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# Site Servicing Report

# 50 The Driveway, Ottawa ON

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ENGINEERS · ARCHITECTS · PLANNERS

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# 1.0 INTRODUCTION

## 1.1 Background

In 2021, J.L. Richards & Associates Limited (JLR) was retained by Canadian Nurses Association (CAN) to prepare an Assessment of Adequacy of Public Services (AAPS) Report and functional-level Drawings of municipal infrastructure in support of a 9-storey mid-rise residential building located at 50 The Driveway within the City of Ottawa. The AAPS Report (revised December, 2021) was prepared as a supporting document to a Zoning By-Law Amendment (ZBLA) and demonstrated that the subject property was serviceable from existing infrastructure. The AAPS Report was subsequently approved by the City of Ottawa.

Recently, Main + Main (M+M) retained the services of JLR to prepare engineering documentation in support of a Site Plan Application. The documents include a Site Servicing Report and detailed design Drawings of municipal infrastructure to support the 9-storey mid-rise residential building. This Site Servicing Report (SSR) also outlines the design objectives and criteria, servicing constraints and strategies for developing the subject lands with water, wastewater, storm and stormwater management services in accordance with the following:

- i) the November 2009 Servicing Study Guidelines for Development Applications in the City of Ottawa (City)
- ii) the Ottawa Sewer Design Guidelines (2012) and associated Technical Bulletins (Section 1.4)
- iii) the approved Assessment of Adequacy of Public Services Report (December 2021)
- iv) the discussions held during pre-consultation meetings with City staff, and
- v) subsequent Email correspondences with the City of Ottawa.

A copy of the Site Plan, Unit Breakdown and Topographical Survey is included in Appendix A while a copy of the two pre-consultation meeting notes and follow-up Email correspondences have been included in Appendix B.

## 1.2 Site Description and Background

The subject property is located within the urban limits of the City of Ottawa, in the area referred to as the “Golden Triangle”. The project site is bounded by the Queens Elizabeth Way (QEW) to the east, by Lewis Street to the north, and by existing residential units along the southern and western perimeter.

As illustrated on Figure 1 (below), 50 The Driveway currently consists of an existing building and an elevated tower and by an adjacent parking area. The site currently consists of a combination of asphalt and building with an L-shaped landscaped area surrounding the building.

**Figure 1: Site Plan Location**

The subject parcel accounts for ±2,957 m$^2$. The subject property will be rezoned to a "Residential Fifth Density, Subzone 'B' (R5B)" to permit the proposed nine (9) storey mid-rise development. The City of Ottawa has not yet sent out a Notice of Passing for the Zoning By-Law Amendment, which was approved by City of Ottawa Council on March 23rd, 2022. When this occurs, a unique Urban Exception number and Zoning Schedule number will be assigned to the approved zoning. The "façade" of the existing building and the rooftop "heritage lantern" are considered heritage elements that will be identified through a Heritage easement that will run with the title of the land. These heritage elements will be integrated through the proposed redevelopment.

Appendix A includes a breakdown of the unit type being contemplated for the 9-storey residential building as follows:

- No. 1 Bedroom: 6
- No. 1 Bedroom + Den: 17
- No. 2 Bedroom: 10
- No. 2 Bedroom + Den: 17
- No. Large 2 Bedroom + Den: 27

Based on the above unit breakdown, a total of 77 units are being proposed.

### 1.3 Existing Infrastructure

A review of existing services was carried out in the vicinity of the above-noted subject site to investigate the servicing requirements for the Condominium Tower. The following Drawings and topographical survey were reviewed for the purpose of identifying the infrastructure bounding the subject property (refer to Appendix C for copy of Drawings):

- City of Ottawa Utility Drawing 21-0725-UCC

- Regional Municipality of Ottawa-Carleton Drawing 911-P (as-built); and

- Other Drawings in the vicinity of the Site.

Based on the review of the above information, the topographical survey and the information presented on “geoOttawa”, the following infrastructure has been identified to exist within the Lewis Street and Queen Elizabeth Drive (QED) Right-Of-Way (R.O.W.):

**Watermains:**

- 152 mm diameter ductile iron watermain (circ 1978) located within Lewis Street ROW
- 305 mm diameter unlined cast iron watermain (circ 1913) located within QED ROW, within NCC property.

Based on the review of “geoOttawa”, the following four (4) hydrants are located within the prescribed distances of ISTB-2018-02, in close proximity of the subject property:

- One (1) hydrant is located within 15 m from the northern corner of the property at the intersection of Lewis Street and The Driveway
- One (1) hydrant is located within 55 m from the southwest corner of the property at the Robert Street and Lewis Street intersection
- One (1) hydrant is located within 100 m from the southwest corner of the property in front of unit 43 Gilmour Street and
- One (1) hydrant along Lewis Street, in front of civic address 22 Lewis Street. The hydrant is located within 115 m from the building.

Supply from the above-noted hydrants has been estimated based on the limitations prescribed in ISTDB-2018-02. Based on those supply, a summary sheet was prepared, which is included at the end of Appendix D3 as information only.

**Combined Sewers:**

- 1800 mm diameter combined sewer (circ 1899) located within Lewis Street ROW (flowing east). This combined sewer eventually discharges into to the Somerset trunk sewer, which in turn outlets into the Rideau River Collector (RRC); and
- 305 mm diameter combined sewer (circ 1913) located within the QED ROW. This combined sewer outlets to the 1800 mm diameter combined sewer noted above.

**Storm Sewers:**

- There is an on-site catch basin (CB) in the parking area near the farthest point away from Lewis Street. This CB appears to be connected to the Lewis Street 1800 mm diameter combined sewer

Figure 2 below shows the existing infrastructure bounding the subject property.

**Figure 2: Existing Infrastructure**


## 1.4 Existing Servicing

Dye testing conducted by City staff on June 11, 2021 to determine the dedicated outlet of the existing building. Based on the test, it was confirmed that the existing building (sanitary lateral) is currently serviced by the 305 mm diameter combined sewer located within the QED ROW (refer to E-Mail correspondence in Appendix B). The 305 mm diameter combined sewer outlets into the 1800 mm diameter combined sewer (circ 1899).

Based on a site visit completed by JLR, the alignment of all the building laterals (water and combined) were found to leave the northern end of the building (near the Lewis Street and QED intersection) and were found to head towards the linear infrastructure along the QED ROW.

Based on the review of geoOttawa, an initial version of the building was shown on the 1928 aerial photography. Given that a building existed in 1928 and that the existing Lewis Street 152 mm diameter watermain was only constructed in 1978, the existing building water lateral was determined to also be connected to the QED 305 mm diameter watermain (circ 1913).

A CCTV inspection was sourced by M+M. The CCTV revealed that the parking lot catch basin did not connect to the Lewis Street 1800 mm combined sewer. However, this existing catch basin is part of the serviced area of the QED 300 mm combined sewer.

Based on the above-noted information, the following connections currently exist:

**QED:**

- Existing 50 mm diameter water lateral connecting to the QED 305 mm diameter water.

- Existing 75 mm sanitary lateral connecting to the QED 305 mm diameter combined sewer.
- Existing 150 mm diameter storm lateral connecting to the QED 305 mm diameter combined sewer.
- Existing catch basin lead from parking area that is part of the serviced area of the QED 300 mm diameter combined sewer.
- A number of areas sheet flow towards the QED 300 mm diameter combined sewer.

**Lewis Street:**

- A number of areas sheet flows towards the Lewis Street 1800 mm diameter combined sewer.

### 1.5 Proposed Servicing

The existing servicing and connections to the ROW infrastructure have been summarized in Section 1.3 and 1.4.

In 2022, M+M sourced a CCTV inspection to confirm the re-usability of the existing services. Based on the proposed service requirements and the findings of the CCTV, none of the existing services will be re-used. Hence, the following servicing is proposed:

| | |
|---|---|
| Water Servicing: | Replace the existing 50 mm diameter water service lateral by proposed twin 200 mm diameter watermains (refer to Drawing S1) to connect to the existing QED 305 mm diameter watermain. The twin 200 mm diameter watermains are to be installed with an isolation valve between each lateral to provide isolation during a watermain break. The twin 200 mm diameter watermain connection is consistent with the existing watermain connection point to the distribution system. |
| Wastewater: | Replace the existing 75 mm sanitary service lateral by a proposed 150 mm diameter sanitary sewer connecting to the existing QED 305 mm diameter combined sewer. The proposed connection point is consistent with the connection point of the existing 75 mm diameter sanitary lateral. |
| Storm: | Proposed rooftop drain system to be connected in the building and to outlet to a proposed 200 mm diameter storm sewer. This storm sewer will also serve as the storm outlet for the surrounding amenity areas and to the proposed underground cistern. All contributions to the proposed 200 mm diameter storm sewer will be controlled by inlet control devices (ICDs), by rooftop drains or by an underground cistern. |

This Site Servicing Report and Drawings were prepared in accordance with the following:

Ottawa Sewer Design Guidelines (October 2012) complete with the following Technical Bulletins

- ISTB-2012-01
- ISTDB-2014-01
- ISTDB-2016-01
- ISTDB-2018-01

- ISTDB-2018-04
- ISTDB-2019-01; and
- ISTDB-2019-02

City of Ottawa Water Distribution Guidelines complete with the following Technical Bulletins:

- ISTDB-2010-02
- ISTDB-2014-02
- ISTDB-2018-02; and
- ISTDB-2021-03

Detail Drawings as well as well as Sewer Material Specifications including:

- Sewer Connection (2003-513) and Sewer Use (2003-514) By-Laws
- Watermains/Services Material Specifications as well as Water and Road Standard Detail Drawings
- Water By-Law (2018-167)

### 1.6 Pre-Consultation, Permits and Approvals

An initial pre-consultation meeting was held on May 10, 2021. A subsequent pre-consultation meeting was also held with the City of Ottawa on March 29, 2022. The notes of the meetings as well as a copy of subsequent E-Mail correspondences are included in Appendix B. The City of Ottawa Development Servicing Study Checklist was prepared and included at the end of Appendix B. The project will require Site Plan approval and the necessary permitting from the NCC will be obtained by others.

## 2.0 WATER SERVICING

### 2.1 Existing Condition

The subject site is located within Pressure Zone 1W of the City of Ottawa's water distribution system. Potable water is supplied to Zone 1W from the high lift pumps located at the Lemieux Island WPP, the Fleet Street PS and the Britannia WPP high lift pumps. Potable water from these sources is then transmitted via the Gloucester Street 736 mm diameter feedermain to local watermains and eventually to the subject property.

As noted in Section 1.4, supply to the existing building originates from a 50 mm diameter copper lateral which is connected to the 305 mm diameter watermain along the QED ROW.

### 2.2 Water Supply and Design Criteria

Any additions to the City of Ottawa water distribution system are to be designed in accordance with the Ottawa Design Guidelines (ODG) for Water Distribution (July 2010), and Technical Bulletins ISDTB-2014-02, ISTB-2018-02 and ISTDB-2021-03.

The proposed watermains were designed to satisfy the pressure constraints for the peak hour demand, maximum day demand plus fire flow, and maximum hourly demand. Water demands are to be estimated to the water design criteria listed in Table 1 below.

**Table 1: Water Design Criteria**

| Design Criteria | Design Value |
|---|---|
| **Population > 500** | |
| Residential average demand | 280 L/cap/day |
| Residential maximum demand | 2.5 x Avg |
| Residential peak hour | 2.2 x Max Day |
| Density Single Family | 3.4 |
| Density Semi & townhouse | 2.7 |
| Density (apt) 1-bedroom | 1.4 |
| Density (apt) 2-bedroom | 2.1 |
| Density (apt) 3-bedroom | 3.1 |
| **Population < 500** | |
| Residential average demand | 350 L/cap/day (MOE) |
| Peaking Factors | MOE Table 3-3 |
| **Fire Flow Requirements** | |
| Municipal ROW | F.U.S. |
| Within Private Property | OBC |
| **Pressure/Flow** | |
| Peak hour | >275 kPa (40 psi) |
| Maximum day plus fire flow | >140 kPa (20 psi) |
| Minimum hour (maximum HGL) | <552 kPa (80 psi) |

Based on the unit breakdown (Appendix A), a total population of 145.6 was estimated using the densities listed in the table above. To allow some flexibility with the unit type, a targeted population of 155 was used to calculate water demands and corresponding headlosses.

Given that a targeted population of 155 is less than 500, water demands, and corresponding peaking factors were calculated based on Table 3-3 of the MOE Guidelines. The calculated demands are summarized in a spreadsheet included in Appendix D1. This calculation showed a maximum day demand of 3.05 L/s and peak hour demand of 4.60 L/s. In addition, the calculations showed an average daily consumption of 51.94 $m^3$, thereby exceeding the 50 $m^3$ threshold. Consequently, twin 200 mm diameter watermains are proposed with an isolation valve in between the barrels as shown on Drawing S1.

## 2.3 Required Fire Flow

In the City of Ottawa, water supply for fire protection is governed by the various Technical Bulletins as listed in Section 2.2. For the required fire flow (RFF), water supply within the municipal right-of-way (ROW) is to be estimated in accordance with the Water Supply for Public Fire Protection Guidelines (1999) developed by the Fire Underwriters Survey (FUS) as well as Technical Bulletins ISDTB-2014-02, ISTB-2018-02 and ISTB-2021-03.

However, the latest Technical Bulletin (ISTB-2021-03) recognizes that fire protection for buildings within private property serviced by a lateral can be estimated in accordance with the Ontario Building Code (OBC), if the RFF, does not exceed the maximum fire flow threshold. Page 1 of ISTDB-2021-03 reads as follows:

> "The requirements for levels of fire protection on private property in urban areas are covered in Section 7.2.11 of the OBC. If this approach yields a fire flow greater than 9,000 L/min then the Fire Underwriters Survey method shall be used to determine these requirements instead."

Based on the above excerpt from ISTDB-2021-03, the latest direction from the City of Ottawa with similar projects (residential condominiums) and for buildings that are equipped with a sprinkler system, the OBC requires that fire protection that incorporates a sprinkler system comply with Part 2 of Article A-3.2.5.7 of the OBC. This article reads as follows:

> "For sprinklered buildings, water supply additional to that required by the sprinkler systems should be provided for firefighting using hoses in accordance with the hose stream demands and supply durations for different hazard classifications as specified by NFPA 13."

RFF (NFPA 13)

The overall RFF was reviewed in accordance with NFPA 13. Based on this guidance, the sprinkler system allowance is to be estimated using Table 11.2.2.1 and the hose stream allowance using Table 11.2.3.1.2.

Based on the building classification, the RFF would consist of the following components:

- Sprinkler system flow = 3,200 L/min or 53.3 L/s (Table 11.2.2.1); and
- Hose stream allowance = 950 L/min or 15.83 L/s (Table 11.2.3.1.2).

When both contributions are added, the RFF for this mid-rise residential buildings is 4,150 L/min or 69.2 L/s (refer to Appendix D2 for NFPA 13's Tables 11.2.2.1 and 11.2.3.1.2). Thus, the RFF of 4,150 L/min is below the threshold of 9,000 L/min as referred to in ISTDB-2021-03. On this basis, the RFF for 50 The Driveway is governed by the OBC and set to 4,150 L/min (69.2 L/s).

RFF (Mechanical Engineer)

Coordination with the Owner's mechanical engineer determined the site-specific RFF that reflected the proposed building class and configuration, proposed sprinkler flow and the hose allowance. Based on the Email from the Owner's mechanical engineer (Appendix D2), the overall RFF would consist of the sprinkler flow of 500 GPM (31.54 L/s) derived from the density area curve method and hose allowance of 100 GPM (6.30 L/s). Hence the overall RFF for the proposed building is 600 GPM or 37.84 L/s which is lower than applying the charts noted above.

### 2.4 Headloss Calculations

A request for boundary condition was made during the preparation of the AAPS. The BC was provided by the City for both domestic demands as well as for the maximum day plus fire flow condition (refer to Appendix D2 for copy of the Email correspondence). At the time, the BC was conservatively generated based on an RFF of 250 L/s (15,000 L/min), which reflected the FUS. Based on the guidance of ISTDB-2021-03, the OBC and NFPA 13 is the governing guidance with respect to the RFF.

The proposed water servicing, as presented on Drawing S1, was evaluated under the demand scenarios listed in Section 2.3. The proposed servicing to support the nine-storey residential building consists of twin 200 mm diameter watermains that will span between the QED 305 mm diameter watermain and the building where it will reach the mechanical room, upstream of the water meter. From that location, it will branch into a domestic and sprinkler service lateral. The length of the proposed service lateral to the building is ±15 m. This length has been used to evaluate headlosses (per the Hazen-Williams method) along the service lateral for each of the water demand scenarios.

Peak Hour and Maximum Pressure Check

As shown in the Headloss Calculation Spreadsheet (Appendix D3), a pressure of 370 kPa was calculated under peak hour demand, exceeding the minimum pressure requirement of 275 kPa. Similarly, a pressure of 457 kPa was calculated under the maximum pressure check, which is below the maximum pressure constraint of 552 kPa. Therefore, both pressure constraints under domestic demands have been met as shown in Appendix D3. Thus, there is no need to incorporate a pressure reducing valve (PRV) in the mechanical room.

Maximum Day plus Fire Flow

The headloss calculation under the maximum day plus fire flow was calculated based on the following condition:

- An RFF of 4,150 L/min (69.2 L/s) estimated based on NFPA 13 (OBC) which consists of the sprinkler system allowance (per Table 11.2.2.1 of NFPA) and the hose stream allowance (per Table 11.2.3.1.2 of NFPA); and
- An RFF of 37.9 L/s (600 GPM) calculated by the Owner's mechanical engineer.

The pressure in the mechanical room was found to be 354 kPa under an RFF of 4,150 L/min per the OBC. Similarly, the pressure in the mechanical room is 357 kPa under the RFF of 37.9 L/s. Therefore, the pressure constraint of 140 kPa has been exceeded for the above-noted fire flows. Hence, the maximum day plus fire flow has been met.

Although the FUS protection is not applicable for this site per ISTDB-2021-03, the headloss calculation also shows that the FUS Fire Flow protection is achieved with an RFF of 240 L/s (14,400 L/min) as shown at the bottom of Appendix D3.

Due to the height of the building (±30 m), there will be a need to incorporate a pump which will be sized to provide domestic demands to all floors while meeting the pressure constraint of 275 kPa (40 psi). Similarly, a fire pump will also be required to provide the supply to the building's sprinkler system. Both the domestic and fire pumps will be designed by the Owner's mechanical engineer and/or sprinkler specialist.

## 2.5 Hydrants

Section 1.4 of this Report summarized the distribution system that is currently bounding the Site. Given that the mid-rise will be sprinklered, the Ontario Building Code (OBC) requires that there is an unobstructed path of travel for the firefighters from the vehicle to the fire department connection is not more 45 m. The hydrant located at the Lewis Street and The Driveway intersection is within

45 m from the water service entry with an additional three (3) hydrants in the vicinity of the project site. Hence, providing one single hydrant within 45 m from the siamese connection meets the provincial legislation (OBC).

For information purposes, a Table was prepared (Appendix D3) which summarizes the supply of the nearby hydrants that have been listed in Section 1.3. Based on the distance of each hydrant to the building, an aggregate supply of 316.6 L/s was calculated in accordance with ISTB-2018-02.

### 2.6 Summary and Conclusions

Based on the above watermain servicing details, the proposed twin 200 mm diameter watermains (refer to Drawing S1) can provide supply to meet both domestic and fire protection and meet the OBC and NFA 13 recognizing that domestic and fire pumps will be sized by the Owner's mechanical engineer.

## 3.0 WASTEWATER SERVICING

### 3.1 Existing Conditions

Currently, wastewater flows from the existing building is collected by an internal piping system that converges into the basement of the building. Based on a site visit, the wastewater lateral is a 75 mm (3 in.) diameter copper that leaves the building and discharges into the QED 305 mm diameter combined sewer. This combined sewer is connected to the Lewis Street 1800 mm diameter combined sewer.

### 3.2 Design Criteria

The sanitary service lateral for 50 The Driveway was designed based on the City of Ottawa Sewer Design Guidelines ((OSDG) - (October 2012)) and associated Technical Bulletins. Key design parameters have been summarized in Table 2.

**Table 2: Wastewater Servicing Design Criteria**

| Design Criteria | Design Value | Reference |
|---|---|---|
| Residential average flow | 280 L per capita/day | ISTB-2018-01 |
| Residential peaking factor | Harmon Formula x 0.8 | City Section 4.4.1 |
| Infiltration Allowance<br>0.05 L/s/ha (dry I/I)<br>0.28 L/s/ha (wet I/I) | 0.33 L/s/ha | ISTB-2018-01 |
| Minimum velocity | 0.6 m/s | OSDG Section 6.1.2.2 |
| Maximum velocity | 3.0 m/s | OSDG Section 6.1.2.2 |

| Design Criteria | Design Value | Reference |
|---|---|---|
| Manning Roughness Coefficient (for smooth wall pipes) | 0.013 | OSDG Section 6.1.8.2 |
| Minimum allowable slopes | Varies | OSDG Table 6.2, Section 6.1.2.2 |

### 3.3 Theoretical Sanitary Peak Flow and Proposed Sanitary Servicing

Wastewater flows from the nine-storey building will be collected by a series of internal drains that will converge into the mechanical room. The captured wastewater flows will discharge into the QED 305 mm diameter combined sewer via a proposed 150 mm diameter sanitary lateral, replacing the existing 75 mm diameter sanitary lateral. This proposed 150 mm diameter sanitary lateral will connect to SAN MH10 as indicated on Drawing S1. From SANMH10, a second 150 mm diameter sewer is proposed which will connect to the QED 300 mm diameter combined sewer.

Based on the proposed densities for apartment buildings (as recommended by the OSDG), the peak wastewater flow was calculated based on the design value of 280 L per capita per day and the targeted population of 155 as per the design parameters listed in the above Table . The peak wastewater flow of 1.88 L/s was calculated (refer to Appendix E for Detailed Wastewater Flow Calculations) based on a peaking factor of 3.549, and a total infiltration allowance of 0.10 L/s calculated based on 0.05 L/s/ha (dry I/I) and (0.28 L/s/ha (wet I/I), in accordance with the OSDG and ISTB-2018-01.

As shown on Drawing S1, the 150 mm diameter sanitary lateral from the building to SANMH10 is proposed at a slope of 2%, while the 150 mm diameter sanitary lateral from SANMH10 to the 300 mm diameter QED combined sewer is proposed at 0.6%. Thus, the laterals can provide conveyance of 22.5 L/s and 12.3 L/s, respectively exceeding the peak design flow of 1.88 L/s. Both laterals are also found to exceed the cleansing velocity of 0.6 m/s.

### 3.4 Summary and Conclusions

Based on the above wastewater servicing details, the proposed 150 mm diameter sanitary laterals can provide the conveyance of the theoretical peak wastewater flows to the 305 mm diameter QED combined sewer as depicted on the Servicing Drawing S1.

## 4.0 STORM SERVICING AND STORMWATER MANAGEMENT

### 4.1 Existing Conditions

A review of the existing condition servicing was made by means of a site visit and the findings of the CCTV. It was determined that rooftop drainage was collected by a series of rooftop drains that merged into a 150 mm (6 in.) diameter storm sewer in the basement. From the basement, the 150 mm diameter lateral connected into the QED 305 mm diameter combined sewer.

The review of the aerial photography (Figure 1) and topographical survey (Appendix A) showed that most of the Site consists of hard surfaces; i) the building, ii) an area covered by interlock, and

iii) an asphalted parking area. There is also a large “L-Shape” grassed area bounding the southeastern corner of the building which also sheet flows towards the QED. An Existing Condition Drainage Plan, reflecting the existing condition, is shown in Appendix F1 and in the upper left corner of Drawing STM. This Drawing shows the various types of surfaces and respective outlet are displayed for the existing surfaces.

Under the post-development condition, runoff generated by the project site will be accommodated by internal drains and storm sewers. It is proposed to maintain the existing condition drainage breakdown, as requested by the City whereby the flows from the building and most of the amenity areas will discharge to the QED 305 mm diameter combined sewer while a small mixed-use area west of the building envelope will be sheet flow onto the Lewis Street 1800 mm diameter combined sewer. Runoff will be controlled by means of inlet control devices (ICDs), rooftop restrictors, and a cistern completed with its own restrictor such to meet the prescribed release rates.

### 4.2 Storm Discharge Criteria

This Site Servicing Report and detailed design drawings have been prepared based on the discussions held at pre-consultation meetings and subsequent Email correspondences (Appendix B). The storm design criteria used in this design is based on the following:

- The allowable peak flow is to be estimated based on a 1:5-year intensity-duration-frequency (IDF) curve per the E-mail included in Appendix B. The 1:5-year intensity is to be calculated based on the Time of Concentration reflecting existing condition. As per the City’s requirement, the Runoff Coefficient (C-Factor) should reflect the existing condition surfaces and not exceed 0.40. Given that the peak wastewater flows were estimated to be less than 2 L/s, the City of Ottawa indicated that it did not have to be subtracted from the allowable peak flow.

- The post-development peak flows shall be controlled up to the 1:100-year storm and achieve the allowable peak flow by means of on-site storage.

### 4.3 Allowable Release Rate

Storm servicing and stormwater management for the subject property was developed to limit the 1:100-year post-development flow from the subject property to the prescribed flows at each of the outlets (Lewis Street and QED). To evaluate the allowable peak flows, the various areas delineated and on Existing Condition Drainage Plan (Appendix F1 and Drawing D-STM), was used as well as their Runoff Coefficient (C-Factor). As indicated on that Drawing, C-Factors of 0.20 and 0.90 were assigned to all grassed surfaces and impervious surfaces, respectively.

The time of concentration (Tc) was calculated for the QED and Lewis Street outlets. Based on calculated Tc of 16.56 mins and 15.70 mins, the allowable peak flow (1:5-year) was estimated at 18.92 L/s and 7.23 L/s for the QED and Lewis Street, respectively. The information supporting the Tc calculation as well as the Existing Condition Peak Flow calculations are included in Appendix F2.

