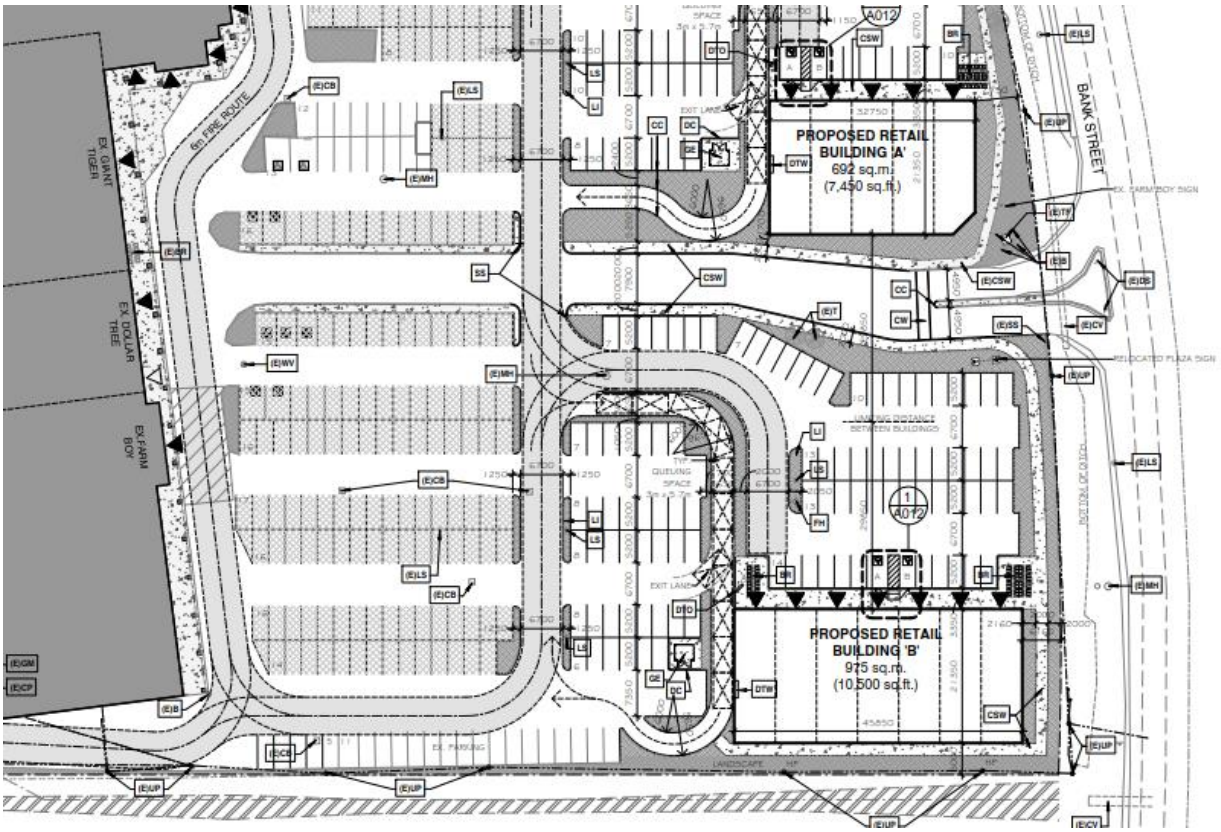
2950-2960 BANK ST. – GEOTECHNICAL REPORT



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REVISED
December 2019

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FOUNDATION DESIGN RECOMMENDATION REPORT
2950-2960 Bank St., Ottawa, Ontario

FOREWORD

This report is a final submission following our draft Geotechnical Investigation and Foundation Design Recommendation Report, submitted in early 2019, for the proposed addition onto the existing Blossom Park Shopping Centre in Ottawa, Ontario. Since then, there were changes made to the scope of the proposed development. It was decided by the design team to proceed with two new building footprints without any substantial overlap with the previously proposed buildings. Therefore, more investigation was carried out to confirm the applicability of the Report for the construction of the modified site plan. Additional site investigation completed evaluating the subsurface conditions within the footprints of the newly proposed buildings to confirm similarity or difference in the subsurface condition for the two alternative design options.

The complementary site investigation was completed by hydro-excavation and hand-operated SPT testing. The fieldwork was carried out on December 03, 2019 and comprised of three boreholes advanced to a maximum depth of 2.6 m (8.6') below the existing ground surface. The number and locations of boreholes were decided based on the location of boreholes from the previous investigation. There is one borehole from the previous investigation, which falls within the footprint of the new proposed layout of retail building A. Therefore, only one location was investigated within that Building A footprint. The other two boreholes were advanced within the footprint of the proposed retail building B. Auger drilling was avoided since the tight timeline of investigation couldn't accommodate refreshing utility locates, and machine drilling was not permitted.

Soil samples were obtained by grab sampling and SPT testing using a 51 mm outside diameter split spoon sampler following the Standard Penetration Test (ASTM D1586) (SPT) procedure. The boreholes were extended to the depth of the native subgrade at all locations. The overburden above native subgrade generally comprised of asphalt surface, pavement structure, grading fill, and peat. Laboratory tests were not completed. Retrieved samples were classified through visual and tactile examination to confirm compatibility and similarity of the two rounds of investigations.

The soils encountered during the additional site investigation can be divided into three different zones as follow:

a) **Pavement structure (Asphalt and Fill)**: 40 to 50 mm of asphalt were encountered, followed by a fill layer that extends to depth ranges from 0.7 to 1.4 m. The fill brown silty sand with gravel.

b) **Peat**: Peat deposits were observed in all boreholes. The peat deposit depth ranges from (0.9 to 2.5 m). The peat has no preferred engineering properties with very high-water contents that exceed 100%.

c) **Sand/Silty Sand to Silt/clayey Silt**: In borehole 19-2 and 19-3, a layer of grey, wet sand/silty sand to Silt/clayey Silt deposit with different portions of silt and gravel was observed under the peat layer.

Based on our additional site investigation and visual confirmation, the subsurface conditions within the new footprints of the proposed buildings are similar to what has been presented in the previous Report. Therefore, all the recommendations for foundation design, slope stability, construction considerations, and pavement structure from the previous report are applicable for new proposed retail stores. The most recent site layout is shown in Appendix G.

The borehole logs for this additional field investigation is included in Appendix C.

The previous report included investigation and discussion on slope stability conditions for an addition at the back of the existing Farm Boy store, which is not part of the new design proposal anymore. However, the slope stability discussion is kept in this final submission for reference only.

1.0 INTRODUCTION

This report presents the factual findings obtained from a geotechnical investigation performed at the above-mentioned site, for the proposed addition onto the existing Blossom Park Shopping Centre in Ottawa, Ontario. The proposed addition includes two detached single-storey commercial buildings at the east of the property within the existing parking lots, an addition to southwest of existing grocery store, and pavement addition to the west of the property. The field work was carried out on November 27, 2018 and comprised of 14 boreholes advanced to a maximum depth of 6.7 m (22') below existing ground surface.

The purpose of the investigation was to explore the subsurface conditions at this site and to provide anticipated geotechnical conditions influencing the design and construction of the proposed buildings.

McIntosh Perry Consulting Engineers Ltd (McIntosh Perry) carried out the investigation at the request of KWC Architects Inc. on behalf of Realty Works Ltd.

2.0 SITE DESCRIPTION

The property under considerations for proposed development is located at 2950-2960 Bank St., at the intersection of Bank St. and Queensdale Ave., Ottawa. The property is located in the middle of a residential and commercial development. The existing property consits of several single-storey retail stores with a truck loading ramp behind the existing building. There is also a standalone single-storey TD bank building close to Bank St. at the north east end. There is a large paved parking area in front of the retail stores and around TD bank building. Several cracks, ruts and undulations were observed at the pavement surface. The shopping plaza is bounded by a creek from the south west and south east. A line of bushes, between the creek and shopping centre, exists to the south west that was observed to vary in width; approximately 15 m at the north and south ends of the shopping centre, and around 25 m in between. Bank Street runs along the east and Queensdale Avenue along the north of the property. The topography of the site was observed to be flat.

It is understood the proposed structures will be single-storey additions without basement.

Site location is shown on Figure 1, Key Plan, included in Appendix B.

3.0 FIELD PROCEDURES

Staff of McIntosh Perry Consulting Engineers (McIntosh Perry) visited the site before the drilling investigation to mark out the proposed borehole locations and assess access for drill rig access. Utility clearance was carried out by USL-1 on behalf of McIntosh Perry. Public and private utility authorities were informed and all utility clearance documents were obtained before the commencement of drilling work.

The equipment used for drilling was owned and operated by OGS Ohlmann Geotechnical Services Inc. of Almonte, Ontario. Boreholes were placed based on the location of underground utilities and location of

proposed development. Boreholes were advanced to a maximum depth of 6.7 m below the existing ground level. Soil samples were obtained at 0.75 m intervals of depth in boreholes using a 51 mm outside diameter split spoon sampler in accordance with the Standard Penetration Test (SPT) procedure. Boreholes were backfilled with auger cuttings. All boreholes were restored to match the original surface. Borehole locations are shown on Figure 2, included in Appendix B.

4.0 LABORATORY TEST PROCEDURES

Laboratory testing on representative SPT samples was performed by McIntosh Perry Laboratories and included moisture content, Atterberg Limit, and hydrometer grainsize analysis. The laboratory tests to determine index properties were performed in accordance with American Society for Testing Materials (ASTM) test procedures.

Paracel Laboratories Ltd., in Ottawa carried out chemical tests on three representative soil samples to determine the soil corrosivity characteristics. Laboratory tests are included in Appendix E.

The rest of the soil samples recovered will be stored in McIntosh Perry storage facility for a period of one month after submission of the final report. Samples will be disposed after this period of time unless otherwise requested in writing by the Client.

5.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

5.1 Site Geology

Based on published physiography maps of the area (Ontario Geological Survey) the site is located within the Ottawa Valley Clay Plains.

The Ottawa Valley between Pembroke and Hawkesbury, Ontario consists of clay plains interrupted by ridges of rock or sand. It is naturally divided into two parts, above and below Ottawa, Ontario. Within the valley, the bedrock is further faulted so that some of the uplifted blocks appear above the clay beds. The sediments themselves in the valley are deep silty clay. Although the clay deposits are grey in colour like the limestones that underlies them in part, they are only mildly calcareous and likely derived from the more acidic rock of the Canadian Shield.

Surficial geology maps indicate presence of coarse-textured glaciomarine deposits of sand, gravel and minor silt and clay for this site and a relatively large area surrounding the site.

5.2 Subsurface Conditions

The site stratigraphy was observed to vary between boreholes. Types of soil encountered through the course of the investigation included; Topsoil/Fill, Peat, Sand/silty Sand, Silt/Silt and Sand, and Sand and gravel/gravelly Sand. The soils encountered at this site can be divided into five different zones.

a) Topsoil/Fill

b) Peat
c) Sand/Silty Sand
d) Silt/Silt and Sand
e) Sand and Gravel/Gravelly Sand

The soils encountered during the course of the investigation, together with the field and laboratory test results are shown on the Record of Borehole sheets included in Appendix C. Description of the strata encountered are given below.

5.2.1 Topsoil/Fill

Where boreholes were advanced on the pavement, 40 to 50 mm of asphalt were encountered, followed by fill layer that varies in depth: i) In the parking areas (BH18-1 to 18-4), the fill layer extends to a depth of 0.9 m below asphalt surface; ii) In the loading area behind the retail stores (BH18-5 to 18-8) the fill layer ranges in depth from 1.8 to 2.3m. The first 150 to 200 mm of the fill layer consists of sandy gravel soil and the rest of the fill deposit consists mainly of moist sand with trace of silt and gravel. The fill layer in general was loose to compact, the SPT 'N' values were observed to be between 8 and 22 blows/300 mm.

Where boreholes were advanced on bushes and grass areas (BH18-9 through 18-14A and B), fill material was observed to extend in depth from surface down to 2.3m except for BH17-12 where there is 150 mm of asphalt followed by fill material. The fill material consists mainly of moist silty sand with trace of gravel. The fill layer in general was loose to compact, the SPT 'N' values were observed to be between 3 and 16 blows/300 mm, except for BH 18-11, which is located near the gate connecting to the undeveloped zone where possibly truck traffic might have possibly contributed to compaction of the fill layer, the SPT 'N' values were between 17 and 22 blows/300 mm.

5.2.2 Peat

Peat deposits were observed in all boreholes except BH18-5, BH18-6, and BH18-7. The peat deposit depth ranges from (0.9 to 1.8 m) in BH18-1 to (2 to 2.9 m) in BH18-4. In BH18-8 a peat layer was observed that extends in depth from 1.5 to 2 m. The peat and organic maters were observed BH18-9, BH18-10, BH18-11 and BH18-14A and B to vary between boreholes and depths range from the soil surface down to 1.8 m. The peat has no preferred engineering properties with very high water contents that exceed 100%, SPT 'N' values ranged between 3 and 5 blows/300 mm. A peat lens of 0.1 m thickness was observed in BH18-10 from depths of 2.9 to 3m.

5.2.3 Sand/Silty Sand

In all boreholes, a layer of grey, wet sand to silty sand deposit with different portions of silt and gravel was observed under the peat layer. The sand layer varies in compactness condition from loose to compact with SPT 'N' values ranged from 2 to 27 blows/300mm. An SPT 'N' value of 91 was obtained in BH18-06 which does not reflect a real condition of the subsurface soil and it is an indication for presence of larger particles such as

cobble or boulders or even large gravel components. A piece of gravel-size fractured rock was found in the head of the spoon after extraction. The sand/silty sand layer extends from a depth around 1.8m to 5.3 m in all boreholes that were extended below 1.8m except for BH18-5, BH18-9, and to BH18-10. In these three boreholes, sand/silty sand layer was not observed.

Gradation test results are shown on Figure 3, included in Appendix B.

5.2.4 Silt/Silt and Sand

Grey, wet loose to compact Silt/Silt and Sand layer with trace of clay and gravel of different portions was observed below the Sand/Silty Sand layer in all boreholes. The Silt/Silt and Sand layer extends from a depth around 4.8 deep to the end of most boreholes except for BH18-5 and BH18-6. In these boreholes, the Silt/Silt and Sand layer is resting on a layer of Sand and Gravel/Gravelly Sand. The Silt/Silt and Sand layer was observed to start immediately below the Fill and Peat layers in BH18-5, BH18-9 and BH18-10.

Gradation test results are shown on Figure 4 included in Appendix B.

5.2.5 Sand and Gravel/Gravelly Sand

Washed wet compacted gray Sand and Gravel to Gravelly sand layer was observed in BH18-5 and BH18-6 below the silty sand layer and extend to the end of the boreholes.

Gradation test results are shown on Figure 5, included in Appendix B.

