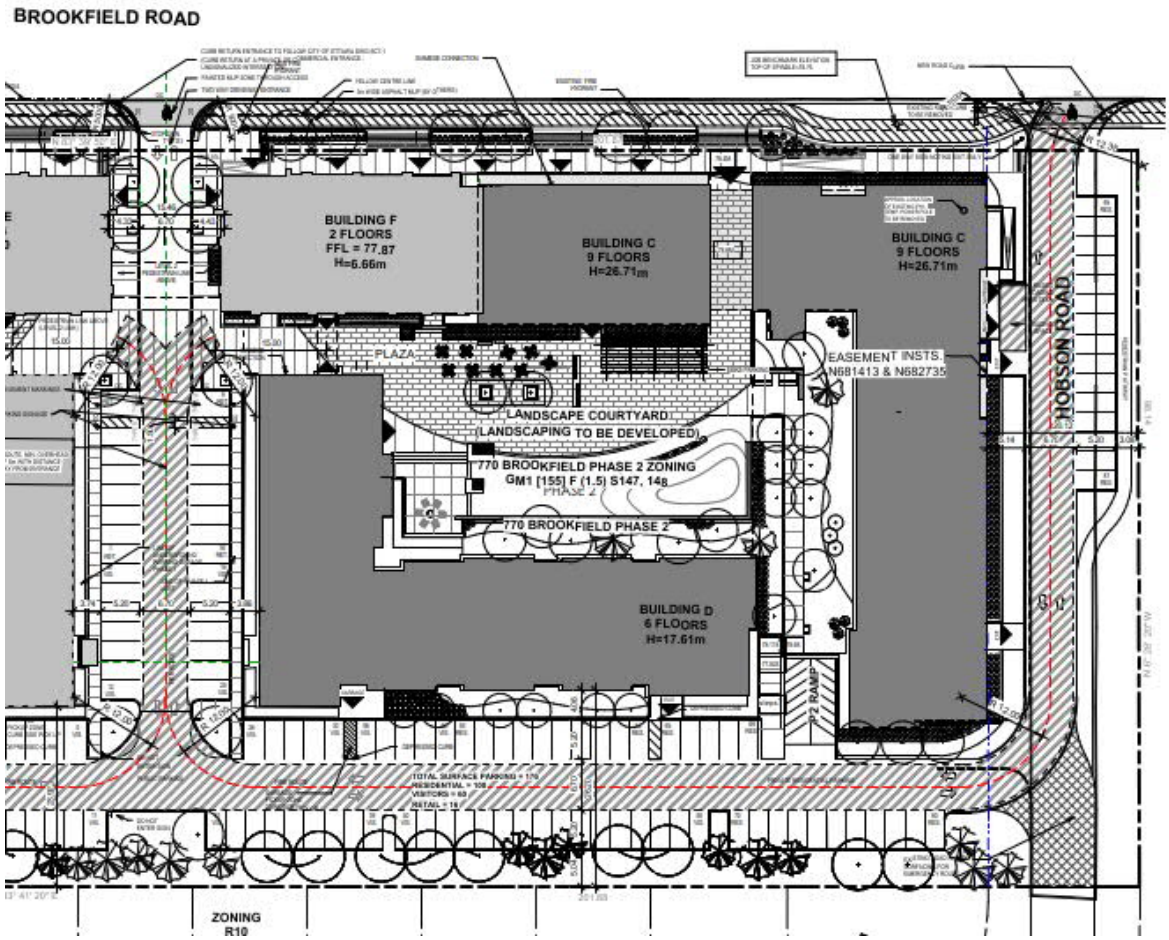
SERVICING & STORMWATER MANAGEMENT REPORT 770 BROOKFIELD ROAD – PHASE 2, OTTAWA



Project No.: CCO-22-3501

City File No.: D07-12-XX-XXXX

Prepared for:

Hobin Architecture Inc
63 Pamilla Street
Ottawa, ON K1S 3K7

Prepared by:

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June 24, 2022

McINTOSH PERRY

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1.0 PROJECT DESCRIPTION

1.1 Purpose

McIntosh Perry (MP) has been retained by Hobin Architecture Inc. to prepare this Servicing and Stormwater Management Report in support of the Site Plan Control application for the proposed Phase II development at 770 Brookfield Road within the City of Ottawa.

The main purpose of this report is to present a servicing design for the development in accordance with the recommendations and guidelines provided by the City of Ottawa (City), the Rideau Valley Conservation Authority (RVCA), and the Ministry of the Environment, Conservation and Parks (MECP). This report will address the water, sanitary and storm sewer servicing for the development, ensuring that existing and available services will adequately service the proposed development.

This report should be read in conjunction with the following drawings:

- CCO-22-3501, C101 – Site Grading and Drainage Plan, and
- CCO-22-3501, C102 – Site Servicing Plan.
- CCO-22-3501, PRE – Pre-Development Drainage Area Plan (Appendix E)
- CCO-22-3501, POST – Post-Development Drainage Area Plan (Appendix F)

1.2 Site Description

The property is located at 770 Brookfield Road. It is described as Registered Plan 787, Parts 7-9 Plan 4R-28560 Ward 16 River, City of Ottawa. The Phase II land in question covers approximately 0.72 ha and is bounded by Brookfield Road to the north and Hobson Road to the east. The development area for the proposed works is approximately 0.72 ha. The site is zoned for General Mixed Use (GM1). See Site Location Plan in Appendix 'A' for more details and Phase II Severance R-Plan included in Appendix 'B'.

Figure 1: Site Map

1.3 Proposed Development and Statistics

The proposed development consists of a 9-storey mixed-use residential building and a 6-storey mixed-use residential building. Visitor parking and drive aisles will be provided west and south of the proposed buildings. Underground parking will be provided for residents with site access extending from Brookfield Road and Hobson Road. Refer to Site Plan prepared by Hobin Architecture included in Appendix 'B' for details.

1.4 Existing Conditions and Infrastructure

The property adjacent to the existing site is currently developed with mixed-use residential buildings, approved under City Application No. D07-12-17-0140 (Functional Servicing and Stormwater Management Report). The Phase II site is currently undeveloped.

The existing Phase II site has no sanitary or water services. In accordance with the Functional Servicing and Stormwater Management Report, drainage within the Phase II site flows both west, currently being picked up by the Phase I servicing network, and east, currently being picked up by the municipal infrastructure within Hobson Road.

Sewer and watermain mapping collected from the City of Ottawa indicate that the following services exist across the property frontages within the adjacent municipal rights-of-way(s):

- Brookfield Road
    - 305mm diameter cast iron watermain,
    - 250mm diameter concrete sanitary sewer, tributary to the Rideau River Collector, and a
    - 750mm diameter concrete storm sewer, tributary to Sawmill Creek sub-watershed with approximately 0.7 km to the outlet
- Hobson Road
    - 203mm diameter cast iron watermain,
    - 300mm diameter asbestos concrete sanitary sewer, tributary to the Rideau River Collector, and a
    - 375mm diameter concrete storm sewer, tributary to Sawmill Creek sub-watershed with approximately 1.1 Km to the outlet.
- Drive Aisle Within 770 Brookfield – Phase I
    - 200mm diameter concrete sanitary sewer, tributary to the Rideau River Collector, and a
    - 675mm diameter concrete storm sewer tributary to Sawmill Creek sub-watershed with approximately 0.7 km to the outlet.

1.5 Approvals

The proposed development is subject to the City of Ottawa site plan control process. Site plan control requires the City to review, provided concurrence and approve the engineering design package. Permits to construct can be requested once the City has issued a site plan agreement.

An Environmental Compliance Approval (ECA) through the Ministry of Environment, Conservation and Parks (MECP) is not anticipated to be required since the development is contained within a single parcel of land and proposes independent servicing, is not within a combined sewer shed, and does not propose industrial sewage. As a result, the stormwater management system meets the exemption requirements under O.Reg 525/90.

2.0 BACKROUND STUDIES, STANDARDS, AND REFFRENCES

2.1 Background Reports / Reference Information

Background studies that have been completed for the proposed site include City of Ottawa as-built drawings, a topographical survey, a geotechnical report and a Phase I Environmental Site Assessment (ESA).

As-built drawings of existing services within the vicinity of the proposed site were reviewed in order to determine accurate servicing and stormwater management schemes for the site.

A topographic survey of the site (Job No. 22509-21) was completed by Annis, O'Sullivan, Vollebekk LTD., dated May 20, 2022.

The following reports have previously been completed and are available under separate cover:

- Geotechnical Investigation completed by Paterson Group, dated May 30, 2022.
- Phase One Environmental Site Assessment completed by Paterson Group, dated December 16, 2019.
- Functional Servicing and Stormwater Management Report completed by David Schaeffer Engineering Ltd, dated May 2019. (Functional Servicing and Stormwater Management Report)
- Stormwater Management Memorandum completed by David Schaeffer Engineering Ltd, dated October 5, 2020.

2.2 Applicable Guidelines and Standards

City of Ottawa:

- Ottawa Sewer Design Guidelines, City of Ottawa, SDG002, October 2012. (Ottawa Sewer Guidelines)
  - Technical Bulletin ISTB-2014-01 City of Ottawa, February 2014. (ISTB-2014-01)
  - Technical Bulletin PIEDTB-2016-01 City of Ottawa, September 2016. (PIEDTB-2016-01)
  - Technical Bulletin ISTB-2018-01 City of Ottawa, January 2018. (ISTB-2018-01)
  - Technical Bulletin ISTB-2018-03 City of Ottawa, March 2018. (ISTB-2018-03)
  - Technical Bulletin ISTB-2019-01 City of Ottawa, January 2019. (ISTB-2019-01)
  - Technical Bulletin ISTB-2019-02 City of Ottawa, February 2019. (ISTB-2019-02)
- Ottawa Design Guidelines – Water Distribution City of Ottawa, July 2010. (Ottawa Water Guidelines)
  - Technical Bulletin ISD-2010-2 City of Ottawa, December 15, 2010. (ISD-2010-2)
  - Technical Bulletin ISDTB-2014-02 City of Ottawa, May 2014. (ISDTB-2014-02)
  - Technical Bulletin ISTB-2018-02 City of Ottawa, March 2018. (ISTB-2018-02)

Ministry of Environment, Conservation and Parks:

- Stormwater Planning and Design Manual, Ministry of the Environment, March 2003. (MECP Stormwater Design Manual)
- Design Guidelines for Sewage Works, Ministry of the Environment, 2008. (MECP Sewer Design Guidelines)

Other:

- Water Supply for Public Fire Protection, Fire Underwriters Survey, 2020. (FUS Guidelines)

3.0 PRE-CONSULTATION SUMMARY

A pre-consultation meeting was conducted on December 16, 2014, regarding the proposed site. Specific design parameters to be incorporated within this design include the following:

- Calculate the time of concentration (Cannot be less than 10 minutes).
- Control post-development flows to the pre-development 2-year storm release rate using the pre-development runoff coefficient or a maximum equivalent 'C' of 0.5, whichever is less. Up to and including the 100-year storm event must be detained on site.
- Coordination with the RVCA is required to confirm quality control requirements.

4.0 WATERMAIN

4.1 Existing Watermain

The site is located within the 2W2C pressure zone, as per the Water Distribution System mapping included in Appendix C. There is an existing 203mm diameter CI watermain within Hobson Road and 305 mm diameter CI watermain within Brookfield Road available to service the development.

4.2 Proposed Watermain

A 150mm diameter PVC water service is proposed to service the development complete with a water valve between the building and the existing watermain. The water service is proposed to be serviced by the existing 203 mm diameter watermain within Hobson Road. The services are designed to have a minimum of 2.4m cover. Refer to drawing C102 for a detailed servicing layout.

The Fire Underwriters Survey 2020 (FUS) method was utilized to determine the required fire flow for the site. The 'C' factor (type of construction) for the FUS calculation was determined to be 0.8 (non-combustible type). The total floor area ('A' value) for the FUS calculation was determined to be 15,433.7 m^2. The results of the calculations yielded a required fire flow of 12,000 L/min for Building C & existing Building F (combined) and 9,000 L/min for Building D. The detailed calculations for the FUS can be found in Appendix 'C'.

The water demands for the proposed building have been calculated to adhere to the Ottawa Design Guidelines – Water Distribution manual and can be found in Appendix 'C'. The results have been summarized in Table 1, below. In accordance with Section 4.3.1 of the guidelines, service areas with a basic day demand greater than 50 m^3/day require a redundant connection to the municipal system. The redundancy is proposed to be provided via a water valve located south of the development service lateral.

Table 1: Water Supply Design Criteria and Water Demands

Site Area	0.91 ha
Residential	280 L/person/day
1 Bedroom Apartment	1.4 persons/unit
2 Bedroom Apartment	2.1 persons/unit
3 Bedroom Apartment	3.1 persons/unit
4 Bedroom Apartment	3.4 persons/unit
Bachelor Apartment	1.4 persons/unit
Maximum Daily Peaking Factor	2.2 x avg day
Maximum Hour Peaking Factor	5.5 x avg day
Average Day Demand (L/s)	2.72
Maximum Daily Demand (L/s)	5.97
Peak Hourly Demand (L/s)	14.90
FUS Fire Flow Requirement (L/s)	200 (12,000 L/min)

The City provided the estimated water pressures at both for the average day scenario, peak hour scenario and the max day plus fire flow scenario for the demands indicated by the correspondence in Appendix C. The resulting pressures for the boundary conditions results are shown in Table 2, below.

Table 2: Boundary Conditions Results

Scenario	Proposed Demands (L/s)	Connection HGL (m H_2O)* / kPa
Average Day Demand	2.72	54.5 / 534.4
Maximum Daily + Fire Flow Demand	5.97 + 200 = 205.97	43.0 / 421.6
Peak Hourly Demand	14.90	48.3 / 473.6
* Adjusted for an estimated ground elevation of 75.52m above the connection point.		

The normal operating pressure range is anticipated to be 474 kPa to 5342 kPa and will not be less than 275 kPa (40 psi) or exceed 689 kPa (100 psi). The proposed watermains will meet the minimum required 20 psi (140 kPa) from the Ottawa Water Guidelines at the ground level under maximum day demand and fire flow conditions. A pressure reducing valve is required for the site since the pressure will exceed 552 kPa (80 psi) in the average day scenario.

To confirm the adequacy of fire flow to protect the proposed development, public fire hydrants within 150 m of the proposed building were analysed per City of Ottawa ISTB 2018-02 Appendix I Table 1. Based on City guidelines (ISTB-2018-02), the existing hydrants can provide adequate fire protection to the proposed development. The results are summarized in Table 3, below.

