Assessment of Adequacy of Public Services Report

CIV-7 Storey Condo Redevelopment
424 Churchill Avenue, Ottawa, ON

Prepared for:

Churchill Properties Inc.
145 Select Avenue
Unit 5, Toronto ON
M1V 5M8

Attention: Jemmy Taing

LRL File No.: 220224

October 11, 2022

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1 Introduction and Site Description

LRL Associates LTD. was retained by Churchill Properties Inc to prepare a functional serviceability report for a 7-storey condo redevelopment at 424 Churchill Avenue in the City of Ottawa.

The subject site is located South of Danforth Avenue, West of Churchill Avenue North and North of Byron Avenue and has an approximate area of **0.101 ha**. Under the City of Ottawa Zoning by-law, the property is currently zoned as TM H (24), Traditional Mainstreet Zone. The site is currently occupied by a single-storey commercial building surrounded by surface parking. There is also a retaining wall located on the North of the site along Danforth Avenue. The subject site can be seen below in Figure 1.

Figure 1: Aerial View of Subject Lands

2 Existing Site and Available Services

The site currently consists of a one-storey commercial building with associated asphalt parking and entrances, located along Byron Avenue and Churchill Avenue. The asphalt surface of the site is generally flat and slopes towards the North and East property lines. At the northwest corner of the site there is a steep slope with tree cover that slopes down to Danforth Avenue. There is a drop of approximately 1m along the East property line along Churchill Ave, from Byron Ave to Danforth Ave. There is also a drop of approximately 6m from the North property line of the site down to Danforth Avenue. To accommodate for this drop there is an existing retaining wall which wraps around the northeast corner, runs primarily along the North property line and cuts into the

treed area located at the Northwest corner of the site. The existing site topographical survey and the location of the existing retaining wall can be found in **Appendix B**.

Sewer and watermain mapping, along with as-built information collected from the City of Ottawa indicate the following existing infrastructure located within the adjacent rights-of-way:

Churchill Avenue N:

- 300mm PVC sanitary sewer (2010)
- 300mm CONC storm sewer (2010)
- 400mm PVC watermain (2010)

Danforth Avenue:

- 225mm CONC sanitary sewer (1940)
- 150mm DI watermain (1984)

3 CONCEPT DEVELOPMENT

The contemplated development is a 7-storey apartment building with 2 levels of underground parking that will be accessed via Danforth Avenue. The development contemplates a total combined floorspace of **7,818 m²**, approximately **58** residential units, some amenity space and 3 office spaces. Refer to the Concept Plan prepared by Open Plan Architects included in **Appendix C.**

4 WATER SUPPLY SERVICING

The subject property lies within the City of Ottawa 1W water distribution network pressure zone. There is an existing 406 mm PVC watermain located within Churchill Avenue N and a 152mm DI watermain located in Danforth Avenue. There are currently six (6) existing fire hydrants within proximity to the subject property. Refer to ***Appendix D*** for the water pressure zone and location of fire hydrants.

According to the City of Ottawa Water Distribution Guidelines (Technical Bulletin ISDTB-2014-02), since the subject site is anticipated to house more than 50 residential units, it is required to be serviced by two water service laterals, separated by an isolation valve, for redundancy and to avoid creation of a vulnerable service area. Hence, the contemplated development is anticipated to be serviced via two (2) 150 mm diameter services connected to the existing 406mm PVC watermain within Churchill Ave N and the 152mm DI watermain located in Danforth Ave. The service laterals are to be looped inside the building in coordination with the mechanical engineer at the detailed design stage.

4.1 Residential Water Demands

The residential water demands, and anticipated population were determined using Appendix 4-A, Table 4.1 and Table 4.2 from the *City of Ottawa Water Distribution Design Guidelines* and Table 3-3 from the *MOE Design Guidelines for Drinking Water Systems*.

The water supply requirements for the residential units, office spaces and amenity space in the proposed development have been calculated using the following formulas:

$$Q = (q \times P \times M), \text{ for the residential and office spaces and}$$
$$Q = (q \times A \times M), \text{ for the amenity space.}$$

Where:
q = average water consumption (L/capita/day) or (L/ha/day)
P = design population (capita)
M = Peak factor
A = area (ha)

Residential

Based on the Concept Site Plan provided by Open Plan Architects Inc., the contemplated development is anticipated to include **58** residential units, with a population of approximately **85.4** people. *Table 1* below summarizes the proposed residential population count as interpreted using Table 4-1 from the *City of Ottawa Water Distribution Design Guideline.*

Table 1: Development Residential Population Estimate

Proposed Unit Type	Persons Per Unit	Number of Units	Total Population
1 Bedroom	1.4	52	72.8
2 Bedroom	2.1	6	12.6
	Total	**58**	**85.4**

With reference to *Table 4.1 of the City of Ottawa Water Distribution Design Guidelines*, an average water consumption rate of 280 L/c/d was used. With reference to Table 3-3 of the MOE *Design Guidelines for Drinking Water Systems* a Maximum Daily Demand Factor and Maximum Hour Demand Factor were calculated to be 7.2 and 10.9, respectively. The anticipated residential demands were calculated as follows:

- Average daily domestic water demand is **0.28** L/s,
- Maximum daily demand is **2.00** L/s, and
- Maximum hourly demand is **3.01** L/s.

Commercial/Institutional

Appendix 4-A and Table 4.2 of the City of Ottawa Water Distribution Design Guidelines were used to determine the consumption rates and peak factors of the amenity and office spaces. A water consumption rate of 75L/p/d was used for office employees and a consumption rate of 28,000L/ha/d was used for the amenity space. The Maximum Daily Demand Factor and the Maximum Hourly Demand Factor were 1.5 and 1.8 respectively. *Table 2* below summarizes the proposed institutional/ commercial demands

Table 2: Institutional/ Commercial Demands

Property Type	Unit	Rate	Units	Demand (L/d)
Office	75	L/p/d	3 people	**225.0**
Amenity Space	28,000	L/ha/d	0.0167 ha	**467.6**

Using the peak factors, the anticipated institutional and commercial demands were calculated as follows:

- Average daily domestic water demand is **0.008** L/s,
- Maximum daily demand is **0.012** L/s, and
- Maximum hourly demand is **0.014** L/s.

Combined

The combined peak factors for the site are anticipated to equal the following:

- Average daily domestic water demand is **0.28** L/s,
- Maximum daily demand is **2.01** L/s, and
- Maximum hourly demand is **3.02** L/s.

For greater detail on Water Demand Calculations, please refer to **Appendix D**.

The City of Ottawa was contacted to obtain boundary conditions associated with the estimated water demand, as indicated in the boundary request correspondence included in ***Appendix D***. Table 3 below summarizes boundary conditions for the proposed development.

Table 3: Summary of Boundary Conditions

Design Parameter	Anticipated Demand (L/s)	Boundary Conditions @ Churchill Ave & Danforth Ave	
		Connection 1* (m H2O / kPa)	Connection 2** (m H2O / kPa)
Average Daily Demand	0.28	41.21 / 404.13	44.04 / 431.88
Max Day + Max Fire Flow (per FUS)	2.01 + 216.7	35.61 / 349.22	15.04 / 147.49
Peak Hour	3.02	35.01 / 343.33	37.84 / 371.08
Ground Elevation assumed at 73.69m for Connection 1 @ Churchill Ave* * Ground Elevation assumed at 70.86m for Connection 2 @ Danforth Ave*			

As indicated in Table 3, pressures in all scenarios meet the required pressure range stated in the City of Ottawa Design Guidelines – Water Distribution (Section 4.2.2). Refer to ***Appendix D*** for Boundary Conditions.
The estimated fire flow for the proposed buildings was calculated in accordance with *ISTB-2018-02*. The following parameters were assumed by the architect:

- Type of construction – Non-combustible construction
- Occupancy type – Limited Combustible
- Sprinkler Protection –Fully Automatic Sprinkler System

The maximum estimated fire flow demand was calculated to be **13,000 L/min**, see **Appendix D** for details.

There are at least ten (10) existing fire hydrants in proximity to the contemplated buildings that are available to provide the maximum required fire flow demands of **13,000 L/min**. Refer to **Appendix D** for fire hydrant locations. Table 4 below summarizes the aggregate fire flow of the contributing hydrants which are in proximity to the proposed development based on Table 18.5.4.3 of *ISTB-2018-02*.

Table 4: Fire Protection Summary Table

	Max. Fire Flow Demand (L/min)	Fire Hydrants(s) within 75m	Fire Hydrant(s) within 150m	Fire Hydrant(s) within 300m	Available Combined Fire Flow (L/min)
Contemplated Development	13,000	2	4	4	(2 x 5678) + (4 x 3785) + (4 x 2839) = 37,852

The total available fire flow from contributing hydrants is equal to **37,852 L/min** which is sufficient to provide adequate fire flow for the proposed development. A certified fire protection system

specialist will need to be employed to design the building's fire suppression system and confirm the actual fire flow demand.

The anticipated water supply design conforms to all relevant City Guidelines and Policies.

5 SANITARY SERVICE

There is an existing 300mm PVC Sanitary sewer located in Churchill Ave N and a 225mm CONC Sanitary Sewer located in Danforth Ave. It is anticipated that the contemplated development will be connected to the existing 300mm PVC sanitary sewer located within Churchill Ave N, to be connected to the proposed building.

