

Functional Servicing and Stormwater Management Report



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

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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 m³ of storage tank will be required as well as 54.10 m³ 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, Vollebakk 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 m² 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 m³, 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 m³, 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 m². 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 m³ to meet the 100 year storage requirement. In order to meet the required volume of 54.10 m³, 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 m³ of storage tank will be required as well as 54.10 m³ 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

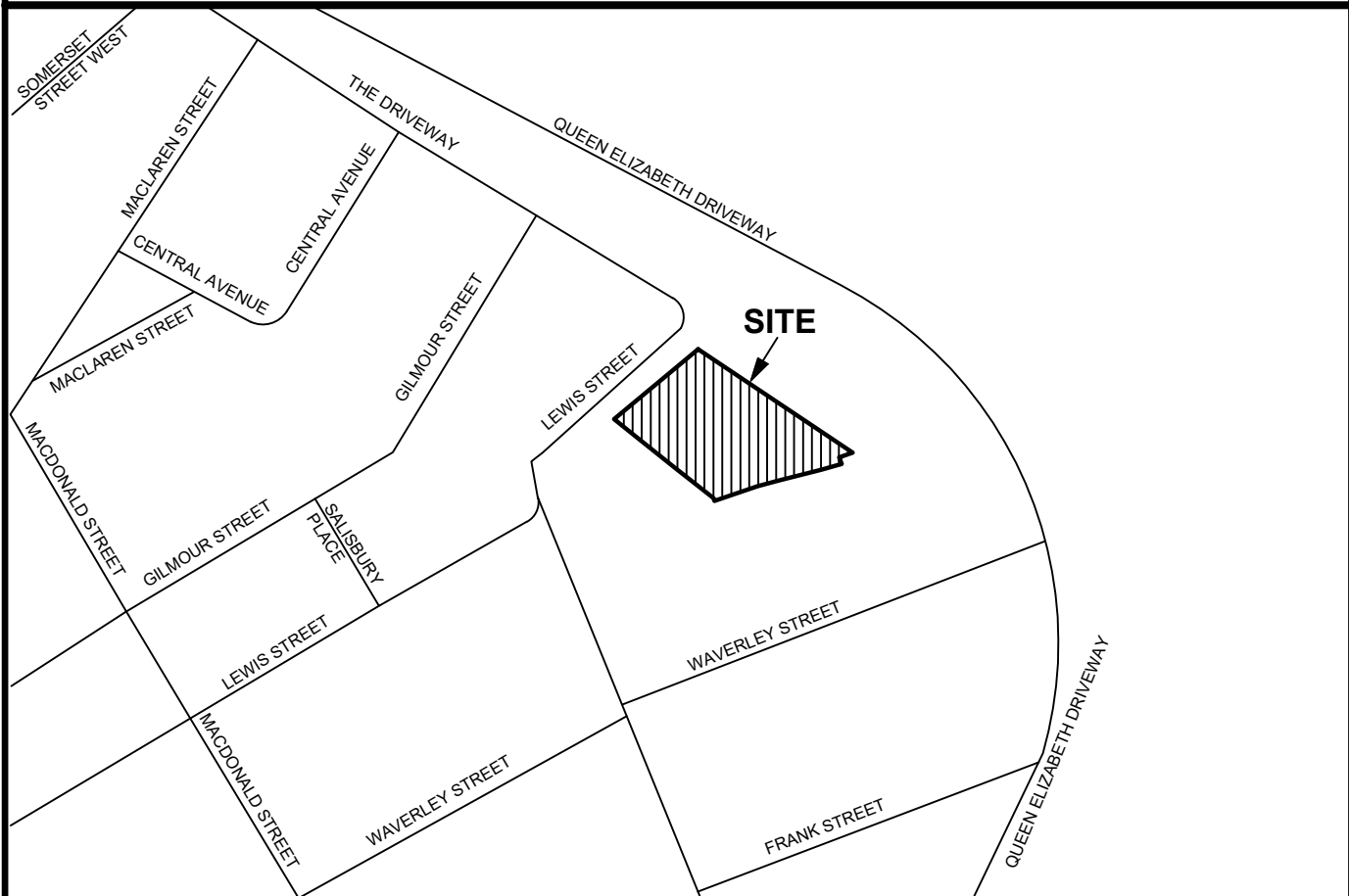
The proposed development will connect to the existing 300mm combined sewer on Queen Elizabeth Driveway ROW, through a 200mm diameter sanitary sewer lateral connection, with a minimum grade of 2.00% (or equivalent pipe design). The additional net discharge flow from the proposed development, is anticipated 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

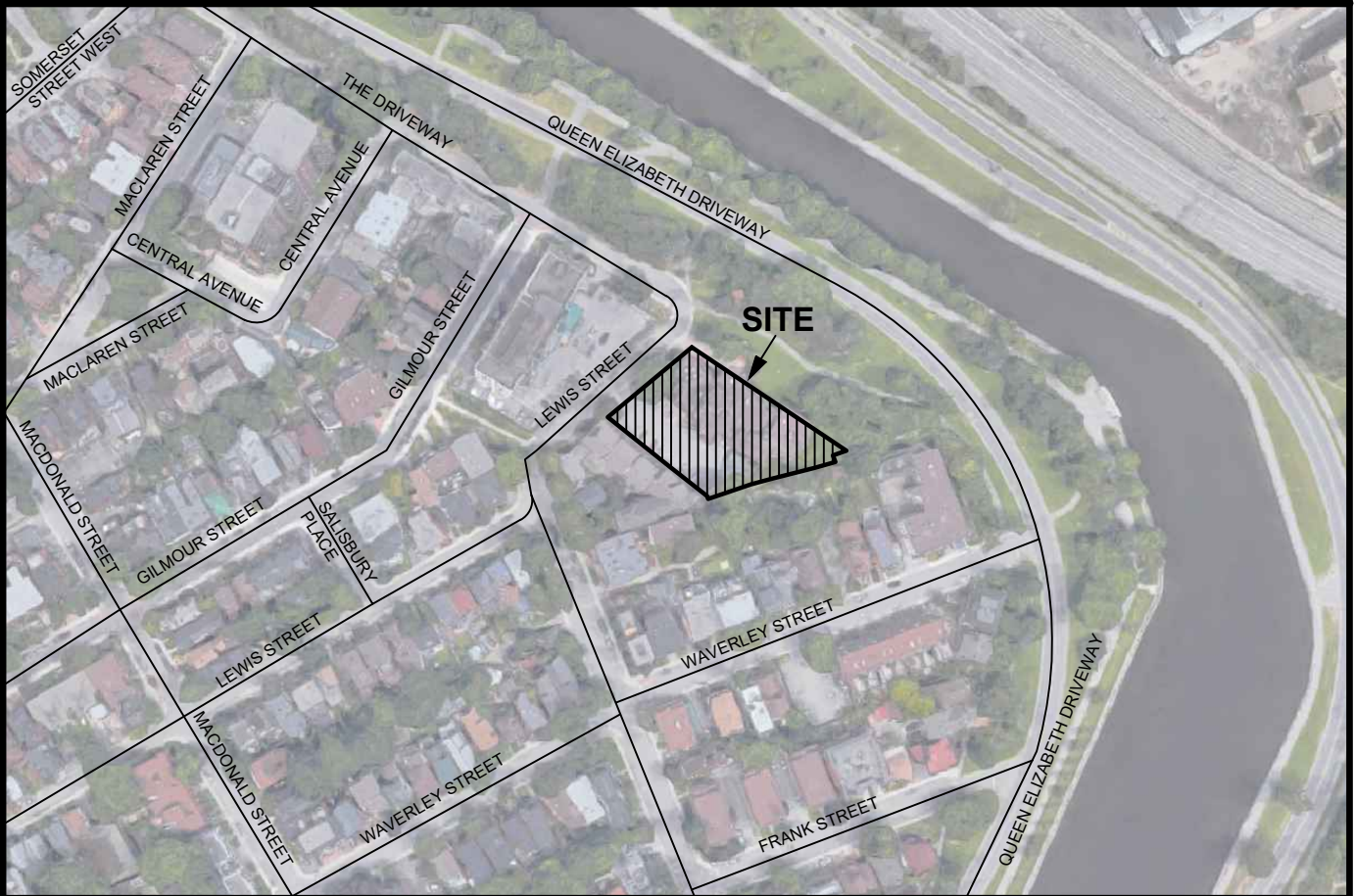
The proposed grades will improve the existing drainage conditions to meet the City's/Regional requirements. Grades will be maintained along the property line wherever feasible. Existing drainage patterns on adjacent properties will not be altered and stormwater runoff from the subject development will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