Table 3: Fire Protection Confirmation

Building	Fire Flow Demand (L/min.)	Fire Hydrant(s) within 75m	Fire Hydrant(s) within 150m	Combined Fire Flow (L/min.)
770 Brookfield Road	12,000 (FUS)	2	2	19,000

5.0 SANITARY DESIGN

5.1 Existing Sanitary Sewer

There is an existing 300mm diameter concrete sanitary sewer within Hobson Road available to service the development. There is also an existing 200mm diameter concrete sanitary sewer within the center drive aisle that currently services the Phase 1 development.

5.2 Proposed Sanitary Sewer

A new 200mm diameter gravity sanitary is proposed be connected to the existing 300mm diameter sanitary sewer within Hobson Road to service Building C. In addition, a new 200mm diameter is proposed to be connected to the existing 300mm diameter sewer within Hobson Road to service Building D. Based on coordination with the mechanical engineer, multiple sanitary connections is expected to be required due to the development size and internal sloping for the building plumbing system. Refer to drawing C102 for a detailed servicing layout.

The Phase II development consists of two mixed-use residential buildings. The peak design flows for the proposed buildings were calculated using criteria from the Ottawa Sewer Guidelines and are summarized in Table 4, below. Based on the unit occupancy statistics provided by the architect, the proposed site development will generate a flow of 9.22 L/s. See Appendix 'D' of this report for more details.

Table 4: Sanitary Design Criteria

Design Parameter	Value
Site Area	0.43 ha
Residential	280 L/person/day
1 Bedroom Apartment	1.4 persons/unit
2 Bedroom Apartment	2.1 persons/unit
3 Bedroom Apartment	3.1 persons/unit
4 Bedroom Apartment	3.4 persons/unit
Bachelor Apartment	1.4 persons/unit
Residential Peaking Factor	3.28
Institutional/Commercial Peaking Factor	1.00
Extraneous Flow Allowance	0.33 L/s/ha

Table 5, below, summarizes the estimated wastewater flow from the proposed development. Refer to Appendix D for detailed calculations.

Table 5: Summary of Estimated Sanitary Flow

Design Parameter	Total Flow (L/s)
Total Estimated Average Dry Weather Flow	2.81
Total Estimated Peak Dry Weather Flow	8.96
Total Estimated Peak Wet Weather Flow	9.22

The proposed 200 mm diameter gravity sanitary service will be installed with a minimum full flow target velocity (cleansing velocity) of 0.6 m/s and a full flow velocity of not more than 3.0 m/s. The capacity of the service lateral is 33.22 L/s at a proposed slope of 1.0%. For the purpose of sizing the sanitary service, it is assumed that the entire Phase II development is conveyed through a single pipe. Due to the complexity of the downstream network, the City will need to advise of any downstream constraints.

6.0 STORM SEWER DESIGN

6.1 Existing Storm Sewers

Storm runoff from the site is currently tributary to the Sawmill Creek sub watershed. The property is currently serviced by the adjacent Phase I storm network and municipal catch basins within Brookfield Road and Hobson Road. There is an existing 375mm diameter concrete storm sewer within Hobson Road that is available for servicing the proposed development.

6.2 Proposed Storm Sewers

A new 250 mm storm service will be extended from the existing 375mm diameter storm sewer within Hobson Road. The sewer system will provide attenuation for the roof area using roof drains and the internal courtyard area by an internal cistern pumped to the required release rate.

Runoff collected on the roof of the proposed buildings will be stored and controlled internally using roof drains. Roof drains will be used to limit the flow from the roof to the specified allowable release rate. For calculation purposes a Watts Accutrol roof drain was used estimate a reasonable roof flow. Other products maybe specified at detailed building design so long as release rates and storage volumes are respected.

Foundation drainage is proposed to be pumped without flow attenuation via the 250 mm diameter storm service downstream of any cistern controls. Roof drainage will also be downstream of any cistern controls.

See CCO-22-3501 - POST include in Appendix F of this report for more details. The Stormwater Management design for the subject property will be outlined in Section 7.0 of this report.

7.0 PROPOSED STORMWATER MANAGEMENT

7.1 Design Criteria and Methodology

Stormwater management for the proposed site will be maintained through rooftop attenuation and an internal cistern that will collect runoff from the at-grade areas within the site. The flow will be directed to the existing 375mm diameter storm sewer within Hobson Road.

In summary, the following design criteria have been employed in developing the stormwater management design for the site as directed by the RVCA and City:

Quality Control

- Based on the Functional Servicing and Stormwater Management Report prepared by DSEL, stormwater quality controls to an enhanced level of treatment are required for the subject site.

Quantity Control

- Based on the Functional Servicing and Stormwater Management Report prepared by DSEL, the allowable release rate for Phase 2 of the proposed development is 80.6 L/s/Ha.

7.2 Runoff Calculations

Runoff calculations presented in this report are derived using the Rational Method, given as:

$$Q = 2.78CIA \quad (L/s)$$

Where: C = Runoff coefficient
I = Rainfall intensity in mm/hr (City of Ottawa IDF curves)
A = Drainage area in hectares

It is recognized that the Rational Method tends to overestimate runoff rates. As a result, the conservative calculation of runoff ensures that any SWM facility sized using this method is expected to function as intended.

The following coefficients were used to develop an average C for each area:

Roofs/Concrete/Asphalt	0.90
Gravel	0.60
Undeveloped and Grass	0.20

As per the City of Ottawa - Sewer Design Guidelines, the 5-year balanced 'C' value must be increased by 25% for a 100-year storm event to a maximum of 1.0.

As per the pre-consultation meeting with the City of Ottawa the time of concentration (Tc) used for pre-development shall be calculated using a minimum Tc of 10 minutes and post-development flows shall be calculated using a Tc of 10 minutes.

7.3 Pre-Development Drainage

It has been assumed that the site contains no stormwater management controls for flow attenuation. The estimated pre-development peak flows for the 5, and 100-year events are summarized below in Table 6. See CCO-22-3501 - PRE in Appendix E and Appendix G for calculations.

Table 6: Pre-Development Runoff Summary

Drainage Area	Area (ha)	Q (L/s)	
		5-Year	100-Year
A1	0.718	45.98	97.14

7.4 Post-Development Drainage

The proposed site drainage limits are demonstrated on the Post-Development Drainage Area Plan. See CCO-22-3501 - POST in Appendix 'F' of this report for more details. A summary of the Post-Development Runoff Calculations can be found below.

Table 7: Post-Development Runoff Summary

Drainage Area	Area (ha)	5-year Peak Flow (L/s)	100-year Peak Flow (L/s)	100-year Storage Required (m^3)	100-year Storage Available (m^3)
C1	0.159	3.36	5.76	68.11	71.43
C2	0.063	1.26	2.16	27.52	28.32
C3	0.154	3.36	5.76	65.20	69.12
C4	0.222	6.33	12.41	36.07	36.07
C5	0.120	16.14	31.77	-	-
Total	0.718	30.45	57.86	196.91	204.95

Post development drainage will be restricted to a maximum release rate of 57.86 L/s based on the Phase I Functional Servicing and Stormwater Management Report.

Runoff for areas C1-C3 will be collected by roof drains and controlled to maximum release rate of 13.68 L/s with 204.94 m^3 of storage provided.

Runoff from area C4 will be collected by area drains that will direct flow to an internal cistern. The 36.07 m^3 internal cistern is anticipated to convey stormwater to the outlet at a maximum flow rate

12.41 L/s. Flows in excess of the 100-year storm event will need to be directed towards Hobson Road via a cistern overflow. Further detail pertaining to the cistern are to be confirmed by the Mechanical Engineer.

Runoff from area C5 will sheet drain without attenuation towards the Phase I storm network and towards municipal catch basins within Brookfield Road and Hobson Road.

Foundation drainage will be pumped and discharged via the 250 mm storm service, downstream of cistern controls.

7.5 Quality Controls

The following methods will be utilized to provide quality controls for the Phase II area:

- Areas C1-C3 will collect rooftop drainage and therefore drainage is considered clean.
- Quality controls for Area C4 will be provided via the cistern in a settling pit. Details are to be confirmed the Mechanical Engineer. Pumped water will combine with clean roof drainage before discharging to the city sewer.
- Drainage flowing towards the Phase 1 development area will be treated by the OGSunit, sized to accommodate the Phase II development.

8.0 EROSION AND SEDIMENT CONTROL

8.1 Temporary Measures

Before construction begins, temporary silt fence, straw bale or rock flow check dams will be installed at all natural runoff outlets from the property. It is crucial that these controls be maintained throughout construction and inspection of sediment and erosion control will be facilitated by the Contractor or Contract Administration staff throughout the construction period.

Silt fences will be installed where shown on the final engineering plans, specifically along the downstream property limits. The Contractor, at their discretion or at the instruction of the City, Conservation Authority or the Contract Administrator shall increase the quantity of sediment and erosion controls on-site to ensure that the site is operating as intended and no additional sediment finds its way off site. The rock flow, straw bale & silt fence check dams and barriers shall be inspected weekly and after rainfall events. Care shall be taken to properly remove sediment from the fences and check dams as required. Fibre roll barriers are to be installed at all existing curb inlet catchbasins and filter fabric is to be placed under the grates of all existing catchbasins and manholes along the frontage of the site and any new structures immediately upon installation. The measures for the existing/proposed structures is to be removed only after all areas have been paved. Care shall be taken at the removal stage to ensure that any silt that has accumulated is properly handled and disposed of. Removal of silt fences without prior removal of the sediments shall not be permitted.

Although not anticipated, work through winter months shall be closely monitored for erosion along sloped areas. Should erosion be noted, the Contractor shall be alerted and shall take all necessary steps to rectify the situation. Should the Contractor's efforts fail at remediating the eroded areas, the Contractor shall contact the City and/or Conservation Authority to review the site conditions and determine the appropriate course of action. As the ground begins to thaw, the Contractor shall place silt fencing at all required locations as soon as ground conditions warrant. Please see the Site Grading, Drainage and Sediment & Erosion Control Plan for additional details regarding the temporary measures to be installed and their appropriate OPSD references.

8.2 Permanent Measures

Rip-rap will be placed at all locations that have the potential for concentrated flow. It is crucial that the Contractor ensure that the geotextile is keyed in properly to ensure runoff does not undermine the rip rapped area. Additional rip rap is to be placed at erosion prone locations as identified by the Contractor / Contract Administrator / City or Conservation Authority.

It is expected that the Contractor will promptly ensure that all disturbed areas receive topsoil and seed/sod and that grass be established as soon as possible. Any areas of excess fill shall be removed or levelled as soon as possible and must be located a sufficient distance from any watercourse to ensure that no sediment is washed out into the watercourse. As the vegetation growth within the

site provides a key component to the control of sediment for the site, it must be properly maintained once established. Once the construction is complete, it will be up to the landowner to maintain the vegetation and ensure that the vegetation is not overgrown or impeded by foreign objects.

9.0 SUMMARY

- Two mixed-use residential buildings are proposed be constructed at 770 Brookfield Road.
- A 150mm diameter water service is proposed to be connected to the existing 200mm diameter watermain within Hobson Road.
- Two 200mm diameter sanitary services are proposed to service the development via the 300mm diameter sanitary sewer within Hobson Road, tributary to the Rideau River Collector.
- A new 250mm storm service for rooftop, surface, and foundation drainage are proposed to service the developments. The storm service will connect to the 375mm diameter storm sewer within Hobson Road, tributary to the Sawmill Creek sub-watershed approximately 1.1 km downstream.
- Storage for the 5- through 100-year storm events will be provided through roof attenuation and internal cistern attenuation.
- Quality control is provided via the cistern settling pit and existing Phase I OGS unit.

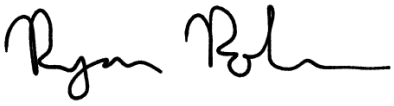
10.0 RECOMMENDATION

Based on the information presented in this report, we recommend that City of Ottawa approve this Servicing and Stormwater Management Report in support of the proposed development at 770 Brookfield Road.

This report is respectfully being submitted for approval.

Regards,

McIntosh Perry Consulting Engineers Ltd.



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11.0 STATEMENT OF LIMITATIONS

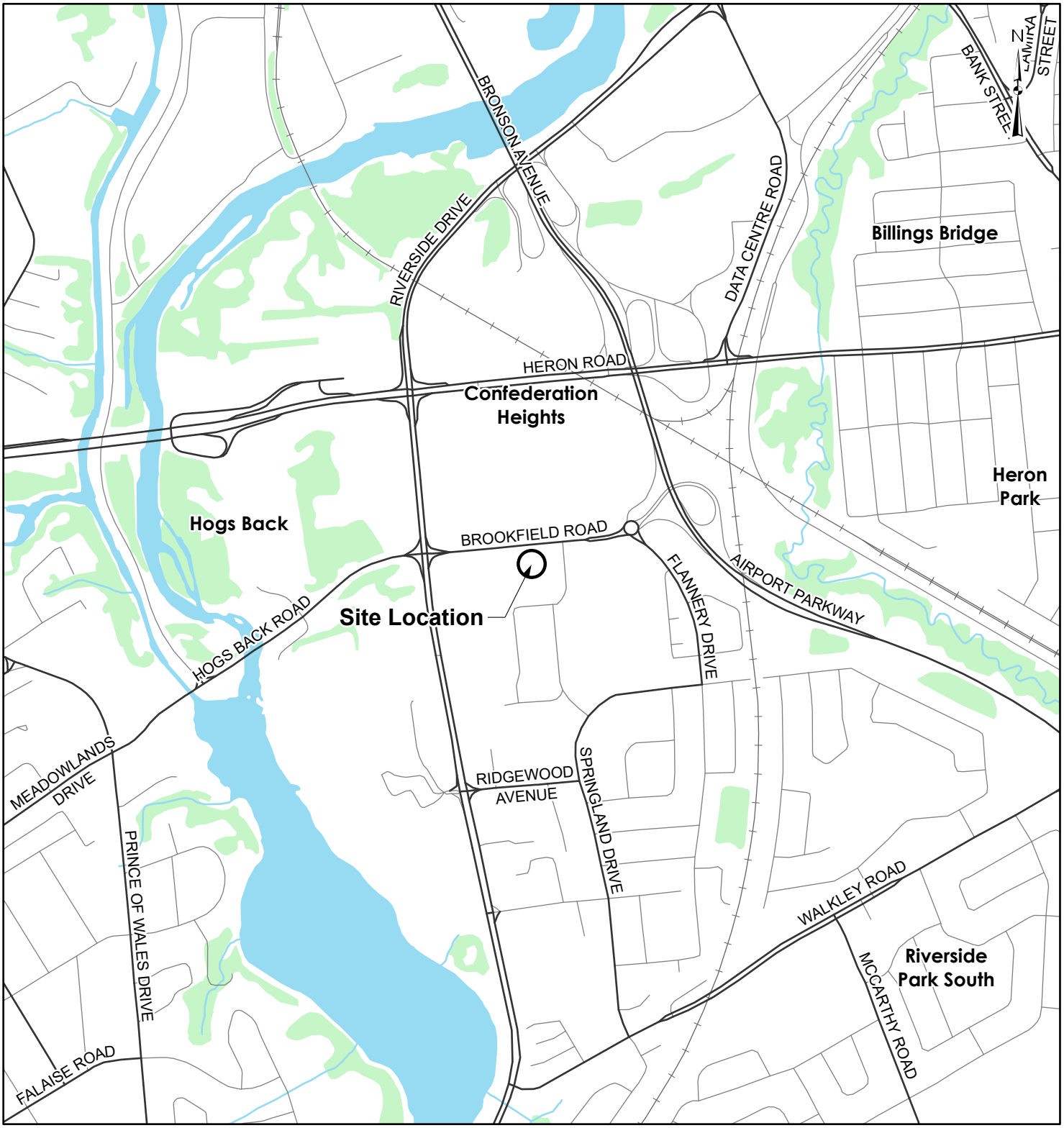
This report was produced for the exclusive use of Hobin Architecture Inc. The purpose of the report is to assess the existing stormwater management system and provide recommendations and designs for the post-construction scenario that are in compliance with the guidelines and standards from the Ministry of the Environment, Conservation and Parks, City of Ottawa and local approval agencies. McIntosh Perry reviewed the site information and background documents listed in Section 2.0 of this report. While the previous data was reviewed by McIntosh Perry and site visits were performed, no field verification/measures of any information were conducted.

