Site Servicing and Stormwater Management Report
Residential Development
229 + 241 Beechwood Ave.
Ottawa, ON

Client:
229 Beechwood Holdings Inc. and 241 Beechwood Holdings Inc.
C/O Bintee Dev Inc.
226 Argyle Avenue
Ottawa, ON K2P 1B9

Submitted for:
Site Plan Control Application

Project Name:
229, 241 Beechwood Avenue

Project Number:
OTT-00238207-C0

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Date Submitted:
July 28, 2023

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1 Introduction

1.1 Overview

EXP Services Inc. (EXP) was retained by 229 Beechwood Holdings Inc. and 241 Beechwood Holdings Inc. to prepare a Site Servicing and Stormwater Management Report for the proposed redevelopment of 229 and 241 Beechwood Ave. in support of a Site Plan Control Application.

The two lots have a combined area of 0.2105 hectares and both lots are 0.1064 hectares and 0.1041 hectares for 229 and 241 Beechwood respectively. The site is situated along Beechwood Avenue between Green Avenue and Corona Avenue, as illustrated in **Figure 2-1** below. The lots are within the City of Ottawa urban boundary and situated in Rideau-Rockcliffe (Ward 13). The description of the subject property is noted below:

229, 231 Beechwood Avenue:

Lot 10, PIN 04226-0120

Part 2 Plan 4R-5284, PIN 04226-0121

Lot 11, PIN 04226-0120

Lot 12, PIN 04226-0122

Part 1 Plan 4R-5284, PIN 04226-0123

241, 245, 247 Beechwood Avenue:

Lot 24, PIN 04226-0136

Part 3 Plan 4R-1168, PIN 04226-0166

Lot 25, PIN 04226-0137

Part 4 Plan 4R-1168, PIN 04226-0167

Lot 26, PIN 04226-0138

Part 5 Plan 4R-1168, PIN 04226-0168

The proposed development will consist of two (2) new residential buildings – 229 Beechwood and 241 Beechwood. 229 Beechwood will be a 3-storey residential apartment building having 42 units with a basement parking lot. 241 Beechwood will be four 4-storey residential building with 52 units with a basement level parking. There will be three (3) standard parking spots and one (1) handicap parking spot in each building.

This report will discuss the adequacy of the adjacent municipal watermain, sanitary sewers and storm sewers to provide the required water supply, convey the sewage and stormwater flows that will result from the proposed development.

2 Existing Conditions

Within the site, there are five (5) existing buildings. The current zoning of the property is R4 - Residential Fourth Density Zone and includes residential dwellings. The following summarizes the current building uses within the property.

- Existing Building 1 (Lot 26) 2 Storey vinyl sided dwelling.
- Existing Building 2 (Lot 25) 2 Storey stucco and metal sided dwelling.
- Existing Building 3 (Lot 24) 2 Storey stucco and metal sided dwelling.
- Existing Building 4 (Lot 12) 3 Storey brick dwelling.
- Existing Building 5 (Lot 11) 2 Storey metal sided dwelling.

The topography of the subject site is sloped from the rear (west) towards the front (east) at approximately 10% grade. A local site access road, Carsdale Avenue, bisects the proposed development from north to south between existing lot 12 and existing lot 24.

There is one (1) vehicular access point into each building from Beechwood Avenue.



Figure 2-1 - Site Location

3 Existing Infrastructure

The proposed project includes five (5) buildings that will be removed during the redevelopment of the two sites. From review of the sewer and watermain mapping, as-built drawings and Utility Central Registry (UCC) plans, the following summarizes the onsite and adjacent offsite infrastructure:

On Beechwood Avenue

300mm dia. concrete sanitary sewer running from north to south along Beechwood Avenue.

1200mm dia. concrete reinforced storm sewer running from north to south along Beechwood Avenue.

254mm dia. unlined cast iron watermain along Beechwood Avenue.

Each lot is assumed to have private sanitary and watermain service connections.

4 Pre-Consultation / Permits / Approvals

A pre-consultation meeting was held with the City prior to design commencement. This teleconference meeting, held May 5, 2020, outlined the submission requirements and provided information to assist with the development proposal.

The proposed site is located within the Rockcliffe Park Heritage District and will required approvals under the Ontario Heritage Act. The site will also require an application for Site Plan Control (complex) and potential variances. This site is located in a design priority area and will therefore be subject to UDRP consultation and review.

Generally, an Environmental Compliance Approval (ECA) would be obtained from the Ministry of Environment, Conservation and Parks (MECP), formerly the Ministry of the Environment and Climate Change (MOECC), for any onsite private Sewage Works. The onsite Sewage Works would generally include the onsite stormwater works such as flow controls, associated stormwater detention, and treatment works. However, an Approval Exemption under Ontario Regulation 525/98 can be applied. Under Section 3 of O'Reg 525/98, Section 53 (1) and (3) do not apply to the alteration, extension, replacement or a change to a stormwater management facility that 1) is designed to service one lot or parcel of land, b) discharges into a storm sewer that is not a combined sewer, c) does not service industrial land or a structure located on industrial land, and finally d) is not located on industrial land. Based on this exemption, if the stormwater management works within the site remain located within one property parcel, then an Approval Exemptions under O'Reg 525/98 would apply and therefore not necessitate an ECA.

In addition, various design guidelines were referred to in preparing the current report including:

Bulletin ISDTB-2012-4 (20 June 2012)

- Technical Bulletin ISDTB-2014-01 (05 February 2014)
- Technical Bulletin PIEDTB-2016-01 (September 6, 2016)
- Technical Bulletin ISDTB-2018-01 (21 March 2018)
- Technical Bulletin ISDTB-2018-04 (27 June 2018)

Ottawa Design Guidelines – Water Distribution, July 2010 (WDG001), including:

- Technical Bulletin ISDTB-2014-02 (May 27, 2014)
- Technical Bulletin ISTB-2018-02 (March 21, 2018)
- Technical Bulletin ISTB-2021-03 (August 18, 2021)

Stormwater Management Planning and Design Manual, Ontario Ministry of the Environment and Climate Change, March 2003 (SMPDM).

Design Guidelines for Drinking-Water Systems, Ontario Ministry of the Environment and Climate Change, 2008 (GDWS).

Fire Underwriters Survey, Water Supply for Public Fire Protection (FUS), 1999.

Ontario Building Code 2012, Ministry of Municipal Affairs and Housing.

5 Water Servicing

5.1 Existing Water Servicing

The subject site is located within the City of Ottawa's water distribution system 1E pressure zone. The site is not currently serviced by any large diameter watermain connection. From GeoOttawa, it is shown that a 254mm dia. watermain runs along Beechwood Avenue towards the east of the proposed development site. It is assumed that each of the five (5) existing buildings on the site are serviced individually from this 254mm dia. watermain. Figure 5-1 below illustrates the existing watermains (in blue) in the subject site area.

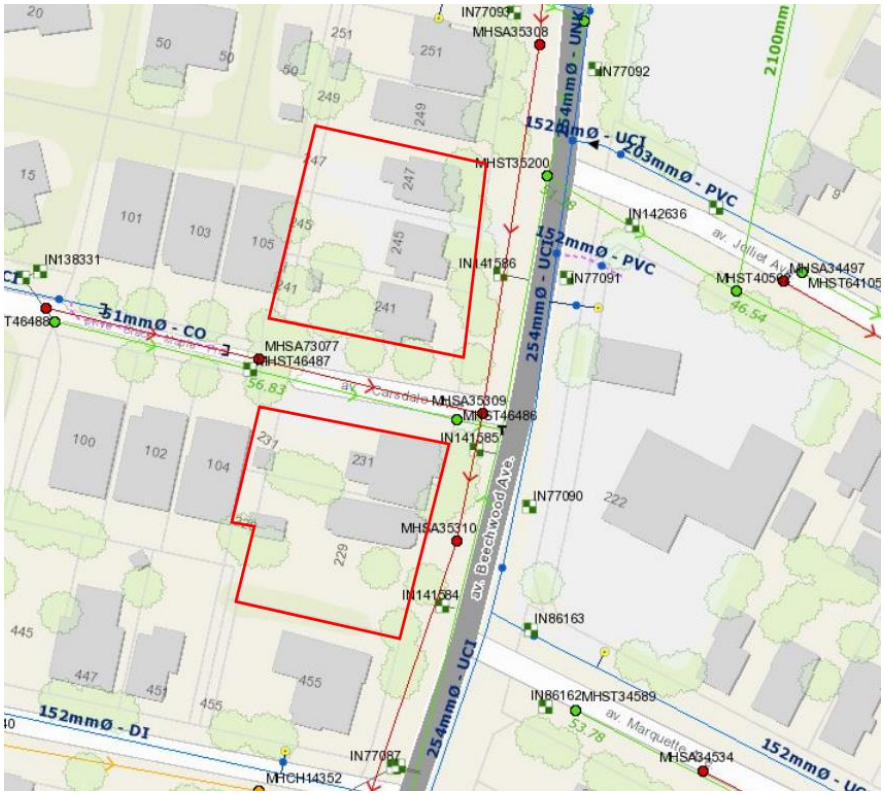


Figure 5-1 – Watermains Near Proposed Site

5.2 Water Servicing Proposal

The proposed development will consist of two (2) multiple family residential buildings – 229 Beechwood Avenue and 241 Beechwood Avenue. 229 Beechwood Ave. is comprised of 42 residential units and 241 Beechwood Ave. is comprised of 52 residential units.

Water supply for the site will be provided by the existing 254mm dia. watermain running along Beechwood Avenue. Each building, 229 and 241 Beechwood Ave., will be serviced by their own 100mm dia. PVC watermain approximately 18m and 19m in length respectively. The Site Servicing Plan in **Appendix E** illustrates the water servicing of the property.

5.3 Water Servicing Design

The water servicing requirements for the proposed buildings are designed in accordance with the City Design Guidelines (July 2010). The following steps indicate the basic methodology that was used in our analysis:

- Estimated water demands under average day, maximum day and peak hour conditions. As the total population estimate was less than 500, MECP Design Guidelines (Table 3-3) peaking factors were used.
- Estimated the required fire flow (RFF) based on the Fire Underwriters Survey (FUS).
- Obtained hydraulic boundary conditions (HGL) from the City, based on the above water demands and required fire flows.
- Boundary condition data and water demands were used to estimate the pressure at the proposed building, and this was compared to the City's design criteria.

Since the average day demand for each individual building did not exceed 50 m^3 per day, redundant watermains are not required as per Section 4.31 of the WDG001. Please refer to **Table A-1** in **Appendix A** for detailed calculations of the total water demands.

A review of the estimated watermain pressure at each building connection, based on the boundary conditions provided, was completed. **Table A-5** & **Table A-6** in **Appendix A** illustrates the anticipated pressures at each building connection.

Based on the hydraulic grade line (HGL) provided by the City it is evident that high pressures already exist in the water distribution system at the property. Static pressures of ± 70 psi – 87 psi are typically available. Due of the relatively short distance that would be necessary between the buildings and the watermain connection, minimal pressure loss is anticipated. The pressure available at the building connection would be within ±2 psi of the pressure in the city main based on a 100mm supply.

Under peak hour conditions the anticipated pressure at the building is within ±2 psi of the city's distribution main pressure. Anticipated pressure losses at the top floor are approximately 19 and 22 psi for 229 and 241 Beechwood Ave respectively.

Based on the results, the installation of a 100mm watermain is proposed. Pressure reducing measures are required as operating pressures are higher than 80 psi.

5.4 Water Servicing Design Criteria

Table 5-1 below summarizes the Design Criteria that was used to establish the water demands and the required fire flows, based on the proposed building uses. The design parameters that apply to this project and used for calculations are identified below.

Table 5-1 - Summary of Water Supply Design Criteria

Design Parameter	Value	Applies
Population Density – Single-family Home	3.4 persons/unit	
Population Density – Semi-detached Home	2.7 persons/unit	
Population Density – Townhome or Terrace Flat	1.8 persons/unit	
Population Density – Bachelor Apartment	1.4 persons/unit	✓
Population Density – Bachelor + Den Apartment	1.4 persons/unit	
Population Density – One Bedroom Apartment	1.4 persons/unit	✓
Population Density – One Bedroom plus Den Apartment	1.4 persons/unit	
Population Density – Two Bedroom Apartment	2.1 persons/unit	✓
Population Density – Two Bedroom plus Den Apartment	2.1 persons/unit	
Population Density – Three Bedroom Apartment	3.1 persons/unit	
Average Day Demands – Residential	280 L/person/day	✓
Average Day Demands – Commercial / Institutional	28,000 L/gross ha/day	
Average Day Demands – Light Industrial / Heavy Industrial	35,000 or 55,000 L/gross ha/day	
Maximum Day Demands – Residential	2.5 x Average Day Demands	✓
Maximum Day Demands – Commercial / Institutional	1.5 x Average Day Demands	
Peak Hour Demands – Residential	5.5 x Average Day Demands	✓
Peak Hour Demands – Commercial / Institutional	2.7 x Average Day Demands	
Fire Flow Requirements Calculation	FUS	✓
Depth of Cover Required	2.4m	✓
Maximum Allowable Pressure	551.6 kPa (80 psi)	✓
Minimum Allowable Pressure	275.8 kPa (40 psi)	✓
Minimum Allowable Pressure during fire flow conditions	137.9 kPa (20 psi)	✓

5.5 Estimated Water Demands

The following

Table 5-2 below summarizes the anticipated water demands for the proposed development based on following:

229 Beechwood Ave. Building having 42 residential units. Estimated residential population of 65 persons.

241 Beechwood Ave. Building having 52 residential units. Estimated residential population of 81 persons.

Table 5-2 : Water Demand Summary

Water Demand Conditions	229 Beechwood Water Demands (L/sec)	241 Beechwood Water Demands (L/sec)	Total Water Demands (L/sec)
Average Day	0.21	0.22	0.43
Max Day	1.18	1.21	2.39
Peak Hour	1.79	1.82	3.61

5.6 Boundary Conditions

Hydraulic Grade Line (HGL) boundary conditions were obtained from the City for design purposes. A copy of the correspondence received from the City is provided in **Appendix B**.

The following hydraulic grade line (HGL) boundary conditions were provided:

- Minimum HGL = 107.8 m
- Maximum HGL = 118.2 m
- Connection A: Max Day + Fire Flow (217 L/s) = 102.0 m
- Connection B: Max Day + Fire Flow (250 L/s) = 100.2 m
- The provided HGL ranges of 107.8 m – 118.2 m were used to estimate pressures at the building. Under Max Day Plus fire flow conditions, the HGL of 102.0 m and 100.2 m was used for 229 and 241 Beechwood Avenue respectively.

5.7 Fire Flow Requirements

Water for fire protection will be available utilizing the proposed fire hydrants located along on Beechwood Avenue. The required fire flows for the proposed buildings were calculated based on typical values as established by the Fire Underwriters Survey 1999 (FUS).

The following equation from the Fire Underwriters document “Water Supply for Public Fire Protection”, 1991, was used for calculation of the on-site supply rates required to be supplied by the hydrants:

$F = 200 * C * \sqrt{(A)}$

where:

F	=	Required Fire flow in Litres per minute
C	=	Coefficient related to type of Construction
A	=	Total Floor Area in square metres

Table 5-3 summarizes the parameters used for estimating the Required Fire Flows (RFF) based on the Fire Underwriters Survey (FUS) and the latest City of Ottawa Technical Bulletins. The RFFs were estimated in accordance with ISTB-2018-02, and based on floor areas provided by the architect, which are illustrated in **Appendix D.** The following summarizes the parameters used for both proposed buildings.

- Type of Construction Non-combustible
- Occupancy Limited combustible

Table 5-3 - Summary of Design Parameters Used in Calculating Required Fire Flows (RFF) Using FUS

Design Parameter	Value
Coefficient Related to type of Construction C	1.0 (229 Beechwood) 1.0 (241 Beechwood)
Total Floor Area (m2)	2,295 (229 Beechwood) 2,801 (241 Beechwood)
Fire Flow. Prior to rounding to closest 1,000 (L/min),	9,817 (229 Beechwood) 11,022 (241 Beechwood)
Fire Flow. Rounded to closest 1,000 (L/min),	10,000 (229 Beechwood) 11,000 (241 Beechwood)
Reduction Due to Occupancy Non-combustible (-25%), Limited Combustible (-15%), Combustible (0%), Free Burning (+15%), Rapid Burning (+25%)	-15% (229 Beechwood) -15% (241 Beechwood)
Reduction due to Sprinkler (Max 50%) Sprinkler Conforming to NFPA 13 (-30%), Standard Water Supply (-10%), Fully Supervised Sprinkler (-10%)	0% (229 Beechwood) 0% (241 Beechwood)
Exposures	+56% (229 Beechwood) +56% (241 Beechwood)
Required Fire Flow, RFF, before rounded to closest 1,000 (L/min)	13,260 (229 Beechwood) 14,586 (241 Beechwood)

The estimated required fire flows (RFF) rounded to the closest 1,000, based on the FUS methods are: 13,000 L/min (or 217 L/sec) for 229 Beechwood Ave. and 15,000 L/min (or 250 L/sec) for 241 Beechwood Ave. Please refer to **Table A-3** and **Table A-4** in **Appendix A.**

5.8 Review of Hydrant Spacing

A review of the hydrant spacing was completed to ensure compliance with Appendix I of Technical Bulletin ISTB-2018-02. As per Section 3 of Appendix I all hydrants within 150 metres were reviewed to assess the total possible available flow from these contributing hydrants.

For each hydrant the distance to the proposed building was determined to arrive at the contribution of fire flow from each. All hydrants are expected to be of Class AA as per Section 5.1 of Appendix I. For each hydrant the straight-line distance, distance measured along a fire route or roadway, whether its location is accessible, and its contribution to the required fire flow.

Figure 5-2 below illustrates all the hydrants that are within the 75 metre and 150 metre offsets from the subject property. Fire hydrants that are denoted with a number having a HP versus H represents a PRIVATE hydrant rather than a CITY owner hydrant.

All hydrants were reviewed to determine if they were accessible or non-accessible. A hydrant would not be accessible if they were located on the opposite side of a median, limiting fire truck access.

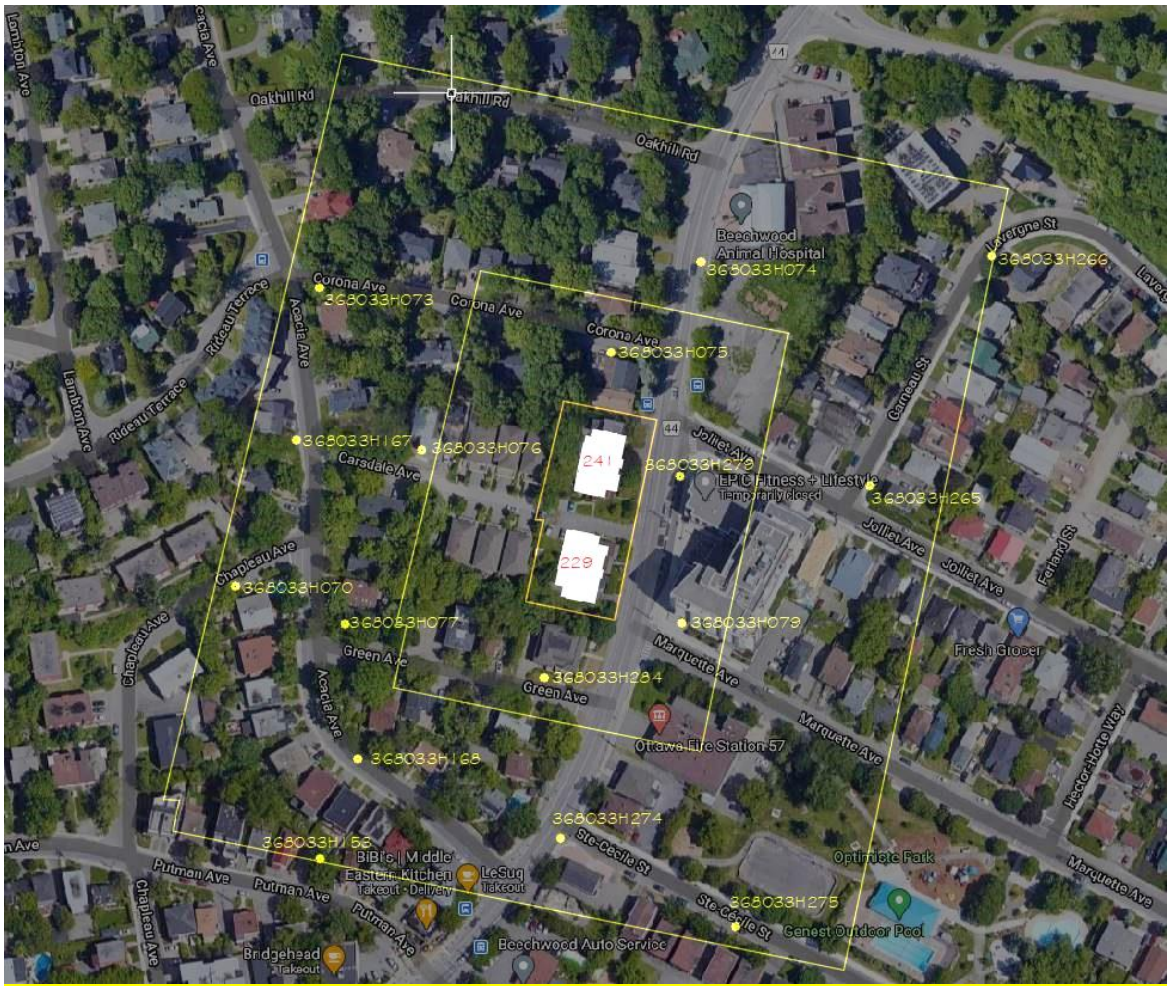


Figure 5-2 – Review of Hydrant Spacing

A summary table of the total fire flows available versus the required fire flows (RFFs) is presented in **Table 5-4** below. Detailed calculations of the available fire flows based on hydrant spacing is provided in **Table A-7** in **Appendix A.**

Table 5-4 –Fire Flows Based on Hydrant Spacing

Building	Required Fire Flow (L/min)	Available Fire Flow Based on Hydrant Spacing as per ISTB-2018-02 (L/min)
229 Beechwood	13,000 (or 217 L/sec)	15,200
241 Beechwood	15,000 (or 250 L/sec)	17,100

The total available contribution of flow from hydrants was estimated at 15,200 L/min for 229 Beechwood Ave. and 17,100 L/min for 241 Beechwood Ave. The maximum required fire flow (RFF) is 13,000 L/min for 229 Beechwood Ave

and 15,000 L/min for 241 Beechwood Ave. Therefore, the available flows from hydrants exceed each building's fire flow requirements as identified in Appendix I of Technical Bulletin ISTB-2018-02.

