are not addressed herein.

This report is subject to the *Conditions and Limitations of This Report*, which follows the text of the report, and are considered an integral part of the report (Appendix A).

2.0 PROJECT AND SITE DESCRIPTION

2.1 Background Information

The following reports and project documents have been provided to and considered by GEMTEC in the preparation of the geotechnical recommendations:

- Drawings issued for PEC prepared by Turner Fleischer and dated June 19, 2024.
- Geotechnical Report titled "*Preliminary Geotechnical Investigation, Main Parcel, North parcel, West Parcel, and Southwest parcel, Picton Airport, Prince Edward County, Ontario,*" prepared by Palmer dated July 9, 2021 (Palmer 2021), and
- Report titled "*Test Pit Observation, Picton Airport/Base 31,*" prepared by Palmer dated November 27, 2023 (Palmer 2023).

2.2 Project Location and Site Description

The Site is located approximately 250 metres (m) southeast of the intersection of Kingsley Road and Church Street in Picton, Prince Edward County, Ontario as shown on the Site Location Plan (Figure 1 in Appendix B).

The Site occupies an area of approximately 1 hectare (ha) and is currently vacant. The Site is bounded by vacant lands to the east, Kingsley Road to the north and Base 31 facilities to the west and south.

The topographic information provided by SCS indicates that the Site is generally flat with elevations (Elev.) ranging from approximately Elev. 146 metres (m) to Elev. 147 m.

At the time of preparing this report, the information available indicated that the Site will be developed with Building A, which will be a seven-storey slab-on-grade building. The building will have both retail spaces and residential units. The remainder of the Site will be occupied by access roads and parking.

2.3 Regional Geology

The surficial geology aspects of the general site area were reviewed from the following publications:

- Chapman, L.J., and Putnam, D.F., 2007, "The Physiography of Southern Ontario"; 4th Edition, Ontario Geological Survey; and
- The Ontario Geological Survey, 2003, "Surficial Geology of Southern Ontario".

Physiographic mapping in the area according to the above-noted reference indicates that the Site lies within the physiographic region of southern Ontario known as the Prince Edward Peninsula. Prince Edward County is a plain or low plateau of limestone projecting in the eastern part of Lake Ontario and separated from the mainland by the Bay of Quinte. The Prince Edward Peninsula consists of clays, sands/silty sands, and till deposits and is underlain by the Lindsay Formation (Upper Ordovician) / Shadow Lake Formation (Middle Ordovician) bedrock. The surficial geology mapping indicates that the Site lies within an area of Palaeozoic bedrock.

Although not shown on the geology maps, reworked native material associated with the previous land use may be present at the Site. In general, the subsurface conditions encountered during the previous and current investigations were generally consistent with the physiographic and surficial geological mapping.

3.0 PREVIOUS INVESTIGATIONS

As noted above, a preliminary geotechnical investigation and test pit investigation were previously conducted for a larger property and extracts of these reports are provided in Appendix C.

The geotechnical report *Palmer 2021* involved drilling two boreholes (BH21-4 and BH21-5) north of Kingsley Road which are the closest boreholes to the proposed location of Building A. The subsurface conditions at the boreholes consisted of topsoil (0.1 m thick) overlying native gravelly silty clay overlying the bedrock. The upper portion of the overburden may have been disturbed due to past activities. The depth to bedrock at the locations of the boreholes was about 0.6 metres below ground surface (mbgs). Palmer 2021 indicated that the weathered zone in the bedrock observed in the boreholes ranged to depths of approximately 1.2 mbgs and 1.5 mbgs and the RQD ranged from 38% to 91%.

Palmer 2023 included four test pits (TP6, TP7, TP8 and TP9) which were excavated in the area of Building A. The subsurface conditions recorded at these locations indicated that the topsoil thickness was about 0.2 m and the granular pad was about 0.6 m underlain by sandy silt (extending to depths ranging from 0.6 mbgs and 0.8 mbgs) underlain by bedrock.

4.0 CURRENT SITE INVESTIGATION METHODOLOGY

The field work for this current site investigation was carried out on July 22, 2024, during which time three boreholes, designated as Boreholes BH24-1 to BH24-3, were advanced to depths ranging from approximately 1.6 m to 4.7 mbgs (between Elev. 141.7 m and Elev. 145.2 m).

The borehole locations are shown on the Borehole Location Plan in Appendix B. Descriptions of the subsurface conditions observed in the boreholes are provided on the Record of Borehole Sheets in Appendix D. The results of the geotechnical laboratory tests are provided on the Record of Boreholes and in Appendix E.

The boreholes were advanced using a track mounted drill rig operated by Pontil Drilling of Mount Albert, Ontario, who is a MECP-licensed Water Well Contractor. The field work was observed throughout by a member of our geotechnical engineering staff who directed the drilling operations and logged the samples and boreholes.

The boreholes through the overburden were advanced to the sampling depths by means of continuous flight hollow stem augers using conventional 50-millimetre (mm) external diameter split spoon sampling equipment driven by an automatic hammer in accordance with the SPT procedures outlined in ASTM International standard D1586: “Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils”. SPT “N”-values were recorded for the sampled intervals as the number of blows required to drive a split spoon sampler 305 mm into the soil, using a 63.5 kg drop hammer falling 750 mm, as per ASTM D1586 procedures. The split-spoon samplers used in the investigation limit the maximum particle size that can be sampled and tested to about 40 mm. Therefore, particles or objects that may exist within the soils that are larger than this dimension were not sampled and are not represented in the grain size distributions contained herein. The results of the field tests (i.e., SPT “N” -values) as presented on the Record of Borehole sheets and in subsequent sections of this report are the values measured directly in the field and are unfactored.

The bedrock was cored using rotary wet coring techniques with HQ core size (63.5 mm outside diameter) at all borehole locations and the results are presented on the Record of Borehole Sheets in Appendix D.

Monitoring wells were installed in two boreholes. The monitoring wells were constructed using nominal 50 mm diameter, Schedule 40 polyvinyl chloride (PVC) pipe with a No. 10 machine slotted screen (0.01-inch slot). The annular space between the monitoring well screen and surrounding soils was backfilled with a silica sand filter to a maximum of 0.3 m above the top of the screen,

and the remainder of the annular space was sealed with bentonite. All monitoring wells were completed with above-ground steel casing. The monitoring well installation details are provided in the Record of Borehole Sheets (Appendix D).

The field work for this investigation was observed by members of GEMTEC's technical staff, who located the boreholes in the field, arranged for the clearance of underground utilities, observed the borehole drilling, sampling and in situ testing operations, logged the boreholes as well as examined and took custody of the recovered soil and rock samples. The samples were identified in the field, placed in appropriate containers, labelled, and transported to our Oshawa geotechnical laboratory for further visual examination by the project engineer and for laboratory testing.

Groundwater conditions were noted in the open boreholes during and upon completion of drilling and monitoring wells were installed in the bedrock, following the completion of drilling to allow for subsequent groundwater measurements. All other boreholes were backfilled and sealed in accordance with Ontario Regulation (O.Reg.) 903, as amended.

Following completion of the drilling, the soil and rock core samples were returned to our laboratory for examination by a geotechnical engineer. Selected samples were submitted for grain size distribution, uniaxial compressive strength (UCS), and moisture content testing.

The borehole locations were selected by GEMTEC and positioned on Site relative to existing features, including underground and above ground utility constraints. The ground surface elevations and coordinates at the borehole and monitoring well locations were surveyed by SCS in August 2024 and provided to GEMTEC.

A summary of the borehole information (including ground surface elevations and monitoring well locations) are provided in Table 4.1.

Table 4.1 – Summary of Borehole Information

Location	Borehole ID	Ground Surface Geodetic Elevation (m)	Borehole Depth (m)	Notes
Parking Lot north of Building A	BH24-1	146.7	1.6	
Within footprint of Building A	BH24-2	146.4	4.7	50-mm diameter monitoring well
	BH24-3	146.5	4.6	50-mm diameter monitoring well

Notes:
[1]Bedrock cored in BH24-2 and BH24-3 (HQ size)

5.0 SUBSURFACE AND GROUNDWATER CONDITIONS

5.1 Subsurface Conditions

The detailed soil profiles encountered in the boreholes are indicated on the Record of Borehole Sheets in Appendix D. The Record of Boreholes indicate the subsurface conditions at the specific borehole locations only. Boundaries between the different soils on the Records are often not distinct, but rather are transitional and have been interpreted. The precision with which subsurface conditions are indicated depends on the method of drilling, the frequency and recovery of samples, the method of sampling, and the uniformity of the subsurface conditions. Subsurface conditions at locations other than the boreholes may vary from the conditions encountered in the boreholes, both laterally and with depth. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the Site or on adjacent properties.

The soil descriptions in this report are based on commonly accepted methods of classification and identification employed in geotechnical practice. Classification and identification of soil involves judgement and GEMTEC does not guarantee descriptions as exact but infers accuracy to the extent that is common in current geotechnical practice.

Based on the results of the geotechnical investigation, subsurface conditions at the Site generally consist of topsoil overlying silty sand to silty sand and gravel (probably disturbed native soils) overlying the limestone bedrock. The weathered bedrock was encountered at depths ranging from about 0.3 mbgs to 0.5 mbgs.

5.1.1 Topsoil

Topsoil which was about 200 mm and 150 mm thick was encountered at BH24-1 and BH24-2, respectively. At BH24-3, a layer of gravel about 300 mm thick was encountered at ground surface.

5.1.2 Overburden

The subsurface conditions of the overburden encountered in the boreholes drilled at the Site are described in the following sections.

Please note that:

- Depths given in the table describing the subsurface conditions are measured from ground surface.
- The SPT “N”-values given are blows for 0.3 m of penetration unless otherwise indicated; and
- Top of the weathered bedrock was inferred at the depth where the grinding of the augers commenced. However, bedrock coring commenced at a depth of about 1.6 mbgs.

A summary of the encountered soil conditions of the Site is presented below in Table 5.1.

Table 5.1 – Summary of Overburden Conditions

Soil Type	Depth (m)		Elevation (m)		SPT "N" Values	Compactness Condition	Approx. Water Content (%)	Notes
	From	To	From	To				
Topsoil	0	0.2	-	-	-	-	-	Encountered at BH24-1 and BH24-2.
Gravel	0	0.3	-	-	-	-	-	Encountered at BH24-3.
Weathered Bedrock	0.2 – 0.3	0.3 to 0.5	146.2 to 146.5	145.9 to 146.4	13 to 50 / 25mm	Compact to very dense	1 to 8	Encountered at all borehole locations.

The overburden was present in all boreholes near surface, and contained oxidation stains, and rock fragments.

5.1.3 Fresh Bedrock

Bedrock was encountered at the following depths and elevations at each borehole location as summarized below in Table 5.2. Photographs taken of the rock cores are provided in Appendix F.

