SERVICING & STORMWATER MANAGEMENT REPORT
289 CARLING AVENUE

Project No.: CP-19-0007

City File No.: D07-12-19-0147

Prepared for:

John Howard Society of Ottawa
c/o PBC Development and Construction Management Group Inc.
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Prepared by:

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McINTOSH PERRY

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1.0 PROJECT DESCRIPTION

1.1 Purpose

McIntosh Perry (MP) has been retained by John Howard Society of Ottawa to prepare this Servicing and Stormwater Management Report in support of the Site Plan Control process for the proposed 6-storey mixed-use building located at 289 Carling Avenue within the City of Ottawa (City File No. D07-12-19-0147).

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:

- CP-19-0007, C101 – Site Grading, Drainage and Removals Plan, and
- CP-19-0007, C102 – Site Servicing and Erosion & Sediment Control Plan.

This site is subject to approval by the Ministry of the Environment, Conservation and Parks (MECP), City of Ottawa and Rideau Valley Conservation Authority (RVCA). The subject site is located within a combined sewershed therefore the approval exemption set out in Section 3 of O.Reg. 525/98 under the OWRA would not apply and an Environmental Compliance Approval (ECA) application will be required for this site. The storm and sanitary sewers within Carling Avenue are separated but then both systems discharge downstream into a combined sewer.

1.2 Site Description

The property is located at 289 Carling Avenue. It is described as Lot 10 and Part of Lots 8, 9, and 11 Registered Plan 31326, Ward 17 – Capital, City of Ottawa, Ontario. The land in question covers approximately 0.13 ha and is located north of the intersection of Carling Avenue and Bell Street South. See Appendix 'A' for Key Plan.

The existing site is currently developed with an asphalt parking lot surrounded by retaining walls and vegetated areas around the perimeter of the property. The site has been a parking lot since approximately the 1950's.

The proposed development consists of a six-storey mixed-use office and apartment building with a partial basement level daylighting to the south. The building will consist of 40 affordable housing units, main offices for JHS Ottawa and client support office. The foundation footprint is approximately 1,008 m². The office space is located within the basement, second floor, and third floor with 40 residential units located on the third through sixth floor. Parking will be provided with upper and lower parking in the basement and first floor respectively, both with access from Bell Street South with 29 propose parking spaces. According to the architectural plans, the unit breakdown of the proposed residential units will be 29 bachelor units and 11 1-bedroom units.

2.0 BACKGROUND STUDIES

Background studies that have been completed for the site include review of the City of Ottawa as-built drawings, and a topographical survey of the site.

As-built drawings of the existing services within the vicinity of the site were obtained from the City of Ottawa Information Center and were reviewed in order to determine proper servicing and stormwater management schemes for the site. A copy of the drawings can be found in Appendix 'B'.

A topographic survey of the site was completed by Fairhall Moffatt & Woodland Limited, dated August 15, 2018 and can be found in Appendix 'B'.

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

- Phase One ESA completed by DST Consulting Engineers Inc., dated March 2017
- Phase Two ESA completed by DST Consulting Engineers Inc., dated May 2017
- Geotechnical Investigation completed by Paterson Group, dated December 13, 2019
- Phase I Environmental Site Assessment Updated by Paterson Group, dated January 15, 2020
- Phase II Environmental Site Assessment Updated by Paterson Group, dated January 16, 2020

3.0 PRE-CONSULTATION SUMMARY

City of Ottawa Staff have been pre-consulted regarding the proposed development in person on October 2, 2018. Specific design parameters to be incorporated within this design include the following:

- Pre-development and post-development flows shall each be calculated using a time of concentration (Tc) of 10 minutes.
- Control 5 through 100-year post-development flows to the 5-year pre-development flows, respectively, with a combined C value to a maximum of 0.50.
- Services shall be extended from Carling Avenue as services on Bell Street end north of the property.
- Sanitary and Storm sewers are initially separate, however they ultimately discharge to a combined sewer therefore MECP approval is required.
- Through correspondence with RVCA, it was noted the site has no quality control requirements.

Correspondence can be found in Appendix 'B'.

4.0 EXISTING SERVICES

The following subsections describe the existing services within the Carling Avenue right-of-way and the Bell Street South right-of-way.

4.1 Carling Avenue

Existing services within Carling Avenue ROW west bound lanes:

- 250mm diameter storm sewer

Existing services within Carling Avenue ROW east bound lanes:

- 400mm diameter water main
- 300mm diameter sanitary sewer

Hydro, cable and Bell service locations shall be confirmed by contractor.

The sanitary and storm sewers flow west along Carling Avenue. The sewers both discharge to separate combined sewers near the intersection of Carling Avenue and Lebreton Street South. The sanitary sewer discharges to a 525mm diameter combined sewer and continues south perpendicular to Carling Avenue. The storm sewer discharges to a 250mm diameter combined sewer and continues west down Carling Avenue. A fire hydrant is present on the south side of Carling Avenue approximately 30.0m from the east corner of the site.

4.2 Bell Street South

Existing services within Bell Street South ROW:

- 200mm diameter watermain
- 300mm diameter combined sewer (ends approximately 25.0m north of site)

Catch basins are present near the existing site entrance as well as across the road. The catch basins are connected to the storm main within Carling Avenue. A fire hydrant with an unobstructed path of travel is present near the west property corner on Bell Street South.

5.0 SERVICING PLAN

5.1 Proposed Servicing Overview

The overall servicing will be provided via service connections to the mains within Carling Avenue and Bell Street South. The water service will be extended from the 200 mm diameter watermain within Bell Street South. Similarly, the storm and sanitary services will be connected to the 250 mm storm sewer (to be reclassified as combined by the City). Details pertaining to the final proposed servicing locations have been reviewed and are shown on the proposed Site Servicing Plan included within the submission package.

5.2 Proposed Water Design

A new 150mm diameter PVC watermain is proposed to service the site complete with a water valve and will be connected to the existing 200 mm diameter watermain within Bell Street South. The watermain is designed to have a minimum of 2.4m cover.

The Fire Underwriters Survey 1999 (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 1.5 (both frame and non-combustible). The total floor area ('A' value) for the FUS calculation was determined to be 4,098 m^2. The results of the calculations yielded a required fire flow of 16,000 L/min. A fire flow of 6,300 L/min was calculated using the Ontario Building Code (OBC) requirements. The detailed calculations for the FUS and OBC 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 below:

Table 1: Water Demands

Average Day Demand (L/s)	0.22
Maximum Daily Demand (L/s)	0.51
Peak Hourly Demand (L/s)	1.10
OBC Fire Flow Requirement (L/s)	105.00
FUS Fire Flow Requirement (L/s)	266.67
Max Day + Fire Flow (FUS) (L/s)	267.18

Boundary conditions have been provided by the City of Ottawa for the current conditions and are available in Appendix 'C'. The subject site is located in pressure zone 1W. A water model was completed using Bentley's WaterCAD based on the boundary conditions. The results determined that the proposed 150mm watermain can adequately service the proposed development and provide sufficient fire flow since Hydrant H-1 produced available fire flows of 13,207.93 L/min. Refer to drawing for more details. The results are available in Appendix 'C' of this report.

Prior to connecting to the municipal water distribution system, it is essential to determine whether the system has adequate capacity and that the overall impact to the existing system is minimal. A WaterCAD model was generated to determine the capacity, pressure and size of pipes required to service the proposed site. Three (3) different scenarios were analyzed within the model, namely average day, maximum day + fire flow and peak hourly demands.

When modelling the proposed water distribution system for 289 Carling Avenue, it was necessary to determine which scenario produced a greater demand: the maximum day + fire flow or peak hourly. It was concluded that the maximum day + fire flow scenario would govern the design process, since it produced the higher demand. A layout of the WaterCAD model has been attached in Appendix C.

The normal operating pressure range is anticipated to be 311 kPa to 429 kPa and will not be less than 275 kPa (40 psi) or exceed 689 kPa (100 psi). The proposed watermain will meet the minimum required 20 psi (140 kPa) at the ground level under maximum day demand and fire flow conditions.

Table 2: Water Pressure at Junctions per Scenario

Junction	Average Day (psi)	Peak Hourly (psi)	Max. Day + Fire Flow (psi)
J-1 (BLDG)	61.92	48.43	45.59
J-2	62.23	48.74	45.91

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. The results are demonstrated below and a fire hydrant coverage figure has been provided in Appendix "C" which shows the Hydrants included in the analysis.

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.)
289 Carling Avenue	16,000	2	2	19,000

5.3 Proposed Sanitary Design

A new 150 mm diameter gravity sanitary service will be connected to the existing 250 mm diameter storm sewer within Carling Avenue (to be reclassified as combined by the City). The sanitary service will be complete with an internal monitoring test port within the building's mechanical room to satisfy the City of Ottawa Sewer-Use By-Law 2003-514.

The subject site is a proposed six-storey mixed-use office and apartment building. The total area of the building is 1,008 m^2. The peak design flows for the proposed building were calculated using criteria from the City of Ottawa – Sewer Design Guidelines, October 2012. The proposed site development area (0.13ha) will generate a flow of 0.863 L/s.

The proposed 150 mm diameter gravity sanitary service will be installed with a minimum full flow target velocity (cleansing velocity) of 0.6 m/s and a full flow velocity of not more than 3.0 m/s. Design parameters for the site include an infiltration rate of 0.33 l/s/ha.

The proposed service for the site will be connected to existing 250 mm diameter storm sewer within Carling Avenue. It is anticipated that flow from the site has been previously accounted for within the downstream infrastructure. Assuming a commercial flow of 50,000 L/ha/d with the site area of 0.13 ha, it would result in a flow of 6,500 L/d or 0.08 L/s. Although the sanitary flow is slightly higher for the proposed development, it is anticipated that there will be no issues with capacity constraints within the existing sanitary main within Carling Avenue.

See Sanitary Flow Calculations and Sanitary Sewer Design Sheet in Appendix 'D' of this report for more details.

5.4 Proposed Storm Design (Conveyance and Management)

Stormwater runoff will be conveyed by way of overland sheet flow which will discharge into the existing infrastructure within Carling Avenue. The roof will provide runoff storage by the use of roof drains before leaving the site. Roof drains will restrict the flow to conform to City requirements.

A new 100 mm diameter storm service will be connected to the existing 250 mm diameter storm main within Carling Avenue. The storm service is provided as an outlet for a foundation drain system. The restricted roof stormwater from the roof drains will be connected to an additional 150 mm diameter storm service which will also be connected to the existing 250 mm diameter storm main within Carling Avenue. An internal monitoring test port will be provided within the building's mechanical room to satisfy City of Ottawa Sewer-Use By-Law 2003-514.

From discussions with the City of Ottawa and the Rideau Valley Conservation Authority (RVCA), quality control will not be provided within the site. Correspondence with the RVCA is available in Appendix 'B'. Further details and calculations pertaining to the quantity and quality of the stormwater management system are provided in Section 6.0.

6.0 PROPOSED STORMWATER MANAGEMENT

6.1 Design Criteria and Methodology

Stormwater management for this site will be maintained through roof storage and positive drainage away from the proposed building. Stormwater runoff will be restreeted on the proposed roof and directed to the proposed storm service before reaching the existing storm sewer within Carling Avenue. Overland flow will be directed towards the Carling Avenue right-of-way. Stormwater Best Management Practices (SWM BMP's) will be implemented at the "Lot level", "Conveyance" and "End of Pipe" locations. These concepts will be explained further in Section 6.4. 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

- No quality control is required for the site as per the RVCA.

Quantity Control

- Post-development flow 5/100-year is be restricted to match the 5-year pre-development flow with a maximum C value of 0.40.

6.2 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 by-product of using extremely conservative prediction method, any facilities that are sized using these results are expected to function as intended in real world conditions.

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 correspondence with City of Ottawa Staff the time of concentration (Tc) used for pre-development flows is to be calculated or 20 minutes and post-development flows shall be 10 minutes.

6.2.1 Pre-Development Drainage

The existing site drainage limits are demonstrated on the Pre-Development Drainage Area Plan. The existing site has been shown as drainage areas A1 and A2. See drawing CP-19-0007 – PRE within Appendix 'D' of this report for more details. Existing conditions have the overland stormwater runoff flowing from high points located across the northern area of the property and draining south towards Carling Avenue's Right-of-Way (ROW) and the existing catch basins. A summary of the Pre-Development Runoff Calculations can be found below.

Table 4: Pre-Development Runoff Summary

Area ID	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5-year	Balanced Runoff Coefficient (C) 100-year	5-Year Flow Rate (l/s)	100-Year Flow Rate (l/s)
A1	0.12	0.68	0.76	23.95	46.13
A2	0.01	0.20	0.25	0.30	0.64
Total	0.13			24.25	46.77

(See Appendix 'G' for Calculations)

6.2.2 Post-Development Drainage

The proposed site drainage limits are demonstrated on the Post-Development Drainage Area Plan. See CP-19-0007 - POST in Appendix 'F' of this report for more details. A summary of the Post-Development Runoff Calculations can be found below.

Table 5: Post-Development Runoff Summary

Area ID	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5-year	Balanced Runoff Coefficient (C) 100-year	5-year Flow Rate (L/s)	100-year Flow Rate (L/s)
B1-1	0.027	0.90	1.00	6.94	13.21
B1-2	0.028	0.90	1.00	7.32	13.94
B2-1	0.012	0.90	1.00	3.26	6.20
B2-2	0.008	0.90	1.00	2.01	3.83
B3-1	0.003	0.90	1.00	0.74	1.42
B3-2	0.017	0.90	1.00	4.47	8.51
B4-1	0.004	0.90	1.00	0.92	1.75
B4-2	0.004	0.90	1.00	0.92	1.75
B5	0.024	0.60	0.68	4.12	7.98
Total	**0.13**			30.71	58.62

(See Appendix 'G' for Calculations)

Runoff from areas B1-B4 will be restricted through the use of roof drains. The roof restrictions will restrict the 100-year runoff to the 5-year pre-development flow rate while accounting for the proposed unrestricted flow from drainage area B5. See Appendix 'F' for calculations. This restriction will be further detailed in Section 6.3.

6.3 Quantity Control

After discussing the stormwater management criteria for the site with City of Ottawa staff, the 5 and 100-year post-development runoff for this site has been restricted to match the 5 and flow rate with a maximum C value of 0.4 (See Appendix 'B' for correspondence). These values create the following allowable release rates and storage volumes for the development.

Table 6: Allowable Release Rate

Area	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5-yr	Tc (min)	5-Year Flow Rate (L/s)
A1 & A2	0.13	0.40	10	14.72

(See Appendix 'G' for Calculations)

Reducing site flows will be achieved using roof drains and will create the need for roof storage. Runoff from areas B1- B4 will be restricted as detailed below.

Table 7: Post-Development Stormwater Management Summary

Area ID	Area (ha)	Restricted Flow (L/s)		Storage Required (m^3)		Storage Provided (m^3)		Restriction Device	
		5-yr	100-yr	5-yr	100-yr	5-yr	100-yr	Type	Location
B1-1	0.027	0.44	0.82	6.38	12.05	6.99	12.98	RD-100-A-ADJ	Weir set to fully exposed
B1-2	0.028	0.44	0.82	6.85	12.93	7.37	13.69		
B2-1	0.012	0.38	0.69	2.40	4.62	2.81	5.16	RD-100-A-ADJ	Weir set to fully exposed
B2-2	0.008	0.32	0.57	1.30	2.53	1.45	2.61		
B3-1	0.003	0.25	0.44	0.31	0.62	0.43	0.75	RD-100-A-ADJ	Weir set to fully exposed
B3-2	0.017	0.38	0.69	3.72	7.11	3.86	7.12		
B4-1	0.004	0.25	0.44	0.45	0.89	0.53	0.93	RD-100-A-ADJ	Weir set to fully exposed
B4-2	0.004	0.25	0.44	0.45	0.89	0.53	0.93		
B5	0.024	4.12	7.98					N/A	N/A
Total	**0.13**	6.83	12.89						

(See Appendix 'G' for Calculations)

Area B1 is the upper level (level 3 to 6) roof area. Runoff from Area B1 will be restricted by two roof drains restricting the flows to 0.44 L/s and 0.82 L/s in both sub catchment areas B1-1 and B1-2 for the 5-year and 100-year storm events. Area B2 is the southwest portion of the third level roof. Area B2 will be restricted by two roof drains restricting the flows to 0.38 L/s and 0.69 L/s for the 5-year and 100-year storm events in sub catchment area B2-1 and to 0.32 L/s and 0.57 L/s in sub catchment area B2-2. Area B3 is the northeast portion of the third level roof. Area B3 will be restricted by two roof drains restricting the flows to 0.25 L/s and 0.44 L/s for the 5-year and 100-year storm events in sub catchment area B3-1 and 0.38 L/s and 0.69 L/s in sub catchment area B3-2. Area B4 is the northeast portion of the second level roof. Area B4 will be restricted by two roof drains restricting the flows to 0.25 L/s and 0.44 L/s for the 5-year and 100-year storm events in both sub catchment areas B4-1 and B4-2. Roof drainage areas for the roof areas is depicted on CP-19-0007 – POST plan available within Appendix 'E'. The table below details the required and provided rooftop storage volumes for the development.

Table 8: Roof Drain Summary

Area ID	Area (ha)	Number of roof Drains	Watts Model # (Weir Opening)	Total Restricted Flow (L/s)		Storage Depth (m)		Storage Volume Required (m^3)		Storage Volume Available (m^3)	
				5-Yr	100-Yr	5-Yr	100-Yr	5-Yr	100-Yr	5-Yr	100-Yr
B1-1	0.027	1	RD-100-A-ADJ (Fully Exposed)	0.44	0.82	0.035	0.065	6.38	12.05	6.99	12.98
B1-2	0.028	1		0.44	0.82	0.035	0.065	6.85	12.93	7.37	13.69
B2-1	0.012	1	RD-100-A-ADJ (Fully Exposed)	0.38	0.69	0.030	0.055	2.40	4.62	2.81	5.16
B2-2	0.008	1		0.32	0.57	0.025	0.045	1.30	2.53	1.45	2.61
B3-1	0.003	1	RD-100-A-ADJ (Fully Exposed)	0.25	0.44	0.020	0.035	0.31	0.62	0.43	0.75
B3-2	0.017	1		0.38	0.69	0.030	0.055	3.72	7.11	3.86	7.12
B4-1	0.004	1	RD-100-A-ADJ (Fully Exposed)	0.25	0.44	0.020	0.035	0.45	0.89	0.53	0.93
B4-2	0.004	1		0.25	0.44	0.020	0.035	0.45	0.89	0.53	0.93

(See Appendix 'G' for Calculations)

In the event that there is a rainfall above the 100-year storm event, or a blockage within the storm sewer system, emergency roof scuppers have been provided so that the storm-water runoff will be conveyed towards Carling Avenue or Bell Street South.

As the development will be connected to a combined sewer, additional flows from groundwater and the sanitary service have been considered in the stormwater calculations. The Geotechnical Report completed by Paterson indicates an expected groundwater flow of 50 L/min (0.83 L/s) while the sanitary flow has been calculated to be 0.863 L/s. The result is a 1.69 L/s increase to the flow discharging to the combined sewer within Carling Avenue. Therefore, the total flow from the site (12.89 L/s + 1.69 L/s) of 14.58 L/s is less then the pre-development flow.