The anticipated post development total flow was calculated to be is **1.04 L/s** as a result of proposed residential population and a small portion of infiltration. Refer to **Appendix E** for further information on the calculated sanitary flows.

Based on as-built information received from the City of Ottawa, the existing 300mm sanitary sewer located in Churchill Ave N is assumed to be sloped at 5.4% with an existing maximum capacity of **224.7 L/s**. The anticipated wet wastewater flows from the contemplated development represent approximately 0.46% of the maximum existing sewer capacity.

Sanitary capacity would need to be reviewed with the City of Ottawa during the detailed design stage to ensure the existing city sanitary sewer has adequate capacity for the proposed sanitary flows.

6 STORMWATER MANAGEMENT

6.1 Existing Stormwater Infrastructure

The subject property lies within the Ottawa River West sub-watershed. There is an existing 300mm CONC storm sewer located in Churchill Ave N. In pre-development conditions, the stormwater runoff from the subject site would generally flow uncontrolled overland towards the North and East property lines. Refer to ***Appendix F*** for the topographical survey showing existing contours.

6.2 Design Criteria

The stormwater management criteria for this development are based on pre-consultation with City of Ottawa officials, the City of Ottawa Sewer Design Guidelines including City of Ottawa Stormwater Management Design Guidelines, 2012 (City standards), as well as the Ministry of the Environment's Stormwater Planning and Design Manual, 2003 (SWMPD Manual).

The stormwater management will need to meet the following stormwater design criteria;

- Meet an allowable release rate based on the pre-development Rational Method Coefficient or a maximum of 0.50, employing the City of Ottawa IDF parameters for a 2-year storm with a calculated time of concentration equal to or greater than 10 minutes; and

- Attenuate all storms up to and including the City of Ottawa 100-year storm event on site.

- Water quality treatment will not be required on this site as the water being collected and conveyed to the storm system is rooftop water.

6.3 Proposed Stormwater Management System

The contemplated development is anticipated to outlet to the 300mm CONC storm sewer located within Churchill Ave N. It is anticipated that roof drains on building rooftops will be utilised to collect and direct runoff to the building's mechanical system in the underground garage. A storm service will be located along the East side of the building to discharge storm flows to the existing 300mm CONC storm sewer in Churchill Ave N.

As per the pre-application consultation meeting with the City of Ottawa, it was recommended that it would be acceptable to control only the roof portion of the building up to the 100-year storm event, to a 2-year pre-development level and that the remainder of the site could be left uncontrolled as long as the uncontrolled portion is directed towards the right of way. Based on these stormwater objectives for the subject site, it was determined that the allowable release rate for the contemplated development is **10.81 L/s** for all storms up to and including the 100-year storms. To meet the stormwater objectives, the contemplated development will use roof top flow attenuation.

Table 5 below summarizes assumed post-development drainage areas based on the *Concept Plan*. Calculations can be seen in ***Appendix F.***

Table 5: Post-Development Estimated Areas & Runoff Coefficients

WATERSHED	C = 0.90 Building Area/ Asphalt & Concrete(m^2)	Total Area (ha)	Weighted Runoff Coefficient (C)
WS-01(ROOF)	116.29	0.012	0.90
WS-02 (ROOF)	141.44	0.014	0.90
WS-03 (ROOF)	248.09	0.025	0.90
WS-04 (ROOF)	62.07	0.006	0.90
WS-05 (ROOF)	130.54	0.013	0.90
WS-06(UN-CONTROLLED)	313.97	0.031	0.90
TOTAL	**1012.4**	**0.101**	**0.38**

Table 6, below, summarizes post-development flow rates. As per the City pre-application consultation meeting, it was recommended that it would be acceptable to control only the roof portion of the building up to the 100-year storm event, to a 2-year pre-development level and that the remainder of the site could be left uncontrolled as long as the uncontrolled portion is directed towards the right of way. The uncontrolled area will be directed towards the right of way.

Table 6: Summary of Post-Development Flow Rates

CATCHMENT AREAS	DRAINAGE AREAS (ha)	100-YEAR RELEASE RATE (L/s)	100-YEAR REQUIRED STORAGE (m^3)	TOTAL AVAILABLE STORAGE (m^3)
WS-01(ROOF)	0.012	1.26	3.15	6.03
WS-02 (ROOF)	0.014	1.26	3.46	4.55
WS-03 (ROOF)	0.025	1.26	6.63	12.25
WS-04 (ROOF)	0.006	1.26	3.15	3.16
WS-05 (ROOF)	0.013	1.26	3.15	6.64
TOTAL CONTROLLED	**0.070**	**6.30**	**19.53**	**32.63**
WS-06 (UNCONTROLLED)	0.031	15.59	0	0
TOTAL UNCONTROLLED	**0.031**	**15.59**	**0.00**	**0.00**
TOTAL	**0.101**	**21.89**	**19.53**	**32.63**

It is anticipated that approximately **19.53 m^3** of storage will be required on site to attenuate flow to the established release rate of **10.81 L/s** in the 100-year storm; storage calculations can be found in **Appendix F**. It is anticipated that the required storage will be achieved through roof top flow attenuation. Based on preliminary calculations there will be approximately **32.63m^3** of available roof top storage.

7 CONCLUSION

This evaluation is limited to assessing the serviceability of the site described within this document to support an Official Plan Amendment and Zoning By-law Amendment.

Based on the *Concept Site Plan* provided by Open Plan Architects, included to **Appendix C**, the following conclusions, in relation to the serviceability of the site, can be made:

- **Water**:
  - The contemplated development will be serviced via two (2) 150mm diameter services connected to the existing 406mm PVC watermain within Churchill Ave N and the 152mm DI watermain located in Danforth Ave.
  - Domestic demands from the proposed concept subdivision are expected to be in the range of **0.28 L/s** for the Average daily demand, **2.01 L/s** for the maximum daily and **3.02 L/s** for maximum hourly.
  - The maximum required fire flow was calculated at **13,000 L/min** using the FUS method.
  - There are at least six (6) existing fire hydrants available to service the proposed development. They will provide a combined fire flow of **37,852 L/min** to the site.
- **Sanitary**:
  - The post development total sanitary effluent was calculated to be is **1.04 L/s** considering proposed residential & commercial population and a small portion of infiltration.
  - The contemplated development will be serviced via a 150mm diameter service that will connect the building flows to the existing 300mm PVC sanitary sewer located within Churchill Ave N.
  - The proposed sanitary discharge represents 0.46% of the maximum capacity of the existing receiving sewer leg.

- **Stormwater**:
  - Site stormwater runoff will need to be controlled to a pre-development release rate of **10.81 L/s** and accommodate **19.53 m^3** of stormwater storage during the 100-year storm event.
  - The subject site is anticipated to outlet to the 300mm CONC storm sewer located within Churchill Ave N.

Shall the concept plan change in relation to the number of units, building footprint, or impervious area of the site, the conclusions above would no longer be appropriate. During the detailed design stage of this development, the storm, sanitary and water servicing details will be further defined and confirmed.

Prepared by:

LRL Associates Ltd.

Tamara Harb, EIT, CPESC-IT

Mohan Basnet, P.Eng.
Civil Engineer

APPENDIX A

Pre-consultation

From:	Bakhit, Reza
To:	Gauthier, Steve
Subject:	PC2022-0016 Pre-application Consultation Meeting 424 Churchill Avenue N
Date:	Tuesday, March 8, 2022 4:48:37 PM
Attachments:	oledata.mso image021.png image001.emz image003.png

