Lithos

January 2023

UD22-093

Functional Servicing and Stormwater Management Report

Project: 50 The Driveway, Ottawa
Client: 276405 Ontario Inc.

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Issues and Revisions Registry

Identification	Date	Description of issued and/or revision
FSR/SWM Report	January 13th , 2023	Issued for Site Plan Application

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Executive Summary

Lithos Group Inc. (Lithos) was retained by 276405 Ontario Inc. (the "Owner") to prepare a Functional Servicing and Stormwater Management Report in support of a Site Plan Application, for a proposed residential-use development located in the area referred to as the "Golden Triangle", at 50 The Driveway (K2P 1E2), in the City of Ottawa (the "City"). The following summarizes our conclusions:

Storm Drainage

The post-development 100-year storm flow has been designed to match the five (5)-year pre-development storm flow. In order to achieve the target flows and meet the City's Regulations, quantity controls will be utilized and 79.00 m^3 of storage tank will be required as well as 54.10 m^3 will be utilized in underground chambers. The stormwater management (SWM) system will be designed to provide enhanced level (Level 1) protection as specified by the Ministry of the Environment, Conservation and Parks (MECP). Water quality control can be provided for a minimum total suspended solids (TSS) removal of 80%.

Sanitary Sewers

The proposed development will connect to the existing 300mm combined sewer on Queen Elizabeth Driveway ROW, through a 200mm diameter sanitary sewer lateral connection, with a minimum grade of 2.00% (or equivalent pipe design). The additional net discharge flow from the proposed development, is anticipated at approximately 1.80 L/s. According to the information provided by the City, the existing infrastructure has the capacity to support the additional sanitary flow, from the proposed development.

Water Supply

Water supply for the site will be from the existing 300mm diameter watermain on the Queen Elizabeth Driveway ROW. It is anticipated that a total design flow of 84.81 L/s will be required to support the proposed development. Based on the boundary conditions received from the City, it is revealed that the existing water infrastructure can support the proposed development.

Site Grading

The proposed grades will improve the existing drainage conditions to meet the City's/Regional requirements. Grades will be maintained along the property line wherever feasible. Existing drainage patterns on adjacent properties will not be altered and stormwater runoff from the subject development will not affect the adjacent properties.

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1.0 Introduction

Lithos Group Inc. (Lithos) was retained by Main and Main (the "Owner") to prepare a Functional Servicing and Stormwater Management Report in support of a Site Plan Application for a proposed residential-use development located at 50 The Driveway in the City of Ottawa (the "City").

The purpose of this report is to provide site-specific information for the City's review with respect to infrastructure required to support the proposed development. More specifically, the report will present details on sanitary discharge, water supply and of the storm drainage pattern.

The following documents were available for our review:

- Plan and Profiles of:
  - Waverley Street, drawing No. 3331 Sheet 11 of 20, dated January, 2003;
  - Lewis Street from Robert Street to N.C.C Driveway, drawing No. 911-P, dated June, 1978;
  - Gilmour Street, drawing No. 012 Sheet 12 of 35, dated March 2018.
- Sewer and Water Maps of the existing combined sewer network upstream and downstream of the subject site (for reference purposes only);
- Site Plan & Statistics prepared by Hobin Architecture Inc., dated January 05, 2023;
- Topographical Survey prepared by Annis, O'Sullivan, Vollebekk Ltd., dated July 01, 2021; and,
- Geotechnical Investigation prepared by Paterson Group dated July 16, 2021.

2.0 Site Description

The existing site is approximately 0.296 hectares and is currently comprised of an existing building, an elevated tower and outdoor parking area. The site is located within the urban limits of the City of Ottawa (K1L 6N1), in the area referred to as the "Golden Triangle". Refer to **Figures 1** and **2** following this report and site photographs in **Appendix A**.

3.0 Site Proposal

The proposed development will be a 9-storey residential-use building and it will be serviced by two (2) underground parking levels. The proposed development will be comprised of 77 residential units. The total development will include approximately 8,886.92 m^2 of Gross Floor Area (GFA). Please refer to **Appendix B** for site plan and building statistics.

4.0 Terms of Reference and Methodology

4.1. Terms of Reference

The following references and technical guidelines were consulted in the present study:

- A City of Ottawa Servicing Study Guidelines, online edition,
- A City of Ottawa Sewer Design Guidelines, (2012),
- A City of Ottawa Design Guidelines – Water Distribution, (2010),
- A Technical Bulletin ISTB-2018-2;
- A Ministry of Environment, Conservation and Park (MECP) Guidelines for the Design of Water Systems (2008)
- A MECP Guidelines for the Design of Sanitary Sewage Systems (2008)
- A MECP Stormwater Planning and Design Manual (2003)
- A Ontario Building Code (2010)

4.2. Methodology: Stormwater Drainage and Management

This report provides a detailed Stormwater Management (SWM) review of the pre-development and post-development conditions and comments on opportunities to reduce peak flows, as per the City of Ottawa guidelines.

The stormwater management criteria for this development are based on the City of Ottawa Sewer Design Guidelines, as well as the Ministry of Environment, Conservation and Parks (MECP) 2003 Stormwater Management Planning and Design Manual (SWMPD). The following design criteria will be reviewed:

- Post-development peak flow for the 100-year storm event from the site should be controlled to the 5-year target flow. A 20-minute time of concentration and a 10 min inlet time derived from City of Ottawa IDF curves, were considered for connection to a dedicated storm sewer;
- For connection to a dedicated storm sewer, when the imperviousness of the existing property is greater than 50%, the maximum value of the runoff coefficient, “c”, used in calculating the pre-development peak runoff rate is limited to 0.40;
- A safe overland flow will be provided for all major flows in excess of the 100-year storm event.

4.3. Methodology: Sanitary Discharge

The sanitary sewage discharge from the site will be determined using sanitary sewer design sheets that incorporate the land use and building statistics as supplied by the design team. The calculated values provide peak sanitary flow discharge that considers infiltration.

The estimated sanitary discharge flows from the proposed site will be calculated based on the criteria shown **Table 4-1** below. (Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines).

Table 4-1 – Sanitary Design Criteria

Design Parameter	Value
Residential Units (1-Bedroom)	1.4 people/unit
Residential Units (2-Bedroom)	2.1 people/unit
Residential Units (3-Bedroom)	3.1 people/unit
Average Daily Residential Flow	280 L/person/day
Residential Peak Factor	$PF = 1 + (14/(4+(P/1000)^{1/2}))$
Commercial Floor Space	50000 L/ha/day
Commercial Peaking Factor	1.5 if commercial contribution >20%, otherwise 1.0
Infiltration and Inflow Allowance	0.28 L/s/ha
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	1.5 m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6 m/s
Maximum Full Flowing Velocity	3.0 m/s

4.4. Methodology: Water Usage

The fire flow requirements were estimated using the method prescribed by the Fire Underwriters Survey (FUS). This method is based on the floor area of the building to be protected, the type and combustibility of the structural frame and the separation distances with adjoining building units.

Section 4.3.22 of the City Design guidelines for water distribution provides guidance for determining the method for estimating Fire Demand. As indicated, the requirements for levels of fire protection on private property are covered in the Ontario Building Code. Section 7.2.11 of the OBC addresses the installation of water service pipes and fire service mains. Part 3 of the OBC outlines the requirement for Fire Protection, Occupant Safety, and Accessibility; and subsection A-3.2.5.7 provides the provisions for firefighting.

Based on trained personnel responding to the emergency and water supply being delivered through a municipal main, the required minimum provision for water supply flow rates shall not be less than 2,700L/min or greater than 9,000L/min (OBC Section A.3.2.5.7, Table 2). The City of Ottawa was contacted in June 2021 to obtain boundary conditions based on an estimated water demand.

The domestic water usage was calculated based on the City of Ottawa Guidelines – Water Distribution outlined in **Table 4-2** that follows.

Table 4-2 – Water Usage

Design Parameter	Value
Average Residential Day Demand	350 L/person/day
Maximum Residential Day Demand	2.5 x Average Day Demand
Maximum Residential Hour Demand	2.2 x Max Day Demand
Average Commercial Day Demand	2.5 $L/m^2/d$
Maximum Commercial Day Demand	1.5 x Average Day Demand
Maximum Commercial Hour Demand	1.8 x Max Day Demand
Minimum Depth of Cover	2.4 m from top of watermain to finished grade
During Peak Hour Demand desired operating pressure is within	350kPa and 480KPa
Minimum pressure during normal operating conditions (average day to maximum hour demand)	275kPa
During normal operating conditions, pressure must not exceed	552kPa
Minimum pressure during fire flow plus maximum day demand	140kPa

5.0 Stormwater Management and Drainage

5.1. Existing Conditions

The existing site is currently comprised of an existing building, an elevated tower and outdoor parking space.

According to available records there is an on-site catchbasin (CB) in the parking area near the east end of the parking area. This catchbasin appears to be connected to the 1800 mm diameter combined sewer on Lewis Street.

Moreover, the existing site is primarily covered by impermeable surfaces; thus, there is no significant infiltration onsite. Although the existing run-off composite coefficient is estimated at 0.90, the City of Ottawa Guidelines require the target flow calculations to be based on a run-off coefficient of 0.4. **Table 5-1** shows the pre-development input parameters, as illustrated on the drainage area plan in **Figure DAP-1** in **Appendix C**.

Table 5-1 – Target Input Parameters

Catchment	Drainage Area (ha)	Actual "C"	Design "C"	Tc (min.)
A1- Pre	0.296	0.90	0.40	20
External Area	0.071	0.49	0.40	20

Peak flows calculated for the existing conditions are shown in **Table 5-2** below. Detailed calculations are in **Appendix C**.

Table 5-2 – Target Peak Flows

Catchment	Peak Flow Rational Method (L/s)	
	5-year	100-year
A1 Pre	23.1	39.5
External Area	5.5	9.5

As shown on **Table 5-2** above, post-development flows towards the City's infrastructure will need to be controlled to the target flow of 23.1 L/s.

5.2. Proposed Conditions

In order to meet the City's Stormwater Management criteria, the development flow rate is to be controlled to the five (5)-year target flow, as established in **Section 5.1**. The site will consist of the following three (3) internal and one (1) external drainage areas:

1. A1 Post – Storm runoff from the Rooftops/Terraces/Walkways will be controlled in the underground storage tank, located into P1 level;
2. A2 Post – Uncontrolled storm runoff conveyed towards the adjacent right of ways;
3. A3 Post – Area towards the catch basin will be controlled in infiltration chambers;
4. Ext.1 – Storm Runoff from External Area that will be controlled in infiltration chambers.

The post-development drainage areas and runoff coefficients are indicated in **Figure DAP-2**, located in **Appendix C** and summarized in **Table 5-3** below.

Table 5-3 – Post-development Input Parameters

Drainage Area	Drainage Area (ha)	Drainage Area Atot (ha)	"C"	Tc (min.)
A1 Post (rooftops/terrace/walkways controlled in tank)	0.226	0.251	1.00*	10
A2 Post (Uncontrolled Area – towards Lewis Street)	0.025		0.61*	10
A3 Post (Area towards the catch basin controlled in chambers)	0.045	0.116	0.62*	10
External Area- (Area towards the catch basin controlled in chambers)	0.071		0.61*	10

* "C" value for the 100 year storm event is increased by 25%, with a maximum of 1.00, as per City's Sewer Design Guidelines.

The external drainage area and A3 Post will be captured by catch basin #1 (CB1) which is to retain any storm runoff from its tributary area into an underground infiltration gallery and avoid discharging it into the municipal infrastructure for events up to 100 years.

5.2.1.1 Quantity Controls

Using the City's intensity-duration-frequency (IDF) data, modified rational method calculations were undertaken to determine the maximum storage required during each storm event. Results for the 5, and 100-year storm events are provided in **Table 5-4**. The detailed post-development quantity control calculations are provided in **Appendix C.**

Table 5-4 – Post-development Quantity Control as Per City Requirements

Storm Event	Target Controlled Release Rate (L/s)	Uncontrolled Flow (L/s)	Required Storage Tank Volume (m^3)	Total Controlled Release Rate of the Tank (L/s)	Total Site Release Rate (L/s)
5-year	23.1	3.5	35.0	9.6	13.1
100-year		7.5	79.0	14.4	21.9

As shown in **Table 5-4**, in order to control post-development flows to the 5-year pre-development conditions, a target flow of 23.1 L/s is to be satisfied. The required on-site storage is accommodated by the use of one (1) underground storage tank, located at P1 level. **Table 5-4,** illustrates the minimum required storage to be retained, which is 79.0 m^3, for the 100-year storm event.

The stormwater flow released from the rooftops and the terraces (**Drainage Area A1 Post**) will be gravity driven into the underground storage tank, at P1 Level. Please refer to engineering drawing **Site Servicing Plan** (**"SS-01",** submitted separately) for details.

5.2.1.2 Underground Storage Tank

An underground storage tank is proposed to meet the quantity control requirements, set forth by the City's WWFMG Guidelines. Controlled stormwater flows from the rooftops and terraces (**Drainage Area A1 Post**) will be gravity driven into the proposed underground main storage tank located at P1 level.

The proposed underground storage tank will have an active storage depth of 1.12 m above the inlet of the outlet pipe, accounting for a quantity control maximum storage of 79.0 m^3, during the hundred year storm event. Stormwater from the underground storage tank will outlet through a **80mm diameter orifice plate** with a maximum release rate of 14.4 L/s and it will be gravity driven to the existing 300mm diameter combined sewer along Queen Elizabeth Driveway ROW.

The proposed storage tank will have a total footprint area of 70.0 m^2. Refer to **Figure 3,** included in **Appendix C**, for the minimum tank design requirements. Additional details of the tank design will also be provided by the mechanical engineer.

In summary, a maximum control stormwater release rate from the main storage tank of 14.4 L/s, along with the uncontrolled release rate of 7.5 L/s (**Drainage Area A2 Post**), results to a post-development total release rate of 21.9 L/s, for the 100-year event.

Consequently, the proposed SWM plan retains enough runoff volume, to reduce the post-development peak flows for each storm event to the extent possible and approach the required target flow.

Underground Infiltration Chambers

Stormwater from the site and external will ultimately be driven into the underground storage chambers before being infiltrated.

The underground chambers will be located at the north east corner of the property (refer to Site Servicing Plan **SS-01**, submitted separately). The underground chambers will have a minimum storage depth of 1.32 m and an active storage component of 57.45 m^3 to meet the 100 year storage requirement. In order to meet the required volume of 54.10 m^3, it is proposed to use 136 blocks of Greenstorm-ST-B Chambers. Please refer to **Appendix B** for more details.

The bottom of the storage facility will be at 63.80 masl and there will be 1.00 m clearance from the existing 'high' groundwater level to the bottom of the chambers, as required by MOE. In addition, the proposed chambers will have more than 5.0 m at horizontal distance from the proposed buildings' footings according to the OBC requirements.

5.2.1.3 Major Overland Flow Route and Emergency Overland Flow Route

Under existing conditions, overland flow from Queen Elizabeth Driveway enters the site and exits through the adjacent properties to the east, reaching Waverley Street. Under post-development conditions, the drainage pattern is being maintained without causing any flooding to the proposed development. All accesses to the building are above the flood limit and the maximum ponding achieved during flooding is estimated at 20 cm as per the proposed grading and the correspondence email, found in **Appendix B**.

5.2.1.4 Quality Controls

For MECP Enhanced Level protection, the removal of 80% total suspended solids (TSS) is required. Stormwater discharged from the proposed development's rooftop area is considered "clean" and will be driven into the underground storage tank. The detailed quality control calculations can be found in **Appendix C**. A summary of the site quality control is included in below.

Table 5-5– Site TSS Removal

Drainage Area	Drainage Area (ha)	% Area of Controlled Site	Effective TSS Removal	Additional Quality Control Required
A1, A3, EXT.1	0.342	100%	80%	Inherent
Total	**0.342**	**100%**		

5.2.1.5 Proposed Storm Connection

The proposed development will connect to the existing 300 mm diameter combined sewer along Queen Elizabeth Driveway ROW, via a 150mm diameter storm sewer service connection, with a minimum grade of 2.00% (or equivalent pipe design). The engineering drawing SS-01 (submitted separately), indicates the stormwater service connection.

6.0 Combined Drainage System

6.1. Existing Combined Drainage System

The existing site is currently comprised of an existing building, an elevated tower and outdoor parking space. According to available records, there are two (2) combined sewers abutting the subject property. More specifically:

- A 300mm diameter combined sewer located within the Queen Elizabeth Driveway ROW. This combined sewer outlets to the 1800 mm diameter combined sewer noted below.
- A 1800mm diameter trunk combined sewer located within Lewis Street ROW (flowing north). This combined sewer eventually discharges into the Somerset trunk sewer, which in turn outlets into the Rideau River Collector (RRC).

6.2. Existing Flows

The sanitary flow generated by the proposed development at 50 The Driveway was compared to the existing flow in order to quantify the net increase in the combined sewer network abutting the subject site.

Using the design criteria outlined in **Section 4.3** and existing site information, the sanitary discharge flow from the existing property towards Lewis Street is estimated at 0.17 L/s.

6.3. Proposed Flows

According to the proposed development statistics, as well as the design criteria outlined in **Section 4.3**, the new building will discharge 1.97 L/s (1.89 L/s of sanitary flow and 0.083 L/s of infiltration) into the City's Infrastructure.

The additional flow will be considered within the sanitary discharge rate; therefore, there is an increase in sanitary flow of approximately 1.80 L/s. For detailed calculations, refer to the sanitary sewer design sheet in **Appendix D**.

6.4. Proposed Sanitary Connections

The proposed development will connect to the existing 300mm diameter combined sewer on Queen Elizabeth Driveway ROW through a 200 mm diameter sanitary sewer connection with horizontal and vertical bendings, at a minimum grade of 2.00% (or equivalent pipe design). According to the coordination that took place with the City of Ottawa, a lateral connection with bends is acceptable, in order to avoid a connection into the NCC property. Please refer to correspondence email included in **Appendix B** as well as to engineering drawing "**SS-01**" (submitted separately) for details.

6.5. Conclusions

After taking into consideration all the above, we provided the required calculations to the City, in order to review how the additional flow from the proposed development will affect the municipal networks downstream. According to the information provided, the combined sewer infrastructure along Queen Elizabeth Driveway ROW has adequate capacity to accommodate the additional flows from the proposed development and, thus, they can support it. Refer to **Appendix B** for email correspondence with the City. For detailed calculations refer to the sanitary sewer design sheet in **Appendix D.**

7.0 Water Supply System

7.1. Existing System

The subject property lies within the City of Ottawa 1W pressure zone. The existing watermain system consists of a 300 mm diameter watermain on the Queen Elizabeth Driveway ROW.

7.2. Proposed Water Supply Requirements

The estimated water consumption was calculated based on the occupancy rates shown on **Table 4-2**, according to the City's watermain design criteria.

It is anticipated that an average domestic water consumption of approximately 0.59 L/s (50,976 L/day), a maximum daily consumption of 1.48 L/s (127,872 L/day) and a peak hourly demand of 3.25 L/s (11,700L/hr) will be required.

The fire flow requirements we estimated using the method prescribed by the Fire Underwriters Survey (FUS) be undertaken to assess the minimum requirement for fire suppression. The fire flow calculations is normally conducted for the largest storey, by area, and for the two immediately adjacent storeys.

As a result, to the above-mentioned method, we have selected the total area of Level 2 and the immediately adjoining storeys, which are Levels 1 and 3.