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 |

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 |

150 Bermondsey Road, Toronto, Ontario M4A 1Y1

Appendix A

Site Photographs



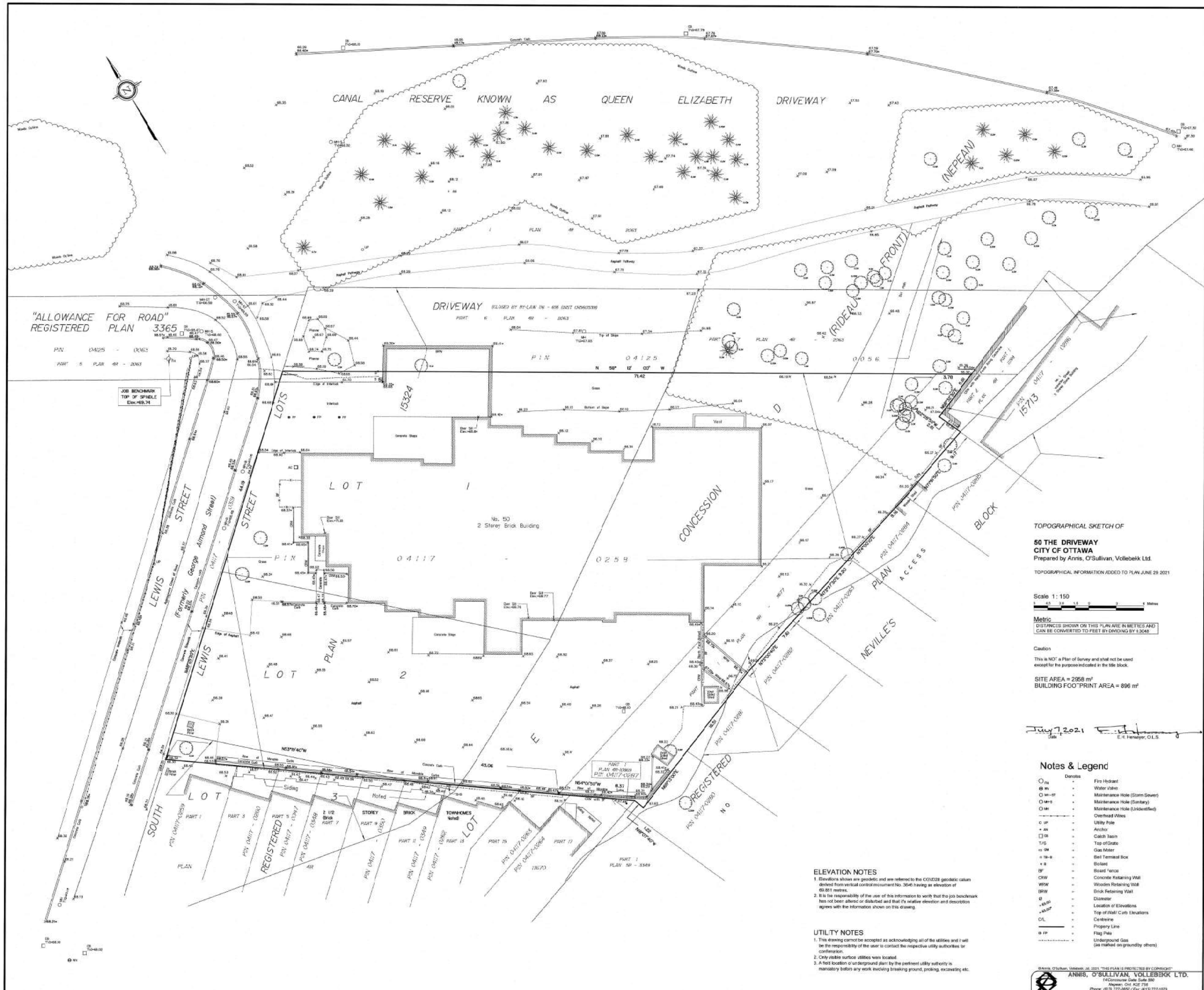
North-West Corner of property along Driveway Road



South-West Corner of property along Driveway Road

Appendix B

Background Information



"ALLOWANCE FOR ROAD"
REGISTERED PLAN 3365

PIN 04125 - 00165
PART 5 PLAN 49 - 2063

JOB BENCHMARK
TOP OF SPHICLE
Elev. 45.74

DRIVEWAY RELEASED BY BY-LAW 06 - 608 (COST 00601539)
PART 10 PLAN 49 - 2063

PIN 04125
N 59° 12' 00" W
71.42

LOT 1

No. 50
2 Storey Brick Building

LOT 2

LOT 3

LOT 4

LOT 5

LOT 6

LOT 7

LOT 8

LOT 9

LOT 10

LOT 11

LOT 12

LOT 13

LOT 14

LOT 15

LOT 16

LOT 17

LOT 18

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LOT 41

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LOT 45

LOT 46

LOT 47

LOT 48

LOT 49

LOT 50

TOPOGRAPHICAL SKETCH OF
50 THE DRIVEWAY
CITY OF OTTAWA
Prepared by Annis, O'Sullivan, Vollebek Ltd.

TOPOGRAPHICAL INFORMATION ADDED TO PLAN JUNE 28 2021

Scale 1:150

Metric
DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND
CAN BE CONVERTED TO FEET BY DIVIDING BY 3.048

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

SITE AREA = 2068 m²
BUILDING FOOTPRINT AREA = 896 m²

July 7, 2021
E.H. Fenwick, O.L.S.

Notes & Legend

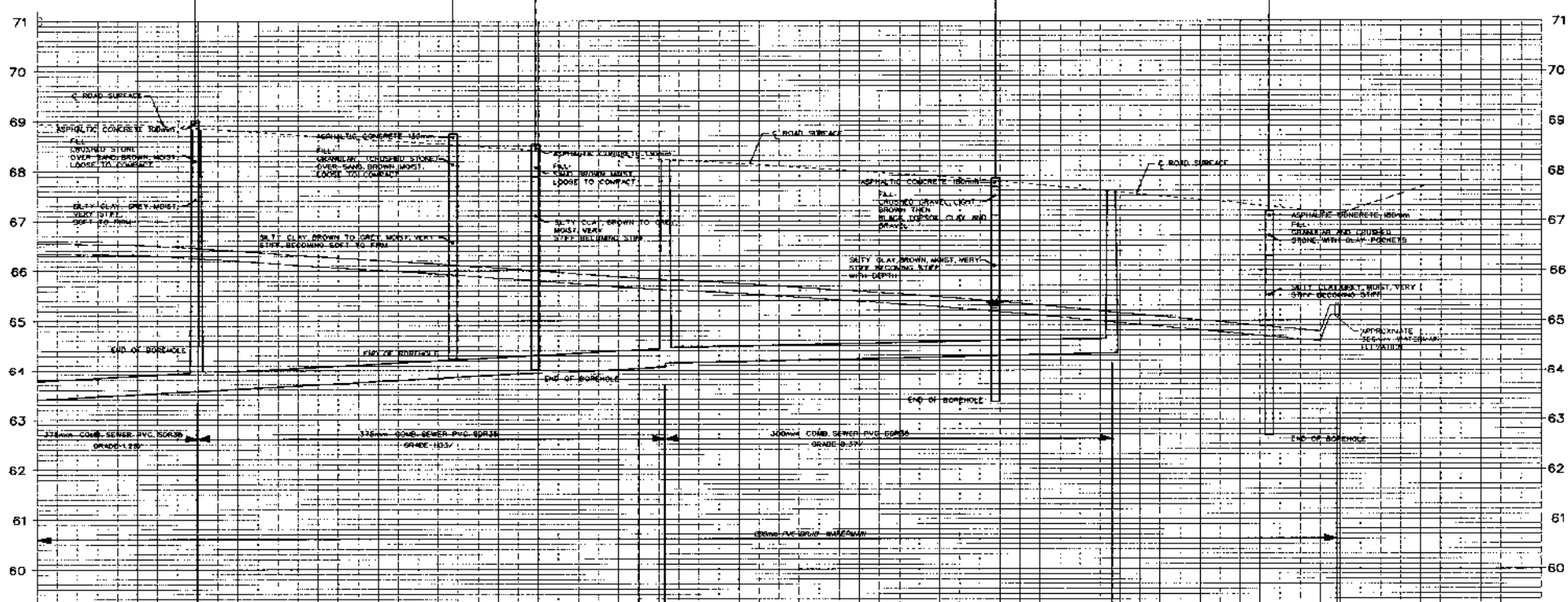
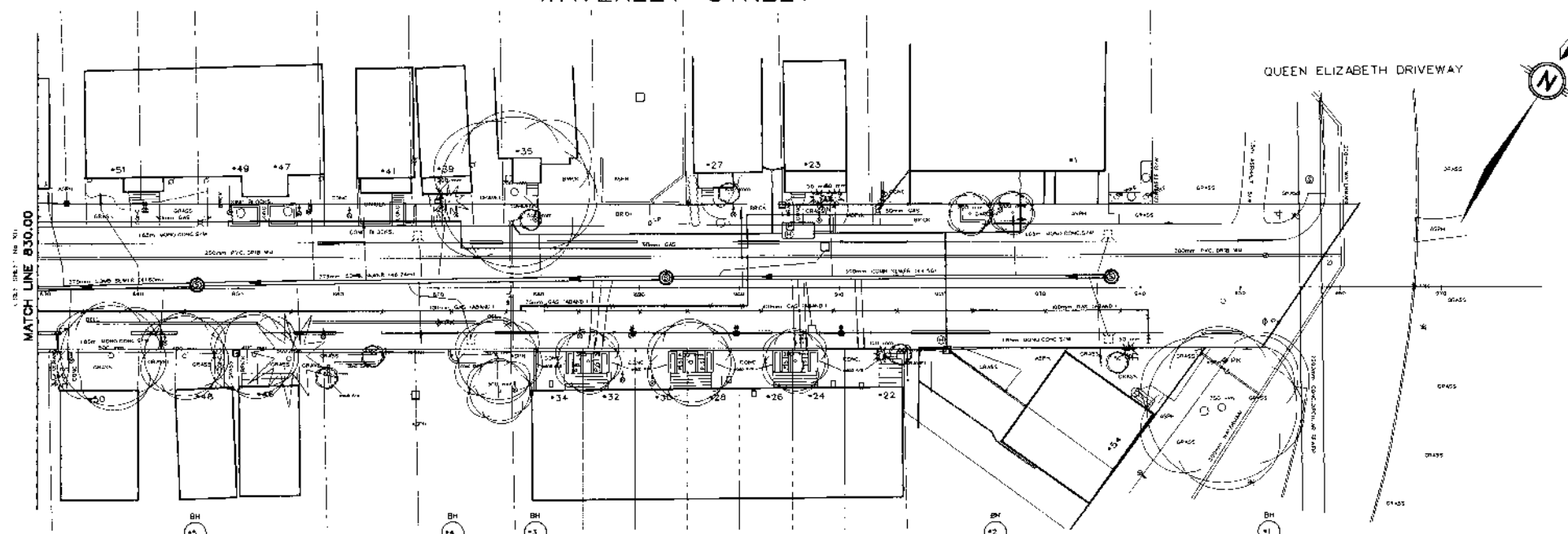
| Denotes | |
|---------|--|
| ○ FH | Fire Hydrant |
| ○ W | Water Valve |
| ○ M-S | Maintenance Hole (Storm Sewer) |
| ○ M-S | Maintenance Hole (Sanitary) |
| ○ M | Maintenance Hole (Unidentified) |
| ○ | Overhead Wires |
| ○ UP | Utility Pole |
| + | Anchor |
| □ | Catch Basin |
| T/S | Top of Grate |
| ○ M | Gas Meter |
| ○ M-B | Ball Terminal Box |
| + | Socket |
| BF | Board Fence |
| CRW | Concrete Retaining Wall |
| WRW | Wooden Retaining Wall |
| BRW | Brick Retaining Wall |
| Ø | Diameter |
| ○ | Location of Elevations |
| ○ | Top of Wall Curb Elevations |
| ○ | Centreline |
| ○ | Property Line |
| ○ | Flag Pole |
| ○ | Underground Gas (as marked on ground by others) |

ELEVATION NOTES
1. Elevations shown are geodetic and are referred to the CGD2011 geodetic datum derived from vertical control monument No. 3546 having an elevation of 89.81 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 its 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 or underground plan by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating, etc.