6.4 Quality Control

The development of this lot will employ Best Management Practices (BMP's) wherever possible. The intent of implementing stormwater BMP's is to ensure that water quality and quantity concerns are addressed at all stages of development. Lot level BMP's typically include temporary retention of the lot runoff, minimizing ground slopes and maximizing landscaped areas. Some of these BMP's cannot be provided for this site due to site constraints and development requirements.

As per the discussions with the RVCA, there are no quality control requirements for the site. Please refer to Appendix 'B' for correspondence with the RVCA. The combination of the above BMP's and the proposed flow control measures will aid in the protection of the natural environment.

7.0 EROSION AND SEDIMENT CONTROL

7.1 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 Servicing and Sediment & Erosion Control Plan for additional details regarding the temporary measures to be installed and their appropriate OPSD references.

7.2 Permanent Measures

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.

8.0 SUMMARY

- A new 1,008 m^2 ground floor area six-story mixed-use office and residential building will be constructed on the site located at 289 Carling Avenue.
- A new 150 mm diameter sanitary service will be installed and connected to the existing 250 mm diameter storm sewer (to be reclassified by City) within Carling Avenue.
- A new 150 mm diameter water lateral will be extended from the existing 200 mm diameter main within Bell Street South.
- A new 150 mm storm service will be installed and connected to the existing 250 mm diameter storm sewer within Carling Avenue.
- Internal testing ports will be provided for the 150mm storm and sanitary services within the building's mechanical room.
- A new 100 mm storm service will be installed for the foundation drainage system and connected to the existing 250 mm dimeter sewer within Carling Avenue.
- As discussed with City of Ottawa staff, the stormwater management design will ensure that the post-development flow rates are restricted to the 5-year pre-development flow rates calculated with a maximum C value of 0.4.
- Storage for the 5 and 100-year storm events will be provided on the proposed flat roof.

9.0 RECOMMENDATIONS

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 located at 289 Carling Avenue.

This report is respectfully being submitted for approval.

Regards,

McIntosh Perry Consulting Engineers Ltd.

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10.0 STATEMENT OF LIMITATIONS

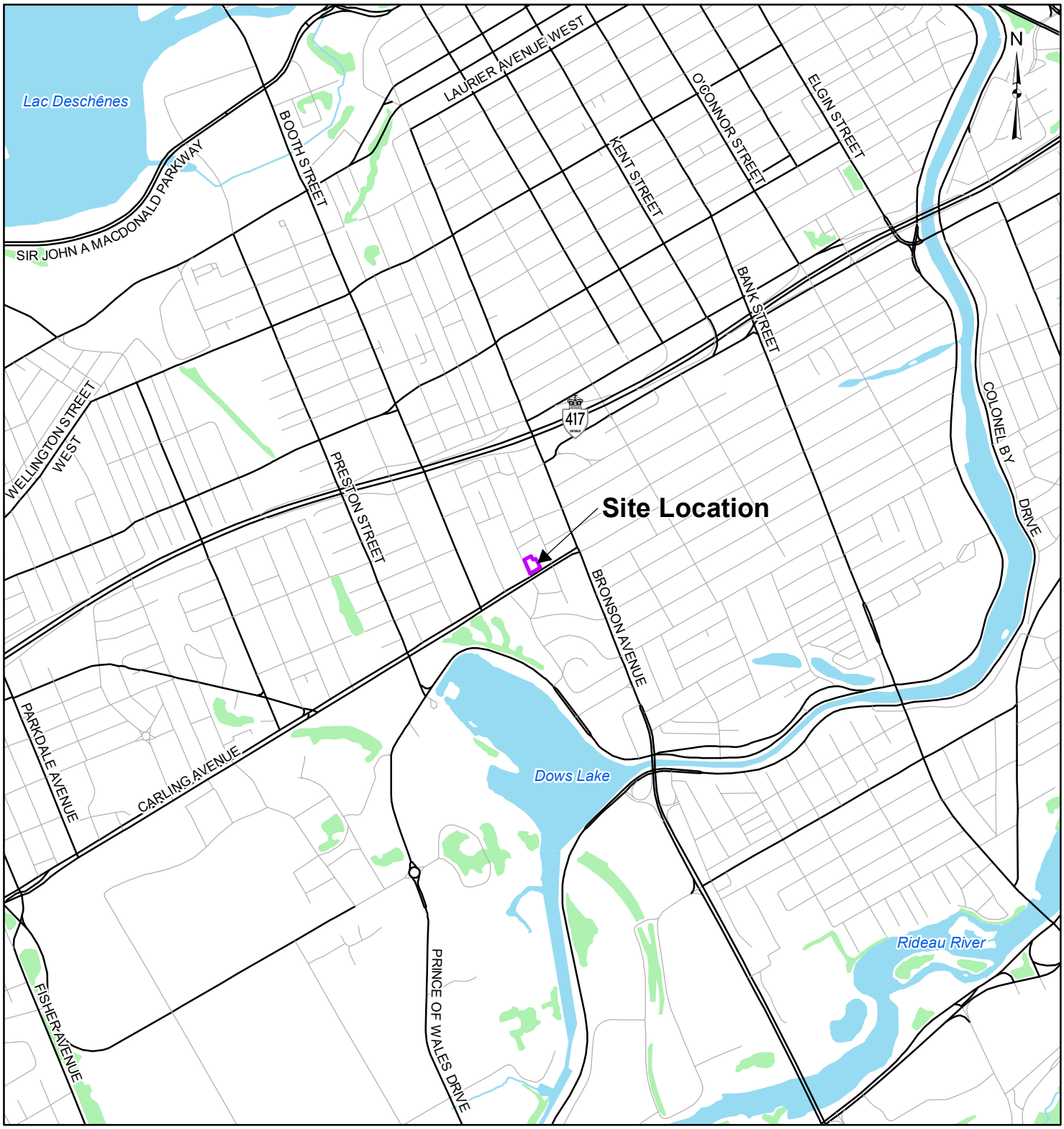
This report was produced for the exclusive use of John Howard Society of Ottawa. The purpose of the report is to assess the existing stormwater management system and provide recommendations and designs for the post-construction scenario that are in compliance with the guidelines and standards from the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



LEGEND

- Approximate Site Boundary
- Local Road
- Major Road
- Watercourse
- Waterbody
- Wooded Area

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2019.

CLIENT: JOHN HOWARD SOCIETY C/O

PROJECT: NEW MIXED USE OFFICE AND APARTMENT BUILDING

TITLE: SITE LOCATION

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

PROJECT NO:CP-19-0007		FIGURE:
Date	Feb., 05, 2019	1
GIS	LC	
Checked By	CH	

H:\01 Project - Proposals\2019 Jobs\CP\0CP-Projects\0CP-19-0007 PBC_JHS Carling_289 Carling Avenue\13 - GIS\mxd\CP-19-0007_01_KeyPlan2.mxd

APPENDIX B
BACKGROUND DOCUMENTS

McINTOSH PERRY

MINUTES

289 Carling Avenue - Pre-Application Consultation Meeting
Date: Tuesday, October 2, 2018
Time: 1:00 PM – 2:00 PM
Location: 110 Laurier Avenue West, Room 4106E

Present:
Maria Martinez (Project Manager)
Christine MacIntosh (John Howard Society)
Ralph Wiesbrock (KWC Architects)
Andrew Kaster (KWC Architects)
Stefan Krauss (KWC Architects)
Robert Sandercott (City of Ottawa Planning)
Richard Buchanan (City of Ottawa Engineering)
Christopher Moise (City of Ottawa Urban Design)

1.0 Introductions

2.0 Overview of Proposal

3.1	**Overview** • Maria Martinez and Christine MacIntosh provided an overview of the proposal: o The subject property is presently subject to a Request for Proposals for an affordable housing development. Proposals are directed to set a target of 40 to 60 dwelling units within the development. o The John Howard Society (JHS) provides supportive housing for individuals in "transition". o JHS is also proposing to move their offices and support centre to this location, should they win the RFP. These uses, in addition to the parking for the development, would occupy the first three storeys (podium) of the building. o The proposed apartments (40 bachelor and 1-bedroom units) would be located on the fourth to seventh storeys of the proposed building. The majority of the amenity space for these units will be accessible from the fourth storey, including roof decks located on top of the podium. o The services provided by the offices and support centre would be available both to residents of the subject building and residents from other buildings operated by JHS. o With respect to the proposed design of the development, it was noted that accommodation of the	

	required on-site parking for the site has so far been the greatest challenge.	

3.2	**Zoning, Official Plan & Setbacks**
	• AM10 – Arterial Mainstreet Zone, Subzone 10
	  ○ The following zoning provisions should also be noted:
	  ▪ A minimum amenity area requirement of 6 square metres per dwelling unit is required, at least 50% of which must be communal.
	  ▪ For the residential units, parking is required at a rate of 0.5 spaces per unit and 0.1 visitor spaces per unit, not including the first 12 units.
	  ▪ For the office space, a minimum parking rate of 1 space for every 100 square metres of gross floor area is required.
	  ▪ Bicycle parking is required at a rate of 0.5 spaces per unit.
	  ▪ As per Section 113 of the By-law, one loading space is required for an office use measuring 1000 sq m of total gross floor area or more.	

3.0 Questions

4.1	• How has the expected parking demand factored into the design? ○ **RESPONSE**: often the units have been geared towards those who don't own vehicles. Often, Minor Variances have been applied for to reduce the minimum parking rate; however, in this instance the applicants would prefer to present a zoning-compliant proposal. It is possible that the clientele in this instance may generate a higher demand for on-site parking than normally expected.	

4.0 Preliminary Comments from City

5.1	**Planning (Robert Sandercott):** • A Site Plan Control application will be required (***Manager Approval, Public Consultation***). • The number of driveway accesses/curb cuts off of Bell Street is a potential concern (i.e. the loading space + both parking accesses), given their proximity to each other. It is preferred to reduce the number of accesses required for this development. ○ Similarly, the location of and access to the proposed loading space is also a concern.	

	• Consider the function and layout of the amenity space provided for the proposed residential units. Acknowledged that this may change depending on the design and stepbacks of the tower relative to the podium. • ○	

5.2	**Engineering (Richard Buchanan):**
	• A servicing study/brief will be required, in order to confirm if upgrades to the existing servicing are necessary, and to confirm how fire protection/fire flow requirements for the building will be addressed.
	• Servicing from Carling Avenue will be necessary, as services on Bell Street end north of the subject property. It is noted that the services on Carling are located towards the opposite side of the street.
	• While sanitary and storm services are separated, they empty to a combined sewer, and Ministry of Environment approval will be required.
	• Stormwater management – a SWM plan and report will be required.
	  • Stormwater management design is for a 1:5 year storm event with a C factor of 0.5 and a Tc of 10 min, controlled up to the 1:100 year storm event.
	• Carling Avenue is an Arterial Road and therefore a noise study will be required.
	  • Carling Avenue is a transit corridor which is expected to be constructed within 4 to 7 years.	

5.3	**Urban Design (Christopher Moise)** • Consider further articulation between the base/podium and tower above, and pushing the tower section back from the podium. Frontage along Carling appears to have significant mass. • Show more of the surrounding building context and how the proposed design addresses that context. • Amount of and design of parking proposed to be provided is a concern, in particular given that it occupies much of the floors closest to street level.	
5.4	**Transportation (Wally Dubyk) – unable to attend meeting however following comments were provided:** • Applicant will need to complete the TIA (Transporation Impact Assessment) screening form to determine scope of TIA required in support of the application. Link: http://documents.ottawa.ca/sites/documents.ottawa.ca/files/tia_guidelines_en.pdf • Carling Avenue is designated as an Arterial road within the City's Official Plan with a ROW protection limit of 44.5 metres. The ROW protection limit and the offset distance (22.05 metres) are to be dimensioned from the existing centerline of pavement and shown on the drawings. • **ROW interpretation** – Land for a road widening will be taken equally from both sides of a road, measured from the centreline in existence at the time of the widening if required by the City. The centreline is a line	

	running down the middle of a road surface, equidistant from both edges of the pavement. In determining the centreline, paved shoulders, bus lay-bys, auxiliary lanes, turning lanes and other special circumstances are not included in the road surface. • A 5.0 metres x 5.0 metres sight triangle would be required at the intersection of Bell Street and Carling Avenue.	

5.0 Next Steps / Process

7.1	• Staff to follow up with minutes and list of required reports and studies • Should proponents proceed with this project, recommended that another pre-consultation meeting be held once the design is further along in the process.	

From: Eric Lalande <eric.lalande@rvca.ca>
Sent: February 20, 2019 10:44 AM
To: Charissa Hampel
Subject: RE: 289 Carling Avenue - Mixed Use Building

Hi Charissa,

Based on the plans provided, the RVCA will have no Quality control requirements for the proposed mixed use building at 289 Carling Avenue. Best management practices are encouraged where possible.

Please contact me should you have any other questions.

Thanks,

Eric Lalande, MCIP, RPP
Planner, Rideau Valley Conservation Authority
613-692-3571 x1137

From: Charissa Hampel <c.hampel@mcintoshperry.com>
Sent: Wednesday, February 20, 2019 10:31 AM
To: Eric Lalande <eric.lalande@rvca.ca>
Subject: 289 Carling Avenue - Mixed Use Building

Hi Eric,
I am currently working on a development at 289 Carling Ave within the City of Ottawa. The development will consist of a 6 storey mixed use office and apartment building. I have attached a site plan for your reference. Could you please let me know the quality control requirements for the site.

Thanks,

Charissa Hampel, EIT
Engineering Intern
115 Walgreen Road, R.R. 3, Carp, ON K0A 1L0
T. 613.714.4625 | **F.** 613.836.3742 | **C.** 613.791.0505
c.hampel@mcintoshperry.com | www.mcintoshperry.com

31 October 2019

Ms. Maria J. Martinez
PBC Development and Construction Management Group Inc.
205-485 Bank St., Ottawa, ON K2P 1Z2

Via Email >> mmartinez@pbcgroup.ca

Re: City of Ottawa File Number: **D07-12-9-0147,** Consultant File Number: CP-19-0007
City of Ottawa comments provided in a letter from Ms. Jenny Kluke, dated October 4, 2019

Consolidation of Engineering Related Comments
289 Carling Ave. [6 Storey Mixed-Use Building]
KWC 1850

Dear Ms. Martinez,

We have received the comments from City of Ottawa, Ms. Jenny Kluke, in a letter dated October 4, 2019 regarding the Site Plan Application drawings, Revision 1, dated August 16, 2019. We have compiled the following in response to the City engineering inquiries as related to architectural items.

Reports:

"11. Please obtain correspondence from the Architect regarding building construction to confirm the parameters applied in the FUS RFF calculation are accurate. The type of construction, occupancy type and confirmation that the building will be sprinklered protection shall be documented by the Architect. Correspondence shall be provided in the Appendix as supporting documentation."

KWC clarification to 11.:
The proposed building will be combustible and non-combustible construction.
The proposed building will include mixed-use Group D, and Group C occupancies.
The proposed building will be sprinklered.

"20. Please provide discussion in Section 5.3 on the unit types and population and include correspondence from the Architect or documentation confirming the unit type breakdown in the Appendix as supporting documentation."

KWC clarification to 20.:
The proposed building will include 29 one bedroom apartments and 11 studio (bachelor) apartments, total of 40 residential units.

"21. An office space population value of 60 employees is used in calculating the peak wastewater flow. Please provide clarification on how the office space population was estimated for this development proposal and confirm that a conservative valve is being applied."

KWC clarification to 21.:
The office spaces population value of 60 employees corresponds to the specific client-user (John Howard Society) identified program requirements.

22. Please provide discussion on how the building intends to operate and if there are any amenities that are proposed to be provided within the building in order to refine and support the estimated peak wastewater flow for this development proposal. Correspondence shall be provided (in the report) from the applicant/owner to clearly identify all building uses in order to establish an approximate peak wastewater flow.

KWC clarification to 22.:
The general building layout includes for 2 parking garage levels (Level 0 and Level 1), office and client service spaces (Level 0, Level 2 and part of Level 3) and residential units (on part of Level 3 and on level 4 to Level 6).
Amenity spaces will be included mainly on Level 3, including a communal laundry space with estimated 3 laundry machines and 3 dryers. Each residential level (Level 4 to Level 6) will include for resident quiet room/office amenity space.
Part of the roof of Level 2 will be used as an exterior terrace amenity space.

We trust that the above is satisfactory.

Sincerely,

Ralph Wiesbrock, *Architect*
OAA, FRAIC, LEED™ Accredited Professional
Partner / Principal

ONTARIO ASSOCIATION OF ARCHITECTS
RALPH WIESBROCK
LICENCE
5270

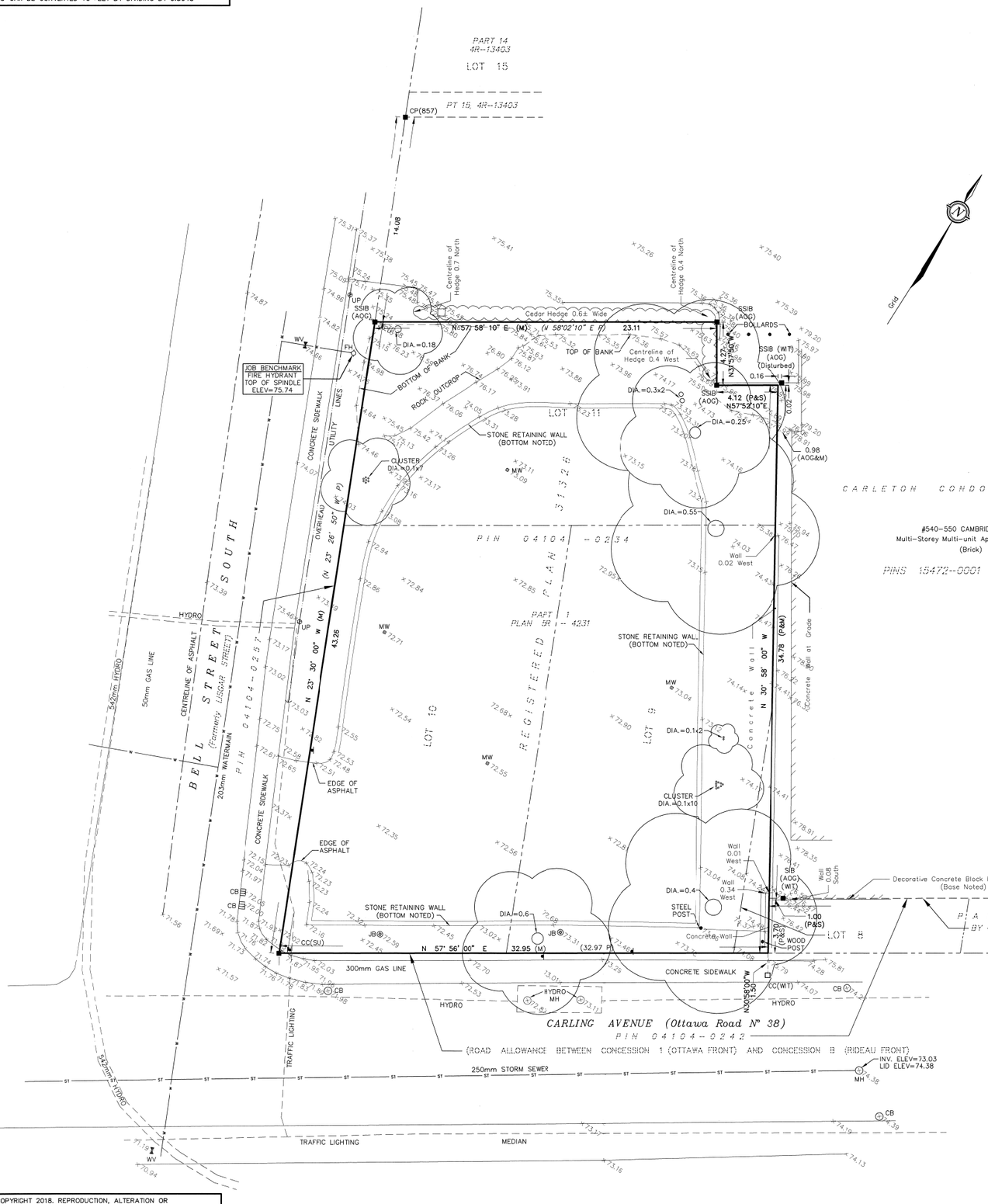
METRIC
DISTANCES AND ELEVATIONS SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

TOPOGRAPHIC SURVEY OF
LOT 10 AND PART OF LOTS 8, 9 AND 11 REGISTERED PLAN 31326 CITY OF OTTAWA

SCALE 1 : 150

0 1 2 5 10 15 metres

FAIRHALL, MOFFATT & WOODLAND LIMITED
ONTARIO LAND SURVEYORS



ELEVATION NOTES

1. ELEVATIONS SHOWN HEREON ARE REFERRED TO GEODETIC DATUM (CGVD28).
2. ELEVATIONS FOR MANHOLE COVERS AND CATCH BASINS HAVE TO BE INDEPENDENTLY CONFIRMED BEFORE THEY CAN BE ACCEPTED FOR FINAL DESIGN OR CONSTRUCTION PURPOSES.
3. IT IS THE RESPONSIBILITY OF THE USER OF THIS INFORMATION TO VERIFY THAT THE JOB BENCHMARKS HAVE NOT BEEN ALTERED OR DISTURBED AND THAT THEIR RELATIVE ELEVATION AND DESCRIPTION AGREE WITH THE INFORMATION SHOWN ON THIS DRAWING.