Table 5.2 – Approximate Depth and Elevations of Bedrock

Borehole ID	Depth (mbgs)	Geodetic Elevation (m)
BH24-1	0.3	146.4
BH24-2	0.5	145.9
BH24-3	0.3	146.2

The upper 1 m to 1.5 m of overburden overlying the fresh bedrock is anticipated to be completely weathered to highly weathered bedrock.

The fresh bedrock encountered can be described as fine to medium grained, dark grey to black, strong to very strong fresh limestone with shale/siltstone interbeds of the Lindsay Formation. The recovery and quality parameters measured during the rock coring are summarized in Table 5.3.

Table 5.3 – Summary of Rock Quality at Borehole Location

Borehole ID	Run	Total Core Recovery (TCR) %	Solid Core Recovery (SCR) %	Rock Quality Designation (RQD) %
BH24-2	Run 1	100	95	72
	Run 2	100	100	100
BH24-3	Run 1	100	100	85
	Run 2	100	100	92

5.1.4 Geotechnical Laboratory Tests

Grain size distribution testing was undertaken on two samples of the overburden and the results are provided in Appendix E and summarized in Table 5.4.

Table 5.4 – Summary of Grain Size Distribution Tests (Overburden)

Borehole	Sample Depth (m)	Gravel (%)	Sand (%)	Silt / Clay (%)	USCS Soil Description
BH24-1	0.8	9.9	48.5	41.5	Silt and Sand
BH24-3	0.8 – 1.2	32.0	41.0	27.0	Gravelly Silty Sand

Three uniaxial compressive strength (UCS) tests were carried out on the HQ size cores and the detailed laboratory results are presented in Appendix E. A summary of the laboratory results is presented in Table 5.5 below:

Table 5.5 – Bedrock UCS Test Results

Borehole	Sample Depth (m)	UCS (MPa)
BH24-2	4.3 – 4.5	38.6
BH24-3	3.9 – 4.2	97.8

5.2 Groundwater Levels

Un-stabilized groundwater levels were measured in the open boreholes upon completion of drilling and the details are provided in Record of Borehole Sheets in Appendix D. Groundwater level measured in seven monitoring wells on August 13, 2024, are provided in Table 5.6Table .

Table 5.6 – Approximate Groundwater Depths and Elevations

Monitoring Wells	Groundwater Depth (mbgs)	Groundwater Elevations (m)
BH24-2	1.5	144.9
BH24-3	0.8	145.7

The measured groundwater levels reflect the groundwater conditions in the boreholes at the time of the field work. Groundwater levels at the Site are anticipated to vary between and beyond the borehole locations and to fluctuate on a seasonal basis and in response to significant precipitation or snowmelt events.

6.0 DISCUSSION AND RECOMMENDATIONS

This section of the report provides guidance on the geotechnical engineering design aspects of the project based on our interpretation of the boreholes advanced as part of the site investigation by GEMTEC. It is stressed that the information in the following sections is provided for the guidance of the designers and is intended for this project only. Contractors bidding on or undertaking the works should examine the factual results of the investigation, satisfy themselves as to the adequacy of the information for construction, and make their own interpretation of the factual data as it affects their construction techniques, schedule, safety, and equipment capabilities.

The professional services retained for this project include only the geotechnical engineering aspects of the subsurface and groundwater conditions at this Site. The presence or implications of possible surface and/or subsurface contamination resulting from previous uses or activities of this Site or adjacent properties, and/or resulting from the introduction onto the Site from materials from off-site sources are outside the terms of reference for this report and have not been investigated or addressed.

6.1 General Site Preparation

Minor cut and fill operations may be required to level the Site. Surficial vegetation and topsoil should be stripped from the proposed development area. Topsoil and fill materials are not considered suitable to provide foundation support for the proposed building foundations, floor slabs, other settlement-sensitive structures, or engineered fill materials that may be subsequently used to support these structures. To reduce the potential for differential settlements, all existing topsoil within the proposed building footprint and paved areas, should be completely sub-excavated and replaced with approved engineered fill materials, as required. Any topsoil and materials with significant quantities of organics and deleterious materials (i.e., construction debris, etc.) are not appropriate for use as engineered fill.

Proposed building foundations, floor slabs, pavements or other settlement-sensitive structures may be supported on approved native undisturbed compact to very dense soils or bedrock that are free of organics and other deleterious materials or on approved engineered fill materials.

It is strongly recommended that construction should be carried out under dry conditions. If construction is required during freezing temperatures, the subgrade should be protected immediately from freezing using straw, propane heaters and insulated tarpaulins, or other suitable means. Backfilling during the winter is not recommended, but recommendations can be provided if required.

6.2 Engineered Fill

Engineered fill may be required to achieve final grades and support structural elements such as foundations and / or floor slab depending on the final grades. The following is recommended for the construction of engineered fill:

- Prior to placing engineered fill, topsoil and any disturbed native soil, or deleterious materials within the limits of the engineered fill must first be removed to competent subgrade. The disturbed native soil (if encountered) can be re-used as engineered fill. Ponded water and sloughed soil due to erosion during rainfall event should be cleaned and/or re-compacted.
- The area of the engineered fill should extend horizontally 1 m beyond the outside edge of the foundations then extend downward at a 1H:1V slope to the competent approved native soil.
- Based on the soil classification and frost group described in Table 14.1 of the Canadian Foundation Engineering Manual (CFEM, 2023), the non-cohesive deposits encountered on the Site are regarded as being of low to moderate frost susceptibility. This should be considered for any design elements exposed to freezing temperatures (concrete flatworks, exterior concrete slabs, and the like).
- The subgrade or base of the engineered fill area must be approved by GEMTEC prior to placement of any new fill, to ensure that suitability of subgrade condition. The area(s) should then be proof rolled in conjunction with an inspection by GEMTEC to confirm that the exposed soils are native, undisturbed, and competent, and have been adequately cleaned of ponded water and all disturbed, loosened, softened, organic and other deleterious material. Any of the localized near-surface soils containing organic matter or loose soils will also need to be removed prior to placement of engineered fill as directed by GEMTEC during proof-rolling.
- Materials for reuse as engineered fill must be approved by GEMTEC prior to placement and should be free of organic, and deleterious materials. In this regard, the native non-cohesive soil which are near their optimum water contents and do not contain topsoil or organics or any other deleterious materials can be reused on Site as engineered fill. The materials for use as engineered fill must be maintained within about 2% of optimum

water content for compaction. The natural water contents of the native non-cohesive soil are below their optimum water contents and wetting of these soils will be required during fill placement to achieve compaction.

- If native soils from the Site are not used as engineered fill, imported material for engineered fill should consist of clean, non-organic soils, free of chemical contamination or deleterious material. Imported materials to be used for engineered fill must be approved by GEMTEC at the source(s), prior to hauling to the Site. In this regard, imported materials which meet the requirements for OPSS 1010.MUNI Select Subgrade Material (SSM) placed in maximum 300 mm thick loose lifts and uniformly compacted to 98% of SPMDD throughout. The water contents at the time of placement should be within +/- 2 percent of its optimum moisture content to achieve the required compaction. Placement of fill is not recommended in the winter season, if unavoidable, any frost penetration into the fill material must be removed prior to placement of subsequent lifts of fill and reviewed by GEMTEC. Additional recommendations will need to be provided at detailed design.
- Cobbles and boulders exceeding 150 mm in diameter should be removed from the engineered fill prior to compaction. It is recommended that the contractor consider the possible presence of cobbles / boulders and bedrock or other obstructions when developing their excavation and engineered fill construction methodology.
- Full time testing and inspection during fill placement is required as outlined in Section 4.2.2.2 of the 2012 Ontario Building Code (OBC).

6.3 Shallow Foundations

At the time of writing this report, information available indicated that the proposed buildings will be a slab-on-grade without any basement level. Footing bases and elevator shafts are anticipated to extend about 1 m to 2 m below the finished floor level.

Based on the subsurface information, the proposed structure can be supported by conventional strip and/or spread footing foundations founded on the fresh bedrock at depths of about1.6 mbgs or greater (Elev. 144.8 m to 145.1 m).

The factored Ultimate Limit States (ULS)bearing resistance for the bedrock was assessed based on the required bearing resistance factor of 0.5 for shallow spread/strip footings. The Serviceability Limit States (SLS) reaction values for less than 25 mm of settlement were also assessed for the various sizes of footings. At the calculated ULS values settlements were below the SLS value of 25 mm for strip footings up to 1 m wide and for spread footings up to 5 m x 5 m (i.e. the SLS reaction for 25 mm of settlement would exceed the factored ULS resistance, and hence, the ULS resistance value will govern the design).

Table 6.1 provides a summary of the factored ULS resistance with foundations placed directly on fresh to slightly weathered bedrock.

Please note that these bearing capacities are for vertical concentric loads only. The effects of load inclination and eccentricity need to be taken into account as appropriate should those loading conditions develop.

Table 6.1 – Recommended ULS and SLS for Shallow Foundations

Footings Dimensions	Factored Geotechnical Resistance at ULS	Geotechnical Reaction at SLS (for 25 mm of settlement)	Settlement
5 m x 5 m spread footings Strip footings up to 1 m wide	10 MPa	ULS capacity govern	<10 mm

It is recommended that the footings be founded on a flat lying surface to convey loads vertically to the bedrock. All footing excavations must be inspected prior to placing concrete to ensure that the base has been adequately cleaned, and that the bedrock conditions as exposed at the founding level are consistent with the design assumptions. Where possible, the footing foundations should be excavated to provide a flat bearing surface at right angles to the axis of the loads. Rock protrusions, cavities, or large open joints should be avoided to provide a uniform bearing pressure across the full area of the footing. All loose, shattered or highly weathered rock within the footprint of the footings and at the footing level should be removed and replaced with concrete with a 28-day compressive strength of at least 15 MPa. All footing foundations should be cleaned of deleterious material. Also, all footings must be inspected by a geotechnical engineer prior to placing any concrete for the footings.

6.3.1 Frost Penetration

Based on the Ontario Provincial Standard Drawing (OPSD) 3090.101, the typical frost penetration depth is expected to be approximately 1.4 mbgs. All exterior footings and footings in unheated areas should be provided with at least 1.4 m of earth cover after final grading or a thermally equivalent thickness of insulation, in order to address the potential for damage due to frost action.

6.3.2 Foundation Walls and Isolated Piers

To avoid ad-freeze and possible jacking (heaving) of the foundations, the interior and exterior of the foundation walls should be backfilled with free draining, non-frost susceptible material that meets OPSS requirements for Granular B Type I or II. The backfill should be compacted in maximum 300 mm thick lifts to at least 95 percent SPMDD using suitable vibratory compaction equipment. Alternatively, where the native soils are used as backfill at the building exterior, appropriate external insulation (e.g., a semi-rigid glass fibre/SM Styrofoam) should be installed to help absorb the adfreezing forces. The insulation should extend to the footing depth. Where the backfill will ultimately support areas of hard surfacing (pavement, sidewalks, or other similar surfaces), the backfill should be placed in maximum 200 mm thick lifts and compacted to 95 percent SPMDD using suitable compaction equipment.