6 Sewage Servicing

6.1 Existing Sewage Conditions

Sewage is currently discharged easterly to the existing 300mm dia. local sanitary sewer on Beachwood Avenue, which then discharges southerly to the Vanier Parkway Collector and then westerly.

6.2 Proposed Sewage Conditions

It is proposed to provide separate sanitary sewer connections from each building to a sanitary manhole on site, which will then discharge to the 300mm dia. sanitary sewer on Beechwood Ave. These manholes will be installed in the frontage of each building, on Beechwood Avenue, and be used as a monitoring manhole. The sanitary sewer system was designed based on a population flow with an area-based infiltration allowance. A 150mm diameter sanitary sewer is proposed with a minimum 2% slope, having a capacity of 21.5 L/sec based on Manning's Equation under full flow conditions. **Table 6-1** below summarizes the design parameters used.

Table 6-1 – Summary of Wastewater Design Criteria / Parameters

Design Parameter	Value	Applies
Population Density – Single-family Home	3.4 persons/unit	
Population Density – Semi-detached Home	2.7 persons/unit	
Population Density – Duplex	2.3 persons/unit	
Population Density – Townhome (row)	2.7 persons/unit	
Population Density – Bachelor Apartment	1.4 persons/unit	✓
Population Density – Bachelor + Den Apartment	1.4 persons/unit	
Population Density – One Bedroom Apartment	1.4 persons/unit	✓
Population Density – One Bedroom plus Den Apartment	1.4 persons/unit	
Population Density – Two Bedroom Apartment	2.1 persons/unit	✓
Population Density – Two Bedroom plus Den Apartment	2.1 persons/unit	
Population Density – Three Bedroom Apartment	3.1 persons/unit	
Population Density – Three Bedroom plus Den Apartment	3.1 persons/unit	
Average Daily Residential Sewage Flow	280 L/person/day	✓
Average Daily Commercial / Intuitional Flow	28,000 L/gross ha/day	
Average Light / Heavy Industrial Daily Flow	35,000 / 55,000 L/gross ha/day	
Residential Peaking Factor – Harmon Formula (Min = 2.0, Max =4.0, with K=0.8)	$M = 1 + \frac{14}{4 + P^{0.5}} * k$	✓
Commercial Peaking Factor	1.0-1.5	
Institutional Peaking Factor	1.5	
Industrial Peaking Factor	As per Table 4-B (SDG002)	

Unit of Peak Extraneous Flow (Dry Weather / Wet Weather)	0.05 or 0.28 L/s/gross ha	
Unit of Peak Extraneous Flow (Total I/I)	0.33 L/s/gross ha	✓

The estimated peak sanitary flow rate from the proposed property is **0.85 L/sec** and **1.06 L/sec** for 229 and 241 Beechwood Ave, respectively based on City Design Guidelines. Sewage rates below include a total infiltration allowance of 0.33 L/ha/sec based on the total gross site area.

Table 6-2 – Summary of Anticipated Sewage Rates

Sewage Condition	229 Beechwood Ave Sanitary Sewage Flow (L/sec)	241 Beechwood Ave Sanitary Sewage Flow (L/sec)
Peak Residential Sewage Flow	0.82	1.03
Infiltration Flow (at 0.33 L/ha/sec)	0.03	0.03
Peak Wet Weather Sewage Flow	0.85	1.06

The City of Ottawa was contacted to discuss the downstream sanitary sewer and to determine if any additional analysis would be required to support this Zoning By-law application.

As each building will require its own sanitary sewer connection, 150mm diameter PVC sewers, each having a slope of 2.0% will be installed. The estimated capacity of each 150mm pipe at 2% is 21.5 L/sec.

Drawing **C100** in **Appendix D** illustrates the sanitary servicing of the property.

7 Storm Servicing & Stormwater Management

Since the subject properties are located within the Rideau Valley Conservation Authority (RVCA) sub watershed, Lower Rideau River Falls catchment, stormwater works are therefore subject to both the RVCA and City of Ottawa (COO) approval.

The proposed stormwater system is designed in conformance with the latest version of the City of Ottawa Design Guidelines (October 2012). Section 5 “Storm and Combined Sewer Design” and Section 8 “Stormwater Management”. A summary of the design criteria that relates to this design report is the proceeding sections below.

7.1 Minor System Design Criteria

The storm sewer was sized based on the Rational Method and Manning’s Equation under free flow conditions for the 2-year storm using a 10-minute inlet time.

The allowable discharge from the site shall be controlled to 2-year rate with a runoff coefficient of not less than 0.50.

Onsite storage shall be provided up to the 100-year event based on the controlled allowable discharge previously noted.

The minimum orifice dia. for a plug style ICD is 83mm and the minimum flow rate from a vortex ICD is recommended at 6.0 L/s in order to reduce the likelihood of plugging.

Minimum sewer slopes to be based on minimum velocities for storm sewers of 0.80 m/sec.

7.2 Major System Design Criteria

As per Technical Bulletin PIEDTB-2016-01 section 8.3.11.1 (p.12 of 14) there shall be no surface ponding on private parking areas during the 2-year storm rainfall event. Depending on the SWM strategy proposed underground or additional underground storage may be required to satisfy this requirement.

The major system has been designed to accommodate on-site detention with sufficient capacity to attenuate the 100-year design storm. On-site storage is calculated based on the 100-year design storm with on-site detention storage provided within the underground stormwater storage chambers (stormwater cistern).

Overland flow routes are provided.

The vertical distance from the spill elevation on the street and the ground elevation at the buildings is at least 150mm.

The emergency overflow spill elevation is at least 300mm below the lowest building opening.

7.3 Runoff Coefficients

Runoff coefficients used for were based on actual areas taken from CAD. Runoff coefficients for impervious surfaces (roofs, asphalt, and concrete) were taken as 0.90, whereas those for pervious surfaces (grass/landscaping) were taken as 0.20. Average runoff coefficients were calculated for catchments (or drainage areas) using weighted average method. The runoff coefficients for pre-development and post-development catchments are provided in **Table A-10** and **Table A-13** and summarized in **Table 7-1** below. It should be noted that a pre-development runoff coefficient of 0.51 was calculated, however 0.50 was used as per City guidelines.

Table 7-1 – Summary of Runoff Coefficients

Location	Area (hectares)	Pre-Development Runoff Coefficient, C_{AVG}	Post-Development Runoff Coefficient, C_{AVG}
Entire Site	0.2105	0.51	0.69

7.4 Pre-Development Conditions

Under current conditions, it appears that stormwater runoff from the 0.2105-hectare site flows overland towards Beechwood Ave. The overland flow route for stormwater is east towards Beechwood Ave. **Table 7-2** below summarizes the estimated peak flows under pre-development conditions using the standard 10-minute time of concentration (time to inlet).

Table 7-2 – Summary of Pre-Development Flows

Return Period Storm	Total Peak Flows (L/sec)
2-year	21.9
5-year	29.8
100-year	65.4

7.5 Allowable Release Rate

Rather than meeting pre-development released rates, the City of Ottawa imposes a more restrictive stormwater release rate as noted in Section 8.3.7.3 of the SDG002. The allowable discharge release rate from the site was established using the peak flows derived based on a 2-year return period storm, a maximum runoff coefficient of 0.50 and a standard time of concentration of 10 minutes.

The allowable release rate of 22.49 L/sec for 229 and 241 Beechwood will be based on a 2-year storm event. **Table A-12** provides detailed calculations on the total allowable peak flow.

7.6 Proposed Stormwater System

Stormwater runoff from the proposed site will drain from a combination of controlled and uncontrolled areas. Although there is no change in the runoff coefficient a reduction in the allowable release rate will result in control of runoff and stormwater detention. A storm drainage plan is illustrated on **Figure 7-1** below. A total of six (6) subcatchments (or drainage areas) within the development site are shown on this drawing with average runoff coefficients calculated for each drainage area. The stormwater works shall consist of the following elements:

Runoff from the roofs will be drained through WATTS Adjustable Flow Controlled Roof Drains and down to a underground storage tank below the garage of each building. The flow controlled roof drains will allow for ponding storage on each roof before draining to the underground storage tanks. Each storage tank will measure 8m x 3m x 1.5m (storing a total volume of 36.0m^3) and the exact location will be coordinated with the mechanical and structural engineers during the building permit submission. In the rear yard, runoff will collected by catch basins and catch basin manholes. The rear yard drainage will then be discharged into the storage tank below the parking garage of the respective buildings. Each stormwater tank will have a Tempest LMF 75 ICD to restrict the outlet flow to a maximum of 6.0 L/sec. The stormwater then discharges out of the storage tanks of the respective buildings, through a 200 mm dia. storm pipe at a maximum flow rate of 6.0 L/sec and into the 1200 mm dia. storm sewer on Beechwood Ave.



Figure 7-1 – Post-Development Storm Drainage

Additional information on the estimated 100-year volumes is provided in **Table A-19** and **Table A-20** in **Appendix A. Table 7-3** and **Table 7-34** below provide a summary of the stormwater peak flows under post-development conditions for each building.

Table 7-3 – Summary of Overall Post-Development Flows (229 Beechwood & 241 Beechwood)

Return Period Storm	Max Allowable Peak Flow (L/sec)	[1]Total Uncontrolled Peak Stormwater Flows (L/sec)	[2]Total Controlled Peak Stormwater Flows (L/sec)
2-year	22.49 L/sec Based on 2-year Storm and C=0.50	31.82	8.75
5-year		42.84	11.55
100-year		83.49	22.21

Note 1-Uncontrolled peak flows, or peak flows that would result if no flow control used.
Note 2-Contolled flows.

Since flow control is being utilized onsite, it is necessary to provide appropriate flow attenuation (storage). Additional information on the estimated 100-year volumes is provided in **Section 7.7** below.

7.7 Flow Attenuation & Storage

The attenuation of stormwater will be achieved by utilizing storage tanks below the parking garage of each building, ponding on the roof areas and drainage through Watts Adjustable Flow Control Drains, and storage in pipes/manholes. Using the allowable release rates, the Modified Rational Method was used to determine the 2-year, 5-year, and 100-year volumes that will occur for corresponding release rates.

Table A-19 and **Table A-20** provide the storage volumes necessary in the below grade stormwater storage units, storage on the roof and in pipes/manholes to attenuate the controlled release rates. **Table A-15** breaks down the storage and release rates of each different method of storage. **Table A-14** summarizes the combined controlled and uncontrolled flows leaving the subject site.

The total estimated required storages in a 100-year storm event are **34.0 m^3** and **34.2 m^3** for 229 and 241 Beechwood Ave respectively. Roof ponding on the upper roof levels will account for **9.69 m^3** and **9.74 m^3**, underground storage tanks will account for **36.00 m^3** and **36.00 m^3** and pipes/manholes will account for **5.03 m^3** and **5.11 m^3** for 229 and 241 Beechwood respectively. The total storage provided for 229 Beechwood is **50.72 m^3** and the total storage for 241 Beechwood is **50.84 m^3**. Both volumes exceed the required storages.

7.8 Quality Control

Due to quality control being handled in the existing infrastructure and stormwater being outlet to the Ottawa River over 2000m downstream, there is no need for addition quality control.

8 Erosion & Sediment Control

During all construction activities, erosion and sedimentation shall be controlled by the following techniques:

Filter cloth shall be installed between the frame and cover of all adjacent catch basins and catch basin manhole structures.

Heavy duty silt fencing will be used to control runoff around the construction area. Silt fencing locations are identified on the site grading and erosion control plan.

A mud mat will be installed at the construction entrance to help avoid mud from being transported to offsite roads.

Visual inspection shall be completed daily on sediment control barriers and any damage repaired immediately. Care will be taken to prevent damage during construction operations.

In some cases, barriers may be removed temporarily to accommodate the construction operations. The affected barriers will be reinstated at night when construction is completed.

Sediment control devices will be cleaned of accumulated silt as required. The deposits will be disposed of as per the requirements of the contract.

During construction, if the engineer believes that additional prevention methods are required to control erosion and sedimentation, the contractor will install additional silt fences or other methods as required to the satisfaction of the engineer.

Construction and maintenance requirements for erosion and sediment controls are to comply with Ontario Provincial Standard Specification (OPSS) OPSS 805 and City of Ottawa specifications.

9 Conclusions and Recommendations

This Servicing & Stormwater Report outlines the rationale which will be used to service the proposed development. The following summarizes the servicing requirements for the site:

Water

A 100 mm watermain is proposed to service 229 and 241 Beechwood Ave, as the average day demands does not exceed 50 m^3 per day, it is not mandatory to provide twin services as per Section 4.31 of the WDG001.

The Required Fire Flows (RFFs) were estimated at **13,000 L/min** (217 L/sec) for 229 Beechwood Ave, and **15,000 L/min** (250 L/sec) for 241 Beechwood Ave. The total minimum available flows for firefighting purposes, based on the contribution from hydrants, was estimated at **15,200 L/min** and **17,100 L/min** for each building respectively.

Based on hydraulic boundary conditions (HGL) provided by the City of Ottawa, a system pressure between ±61 psi – ±63 psi under peak hourly + Fire Flow demands is anticipated at the proposed building. System pressure between **±72 psi** – **±86 psi** under min/max HGL. This exceeds the City's guideline of 40 psi; however, it is anticipated that pressure above 80 psi will occur, therefore pressure reducing valves will be used to used the pressure in each building remains between 80 psi.

Sewage

Estimated peak sewage flows of **0.85 L/sec** and **1.06 L/sec** are anticipated for 229 and 241 Beechwood respectively.

Stormwater

For the stormwater system, the allowable capture rate from the entire site was calculated based on a runoff coefficient of 0.50, time of concentration of 10 minutes for a 2-year storm event. The allowable release rate for the entire site was calculated to be **22.49 L/sec** for 229 and 241 Beechwood. Runoff in excess of this will be detained on the roof, in underground storage tanks, and in pipes/manholes for up to the 100-year storm.

Runoff from the roofs will be drained through WATTS Adjustable Flow Controlled Roof Drains and down to a underground storage tank below the garage of each building. The flow controlled roof drains will allow for ponding storage on each roof before draining to the underground storage tanks. Each storage tank will measure 8m x 3m x 1.5m (storing a total volume of 36.0m^3) and the exact location will be coordinated with the mechanical and structural engineers during the building permit submission. In the rear yard, runoff will collected by catch basins and catch basin manholes. The rear yard drainage will then be discharged into the storage tank below the parking garage of the respective buildings. Each stormwater tank will have a Tempest LMF 75 ICD to restrict the outlet flow to a maximum of 6.0 L/sec. The stormwater then discharges out of the storage tanks of the respective buildings, through a 200 mm dia. storm pipe at a maximum flow rate of 6.0 L/sec and into the 1200 mm dia. storm sewer on Beechwood Ave.

The total estimated required storages in a 100-year storm event are **35.0 m^3** and **34.2 m^3** for 229 and 241 Beechwood Ave respectively. Roof ponding on the upper roof levels will account for **9.69 m^3** and **9.74 m^3**, underground storage tanks will account for **36.00 m^3** and **36.00 m^3** and pipes/manholes will account for **5.03 m^3** and **5.11 m^3** for 229 and 241 Beechwood respectively. The total storage provided for 229 Beechwood is **50.72 m^3** and the total storage for 241 Beechwood is **50.84 m^3**. Both volumes exceed the required storages.

Due to quality control being handled in the existing infrastructure and stormwater being outlet to the Ottawa River over 2000m downstream, there is no need for addition quality control.

10 Legal Notification

This report was prepared by EXP Services Inc. for the account of 229 Beechwood Holdings Inc. and 241 Beechwood Holdings Inc. C/O Bintee Dev Inc.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. EXP Services Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this project.

Appendix A – Design Tables

Table A-1 – Water Demand Chart

Table A-2 – Summary of Required Fire Flows (RFFs)

Table A-3 – Fire Flow Requirements Based on Fire Underwriters Survey (FUS) – 229 Beechwood

Table A-4 – Fire Flow Requirements Based on Fire Underwriters Survey (FUS) – 241 Beechwood

Table A-5 – Estimated Water Pressures at 229 Beechwood Ave

Table A-6 – Estimated Water Pressures at 241 Beechwood Ave

Table A-7 – Available Fire Flows Based on Hydrant Spacing

Table A-8 – NOT USED

Table A-9 – Sanitary Sewer Design Sheet

Table A-10 – Average Runoff Coefficients for Pre-Development Conditions

Table A-11 – Peak Runoff for Pre-Development Conditions

Table A-12 – Allowable Peak Flows (Based on Max C=0.50 with Tc=10mins & 2-yr Storm)

Table A-13 – Average Runoff Coefficients for Post-Development

Table A-14 – Summary of Post-Development Peak Flows (Uncontrolled and Controlled)

Table A-15 – Summary of Post Development Storage and Release Rates

Table A-16 – Calculation of Available Surface Storage

Table A-17 – Calculation of Underground Pipe Storage

Table A-18 – Calculation of Underground Structure Storage

Table A-19 – Storage Volumes for 2-year, 5-year and 100-Year Storms (MRM) (241 Beechwood Ave.)

Table A-20 – Storage Volumes for 2-year, 5-year and 100-Year Storms (MRM) (241 Beechwood Ave.)

Table A-21 – 5-Year and 100-Year Roof Design Sheet (229 Beechwood)

Table A-22 – 5-Year and 100-Year Roof Design Sheet (241 Beechwood)

TABLE A-1
WATER DEMAND CHART

Location:	229 Beechwood	**Population Densities (see note 3)**			**Maximum Daily Demand (note 1)**			
Project No:	OTT-00238207	Single Family	3.4	person/unit	Residential	**2.5**	x avg. day.	
Designed by:	A. O'Beirn	Semi-Detahced	2.7	person/unit	Industrial	**1.5**	x avg. day.	
Checked By:	J. Fitzpatrick	Duplex	2.3	person/unit	Commercial	**1.5**	x avg. day.	
Date Revised:	Mar 2022	Townhome (Row)	2.7	person/unit	Institutional	**1.5**	x avg. day.	
		Bachelor Apartment	1.4	person/unit				
Water Consumption		1 Bedroom Apartment	1.4	person/unit	**Peak Hourly Demand (note 1)**			
Per Table 4.1 (WDG001)		2 Bedroom Apartment	2.1	person/unit	Residential	**2.2**	x max. day. = **5.5**	x avg. day.
Residential =	**280** L/cap/day	3 Bedroom Apartment	3.1	person/unit	Industrial	**1.8**	x max. day. = **2.7**	x avg. day.
Commercial =	5.0 L/m^2/day	4 Bedroom Apartment	4.1	person/unit	Commercial	**1.8**	x max. day. = **2.7**	x avg. day.
		Avg. Apartment	1.8	person/unit	Institutional	**1.8**	x max. day. = **2.7**	x avg. day.