WAVERLEY STREET

QUEEN ELIZABETH DRIVEWAY



| Stations | Top of Watermain | Existing Surface | Sewer Type & Diameter | Sewer Inverts Existing & Proposed |
|----------|------------------|------------------|-----------------------|-----------------------------------|
| 834.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 845.00 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 850.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 855.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 860.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 865.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 870.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 875.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 880.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 885.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 890.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 895.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 900.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 905.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 910.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 915.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 920.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 925.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 930.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 935.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 940.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 945.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 950.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 955.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 960.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 965.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 970.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 975.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 980.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 985.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 990.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 995.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |
| 1000.0 | 68.871 | 68.824 | 150mm CB&I | 68.871 |

Revisions:

| No. | Date | Description | Drawn By | Approved By |
|-----|------|-------------|----------|-------------|
| | | | | |
| | | | | |

Design:

| Drawn By | Date | Checked By | Date |
|--------------------|------|--------------------|------|
| J. FRANK, J. FRANK | 2012 | J. FRANK, J. FRANK | 2012 |
| J. FRANK, J. FRANK | 2012 | J. FRANK, J. FRANK | 2012 |
| S. SAUVE, A. SAUVE | 2012 | S. SAUVE, A. SAUVE | 2012 |

Construction Services Manager:

Wayne Bennett P.Eng.

Final Measurements:

| Construction Type | Inspector |
|-------------------|---------------------|
| SEWER WATER MAIN | A. SAUVE |
| Start Date | 2012 |
| End Date | 2012 |
| Contractor | WAYNE B. SAUVE INC. |
| Drawn By | A. SAUVE |
| Checked By | S. SAUVE |

Tender Notes:

1. Soil information shown is not guaranteed and contractors are advised to collect additional information as deemed necessary.
2. Submittal information taken from FONDEX Ref. # 00-504-4
3. This plan supersedes the whole or a part plan # FS4
4. While frustrations and utilities shown are taken from the best available information, they cannot be guaranteed.
5. The cutback file 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 Ministry of Environment Approval # Sewer Water

Legal Survey Notes:

Boundary information shown herein has been compiled and indicated from Toronto 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.

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THIS IS NOT A PLAN OF SURVEY

The data was compiled from plans and documents recorded in the Land Registry System and has been prepared for display having surveyed the same.

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Ottawa
Transportation, Utilities and Public Works
Infrastructure Services Branch
10 LAUREL AVENUE WEST, OTTAWA, ONTARIO K1P 1J1

Rosemarie Leclair
Center Manager

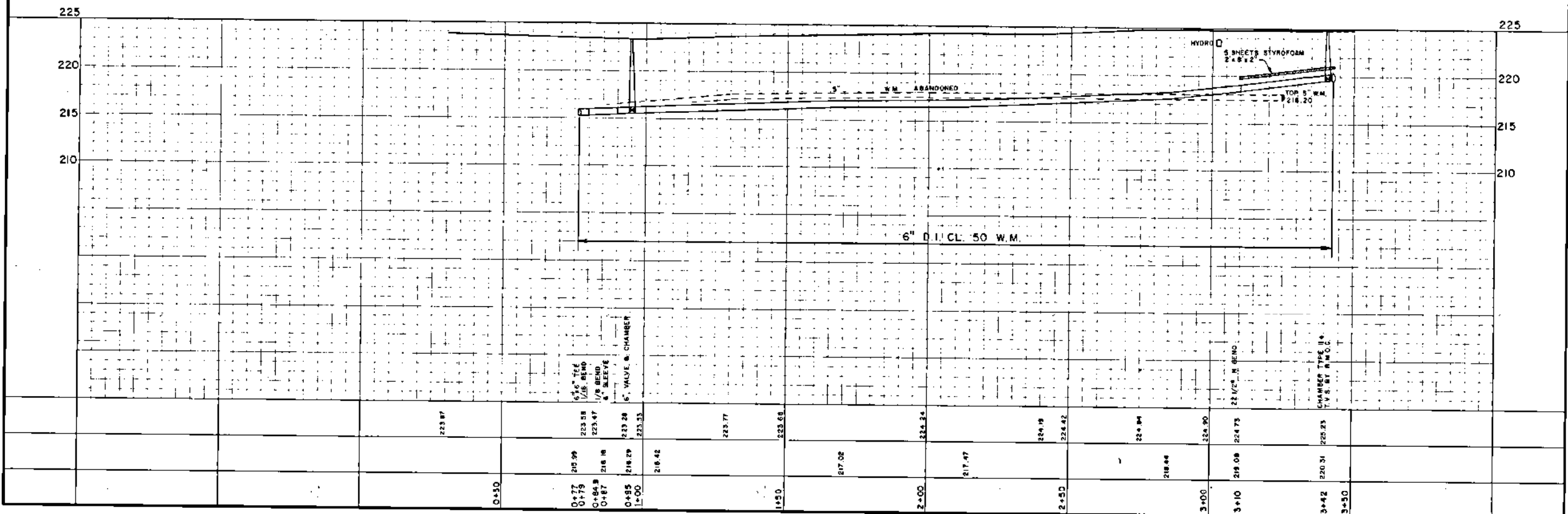
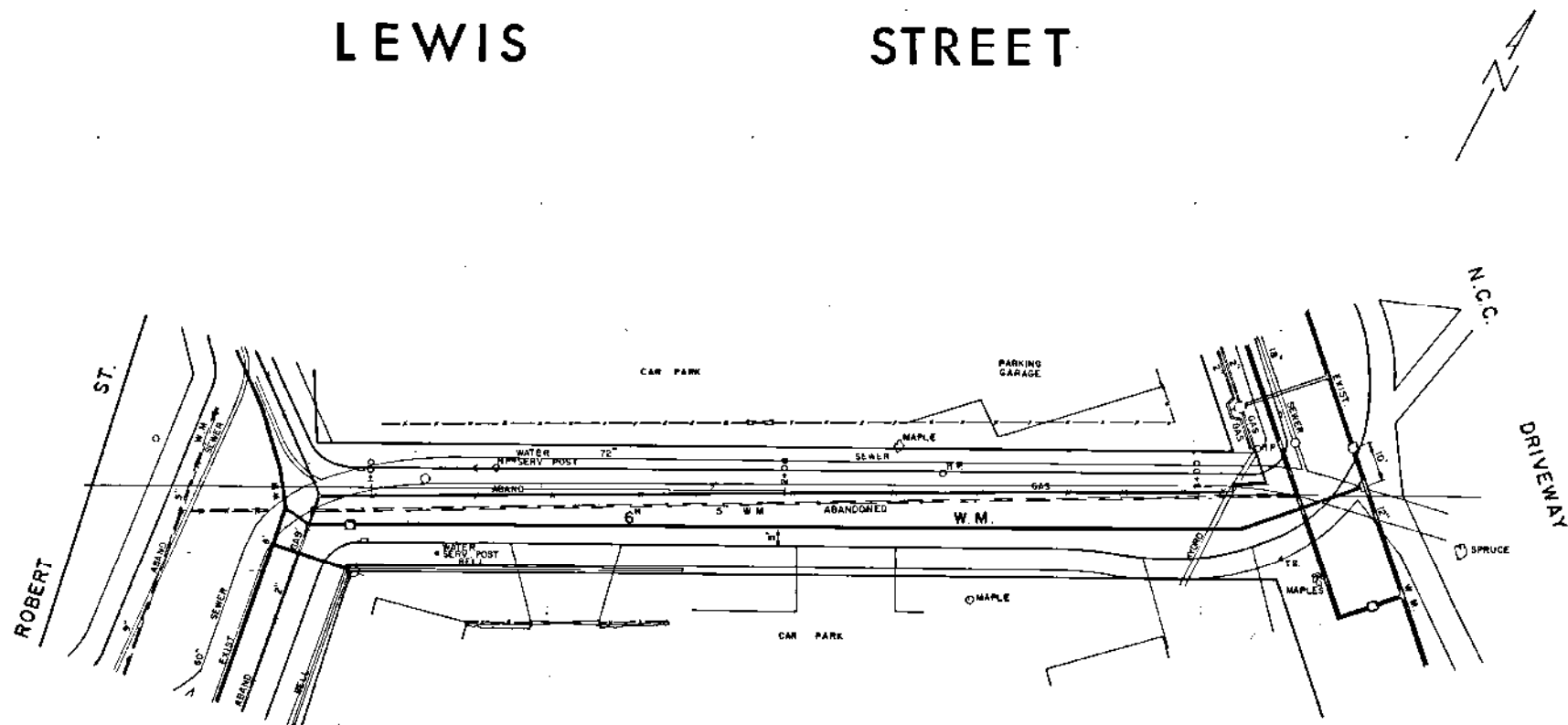
Richard Hewitt, P.Eng.
Branch Director

WAVERLEY STREET
STA. 830.00 TO QUEEN ELIZABETH DRIVEWAY

| | | | | | |
|--------------|------|-------------------|-------|-----------------|----------|
| Contract No: | 3331 | Scale: | 1:250 | Sheet No: | 11 of 20 |
| Survey No: | 3331 | Horizontal Scale: | 1:250 | Vertical Scale: | 1:50 |