UTILITY NOTES

1. THIS DRAWING CANNOT BE ACCEPTED AS ACKNOWLEDGING ANY UNDERGROUND UTILITIES AND IT WILL BE THE RESPONSIBILITY OF THE USER TO CONTACT THE RESPECTIVE UTILITY AUTHORITIES FOR CONFIRMATION OR LOCATION.
2. UNDERGROUND UTILITIES, AS REPORTED ON THIS DRAWING, ARE NOT BASED ON AN ACTUAL 'FIELD LOCATE' BY THE RESPECTIVE UTILITY AGENCIES BUT HAVE BEEN COMPILED FROM DATA OBTAINED FROM THE FOLLOWING SOURCE:
   a) CITY OF OTTAWA
3. BEFORE ANY WORK INVOLVING PROBING, EXCAVATING, ETC., A FIELD LOCATION OF UNDERGROUND PLANT BY THE PERTINENT UTILITY AUTHORITY IS MANDATORY.

NOTES

1. BEARINGS ARE GRID, DERIVED FROM THE NORTHERLY LIMIT OF CARLING AVENUE SHOWN ON PLAN OF SURVEY BY FAIRHALL, MOFFATT AND WOODLAND LIMITED DATED MARCH 6, 2015 (REF#1-CCP472) AS HAVING A BEARING OF N57°56'00".

LEGEND

□	– SURVEY MONUMENT SET
■	– SURVEY MONUMENT FOUND
SIB	– STANDARD IRON BAR
SSIB	– SHORT STANDARD IRON BAR
CC	– CUT CROSS
CP	– CONCRETE PIN
(P)	– CARLETON CONDOMINIUM PLAN 472
(M)	– MEASURED
(S)	– SET
DIA.	– DIAMETER
PIN	– PROPERTY IDENTFIER NUMBER
CB	– CATCH BASIN
MH	– MANHOLE
LS	– LAMP STANDARD
UP	– UTILITY POLE
←	– GUY WIRE AND ANCHOR
•	– BOLLARD
▲	– SIGN
	– CONIFEROUS TREE
	– DECIDUOUS TREE
—W—	– WATERMAIN
— —	– OVERHEAD UTILITY WIRES
—UH—	– UNDERGROUND HYDRO
—UB—	– UNDERGROUND BELL
—G—	– GAS MAIN
—ST—	– STORM SEWER
—S—	– SANITARY SEWER
	– CURB
JB	– JUNCTION BOX
MW	– MONITORING WELL
WV	– WATER VALVE
FH	– FIRE HYDRANT

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:
1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON AUGUST 15, 2018.

2018/08/16
DATE

JOHN H. GUTRI
ONTARIO LAND SURVEYOR

THIS IS NOT A VALID COPY UNLESS EMBOSSED WITH SEAL

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2060907

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

Fairhall Moffatt & Woodland LIMITED
ONTARIO LAND SURVEYORS
OTTAWA
Surveying and Land Information Services
100-600 TERRY FOX DRIVE, EANATA, ONTARIO K2L 4B6
TEL: (613) 591-2580 FAX: (613) 591-1495
www.fmw.on.ca

JOB No. Y24100
E 367282
N 5029263
REFERENCE No. 8 – 31326
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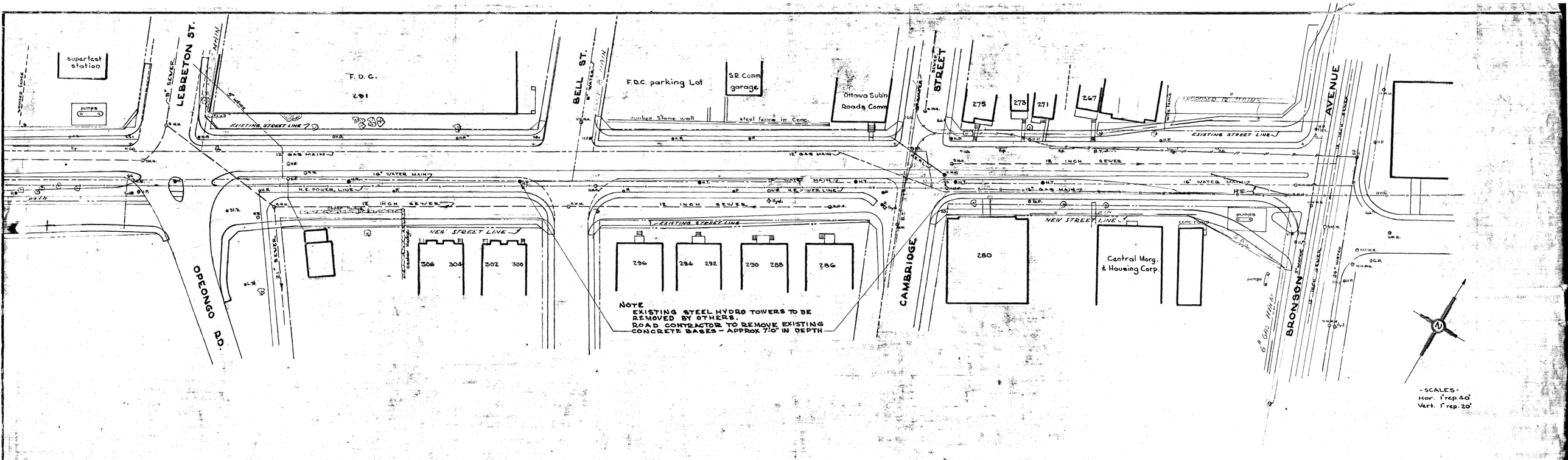
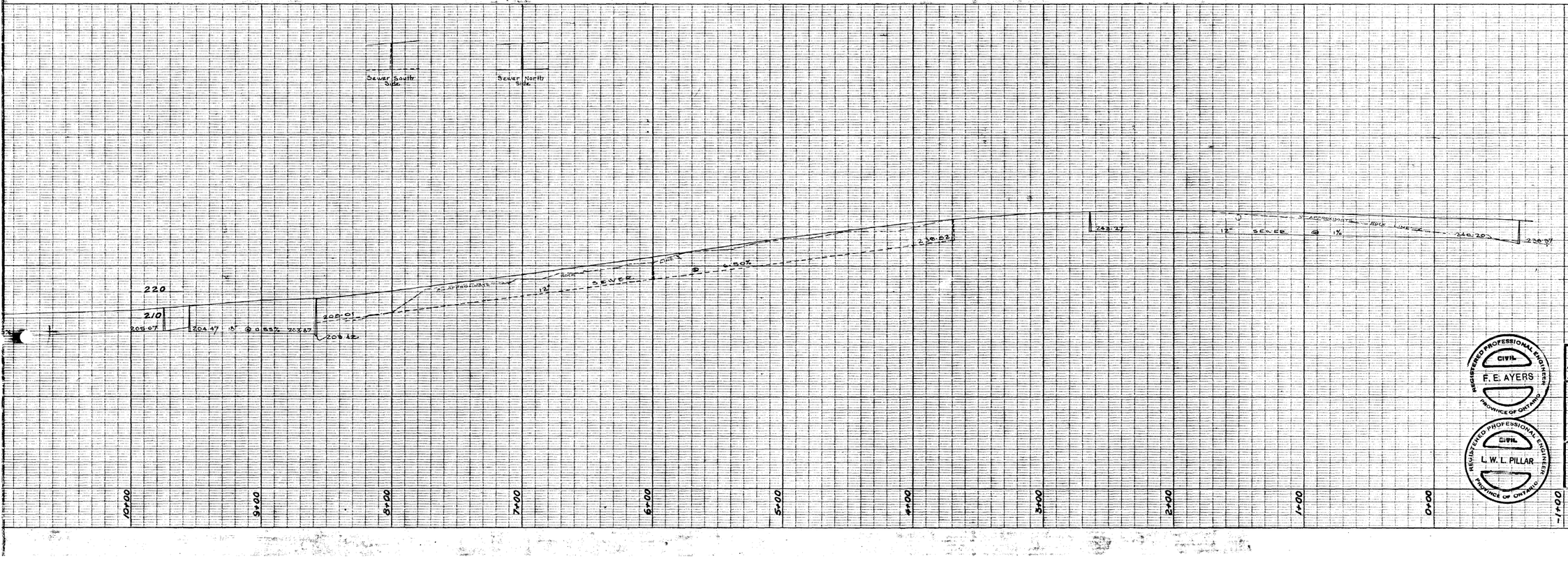




REGISTERED PROFESSIONAL ENGINEER — CIVIL — F. E. AYERS — PROVINCE OF ONTARIO

REGISTERED PROFESSIONAL ENGINEER — CIVIL — L. W. L. PILLAR — PROVINCE OF ONTARIO

CITY OF OTTAWA
PLANNING AND WORKS DEPT.
DESIGN & SPECIAL PROJECTS BRANCH

CARLING AVENUE

GENERAL LAYOUT
RECONSTRUCTION & WIDENING
From BRONSON AVE. to KIRKWOOD AVE.
CONTRACT No 56-28

Engineer i/c Special Projects

Director of Planning & Works

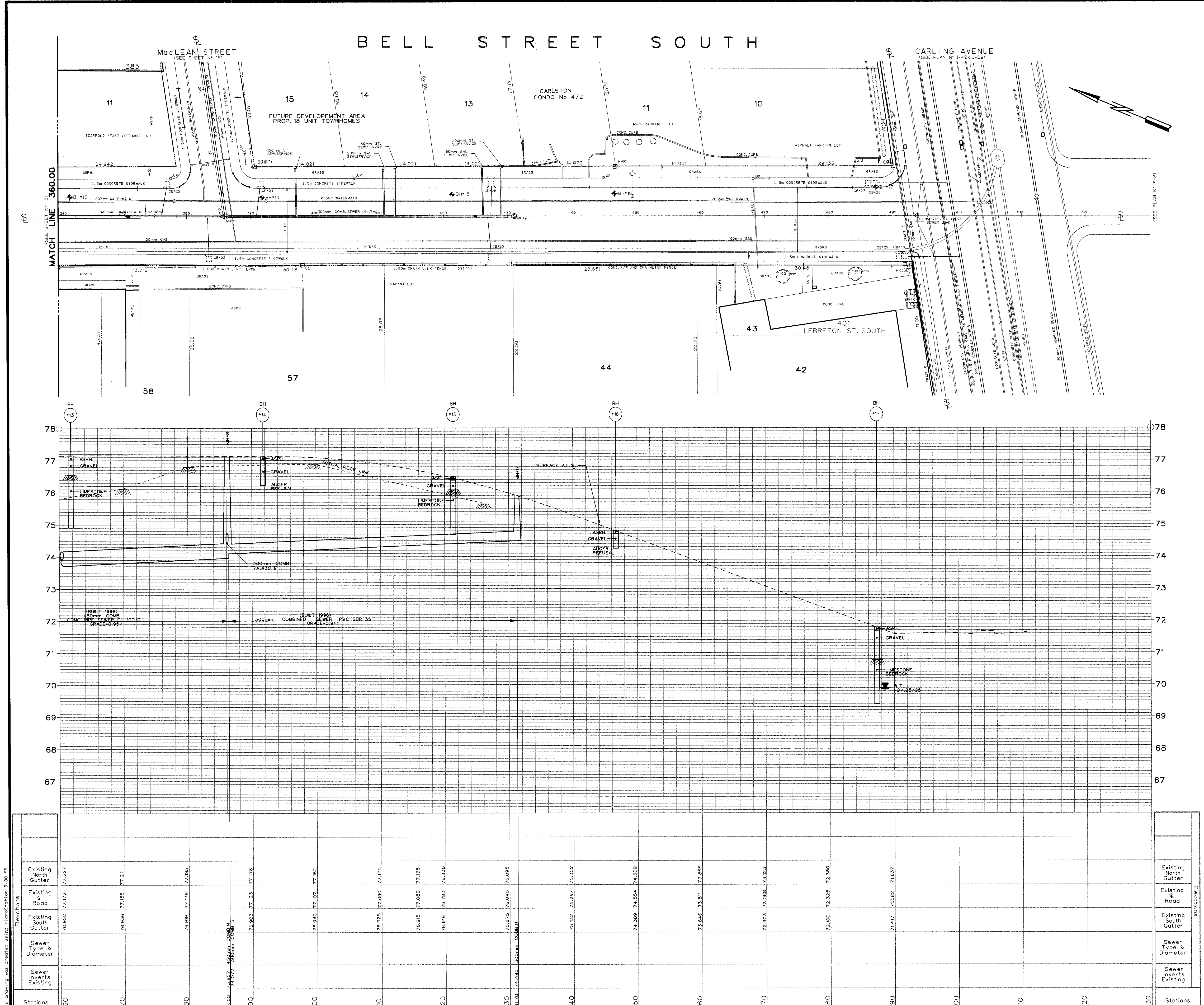
Drawn By C.K.M.

Checked By D.M.

Date March 15, 1956

PLAN No R-1000-71

2907 BELL STREET SOUTH (SHT.6)



Revisions:

No.	Date	Description	Drawn By	Approved By
1	MAY,1996	PROP.GAS ADDED.CONSUM.GAS PLAN 1579	A.S.	W.T.C.

Design:

Designed By W.T.CLOUTHIER	Date FEB./96	Checked By	Date
Survey Detail By R.LESTER, B.QUACKENBUSH	Date JUNE/95	Field Checked By	Date
Drafting By A.SCAFFIDI & D.GOW	Date JAN./96	Checked By	Date

Chief Design & Const. Eng.
H. V. Pascoe, P.Eng.

Final Measurements:

Construction Type	SEWER,ROAD AND WATERMAIN	Inspector	D.GOW, A.SCAFFIDI
Work Commenced	MAY/96	Project Manager	W.T.CLOUTHIER
Work Completed	JUNE/97	Field Book #	2907
Contractor	GRAYDEX OTTAWA INC.	Date	
Drafting Revisions	A.SCAFFIDI Date MAR./97	Checked By	

Notes:

- While illustrations and utilities shown are taken from the best available information, they cannot be guaranteed.
- The contractor is requested to check with all utility companies before digging.
- Soil information shown is not guaranteed and contractors are advised to collect additional soils information as deemed necessary
- The actual rock line was recorded during construction of the existing sewer.
- Soil information taken from : John D. Paterson & Assoc.Ltd., Trow Ontario Ltd.
- Reference bench mark : Mon.No.3599, Elev.76.499m, Index No.160
- Date of television inspection : Sewer-Matic/94, Tamarack/91, Sanitec Inc./94.
- This plan supercedes (in whole or in part) plan # A-10b, B-14b, B-20a, F-26, J-20a.
- Registered Plan # : 33,37,54,67,
- When reduced, the scale of this drawing is approximately 1:400 horizontally and 1:80 vertically. Do not scale this drawing.

