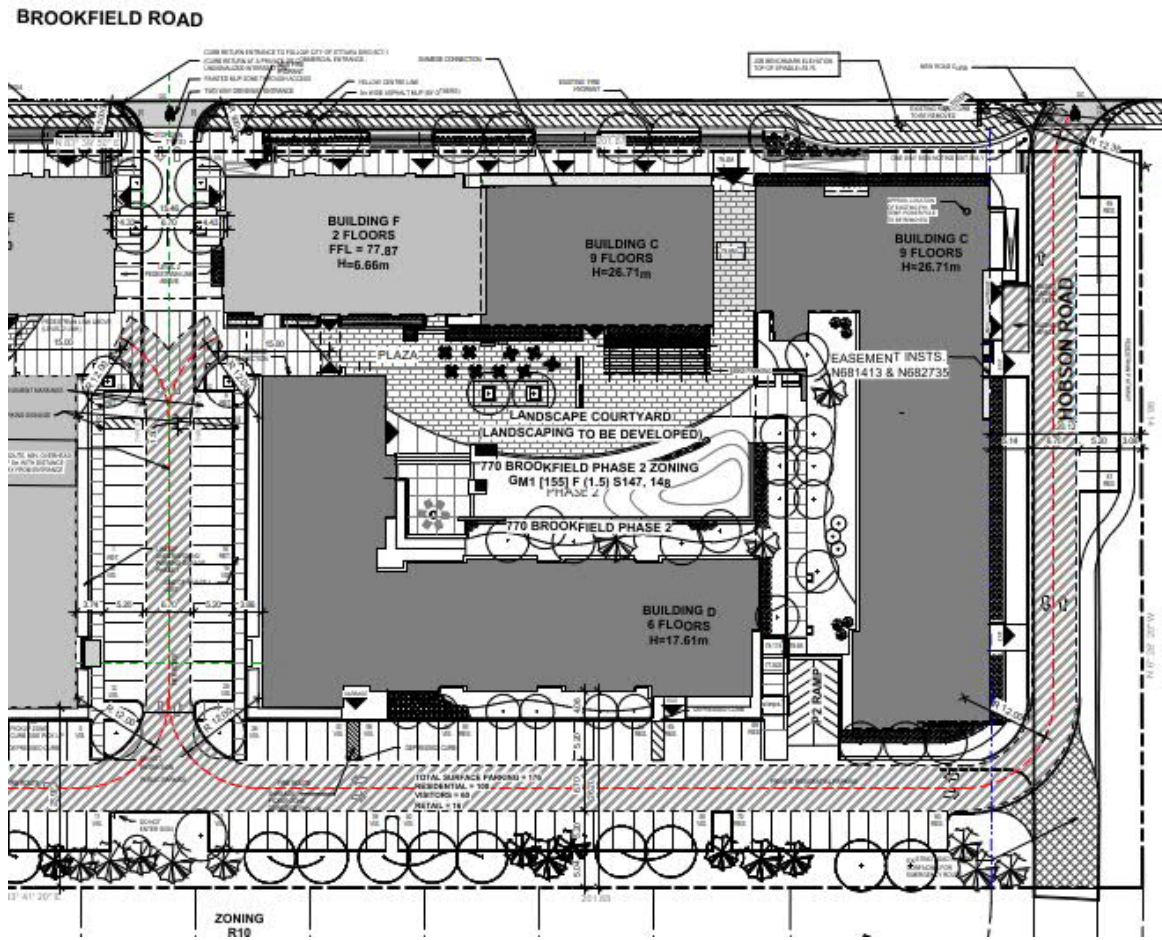


SERVICING & STORMWATER MANAGEMENT REPORT 770 BROOKFIELD ROAD – PHASE 2, OTTAWA



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

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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'.

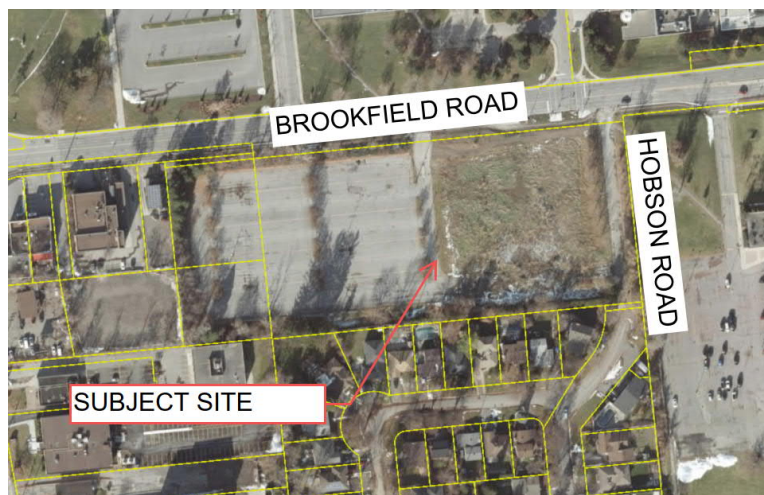


Figure 1: Site Map

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, provide 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 BACKGROUND STUDIES, STANDARDS, AND REFERENCES

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, Vollebakk 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 m². 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 m³/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 ₂ O)* /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:

$$Q = 2.78CIA \text{ (L/s)}$$

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 m³ of storage provided.

Runoff from area C4 will be collected by area drains that will direct flow to an internal cistern. The 36.07 m³ 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 OGS unit, 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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A handwritten signature in black ink that reads "Ryan Robineau".

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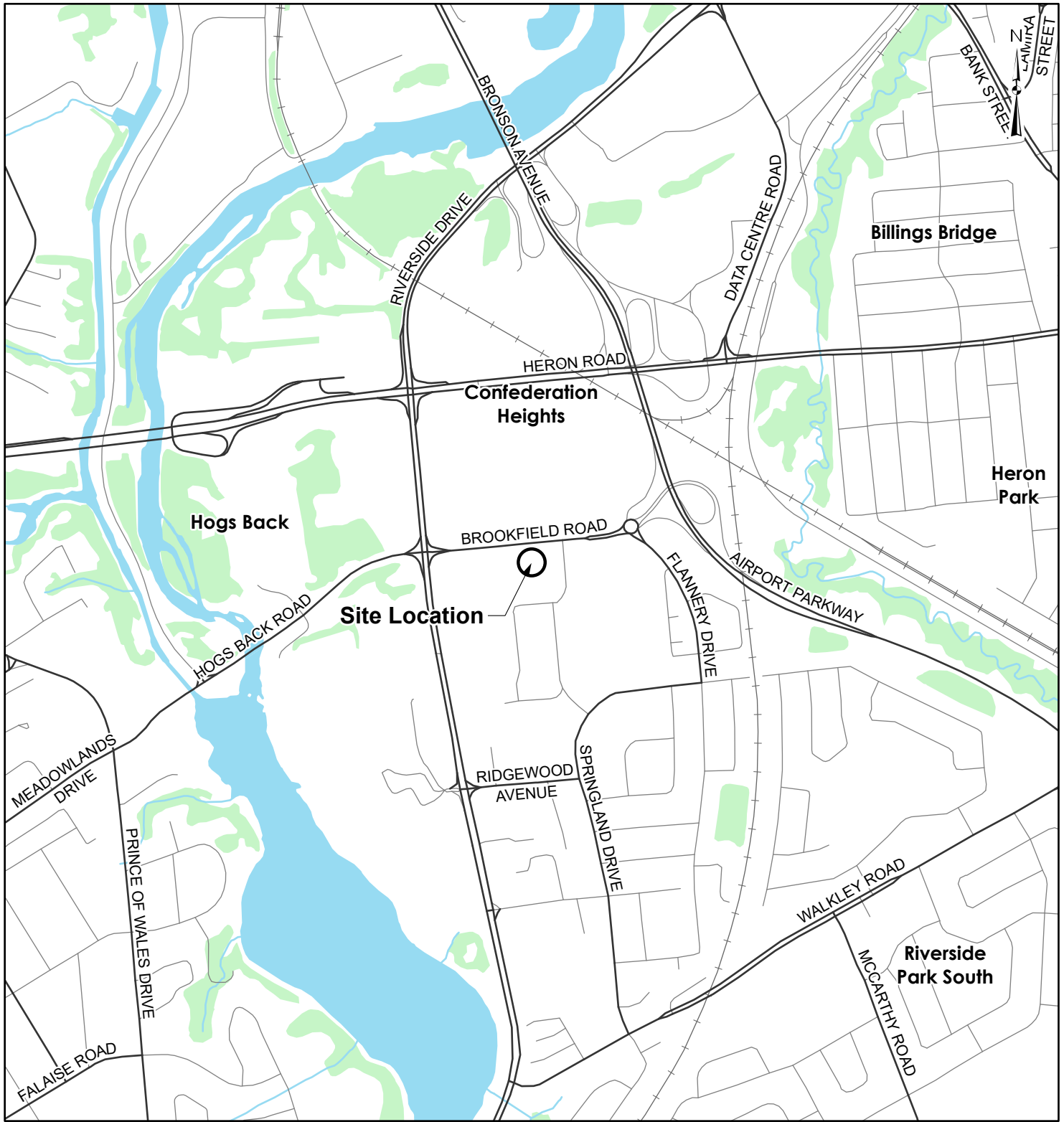
11.0 STATEMENT OF LIMITATIONS

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.

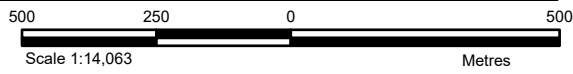
The findings, conclusions and/or recommendations of this report are only valid as of the date of this report. No assurance is made regarding any changes in conditions subsequent to this date. If additional information is discovered or becomes available at a future date, McIntosh Perry should be requested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

APPENDIX A
KEY PLAN



LEGEND

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



REFERENCE

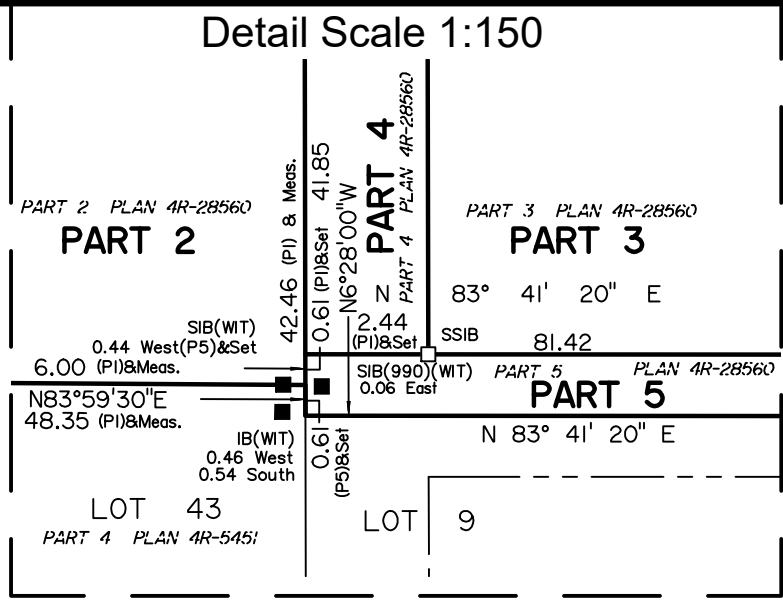
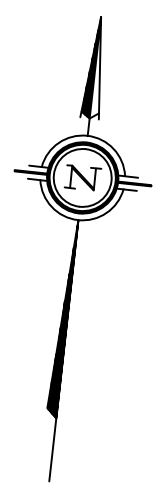
GIS data provided by the Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry, 2022.