### 4.4 Storm Design Criteria

The general storm and stormwater servicing constraints used to develop detailed design for 50 The Driveway are listed in Table below.

**Table 3: Storm Servicing Design Criteria**

| General Design Criteria |
|---|
| Storm drains are to be designed by the mechanical engineer to convey the calculated flows presented herein in accordance with the Ontario Building Code. The calculated peak flows were estimated with the Rational Method and the City of Ottawa Intensity-Duration-Frequency (IDF) curves. |
| Post-development Peak flows estimated based on an inlet time of ten (10) minutes, as per the Technical Bulletin ISDTB-2012-4. |
| Calculated peak flows to be estimated based on weighted average C-Factors. The weighted C-Factors have been calculated based on 0.90 for all hard surfaces and 0.20 for all landscaped areas. |
| The 1:100-year peak flows to be detained by means of on-site retention measures; i) at grade surface ponding, ii) rooftop storage, or iii) stormwater cistern. |
| Provide measures to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control. |

### 4.5 Proposed Stormwater Management Solution and Calculations

#### 4.5.1 Water Quantity Requirements

Storm servicing and stormwater management for 50 The Driveway was developed to limit the 1:100-year post-development flows at both outlets. As part of the proposed grading, several low points and restrictions were introduced along the areas surrounding the building envelope, where feasible and practical. The four (4) low points, denoted as LP1 to LP4, along with the restrictors provide on-site retention to meet the allowable peak flow rates.

Proposed storm sewers upstream of restrictors were also considered to supplement the at-grade surface storage. In terms of restrictors, one Hydrovex 75-VHV-1 is proposed at CB02/ICD1, one Hydrovex 50-VHV-1 is proposed at CB05/ICD2, and one Hydrovex 50-VHV-1 is proposed at CB06/ICD3 (refer to Drawing STM for location of ICD and SWM calculation in Appendix F2.

In regard to other stormwater management measures, most of the building's runoff will be conveyed and accommodated by a common underground cistern while rooftop restrictors/storage will only be implemented for the mechanical penthouse. The cistern will accommodate most of Area QED.1, and all of Area QED.2 and Area QED.3 (refer to Drawing STM for areas). Storage and rooftop restriction is proposed for the mechanical penthouse. Two (2) Watts roof drains (or equivalent) is proposed, each one delivering 0.3165 L/s when the weir is fully closed (150 mm depth). Based on 60% of the penthouse being devoted to rooftop storage (150 mm depth), the area would provide

20.7 $m^3$ which is sufficient to detain both the 1:100-year and climate change event (Appendix F2).

The underground cistern will accommodate the lower terrace (9th floor), and the rooftop flows from the 5th to 8th level as well as the 2nd roof level. These flows will drain uncontrolled to the common parking lot cistern for detention. The sizing of the underground cistern was carried out using the Modified Rational Method using 50% of the targeted flow rate as prescribed by the City of Ottawa. Thus, stormwater management will be achieved by rooftop restriction, surface storage, pipe storage and underground cistern.

Detailed Design Drawings to support the Stormwater Management (SWM) calculations include:

- Servicing Plan (Drawing S1)
- Drainage and Stormwater Management Plan (Drawing DST)
- Removals, Reinstatements, Erosion and Sediment Control (Drawing RESC); and
- Grading Plan (Drawing G1).

The above-noted Drawings have been included at the back of the Report. It should be noted that Drawing DST, denotes in boxes the drainage area as well as the intended drainage outlet. As an example, “L.1” refers to Area 1 that outlets to Lewis Street while “QED.1” refers to Drainage Area 1 that drains to the QED combined sewer.

C-Factors used in the SWM calculations (Appendix F2) have been based on a weighted C-Factor approach; all hard surfaces (building, interlock, and concrete) have been assigned a Runoff-Coefficient of 0.90 while the grassed area a C-Factor of 0.20. Mixed surfaces have been assigned a conservative C-Factor of 0.50.

### 4.5.2 Storm Servicing and Stormwater Management

Proposed storm laterals and storm sewers are shown on Drawing S1. Roof runoff from the cistern will be conveyed by a proposed 200 mm diameter storm lateral set at a slope of 2% connecting to STMMH02. This lateral provides a conveyance of 48 L/s. The storm system surrounding the building envelope consists of 250 mm diameter storm sewers (HDPE) at 0.60% (48 L/s) and 0.65% (50 L/s). The most downstream sewers consist of standard 250 mm diameter PVC sewers, from STMH02 to STMMH03 (slope of 1% - 62 L/s), and from STMMH03 to the QED 300 mm diameter combined sewer (slope of 0.61% - 48.5 L/s). All proposed sewers can provide the conveyance of the 1:100-year flows summarized in the Tables below.

To assess storage volume requirements for the rooftop and at-grade mixed areas, the Modified Rational Method (MRM) was used. An evaluation of the stormwater management system design was carried out under both the 1:100-year and CCE storms which has been documented in Appendix F2. Findings under the 1:100-year design event are summarized below (refer to Appendix F2 for Post-Development Stormwater Management Calculations):

**1:100-year Summary Results**

QED Outlet:

| Area Number | Tributary Area (m2) | Controlled Peak Flow (L/s) | Uncontrolled Peak Flow (L/s) | 1:100yr Storage Required ($m^3$) | Storage Provided ($m^3$) |
|---|---|---|---|---|---|
| 9th Floor Mechanical Terrace | 230 | 0.63 | N/A | 9.40 | 20.70 |
| QED.1 (Lower Terrace) + QED.2 + QED.3 | 1,420 | 7.05 | N/A | 59.85 | > 59.85 |
| QED.4 | 422 | 3.00 | N/A | 4.04 | 5.71 |
| QED.5 | 576 | 5.70 | N/A | 5.17 | 6.92 |
| QED.6 | 52 | N/A | 0.52 | N/A | N/A |
| QED.7 | 123 | 2.00 | N/A | 2.16 | 2.39 |
| Total | 2,248 | 18.38 | 0.52 | 80.62 | 95.57 |

Lewis Street Outlet:

| Area Number | Area (m2) | Controlled Peak Flow | Uncontrolled Peak Flow | Storage Required | Storage Provided |
|---|---|---|---|---|---|
| L.1 | 134 | N/A | 5.99 | N/A | N/A |
| Total | 134 | N/A | 5.99 | N/A | N/A |

Based on the SWM calculations, the 1:100-year post-development peak flow at both the QED and Lewis Street outlets are below the allowable 1:5-year peak flows of 18.92 L/s (18.90 L/s) and 7.23 L/s (5.99 L/s) at the QED and Lewis, respectively. Hence, the post-development peak flows under the 1:100-year design storm will be limited below those under the 1:5-year existing condition for both outlets. The SWM solution will provide a reduction in flows at both outlets.

**Climate Change Event**

SWM calculations were also carried out to assess the climate change event (CCE). Results of these calculations are summarized below (refer to Appendix F2):

Mechanical Penthouse (part of QED.1)
Based on a depth of storage of 150 mm and 60% of the roof being devoted to storage, 20.70 $m^3$ can be provided. The storage volume requirement under the CCE was estimated at 12.58 $m^3$. Thus, the CCE can be accommodated by the proposed rooftop storage.

Part of Area QED.1 + QED.2 + QED.3

Runoff from these areas will be accommodated by a common underground cistern located in the parking area (location and configuration by the Owner's mechanical engineer). Based on the summary results shown in Appendix F2, a cistern of 59.85 $m^3$ will detain the 1:100-year design storm. Due to space constraints in the basement, the mechanical engineer will incorporate an overflow sewer capable of accommodating a peak flow of 3.82 L/s which is the difference between the CCE peak flow and the 1:100-year peak flow. Hence, the cistern and overflow sewer will accommodate the CCE.

Area QED.4

Runoff from Area QED.4 will be intercepted by a combination of storage; surface, pipe and catch basins. The SWM Calculations (Appendix F2) show a flow of 1.76 L/s beyond the 1:100-year peak flow of 7.04 L/s that would sheet flow along QED.6. Based on a 9.8 m width, the additional flow of 1.76 L/s would represent a depth of flow less than 0.01 m. Thus, the additional flow during the CCE can easily be accommodated by the area bounding the QED.4 (refer to Appendix F2 for depth of flow).

Area QED.5

Runoff from Area QED.5 will be intercepted by a combination of storage; surface, pipe and catch basins. The SWM Calculations (Appendix F2) show a flow of 2.86 L/s beyond the 1:100-year peak flow of 11.44 L/s that would sheet flow towards Lewis Street. Based on a 4.9 m width, the additional flow of 2.86 L/s would represent a depth of flow less than 0.01 m. Thus, the additional flow during the CCE can easily be accommodated by Lewis Street (refer to Appendix F2 for depth of flow).

Area QED.6

Runoff from Area QED.6 will sheet flow along the strip of grass along the northern perimeter of the site. Due to the topographical constraints, there is no opportunity to detain the flows. The SWM Calculations (Appendix F2) show a flow of 0.13 L/s beyond the 1:100-year peak flow of 0.52 L/s that would sheet flow along QED.6 towards Lewis Street. Based on a 5 m width, the additional flow of 0.13 L/s would represent a depth of flow less than 0.01 m. Thus, the additional flow during the CCE can be accommodated by the area bounding the QED.6 (refer to Appendix F2 for depth of flow).

Area QED.7

Runoff from Area QED.7 will be intercepted by surface storage and the actual storage of the proposed trench drain. The SWM Calculations (Appendix F2) show a flow of 1.10 L/s beyond the 1:100-year peak flow of 4.40 L/s that would sheet flow along QED.7 to Lewis Street. Based on a 5 m width, the additional flow of 1.10 L/s would represent a depth of flow less than 0.01 m. Thus, the additional flow during the CCE can be accommodated by QED.7 (refer to Appendix F2 for depth of flow).

Area L.1

During the CCE, a flow of 7.48 L/s would sheet flow along this strip of hard surface to Lewis Street. Based on a 35 m width, the flow of 7.48 L/s would represent a flow depth of less than 0.01 m. Thus, the peak flow under the CCE can easily be accommodated by Lewis Street.

#### 4.5.3 Water Quality

The RVCA was consulted to determine whether quality measures were necessary for this redevelopment. Based on an E-Mail correspondence from the RVCA (Appendix B), the servicing does not require any quality measures given the types of surfaces that are proposed and the fact that the Site's runoff is tributary to combined sewers.

### 4.6 Summary and Conclusions

As demonstrated above, the storm and stormwater servicing as well as grading will meet the allowable peak flow of 18.92 L/s (18.90 L/s) and 7.23 L/s (5.99 L/s) for the QED and Lewis Street outlets, respectively. Storm flows will be contained by means of an underground cistern, some rooftop storage and surface/pipe storage which will be controlled by means of rooftop restrictors, and ICDs.

## 5.0 EROSION AND SEDIMENTATION CONTROL

At the on-set of the construction of the building, substantial excavation will be completed for the underground garage. As a result, runoff from the site will mostly be contained in the excavation area. As such, erosion and sedimentation control measures are proposed (Drawing RESC), as outlined in the Ontario Ministry of Natural Resources (MNR) Guidelines on Erosion and Sediment Control for Urban Construction Sites, to trap sediment on site. The following erosion and sedimentation control measures could be implemented during construction (refer to Drawing RESC for measures):

- Supply and installation of a silt fence barrier around the perimeter of the Site, as per OPSD 219.110
- Supply and installation of filter fabric between the frame and cover of catch basins and maintenance holes adjacent to the project area during construction, to prevent sediment from entering the sewer system. The filter fabric is to be inspected regularly and corrected as required
- Stockpiling of material during construction is to be located offsite
- Sandbags are to be placed blocking part of the sewer pipe in the connecting storm maintenance holes to eliminate construction debris from entering the existing storm sewer system. The sandbags are to be removed after the proposed storm sewers have been fully cleaned.

The proposed removal and reinstatement measure as well as the erosion control measures (refer to Drawing RESC) shall conform to the following documents:

- "Guidelines on Erosion and Sediment Control for Urban Construction Sites" published by Ontario Ministries of Natural Resources, Environment, Municipal Affairs, and Transportation & Communication, Association of Construction Authorities of Ontario and Urban Development Institute, Ontario, May 1987.
- "MTO Drainage Manual", Chapter F: "Erosion of Materials and Sediment Control", Ministry of Transportation & Communications, 1985.
- "Erosion and Sediment Control" Training Manual by Ministry of Environment, Spring 1998.
- Applicable Regulations and Guidelines of the Ministry of Natural Resources.

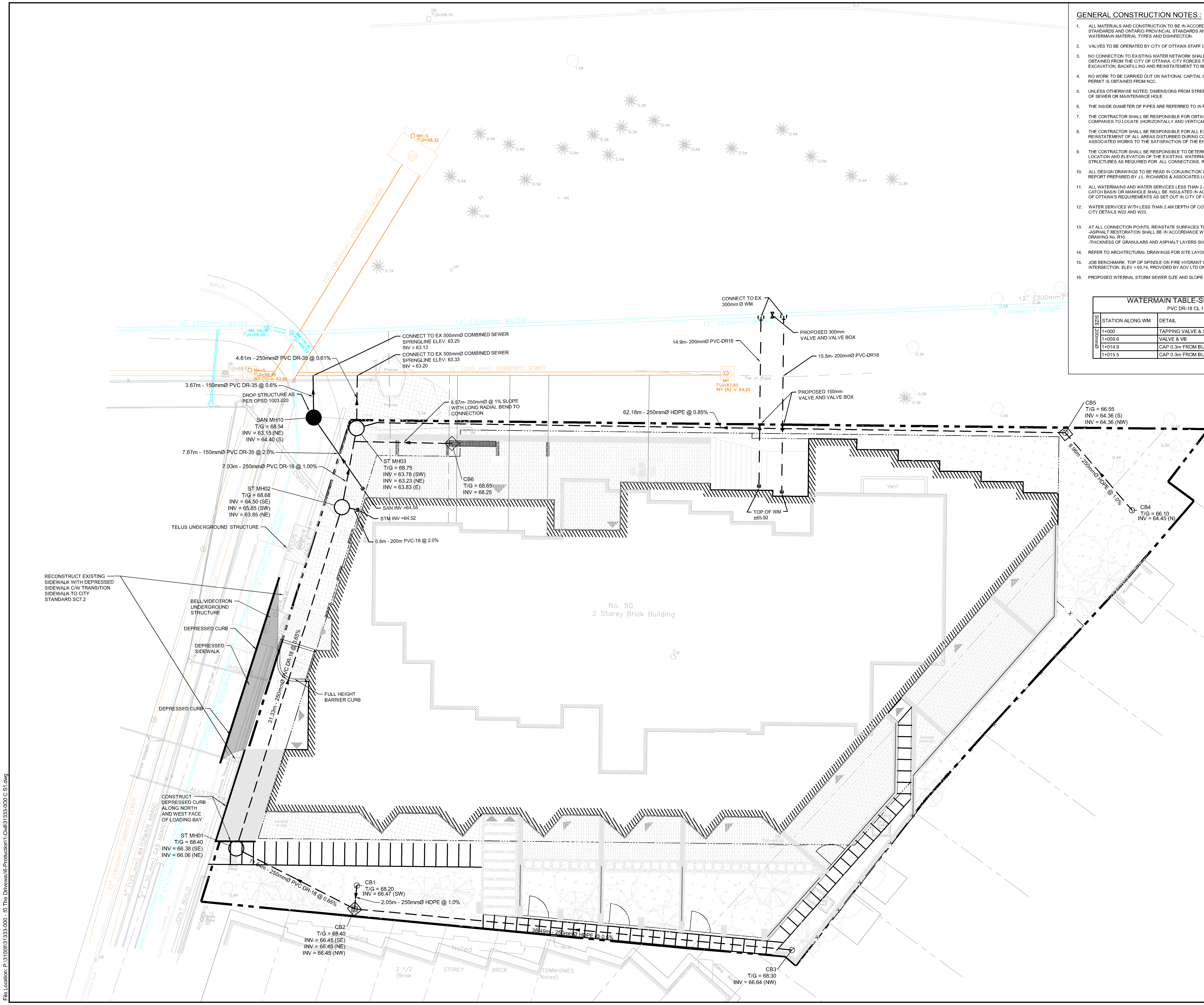
This report has been prepared for the exclusive use of Main + Main for the stated purpose, for the named facility. Its discussions and conclusions are summary in nature and cannot be properly used, interpreted, or extended to other purposes without a detailed understanding and discussions with the client as to its mandated purpose, scope and limitations. This report was prepared for the sole benefit and use of Main + Main and may not be used or relied on by any other party without the express written consent of J.L. Richards & Associates Limited.



J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:


Guy Forget, P.Eng.
Senior Water Resources Engineer




## GENERAL CONSTRUCTION NOTES :

1. ALL MATERIALS AND CONSTRUCTION TO BE IN ACCORDANCE WITH CURRENT CITY OF OTTAWA STANDARDS AND ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS (OPSS & OPSD); SEWER AND WATERMAIN MATERIAL TYPES AND DISINFECTION.
2. VALVES TO BE OPERATED BY CITY OF OTTAWA STAFF ONLY.
3. NO CONNECTION TO EXISTING WATER NETWORK SHALL BE COMPLETED UNTIL A WATER PERMIT IS OBTAINED FROM THE CITY OF OTTAWA. CITY FORCES TO COMPLETE WATERMAIN CONNECTIONS. EXCAVATION, BACKFILLING AND REINSTATEMENT TO BE COMPLETED BY CONTRACTOR.
4. NO WORK TO BE CARRIED OUT ON NATIONAL CAPITAL COMMISSION (NCC) PROPERTY UNTIL ACCESS PERMIT IS OBTAINED FROM NCC.
5. UNLESS OTHERWISE NOTED, DIMENSIONS FROM STREET LINE ARE TO THE CENTRELINE OF SEWER OR MAINTENANCE HOLE.
6. THE INSIDE DIAMETER OF PIPES ARE REFERRED TO IN PLAN VIEW.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING LOCATES FROM ALL UTILITY COMPANIES TO LOCATE (HORIZONTALLY AND VERTICALLY) EXISTING UTILITIES PRIOR TO EXCAVATION.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXCAVATION, BACKFILL, REINSTATEMENT OF ALL AREAS DISTURBED DURING CONSTRUCTION AND ALL ASSOCIATED WORKS TO THE SATISFACTION OF THE ENGINEER AND CITY OF OTTAWA.
9. THE CONTRACTOR SHALL BE RESPONSIBLE TO DETERMINE, VIA EXCAVATION, THE EXACT LOCATION AND ELEVATION OF THE EXISTING WATERMAINS, SEWERS AND UNDERGROUND STRUCTURES AS REQUIRED FOR ALL CONNECTIONS, RELOCATIONS AND BLANKINGS.
10. ALL DESIGN DRAWINGS TO BE READ IN CONJUNCTION WITH THE LATEST SERVICING REPORT PREPARED BY J.L. RICHARDS & ASSOCIATES LIMITED.
11. ALL WATERMAINS AND WATER SERVICES LESS THAN 2.4m FROM A STORM SEWER, CATCH BASIN OR MANHOLE SHALL BE INSULATED IN ACCORDANCE WITH THE CITY OF OTTAWA'S REQUIREMENTS AS SET OUT IN CITY OF OTTAWA SPECIFICATION F-7014.
12. WATER SERVICES WITH LESS THAN 2.4M DEPTH OF COVER SHALL BE INSULATED IN ACCORDANCE WITH CITY DETAILS W22 AND W23.
13. AT ALL CONNECTION POINTS, REINSTATE SURFACES TO EXISTING CONDITION OR BETTER.
-ASPHALT RESTORATION SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD DRAWING No. R10.
-THICKNESS OF GRANULARS AND ASPHALT LAYERS SHALL MATCH EXISTING
14. REFER TO ARCHITECTURAL DRAWINGS FOR SITE LAYOUT.
15. JOB BENCHMARK: TOP OF SPINDLE ON FIRE HYDRANT LOCATED WEST SIDE OF THE DRIVEWAY AND LEWIS INTERSECTION. ELEV = 69.74, PROVIDED BY AOV LTD ON JUNE 29TH 2021.
16. PROPOSED INTERNAL STORM SEWER SIZE AND SLOPE TO BE DESIGNED BY MECHANICAL ENGINEER.

### WATERMAIN TABLE-Sta. 1+000 to 1+015.5

PVC DR-18 CL.150

| SIZE | STATION ALONG WM | DETAIL | FINISHED GRADE | TOP OF WM |
|---|---|---|---|---|
| 200mmØ | 1+000 | TAPPING VALVE & SLEEVE | ±67.78 | EX ±65.38 |
| | 1+009.6 | VALVE & VB | 68.21 | 65.81 |
| | 1+014.9 | CAP 0.3m FROM BUILDING | 68.32 | 65.92 |
| | 1+015.5 | CAP 0.3m FROM BUILDING | 68.32 | 65.92 |

## LEGEND

- EXISTING CATCH BASIN
- PROPOSED WATERMAIN & VALVE
- EXISTING WATERMAIN, VALVE & HYDRANT
- EXISTING COMBINED (CMB) SEWER & MAINTENANCE HOLE
- PROPOSED SANITARY SEWER & MAINTENANCE HOLE
- PROPOSED STORM SEWER & MAINTENANCE HOLE
- PROPOSED LANDSCAPE DRAIN & PERFORATED STORM PIPE
- RETAINING WALL
- FF = 104.48 FINISHED FLOOR ELEVATION
- FDC FIRE DEPARTMENT (SIAMESE) CONNECTION
- PROPOSED BUILDING ENTRANCE
- PROPERTY LINE
- INTERLOCK SURFACE
- LANDSCAPE AREA
- GARDEN/ SHRUBS

| No. | ISSUE / REVISION | DD/MM/YY |
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| 1 | ISSUED FOR SITE PLAN SUBMISSION | 14/06/22 |

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PROFESSIONAL STAMP

LICENSED PROFESSIONAL ENGINEER
M. N. L. DALRYMPLE
2022-06-13
PROVINCE OF ONTARIO

PROJECT NORTH

PROJECT:

50 THE DRIVEWAY

DRAWING:

SERVICING PLAN

DESIGN: LD
DRAWN: KT
CHECKED: GF
JLR #: 31333-000

DRAWING #: S1

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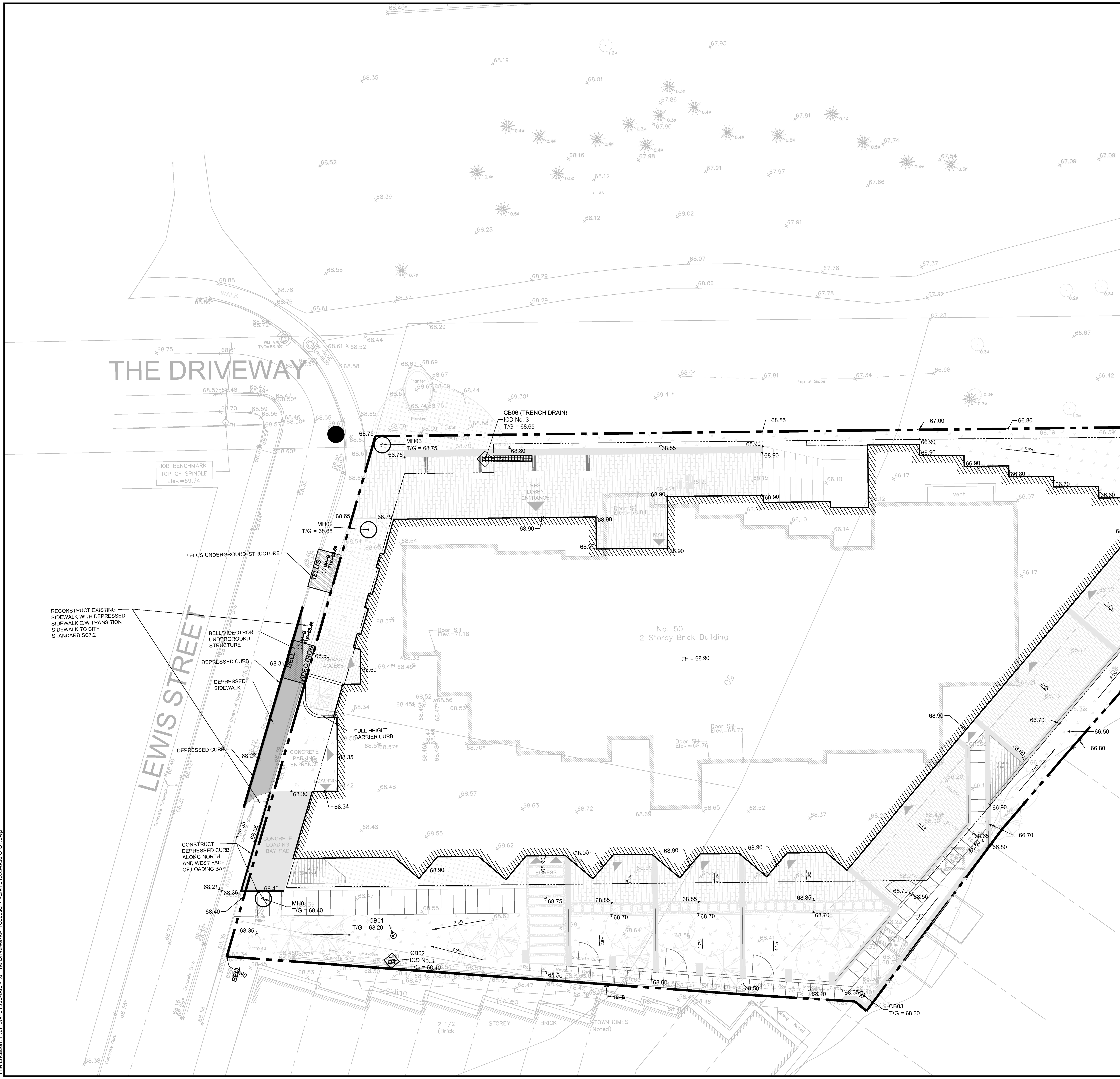


