1137 Ogilvie Road Servicing and Stormwater Management Report

Stantec

Prepared for:
TC United Development Corporation

April 16, 2025

Prepared by:
Warren Johnson

Project/File:
160402095

Stantec Consulting Ltd.

Revision Schedule

Revision	Description	Author	Date	Quality Check	Date	Independent Review	Date

Disclaimer

The conclusions in the Report titled 1137 Ogilvie Road Servicing and Stormwater Management Report are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from TC United Development Corporation (the "Client") and third parties in the preparation of the Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This Report is intended solely for use by the Client in accordance with Stantec's contract with the Client. While the Report may be provided by the Client to applicable authorities having jurisdiction and to other third parties in connection with the project, Stantec disclaims any legal duty based upon warranty, reliance or any other theory to any third party, and will not be liable to such third party for any damages or losses of any kind that may result.

Prepared by

Signature

Warren Johnson

Printed Name

Reviewed by

Signature

Kris Kilborn

Printed Name

Approved by

Signature

Peter Moroz

Printed Name

Table of Contents

1 Introduction 6
1.1 Objective 7

2 Background 9
3 Water Servicing 10
3.1 Background 10
3.1 Water Demands 10
3.1.1 Potable (Domestic) Water Demands 10
3.1.2 Fire Flow Demands 11
3.2 Level of Servicing 11
3.2.1 Boundary Conditions 11
3.2.2 Allowable Domestic Pressures 11
3.2.3 Allowable Fire Flow Pressures 12
3.2.4 Fire Hydrant Coverage 12
3.3 Proposed Water Servicing 12

4 Wastewater Servicing 13
4.1 Background 13
4.2 Design Criteria 13
4.3 Wastewater Generation and Servicing Design 13
4.4 Proposed Sanitary Servicing 14

5 Stormwater Management and Servicing 15
5.1 Background 15
5.2 Stormwater Management (SWM) Criteria 15
5.3 Existing Conditions 16
5.4 Stormwater Management Design 16
5.4.1 Allowable Release Rate 17
5.4.2 Quantity Control 18
5.4.3 Quality Control 19
5.5 Results 19
5.6 Proposed Stormwater Servicing 20

6 Site Grading 21
7 Utilities 22
8 Approvals 23
9 Erosion and Sediment Control During Construction 24
10 Geotechnical Investigation 25
11 Conclusions 26
11.1 Water Servicing 26
11.2 Sanitary Servicing 26
11.3 Stormwater Servicing and Management 26
11.4 Grading 26
11.5 Erosion and Sediment Control During Construction 26
11.6 Geotechnical Investigation 27
11.7 Utilities 27
11.8 Approvals 27

List of Tables

Table 1.1: Unit Type Breakdown 7
Table 3.1: Estimated Water Demands 10
Table 3.2: Boundary Conditions 11
Table 4.1: Estimated Peak Wastewater Flow 14
Table 5.1: Summary of Subcatchment Areas 16
Table 5.2: Peak Pre-Development Flow Rates 17
Table 5.3: Peak Post-Development Discharge of Uncontrolled Areas 18
Table 5.4: Total Volume for Each Storage Option 19
Table 5.5: Comparison of Pre- and Post-Development Release Rates 19
Table 10.1: Pavement Structure 25

List of Figures

Figure 1-1: Key Plan of Site 6

List of Appendices

Appendix A Appendix A Background Documents
A.1 Correspondence with Architect on Construction Type
A.2 Pre-Consultation Meeting Minutes from Previous 1137 Ogilvie Road Application
Appendix B Water Servicing
B.1 Domestic Water Demands
B.2 Fire Flow Demands (2020 FUS)
B.3 Boundary Conditions
B.4 Fire Hydrant Coverage Calculations
Appendix C Sanitary
C.1 Sanitary Sewer Design Sheet
C.2 Correspondence with City on Sanitary Sewer Capacity
Appendix D Stormwater Servicing
D.1 Modified Rational Method Sheet
D.2 Storm Sewer Design Sheet
D.3 Stormceptor Report and Specifications
Appendix E Background Studies
E.1 Geotechnical Investigation (Paterson Group, February 2025)

1 Introduction

Stantec Consulting Ltd. has been commissioned by TCU Development Corporation to prepare the following Servicing Report in support of a Site Plan Control application for the proposed development located at 1137 Ogilvie Road Cummings Avenue in the City of Ottawa.

The 0.45 ha site is situated at the northeast corner of the intersection between Cummings Avenue and Ogilvie Road. The site is currently zoned LC6 and contains an existing one-storey commercial building with surface parking and small grassed areas. The site is bound by Ogilvie Road to the south, Cummings Avenue to the west, an existing residential development to the north and an existing commercial property to the east as shown in **Figure 1-1** below.

Figure 1-1: Key Plan of Site

The proposed 0.45 ha site comprises of a 30-storey plus mechanical penthouse mixed-use building with around 543 m^2 of ground floor commercial area. Roderick Lahey Architect Inc. has prepared a site plan

dated April 1, 2025, which defines the proposed development. It is anticipated that a 30-storey plus mechanical penthouse mixed-use building will be constructed on the adjacent 1151 Ogilvie Road property as part of a future Phase 2 of the development. The future building is anticipated to be serviced through the proposed infrastructure on the 1137 Ogilvie Road development and as such has been accounted for as part of this analysis. The unit type breakdown is listed in **Table 1.1** below as confirmed by Roderick Lahey Architect Inc.

Table 1.1: Unit Type Breakdown

Unit Type	1137 Ogilvie Number	1151 Ogilvie Number
Studio	211	139
One-bedroom	77	120
One-bedroom with Study	26	51
Two-bedroom	94	70
Two-bedroom with Study	28	27
Three-bedroom	0	0
Total	**436**	**407**

1.1 Objective

This site servicing and stormwater management (SWM) report presents a servicing scheme that is free of conflicts, provides on-site servicing in accordance with City of Ottawa Design Guidelines, and uses the existing municipal infrastructure in accordance with any limitations communicated during consultation with the City of Ottawa staff. Details of the existing infrastructure located within Cummings Avenue and Ogilvie Road were obtained from available as-built drawings and site topographic survey.

Criteria and constraints provided by the City of Ottawa have been used as a basis for the detailed servicing design of the proposed development. Specific and potential development constraints to be addressed are as follows:

- Potable Water Servicing
    - Estimated water demands to characterize the proposed feed(s) for the proposed development which will be serviced from the existing 305 mm diameter watermain within the Cummings Avenue ROW.
    - Watermain servicing for the development is to be able to provide average day and maximum day (including peak hour) demands (i.e., non-emergency conditions) at pressures within the acceptable range of 345 to 552 kPa (50 to 80 psi).
    - Under fire flow (emergency) conditions, the water distribution system is to maintain a minimum pressure greater than 140 kPa (20 psi).
- Wastewater (Sanitary) Servicing
    - Define and size the sanitary service laterals which will be connected to the existing 250 mm diameter sanitary sewer within the Cummings Avenue ROW.
- Storm Sewer Servicing

  - Define major and minor conveyance systems in conjunction with the proposed grading plan.
  - Determine the stormwater management storage requirements to meet the allowable release rate for the site.
  - Define and size the proposed storm service lateral that will be connected to the existing 525 mm diameter municipal storm sewer within the Ogilvie Road ROW.
- Prepare a grading plan in accordance with the proposed site plan and existing grades.

Drawing SSP-1 illustrates the proposed servicing scheme for the site.

2 Background

Documents referenced in preparing this stormwater and servicing report include:

- *City of Ottawa Sewer Design Guidelines* (SDG), City of Ottawa, October 2012, including all subsequent technical bulletins
- *City of Ottawa Design Guidelines – Water Distribution*, City of Ottawa, July 2010, including all subsequent technical bulletins
- *Design Guidelines for Drinking Water Systems*, Ministry of the Environment, Conservation, and Parks (MECP), 2008
- *Fire Protection Water Supply Guideline* for Part 3 in the Ontario Building Code, Office of the Fire Marshal (OFM), October 2020
- *Water Supply for Public Fire Protection*, Fire Underwriters Survey (FUS), 2020
- *Geotechnical Investigation – Proposed Multi-Storey Building, 1137 to 1151 Ogilvie Road & 1111 Cummings Avenue, Ottawa, ON,* Paterson Group Inc, February 2025.
- *1137/1151 Ogilvie Road and 1111 Cummings Avenue Servicing and Stormwater Management Report*, Stantec Consulting Ltd., February 2025

3 Water Servicing

3.1 Background

The proposed development comprises of a 30-storey plus mechanical penthouse mixed-use building with around 543 m^2 of ground floor commercial area. The site is within Pressure Zone 1E of the City of Ottawa's Water Distribution System and is bounded by an existing 305 mm diameter watermain within Cummings Avenue and an existing 610 mm diameter watermain on Ogilvie Road. The existing dwelling has a water service lateral connection to the existing 610 mm diameter watermain on Ogilvie Road. The location of the existing services shall be confirmed by the contractor prior to construction and are to be blanked at the main by City forces.

It is anticipated that a 30-storey plus mechanical penthouse mixed-use building will be constructed on the adjacent 1151 Ogilvie Road property as part of a future Phase 2 of the development. The future building is anticipated to be serviced through the proposed infrastructure on the 1137 Ogilvie Road development and as such has been accounted for as part of this analysis.

3.1 Water Demands

3.1.1 Potable (Domestic) Water Demands

The City of Ottawa Water Distribution Guidelines (July 2010) and ISTB 2021-03 Technical Bulletin were used to determine water demands based on projected population densities for residential areas and associated peaking factors.

The population was estimated using an occupancy of 1.4 persons per unit for studio and one-bedroom apartments, 2.1 persons per unit for one-bedroom with study and two-bedroom apartments and 3.1 persons per unit for two-bedroom with study and three-bedroom units. Based on the unit type breakdown in **Table 1.1**, the proposed buildings are estimated to have a total population of 1442 persons.

A daily rate of 280 L/cap/day and 28,000 L/gross ha/day has been used to estimate average daily (AVDY) potable water demand for the residential units and commercial area respectively. Maximum daily (MXDY) demands were determined by multiplying the AVDY demands by a factor of 2.5 for residential areas and 1.5 for commercial areas, while peak hourly (PKHR) demands were determined by multiplying the MXDY demands by a factor of 2.2 for residential areas and 1.8 for commercial areas. The estimated demand for the proposed residential building is summarized in **Table 3.1** below and detailed in **Appendix B.1**.

Table 3.1: Estimated Water Demands

Demand Type	Area (m^2)	Population	AVDY (L/s)	MXDY (L/s)	PKHR (L/s)
Residential	-	1442	4.67	11.69	25.71

Commercial	773	-	0.02	0.03	0.05
Total Site:	**773**	**1420**	**4.69**	**11.71**	**25.76**

3.1.2 Fire Flow Demands

Fire flow demand was calculated based on the 2020 Fire Underwriters Survey (FUS) Guidelines. The FUS estimate is based on a building of non-combustible construction type. Additionally, it is anticipated that the buildings will be equipped with an automatic sprinkler system that is fully supervised and conforms to the NFPA 13 standard. Required fire flows were determined to be 83.3 L/s (5,000 L/min). Detailed fire flow calculations per the FUS methodology are provided in **Appendix B.2**, while correspondence with the architect on the construction type are provided in **Appendix A.1**.

3.2 Level of Servicing

3.2.1 Boundary Conditions

The estimated domestic water and fire flow demands were used to define the level of servicing required for the proposed development from the municipal watermain and hydrants within the Cummings Avenue ROW. Boundary conditions were previously provided by the City for the site during the Zoning By-Law Amendment application as part of the Functional servicing report titled *1137/1151 Ogilvie Road and 1111 Cummings Avenue Servicing and Stormwater Management Report*, prepared by Stantec Consulting Ltd., dated February 2025. Since there were no significant changes to domestic water and fire flow demands it was deemed reasonable to use the previously provided boundary conditions. **Table 3.2** outlines the boundary conditions provided by the City of Ottawa during the Zoning By-Law Amendment application (refer to **Appendix B.3**).

Table 3.2: Boundary Conditions

	Connection at Cummings Avenue
Min. HGL (m)	109.3
Max. HGL (m)	118.2
Max. Day + Fire Flow (100.0 L/s) HGL (m)	113.0

3.2.2 Allowable Domestic Pressures

The desired normal operating pressure range in occupied areas as per the City of Ottawa 2010 Water Distribution Design Guidelines is 345 kPa to 552 kPa (50 psi to 80 psi) under a condition of maximum daily flow and no less than 276 kPa (40 psi) under a condition of maximum hourly demand. Furthermore, the maximum pressure at any point in the water distribution should not exceed 689 kPa (100 psi) as per the Ontario Building/Plumbing Code; pressure reducing measures are required to service areas where pressures greater than 552 kPa (80 psi) are anticipated in occupied areas.

The proposed finished floor elevation, 72.20 m, will serve as the ground floor elevation for the calculation of the residual pressures at ground level. As per the boundary conditions, the on-site pressures are expected to range from 364.0 kPa (52.8 psi) to 450.9 kPa (65.4 psi) under normal operating conditions, which are within the normal operating pressure range defined by the City of Ottawa as within 276 kPa (40 psi) to 552 kPa (80 psi). It is anticipated that booster pumps will be required to service the upper stories of the building.

3.2.3 Allowable Fire Flow Pressures

The boundary conditions provided by the City of Ottawa indicate that the watermain within Cummings Avenue is expected to maintain a residual pressure of 40.8 m equivalent to 400.0 kPa (58.0 psi) under worst-case fire flow conditions. This demonstrates that the watermain and nearby hydrants can provide the required fire flows while maintaining a residual pressure of 20 psi.

3.2.4 Fire Hydrant Coverage

The building will be sprinklered and a Siamese (fire department) connection is to be provided with an unobstructed maximum distance of 45 m from the Siamese connection to the closest hydrant, as per the Ontario Building Code (OBC). There are two existing hydrants in the proximity of the proposed development site, as shown on drawing **SSP-1**.

According to the NFPA 1 Table 18.5.4.3 in Appendix I of the City of Ottawa Technical Bulletin ISTB-2018-02, a hydrant situated less than 76 m away from a building can supply a maximum capacity of 5,678 L/min, while a hydrant situated between 76 m and 152 m away from a building can supply a maximum capacity of 3,785 L/min. Hence, the required fire flow demands for the proposed building can be achieved with the existing hydrants at the intersection of Cummings Avenue and Ogilvie Road (HYD-01) and at Ken Steele Park (HYD-02). Refer to **Appendix B.4** for fire hydrant coverage calculations.

3.3 Proposed Water Servicing

The development will be serviced via dual 150 mm building services connecting to the existing 305 mm diameter watermain on Cummings Avenue with a 300 mm main isolation valve. The water valves are proposed to allow for the isolation of the municipal watermain to the north or south on Cummings Avenue in case of any breaks, repairs, or replacements of the municipal water system north or south of the proposed site.

The proposed water servicing is shown on **Drawing SSP-1**. Based on the City of Ottawa Water Design Guidelines and the provided boundary conditions, the existing 305 mm diameter watermain on Cummings Avenue can provide adequate fire and domestic flows for the subject site.

Confirmation of the service sizes to the building, the water pressure within the building, and booster pump requirements to meet building code will be the responsibility of the mechanical engineering consultant at the building permit phase.

4 Wastewater Servicing

4.1 Background

The existing municipal sanitary sewers adjacent to the site consist of existing 250 mm diameter asbestos cement sanitary sewers within the Cummings Avenue and Ogilvie Road ROW's. The location of the existing sanitary service lateral shall be confirmed by the contractor prior to construction and is to be abandoned as part of the servicing works.

It is anticipated that a 30-storey plus mechanical penthouse mixed-use building will be constructed on the adjacent 1151 Ogilvie Road property as part of a future Phase 2 of the development. The future building is anticipated to be serviced through the proposed infrastructure on the 1137 Ogilvie Road development and as such has been accounted for as part of this analysis.

4.2 Design Criteria

As outlined in the City of Ottawa Sewer Design Guidelines and the MECP Design Guidelines for Sewage Works, the following criteria were used to calculate the estimated wastewater flow rates and to determine the size and location of the sanitary service lateral:

- Minimum velocity = 0.6 m/s (0.8 m/s for upstream sections)
- Maximum velocity = 3.0 m/s
- Manning roughness coefficient for all smooth wall pipes = 0.013
- Minimum size of sanitary sewer service = 135 mm
- Minimum grade of sanitary sewer service = 1.0 % (2.0 % preferred)
- Average wastewater generation = 280 L/person/day (per City Design Guidelines)
- Peak Factor = based on Harmon Equation; maximum of 4.0 (residential)
- Harmon correction factor = 0.8
- Infiltration allowance = 0.33 L/s/ha (per City Design Guidelines)
- Minimum cover for sewer service connections = 2.0 m
- Population density for one-bedroom and bachelor apartments =1.4 persons/apartment
- Population density for one-bedroom with den and two-bedroom apartments = 2.1 persons/apartment
- Population density for two-bedroom with den and three-bedroom apartments = 3.1 persons/apartment

4.3 Wastewater Generation and Servicing Design

The estimated peak wastewater flows generated are based on the current site plan and unit breakdown as shown in **Table 1.1**. The anticipated wastewater peak flow generated from the proposed development is summarized in **Table 4.1** below.

Table 4.1: Estimated Peak Wastewater Flow

Peak Residential Wastewater Flow			C+I+I Flow	Infiltration Flow (L/s)	Total Peak Flow (L/s)
Population	Peak Factor	Peak Flow (L/s)			
1442	3.15	14.74	0.03	0.23	15.00

Preliminary sanitary sewage calculations are included in **Appendix C.1**.

The estimated peak wastewater flows for the proposed development were provided to the City of Ottawa staff on November 28, 2024 (see **Appendix C.2**) to evaluate the adequacy of the receiving municipal sanitary sewer system in the vicinity of the site and downstream network during the Zoning By-Law Amendment application as part of the Functional servicing report titled *1137/1151 Ogilvie Road and 1111 Cummings Avenue Servicing and Stormwater Management Report*, prepared by Stantec Consulting Ltd., dated February 2025. During this process, City Staff confirmed that the downstream municipal sanitary sewers have adequate capacity to accept the estimated peak sanitary flow from the development.

Since there are no significant changes to total peak flows from the proposed site as part of this detailed design analysis it is anticipated that there is adequate capacity in the downstream receiving sewers.

4.4 Proposed Sanitary Servicing

Sanitary discharge from the site is to outlet through a sanitary monitoring manhole before connecting to the existing 250 mm diameter sanitary sewer in Cummings Avenue via a 200 mm diameter sanitary building service and a new manhole within Cummings Avenue. Due to the depth of the underground parking garage, sanitary sump pumps will be required to discharge the internal sanitary sewers. The proposed functional sanitary servicing is shown on **Drawing SSP-1 and SA-1**.

The mechanical engineering consultant is responsible to confirm service lateral sizes, sump pump requirements, and that the appropriate backwater valve requirements are satisfied at the building permit phase.

5 Stormwater Management and Servicing

5.1 Background

The existing storm servicing system along the boundaries of the site consists of curb and catch basins (urban roadway section) along Cummings Avenue and Ogilvie Road, with the drainage collected by the catch basins directed to the 525 mm diameter storm sewer within Ogilvie Road and the 600 mm diameter storm sewer within Cummings Avenue.

It is anticipated that a 30-storey plus mechanical penthouse mixed-use building will be constructed on the adjacent 1151 Ogilvie Road property as part of a future Phase 2 of the development. The future building is anticipated to be serviced through the proposed infrastructure on the 1137 Ogilvie Road development and as such has been accounted for as part of this analysis.

5.2 Stormwater Management (SWM) Criteria

The Stormwater Management (SWM) criteria were established by combining current design practices outlined by the City of Ottawa Sewer Design Guidelines (SDG) (October 2012), review of project pre-consultation notes with the City of Ottawa, and through consultation with City of Ottawa staff during the Zoning By-Law Amendment application. The following summarizes the criteria, with the source of each criterion indicated in brackets:

General

- Use of the dual drainage principle (City of Ottawa SDG)
- Wherever feasible and practical, site-level measures should be used to reduce and control the volume and rate of runoff (City of Ottawa SDG)
- Assess impact of 100-year event outlined in the City of Ottawa Sewer Design Guidelines on the major and minor drainage systems (City of Ottawa SDG)

Storm Sewer & Inlet Controls

- Discharge for each storm event to be restricted to a 2-year storm event pre-development rate with a maximum pre-development C coefficient of 0.5 (City of Ottawa pre-consultation)
- Peak flows generated from events greater than the 2-year storm up to and including the 100-year storm must be detained on site (City of Ottawa pre-consultation)
- The preferred stormwater system outlet for this site is the 525 mm diameter storm sewer within Ogilvie Road
- The foundation drainage system is to be pumped to the building site storm service lateral directed to Ogilvie Road.
- T_c should be not less than 10 minutes (City of Ottawa SDG).

Surface Storage & Overland Flow

- Building openings to be a minimum of 0.30 m above the 100-year water level (City of Ottawa SDG)
- Maximum depth of flow under either static or dynamic conditions shall be less than 0.35 m (City of Ottawa SDG)
- Provide adequate emergency overflow conveyance off-site with a minimum vertical clearance of 15 cm between the spill elevation and the ground elevation at the building envelope in the proximity of the flow route or ponding area (City of Ottawa SDG)

Quality Control

- An enhanced level of quality control of 80% Total Suspended Solids (TSS) Removal is required for this site (City of Ottawa pre-consultation)

5.3 Existing Conditions

The 0.45 ha site area currently consists of an existing strip mall with asphalt parking and patches of grassed areas and some trees. The 0.26 ha future Phase 2 property on 1151 Ogilvie Road currently consists of an existing restaurant with asphalt parking and patches of grassed areas and some trees. The existing storm drainage plan (**Drawing EXSD-1**) shows the existing surface conditions and related runoff coefficients considered. The pre-development imperviousness of the proposed and future development area is calculated at 91 % (C = 0.84).

Under existing conditions stormwater runoff, the from the majority of the 1137 Ogilvie Road property drains uncontrolled to the public drainage system with a small portion of drainage directed north to a private catch basin on 96-106 Strathaven Private. A network of private catch basins exists through the 1151 Ogilvie Road property and ultimately discharge to the existing 450 mm diameter storm sewer within Ogilvie Road.

5.4 Stormwater Management Design

The Modified Rational Method (MRM) is employed to assess the rate and volume of runoff anticipated during post-development rainfall runoff events. Based on the proposed Site Plan and Grading Plan, drainage area boundaries are defined, runoff coefficient values are then assigned to each drainage area based on the anticipated finished surface condition (e.g. asphalt, concrete, gravel, grass, etc.). Runoff coefficients for each surface type are assigned based on City of Ottawa SDG and accepted practices. A summary of subareas and runoff coefficients is provided in **Table 5.1** below. Further details can be found in **Appendix D.1**, while **Drawing SD-1** illustrates the proposed sub-catchments.

Table 5.1: Summary of Subcatchment Areas

Catchment Areas	C	A (ha)	Catchment Type	Outlet
BLDG	0.90	0.17	Tributary	525 mm Storm Sewer (Ogilvie Road)
1151	0.85	0.22	Tributary	525 mm Storm Sewer (Ogilvie Road)

CISTERN	0.72	0.22	Tributary	525 mm Storm Sewer (Ogilvie Road)
UNC-1	0.70	0.07	Non-Tributary	Ogilvie Road ROW Cummings Avenue ROW
UNC-2	0.70	0.03	Non-Tributary	Ogilvie Road ROW
Total Site	**0.80**	**0.71**	**-**	**-**

5.4.1 Allowable Release Rate

Based on pre-consultation with City of Ottawa staff, the design criterion for the peak post-development discharge from the subject site is to be limited to the discharge resulting from the 2-year pre-development event using a site runoff coefficient of C= 0.5 or the pre-development C, whichever is less. Based on the calculated C value of 0.84 for the existing site condition, a runoff coefficient of 0.5 is used to establish the allowable release rate.

Given the limitations of site grading based on the existing topography, and the existing uncontrolled runoff condition for the site, it is proposed that the post-development drainage pattern for the uncontrolled areas (UNC-1 and UNC-2) along the west and south perimeters be allowed to continue to drain uncontrolled to the adjacent public roads. The resultant areas that can be restricted to meet the allowable release rate is limited to drainage areas defined by 'BLDG', '1151', and 'CISTERN', totalling 0.61 ha.

The allowable release rate for the site is determined using the modified rational method based on the criteria above. A time of concentration of 10 minutes is used based on the small site size, its proximity to the existing drainage outlet, and recommendations provided during pre-consultation with the City.

The peak pre-development flow rates shown in **Table 5.2** have been calculated using the rational method as follows:

$$Q = 2.78\,(C)(I)(A)$$

Where:
$Q = peak\ flow\ rate, L/s$
$C = site\ runoff\ coefficient$
$I = rainfall\ intensity, mm/hr\ (per\ City\ of\ Ottawa\ IDF\ curves)$
$A = drainage\ area, ha$

Table 5.2: Peak Pre-Development Flow Rates

Design Storm	Pre-Development Flow Rate (L/s) for C=0.50, A=0.71 ha, t_c = 10 min
2-year	**75.8**

For the proposed development, the target allowable release rate of 75.8 L/s is used to assess water quantity control measures to be applied.

5.4.1.1 Uncontrolled Areas

As specified above, considering the existing conditions of the site and the grading restrictions along the site's perimeter, it is proposed to control the interior of the site and the apartment building roof areas only and allow the rest of the site to drain uncontrolled per existing conditions. The drainage areas UNC-1 and UNC-2 will direct uncontrolled surface runoff to the Cummings Avenue and Ogilvie Road ROW's. Peak discharges from the uncontrolled areas are calculated using the Modified Rational Method (MRM) approach and are summarized in the **Table 5.3** below.

Table 5.3: Peak Post-Development Discharge of Uncontrolled Areas

Uncontrolled Drainage Area	2-Year Post-Development Discharge (L/s)	100-Year Post-Development Discharge (L/s)
UNC-1	9.7	28.2
UNC-2	5.8	12.5
Total Uncontrolled	**15.5**	**40.7**

The proposed uncontrolled runoff condition from 0.09 ha is considered an improvement over the existing condition during which the area outside the strip mall building, at 0.40 ha, contributes uncontrolled runoff to the existing public drainage system.

For reference, the uncontrolled runoff rates for the existing 0.40 ha site area (applying the 0.89 runoff coefficient as per drawing **EXSD-1**) are 76.0 L/s for the 2-year return period, and 176.7 L/s for the 100-year return period design storms.

5.4.2 Quantity Control

Based on the change in overall imperviousness of the site, expressed by the calculated runoff coefficients, quantity control measures are needed to manage stormwater runoff. The use of a controlled cistern (to be designed by the mechanical engineering consultant) contained within the underground parking area which captures the proposed roof, access road, and amenity areas is proposed to reduce site peak outflow to the allowable target release rates. A spreadsheet approach using the MRM is used to determine the storage volume required for both storage options.

The associated calculations consider the allowable release rate of 75.8 L/s for the uncontrolled area, the roof areas, and controlled areas tributary to the proposed SWM underground storage and the runoff coefficients associated with the proposed post-development catchments. The MRM calculations used to establish the storage volume requirements are provided in **Appendix D.1** and the storm sewer design sheet is provided in **Appendix D.2**.

The total storage volumes are tabulated in **Table 5.4** below. The proposed design can attenuate peak flows from the roof and controlled areas for a release at a controlled flow rate to meet the target allowable release rate for the site.

Table 5.4: Total Volume for Each Storage Option

Storage	Required Storage (m^3)	Cistern (m^3)
Cistern	212	215

5.4.3 Quality Control

To meet the expected quality control requirements of 80% TSS removal for the site, storm runoff from the proposed development area will be captured within the site storm sewer system and directed to a proposed oil/grit separator (OGS) unit downstream of the cistern. A Stormceptor EFO4 unit has been sized to provide 83% TSS removal from the contributing areas. For further details regarding the sizing and specifications of the Stormceptor EFO4 see **Appendix D.3**.

5.5 Results

Through the MRM analysis, the controlled 2-year post-development release rates are under the pre-development target release rate of 75.8 L/s. In addition, the 100-year post-development storm event release rate will be maintained at the 75.8 L/s allowable target. The uncontrolled portions of the site with runoff draining to the adjacent ROWs are consistent with the existing drainage pattern.

Relative to the existing site condition with 0.40 ha of uncontrolled runoff, the proposed post-development 2-year flow control for 0.61 ha of the site is anticipated to reduce the total stormwater discharge from the site. The data summarized in **Table 5.5** indicates that the proposed SWM plan reduces the overall site storm runoff release rate by 74.4 % compared to the pre-development C=0.84, 100-year design storm event.

