October 5, 2020

THE REGIONAL MUNICIPALITY OF YORK

ADDENDUM #4

T-20-122

FOR: **Construction of a New Elevator and 2nd Floor AODA Washroom**

LOCATION: **145 Harry Walker Parkway, Town of Newmarket, Ontario**

CLOSING DATE: **October 14, 2020, 1:00:00 P.M. (Eastern Time)**

Bidders are requested to incorporate the changes/clarifications noted below to the above noted Bid Documents in your possession and be governed accordingly.

1. BIDDERS QUESTIONS (Q) AND REGION'S RESPONSES (A)

Q1. As per drawing A302, can you please clarify if all ceiling tiles are to be replaced throughout the office area on the second floor.

A1. All ceiling tiles are to be removed and replaced with new (grid and fixtures to remain) except for tiles in Meeting Room #20100.

Q2. Please provide additional information regarding to the removal & relocation of existing Refrigerant piping (Dwg M201 Detail 1).

1. Refrigerant Type & quantity
2. Equipment Type, Make & model
3. Existing Refrigerant pipe sizes

A2. 2 refrigerant pipes serving the ground floor IT room. Condensing 3 ton unit is located on the north side of the building. Refrigerant is R407C. Contractor to verify pipe size, routing, charge, refrigerant, etc. once construction begins. Note that system serves the building IT room. Any modifications and shut downs to the system are to be coordinated with York Region. Downtime is to be minimal.

Q3. Please advise if there is a base building automation/controls contractor and if so please provide the contact information.

A3. Controls work will be carried under the cash allowance Item CA1 Building Automation System and Controls.

Q4. Kitchen Area: Please advise if we need a POR floor or vinyl flooring patch only? If its Vinyl floor patch, please provide the spec for vinyl flooring and quantity for a patch if possible. According to drawing sheet A703, It's showing they exclude the kitchen wall area from the scope of the work. However, the room finish schedule indicates different things.

A4. Vinyl tile is to remain in the kitchen area. Specs of original vinyl tile are not available. Contractor to match existing as much as possible where patchwork is required.

Q5. Please confirm that the existing VAVs are pneumatic , otherwise we need name of BAS control contractor to quote for assisting air balancer

A5. Controls are not pneumatic. Controls work will be carried under the cash allowance Item CA1 Building Automation System and Controls.

Q6. There is a note on drawing A302 to remove and replace all ceiling tiles on 2nd floor. Could you please clarify extent of this work and if we need to remove all ceiling tiles on 2nd floor and replace with new?

A6. All ceiling tiles are to be removed and replaced with new (grid and fixtures to remain) except for tiles in Meeting Room #20100.

Q7. Could you please provide specification on the existing vinyl flooring and base in the Kitchen we need to patch?

A7. Specs on existing vinyl are not available. Contractor is responsible to match existing as much as possible.

Q8. Is there any specific LULA Elevator manufacturer you are looking for or we can carry any manufacturer that meets specified requirements?

A8. As indicated in Article 1.1.5 of Section 14 26 00, the elevator specifications are based on a Delta Elevator Limited Use/Limited Application elevator. The Contractor shall carry an elevator from any manufacturer that meets the requirements specified in Section 14 26 00. Please refer to Section 14 26 00 Limited Use Limited Application Elevator.

Q9. In reference to new concrete work sections on drawing A704, could you please let us know what is considered disturbed soil? Also, would it be possible to clarify the depth we need to excavate to?

A9. Compact granular A below pit to be min. 8" deep.

Q10. Is there any Geotechnical Report available for this project?

A10. Geotechnical Report from 2015 is attached. The contractor shall provide soil testing to confirm the bearing capacity of the area of the new elevator as part of Cash Allowance Item CA5 Inspection and Testing.

Q11. I was not able to find commencement date, substantial completion date and total completion dates in the contract documents for this project. Could you please clarify these dates as well?

A11. Answered in Addendum #3, Question #7

Bidders shall acknowledge receipt of all addenda to this RFT prior to submitting their Bid. Bids that do not contain evidence of receipt of all addenda will be deemed to be "incomplete" and will not be accepted in the Bidding Website.

This addendum shall remain attached to and form part of the Contract Documents.

Yours truly,

Marie Kavanagh
Senior Purchasing Analyst
Procurement Office

Attachments: Geotechnical Report

Peto MacCallum Ltd.
CONSULTING ENGINEERS

GEOTECHNICAL INVESTIGATION
UPGRADES OF 145 HARRY WALKER PARKWAY
145 HARRY WALKER PARKWAY
NEWMARKET, ONTARIO

for

THE REGIONAL MUNICIPALITY OF YORK

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PML Ref.: 14TF028
Report: 1, Revised
January 22, 2015

TABLE OF CONTENTS

ATTACHMENTS

Peto MacCallum Ltd.
CONSULTING ENGINEERS

January 22, 2015 PML Ref.: 14TF028, Revised

Ms. Priya Ashta, MS, B.Arch, PMP, LEED Green Associates
Project Manager
Capital Delivery Property Services Branch
Corporate Services
The Regional Municipality of York
17250 Yonge Street
Newmarket, Ontario
L3Y 6Z1

Dear Ms. Ashta

Geotechnical Investigation
Upgrades of 145 Harry Walker Parkway
145 Harry Walker Parkway
Newmarket, Ontario

We are pleased to present the revised geotechnical investigation recently completed for the above referenced project. Authorization to proceed with this assignment was provided via Purchase Order No. 0000085013, dated August 6, 2014.

We will retain the soil samples obtained during the investigation for three months. The samples will be discarded at the end of the three-month period, unless we are instructed otherwise. If you would like the samples stored beyond the three-month period, this can be arranged for a service fee.

We thank you for the opportunity to have been of service on this assignment and trust that this report is complete within the term of reference. Please contact this office should you have any questions and comments on this report.

Sincerely

Peto MacCallum Ltd.

Nadia Elgohary, MEng, P.Eng.
Manager, Geotechnical Services

NE:mm

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BARRIE, HAMILTON, KITCHENER, TORONTO

1. INTRODUCTION

It is understood that several improvements are planned at the site located at 145 Harry Walker Parkway in Newmarket, Ontario. Currently a warehouse building with asphalt paved parking areas exists at the site. The planned improvements include:

- A mezzanine level will be added to the existing warehouse building at the east side (Area 5 as show on Drawing 1, appended). New columns will be constructed within the warehouse building to support the mezzanine level. No underground structures are planned as part of the new construction. The existing ground floor slab elevation will remain unchanged.
- Parking areas are planned to the north, east and south of the existing warehouse building (Areas 1, 2 and 3). Minimal grade changes are planned in the parking areas. In Areas 1 and 3, a ramp will be built to provide loading dock access to trucks.
- An access road for heavy truck traffic is planned to the immediate south of the warehouse building (Area 4).

The recommendations provided in this report are based on preliminary information available at the time of this report. Peto MacCallum Ltd. (PML) should review the final drawings when they are available. The review may result in a modification of our recommendations or require additional field or laboratory work to examine whether the changes are acceptable from a geotechnical viewpoint.

All the elevations referenced in this report are expressed in meters.

2. INVESTIGATION PROCEDURES

The field work for this investigation was carried out on August 14 and 16, 2014 and comprised a total of 15 boreholes carried out at the locations indicated on Drawing 1, appended. The boreholes were drilled to depths of 3.1 to 6.1 m, elevations 273.8 to 277.8.

The exterior borehole locations were selected and located in the field by PML geotechnical staff using a hand held Global Navigation Satellite System (GNSS) device and should be considered

accurate to 5.0 to 10.0 m. The boreholes advanced within the existing warehouse building were located by measuring distances from available landmarks. The underground services were cleared with assistance from Ontario-One-Call and a private utility locating company. The ground surface elevations at the borehole locations were determined by interpolating from elevation contours on a topographic survey plan dated June 24, 2014, prepared by Lloyd and Purcell Ltd. It should be noted that the ground surface elevations at the boreholes are approximate and are referenced for describing the soil stratigraphy. The provided borehole elevations should not be used or relied upon for any other purpose.

The boreholes were advanced using continuous flight solid stem augers, powered by a truck-mounted D-50 drill rig and a Dynamic Ram Sounder, supplied and operated by specialist drilling contractors, working under the full-time supervision of a member of PML engineering staff.

Representative samples of the overburden were recovered at frequent depth intervals using a conventional split spoon sampler during drilling. Standard penetration tests were conducted simultaneously with the sampling operation to assess the strength characteristics of the subsurface strata.

The groundwater conditions in the open boreholes were closely monitored in the course of the borehole drilling. The boreholes were backfilled upon completion of drilling.

3. LABORATORY TESTING

All the recovered samples were returned to the PML geotechnical laboratory in Toronto for detailed visual examination, moisture content determinations on all retrieved samples and grain size analyses on four selected samples. Results of grain size analysis tests are shown on Figure GS-1.

In addition two soil samples were submitted for corrosivity and sulphate testing to AGAT Laboratories. Two asphalt cores were recovered from the existing parking areas for asbestos content testing and sent to AGAT Laboratories for testing.

4. SUMMARISED SUBSURFACE CONDITIONS

Reference is made to the appended Log of Borehole sheets 1 to 15 for details of the subsurface conditions, including soil classifications, inferred soil stratigraphy, standard penetration test data, groundwater observations as well as the results of laboratory grain size distribution and moisture content determinations.

Boreholes 1 to 10 were advanced in the exterior areas around the existing building while boreholes 11 to 15 were advanced inside the warehouse building.

For ease of reference, summarized subsurface conditions encountered in the two areas are separately described as follows:

4.1 Parking and Driveway Areas (Boreholes 1 to 10)

Boreholes 1 to 10 were advanced to 3.1 m depth within the proposed parking areas around the existing warehouse.

From the ground surface, a pavement structure consisting of 75 to 130 mm of asphalt, underlain by 150 to 800 mm of granular materials was contacted in boreholes 1 to 4 and 8 to 10, drilled in the asphalt covered areas 1, 3 and 4. About 200 to 600 mm of topsoil was contacted at the ground surface in boreholes 5 to 7.

The provided topsoil depths should not be used for estimating removal quantities as the topsoil depth may vary at locations away from boreholes. Further the boundaries between the topsoil and underlying materials are not distinct and may require use of judgement to ascertain. PML should be retained during site preparation so that further guidance can be provided. The quality of the topsoil has not been assessed for landscaping purposes.

Beneath the surficial materials, fill consisting of sandy silt and silt was contacted to 1.2 and 0.9 m, elevation 279.6 and 277.6 in boreholes 1 and 10, respectively. SPT N value of 9 was recorded in the fill within borehole 1 indicating a loose consistency.

Below the surficial materials in the boreholes 2 to 9 and below the fill in boreholes 1 and 10, native silt with trace to some sand and trace to some clay was contacted to the borehole termination depth of 3.1 m, elevation 275.3 to 277.8. SPT N values in the silt ranged from 6 to 49 indicating a loose to very dense relative density. Moisture contents ranged from 12 to 25%.

All the boreholes except borehole 3 were open and dry on completion of drilling. Groundwater was contacted at 2.4 m, elevation 277.9 in borehole 3 on completion of drilling. Borehole 3 stayed open on completion of drilling.

4.2 Warehouse Building (Boreholes 11 to 15)

From the ground surface a concrete slab 130 to 150 mm in thickness, underlain by a 150 to 420 mm thick layer of sand and gravel was contacted at all the borehole locations.

Below the concrete slab and sand and gravel layer, fill consisting of sandy silt and silt was contacted to 1.1 to 1.4 m, elevation 278.5 to 278.8 in all the boreholes. SPT N values in the fill ranged from 16 to 30 indicating a compact to dense condition. Moisture contents ranged from 8 to 21%.

Below the fill, native silt was contacted from 1.1 to 1.4 m, elevation 278.5 to 278.8 and extended to the borehole termination depth of 4.6 to 6.1 m, elevation 273.8 to 275.3. The native silt contained trace to some sand and trace to some clay. SPT N values in the silt ranged from 18 to 84 indicating a compact to very dense condition. Moisture contents ranged from 9 to 22%.

Groundwater was not contacted in the boreholes on completion of drilling. Boreholes 12 and 13 caved at 5.8 and 3.7 m, respectively, on completion of drilling; the remaining boreholes were open.

5. ENGINEERING DISCUSSION AND RECOMMENDATIONS

5.1 Site Grading

Minimal grade changes are anticipated at the site, except for the construction of two ramps in Areas 1 and 3 for loading dock access.

The following general procedures are recommended for the construction of fill areas at the site. Reference is made to Appendix A for Engineered Fill Placement Guidelines. The native soil subgrade should be inspected before engineered fill materials are placed.

- All existing fill should be removed. Any deleterious materials found during native subgrade inspection, after removal of all existing fill should be excavated.
- The exposed native subgrade surface should be proof rolled with a tandem truck or equivalent and inspected by geotechnical personnel from PML. Any soft/loose spots encountered during the process should be sub-excavated and replaced with approved on-site or imported material, compacted to at least 98% of the ASTM D-698 moisture-density relationship test (standard Proctor) maximum dry density.
- The excavated area can then be brought up to the final grade level with approved on site or imported material placed in lifts not exceeding 200 mm and compacted to at least 98% of the standard Proctor maximum dry density. The upper 600 mm zone of the subgrade backfill should be compacted to at least 100% of the standard Proctor maximum dry density.

All backfilling and compaction operations should be supervised on a full-time basis by geotechnical personnel from PML to examine and approve backfill materials, evaluate placement operations and verify that the specified degree of compaction is achieved uniformly throughout the fill.

5.2 Warehouse Building Foundations

A mezzanine level will be added to the existing warehouse building at the east side (Area 5 as shown on Drawing 1). The existing ground floor slab elevation will remain unchanged.