5.3 Groundwater

Four standpipe piezometers were constructed in BH18-1, BH18-4, and BH18-5 and BH18-8 to monitor the groundwater table. The depth of groundwater table was measured after 5 to 6 days of installation and was found varying with respect to depth between these boreholes and relatively consistent with respect to elevation; 2.02m (EL. 91.0) in BH18-1, 1.91m (El. 91.1) in BH18-4, 1.05 m in BH18-5 (El. 91.1), and 1.47 (El. 91.2) in BH18-8. Groundwater level may be expected to fluctuate due to seasonal changes.

5.4 Chemical Analysis

The chemical test results conducted by Paracel Laboratories in Ottawa, Ontario, to determine the resistivity, pH, sulphate and chloride content of representative soil sample are shown in Table 5-1 below:

Table 5-1: Soil Chemical Analysis Results

Borehole	Sample	Depth (m)	pH	Sulphate (%)	Chloride (%)	Resistivity (Ohm-cm)
BH 18-2	SS-4	2.3 - 2.9	7.85	0.0124	0.0046	3,120
BH 18-4	SS-2A	1.5 - 2	7.82	0.0072	0.0036	3,670
BH 18-6	SS-2A	1.5 - 2	7.86	0.0026	0.0009	7,710

6.0 DISCUSSIONS AND RECOMMENDATIONS

6.1 General

This section of the report provides recommendations for the design of the proposed two new buildings and an addition to existing single-storey Farm Boy Building located at the intersection of Bank Street and Queensdale Avenue in Gloucester, Ontario. The recommendations are based on interpretation of the factual information obtained from the boreholes advanced during the subsurface investigation. The discussions and recommendations presented are intended to provide sufficient information to the designer of the proposed building to select the suitable types of foundation to support the structure.

The comments made on the construction are intended to highlight aspects which could have impact or affect the detailed design of the building, for which special provisions may be required in the Contract Documents. Those who require information on construction aspects should make their own interpretation of the factual data presented in the report. Interpretation of the data presented may affect equipment selection, proposed construction methods, and scheduling of construction activities.

6.2 Project Design

6.2.1 Existing Site Condition

Detailed site condition is provided in Section 2. The topography of the property and surrounding streets and properties varied. Typically, the ground slopes down to the north east. The area surrounding the existing building was comprised of bushes and grass areas, paved parking, and boarded by a creek at the south west and south east. The location of the site is shown on Figure 1 included in Appendix B.

6.2.2 Proposed Development

It is understood that the proposed development will be comprised of single-storey buildings and will likely be conventional non-structural floating slab-on-grade with shallow strip and spread footing foundation.

It is understood the proposed addition will not have a basement.

6.3 Frost Protection

Based on applicable building codes, a minimum earth cover of 1.8 m, or the equivalent of thermal insulation, should be provided for all exterior footings to reduce the effects of frost action. If the buildings are considered ‘heated’, the depth of frost cover can be reduced to 1.5 m for Ottawa area.

6.4 Site Classification for Seismic Site Response

Selected spectral responses in the general vicinity of the site for 2% chance of exceedance in 50 years (2500 years return period) are as indicated in Table 6-1, shown below and in Appendix E;

Table 6-1: Selected Seismic Spectral Responses (2% in 50 Yrs)

Sa(0.2)	Sa(0.5)	Sa(2.0)	PGA	PGV
0.633 g	0.307 g	0.137 g	0.046 g	0.322 g

The above noted spectral responses are for reference only and it may not indicate the critical spectrum for the proposed structure. The structural engineer shall consider deriving design specific spectral responses.

Based on gradation analysis and fine content the site is not liquefiable. The site can be classified as a Site Class "D" based on the compactness of the materials encountered during the investigation for the purposes of site-specific seismic response to earthquakes based on Table 4.1.8.4.A OBC 2012. Liquefaction potential was considered for this site and it is non-liquefiable based on guidelines provided in Canadian Foundation Engineering Manual.

6.5 Slabs-on-Grade

Free-floating non-structural slabs-on-grade should be supported on minimum 200 mm of Granular A compacted to 100% SPMDD. All peat, existing unsuitable fill, and deleterious material shall be removed from the entire footprint of the building. In case the subgrade needs to be raised, or the level should be reconstructed due to over-excavation, Granular B type II or granular A shall be used and compacted to minimum 96% SPMDD up to underneath the slab bedding. If the slab-on-grade is designed to support internal columns, the fill used for the grade raise shall be compacted to minimum 100% SPMDD.

All subgrades should be approved and proof-rolled under the supervision of a geotechnical representative prior to placement of the Granular "A" and slab-on-grade.

6.6 Shallow Foundations

Considering the order of structural loads expected at the foundation level, provision of conventional strip and spread footings will be adequate. Footings are expected to be buried to resist overturning and sliding and also to provide protection against frost action.

If adequate frost cover is not provided, the deficit of earth cover should be compensated by application of synthetic insulation material adequately projecting beyond foundation walls. All existing fill, peat, organic soil and any other deleterious material shall be entirely removed from the influence zone of all footings. The influence zone of the footing is defined by a straight line going downward and outward from the edge of the footing by 1H:2V slope. All granular material should be placed in horizontal lifts of uniform thickness of no more than 300 mm before compaction. All engineered fill supporting footings and structural elements should be

placed at appropriate moisture content and compacted to a 100% standard Proctor density. The requirements for fill material and compaction may be addressed with a note on the structural drawing for foundation or grading drawing and/or with a Non-Standard Special Provision (NSSP).

6.6.1 Bearing Capacity

Assuming the strip and spread footings are constructed through excavating any existing fill or peat (organic mater) and exposing the native subgrade, the following bearing capacity values can be used for structural design;

Factored beading pressure at Ultimate Limit State (ULS): 150 kPa

Serviceability Limit State (SLS): 75 kPa

It is expected the strip footing will not be less than 0.6 m in the width and spread footings will not be less than 1.5 m in their shorter dimension. , if smaller footings are required, the authors of this report should be informed to verify the compatibility of the design.

Based on the results of the investigation, it is possible footings may be resting on different material. However, the native subgrade across the site is predominantly sand with different portions of silt and gravel. From the foundation design perspective and considering the provided bearing capacities, differential settlement is not expected to exceed 25 mm. Structural design should consider reducing eccentric loads as much as possible.

6.7 Lateral Earth Pressure

Free draining material should be used as backfill material for foundation walls. If the proper drainage is provided "at rest" condition may be assumed for calculation of earth pressure on foundation walls. The following parameters are recommended for the granular backfill.

Table 6-1: Backfill Material Properties

Borehole	Granular "A"	Granular "B"
Effective Internal Friction Angle, ϕ'	35°	30°
Unit Weight, γ (kN/m^3)	22.8	22.8

It is expected the footings for the new structure will be adjacent to the foundation wall of the existing structure. An average vertical stress distribution factor of 0.9 can be used for the soil elements beneath the footing and an at rest earth pressure coefficient of 0.5 can be used for estimation of lateral loading on the existing building and its foundation system. Care should be taken to not undermine the existing footings during excavation. Dimensions and subgrade conditions of the existing footings is unknown to the authors of this report. It the contractors' responsibility to practice care when excavating beside the existing footings and provide stamped shoring drawings for temporarily supporting the existing structure during construction.

7.0 SLOPE STABIILITY

A computer analysis was completed using SoilVision's limit equilibrium software, SVSLOPE. The model was developed based on existing site topography as well as the subsurface information which was obtained through geotechnical field investigation. Two cases were considered for this analysis, one for the proposed building extension and the other for the proposed parking at the west of the shopping center. Results of both analyses are shown in Appendix F. The purpose of analysis was to estimate the factor of safety against failure. Factor of safety equal or greater than 2 is considered acceptable.

West Parking Lot

The shortest distance between the proposed parking lot and the crown of the slope is approximately 10.5 m. Based on field investigation data it is understood the slope is mostly fill underlain by a layer of 0.3 m to 0.5 m of peat over the native till. The weak peat layer dictates the failure mode of the slope. Nevertheless, a factor of safety greater than 2.5 and less than 3 is expected for the existing site condition. As indicated in Appendix F, a segment of the slope is identified as weak zone. Investigation did not extend to that area due to access restriction, however, it is expected that the fill in that area is not compacted under controlled procedure. If the water table rises, that week zone over the peat layer can be prone to sliding. Although the chance of retrogressive sliding causing damage to the proposed parking lot is minimal, it is prudent to reinforce the toe of slope against future erosion and sloughing. Where identified as "weak zone" a toe wall embedded into the native till is an option.

Alternatively, the peat underneath the existing fill can be isolated at the limits of the proposed parking lot. The proposed lot boundary can be excavated into the existing native silty sand subgrade and a row of gabion baskets shall be planted 0.3 m into the native till. Gabion baskets shall be supported on a layer of 150 mm Granular A compacted to 100% SPMDD. The main purpose of the gabion baskets will be to isolate the peat layer and therefore prevent potential sliding of the fill over saturated peat. Even low strain adjustments can cause cracks in the pavement. Therefore, one tier of gabion baskets shall be adequate. Gabion baskets can be buried within the fill upon installation, and receive the pavement structure on top. It is prudent to saw cut the pavement surface at the edge of the buried gabions and seal the cut, to mitigate the expected differential behaviour of asphalt from fill to gabion subgrade. The existing fill, once excavated to required elevation, shall be proof rolled before receiving the pavement structure.

Building Extension

The closest distance from the edge of the proposed building extension to the creek was measured 8.2 m. Comparable to previous analysis, in this case also slope predominantly consists of fill. Building loads were applied on a strip footing at the surface of the native till. Factor of safety was estimated approximately 3. Similarly, in this section also the slope will be prone to erosion and loss of integrity due to creek effects. In order to maintain the calculated factor of safety the toe of the slope shall be protected against erosion and scouring.

Conclusion

Based on the current site topography, subsurface soil condition, and existing creek level, the proposed development appears feasible. A factor of safety equal or greater than 2 is commonly accepted in the construction industry for probability of slope failure, unless otherwise higher safety factors are requested by respective authorities. For this site-specific analysis factor of safety is approximately 3±0.2 for global stability of slopes. This site in particular is more prone to erosion and local and surficial failure. Global failure is of a lesser concern.

In order to overcome local failures and to reduce the risks associated with temporary raise of the water level, an erosion protection system shall be constructed where the creek is running within a close proximity of the proposed layout, for both buildings and parking lots. It should be noted that the native till consists of large portions of sand and silt and it susceptible to erosion. A gabion basket retaining system is a preferred option. Gabion baskets shall be founded on a minimum 300 mm thick Granular A bedding constructed below the scour depth of the creek. All gabion baskets shall be protected by a filter geotextile at their contact with the backfill or existing earth. Live-cribs can be also considered if more environmentally friendly options are pursued. Either options shall be designed and stamped by a licensed structural engineer.

8.0 CONSTRUCTION CONSIDERATIONS

Any organic material and existing fill material of any kind, should be removed from the footprint of the footings and all structurally load bearing elements. Currently there is a noticeable amount of organic substance, or as identified as peat in the borehole logs, exists on site. This material shall be removed from the entire footprint of the building.

If grade raise is required suitable fill material to conform to specifications of OPSS Granular criteria shall be used. The Structural Fill, if directly supporting the load of the structure, should be free from any recycled or deleterious material, it should not be placed in lifts thicker than 300 mm and should be compacted to 100% Standard Proctor Maximum Dry Density (SPMDD).

The foundation level is expected above the groundwater level encountered at this site. However, dewatering may be required since the groundwater level is expected to be very close to foundation level and it may seasonally fluctuate. The excavated subgrade must be kept dry at all time to minimize the disturbance of the subgrade. Any water infiltrating into the open excavation can be removed through conventional sump and pump methods. Hydraulic conductivity of 'sand' is expected to be relatively high although the actual conductivity may change with the silt content. The hydraulic conductivity can be roughly estimated around 10^{-3} m^2/sec. The contractor is responsible to determine the necessity of application for Permit to Take Water (PTTW).

The excavations are expected to be advanced through either the fill and peat deposits. The overburden excavation should be completed in accordance with Ontario Regulation (O.Reg.) 213/91 under the

Occupational Health and Safety Act (OHSA) with specific reference to acceptable side slopes and stabilization requirements. The general stratigraphy outlined herein can be considered an OHSA Type 3 Soil above groundwater table and Type 4 soil below groundwater. For excavations through multiple soil types, the side slope geometry is governed by the soil with the highest number designation. Extremely soft and compressible peat may cause additional sloughing of the excavation walls which shall be accounted for by the contractor.

No information on the neighbouring properties type or depth of foundation has been provided. Existing properties should be reviewed prior to construction by a structural engineer to assess pre-construction condition and establish a baseline. The existing foundation should be protected against excessive settlement due to proposed excavations. Since the native soil constitutes majorly of sandy soil, dewatering or groundwater lowering will not result in consolidation settlement. However, the present of the water table at the foundation level can cause the sand to turn into slurry and collapse from underneath the foundations upon excavation. It is recommended that the footings of adjacent buildings should be carefully exposed providing adequate supporting system. A structural engineer shall review and provide stamped underpinning, shoring or jacking drawings, whatever is applicable. Building exterior and interior conditions can be video recorded to document all existing cracks and other deficiencies.

Also, for general excavation, a temporary shoring drawing shall be provided if excavations exceed 1.2 m in depth. Authors of this report shall be informed if based on the selected shoring solution, additional information than those presented in this report are needed for the shoring design by the structural engineer.

A geotechnical engineer or technician should attend the site to confirm the type of the material and level of compaction.

Foundation walls should be backfilled with free-draining material such as OPSS Granular types A or B. The native silty sand is not a suitable material for backfilling. Installation of sub-drains at foundation level with positive of drainage to the City sewer is a preferred construction practice. However, in the absence of a basement level, drainage around footings is not necessary.

9.0 SITE SERVICES

At the subject site, the burial depth of water-bearing utility lines is typically 2.4 m below ground surface. If this depth is not achievable due to design restrictions, equivalent thermal insulation should be provided. The contractor should retain a professional engineer to provide detailed drawings for excavation and temporary support of the excavation walls during construction.

Utilities should be supported on minimum of 150 mm bedding of Granular A compacted to minimum 96% of SPMDD. In areas where the subgrade contains higher silt portions, it is recommended to separate the subgrade from the bedding material by a layer of geotextile to prevent cross migration of materials. Utility cover can be Granular A or Granular B type II compacted to 96% SPMDD. All covers are to be compacted to 100% SPMDD if

intersecting structural elements. The engineer designing utilities shall ensure the proposed utility pipes can tolerate compaction loads.

10.0 CEMENT TYPE AND CORROSION POTENTIAL

Three soil samples were submitted to Paracel laboratories for testing of chemical properties relevant to exposure of concrete elements to sulphate attacks as well as potential soil corrosivity effects on buried metallic structural element. Test results are presented in Tables 5-1.

The potential for sulphate attack on concrete structures is moderate. Type GU Portland cement is expected to be adequate to protect buried concrete elements in the subsurface conditions encountered.