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Hi Steve

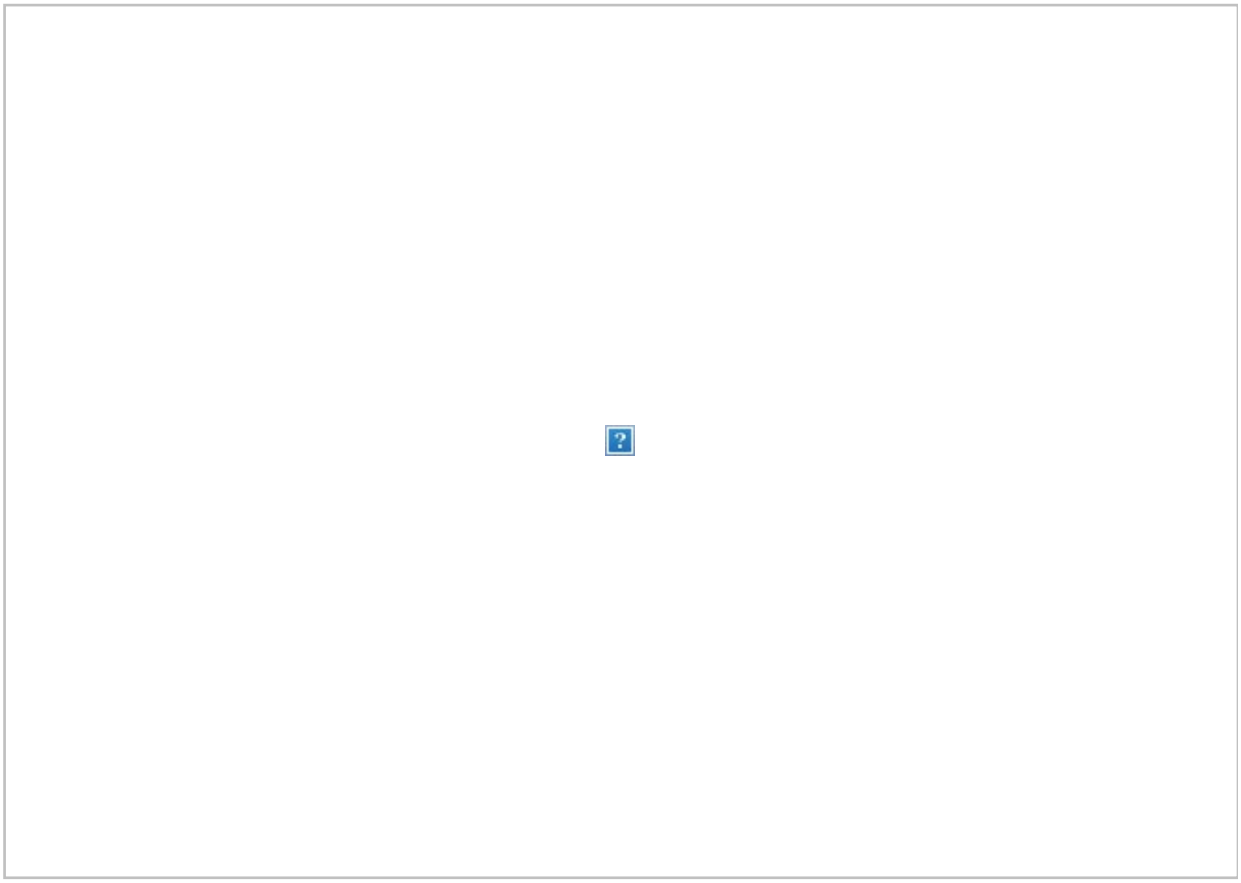
Please forward the below information to the applicant regarding a development proposal at **424 Churchill Avenue N, Ottawa for the 9 story apartment building.**. Note that the information is considered **preliminary** and the assigned Development Review Project Manager may modify and/or add additional requirements and conditions upon review of an application if deemed necessary.

General:

- It is the sole responsibility of the consultant to investigate the location of existing underground utilities in the proposed servicing area and submit a request for locates to avoid conflict(s). The location of existing utilities and services shall be documented on an **Existing Conditions Plan**.
- Any easements on the subject site shall be identified and respected by any development proposal and shall adhere to the conditions identified in the easement agreement. A **legal survey plan** shall be provided and all easements shall be shown on the engineering plans.
- A deep excavation and dewatering operations have the potential to cause damages to the neighboring adjacent buildings/ City infrastructure. Document that construction activities (excavation, dewatering, vibrations associated with construction, etc.) will not have an impact on any adjacent buildings and infrastructure.
- 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 to a more sensitive property use.

0. Reference documents for information purposes :
    - Ottawa Sewer Design Guidelines (October 2012)
    - Technical Bulletin PIEDTB-2016-01
    - Technical Bulletins ISTB-2018-01, ISTB-2018-02 and ISTB-2018-03.
    - Ottawa Design Guidelines - Water Distribution (2010)
    - Technical Bulletin ISTB-2021-03
    - 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 Accessibility Design Standards (2012) (City recommends development be in accordance with these standards on private property)
    - Ottawa Standard Tender Documents (latest version)
    - Ontario Provincial Standards for Roads & Public Works (2013)
    - 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) 580-424 x.44455).

Please note that this is the applicant responsibility to refer to the latest applicable guidelines while preparing reports and studies.



Disclaimer:
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Stormwater Management Criteria and Information:

- **Water Quantity Control:** In the absence of area specific SWM criteria please control post-development runoff from the subject site, up to and including the **100-year storm event**, to **a 2-year pre-development level.** The pre-development runoff coefficient will need to be determined **as per existing conditions** but in no case more than 0.5. [**If 0.5 applies it needs to be clearly demonstrated in the report that the pre-development runoff coefficient is greater than 0.5**]. The time of concentration (T_c) used to determine the pre-development condition should be calculated. *Tc should not be less than 10 min. since IDF curves become unrealistic at less than 10 min; T_c of 10 minutes shall be used for all post-development calculations*].
- Any storm events greater than the established **2-year allowable** release rate, up to and including the **100-year storm event**, shall be detained on-site. The SWM measures required to avoid impact on downstream sewer system will be subject to review.
- Please note that foundation drainage is to be independently connected to sewer main unless being pumped with appropriate back up power, sufficient sized pump and back flow prevention. **It is recommended that the foundation drainage system be drained by a sump pump connection to the storm sewer to minimize risk of basement flooding as it will provide the best protection from the uncontrolled sewer system compared to relying on the backwater valve.**

Water Quality Control: Please consult with the local conservation authority (RVCA) regarding water quality criteria prior to submission of a Site Plan Control Proposal application to establish any water quality control restrictions, criteria and measures for the site. Correspondence and clearance shall be provided in the Appendix of the report.

- Please note that as per *Technical Bulletin PIEDTB-2016-01 section 8.3.11.1 (p.12 of 14)* **there shall be no surface ponding on private parking areas during the 5-year storm rainfall event**.
- **If Underground Storage proposed:** Please note that 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.

  Please provide information on UG storage pipe. Provide required cover over pipe and details, chart of storage values, capacity etc. How will this pipe be cleaned of sediment and debris?

  Provide information on type of underground storage system including product name and model, number of chambers, chamber configuration, confirm invert of chamber system, top of chamber system, required cover over system and details, interior bottom slope (for self-cleansing), chart of storage values, length, width and height, capacity, entry ports (maintenance) etc.

  Provide a cross section of underground chamber system showing invert and obvert/top, major and minor HWLs, top of ground, system volume provided during major and minor events. UG storage to provide actual 2- and 100-year event storage requirements.

  In regard to all proposed UG storage, ground water levels (and in particular HGW levels) will need to be reviewed to ensure that the proposed system does not become surcharged and thereby ineffective.

  Modeling can be provided to ensure capacity for both storm and sanitary sewers for the proposed development by City's Water Distribution Dept. – Modeling Group, through PM and upon request.

  -
- Please note that the minimum orifice dia. for a plug style **ICD is 83mm and the minimum flow rate from a vortex ICD is 6 L/s** in order to reduce the likelihood of plugging.
- Post-development site grading shall match existing property line grades in order to minimize disruption to the adjacent residential properties. A **topographical plan of survey** shall be provided as part of the submission and a note provided on the plans.
- Please provide 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 SWM solution**.
- **If rooftop control** and storage is proposed as part of the SWM solutions sufficient details (Cl. 8.3.8.4) shall be discussed and document in the report and on the plans. Roof drains are to be connected downstream of any incorporated ICDs within the SWM system and not to the

foundation drain system. Provide a **Roof Drain Plan** as part of the submission.

- **Considering the size of the site, it would be acceptable to control the roof portion only (100-year storm event, to a 2-year pre-development level) and leave the remainder of the site uncontrol as long as the uncontrolled portion is directed towards the right of way. This approach should be discussed in the SWM report. Also, the grading plan should clearly demonstrate that the runoff from the uncontrolled portion of the site will be directed towards the ROW**
- If **Window wells** are proposed, they are to be indirectly connected to the footing drains. A detail of window well with indirect connection is required, as is a note at window well location speaking to indirect connection.
- There must be at least **15cm of vertical clearance** between the spill elevation and the ground elevation at the building envelope that is in proximity of the flow route or ponding area. The exception in this case would be at reverse sloped loading dock locations. At these locations, a minimum of 15cm of vertical clearance must be provided below loading dock openings. Ensure to provide discussion in report and ensure grading plan matches if applicable.

Storm Sewer:

- A 300mm dia. CONC storm sewer (2010) is available within Churchill Avenue N**.**

Sanitary Sewer Maclaren St:

- A 250 mm dia. PVC Sanitary sewer (2010) is available within Churchill Avenue N**.**
- A 225 mm dia. CONC Sanitary sewer (1940) is available within Danforth Avenue.
- Please provide the new Sanitary sewer discharge and we confirm if sanitary sewer main has the capacity. An analysis and demonstration that there is sufficient/adequate residual capacity to accommodate any increase in wastewater flows in the receiving and downstream wastewater system is required to be provided. Needs to be demonstrated that there is adequate capacity to support any increase in wastewater flow.
- Please apply the wastewater design flow parameters *in Technical Bulletin PIEDTB-2018-01.*
- Sanitary sewer monitoring maintenance hole is required to be installed at the property line (on the private side of the property) as per City of Ottawa Sewer-Use By-Law 2003-514 (14) *Monitoring Devices*.
- A backwater valve is required on the sanitary service for protection.

Water :

- A 406 mm dia. PVC watermain (2010) is available within Churchill Avenue N**.**
- A 152 mm dia. DI watermain (1984) is available within Danforth Avenue.
- Existing residential service to be blanked at the main.
- **Water Supply Redundancy:** Residential buildings with a basic day demand greater than 50m^3/day (0.57 L/s) are required to be connected to a minimum of two water services separated by an isolation valve to avoid a vulnerable service area as per the *Ottawa Design Guidelines - Water Distribution, WDG001, July 2010 Clause 4.3.1 Configuration.*
- Please **review Technical Bulletin ISTB-2018-0**, maximum fire flow hydrant capacity is provided in Section 3 Table 1 of Appendix I. A **hydrant coverage figure** shall be provided and **demonstrate there is adequate fire protection for the proposal**. Two or more public hydrants are anticipated to be required to handle fire flow.
- 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. 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. Please provide the following information to the City of Ottawa via email to request water distribution network boundary conditions for the subject site. Please note that once this information has been provided to the City of Ottawa it takes approximately 5-10 business days to receive boundary conditions.