GRADING NOTES:

1. CONTRACTOR IS RESPONSIBLE TO KEEP THE ROADS FREE AND CLEAN FROM MUD OR DEBRIS.
2. AT ALL CONNECTION POINTS REINSTATE SURFACES TO EXISTING CONDITION OR BETTER:
   - ASPHALT RESTORATION SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD DRAWING R10
5. DRAWING TO BE READ IN CONJUNCTION WITH ARCHITECTURAL DRAWINGS.
6. ALL WORKS TO BE COMPLETED TO CITY OF OTTAWA STANDARDS.
7. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
8. JOB BENCHMARK: TOP OF SPINDLE ON FIRE HYDRANT LOCATED WEST SIDE OF THE DRIVEWAY AND LEWIS INTERSECTION. ELEV = 69.74, PROVIDED BY AOV LTD ON JUNE 29TH 2021.
9. NO WORKS TO BE CARRIED ON NCC PROPERTY UNTIL ACCESS PERMIT IS OBTAINED FROM NCC

LEGEND

| | |
|---|---|
| | EXISTING CATCH BASIN |
| 66.35 | PROPOSED ELEVATION |
| 66.42 | EXISTING ELEVATION |
| 1.5% | SURFACE SLOPE |
| | RETAINING WALL |
| FF = 68.90 | FINISHED FLOOR ELEVATION |
| FDC | FIRE DEPARTMENT (SIAMESE) CONNECTION |
| | PROPOSED BUILDING ENTRANCE |
| | PROPERTY LINE |
| | INTERLOCK SURFACE |
| | LANDSCAPE AREA |
| | GARDEN/ SHRUBS |
| | PROPOSED BUILDING OUTLINE |
| | EXISTING BUILDING OUTLINE |
| | UNDERGROUND PARKING OUTLINE |
| | CATCHBASIN |
| | LANDSCAPE POT |
| | CATCHBASIN WITH ICD |
| | LANDSCAPE POT WITH ICD |
| | TRENCH DRAIN WITH ICD |

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PROFESSIONAL STAMP

LICENSED PROFESSIONAL ENGINEER
M. N. L. DALRYMPLE
2022-06-13
PROVINCE OF ONTARIO

PROJECT NORTH

PROJECT:

50 THE DRIVEWAY

DRAWING:

GRADING PLAN

| | | |
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| DESIGN: | LD | DRAWING #: |
| DRAWN: | KT | G1 |
| CHECKED: | GF | |
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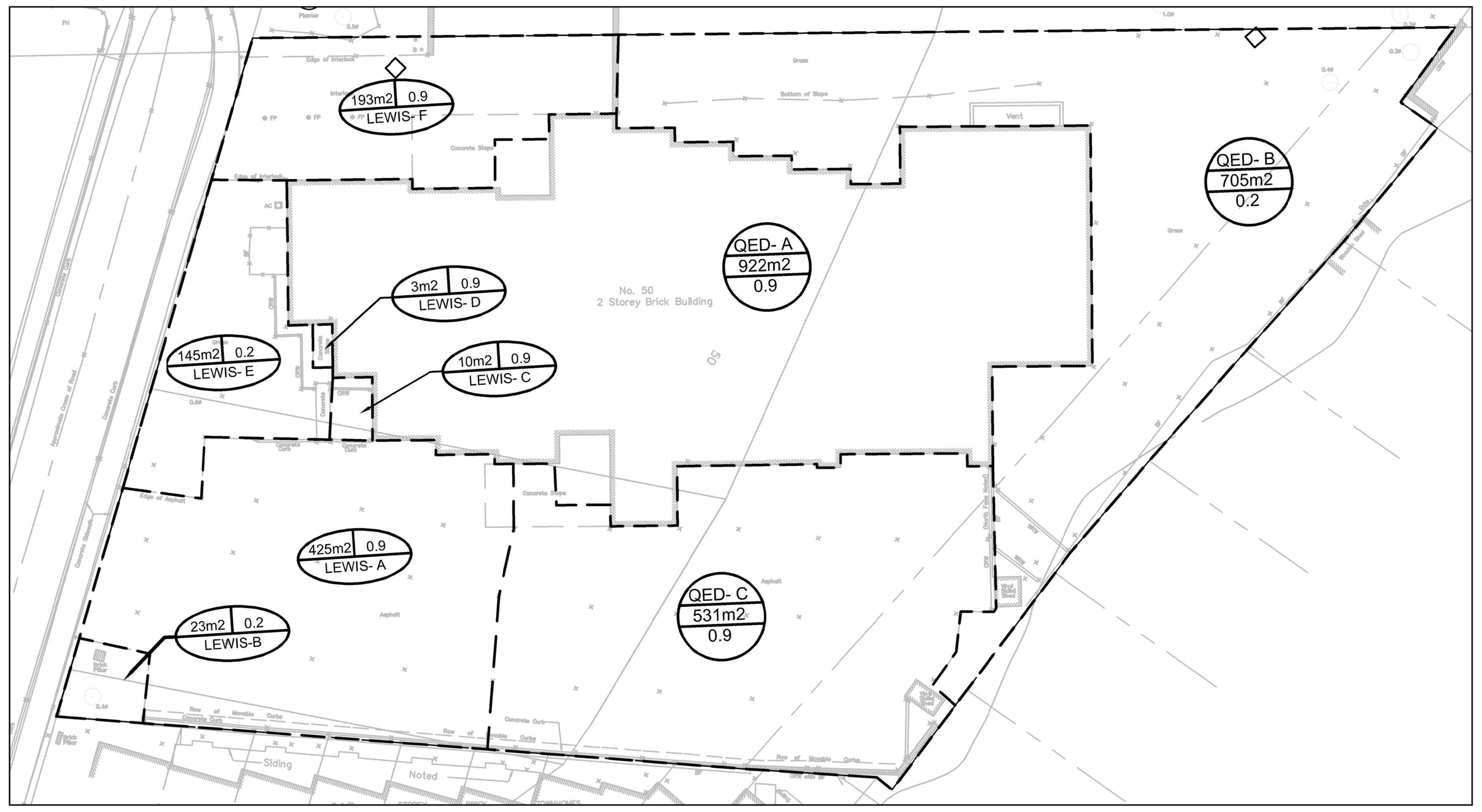



PRE-DEVELOPMENT DRAINAGE PLAN - SCALE 1:300

| PONDING AREA TABLE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| AREA ID. | OUTLET | ICD FLOW (L/s) | UNCONTROLLED FLOW (L/s) | MAXIMUM STATIC PONDING DEPTH (m) | MAXIMUM STATIC PONDING ELEVATION (m) | MAXIMUM STATIC PONDING VOLUME ($m^3$) | MAXIMUM STATIC PONDING AREA ($m^2$) | MAX. 100 YR PONDING DEPTH (ABOVE CB T/G) | 100 YR HGL (m) OR 1:100 YR FLOW DEPTH (m) | CLIMATE CHANGE EVENT ELEVATION (m) |
| QED. 5 | QED | 5.7 | N/A | 0.20 (LP1) | 68.40 | 4.69 (LP1) | 73.91 (LP1) | 0.13 | 68.35 | 68.41 |
| LP1 (CB02/ICD1) & LP2 (CB03) | | | | 0.10 (LP2) | 68.40 | 0.27 (LP2) | 7.68 (LP2) | | | |
| QED.4 | QED | 3.0 | N/A | 0.20 | 66.30 | 2.81 | 73.29 | 0.17 | 68.27 | 68.31 |
| LP3 (CB05/ICD2) | | | | | | 1.26 | | | | |
| QED. 7 | QED | 2 | | 0.10 (LP4) | 68.75 | 1.75 (LP4) | 52.44 (LP4) | 0.02 | 68.67 | 68.73 |
| LP4 | | | | | | 0.64 | | | | |
| (CB06/ICD3) | | | | | | | | | | |
| QED. 6 | QED | | 0.52 | 0.01 | 0.01 | N/A | N/A | 0.01 | 0.01 | 0.01 |
| PENTHOUSE (PART QED.1) | QED | 0.63 | | 0.15 | N/A | 20.7 | N/A | 0.15 | N/A | N/A |
| CISTERN | QED | 7.05 | | N/A | N/A | 59.85 | N/A | N/A | N/A | N/A |
| QED.1 (PART), QED. 2 & QED.3 | | | | | | | | | | |
| L1 | LEWIS | 5.99 | | 0.01 | 0.01 | N/A | N/A | 0.01 | 0.01 | 0.01 |

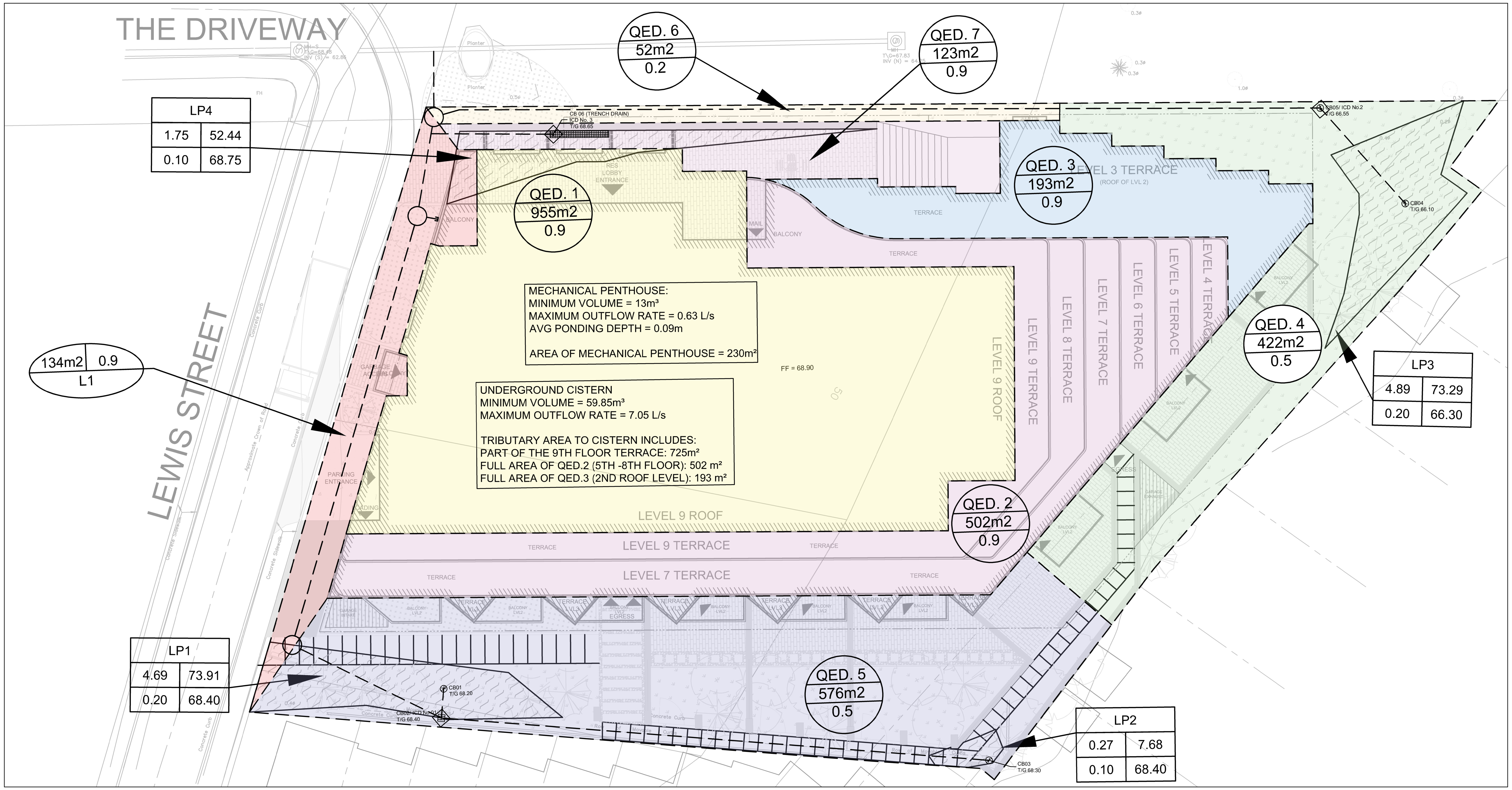
| ICD TABLE | | | | | | |
|---|---|---|---|---|---|---|
| ICD ID. | SEWER INVERT (m) | T/G ELEV (m) | PONDING ELEV (m) | HEAD (m) | 100-YEAR RESTRICTED FLOW (L/s) | ICD TYPE |
| CB02/ICD1 | 66.45 | 68.40 | 68.40 | 1.45 | 5.7 | HYDROVEX 75-VH-1 |
| CB05/ICD2 | 64.36 | 66.55 | 66.30 | 1.20 | 3.0 | HYDROVEX 50-VH-1 |
| CB06/ICD3 | 68.25 | 68.65 | 68.75 | 0.5 | 2.0 | HYDROVEX 50-VH-2 |

STORMWATER MANAGEMENT REQUIREMENTS:

PRE-DEVELOPMENT PEAK FLOWS (ALLOWABLE) TO BE SET BASED ON THE EXISTING RUNOFF COEFFICIENTS AND NOT TO EXCEED A C=0.40. THE ALLOWABLE PEAK FLOWS TO BE CALCULATED BASED ON THE 1:5 YEAR INTENSITY IN ACCORDANCE WITH AN EMAIL FROM THE CITY AND THE CALCULATED TIME OF CONCENTRATION.

TO LIMIT POST-DEVELOPMENT FLOWS TO THE ALLOWABLE PEAK FLOWS, THE FOLLOWING IS PROPOSED:

1. THREE (3) OF THE CATCH BASINS TO BE EQUIPPED WITH INLET CONTROL DEVICES (ICDs), WHICH IS COMBINED WITH ON-SITE STORAGE AT FOUR (4) LOCATIONS. REFER TO DRAWING BELOW AND PONDING AREA TABLE FOR MORE INFORMATION.
2. ROOFTOP RESTRICTION AND STORAGE IS PROPOSED ON TOP OF THE MECHANICAL PENTHOUSE AS PER DRAWING AND PONDING AREA TABLE. PRELIMINARY PONDING DEPTH IS PROVIDED, TO BE REVISED BASED ON ROOFTOP DESIGN.
3. UNDERGROUND CISTERN IS PROPOSED AS PER THE DETAILS SHOWN IN THE DRAWING AND THE PONDING AREA TABLE. THE CISTERN TO BE SIZED TO ACCOMMODATE PART OF QED. 1 (LOWER TERRACE), AS WELL AS AREAS QED.2 AND QED.3




POST-DEVELOPMENT DRAINAGE PLAN - SCALE 1:150

LEGEND

DRAINAGE AREA TO LEWIS STREET
134 0.9 L1 — AREA IN SQUARE METERS; RUNOFF COEFFICIENT; DRAINAGE AREA NUMBER AND OUTLET LOCATION

DRAINAGE AREA TO QUEEN ELIZABETH WAY
QED.3 193 0.9 — DRAINAGE AREA NUMBER AND OUTLET LOCATION; AREA IN SQUARE METERS; RUN OFF COEFFICIENT

POST DRAINAGE BOUNDARY

PONDING
LP3 4.89 73.29 0.20 66.30 — MAX. PONDING VOLUME ($m^3$); AREA ID; MAX. PONDING AREA ($m^2$); MAX. WATER LEVEL (m) (STATIC); PONDING DEPTH (m) (STATIC)

MAX. WATER LEVEL (STATIC)
CONCRETE SURFACE
GRASS SURFACE
INTERLOCK PATHWAY
BUILDING OUTLINE
EXISTING BUILDING OUTLINE
UNDERGROUND PARKING LIMITS
CATCHBASIN
LANDSCAPE POT
CATCHBASIN WITH ICD
LANDSCAPE POT WITH ICD
TRENCH DRAIN WITH ICD

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PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER M. N. L. DALRYMPLE 2022-06-13 PROVINCE OF ONTARIO

PROJECT NORTH

PROJECT: 50 THE DRIVEWAY

DRAWING: DRAINAGE AND STORMWATER MANAGEMENT PLAN

DESIGN: LD
DRAWN: KT
CHECKED: GF
JLR #: 31333-000
DRAWING #: DST

PLOT DATE: Monday, June 13, 2022 4:03:51 PM

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## GENERAL CONSTRUCTION NOTES :

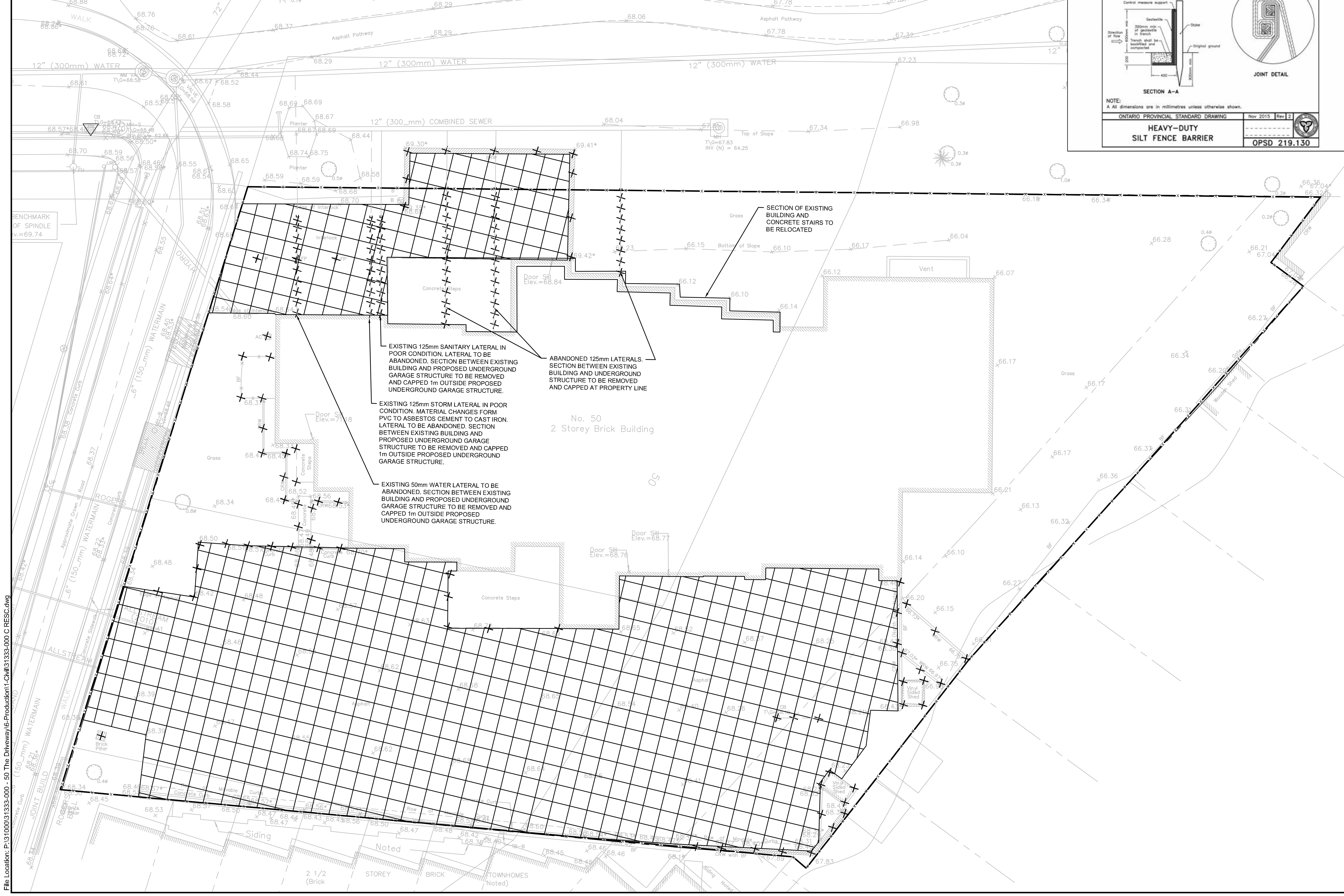
EROSION AND SEDIMENTATION CONTROL SYSTEM (ESCS) REQUIREMENTS

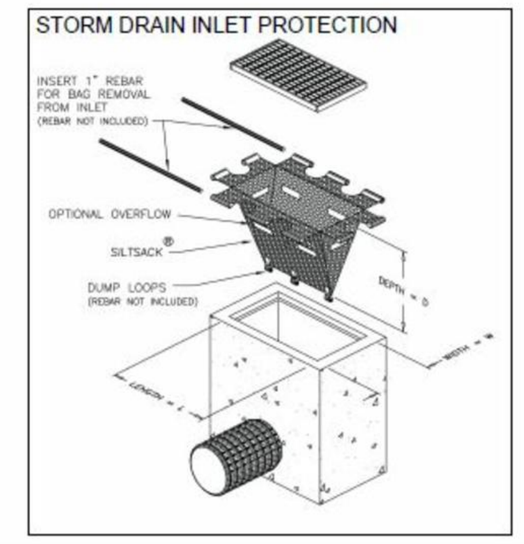
PRIOR TO COMMENCING ANY WORK, THE CONTRACTOR IS REQUIRED TO CONSTRUCT AN EROSION AND SEDIMENTATION CONTROL SYSTEM (ESCS) ON-SITE (IN ADDITION TO THE PROPOSED MEASURES DEPICTED ON THIS DRAWING) TO CONVEY RAINWATER AND/OR PUMPED WATER PRIOR TO ITS DISCHARGE TO THE SURFACE AND/OR TO ANY NATURAL WATER COURSE AND/OR TO ANY EXISTING SEWER SYSTEM. THE CONTRACTOR SHALL CONSTRUCT THE ESCS IN SUCH A WAY AS TO ENSURE THAT THE QUALITY OF THE DISCHARGED PUMP WATER DOES NOT EXCEED THE MORE STRINGENT CRITERIA OF EITHER THE ALLOWABLE TSS CONCENTRATION LIMITS SPECIFIED IN THE PTTW OR 25 MG/L AT ANY TIME.

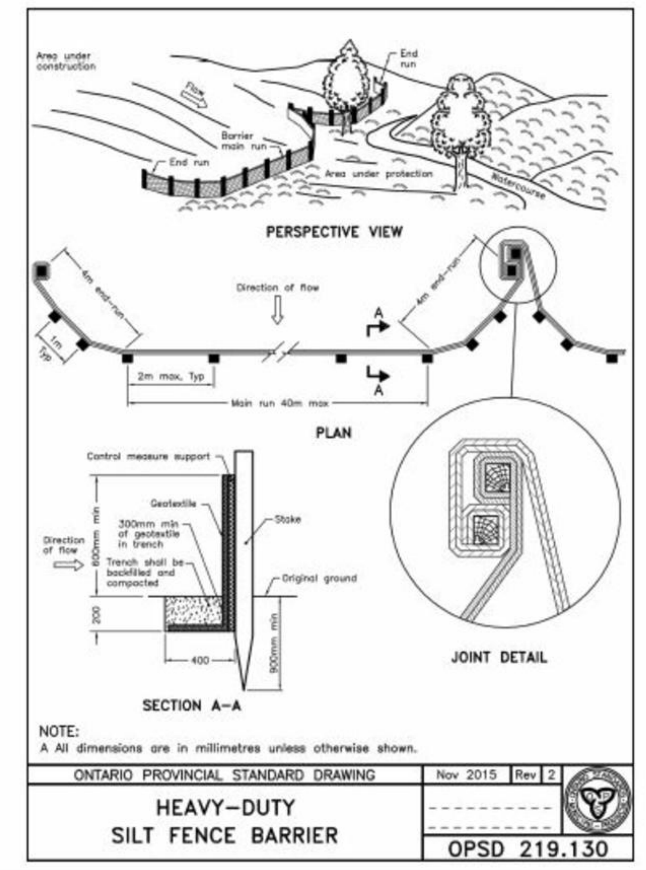
THE CONTRACTOR SHALL CONSTRUCT AN ESCS TO ACHIEVE THE TURBIDITY AND TSS REMOVAL CRITERIA, REGULARLY MONITOR AND MAINTAIN IT TO ENSURE ONGOING COMPLIANCE. THE CONTRACTOR SHALL TAKE WATER SAMPLES AT THE OUTLET OF THE ESCS TO ENSURE THAT THE TURBIDITY AND TSS REMOVAL CRITERIA ARE MET IN ACCORDANCE WITH CITY OF OTTAWA S.P. NO. F_1004 AND MEET THE REQUIREMENTS OF SEWER USE BYLAW. IF THE ANALYTICAL RESULTS ARE LESS THAN PRESCRIBED CRITERIA, THEN THE CONTRACTOR MAY BEGIN DEWATERING PROVIDED THAT THE QUALITY OF THE WATER REMAINS SUBSTANTIALLY THE SAME AS THE INITIAL MEASURED SAMPLE. SUBSEQUENT WATER SAMPLES SHALL ALSO BE COLLECTED IN ACCORDANCE WITH CITY OF OTTAWA S.P. NO. F_1004.