CLIENT:		HOBIN ARCHITECTURE	
PROJECT:		770 BROOKFIELD PHASE 2	
TITLE:		KEY MAP	
PROJECT NO: CCO-23-3501		FIGURE:	
Date	Jun., 22, 2022	1	
GIS	MG		
Checked By	RR		

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APPENDIX B
BACKGROUND DOCUMENTS



I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.
DATE: _____

E. H. HERWEYER
ONTARIO LAND SURVEYOR

PLAN 4R-
RECEIVED AND DEPOSITED
DATE: _____

REPRESENTATIVE 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		
	4	PART OF B		
	5	PART OF B & C		
	6	PART OF B & C	787	
	7	PART OF B & C		
9130	8	PART OF HOBSON ROAD (Closed by By-Law 2-93 Inst. N647611)		ALL OF 04071-0001
	9	PART OF C		

Parts 4, 5, 6 and 9: Subject to Easement Inst. OT63570
Part 8: Subject to Easements Inst. 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, Vollebakk Ltd.



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 Survey 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
 - Denotes Survey Monument Found
 - Denotes Standard Iron Bar
 - SSB— Denotes Short Standard Iron Bar
 - IB— Denotes Iron Bar
 - RIB— Denotes Round Iron Bar
 - CP— Denotes Concrete Pin
 - (WT)— Denotes Witness
 - (AOG)— Denotes Annis, O'Sullivan, Vollebakk Ltd. Meas.
 - (P1)— Denotes Plan 4R-19886
 - (P3)— Denotes Plan 4R-8677
 - (P4)— Denotes Registered Plan 787
 - (P5)— Denotes Plan CAR-51
 - (P6)— Denotes (87) Plan, April 26, 2000
 - BF— Denotes Board Fence
 - CLF— Denotes Chain Link Fence
 - CHW— Denotes Overhead Wires
 - O P— Denotes Utility Pole
 - O A— Denotes Anchor
 - Acc— Denotes 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 18 (75°30' West Longitude) NAD-83 (original).

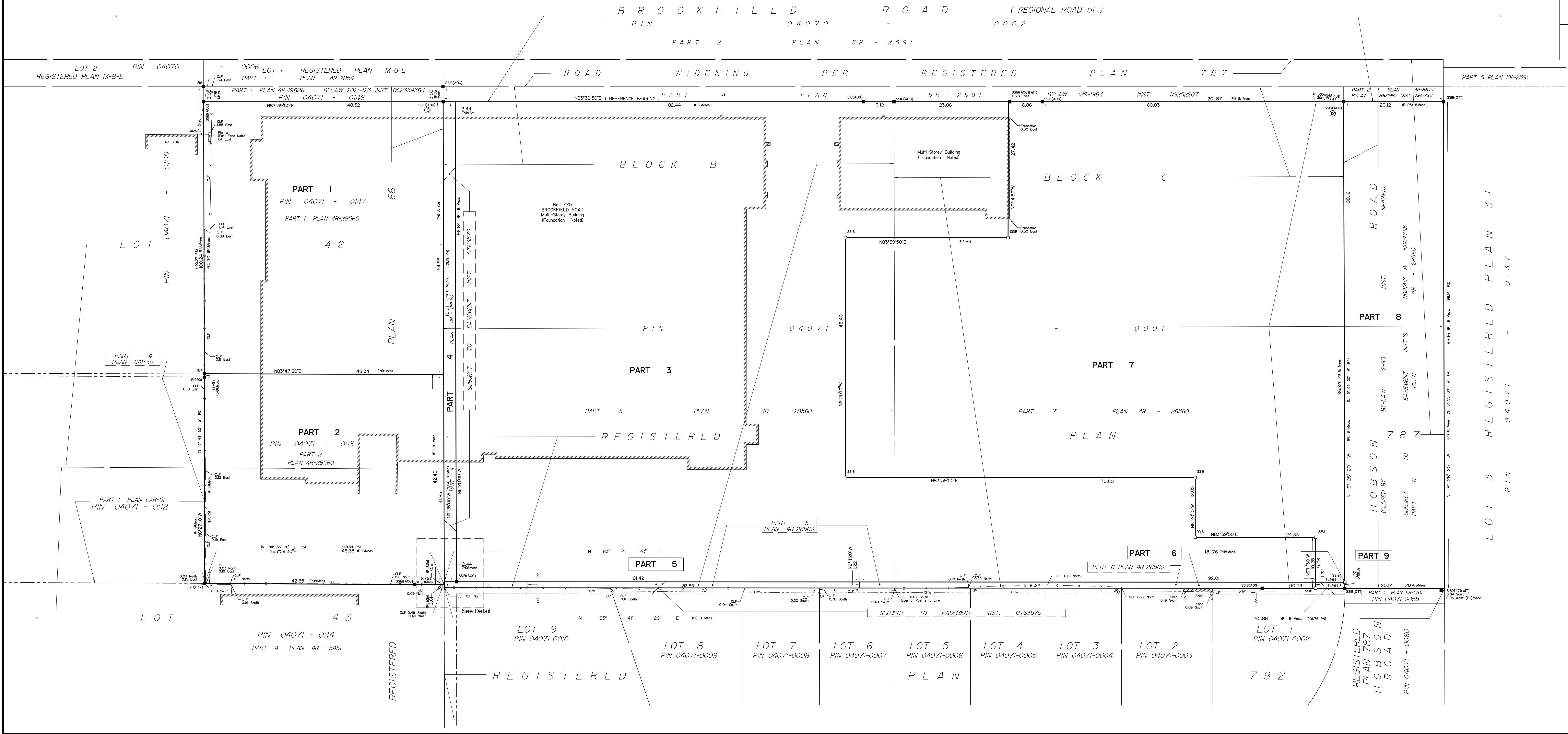
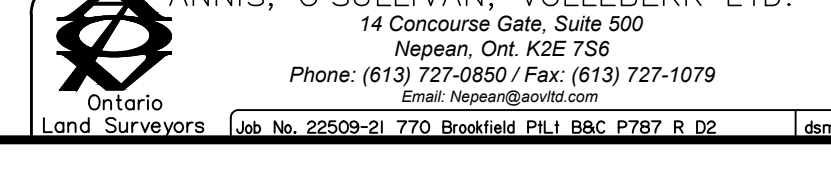
For bearing comparisons, a rotation of 0°34'10" counter-clockwise was applied to bearings on Registered Plan 787.

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

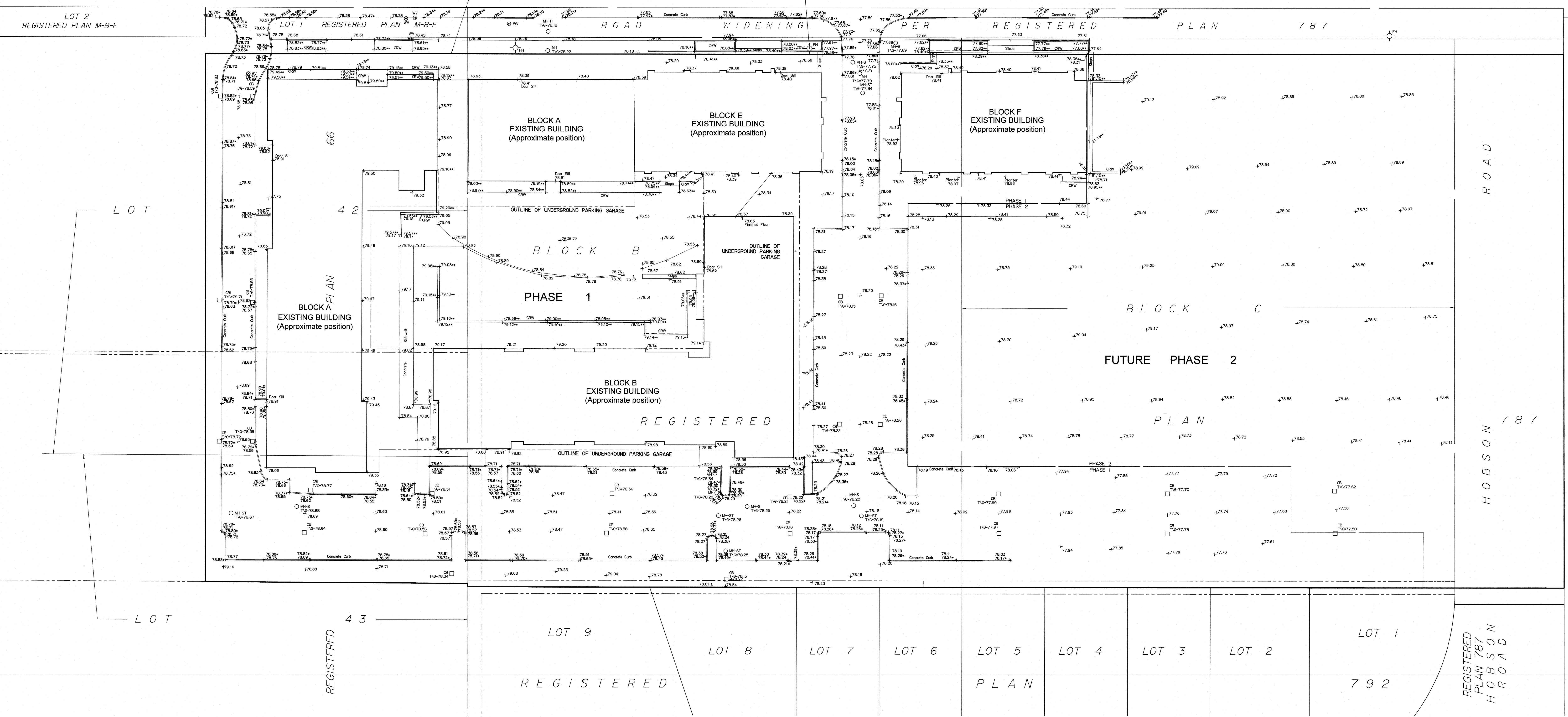
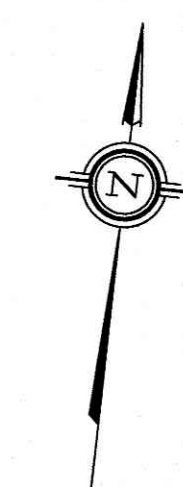
Coordinate values are to urban accuracy in accordance with O. Reg. 216/10.