0. Type of Development and Units
1. Site Address
2. A plan showing the proposed water service connection location.
3. **Average Daily Demand** (L/s)
4. **Maximum Daily Demand** (L/s)
5. **Peak Hour Demand** (L/s)
6. **Fire Flow** (L/min)

[*Fire flow demand requirements shall be based on **Fire Underwriters Survey (FUS)** Water Supply for Public Fire Protection 1999*]
[Fire flow demand requirements shall be based on ISTB-2021-03]
Note: The OBC method can be used if the fire demand for the private property is less than 9,000 L/min. If the OBC fire demand reaches 9000 L/min, then the FUS method is to be used.
Exposure separation distances shall be defined on a figure to support the FUS calculation and required fore flow (RFF).

7. **Hydrant capacity shall be assessed to demonstrate the RFF can be achieved**. Please identify which hydrants are being considered to meet the RFF on a fire hydrant coverage plan as part of the boundary conditions request.

Snow Storage:

0. Any portion of the subject property which is intended to be used for permanent or temporary snow storage shall be as shown on the approved site plan and grading plan. Snow storage shall not interfere with approved grading and drainage patters or servicing. Snow storage areas shall be setback from the property lines, foundations, fencing or landscaping a minimum of 1.5m. Snow storage areas shall not occupy driveways, aisles, required parking spaces or any portion of a road allowance. If snow is to be removed from the site please indicate this on the plan(s).

Gas pressure regulating station

A gas pressure regulating station may be required depending on HVAC needs (typically for 12+ units). Be sure to include this on the Grading, Site Servicing, SWM and Landscape plans. This is to ensure that there are no barriers for overland flow routes (SWM) or conflicts with any proposed grading or landscape features with installed structures and has nothing to do with supply and demand of any product.

Regarding Quantity Estimates:

Please note that external Garbage and/or bicycle storage structures are to be added to QE under Landscaping as it is subject to securities.In addition, sump pumps for Sanitary and Storm laterals and/or cisterns are to be added to QE under Hard items as it is subject to securities, even though it is internal and is spoken to under SWM and Site Servicing Report and Plan.

CCTV sewer inspection

CCTV sewer inspection required for pre and post construction conditions to ensure no damage to City Assets surrounding site.

Pre-Construction Survey

Pre-Construction (Piling/Hoe Ramming or close proximity to City Assets) and/or Pre-Blasting (if applicable) Survey required for any buildings/dwellings in proximity of 75m of site and circulation of notice of vibration/noise to residents within 150 m of site. Conditions for Pre-Construction/ Pre-Blast Survey & Use of Explosives will be applied to agreements. Refer to City's Standard S.P. No. F-1201 entitled Use of Explosives, as amended.

Road Reinstatement

Where servicing involves three or more service trenches, either a full road width or full lane width 40 mm asphalt overlay will be required, as per amended Road Activity By-Law 2003-445 and City Standard Detail Drawing R10. The amount of overlay will depend on condition of roadway and width of roadway(s).

Required Engineering Plans and Studies:

PLANS:

- Existing Conditions and Removals Plan
- Site Servicing Plan
- Grade Control and Drainage Plan
- Erosion and Sediment Control Plan
- Roof Drainage Plan (When rooftop storage is proposed)
- Topographical survey

REPORTS:

- Site Servicing and Stormwater Management Report (is required per section 4.7.1, policy 6 and section 4.7.1, policy 23 of the OP
- Geotechnical Study/Investigation (including sensitive marine clays and unstable slopes) is required per section 10.1.4 of OP
- Noise Control Study required as per section 10.2.1
- Phase I ESA 4) A Phase 1 and, where required, a Phase 2 ESA are required per section 10.1.6 OP
- Phase II ESA (Depending on recommendations of Phase I ESA) . It appears the site is contaminated .
- RSC (Record of the site Conditions)
- Site lighting certificate
- Wind analysis
- Shadow Study

Please refer to the **City of Ottawa Guide to Preparing Studies and Plans [Engineering]:**
Specific information has been incorporated into both the Guide to Preparing Studies and Plans for a site plan. The guide outlines the requirement for a statement to be provided on the plan about where the property boundaries have been derived from.
Added to the general information for servicing and grading plans is a note that an **O.L.S**. should be engaged when reporting on or relating information to property boundaries or existing conditions. The importance of engaging an O.L.S. for development projects is emphasized.

Phase One Environmental Site Assessment:

- A Phase I ESA is required to be completed in accordance with Ontario Regulation 153/04 in

support of this development proposal to determine the potential for site contamination. Depending on the Phase I recommendations a Phase II ESA may be required.
- The Phase I ESA shall provide all the required Environmental Source Information as required by O. Reg. 153/04. ERIS records are available to public at a reasonable cost and need to be included in the ESA report to comply with O.Reg. 153/04 and the Official Plan. The City will not be in a position to approve the Phase I ESA without the inclusion of the ERIS reports.
- Official Plan Section 4.8.4:

https://ottawa.ca/en/city-hall/planning-and-development/official-plan-and-master-plans/official-plan/volume-1-official-plan/section-4-review-development-applications#4-8-protection-health-and-safety

RSC (Record of the site Conditions)

- A RSC is required when changing the land use (zoning) of a property to a more sensitive land use.

Submitting a record of site condition | Ontario.ca

Geotechnical Investigation:

- A Geotechnical Study/Investigation shall be prepared in support of this development proposal.
- Reducing the groundwater level in this area can lead to potential damages to surrounding structures due to excessive differential settlements of the ground. The impact of groundwater lowering on adjacent properties needs to be discussed and investigated to ensure there will be no short term and long term damages associated with lowering the groundwater in this area.
- Geotechnical Study shall be consistent with the **Geotechnical Investigation and Reporting Guidelines for Development Applications**.

https://documents.ottawa.ca/sites/documents/files/geotech_report_en.pdf

Noise Study:

- A **Transportation Noise Assessment** is required as the subject development is located within 100m proximity of an Arterial Road
- A **Stationary Noise Assessment** is required in order to assess the noise impact of the proposed sources of stationary noise (mechanical HVAC system/equipment) of the development onto the surrounding residential area to ensure the noise levels do not exceed allowable limits specified in the City Environmental Noise Control Guidelines.

https://documents.ottawa.ca/sites/default/files/documents/enviro_noise_guide_en.pdf

Wind analysis:

0. A wind analysis must be prepared, signed and stamped by an engineer who specializes in pedestrian level wind evaluation. Where a wind analysis is prepared by a company which do not have extensive experience in pedestrian level wind evaluation, an independent peer review may be required at the expense of the proponent.

Terms of Reference: Wind Analysis (ottawa.ca)

Shadow Study

When greater than 9 storey in height, a Shadow Study required for all buildings/dwellings.

Exterior Site Lighting:

1. Any proposed light fixtures (both pole-mounted and wall mounted) must be part of the approved Site Plan. All external light fixtures must meet the criteria for Full Cut-off Classification as recognized by the Illuminating Engineering Society of North America (IESNA or IES), and must result in minimal light spillage onto adjacent properties (as a guideline, 0.5 fc is normally the maximum allowable spillage). In order to satisfy these criteria, the please provide the City with a **Certification (Statement) Letter** from an acceptable professional engineer stating that the design is compliant.

Fourth (4th) Review Charge:

Please be advised that additional charges for each review, after the 3rd review, will be applicable to each file. There will be no exceptions.

Construction approach – Please contact the Right-of-Ways Permit Office TMconstruction@ottawa.ca early in the Site Plan process to determine the ability to construct site and copy File Lead Steve.Gauthier@ottawa.ca on this request.

Please note that these comments are considered preliminary based on the information available to date and therefore maybe amended as additional details become available and presented to the City. It is the responsibility of the applicant to verify the above information. The applicant may contact me for follow-up questions related to engineering/infrastructure prior to submission of an application if necessary.

If you have any questions or require any clarification, please let me know.

Regards,

Reza Bakhit, P.Eng, C.E.T
Project Manager
Planning, Real Estate and Economic Development Department / Direction générale de la planification, des biens immobiliers et du développement économique
Development Review - Centeral Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2400 ext./poste 19346, reza.bakhit@ottawa.ca
Please note: Given the current pandemic, I will be working from home until further notice; reaching me by email is the easiest. I will be checking my voicemail, just not as frequently as I normally would be.

APPENDIX B

Site Topographical Survey

TOPOGRAPHICAL PLAN OF SURVEY OF

LOT 1 and PART OF LOT 2 (South Danforth Avenue) REGISTERED PLAN 204 CITY OF OTTAWA

Prepared by Annis, O'Sullivan, Vollebekk Ltd.

AMENDED July 12th, 2022 to illustrate tree sizes & locations, additional street servicing & details, new vertical Benchmark No.1 and updated overhead wire locations & elevations.