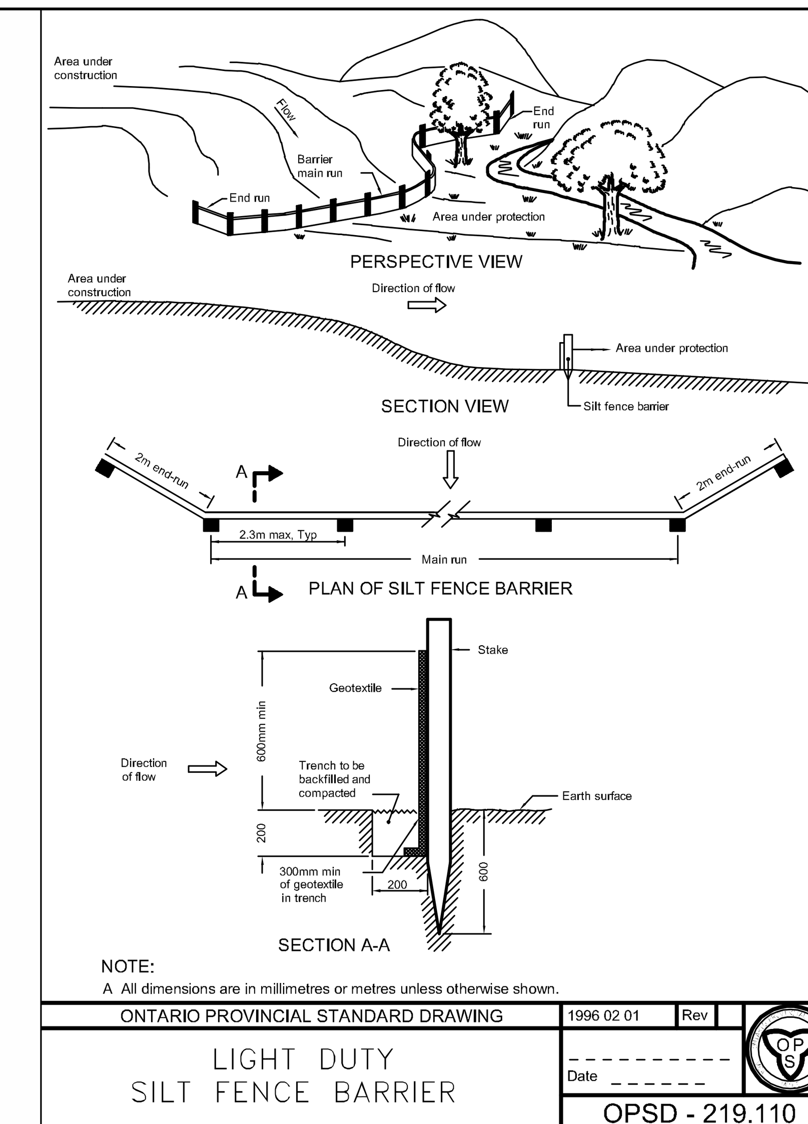
NOTES:

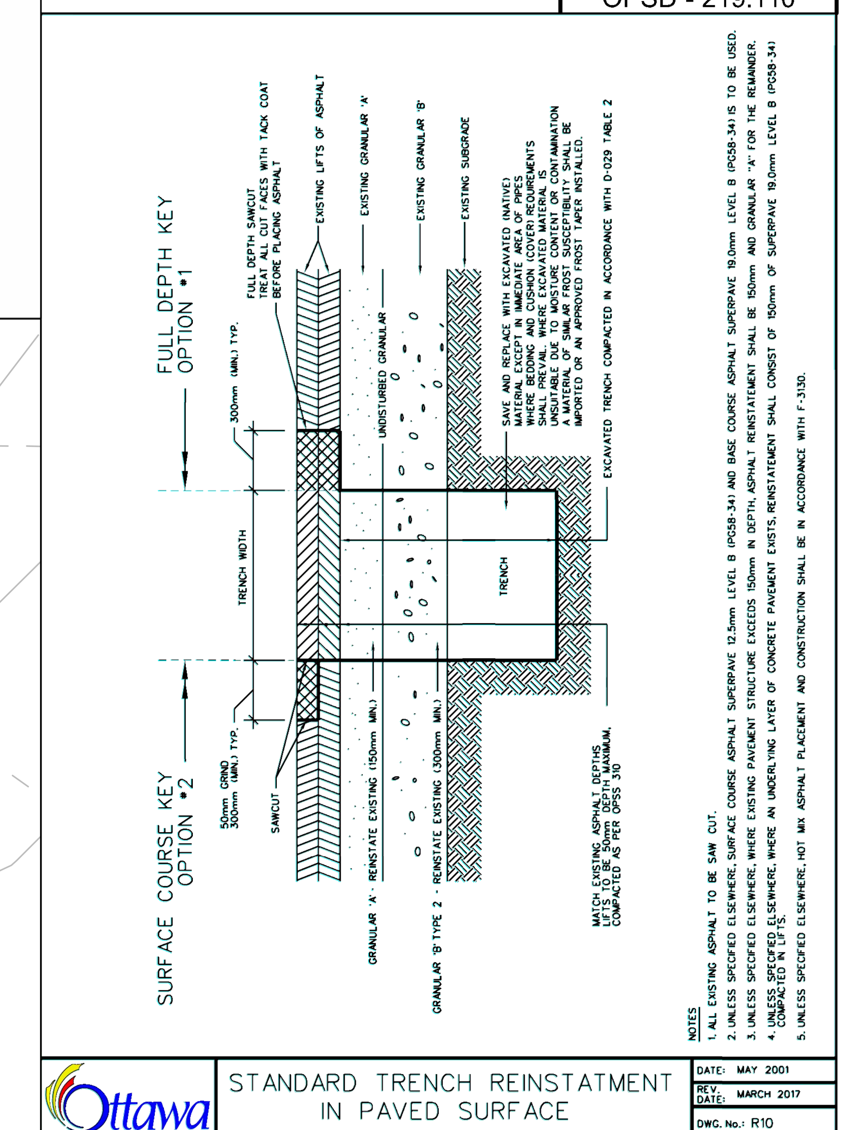
1. SEDIMENT AND EROSION CONTROL MEASURES SHALL BE IMPLEMENTED PRIOR TO WORK AND MAINTAINED DURING THE WORK PHASE BY THE GENERAL CONTRACTOR TO PREVENT ENTRY OF SEDIMENT INTO THE RECEIVING STREAM. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE INSPECTED DAILY BY THE GENERAL CONTRACTOR TO ENSURE THAT THEY ARE FUNCTIONING PROPERLY AND ARE BEING MAINTAINED AND/OR UPGRADED AS REQUIRED. IF THE SEDIMENT AND EROSION CONTROL MEASURES ARE NOT FUNCTIONING PROPERLY, NO FURTHER WORK SHALL OCCUR UNTIL THE PROBLEM HAS BEEN ADDRESSED AND RECTIFIED.
2. ALL MATERIALS AND EQUIPMENT USED FOR THE PURPOSE OF SITE PREPARATION AND PROJECT COMPLETION SHALL BE OPERATED AND STORED IN A MANNER THAT PREVENTS ANY DELETERIOUS SUBSTANCES (I.E. PETROLEUM PRODUCTS, SILT, ETC.) FROM ENTERING THE RECEIVING STREAM.
3. SEDIMENT AND EROSION CONTROL MEASURES MAY BE MODIFIED IN THE FIELD AT THE DISCRETION OF THE CITY SITE INSPECTOR, ENGINEER AND/OR THE LOCAL CONSERVATION AUTHORITY.
4. INSPECTIONS AND REPAIR OF SEDIMENT AND EROSION CONTROLS WILL BE CONDUCTED AS SOON AS POSSIBLE FOLLOWING ANY RAIN EVENTS.
5. WORKS WILL NOT BE CONSIDERED COMPLETE UNTIL ALL SEDIMENT CONTROLS ARE REMOVED.
6. ALL SEDIMENTATION CONTROL MEASURES SHALL BE IMPLEMENTED AND CONSTRUCTED PER OPSS AND OPSD. SILT FENCE SHALL BE TO OPSD 219.110.
7. CONTRACTOR IS RESPONSIBLE TO KEEP THE ROADS FREE AND CLEAN FROM MUD OR DEBRIS
8. A MUD MAT IS TO BE BUILT AT THE DRIVE SITE ENTRANCE TO PREVENT THE TRANSPORT OF SEDIMENT ONTO PAVED SURFACES.
9. FILTER FABRIC TO BE PLACED UNDER GRATE OF EXISTING STREET CATCH BASINS. THE FILTER FABRIC SHALL BE INSPECTED DAILY TO ENSURE THAT THEY ARE FUNCTIONING PROPERLY AND ARE MAINTAINED AS REQUIRED.
10. CB SUMP TO BE PERIODICALLY CLEANED TO ENSURE ACCUMULATED SEDIMENTS DO NOT INTERFERE WITH STORMWATER CONVEYANCE OR CONTRIBUTE TO INCREASED BUILD-UP OF CONTAMINANTS (HEAVY METALS, NUTRIENTS, TOTAL SUSPENDED SOLIDS, PCB's, PAH's ETC.) IN THE SUMP, THAT MAY ENTER THE SEWER SYSTEM.
11. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEMS AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPORPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
12. AT ALL CONNECTION POINTS, REINSTATE SURFACES TO EXISTING CONDITION OR BETTER.
   - -ASPHALT RESTORATION SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD DRAWING No. R10.
   - -THICKNESS OF GRANULARS AND ASPHALT LAYERS SHALL MATCH EXISTING. ASPHALT SHALL BE A MINIMUM OF 150mm (50mm BASE AND 50mm INTERMEDIATE COURSE, 50mm WEAR COURSE).
   - -AN ASPHALT OVERLAY CONSISTING OF 50mm ASPHALT FOR 300mm MINIMUM IS REQUIRED OUTSIDE OF TRENCHES PER CITY OF OTTAWA STANDARD DRAWING No. R10.
   - -BOULEVARDS / GRASSED AREAS SHALL BE REINSTATED WITH MINIMUM 100mm TOPSOIL AND SOD.




## SEDIMENT CONTROL MEASURES

1. CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES TO PROVIDE FOR PROTECTION OF RECEIVING STORM SEWER OR DRAINAGE DURING CONSTRUCTION ACTIVITIES.
2. ANY STOCK PILE MATERIAL TO BE KEPT ON FLAT AREAS DURING CONSTRUCTION AWAY FROM DRAINAGE PATHS. IF STOCK PILE MATERIAL IS PLACED ON SLOPE AREA, SILT FENCE TO BE INSTALLED.
3. FILTER CLOTH TO BE PLACED UNDER ALL CATCH BASIN AND MANHOLE COVERS ON SITE, FOR TEMPORARY SEDIMENT CONTROL DURING CONSTRUCTION.

## LEGEND

- PROPOSED SILT FENCE BARRIER TO OPSD 219.110
- EXISTING OFFSITE CATCH BASIN c/w FILTER CLOTH
- UNDERGROUND SERVICE TO BE REMOVED
- CONCRETE SIDEWALK / CURB AND RETAINING WALL REMOVAL
- PROPERTY LINE
- BUILDING OUTLINE
- SURFACE REMOVAL

| No. | ISSUE / REVISION | DD/MM/YY |
|---|---|---|
| 1 | ISSUED FOR SITE PLAN SUBMISSION | 14/06/22 |

SCALE: 1:150

CLIENT: MAIN + MAIN

CONSULTANT: www.jlrichards.ca

J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS

CONSULTANT:

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER M. N. L. DALRYMPLE 2022-06-13 PROVINCE OF ONTARIO

PROJECT NORTH

PROJECT: 50 THE DRIVEWAY

DRAWING: REMOVALS, REINSTATEMENTS, EROSION & SEDIMENT CONTROL

| | |
|---|---|
| DESIGN: | LD |
| DRAWN: | KT |
| CHECKED: | GF |
| JLR #: | 31333-000 |

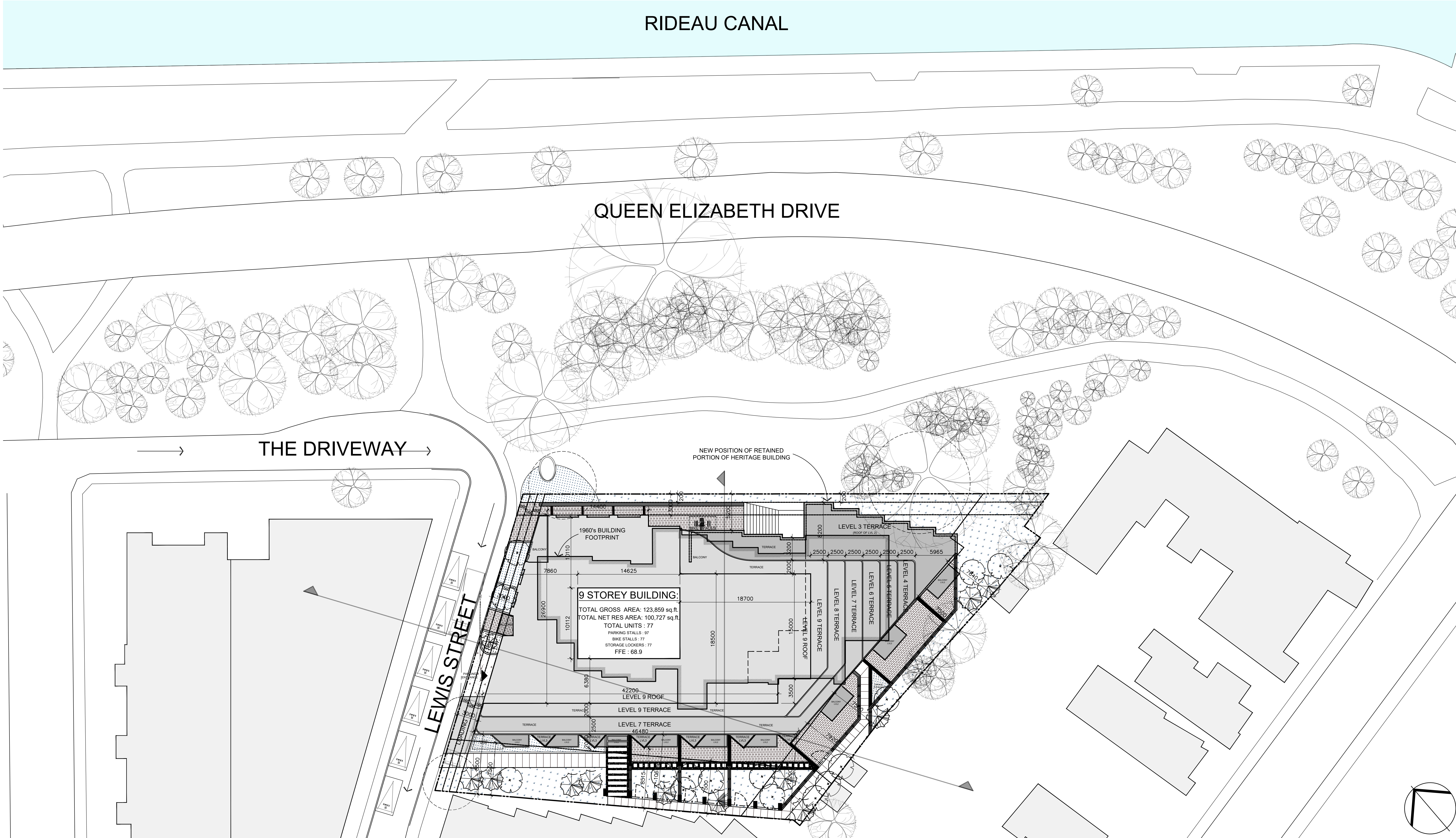
DRAWING #: RESC

PLOT DATE: Monday, June 13, 2022 4:00:18 PM

File Location: P:\31000\31333-000 - 50 The Driveway\6-Production\1-Civil\31333-000 C RESC.dwg

# Appendix A

Site Plan, Legal Plan and Survey




HOBIN

# 50 THE DRIVEWAY

## SITE PLAN

SCALE: 1:500

APRIL 22nd 2022

1 **BUILDING AREA SUMMARY**

| | | | |
|---|---|---|---|
| BUILDING AREA | 18,012 | SQ.FT. | |
| NUMBER OF STOREYS ABOVE GRADE | **9** | **STOREYS** | |
| TOTAL GROSS AREA | **123,859** | **SQ.FT.** | (**EXCLUDES AREA BELOW GRADE) |
| TOTAL NET/LEASEABLE AREA | | | |
| RESIDENTIAL | **100,727** | **SQ.FT.** | |
| COM/RET | - | SQ.FT. | |
| TOTAL GFA (AS PER CITY DEF.) | 94,232 | SQ.FT. | |

2 **UNIT SUMMARY**

TOTAL UNITS **77**

| | | | QTY. | RATIO % | |
|---|---|---|---|---|---|
| **SMALL SUITES** (≤ 850 SQ.FT) | 13 | **1 BED** | 6 | 8% | 17% |
| | | **1 BED + DEN** | 7 | 9% | |
| **MEDIUM SUITES** (850 - 1,400 SQ.FT) | 37 | **1 BED + DEN** | 10 | 13% | 48% |
| | | **2 BED** | 10 | 13% | |
| | | **2 BEDROOM + DEN** | 17 | 22% | |
| **LARGE SUITES** (≥1,400 SQ.FT) | 27 | **2 BEDROOM + DEN** (1,400 - 1,800 SQ.FT) | 15 | 19% | 35% |
| | | **2 BEDROOM + DEN** (OVER 1,800 SQ.FT) | 12 | 16% | |

AVERAGE UNIT SIZE 1,308 SQ.FT.

3 **PARKING REQUIREMENTS (ZBL)**

| | | | |
|---|---|---|---|
| **RES** | TOTAL PARKING REQUIRED (ZBL) | 39 | SPACES |
| | TOTAL PARKING PROVIDED | **77** | **SPACES** |
| | PARKING RATE | 1.00 | /UNIT |
| **VIS** | TOTAL VISITOR PARKING REQUIRED | 8 | SPACES |
| | TOTAL VISITOR PROVIDED | **20** | **SPACES** |
| | PARKING RATE PROVIDED | 0.26 | /UNIT |

4 **TOTAL AMENITY SPACE REQUIRED (ZBL)**

| | | |
|---|---|---|
| TOTAL AMENITY SPACE REQUIRED | 4,971 | SQ.FT. |
| TOTAL SHARED AMENITY SPACE REQUIRED | 2,486 | SQ.FT. |
| TOTAL SHARED AMENITY SPACE PROVIDED | **3,760** | **SQ.FT.** |

5 **BICYCLE PARKING REQUIREMENTS (ZBL)**

| | | |
|---|---|---|
| TOTAL BIKE PARKING SPACES REQUIRED | 39 | SPACES |
| RATE/UNIT | 0.5 | /UNIT |
| TOTAL BIKE PARKING SPACES PROVIDED | **77** | **SPACES** |
| RATE/UNIT | 1.00 | /UNIT |


*TOPOGRAPHICAL SKETCH OF*

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

TOPOGRAPHICAL INFORMATION ADDED TO PLAN JUNE 29, 2021

Scale 1 : 150

6 4.5 3.0 1.5 0 3 6 Metres

Metric

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

Caution

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

SITE AREA = 2958 m²
BUILDING FOOTPRINT AREA = 896 m²

June 30, 2021
Date

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

## Notes & Legend

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

## ELEVATION NOTES

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

## UTILITY NOTES

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



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

Job No. 20693-20 Lt1 & Pt Lt 2&3 PL 15324 T F | FS

# Appendix B

Pre-consultation notes and
Email Correspondences

Pre-consultation follow up for 50 Queen Elizabeth Drive, Monday May10, 2021

**Site: A addition of 9-soreys building.  Residential from Commercial Development**

Combined Sewer: 300mm dia clay install in 1913 and 1800 brick trunk sewer (Lewis Street) install in 1899 fronting this site.
Water: 305 mm UCI and 152 mm (Lewis Street)

**General:**

- It is the sole responsibility of the consultant to investigate the location of existing underground utilities in the proposed servicing area to avoid any conflict with utilities. The location of existing utilities and services shall be documented on an Existing Conditions Plan.
- All underground and above ground building footprints and permanent walls need to be shown on the plans to confirm that any permanent structure does not extend either above or below into the existing property lines and sight triangles and/or future road widening protection limits.

**Comments:**

- A Record of Site Condition (RSC) in accordance with O. Reg. 153/04 will be required to be filed and acknowledged by the Ministry prior to issuance of a building permit due to a change in property use from industrial to residential.
- Construction approach – Please contact the Right-of-Ways Permit Office TMconstruction@ottawa.ca early in the OP / Zoning / Site Plan process to determine the ability to construct site and copy Andrew. McCreight @Ottawa.ca.
- A CCTV report will be required to add in the Servicing Study to asses the existing condition of the services if the proposal intends to re-use the existing services.
- If rooftop control and storage is considered as part of the SWM solution enough details (Cl. 8.3.8.4) shall be discussed and documented in the report and on the plans. A roof drainage plan and detailed roof drain summary table with supporting drain manufacturer information will be required. The roof drainage plan will need to document roof drain type, flow rates, emergency scupper locations and spill over elevations and ponding areas.
- Please note that the HGL within the receiving sewer system will need to be assessed if underground storage (cistern) is proposed as part of the stormwater management solution to ensure the system does not become surcharged and thereby ineffective do to a loss in available storage.
- **Underground Storage: Underground storage volumes are to be based on 50% peak flow rates or use dynamic compute model.** The Modified Rational Method for storage computation in the Sewer Design Guidelines was originally intended to be used for above ground storage (i.e. parking lot) where the change in head over the orifice varied from 1.5 m to 1.2 m (assuming a 1.2 m deep CB and a max ponding depth of 0.3 m).  This change in head was small and hence the release rate fluctuated little, therefore there was no need to use an average release rate.
  When underground storage is used, the release rate fluctuates from a maximum peak flow based on maximum head down to a release rate of zero.  This difference is large and has a significant impact on storage requirements.  **We therefore require that an average release rate equal to 50% of the peak allowable rate shall be applied to**

**estimate the required volume. Alternatively, the consultant may choose to use a submersible pump in the design to ensure a constant release rate.**
In the event that there is a disagreement from the designer regarding the required storage, The City will require that the designer demonstrate their rationale utilizing dynamic modelling, that will then be reviewed by City modellers in the Water Resources Group.
Note that the above will added to upcoming revised Sewer Design Guidelines to account for underground storage, which is now widely used.

- If a storage tank (internal cistern) is considered as part of the SWM solution sufficient details and system information will need to be provided. A detailed cross-section of such system (provided from the mechanical engineer and shown on the plans) with sufficient details and information (HWLs, release rate, volume, location, size (dimensions), control device, emergency flow outlet and backflow protection, etc.) will need to be provided. An appropriate emergency overflow location will need to be determined and documented. Backup power supply necessary if pump controlled. Details regarding the proposed on-site stormwater management system are to be provided for review.
- Please include a Pre-Development Drainage Area Plan to define the pre-development drainage areas/patterns. Existing drainage patterns shall be maintained and discussed as part of the proposed

**Disclaimer:**
*The City of Ottawa does not guarantee the accuracy or completeness of the data and information contained on the above image(s) and does not assume any responsibility or liability with respect to any damage or loss arising from the use or interpretation of the image(s) provided. This image is for schematic purposes only.*

**Capacity issues for sewers**

Please find the Servicing Report Template & Study Guidelines" in the attachment and prepare the servicing study accordingly. For capacity issue, please see section 3.2.1 page 3-3 and follow this section. A completed checklist with corresponding references from the servicing study is mandatory for the completeness of the study. Please add a completed checklist in the report.

**ServicingGuidelines_ final_Dec...**

Servicing Report Template Final Versi

The allowable sewer release rate should be based on the existing Zoning Designation using the City's Sewer Guidelines. If the proposal requires a greater flow than the allowable, then please do an analysis of the City's sewers system as per servicing guidelines to determine available capacity in the City's sewers system or Please calculate the sewers demand for the proposed development and send it to us ASAP, if you want to verify whether or not there is enough capacity in the city system. Normally, it takes 10 business days to get response back from the internal circulation.

**Required information for Water boundary conditions (not required if you're using existing service)**

Boundary conditions are required to confirm that the require fire flows can be achieved as well as availability of the domestic water pressure on the city street in front of the development. Please use Table 3-3 of the MOE Design Guidelines for Drinking-Water System to determine Maximum Day and Maximum Hour peaking factors for 0 to 500 persons and use Table 4.2 of the Ottawa Design Guidelines, Water Distribution for 501 to 3,000 persons.

1. Location of Service
2. A sketch of the proposed water service to the city watermain
3. Street Number & Name
4. Type of development and units
5. Amount of fire flow required ___l/s (Calculation as per the FUS Method).
6. Average daily demand: -l/s
7. Maximum daily demand: -l/s
8. Maximum hourly daily demand: -l/s

Please note two separate service connections will be required for a proposed development if the basic day demand is greater than 50m3/day to avoid a vulnerable service area. Two compound water meters will be required for two service connections.

**Grade limitations for underground ramps ( Neeti)**
Underground ramps should be limited to a 12% grade and must contain a subsurface melting device when exceeds 6%. If the ramp's break over slope exceeds 8%, a vertical transition curve or a transition slope should be used in the midway of the ramp.

**SWM Criteria for the Catchment Area of the site being redeveloped: (Quantity control criteria)**

**Stormwater Management criteria connecting into the combined sewer system (Quantity control criteria)**

- Total (storm +sanitary) allowable release rate will be 2-year pre-development rate.
- C Coefficient of runoff will need to be determined **as per existing conditions** but in no case more than 0.4
- TC =20 minutes or can be calculated,
- TC should not be less than 10 minutes, since the IDF curves become unrealistic less than 10min.
- Any storm events greater than 2 year, up to 100 year, and including 100-year storm event must be detained on site.
- Two service laterals will be required for a single unit.

**TECHNICAL BULLETIN PIEDTB-2016-01**

Section 5.4.9.2,Page 5.31,

While rear yard grading will create low points and storage at each catch basin, the storage will not be considered in the available storage requirements. It will be assumed that all backyard flows in excess of the 2-year will flow towards the roads. Effective available storage will only be considered on streets and open space/park storage. Furthermore, there must be at least 30 cm of vertical clearance between the
rear yard spill elevation and the ground elevation at the adjacent building envelope.

Major system storage in backyards is not to be included/accounted for in design computations, however the effect of flow attenuation can now be accounted for by assuming a constant slope ditch/swale draining to the street with the following geometry: a minimum slope of 1.5% and a minimum depth of 150 mm. The maximum allowable depth of a swale/ditch shall be 600 mm. The maximum side slope of swales/ditches shall be 3 horizontal to 1 vertical.

Section 8.3.11.6, Page 8.20:

Rear Yard storage cannot be accounted for in the water storage calculation. It should be assumed that all water in excess of the 2-year event will flow to the street. The maximum depth of flow depth in rear yards is 300 mm. Furthermore, there must be at least 30 cm of vertical clearance between the rear yard spill elevation and the ground elevation at the adjacent building envelope. See Section 5.4.9 for further information. Major system storage in backyards is not to be included/accounted for in design computations, however the effect of flow attenuation can now be accounted for by assuming a constant slope ditch/swale draining to the street.

