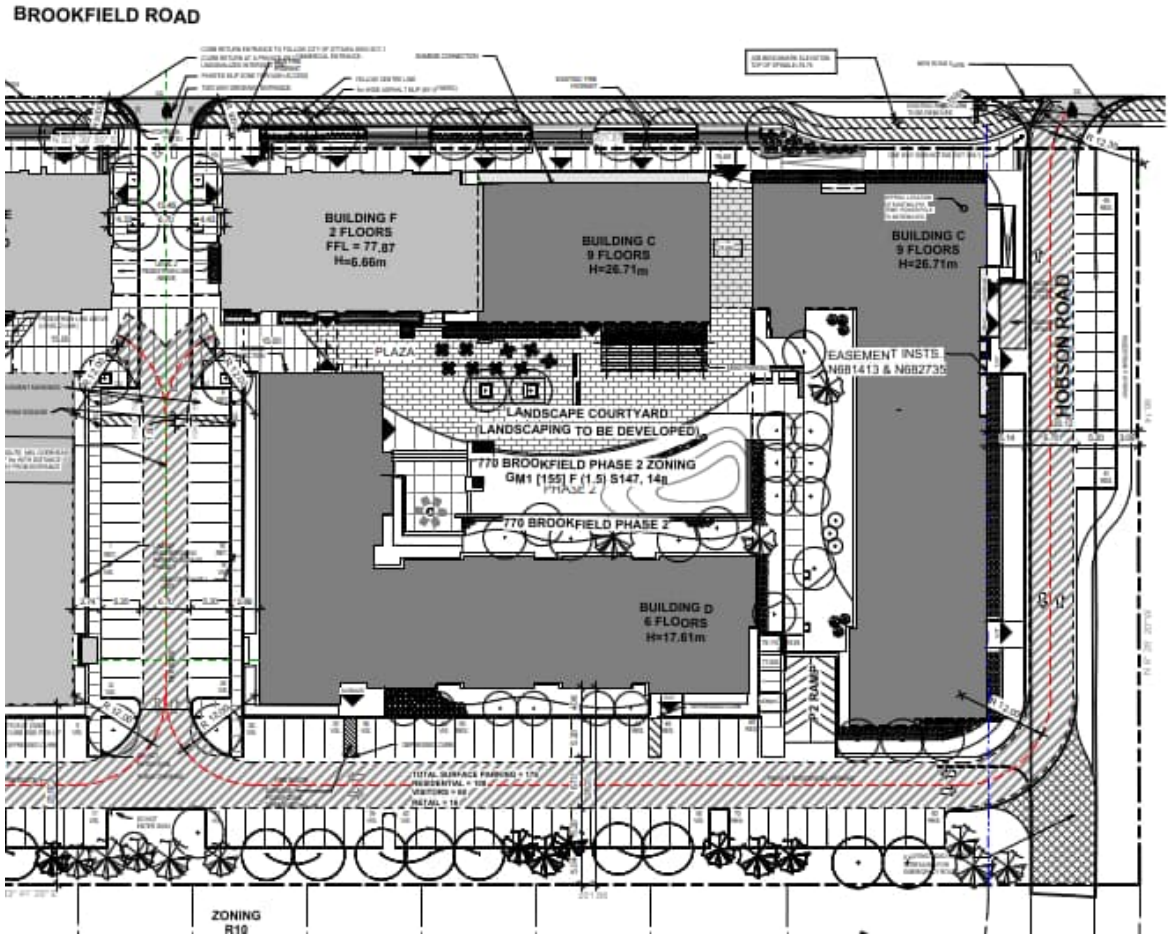
SERVICING & STORMWATER MANAGEMENT REPORT
770 BROOKFIELD ROAD – PHASE 2, OTTAWA



Project No.: CCO-22-3501

City File No.: D07-12-22-0109

Prepared for:

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January 20, 2023 Rev 3

McINTOSH PERRY

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1.0 PRO4JECT 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 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
    - 305 mm diameter cast iron watermain,
    - 250 mm diameter concrete sanitary sewer, tributary to the Rideau River Collector, and a
    - 750 mm diameter concrete storm sewer, tributary to Sawmill Creek sub-watershed with approximately 0.7 km to the outlet
- Hobson Road
    - 203 mm diameter cast iron watermain,
    - 300 mm diameter asbestos concrete sanitary sewer, tributary to the Rideau River Collector, and a
    - 375 mm 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
    - 200 mm diameter concrete sanitary sewer, tributary to the Rideau River Collector, and a
    - 675 mm 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 for the Site Plan Control application.

2.0 BACKROUND STUDIES, STANDARDS, AND REFRENCES

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 March 20th, 2022, 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 203 mm diameter CI watermain within Hobson Road and 305 mm diameter CI watermain within Brookfield Road available to service the development.

4.2 Proposed Watermain

Two 150 mm diameter PVC water services are proposed to service the development complete with water valves between the building and the existing watermain. The water services are proposed to be serviced by the existing 305 mm diameter watermain within Brookfield Road. The services are designed to have a minimum of 2.4 m 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)	2.53
Maximum Daily Demand (L/s)	5.55
Peak Hourly Demand (L/s)	13.85
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*. Demands have decreased by approximately 7% since the boundary condition request was received which is not anticipated to have a significant impact on the results. 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	2.53	54.5 / 534.4
Maximum Daily + Fire Flow Demand	5.55 + 200 = 205.55	45.0 / 441.3
Peak Hourly Demand	13.85	48.3 / 473.6
**Adjusted for an estimated ground elevation of 77.92m above the connection point.*		

The normal operating pressure range is anticipated to be 474 kPa to 534 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.

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 300 mm diameter concrete sanitary sewer within Hobson Road and a 250 mm diameter concrete sanitary sewer within Brookfield Road available to service the development. In addition, there is an existing 200 mm diameter concrete sanitary sewer within the center drive aisle that currently services the Phase 1 development.

5.2 Proposed Sanitary Sewer

A new 200 mm diameter gravity sanitary is proposed be connected to the existing 250 mm diameter sanitary sewer within Brookfield Road to service Building C. Building D is proposed to be serviced by a 200 mm diameter gravity sanitary service connected to the existing 300 mm diameter sanitary sewer within Hobson Road. A portion of sanitary flows from Building D will be directed to the 200mm diameter sanitary service currently servicing existing Building F Based on coordination with the mechanical engineer, multiple sanitary connections are 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 *6.01 L/s* from Building C and *3.26 L/s* for Building D. See *Appendix 'D'* of this report for more details.

Table 4: Sanitary Design Criteria

Design Parameter	Value
Site Area	0.91 ha
Residential	280 L/person/day
Bachelor & 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
Residential Peaking Factor	3.37 (Building C) 3.48 (Building D)
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	Building C Flow (L/s)	Building D Flow (L/s)	Total Flow (L/s)
Total Estimated Average Dry Weather Flow	1.77	0.91	2.68
Total Estimated Peak Dry Weather Flow	5.75	3.01	8.76
Total Estimated Peak Wet Weather Flow	6.01	3.26	9.27

The proposed 200 mm diameter gravity sanitary services 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 laterals is 34.22 L/s at a proposed slope of 1.0%. Therefore, the building services are sufficiently sized to accommodate the development. Refer to *Appendix D* for the Building C and Building D sanitary sewer design sheets.

Due to the complexity of the downstream network, City staff 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 375 mm diameter concrete storm sewer within Hobson Road that is available for servicing the proposed development.

6.2 Proposed Storm Sewers

A new 375 mm storm service will be extended from the existing 750 mm diameter storm sewer within Brookfield Road. The sewer system will provide attenuation for the Building C roof area using roof drains and the internal courtyard area by an internal cistern pumped to the required release rate. A cistern detail has been provided by Hobin Architecture, refer to *Appendix G.*

A new 250 mm storm service will be extended from the existing 375mm diameter concrete storm sewer within Hobson Road. The sewer system will provide attenuation for the Building D roof area using roof drains.

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 375 mm diameter storm service extending from Building C, 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 750 mm diameter storm sewer within Brookfield 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:

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

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	0.913	52.93	109.03

7.4 Post-Development Drainage

The post-development release rate has been established using the *Functional Servicing and Stormwater Management Report* and City of Ottawa design criteria. Refer to *Table 7* below for further details.

Table 7: Post-Development Release Rate

Drainage Area	Area (ha)	Q (L/s)		
		2-Year	5-Year	100-Year
Ultimate Site (Phase 1 Design)	2.523	202.77	-	-
EX-1	0.511	47.64	64.40	110.06
Total	3.034	250.41	267.17	312.84
**EX-1 is controlled to existing conditions for 2, 5, and 100-year storm events.*				

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 8: 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	2.52	4.62	73.15	76.93
C4	0.092	98.87	115.56	346.33	350.00
A	0.904				
EX-1	0.511				
BLDG	0.491			170.60	388.70
C2	0.225	5.46	9.36	92.42	95.48
C3	0.210	15.84	31.01	16.24	16.24
U	0.215	32.33	63.17	-	-
C5	0.028	7.39	14.07	-	-
C6	0.197	38.97	75.05	-	-
Total	3.034	201.38	312.84	698.74	927.35

Post development drainage will be restricted to a maximum release rate of *267.2 L/s* during the 5-year storm event and *312.84 L/s* during the 100-year storm event, as per *Table 7* above.

Runoff for area C1 (Phase II Building D) will be stored on the roof of the proposed building and restricted using seven Watts Accutrol roof drains (or equivalent product) and will provide up to *76.9 m^3* of storage. Stormwater will be conveyed to the existing storm sewer within Hobson Road via the proposed 200 mm storm service at a maximum release rate of *4.62 L/s*.

Runoff from area C4 (Phase II) will sheet drain without attenuation towards the Phase I storm network within the south-east corner of the site.

Runoff from area A (Phase I Controlled) and BLDG (Phase I Building Controlled) will continue to sheet drain without attenuation towards the Phase I storm network. Roof areas within this area will be controlled via roof drains. No changes to site grading and/or storm sewer sizing is proposed within this area. Refer to *Functional Servicing and Stormwater Management report* for further details.

In accordance with the *Stormwater Management Memorandum – Proposed Amendment to 770 Brookfield Road* prepared by DSEL and dated October 5th, 2020, an external drainage area south of the site currently enters the property and is collected by the Phase I design. Runoff within this area will continue to be conveyed through the Phase I system. No offsite grading is proposed.

The existing ICD, installed on the outlet site of the Phase I storm structure STM102, is proposed to be replaced with a 197mm ICD to accommodate the added Phase II area (C4). Stormwater storage will continue to be provided by the existing 350 m^3 stormwater storage system. No ponding is proposed on the surface during any storm event. Overland flow routes for the Phase I area are towards Hobson Road via the southern drive aisle and towards Brookfield Road via the center drive aisle. Overland flow routes are proposed to be retained.

Runoff for area C2 (Phase II Building C) will be stored on the roof of the proposed building and restricted using thirteen Watts Accutrol roof drains (or equivalent product) to a maximum release rate of *9.36 L/s* and will provide up to *95.48 m^3* of storage.

Runoff from area C3 will be collected by area drains within the courtyard. The internal plumbing system will direct flow to an internal cistern. The *16.24 m^3* internal cistern is proposed to convey stormwater to the outlet via pump at a maximum flow rate *31.0 L/s*. Based on coordination with the mechanical engineer, flows in excess of the 100-year storm event will need to be directed towards Hobson Road via a cistern overflow structure. Foundation drainage will be pumped and discharged via the 375 mm storm service, downstream of cistern controls. A cistern detail has been provided by Hobin Architecture, refer to *Appendix G.*

Runoff from area U (Phase I Uncontrolled) will continue to sheet drain without attenuation towards Brookfield Road.

Runoff from area C5 (Phase II Uncontrolled) will sheet drain without attenuation towards Brookfield Road.

Runoff from area C6 (Hobson Road will sheet drain without attenuation towards Hobson Road and will be collected by the existing municipal 375 mm diameter storm sewer.

7.5 Quality Controls

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

- Areas C1 & C2 will collect rooftop drainage and therefore drainage is considered clean.
- Quality controls for Area C3 will be provided via the cistern in a settling pit. No surface parking is proposed within this area. Cistern 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 from C4 will be treated by the OGS unit. The manufacturer has been contacted to confirm that the OGS unit will provide 80% TSS removal for the Phase 1 development, area EX-1 and area C4.

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.
- Dual 150 mm diameter water services are proposed to be connected to the existing 305 mm diameter watermain within Brookfield Road.
- Two 200 mm diameter sanitary services are proposed to service the Phase II development. Building C will be serviced via the 250 mm diameter sanitary sewer within Brookfield Road and Building D will be serviced via the 300 mm diameter sanitary sewer within Hobson Road and the existing 200 mm diameter sanitary service from Building F.
- A new 375 mm storm service for rooftop, surface, and foundation drainage is proposed to service the development. The storm service will connect to the 750 mm diameter storm sewer within Brookfield Road.
- A new 200 mm storm service is proposed to service rooftop drainage for Building D, extending from the 375 mm diameter storm sewer within Hobson Road.
- Storage for the 5- through 100-year storm events will be provided through roof attenuation, internal cistern attenuation, and through the existing Phase I storm sewer network.
- Quality control is proposed to be provided via the cistern settling pit and existing Phase I OGS unit.

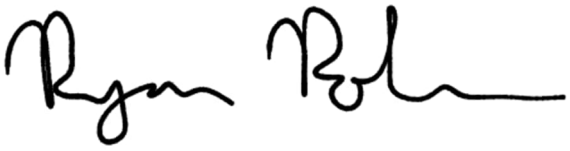
10.0 RECOMMENDATION

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

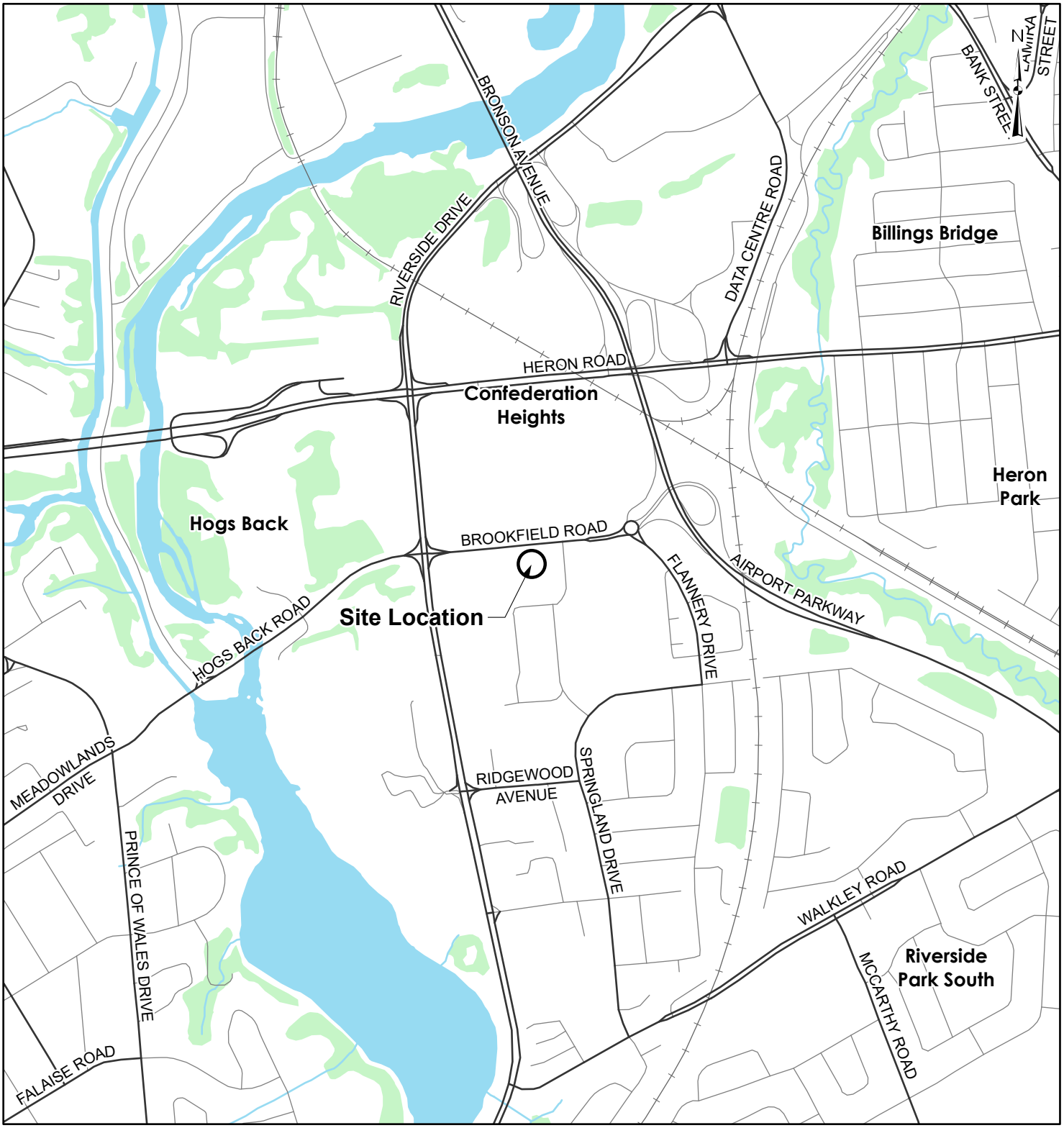
This report was produced for the exclusive use of Hobin Architecture Inc. The purpose of the report is to assess the existing stormwater management system and provide recommendations and designs for the post-construction scenario that are in compliance with the guidelines and standards from the Ministry 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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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

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

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

FIGURE: 1

C:\Users\M Grunstra\McIntosh Perry\GIS - Documents\Projects\2022\CCO\CCO-22-3501 Hobin - 770 Brookfield Key Map\aprx\Key Maps\Environmental\CCO-22-3501 Hobin - 770 Brookfield Key Map Option D.aprx

APPENDIX B
BACKGROUND DOCUMENTS

McINTOSH PERRY

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 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).

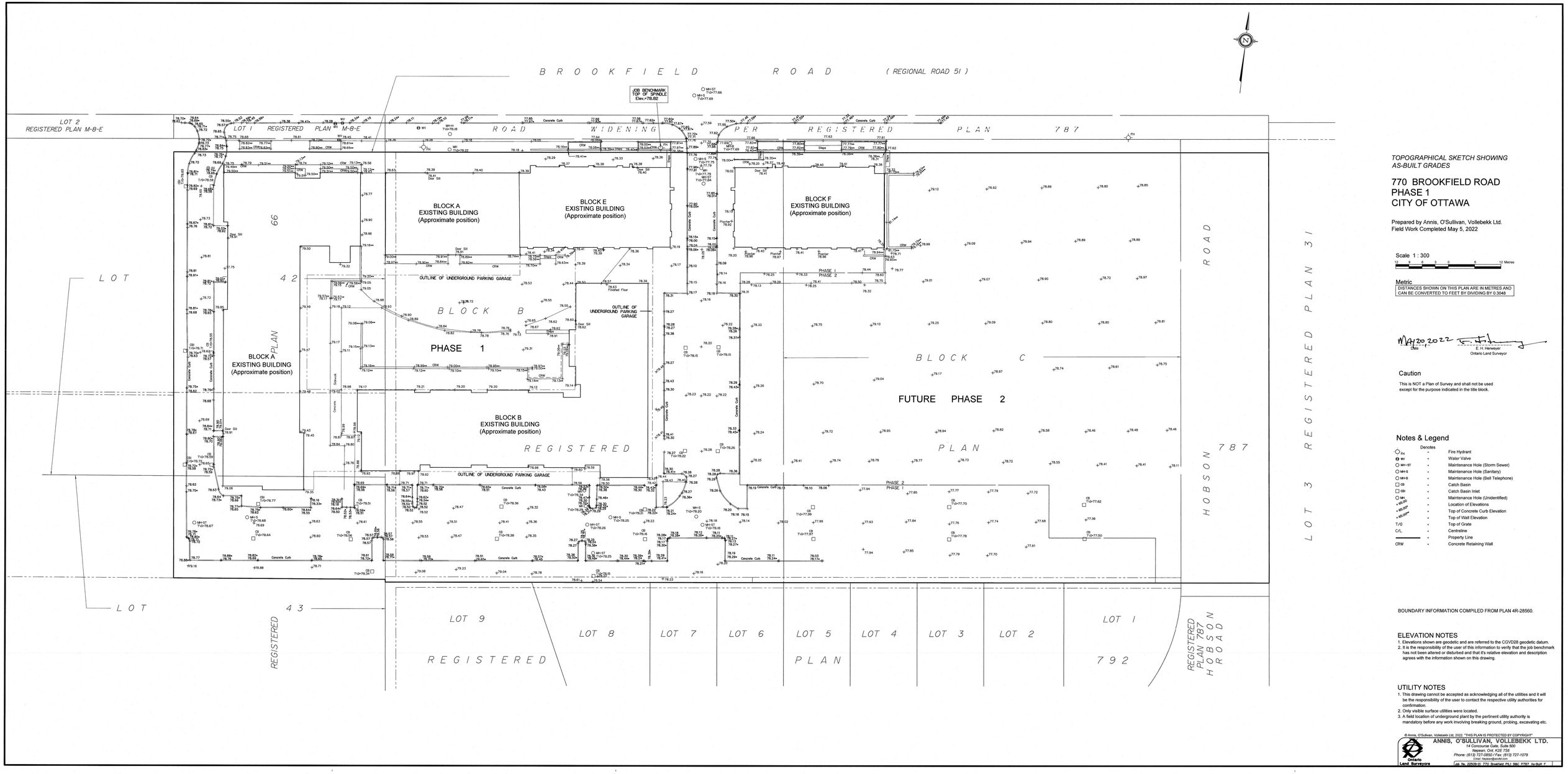
Coordinate values are to urban accuracy in accordance with O. Reg. 216/10.