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

JOB BENCHMARK No.2
Fire Hydrant - Top of Spindle
Elev = 70.07

JOB BENCHMARK No.1
MAG nail in West Face of UP
Elev = 73.54

DANFORTH AVENUE (FORMERLY JAMES STREET, INST. NP48636)
PIN 04017 - 0136

CHURCHILL AVENUE NORTH (FORMERLY MAIN STREET) BETWEEN LOTS 30 AND 31) (ROAD ALLOWANCE)
PIN 04020 - 0170

BYRON AVENUE (FORMERLY OTTAWA ELECTRIC RAILWAY RIGHT-OF-WAY BRITANNIA BRANCH)
PIN 04017-0138

PART OF LOT 30 CONCESSION I (OTTAWA FRONT) (NEPEAN)

REGISTERED PLAN 3 — LOT 4 — LOT 5 — LOT 3 — LOT 2 — LOT 1 — REGISTERED PLAN 204

PART 2 PLAN 4R-22956

No. 325 — 0.34 (P1,P3)Set

No. 414 (Brick Noted)

No. 424
1 Storey Brick & Concrete Block Building
(Foundation Noted)
Building Flashing Elev.=82.00
(Brick Noted)

Steel Building

SITE AREA = 1009.6 m²

Notes & Legend

Denotes

—□—	"	Survey Monument Planted
—■—	"	Survey Monument Found
SSIB	"	Short Standard Iron Bar
IB	"	Iron Bar
CC	"	Cut Cross
(WIT)	"	Witness
Meas.	"	Measured
(AOG)	"	Annis, O'Sullivan, Vollebekk Ltd.
(DI)	"	Deed Inst. N632657
(P)	"	Registered Plan 204
(P1)	"	(AOG) Plan dated Dec. 1, 2003
(P2)	"	Plan 4R-22856
(P3)	"	(AOG) Plan dated Sept. 29, 1999
(P4)	"	(AOG) Plan dated June 24, 2020
(P5)	"	(671) Plan dated Feb. 4, 1986
RW-C	"	Concrete Retaining Wall
RW-CB	"	Concrete Block Retaining Wall
○ MH-ST	"	Maintenance Hole (Storm Sewer)
○ MH-S	"	Maintenance Hole (Sanitary)
○ MH-T	"	Maintenance Hole (Traffic)
⊖ VC	"	Valve Chamber (Watermain)
	"	Deciduous Tree
+ 69.09	"	Location of Elevations
+ 69.00	"	Top of Concrete Curb Elevation

—— FO ——	"	Underground Fibre Optic
—— L ——	"	Underground Power (Lighting)
—— W ——	"	Underground Water
—— P ——	"	Underground Power
—— T ——	"	Underground Traffic Cable
—— ST ——	"	Underground Storm Sewer
—— S ——	"	Underground Sanitary Sewer
—— OHW ——	"	Overhead Wires
O UP	"	Utility Pole
∘ AN	"	Anchor
O LS	"	Light Standard
□ CB	"	Catch Basin
◯ FH	"	Fire Hydrant
⊖ WV	"	Water Valve
Inv.	"	Invert
T/G	"	Top of Grate
▭ GM	"	Gas Meter
□ HH	"	Handhole
⊶⊷ TSP	"	Traffic Signal Post
∘ B	"	Bollard
△ S	"	Sign
RWT	"	Timber Retaining Wall
RWC	"	Concrete Retaining Wall
H-T	"	Hydro Transformer
Ø	"	Diameter
C/L	"	Centreline
	"	Property Line

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
V-19592

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR In accordance with Regulation 1026, Section 29 (3).

ELEVATION NOTES

1. Elevations shown are geodetic and are referred to the CGVD28 geodetic datum.
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.
4. Underground servicing information shown are as illustrated on City Of Ottawa plan No.'s ; E-04-23 , ISB08-5000 (Sheets 016, 017), 1772 (Sheet 1).

Surveyor's Certificate

I CERTIFY THAT :

1. This survey and plan are correct and in accordance with the Surveys Act and the Surveyors Act and the regulations made under them.
2. The survey was completed on the 9th day of December, 2021.

December 10, 2021
Date

A. Andrew Sheils
Ontario Land Surveyor

Bearings are grid, derived from Can-Net 2016 Real Time Network GPS observations on the northerly boundary of Danforth Avenue having a bearing of N53°00'10"W and are referenced to Specified Control Points 01919680005 and 01919680105, MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

For bearing comparisons, a rotation of 0°42'50" counter-clockwise was applied to bearings on plans (P2) and (P3).

For comparison purposes, bearings shown on Plans (P) and (P5) are astronomic bearings.

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
Ontario Land Surveyors

Job No. 22329-2I (Amend) GSI Properties Pt. Lts 1,2 Pl.204 T F2 ns

APPENDIX C

Concept Plan by Open Plan Architechts

424 Churchill Avenue North, Ottawa

Zoning Data:

Zone: TM H(24)

Adjacent zones:
north: TBC
south: TBC
east: TBC
west: TBC

Frontage: 25.34 (Churchill Ave. N.)

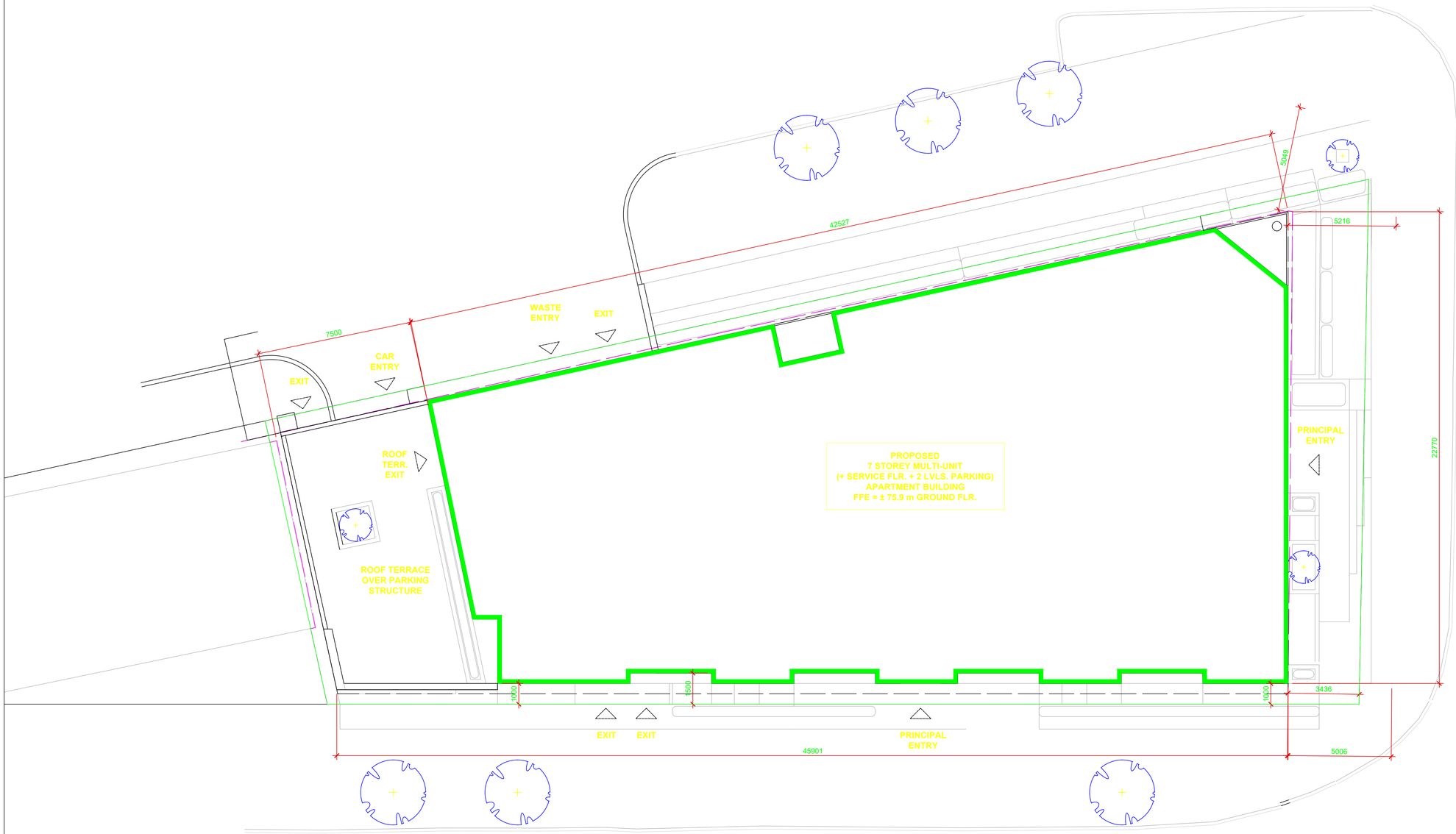
Proposed building area: TBC

Proposed use: Apartment Dwelling, Mid-Rise

Proposed number of units: 48

Proposed car parking: 36

Mechanism	Required	Proposed	Notes
frontage (min.):	-	-	-
lot area (min.):	-	-	-
setbacks (min.):			
front yard (min.):	-	-	-
corner side yard (min.):	-	-	-
interior side yard (min.):	-	-	-
rear yard (min.):	-	-	-
lot coverage (min.):	-	-	-
landscaped area (min.):	-	-	-
building height (max.):	24 m	26.5 m	-
density (max.):	-	-	-



CLIENT / OWNER :
GSI SLOUGH STREET PROPERTIES INC.
5-145 SELECT AVE.,
TORONTO, ON, M1V 5M8
416-292-9920

CONSULTING PLANNER :
FOTENN
396 COOPER STREET, SUITE 300
OTTAWA, ON K2P 2H7
613-730-5709

rev. / issue	description	date MM/DD/YY
01	ISSUED FOR PRE-CONSULTATION W/ COUNCILLOR	25 JUL. 2022

professional stamp

project north

Kristopher D. Benes, OAA, MRAIC, LEED AP

OPA open plan architects inc.
architecture | interiors | concepts

2305 HILLARY AVE. | OTTAWA | ON | K1H 7J2
613.883.5090 | info@openplan.ca

project

424 CHURCHILL AVE N.,
CONDOMINIUM

drawing

CONCEPT SITE PLAN

drawn: KDB	date: 2022-JUL-25
approved: KDB	revision: 0
project no.: 2109	scale: 1 : 100

drawing no.