**Implementation considerations**

- Accounting for external overland drainage
- Use of standard ICDs
- Requirement for ICD plans
- Requirement for plans showing 100-year and stress-test ponding limits
- Provide a foundation drain backwater valve installed as per Std Dwg S14.
- Provide a full port backwater valve, in the sanitary building drain, installed as per Std Dwg S14.1.
- Connect the water service to the existing /extended watermain and show proposed fire route and existing fire hydrant on the plan.

**Monitoring MHs**

Onsite Monitoring MHs are required for sewers (sanitary and storm) if there will be commercial component with the residential development.

**Sight Triangle and Road widening requirement (By Transportation Project Manager Mr. Wally Dubyk)**

**Sidewalk Condition/Requirement: if there is no sidewalk, damaged one or asphalt sidewalk which needs to be changed to concrete.**

City needs minimum 2.0 m monolithic concrete sidewalk for more information please contact with Wally Dubyk at 613-580-2424 ext. 13783

**Studies required for ZA/Site Plan application**

- Assessment of adequacy of public services, water, wastewater and stormwater (ZA)
- Serviceability Study
- Erosion and sediment Control Plan, it can be combined with grading plan
- Stormwater Management Report
- Geotechnical Study
- Transportation -Wally Dubyk,
- Phase 1 Noise Control Feasibility Study- Please add stationary noise concerns if the usages are considered as Industrial, car dealerships, moto vehicle maintenance and commercial activities and equipped with is generator, fans or commercial air conditioners (ZA)
- Phase 2 Noise Control Detailed Study- Please add stationary noise concerns if the usages are considered as Industrial, car dealerships, moto vehicle maintenance and commercial activities and equipped with generator, fans or commercial air conditioners.
- Vibration Study
- ESA-Phase 1 Study, needs to be prepared as per current MOE regulation not as per CSA standards
- ESA-Phase 2, Depend on the Phase I recommendation if required needs to be prepared as per current MOE regulation not as per CSA standard
- RSC is needed for more sensitive land usage; - RSC is required before a ZA approval.
- Wind Analysis (10 storeys or more or a proposed building is more than twice the height of adjacent existing buildings and is greater than five storeys in height)

1. Plans required;
    a. Site Servicing Plan (Plan and Profile's for all services requiring MOE ECA)
    b. Grade Control and Drainage Plan
    c. Erosion and Sediment Control Plan
    d. Plan and profile for MOE application under transfer of Review program

**MOECCP SWM Requirement:**

- Connecting to a combined sewer, SWM requires an MOECCP ECA application

**Relevant information**

1. Servicing & site works shall be in accordance with the following documents:

    ⇨ Ottawa Sewer Design Guidelines (2012)
    ⇨ Ottawa Design Guidelines – Water Distribution (2010)
    ⇨ Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
    ⇨ City of Ottawa Slope Stability Guidelines for Development Applications (2004)
    ⇨ City of Ottawa Environmental Noise Control Guidelines (2006)
    ⇨ City of Ottawa Park and Pathway Development Manual (2012)
    ⇨ City of Ottawa Accessibility Design Standards (2012)

- ⇨ Ottawa Standard Tender Documents (2015)
- ⇨ Ontario Provincial Standards for Roads & Public Works (2015)

2. Record drawings and utility plans can be purchased from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455).

Regards,

Mohammad

Mohammad Abdul Mottalib, M. Sc., M. Eng., P. Eng.
Sr. Engineer Infrastructure Applications
Development Review , Central Group
Planning, Infrastructure and Economic Development Department
Services de la planification, de l'infrastructure et du développement économique
City of Ottawa | Ville d'Ottawa
110 Laurier Ave. West / 110, avenue Laurier Ouest, Ottawa K1P 1J1
Tel. 613-580-2424 ext. 27798 , Fax. 613-560-6006 ,E-mail: Abdul.Mottalib@ottawa.ca

## Guy Forget

**From:** Guy Forget
**Sent:** Monday, July 5, 2021 6:59 AM
**To:** Mottalib, Abdul
**Cc:** Lucie Dalrymple
**Subject:** RE: 50 The Driveway

Hi Abdul,

Just to close the loop on your Email, the wastewater flows for our Site (66 units) is ±1.55 L/s, which includes the dry & wet I/I allowances.

Therefore, the allowable peak flow will be based on the 1:5 year peak flow which will be set to a C-Factor of 0.40 given that it is in a combined area. Due to the low theoretical sanitary flow noted above, we will not subtract it from the allowable.

Per the pre-consult notes, the 1:100-year post-development flows will be retained on-site while releasing to the allowable rate set based on the above.

Thank you

Guy

---

**From:** Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
**Sent:** Friday, July 2, 2021 3:09 PM
**To:** Guy Forget <gforget@jlrichards.ca>
**Cc:** Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
**Subject:** RE: 50 The Driveway

Hello Guy,

Please see respond below from asset management:

" The model shows a 5-year level of service so we have used that for this area, but I would keep the C value at 0.4 since it is combined. If the domestic flow increases significantly , say they add 10 L/s over existing, we ask that they overcontrol the storm by that amount because the Preston model was an existing condition model and not a future buildout model (so it assumes existing sanitary flows)."

--

Thanks,

Abdul
Mohammad Abdul Mottalib, P. Eng.
Extension: 27798

---

**From:** Guy Forget <gforget@jlrichards.ca>
**Sent:** June 28, 2021 11:16 AM

**To:** Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
**Subject:** RE: 50 The Driveway



Hi Abdul,

Attached are the engineering notes provided to us at the early stage of this project.

I have a question relating to the storm discharge criterion being based on a 1:2-year storm. Elsewhere in the downtown core of the City of Ottawa where sites are serviced by combined sewers, the City have provided that the allowable be set based on a 1:5-year which was the design basis back then.

Can you ask the water resources group to reconsider the 1:2-year design storm, we would like to use the 1:5-year design storm.

Thanks

Guy

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

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

J.L. Richards & Associates Limited
ENGINEERS • ARCHITECTS • PLANNERS

BEST MANAGED COMPANIES Platinum member



---

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

**[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 |

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

*Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.*

**From:** Guy Forget <gforget@jlrichards.ca>
**Sent:** June 22, 2021 11:01 AM
**To:** Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
**Cc:** Lucie Dalrymple <ldalrymple@jlrichards.ca>; Fel Petti <fel@mainandmain.ca>; Emily Roukhkian <emily@mainandmain.ca>
**Subject:** 50 The Driveway



,

We are preparing the Assessment of Adequacy of Public Services Report in support of Main+Main's development located at 50 Driveway, in the downtown area of the City of Ottawa.

We wish to request hydraulic water Boundary Conditions (BCs) to complete a high-level hydraulic assessment to demonstrate that the Site is serviceable.

Given that the Site is bounded by two (2) watermains; 305 mm dia. WM on the QED ROW and 152 mm dia WM on Lewis Street, we would like to receive a BC for each one of them as shown in the attached PDF (BC Request.PDF). I have also included a snippet from geoOttawa showing the servicing around the Site.

In support to the FUS Calculations, I have attached a sketch showing the various exposures to the future building and the FUS Calculations.

The required development details and info for the BC are as follows:

Development Type: **Nine-storey high-density residential development;**

Location of Development: **50 The Driveway (Queen Elizabeth Driveway and Lewis Street intersection;**

Location of Requested Boundary Conditions: **Current service lateral (50 mm) from existing building connected to existing 305 mm diameter watermain on Queens Elizabeth Driveway (QED);**

**Boundary Condition Request: (1) off of the QED 305 mm diameter watermain, and (2) off of the 152 mm diameter watermain on Lewis Street (see attached Figure).**

1. Location of Service: **50 The Driveway**
2. A sketch of the proposed water service to the city watermain: **Proposed lateral to either the QED 305 mm diameter watermain or to the Lewis Street 152 mm diameter WM**
3. Street Number & Name: **50 The Driveway**

4. Type of development and units: **66 Condominium units**

5. Amount of fire flow required: **233 L/s or 14,000 L/min**
   **(Calculation as per the FUS Method);**

6. Average daily demand: **0.42 L/s**

7. Maximum daily demand: **1.36 L/s**

8. Maximum hourly daily demand: **0.11 L/s**

Given that the average day demand is well below 50 m3/day, the dual connection is not mandatory.

If BCs can be provided at both locations under Peak Hour, Maximum Day plus Fire Flow (233 L/s) and Maximum Pressure Check scenarios.

Should you have any questions or require anything further, please do not hesitate to call.

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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& Associates Limited
ENGINEERS • ARCHITECTS • PLANNERS

BEST MANAGED COMPANIES
Platinum member

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## Guy Forget

**From:** MacKinnon, Christopher <Christopher.MacKinnon@ottawa.ca>
**Sent:** Monday, July 12, 2021 8:16 AM
**To:** Guy Forget
**Subject:** 50 driveway



Good morning

Dye test confirmed the service for 50 driveway is connected to COM11459 22 meters downstream from mhch11535. I have attached a map reference

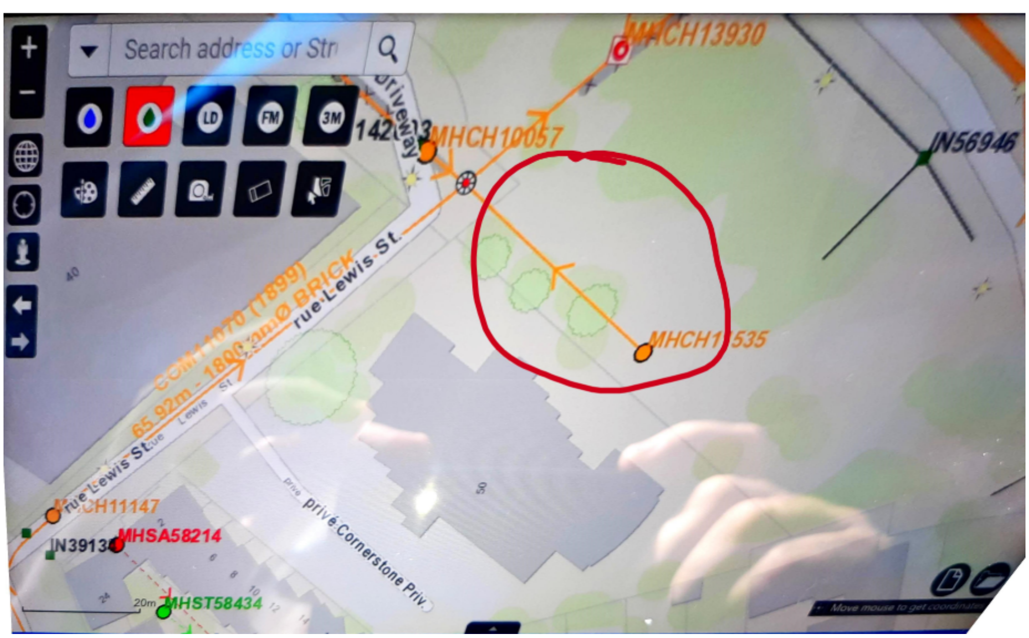
Thanks

Chris Mackinnon

Get [Outlook for Android](#)

'





## Guy Forget

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



Good Morning Guy,

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

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

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



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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



---

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

Hi Eric,

Hope you are doing well.

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

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

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

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

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

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

Thank you

Guy

# **Pre-Application Consultation Meeting Notes**

**50 The Driveway, Ottawa**
**PC2022-0067**
**Meeting Date: Tuesday, March 29, 2022**
**MS Teams**

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**Attendees:**

*City of Ottawa:*
Andrew McCreight, File Lead, Acting Manager
Randolph Wang, Urban Designer
MacKenzie Kimm, Heritage Planner
Mohammed Fawzi, Engineer
Wally Dubyk, Transportation Project Manager
Parthvi Patel, Student Planner

*Applicant Team:*
David Anderson
Carl Bray
Emily Roukhkian
Tim Chadder
Eric Forhan
Barry Hobin
Lucie Dalrymple

*Community Association: Centretown Community Association (subject to NDA)*
Jack Hanna
Mary Huang

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**Subject: Proposal for a Site Plan Control application to support a nine-storey apartment building at 50 The Driveway**

**Proposal Details:**

- The proposed development is a nine-storey residential building, with a total of 88 units and two levels of underground parking.
- The lantern feature will be incorporated on the roof to respect the heritage of the site.
- Efforts are being made to create a strong buffer between the townhomes that have a side yard against the site – a buffer of 7.5 metres to 11 metres of the property line is proposed.

**Technical Comments – City Staff**

Planning Comments – Andrew McCreight

- The plans were very well developed for the OP and Zoning-By Law applications but need to be updated for the Site Plan Application.
    - For example, the landscape buffer along the residential edge – the Landscape Plan needs to be updated to better understand the specific treatment of this buffer, the new tree plantings, the private amenity space etc.
    - Within the Tree Conservation Report last submitted, there were 2-3 trees that were unconfirmed, these should be updated and looked at closer among other landscape details and determine preservation status.
- Confirmation of the parking should be shown in site plan details. For informational purposes, it is required to submit parking plans and floor plans.
    - A table on the site plan should confirm the breakdown of residential and visitor parking.
    - Details on the EV charging spaces
- As a reminder, at planning committee, Councillor McKenney raised concerns about the potential of delegated authority being removed if the parking was not reduced.
- Provide more details on the amenity space strategy, particularly for the common amenity area.

Transportation Comments - Wally Dubyk

- Transportation comments were submitted in February – please ensure that a response to these comments is submitted.
    - For the site plan submission, ensure that the TIA and responses are updated.

Heritage Comments – MacKenzie Kimm

- Please consider identifying elements that are being conserved from the heritage building and how they are being re-incorporated on the elevations.
- The next major step is to draft and negotiate the Heritage Easement Agreement terms before bringing to Council for approval. Heritage staff will work with legal staff to provide a first draft.
- Further conversations on the treatment of the lantern, how it is to be integrated into the new construction and how visible it will be an important part of consideration of the final plans. The preparation and study of options as suggested by UD staff is recommended.
- Heritage staff are aware that some investigative work is planned in the short term. Please keep us in formed of any challenges or findings that may need to inform the easement preparation.
- Photo documentation and recording of the site for archival purposes should be undertaken prior to any investigative work.
- A “conservation plan” or similar document should be provided as part of the submission—it can be a working document to be finalized as investigations are completed. It should include:

  - Technical memos provided from the structural engineer/contractor/architect in support of any recommendations for how the deconstruction/reconstruction will occur
  - The archival recording (photos) and as-found conditions
  - Scaled recording of the heritage attributes in situ (i.e., rectified photographs of the elevations for use as the basis for reconstruction.
  - If there’s an opportunity to laser scan the building, that would be recommended.
  - Detailed outline of the conservation approach for each of the attributes
- In terms of timing, staff see the following steps/milestones:
  - Receive SPC application
  - Staff will review and provide comments
  - Heritage Easement to be refined along side the SPC application; details of the lantern treatment to be ironed out concurrently
  - Once Heritage Easement is closer to being finalized along with SPC, attend UDRP
  - Finalize plans according to feedback to incorporate into Heritage Easement and bring to BHSC and Council for approval;
  - SPC finalized
  - Holding Zone lifted

<u>Urban Design Comments – Randolph Wang</u>

- A Design Brief is required. The Terms of Reference of the Design Brief is attached for convenience. The expectation is that the architecture and landscape design provided for site plan control application should be very detailed and specific.
- Please continue to study how a reconstructed heritage lantern will be appropriately integrated into the new building. Please explore different options and document these options in the Design Brief. The submission should include architectural details of the recommended option.
- The site is within a Design Priority Area under the new OP (whereas at the OPA and ZBLA stage, it was not). As such formal review by the UDRP is required.

<u>Engineer Comments – Mohammed Fawzi</u>

***Available Infrastructure:***

**Lewis Street:**
Combined: 1800 Brick (1899)
Water: 150mm DI (Install 1978)

**Queen Elizabeth Drive:**
Combined: 300 Clay (1913)
Water: 305mm UCI (Install 1913)

***Water Boundary Conditions:***

Will be provided at request of consultant. Requests must include the location of the service and the expected loads required by the proposed development. Please provide the following and submit Fire Flow Calculation Sheet per FUS method with the request:

- Location of service
- Type of development and amount of required fire flow (per FUS method – include FUS calculation sheet with request)
- Average Daily Demand (l/s)
- Maximum Hourly Demand (l/s)
- Maximum Daily Demand (l/s)
- Water Supply Redundancy – Fire Flow:
  Applicant to ensure that a second service with an inline valve chamber be provided where the average daily demand exceeds 50 $m^3$ / day (0.5787 l/s per day)

Water services larger than 19 mm require a Water Data Card. Please complete card and submit.

***Stormwater Management (Quantity Control):***

- Coefficient (C) of runoff determined **as per existing conditions** but in no case more than 0.5.
- TC = To be calculated, minimum 10 minutes
- Any storm events greater than 5 year, up to 100 year, and including 100-year storm event must be detained on site (as per email dated July 5, 2021)
- Foundation drains are to be independently connected to sewer main unless being pumped with appropriate back up power, sufficient sized pump and back flow prevention.
- Roof drains are to be connected downstream of any incorporated ICD within the SWM system.

***Stormwater Management (Quality Control):***

- Rideau Valley Conservation Authority to provide Quality Controls.

***Noise Study:***

- Noise study required – property is 130m from Arterial Road (Nicholas St.)

***Phase I and Phase II ESA:***

- Phase I ESA is required; Phase II ESA may be required depending on the results of the Phase I ESA. Phase I ESA must include an EcoLog ERIS Report.
- Phase I ESA and Phase II ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.

***Required Studies***

- Stormwater Management Report

- Site Servicing Study
- Geotechnical Study
- Phase I ESA
- Phase II ESA (depends on outcome of Phase I)
- Noise Study

***Required Plans***

- Site Servicing Plan
- Grade Control and Drainage Plan
- Erosion and Sediment Control Plan (Can be combined with Grading Plan)

***Relevant information***

1. The Servicing Study Guidelines for Development Applications are available at the following address: https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans#servicing-study-guidelines-development-applications
2. Servicing and site works shall be in accordance with the following documents:
    - Ottawa Sewer Design Guidelines (October 2012)
    - Ottawa Design Guidelines – Water Distribution (2010)
    - Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
    - City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
    - City of Ottawa Environmental Noise Control Guidelines (January 2016)
    - City of Ottawa Park and Pathway Development Manual (2012)
    - City of Ottawa Accessibility Design Standards (2012)
    - Ottawa Standard Tender Documents (latest version)
    - Ontario Provincial Standards for Roads & Public Works (2013)
3. Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455).
4. Any proposed work in utility easements requires written consent of easement owner.

Community Comments – Jack Hannah, Mary Huang

- We appreciate that the developer has met and accomplished many of the items asked in our two-paged letter submitted during the OPA and Zoning.
- We wish you were presenting this as a green building – if a building of luxury condos can't be green, what can.
- Regarding parking, seniors need a lot of parking (for caregivers, cleaners, family etc.), we believe that a fairly high visitor parking ratio is needed.
- I have walked past this site many times, the lantern on top of the building does not look like a lantern and people often have to be told what it is. It is suggested that a plaque be used to explain the lantern and its meaning.
- Update amenity area and consider use for a variety of people.
- Look at demographics and aging in place.

| 50 The Driveway<br>**DEVELOPMENT SERVICING STUDY CHECKLIST** | |
|---|---|
| **REFERENCED STUDIES AND REPORTS** | **REFERENCE** |
| Site Servicing Report for 50 The Driveway (J.L. Richards & Associates Limited, April 29, 2022) | SSR |

| **4.1** | **GENERAL CONTENT** | **REFERENCE** |
|---|---|---|
| ☐ | Executive Summary (for larger reports only). | N/A |
| ☒ | Date and revision number of the report. | SSR (Title Page) |
| ☒ | Location map and plan showing municipal address, boundary, and layout of proposed development. | SSR (Figure 1)<br>All Drawings |
| ☒ | Plan showing the site and location of all existing services. | Site Servicing Plan (S1) |
| ☒ | Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere. | SSR (Section 1.0) |
| ☒ | Summary of Pre-consultation Meetings with City and other approval agencies. | SSR (Section 1.0, Appendix 'B') |
| ☒ | Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria. | ESA by Paterson Group Inc. dated July 19, 2021 |
| ☒ | Statement of objectives and servicing criteria. | SSR (Section 1.0, 2.0, 3.0, 4.0, 5.0) |
| ☒ | Identification of existing and proposed infrastructure available in the immediate area. | SSR (Section 1.0, 2.0, 3.0, 4.0)<br>Site Servicing Plan (S1) |
| ☐ | Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available). | N/A |
| ☒ | Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths. | Grading Plan (G1) |

| | | |
|---|---|---|
| ☐ | Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts. | N/A |
| ☐ | Proposed phasing of the development, if applicable. | N/A |
| ☒ | Reference to geotechnical studies and recommendations concerning servicing. | Geotechnical Investigation by Paterson Group Inc. dated July 19, 2021 |
| ☒ | All preliminary and formal site plan submissions should have the following information:<br>▪ Metric scale<br>▪ North arrow (including construction North)<br>▪ Key plan<br>▪ Name and contact information of applicant and property owner<br>▪ Property limits, including bearings and dimensions<br>▪ Existing and proposed structures and parking areas<br>▪ Easements, road widening and rights-of-way<br>▪ Adjacent street names | All Drawings |

| 4.2 | DEVELOPMENT SERVICING REPORT: WATER | REFERENCE |
|---|---|---|
| ☐ | Confirm consistency with Master Servicing Study, if available. | N/A |
| ☒ | Availability of public infrastructure to service proposed development. | SSR (Section 1.0, 2.0)<br>Site Servicing Plan (S1) |
| ☒ | Identification of system constraints. | SSR (Section 2.0) |
| ☒ | Identify boundary conditions. | SSR (Section 2.0, Appendix 'D3') |
| ☒ | Confirmation of adequate domestic supply and pressure. | SSR (Section 2.0) |
| ☒ | Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development. | SSR (Section 2.0, Appendix 'D2') |
| ☒ | Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves. | SSR (Section 2.0) |
| ☐ | Definition of phasing constraints. Hydraulic modelling is required to confirm servicing for all defined phases of the project, including the ultimate design. | N/A |
| ☒ | Address reliability requirements, such as appropriate location of shutoff valves. | SSR (Section 2.0) |
| ☐ | Check on the necessity of a pressure zone boundary modification. | N/A |

| | | |
|---|---|---|
| ☒ | Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range. | SSR (Section 2.0, Appendix 'D1' to 'D4') |
| ☒ | Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants), including special metering provisions. | SSR (Section 2.0) |
| ☐ | Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation. | N/A |
| ☒ | Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines. | SSR (Section 2.0) |
| ☒ | Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference. | SSR (Appendix 'D1' to 'D4') |

| **4.3** | **DEVELOPMENT SERVICING REPORT: WASTEWATER** | **REFERENCE** |
|---|---|---|
| ☒ | Summary of proposed design criteria (Note: Wet weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure). | SSR (Section 3.0, Appendix 'E') |
| ☐ | Confirm consistency with Master Servicing Study and/or justifications for deviations. | N/A |
| ☐ | Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the Guidelines. This includes groundwater and soil conditions, and age and condition of sewers. | N/A |
| ☒ | Description of existing sanitary sewer available for discharge of wastewater from proposed development. | SSR (Section 1.0, 3.0)<br>Site Servicing Plan (S1) |
| ☒ | Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable.) | SSR (Section 3.0, Appendix 'E') |
| ☒ | Calculations related to dry weather and wet weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format. | SSR (Appendix 'E') |
| ☒ | Description of proposed sewer network, including sewers, pumping stations and forcemains. | SSR (Section 3.0)<br>Site Servicing Plan (S1) |

| | | |
|---|---|---|
| ☐ | Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality). | N/A |
| ☐ | Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development. | N/A |
| ☐ | Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity. | N/A |
| ☐ | Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding. | N/A |
| ☐ | Special considerations, such as contamination, corrosive environment, etc. | N/A |

| **4.4** | **DEVELOPMENT SERVICING REPORT: STORMWATER** | **REFERENCE** |
|---|---|---|
| ☒ | Description of drainage outlets and downstream constraints, including legality of outlets (i.e., municipal drain, right-of-way, watercourse, or private property). | SSR (Section 1.0, 4.0) |
| ☒ | Analysis of available capacity in existing public infrastructure. | SSR (Section 4.0) |
| ☒ | A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern. | Drainage and Stormwater Management Plan (DST) |
| ☒ | Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects. | SSR (Section 4.0) |
| ☒ | Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements. | SSR (Section 4.0) |
| ☒ | Description of the stormwater management concept with facility locations and descriptions with references and supporting information. | SSR (Section 4.0)<br>Drainage and Stormwater Management Plan (DST) |
| ☐ | Setback from private sewage disposal systems. | N/A |
| ☐ | Watercourse and hazard lands setbacks. | N/A |
| ☒ | Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed. | SSR (Appendix ‘B’) |