City of / Ville d' **Ottawa**

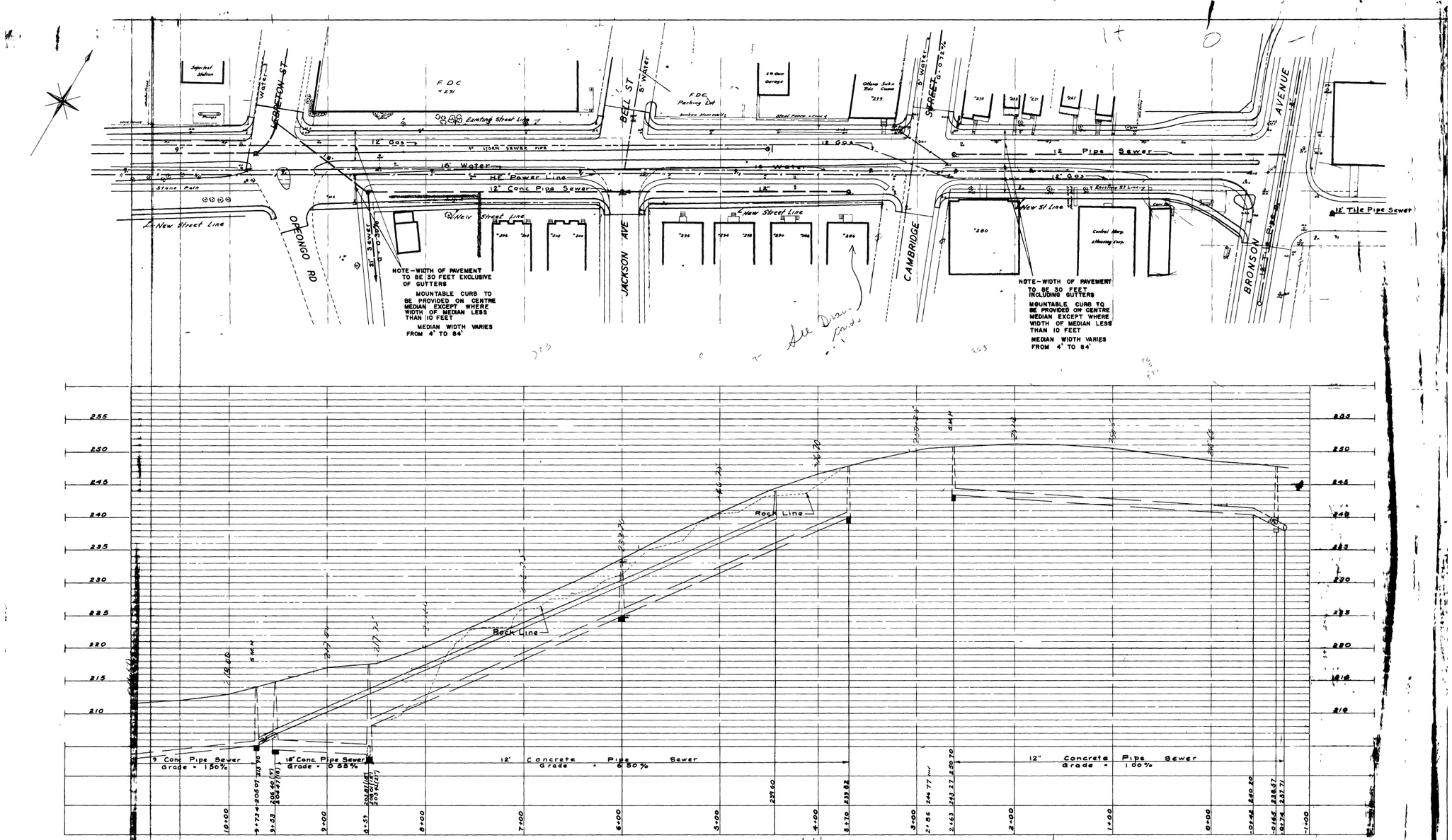
Department Of Engineering And Works
Engineering Branch
Design And Construction Division
111 SUSSEX DRIVE, SUSSEX PAVILION, 7TH FLOOR, OTTAWA, ONTARIO. K1N 5A1

E.M. Robinson — Commissioner
W.R. Cole, P.Eng. — Branch Director

BELL STREET SOUTH
FROM CH.360.00 TO CARLING AVENUE

Contract No:	Survey Books:	Scales: (See note)	Plan No:
96C2907	2907	HOR. 1:250 VERT. 1:50	2907 Sheet 6 of 18

Filename: 2907-s3.dgn Reference: ottebdr.dgn bell-b.dgn merged2.dgn 2907l.dgn 2907-p.dgn bell-p.dgn

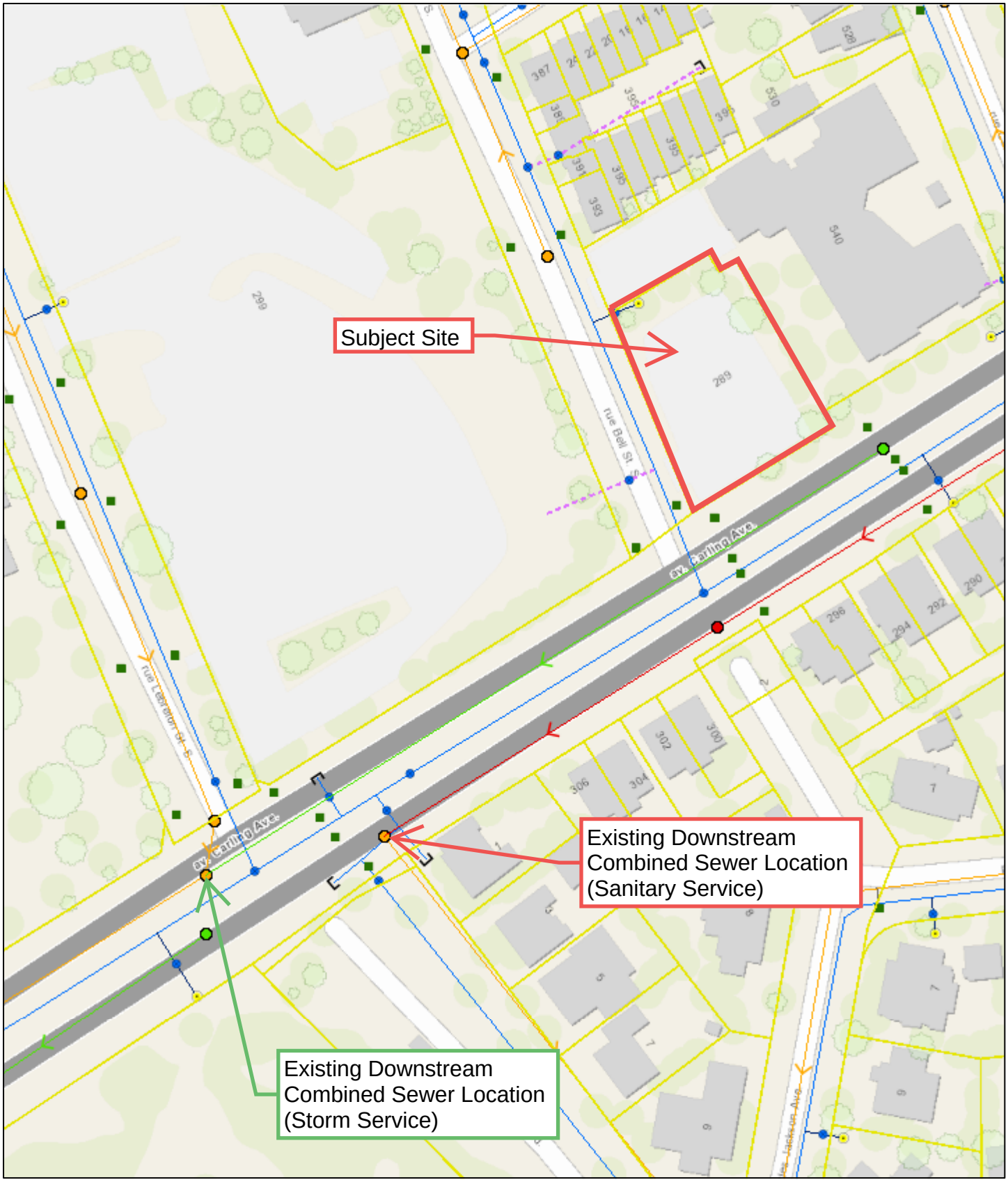


SEWERS & DRAINAGE
J-29
-1

CITY OF OTTAWA
DEPARTMENT OF PLANNING & WORKS

J29-1

Sewer Location Plan



October 25, 2019

Property Parcels

1:1,507

0 0.0125 0.025 0.05 mi

0 0.02 0.04 0.08 km

City of Ottawa

APPENDIX C
WATERMAIN CALCULATIONS

McINTOSH PERRY

McINTOSH PERRY

CP-19-0007 - 289 Carling Avenue - Water Demands

Project:	289 Carling Avenue		
Project No.:	CP-19-0007		
Designed By:	CDH		
Checked By:	RPK		
Date:	2019/10/24		
Site Area:	0.13	ha	
Office Area	0.12	ha	
Bachlor Apartments	29.00	1.4 Persons per unit	40.6
1-Bedroom Apartments	11.00	1.4 Persons per unit	15.4
		Total	56

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 Parks 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	0.22	L/s

MAXIMUM DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	2.5 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	0.51	L/s

MAXIMUM HOUR DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	2.2 x max. 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	1.10	L/s

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

McINTOSH PERRY

CP-19-0007 - 289 Carling Avenue - OBC Fire Calculations

Project:	289 Carling Avenue
Project No.:	CP-19-0007
Designed By:	CDH
Checked By:	RPK
Date:	2019/10/24

Ontario 2006 Building Code Compendium (Div. B - Part 3)

Water Supply for Fire-Fighting - Store/Office & Warhouse Building

Building is classified as Groups : C & C and D (from table 3.2.2.67)
Building is of noncombustable construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2, including loadbearging walls, columns and arches.

From Div. B A-3.2.5.7. of the Ontario Building Code - 3. Building On-Site Water Supply:

(a) Q = K x V x Stot

where:

Q = minimum supply of water in litres

K = water supply coefficient from Table 1

V = total building volume in cubic metres

Stot = total of spatial coefficient values from the property line exposures on all sides as obtained from the formula:

Stot = 1.0 + [Sside1+Sside2+Sside3+...etc.]

K	16	(from Table 1 pg A-31)
V	14,955	(Total building volume in m³.)
Stot	1.0	(From figure 1 pg A-32)
Q =	239,276.00 L	

From Table 2: Required Minimum Water Supply Flow Rate (L/s)

6300 L/min (if 190,000 > Q > 270,000 L)
1664 gpm

From Figure 1 (A-32)

Snorth	16	m	0.0
Seast	10	m	0.0
Ssouth	35	m	0.0
Swest	-	m	0.0

*approximate distances

McINTOSH PERRY

CP-19-0007 - 289 Carling Avenue - Fire Underwriters Survey (FUS) Fire Calculations

Project:	289 Carling Avenue
Project No.:	CP-19-0007
Designed By:	CDH
Checked By:	RPK
Date:	January 16, 2020

From the Fire Underwriters Survey (1999)

From Part II – Guide for Determination of Required Fire Flow Copyright I.S.O.:

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.

A. Determine The Coefficient Related To The Type Of Construction

The building is considered to be of both frame and non-combustible construction type. Therefore,

C = 1.50

B. Determine Ground Floor Area

As provided by the Architect:

Floor Area = 4,098.00 m²

C. Determine Height in Storeys

From Architectural Drawings:

Number of Storeys = 6.00

D. Calculate Required Fire Flow

F = 220 x C x √A

F = 220.00 X 1.50 X √ 4098.00

F = 21,125.16 L/min.

F = 21,000.00 L/min.

E. Determine Increase or Decrease Based on Occupancy

From note 2, Page 18 of the Fire Underwriter Survey:

Office and Apartment Limited Combustible (C-2)

-15% Charge

Occupancy Decrease = 3,150.00 L/min.

F = 17,850.00 L/min.

F. Determine the Decrease, if any for Sprinkler Protection

From note 3, Page 18 of the Fire Underwriter Survey:

- The flow requirement may be reduced by up to 50% for complete automatic sprinkler protection depending upon adequacy of the system.
- The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards.
- Additional credit of 10% if water supply is standard for both the system and fire department hose lines
- If sprinkler system is fully supervised system, an additional 10% credit is granted
- The building will be sprinklered, fully supervised, have standard water supply
- Therefore the value obtained in Step E is reduced by 50%

Reduction = 17,850.00 L/min. X 50%

Reduction = 8,925.00 L/min.

G. Determine the Total Increase for Exposures

From note 4, Page 18 of the Fire Underwriter Survey:

- North 16m, East 10m, South 35m
- Therefore the charge for exposure is (15+20+5) 40% of the value obtained in Step E.

= 17,850.00 L/min. X 40%

Increase = 7,140.00 L/min.

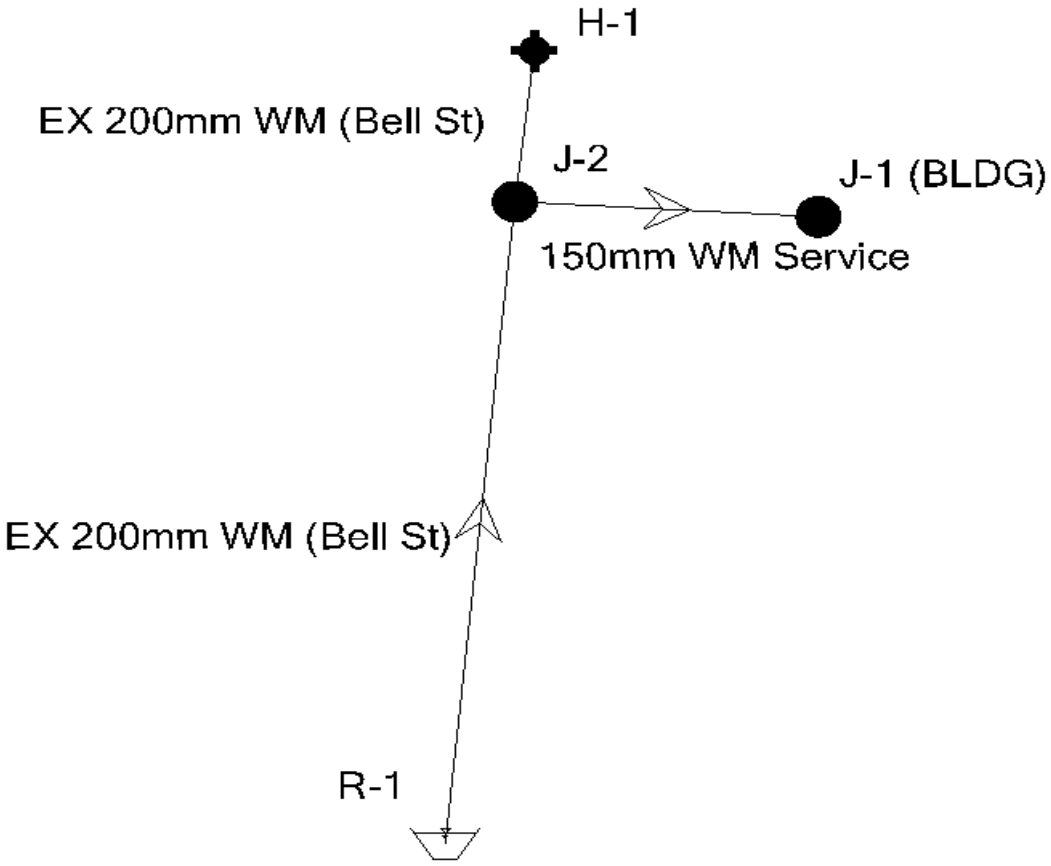
H. Determine the Total Fire Demand

- To the answer obtained in E, substract the value obtained in F and add the value obtained in G
- Fire flow should be no less than 2,000L/min. and the maximum value shoul not exceed 45,000L/min.

F = 17,850.00 L/min. - 8,925.00 L/min. + 7,140.00 L/min.
F = 16,065.00 L/min.

Therefore, after rounding to the nearest 1,000 L/min, the total required fire flow for the development is 16000 L/min (4227 GPM).

CP-19-0007 - 289 Carling Avenue - WaterCAD Model Schematic



E-MAIL

Antares Engineering Group Inc.
Professional Mechanical, Electrical, Testing and Research Engineers
159 Colonnade Road South, Unit 1, Ottawa, Ontario, Canada, K2E 7J4
Phone 613-723-6034 • Fax 613-723-5749 • mail@antaresengineering.ca

DATE: 12 February 2020	**# PAGES (including cover):** 1
ATTENTION: Maria Martinez	**FROM:** Slavo J. Samel
Tel: (613) 739 1327 Ext: 226	**TEL:** (613) 723-6034
COMPANY: PBC Management Group	**PROJECT No:** Antares Eng. 19-693
REFERENCE: **JHS - 289 Carling Avenue Ottawa, Ontario K1S 4K5**	

Attn: Ms. Martinez

Regarding: Consolidation of Engineering Related Comments (Item #5)
NFPA Compliance & "FUS" Guidelines for Sprinkler System.

The building sprinkler system will meet the requirements of a fully supervised system as per the NFPA to support applying the maximum sprinkler protection credit to the FUS method.

Please do not hesitate to contact us if you have any questions.

Sincerely,

REGISTERED PROFESSIONAL ENGINEER
J. C. JARRETT
PROVINCE OF ONTARIO

Slavo J. Samel

ANTARES Engineering Group Inc.
Slavo J. Samel
Senior Project Manager

Active Scenario: Average Day

Label	Elevation (m)	Demand (L/min)	Pressure (psi)	Hydraulic Grade (m)
J-2	71.66	0.00	62.23	115.50
J-1 (BLDG)	71.88	13.20	61.92	115.50

Bentley Systems, Inc. Haestad Methods Solution Center
27 Siemon Company Drive Suite 200 W Watertown, CT 06795 USA
+1-203-755-1666

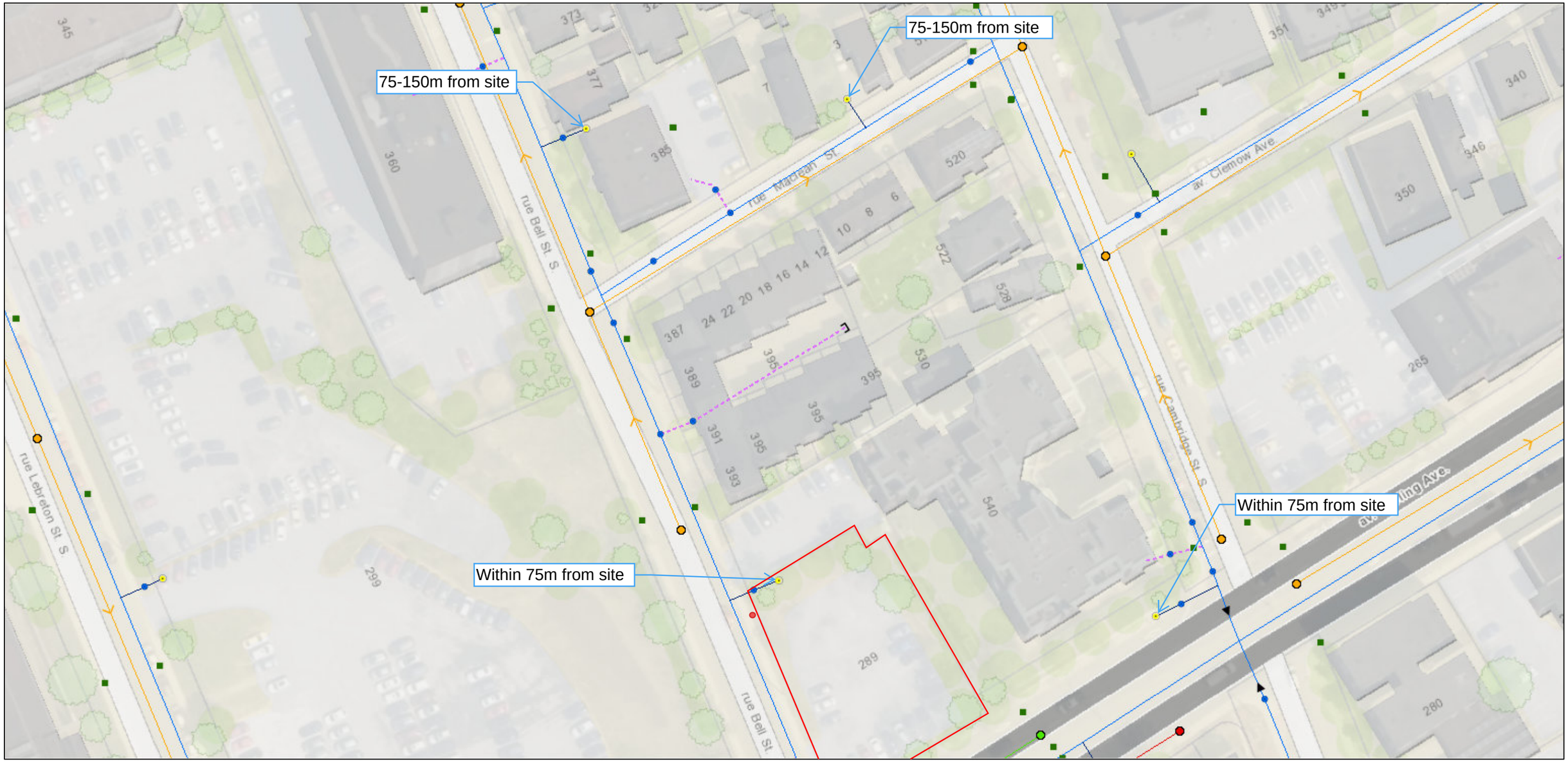
Active Scenario: Peak Hourly

Label	Elevation (m)	Demand (L/min)	Pressure (psi)	Hydraulic Grade (m)
J-2	71.66	0.00	48.74	106.00
J-1 (BLDG)	71.88	66.00	48.43	106.00