Table 7-1 illustrates the input parameters used for the FUS calculations. According to our calculations, a minimum fire suppression flow of approximately 83.33 L/s (1,320 USGPM) will be required. Detailed calculations can be found in **Appendix E**.

Table 7-1 – Fire Flow Input Parameters

Parameter	Frame used for Building	Combustibility of Contents	Presence of Sprinklers	Separation Distance			
				North	East	South	West
Value according to FUS options	Non-Combustible Construction	Non-Combustible	Yes	30.1m to 45m	10.1m to 20m	10.1m to 20m	>45m
Surcharge/reduction from base flow	0.8	25%	30%	5%	11%	11%	0%

In summary, the required design flow is the sum of 'the minimum fire suppression flow' and 'maximum daily demand' (83.33 + 1.48 = 84.81 L/s, 1,344 USGPM).

Table 7-2 summarizes the anticipated water demand on the City of Ottawa Guidelines – Water Distribution.

Table 7-2 – Water Demand

Design Parameter	Anticipated Demand (L/min)
Average Day Demand	35.4
Max Day + Fire Flow	88.8 + 7,000.2 = 7,089
Max Hour Demand	195.0

7.3. Watermain Analysis Results

Upon completion of the detailed calculations in order to determine the anticipated domestic water consumption and the required minimum fire flow for the proposed development, the calculation results were provided to the City of Ottawa. As a result, the above noted values were used to generate the municipal watermain network boundary conditions.

Table 7-3 below summarizes the boundary conditions provided by the City of Ottawa for the existing municipal watermain network along Lewis and Queen Elizabeth Driveway.

Table 7-3– Boundary Conditions Provided by the City

Municipal Watermain Boundary Condition	152 mm on Lewis Street	305 mm on Queen Elizabeth Driveway
Minimum HGL	106.4	106.4
Maximum HGL	115.3	115.3
Max Day + Fire Flow (250 L/s) (m)	91.7	105.3

Table 7-4 below summarizes the calculated water demands for the proposed development under the various operating conditions and compares the anticipated operating pressures at the watermains to the normal operating pressures outlined in the City of Ottawa Design Guidelines. Furthermore, the pressure losses from the building's water service to the Siamese connection have been calculated, in order to define the available flow at this point.

Table 7-4- Watermain Analysis Results – Domestic Flow

Watermain Connection	Design Parameter	Anticipated Demand (L/s)	Approximate Design Operating Pressures (psi) / Relative Head (m)	Normal Municipal Operating Pressures (psi)
Queen Elizabeth Driveway	Average Demand	0.59	87 psi (66.3m)	50-70 psi
	Peak Hour Demand	3.25	54.0 psi (37.7m)	40-70 psi
	Max Day + Fire Flow	118.15	52.0 psi (36.6m)	20 psi (min)

According to **Table 7-4** and the information provided by the City of Ottawa, the water pressure for the average demand and the peak hour demand, result in values that achieve the criteria of the City's Guidelines, as indicated in the **Table 8-4**.

7.4. Proposed Watermain Connection

The proposed development will be serviced by one (1) 150 mm diameter and one (1) 200 mm diameter waterline separated by an isolation valve. The proposed water lateral will connect to the 300mm diameter existing watermain on Queen Elizabeth Driveway ROW. Refer to engineering drawings **"SS-01"** (submitted separately) for details.

8.0 Erosion and Sediment Control

Soil erosion occurs naturally and is a function of soil type, climate topography. The extent of erosion losses is exaggerated during construction where vegetation has been removed and the top layer of soil becomes agitated.

Prior to topsoil stripping, earthworks or underground construction, erosion and sediment controls will be implemented and will be maintained throughout construction.

Silt fence will be installed around the perimeter of the site and will be cleaned and maintained throughout construction.

Catch basins will have filter fabric installed under the grate during construction to protect from silt entering the storm sewer system.

A mud mat will be installed at the construction access in order to prevent mud tracking onto adjacent roads.

Erosion and sediment controls must be in place during construction. The following recommendations to the contractor will be included in contract documents.

- Limit extend of exposed soils at any given time.
- Re-vegetate exposed areas as soon as possible.
- Minimize the area to be cleared and grubbed.
- Protect exposed slopes with plastic or synthetic mulches.
- Install silt fence to prevent sediment from entering existing ditches.
- No refueling or cleaning of equipment near existing watercourses.
- Provide sediment traps and basins during dewatering.
- Install filter cloth between catch basins and frames.
- Plan construction at proper time to avoid flooding.

Establish material stockpiles away from watercourses, so that barriers and filters may be installed.

The contractor will, at every rainfall, complete inspections and guarantee proper performance. The inspection is to include:

- Verification that water is not following under silt barriers.
- Clean and change filter cloth at catch basins.

9.0 Site Grading

9.1. Existing Grades

The existing site is approximately 0.296 hectares and is currently comprised of an existing building, an elevated tower and by an adjacent outdoor parking area. The site drains into the existing stormwater system inside the property and the drainage pattern is being maintained as previously existed.

9.2. Proposed Grades

The proposed grades will improve the existing drainage conditions to meet the City's/Regional requirements. Grades will be maintained along the property line wherever feasible. Existing drainage patterns on adjacent properties will not be altered and stormwater runoff from the subject development will not affect the adjacent properties.

10.0 Conclusions and Recommendations

Based on our investigation, we conclude the following:

Storm Drainage

The post-development 100-year storm flow has been designed to match the five (5)-year pre-development storm flow. In order to achieve the target flows and meet the City's Regulations, quantity controls will be utilized and 79.00 m^3 of storage tank will be required as well as 54.10 m^3 will be utilized in underground chambers. The stormwater management (SWM) system will be designed to provide enhanced level (Level 1) protection as specified by the Ministry of the Environment, Conservation and Parks (MECP). Water quality control can be provided for a minimum total suspended solids (TSS) removal of 80%.

Sanitary Sewers

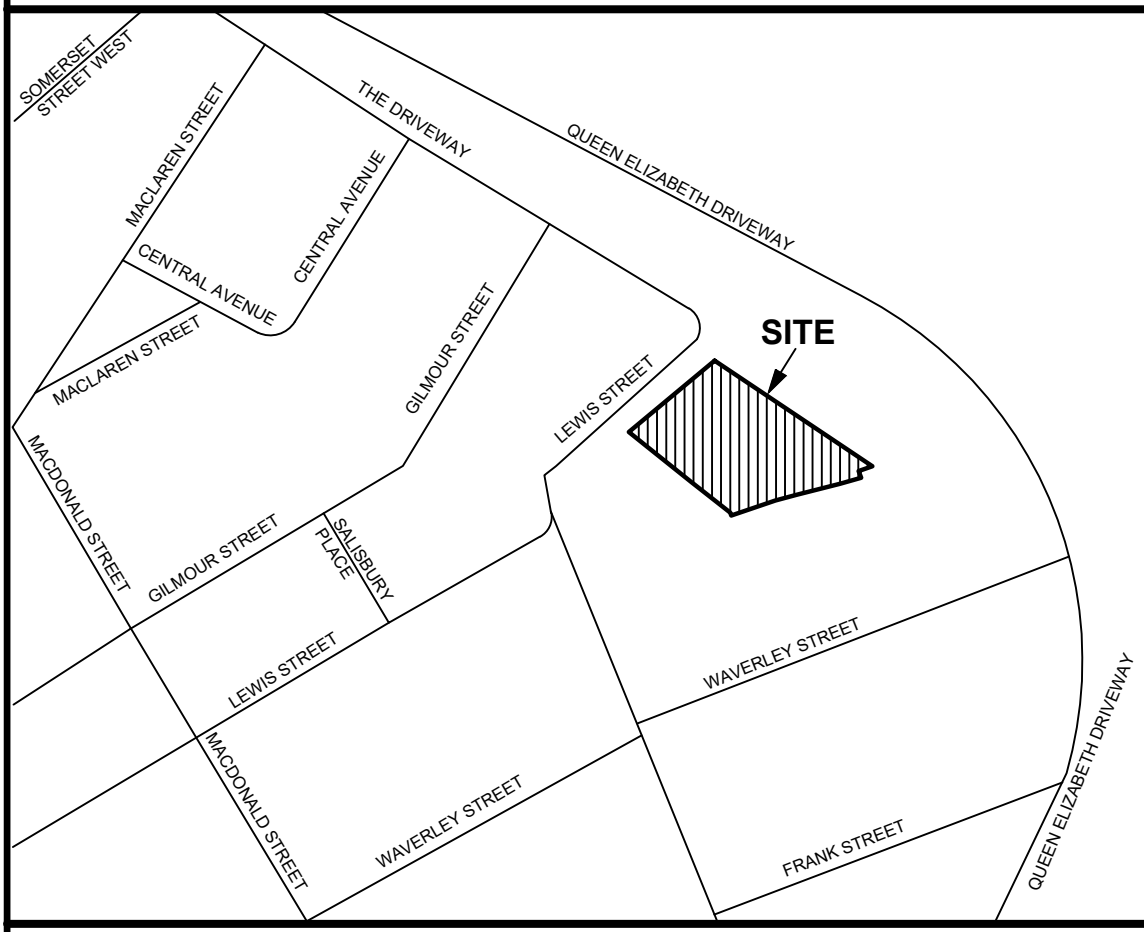
The proposed development will connect to the existing 300mm combined sewer on Queen Elizabeth Driveway ROW, through a 200mm diameter sanitary sewer lateral connection, with a minimum grade of 2.00% (or equivalent pipe design). The additional net discharge flow from the proposed development, is anticipated at approximately 1.80 L/s. According to the information provided by the City, the existing infrastructure has the capacity to support the additional sanitary flow, from the proposed development.

Water Supply

Water supply for the site will be from the existing 300mm diameter watermain on the Queen Elizabeth Driveway ROW. It is anticipated that a total design flow of 84.81 L/s will be required to support the proposed development. Based on the boundary conditions received from the City, it is revealed that the existing water infrastructure can support the proposed development.

Site Grading

The proposed grades will improve the existing drainage conditions to meet the City's/Regional requirements. Grades will be maintained along the property line wherever feasible. Existing drainage patterns on adjacent properties will not be altered and stormwater runoff from the subject development will not affect the adjacent properties.

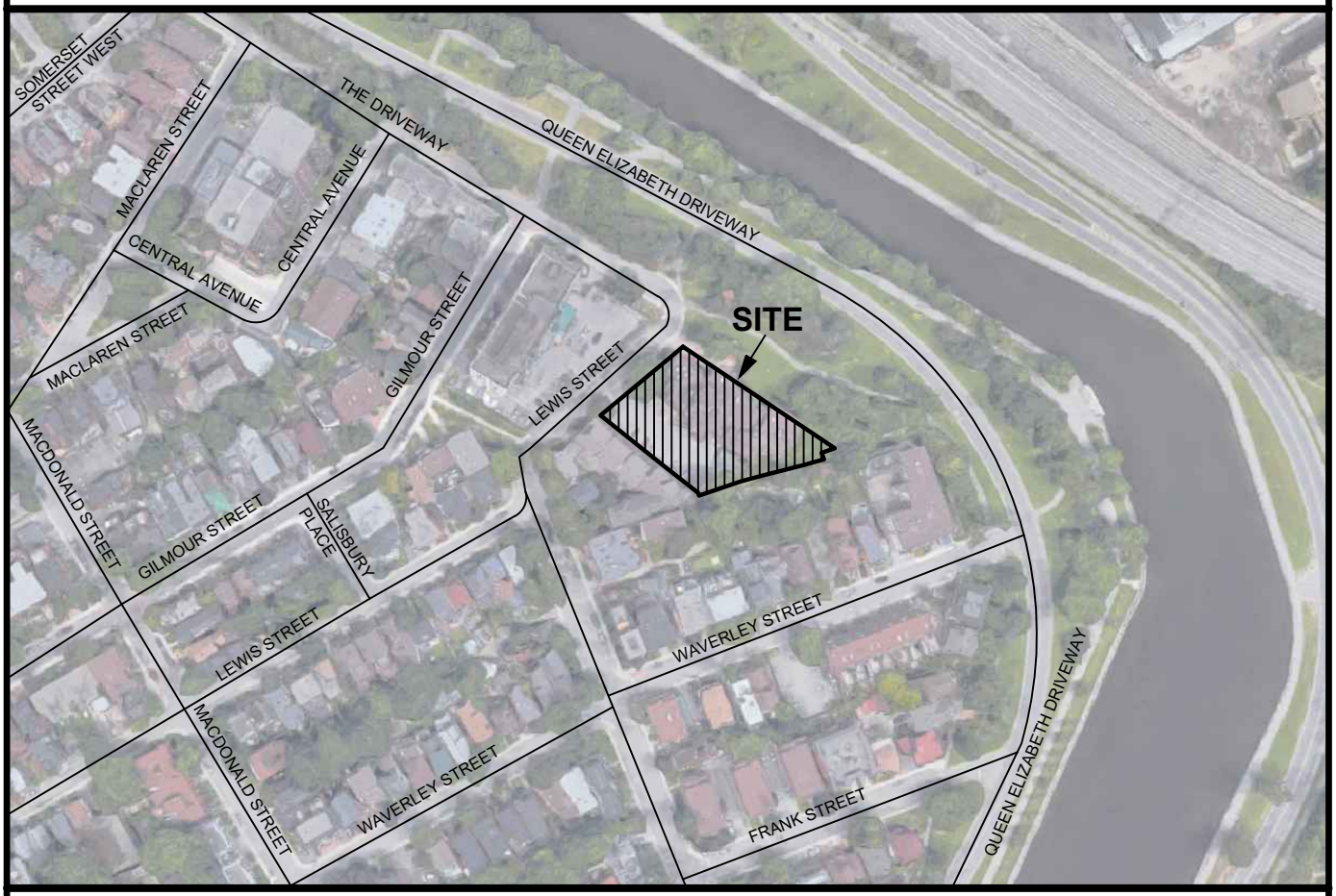


Lithos

150 Bermondsey Road, Toronto, Ontario M4A 1Y1

LOCATION PLAN
RESIDENTIAL USE DEVELOPMENT
50 THE DRIVEWAY
OTTAWA, ONTARIO

DATE:	JANUARY 2023	PROJECT No:	UD22-093
SCALE:	N.T.S.	FIGURE No:	FIG 1



Lithos

150 Bermondsey Road, Toronto, Ontario M4A 1Y1

AERIAL PLAN
RESIDENTIAL USE DEVELOPMENT
50 THE DRIVEWAY
OTTAWA, ONTARIO

DATE:	JANUARY 2023	PROJECT No:	UD22-093
SCALE:	N.T.S.	FIGURE No:	FIG 2

Appendix A

Site Photographs

North-West Corner of property along Driveway Road

South-West Corner of property along Driveway Road

Appendix B

Background Information

TOPOGRAPHICAL SKETCH OF

50 THE DRIVEWAY
CITY OF OTTAWA
Prepared by Annis, O'Sullivan, Vollebekk Ltd.

TOPOGRAPHICAL INFORMATION ADDED TO PLAN JUNE 29, 2021

Scale 1 : 150

Metric

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

Caution

This is NOT a Plan of Survey and shall not be used except for the purpose indicated in the title block.

SITE AREA = 2958 m²
BUILDING FOOTPRINT AREA = 896 m²

July 7, 2021
Date

E.H. Herweyer, O.L.S.

ELEVATION NOTES

1. Elevations shown are geodetic and are referred to the CGVD28 geodetic datum derived from vertical control monument No. 3646 having an elevation of 69.851 metres.
2. It is the responsibility of the user of this information to verify that the job benchmark has not been altered or disturbed and that it's relative elevation and description agrees with the information shown on this drawing.

UTILITY NOTES

1. This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for confirmation.
2. Only visible surface utilities were located.
3. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc.

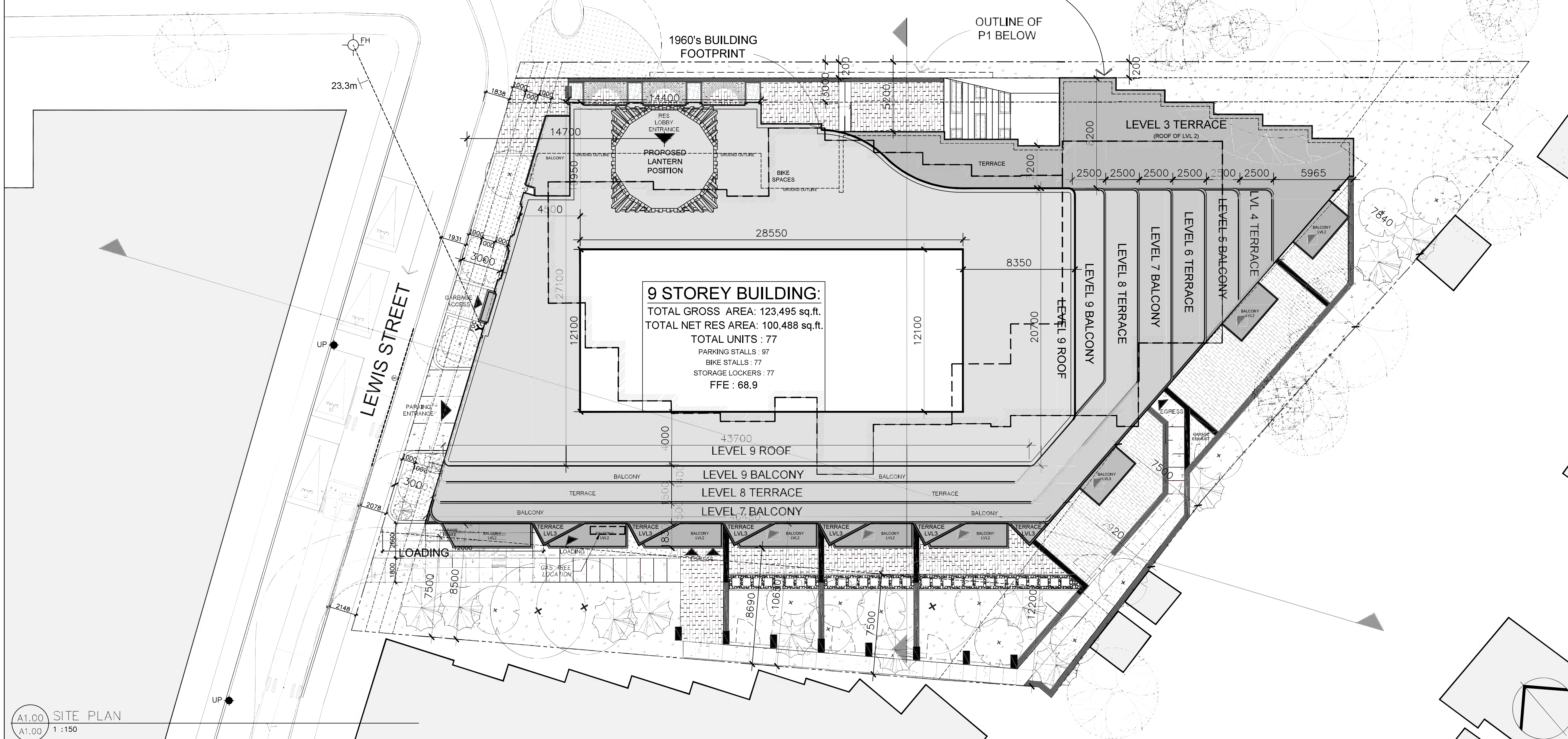
Notes & Legend

	Denotes	
○ FH	-	Fire Hydrant
WV	-	Water Valve
○ MH-ST	-	Maintenance Hole (Storm Sewer)
○ MH-S	-	Maintenance Hole (Sanitary)
○ MH	-	Maintenance Hole (Unidentified)
	-	Overhead Wires
○ UP	-	Utility Pole
AN	-	Anchor
□ CB	-	Catch Basin
T/G	-	Top of Grate
GM	-	Gas Meter
TB-B	-	Bell Terminal Box
B	-	Bollard
BF	-	Board Fence
CRW	-	Concrete Retaining Wall
WRW	-	Wooden Retaining Wall
BRW	-	Brick Retaining Wall
Ø	-	Diameter
+65.00	-	Location of Elevations
+65.00*	-	Top of Wall/ Curb Elevations
C/L	-	Centreline
	-	Property Line
FP	-	Flag Pole
	-	Underground Gas (as marked on ground by others)

Ontario Land Surveyors
ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: Nepean@aovltd.com

Job No. 20693-20 Lt 1 & Pt Lt 2 RP 15324 T F2

THE DRIVEWAY



BUILDING AREA SUMMARY

BUILDING AREA	17,988	SQ.FT.	
NUMBER OF STOREYS ABOVE GRADE	9	STOREYS	
TOTAL GROSS AREA	123,495	SQ.FT.	(**EXCLUDES AREA BELOW GRADE)
TOTAL NET/LEASEABLE AREA			
RESIDENTIAL	100,488	SQ.FT.	
COM/RET	-	SQ.FT.	
TOTAL GFA (AS PER CITY DEF.)	95,658	SQ.FT.	