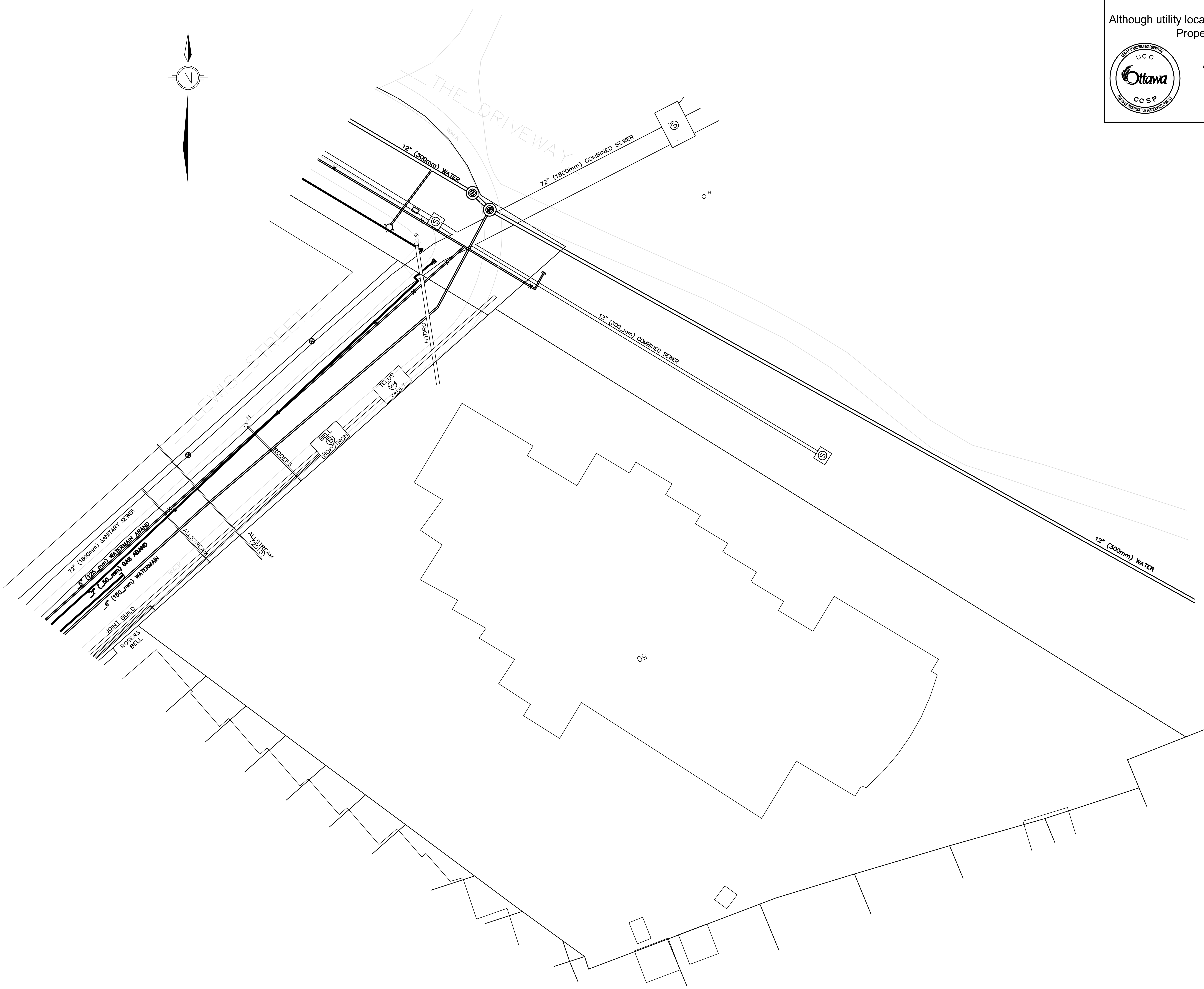
| | | |
|---|---|---|
| ☐ | Confirm consistency with subwatershed and Master Servicing Study, if applicable study exists. | N/A |
| ☒ | Storage requirements (complete with calculations) and conveyance capacity for minor events (1:2 year return period) and major events (1:100 year return period). | SSR (Section 4.0) |
| ☐ | Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals. | N/A |
| ☒ | Calculate pre- and post-development peak flow rates, including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions. | SSR (Section 4.0) |
| ☒ | Any proposed diversion of drainage catchment areas from one outlet to another. | SSR (Section 4.0) |
| ☒ | Proposed minor and major systems, including locations and sizes of stormwater trunk sewers, and stormwater management facilities. | Drainage and Stormwater Management Plan (DST), Site Servicing Plan (S1) |
| ☒ | If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event. | Quantity control proposed per SSR (Section 4.0) |
| ☐ | Identification of potential impacts to receiving watercourses. | N/A |
| ☐ | Identification of municipal drains and related approval requirements. | N/A |
| ☒ | Description of how the conveyance and storage capacity will be achieved for the development. | SSR (Section 4.0) |
| ☒ | 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading. | SSR (Section 4.0), Drainage and Stormwater Management Plan (DST), Site Servicing Plan (S1) |
| ☒ | Inclusion of hydraulic analysis, including hydraulic grade line elevations. | SSR (Section 4.0) |
| ☒ | Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors. | SSR (Section 5.0) |
| ☐ | Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions. | N/A |
| ☐ | Identification of fill constraints related to floodplain and geotechnical investigation. | N/A |

| 4.5 | APPROVAL AND PERMIT REQUIREMENTS | REFERENCE |
|---|---|---|
| The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development, as well as the relevant issues affecting such approval. The approval and permitting shall include but not be limited to the following: | | |
| ☐ | Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams, as defined in the Act. | N/A |
| ☐ | Application for Environmental Compliance Approval (ECA) under the Ontario Water Resources Act. | N/A |
| ☐ | Changes to Municipal Drains. | N/A |
| ☐ | Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation, etc.). | N/A |

| 4.6 | CONCLUSION CHECKLIST | REFERENCE |
|---|---|---|
| ☒ | Clearly stated conclusions and recommendations. | SSR (Section 2.6, 3.4, 4.6) |
| ☐ | Comments received from review agencies, including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency. | N/A |
| ☒ | All draft and final reports shall be signed and stamped by a Professional Engineer registered in Ontario. | SSR<br>All Drawings |

# Appendix C

Background Drawings




## 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.

UCC Ottawa CCSP

*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.*

## 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 — P/S, PED, GR
Amp, Hand Hole, Vault, Gas Valve — AMP
OC Transpo: Bus Shelter-No Power, Energized, Isolated — BUS, BUS, BUS
Streetscape: Planter Box, Grate Square, Eng. Soil — TGS
Traffic Connect Box / Disconnect Box, SL Disconnect — TCB, TDB, SDB
R.L Hand Hole, R.L. Camera — THH
Scada: Handhold, Monitoring Panel
Reducer
Pipe, Duct, Conduit, Lateral
Culvert
Abandoned
Capped
Buried Cable
Property Line
Install Year — (2015)

### TELECOM GLOSSARY

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

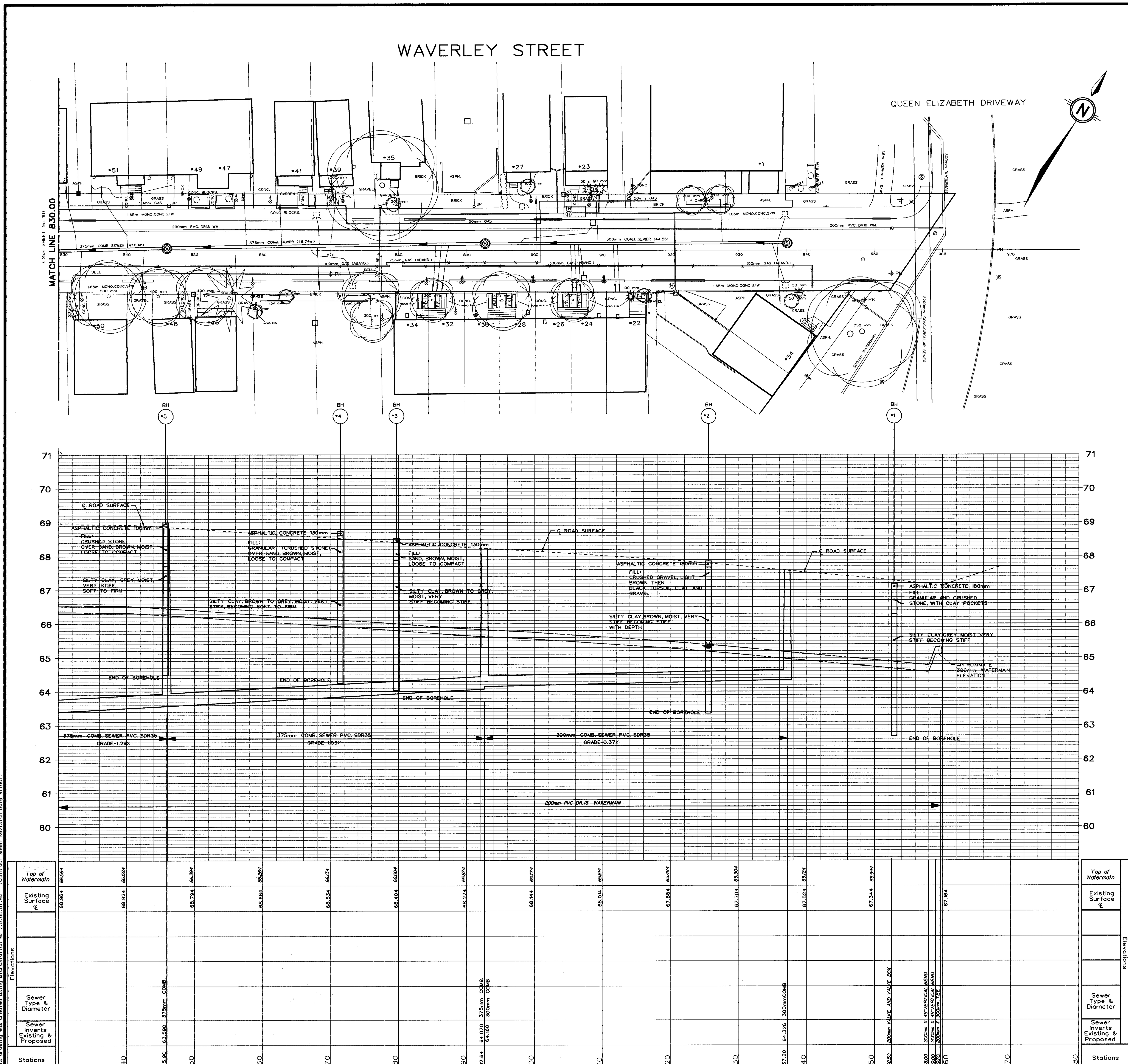
### GLOSSARY - OTHER

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

### 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.*




## Revisions:

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

## Design:

| | | | |
|---|---|---|---|
| Designed By: ZAFAR I. RANA | Date | Checked By | Date |
| Survey Detail By: J. FRANCE, J. PINHEY | Date | Field Checked By | Date |
| Drafting By: S. SAUVE, A. SCAFFIDI | Date | Checked By | Date |

Construction Services Manager
**Wayne Bennett P.Eng.**

## Final Measurements:

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

## Tender Notes:

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

## Legal Survey Notes:

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

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



THIS IS NOT A PLAN OF SURVEY
This plan was compiled from plans and documents recorded in the Land Registry System and has been prepared for property indexing purposes only.



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

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

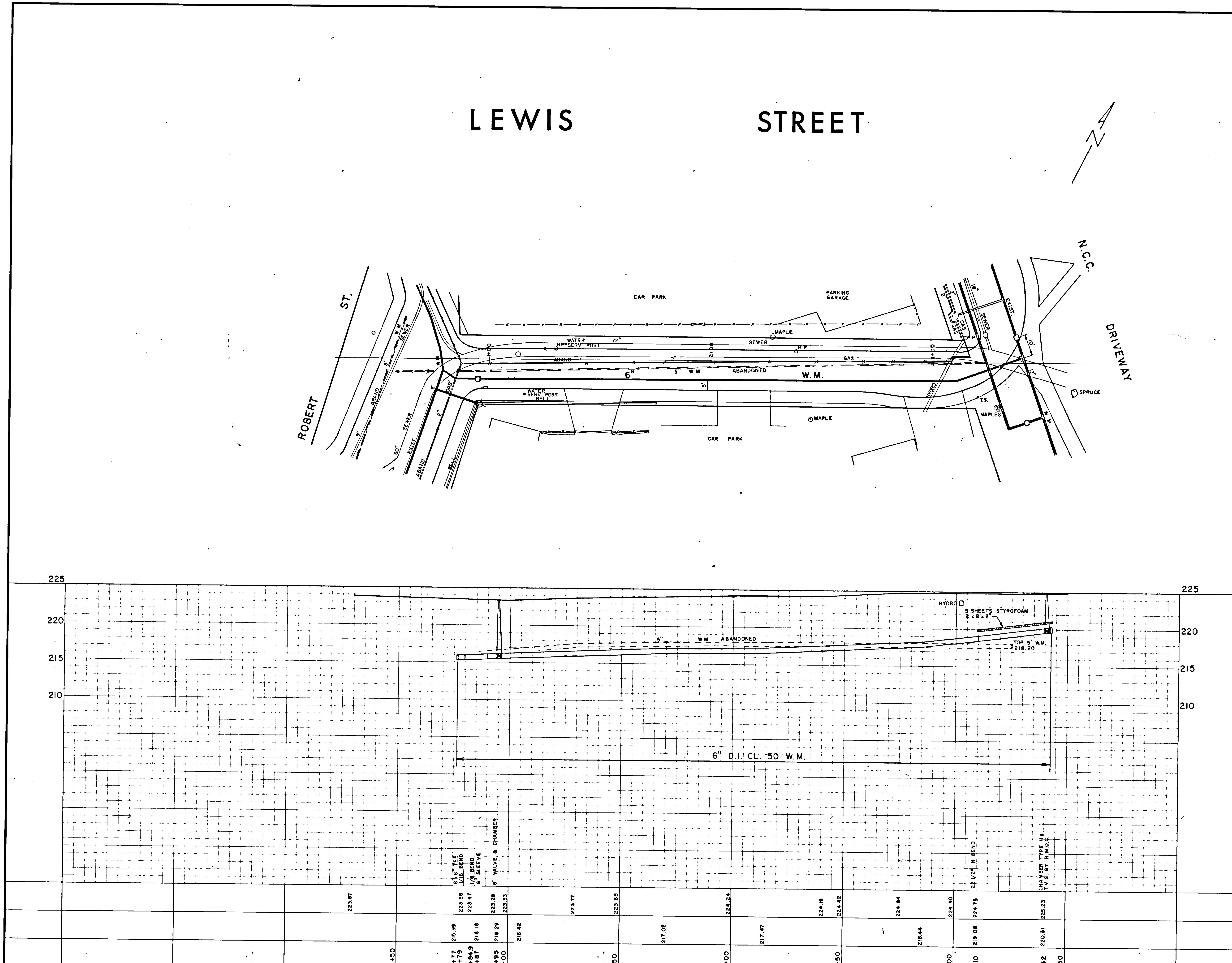
# WAVERLEY STREET

STA. 830.00 TO QUEEN ELIZABETH DRIVEWAY

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

Filename: 3330s10.dgn
Reference: wavbp1.dgn merg.dgn

This drawing was created using Microstation 95 V.5.05.01.65 (Contract Sheet Revision date 97.10.01)




**Regional Municipality of Ottawa-Carleton Works Department**

| | |
|---|---|
| F.E. AYERS<br>Works Commissioner | W.L. KEAY<br>Director Pollution Control |
| Engineer in Charge of Design & Construction<br>L. L. Larson P.Eng<br>Date 6-6-78 | REGISTERED PROFESSIONAL ENGINEER<br>L. L. LARSON<br>PROVINCE OF ONTARIO |
| Project officer Timothy J. Slack | Date 5/6/78 |
| Drawn by: S. 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 29

Revisions

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

Scales

HORIZON 0 10 20 30 40 FEET

VERTICAL 0 3 6 9 12 FEET

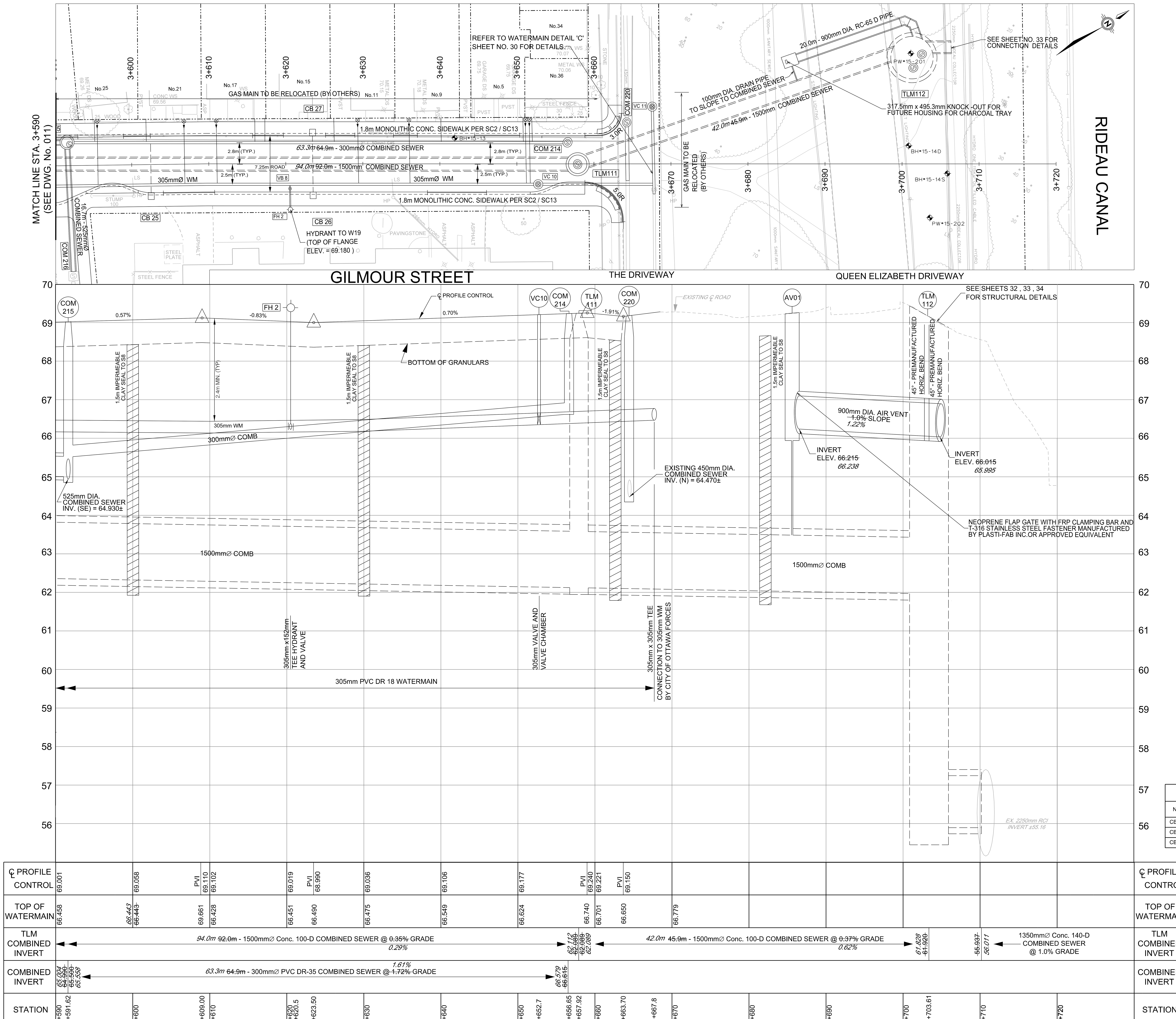
Project Title

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

Drawing No.: 911-P

Sheet

6500




# GILMOUR STREET TRUNK SEWER
## ROAD, SEWER AND WATERMAIN CONSTRUCTION

Ottawa

Contract No. ISD15-5013 | Dwg. No. 012

Sheet 12 of 35

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

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

T. BLASIOLI P. ENG.
*Project Manager*

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

Asset No.

Asset Group

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

Const. Inspector

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

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

REVISIONS

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

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

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

## COMBINED TLM MAINTENANCE HOLE DATA

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

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

## COMBINED MAINTENANCE HOLE DATA

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

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

## CATCH BASIN DATA

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

1. OFFSET MEASURED FROM ROAD ALIGNMENT CONTROL TO CENTER OF CATCH BASIN.
2. GRATE ELEVATIONS ARE GIVEN AT EDGE OF PAVEMENT.
3. ALL CATCH BASIN LEADS TO BE 200mmØ PVC DR-35 UNLESS SHOWN OTHERWISE FOR STANDARD CONCRETE CATCH BASINS (OPSD 705.010).
4. ALL CATCH BASINS TO INCLUDE 600mm SUMP.
5. LENGTH MEASURED FROM CENTERLINE OF STRUCTURE TO CENTERLINE OF SEWER.
6. INLET CONTROL DEVICE (ICD)
   V = VORTEX TYPE ICD
   C = FRAME TYPE ICD WITH CIRCULAR ORIFICE
   O = ODOUR CONTROL INLET
   REFER TO CONTRACT SPECIFICATIONS FOR ICD DETAILS
7. ALL CATCH BASINS ARE TO BE CONNECTED TO THE LOCAL COMBINED SEWER.

# Appendix D1

Water Demand Calculations

**Water Demand Calculations**
**50 The Driveway (JLR 31333-001)**

| **Unit Breakdown** | **No.** | **Person Per Unit (Table 4.1)** |
|---|---|---|
| 1 BED | 6 | 1.4 |
| 1 BED + Den | 17 | 1.4 |
| 2 BED | 10 | 2.1 |
| 2 BED + Den | 17 | 2.1 |
| Large 2 BED + Den | 27 | 2.1 |
| Total Unit Count = | 77 | |
| No. of 1-bed & 1-bed + | 23 | units |
| Density | 1.4 | p/p/u |
| No. Ppl | 33 | ppl |
| No. of 2-bed & 2-bed + | 27 | units |
| Density | 2.1 | p/p/u |
| No. Ppl | 57 | ppl |
| No. of Exec 2-bed | 27 | units |
| Density | 2.1 | p/p/u |
| No. Ppl | 56.7 | ppl |
| Calculated Population | 145.6 | ppl |
| **Targeted Population** | **155** | **ppl** |
| Average Day Consumption Rate | 350 | L/c/d |
| Average Day Volume | 50.96 | m3 |
| **Average Day Demand** | **0.63** | **L/s** |
| Maximum Day Peaking Factor | 4.86 | x Avg Day (Table 3-3 MOE) |
| **Maximum Day Demand** | **3.05** | **L/s** |
| Peak Hour Peaking Factor | 7.33 | x Max Day (Table 3-3 MOE) |
| **Peak Hour Demand** | **4.60** | **L/s** |
| Minimum Hour Peaking Factor | 0.10 | x Avg Day (Table 3-3 MOE) |
| **Minimum Hour Demand** | **0.06** | **L/s** |

# Appendix D2

Fire Flow (NFPA  and Email)

## Guy Forget

|  |  |
|---|---|
| **From:** | Elaine Guenette <elaine.guenette@smithandandersen.com> |
| **Sent:** | Wednesday, April 27, 2022 7:23 AM |
| **To:** | Guy Forget; David Anderson; Andre Drouin |
| **Cc:** | Emily Roukhkian; Lucie Dalrymple; Kendra Tyhurst |
| **Subject:** | RE: 50 The Driveway Introduction |

Hi David, Guy,

David – Do you have a MPH layout to start the discussion for this roof? The size of the penthouse will change with the mechanical system but we can lay out an option. Our understanding from the call is that there will likely be occupied roof area around the penthouse.

Guy – The number below requires an outside hose allowance of 100 gpm, for a total flow of 600 GPM. The sprinkler contractor would use the hydraulic calculation method for sprinkler flow. We will have a combined sprinkler/standpipe system, and this building will only have two hose connections per floor max.

Regards,

**Smith + Andersen**

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

---

**From:** Guy Forget <gforget@jlrichards.ca>
**Sent:** April 25, 2022 7:20 AM
**To:** Elaine Guenette <elaine.guenette@smithandandersen.com>; David Anderson <danderson@hobinarc.com>; Andre Drouin <Andre.Drouin@smithandandersen.com>
**Cc:** Emily Roukhkian <emily@mainandmain.ca>; Lucie Dalrymple <ldalrymple@jlrichards.ca>; Kendra Tyhurst <ktyhurst@jlrichards.ca>
**Subject:** RE: 50 The Driveway Introduction

**CAUTION: This message originated from outside Smith + Andersen**

---

Hi Elaine,

Could you clarify your bullet under control flow? Can you provide the breakdown of the 9th floor rooftop that will be controlled by the roof drain and the associated restriction? Will the penthouse runoff be conveyed also in the cistern in the parking area and will be combined to the runoff of the 5th-8th floor roof and the 2nd floor terrace?

In regard to the sprinkler flow, presumably I will need to add the hose allowance, correct?

Thanks

Guy

**11.2.2 Water Demand Requirements — Pipe Schedule Method.**

**11.2.2.1** Table 11.2.2.1 shall be used in determining the minimum water supply requirements for light and ordinary hazard occupancies protected by systems with pipe sized according to the pipe schedules of Section 23.7.

**Table 11.2.2.1 Water Supply Requirements for Pipe Schedule Sprinkler Systems**

| Occupancy Classification | Minimum Residual Pressure Required | | Acceptable Flow at Base of Riser (Including Hose Stream Allowance) | | Duration |
|---|---|---|---|---|---|
| | psi | bar | gpm | L/min | (minutes) |
| Light hazard | 15 | 1 | 500–750 | 1900-2850 | 30–60 |
| Ordinary hazard | 20 | 1.4 | 850–1500 | 3200-5700 | 60–90 |

**11.2.2.2** Pressure and flow requirements for extra hazard occupancies shall be based on the hydraulic calculation methods of 11.2.3.

**11.2.2.3** The pipe schedule method shall be permitted as follows:

(1) Additions or modifications to existing pipe schedule systems sized according to the pipe schedules of Section 23.7
(2) Additions or modifications to existing extra hazard pipe schedule systems
(3) New systems of 5000 ft$^2$ (465 m$^2$) or less
(4) New systems exceeding 5000 ft$^2$ (465 m$^2$) where the flows required in Table 11.2.2.1 are available at a minimum residual pressure of 50 psi (3.4 bar) at the highest elevation of sprinkler

**11.2.2.4** Table 11.2.2.1 shall be used in determining the minimum water supply requirements.

**11.2.2.5** The lower duration value of Table 11.2.2.1 shall be acceptable only where the sprinkler system waterflow alarm device(s) and supervisory device(s) are electrically supervised and such supervision is monitored at an approved, constantly attended location.