. 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.



BROOKFIELD ROAD (REGIONAL ROAD 51)



TOPOGRAPHICAL SKETCH SHOWING AS-BUILT GRADES

770 BROOKFIELD ROAD
PHASE 1
CITY OF OTTAWA

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

Scale 1:300
0 3 6 9 12 Metres

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

MA 20 2022
E. H. Hevener
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.

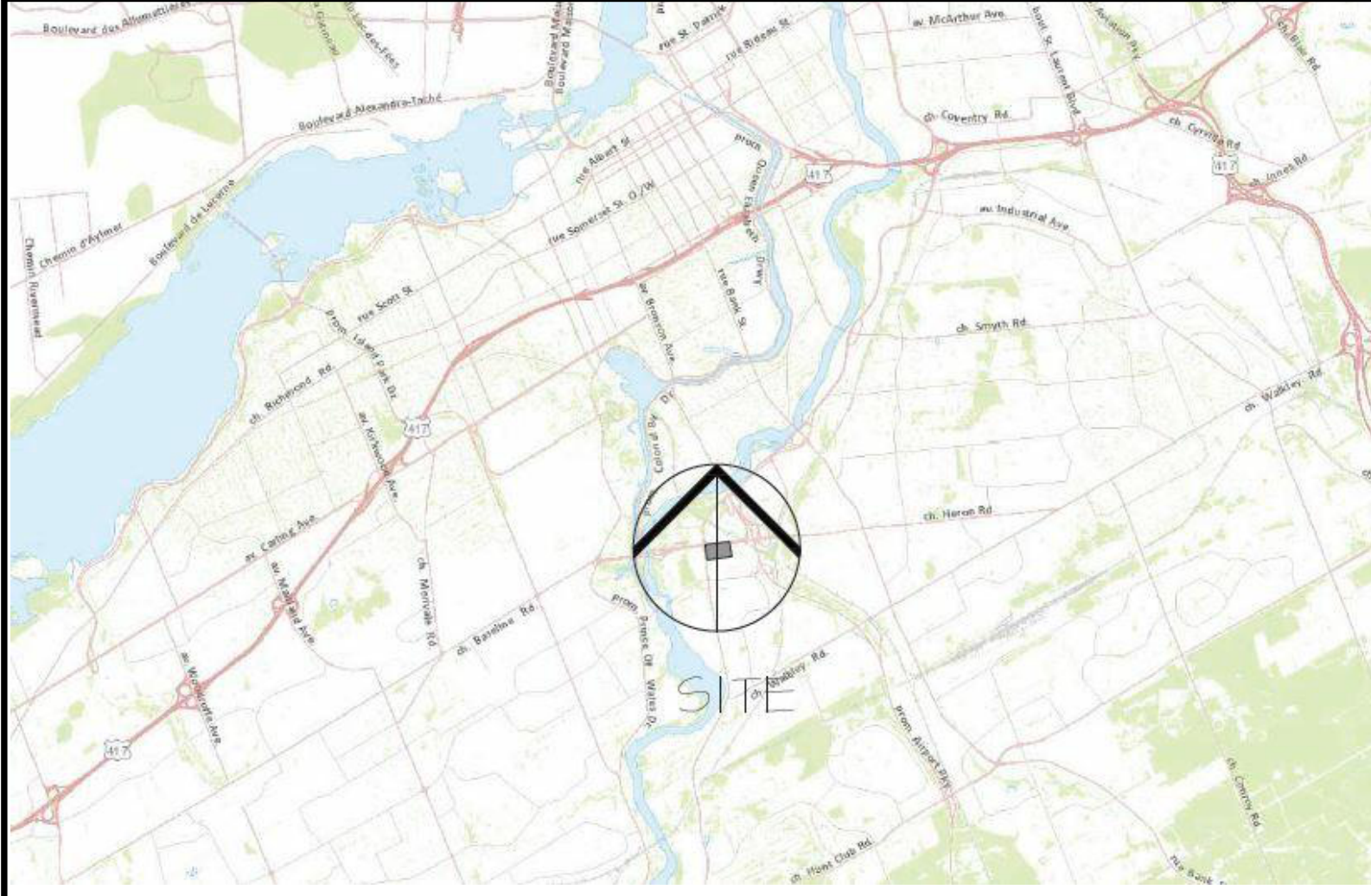
Notes & Legend

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-U	Maintenance Hole (Unidentified)
⊙ LE	Location of Elevations
⊙ TC	Top of Concrete Curb Elevation
⊙ TE	Top of Wall Elevation
T/G	Top of Grade
C/L	Centreline
—	Property Line
CRW	Concrete Retaining Wall

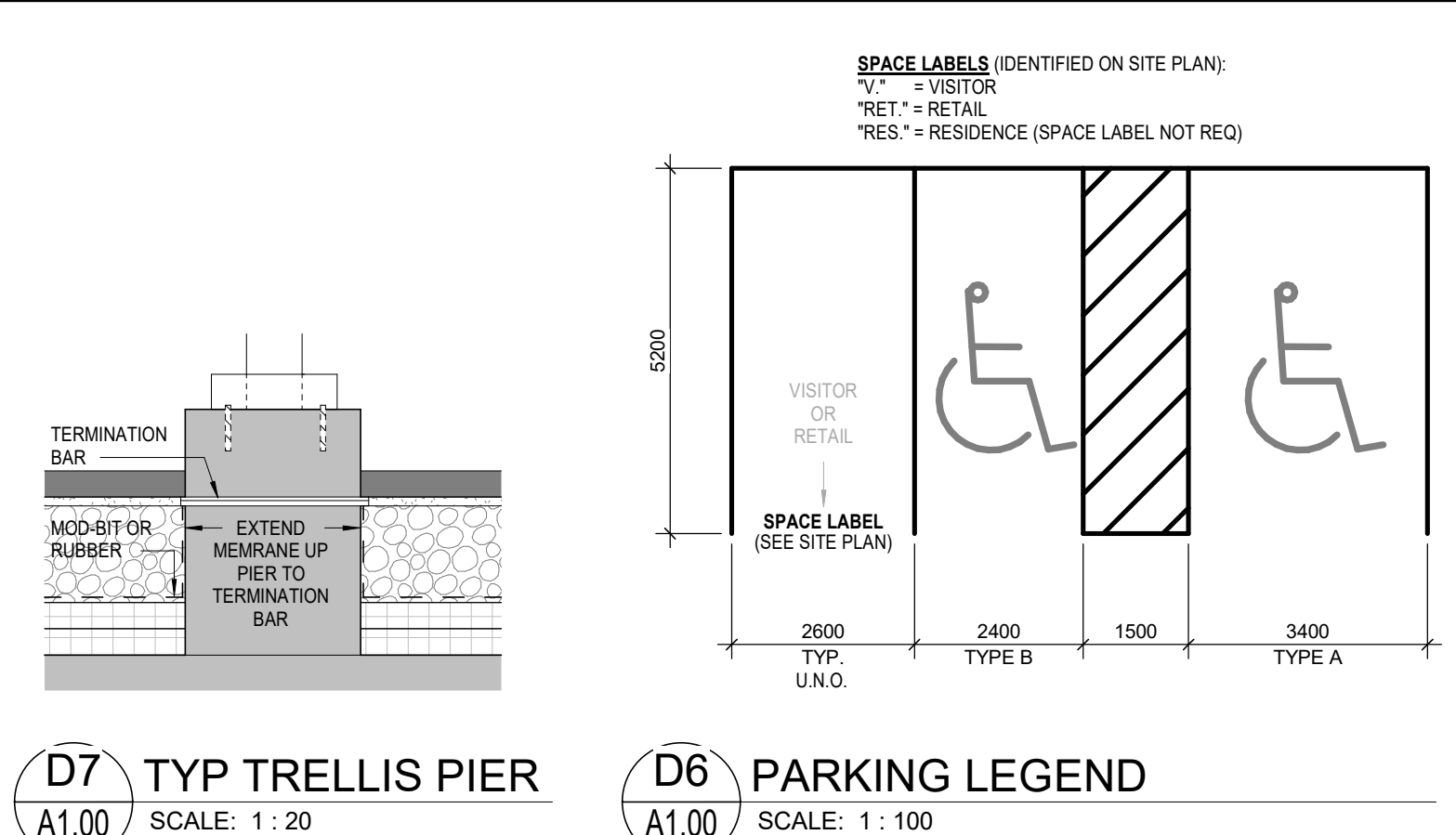
BOUNDARY INFORMATION COMPILED FROM PLAN 4R-28560.

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 its relative elevation and description agrees with the information shown on this drawing.

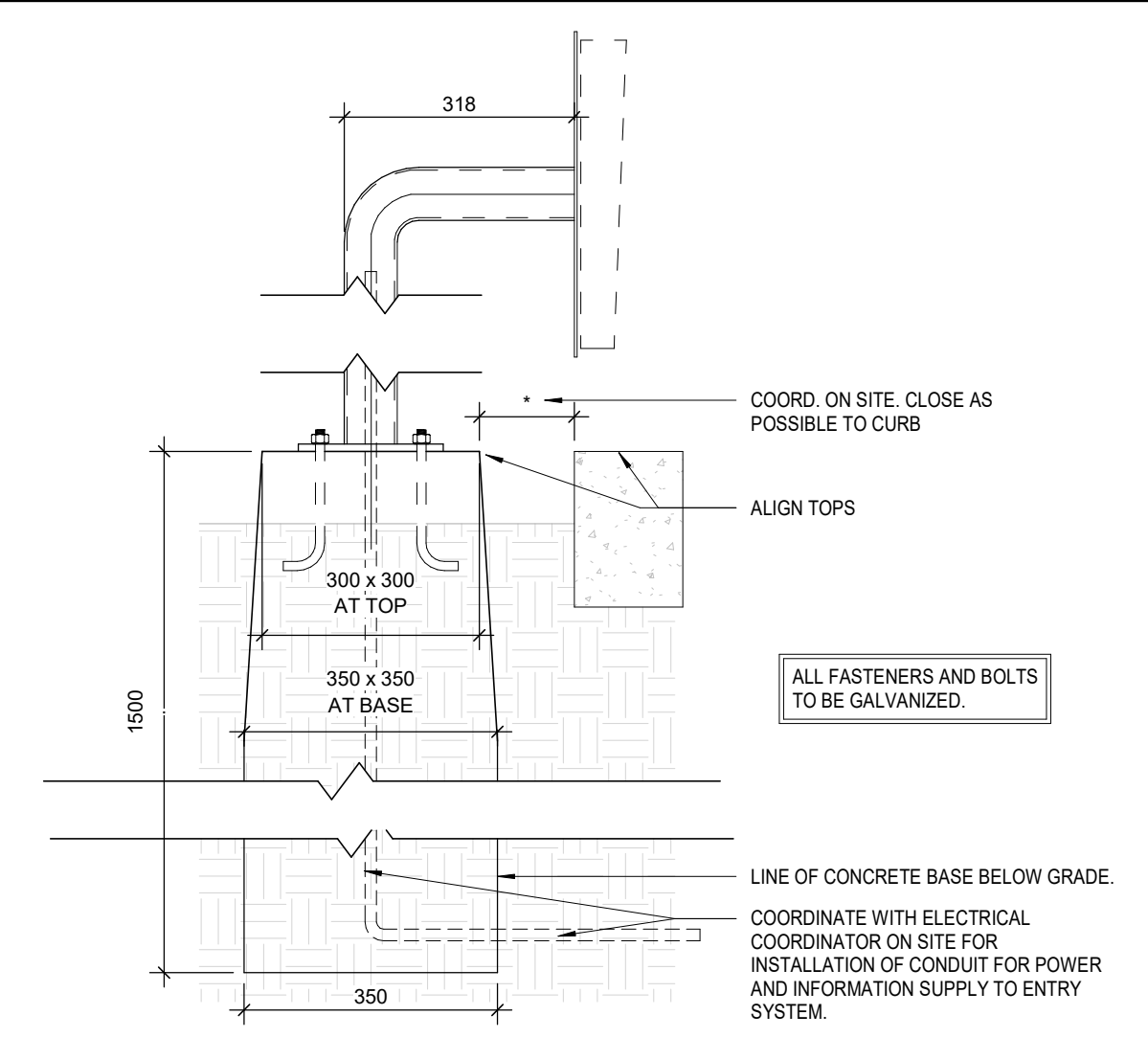
UTILITY NOTES
1. This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for confirmation.
2. Only visible surface utilities were located.
3. A field location of underground plant by the pertinent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