. 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
Date

E.H. Harwerys'
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 45.00	=	Location of Elevations
+ 45.00*	=	Top of Concrete Curb Elevation
+ 45.00**	=	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.

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
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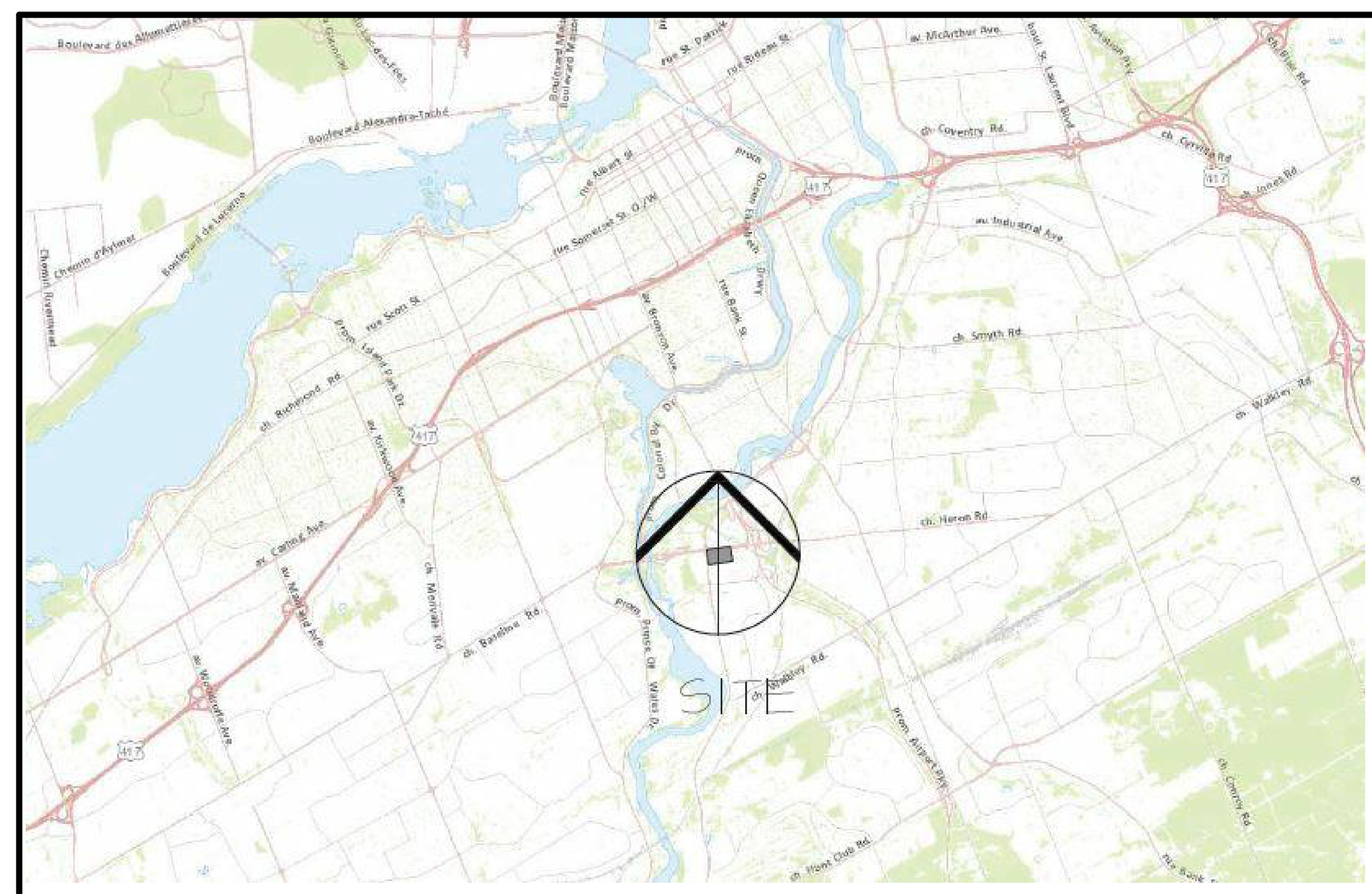
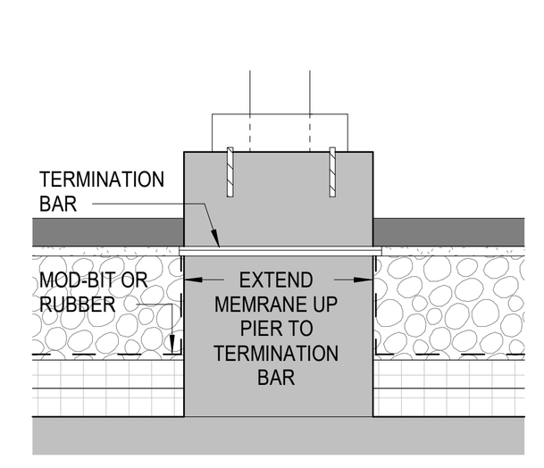
Ontario Land Surveyors

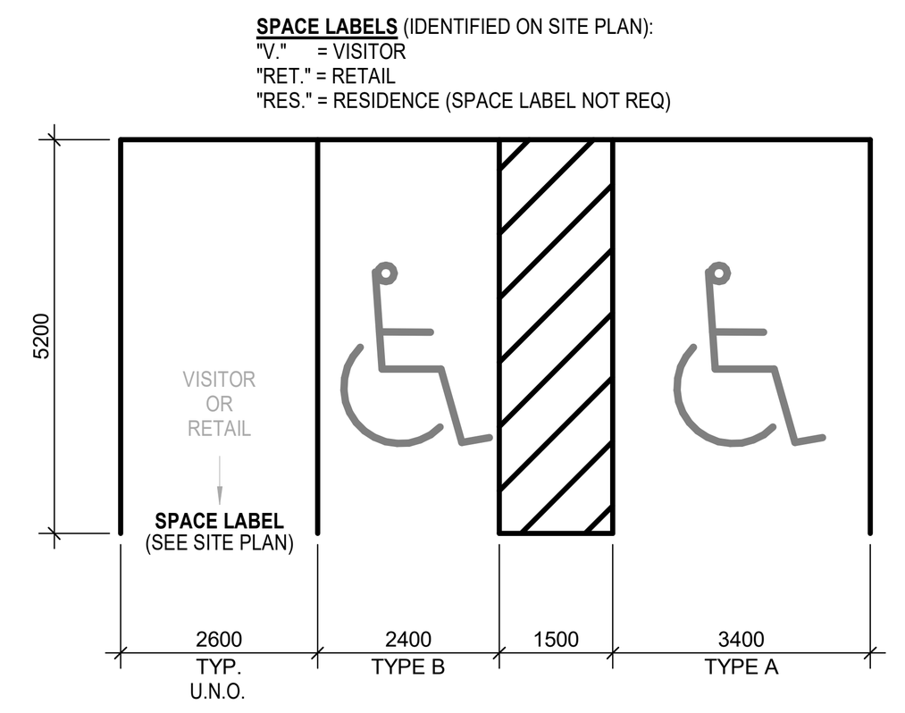
Job No. 22009-2r 770 Brookfield PH1 99C #787 As-Built F



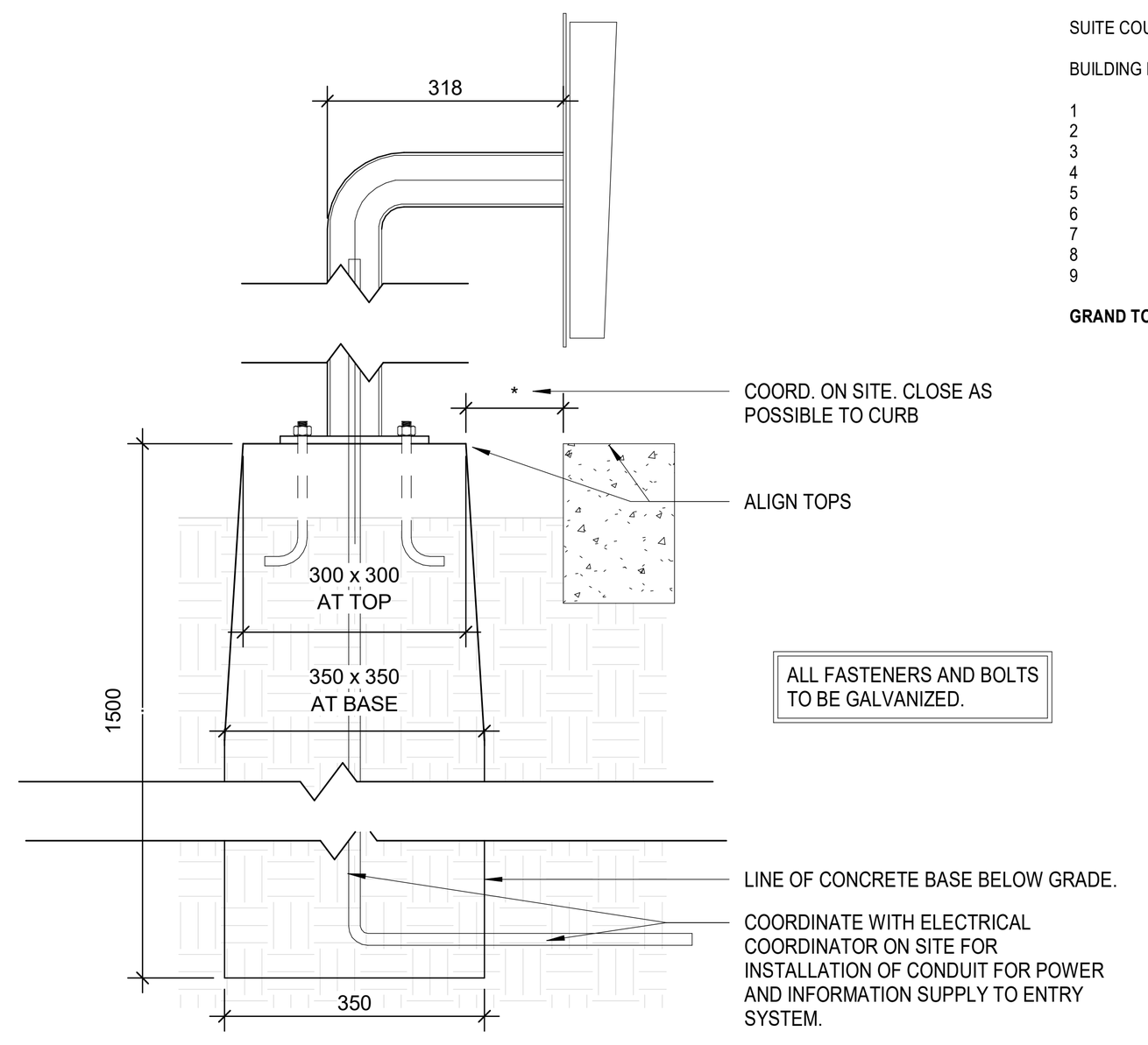
LOCATION PLAN



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

SUITE COUNT BUILDINGS C + D

BUILDING LEVEL	BACH	1 BED	2 BED	3 BED	4 BED	4 BED(2 BATH)	TOTAL
1	16	2	9	3	1	2	33
2	32	5	13	0	2	6	58
3	26	5	14	2	2	6	55
4	26	5	13	2	2	6	54
5	26	5	13	2	2	6	54
6	26	5	13	2	2	6	54
7	13	4	7	2	1	4	31
8	13	4	7	2	1	4	31
9	13	4	7	2	1	4	31
GRAND TOTAL	**191**	**39**	**96**	**17**	**14**	**58**	**401**

UNIT COUNT

BUILDING LEVEL	BLOCK A	BLOCK B	BLOCK C	BLOCK D	TOTAL
1	12	22	11	22	68
2	38	23	35	23	122
3	34	24	31	24	116
4	34	23	31	23	114
5	34	23	31	23	114
6	34	23	31	23	114
7	34	0	31	0	68
8	34	0	31	0	68
9	34	0	31	0	68
GRAND TOTAL	**288**	**138**	**263**	**138**	**827**

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:	6050.7	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 (A) + 1585.2 (B)
L4:	3730.8	2244.2 (A) + 1486.6 (B)
L5:	3730.8	2244.2 (A) + 1486.6 (B)
L6:	3730.8	2244.2 (A) + 1486.6 (B)
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) 587.8 m2
BLOCK C (PH2) 587.8 m2
BLOCK E (PH1) 628.7 m2
BLOCK F (PH1) 628.7 m2

TOTAL: 2,433 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) SITE AREA (SURVEY)	24,655 m2 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		401 UNITS
TOTAL RESIDENTIAL UNITS PHASE 1+2		827 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 =	538 m2
LEVEL 2 =	1,647 m2
LEVELS 3-9 =	1,668 m2 / FLOOR
TOTAL =	**14,523 m2**
BLOCK B	
LEVEL 1 =	997.31 m2
LEVEL 2 =	1,030.69 m2
LEVEL 3 =	1,105.08 m2
LEVEL 4-6 =	1,031.26 m2 / 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 =	1,668m2 / FLOOR
TOTAL =	**14,488m2**
BLOCK D	
LEVEL 1 =	997.31m2
LEVEL 2 =	1,030.69m2
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**

	REQUIRED	PROVIDED
BUILDING HEIGHT:	27m MAX.	27m

YARDS:

	REQUIRED	PROVIDED
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	(REQ'D FOR AREA X, ZONING BY-LAW 2019-256)	
RESIDENTIAL PARKING TOTAL UNITS MINUS FIRST 12 UNITS/BUILDING (426+401) - 24 = 803 UNITS (MIN. 0.5/UNIT)	402 SPACES	402 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	9
BLOCK E 4 TENANTS @158m²=635m²	0	10
BLOCK F 4 TENANTS @158m²=635m²	0	10
BLOCK C PH.2 3 TENANTS @180m²=541m²	0	10
TOTAL RETAIL 2,334m²	0	39 SPACES
TOTAL PARKING	**462 SPACES**	**501 SPACES**

PARKING DISTRIBUTION

PHASE 1+2 TOTAL PARKING DISTRIBUTION	
UNDERGROUNG PARKING LEVELS	
P1 LEVEL PHASE 1	133
P1 LEVEL PHASE 2	199
SURFACE PARKING PHASE 1+2 (*Total % of surface parking 33.6%) (70 Res+60 Vis+40 Ret)	169
TOTAL PARKING PHASE 1+2	501

BICYCLE PARKING

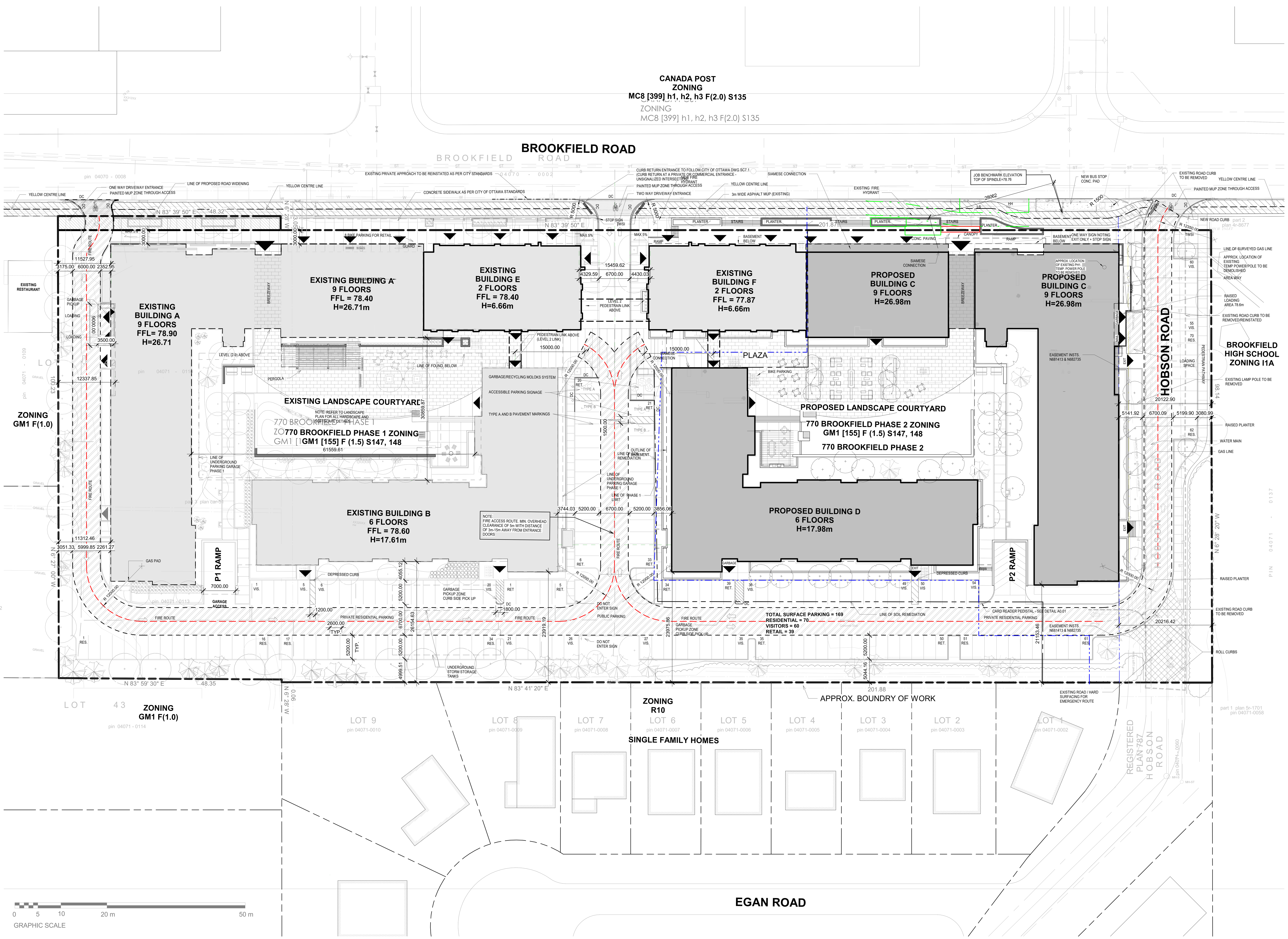
	REQUIRED	PROVIDED
BICYCLE PARKING PHASE 1+2 827 UNITS RETAIL	MIN. 0.5/UNIT 413 SPACES (1 / 250 m2) 9 SPACES	
TOTAL	**422 SPACES**	**425 SPACES**

Ph 1 (16 exterior + 184 interior bike stalls) 200.
Ph 2 (18 exterior + 207 interior bike stalls) 225

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**	**7,623 m2**

NOTE: ALL PARKING SPACES 2600x5200 UNLESS OTHERWISE NOTED.



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

LEGEND:

- PROPERTY LINE
- EASEMENT
- BUILDING FOOTPRINT
- BUILDING PROJECTION
- EXISTING BUILDING
- BARRIER FREE PARKING
- 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) 738-4160

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
2	221211	Issued for Permit, SI-002
1	221130	Issued with SI-001
F	221123	Issued for Permit
E	221107	Issued for Permit - Comments
D	220915	Issued for Block F Revisons Permit
C	220914	Issued for Foundation Permit
B	220824	Issued to Ex. Permit
A	220624	Issued for Site Plan

It is the responsibility of the appropriate contractor to check and verify all dimensions on site and report all errors and/or omissions to the engineer.

All contractors must comply with all

Do not scale drawings.

This drawing may not be used for construction until signed.