The corrosion potential for buried steel elements was determined as 'non-aggressive'.

11.0 PAVEMENT STRUCTURE

No details are provided on the traffic loads but it is understood that the parking lot and surrounding paved area is to be used frequently by light to heavy weight vehicles, and transport trucks on a daily basis. Pavement structure most likely to be placed on engineered fill material overlaying native soil. If the native soil is peat or contains high organic matter, it is recommended to be replaced with compacted Granular B Type II or Granular A and compacted to 95% SPMDD. If the fill needs to be excavated to the required depth to accommodate the pavement structure, then the subgrade should be proof rolled under the supervision of a geotechnical engineer. Should grade raise be required, compacted Granular B Type II or Granular A should be placed as needed and compacted to 95% SPMDD prior to construction of pavement structure.

The proposed pavement structure for light vehicles parking area and access road is included in Table 11-1:

Table 11-1: "Light Duty" Pavement Structure

Material		Thickness (mm)
Surface	Superpave 12.5 mm, PG 58-34	50
Base	OPSS Granular A	150
Sub-base	OPSS Granular B Type II	350

A heavier pavement structure is needed for access roads and loading docs which are known for heavy transport truck access.

Table 11-2: Truck Traffic Pavement Structure

Material		Thickness (mm)
Surface	Superpave 12.5 mm, PG 58-34	50
Binder	Superpave 19.0 mm, PG 58-34	50
Base	OPSS Granular A	150
Sub-base	OPSS Granular B Type II	450

The proposed pavement structures are designed for proof rolled subgrades or proper grade raise using granular material conforming to OPSS 1010 Granular criteria.

The base and sub base materials, i.e., Granular A for base and Granular Type B or SSM for subbase, shall be in accordance with OPSS 1010. Both base and sub-base should be compacted to 100% SPMDD. Asphalt layers should be compacted to comply with OPSS 310. Where the pavement structure is to be placed on engineered fill, the upper 600 mm of the fill should be compacted to 95% SPMDD to act as subbase.

Above recommended Superpave 12.5 and 19.0 can be replaced with HL-3 and HL-8 if required. If the required quantity of SP-19/HL-8 is small, and to avoid providing multiple asphalt mix designs, SP-19 can be replaced with SP-12.5 as long as they are placed in two separate layers. McIntosh Perry will not be responsible for cost implications of such decision.

12.0 CLOSURE

We trust this geotechnical investigation and foundation design report meets requirements of your project. The "Limitations of Report" presented in Appendix A are an integral part of this report. Please do not hesitate to contact the undersigned should you have any questions or concerns.

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REFERENCES

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3) Google Earth, Google, 2015.

4) Government of Canada, National Building Code of Canada (NBCC), "Seismic Hazard Calculation" (online), 2010.

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2950-2960 BANK STREET (0CP-17-0565)

APPENDIX A
LIMITATIONS OF REPORT

McINTOSH PERRY

LIMITATIONS OF REPORT

McIntosh Perry Consulting Engineers Ltd. (McIntosh Perry) carried out the field work and prepared the report. This document is an integral part of the Foundation Investigation and Design report presented.

The conclusions and recommendations provided in this report are based on the information obtained at the borehole locations where the tests were conducted. Subsurface and groundwater conditions between and beyond the boreholes may differ from those encountered at the specific locations where tests were conducted and conditions may become apparent during construction, which were not detected and could not be anticipated at the time of the site investigation. The benchmark level used and borehole elevations presented in this report are primarily to establish relative differenced in elevations between the borehole locations and should not be used for other purposes such as to establish elevations for grading, depth of excavations or for planning construction.

The recommendations presented in this report for design are applicable only to the intended structure and the project described in the scope of the work, and if constructed in accordance with the details outlined in the report. Unless otherwise noted, the information contained in this report does not reflect on any environmental aspects of either the site or the subsurface conditions.

The comments or recommendation provided in this report on potential construction problems and possible construction methods are intended only to guide the designer. The number of boreholes advanced at this site may not be sufficient or adequate to reveal all the subsurface information or factors that may affect the method and cost of construction. The contractors who are undertaking the construction shall make their own interpretation of the factual data presented in this report and make their conclusions, as to how the subsurface conditions of the site may affect their construction work.

The boundaries between soil strata presented in the report are based on information obtained at the borehole locations. The boundaries of the soil strata between borehole locations are assumed from geological evidences. If differing site conditions are encountered, or if the Client becomes aware of any additional information that differs from or is relevant to the McIntosh Perry findings, the Client agrees to immediately advise McIntosh Perry so that the conclusions presented in this report may be re-evaluated.

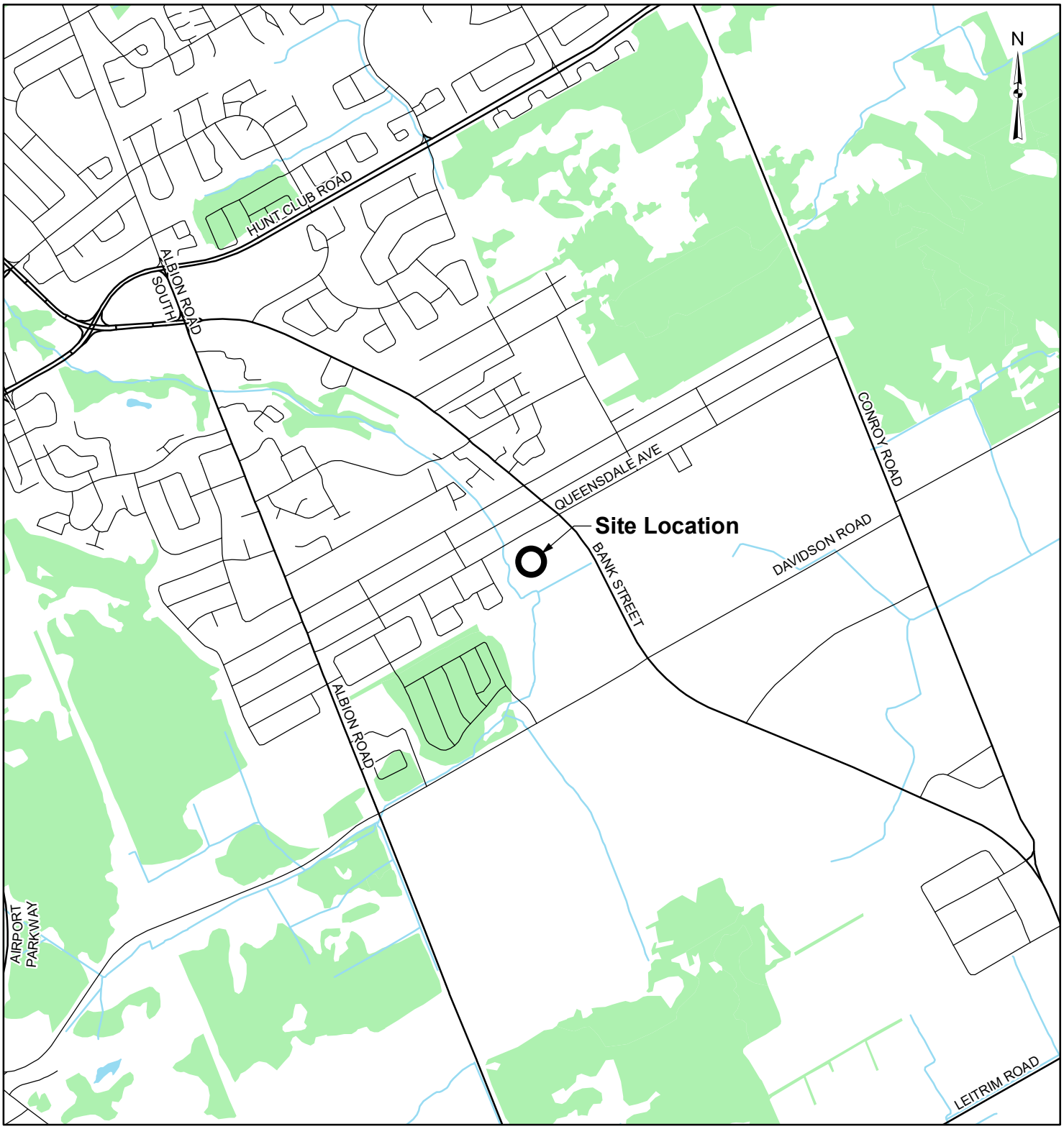
Under no circumstances shall the liability of McIntosh Perry for any claim in contract or in tort, related to the services provided and/or the content and recommendations in this report, exceed the extent that such liability is covered by such professional liability insurance from time to time in effect including the deductible therein, and which is available to indemnify McIntosh Perry. Such errors and omissions policies are available for inspection by the Client at all times upon request, and if the Client desires to obtain further insurance to protect it against any risks beyond the coverage provided by such policies, McIntosh Perry will co-operate with the Client to obtain such insurance.

McIntosh Perry prepared this report for the exclusive use of the Client. Any use which a third party makes of this report, or any reliance on or decision to be made based on it, are the responsibility of such third parties. McIntosh Perry accepts no responsibility and will not be liable for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

2950-2960 BANK STREET (0CP-17-0565)

APPENDIX B
FIGURES

McINTOSH PERRY



600 300 0 600

Scale 1:20,000 Metres

LEGEND

- SiteLocation
- Local Road
- Major Road
- Watercourse
- Waterbody
- Wooded Area

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2018.

CLIENT: KWC ARCHITECTS INC

PROJECT: GEOTECHNICAL INVESTIGATION
BANK ST AND QUEENSDALE AVE

TITLE: SITE LOCATION

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

PROJECT NO:CP-17-0565		FIGURE:
Date	Dec., 05, 2018	1
GIS	LC	
Checked By	MG	

H:\01 Project - Proposals\2017 Jobs\CP\0CP-17-0565 Blossom Park & KWC_10 Bay Building_2950-2960 Bank Street\GIS\mxd\Geotechnical\CP-17-0565_01_SiteLocation.mxd

LEGEND

- Borehole Location
- Proposed Addition
- Proposed Building

50 25 0 50

Scale 1:1,800 Metres

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2018 and the City of Ottawa, 2018.

CLIENT: KWC ARCHITECTS INC

PROJECT: GEOTECHNICAL INVESTIGATION
BANK ST AND QUEENSDALE AVE

TITLE: BOREHOLE LOCATIONS

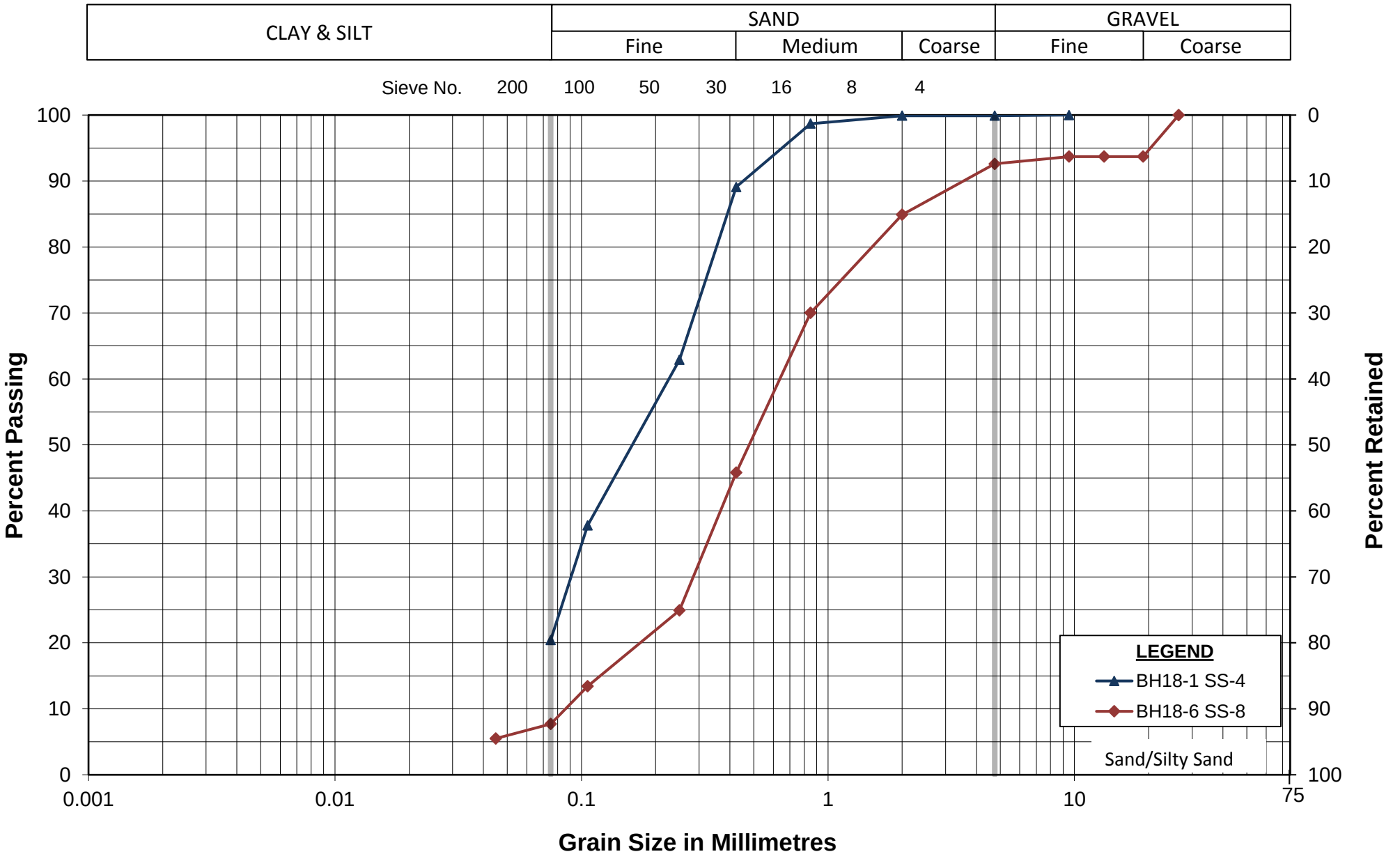
McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