The foundation support should be constructed within native compact to dense silt which was encountered 1.1 to 1.4 m below the existing finished floor elevation in the boreholes 11 to 15 advanced within the warehouse building. The bearing resistance of the native silt is not consistent and varies across the warehouse building, Area 5, as indicated by boreholes 11 to 15.

For new foundations, conventional spread footings placed within the native silt may be designed for a factored net Ultimate Limit State (ULS) resistance of 300 kPa and a Serviceability Limit State (SLS) resistance of 200 kPa, subject to inspection during construction.

The geotechnical resistance for the founding soils at SLS normally allows for 25 mm of compression of the founding medium. Differential settlement is expected to be less than 75% of this value, provided the subgrade is not loosened or softened by construction activity or prolonged exposure to the elements. To this end, if the footing is not cast on the same day of the inspection, it is recommended that the founding surfaces be covered with a 50 mm thick concrete mud slab immediately after excavation and approval to maintain the integrity of the subgrade.

Exterior footings and all footings exposed to seasonal freezing conditions must be protected against frost. The thermal insulation equivalent to that of 1.2 m of earth cover should be provided as foundation frost protection. A 25 mm thick layer of polystyrene insulation is thermally equivalent to 600 mm of soil cover.

New footings should be supported at the same or lower elevation as the existing adjacent footings of nearby structures. Where founding levels of adjacent footings vary, the founding elevation between footings should be stepped in maximum 600 mm steps at a maximum inclination of 10 horizontal to 7 vertical (10H:7V).

Prior to placement of concrete, all founding surfaces must be inspected by geotechnical personnel from PML to ensure that the founding soils are capable of supporting the recommended bearing resistances.

For sliding resistance the coefficient of friction between cast in place concrete and native compact to dense silt can be assumed as 0.35.

5.3 Loading of Existing Foundations

It is understood that part of the mezzanine will be loaded on the existing foundations. Based on design drawings S10, S11, S16 and S17 for the proposed location of the mezzanine, by URS Architects and Engineers Canada Ltd and structural Drawings of the existing structure dated 1988 by Ellis-Don; (drawing supplied to PML on January 21, 2015 by URS), the actual founding elevations of the existing footings is not shown on the supplied design drawings.

With regards to the first area of concern located at north west corner between lines 1 and 3 and A and C, Drawing S1, borehole 11 is the closest to this area and also the second area of concern located at the south west corner between lines 2 and 3 north and south of lines M and N, Drawing S11, the closest borehole is 15.

Assuming that the existing foundation is constructed within the native silt, located at 1.4m depth, elevation 278.5 in boreholes 11 and 15, a factored net ultimate Limited State (ULS) 450 kPa and a serviceability Limit State (SLS) resistance is 300 kPa is available in the native silt.

5.4 Seismic Site Classification

Based on the soil profile revealed in the geotechnical investigation, the site classification for the seismic site response may be considered as “Site Class D” according to Table 4.1.8.4.A of the Ontario Building Code of Canada (OBC, 2006).

5.5 Slab-on-Grade

It is assumed that a new slab will be constructed to match the level of the existing slab within the mezzanine addition area.

Construction of a slab-on-grade on the sandy silt fill subgrade should be feasible, provided the slab subgrade is inspected by PML prior to construction. The modulus of subgrade reaction for slab-on-grade construction on the existing silt fill or native subgrade is estimated to be 25 MPa/m.

A minimum 200 mm thick layer of well compacted 19 mm clear crushed stone or equivalent is recommended directly beneath the floor slab for bedding purposes and as a vapour barrier. If a moisture sensitive floor finish is to be provided, extra vapour barrier may be necessary. To this end, heavy duty polyethylene sheeting may be installed between the concrete slab and the compacted granular base to act as the vapour barrier. This requirement should be selected by the Architect/Engineer considering the specification of the floor finish product and both the thickness and type of concrete floor slab.

The floor slab should be structurally separate from the foundation walls and columns. Control joints should be provided along column lines and at regular intervals to minimise temperature cracks and to allow for any differential movement of the floor slab.

5.6 Lateral Earth Pressure on Loading Dock Walls

The walls constructed for loading docks should be designed to resist the unbalanced lateral earth pressure imposed by the backfill adjacent to the wall. The lateral earth pressure may be computed using the following equation, assuming a triangular pressure distribution:

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

where p = earth pressure at depth h (kPa)

K = coefficient of earth pressure
= 0.5 for rigid walls

γ = unit weight of soils retained (assumed compacted Granular B materials)
= 21.0 kN/m^3

h = depth below exterior grade (m)

q = surcharge and traffic loading (kPa)

The above equation assumes that a drainage system is provided and the backfill behind the wall is free draining granular material. If free draining backfill material and a drainage system are not provided, the wall must also be designed to withstand the full hydrostatic pressure in addition to the earth pressure.

5.7 Temporary Excavations

Minimal grade changes are planned in the parking and access road areas. Excavations for foundations in the warehouse building will extend to up to about 1.7 m depth below the top of the concrete slab. Utility excavations are assumed to extend to a depth of 2.0 to 2.5 m below ground surface.

It is anticipated that excavation can be carried out with conventional equipment. Obstructions due to presence of debris within the fill should be anticipated.

All construction work must be carried out in accordance with the Occupational Health and Safety Act (OHSA)/1990 and Regulation 213/91 for construction projects as wells as local regulations. With respect to the OHSA, the fill materials, and compact silt should be considered Type 3 soils. The dense silt is considered a Type 2 soil.

The OSHA requires that the excavation be cut at a predetermined inclination based on soil types. For an excavation entirely in Type 2 soil, the side slopes should be cut vertically in the lower 1.2 m from the base of an excavation and at an inclination of 1H:1V above 1.2 m height. Excavations in Type 3 soil, should be cut at an inclination of 1H:1V from the base of the excavation. If an excavation contains more than one soil type the excavation slope geometry shall be governed by the highest soil type. Based on the above, all the excavation on site will be in Type 3 soil and must be sloped at an inclination of 1H:1V. If this side slope requirement cannot be met due to space restrictions inside the warehouse, excavations exceeding 1.2 m in depth should be supported in accordance with the OHSA, 1990 and Regulation 213/1991 for construction projects.

Excavation faces on temporary excavation ramps should be cut to the configuration dictated by the soil type with the highest number present on the slope.

Foundations of heavily loaded/settlement sensitive structures and/or utilities located within close proximity to the excavation may require underpinning or support to preserve the integrity of these structures. Further comments and general guidelines in this regard are presented in Figure 1.

All work should be carried out in accordance with the Occupational Health and Safety Act, 1990 and Ontario Regulation 213/91 for construction projects and with local regulations.

No surcharge should be placed in the proximity of excavation and trenches. If required, trenching and pipe installations may be staged so as to minimize the potential impact on trench stability.

For safety reasons, trench or foundation excavations should not be left open overnight. Backfilling should be carried out as soon as possible following excavation and foundation or pipe installation to minimize potential soil loosening, sloughing and groundwater seepage.

5.8 Groundwater Control

Boreholes 1, 2 and 4 to 10, advanced in the proposed parking and access road areas, were open and dry on completion of drilling. Groundwater was contacted at 2.4 m, elevation 277.9 in borehole 3 on completion of drilling.

Groundwater was not contacted in boreholes 11 to 15 drilled within the warehouse building on completion of drilling. Boreholes 12 and 13 caved at 5.8 and 3.7 m, respectively on completion of drilling; the remaining boreholes were open.

Generally it is anticipated that the long term groundwater level will be below the planned excavation depth in the construction areas; however perched groundwater may be encountered within existing fill depending on the construction period.

In general, it is expected that seepage or surface water that enters excavations can be adequately handled by conventional sump pumping techniques. The possibility of encountering concentrated seepage from more permeable sections of the fill stratum or relatively permeable sand pockets within the till which require more active dewatering methods should not be overlooked.

5.9 Pipe Bedding

Several utilities are planned at the site. The invert depth of the utilities was not known at the time of this report; it is assumed that the utilities will have invert levels at 2.0 to 2.5 m depth below ground surface. Native silt was contacted in all boreholes at this depth.

Based on the estimated invert levels, bearing capacity or basal instability issues are not anticipated for the underground utility installations founded in undisturbed native silt. The silt is considered dilatant, i.e. the silt tends to expand when disturbed by construction equipment or traffic and subsequently experience high settlements on loading. To prevent the dilatant soils from being disturbed careful construction techniques must be followed. Once excavated, dilatant soils must be suitably protected to prevent them from being disturbed.

Pipe bedding thickness, composition and compaction should conform to OPSD 802.03, for rigid pipes and OPSD 802.01 for flexible pipes or local standards. As a general guideline, a minimum 150 mm thick layer of OPSS Granular A material is recommended for pipes 450 mm diameter or less; for larger diameter pipes, the thickness of the bedding should be increased to 200 mm. The selection of bedding material for large pipes may also be determined by the Engineer based on the types of pipe, bedding factors and installation methods. If the subgrade becomes unduly wet during construction, additional bedding material should be provided. The granular bedding material should be placed in thin lifts not more than 150 mm thick and compacted to at least 98% standard Proctor maximum dry density. The bedding requirement should also satisfy local standards and regulations including the York Region Standards.

As an alternative, 19 mm clear crushed stone or High Performance Bedding Material (HPBM) may be used as pipe bedding. The 19 mm clear crushed stone or HPBM bedding material must be wrapped with an approved synthetic fabric (Terrafix 270 R or equivalent) particularly where the subgrade is predominantly silt or fine sand below the groundwater table. Otherwise, the soil fines from the subgrade could infiltrate into the voids of the bedding materials, causing potential loss of subgrade support and subsequent failure of the pipe**.**

Sand cover material should be carried up as backfill at least 300 mm above the top of the pipe or as per local practice. The material should be placed in thin lifts not more than 300 mm thick and compacted to at least 95% of the standard Proctor maximum dry density.

5.10 Backfill Considerations

The native soils that are not mixed with organics or other unsuitable materials may be reused as backfill from a geotechnical viewpoint, if the natural moisture content is within 2% of the optimum value determined from standard Proctor moisture-density relationships.

The excavated silt will require tight control of moisture content to achieve the required compaction, and this may result in construction delays especially during inclement weather.

Moisture content adjustments will be required for efficient compaction. It may be prudent to anticipate imported granular backfill for fill placement to maintain construction schedules. It is recommended that several Proctor compaction tests be conducted on anticipated reuse materials to determine the suitability of the materials for fill placement, prior to commencement of the construction tendering process.

Any frozen, organic, excessively wet or other deleterious materials should not be used for backfill purposes. These materials should be separated and set aside for non-critical purposes.

The native soils that are not free-draining should not be used in areas where this characteristic is necessary or in confined spaces (for instance, around manholes and catch basins). Imported granular material conforming to OPSS Granular B Type I would be suitable for these purposes.

To reduce post construction settlement, all backfill should be placed in maximum 300 mm thick loose lifts compacted to at least 98% of the standard Proctor maximum dry density or in accordance with local standards. The upper 600 mm zone of the trench backfill under pavement should be compacted to at least 100% of the standard Proctor maximum dry density.

Trench backfilling should be carried out as soon as possible following trench excavation and pipe installation to avoid excessive wetting of the subgrade.

As a general guideline, heavy compactors which generate large stresses should be kept at a distance away from existing structures to avoid damage. However; the contractor should make their own determination of the safe distance depending on the equipment used. At locations where compaction equipment operates close to retaining walls, the walls should be suitably braced or supported.

Vibrations resulting from the construction equipment should be monitored by the contractor to avoid damage to the existing warehouse.

All backfill and compaction operations should be monitored by qualified geotechnical personnel from PML to approve material, evaluate placement operations and verify that the specified degree of compaction has been achieved uniformly throughout the fill.

5.11 Pavement Design and Construction

As part of the subgrade preparation, proposed new pavement areas should be stripped of all deleterious and unsuitable material. Fill required to raise grades to design elevation should be organic free and at a moisture content that will permit compaction to the densities indicated.

The anticipated subgrade materials for the parking and driveway areas will consist of mostly of native silt and in some cases existing fill consisting of sandy silt or silt which may be loose in some areas. It should be noted that pavement areas constructed on existing fill may be subject to future settlement and subsequent deterioration. Periodic maintenance of the pavement areas must be anticipated. Alternatively, the existing fill must be removed and replaced with engineered fill placed and compacted in accordance with the fill placement guidelines provided in this report.

It should be noted that silts are highly susceptible to disturbance and become dilatant when wet. It is imperative that construction of the parking lot be carried out in dry weather to avoid delays associated with remediation of wet subgrade materials. Further the subgrade materials are considered highly frost susceptible due to which provision of drainage will be critical to the pavement performance. Provision for adequate surface and subsurface drainage must be made in the pavement design.

Based on the strength and frost susceptibility of the anticipated subgrade materials, loading requirements and assuming adequate drainage, the recommended minimum flexible pavement structure thickness for the outside parking area and driveways is as follows:

MATERIAL	CAR PARKING (mm)	DRIVEWAY/FIRE ROUTE (mm)
Asphaltic Concrete HL-3	40	60
Asphaltic Concrete HL-8	40	80
OPSS Granular A Base Course	150	150
OPSS Granular B Type I Subbase Course	250	400

The final pavement subgrade should be proof rolled using heavy equipment and inspected by geotechnical personnel from Peto MacCallum Ltd. Any soft, wet or deleterious material that becomes evident during proof rolling should be subexcavated and replaced with suitable and approved materials placed in 200 mm thick lifts, each lift being compacted to at least 100% of the standard Proctor maximum dry density before placing subsequent lifts.

The granular base and subbase courses should conform to the gradation specifications of the Ontario Provincial Standards Specifications (OPSS) 1010 for select granular materials and should be compacted to a minimum of 100 % SPMDD.

Asphalt concrete should conform to latest edition of OPS 310. It is recommended that the asphalt design be reviewed by PML before selection of the final mix design and prior to the start of paving.