Backfilling against isolated (unheated) walls or piers should consist of free draining, non-frost susceptible material meeting OPSS Granular B Type I or II requirements. Other measures to prevent frost jacking of foundation elements can be provided if required.

Where areas of hard surfacing (pavement etc.) abut the proposed structures, a gradual transition should be provided between those areas of hard surfacing underlain by non-frost susceptible granular wall backfill and those areas underlain by existing frost susceptible material to reduce the effects of differential frost heaving. It is suggested that granular frost tapers be constructed from 1.4 m below finished grade to the underside of the granular subbase material for the hard surfaced areas. The frost tapers should be sloped at 1H:1V or flatter.

6.3.3 Permanent Drainage

The groundwater level measurement taken in the monitoring wells ranges from about 0.8 mbgs to 1.5 mbgs. Based on the information provided, the building on Site will be a slab-on-grade building.

A perforated perimeter drain should be provided at the level of the bottom of the footings where the floor slab is at or above the exterior final grade. The drain should outlet by gravity to a storm sewer or to a sump pit from which the water is pumped to a suitable outlet.

If the finished floor slab elevation is at or above the finished exterior grade, an underfloor drainage system would not be required.

The extent of drainage measures such as a composite synthetic drainage system or equivalent, under slab drainage and sump system should be assessed during the final design stages and GEMTEC can provide geotechnical input as required.

The exterior grade around any buildings should be sloped from the walls to direct surface runoff away from the building.

If an underfloor drainage system connected to sumps is required, it should be provided to collect seepage and to limit pore water pressure build-up on the underside of the floor slab. The subfloor drainage system may consist of a network of robust sub-drainpipes conveying collected groundwater to a sump or sumps from which the groundwater can be pumped to a municipal storm sewer. The drainage system would consist of interconnected perforated drainpipes (bedded on, and within, free draining granular soils wrapped in geotextile fabric) installed around the perimeter of the building and within the building footprint.

6.3.4 Seismic Site Classification

Seismic hazard is defined in the 2012 OBC (as amended) by uniform hazard spectra (UHS) at spectral coordinates of 0.2 second, 0.5 second, 1.0 second and 2.0 seconds and a probability of exceedance of 2% in 50 years. The OBC method uses a site classification system defined by the average soil/bedrock properties (e.g., shear wave velocity, Standard Penetration Test (SPT)

resistance, undrained soil shear strength, etc.) in the 30 m of the soil profile extending below the foundation level. There are 6 site classes from A to F, decreasing in ground stiffness from A, hard rock, to E, soft soil; with site class F used to denote problematic soils (e.g., sites underlain by thick peat deposits and/or liquefiable/collapsible soils). The site class is then used to obtain acceleration and velocity-based site coefficients F_a and F_v, respectively, used to modify the UHS to account for the effects of site-specific soil conditions in design.

The site classification recommendation is based on the available information as well as our interpretation of conditions below the boreholes and our knowledge of the soil/bedrock conditions in the area. In accordance with Table 4.1.8.4.A of the OBC (2012), it is recommended that Site Class "C" (very dense soils and soft rock) be applied for structural design at the Site. The site classification may be improved by site-specific testing such as seismic cone penetration testing or multi-channel analysis of surface waves (MASW) testing.

6.3.5 Slab-on-Grade (Heated Areas Only) Floor

It is anticipated that the floor slab can be designed as a concrete slab-on-grade. Based on the existing borehole information, the subgrade will consist of engineered fill or compact to very dense native soils, and limestone bedrock. The final rock surface should be cleared of any loose or shattered rock and debris for slab in the bedrock.

Any low areas may be brought up to within at least 200 mm of the underside of the floor slabs, as required, using Ontario Provincial Standard Specification (OPSS) Granular 'B', Type I material or other approved material, placed in maximum 200-mm thick loose lifts and uniformly compacted to at least 98% of the material's SPMDD.

The final lift of granular fill beneath floor slabs should consist of a minimum thickness of 200 mm of OPSS 1010 Granular A compacted to 100% of its SPMDD in order to create a stable working surface, to distribute loadings, and for drainage purposes.

The floor slabs should be structurally separate from the foundation walls and columns. Sawcut control joints should be provided at regular intervals and along column lines to control shrinkage cracking and to allow for differential settlement of the floor slabs.

6.4 Temporary Excavation

Depending on the finished grades, finished floor elevations, and inverts of site servicing, it is anticipated that excavations will extend into the compact to very dense non-cohesive deposits and the underlying bedrock.

6.4.1 Overburden Excavation

The sides of the excavations should be sloped in accordance with the requirements in Ontario Regulation 213/91 under the Occupational Health and Safety Act (OHSA). It is anticipated that

temporary excavations in compact to very dense native soils can be classified as Type 2 soils with unsupported side slopes no steeper than 1 horizontal to 1 vertical (1H:1V.

Where the side slopes consist of more than one soil type, the soil shall be classified as the type with the highest number among the soil types present. Please note that if the excavation extends below the groundwater table without adequate dewatering, the soil at the face of the excavation would be classified as Type 4. The soil type classifications indicated above are provisional and are subject to change based on field observations of the actual conditions at the time of exposure.

Flattening and / or blanketing of the side slopes may be required in the non-cohesive materials depending on the weather conditions and construction procedure adopted by the contractor. Further, excavations should be left open for as short a duration as possible and completely backfilled at the end of each working day.

All excavated material should be stockpiled well away (i.e., minimum 2 m) from the sides / crest of the excavation. In general, stockpiles of excavated materials should be kept at least the same horizontal distance from the top edge of the excavation as the depth to not negatively impact excavation slope stability, subject to confirmation by a geotechnical engineer in the field during construction.

6.4.2 Bedrock Excavation

All excavations should be carried out in accordance with Ontario Regulation 213 (Ontario Occupational Health and Safety Act, OHSA, for Construction projects).

The measured UCS of the selected rock samples ranged from about 38 MPa to 98 MPa and it is anticipated that the rock excavation in the Lindsay Formation will require the use of hydraulic rock breakers (i.e., hoe ramming) and large hydraulic excavators may not be able to penetrate the shale or limestone encountered in the boreholes.

A hydraulic excavator equipped with rock teeth may be able to excavate fractured bedrock horizons, but will need to be supplemented with equipment such as a road header or hydraulic rock breaker in the more competent bedrock at depth. The rate of excavation through the bedrock is highly dependent on the method and equipment chosen by the contractor. Any excavations into a minimum of moderately fractured bedrock (150 mm to 300 mm bedding planes) can have vertical side slopes; excavations in closely fractured bedrock (20 mm to 150 mm bedding planes) should be benched or sloped back with side slopes no steeper than 1H:1V, provided that all loosened rock fragments are removed from the excavated rock faces.

Alternatively, blasting may be considered for excavation into the fresh strong to very strong limestone bedrock. Blasting would be carried out by a specialist contractor.

Noise, vibration and dust would be a significant issue during excavation of the bedrock. Pre- and post construction condition surveys are recommended on structures (if any within the zone of influence) that could be impacted by the construction activities.

6.5 Temporary Groundwater Control

The groundwater levels measured in the monitoring wells installed were about 0.8 mbgs and 1.5 mbgs (or Elev. 145.7 m and 144.9 m) at the time of the investigation in August 2024. It is anticipated that excavations will be generally extend below the groundwater level. Based on these observations, it is assumed that the groundwater table will be within the bedrock; however, it should be noted that the groundwater table is influenced by seasonal fluctuations and major precipitation events. Large open excavations or excavations extending into the bedrock may experience groundwater seepage during heavy precipitation events. Therefore, minor groundwater seepage may be anticipated during typical excavations but should be controllable with filtered sumps and pumps. In any event, groundwater levels should be lowered to at least 1 m below the excavation invert.

The rate and volume required for dewatering will be dependent on the depth of the required excavations, the groundwater levels at the time of construction and the construction methods and staging chosen by the Contractor.

Water takings in excess of 50 cubic metres per day (m^3/day) are regulated by the Ministry of the Environment, Conservation and Parks (MECP). Certain takings of groundwater and storm water for construction site dewatering purposes with a combined total less than 400 m^3/day qualify for self-registration on the MECP's Environmental Activity and Sector Registry ("EASR"). Registration on the EASR replaces the need to obtain a PTTW and a Section 53 approval. A Category 3 PTTW is required where the proposed water taking is greater than 400 m^3/day.

The dewatering system is the Contractor's responsibility and the rate and volume required for dewatering is dependent on the construction methods and staging chosen by the contractor. Further, the contractor will be responsible for obtaining any required discharge approvals.

6.6 Site Servicing

Trench excavations should follow general guidelines of Section 6.4.

The bedding for the site servicing pipes should be compatible with the type and class of pipe, the surrounding subsoil and anticipated loading conditions and should be designed in accordance with provincial and municipal standards. Where granular bedding is deemed to be acceptable, it should consist of at least 150 mm of Granular A or 19-mm crusher run limestone material. Crushed rock mined from the Site can be used as bedding meeting the gradation of OPSS 1010 Granular A. The physical properties as per OPS standards must be confirmed and met prior to use on Site. From the springline to 300 mm above the pipe obvert, sand cover may be used. The

bedding and cover material shall be placed in maximum 200 mm thick lifts and should be compacted to at least 98% of SPMDD.

The use of ‘high-performance bedding' as the bedding or cover material should not be permitted.

6.6.1 Trench Cut-Offs

Where the invert levels of the services are located below the measured groundwater levels, consideration should be given to installation of low hydraulic conductivity water-stops or cut-offs (trench plugs) at strategic locations in accordance with OPSD 802.095. This should be done, as appropriate, to reduce the potential for preferential groundwater flow through the granular bedding and trench backfill where the trench is within the bedrock or along steep grades. The need for and frequency of trench plugs should be evaluated during the detailed design phase and should be considered at the construction limits, and equally spaced at a maximum 100 m spacing (depending on pipe length, may be less).

6.7 Asphalt Pavement Construction

6.7.1 Pavement Structure

Based on the results of the geotechnical investigation and on review of the preliminary grading plan provided, it is our understanding that the roads within the development will be used for residential use and classified as a Local Road.

Traffic information was not available at the time of this report preparation, as such, the recommended minimum pavement structure design has been developed for two traffic loading scenarios, light duty and heavy duty and provided in Table 6.2.

Table 6.2 – Flexible Pavement Design Recommendations

Pavement Layer	Light Duty Pavements	Heavy Duty Pavements
Surface Course Asphalt	40 mm HL3	50 mm HL3
Binder Course Asphalt	50 mm HL8	70 mm HL8
Granular Base	150 mm Granular A	150 mm Granular A
Granular Subbase	300 mm Granular B Type I or II	400 mm Granular B Type I or II

The heavy-duty design is appropriate for areas where heavy trucks and maintenance vehicles are anticipated to drive while the light duty design is appropriate for areas where no heavy traffic is anticipated.