PROJECT NO:CP-17-0565	
Date	Dec., 05, 2018
GIS	LC
Checked By	MG

FIGURE: 2

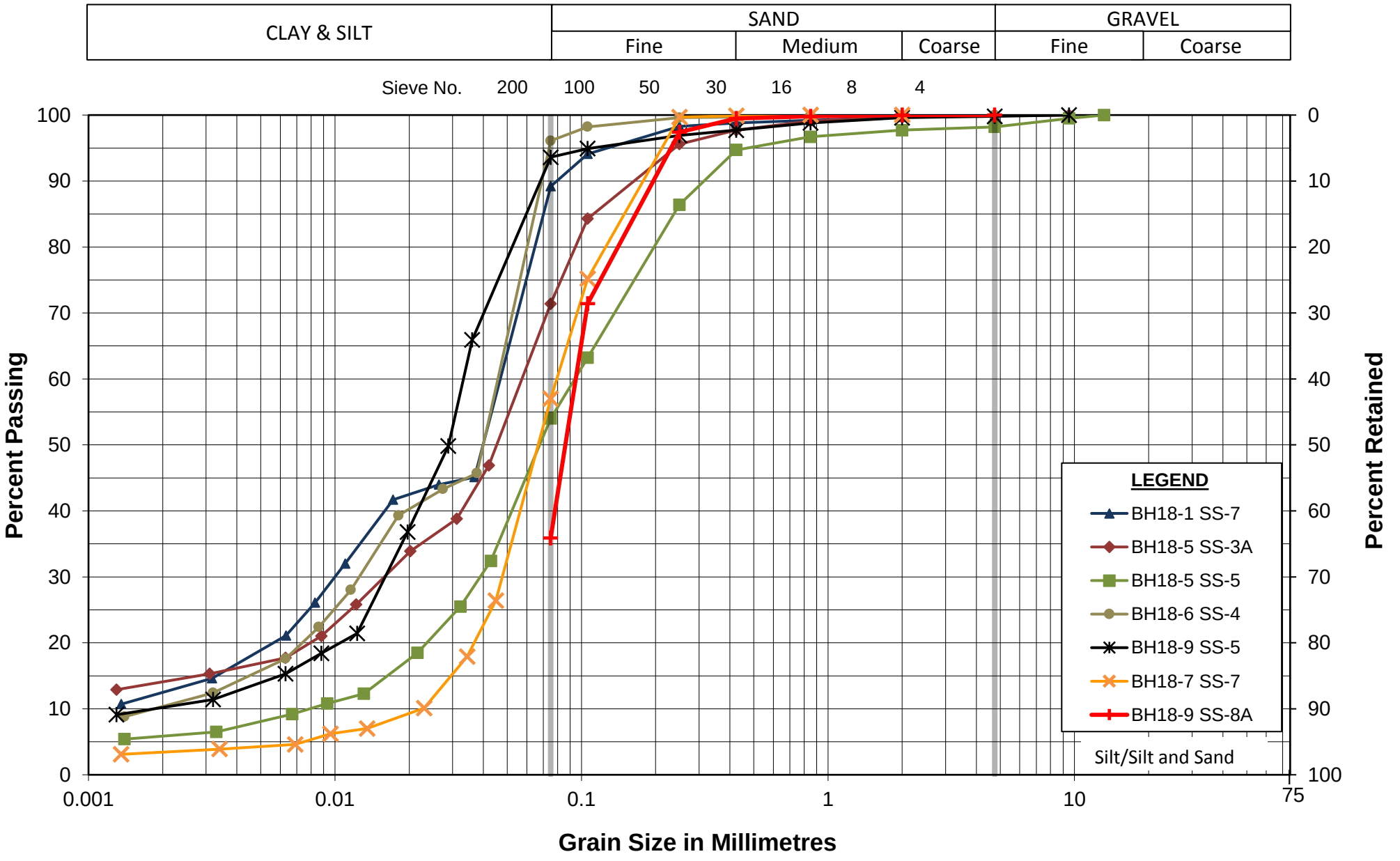
H:\01 Project - Proposals\2017 Jobs\CP\0CP-17-0565 Blossom Park & KWC_10 Bay Building_2950-2960 Bank Street\GIS\mxd\Geotechnical\CP-17-0565_02_BoreholeLocations.mxd

Unified Soil Classification System



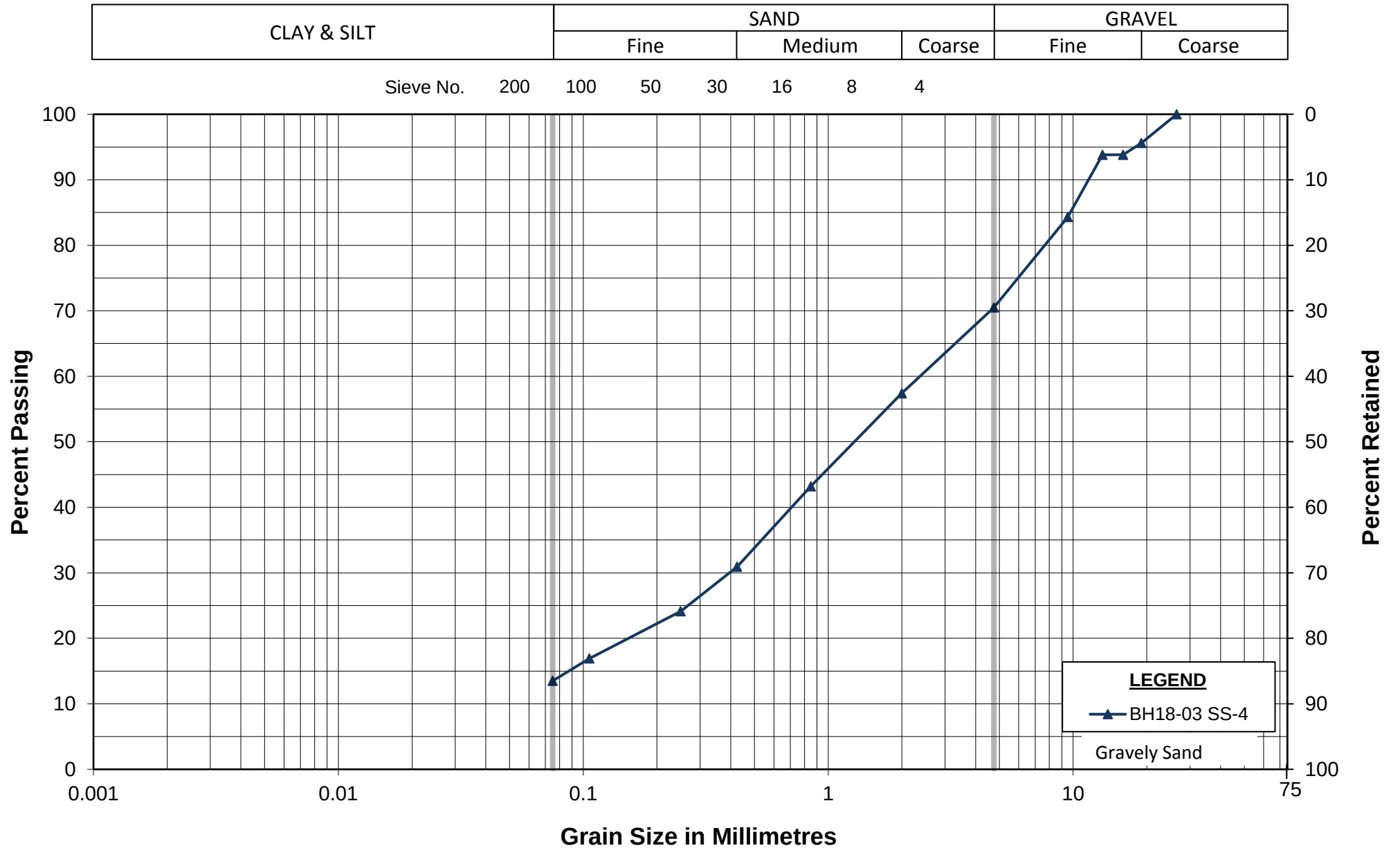
McINTOSH PERRY	Grain Size Distribution SAND/SILTY SAND Blossom Park	Figure No. 3 CP-17-0565

Unified Soil Classification System



McINTOSH PERRY	Grain Size Distribution SILT/SILT and Sand Blossom Park	Figure No. 4 CP-17-0565

Unified Soil Classification System



McINTOSH PERRY	Grain Size Distribution GRAVELLY SAND Blossom Park	Figure No. 5 CP-17-0565

2950-2960 BANK STREET (0CP-17-0565)

APPENDIX C
BOREHOLE LOGS

McINTOSH PERRY

EXPLANATION OF TERMS USED IN REPORT

N-VALUE: THE STANDARD PENETRATION TEST (SPT) N-VALUE IS THE NUMBER OF BLOWS REQUIRED TO CAUSE A STANDARD 51mm O.D SPLIT BARREL SAMPLER TO PENETRATE 0.3m INTO UNDISTURBED GROUND IN A BOREHOLE WHEN DRIVEN BY A HAMMER WITH A MASS OF 63.5 kg, FALLING FREELY A DISTANCE OF 0.76m. FOR PENETRATIONS OF LESS THAN 0.3m N-VALUES ARE INDICATED AS THE NUMBER OF BLOWS FOR THE PENETRATION ACHIEVED. AVERAGE N-VALUE IS DENOTED THUS $\bar{N}$.

DYNAMIC CONE PENETRATION TEST: CONTINUOUS PENETRATION OF A CONICAL STEEL POINT (51mm O.D. 60° CONE ANGLE) DRIVEN BY 475J IMPACT ENERGY ON 'A' SIZE DRILL RODS. THE RESISTANCE TO CONE PENETRATION IS MEASURED AS THE NUMBER OF BLOWS FOR EACH 0.3m ADVANCE OF THE CONICAL POINT INTO THE UNDISTURBED GROUND.

SOILS ARE DESCRIBED BY THEIR COMPOSITION AND CONSISTENCY OR DENSENESS.

CONSISTENCY: COHESIVE SOILS ARE DESCRIBED ON THE BASIS OF THEIR UNDRAINED SHEAR STRENGTH (c_u) AS FOLLOWS:

C_u (kPa)	0 – 12	12 – 25	25 – 50	50 – 100	100 – 200	>200
	VERY SOFT	*SOFT*	*FIRM*	*STIFF*	*VERY STIFF*	*HARD*

DENSENESS: COHESIONLESS SOILS ARE DESCRIBED ON THE BASIS OF DENSENESS AS INDICATED BY SPT N VALUES AS FOLLOWS:

N (BLOWS/0.3m)	0 – 5	5 – 10	10 – 30	30 – 50	>50
	VERY LOOSE	*LOOSE*	*COMPACT*	*DENSE*	*VERY DENSE*

ROCKS ARE DESCRIBED BY THEIR COMPOSION AND STRUCUTRAL FEATURES AND/OR STRENGTH.

RECOVERY: SUM OF ALL RECOVERED ROCK CORE PIECES FROM A CORING RUN EXPRESSED AS A PERCENT OF THE TOTAL LENGTH OF THE CORING RUN.

MODIFIED RECOVERY: SUM OF THOSE INTACT CORE PIECES, 100mm+ IN LENGTH EXPRESSED AS A PERCENT OF THE LENGTH OF THE CORING RUN. THE ROCK QUALITY DESIGNATION (RQD), FOR MODIFIED RECOVERY IS:

RQD (%)	0 – 25	25 – 50	50 – 75	75 – 90	90 – 100
	VERY POOR	*POOR*	*FAIR*	*GOOD*	*EXCELLENT*

JOINT AND BEDDING:

SPACING	50mm	50 – 300mm	0.3m – 1m	1m – 3m	>3m
JOINTING	*VERY CLOSE*	*CLOSE*	*MOD. CLOSE*	*WIDE*	*VERY WIDE*
BEDDING	*VERY THIN*	*THIN*	*MEDIUM*	*THICK*	*VERY THICK*

ABBREVIATIONS AND SYMBOLS

FIELD SAMPLING

SS	SPLIT SPOON	TP	THINWALL PISTON
WS	WASH SAMPLE	OS	OSTERBERG SAMPLE
ST	SLOTTED TUBE SAMPLE	RC	ROCK CORE
BS	BLOCK SAMPLE	PH	TW ADVANCED HYDRAULICALLY
CS	CHUNK SAMPLE	PM	TW ADVANCED MANUALLY
TW	THINWALL OPEN	FS	FOIL SAMPLE

STRESS AND STRAIN

u_w	kPa	PORE WATER PRESSURE
r_u	1	PORE PRESSURE RATIO
σ	kPa	TOTAL NORMAL STRESS
σ'	kPa	EFFECTIVE NORMAL STRESS
τ	kPa	SHEAR STRESS
$\sigma_1, \sigma_2, \sigma_3$	kPa	PRINCIPAL STRESSES
ε	%	LINEAR STRAIN
$\varepsilon_1, \varepsilon_2, \varepsilon_3$	%	PRINCIPAL STRAINS
E	kPa	MODULUS OF LINEAR DEFORMATION
G	kPa	MODULUS OF SHEAR DEFORMATION
μ	1	COEFFICIENT OF FRICTION

MECHANICALL PROPERTIES OF SOIL

m_v	kPa^{-1}	COEFFICIENT OF VOLUME CHANGE
c_c	1	COMPRESSION INDEX
c_s	1	SWELLING INDEX
c_a	1	RATE OF SECONDARY CONSOLIDATION
c_v	m^2/s	COEFFICIENT OF CONSOLIDATION
H	m	DRAINAGE PATH
T_v	1	TIME FACTOR
U	%	DEGREE OF CONSOLIDATION
σ'_{vo}	kPa	EFFECTIVE OVERBURDEN PRESSURE
σ'_p	kPa	PRECONSOLIDATION PRESSURE
τ_f	kPa	SHEAR STRENGTH
c'	kPa	EFFECTIVE COHESION INTERCEPT
Φ'	$^{-o}$	EFFECTIVE ANGLE OF INTERNAL FRICTION
c_u	kPa	APPARENT COHESION INTERCEPT
Φ_u	$^{-o}$	APPARENT ANGLE OF INTERNAL FRICTION
τ_R	kPa	RESIDUAL SHEAR STRENGTH
τ_r	kPa	REMOULDED SHEAR STRENGTH
S_t	1	SENSITIVITY = c_u / τ_r

PHYSICAL PROPERTIES OF SOIL

ρ_s	kg/m^3	DENSITY OF SOLID PARTICLES	e	1,%	VOID RATIO	e_{min}	1,%	VOID RATIO IN DENSEST STATE
γ_s	kN/m^3	UNIT WEIGHT OF SOLID PARTICLES	n	1,%	POROSITY	I_D	1	DENSITY INDEX = $\frac{e_{max} - e}{e_{max} - e_{min}}$
ρ_w	kg/m^3	DENSITY OF WATER	w	1,%	WATER CONTENT	D	mm	GRAIN DIAMETER
γ_w	kN/m^3	UNIT WEIGHT OF WATER	s_r	%	DEGREE OF SATURATION	D_n	mm	N PERCENT – DIAMETER
ρ	kg/m^3	DENSITY OF SOIL	w_L	%	LIQUID LIMIT	C_u	1	UNIFORMITY COEFFICIENT
γ	kN/m^3	UNIT WEIGHT OF SOIL	w_P	%	PLASTIC LIMIT	h	m	HYDRAULIC HEAD OR POTENTIAL
ρ_d	kg/m^3	DENSITY OF DRY SOIL	w_s	%	SHRINKAGE LIMIT	q	m^3/s	RATE OF DISCHARGE
γ_d	kN/m^3	UNIT WEIGHT OF DRY SOIL	I_P	%	PLASTICITY INDEX = $(W_L - W_L)$	v	m/s	DISCHARGE VELOCITY
ρ_{sat}	kg/m^3	DENSITY OF SATURATED SOIL	I_L	1	LIQUIDITY INDEX = $(W - W_P)/ I_P$	i	1	HYDAULIC GRADIENT
γ_{sat}	kN/m^3	UNIT WEIGHT OF SATURATED SOIL	I_C	1	CONSISTENCY INDEX = $(W_L - W) / 1_P$	k	m/s	HYDRAULIC CONDUCTIVITY
ρ'	kg/m^3	DENSITY OF SUBMERED SOIL	$e_{,max}$	1,%	VOID RATIO IN LOOSEST STATE	j	kN/m^3	SEEPAGE FORCE
γ'	kN/m^3	UNIT WEIGHT OF SUBMERGED SOIL						