It is recommended that the pavement structure and asphalt be constructed during the drier time of the year. The pavement design considers that the subgrade is stable. If the subgrade is wet and unstable, additional thickness of the subbase course material may be required.

For the pavement to function properly, provision must be made for water to drain out of, and not to collect in the granular base courses. Without the following recommended drainage measures the pavement service life will be significantly reduced. Where curb and gutter construction is used, continuous perforated corrugated steel or plastic longitudinal sub-drains (minimum diameter 100 mm) should be used to prevent the build up of water in the pavement granular base courses.

The pipes should be surrounded by a geotextile filter fabric. The sub-drains should be at least 300 mm below the subgrade level. Backfill above the drains should be free draining OPSS Granular B Type I or equivalent granular filter material. The sub-drains should be laid on a positive grade leading to frost-free sumps or catch basins.

Catch basins and manholes should be backfilled with compacted Granular B Type I material with provision for infiltration from the granular base course into these drainage structures. To effectively drain the backfill of the catch basins, the perforated sub-drains should be connected to the catch basin just above the drain obvert level. This procedure will also alleviate the problems of differential movement between the pavement and catch basins or manholes due to frost heave.

6. CORROSIVITY, SULPHATE AND ASBESTOS TESTING RESULTS

6.1 Soil Aggressiveness

6.1.1 Corrosivity of Soils/Bedrock and Protective Measures

The corrosivity of the soil on ductile iron pipe was evaluated in accordance with the American Water Works Association (AWWA) system that uses resistivity, sulphides, pH, redox potential and drainage characteristics as the main indicators of soil aggressiveness. In this procedure, a point system is used to evaluate the corrosivity of the soil. Points were also assigned to each indicator in accordance with its anticipated contribution to the total corrosion potential of the soil as determined by laboratory testing and visual examination of the soil.

Two samples were tested for corrosive potential. The designated point totals are indicated in Table 1 included in the Appendix. The results of the AWWA analysis indicated that samples tested are not corrosive to ductile iron pipe.

The laboratory Certificate of Analysis is included in Appendix B.

6.1.2 Sulphate Attack on Concrete

Results of soluble sulphate tests conducted on two selected samples are as below:

BOREHOLE NO.	DEPTH (m)	SOLUBLE SULPHATE1 (μG/G) / (%)
BH11, SS2	0.76 – 1.5	12/0.0012
BH15, SS2	0.76 – 1.5	38/0.0038

Notes:
1. Based on CSA Standard A23.1-09 – Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practice for Concrete.
2. Percent water soluble sulphate in soil sample
   0.10 to 0.20 - Moderate
   0.20 to 2.0 - Severe
   >2.0 - Very severe

The results of soluble sulphate testing indicated the potential for sulphate attack on buried concrete is negligible. For further comments regarding cement requirements, refer to the current CSA A23.1 standard.

6.1.3 Asbestos

Results of asbestos tests conducted on two selected asphalt cores are as below:

BOREHOLE NO.	ASBESTOS (BULK) (%)
BH4, Asphalt Core	< 0.5
BH9, Asphalt Core	< 0.5

7. GEOENVIRONMENTAL CONSIDERATIONS

As mentioned earlier, the current geoenvironmental sampling and chemical testing program was conducted in conjunction with a geotechnical investigation.

The subject site is located within a recently developed industrial campus located on the east side of the Town of Newmarket. Ontario. Our site background review indicated that the subject site and vicinity were historically used for agricultural and residential purposes, which experienced urban development in the past 15 to 20 years.

We understand that a program of geoenvironmental sampling and chemical testing was required to characterize the environmental quality of the excess soils to be generated during the proposed development activities for off-site disposal options.

7.1 Field Work

For geoenvironmental characterization, representative soil samples were selected for chemical analyses. During field work, appropriate precautions were taken and sampling tools decontamination was carried during field work to minimize potential cross-contamination between samples.

A total of eight soil samples, representative of all five areas were selected for chemical analyses

Samples obtained during the fieldwork were immediately placed in glass jars and plastic bags. Observations of visible foreign materials and odors were recorded during the sampling operations. The plastic bag samples were brought to Peto MacCallum Ltd. laboratory for detailed visual examination.

The jar samples were stored at low temperature at the site in a cooler provided by the chemical analytical laboratory. Prior to submission to the chemical analytical laboratory, the jar samples were stored in Peto MacCallum Ltd. laboratory at low temperature.

7.2 Applicable Regulatory Standards for Chemical Analyses

In general, the standards of applicable environmental quality depend on the location, land use, and source of potable water at the location of disposal and/or re-use of the excess soils. Regarding off-site disposal, the following provincial Standards are applicable for this project:

- Ontario Regulation 153/04; *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act* for residential/parkland and/or industrial/commercial land uses in both potable and non-potable ground water condition (Tables 2 and 3) dated March 9, 2004 as amended by Ontario Regulation 511/09 dated July 27, 2009.
- Ontario Regulation 347, Schedule 4, as amended by O.Reg. 558/00, March 2002.

7.3 Chemical Analyses

Based on the visual examination of soils in the boreholes and the site background information, the retrieved soil samples were submitted to AGAT Laboratories Inc. (AGAT), located in Mississauga, Ontario for chemical testing. AGAT is accredited by the Canadian Association for Laboratory Accreditation (CALA). The soil samples were analyzed for the following parameters.

- Seven soil samples were analyzed for metals and inorganic parameters as listed in the Ontario Regulation 153/04 as amended by Ontario Regulation 511/09.
- One composite soil sample was analyzed for Toxicity Characteristic Leachate Procedure (TCLP) for metals, inorganic parameters listed in Schedule 4 of Ontario Regulation 347 as amended by Ontario Regulation 558/00.

7.4 Findings of Chemical Analyses

The results of chemical analyses carried out by AGAT in accordance with the protocol described above are attached in Appendix C and are outlined below.

For on-site reuse and off-site disposal, the results of the soil chemical analyses were compared with the Ontario Regulation 511/09 Standards for residential/parkland and industrial/commercial Property Uses in both potable and non-potable ground water situations (Tables 2 and 3).

Based on the chemical test results the analyzed soil samples complied with the Tables 2 and 3 Site Condition Standards for residential/parkland and industrial/commercial land uses Standards with the following exceptions.

- Measured sodium absorption ratio (SAR) in soil sample SS1 (5.33) from BH2 from 4 and in sample SS2 (7.97) from BH9 from Area 1 exceeded the Tables 2 and 3 residential/parkland standard of 5.0 but complied with the industrial/commercial standard of 12.0, respectively.
- Measured Electrical Conductivity (EC) in soil sample SS2 (1.62 mS/cm) from BH9 from Area 1 exceeded the Tables 2 and 3 residential/parkland standard of 0.7 and 1.4 mS/cm, respectively.

The results of the TCLP analyses were compared with Schedule 4, Ontario Regulation 347 as amended by Ontario Reg. 558/00, and found that the analyzed soils are not of leachate toxic nature.

7.5 Conclusions and Recommendations

- Based on the results of the current geoenvironmental sampling and chemical testing program regarding the environmental quality of the soils analysed from the subject site, the following conclusions and recommendations are made.
- Considering the above-noted findings, the soils from Areas 2, 3 4 and 5 are suitable for on-site reuse or can be disposed off-site at residential/parkland or industrial/commercial land use properties in the potable and non-potable ground water situations (Tables 2 and 3).
- The soils from the Area 1 are considered to be salt impacted and the impacted soils are not leachate toxic.
- The soils from Area 1 should be disposed of off-site to licensed landfill or recycling facility. Alternatively, it can be disposed off-site to roadway construction sites where landscaping are not considered and the materials are not in contact with water environment such as road beds.
- It should be noted that the acceptance of soils solely depends on the discretion of the receiving sites authorities.
- It is recommended that the site earthwork operations, reuse and/or disposal of the excess soils be monitored under full-time inspection and reviewed by our field staff to ensure that the removed soils are consistent with the geoenvironmental soil characterization program recently carried out and presented in this report.
- If indications of questionable materials or evidence of higher concentrations or other contaminants, and/or other deleterious materials are observed during site removal, the soils should be segregated for further assessment.

8. ANCILLARY CONSIDERATIONS

The discussions and recommendations in this report have been made based on the findings in the borehole locations. Soil and groundwater conditions may vary between and beyond the boreholes. These variations may necessitate modifications in our recommendations and design considerations.

We trust that the information presented in this report is sufficient for your present purposes. Please do not hesitate to contact our office should you have any questions.

Sincerely

Peto MacCallum Ltd.

Harry Gharegrat, MS, P.Eng.
Senior Engineer, Geotechnical Services

Mahaboob Alam, MSc, PhD, P.Geo.
Associate
Manager, Geoenvironmental and Hydrogeological Services

Nadia Elgohary, MEng, P.Eng.
Manager, Geotechnical Services

NE/HG:mm

TABLE 1

Summary of Ductile Iron Pipe Corrosivity Analysis on Soil Samples

BOREHOLE No.	**DEPTH (m)**	**pH POINTS**	**SULPHIDE (%) POINTS**	**MOISTURE POINTS**	**RESISTIVITY (ohm-cm) POINTS**	**REDOX POTENTIAL (mV) POINTS**	**POINTS[1] TOTAL**
BH11, SS2	0.76 – 1.5	8.04 0	0.01 2	Moist 1	6940 0	180 0	3.0
BH15, SS2	0.76 – 1.5	8.19 0	0.03 2	Moist 1	5680 0	210 0	3.0

Note: (1) Point total is the sum of the points assessed from pH, sulphide, moisture, resistivity and redox potential tests. Corrosion potential is based on the A.W.W.A evaluation system for ductile iron pipe. Ten points indicate that soil is corrosive to ductile iron pipe: protection is needed.

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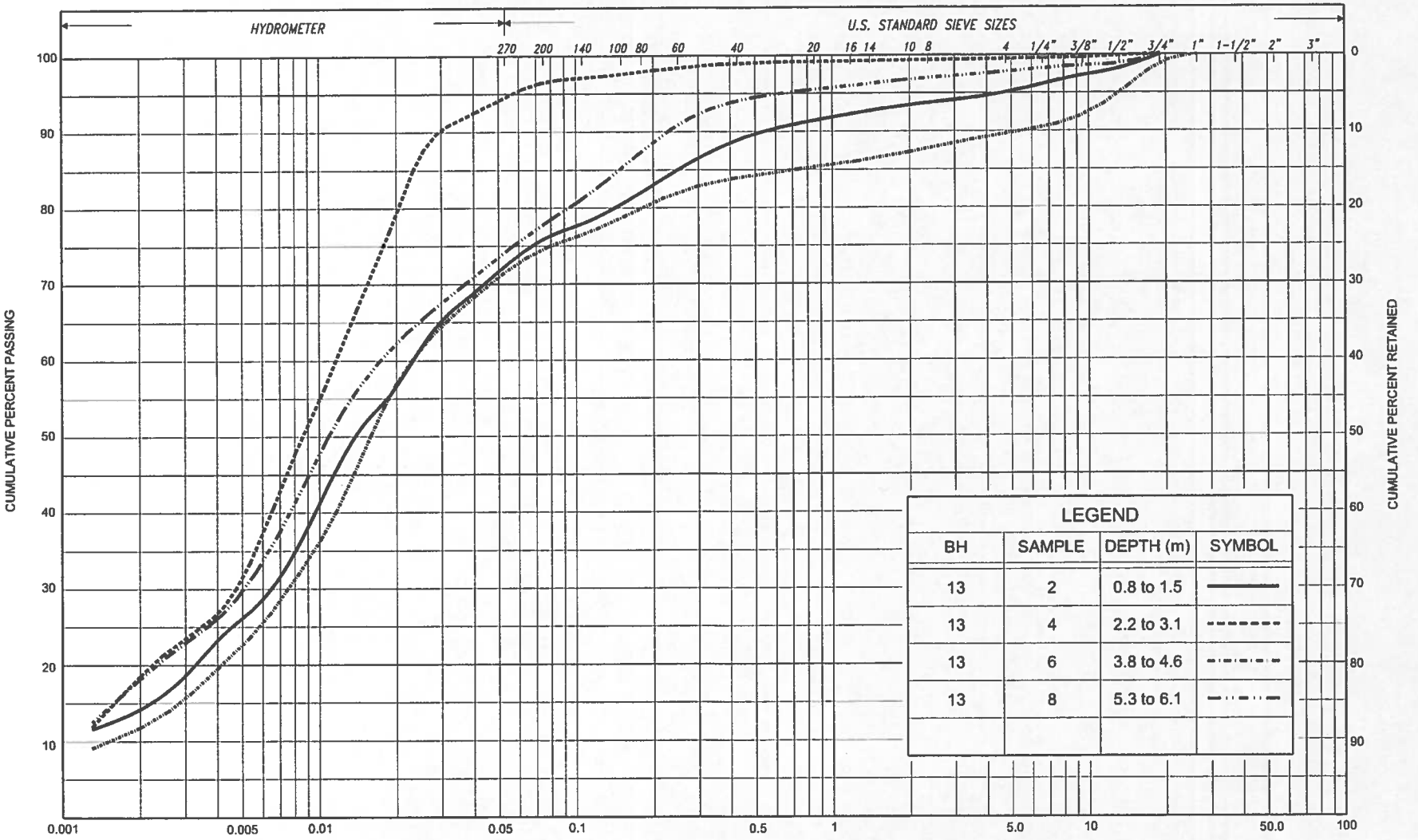
PARTICLE SIZE DISTRIBUTION CHART

PROJECT NO. 14TF028
FIGURE NO. GS-1



SILT & CLAY				FINE	MEDIUM	COARSE	GRAVEL			COB BLES	UNIFIED
				SAND							
CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	GRAVEL			COBBLES	M.I.T.
	SILT			SAND							
CLAY	SILT			V. FINE	FINE	MED.	COARSE	GRAVEL			U.S. BUREAU
				SAND							

REMARKS: SILT: Silt, trace to some sand, trace to some clay, trace gravel (TILL)

NOTES

1. The need to underpin existing footings/utilities is dependent upon soil type, proximity of the existing facility to the face of the excavation, loads imposed on the foundation and permissible movements.