GEMTEC should be allowed to review the drawings and provide additional recommendations if the design differs from our assumptions. In general, heavy-duty pavement should be provided for access roads and where trucks will be present.

6.7.2 Effects of Subgrade Disturbance

If the road subgrade surface becomes disturbed or wetted due to construction operations or precipitation, or the granular pavement materials are to be used by construction traffic, the Granular B thicknesses provided above may not be adequate and it may be necessary to increase the thickness of the Granular B subbase or exclusively use Granular B, Type II subbase. The contractor should be responsible for providing suitable access for construction equipment.

The required thickness of the subbase materials will depend on a number of factors, including contractor workmanship and schedule, contractor methodology, soil types, and weather conditions, and should be assessed by geotechnical personnel at the time of construction. In our opinion, the recommended approach for subgrade preparation from a geotechnical point of view is to:

- Proofroll the subgrade conditions at the time of construction under the supervision of experienced geotechnical personnel; and,
- Adjust the thickness or type of the subbase material and include a woven geotextile separator, as required. Unit rate allowances should be made in the contract for sub-excavation and replacement with OPSS Granular B, Type II (as required).

6.7.3 Asphaltic Cement

Performance graded PG 58-28 asphaltic cement is recommended for the road construction. The final asphalt surface should be sloped at a minimum of 2% to shed runoff.

6.7.4 Granular and Asphalt Material Placement

The pavement granular materials should be compacted in maximum 300 mm thick loose lifts to the 100% SPMDD using suitable vibratory compaction equipment. Crushed rock mined from the Site can be used as granular subbase meeting the requirements of OPSS 1010 Granular B, Type II. However, the physical properties as per OPS standards must be confirmed and met prior to use on Site.

The asphalt materials should be compacted to at least 92 percent of their Marshall Maximum Relative Density according to OPSS 310, as measured in the field using a nuclear density gauge.

6.7.5 Transition Treatments

In areas where the new pavement structure will abut existing pavements, the depths of the granular materials should taper up or down at 5H:1V, or flatter, to match the depths of the granular material(s) exposed in the existing pavement. Any undermining or broken edges resulting from

the construction activities should be removed by saw cut. All milled surfaces and butt joints should be properly tack coated prior to asphalt placement.

6.7.6 Pavement Drainage

In order to provide drainage of the granular base and subbase, the granular material should extend to ditches or drainage outlets. The bottom of the granular subbase layer should be at least 0.3 m above the bottom of the ditch or drainage outlet and should have positive drainage away from the Site.

If storm sewers and catch basins are installed, it is suggested that continuous subdrains connected to catch basins be provided along the perimeter of both sides of all roadways to assist with drainage of the pavement structure. These drains should be installed at the bottom of the subbase layer.

7.0 ADDITIONAL CONSIDERATIONS

7.1 Monitoring Well Abandonment

All monitoring wells installed as part of this investigation should be decommissioned when no longer required by a licensed Water Well Contractor in accordance with applicable legislation. The well abandonment could be carried out in advance of or during construction.

7.2 Corrosion Considerations

The potential for the subsurface soil and groundwater conditions to corrode concrete and steel elements, or the like, should be considered in the final design. Additional sampling and / or testing may be required, or suitable protection measures (i.e., sulphate resistance concrete, sacrificial thickness, cathodic protection, etc.) should be considered by the designer.

7.3 Management of Excess Soil

It is noted that the professional services retained for this project include only the geotechnical aspects of the subsurface conditions at this Site. The presence or implications of possible surface and/or subsurface contamination, including naturally occurring sources of contamination, are outside the terms of reference for this report. This report does not constitute a Phase II Environmental Site Assessment (ESA), nor does it constitute a contaminated material management plan. It is recommended that soil samples be collected prior to and/or during construction to support the disposal or re-use of excess soil generated from the Site.

7.4 Effects of Construction Induced Vibration

Some of the construction operations (such as excavation, granular material compaction, depth foundation installation, etc.) will cause ground vibration on and off the Site. The vibrations will attenuate with distance from the source but may be felt at nearby structures. Assuming that excavation is carried out in accordance with the guidelines in this report, the magnitude of the vibrations may be less than that which could cause damage to the nearby structures or

infrastructure in good condition but are anticipated to be felt at and within the adjacent nearby structures. Construction planning / scheduling and vibration monitoring should be considered, especially if work within the underlying bedrock is to be undertaken and given the proximity to the existing residential development to the north.

7.5 Design Review and Construction Observation

The engagement of the services of the geotechnical consultant during construction is recommended to confirm that the subsurface conditions throughout the proposed Site development and excavations do not materially differ from those given in the report, and that the construction activities do not adversely affect the intent of the design. The subgrade surfaces for the services and pavement construction should be inspected by experienced geotechnical personnel to ensure that suitable materials have been reached and properly prepared. The placing and compaction of earth fill and imported granular materials should be inspected to ensure that the materials used conform to the grading and compaction specifications.

8.0 CLOSURE

We trust that this report meets your immediate requirements. If conditions that differ from those assumed in this geotechnical and hydrogeological investigation report are encountered during construction, GEMTEC should be given the opportunity to review the recommendations presented herein.

If you have any questions or require additional information, please contact the undersigned.

Regards,

GEMTEC Consulting Engineers and Scientists Limited

Rafael Abdulla, M.Eng., P.Eng., PMP
Senior Geotechnical Engineer

Dale Edwards, C.Tech
Branch Manager - Oshawa

APPENDIX A

Conditions and Limitations of This Report

Conditions and Limitations of This Report

1. **Standard of Care:** GEMTEC has prepared this report in a manner consistent with generally accepted engineering or environmental consulting practice in the jurisdiction in which the services are provided at the time of the report. No other warranty, expressed or implied is made.
2. **Copyright:** The contents of this report are subject to copyright owned by GEMTEC, save to the extent that copyright has been legally assigned by us to another party or is used by GEMTEC under license. To the extent that GEMTEC owns the copyright in this report, it may not be copied without our prior written agreement for any purpose other than the purpose indicated in this report. The methodology (if any) contained in this report is provided to the Client in confidence and must not be disclosed or copied to third parties without the prior written agreement of GEMTEC. Disclosure of that information may constitute an actionable breach of confidence or may otherwise prejudice our commercial interests.
3. **Complete Report:** This report is of a summary nature and is not intended to stand alone without reference to the instructions given to GEMTEC by the Client, communications between GEMTEC and the Client and to any other reports prepared by GEMTEC for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. GEMTEC can not be responsible for use of portions of the report without reference to the entire report.
4. **Basis of Report:** This Report has been prepared for the specific site, development, design objectives and purposes that were described to GEMTEC by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document, subject to the limitations provided herein, are only valid to the extent that this report expressly addresses the proposed development, design objectives and purposes. Any change of site conditions, purpose or development plans may alter the validity of the report and GEMTEC cannot be responsible for use of this report, or portions thereof, unless GEMTEC is requested to review any changes and, if necessary, revise the report.
5. **Time Dependence:** If the proposed project is not undertaken by the Client within 18 months following the issuance of this report, or within the timeframe understood by GEMTEC to be contemplated by the Client, the guidance and recommendations within the report should not be considered valid unless reviewed and amended or validated by GEMTEC in writing.
6. **Use of This Report:** The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without GEMTEC's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, GEMTEC may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process.

   Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.
7. **No Legal Representations:** GEMTEC makes no representations whatsoever concerning the legal significance of its findings, or as to other legal matters touched on in this report, including but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.

8. **Decrease in property value:** GEMTEC shall not be responsible for any decrease, real or perceived, of the property or site's value or failure to complete a transaction, as a consequence of the information contained in this report.
9. **Reliance on Provided Information:** The evaluation and conclusions contained in this report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations. information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of misstatements, omissions, misrepresentations. or fraudulent acts of the Client or other persons providing information relied on by us. We are entitled to rely on such representations, information and instructions and are not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.
10. **Investigation Limitations:** Site investigation programs are a professional estimate of the scope of investigation required to provide a general profile of subsurface conditions but even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions.

    The data derived from the site investigation program and subsequent laboratory testing are interpreted by trained personnel and extrapolated across the site to form an inferred geological representation and an engineering opinion is rendered about overall subsurface conditions and their likely behaviour with regard to the proposed development. Conditions between and beyond the borehole/test hole locations may differ from those encountered at the borehole/test hole locations and the actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies. Accordingly, GEMTEC does not warrant or guarantee the exactness of of the subsurface descriptions.

    Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination-or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

    In addition, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.
11. **Sample Disposal:** GEMTEC will dispose of all uncontaminated soil and/or rock samples 60 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.
12. **Follow-Up and Construction Services:** All details of the design were not known at the time of submission of GEMTEC's report. GEMTEC should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of GEMTEC's report.

    During construction, GEMTEC should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not

materially differ from those interpreted conditions considered in the preparation of GEMTEC's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in GEMTEC's report. Adequate field review, observation and testing during construction are necessary for GEMTEC to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, GEMTEC's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

13. **Changed Conditions:** Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that GEMTEC be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that GEMTEC be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.
14. **Drainage:** Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. GEMTEC takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.

APPENDIX B

Site Location Plan
Borehole Location Plan

Legend

APPROXIMATE SITE BOUNDARY

NOTES:

1. All locations approximate
2. Coordinate system: NAD 1983 UTM Zone 18N
3. Geographic dataset source: Ontario GeoHub.
4. Contains information licensed under the Open Government Licence – Ontario.
5. Service Layer Credits: World Imagery: Maxar, Microsoft
World Street Map: Esri Community Maps Contributors, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada

Scale:
1:750

0 10 20 40 60 Meters

Drawing
SITE LOCATION PLAN

Client:
PEC COMMUNITY PARTNERS INC.

Project
PRELIMINARY GEOTECHNICAL INVESTIGATION
BUILDING A- BASE 31 AREA, PICTON,
COUNTY OF PRINCE EDWARD, ONTARIO

Drwn By:	S.J.	Chkd By:	R.A.
Project No.	103589.001	Revision No.	0
Date	SEPTEMBER 2024		**FIGURE 1**

GEMTEC
Consulting Engineers and Scientists
6695 Millcreek DR #7,
Mississauga, ON L5N 5M4
T: (416) 347-7427
www.gemtec.ca

Folder: N:\Projects\103500\103589.001\06_Civil Drafting\Sheets\Drafting\PrelimGeoTech\103589_001_PrelimGeoTech_Base31_R0_2024_08_30\

Legend

BH # BOREHOLE ID

APPROXIMATE BOREHOLE LOCATION

APPROXIMATE MONITORING WELL LOCATION

APPROXIMATE SITE BOUNDARY

NOTES:

1. All locations approximate
2. Coordinate system: NAD 1983 UTM Zone 18N
3. Geographic dataset source: Ontario GeoHub.
4. Contains information licensed under the Open Government Licence – Ontario.
5. Service Layer Credits: World Imagery: Maxar, Microsoft

Scale: 1:750

0 10 20 40 60 Meters

Drawing: BOREHOLE LOCATION PLAN

Client: PEC COMMUNITY PARTNERS INC.