UNIT SUMMARY

TOTAL UNITS **77**

			QTY.	RATIO %	
SMALL SUITES (≤ 850 SQ.FT)	15	1 BED	7	9%	19%
		1 BED + DEN	8	10%	
MEDIUM SUITES (850 - 1,400 SQ.FT)	34	1 BED + DEN	8	10%	44%
		2 BED	13	17%	
		2 BEDROOM + DEN	13	17%	
LARGE SUITES (≥1,400 SQ.FT)	28	2 BEDROOM + DEN (1,400 - 1,800 SQ.FT)	16	21%	36%
		2 BEDROOM + DEN (OVER 1,800 SQ.FT)	12	16%	

AVERAGE UNIT SIZE 1,305 SQ.FT.

NOTE:

ALL EXISTING SITE INFORMATION AS PER SITE SURVEY PLAN DATED JUNE 30TH, 2021 AND PREPARED BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD.

ZONING NOTES:

CURRENT ZONING: **R4UC[478]**

LOT AREA : 2,958 m^2
LOT WIDTH(Lewis st.) : 44.19 m
LOT DEPTH. : 75.2 m

LEGAL DESCRIPTION
LOT 50
REGISTERED PLAN XXXXXX
CITY OF OTTAWA

DEVELOPMENT STATS	REQUIRED	PROPOSED
LOT OF AREA 'A'	MIN 1150 m^2	2,958 m^2
% OF LANDSCAPED AREA	30%	46.3%
TOTAL UNITS		77
SETBACK ALONG FRONT YARD (LEWIS ST.)	3 m	3 m
SETBACK ALONG SIDE YARD (FACING CANAL)	1.2 m	1.2 m
SETBACK ALONG SIDE YARD (FACING TOWNS)	1.2 m	7.5 m
SETBACK ALONG REAR YARD	7.5 m	7.5 m
MAXIMUM HEIGHT	14.5 m	32 m
NUMBER OF STOREYS		9
BUILDING GFA		11,473 m^2
ZONING GFA (as per city zoning def.)		8,886 m^2

PARKING REQUIREMENTS

1. VEHICLE PARKING	REQUIRED PARKING	PROVIDED PARKING
RESIDENTIAL PARKING 77 UNITS (– 12UNITS) (X 0.5)	0.5 / UNIT 33 SPACES	1.0 / UNIT 77 SPACES
VISITOR PARKING 88 UNITS (– 12UNITS) (X 0.1)	0.1 / UNITS 7 SPACES	0.26 / UNITS 20 SPACES
TOTAL PARKING	40 SPACES	97 SPACES
PARKING DISTRIBUTION		
LEVEL P2		46 SPACES
LEVEL P1		51 SPACES
TOTAL		97 SPACES

2. BICYCLE PARKING

REQUIRED BICYCLE PARKING SPACES
RESIDENTIAL (NEW) 0.5 SPACE/UNIT – 39 SPACES REQUIRED FOR 77 UNITS

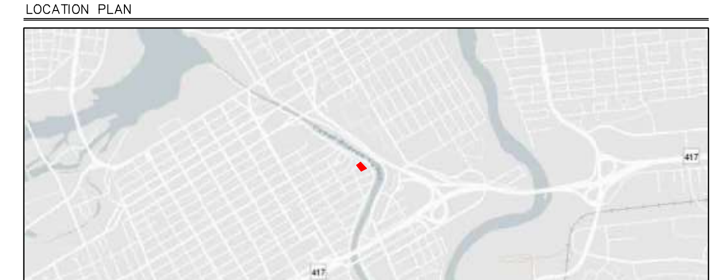
PROVIDED BICYCLE PARKING SPACES
77 TOTAL BIKE STALLS (UNDERGROUND)

3. AMENITY REQUIREMENTS

REQUIRED AMENITY SPACE 6 m^2 REQUIRED PER UNIT
77 UNITS X 6 SQ.M. = 462 SQ.M. TOTAL AMENITY REQUIRED
REQUIRED AMENITY SPACE TO BE COMMON – 231 SQ.M.
PROVIDED COMMON AMENITY SPACE – 290 SQ.M.

PROVIDED AMENITY SPACE BREAKDOWN:
–GROUND FLOOR COMMON AMENITY – 290 m^2(240m^2 INTERIOR + 50m^2 EXTERIOR)
–PRIVATE BALCONY & TERRACE AMENITY – 2,541 m^2
TOTAL AMENITY SPACE PROVIDED 2,831 m^2

LOCATION PLAN



LEGEND

- PROPOSED FIRE ROUTE
- PROPOSED BUILDING
- BUILDING TO BE DEMOLISHED
- HMH EXISTING TRAFFIC MAN HOLE
- TMH EXISTING TRAFFIC MAN HOLE
- MH EXISTING MAN HOLE
- TSP EXISTING TRAFFIC LIGHT
- FH EXISTING FIRE HYDRANT
- CONC. CURB DETAIL. TO CITY OF OTTAWA STANDARDS
- BP BIKE PARKING SPACE
- EDGE OF SIDEWALK
- PROPERTY LINE
- SETBACK
- DC PROPOSED DEPRESSED CURB DETAIL TO CITY OF OTTAWA STANDARD SC–7
- EXTENT OF PRIVATELY OWNED PUBLIC SPACE
- CURB TO BE REBUILT
- ROLL CURB
- UP EXISTING UTILITY POLE
- FDC FIRE DEPARTMENT CONNECTION
- PTD PARKING TICKET DISPENCER
- PDS EXISTING PAY & DISPLAY
- BS EXISTING TRANSIT STOP
- CB EXISTING CATCH BASIN
- CB PROPOSED CATCH BASIN
- AS SIGNAGE FOR ACCESSIBLE PARKING SPACE
- FRS SIGNAGE FOR FIRE ROUTE ACCESS
- S EXISTING SIGN
- B EXISTING BOLLARD
- EXISTING LIGHT POLE
- NEW LIGHT POLE
- PROPOSED WALL MOUNTED LIGHT
- SL EXISTING STREET LIGHTING BOX
- TB EXISTING TRAFFIC SIGNAL BOX

PROJECT TEAM

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HOBIN ARCHITECTURE
Barry Hobin
bjhobin@hobinarc.com

David Anderson
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613.238.7200 x122

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ENVIRONMENTAL
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Joshua Foster
joshua.foster@gradientwind.com

no.	date	revision
5	230105	RE–ISSUED FOR SPC
4	220429	ISSUED FOR SPC
3	220119	RE–ISSUED FOR REZONING
2	211208	RE–ISSUED FOR REZONING
1	210716	ISSUED FOR REZONING

It is the responsibility of the appropriate contractor to check and verify all dimensions on site and report all errors and/or omissions to the architect.

All contractors must comply with all pertinent codes and by–laws.

Do not scale drawings.

This drawing may not be used for construction until signed.

Hobin Architecture Incorporated
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Canada K1S 3K7
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F: 613-235-2005
E: mail@hobinarc.com
hobinarc.com
HOBIN ARCHITECTURE

PROJECT/LOCATION: 50 THE DRIVEWAY

DRAWING TITLE: SITE PLAN

DRAWN BY:	DATE:	SCALE:
DA	2023-01-05	1:150

ONTARIO ASSOCIATION OF ARCHITECTS BARRY J. HOBIN LICENCE 3049

PROJECT: 2051

DRAWING NO.: A1-00

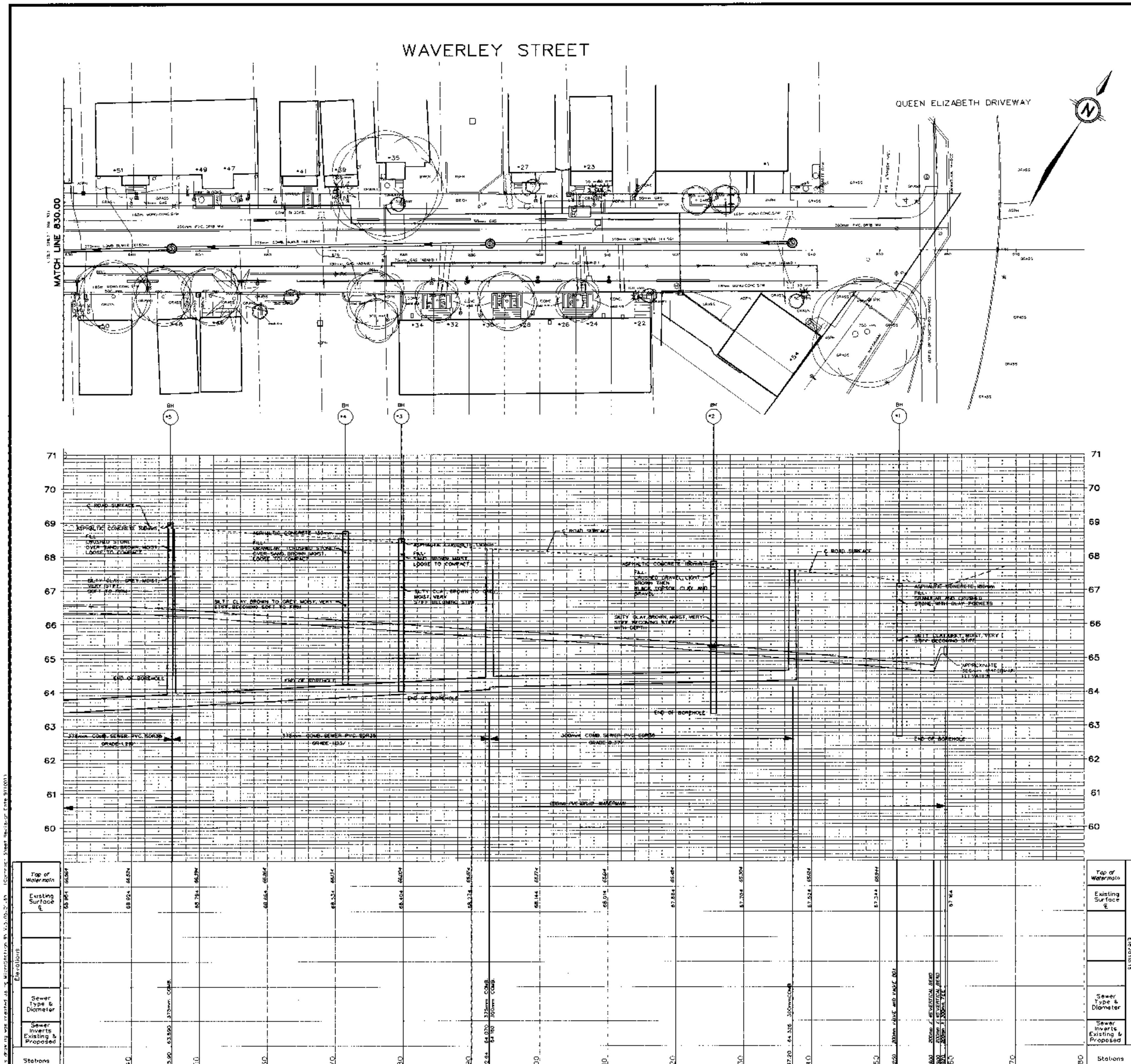
REVISION NO.:

D07-12-22-0100

DWG 18798

DATE-PLOT
DWGNAME


305mmØ - UCI
152mmØ - UNK
The Driveway
rue Gilmour St
IN139642
IN139541
305mmØ - PVC
MHCH13930
IN56945
IN56946
1800mmØ BRICK
300mmØ CLAY
MHCH11535
305mmØ - UCI
40
50
139540
MHCH11137
152mmØ - PVC
152mmØ - DI
MHCH11147
MHCH13550
IN39139
IN39134
MHSA58214
152mmØ - UNK
MHST58434
MHSA58215
MHST58431
MHSA58213
MHCH10070
IN39140
IN56947
MHCH11531
Cornerstone Priv
10
20m
© 2022 City of Ottawa © 2022 Teranet



Revisions:

No.	Date	Description	Drawn By	Approved By

Design:

Construction Services Manager
Wayne Bennett P.Eng.

Final Measurements:

Construction Type: SEWER, WATER, ROAD	Inspector: A. SCAFFIDI
Work Commenced: AUGUST 2001	Project Manager: Z. RANA, J. BRADLEY, N. STOUT.
Work Completed: OCT 2002	Field Book #
Contractor: GRAYDEX INC	Date: JAN. 2003
Drafting Revisions: A. SCAFFIDI	Checked By: S. SAUVE, JAN. 2003.

Tender Notes:

1. Soil information shown is not guaranteed and contractors are advised to collect additional soils information as deemed necessary.
2. Soil information taken from : FONDEX , Ref. # 00-504-4
3. This plan supersedes (in whole or in part) plan # F5a
4. While illustrations and utilities shown are taken from the best available information, they cannot be guaranteed.
5. The bedrock line was recorded during construction of the existing
6. Boreholes taken prior to construction
7. See typical cross sections for road structure material depths
8. All Water information and locations cannot be guaranteed. Please contact the Region of Ottawa Carleton Environmental Section
9. Ministry of Environment Approval # Sewer Water

Legal Survey Notes:

Boundary information shown hereon has been compiled and calculated from Teranet data and not based on an actual survey.

Distances shown to survey monuments are for reference purposes only. Survey monuments may not define property boundaries.

THIS IS NOT A PLAN OF SURVEY

This plan was compiled from plans and documents recorded in the Land Registry System and has been prepared for property mapping purposes only.

Ottawa

Transportation, Utilities and Public Works
Infrastructure Services Branch
110 LAURIER AVENUE WEST, OTTAWA, ONTARIO K1P 1J1

Rosemarie Leclair General Manager	**Richard Hewitt, P.Eng.** Branch Director

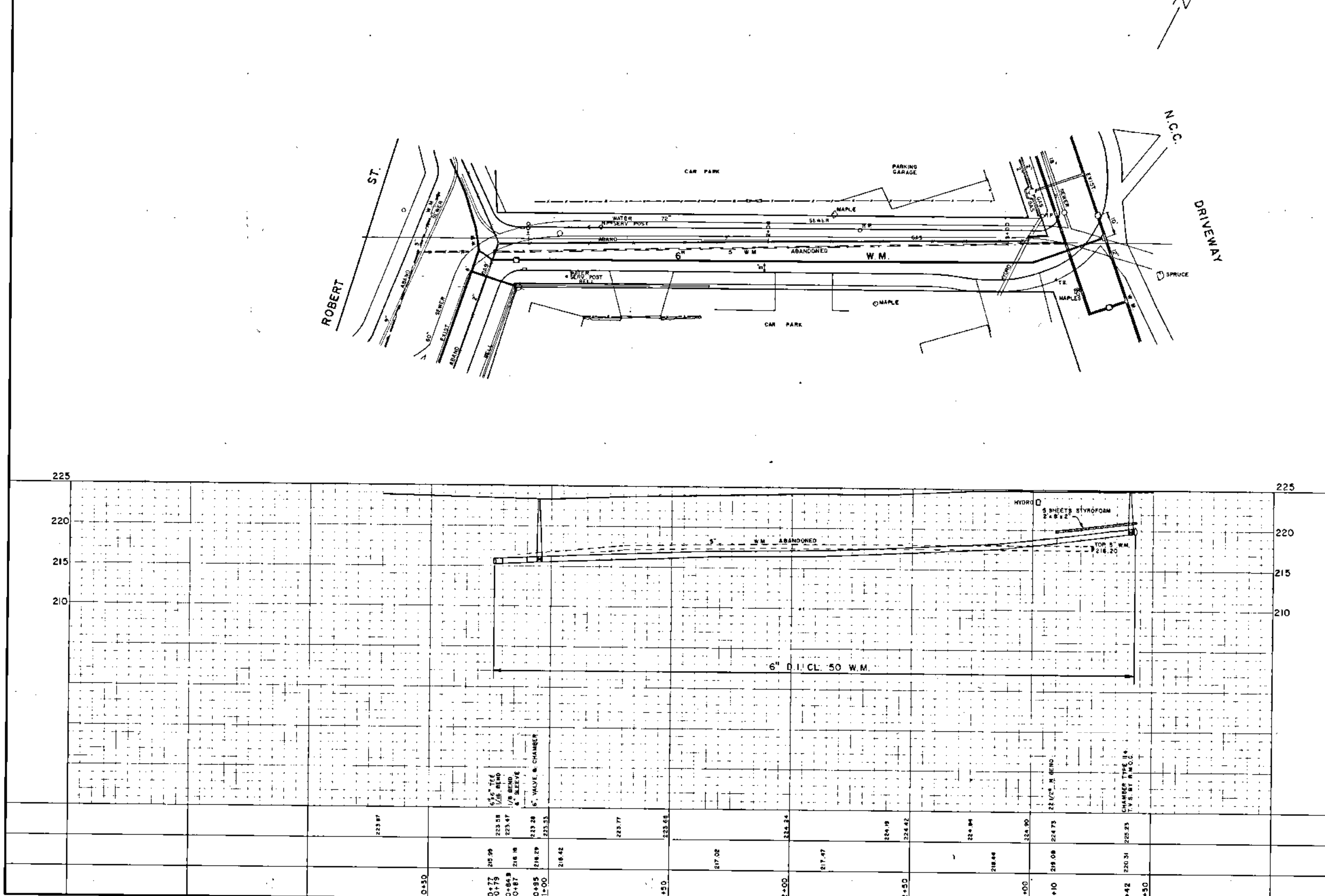
WAVERLEY STREET

STA. 830.00 TO QUEEN ELIZABETH DRIVEWAY

Contract No:	Survey Books:	Scales: (See note)	Plan No.
01C3331	3331	HOR. 1:250 VERT. 1:50	3331 Sheet 11 of 20

Filename: 3330510.dgn
Reference: wavbpl.dgn

LEWIS STREET



Regional Municipality of Ottawa-Carleton Works Department

F.E. AYERS Works Commissioner	W.L. KEAY Director Pollution Control
Engineer in Charge of Design & Construction Date 6-6-78	L. L. LARSON (Registered Professional Engineer, Province of Ontario)
Project officer	Date 5/6/78
Drawn by: R. BARRETT	Date APRIL 1978
Approved by:	Date

Notes

THIS PLAN DRAWN FROM THE FOLLOWING SURVEY BOOK 570, SURVEYOR H. PICKARD CENTRAL REGISTRY E-13 SHEET 20, E-14 SHEET 25

Revisions
1. 30/10/78 AS BUILT FROM BOOK 570 & FIELD PRINT. S.P.B., T.J.S.