Any use of this review by a third party, or any reliance on decisions made based on it, without a reliance report is the responsibility of such third parties. McIntosh Perry accepts no responsibility for damages, if any, suffered by any third party as a result of decisions or actions made based on this review.

The findings, conclusions and/or recommendations of this report are only valid as of the date of this report. No assurance is made regarding any changes in conditions subsequent to this date. If additional information is discovered or becomes available at a future date, McIntosh Perry should be requested to re-evaluate the conclusions presented in this report, and provide amendments, if required.

APPENDIX A
KEY PLAN

McINTOSH PERRY



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Scale 1:14,063 Metres

LEGEND

- Local Road
- Major Road
- Railroad
- Watercourse
- Waterbody
- Wooded Area
- Site Location

REFERENCE

GIS data provided by the Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry, 2022.

CLIENT: HOBIN ARCHITECTURE

PROJECT: 770 BROOKFIELD PHASE 2

TITLE: KEY MAP

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www.mcintoshperry.com

PROJECT NO:	CCO-23-3501
Date	Jun., 22, 2022
GIS	MG
Checked By	RR

FIGURE: 1

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APPENDIX B
BACKGROUND DOCUMENTS

McINTOSH PERRY

I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT. DATE:____________	PLAN 4R- RECEIVED AND DEPOSITED DATE:____________
E.H. HERWEYER ONTARIO LAND SURVEYOR	REPRESENTATIVE FOR LAND REGISTRAR FOR THE LAND TITLES DIVISION OF OTTAWA-CARLETON NO. 4.

SCHEDULE

AREA (sq.m.)	PART	LOT/ BLOCKS	PLAN	PIN
15382	1	PART OF 42	66	ALL OF 04071-0147
	2	PART OF 42 & 43		ALL OF 04071-0113
	3	PART OF B & C	787	ALL OF 04071-0001
	4	PART OF B		
	5			
	6	PART OF B & C		
	7			
9130	8	PART OF HOBSON ROAD (Closed by By-Law 2-93 Inst. N647611)		
	9	PART OF C		

Parts 4, 5, 6 and 9: Subject to Easement Inst. OT63570
Part 8: Subject to Easements Inst.'s N681413 & N682735

PLAN OF SURVEY OF

PART OF BLOCKS B AND C &
PART OF HOBSON ROAD
(Closed by By-law 2-93 Inst. N647611)
REGISTERED PLAN 787
AND
PART OF LOTS 42 and 43
REGISTERED PLAN 66
CITY OF OTTAWA
Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

Scale 1 : 300
12 9 6 3 0 6 12 Metres

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

Surveyor's Certificate

I CERTIFY THAT :
1. This survey and plan are correct and in accordance with the Surveys Act, the Surveyors Act and the Land Titles Act and the regulations made under them.
2. The survey was completed on the __ day of January, 2022.

Date — E.H. Herweyer, Ontario Land Surveyor

Notes & Legend

—□—	Denotes	Survey Monument Planted
—■—	"	Survey Monument Found
SIB	"	Standard Iron Bar
SSIB	"	Short Standard Iron Bar
IB	"	Iron Bar
IBØ	"	Round Iron Bar
CP	"	Concrete Pin
(WIT)	"	Witness
(AOG)	"	Annis, O'Sullivan, Vollebekk Ltd.
Meas.	"	Measured
(P1)	"	Plan 4R-19886
(P3)	"	Plan 4R-8677
(P4)	"	Registered Plan 787
(P5)	"	Plan CAR-51
(P6)	"	(857) Plan, April 26, 2000
BF	"	Board Fence
CLF	"	Chain Link Fence
–OHW–	"	Overhead Wires
O UP	"	Utility Pole
O AN	"	Anchor
Acc.	"	Accepted

Distances shown on this plan are ground distances and can be converted to grid distances by multiplying by the combined scale factor of 0.99994.

Bearings are grid bearings, derived from northerly limit of Plan 4R-19886 having a bearing of N83°39`50"E and are referred to the Central Meridian of MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

For bearing comparisons, a rotation of 0°34'10" counter-clockwise was applied to bearings on Registered Plan 787.

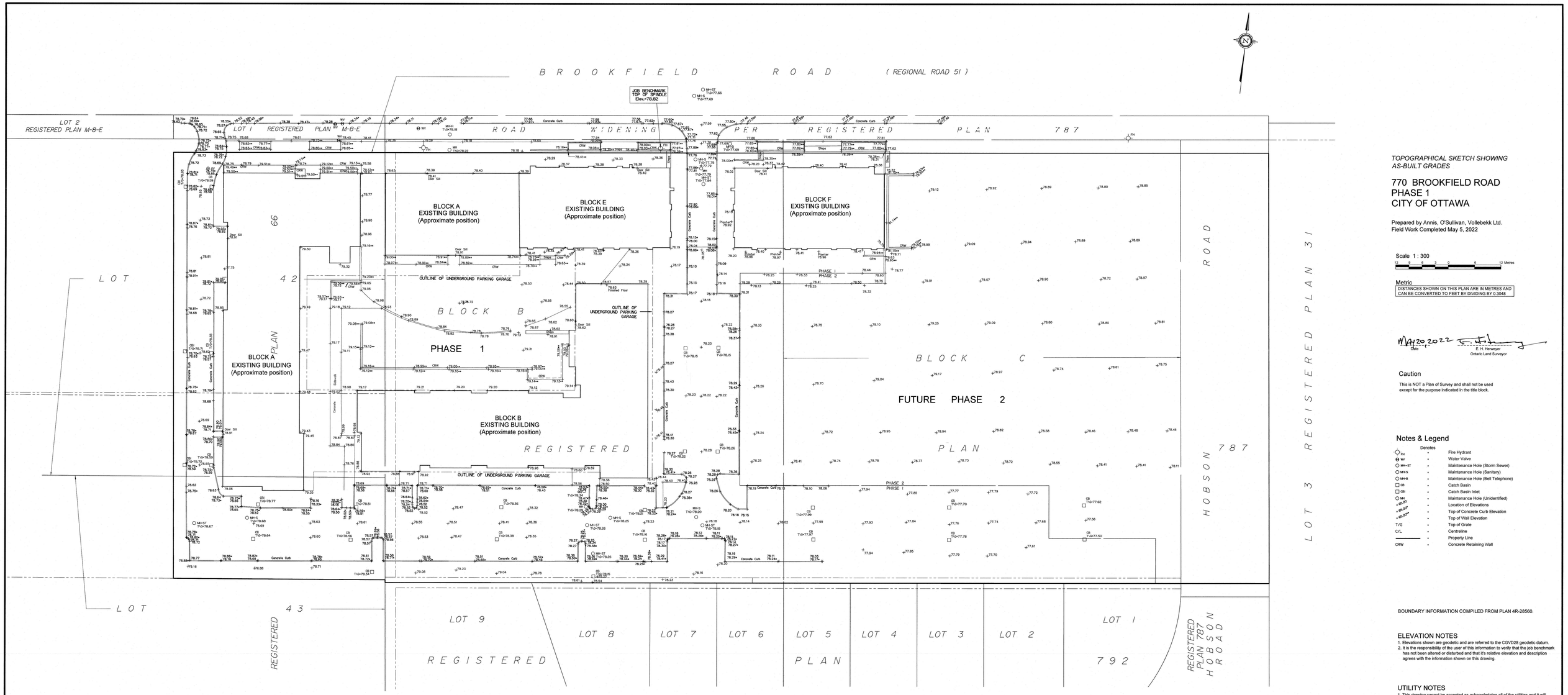
Coordinates are referred to the Central Meridian of MTM Zone 9 NAD-83 (original).

Coordinate values are to urban accuracy in accordance with O. Reg. 216/10.

. Point 12	Northing 5026225.28	Easting 368337.20
. Point 19	Northing 5026245.34	Easting 368517.84

Caution: Coordinates cannot, in themselves, be used to re-establish corners or boundaries shown on this plan.

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. 22509-21 770 Brookfield PtLt B&C P787 R D2 dsm



TOPOGRAPHICAL SKETCH SHOWING AS-BUILT GRADES

770 BROOKFIELD ROAD
PHASE 1
CITY OF OTTAWA

Prepared by Annis, O'Sullivan, Vollebekk Ltd.
Field Work Completed May 5, 2022

Scale 1 : 300

12 9 6 3 0 6 12 Metres

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

May 20 2022

E.H. Herweyer
Ontario Land Surveyor

Caution

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

Notes & Legend

Denotes		
FH	=	Fire Hydrant
WV	=	Water Valve
MH-ST	=	Maintenance Hole (Storm Sewer)
MH-S	=	Maintenance Hole (Sanitary)
MH-B	=	Maintenance Hole (Bell Telephone)
CB	=	Catch Basin
CBI	=	Catch Basin Inlet
MH	=	Maintenance Hole (Unidentified)
x 85.00	=	Location of Elevations
+ 85.00*	=	Top of Concrete Curb Elevation
x 85.00*	=	Top of Wall Elevation
T/G	=	Top of Grate
C/L	=	Centreline
	=	Property Line
CRW	=	Concrete Retaining Wall

BOUNDARY INFORMATION COMPILED FROM PLAN 4R-28560.

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.

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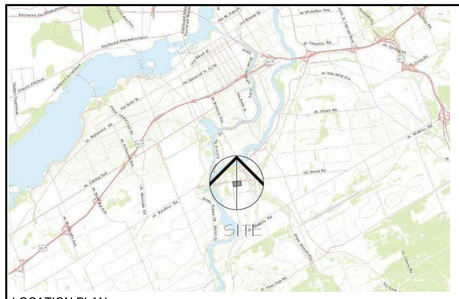
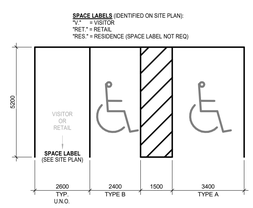
Ontario Land Surveyors

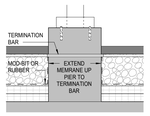
Job No. 22009-2r 770 Brookfield PH1 BSC 2787 As-Built F



LOCATION PLAN

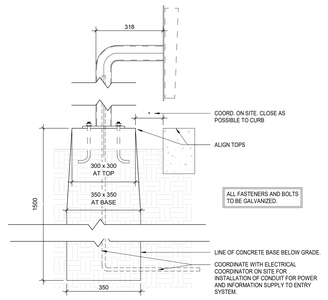
SPACE LABELS (IDENTIFIED ON SITE PLAN):
"V" = VISITOR
"RET" = RETAIL
"RES" = RESIDENCE (SPACE LABEL NOT REQ)





D7 / A1.00 TYP TRELLIS PIER
SCALE: 1 : 20

D6 / A1.00 PARKING LEGEND
SCALE: 1 : 100



D5 / A1.00 SECTION - GARAGE DOOR ENTRY SYSTEM
SCALE: 1 : 10

UNIT COUNT

BUILDING LEVEL	BLOCK A	BLOCK B	BLOCK C	BLOCK D	TOTAL
1	12	23	12	23	70
2	36	23	36	23	122
3	34	23	34	23	114
4	34	23	34	23	114
5	34	23	34	23	114
6	34	23	34	23	114
7	34	0	34	0	68
8	34	0	34	0	68
9	34	0	34	0	68
GRAND TOTAL	286	138	286	138	852

BEDROOM COUNT

BUILDING LEVEL	BLOCK A	BLOCK B	BLOCK C	BLOCK D	TOTAL
1	22	35	22	35	114
2	57	38	57	38	190
3	57	40	57	40	194
4	57	38	57	38	190
5	57	38	57	38	190
6	57	38	57	38	190
7	57	0	57	0	114
8	57	0	57	0	114
9	57	0	57	0	114
GRAND TOTAL	478	227	478	227	1,410

PHASE 1 Area : Gross Building (M2) - Area taken to outside of exterior wall.

Basement:	8350.7	5386.2 (A+B+E) + 664.5 (F)
L1:	4918.8	2063.8 (A) + 1585.2 (B) + 628.7 (E) + 641.1 (F)
L2:	5190.5	2244.2 (A) + 1585.2 (B) + 628.7 (E) + 636.2 (F) 96.2 (Links)
L3:	3829.4	2244.2 (C) + 1585.2 (D)
L4:	3730.8	2244.2 (C) + 1486.6 (D)
L5:	3730.8	2244.2 (C) + 1486.6 (D)
L6:	3730.8	2244.2 (C) + 1486.6 (D)
L7:	2450.7	2244.2 (A) + 206.5 (B)
L8:	2244.2	(A)
L9:	2244.2	(A)
L10:	290.9	(A)
Total:	38,411.8 m2	

PHASE 2 - Area : Gross Building (M2) - Area taken to outside of exterior wall.

Basement:	6,258.8	6,258.8 (C+D)
L1:	3,649	2063.8 (C) + 1585.2 (D)
L2:	3,852.7	2244.2 (C) + 1585.2 (D) + 23.3 (Links)
L3:	3,829.4	2244.2 (C) + 1585.2 (D)
L4:	3,730.8	2244.2 (C) + 1486.6 (D)
L5:	3,730.8	2244.2 (C) + 1486.6 (D)
L6:	3,730.8	2244.2 (C) + 1486.6 (D)
L7:	2,450.7	2244.2 (C) + 206.5 (D)
L8:	2,244.2	2244.2 (A)
L9:	2,244.2	2244.2 (A)
L10:	290.9	290.9 (A)
Total:	36,012.3 m2	

RETAIL AREAS

BLOCK A (PH1) 578.7m2
BLOCK C (PH2) 578.7 m2
BLOCK E (PH1) 626.2 m2
BLOCK F (PH1) 626.2 m2

TOTAL: 2,409.8 m2

SURVEY INFORMATION TAKE FROM:

TOPOGRAPHICAL PLAN OF BLOCKS B AND C
AND PART OF HOBSON ROAD (AS CLOSED)
REGISTERED PLAN 787 AND PART OF LOTS 42 AND 43
REGISTERED PLAN 66
CITY OF OTTAWA

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.