Active Scenario: Max Day + Fire Flow

Label	Is Fire Flow Run Balanced?	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (L/min)	Fire Flow (Available) (L/min)	Pressure (psi)	Elevation (m)	Demand (L/min)	Pressure (Residual Lower Limit) (psi)
H-1	True	False	16,000.00	13,207.93	45.07	72.25	0.00	20.00
J-2	False	False	16,000.00	(N/A)	45.91	71.66	0.00	20.00
J-1 (BLDG)	False	False	16,000.00	(N/A)	45.59	71.88	30.60	20.00

Fire Hydrant Coverage



December 19, 2019

Sewer Fittings / Raccords

- Cap / bouchon
- Tee / raccord en T
- Sanitary Manholes / Regards d'égout domestique

Sanitary Pipes / Conduites d'égout domestique

- Private / Branchement privé
- Public / Branchement public

Sanitary Pump Stations and Treatment Plants / Installations d'infrastructure

- Sanitary Pump Station / Station de pompage des eaux usées
- Wastewater Treatment Plant / Usine d'épuration des eaux usées

- Storm Inlets / Prises d'entrée des eaux pluviales
- Storm Outlets / Prises de sortie des eaux pluviales
- Storm Manholes / Regards de conduites d'eaux pluviales
- Storm Inlet Leads / Avaloirs des prises d'entrée des eaux pluviales

Storm Pipes / Conduites d'eaux pluviales

- Private / Branchement privé
- Public / Branchement public

Storm Pump Stations / Stations de pompage des eaux pluviales

- Storm Pump Station / Station de pompage des eaux pluviales
- Combined Manholes / Regards d'égout unitaire

Combined Pipes / Conduites d'égout unitaire

- Public / Branchement public
- Private / Branchement privé

Valves / Vannes

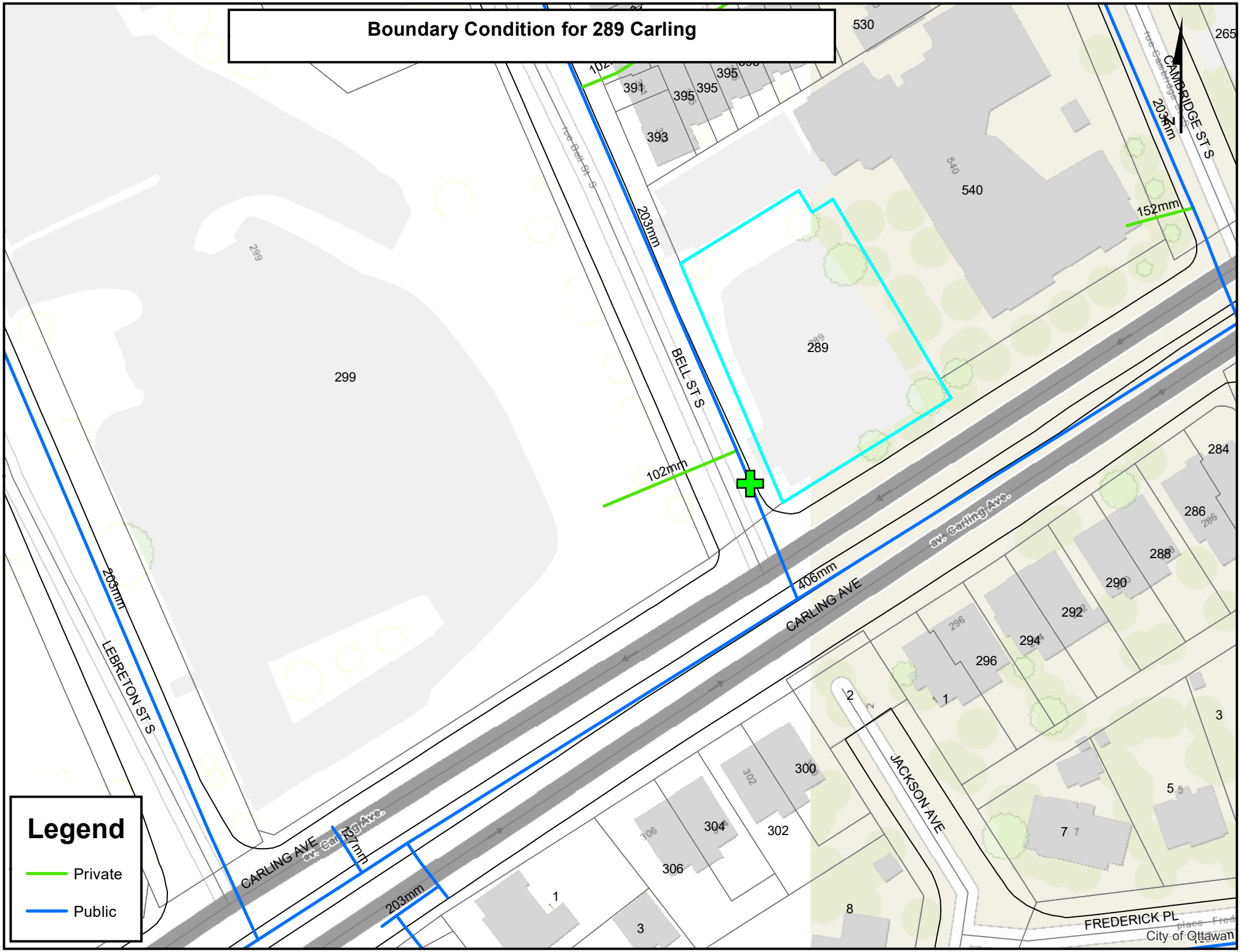
- Valve / Vanne
- TVS, A, D

1:1,026

0 0.01 0.02 0.04 mi

0 0.0175 0.035 0.07 km

City of Ottawa


Boundary Condition for 289 Carling
530
265
391
395
395
395
393
540
540
203mm
152mm
BELL ST S
299
289
102mm
406mm
CARLING AVE
CAMBRIDGE ST S
LEBRETON ST S
203mm
284
286
288
290
292
294
296
300
302
304
306
JACKSON AVE
FREDERICK PL
127mm
203mm
Legend
Private
Public
City of Ottawa

Nicholas Vachon

From: Fraser, Mark <Mark.Fraser@ottawa.ca>
Sent: January 20, 2020 3:22 PM
To: Nicholas Vachon
Cc: Tyler Ferguson; Maria J. Martinez
Subject: RE: Request for Boundary Conditions - 289 Carling Ave (D07-12-19-0147)
Attachments: 289 Carling Jan 2020.pdf; C(1) - WM Calcs.pdf

Hi Nicholas,

Please find below boundary conditions, HGL, for hydraulic analysis at 289 Carling Ave. (zone 1W) assumed to be connected to the 203mm watermain on Bell Street S. (see attached PDF for location).

Type of Development: Mixed-use residential and office building.
Water Service Connection: 203mm dia. PVC watermain on Bell Street S.
Average Daily Demand: 0.22 L/s.
Maximum Daily Demand: 0.51 L/s.
Maximum Hourly Demand: 1.10 L/s.
Required Fire Flow: 16,000 L/min

Minimum HGL = 106.0m
Maximum HGL = 115.5m
MaxDay + Fireflow (267 L/s) = 104.0m

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

Regards,

Mark Fraser
Project Manager, Planning Services
Development Review Central Branch
City of Ottawa | Ville d'Ottawa
Planning, Infrastructure and Economic Development Department
110 Laurier Avenue West. 4th Floor, Ottawa ON, K1P 1J1
Tel:613.580.2424 ext. 27791
Fax: 613-580-2576
Mail: Code 01-14
Email: Mark.Fraser@ottawa.ca

From: Tyler Ferguson <t.ferguson@mcintoshperry.com>
Sent: January 16, 2020 1:17 PM

To: Fraser, Mark <Mark.Fraser@ottawa.ca>; Nicholas Vachon <n.vachon@mcintoshperry.com>
Cc: Maria J. Martinez <mmartinez@pbcgroup.ca>
Subject: RE: Request for Boundary Conditions - 289 Carling Ave (D07-12-19-0147)

Hi Mark,

As per the definition under classification of mixed construction in ISTB-2018-02, although the building is a combination of Construction class 1 (Frame) and Construction class 3 (Non-combustible), the building is classified as the following as over 50% of the building is wood frame. So a coefficient of 1.5 is used. The building construction has already been confirmed by the architect in the letter dated October 31, 2019 submitted with our last submission.

f. **Frame:** Any building not qualifying under a. through e., above, or any building with over 33 1/3 % of the total wall area of combustible construction, regardless of the type of construction of the balance of the building.

As per our typical due diligence process the information that is used to determine the fire flow is confirmed through consultation with the architect and mechanical engineer. Prior to providing the revised request for boundary conditions we confirmed with the Mechanical Engineer that the sprinkler system meets the 50% credit requirements.

In order to provide a complete resubmission package we require the new boundary conditions in order to finalize.

Thanks,

Tyler Ferguson, P.Eng.
Project Engineer
115 Walgreen Road, R.R. 3, Carp, ON K0A 1L0
T. 613.903.4426 | **F.** 613.836.3742 | **C.** 613.298.2921
t.ferguson@mcintoshperry.com | www.mcintoshperry.com

From: Fraser, Mark <Mark.Fraser@ottawa.ca>
Sent: January 16, 2020 11:45 AM
To: Nicholas Vachon <n.vachon@mcintoshperry.com>
Cc: Tyler Ferguson <t.ferguson@mcintoshperry.com>; Maria J. Martinez <mmartinez@pbcgroup.ca>
Subject: RE: Request for Boundary Conditions - 289 Carling Ave (D07-12-19-0147)

Hi Nicholas,

Can you please have the architect confirm that the subject building will have a combustible structural system and does not qualify as ordinary construction. The architect needs to confirm that the sprinkler system will be a fully supervised system as defined by NFPA to justify applying the maximum sprinkler protection credit of 50%.

Regards,

Mark Fraser
Project Manager, Planning Services
Development Review Central Branch

City of Ottawa | Ville d'Ottawa
Planning, Infrastructure and Economic Development Department
110 Laurier Avenue West. 4th Floor, Ottawa ON, K1P 1J1
Tel:613.580.2424 ext. 27791
Fax: 613-580-2576
Mail: Code 01-14
Email: Mark.Fraser@ottawa.ca

From: Nicholas Vachon <n.vachon@mcintoshperry.com>
Sent: January 16, 2020 9:34 AM
To: Fraser, Mark <Mark.Fraser@ottawa.ca>
Cc: Tyler Ferguson <t.ferguson@mcintoshperry.com>; Maria J. Martinez <mmartinez@pbcgroup.ca>
Subject: RE: Request for Boundary Conditions - 289 Carling Ave (D07-12-19-0147)

Hey Mark,

The water calculations have been revised for the boundary condition request, see attached. Summary below:

1. Type of development: Mix use residential and office building.
2. Location of service: 289 Carling Ave
3. Amount of fire flow required: 16,000 L/min (FUS)
4. Average daily demand: 0.22 L/s.
5. Maximum daily demand: 0.51L/s.
6. Maximum hourly daily demand: 1.10 L/s.

Nicholas Vachon, EIT
Engineering Intern
115 Walgreen Road, R.R. 3, Carp, ON K0A 1L0
T. 613.903.5805
n.vachon@mcintoshperry.com | www.mcintoshperry.com

From: Fraser, Mark <Mark.Fraser@ottawa.ca>
Sent: January 10, 2020 2:42 PM
To: Nicholas Vachon <n.vachon@mcintoshperry.com>
Cc: Tyler Ferguson <t.ferguson@mcintoshperry.com>
Subject: RE: Request for Boundary Conditions - 289 Carling Ave (D07-12-19-0147)

Hi Nicholas,

The required fire flow is considered high. Please investigate available options to lower the fire flow to a more reasonable value.

As per the FUS Fire Flow Calculations provided a mixed construction type (ordinary and non-combustible) is noted with a coefficient of C=1.2 being applied. A coefficient of C=1.2 is not an appropriate parameter for the FUS method. Please refer to Technical Bulletin ISTB-2018-02 dated March 21, 2018 ISO Guide [Annex I-ISO Construction Classes and Factors] [3.Classification of mixed construction p.G-114] for detailed rules to select the most appropriate construction class for buildings of mixed construction if that is the case for this proposal.

Regards,

Mark Fraser
Project Manager, Planning Services
Development Review Central Branch
City of Ottawa | Ville d'Ottawa
Planning, Infrastructure and Economic Development Department
110 Laurier Avenue West. 4th Floor, Ottawa ON, K1P 1J1
Tel:613.580.2424 ext. 27791
Fax: 613-580-2576
Mail: Code 01-14
Email: Mark.Fraser@ottawa.ca

From: Nicholas Vachon <n.vachon@mcintoshperry.com>
Sent: January 09, 2020 2:18 PM
To: Fraser, Mark <Mark.Fraser@ottawa.ca>
Cc: Tyler Ferguson <t.ferguson@mcintoshperry.com>
Subject: RE: Request for Boundary Conditions - 289 Carling Ave (D07-12-19-0147)

Hey Mark,

As per the most recent comments on 289 Carling, the water service is being moved to connect to the watermain within Bell Street instead of Carling. Would you be able to provide us with updated boundary conditions?

See attached the updated water calculations as well as a location plan. A summary of the parameters is provided below:

1. Type of development: Mix use residential and office building.
2. Location of service: 289 Carling Ave
3. Amount of fire flow required: 19,000 L/min (FUS)
4. Average daily demand: 0.22 L/s.
5. Maximum daily demand: 0.51L/s.
6. Maximum hourly daily demand: 1.10 L/s.

Regards,

Nicholas Vachon, EIT
Engineering Intern

115 Walgreen Road, R.R. 3, Carp, ON K0A 1L0
T. 613.903.5805
n.vachon@mcintoshperry.com | www.mcintoshperry.com

From: Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Sent: February 27, 2019 2:56 PM
To: Charissa Hampel <c.hampel@mcintoshperry.com>
Subject: RE: Request for Boundary Conditions - 289 Carling Ave

No

Richard Buchanan, CET

Project Manager, Development Approvals
Planning, Infrastructure and Economic Development Department
Planning & Growth Management Branch
City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 27801
ottawa.ca/planning / ottawa.ca/urbanisme

From: Charissa Hampel <c.hampel@mcintoshperry.com>
Sent: Wednesday, February 27, 2019 2:36 PM
To: Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Subject: RE: Request for Boundary Conditions - 289 Carling Ave

Thanks Richard. Is there any flow data for the nearby hydrants?

Charissa Hampel, EIT
Engineering Intern
115 Walgreen Road, R.R. 3, Carp, ON K0A 1L0
T. 613.714.4625 | **F.** 613.836.3742 | **C.** 613.791.0505
c.hampel@mcintoshperry.com | www.mcintoshperry.com

From: Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Sent: February 27, 2019 2:08 PM
To: Charissa Hampel <c.hampel@mcintoshperry.com>
Subject: FW: Request for Boundary Conditions - 289 Carling Ave

Hi Charissa

The following are boundary conditions, HGL, for hydraulic analysis at 289 Carling (zone 1W) assumed to be connected to the 406mm on Carling (see attached PDF for location).

Minimum HGL = 107.0m

Maximum HGL = 114.8m

MaxDay + Fireflow (250 L/s) = 106.0m

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.

Richard Buchanan, CET

Project Manager, Development Approvals
Planning, Infrastructure and Economic Development Department
Planning & Growth Management Branch
City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 27801
ottawa.ca/planning / ottawa.ca/urbanisme

From: Charissa Hampel <c.hampel@mcintoshperry.com>
Sent: Friday, February 15, 2019 2:16 PM
To: Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Subject: Request for Boundary Conditions - 289 Carling Ave

Good Afternoon,
Please see below for parameters. Site Plan is attached as well.

1. Type of development: Mix use residential and office building.
2. Location of service: 289 Carling Ave
3. Amount of fire flow required: 15,000 L/min (FUS)
4. Average daily demand: 0.27 L/s.
5. Maximum daily demand: 0.63L/s.
6. Maximum hourly daily demand: 1.35 L/s.

We will also need flow data from hydrants within the vicinity.

Thank you,

Charissa Hampel, EIT
Engineering Intern
115 Walgreen Road, R.R. 3, Carp, ON K0A 1L0
T. 613.714.4625 | **F.** 613.836.3742 | **C.** 613.791.0505
c.hampel@mcintoshperry.com | www.mcintoshperry.com

McINTOSH PERRY

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APPENDIX D
SANITARY CALCULATIONS

McINTOSH PERRY

McINTOSH PERRY

Project:	CP-19-0007
Designed By:	N.B.V.
Checked By:	T.D.F.
Date:	February 20, 2020

Re: Sanitary Flow Calculations

1. Building Occupancy

The new building will be mixed use with office and apartment space. Occupancies calculated below:

Bachelor Apartments – 29 units x 1.4 persons per unit = 40.6

1-Bedroom Apartments – 11 units x 1.4 persons per unit = 15.4

Office Space – 60 Employees

Laundry – 3 Machines

Site Area – 0.13 Hectares

2. Daily Volume in Litres

As per the extract of the City of Ottawa Sewer Design Guidelines, Appendix 4-A;

Single family houses, apartments, Condominiums, cottages, etc.:

- 280 Liters/Person/Day

Office Staff:

- 75 Liters/Person/Day

Auto washers in apartment buildings:

- 1200 Liters/Machine/Day

Infiltration Allowance:

- 0.33 Liters/Second/Hectare

3. Peak Flow (Q/p)

- $Q_1(p) = F \times P \times PF$ Where:
  F = 280 Litres/Person/Day
  P = (40.6 + 15.4) Persons
  PF = 4.00 (Peak Factor)
  Therefore, $Q_1(p) = (280) \times (56) \times (4) = 62{,}720$ L/Day (0.726 L/Sec)
- $Q_2(p) = F \times P$ Where:
  F = 75 Litres/Person/Day
  P = 60 Employees
  Therefore, $Q_2(p) = (75) \times (60) = 4{,}500$ L/Day (0.052 L/Sec)
- $Q_3(p) = F \times P$ Where:

F = 1200 Litres/Machine/Day
P = 3 Machines

Therefore, $Q_3(p)$ = (1200) x (3) = 3,600 L/Day (0.042 L/Sec)

- $Q_4(p) = A \times I$ Where:
  A = 0.13 Hectares
  I = 0.33 Liters/Second/Hectare

  Therefore, $Q_4(p)$ = (0.13) x (0.33) = 0.043 L/Sec

- Therefore, $Q_{TOTAL}(p) = Q_1(p) + Q_2(p) + Q_3(p) + Q_4(p)$ = 74,527 L/Day (0.863 L/s)

SANITARY SEWER DESIGN SHEET

PROJECT: 289 Carling Avenue
LOCATION: Ottawa, Ontario
CLIENT: John Howard Society

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	TO MH	UNIT TYPES SF	SD	TH	APT	AREA (ha)	POPULATION IND	CUM	PEAK FACTOR	PEAK FLOW (L/s)	AREA (ha) INSTITUTIONAL IND	CUM	COMMERCIAL IND	CUM	INDUSTRIAL IND	CUM	PEAK FLOW (L/s)	AREA (ha) IND	CUM	FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY L/s	(%)
		BLDG	Tee				40	0.13	92.0	92.0	4.00	1.49		0.00	0.13	0.13		0.00	0.11	0.13	0.13	0.04	1.65	22.47	11.95	150	2.00	1.232	20.82	92.67

Design Parameters:

Residential			ICI Areas			
						Peak Factor
SF	3.4	p/p/u				
TH/SD	2.7	p/p/u	INST	50,000	L/Ha/day	1.5
APT	2.3	p/p/u	COM	50,000	L/Ha/day	1.5
Other	60	p/p/Ha	IND	35,000	L/Ha/day	MOE Chart

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 350 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+P^0.5))
where P = population in thousands

Designed: N.B.V.