Project: PRELIMINARY GEOTECHNICAL INVESTIGATION
BUILDING A- BASE 31 AREA, PICTON,
COUNTY OF PRINCE EDWARD, ONTARIO

Drwn By:	S.J.	Chkd By:	R.A.
Project No.	103589.001	Revision No.	0
Date	SEPTEMBER 2024		**FIGURE 2**

GEMTEC
Consulting Engineers and Scientists
6695 Millcreek DR #7,
Mississauga, ON L5N 5M4
T: (416) 347-7427
www.gemtec.ca

Folder: N:\Projects\103500\103589.001\06_Civil Drafting\Sheets\Drafting\PrelimGeoTech\103589_001_PrelimGeoTech_Base31_R0_2024_08_30\

APPENDIX C

Previous Reports
Palmer 2021 & Palmer 2023

871 Equestrian Court, Unit 1, Oakville ON L6L 6L7
Tel: 647-795-8153 | www.pecg.ca

Memorandum

Date: November 27, 2023
Project #: 1510458

To: Mike Pearsell and Julia Risi
SCS Consulting Group Ltd.
30 Centurian Drive, Suite 100, Markham, ON, L3R 8B8

From: Ted Ou and Matthew St. Denis

Re: Test Pit Observation
Picton Airport/Base 31

1. Introduction

Palmer is pleased to provide SCS Consulting Group Ltd. with our memorandum for test pit observation at the project Site located at 343 County Rd 22, in the county of Prince Edward, Ontario.

It is understood that the proposed development will consist of low rise and multi-storey buildings. The purpose of the test pit is to confirm bedrock depth in the Revitalization area to support the upcoming works as well as in the proposed Village A development area north of Kingsley Road to support the design of this future area, by means of twelve (12) test pits.

2. Test Pit Observation

The field work was carried out on Nov 15, 2023 by JCB 3CX rubber tire backhoe, with an 18inch bucket, provided by the client, during which time twelve (12) test pits (TP1 to TP12) were advanced at the locations shown on the **Test Pit Location Plan**, Drawing 1. The test pits were excavated to refusal on sound bedrock at depths ranging from 0.5 to 1.2m below existing ground surface.

Nine (9) test pits were conducted within the Revitalization area. Three (3) test pits were conducted within the Village A area, and the soil conditions were observed by the bidder and the engineers/technician from SCS and Palmer. The test pit locations were provided by the client and the test pit locations plotted on the Test Pit Location Plan (Drawing 1) were based on the measurement of site features and should be considered as approximate.

During the test pit excavation, fractured rock debris were observed at throughout the site as shown in the Photos in **Appendix A**. Due to the limit of excavation method during the excavation, all test pits were terminated at the sound bedrock surface. Additional heavy duty excavator equipped with a hoe ram or rock bucket were not available on site for further advancement into bedrock.

Table 1. Observations at Test Pits

Test Pit	Soil Obersvations
TP1	0 - 0.3m: Top soil 0.3 – 0.9m: Brown sandy silt mix with rock debris, moist 0.9m: Bedrock
TP2	0 - 0.3m: Top soil 0.3 – 1.2 m: Brown sandy silt mix with rock debris, moist 1.2m: Bedrock
TP3	0 - 0.3m: Top soil 0.3 – 0.8m: Brown sandy silt mix with rock debris, moist 0.8m: Bedrock
TP4	0 - 0.4m: Top soil 0.4 – 0.9m: Brown sandy silt mix with rock debris, moist 0.9m: Bedrock
TP5	0 - 0.4m: Top soil 0.4 – 0.7m: Brown sandy silt mix with rock debris, moist 0.7m: Bedrock
TP6	0 - 0.2m: Top soil 0.2 – 0.6m: Brown sandy silt mix with rock debris, moist 0.6m: Bedrock
TP7	0 - 0.2m: Top soil 0.2 – 0.7m: Brown sandy silt mix with rock debris, moist 0.7m: Bedrock
TP8	0 - 0.4m: Granular Fill 0.4 – 0.6m: Asphalt mix with granular fill 0.6 – 0.8m: Brown sandy silt mix with rock debris, moist 0.8m: Bedrock
TP9	0 - 0.4m: Granular Fill 0.4 – 0.6m: Asphalt mix with granular fill 0.6 – 0.85m: Brown sandy silt mix with rock debris, moist 0.85m: Bedrock
TP10 (TP#1 in Village A)	0 - 0.4m: Top soil 0.4 – 0.5m: Brown sandy silt mix with rock debris, moist 0.5m: Bedrock
TP11(TP#3 in Village A)	0 - 0.4m: Top soil 0.4 – 0.6m: Brown sandy silt mix with rock debris, moist 0.6m: Bedrock
TP12(TP#5 in Village A)	0 - 0.4m: Top soil 0.4 – 0.8m: Brown sandy silt mix with rock debris, moist 0.8m: Bedrock

3. Certification

We trust that the information contained in this memorandum is satisfactory. Should you have any questions, please do not hesitate to contact this office.

This memorandum was prepared and reviewed by the undersigned:

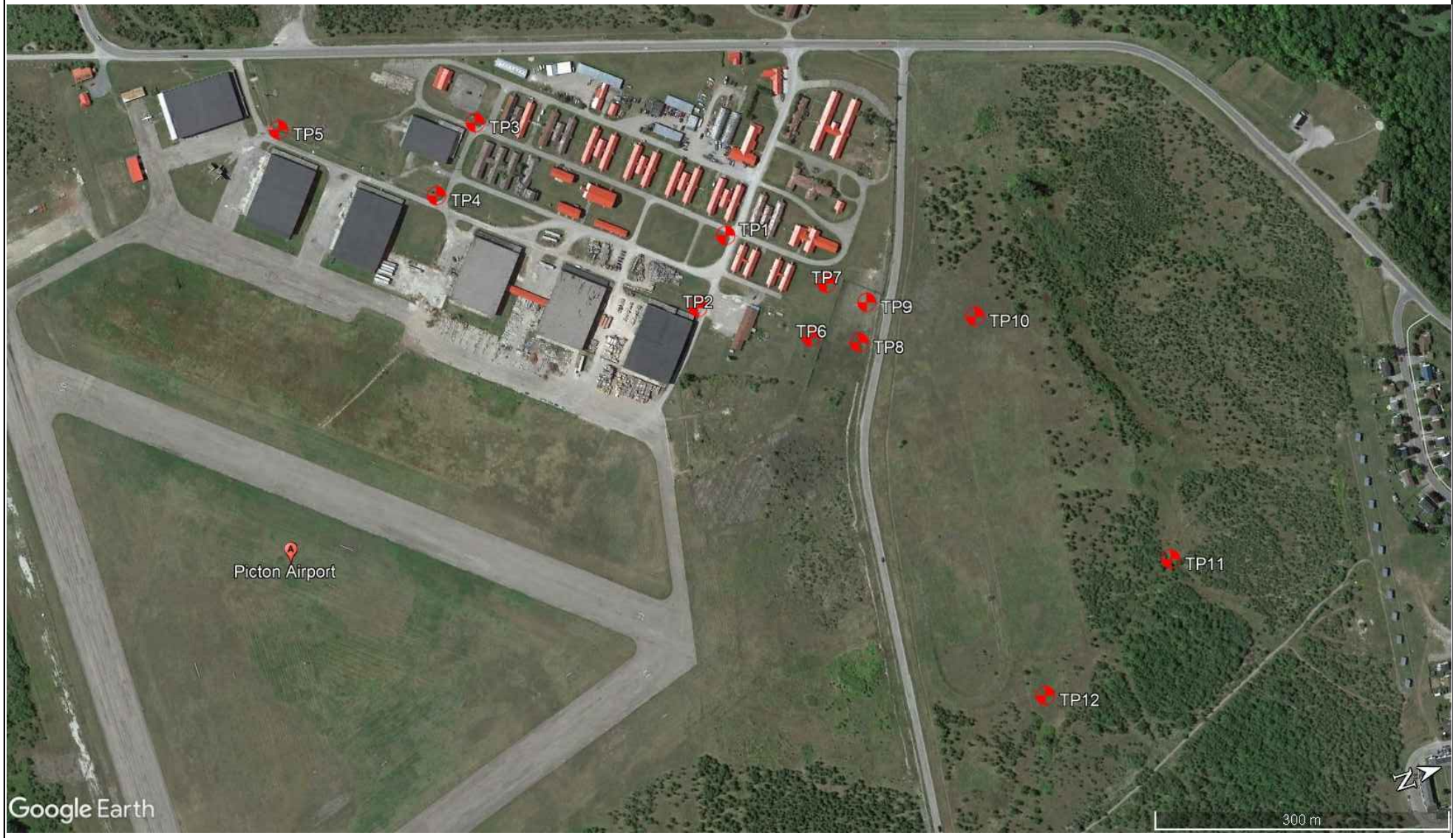
Prepared By:

Ted Ou, M.Sc, P.Eng, PMP.
Geotechnical Project Manager

Reviewed By:

Matthew D. St Denis., P.Eng.
Team Lead, Geotechnical Engineering

Drawings



LEGEND

Test Pit Location

Client:				Project No.: **1510458**	Drawing No.: **1**
Drawn: **TO**		Approved: **MDS**		Title: **Test Pit Location Plan**	
Date: **Nov, 2023**		Scale: **As Shown**		Project: **Test Pit Observation** **Picton Airport, Prince Edward County, ON**	
Original Size: **Letter**		Rev: **N/A**		Palmer PART OF SLR	871 Equestrain Court, Unit 1 Oakville, Ontario L6L 6L7