   ZONE A:
   Foundations of relatively heavy and/or settlement sensitive structures/ utilities located in Zone A generally require underpinning.

   ZONE B:
   Foundations of structures located within Zone B generally do not require underpinning. Consideration should be given to underpinning of settlement sensitive utilities or heavy foundation units located in this zone.

   ZONE C:

   Utilities and foundations located within Zone C do not normally require underpinning.

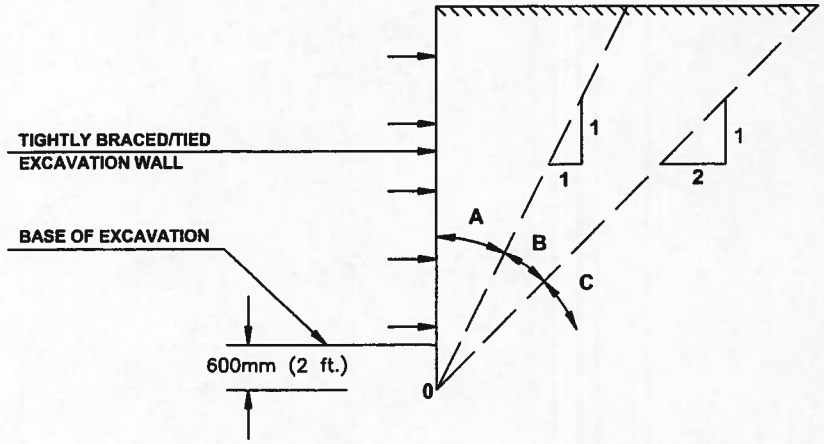
   Underpinning of foundations located in Zones A and B should extend at least into Zone C.

2. As an alternative to underpinning, it may be possible to control movement of existing utilities and foundations by supporting the face of the excavation with bracing/tiebacks or a rigid (caisson) wall. Horizontal and vertical earth pressures imposed on the excavation wall by non–underpinned foundations must be considered in the design of the support system.

3. A condition survey should be conducted prior to construction and appropriate monitoring (surface and insitu) carried out during construction to monitor any movement which may occur.

4. All work should be carried out in accordance with the Occupational Health and Safety Act and local regulations. Good quality workmanship and construction practices are to be employed.

5. This sheet is to be read in conjunction with text of report for this project. Additional comments and recommendations concerning these general guidelines will be provided if required.



If the base of the excavation is in bedrock, point "0" is drawn through the intersection point of the wall and the surface of sound bedrock

STANDARD DRAWING

GENERAL GUIDELINES REGARDING UNDERPINNING OF FOUNDATIONS / UTILITIES LOCATED CLOSE TO EXCAVATION

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DRAWN:	N.A.	DATE	SCALE	JOB NO.	FIGURE NO.
CHECKED:	H.G.	SEPT. 2014	N.T.S.	14TF028	1
APPROVED:	N.E.				

LIST OF ABBREVIATIONS

PENETRATION RESISTANCE

Standard Penetration Resistance N: - The number of blows required to advance a standard split spoon sampler 0.3 m into the subsoil. Driven by means of a 63.5 kg hammer falling freely a distance of 0.76 m.

Dynamic Penetration Resistance: - The number of blows required to advance a 51 mm, 60 degree cone, fitted to the end of drill rods, 0.3 m into the subsoil. The driving energy being 475 J per blow.

DESCRIPTION OF SOIL

The consistency of cohesive soils and the relative density or denseness of cohesionless soils are described in the following terms:

CONSISTENCY	N (blows/0.3 m)	c (kPa)	DENSENESS	N (blows/0.3 m)
Very Soft	0 - 2	0 - 12	Very Loose	0 - 4
Soft	2 - 4	12 - 25	Loose	4 - 10
Firm	4 - 8	25 - 50	Compact	10 - 30
Stiff	8 - 15	50 - 100	Dense	30 - 50
Very Stiff	15 - 30	100 - 200	Very Dense	> 50
Hard	> 30	> 200		

WTPL	Wetter Than Plastic Limit
APL	About Plastic Limit
DTPL	Drier Than Plastic Limit

TYPE OF SAMPLE

SS	Split Spoon	TW	Thinwall Open
WS	Washed Sample	TP	Thinwall Piston
SB	Scraper Bucket Sample	OS	Oesterberg Sample
AS	Auger Sample	FS	Foil Sample
CS	Chunk Sample	RC	Rock Core
ST	Slotted Tube Sample		
	PH Sample Advanced Hydraulically		
	PM Sample Advanced Manually		

SOIL TESTS

Qu	Unconfined Compression	LV	Laboratory Vane
Q	Undrained Triaxial	FV	Field Vane
Qcu	Consolidated Undrained Triaxial	C	Consolidation
Qd	Drained Triaxial		

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LOG OF BOREHOLE NO. 1

PROJECT Upgrades of 145 Harry Walker Parkway
LOCATION 145 Harry Walker Parkway, Newmarket, Ontario
BORING METHOD Continuous Flight Solid Stem Augers

Coords: 4 881 041.0 N; 626 165.0 E
BORING DATE August 16, 2014

OUR PROJECT NO. 14TF028
ENGINEER H.G.
TECHNICIAN S.A.

ELEV. / DEPTH in METRES	DESCRIPTION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	GAS READINGS ppm
	GROUND ELEVATION 280.8				
280.4 / 0.4	PAVEMENT STRUCTURE: 75mm asphaltic concrete over 280mm brown gravelly sand with concrete debris	1	SS	15	
	FILL: brown sandy silt, trace clay, moist	2	SS	9	
279.6 / 1.2	SILT: compact brown silt, some sand, trace clay, trace gravel, moist	3	SS	22	
	some clay, trace sand	4	SS	25	
277.7 / 3.1	BOREHOLE TERMINATED AT 3.1 m				

SHEAR STRENGTH C_u (kPa) 20 40 60 80
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ___ W
W_P W W_L
WATER CONTENT % 10 20 30

GROUND WATER OBSERVATIONS AND REMARKS

Upon completion of augering, no free water, no cave-in

GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

NOTES:

+ UNDISTURBED FIELD VANE
⊖ REMOLDED FIELD VANE
⊗ LAB SHEAR TEST
▲ POCKET PENETROMETER

CHECKED BY HG

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 2

PROJECT Upgrades of 145 Harry Walker Parkway
LOCATION 145 Harry Walker Parkway, Newmarket, Ontario
BORING METHOD Continuous Flight Solid Stem Augers
Coords: 4 881 069.0 N; 626 235.0 E
BORING DATE August 16, 2014
OUR PROJECT NO. 14TF028
ENGINEER H.G.
TECHNICIAN S.A.

ELEV. DEPTH in METRES	DESCRIPTION	LEGEND	NUMBER	TYPE	BLOWS/0.3m N - VALUES	GAS READINGS ppm	ELEVATION SCALE	SHEAR STRENGTH C_u (kPa) 20 40 60 80; DYNAMIC CONE PENETRATION ×; STANDARD PENETRATION TEST ●; BLOWS/0.3M 20 40 60 80	LIQUID LIMIT ____ W_L; PLASTIC LIMIT ____ W_P; WATER CONTENT ___ W; W_P W W_L; WATER CONTENT % 10 20 30	GROUND WATER OBSERVATIONS AND REMARKS; GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
GROUND ELEVATION 279.7										
279.4 0.3	PAVEMENT STRUCTURE: 130mm asphaltic concrete over 170mm grey/black gravelly sand		1	SS	11		279			
	SILT: compact to dense brown silt, trace to some clay, trace sand, moist		2	SS	12					
	some sand, trace clay		3	SS	17		278			
			4	SS	30		277			
276.6 3.1	BOREHOLE TERMINATED AT 3.1 m									Upon completion of augering, no free water, no cave-in

0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0

NOTES:

+ UNDISTURBED FIELD VANE
⊖ REMOLDED FIELD VANE
⊛ LAB SHEAR TEST
▲ POCKET PENETROMETER

CHECKED BY HG

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 3

PROJECT Upgrades of 145 Harry Walker Parkway
LOCATION 145 Harry Walker Parkway, Newmarket, Ontario
BORING METHOD Continuous Flight Solid Stem Augers
Coords: 4 881 083.0 N; 626 323.0 E
BORING DATE August 16, 2014
OUR PROJECT NO. 14TF028
ENGINEER H.G.
TECHNICIAN S.A.

ELEV. / DEPTH in METRES	DESCRIPTION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	GAS READINGS ppm	GROUND WATER OBSERVATIONS AND REMARKS
	GROUND ELEVATION 280.3					
279.9 / 0.4	PAVEMENT STRUCTURE: 100mm asphaltic concrete over 280mm grey/black gravelly sand	1	SS	11		
	SILT: compact brown silt, some clay, trace sand, moist	2	SS	15		
		3	SS	27		Water first strike at 1.8m
	grey	4	SS	20		
277.2 / 3.1	BOREHOLE TERMINATED AT 3.1 m					Upon completion of augering, free water at 2.4m, no cave-in

SHEAR STRENGTH C_u (kPa) 20 40 60 80
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80
ELEVATION SCALE 280 279 278

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ___ W
W_P W W_L
WATER CONTENT % 10 20 30

GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0

NOTES:

⊕ UNDISTURBED FIELD VANE
⊖ REMOLDED FIELD VANE
⊛ LAB SHEAR TEST
▲ POCKET PENETROMETER

CHECKED BY HG

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 4

PROJECT Upgrades of 145 Harry Walker Parkway
LOCATION 145 Harry Walker Parkway, Newmarket, Ontario
BORING METHOD Continuous Flight Solid Stem Augers

Coords: 4 881 090.0 N; 626 298.0 E
BORING DATE August 16, 2014

OUR PROJECT NO. 14TF028
ENGINEER H.G.
TECHNICIAN S.A.

ELEV. / DEPTH in METRES	DESCRIPTION	LEGEND	NUMBER	TYPE	BLOWS/0.3m N - VALUES	GAS READINGS ppm
	GROUND ELEVATION 279.1					
278.8 / 0.3	PAVEMENT STRUCTURE: 130mm asphaltic concrete over 170mm grey/black gravelly sand		1	SS	5	
	SILT: compact to dense brown silt, trace to some clay, trace sand, moist		2	SS	31	
			3	SS	28	
			4	SS	40	
276.0 / 3.1	BOREHOLE TERMINATED AT 3.1 m					

SHEAR STRENGTH C_u (kPa) 20 40 60 80
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ___ W
W_P W W_L
WATER CONTENT % 10 20 30

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Upon completion of augering, no free water, no cave-in

NOTES:

+ UNDISTURBED FIELD VANE
⊖ REMOLDED FIELD VANE
⊛ LAB SHEAR TEST
▲ POCKET PENETROMETER

CHECKED BY HG

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 5

PROJECT Upgrades of 145 Harry Walker Parkway
LOCATION 145 Harry Walker Parkway, Newmarket, Ontario
BORING METHOD Continuous Flight Solid Stem Augers
Coords: 4 881 139.0 N; 626 318.0 E
BORING DATE August 16, 2014
OUR PROJECT NO. 14TF028
ENGINEER H.G.
TECHNICIAN S.A.

ELEV. DEPTH in METRES	DESCRIPTION	LEGEND	NUMBER	TYPE	BLOWS/0.3m N - VALUES	GAS READINGS ppm	ELEVATION SCALE	SHEAR STRENGTH C_u (kPa) 20 40 60 80; DYNAMIC CONE PENETRATION ×; STANDARD PENETRATION TEST ●; BLOWS/0.3M 20 40 60 80	LIQUID LIMIT ____ W_L; PLASTIC LIMIT ____ W_P; WATER CONTENT ___ W; W_P W W_L; WATER CONTENT % 10 20 30	GROUND WATER OBSERVATIONS AND REMARKS; GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	GROUND ELEVATION 280.9									
0.0	TOPSOIL		1	SS	12					
280.30										
0.60	SILT: compact brown silt, some clay, trace sand, moist		2	SS	22		280			
1.0										
			3	SS	28		279			Water first strike at 1.8m
2.0	grey									
			4	SS	27		278			
3.0										
277.8										
3.1	BOREHOLE TERMINATED AT 3.1 m									Upon completion of augering, no free water, no cave-in
4.0										
5.0										
6.0										
7.0										
8.0										
9.0										
10.0										
11.0										
12.0										
13.0										
14.0										
15.0										

NOTES:

⊕ UNDISTURBED FIELD VANE
⊖ REMOLDED FIELD VANE
⊛ LAB SHEAR TEST
▲ POCKET PENETROMETER

CHECKED BY HG

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 6

PROJECT Upgrades of 145 Harry Walker Parkway
LOCATION 145 Harry Walker Parkway, Newmarket, Ontario
BORING METHOD DYNAMIC RAM SOUNDER

Coords: 4 881 165.0 N; 626 291.0 E
BORING DATE August 14, 2014

OUR PROJECT NO. 14TF028
ENGINEER H.G.
TECHNICIAN S.A.