Scales
HORIZON 0 10 20 30 40 FEET
VERTICAL 0 3 6 9 12 FEET

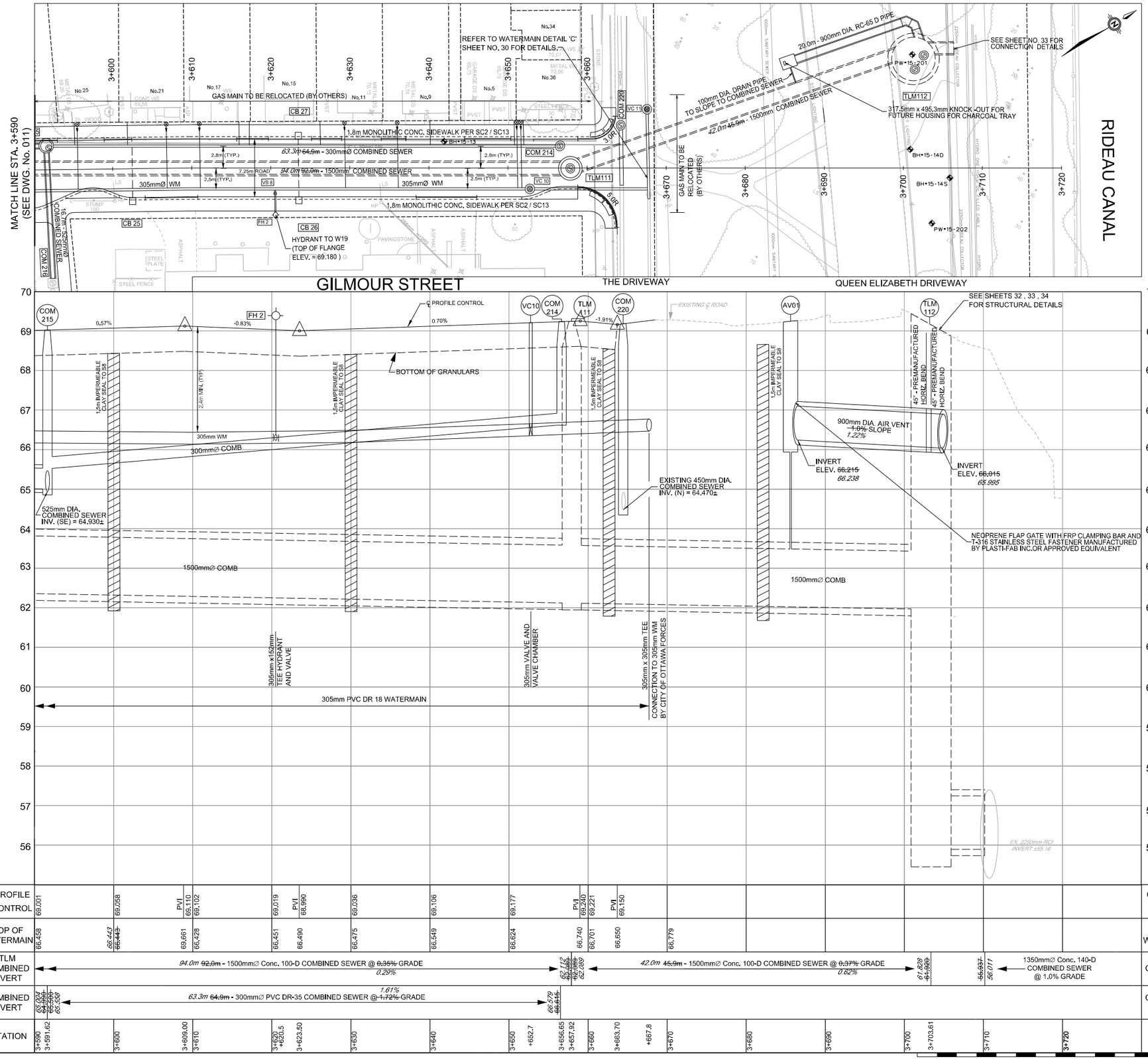
Project Title

6" W.M. IN LEWIS STREET FROM ROBERT ST. TO N.C.C. DRIVEWAY

Drawing No.: 911-P

Sheet

6500



GILMOUR STREET TRUNK SEWER
ROAD, SEWER AND WATERMAIN CONSTRUCTION

GILMOUR STREET
PLAN AND PROFILE
STA. 3+590 TO STA. 3+720

W. NEWELL P. ENG.
General Manager,
Infrastructure Services Department

T. BLASIOLI P. ENG.
Project Manager

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

Ottawa

Contract No.	Dwg. No.
ISD15-5013	012

Sheet 12 of 35

Asset No.

Asset Group

Des.	Chk'd.
PDR	PDR
Dwn.	**Chk'd.**
MF, MB	PDR
Utility Circ. No.	Index No.

Const. Inspector

Scale:
HORIZONTAL 1:250
0m 2.5 5 10
0m 1 2
VERTICAL 1:50

NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

REVISIONS

No.	Description	By	Date (dd/mm/yy)
1	ISSUED FOR UTILITY CIRCULATION	PDR	22/06/15
2	ISSUED FOR 66% PRELIMINARY DESIGN	PDR	17/07/15
3	ISSUED FOR PRELIMINARY DESIGN CIRCULATION	PDR	07/08/15
4	ISSUED FOR MOE APPROVAL	PDR	14/08/15
5	ISSUED FOR 33% DETAILED DESIGN SUBMISSION	CB	15/09/15
6	ISSUED FOR 66% DETAILED DESIGN SUBMISSION	CB	14/10/15
7	ISSUED FOR TENDER	CB	03/12/15
8	ISSUED FOR ADDENDUM NO. 2	PDR	11/01/16
9	ISSUED FOR CONSTRUCTION	CB	01/02/16
10	ISSUED FOR SCM NO. 6	CB	16/03/16
11	'AS BUILT' INFORMATION ADDED	CB	30/03/18

' AS BUILT ' NOTE:
"ALL NUMERICAL VALUES THAT ARE NOT STROKED OUT AND REPLACED IN ITALICS ON ' AS BUILT' DRAWINGS ARE CONSIDERED TO BE DESIGN VALUES ONLY AND NOT MEASURED IN THE FIELD "

This drawing comprises the original design drawing updated to reflect information supplied by others as to the final 'AS CONSTRUCTED' conditions. The information supplied by others has not been verified and, as such, this drawing is not warranted by J.L. Richards and Associates Limited for completeness or accuracy.
Date of Issue: MARCH 30, 2018

COMBINED TLM MAINTENANCE HOLE DATA

NO.	STRUCTURE TYPE / SIZE
TLM 111	OPSD 701.013 - 2400mm Ø C/W SAFETY LANDING (OPSD 404.020)
TLM 112	5.0 m - CAST IN PLACE BAFFLE DROP CHAMBER

1. MAINTENANCE HOLES TO BE BENCHED PER OPSD 701.021

2. MAINTENANCE HOLE COVERS TO S24 UNLESS SHOWN OTHERWISE

COMBINED MAINTENANCE HOLE DATA

NO.	STRUCTURE TYPE / SIZE
COM 214	OPSD 701.010 - 1200mm Ø
COM 215	OPSD 701.011 - 1500mm Ø
COM 220	OPSD 701.010 - 1200mm Ø
AV01	OPSD 701.031 - 1524mm x 1829mm C/W 300mm SUMP AND GALVANIZED STEEL HONEYCOMB GRATING PER OPSD 403.010 (TYPE B)

1. MAINTENANCE HOLES TO BE BENCHED PER OPSD 701.021

2. MAINTENANCE HOLE COVERS TO S24.1 UNLESS SHOWN OTHERWISE

CATCH BASIN DATA

NO.	STATION	OFFSET	COVER	STRUCTURE	T/GRATE	LENGTH	INVERT	ICD
CB 25	3+602.50	4.0 R	S23	OPSD 705.010	68.927	7.4	67.527	V - O
CB 26	3+623.50	4.0 R	S23	OPSD 705.010	68.844	7.2	67.444	C - O
CB 27	3+623.50	4.0 L	S23	OPSD 705.010	68.917	0.8	67.517	C - O

1. OFFSET MEASURED FROM ROAD ALIGNMENT CONTROL TO CENTER OF CATCH BASIN.

2. GRATE ELEVATIONS ARE GIVEN AT EDGE OF PAVEMENT.

3. ALL CATCH BASIN LEADS TO BE 200mmØ PVC DR-35 UNLESS SHOWN OTHERWISE FOR STANDARD CONCRETE CATCH BASINS (OPSD 705.010).

4. ALL CATCH BASINS TO INCLUDE 600mm SUMP.

5. LENGTH MEASURED FROM CENTERLINE OF STRUCTURE TO CENTERLINE OF SEWER.

6. INLET CONTROL DEVICE (ICD)
V = VORTEX TYPE ICD
C = FRAME TYPE ICD WITH CIRCULAR ORIFICE
O = ODOUR CONTROL INLET
REFER TO CONTRACT SPECIFICATIONS FOR ICD DETAILS

7. ALL CATCH BASINS ARE TO BE CONNECTED TO THE LOCAL COMBINED SEWER.

E-13-16

E-13-19

E-14-21

E-13-24

Metres

GILMOUR STREET

THE DRIVEWAY

LEWIS STREET

SALISBURY STREET

ROBERT STREET

REVISIONS / RÉVISIONS	DATE	BY
REDRAWN FROM VOIDED UTILITY PLAN E-13-20	JUNE 2009	MH
ENGRIDGE GAS-EC0090038 (SEPT. 2009) GASLINE ADDED ON SALISBURY ST.	MAR. 2010	KJ
ALLSTREAM - ALL10031(DEC. 2010) CONDUIT ADDED TO LEWIS STREET	AUG 2011	DC
HYDRO/BELL/ENBRIDGE/ROGERS, CITY SEWER, WATER, TRAFFIC, SL COMPILED/DIGITIZED FROM UTILITY/CITY DATA	FEB 2015	DC
ALL10031 - LEWIS STREET (DEC 2010) CONDUIT ADDED TO LEWIS STREET	JUN 2021	JH

LEGEND

- Water Valve, Valve Chamber, Fire Hydrant
- Sewer Manhole, Catch Basin Manhole
- Catch Basin / Drainage, Wing Wall, Head Wall
- Pole, Pole w/ light, Decorative, Lawn Light
- Power Supply, Panel, Pedestal, Transformer, Tower, Regulator (PS, PM, GR)
- Amp, Hand Hole, Vault, Gas Valve
- OC Transpo: Bus Shelter-No Power, Energized, Isolated (BUS)
- Streetscape: Planter Box, Grate Square, Eng. Soil (TGS)
- Traffic Connect Box / Disconnect Box, SL Disconnect (TCP, TYP, SCN)
- R.L. Hand Hole, R.L. Camera (TYPE)
- Scada: Hand Hole, Monitoring Panell
- Reducer
- Pipe, Duct, Conduit, Lateral
- Culvert
- Abandoned
- Capped
- Buried Cable
- Property Line
- Install Year (2015)

TELECOM GLOSSARY

A ..... Allstream	P ..... Primus
AT ..... Atria	P2P ..... Canadian P2P Fibre
B ..... Bell	R ..... Rogers
BH ..... Birch Hill	S ..... Sprint
F ..... Fibre Noir	SL ..... Street Lighting
G ..... Glentilly	T ..... Traffic
GT ..... Group Telecom	TO ..... Telecom Ottawa
H ..... Hydro Ottawa	TU ..... Telus
H1 ..... Hydro One	V ..... Videotron
L / L3 ..... Level 3	Z ..... Zayo

GLOSSARY - OTHER

DD ..... Dept. of Defence	PED ..... Pedestal (owner unknown)
MH ..... Manhole (owner unknown)	PW ..... Public Works
O/OC ..... OCTranspo	UP ..... Utility Pole (owner unknown)
SCD ..... Scada	

CAUTION/ATTENTION

Although utility locations are established using the best available information, they cannot be guaranteed.

Property lines were compiled from plans and documents recorded in the Land Registry System and are for indexing purposes only.

Bien que l'emplacement des services publics soient établis en utilisant la meilleure information disponible, ils ne peuvent pas être garantis.

Des lignes de propriété ont été compilées en utilisant des plans et des documents enregistrés dans le système du cadastre et sont pour l'indexation seulement.

Ottawa

Right of Way, Heritage, and Urban Design Services / Gestionnaire, Services des emprises, du patrimoine, et du design urbain
Planning, Infrastructure and Economic Development Department: / Direction generale de la planification, de l'infrastructure et du developpement economique
100 Constellation Cres., 6th Floor East / 6ème Étage Est, Ottawa, ON K2G 6J8

OTTAWA UTILITY COORDINATING COMMITTEE
CENTRAL REGISTRY
COMITÉ DE COORDINATION DES SERVICES PUBLICS D'OTTAWA
ENREGISTREMENT CENTRAL

PRODUCED BY: GIS & DATA MANAGEMENT BRANCH
INFORMATION CENTRE UNIT

SCALE: 1:250

SHEET NUMBER
E-13-20

REVISIONS / RÉVISIONS	DATE	BY
REDRAWN FROM VOIDED UTILITY PLANS E-14-16, 20, 29	JUNE 2009	KJ
HYDRO,BELL,ENBRIDGE,ROGERS, CITY SEWER, WATER, TRAFFIC, SL COMPILED/DIGITIZED FROM UTILITY/CITY DATA	MAY 2010	KJ
HYDRO 1 - 115kV HIGH VOLTAGE(2015) HYDRO1 -HV OIL FILLED LINE ON CATHERINE	DEC 2016	KJ

LEGEND

- Water Valve, Valve Chamber, Fire Hydrant
- Sewer Manhole, Catch Basin Manhole
- Catch Basin / Drainage, Wing Wall, Head Wall
- Pole, Pole w/ light, Decorative, Lawn Light
- Power Supply, Panel, Pedestal, Transformer, Tower, Regulator (PS, PM, GR)
- Amp, Hand Hole, Vault, Gas Valve
- OC Transpo: Bus Shelter-No Power, Energized, Isolated (BUS)
- Streetscape: Planter Box, Grate Square, Eng. Soil (TGS)
- Traffic Connect Box / Disconnect Box, SL Disconnect (TCB, TDB, SDB)
- R.L. Hand Hole, R.L. Camera (TYPE)
- Scada: Hand Hole, Monitoring Panel
- Reducer
- Pipe, Duct, Conduit, Lateral
- Culvert
- Abandoned
- Capped
- Buried Cable
- Property Line
- Install Year (2015)

TELECOM GLOSSARY

A - Allstream	P - Primus
AT - Atria	P2P - Canadian P2P Fibre
B - Bell	R - Rogers
BH - Birch Hill	S - Sprint
F - Fibre Noir	SL - Street Lighting
G - Globility	T - Traffic
GT - Group Telecom	TO - Telecom Ottawa
H - Hydro Ottawa	TU - Telus
H1 - Hydro One	V - Videotron
L / L3 - Level 3	Z - Zayo

GLOSSARY - OTHER

DD - Dept. of Defence	PED - Pedestal (owner unknown)
MH - Manhole (owner unknown)	PW - Public Works
O/OC - OCTranspo	UP - Utility Pole (owner unknown)
SCD - Scada	

CAUTION/ATTENTION

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Ottawa

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Planning, Infrastructure and Economic Development Department / Direction generale de la planification, de l'infrastructure et du developpement economique
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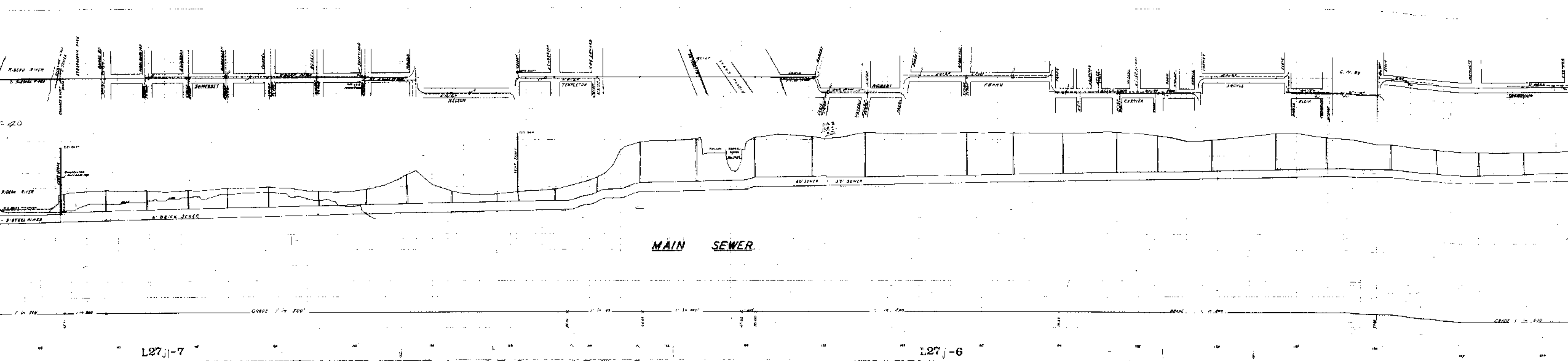
OTTAWA UTILITY COORDINATING COMMITTEE
CENTRAL REGISTRY
COMITÉ DE COORDINATION DES SERVICES PUBLICS D'OTTAWA
ENREGISTREMENT CENTRAL

UTILITY COORDINATING COMMITTEE U C C Ottawa C C S P COMITÉ DE COORDINATION DES SERVICES PUBLICS

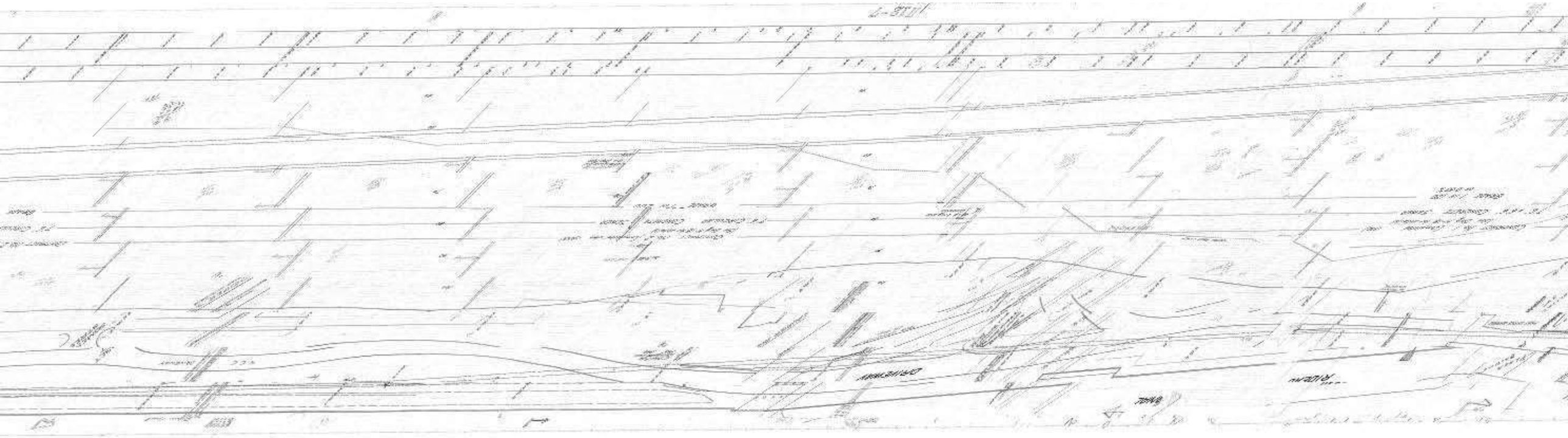
PRODUCED BY: GIS & DATA MANAGEMENT BRANCH
INFORMATION CENTRE UNIT

SCALE: 1 : 250

SHEET NUMBER
E-14-21



MAIN SEWER
L27j-7
L27j-6



Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

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Building Science

Noise and Vibration Studies

Paterson Group Inc.
Consulting Engineers
154 Colonnade Road South
Ottawa (Nepean), Ontario
Canada K2E 7S8

Tel: (613) 226-7381
Fax: (613) 226-6344
www.patersongroup.ca

patersongroup

Geotechnical Investigation

Proposed Multi-Storey Building
50 The Driveway
Ottawa, Ontario

Prepared For

Main and Main

July 16, 2021

Report: PG5880-1

Table of Contents

Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by Main and Main to conduct a geotechnical investigation for the proposed development to be located at 50 The Driveway in the City of Ottawa (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 boreholes.
- 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 the presence or potential presence of contamination on the subject property was not part of the scope of work of the present investigation. Therefore, the present report does not address environmental issues.