SITE SUMMARY

PROPERTY ADDRESS:	716/770 BROOKFIELD ROAD
ZONING:	GM [155] F(1.5) S147, 148
SITE AREA (ZONING SCH. 147)	24,655 m2
SITE AREA (SURVEY)	24,655 m2
PROPOSED USE:	MIXED USE / RESIDENTIAL APARTMENT BUILDING AND RETAIL
BUILDING FOOTPRINT: (ABOVE GRADE)	BLOCK A (PH1) = 2,063.5 m2 BLOCK B (PH1) = 1,585.2 m2 BLOCK E (PH1) = 628.7 m2 BLOCK F (PH1) = 641.1 m2 BLOCK C (PH2) = 2,063.5 m2 BLOCK D (PH2) = 1,585.2 m2 TOTAL: = 8,567.2 m2 (3,648.7 m2 (PH2))

ZONING SUMMARY:

	REQUIRED	PROVIDED
RESIDENTIAL UNITS PHASE 1		426 UNITS
RESIDENTIAL UNITS PHASE 2		426 UNITS
TOTAL RESIDENTIAL UNITS PHASE 1+2		852 UNITS
FSI PHASE 1	1.5	0.89
FSI PHASE 2	1.8	1.73

GFA (FOR FSI CALCULATION)

PHASE 1

BLOCK A

LEVEL 1 =	662 m2
LEVEL 1 RETAIL =	539 m2
LEVEL 2 =	1,647 m2
LEVELS 3-9 =	1,666 m2 / FLOOR
TOTAL =	**14,523 m2**

BLOCK B

LEVEL 1 =	997.31 m2
LEVEL 2 =	1,030.68 m2
LEVEL 3 =	1,105.08 m2
LEVEL 4-6 =	1,031.26m2 / FLOOR
TOTAL =	**6,226.86 m2**

BLOCK E1 - RETAIL	**635 m2**
BLOCK E2 - RETAIL	**635 m2**
TOTAL PHASE 1 GFA =	**21,914.38m2**

PHASE 2

BLOCK C

LEVEL 1 =	1165m2
LEVEL 2 =	1,647m2
LEVELS 3-9 =	1,666m2 / FLOOR
TOTAL =	**14,488m2**

BLOCK D

LEVEL 1 =	997.31m2
LEVEL 2 =	1,030.68m2
LEVEL 3 =	1,105.08m2
LEVEL 4-6 =	1,031.26m2 / FLOOR
TOTAL =	**6,226.86m2**

TOTAL PHASE 2 GFA =	**20,714.86m2**
TOTAL GFA PHASE 1 + 2	**42,629.24m2**
TOTAL FSI PHASE 1+2	**1.73**
BUILDING HEIGHT:	27m MAX. 27m

YARDS:

FRONT YARD: BROOKFIELD ROAD	3m MIN.	3m
REAR YARD	7.5m MIN.	20m
INTERIOR SIDE YARD:	3m MIN.	88.3m WEST 12.2m EAST

VEHICULAR PARKING:

	REQUIRED	PROVIDED
RESIDENTIAL PARKING PHASE 1 + 2 TOTALS	(REQD FOR AREA X, ZONING BY-LAW 2019-256)	
RESIDENTIAL PARKING TOTAL UNITS MINUS FIRST 12 UNITS/BUILDING (426+426) - 24 = 828 UNITS (MIN. 0.5/UNIT)	414 SPACES	427 SPACES
VISITORS PARKING (MIN. 0.1/UNIT)	60 SPACES	60 SPACES
RETAIL PARKING		
RETAIL USES < 200m² = 0 SPACES RETAIL USES > 200m² = 1.25/100m²		
RETAIL GFA:		
BLOCK A — 3 TENANTS @ 180m²=541m²	0	4
BLOCK E1 — 4 TENANTS @ 158m²=635m²	0	6
BLOCK E2 — 4 TENANTS @ 158m²=635m²	0	6
BLOCK C PH 2 — 3 TENANTS @ 180m²=541m²	0	0
TOTAL RETAIL — 2,334m²	0	16 SPACES
TOTAL PARKING	**474 SPACES**	**503 SPACES**

PARKING DISTRIBUTION

PHASE 1+2 TOTAL PARKING DISTRIBUTION

UNDERGROUND PARKING LEVELS	
P1 LEVEL PHASE 1	133
P1 LEVEL PHASE 2	199
SURFACE PARKING PHASE 1+2 (*Total % of surface parking 33.6% | (95 Res+80 Vis+16 Ret)	171
TOTAL PARKING PHASE 1+2	503

BICYCLE PARKING

	REQUIRED	PROVIDED
BICYCLE PARKING PHASE 1+2	MIN. 0.5/UNIT	
852 UNITS	426 SPACES	429 SPACES
RETAIL	(1 / 250 m2) 9 SPACES	16 SPACES
TOTAL	**435 SPACES**	**445 SPACES**

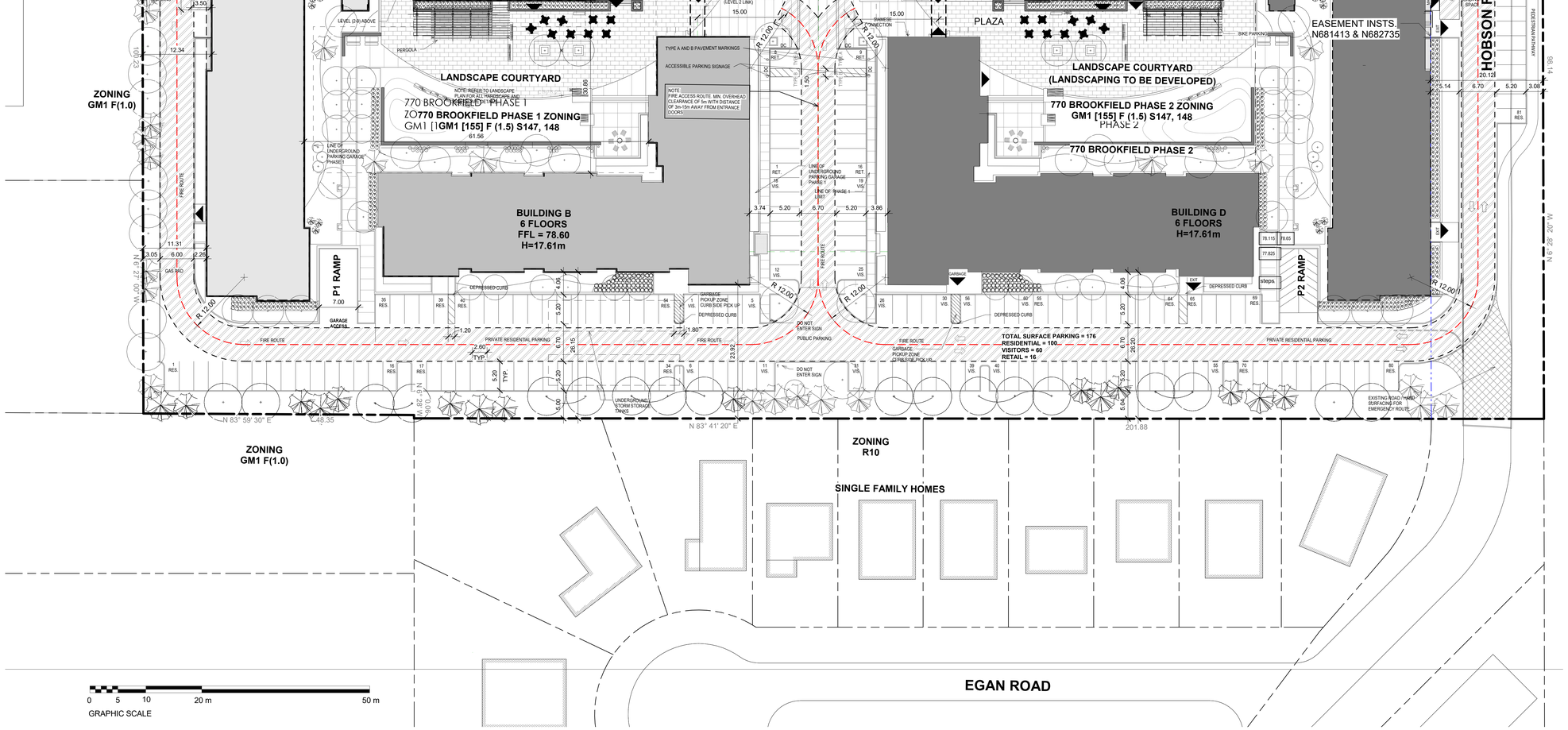
AMENITY

	REQUIRED	PROVIDED
BLOCK A 287 UNITS	1,722 m2 (MIN. 6 m2/UNIT)	855 m2
BLOCK B 139 UNITS	834 m2 MIN. 6 m2/UNIT	346 m2 124 m2 (EXT. ROOF TERRACE)
BLOCK E	0 m2 (N/A)	635 m2
BLOCK F	0 m2 (N/A)	635 m2
PH1 LANDSCAPE COURT YARD		1867 m2
BLOCK C	1,722 m2 MIN. 6 M2/UNIT	855 m2
BLOCK D	834 m2 MIN. 6 M2/UNIT	346 m2 124 m2 (EXT. ROOF TERRACE)
PH 2 LANDSCAPE COURT YARD		1867 m2
TOTAL	**5,112 m2**	**7,823 m2**

NOTE: ALL PARKING SPACES 2600x5200 UNLESS OTHERWISE NOTED.

CANADA POST
ZONING
MC8 [399] h1, h2, h3 F(2.0) S135
ZONING
MC8 [399] h1, h2, h3 F(2.0) S135

BROOKFIELD ROAD



0 5 10 20 m 50 m
GRAPHIC SCALE

1 / A1.00 00-Site
SCALE: 1 : 300

2022-06-01 11:46:54 AM

LEGEND:

- PROPERTY LINE
- EASEMENT
- BUILDING FOOTPRINT
- BUILDING PROJECTION
- BASEMENT VENT SHAFT
- BARRIER FREE PARKING
- SNOW STORAGE ZONE
- FIRE ROUTE
- DC — DEPRESSED CURB
- # v — VISITOR PARKING SPOT
- MAIN ENTRANCE
- SECONDARY ENTRANCE
- EXIT

OWNER
ATLANTIS INVESTMENTS INC.

PROJECT MANAGER
TURNER & TOWNSEND
170 LAURIER AVE. WEST, Suite 604,
Ottawa, ON
K1P 5V5

GREG STALLARD
TEL (613) 235 4854

SURVEYOR
ANNIS O'SULLIVAN, VOLLEBEKK LTD.
14 CONCOURSE GATE, SUITE 500
OTTAWA, ONTARIO

E.H. HERWEYER
TEL (613) 727-0850

GEOTECHNICAL
PATERSON GROUP INC.

154 COLONNADE ROAD SOUTH
OTTAWA, ONTARIO K2E 7J5

SCOTT DENNIS, P.ENG
TEL (613) 226-7381 x332

TRANSPORTATION ENGINEER
PARSONS

1223 MICHAEL STREET, SUITE 100
PERTH, ONTARIO K1J 7T2

CHRISTOPHER GORDEN
TEL (613) 736-4160

LANDSCAPE ARCHITECT
CSW LTD.
SUITE 200, 1960 SCOTT STREET
OTTAWA, ONTARIO K1Z 8L8

SHERI EDWARDS
TEL (613) 729-4536 X 228

SITE SERVICING ENGINEER
MCINTOSH PERRY

115 WALGREEN ROAD
R.R 3 CARP, ONTARIO K0A 1L0

ALISON GOSLING, P.ENG.
613 714 4629

NO.	DATE	REVISION

Hobin Architecture Incorporated
63 Parmilla Street
Ottawa, Ontario
Canada K1S 3K7

T: 613-238-7200
F: 613-235-2005
E: mail@hobinarc.com

hobinarc.com

HOBIN ARCHITECTURE

PROJECT:
770 BROOKFIELD PHASE 2
770 BROOKFIELD, OTTAWA, ON.

DRAWING TITLE:
SITE PLAN

DRAWN:	DATE:	SCALE:
S.H.	06/10/21	As indicated

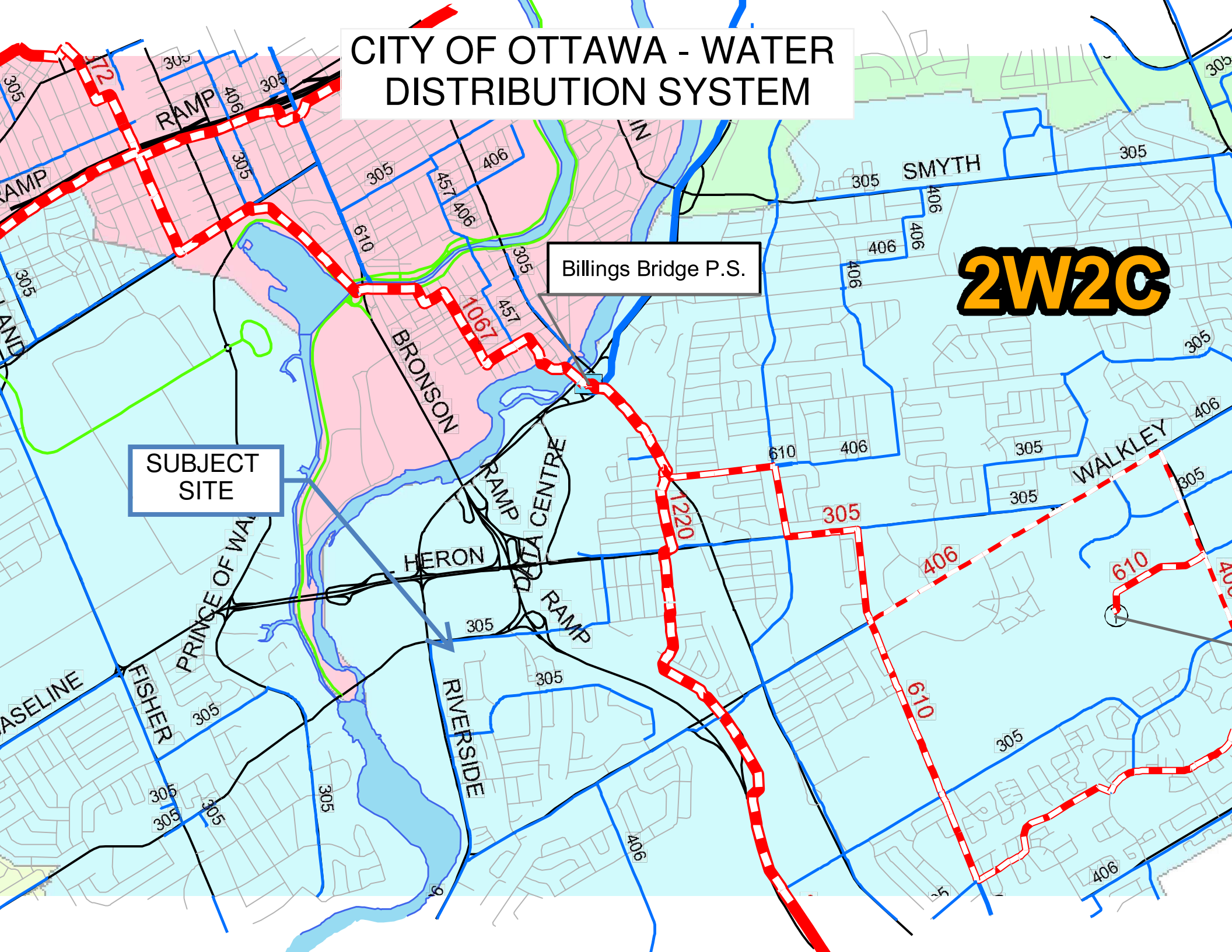
PROJECT #: 1741

DRAWING NO.: A1.00

REVISION NO.:

APPENDIX C
WATERMAIN CALCULATIONS

McINTOSH PERRY


CITY OF OTTAWA - WATER DISTRIBUTION SYSTEM
Billings Bridge P.S.
2W2C
SUBJECT SITE
SMYTH
BRONSON
RAMP
HERON
RIVERSIDE
WALKLEY
FISHER
1067
1220
610
406
305
457

McINTOSH PERRY

CCO-22-3501 - 770 Brookfield Phase 2 - BUILDING C & D - Water Demands

Project:	770 Brookfield Phase 2 - BUILDING C & D
Project No.:	CCO-22-3501
Designed By:	RRR
Checked By:	AJG
Date:	June 23, 2022
Site Area:	0.91 gross ha

Residential	**NUMBER OF UNITS**		**UNIT RATE**	
Single Family		homes	3.4	persons/unit
Semi-detached		homes	2.7	persons/unit
Townhouse		homes	2.7	persons/unit
Bachelor Apartment	241	units	1.4	persons/unit
1 Bedroom Apartment	39	units	1.4	persons/unit
2 Bedroom Apartment	70	units	2.1	persons/unit
3 Bedroom Apartment	29	units	3.1	persons/unit
4 Bedroom Apartment	60	units	3.4	persons/unit

Total Residential Population	**833**	**persons**
Commercial	579	m2
Industrial - Light		m2
Industrial - Heavy		m2

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	280	L/c/d
Industrial - Light	35,000	L/gross ha/d
Industrial - Heavy	55,000	L/gross ha/d
Shopping Centres	2,500	L/(1000m² /d
Hospital	900	L/(bed/day)
Schools	70	L/(Student/d)
Trailer Park with no Hook-Ups	340	L/(space/d)
Trailer Park with Hook-Ups	800	L/(space/d)
Campgrounds	225	L/(campsite/d)
Mobile Home Parks	1,000	L/(Space/d)
Motels	150	L/(bed-space/d)
Hotels	225	L/(bed-space/d)
Tourist Commercial	28,000	L/gross ha/d
Other Commercial	28,000	L/gross ha/d

AVERAGE DAILY DEMAND	**Residential**	**2.70**	**L/s**
	Commerical/Industrial/ Institutional	**0.02**	**L/s**

115 Walgreen Road, R.R.3. Carp, ON K0A 1L0 | T. 613-836-2184 | F. 613-836-3742
info@mcintoshperry.com | www.mcintoshperry.com

MAXIMUM DAILY DEMAND

DEMAND TYPE	AMOUNT		UNITS
Residential	2.2	x avg. day	L/c/d
Industrial	1.5	x avg. day	L/gross ha/d
Commercial	1.5	x avg. day	L/gross ha/d
Institutional	1.5	x avg. day	L/gross ha/d
MAXIMUM DAILY DEMAND	**Residential**	**5.94**	**L/s**
	Commerical/Industrial/ Institutional	**0.03**	**L/s**

MAXIMUM HOUR DEMAND

DEMAND TYPE	AMOUNT		UNITS
Residential	5.5	x avg. day	L/c/d
Industrial	1.8	x max. day	L/gross ha/d
Commercial	1.8	x max. day	L/gross ha/d
Institutional	1.8	x max. day	L/gross ha/d
MAXIMUM HOUR DEMAND	**Residential**	**14.85**	**L/s**
	Commerical/Industrial/ Institutional	**0.05**	**L/s**

WATER DEMAND DESIGN FLOWS PER UNIT COUNT
CITY OF OTTAWA - WATER DISTRIBUTION GUIDELINES, JULY 2010

AVERAGE DAILY DEMAND	2.72	L/s
MAXIMUM DAILY DEMAND	5.97	L/s
MAXIMUM HOUR DEMAND	14.90	L/s

McINTOSH PERRY

CCO-22-3501 - 770 Brookfield Phase 2-Building C & F - Fire Underwriters Survey

Project:	770 Brookfield Phase 2-Building C & F
Project No.:	CCO-22-3501
Designed By:	RRR
Checked By:	AJG
Date:	June 23, 2022

From the Fire Underwriters Survey (2020)

From Part II – Guide for Determination of Required Fire Flow Copyright I.S.O.:
City of Ottawa Technical Bulletin ISTB-2018-02 Applied Where Applicable

A. BASE REQUIREMENT (Rounded to the nearest 1000 L/min)

F = 220 x C x √A Where:

F = Required fire flow in liters per minute
C = Coefficient related to the type of construction.
A = The total floor area in square meters (including all storey's, but excluding basements at least 50 percent below grade) in the building being considered.

Construction Type Non-Combustible Construction

C	0.8	**A**	**21,294.7**	**m^2**
	Total Floor Area (per the 2020 FUS Page 20 - Total Effective Area)		**15,443.7**	**m^2** **Unprotected Vertical Openings*

Calculated Fire Flow	**21,872.0 L/min**
	22,000.0 L/min

B. REDUCTION FOR OCCUPANCY TYPE (No Rounding)

From Page 24 of the Fire Underwriters Survey:

Limited Combustible	-15%

Fire Flow	**18,700.0 L/min**

C. REDUCTION FOR SPRINKLER TYPE (No Rounding)

Fully Supervised Sprinklered	-50%

Reduction	**-9,350.0 L/min**

D. INCREASE FOR EXPOSURE (No Rounding)

	Separation Distance (m)	Cons.of Exposed Wall	Length Exposed Adjacent Wall (m)	Height (Stories)	Length-Height Factor	
Exposure 1	Over 30 m	Ordinary - Mass Timber (Unprotected)	100	2	200.0	0%
Exposure 2	Over 30 m	Ordinary - Mass Timber (Unprotected)	126	2	252.0	0%
Exposure 3	10.1 to 20	Fire Resistive - Non Combustible (Unprotected Openings)	66	6	396.0	8%
Exposure 4	10.1 to 20	Fire Resistive - Non Combustible (Unprotected Openings)	18	6	108.0	8%
					% Increase*	**16%**

Increase*	**2,992.0 L/min**

E. Total Fire Flow (Rounded to the Nearest 1000 L/min)

Fire Flow	**12,342.0 L/min**
Fire Flow Required**	**12,000.0 L/min**

*In accordance with Part II, Section 4, the Increase for separation distance is not to exceed 75%
**In accordance with Section 4 the Fire flow is not to exceed 45,000 L/min or be less than 2,000 L/min

McINTOSH PERRY

CCO-22-3501 - 770 Brookfield Phase 2-Building D - Fire Underwriters Survey

Project:	770 Brookfield Phase 2-Building D
Project No.:	CCO-22-3501
Designed By:	RRR
Checked By:	AJG
Date:	June 23, 2022

From the Fire Underwriters Survey (2020)

From Part II – Guide for Determination of Required Fire Flow Copyright I.S.O.:
City of Ottawa Technical Bulletin ISTB-2018-02 Applied Where Applicable

A. BASE REQUIREMENT (Rounded to the nearest 1000 L/min)

F = 220 x C x √A Where:

F = Required fire flow in liters per minute
C = Coefficient related to the type of construction.
A = The total floor area in square meters (including all storey's, but excluding basements at least 50 percent below grade) in the building being considered.

Construction Type Non-Combustible Construction

C	0.8	**A**	**9,421.9**	**m²**
	Total Floor Area (per the 2020 FUS Page 20 - Total Effective Area)		**6,296.2**	**m²**

**Unprotected Vertical Openings*

Calculated Fire Flow	**13,965.3 L/min**
	14,000.0 L/min

B. REDUCTION FOR OCCUPANCY TYPE (No Rounding)

From Page 24 of the Fire Underwriters Survey:

Limited Combustible	-15%

Fire Flow	**11,900.0 L/min**

C. REDUCTION FOR SPRINKLER TYPE (No Rounding)

Fully Supervised Sprinklered	-50%

Reduction	**-5,950.0 L/min**

D. INCREASE FOR EXPOSURE (No Rounding)

	Separation Distance (m)	Cons.of Exposed Wall	Length Exposed Adjacent Wall (m)	Height (Stories)	Length-Height Factor	
Exposure 1	3.1 to 10	Fire Resistive - Non Combustible (Unprotected Openings)	33	2	66.0	9%
Exposure 2	10.1 to 20	Fire Resistive - Non Combustible (Unprotected Openings)	55	9	495.0	8%
Exposure 3	Over 30 m	Ordinary - Mass Timber (Unprotected)	10	2	20.0	0%
Exposure 4	10.1 to 20	Fire Resistive - Non Combustible (Unprotected Openings)	18	6	108.0	8%
					% Increase*	**25%**

Increase*	**2,975.0 L/min**

E. Total Fire Flow (Rounded to the Nearest 1000 L/min)

Fire Flow	**8,925.0 L/min**
Fire Flow Required**	**9,000.0 L/min**

*In accordance with Part II, Section 4, the Increase for separation distance is not to exceed 75%
**In accordance with Section 4 the Fire flow is not to exceed 45,000 L/min or be less than 2,000 L/min

McINTOSH PERRY

CCO-22-3501 - 770 Brookfield Phase 2 - Boundary Condition Unit Conversion

Project:	770 Brookfield Phase 2
Project No.:	CCO-22-3501
Designed By:	RRR
Checked By:	AJG
Date:	June 23, 2022

Boundary Conditions Unit Conversion

BROOKFIELD ROAD & HOBSON ROAD

Scenario	Height (m)	Elevation (m)	m H_2O	PSI	kPa
Avg. DD	130.0	75.5	54.5	77.5	534.4
Fire Flow - Brookfield (200 L/s or 12,000 L/min)	120.5	75.5	45.0	64.0	441.3
Fire Flow - Hobson (200 L/s or 12,000 L/min)	118.5	75.5	43.0	61.2	421.6
Peak Hour	123.8	75.5	48.3	68.7	473.6

Alison Gosling

From: Sharif, Golam <sharif.sharif@ottawa.ca>
Sent: June 23, 2022 12:25 PM
To: Ryan Robineau
Cc: Alison Gosling
Subject: RE: 770 Brookfield Road Boundary Condition Request
Attachments: 770 Brookfield Road June 2022.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Ryan,

Please see the requested BC below. I believe they had to put two connections to work the model. However, attached is the information.

The following are boundary conditions, HGL, for hydraulic analysis at 770 Brookfield Road (zone 2W2C) assumed to connected to the 203 mm on Brookfield Road and the 203 mm on Hobson Road (see attached PDF for location).

Both Connections:

Minimum HGL: 123.8 m

Maximum HGL: 130.0 m

Max Day + Fire Flow (200 L/s): 120.5 m (Connection 1)

Max Day + Fire Flow (200 L/s): 118.5 m (Connection 2)

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

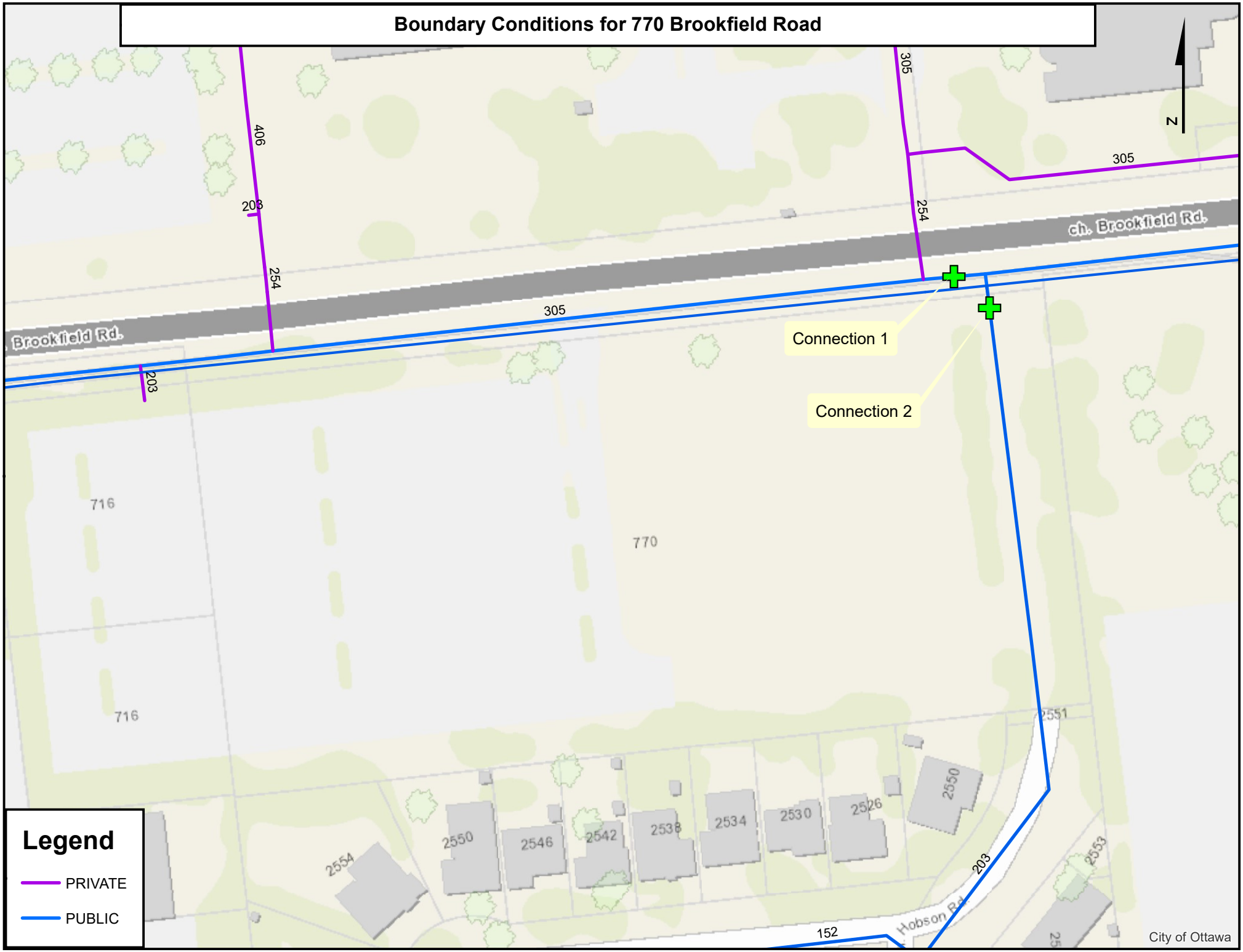
Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation 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.