Project No: 3331

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
L.L. Larson
Date
10-2-78


L. L. LARSON
 REGISTERED PROFESSIONAL ENGINEER
 PROVINCE OF ONTARIO

Project officer
Kenneth J. Slack Date 5/16/78

Drawn by:
B. BARRETT Date APRIL 1978

Approved by: _____ Date _____

Notes

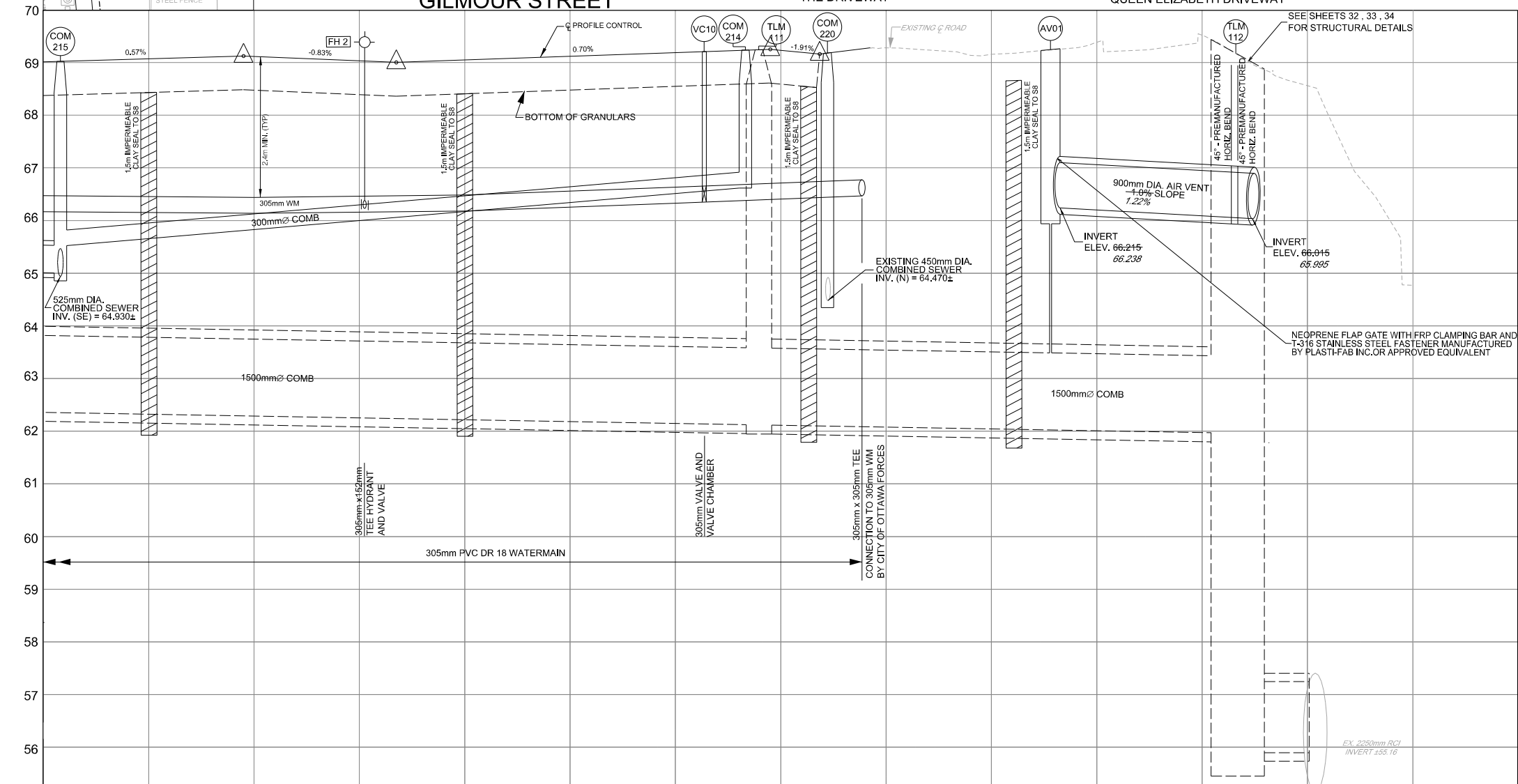
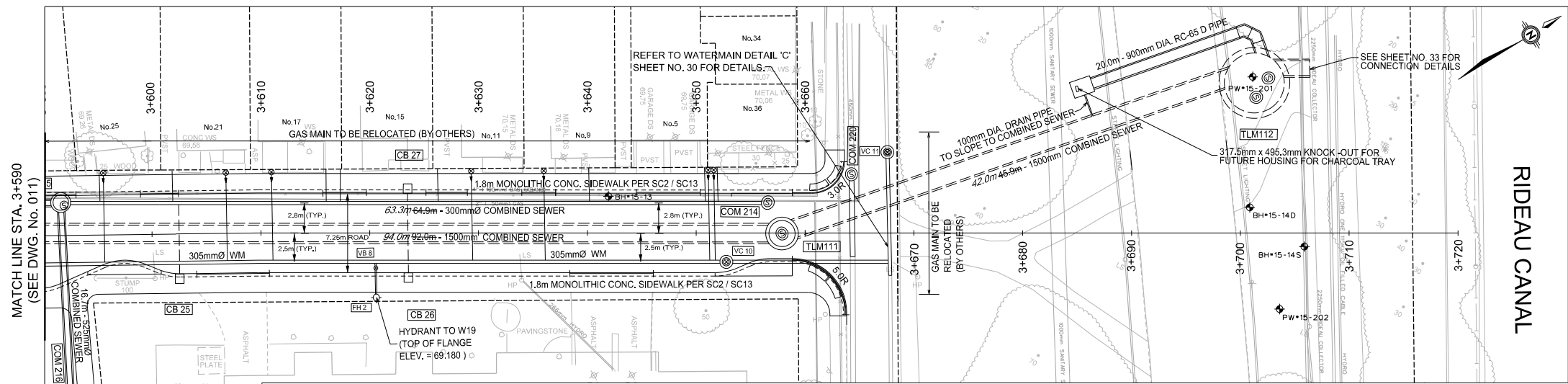
THIS PLAN DRAWN FROM THE FOLLOWING
SURVEY BOOK 570, SURVEYOR H. PICKARD
CENTRAL REGISTRY E-13 SHEET 20, E-14 SHEET 25

Revisions
1. 30/10/78 AS BUILT FROM BOOK 570
& FIELD PRINT. S.P.B., I.J.S. *[Signature]*

Scales
HORIZONTAL 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 _____



| | | | | | | | | | | | | | | | | | | | | | |
|---------------------|---|--|----------|--------|-----------------|----------|--------|--------|--------|------------------|----------------------|------------------|-----------------|--------|-------|-------|-------|-------|----------|-------|-------|
| PROFILE CONTROL | 69.001 | 69.056 | PVI | 69.019 | 69.990 | 69.036 | 69.106 | 69.177 | PVI | 69.221 | 69.150 | | PROFILE CONTROL | | | | | | | | |
| TOP OF WATERMAIN | 66.458 | 66.447 66.443 | 69.061 | 66.428 | 66.451 | 66.490 | 66.475 | 66.549 | 66.624 | 66.740 66.730 | 66.701 | 66.660 | 66.779 | | | | | | | | |
| TLM COMBINED INVERT | <p>94.0m 92.9m - 1500mm\varnothing Conc. 100-D COMBINED SEWER @ 0.35% GRADE</p> <p>42.0m 45.9m - 1500mm\varnothing Conc. 100-D COMBINED SEWER @ 0.37% GRADE</p> <p>1350mm\varnothing Conc. 140-D COMBINED SEWER @ 1.0% GRADE</p> | | | | | | | | | | | | | | | | | | | | |
| COMBINED INVERT | 65.237 65.234 65.230 | 63.3m 64.9m - 300mm \varnothing PVC DR-35 COMBINED SEWER @ 1.72% GRADE | | | | | | | | | | 66.279 66.275 | | | | | | | | | |
| STATION | 3+590 3+591.62 | 3+600 | 3+609.00 | 3+610 | 3+620 +620.5 | 3+623.50 | 3+630 | 3+640 | 3+650 | +652.7 | 3+656.65 3+657.92 | 3+660 | 3+663.70 | +667.8 | 3+670 | 3+680 | 3+690 | 3+700 | 3+703.61 | 3+710 | 3+720 |

**GILGOUR STREET TRUNK SEWER
ROAD, SEWER AND
WATERMAIN CONSTRUCTION**

**GILGOUR STREET
PLAN AND PROFILE
STA. 3+590 TO STA. 3+720**

Contract No. **ISD15-5013** Dwg. No. **012**
Sheet 12 of 35

Asset No. _____
Asset Group _____

General Manager: **W. NEWELL P. ENG.** Project Manager: **T. BLASIOLI P. ENG.**
Infrastructure Services Department

JR J.L. Richards
ENGINEERS ARCHITECTS PLANNERS
www.jrichards.ca

Des. PDR Chk'd PDR
Dwn. MF, MB PDR
Utility Circ. No. Index No.
Const. Inspector _____

Scale: HORIZONTAL 1:250
0m 2.5 5 10
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.

| 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. 8 | 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

| NO. | STRUCTURE TYPE / SIZE |
|---------|--|
| TLM 111 | OPSD 701.013 - 2400mm \varnothing 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

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

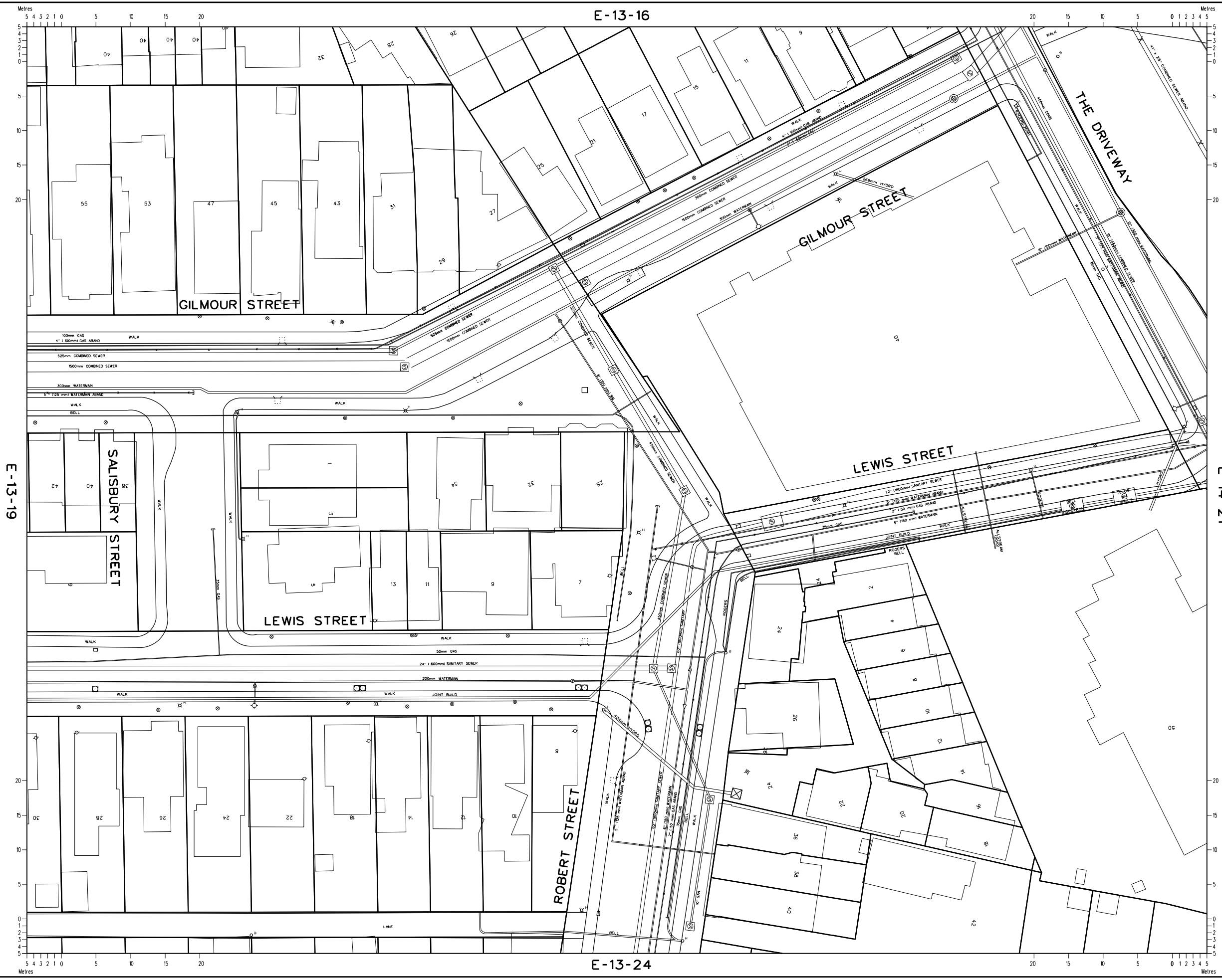
1. MAINTENANCE HOLES TO BE BENCHED PER OPSD 701.021
2. MAINTENANCE HOLE COVERS TO S24.1 UNLESS SHOWN OTHERWISE