2.0 Proposed Development

Based on the available drawings, it is understood that the proposed development will consist of a multi-storey mixed-use structure with two levels of underground parking which will occupy the majority of the subject site. It is also understood that portions of the east and south existing building facades will be retained and integrated as part of the proposed building. However, the structure is expected to be demolished as part of the proposed development.

The proposed building will generally be surrounded by walkways and landscaped areas. It is also expected that the proposed building will be municipally serviced.

3.0 Method of Investigation

3.1 Field Investigation

Field Program

The field program for the current geotechnical investigation was carried out during the period of June 30 through July 5, 2021. At that time three (3) boreholes and two (2) test pits were advanced to maximum depth of 20.5 m and 4.7 m below the existing ground surface, respectively. The test hole locations were distributed in a manner to provide general coverage of the subject site and taking into consideration the location of underground utilities and site features. The test hole locations are shown on Drawing PG5880-1 - Test Hole Location Plan included in Appendix 2.

The boreholes were drilled using a low-clearance drill rig operated by a two-person crew. The test pits were excavated using a rubber-tired back-hoe. All fieldwork was conducted under the full-time supervision of Paterson personnel under the direction of a senior engineer. The drilling procedure consisted of advancing each test hole to the required depths at the selected locations and sampling the overburden.

Sampling and In Situ Testing

The soil samples were recovered from the auger flights and using a 50 mm diameter split-spoon sampler. Grab samples were collected from the test pit sidewalls and by hand-auger recovery at selected intervals. The samples were classified on site, placed in sealed plastic bags, and transported to our laboratory. The depths at which the auger, split spoon and grab samples were recovered from the boreholes are shown as SS, AU and G, respectively, on the Soil Profile and Test Data sheets in Appendix 1.

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

Undrained shear strength testing, using a vane apparatus, was carried out at regular intervals of depth in cohesive soils.

The overburden thickness was evaluated by a dynamic cone penetration test (DCPT) completed at BH 1-21 and BH 5-21. The DCPT consists of driving a steel drill rod, equipped with a 50 mm diameter cone at the tip, using a 63.5 kg hammer falling from a height of 760 mm. The number of blows required to drive the cone into the soil is recorded for each 300 mm increment.

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

Groundwater

Monitoring wells were installed at boreholes BH 1-21, BH 4-21, and BH 5-21. Boreholes BH 2-21, BH 3-21 and BH 5-21 were fitted with flexible standpipe piezometers to allow for groundwater level monitoring. Groundwater level observations are discussed in Section 4.3 and are presented in the Soil Profile and Test Data sheets in Appendix 1.

Monitoring Well Installation

Typical monitoring well construction details are described below:

- 3.0 m of slotted 51 mm PVC screen at the base of the boreholes.
- 51 mm diameter PVC riser pipe from the top of the screen to the ground surface.
- No. 3 silica sand backfill within annular space around screen.
- 300 mm thick bentonite hole plug directly above PVC slotted screen.
- Clean backfill from top of bentonite plug to the ground surface.

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

Sample Storage

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

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 personnel using a handheld GPS and referenced to a geodetic datum. The location of the boreholes and ground surface elevation at each test hole location are presented on Drawing PG5880-1 - Test Hole Location Plan in Appendix 2.

3.3 Laboratory Testing

Soil samples were recovered from the subject site and visually examined in our laboratory to review the results of the field logging. Soil samples will be stored for a period of one month after this report is completed, unless otherwise directed.

3.4 Analytical Testing

One (1) soil sample was submitted for analytical testing to assess the corrosion potential for exposed ferrous metals and the potential of sulphate attacks against subsurface concrete structures. 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 Section 6.7.

4.0 Observations

4.1 Surface Conditions

Existing Conditions

The subject site is currently occupied by a three-storey institutional building with associated landscaped areas, parking areas and access lanes. The ground surface is relatively flat throughout the parking area. The ground surface around the eastern portion of the site slopes downwards gradually form north to south and between geodetic elevations of 68.5 to 66.0 m.

The site is bordered to the east by a paved pedestrian pathway and further by Queen Elizabeth Driveway, to the south by the Embassy of Germany and residential dwellings, to the west by townhouses and to the north by Lewis Street and further by a high-rise apartment building and the associated above-ground parking structure.

Historical Conditions

It should be noted Neville's Creek historically transected the southern portion of the subject site, which is understood to have been infilled in the late 19th century. The existing surface conditions have been completely altered since that time and are not considered representative of its previous footprint due to notable in-filling of the creek.

4.2 Subsurface Profile

Overburden

Generally, the subsurface profile encountered at the test hole locations consisted of an asphalt pavement structure or topsoil underlain by a variable layer of fill. The fill was observed to generally consist of brown and/or grey silty clay or sand with varying amounts of gravel, cobbles, concrete, wood debris and organics. The fill was observed to extend to depths ranging between of 0.7 m to 6.7 m below the existing ground surface.

The fill layers were observed to be underlain by a deposit of silty clay. This deposit was generally observed to consist of a very stiff to stiff, brown silty clay crust underlain by a layer of stiff grey silty clay. It should be noted the crust layer was not encountered in the areas where the fill layer was encountered above the grey silty clay at BH 2-21 and BH 5 -21.

Practical refusal to DCPT was encountered at an approximate depth of 20.5 m and 22.1 m at the location of boreholes BH 1-21 and BH 5-21, respectively.

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

Bedrock

Based on available geological mapping, the bedrock in the subject area consists of Paleozoic Shale of the Carlsbad formation, with an overburden drift thickness of 15 to 25 m depth.

Existing Building Foundation

Two test pits were advanced against portions of the existing building that are anticipated to be incorporated as part of the proposed development. The foundation wall was generally observed to consist of damp-proofed concrete and backfilled against by fill containing variable amounts of clay, silt, sand, gravel and inorganic debris. The top of the footing was encountered at an elevation of 63.3 and 62.2 m at TP 1-21 and TP 2-21, respectively. The underside of footing was encountered at an elevation of 63.0 m at TP 1-21 along with a clay drainage pipe.

The underside of footing was not encountered at TP 2-21 due to a combination of groundwater ingress and loose foundation backfill sidewalls unable to remain open. The top of the footing was inferred at an elevation of 62.2 m based on auger-probes carried out prior to in-filling the test pit at that time.

Based on our review of structural drawings prepared for The Canadian Nurses Association and dated October 1986, the southwestern and southeastern building addition is understood to be founded on piles anticipated to have been driven to refusal.

4.3 Groundwater

Groundwater levels were measured on July 6, 2021 within the installed monitoring wells and piezometers. Also, groundwater infiltration levels were recorded within the open holes during the excavation of the test pits. The measured groundwater levels and observed depth of infiltration are presented in Table 1 below:

Table 1 – Summary of Groundwater Levels

Test Hole Number	Groundwater Measuring Medium	Ground Surface Elevation (m)	Measured Groundwater Level / Groundwater Infiltration for Test Pits		Dated Recorded
			Depth (m)	Elevation (m)	
BH 1-21	Monitoring Well	68.36	Dry	Dry	July 6, 2021
BH 2-21	Piezometer	68.21	10.56	57.65	July 6, 2021
BH 3-21	Piezometer	68.69	4.13	64.56	July 6, 2021
BH 4-21	Monitoring Well	66.10	4.03	62.57	July 6, 2021
BH 5-21	Monitoring Well	66.18	3.82	62.36	July 6, 2021
BH 5-21	Piezometer	66.18	9.72	56.46	July 6, 2021
TP 1-21	Sidewall Infiltration	65.98	Dry	Dry	June 30, 2021
TP 2-21	Sidewall Infiltration	66.18	3.0	63.18	June 30, 2021

Note: The ground surface elevation at each borehole location was surveyed using a handheld GPS using a geodetic datum.

It should be noted that long-term groundwater levels can also be estimated based on the observed colour and consistency of the recovered soil samples. Based on these observations, the long-term groundwater table can be expected at approximate depths of 3.5 to 4.5 m below ground surface. The recorded groundwater levels are noted on the applicable Soil Profile and Test Data sheet presented in Appendix 1.

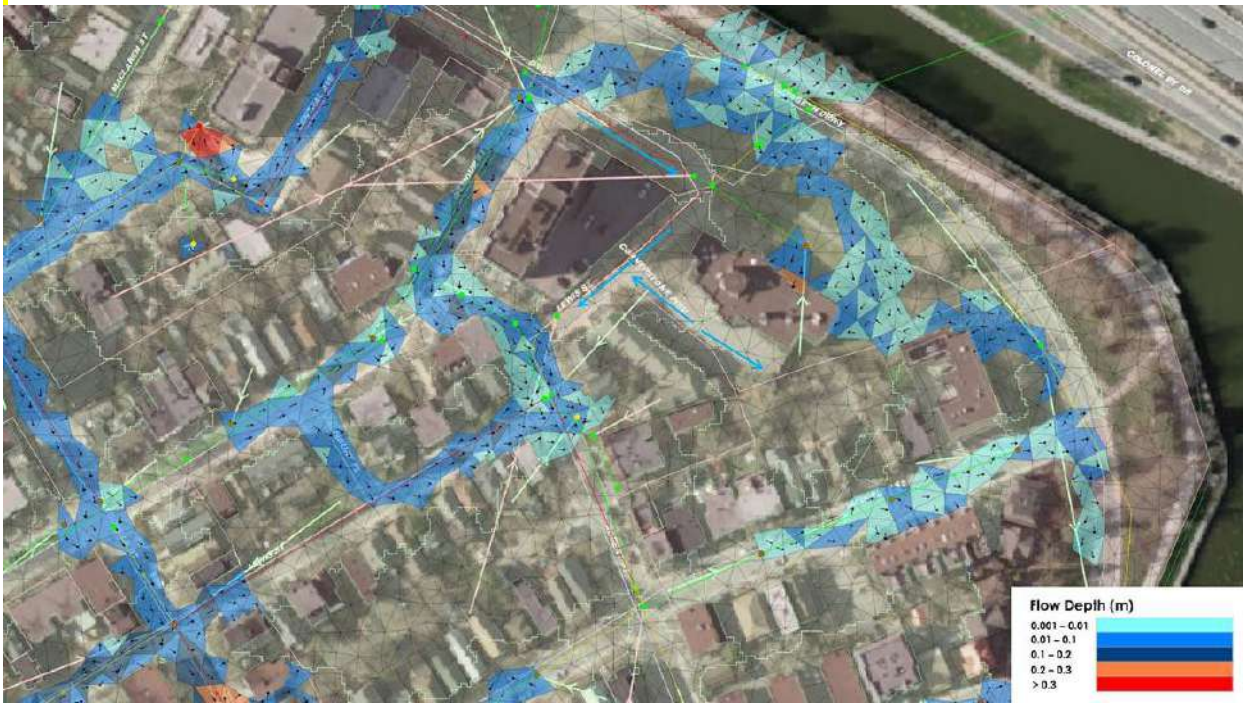
However, it should be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater levels could vary at the time of construction.

From: Sidhu, Jasmin <Jasmin.Sidhu@stantec.com>
Sent: December 22, 2022 3:00 PM
To: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Cc: D'Aoust, Stephane <stephane.daoust@stantec.com>; Gillott, Fiona <Fiona.Gillott@ottawa.ca>
Subject: RE: 50 Driveway

Good afternoon Eric,

Given the pseudo-2D nature of the model (i.e., where runoff is generated using standard storm subcatchments and directed to CBs at ground surface, from where uncaptured flow is then routed onto the 2D surface), 2D surface model results only reflect overland spill which ICM reports in terms of depth, direction, and velocity per mesh element.

However, below is s screenshot of the existing conditions model for the area of interest. This figure shows the general direction of flow and ponding in the area near 50 the Driveway under the 1:100-yr design event, based on ground elevations from the City's 1m DEM. The anticipated flow paths along Lewis St, the Driveway, and the parking lot of 50 the Driveway are also shown on the figure (blue arrows). Based on the DEM, overland flow from Gilmour St would flow southeast along the Driveway and southwest along Lewis St to Robert St. There is ~0.4m between the bottom of curb/edge of roadway to the high (spill) point in the parking lot area for the property in question.



Kind regards,

Jasmin Sidhu P.Eng.
Water Resources Engineer
*Vacation Alert: Please note that I will be off work from December 22 to January 9, inclusive.

From: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Sent: Monday, December 19, 2022 14:57
To: Sidhu, Jasmin <Jasmin.Sidhu@stantec.com>
Cc: D'Aoust, Stephane <stephane.daoust@stantec.com>; Gillott, Fiona <fiona.gillott@ottawa.ca>
Subject: RE: 50 Driveway

Thanks Jasmin, much appreciated.

Eric

From: Sidhu, Jasmin <Jasmin.Sidhu@stantec.com>
Sent: December 19, 2022 2:53 PM
To: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Cc: D'Aoust, Stephane <stephane.daoust@stantec.com>; Gillott, Fiona <Fiona.Gillott@ottawa.ca>
Subject: RE: 50 Driveway

Hi Eric,

Of course. This does fall within the O'Connor model extents. We'll take a look at the modelled major system flow through this site and let you know what we find.

Kind regards,

Jasmin Sidhu P.Eng.
Water Resources Engineer
*Vacation Alert: Please note that I will be off work from December 22 to January 9, inclusive.

---

sarrak@lithosgroup.ca

From: Bakhit, Reza <reza.bakhit@ottawa.ca>
Sent: December 13, 2022 4:58 PM
To: sarrak@lithosgroup.ca
Cc: Fawzi, Mohammed
Subject: RE: 50 The Driveway, OT - capacity of the combined sewer

Hi Sarra,

I can confirm the proposed wastewater flow of 1.97l/s is acceptable.

Thanks,

Reza Bakhit, P.Eng, C.E.T
Project Manager
Planning, Real Estate and Economic Development Department / Direction générale de la planification, des biens immobiliers et du développement économique
Development Review - Centeral Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 19346, reza.bakhit@ottawa.ca
Please note: Given the current pandemic, I will be working from home until further notice; reaching me by email is the easiest. I will be checking my voicemail, just not as frequently as I normally would be.

From: Bakhit, Reza
Sent: Tuesday, December 13, 2022 9:13 AM
To: 'sarrak@lithosgroup.ca' <sarrak@lithosgroup.ca>
Subject: RE: 50 The Driveway, OT - capacity of the combined sewer

Hi Sarra,

I will provide you with clarification on the capacity.

Thanks,

Reza Bakhit, P.Eng, C.E.T
Project Manager
Planning, Real Estate and Economic Development Department / Direction générale de la planification, des biens immobiliers et du développement économique
Development Review - Centeral Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 19346, reza.bakhit@ottawa.ca
Please note: Given the current pandemic, I will be working from home until further notice; reaching me by email is the easiest. I will be checking my voicemail, just not as frequently as I normally would be.

From: sarrak@lithosgroup.ca <sarrak@lithosgroup.ca>
Sent: December 12, 2022 10:54 AM
To: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Subject: 50 The Driveway, OT - capacity of the combined sewer

I hope my email finds you well.

We are the civil engineers working on the second SPA submission for the property at 50 The Driveway, in the City of Ottawa.

Could you kindly confirm that there is enough capacity in the combined sewer network abutting our site, taking into consideration that the calculated wastewater flow for the subject property is 1.97 L/s (net flow 1.80 L/s)?

Thank you for your assistance.

Sincerely,

Sarra Karavasili, P.E., M.A.Sc.
Assistant Project Manager
Lithos Group Inc.
150 Bermondsey Rd, Unit #200
Toronto, Ontario M4A 1Y1
D: (647) 366-9610 x1
Main Office: (416) 750-7769
Sarrak@LithosGroup.ca
www.LithosGroup.ca

From: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Sent: Tuesday, November 29, 2022 11:48 AM
To: Fel Petti
Cc: Neff, Pete; Fawzi, Mohammed
Subject: RE: 50 Driveway

Hi Fel

I had a chat internally here and a lateral connection with bends would be acceptable due to the exceptional situation here. However, it will still need to be discussed with Operations first. This would be one pipe out of the Monitoring MH since this is in the ultimate combined sewer area. We would need some kind of deviation report.

We can chat further if you wish.

Eric

'

'

From: Elaine Guenette
To: sarrak@lithosgroup.ca
Cc: dimitraf@lithosgroup.ca
Subject: RE: 50 The Driveway, OT- addressing comments
Date: Thursday, December 15, 2022 9:11:03 AM

Hi Sarra,

The proposed building at 50 The Driveway will be fully sprinklered.

Regards,

Smith + Andersen

Elaine Guenette B.A.Sc., P.Eng., LEED AP
Principal
d 613 691 1853 **m** 343 961 2244

From: sarrak@lithosgroup.ca <sarrak@lithosgroup.ca>
Sent: December 15, 2022 8:30 AM
To: Elaine Guenette <elaine.guenette@smithandandersen.com>
Cc: dimitraf@lithosgroup.ca
Subject: 50 The Driveway, OT- addressing comments

Hello Elaine,

I hope my email finds you well.

We are the civil engineers working on the 2nd SPA submission for the subject project.

Following our review of the 1st round of comments dated August 31, 2022, we would require your assistance on the comment below:

3.10: ''Provide an email correspondence from the mechanical engineer confirming that the proposed building will be sprinklered. Please include this correspondence as an appendix in the report.''

Could you kindly confirm that the proposed building will be sprinklered, just so we address the above noted comment?

Thank you,

Sarra Karavasili, P.E., M.A.Sc.

Assistant Project Manager

Lithos Group Inc.

150 Bermondsey Rd, Unit #200
Toronto, Ontario M4A 1Y1
D: (647) 366-9610 x1
Main Office: (416) 750-7769
Sarrak@LithosGroup.ca
www.LithosGroup.ca

Holiday Closure Notice: Lithos Group Inc. will be closed for the holidays from 5pm on Friday, 23 December, reopening at 8:30 am on Tues, January 3, 2023.