Appendix A

Site Photos

Test Pit 1

Test pit 2

Test pit 3

Test pit 4

Test pit 5

Test pit 6

Test pit 7

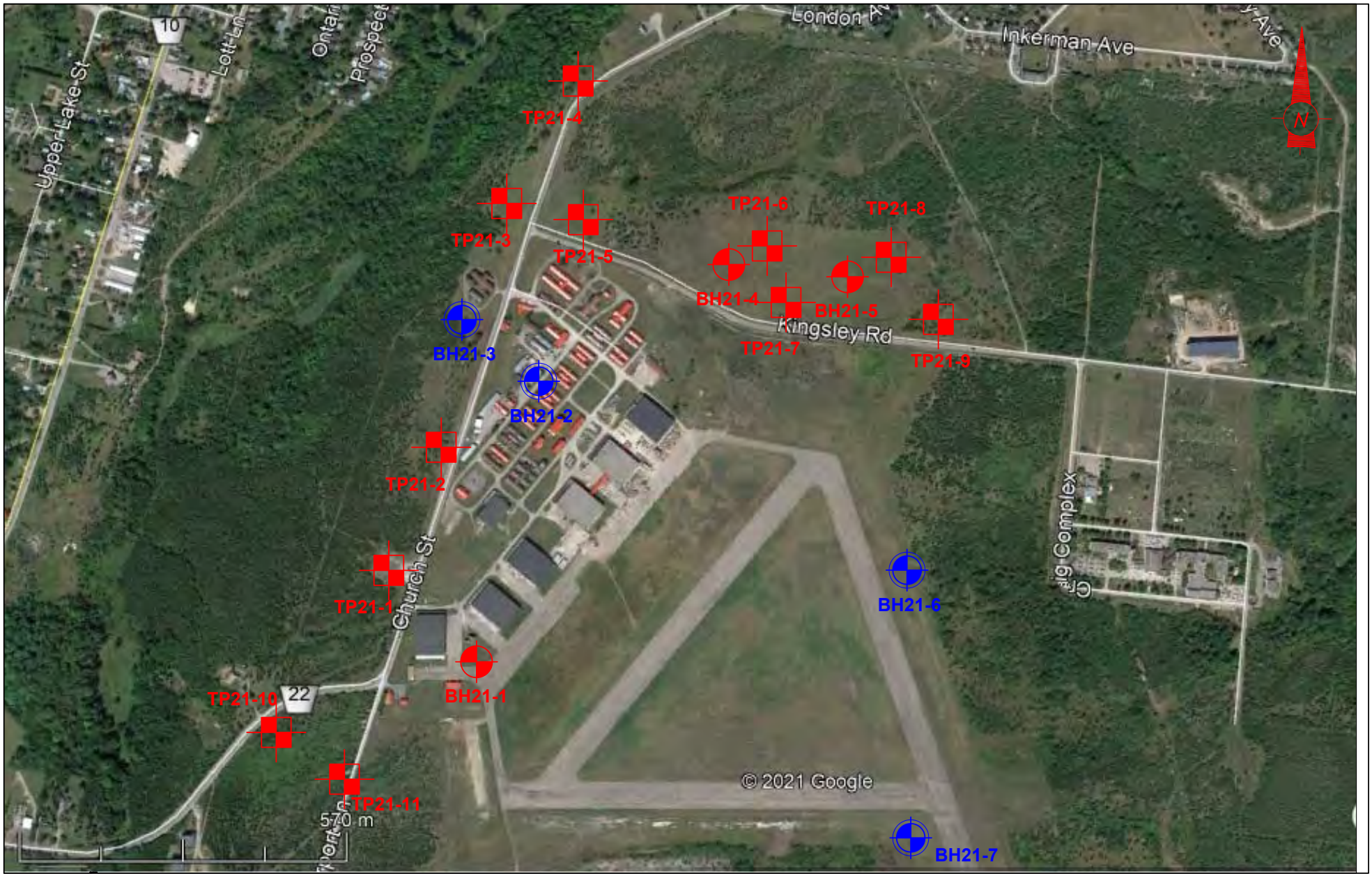
Test pit 8

Test pit 9

Test pit 10

Test pit 11

Test pit 12



LEGEND

- Test Pit Locations
- Borehole Locations
- Borehole/Monitoring Well Locations

Client:	**Tercot Acquisitions Limited**			Project No.: **1510436**	Drawing No.: **1**
Drawn:	**TP**	Approved:	**DT**	Title:	**Test Pit/Borehle/Monitoring Well Location Plan**
Date:	**July, 2021**	Scale:	**As Shown**	Project:	**Preliminary Geotechnical Investigation Picton Airport, Prince Edward County, ON**
Original Size:	**Letter**	Rev:	**N/A**	Palmer™	74 Berkeley Street Toronto, Ontario M5A 2W7

Palmer

LOG OF TEST PIT TP21-5

PROJECT: Preliminary Geotechnical Investigation - Picton Airport

CLIENT: Tercot Development Group

Method: Backhoe Excavation

PROJECT LOCATION: 343 County Road 22, Picton, Prince Edward County, ON

Diameter:

REF. NO.: 1510436

DATUM: N/A

Date: Feb/17/2021

ENCL NO.: 5

TP LOCATION: See Test Pit Location Plan

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Ground Surface										
0.0	**TOPSOIL:** 50 mm										
0.1	**DISTURBED NATIVE (FILL):** organic clayey silt, trace sand, trace gravel, some rootlets, brown, wet		1	GS					55	5	
0.6	**FRAGMENTED BEDROCK:** limestone, grey		2	GS							
0.7	**END OF TEST PIT UPON REFUSAL ON LIMESTONE BEDROCK** 1. No groundwater accumulation upon completion of excavation.										

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

Palmer

LOG OF TEST PIT TP21-6

PROJECT: Preliminary Geotechnical Investigation - Picton Airport

CLIENT: Tercot Development Group

Method: Backhoe Excavation

PROJECT LOCATION: 343 County Road 22, Picton, Prince Edward County, ON

Diameter:

REF. NO.: 1510436

DATUM: N/A

Date: Feb/17/2021

ENCL NO.: 6

TP LOCATION: See Test Pit Location Plan

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m							
	Ground Surface											
0.0	**TOPSOIL:** 100 mm											
0.1	**DISTURBED NATIVE (FILL):** sandy silt, some clay, trace gravel, some organics, trace rootlets, dark brown to brown, moist to wet		1	GS								
0.7	**END OF TEST PIT UPON REFUSAL ON LIMESTONE BEDROCK** 1. No groundwater accumulation upon completion of excavation.											

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES $+^3$, $\times^3$: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

Palmer

LOG OF TEST PIT TP21-7

PROJECT: Preliminary Geotechnical Investigation - Picton Airport

CLIENT: Tercot Development Group

Method: Backhoe Excavation

PROJECT LOCATION: 343 County Road 22, Picton, Prince Edward County, ON

Diameter:

REF. NO.: 1510436

DATUM: N/A

Date: Feb/17/2021

ENCL NO.: 7

TP LOCATION: See Test Pit Location Plan

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS / 0.3 m "N"							GR SA SI CL
	Ground Surface											
0.0	**TOPSOIL:** 100 mm											
0.1	**DISTURBED NATIVE (FILL):** sandy silt, some clay, trace gravel, trace rootlets, trace organics, dark brown to brown, moist to wet		1	GS					○			
0.5	**END OF TEST PIT UPON REFUSAL ON LIMESTONE BEDROCK** 1. No groundwater accumulation upon completion of excavation.											

GROUNDWATER ELEVATIONS

Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

Palmer

LOG OF TEST PIT TP21-8

PROJECT: Preliminary Geotechnical Investigation - Picton Airport

CLIENT: Tercot Development Group

Method: Backhoe Excavation

PROJECT LOCATION: 343 County Road 22, Picton, Prince Edward County, ON

Diameter:

REF. NO.: 1510436

DATUM: N/A

Date: Feb/17/2021

ENCL NO.: 8

TP LOCATION: See Test Pit Location Plan

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT (w_P w w_L) WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS / 0.3 m "N"							GR SA SI CL
	Ground Surface											
0.0	**TOPSOIL:** 300 mm											
0.3	**DISTURBED NATIVE (FILL):** sandy silt, some clay, trace gravel, some organics, trace rootlets, dark brown, moist to wet		1	GS					○			
0.6	**DISTURBED NATIVE (FILL):** clayey silt, some sand, some gravel, trace organics, contains cobbles, dark brown to brown, moist		2	GS					○	50		44 11 29 16
1.2	**END OF TEST PIT UPON REFUSAL ON LIMESTONE BEDROCK** 1. No groundwater accumulation upon completion of excavation.											

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES + 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure

PROJECT: Preliminary Geotechnical Investigation - Picton Airport

CLIENT: Tercot Development Group

Method: Backhoe Excavation

PROJECT LOCATION: 343 County Road 22, Picton, Prince Edward County, ON

Diameter:

REF. NO.: 1510436

DATUM: N/A

Date: Feb/17/2021

ENCL NO.: 9

TP LOCATION: See Test Pit Location Plan

(m) ELEV DEPTH	SOIL PROFILE – DESCRIPTION (Ground Surface)	STRATA PLOT	SAMPLES NUMBER	TYPE	"N" BLOWS/0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT (%)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m^3)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL:** 200 mm											
0.2	**DISTURBED NATIVE (FILL):** sandy silt, some clay, trace gravel, trace rootlets, brown, moist to wet		1	GS					~21			
0.5	**END OF TEST PIT UPON REFUSAL ON LIMESTONE BEDROCK** 1. No groundwater accumulation upon completion of excavation.											

Legend: DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100; SHEAR STRENGTH (kPa): O UNCONFINED, + FIELD VANE & Sensitivity, ● QUICK TRIAXIAL, × LAB VANE; PLASTIC LIMIT W_P, NATURAL MOISTURE CONTENT W, LIQUID LIMIT W_L; WATER CONTENT (%) 10 20 30

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity; O ε=3% Strain at Failure

Palmer

LOG OF BOREHOLE BH21-4

PROJECT: Preliminary Geotechnical Investigation - Picton Airport

CLIENT: Tercot Acquisitions Limited — Method: Hollow Stem Augers/NQ Coring

PROJECT LOCATION: 343 County Road 22, Picton, Prince Edward County, ON — Diameter: 205 mm/76 mm — REF. NO.: 1510436

DATUM: Geodetic — Date: Jun-02-2021 — ENCL NO.: 15

BH LOCATION: See Borehole Location Plan

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
146.4	Ground Surface											
146.3 0.0	**TOPSOIL:** 100 mm											
0.1	**DISTURBED NATIVE (FILL):** gravelly silty clay, trace sand, trace rootlets, contain cobbles and boulders, brown, moist, hard		1	SS	70/ 175mm		146					
145.8												
0.6	**ROCK CORING STARTS, REFER TO ROCK CORE LOG**						145					Auger grinding and spoon bouncing
1												
2							144					
3							143					
4							142					
5												
141.2												
5.2	**END OF BOREHOLE** Notes: 1. Borehole was open upon completion of drilling.											