Table 5.5: Comparison of Pre- and Post-Development Release Rates

Drainage areas	2-year Discharge (L/s)	100-Year Discharge (L/s)
Pre-Development Total (0.71 ha)	127.3	296.1
Post-Development		
Tributary (0.61 ha)	35.1	35.1
Non-Tributary (0.10 ha)	15.5	40.7
Post-Development Total (0.71 ha)	50.6	75.8
Target (L/s)	**75.8**	**75.8**
Difference (Post minus Pre)	**-76.7 (-59.7 %)**	**-220.2 (-74.4 %)**

5.6 Proposed Stormwater Servicing

The development is to be serviced via an internal storm network part of the building's mechanical system, which will receive the runoff from the roof and site areas. Stormwater detention infrastructure through the use of an underground cistern will be provided onsite and discharged from the proposed development at a controlled flow rate. Due to the depth of the underground parking garage, storm sump pumps will be required to discharge the foundation drains. See **Drawings SSP-1** and **SD-1** for the proposed locations of the stormwater infrastructure.

The mechanical engineering consultant is responsible to confirm sizing of the sump pumps and services to the building, that the appropriate backwater valve requirements are satisfied, and that any roof drainage systems and underground storages and pumping systems are adequate for accommodating the 100-year design storm conditions.

6 Site Grading

The proposed re-development site measures approximately 0.45 ha in area and consists of surface parking, grassed areas with trees and two existing commercial buildings. The topography across the site generally slopes from the eastern boundary towards the Cummings Avenue ROW at the west and away from the commercial building to the Ogilvie Road ROW to the south.

A grading plan (see **Drawing GP-1**) has been provided to satisfy the stormwater management requirements, as detailed in **Section 5**, adhere to any grade raise restrictions for the site, and provide for minimum cover requirements for storm and sanitary sewers where possible.

Site grading has been established to provide emergency overland flow routes required for stormwater management. Upon review of the existing grading at neighbouring properties, it is concluded the site will not receive external drainage from the neighbouring properties. The main overland escape route will follow the west drive aisle with overland flow to Cummings Avenue right of way while a portion of the site will be directed towards the Ogilvie Road right of way. A section of the existing parking lot on the 1157 Ogilvie Road property will need to be regraded to tie into the proposed access lane elevations.

7 Utilities

Overhead (OH) hydro-wires run parallel to the west property line. All utilities within the work area will require relocation during construction. The existing utility poles within the public right of way are to be protected during construction.

As the site is surrounded by existing residential and commercial development, Hydro Ottawa, Bell, Rogers, and Enbridge servicing is readily available through existing infrastructure to service this site. The exact size, location, and routing of utilities will be finalized after design circulation. Existing underground hydro ducts and gas service north of the existing commercial building are to be removed as per **Drawing EX-1**. Existing overhead wires and utility plants may need to be temporarily moved/reconfigured to allow sufficient clearance for the movement of heavy machinery required for construction. The relocation of existing utilities will be coordinated with the individual utility providers upon design circulation.

8 Approvals

An Environmental Compliance Approval (ECA) from the Ontario Ministry of Environment, Conservation, and Parks (MECP) is not anticipated for the proposed servicing works for the 1137 Ogilvie Road property as all services are connecting into existing sewer infrastructure, and service a single property parcel of non-industrial nature. However, during Phase 2 of the development, if the 1137 and 1151 Ogilvie Road properties remain under separate ownership the sites would be required to follow the Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Application (ECA) process under O.Reg. 525/98 since the two properties are intended to have a single service connection.

For ground or surface water volumes being pumped during the construction phase, typically between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). It is possible that groundwater may be encountered during the foundation excavation on this site. A minimum of two to four weeks should be allotted for completion of the EASR registration and the preparation of the Water Taking and Discharge Plan by a Qualified Person as stipulated under O.Reg. 63/16. An MECP Permit to Take Water (PTTW), which is required for dewatering volumes exceeding 400,000L/day, is not anticipated for the site.

9 Erosion and Sediment Control During Construction

To protect downstream water quality and prevent sediment build-up in catch basins and storm sewers, erosion and sediment control measures must be implemented during construction. The following recommendations will be included in the contract documents and communicated to the Contractor.

1. Implement best management practices to provide appropriate protection of the existing and proposed drainage system and the receiving water course(s).
2. Limit the extent of the exposed soils at any given time.
3. Re-vegetate exposed areas as soon as possible.
4. Minimize the area to be cleared and grubbed.
5. Protect exposed slopes with geotextiles, geogrid, or synthetic mulches.
6. Install silt barriers/fencing around the perimeter of the site to prevent the migration of sediment offsite.
7. Install trackout control mats (mud mats) at the entrance/egress to prevent migration of sediment into the public ROW.
8. Provide sediment traps and basins during dewatering works.
9. Install sediment traps (such as SiltSack® by Terrafix) between catch basins and frames.
10. Schedule the construction works at times which avoid flooding due to seasonal rains.

The Contractor will also be required to complete inspections and guarantee the proper performance of their erosion and sediment control measures at least after every rainfall. The inspections are to include:

- Verification that water is not flowing under silt barriers.
- Cleaning and changing the sediment traps placed on catch basins.

Refer to Drawing EC-1 for details of the proposed erosion control measures.

10 Geotechnical Investigation

A geotechnical investigation for 1137 to 1151 Ogilvie Road and 1111 Cummings Avenue was completed by Paterson on February 3, 2025. Field testing consisting of the advancement of nine boreholes to a maximum depth of 7.1m below existing grade was carried out throughout the subject site on April 19, 2021 and June 4, 2024. The information obtained from the field investigation will guide the site design and identify development constraints.

The subsurface profile encountered at the test hole locations consists of asphaltic concrete, underlain by fill and glacial till, overlying bedrock. The fill was noted to consist of a mixture of brown silty sand with gravel and crushed stone, trace topsoil and organics. Bedrock was observed to consist of black shale and is classified as very poor quality at the top, generally increasing in quality with depth.

Groundwater levels were measured to be at depths ranging from 1.90 m to 3.15 m below ground surface (BGS) at six boreholes on site. Long term groundwater level is estimated to be at 2.5 m to 3.5 m BGS, though seasonal variations in the water table should be expected.

Clean imported granular fill should be used for grading beneath the building areas, while site-excavated soil and non-specified existing fill can be used for general landscaping fill where settlement of the ground surface is of minor concern.

The subject site is considered suitable for the proposed buildings, and it is recommended that it be founded using conventional spread footings placed on clean, surface sounded bedrock. Bedrock removal will be required to complete the underground parking level.

The recommended rigid pavement structure is provided as follows in **Table 10.1** below.

Table 10.1: Pavement Structure

Material	Thickness (mm)		
	Access Lanes Over Podium	Car Parking Over Podium	Underground Parking
Exposure Class C2 – 32 MPa concrete with air entrainment	-	-	125
Wear Course – HL-3 or Superpave 12.5 Asphaltic Concrete	40	50	-
Binder – HL-8 or Superpave 19.0 Asphaltic Concrete	50	-	-
Base – OPSS Granular A Crushed Stone	300	200	300
Sub-Base – OPSS Granular B Type II	-	-	-

Refer to the full geotechnical report attached as part of the submission package for further details.

11 Conclusions

11.1 Water Servicing

Based on the supplied boundary conditions for existing watermains and calculated domestic and fire flow demands for the subject site, the adjacent watermain on Cummings Avenue has sufficient capacity to sustain the required domestic demands and fire flow demands for the site. The proposed development will be serviced by the existing 305 mm watermain on Cummings Avenue via a dual connection. Sizing of the water service laterals and booster pump requirements are to be confirmed by the mechanical engineering consultant.

11.2 Sanitary Servicing

The proposed sanitary sewer service will consist of a 200 mm diameter sanitary service lateral connected to the existing 250 mm diameter sanitary sewer on Cummings Avenue. The municipal sanitary sewers are anticipated to have the downstream capacity required to receive the projected peak wastewater flows from the proposed development. Sizing of the service lateral and the appropriate backwater valve requirements are to be confirmed by the mechanical consultant.

11.3 Stormwater Servicing and Management

The proposed storm service will consist of the internal storm sewers within the building's mechanical system and roof and foundation drains directing stormwater to the existing 525 mm diameter storm sewer in Ogilvie Road. Stormwater storage through an underground cistern within the underground parking levels will meet the site's target discharge. Sizing of the storm sewer laterals, design of the roof drains, cistern and sump pumps, and the appropriate backwater valve requirements are to be confirmed by the mechanical engineering consultant.

11.4 Grading

Site grading is designed to provide an adequate emergency overland flow route and drainage to support the proposed storm sewer network and SWM systems. The site will not receive external drainage from neighbouring properties. The west and south sides drain uncontrolled to the Cummings Avenue and Ogilvie Road rights-of-way as per existing conditions.

11.5 Erosion and Sediment Control During Construction

Erosion and sediment control measures and best management practices outlined in this report will be implemented during construction to reduce the impact on adjacent properties, the public ROW, and existing facilities.

11.6 Geotechnical Investigation

Based on the Geotechnical Investigation, the site is considered suitable for the proposed building, and it is recommended that it be founded using conventional spread footing placed on clean, surface sounded bedrock. Long term groundwater level is estimated to be at 2.5 to 3.5 m BGS, though seasonal variations in the water table should be expected.

11.7 Utilities

The site is situated within an established neighbourhood, hence existing utility infrastructure is readily available to service the proposed development.

11.8 Approvals

The proposed 1137 Ogilvie Road development services connect into existing infrastructure and service a single property parcel of non-industrial nature so an Environmental Compliance Approval (ECA) from the Ontario Ministry of Environment, Conservation, and Parks (MECP) is not anticipated. However, during Phase 2 of the development, if the 1137 and 1151 Ogilvie Road properties remain under separate ownership the Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Application (ECA) process under O.Reg. 525/98 will be required. For the expected dewatering needs of 50,000 to 400,000 L/day, the proponent will need to register on the MECP's Environmental Activity and Sector Registry (EASR). A Permit to Take Water, for dewatering needs in excess of 400,000 L/day, is not anticipated for this site.

Appendices

Appendix A Appendix A Background Documents

A.1 Correspondence with Architect on Construction Type

Wu, Michael

From: Kilborn, Kris
Sent: February 7, 2025 05:49
To: Wu, Michael
Cc: Wang, Ziyi
Subject: FW: 1137-1151 Ogilvie Road - Landscape Site Plan RLA Coordination mk ups 2025.01.29
Attachments: 2420_1137-1151 Ogilvie Road_Building Stats_2025-01-27.xlsx; 2420_Ogilvie Road_Ground Floor Plan_Commercial Area Markup_2025-02-06.pdf; L5 RTC 25.02.06.pdf; L7 RTC 25.02.06.pdf; Upper most Roof RTC 25.02.06.pdf

Hey Michael

See attached some unit counts and information for updating of the 1137 Ogilvie report.

Sincerely

Kris Kilborn
Principal, Community Development
Business Center Practice Lead

Mobile: 613 297-0571
Fax: 613 722-2799
kris.kilborn@stantec.com
Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Liam McNairn <lmcnairn@rlaarchitecture.ca>
Sent: Thursday, February 6, 2025 2:34 PM
To: Kilborn, Kris <kris.kilborn@stantec.com>; Evan Johnson <e.johnson@tcudevcorp.com>
Cc: Marina Knuckey <mknuckey@nak-design.com>; Jennifer Hemmings <jhemmings@nak-design.com>; Shannon Card <scard@nak-design.com>; Kevin Reid <kreid@rlaarchitecture.ca>; Johnson, Warren <Warren.Johnson@stantec.com>; Moroz, Peter <peter.moroz@stantec.com>
Subject: RE: 1137-1151 Ogilvie Road - Landscape Site Plan RLA Coordination mk ups 2025.01.29

Hi Kris,

Please see my responses in **red** to your questions below. If you have any other questions or points of discussion, please do not hesitate to reach out!

Kind regards,

Liam McNairn
M.Arch, B.A.S., MRAIC
Intern Architect
RLA Architecture
56 Beech Street,
Ottawa, Ontario K1S 3J6
Tel: 613.724.9932 x 223
lmcnairn@rlaarchitecture.ca

From: Kilborn, Kris <kris.kilborn@stantec.com>
Sent: February 6, 2025 10:15 AM
To: Liam McNairn <lmcnairn@rlaarchitecture.ca>; Evan Johnson <e.johnson@tcudevcorp.com>
Cc: Marina Knuckey <mknuckey@nak-design.com>; Jennifer Hemmings <jhemmings@nak-design.com>; Shannon Card <scard@nak-design.com>; Kevin Reid <kreid@rlaarchitecture.ca>; Johnson, Warren <Warren.Johnson@stantec.com>; Moroz, Peter <peter.moroz@stantec.com>
Subject: RE: 1137-1151 Ogilvie Road - Landscape Site Plan RLA Coordination mk ups 2025.01.29

Good morning everyone

Please find attached our autocad and pdf of the proposed grading for the 1137-1151 Ogilvie Road project for review and coordination.

In speaking with Shannon this morning, there are minor changes that may be required for the work she is completing on the Terraces.

Servicing from 1151 Ogilvie is being designed and brough through parking garage through 1137 Ogilvie.

Kevin / Liam – We are looking for you to confirm the following information that forms part of our analysis and report

1. Residential unit breakdowns for each tower

I have attached the unit mix and building stats spreadsheet. Please note it does not include the Phase 2 unit mix, however for the time being, the tower unit mix for phase 2 will be based on phase 1.

2. Proposed ground floor commercial in each tower

Please see the attached ground floor plan. The proposed commercial spaces are highlighted in red.

3. Roof plans with areas where stormwater can be stored. If not available, it would be fine as our report speaks to roof storage and non-roof storage options.

Please see the attached L5, L7 and MPH Roof plans. The areas with potential for stormwater control are highlighted in a light blue.

4. Building construction type

At current, we are planning for a cast-in-place concrete structure.

Let me know if you have any questions

Sincerely

Kris Kilborn
Principal, Community Development
Business Center Practice Lead

Mobile: 613 297-0571
Fax: 613 722-2799
kris.kilborn@stantec.com
Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

From: Liam McNairn <lmcnairn@rlaarchitecture.ca>
Sent: Tuesday, February 4, 2025 2:11 PM
To: Kilborn, Kris <kris.kilborn@stantec.com>; Evan Johnson <e.johnson@tcudevcorp.com>
Cc: Marina Knuckey <mknuckey@nak-design.com>; Jennifer Hemmings <jhemmings@nak-design.com>; Shannon Card <scard@nak-design.com>; Kevin Reid <kreid@rlaarchitecture.ca>; Johnson, Warren <Warren.Johnson@stantec.com>
Subject: RE: 1137-1151 Ogilvie Road - Landscape Site Plan RLA Coordination mk ups 2025.01.29

Hi Kris,

A.2 Pre-Consultation Meeting Minutes from Previous 1137 Ogilvie Road Application

File No.: PC2023-0275

Tyler Yakichuk
Fotenn Consultants
Via email: yakichuk@fotenn.com

Subject: **Pre-Consultation: Meeting Feedback**
Proposed Zoning By-law Amendment Application – 1137 Ogilvie Road

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on October 25, 2023.

Pre-Consultation Preliminary Assessment

1 ☒	**2** ☐	**3** ☐	**4** ☐	**5** ☐

One (1) indicates that considerable major revisions are required while five (5) suggests that the proposal appears to meet the City's key land use policies and guidelines. This assessment is purely advisory and does not consider technical aspects of the proposal or in any way guarantee application approval.

Next Steps

1. A review of the proposal and materials submitted for the above-noted pre-consultation has been undertaken. The applicant is strongly advised to revise their concept plan for a second Phase 1 pre-consultation.

2. In your subsequent pre-consultation submission, please ensure that all comments or issues detailed herein are addressed. A detailed cover letter stating how each issue has been addressed must be included with the submission materials. Please coordinate the numbering of your responses within the cover letter with the comment number(s) herein.

3. Please note, if your development proposal changes significantly in scope, design, or density before the Phase 3 pre-consultation, you may be required to complete or repeat the Phase 2 pre-consultation process.

Supporting Information and Material Requirements

1. The attached **Study and Plan Identification List** outlines the information and material that has been identified, during this phase of pre-consultation, as either required (R) or advised (A) as part of a future complete application submission.

    a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline

the specific requirements that must be met for each plan or study to be deemed adequate.

Consultation with Technical Agencies

You are encouraged to consult with technical agencies early in the development process and throughout the development of your project concept.

Planning

The proposal is for a 30-storey high-rise building with a nine-storey podium. 455 residential units and three ground floor commercial units are proposed, with two levels of underground parking. The proposed design is for a “C” shaped building containing outdoor amenity area.

As discussed in the pre-consultation meeting, there are some important City comments to address on this site before progressing with the design. You are welcome to provide an updated concept to me so I may distribute it to the team and organize high-level thoughts before you begin work on the required studies and plans. It may be more productive to hold a second Phase 1 – Pre-Consultation meeting before progressing further in the process.

Comments:

1. Official Plan: The subject lands are designated Hub lands with an Evolving Neighbourhood Overlay, within the Inner Urban Transect of the Official Plan. The lands are just outside of the Protected Major Transit Station Area generated by the Cyrville LRT station. Ogilvie is a Mainstreet Corridor and Existing Arterial Road and Cummings is a Minor Corridor and Existing Collector Road. Adjacent lands to the north and west are Neighbourhood Area with an Evolving Neighbourhood Overlay. The intent of Hubs within the Inner Urban Transect is to develop with mid to high-density building forms, a mix of uses, and a high-quality urban design, with heights and massing that respond to surrounding context.

2. Inner East Lines 1 and 3 Stations Secondary Plan: The subject lands are within “ Area A” of this Secondary Plan, which permits a “Maximum height [of] 30 storeys and Minimum density [of] 350 units per net hectare (residential)”. Surrounding lands are also within the Secondary Plan, and within Area D with a 6-storey height maximum. The proposed heights of 30 storeys are so far consistent with the Secondary Plan.

3. Urban Design Policies are provided in Section 4.6 of the Official Plan, and Urban Design Guidelines for High Rise Buildings are a separate document that provide the City’s standards and requirements for high-rise building design. The current concept– particularly the nine-storey podium - is not consistent with these guidelines, which require the base portion of the building to be equal to the width

of the ROW, to respect existing and planned conditions of surrounding lands, and provide a transition in height on the base.

4. The subject lands are within a Design Priority Area and will be required to attend the City's Urban Design Review Panel (UDRP). Attending the UDRP during the pre-consultation process is now a requirement before officially applying for Zoning By-law Amendment Applications.

5. The former Section 37 regime has been replaced with a "Community Benefits Charge" (By-law No. 2022-307) of 4% of the land value. This charge will be required for ALL buildings that are 5 or more storeys and 10 or more units and will be required at the time of building permit unless the development is subject to an existing registered Section 37 agreement. Questions regarding this change can be directed to Ranbir.Singh@ottawa.ca.

6. Any reductions in parking requirements will need to be justified in your Planning Rationale, with further justification from a Transportation Engineering perspective; TDM measures, etc. You discussed how you are at about a 0.35 parking to unit ratio and wish to reduce further. Please analyze the zoning requirement for the proposed zone and discuss whether an exception is required to reduce the ratio.

7. You are required to meet the City's Bird-Safe Design Guidelines. Please reference and demonstrate how you meet the requirements. At the eventual Phase 3 Pre-Consultation step we will circulate the plans to an expert who reviews them for compliance with these guidelines.

Urban Design

Comments:

8. An Urban Design Brief is required for a Zoning By-law Amendment application (ZBA). Please see attached customized Terms of Reference to guide the preparation. Here are a few highlights:
    a. The Urban Design Brief should be structured by generally following the headings highlighted under Section 3 – Contents of these Terms of Reference.
    b. Please explore alternative site plan and massing options and include diagrams and images to show and document options explored.
    c. Please note that Urban Design Brief will also serve as the submission to the Urban Design Review Panel (see notes below).
9. Please refer to relevant Terms of Reference available on the City's website (Planning application submission information and materials | City of Ottawa) to prepare additional drawings and studies required. Please note both shadow and wind studies are required.

UDRP Review and Report

10. The site is in a Design Priority Area. According to the current Urban Design Review Panel (UDRP) Terms of Reference, a ZBA to support a high-rise development is subject to UDRP review. The UDRP review will occur in the pre-consultation stage. Please contact udrp@ottawa.ca for scheduling details.
11. The submission of a UDRP report is a requirement for deeming an application complete. The Terms of Reference of the UDRP report can be find in this link.

Comments on the Concept Presented

The concept presented at the meeting was very similar to (if not the same as) the concept presented in April 2021. Hence, comments provided at that time remain valid. Here are the highlights:

12. Site organization
    a. Urban design supports commercial uses on Ogilvie and residential frontage on Cummings.
    b. The ramp leading to the underground garage should be incorporated into the building design rather than being a standalone structure.
    c. The proposal includes too many curb cuts on Cummings.
    d. The U-shape building footprint appears to be very dense for the site. The courtyard is proportionally too narrow and likely in perpetual shade.
13. Building massing
    a. The proposed 9-storey podium is too tall for Cummings. The TOD plan and the TD zoning supports a maximum 6-storey podium.
    b. The tower appears to setback appropriately. However, it is unclear what the floor plate size is. The City's policy supports point tower design with a small floor plate (maximum 750m²). Slightly larger floor plate may be supportable if additional tower separations and sculpting are provided.

Suggestions for Design

14. The required provision of parkland dedication on the site will result in a redesign of the site. It is recommended that as the next step, the applicant explore a few site and massing options, discuss such options with staff before moving forward in the planning approval process.
15. Practical and functional requirements need to be carefully studied and appropriately organized on site. Passengers drop off, garbage pick-up, temporary short-term parking for delivery services, etc., should be reasonably accommodated on site, not spill over into City streets.
16. Consider a L-shape building footprint with two wings framing Ogilvie and Cummings. Locate the above-noted practical functions internal to the site behind the two wings.
17. The podium should be sensitively designed and provide appropriate transition to the low-rise buildings to the north. Apply a 45-degree angular plane from the

northern property line to determine the appropriate height and step-backs on the podium.

18. Given the differences in character between Ogilvie and Cummings, the podium may be treated differently on these two streets. Cummings is a relatively narrow street with residential characteristics. It is therefore desirable and appropriate to establish a 2 or 3 storey base with step-backs on the upper floors.
19. Design a point tower with small floor plate.
20. Treatments along both Ogilvie and Cummings should be carefully considered in accordance with the TOD plan and other relevant City policies and guidelines, including the planned functions of both streets, such as sidewalks and cycle tracks.
21. Continuous tree canopies should be provided along both public streets.

Engineering

Comments:

Water

22. Watermain looping is recommended to avoid creating a vulnerable service area. District Metering Area (DMA) Chamber(s) are required for private developments serviced by a connection 150 mm or larger or when there are two or more private connections to the public watermain. Refer to the City of Ottawa Water Distribution Guidelines.

    Please be advised that capacity of the existing system will be determined after Water Boundary conditions are requested. Water Boundary condition requests must be submitted to the City Project Manager, Development Review by the civil design engineer or consultant prior to submission and include the following information:

- The location of the service and the expected water demand of the proposed development shown on a plan, figure, or map;
- Type of development;
- Average daily demand: ___ l/s;
- Maximum daily demand: ___l/s;
- Maximum hourly daily demand: ___ l/s;
- Required fire flow and completed FUS Design Declaration if applicable;
- Supporting Calculations for all demands listed above and required fire flow as per Ontario Building Code or Fire Underwriter Surveys (See technical Bulletin ISTB-2021-03;
- Watermain system analysis demonstrating adequate pressure as per section 4.2.2 of the Water Distribution Guidelines;

23. Demonstrate adequate hydrant coverage for fire protection. Please review Technical Bulletin ISTB-2018-02, Appendix I Table 1 – maximum flow to be considered from a given hydrant;

24. Proposed emergency route (to be satisfactory to Fire Services)

Sanitary Sewers

25. A monitoring maintenance hole shall be required just inside the property line for all non-residential and multi residential buildings connections from a private sewer to a public sewer. See the sewer use by-law for details.

26. Plantings are not permitted overtop of City infrastructure other than sod.

27. Provide pre and post CCTV of the sanitary trunk sewer as per City Standard CCTV spec S.P. F-4090.

28. Provide an analysis to demonstrate that there is adequate residual capacity in the receiving and downstream wastewater system to accommodate the proposed development.

29. Please apply the wastewater design flow parameters in Technical Bulletin PIEDTB-2018-01.

30. A maintenance hole is required to be installed over the public sewer where private sewer connection to the public sewer exceeds 50% of the public sewer diameter. If a maintenance hole is proposed to be installed over existing City infrastructure, clearly indicate on the design drawings the applicable Standard City Drawing. For example, S12.1 or doghouse structure / S12.2, etc.

Stormwater Management

31. A monitoring maintenance hole shall be required just inside the property line for all non-residential and multi residential buildings connections from a private sewer to a public sewer. See the sewer use by-law for details.

32. A maintenance hole is required to be installed over the public sewer where private sewer connection to the public sewer exceeds 50% of the public sewer diameter.

33. If a maintenance hole is proposed to be installed over existing City infrastructure, clearly indicate on the design drawings the applicable Standard City Drawing. For example, S12.1 or doghouse structure / S12.2, etc.

34. Stormwater Quality: Characterize the water quality to be protected and Stormwater Contaminants (e.g., suspended solids, nutrients, bacteria, water temperature) for potential impact on the Natural Environment, and control as necessary; OR As per the MSS, watershed/subwatershed plan, similar area-wide

Stormwater study, or Stormwater management plan to minimize, or where possible, prevent increases in Contaminant loads and impacts to receiving waters.

35. Provide Enhanced level of protection (80%) for suspended solids removal.

36. OGS unit sizing shall be as per ISO 14034 Environmental Technology Verification (ETV)

37. Stormwater Quantity: Stormwater Management for the site requires runoff detention of the 100 year post to 2 year pre. The allowable release rate is to be computed using the lesser of C=0.5 or existing. Time of concentration (Tc) to be calculated, min Tc = 10mins

Grading and Drainage

38. Permissible ponding of 350mm for 100-year. No spilling to adjacent sites. At 100-year ponding elevation, you must spill to the ROW. 100-year Spill elevation must be 300mm lower than any building opening or ramp.

39. Consider Pedestrian Accessibilities at max 5%.

Geotechnical and Slope Stability

40. Sensitive Marine Clay (SMC) is widely found across Ottawa- geotechnical reports should include Atterberg Limits, consolidation testing, sensitivity values, and vane shear test. Refer to City of Ottawa Geotechnical and Slope Stability Guidelines.

Additional Notes

41. Work Project that would impact the application has not been identified at this time.

42. No road moratorium that would impact the application has been identified.

43. Any easement required should be shown on all plans.

44. For any proposed exterior light fixtures, please provide certification from a licensed professional engineer confirming lighting has been designed only using fixtures that meet the criteria for full cut-off classification as recognized by the Illuminating Engineering Society of North America and result in minimal light spillage onto adjacent properties (maximum allowable spillage is 0.5 fc). Additionally, include in the submission the location of the fixtures, fixture type (make, model, part number and mounting height.

45. Sewer connections to be made above the springline of the sewermain as per:

i) Std Dwg S11.1 for flexible main sewers – connections made using approved tee or wye fittings.
ii) Std Dwg S11 (For rigid main sewers) – lateral must be less that 50% the diameter of the sewermain,
iii) Std Dwg S11.2 (for rigid main sewers using bell end insert method) – for larger diameter laterals where manufactured inserts are not available; lateral must be less that 50% the diameter of the sewermain,
iv) Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the sewermain. – Connect obvert to obvert with the outlet pipe unless pipes are a similar size.
v) No submerged outlet connections.

Minimum Drawing and File Requirements

Plans are to be submitted on standard A1 size (594mm x 841mm) sheets, utilizing an appropriate Metric scale (1:200, 1:250, 1:300, 1:400, or 1:500).

With all submitted hard copies provide individual PDF of the DWGs and for reports please provide one PDF file of the reports. All PDF documents are to be unlocked and flattened.

Drawings, Plans and geoOttawa
Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455.

Please refer to GeoOttawa with the Water and Wastewater Infrastructure layer turned on to determine what servicing is available for this site: https://maps.ottawa.ca/geoottawa/.