Thanks,

Sharif

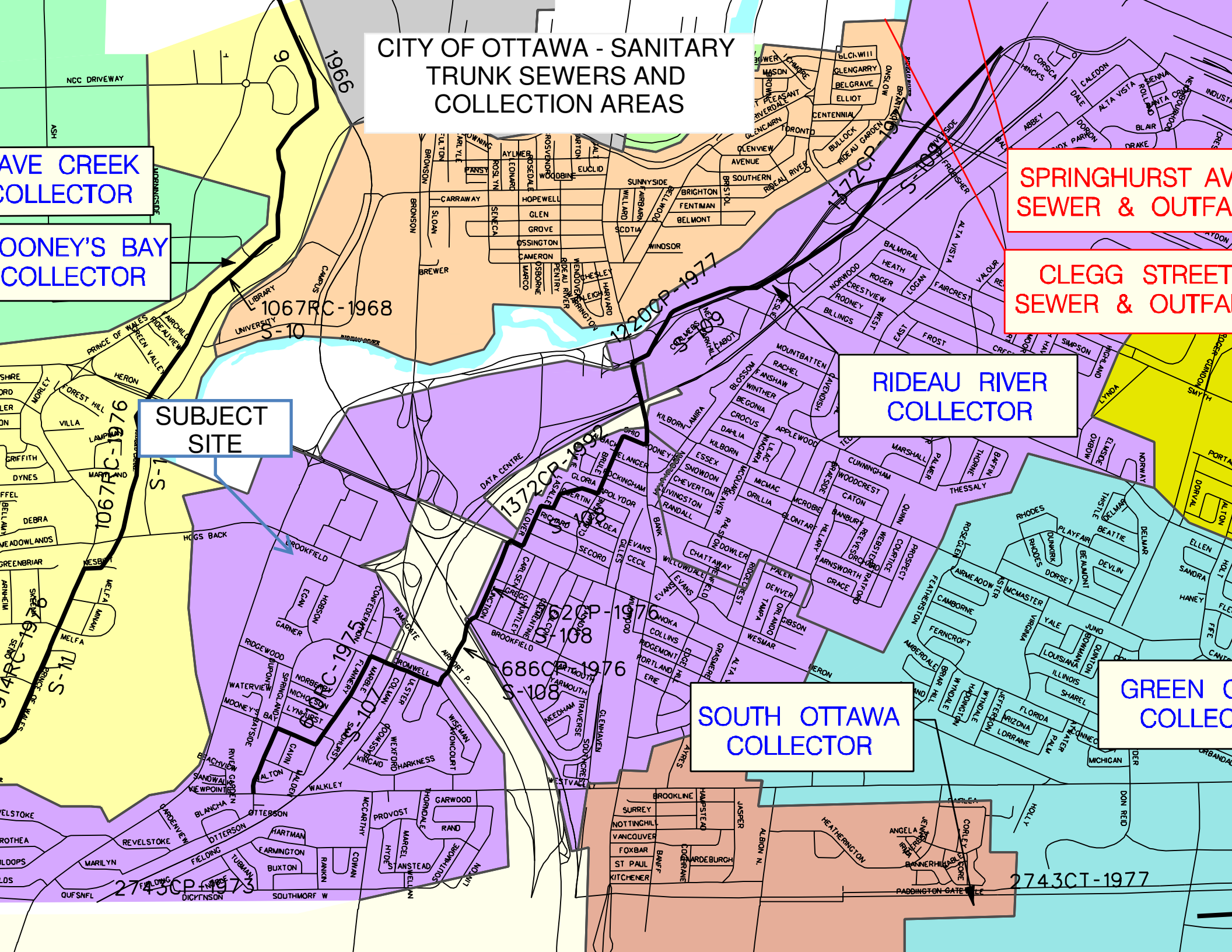
From: Ryan Robineau <r.robineau@mcintoshperry.com>
Sent: June 22, 2022 2:35 PM
To: Sharif, Golam <sharif.sharif@ottawa.ca>

Boundary Conditions for 770 Brookfield Road



APPENDIX D
SANITARY CALCULATIONS

McINTOSH PERRY


CITY OF OTTAWA - SANITARY TRUNK SEWERS AND COLLECTION AREAS
AVE CREEK COLLECTOR
OONEY'S BAY COLLECTOR
SUBJECT SITE
RIDEAU RIVER COLLECTOR
SOUTH OTTAWA COLLECTOR
SPRINGHURST AV SEWER & OUTFA
CLEGG STREET SEWER & OUTFA
GREEN C COLLEC
1067RC-1968
S-10
1067RC-1976
S-11
914RC-1976
1372CP-1977
S-109
1220CP-1977
1372CP-1992
S-108
620CP-1976
S-108
686CT-1976
S-108
1372RC-1975
S-107
2743CP-1973
2743CT-1977
1966
S-9

McINTOSH PERRY

CCO-22-3501 - 770 Brookfield Phase 2 - Block C & D - Sanitary Demands

Project:	770 Brookfield Phase 2 - Block C & D
Project No.:	CCO-22-3501
Designed By:	RRR
Checked By:	AJG
Date:	June 23, 2022

Site Area	0.91	Gross ha	
Bachelor	241	1.40	Persons per unit
1 Bedroom	39	1.40	Persons per unit
2 Bedroom	70	2.10	Persons per unit
3 Bedroom	29	3.10	Persons per unit
4 Bedroom	60	3.40	Persons per unit

Total Population	833	Persons
Commercial Area	579.00	m^2
Amenity Space	1325.00	m^2

DESIGN PARAMETERS

Institutional/Commercial Peaking Facto	1	
Residential Peaking Factor	3.28	** Using Harmon Formula =* 1+(14/(4+P^0.5))*0.8
		where P = population in thousands, Harmon's Correction Factor = 0.8
Mannings coefficient (n)	0.013	
Demand (per capita)	280	L/day
Infiltration allowance	0.33	L/s/Ha

EXTRANEOUS FLOW ALLOWANCES

Infiltration / Inflow	Flow (L/s)
Dry	0.05
Wet	0.25
Total	**0.30**

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS	POPULATION / AREA	Flow (L/s)
Residential	280	L/c/d	833	2.70
Industrial - Light**	35,000	L/gross ha/d		0
Industrial - Heavy**	55,000	L/gross ha/d		0
Commercial / Amenity	2,800	L/(1000m^2 /d)	1904.00	0.06
Hospital	900	L/(bed/day)		0
Schools	70	L/(Student/d)		0
Trailer Parks no Hook-Ups	340	L/(space/d)		0
Trailer Park with Hook-Ups	800	L/(space/d)		0
Campgrounds	225	L/(campsite/d)		0
Mobile Home Parks	1,000	L/(Space/d)		0
Motels	150	L/(bed-space/d)		0
Hotels	225	L/(bed-space/d)		0
Office	75	L/7.0m^2/d		0
Tourist Commercial	28,000	L/gross ha/d		0
Other Commercial	28,000	L/gross ha/d		0

AVERAGE RESIDENTIAL FLOW	2.70	L/s
PEAK RESIDENTIAL FLOW	8.85	L/s
AVERAGE ICI FLOW	0.06	L/s
PEAK INSTITUTIONAL/COMMERCIAL FLOW	0.06	L/s
PEAK INDUSTRIAL FLOW	0.00	L/s
TOTAL PEAK ICI FLOW	0.06	L/s

TOTAL SANITARY DEMAND

TOTAL ESTIMATED AVERAGE DRY WEATHER FLOW	2.81	L/s
TOTAL ESTIMATED PEAK DRY WEATHER FLOW	8.96	L/s
TOTAL ESTIMATED PEAK WET WEATHER FLOW	9.22	L/s

SANITARY SEWER DESIGN SHEET

PROJECT: CCO-22-3501
LOCATION: 770 Brookfield Road - Phase 2
CLIENT: Hobin Architecture

McINTOSH PERRY

LOCATION				RESIDENTIAL									ICI AREAS							INFILTRATION ALLOWANCE			FLOW	SEWER DATA						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
STREET	AREA ID	FROM MH	TO MH	UNIT TYPES BAC/1-BED	2-BED	3-BED	4-BED	AREA (ha)	POPULATION IND	CUM	PEAK FACTOR	PEAK FLOW (L/s)	AREA (ha) INSTITUTIONAL IND	CUM	COMMERCIAL IND	CUM	INDUSTRIAL IND	CUM	PEAK FLOW (L/s)	AREA (ha) IND	CUM	FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY L/s	(%)
		BLDG	EX. Sewer	280	70	29	60	0.91	833.0	833.0	3.28	8.85		0.00	0.19	0.19		0.00	0.06	1.10	1.10	0.36	9.28	34.22	8.93	200	1.00	1.055	24.94	72.88

Design Parameters:

Residential			ICI Areas			
BAC/1-BED	1.4	p/p/u				Peak Factor
2-BED	2.1	p/p/u	INST	28,000	L/Ha/day	1
3-BED	3.1	p/p/u	COM	28,000	L/Ha/day	1
4-BED	3.4	p/p/u	IND	35,000	L/Ha/day	MOE Chart

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+P^0.5)*0.8)
where P = population in thousands

Designed: RRR

Checked: AJG

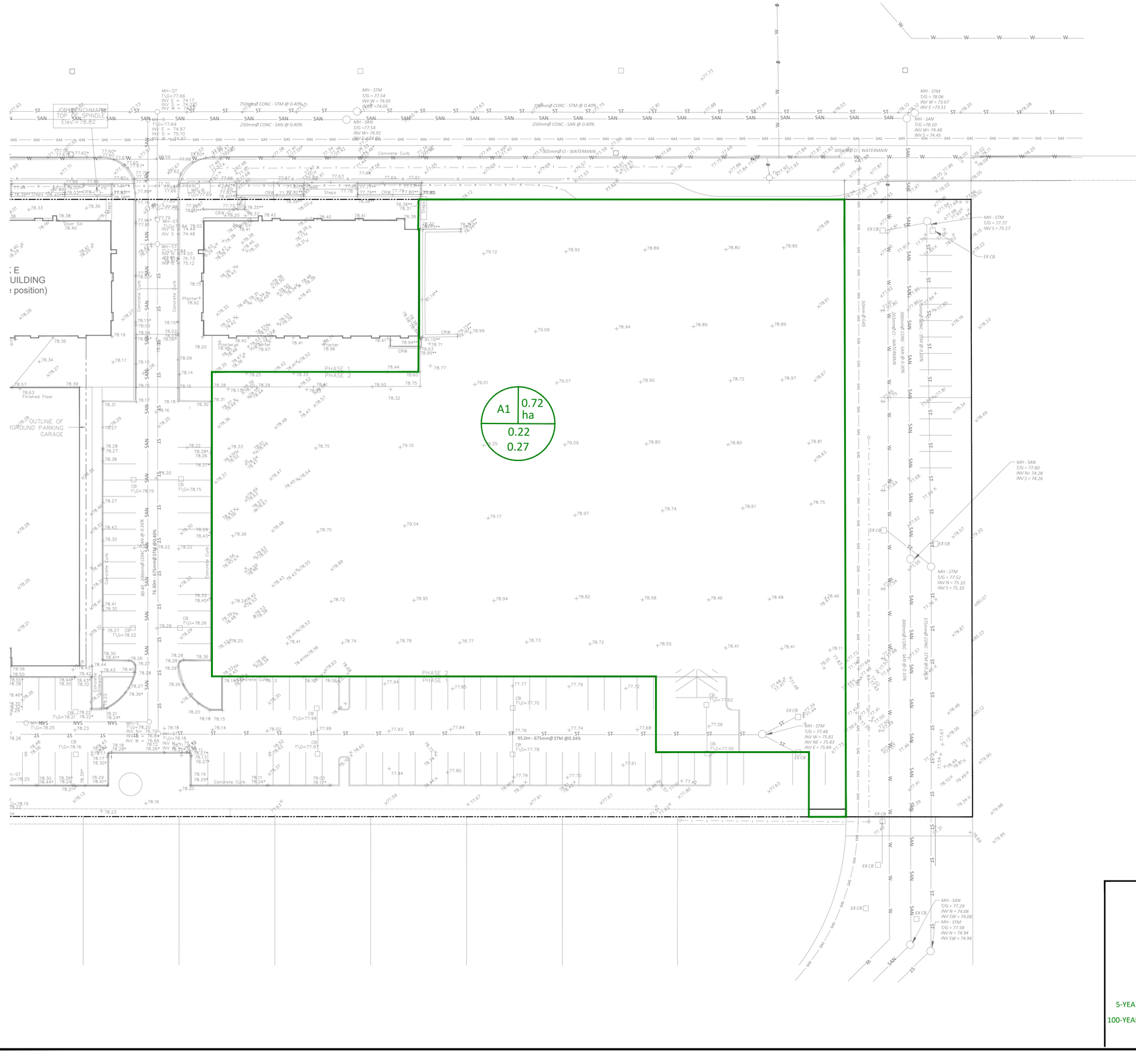
Project No.: CCO-22-3501

No.	Revision	Date
1.	ISSUED FOR REVIEW	2022-06-24

Sheet No:
1 of 1

APPENDIX E
PRE-DEVELOPMENT DRAINAGE PLAN

McINTOSH PERRY



GENERAL NOTES

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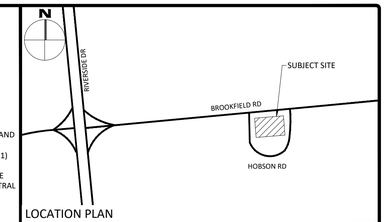

LOCATION PLAN

LEGEND

BARRIER CURB & CURB DEPRESSION (DC)		CENTRELINE OF SWALE	
PROPOSED ASPHALT		CENTRELINE OF DITCH	
PROPOSED CONCRETE WALKWAY		SLOPING AT 3:1 UNLESS SPECIFIED	
MH# STORM MANHOLE		PROPOSED ELEVATION EXISTING ELEVATION	95.94 (93.20)
CB / DCB / DI CATCHBASIN, CURB INLET OR DITCH INLET		SWALE ELEVATION	95.94 (S)
		TOP/BOTTOM WALL FACE ELEVATIONS	T/W 100.50 B/W 99.50
MH# SANITARY MANHOLE		EMERGENCY OVERLAND FLOW ROUTE	
PERFORATED PIPE		SILT FENCE BARRIER PER OPSD 219.110	
WATER VAVLE/CHAMBER		BUILDING ENTRANCE OVERHEAD DOOR	
FIRE HYDRANT		REDUCER	
PROPOSED WALL			
SEDIMENT CONTROL DEVICE PER DETAIL			
ROADCUT AND REINSTATEMENT PER CITY R10			

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NOT FOR CONSTRUCTION

No.	Revisions	Date
1	ISSUED FOR REVIEW	JUNE 24, 2022

Check and verify all dimensions before proceeding with the work — Do not scale drawings

SCALE 1 : 300
0 5 10 15 20 25 30 Metres

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Stamp: LICENSED PROFESSIONAL ENGINEER — A. J. GOSLING — 100226726 — PROVINCE OF ONTARIO

Client:
HOBIN ARCHITECTURE IN
63 PAMILLA STREET
OTTAWA, ON K1S 3K7

Project:
PHASE 2
770 BROOKFIELD ROAD
OTTAWA ON

Drawing Title:
PRE-DEVELOPMENT DRAINAGE PLAN

Scale: 1:300	Project Number: CCO-22-3501
Drawn By: R.R.R.	
Checked By: A.J.G.	Drawing Number: PRE
Designed By: A.J.G.	