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

Palmer

LOG OF ROCK CORE BH21-4

PROJECT: Preliminary Geotechnical Investigation - Picton Airport

CLIENT: Tercot Acquisitions Limited | Method: Hollow Stem Augers/NQ Coring | REF. NO.: 1510436

LOCATION: 343 County Road 22, Picton, Prince Edward County, ON | Diameter: 205 mm/76 mm | ENCL NO.: 15

DATUM: Geodetic | Date: Jun-02-2021

BH LOCATION: See Borehole Location Plan

(m) ELEV / DEPTH	ROCK DESCRIPTION	GROUND WATER CONDITIONS	CORE SAMPLE NUMBER	CORE SAMPLE SIZE	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	HARD LAYER (%)	RQD (%)	FRACTURE INDEX (per 0.3 m)	DISCONTINUITIES	Weathering Index	HYDRAULIC CONDUCTIVITY (cm/sec)	POINT LOAD TEST UCS AXIAL (MPa)*	POINT LOAD TEST UCS DIAMETRAL (MPa)*	UNIAXIAL COMPRESSION (MPa)	DENSITY (g/cm³) E (GPa)
145.8	Rock Surface															
145.8 / 0.0	**LIMESTONE** moderately weathered with cobbles and boulders, medium strong to very strong, grey								14	Gravel Layer/Fragment Zone: 0.56m - 0.64m Fragment Zone: 0.87m - 0.97m 1.27m - 1.35m	W3-W2					
0.6	**LIMESTONE** slightly weathered to fresh, strong to very strong, grey								11							
1			1	NQ	100	82	N/A	47	9							
									2							
2 / 144.3									2							
2.1									3							
									5							
3			2	NQ	100	100	N/A	75	2		W1		104.6	114.2		
									4							
142.8									2							
3.6									1							
4									4							
			3	NQ	100	100	N/A	64	4							
									3							
5 / 141.2									4							
5.2	**END OF BOREHOLE** Notes: 1. Borehole was open upon completion of drilling.															

Weathering Index: W1-Fresh, W2-Slightly weathered, W3-Moderately weathered, W4-Highly weathered, W5-Completely weathered

Angle to the core axis

E = Modulus of Elasticity

*: UCS [Mpa] ≈ 24 $I_{S(50)}$

Palmer

LOG OF BOREHOLE BH21-5

PROJECT: Preliminary Geotechnical Investigation - Picton Airport

CLIENT: Tercot Acquisitions Limited — Method: Hollow Stem Augers/NQ Coring

PROJECT LOCATION: 343 County Road 22, Picton, Prince Edward County, ON — Diameter: 205 mm/76 mm — REF. NO.: 1510436

DATUM: Geodetic — Date: Jun-02-2021 — ENCL NO.: 16

BH LOCATION: See Borehole Location Plan

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
145.9	Ground Surface							
145.8 0.0	**TOPSOIL:** 100 mm							
0.1	**DISTURBED NATIVE (FILL):** gravelly silty clay, trace sand, trace rootlets, contain cobbles and boulders, brown, moist, hard		1	SS	56/ 275mm			
145.4								
0.6	**ROCK CORING STARTS, REFER TO ROCK CORE LOG**							Auger grinding and spoon bouncing
140.9							145 144 143 142 141	
5.1	**END OF BOREHOLE** Notes: 1. Borehole was open upon completion of drilling.							

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE; 20 40 60 80 100

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

Palmer

LOG OF ROCK CORE BH21-5

PROJECT: Preliminary Geotechnical Investigation - Picton Airport

CLIENT: Tercot Acquisitions Limited | Method: Hollow Stem Augers/NQ Coring | REF. NO.: 1510436

LOCATION: 343 County Road 22, Picton, Prince Edward County, ON | Diameter: 205 mm/76 mm | ENCL NO.: 16

DATUM: Geodetic | Date: Jun-02-2021

BH LOCATION: See Borehole Location Plan

(m) ELEV / DEPTH	ROCK DESCRIPTION	GROUND WATER CONDITIONS	CORE SAMPLE NUMBER	CORE SAMPLE SIZE	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	HARD LAYER (%)	RQD (%)	FRACTURE INDEX (per 0.3 m)	DISCONTINUITIES	Weathering Index	HYDRAULIC CONDUCTIVITY (cm/sec)	POINT LOAD TEST UCS AXIAL (MPa)*	POINT LOAD TEST UCS DIAMETRAL (MPa)*	UNIAXIAL COMPRESSION (MPa)	DENSITY (g/cm^3) E (GPa)
145.4	Rock Surface															
0.6	**LIMESTONE** moderately weathered with cobbles and boulders, medium strong to very strong, grey								>25	Gravel Layer/Fragment Zone: 0.56m - 0.89m	W3-W2					
145.0																
0.9	**LIMESTONE** slightly weathered to fresh, strong to very strong, grey								10							
1			1	NQ	100	73	N/A	38	4							
									1							
144.1									1							
1.9									2							
2									2							
			2	NQ	100	100	N/A	91	5		W1				89.1	
3									1							
									2							
142.4																
3.5									2				109.8	88.4		
4									3							
			3	NQ	100	100	N/A	72	3							
									2							
5									1							
140.9																
5.1	**END OF BOREHOLE** Notes: 1. Borehole was open upon completion of drilling.															

Weathering Index: W1-Fresh, W2-Slightly weathered, W3-Moderately weathered, W4-Highly weathered, W5-Completely weathered

Angle to the core axis

E = Modulus of Elasticity

*: UCS [Mpa] ≈ 24 $I_{S(50)}$

APPENDIX D

Abbreviations and Terminology Used on Records of Boreholes
Record of Borehole Sheets BH24-1 to BH24-3

ABBREVIATIONS AND TERMINOLOGY USED ON RECORDS OF BOREHOLES AND TEST PITS

SAMPLE TYPES	
AS	Auger sample
CA	Casing sample
CS	Chunk sample
BS	Borros piston sample
GS	Grab sample
MS	Manual sample
RC	Rock core
SS	Split spoon sampler
ST	Slotted tube
TO	Thin-walled open shelby tube
TP	Thin-walled piston shelby tube
WS	Wash sample

SOIL TESTS	
w	Water content
PL, w_p	Plastic limit
LL, w_L	Liquid limit
C	Consolidation (oedometer) test
D_R	Relative density
DS	Direct shear test
G_S	Specific gravity
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	Organic content test
UC	Unconfined compression test
γ	Unit weight

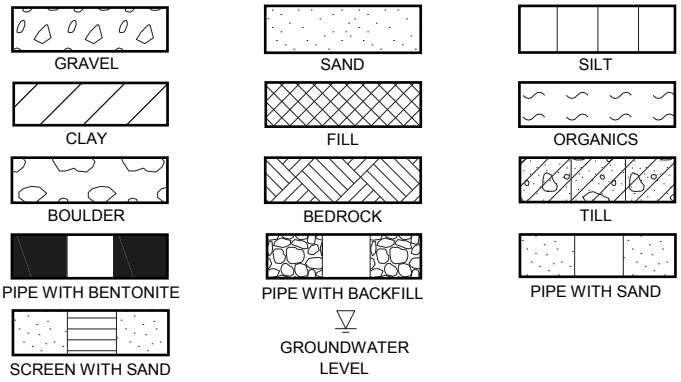
PENETRATION RESISTANCE

Standard Penetration Resistance, N
The number of blows by a 63.5 kg (140 lb) hammer dropped 760 millimetres (30 in.) required to drive a 50 mm split spoon sampler for a distance of 300 mm (12 in.). For split spoon samples where less than 300 mm of penetration was achieved, the number of blows is reported over the sampler penetration in mm.

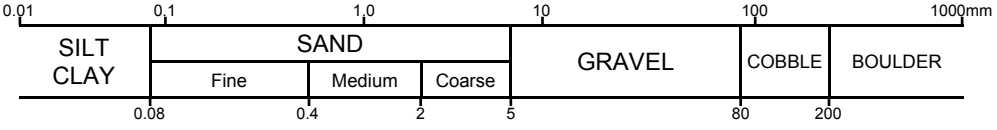
Dynamic Penetration Resistance
The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive a 50 mm (2 in.) diameter 60° cone attached to 'A' size drill rods for a distance of 300 mm (12 in.).

WH	Sampler advanced by static weight of hammer and drill rods
WR	Sampler advanced by static weight of drill rods
PH	Sampler advanced by hydraulic pressure from drill rig
PM	Sampler advanced by manual pressure

COHESIONLESS SOIL Compactness		COHESIVE SOIL Consistency	
SPT N-Values	**Description**	**Cu, kPa**	**Description**
0-4	Very Loose	0-12	Very Soft
4-10	Loose	12-25	Soft
10-30	Compact	25-50	Firm
30-50	Dense	50-100	Stiff
>50	Very Dense	100-200	Very Stiff
		>200	Hard

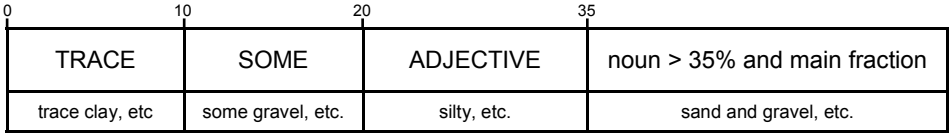


GRAIN SIZE



DESCRIPTIVE TERMINOLOGY

(Based on the CANFEM 4th Edition)



RECORD OF BOREHOLE BH24-1

CLIENT: PEC Community Partners Inc.
PROJECT: Building A, Base 31, 26-343 County Road 22, Picton, Ontario
JOB#: 103589.001
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: Geodetic
BORING DATE: Jul 22 2024

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA / WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Power Auger Hollow Stem Auger (152mm)	Ground Surface		146.72							
		TOPSOIL (~200 mm thick)		0.00	1A						
				146.52							
		FILL - (GP) GRAVEL and SAND; grey; non-cohesive, moist, very dense		0.20							
				146.42							
				0.30	1B	SS	305	42			
		- auger grinding between approximately 0.3 m (start of weathered BEDROCK) and 0.8 m depths			2	SS	25	50 / 0.08		MH	
1											
				145.17	3	SS	0	50 / 0.03			
		End of Borehole on Inferred Bedrock		1.55							
2		Notes:									
		1. Borehole open and dry upon completion of drilling.									
		2. Borehole was backfilled with bentonite upon completion of drilling.									
3											
4											
5											
6											

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

GEMTEC
Consulting Engineers and Scientists

LOGGED: IO
CHECKED: PM

GEO - BOREHOLE LOG 103589.001_GINT_GEOTECH_R0_2024_08_23.GPJ GEMTEC 2018.GDT 9/26/24

RECORD OF BOREHOLE BH24-2

CLIENT: PEC Community Partners Inc.
PROJECT: Building A, Base 31, 26-343 County Road 22, Picton, Ontario
JOB#: 103589.001
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: Geodetic
BORING DATE: Jul 22 2024