A000

APPENDIX D

Water Demand Calculations and Figures

Water Supply Calculations

LRL File No.	220224
Date	2022-09-07
Prepared by	Tamara Harb

Water Demand based on the City of Ottawa Design Guidelines-Water Distribution, 2010

Domestic Demand			
Unit Type	**Persons Per Unit**	**Number of Units**	**Population**
1 Bedroom Apartment	1.4	52	72.8
2 Bedroom Apartment	2.1	6	12.6
	Total	**58**	**85.4**

**Based on a daily demand of 280L/day per person as identified by Appendix 4-A of the Sewer design guidelines.*

Average Water Consumption Rate	280	L/c/d			
Average Day Demand	**23,912**	**L/d**		**0.28**	**L/s**
Maximum Day Factor	7.2		Table (3-3) MOE Peaking Factors		
Maximum Daily Demand	**172,910**	**L/d**		**2.00**	**L/s**
Peak Hour Factor	10.9		Table (3-3) MOE Peaking Factors		
Maximum Hour Demand	**260,015**	**L/d**		**3.01**	**L/s**

Institutional / Commercial / Industrial Demand					
Property Type	**Unit Rate**		**Units**		**Demand (L/d)**
Office	75	L/p/d	3	people	225.0
Amenities	28000	L/ha/d	0.0167	ha	467.6

Average Day Demand	**693**	**L/d**		**0.008**	**L/s**
Maximum Day Factor	1.5		(Design Guidelines-Water Distribution Table 4.2)		
Maximum Daily Demand	**1,039**	**L/d**		**0.012**	**L/s**
Peak Hour Factor	1.8		(Design Guidelines-Water Distribution Table 4.2)		
Maximum Hour Demand	**1,870**	**L/d**		**0.022**	**L/s**

TOTAL DEMAND				
Average Day Demand	**24,605**	**L/d**	**0.28**	**L/s**
Maximum Daily Demand	**173,949**	**L/d**	**2.01**	**L/s**
Maximum Hour Demand	**261,885**	**L/d**	**3.03**	**L/s**

Water Service Pipe Sizing

Q = VA

Where: V = velocity
A = area of pipe
Q = flow rate

Assuming a maximum velocity of 1.8m/s, the diameter of pipe is calculated as:

Minimum pipe diameter (d) =	$(4Q/\pi V)^{1/2}$	
=	0.046	m
=	46	mm
Proposed pipe diameter (d) =	**150**	mm
=	**6**	Inches

Fire Flow Calculations

LRL File No.	220224
Date	September 8, 2022
Method	Fire Underwriters Survey (FUS)
Prepared by	Tamara Harb

Step	Task	Term	Options	Multiplier	Choose:	Value	Unit	Fire Flow
Structural Framing Material								
1	Choose frame used for building	Coefficient C related to the type of construction	Wood Frame	1.5	Non-combustible construction	**0.8**		
			Ordinary Construction	1.0				
			Non-combustible construction	0.8				
			Fire resistive construction <2 hrs	0.7				
			Fire resistive construction >2 hrs	0.6				
Floor Space Area (A)								
2	Total area					**6,961**	m^2	
3	Obtain fire flow before reductions	Required fire flow *(rounded to nearest 1,000 L/min)*	Fire Flow = 220 x C x $A^{0.5}$				L/min	**15,000**
Reductions or surcharge due to factors affecting burning								
4	Choose combustibility of contents	Occupancy hazard reduction or surcharge	Non-combustible	-25%	Limited combustible	**-15%**	L/min	**12,750**
			Limited combustible	-15%				
			Combustible	0%				
			Free burning	15%				
			Rapid burning	25%				
5	Choose reduction for sprinklers	Sprinkler reduction	Full automatic sprinklers	-30%	True	**-30%**	L/min	**7,650**
			Water supply is standard for both the system and fire department hose lines	-10%	True	**-10%**		
			Fully supervised system	-10%	False	**0%**		
6	Choose separation	Exposure distance between units	North side	>30m	0%		L/min	**13,388**
			West side	0 to 3m	25%			
			East side	20.1 to 30m	10%			
			South side	20.1 to 30m	10%	**45%**		
Net required fire flow								
7	Obtain fire flow, duration, and volume				Minimum required fire flow rate (rounded to nearest 1000)		L/min	**13,000**
					Minimum required fire flow rate		L/s	**216.7**
					Required duration of fire flow		hr	**2.75**

APPENDIX E

Sanitary Flow Calculations

LRL File No. 220224
Project: CIV 7 Storey Condo Redevelopment
Location: 424 Churchill Avenue
Date: September 6,2022

Sanitary Design Parameters

Commercial & Institutional Flow = 28000 L/ha/day
Light Industrial Flow = 35000 L/ha/day
Heavy Industrial Flow = 55000 L/ha/day
Maximum Residential Peak Factor = 4.0
Commercial & Institutional Peak Factor = 1.5
Average Daily Flow = 280 L/p/day
Daily Flow for Places of Employment = 75L/p/day
Industrial Peak Factor = as per Appendix 4-B = 7
Extraneous Flow = 0.33L/s/gross ha

Pipe Design Parameters

Minimum Velocity = 0.60 m/s
Manning's n = 0.013

LOCATION			RESIDENTIAL AREA AND POPULATION						COMMERCIAL		INDUSTRIAL			OFFICE		C+I+I	INFILTRATION			TOTAL FLOW (l/s)	PIPE					
STREET	FROM	TO	AREA (Ha)	POP.	CUMMULATIVE AREA (Ha)	CUMMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (Ha)	ACCU. AREA (Ha)	AREA (Ha)	ACCU. AREA (Ha)	PEAK FACT.	POP	ACCU. POP	PEAK FLOW (l/s)	TOTAL AREA (Ha)	ACCU. AREA (Ha)	INFILT. FLOW (l/s)		LENGTH (m)	DIA. (mm)	SLOPE (%)	MATERIAL	CAP. (FULL) (l/s)	VEL. (FULL) (m/s)
Churchill Ave	Bldg	PROP SAN MH01	0.101	85.4	0.101	85.4	3.6	1.00	0.017	0.017	0.00	0.00	7.0	3.0	3.0	0.01	0.101	0.101	0.03	**1.04**	13.1	150	2.00%	PVC	**21.54**	**1.22**

NOTES: Existing inverts and slopes are estimated. They are to be confirmed on-site.

Designed: **TH**	PROJECT: **CIV 7-Storey Condo Redevelopment**		
Checked: **AS**	LOCATION: **424 Churchil Avenue**		
Dwg. Reference: **C.401**	File Ref.: **220224**	Date: **2022-09-06**	Sheet No. 1 of 1

APPENDIX F

Stormwater Management Calculations

LRL Associates Ltd.
Storm Watershed Summary

LRL File No.	220224
Project:	CIV 7-Storey Condo Building
Location:	424 Churchill Avenue
Date:	October 11, 2022
Designed:	Tamara Harb
Drawing Reference:	C701/C702

Pre-Development Catchments

WATERSHED	C = 0.2	C=0.7	C = 0.90	Total Area (m^2)	Total Area (ha)	Combined C
EWS-01	119.4	0.0	893.0	1012.4	0.101	0.82
TOTAL	**119.4**	**0.0**	**893.0**	**1012.4**	**0.101**	**0.82**

Post-Development Catchments

WATERSHED	C = 0.20	C = 0.70	C = 0.90	Total Area (m^2)	Total Area (ha)	Combined C
WS-01(ROOF)	0.00	0.00	116.29	116.29	0.012	0.90
WS-02 (ROOF)	0.00	0.00	141.44	141.44	0.014	0.90
WS-03 (ROOF)	0.00	0.00	248.09	248.09	0.025	0.90
WS-04 (ROOF)	0.00	0.00	62.07	62.07	0.006	0.90
WS-05 (ROOF)	0.00	0.00	130.54	130.54	0.013	0.90
WS-06(UN-CONTROLLED)	0.00	0.00	313.97	313.97	0.031	0.90
TOTAL	**0.0**	**0.0**	**1012.4**	**1012.4**	**0.101**	**0.90**

LRL File No. 220224
Project: CIV 7-Storey Condo Building
Location: 424 Churchilll Ave
Date: October 11, 2022
Designed: Tamara Harb
Drawing Ref.: C601