	No. of Residential Units											Residential Demands in (L/sec)					Commercial						Total Demands (L/sec)		
	Singles/Semis/Towns				Apartments								Peaking Factors (x Avg Day) (See note 2)						Peaking Factors (x Avg Day)						
Proposed Buildings	Single Family	Semi-Detached	Duplex	Townhome	Studio	1 Bedroom	2 Bedroom	3 Bedroom	4 Bedroom	Avg Apt.	Total Persons (pop)	Avg. Day Demand (L/day)	Max Day	Peak Hour	Max Day Demand (L/day)	Peak Hour Demand (L/day)	Area (m^2)	Avg Demand (L/day)	Max Day	Peak Hour	Max Day Demand (L/day)	Peak Hour Demand (L/day)	Avg Day (L/s)	Max Day (L/s)	Max Hour (L/s)
229 Beechwood - BSMT					9						12.6	3,528	5.55	8.38	19,586	29,556							0.04	0.23	0.34
229 Beechwood - 1st Floor					6	1	4				18.2	5,096	5.55	8.38	28,291	42,692							0.06	0.33	0.49
229 Beechwood - 2nd Floor					6	1	4				18.2	5,096	5.55	8.38	28,291	42,692							0.06	0.33	0.49
229 Beechwood - 3rd Floor					8	1	2				16.8	4,704	5.55	8.38	26,115	39,408							0.05	0.30	0.46
Subtotal =					**29**	**3**	**10**				**66**	**18,424**			**102,284**	**154,347**							**0.21**	**1.18**	**1.79**
241 Beechwood - BSMT					6		1				10.5	2,940	5.55	8.38	16,322	24,630							0.03	0.19	0.29
241 Beechwood - 1st Floor					8	1	3				18.9	5,292	5.55	8.38	29,379	44,334							0.06	0.34	0.51
241 Beechwood - 2nd Floor					8	1	3				18.9	5,292	5.55	8.38	29,379	44,334							0.06	0.34	0.51
241 Beechwood - 3rd Floor					8	1	3				18.9	5,292	5.55	8.38	29,379	44,334							0.06	0.34	0.51
241 Beechwood - 4th Floor					6		3				14.7	4,116	5.55	8.38	22,851	34,482							0.05	0.26	0.40
Subtotal =					**36**	**3**	**13**				**67**	**18,816**			**104,460**	**157,631**							**0.22**	**1.21**	**1.82**
Total =					**65**	**6**	**23**				**133**	**37,240**			**206,744**	**311,978**							**0.43**	**2.39**	**3.61**

Notes
1) When Polulation is greater than 500 persons, Max Day and Peak Hour Factors are based on Table 4.2 of City of Ottawa WDG001.
2) When Population is less than 500 persons, Max Day and Peak Hour Factors are based on Table 3-3 of MECP "Design Guidelines for Drinking Water Systems", 2008.
3) Unit densities based on Table 4.1 of City of Ottawa WDG001.

TABLE A2
SUMMARY OF REQUIRED FIREFLOWS (RFFs)

Building #	Description	[1]No of Storeys	Fire Flow, F (L/min)	[2]Type of Constr. Coeff, C	[3]Reduction Due to Occupancy (%)	[4]Reduction Due to Sprinklers (%)	[5]Total Increase due to Exposures (%)	[6]Required Fire Flow in	
								(L/min)	(L/sec)
229 BEECHWOOD AVE	Appartments	3+	10,000	1.0	-15%	0%	56%	13,000	217
241 BEECHWOOD AVE	Appartments	4+	11,000	1.0	-15%	0%	56%	15,000	250

Notes

1 - If basements are included (<50% below grade) then denoted as +.

2 -Types of constructions: 0.8 for non-combustible, 1.0 for ordinary construction,1.5 for wood frame construction.

3 - Reductions due to Occupancy are -25% for non-combustible or -15% for limited combustible.

4 - Reductions due to Sprinkler Systems

5 – Increase due to exposures were calculated based on FUS and technical bulletin ISTB-2018-02.

6 – Required Fire Flows are rounded to nearest 1,000 L/min.

TABLE A3
FIRE FLOW REQUIREMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 1999 FOR

229 BEECHWOOD AVE

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where: F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input				Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Ordinary Construction				1	
	Ordinary Construction	1						
	Non-combustible Construction	0.8						
	Fire Resistive Construction	0.6						
Input Building Floor Areas (A)			Area	% Used	Area Used	Comment		
	Floor 3		468	100%	468			
	Floor 2		608	50%	304			
	Floor 1		608	100%	608			
	BSMT		611	100%	611			
	Basement (At least 50% below grade, not included)				1,991			
Fire Flow (F)	F = 220 * C * SQRT(A)							9,817
Fire Flow (F)	Rounded to nearest 1,000							**10,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-1,500	8,500
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	No Sprinkler	0%	0	8,500
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Not Standard Water Supply or Unavailable	0%	0	8,500
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Not Fully Supervised or N/A	0%	0	8,500
	Not Fully Supervised or N/A	0%				

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-Height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	Front	24	4	20.1 to 30	Type B	30	3	90	4C	8%	56%	4,760	13,260
	Side 1	4	2	3.1 to 10	Type A	18	2	36	2B	18%			
	Back	9	2	3.1 to 10	Type A	20	3	60	2B	18%			
	Side 2	17	3	10.1 to 20	Type A	19	3	30	3A	12%			
Obtain Required Fire Flow										Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =			**13,000**
										Total Required Fire Flow, L/s =			**217**

Exposure Charges for Exposing Walls of Wood Frame Construciton (from Table G5)

Type A	Wood-Frame or non-conbustible
Type B	Ordinary or fire-resisitve with unprotected openings
Type C	Ordinary or fire-resisitve with semi-protected openings
Type D	Ordinary or fire-resisitve with blank wall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
30.1m to 45m	5
> 45.1m	6

TABLE A4
FIRE FLOW REQUIREMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 1999 FOR

241 BEECHWOOD AVE

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where: F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input				Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Ordinary Construction				1	
	Ordinary Construction	1						
	Non-combustible Construction	0.8						
	Fire Resistive Construction	0.6						
Input Building Floor Areas (A)			Area	% Used	Area Used	Comment		
	Floor 4		489	100%	489			
	Floor 2		582	100%	582			
	Floor 2		582	50%	291			
	Floor 1		582	100%	582			
	BSMT		566	100%	566			
	Basement (At least 50% below grade, not included)				2,510			
Fire Flow (F)	F = 220 * C * SQRT(A)							11,022
Fire Flow (F)	Rounded to nearest 1,000							**11,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-1,650	9,350
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	No Sprinkler	0%	0	9,350
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Not Standard Water Supply or Unavailable	0%	0	9,350
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Not Fully Supervised or N/A	0%	0	9,350
	Not Fully Supervised or N/A	0%				

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-Height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	Front	27	4	20.1 to 30	Type B	18	4	72	4C	8%	56%	5,236	14,586
	Side 1	17	3	10.1 to 20	Type A	19	3	57	3B	13%			
	Back	9	2	3.1 to 10	Type A	20	3	60	2B	18%			
	Side 2	5	2	3.1 to 10	Type A	18	3	30	2A	17%			
Obtain Required Fire Flow										Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =			**15,000**
										Total Required Fire Flow, L/s =			**250**

Exposure Charges for Exposing Walls of Wood Frame Construciton (from Table G5)

Type A	Wood-Frame or non-conbustible
Type B	Ordinary or fire-resisitve with unprotected openings
Type C	Ordinary or fire-resisitve with semi-protected openings
Type D	Ordinary or fire-resisitve with blank wall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
30.1m to 45m	5
> 45.1m	6

TABLE A5
ESTIMATED WATER PRESSURE AT PROPOSED BUILDING (229 Beechwood Ave)

Description	From	To	Demand (L/sec)	Pipe Length (m)	Pipe Dia (mm)	Dia (m)	Slope of HGL (m/m)	Head Loss (m)	Elev From (m)	Elev To (m)	*Elev Diff (m)	Pressure From kPa	(psi)	Pressure To kPa	(psi)	Pressure Drop (psi)
Peak Hour Conditons																
50mm service	Main	Basement	1.790	18 m	50	0.050	0.03735	0.6724	55.50	56.20	-0.7	436.5	(63.3)	423.1	(61.4)	2.0
	Basement	Top floor	0.448	10 m	38	0.038	0.01091	0.1128	56.20	69.24	-13.0	423.1	(61.4)	294.1	(42.6)	18.7
100mm service	Main	Basement	1.790	18 m	100	0.100	0.00128	0.023	55.50	56.20	-0.7	436.5	(63.3)	429.5	(62.3)	1.0
	Basement	Top floor	0.448	10 m	38	0.038	0.01091	0.1128	56.20	69.24	-13.0	429.5	(62.3)	300.4	(43.6)	18.7

Water Demand Info

Average Demand =	0.21	L/sec
Max Day Demand =	1.18	L/sec
Peak Hr Deamand =	1.79	L/sec
Fireflow Requriement =	216	L/sec
Max Day Plus FF Demand =	217.2	L/sec

Boundary Conditon

	Min HGL	Max HGL	Peak Hour+FF HGL
HGL (m)	107.8	118.2	102.0
Approx Ground Elev (m) =	57.5	57.5	57.5
Pressure (m) =	50.3	60.7	44.5
Pressure (Pa) =	493,443	595,467	436,545
Pressure (psi) =	71.6	86.4	63.3

<----- (From City of Ottawa at connnection point)

Pipe Lengths

From watermain to building mech room=	18 m
From mech room to centre top floor =	10.3 m
Hazen Williams C Factor for Friction Loss in Pipe, C=	100

Elevations

At roadway =	57.50
At building (mech room FF) =	58.90
Centre of top floor =	69.24

TABLE A6
ESTIMATED WATER PRESSURE AT PROPOSED BUILDING (241 Beechwood Ave)

Description	From	To	Demand (L/sec)	Pipe Length (m)	Pipe Dia (mm)	Dia (m)	Slope of HGL (m/m)	Head Loss (m)	Elev From (m)	Elev To (m)	*Elev Diff (m)	Pressure From kPa	(psi)	Pressure To kPa	(psi)	Pressure Drop (psi)
Peak Hour Conditons																
50mm service	Main	Basement	1.820	19 m	50	0.050	0.03852	0.7319	56.50	56.95	-0.5	418.9	(60.8)	407.3	(59.1)	1.7
	Basement	Top floor	0.455	14 m	38	0.038	0.01125	0.1578	56.95	72.93	-16.0	407.3	(59.1)	249.0	(36.1)	23.0
100mm service	Main	Basement	1.820	19 m	100	0.100	0.00132	0.025	56.50	56.95	-0.5	418.9	(60.8)	414.2	(60.1)	0.7
	Basement	Top floor	0.455	14 m	38	0.038	0.01125	0.1578	56.95	72.93	-16.0	414.2	(60.1)	255.9	(37.1)	23.0

Water Demand Info

Average Demand =	0.22	L/sec
Max Day Demand =	1.21	L/sec
Peak Hr Deamand =	1.82	L/sec
Fireflow Requriement =	250	L/sec
Max Day Plus FF Demand =	251.2	L/sec

Boundary Conditon

	Min HGL	Max HGL	Peak Hour+FF HGL
HGL (m)	107.8	118.2	100.2
Approx Ground Elev (m) =	57.5	57.5	57.5
Pressure (m) =	50.3	60.7	42.7
Pressure (Pa) =	493,443	595,467	418,887
Pressure (psi) =	71.6	86.4	60.8

<----- (From City of Ottawa at connnection point)

Pipe Lengths

From watermain to building mech room=	19 m
From mech room to centre top floor =	14.0 m
Hazen Williams C Factor for Friction Loss in Pipe, C=	100

Elevations

At roadway =	58.60
At building (mech room FF) =	58.90
Centre of top floor =	72.93

TABLE A7

FIRE FLOW REQUIREMENTS BASED ON HYDRANT SPACING

Hydrant #	229 Beechwood Ave.		241 Beechwood Ave.	
	[1]Distance (m)	[2]Fire Flow Contribution (L/min)	[1]Distance (m)	[2]Fire Flow Contribution (L/min)
368033H279	61	5,700	39	5,700
368033H079	72	5,700	98	3,800
368033H075	117	3,800	99	3,800
368033H284	169	0	131	3,800
368033H265	201	0	174	0
Total Available (L/min)		15,200		17,100
FUS RFF in L/min or (L/sec)		13,000 (217)		15,000 (250)
Meets Requreiment (Yes/No)		Yes		Yes

Notes:

[1]Distance is measured along a road or fire route.

[2]Fire Flow Contribution for Class AA Hydrant from Table 1 of Appendix I, ISTB-2018-02

Table A-9

SANITARY SEWER CALCULATION SHEET

LOCATION			RESIDENTIAL AREAS AND POPULAITONS									COMMERCIAL				INFILTRATION				SEWER DATA						
				NUMBER OF UNITS					POPULATION				AREA (ha)				AREA (ha)									
Street	U/S MH	D/S MH	Area (ha)	Single	Semi	1-Bed Apt.	2-Bed Apt.	3-Bed Apt.	INDIV	ACCU	Peak Factor	Peak Flow (L/sec)	INDIV	ACCU	Peak Factor	Peak Flow (L/sec)	INDIV	ACCU	INFILT FLOW (L/s)	TOTAL FLOW (L/s)	Nom Dia (mm)	Actual Dia (mm)	Slope (%)	Length (m)	Capacity (L/sec)	Q/Q_{CAP} (%)	Full Velocity (m/s)
Beechwood	229	SANMH	0.1054			32	10		65.8	65.8	4.00	0.85					0.1054	0.105	0.03	0.89	150	135.00	2.0	8.6	16.3	5%	1.72
Beechwood	241	SANMH	0.1031			39	13		81.9	81.9	4.00	1.06					0.1031	0.103	0.03	1.10	150	135.00	2.0	9.8	16.3	7%	1.72
			0.209			**71**	**23**		**147.7**								**0.209**										

Residential Avg. Daily Flow, q (L/p/day) = 280
Commercial Avg. Daily Flow (L/gross ha/day) = 28,000
or L/gross ha/sec = 0.324
Institutianal Avg. Daily Flow (L/s/ha) = 28,000
or L/gross ha/sec = 0.324
Light Industrial Flow (L/gross ha/day) = 35,000
or L/gross ha/sec = 0.4051
Light Industrial Flow (L/gross ha/day) = 55,000
or L/gross ha/sec = 0.637

Commercial Peak Factor = 1.5 (when area >20%), 1.0 (when area <20%)
Institutional Peak Factor = 1.5 (when area >20%), 1.0 (when area <20%)
Residential Correct 0.80
Manning N = 0.013
Peak extraneous flc 0.33 (Total I/I)

Peak Population Flow, (L/sec) = P*q*M/86.4
Peak Extraneous Flow, (L/sec) = I*Ac
Residential Peaking Factor, M = 1 + (14/(4+P^0.5)) * K
Sewer Capacity, Qcap (L/sec) = $1/N \; S1^{/2} \; R^{2/3} \; A_c$

Unit Type	Ppu
Singles =	3.4
Semi-Detached =	2.7
1-bed Apt =	1.4
1-bed + Den Apt =	1.4
2-bed Apt. Unit =	2.1
2-bed + Den Apt =	2.1
3-bed Apt. Unit =	3.1

Designed:	Project:
Alexander Cole	229 + 241 Beechwood
Checked:	Location:
Jason Fitzpatrick, P.Eng.	Ottawa, Ontario
File Reference:	Page No:
OTT-00238207	**1 of 1**

TABLE A10

CALCULATION OF AVERAGE RUNOFF COEFFICIENTS FOR PRE-DEVELOPMENT CONDITIONS

Area No.	Roof Areas C=0.90		Asphalt Areas C=0.90		Concrete / Pavers C=0.90		Gravel C=0.75		Grassed Areas C=0.20		Sum AC	Total Area (m^2)	C_{AVG}
	Area (m^2)	A * C	Area (m^2)	A * C	Area (m^2)	A * C	Area (m^2)	A * C	Area (m^2)	A * C			
229 Beechwood	240.50	216.5	84.40	76.0	76.50	68.9	22.90	17.2	640.70	128.14	506.6	1065.00	0.48
241 Beechwood	219.70	197.7	238.60	214.7	49.00	44.1			534.70	106.94	563.5	1042.00	0.54
Overall	460.20	414.2	323.00	290.7	125.50	113.0	22.90	20.6	1175.40	1057.9	1070.1	2107.0	0.51

TABLE A11

CALCULATION OF PEAK RUNOFF FOR PRE-DEVELOPMENT CONDITIONS

Area No	Outlet Location	Area (ha)	Time of Conc, Tc (min)	Storm = 2 yr			Storm = 5 yr			Storm = 100 yr		
				I_2 (mm/hr)	Cavg	Q_2 (L/sec)	I_5 (mm/hr)	Cavg	Q_5 (L/sec)	I_{100} (mm/hr)	Cavg	Q_{100} (L/sec)
229 Beechwood	Beechwood	0.10650	10	76.81	0.48	10.8	104.19	0.48	14.7	178.56	0.59	31.4
241 Beechwood	Beechwood	0.10420	10	76.81	0.54	12.0	104.19	0.54	16.3	178.56	0.68	35.0
Overall	Beechwood	0.21070	10	76.81	0.51	22.8	104.19	0.51	31.0	178.56	0.63	66.4

Notes

1) Intensity, I = 732.951/(Tc+6.199) $^{0.810}$ (2-year, City of 0ttawa)

2) Intensity, I = 998.071/(Tc+6.053) $^{0.814}$ (5-year, City of 0ttawa)

3) Intensity, I = 1735.688/(Tc+6.014) $^{0.820}$ (100-year, City of Ottawa)

4) Cavg for 100-year is increased by 25% to a maximum of 1.0

5) The standard minimium Time of Concentraion of 10 minutes was used, rather then the calaculted time, since calcualted time was less than 10 minutes.

TABLE A12

ESTIMATION OF ALLOWABLE PEAK FLOWS (Based on Max C=0.50 with Tc=10mins & 2-yr Storm)

Area No	Outlet Location	Area (ha)	Time of Conc, Tc (min)	Storm = 2 yr			Storm = 5 yr			Storm = 100 yr		
				I_2 (mm/hr)	Cavg	Q_{ALLOW} (L/sec)	I_5 (mm/hr)	Cavg	Q_{ALLOW} (L/sec)	I_5 (mm/hr)	Cavg	Q_{ALLOW} (L/sec)
229 Beechwood	Beechwood	0.10650	10	76.81	0.48	10.82	104.19	0.48	14.67	178.56	0.63	33.04
241 Beechwood	Beechwood	0.10420	10	76.81	0.50	11.12	104.19	0.50	15.09	178.56	0.63	32.33
Overall	Beechwood	0.21070	10	76.81	0.50	**22.49**	104.19	0.51	31.00	178.56	0.63	65.37

Notes

1) Intensity, I = 732.951/(Tc+6.199) $^{0.810}$ (2-year, City of 0ttawa)

2) Intensity, I = 998.071/(Tc+6.053) $^{0.814}$ (5-year, City of 0ttawa)

3) Intensity, I = 1735.688/(Tc+6.014) $^{0.820}$ (100-year, City of Ottawa)

4) Cavg for 100-year is increased by 25% to a maximum of 1.0

5) Allowable Discharge Rate is based on 2-year storm at Tc=10 minutes, and discharging to storm sewer on Beechwood Avenue

Allowable Discharge (based on 2-yr storm)

TABLE A13
AVERAGE RUNOFF COEFFICIENTS FOR POST-DEVELOPMENT CONDITIONS

$C_{ASPH/CONC}$ = 0.90 C_{ROOF} = 0.90 C_{GRASS} = 0.20

Area No.	Asphalt & Conc Areas (m^2)	A * C_{ASPH}	Roof Areas (m^2)	A * C_{ROOF}	Grassed Areas (m^2)	A * C_{GRASS}	Sum AC	Total Area (m^2)	C_{AVG} (see note)	Comment
S01			582.0	523.8			523.8	582	0.90	North Building Roof
S02	106.5	107.4			132.5	27	133.9	239	0.50	North Back Yard
S03	30.7	27.6			189.3	37.9	65.5	220	0.31	North Front Yard
S04	14.0	12.6	587.0	528.3			540.9	601	0.90	South Building Roof
S05	87.1	78.4			126.9	25	103.8	214	0.59	South Back Yard
S06	39.8	35.8			210.2	42.0	77.9	250	0.31	South Front Yard
Totals								2106	**0.69**	

Notes
1) Cavg derived with area-weighting command in PCSWMM

TABLE A14
SUMMARY OF POST-DEVELOPMENT PEAK FLOWS (Uncontrolled and Controlled)

			Storm = 2 yr				Storm = 5 yr				Storm = 100 yr			
Area No	Area (ha)	Time of Conc, Tc (min)	C_{AVG}	I_2 (mm/hr)	Q (L/sec)	Q_{CAP} (L/sec)	C_{AVG}	I_5 (mm/hr)	Q (L/sec)	Q_{CAP} (L/sec)	C_{AVG}	I_{100} (mm/hr)	Q (L/sec)	Q_{CAP} (L/sec)
S01	0.0582	10	0.90	76.81	11.18	**(2.32)**	0.90	104.19	15.17	**(3.15)**	1.00	178.56	28.89	**(6.00)**
S02	0.0239	10	0.50	76.81	2.55		0.50	104.19	3.46		0.63	178.56	7.41	
S03	0.0220	10	0.31	76.81	1.46	**1.46**	0.31	104.19	1.98	**1.98**	0.39	178.56	4.23	**4.23**
S04	0.0601	10	0.90	76.81	11.55	**(2.32)**	0.90	104.19	15.67	**(3.15)**	1.00	178.56	29.83	**(6.00)**
S05	0.0214	10	0.59	76.81	2.70		0.59	104.19	3.66		0.74	178.56	7.83	
S06	0.0250	10	0.31	76.81	1.65	**1.65**	0.31	104.19	2.24	**2.24**	0.39	178.56	4.81	**4.81**
total (storm)	**0.2106**				**31.09**	**7.76**			**42.18**	**10.52**			**83.01**	**21.04**
foundation drain (note 7)						0.90				0.90				0.90
Totals	**0.2106**					**8.66**				**11.42**				**21.94**
Allowable rates for comparison						***22.49***				***22.49***				***22.49***

Notes
1) Intensity, I = 732.951/(Tc+6.199) $^{0.810}$ (2-year, City of Ottawa)
2) Intensity, I = 998.071/(Tc+6.053) $^{0.814}$ (5-year, City of Ottawa)
3) Intensity, I = 1735.688/(Tc+6.014) $^{0.820}$ (100-year, City of Ottawa)
4) Cavg for 100-year is increased by 25% to a maximum of 1.0
5) Time of Concentration, Tc = ***10 mins***
6) For Flows under column Qcap which are shown in brackets ***(0.0)*** *, denotes flows that are controlled*
7) Foundaion Drain allowance based on Section 5.4.7 of SDG002 = ***0.45 L/s/home***

TABLE A15
SUMMARY OF POST DEVELOPMENT STORAGE & RELEASE RATES

Area No.	Area (ha)	Max Release Rate (L/s)			[1] Storage Required (m^3)				Storage Provided (m^3)					Control Method
		2-yr	5-yr	100-yr	2-yr (MRM)	5-yr (MRM)	100-yr (MRM)	100-yr +20 (MRM)	Roof Storage	Pipe	UG CB/MHs	UG Chamber	Total	
S01	0.0582	2.32	3.15	6.00	8.7	11.7	34.2	43.5	9.74				9.74	Roof Drains
S02	0.0239									0.80	4.31	36.00	41.11	Underground Storage
S03	0.0220	1.46	4.23	4.23										none
Subtotal (241 Beechwood)		3.78	7.38	10.23	8.71	11.69	34.18	43.53	9.74	0.80	4.31	36.00	50.84	
S04	0.0601	2.32	3.15	6.00	9.2	12.3	34.8	44.3	9.69				9.69	Roof Drains
S05	0.0214									1.05	3.98	36.00	41.03	Underground Storage
S06	0.0250	1.65	4.81	4.81										none
Subtotal (229 Beechwood)		3.98	7.96	10.81	9.19	12.33	34.79	44.32	9.69	1.05	3.98	36.00	50.72	
Totals	0.2106	7.76	15.34	21.04	17.90	24.02	68.97	87.85	19.42	2.65	12.60	108.00	101.56	

Notes
1) The storage required is based on the Modified Rational Method (MRM) for the relase rates noted.