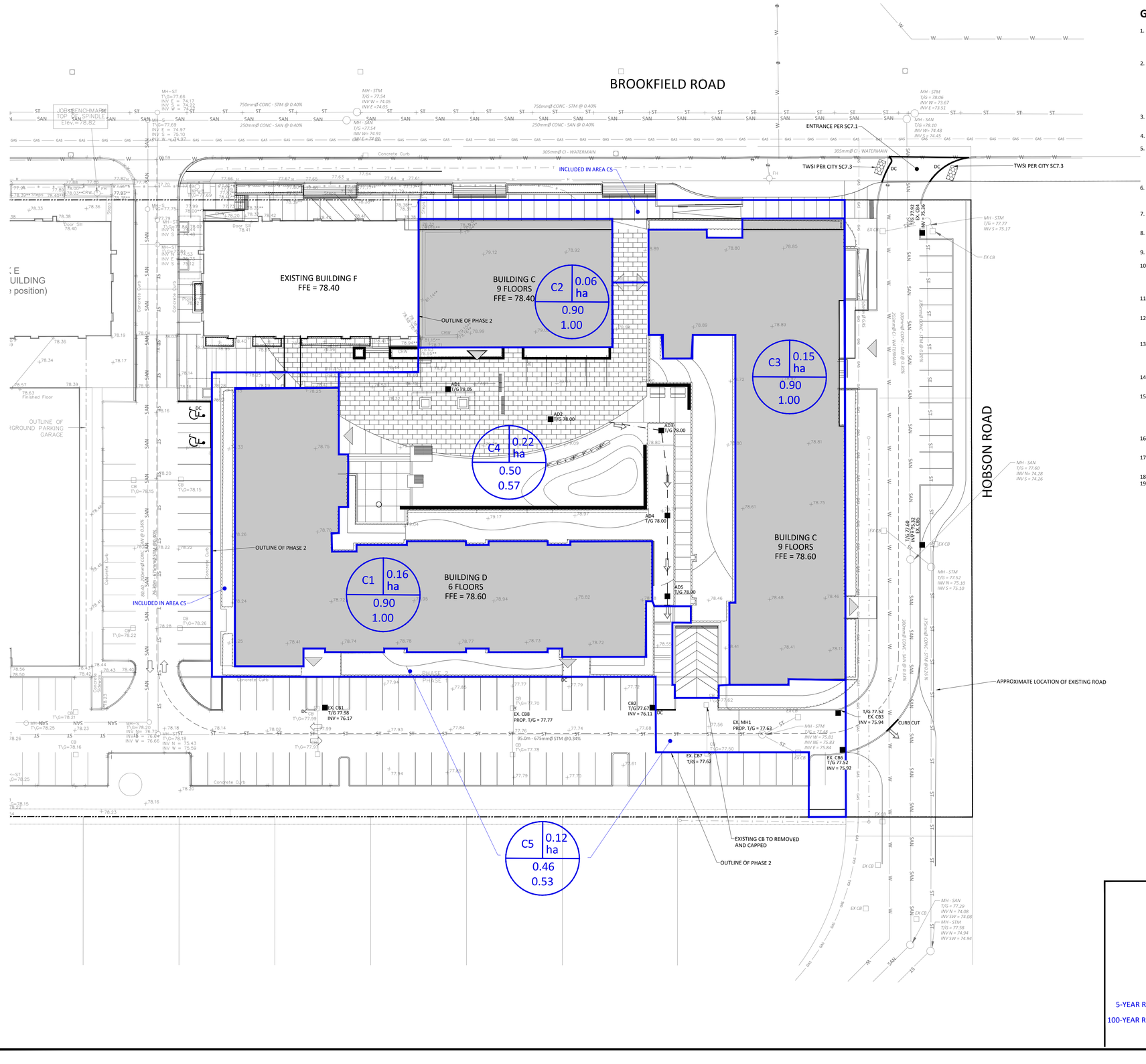
DRAINAGE AREA B3 — AREA 0.07 ha
5-YEAR RUNOFF COEFFICIENT 0.79
100-YEAR RUNOFF COEFFICIENT 0.88

D07-12-XX-XXXX
#XXXXX

FILENAME: I:\Ottawa\90 Project - Proposals\2022 Jobs\CCO\CCO-22-3501 Hobin - 770 Brookfield\12 - Drawings\CCO-22-3501 - PRESENTATION.dwg
LAST SAVED: Friday, June 24, 2022 LAST SAVED BY: r.robineau
LAST PLOTTED: Friday, June 24, 2022 7:56:16 AM EDT

APPENDIX F
POST-DEVELOPMENT DRAINAGE PLAN

McINTOSH PERRY



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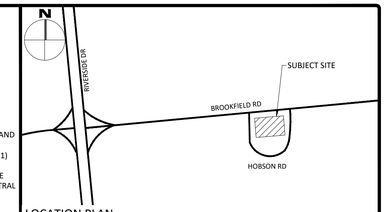

LOCATION PLAN

LEGEND

- BARRIER CURB & CURB DEPRESSION
- PROPOSED ASPHALT
- PROPOSED CONCRETE WALKWAY
- STORM MANHOLE
- CATCHBASIN, CURB INLET OR DITCH INLET
- SANITARY MANHOLE
- PERFORATED PIPE
- WATER VAVLE/CHAMBER
- FIRE HYDRANT
- PROPOSED WALL
- SEDIMENT CONTROL DEVICE PER DETAIL
- ROADCUT AND REINSTATEMENT PER CITY R10
- CENTRELINE OF SWALE
- CENTRELINE OF DITCH
- SLOPING AT 3:1 UNLESS SPECIFIED
- PROPOSED ELEVATION EXISTING ELEVATION
- SWALE ELEVATION
- TOP/BOTTOM WALL FACE ELEVATIONS
- EMERGENCY OVERLAND FLOW ROUTE
- SILT FENCE BARRIER PER OPSD 219.110
- BUILDING ENTRANCE OVERHEAD DOOR
- REDUCER

FOR REVIEW ONLY
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No.	Revisions	Date
1	ISSUED FOR REVIEW	JUNE 24, 2022

Check and verify all dimensions before proceeding with the work — Do not scale drawings

SCALE 1 : 500
0 10 20 30 40 50 Metres

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
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Stamp: LICENSED PROFESSIONAL ENGINEER — A. J. GOSLING — 100226726 — 2022-06-24 — PROVINCE OF ONTARIO

Client:
HOBIN ARCHITECTURE IN
63 PAMILLA STREET
OTTAWA, ON K1S 3K7

Project:
PHASE 2
770 BROOKFIELD ROAD
OTTAWA ON

Drawing Title:
POST-DEVELOPMENT DRAINAGE PLAN

DRAINAGE AREA — AREA
B3 — 0.07 ha
0.79 — 5-YEAR RUNOFF COEFFICIENT
0.88 — 100-YEAR RUNOFF COEFFICIENT

Scale: 1:300	Project Number: CCO-22-3501
Drawn By: R.R.R.	
Checked By: A.J.G.	Drawing Number: POST
Designed By: A.J.G.	

D07-12-XX-XXXX
#XXXXX

FILENAME: I:\Ottawa\01 Project - Proposals\2022 Jobs\CCO\CCO-22-3501 Hobin - 770 Brookfield\12 - Drawings\CCO-22-3501 - PRESENTATION.dwg
LAST SAVED: Friday, June 24, 2022 LAST SAVED BY: r.robineau
LAST PLOTTED: Friday, June 24, 2022 CTB FILE USED: —

APPENDIX G
STORMWATER MANAGEMENT CALCULATIONS

McINTOSH PERRY

CCO-22-3501 - 770 Brookfield Phase 2 - Runoff Calculations

Pre-Development Runoff Coefficient

Drainage Area	Area (ha)	Impervious Area (m^2)	C	Gravel Area (m^2)	C	Pervious Area (m^2)	C	C_{AVG} 2/5-Year	C_{AVG} 100-Year
PH2 - A1	0.718	217.36	0.90	0.00	0.60	6,958.44	0.20	0.22	0.27

Pre-Development Runoff Calculations

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	I (mm/hr)			Q (L/s)		
					2-Year	5-Year	100-Year	2-Year	5-Year	100-Year
PH2 - A1	0.718	0.22	0.27	10	76.8	104.2	178.6	33.9	45.98	97.14
Total	0.718							33.89	45.98	97.14

Post-Development Runoff Coefficient

Drainage Area	Area (ha)	Impervious Area (m^2)	C	Gravel Area (m^2)	C	Pervious Area (m^2)	C	C_{AVG} 2/5-Year	C_{AVG} 100-Year	
C1	0.159	1,587.44	0.90	0.00	0.60	0.00	0.20	0.90	1.00	Building D
C2	0.063	629.35	0.90	0.00	0.60	0.00	0.20	0.90	1.00	Building C West
C3	0.154	1,536.11	0.90	0.00	0.60	0.00	0.20	0.90	1.00	Building C East
C4	0.222	943.32	0.90	0.00	0.60	1,280.42	0.20	0.50	0.57	Controlled Cistern
C5	0.120	453.59	0.90	0.00	0.60	745.57	0.20	0.46	0.53	Uncontrolled

Post-Development Runoff Calculations

Drainage Area	Area (ha)	C 2/5-Year	C 100-Year	Tc (min)	I (mm/hr)			Q (L/s)		
					2-Year	5-Year	100-Year	2-Year	5-Year	100-Year
C1	0.159	0.90	1.00	10	76.8	104.2	178.6	30.51	41.38	78.80
C2	0.063	0.90	1.00	10	76.8	104.2	178.6	12.09	16.41	31.24
C3	0.154	0.90	1.00	10	76.8	104.2	178.6	29.52	40.04	76.25
C4	0.222	0.50	0.57	10	76.8	104.2	178.6	23.60	32.01	62.72
C5	0.120	0.46	0.53	10	76.8	104.2	178.6	11.90	16.14	31.77
Total	0.718							95.71	145.99	280.78

Required Restricted Flow

Drainage Area	Area (ha)	Q* (L/s/ha)	Q (L/s)
		2-Year	2-Year
PH2 -A1	0.718	80.6	57.86
Total	0.718		57.86

* Allowable release rate based on Functional Servicing and Stormwater Management Report and Stormwater Management Memorandum prepared by others.

Post-Development Restricted Runoff Calculations

Drainage Area	Unrestricted Flow (L/s)		Restricted Flow (L/s)		Storage Required (m^3)		Storage Provided (m^3)	
	5-Year	100-Year	5-Year	100-Year	5-Year	100-Year	5-Year	100-Year
C1	41.38	78.80	3.36	5.76	34.95	68.11	41.67	71.43
C2	16.41	31.24	1.26	2.16	14.15	27.52	16.52	28.32
C3	40.04	76.25	3.36	5.76	33.42	65.20	40.32	69.12
C4	32.01	62.72	6.33	12.41	18.57	36.07	36.07	36.07
C5	16.14	31.77	16.14	31.77				
Total	145.99	280.78	30.45	57.86	101.09	196.91	134.59	204.95

Storage Requirements for Area C1

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) C1	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
30	53.9	21.41	3.36	18.05	32.49
40	44.2	17.56	3.36	14.20	34.07
50	37.7	14.97	3.36	11.61	34.84
60	32.9	13.07	3.36	9.71	34.95
70	29.4	11.68	3.36	8.32	34.93

Maximum Storage Required 5-year =	35	m^3

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) C1	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
30	91.9	40.56	5.76	34.80	62.63
40	75.1	33.14	5.76	27.38	65.72
50	64.0	28.24	5.76	22.48	67.45
60	55.9	24.67	5.76	18.91	68.07
70	49.8	21.98	5.76	16.22	68.11
80	45.0	19.86	5.76	14.10	67.67
90	41.1	18.14	5.76	12.38	66.84
100	37.9	16.73	5.76	10.97	65.79
110	35.2	15.53	5.76	9.77	64.51
120	32.9	14.52	5.76	8.76	63.06

Maximum Storage Required 100-year =	68	m^3

5-Year Storm Event Storage Summary

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	1190.58	0.035	41.67

Storage Available (m^3) =	41.67
Storage Required (m^3) =	34.95

100-Year Storm Event Storage Summary

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	1190.58	0.060	71.43

Storage Available (m^3) =	71.43
Storage Required (m^3) =	68.11

* Area is 75% of the total roof area

Roof Drain Flow (C1)

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drians	8	
	5-Year	100-Year
Rooftop Storage (m^3)	41.67	71.43
Storage Depth (m)	0.035	0.060
Flow (Per Roof Drain) (L/s)	0.42	0.72
Total Flow (L/s)	3.36	5.76

Flow Rate Vs. Build-Up (One Weir)	
Depth (mm)	Flow (L/s)
15	0.18
20	0.24
25	0.30
30	0.36
35	0.42
40	0.48
45	0.54
50	0.60
55	0.66

* Roof Drain model to be Accutrol Weirs, See attached sheets
* Roof Drain Flow information taken from Watts Drainage website

CALCULATING ROOF FLOW EXAMPLES

1 roof drain during a 5 year storm
elevation of water = 25mm
Flow leaving 1 roof drain = (1 x 0.30 L/s) = 0.30 L/s