ELEV. DEPTH in METRES	DESCRIPTION	LEGEND	NUMBER	TYPE	BLOWS/0.3m N - VALUES	GAS READINGS ppm	ELEVATION SCALE
	GROUND ELEVATION 280.0						
279.70	TOPSOIL						
0.30	SILT: dense brown silt, trace to some clay, trace sand, moist		1	SS	15		
			2	SS	31		279
			3	SS	47		278
			4	SS	49		277
276.9							
3.1	BOREHOLE TERMINATED AT 3.1 m						

SHEAR STRENGTH C_u (kPa) 20 40 60 80
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ___ W
W_P W W_L
WATER CONTENT % 10 20 30

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Upon completion of augering, no free water, no cave-in

NOTES:

+ UNDISTURBED FIELD VANE
⊖ REMOLDED FIELD VANE
⊛ LAB SHEAR TEST
▲ POCKET PENETROMETER

CHECKED BY HG

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 7

PROJECT Upgrades of 145 Harry Walker Parkway
LOCATION 145 Harry Walker Parkway, Newmarket, Ontario
BORING METHOD Continuous Flight Solid Stem Augers

Coords: 4 881 219.0 N; 626 257.0 E
BORING DATE August 16, 2014

OUR PROJECT NO. 14TF028
ENGINEER H.G.
TECHNICIAN S.A.

ELEV. / DEPTH in METRES	DESCRIPTION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	GAS READINGS ppm
	GROUND ELEVATION 279.1				
278.90	TOPSOIL				
0.20	SILT: compact brown silt, trace to some clay, trace sand, moist	1	SS	11	
		2	SS	10	
		3	SS	19	
		4	SS	24	
276.0					
3.1	BOREHOLE TERMINATED AT 3.1 m				

SHEAR STRENGTH C_u (kPa) 20 40 60 80
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ____ W
W_P W W_L
WATER CONTENT % 10 20 30

GROUND WATER OBSERVATIONS AND REMARKS

Upon completion of augering, no free water, no cave-in

GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

NOTES:

⊤ UNDISTURBED FIELD VANE
⊖ REMOLDED FIELD VANE
⊛ LAB SHEAR TEST
▲ POCKET PENETROMETER

CHECKED BY HG

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 8

PROJECT Upgrades of 145 Harry Walker Parkway
LOCATION 145 Harry Walker Parkway, Newmarket, Ontario
BORING METHOD Continuous Flight Solid Stem Augers

Coords: 4 881 208.0 N; 626 236.0 E
BORING DATE August 16, 2014

OUR PROJECT NO. 14TF028
ENGINEER H.G.
TECHNICIAN S.A.

ELEV. DEPTH in METRES	DESCRIPTION	LEGEND	NUMBER	TYPE	BLOWS/0.3m N - VALUES	GAS READINGS ppm
	GROUND ELEVATION 278.6					
277.7 0.9	PAVEMENT STRUCTURE: 100mm asphaltic concrete over 800mm brown gravelly sand with rootlets and brick debris		1	SS	13	
	SILT: compact brown silt, some clay, trace sand, moist		2	SS	15	
			3	SS	11	
275.5 3.1	BOREHOLE TERMINATED AT 3.1 m		4	SS	14	

SHEAR STRENGTH C_u (kPa) 20 40 60 80
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

ELEVATION SCALE: 278, 277, 276

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ___ W
W_P W W_L
WATER CONTENT % 10 20 30

GROUND WATER OBSERVATIONS AND REMARKS

Upon completion of augering, no free water, no cave-in

GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0

NOTES:

+ UNDISTURBED FIELD VANE
⊖ REMOLDED FIELD VANE
⊗ LAB SHEAR TEST
▲ POCKET PENETROMETER

CHECKED BY HG

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 9

PROJECT Upgrades of 145 Harry Walker Parkway
LOCATION 145 Harry Walker Parkway, Newmarket, Ontario
BORING METHOD Continuous Flight Solid Stem Augers

Coords: 4 881 190.0 N; 626 185.0 E
BORING DATE August 16, 2014

OUR PROJECT NO. 14TF028
ENGINEER H.G.
TECHNICIAN S.A.

ELEV. / DEPTH in METRES	DESCRIPTION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	GAS READINGS ppm	GROUND WATER OBSERVATIONS AND REMARKS
GROUND ELEVATION 278.4						
278.1 / 0.3	PAVEMENT STRUCTURE: 80mm asphaltic concrete over 175mm brown gravelly sand					
	SILT: loose to compact brown silt, trace to some clay, trace sand, moist	1	SS	13		
		2	SS	7		
		3	SS	14		
		4	SS	24		
275.3 / 3.1	BOREHOLE TERMINATED AT 3.1 m					Upon completion of augering, no free water, no cave-in

SHEAR STRENGTH C_u (kPa) 20 40 60 80
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ____ W
W_P W W_L
WATER CONTENT % 10 20 30

ELEVATION SCALE: 278, 277, 276

GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

NOTES:

+ UNDISTURBED FIELD VANE
⊖ REMOLDED FIELD VANE
⊛ LAB SHEAR TEST
▲ POCKET PENETROMETER

CHECKED BY HG

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 10

PROJECT Upgrades of 145 Harry Walker Parkway
LOCATION 145 Harry Walker Parkway, Newmarket, Ontario
BORING METHOD Continuous Flight Solid Stem Augers

Coords: 4 881 173.0 N; 626 144.0 E
BORING DATE August 16, 2014

OUR PROJECT NO. 14TF028
ENGINEER H.G.
TECHNICIAN S.A.

ELEV. / DEPTH in METRES	DESCRIPTION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	GAS READINGS ppm	GROUND WATER OBSERVATIONS AND REMARKS
GROUND ELEVATION 278.5						
278.2 / 0.3	PAVEMENT STRUCTURE: 100mm asphaltic concrete over 150mm grey/black gravelly sand	1	SS	5		
277.60 / 0.90	FILL: brown silt, some sand, trace clay, trace gravel, moist	2	SS	6		
	SILT: loose to compact brown silt, some clay, trace to some sand, trace gravel, moist	3	SS	9		
		4	SS	20		
275.4 / 3.1	BOREHOLE TERMINATED AT 3.1 m					Upon completion of augering, no free water, no cave-in

SHEAR STRENGTH C_u (kPa) 20 40 60 80
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ____ W
W_P W W_L
WATER CONTENT % 10 20 30

GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

ELEVATION SCALE 278 277 276

0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0

NOTES:

+ UNDISTURBED FIELD VANE
⊖ REMOLDED FIELD VANE
⊛ LAB SHEAR TEST
▲ POCKET PENETROMETER

CHECKED BY HG

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 11

PROJECT Upgrades of 145 Harry Walker Parkway
LOCATION 145 Harry Walker Parkway, Newmarket, Ontario
BORING METHOD DYNAMIC RAM SOUNDER

Coords: 4 881 144.2 N; 626 170.8 E
BORING DATE August 14, 2014

OUR PROJECT NO. 14TF028
ENGINEER H.G.
TECHNICIAN A.L.

ELEV. DEPTH in METRES	DESCRIPTION	LEGEND	NUMBER	TYPE	BLOWS/0.3m N - VALUES	GAS READINGS ppm	ELEVATION SCALE	SHEAR STRENGTH C_u (kPa) 20 40 60 80; DYNAMIC CONE PENETRATION ×; STANDARD PENETRATION TEST ●; BLOWS/0.3M 20 40 60 80	LIQUID LIMIT ____ W_L; PLASTIC LIMIT ____ W_P; WATER CONTENT ____ W; W_P W W_L; WATER CONTENT % 10 20 30	GROUND WATER OBSERVATIONS AND REMARKS; GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	GROUND ELEVATION 279.9									
279.6 0.3	CONCRETE SLAB: 150mm thick cement concrete slab over 150mm brown sand and gravel, moist									
	FILL: brown to dark brown sandy silt, trace clay, trace gravel, moist		1	SS	27					
278.5 1.4	SILT: dense to very dense brown silt, trace to some clay, trace to some sand, moist		2	SS	18		279			
			3	SS	36		278			
			4	SS	42		277			
			5	SS	69					
			6	SS	84		276			
275.3 4.6	BOREHOLE TERMINATED AT 4.6 m									Upon completion of augering, no free water, no cave-in

0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0

NOTES:

+ UNDISTURBED FIELD VANE
⊖ REMOLDED FIELD VANE
⊛ LAB SHEAR TEST
▲ POCKET PENETROMETER

CHECKED BY RG

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 12

PROJECT Upgrades of 145 Harry Walker Parkway
LOCATION 145 Harry Walker Parkway, Newmarket, Ontario
BORING METHOD DYNAMIC RAM SOUNDER

Coords: 4 881 163.2 N; 626 197.0 E
BORING DATE August 14, 2014

OUR PROJECT NO. 14TF028
ENGINEER H.G.
TECHNICIAN S.A.

ELEV. / DEPTH in METRES	DESCRIPTION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	GAS READINGS ppm
	GROUND ELEVATION 279.9				
279.6 / 0.3	CONCRETE SLAB: 130mm thick cement concrete slab over 200mm brown sand and gravel, moist FILL: brown sandy silt, trace clay, moist	1	SS	18	
278.8 / 1.1	SILT: compact to dense brown silt, some clay, trace sand, moist	2	SS	21	
		3	SS	20	
		4	SS	24	
		5	SS	25	
	trace gravel	6	SS	28	
		7	SS	31	
273.8 / 6.1	BOREHOLE TERMINATED AT 6.1 m	8	SS	42	

SHEAR STRENGTH C_u (kPa) 20 40 60 80
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ___ W
W_P W W_L
WATER CONTENT % 10 20 30

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Upon completion of augering, no free water, cave-in at 5.8m

NOTES:

+ UNDISTURBED FIELD VANE
⊕ REMOLDED FIELD VANE
⊛ LAB SHEAR TEST
▲ POCKET PENETROMETER

CHECKED BY HG

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 13

PROJECT Upgrades of 145 Harry Walker Parkway
LOCATION 145 Harry Walker Parkway, Newmarket, Ontario
BORING METHOD DYNAMIC RAM SOUNDER

Coords: 4 881 117.0 N; 626 195.1 E
BORING DATE August 14, 2014

OUR PROJECT NO. 14TF028
ENGINEER H.G.
TECHNICIAN A.L.

ELEV. DEPTH In METRES	DESCRIPTION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	GAS READINGS ppm
	GROUND ELEVATION 279.9				
279.6 / 0.3	CONCRETE SLAB: 150mm thick cement concrete slab over150mm brown sand and gravel, moist	1	SS	45	
	FILL: grey to brown silt, some sand, some clay, trace gravel, topsoil, moist	2	SS	30	
278.5 / 1.4	SILT: compact to dense brown silt, some clay, trace to some sand, moist	3	SS	18	
		4	SS	24	
		5	SS	27	
		6	SS	38	
	wet	7	SS	30	
		8	SS	25	
273.8 / 6.1	BOREHOLE TERMINATED AT 6.1 m				

SHEAR STRENGTH C_u (kPa) 20 40 60 80
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ____ W
W_P W W_L
WATER CONTENT % 10 20 30

GROUND WATER OBSERVATIONS AND REMARKS	GRAIN SIZE DISTRIBUTION (%) GR	SA	SI	CL
	5	19	62	14
	0	3	79	18
	10	15	63	12
Water first strike at 4.6m				
	2	20	60	18
Upon completion of augering, no free water, cave-in at 3.7m				

NOTES:

+ UNDISTURBED FIELD VANE
⊕ REMOLDED FIELD VANE
⊛ LAB SHEAR TEST
▲ POCKET PENETROMETER

CHECKED BY H G

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 14

PROJECT Upgrades of 145 Harry Walker Parkway
LOCATION 145 Harry Walker Parkway, Newmarket, Ontario
BORING METHOD DYNAMIC RAM SOUNDER

Coords: 4 881 092.2 N; 626 225.6 E
BORING DATE August 14, 2014

OUR PROJECT NO. 14TF028
ENGINEER H.G.
TECHNICIAN S.A.

ELEV. DEPTH in METRES	DESCRIPTION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	GAS READINGS ppm
	GROUND ELEVATION 279.9				
279.3 / 0.6	CONCRETE SLAB: 140mm thick cement concrete slab over 420mm brown sand and gravel, moist	1	SS	18	
	FILL: brown sandy silt, organic and topsoil inclusion, moist	2	SS	25	
278.5 / 1.4	SILT: dense brown silt, trace to some clay, trace sand, moist	3	SS	39	
		4	SS	45	
		5	SS	39	
		6	SS	36	
	grey, moist to wet	7	SS	35	
274.6 / 5.3	BOREHOLE TERMINATED AT 5.3 m				

SHEAR STRENGTH C_u (kPa) 20 40 60 80
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ___ W
W_P W W_L
WATER CONTENT % 10 20 30

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Upon completion of augering, no free water, no cave-in

NOTES:

+ UNDISTURBED FIELD VANE
⊖ REMOLDED FIELD VANE
⊛ LAB SHEAR TEST
▲ POCKET PENETROMETER

CHECKED BY HG

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 15

PROJECT Upgrades of 145 Harry Walker Parkway
LOCATION 145 Harry Walker Parkway, Newmarket, Ontario
BORING METHOD DYNAMIC RAM SOUNDER

Coords: 4 881 094.5 N; 626 186.9 E
BORING DATE August 14, 2014

OUR PROJECT NO. 14TF028
ENGINEER H.G.
TECHNICIAN A.L.