| 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 200mm \varnothing 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-13-24



| REVISIONS / RÉVISIONS | DATE | BY |
|---|-----------|----|
| REDRAWN FROM VOIDED UTILITY PLAN E-13-20 | JUNE 2009 | MH |
| INCREASE GAS CONDUIT DEPTH 2001 GASLINE ADDED ON SALISBURY ST. | MAR. 2010 | KJ |
| ALISTREAM - ALLIUM DEC 2001 CONDUIT ADDED TO LEWIS STREET | AUG 2011 | DC |
| HYDRO-ELC/ENR/OC/DC/CC/CTV - SEWER WATER, TRAFFIC, S. COMPILED/DIGITIZED FROM UTILITY/CITY DATA | FEB 2015 | DC |
| ALLIUM - LEWIS STREET DEC 2001 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 | |
| Amp, Hand Hole, Vault, Gas Valve | |
| OC Transpo: Bus Shelter-No Power, Energized, Isolated | |
| Streetscape: Planter Box, Grate Square, Eng. Soil | |
| Traffic: Connect Box / Disconnect Box, SL Disconnect | |
| R.L. Hand Hole, R.L. Camera | |
| 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.....Atis | P2P.....Canadian P2P Fibre | | |
| B.....Bell | R.....Rogers | | |
| BH.....Borch Hill | S.....Sprint | | |
| F.....Fibre Noir | SL.....Street Lighting | | |
| G.....Gloabal | T.....Traffic | | |
| GT.....Group Telecom | TO.....Telcom Ottawa | | |
| H.....Hydro Ottawa | TU.....Telus | | |
| HI.....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 | | |
| OC.....OC Transpo | UP.....Utility Pole (owner unknown) | | |
| SCD.....Scada | | | |

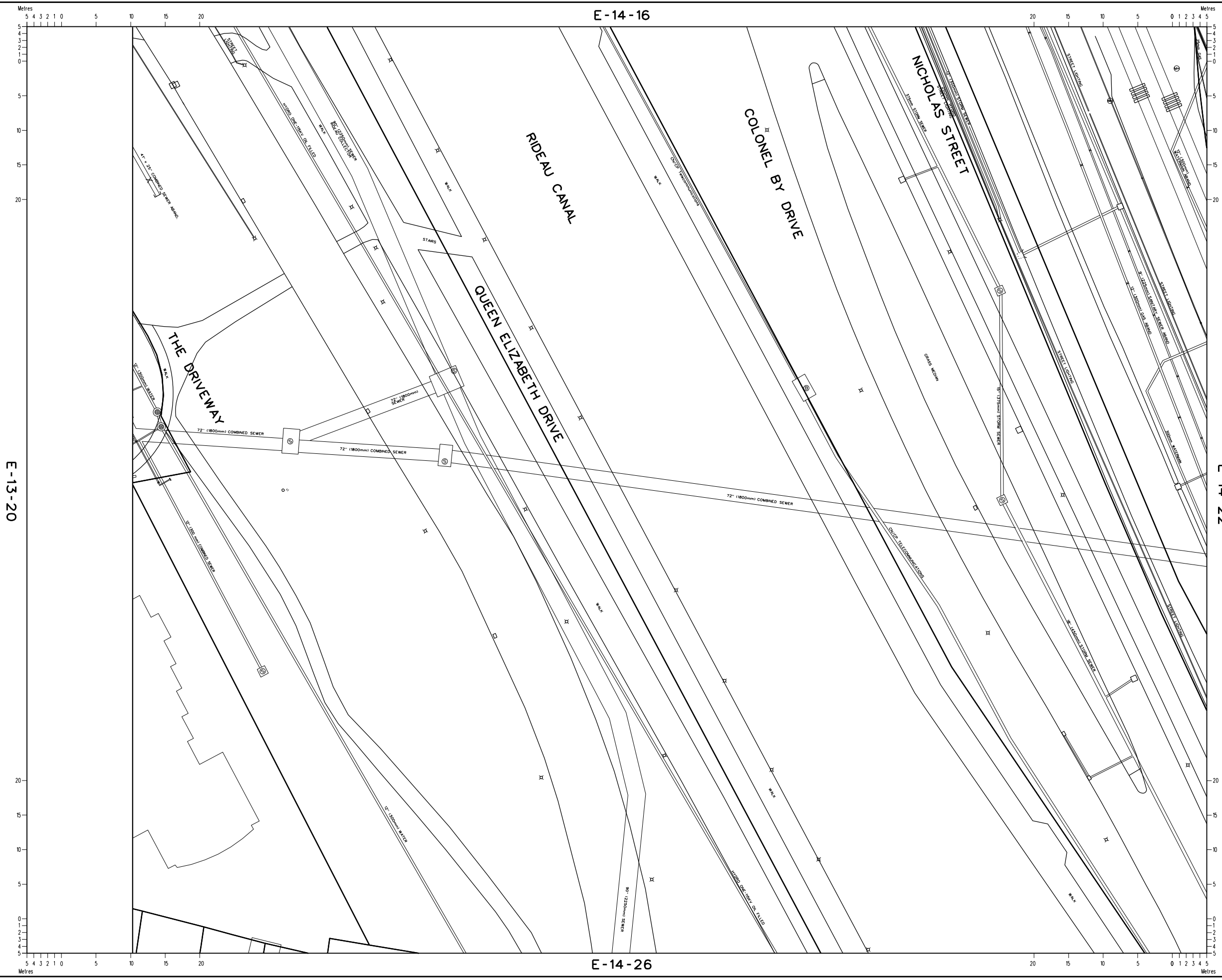
CAUTION/ATTENTION
 Although utility locations are established using the best available information, they cannot be guaranteed. Property lines were compiled from plans and documents recorded in the Land Registry System and are for indexing purposes only.
 Bien que l'emplacement des services publics soient 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 de cadastre et sont pour l'indexation seulement.

Ottawa
 Right of Way, Heritage, and Urban Design Services /
 Gestion des emprises, du patrimoine, et du design urbain
 Planning, Infrastructure and Economic Development Department /
 Direction générale de la planification, de l'infrastructure et du développement économique
 100 Constitution 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

UCC
 Ottawa
 CCSP
 COMITÉ DE COORDINATION DES SERVICES PUBLICS

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 |
| HYDROBELLEFROGERS, CITY SEWER, WATER, TRAFFIC, SL COMPILED/DIGITIZED FROM UTILITY/CITY DATA | MAY 2010 | KJ |
| HYDRO 1 - 15KV HIGH VOLTAGE/20KV 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 | |
| Amp, Hand Hole, Vault, Gas Valve | |
| OC Transpo: Bus Shelter-No Power, Energized, Isolated | |
| Streetscape: Planter Box, Grate Square, Eng. Soil | |
| Traffic: Connect Box / Disconnect Box, SL, Disconnect | |
| R.L. Hand Hole, R.L. Camera | |
| Scada: Hand Hole, Monitoring Panel | |
| Reducer | |
| Pipe, Duct, Conduit, Lateral | |
| Chimney | |
| Abandoned | |
| Capped | |
| Buried Cable | |
| Property Line | |
| Install Year | (2015) |

| TELECOM GLOSSARY | |
|----------------------|----------------------------|
| A.....Allstream | P.....Primus |
| AT.....Atia | P2P.....Canadian P2P Fibre |
| B.....Bell | R.....Rogers |
| BH.....Borch Hill | S.....Sprint |
| F.....Fibre Noir | SL.....Street Lighting |
| G.....Gloability | T.....Traffic |
| GT.....Group Telecom | TO.....Telecom Ottawa |
| H.....Hydro Ottawa | TU.....Telus |
| HI.....Hydro One | V.....Videotron |
| L / L3.....Level3 | Z.....Zayo |

| GLOSSARY - OTHER | |
|--------------------------------|-------------------------------------|
| DD.....Dept. of Defence | PED.....Pedestal (owner unknown) |
| MH.....Manhole (owner unknown) | PW.....Public Works |
| OIOC.....OC Transpo | 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 de cadastre et sont pour l'indexation seulement.