For information on preparing required studies and plans refer to:

- Planning application submission information and materials | City of Ottawa;
- Ottawa Sewer Design Guidelines (October 2012);
- Ottawa Design Guidelines – Water Distribution (2010);
- Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007);
- City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012);
- City of Ottawa Environmental Noise Control Guidelines (January, 2016);
- City of Ottawa Park and Pathway Development Manual (2012);
- City of Ottawa Accessibility Design Standards (2012);
- Ottawa Standard Tender Documents (latest version);
- Please refer to other applicable Guidelines (provincial and federal);

- Site Alteration (By-law No. 2018-164) | City of Ottawa;
- Sewer Connection (By-law No. 2003-513) | City of Ottawa;
- Sewer Use (By-law No. 2003-514) | City of Ottawa;
- Building (By-law No. 2014-220) | City of Ottaw;
- Community Benefits Charge By-law (By-law No. 2022-307) | City of Ottawa;
- Delegation of Authority (By-law No. 2023-67) | City of Ottawa;
- Encroachments on City Highways (By-law No. 2003-446) | City of Ottawa;
- Fence (By-law No. 2003-462) | City of Ottawa;
- Fire Routes (By-law No. 2003-499) | City of Ottawa;
- Integrated Orléans Community Improvement Plan (By-law No. 2021-284) | City of Ottawa;
- Integrated Orléans Community Improvement Plan (By-law No. 2021-285) | City of Ottawa;
- Montreal Road Community Improvement Plan (By-law No. 2019-224) | City of Ottaw;
- Montreal Road Community Improvement Plan Area (By-law No. 2019-213) | City of Ottawa;
- Noise (By-law No. 2017-255) | City of Ottaw;
- Private Approach (By-law No. 2003-447) | City of Ottawa;
- Road Activity (By-law No. 2003-445) | City of Ottawa;
- Site Plan Control (By-law No. 2014 - 256) | City of Ottawa;
- Tree Protection (By-law No. 2020-340) | City of Ottawa;
- Water (By-law No. 2019-74) | City of Ottawa;
- Zoning (By-law No. 2008-250) | City of Ottawa;

Please contact Alex Polyak, Infrastructure Project Manager, for questions regarding engineering.

Noise

Comments:

46. A noise study is not required for a Zoning By-law Amendment application.

47. Noise studies (roadway, stationary) will be required at the time of Site Plan application.

Please contact Josiane Gervais, Transportation Project Manager, for follow-up questions on noise requirements.

Transportation

Comments:

48. Follow Transportation Impact Assessment Guidelines.

    a. Note that the TIA guidelines have been updated to align with the new pre-application consultation process. The changes are available on the City's website: https://ottawa.ca/en/transportation-impact-assessment-guidelines#section-41824473-e537-4647-b516-dd528523f9fe

    b. A Transportation Impact Assessment is required. Please submit the Scoping report to josiane.gervais@ottawa.ca at your earliest convenience or, at the latest, as part of the Phase 2 pre-con package. Should a Phase 2 pre-con be waived, the applicant is still responsible to submit the Scoping Report and must allow for a 14 day circulation period.

    c. The Strategy Report must be submitted for review at the latest with the Phase 3 pre-con package. The applicant is still encouraged to submit the Strategy Repot to the TMP before submission of the Phase 3 pre-con package and allow for a 14 day circulation period.

    d. If an RMA is required to support the proposed development, the functional plan and/or RMA plans must be submitted with the formal submission to deem complete. Request base mapping asap if RMA is required. Contact Engineering Services (https://ottawa.ca/en/city-hall/planning-and-development/engineering-services)

49. Ensure that the development proposal complies with the Right-of-Way protection requirements of the Official Plan's Schedule C16.

    a. See Schedule C16 of the Official Plan, which identifies the protection on both Ogilvie Road and Cummings Avenue.

    b. Any requests for exceptions to ROW protection requirements must be discussed with Transportation Planning and concurrence provided by Transportation Planning management.

    c. Corner triangles as per OP Annex 1 - Road Classification and Rights-of-Way at the following locations on the final plan will be required (measure on the property line/ROW protected line; no structure above or below this triangle): Collector Road to Arterial Road: 5 m x 5 m

    d. ROW and corner triangles must be unincumbered and conveyed at no cost to the City as part of the Site Plan application. Note that conveyance of the ROW/corner triangle will be required prior to registration of the SP agreement. Additional information on the conveyance process can be provided upon request.

50. TMP identifies:

    a. LRT Cyrville Station is within 600m radius of the site.

    b. Ogilvie Road is identified as a Transit Priority Corridor (Isolated Measures) (2031 Network Concept)

51. Nearby planned construction and infrastructure projects include: “Work by Public Works and Environmental Services” planned in the next 1-2 years identified along Ogilvie Road.

52. Additional notes provided should be considered while developing the site plan:

    a. Ensure site access meets the City’s Private Approach Bylaw. Consolidating accesses is preferred. Should two accesses on Cummings be pursued, ensure the two accesses meet the minimum separation requirements as set out by the Bylaw.

    b. The car share parking stalls are within the required clear throat of the site access and are not supported. Clear throat requirements for >200 units on a collector is 25m. The clear throat length is measured from the ends of the driveway curb return radii at the roadway and the point of first conflict on-site. Note the minimum throat length provided must be maintained with the future ROW protection.

    c. Corner clearances should follow minimum distances set out within TAC Figure 8.8.2.

    d. Show all details of the roads abutting the site; include such items as pavement markings, accesses and/or sidewalks.

    e. Turning movement diagrams required for all accesses showing the largest vehicle to access/egress the site.

    f. Turning movement diagrams required for internal movements (loading areas, garbage), as applicable.

    g. Show all curb radii measurements; ensure that all curb radii are reduced as much as possible and fall within TAC guidelines (Figure 8.5.1).

    h. Show dimensions for site elements (i.e. lane/aisle widths, access width and throat length, parking stalls, sidewalks, pedestrian pathways, etc.)

    i. Sidewalk is to be continuous across access, as per City Specification 7.1.

    j. Show slope of garage ramp on site plan. Note that underground ramps should be limited to a 12% grade and must contain a subsurface melting

device when exceeding 6%. Ramp grades greater than 15% can be psychological barriers to some drivers.

k. Parking stalls at the end of dead-end parking aisles require adequate turning around space.

l. Pavers within City ROW would require Maintenance and Liability Agreement.

m. The at-grade bike storage is supported and appreciated.

n. As the proposed site is multi-use, AODA legislation applies.

    i. Ensure all crosswalks located internally on the site provide a TWSI at the depressed curb, per requirements of the Integrated Accessibility Standards Regulation under the AODA.

    ii. Clearly define accessible parking stalls and ensure they meet AODA standards (include an access aisle next to the parking stall and a pedestrian curb ramp at the end of the access aisle, as required).

    iii. Please consider using the City's Accessibility Design Standards, which provide a summary of AODA requirements. https://ottawa.ca/en/city-hall/creating-equal-inclusive-and-diverse-city/accessibility-services/accessibility-design-standards-features#accessibility-design-standards

Please contact Josiane Gervais, Transportation Project Manager, for follow-up questions regarding traffic.

Planning Forestry

53. The site must be designed to allow enough space and provide adequate soil volume for tree planting. This must be considered when establishing the zone and associated building setbacks for the site. If there are any landscaping implications from a geotechnical standpoint, this must also be considered now.

54. It is advised that a conceptual landscape plan be submitted with the Zoning By-law Application to show how trees can be incorporated into the site with adequate growing space and soil volume.

55. The LC6 zone, for a non-residential use building or a mixed residential/non-residential use building, from that portion of a rear lot line abutting a residential zone the setback provision is a 7.5m rear yard setback. For the proposed TD3 zone, the setback is 3m. This should be considered when ensuring space is

available on the site to accommodate trees that will provide canopy cover on the site (medium to large).

Please contact Hayley Murray, Planning Forester, for follow-up questions regarding forestry.

Parkland

Comments:

Parkland Dedication:

56. The amount of required parkland conveyance is to be calculated as per the City of Ottawa Parkland Dedication By-law No.2022-280 (or as amended):
    - (i) For conveyance of parkland (residential > 18 units/net ha):
        - i. one hectare per 600 net residential units but shall not exceed a maximum of 10% of the gross land area where less than or equal to five hectares.
    - (ii) For cash-in-lieu of conveyance of parkland (residential > 18 units/net ha):
        - i. one hectare per 1,000 net residential units but shall not exceed a maximum of 10% of the gross land area where less than or equal to five hectares.
    - (iii) For conveyance of parkland, cash-in-lieu of conveyance parkland, or combination thereof:
        - i. 5% of the gross land area (residential ≤ 18 units/net ha).
        - ii. 5% of the gross land area (other purposes, including residential care facility as defined by the Zoning By-law, excluding residential).
        - iii. 2% of the gross land area (commercial & industrial uses).

    (iv) Where land is developed for a mix of land uses that are located on discrete parts of the site, the conveyance requirement shall be the cumulative sum for each use, as calculated using the applicable rate and based upon the portion of the site allocated to each use, including, but not limited to, required and provided parking spaces, amenity space, landscape buffers, driveways, and drive aisles.

    (v) Where land is developed for a mix of uses within a building, the conveyance requirement shall be the cumulative sum for each use, as calculated using the applicable rate prorated proportionally to the gross floor area allocated to each use.

Preliminary Parkland Dedication Calculation:

57. *Preliminary* parkland conveyance calculations based on information provided/identified in the pre-application consultation, is calculated to be **approximately 460 square meters.**
58. Please note, if the proposed unit count or land use changes, then the parkland dedication requirement will be re-evaluated accordingly.

59. PFP requests the following information to confirm and calculate the parkland conveyance:

a) Gross land area, in square meters
b) Number of residential units proposed/existing
c) Gross floor area of proposed residential development
d) Gross floor area of proposed/existing commercial development
e) The proportion of commercial/residential development proposed on site.

Form of Parkland Dedication:

60. PFP will be requesting **land conveyance** for parkland dedication in accordance with the Parkland Dedication By-law (as amended).
61. The proposed park block is to provide the full required parkland conveyance.
62. PFP requests a surveyor's note (or equivalent) which specifies the gross land area of the property with your application.

Shape & Location of Park Block:

63. A continuous sidewalk is required along all park street frontages.
64. The park block shall be dedicated as one, contiguous parcel.
65. The park block shall be rectangular-based.
66. PFP is open to discussing an appropriate location for the proposed parkland and invite the applicant to review our Park Development Manual for further direction.

Policies:

67. The required parkland dedication is requested in **land conveyance**.

68. Policy 4.4.1(2) of the City of Ottawa's Official Plan indicates the following: *All development, regardless of use, shall meet all of the following criteria to the satisfaction of the City:*

    *a) Consider land acquisition for parks as directed by the Parkland Dedication By-law **to meet community needs** for both residential and non-residential development, with an emphasis on active recreation amenities and potential cultural development with new parks acquired to address gaps or community needs; and*

    *b) **Prioritize land for parks on-site over cash-in-lieu of parkland.** Cash-in-lieu of parkland shall only be accepted when land or location is not suitable. The land to be conveyed shall, wherever feasible:*

        i) Be a **minimum of 400 square metres** or as described in the Land First Policy and updated Park Development Manual as directed by the Parks and Recreation Facilities Master Plan;

        ii) Be free of encumbrances above and below ground when land for parks is obtained by parkland dedication; or in the case of land purchases for the creation of new parks in established areas, unless the encumbrances have been approved by the City where reasonable;

iii) Be of a usable shape, topography and size that reflects its intended use;

iv) Meet applicable provincial soil regulations; and

v) Meet the minimum standards for drainage, grading and general condition.

69. Policy 4.4.1(3) of the City of Ottawa's Official Plan indications:
*For Site Plan Control applications in the Downtown, Inner Urban, Outer Urban and Suburban Transects, where the development site is more than **4,000 m²**, the City shall place a priority on acquisition of land for park(s) as per the Planning Act and the Parkland Dedication By-law.*

70. Policy 4.4.6(1)(e) of the City of Ottawa's Official Plan indicates that a preferred minimum of 50% of the park perimeter shall be continuous frontage on abutting streets.

71. The conveyance of parkland is further supported by the Parks and Recreation Facilities Master Plan, where *the city will prioritize the acquisition of new parkland in neighbourhoods that do not meet the 2ha per 1,000 people target.*

Zoning:

72. It is common practice for the City to zone most parks as "O1" (Parks and Open Space Zone). PFP request that the park block be rezoned through the Zoning By-law Amendment application.

73. PFP will request a surveyor's certificate to confirm parkland dedication required, prior to Zoning By-law amendment approval.

74. We will request a appropriate interior side yard setback from an "O1" zone to mitigate the impact of the proposed buildings on the park block.

75. The applicant should submit a site plan with the dimensions of the park or a CAD file for the purpose of preparing the Location Map / Zoning Key Plan for the Details of the Recommended Zoning By-law Amendment portion of the staff report.

76. The future site plan illustrating the park block is to show high level park macro-grading on the Preliminary Grading Plan, including key spot elevations, stormwater flow arrows and slope percentages. Park block is to be graded to the surrounding levels and needs to show positive surface drainage towards the ROW.

77. Park services are to be connected from a municipal street. At a minimum, the park would require the following:

    i. 300mm diameter storm sewer connection to a municipal storm sewer and CB/MH located 2m inside the park lot line

    ii. A 50mm diameter water line complete with water vault chamber at 2m inside the park property line as per city standard details for unit price contracts. Costs for the water vault chamber and water meter, if

ultimately required, shall be paid for by the City or be included as part of the maximum park construction budget for the park;

iii. 150mm diameter sanitary sewer and Manhole at 2m inside the park property line;

iv. A 120/240 volt, 200 amperes single phase hydro service at 2m inside the park property line complete with electrical kiosk for park services as per city standard details.

v. Electrical and water connections (minimum 50mm) are to be connected directly to the street line, including back flow preventors, shutoff valves, water and hydro meters and chambers.

78. The park block shall be conveyed to the City in a 'clean and green' state. This includes, but is not limited to:
    - Removal of all debris, contaminated soils, vegetation (except as identified for retention), etc;
    - Being brought to the same grade level as the surrounding area, ensuring positive surface drainage throughout the park block;
    - Services are to be provided to 2m inside the park block property line;
    - Supplying and installing a minimum depth of 150mm of topsoil and seed or sod to City standards.
79. Any fill or disposal of soil to/from the park block is to meet current soil regulations.
80. The Owner may be required to supply and install a minimum 1.5m high commercial grade chain link fence or approved equivalent along the park lot lines depending on the final location of the park block and proposed land use(s) adjacent to the park.
81. The above noted requirements are standard requirements the owner is responsible for in the construction and installation of the 'base park improvements' for the park block and at the owner's sole expense.
82. A Record of Site Condition would be required prior to registration of the site plan agreement since there is a proposed change in use to parkland.
83. The conditions of site plan approval would require the Owner to convey the parkland to the City at the time of registration of the site plan agreement. The Owner would be responsible for retaining a land surveyor to prepare a draft reference plan describing the park parcel.
84. Before carrying out any of the 'base park improvements' the Owner must obtain, at the Owner's expense, a License of Occupation (LOO) or a Consent to Enter (CTE) form the City's Corporate Real Estate Office.
85. The City would take over the park block after the site works have been completed and the grassed areas in the park have been established to the satisfaction of the City.
86. The City would be responsible for the future development of the park.

Facility Fit Plan:

87. PFP requests a Facility Fit Plan at Site Plan.
(b) Facility Fit Plans must clearly show (in metric) the following:

a. Those items required on a Site Plan but for the park block
b. Key Plan showing the location of the park black within the development site
c. Overlaid over an aerial photo if requested
d. Critical dimensions of all park amenities including buffers and setbacks
e. Grading across the park block and within the context of development area
f. Any existing vegetation and special features within the park which may be preserved

Urban Design Review Panel

88. If the Urban Design Review Panel provides comments on the park size, location or configuration that differ from the above comments, staff may need to revisit the above comments.

Phase 1 Environmental Site Assessment

89. PFP and ERU will need to receive confirmation that redevelopment of the site from (industrial use) to park use is achievable. Any remedial work required to convert land use will be the responsibility of the owner prior to conveyance of park block to the City.

Reference Documents:

Please review the following City of Ottawa reference documents which outline the requirements for parkland conveyance and/or cash-in-lieu of parkland.

- Official Plan (2021)
- Parks and Recreation Facilities Master Plan (2021)
- Park Development Manual, 2nd edition
- Parkland Dedication By-Law (2022-280) and Planning Act amendments
- City of Ottawa Standard Parks Conditions

Please note that the park comments are preliminary and will be finalized (and subject to change) upon receipt of the development application and the requested supporting documentation.

Please contact Phil Castro, Parks Planner, for follow-up questions related to parkland.

Community issues

Comments:

90. The Ottawa Neighbourhood Equity Index identifies the community in this area as having a strong equity concern. Development proponents in this area should consider how their proposal may contribute to improving inequities, especially in the domain of economics, community belonging and the physical environment.

Other

91. The High Performance Development Standard (HPDS) is a collection of voluntary and required standards that raise the performance of new building projects to achieve sustainable and resilient design. The HPDS was passed by Council on April 13, 2022.

    a. At this time, the HPDS is not in effect and Council has referred the 2023 HPDS Update Report back to staff with direction to bring forward an updated report to Committee with recommendations for revised phasing timelines, resource requirements and associated amendments to the Site Plan Control By-law by no later than Q1 2024.

    b. Please refer to the HPDS information attached and ottawa.ca/HPDS for more information.

Should there be any questions, please do not hesitate to contact myself or the contact identified for the above areas / disciplines.

Yours Truly,
Kelly Livingstone, Planner

cc.

Alex Polyak, PM (Infrastructure Approvals)
Cam Elsby, PM (Infrastructure Approvals)
Jerrica Gilbert, PL (DR)
Josiane Gervais, PM (Transportation)
Phil Castro, PL (Parks and Facilities)
Hayley Murray, PL (Forestry)
Randolph Wang, PL (Urban Design)

Appendix B Water Servicing

B.1 Domestic Water Demands

1137/1151 Ogilvie Road & 1111 Cummings Avenue - Domestic Water Demand Estimates

Based on Architectural Plans from rla Architecture (2025-04-01)

Project No. 160402095 Designed by: WJ

Date: 4/9/2025 Checked by:

Revision: 01

Population densities per Table 4.1 City of Ottawa Water Design Guidelines:		
Studio and 1 Bedroom	1.4	ppu
2 Bedroom	2.1	ppu
3 Bedroom	3.1	ppu
Demand conversion factors per Table 4.2 of the City of Ottawa Water Design Guidelines and Technical Bulletin ISTB-2021-03:		
Residential	280	L/cap/day
Commercial	28000	L/gross ha/day

Unit Type	1137 Ogilvie Commercial Area (m^2)	1151 Ogilvie Commercial Area (m^2)	1137 Ogilvie Number of Residential Units	1151 Ogilvie Number of Residential Units	Population	Avg Day Demand		Max Day Demand [1, 2]		Peak Hour Demand [1, 2]	
						(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	(L/s)
Studio	-	-	211	139	490	95.3	1.59	238.2	3.97	524.0	8.73
1 Bedroom	-	-	77	120	276	53.6	0.89	134.1	2.23	295.0	4.92
1 Bedroom + Study[3]	-	-	26	51	162	31.4	0.52	78.6	1.31	172.9	2.88
2 Bedroom	-	-	94	70	344	67.0	1.12	167.4	2.79	368.3	6.14
2 Bedroom + Study[3]	-	-	28	27	171	33.2	0.55	82.9	1.38	182.3	3.04
3 Bedroom	-	-	0	0	0	0.0	0.00	0.0	0.00	0.0	0.00
Total Residential :			**-**	**-**	**1442**	**280.5**	**4.67**	**701.2**	**11.69**	**1542.6**	**25.71**
Ground Floor Commercial Space	543	230	-	-	-	1.1	0.02	1.6	0.03	2.9	0.05
Total Site :	**542.7**	**230.5**	**436**	**407**	**1442**	**281.5**	**4.69**	**702.8**	**11.71**	**1545.4**	**25.76**

Notes:

1 The City of Ottawa water demand criteria used to estimate peak demand rates for residential areas are as follows:
maximum day demand rate = 2.5 x average day demand rate
peak hour demand rate = 2.2 x maximum day demand rate (as per Technical Bulletin ISD-2010-02)

2 Water demand criteria used to estimate peak demand rates for gross commercial area are as follows:
maximum daily demand rate = 1.5 x average day demand rate
peak hour demand rate = 1.8 x maximum day demand rate (as per Technical Bulletin ISD-2010-02)

3 Assumption that "1 bedroom with study" has density of 2.1 ppu, "2-bedroom with with study" has density of 3.1 ppu

B.2 Fire Flow Demands (2020 FUS)

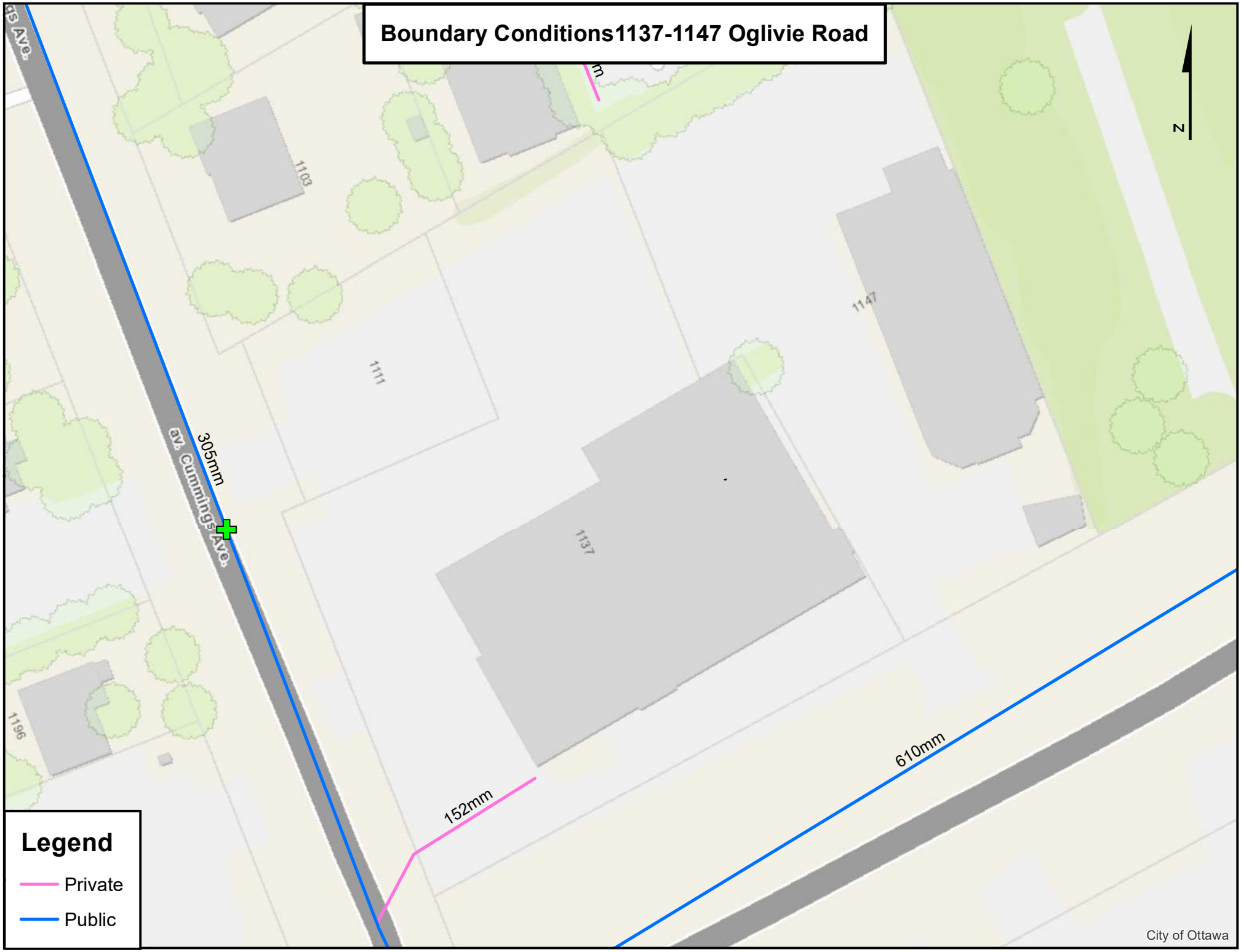
FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 160402095
Project Name: 1137 Ogilvie Road
Date: 4/9/2025
Fire Flow Calculation #: 1
Description: 1137 Ogilvie Road

Notes: 30-storey + mechanical penthouse mixed-use high-rise (with 2-6 storey podium) with commercial space on the ground floor and residential space on remaining floors. Building information provided by RLA Architecture dated April 1, 2025. Assumed 2-hour fire separation provided between each floor and 1-hour fire separation provided for exterior vertical communications.
30-storey + mechanical penthouse high rise to be constructed at 1151 Ogilvie Road during Phase 2.

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type II - Noncombustible Construction / Type IV-A - Mass Timber Construction										0.8	-
2	Determine Effective Floor Area	Sum of Largest Floor + 25% of Two Additional Floors					Vertical Openings Protected?					YES	-
		1650	1650	1622								2468	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	9000
4	Determine Occupancy Charge	Limited Combustible										-15%	7650
5	Determine Sprinkler Reduction	Conforms to NFPA 13										-30%	-3825
		Standard Water Supply										-10%	
		Fully Supervised										-10%	
		% Coverage of Sprinkler System										100%	
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		North	20.1 to 30	45.9	3	> 100	Type V	NO				10%	765
		East	10.1 to 20	55.5	31	> 100	Type I-II - Protected Openings	YES				0%	
		South	> 30	48.4	1	41-60	Type V	NO				0%	
		West	> 30	55.5	1	41-60	Type V	NO				0%	
7	Determine Final Required Fire Flow	Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min											5000
		Total Required Fire Flow in L/s											83.3
		Required Duration of Fire Flow (hrs)											1.75
		Required Volume of Fire Flow (m^3)											525

B.3 Boundary Conditions


Boundary Conditions1137-1147 Oglivie Road
N
av. Cummings Ave.
305mm
1103
1111
1137
1147
1196
152mm
610mm
Legend
Private
Public
City of Ottawa

From:	Kilborn, Kris
To:	Johnson, Warren
Subject:	FW: 1137-1147 Ogilvie - Sanitary and Watermain Confirmation
Date:	Tuesday, February 4, 2025 8:53:11 AM
Attachments:	image001.png 1137-1147 Ogilvie Road December 2024.pdf

From: Polyak, Alex <alex.polyak@ottawa.ca>
Sent: Friday, December 20, 2024 8:49 AM
To: Kilborn, Kris <kris.kilborn@stantec.com>
Cc: Evan Johnson <e.johnson@tcudevcorp.com>; Wang, Ziyi <Ziyi.Wang@stantec.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>; Haynes, Kris <Kris.Haynes@ottawa.ca>; Fadel, Rafic <rafic.fadel@ottawa.ca>
Subject: 1137-1147 Ogilvie - Sanitary and Watermain Confirmation

Good morning Kris,

The following are boundary conditions, HGL, for hydraulic analysis at 1137-1147 Ogilvie Road (zone 1E) assumed to be a dual connection connected to the 305mm watermain on Cummings Avenue (see attached PDF for location).

Minimum HGL = 109.3 m
Maximum HGL =118.2 m
Max Day + Fire Flow (100 L/s) = 113.0 m

These are for current conditions and are based on computer model simulation.

Happy Holidays,

Oleksandr (Alex) Polyak, B.Eng., C.E.T., P.Eng.
Project Manager, Infrastructure Approvals, Development Review East Branch | Gestionnaire de projet, Direction de l'examen des projets d'aménagement – Est.
Planning, Development and Building Services Department (PDBS) | Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)

City of Ottawa | Ville d'Ottawa
110 Laurier Ave., 4th Fl East, Ottawa ON K1P 1J1
Email: alex.polyak@ottawa.ca
Cell : 613-857-4380
www.Ottawa.ca

'

'

B.4 Fire Hydrant Coverage Calculations

Stantec	Project: **1137 Ogilvie Road**	160402095
	TABLE 1: FIRE HYDRANT COVERAGE TABLE	
	Revision: 01	Prepared By: WJ
	Revision Date: 4/9/2025	Checked By:

Description	Hydrants[1]			Total Available Fire Flow (L/min)	Total Required Fire Flow[2] (L/min)
	HYD-01	**HYD-02**			
1137 Ogilvie Road					
Distance from building (m)	10.2	78.7		-	-
Maximum fire flow capacity[3] (L/min)	5,678	3,785		**9,463**	5,000

NFPA 1 Table 18.5.4.3	
Distance to Building (m)	Maximum Capacity (L/min)
≤ 76	**5,678**
> 76 and ≤ 152	**3,785**
> 152 and ≤ 305	**2,839**

Notes:

1. Hydrant HYD-02 as per GeoOttawa accessed on February 3, 2025. Refer to drawing SSP-1.
2. See FUS Calculations, Appendix B.2 for fire flow requirements.
3. See NFPA 1 Table 18.5.4.3 for maxiumim fire flow capacity of hydrants by distance to building.