**11.2.2.6* Residual Pressure.**

**11.2.2.6.1** The residual pressure requirement of Table 11.2.2.1 shall be met at the elevation of the highest sprinkler.

**11.2.2.6.2 Friction Loss Due to Backflow Prevention Valves.**

**11.2.2.6.2.1** When backflow prevention valves are installed on pipe schedule systems, the friction losses of the device shall be accounted for when determining acceptable residual pressure at the top level of sprinklers.

**11.2.2.6.2.2** The friction loss of this device [in psi (bar)] shall be added to the elevation loss and the residual pressure at the top row of sprinklers to determine the total pressure needed at the water supply.

**11.2.2.7** The lower flow figure of Table 11.2.2.1 shall be permitted only where the building is of noncombustible construction or the potential areas of fire are limited by building size or compartmentation such that no open areas exceed 3000 ft$^2$ (280 m$^2$) for light hazard or 4000 ft$^2$ (370 m$^2$) for ordinary hazard.

**11.2.3 Water Demand Requirements — Hydraulic Calculation Methods.**

**11.2.3.1 General.**

**11.2.3.1.1** The water demand for sprinklers shall be determined only from one of the following, at the discretion of the designer:

(1) Density/area curves of Figure 11.2.3.1.1 in accordance with the density/area method of 11.2.3.2
(2) The room that creates the greatest demand in accordance with the room design method of 11.2.3.3
(3) Special design areas in accordance with 11.2.3.4

**11.2.3.1.2** The minimum water supply shall be available for the minimum duration specified in Table 11.2.3.1.2.

**11.2.3.1.3** The lower duration values in Table 11.2.3.1.2 shall be permitted where the sprinkler system waterflow alarm device(s) and supervisory device(s) are electrically supervised and such supervision is monitored at an approved, constantly attended location.

**11.2.3.1.4 Restrictions.** When either the density/area method or room design method is used, the following shall apply:

(1)*For areas of sprinkler operation less than 1500 ft$^2$ (139 m$^2$) used for light and ordinary hazard occupancies, the density for 1500 ft$^2$ (139 m$^2$) shall be used.
(2) For areas of sprinkler operation less than 2500 ft$^2$ (232 m$^2$) for extra hazard occupancies, the density for 2500 ft$^2$ (232 m$^2$) shall be used.

**11.2.3.1.5 Unsprinklered Combustible Concealed Spaces.**

**11.2.3.1.5.1*** When using the density/area or room design method, unless the requirements of 11.2.3.1.5.2 are met for buildings having unsprinklered combustible concealed spaces, as described in 8.15.1.2 and 8.15.6, the minimum area of sprinkler operation for that portion of the building shall be 3000 ft$^2$ (280 m$^2$).

**(A)** The design area of 3000 ft$^2$ (280 m$^2$) shall be applied only to the sprinkler system or portions of the sprinkler system that are adjacent to the qualifying combustible concealed space.

**(B)** The term *adjacent* shall apply to any sprinkler system protecting a space above, below, or next to the qualifying concealed space except where a barrier with a fire resistance rating at least equivalent to the water supply duration completely separates the concealed space from the sprinklered area.

**11.2.3.1.5.2** The following unsprinklered concealed spaces shall not require a minimum area of sprinkler operation of 3000 ft$^2$ (280 m$^2$):

(1) Noncombustible and limited-combustible concealed spaces with minimal combustible loading having no access. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum.
(2) Noncombustible and limited-combustible concealed spaces with limited access and not permitting occupancy or storage of combustibles. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum.
(3) Combustible concealed spaces filled entirely with noncombustible insulation.
(4)*Light or ordinary hazard occupancies where noncombustible or limited-combustible ceilings are directly attached

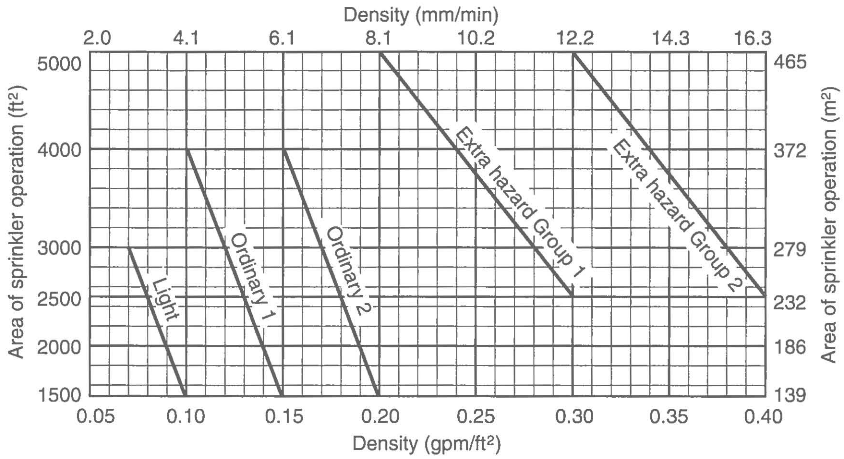



**FIGURE 11.2.3.1.1 Density/Area Curves.**

**Table 11.2.3.1.2 Hose Stream Allowance and Water Supply Duration Requirements for Hydraulically Calculated Systems**

| Occupancy | Inside Hose gpm | Inside Hose L/min | Total Combined Inside and Outside Hose gpm | Total Combined Inside and Outside Hose L/min | Duration (minutes) |
|---|---|---|---|---|---|
| Light hazard | 0, 50, or 100 | 0, 190, or 380 | 100 | 380 | 30 |
| Ordinary hazard | 0, 50, or 100 | 0, 190, or 380 | 250 | 950 | 60–90 |
| Extra hazard | 0, 50, or 100 | 0, 190, or 380 | 500 | 1900 | 90–120 |

to the bottom of solid wood joists or solid limited-combustible construction or noncombustible construction so as to create enclosed joist spaces 160 ft³ (4.5 m³) or less in volume, including space below insulation that is laid directly on top or within the ceiling joists in an otherwise sprinklered concealed space.

(5) Concealed spaces where rigid materials are used and the exposed surfaces have a flame spread index of 25 or less and the materials have been demonstrated to not propagate fire more than 10.5 ft (3.2 m) when tested in accordance with ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*, extended for an additional 20 minutes in the form in which they are installed in the space.

(6) Concealed spaces in which the exposed materials are constructed entirely of fire-retardant-treated wood as defined by NFPA 703.

(7) Concealed spaces over isolated small rooms not exceeding 55 ft² (5.1 m²) in area.

(8) Vertical pipe chases under 10 ft² (0.9 m²), provided that in multifloor buildings the chases are firestopped at each floor using materials equivalent to the floor construction, and where such pipe chases contain no sources of ignition, piping shall be noncombustible, and pipe penetrations at each floor shall be properly sealed.

(9) Exterior columns under 10 ft² (0.9 m²) in area formed by studs or wood joists, supporting exterior canopies that are fully protected with a sprinkler system.

(10)*Light or ordinary hazard occupancies where noncombustible or limited-combustible ceilings are attached to the bottom of composite wood joists either directly or on to metal channels not exceeding 1 in. (25 mm) in depth, provided the adjacent joist channels are firestopped into volumes not exceeding 160 ft³ (4.5 m³) using materials equivalent to ½ in. (13 mm) gypsum board, and at least 3½ in. (90 mm) of batt insulation is installed at the bottom of the joist channels when the ceiling is attached utilizing metal channels.

**11.2.3.2 Density/Area Method.**

**11.2.3.2.1 Water Supply.**

**11.2.3.2.1.1** The water supply requirement for sprinklers only shall be calculated from the density/area curves of Figure 11.2.3.1.1 or from Chapter 22 where density/area criteria are specified for special occupancy hazards.

**11.2.3.2.1.2** When using Figure 11.2.3.1.1, the calculations shall satisfy any single point on the appropriate density/area curve.

**11.2.3.2.1.3** When using Figure 11.2.3.1.1, it shall not be necessary to meet all points on the selected curves.

**11.2.3.2.2 Sprinklers.**

**11.2.3.2.2.1** The densities and areas provided in Figure 11.2.3.1.1 shall be for use only with spray sprinklers.

**11.2.3.2.2.2** Quick-response sprinklers shall not be permitted for use in extra hazard occupancies or other occupancies where there are substantial amounts of flammable liquids or combustible dusts.

**11.2.3.2.2.3** For extended coverage sprinklers, the minimum design area shall be that corresponding to the hazard in Figure 11.2.3.1.1 or the area protected by five sprinklers, whichever is greater.

**11.2.3.2.2.4** Extended coverage sprinklers shall be listed with and designed for the minimum flow corresponding to the density for the hazard as specified in Figure 11.2.3.1.1.

# Appendix D3

Headloss Calculations &
Hydrant Table

## Guy Forget

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



Hello Guy,

Please see email below as requested.

Thanks

Abdul

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**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 |

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

*Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.*

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**From:** Guy Forget <gforget@jlrichards.ca>
**Sent:** June 22, 2021 11:01 AM
**To:** Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
**Cc:** Lucie Dalrymple <ldalrymple@jlrichards.ca>; Fel Petti <fel@mainandmain.ca>; Emily Roukhkian <emily@mainandmain.ca>
**Subject:** 50 The Driveway

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**ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.**

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We are preparing the Assessment of Adequacy of Public Services Report in support of Main+Main's development located at 50 Driveway, in the downtown area of the City of Ottawa.

We wish to request hydraulic water Boundary Conditions (BCs) to complete a high-level hydraulic assessment to demonstrate that the Site is serviceable.

Given that the Site is bounded by two (2) watermains; 305 mm dia. WM on the QED ROW and 152 mm dia WM on Lewis Street, we would like to receive a BC for each one of them as shown in the attached PDF (BC Request.PDF). I have also included a snippet from geoOttawa showing the servicing around the Site.

In support to the FUS Calculations, I have attached a sketch showing the various exposures to the future building and the FUS Calculations.

The required development details and info for the BC are as follows:

Development Type: **Nine-storey high-density residential development;**

Location of Development: **50 The Driveway (Queen Elizabeth Driveway and Lewis Street intersection;**

Location of Requested Boundary Conditions: **Current service lateral (50 mm) from existing building connected to existing 305 mm diameter watermain on Queens Elizabeth Driveway (QED);**

**Boundary Condition Request: (1) off of the QED 305 mm diameter watermain, and (2) off of the 152 mm diameter watermain on Lewis Street (see attached Figure).**

1. Location of Service: **50 The Driveway**
2. A sketch of the proposed water service to the city watermain: **Proposed lateral to either the QED 305 mm diameter watermain or to the Lewis Street 152 mm diameter WM**
3. Street Number & Name: **50 The Driveway**
4. Type of development and units: **66 Condominium units**
5. Amount of fire flow required: **233 L/s or 14,000 L/min**
   **(Calculation as per the FUS Method);**
6. Average daily demand: **0.42 L/s**
7. Maximum daily demand: **1.36 L/s**
8. Maximum hourly daily demand: **0.11 L/s**

Given that the average day demand is well below 50 m3/day, the dual connection is not mandatory.

If BCs can be provided at both locations under Peak Hour, Maximum Day plus Fire Flow (233 L/s) and Maximum Pressure Check scenarios.

Should you have any questions or require anything further, please do not hesitate to call.

Guy

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

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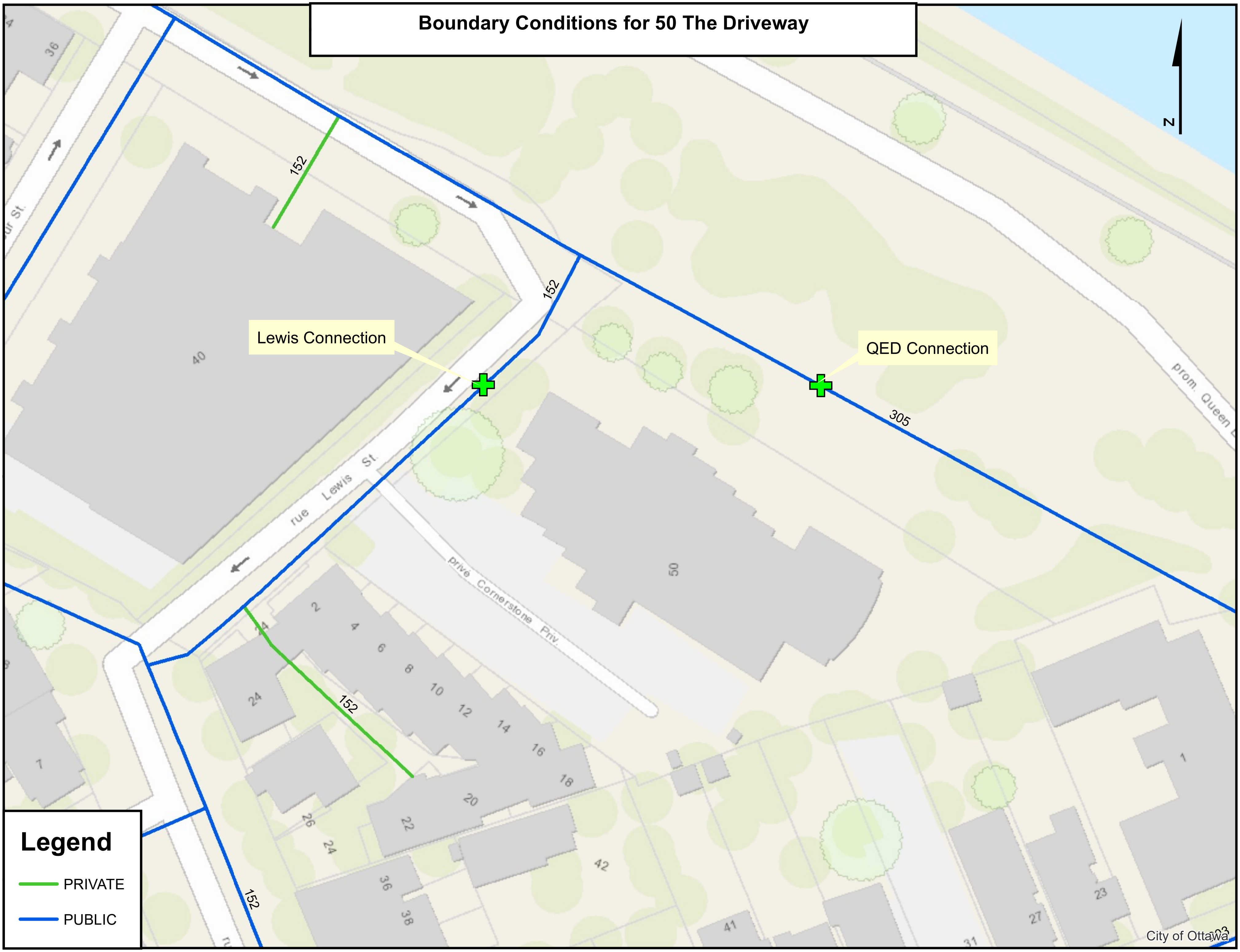
# Boundary Conditions for 50 The Driveway



**50 The Driveway**
**Main + Main**
**31333-000.1**

### Data provided to the City (June 22, 2021)

| Demand Scenario | Demand (L/s) |
|---|---|
| Average Day | 0.42 |
| Maximum Day | 2.39 |
| NFPA 13 Onsite Fire Flow | 69.2 |
| FUS Fire Flow | 250.0 |
| Peak Hour | 3.60 |
| Maximum HGL (Min Demand) | 0.04 |

### Boundary Conditions (June 26, 2021 Email from the City):

| Water Demand Scenario | Demands (L/s) | Head (m) @ QED | Head (m) @ Lewis St |
|---|---|---|---|
| Peak Hour | 3.60 | 106.4 | 106.4 |
| Maximum HGL (Minimum Hr) | 0.04 | 115.3 | 115.3 |
| MXDY + FF | 252.39 | 105.3 | 91.7 |

**Note: The supply elevations under the maximum day demand plus fire flow estimated by the City based on RFF of 15,000 L/min while FUS Requirements was 14,000 L/min**

### Headloss Calculations (Hazen Williams Equation)

Calculate headloss in a given pipe length based on flows and C value

**HL = 10.675 * L * Q^1.852 / ( C^1.856 * D ^4.8704)**

Where,
HL = Headloss (m)
L - Length (m)
Q - Flow ($m^3/s$)
C - Hazen Williams "C"
D - Watermain Diameter (m)

### Headloss Calculations - 200 mm diameter WM Connection to QED 305 mm diameter WM

| Water Demand Condition | Flow - Q (L/s) | Flow - Q ($m^3/s$) | Length (m) | C | D (m) | HeadLoss (m) | HGL (m) @ QED | Calculated HGL (m) | Elevation (m) | Pressure @ Node (m) | Pressure @ Node (kPa) | Requirement | Criteria Acheived? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average Day | 0.63 | 0.00063 | 15.0 | 110 | 0.200 | | | | | | | | |
| Maximum Day | 3.05 | 0.00305 | 15.0 | 110 | 0.200 | | | | | | | | |
| Peak Hour | 4.60 | 0.00460 | 15.0 | 110 | 0.200 | 0.00312 | 106.400 | 106.397 | 68.7 | 37.697 | 370 | 275 | Yes |
| Maximum HGL | 0.06 | 0.00006 | 15.0 | 110 | 0.200 | 0.00000 | 115.300 | 115.300 | 68.7 | 46.600 | 457 | 552 | Yes |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **RFF (OBC) = 69.2 L/s**<br>Maximum Day Plus Fire<br>(Q = 3.05 L/s + 69.2 L/s) | 69.79 | 0.06979 | 15.0 | 110 | 0.200 | 0.47940 | 105.300 | 104.821 | 68.7 | 36.121 | 354 | 140 | Yes |
| **RFF- 600 GMP (Mech Eng)**<br>Maximum Day Plus Fire<br>(Q = 3.05 L/s + 37.9 L/s) | 40.95 | 0.04095 | 15.0 | 110 | 0.200 | 0.17858 | 105.300 | 105.121 | 68.7 | 36.421 | 357 | 140 | Yes |
| **FUS Fire Flow = 240 L/s**<br>Maximum Day Plus Fire<br>(Q = 3.05 L/s + 240 L/s) | 243.05 | 0.24305 | 15.0 | 110 | 0.200 | 4.83332 | 105.300 | 100.467 | 68.7 | 31.767 | 312 | 140 | Yes |

**Supply from Nearby Hydrants**

| Hydrant Location | Distance (m) from Property | Supply (L/s) per ISTDB-2018-02 |
|---|---|---|
| Lewis St & Driveway | 15 | 95 |
| Robert St & Lewis St | 55 | 95 |
| Gilmour St | 100 | 63.3 |
| 22 Lewis St | 115 | 63.3 |
| | Aggregate sum = | 316.6 |

# Appendix E

Wastewater Calculations

**Wastewater Calculations**
**50 The Driveway (JLR 31333-001)**

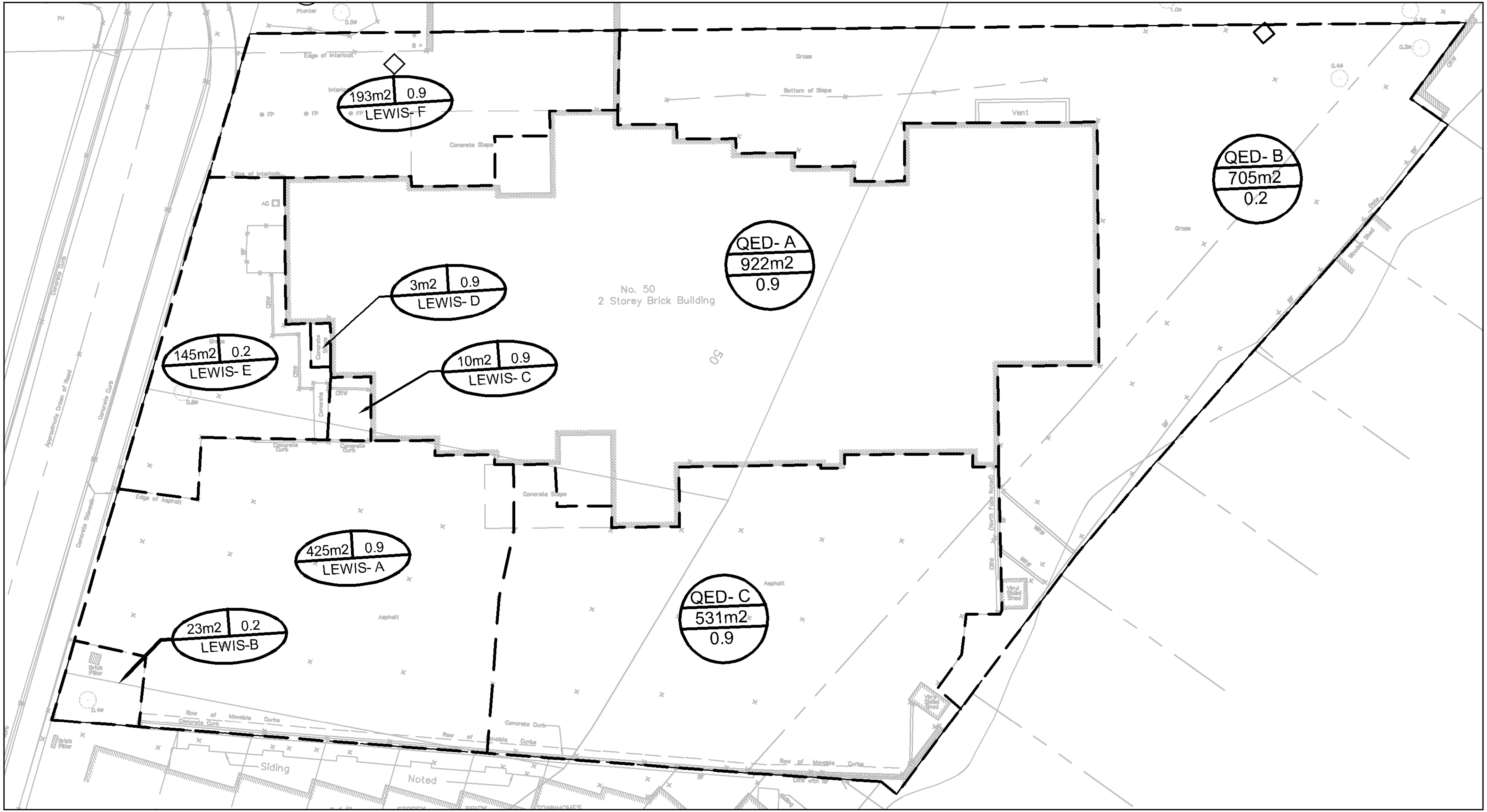
| **MID-RISE Tower** | 0.2957 | Ha |
|---|---|---|
| **Unit Breakdown** | **No.** | **Person Per Unit (Table 4.1)** |
| 1 BED | 6 | 1.4 |
| 1 BED + | 17 | 1.4 |
| 2 BED | 10 | 2.1 |
| 2 BED + | 17 | 2.1 |
| Large 2 BED + | 27 | 2.1 |
| Total Unit Count = | 77 | |
| Calculated Population | 145.6 | ppl |
| **Targeted Population** | **155** | **ppl** |
| Theoretical Wastewater Flow | 280 | L/c/d |
| **Average Wastewater Flow** | **0.50** | **L/s** |
| Harmon Peaking Factor | 3.549 | |
| **Peak Wastewater Flow** | **1.78** | **L/s** |
| Commercial/Office Area (ha) | 0.00 | |
| Commercial PF = | 1.0 | |
| Peak Flow (Comm) = | 0.000 | L/s |
| Dry & Wet I/I (0.33 L/s/ha) | 0.10 | L/s |
| | | |
| Peak WW Flow (L/s) | 1.88 | L/s |

From Hobin (April 1, 2022 Project Stats)
Design Population of 155 people exceed calculated population based on unit statistics

# Appendix F1

Existing Condition

Drainage Plan



193m2
0.9
LEWIS- F
QED- B
705m2
0.2
QED- A
922m2
0.9
No. 50
2 Storey Brick Building
3m2
0.9
LEWIS- D
145m2
0.2
LEWIS- E
10m2
0.9
LEWIS- C
425m2
0.9
LEWIS- A
QED- C
531m2
0.9
23m2
0.2
LEWIS-B
Siding
Noted

# Appendix F2

Time of Concentration, Allowable Peak Flow and SWM Calculations

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# 50 The Driveway

## Pre-development (Exisitng) Peak Flow Calculations

**Guidance on Approach to Estimate Allowable Peak Flow and SWM Calculations:**

1 Allowable peak flow shall be estimated based on a 1:5 year IDF and based on a C-Factor = 0.4.
2 Time of Concentration (Tc) to be calculated based on existing condition.
3 Rooftop flows and Amenity Area Flows to be controlled and conveyed to the QED 305 mm diameter combined sewer and to the Lewis Street 1800 mm diameter combined sewer
4 1:100 year post development flows to be limited to the allowable peak flow (1:5 year flow) by means of on-site retentio nmeasures
5 SWM calculations to be complted using the Modified Rational Method (MRM) for rooftop and at grade storage
6 MRM calculations to estimate cistern storage, to be estimated based on 50% of the peak flow rate per City requirement
7 All storm contributions to be relased to the combined sewer to be controlled by means of an inlet control device (ICD) or accounted as uncontrolled.
8 The subject property is within a combined area and consists of rooftop and limited amenity areas.