McINTOSH PERRY

RECORD OF BOREHOLE No 18-01

DATE:	28/11/2018 -	**LOCATION:**	2950-2960 Bank Street (Blossom Park)	**ORIGINATED BY:**	PH
PROJECT:	CP-17-0565-BLOSSOM	**COORDINATES:**	Lat: 45.34680477 , Lon: -75.62514037	**COMPILED BY:**	MG
CLIENT:	Realty Works Ltd.	**DATUM:**	Geodetic	**CHECKED BY:**	NT
ELEVATION:	93.0 m	**REMARK:**		**REPORT DATE:**	21/01/2019

DEPTH - feet	DEPTH - meters	SOIL PROFILE: ELEVATION - m / DEPTH - m	SOIL PROFILE: DESCRIPTION	SYMBOL	SAMPLES: TYPE AND NUMBER	SAMPLES: STATE	SAMPLES: RECOVERY	SAMPLES: "N" or RQD	GROUNDWATER CONDITIONS	DYNAMIC CONE PEN. RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT and LIMITS (%)	REMARKS & GRAIN SIZE DISTRIBUTION (%) G	S	M	C
		93.0	Natural ground surface												
		0.0 / 93.0	40 mm Asphalt.												
		0.0 / 92.8	Fill. Sandy Gravel												
		0.2 / 92.1	Fill. Sand, trace to some silt, trace gravel, brown, moist.												
	1	0.9 / 91.2	Peat, silty. Presense of organic material (trace wood).		SS-01		38	12							
5					GS-02										
					SS-03		42	6	2.02 m						
	2	1.8 / 91.2	Silty sand, grey, moist, compact.												
					SS-04		50	11				0	80		20
10	3				SS-05		42	24							
			- Gravel												
	4				SS-06		4	7							
		88.5 / 4.6	Silt, some clay and sand, grey, wet, compact.												
15					SS-07		50	13				0	11	71	18
	5														
					SS-08		42	11							
	6														
20					SS-09		58	16							
		86.3 / 6.7	**END OF BOREHOLE**												
	7														
25															
	8														
	9														
30															

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McINTOSH PERRY

RECORD OF BOREHOLE No 18-02

DATE:	28/11/2018 -	**LOCATION:**	2950-2960 Bank Street (Blossom Park)	**ORIGINATED BY:**	PH
PROJECT:	CP-17-0565-BLOSSOM	**COORDINATES:**	Lat: 45.34672098 , Lon: -75.62492184	**COMPILED BY:**	MG
CLIENT:	Realty Works Ltd.	**DATUM:**	Geodetic	**CHECKED BY:**	NT
ELEVATION:	93.1 m	**REMARK:**		**REPORT DATE:**	21/01/2019

DEPTH - feet	DEPTH - meters	ELEVATION - m / DEPTH - m	DESCRIPTION	SYMBOL	SAMPLES: TYPE AND NUMBER	SAMPLES: STATE	SAMPLES: RECOVERY	SAMPLES: "N" or RQD	GROUNDWATER CONDITIONS	DYNAMIC CONE PEN. RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT and LIMITS (%)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
		93.1	Natural ground surface									
		0.0	50 mm Asphalt.									
		93.0	Fill. Sandy Gravel									
		0.1	Fill. Sand, trace silt, trace gravel, brown, moist.									
		92.9										
		0.2										
		92.2										
	1	0.9	Peat. Presense of organic material.		SS-01		46	16				
5					GS-02							
					SS-03		42	5				
		91.1										
	2	2.0	Sand, traces of silt, grey, moist, loose.									
			- wet, compact		SS-04		50	11				
		90.0										
10	3	3.0	Sand, trace to some gravel, traces of silt, grey, wet, compact.		SS-05		33	23				
	4				SS-06		50	27				
		88.5										
15		4.6	Silt and sand, grey, wet, compact.		SS-07		50	12				
	5				SS-08		50	8				
	6											
20					SS-09		54	10				
		86.4										
		6.7	**END OF BOREHOLE**									
	7											
25												
	8											
	9											
30												

DYNAMIC CONE PEN. RESISTANCE PLOT: 20 40 60 80

SHEAR STRENGTH (kPa): Vane test (◇ Intact, ◆ Remolded) Lab vane (□ Intact, ■ Remolded); 20 40 60 80 100

WATER CONTENT and LIMITS (%): W_P W W_L; 25 50 75

REMARKS & GRAIN SIZE DISTRIBUTION (%): G S M C

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McINTOSH PERRY

RECORD OF BOREHOLE No 18-03

DATE:	28/11/2018 -	**LOCATION:**	2950-2960 Bank Street (Blossom Park)	**ORIGINATED BY:**	PH
PROJECT:	CP-17-0565-BLOSSOM	**COORDINATES:**	Lat: 45.34635345 , Lon: -75.62448829	**COMPILED BY:**	MG
CLIENT:	Realty Works Ltd.	**DATUM:**	Geodetic	**CHECKED BY:**	NT
ELEVATION:	93.3 m	**REMARK:**		**REPORT DATE:**	21/01/2019

DEPTH - feet	DEPTH - meters	SOIL PROFILE: ELEVATION - m / DEPTH - m	DESCRIPTION	SYMBOL	SAMPLES: TYPE AND NUMBER	STATE	RECOVERY	"N" or RQD	GROUNDWATER CONDITIONS	DYNAMIC CONE PEN. RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT and LIMITS (%)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
		93.3	Natural ground surface							20 40 60 80		
		0.0 / 93.2	40 mm Asphalt.							Vane test: ◇ Intact ◆ Remolded; Lab vane: □ Intact ■ Remolded		
		0.0 / 93.0	Fill. Sandy Gravel.							20 40 60 80 100	W_P W W_L	G S M C
		0.2	Fill. Sand, trace silt, brown, moist, compact.									
	1				SS-01			22			○	
5		91.6									○	
		1.7	Peat. Presense of organic material (trace wood).		SS-02		54	5			○	
	2				SS-03		25	2			○	
		90.2										
10	3	3.0	Gravelly sand, some silt, wet, loose to compact.		SS-04		29	9			○	30 57 13
	4				SS-05		42	11			○	
15												
	5				SS-06		83	17			○	
		88.1										
		5.2	**END OF BOREHOLE**									
			Terminated due to presence of flowing sands.									
20	6											
	7											
25												
	8											
	9											
30												

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McINTOSH PERRY

RECORD OF BOREHOLE No 18-04

DATE:	29/11/2018 -	**LOCATION:**	2950-2960 Bank Street (Blossom Park)	**ORIGINATED BY:**	PH
PROJECT:	CP-17-0565-BLOSSOM	**COORDINATES:**	Lat: 45.34622095 , Lon: -75.62423025	**COMPILED BY:**	MG
CLIENT:	Realty Works Ltd.	**DATUM:**	Geodetic	**CHECKED BY:**	NT
ELEVATION:	93.1 m	**REMARK:**		**REPORT DATE:**	21/01/2019

DEPTH - feet	DEPTH - meters	ELEVATION - m / DEPTH - m	DESCRIPTION	SYMBOL	SAMPLES: TYPE AND NUMBER	STATE	RECOVERY	"N" or RQD	GROUNDWATER CONDITIONS	DYNAMIC CONE PEN. RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT and LIMITS (%)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
		93.1	Natural ground surface									
		0.0	40 mm Asphalt.									
		93.1	Fill. Sandy Gravel.									
		0.0	Fill. Sand, trace silt, trace gravel, brown to grey, moist, loose.									
		92.9										
		0.2										
	1				SS-01		54	8				
5												
					SS-02		37	7	1.91 m			
		91.1										
	2	2.0	Peat. Presense of organic material (trace wood).									
					SS-03		54	3				
		90.2										
10	3	2.9	Silty sand, grey, wet, loose.									
		89.9										
		3.2	Gravelly sand, traces of silt, grey, wet, compact.		SS-04		33	13				
	4				SS-05		29	13				
15			- loose									
	5				SS-06		29	6				
		87.8										
		5.3	Silt and sand, grey, wet, loose.		SS-07		62	5				
20	6											
					SS-08		75	3				
		86.4										
		6.7	**END OF BOREHOLE**									
	7											
25												
	8											
	9											
30												

DYNAMIC CONE PEN. RESISTANCE PLOT: 20 40 60 80

SHEAR STRENGTH (kPa): Vane test (◇ Intact, ◆ Remolded) Lab vane (□ Intact, ■ Remolded); 20 40 60 80 100

WATER CONTENT and LIMITS (%): W_P W W_L; 25 50 75

REMARKS & GRAIN SIZE DISTRIBUTION (%): G S M C

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McINTOSH PERRY

RECORD OF BOREHOLE No 18-05

DATE:	29/11/2018 -	**LOCATION:**	2950-2960 Bank Street (Blossom Park)	**ORIGINATED BY:**	PH
PROJECT:	CP-17-0565-BLOSSOM	**COORDINATES:**	Lat: 45.34536873 , Lon: -75.62604862	**COMPILED BY:**	MG
CLIENT:	Realty Works Ltd.	**DATUM:**	Geodetic	**CHECKED BY:**	NT
ELEVATION:	92.8 m	**REMARK:**		**REPORT DATE:**	21/01/2019

DEPTH - feet	DEPTH - meters	SOIL PROFILE: ELEVATION - m / DEPTH - m	SOIL PROFILE: DESCRIPTION	SYMBOL	SAMPLES: TYPE AND NUMBER	SAMPLES: STATE	SAMPLES: RECOVERY	SAMPLES: "N" or RQD	GROUNDWATER CONDITIONS	DYNAMIC CONE PEN. RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT and LIMITS (%)	REMARKS & GRAIN SIZE DISTRIBUTION (%) G	S	M	C
		92.8	Natural ground surface												
		0.0	100 mm Asphalt												
		92.7 / 0.1	Fill. Sand and gravel, brown, moist, compact.		SS-01		62	16	1.05 m						
5	1	91.3 / 1.5	Fill. Sand, trace gravel, brown, moist, loose.		SS-02		58	9							
	2	90.5 / 2.3	Sandy silt, grey, wet, loose to compact.		SS-03		21	11				0	29	55	16
10	3				SS-04		50	4							
		89.0 / 3.8	Silt and sand, traces of clay and gravel, grey, wet, loose to compact.		SS-05		50	7				2	44	46	8
15	4				SS-06		50	18							
	5	87.0 / 5.8	Sand and gravel, grey, wet, compact.		SS-07		62	21							
20	6				SS-08		33	52							
		86.1 / 6.7	**END OF BOREHOLE**												
	7														
25	8														
	9														
30															

DYNAMIC CONE PEN. RESISTANCE PLOT: 20 40 60 80

SHEAR STRENGTH (kPa): Vane test (◇ Intact, ◆ Remolded); Lab vane (□ Intact, ■ Remolded); 20 40 60 80 100

WATER CONTENT and LIMITS (%): W_P W W_L; 25 50 75

REMARKS & GRAIN SIZE DISTRIBUTION (%): G S M C

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McINTOSH PERRY

RECORD OF BOREHOLE No 18-06

DATE:	30/11/2018 -	**LOCATION:**	2950-2960 Bank Street (Blossom Park)	**ORIGINATED BY:**	PH
PROJECT:	CP-17-0565-BLOSSOM	**COORDINATES:**	Lat: 45.34529723 , Lon: -75.62602726	**COMPILED BY:**	MG
CLIENT:	Realty Works Ltd.	**DATUM:**	Geodetic	**CHECKED BY:**	NT
ELEVATION:	92.7 m	**REMARK:**		**REPORT DATE:**	21/01/2019

DEPTH - feet	DEPTH - meters	SOIL PROFILE: ELEVATION - m / DEPTH - m	SOIL PROFILE: DESCRIPTION	SYMBOL	SAMPLES: TYPE AND NUMBER	SAMPLES: STATE	SAMPLES: RECOVERY	SAMPLES: "N" or RQD	GROUNDWATER CONDITIONS	DYNAMIC CONE PEN. RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT and LIMITS (%)	REMARKS & GRAIN SIZE DISTRIBUTION (%) G	S	M	C
		92.7	Natural ground surface												
		0.0	40 mm Asphalt.												
		92.6	Fill. Sandy Gravel.												
		0.0	Fill. Sand, some gravel, trace silt, brown, moist, compact.												
		92.4													
		0.2													
	1				SS-01		58	15							
5															
		90.8			SS-02		33	6							
	2	1.8	Silty sand to sand, trace silt, grey, wet, loose to compact.												
					SS-03		17	91							
		89.6													
10	3	3.0	Silt, some clay, traces of sand, grey, wet, loose.		SS-04		37	3				0	4	81	15
	4				SS-05		67	11							
15															
		87.8			SS-06		92	3							
	5	4.9	Gravelly sand, grey, wet, loose to compact.												
					SS-07		58	19							
20	6														
					SS-08		50	19				15	79		6
		85.9													
		6.7	**END OF BOREHOLE**												
	7														
25															
	8														
	9														
30															

DYNAMIC CONE PEN. RESISTANCE PLOT: 20 40 60 80

SHEAR STRENGTH (kPa): Vane test (◇ Intact, ◆ Remolded); Lab vane (□ Intact, ■ Remolded); 20 40 60 80 100

WATER CONTENT and LIMITS (%): W_P W W_L; 25 50 75

REMARKS & GRAIN SIZE DISTRIBUTION (%): G S M C

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McINTOSH PERRY

RECORD OF BOREHOLE No 18-07

DATE:	30/11/2018 -	**LOCATION:**	2950-2960 Bank Street (Blossom Park)	**ORIGINATED BY:**	PH
PROJECT:	CP-17-0565-BLOSSOM	**COORDINATES:**	Lat: 45.34538652 , Lon: -75.62648651	**COMPILED BY:**	MG
CLIENT:	Realty Works Ltd.	**DATUM:**	Geodetic	**CHECKED BY:**	NT
ELEVATION:	92.8 m	**REMARK:**		**REPORT DATE:**	21/01/2019