Appendix C Sanitary

C.1 Sanitary Sewer Design Sheet

Stantec

SUBDIVISION:

1137/1151 Ogilvie Road and 1111 Cummings Avenue

DATE: 4/9/2025
REVISION: 1
DESIGNED BY: WAJ
CHECKED BY:

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160402095

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	280	l/p/day	MINIMUM VELOCITY	0.60	m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	28,000	l/ha/day	MAXIMUM VELOCITY	3.00	m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000	l/ha/day	MANNINGS n	0.013	
PEAKING FACTOR (ICI >20%):	1.5	INDUSTRIAL (LIGHT)	35,000	l/ha/day	BEDDING CLASS	B	
PERSONS / 1 BED & DEN	1.4	INSTITUTIONAL	28,000	l/ha/day	MINIMUM COVER	2.50	m
PERSONS / 2 BED & 1 BED + DEN	2.1	INFILTRATION	0.33	l/s/Ha	HARMON CORRECTION FACTOR	0.8	
PERSONS / 3 BED & 2 BED + DEN	3.1						

LOCATION			RESIDENTIAL AREA AND POPULATION									COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+I+I	INFILTRATION			TOTAL	PIPE							
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA	UNITS 1 BED STUDIO	UNITS 2 BED 1 BED + DEN	UNITS 3 BED 2 BED + DEN	POP.	CUMULATIVE AREA	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW	FLOW	LENGTH	DIA	MATERIAL	CLASS	SLOPE	CAP. (FULL)	CAP. V PEAK FLOW	VEL. (FULL)	VEL. (ACT.)
			(ha)					(ha)			(l/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)			(%)	(l/s)	(%)	(m/s)	(m/s)
Phase 1 1137 Ogilvie and Phase 2 1151 Ogilvie	BLDG	2	0.71	547	241	55	1442	0.71	1442	3.15	14.74	0.08	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.71	0.71	0.23	15.00	0.5	200	PVC	SDR 35	1.00	33.4	**44.86%**	1.05	0.87
	2	1	0.00	0	0	0	0	0.71	1442	3.15	14.74	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.71	0.23	15.00	18.6	200	PVC	SDR 35	1.00	33.4	**44.86%**	1.05	0.87
																												250							

Notes

1. Unit breakdown provided by RLA Architects and dated April 1, 2025
2. Site to outlet to existing 250 mm dia. sanitary sewer on Cummings Avenue.
3. Entire site area considered as potential source of infiltration.
4. Assumed studio unit has 1.4 ppu, "1 bedroom with den" has 2.1 ppu, "2 bedroom with den" has 3.1 ppu.

C.2 Correspondence with City on Sanitary Sewer Capacity

Kilborn, Kris

From: Polyak, Alex <alex.polyak@ottawa.ca>
Sent: Tuesday, December 10, 2024 10:25 AM
To: Kilborn, Kris
Cc: Evan Johnson; Wang, Ziyi; Thiffault, Dustin; Haynes, Kris
Subject: RE: 1137-1147 Ogilvie - Sanitary and Watermain Confirmation

Follow Up Flag: Follow up
Flag Status: Flagged

Hello Kris,

We confirm that the sanitary sewer has the capacity for the proposed 16.09 L/s from 1137 and 1147 Ogilvie Road.

Regards,

Oleksandr (Alex) Polyak, B.Eng., C.E.T., P.Eng.
Project Manager, Infrastructure Approvals, Development Review East Branch | Gestionnaire de projet, Direction de l'examen des projets d'aménagement – Est.
Planning, Development and Building Services Department (PDBS) | Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)

City of Ottawa | Ville d'Ottawa
110 Laurier Ave., 4th Fl East, Ottawa ON K1P 1J1
Email: alex.polyak@ottawa.ca
Cell : 613-857-4380
www.Ottawa.ca

From: Kilborn, Kris
Sent: Thursday, November 28, 2024 2:39 PM
To: Polyak, Alex <alex.polyak@ottawa.ca>; Elsby, Cam <Cam.Elsby@ottawa.ca>
Cc: Evan Johnson <e.johnson@tcudevcorp.com>; Wang, Ziyi <Ziyi.Wang@stantec.com>; Thiffault, Dustin <Dustin.Thiffault@stantec.com>
Subject: FW: 1137-1147 Ogilvie - Sanitary and Watermain Confirmation

Good afternoon Alex and Cam and hope all is well

We are working with TCU Development Corporation on a new concept development for their existing site at 1137 Ogilvie Road incorporating the property at 1147 Ogilvie Road which they are looking at purchasing. The development at 1137 Ogilvie Road (D02-02-24-0028) has been submitted for zoning bylaw amendment with a single 24-storey residential complex building. The proposed development would look at sharing the two properties and have two residential 30 story towers with shared podium and underground parking. Although there is no detailed conceptual site plan available to share

at this stage, we are looking to obtain information on the sanitary capacity allowance for the sewer along Ogilvie for the two combined properties and submission of a new watermain boundary request for the two parcels.

Stantec is in the process of preparing a serviceability memo for TCU Development Corporation to seek approval of the sanitary flows and availability of fire flows to service the two properties. TCU requires confirmation by Dec 12 in order assess and meet the conditions of purchase and sale of the property at 1147 Ogilvie Road.
Below are the conceptual site stats for the two combined properties.

The total estimated units for 1137-1147 Ogilvie contains:

Unit Type	Number of Units	Population factor
Studio:	336 units	1.4
1 Bedroom:	306 units	1.4
1 Bedroom + Den:	93 units	2.1
2 Bedroom:	129 units	2.1
2 Bedroom + Den:	56 units	3.1
3 Bedroom:	7 units	3.1

The two parcels have a total area of 0.733 ha according to the data from GeoOttawa, please find the following key plan for the site location and boundary condition locations:

Based on the information we have we are requesting water boundary conditions and the sanitary capacity at the locations indicated on the attached figure under the following condition:

Water Boundary Conditions

- Domestic Demands
  - 2119.4L/min

- Fire Flow Demand
  - ~ 6000L/min minimum requirements
  - Would the current watermain on Cummings Ave and Ogilvie Road be able to provide a higher Fire Flow Volume for this site?

Sanitary Capacity

- The overall conceptual development would generate approximate 16.1 L/s total sanitary flow.
- Could you please advise if there are any sanitary capacity constraints and if the combined development is permitted to release at 16.1 L/s

The existing site at 1137 Ogilvie Road was approved to discharge to release at 9.44 L/s (Email from Alex Polyak to Kris Kilborn Jan 24, 2024). We would be looking to confirm discharge of approximately 6.6 l/s for the 1147 Ogilvie property.

For the assumption of domestic water calculation, we are also using 2.5 as the peak factor for max day demand, and 2.2 for peak hour demand per the City's guideline. The peak flow parameters for sanitary flow calculation are per the City of Ottawa Sewer Design Guideline revised section 4.4.1 (Tech bulletin ISTB-2018-01 the figure 4.3)

Please find attached the FUS calculations, domestic water demand calculation sheet and sanitary design sheet for your reference.

We would like to receive confirmation on the water and sanitary by Dec 9 to meet the timelines for the purchase and sale by the owner.
Appreciate any help to move this along and please give me a call if you have any questions

Sincerely

Kris Kilborn
Principal, Community Development
Business Center Practice Lead

Mobile: 613 297-0571
Fax: 613 722-2799
kris.kilborn@stantec.com
Stantec
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

'

'

Appendix D Stormwater Servicing

D.1 Modified Rational Method Sheet

Stormwater Management Calculations

File No: **160402095**
Project: **1137 Ogilvie Road**
Date: **10-Apr-25**

SWM Approach:
100-year Post-development to 2-year Pre-development flows
No rooftop storage

Post-Development Site Conditions:

Overall Runoff Coefficient for Site and Sub-Catchment Areas

Runoff Coefficient Table

Catchment Type	Sub-catchment Area ID / Description		Area (ha) "A"		Runoff Coefficient "C"	"A x C"		Overall Runoff Coefficient
Uncontrolled - Non-Tributary	UNC-2	Hard	0.021		0.9	0.018		
		Soft	0.008		0.2	0.002		
		Subtotal		0.03			0.02009	0.700
Uncontrolled - Non-Tributary	UNC-1	Hard	0.046		0.9	0.042		
		Soft	0.019		0.2	0.004		
		Subtotal		0.07			0.0455	0.700
Uncontrolled - Tributary	1151	Hard	0.205		0.9	0.184		
		Soft	0.016		0.2	0.003		
		Subtotal		0.22			0.187595	0.850
Uncontrolled - Tributary	BLDG1	Hard	0.174		0.9	0.157		
		Soft	0.000		0.2	0.000		
		Subtotal		0.17			0.1566	0.900
Controlled - Tributary	CISTERN	Hard	0.162		0.9	0.146		
		Soft	0.056		0.2	0.011		
		Subtotal		0.22			0.156816	0.720
Total				**0.71**			**0.567**	
Overall Runoff Coefficient= C:								**0.80**

Total Roof Areas	**0.00 ha**
Total Tributary Surface Areas (Controlled and Uncontrolled)	**0.61 ha**
Total Tributary Area to Outlet	**0.61 ha**
Total Uncontrolled Areas (Non-Tributary)	**0.09 ha**
Total Site	**0.71 ha**

Stormwater Management Calculations

Project #160402095, 1137 Ogilvie Road
Modified Rational Method Calculatons for Storage

2 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	732.951
b =	6.199
c =	0.81

t (min)	I (mm/hr)
10	76.8
20	52.0
30	40.0
40	32.9
50	28.0
60	24.6
70	21.9
80	19.8
90	18.1
100	16.7
110	15.6
120	14.6

2 YEAR Predevelopment Target Release from Portion of Site

Subdrainage Area: Predevelopment Tributary Area to Outlet
Area (ha): 0.7100
C: 0.50

Typical Time of Concentration

tc (min)	I (2 yr) (mm/hr)	Qtarget (L/s)
10	76.8	**75.8**

2 YEAR Modified Rational Method for Entire Site

Subdrainage Area: UNC-2 — Uncontrolled - Non-Tributary
Area (ha): 0.03
C: 0.70

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
5	103.57	5.78	5.78		
10	76.81	4.29	4.29		
15	61.77	3.45	3.45		
20	52.03	2.91	2.91		
25	45.17	2.52	2.52		
30	40.04	2.24	2.24		
35	36.06	2.01	2.01		
40	32.86	1.84	1.84		
45	30.24	1.69	1.69		
50	28.04	1.57	1.57		
55	26.17	1.46	1.46		
60	24.56	1.37	1.37		

Subdrainage Area: UNC-1 — Uncontrolled - Non-Tributary
Area (ha): 0.07
C: 0.70

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.8	9.7	9.7		
20	52.0	6.6	6.6		
30	40.0	5.1	5.1		
40	32.9	4.2	4.2		
50	28.0	3.5	3.5		
60	24.6	3.1	3.1		
70	21.9	2.8	2.8		
80	19.8	2.5	2.5		
90	18.1	2.3	2.3		
100	16.7	2.1	2.1		
110	15.6	2.0	2.0		
120	14.6	1.8	1.8		

Subdrainage Area: 1151 — Uncontrolled - Tributary
Area (ha): 0.22
C: 0.85

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.8	40.1	40.1		
20	52.0	27.1	27.1		
30	40.0	20.9	20.9		
40	32.9	17.1	17.1		
50	28.0	14.6	14.6		
60	24.6	12.8	12.8		
70	21.9	11.4	11.4		
80	19.8	10.3	10.3		
90	18.1	9.5	9.5		
100	16.7	8.7	8.7		
110	15.6	8.1	8.1		
120	14.6	7.6	7.6		

Subdrainage Area: BLDG1 — Uncontrolled - Tributary
Area (ha): 0.17
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.8	33.4	33.4		
20	52.0	22.7	22.7		
30	40.0	17.4	17.4		
40	32.9	14.3	14.3		
50	28.0	12.2	12.2		
60	24.6	10.7	10.7		
70	21.9	9.5	9.5		
80	19.8	8.6	8.6		
90	18.1	7.9	7.9		
100	16.7	7.3	7.3		
110	15.6	6.8	6.8		
120	14.6	6.3	6.3		

Subdrainage Area: CISTERN — Controlled - Tributary
Area (ha): 0.22
C: 0.72

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.8	107.0	35.1	71.9	43.1
20	52.0	72.5	35.1	37.4	**44.8**
30	40.0	55.8	35.1	20.7	37.2
40	32.9	45.8	35.1	10.7	25.6

Project #160402095, 1137 Ogilvie Road
Modified Rational Method Calculatons for Storage

100 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	1735.688
b =	6.014
c =	0.820

t (min)	I (mm/hr)
10	178.6
20	120.0
30	91.9
40	75.1
50	64.0
60	55.9
70	49.8
80	45.0
90	41.1
100	37.9
110	35.2
120	32.9

100 YEAR Predevelopment Target Release from Portion of Site

Subdrainage Area: Predevelopment Tributary Area to Outlet
Area (ha): 0.7100
C: 0.50

100 YEAR Modified Rational Method for Entire Site

Subdrainage Area: UNC-2 — Uncontrolled - Non-Tributary
Area (ha): 0.03
C: 0.88

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	12.47	12.47		
20	119.95	8.37	8.37		
30	91.87	6.41	6.41		
40	75.15	5.25	5.25		
50	63.95	4.46	4.46		
60	55.89	3.90	3.90		
70	49.79	3.48	3.48		
80	44.99	3.14	3.14		
90	41.11	2.87	2.87		
100	37.90	2.65	2.65		
110	35.20	2.46	2.46		
120	32.89	2.30	2.30		

Subdrainage Area: UNC-1 — Uncontrolled - Non-Tributary
Area (ha): 0.07
C: 0.88

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	28.2	28.2		
20	120.0	19.0	19.0		
30	91.9	14.5	14.5		
40	75.1	11.9	11.9		
50	64.0	10.1	10.1		
60	55.9	8.8	8.8		
70	49.8	7.9	7.9		
80	45.0	7.1	7.1		
90	41.1	6.5	6.5		
100	37.9	6.0	6.0		
110	35.2	5.6	5.6		
120	32.9	5.2	5.2		

Subdrainage Area: 1151 — Uncontrolled - Tributary
Area (ha): 0.22
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	109.6	109.6		
20	120.0	73.6	73.6		
30	91.9	56.4	56.4		
40	75.1	46.1	46.1		
50	64.0	39.2	39.2		
60	55.9	34.3	34.3		
70	49.8	30.5	30.5		
80	45.0	27.6	27.6		
90	41.1	25.2	25.2		
100	37.9	23.3	23.3		
110	35.2	21.6	21.6		
120	32.9	20.2	20.2		

Subdrainage Area: BLDG1 — Uncontrolled - Tributary
Area (ha): 0.17
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	86.4	86.4		
20	120.0	58.0	58.0		
30	91.9	44.4	44.4		
40	75.1	36.3	36.3		
50	64.0	30.9	30.9		
60	55.9	27.0	27.0		
70	49.8	24.1	24.1		
80	45.0	21.8	21.8		
90	41.1	19.9	19.9		
100	37.9	18.3	18.3		
110	35.2	17.0	17.0		
120	32.9	15.9	15.9		

Subdrainage Area: CISTERN — Controlled - Tributary
Area (ha): 0.22
C: 0.90

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	293.2	35.1	258.1	154.9
20	120.0	197.0	35.1	161.9	194.3
30	91.9	150.9	35.1	115.8	208.4
40	75.1	123.4	35.1	88.3	**211.9**

Stormwater Management Calculations

Project #160402095, 1137 Ogilvie Road
Modified Rational Method Calculatons for Storage

50	28.0	39.1	35.1	4.0	11.9
60	24.6	34.2	34.2	0.0	0.0
70	21.9	30.5	30.5	0.0	0.0
80	19.8	27.6	27.6	0.0	0.0
90	18.1	25.3	25.3	0.0	0.0
100	16.7	23.3	23.3	0.0	0.0
110	15.6	21.7	21.7	0.0	0.0
120	14.6	20.3	20.3	0.0	0.0

Storage: Underground Cistern storage. Roof areas to be directed to cistern.

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
2-year Water Level	-	-	35.1	44.8	215.0	OK

SUMMARY TO OUTLET

		Vrequired	Vavailable*	
Tributary Area	0.61 ha			
Total 2yr Flow to Sewer	35.1 L/s	45	215 m^3	Ok
Non-Tributary Area	0.09 ha			
Total 2yr Flow Uncontrolled	15.5 L/s			
Total Area	0.71 ha			
Total 2yr Flow	50.6 L/s			
Target	75.8 L/s			

Project #160402095, 1137 Ogilvie Road
Modified Rational Method Calculatons for Storage

50	64.0	105.0	35.1	69.9	209.8
60	55.9	91.8	35.1	56.7	204.1
70	49.8	81.8	35.1	46.7	196.0
80	45.0	73.9	35.1	38.8	186.2
90	41.1	67.5	35.1	32.4	175.0
100	37.9	62.2	35.1	27.1	162.9
110	35.2	57.8	35.1	22.7	149.9
120	32.9	54.0	35.1	18.9	136.2

Storage: Underground Cistern storage. Roof areas to be directed to cistern.

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	-	-	35.1	211.9	215.0	OK
					3.1	

SUMMARY TO OUTLET

		Vrequired	Vavailable*	
Tributary Area	0.61 ha			
Total 100yr Flow to Sewer	35.1 L/s	212	215 m^3	Ok
Non-Tributary Area	0.09 ha			
Total 100yr Flow Uncontrolled	40.7 L/s			
Total Area	0.71 ha			
Total 100yr Flow	75.8 L/s			
Target	75.8 L/s			

D.2 Storm Sewer Design Sheet

Stantec

1137/1151 Ogilvie Road and 1111 Cummings Avenue

DATE: 2025-04-10
REVISION: 1
DESIGNED BY: WAJ
CHECKED BY:

STORM SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160402095

DESIGN PARAMETERS

$I = a / (t+b)^c$ (As per City of Ottawa Guidelines, 2012)

	1:2 yr	1:5 yr	1:10 yr	1:100 yr
a =	732.951	998.071	1174.184	1735.688
b =	6.199	6.053	6.014	6.014
c =	0.810	0.814	0.816	0.820

MANNING'S n = 0.013 BEDDING CLASS = B
MINIMUM COVER: 2.00 m
TIME OF ENTRY 10 min

LOCATION			DRAINAGE AREA																				PIPE SELECTION										
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (5-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (2-YEAR) (-)	C (5-YEAR) (-)	C (10-YEAR) (-)	C (100-YEAR) (-)	A x C (2-YEAR) (ha)	ACCUM AxC (2YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	A x C (10-YEAR) (ha)	ACCUM. AxC (10YR) (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	$I_{2\text{-YEAR}}$ (mm/h)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$I_{100\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETEI (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)	VEL. (ACT) (m/s)	TIME OF FLOW (min)
BLDG1, 1151, CISTERN	BLDG	101	0.61	0.00	0.00	0.00	0.00	0.82	0.00	0.00	0.00	0.498	0.498	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	106.3	1.4	375	375	CIRCULAR	PVC	SDR 35	1.00	164.8	**64.51%**	1.56	1.44	0.02
	101	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.498	0.000	0.000	0.000	0.000	0.000	0.000	10.02	76.74	104.11	122.04	178.41	0.0	0.0	106.2	8.5	375	375	CIRCULAR	PVC	SDR 35	1.00	164.8	**64.46%**	1.56	1.44	0.10
																				10.11									525	525									

D.3 Stormceptor Report and Specifications

Stormceptor® Rinker Materials

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

04/09/2025

Province:	Ontario
City:	Ottawa
Nearest Rainfall Station:	OTTAWA CDA RCS
Climate Station Id:	6105978
Years of Rainfall Data:	20

Site Name:	

Drainage Area (ha):	0.61
Runoff Coefficient 'c':	0.82

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	
Estimated Water Quality Flow Rate (L/s):	16.14
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	42.50
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	
Estimated Average Annual Sediment Volume (L/yr):	485

Project Name:	1137 Ogilvie Road
Project Number:	160402095
Designer Name:	Warren Johnson
Designer Company:	Stantec
Designer Email:	warren.johnson@stantec.com
Designer Phone:	613-784-2272
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	83
EFO5	88
EFO6	92
EFO8	96
EFO10	98
EFO12	99

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 83

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

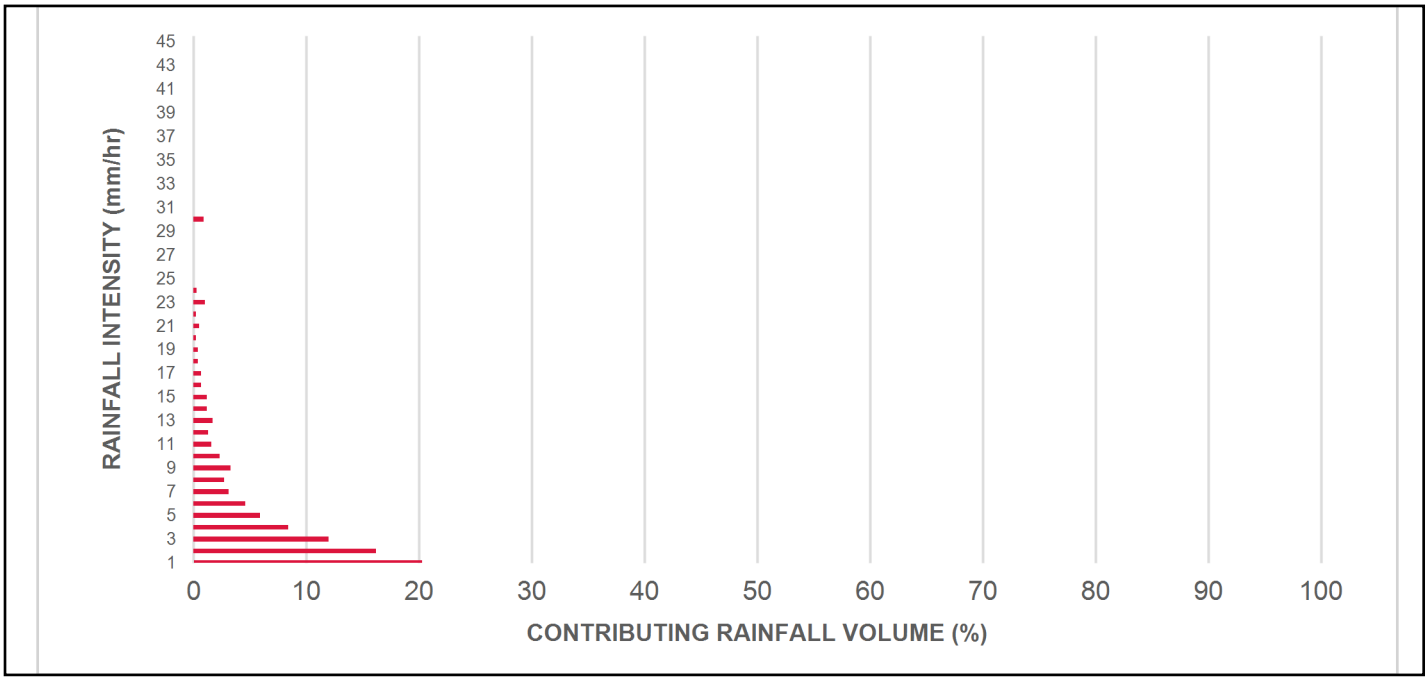
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Upstream Flow Controlled Results

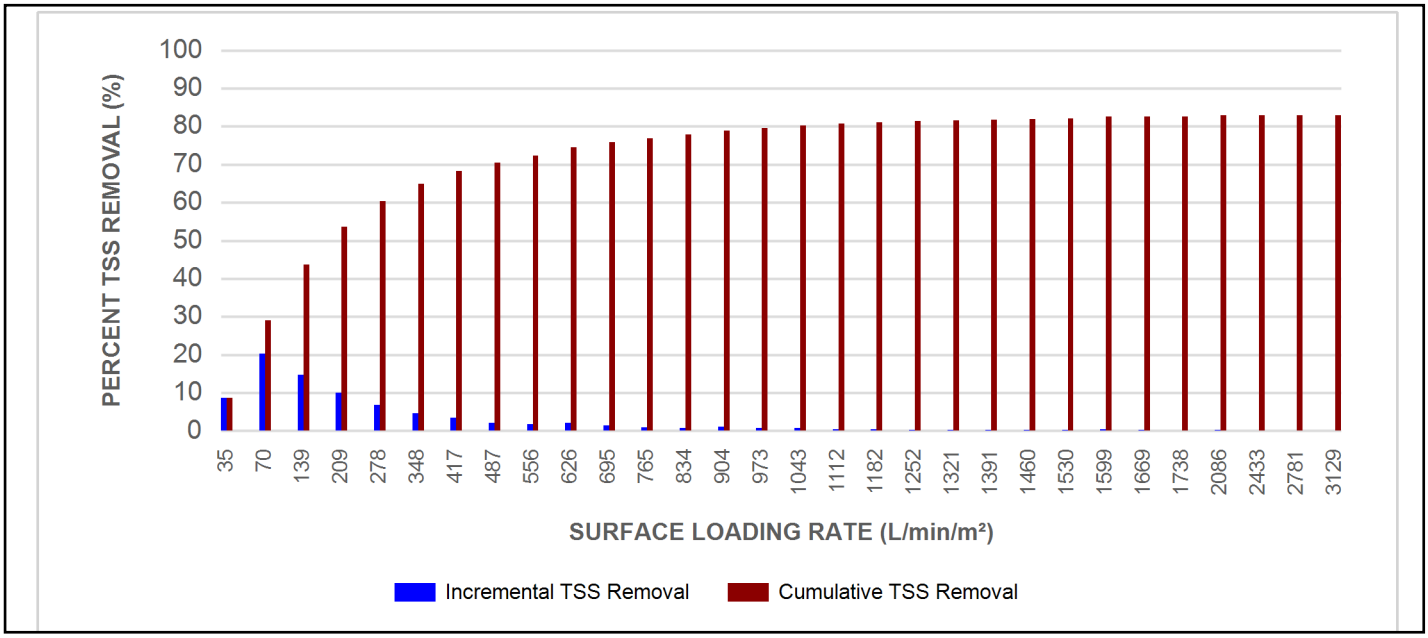
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	0.70	42.0	35.0	100	8.6	8.6
1.00	20.3	29.0	1.39	83.0	70.0	100	20.3	29.0
2.00	16.2	45.2	2.78	167.0	139.0	91	14.7	43.7
3.00	12.0	57.2	4.17	250.0	209.0	83	10.0	53.7
4.00	8.4	65.6	5.56	334.0	278.0	80	6.7	60.4
5.00	5.9	71.6	6.95	417.0	348.0	77	4.6	64.9
6.00	4.6	76.2	8.34	501.0	417.0	73	3.4	68.3
7.00	3.1	79.3	9.73	584.0	487.0	70	2.1	70.5
8.00	2.7	82.0	11.12	667.0	556.0	67	1.8	72.3
9.00	3.3	85.3	12.52	751.0	626.0	64	2.1	74.5
10.00	2.3	87.6	13.91	834.0	695.0	64	1.5	75.9
11.00	1.6	89.2	15.30	918.0	765.0	63	1.0	76.9
12.00	1.3	90.5	16.69	1001.0	834.0	63	0.8	77.8
13.00	1.7	92.2	18.08	1085.0	904.0	62	1.1	78.8
14.00	1.2	93.5	19.47	1168.0	973.0	62	0.8	79.6
15.00	1.2	94.6	20.86	1252.0	1043.0	61	0.7	80.3
16.00	0.7	95.3	22.25	1335.0	1112.0	59	0.4	80.7
17.00	0.7	96.1	23.64	1418.0	1182.0	57	0.4	81.1
18.00	0.4	96.5	25.03	1502.0	1252.0	56	0.2	81.4
19.00	0.4	96.9	26.42	1585.0	1321.0	54	0.2	81.6
20.00	0.2	97.1	27.81	1669.0	1391.0	53	0.1	81.7
21.00	0.5	97.5	29.20	1752.0	1460.0	50	0.2	81.9
22.00	0.2	97.8	30.59	1836.0	1530.0	48	0.1	82.0
23.00	1.0	98.8	31.98	1919.0	1599.0	46	0.5	82.5
24.00	0.3	99.1	33.37	2002.0	1669.0	44	0.1	82.6
25.00	0.0	99.1	34.76	2086.0	1738.0	42	0.0	82.6
30.00	0.9	100.0	41.72	2503.0	2086.0	35	0.3	82.9
35.00	0.0	100.0	42.00	2520.0	2100.0	35	0.0	82.9
40.00	0.0	100.0	42.00	2520.0	2100.0	35	0.0	82.9
45.00	0.0	100.0	42.00	2520.0	2100.0	35	0.0	82.9
Estimated Net Annual Sediment (TSS) Load Reduction =								**83 %**