Hobin Architecture Incorporated
63 Pamilla Street
Ottawa, Ontario
Canada K1S 3K7
T: 613-238-7200
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E: mail@hobinarc.com
hobinarc.com
HOBIN ARCHITECTURE

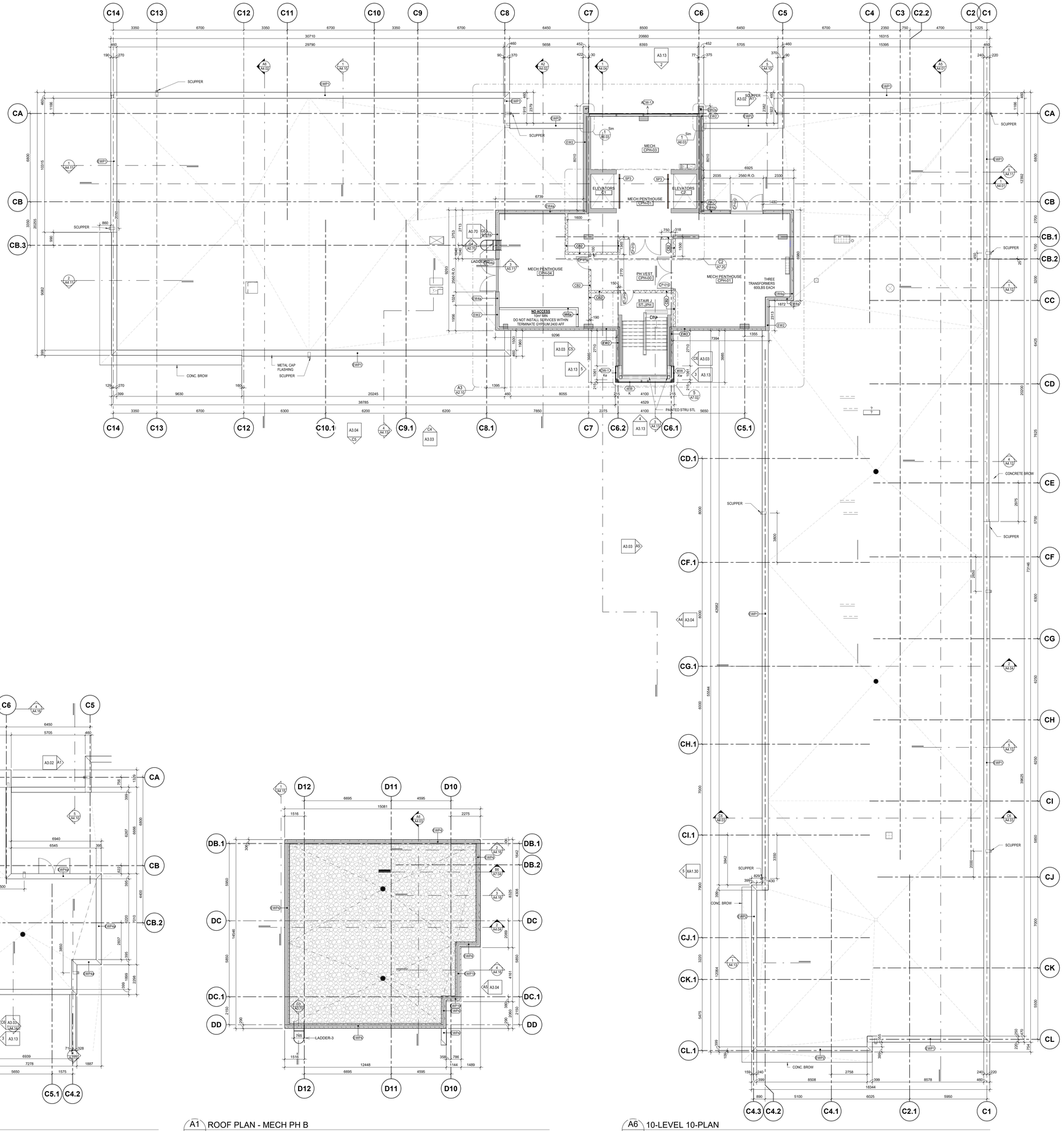
PROJECT
770 BROOKFIELD PHASE 2
770 BROOKFIELD, OTTAWA, ON.

DRAWING TITLE
SITE PLAN

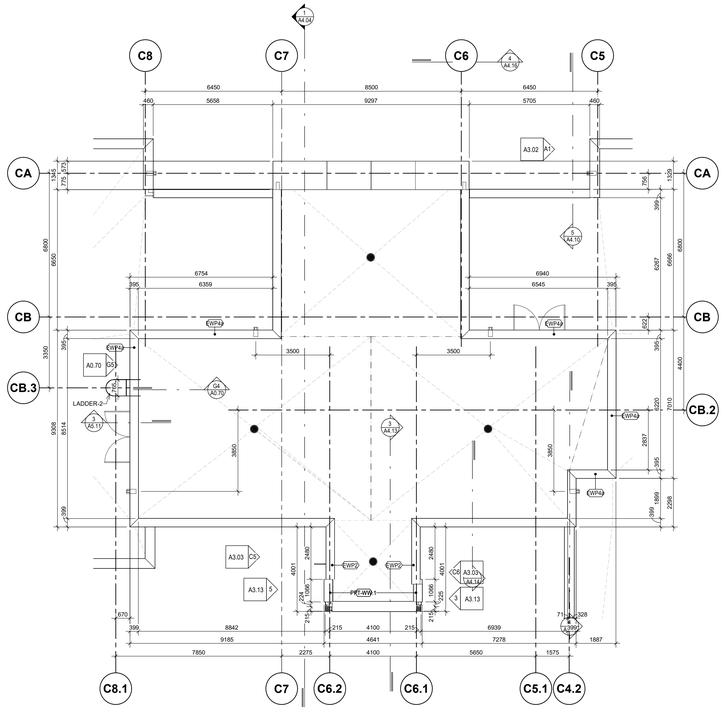
DRAWN	DATE	SCALE
D.H.	08/10/21	As indicated

PROJECT 2204
DRAWING NO. A1.00
REVISION NO. 2

ONTARIO ASSOCIATION OF ARCHITECTS — BARRY J. HOBIN LICENCE 3049



A3 / A2.10 ROOF PLAN - MECH PH
SCALE: 1 : 100



A1 / A2.10 ROOF PLAN - MECH PH B
SCALE: 1 : 100

A6 / A2.10 10-LEVEL 10-PLAN
SCALE: 1 : 100

No.	Date	Revision

It is the responsibility of the appropriate contractor to check and verify all dimensions on site and report all errors and/or omissions to the engineer.

All contractors must comply with all

Do not scale drawings.

This drawing may not be used for construction until signed.

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HOBIN ARCHITECTURE

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

DRAWING TITLE
BUILDING A MECH. PENTHOUSE

DRAWN	DATE	SCALE
KL	06/01/21	1 : 100

PROJECT 2204

DRAWING NO. A2.10

REVISION NO. 2

ONTARIO ASSOCIATION OF ARCHITECTS
JEFF HOBIN
LICENCE 3049

FLOW CONTROL ROOF DRAINAGE DECLARATION

THIS FORM TO BE COMPLETED BY THE MECHANICAL AND STRUCTURAL ENGINEERS RESPONSIBLE FOR DESIGN

Permit Application No.

Project Name: 770 Brookfield Phase 2

Building Location: 770 Brookfield Ave Municipality: Ottawa

The roof drainage system has been designed in accordance with the following criteria: (please check one of the following).

M1. ☐ Conventionally drained roof (no flow control roof drains used).

M2. ☒ Flow control roof drains meeting the following conditions have been incorporated in this design:

(a) the maximum drain down time does not exceed 24h,
(b) one or more scuppers are installed so that the maximum depth of water on the roof cannot exceed 150mm,
(c) drains are located not more than 15m from the edge of roof and not more than 30m from adjacent drains, and
(d) there is at least one drain for each 900 sq.m

M3. ☐ A flow control drainage system that does not meet the minimum drainage criteria described in M2 has been incorporated in this design

PROFESSIONAL SEAL APPLIED BY:

Practitioner's Name: Adrianne Mitani

Firm: Smith + Andersen

Phone#: 613-230-1186

City: Ottawa Province: Ontario

Mechanical Engineer's Seal

S1. ☒ The design parameters incorporated into the overall structural design are consistent with the information provided by the Mechanical Engineer in M2. Loads due to rain are not considered to act simultaneously with loads due to snow as per Sentence 4.1.7.3 (3) OBC.

S2. ☐ The structure has been designed incorporating the additional structural loading due to rain acting simultaneously with the snow load. The design parameters are consistent with the control flow drainage system designed by the mechanical engineer.

PROFESSIONAL SEAL APPLIED BY:

Practitioner's Name: Richard Cunliffe

Firm: Cunliffe & Associates

Phone#: 613-729-7242 x222

City: Ottawa Province: ON

Structural Engineer's Seal

770 Brookfield Drive

Meeting Summary Notes

March 30, 2022, Online Teams Meeting

Attendees:

- Greg Stallard, Turner & Townsend, Owner
- Gord Lorimer, Hobin Architects
- Rheal Labelle, Hobin Architects
- Imran Shaikh, Campus Developments, Owner
- Dan Henhoeffer, Hobin Architects
- Jaime Posen, Fotenn Consultants.
- Nathan Petryshyn, Fotenn Consultants.

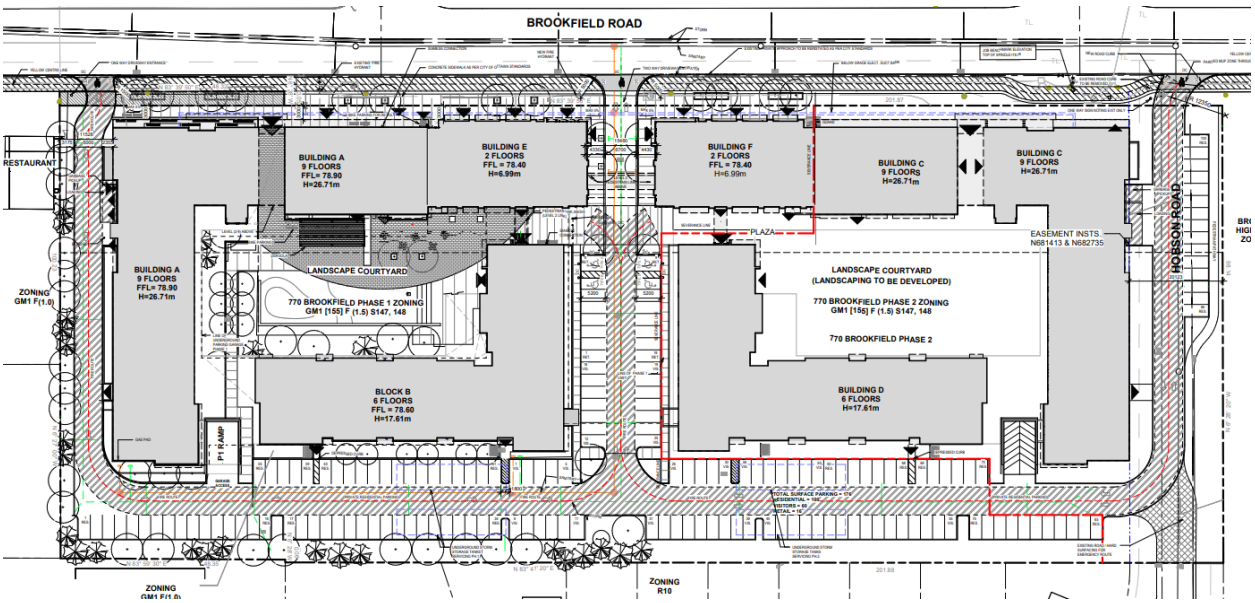
- Golam Sharif (Project Manager, City of Ottawa)
- Christopher Moise (Urban Designer, Architect, City of Ottawa)
- Burl Walker (Parks Planner, City of Ottawa)
- Tracey Scaramozzino (File Lead, Planner, City of Ottawa)

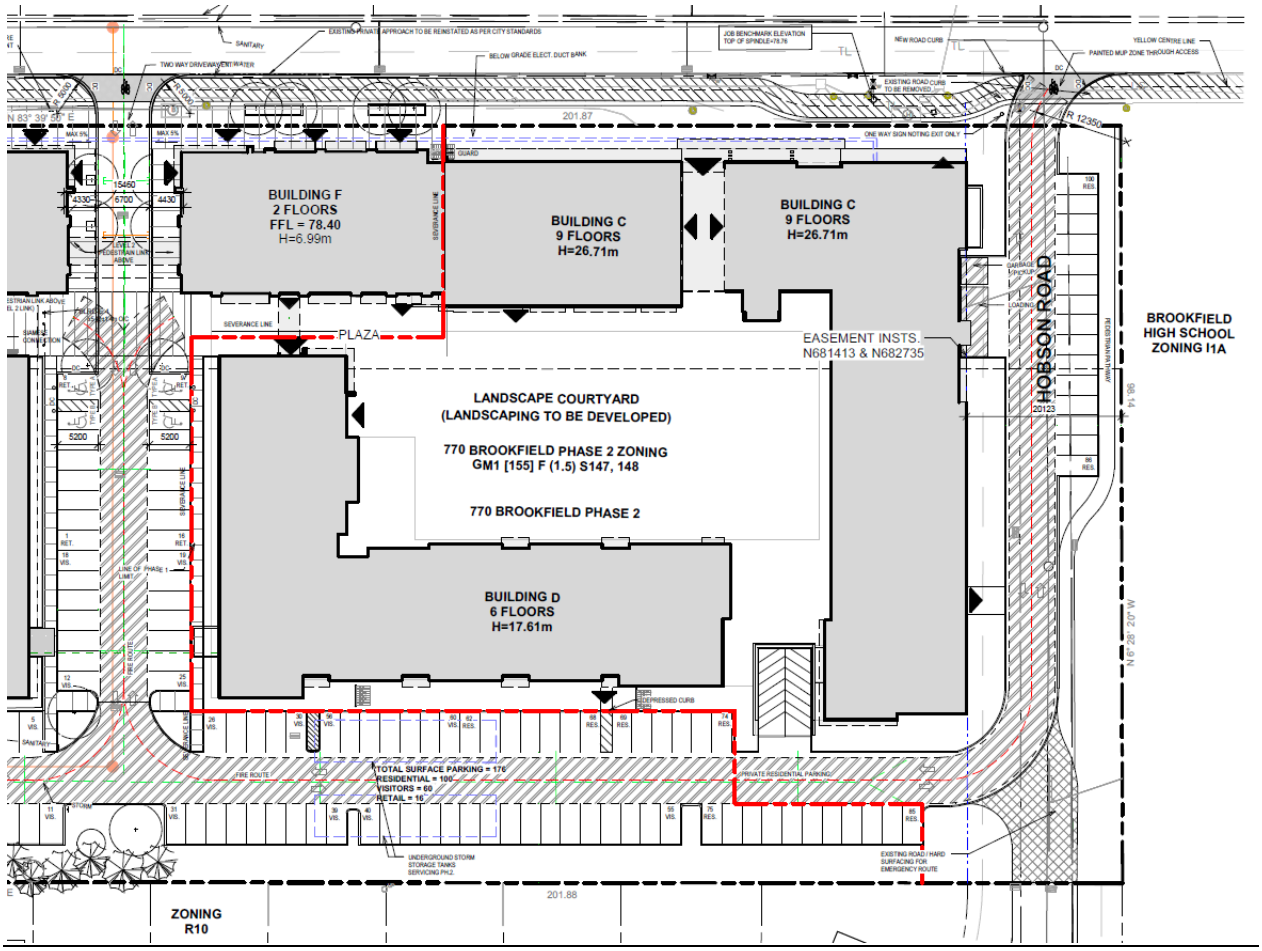
Unable to Attend:

- Mark Richardson, Planning Forester
- Jamie Batchelor, RVCA
- Wally Dubyk (Transportation Project Manager, City of Ottawa)
- Matthew Hayley, Environment Planner

Issue of Discussion:

- Phase 2 of the Brookfield 'student housing' development
- Phase 1 was approved in 2019 and construction was completed in 2021.
- This is a new preconsultation meeting and a fee is req'd. The previous discussions were held several years ago and are only valid for 1 year. The fee will be refunded if an application is submitted within 1 yr.
- The legal agreement will be an amending agreement (as confirmed by Wendy Tse who was the file lead for Phase 1 of the project).
- Discussions are ongoing between the Applicant and OC Transpo regarding the placement of the permanent bus shelter in front of Phase 1.


BROOKFIELD ROAD
RESTAURANT
BUILDING A
9 FLOORS
FFL= 78.90
H=26.71m
BUILDING E
2 FLOORS
FFL = 78.40
H=6.99m
BUILDING F
2 FLOORS
FFL = 78.40
H=6.99m
BUILDING C
9 FLOORS
H=26.71m
BUILDING C
9 FLOORS
H=26.71m
HOBSON ROAD
PLAZA
EASEMENT INSTS.
N681413 & N682735
LANDSCAPE COURTYARD
LANDSCAPE COURTYARD
(LANDSCAPING TO BE DEVELOPED)
770 BROOKFIELD PHASE 1 ZONING
GM1 [155] F (1.5) S147, 148
770 BROOKFIELD PHASE 2 ZONING
GM1 [155] F (1.5) S147, 148
770 BROOKFIELD PHASE 2
BLOCK B
6 FLOORS
FFL = 78.60
H=17.61m
BUILDING D
6 FLOORS
H=17.61m
P1 RAMP
ZONING
GM1 F(1.5)
ZONING
R10


BUILDING F
2 FLOORS
FFL = 78.40
H=6.99m
BUILDING C
9 FLOORS
H=26.71m
BUILDING C
9 FLOORS
H=26.71m
HOBSON ROAD
BROOKFIELD
HIGH SCHOOL
ZONING I1A
PLAZA
EASEMENT INSTS.
N681413 & N682735
LANDSCAPE COURTYARD
(LANDSCAPING TO BE DEVELOPED)
770 BROOKFIELD PHASE 2 ZONING
GM1 [155] F (1.5) S147, 148
770 BROOKFIELD PHASE 2
BUILDING D
6 FLOORS
H=17.61m
TOTAL SURFACE PARKING = 176
RESIDENTIAL = 100
VISITORS = 60
RETAIL = 16
ZONING
R10

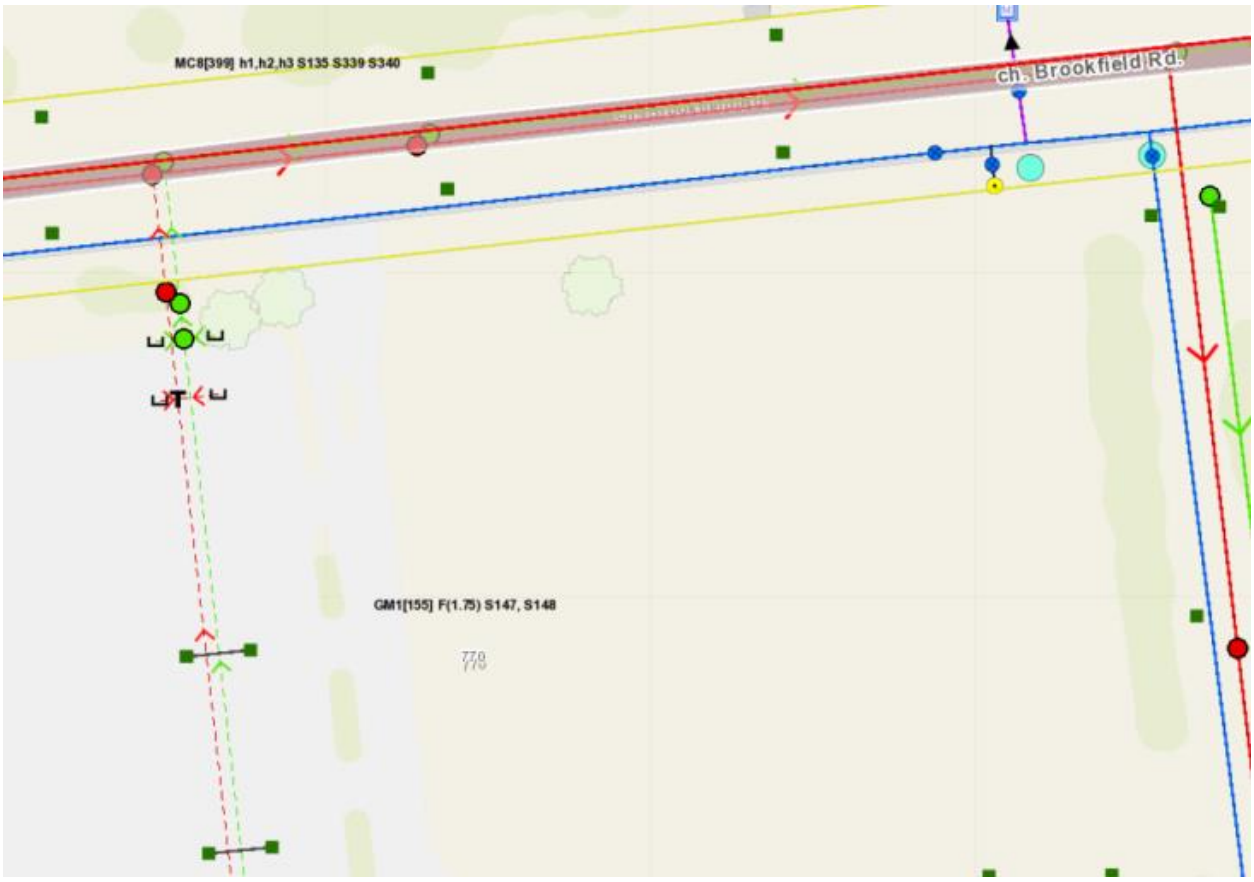
1. **Current Official Plan -** designated “General Urban Area”.