LOCATION PLAN



D7 TYP TRESSIS PIER SCALE: 1:20
D6 PARKING LEGEND SCALE: 1:100



D5 SECTION - GARAGE DOOR ENTRY SYSTEM SCALE: 1:10

UNIT COUNT					
BUILDING LEVEL	BLOCK A	BLOCK B	BLOCK C	BLOCK D	TOTAL
1	10	23	42	23	100
2	38	23	38	23	102
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	23	34	23	114
8	34	23	34	23	114
9	34	23	34	23	114
GRAND TOTAL	388	138	388	138	662

BEDROOM COUNT					
BUILDING LEVEL	BLOCK A	BLOCK B	BLOCK C	BLOCK D	TOTAL
1	22	35	32	35	114
2	27	35	32	35	139
3	27	35	32	35	139
4	27	35	32	35	139
5	27	35	32	35	139
6	27	35	32	35	139
7	27	35	32	35	139
8	27	35	32	35	139
9	27	35	32	35	139
GRAND TOTAL	478	227	478	227	1410

SURVEY INFORMATION TAKE FROM:

TOPOGRAPHICAL PLAN OF BLOCKS B AND C AND PART OF HOBSON ROAD (AS CLOSED) REGISTERED PLAN 1740 PART OF LOTS 42 AND 43 CITY OF OTTAWA

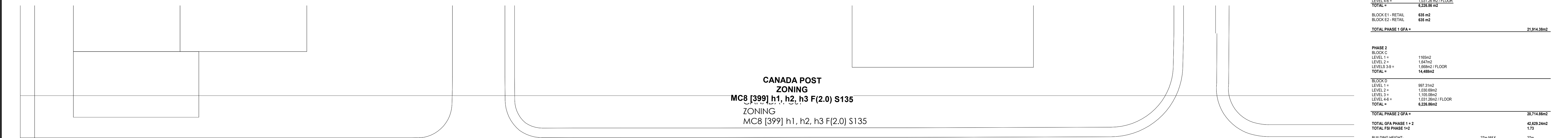
ANNIS OSULLIVAN VOLLEBEK LTD.

SITE SUMMARY

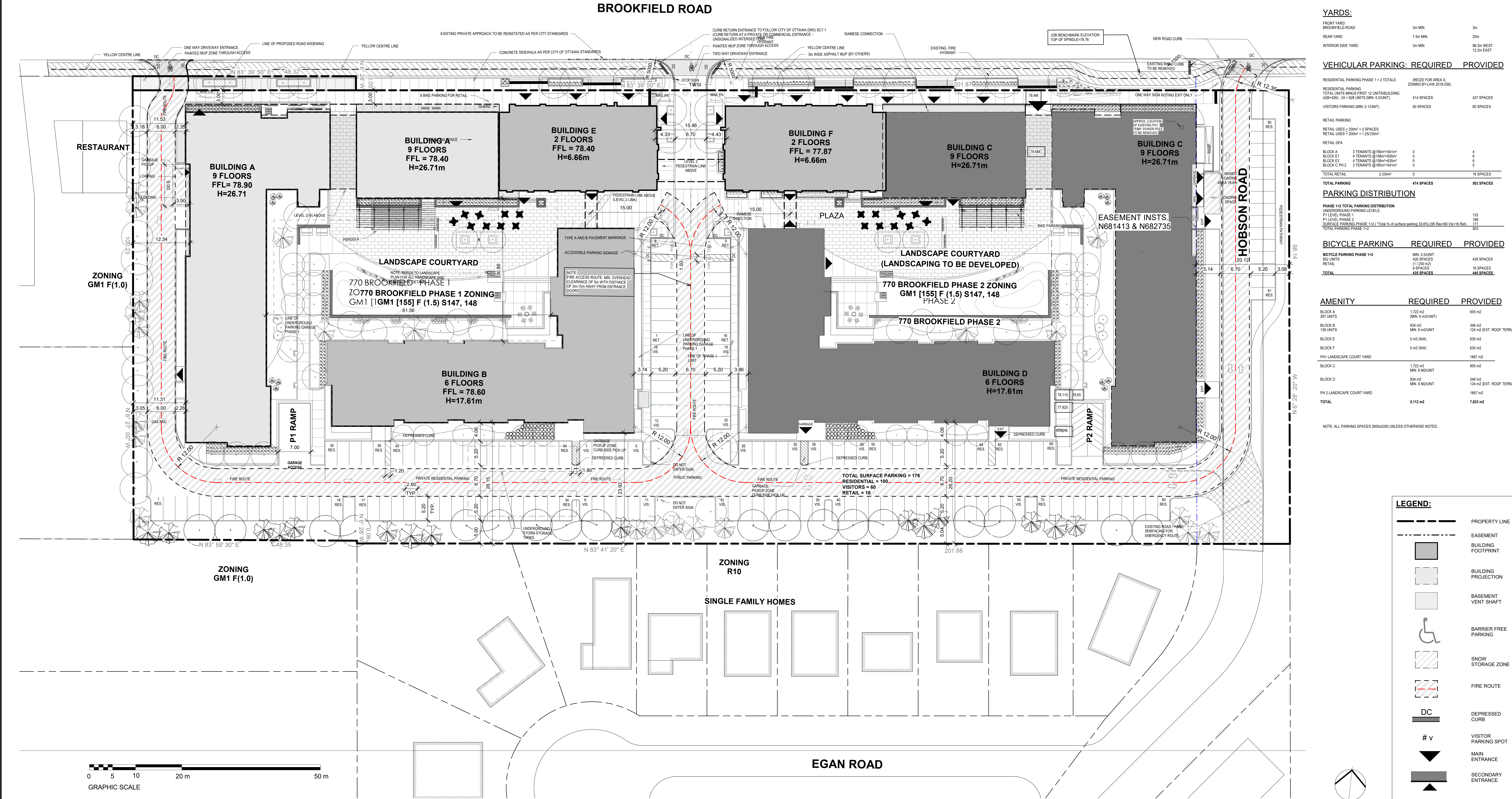
PROPERTY ADDRESS: 770 BROOKFIELD ROAD
ZONING: GM (S15) F1 S147, 148
SITE AREA (ZONING SCH 147): 24,655 m²
SITE AREA (SURVEY): 24,655 m²

ZONING SUMMARY: REQUIRED PROVIDED

RESIDENTIAL UNITS PHASE 1: 420 UNITS
RESIDENTIAL UNITS PHASE 2: 420 UNITS
TOTAL RESIDENTIAL UNITS PHASE 1+2: 840 UNITS
FS PHASE 1: 1.5
FS PHASE 2: 1.8



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



VEHICULAR PARKING: REQUIRED PROVIDED

RESIDENTIAL PARKING PHASE 1 + 2 TOTALS: 414 SPACES
RETAIL PARKING: 60 SPACES
TOTAL: 474 SPACES

PARKING DISTRIBUTION

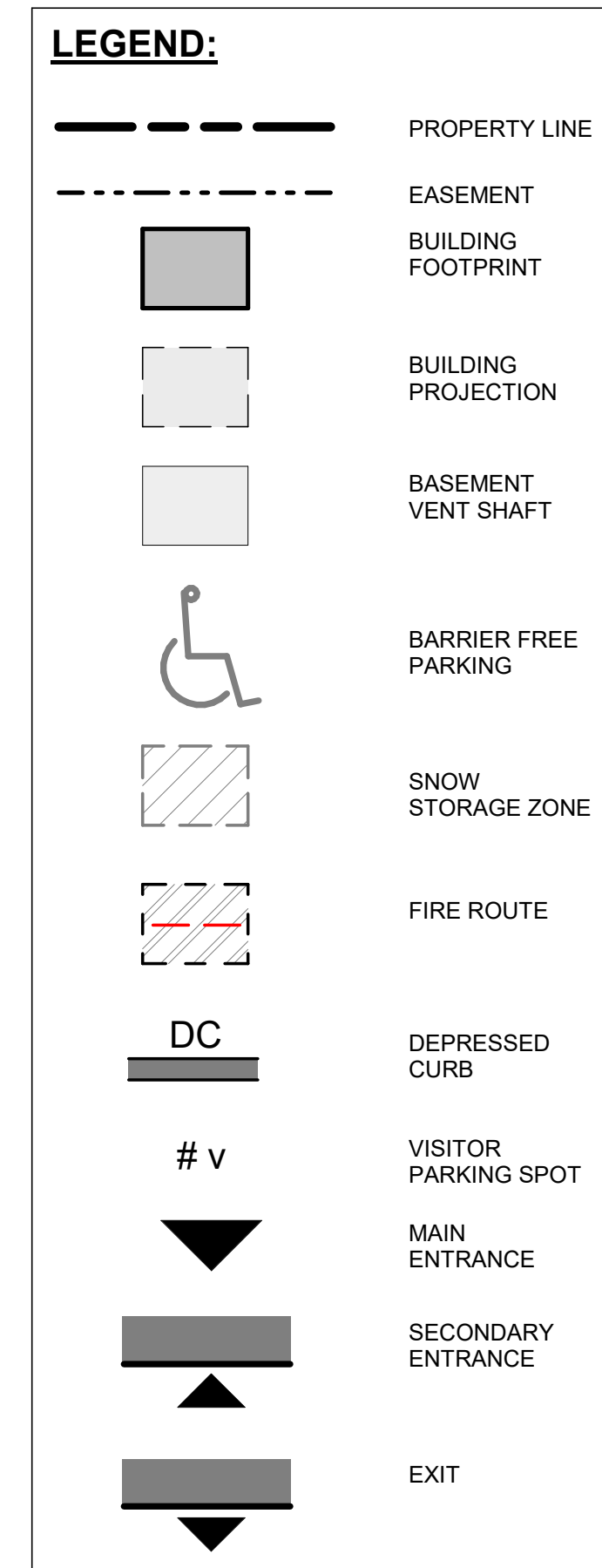
PHASE 1+2 TOTAL PARKING DISTRIBUTION: 474 SPACES
PHASE 1: 133 SPACES
PHASE 2: 341 SPACES

BICYCLE PARKING: REQUIRED PROVIDED

RESIDENTIAL: 420 UNITS
RETAIL: 60 SPACES
TOTAL: 480 SPACES

AMENITY: REQUIRED PROVIDED

BLOCK A: 370 UNITS, 1722 m²
BLOCK B: 180 UNITS, 834 m²
BLOCK C: 370 UNITS, 1722 m²
BLOCK D: 180 UNITS, 834 m²
BLOCK E: 370 UNITS, 1722 m²
BLOCK F: 180 UNITS, 834 m²
TOTAL: 1800 UNITS, 8520 m²



1 00-Site SCALE: 1:300

OWNER
ATLANTIS INVESTMENTS INC.