DEPTH - feet	DEPTH - meters	SOIL PROFILE: ELEVATION - m / DEPTH - m	SOIL PROFILE: DESCRIPTION	SYMBOL	SAMPLES: TYPE AND NUMBER	SAMPLES: STATE	SAMPLES: RECOVERY	SAMPLES: "N" or RQD	GROUNDWATER CONDITIONS	DYNAMIC CONE PEN. RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT and LIMITS (%)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
		92.8	Natural ground surface							DYNAMIC CONE PEN. RESISTANCE PLOT 20 40 60 80; SHEAR STRENGTH (kPa) Vane test: ◇ Intact ◆ Remolded; Lab vane: □ Intact ■ Remolded; 20 40 60 80 100	W_P W W_L; 25 50 75	G S M C
		0.0 / 92.8	40 mm Asphalt.									
		0.0 / 92.6	Fill. Sandy Gravel.									
		0.2	Fill. Sand, some to trace gravel, brown, moist, compact to loose.		SS-01		62	17				
	1				SS-02		79	26				
5					SS-03		50	8				
	2	90.5										
		2.3	Sand, some gravel, traces of silt, grey, wet, loose.		SS-04		58	10				
10	3				SS-05		62	12				
	4	88.5			SS-06		79	2				
		4.3	Silt and sand, traces of clay, grey, wet, loose.									
15					SS-07		58	7				0 43 53 4
	5				SS-08		83	4				
	6				SS-09		83	3				
20		86.4										
		6.4	**END OF BOREHOLE**									
	7											
25												
	8											
	9											
30												

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McINTOSH PERRY

RECORD OF BOREHOLE No 18-08

DATE:	30/11/2018 -	**LOCATION:**	2950-2960 Bank Street (Blossom Park)	**ORIGINATED BY:**	PH
PROJECT:	CP-17-0565-BLOSSOM	**COORDINATES:**	Lat: 45.34538424 , Lon: -75.62680315	**COMPILED BY:**	MG
CLIENT:	Realty Works Ltd.	**DATUM:**	Geodetic	**CHECKED BY:**	NT
ELEVATION:	92.9 m	**REMARK:**		**REPORT DATE:**	21/01/2019

DEPTH - feet	DEPTH - meters	SOIL PROFILE: ELEVATION - m / DEPTH - m	SOIL PROFILE: DESCRIPTION	SYMBOL	SAMPLES: TYPE AND NUMBER	SAMPLES: STATE	SAMPLES: RECOVERY	SAMPLES: "N" or RQD	GROUNDWATER CONDITIONS	DYNAMIC CONE PEN. RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT and LIMITS (%)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
		92.9	Natural ground surface							20 40 60 80		
		0.0	40 mm Asphalt.									
		92.8	Fill. Sandy Gravel.									
		0.0										
		92.5	Fill. Sand, trace silt, brown, moist, compact.									
		0.3										
	1				SS-01		58	14				
5		91.3							1.47 m			
		1.5	Peat. Presense of organic material (trace wood).									
		90.9			SS-02		33	4				
	2	2.0	Sand, trace to some silt, wet, compact.									
					SS-03		50	10				
10	3				SS-04		62	13				
	4				SS-05		50	13				
15					SS-06		62	14				
	5	87.2										
		5.6	Silt and sand, traces of gravel, grey, wet, loose.		SS-07		79	4				
20	6				SS-08		50	7				
		86.2										
		6.7	**END OF BOREHOLE**									
	7											
25												
	8											
	9											
30												

SHEAR STRENGTH (kPa): Vane test ◇ Intact ◆ Remolded; Lab vane □ Intact ■ Remolded

WATER CONTENT and LIMITS (%): W_P W W_L; 25 50 75

REMARKS & GRAIN SIZE DISTRIBUTION (%): G S M C

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McINTOSH PERRY

RECORD OF BOREHOLE No 18-09

DATE:	03/12/2018 -	**LOCATION:**	2950-2960 Bank Street (Blossom Park)	**ORIGINATED BY:**	PH
PROJECT:	CP-17-0565-BLOSSOM	**COORDINATES:**	Lat: 45.34518133 , Lon: -75.6265867	**COMPILED BY:**	MG
CLIENT:	Realty Works Ltd.	**DATUM:**	Geodetic	**CHECKED BY:**	NT
ELEVATION:	93.5 m	**REMARK:**		**REPORT DATE:**	21/01/2019

DEPTH - feet	DEPTH - meters	SOIL PROFILE: ELEVATION - m / DEPTH - m	SOIL PROFILE: DESCRIPTION	SYMBOL	SAMPLES: TYPE AND NUMBER	SAMPLES: STATE	SAMPLES: RECOVERY	SAMPLES: "N" or RQD	GROUNDWATER CONDITIONS	DYNAMIC CONE PEN. RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT and LIMITS (%)	REMARKS & GRAIN SIZE DISTRIBUTION (%) G	S	M	C
		93.5	Natural ground surface												
		0.0 / 93.4	Fill. Silty sand. Presence of organic matter.												
		0.2	Fill. Sand, traces of silt, brown, moist, loose. - some gravel		SS-01		58	3							
	1				SS-02		62	13							
5			- trace gravel		SS-03		42	6							
		91.9 / 1.7 / 91.7	Fill. Silty sand, traces of clay, grey, moist, compact.												
	2	1.8 / 91.3	Sandy silt. Presence of organic matter.		SS-04		33	12							
		2.3	Silt, some clay, traces of sand, grey, moist to wet, loose to compact.		SS-05		50	17				0	6	80	14
10	3				SS-06		42	10							
	4				SS-07		42	6							
		89.3 / 4.3	Silt and sand, grey, wet, compact.		SS-08		50	22				0	64		36
15		88.7 / 4.9	**END OF BOREHOLE**												
	5														
20	6														
	7														
25															
	8														
	9														
30															

DYNAMIC CONE PEN. RESISTANCE PLOT: 20 40 60 80

SHEAR STRENGTH (kPa): 20 40 60 80 100
Vane test: ◇ Intact ◆ Remolded
Lab vane: □ Intact ■ Remolded

WATER CONTENT and LIMITS (%): W_P W W_L — 25 50 75

REMARKS & GRAIN SIZE DISTRIBUTION (%): G S M C

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McINTOSH PERRY

RECORD OF BOREHOLE No 18-10

DATE:	03/12/2018 -	**LOCATION:**	2950-2960 Bank Street (Blossom Park)	**ORIGINATED BY:**	PH
PROJECT:	CP-17-0565-BLOSSOM	**COORDINATES:**	Lat: 45.34517637 , Lon: -75.62704284	**COMPILED BY:**	MG
CLIENT:	Realty Works Ltd.	**DATUM:**	Geodetic	**CHECKED BY:**	NT
ELEVATION:	93.8 m	**REMARK:**		**REPORT DATE:**	21/01/2019

DEPTH - feet	DEPTH - meters	ELEVATION - m / DEPTH - m	DESCRIPTION	SYMBOL	TYPE AND NUMBER	STATE	RECOVERY	"N" or RQD	GROUNDWATER CONDITIONS
		93.8	Natural ground surface						
		0.0	Fill. Silty snad. Presence of organic matter.						
		93.5			SS-01		50	9	
		0.3	Fill. Sand, trace silt, brown, moist, compact.						
		93.2							
		0.6	Fill. Sand and gravel, trace silt, brown, moist, compact.		SS-02		42	16	
	1	92.7							
		1.1	Fill. Sand, trace silt, brown, moist, compact.						
5		92.1			SS-03		42	12	
		1.7	Fill. Silty sand, trace clay, grey with black, moist, compact.						
	2				SS-04		58	21	
		90.9							
		2.9	Peat. Presense of organic material (trace wood).		SS-05		46	10	
10	3	90.7							
		3.0	Silt and sand, traces of gravel, grey, wet, loose to compact.		SS-06		50	11	
	4				SS-07		42	8	
			- silty to some silt						
15					SS-08		75	11	
		88.9							
	5	4.9	**END OF BOREHOLE**						
	6								
20									
	7								
25									
	8								
	9								
30									

DYNAMIC CONE PEN. RESISTANCE PLOT — 20 40 60 80

SHEAR STRENGTH (kPa)

Vane test	Lab vane
◇ Intact	□ Intact
◆ Remolded	■ Remolded

20 40 60 80 100

WATER CONTENT and LIMITS (%) — W_P W W_L — 25 50 75

REMARKS & GRAIN SIZE DISTRIBUTION (%) — G S M C

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McINTOSH PERRY

RECORD OF BOREHOLE No 18-11

DATE:	03/12/2018 -	**LOCATION:**	2950-2960 Bank Street (Blossom Park)	**ORIGINATED BY:**	PH
PROJECT:	CP-17-0565-BLOSSOM	**COORDINATES:**	Lat: 45.34533034 , Lon: -75.62723172	**COMPILED BY:**	MG
CLIENT:	Realty Works Ltd.	**DATUM:**	Geodetic	**CHECKED BY:**	NT
ELEVATION:	93.7 m	**REMARK:**		**REPORT DATE:**	21/01/2019

DEPTH - feet	DEPTH - meters	SOIL PROFILE: ELEVATION - m / DEPTH - m	SOIL PROFILE: DESCRIPTION	SYMBOL	SAMPLES: TYPE AND NUMBER	SAMPLES: STATE	SAMPLES: RECOVERY	SAMPLES: "N" or RQD	GROUNDWATER CONDITIONS	DYNAMIC CONE PEN. RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT and LIMITS (%)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
		93.7	Natural ground surface									
		0.0 / 93.7	Fill. Silty sand, trace clay, trace gravel, dark brown to brown, moist, compact.		SS-01		58	17				
		93.2	Presense of organic material.									
		0.5 / 93.1	Fill. Sand, trace silt, trace gravel, brown, moist, compact.									
		0.6 / 92.6	Fill. Sand and gravel, trace silt, brown, moist, compact.		SS-02		33	22				
	1	1.1 / 92.2	Fill. Sand, trace silt, brown, moist, compact.									
5		1.5 / 91.9	Fill. Silty sand, trace clay, trace gravel, grey with black, moist, compact.		SS-03		54	15				
	2	1.8	**END OF BOREHOLE**									
10	3											
	4											
15												
	5											
20	6											
	7											
25												
	8											
	9											
30												

DYNAMIC CONE PEN. RESISTANCE PLOT: 20 40 60 80

SHEAR STRENGTH (kPa): Vane test — ◇ Intact, ◆ Remolded; Lab vane — □ Intact, ■ Remolded; 20 40 60 80 100

WATER CONTENT and LIMITS (%): W_P W W_L; 25 50 75

REMARKS & GRAIN SIZE DISTRIBUTION (%): G S M C

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McINTOSH PERRY

RECORD OF BOREHOLE No 18-12

DATE:	03/12/2018 -	**LOCATION:**	2950-2960 Bank Street (Blossom Park)	**ORIGINATED BY:**	PH
PROJECT:	CP-17-0565-BLOSSOM	**COORDINATES:**	Lat: 45.34537163 , Lon: -75.62715164	**COMPILED BY:**	MG
CLIENT:	Realty Works Ltd.	**DATUM:**	Geodetic	**CHECKED BY:**	NT
ELEVATION:	93.5 m	**REMARK:**		**REPORT DATE:**	21/01/2019

DEPTH - feet	DEPTH - meters	SOIL PROFILE: ELEVATION - m / DEPTH - m	SOIL PROFILE: DESCRIPTION	SYMBOL	SAMPLES: TYPE AND NUMBER	SAMPLES: STATE	SAMPLES: RECOVERY	SAMPLES: "N" or RQD	GROUNDWATER CONDITIONS	DYNAMIC CONE PEN. RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT and LIMITS (%)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
		93.5	Natural ground surface							DYNAMIC CONE PEN. RESISTANCE PLOT 20 40 60 80 SHEAR STRENGTH (kPa) Vane test: ◇ Intact ◆ Remolded; Lab vane: □ Intact ■ Remolded 20 40 60 80 100	W_P W W_L 25 50 75	G S M C
		0.0	150 mm Asphalt.									
		93.4 / 0.2	Fill. Sand, trace silt, brown, moist, loose.		SS-01		50	6				
		92.8 / 0.8	Fill. Sandy silt, trace clay, dark brown to black, moist, loose.		SS-02		46	6				
5	1	92.6 / 0.9	Fill. Sand, some silt to silty, trace clay, grey, moist, loose.		SS-03		50	8				
		92.0 / 1.5	Fill. Sandy Silt, trace clay, trace gravel, dark brown to black, moist, loose.									
	2	91.7 / 1.8	**END OF BOREHOLE**									
10	3											
	4											
15	5											
20	6											
	7											
25	8											
30	9											

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McINTOSH PERRY

RECORD OF BOREHOLE No 18-13

DATE:	03/12/2018 -	**LOCATION:**	2950-2960 Bank Street (Blossom Park)	**ORIGINATED BY:**	PH
PROJECT:	CP-17-0565-BLOSSOM	**COORDINATES:**	Lat: 45.34560136 , Lon: -75.62746042	**COMPILED BY:**	MG
CLIENT:	Realty Works Ltd.	**DATUM:**	Geodetic	**CHECKED BY:**	NT
ELEVATION:	93.7 m	**REMARK:**		**REPORT DATE:**	21/01/2019

DEPTH - feet	DEPTH - meters	SOIL PROFILE: ELEVATION - m / DEPTH - m	SOIL PROFILE: DESCRIPTION	SYMBOL	SAMPLES: TYPE AND NUMBER	SAMPLES: STATE	SAMPLES: RECOVERY	SAMPLES: "N" or RQD	GROUNDWATER CONDITIONS	DYNAMIC CONE PEN. RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT and LIMITS (%)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
		93.7	Natural ground surface									
		0.0	Fill. Silty sand, trace to come gravel, trace clay, brown, moist, loose to compact. -trace organics, trace brick, presence of organic matter - wood and rootlets		SS-01		83	9				
	1				SS-02		21	13				
		92.5										
5		1.2	Fill. Sand, some silt, trace gravel, grey to dark brown, moist, loose. Presence of organic matter.		SS-03		33	8				
		91.9										
	2	1.8	**END OF BOREHOLE**									
10	3											
	4											
15												
	5											
20	6											
	7											
25												
	8											
	9											
30												

DYNAMIC CONE PEN. RESISTANCE PLOT: 20 40 60 80

SHEAR STRENGTH (kPa): Vane test — ◇ Intact, ◆ Remolded; Lab vane — □ Intact, ■ Remolded; 20 40 60 80 100

WATER CONTENT and LIMITS (%): W_P W W_L; 25 50 75

REMARKS & GRAIN SIZE DISTRIBUTION (%): G S M C

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McINTOSH PERRY

RECORD OF BOREHOLE No 18-14A

DATE:	03/12/2018 -	**LOCATION:**	2950-2960 Bank Street (Blossom Park)	**ORIGINATED BY:**	PH
PROJECT:	CP-17-0565-BLOSSOM	**COORDINATES:**	Lat: 45.34568535 , Lon: -75.62751374	**COMPILED BY:**	MG
CLIENT:	Realty Works Ltd.	**DATUM:**	Geodetic	**CHECKED BY:**	NT
ELEVATION:	93.5 m	**REMARK:**		**REPORT DATE:**	21/01/2019