TABLE A16
CALCULATION OF AVAILABLE SURFACE STORAGE

Drainage Area	Ponding Number	Min W/L or T/G (m)	Indiv Spill Elev (m)	[1]Max Depth (m)	Area (m^2)	Max Volume (m^3)
S01				0.00	28	0.0
S02				0.00	28	0.0
S03				0.00	28	0.0
S04				0.00	28	0.0
S05				0.00	28	0.0
S06				0.00	28	0.0
Totals						**0.0**

Notes:
The Max Depth is is the distance from the Min W/L (T/G) and the lower of the Indiv Spill or System Spill Elev

TABLE A17
CALCULATION OF UNDERGROUND PIPE STORAGE

Drainage Area	U/S Manhole	D/S Manhole	Pipe Type	Length (m)	Pipe Dia (mm)	Pipe Area (m^2)	Pipe Volume (m3)
S01							
S02			PVC	16.1	200	0.031	0.51
			PVC	16.6	150	0.018	0.29
S03							
S04							
S05			PVC	13.9	200	0.031	0.44
			PVC	34.6	150	0.018	0.61
S06							
Totals							**1.85**

TABLE A18
CALCULATION OF UNDERGROUND STRUCTURE STORAGE

Drainage Area	Structure No.	Size	T/G (m)	Spill Elev (m)	Inv Elev (m)	Sump Elev (m)	[1]Storage Depth (m)	Area (m^2)	Volume (m^3)
S01									
S02	CBMH 3	1200 dia	60.69	60.18	58.45	58.45	1.73	1.13	1.96
	CBMH 4	1200 dia	60.65	60.18	58.10	58.10	2.08	1.13	2.35
S03									
S04									
S05	CBMH 1	1200 dia	59.26	59.06	57.16	57.16	1.90	1.13	2.15
	CBMH 2	1200 dia	60.67	59.06	57.44	57.44	1.62	1.13	1.83
S06									
Totals									**8.29**

Notes:
The Storage Depth is the distance from the invert elevation to either the T/G or Spill Elev (whichever is lower)

TABLE A19 Storage Volumes for 2-year, 5-Year and 100-Year Storms (MRM) (229 Beechwood Ave.)

Area No: **S04, S05**

C_{AVG} = 0.82 (2-yr)

C_{AVG} = 0.82 (5-yr)

C_{AVG} = 1.00 (100-yr, Max 1.0)

Time Interval = 10.00 (mins)

Drainage Area = 0.0801 (hectares)

Actual Release Rate (L/sec) = 6.00

Percentage of Actual Rate (City of Ottawa requirement) = 50% (Set to 50% when U/G storage used)

Release Rate Used for Estimation of 100-year Storage (L/sec) = 3.00

Intensity Incr (%) = 20% Use 20% for Climate Change

Duration (mins)	Release Rate = 2.32 (L/sec), Return Period = 2 (years), IDF Parameters, A = 733.0, B = 0.810, (I = A/(T_c+C), C = 6.199					Release Rate = 3.15 (L/sec), Return Period = 5 (years), IDF Parameters, A = 998.1, B = 0.814, (I = A/(T_c+C), C = 6.053					Release Rate = 3.00 (L/sec), Return Period = 100 (years), IDF Parameters, A = 1735.7, B = 0.820, (I = A/(T_c+C), C = 6.014					Release Rate = 3.00 (L/sec), Return Period = 100+20% (years), IDF Parameters, A = 1735.7, B = 0.820, (I = A/(T_c+C), C = 6.014				
	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)
0	167.2	30.4	2.3	28.1	0.0	230.5	41.9	3.2	38.8	0.0	398.6	88.8	3.0	85.8	0.0	478.3	106.5	3.0	103.5	0.0
10	76.8	14.0	2.3	11.7	7.0	104.2	19.0	3.2	15.8	9.5	178.6	39.8	3.0	36.8	22.1	214.3	47.7	3.0	44.7	26.8
20	52.0	9.5	2.3	7.1	8.6	70.3	12.8	3.2	9.6	11.6	120.0	26.7	3.0	23.7	28.5	143.9	32.1	3.0	29.1	34.9
30	40.0	7.3	2.3	5.0	8.9	53.9	9.8	3.2	6.7	12.0	91.9	20.5	3.0	17.5	31.4	110.2	24.5	3.0	21.5	38.8
40	32.9	6.0	2.3	3.7	8.8	44.2	8.0	3.2	4.9	11.7	75.1	16.7	3.0	13.7	33.0	90.2	20.1	3.0	17.1	41.0
50	28.0	5.1	2.3	2.8	8.3	37.7	6.9	3.2	3.7	11.1	64.0	14.2	3.0	11.2	33.7	76.7	17.1	3.0	14.1	42.3
60	24.6	4.5	2.3	2.1	7.7	32.9	6.0	3.2	2.8	10.2	55.9	12.4	3.0	9.4	34.0	67.1	14.9	3.0	11.9	43.0
70	21.9	4.0	2.3	1.7	7.0	29.4	5.3	3.2	2.2	9.2	49.8	11.1	3.0	8.1	34.0	59.7	13.3	3.0	10.3	43.3
80	19.8	3.6	2.3	1.3	6.2	26.6	4.8	3.2	1.7	8.1	45.0	10.0	3.0	7.0	33.7	54.0	12.0	3.0	9.0	43.3
90	18.1	3.3	2.3	1.0	5.3	24.3	4.4	3.2	1.3	6.9	41.1	9.2	3.0	6.2	33.2	49.3	11.0	3.0	8.0	43.1
100	16.7	3.0	2.3	0.7	4.3	22.4	4.1	3.2	0.9	5.6	37.9	8.4	3.0	5.4	32.6	45.5	10.1	3.0	7.1	42.8
110	15.6	2.8	2.3	0.5	3.4	20.8	3.8	3.2	0.6	4.2	35.2	7.8	3.0	4.8	31.9	42.2	9.4	3.0	6.4	42.3
120	14.6	2.6	2.3	0.3	2.4	19.5	3.5	3.2	0.4	2.8	32.9	7.3	3.0	4.3	31.1	39.5	8.8	3.0	5.8	41.7
130	13.7	2.5	2.3	0.2	1.3	18.3	3.3	3.2	0.2	1.4	30.9	6.9	3.0	3.9	30.3	37.1	8.3	3.0	5.3	41.0
140	12.9	2.4	2.3	0.0	0.2	17.3	3.1	3.2	0.0	-0.1	29.2	6.5	3.0	3.5	29.3	35.0	7.8	3.0	4.8	40.2
150	12.3	2.2	2.3	-0.1	-0.8	16.4	3.0	3.2	-0.2	-1.6	27.6	6.1	3.0	3.1	28.3	33.1	7.4	3.0	4.4	39.4
160	11.7	2.1	2.3	-0.2	-1.9	15.6	2.8	3.2	-0.3	-3.1	26.2	5.8	3.0	2.8	27.3	31.5	7.0	3.0	4.0	38.5
170	11.1	2.0	2.3	-0.3	-3.1	14.8	2.7	3.2	-0.5	-4.6	25.0	5.6	3.0	2.6	26.2	30.0	6.7	3.0	3.7	37.6
180	10.6	1.9	2.3	-0.4	-4.2	14.2	2.6	3.2	-0.6	-6.2	23.9	5.3	3.0	2.3	25.1	28.7	6.4	3.0	3.4	36.6
190	10.2	1.9	2.3	-0.5	-5.3	13.6	2.5	3.2	-0.7	-7.7	22.9	5.1	3.0	2.1	23.9	27.5	6.1	3.0	3.1	35.6
200	9.8	1.8	2.3	-0.5	-6.5	13.0	2.4	3.2	-0.8	-9.3	22.0	4.9	3.0	1.9	22.7	26.4	5.9	3.0	2.9	34.5
Max =					**8.9**					**12.0**					**34.0**					**43.3**

Notes

1) Peak flow is equal to the product of 2.78 x C x I x A

2) Rainfall Intensity, I = A/(Tc+C)^{o}

3) Release Rate = Min (Release Rate, Peak Flow)

4) Storage Rate = Peak Flow - Release Rate

5) Storage = Duration x Storage Rate

6) Maximium Storage = Max Storage Over Duration

7) Parameters a,b,c are for City of Ottawa

City of Ottawa IDF Data (from SDG002)

IDF curve equations (Intensity in mm/hr)

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$

50 year Intensity = 1569.580 / (Time in min + 6.014) $^{0.820}$

25 year Intensity = 1402.884 / (Time in min + 6.018) $^{0.819}$

10 year Intensity = 1174.184 / (Time in min + 6.014) $^{0.816}$

5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$

2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

TABLE A20 Storage Volumes for 2-year, 5-Year and 100-Year Storms (MRM) (241 Beechwood Ave.)

Area No: **S01, S02**

C_{AVG} = 0.78 (2-yr)

C_{AVG} = 0.78 (5-yr)

C_{AVG} = 0.98 (100-yr, Max 1.0)

Time Interval = 10.00 (mins)

Drainage Area = 0.0821 (hectares)

Actual Release Rate (L/sec) = 6.00

Percentage of Actual Rate (City of Ottawa requirement) = 50% (Set to 50% when U/G storage used)

Release Rate Used for Estimation of 100-year Storage (L/sec) = 3.00

Intensity Incr (%) = 20% Use 20% for Climate Change

Duration (mins)	Release Rate = 2.32 (L/sec), Return Period = 2 (years), IDF Parameters, A = 733.0, B = 0.810, (I = A/(T_c+C), C = 6.199					Release Rate = 3.15 (L/sec), Return Period = 5 (years), IDF Parameters, A = 998.1, B = 0.814, (I = A/(T_c+C), C = 6.053					Release Rate = 3.00 (L/sec), Return Period = 100 (years), IDF Parameters, A = 1735.7, B = 0.820, (I = A/(T_c+C), C = 6.014					Release Rate = 3.00 (L/sec), Return Period = 100+20% (years), IDF Parameters, A = 1735.7, B = 0.820, (I = A/(T_c+C), C = 6.014				
	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)
0	167.2	29.9	2.3	27.6	0.0	230.5	41.2	3.2	38.1	0.0	398.6	89.1	3.0	86.1	0.0	478.3	106.9	3.0	103.9	0.0
10	76.8	13.7	2.3	11.4	6.8	104.2	18.6	3.2	15.5	9.3	178.6	39.9	3.0	36.9	22.1	214.3	47.9	3.0	44.9	26.9
20	52.0	9.3	2.3	7.0	8.4	70.3	12.6	3.2	9.4	11.3	120.0	26.8	3.0	23.8	28.6	143.9	32.2	3.0	29.2	35.0
30	40.0	7.2	2.3	4.8	8.7	53.9	9.6	3.2	6.5	11.7	91.9	20.5	3.0	17.5	31.6	110.2	24.6	3.0	21.6	39.0
40	32.9	5.9	2.3	3.6	8.5	44.2	7.9	3.2	4.8	11.4	75.1	16.8	3.0	13.8	33.1	90.2	20.2	3.0	17.2	41.2
50	28.0	5.0	2.3	2.7	8.1	37.7	6.7	3.2	3.6	10.7	64.0	14.3	3.0	11.3	33.9	76.7	17.2	3.0	14.2	42.5
60	24.6	4.4	2.3	2.1	7.4	32.9	5.9	3.2	2.7	9.9	55.9	12.5	3.0	9.5	34.2	67.1	15.0	3.0	12.0	43.2
70	21.9	3.9	2.3	1.6	6.7	29.4	5.3	3.2	2.1	8.8	49.8	11.1	3.0	8.1	34.1	59.7	13.4	3.0	10.4	43.5
80	19.8	3.5	2.3	1.2	5.9	26.6	4.8	3.2	1.6	7.7	45.0	10.1	3.0	7.1	33.9	54.0	12.1	3.0	9.1	43.5
90	18.1	3.2	2.3	0.9	5.0	24.3	4.3	3.2	1.2	6.4	41.1	9.2	3.0	6.2	33.4	49.3	11.0	3.0	8.0	43.4
100	16.7	3.0	2.3	0.7	4.0	22.4	4.0	3.2	0.9	5.1	37.9	8.5	3.0	5.5	32.8	45.5	10.2	3.0	7.2	43.0
110	15.6	2.8	2.3	0.5	3.0	20.8	3.7	3.2	0.6	3.8	35.2	7.9	3.0	4.9	32.1	42.2	9.4	3.0	6.4	42.5
120	14.6	2.6	2.3	0.3	2.0	19.5	3.5	3.2	0.3	2.4	32.9	7.4	3.0	4.4	31.3	39.5	8.8	3.0	5.8	41.9
130	13.7	2.4	2.3	0.1	1.0	18.3	3.3	3.2	0.1	0.9	30.9	6.9	3.0	3.9	30.5	37.1	8.3	3.0	5.3	41.3
140	12.9	2.3	2.3	0.0	-0.1	17.3	3.1	3.2	-0.1	-0.5	29.2	6.5	3.0	3.5	29.5	35.0	7.8	3.0	4.8	40.5
150	12.3	2.2	2.3	-0.1	-1.2	16.4	2.9	3.2	-0.2	-2.0	27.6	6.2	3.0	3.2	28.6	33.1	7.4	3.0	4.4	39.7
160	11.7	2.1	2.3	-0.2	-2.3	15.6	2.8	3.2	-0.4	-3.5	26.2	5.9	3.0	2.9	27.5	31.5	7.0	3.0	4.0	38.8
170	11.1	2.0	2.3	-0.3	-3.4	14.8	2.7	3.2	-0.5	-5.1	25.0	5.6	3.0	2.6	26.4	30.0	6.7	3.0	3.7	37.8
180	10.6	1.9	2.3	-0.4	-4.6	14.2	2.5	3.2	-0.6	-6.6	23.9	5.3	3.0	2.3	25.3	28.7	6.4	3.0	3.4	36.8
190	10.2	1.8	2.3	-0.5	-5.7	13.6	2.4	3.2	-0.7	-8.2	22.9	5.1	3.0	2.1	24.2	27.5	6.1	3.0	3.1	35.8
200	9.8	1.7	2.3	-0.6	-6.9	13.0	2.3	3.2	-0.8	-9.8	22.0	4.9	3.0	1.9	23.0	26.4	5.9	3.0	2.9	34.8
Max =					**8.7**					**11.7**					**34.2**					**43.5**

Notes

1) Peak flow is equal to the product of 2.78 x C x I x A

2) Rainfall Intensity, I = A/(Tc+C)^{o}

3) Release Rate = Min (Release Rate, Peak Flow)

4) Storage Rate = Peak Flow - Release Rate

5) Storage = Duration x Storage Rate

6) Maximium Storage = Max Storage Over Duration

7) Parameters a,b,c are for City of Ottawa

City of Ottawa IDF Data (from SDG002)

IDF curve equations (Intensity in mm/hr)

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$

50 year Intensity = 1569.580 / (Time in min + 6.014) $^{0.820}$

25 year Intensity = 1402.884 / (Time in min + 6.018) $^{0.819}$

10 year Intensity = 1174.184 / (Time in min + 6.014) $^{0.816}$

5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$

2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Table A21: 5-year & 100-year Roof Design Sheet - For Roof Drains using Flow Controlled Roof Drains (229 Beechwood)

Project: 229-241 Beechwood Avenue
Location: City of Ottawa
Date:March 2022

Area #	Drain Type	Roof Drain Type	No Drains per Area	No of Weirs per Drain	Weir Position	Runoff Coeff (Cavg)		Drainage Area		5-year Event						100-year Event						Storage Required *(MRM)*		Maximium Storage Provided at Spill Elevation			
						5-year	100-year	m^2	ha	Runoff Rate (L/sec)	5yr Ponding Depth (mm)	Roof Drain Capacity Per Weir (gpm)	Roof Drain Capacity Per Drain per weir (gpm)	Roof Drain Capacity Per Drain (L/sec)	Total Flow From Roof Drains (L/sec)	Runoff Rate (L/sec)	100yr Ponding Depth (mm)	Roof Drain Capacity Per Weir (gpm)	Roof Drain Capacity Per Drain per weir (gpm)	Roof Drain Capacity Per Drain (L/sec)	Total Flow From Roof Drains (L/sec)	5-year (m^3)	100-year (m^3)	Area Available for Storage (m^2)	Max Prism Depth (mm)	Max Prisim Volume (m^3)	Total Volume (m3)
S04_1	RD	RD1	2	1	6-Full	0.90	0.90	132.3	0.0132	3.449	87	17.4	17.4	1.098	2.196	5.911	110	22.0	22.0	1.388	2.776	0.79	1.88	132.3	150	6.6	6.62
S04_2	RD	RD1	1	1	6-Full	0.90	0.90	56.5	0.0057	1.473	75	15.0	15.0	0.946	0.946	2.524	98	19.6	19.6	1.237	1.237	0.33	0.77	56.5	150	2.8	2.83
S04_3	RD	RD1	1	1	3-1/4 open	0.90	0.90	33.2	0.0033	0.865	67	10.9	10.9	0.685	0.685	1.483	95	12.3	12.3	0.773	0.773	0.15	0.43	33.2	150	1.7	1.66
S04_4	RD	RD1	1	1	4-1/2 open	0.90	0.90	151.0	0.0151	3.936	98	14.8	14.8	0.933	0.933	6.746	125	17.5	17.5	1.104	1.104	2.07	4.23	151.0	150	7.6	7.55
S04_5	RD	RD1	1	1	3-1/4 open	0.90	0.90	93.9	0.0094	2.448	93	12.2	12.2	0.767	0.767	4.195	120	13.5	13.5	0.852	0.852	1.08	2.38	93.9	150	4.7	4.70
S04_6	RD	RD2	1	no weir	1-None	0.90	0.90	31.7	0.0032	0.826	0	13.1	13.1	0.826	0.826	1.416	0	22.4	22.4	1.416	1.416			0.0	0	0.0	0.00
S04_7	RD	RD2	1	no weir	1-None	0.90	0.90	10.1	0.0010	0.263	0	4.2	4.2	0.263	0.263	0.451	0	7.2	7.2	0.451	0.451			0.0	0	0.0	0.00
S04_8	RD	RD2	1	no weir	1-None	0.90	0.90	12.9	0.0013	0.336	0	5.3	5.3	0.336	0.336	0.576	0	9.1	9.1	0.576	0.576			0.0	0	0.0	0.00
S04_9	RD	RD2	1	no weir	1-None	0.90	0.90	19.5	0.0020	0.508	0	8.1	8.1	0.508	0.508	0.871	0	13.8	13.8	0.871	0.871			0.0	0	0.0	0.00
S04_10	RD	RD2	1	no weir	1-None	0.90	0.90	13.8	0.0014	0.360	0	5.7	5.7	0.360	0.360	0.617	0	9.8	9.8	0.617	0.617			0.0	0	0.0	0.00
S04_11	RD	RD2	1	no weir	1-None	0.90	0.90	16.8	0.0017	0.438	0	6.9	6.9	0.438	0.438	0.751	0	11.9	11.9	0.751	0.751			0.0	0	0.0	0.00
S04_12	RD	RD2	1	no weir	1-None	0.90	0.90	32.2	0.0032	0.839	0	13.3	13.3	0.839	0.839	1.439	0	22.8	22.8	1.439	1.439			0.0	0	0.0	0.00
Totals						0.9	0.9	**604**	**0.0604**	15.743		**126.80**		**8.00**	**9.10**	**26.98**		**181.86**		**11.47**	**12.86**	**4.42**	**9.69**	**467**		**23.3**	**23.3**
Min											**0**						**0**										
Max											**98**						**125**										