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA / WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		Ground Surface		146.39							Monument
		TOPSOIL (~150 mm thick)		0.00 / 146.24	1A						
		FILL - (SM) clayey SILTY SAND, some gravel; brown, oxidation stains; non-cohesive, moist, very dense		0.15 / 145.89	1B	SS	279	50 / 0.13			
1	Power Auger Hollow Stem Auger (152mm)	- Auger grinding between approximately 0.5 m (start of weathered BEDROCK) and 1.6 m depths		0.50 / 144.74	2	SS	76	50 / 0.08			
					3	SS	0	50 / 0.03			
2	Diamond Rotary Core HQ (89mm OD)	End of Augering BEDROCK cored (approximately 1.7 m to 4.7 m depths): Fine to medium grained, dark grey to black, strong to very strong, fresh LIMESTONE (Lindsay Formation), with shale / siltstone interbeds.		1.65	R1	RC	1524	TCR = 100%, SCR = 95%, RQD = 72%			Bentonite
3											Filter Sand
4				141.69	R2	RC	1524	TCR = 100%, SCR = 100%, RQD = 100%			50 mm dia. Well Screen
		Notes: 1. Groundwater measured at a depth of approximately 2.1 m in open borehole upon completion of drilling. 2. Monitoring well installed as shown upon completion of drilling. 3. Groundwater level measured in monitoring well at approximately 1.5 mbgs (Elev. 144.9 m) on August 18, 2024.		4.70							End of Coring
5											
6											

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/07/22	2.1	144.3
24/08/18	1.5	144.9

GEMTEC
Consulting Engineers and Scientists

LOGGED: IO
CHECKED: PM

GEO - BOREHOLE LOG 103589.001_GINT_GEOTECH_R0_2024_08_23.GPJ GEMTEC 2018.GDT 9/26/24

RECORD OF BOREHOLE BH24-3

CLIENT: PEC Community Partners Inc.
PROJECT: Building A, Base 31, 26-343 County Road 22, Picton, Ontario
JOB#: 103589.001
LOCATION: See Borehole Location Plan

SHEET: 1 OF 1
DATUM: Geodetic
BORING DATE: Jul 22 2024

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	PENETRATION RESISTANCE (N), BLOWS/0.3m / DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH (Cu), kPA / WATER CONTENT, %	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		Ground Surface		146.50							Monument
	Power Auger Hollow Stem Auger (152mm)	GRAVEL (~300 mm thick)		0.00 / 146.20	1A						
		- Auger grinding between approximately 0.3 m (start of weathered BEDROCK) and 1.6 m depths		0.30	1B	SS	559	13			
1					2	SS	381	80 / 0.03		MH	
				144.93	3	SS	25	50 / 0.03			Bentonite
	Diamond Rotary Core HQ (89mm OD)	End of Augering BEDROCK cored (approximately 1.6 m to 4.6 m depths) Fine to medium grained, dark grey to black, strong to very strong, fresh LIMESTONE (Lindsay Formation), with shale / siltstone interbeds.		1.57							
2											
					R1	RC	1524	TCR = 100%, SCR = 100%, RQD = 85%			
3											Filter Sand
					R2	RC	1524	TCR = 100%, SCR = 100%, RQD = 92%			50 mm dia. Well Screen
4											
		Notes: 1. Borehole open and dry upon completion of drilling. 2. Monitoring well installed as shown upon completion of drilling. 3. Groundwater level measured in monitoring well at approximately 0.8 mbgs (Elev. 145.7 m) on August 18, 2024.		141.88 / 4.62							End of Coring
5											
6											

PENETRATION RESISTANCE (N), BLOWS/0.3m
DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m
SHEAR STRENGTH (Cu), kPA: + NATURAL ⊕ REMOULDED
WATER CONTENT, %: W_P — W — W_L
10 20 30 40 50 60 70 80 90

GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
24/08/18	0.8 ▽	145.7

GEMTEC
Consulting Engineers and Scientists

LOGGED: IO
CHECKED: PM

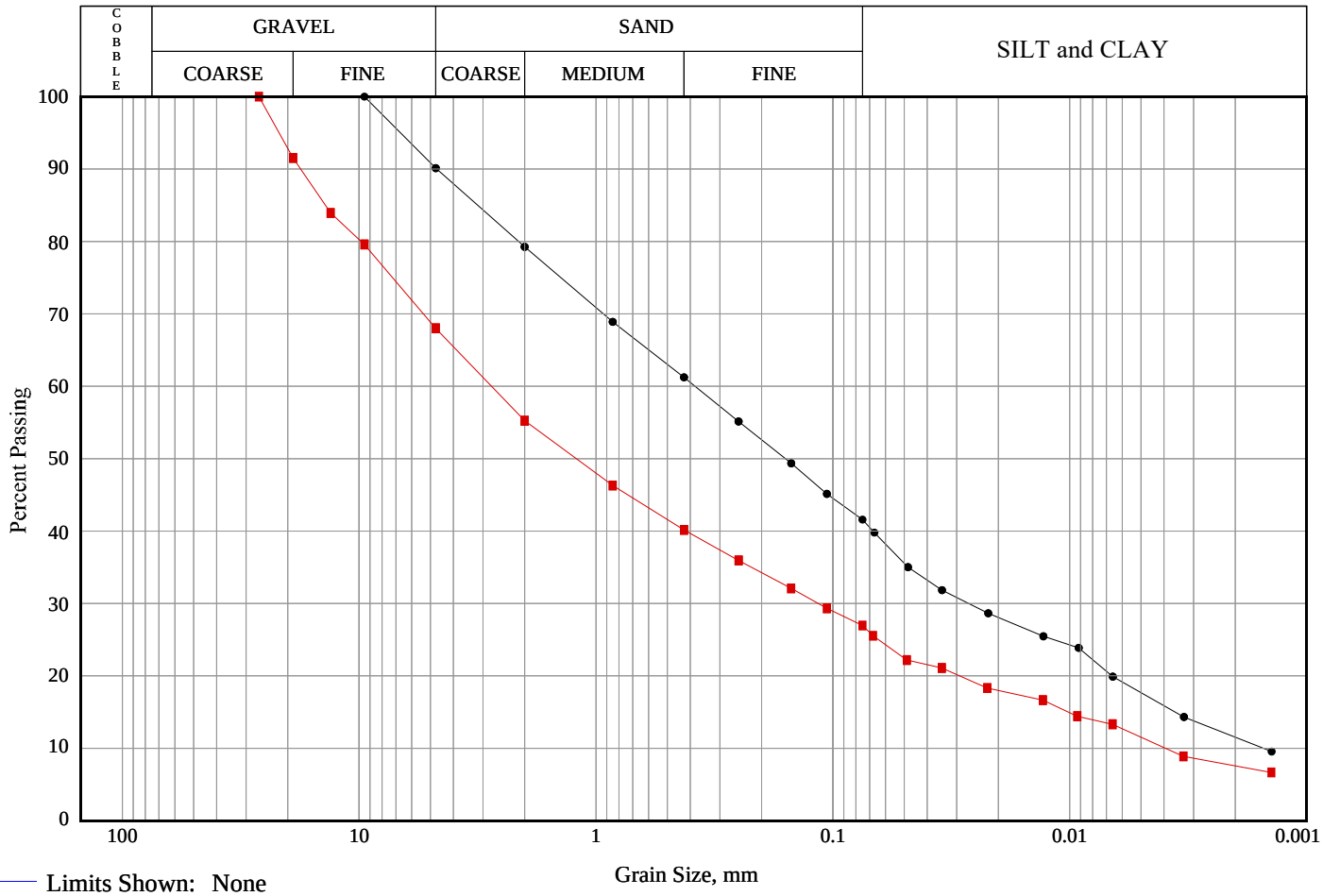
GEO - BOREHOLE LOG 103589.001_GINT_GEOTECH_R0_2024_08_23.GPJ GEMTEC 2018.GDT 9/26/24

APPENDIX E

Geotechnical Laboratory Results

GEMTEC Consulting Engineers and Scientists	Client: Rockport Group	Soils Grading LS-702/ASTM D-422
	Project: Base 31, 26-343 County Road 22, Picton, Ontario	
	Project #: 103589001	

Note: More information available upon request



Line Symbo	Sample	Borehole/ Test Pit	Sample Number	Depth	% Cob.+ Gravel	% Sand	% Silt and Clay
		BH24-1	SA-2	0.8	9.9	48.5	41.5
		BH24-3	SA-2	0.8-1.2	32.0	41.0	27.0

Line Symbol	USCS Classification	USCS Symbol	D_{10}	D_{15}	D_{30}	D_{50}	D_{60}	D_{85}	% 5-75µm
	SILT and SAND, trace gravel	SM	0.002	0.004	0.03	0.16	0.38	3.16	30.0
	Gravelly SILTY SAND	SM	0.004	0.010	0.12	1.21	2.76	13.89	19.4

GEMTEC
Consulting Engineers and Scientists

Client: Rockport Group

Project: Base 31, 26-343 County Road 22, Picton, Ontario

Project #: 103589001

Rock Core Compressive Strength

Date/Time Sampled: 24/08/21 2:59:00 PM	Date/Time Tested: 24/08/28 3:00:24 PM

BH	Sample No	Depth	Description	Diameter, mm	Area, mm²	Length After Capping, mm	L/D	Load, kN	Comp. Str., MPa
24-2	1888	4.3-4.5		63.3	3151	126	1.99	121.390	38.6
24-3	1889	3.9-4.16		63.0	3121	126	2.00	305.000	97.8

APPENDIX F

Rock Core Photographs

PEC Community Partners Inc.
Building A - Base 31, Rockport
Picton, Ontario

Photo 1: BH 24-2

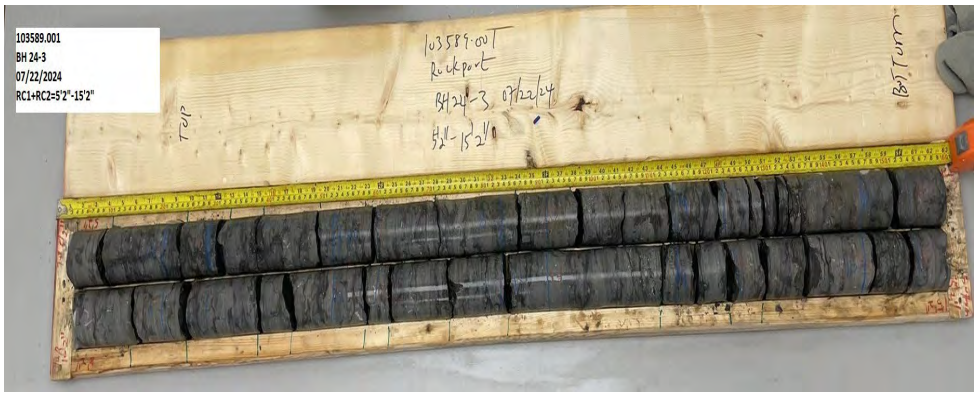


Photo 2: BH 24-3

GEMTEC
Consulting Engineers and Scientists

Date:	September 6, 2024
Project No:	103589.001
Figure No:	1 and 2

experience • knowledge • integrity

civil	civil
geotechnical	géotechnique
environmental	environnement
structural	structures
field services	surveillance de chantier
materials testing	service de laboratoire des matériaux

expérience • connaissance • intégrité