Climate Station ID: 6105978 *Years of Rainfall Data*: 20

RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

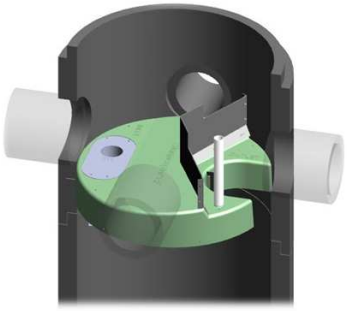
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

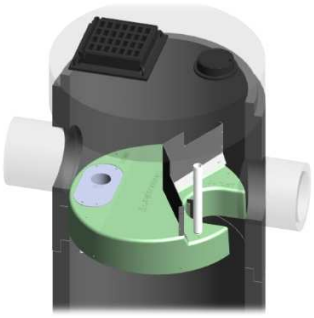
DESIGN FLEXIBILITY

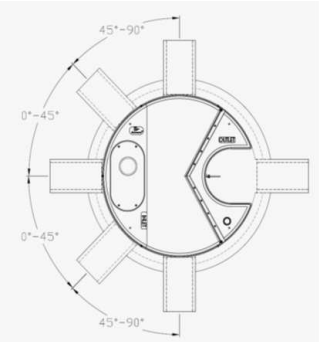
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREAMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit** S**eparators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	5 ft (1524 mm) Diameter OGS Units:	1.95 m^3 sediment / 420 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

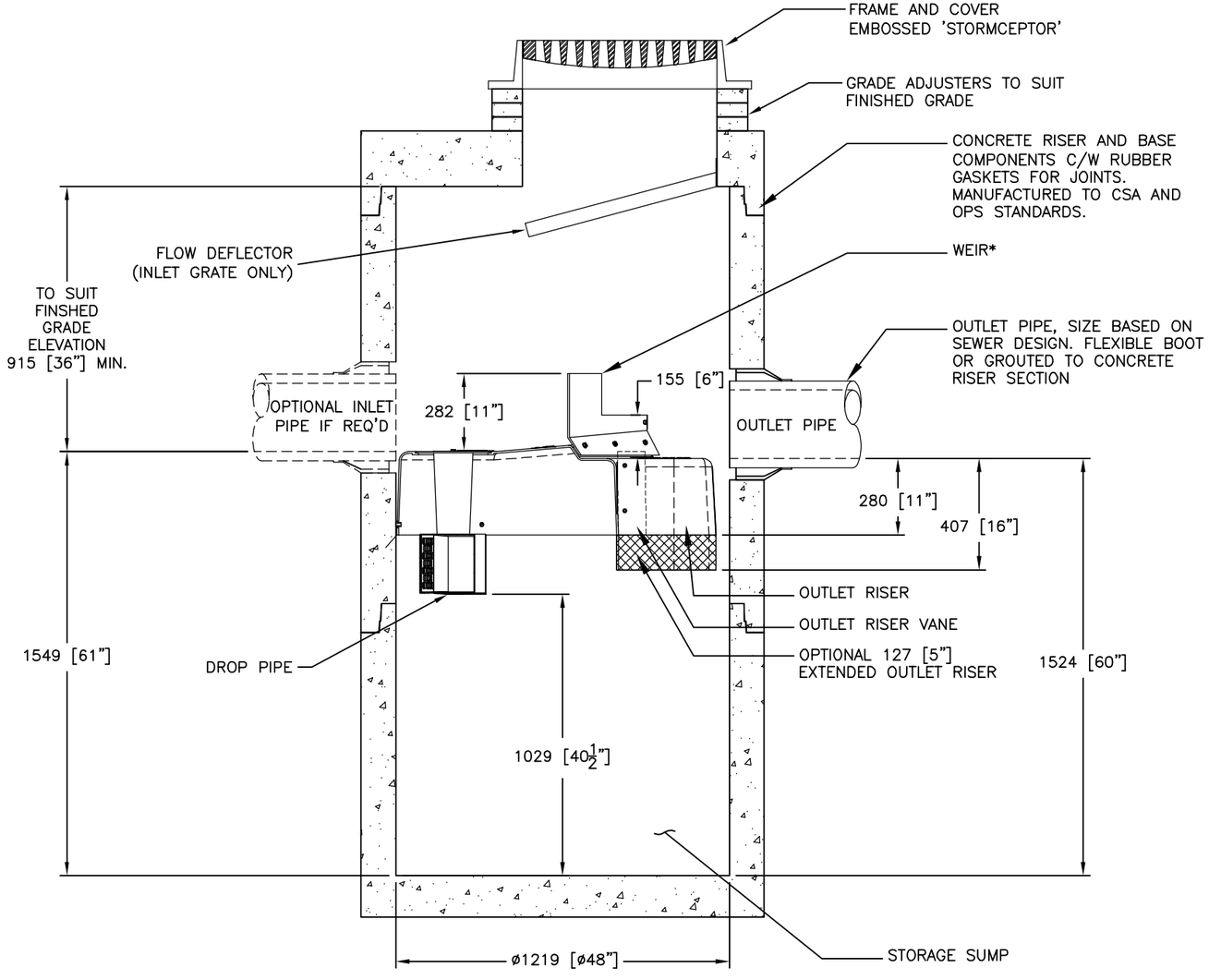
3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

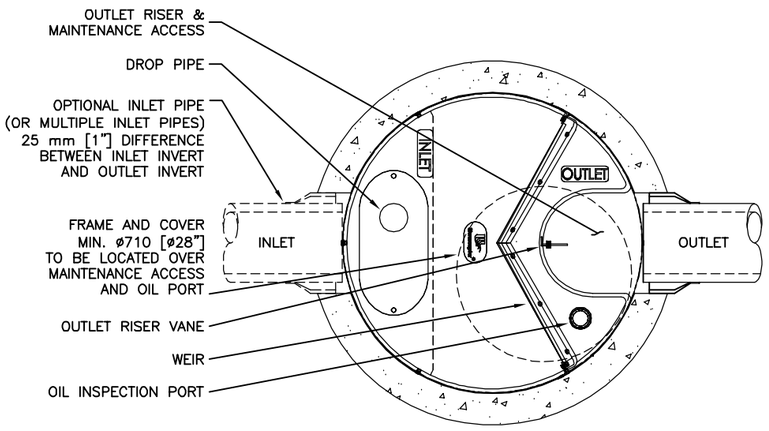
The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid

Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

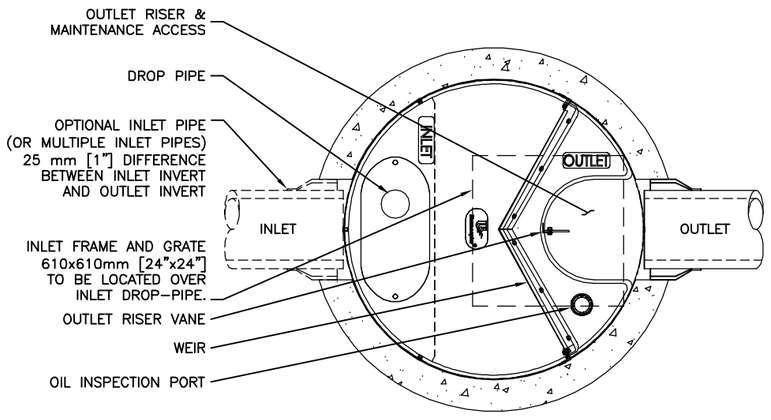
3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL STORMCEPTOR REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE (IF REQUIRED).

GENERAL NOTES:

* MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m^2 (27.9 gpm/ft^2) FOR STORMCEPTOR EF4 AND 535 L/min/m^2 (13.1 gpm/ft^2) FOR STORMCEPTOR EFO4 (OIL CAPTURE CONFIGURATION). WEIR HEIGHT IS 150 mm (6 INCH) FOR EF04.

1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
2. STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE STORMCEPTOR SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EFO4				
STRUCTURE ID					*
HYDROCARBON STORAGE REQ'D (L)					*
WATER QUALITY FLOW RATE (L/s)					*
PEAK FLOW RATE (L/s)					*
RETURN PERIOD OF PEAK FLOW (yrs)					*
DRAINAGE AREA (HA)					*
DRAINAGE AREA IMPERVIOUSNESS (%)					*
PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

* PER ENGINEER OF RECORD

MARK	DATE	REVISION DESCRIPTION	BY
####	####	####	####
####	####	####	####
1	6/8/18	UPDATES	JSK
0	5/26/17	INITIAL RELEASE	JSK

Stormceptor® EF

SCALE = NTS

imbrium®
407 FAIRVIEW DRIVE, WHITBY, ON, L1N 9A9
TF 800-565-4501 CA 416-800-9000 INTL +1-416-800-9000

DATE: 10/13/2017

DESIGNED:	DRAWN:
JSK	JSK
CHECKED:	APPROVED:
BSF	SP
PROJECT No.:	SEQUENCE No.:
EFO4	*

SHEET: 1 OF 1

Stormceptor® EF

Stormceptor® EF Overview

imbrium®

About Imbrium® Systems

Imbrium® Systems is dedicated to protecting Canada's waterways. Based on our knowledge and experience in the Canadian stormwater industry, we have the ability to provide the most effective stormwater treatment technologies that capture and retain harmful pollutants from urban runoff before it enters our streams, rivers, lakes, and oceans.

Imbrium's engineered treatment solutions have been third-party tested and verified in accordance with the ISO 14034 Environmental Technology Verification (ETV) protocol to ensure performance in real-world conditions as designed. Our team of highly skilled engineers and partners provide the highest level of service from design to installation and long-term maintenance.

By working with Imbrium and our partners, you can expect superior treatment technology, unparalleled customer service, compliance with local stormwater regulations, and cleaner water. To find your local representative, please visit **www.imbriumsystems.com/localrep**.

Learn About the Stormceptor® EF

Go online and watch our animation to learn how the Stormceptor EF works. The animation highlights important features of the Stormceptor EF including:

- Functionality
- Applications
- Inspection and Maintenance

To view the Stormceptor EF animation, visit **www.imbriumsystems.com/stormceptoref**

Stormceptor® EF

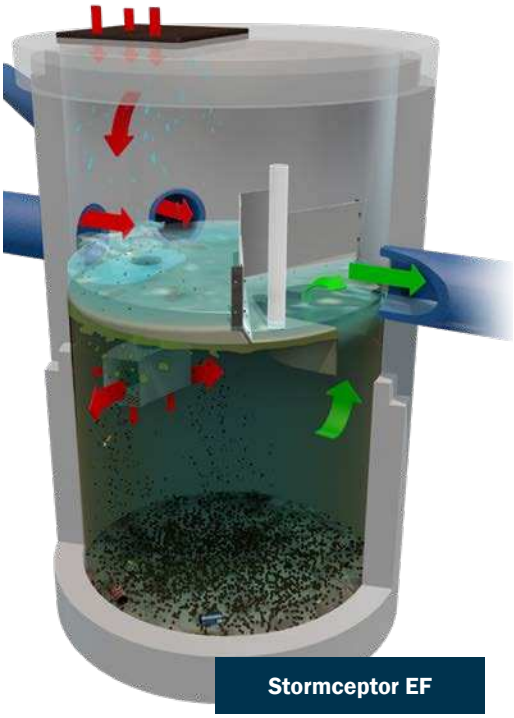
A CONTINUATION AND EVOLUTION OF THE MOST GLOBALLY RECOGNIZED OIL GRIT SEPARATOR (OGS) STORMWATER TREATMENT TECHNOLOGY

Stormceptor EF effectively targets sediment (TSS), free oils, gross pollutants and other pollutants that attach to particles, such as nutrients and metals. Stormceptor EF's independently tested and verified, patent- pending treatment and scour prevention platform ensures pollutants are captured and contained during all rainfall events.

Stormceptor EF also offers design flexibility in one platform, accepting flow from a single inlet pipe, multiple inlet pipes, and from the surface through an inlet grate. Stormceptor EF can also accommodate a 90-degree inlet to outlet bend angle, and tailwater conditions.

Ideal Uses

- Sediment (TSS) removal
- Hydrocarbon control and hotspots (Stormceptor EF)
- Debris and small floatables capture
- Pretreatment for filtration, detention/retention systems, ponds, wetlands, and bioretention
- Retrofit and redevelopment projects

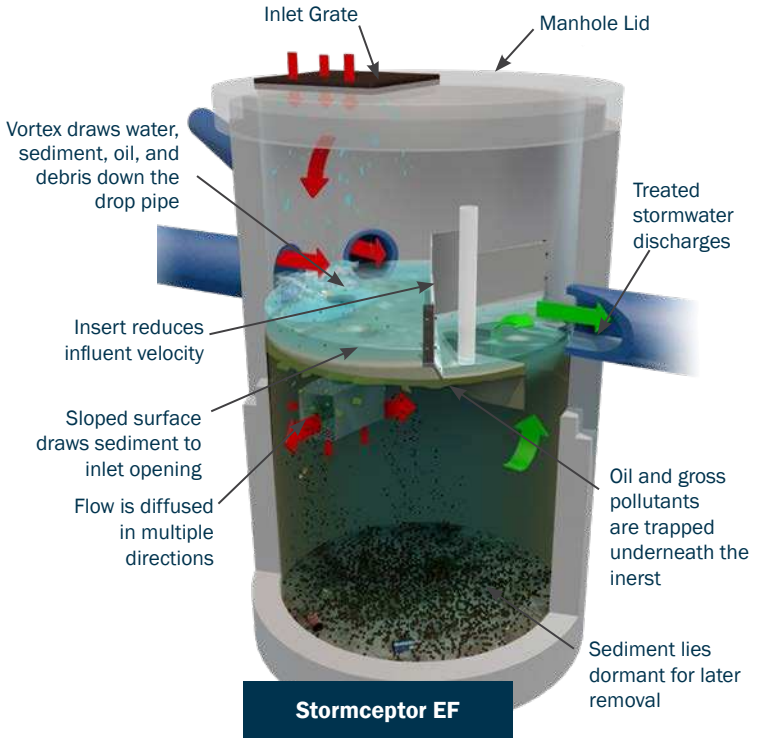


Stormceptor EF

Stormceptor EF and Stormceptor EFO have been verified in accordance with ISO 14034 Environment Management - Environmental Technology Verification (ETV) protocol.

How the Stormceptor® EF Works

- Flow enters the Stormceptor through one or more inlet pipes or an inlet grate.
- A specially designed insert reduces influent velocity by creating a pond upstream of the weir, allowing sediments to begin settling.
- Swirling flow sweeps water and pollutants across the sloped insert surface to the drop pipe, where a strong vortex draws water, sediment, oil, and debris down the drop pipe cone and into the lower chamber.
- Flow exits the drop pipe through two large rectangular openings, while also diffusing through perforations in multiple directions. This reduces stream velocities and increases pollutant removal efficiency while preventing resuspension and washout of previously captured pollutants.
- Floatables, such as oil and gross pollutants, rise up and are trapped beneath the insert.
- Sediment settles to the sump.
- Treated stormwater discharges to the top side of the insert downstream of the weir, where it exits through the outlet pipe.
- During intense storm events excess influent passes over the weir and exits through the outlet pipe. The pond continues to separate sediment from all incoming flows, while full treatment in the lower chamber continues at the maximum flow rate, without scour of previously captured pollutants.

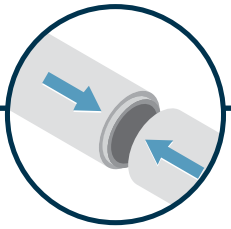


* Fiberglass system is an option

Stormceptor® EF Features & Benefits

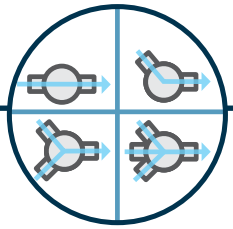
EASY TO INSTALL

Small footprint saves time and money with limited disruption to your site.



SEAMLESS

Minimal drop between inlet and outlet pipes makes Stormceptor ideal for retrofits and new development projects.

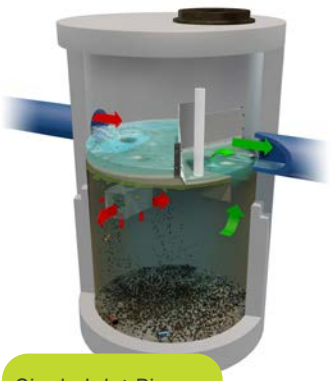


FLEXIBLE

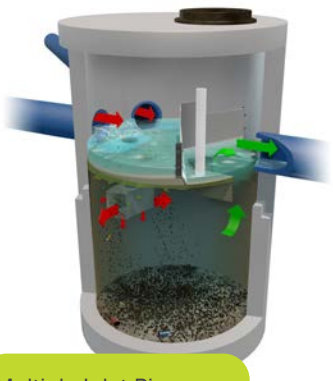
Multiple inlets can connect to a single unit. Can be used as a bend structure.

FEATURES	BENEFITS
Patent-pending enhanced flow treatment and scour prevention technology	Superior, third-party verified performance
Third-party verified light liquid capture and retention (EFO version)	Proven performance for fuel/oil hotspot locations
Functions as bend, junction or inlet structure	Cost savings and design flexibility
Minimal drop between inlet and outlet	Site installation ease
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade

Stormceptor® EF Standard Configurations

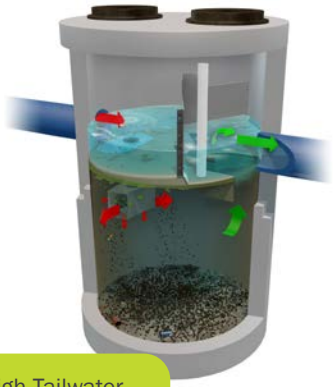


Single Inlet Pipe



Multiple Inlet Pipes

Grate Inlet



High Tailwater

OPTIONS & ACCESSORIES

The following options and accessories are available for specific functions and site conditions:

- **Tailwater/Submerged Site** – For sites with standing water during dry weather periods, weir modifications can be implemented to ensure optimal performance.
- **Additional Sediment Storage Volume** – For sites with high pollutant loads or remote sites, additional sediment storage volume can easily be added.
- **Oil Alarm** – To mitigate spill liability, a monitoring system can be employed to trigger a visual and audible alarm when an oil or fuel spill occurs.
- **Additional Oil Capture** – A draw-off tank can be incorporated to increase spill storage capacity.
- **High Load** – Standard design loading is CHBDC or AASHTO H-20. Specialized loading can be designed to withstand very high loadings typical of airports and port facilities.
- **Lightweight** – Sites that required lightweight or above ground units are available as complete fiberglass systems.

Optional Oil Alarm

For any of these options or accessories, please contact your Stormceptor representative for design assistance.

Stormceptor® EFO

Accidents and spills happen, whether it is a fueling station, port, ndustrial site, or general hot spot with daily vehicle traffic. Protect the environment and your site from potentially costly clean-up, remediation, litigation and fines with the Stormceptor EFO configuration.

The Stormceptor EFO has been third-party tested to ensure oil capture, and retention during high flow events. The hydraulics of the Stormceptor EFO have been optimized to enhance oil and hydrocarbon capture.

STORMCEPTOR EFO – HYDROCARBON SPILL PROTECTION

- Stormceptor EFO configuration has been third-party performance tested for safe oil capture and retention.
- Patent-pending technology ensures captured oil and sediment are retained even during the largest rain events, for secure storage, environmental protection and easy removal.
- Stormceptor EFO provides double wall containment for captured hydrocarbons.
- Stormceptor EFO is ideal for gas stations, fuel depots, ports, garages, loading docks, industrial sites, fast food locations, high-collision intersections and other hotspots with spill-prone areas.
- Stormceptor EFO can accommodate an optional oil alarm and additional storage to increase spill storage capacity.

Stormceptor® Inspection & Maintenance

Conducted at grade, the Stormceptor EF design makes inspection and maintenance an easy and inexpensive process. Once maintained, the Stormceptor EF is functionally restored as designed, with full pollutant capture capacity.

MAINTENANCE RECOMMENDATIONS:

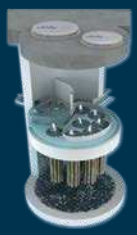
- Inspect every six months for the first year to determine the pollutant accumulation rate.
- In subsequent years, inspections can be based on observations or local requirements.
- Inspect the unit immediately after an oil, fuel or chemical spill. A licensed waste management company should remove oil and sediment, and dispose responsibly.

Stormceptor maintenance is performed at grade with a standard vacuum truck

ADDITIONAL SOLUTIONS

FILTERRA® BIORETENTION

The Filterra® Bioretention System is an engineered biofiltration device with components that make it similar to bioretention in pollutant removal and application, but has been optimized for high volume/flow treatment in a compact system.



JELLYFISH® FILTER

The Jellyfish® Filter is a stormwater treatment technology featuring pretreatment and membrane filtration in a compact stand-alone treatment system that removes a high level and a wide variety of stormwater pollutants.

LEARN MORE

- Access project profiles, photos, videos, and more online at **www.imbriumsystems.com/stormceptoref.**

REQUEST DESIGN ASSISTANCE

- Call us at (888) 279-8826 or 301-279-8827 to talk to one of our engineers for technical support or design assistance.

START A PROJECT

- Submit your system requirements on our product Design Worksheet at **www.imbriumsystems.com/pdw.**

FIND A LOCAL REPRESENTATIVE

- Visit **www.imbrumsystems.com/localrep** for contact information for your local Imbrium representative.

imbrium®

+1 416-960-9900

www.imbriumsystems.com

Imbrium® Systems is an engineered stormwater treatment company that designs and manufactures stormwater treatment solutions that protect water resources from harmful pollutants. By developing technologies to address the long-term impact of urban runoff, Imbrium ensures our clients' projects are compliant with government water quality regulations. For information, visit www.imbriumsystems.com or call +1 416-960-9900.

Get Social With Us!

IB-Stormceptor EF Bro 4/21 PDF

MADE IN CANADA
By Canadians, for Canadians.

Appendix E Background Studies

E.1 Geotechnical Investigation (Paterson Group, February 2025)

PATERSON GROUP

Geotechnical Investigation

Proposed Multi-Storey Building

1137 to 1151 Ogilvie Road & 1111 Cummings Avenue
Ottawa, Ontario

Prepared for TCU Development Corporation

Report PG5770-1 Revision 4 dated February 3, 2025

Table of Contents

PAGE

1.0 Introduction 1
2.0 Proposed Development 1
3.0 Method of Investigation 2
3.1 Field Investigation 2
3.2 Field Survey 3
3.3 Laboratory Review 3
3.4 Analytical Testing 4
4.0 Observations 5
4.1 Surface Conditions 5
4.2 Subsurface Profile 5
4.3 Groundwater 7
5.0 Discussion 8
5.1 Geotechnical Assessment 8
5.2 Site Grading and Preparation 8
5.3 Foundation Design 10
5.4 Design for Earthquakes 11
5.5 Basement Floor Slab 12
5.6 Basement Wall 13
5.7 Rock Anchor Design 14
5.8 Pavement Design 17
6.0 Design and Construction Precautions 21
6.1 Foundation Drainage and Backfill 21
6.2 Protection of Footings Against Frost Action 22
6.3 Excavation Side Slopes 22
6.4 Pipe Bedding and Backfill 25
6.5 Groundwater Control 25
6.6 Winter Construction 26
6.7 Corrosion Potential and Sulphate 26
6.8 Protection of Potentially Expansive Bedrock 27
7.0 Recommendations 28
8.0 Statement of Limitations 29

Appendices

Appendix 1

Soil Profile and Test Data Sheets
Symbols and Terms
Log of Borehole Sheets by Others
Grain Size Distribution Curve by Others
Analytical Testing Results by Others

Appendix 2

Figure 1 - Key Plan
Figure 2 – Aerial Photograph – 1991
Figure 3 – Aerial Photograph – 2019
Figure 4 & 5 – Seismic Shear Wave Velocity Profiles
Drawing PG5770-1 – Test Hole Location Plan

1.0 Introduction

Paterson Group (Paterson) was commissioned by TCU Development Corporation to conduct a geotechnical investigation for the proposed multi-storey building to be located at 1137 to 1151 Ogilvie Road and 1111 Cummings Avenue, in the City of Ottawa, Ontario (refer to Figure 1 - Key Plan in Appendix 2 of this report).

The objectives of the geotechnical investigation were to:

- ❑ Determine the subsoil and groundwater conditions at this site by means of test holes.
- ❑ Provide geotechnical recommendations pertaining to the design of the proposed development including construction considerations which may affect the design.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes geotechnical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

Investigating for the presence or potential presence of contamination on the subject property was not part of the scope of the present investigation. Therefore, the present report does not address environmental issues.

2.0 Proposed Development

Based on available drawings, it is understood that the proposed development will consist of two multi-storey mixed-use buildings, with three levels of underground parking which will occupy the majority of the site footprint. At-grade parking areas, access lanes and landscaped margins are also anticipated. It is expected that the proposed development will be municipally serviced.

It is also expected that the existing structures will be demolished as part of the proposed development.

3.0 Method of Investigation

3.1 Field Investigation

Field Program

The field program for the geotechnical investigation was carried out on April 19, 2021 and consisted of advancing 5 boreholes to a maximum depth of 6.8 m below the existing ground surface. A geotechnical investigation was carried out by others at the 1151 Ogilvie Road property on June 4, 2024. The investigation by others consisted of advancing a total of 4 boreholes to a maximum depth of 7.1 m.

The borehole locations were determined in the field by Paterson personnel, taking into consideration existing site features and underground services. The locations of the boreholes are shown on Drawing PG5770-1 - Test Hole Location Plan included in Appendix 2.

The boreholes were completed with a low clearance, track-mounted drill rig operated by a two-person crew. All fieldwork was conducted under the full-time supervision of our personnel under the direction of a senior engineer. The test hole procedure consisted of augering and rock coring to the required depths at the selected locations, and sampling and testing the overburden and bedrock.

Sampling and In-Situ Testing

Soil samples were collected from the boreholes using two different techniques, namely, sampled directly from the auger flights (AU) or collected using a 50 mm diameter split-spoon (SS) sampler. Rock cores (RC) were obtained using 47.6 mm inside diameter coring equipment. All samples were visually inspected and initially classified on site. The auger and split-spoon samples were placed in sealed plastic bags, and rock cores were placed in cardboard boxes. All samples were transported to our laboratory for further examination and classification. The depths at which the auger, split spoon and rock core samples were recovered from the boreholes are shown as AU, SS and RC, respectively, on the Soil Profile and Test Data sheets presented in Appendix 1.

A Standard Penetration Test (SPT) was conducted in conjunction with the recovery of the split spoon samples. The SPT results are recorded as "N" values on the Soil Profile and Test Data sheets. The "N" value is the number of blows required to drive the split spoon sampler 300 mm into the soil after a 150 mm initial penetration using a 63.5 kg hammer falling from a height of 760 mm.

Bedrock samples were recovered using a core barrel and diamond drilling techniques. The depths at which rock core samples were recovered from the boreholes are shown as RC on the Soil Profile and Test Data sheets in Appendix 1.

A recovery value and a Rock Quality Designation (RQD) value were calculated for each drilled section (core run) of bedrock and are shown on the borehole logs. The recovery value is the ratio, in percentage, of the length of the bedrock sample recovered over the length of the drilled section (core run). The RQD value is the ratio, in percentage, of the total length of intact rock pieces longer than 100 mm in one core run over the length of the core run. These values are indicative of the quality of the bedrock.

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

Groundwater

Monitoring wells were installed within boreholes BH 1-21 through BH 3-21 to measure the stabilized groundwater levels subsequent to completion of the sampling program. Groundwater conditions were also observed and recorded in the field during the field investigation program. Groundwater monitoring wells were also instead boreholes BH 1, BH 2 and BH 4 during the investigation by others.

All monitoring wells should be decommissioned in accordance with Ontario Regulations O.Reg 903 by a qualified licensed well technician and prior to construction.

3.2 Field Survey

The test hole locations were selected by Paterson to provide general coverage of the proposed development taking into consideration the existing site features and underground utilities. The test hole locations and ground surface elevation at each test hole location were surveyed by Paterson using a GPS unit with respect to a geodetic datum. The location of the test holes and ground surface elevation at each test hole location are presented on Drawing PG5770-1 - Test Hole Location Plan in Appendix 2.

3.3 Laboratory Review

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

A total of one (1) grain size distribution analysis were completed on selected soil samples by others. Unconfined compressive strength testing was carried out by others on two (2) bedrock samples from BH 3. The results of the testing are discussed in Subsection 4.2 and are provided in Appendix 1.