DEPTH - feet	DEPTH - meters	SOIL PROFILE: ELEVATION - m / DEPTH - m	SOIL PROFILE: DESCRIPTION	SYMBOL	SAMPLES: TYPE AND NUMBER	SAMPLES: STATE	SAMPLES: RECOVERY	SAMPLES: "N" or RQD	GROUNDWATER CONDITIONS	DYNAMIC CONE PEN. RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT and LIMITS (%)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
		93.5	Natural ground surface									
		0.0	100 mm Topsoil.									
		93.4 / 0.1	Fill. Silty sand, trace clay, trace gravel, brown, moist, loose. Presense of debris - glass.		SS-01		54	6			○	
		92.9 / 0.6	Fill. Presence of organic matter - wood.		SS-02		25	15				
5	1				SS-03		25	47				
		91.6 / 1.8	**END OF BOREHOLE**									
10	2											
	3											
15	4											
	5											
20	6											
	7											
25	8											
	9											
30												

DYNAMIC CONE PEN. RESISTANCE PLOT: 20 40 60 80

SHEAR STRENGTH (kPa): Vane test (◇ Intact, ◆ Remolded); Lab vane (□ Intact, ■ Remolded); 20 40 60 80 100

WATER CONTENT and LIMITS (%): W_P W W_L; 25 50 75

REMARKS & GRAIN SIZE DISTRIBUTION (%): G S M C

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McINTOSH PERRY

RECORD OF BOREHOLE No 18-14B

DATE:	03/12/2018 -	**LOCATION:**	2950-2960 Bank Street (Blossom Park)	**ORIGINATED BY:**	PH
PROJECT:	CP-17-0565-BLOSSOM	**COORDINATES:**	Lat: 45.34566929 , Lon: -75.62748972	**COMPILED BY:**	MG
CLIENT:	Realty Works Ltd.	**DATUM:**	Geodetic	**CHECKED BY:**	NT
ELEVATION:	93.4 m	**REMARK:**		**REPORT DATE:**	21/01/2019

DEPTH - feet	DEPTH - meters	SOIL PROFILE: ELEVATION - m / DEPTH - m	SOIL PROFILE: DESCRIPTION	SYMBOL	SAMPLES: TYPE AND NUMBER	SAMPLES: STATE	SAMPLES: RECOVERY	SAMPLES: "N" or RQD	GROUNDWATER CONDITIONS	DYNAMIC CONE PEN. RESISTANCE PLOT / SHEAR STRENGTH (kPa)	WATER CONTENT and LIMITS (%)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
		93.4	Natural ground surface									
		0.0	Fill. Silty sand, some gravel, trace clay, dark brown, moist, loose. Presense of organic matter - wood.		SS-01		54	9				
	1		- Brick fragments, with plastic.		SS-02		50	4				
5			- Trace gravel, wood fibers.		SS-03		8	6				
		91.6										
	2	1.8	Fill. Silty sand, trace clay, grey to black, moist, loose.		SS-04		37	11				
		91.1										
		2.3	Peat.									
		91.1	Silty sand, traces of clay, grey, moist, compact.									
		2.3										
		91.0										
		2.4	**END OF BOREHOLE**									
10	3											
	4											
15												
	5											
20	6											
	7											
25												
	8											
	9											
30												

DYNAMIC CONE PEN. RESISTANCE PLOT: 20 40 60 80

SHEAR STRENGTH (kPa): Vane test — ◇ Intact, ◆ Remolded; Lab vane — □ Intact, ■ Remolded; 20 40 60 80 100

WATER CONTENT and LIMITS (%): W_P W W_L; 25 50 75

REMARKS & GRAIN SIZE DISTRIBUTION (%): G S M C

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Borehole Logs
Site Investigation: December 3, 2019
Logged By: A. L.
Checked By: N. T.

BH19-1
(Building B Footprint)

0	-	40	Asphalt
40	-	160	Granular A
160	-	1370	Br Si(y) Sa with Gr
1370	-	1980	Drk Br/Blk Peat

BH19-2
(Building B Footprint)

0	-	40	Asphalt
40	-	100	Granular A
100	-	760	Br Si(y) Sa with Gr
760	-	2515	Drk Br/Blk Peat
2515	-	2590	Gry Cl(y) Si

Note: Water observed at 1170 mm

BH19-3
(Building A Footprint)

0	-	50	Asphalt
50	-	165	Granular A
165	-	1350	Br Si(y) Sa with Gr
1350	-	2895	Gry Si(y) Sa

2950-2960 BANK STREET (0CP-17-0565)

APPENDIX D
LAB RESULTS

McINTOSH PERRY

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Certificate of Analysis

McIntosh Perry Consulting Eng. (Carp)

215 Menton Place
Nepean, ON K2H 9C1
Attn: Mary Ellen Gleeson

Client PO: CP-17-0565/ Blossum Park
Project: CP-17-0565
Custody: 120050

Report Date: 15-Jan-2019
Order Date: 10-Jan-2019

Order #: 1902277

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1902277-01	BH 18-2 SS-4
1902277-02	BH 18-4 SS-2A
1902277-03	BH 18-6 SS-2A

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 15-Jan-2019

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 10-Jan-2019

Client PO: CP-17-0565/ Blossum Park

Project Description: CP-17-0565

	Client ID:	BH 18-2 SS-4	BH 18-4 SS-2A	BH 18-6 SS-2A	-
	Sample Date:	11/30/2018 09:00	11/30/2018 09:00	11/30/2018 09:00	-
	Sample ID:	1902277-01	1902277-02	1902277-03	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	91.4	86.0	85.7	-
General Inorganics					
pH	0.05 pH Units	7.85	7.82	7.86	-
Resistivity	0.10 Ohm.m	31.2	36.7	77.1	-
Anions					
Chloride	5 ug/g dry	46 [1]	36 [1]	9 [1]	-
Sulphate	5 ug/g dry	124 [1]	72 [1]	26 [1]	-

Qualifier Notes:

Login Qualifiers :

Sample - One or more parameter received past hold time -
Applies to samples: BH 18-2 SS-4, BH 18-4 SS-2A, BH 18-6 SS-2A

Sample Qualifiers :

1 : Holding time had been exceeded upon receipt of the sample at the laboratory.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

2950-2960 BANK STREET (0CP-17-0565)

APPENDIX E
SEISMIC HAZARD CALCULATION

McINTOSH PERRY

2010 National Building Code Seismic Hazard Calculation

INFORMATION: Eastern Canada English (613) 995-5548 français (613) 995-0600 Facsimile (613) 992-8836
Western Canada English (250) 363-6500 Facsimile (250) 363-6565

Requested by: , January 21, 2019

Site Coordinates: 45.3464 North 75.6254 West

User File Reference:

National Building Code ground motions:
2% probability of exceedance in 50 years (0.000404 per annum)

Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA (g)
0.633	0.307	0.137	0.046	0.322

Notes. Spectral and peak hazard values are determined for firm ground (NBCC 2010 soil class C - average shear wave velocity 360-750 m/s). Median (50th percentile) values are given in units of g. 5% damped spectral acceleration (Sa(T), where T is the period in seconds) and peak ground acceleration (PGA) values are tabulated. Only 2 significant figures are to be used. ***These values have been interpolated from a 10 km spaced grid of points. Depending on the gradient of the nearby points, values at this location calculated directly from the hazard program may vary. More than 95 percent of interpolated values are within 2 percent of the calculated values.***

Ground motions for other probabilities:

Probability of exceedance per annum	0.010	0.0021	0.001
Probability of exceedance in 50 years	40%	10%	5%
Sa(0.2)	0.089	0.247	0.384
Sa(0.5)	0.043	0.122	0.186
Sa(1.0)	0.017	0.056	0.087
Sa(2.0)	0.0061	0.018	0.028
PGA	0.038	0.122	0.200

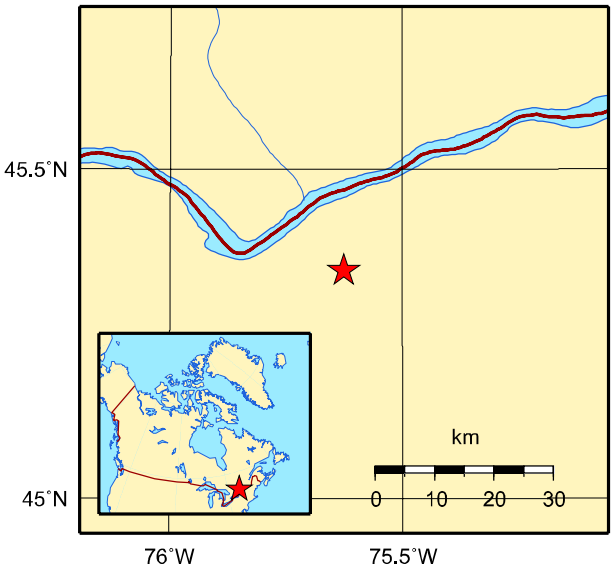
References

National Building Code of Canada 2010 NRCC no. 53301; sections 4.1.8, 9.20.1.2, 9.23.10.2, 9.31.6.2, and 6.2.1.3
Appendix C: Climatic Information for Building Design in Canada - table in Appendix C starting on page C-11 of Division B, volume 2

User's Guide - NBC 2010, Structural Commentaries NRCC no. 53543 (in preparation)
Commentary J: Design for Seismic Effects

Geological Survey of Canada Open File xxxx
Fourth generation seismic hazard maps of Canada: Maps and grid values to be used with the 2010 National Building Code of Canada (in preparation)

See the websites *www.EarthquakesCanada.ca* and *www.nationalcodes.ca* for more information



Aussi disponible en français

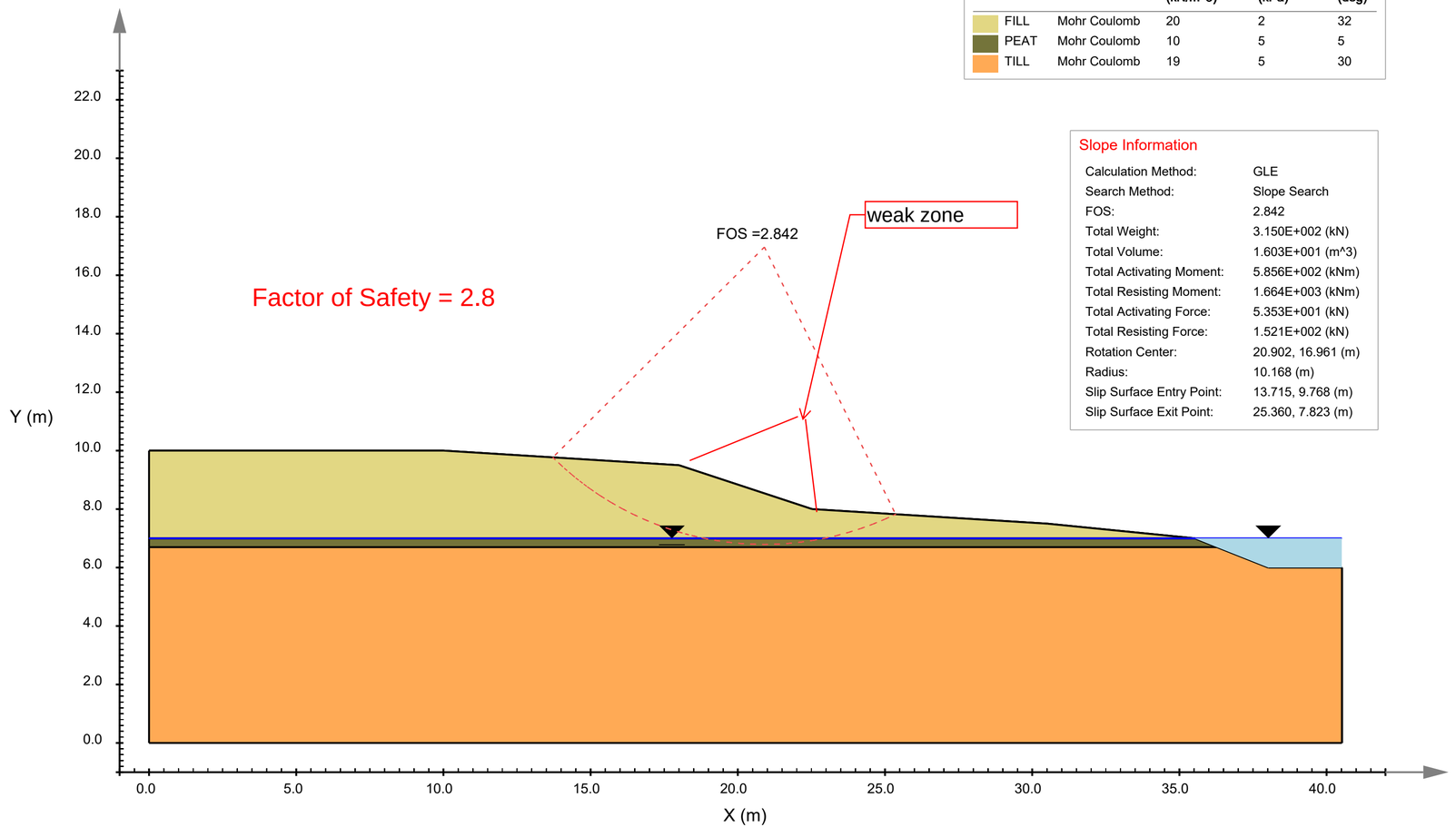
Natural Resources Canada Ressources naturelles Canada
Canada

2950-2960 BANK STREET (0CP-17-0565)

APPENDIX F
SLOPE STABILITY ANALYSIS

McINTOSH PERRY

Estimation of the Slope Factor of Safety for the Proposed Parking Lot



Materials

Name	Strength Type	Unit Weight (kN/m^3)	Cohesion (kPa)	Phi (deg)
FILL	Mohr Coulomb	20	2	32
PEAT	Mohr Coulomb	10	5	5
TILL	Mohr Coulomb	19	5	30

Slope Information

Calculation Method:	GLE
Search Method:	Slope Search
FOS:	2.842
Total Weight:	3.150E+002 (kN)
Total Volume:	1.603E+001 (m^3)
Total Activating Moment:	5.856E+002 (kNm)
Total Resisting Moment:	1.664E+003 (kNm)
Total Activating Force:	5.353E+001 (kN)
Total Resisting Force:	1.521E+002 (kN)
Rotation Center:	20.902, 16.961 (m)
Radius:	10.168 (m)
Slip Surface Entry Point:	13.715, 9.768 (m)
Slip Surface Exit Point:	25.360, 7.823 (m)