2. **New Draft Official Plan, Approved by Council, Oct 27, 2021 –** designated Outer Urban Transect, Evolving Neighbourhod

3. **Zoning Information:** GM 1 [155] F(1.75) S147, S148; Schedule 147 stipulates heights and building setbacks.

4. **Infrastructure/Servicing (Golam Sharif):**

    1. The Servicing Study Guidelines for Development Applications are available at the following address: https://ottawa.ca/en/city-hall/planning-and-development/how-develop-property/development-application-review-process-2/guide-preparing-studies-and-plans
    2. Servicing and site works shall be in accordance with the following documents:
        - Ottawa Sewer Design Guidelines (October 2012) and all the Technical Bulletins including, Technical Bulletin PIEDTB-2016-01 and ISTB-2018-01
        - Ottawa Design Guidelines – Water Distribution (2010) and Technical Bulletins ISD-2010-2, ISDTB-2014-02 and ISTB-2018-02
        - Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
        - City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
        - City of Ottawa Environmental Noise Control Guidelines (January, 2016)
        - City of Ottawa Park and Pathway Development Manual (2012)
        - City of Ottawa Accessibility Design Standards (2012)
        - Ottawa Standard Tender Documents (latest version)
        - Ontario Provincial Standards for Roads & Public Works (2013)
    3. Record drawings and utility plans are also available for purchase from the City (Contact the City’s Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x 44455
    4. The Stormwater Management Criteria, for the subject site, is to be based on the following:
        - SWM control to 2-yr storm event.
        - The 2-yr storm event using the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.
        - For separated sewer system built pre-1970 the design of the storm sewers are based on a 2 year storm.
        - The pre-development runoff coefficient or a maximum equivalent ‘C’ of 0.5, whichever is less (§ 8.3.7.3).
        - A calculated time of concentration (Cannot be less than 10 minutes).
        - Flows to the storm sewer in excess of the 2-year storm release rate, up to and including the 100-year storm event, must be detained on site.
        - For a combined sewer system the maximum C= 0.4 or the pre-development C value, whichever is less. In the absence of other information the allowable release rate shall be based on a 2 year storm event.
        - Please contact RVCA for specific water quality requirement.
    5. Deep Services:



Hydrants

Hydrant Laterals

Trunk Sewers
- Sanitary Pipe
- Combined Pipe
- Storm Pipe

Water Pipes
- Public
- Private

Storm Manholes

Storm Inlets

Valves
- Valve
- TVS, A, D

i. *A plan view of the approximate services may be seen above. Services should ideally be grouped in a common trench to minimize the number of road cuts. The sizing of available future services is:*

   a. Connections (Brookfield):

      i. 750 mm dia. STM (Conc)
      ii. 300 mm dia. Watermain (CI)
      iii. 250 mm dia. Sanitary (Conc).

ii. *Provide existing servicing information and the recommended location for the proposed connections. Services should ideally be grouped in a common trench to minimize the number of road cuts.*

iii. *Connections to trunk sewers and easement sewers are typically not permitted.*

iv. *Provide information on the monitoring manhole requirements – should be located in an accessible location on private property near the property line (ie. Not in a parking area).*

v. *Review provision of a high-level sewer.*

vi. *Provide information on the type of connection permitted*

Sewer connections to be made above the springline of the sewermain as per:

a. Std Dwg S11.1 for flexible main sewers – *connections made using approved tee or wye fittings.*

b. Std Dwg S11 (For rigid main sewers) – *lateral must be less that 50% the diameter of the sewermain,*

c. Std Dwg S11.2 (for rigid main sewers using bell end insert method) – *for larger diameter laterals where manufactured inserts are not available; lateral must be less that 50% the diameter of the sewermain,*

d. Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the sewermain. – Connect obvert to obvert with the outlet pipe unless pipes are a similar size.

e. *No submerged outlet connections.*

6. Water Boundary condition (required to verify the current BC) requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:
   i. Location of service
   ii. Type of development and the amount of fire flow required (as per FUS, 1999).
   iii. Average daily demand: ___ l/s.
   iv. Maximum daily demand: ___l/s.
   v. Maximum hourly daily demand: ___ l/s.
   vi. Hydrant location and spacing to meet City's Water Design guidelines.
   vii. Water supply redundancy will be required for more than 50 m3/day water demand.
7. Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.
8. MECP ECA Requirements –

   All development applications should be considered for an Environmental Compliance Approval (ECA) by the Ministry of the Environment, Conservation, and Parks (MECP);

   a. Consultant determines if an approval for sewage works under Section 53 of OWRA is required. Consultant then determines what type of application is required and the City's project manager confirms. (If the consultant is not clear if an ECA is required, they will work with the City to determine what is required. If the consultant it is still unclear or there is a difference of opinion only then will the City PM approach the MECP.

   b. The project will be either transfer of review (standard), transfer of review (additional), direct submission, or exempt as per O. Reg. 525/98.

c. Pre-consultation is not required. d. Standard Works ToR Draft ECA's are sent to the local MECP office ([mailto:moeccottawasewage@ontario.ca).for]moeccottawasewage@ontario.ca).for information only

d. Additional ToR draft ECAs require a project summary/design brief and require a response from the local MECP (10 business day window)

9. Water supply redundancy will be required for more than 50 m3/day water demand.
10. Service connections to easement is not permitted.
11. PH1 sanitary servicing will have to upgrade as per the PH1 servicing report.
12. The site is within the Sawmill Creek sub watershed, please contact RVCA for specific SWM criteria as per the Sub watershed Study.

5. Initial Planning Comments (Tracey Scaramozzino):

a. Discuss proposal with local Councillor and Community Associations
b. Ensure ample greenspace/useable amenity space
c. Use native species and avoid monocultures when possible
d. Please provide a copy of the revised noise study that reviewed the enlarged and re-located HVAC system.
e. Provide an update once the stop sign has been installed for vehicles leaving the site, prior to crossing the MUP.
f. I am waiting to hear back from my colleague re. the desirability of painting the MUP green. Thank you for the offer.

6. Urban Design Comments (Christopher Moise):

- We appreciate the drawings and discussion at the pre-consultation meeting and have the following comments/questions about phase II of the proposal:
    - Are there any lessons learned that could be adapted for the second phase?
    - Were there any concerns by neighbouring properties that can be addressed in phase II?
- A scoped Design Brief is a required submittal for all Site Plan/Re-zoning applications and can be combined with the Planning Rationale. Please see the Design Brief Terms of Reference provided.
    - ***Note. The Design Brief submittal should have a section which addresses these pre-consultation comments;***

7. Parks (Burl Walker):

a. The owner provided cash-in-lieu of parkland dedication in the amount of $821,501.64 through the Phase 1 site plan agreement. The cash-in-lieu of parkland dedication requirement was based on the information included with the 1st submission of the Phase 1 site plan application. The Phase 1 parkland dedication requirement was calculated based on 355 proposed apartment dwelling units, a total site area of 24,655 m^2, a commercial gross floor area ratio of 4.1% and a residential gross floor area ratio of 95.9%. The total corresponding area of parkland dedication was calculated to be 2,385 m^2. The calculations were described in the 1st Site Plan

Review letter for 716 and 770 Brookfield Road prepared by Wendy Tse and dated April 24, 2018.

b. Based on the information shown on the Phase 2 Site Plan, the combined Phase 1 and 2 development has a commercial gross floor area ratio of 4.2% and a residential gross floor area ratio of 95.8%. As the residential gross floor area ratio for the combined Phase 1 and 2 development is not greater than the ratio that was used to calculate the Phase 1 cash-in-lieu of parkland dedication requirement, there is no additional requirement for cash-in-lieu of parkland for the proposed Phase 2 development based on the provisions of the current Parkland Dedication By-law.

c. Parks and Facilities Planning is currently undertaking a legislated review for the replacement of the Parkland Dedication By-law, with the new by-law to be considered by City Council in early July 2022. The applicant is encouraged to sign up for project notifications on the Engage Ottawa project page or by emailing the project lead at Kersten.Nitsche@ottawa.ca to ensure that they are aware of the provisions of the new by-law and any potential implications for the proposed Phase 2 site plan application.

8. Trees (Mark Richardson)

TCR requirements:

1. a Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City
    a. an approved TCR is a requirement of Site Plan approval.
    b. The TCR may be combined with the LP provided all information is supplied
2. Any removal of privately-owned trees 10cm or larger in diameter, or city-owned trees of any diameter requires a tree permit issued under the Tree Protection Bylaw (Bylaw 2020 – 340); the permit will be based on an approved TCR and made available at or near plan approval.
3. The Planning Forester from Planning and Growth Management as well as foresters from Forestry Services will review the submitted TCR
    a. If tree removal is required, both municipal and privately-owned trees will be addressed in a single permit issued through the Planning Forester
    b. Compensation may be required for city owned trees – if so, it will need to be paid prior to the release of the tree permit
4. the TCR must list all trees on site, as well as off-site trees if the CRZ extends into the developed area, by species, diameter and health condition
5. please identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line)
6. If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained
7. All retained trees must be shown, and all retained trees within the area impacted by the development process must be protected as per City guidelines available at Tree Protection Specification or by searching Ottawa.ca

a. the location of tree protection fencing must be shown on the plan
b. show the critical root zone of the retained trees
c. if excavation will occur within the critical root zone, please show the limits of excavation

8. the City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.
9. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca or on City of Ottawa

LP tree planting requirements:

For additional information on the following please contact tracy.smith@Ottawa.ca

Minimum Setbacks

- Maintain 1.5m from sidewalk or MUP/cycle track.
- Maintain 2.5m from curb
- Coniferous species require a minimum 4.5m setback from curb, sidewalk or MUP/cycle track/pathway.
- Maintain 7.5m between large growing trees, and 4m between small growing trees. Park or open space planting should consider 10m spacing, except where otherwise approved in naturalization / afforestation areas. Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

Tree specifications

- Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.
- Maximize the use of large deciduous species wherever possible to maximize future canopy coverage
- Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; and include watering and warranty as described in the specification (can be provided by Forestry Services).
- Plant native trees whenever possible
- No root barriers, dead-man anchor systems, or planters are permitted.
- No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree)

Hard surface planting

- Curb style planter is highly recommended
- No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.
- Trees are to be planted at grade

Soil Volume

- Please ensure adequate soil volumes are met:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9
Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18
Conifer	25	15

Please note that these soil volumes are not applicable in cases with Sensitive Marine Clay.

Sensitive Marine Clay

- Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines

Tree Canopy Cover

· The landscape plan shall show how the proposed tree planting will replace and increase canopy cover on the site over time, to support the City's 40% urban forest canopy cover target.

· At a site level, efforts shall be made to provide as much canopy cover as possible, through tree planting and tree retention, with an aim of 40% canopy cover at 40 years, as appropriate.

· Indicate on the plan the projected future canopy cover at 40 years for the site.

9. Environment (Matthew Hayley):

a) Bird-safe Design

Given the proposal for a residential building (greater than 4 stories), please review and incorporate bird safe design elements. Some of the risk factors include glass and related design traps such as corner glass and fly-through conditions, ventilation grates and open pipes, landscaping, light pollution. More guidance and solutions are available in the guidelines which can be found here: https://ottawa.ca/en/planning-development-and-construction/developing-property/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans.

b) Urban Heat Island

Please add features that reduce the urban heat island effect (see OP 10.3.3) produced by the laneways, parking, landscaping and building footprint. For example, this impact can be reduced by adding large canopy trees, green roofs or vegetation walls, or constructing the parking lot or building differently.

10. Conservation Authority (Jamie Batchelor, RVCA):

a) There are no natural hazards identified on the property. There are also no natural heritage features identified on property which the RVCA would review in accordance with our MOA with the City.

b) **Stormwater**
The property falls within the Sawmill Creek Subwatershed Study area. Therefore the stormwater for this site will need to follow all of the recommendations in the subwatershed study. The appropriate water quality target is 'enhanced' (80% TSS removal). The stormwater management plan for the site should explore opportunities for LID measures on-site. The applicant is also strongly encouraged to refer to any upcoming new guidelines that may be coming from MECP.

11. Transportation (Wally Dubyk):

- Comments will be the same as phase1
- A screening report needs to be submitted asap.

a) We are unable to provide comments until a comprehensive transportation review has been completed. For a development of this magnitude, and in accordance with the City's TIA Guidelines, a full Transportation Impact Study is required. In addition, the site traffic trip generation data is significant and we anticipate mitigation measures will be required for this development.

Update to the TIA Guideline Forecasting Report

- We would like to inform all consultants making TIA Forecasting Report submissions to the City of Ottawa as part of a development application, that all new applications (pre-consultation meetings dated after March 3, 2021) must use the NEW TRANS Trip Generation Manual when forecasting site generated trips using this manual (see attached).
- The TRANS committee (a joint transportation planning committee serving the National Capital region) finalized a new manual early in March 2021. The document will be available in French and English on the TRANS website http://www.ncr-trans-rcn.ca/surveys/2009-trip-generation.
- The new manual has simplified the conversion from vehicle trips to person trips and then trips by modal share. The City has also developed a spreadsheet that will apply the factors of location and building type to quickly provide the existing trip numbers by mode share.

12. Waste Collection

a. Please see City's Waste Management Guidelines for multi-unit residential: - http://ottawa.ca/calendar/ottawa/citycouncil/pec/2012/11-13/Solid%20Waste%20Collection%20Guidelines%20-%20Doc%201.pdf

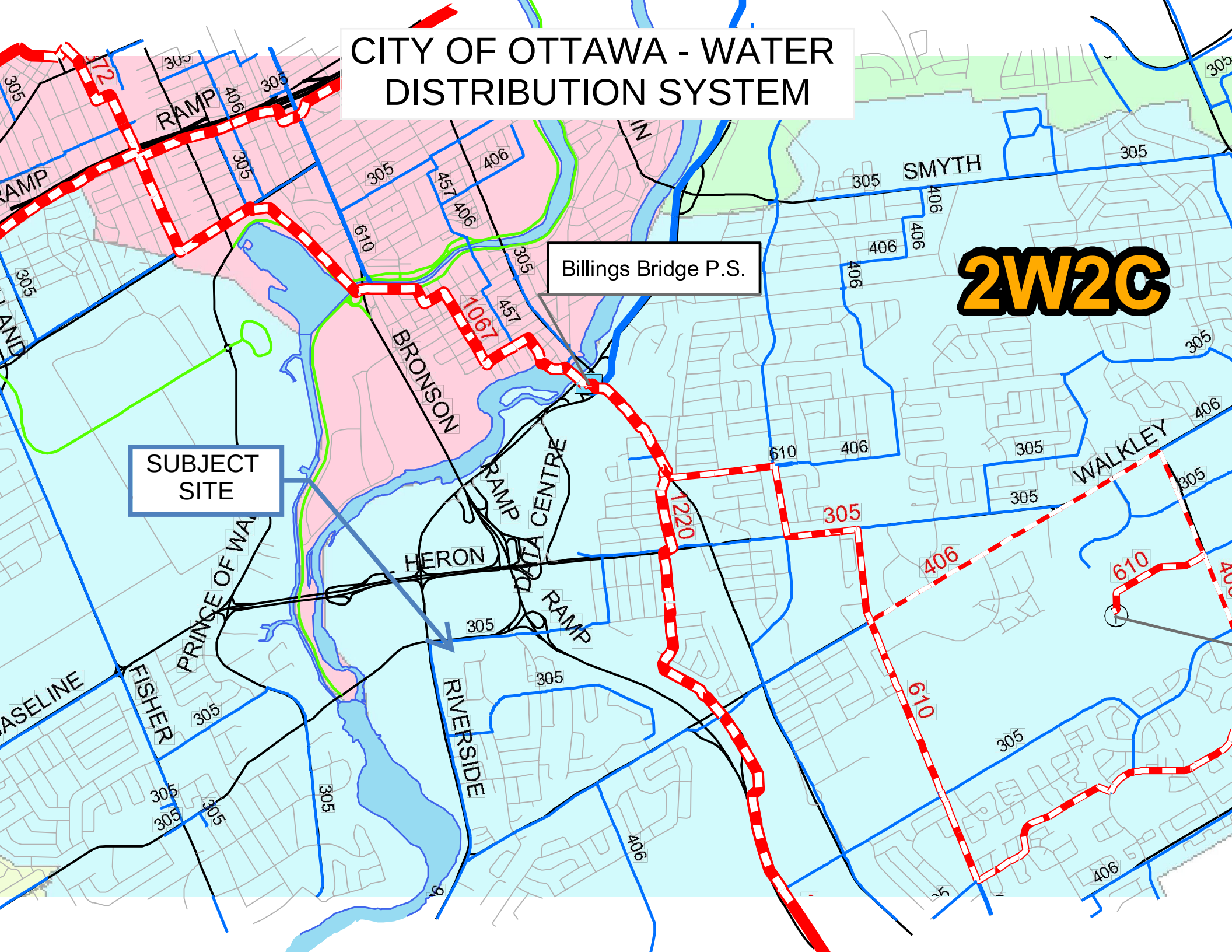
b) Make sure all the garbage rooms have their sizes identified
c) Service doors must be 2.2m in width
d) The Commercial uses will need their own waste storage area and is not to be shared with the residential uses.

13. General Information

a. Ensure that all plans and studies are prepared as per City guidelines – as available online…
https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans

APPENDIX C
WATERMAIN CALCULATIONS

McINTOSH PERRY


CITY OF OTTAWA - WATER DISTRIBUTION SYSTEM
Billings Bridge P.S.
2W2C
SUBJECT SITE
SMYTH
BRONSON
HERON
RIVERSIDE
WALKLEY
FISHER
RAMP
305
406
610
1067
1220
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:	November 3, 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	191	units	1.4	persons/unit
1 Bedroom Apartment	39	units	1.4	persons/unit
2 Bedroom Apartment	96	units	2.1	persons/unit
3 Bedroom Apartment	17	units	3.1	persons/unit
4 Bedroom Apartment	58	units	3.4	persons/unit

Total Residential Population **774 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**	**2.51**	**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**	**5.52**	**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**	**13.80**	**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	2.53	L/s
MAXIMUM DAILY DEMAND	5.55	L/s
MAXIMUM HOUR DEMAND	13.85	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:	November 3, 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**	**21,585.6**	**m^2**
	Total Floor Area (per the 2020 FUS Page 20 - Total Effective Area)		**13,585.5**	**m^2**

**Unprotected Vertical Openings*

Calculated Fire Flow	**20,514.0 L/min**
	21,000.0 L/min

B. REDUCTION FOR OCCUPANCY TYPE (No Rounding)

From Page 24 of the Fire Underwriters Survey:

Limited Combustible	-15%

Fire Flow	**17,850.0 L/min**

C. REDUCTION FOR SPRINKLER TYPE (No Rounding)

Fully Supervised Sprinklered	-50%

Reduction	**-8,925.0 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*	**2,856.0 L/min**

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

Fire Flow	**11,781.0 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:	November 3, 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

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:	November 3, 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>

Cc: Alison Gosling <a.gosling@mcintoshperry.com>
Subject: RE: 770 Brookfield Road Boundary Condition Request

Hello Sharif,

Just following up to see if you have received the Boundary Condition request below.

Thanks,

From: Ryan Robineau <r.robineau@mcintoshperry.com>
Sent: June 7, 2022 10:25 AM
To: sharif.sharif@ottawa.ca
Cc: Alison Gosling <a.gosling@mcintoshperry.com>
Subject: 770 Brookfield Road Boundary Condition Request

Dear Sharif,

We would like to request Boundary Conditions for 770 Brookfield Road. The proposed development consists of two mixed use residential buildings. Building C will consist of 288 units with 14,488m^2 of floor area and connect to existing Building F. Building D will consist of 138 units with 6,227m^2 of floor area. Please provide boundary conditions for potential service connections to the 305 mm Dia. watermain on Brookfield Road and the 203 mm Diam. watermain on Hobson Road (see attached figure).

- The estimated fire flow is 12,000 L/min based on the FUS
- Total average daily demand: 2.72 l/s.
- Total maximum daily demand: 5.97 l/s.
- Total maximum hourly daily demand: 14.90 l/s.