Guy Forget

From: Jamie Batchelor <jamie.batchelor@rvca.ca>
Sent: Monday, July 12, 2021 9:26 AM
To: Guy Forget
Cc: Eric Lalande
Subject: RE: 50 Driveway

Good Morning Guy,

Based on the proposed plans (rooftops and landscaped areas) and the fact that the stormwater from this site would ultimately be directed to combined storm sewers, no additional on-site water quality control would be required save and except best management practices. We would encourage you to explore opportunities to incorporate LID measures into the stormwater management plan.

Jamie Batchelor, MCIP, RPP
Planner, ext. 1191
Jamie.batchelor@rvca.ca

Rideau Valley Conservation Authority
3889 Rideau Valley Drive
PO Box 599, Manotick ON K4M 1A5
T 613-692-3571 | 1-800-267-3504 F 613-692-0831 | www.rvca.ca

From: Guy Forget <gforget@jlrichards.ca>
Sent: Thursday, July 8, 2021 4:06 PM
To: Jamie Batchelor <jamie.batchelor@rvca.ca>
Cc: Eric Lalande <eric.lalande@rvca.ca>
Subject: FW: 50 Driveway

Hi Jamie,

I just sent this email to Eric for an opinion on water quality (see attached and below).

We are submitting mid next week, and was hoping to have an opinion before then. Given that Eric is back next week, can I ask you or somebody else at the RVCA to provide an opinion?

Let me know

Guy

Guy Forget, P.Eng., LEED AP
Senior Water Resources Engineer

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Direct: 343-804-5363

J.L. Richards & Associates Limited is proactively doing our part to protect the wellbeing of our staff and communities while improving our communication technology. ***We are pleased to announce that we have implemented direct phone lines for all of our staff, allowing you to connect with us regardless of whether we are working remotely or in the office.*** *We are dedicated to delivering quality services to you through value and commitment, as always. Please reach out to us if you have any questions about your project.*

From: Guy Forget
Sent: Thursday, July 8, 2021 4:01 PM
To: 'Eric Lalande' <eric.lalande@rvca.ca>
Cc: Lucie Dalrymple <ldalrymple@jlrichards.ca>; 'Emily Roukhkian' <emily@mainandmain.ca>
Subject: 50 Driveway

Hi Eric,

Hope you are doing well.

We have been retained to prepare an Assessment of Adequacy of Public Services Report (Servicing Brief) for 50 Driveway, in the City of Ottawa.

As shown on the attached Location Plan, the Site (0.28 ha) is bounded by Queen Elizabeth Way and Lewis Street and is part of the combined sewer system that ultimately drains to ROPEC.

There is a large combined (1800 mm diameter) on Lewis Street and a smaller 305 mm diameter on QED. Based on our review of the existing condition, runoff from the site currently drains to both combined sewers.

Under the post-development condition (see attached), a significant portion of the site will be the 9-storey roof which accounts for 60% of the overall parcel (1700 m2 of 2800 m2).

The areas outside of the of the building envelope are either grassed or interlock. The area labelled in cyan as 127 m2 is the one that is almost all hard surface and will sheet flow to the 1800 mm combined sewer as there are no opportunities to pick it up with a sewer. The other areas I have labelled are a combination of grass and interlock. Please note that there is no above ground parking. As such, there will be a reduction in TSS given that the large existing parking surface will be removed.

Could you provide an opinion whether the project can proceed without any additional quality measures given the reduction in TSS combined to the fact that the Site is part of the combined system which ultimately drains to ROPEC. Note that we are submitting our Report mid next week, so we would be grateful if you could provide RVCA's opinion before then.

Thank you
Guy

FRÄNKISCHE

Rigofill® ST block/half block

CONTENTS

Contact search

FRÄNKISCHE

polypropylene (PP).

The Rigofill ST full block consists of two half elements to be installed on site and has a void ratio of > 96 %. The Rigofill ST half block consists of only one half element, which must be assembled with a roof slab on site. The cross-shaped inspection tunnel in the storage/infiltration unit has been designed for the use of automotive dollies. This allows for full inspection of the effective drainage surface and the entire system volume with all statically relevant bearing-type fixtures. In combination with QuadroControl ST, Rigofill ST storage/infiltration systems have been designed for professional final acceptance inspection and repeated inspection. Installation under trafficked areas (HGV 60) and at great depths is possible.

NB! Follow the Rigofill ST installation manual! **Rigofill ST block**

- W x D x H = 800 x 800 x 660 mm
- Gross volume: 422 l
- Storage volume: 406 l

Rigofill ST half block

- W x D x H = 800 x 800 x 350 mm
- Gross volume: 224 l
- Storage volume: 212 l

cial geotextile lining, QuadroControl ST inspection shafts and additional accessories.

FRÄNKISCHE

Accessories

Side wall lattice Rigofill® ST

Accessories

Side wall lattice Rigofill® ST half block

Accessories

Block connector Rigofill® ST

Accessories

Adapter Rigofill® ST

Accessories

Side wall lattice Rigofill® ST short

Accessories

Side wall lattice Rigofill® ST half block short

Accessories

The supporting grid

Downloads

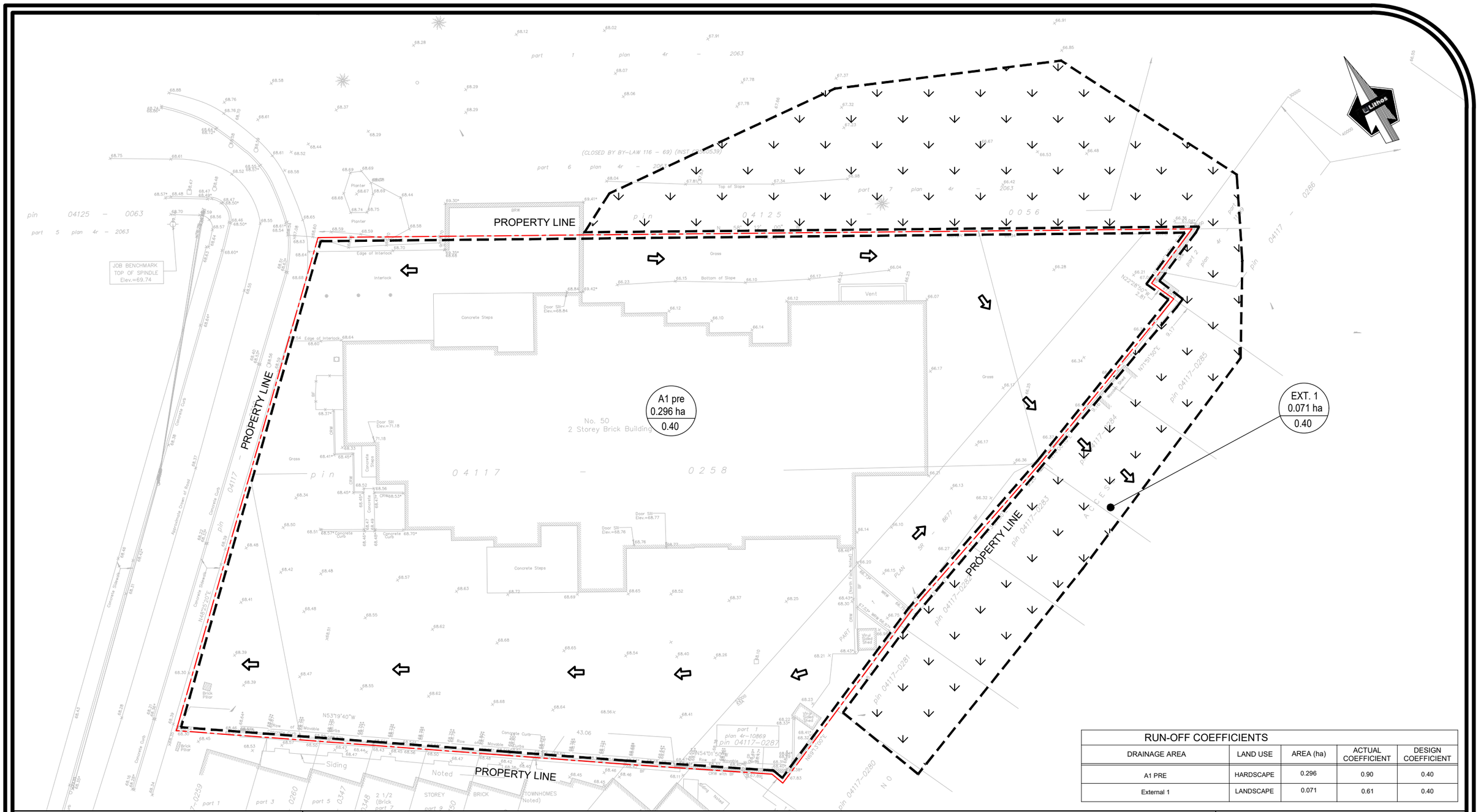
FRÄNKISCHE

Data Sheet Rigofill ST

Datasheet

Appendix C

Storm Analysis



RUN-OFF COEFFICIENTS				
DRAINAGE AREA	LAND USE	AREA (ha)	ACTUAL COEFFICIENT	DESIGN COEFFICIENT
A1 PRE	HARDSCAPE	0.296	0.90	0.40
External 1	LANDSCAPE	0.071	0.61	0.40

Lithos

150 Bermondsey Road, Toronto, Ontario M4A 1Y1

LEGEND

A1 pre / 0.04 ha / 0.50 — STORM DRAINAGE AREA NUMBER; DRAINAGE AREA (ha); COMPOSITE RUNOFF COEFFICIENT

PRE-DEVELOPMENT STORM DRAINAGE AREA

PROPERTY LINE

EMERGENCY OVERLAND FLOW ROUTE

PRE-DEVELOPMENT DRAINAGE AREA PLAN

RESIDENTIAL USE DEVELOPMENT
50 THE DRIVEWAY
OTTAWA, ONTARIO

DATE: JANUARY 2023	PROJECT No: UD22-093
SCALE: N.T.S.	FIGURE No: DAP1

Lithos

Rational Method
Pre-Development Flow Calculation

50 The Driveway
File No. UD22-093
City of Ottawa
Date: January 2023

Prepared By: Dimitra Frysali, P.E., M.A.Sc.
Reviewed by: Nick Moutzouris, P.Eng., M.A.Sc.

Area Number	Area (ha)	Actual Coefficient	Design Coefficient
A1 Pre	0.296	0.90	0.40
External Area 1	0.071	0.49	0.40
A1 Pre + External Area 1	0.367	0.77	0.40

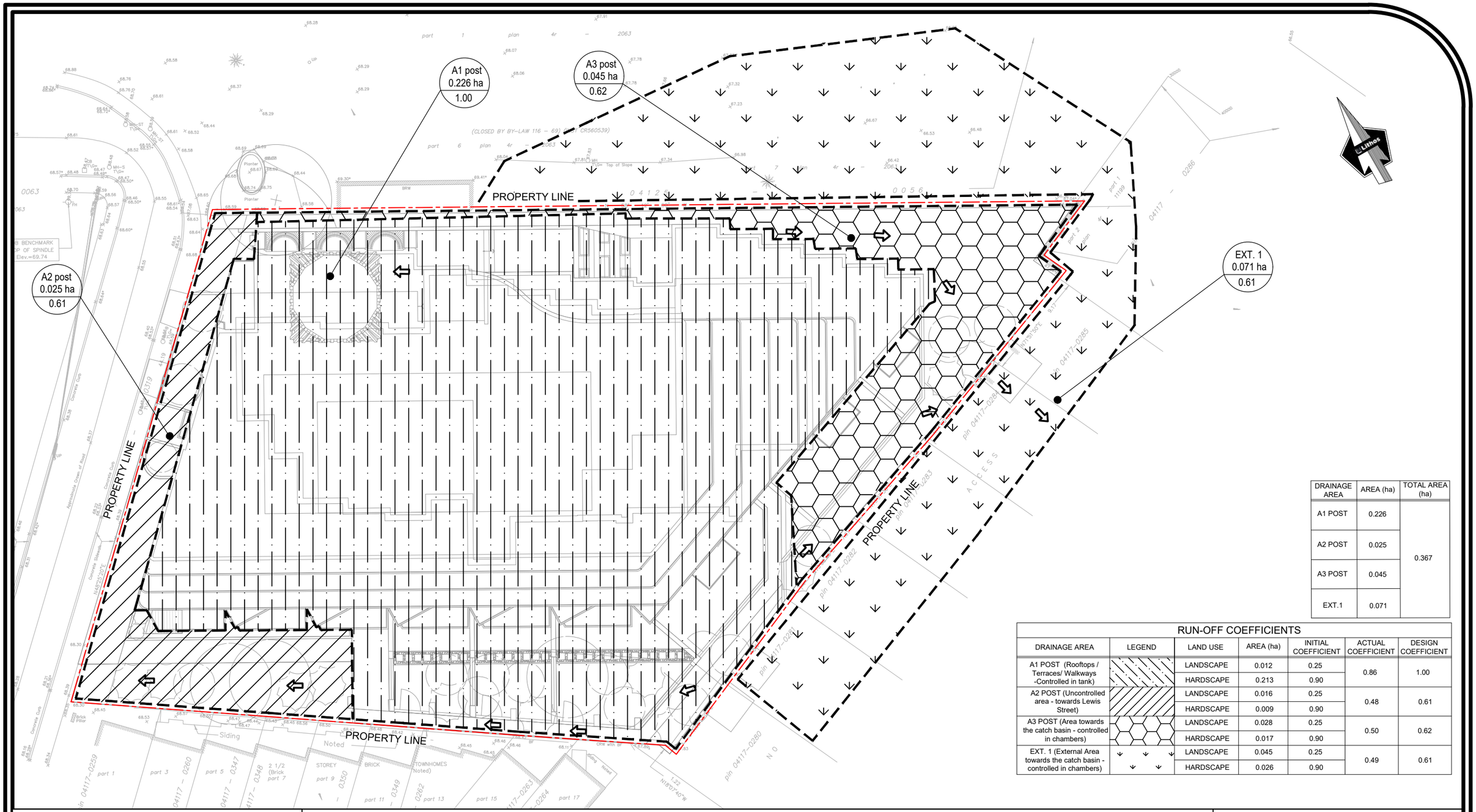
Rational Method Calculation

Event 5-year IDF Data Set City of Ottawa a = 998.071 b= 6.053 c= 0.81

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m^3/s)	Q (L/s)
A1 Pre	0.296	0.40	0.12	20	70.25	0.023	23.1
External Area 1	0.071	0.400	0.028	20	70.25	0.006	5.5

Event 100-year IDF Data Set City of Ottawa a = 1735.688 b= 6.014 c= 0.82

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m^3/s)	Q (L/s)
A1 Pre	0.296	0.40	0.12	20	119.95	0.039	39.5
External Area 1	0.071	0.400	0.028	20	119.95	0.009	9.5



DRAINAGE AREA	AREA (ha)	TOTAL AREA (ha)
A1 POST	0.226	0.367
A2 POST	0.025	
A3 POST	0.045	
EXT.1	0.071	

RUN-OFF COEFFICIENTS

DRAINAGE AREA	LEGEND	LAND USE	AREA (ha)	INITIAL COEFFICIENT	ACTUAL COEFFICIENT	DESIGN COEFFICIENT
A1 POST (Rooftops / Terraces/ Walkways -Controlled in tank)		LANDSCAPE	0.012	0.25	0.86	1.00
		HARDSCAPE	0.213	0.90		
A2 POST (Uncontrolled area - towards Lewis Street)		LANDSCAPE	0.016	0.25	0.48	0.61
		HARDSCAPE	0.009	0.90		
A3 POST (Area towards the catch basin - controlled in chambers)		LANDSCAPE	0.028	0.25	0.50	0.62
		HARDSCAPE	0.017	0.90		
EXT. 1 (External Area towards the catch basin - controlled in chambers)		LANDSCAPE	0.045	0.25	0.49	0.61
		HARDSCAPE	0.026	0.90		

Lithos

150 Bermondsey Road, Toronto, Ontario M4A 1Y1

LEGEND

A1 pre / 0.04 ha / 0.50 — STORM DRAINAGE AREA NUMBER; DRAINAGE AREA (ha); COMPOSITE RUNOFF COEFFICIENT

POST-DEVELOPMENT STORM DRAINAGE AREA

PROPERTY LINE

EMERGENCY OVERLAND FLOW ROUTE

POST-DEVELOPMENT DRAINAGE AREA PLAN

RESIDENTIAL USE DEVELOPMENT
50 THE DRIVEWAY
OTTAWA, ONTARIO

DATE: JANUARY 2023 | PROJECT No: UD22-093

SCALE: N.T.S. | FIGURE No: DAP2

Modified Rational Method - 5 Year Storm

Site Flow and Storage Summary

50 The Driveway, Ottawa

File No: UD22-093
Prepared by: Dimitra Frysali P.E., M.A.Sc
Reviewed by: Nick Moutzouris, P.Eng., M.A.Sc.