Stormwater Management Design Sheet

Runoff Equation

Q = 2.78CIA (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) = A / (Td + C)^{B}
A = Area (ha)
T_c = Time of concentration (min)

Pre-development Stormwater Management - 2 Year Storm

2 year storm

I2 = 732.95 / (Td + 6.199)$^{0.81}$ **a = 732.951** **b = 0.810** **C = 6.199**

C =	0.50	max of 0.5 as per City of Ottawa
I =	76.8	mm/hr
Tc =	10	min
Total Area =	0.101	ha

Allowable Release Rate= **10.81** L/s

Post-development Stormwater Management

					$\sum R_{2\&5}$	$\sum R_{100}$
	Total Site Area =	**0.070**	ha	**∑R=**		
Controlled	WS-01(ROOF)	0.012	ha	R=	0.90	1.00
	WS-02 (ROOF)	0.014	ha	R=	0.90	1.00
	WS-03 (ROOF)	0.025	ha	R=	0.90	1.00
	WS-04 (ROOF)	0.006	ha	R=	0.90	1.00
	WS-05 (ROOF)	0.013	ha	R=	0.90	1.00
	Total Controlled	**0.070**	**ha**	**∑R=**	**0.90**	**1.00**
Un-controlled	WS-06 (UNCONTROLLED)	0.031	ha	R=	0.90	1.00
	Total Un-Controlled =	**0.031**	**ha**	**∑R=**	**0.90**	**1.00**

Post-development Stormwater Management (Uncontrolled Catchment WS-06)

100 Year Storm Event:

I_{100} = 1735.688 / (Td + 6.014)$^{0.820}$ **a = 1735.688** **b = 0.820** **C = 6.014**

Time (min)	Intensity (mm/hr)	Uncontrolled Runoff (L/s)	Controlled Release Rate Constant (L/s)	Total Release Rate (L/s)
10	178.6	15.59	0.00	15.59

LRL File No. 220224
Project: CIV 7-Storey Condo Building
Location: 424 Churchilll Ave
Date: October 11, 2022
Designed: Tamara Harb
Drawing Ref.: C601

Stormwater Management Design Sheet

Post-development Stormwater Management (WS-01 ROOF)

100 Year Storm Event:

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$ a = 1735.688 b = 0.820 C = 6.014

Time (min)	Intensity (mm/hr)	Storage Required: Controlled Runoff (L/s)	Storage Required: Storage Volume (m^3)	Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	178.6	5.77	2.71	1.26	0.00	1.26
15	142.9	4.62	3.02	1.26	0.00	1.26
20	120.0	3.88	3.14	1.26	0.00	1.26
25	103.8	3.36	3.15	1.26	0.00	1.26
30	91.9	2.97	3.08	1.26	0.00	1.26
35	82.6	2.67	2.96	1.26	0.00	1.26
40	75.1	2.43	2.81	1.26	0.00	1.26
45	69.1	2.23	2.63	1.26	0.00	1.26
50	64.0	2.07	2.42	1.26	0.00	1.26
60	55.9	1.81	1.97	1.26	0.00	1.26
70	49.8	1.61	1.47	1.26	0.00	1.26
80	45.0	1.45	0.93	1.26	0.00	1.26
90	41.1	1.33	0.37	1.26	0.00	1.26
100	37.9	1.23	0.00	1.26	0.00	1.26
110	35.2	1.14	0.00	1.26	0.00	1.26
120	32.9	1.06	0.00	1.26	0.00	1.26

Summary of Roof Storage

Maximum Required Roof Storage (100 Year) =	3.15	m^3	
Proposed Head =	150	mm	*An Emergency overflow scupper is provided above this height.
Control Flow/Drain =	0.63	L/s	
Number of Roof Drains =	**2**		
Total Flow from Roof Drain =	1.26	L/s	
Available Roof Surface =	116.28	m^2	
Roof Drain Model =	*WATTS adjustable roof drain w/ weir opening-closed*		
Total Storage Required =	**3.15**	**m^3**	
Available Roof Storage =	**6.03**	**m^3**	refer to LRL Plan C601

Post-development Stormwater Management (WS-02 ROOF)

100 Year Storm Event:

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$ a = 1735.688 b = 0.820 C = 6.014

Time (min)	Intensity (mm/hr)	Storage Required: Controlled Runoff (L/s)	Storage Required: Storage Volume (m^3)	Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	178.6	7.02	3.46	1.26	0.00	1.26
15	142.9	4.62	3.02	1.26	0.00	1.26
20	120.0	3.88	3.14	1.26	0.00	1.26
25	103.8	3.36	3.15	1.26	0.00	1.26
30	91.9	2.97	3.08	1.26	0.00	1.26
35	82.6	2.67	2.96	1.26	0.00	1.26
40	75.1	2.43	2.81	1.26	0.00	1.26
45	69.1	2.23	2.63	1.26	0.00	1.26
50	64.0	2.07	2.42	1.26	0.00	1.26
60	55.9	1.81	1.97	1.26	0.00	1.26
70	49.8	1.61	1.47	1.26	0.00	1.26
80	45.0	1.45	0.93	1.26	0.00	1.26
90	41.1	1.33	0.37	1.26	0.00	1.26
100	37.9	1.23	0.00	1.26	0.00	1.26
110	35.2	1.14	0.00	1.26	0.00	1.26
120	32.9	1.06	0.00	1.26	0.00	1.26

Summary of Roof Storage

Maximum Required Roof Storage (100 Year) =	3.46	m^3	
Proposed Head =	150	mm	*An Emergency overflow scupper is provided above this height.
Control Flow/Drain =	0.63	L/s	
Number of Roof Drains =	**2**		
Total Flow from Roof Drain =	1.26	L/s	
Available Roof Surface =	141	m^2	
Roof Drain Model =	*WATTS adjustable roof drain w/ weir opening-closed*		
Total Storage Required =	**3.46**	**m^3**	
Available Roof Storage =	**4.55**	**m^3**	refer to LRL Plan C601

Post-development Stormwater Management (WS-03 ROOF)

LRL File No. 220224
Project: CIV 7-Storey Condo Building
Location: 424 Churchilll Ave
Date: October 11, 2022
Designed: Tamara Harb
Drawing Ref.: C601

Stormwater Management Design Sheet

100 Year Storm Event:

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$ a = 1735.688 b = 0.820 C = 6.014

		Storage Required				
Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	178.6	12.32	6.63	1.26	0.00	1.26
15	142.9	4.62	3.02	1.26	0.00	1.26
20	120.0	3.88	3.14	1.26	0.00	1.26
25	103.8	3.36	3.15	1.26	0.00	1.26
30	91.9	2.97	3.08	1.26	0.00	1.26
35	82.6	2.67	2.96	1.26	0.00	1.26
40	75.1	2.43	2.81	1.26	0.00	1.26
45	69.1	2.23	2.63	1.26	0.00	1.26
50	64.0	2.07	2.42	1.26	0.00	1.26
60	55.9	1.81	1.97	1.26	0.00	1.26
70	49.8	1.61	1.47	1.26	0.00	1.26
80	45.0	1.45	0.93	1.26	0.00	1.26
90	41.1	1.33	0.37	1.26	0.00	1.26
100	37.9	1.23	0.00	1.26	0.00	1.26
110	35.2	1.14	0.00	1.26	0.00	1.26
120	32.9	1.06	0.00	1.26	0.00	1.26

Summary of Roof Storage

Maximum Required Roof Storage (100 Year) =	6.63	m^3	
Proposed Head =	150	mm	*An Emergency overflow scupper is provided above this height.
Control Flow/Drain =	0.63	L/s	
Number of Roof Drains =	2		
Total Flow from Roof Drain =	1.26	L/s	
Available Roof Surface =	248	m^2	
Roof Drain Model =	*WATTS adjustable roof drain w/ weir opening-closed*		
Total Storage Required =	**6.63**	**m^3**	
Available Roof Storage =	**12.25**	**m^3**	refer to LRL Plan C601

Post-development Stormwater Management (WS-04 ROOF)

100 Year Storm Event:

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$ a = 1735.688 b = 0.820 C = 6.014

		Storage Required				
Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	178.6	3.08	1.09	1.26	0.00	1.26
15	142.9	4.62	3.02	1.26	0.00	1.26
20	120.0	3.88	3.14	1.26	0.00	1.26
25	103.8	3.36	3.15	1.26	0.00	1.26
30	91.9	2.97	3.08	1.26	0.00	1.26
35	82.6	2.67	2.96	1.26	0.00	1.26
40	75.1	2.43	2.81	1.26	0.00	1.26
45	69.1	2.23	2.63	1.26	0.00	1.26
50	64.0	2.07	2.42	1.26	0.00	1.26
60	55.9	1.81	1.97	1.26	0.00	1.26
70	49.8	1.61	1.47	1.26	0.00	1.26
80	45.0	1.45	0.93	1.26	0.00	1.26
90	41.1	1.33	0.37	1.26	0.00	1.26
100	37.9	1.23	0.00	1.26	0.00	1.26
110	35.2	1.14	0.00	1.26	0.00	1.26
120	32.9	1.06	0.00	1.26	0.00	1.26