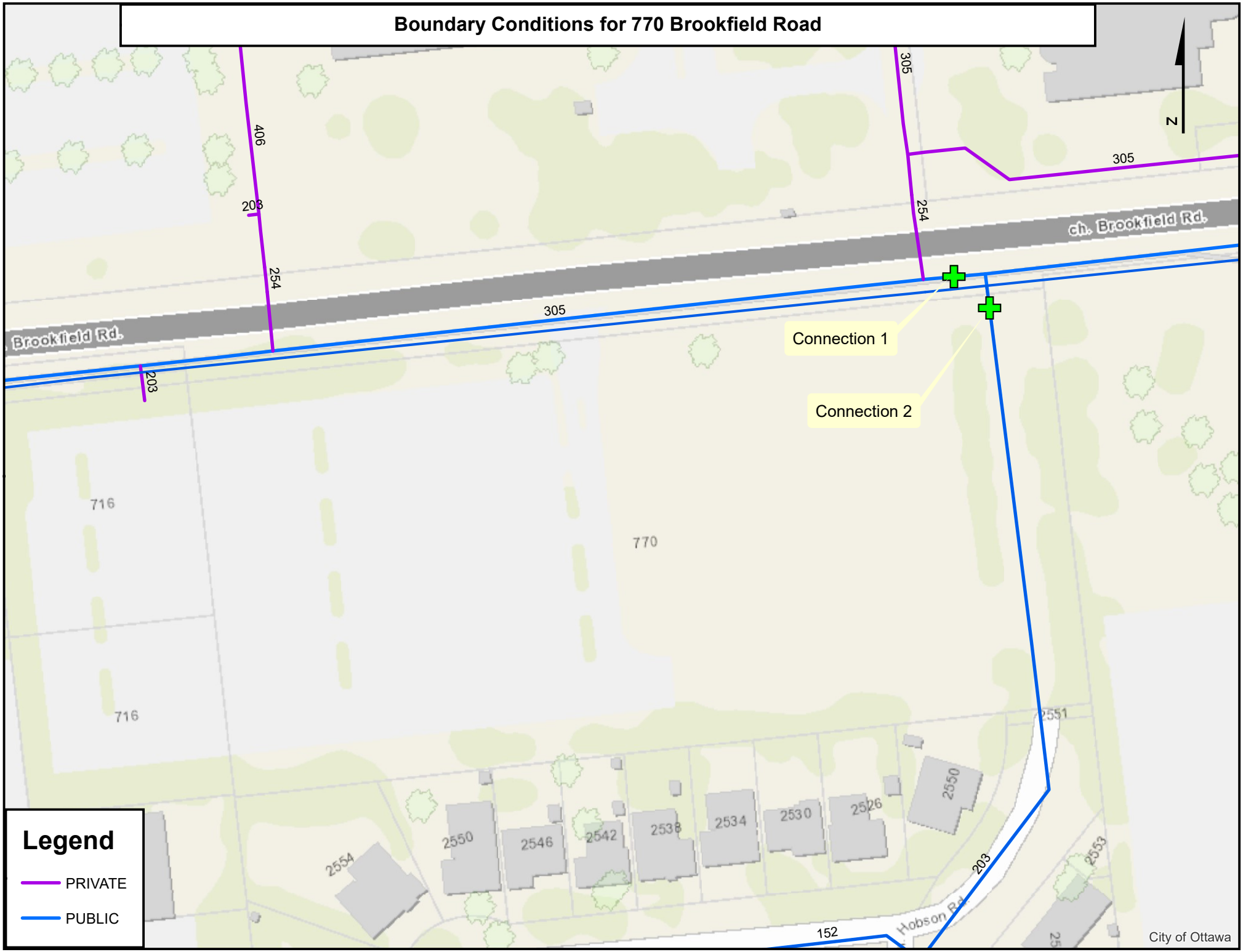
Regards,

Ryan Robineau, EIT
Civil Engineering Technologist
T. 613.714.6611
r.robineau@mcintoshperry.com | www.mcintoshperry.com

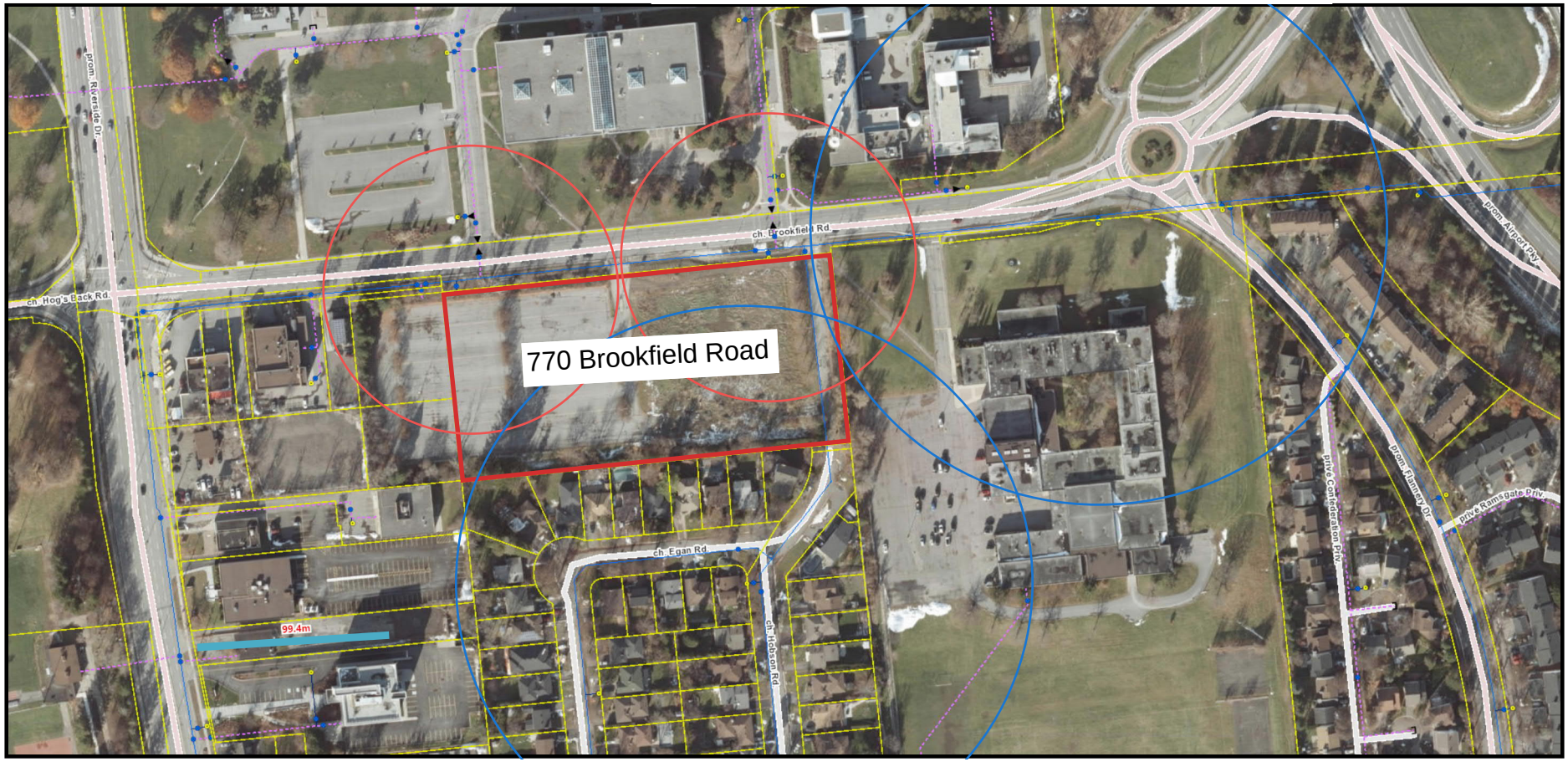
McINTOSH PERRY

Turning Possibilities Into Reality

Boundary Conditions for 770 Brookfield Road



770 Brookfield Hydrant Coverage Figure

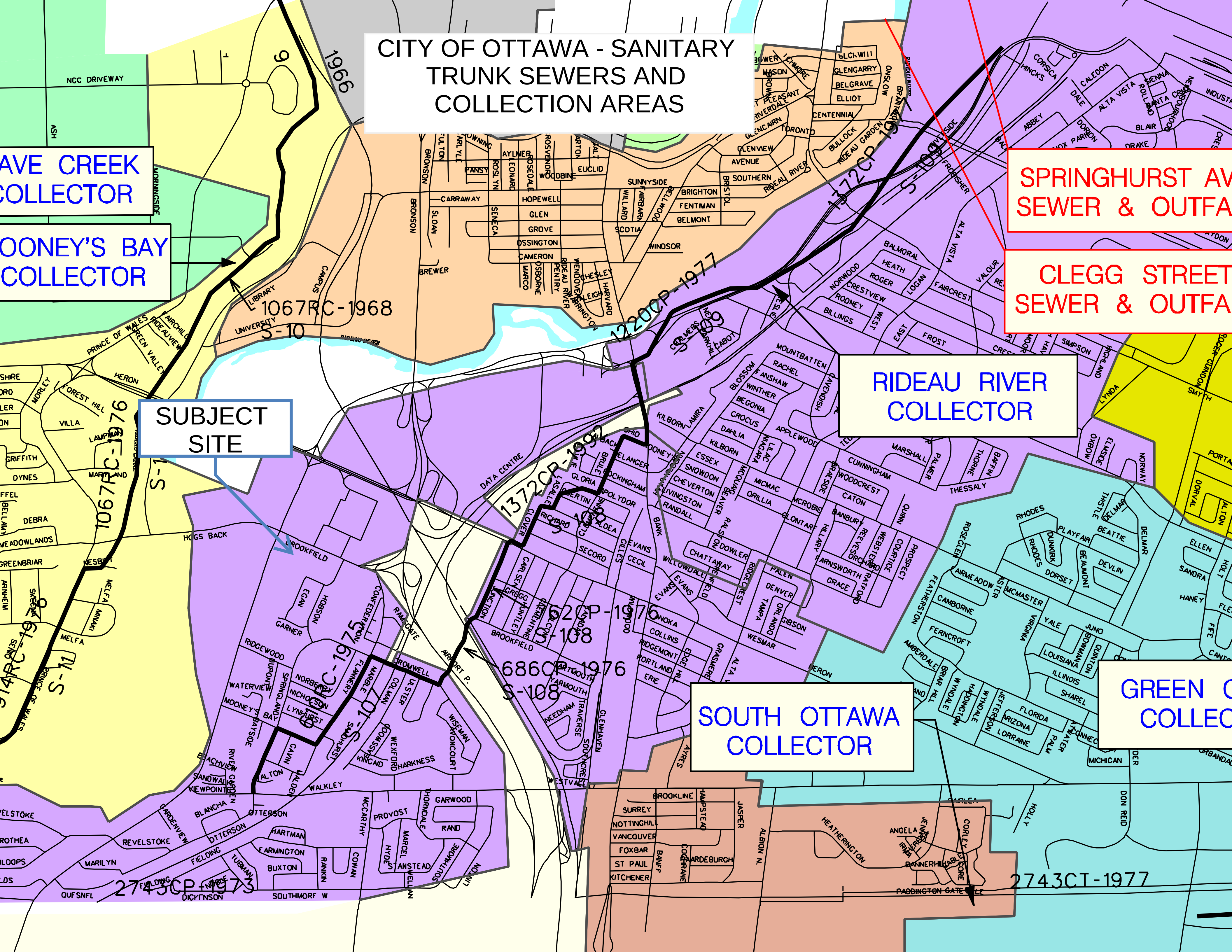


Hydrants Within 75m: 2

Hydrants Within 150m: 2

APPENDIX D
SANITARY CALCULATIONS

McINTOSH PERRY


CITY OF OTTAWA - SANITARY
TRUNK SEWERS AND
COLLECTION AREAS
SUBJECT
SITE
RIDEAU RIVER
COLLECTOR
SOUTH OTTAWA
COLLECTOR
SPRINGHURST AV
SEWER & OUTFA
CLEGG STREET
SEWER & OUTFA
OONEY'S BAY
COLLECTOR
AVE CREEK
COLLECTOR
GREEN C
COLLEC
1067RC-1968
S-10
1067RC-1976
S-11
1372CP-1992
1220CP-1977
S-109
1372CP-1977
S-109
762CP-1976
S-108
686CP-1976
S-108
610RC-1975
S-107
2743CP-1973
2743CT-1977
1966
NCC DRIVEWAY
HOGS BACK
BROOKFIELD
PRINCE OF WALES
RIVERSIDE
BANK
WALKLEY
AIRPORT P.
HERON
ALTA VISTA
DATA CENTRE

McINTOSH PERRY

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

Project:	770 Brookfield Phase 2 - Block C
Project No.:	CCO-22-3501
Designed By:	RRR
Checked By:	AJG
Date:	November 3, 2022

Site Area	0.91	Gross ha	
Bachelor	116	1.40	Persons per unit
1 Bedroom	33	1.40	Persons per unit
2 Bedroom	57	2.10	Persons per unit
3 Bedroom	16	3.10	Persons per unit
4 Bedroom	41	3.40	Persons per unit

Total Population	518	Persons
Commercial Area	579.00	m^2
Amenity Space	855.00	m^2

DESIGN PARAMETERS

Institutional/Commercial Peaking Facto	1	
Residential Peaking Factor	3.37	** 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	518	1.68
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)	1434.00	0.05
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	1.68	L/s
PEAK RESIDENTIAL FLOW	5.66	L/s
AVERAGE ICI FLOW	0.05	L/s
PEAK INSTITUTIONAL/COMMERCIAL FLOW	0.05	L/s
PEAK INDUSTRIAL FLOW	0.00	L/s
TOTAL PEAK ICI FLOW	0.05	L/s

TOTAL SANITARY DEMAND

TOTAL ESTIMATED AVERAGE DRY WEATHER FLOW	1.77	L/s
TOTAL ESTIMATED PEAK DRY WEATHER FLOW	5.75	L/s
TOTAL ESTIMATED PEAK WET WEATHER FLOW	6.01	L/s

SANITARY SEWER DESIGN SHEET

PROJECT: CCO-22-3501
LOCATION: 770 Brookfield Road - Phase 2 (Building C)
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				AREA	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	(ha)	IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL			IND	CUM								L/s	(%)
													IND	CUM	IND	CUM	IND	CUM											
		BLDG	EX. Sewer	149	57	16	41	0.91	518.0	518.0	3.37	5.66		0.00	0.14	0.14		0.00	0.05	0.91	0.91	0.30	6.01	34.22	15.23	200	1.00	1.055	28.21	82.44

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
2	ISSUED FOR REVIEW	2022-11-04

Sheet No: 1 of 1

McINTOSH PERRY

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

Project:	770 Brookfield Phase 2 - Block D
Project No.:	CCO-22-3501
Designed By:	RRR
Checked By:	AJG
Date:	November 3, 2022

Site Area	0.91	Gross ha	
Bachelor	74	1.40	Persons per unit
1 Bedroom	6	1.40	Persons per unit
2 Bedroom	37	2.10	Persons per unit
3 Bedroom	2	3.10	Persons per unit
4 Bedroom	19	3.40	Persons per unit

Total Population	261	Persons
Commercial Area	0.00	m^2
Amenity Space	470.00	m^2

DESIGN PARAMETERS

Institutional/Commercial Peaking Facto	1	
Residential Peaking Factor	3.48	** 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	261	0.85
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)	470.00	0.02
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	0.85	L/s
PEAK RESIDENTIAL FLOW	2.95	L/s
AVERAGE ICI FLOW	0.02	L/s
PEAK INSTITUTIONAL/COMMERCIAL FLOW	0.02	L/s
PEAK INDUSTRIAL FLOW	0.00	L/s
TOTAL PEAK ICI FLOW	0.02	L/s

TOTAL SANITARY DEMAND

TOTAL ESTIMATED AVERAGE DRY WEATHER FLOW	0.91	L/s
TOTAL ESTIMATED PEAK DRY WEATHER FLOW	3.01	L/s
TOTAL ESTIMATED PEAK WET WEATHER FLOW	3.26	L/s

SANITARY SEWER DESIGN SHEET

PROJECT: CCO-22-3501
LOCATION: 770 Brookfield Road - Phase 2 (Building D)
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				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	
				BCH/1-BED	2-BED	3-BED	4-BED		IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL			IND	CUM								L/s	(%)
													IND	CUM	IND	CUM	IND	CUM											
	BUILDING D	BLDG	EX Sewer	80	37	2	19	0.91	261	261	3.48	2.94		0.00	0.05	0.05		0.00	0.02	0.91	0.91	0.30	3.26	34.22	5.91	200	1.00	1.055	30.95	90.46

Design Parameters:

Residential			ICI Areas		
BCH/1-BED	1.4	p/p/u			Peak Factor
2-BED	2.1	p/p/u	INST	28,000 L/Ha/day	1.5
3-BED	3.1	p/p/u	COM	28,000 L/Ha/day	1.5
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
5 Refer to *FUNCTIONAL SERVICING AND STOWMWATER MANAGEMENT REPORT* by DSEL

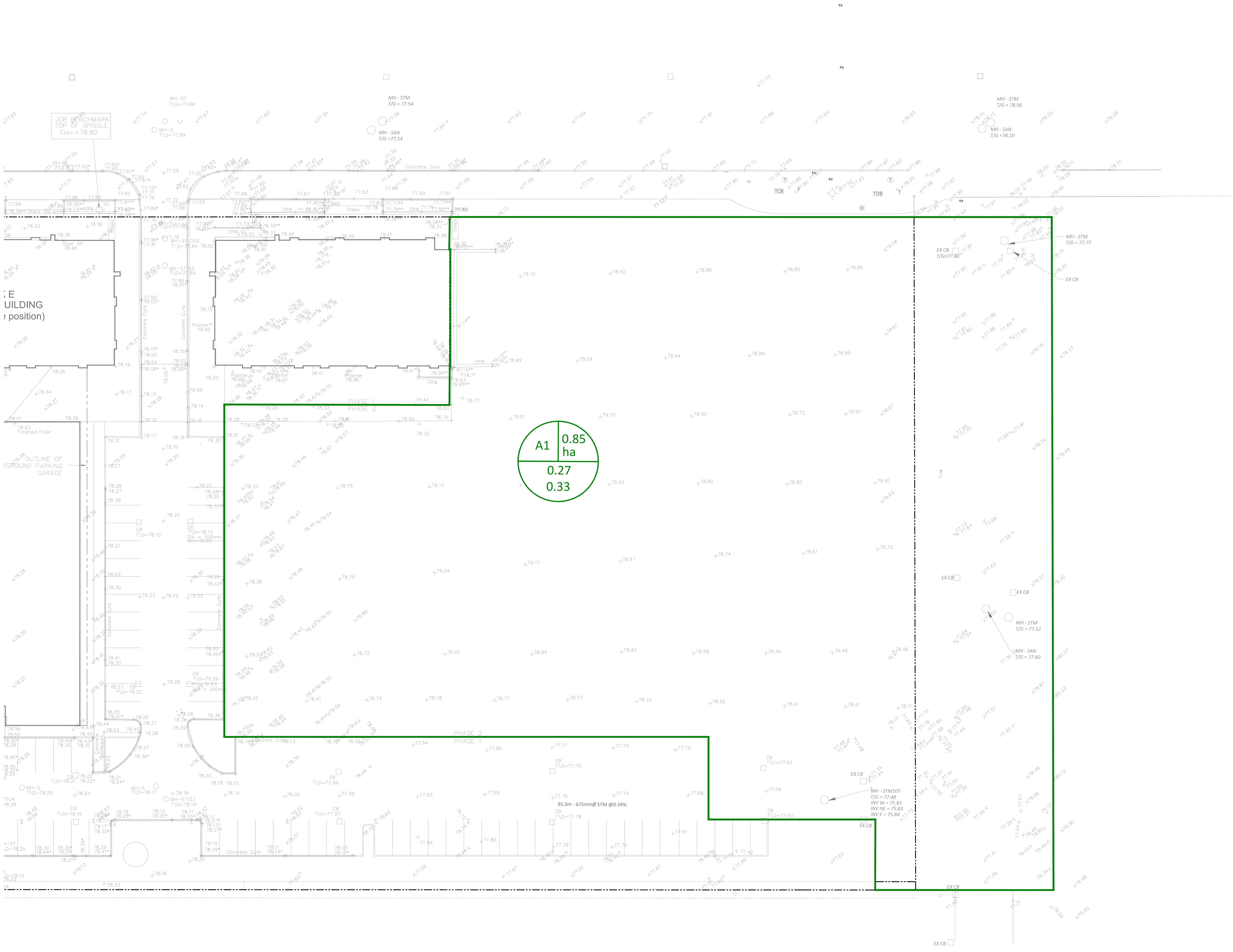
Designed: RRR
Checked: AJG
Project No.: CCO-22-3501