Runoff Based on the Following:

Storm Frequency (years) =	5	100
Time of Conc (mins) =	10	10
Storm Intensity (mm/hr) =	104.2	178.6

Qyr(cont) = 6.8
V2yr = 3.3

Roof Drains have Following Flow Rates: WATTS Flow Conttolled Drain

Weir Position		Flow (gpm) per depth							Max Flow Rate per Weir
		0	25	50	75	100	125	150	
		0	0.025	0.05	0.075	0.1	0.125	0.15	
1-None		0	0	0	0	0	0	0	0.000
2-Closed		0	5	5	5	5	5	5	0.315
3-1/4 open		0	5	10	11	13	14	15	0.946
4-1/2 open		0	5	10	12	15	18	20	1.262
5-3/4 open		0	5	10	14	18	21	25	1.577
6-Full		0	5	10	15	20	25	30	1.893

Roof Drain Types

Drain Type =	RD1	RD2
Max Overflow Depth (mm	150 mm	150 mm
Flow Controlled (Yes/No)	Yes	No
Ponding	Yes	No
Weir Desc	Accutrol	n/a
No. Weirs	1	n/a

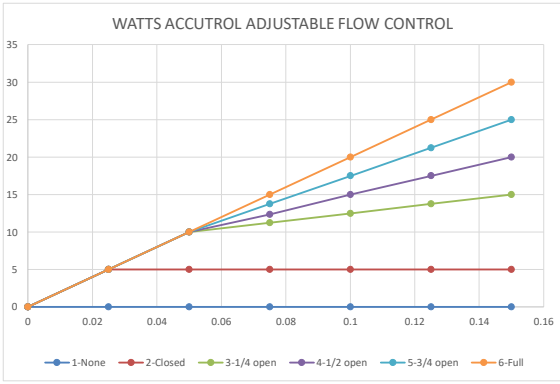


Table A22: 5-year & 100-year Roof Design Sheet - For Roof Drains using Flow Controlled Roof Drains (241 Beechwood)

Project: 229-241 Beechwood Avenue
Location: City of Ottawa
Date:March 2022

Area #	Drain Type	Roof Drain Type	No Drains per Area	No of Weirs per Drain	Weir Position	Runoff Coeff (Cavg)		Drainage Area		5-year Event						100-year Event						Storage Required *(MRM)*		Maximum Storage Provided at Spill Elevation			
						5-year	100-year	m^2	ha	Runoff Rate (L/sec)	5yr Ponding Depth (mm)	Roof Drain Capacity Per Weir (gpm)	Roof Drain Capacity Per Drain per weir (gpm)	Roof Drain Capacity Per Drain (L/sec)	Total Flow From Roof Drains (L/sec)	Runoff Rate (L/sec)	100yr Ponding Depth (mm)	Roof Drain Capacity Per Weir (gpm)	Roof Drain Capacity Per Drain per weir (gpm)	Roof Drain Capacity Per Drain (L/sec)	Total Flow From Roof Drains (L/sec)	5-year (m^3)	100-year (m^3)	Area Available for Storage (m^2)	Max Prism Depth (mm)	Max Prisim Volume (m^3)	Total Volume (m3)
S01_1	RD	RD1	1	1	6-Full	0.90	0.90	120.1	0.0120	3.131	89	17.8	17.8	1.123	1.123	5.366	113	22.6	22.6	1.426	1.426	1.24	2.61	120.1	150	6.0	6.01
S01_2	RD	RD1	1	1	6-Full	0.90	0.90	31.9	0.0032	0.832	65	13.0	13.0	0.820	0.820	1.425	82	16.4	16.4	1.035	1.035	0.08	0.28	31.9	150	1.6	1.60
S01_3	RD	RD1	1	1	3-1/4 open	0.90	0.90	122.3	0.0122	3.188	97	12.4	12.4	0.779	0.779	5.464	124	13.7	13.7	0.864	0.864	1.65	3.50	122.3	150	6.1	6.12
S01_4	RD	RD1	1	1	4-1/2 open	0.90	0.90	62.8	0.0063	1.637	80	12.9	12.9	0.813	0.813	2.806	107	15.7	15.7	0.991	0.991	0.49	1.12	62.8	150	3.1	3.14
S01_5	RD	RD1	1	1	3-1/4 open	0.90	0.90	89.8	0.0090	2.341	92	12.1	12.1	0.763	0.763	4.012	119	13.5	13.5	0.849	0.849	1.00	2.22	89.8	150	4.5	4.49
S01_6	RD	RD2	1	no weir	1-None	0.90	0.90	10.3	0.0010	0.269	0	4.3	4.3	0.269	0.269	0.460	0	7.3	7.3	0.460	0.460			0.0	0	0.0	0.00
S01_7	RD	RD2	1	no weir	1-None	0.90	0.90	22.7	0.0023	0.592	0	9.4	9.4	0.592	0.592	1.014	0	16.1	16.1	1.014	1.014			0.0	0	0.0	0.00
S01_8	RD	RD2	1	no weir	1-None	0.90	0.90	20.8	0.0021	0.542	0	8.6	8.6	0.542	0.542	0.929	0	14.7	14.7	0.929	0.929			0.0	0	0.0	0.00
S01_9	RD	RD2	1	no weir	1-None	0.90	0.90	25.6	0.0026	0.667	0	10.6	10.6	0.667	0.667	1.144	0	18.1	18.1	1.144	1.144			0.0	0	0.0	0.00
S01_10	RD	RD2	1	no weir	1-None	0.90	0.90	53.4	0.0053	1.392	0	22.1	22.1	1.392	1.392	2.386	0	37.8	37.8	2.386	2.386			0.0	0	0.0	0.00
S01_11	RD	RD2	1	no weir	1-None	0.90	0.90	23.0	0.0023	0.600	0	9.5	9.5	0.600	0.600	1.028	0	16.3	16.3	1.028	1.028			0.0	0	0.0	0.00
Totals						0.9	0.9	**583**	**0.0583**	15.190		**132.51**		**8.36**	**8.36**	**26.03**		**192.18**		**12.12**	**12.12**	**4.47**	**9.74**	**427**		**21.3**	**21.3**
Min											**0**						**0**										
Max											**97**						**124**										

Runoff Based on the Following:

Storm Frequency (years) =	5	100
Time of Conc (mins) =	10	10
Storm Intensity (mm/hr) =	104.2	178.6

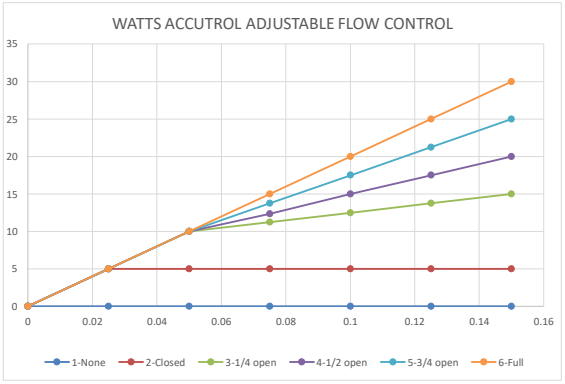
Qyr(cont) = 6.3
V2yr = 3.3

Roof Drains have Following Flow Rates: WATTS Flow Conttolled Drain

Weir Position		Flow (gpm) per depth							Max Flow Rate per Weir
		0	25	50	75	100	125	150	
		0	0.025	0.05	0.075	0.1	0.125	0.15	
1-None		0	0	0	0	0	0	0	0.000
2-Closed		0	5	5	5	5	5	5	0.315
3-1/4 open		0	5	10	11	13	14	15	0.946
4-1/2 open		0	5	10	12	15	18	20	1.262
5-3/4 open		0	5	10	14	18	21	25	1.577
6-Full		0	5	10	15	20	25	30	1.893

Roof Drain Types

Drain Type =	RD1	RD2
Max Overflow Depth (mm	150 mm	150 mm
Flow Controlled (Yes/No)	Yes	No
Ponding	Yes	No
Weir Desc	Accutrol	n/a
No. Weirs	1	n/a



Appendix B – Consultation / Correspondence

Email from City of Ottawa on Water System Boundary Conditions

Alexander Cole

From: Eric Lalande <eric.lalande@rvca.ca>
Sent: Monday, March 14, 2022 5:25 PM
To: Alexander Cole
Subject: RE: 229 - 241 Beechwood Avenue

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Alexander,

Based on the Site Plans and information provided, the RVCA has no additional water quality protection requirements. Best management is encouraged where possible.

Thank you,

Eric Lalande, MCIP, RPP
Planner, RVCA
613-692-3571 x1137

From: Alexander Cole <Alexander.Cole@exp.com>
Sent: Monday, March 14, 2022 3:12 PM
To: Eric Lalande <eric.lalande@rvca.ca>
Cc: Bruce Thomas <bruce.thomas@exp.com>; Jason Fitzpatrick <jason.fitzpatrick@exp.com>
Subject: RE: 229 - 241 Beechwood Avenue

Hi Eric,

Please see attached the most recent site plan. Things are not yet finalized, was just hoping to get an understanding on the quality control. I saw another project very close to our site on Beechwood Ave. that did not require additional quality control and was wondering if our site could follow the same requirements.

Thanks,

Alexander Cole
EXP | Engineering Designer
t : +1.613.688.1899, 63223 | m : +1.613.415.8783 | e : alexander.cole@exp.com
exp.com | legal disclaimer
keep it green, read from the screen

From: Eric Lalande <eric.lalande@rvca.ca>
Sent: Monday, March 14, 2022 8:56 AM
To: Alexander Cole <Alexander.Cole@exp.com>
Subject: RE: 229 - 241 Beechwood Avenue

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Alexander,

Do you have a site plan for me to review as part of this request?

Thank you,

Eric Lalande, MCIP, RPP
Planner, RVCA
613-692-3571 x1137

From: Alexander Cole <Alexander.Cole@exp.com>
Sent: Friday, March 11, 2022 9:36 AM
To: Eric Lalande <eric.lalande@rvca.ca>
Cc: Bruce Thomas <bruce.thomas@exp.com>; Jason Fitzpatrick <jason.fitzpatrick@exp.com>
Subject: 229 - 241 Beechwood Avenue

Hi Eric,

We are currently working on a development at 229 and 241 Beechwood Avenue. It is our understanding that the quality control is handled in the existing infrastructure since it outlets to the Ottawa River over 2000m downstream. Could you please confirm to ensure we do not need additional quality control?

Thanks,

Alexander Cole
EXP | Engineering Designer
t : +1.613.688.1899, 63223 | m : +1.613.415.8783 | e : alexander.cole@exp.com
2650 Queensview Drive
Suite 100
Ottawa, ON K2B 8H6
CANADA

exp.com | *legal disclaimer*

keep it green, read from the screen

Appendix C – Background Information

IPEX LMF 75 ICD Specifications

Watts Adjustable Flow Control Drains Specifications

Servicing Guidelines for Development Applications Checklist

City of Ottawa Vault Drawings (Plan and Profiles)

March 22, 2022

Mr. Simon M. Deiaco, MCIP, RPP, Development Review
City of Ottawa
110 Laurier Avenue West
Ottawa, ON K1P 1J1

Re: OTT-00238207-C0 Submission # 2 for 229-247 Beechwood Ave
Response to 1st Round Comments

Dear Mr. Deiaco,

We have reviewed the City of Ottawa's comments on our 1st submission package, which was dated December 15th, 2020. As a result, we have updated our Civil Drawings and Servicing and Stormwater Management Report and are providing the following for City review and approval.

Report

- Site Servicing and Storm Water Management Report dated March 22, 2022.

Drawings (All stamped March 22, 2022)

- 238207-C001 LEGEND PAGE
- 238207-C002 EXISTING CONDITIONS PLAN
- 238207-C100 SITE SERVICING PLAN
- 238207-C200 GRADING PLAN
- 238207-C300 EROSION AND SEDIMENT CONTROL PLAN
- 238207-C400 POST DEVELOPMENT CATCHMENT AREAS PLAN

We are providing the original City comment below and our responses to each item in **blue** below.

Transportation

Transportation Engineering Services

10. On the site plan, dimension the 23m ROW protection for Beechwood Avenue (per Annex 1 of the OP) - 11.5m from the centreline of the road. Ensure building setbacks and building access vertical circulation elements (stairs, ramps) do not conflict with the ROW widening protection.

EXP Response: Road widening has been labeled on the site plans. No building access vertical circulation elements are interfering with the ROW widening.

11. Remove all retaining walls along the frontage to private property (outside of the 23m ROW protection).

EXP Response: All retaining walls along the frontage to private property have been removed. Grading plan has tied into existing elevations on frontages to private properties.

12. Relocate the ramp structure for 241 Beechwood Avenue to private property (outside of the 23m ROW protection).

EXP Response: Ramp has been relocated to private property.

13. A draft RMA has been prepared with respect to the future cross section of Beechwood Avenue with includes a grade separated raised cycle track. Staff request the applicant to consider constructing the proposed road design along the frontage of this site. The curb would move to approximately where the existing bike lane marking is located and would include a raised cycle track and new sidewalk. A road design would be required that would include the relocation of curb side catch basins and potentially the design of the transit stop. The City may consider contributing to the extension of the proposed works.

EXP Response: Noted. We have designed the sites to accommodate the future road widening.

14. Should the draft RMA design cannot be included in the site plan approval, the existing asphalt sidewalk along the site frontage must be reconstructed to City standards (concrete sidewalk per SC2). Assuming the Carsdale Avenue ROW is being acquired, then reconstruct the access crossing per City standards (SC8 or SC13).

EXP Response: Carsdale Avenue ROW is not being acquired however the site plans include reconstructing the frontage of the buildings with concrete sidewalk as per SC2.

15. The proposed parking on Carsdale Avenue (acquired as private property for site development) will be challenging for motorists, especially the accessible parking spot. Review if it would be possible to remove one vehicle parking space to provide additional room at the amenity interlock walkway crossing for vehicles to use this space to turn around. This would provide a turn around at each end of the angled parking spaces.

EXP Response: Carsdale Avenue is no longer being acquired and no parking spots are being added to Carsdale Avenue.

16. Consult with Transit Services (octdevelopmentreview@ottawa.ca) on the potential requirement for a concrete bus shelter pad and/or other improvements required for the adjacent bus stop (Stop ID: 8797).

EXP Response: Email has been sent to the listed address. Currently waiting to hear back and will update plan accordingly.

Engineering

Comments

General:

49. Place City of Ottawa project # D07 # on all plans using BOLD BLACK TEXT. For this application, the file number is D07-12-21-0001. In addition, the Plan number (for GIS & Data Mgmt) will be # 18403 for this project.

EXP Response: City of Ottawa project # D07-12-21-0001 & plan #18403 has been added in bold black text in the appropriate location on all plans.

50. Please refer to City of Ottawa website portal for "Guide to preparing Studies and Plans" at https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans.

EXP Response: City of Ottawa Website Portal for "Guide to preparing Studies and Plans" was referred to when updating to plans to ensure they comply with City of Ottawa standards.

51. Please ensure you are using the current guidelines, bylaws and standards including materials of construction, disinfection, and all relevant reference to OPSS/D and AWWA guidelines - all current and as amended.

EXP Response: City of Ottawa Website Portal for "Guide to preparing Studies and Plans" was referred to when updating to plans to ensure they comply with City of Ottawa standards.

52. All plans or reports stamped or noted with "NOT FOR CONSTRUCTION" to be removed prior to review if applicable. Suggested that "Preliminary Drawings" and/or "Subject to Approval" or similar wording is used in its place.

EXP Response: All "NOT FOR CONSTRUCTION" stamps have been removed from drawings and reports.

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

EXP Response: Space for Gas pressure regulating station at corner of each building in rear yard along Carsdale Ave. Final location to be coordinated with mechanical team.

54. Water services greater than 19 mm require a Water Data Card. Please complete card and submit when completed, once design has been finalized and in preparation for Commence Work Notification and Water Permit Application.

EXP Response: Water cards have been advanced as far as possible for this stage. They will be finalized once design is finalized.

Report Specific Comments:

Geotechnical Investigation Report, prepared by EXP Services Inc, dated August 9, 2017:

55. This report is out of date, being over two years old. Please revise.

EXP Response: Geotechnical report has been revised and updated.

Slope Stability Study

56. We require this report as grade differential, across the site, is greater than 2.0 metres in elevation. Please submit for our review.

EXP Response: Slope stability report to follow from Geotechnical.

Phase I Environmental Site Assessment, prepared by EXP Services Inc, dated July 29, 2020:

57. Document is in draft form.

EXP Response: The report has been finalized and stamped.

58. The report states that a request for information had been submitted to the MECP for pertinent instruments, incidents, violations, etc. on this property by your firm. Please submit all received information for our review if applicable.

EXP Response: The MECP response was received and the information has been added into the report.

59. Recommendations both in the Executive Summary and in Part 8.0 Conclusions, the report states that a Phase II Environmental Site Assessment is required due to potential contamination from a previous oil spill on the adjacent north property and from the existing automotive service garage. Please Submit.

EXP Response: A Phase One ESA was completed in 2017. The 2022 Phase One ESA recommended collecting groundwater samples from the existing wells on the site to confirm that there is no impact to groundwater. These results were included in the 2022 Phase One ESA report.

60. The HLUI has undergone recent updates that include additional sources beyond those included in the previous database, making the inclusion of this record search even more important.

Although a municipal historic land use database is not specifically listed as required environmental record in O. Reg 153/04, Schedule D, Part II states the following:

The following are the specific objectives of a records review:

i. To obtain and review records that relate to the Phase I (One) property and to the current and past uses of and activities at or affecting the Phase I (One) property in order to determine if an area of potential environmental concern exists and to interpret any area of potential environmental concern.

ii. To obtain and review records that relate to properties in the Phase I (One) study area other than the Phase I (One) property, in order to determine if an area of potential environmental concern exists and to interpret any area of potential environmental concern.

It is therefore reasonable to request that the HLUI search be included in the Phase I ESA to meet the above objectives. Please ensure the updated report includes response from the City for recent information.

EXP Response: The HLUI results have been discussed in the 2022 Phase One ESA report.

61. Please speak to Radon Testing and if it would be required. There are many locations where Radon Gas have been more recently identified within the City of Ottawa.

EXP Response: Comments were made on the bedrock type and due to the type of bedrock, radon gas would not be generated at the site or surrounding area.

62. Please ensure to include:

City of Ottawa Landfill Document, Areas of Natural Significance (MNR), City of

Ottawa Historical Land Use Inventory, Former City of Ottawa Industrial Sites.

EXP Response: The first three were previously discussed in the report in Sections 3.6.2, 3.6.9, 3.8.4. Section 3.6.10 was added to include Former City of Ottawa Industrial Sites.

Phase II Environmental Site Assessment

63. We require this report as indicated in Executive Summary section of the provided Phase I - Environmental Site Assessment. Please submit for our review.

EXP Response: The Phase Two ESA from 2017 is being sent now.

64. Report is to be prepared in general accordance with the requirements of Ontario Regulation 153/04 and City of Ottawa Phase II ESA Guidelines (both as amended).

EXP Response: The Phase Two ESA from 2017 was prepared in general accordance with the requirements of Ontario Regulation 153/04 and City of Ottawa Phase II ESA Guidelines (both as amended).

Traffic Noise Feasibility Study, prepared by Gradient Wind Engineering Inc., dated December 23, 2020:

65. No comments.

Site Servicing & Stormwater Management Report, prepared EXP, dated December 15, 2020:

66. Revise the report and plans in the report based upon your changes to the plans as mentioned below. Review and revise accordingly.

EXP Response: Report, tables and drawings have been updated with the below comments as well as in coordination with the most recent architectural plans.

67. Please be advised that, in the event the current or future owners may consider a severance application, an MECP ECA would be required due to SWM on multiple properties.

EXP Response: Noted that an MECP ECA would be required upon a severance application.

68. Please see the attached city guidelines and add a completed checklist with the report.

EXP Response: Completed checklist has been added to Appendix C of the SWM report.

69. Provide Flow Control Roof Drainage Declaration as per Ontario Building Code (OBC) Section 7.4.10.4. Alternatively, provide a stamped and sealed memo that confirms the new roof will be designed with flow control drains to meet the Stormwater Management objectives with roof spill scuppers and in accordance with the requirements of clause 7.4.10.4 of the latest edition of the Ontario Building code, as ammended.

EXP Response: Flow controlled roof drainage has been included in Table A-21 and Table A-22. The servicing drawing has also included the roof drainage plan and has been stamped.

70. It is recommended that a pressurized drainpipe type material be used for the roof drain leader pipe in the event of surcharge in the system.