PROJECT MANAGER
TURNER & TOWNSEND
170 LAURIER AVE. WEST, SUITE 604
OTTAWA, ON
K1P 9Y5
GREG STALLARD
TEL: (613) 231-4554

SURVEYOR
ANNIS OSULLIVAN VOLLEBEK LTD.
14 COLONNADE ROAD SOUTH
OTTAWA, ONTARIO K2E 1Z5

GEOTECHNICAL
PATERSON GROUP INC.
154 COLONNADE ROAD SOUTH
OTTAWA, ONTARIO K2E 1Z5

TRANSPORTATION ENGINEER
PARSONS
1325 MICHAEL STREET, SUITE 100
PERTH, ONTARIO K1J 7T2

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

SITE SURVEYING ENGINEER
MONTSIEUX PERRY
115 WALGREEN ROAD
R.R.3 CARP, ONTARIO K0A 1L0

VEHICULAR PARKING: REQUIRED PROVIDED

RESIDENTIAL PARKING PHASE 1 + 2 TOTALS: 414 SPACES
RETAIL PARKING: 60 SPACES
TOTAL: 474 SPACES

PARKING DISTRIBUTION

PHASE 1+2 TOTAL PARKING DISTRIBUTION: 474 SPACES
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TOTAL: 1800 UNITS, 8520 m²

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BLOCK A: 370 UNITS, 1722 m²
BLOCK B: 180 UNITS, 834 m²
BLOCK C: 370 UNITS, 1722 m²
BLOCK D: 180 UNITS, 834 m²
BLOCK E: 370 UNITS, 1722 m²
BLOCK F: 180 UNITS, 834 m²
TOTAL: 1800 UNITS, 8520 m²

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RESIDENTIAL PARKING PHASE 1 + 2 TOTALS: 414 SPACES
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TOTAL: 474 SPACES

PARKING DISTRIBUTION

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RETAIL: 60 SPACES
TOTAL: 480 SPACES

AMENITY: REQUIRED PROVIDED

BLOCK A: 370 UNITS, 1722 m²
BLOCK B: 180 UNITS, 834 m²
BLOCK C: 370 UNITS, 1722 m²
BLOCK D: 180 UNITS, 834 m²
BLOCK E: 370 UNITS, 1722 m²
BLOCK F: 180 UNITS, 834 m²
TOTAL: 1800 UNITS, 8520 m²

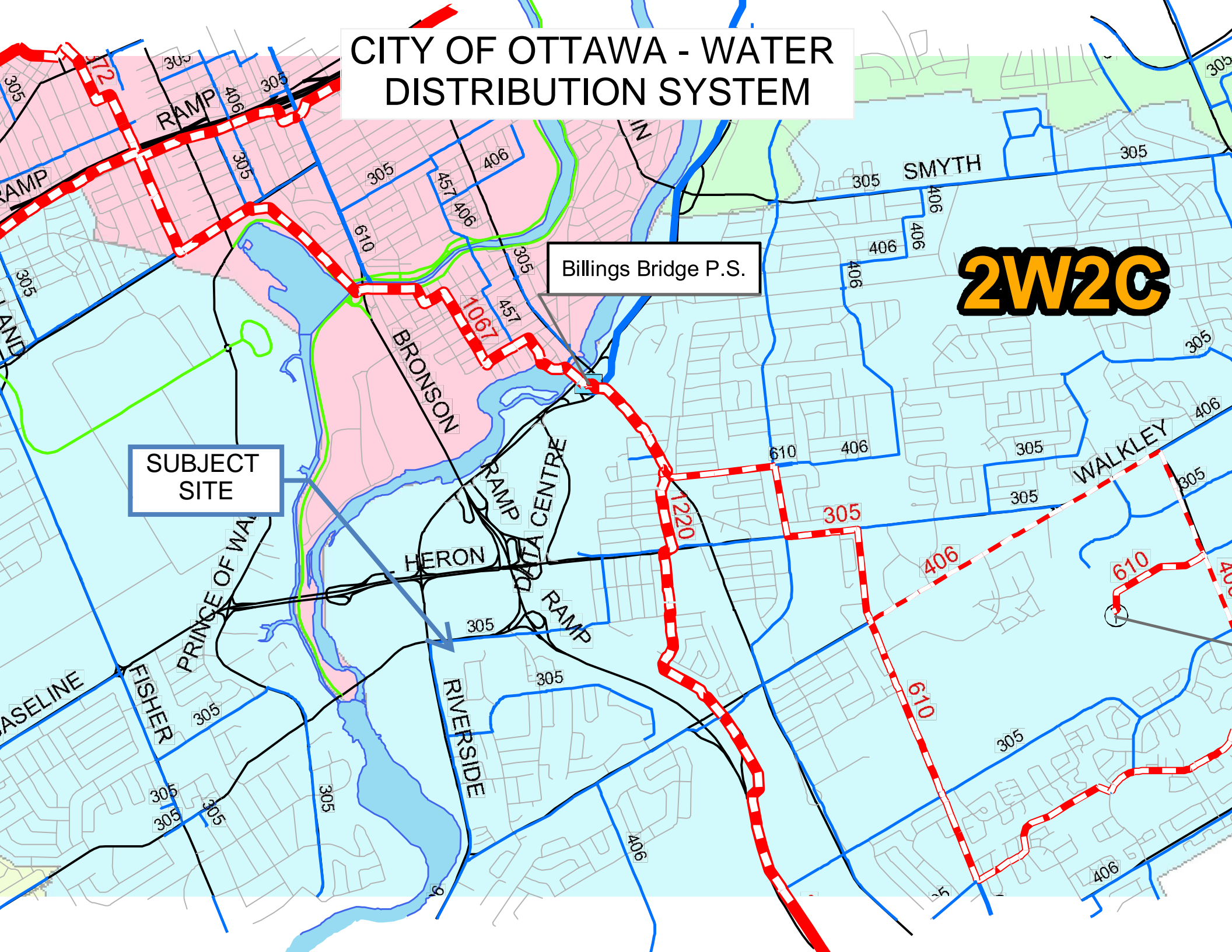
APPENDIX C
WATERMAIN CALCULATIONS

CITY OF OTTAWA - WATER DISTRIBUTION SYSTEM

2W2C

Billings Bridge P.S.

SUBJECT SITE



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

<u>Residential</u>	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		
<u>Commercial</u>	579 m2		
<u>Industrial - Light</u>	m2		
<u>Industrial - Heavy</u>	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/(1000m ² /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

McINTOSH PERRY

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 m²

Total Floor Area (per the 2020 FUS Page 20 - Total Effective Area) 15,443.7 m² *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 VA 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 ₂ O	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 be 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.

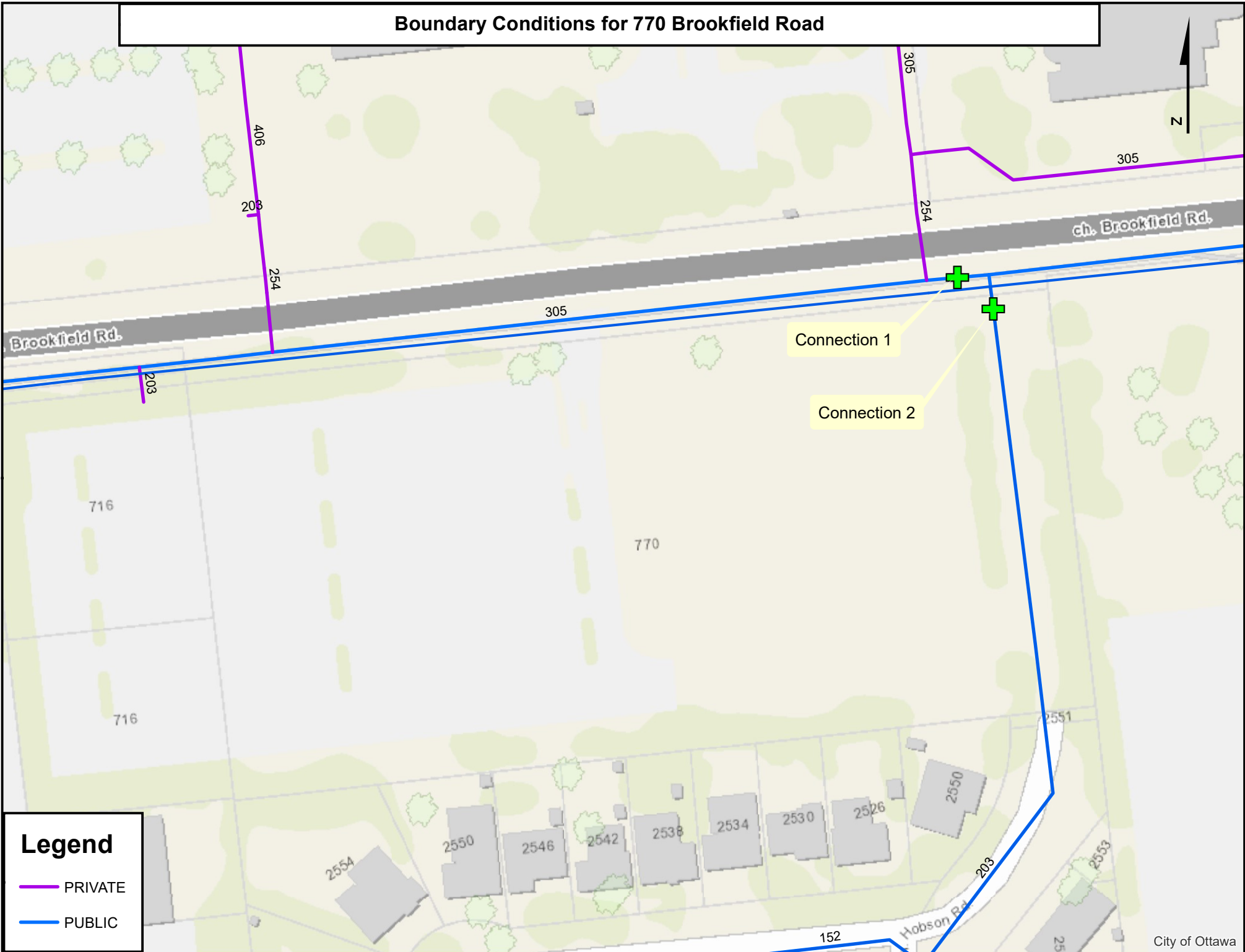
Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation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