No.	Revision	Date
1.	Issued For Review	2022-11-04
2	Issued For Review	2023-01-20

Sheet No: 1 of 1

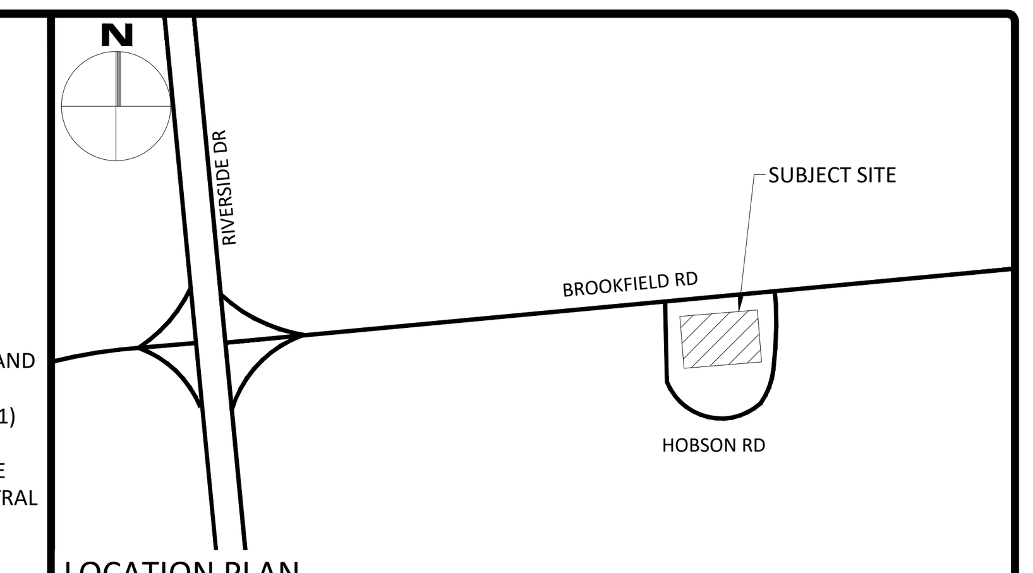
APPENDIX E
PRE-DEVELOPMENT DRAINAGE PLAN

McINTOSH PERRY



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.
2. THIS PLAN IS NOT A CADASTRAL SURVEY SHOWING LEGAL PROPERTY BOUNDARIES AND EASEMENTS. THE PROPERTY BOUNDARIES SHOWN HEREON HAVE BEEN DERIVED INFORMATION SUPPLIED BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD. (JOB NO. 22509-21) AND CANNOT BE RELIED UPON TO BE ACCURATE OR COMPLETE. THE PRECISE LOCATION OF THE CURRENT PROPERTY BOUNDARIES AND EASEMENTS CAN ONLY BE DETERMINED BY AN UP-TO-DATE LAND TITLES SEARCH AND A SUBSEQUENT CADASTRAL SURVEY PERFORMED AND CERTIFIED BY AN ONTARIO LAND SURVEYOR.
3. THE CONTRACTOR IS TO OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY BEFORE COMMENCING CONSTRUCTION.
4. THE CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT.
5. THE CONTRACTOR IS TO DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME ALL RESPONSIBILITY FOR EXISTING UTILITIES WHETHER OR NOT SHOWN ON THESE DRAWINGS. IF THERE IS ANY DISCREPANCY THE CONTRACTOR IS TO NOTIFY THE ENGINEER PROMPTLY.
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.
13. CONTACT THE CITY FOR INSPECTION OF ROUGH GRADING OF PARKING LOTS, ROADWAYS AND LANDSCAPED AREAS PRIOR TO PLACEMENT OF ASPHALT AND TOPSOIL. ALL DEFICIENCIES NOTED SHALL BE RECTIFIED TO THE CITY'S SATISFACTION PRIOR TO PLACEMENT OF ANY ASPHALT, TOPSOIL, SEED & MULCH AND/OR SOD.
14. ALL DIMENSIONS AND INVERTS MUST BE VERIFIED PRIOR TO CONSTRUCTION, IF THERE IS ANY DISCREPANCY THE CONTRACTOR IS TO NOTIFY THE ENGINEER PROMPTLY.
15. ELECTRICAL, GAS, TELEPHONE AND TELEVISION SERVICE LOCATIONS ARE SUBJECT TO THE INDIVIDUAL AGENCY:
    - ELECTRICAL SERVICE - HYDRO ONE,
    - GAS SERVICE - ENBRIDGE,
    - 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.



LOCATION PLAN

LEGEND

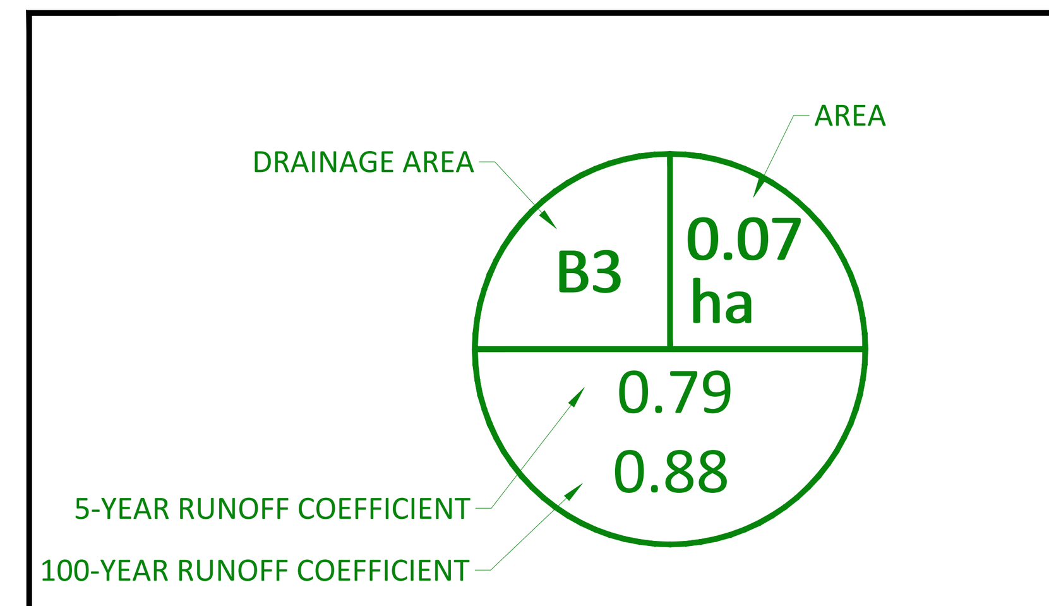
- BARRIER CURB
- PROPOSED ASPHALT
- PROPOSED CONCRETE WALKWAY
- MH# STORM MANHOLE
- CB / CICB / DI CATCHBASIN, CURB INLET OR DITCH INLET
- MH#A SANITARY MANHOLE
- PERFORATED PIPE
- WATER VAVLE/CHAMBER
- FIRE HYDRANT
- PROPOSED WALL
- SEDIMENT CONTROL DEVICE PER DETAIL
- ROADCUT AND REINSTATEMENT PER CITY R10
- DC BARRIER CURB DEPRESSION PER CITY SC1.1 UNLESS OTHERWISE SPECIFIED
- CENTRELINE OF SWALE
- CENTRELINE OF DITCH
- SLOPING AT 3:1 UNLESS SPECIFIED
- 95.94 / 93.20 PROPOSED ELEVATION / EXISTING ELEVATION
- 95.94 (S) SWALE ELEVATION
- T/W100.50 B/W90.50 TOP/BOTTOM WALL FACE ELEVATIONS
- EMERGENCY OVERLAND FLOW ROUTE
- SILT FENCE BARRIER PER OPSD 219.110
- BUILDING ENTRANCE OVERHEAD DOOR
- REDUCER
- TD TRENCH DRAIN PER CITY S15
- SIAMESE CONNECTION LOCATION
- RD SC ROOF DRAIN AND SCUPPER LOCATIONS PER ARCHITECTURAL PLAN

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

No.	Revisions	Date
4	ISSUED FOR REVIEW	JAN 20, 2023
3	ISSUED FOR REVIEW	NOV 24, 2022
2	ISSUED FOR REVIEW	NOV 04, 2022
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 — C. D. HAMPEL — 100223712 — 2023/01/20 — 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.	

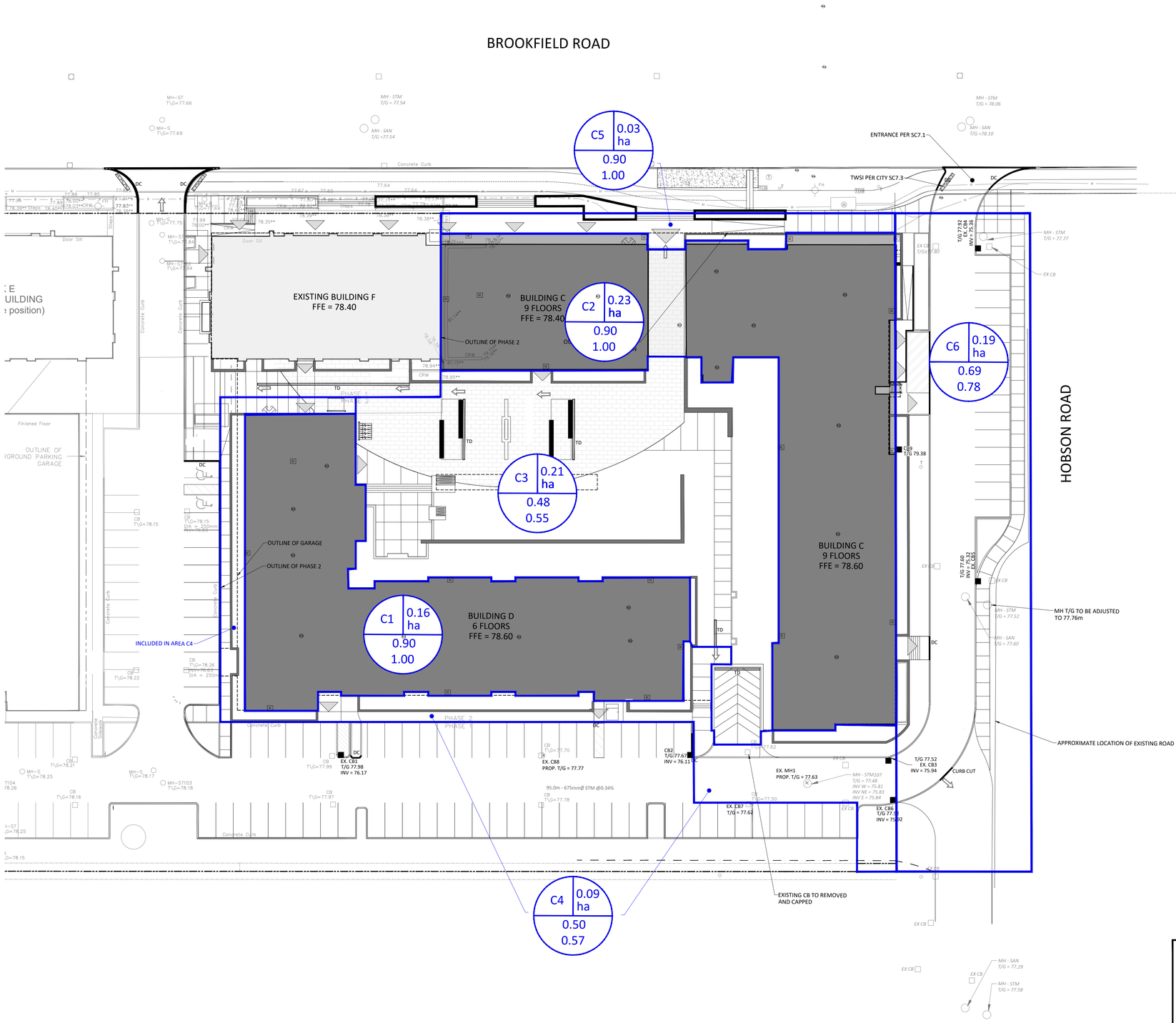
D07-12-22-0109

#18830

FILENAME: U:\Ottawa\01 Project - Proposals\2022 Jobs\CCO\CCO-22-3501 Hobin - 770 Brookfield\12 - Drawings\CCO-22-3501 - PRESENTATION.dwg
LAST SAVED: Friday, January 20, 2023 LAST SAVED BY: r.robineau
LAST PLOTTED: Friday, January 20, 2023 CTB FILE USED: ---

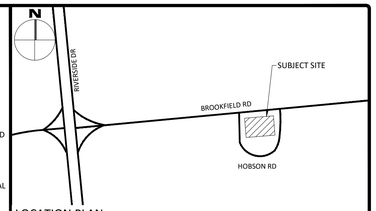
APPENDIX F
POST-DEVELOPMENT DRAINAGE PLAN

McINTOSH PERRY



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.
2. THIS PLAN IS NOT A CADASTRAL SURVEY SHOWING LEGAL PROPERTY BOUNDARIES AND EASEMENTS. THE PROPERTY BOUNDARIES SHOWN HEREON HAVE BEEN DERIVED INFORMATION SUPPLIED BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD. (JOB NO. 22509-21) AND CANNOT BE RELIED UPON TO BE ACCURATE OR COMPLETE. THE PRECISE LOCATION OF THE CURRENT PROPERTY BOUNDARIES AND EASEMENTS CAN ONLY BE DETERMINED BY AN UP-TO-DATE LAND TITLES SEARCH AND A SUBSEQUENT CADASTRAL SURVEY PERFORMED AND CERTIFIED BY AN ONTARIO LAND SURVEYOR.
3. THE CONTRACTOR IS TO OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY BEFORE COMMENCING CONSTRUCTION.
4. THE CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT.
5. THE CONTRACTOR IS TO DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME ALL RESPONSIBILITY FOR EXISTING UTILITIES WHETHER OR NOT SHOWN ON THESE DRAWINGS. IF THERE IS ANY DISCREPANCY THE CONTRACTOR IS TO NOTIFY THE ENGINEER PROMPTLY.
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.
13. CONTACT THE CITY FOR INSPECTION OF ROUGH GRADING OF PARKING LOTS, ROADWAYS AND LANDSCAPED AREAS PRIOR TO PLACEMENT OF ASPHALT AND TOPSOIL. ALL DEFICIENCIES NOTED SHALL BE RECTIFIED TO THE CITY'S SATISFACTION PRIOR TO PLACEMENT OF ANY ASPHALT, TOPSOIL, SEED & MULCH AND/OR SOD.
14. ALL DIMENSIONS AND INVERTS MUST BE VERIFIED PRIOR TO CONSTRUCTION, IF THERE IS ANY DISCREPANCY THE CONTRACTOR IS TO NOTIFY THE ENGINEER PROMPTLY.
15. ELECTRICAL, GAS, TELEPHONE AND TELEVISION SERVICE LOCATIONS ARE SUBJECT TO THE INDIVIDUAL AGENCY:
    - ELECTRICAL SERVICE - HYDRO ONE,
    - GAS SERVICE - ENBRIDGE,
    - 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.



LOCATION PLAN

LEGEND

- BARRIER CURB
- PROPOSED ASPHALT
- PROPOSED CONCRETE WALKWAY
- MH# STORM MANHOLE
- CB / DCB 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
- DC BARRIER CURB DEPRESSION PER CITY SC3.1 UNLESS OTHERWISE SPECIFIED
- CENTRELINE OF SWALE
- CENTRELINE OF DITCH
- SLOPING AT 3:1 UNLESS SPECIFIED
- 95.94 93.20 PROPOSED ELEVATION EXISTING ELEVATION
- 95.94 (S) SWALE ELEVATION
- T/W100.50 b/w90.50 TOP/BOTTOM WALL FACE ELEVATIONS
- EMERGENCY OVERLAND FLOW ROUTE
- SILT FENCE BARRIER PER OPSD 219.110
- BUILDING ENTRANCE OVERHEAD DOOR
- REDUCER
- TD TRENCH DRAIN PER CITY S15
- SIAMESE CONNECTION LOCATION
- 69 SC ROOF DRAIN AND SCUPPER LOCATIONS PER ARCHITECTURAL PLAN

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

No.	Revisions	Date
4	ISSUED FOR REVIEW	JAN 20, 2023
3	ISSUED FOR REVIEW	NOV 24, 2022
2	ISSUED FOR REVIEW	NOV 04, 2022
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

N

Stamp: LICENSED PROFESSIONAL ENGINEER C.D. HAMPEL 100223712 2023/01/20 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.	

D07-12-22-0109

#18830

FILENAME: I:\Ottawa\01 Project - Proposal\3202 Jobs\CCO\CCO-22-3501 Hobin - 770 Brookfield\12 - Drawings\CCO-22-3501 - PRESENTATION.dwg
LAST SAVED: Friday, January 20, 2023 LAST SAVED BY: r.robineau
LAST PLOTTED: Friday, January 20, 2023 4:19 PM EST

PROPOSED AMMENDMENT

BROOKFIELD ROAD

HOBSON ROAD

FUTURE PHASE TWO

BLOCK A FFE=78.40

BLOCK E FFE=78.40

BLOCK F FFE=78.40

BLOCK A FFE=78.90

BLOCK B FFE=78.60

BLOCK C

U 0.215 0.58

BLDG 0.491 0.90

A 0.904 0.68

EX-1 0.511 0.58

EX6 4.010 0.19

INCLUDED IN AREA U

INCLUDED IN AREA I

LIMIT OF PHASE I

20-ZURN ROOF DRAINS OR AN APPROVED EQUIVALENT
5-YEAR RELEASE RATE=23.7 L/s
5-YEAR STORAGE DEPTH=0.078 m
100-YEAR RELEASE RATE=31.4 L/s
100-YEAR STORAGE DEPTH=0.103 m
ROOF VOLUME=388.7 m³

STM101 (1500) T/L=77.87 E.INV=74.15 S.INV=74.15 W.INV=74.15

CONTRACTOR TO CONFIRM DISTANCE BETWEEN EX. STM MH & SAN & ADVISE DSEL OF ANY DISCREPANCIES IMMEDIATELY

STM CROSSING UNDER SAN INV=74.89 STM OBV=74.68

15.4m-525mmø STM @ 1.9%

JOB BENCHMARK ELEVATION TOP OF SPINDLE=78.78

OGS STORMCEPTOR STC750 OR APPROVED EQUIVALENT T/L=77.83 N.INV=74.44 S.INV=74.47

2.9m-300mmø STM @ 1.0%

2.7m-250mmø STM SERVICE @ 1.0% (MIN) INV=76.87*

STM102 (1500) T/L=77.89 N.INV=74.52 C/W 205 mm ICD E/W.INV=76.74 S.INV=75.11 5-YEAR FLOW = 91.6 L/s 100-YEAR FLOW = 130.2 L/s 5-YEAR ELEV = 76.17 m 100-YEAR ELEV = 77.24 m

2.2m-250mmø STM SERVICE @ 1.0% (MIN) INV=76.87*

76.3m-750mmø STM @ 0.43%

84.3m-750mmø STM @ 0.43%

88.7m-750mmø STM @ 0.43%

89.3m-450mmø STM @ 0.34%

95.0m-675mmø STM @ 0.34%

24.0m-525mmø STM @ 0.34%

56.4m-375mmø STM @ 2.00%

2.5m-600mmø PVC STM @ 1.0%

2.9m-250mmø CB LEAD @ 1.0% (MIN)

1.4m-600mmø PVC STM @ 1.0%

3.6m-250mmø CB LEAD @ 1.0% (MIN)

3.8m-250mmø CB LEAD @ 1.0% (MIN)

3.4m-250mmø CB LEAD @ 1.0% (MIN)

2.8m-250mmø CB LEAD @ 1.0% (MIN)

3.3m-250mmø CB LEAD @ 1.0% (MIN)

5.5m-250mmø CB LEAD @ 1.0% (MIN)

3.9m-250mmø CB LEAD @ 1.0% (MIN)

2.0m-250mmø CB LEAD @ 1.0% (MIN)

3.4m-250mmø CB LEAD @ 1.0% (MIN)

2.7m-250mmø CB LEAD @ 1.0% (MIN)

3.7m-250mmø CB LEAD @ 1.0% (MIN)

3.3m-250mmø CB LEAD @ 1.0% (MIN)