EXP Response: Drainage from the roof will be coordinated with the mechanical team.

71. Above and below ground storage is permitted although will need to use ½ Peak Flow Rate or is alternatively modeled. Please confirm that this has been accounted for and/or revise.

EXP Response: Half peak flow rate was accounted for.

72. Provide technical information sheets for all orifice control products used.

EXP Response: Technical information sheets for all ICD's in structures were included in Appendix C of the SWM report.

73. There must be at least 15cm of vertical clearance between the spill elevation and the ground elevation at the building envelope that is in proximity of the flow route or ponding area. Provide discussion in report and ensure grading plan matches.

EXP Response: Confirmed there is at least 15cm vertical clearance between any entrance and any ponding/flow areas.

74. The water level in the major system must not touch any part of the building envelope and must remain below the lowest building opening that is in proximity of the overland flow route or ponding area, during the stress-test event (100 year + 20%). Provide discussion in the report and include plan/figure.

EXP Response: 100 year + 20% has been accounted for and the major system will not touch any part of the building. Tables A-19 and A-20 display the storage required for the 100 year + 20% event.

75. There are additional technical bulletin updates since 2018, for City Sewer Design and Water Distribution Guidelines.

EXP Response: Most recent technical bulletins have been added to the SWM report.

Plan Specific Comments:

Site Grading Plan, Dwg 200, prepared by EXP, revision 1 dated December 15, 2020:

80. See notes above regarding SWM report.

EXP Response: Above notes for the SWM report have been addressed.

81. Revise all that is required and ensure these revisions are captured in the Servicing and Stormwater Management Report.

EXP Response: All required revisions have been updated in the drawings as well as the SWM report.

82. Indicate if you will have ponding at the proposed CB and CBMH's. You should show the ponding on the plans. Revise if applicable.

EXP Response: Ponding areas around CB's have been added to the grading plan.

83. If applicable, Window Wells are to be shown on the plan. Please provide detail and note that window well drains must be indirectly connected to the footing drains.

EXP Response: Outline of window wells have been added from architects plans and are shown in all drawings.

84. Show top and bottom of curb/retaining wall elevations, as applicable.

EXP Response: Top and bottom of retaining wall elevations have been shown on grading plan and curb elevations will be tying into existing curbs.

85. Provide additional proposed finished grades on plan, particularly around entrances and at building footprint as well as property lines.

EXP Response: Additional grades have been provided across the site.

Site Servicing Plan, Dwg C100, prepared by EXP, revision 1 dated December 15, 2020:

86. See notes above regarding SWM report.

EXP Response: Above notes for the SWM report have been addressed.

87. Revise all that is required and ensure these revisions are captured in the Servicing and Stormwater Management Report.

EXP Response: All required revisions have been updated in the drawings as well as the SWM report.

88. Please provide service crossing table or add crossing labels on plan for reference.

EXP Response: Crossing table has been added to the servicing drawing and all crossings have been numbered.

89. Show maximum (spill point elevation), 100 year and 5-year ponding levels. Include HWL, ponding depth, and year-storm labels for each ponding area. For the 100-year and 5-year ponding levels also include volume.

EXP Response: No ponding to occur on site. Storage of major events to occur underground in Stormtech storage chambers, pipes/manholes, and on roof as stated in stormwater section of SWM report.

90. Confirm that there is a two-meter minimum clearance between the watermain and adjacent trees and utility plant. Refer to Standard Detail Drawings R20 & R22

EXP Response: Minimum 2m clearance has been verified in accordance with Standard Detail Drawings R20 and R22.

91. Include size, slope and direction of flow on all existing & proposed sewermains.

EXP Response: Size, slope and direction has been included on the existing and proposed sewermains.

92. Spring line elevations of service lateral connections to sewer mains are required. Sewer connections to be above the spring line of the sewermain as per:

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

EXP Response: Note has been added for service later to sewer main connection to be completed above the spring line. Inverts have also been included.

93. Show upstream and downstream MHs with invert and T/G elevations.

EXP Response: Upstream and downstream MH T/G and invert elevations are labeled on drawings.

Erosion & Sediment Control Plan, Dwg C300, prepared by EXP, revision 1 dated December 15, 2020:

94. Provide a Note: Contractor is responsible to keep the roads free and clean from mud or debris. Revise

EXP Response: Note added to Erosion & Sediment Control Plan.

95. Insert the following opening paragraph in Notes, "The contractor shall implement best management practices, to provide for protection of the area drainage system and the receiving watercourse, during construction activities. The contractor acknowledges that failure to implement appropriate erosion and sediment control measures may be subject to penalties imposed by any applicable regulatory agency."

EXP Response: Note added to Erosion & Sediment Control Plan.

96. Provide CB detail similar to example, shown below.

EXP Response: Filter bag detail for CB has been included on the Erosion & Sediment control Plan.

Storm Drainage Plan. Dwg C400, prepared by EXP, revision 1 dated December 15, 2020:

97. See notes above regarding SWM report. Revise all that is required and ensure these revisions are captured in the Servicing and Stormwater Management Report.

EXP Response: All revisions have been captured in the Storm Drainage Plan.

Notes and Legend Sheet, Dwg C001, prepared by EXP, revision 1 dated December 15, 2020:

98. There are no notes regarding blanking water services, as required.

EXP Response: Notes regarding blanking water services have been included in drawing C002 Existing Conditions and Removals.

Roof Drainage Plan:

102. Not provided. Please submit a plan of proposed roof drainage or revise SWM or Site Plan accordingly.

EXP Response: Roof plan is included and site plan/SWM has been updated accordingly.

103. Provide roof drain type with specified opening setting and controlled Q.

EXP Response: Roof drain types and opening setting have been specified in Table A-21 and A-22.

104. Provide 5- and 100-year storm event ponding areas.

EXP Response: 5-year and 100-year ponding depths and areas are included in Table A-21 and A-22.

105. Provide scupper locations with outlet elevation.

EXP Response: Scupper locations to be coordinated with mechanical.

RVCA:

Stormwater Management:

124. The stormwater management report "Site Servicing Report and Stormwater Management Report – Residential Development, 229 + 241 Beechwood Ave., Ottawa, ON" dated December 15th, 2020, prepared by EXP Services Inc. indicates that stormwater from the site will outlet to a proposed storm sewer on Carsdale Avenue and then to the existing storm sewer on Beechwood Avenue. The stormwater management plan proposes a water quality target of 'enhanced' (80% TSS removal) which will be achieved via the installation of an OGS unit treatment unit. The water quality objective is appropriate for the downstream receiving watercourse.

EXP Response: RVCA was contacted and based on the site plans and information provided, the RVCA has no water quality protection requirements. Email has been attached in Appendix B of the report.

Should you have any questions during your review please contact either of the undersigned.

Sincerely,

EXP Services Inc.

Jason Fitzpatrick, P.Eng.
Senior Engineer
Infrastructure Services

Bruce Thomas, P.Eng.
Senior Project Manager
Infrastructure Services

Servicing study guidelines for development applications

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

- ☒ Executive Summary (for larger reports only).
- ☒ Date and revision number of the report.
- ☒ Location map and plan showing municipal address, boundary, and layout of proposed development.
- ☒ Plan showing the site and location of all existing services.
- ☒ 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.
- ☒ Summary of Pre-consultation Meetings with City and other approval agencies.
- ☒ 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.
- ☒ Statement of objectives and servicing criteria.
- ☒ Identification of existing and proposed infrastructure available in the immediate area.
- ☒ 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).
- ☒ 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.
- ☒ 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.
- ☒ Proposed phasing of the development, if applicable.

☒ Reference to geotechnical studies and recommendations concerning servicing.

☒ All preliminary and formal site plan submissions should have the following information:
- Metric scale
- North arrow (including construction North)
- Key plan
- Name and contact information of applicant and property owner
- Property limits including bearings and dimensions
- Existing and proposed structures and parking areas
- Easements, road widening and rights-of-way
- Adjacent street names

4.2 Development Servicing Report: Water

☒ Confirm consistency with Master Servicing Study, if available
☒ Availability of public infrastructure to service proposed development
☒ Identification of system constraints
☒ Identify boundary conditions
☒ Confirmation of adequate domestic supply and pressure
☒ 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.
☒ 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.
☒ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design
☒ Address reliability requirements such as appropriate location of shut-off valves
☒ Check on the necessity of a pressure zone boundary modification.
☒ 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

- ☒ 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.
- ☒ 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.
- ☒ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.
- ☒ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

4.3 Development Servicing Report: Wastewater

- ☒ 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).
- ☒ Confirm consistency with Master Servicing Study and/or justifications for deviations.
- ☒ 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.
- ☒ Description of existing sanitary sewer available for discharge of wastewater from proposed development.
- ☒ 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)
- ☒ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix ‘C’) format.
- ☒ Description of proposed sewer network including sewers, pumping stations, and forcemains.
- ☒ 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).
- ☒ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.
- ☒ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.
- ☒ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.
- ☒ Special considerations such as contamination, corrosive environment etc.

4.4 Development Servicing Report: Stormwater Checklist

- ☒ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)
- ☒ Analysis of available capacity in existing public infrastructure.
- ☒ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.
- ☒ 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.
- ☒ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.
- ☒ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.
- ☒ Set-back from private sewage disposal systems.
- ☒ Watercourse and hazard lands setbacks.
- ☒ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.
- ☒ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.
- ☒ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).
- ☒ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.
- ☒ 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.
- ☒ Any proposed diversion of drainage catchment areas from one outlet to another.
- ☒ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.
- ☒ 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.
- ☒ Identification of potential impacts to receiving watercourses
- ☒ Identification of municipal drains and related approval requirements.
- ☒ Descriptions of how the conveyance and storage capacity will be achieved for the development.
- ☒ 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.

- ☒ Inclusion of hydraulic analysis including hydraulic grade line elevations.
- ☒ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.
- ☒ 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.
- ☒ Identification of fill constraints related to floodplain and geotechnical investigation.

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:

- ☒ 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.
- ☒ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.
- ☒ Changes to Municipal Drains.
- ☒ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)

4.6 Conclusion Checklist

- ☒ Clearly stated conclusions and 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 draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario

Appendix D – Drawings

C001 - NOTES AND LEGENG SHEET

C002 – EXISTING CONDITIONS AND REMOVALS PLAN

C100 - SITE SERVICING PLAN

C200 - SITE GRADING PLAN

C300 - EROSION AND SEDIMENT CONTROL PLAN

C400 - STORM DRAINAGE PLAN

SITE FEATURES

DESCRIPTION	EXISTING	PROPOSED
PROPERTY LINE		
TOP OF SLOPE		
TERRACING (3:1 TYPICAL)		
℄ DITCH/SWALE AND DIRECTION OF FLOW		
EDGE OF SHOULDER		
EDGE OF PAVEMENT		
℄ ROAD/ALIGNMENT		
CHAINLINK FENCE	X X	X X
POST AND RAIL FENCE		
SIDEWALK (TYPE AS NOTED ON DRAWINGS)		
BARRIER CURB (SC1.1)		
MOUNTABLE CURB (SC1.3)		
DEPRESSED CURB	DC	DC
TACTILE WALKING SURFACE INDICATOR "TWSI" (SC7.3)		
GUARDRAIL		
JERSEY BARRIERS		
BUILDING ENTRY/EXIT WITH RISERS	xR	xR
BUILDING ENTRY/EXIT BARRIER FREE	BF	BF
BUILDING ENTRY/EXIT OVERHEAD DOOR		
POST	POST	POST
SIGN	SIGN	SIGN
BOLLARD	BOLL	BOLL
VEGETATION		

UTILITY AND STRUCTURES

DESCRIPTION	EXISTING	PROPOSED
HYDRO (OVERHEAD)	OH	OH
HYDRO	H	H
POWER	P P	P P
ELECTRICAL	E	E
BELL (OVERHEAD)	OB	OB
BELL	B	B
CABLE (OVERHEAD)	OC	OC
CABLE TV	C	C
FIBRE OPTIC	FO	FO
STREETLIGHT	SL SL	SL SL
GASMAIN	G G	G G
JOINT USE TRENCH – BELL/CABLE TV	BC	BC
JOINT USE TRENCH – HYDRO/BELL/CABLE TV	HBC	HBC
JOINT USE TRENCH – HYDRO/BELL/CABLE TV/GAS	HBCG	HBCG
JOINT USE TRENCH – BELL/CABLE TV/GAS	BCG	BCG
DUCT CROSSING WITH NUMBER AND TYPE OF DUCTS	2H,2C,2B	2H,2C,2B
STREETLIGHT	LS	LS
STREETLIGHT DISCONNECT	SD	SD
HYDRO TRANSFORMER		
HYDRO SWITCHING KIOSK		
HYDRO MANHOLE	H	H
HYDRO METER		
UTILITY POLE AND GUY WIRE	UP	UP
CABLE PEDESTAL	C	C
BELL PEDESTAL	B	B
BELL MANHOLE	B	B
BELL GROUND LEVEL BOX	GLB	GLB
ENDWALL		
COMMUNITY MAILBOX	CMB	CMB
GAS VALVE	GV	GV
GAS METER		
TRAFFIC MANHOLE	TMH	TMH
TRAFFIC HAND HOLE	HH	HH
TRAFFIC JOINT USE POLE	JUP	JUP
TRAFFIC MAST ARM	MAF	MAF
TRAFFIC CONDUIT	T T	T T

SERVICES AND STRUCTURES

DESCRIPTION	EXISTING	PROPOSED
SANITARY SEWER	SA EX.250mmø SAN ST	250mmø SAN
COMBINATION SEWER	EX.300mmø COMB	300mmø COMB
STORM SEWER	ST EX.375mmø STM ST	375mmø STM
STORM SUBDRAIN	EX.150mmø SUBDRAIN	150mmø SUBDRAIN
STORM CULVERT	EX.600mmø CULVERT	600mmø CULVERT
SANITARY MANHOLE	EX.SAN	SANMH 100
COMBINATION MANHOLE	EX.COMB	COMBMH 100
STORM MANHOLE	EX.STM	STMMH 200
CATCHBASIN MANHOLE	EX.CBMH	CBMH 100
CATCHBASIN	EX.CB	CB1
DOUBLE CATCHBASIN	EX.DCB	DCB1
AREA DRAINS		AD
ROOF DRAINS		RD
CURB INLET CATCHBASIN	EX.CICB	CICB 1
DITCH INLET CATCHBASIN	EX.DICB	DICB 1
WATERMAIN	200mmø WATERMAIN	200mmø WATERMAIN
IRRIGATION	IR IR	IR IR
VALVE AND VALVE BOX	V&VB	V&VB
VALVE AND VALVE CHAMBER	V&VC	V&VC
FIRE HYDRANT	FH	FH
SIAMESE CONNECTION	SC	SC
WATER METER	M	M
REMOTE WATER METER	RM	RM
45° BEND	45°	45°
22.5° BEND	22°	22°
11.25° BEND	11°	11°
TEE	200X150 TEE	200X150 TEE
REDUCER	200X100 RED	200X100 RED
CROSS	300X200 CROSS	300X200 CROSS
CURB STOP	CS	CS
WATER WELL		

GRADING

DESCRIPTION	EXISTING	PROPOSED
GROUND ELEVATION	X 100.00	X 100.00
SWALE ELEVATION	X 100.00(S)	X 100.00(S)
TOP OF GRATE ELEVATION	T/G=100.00	T/G=100.00
TOP OF WALL ELEVATION	X 100.00 T/W	X 100.00 T/W
BOTTOM OF WALL ELEVATION	X 100.00 B/W	X 100.00 B/W
FINISHED FLOOR ELEVATION	FF=100.00	FF=100.00
TOP OF FOUNDATION ELEVATION	TF=100.00	TF=100.00
BASEMENT FLOOR ELEVATION	BF=100.00	BF=100.00
PARKING LEVEL ELEVATION	P1=100.00	P1=100.00
UNDERSIDE OF FOOTING ELEVATION	USF=100.00	USF=100.00
ORIGINAL GROUND ELEVATION	OG=100.00	OG=100.00
TOP OF ROCK ELEVATION	T/ROCK=100.00	T/ROCK=100.00
CONTOUR LINES	100.00	100.00
SLOPE AND DIRECTION OF FLOW	2.0%	2.0%
OVERLAND FLOW ROUTE ONSITE		
OVERLAND FLOW ROUTE EXTERNAL		

STORMWATER MANAGEMENT

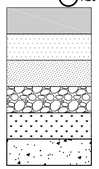
DESCRIPTION	EXISTING	PROPOSED
STORM DRAINAGE AREA BOUNDARY		
STORM DRAINAGE AREA NUMBER STORM DRAINAGE AREA IN HECTARES RUN-OFF COEFFICENT	1 0.06 0.75	1 0.06 0.75
5 YEAR PONDING AREA	5 YR	5 YR
100 YEAR PONDING AREA	100 YR	100 YR

GEOTECHNICAL

DESCRIPTION	EXISTING	PROPOSED
BOREHOLE	BH	BH
TEST PIT	TP	TP
COREHOLE	CH	CH
PIEZOMETER	PIZ	PIZ
MONITORING WELL	MW	MW

MISCELLANEOUS

DESCRIPTION	EXISTING	PROPOSED
REMOVED	X X X	REM
RELOCATED		REL
ADJUSTED		ADJ
LIGHT DUTY PAVEMENT REFER TO NOTES FOR COMPOSITION		
HEAVY DUTY PAVEMENT REFER TO NOTES FOR COMPOSITION		
ROAD REINSTATEMENT AS PER CITY STANDARD R10		
RIP-RAP AS PER OPSD 810.010		
LANDSCAPE REINSTATEMENT		
MONOLITHIC CURB INSTALLATION		



GENERAL NOTES

1. ALL WORKS AND MATERIALS SHALL CONFORM TO THE LATEST REVISIONS OF THE STANDARDS AND SPECIFICATIONS OF THE CITY OF OTTAWA, ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS), WHERE APPLICABLE.
2. THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE THE LOCATION AND STATUS OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION OF PLANT AND EQUIPMENT FROM DAMAGE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OR REPLACEMENT OF ANY SERVICES OR UTILITIES DISTURBED DURING CONSTRUCTION, TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION.
3. THE CONTRACTOR SHALL VERIFY THE LOCATION AND ELEVATION OF EXISTING SERVICES PRIOR TO ANY CONSTRUCTION. THE CONTRACTOR SHALL CONFIRM LOCATIONS AND ELEVATIONS OF EXISTING SERVICES AND STRUCTURES TO BE CONNECTED TO AND EXISTING SERVICES THAT MAY BE DAMAGED OR CAUSE CONFLICTS PRIOR TO CONSTRUCTION OF ANY NEW SEWER, WATER AND/OR STORM WATER WORKS. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION. ANY DISCREPANCIES, INTERPRETATIONS, CHANGES AND ADDITIONS TO THESE DRAWINGS MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER, WHEN NOTED AND BEFORE PROCEEDING WITH CONSTRUCTION WORKS. DO NOT CONTINUE CONSTRUCTION IN AREAS WHERE DISCREPANCIES APPEAR UNTIL SUCH DISCREPANCIES HAVE BEEN RESOLVED.
4. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED. ALL DRAWINGS SHOULD NOT BE SCALED BY THE CONTRACTOR. ANY MISSING OR QUESTIONABLE DIMENSIONS ARE TO BE CONFIRMED WITH THE ENGINEER IN WRITING.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED AND BEAR COST OF THE SAME.
6. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE "OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS", THE GENERAL CONTRACTOR SHALL BE DEEMED TO BE THE CONSTRUCTOR AS DEFINED IN THE ACT.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXCAVATION, BACKFILL AND REINSTATEMENT OF ALL AREAS DISTURBED DURING CONSTRUCTION TO THE SATISFACTION OF THE ENGINEER, THE CITY OF OTTAWA AND THE AUTHORITY HAVING JURISDICTION.
8. ANY AREAS BEYOND THE LIMIT OF THE SITE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION AT THE CONTRACTOR'S EXPENSE.
9. THE CONTRACTOR SHALL COMPLY WITH THE CITY OF OTTAWA REQUIREMENTS FOR TRAFFIC CONTROL WHEN WORKING ON CITY STREETS. ALL CONSTRUCTION SIGNAGE MUST CONFORM TO THE M.T.O. MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (LATEST AMENDMENT).
10. THE SUPPORT OF ALL UTILITIES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
11. THERE WILL BE NO SUBSTITUTION OF MATERIALS UNLESS WRITTEN APPROVAL BY THE ENGINEER HAS BEEN OBTAINED.
12. EXCESS EXCAVATED MATERIAL SHALL BE REMOVED FROM THE SITE.
13. THE SITE LAYOUT IS THE RESPONSIBILITY OF THE CONTRACTOR. AS-BUILT SITE SERVICING & GRADING DRAWINGS SHALL BE MAINTAINED ON SITE BY THE CONTRACTOR.
14. ALL EDGES OF DISTURBED PAVEMENT SHALL BE SAW CUT TO FORM A NEAT AND STRAIGHT LINE PRIOR TO PLACING NEW PAVEMENT.
15. FOR GEOTECHNICAL INFORMATION REFER TO GEOTECHNICAL INVESTIGATION REPORT PREPARED BY EXP SERVICES INC DATED MARCH, 2022, PROJECT NO. OTT-00238207-C0
16. THE CONTRACTOR SHALL APPRAISE HIS/HER SELF OF ALL SURFACE AND SUBSURFACE CONDITIONS TO BE ENCOUNTERED AND SHALL CARRY OUT THEIR OWN TEST PITS AS REQUIRED TO MAKE THEIR OWN INDEPENDENT ASSESSMENT OF GROUND CONDITIONS. THE CONTRACTOR SHALL NOT MAKE ANY CLAIM FOR ANY EXTRA COST DUE TO ANY SUCH GROUND CONDITIONS VARYING FROM THOSE ANTICIPATED BY THE CONTRACTOR.
17. DO NOT CONSTRUCT USING DRAWINGS THAT ARE NOT MARKED "ISSUED FOR CONSTRUCTION".
18. FOR TOPOGRAPHICAL INFORMATION REFER TO PLAN PREPARED BY ANIS, O'SULLIVAN, VOLLEBEKK SURVEYING LTD. DATED JUNE 16, 2017.
19. CIVIL DRAWINGS TO BE READ IN CONJUNCTION WITH ARCHITECTURAL, MECHANICAL, ELECTRICAL, STRUCTURAL, LANDSCAPE AND LEGAL DRAWINGS.
20. A SCHEMATIC DIAGRAM INCLUDING PROPOSED ELEVATIONS, DETAILS OF PROPOSED FOUNDATION DRAINS, STORM LATERAL, AND INTERNAL MECHANICAL PIPING WILL BE PREPARED BY THE MECHANICAL CONSULTANT PRIOR TO REGISTRATION.
21. THE SIDES OF THE EXCAVATION FOR UTILITY TRENCHES AND SUBSURFACE BASEMENT WALLS THAT EXTEND INTO THE SHALE BEDROCK BELOW THE GROUND WATER SHOULD BE SPRAYED WITH GUNNITE TO PREVENT DETERIORATION AND HEAVE OF THE SHALE BEDROCK. FOR UNDERGROUND SERVICE, AN ALTERNATIVE TO GUNNITE IS TO BACKFILL THE PORTION OF THE TRENCHES IN BEDROCK BELOW THE GROUNDWATER LEVEL USING CLAY OR CONCRETE.