3.4 Analytical Testing

Two (2) samples was submitted for analytical testing to assess the corrosion potential for exposed ferrous metals and the potential of sulphate attacks against subsurface concrete structures by others. The sample was submitted to determine the concentration of sulphate and chloride, the resistivity, and the pH of the samples. The results are presented in Appendix 1 and are discussed further in Subsection 6.7.

4.0 Observations

4.1 Surface Conditions

The subject site consists of 3 contiguous properties, 1111 Cummings Avenue, 1151 Ogilvie Road and 1137 Ogilvie Road. The properties at 1137 and 1151 Ogilive Road are each occupied by a commercial building with associated asphalt-paved parking areas and landscaped margins.

The property at 1111 Cummings Avenue is currently occupied by an asphalt paved parking and landscapes areas. However, based on available aerial photos, a residential dwelling was located within the western portion of the site as recently as 1991, and was no longer present in 1999. Reference should be made to the aerial photographs in Figure 2 - Aerial Photograph - 1991 and Figure 3 - Aerial Photograph - 2019 which illustrate the former and present site conditions, respectively.

The subject site is bordered by residential dwellings to the north, a tree-covered area to the east, Ogilvie Road to the south and Cummings Avenue to the west. The existing ground surface across the site is relatively level and at grade with the surrounding roadways and neighbouring properties.

4.2 Subsurface Profile

Overburden

Generally, the subsurface profile at the test hole locations consists of an approximate 25 to 130 mm thick layer of asphaltic concrete underlain by fill which extends to approximate depths of 0.5 to 3.1 m below the existing ground surface. The fill was generally observed to consist of a brown silty sand to silty clay with gravel and crushed stone. Trace amounts of topsoil and organics were also observed within the fill at boreholes BH 1-21, BH 2-21 and BH 4.

A glacial till deposit was encountered underlying the fill layer at boreholes BH 1, BH 2 and BH 3 on the 1151 Ogilvie Road property and was generally observed to consist of compact to very dense brown silty sand with clay, gravel, cobbles and boulders. The glacial till deposit was observed to extend to maximum depths of 1.9 to 3.1 m below the existing ground surface.

Grain Size Distribution Testing

One (1) grain size distribution test were completed by others to further classify the selected soil sample. The results are summarized in Table 1 below and are presented in Appendix 1.

Table 1 – Summary of Grain Size Distribution Analysis by Others

Test Hole	Sample	Depth (m)	Gravel (%)	Sand (%)	Silt & Clay (%)
BH 24-2	SS3	1.5 - 2.1	12	66	22

Bedrock

Practical refusal to augering on the bedrock surface was encountered at approximate depths ranging from 1.7 to 3.1 m. The bedrock was observed to consist of black shale and based on the RQDs of the recovered bedrock core, was generally weathered and of very poor quality to approximate depths ranging from 3.1 to 4.6 m, becoming fair to excellent in quality with depth. At boreholes BH 1-21 to BH 3-21 and BH 3, the bedrock was cored to depths ranging from 5.9 to 7.1 m below the existing ground surface. Approximate 10 cm clay seams were noted at approximate depths of 4.1and 4.4 at borehole BH 3.

Based on available geological mapping, bedrock in the area of the subject site consists of black shale of the Billings Formation with an overburden thickness ranging from approximately 2 to 3 m.

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

Unconfined Compressive Strength Testing by Others

Two (2) bedrock cores were tested for unconfined compressive strength by others. The results are summarized in Table 2 below.

Table 2 – Summary of Unconfined Bedrock Compressive Strength Testing Results

Borehole	Sample	Test Core Depth (m)	Unit Weight (kN/m^3)	Unconfined Compressive Strength (MPa)	Classification of Rock with respect to Strength	Bedrock Type
BH 3	RC6	4.5 - 4.6	25.4	61.2	Strong R4	Shale
BH 3	RC7	5.3 - 5.4	25.2	57.8	Strong R4	Shale

4.3 Groundwater

Groundwater levels were measured in the monitoring wells at boreholes BH 1-21, BH 2-21 and BH 3-21 on April 26, 2021. Groundwater monitoring devices were installed in the boreholes BH 1, BH 2 and BH 4 by others. The results are presented in Table 3 below.

Table 3 – Summary of Groundwater Levels

Borehole Number	Ground Surface Elevation (m)	Measured Groundwater Level		Dated Recorded
		Depth (m)	Elevation (m)	
BH 1-21	72.33	2.80	69.53	April 26, 2021
BH 2-21	71.97	3.06	68.91	
BH 3-21	71.78	3.15	68.63	
BH 1	71.61	1.90	69.70	June 24, 2024
BH 2	71.85	2.00	69.90	
BH 4	71.55	1.70	69.90	

Note: The ground surface elevation at each test hole location was surveyed using a GPS referenced to a geodetic datum.

It should be noted that groundwater levels could be influence by surface water infiltrating the backfilled boreholes. Long-term groundwater levels can also be estimated based on the observed colour, moisture content and consistency of the recovered soil samples. Based on these observations, the long-term groundwater level is expected to be between an approximate **2.5 to 3.5 m** depth. However, it should be noted that groundwater levels are subject to seasonal fluctuations, and therefore, the groundwater levels could vary at the time of construction.

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is suitable for the proposed development. It is recommended that the proposed high-rise buildings be founded on conventional spread footings placed on clean, surface sounded bedrock.

Bedrock removal will be required to complete the underground parking levels. Hoe ramming is an option where the bedrock is weathered and/or where only small quantities of bedrock need to be removed. Line drilling and controlled blasting is recommended where large quantities of bedrock need to be removed. The blasting operations should be planned and completed under the guidance of a professional engineer with experience in blasting operations.

Expansive shale bedrock could be present on site. Precautions should be provided during construction to reduce the risks associated with the potentially heaving shale bedrock. This is discussed further in Section 6.7.

The above and other considerations are discussed in the following sections.

5.2 Site Grading and Preparation

Stripping Depth

Topsoil and deleterious fill, such as those containing organic materials, should be stripped from under any buildings, paved areas, pipe bedding, and other settlement sensitive structures.

Existing foundation walls and other construction debris should be entirely removed from within the building perimeter and within the lateral support zones of the foundations. Under paved areas, existing construction remnants, such as foundation walls, should be excavated to a minimum of 1 m below final grade.

Due to the relatively shallow depth of the bedrock surface and the anticipated founding level for the proposed building, all existing overburden material should be excavated from within the proposed building footprint.

Bedrock Removal

Bedrock removal can be accomplished by hoe ramming where the bedrock is weathered and/or where only small quantities of the bedrock need to be removed. Sound bedrock may be removed by line drilling in conjunction with controlled blasting and/or hoe ramming.

Prior to considering blasting operations, the blasting effects on the existing services, buildings and other structures should be addressed. A pre-blast or pre-construction survey of the existing structures located in proximity of the blasting operations should be completed prior to commencing construction. The extent of the survey should be determined by the blasting consultant and sufficient to respond to any inquiries/claims related to the blasting operations.

As a general guideline, peak particle velocity (measured at the structures) should not exceed 25 mm/s during the blasting program to reduce the risks of damage to the existing structures.

The blasting operations should be planned and conducted under the supervision of a licensed professional engineer who is also an experienced blasting consultant.

Vibration Considerations

Construction operations are the cause of vibrations, and possibly, sources of nuisance to the community. Therefore, means to reduce the vibration levels as much as possible should be incorporated in the construction operations to maintain a cooperative environment with the residents.

The following construction equipment could be the source of vibrations: hoe ram, compactor, dozer, crane, truck traffic, etc. Vibrations, whether caused by blasting operations or by construction operations, could be the source of detrimental vibrations at the nearby buildings and structures. Therefore, it is recommended that all vibrations be limited.

Two parameters are used to determine the permissible vibrations, namely, the maximum peak particle velocity and the frequency. For low frequency vibrations, the maximum allowable peak particle velocity is less than that for high frequency vibrations. As a guideline, the peak particle velocity should be less than 15 mm/s between frequencies of 4 to 12 Hz, and 50 mm/s above a frequency of 40 Hz (interpolate between 12 and 40 Hz). The guidelines are for current construction standards. Considering that these guidelines are above perceptible human level and, in some cases, could be very disturbing to some people, a pre-construction survey is recommended to be completed minimize the risks of claims during or following the construction of the proposed building.

Fill Placement

Fill used for grading beneath the proposed buildings should consist of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. This material should be tested and approved prior to delivery to the site. The fill should be placed in lifts no greater than 300 mm thick and compacted using suitable compaction equipment for the lift thickness. Fill placed beneath the building and paved areas should be compacted to at least 98% of the material's standard Proctor maximum dry density (SPMDD).

Non-specified existing fill, along with site-excavated soil, can be used as general landscaping fill where settlement of the ground surface is of minor concern. This material should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If this material is to be used to build up the subgrade level for areas to be paved, it should be compacted in thin lifts to at least 95% of the material's SPMDD.

Non-specified existing fill and site-excavated soils are not suitable for use as backfill against foundation walls unless used in conjunction with a composite drainage membrane.

Expansive shale deteriorates upon exposure to air and is not generally suitable for reuse as an engineered fill. The use of imported granular fill is recommended for this purpose.

5.3 Foundation Design

Bearing Resistance Values

Footings placed on clean, surface sounded shale bedrock can be designed using a factored bearing resistance value at ultimate limit states (ULS) of **2,000 kPa**. A geotechnical resistance factor of 0.5 was applied to the bearing resistance at ULS.

A clean, surface-sounded bedrock bearing surface should be free of loose materials, and have no near surface seams, voids, fissures or open joints which can be detected from surface sounding with a rock hammer.

Footings bearing on an acceptable bedrock bearing surface and designed for the bearing resistance values provided herein will be subjected to negligible potential post-construction total and differential settlements.

Lateral Support

The bearing medium under footing-supported structures is required to be provided with adequate lateral support with respect to excavations and different foundation levels. Adequate lateral support is provided to a sound bedrock bearing medium when a plane extending horizontally and vertically from the footing perimeter at a minimum of 1H:6V (or shallower) passes through sound bedrock or a material of the same or higher capacity as the bedrock, such as concrete.

5.4 Design for Earthquakes

Seismic shear wave velocity testing was completed for the subject site to accurately determine the applicable seismic site classification for the proposed building in accordance with Table 4.1.8.4.A of the Ontario Building Code 2012. The shear wave velocity testing was completed by Paterson personnel. The results of the shear wave velocity testing are provided on Figures 4 and 5 in Appendix 2 of the present report.

Field Program

The seismic array testing location was placed as shown on Drawing PG5770-1-Test Hole Location Plan, attached to the present report. Paterson field personnel placed 18 horizontal 4.5 Hz. geophones mounted to the surface by means of two 75 mm ground spikes attached to the geophone land case. The geophones were spaced at 1 m intervals and connected by a geophone spread cable to a Geode 24 Channel seismograph.

The seismograph was also connected to a computer laptop and a hammer trigger switch attached to a 12-pound dead blow hammer. The hammer trigger switch sends a start signal to the seismograph. The hammer is used to strike an I-Beam seated into the ground surface, which creates a polarized shear wave.

The hammer shots are repeated between four (4) to eight (8) times at each shot location to improve signal to noise ratio. The shot locations were 5.0 and 1.0 m away from the first and last geophone of the seismic array and in the middle of the array.

Data Processing and Interpretation

Interpretation of the shear wave velocity results was completed by Paterson personnel. Shear wave velocity measurement was made using reflection/refraction method. The interpretation is performed by recovering arrival times from direct and refracted waves. The interpretation is repeated at each shot location to provide an

average shear wave velocity, V_{s30}, of the upper 30 m profile, immediately below the proposed foundations of the building.

The layer intercept times, velocities from different layers and critical distances are interpreted from the shear wave records to compute the bedrock depth at each location.

The bedrock velocity was interpreted using the main refractor wave velocity, which is considered a conservative estimate of the bedrock velocity due to the increasing quality of the bedrock with depth. It should be noted that as bedrock quality increases, the bedrock shear wave velocity also increases.

Based on our testing results, the bedrock shear wave velocity is **1,918 m/s**. Further, it is expected that footings will be founded on the bedrock surface. Based on the above, the V_{s30} was calculated using the standard equation for average shear wave velocity provided in the OBC 2012 and as presented below.

$$V_{s3} = \frac{Depth_{of\ interest}(m)}{\left(\frac{Depth_{Layer1}(m)}{V_{S_{Layer1}}(m/s)} + \frac{Depth_{Layer2}(m)}{V_{S_{Layer2}}(m/s)}\right)}$$

$$V_{s30=} \frac{30\ m}{\left(\frac{30\ m}{1{,}918\ m/s}\right)}$$

$$V_{s30=}\ 1{,}918\ m/s$$

Based on the results of the shear wave velocity testing, the average shear wave velocity V_{s30} for the proposed building with foundation bearing directly on the bedrock surface is **1,918 m/s**.

Therefore, **Site Class X_{1918}** is applicable for the design of the proposed building, as per Table 4.1.8.4.A of the Ontario Building Code (OBC) 2024. Soils underlying the subject site are not susceptible to liquefaction.

5.5 Basement Floor Slab

For the proposed development, all overburden soil will be removed from the building footprint, leaving the bedrock as the founding medium for the basement floor slab.

It is anticipated that the basement area for the proposed building will be mostly parking and the recommended pavement structures noted in Subsection 5.8 will be applicable. However, if storage or other uses of the lower level will involve the construction of a concrete floor slab, the upper 200 mm of sub-slab fill is recommended to consist of 19 mm clear crushed stone.

Any soft areas in the basement slab subgrade should be removed and backfilled with appropriate backfill material prior to placing fill. OPSS Granular A or Granular B Type II, with a maximum particle size of 50 mm, are recommended for backfilling below the floor slab. All backfill material within the footprint of the proposed building should be placed in maximum 300 mm thick loose layers and compacted to a minimum of 98% of the SPMDD.

In consideration of the groundwater conditions at the site, a sub-slab drainage system, consisting of lines of perforated drainage pipe subdrains connected to a positive outlet, should be provided in the subfloor fill under the lower basement floor. This is discussed further in Subsection 6.1.

5.6 Basement Wall

There are several combinations of backfill materials and retained soils that could be applicable for the basement walls of the proposed building. However, in our opinion, the conditions can be well-represented by assuming the retained soil consists of a material with an angle of internal friction of 30 degrees and a dry unit weight of 20 kN/m^3.

The applicable effective unit weight of the retained soil can be estimated as 13 kN/m^3, where applicable. A hydrostatic pressure should be added to the total static earth pressure when calculating the effective unit weight.

The total seismic force (P_{AE}) includes both the earth force component (P_o) and the seismic component (ΔP_{AE}).

Static Earth Pressures

The static horizontal earth pressure (p_o) can be calculated using a triangular earth pressure distribution equal to $K_o \cdot \gamma \cdot H$ where:

K_o = at-rest earth pressure coefficient of the applicable retained soil (0.5)
γ = unit weight of fill of the applicable retained soil (kN/m^3)
H = height of the wall (m)

An additional pressure having a magnitude equal to $K_o \cdot q$ and acting on the entire height of the wall should be added to the above diagram for any surcharge loading, q (kPa), that may be placed at ground surface adjacent to the wall. The surcharge pressure will only be applicable for static analyses and should not be used in conjunction with the seismic loading case.

Actual earth pressures could be higher than the "at-rest" case if care is not exercised during the compaction of the backfill materials to maintain a minimum separation of 0.3 m from the walls with the compaction equipment.

Seismic Earth Pressures

The total seismic force (P_{AE}) includes both the earth force component (P_o) and the seismic component (ΔP_{AE}).

The seismic earth force (ΔP_{AE}) can be calculated using $0.375 \cdot a \cdot H^2/g$ where:

$a_c = (1.45-a_{max}/g)a_{max}$
γ = unit weight of fill of the applicable retained soil (kN/m^3)
H = height of the wall (m)
g = gravity, 9.81 m/s^2

The peak ground acceleration, (a_{max}), for the Ottawa area is 0.33g according to OBC 2024. Note that the vertical seismic coefficient is assumed to be zero.

The earth force component (P_o) under seismic conditions can be calculated using $Po = 0.5\ K_o \cdot \gamma \cdot H^2$, where K = 0.5 for the soil conditions noted above.

The total earth force (P_{AE}) is considered to act at a height, h (m), from the base of the wall, where:

$$h = \{P_o \cdot (H/3) + \Delta P_{AE} \cdot (0.6 \cdot H)\}/P_{AE}$$

The earth forces calculated are unfactored. For the ULS case, the earth loads should be factored as live loads, as per OBC 2012.

5.7 Rock Anchor Design

Overview of Anchor Features

The geotechnical design of grouted rock anchors in sedimentary bedrock is based upon two possible failure modes. The anchor can fail either by shear failure along the grout/rock interface or a 60 to 90 degree pullout of rock cone with the apex of

the cone near the middle of the bonded length of the anchor. Interaction may develop between the failure cones of anchors that are relatively close to one another, resulting in a total group capacity smaller than the sum of the load capacity of each individual anchor.

A third failure mode of shear failure along the grout/steel interface should be reviewed by the structural engineer to ensure all typical failure modes have been reviewed.

Anchors in close proximity to each other are recommended to be grouted at the same time to ensure any fractures or voids are completely in-filled and grout fluid does not flow from one hole to adjacent empty one.

Anchors can be of the “passive: or the “post-tensioned” type, depending on whether the anchor tendon is provided with post-tensioned load or not, prior to servicing. To resist seismic uplift pressures, a passive rock anchor system is adequate. However, a post-tensioned anchor will absorb the uplift load pressure with less deflection than a passive anchor.

Regardless of whether an anchor is of the passive or the post-tensioned type, it is recommended that the anchor is provided with a fixed anchor length at the anchor base, and a free anchor length between the rock surface and the top of the bonded length. As the depth at which the apex of the shear failure cone develops midway along the bonded length, a fully bonded anchor would tend to have a much shallower cone, then therefore, less geotechnical resistance, than one where the bonded length is limited to the bottom part of the overall anchor.

Permanent anchors should be provided with corrosion protection. As a minimum, the entire drill hole should be filled with cementitious grout. The free anchor length is provided by installing a plastic sleeve to act as a bond break, with the sleeve filled with grout or a corrosion inhibiting mastic.

Double corrosion protection can be provided with factory assembled systems, such as those available from Dywidag Systems or Williams Form Engineering Corp. Recognizing the importance of the anchors for the long-term performance of the foundation of the proposed building, if required, any rock anchors for this project are recommended to be provided with double corrosion protection.

Grout to Rock Bond

The Canadian Foundation Engineering Manual recommends a maximum allowable grout to rock bond stress (for sound rock) of 1/30 of the unconfined compressive strength (UCS) of either the grout or rock (but less than 1.3 MPa) for an anchor of minimum length (depth) of 3 m. The unconfined compressive strength

of shale bedrock ranges between 40 and 90 MPa, which is stronger than most routine grouts. A factored tensile grout to rock bond resistance value at ULS of **1.0 MPa**, incorporating a resistance factor of 0.3, can be used. A minimum grout strength of 40 MPa is recommended.

Rock Cone Uplift

As discussed previously, the geotechnical capacity of the rock anchors depends on the dimensions of the rock anchors and the configuration of the anchorage system. A **Rock Mass Rating (RMR) of 44** was assigned to the bedrock, and Hoek and Brown parameters (m and s) were taken as **0.183 and 0.00009**, respectively. For design purposes, all rock anchors were assumed to be placed at least 1.2 m apart to reduce group anchor effects.

Recommended Rock Anchor Lengths

Parameters used to calculate rock anchor lengths are provided in Table 4 below.

Table 4 - Parameters used in Rock Anchor Review	
Grout to Rock Bond Strength - Factored at ULS	1.0 MPa
Compressive Strength - Grout	40 MPa
Rock Mass Rating (RMR)-Fair quality Shale Hoek and Brown parameters	44 m=0.183 and s=0.00009
Unconfined compressive strength - Shale bedrock	50 MPa
Unit weight - Submerged Bedrock	15 kN/m^3
Apex angle of failure cone	60^o
Apex of failure cone	mid-point of fixed anchor length

The fixed anchor length will depend on the diameter of the drill holes. Recommended anchor lengths for a 75 mm and 125 mm diameter hole are provided in the following Table 3.

The factored tensile resistance values given in Table 5 are based on a single anchor with no group influence effects. A detailed analysis of the anchorage system, including potential group influence effects, could be provided once the details of the loading for the proposed building are determined.

Table 5 - Recommended Rock Anchor Lengths - Grouted Rock Anchor

Diameter of Drill Hole (mm)	Anchor Lengths (m)			Factored Tensile Resistance (kN)
	Bonded Length	Unbonded Length	Total Length	
75	3.0	1.0	4.0	250
	2.2	3.6	5.8	500
	3.2	3.7	6.9	750
	5.3	4.3	9.6	1250
125	0.7	3.1	3.8	250
	1.3	4.0	5.3	500
	1.9	4.4	6.3	1250
	3.2	5.3	8.5	1250

Other considerations

The anchor drill holes should be within 1.5 to 2 times the rock anchor tendon diameter, inspected by geotechnical personnel, and should be flushed clean prior to grouting. A tremie tube is recommended to place grout from the bottom of the anchor holes.

Compressive strength testing is recommended to be completed for the rock anchor grout. The geotechnical capacity of each rock anchor should be proof tested at the time of construction. More information on testing can be provided upon request. A set of grout cubes should be tested for each day grout is prepared.

5.8 Pavement Design

Lowest Underground Parking Level

For design purposes, it is recommended that the rigid pavement structure for the lower underground parking level of the proposed building consist of Category C2, 32 MPa concrete at 28 days with air entrainment of 5 to 8%. The recommended rigid pavement structure is further presented in Table 6 below.

Table 6 – Recommended Rigid Pavement Structure – Underground Parking Level	
Thickness (mm)	**Material Description**
125	**Exposure Class C2 – 32 MPa Concrete** (5 to 8% Air Entrainment)
300	**BASE** – OPSS Granular A Crushed Stone
SUBGRADE – Existing imported fill, or OPSS Granular B Type I or II material placed over in situ soil or bedrock.	

To control cracking due to shrinking of the concrete floor slab, it is recommended that strategically located saw cuts be used to create control joints within the concrete floor slab of the lower underground parking level. The control joints are generally recommended to be located at the center of the column lines and spaced at approximately 24 to 36 times the slab thickness (for example; a 0.15 m thick slab should have control joints spaced between 3.6 and 5.4 m).

The joints should be cut between 25 and 30% of the thickness of the concrete floor slab and completed as early as 4 hour after the concrete has been poured during warm temperatures and up to 12 hours during cooler temperatures.

Pavement Structure Over Podium Deck

The pavement structures presented in Tables 7 and 8 should be used for car only parking areas, at grade access lanes and heavy loading parking areas over the top of the podium structure, should they be required.

Table 7 - Recommended Pavement Structure - Car Only Parking Areas Over Podium Deck	
Thickness (mm)	**Material Description**
50	**Wear Course** – HL-3 or Superpave 12.5 Asphaltic Concrete
200*	**BASE** - OPSS Granular A Crushed Stone
See below**	**Thermal Break** - Rigid Insulation (See Following Paragraph)**
n/a	**Waterproofing Membrane and IKO Protection Board**
SUBGRADE – Reinforced concrete podium deck * Thickness of base course is dependent on grade of insulation as noted in proceeding paragraph ** If specified by others, not required from a geotechnical perspective	

Table 8 - Recommended Pavement Structure – Access Lanes, Fire Truck Lane, Ramp, and Heavy Loading Areas Over Podium Deck	
Thickness (mm)	**Material Description**
40	**Wear Course** – HL-3 or Superpave 12.5 Asphaltic Concrete
50	**Binder Course** – HL-8 or Superpave 19.0 Asphaltic Concrete
300*	**BASE** - OPSS Granular A Crushed Stone
See below**	**Thermal Break** - Rigid Insulation (See Following Paragraph)**
n/a	**Waterproofing Membrane and IKO Protection Board**
SUBGRADE – Reinforced concrete podium deck * Thickness of base course is dependent on grade of insulation as noted in proceeding paragraph ** If specified by others, not required from a geotechnical perspective	

The transition between the pavement structure over the podium deck subgrade and soil subgrade beyond the footprint of the podium deck is recommended to be transitioned to match the pavement structures provided in the following section.

For this transition, a 5H:1V is recommended between the two subgrade surfaces. Further, the base layer thickness should be increased to a minimum thickness of 500 mm below the top of the podium slab a minimum of 1.5 m from the face of the foundation wall prior to providing the recommended taper.

Should the proposed podium deck be specified to be provided a thermal break by the use of a layer of rigid insulation below the pavement structure, its placement within the pavement structure is recommended to be as per the above-noted tables. The layer of rigid insulation is recommended to consist of a DOW Chemical High-Load 100 (HI-100), High-Load 60 (HI-60), or High-Load 40 (HI-40). The base layer thickness will be dependent on the grade of insulation considered for this project and should be reassessed by the geotechnical consultant once pertinent design details have been prepared.

The higher grades of insulation have more resistance to deformation under wheel-loading and require less granular cover to avoid being crushing by vehicular loading. It should be noted that SM (Styrofoam) rigid insulation is **not** considered suitable for this application.

Other Considerations

Minimum Performance Graded (PG) 58-34 asphalt cement should be used for this project.

If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type II material.

The pavement granular (base and subbase) should be placed in maximum 300 mm thick lifts and compacted to a minimum of 99% of the material's SPMDD using suitable compaction equipment.

6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

Water Suppression System and Foundation Drainage

For the proposed underground parking levels, it is anticipated that the majority of the building foundation walls will be placed in close proximity to the site boundaries. Therefore, it is recommended that the foundation wall be blind poured against a drainage system and waterproofing system fastened to the temporary shoring system. Waterproofing of the foundation wall is recommended, and the membrane is to be installed starting at the top of the foundation wall, extending down to founding elevation. The waterproofing membrane should also be extended horizontally below the proposed footings a minimum of 600 mm away from the face of the excavation. The membrane will serve as a water infiltration suppression system.

It is also recommended that the composite drainage system, such as Delta Drain 6000 or equivalent, be installed between the waterproofing membrane and the foundation wall, and extend from the exterior finished grade to the founding elevation (underside of footing or raft slab). The purpose of the composite drainage system is to direct any water infiltration resulting from a breach of the waterproofing membrane to the building sump pit.

It is recommended that 150 mm diameter sleeves at 3 m centres be cast in the foundation wall at the footing interface to allow the infiltration of water to flow to an interior perimeter underslab drainage pipe. The perimeter drainage pipe should direct water to sump pit(s) within the lower basement area.

Sub-slab Drainage

Sub-slab drainage will be required to control water infiltration below the lowest underground parking level slab. For preliminary design purposes, we recommend that 150 mm diameter perforated pipes be placed at approximate 6 m centres underlying the lowest level floor slab. The spacing of the sub-slab drainage system should be confirmed at the time of completing the excavation when water infiltration can be better assessed.

Foundation Backfill

Where space is available, backfill against the exterior sides of the foundation walls should consist of free-draining, non frost susceptible granular materials.

The greater part of the site excavated materials will be frost susceptible and, as such, are not recommended for re-use as backfill against the foundation walls unless used in conjunction with a composite drainage system, such as Delta Drain 6000 or an approved equivalent. Imported granular materials, such as clean sand or OPSS Granular B Type I granular material, should otherwise be used for this purpose.

6.2 Protection of Footings Against Frost Action

Perimeter footings of heated structures are required to be insulated against the deleterious effects of frost action. A minimum of 1.5 m of soil cover alone, or a minimum of 0.6 m of soil cover in conjunction with adequate foundation insulation, should be provided.

Exterior unheated footings, such as those for isolated exterior piers, are more prone to deleterious movement associated with frost action than the exterior walls of the heated structure and require additional protection, such as soil cover of 2.1 m or an equivalent combination of soil cover and foundation insulation.

However, foundations which are founded directly on clean, surface-sounded bedrock, and which is approved by Paterson at the time of construction, is not considered frost susceptible and does not require soil cover.

The underground parking area should not require protection against frost action due to the founding depth. Unheated structures, such as the access ramp wall footings, may be required to be insulated against the deleterious effect of frost action. A minimum of 2.1 m of soil cover alone, or a minimum of 0.6 m of soil cover, in conjunction with foundation insulation, should be provided.

6.3 Excavation Side Slopes

The side slopes of excavations in the overburden materials and weathered shale bedrock should either be cut back at acceptable slopes or should be retained by shoring systems from the start of the excavation until the structure is backfilled.

Unsupported Excavations

The excavation side slopes in the overburden and very poor to poor quality bedrock, above the groundwater level and extending to a maximum depth of 3 m, should be excavated at 1H:1V or shallower. The shallower slope is required for excavation below groundwater level. The subsurface soils are considered to be a Type 2 and 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.

Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should be kept away from the excavation sides.

Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant in order to detect if the slopes are exhibiting signs of distress.

It is recommended that a trench box is used to protect personnel working in trenches with steep or vertical sides. It is expected that services will be installed by "cut and cover" methods and excavations will not be left open for extended periods of time.

Bedrock Stabilization

In sound bedrock, almost vertical side slopes can be constructed, provided all weathered and loose rock is removed or stabilized with rock anchors. A minimum 1 m horizontal ledge should remain between the unsupported excavation and sound bedrock surface. Where sufficient space for the horizontal ledge is not available, it is recommended that a temporary concrete block retaining wall be used to retain the overburden soils.

Where the vertical sides are constructed within sound bedrock, bedrock stabilization may be required. Specifically, horizontal anchors maybe required at specific location to prevent pop-outs of the bedrock, especially in areas where bedrock fractures and weak bedding planes are conductive to the failure of the bedrock surface.

The requirement for horizontal rock anchors should be evaluated by Paterson during the excavation operations and should be discussed with the structural engineer during the design stage.

Temporary Shoring

Temporary shoring may be required for the overburden soil and weathered bedrock to complete the required excavations where insufficient room is available for open cut methods. The design and approval of the temporary shoring system will be the responsibility of the shoring contractor and the shoring designer who is a licensed professional engineer and is hired by the shoring contractor. It is the responsibility of the shoring contractor to ensure that the temporary shoring is in compliance with safety requirements, designed to avoid any damage to adjacent structures, and include dewatering control measures.

In the event that subsurface conditions differ from the approved design during the actual installation, it is the responsibility of the shoring contractor to commission the required experts to re-assess the design and implement the required changes. The designer should also take into account the impact of a significant precipitation event and designate design measures to ensure that precipitation will not negatively impact the shoring system or soils supported by the system.

The temporary shoring system may consist of a soldier pile and lagging system. Any additional loading due to street traffic, construction equipment, adjacent structures and facilities, etc., should be added to the earth pressures described below. These systems can be cantilevered, anchored or braced. Generally, the shoring systems should be provided with tie-back rock anchors to ensure the stability.

The toe of the shoring is recommended to be adequately supported to resist toe failure by means of rock bolts or extending the piles into the bedrock through pre-augered holes if a soldier pile and lagging system is used.

The earth pressure acting on the shoring system may be calculated using the parameters in Table 9:

Table 9 – Soil Parameters

Parameters	Values
Active Earth Pressure Coefficient (K_a)	0.33
Passive Earth Pressure Coefficient (K_p)	3
At-Rest Earth Pressure Coefficient (K_o)	0.5
Unit Weight, kN/m3	21
Submerged Unit Weight, kN/m3	13

The active earth pressure should be calculated where wall movements are permissible while the at-rest pressure should be calculated if no movement is permissible.

The dry unit weight should be calculated above the groundwater level while the effective unit weight should be calculated below the groundwater table.

The hydrostatic groundwater pressure should be included to the earth pressure distribution wherever the effective unit weight is calculated for earth pressures. If the groundwater level is lowered, the dry unit weight for the soil should be calculated full weight, with no hydrostatic groundwater pressure component. For design purposes, the minimum factor of safety of 1.5 should be calculated.

6.4 Pipe Bedding and Backfill

Bedding and backfill materials should be in accordance with the most recent Material Specifications & Standard Detail Drawings from the Department of Public Works and Services, Infrastructure Services Branch of the City of Ottawa.

A minimum of 150 mm of OPSS Granular A should be placed for bedding for sewer or water pipes when placed on soil subgrade. If the bedding is placed on bedrock, the thickness of the bedding should be increased to 300 mm for sewer pipes. The bedding should extend to the spring line of the pipe. Cover material, from the spring line to a minimum of 300 mm above the obvert of the pipe should consist of OPSS Granular A (concrete or PSM PVC pipes) or sand (concrete pipe). The bedding and cover materials should be placed in maximum 225 mm thick lifts and compacted to 95% of the SPMDD.

Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) should match the soils exposed at the trench walls to reduce the potential differential frost heaving. The trench backfill should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 95% of the SPMDD.

6.5 Groundwater Control

Groundwater Control for Building Construction

It is anticipated that groundwater infiltration into the excavations should be controllable using open sumps. The contractor should be prepared to direct water away from all bearing surfaces and subgrades, regardless of the source, to prevent disturbance to the founding medium.

A temporary Ministry of Environment, Conservation and Parks (MECP) permit to take water (PTTW) may be required if more than 400,000 L/day of ground and/or surface water are to be pumped during the construction phase. At least 4 to 5 months should be allowed for completion of the application and issuance of the permit by the MECP.

For typical ground or surface water volumes being pumped during the construction phase, typically between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Person as stipulated under O.Reg. 63/16.

If a project qualifies for a PTTW based upon anticipated conditions, an EASR will not be allowed as a temporary dewatering measure while awaiting the MECP review of the PTTW application.

Impacts to Neighbouring Properties

Based on the subsurface conditions encountered at the subject site, it is anticipated that the adjacent structures are founded on bedrock. Therefore, no adverse effects from short term and long term dewatering are expected for surrounding structures.

6.6 Winter Construction

Precautions must be taken if winter construction is considered for this project. The subsoil conditions at this site mostly consist of frost susceptible materials. In the presence of water and freezing conditions, ice could form within the soil mass. Heaving and settlement upon thawing could occur.

In the event of construction during below zero temperatures, the founding stratum should be protected from freezing temperatures by the use of straw, propane heaters, tarpaulins or other suitable means. In this regard, the base of the excavations should be insulated from sub-zero temperatures immediately upon exposure and until such time as heat is adequately supplied to the building and the footings are protected with sufficient soil cover to prevent freezing at founding level.

Trench excavations and pavement construction are also difficult activities to complete during freezing conditions without introducing frost in the subgrade or in the excavation walls and bottoms. Precautions should be taken if such activities are to be carried out during freezing conditions. Additional information could be provided, if required.

6.7 Corrosion Potential and Sulphate

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

6.8 Protection of Potentially Expansive Bedrock

Upon being exposed to air and moisture, shale may decompose into thin flakes along the bedding planes. Previous studies have concluded shales containing pyrite are subject to volume changes upon exposure to air. As a result, the formation of jarosite crystals by aerobic bacteria occurs under certain ambient conditions.

It has been determined that the expansion process does not occur or can be retarded when air (i.e. oxygen) is prevented from contact with the shale and/or the ambient temperature is maintained below 20°C, and/or the shale is confined by pressures in excess of 70 kPa. The latter restriction on the heaving process is probably the major reason why damage to structures has, for the greater part, been confined to slabs-on-grade rather than footings.

Based on the borehole logs, expansive shale may be encountered at the subject site. To reduce the long-term deterioration of the shale, exposure of the bedrock surface to oxygen should be kept as low as possible. The bedrock surface within the proposed building footprint should be protected from excessive dewatering and exposure to ambient air. A 50 mm thick concrete mud slab, consisting of minimum 15 MPa lean concrete, should be placed on the exposed bedrock surface within a 48-hour period of being exposed.

Another option for protecting the shale from deterioration is placing granular fill over the exposed surface within a 48-hour period after exposure. Preventing the dewatering of the shale bedrock will also prevent the rapid deterioration and expansion of the shale bedrock. This can be accomplished by spraying bituminous emulsion as noted above.

7.0 Recommendations

A materials testing and observation services program is a requirement for the provided foundation design data to be applicable. The following aspects of the program should be performed by the geotechnical consultant:

- ❑ Review of the geotechnical aspects of the excavating contractor's shoring design, prior to construction.
- ❑ Review the bedrock stabilization and excavation requirements.
- ❑ Observation of all bearing surfaces prior to the placement of concrete.
- ❑ Sampling and testing of the concrete and fill materials.
- ❑ Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
- ❑ Observation of all subgrades prior to backfilling.
- ❑ Field density tests to determine the level of compaction achieved.
- ❑ Sampling and testing of the bituminous concrete including mix design reviews.

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

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

8.0 Statement of Limitations

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

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

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

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than TCU Development Corporation, or their agent(s), is not authorized without review by Paterson for the applicability of our recommendations to the alternative use of the report.

Paterson Group Inc.

Kevin Pickard, P.Eng.

Scott S. Dennis, P.Eng.

Report Distribution:

- ❑ TCU Development Corporation (email copy)
- ❑ Paterson Group (1 copy)

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LOG OF BOREHOLE SHEETS BY OTHERS

GRAIN SIZE DISTRIBUTION CURVE BY OTHERS

ANALYTICAL TESTING RESULTS BY OTHERS

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Multi-Storey Building
1137 Ogilvie Road and 1111 Cummings Ave., Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5770

REMARKS

HOLE NO. BH 1-21

BORINGS BY CME-55 Low Clearance Drill **DATE** April 19, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	72.33
Asphaltic concrete 0.08							
FILL: Brown silty sand with crushed stone 0.69		AU	1				
		SS	2	33	17	1	71.33
FILL: Brown silty clay with sand and gravel, some to trace topsoil		SS	3	50	53	2	70.33
2.29							
FILL: Brown silty sand with gravel and crushed stone 3.05		SS	4	75	35	3	69.33
		RC	1	100	19	4	68.33
BEDROCK: Very poor to fair quality, black shale						5	67.33
		RC	2	100	70		
- excellent quality by 6.0m depth						6	66.33
		RC	3	100	100		
6.83							
End of Borehole							
(GWL @ 2.80m - April 26, 2021)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %

20 40 60 80

Monitoring Well Construction

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

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Multi-Storey Building
1137 Ogilvie Road and 1111 Cummings Ave., Ottawa, Ontario

DATUM Geodetic

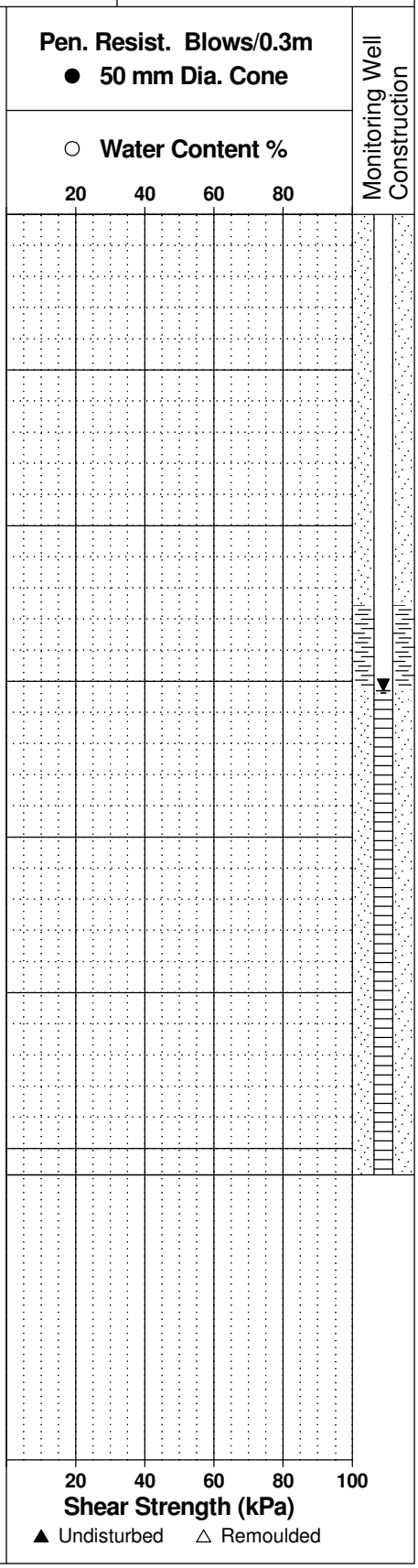
FILE NO. PG5770

REMARKS

HOLE NO. BH 2-21

BORINGS BY CME-55 Low Clearance Drill **DATE** April 19, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	71.97
Asphaltic concrete 0.13							
FILL: Brown silty sand with crushed stone 0.60		AU	1				
FILL: Brown silty clay with sand and gravel, trace topsoil		SS	2	75	8	1	70.97
1.45							
FILL: Brown silty sand with gravel		SS	3	17	19	2	69.97
2.36		SS	4	20	50+		
BEDROCK: Very poor quality, black shale		RC	1	100	0	3	68.97
- good quality by 3.1m depth		RC	2	100	85	4	67.97
		RC	3	100	88	5	66.97
6.17						6	65.97
End Borehole							
(GWL @ 3.06m - April 26, 2021)							



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Multi-Storey Building
1137 Ogilvie Road and 1111 Cummings Ave., Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5770

REMARKS

HOLE NO. BH 3-21

BORINGS BY CME-55 Low Clearance Drill **DATE** April 19, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Monitoring Well Construction
GROUND SURFACE									
Asphaltic concrete 0.10						0	71.78		
FILL: Brown silty sand with crushed stone 0.60		AU	1						
FILL: Dark grey to brown silty sand with clay, trace wood		SS	2	42	19	1	70.78		
1.68		SS	3	60	50+				
Compact, brown **SILTY SAND,** trace gravel 1.78						2	69.78		
		RC	1	87	0				
BEDROCK: Very poor to poor quality, black shale						3	68.78		
		RC	2	72	25				
						4	67.78		
- excellent quality by 4.6m depth									
		RC	3	100	94	5	66.78		
5.87									
End of Borehole									
(GWL @ 3.15m - April 26, 2021)									

Pen. Resist. Blows/0.3m: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Multi-Storey Building
1137 Ogilvie Road and 1111 Cummings Ave., Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5770

REMARKS

HOLE NO. BH 4-21

BORINGS BY CME-55 Low Clearance Drill **DATE** April 19, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Monitoring Well Construction
GROUND SURFACE									
Asphaltic concrete 0.05						0	72.50		
FILL: Brown silty sand with crushed stone 0.60		AU	1						
FILL: Brown silty clay with sand and gravel, trace shale fragments		SS	2	50	6	1	71.50		
1.73		SS	3	100	50+				
End of Borehole									
Practical refusal to augering at 1.73m depth.									

Pen. Resist. Blows/0.3m: 20 40 60 80

Water Content %: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Multi-Storey Building
1137 Ogilvie Road and 1111 Cummings Ave., Ottawa, Ontario

DATUM Geodetic

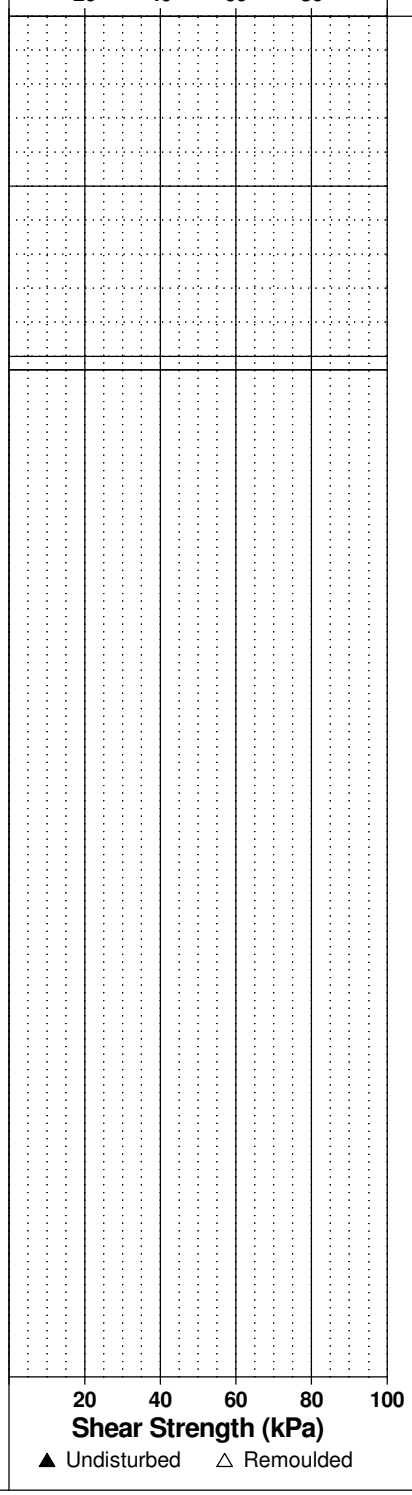
FILE NO. PG5770

REMARKS

HOLE NO. BH 5-21

BORINGS BY CME-55 Low Clearance Drill **DATE** April 19, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Monitoring Well Construction
GROUND SURFACE									
Asphaltic concrete 0.05						0	72.74		
FILL: Brown silty sand with crushed stone 0.46		AU	1						
FILL: Brown silty sand with clay and gravel		SS	2	58	12	1	71.74		
		SS	3	64	40				
2.08						2	70.74		
End of Borehole									
Practical refusal to augering at 2.08m depth									



SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the relative strength of cohesionless soils is the compactness condition, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm. An SPT N value of "P" denotes that the split-spoon sampler was pushed 300 mm into the soil without the use of a falling hammer.

Compactness Condition	'N' Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory shear vane tests, unconfined compression tests, or occasionally by the Standard Penetration Test (SPT). Note that the typical correlations of undrained shear strength to SPT N value (tabulated below) tend to underestimate the consistency for sensitive silty clays, so Paterson reviews the applicable split spoon samples in the laboratory to provide a more representative consistency value based on tactile examination.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their "sensitivity". The sensitivity, S_t, is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil. The classes of sensitivity may be defined as follows:

Low Sensitivity:	$S_t < 2$
Medium Sensitivity:	$2 < S_t < 4$
Sensitive:	$4 < S_t < 8$
Extra Sensitive:	$8 < S_t < 16$
Quick Clay:	$S_t > 16$

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NQ or larger size core. However, it can be used on smaller core sizes, such as BQ, if the bulk of the fractures caused by drilling stresses (called "mechanical breaks") are easily distinguishable from the normal in situ fractures.

RQD %	**ROCK QUALITY**
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube, generally recovered using a piston sampler
G	-	"Grab" sample from test pit or surface materials
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size BQ, NQ, HQ, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

WC%	-	Natural water content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic Limit, % (water content above which soil behaves plastically)
PI	-	Plasticity Index, % (difference between LL and PL)
Dxx	-	Grain size at which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D30)^2 / (D10 \times D60)$
Cu	-	Uniformity coefficient = D60 / D10

Cc and Cu are used to assess the grading of sands and gravels:
Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$
Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$
Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.
Cc and Cu are not applicable for the description of soils with more than 10% silt and clay (more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

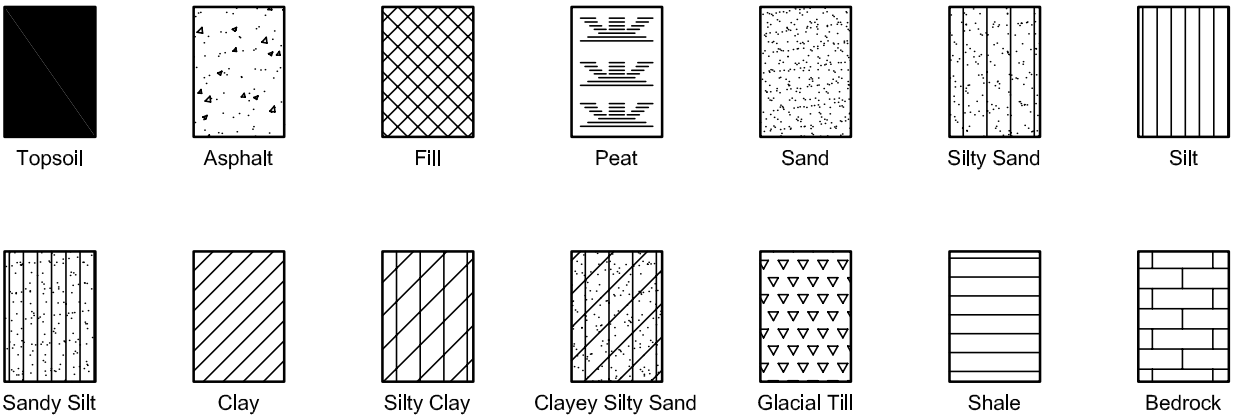
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
Wo	-	Initial water content (at start of consolidation test)

PERMEABILITY TEST

k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.

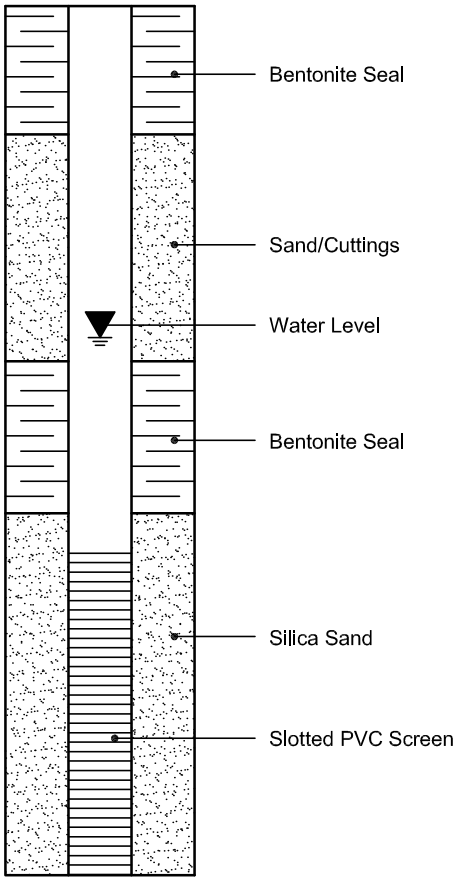
SYMBOLS AND TERMS (continued)

STRATA PLOT

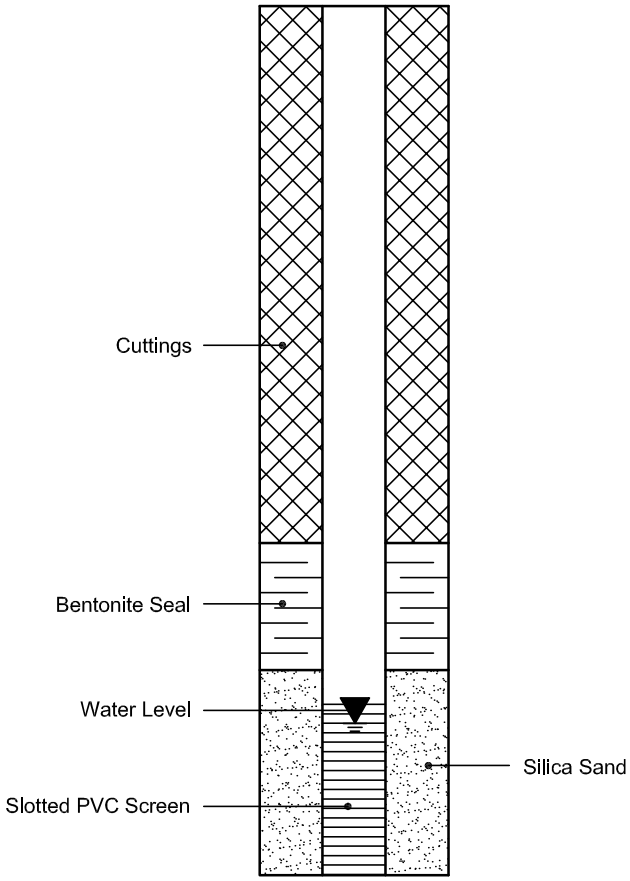


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



Log of Borehole BH1

Project No: OTT-24006095-A0

Project: Proposed Geotechnical Investigation

Location: 1151 Ogilvie, Ottawa, ON

Figure No. 3

Page. 1 of 1

Date Drilled: 'June 4, 2024

Drill Type: CME-55 Truck Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: MZ Checked by: DW

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)

Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		ASPHALTIC CONCRETE ~ 40 mm thick	71.61	0				
		GRANULAR FILL Sand with crushed gravel, brown, moist, (compact)	71.6					
		GLACIAL TILL Silty sand with clay, gravel, cobble and boulder, brown, moist, (compact)	71.1		14		SS1	
				1	26		SS2	
			69.72		21		SS3	
		HIGHLY WEATHERED SHALE Gravel sized shale fragments, black	69.4	2	50/75 mm		SS4	
		Auger Refusal at 2.5 m Depth	69.1					

Standard Penetration Test N Value: 20 40 60 80
Shear Strength: 50 100 150 200 kPa
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 32 mm monitoring well installed upon completion
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24006095-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
6/24/2024	1.9	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE GINT LOGS 06.21.2024.GPJ TROW OTTAWA.GDT 7/2/24

Log of Borehole BH2

Project No: OTT-24006095-A0

Project: Proposed Geotechnical Investigation

Location: 1151 Ogilvie, Ottawa, ON

Date Drilled: 'June 4, 2024

Drill Type: CME-55 Truck Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: MZ Checked by: DW

Figure No. 4

Page. 1 of 1

Split Spoon Sample ⊠
Auger Sample ▮▯
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test +S

Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits ⊢○
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		ASPHALTIC CONCRETE ~ 50 mm thick	71.85	0				
		GRANULAR FILL Sand with crushed gravel, brown, moist, (compact)	71.8					
		FILL Silty sand with gravel, brown, moist, (loose)	71.2		23	×	SS1	
				1	9	×	SS2	
		GLACIAL TILL Silty sand with clay, gravel, cobble and boulder, brown, moist, (dense)	70.5		41	×	SS3	
		Auger Refusal at 2 m Depth	69.9 69.88	2				

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 32 mm monitoring well installed upon completion
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24006095-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
6/24/2024	2.0	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE GINT LOGS 06.21.2024.GPJ TROW OTTAWA.GDT 7/2/24

Log of Borehole BH3

Project No: OTT-24006095-A0

Project: Proposed Geotechnical Investigation

Location: 1151 Ogilvie, Ottawa, ON

Date Drilled: 'June 4, 2024

Drill Type: CME-55 Truck Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: MZ Checked by: DW

Figure No. 5

Page. 1 of 1

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)

Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

Depth	Geodetic Elevation m	SOIL DESCRIPTION	SAMPLES	Natural Unit Wt. kN/m³
0	71.53	**ASPHALTIC CONCRETE ~ 25 mm thick**		
	71.5	**GRANULAR FILL** Sand with crushed gravel, brown, moist, (compact)		
	71.0	**FILL** Silty sand with gravel, reddish brown, moist, (compact)	SS1	
1			SS2	
	69.7	**GLACIAL TILL** Silty sand with clay, gravel, cobble and boulder, brown, moist, (compact to very dense)	SS3	
2			SS4	
	68.4	**SHALE BEDROCK** Fractured, black, (very poor quality)	CORE1	
3			CORE2	
	67.4	**SHALE BEDROCK** With clay seams, black, (poor to excellent quality) Clay seam from 4.1 m to 4.2 m depth Clay seam from 4.4 m to 4.5 m depth	CORE3	
5				
6			CORE4	
7	64.4	**Borehole Terminated at 7.1 m Depth**		

Standard Penetration Test N Value: 20 40 60 80
Shear Strength: 50 100 150 200 kPa
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 20 40 60

26
13
24
28, 32 then 50/125 mm

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. The borehole was backfilled upon completion.
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24006095-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	2.4 - 3.1	28	0
2	3.1 - 4.1	100	0
3	4.1 - 5.5	100	40
4	5.5 - 7.1	100	97

LOG OF BOREHOLE GINT LOGS 06.21.2024.GPJ TROW OTTAWA.GDT 7/2/24

Log of Borehole BH4

Project No: OTT-24006095-A0

Project: Proposed Geotechnical Investigation

Location: 1151 Ogilvie, Ottawa, ON

Date Drilled: 'June 4, 2024

Drill Type: CME-55 Truck Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: MZ Checked by: DW

Figure No. 6

Page. 1 of 1

Split Spoon Sample ⊠
Auger Sample ▮▯
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test +S

Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits —○—
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth
		ASPHALTIC CONCRETE ~ 50 mm thick	71.55	0
		GRANULAR FILL Sand with crushed gravel, brown, moist, (compact)	71.5	
		FILL Silty sand with gravel, brown, moist, (loose) With topsoil inclusions from 0.8 m to 1.4 m depth	70.9	
			69.83	1
		HIGHLY WEATHERED SHALE Gravel sized shale fragments, black	69.4	2
		Auger Refusal at 2.6 m Depth	69.0	

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 20 40 60

SAMPLES	Natural Unit Wt. kN/m³	Standard Penetration Test N Value	Combustible Vapour Reading (ppm)
SS1		19	×
SS2		8	×
SS3		7	×
SS4		28, then 50/75 mm	×

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. 38 mm monitoring well was installed in the borehole upon completion
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24006095-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
6/24/2024	1.7	