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 Right of Way, Heritage, and Urban Design Services /
 Gestionnaire, Services des entreprises, du patrimoine, et du design urbain
 Planning, Infrastructure and Economic Development Department /
 Direction générale de la planification, de l'infrastructure et du développement économique
 100 Concession Street, 6th Floor East / 6ème Étage Est, Ottawa, ON K2G 6J8

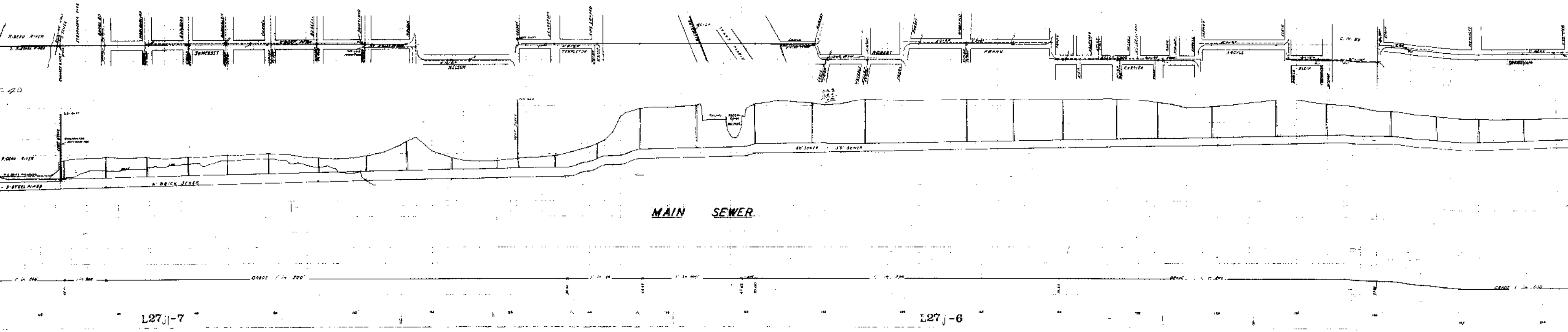
OTTAWA UTILITY COORDINATING COMMITTEE
 CENTRAL REGISTRY
 COMITÉ DE COORDINATION DES SERVICES PUBLICS D'OTTAWA
 ENREGISTREMENT CENTRAL



PRODUCED BY: GIS & DATA MANAGEMENT BRANCH
 INFORMATION CENTRE UNIT
 SCALE: 1:250
 SHEET NUMBER
E-14-21

E-13-20

E-14-22



This image shows a page of handwritten musical notation on ten staves. The notation is dense and includes various musical symbols such as notes, rests, and stems. There are several annotations and markings throughout the score:

- Staff 1:** Contains the word "RUBEN" written in a larger, bold font.
- Staff 2:** Contains the word "DRUM" written in a larger, bold font.
- Staff 3:** Contains the word "C" written in a larger, bold font.
- Staff 4:** Contains the word "C" written in a larger, bold font.
- Staff 5:** Contains the word "C" written in a larger, bold font.
- Staff 6:** Contains the word "C" written in a larger, bold font.
- Staff 7:** Contains the word "C" written in a larger, bold font.
- Staff 8:** Contains the word "C" written in a larger, bold font.
- Staff 9:** Contains the word "C" written in a larger, bold font.
- Staff 10:** Contains the word "C" written in a larger, bold font.

The handwriting is in black ink on a white background. The notation is somewhat messy and appears to be a working draft or a sketch. There are also some small, illegible markings and symbols scattered throughout the page.

Geotechnical
Engineering

Environmental
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Engineering

Materials Testing

Building Science

Noise and Vibration
Studies

Paterson Group Inc.

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www.patersongroup.ca

Geotechnical Investigation
Proposed Multi-Storey Building
50 The Driveway
Ottawa, Ontario

Prepared For

Main and Main

July 16, 2021

Report: PG5880-1

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Appendices

- Appendix 1** Soil Profile and Test Data Sheets
 Symbols and Terms
 Analytical Test Results
- Appendix 2** Figure 1 - Key Plan
 Figures 2 & 3 – Seismic Shear Wave Velocity Profiles
 Drawing PG5880-1 - Test Hole Location Plan

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 from 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

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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 a 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

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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 - Central 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 - Central Branch

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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

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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.

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Sarrak@LithosGroup.ca

www.LithosGroup.ca

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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



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From: [Elaine Guenette](mailto:Elaine.Guenette@lithosgroup.ca)
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

CAUTION: This message originated from outside Smith + Andersen

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
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www.LithosGroup.ca

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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

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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



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

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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



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Platinum
member

*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 Lalonde' <eric.lalonde@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 / EN / Products / Rigofill® ST block/half block

[BACK TO OVERVIEW](#)

Rigofill® ST block/half block

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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.

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


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

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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

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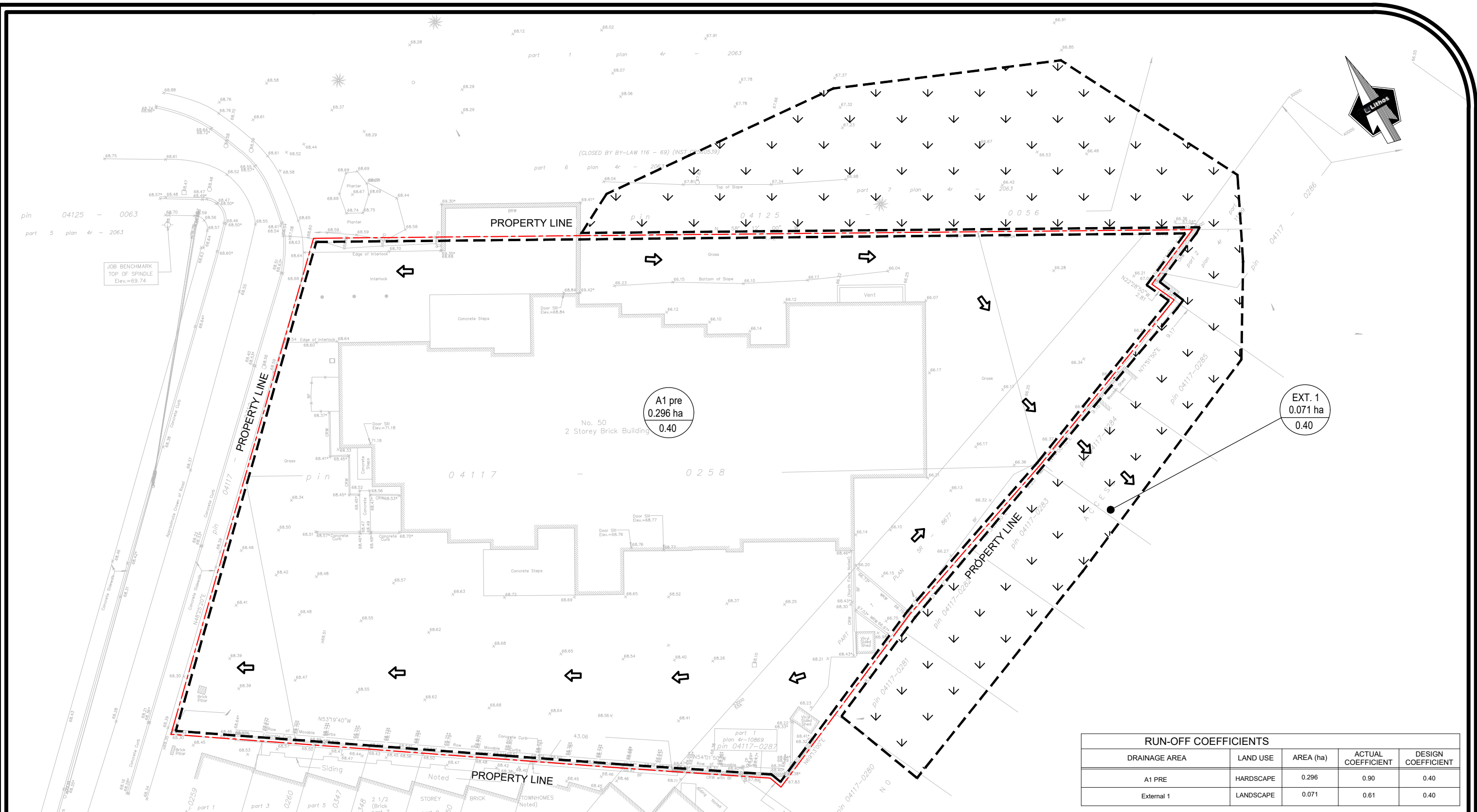