CB1 T/L=77.41 W.INV=75.89

CB2 T/L=77.58 W.INV=75.89

CB3 T/L=77.56 S.INV=76.06

CB4 T/L=77.57 N.INV=76.07

CB5 T/L=77.71 S.INV=76.21

CB6 T/L=77.71 N.INV=76.21

CB7 T/L=77.92 S.INV=76.17

CB8 T/L=77.92 N.INV=76.42

CB9 T/L=78.14 S.INV=76.89

CB10 T/L=78.13 E.INV=76.63

CB11 T/L=78.10 E.INV=76.60

CB12 T/L=78.10 E.INV=76.09

CB13 T/L=78.13 E.INV=76.17

CB14 T/L=78.34 N.INV=76.54

CB15 T/L=78.34 S.INV=76.54

CB16 T/L=78.49 N.INV=76.99

CB17 T/L=78.49 S.INV=77.24

CB18 T/L=78.58 N.INV=77.08

CB19 T/L=78.58 S.INV=77.33

CB20 T/L=78.63 NE.INV=77.13

CB21 T/L=78.53 E.INV=77.03

CB22 T/L=78.53 W.INV=77.03

CB23 T/L=78.53 E.INV=77.03

CB24 T/L=78.53 W.INV=77.03

CB25 T/L=78.53 W.INV=77.03

CB26 T/L=78.53 E.INV=77.03

CB27 T/L=78.14 N.INV=76.42

CICB19 T/L=78.58 S.INV=77.33

CICB20 T/L=78.63 NE.INV=77.13

CICB21 T/L=78.53 E.INV=77.03

CICB22 T/L=78.53 W.INV=77.03

CICB23 T/L=78.53 E.INV=77.03

CICB26 T/L=78.53 E.INV=77.03

STM104 (1500) T/L=78.29 E.INV=75.66 W.INV=75.68 N/S.INV=75.75

STM103 (1800) T/L=78.14 N.INV=75.43 E.INV=75.49 W.INV=75.60

STM105 (1200) T/L=78.72 N.INV=76.04 E.INV=75.98 SW.INV=77.10

STM106 (1200) T/L=78.83 S.INV=76.40

STM107 (1500) T/L=77.48 W.INV=75.81 NE.INV=75.84 E.INV=75.84

EX. STMMH T/L=78.93 W.INV=75.86 E.INV=74.69

EX. STMMH T/L=78.18 W.INV=74.33 E.INV=74.33

EX. STMMH T/L=77.54 W.INV=74.05 E.INV=74.05

EX. STMMH T/L=77.71 N.INV=75.10 S.INV=75.10

EX. CB T/L=78.14 (TO BE REMOVED)

EX. CB T/L=78.19 (TO BE REMOVED)

EX. CB T/L=78.08 (TO BE REMOVED)

EX. CB T/L=78.19 (TO BE REMOVED)

EX. CB T/L=78.19 (TO BE REMOVED)

EX. CB T/L=78.19 (TO BE REMOVED)

EX. STMMH T/L=78.55 (TO BE REMOVED)

EX. STMMH T/L=78.19 (TO BE REMOVED)

EX. STMMH T/L=78.19 (TO BE REMOVED)

EX. STMMH T/L=78.19 (TO BE REMOVED)

EX. STMMH T/L=78.19 (TO BE REMOVED)

EX. STMMH T/L=78.19 (TO BE REMOVED)

OUTLINE OF UNDERGROUND PARKING GARAGE

MECHANICAL DRAINS T/L=78.23 OUTLET DIRECTLY INTO BUILDING

MECHANICAL DRAIN T/L=78.35 OUTLET DIRECTLY INTO BUILDING

MECHANICAL DRAIN T/L=78.94 OUTLET DIRECTLY INTO BUILDING

185.3m³ STORAGE UNIT 3.6m-250mmø CB LEAD @ 1.0% (MIN)

165m³ STORAGE UNIT

TRITON S-29 STORAGE UNIT OR AN APPROVED EQUIVALENT TOTAL VOL=350.0m³ INV=75.77 OBV=76.68 TOP OF CLEAR STONE=77.28

CB C/W BACKWATER VALVE T/L=77.78 N.INV=76.13

TO BE RELOCATED CONTRACTOR TO CONFIRM OUTLET LOCATION

EX. CB T/L=77.77

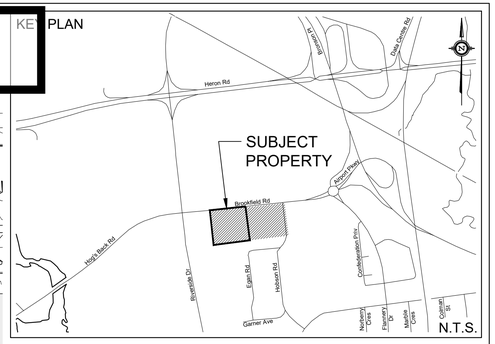
REGISTERED PLAN M-8-E LOT 1 LOT 2 LOT 3 LOT 4 LOT 5 LOT 6 LOT 7 LOT 8 LOT 9 LOT 10

part 1 plan 5R-2591 part 2 plan 5R-2591 part 3 plan 5R-2591 part 4 plan 5R-2591 part 1 plan car-51 part 4 plan car-51

REGISTERED PLAN 792

easement inst. ot63570

KEY PLAN



LEGEND

EX6 | 4.010 | 0.19 — DRAINAGE AREA ID / AREA IN Ha / RATIONAL METHOD RUNOFF COEFFICIENT

PROPERTY LINE
PROPOSED STORM SEWER
DRAINAGE DIVIDE
PROPOSED STORM MANHOLE
PROPOSED CATCH BASIN
MAJOR SYSTEM FLOW ROUTE

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY ANNIS O'SULLIVAN VOLLEBEKK LTD.
PROJ. NO. 19746-147
DATED OCTOBER 5, 2017

SITE PLAN INFORMATION

SITE PLAN PROVIDED BY BARRY J. HOBIN & ASSOCIATES ARCHITECTS INC.
PROJ. NO. 1741
DATED AUGUST 2020

GEOTECHNICAL STUDY

GEOTECHNICAL RECOMMENDATIONS PROVIDED BY PATERSON GROUP
PROJ. NO. PG3275-1
DATED NOVEMBER 28, 2014

SITE SERVICING AND STORMWATER MANAGEMENT STUDY

SERVICING AND STORMWATER MANAGEMENT RECOMMENDATIONS PROVIDED BY DSEL
PROJ. NO. 17-966
DATED MAY 2019

BENCH MARK

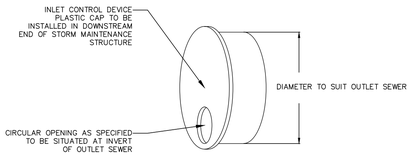
TOP OF SPINDLE OF FIRE HYDRANT LOCATED NORTH EAST OF SITE, WEST OF BROOKFIELD ROAD AND HOBSON ROAD INTERSECTION
ELEV=78.76

No.	BY	YY.MM.DD	DESCRIPTION
10	C.M.K.	20.10.05	ISSUED FOR MUNICIPAL REVIEW
9	C.M.K.	20.09.29	ISSUED FOR MUNICIPAL REVIEW
8	A.J.G.	20.06.22	ISSUED FOR CIB-007
7	A.J.G.	19.08.07	REVISED PER SITE PLAN
6	A.J.G.	19.05.22	ISSUED FOR MUNICIPAL APPROVAL
5	A.J.G.	19.04.15	ISSUED FOR SUPERSTRUCTURE PERMIT
4	C.M.K.	19.04.12	ISSUED FOR MUNICIPAL REVIEW
3	A.J.G.	18.09.10	ISSUED FOR MUNICIPAL REVIEW
2	A.J.T.	18.06.15	ISSUED FOR MUNICIPAL REVIEW
1	A.J.G.	17.10.31	ISSUED FOR MUNICIPAL REVIEW

PROJECT No. 17-966

LICENSED PROFESSIONAL ENGINEER — A. J. GOSLING — 100226726 — 17-966 — 2020-10-05 — PROVINCE OF ONTARIO

INLET CONTROL DEVICE (ICD) DETAIL
PLASTIC "PLUG" STYLE



NOT TO SCALE

STORMWATER MANAGEMENT PLAN
770 BROOKFIELD ROAD - PHASE I

HOBIN ARCHITECTURE INCORPORATED
63 PAMILLA STREET
OTTAWA, ON K1S 3K7
(613) 238-7200

DSEL david schaeffer engineering ltd
SMART SUBDIVISIONS™
120 Iber Road Unit 103
Stittsville, Ontario, K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

DRAWN BY:	A.J.T.	CHECKED BY:	R.D.F.	DRAWING NO.	SHEET NO.
DESIGNED BY:	A.J.T.	CHECKED BY:	A.D.F.	SWM-1	1 of 2
SCALE:	1:400	DATE:	OCTOBER 2017		

D02-12-17-0140

z:\projects\17-966_atlantis_770-brookfield\b_design\b2_drawings\b2-2_main (dsel)\sub-1\cad\2020-10-05_966_spa.dwg

PLAN NO.:#17548

APPENDIX G
STORMWATER MANAGEMENT CALCULATIONS

McINTOSH PERRY

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	0.913	871.73	0.90	0.00	0.60	8,257.57	0.20	0.27	0.32

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	0.913	0.27	0.32	17	57.8	78.2	133.6	39.2	52.93	109.03
Total	0.913							39.16	52.93	109.03

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	*Phase II Building D*
C2	0.225	2,254.37	0.90	0.00	0.60	0.00	0.20	0.90	1.00	*Phase II Building C*
C3	0.210	854.42	0.90	0.00	0.60	1,249.33	0.20	0.48	0.55	*Phase II Controlled Cistern Drainage*
C4	0.092	399.51	0.90	0.00	0.60	524.65	0.20	0.50	0.57	*Phase II Attenuated Surface Drainage*
A	0.904	6,230.00	0.90	0.00	0.60	2,810.00	0.20	0.68	0.77	*Phase I Attenuated Surface Drainage*
EX-1	0.511	2,780.00	0.90	0.00	0.60	2,330.00	0.20	0.58	0.66	*External Drainage Area*
BLDG	0.491	4,910.00	0.90	0.00	0.60	0.00	0.20	0.90	1.00	*Phase I Roof Area*
U	0.215	980.00	0.90	0.00	0.60	1,170.00	0.20	0.52	0.59	*Phase I Unattenuated Area*
C5	0.028	283.48	0.90	0.00	0.60	0.00	0.20	0.90	1.00	*Unattenuated North of Building C*
C6	0.197	1,358.27	0.90	0.00	0.60	614.73	0.20	0.68	0.77	*Unattenuated Hobson Road*

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	*Phase II Building D*
C2	0.225	0.90	1.00	10	76.8	104.2	178.6	43.32	58.77	111.91	*Phase II Building C*
C3	0.210	0.48	0.55	10	76.8	104.2	178.6	21.75	29.51	57.92	*Phase II Controlled*
C4	0.092	0.50	0.57	10	76.8	104.2	178.6	9.92	13.45	26.34	*Phase II Attenuated Drainage*
A	0.904	0.68	0.77	10	76.8	104.2	178.6	131.72	178.69	344.13	*Phase I Attenuated Drainage*
EX-1	0.511	0.58	0.66	10	76.8	104.2	178.6	63.37	85.97	166.91	*External Drainage*
BLDG	0.491	0.90	1.00	10	76.8	104.2	178.6	94.35	128.00	243.73	*Phase I Roof Area*
U	0.215	0.52	0.59	10	76.8	104.2	178.6	23.83	32.33	63.17	*Phase I Unattenuated*
C5	0.028	0.90	1.00	10	76.8	104.2	178.6	5.45	7.39	14.07	*Unattenuated North Building C*
C6	0.197	0.68	0.77	10	76.8	104.2	178.6	28.73	38.97	75.05	*Unattenuated Hobson Road*
Total	3.034							452.95	614.46	1,182.02	

Required Restricted Flow

Drainage Area	Area (ha)	C 2-Year	Tc (min)	I (mm/hr)			Q (L/s)		
				2-Year	5-Year	100-Year	2-Year	5-Year	100-Year
Ultimate Site*	2.523	0.50	16.80	57.8	78.2	133.6	202.77	N/A	N/A
EX-1	0.511	0.58	16.80	57.8	78.2	133.6	47.64	64.40	110.06
Total	3.034					**Total	250.41	267.17	312.84

*Note: *Ultimate Site* drainage area comprised of Phase I, EX1 (per reports by others) and Phase II development area.

**Note: Area EX-1 to be controlled to existing conditions for 2, 5 and 100-year events.

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	2.52	4.62	38.46	73.15	41.96	76.93	*Phase II Building D*
C4	13.45	26.34	98.87	115.56	135.01	346.33	350.00	350.00	*Phase II Attenuated*
A	178.69	344.13							*Phase I Attenuated*
EX-1	85.97	166.91							*External Drainage Area*
BLDG	128.00	243.73			76.50	170.60	388.70	388.70	*Phase I Roof Area*
C2	58.77	111.91	5.46	9.36	47.41	92.42	55.70	95.48	*Phase II Building C*
C3	29.51	57.92	15.84	31.01	8.24	16.24	16.24	16.24	*Phase II Controlled Cistern Drainage*
U	32.33	63.17	32.33	63.17					*Phase I Unattenuated Area*
C5	7.39	14.07	7.39	14.07					*Unattenuated North of Building C*
C6	38.97	75.05	38.97	75.05					*Unattenuated Hobson Road*
Total	614.46	1,182.02	201.38	312.84	305.62	698.74	852.59	927.35	

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	2.52	18.89	34.00
40	44.2	17.56	2.52	15.04	36.08
50	37.7	14.97	2.52	12.45	37.36
60	32.9	13.07	2.52	10.55	37.97
70	29.4	11.68	2.52	9.16	38.46

Maximum Storage Required 5-year =	38	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	4.62	35.94	64.68
40	75.1	33.14	4.62	28.52	68.45
50	64.0	28.24	4.62	23.62	70.87
60	55.9	24.67	4.62	20.05	72.18
70	49.8	21.98	4.62	17.36	72.90
80	45.0	19.86	4.62	15.24	73.15
90	41.1	18.14	4.62	13.52	73.00
100	37.9	16.73	4.62	12.11	72.63
110	35.2	15.53	4.62	10.91	72.03
120	32.9	14.52	4.62	9.90	71.27

Maximum Storage Required 100-year =	73	m^3

5-Year Storm Event Storage Summary

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	1398.81	0.030	41.96

Storage Available (m^3) =	41.96
Storage Required (m^3) =	38.46

100-Year Storm Event Storage Summary

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	1398.81	0.055	76.93

Storage Available (m^3) =	76.93
Storage Required (m^3) =	73.15

*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 Drains	7	
	5-Year	100-Year
Rooftop Storage (m^3)	41.96	76.93
Storage Depth (m)	0.030	0.055
Flow (Per Roof Drain) (L/s)	0.36	0.66
Total Flow (L/s)	2.52	4.62

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	1.26
0.24	20	1.68
0.30	25	2.10
0.36	30	2.52
0.42	35	2.94
0.48	40	3.36
0.54	45	3.78
0.60	50	4.20
0.66	55	4.62
0.72	60	5.04
0.78	65	5.46
0.84	70	5.88
0.90	75	6.30
0.96	80	6.72
1.02	85	7.14
1.08	90	7.56
1.14	95	7.98
1.20	100	8.40
1.26	105	8.82
1.32	110	9.24
1.38	115	9.66
1.44	120	10.08
1.50	125	10.50
1.56	130	10.92
1.62	135	11.34
1.68	140	11.76
1.74	145	12.18
1.80	150	12.60

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	24.93	5.46	19.47	46.73
50	37.7	21.26	5.46	15.80	47.41
60	32.9	18.56	5.46	13.10	47.15
70	29.4	16.58	5.46	11.12	46.72
80	26.6	15.00	5.46	9.54	45.81

Maximum Storage Required 5-year =	47	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	57.59	9.36	48.23	86.82
40	75.1	47.07	9.36	37.71	90.49
50	64.0	40.11	9.36	30.75	92.25
60	55.9	35.03	9.36	25.67	92.42
70	49.8	31.21	9.36	21.85	91.77
80	45.0	28.20	9.36	18.84	90.44
90	41.1	25.76	9.36	16.40	88.55
100	37.9	23.75	9.36	14.39	86.35
110	35.2	22.06	9.36	12.70	83.82
120	32.9	20.62	9.36	11.26	81.06

Maximum Storage Required 100-year =	92	m^3

5-Year Storm Event Storage Summary

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	1591.34	0.035	55.70

Storage Available (m^3) =	55.70
Storage Required (m^3) =	47.41

100-Year Storm Event Storage Summary

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	1591.34	0.060	95.48

Storage Available (m^3) =	95.48
Storage Required (m^3) =	92.42

*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 Drains	13	
	5-Year	100-Year
Rooftop Storage (m^3)	55.70	95.48
Storage Depth (m)	0.035	0.060
Flow (Per Roof Drain) (L/s)	0.42	0.72
Total Flow (L/s)	5.46	9.36

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	2.34
0.24	20	3.12
0.30	25	3.90
0.36	30	4.68
0.42	35	5.46
0.48	40	6.24
0.54	45	7.02
0.60	50	7.80
0.66	55	8.58
0.72	60	9.36
0.78	65	10.14
0.84	70	10.92
0.90	75	11.70
0.96	80	12.48
1.02	85	13.26
1.08	90	14.04
1.14	95	14.82
1.20	100	15.60
1.26	105	16.38
1.32	110	17.16
1.38	115	17.94
1.44	120	18.72
1.50	125	19.50
1.56	130	20.28
1.62	135	21.06
1.68	140	21.84
1.74	145	22.62
1.80	150	23.40

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

Storage Requirements for C1, C5, & Phase I Attenuated Areas

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) C4	Runoff (L/s) A	Runoff (L/s) BLDG	Runoff (L/s) EX-1	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	13.46	178.70	23.73	85.98	98.87	202.99	121.80
15	83.6	10.79	143.37	23.73	68.98	98.87	148.01	133.21
20	70.3	9.08	120.56	23.73	58.00	98.87	112.51	135.01
25	60.9	7.86	104.44	23.73	50.25	98.87	87.42	131.12
30	53.9	6.96	92.44	23.73	44.47	98.87	68.73	123.72

Maximum Storage Required 5-year =	135 m^3

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) C4	Runoff (L/s) A	Runoff (L/s) BLDG	Runoff (L/s) EX-1	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	26.35	344.20	31.39	166.95	115.56	453.33	272.00
15	142.9	21.08	275.40	31.39	133.58	115.56	345.89	311.30
20	120.0	17.70	231.27	31.39	112.17	115.56	276.97	332.37
25	103.8	15.31	200.05	31.39	97.03	115.56	228.22	342.33
30	91.9	13.56	177.11	31.39	85.91	115.56	192.41	346.33
35	82.6	12.19	159.19	31.39	77.21	115.56	164.42	345.28
40	75.1	11.08	144.74	31.39	70.20	115.56	141.85	340.43
45	69.1	10.19	133.17	31.39	64.59	115.56	123.79	334.23
50	64.0	9.44	123.34	31.39	59.83	115.56	108.44	325.32
55	59.6	8.79	114.86	31.39	55.71	115.56	95.20	314.15

Maximum Storage Required 100-year =	346.33 m^3

Tank Storage

Storage Available (m^3) =	350.00
Storage Required (m^3) =	346.33

For Orifice Flow, C= 0.60
For Weir Flow, C= 1.84

	Orifice 1	Orifice 2	Weir 1	Weir 2
invert elevation	74.53	X	X	X
center of crest elevation	74.63	X		X
orifice width / weir length	197 mm	X	X	X
weir height				X
orifice area (m^2)	0.030	X	x	X