ELEV. DEPTH in METRES	DESCRIPTION	LEGEND	NUMBER	TYPE	BLOWS/0.3m N - VALUES	GAS READINGS ppm
	GROUND ELEVATION 279.9					
279.6 / 0.3	CONCRETE SLAB: 150mm thick cement concrete slab over 150mm brown sand and gravel, moist		1	SS	22	
	FILL: brown sandy silt, trace gravel, topsoil, moist		2	SS	24	
278.5 / 1.4	SILT: compact to dense brown silt, trace to some clay, trace sand, moist		3	SS	23	
			4	SS	38	
	greyish brown, trace gravel		5	SS	28	
275.3 / 4.6	BOREHOLE TERMINATED AT 4.6 m		6	SS	54	

SHEAR STRENGTH C_u (kPa) 20 40 60 80
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80
ELEVATION SCALE 279 278 277 276

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ____ W
W_P W W_L
WATER CONTENT % 10 20 30

GROUND WATER OBSERVATIONS AND REMARKS

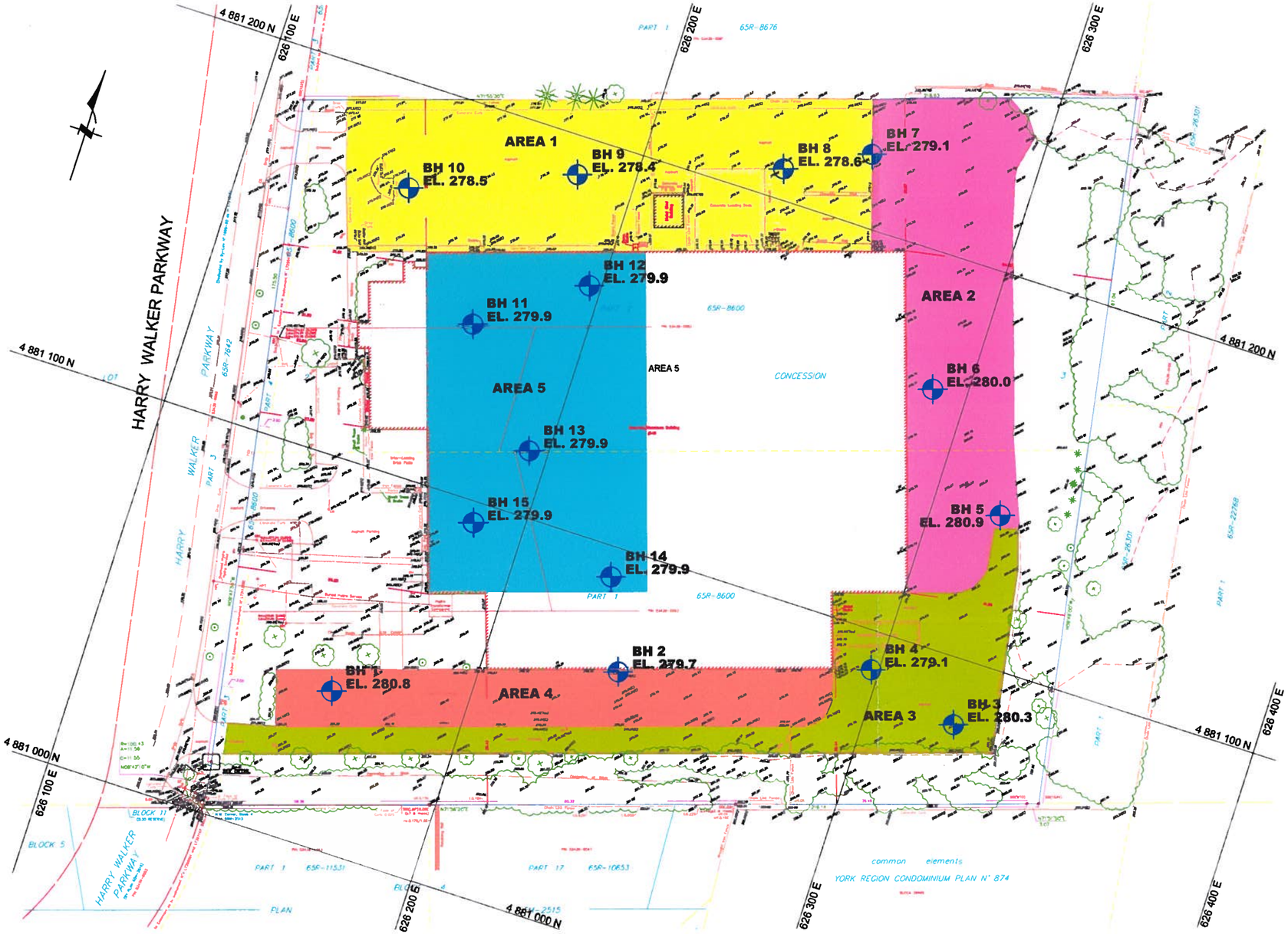
GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

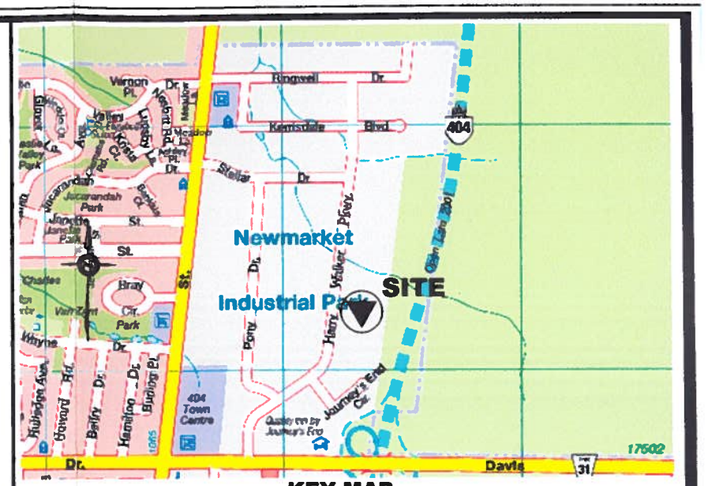
Upon completion of augering, no free water, no cave-in

NOTES:

+ UNDISTURBED FIELD VANE
⊖ REMOLDED FIELD VANE
⊛ LAB SHEAR TEST
▲ POCKET PENETROMETER

CHECKED BY HG





KEY MAP
SCALE 1 : 25,000

LEGEND:

BH 15
EL. 279.9 — BOREHOLE

NOTES:

1. THE INFERRED STRATIGRAPHY REFERRED TO IN THIS REPORT IS BASED ON DATA FROM THESE BOREHOLES, SUPPLEMENTED BY GEOLOGICAL EVIDENCE. THE ACTUAL STRATIGRAPHY AT OTHER POINTS BETWEEN THE BORINGS MAY VARY FROM THAT SHOWN.
2. THIS DRAWING WAS REPRODUCED FROM A SURVEY PLAN *'WB14-281_MAY29-14.dwg'* DATED MAY 29, 2014 PREPARED BY LLOYD & PURCELL, ONTARIO LAND SURVEYORS AND PROVIDED BY THE REGIONAL MUNICIPALITY OF YORK VIA EMAIL DATED JUNE 24, 2014.
3. GROUND SURFACE ELEVATIONS AT THE BOREHOLE LOCATIONS WERE INTERPOLATED FROM SPOT ELEVATIONS PROVIDED ON THE ABOVE MENTIONED SURVEY PLAN.
4. EXTERIOR BOREHOLE LOCATIONS ARE BASED ON COORDINATES PROVIDED BY A *'GARMIN GPSMAP 62ST GPS'* WITH AN ACCURACY OF ± 5 TO 10 m.

No.	REVISIONS	DATE	BY

THE REGIONAL MUNICIPALITY OF YORK

UPGRADES OF 145 HARRY WALKER PARKWAY
145 HARRY WALKER PARKWAY
NEWMARKET, ONTARIO

BOREHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS

DRAWN: N.A.	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED: H.G.	SEPT. 2014	1 : 1,200	14TF028	1
APPROVED: N.E.				

APPENDIX A

Engineered Fill

ENGINEERED FILL

The information presented in this appendix is intended for general guidance only. Site specific conditions and prevailing weather may require modification of compaction standards, backfill type or procedures. Each site must be discussed, and procedures agreed with Peto MacCallum Ltd. prior to the start of the earthworks and must be subject to ongoing review during construction. This appendix is not intended to apply to embankments. Steeply sloping ravine residential lots require special consideration.

For fill to be classified as engineered fill suitable for supporting structural loads, a number of conditions must be satisfied, including but not necessarily limited to the following:

1. Purpose

The site specific purpose of the engineered fill must be recognized. In advance of construction, all parties should discuss the project and its requirements and agree on an appropriate set of standards and procedures.

2. Minimum Extent

The engineered fill envelope must extend beyond the footprint of the structure to be supported. The minimum extent of the envelope should be defined from a geotechnical perspective by:

- at founding level, extend a minimum 1.0 m beyond the outer edge of the foundations, greater if adequate layout has not yet been completed as noted below; and
- extend downward and outward at a slope no greater than 45° to meet the subgrade.

All fill within the envelope established above must meet the requirements of engineered fill in order to support the structure safely. Other considerations such as survey control, or construction methods may require an envelope that is larger, as noted in the following sections.

Once the minimum envelope has been established, structures must not be moved or extended without consultation with Peto MacCallum Ltd. Similarly, Peto MacCallum Ltd. should be consulted prior to any excavation within the minimum envelope.

3. Survey Control

Accurate survey control is essential to the success of an engineered fill project. The boundaries of the engineered fill must be laid out by a surveyor in consultation with engineering staff from Peto MacCallum Ltd. Careful consideration of the maximum building envelope is required.

During construction it is necessary to have a qualified surveyor provide total station control on the three dimensional extent of filling.

4. Subsurface Preparation

Prior to placement of fill, the subgrade must be prepared to the satisfaction of Peto MacCallum Ltd. All deleterious material must be removed and in some cases, excavation of native mineral soils may be required.

Particular attention must be paid to wet subgrades and possible additional measures required to achieve sufficient compaction. Where fill is placed against a slope, benching may be necessary and natural drainage paths must not be blocked.

5. Suitable Fill Materials

All material to be used as fill must be approved by Peto MacCallum Ltd. Such approval will be influenced by many factors and must be site and project specific. External fill sources must be sampled, tested and approved prior to material being hauled to site.

6. Test Section

In advance of the start of construction of the engineered fill pad, the Contractor should conduct a test section. The compaction criterion will be assessed in consultation with Peto MacCallum Ltd. for the various fill material types using different lift thicknesses and number of passes for the compaction equipment proposed by the Contractor.

Additional test sections may be required throughout the course of the project to reflect changes in fill sources, natural moisture content of the material and weather conditions.

The Contractor should be particularly aware of changes in the moisture content of fill material. Site review by Peto MacCallum Ltd. is required to ensure the desired lift thickness is maintained and that each lift is systematically compacted, tested and approved before a subsequent lift is commenced.

7. Inspection and Testing

Uniform, thorough compaction is crucial to the performance of the engineered fill and the supported structure. Hence, all subgrade preparation, filling and compacting must be carried out under the full time inspection by Peto MacCallum Ltd.

All founding surfaces must be inspected and approved by Peto MacCallum Ltd. prior to placement of structural concrete.

8. Protection of Fill

Fill is generally more susceptible to the effects of weather than natural soil. Fill placed and approved to the level at which structural support is required must be protected from excessive wetting, drying, erosion or freezing. Where adequate protection has not been provided, it may be necessary to provide deeper footings or to strip and recompact some of the fill.

9. Construction Delay Time Considerations

The integrity of the fill pad can deteriorate due to the harsh effects of our Canadian weather. Hence, particular care must be taken if the fill pad is constructed over a long time period.

It is necessary therefore, that all fill sources are tested to ensure the material compactability prior to the soil arriving at site. When there has been a lengthy delay between construction periods of the fill pad, it is necessary to conduct subgrade proof rolling, test pits or boreholes to verify the adequacy of the exposed subgrade to accept new fill material.

When the fill pad will be constructed over a lengthy period of time, a field survey should be completed at the end of each construction season to verify the areal extent and the level at which the compacted fill has been brought up to, tested and approved.

In the following spring, subexcavation may be necessary if the fill pad has been softened attributable to ponded surface water or freeze / thaw cycles.

A new survey is required at the beginning of the next construction season to verify that random dumping and / or spreading of fill has not been carried out at the site.

10. Approved Fill Pad Surveillance

It should be appreciated that once the fill pad has been brought to final grade and documented by field survey, there must be ongoing surveillance to ensure that the integrity of the fill pad is not threatened.

Grading operations adjacent to fill pads can often take place several months or years after completion of the fill pad.

It is imperative that all site management and supervision staff, the staff of Contractors and earthwork operators be fully aware of the boundaries of all approved engineered fill pads.

Excavation into an approved engineered fill pad should never be contemplated without the full knowledge, approval and documentation by the geotechnical consultant.

If the fill pad is knowingly built several years in advance of ultimate construction, the areal limits of the fill pad should be substantially overbuilt laterally to allow for changes in possible structure location and elevation and other earthwork operations and competing interests on the site. The overbuilt distance required is project and / or site specified.

Iron bars should be placed at the corner / intermediate points of the fill pad as a permanent record of the approved limits of the work for record keeping purposes.

11. Unusual Working Conditions

Construction of fill pads may at times take place at night and/or during periods of freezing weather conditions because of the requirements of the project schedule. It should be appreciated therefore, that both situations present more difficult working conditions. The Owner, Contractor, Design Consultant and Geotechnical Engineer must be willing to work together to revise site construction procedures, enhance field testing and surveillance, and incorporate design modifications as necessary to suit site conditions.

When working at night there must be sufficient artificial light to properly illuminate the fill pad and borrow areas.

Placement of material to form an engineered fill pad during winter and freezing temperatures has its own special conditions that must be addressed. It is imperative that each day prior to placement of new fill, the exposed subgrade must be inspected and any overnight snow or frozen material removed. Particular attention should be given to the borrow source inspection to ensure only non frozen fill is brought to the site.

The Contractor must continually assess the work program and have the necessary spreading and compacting equipment to ensure that densification of the fill material takes place in a minimum amount of time. Changes may be required to the spreading methods, lift thickness, and compaction techniques to ensure the desired compaction is achieved uniformly throughout each fill lift.

The Contractor should adequately protect the subgrade at the end of each shift to minimize frost penetration overnight. Since water cannot be added to the fill material to facilitate compaction, it is imperative that densification of the fill be achieved by additional compaction effort and an appropriate reduced lift thickness. Once the fill pad has been completed, it must be properly protected from freezing temperatures and ponding of water during the spring thaw period.