CORE DRILLING RECORD

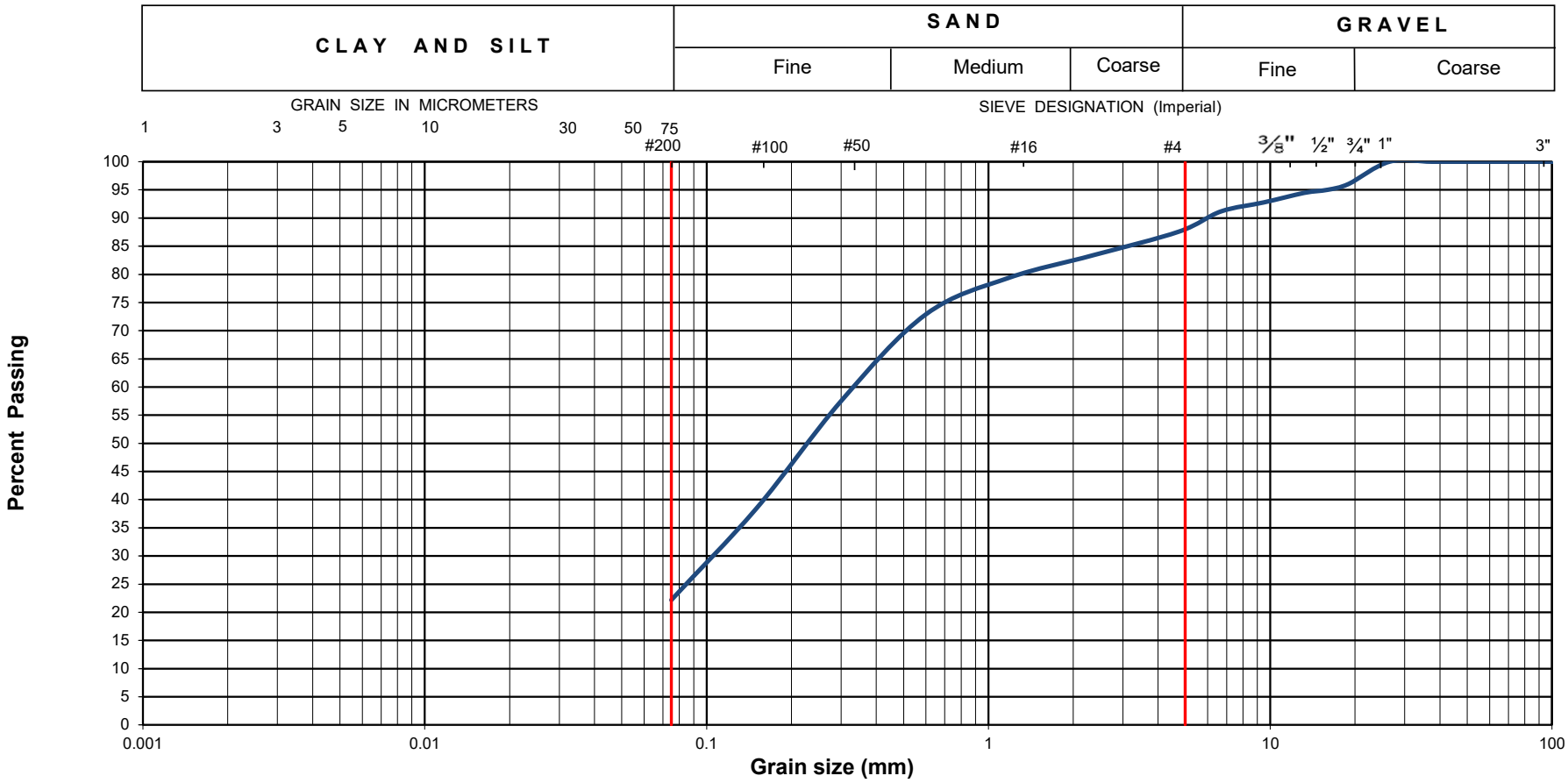
Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE GINT LOGS 06.21.2024.GPJ TROW OTTAWA.GDT 7/2/24

EXP Services Inc.
100-2650 Queensview Drive
Ottawa, ON K2B 8H6

Grain-Size Distribution Curve
Method of Test For Sieve Analysis of Aggregate
ASTM C-136

Unified Soil Classification System



EXP Project No.:	**OTT-24006095-A0**	**Project Name :**	**Proposed Residential Development**					
Client :	**Starwood Group**	**Project Location :**	**1151 Ogilvie Road, Ottawa, Ontario**					
Date Sampled :	**June 4, 2024**	**Borehole No:**	**BH24-2**	**Sample:**	**SS3**		**Depth (m) :**	**1.5-2.1**
Sample Composition :		**Gravel (%)**	**12**	**Sand (%)**	**66**	**Silt & Clay (%)**	**22**	**Figure :** **8**
Sample Description :	**Glacial Till - Silty Sand (SM), some gravel**							

AGAT Laboratories

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

CLIENT NAME: **EXP SERVICES INC**
2650 QUEENSVIEW DRIVE, UNIT 100
OTTAWA, ON K2B8H6
(613) 688-1899

ATTENTION TO: **Daniel Wall**

PROJECT: **OTT-24006095-A0**

AGAT WORK ORDER: **24Z161936**

SOIL ANALYSIS REVIEWED BY: **Sukhwinder Randhawa, Inorganic Team Lead**

DATE REPORTED: **Jun 20, 2024**

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

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This Certificate shall not be reproduced except in full, without the written approval of the laboratory.*
- *The test results reported herewith relate only to the samples as received by the laboratory.*
- *Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.*
- *All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.*
- *For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.*

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: 24Z161936

PROJECT: OTT-24006095-A0

CLIENT NAME: EXP SERVICES INC

ATTENTION TO: Daniel Wall

SAMPLING SITE:1151 Ogilvie Road, Ottawa

SAMPLED BY:EXP

(Soil) Inorganic Chemistry

DATE RECEIVED: 2024-06-12 **DATE REPORTED: 2024-06-20**

				BH24-4 SS4	BH24-1 SS3
		SAMPLE DESCRIPTION:		(7.5'-9.5')	(5'-7')
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2024-06-04	2024-06-04
Parameter	Unit	G / S	RDL	5933210	5933211
Chloride (2:1)	µg/g		2	125	66
Sulphate (2:1)	µg/g		2	540	301
pH (2:1)	pH Units		NA	7.38	8.52
Electrical Conductivity (2:1)	mS/cm		0.005	0.769	0.217

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5933210-5933211 EC, pH, Chloride and Sulphate were determined on the extract obtained from the 2:1 leaching procedure (2 parts DI water: 1 part soil). Resistivity is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

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: EXP SERVICES INC
AGAT WORK ORDER: 24Z161936
PROJECT: OTT-24006095-A0
ATTENTION TO: Daniel Wall
SAMPLING SITE:1151 Ogilvie Road, Ottawa
SAMPLED BY:EXP

Soil Analysis

RPT Date: Jun 20, 2024			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
(Soil) Inorganic Chemistry															
Chloride (2:1)	5936670		189	194	2.6%	< 2	98%	70%	130%	99%	80%	120%	96%	70%	130%
Sulphate (2:1)	5936670		86	87	1.2%	< 2	100%	70%	130%	100%	80%	120%	98%	70%	130%
pH (2:1)	5946237		7.40	8.30	11.5%	NA	98%	80%	120%						
Electrical Conductivity (2:1)	5946237		0.172	0.174	1.2%	< 0.005	101%	80%	120%						

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.

(Soil) Inorganic Chemistry									
pH (2:1)	5933210	5933210	7.38	6.96	5.9%	NA	98%	80%	120%
Electrical Conductivity (2:1)	5933210	5933210	0.769	0.749	2.6%	< 0.005	100%	80%	120%

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.

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: EXP SERVICES INC

AGAT WORK ORDER: 24Z161936

PROJECT: OTT-24006095-A0

ATTENTION TO: Daniel Wall

SAMPLING SITE:1151 Ogilvie Road, Ottawa

SAMPLED BY:EXP

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Chloride (2:1)	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Sulphate (2:1)	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
pH (2:1)	INOR 93-6031	modified from EPA 9045D and MCKEAGUE 3.11	PH METER
Electrical Conductivity (2:1)	INOR-93-6075	modified from MSA PART 3, CH 14 and SM 2510 B	PC TITRATE

AGAT Laboratories

Have feedback? Scan here for a quick survey!

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Report Information:

Company: EXP Services Inc
Contact: Daniel Wall
Address: 2650 Queensview Drive, Suit 100
Ottawa, Ontario, K2B 8H6
Phone: 613-688-1899 Fax:
Reports to be sent to:
1. Email: daniel.wall@exp.com
2. Email: ryan.digiuseppe@exp.com

Project Information:

Project: OTT-24006095-A0
Site Location: 1151 Ogilvie Road, Ottawa
Sampled By: EXP
AGAT Quote #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☑ No ☐
Company:
Contact:
Address:
Email:

Regulatory Requirements:

(Please check all applicable boxes)

☐ Regulation 153/04
Table (Indicate One) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (Check One) ☐ Coarse ☐ Fine

☐ Regulation 406
Table (Indicate One) ☐ Ind/Com ☐ Res/Park ☐ Agriculture

☐ Regulation 558
☐ CCME

☐ Sewer Use ☐ Sanitary ☐ Storm
Region
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
Indicate One

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

Report Guideline on *Certificate of Analysis* ☐ Yes ☐ No

Legal Sample ☐

Sample Matrix Legend

GW	Ground Water	SD	Sediment
O	Oil	SW	Surface Water
P	Paint	R	Rock/Shale
S	Soil		

Laboratory Use Only

Work Order #: 24716 1936
Cooler Quantity: n/a-no ice packs
Arrival Temperatures: 24.2 | 24.4 | 24.4
Depot Temperatures: 4.7 | 4.9 | 5.2.5
Custody Seal Intact: ☐Yes ☐No ☐N/A
Notes: 13 17

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days
Rush TAT (Rush Surcharges Apply)
☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day
OR Date Required (Rush Surcharges May Apply):
Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*
For 'Same Day' analysis, please contact your AGAT CSR

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC Y / N	O. Reg 153: Metals & Inorganics	Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	BTEX, F1-F4 PHCs	VOC	PAHs	PCBs: Aroclors ☐	O. Reg 406: Regulation 406 Characterization Package	pH, Metals, BTEX, F1-F4	EC, SAR	Regulation 406 SPLP Rainwater Leach mSPLP- ☐ Metals ☐ VOCs ☐ SVOCs ☐ OC	O. Reg 558: Landfill Disposal Characterization TCLP: TCLP ☐ M&I ☐ VOCs ☐ ABNs ☐ BaP ☐ PCBs	Corrosivity: ☐ Moisture ☐ Sulphide	pH	Sulphates	Chlorides	Electro Conductivity			Potentially Hazardous or High Concentration (Y/N)
1. BH24-4 SS4 (7.5'-9.5')	June 4	AM PM	1															☑	☑	☑	☑			
2. BH 24-1 SS3 (5'-7')	June 4	AM PM	1															☑	☑	☑	☑			
3.		AM PM																						
4.		AM PM																						
5.		AM PM																						
6.		AM PM																						
7.		AM PM																						
8.		AM PM																						
9.		AM PM																						
10.		AM PM																						
11.		AM PM																						

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
			C. Griffiths	06/12/24	16h15
Samples Relinquished By (Print Name and Sign): CC to Ryan	06/13/24	15h00	Samples Received By (Print Name and Sign):	Jun 14	9:25
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time

Page _____ of _____
N°:

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

APPENDIX 2

FIGURE 1 – KEY PLAN

FIGURE 2 – AERIAL PHOTOGRAPH – 1991

FIGURE 3 – AERIAL PHOTOGRAPH – 2019

FIGURE 4 & 5 – SEISMIC SHEAR WAVE VELOCITY PROFILES

DRAWING PG5770-1 – TEST HOLE LOCATION PLAN

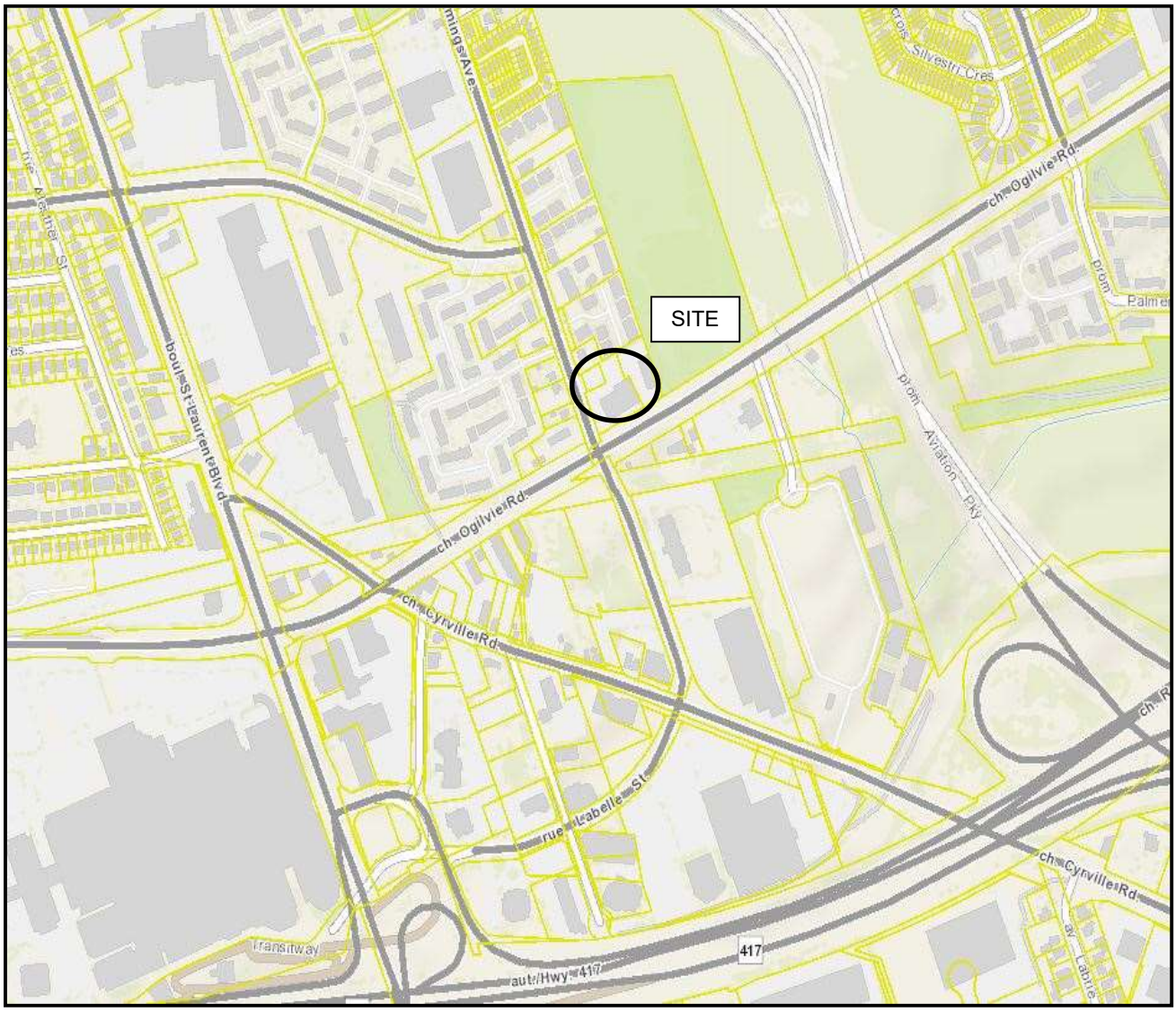


FIGURE 1

KEY PLAN

PATERSON GROUP

FIGURE 2

Aerial Photograph - 1991

PATERSON GROUP

FIGURE 3

Aerial Photograph - 2019

PATERSON GROUP

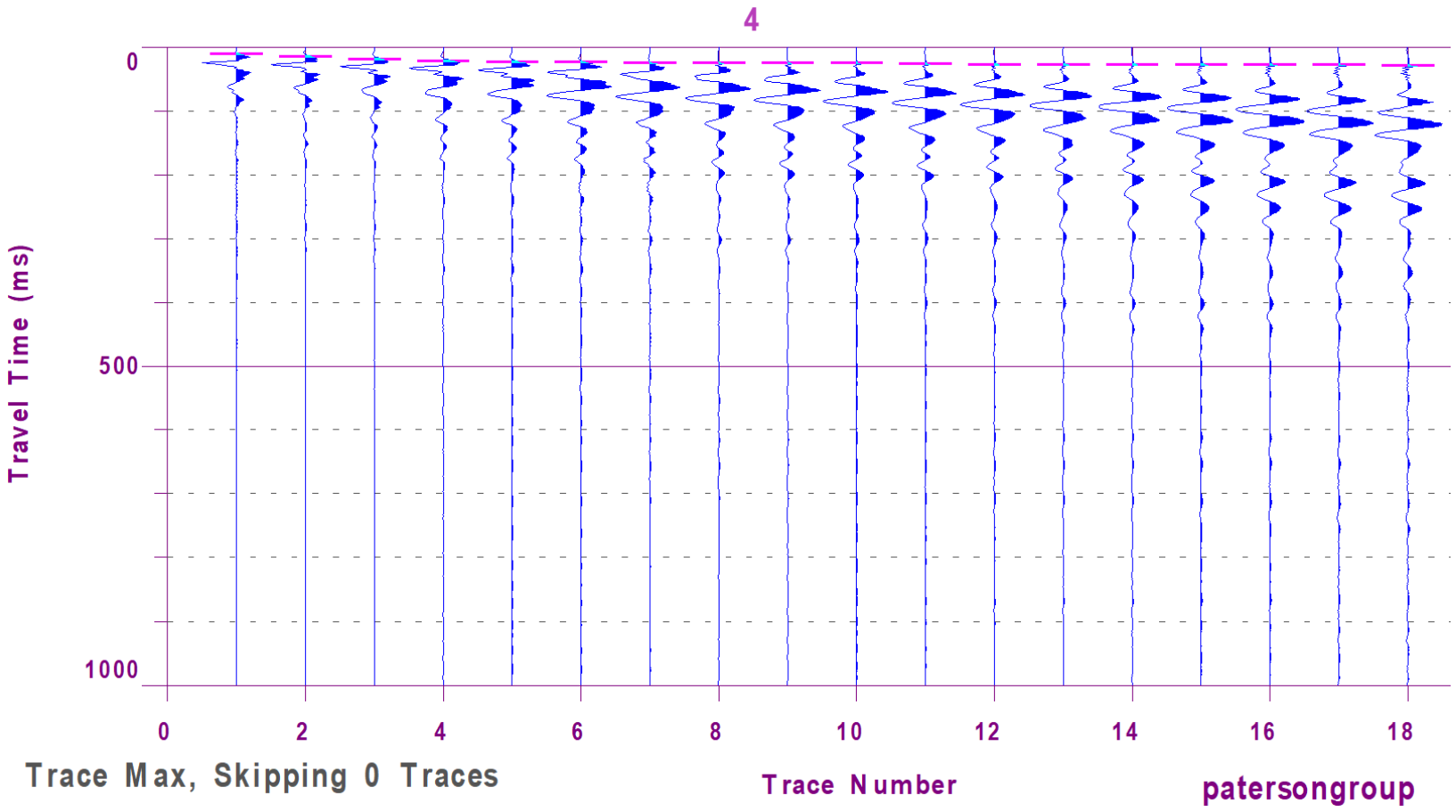


Figure 4 – Shear Wave Velocity Profile at Shot Location -5 m

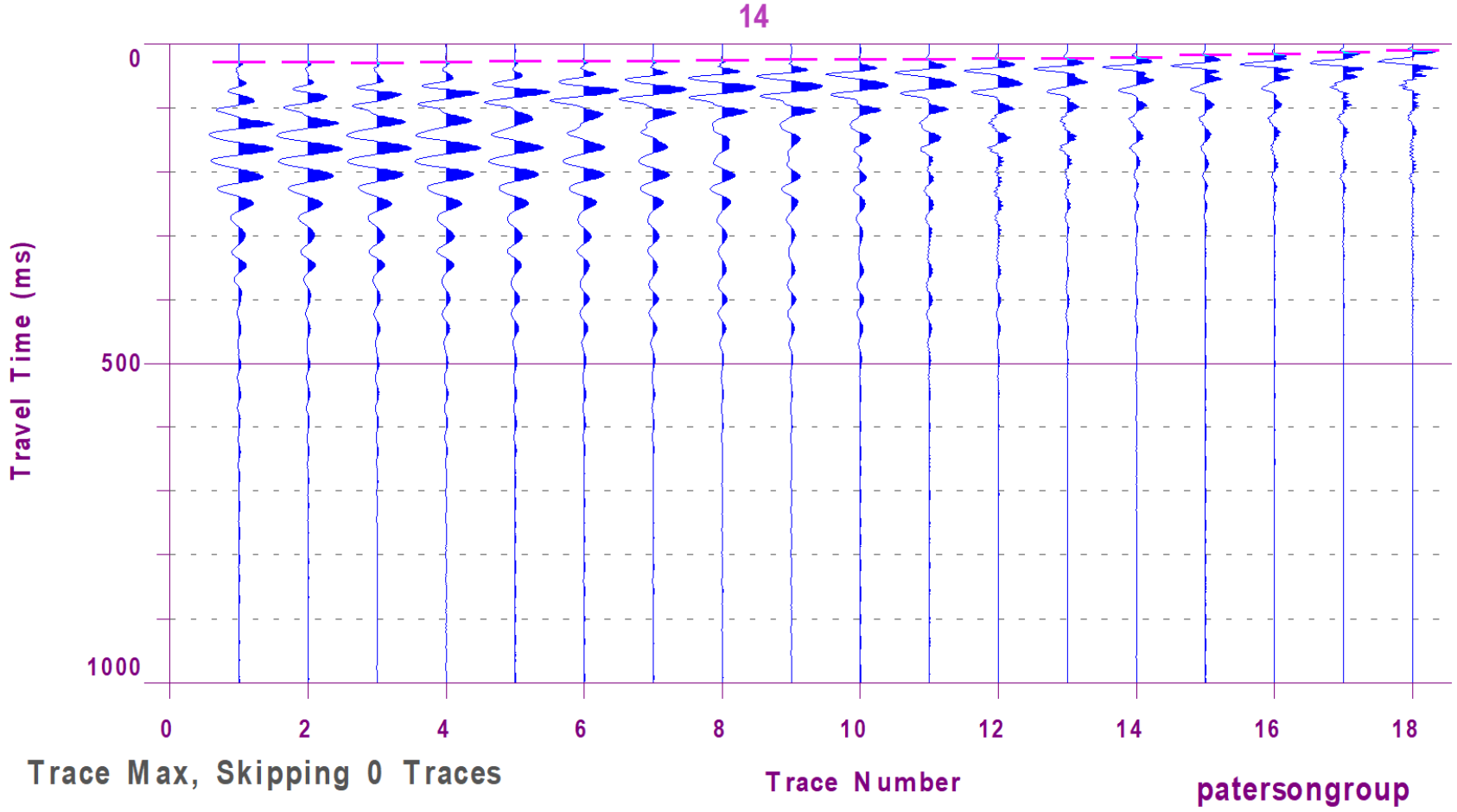
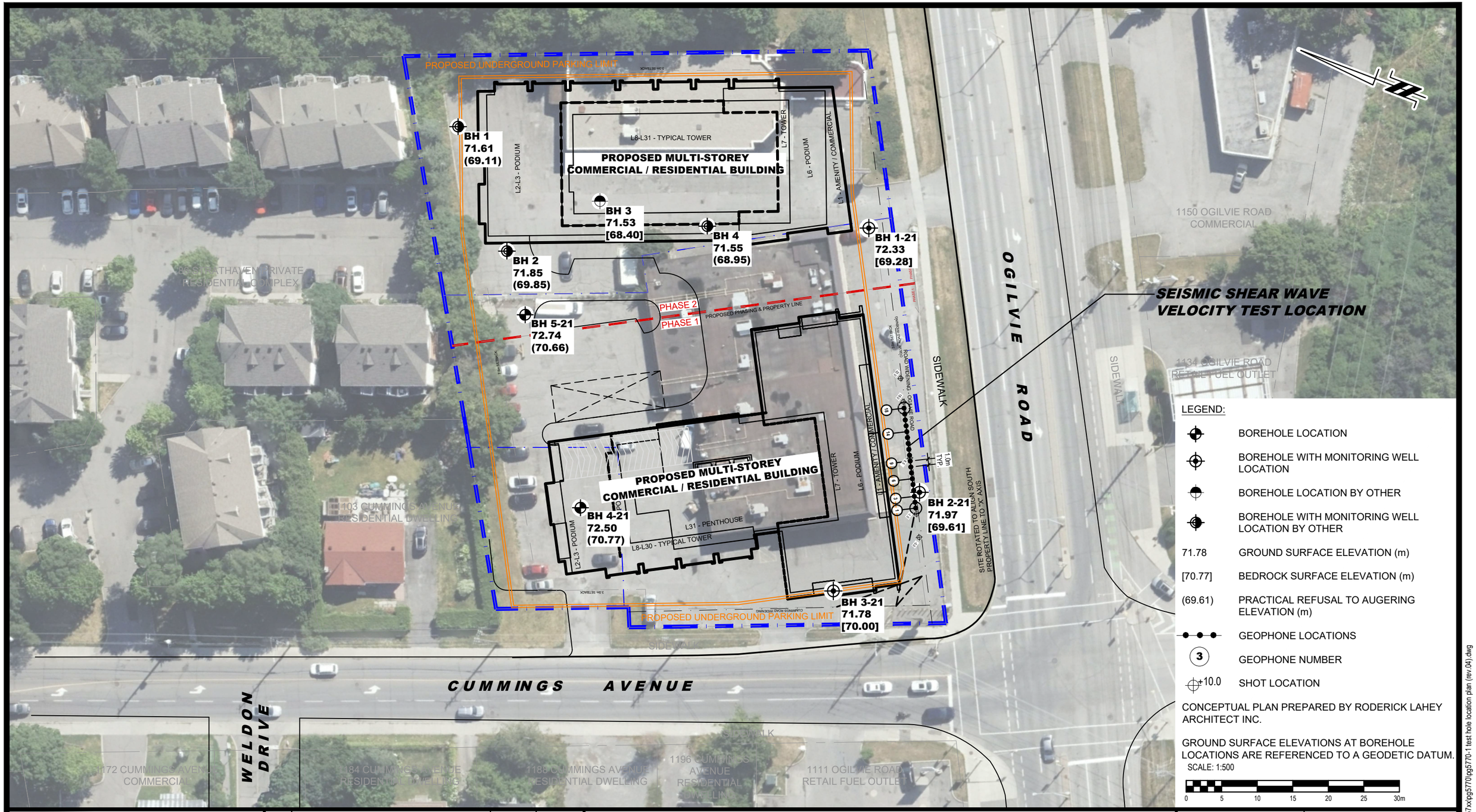


Figure 5 – Shear Wave Velocity Profile at Shot Location 22 m



LEGEND:

⊕	BOREHOLE LOCATION
⊕	BOREHOLE WITH MONITORING WELL LOCATION
⊕	BOREHOLE LOCATION BY OTHER
⊕	BOREHOLE WITH MONITORING WELL LOCATION BY OTHER
71.78	GROUND SURFACE ELEVATION (m)
[70.77]	BEDROCK SURFACE ELEVATION (m)
(69.61)	PRACTICAL REFUSAL TO AUGERING ELEVATION (m)
●●●	GEOPHONE LOCATIONS
3	GEOPHONE NUMBER
+10.0	SHOT LOCATION

CONCEPTUAL PLAN PREPARED BY RODERICK LAHEY ARCHITECT INC.

GROUND SURFACE ELEVATIONS AT BOREHOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:500

0 5 10 15 20 25 30m

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL
4	UPDATED TO NEW CONCEPTUAL PLAN	03/02/2025	KP
3	UPDATED TO NEW CONCEPTUAL PLAN AND ADDED BOREHOLE LOCATION BY OTHERS	20/01/2025	MA
2	ADDED SEISMIC SHEAR WAVE VELOCITY TEST LOCATION	13/08/2024	FC
1	UPDATED TO NEW CONCEPTUAL PLAN	03/07/2024	KP

TCU DEVELOMENT CORP.

GEOTECHNICAL INVESTIGATION
PROPOSED MULTI-STOREY BUILDING
1137/1151 OGILVIE ROAD AND 1111 CUMMINGS AVENUE

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:500	Date: 05/2021
Drawn by: JM	Report No.: PG5770-1
Checked by: KP	Dwg. No.: PG5770-1
Approved by: DJG	Revision No.: 4

p:\autocad drawings\geotechnical\pg57xx\pg5770\pg5770-1 test hole location plan (rev.04).dwg

11x17

With every community, we redefine what's possible.

Stantec is a global leader in sustainable engineering, architecture, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.

Stantec Consulting Ltd.
300 - 1331 Clyde Avenue
Ottawa ON K2C 3G4
stantec.com