Summary of Roof Storage

Maximum Required Roof Storage (100 Year) =	3.15	m^3	
Proposed Head =	150	mm	*An Emergency overflow scupper is provided above this height.
Control Flow/Drain =	0.63	L/s	
Number of Roof Drains =	2		
Total Flow from Roof Drain =	1.26	L/s	
Available Roof Surface =	62.07	m^2	
Roof Drain Model =	*WATTS adjustable roof drain w/ weir opening-closed*		
Total Storage Required =	**3.15**	**m^3**	
Available Roof Storage =	**6.64**	**m^3**	refer to LRL Plan C601

Post-development Stormwater Management (WS-05 ROOF)

LRL File No. 220224
Project: CIV 7-Storey Condo Building
Location: 424 Churchilll Ave
Date: October 11, 2022
Designed: Tamara Harb
Drawing Ref.: C601

Stormwater Management Design Sheet

100 Year Storm Event:

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$ **a = 1735.688** **b = 0.820** **C = 6.014**

		Storage Required				
Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	178.6	6.48	3.13	1.26	0.00	1.26
15	142.9	4.62	3.02	1.26	0.00	1.26
20	120.0	3.88	3.14	1.26	0.00	1.26
25	103.8	3.36	3.15	1.26	0.00	1.26
30	91.9	2.97	3.08	1.26	0.00	1.26
35	82.6	2.67	2.96	1.26	0.00	1.26
40	75.1	2.43	2.81	1.26	0.00	1.26
45	69.1	2.23	2.63	1.26	0.00	1.26
50	64.0	2.07	2.42	1.26	0.00	1.26
60	55.9	1.81	1.97	1.26	0.00	1.26
70	49.8	1.61	1.47	1.26	0.00	1.26
80	45.0	1.45	0.93	1.26	0.00	1.26
90	41.1	1.33	0.37	1.26	0.00	1.26
100	37.9	1.23	0.00	1.26	0.00	1.26
110	35.2	1.14	0.00	1.26	0.00	1.26
120	32.9	1.06	0.00	1.26	0.00	1.26

Summary of Roof Storage

Maximum Required Roof Storage (100 Year) =	3.15	m^3	
Proposed Head =	150	mm	*An Emergency overflow scupper is provided above this height.
Control Flow/Drain =	0.63	L/s	
Number of Roof Drains =	**2**		
Total Flow from Roof Drain =	1.26	L/s	
Available Roof Surface =	131	m^2	
Roof Drain Model =	*WATTS adjustable roof drain w/ weir opening-closed*		
Total Storage Required =	**3.15**	**m^3**	
Available Roof Storage =	**3.16**	**m^3**	refer to LRL Plan C.601

SUMMARY OF RELEASE RATES AND STORAGE VOLUMES				
CATCHMENT AREAS	DRAINAGE AREAS (ha)	100-YEAR RELEASE RATE	100-YEAR REQUIRED STORAGE (m3)	TOTAL AVAILABLE STORAGE (m3)
WS-01(ROOF)	0.012	1.26	3.15	6.03
WS-02 (ROOF)	0.014	1.26	3.46	4.55
WS-03 (ROOF)	0.025	1.26	6.63	12.25
WS-04 (ROOF)	0.006	1.26	3.15	3.16
WS-05 (ROOF)	0.013	1.26	3.15	6.64
TOTAL CONTROLLED	**0.070**	**6.30**	**19.53**	**32.63**
WS-06 (UNCONTROLLED)	0.031	15.59	0	0
TOTAL UNCONTROLLED	**0.031**	**15.59**	**0.00**	**0.00**
TOTAL	**0.101**	**21.89**	**19.53**	**32.63**

LRL Associates Ltd.

Storm Design Sheet

LRL File No. 220224
Project: CIV 7-Storey Condo Building
Location: 424 Churchill Avenue
Date: October 11, 2022
Designed: Tamara Harb
Drawing Reference: C.401

Storm Design Parameters

Rational Method Q = 2.78CIA

Q = Peak flow in litres per second (L/s)
A = Drainage area in hectares (ha)
C = Runoff coefficient
I = Rainfall intensity (mm/hr)

Runoff Coefficient (C)

Grass	0.20
Gravel	0.70
Asphalt / rooftop	0.90

Ottawa Macdonald-Cartier International Airport IDF curve equation (10 year event, intensity in mm/hr)

I100 = 1735.688 / (Td + 6.014)0.820

Min. velocity = 0.80 m/s
Manning's "n" = 0.013

LOCATION			AREA (ha)			FLOW						STORM SEWER							
WATERSHED / STREET	From MH	To MH	C = 0.20	C = 0.70	C = 0.90	Indiv. 2.78AC	Accum. 2.78AC	Time of Conc. (min.)	Rainfall Intensity (mm/hr)	Peak Flow Q (L/s)	Controlled Flow Q (L/s)	Pipe Diameter (mm)	Type	Slope (%)	Length (m)	Capacity Full (L/s)	Velocity Full (m/s)	Time of Flow (min.)	Ratio (Q/Q_{FULL})
WS-01 to WS-05	Building	PROP STM MH01	0.000	0.000	0.070	0.175	0.175	10.00	178.6	31.28	6.30	250	PVC	2.00%	11.6	84.1	1.71	0.11	0.37

APPENDIX G

Fire Hydrant Locations

FIRE HYDRANTS LOCATIONS

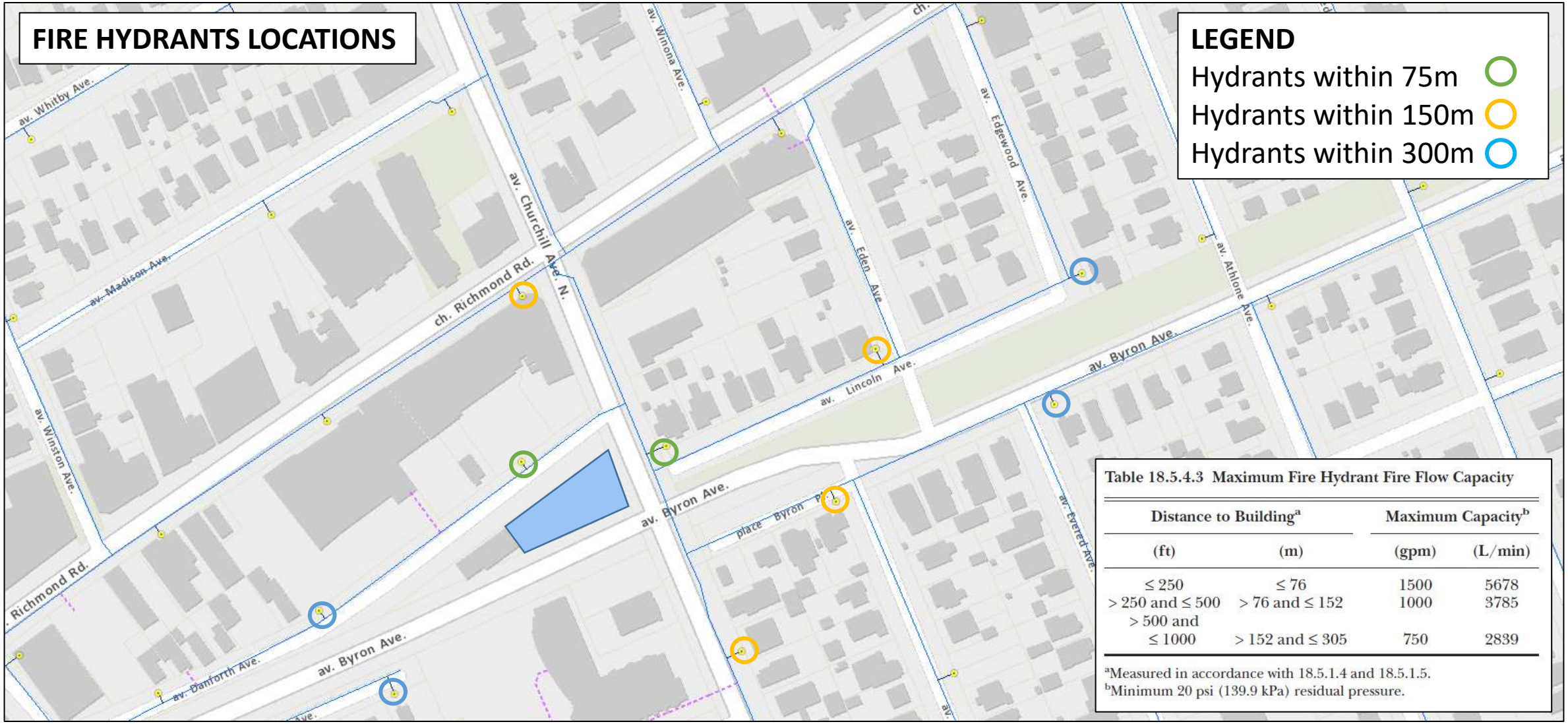


Table 18.5.4.3 Maximum Fire Hydrant Fire Flow Capacity

Distance to Building[a]		Maximum Capacity[b]	
(ft)	(m)	(gpm)	(L/min)
≤ 250	≤ 76	1500	5678
> 250 and ≤ 500	> 76 and ≤ 152	1000	3785
> 500 and ≤ 1000	> 152 and ≤ 305	750	2839

[a]Measured in accordance with 18.5.1.4 and 18.5.1.5.
[b]Minimum 20 psi (139.9 kPa) residual pressure.