Data Sheet Rigofill ST Datasheet



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 |



150 Bermondsey Road, Toronto, Ontario M4A 1Y1

LEGEND

- 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 |



**Rational Method
Pre-Development Flow Calculation**

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

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

| 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 |

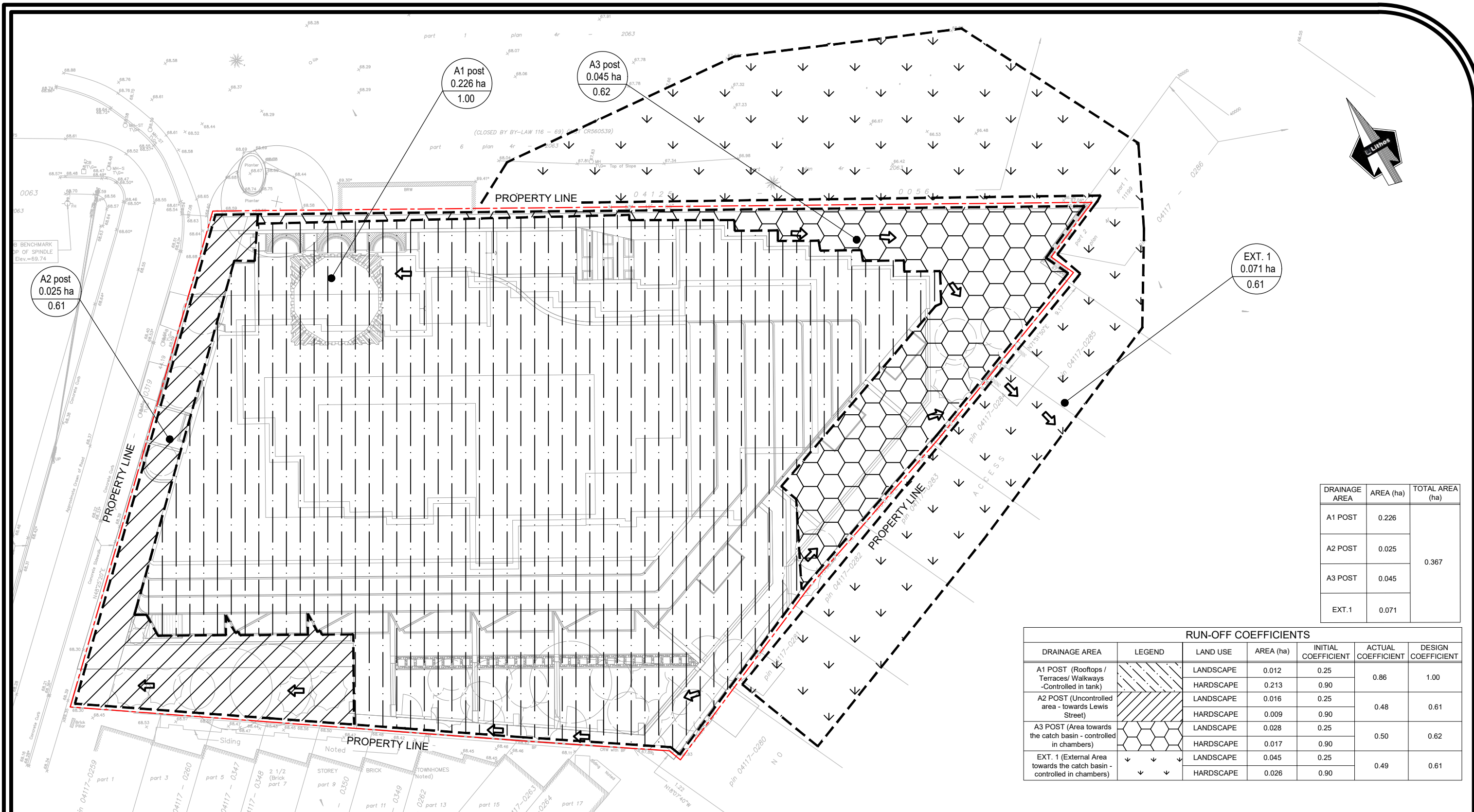
Rational Method Calculation

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) | [Diagonal Hatching] | LANDSCAPE | 0.012 | 0.25 | 0.86 | 1.00 |
| | | HARDSCAPE | 0.213 | 0.90 | | |
| A2 POST (Uncontrolled area - towards Lewis Street) | [Diagonal Hatching] | LANDSCAPE | 0.016 | 0.25 | 0.48 | 0.61 |
| | | HARDSCAPE | 0.009 | 0.90 | | |
| A3 POST (Area towards the catch basin - controlled in chambers) | [Hexagonal Pattern] | 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) | [Downward Arrows] | LANDSCAPE | 0.045 | 0.25 | 0.49 | 0.61 |
| | | HARDSCAPE | 0.026 | 0.90 | | |



LEGEND

- 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 Frysalis P.E., M.A.Sc

Reviewed by: Nick Moutzouris, P.Eng., M.A.Sc.

File No. UD22-093

City of Ottawa

Date: January 2023

| Drainage Area A1 Post | | Drainage Area A2 Post | | | | Total Site | | | | | | | | | | | |
|---|---------------|---|-------|-------------------|--------------|---|--------|---------------------|-------|-------------------|-------------------|-------------------|--|---------------|--|------|--|
| Rooftops / Terraces/ Walkways -Controlled in tank | | Uncontrolled area - towards Lewis Street | | | | Total Site= A1 + A2 | | | | | | | | | | | |
| 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 | | 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 | | | | 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 | Landsc.Area | 0.016 | 0.025 | 0.48 | | | | | | |
| b= | 6.053 | Hardsc. Area | 0.213 | 0.90 | Hardsc. Area | 0.009 | 0.90 | Hardsc. Area | 0.009 | 0.025 | 0.48 | | | | | | |
| c= | 0.814 | Total | 0.226 | 0.86 | Total | 0.025 | 0.48 | Total | 0.025 | 0.48 | | | | | | | |
| I = | a / (TC + b)c | | | | | | | | | | | | | | | | |
| (1) | (2) | (3) | | (4) | | (5) | | (6) | | (7) | | (8) | | (9) | | (10) | |
| Time | Rainfall | Storm | | Runoff | | Storm | | Runoff | | Total Storm | Released | Storage | | Storage | | | |
| (min) | (mm/hr) | Runoff (A1 post) | | Volume (A1 post) | | Runoff (A2 Post) | | Volume (A2 Post) | | Runoff Volume | Volume | Volume | | Depth of Tank | | | |
| | | (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

50 The Driveway, Ottawa

Storm Site Flow and Storage Summary

File No. UD22-093

City of Ottawa

Date: January 2023

File No: UD22-093

Prepared by: Dimitra Frysalis P.E., M.A.Sc

Reviewed by: Nick Moutzouris, P.Eng., M.A.Sc.

| (1) Time (min) | (2) Rainfall Intensity (mm/hr) | (3) Storm Runoff (A1 post) (m ³ /s) | | (4) Runoff Volume (A1 post) (m ³) | | (5) Storm Runoff (A2 Post) (m ³ /s) | | (6) Runoff Volume (A2 Post) (m ³) | | (7) Total Storm Runoff Volume (m ³) | | (8) Released Volume (m ³) | | (9) Storage Volume (m ³) | | (10) Storage Depth of Tank (m) | | | |
|----------------------|---|--|--------|---|-------|--|--------|---|------|---|-------|--|--------|---|-------|---|--------|-------|------|
| | | 10.0 | 178.6 | 0.112 | 67.26 | 0.008 | 4.50 | 67.26 | 8.64 | 58.62 | 0.84 | 10.0 | 178.6 | 0.112 | 67.26 | 0.008 | 4.50 | 67.26 | 8.64 |
| 15.0 | 142.9 | 0.090 | 80.74 | 0.006 | 5.40 | 80.74 | 12.96 | 67.78 | 0.97 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 240.0 | 19.0 | 0.012 | 171.81 | 0.001 | 11.50 | 171.81 | 207.36 | 0.00 | 0.00 |



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

Site Flow and Storage Summary

City of Ottawa

50 The Driveway, Ottawa

Date: January 2023

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 | | | | EXT.1 | | | Total Site | | | | |
|--|-----------|---------------------|-------|--|---------------------|-------|---|------|-------------------|-------------------|-------------------|
| Area towards the catch basin -Controlled in chambers | | | | External Area - controlled in chambers | | | Void Space= 96 % | | | | |
| Area (A1) = 0.045 ha | | | | Area (A3) = 0.071 ha | | | Max. Storage Size = 26.4 m ³ | | | | |
| "C" = 0.50 | | | | "C" = 0.49 | | | Area of Underground Chambers = 43.64 m ² | | | | |
| AC1= 0.022 | | | | AC3= 0.03 | | | PROPOSED STORMWATER CHAMBERS | | | | |
| Tc = 10.0 min | | | | Tc = 10.0 min | | | CAPABLE TO RETAIN 57.45m3 | | | | |
| Time Increment = 5.0 min | | | | Time Increment = 5.0 min | | | MODEL: GREENSTORM-ST-B (0.8X0.8X0.66)M, | | | | |
| Release Rate = 6.45 L/s | | | | Max. Release Rate = 10.03 L/s | | | 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 | Storm | | Runoff | Storm | | Runoff | | Total Storm | Storage | Storage |
| | Intensity | Runoff (A1 post) | | Volume (A1 post) | Runoff (A3 Post) | | Volume (A3 Post) | | Runoff Volume | Volume | 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.