Legend

- PRIVATE
- PUBLIC

APPENDIX D
SANITARY CALCULATIONS

CITY OF OTTAWA - SANITARY TRUNK SEWERS AND COLLECTION AREAS

AVE CREEK COLLECTOR

MOONEY'S BAY COLLECTOR

SPRINGHURST AV SEWER & OUTFA

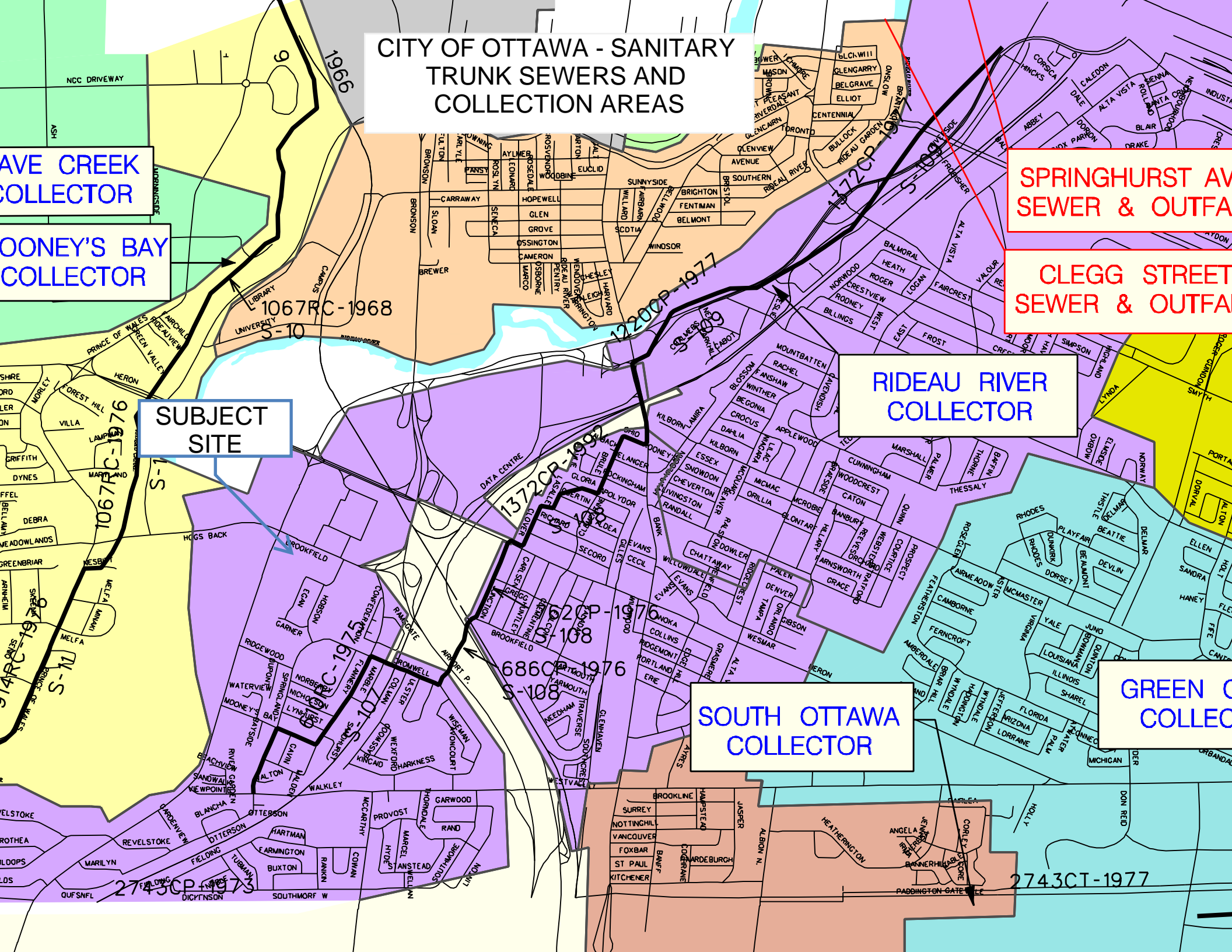
CLEGG STREET SEWER & OUTFA

SUBJECT SITE

RIDEAU RIVER COLLECTOR

SOUTH OTTAWA COLLECTOR

GREEN C COLLEC



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 Factor	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

EXTRANEIOUS 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

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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

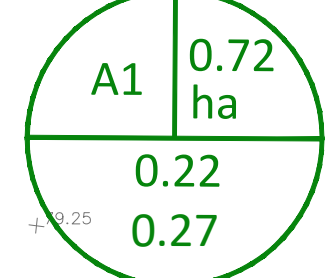
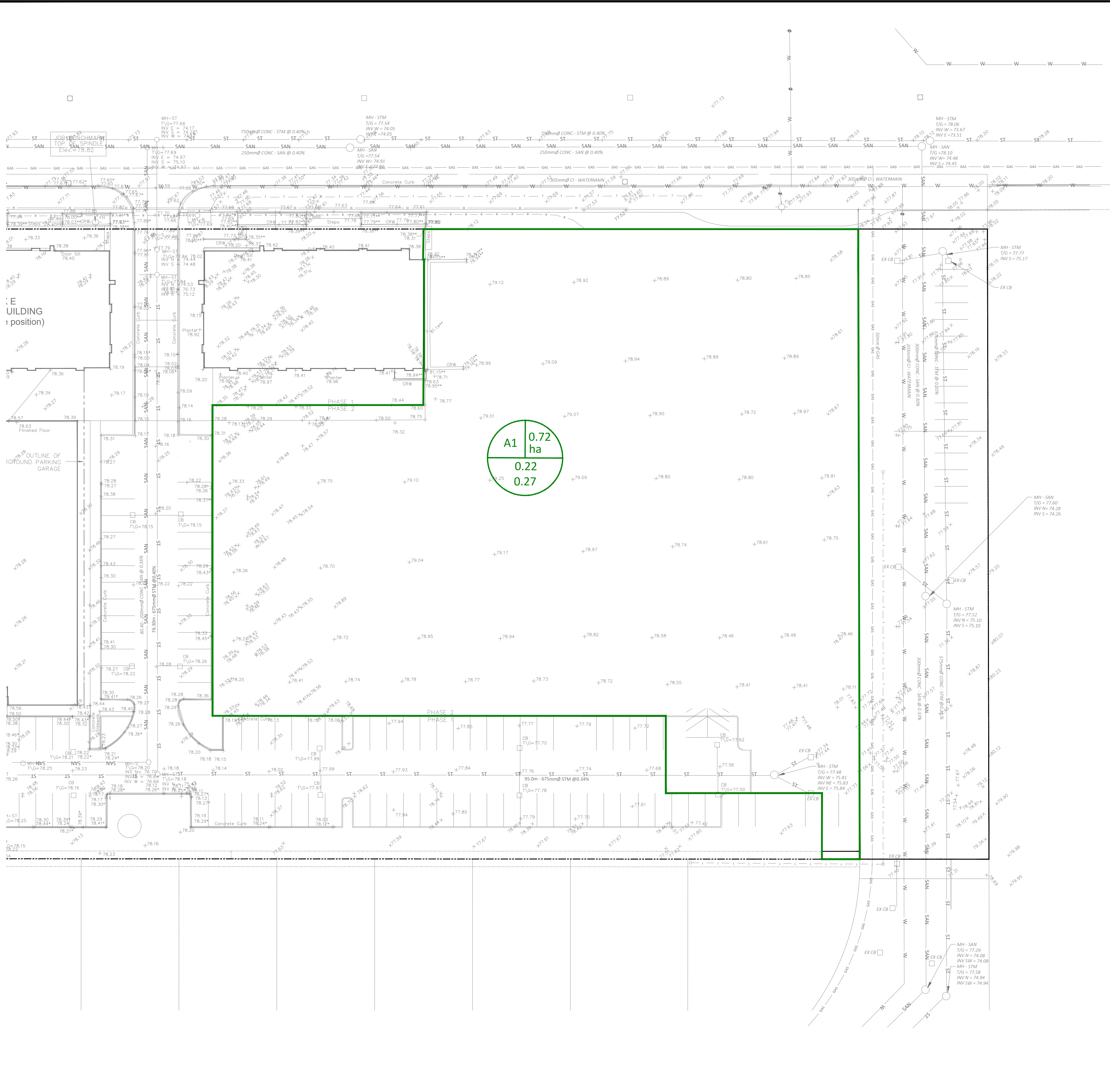
SANITARY SEWER DESIGN SHEET

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



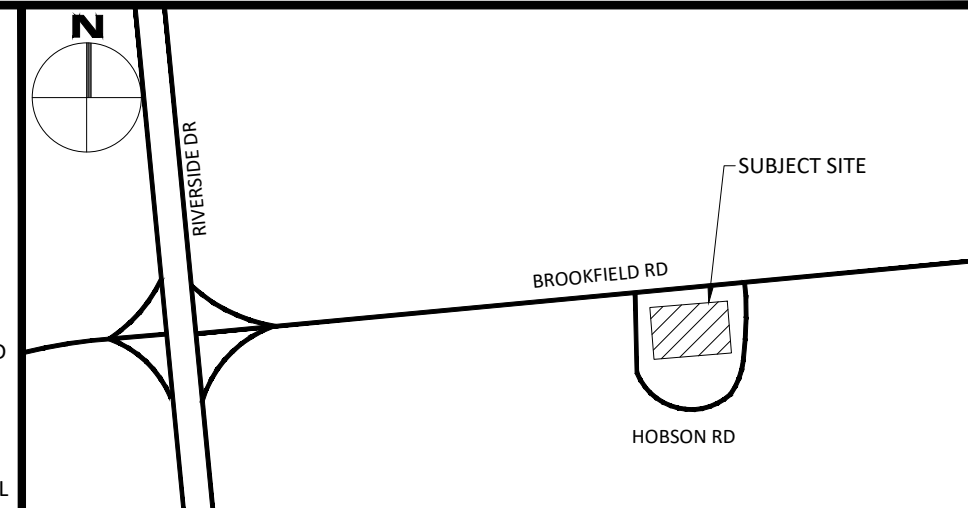
LOCATION				RESIDENTIAL								ICI AREAS								INFILTRATION ALLOWANCE			FLOW		SEWER DATA					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
STREET	AREA ID	FROM MH	TO MH	UNIT TYPES				AREA (ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (ha)						PEAK FLOW (L/s)	AREA (ha)		FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
				BAC/1-BED	2-BED	3-BED	4-BED		IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL			IND	CUM								IND	CUM
		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:				Notes:								Designed: RRR								No.		Revision						Date		
Residential				ICI Areas								Checked: AJG								1.		ISSUED FOR REVIEW						2022-06-24		
BAC/1-BED 1.4 p/p/u				1. Mannings coefficient (n) = 0.013								Project No.: CCO-22-3501																		
2-BED 2.1 p/p/u				2. Demand (per capita): 280 L/day																										
3-BED 3.1 p/p/u				3. Infiltration allowance: 0.33 L/s/Ha																										
4-BED 3.4 p/p/u				4. Residential Peaking Factor: Harmon Formula = 1+(14/(4+P^0.5))*0.8 where P = population in thousands																										
INST 28,000 L/Ha/day																														
COM 28,000 L/Ha/day																														
IND 35,000 L/Ha/day																														
Peak Factor 1																														
MOE Chart																														
																												Sheet No: 1 of 1		