Estimation of the Slope Factor of Safety for the Proposed Building Addition

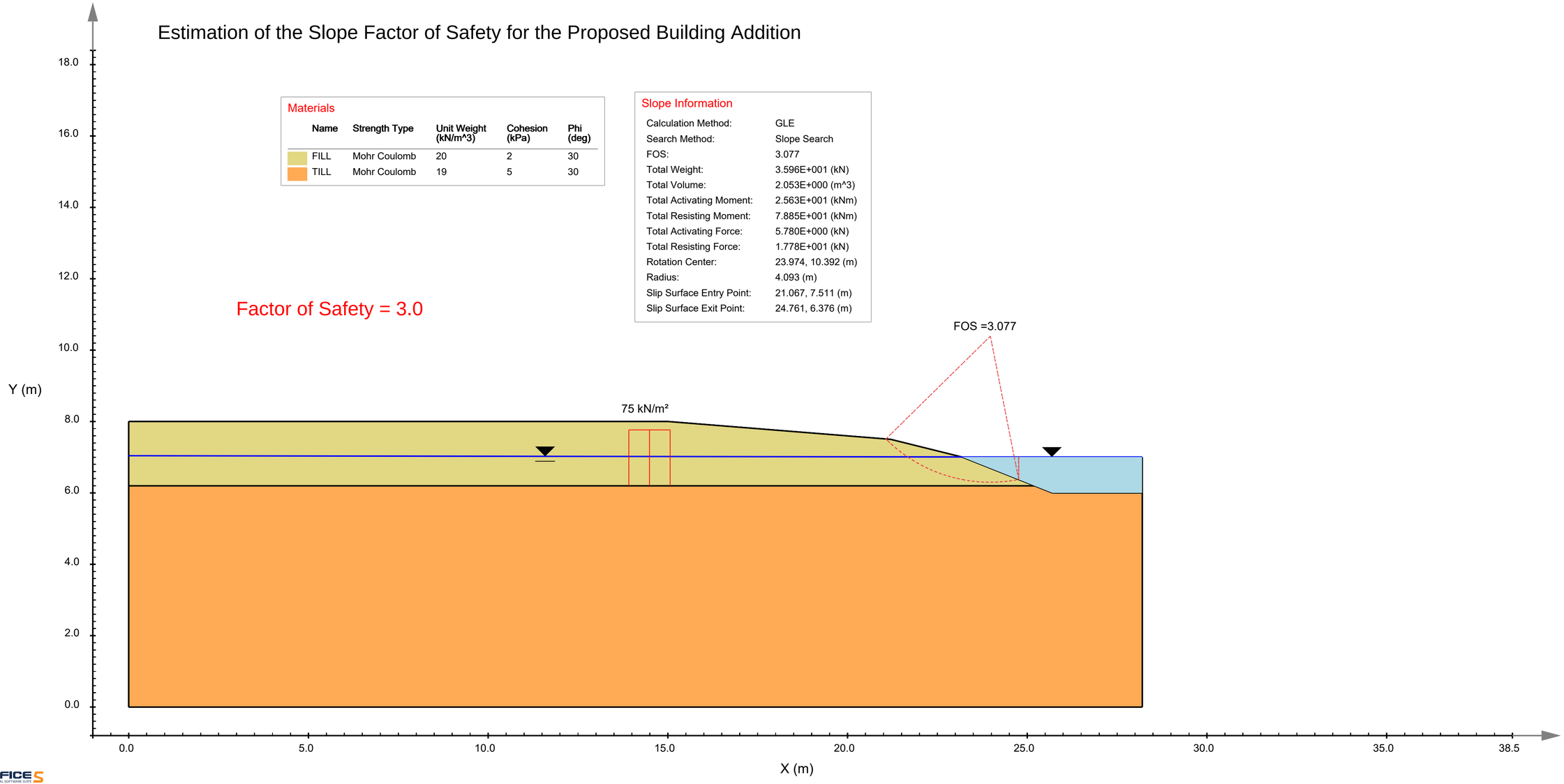
Materials

Name	Strength Type	Unit Weight (kN/m^3)	Cohesion (kPa)	Phi (deg)
FILL	Mohr Coulomb	20	2	30
TILL	Mohr Coulomb	19	5	30

Slope Information

Calculation Method:	GLE
Search Method:	Slope Search
FOS:	3.077
Total Weight:	3.596E+001 (kN)
Total Volume:	2.053E+000 (m^3)
Total Activating Moment:	2.563E+001 (kNm)
Total Resisting Moment:	7.885E+001 (kNm)
Total Activating Force:	5.780E+000 (kN)
Total Resisting Force:	1.778E+001 (kN)
Rotation Center:	23.974, 10.392 (m)
Radius:	4.093 (m)
Slip Surface Entry Point:	21.067, 7.511 (m)
Slip Surface Exit Point:	24.761, 6.376 (m)

Factor of Safety = 3.0



2950-2960 BANK STREET (0CP-17-0565)

APPENDIX G
UPDATED SITE PLAN - NOVEMBER 2019

McINTOSH PERRY

Project Zoning Review/Statistics

Municipality: City of Ottawa
Municipal Address: 2950 Bank Street
Registered Owner: Blossom Park Retail Centre Inc.
Lot Area: 58,674 sq.m. (631,561 sq.ft.)(14.5 acres)

Zoning Analysis
Ottawa
Zoning By-law: 2008-250
Zone: AM1 H(30)
Proposed Use: Retail Store; Drive-Through Facility; Restaurant (Shopping Centre)

Building Areas

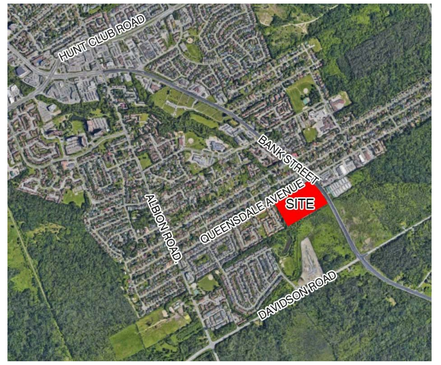
	Gross (out-to-out) Sq.m.	Sq.ft
Existing Shopping Centre	13,022	140,167
Existing Bank Building	422	4,542
Existing Development	**13,444**	**144,709**
Proposed Building 'A'	692	7,450
Proposed Building 'B'	975	10,500
Proposed Development	**1,668**	**17,950**
Grand Total	**15,112**	**162,659**

Development Standards

	Required	Provided	
Minimum Lot Area	No min.	58,674 sq.m.	
Minimum Lot Width	No min.	194.6m	
Minimum Required Yard			
Front Yard (min.)	No min.	6m	
Corner Side Yard (min.)	No min.	14.5m	
Interior Side Yard (min.)	No min.	5m	*(not abutting residential zone)*
Rear Yard (min.)	7.5m	69.3m	*(abutting residential zone)*
Maximum Building Height	30m	10m	*(Approx. - Existing Building)*
Maximum Floor Space Index	2**	0.26	*(**FSI no more than 1 for non-residential uses, as per AM1 subzone)*

Parking, Loading, Queuing

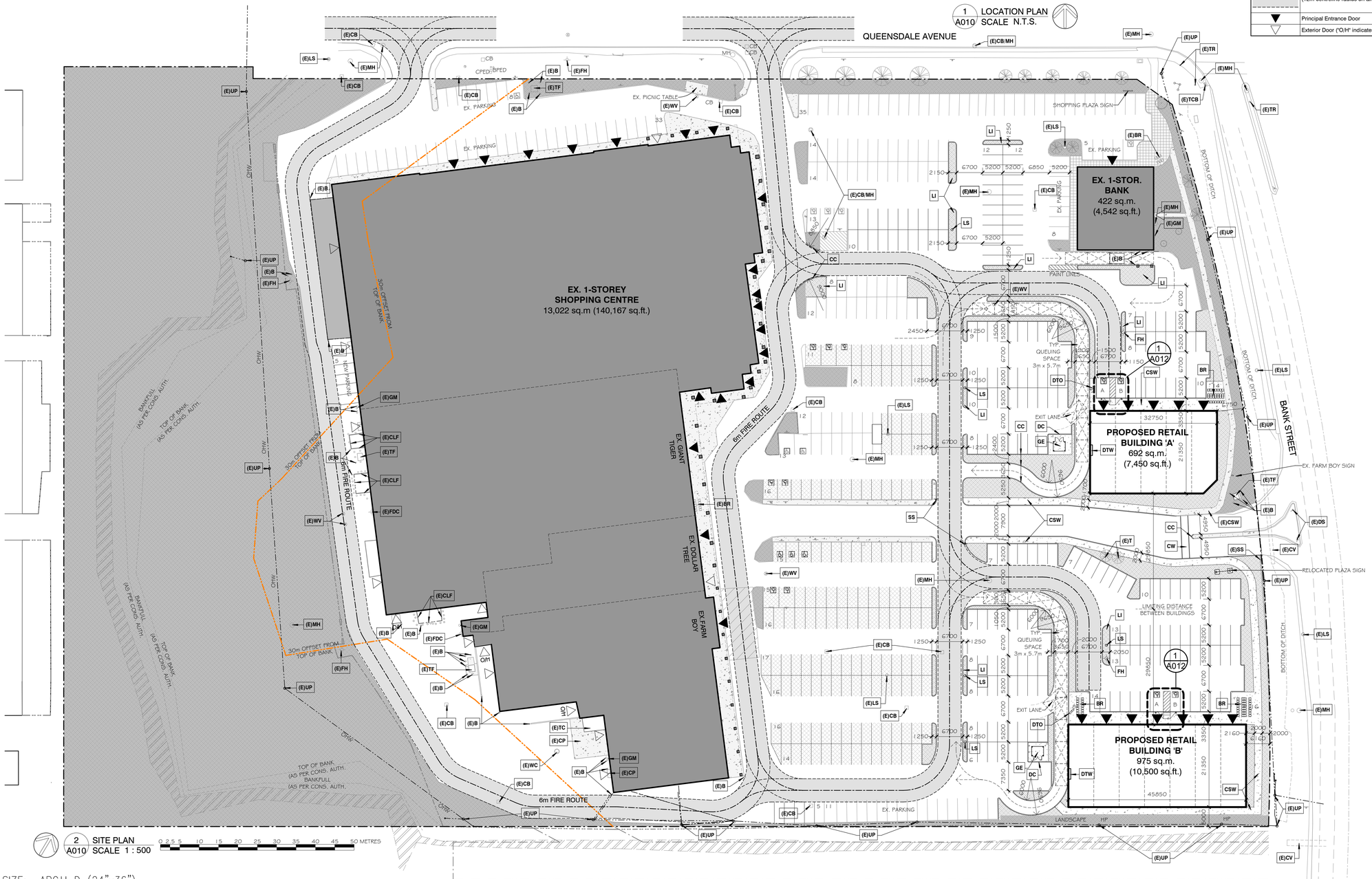
Parking Spaces (2.6m x 5.2m)			*Area C Schedule 1A*
Shopping Centre (3.6 spaces/100 sq.m.)	Required:	544	
	Provided:	544	
Accessible Parking	Required:	13	*(6 Type 'A', 3.4m wide; 7 Type 'B', 2.6m wide)*
	Provided:	21	*(17 Existing; plus 2 Type 'A' & 2 Type 'B')*
Bicycle Parking (0.6m x 1.8m) (Shopping Centre: 1/500 sq.m.)	Required:	30	
	Provided:	46	
Loading Spaces (3.5m x 7.0m)	Required:	2	*(Table 113A)*
	Provided:	3	*(Existing)*



1 / A010 LOCATION PLAN SCALE N.T.S.

SITE PLAN LEGEND

ICON	DESCRIPTION
	Existing Concrete
	Proposed Concrete
	Existing Landscape Area
	Proposed Landscape Area
	Existing Paver Walkway
	Parking Lines to be Repainted
	Watercourse
	Existing Buildings
	Proposed Buildings
	Existing Concrete Curb
	Proposed Concrete Curb
	Overhead Wires
	Property Lines
	Road Lanes
	Fence
	Signage
	BF Parking Space
	6m Wide Fire Route (12m centreline radius on all turns, TYP.)
	Principal Entrance Door
	Exterior Door ('O/H' indicates Overhead Door)



2 / A010 SITE PLAN SCALE 1 : 500 — 0 2.5 5 10 15 20 25 30 35 40 45 50 METRES

plot scale 1:1

SHEET SIZE: ARCH D (24"x36")

NOTES:

Contractor shall check and verify all dimensions on site and report any discrepancies to the Architect before proceeding.

SITE PLAN NOTES

Note #	Note Text
(E)B	Existing Bollard
(E)BR	Existing Bike Rack
(E)CB	Existing Catch Basin
(E)CB/MH	Existing Catch Basin / Manhole
(E)CLF	Existing Chainlink Fence
(E)CP	Existing Concrete Pad
(E)CSW	Existing Concrete Sidewalk
(E)CV	Existing Culvert
(E)DS	Existing Directional Sign
(E)FDC	Existing Fire Department Connection
(E)FH	Existing Fire Hydrant
(E)GM	Existing Gas Meter
(E)LS	Existing Light Standard
(E)MH	Existing Manhole
(E)SS	Existing Stop Sign
(E)T	Existing Tree to remain
(E)TC	Existing Trash Compactor
(E)TCB	Existing Traffic Control Box
(E)TF	Existing Transformer
(E)TR	Existing Traffic Light Pole
(E)UP	Existing Utility Pole
(E)WC	Existing Well Cap
(E)WV	Existing Water Valve
BR	Bike Rack, See Landscape Plan
BRK1	Brick Veneer 'Williamsburg MKII'
BRK2	Brick Veneer 'Sierra Sandstone'
BSC	Brick Soldier Course, 'Sierra Sandstone'
CC	Concrete Curb
CGL	Clear Vision Glass
CSW	Concrete Sidewalk
CW	Crosswalk, Painted Lines
DC	Depressed Curb
DTO	Drive-Thru Order Board
DTW	Drive-Thru Window
EC	EIFS Cornice, Colour - TBD
EIFS	Exterior Insulating Finish System; Colour - TBD
FH	Fire Hydrant
GE	Garbage Enclosure
LI	Landscape Island
LS	Light Standard
MF	Metal Cap Flashing, Colour Matching EIFS
SB	Illuminated Sign Box
SGL	Spandrel Glass, Colour - TBD
SS	Stop Sign

no.	revision	date
0	ISSUED FOR COORDINATION	06 NOV 2019

north / nord

KWC ARCHITECTS INC.
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detail no. / détail no.: 1
sheet no. / feuille no.: A1

project / projet:

NEW FREESTAND RETAIL BUILDINGS BLOSSOM PARK SHOPPING CENTRE
2950-2960 BANK STREET OTTAWA, ON.

designed by / conçu par	KWC
approved by / approuvé par	
drawn by / dessiné par	AK
project no. / no. du projet	1849
date	05 NOVEMBER 2019
scale	as noted

drawing / dessin: **SITE PLAN**

revision / révision:
sheet no. / no. de la feuille: **A010**