Checked: T.D.F.

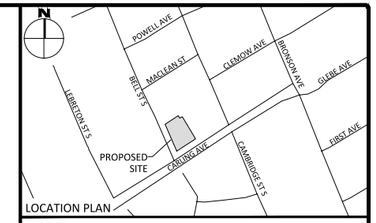
Project No.: CP-19-0007

No.	Revision	Date
1.	ISSUED FOR SITE PLAN CONTROL	2019-10-25
2	REVISED AS PER CITY COMMENTS	2020-01-20
3	REVISED AS PER CITY COMMENTS	2020-02-20

Sheet No:
1 of 1

APPENDIX E
PRE-DEVELOPMENT DRAINAGE PLAN

McINTOSH PERRY



LEGEND

AREA NAME — AREA (Ha)

A1 | 0.25
0.90
1.00

5yr & 100yr COEFFICIENT

OVERLAND DRAINAGE FLOW

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

No.	Revisions	Date
4	UPDATED AS PER CITY COMMENTS	FEB. 20, 2020
3	UPDATED AS PER CITY COMMENTS	JAN. 22, 2020
2	UPDATED AS PER CITY COMMENTS	NOV 01, 2019
1	ISSUED FOR SITEPLAN CONTROL	AUG. 15, 2019

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

SCALE 1 : 150
0 5 10 15 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 — T.D. FERGUSON — 100225917 — 2020/02/20 — PROVINCE OF ONTARIO

Client:
JOHN HOWARD SOCIETY c/o PBC DEVELOPMENT AND CONSTRUCTION MANAGEMENT GROUP INC.
485 BANK STREET, SUITE 205
OTTAWA, ON K2P 1Z2

Project:
NEW MIXED USE OFFICE & APARTMENT BUILDING
289 CARLING AVENUE
OTTAWA, ON K1S 4K5

Drawing Title:
PRE-DEVELOPMENT DRAINAGE AREA PLAN

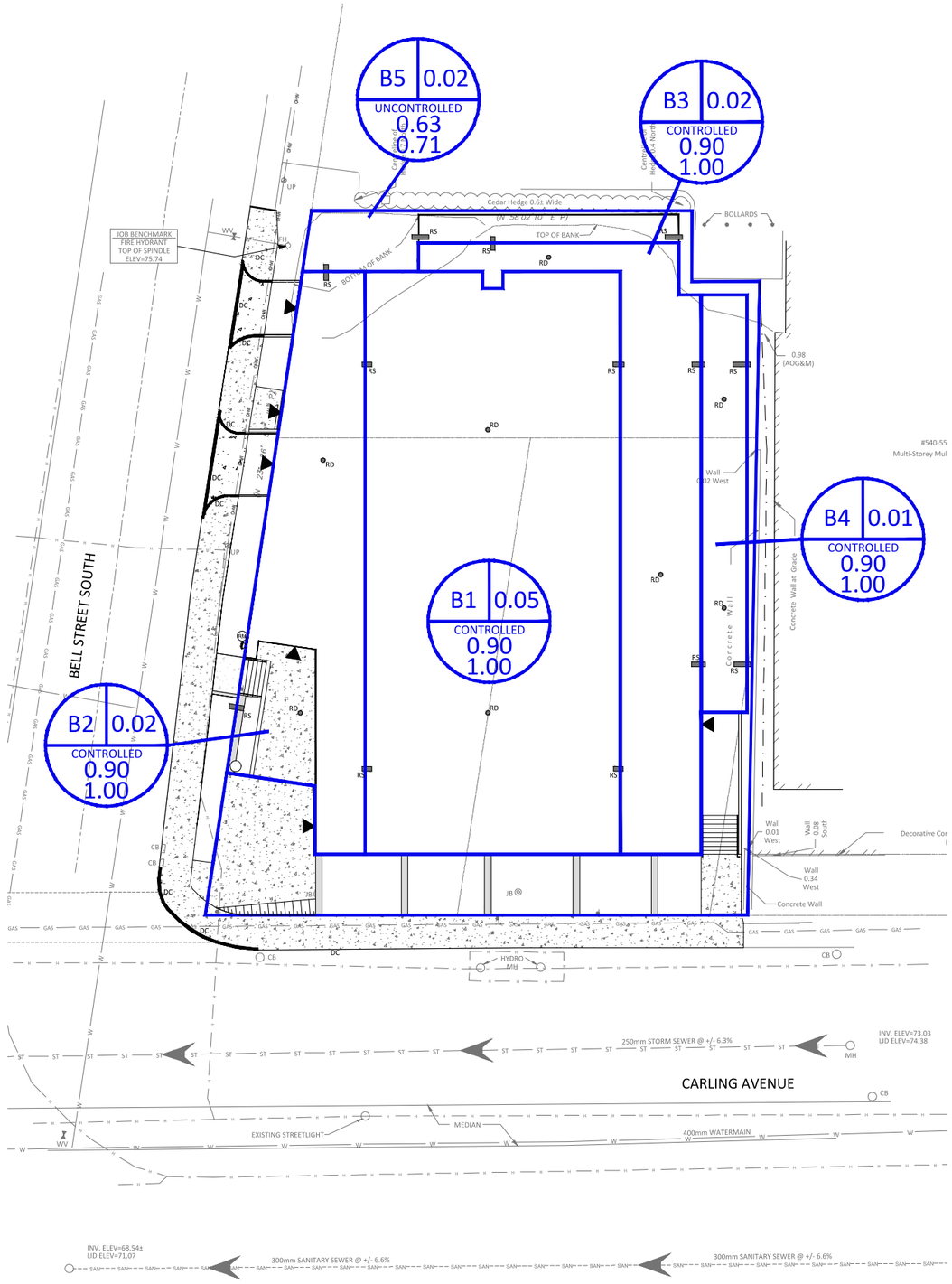
Scale:	1:150
Drawn By:	N.B.V.
Checked By:	T.D.F.
Designed By:	N.B.V.
Project Number:	CP-19-0007
Drawing Number:	PRE

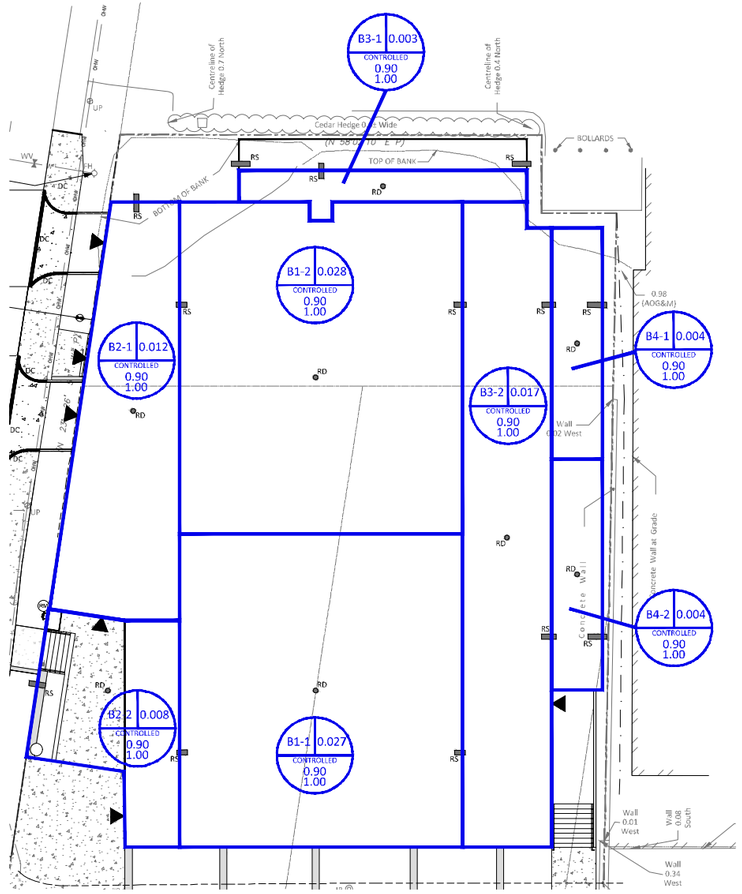
D07-12--19-0147

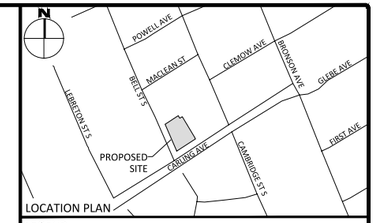
18008

APPENDIX F
POST-DEVELOPMENT DRAINAGE PLAN

McINTOSH PERRY

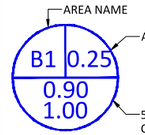






LOCATION PLAN

LEGEND



FOR REVIEW ONLY
NOT FOR CONSTRUCTION

No.	Revisions	Date
4	UPDATED AS PER CITY COMMENTS	FEB. 20, 2020
3	UPDATED AS PER CITY COMMENTS	JAN. 22, 2020
2	REVISED AS PER CITY COMMENTS	NOV 01, 2019
1	ISSUED FOR SITE PLAN CONTROL	AUG. 15, 2019

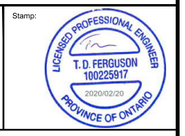
Check and verify all dimensions before proceeding with the work — Do not scale drawings

SCALE 1 : 150

0 5 10 15 Metres

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

Stamp:



Client:
JOHN HOWARD SOCIETY c/o PBC DEVELOPMENT AND CONSTRUCTION MANAGEMENT GROUP INC.
485 BANK STREET, SUITE 205
OTTAWA, ON K2P 1Z2

Project:
NEW MIXED USE OFFICE & APARTMENT BUILDING
289 CARLING AVENUE
OTTAWA, ON K1S 4K5

Drawing Title:
POST-DEVELOPMENT DRAINAGE AREA PLAN

Scale: 1:150	Project Number: CP-19-0007
Drawn By: N.B.V.	
Checked By: T.D.F.	Drawing Number: POST
Designed By: N.B.V.	

D07-12--19-0147

18008

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} 5-Year	C_{AVG} 100-Year
A1	0.12	832.79	0.90	0.00	0.60	385.99	0.20	0.68	0.76
A2	0.01	0.00	0.90	0.00	0.60	51.75	0.20	0.20	0.25

Pre-Development Runoff Calculations

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	I (mm/hr)		Q (L/s)	
					5-Year	100-Year	5-Year	100-Year
A1	0.12	0.68	0.76	10	104.2	178.6	23.95	46.13
A2	0.01	0.20	0.25	10	104.2	178.6	0.30	0.64
Total	0.13						24.25	46.77

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} 5-Year	C_{AVG} 100-Year
B1-1	0.027	266.21	0.90	0.00	0.60	0.00	0.20	0.90	1.00
B1-2	0.028	280.91	0.90	0.00	0.60	0.00	0.20	0.90	1.00
B2-1	0.012	124.99	0.90	0.00	0.60	0.00	0.20	0.90	1.00
B2-2	0.008	77.23	0.90	0.00	0.60	0.00	0.20	0.90	1.00
B3-1	0.003	28.52	0.90	0.00	0.60	0.00	0.20	0.90	1.00
B3-2	0.017	171.44	0.90	0.00	0.60	0.00	0.20	0.90	1.00
B4-1	0.004	35.34	0.90	0.00	0.60	0.00	0.20	0.90	1.00
B4-2	0.004	35.34	0.90	0.00	0.60	0.00	0.20	0.90	1.00
B5	0.024	135.56	0.90	0.00	0.60	101.19	0.20	0.60	0.68

Post-Development Runoff Calculations

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	I (mm/hr)		Q (L/s)	
					5-Year	100-Year	5-Year	100-Year
B1-1	0.027	0.90	1.00	10	104.2	178.6	6.94	13.21
B1-2	0.028	0.90	1.00	10	104.2	178.6	7.32	13.94
B2-1	0.012	0.90	1.00	10	104.2	178.6	3.26	6.20
B2-2	0.008	0.90	1.00	10	104.2	178.6	2.01	3.83
B3-1	0.003	0.90	1.00	10	104.2	178.6	0.74	1.42
B3-2	0.017	0.90	1.00	10	104.2	178.6	4.47	8.51
B4-1	0.004	0.90	1.00	10	104.2	178.6	0.92	1.75
B4-2	0.004	0.90	1.00	10	104.2	178.6	0.92	1.75
B5	0.024	0.60	0.68	10	104.2	178.6	4.12	7.98
Total	0.13						30.71	58.62

Required Restricted Flow

Drainage Area	Area (ha)	C 5-Year	Tc (min)	I (mm/hr)	Q (L/s)
				5-Year	5-Year
A1&A2	0.13	0.40	10	104.2	14.72

Post-Development Restricted Runoff Calculations

Drainage Area	Unrestricted Flow (L/s)		Restricted Flow (L/s)		Storage Required (m^3)		Storage Provided (m^3)		
	5-Year	100-Year	5-Year	100-Year	5-Year	100-Year	5-Year	100-Year	
B1-1	6.94	13.21	0.44	0.82	6.38	12.05	6.99	12.98	Restricted
B1-2	7.32	13.94	0.44	0.82	6.85	12.93	7.37	13.69	Restricted
B2-1	3.26	6.20	0.38	0.69	2.40	4.62	2.81	5.16	Restricted
B2-2	2.01	3.83	0.32	0.57	1.30	2.53	1.45	2.61	Restricted
B3-1	0.74	1.42	0.25	0.44	0.31	0.62	0.43	0.75	Restricted
B3-2	4.47	8.51	0.38	0.69	3.72	7.11	3.86	7.12	Restricted
B4-1	0.92	1.75	0.25	0.44	0.45	0.89	0.53	0.93	Restricted
B4-2	0.92	1.75	0.25	0.44	0.45	0.89	0.53	0.93	Restricted
B5	4.12	7.98	4.12	7.98					Unrestricted
Total	30.71	58.62	6.83	12.89	21.86	41.62	23.97	44.16	

Storage Requirements for Area B1-1

5-Year Storm Event

Tc (min)	I (mm/hr)	B1-1 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
50	37.7	2.51	0.44	2.07	6.20
55	35.1	2.34	0.44	1.90	6.27
60	32.9	2.19	0.44	1.75	6.32
65	31.0	2.07	0.44	1.63	6.35
70	29.4	1.96	0.44	1.52	6.37
75	27.9	1.86	0.44	1.42	6.38
80	26.6	1.77	0.44	1.33	6.38
85	25.4	1.69	0.44	1.25	6.37
90	24.3	1.62	0.44	1.18	6.36
95	23.3	1.55	0.44	1.11	6.34

Maximum Storage Required 2-Year (m^3) =	6.38

100-Year Storm Event

Tc (min)	I (mm/hr)	B1-1 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
50	64.0	4.73	0.82	3.91	11.74
55	59.6	4.41	0.82	3.59	11.86
60	55.9	4.14	0.82	3.32	11.94
65	52.6	3.90	0.82	3.08	12.00
70	49.8	3.68	0.82	2.86	12.03
75	47.3	3.50	0.82	2.68	12.05
80	45.0	3.33	0.82	2.51	12.05
85	43.0	3.18	0.82	2.36	12.03

Maximum Storage Required 5-Year (m^3) =	12.05

Storage Occupied In Area B1-1

5-Year Storm Event

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	199.66	0.035	6.99
		Total	6.99

Storage Available (m^3) =	6.99
Storage Required (m^3) =	6.38

100-Year Storm Event

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	199.66	0.065	12.98
		Total	12.98

Storage Available (m^3) =	12.98
Storage Required (m^3) =	12.05

*Area is 75% of the total roof area

Roof Drain Flow (B1-1)

Roof Drains Summary		
Type of Control Device	Watts Drianage - Accutrol Weir	
Number of Roof Drians	1	
	5-Year	100-Year
Rooftop Storage (m^3)	6.99	12.98
Storage Depth (m)	0.035	0.065
Flow (Per Roof Drain) (L/s)	0.44	0.82
Total Flow (L/s)	0.44	0.82

Flow Rate Vs. Build-Up (One Weir)	
Depth (mm)	Flow (L/s)
15	0.19
20	0.25
25	0.32
30	0.38
35	0.44
40	0.50
45	0.57
50	0.63
55	0.69

*Roof Drain model to be Adjustable Accutrol Weirs, Fully Exposed

*Roof Drain Flow information taken from Watts Drainage website

CALCULATING ROOF FLOW EXAMPLES

2 roof drains during a 5 year storm
elevation of water = 30mm
Flow leaving 2 roof drains = (2 x 0.36 L/s) = 0.72 L/s

2 roof drains during a 100 year storm
elevation of water = 45mm
Flow leaving 2 roof drains = (2 x 0.54 L/s) = 1.08 L/s

	Roof Drain Flow		
	Flow (l/s)	Storage Depth (mm)	Drains Flow (l/s)
	0.19	15	0.19
	0.25	20	0.25
	0.32	25	0.32
	0.38	30	0.38
5-Year	0.44	35	0.44
	0.50	40	0.50
	0.57	45	0.57
	0.63	50	0.63
	0.69	55	0.69
	0.76	60	0.76
100-Year	0.82	65	0.82
	0.88	70	0.88
	0.95	75	0.95
	1.01	80	1.01
	1.07	85	1.07
	1.13	90	1.13
	1.20	95	1.20
	1.26	100	1.26
	1.32	105	1.32
	1.39	110	1.39
	1.45	115	1.45
	1.51	120	1.51
	1.58	125	1.58
	1.64	130	1.64
	1.70	135	1.70
	1.76	140	1.76
	1.83	145	1.83
	1.89	150	1.89