APPENDIX E
PRE-DEVELOPMENT DRAINAGE PLAN



GENERAL NOTES

1. THE ORIGINAL TOPOGRAPHY, GROUND ELEVATION AND SURVEY DATA SHOWN ARE SUPPLIED FOR INFORMATION PURPOSES ONLY, AND IMPLY NO GUARANTEE OF ACCURACY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL INFORMATION SHOWN.
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6. RESTORE ALL TRENCHES AND SURFACES OF PUBLIC ROAD ALLOWANCES TO CONDITION EQUAL OR BETTER THAN ORIGINAL CONDITION AND TO THE SATISFACTION OF THE CITY AUTHORITIES.
7. EXCAVATE AND DISPOSE OF ALL EXCESS EXCAVATED MATERIAL, SUCH AS ASPHALT, CURBING AND DEBRIS, OFF SITE AS DIRECTED BY THE ENGINEER AND THE CITY.
8. TOPSOIL TO BE STRIPPED AND STOCKPILED FOR REHABILITATION. CLEAN FILL TO BE PLACED IN FILL AREAS AND COMPACTED TO 95% STANDARD PROCTOR DENSITY.
9. ALL DISTURBED AREAS TO BE RESTORED TO ORIGINAL CONDITION OR BETTER UNLESS OTHERWISE SPECIFIED.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING THE SUPPLY, INSTALLATION, AND REMOVAL OF ALL NECESSARY SIGNAGE, DELINEATORS, MARKERS AND BARRIERS.
11. DO NOT ALTER GRADING OF THE SITE WITHOUT PRIOR APPROVAL OF THE ENGINEER/CITY.
12. ALL ROADWAY, PARKING LOT, AND GRADING WORKS TO BE UNDERTAKEN IN ACCORDANCE WITH CITY STANDARDS AND SPECIFICATIONS. THE CONTRACTOR IS TO PROVIDE POSITIVE DRAINAGE AWAY FROM THE BUILDING.
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 - TELEPHONE SERVICE - BELL CANADA.
 - TELEVISION SERVICE - ROGERS.
16. INSTALLATION TO BE IN ACCORDANCE WITH CURRENT CODES AND STANDARDS OF APPROVAL AGENCIES HYDRO ONE, BELL AND THE CITY.
17. CONTRACTOR TO ENSURE ALL APPLICABLE OPS SPECIFICATIONS ARE FOLLOWED DURING CONSTRUCTION.
18. ALL PROPOSED CURB TO BE CONCRETE BARRIER CURB UNLESS OTHERWISE SPECIFIED.
19. THIS PLAN MUST BE READ IN CONJUNCTION WITH THE GEOTECHNICAL INVESTIGATION COMPLETED BY QUALITAS OUTAOUAIS, DATED JANUARY 2007.



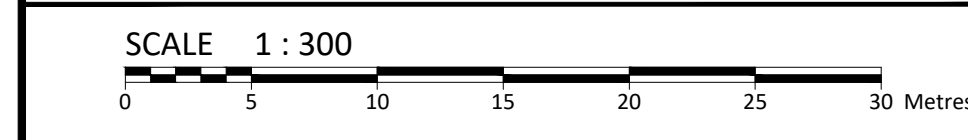
LEGEND

- DC BARRIER CURB & CURB DEPRESSION
- PROPOSED ASPHALT
- PROPOSED CONCRETE WALKWAY
- STORM MANHOLE
- CATCHBASIN, CURB INLET OR DITCH INLET
- Sanitary Manhole
- PERFORATED PIPE
- Water Valve/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
NOT FOR CONSTRUCTION

1	ISSUED FOR REVIEW	JUNE 24, 2022
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Check and verify all dimensions before proceeding with the work. Do not scale drawings.



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

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

Project: **PHASE 2**
770 BROOKFIELD ROAD

OTTAWA ON

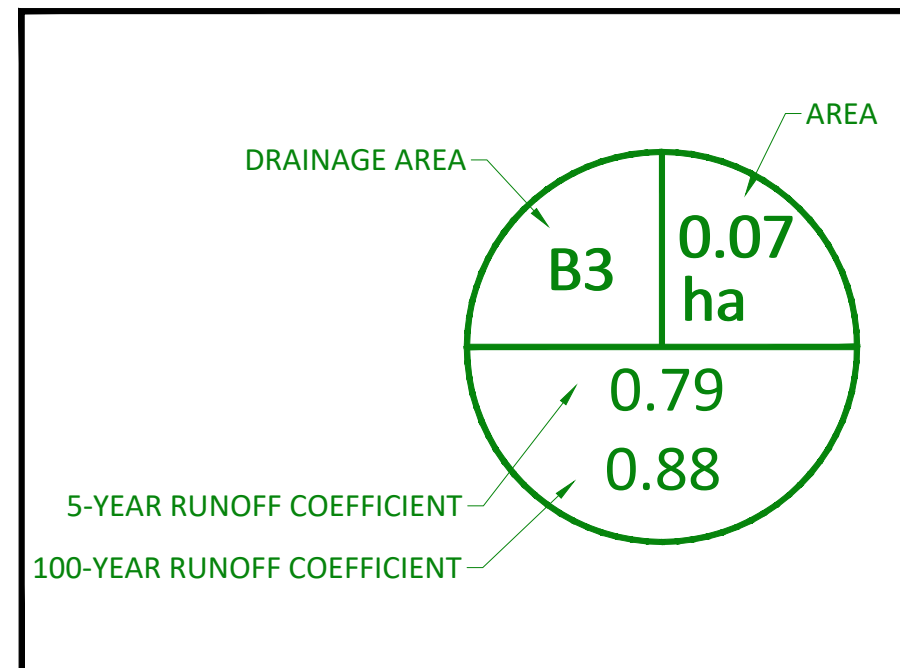
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Scale: 1:300 Project Number: CCO-22-3501

Drawn By: R.R.R. Drawing Number: PRE

Checked By: A.J.G.

Designed By: A.J.G.

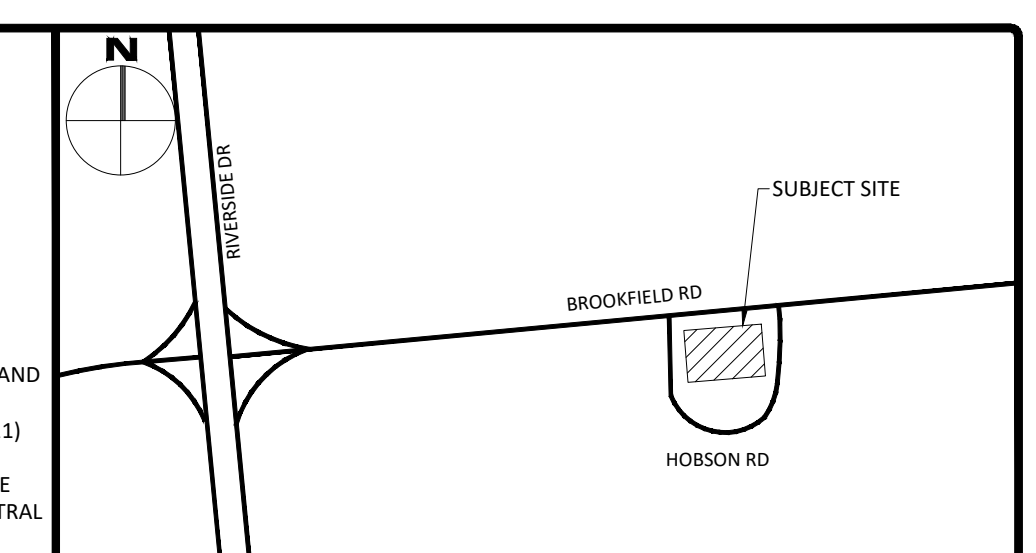
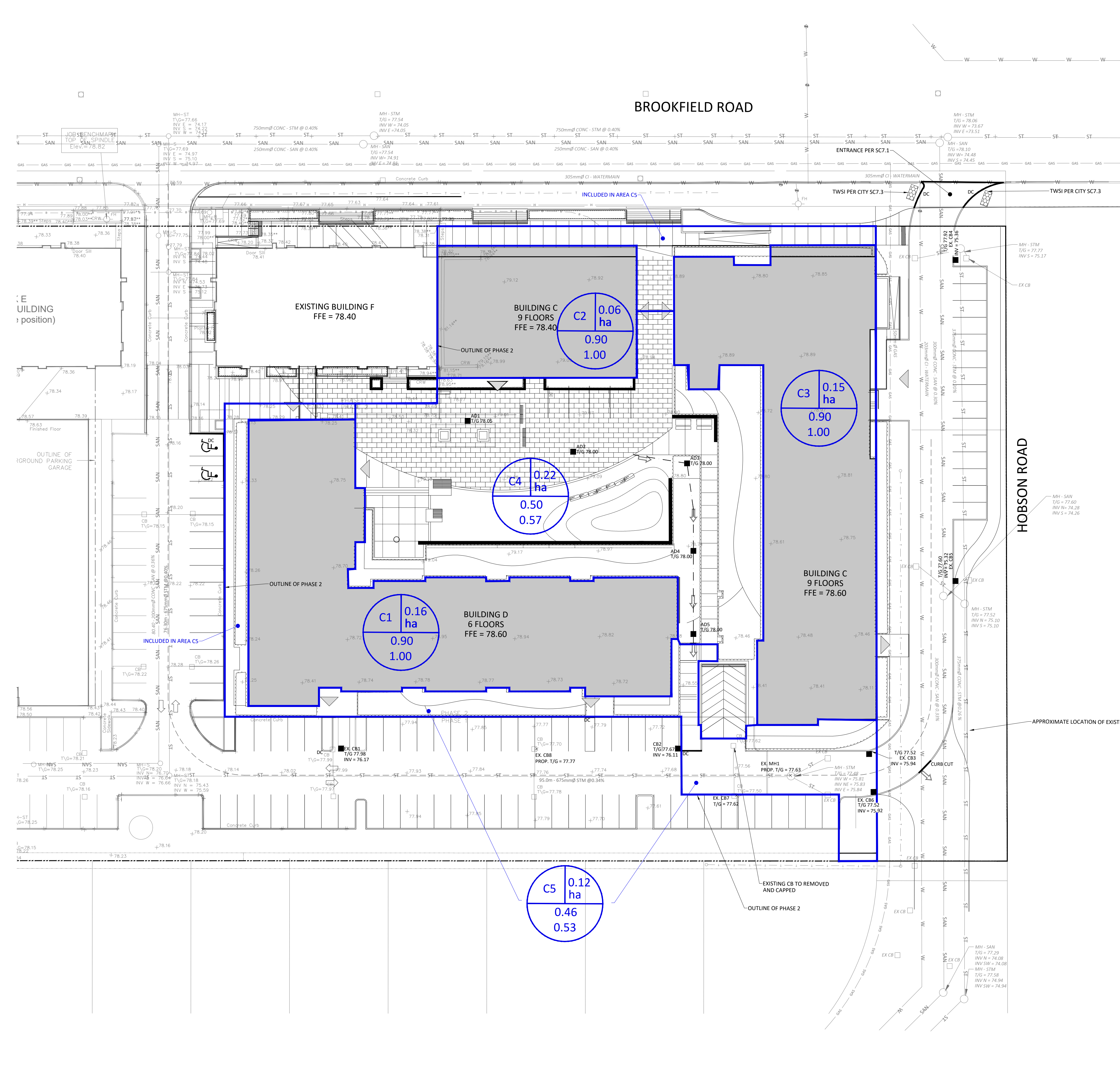