SANITARY SEWER NOTES:

1. ALL SANITARY SEWER MATERIALS AND INSTALLATION SHALL CONFORM TO THE LATEST REVISIONS OF THE STANDARDS AND SPECIFICATIONS OF THE CITY OF OTTAWA, ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS).
2. ALL SANITARY SEWERS SHALL BE PVC DR 35, IPEX "RING-TITE" (OR EQUIVALENT), AS PER CSA STANDARD B182.2 OR LATEST AMENDMENT, UNLESS OTHERWISE NOTED.
3. SANITARY SEWER TRENCH AND BEDDING SHALL BE AS PER CITY OF OTTAWA STD. S6 AND S7, CLASS 'B BEDDING UNLESS OTHERWISE NOTED. BEDDING DEPTH AS PER GEOTECHNICAL STUDY.
4. THE CONTRACTOR SHALL CONDUCT CCTV INSPECTION OF ALL NEWLY INSTALLED SANITARY SEWERS AND EXISTING SEWERS CONNECTED TO. THE TEST SHALL BE PERFORMED IMMEDIATELY AFTER SEWERS INSTALLED.
5. THE CONTRACTOR SHALL CONSTRUCT FLEXIBLE SANITARY SEWERS IN ACCORDANCE WITH OPSD 802.010 AND 802.013. DURING CONSTRUCTION, THE CONTRACTOR SHALL PROTECT THE PIPES FROM HEAVY CONSTRUCTION EQUIPMENT. BEDDING AND BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 95% SPMDD.
6. ALL ABANDONED EXISTING SEWERS TO BE CAPPED AT THE PROPERTY LINE TO THE SATISFACTION OF THE CITY OF OTTAWA'S SEWER OPERATIONS.
7. WITHIN THE FROST ZONE, THE BACKFILL IN THE SERVICE TRENCHES SHOULD MATCH THE SOIL ON SIDES TO MINIMIZE DIFFERENTIAL FROST HEAVING IN THE SUBGRADE.

STORM SEWER NOTES:

1. ALL STORM SEWER MATERIALS AND INSTALLATION SHALL CONFORM TO THE LATEST REVISIONS OF THE STANDARDS AND SPECIFICATIONS OF THE CITY OF OTTAWA, ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS).
2. ALL PVC STORM SEWERS ARE TO BE SDR 35 APPROVED PER C.S.A. B182.2 OR LATEST AMENDMENT, UNLESS OTHERWISE SPECIFIED.
3. THE CONTRACTOR SHALL CONSTRUCT FLEXIBLE STORM SEWERS IN ACCORDANCE WITH OPSD 802.010 AND 802.013. DURING CONSTRUCTION THE CONTRACTOR SHALL PROTECT THE PIPES FROM HEAVY CONSTRUCTION EQUIPMENT. BEDDING AND BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 95% SPMDD.
4. SEWER BEDDING DEPTH AS PER GEOTECHINCAL STUDY.
5. ALL ABANDONED EXISTING SEWERS TO BE CAPPED AT THE PROPERTY LINE TO THE SATISFACTION OF THE CITY OF OTTAWA'S SEWER OPERATIONS.
6. WITHIN THE FROST ZONE, THE BACKFILL IN THE SERVICE TRENCHES SHOULD MATCH THE SOIL ON SIDES TO MINIMIZE DIFFERENTIAL FROST HEAVING IN THE SUBGRADE.
7. ALL STORM SERVICES TO BE EQUIPPED WITH APPROVED BACKWATER VALVES. REFER TO MECHANICAL DRAWINGS.
8. THE CONTRACTOR SHALL CONDUCT CCTV INSPECTION OF ALL NEWLY INSTALLED STORM SEWERS AND EXISTING SEWERS CONNECTED TO. THE TEST SHALL BE PERFORMED IMMEDIATELY AFTER SEWERS INSTALLED.
9. CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR ALL STORMTECH CHAMBERS.

WATERMAIN NOTES:

1. ALL WATERMAIN MATERIALS AND INSTALLATION SHALL CONFORM TO THE LATEST REVISIONS OF THE STANDARDS AND SPECIFICATIONS OF THE CITY OF OTTAWA, ONTARIO PROVICIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS).
2. NO WORK SHALL COMMENCE UNLESS A CITY WATER WORKS INSPECTOR IS ON SITE. WATERMAIN CONNECTIONS BY CITY OF OTTAWA FORCES WITH ALL EXCAVATION BACKFILL AND ROAD REINSTATEMENT BY CONTRACTOR.
3. WATERMAINS TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD W17, UNLESS OTHERWISE SPECIFIED. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY PROJECT GEOTECHNICAL ENGINEER.
4. CATHODIC PROTECTION IS REQUIRED ON ALL METALLIC FITTINGS AS PER CITY OF OTTAWA STD. W40. ALL ANODES SHALL BE A Z-24-48 AS PER CITY OF OTTAWA STD. W44.
5. ALL WATERMAINS TO BE INSTALLED AT MINIMUM COVER OF 2.4m.
6. IF WATERMAIN MUST BE DEFLECTED TO MEET ALIGNMENT, ENSURE THAT THE AMOUNT OF DEFLECTION USED IS LESS THAN HALF THAT RECOMMENDED BY THE MANUFACTURER.
7. DISINFECTION AND TESTING OF WATERMAIN TO BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARDS.
8. WATER METER TO BE INSTALL TO BE COORDINATED WITH MECHANICAL.
9. INSULATION FOR WATERMAIN CROSSING OVER AND BELOW SEWER SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. W25.2 AND W25, RESPECTIVELY, WHERE WATERMAN COVER IS LESS THAN 2.4m.
10. PRESSURE REDUCING MEASURES REQUIRED FOR INTERNAL WATER SYSTEMS.

ROAD NOTES:

1. PAVEMENT REINSTATEMENT FOR SERVICE AND UTILITY CUTS SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. R10 AND OPSD 509.010, OPSS 310.
2. GRANULAR "A" SHALL BE PLACED TO A MINIMUM THICKNESS OF 300mm AROUND ALL STRUCTURES WITHIN PAVEMENT AREA.
3. ALL GRANULAR FOR ROADS SHALL BE COMPACTED TO A MINIMUM OF 95% STANDARD PROCTOR MAXIMUM DRY DENSITY.
4. PAVEMENT STRUCTURE:

   SITE ACCESS DRIVEWAYS:
   - 40mm SUPERPAVE 12.5 ASPHALTIC CONCRETE
   - 50mm SUPERPAVE 19.0 ASPHALTIC CONCRETE
   - 150mm GRANULAR "A" CRUSHED LIMESTONE (OPSS 1010)
   - 400mm GRANULAR "B" TYPE II (OPSS 1010)

   BEECHWOOD AVENUE:
   - 40mm SUPERPAVE 12.5 ASPHALTIC CONCRETE
   - 50mm SUPERPAVE 19.0 ASPHALTIC CONCRETE
   - 150mm GRANULAR "A" CRUSHED LIMESTONE (OPSS 1010)
   - 400mm GRANULAR "B" TYPE II (OPSS 1010)

CAUTION
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

REV	REVISION DESCRIPTION	DATE	BY	APPD
3	ISSUED FOR APPROVAL	28/07/23	SAB	BMT
2	ISSUED FOR CITY REVIEW	22/03/22	AC	BMT
1	ISSUED FOR SITE PLAN CONTROL	15/12/20	SK	BMT

SCALE | NORTH | DESIGNED BY | REVIEWED BY

CLIENT: 229 BEECHWOOD HOLDINGS INC. AND 241 BEECHWOOD HOLDINGS INC. C/O BINTEE DEV INC.BINTEE DEV INC. 226 ARGYLE Ave., OTTAWA, ON, K2P 1B9

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• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

BASEPLAN: SK
DESIGN: JLF/ARO
CHECKED: BMT
CAD: SK
PROJECT MANAGER: BMT
APPROVED: BMT

PROJECT: 229-247 BEECHWOOD OTTAWA, ON

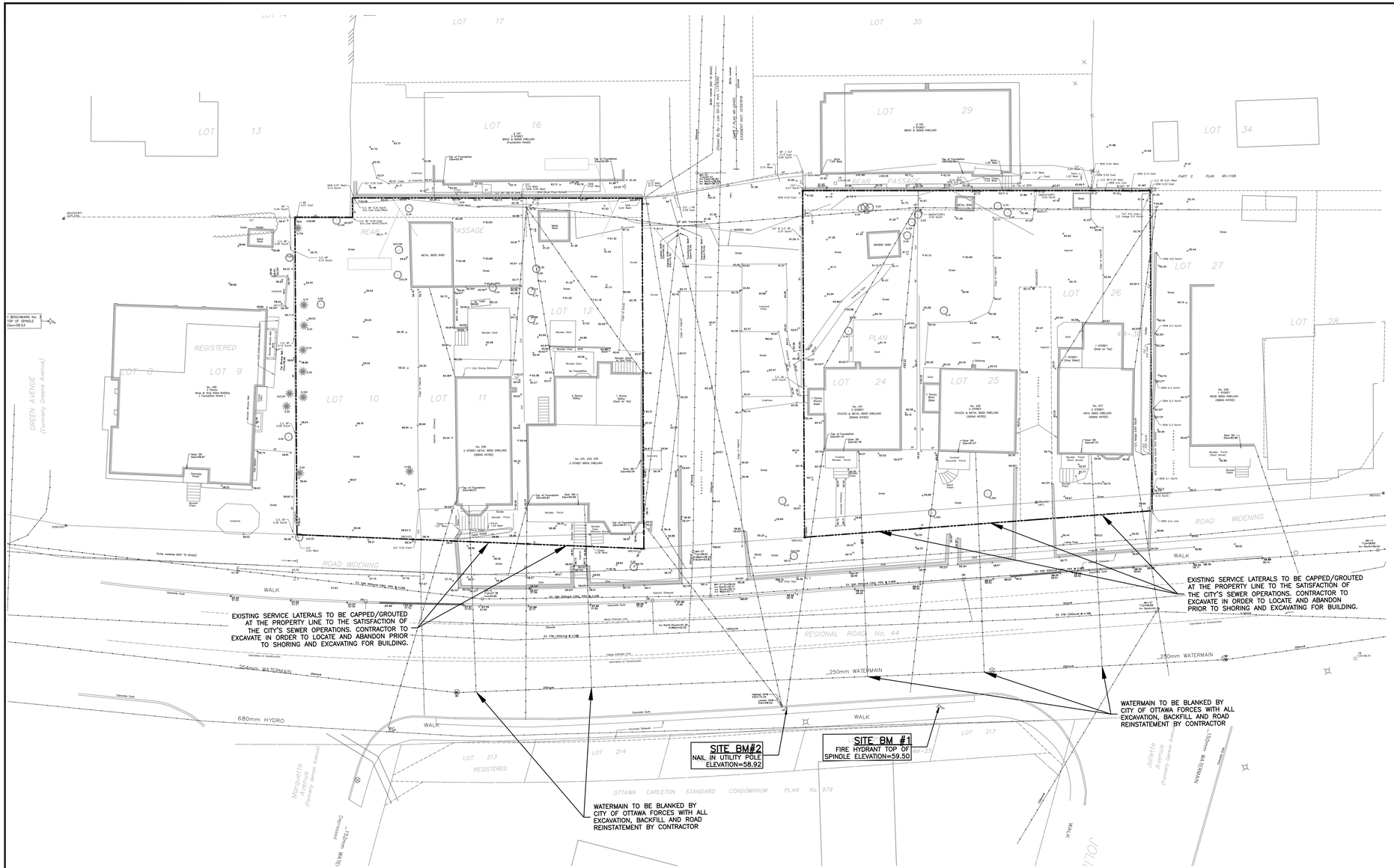
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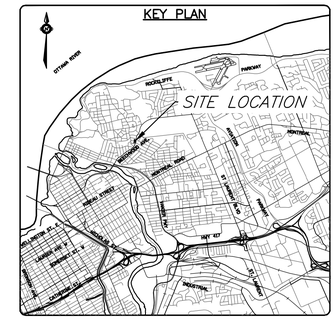
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SURVEY: AOV
DATE: DEC 2020
DRAWING No.: C001

DOT-12-21-0001

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NOTES:

1. THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE THE LOCATION AND STATUS OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION OF PLANT AND EQUIPMENT FROM DAMAGE UNTIL SUCH TIME AS THE SERVICE PROVIDER HAS CONFIRMED IN WRITING THE SERVICE IS ABANDONED AND CAN BE REMOVED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OR REPLACEMENT OF ANY SERVICES OR UTILITIES DISTURBED DURING CONSTRUCTION, TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION.
2. THE CONTRACTOR SHALL VERIFY THE LOCATION AND ELEVATION OF EXISTING SERVICES PRIOR TO ANY CONSTRUCTION. THE CONTRACTOR SHALL CONFIRM LOCATIONS AND ELEVATIONS OF EXISTING SERVICES PRIOR TO COMMENCING CONSTRUCTION. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION. ANY DISCREPANCIES, INTERPRETATIONS, CHANGES AND ADDITIONS TO THESE DRAWINGS MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER, WHEN NOTED AND BEFORE PROCEEDING WITH CONSTRUCTION WORKS. DO NOT CONTINUE CONSTRUCTION IN AREAS WHERE DISCREPANCIES APPEAR UNTIL SUCH DISCREPANCIES HAVE BEEN RESOLVED.
3. ALL ELEVATIONS SHOWN ARE GEODETIC AND ARE REFERENCED TO THE NAD83 GEODETIC DATUM.
4. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THAT THE JOB BENCHMARK IS ACCURATE AND HAS NOT BEEN ALTERED OR DISTURBED AND THAT ITS RELATIVE ELEVATION AND DESCRIPTION AGREES WITH THE INFORMATION PROVIDED IN THIS DRAWING.
5. FOR ADDITIONAL PROJECT NOTES REFER TO DRAWING C001.

LEGAL PARCEL NOTE:

PIN 04226-205 COMPRISED OF:

229 BEECHWOOD AVENUE
- LOT 10, PIN 04226-0120
- PART 2 PLAN 4R-5284, PIN 04226-0121
- LOT 11, PIN 04226-0120
- LOT 12, PIN 04226-0122
- PART 1 PLAN 4R-5284, PIN 04226-0123

241 BEECHWOOD AVENUE
- LOT 24, PIN 04226-0136
- PART 3 PLAN 4R-1168, PIN 04226-0166
- LOT 25, PIN 04226-0137
- PART 4 PLAN 4R-1168, PIN 04226-0167
- LOT 26, PIN 04226-0138
- PART 5 PLAN 4R-1168, PIN 04226-0168

CAUTION
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1	ISSUED FOR SITE PLAN CONTROL	15/12/20	SK	BMT

SCALE: 0 2m 4m 8m — HORIZONTAL 1:200
NORTH
DESIGNED BY: L'ICENSED PROFESSIONAL ENGINEER Z. D. PAN 100118205 2023/08/28 PROVINCE OF ONTARIO
REVIEWED BY

CLIENT: 229 BEECHWOOD HOLDINGS INC. AND 241 BEECHWOOD HOLDINGS INC. C/O BINTEE DEV INC.BINTEE DEV INC. 226 ARGYLE Ave., OTTAWA, ON, K2P 1B9

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BASEPLAN	SK
DESIGN	JLF/ARO
CHECKED	BMT
CAD	SK
PROJECT MANAGER	BMT
APPROVED	BMT

PROJECT: 229-247 BEECHWOOD OTTAWA, ON

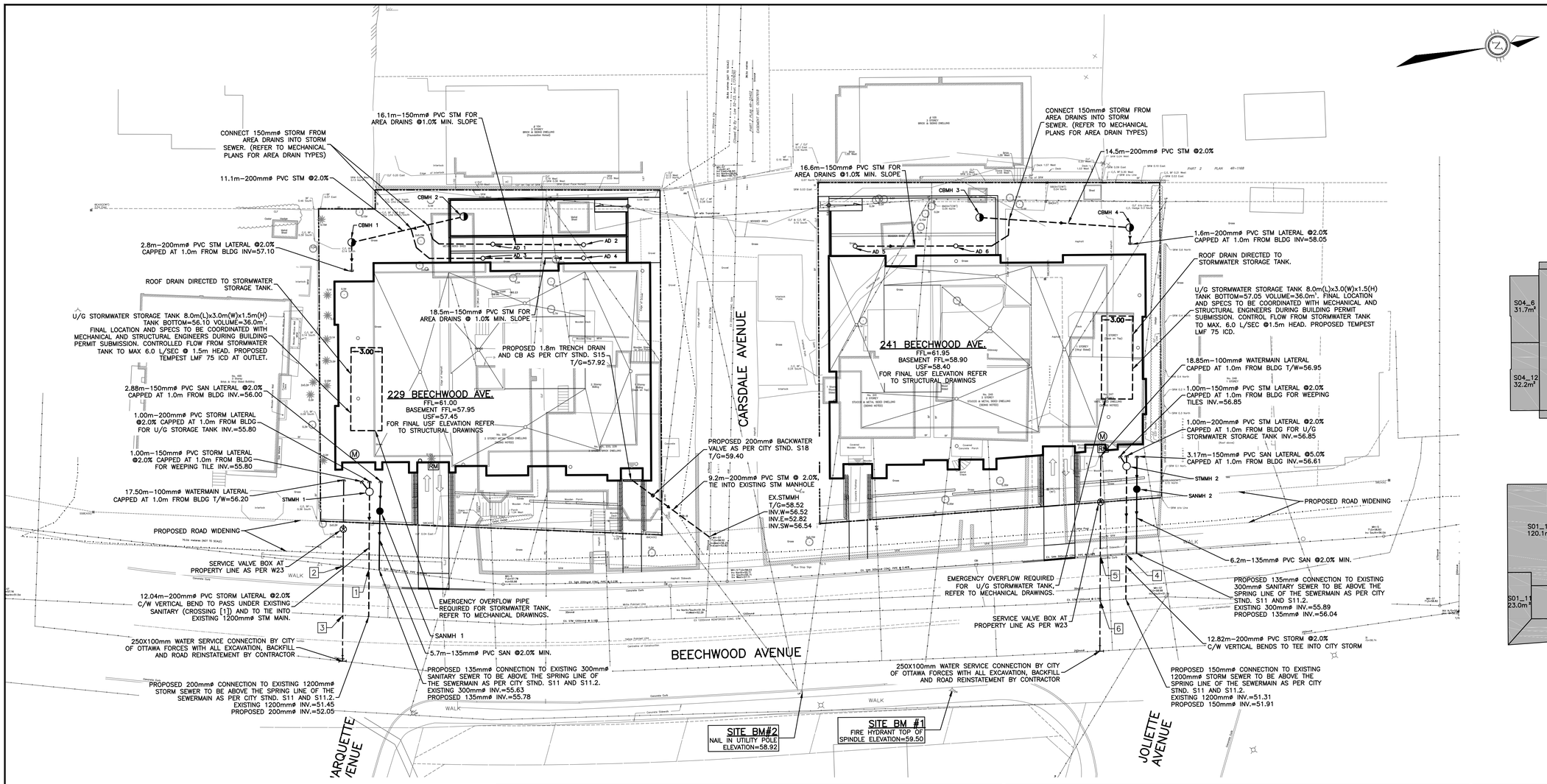
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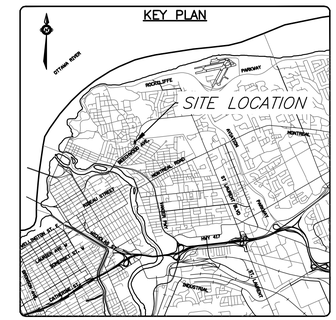
PROJECT No.	OTT-238207-C0
SURVEY	AOV
DATE	DEC 2020
DRAWING No.	C002

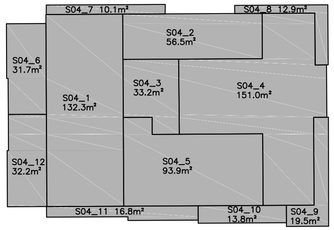
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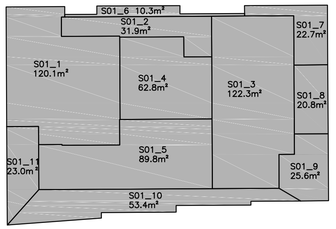
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Xrefs: xref-Tbase.dwg; xref-Tblock.dwg; xref-UDC-Beechwood.dwg
References: xref-Tbase.dwg; xref-Tblock.dwg; xref-UDC-Beechwood.dwg







ROOF DRAIN AREA PLAN
229 BEECHWOOD AVE.
N.T.S.