If the pad is unusually thick or if the fill thickness varies dramatically across the width or length of the fill pad, Peto MacCallum Ltd. should be consulted for additional recommendations. In this case, alternative special provisions may be recommended, such as providing a surcharge preload for a limited time or increase the degree of compaction of the fill.

APPENDIX B

AGAT Certificate of Analysis for Corrosivity, Sulphate and Asbestos Tests

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: PETO MACCALLUM LIMITED
165 CARTWRIGHT AVENUE
TORONTO, ON M6A1V5
(416) 785-5110

ATTENTION TO: Harry Gharegrat

PROJECT: 14TF028

AGAT WORK ORDER: 14T878867

ASBESTOS REVIEWED BY: Ian Seddon, Analyst

SOIL ANALYSIS REVIEWED BY: Anthony Dapaah, PhD (Chem), Inorganic Lab Manager

DATE REPORTED: Sep 03, 2014

PAGES (INCLUDING COVER): 5

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14T878867

PROJECT: 14TF028

CLIENT NAME: PETO MACCALLUM LIMITED

SAMPLING SITE:

ATTENTION TO: Harry Gharegrat

SAMPLED BY:Harry Gharegrat

Bulk Asbestos

DATE RECEIVED: 2014-08-21 **DATE REPORTED: 2014-09-03**

				BH4 Asphalt	BH9 Asphalt
		SAMPLE DESCRIPTION:		core	core
		SAMPLE TYPE:		Asphalt	Asphalt
		DATE SAMPLED:		8/16/2014	8/16/2014
Parameter	Unit	G / S	RDL	5721265	5721268
Asbestos (Bulk)	%		0.5	<0.5	<0.5

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
5721265-5721268 Condition of sample was satisfactory at time of arrival in laboratory.
Asbestos present - Chrysotile

Certified By:

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14T878867

PROJECT: 14TF028

CLIENT NAME: PETO MACCALLUM LIMITED

SAMPLING SITE:

ATTENTION TO: Harry Gharegrat

SAMPLED BY:Harry Gharegrat

Corrosivity Package

DATE RECEIVED: 2014-08-21

DATE REPORTED: 2014-09-03

Parameter	Unit	G / S	RDL	SAMPLE DESCRIPTION: BH11, SS2 SAMPLE TYPE: Soil DATE SAMPLED: 8/14/2014 5721269	SAMPLE DESCRIPTION: BH14, SS2 SAMPLE TYPE: Soil DATE SAMPLED: 8/14/2014 5721270
Sulfide	%		0.01	0.01	0.03
Chloride (2:1)	µg/g		2	6	19
Sulphate (2:1)	µg/g		2	12	38
pH (2:1)	pH Units		NA	8.04	8.19
Electrical Conductivity (2:1)	mS/cm		0.005	0.144	0.176
Resistivity (2:1)	ohm.cm		1	6940	5680
Redox Potential (2:1)	mV		5	180	210

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
5721269-5721270 * Analysis was performed at AGAT's Mining Division.

EC/Resistivity, pH, Chloride, Sulphate and Redox Potential were determined on the extract obtained from the 2:1 leaching procedure (2 parts DI water: 1 part soil).

Certified By:

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: PETO MACCALLUM LIMITED

PROJECT: 14TF028

SAMPLING SITE:

AGAT WORK ORDER: 14T878867

ATTENTION TO: Harry Gharegrat

SAMPLED BY:Harry Gharegrat

Soil Analysis

RPT Date: Sep 03, 2014			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Corrosivity Package															
Sulfide	5721269		0.01	0.01	0.0%	< 0.01	92%	80%	120%						
Chloride (2:1)	5721269	5721269	6	6	0.0%	< 2	102%	80%	120%	97%	80%	120%	91%	70%	130%
Sulphate (2:1)	5721269	5721269	12	12	0.0%	< 2	94%	80%	120%	103%	80%	120%	98%	70%	130%
pH (2:1)	5721269	5721269	8.04	8.10	0.7%	NA	99%	90%	110%	NA			NA		
Electrical Conductivity (2:1)	5721269	5721269	0.144	0.133	7.9%	< 0.005	101%	90%	110%	NA			NA		
Redox Potential (2:1)	1	5721269	180	190	5.4%	< 5	92%	70%	130%	NA			NA		

Comments: NA signifies Not Applicable.

Certified By:

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Method Summary

CLIENT NAME: PETO MACCALLUM LIMITED

AGAT WORK ORDER: 14T878867

PROJECT: 14TF028

ATTENTION TO: Harry Gharegrat

SAMPLING SITE:

SAMPLED BY:Harry Gharegrat

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Asbestos (Bulk)	INORG 93-6010	EPA 600/R-93/116 & NIOSH 9002	PLM
Soil Analysis			
Sulfide			GRAVIMETRIC
Chloride (2:1)	INOR-93-6004	McKeague 4.12 & SM 4110 B	ION CHROMATOGRAPH
Sulphate (2:1)	INOR-93-6004	McKeague 4.12 & SM 4110 B	ION CHROMATOGRAPH
pH (2:1)	INOR 93-6031	MSA part 3 & SM 4500-H+ B	PH METER
Electrical Conductivity (2:1)	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Resistivity (2:1)	INOR-93-6036		CALCULATION
Redox Potential (2:1)		McKeague 4.12 & SM 2510 B	REDOX POTENTIAL ELECTRODE

CORE SAMPLES

AGAT Laboratories

5835 Coopers Avenue
Mississauga, ON
L4Z 1Y2
www.agatlabs.com · webearth.agatlabs.com

P: 905.712.5100 · F: 905.712.5122 · TF: 800.856.6261

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 18 18 18 8
AGAT WO #: 16[illegible]
Lab Temperature:
Notes: 1Ca 14T878567

Client Information
Company: Peto MacCallum Ltd.
Contact: Harry Gharagrat
Address: PMH Toronto
Phone: 416 785 5110 Fax: 5120
Project: 14TF028 PO:
AGAT Quotation #: —
Please note, if quotation number is not provided, client will be billed full price for analysis.

Regulatory Requirements
☐ Regulation 153/04 (reg. 511 Amend.)
Table ☐ Ind/Com ☐ Res/Park ☐ Agriculture (Indicate one)
Soil Texture (check one) ☐ Coarse ☐ Fine
☐ Sewer Use
Region (Indicate one) ☐ Sanitary ☐ Storm
☐ Regulation 558
☐ CCME
☐ Other (specify)
☐ Prov. Water Quality Objectives (PWQO)
☐ None

Turnaround Time Required (TAT) Required*
Regular TAT
☑ 5 to 7 Working Days
Rush TAT (please provide prior notification)
Rush Surcharges Apply
☐ 3 Working Days
☐ 2 Working Days
☐ 1 Working Day
OR
Date Required (Rush surcharges may apply):
*TAT is exclusive of weekends and statutory holidays

Invoice To
Same: Yes ☑ No ☐
Company:
Contact:
Address:

Is this a drinking water sample? (potable water intended for human consumption) ☐ Yes ☐ No
If "Yes", please use the *Drinking Water Chain of Custody Form*

Is this submission for a **Record of Site Condition?** ☐ Yes ☐ No

Legend Matrix
GW Ground Water · O Oil
SW Surface Water · P Paint
SD Sediment · S Soil

Report Information – reports to be sent to:
1. Name: Harry Gharagrat
Email: hgharagrat@petomaccallum.com
2. Name:
Email:

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/Sample Information	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ EC ☐ FOC ☐ Cr+6 ☐ SAR ☐ Hg ☐ pH ☐ NO_3/NO_2 ☐ N Total	Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3/NO_2	VOC: ☐ VOC ☐ THM ☐ BTEX	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use	Asbestos	Corrosivity + SO_4
BH4 Asphaltcore	Aug 16, 2014		Asphalt																	✓	
BH9 Asphaltcore	Aug 16, 2014		Asphalt																	✓	
BH11, SS2	Aug 16, 2014		Soil																		✓
BH14, SS2	Aug 14, 2014		Soil																		✓

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
HARRY GHARAGRAT	Aug 19, 2014	Simon Aug 21/14	10:40
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign): Simon Aug 21/14	Date/Time 11:15

Pink Copy - Client
Yellow Copy - AGAT
White Copy - AGAT

Page ____ of ____
N°: 189482

Document ID: DW-78-1511-007 Date Issued: July 23, 2012

APPENDIX C

AGAT Certificate of Analysis - Chemical Analysis for Disposal Options

AGAT Laboratories

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CLIENT NAME: PETO MACCALLUM LIMITED
165 CARTWRIGHT AVENUE
TORONTO, ON M6A1V5
(416) 785-5110

ATTENTION TO: Mahaboob Alam

PROJECT: 14TF028

AGAT WORK ORDER: 14T877594

SOIL ANALYSIS REVIEWED BY: Anthony Dapaah, PhD (Chem), Inorganic Lab Manager

DATE REPORTED: Aug 25, 2014

PAGES (INCLUDING COVER): 10

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 14T877594

PROJECT: 14TF028

CLIENT NAME: PETO MACCALLUM LIMITED

SAMPLING SITE:

ATTENTION TO: Mahaboob Alam

SAMPLED BY:J.J.

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2014-08-18

DATE REPORTED: 2014-08-25

SAMPLE DESCRIPTION:				BH2, SS1	BH4, SS2	BH9, SS2	BH13, SS3
SAMPLE TYPE:				Soil	Soil	Soil	Soil
DATE SAMPLED:				8/16/2014	8/16/2014	8/16/2014	8/16/2014
Parameter	Unit	G / S	RDL	5708783	5708795	5708799	5708803
Antimony	µg/g	1.3	0.8	<0.8	<0.8	<0.8	<0.8
Arsenic	µg/g	18	1	1	2	2	2
Barium	µg/g	220	2	26	30	48	62
Beryllium	µg/g	2.5	0.5	<0.5	<0.5	<0.5	<0.5
Boron	µg/g	36	5	6	5	6	6
Boron (Hot Water Soluble)	µg/g	NA	0.10	0.41	0.18	<0.10	<0.10
Cadmium	µg/g	1.2	0.5	<0.5	<0.5	<0.5	<0.5
Chromium	µg/g	70	2	9	10	13	16
Cobalt	µg/g	21	0.5	4.0	3.8	4.6	5.3
Copper	µg/g	92	1	7	9	11	13
Lead	µg/g	120	1	4	4	5	6
Molybdenum	µg/g	2	0.5	<0.5	<0.5	<0.5	<0.5
Nickel	µg/g	82	1	4	4	7	8
Selenium	µg/g	1.5	0.4	<0.4	<0.4	<0.4	<0.4
Silver	µg/g	0.5	0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/g	1	0.4	<0.4	<0.4	<0.4	<0.4
Uranium	µg/g	2.5	0.5	<0.5	<0.5	<0.5	0.5
Vanadium	µg/g	86	1	16	20	21	24
Zinc	µg/g	290	5	19	20	23	25
Chromium VI	µg/g	0.66	0.2	<0.2	<0.2	<0.2	<0.2
Cyanide	µg/g	0.051	0.040	<0.040	<0.040	<0.040	<0.040
Mercury	µg/g	0.27	0.10	<0.10	<0.10	<0.10	<0.10
Electrical Conductivity (2:1)	mS/cm	0.57	0.005	0.275	0.365	1.62	0.138
Sodium Adsorption Ratio (2:1)	NA	2.4	NA	5.33	2.03	7.97	0.150
pH, 2:1 CaCl2 Extraction	pH Units			8.11	7.96	7.86	7.79

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to T1(ALL) - Current

5708783-5708803 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio.

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 14T877594

PROJECT: 14TF028

CLIENT NAME: PETO MACCALLUM LIMITED

SAMPLING SITE:

ATTENTION TO: Mahaboob Alam

SAMPLED BY:J.J.

O. Reg. 153(511) - Metals (Comprehensive) (Soil)

DATE RECEIVED: 2014-08-18

DATE REPORTED: 2014-08-25

		SAMPLE DESCRIPTION:		BH6, SS1	BH6, SS2	BH13, SS2
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		8/16/2014	8/16/2014	8/16/2014
Parameter	Unit	G / S	RDL	5708797	5708798	5708802
Antimony	µg/g	1.3	0.8	<0.8	<0.8	<0.8
Arsenic	µg/g	18	1	1	1	1
Boron	µg/g	36	5	<5	<5	<5
Barium	µg/g	220	2	36	20	43
Beryllium	µg/g	2.5	0.5	<0.5	<0.5	<0.5
Cadmium	µg/g	1.2	0.5	<0.5	<0.5	<0.5
Chromium	µg/g	70	2	11	8	13
Cobalt	µg/g	21	0.5	3.8	3.1	4.3
Copper	µg/g	92	1	9	7	11
Lead	µg/g	120	1	5	3	5
Molybdenum	µg/g	2	0.5	<0.5	<0.5	<0.5
Nickel	µg/g	82	1	5	3	5
Selenium	µg/g	1.5	0.4	<0.4	<0.4	<0.4
Silver	µg/g	0.5	0.2	<0.2	<0.2	<0.2
Thallium	µg/g	1	0.4	<0.4	<0.4	<0.4
Uranium	µg/g	2.5	0.5	<0.5	<0.5	<0.5
Vanadium	µg/g	86	1	21	18	20
Zinc	µg/g	290	5	22	17	23

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to T1(ALL) - Current

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 14T877594

PROJECT: 14TF028

CLIENT NAME: PETO MACCALLUM LIMITED

SAMPLING SITE:

ATTENTION TO: Mahaboob Alam

SAMPLED BY:J.J.