**Pre-Development Area Breakdown:**

**To QED 305 mm diameter combined sewer:**

| Type of Area | Area ($m^2$) | C-Factor | C-Factor (Eff) |
|---|---|---|---|
| QED.a - Building | 922 | 0.90 | |
| QED.b - Grass | 705 | 0.20 | |
| QED.c - Parking | 531 | 0.90 | |
| Total = | 2158 | 0.67 | 0.40 |

**Time of Concentration (existing):**

Longest Flow Path: CB in parking to QED 300 mm dia. combined sewer

Flow Path 1 (sheet flow):

Sheet flow drainage to CB; Elevation Difference: (68.68 m - 68.10) & Length = 22.43 m
Slope = (68.68 m - 68.10)/22.43 m; Slope = 2.6%; Velocity = 1.0 m/s (Uplands)
Travel Time = 22.43 m/1.0 m/s = 0.4 min

Flow Path 2 (Sewer):

Length of sewer = 68.45 m to QED 300 mm diameter combined sewer
Inverts difference = (66.63 m - 66.31 m) = 0.32 m. Slope = (0.32 m / 68.45 m) = 0.47%
Pipe Velocity = 0.98 m/s; Travel Length = 68.45 m /0.98 m/s = 1.16 mins

Tc (exist) = 15 mins (inlet time) + 0.4 mins + 1.16 mins

**Tc = 16.56 mins**

| Intensity$_{(5yr)}$ = | 78.83 mm/hr |
|---|---|

**Allowable Peak Flow (1:5-year) Calculations (C-Factor = 0.40)**

$Q_{5yr}$ = 2.78CAI
$Q_{5yr}$ = (2.78) x (0.40) x (0.2158 ha) x 78.83 mm/hr

| $Q_{5yr}$ = | 18.92 L/s |
|---|---|

**To Lewis Street 1800 mm diameter combined sewer:**

| Type of Area | Area ($m^2$) | C-Factor | C-Factor (Eff) |
|---|---|---|---|
| Lewis.a - Parking | 425 | 0.90 | |
| Lewis.b - Grass | 23 | 0.20 | |
| Lewis.c - Concrete | 10 | 0.90 | |
| Lewid.d - Concrete | 3 | 0.90 | |
| Lewis.e - Grass | 145 | 0.20 | |
| Lewis.f - Interlock | 193 | 0.90 | |
| Total = | 799 | 0.75 | 0.40 |

**Time of Concentration (existing):**

Longest Flow Path: sheet flow drainage along parking area

Flow Path 1 (sheet flow):

Sheet flow drainage to Lewis; Elevation Difference: (68.68 m - 68.21) & Length = 29.6 m; Slope = 1.6%
Slope = 1.6%, length = 29.6 m; Uplands yields: Velocity = 0.73 m/s: Time = (29.6 m/0.73 m/s) = 0.7 mins
Tc = 0.7 mins

Tc (exist) = 15 mins (inlet time) + 0.7 min

**Tc = 15.70 mins**

| Intensity$_{(5yr)}$ = | 81.36 mm/hr |
|---|---|

**Allowable Peak Flow (1:5-year) Calculations (C-Factor = 0.40)**

$Q_{5yr}$ = 2.78CAI
$Q_{5yr}$ = (2.78) x (0.40) x (0.0799 ha) x 81.36 mm/hr

| $Q_{5yr}$ = | 7.23 L/s |
|---|---|

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# 50 Driveway
## Allowable Peak Flow & SWM Calculations

**Allowable Peak Flow Calculation:**

**To QED 305 mm diameter combined sewer:**

| | |
|---|---|
| $Q_{allowable}$ (1:5-year) = | 18.92 L/s |

**Allowable Peak Flow Calculation:**

**To Lewis Street 1800 mm diameter combined sewer:**

| | |
|---|---|
| $Q_{allowable}$ (1:5-year) = | 7.23 L/s |

**Post-Development Drainage Areas**

**To QED 305 mm diameter combined sewer:**

| Area Number & Area Type | Area ($m^2$) | C-Factor |
|---|---|---|
| QED.1a - 9th floor mechanical penthouse | 230 | 0.90 |
| QED.1b - Lower Terrace | 725 | 0.90 |
| QED.2 - Building (5th-8th floor rooftop) | 502 | 0.90 |
| QED.3 - Building (2nd floor rooftop) | 193 | 0.90 |
| QED.4 - Mixed (Grass/interlock) | 422 | 0.50 |
| QED.5 - Mixed (Grass/interlock) | 576 | 0.50 |
| QED.6 - Grass | 52 | 0.20 |
| QED.7 - Hard surface | 123 | 0.90 |
| Total = | 2823 | 0.47 |

**To Lewis Street 1800 mm diameter combined sewer:**

| Area Number & Area Type | Area ($m^2$) | C-Factor |
|---|---|---|
| Lewis.1 - Mostly hard surface | 134 | 0.90 |
| Total = | 134 | 0.90 |

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# 50 Driveway

## Allowable Peak Flow & SWM Calculations

**SWM Calcs for Areas Tributary to QED 305 mm dia combined sewer:**

| **QED.1a - 9th Floor mechanical penthouse - Controlled by Roof Drains** | |
|---|---|
| **Roof (m2)** | 230 |
| **C =** | 0.90 |
| **Sum of Roof Drains =** | 0.63 |
| **Storage Volume (m3)** | 20.70 |

| Assuming Watts Ajustable Accutrol Weir (weir fully closed at 6" depth) | |
|---|---|
| No. of Drains | 2 |
| Flow/drain: | 0.315 L/s |

| Time (min) | Intensity 1:100 Yr (mm/hr) | Qp 1:100 Yr (L/s) | Qp Rooftop ICD (L/s) | Qp stored (L/s) | Max Volume Requirement ($m^3$) | Qp CCE (L/s) | Qp stored (L/s) | Volume CCE Requirement ($m^3$) | Qp CCE - Qp100yr (L/s) |
|---|---|---|---|---|---|---|---|---|---|
| 30 | 91.87 | 5.29 | 0.63 | 4.66 | 8.38 | 6.61 | 5.98 | 10.76 | 1.32 |
| 35 | 82.58 | 4.75 | 0.63 | 4.12 | 8.66 | 5.94 | 5.31 | 11.15 | 1.19 |
| 40 | 75.15 | 4.32 | 0.63 | 3.69 | 8.87 | 5.41 | 4.78 | 11.46 | 1.08 |
| 45 | 69.05 | 3.97 | 0.63 | 3.34 | 9.03 | 4.97 | 4.34 | 11.71 | 0.99 |
| 50 | 63.95 | 3.68 | 0.63 | 3.05 | 9.15 | 4.60 | 3.97 | 11.91 | 0.92 |
| 55 | 59.62 | 3.43 | 0.63 | 2.80 | 9.24 | 4.29 | 3.66 | 12.07 | 0.86 |
| 60 | 55.89 | 3.22 | 0.63 | 2.59 | 9.31 | 4.02 | 3.39 | 12.21 | 0.80 |
| 65 | 52.65 | 3.03 | 0.63 | 2.40 | 9.36 | 3.79 | 3.16 | 12.31 | 0.76 |
| 70 | 49.79 | 2.87 | 0.63 | 2.24 | 9.39 | 3.58 | 2.95 | 12.40 | 0.72 |
| 75 | 47.26 | 2.72 | 0.63 | 2.09 | 9.40 | 3.40 | 2.77 | 12.46 | 0.68 |
| 80 | 44.99 | 2.59 | 0.63 | 1.96 | 9.40 | 3.24 | 2.61 | 12.51 | 0.65 |
| 85 | 42.95 | 2.47 | 0.63 | 1.84 | 9.39 | 3.09 | 2.46 | 12.54 | 0.62 |
| 90 | 41.11 | 2.37 | 0.63 | 1.74 | 9.37 | 2.96 | 2.33 | 12.57 | 0.59 |
| 95 | 39.43 | 2.27 | 0.63 | 1.64 | 9.34 | 2.84 | 2.21 | 12.58 | 0.57 |
| 100 | 37.90 | 2.18 | 0.63 | 1.55 | 9.31 | 2.73 | 2.10 | 12.58 | 0.55 |
| 105 | 36.50 | 2.10 | 0.63 | 1.47 | 9.26 | 2.63 | 2.00 | 12.57 | 0.53 |

The following assumptions were made in regard to the configuration of the mechanical penthouse:

| **9th Floor Mechanical Penthouse** | |
|---|---|
| Rooftop flow (2 drains) = | 0.63 L/s |
| Area of Roof | 230 m2 |
| Volume (60% at 150 mm) | 20.70 m3 |

The SWM Calculations (above) shows rooftop storage volume requirements of 9.4 m3 and 12.58 m3 under the 1:100 year and CCE, respectivley

Based on the above assumption (60% of rooftop used as storage at 150 mm depth), sufficient rooftop storage (20.7 m3) will be provided to detain both the 1:100 yr and CCE on the roof.
An average ponding depth of 0.09 m is expected, to be determined by the mechanical engineer

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# 50 Driveway

## Allowable Peak Flow & SWM Calculations

**Areas combined to underground Cistern**

**QED.1b - 9th Floor Terrace - Captured by a Cistern**
**QED.2 - 5th-8th Floor Roof - Captured by a Cistern**
**QED.3 - 2nd Roof Level - Captured by a Cistern**

| | |
|---|---|
| **QED.1 - Roof (m2)** | 725 |
| **QED.2 - Roof (m2)** | 502 |
| **QED.3 - Roof (m2)** | 193 |
| **C.1 =** | 0.90 |
| **C.2 =** | 0.90 |
| **C.3 =** | 0.90 |
| **Cistern Controlled Outflow =** | 7.05 |
| **MRM Controlled (50%) =** | 3.53 |
| **Storage Volume 100 year (m3)** | 59.85 |

| Time (min) | Intensity 1:100 Yr (mm/hr) | Qp 1:100 Yr (L/s) | Controlled Cistern Flow 50% (L/s) | Qp stored (L/s) | Max Volume Requirement ($m^3$) | Qp CCE (L/s) | Qp stored (L/s) | Volume CCE Requirement ($m^3$) | Qp CCE - Qp100yr (L/s) |
|---|---|---|---|---|---|---|---|---|---|
| 20 | 119.95 | 42.62 | 3.53 | 39.09 | 46.91 | 53.27 | 49.75 | 59.69 | 10.65 |
| 25 | 103.85 | 36.90 | 3.53 | 33.37 | 50.06 | 46.12 | 42.59 | 63.89 | 9.22 |
| 30 | 91.87 | 32.64 | 3.53 | 29.11 | 52.41 | 40.80 | 37.27 | 67.09 | 8.16 |
| 35 | 82.58 | 29.34 | 3.53 | 25.81 | 54.21 | 36.67 | 33.15 | 69.61 | 7.33 |
| 40 | 75.15 | 26.70 | 3.53 | 23.17 | 55.62 | 33.37 | 29.85 | 71.63 | 6.67 |
| 45 | 69.05 | 24.53 | 3.53 | 21.01 | 56.72 | 30.67 | 27.14 | 73.28 | 6.13 |
| 50 | 63.95 | 22.72 | 3.53 | 19.20 | 57.59 | 28.40 | 24.88 | 74.63 | 5.68 |
| 55 | 59.62 | 21.18 | 3.53 | 17.66 | 58.27 | 26.48 | 22.95 | 75.75 | 5.30 |
| 60 | 55.89 | 19.86 | 3.53 | 16.33 | 58.80 | 24.82 | 21.30 | 76.67 | 4.96 |
| 65 | 52.65 | 18.70 | 3.53 | 15.18 | 59.20 | 23.38 | 19.86 | 77.44 | 4.68 |
| 70 | 49.79 | 17.69 | 3.53 | 14.16 | 59.49 | 22.11 | 18.59 | 78.06 | 4.42 |
| 75 | 47.26 | 16.79 | 3.53 | 13.26 | 59.69 | 20.99 | 17.46 | 78.58 | 4.20 |
| 80 | 44.99 | 15.98 | 3.53 | 12.46 | 59.81 | 19.98 | 16.46 | 78.99 | 4.00 |
| 85 | 42.95 | 15.26 | 3.53 | 11.74 | 59.85 | 19.08 | 15.55 | 79.31 | 3.82 |
| 90 | 41.11 | 14.61 | 3.53 | 11.08 | 59.84 | 18.26 | 14.73 | 79.56 | 3.65 |
| 95 | 39.43 | 14.01 | 3.53 | 10.49 | 59.77 | 17.51 | 13.99 | 79.73 | 3.50 |
| 100 | 37.90 | 13.47 | 3.53 | 9.94 | 59.65 | 16.83 | 13.31 | 79.85 | 3.37 |

The SWM Calculations (above) shows that an underground cistern of 59.85 m3 is required to contain the 1:100 year storm
The SWM Calculations (above) shows that the CCE can be accomodated by providing an overflow drain with a capacity of 3.82 L/s
The underground cistern to be designed by mechanical engineer

# 50 Driveway
## Allowable Peak Flow & SWM Calculations

| QED.4 - Mixed (Grass/interlock) | |
|---|---|
| **Area (m2)** | 422 |
| **C =** | 0.50 |
| **CB5/ICD2 Flow =** | 3.00 |
| **Surface + pipe + CB05 + CB04 =** | 5.71 |

| Time (min) | Intensity 1:100 Yr (mm/hr) | Qp 1:100 Yr (L/s) | Qp ICD No. 2 (L/s) | Qp stored (L/s) | Max Volume Requirement ($m^3$) | Qp CCE (L/s) | Qp stored (L/s) | Volume CCE Requirement ($m^3$) | Qp CCE - Qp100yr (L/s) |
|---|---|---|---|---|---|---|---|---|---|
| 10 | 178.56 | 10.47 | 3.00 | 7.47 | 4.48 | 13.09 | 10.09 | 6.06 | 2.62 |
| 15 | 142.89 | 8.38 | 3.00 | 5.38 | 4.84 | 10.48 | 7.48 | 6.73 | 2.10 |
| 20 | 119.95 | 7.04 | 3.00 | 4.04 | 4.84 | 8.80 | 5.80 | 6.95 | 1.76 |
| 25 | 103.85 | 6.09 | 3.00 | 3.09 | 4.64 | 7.61 | 4.61 | 6.92 | 1.52 |
| 30 | 91.87 | 5.39 | 3.00 | 2.39 | 4.30 | 6.74 | 3.74 | 6.72 | 1.35 |
| 35 | 82.58 | 4.84 | 3.00 | 1.84 | 3.87 | 6.05 | 3.05 | 6.42 | 1.21 |
| 40 | 75.15 | 4.41 | 3.00 | 1.41 | 3.38 | 5.51 | 2.51 | 6.02 | 1.10 |
| 45 | 69.05 | 4.05 | 3.00 | 1.05 | 2.84 | 5.06 | 2.06 | 5.57 | 1.01 |
| 50 | 63.95 | 3.75 | 3.00 | 0.75 | 2.25 | 4.69 | 1.69 | 5.07 | 0.94 |
| 55 | 59.62 | 3.50 | 3.00 | 0.50 | 1.64 | 4.37 | 1.37 | 4.53 | 0.87 |

**Proposed SWM Measures (surface ponding and pipe stroage):**

| | | |
|---|---|---|
| Surface Ponding | 4.89 | m3 |
| Pipe storage (8.9 m - 250 mm lead) + CB = | 0.44 | m3 |
| CB04 + CB05 | 0.82 | m3 |
| | **5.71** | **m3** |

Based on the above SWM calculations for Area QED.4, the storage volume provided by the design (5.71 m3) exceeds the 1:100 yr volume requirement of 4.84 m3

Ponding elevations of 68.27 m and 68.31 will be reached during the 1:100 year and CCE, respectively

# 50 Driveway

## Allowable Peak Flow & SWM Calculations

| QED.5 - Mixed (Grass/interlock) | |
|---|---|
| **Area (m2)** | 576 |
| **C =** | 0.50 |
| **CB02/ICD01 Flow =** | 5.70 |
| **Surface + pipe + (CB01 + CB02 + CB03) =** | 6.92 |

| Time (min) | Intensity 1:100 Yr (mm/hr) | Qp 1:100 Yr (L/s) | Qp ICD No. 1 (L/s) | Qp stored (L/s) | Max Volume Requirement ($m^3$) | Qp CCE (L/s) | Qp stored (L/s) | Volume CCE Requirement ($m^3$) | Qp CCE - Qp100yr (L/s) |
|---|---|---|---|---|---|---|---|---|---|
| 10 | 178.56 | 14.30 | 5.70 | 8.60 | 5.16 | 17.87 | 12.17 | 7.30 | 3.57 |
| 15 | 142.89 | 11.44 | 5.70 | 5.74 | 5.17 | 14.30 | 8.60 | 7.74 | 2.86 |
| 20 | 119.95 | 9.60 | 5.70 | 3.90 | 4.68 | 12.00 | 6.30 | 7.57 | 2.40 |
| 25 | 103.85 | 8.31 | 5.70 | 2.61 | 3.92 | 10.39 | 4.69 | 7.04 | 2.08 |
| 30 | 91.87 | 7.36 | 5.70 | 1.66 | 2.98 | 9.19 | 3.49 | 6.29 | 1.84 |
| 35 | 82.58 | 6.61 | 5.70 | 0.91 | 1.91 | 8.26 | 2.56 | 5.39 | 1.65 |
| 40 | 75.15 | 6.02 | 5.70 | 0.32 | 0.76 | 7.52 | 1.82 | 4.37 | 1.50 |
| 45 | 69.05 | 5.53 | 5.70 | N/A | N/A | 6.91 | 1.21 | 3.27 | 1.38 |
| 50 | 63.95 | 5.12 | 5.70 | N/A | N/A | 6.40 | 0.70 | 2.10 | 1.28 |

**Proposed SWM Measures (surface ponding and pipe stroage):**

| | | |
|---|---|---|
| Surface ponding (4.69 m3 + 0.27 m3) | 4.96 | m3 |
| Pipe storage (40 m - 250 mm diam) | 1.96 | m3 |
| CB01 + CB02 + CB03 | 0.85 | m3 |
| | **6.92** | **m3** |

Based on the above SWM calculations for Area QED.5, the storage volume provided by the design (6.92 m3) exceeds the 1:100 yr volume requirement of 5.17 m3

Ponding elevation of 68.35 m will be reached during the 1:100 year. Under the CCE, a ponding depth of less than 0.01 m beyond elevation 68.40 m. Thus, ponding elevation of 68.41 m or less will be reached

| QED.6 - Grass | |
|---|---|
| **Area (m2)** | 52 |
| **C =** | 0.20 |
| **Uncontrolled** | 0.00 |
| **No Storage** | 0.00 |

| Time (min) | Intensity 1:100 Yr (mm/hr) | Qp 1:100 Yr (L/s) | Qp Uncontrolled (L/s) | Qp stored (L/s) | Max Volume Requirement ($m^3$) | Qp CCE (L/s) | Qp stored (L/s) | Volume CCE Requirement ($m^3$) | Qp CCE - Qp100yr (L/s) |
|---|---|---|---|---|---|---|---|---|---|
| 10 | 178.56 | 0.52 | 0.00 | 0.52 | 0.31 | 0.65 | 0.65 | 0.39 | 0.13 |
| 15 | 142.89 | 0.41 | 0.00 | 0.41 | 0.37 | 0.52 | 0.52 | 0.46 | 0.10 |
| 20 | 119.95 | 0.35 | 0.00 | 0.35 | 0.42 | 0.43 | 0.43 | 0.52 | 0.09 |
| 25 | 103.85 | 0.30 | 0.00 | 0.30 | 0.45 | 0.38 | 0.38 | 0.56 | 0.08 |
| 30 | 91.87 | 0.27 | 0.00 | 0.27 | 0.48 | 0.33 | 0.33 | 0.60 | 0.07 |
| 35 | 82.58 | 0.24 | 0.00 | 0.24 | 0.50 | 0.30 | 0.30 | 0.63 | 0.06 |
| 40 | 75.15 | 0.22 | 0.00 | 0.22 | 0.52 | 0.27 | 0.27 | 0.65 | 0.05 |
| 45 | 69.05 | 0.20 | 0.00 | 0.20 | 0.54 | 0.25 | 0.25 | 0.67 | 0.05 |

The SWM Calculations (above) show peak flows 0.52 L/s & 0.65 L/s under the 1:100 year & CCE. A flow depth of flow of less than 0.01 m during either the 1:100 year & CCE.

# 50 Driveway
## Allowable Peak Flow & SWM Calculations

| QED.7 - Hard surface | |
|---|---|
| **Area (m2)** | 123 |
| **C =** | 0.90 |
| **CB06/ICD3 (L/s) =** | 2.00 |
| **Surface Volume** | 1.75 |

| Time (min) | Intensity 1:100 Yr (mm/hr) | Qp 1:100 Yr (L/s) | Qp ICD No. 3 (L/s) | Qp stored (L/s) | Max Volume Requirement ($m^3$) | Qp CCE (L/s) | Qp stored (L/s) | Volume CCE Requirement ($m^3$) | Qp CCE - Qp100yr (L/s) |
|---|---|---|---|---|---|---|---|---|---|
| 10 | 178.56 | 5.50 | 2.00 | 3.50 | 2.10 | 6.87 | 4.87 | 2.92 | 1.37 |
| 15 | 142.89 | 4.40 | 2.00 | 2.40 | 2.16 | 5.50 | 3.50 | 3.15 | 1.10 |
| 20 | 119.95 | 3.69 | 2.00 | 1.69 | 2.03 | 4.61 | 2.61 | 3.14 | 0.92 |
| 25 | 103.85 | 3.20 | 2.00 | 1.20 | 1.79 | 3.99 | 1.99 | 2.99 | 0.80 |
| 30 | 91.87 | 2.83 | 2.00 | 0.83 | 1.49 | 3.53 | 1.53 | 2.76 | 0.71 |
| 35 | 82.58 | 2.54 | 2.00 | 0.54 | 1.14 | 3.18 | 1.18 | 2.47 | 0.64 |
| 40 | 75.15 | 2.31 | 2.00 | 0.31 | 0.75 | 2.89 | 0.89 | 2.14 | 0.58 |
| 45 | 69.05 | 2.12 | 2.00 | 0.12 | 0.34 | 2.66 | 0.66 | 1.77 | 0.53 |

**Proposed SWM Measures (surface ponding and pipe stroage):**

Surface ponding = 1.75 m3
Trench drain = 0.64 m3
Stroage = 2.39 m3

Based on the above SWM calculations for Area QED.5, the proposed storage of 2.39 m3 exceeds the requirements of 2.10 m3 under 1:100 yr storm.

Ponding elevations of 68.67 m and 68.73 will be reached during the 1:100 year and CCE, respectively

**Comparison of Allowable to Controlled Peak Flow**

**Allowable Peak Flow to QED:**

$Q_{allowable}$ (1:5-year) = 18.92 L/s

**Summary of SWM Controls to QED:**

| | |
|---|---|
| QED.1 (mechanical penthouse controlled roof) | 0.63 L/s |
| QED.1 + QED.2 + QED.3 (roof controlled by cistern) | 7.05 L/s |
| QED.4 - Mixed (Grass/interlock) | 3.00 L/s |
| QED.5 - Mixed (Grass/interlock) | 5.70 L/s |
| QED.6 - Grass | 0.52 L/s |
| QED.7 - Hard surface | 2.00 L/s |

$Q_{100yr-total}$ = 18.90 L/s

**Based on the above SWM controls, the 1:100 year post-development controlled flow of 18.65 L/s is below the allowable peak flow of 18.92 L/s at the QED**

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

# 50 Driveway
## Allowable Peak Flow & SWM Calculations

**SWM Calcs for Areas Tributary to Lewis 1800 mm dia combined sewer:**

| **Lewis.1 - Mostly hard surface** | |
|---|---|
| **Area (m2)** | 134 |
| **C =** | 0.90 |
| **Allowable Flow (L/s) =** | 7.23 |
| **Storage Volume (m3)** | N/A |

| Time (min) | Intensity 1:100 Yr (mm/hr) | Qp 1:100 Yr (L/s) | Qp Allowable (L/s) | Qp stored (L/s) | Max Volume Requirement ($m^3$) | Qp CCE (L/s) | Qp stored (L/s) | Volume CCE Requirement ($m^3$) | Qp CCE - Qp100yr (L/s) |
|---|---|---|---|---|---|---|---|---|---|
| 10 | 178.56 | 5.99 | 7.23 | N/A | N/A | 7.48 | 0.25 | 0.15 | 1.50 |
| 15 | 142.89 | 4.79 | 7.23 | N/A | N/A | 5.99 | N/A | N/A | 1.20 |
| 20 | 119.95 | 4.02 | 7.23 | N/A | N/A | 5.03 | N/A | N/A | 1.01 |
| 25 | 103.85 | 3.48 | 7.23 | N/A | N/A | 4.35 | N/A | N/A | 0.87 |
| 30 | 91.87 | 3.08 | 7.23 | N/A | N/A | 3.85 | N/A | N/A | 0.77 |
| 35 | 82.58 | 2.77 | 7.23 | N/A | N/A | 3.46 | N/A | N/A | 0.69 |
| 40 | 75.15 | 2.52 | 7.23 | N/A | N/A | 3.15 | N/A | N/A | 0.63 |
| 45 | 69.05 | 2.32 | 7.23 | N/A | N/A | 2.89 | N/A | N/A | 0.58 |
| 50 | 63.95 | 2.14 | 7.23 | N/A | N/A | 2.68 | N/A | N/A | 0.54 |
| 55 | 59.62 | 2.00 | 7.23 | N/A | N/A | 2.50 | N/A | N/A | 0.50 |
| 60 | 55.89 | 1.87 | 7.23 | N/A | N/A | 2.34 | N/A | N/A | 0.47 |
| 65 | 52.65 | 1.77 | 7.23 | N/A | N/A | 2.21 | N/A | N/A | 0.44 |
| 70 | 49.79 | 1.67 | 7.23 | N/A | N/A | 2.09 | N/A | N/A | 0.42 |

The SWM Calculations (above) shows that the 1:100 year peak flow 5.99 L/s is below the allowable peak flow of 7.42 L/s.

**Comparison of Allowable to Controlled Peak Flow**

**Allowable Peak Flow to Lewis:**

$Q_{allowable}$ (1:5-year) = 7.23 L/s

**Summary of SWM Controls to Lewis:**

L.1 - Mixed Area 5.99 L/s

$Q_{100yr\text{-}total}$ = 5.99 L/s

Ponding depths of less than 0.01 m will be reached under the 1:100 year and CCE, respectively based on a width of flow of 40 m www.jlrichards.ca


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