50 The Driveway, Ottawa

File No. UD22-093
City of Ottawa
Date: January 2023

Drainage Area A1 Post

Rooftops / Terraces/ Walkways -Controlled in tank

Area (A1) = **0.226** ha
"C" = **0.86**
AC1= **0.195**
Tc = **10.0** min
Time Increment = **5.0** min
Release Rate = **56.42** L/s

Drainage Area A2 Post

Uncontrolled area - towards Lewis Street

Area (A2) = **0.025** ha
"C" = **0.48**
AC2= **0.01**
Tc = **10.0** min
Time Increment = **5.0** min
Max. Release Rate = **3.5** L/s

Total Site

Total Site= A1 + A2

Design Controlled Release Rate (80mm orifice plate)= **9.6** L/s
Max. Storage Tank Size = **35** m^3
Storage Tank footprint Area = **70.0** m^2
Controlled Release Rate Achieved = **9.6** L/s
Uncontrolled Release Rate = **3.5** L/s
Total Site Release Rate = **13.1** L/s
5-year pre-development Site Release Rate (Allowable Release Rate) = **23.1** L/s

5-Year Design Storm		Tributary Area (A1)	ha	C	Tributary Area (A2)	ha	C
a=	998.07	Landsc.Area	0.013	0.25	Landsc.Area	0.016	0.25
b=	6.053	Hardsc. Area	0.213	0.90	Hardsc. Area	0.009	0.90
c=	0.814	Total	0.226	0.86	Total	0.025	0.48
I =	a / (TC + b)c						

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Time	Rainfall Intensity	Storm Runoff (A1 post)	Runoff Volume (A1 post)	Storm Runoff (A2 Post)	Runoff Volume (A2 Post)	Total Storm Runoff Volume	Released Volume	Storage Volume	Storage Depth of Tank
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3/s)	(m^3)	(m^3)	(m^3)	(m^3)	(m)
10.0	104.2	0.056	33.85	0.004	2.10	33.85	5.76	28.09	0.40
15.0	83.6	0.045	40.72	0.003	2.53	40.72	8.64	32.08	0.46
20.0	70.3	0.038	45.65	0.002	2.83	45.65	11.52	34.13	0.49
25.0	60.9	0.033	49.47	0.002	3.07	49.47	14.41	35.06	0.50
30.0	53.9	0.029	52.57	0.002	3.26	52.57	17.29	35.28	0.50
35.0	48.5	0.026	55.17	0.002	3.42	55.17	20.17	35.01	0.50
40.0	44.2	0.024	57.43	0.001	3.56	57.43	23.05	34.38	0.49
45.0	40.6	0.022	59.40	0.001	3.69	59.40	25.93	33.47	0.48
50.0	37.7	0.020	61.17	0.001	3.80	61.17	28.81	32.36	0.46
55.0	35.1	0.019	62.77	0.001	3.90	62.77	31.69	31.08	0.44
60.0	32.9	0.018	64.22	0.001	3.99	64.22	34.57	29.65	0.42
65.0	31.0	0.017	65.56	0.001	4.07	65.56	37.45	28.11	0.40
70.0	29.4	0.016	66.80	0.001	4.15	66.80	40.34	26.47	0.38
75.0	27.9	0.015	67.96	0.001	4.22	67.96	43.22	24.74	0.35
80.0	26.6	0.014	69.04	0.001	4.29	69.04	46.10	22.95	0.33
85.0	25.4	0.014	70.06	0.001	4.35	70.06	48.98	21.08	0.30
90.0	24.3	0.013	71.03	0.001	4.41	71.03	51.86	19.17	0.27
95.0	23.3	0.013	71.94	0.001	4.46	71.94	54.74	17.20	0.25
100.0	22.4	0.012	72.80	0.001	4.52	72.80	57.62	15.18	0.22
105.0	21.6	0.012	73.63	0.001	4.57	73.63	60.50	13.13	0.19
110.0	20.8	0.011	74.42	0.001	4.62	74.42	63.38	11.04	0.16
115.0	20.1	0.011	75.18	0.001	4.67	75.18	66.26	8.91	0.13
120.0	19.5	0.011	75.90	0.001	4.71	75.90	69.15	6.76	0.10
125.0	18.9	0.010	76.60	0.001	4.75	76.60	72.03	4.58	0.07
130.0	18.3	0.010	77.27	0.001	4.80	77.27	74.91	2.37	0.03
135.0	17.8	0.010	77.92	0.001	4.84	77.92	77.79	0.13	0.00
140.0	17.3	0.009	78.55	0.001	4.88	78.55	80.67	0.00	0.00
145.0	16.8	0.009	79.16	0.001	4.91	79.16	83.55	0.00	0.00
150.0	16.4	0.009	79.74	0.001	4.95	79.74	86.43	0.00	0.00
155.0	15.9	0.009	80.31	0.001	4.98	80.31	89.31	0.00	0.00
160.0	15.6	0.008	80.87	0.001	5.02	80.87	92.19	0.00	0.00
165.0	15.2	0.008	81.40	0.001	5.05	81.40	95.08	0.00	0.00
170.0	14.8	0.008	81.93	0.000	5.08	81.93	97.96	0.00	0.00
175.0	14.5	0.008	82.44	0.000	5.12	82.44	100.84	0.00	0.00
180.0	14.2	0.008	82.93	0.000	5.15	82.93	103.72	0.00	0.00
185.0	13.9	0.008	83.42	0.000	5.18	83.42	106.60	0.00	0.00
190.0	13.6	0.007	83.89	0.000	5.21	83.89	109.48	0.00	0.00
195.0	13.3	0.007	84.35	0.000	5.24	84.35	112.36	0.00	0.00
200.0	13.0	0.007	84.80	0.000	5.26	84.80	115.24	0.00	0.00
205.0	12.8	0.007	85.24	0.000	5.29	85.24	118.12	0.00	0.00
210.0	12.6	0.007	85.67	0.000	5.32	85.67	121.01	0.00	0.00
215.0	12.3	0.007	86.09	0.000	5.34	86.09	123.89	0.00	0.00
220.0	12.1	0.007	86.50	0.000	5.37	86.50	126.77	0.00	0.00
225.0	11.9	0.006	86.91	0.000	5.39	86.91	129.65	0.00	0.00
230.0	11.7	0.006	87.30	0.000	5.42	87.30	132.53	0.00	0.00
235.0	11.5	0.006	87.69	0.000	5.44	87.69	135.41	0.00	0.00
240.0	11.3	0.006	88.07	0.000	5.47	88.07	138.29	0.00	0.00

Modified Rational Method - 100 Year Storm

Site Flow and Storage Summary

50 The Driveway, Ottawa

File No: UD22-093
Prepared by: Dimitra Frysali P.E., M.A.Sc
Reviewed by: Nick Moutzouris, P.Eng., M.A.Sc.

50 The Driveway, Ottawa

File No. UD22-093
City of Ottawa
Date: January 2023

*** C value for the 100 year storm event is increased by 25%, with a maximum of 1.0 per City's Sewer Design Guidelines**

Drainage Area A1 Post

Rooftops / Terraces/ Walkways -Controlled in tank

Area (A1) =	**0.226**	ha
"C" =	**1.00**	
AC1=	**0.226**	
Tc =	**10.0**	min
Time Increment =	**5.0**	min
Release Rate =	**112.10**	L/s

Drainage Area A2 Post

Uncontrolled area - towards Lewis Street

Area (A2) =	**0.025**	ha
"C" =	**0.61**	
AC2=	**0.02**	
Tc =	**10.0**	min
Time Increment =	**5.0**	min
Max. Release Rate =	**7.5**	L/s

Total Site

Total Site= A1 + A2

Design Controlled Release Rate (80mm orifice plate)=	**14.4**	L/s
Max. Storage Tank Size =	**79**	m^3
Storage Tank footprint Area =	**70.0**	m^2
Controlled Release Rate Achieved =	**14.4**	L/s
Uncontrolled Release Rate =	**7.5**	L/s
Total Site Release Rate =	**21.9**	L/s
5-year pre-development Site Release Rate (Allowable Release Rate) =	**23.1**	L/s

100-Year Design Storm		**Tributary Area (A1)**	**ha**	**C**	**Tributary Area (A2)**	**ha**	**C**
a=	1735.69	Landsc.Area	0.013	0.25	Landsc.Area	0.016	0.25
b=	6.014	Hardsc. Area	0.213	0.90	Hardsc. Area	0.009	0.90
c=	0.820	Total	0.226	0.86	Total	0.025	0.48
I =	a / (TC + b)c						

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Time	**Rainfall Intensity**	**Storm Runoff (A1 post)**	**Runoff Volume (A1 post)**	**Storm Runoff (A2 Post)**	**Runoff Volume (A2 Post)**	**Total Storm Runoff Volume**	**Released Volume**	**Storage Volume**	**Storage Depth of Tank**
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3/s)	(m^3)	(m^3)	(m^3)	(m^3)	(m)
10.0	178.6	0.112	67.26	0.008	4.50	67.26	8.64	58.62	0.84
15.0	142.9	0.090	80.74	0.006	5.40	80.74	12.96	67.78	0.97
20.0	120.0	0.075	90.36	0.005	6.05	90.36	17.28	73.08	1.04
25.0	103.8	0.065	97.79	0.004	6.54	97.79	21.60	76.19	1.09
30.0	91.9	0.058	103.81	0.004	6.95	103.81	25.92	77.89	1.11
35.0	82.6	0.052	108.87	0.003	7.29	108.87	30.24	78.63	1.12
40.0	75.1	0.047	113.22	0.003	7.58	113.22	34.56	78.66	1.12
45.0	69.1	0.043	117.04	0.003	7.83	117.04	38.88	78.16	1.12
50.0	64.0	0.040	120.45	0.003	8.06	120.45	43.20	77.25	1.10
55.0	59.6	0.037	123.52	0.003	8.27	123.52	47.52	76.00	1.09
60.0	55.9	0.035	126.32	0.002	8.45	126.32	51.84	74.48	1.06
65.0	52.6	0.033	128.90	0.002	8.63	128.90	56.16	72.74	1.04
70.0	49.8	0.031	131.28	0.002	8.79	131.28	60.48	70.80	1.01
75.0	47.3	0.030	133.50	0.002	8.93	133.50	64.80	68.70	0.98
80.0	45.0	0.028	135.57	0.002	9.07	135.57	69.12	66.45	0.95
85.0	43.0	0.027	137.52	0.002	9.20	137.52	73.44	64.08	0.92
90.0	41.1	0.026	139.37	0.002	9.33	139.37	77.76	61.61	0.88
95.0	39.4	0.025	141.11	0.002	9.44	141.11	82.08	59.03	0.84
100.0	37.9	0.024	142.77	0.002	9.55	142.77	86.40	56.37	0.81
105.0	36.5	0.023	144.35	0.002	9.66	144.35	90.72	53.63	0.77
110.0	35.2	0.022	145.86	0.001	9.76	145.86	95.04	50.82	0.73
115.0	34.0	0.021	147.30	0.001	9.86	147.30	99.36	47.94	0.68
120.0	32.9	0.021	148.69	0.001	9.95	148.69	103.68	45.01	0.64
125.0	31.9	0.020	150.02	0.001	10.04	150.02	108.00	42.02	0.60
130.0	30.9	0.019	151.30	0.001	10.13	151.30	112.32	38.98	0.56
135.0	30.0	0.019	152.53	0.001	10.21	152.53	116.64	35.89	0.51
140.0	29.2	0.018	153.73	0.001	10.29	153.73	120.96	32.77	0.47
145.0	28.4	0.018	154.88	0.001	10.37	154.88	125.28	29.60	0.42
150.0	27.6	0.017	156.00	0.001	10.44	156.00	129.60	26.40	0.38
155.0	26.9	0.017	157.08	0.001	10.51	157.08	133.92	23.16	0.33
160.0	26.2	0.016	158.14	0.001	10.58	158.14	138.24	19.90	0.28
165.0	25.6	0.016	159.16	0.001	10.65	159.16	142.56	16.60	0.24
170.0	25.0	0.016	160.15	0.001	10.72	160.15	146.88	13.27	0.19
175.0	24.4	0.015	161.12	0.001	10.78	161.12	151.20	9.92	0.14
180.0	23.9	0.015	162.06	0.001	10.85	162.06	155.52	6.54	0.09
185.0	23.4	0.015	162.98	0.001	10.91	162.98	159.84	3.14	0.04
190.0	22.9	0.014	163.87	0.001	10.97	163.87	164.16	0.00	0.00
195.0	22.4	0.014	164.75	0.001	11.03	164.75	168.48	0.00	0.00
200.0	22.0	0.014	165.60	0.001	11.08	165.60	172.80	0.00	0.00
205.0	21.6	0.014	166.44	0.001	11.14	166.44	177.12	0.00	0.00
210.0	21.1	0.013	167.25	0.001	11.19	167.25	181.44	0.00	0.00
215.0	20.8	0.013	168.05	0.001	11.25	168.05	185.76	0.00	0.00
220.0	20.4	0.013	168.83	0.001	11.30	168.83	190.08	0.00	0.00
225.0	20.0	0.013	169.60	0.001	11.35	169.60	194.40	0.00	0.00
230.0	19.7	0.012	170.35	0.001	11.40	170.35	198.72	0.00	0.00
235.0	19.3	0.012	171.09	0.001	11.45	171.09	203.04	0.00	0.00
240.0	19.0	0.012	171.81	0.001	11.50	171.81	207.36	0.00	0.00

Lithos

Orifice Design

50 The Driveway, Ottawa
File No. UD22-093
Date: January 2023
Prepared by: Dimitra Frysali, P.E., M.A.Sc.
Reviewed by: Nick Moutzouris, P.Eng., M.A.Sc.

Orifice Equation for 80mm Plate

$$Q = C \times A \times \sqrt{2 \times g \times h}$$

100 yr event

d=	80	mm
C=	0.61	
A=	0.005	m^2
g=	9.81	m/s^2
h=	1.12	m
Q=	**14.4**	**L/s**

5 yr event

d=	80	mm
C=	0.61	
A=	0.005	m^2
g=	9.81	m/s^2
h=	0.50	m
Q=	**9.6**	**L/s**

Modified Rational Method - 5 Year Storm - Chambers

50 The Driveway, Ottawa
File No. UD22-093
City of Ottawa
Date: January 2023

Site Flow and Storage Summary

50 The Driveway, Ottawa

File No: UD22-093
Prepared by: Dimitra Frysali P.E., M.A.Sc
Reviewed by: Nick Moutzouris, P.Eng., M.A.Sc.

Drainage Area A3 Post

Area towards the catch basin -Controlled in chambers

Area (A1) = **0.045** ha
"C" = **0.50**
AC1= **0.022**
Tc = **10.0** min
Time Increment = **5.0** min
Release Rate = **6.45** L/s

EXT.1

External Area - controlled in chambers

Area (A3) = **0.071** ha
"C" = **0.49**
AC3= **0.03**
Tc = **10.0** min
Time Increment = **5.0** min
Max. Release Rate = **10.03** L/s

Total Site

Void Space= 96 %
Max. Storage Size = 26.4 m^3
Area of Underground Chambers = 43.64 m^2

PROPOSED STORMWATER CHAMBERS
CAPABLE TO RETAIN 57.45m3
MODEL: GREENSTORM-ST-B (0.8X0.8X0.66)M,
NUMBER OF BLOCKS: 136
FOOTPRINT: 43.64m2

5-Year Design Storm		Tributary Area (A1)	ha	C	Tributary Area (A3)	ha	C
a=	998.07	Landsc.Area	0.028	0.25	Landsc.Area	0.045	0.25
b=	6.053	Hardsc. Area	0.017	0.90	Hardsc. Area	0.026	0.90
c=	0.814	Total	0.045	0.50	Total	0.071	0.49
I =	a / (TC + b)c						

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Time	Rainfall Intensity	Storm Runoff (A1 post)	Runoff Volume (A1 post)	Storm Runoff (A3 Post)	Runoff Volume (A3 Post)	Total Storm Runoff Volume	Storage Volume	Storage Depth of Chambers
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3/s)	(m^3)	(m^3)	(m^3)	(m)
10.0	104.2	0.006	3.87	0.010	6.02	9.89	9.89	0.24
15.0	83.6	0.005	4.66	0.008	7.24	11.90	11.90	0.28
20.0	70.3	0.004	5.22	0.007	8.11	13.34	13.34	0.32
25.0	60.9	0.004	5.66	0.006	8.79	14.45	14.45	0.34
30.0	53.9	0.003	6.01	0.005	9.34	15.36	15.36	0.37
35.0	48.5	0.003	6.31	0.005	9.81	16.12	16.12	0.38
40.0	44.2	0.003	6.57	0.004	10.21	16.78	16.78	0.40
45.0	40.6	0.003	6.80	0.004	10.56	17.35	17.35	0.41
50.0	37.7	0.002	7.00	0.004	10.87	17.87	17.87	0.43
55.0	35.1	0.002	7.18	0.003	11.16	18.34	18.34	0.44
60.0	32.9	0.002	7.35	0.003	11.41	18.76	18.76	0.45
65.0	31.0	0.002	7.50	0.003	11.65	19.15	19.15	0.46
70.0	29.4	0.002	7.64	0.003	11.87	19.52	19.52	0.47
75.0	27.9	0.002	7.77	0.003	12.08	19.85	19.85	0.47
80.0	26.6	0.002	7.90	0.003	12.27	20.17	20.17	0.48
85.0	25.4	0.002	8.01	0.002	12.45	20.47	20.47	0.49
90.0	24.3	0.002	8.12	0.002	12.62	20.75	20.75	0.50
95.0	23.3	0.001	8.23	0.002	12.79	21.01	21.01	0.50
100.0	22.4	0.001	8.33	0.002	12.94	21.27	21.27	0.51
105.0	21.6	0.001	8.42	0.002	13.09	21.51	21.51	0.51
110.0	20.8	0.001	8.51	0.002	13.23	21.74	21.74	0.52
115.0	20.1	0.001	8.60	0.002	13.36	21.96	21.96	0.52
120.0	19.5	0.001	8.68	0.002	13.49	22.17	22.17	0.53
125.0	18.9	0.001	8.76	0.002	13.62	22.38	22.38	0.53
130.0	18.3	0.001	8.84	0.002	13.73	22.57	22.57	0.54
135.0	17.8	0.001	8.91	0.002	13.85	22.76	22.76	0.54
140.0	17.3	0.001	8.99	0.002	13.96	22.95	22.95	0.55
145.0	16.8	0.001	9.05	0.002	14.07	23.12	23.12	0.55
150.0	16.4	0.001	9.12	0.002	14.17	23.30	23.30	0.56
155.0	15.9	0.001	9.19	0.002	14.27	23.46	23.46	0.56
160.0	15.6	0.001	9.25	0.001	14.37	23.62	23.62	0.56
165.0	15.2	0.001	9.31	0.001	14.47	23.78	23.78	0.57
170.0	14.8	0.001	9.37	0.001	14.56	23.93	23.93	0.57
175.0	14.5	0.001	9.43	0.001	14.65	24.08	24.08	0.57
180.0	14.2	0.001	9.49	0.001	14.74	24.23	24.23	0.58
185.0	13.9	0.001	9.54	0.001	14.83	24.37	24.37	0.58
190.0	13.6	0.001	9.60	0.001	14.91	24.51	24.51	0.58
195.0	13.3	0.001	9.65	0.001	14.99	24.64	24.64	0.59
200.0	13.0	0.001	9.70	0.001	15.07	24.77	24.77	0.59
205.0	12.8	0.001	9.75	0.001	15.15	24.90	24.90	0.59
210.0	12.6	0.001	9.80	0.001	15.23	25.03	25.03	0.60
215.0	12.3	0.001	9.85	0.001	15.30	25.15	25.15	0.60
220.0	12.1	0.001	9.89	0.001	15.37	25.27	25.27	0.60
225.0	11.9	0.001	9.94	0.001	15.45	25.39	25.39	0.61
230.0	11.7	0.001	9.99	0.001	15.52	25.50	25.50	0.61
235.0	11.5	0.001	10.03	0.001	15.59	25.62	25.62	0.61
240.0	11.3	0.001	10.07	0.001	15.65	25.73	25.73	0.61

Modified Rational Method - 100 Year Storm - Chambers

50 The Driveway, Ottawa
File No. UD22-093
City of Ottawa
Date: January 2023

Site Flow and Storage Summary

50 The Driveway, Ottawa

File No: UD22-093
Prepared by: Dimitra Frysali P.E., M.A.Sc
Reviewed by: Nick Moutzouris, P.Eng., M.A.Sc.