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

Storage Requirements for Area B1-2

5-Year Storm Event

Tc (min)	I (mm/hr)	B1-2 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
50	37.7	2.65	0.44	2.21	6.62
55	35.1	2.47	0.44	2.03	6.69
60	32.9	2.32	0.44	1.88	6.75
65	31.0	2.18	0.44	1.74	6.79
70	29.4	2.06	0.44	1.62	6.82
75	27.9	1.96	0.44	1.52	6.84
80	26.6	1.87	0.44	1.43	6.85
85	25.4	1.78	0.44	1.34	6.85
90	24.3	1.71	0.44	1.27	6.84
95	23.3	1.64	0.44	1.20	6.83

Maximum Storage Required 2-Year (m^3) =	6.85

100-Year Storm Event

Tc (min)	I (mm/hr)	B1-2 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
60	55.9	4.36	0.82	3.54	12.76
65	52.6	4.11	0.82	3.29	12.84
70	49.8	3.89	0.82	3.07	12.89
75	47.3	3.69	0.82	2.87	12.92
80	45.0	3.51	0.82	2.69	12.93
85	43.0	3.35	0.82	2.53	12.93
90	41.1	3.21	0.82	2.39	12.91
95	39.4	3.08	0.82	2.26	12.88

Maximum Storage Required 5-Year (m^3) =	12.93

Storage Occupied In Area B1-2

5-Year Storm Event

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	210.68	0.035	7.37
		Total	7.37

Storage Available (m^3) =	7.37
Storage Required (m^3) =	6.85

100-Year Storm Event

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	210.68	0.065	13.69
		Total	13.69

Storage Available (m^3) =	13.69
Storage Required (m^3) =	12.93

*Area is 75% of the total roof area

Roof Drain Flow (B1-2)

Roof Drains Summary		
Type of Control Device	Watts Drianage - Accutrol Weir	
Number of Roof Drians	1	
	5-Year	100-Year
Rooftop Storage (m^3)	7.37	13.69
Storage Depth (m)	0.035	0.065
Flow (Per Roof Drain) (L/s)	0.44	0.82
Total Flow (L/s)	0.44	0.82

Flow Rate Vs. Build-Up (One Weir)	
Depth (mm)	Flow (L/s)
15	0.19
20	0.25
25	0.32
30	0.38
35	0.44
40	0.50
45	0.57
50	0.63
55	0.69

*Roof Drain model to be Adjustable Accutrol Weirs, Fully Exposed

*Roof Drain Flow information taken from Watts Drainage website

CALCULATING ROOF FLOW EXAMPLES

2 roof drains during a 5 year storm
elevation of water = 30mm
Flow leaving 2 roof drains = (2 x 0.36 L/s) = 0.72 L/s

2 roof drains during a 100 year storm
elevation of water = 45mm
Flow leaving 2 roof drains = (2 x 0.54 L/s) = 1.08 L/s

	Roof Drain Flow		
	Flow (l/s)	Storage Depth (mm)	Drains Flow (l/s)
	0.19	15	0.19
	0.25	20	0.25
	0.32	25	0.32
	0.38	30	0.38
5-Year	0.44	35	0.44
	0.50	40	0.50
	0.57	45	0.57
	0.63	50	0.63
	0.69	55	0.69
	0.76	60	0.76
100-Year	0.82	65	0.82
	0.88	70	0.88
	0.95	75	0.95
	1.01	80	1.01
	1.07	85	1.07
	1.13	90	1.13
	1.20	95	1.20
	1.26	100	1.26
	1.32	105	1.32
	1.39	110	1.39
	1.45	115	1.45
	1.51	120	1.51
	1.58	125	1.58
	1.64	130	1.64
	1.70	135	1.70
	1.76	140	1.76
	1.83	145	1.83
	1.89	150	1.89

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

Storage Requirements for Area B2-1

5-Year Storm Event

Tc (min)	I (mm/hr)	B2-1 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
30	53.9	1.69	0.38	1.31	2.35
35	48.5	1.52	0.38	1.14	2.39
40	44.2	1.38	0.38	1.00	2.40
45	40.6	1.27	0.38	0.89	2.40
50	37.7	1.18	0.38	0.80	2.39
55	35.1	1.10	0.38	0.72	2.37

Maximum Storage Required 2-Year (m^3) =	2.40

100-Year Storm Event

Tc (min)	I (mm/hr)	B2-1 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
30	91.9	3.19	0.69	2.50	4.50
35	82.6	2.87	0.69	2.18	4.58
40	75.1	2.61	0.69	1.92	4.61
45	69.1	2.40	0.69	1.71	4.62
50	64.0	2.22	0.69	1.53	4.60
55	59.6	2.07	0.69	1.38	4.56

Maximum Storage Required 5-Year (m^3) =	4.62

Storage Occupied In Area B2-1

5-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m^3)
Roof	93.74	0.030	2.81
		Total	2.81

Storage Available (m^3) =	2.81
Storage Required (m^3) =	2.40

100-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m^3)
Roof	93.74	0.055	5.16
		Total	5.16

Storage Available (m^3) =	5.16
Storage Required (m^3) =	4.62

*Area is 75% of the total roof area

Roof Drain Flow (B2-1)

Roof Drains Summary		
Type of Control Device	Watts Drianage - Accutrol Weir	
Number of Roof Drians	1	
	5-Year	100-Year
Rooftop Storage (m^3)	2.81	5.16
Storage Depth (m)	0.030	0.055
Flow (Per Roof Drain) (L/s)	0.38	0.69
Total Flow (L/s)	0.38	0.69

Flow Rate Vs. Build-Up (One Weir)	
Depth (mm)	Flow (L/s)
15	0.19
20	0.25
25	0.32
30	0.38
35	0.44
40	0.50
45	0.57
50	0.63
55	0.69

*Roof Drain model to be Adjustable Accutrol Weirs, Fully Exposed

*Roof Drain Flow information taken from Watts Drainage website

CALCULATING ROOF FLOW EXAMPLES

3 roof drains during a 5 year storm
elevation of water = 55mm
Flow leaving 4 roof drains = (3 x 0.66 L/s) = 1.98 L/s

3 roof drains during a 100 year storm
elevation of water = 85mm
Flow leaving 4 roof drains = (3 x 1.02 L/s) = 3.06 L/s

	Roof Drain Flow		
	Flow (l/s)	Storage Depth (mm)	Drains Flow (l/s)
	0.19	15	0.19
	0.25	20	0.25
	0.32	25	0.32
5-Year	0.38	30	0.38
	0.44	35	0.44
	0.50	40	0.50
	0.57	45	0.57
	0.63	50	0.63
100-Year	0.69	55	0.69
	0.76	60	0.76
	0.82	65	0.82
	0.88	70	0.88
	0.95	75	0.95
	1.01	80	1.01
	1.07	85	1.07
	1.13	90	1.13
	1.20	95	1.20
	1.26	100	1.26
	1.32	105	1.32
	1.39	110	1.39
	1.45	115	1.45
	1.51	120	1.51
	1.58	125	1.58
	1.64	130	1.64
	1.70	135	1.70
	1.76	140	1.76
	1.83	145	1.83
	1.89	150	1.89

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

Storage Requirements for Area B2-2

5-Year Storm Event

Tc (min)	I (mm/hr)	B2-2 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
20	70.3	1.36	0.32	1.04	1.24
25	60.9	1.18	0.32	0.86	1.29
30	53.9	1.04	0.32	0.72	1.30
35	48.5	0.94	0.32	0.62	1.30
40	44.2	0.85	0.32	0.53	1.28
45	40.6	0.79	0.32	0.47	1.26

Maximum Storage Required 2-Year (m^3) =	1.30

100-Year Storm Event

Tc (min)	I (mm/hr)	B2-2 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
20	120.0	2.58	0.57	2.01	2.41
25	103.8	2.23	0.57	1.66	2.49
30	91.9	1.97	0.57	1.40	2.52
35	82.6	1.77	0.57	1.20	2.53
40	75.1	1.61	0.57	1.04	2.50
45	69.1	1.48	0.57	0.91	2.46

Maximum Storage Required 5-Year (m^3) =	2.53

Storage Occupied In Area B2-2

5-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m^3)
Roof	57.92	0.025	1.45
		Total	1.45

Storage Available (m^3) =	1.45
Storage Required (m^3) =	1.30

100-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m^3)
Roof	57.92	0.045	2.61
		Total	2.61

Storage Available (m^3) =	2.61
Storage Required (m^3) =	2.53

*Area is 75% of the total roof area

Roof Drain Flow (B2-2)

Roof Drains Summary		
Type of Control Device	Watts Drianage - Accutrol Weir	
Number of Roof Drians	1	
	5-Year	100-Year
Rooftop Storage (m^3)	1.45	2.61
Storage Depth (m)	0.025	0.045
Flow (Per Roof Drain) (L/s)	0.32	0.57
Total Flow (L/s)	0.32	0.57

Flow Rate Vs. Build-Up (One Weir)	
Depth (mm)	Flow (L/s)
15	0.19
20	0.25
25	0.32
30	0.38
35	0.44
40	0.50
45	0.57
50	0.63
55	0.69

*Roof Drain model to be Adjustable Accutrol Weirs, Fully Exposed

*Roof Drain Flow information taken from Watts Drainage website

CALCULATING ROOF FLOW EXAMPLES

3 roof drains during a 5 year storm
elevation of water = 55mm
Flow leaving 4 roof drains = (3 x 0.66 L/s) = 1.98 L/s

3 roof drains during a 100 year storm
elevation of water = 85mm
Flow leaving 4 roof drains = (3 x 1.02 L/s) = 3.06 L/s

	Roof Drain Flow		
	Flow (l/s)	Storage Depth (mm)	Drains Flow (l/s)
	0.19	15	0.19
	0.25	20	0.25
5-Year	0.32	25	0.32
	0.38	30	0.38
	0.44	35	0.44
	0.50	40	0.50
100-Year	0.57	45	0.57
	0.63	50	0.63
	0.69	55	0.69
	0.76	60	0.76
	0.82	65	0.82
	0.88	70	0.88
	0.95	75	0.95
	1.01	80	1.01
	1.07	85	1.07
	1.13	90	1.13
	1.20	95	1.20
	1.26	100	1.26
	1.32	105	1.32
	1.39	110	1.39
	1.45	115	1.45
	1.51	120	1.51
	1.58	125	1.58
	1.64	130	1.64
	1.70	135	1.70
	1.76	140	1.76
	1.83	145	1.83
	1.89	150	1.89

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

Storage Requirements for Area B3-1

5-Year Storm Event

Tc (min)	I (mm/hr)	B3-1 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	0.74	0.25	0.49	0.30
15	83.6	0.60	0.25	0.35	0.31
20	70.3	0.50	0.25	0.25	0.30
25	60.9	0.43	0.25	0.18	0.28
30	53.9	0.38	0.25	0.13	0.24
35	48.5	0.35	0.25	0.10	0.20

Maximum Storage Required 2-Year (m^3) =	0.31

100-Year Storm Event

Tc (min)	I (mm/hr)	B3-1 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	1.42	0.44	0.98	0.59
15	142.9	1.13	0.44	0.69	0.62
20	120.0	0.95	0.44	0.51	0.61
25	103.8	0.82	0.44	0.38	0.58
30	91.9	0.73	0.44	0.29	0.52
35	82.6	0.65	0.44	0.21	0.45

Maximum Storage Required 5-Year (m^3) =	0.62

Storage Occupied In Area B3-1

5-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m^3)
Roof	21.39	0.020	0.43
		Total	0.43

Storage Available (m^3) =	0.43
Storage Required (m^3) =	0.31

100-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m^3)
Roof	21.39	0.035	0.75
		Total	0.75

Storage Available (m^3) =	0.75
Storage Required (m^3) =	0.62

*Area is 75% of the total roof area

Roof Drain Flow (B3-1)

Roof Drains Summary		
Type of Control Device	Watts Drianage - Accutrol Weir	
Number of Roof Drians	1	
	5-Year	100-Year
Rooftop Storage (m^3)	0.43	0.75
Storage Depth (m)	0.020	0.035
Flow (Per Roof Drain) (L/s)	0.25	0.44
Total Flow (L/s)	0.25	0.44

Flow Rate Vs. Build-Up (One Weir)	
Depth (mm)	Flow (L/s)
15	0.19
20	0.25
25	0.32
30	0.38
35	0.44
40	0.50
45	0.57
50	0.63
55	0.69

*Roof Drain model to be Adjustable Accutrol Weirs, Fully Exposed

*Roof Drain Flow information taken from Watts Drainage website

CALCULATING ROOF FLOW EXAMPLES

4 roof drains during a 5 year storm
elevation of water = 50mm
Flow leaving 4 roof drains = (4 x 0.60 L/s) = 2.40 L/s

4 roof drains during a 100 year storm
elevation of water = 75mm
Flow leaving 4 roof drains = (4 x 0.90 L/s) = 3.60 L/s

	Roof Drain Flow		
	Flow (l/s)	Storage Depth (mm)	Drains Flow (l/s)
	0.19	15	0.19
5-Year	0.25	20	0.25
	0.32	25	0.32
	0.38	30	0.38
100-Year	0.44	35	0.44
	0.50	40	0.50
	0.57	45	0.57
	0.63	50	0.63
	0.69	55	0.69
	0.76	60	0.76
	0.82	65	0.82
	0.88	70	0.88
	0.95	75	0.95
	1.01	80	1.01
	1.07	85	1.07
	1.13	90	1.13
	1.20	95	1.20
	1.26	100	1.26
	1.32	105	1.32
	1.39	110	1.39
	1.45	115	1.45
	1.51	120	1.51
	1.58	125	1.58
	1.64	130	1.64
	1.70	135	1.70
	1.76	140	1.76
	1.83	145	1.83
	1.89	150	1.89

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

Storage Requirements for Area B3-2

5-Year Storm Event

Tc (min)	I (mm/hr)	B3-2 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
40	44.2	1.90	0.38	1.52	3.64
45	40.6	1.74	0.38	1.36	3.68
50	37.7	1.62	0.38	1.24	3.71
55	35.1	1.51	0.38	1.13	3.72
60	32.9	1.41	0.38	1.03	3.72
65	31.0	1.33	0.38	0.95	3.71

Maximum Storage Required 2-Year (m^3) =	3.72

100-Year Storm Event

Tc (min)	I (mm/hr)	B3-2 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
40	75.1	3.58	0.69	2.89	6.94
45	69.1	3.29	0.69	2.60	7.02
50	64.0	3.05	0.69	2.36	7.07
55	59.6	2.84	0.69	2.15	7.10
60	55.9	2.66	0.69	1.97	7.11
65	52.6	2.51	0.69	1.82	7.09

Maximum Storage Required 5-Year (m^3) =	7.11

Storage Occupied In Area B3-2

5-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m^3)
Roof	128.58	0.030	3.86
		Total	3.86

Storage Available (m^3) =	3.86
Storage Required (m^3) =	3.72

100-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m^3)
Roof	128.58	0.055	7.12
		Total	7.12

Storage Available (m^3) =	7.12
Storage Required (m^3) =	7.11

*Area is 75% of the total roof area

Roof Drain Flow (B3-2)

Roof Drains Summary		
Type of Control Device	Watts Drianage - Accutrol Weir	
Number of Roof Drians	1	
	5-Year	100-Year
Rooftop Storage (m^3)	3.86	7.12
Storage Depth (m)	0.030	0.055
Flow (Per Roof Drain) (L/s)	0.38	0.69
Total Flow (L/s)	0.38	0.69

Flow Rate Vs. Build-Up (One Weir)	
Depth (mm)	Flow (L/s)
15	0.19
20	0.25
25	0.32
30	0.38
35	0.44
40	0.50
45	0.57
50	0.63
55	0.69

*Roof Drain model to be Adjustable Accutrol Weirs, Fully Exposed

*Roof Drain Flow information taken from Watts Drainage website

CALCULATING ROOF FLOW EXAMPLES

4 roof drains during a 5 year storm
elevation of water = 50mm
Flow leaving 4 roof drains = (4 x 0.60 L/s) = 2.40 L/s

4 roof drains during a 100 year storm
elevation of water = 75mm
Flow leaving 4 roof drains = (4 x 0.90 L/s) = 3.60 L/s

	Roof Drain Flow		
	Flow (l/s)	Storage Depth (mm)	Drains Flow (l/s)
	0.19	15	0.19
	0.25	20	0.25
	0.32	25	0.32
5-Year	0.38	30	0.38
	0.44	35	0.44
	0.50	40	0.50
	0.57	45	0.57
	0.63	50	0.63
100-Year	0.69	55	0.69
	0.76	60	0.76
	0.82	65	0.82
	0.88	70	0.88
	0.95	75	0.95
	1.01	80	1.01
	1.07	85	1.07
	1.13	90	1.13
	1.20	95	1.20
	1.26	100	1.26
	1.32	105	1.32
	1.39	110	1.39
	1.45	115	1.45
	1.51	120	1.51
	1.58	125	1.58
	1.64	130	1.64
	1.70	135	1.70
	1.76	140	1.76
	1.83	145	1.83
	1.89	150	1.89

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

Storage Requirements for Area B4-1

5-Year Storm Event

Tc (min)	I (mm/hr)	B4-1 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	0.92	0.25	0.67	0.40
15	83.6	0.74	0.25	0.49	0.44
20	70.3	0.62	0.25	0.37	0.45
25	60.9	0.54	0.25	0.29	0.43
30	53.9	0.48	0.25	0.23	0.41
35	48.5	0.43	0.25	0.18	0.38

Maximum Storage Required 2-Year (m^3) =	0.45

100-Year Storm Event

Tc (min)	I (mm/hr)	B4-1 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	1.75	0.44	1.31	0.79
15	142.9	1.40	0.44	0.96	0.87
20	120.0	1.18	0.44	0.74	0.89
25	103.8	1.02	0.44	0.58	0.87
30	91.9	0.90	0.44	0.46	0.83
35	82.6	0.81	0.44	0.37	0.78

Maximum Storage Required 5-Year (m^3) =	0.89

Storage Occupied In Area B4-1

5-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m^3)
Roof	26.51	0.020	0.53
		Total	0.53

Storage Available (m^3) =	0.53
Storage Required (m^3) =	0.45

100-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m^3)
Roof	26.51	0.035	0.93
		Total	0.93

Storage Available (m^3) =	0.93
Storage Required (m^3) =	0.89

*Area is 75% of the total roof area

Roof Drain Flow (B4-1)

Roof Drains Summary		
Type of Control Device	Watts Drianage - Accutrol Weir	
Number of Roof Drians	1	
	5-Year	100-Year
Rooftop Storage (m^3)	0.53	0.93
Storage Depth (m)	0.020	0.035
Flow (Per Roof Drain) (L/s)	0.25	0.44
Total Flow (L/s)	0.25	0.44

Flow Rate Vs. Build-Up (One Weir)	
Depth (mm)	Flow (L/s)
15	0.19
20	0.25
25	0.32
30	0.38
35	0.44
40	0.50
45	0.57
50	0.63
55	0.69