| 100-Year Design Storm | | Tributary Area (A1) | ha | C | Tributary Area (A3) | ha | C | Total Storm | | Storage | Storage Depth of Chambers |
|-----------------------|--------------------|------------------------|-------------------------|------------------------|-------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| Time | Rainfall Intensity | Storm Runoff (A1 post) | Runoff Volume (A1 post) | Storm Runoff (A3 Post) | Runoff Volume (A3 Post) | Runoff | Volume | Runoff | Volume | Volume | Storage Depth of Chambers |
| (min) | (mm/hr) | (m ³ /s) | (m ³) | (m ³ /s) | (m ³) | (m ³) | (m ³) | (m ³) | (m ³) | (m ³) | (m) |
| 10.0 | 178.6 | 0.014 | 8.30 | 0.021 | 12.89 | 21.19 | 21.19 | 21.19 | 21.19 | 0.51 | |
| 15.0 | 142.9 | 0.011 | 9.96 | 0.017 | 15.47 | 25.43 | 25.43 | 25.43 | 25.43 | 0.61 | |
| 20.0 | 120.0 | 0.009 | 11.15 | 0.014 | 17.32 | 28.46 | 28.46 | 28.46 | 28.46 | 0.68 | |
| 25.0 | 103.8 | 0.008 | 12.06 | 0.012 | 18.74 | 30.80 | 30.80 | 30.80 | 30.80 | 0.74 | |
| 30.0 | 91.9 | 0.007 | 12.80 | 0.011 | 19.90 | 32.70 | 32.70 | 32.70 | 32.70 | 0.78 | |
| 35.0 | 82.6 | 0.006 | 13.43 | 0.010 | 20.86 | 34.29 | 34.29 | 34.29 | 34.29 | 0.82 | |
| 40.0 | 75.1 | 0.006 | 13.96 | 0.009 | 21.70 | 35.66 | 35.66 | 35.66 | 35.66 | 0.85 | |
| 45.0 | 69.1 | 0.005 | 14.44 | 0.008 | 22.43 | 36.87 | 36.87 | 36.87 | 36.87 | 0.88 | |
| 50.0 | 64.0 | 0.005 | 14.86 | 0.008 | 23.08 | 37.94 | 37.94 | 37.94 | 37.94 | 0.91 | |
| 55.0 | 59.6 | 0.005 | 15.24 | 0.007 | 23.67 | 38.91 | 38.91 | 38.91 | 38.91 | 0.93 | |
| 60.0 | 55.9 | 0.004 | 15.58 | 0.007 | 24.21 | 39.79 | 39.79 | 39.79 | 39.79 | 0.95 | |
| 65.0 | 52.6 | 0.004 | 15.90 | 0.006 | 24.70 | 40.60 | 40.60 | 40.60 | 40.60 | 0.97 | |
| 70.0 | 49.8 | 0.004 | 16.19 | 0.006 | 25.16 | 41.35 | 41.35 | 41.35 | 41.35 | 0.99 | |
| 75.0 | 47.3 | 0.004 | 16.47 | 0.006 | 25.58 | 42.05 | 42.05 | 42.05 | 42.05 | 1.00 | |
| 80.0 | 45.0 | 0.003 | 16.72 | 0.005 | 25.98 | 42.70 | 42.70 | 42.70 | 42.70 | 1.02 | |
| 85.0 | 43.0 | 0.003 | 16.96 | 0.005 | 26.36 | 43.32 | 43.32 | 43.32 | 43.32 | 1.03 | |
| 90.0 | 41.1 | 0.003 | 17.19 | 0.005 | 26.71 | 43.90 | 43.90 | 43.90 | 43.90 | 1.05 | |
| 95.0 | 39.4 | 0.003 | 17.40 | 0.005 | 27.04 | 44.45 | 44.45 | 44.45 | 44.45 | 1.06 | |
| 100.0 | 37.9 | 0.003 | 17.61 | 0.005 | 27.36 | 44.97 | 44.97 | 44.97 | 44.97 | 1.07 | |
| 105.0 | 36.5 | 0.003 | 17.80 | 0.004 | 27.66 | 45.47 | 45.47 | 45.47 | 45.47 | 1.09 | |
| 110.0 | 35.2 | 0.003 | 17.99 | 0.004 | 27.95 | 45.94 | 45.94 | 45.94 | 45.94 | 1.10 | |
| 115.0 | 34.0 | 0.003 | 18.17 | 0.004 | 28.23 | 46.40 | 46.40 | 46.40 | 46.40 | 1.11 | |
| 120.0 | 32.9 | 0.003 | 18.34 | 0.004 | 28.50 | 46.83 | 46.83 | 46.83 | 46.83 | 1.12 | |
| 125.0 | 31.9 | 0.002 | 18.50 | 0.004 | 28.75 | 47.25 | 47.25 | 47.25 | 47.25 | 1.13 | |
| 130.0 | 30.9 | 0.002 | 18.66 | 0.004 | 29.00 | 47.66 | 47.66 | 47.66 | 47.66 | 1.14 | |
| 135.0 | 30.0 | 0.002 | 18.81 | 0.004 | 29.23 | 48.05 | 48.05 | 48.05 | 48.05 | 1.15 | |
| 140.0 | 29.2 | 0.002 | 18.96 | 0.004 | 29.46 | 48.42 | 48.42 | 48.42 | 48.42 | 1.16 | |
| 145.0 | 28.4 | 0.002 | 19.10 | 0.003 | 29.68 | 48.79 | 48.79 | 48.79 | 48.79 | 1.16 | |
| 150.0 | 27.6 | 0.002 | 19.24 | 0.003 | 29.90 | 49.14 | 49.14 | 49.14 | 49.14 | 1.17 | |
| 155.0 | 26.9 | 0.002 | 19.37 | 0.003 | 30.10 | 49.48 | 49.48 | 49.48 | 49.48 | 1.18 | |
| 160.0 | 26.2 | 0.002 | 19.50 | 0.003 | 30.31 | 49.81 | 49.81 | 49.81 | 49.81 | 1.19 | |
| 165.0 | 25.6 | 0.002 | 19.63 | 0.003 | 30.50 | 50.13 | 50.13 | 50.13 | 50.13 | 1.20 | |
| 170.0 | 25.0 | 0.002 | 19.75 | 0.003 | 30.69 | 50.45 | 50.45 | 50.45 | 50.45 | 1.20 | |
| 175.0 | 24.4 | 0.002 | 19.87 | 0.003 | 30.88 | 50.75 | 50.75 | 50.75 | 50.75 | 1.21 | |
| 180.0 | 23.9 | 0.002 | 19.99 | 0.003 | 31.06 | 51.05 | 51.05 | 51.05 | 51.05 | 1.22 | |
| 185.0 | 23.4 | 0.002 | 20.10 | 0.003 | 31.23 | 51.34 | 51.34 | 51.34 | 51.34 | 1.23 | |
| 190.0 | 22.9 | 0.002 | 20.21 | 0.003 | 31.41 | 51.62 | 51.62 | 51.62 | 51.62 | 1.23 | |
| 195.0 | 22.4 | 0.002 | 20.32 | 0.003 | 31.57 | 51.89 | 51.89 | 51.89 | 51.89 | 1.24 | |
| 200.0 | 22.0 | 0.002 | 20.43 | 0.003 | 31.74 | 52.16 | 52.16 | 52.16 | 52.16 | 1.25 | |
| 205.0 | 21.6 | 0.002 | 20.53 | 0.003 | 31.90 | 52.43 | 52.43 | 52.43 | 52.43 | 1.25 | |
| 210.0 | 21.1 | 0.002 | 20.63 | 0.003 | 32.05 | 52.68 | 52.68 | 52.68 | 52.68 | 1.26 | |
| 215.0 | 20.8 | 0.002 | 20.73 | 0.002 | 32.21 | 52.93 | 52.93 | 52.93 | 52.93 | 1.26 | |
| 220.0 | 20.4 | 0.002 | 20.82 | 0.002 | 32.36 | 53.18 | 53.18 | 53.18 | 53.18 | 1.27 | |
| 225.0 | 20.0 | 0.002 | 20.92 | 0.002 | 32.50 | 53.42 | 53.42 | 53.42 | 53.42 | 1.28 | |
| 230.0 | 19.7 | 0.002 | 21.01 | 0.002 | 32.65 | 53.66 | 53.66 | 53.66 | 53.66 | 1.28 | |
| 235.0 | 19.3 | 0.001 | 21.10 | 0.002 | 32.79 | 53.89 | 53.89 | 53.89 | 53.89 | 1.29 | |
| 240.0 | 19.0 | 0.001 | 21.19 | 0.002 | 32.93 | 54.12 | 54.12 | 54.12 | 54.12 | 1.29 | |



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

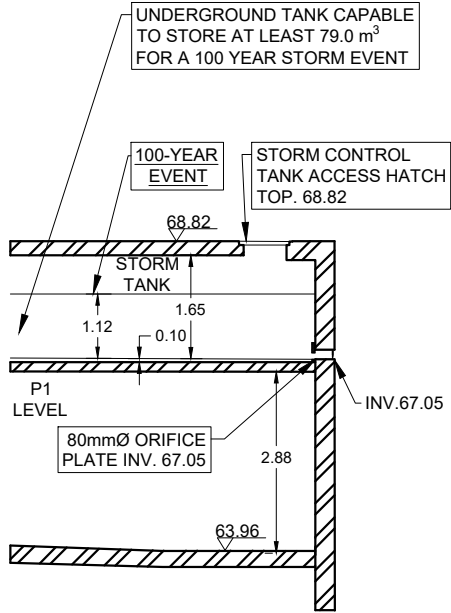
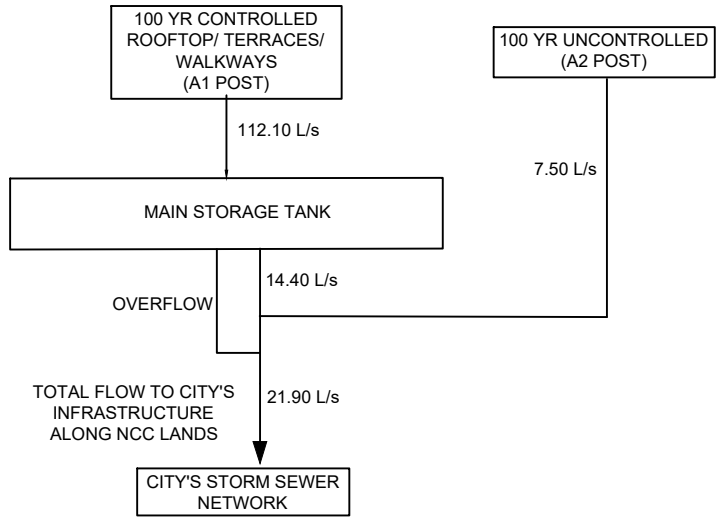


Water Quality Calculations

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 = 79.0 m³
 Tank Area = 70.0 m²

NOTE: TANK DESIGN TO BE VERIFIED BY BUILDING MECHANICAL CONSULTANT



TANK DESIGN
 RESIDENTIAL USE DEVELOPMENT
 50 THE DRIVEWAY
 OTTAWA, ONTARIO

150 Bermondsey Road, Toronto, Ontario M4A 1Y1

DATE: JANUARY 2023
 SCALE: N.T.S.

PROJECT No: UD22-093
 FIGURE No: FIG 3

Appendix D

Sanitary Data Analysis



COMBINED SEWER DESIGN SHEET
50 The Driveway
CITY OF OTTAWA

| LOCATION | SECTION (ha.) | RESIDENTIAL | | | | | | | | | | | COMMERCIAL | | | INFILTRATION | | SEWER DESIGN | | | | | | |
|---|------------------|----------------------------------|---|------------------|--------------------|-----------------|-----------------|-----------------|------------------------|------------------------------|---|-----------------------|----------------------|--------------------------|---|-------------------------------|-------------------------|------------------------------|-------------------------|-----------------|----------------|-----------|--------------------------------------|--------------------------|
| | | 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 | 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 | | | | | | | | | | | | | | | | | | | | | | | | |
| Institutional (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% |
| Average Residential Flow Rate - 280 Litres / capita / day | | | | | | | | | | | Infiltration Allowance (Dry Weather) - 0.05 Litres / s / gross ha | | | | | | | | | | | | | |
| Average Daily Flow Commercial - 50,000 Litres / gross ha / day | | | | | | | | | | | Infiltration Allowance (Wet Weather) - 0.28 Litres / s / gross ha | | | | | | | | | | | | | |
| Average Daily Flow Institutional - 50,000 Litres / gross ha / day | | | | | | | | | | | Infiltration Allowance (Total I/I) - 0.33 Litres / s / gross ha | | | | | | | | | | | | | |
| Average Daily Flow Industrial - 35,000 Litres / gross ha / day | | | | | | | | | | | Peaking Factor = $1 + [14 / (4 + P^{0.5})]$, P=Population in thousands | | | | | | | | | | | | | |
| Site Area: 0.296 Ha | | | | | | | | | | | Total Net Flow towards QED ROW= 1.80 | | | | | | | | | | | | | |



Prepared By: Dimitra Frysalis, 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

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 | $F(No.1) = 200C \sqrt{A}$ |
| F = 8,000 L/min | $F(No.1) \text{ Round to nearest } 1000 \text{ l/min}$ |

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 $F(No.2) = F(No.1) \times \text{occupancy reduction/charge}(\%)$

3 Sprinkler Reduction

30% Reduction for NFPA Sprinkler System

F = 4760 l/min $F(No.3) = F(No.2) \times \text{sprinkler reduction}(\%)$

4 Separation Charge

0% West >45m

5% North 30.1m to 45m

11% South 10.1m to 20m

11% East 10.1m to 20m

27% Total Separation Charge

F = 1,836.00 L/min $F(No.4) = F(No.2) \times \text{separation charge}(\%)$

F = 6,596.00 L/min $F(tot) = F(No.3) + F(No.4)$

F = 7,000 L/min $F(tot) \text{ Round to nearest } 1000 \text{ l/min}$

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 Residential 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



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

[CAUTION] This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. If in doubt, please forward suspicious emails to Helpdesk.

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



Lewis Connection

QED Connection

Legend

- PRIVATE
- PUBLIC