*** C value for the 100 year storm event is increased by 25%, with a maximum of 1.0 per City's Sewer Design Guidelines**

Drainage Area A3 Post

Area towards the catch basin -Controlled in chambers

Area (A1) =	**0.045**	ha
"C" =	**0.62**	
AC1=	**0.028**	
Tc =	**10.0**	min
Time Increment =	**5.0**	min
Release Rate =	**13.83**	L/s

EXT.1

External Area - controlled in chambers

Area (A3) =	**0.071**	ha
"C" =	**0.61**	
AC3=	**0.04**	
Tc =	**10.0**	min
Time Increment =	**5.0**	min
Max. Release Rate =	**21.48**	L/s

Total Site

Void Space=	**96**	%
Max. Storage Chamber Size =	**54.1**	m^3
Area of Underground Chambers =	**43.64**	m^2

PROPOSED STORMWATER CHAMBERS
CAPABLE TO RETAIN 57.45m3
MODEL: GREENSTORM-ST-B (0.8X0.8X0.66)M,
NUMBER OF BLOCKS: 136
FOOTPRINT: 43.64m2

100-Year Design Storm

a=	1735.69
b=	6.014
c=	0.820
I =	a / (TC + b)c

Tributary Area (A1)	ha	C
Landsc.Area	0.028	0.25
Hardsc. Area	0.017	0.90
Total	0.045	0.50

Tributary Area (A3)	ha	C
Landsc.Area	0.045	0.25
Hardsc. Area	0.026	0.90
Total	0.071	0.49

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Time	**Rainfall Intensity**	**Storm Runoff (A1 post)**	**Runoff Volume (A1 post)**	**Storm Runoff (A3 Post)**	**Runoff Volume (A3 Post)**	**Total Storm Runoff Volume**	**Storage Volume**	**Storage Depth of Chambers**
(min)	(mm/hr)	(m^3/s)	(m^3)	(m^3/s)	(m^3)	(m^3)	(m^3)	(m)
10.0	178.6	0.014	8.30	0.021	12.89	21.19	21.19	0.51
15.0	142.9	0.011	9.96	0.017	15.47	25.43	25.43	0.61
20.0	120.0	0.009	11.15	0.014	17.32	28.46	28.46	0.68
25.0	103.8	0.008	12.06	0.012	18.74	30.80	30.80	0.74
30.0	91.9	0.007	12.80	0.011	19.90	32.70	32.70	0.78
35.0	82.6	0.006	13.43	0.010	20.86	34.29	34.29	0.82
40.0	75.1	0.006	13.96	0.009	21.70	35.66	35.66	0.85
45.0	69.1	0.005	14.44	0.008	22.43	36.87	36.87	0.88
50.0	64.0	0.005	14.86	0.008	23.08	37.94	37.94	0.91
55.0	59.6	0.005	15.24	0.007	23.67	38.91	38.91	0.93
60.0	55.9	0.004	15.58	0.007	24.21	39.79	39.79	0.95
65.0	52.6	0.004	15.90	0.006	24.70	40.60	40.60	0.97
70.0	49.8	0.004	16.19	0.006	25.16	41.35	41.35	0.99
75.0	47.3	0.004	16.47	0.006	25.58	42.05	42.05	1.00
80.0	45.0	0.003	16.72	0.005	25.98	42.70	42.70	1.02
85.0	43.0	0.003	16.96	0.005	26.36	43.32	43.32	1.03
90.0	41.1	0.003	17.19	0.005	26.71	43.90	43.90	1.05
95.0	39.4	0.003	17.40	0.005	27.04	44.45	44.45	1.06
100.0	37.9	0.003	17.61	0.005	27.36	44.97	44.97	1.07
105.0	36.5	0.003	17.80	0.004	27.66	45.47	45.47	1.09
110.0	35.2	0.003	17.99	0.004	27.95	45.94	45.94	1.10
115.0	34.0	0.003	18.17	0.004	28.23	46.40	46.40	1.11
120.0	32.9	0.003	18.34	0.004	28.50	46.83	46.83	1.12
125.0	31.9	0.002	18.50	0.004	28.75	47.25	47.25	1.13
130.0	30.9	0.002	18.66	0.004	29.00	47.66	47.66	1.14
135.0	30.0	0.002	18.81	0.004	29.23	48.05	48.05	1.15
140.0	29.2	0.002	18.96	0.004	29.46	48.42	48.42	1.16
145.0	28.4	0.002	19.10	0.003	29.68	48.79	48.79	1.16
150.0	27.6	0.002	19.24	0.003	29.90	49.14	49.14	1.17
155.0	26.9	0.002	19.37	0.003	30.10	49.48	49.48	1.18
160.0	26.2	0.002	19.50	0.003	30.31	49.81	49.81	1.19
165.0	25.6	0.002	19.63	0.003	30.50	50.13	50.13	1.20
170.0	25.0	0.002	19.75	0.003	30.69	50.45	50.45	1.20
175.0	24.4	0.002	19.87	0.003	30.88	50.75	50.75	1.21
180.0	23.9	0.002	19.99	0.003	31.06	51.05	51.05	1.22
185.0	23.4	0.002	20.10	0.003	31.23	51.34	51.34	1.23
190.0	22.9	0.002	20.21	0.003	31.41	51.62	51.62	1.23
195.0	22.4	0.002	20.32	0.003	31.57	51.89	51.89	1.24
200.0	22.0	0.002	20.43	0.003	31.74	52.16	52.16	1.25
205.0	21.6	0.002	20.53	0.003	31.90	52.43	52.43	1.25
210.0	21.1	0.002	20.63	0.003	32.05	52.68	52.68	1.26
215.0	20.8	0.002	20.73	0.002	32.21	52.93	52.93	1.26
220.0	20.4	0.002	20.82	0.002	32.36	53.18	53.18	1.27
225.0	20.0	0.002	20.92	0.002	32.50	53.42	53.42	1.28
230.0	19.7	0.002	21.01	0.002	32.65	53.66	53.66	1.28
235.0	19.3	0.001	21.10	0.002	32.79	53.89	53.89	1.29
240.0	19.0	0.001	21.19	0.002	32.93	54.12	54.12	1.29

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Water Quality Calculations

50 The Driveway, Ottawa
File No. UD22-093
Date: January 2023

Surface	Method	Effective TSS Removal	Area (ha)	% Area of Controlled Site	Overall TSS Removal
Rooftops and Terraces	Inherent	80%	0.342	100%	80%
Total			0.342	100%	80%

Note: Uncontrolled water does not account in the above calculations

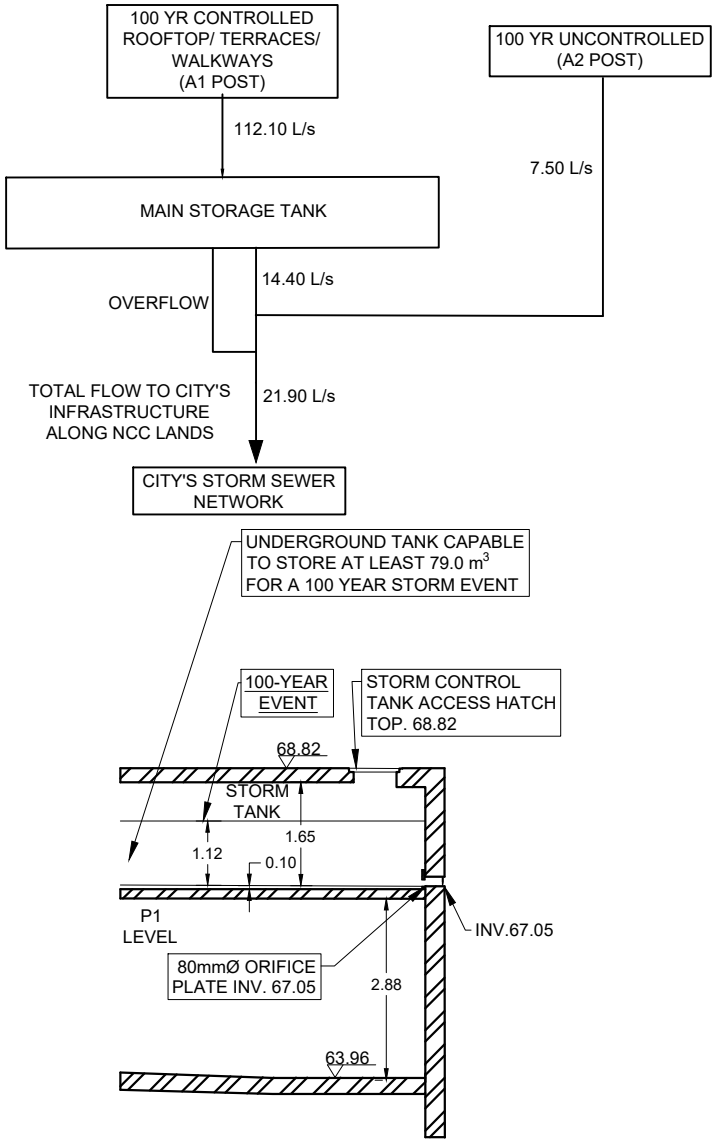
Lithos

Water Quality Calculations

50 The Driveway, Ottawa
File No. UD22-093
Date: January 2023

Surface	Method	Effective TSS Removal	Area (ha)	% Area of Controlled Site	Overall TSS Removal
Rooftops and Terraces	Inherent	80%	0.342	100%	80%
Total			0.342	100%	80%

Note: Uncontrolled water does not account in the above calculations



QUANTITY CONTROL
Volume required for 100-year event = 79.00 m³
Tank Area = 70.0 m²

NOTE: TANK DESIGN TO BE VERIFIED BY BUILDING MECHANICAL CONSULTANT

Lithos

150 Bermondsey Road, Toronto, Ontario M4A 1Y1

TANK DESIGN
RESIDENTIAL USE DEVELOPMENT
50 THE DRIVEWAY
OTTAWA, ONTARIO

DATE:	JANUARY 2023	PROJECT No:	UD22-093
SCALE:	N.T.S.	FIGURE No:	FIG 3

Appendix D

Sanitary Data Analysis

COMBINED SEWER DESIGN SHEET

50 The Driveway

CITY OF OTTAWA

LOCATION		RESIDENTIAL												COMMERCIAL			INFILTRATION			SEWER DESIGN				
	SECTION (ha.)	SINGLE FAMILY DWELLING @ 3.4 ppu	SEMI-DETACHED / TOWNHOUSE (ROW) @ 2.7 ppu	DUPLEX @ 2.3 ppu	BACHELOR @1.4 ppu	1 BED @1.4 ppu	2 BED @2.1 ppu	3 BED @3.1 ppu	AVERAGE APT. @1.8 ppu	TOTAL RESIDENTIAL POPULATION population	AVERAGE RES. FLOW @ 280 L/c/d (L/s)	HARMON PEAKING FACTOR	RES. PEAK FLOW (L/s)	INSTITUTIONAL AREA (ha.)	AVERAGE INSTITUTIONAL FLOW @50000/L/ha/d (L/s)	INSTITUTIONAL PEAK FLOW (L/s)	TOTAL ACCUM. AREA (ha.)	INFILT. @ 0.28 L/s/ha. (L/s)	TOTAL DESIGN FLOW (L/s)	PIPE LENGTH (m)	PIPE DIA. (mm)	SLOPE (%)	FULL FLOW CAPACITY n = 0.013 (L/sec)	% of DESIGN CAPACITY (%)
column number	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Existing Condition																								
Institutitional (towards QED ROW)	0.296	0	0	0	0	0	0	0	0	0.00	0.00	4.00	0.00	0.10	0.06	0.08	0.296	0.083	**0.17**	-	-	-	-	-
Proposed Condition																								
Residential-use development (towards QED ROW)	0.296	0	0	0	0	23	54	0	0	146	0.47	4.00	1.89	0.00	0.00	0.00	0.296	0.083	**1.97**		200	2.0%	46.38	4.25%
																Total Net Flow towards QED ROW=			1.80					

Average Residential Flow Rate - 280 Litres / capita / day
Average Daily Flow Commercial - 50,000 Litres / gross ha / day
Average Daily Flow Institutional - 50,000 Litres / gross ha / day
Average Daily Flow Industrial - 35,000 Litres / gross ha / day

Infitration Allowance (Dry Weather) - 0.05 Litres / s / gross ha
Infitration Allowance (Wet Weather) - 0.28 Litres / s / gross ha
Infitration Allowance (Total I/I) - 0.33 Litres / s / gross ha
Peaking Factor = $1 + [14 / (4 + P^{0.5})]$, P=Population in thousands

Site Area: 0.296 Ha

Prepared By: Dimitra Frysali, P. E., M.A.Sc.
Reviewed by: Nick Moutzouris, P.Eng., M.A.Sc.
Date: January 2023

Project: 50 The Driveway
Project: UD22-093
City of Ottawa Sheet 1 OF 1

Appendix E

Water Data Analysis

WATER DEMAND

50 The Driveway, Ottawa
File No: UD22-093
Date: January 2023
Prepared by: Dimitra Frysali, P.E., M.A.Sc.
Reviewed By: Nick Moutzouris, P.Eng., M.A.Sc.

Fire Flow Calculation

1 $F = 220\ C\ (A)^{1/2}$

Where F= Fire flow in Lpm
C= construction type coefficient
= 0.8 for non combustible
A = total floor area in sq.m. excluding basements

			Area Applied
Level 2=	1592.17	m^2	100%
Level 1=	1588.64	m^2	25%
Level 3=	1350.35	m^2	25%
=	2,326.9	sq.m.	
F =	8,489.91	L/min	*F(No.1) = 200C √A*
F =	8,000	L/min	*F(No.1) Round to nearest 1000 l/min*

Note: The levels indicated, reference the floors with the largest areas (refer to architectural design)

2 Occupancy Reduction
15% reduction for limited-combustible occupancy
F = 6800 L/min *F(No.2) = F(No.1) x occupancy reduction/charge(%)*

3 Sprinkler Reduction
30% Reduction for NFPA Sprinkler System
F = 4760 l/min *F(No.3) = F(No.2) x sprinkler reduction(%)*

4 Separation Charge

0%	West	>45m
5%	North	30.1m to 45m
11%	South	10.1m to20m
11%	East	10.1m to20m
27%	Total Separation Charge	

F = 1,836.00 L/min *F (No.4) = F(No.2) x separation charge(%)*
F = 6,596.00 L/min *F (tot) = F(No.3) + F(No.4)*
F = 7,000 L/min *F(tot) Round to nearest 1000 l/min*
116.67 L/s
F = 1849 US GPM

Domestic Flow Calculations

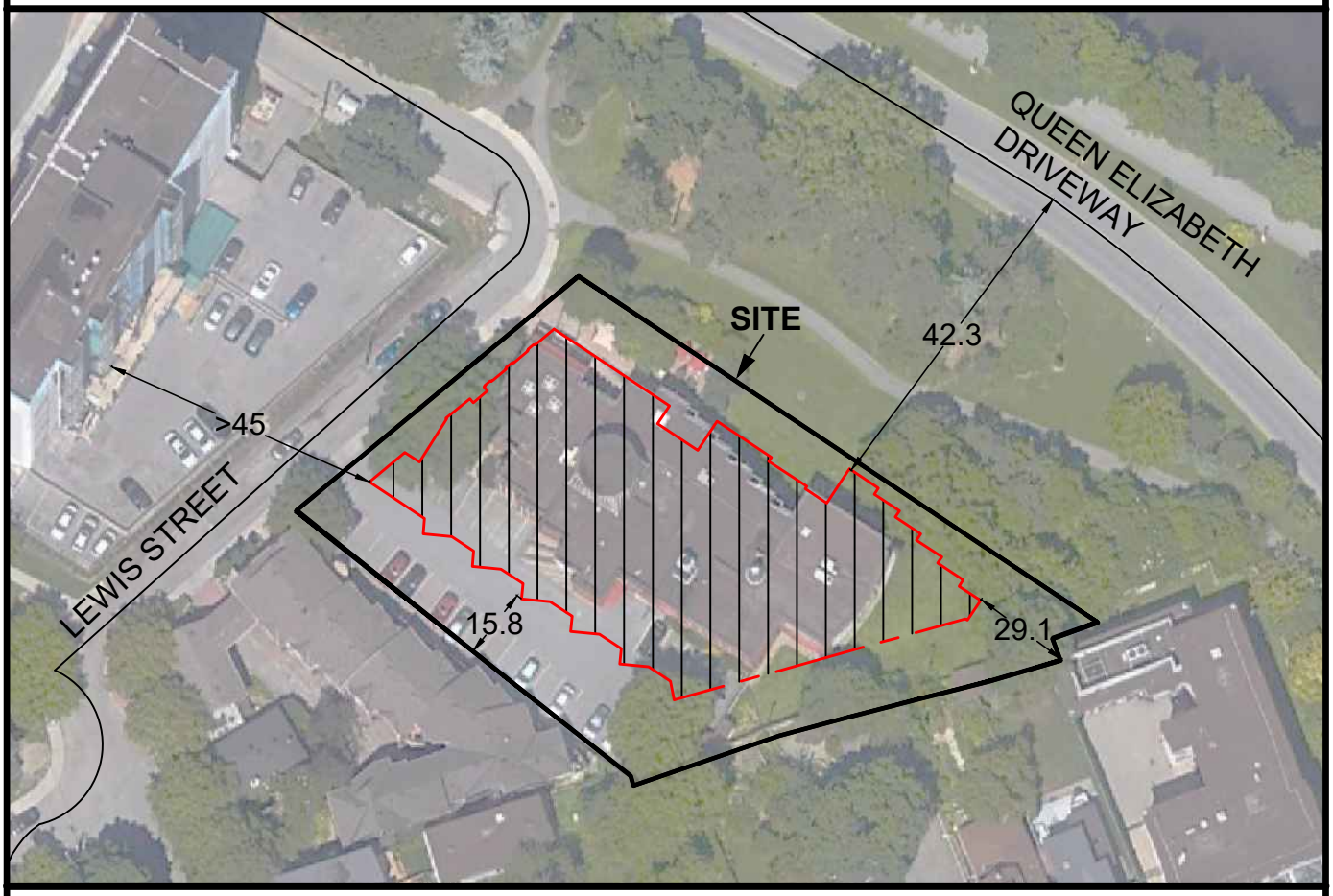
Population=	146	Persons		From Sanitary Calculations
Commercial Area (Retail) =	0.0	m^2		From Site Statistics
Average Day Demand (Residential) =	350.0	L/person/day		
Average Day Demand (Commercial) =	2.5	$L/m^2/day$	(OBC)	1 US Gallon=3.785 L
Average Residential Water Demand=	0.59	L/s		
	9	US GPM		1L/s=15.852 US GPM
Average Commercial Water Demand=	0.00	L/s		
	0.00	US GPM		

Max. Daily Residentail Demand Peaking Factor= 2.5
Max. Daily Commercial Demand Peaking Factor = 1.5
Max. Daily Demand = 1.48 L/s = 23 US GPM
or
Max. Hourly Residential Demand Peaking Factor = 2.2
Max. Hourly Commercial Demand Peaking Factor = 1.8
Max. Hourly Demand = 3.25 L/s = 52 US GPM

Max Daily Demand = 1.48 L/s
Fire Flow = 116.67 L/s

Required 'Design' Flow = 118.15 L/s
1873 US GPM

Note: Required 'Design' Flow is the maximum of either:
1) Fire Flow + Maximum Daily Demand
2) Maximum Hourly Demand



Lithos

150 Bermondsey Road, Toronto, Ontario M4A 1Y1

SEPARATION DISTANCES
RESIDENTIAL USE DEVELOPMENT
50 THE DRIVEWAY
OTTAWA, ONTARIO

DATE:	DECEMBER 2022	PROJECT No:	UD22-093
SCALE:	N.T.S.	FIGURE No:	FIG 4

Guy Forget

From: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Sent: Friday, June 25, 2021 5:22 PM
To: Guy Forget
Cc: Mottalib, Abdul
Subject: FW: 50 The Driveway
Attachments: 50 The Driveway June 2021.pdf

Hello Guy,

Please see email below as requested.

Thanks

Abdul

From:.....
Sent: June 25, 2021 4:49 PM
To: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Cc: Bourke, Simone <simone.bourke@ottawa.ca>
Subject: RE: 50 The Driveway

Hi Abdul,

The following are boundary conditions, HGL, for hydraulic analysis at 50 The Driveway (zone 1W) assumed to be connected to either the 152 mm on Lewis Street OR the 305 mm on Queen Elizabeth Driveway (see attached PDF for location).

	152 mm on Lewis	305 mm on QED
Minimum HGL (m)	106.4	106.4
Maximum HGL (m)	115.3	115.3
Max Day + Fire Flow (250 L/s) (m)	91.7	105.3

Boundary Conditions for 50 The Driveway