Elevation Discharge Table - Storm Routing

Elevation	Orifice 1		Orifice 2		Weir 1		Weir 2		Total	Incremental Tank Volume	
	H [m]	Q [m^3/s]	H [m]	Q [m^3/s]	H [m]	Q [m^3/s]	H [m]	Q [m^3/s]	Q [L/s]	V [m^3]	
75.77	1.14	0.086	x	x	x	x	x	x	86.21	0	
75.78	1.15	0.09	x	x	x	x	x	x	86.58	4	
75.79	1.16	0.09	x	x	x	x	x	x	86.96	8	
75.80	1.17	0.09	x	x	x	x	x	x	87.33	12	
75.81	1.18	0.09	x	x	x	x	x	x	87.70	15	
75.82	1.19	0.09	x	x	x	x	x	x	88.07	19	
75.83	1.20	0.09	x	x	x	x	x	x	88.44	23	
75.84	1.21	0.09	x	x	x	x	x	x	88.81	27	
75.85	1.22	0.09	x	x	x	x	x	x	89.17	31	
75.86	1.23	0.09	x	x	x	x	x	x	89.54	35	
75.87	1.24	0.09	x	x	x	x	x	x	89.90	38	
75.88	1.25	0.09	x	x	x	x	x	x	90.26	42	
75.89	1.26	0.09	x	x	x	x	x	x	90.62	46	
75.90	1.27	0.09	x	x	x	x	x	x	90.98	50	
75.91	1.28	0.09	x	x	x	x	x	x	91.34	54	
75.92	1.29	0.09	x	x	x	x	x	x	91.69	58	
75.93	1.30	0.09	x	x	x	x	x	x	92.05	62	
75.94	1.31	0.09	x	x	x	x	x	x	92.40	65	
75.95	1.32	0.09	x	x	x	x	x	x	92.75	69	
75.96	1.33	0.09	x	x	x	x	x	x	93.10	73	
75.97	1.34	0.09	x	x	x	x	x	x	93.45	77	
75.98	1.35	0.09	x	x	x	x	x	x	93.80	81	
75.99	1.36	0.09	x	x	x	x	x	x	94.15	85	
76.00	1.37	0.09	x	x	x	x	x	x	94.49	88	
76.01	1.38	0.09	x	x	x	x	x	x	94.83	92	
76.02	1.39	0.10	x	x	x	x	x	x	95.18	96	
76.03	1.40	0.10	x	x	x	x	x	x	95.52	100	
76.04	1.41	0.10	x	x	x	x	x	x	95.86	104	
76.05	1.42	0.10	x	x	x	x	x	x	96.20	108	
76.06	1.43	0.10	x	x	x	x	x	x	96.53	112	
76.07	1.44	0.10	x	x	x	x	x	x	96.87	115	
76.08	1.45	0.10	x	x	x	x	x	x	97.21	119	
76.09	1.46	0.10	x	x	x	x	x	x	97.54	123	
76.10	1.47	0.10	x	x	x	x	x	x	97.87	127	
76.11	1.48	0.10	x	x	x	x	x	x	98.21	131	
76.12	1.49	0.10	x	x	x	x	x	x	98.54	135	
76.13	1.50	0.10	x	x	x	x	x	x	98.87	138	5-Year
76.14	1.51	0.10	x	x	x	x	x	x	99.20	142	
76.15	1.52	0.10	x	x	x	x	x	x	99.52	146	
76.16	1.53	0.10	x	x	x	x	x	x	99.85	150	
76.17	1.54	0.10	x	x	x	x	x	x	100.17	154	
76.18	1.55	0.10	x	x	x	x	x	x	100.50	158	
76.19	1.56	0.10	x	x	x	x	x	x	100.82	162	
76.20	1.57	0.10	x	x	x	x	x	x	101.14	165	
76.21	1.58	0.10	x	x	x	x	x	x	101.47	169	
76.22	1.59	0.10	x	x	x	x	x	x	101.79	173	
76.23	1.60	0.10	x	x	x	x	x	x	102.11	177	
76.24	1.61	0.10	x	x	x	x	x	x	102.42	181	
76.25	1.62	0.10	x	x	x	x	x	x	102.74	185	
76.26	1.63	0.10	x	x	x	x	x	x	103.06	188	
76.27	1.64	0.10	x	x	x	x	x	x	103.37	192	
76.28	1.65	0.10	x	x	x	x	x	x	103.69	196	
76.29	1.66	0.10	x	x	x	x	x	x	104.00	200	
76.30	1.67	0.10	x	x	x	x	x	x	104.31	204	
76.31	1.68	0.10	x	x	x	x	x	x	104.62	208	
76.32	1.69	0.10	x	x	x	x	x	x	104.93	212	
76.33	1.70	0.11	x	x	x	x	x	x	105.24	215	
76.34	1.71	0.11	x	x	x	x	x	x	105.55	219	
76.35	1.72	0.11	x	x	x	x	x	x	105.86	223	
76.36	1.73	0.11	x	x	x	x	x	x	106.17	227	
76.37	1.74	0.11	x	x	x	x	x	x	106.47	231	
76.38	1.75	0.11	x	x	x	x	x	x	106.78	235	
76.39	1.76	0.11	x	x	x	x	x	x	107.08	238	
76.40	1.77	0.11	x	x	x	x	x	x	107.39	242	
76.41	1.78	0.11	x	x	x	x	x	x	107.69	246	
76.42	1.79	0.11	x	x	x	x	x	x	107.99	250	

76.43	1.80	0.11	x	x	x	x	x	x	108.29	254	
76.44	1.81	0.11	x	x	x	x	x	x	108.59	258	
76.45	1.82	0.11	x	x	x	x	x	x	108.89	262	
76.46	1.83	0.11	x	x	x	x	x	x	109.19	265	
76.47	1.84	0.11	x	x	x	x	x	x	109.49	269	
76.48	1.85	0.11	x	x	x	x	x	x	109.79	273	
76.49	1.86	0.11	x	x	x	x	x	x	110.08	277	
76.50	1.87	0.11	x	x	x	x	x	x	110.38	281	
76.51	1.88	0.11	x	x	x	x	x	x	110.67	285	
76.52	1.89	0.11	x	x	x	x	x	x	110.96	288	
76.53	1.90	0.11	x	x	x	x	x	x	111.26	292	
76.54	1.91	0.11	x	x	x	x	x	x	111.55	296	
76.55	1.92	0.11	x	x	x	x	x	x	111.84	300	
76.56	1.93	0.11	x	x	x	x	x	x	112.13	304	
76.57	1.94	0.11	x	x	x	x	x	x	112.42	308	
76.58	1.95	0.11	x	x	x	x	x	x	112.71	312	
76.59	1.96	0.11	x	x	x	x	x	x	113.00	315	
76.60	1.97	0.11	x	x	x	x	x	x	113.29	319	
76.61	1.98	0.11	x	x	x	x	x	x	113.57	323	
76.62	1.99	0.11	x	x	x	x	x	x	113.86	327	
76.63	2.00	0.11	x	x	x	x	x	x	114.15	331	
76.64	2.01	0.11	x	x	x	x	x	x	114.43	335	
76.65	2.02	0.11	x	x	x	x	x	x	114.71	338	
76.66	2.03	0.11	x	x	x	x	x	x	115.00	342	
76.67	2.04	0.12	x	x	x	x	x	x	115.28	346	
76.68	2.05	0.12	x	x	x	x	x	x	115.56	350	100-Year

Notes:
1. For Orifice Flow, User is to Input an Elevation Higher than Crown of Orifice.
2. Orifice Equation: $Q = cA(2gh)^{1/2}$
3. Weir Equation: $Q = CLH^{3/2}$
4. These Computations Do Not Account for Submergence Effects Within the Pond Riser.
5. H for orifice equations is depth of water above the centroide of the orifice.
6. H for weir equations is depth of water above the weir crest.

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)
7	123.3	34.92	15.84	19.08	8.01
8	116.1	32.88	15.84	17.04	8.18
9	109.8	31.10	15.84	15.26	8.24
10	104.2	29.51	15.84	13.67	8.20
11	99.2	28.10	15.84	12.26	8.09

Maximum Storage Required 5-year =	8	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)
5	242.7	78.72	31.01	47.71	14.31
6	226.0	73.30	31.01	42.29	15.23
7	211.7	68.67	31.01	37.66	15.82
8	199.2	64.61	31.01	33.60	16.13
9	188.3	61.08	31.01	30.07	16.24
10	178.6	57.93	31.01	26.92	16.15
11	169.9	55.11	31.01	24.10	15.90
12	162.1	52.58	31.01	21.57	15.53
13	155.1	50.31	31.01	19.30	15.05
14	148.7	48.23	31.01	17.22	14.47

Maximum Storage Required 100-year =	16.24	m^3

Cistern Storage

Storage Available (m^3) =	16.24
Storage Required (m^3) =	16.24

STORM SEWER DESIGN SHEET

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

Refer to DSEL *FUNCTIONAL SERVICING AND STORMWATER MANAGMEENT REPORT* PROJECT NO. 17-966 FOR FULL PHASE 1 SEWER CALCULATIONS

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)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr)	
																					DIA	W	H			(L/s)	(%)
	PH1-B4	STM107	STM103																								
	PH2 - C4			0.50	0.09	0.05	0.05	10.00	1.14	11.14	104.19	122.14	178.56	13.45				13.45	511.34	95.00	675			0.34	1.384	497.88	97.37%
	PH1-BLDG A	STM104	STM103	0.90	0.21	0.19																					
	PH1-BLDG B1			0.90	0.16	0.14																					
	PH1-B1			0.78	0.07	0.06																					
	PH1-B2			0.70	0.18	0.12																					
	PH1-B3			0.60	0.13	0.08																					
	PH1-B6			0.04	0.20	0.01																					
	PH1-COURT			0.52	0.21	0.11																					
	EX-1			0.51	0.58	0.30	1.00	13.20	0.34	13.54	89.86	105.27	153.78	36.61				36.61	261.61	24.00	525			0.34	1.171	225.00	86.00%
	PH1-B5	STM103	STM102	0.86	0.10	0.08																					
	PH2-C1			0.90	0.16	0.14	1.27	13.54	0.84	14.38	88.59	103.77	151.58	47.87				47.87	561.51	76.20	675			0.41	1.520	513.64	91.47%
	PH1-BLDG-E1	STM102	OGS	0.90	0.06	0.06		0.00	0.02	0.02	230.48	271.61	398.62	0.00				0.00	840.09	2.90	600			1.72	2.878		
	PH1-BLDG-E2			0.90	0.06	0.06	1.39	14.38	0.02	14.39	85.63	100.28	146.46	55.36				55.36	840.09	2.90	600			1.72	2.878	784.73	93.41%
		OGS	STM101	-	-	-	1.39	14.39	0.11	14.50	85.57	100.22	146.36	55.42				55.42	542.11	15.40	525			1.46	2.426	486.69	89.78%

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: RR
Checked: CH
Project No.: CCO-22-3501

No.	Revision	Date
1.	ISSUED FOR REVIEW	2022-06-24
2.	ISSUED FOR REVIEW	2022-11-04
3.	ISSUED FOR REVIEW	2022-11-24
4.	ISSUED FOR REVIEW	2023-01-20

Date: 2023-01-19
Sheet No: 1 of 1

WATTS®	Adjustable Accutrol Weir Tag: _____	Adjustable Flow Control for Roof Drains

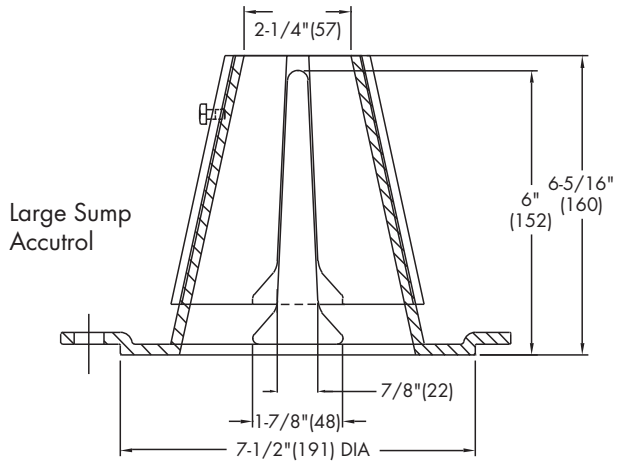
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

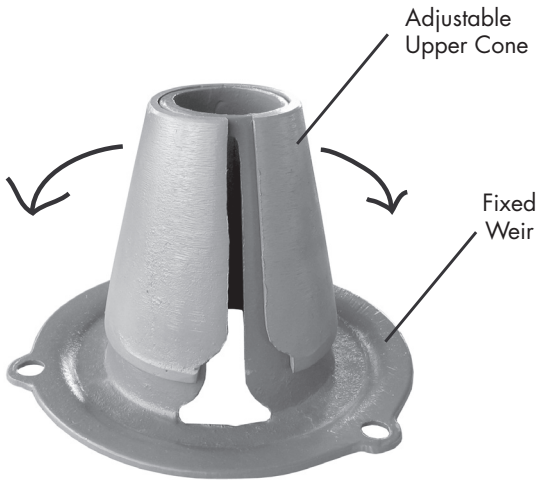
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot in the adjustable upper cone according to the flow rate required. Refer to Table 1 below.
Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

EXAMPLE:

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2"of head will be restricted to 2-1/2 gpm per inch of head.

Therefore, at 3"of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:
[5 gpm (per inch of head) x 2 inches of head] + 2-1/2 gpm (for the third inch of head) = 12-1/2 gpm.





1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	5	5	5	5	5

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

USA: Tel: (800) 338-2581 • Fax: (828) 248-3929 • Watts.com
Canada: Tel: (905) 332-4090 • Fax: (905) 332-7068 • Watts.ca
Latin America: Tel: (52) 81-1001-8600 • Fax: (52) 81-8000-7091 • Watts.com

WATTS®
A Watts Water Technologies Company

SCHEMATIC NOTES

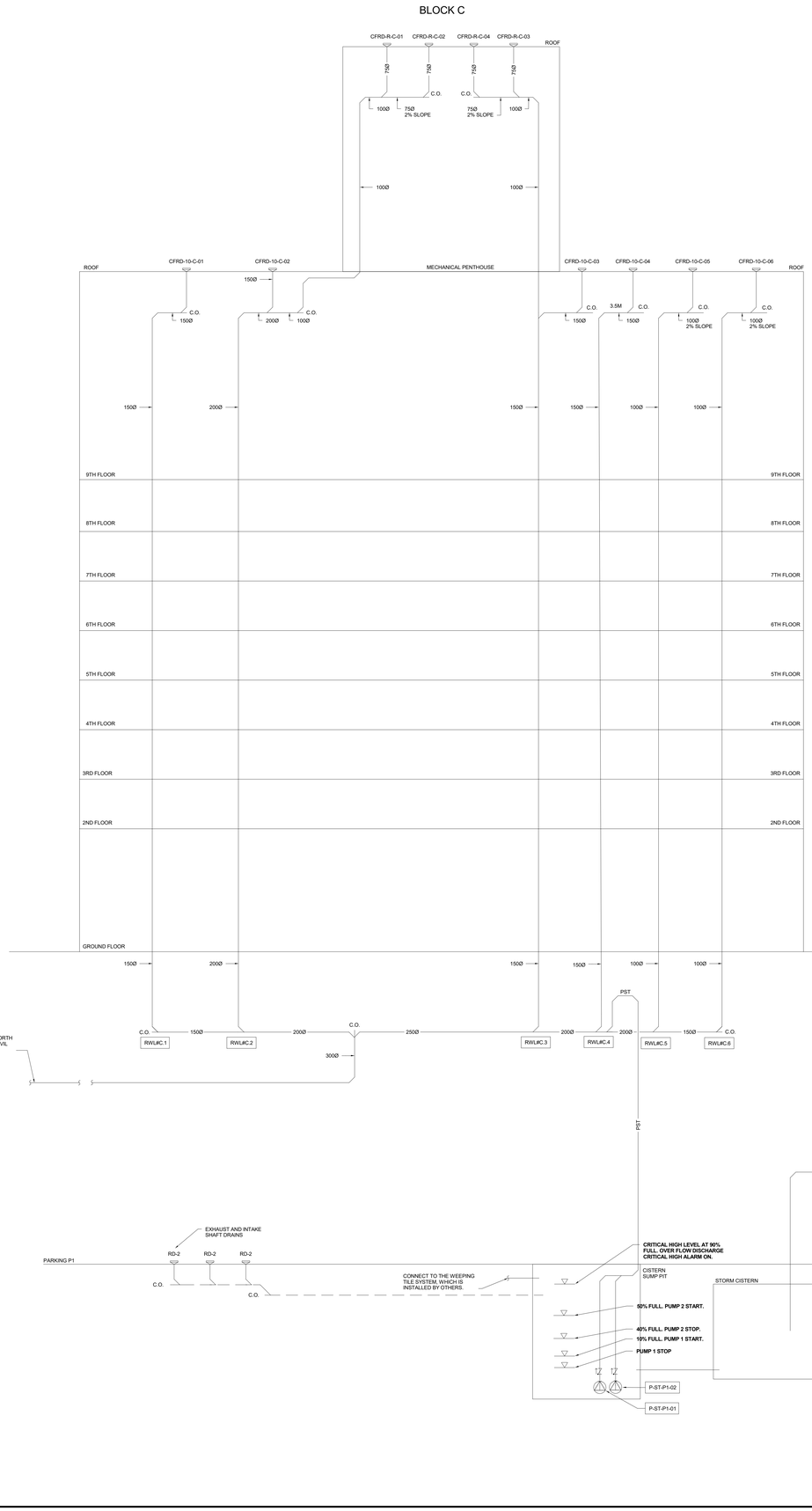
1. READ SCHEMATICS IN CONJUNCTION WITH FLOOR PLANS. ASSUME INFORMATION SHOWN ON FLOOR PLANS TO BE APPLICABLE TO THE RELATED SYSTEM SCHEMATIC AND VICE-VERSA TO PROVIDE A COMPLETE AND OPERATIONAL SYSTEM.
2. VERIFY STATIC AND OPERATING PRESSURES AT ALL POINTS IN THE SYSTEMS AND ENSURE PIPING, FITTINGS, COMPONENTS, ETC. ARE SUITABLE FOR THESE CONDITIONS.
3. HANGERS, SUPPORTS, ANCHORS, GUIDES AND RESTRAINTS, WHERE INDICATED, ARE SHOWN FOR GUIDANCE ONLY. ENSURE ALL COMPONENTS ARE LOCATED AND DESIGNED TO WITHSTAND ALL STATIC AND DYNAMIC FORCES. PROVIDE SHOP DRAWINGS SEALED BY A PROFESSIONAL ENGINEER, REFER TO THE SPECIFICATION FOR DETAILS. PROVIDE INTERMEDIATE GUIDES AS REQUIRED.
4. PROVIDE TYPE CV-1 CONTROL VALVES UNLESS INDICATED OTHERWISE.

GENERAL NOTES

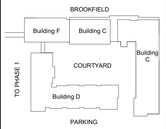
1. DO NOT SCALE DRAWINGS. THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR SPECIFIED THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE. DETERMINE THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS BASED ON SITE CONDITIONS. REVIEW ALL REVISIONS WITH THE CONSULTANT.
2. READ FLOOR PLANS IN CONJUNCTION WITH SCHEMATICS. ASSUME INFORMATION SHOWN ON FLOOR PLANS TO BE APPLICABLE TO THE RELATED SYSTEM SCHEMATIC AND VICE-VERSA TO PROVIDE A COMPLETE AND OPERATIONAL SYSTEM.
3. VERIFY STRUCTURAL INTEGRITY OF ALL TEMPORARY AND PERMANENT OPENINGS. PROVIDE ADDITIONAL FRAMING TO ENSURE STRUCTURAL INTEGRITY AS REQUIRED.
4. REFER TO THE STANDARD DETAILS AND DETAIL SHEETS FOR ADDITIONAL INFORMATION.

ROOF DRAIN SCHEDULE

TAG	LOCATION	TYPE	WEIR OPENING EXPOSED	FLOW	
				L/S	GPM
CFRD-10-C-01	BLOCK C LVL 10 ROOF	CONTROL FLOW	1/4	0.9	14.5
CFRD-10-C-02	BLOCK C LVL 10 ROOF		1/4	0.9	14.9
CFRD-10-C-03	BLOCK C LVL 10 ROOF		1/4	0.9	14.9
CFRD-10-C-04	BLOCK C LVL 10 ROOF		1/4	0.9	14.4
CFRD-10-C-05	BLOCK C LVL 10 ROOF		1/4	0.9	14.4
CFRD-10-C-06	BLOCK C LVL 10 ROOF		1/4	0.9	14.5
CFRD-R-C-01	BLOCK C PENTHOUSE ROOF		CLOSED	0.3	5.0
CFRD-R-C-02	BLOCK C PENTHOUSE ROOF		CLOSED	0.3	5.0
CFRD-R-C-03	BLOCK C PENTHOUSE ROOF		CLOSED	0.3	5.0
CFRD-R-C-04	BLOCK C PENTHOUSE ROOF		CLOSED	0.3	5.0
CFRD-07-D-01	BLOCK D LVL 7 ROOF		1/4	0.9	14.5
CFRD-07-D-02	BLOCK D LVL 7 ROOF		1/4	0.9	14.8
CFRD-07-D-03	BLOCK D LVL 7 ROOF		1/4	0.9	14.4
CFRD-07-D-04	BLOCK D LVL 7 ROOF		1/4	0.9	14.4
CFRD-07-D-05	BLOCK D LVL 7 ROOF		1/4	0.9	14.5
CFRD-R-D-01	BLOCK D PENTHOUSE ROOF		CLOSED	0.3	5.0
CFRD-R-D-02	BLOCK D PENTHOUSE ROOF		CLOSED	0.3	5.0
RD-04-D-01	BLOCK D LVL 4 TERRACE	FULL FLOW	--	2.4	37.4
RD-04-D-02	BLOCK D LVL 4 TERRACE		--	2.1	33.6



DETAIL 1 - CISTERN OVERFLOW



no.	date	revision
D	2023/01/09	ISSUED FOR TENDER
C	2022/12/09	ISSUED FOR PRICING - SI M01
B	2022/12/09	ISSUED FOR PERMIT
A	2022/09/02	ISSUED FOR FOUNDATION PERMIT

It is the responsibility of the appropriate contractor to check and verify all dimensions on site and report all errors and/or omissions to the engineer.

All contractors must comply with all

Do not scale drawings.

This drawing may not be used for construction until signed.

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HOBIN ARCHITECTURE

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

DRAWING TITLE
STORM SCHEMATIC

DRAWN	DATE	SCALE
Author	06/24/22	As indicated

PROJECT
18327.002

DRAWING NO.
M-205

REVISION NO. D

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