*Roof Drain model to be Adjustable Accutrol Weirs, Fully Exposed

*Roof Drain Flow information taken from Watts Drainage website

CALCULATING ROOF FLOW EXAMPLES

4 roof drains during a 5 year storm
elevation of water = 50mm
Flow leaving 4 roof drains = (4 x 0.60 L/s) = 2.40 L/s

4 roof drains during a 100 year storm
elevation of water = 75mm
Flow leaving 4 roof drains = (4 x 0.90 L/s) = 3.60 L/s

	Roof Drain Flow		
	Flow (l/s)	Storage Depth (mm)	Drains Flow (l/s)
	0.19	15	0.19
5-Year	0.25	20	0.25
	0.32	25	0.32
	0.38	30	0.38
100-Year	0.44	35	0.44
	0.50	40	0.50
	0.57	45	0.57
	0.63	50	0.63
	0.69	55	0.69
	0.76	60	0.76
	0.82	65	0.82
	0.88	70	0.88
	0.95	75	0.95
	1.01	80	1.01
	1.07	85	1.07
	1.13	90	1.13
	1.20	95	1.20
	1.26	100	1.26
	1.32	105	1.32
	1.39	110	1.39
	1.45	115	1.45
	1.51	120	1.51
	1.58	125	1.58
	1.64	130	1.64
	1.70	135	1.70
	1.76	140	1.76
	1.83	145	1.83
	1.89	150	1.89

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

Storage Requirements for Area B4-2

5-Year Storm Event

Tc (min)	I (mm/hr)	B4-2 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	0.92	0.25	0.67	0.40
15	83.6	0.74	0.25	0.49	0.44
20	70.3	0.62	0.25	0.37	0.45
25	60.9	0.54	0.25	0.29	0.43
30	53.9	0.48	0.25	0.23	0.41
35	48.5	0.43	0.25	0.18	0.38

Maximum Storage Required 2-Year (m^3) =	0.45

100-Year Storm Event

Tc (min)	I (mm/hr)	B4-2 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	1.75	0.44	1.31	0.79
15	142.9	1.40	0.44	0.96	0.87
20	120.0	1.18	0.44	0.74	0.89
25	103.8	1.02	0.44	0.58	0.87
30	91.9	0.90	0.44	0.46	0.83
35	82.6	0.81	0.44	0.37	0.78

Maximum Storage Required 5-Year (m^3) =	0.89

Storage Occupied In Area B4-2

5-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m^3)
Roof	26.51	0.020	0.53
		Total	0.53

Storage Available (m^3) =	0.53
Storage Required (m^3) =	0.45

100-Year Storm Event

Roof Storage			
Location	Area	Depth	Volume (m^3)
Roof	26.51	0.035	0.93
		Total	0.93

Storage Available (m^3) =	0.93
Storage Required (m^3) =	0.89

*Area is 75% of the total roof area

Roof Drain Flow (B4-2)

Roof Drains Summary		
Type of Control Device	Watts Drianage - Accutrol Weir	
Number of Roof Drians	1	
	5-Year	100-Year
Rooftop Storage (m^3)	0.53	0.93
Storage Depth (m)	0.020	0.035
Flow (Per Roof Drain) (L/s)	0.25	0.44
Total Flow (L/s)	0.25	0.44

Flow Rate Vs. Build-Up (One Weir)	
Depth (mm)	Flow (L/s)
15	0.19
20	0.25
25	0.32
30	0.38
35	0.44
40	0.50
45	0.57
50	0.63
55	0.69

*Roof Drain model to be Adjustable Accutrol Weirs, Fully Exposed

*Roof Drain Flow information taken from Watts Drainage website

CALCULATING ROOF FLOW EXAMPLES

4 roof drains during a 5 year storm
elevation of water = 50mm
Flow leaving 4 roof drains = (4 x 0.60 L/s) = 2.40 L/s

4 roof drains during a 100 year storm
elevation of water = 75mm
Flow leaving 4 roof drains = (4 x 0.90 L/s) = 3.60 L/s

	Roof Drain Flow		
	Flow (l/s)	Storage Depth (mm)	Drains Flow (l/s)
	0.19	15	0.19
5-Year	0.25	20	0.25
	0.32	25	0.32
	0.38	30	0.38
100-Year	0.44	35	0.44
	0.50	40	0.50
	0.57	45	0.57
	0.63	50	0.63
	0.69	55	0.69
	0.76	60	0.76
	0.82	65	0.82
	0.88	70	0.88
	0.95	75	0.95
	1.01	80	1.01
	1.07	85	1.07
	1.13	90	1.13
	1.20	95	1.20
	1.26	100	1.26
	1.32	105	1.32
	1.39	110	1.39
	1.45	115	1.45
	1.51	120	1.51
	1.58	125	1.58
	1.64	130	1.64
	1.70	135	1.70
	1.76	140	1.76
	1.83	145	1.83
	1.89	150	1.89

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

Time of Concentration Pre-Development

Drainage Area ID	Sheet Flow Distance (m)	Slope of Land (%)	Tc (min) (5-Year)	Tc (min) (100-Year)
A1/A2	49	8.00	4	3

Therefore, a Tc of 10 can be used

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

c= Blanced Runoff Coefficient

L= Length of drainage area

S= Average slope of watershed

STORM SEWER DESIGN SHEET

PROJECT: 289 Carling Avenue
LOCATION: Ottawa, Ontario
CLIENT: John Howard Society

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	29	30	31	32
STREET	AREA ID	FROM MH	TO MH	C-VALUE						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)	
				0.20	0.60	0.79	0.85	0.87	0.90																DIA	W	H			(L/s)	(%)
	B1 - B4	BLDG	TEE						0.10	0.09	0.09	10.00	0.16	10.16	104.19	122.14	178.56	26.62			4.91	4.91	22.47	12.01	150			2.00	1.232	17.56	78.15%

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: N.V.B.

Checked: T.D.F.

Project No.: CP-19-0007

No.	Revision	Date
1.	REVISED AS PER CITY COMMENTS	2019-10-25
2	REVISED AS PER CITY COMMENTS	2020-01-08
3	REVISED AS PER CITY COMMENTS	2020-02-20

Sheet No: 1 of 1

E-MAIL

Antares Engineering Group Inc.
Professional Mechanical, Electrical, Testing and Research Engineers
159 Colonnade Road South, Unit 1, Ottawa, Ontario, Canada, K2E 7J4
Phone 613-723-6034 • Fax 613-723-5749 • mail@antaresengineering.ca

DATE: 12 February 2020	**# PAGES (including cover):** 1
ATTENTION: Maria Martinez	**FROM:** Slavo J. Samel
Tel: (613) 739 1327 Ext: 226	**TEL:** (613) 723-6034
COMPANY: PBC Management Group	**PROJECT No:** Antares Eng. 19-693
REFERENCE: **JHS - 289 Carling Avenue Ottawa, Ontario K1S 4K5**	

Attn: Ms. Maria Martinez

Regarding: Consolidation of Engineering Related Comments
Flow Control Roof Drains Item #4

The roof drains will be designed for flow control in accordance with OBC 7.4.10.4(2) with **8** controlled flow roof drains with a maximum flow of **1.89 L/s** at 150mm depth using Watts RD-100-A-ADJ roof drains, each set with a fully exposed weir opening.

Please do not hesitate to contact us if you have any questions.

Sincerely,

REGISTERED PROFESSIONAL ENGINEER
J. C. JARRETT
PROVINCE OF ONTARIO

Slavo J. Samel

ANTARES Engineering Group Inc.
Slavo J. Samel
Senior Project Manager

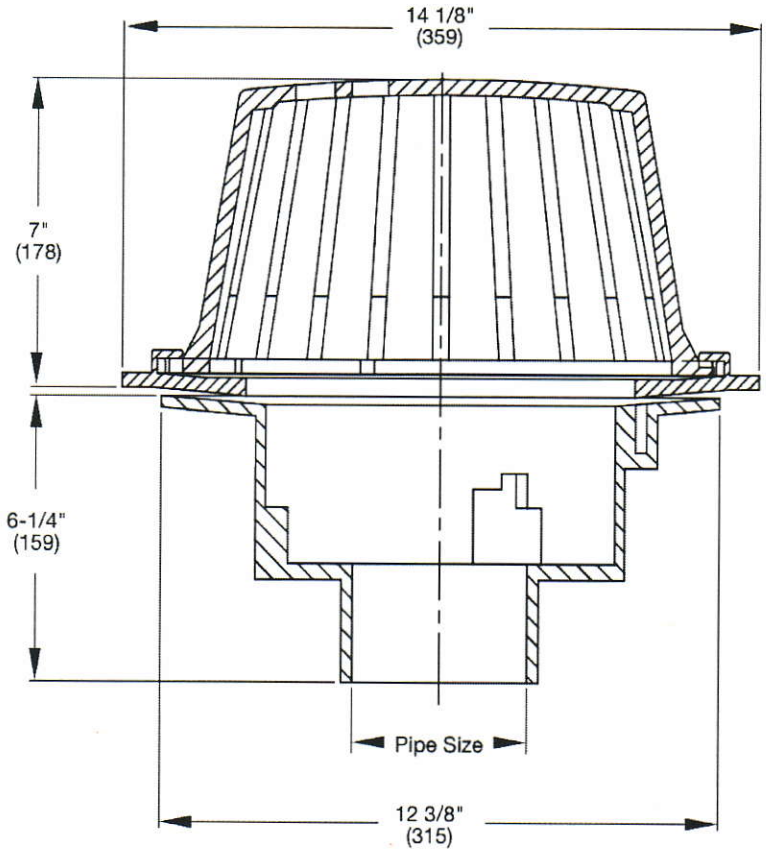
WATTS®

RD-100

Tag: _____

Large Area Roof Drain

SPECIFICATION: Watts Drainage RD-100 epoxy coated cast iron roof drain with flashing clamp with integral gravel stop, self-locking polyethylene dome (standard), and no hub (standard) outlet.



Pipe Sizing (Select One)		
Suffix	Description	
2	2"(51) Pipe Size	☐
3	3"(76) Pipe Size	☐
4	4"(102) Pipe Size	☐
5	5"(127) Pipe Size (NH Only)	☐
6	6"(152) Pipe Size	☐

Outlet Type (Select One)		
Suffix	Description	
NH	No Hub (MJ)	☐
P	Push On	☐
T	Threaded Outlet	☐
X	Inside Caulk	☐

Options (Select One or More)		
Suffix	Description	
-13	Galvanized Body & Flashing Clamp	☐
-A	Accutrol Flow Restrictor	☐
-B	Sump Receiver	☐
-D	Underdeck Clamp	☐
-F	Deck Flange/Adj. Extension	☐
-GSS	Stainless Steel Ballast Guard	☐
-K	Ductile Iron Dome	☐
-K13	Galvanized Dome	☐
-K40	Ductile Iron Low Dome (4"high)	☐
-K81	Rough Bronze Dome	☐
-K80	Aluminum Dome	☐
-K83	SS Mesh Covered Dome	☐
-L	Vandal Proof Dome	☐
-R	2" External Water Dam	☐
-SO	Side Outlet (2, 3, 4" only)	☐
-V	Fixed Extension (1-1/2",2",3",4")	☐
-US	Buy American Compliant	☐
-W	4" Internal Water Dam	☐

Optional Body Material		
Suffix	Description	
60	PVC Body w/Socket Outlet	☐
61	ABS Body w/Socket Outlet	☐

NOTICE

The information contained herein is not intended to replace the full product installation and safety information available or the experience of a trained product installer. You are required to thoroughly read all installation instructions and product safety information before beginning the installation of this product

Free Area Sq. In.
137

Deck Opening 10"(254) with sump receiver 13-1/4"(337)

Job Name _____ Contractor _____

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

Engineer _____ Representative _____

WATTS®

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

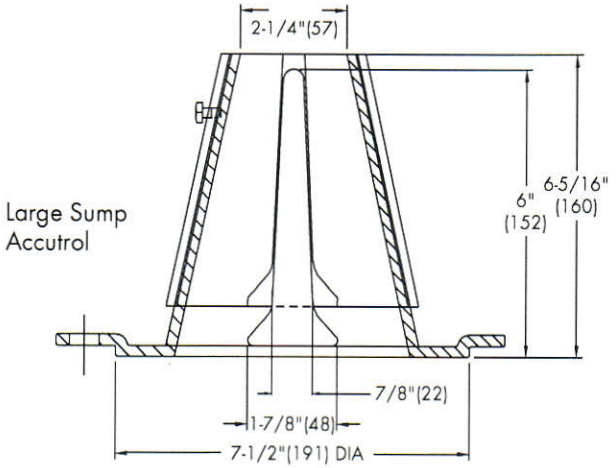
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

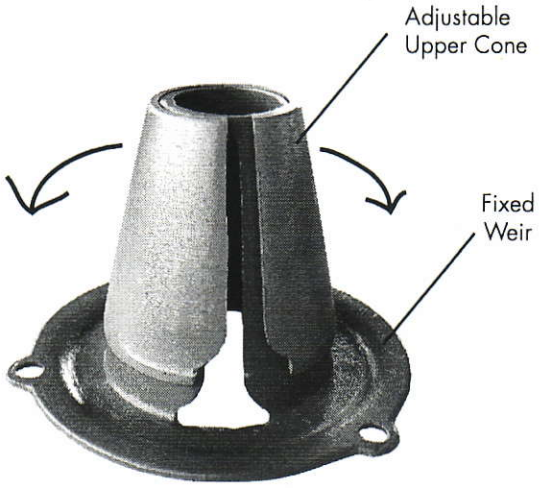
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the 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
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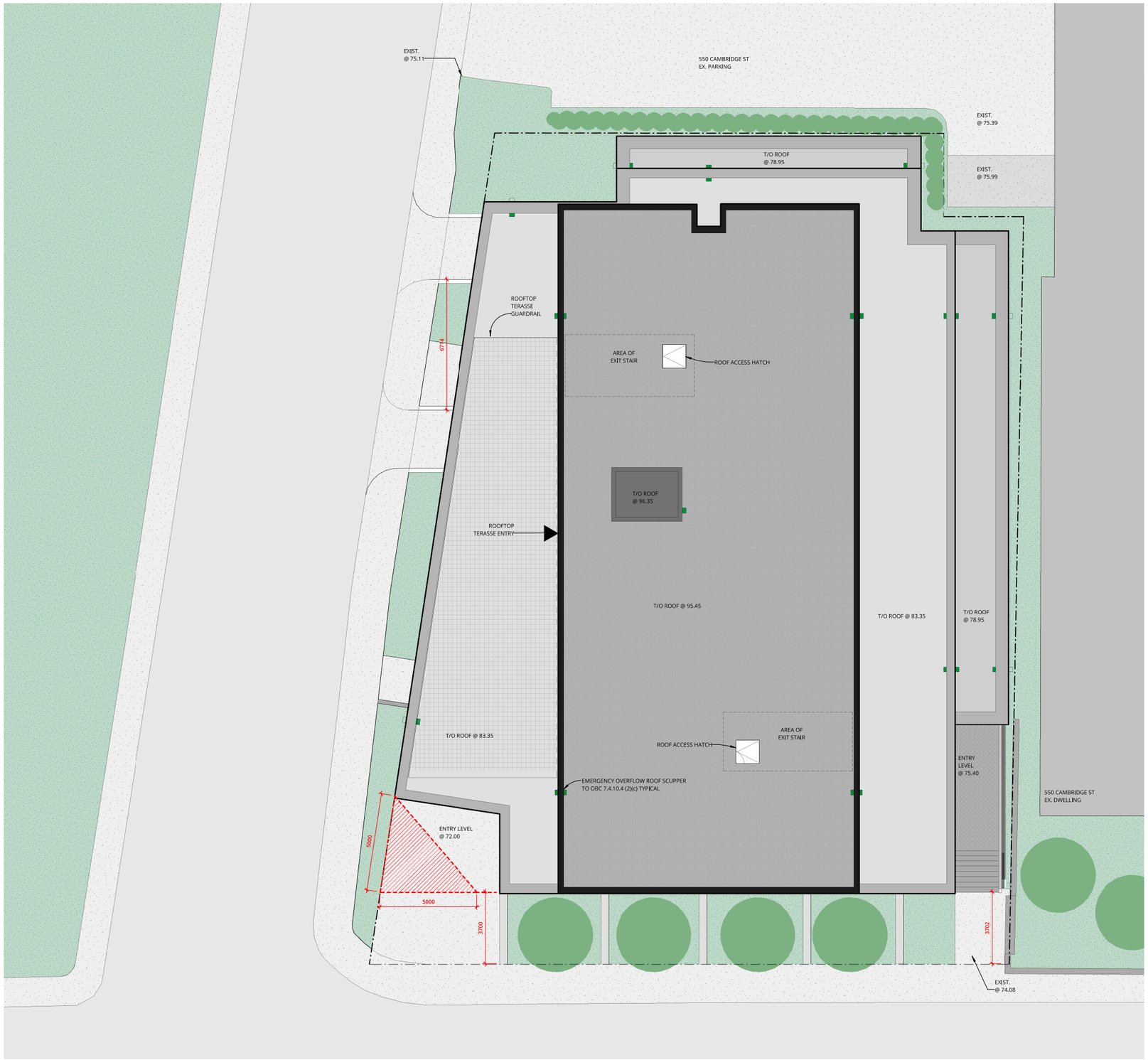
plot scale 1:1



1 ROOF PLAN
A107 SCALE 1 : 100

SHEET SIZE: ARCH D (24"x36")

NOTES:

Contractor shall check and verify all dimensions on site and report any discrepancies to the Architect before proceeding.

no.	revision	date
1	ISSUED FOR SITE PLAN APPROVAL R1	9 JAN 2020
0	ISSUE FOR SITE PLAN APPROVAL	31 OCT 2019

north nord

ONTARIO ASSOCIATION OF ARCHITECTS
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detail no. 1 détail no.
sheet no. A1 feuille no.

project
projet

JHS - 289 CARLING AVENUE

JOHN HOWARD SOCIETY
289 CARLING AVE, OTTAWA

designed by conçu par	KWC	approved by approuvé par	RZ
drawn by dessiné par	SK	project no. no. du projet	1850
date	2019-MAY-09	scale	as noted

drawing / dessin

ROOF PLAN

FILE No. D07-12-19-0147
PLAN No. #18008

revision
révision

sheet no.
no. de la feuille **A107**

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 E
☐ 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 A
☐ 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, Drainage, Sediment & Erosion Control 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, Drainage, Sediment & Erosion Control 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 Backround Studies
☐ 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, Drainage, Sediment & Erosion Control 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	N/A
☐ 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 B
☐ 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	N/A

☐ 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.	N/A
☐ 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 B
☐ 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 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)	N/A
☐ 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 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 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 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 Management
☐ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Section 6.0 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 F

☐ 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, Drainage, Sediment & Erosion Control 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 6.0 Stormwater Management Appendix F
☐ Any proposed diversion of drainage catchment areas from one outlet to another.	Section 6.0 Stormwater Management
☐ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Section 6.0 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.	Appendix 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 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, Drainage, Sediment & Erosion Control 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 7.0 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 8.0 Summary Section 9.0 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