1 roof drain during a 100 year storm
elevation of water = 50mm
Flow leaving 1 roof drain = (1 x 0.60 L/s) = 0.60 L/s

4 roof drains during a 5 year storm
elevation of water = 25mm
Flow leaving 4 roof drains = (4 x 0.30 L/s) = 1.20 L/s

4 roof drains during a 100 year storm
elevation of water = 50mm
Flow leaving 4 roof drains = (4 x 0.60 L/s) = 2.40 L/s

Roof Drain Flow		
Flow (l/s)	Storage Depth (mm)	Drains Flow (l/s)
0.18	15	1.44
0.24	20	1.92
0.30	25	2.40
0.36	30	2.88
0.42	35	3.36
0.48	40	3.84
0.54	45	4.32
0.60	50	4.80
0.66	55	5.28
0.72	60	5.76
0.78	65	6.24
0.84	70	6.72
0.90	75	7.20
0.96	80	7.68
1.02	85	8.16
1.08	90	8.64
1.14	95	9.12
1.20	100	9.60
1.26	105	10.08
1.32	110	10.56
1.38	115	11.04
1.44	120	11.52
1.50	125	12.00
1.56	130	12.48
1.62	135	12.96
1.68	140	13.44
1.74	145	13.92
1.80	150	14.40

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

Storage Requirements for Area C2

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) C2	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
40	44.2	6.96	1.26	5.70	13.68
50	37.7	5.94	1.26	4.68	14.03
60	32.9	5.18	1.26	3.92	14.11
70	29.4	4.63	1.26	3.37	14.15
80	26.6	4.19	1.26	2.93	14.06

Maximum Storage Required 5-year =	14	m^3

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) C2	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
30	91.9	16.08	2.16	13.92	25.05
40	75.1	13.14	2.16	10.98	26.35
50	64.0	11.20	2.16	9.04	27.11
60	55.9	9.78	2.16	7.62	27.43
70	49.8	8.71	2.16	6.55	27.52
80	45.0	7.87	2.16	5.71	27.42
90	41.1	7.19	2.16	5.03	27.17
100	37.9	6.63	2.16	4.47	26.83
110	35.2	6.16	2.16	4.00	26.39
120	32.9	5.76	2.16	3.60	25.89

Maximum Storage Required 100-year =	28	m^3

5-Year Storm Event Storage Summary

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	472.01	0.035	16.52

Storage Available (m^3) =	16.52
Storage Required (m^3) =	14.15

100-Year Storm Event Storage Summary

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	472.01	0.060	28.32

Storage Available (m^3) =	28.32
Storage Required (m^3) =	27.52

* Area is 75% of the total roof area

Roof Drain Flow (C2)

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drians	3	
	5-Year	100-Year
Rooftop Storage (m^3)	16.52	28.32
Storage Depth (m)	0.035	0.060
Flow (Per Roof Drain) (L/s)	0.42	0.72
Total Flow (L/s)	1.26	2.16

Flow Rate Vs. Build-Up (One Weir)	
Depth (mm)	Flow (L/s)
15	0.18
20	0.24
25	0.30
30	0.36
35	0.42
40	0.48
45	0.54
50	0.60
55	0.66

* Roof Drain model to be Accutrol Weirs, See attached sheets
* Roof Drain Flow information taken from Watts Drainage website

CALCULATING ROOF FLOW EXAMPLES

1 roof drain during a 5 year storm
elevation of water = 25mm
Flow leaving 1 roof drain = (1 x 0.30 L/s) = 0.30 L/s

1 roof drain during a 100 year storm
elevation of water = 50mm
Flow leaving 1 roof drain = (1 x 0.60 L/s) = 0.60 L/s

4 roof drains during a 5 year storm
elevation of water = 25mm
Flow leaving 4 roof drains = (4 x 0.30 L/s) = 1.20 L/s

4 roof drains during a 100 year storm
elevation of water = 50mm
Flow leaving 4 roof drains = (4 x 0.60 L/s) = 2.40 L/s

Roof Drain Flow		
Flow (l/s)	Storage Depth (mm)	Drains Flow (l/s)
0.18	15	0.54
0.24	20	0.72
0.30	25	0.90
0.36	30	1.08
0.42	35	1.26
0.48	40	1.44
0.54	45	1.62
0.60	50	1.80
0.66	55	1.98
0.72	60	2.16
0.78	65	2.34
0.84	70	2.52
0.90	75	2.70
0.96	80	2.88
1.02	85	3.06
1.08	90	3.24
1.14	95	3.42
1.20	100	3.60
1.26	105	3.78
1.32	110	3.96
1.38	115	4.14
1.44	120	4.32
1.50	125	4.50
1.56	130	4.68
1.62	135	4.86
1.68	140	5.04
1.74	145	5.22
1.80	150	5.40

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

Storage Requirements for Area C3

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) C3	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
50	37.7	14.49	3.36	11.13	33.39
60	32.9	12.64	3.36	9.28	33.42
70	29.4	11.30	3.36	7.94	33.35
80	26.6	10.22	3.36	6.86	32.94
90	24.3	9.34	3.36	5.98	32.29

Maximum Storage Required 5-year =	33	m^3

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) C3	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
30	91.9	39.24	5.76	33.48	60.27
40	75.1	32.07	5.76	26.31	63.15
50	64.0	27.33	5.76	21.57	64.71
60	55.9	23.87	5.76	18.11	65.20
70	49.8	21.27	5.76	15.51	65.13
80	45.0	19.22	5.76	13.46	64.59
90	41.1	17.55	5.76	11.79	63.67
100	37.9	16.18	5.76	10.42	62.55
110	35.2	15.03	5.76	9.27	61.19
120	32.9	14.05	5.76	8.29	59.68

Maximum Storage Required 100-year =	65	m^3

5-Year Storm Event Storage Summary

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	1152.08	0.035	40.32

Storage Available (m^3) =	40.32
Storage Required (m^3) =	33.42

100-Year Storm Event Storage Summary

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	1152.08	0.060	69.12

Storage Available (m^3) =	69.12
Storage Required (m^3) =	65.20

* Area is 75% of the total roof area

Roof Drain Flow (C3)

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drians	8	
	5-Year	100-Year
Rooftop Storage (m^3)	40.32	69.12
Storage Depth (m)	0.035	0.060
Flow (Per Roof Drain) (L/s)	0.42	0.72
Total Flow (L/s)	3.36	5.76

Flow Rate Vs. Build-Up (One Weir)	
Depth (mm)	Flow (L/s)
15	0.18
20	0.24
25	0.30
30	0.36
35	0.42
40	0.48
45	0.54
50	0.60
55	0.66

* Roof Drain model to be Accutrol Weirs, See attached sheets
* Roof Drain Flow information taken from Watts Drainage website

CALCULATING ROOF FLOW EXAMPLES

1 roof drain during a 5 year storm
elevation of water = 25mm
Flow leaving 1 roof drain = (1 x 0.30 L/s) = 0.30 L/s

1 roof drain during a 100 year storm
elevation of water = 50mm
Flow leaving 1 roof drain = (1 x 0.60 L/s) = 0.60 L/s

4 roof drains during a 5 year storm
elevation of water = 25mm
Flow leaving 4 roof drains = (4 x 0.30 L/s) = 1.20 L/s

4 roof drains during a 100 year storm
elevation of water = 50mm
Flow leaving 4 roof drains = (4 x 0.60 L/s) = 2.40 L/s

Roof Drain Flow		
Flow (l/s)	Storage Depth (mm)	Drains Flow (l/s)
0.18	15	1.44
0.24	20	1.92
0.30	25	2.40
0.36	30	2.88
0.42	35	3.36
0.48	40	3.84
0.54	45	4.32
0.60	50	4.80
0.66	55	5.28
0.72	60	5.76
0.78	65	6.24
0.84	70	6.72
0.90	75	7.20
0.96	80	7.68
1.02	85	8.16
1.08	90	8.64
1.14	95	9.12
1.20	100	9.60
1.26	105	10.08
1.32	110	10.56
1.38	115	11.04
1.44	120	11.52
1.50	125	12.00
1.56	130	12.48
1.62	135	12.96
1.68	140	13.44
1.74	145	13.92
1.80	150	14.40

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

Storage Requirements for Area C4

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) C4	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
20	70.3	21.60	6.33	15.27	18.32
25	60.9	18.71	6.33	12.38	18.57
30	53.9	16.56	6.33	10.23	18.41
35	48.5	14.90	6.33	8.57	18.00
40	44.2	13.58	6.33	7.25	17.40

Maximum Storage Required 5-year =	19	m^3

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) C4	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
20	120.0	42.15	12.41	29.74	35.69
25	103.8	36.46	12.41	24.05	36.07
30	91.9	32.28	12.41	19.87	35.76
35	82.6	29.01	12.41	16.60	34.86
40	75.1	26.38	12.41	13.97	33.52
45	69.1	24.27	12.41	11.86	32.02
50	64.0	22.48	12.41	10.07	30.21
55	59.6	20.93	12.41	8.52	28.13
60	55.9	19.63	12.41	7.22	26.01
65	52.6	18.47	12.41	6.06	23.65

Maximum Storage Required 100-year =	36.07	m^3

Cistern Storage

Storage Available (m^3) =	36.07
Storage Required (m^3) =	36.07

Time of Concentration Pre-Development

Drainage Area ID	Sheet Flow Distance (m)	Slope of Land (%)	Tc (min) (5-Year)	Tc (min) (100-Year)
A1	21	2.10	10	2

* Therefore, a Tc of 10 can be used

Tc= (3.26(1.1-c)L^0.5/ S^0.33)

c= Balanced Runoff Coefficient

L= Length of Drainage Area

S= Average Slope of Watershed

STORM SEWER DESIGN SHEET

PROJECT: CCO-22-3501
LOCATION: 770 Brookfield
CLIENT: Hobin Architecture

McINTOSH PERRY

LOCATION				CONTRIBUTING AREA (ha)				RATIONAL DESIGN FLOW									SEWER DATA								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
STREET	AREA ID	FROM MH	TO MH	C-VALUE	AREA	INDIV AC	CUMUL AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr) (L/s)	(%)
Hobson Road	C1, C2, C3	BLDG	EX. 375mm Sewr	0.90	0.38	0.34	0.34	10.00	0.17	10.17	104.19	122.14	178.56	7.98					62.04	12.25	250			1.00	1.224		
	C4			0.50	0.22	0.11	0.45	10.00	0.17	10.17	104.19	122.14	178.56	6.33				14.31	62.04	12.25	250			1.00	1.224	47.73	76.93%

Definitions:
Q = 2.78CIA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

Designed: RRR
Checked: AJG
Project No.: CCO-22-3501

No.	Revision	Date
1.	ISSUED FOR REVIEW	

Date: 2022-06-24
Sheet No: 1 of 1

APPENDIX H
CITY OF OTTAWA DESIGN CHECKLIST

McINTOSH PERRY

City of Ottawa

4. Development Servicing Study Checklist

The following section describes the checklist of the required content of servicing studies. It is expected that the proponent will address each one of the following items for the study to be deemed complete and ready for review by City of Ottawa Infrastructure Approvals staff.

The level of required detail in the Servicing Study will increase depending on the type of application. For example, for Official Plan amendments and re-zoning applications, the main issues will be to determine the capacity requirements for the proposed change in land use and confirm this against the existing capacity constraint, and to define the solutions, phasing of works and the financing of works to address the capacity constraint. For subdivisions and site plans, the above will be required with additional detailed information supporting the servicing within the development boundary.

4.1 General Content

Criteria	Location (if applicable)
☐ Executive Summary (for larger reports only).	N/A
☐ Date and revision number of the report.	On Cover
☐ Location map and plan showing municipal address, boundary, and layout of proposed development.	Appendix A
☐ Plan showing the site and location of all existing services.	Site Servicing Plan (C102)
☐ 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.	1.1 Purpose 1.2 Site Description 6.0 Stormwater Management
☐ Summary of pre-consultation meetings with City and other approval agencies.	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.	1.1 Purpose 1.2 Site Description 6.0 Stormwater Management
☐ Statement of objectives and servicing criteria.	3.0 Pre-Consultation Summary

☐ Identification of existing and proposed infrastructure available in the immediate area.	N/A
☐ 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).	Site Grading Plan (C101)
☐ 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.	Site Grading Plan (C101)
☐ 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.	Section 2.0 Background Studies, Standards and References
☐ All preliminary and formal site plan submissions should have the following information: o Metric scale o North arrow (including construction North) o Key plan o Name and contact information of applicant and property owner o Property limits including bearings and dimensions o Existing and proposed structures and parking areas o Easements, road widening and rights-of-way o Adjacent street names	Site Grading Plan (C101)

4.2 Development Servicing Report: Water

Criteria	Location (if applicable)
☐ Confirm consistency with Master Servicing Study, if available	N/A
☐ Availability of public infrastructure to service proposed development	N/A
☐ Identification of system constraints	N/A
☐ Identify boundary conditions	Appendix C
☐ Confirmation of adequate domestic supply and pressure	N/A
☐ 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.	Appendix C
☐ 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.	N/A
☐ Definition of phasing constraints. Hydraulic modeling 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 shut-off valves	N/A
☐ 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	Appendix C, Section 4.2

☐ 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.	Site Servicing Plan (C101)
☐ 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.	Appendix C
☐ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A

4.3 Development Servicing Report: Wastewater

Criteria	Location (if applicable)
☐ 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).	N/A
☐ 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.	Section 5.2 Proposed Sanitary Sewer

☐ 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)	Section 5.3 Proposed Sanitary Design
☐ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	N/A
☐ Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 5.2 Proposed Sanitary Sewer
☐ 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 Checklist

Criteria	Location (if applicable)
☐ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
☐ Analysis of available capacity in existing public infrastructure.	N/A
☐ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Pre & Post-Development Plans
☐ 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.	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
☐ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
☐ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
☐ Set-back 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.	N/A
☐ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A
☐ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5-year return period) and major events (1:100-year return period).	Appendix G

☐ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Site Grading Plan
☐ 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.	Section 7.0 Proposed Stormwater Management Appendix G
☐ Any proposed diversion of drainage catchment areas from one outlet to another.	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
☐ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
☐ 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.	N/A
☐ Identification of potential impacts to receiving watercourses	N/A
☐ Identification of municipal drains and related approval requirements.	N/A
☐ Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
☐ 100-year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Site Grading Plan (C101)
☐ Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A

☐ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 8.0 Sediment & Erosion Control
☐ 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: Checklist

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 each approval. The approval and permitting shall include but not be limited to the following:

Criteria	Location (if applicable)
☐ 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 Certificate of Approval (CofA) 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

Criteria	Location (if applicable)
☐ Clearly stated conclusions and recommendations	Section 9.0 Summary Section 10.0 Recommendations
☐ 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.	All are stamped
☐ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	All are stamped