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 USER: R.R.R.

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APPENDIX F
POST-DEVELOPMENT DRAINAGE PLAN



LEGEND

DC	BARRIER CURB & CURB DEPRESSION	---	CENTRELINE OF SWALE
PROPOSED ASPHALT	PROPOSED ASPHALT	---	CENTRELINE OF DITCH
PROPOSED CONCRETE WALKWAY	PROPOSED CONCRETE WALKWAY	---	SLOPING AT 3:1 UNLESS SPECIFIED
MH#	STORM MANHOLE	95.94	PROPOSED ELEVATION EXISTING ELEVATION
CB	CATCHBASIN, CURB INLET OR DITCH INLET	95.94 (B)	SWALE ELEVATION
MH#A	SANITARY MANHOLE	TW100.50	TOP/BOTTOM WALL FACE ELEVATIONS
PERFORATED PIPE	PERFORATED PIPE	95.94 (B)	EMERGENCY OVERLAND FLOW ROUTE
WATER VALVE/CHAMBER	WATER VALVE/CHAMBER	TW100.50	SILT FENCE BARRIER PER OPSD 219.110
FIRE HYDRANT	FIRE HYDRANT	---	BUILDING ENTRANCE OVERHEAD FLOW ROUTE REDUCER
PROPOSED WALL	PROPOSED WALL	---	
SEDIMENT CONTROL DEVICE PER DETAIL	SEDIMENT CONTROL DEVICE PER DETAIL	---	
ROADCUT AND REINSTATEMENT PER CITY R10	ROADCUT AND REINSTATEMENT PER CITY R10	---	

FOR REVIEW ONLY
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



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Project: **PHASE 2**
770 BROOKFIELD ROAD

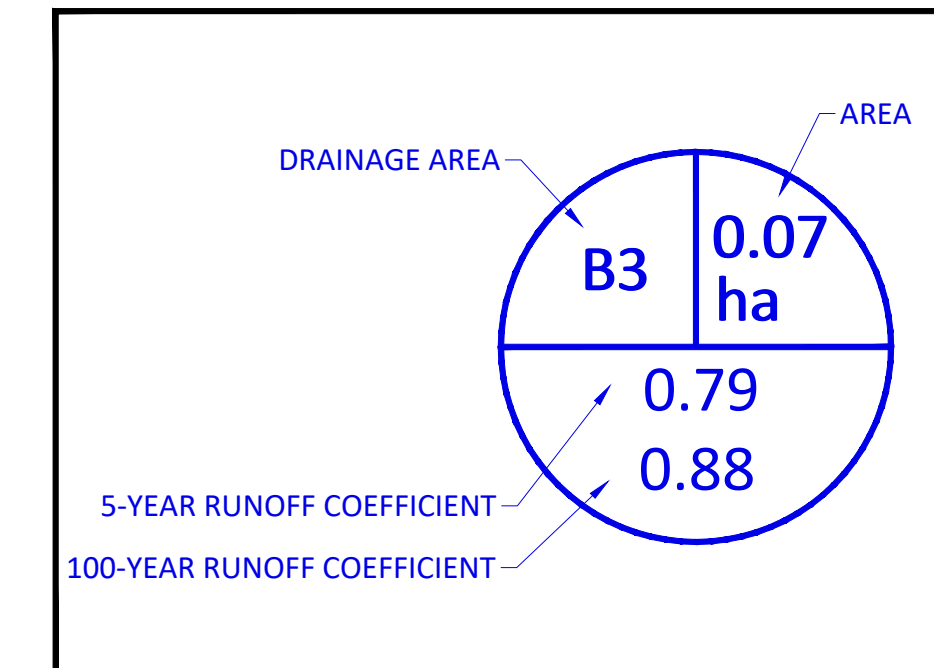
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Drawing Title: **POST-DEVELOPMENT DRAINAGE PLAN**

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Drawn By: R.R.R.	Project Number: CCO-22-3501
Checked By: A.J.G.	Project Number: CCO-22-3501
Designed By: A.J.G.	Project Number: CCO-22-3501

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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

McINTOSH PERRY

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

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

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Roof Drain Flow (C1)

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drains	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

McINTOSH PERRY

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

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 m³

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 m³

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

McINTOSH PERRY

Roof Drain Flow (C2)

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drains	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

McINTOSH PERRY

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

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
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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
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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

McINTOSH PERRY

Roof Drain Flow (C3)

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drains	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

McINTOSH PERRY

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

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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 m³

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 m³

Cistern Storage

Storage Available (m³) = 36.07

Storage Required (m³) = 36.07

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

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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

$$T_c = (3.26(1.1-c)L^{0.5}/S^{0.33})$$

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



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)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr)		
																					DIA	W	H					
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. 1. Revision: ISSUED FOR REVIEW				Date: 2022-06-24				Date: _____ Sheet No: 1 of 1								

APPENDIX H
CITY OF OTTAWA DESIGN CHECKLIST

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

<input type="checkbox"/> Identification of existing and proposed infrastructure available in the immediate area.	N/A
<input type="checkbox"/> 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)
<input type="checkbox"/> 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)
<input type="checkbox"/> 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
<input type="checkbox"/> Proposed phasing of the development, if applicable.	N/A
<input type="checkbox"/> Reference to geotechnical studies and recommendations concerning servicing.	Section 2.0 Background Studies, Standards and References
<input type="checkbox"/> All preliminary and formal site plan submissions should have the following information: <ul style="list-style-type: none"> ○ Metric scale ○ North arrow (including construction North) ○ Key plan ○ Name and contact information of applicant and property owner ○ Property limits including bearings and dimensions ○ Existing and proposed structures and parking areas ○ Easements, road widening and rights-of-way ○ Adjacent street names 	Site Grading Plan (C101)

4.2 Development Servicing Report: Water

Criteria	Location (if applicable)
<input type="checkbox"/> Confirm consistency with Master Servicing Study, if available	N/A
<input type="checkbox"/> Availability of public infrastructure to service proposed development	N/A
<input type="checkbox"/> Identification of system constraints	N/A
<input type="checkbox"/> Identify boundary conditions	Appendix C
<input type="checkbox"/> Confirmation of adequate domestic supply and pressure	N/A
<input type="checkbox"/> 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
<input type="checkbox"/> 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
<input type="checkbox"/> Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
<input type="checkbox"/> Address reliability requirements such as appropriate location of shut-off valves	N/A
<input type="checkbox"/> Check on the necessity of a pressure zone boundary modification.	N/A
<input type="checkbox"/> 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

<input type="checkbox"/> 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)
<input type="checkbox"/> Description of off-site required feeder mains, 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
<input type="checkbox"/> Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Appendix C
<input type="checkbox"/> 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)
<input type="checkbox"/> 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
<input type="checkbox"/> Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
<input type="checkbox"/> 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
<input type="checkbox"/> Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 5.2 Proposed Sanitary Sewer

<input type="checkbox"/> 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
<input type="checkbox"/> 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
<input type="checkbox"/> Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 5.2 Proposed Sanitary Sewer
<input type="checkbox"/> 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
<input type="checkbox"/> Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
<input type="checkbox"/> Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
<input type="checkbox"/> 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
<input type="checkbox"/> Special considerations such as contamination, corrosive environment etc.	N/A

4.4 Development Servicing Report: Stormwater Checklist

Criteria	Location (if applicable)
<input type="checkbox"/> 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
<input type="checkbox"/> Analysis of available capacity in existing public infrastructure.	N/A
<input type="checkbox"/> A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Pre & Post-Development Plans
<input type="checkbox"/> 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
<input type="checkbox"/> 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
<input type="checkbox"/> 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
<input type="checkbox"/> Set-back from private sewage disposal systems.	N/A
<input type="checkbox"/> Watercourse and hazard lands setbacks.	N/A
<input type="checkbox"/> Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N/A
<input type="checkbox"/> Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A
<input type="checkbox"/> 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

<input type="checkbox"/> 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
<input type="checkbox"/> 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
<input type="checkbox"/> Any proposed diversion of drainage catchment areas from one outlet to another.	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
<input type="checkbox"/> 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
<input type="checkbox"/> 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
<input type="checkbox"/> Identification of potential impacts to receiving watercourses	N/A
<input type="checkbox"/> Identification of municipal drains and related approval requirements.	N/A
<input type="checkbox"/> 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
<input type="checkbox"/> 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)
<input type="checkbox"/> Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A

<input type="checkbox"/> 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
<input type="checkbox"/> 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
<input type="checkbox"/> 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)
<input type="checkbox"/> 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
<input type="checkbox"/> Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
<input type="checkbox"/> Changes to Municipal Drains.	N/A
<input type="checkbox"/> 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)
<input type="checkbox"/> Clearly stated conclusions and recommendations	Section 9.0 Summary Section 10.0 Recommendations
<input type="checkbox"/> 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
<input type="checkbox"/> All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	All are stamped