O. Reg. 153(511) - ORPs (Soil) pH, EC, SAR

DATE RECEIVED: 2014-08-18

DATE REPORTED: 2014-08-25

		SAMPLE DESCRIPTION:		BH6, SS1	BH6, SS2	BH13, SS2
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		8/16/2014	8/16/2014	8/16/2014
Parameter	Unit	G / S	RDL	5708797	5708798	5708802
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.82	7.96	7.87
Electrical Conductivity (2:1)	mS/cm	0.57	0.005	0.129	0.096	0.157
Sodium Adsorption Ratio	NA	2.4	NA	0.132	0.079	0.413

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to T1(ALL) - Current

5708797-5708802 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract obtained from 2:1 leaching procedure (2 parts extraction fluid:1 part wet soil).

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 14T877594

PROJECT: 14TF028

CLIENT NAME: PETO MACCALLUM LIMITED

SAMPLING SITE:

ATTENTION TO: Mahaboob Alam

SAMPLED BY:J.J.

O. Reg. 558 Metals and Inorganics

DATE RECEIVED: 2014-08-18

DATE REPORTED: 2014-08-25

		SAMPLE DESCRIPTION:		COMP 1
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		8/16/2014
Parameter	Unit	G / S	RDL	5708804
Arsenic Leachate	mg/L	2.5	0.010	<0.010
Barium Leachate	mg/L	100	0.100	0.463
Boron Leachate	mg/L	500	0.050	<0.050
Cadmium Leachate	mg/L	0.5	0.010	<0.010
Chromium Leachate	mg/L	5.0	0.010	<0.010
Lead Leachate	mg/L	5.0	0.010	<0.010
Mercury Leachate	mg/L	0.1	0.01	<0.01
Selenium Leachate	mg/L	1.0	0.010	<0.010
Silver Leachate	mg/L	5.0	0.010	<0.010
Uranium Leachate	mg/L	10.0	0.050	<0.050
Fluoride Leachate	mg/L	150	0.05	0.20
Cyanide Leachate	mg/L	20.0	0.05	<0.05
(Nitrate + Nitrite) as N Leachate	mg/L	1000	0.70	<0.70

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Regulation 558

Certified By:

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Guideline Violation

AGAT WORK ORDER: 14T877594

PROJECT: 14TF028

CLIENT NAME: PETO MACCALLUM LIMITED

ATTENTION TO: Mahaboob Alam

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
5708783	BH2, SS1	T1(ALL) - Current	O. Reg. 153(511) - Metals & Inorganics (Soil)	Sodium Adsorption Ratio (2:1)	2.4	5.33
5708799	BH9, SS2	T1(ALL) - Current	O. Reg. 153(511) - Metals & Inorganics (Soil)	Electrical Conductivity (2:1)	0.57	1.62
5708799	BH9, SS2	T1(ALL) - Current	O. Reg. 153(511) - Metals & Inorganics (Soil)	Sodium Adsorption Ratio (2:1)	2.4	7.97

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Quality Assurance

CLIENT NAME: PETO MACCALLUM LIMITED

PROJECT: 14TF028

SAMPLING SITE:

AGAT WORK ORDER: 14T877594

ATTENTION TO: Mahaboob Alam

SAMPLED BY:J.J.

Soil Analysis

RPT Date: Aug 25, 2014			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	1		< 0.8	< 0.8	0.0%	< 0.8	97%	70%	130%	104%	80%	120%	96%	70%	130%
Arsenic	1		2	2	0.0%	< 1	95%	70%	130%	103%	80%	120%	100%	70%	130%
Barium	1		58	57	1.7%	< 2	102%	70%	130%	106%	80%	120%	101%	70%	130%
Beryllium	1		< 0.5	< 0.5	0.0%	< 0.5	107%	70%	130%	103%	80%	120%	94%	70%	130%
Boron	1		5	4	22.2%	< 5	73%	70%	130%	106%	80%	120%	98%	70%	130%
Boron (Hot Water Soluble)	5718896		5.26	5.17	1.7%	< 0.10	111%	60%	140%	101%	70%	130%	94%	60%	140%
Cadmium	1		< 0.5	< 0.5	0.0%	< 0.5	99%	70%	130%	107%	80%	120%	104%	70%	130%
Chromium	1		15	14	6.9%	< 2	96%	70%	130%	111%	80%	120%	124%	70%	130%
Cobalt	1		6.0	5.7	5.1%	< 0.5	100%	70%	130%	103%	80%	120%	90%	70%	130%
Copper	1		12	11	8.7%	< 1	102%	70%	130%	112%	80%	120%	116%	70%	130%
Lead	1		12	11	8.7%	< 1	110%	70%	130%	118%	80%	120%	95%	70%	130%
Molybdenum	1		< 0.5	< 0.5	0.0%	< 0.5	105%	70%	130%	106%	80%	120%	104%	70%	130%
Nickel	1		8	7	13.3%	< 1	96%	70%	130%	107%	80%	120%	94%	70%	130%
Selenium	1		< 0.4	< 0.4	0.0%	< 0.4	101%	70%	130%	98%	80%	120%	89%	70%	130%
Silver	1		< 0.2	< 0.2	0.0%	< 0.2	113%	70%	130%	111%	80%	120%	97%	70%	130%
Thallium	1		< 0.4	< 0.4	0.0%	< 0.4	110%	70%	130%	102%	80%	120%	92%	70%	130%
Uranium	1		< 0.5	< 0.5	0.0%	< 0.5	104%	70%	130%	115%	80%	120%	101%	70%	130%
Vanadium	1		24	21	13.3%	< 1	101%	70%	130%	107%	80%	120%	106%	70%	130%
Zinc	1		38	37	2.7%	< 5	105%	70%	130%	118%	80%	120%	86%	70%	130%
Chromium VI	5708803	5708803	<0.2	<0.2	0.0%	< 0.2	98%	70%	130%	98%	80%	120%	100%	70%	130%
Cyanide	5704256		<0.040	<0.040	0.0%	< 0.040	101%	70%	130%	106%	80%	120%	114%	70%	130%
Mercury	1		< 0.10	< 0.10	0.0%	< 0.10	124%	70%	130%	113%	80%	120%	102%	70%	130%
Electrical Conductivity (2:1)	5718896		0.384	0.385	0.3%	< 0.005	103%	90%	110%	NA			NA		
Sodium Adsorption Ratio (2:1)	5710052		0.361	0.360	0.3%	NA	NA			NA			NA		
pH, 2:1 CaCl2 Extraction	5708797	5708797	7.82	7.90	1.0%	NA	100%	80%	120%	NA			NA		
O. Reg. 558 Metals and Inorganics															
Arsenic Leachate	1		< 0.010	< 0.010	0.0%	< 0.010	95%	90%	110%	103%	80%	120%	102%	70%	130%
Barium Leachate	1		0.617	0.614	0.5%	< 0.100	101%	90%	110%	105%	80%	120%	106%	70%	130%
Boron Leachate	1		< 0.050	< 0.050	0.0%	< 0.050	104%	90%	110%	92%	80%	120%	92%	70%	130%
Cadmium Leachate	1		< 0.010	< 0.010	0.0%	< 0.010	100%	90%	110%	105%	80%	120%	115%	70%	130%
Chromium Leachate	1		< 0.010	< 0.010	0.0%	< 0.010	102%	90%	110%	108%	80%	120%	109%	70%	130%
Lead Leachate	1		< 0.010	< 0.010	0.0%	< 0.010	105%	90%	110%	103%	80%	120%	105%	70%	130%
Mercury Leachate	1		< 0.01	< 0.01	0.0%	< 0.01	98%	90%	110%	110%	80%	120%	96%	70%	130%
Selenium Leachate	1		< 0.010	< 0.010	0.0%	< 0.010	97%	90%	110%	103%	80%	120%	104%	70%	130%
Silver Leachate	1		< 0.010	< 0.010	0.0%	< 0.010	99%	90%	110%	105%	80%	120%	106%	70%	130%
Uranium Leachate	1		< 0.050	< 0.050	0.0%	< 0.050	102%	90%	110%	97%	80%	120%	97%	70%	130%
Fluoride Leachate	1		0.18	0.18	0.0%	< 0.05	103%	90%	110%	110%	90%	110%	99%	70%	130%

Comments: NA signifies Not Applicable.

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Quality Assurance

CLIENT NAME: PETO MACCALLUM LIMITED

PROJECT: 14TF028

SAMPLING SITE:

AGAT WORK ORDER: 14T877594

ATTENTION TO: Mahaboob Alam

SAMPLED BY:J.J.

Soil Analysis (Continued)

RPT Date: Aug 25, 2014			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Cyanide Leachate	5708546		<0.05	<0.05	0.0%	< 0.05	106%	90%	110%	104%	90%	110%	101%	70%	130%
(Nitrate + Nitrite) as N Leachate	5708546		<0.70	<0.70	0.0%	< 0.70	99%	80%	120%	102%	80%	120%	76%	70%	130%

Certified By:

AGAT Laboratories

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Method Summary

CLIENT NAME: PETO MACCALLUM LIMITED

AGAT WORK ORDER: 14T877594

PROJECT: 14TF028

ATTENTION TO: Mahaboob Alam

SAMPLING SITE:

SAMPLED BY:J.J.

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Barium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	EPA SW 846 6010C; MSA, Part 3, Ch.21	ICP/OES
Cadmium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Copper	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Lead	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Molybdenum	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Nickel	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Selenium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Silver	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Thallium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Uranium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Zinc	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium VI	INOR-93-6029	SM 3500 B; MSA Part 3, Ch. 25	SPECTROPHOTOMETER
Cyanide	INOR-93-6052	MOE CN-3015 & E 3009 A;SM 4500 CN	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Electrical Conductivity (2:1)	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Sodium Adsorption Ratio (2:1)	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010B	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	MSA part 3 & SM 4500-H+ B	PH METER
Antimony	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Barium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Copper	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Lead	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Molybdenum	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Nickel	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Selenium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Silver	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Thallium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Uranium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Zinc	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
pH, 2:1 CaCl2 Extraction	INOR-93-6031	MSA part 3 & SM 4500-H+ B	pH METER
Electrical Conductivity (2:1)	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Sodium Adsorption Ratio	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010C	ICP/OES

AGAT Laboratories

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MISSISSAUGA, ONTARIO
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TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Method Summary

CLIENT NAME: PETO MACCALLUM LIMITED

AGAT WORK ORDER: 14T877594

PROJECT: 14TF028

ATTENTION TO: Mahaboob Alam

SAMPLING SITE:

SAMPLED BY:J.J.

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Arsenic Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Barium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Boron Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Cadmium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Chromium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Lead Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Mercury Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Selenium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Silver Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Uranium Leachate	MET-93-6103	EPA SW-846 1311 & 3010A & 6020A	ICP-MS
Fluoride Leachate	INOR-93-6018	EPA SW-846-1311 & SM4500-F- C	ION SELECTIVE ELECTRODE
Cyanide Leachate	INOR-93-6052	EPA SW-846-1311 & MOE 3015 & SM 4500 CN- I	TECHNICON AUTO ANALYZER
(Nitrate + Nitrite) as N Leachate	INOR-93-6053	EPA SW 846-1311 & SM 4500 - NO3- I	LACHAT FIA

AGAT Laboratories

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Mississauga, ON
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Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 14T877594
AGAT WO #: 631491414
Lab Temperature:
Notes:

Client Information
Company: PETO MacCALLUM Ltd.
Contact: M. ALAM
Address: 165 CARTWRIGHT AVE TORONTO, ONT
Phone: 416 785-5110 Fax: (416) 785-5120
Project: 14TF028 PO:
AGAT Quotation #: PML RATE
Please note, if quotation number is not provided, client will be billed full price for analysis.

Regulatory Requirements
☑ Regulation 153/04 (reg. 511 Amend.)
Table 1 (Indicate one)
☐ Ind/Com
☑ Res/Park
☐ Agriculture
Soil Texture (check one) ☐ Coarse ☐ Fine

☐ Sewer Use
Region (Indicate one)
☐ Sanitary
☐ Storm

☐ Regulation 558
☐ CCME
☐ Other (specify)
☐ Prov. Water Quality Objectives (PWQO)
☐ None

Turnaround Time Required (TAT) Required*
Regular TAT
☑ 5 to 7 Working Days
Rush TAT (please provide prior notification)
Rush Surcharges Apply
☐ 3 Working Days
☐ 2 Working Days
☐ 1 Working Day
OR
Date Required (Rush surcharges may apply): 5 DAYS TAT
*TAT is exclusive of weekends and statutory holidays

Invoice To
Same: Yes ☐ No ☐
Company:
Contact:
Address:

Is this a drinking water sample? (potable water intended for human consumption) ☐ Yes ☐ No
If "Yes", please use the Drinking Water Chain of Custody Form

Is this submission for a Record of Site Condition? ☐ Yes ☐ No

Legend Matrix
GW Ground Water O Oil
SW Surface Water P Paint
SD Sediment S Soil

Report Information – reports to be sent to:
1. Name:
Email:
2. Name:
Email:

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/Sample Information	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: ☐ B-HWS ☐ Cl- ☐ CN- ☐ EC ☐ FOC ☐ Cr+6- ☐ SAR ☐ N- Total ☐ Hg ☐ pH ☐ NO_3/NO_2	Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3/NO_2	VOC: ☐ VOC ☐ THM ☐ BTEX	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use	PH, EC, SAR
BH2, SS2	08/16		Soil	1		✓														
BH4, SS2	"		"	1		✓														
BH6, SS1	"		"	1			✓													✓
BH6, SS2	"		"	1			✓													✓
BH9, SS2	"		"	1		✓														
BH13, SS2	"		"	1			✓													✓
BH13, SS3	"		"	1		✓														
COMP #1	"		"	1														✓		

Samples Relinquished By (Print Name and Sign): JINSUK OH
Date/Time: 2014.8.18 pm
Samples Received By (Print Name and Sign): Shaimin
Date/Time: Aug 18/14 4:10
Samples Relinquished By (Print Name and Sign):
Date/Time:
Samples Received By (Print Name and Sign):
Date/Time:

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

Page 1 of 1
N°: 28054