ROOF DRAIN AREA PLAN
241 BEECHWOOD AVE.
N.T.S.

STRUCTURE TABLE

STRUCTURE NUMBER	TYPE	LID ELEV (m)	INVERT IN (m) and DIA (mm)		INVERT OUT (m) and DIA (mm)		STRUCTURE SIZE	STRUCTURE REFERENCE	STRUCTURE FRAME	STRUCTURE COVER	Comment
CBMH 1	STORM	59.26	57.220	(200)	57.160	(200)	1200 DIA	OPSD 701.010	Ottawa S25	Ottawa S28.1	
CBMH 2	STORM	60.67			57.440	(200)	1200 DIA	OPSD 701.010	Ottawa S25	Ottawa S28.1	
CBMH 3	STORM	60.69			58.430	(200)	1200 DIA	OPSD 701.010	Ottawa S25	Ottawa S28.1	
CBMH 4	STORM	60.65	58.140	(200)	58.080	(200)	1200 DIA	OPSD 701.010	Ottawa S25	Ottawa S28.1	
STMMH 1	STORM	58.44	55.78 (W)	(200)	55.750	(200)	1200 DIA	OPSD 701.010	Ottawa S25	Ottawa S24.1	Lateral to stormwater storage tank
			55.78 (SW)	(150)							Lateral for weeping tile connection
STMMH 2	STORM	59.70	56.83 (W)	(200)	56.800	(200)	1200 DIA	OPSD 701.010	Ottawa S25	Ottawa S24.1	Lateral to stormwater storage tank
			56.83 (SW)	(150)							Lateral for weeping tile connection
SANMH 1	SANITARY	58.32	55.930	(150)	55.900	(135)	1200 DIA	OPSD 705.010	Ottawa S25	Ottawa S24	
SANMH 2	SANITARY	59.67	56.450	(150)	56.400	(135)	1200 DIA	OPSD 705.010	Ottawa S25	Ottawa S24	

ICD SUMMARY TABLE

Control Location	Post-Dev Area No.	Max Flow (L/sec)	Max Head (m)	Type	Model
229 Beechwood U/G Stormwater Tank	S04	6.00	1.5	TEMPEST	LMF75
241 Beechwood U/G Stormwater Tank	S01	6.00	1.5	TEMPEST	LMF75

WATERMAIN / SEWER CROSSING TABLE

LOCATION	FINISHED GRADE (m)	SANITARY SEWER INV ELEV (m)	SANITARY SEWER DIA (mm)	SANITARY SEWER OBV ELEV (m)	STORM SEWER INV ELEV (m)	STORM SEWER DIA (mm)	STORM SEWER OBV ELEV (m)	WATERMAIN INV ELEV (m)	WATERMAIN DIA (mm)	WATERMAIN OBV ELEV (m)	CLEARANCES (mm)
1	57.69	55.63	300	55.93	54.93	200	55.13				500
2	57.68	55.62	300	55.92				54.87	100	54.97	650
3	57.50				51.89	1200	53.09	55.25	100	55.35	2160
4	58.65	55.87	300	56.17	56.63	200	56.83				460
5	58.67	55.88	300	56.18				56.50	100	56.60	320
6	58.60				51.31	1200	52.51	56.45	100	56.55	3940

WATERMAIN TABLE

STATION	DESCRIPTION	GROUND ELEVATION (m)	TOP OF WATERMAIN. ELEV (m) PROPOSED (m)	AS-BUILT (m)
229 Beechwood				
0+000	250x100 TEE	57.50	55.40	
0+07.7	45° VERTICAL BEND	57.67	55.27	
0+08.0	45° VERTICAL BEND	57.67	54.97	
0+10.3	45° VERTICAL BEND	58.15	54.97	
0+11.1	45° VERTICAL BEND	58.17	55.77	
0+013.4	VALVE AND VALVE BOX	58.37	55.97	
0+017.5	CAP - 1m FROM BUILDING	58.60	56.20	
241 Beechwood				
0+000	250x100 TEE	58.60	56.50	
0+014.4	VALVE AND VALVE BOX	59.05	56.65	
0+018.8	CAP - 1m FROM BUILDING	59.73	56.95	

229 BEECHWOOD ROOF PONDING TABLE

AREA #	100 YEAR PONDING DEPTH (mm)	WEIR TYPE	NO. OF WEIRS PER DRAIN	WEIR POSITION
S04_1	110	WATTS ACCUTROL	1	6-FULL
S04_2	98	WATTS ACCUTROL	1	6-FULL
S04_3	95	WATTS ACCUTROL	1	3-1/4 OPEN
S04_4	125	WATTS ACCUTROL	1	4-1/2 OPEN
S04_5	120	WATTS ACCUTROL	0	3-1/4 OPEN
S04_6	0	NONE	NO WEIR	1-NONE
S04_7	0	NONE	NO WEIR	1-NONE
S04_8	0	NONE	NO WEIR	1-NONE
S04_9	0	NONE	NO WEIR	1-NONE
S04_10	0	NONE	NO WEIR	1-NONE
S04_11	0	NONE	NO WEIR	1-NONE
S04_12	0	NONE	NO WEIR	1-NONE

241 BEECHWOOD ROOF PONDING TABLE

AREA #	100 YEAR PONDING DEPTH (mm)	WEIR TYPE	NO. OF WEIRS PER DRAIN	WEIR POSITION
S01_1	113	WATTS ACCUTROL	1	6-FULL
S01_2	82	WATTS ACCUTROL	1	6-FULL
S01_3	124	WATTS ACCUTROL	1	3-1/4 OPEN
S01_4	107	WATTS ACCUTROL	1	4-1/2 OPEN
S01_5	119	WATTS ACCUTROL	1	3-1/4 OPEN
S01_6	0	NONE	NO WEIR	1-NONE
S01_7	0	NONE	NO WEIR	1-NONE
S01_8	0	NONE	NO WEIR	1-NONE
S01_9	0	NONE	NO WEIR	1-NONE
S01_10	0	NONE	NO WEIR	1-NONE
S01_11	0	NONE	NO WEIR	1-NONE

CAUTION
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REV	REVISION DESCRIPTION	DATE	BY	APPD
3	ISSUED FOR APPROVAL	28/07/23	SAB	BMT
2	ISSUED FOR CITY REVIEW	22/03/22	AC	BMT
1	ISSUED FOR SITE PLAN CONTROL	15/12/20	SK	BMT

SCALE: 0 2m 4m 8m — HORIZONTAL 1:200
NORTH

DESIGNED BY: L'ICENSED PROFESSIONAL ENGINEER Z. D. PAN 100118205 2023/07/28 PROVINCE OF ONTARIO
REVIEWED BY

CLIENT: 229 BEECHWOOD HOLDINGS INC. AND 241 BEECHWOOD HOLDINGS INC. C/O BINTEE DEV INC.BINTEE DEV INC. 226 ARGYLE Ave., OTTAWA, ON, K2P 1B9

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BASEPLAN: SK
DESIGN: JLF/ARO
CHECKED: BMT
CAD: SK
PROJECT MANAGER: BMT
APPROVED: BMT

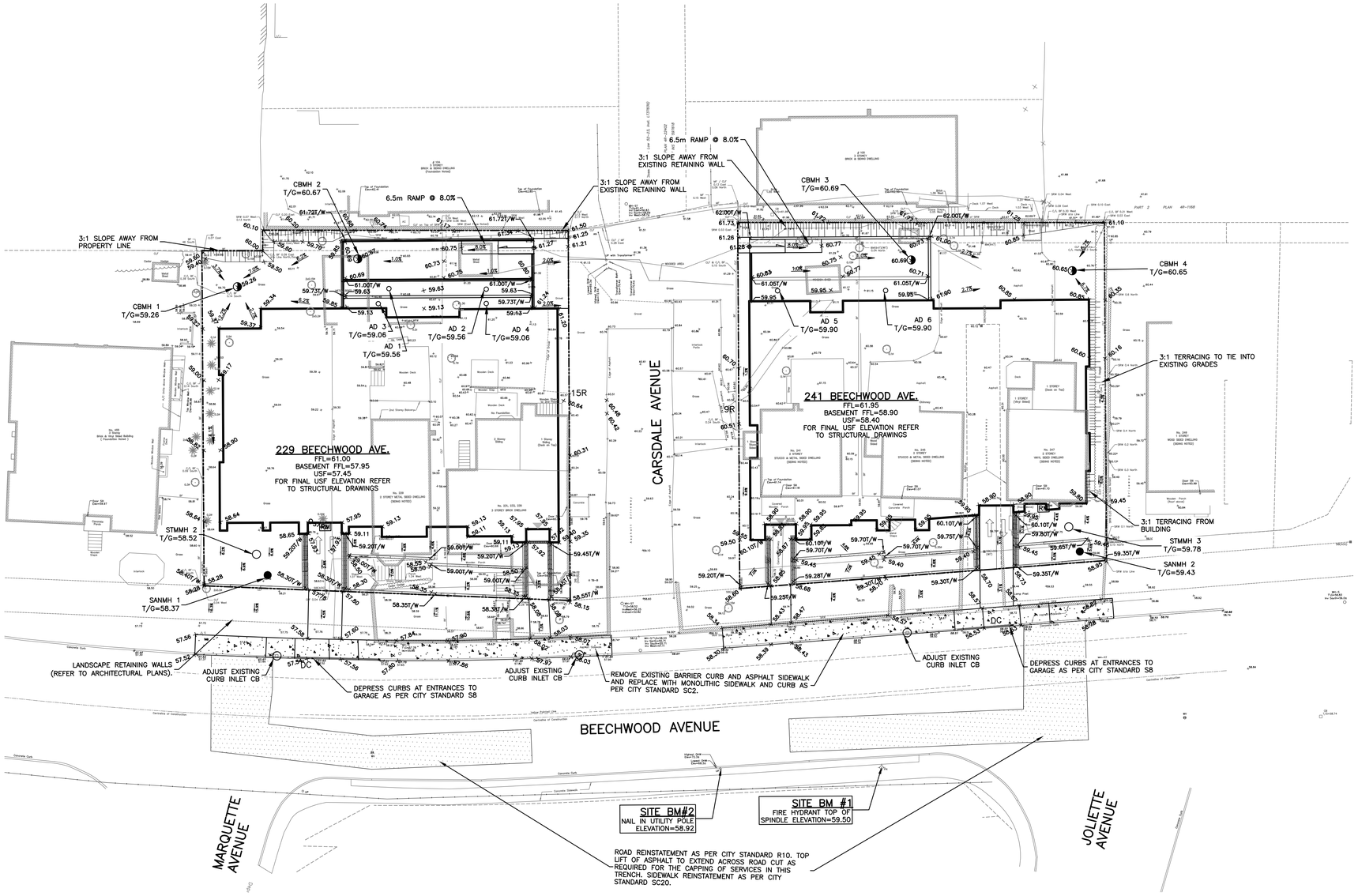
PROJECT: 229–247 BEECHWOOD OTTAWA, ON
TITLE: SITE SERVICING PLAN

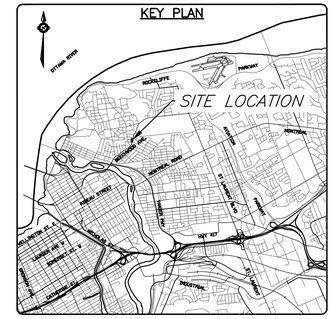
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SURVEY: AOV
DATE: DEC 2020
DRAWING No.: C100

DO7-12-21-0001

#18403

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References:





GENERAL NOTES FOR GRADING

1. IT SHALL BE THE BUILDER'S RESPONSIBILITY TO ENSURE THAT GRADING AROUND HYDRANTS, TRANSFORMERS, AND UTILITY PEDESTALS, ETC., MEET CURRENT CITY OF OTTAWA, HYDRO AND UTILITY COMPANY REQUIREMENTS.
2. ALL GROUND SURFACES SHALL BE EVENLY GRADED WITHOUT PONDING AREAS AND WITHOUT LOW POINTS EXCEPT WHERE APPROVED SWALE OR CATCH BASIN OUTLETS ARE PROVIDED.
3. CONTRACTOR TO ADJUST EXISTING CATCH BASINS, MANHOLES, FIRE HYDRANTS, VALVE CHAMBERS AND VALVE BOXES TO FINAL GRADE AS REQUIRED.
4. CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT EXISTING FOUNDATIONS OF ADJACENT BUILDINGS DURING EXCAVATION AND CONSTRUCTION PERIOD.
5. GRADING IN GRASSED AREAS WILL BE BETWEEN 2% TO 7%. GRADES IN EXCESS OF 7% WILL REQUIRE A MAXIMUM 3:1 TERRACING.
6. NO EXCESS DRAINAGE, DURING OR AFTER CONSTRUCTION, TO BE DIRECTED TOWARDS NEIGHBORING PROPERTIES.
7. EXISTING DRAINAGE PATTERNS TO BE MAINTAINED.
8. ENSURE POSITIVE DRAINAGE AWAY FROM FOUNDATION.
9. NO ALTERATION TO EXISTING GRADES ON THE PROPERTY LINES.
10. UNDERSIDE OF FOOTING TO BE MINIMUM 1.5m BELOW FINISHED GRADE OR INSULATION TO BE PROVIDED. TOP OF FOUNDATION TO BE MAINTAINED 0.15m ABOVE FINISHED GRADE.
11. FOR ADDITIONAL NOTES REFER TO NOTES AND LEGEND SHEET, DRAWING C001

CAUTION

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1	ISSUED FOR SITE PLAN CONTROL	15/12/20	SK	BMT

SCALE: 0 2m 4m 8m — HORIZONTAL 1:200

NORTH

DESIGNED BY: L. Z. D. PAN 100118205 PROVINCE OF ONTARIO — LICENSED PROFESSIONAL ENGINEER — 2023/07/28

REVIEWED BY

CLIENT: 229 BEECHWOOD HOLDINGS INC. AND 241 BEECHWOOD HOLDINGS INC. C/O BINTEE DEV INC.BINTEE DEV INC. 226 ARGYLE Ave., OTTAWA, ON, K2P 1B9

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BASEPLAN	SK
DESIGN	JLF/ARO
CHECKED	BMT
CAD	SK
PROJECT MANAGER	BMT
APPROVED	BMT

PROJECT: 229–247 BEECHWOOD OTTAWA, ON

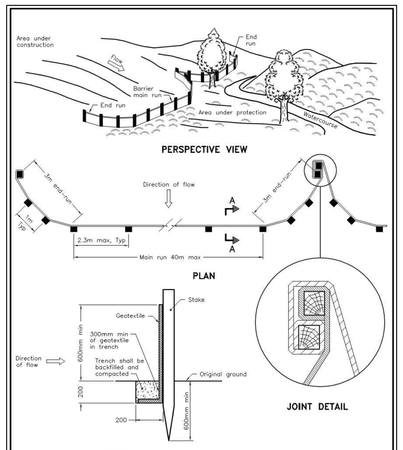
TITLE: SITE GRADING PLAN

PROJECT No.	OTT-238207-C0
SURVEY	AOV
DATE	DEC 2020
DRAWING No.	C200

DO7-12-21-0001

#18403

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NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
LIGHT–DUTY SILT FENCE BARRIER		OPSD 219.110

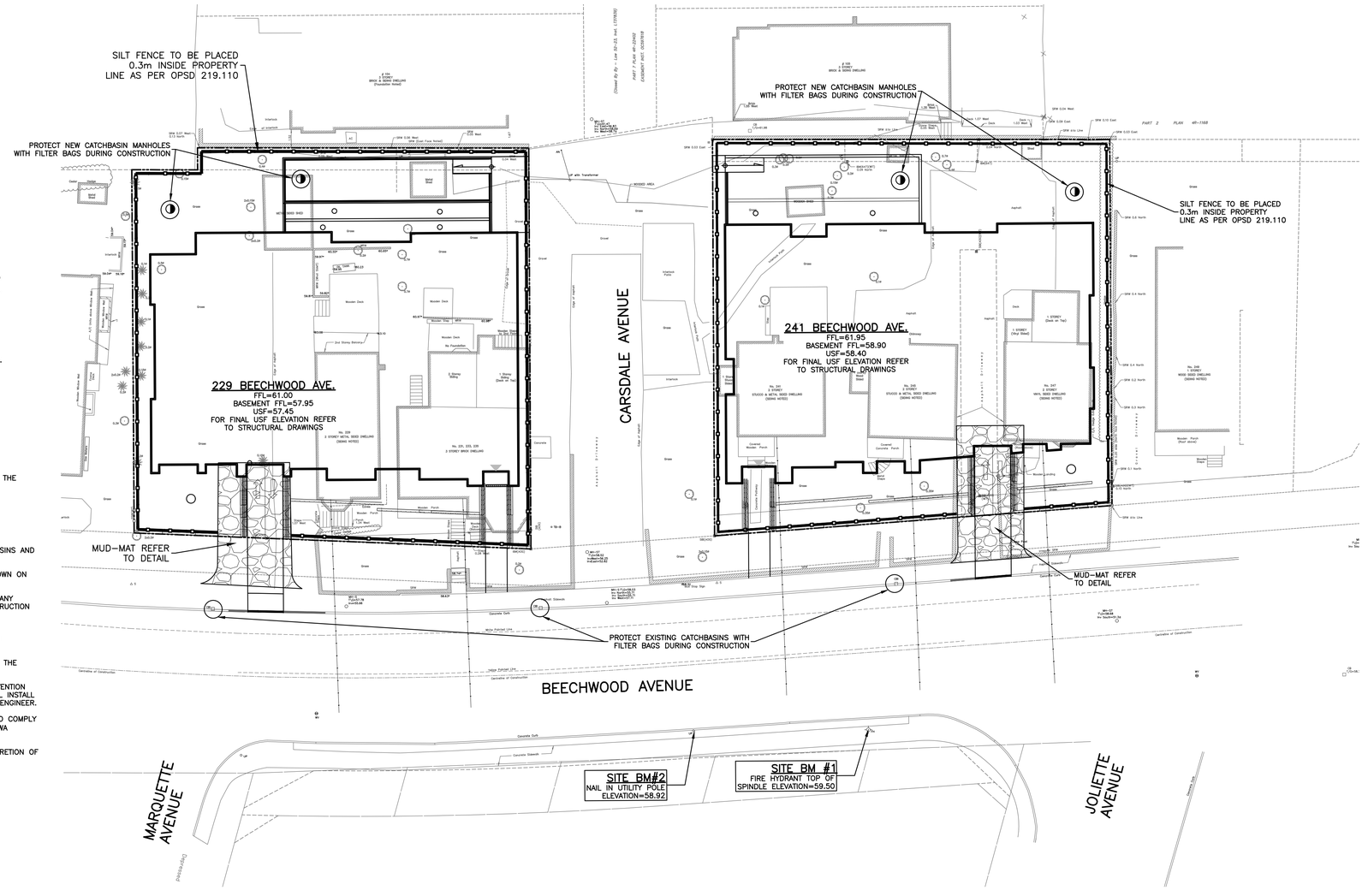
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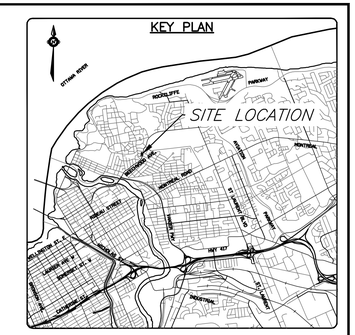
1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO WOOD POSTS WITH WIRE TIES OR STAPLES.
2. POSTS TO BE SPACED AT 2.3 METRES CENTRE TO CENTRE.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY A MINIMUM OF 500mm.
4. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.
5. WOOD POSTS TO BE HARDWOOD TYPE (50mm x 50mm).
6. GEOTEXTILE TO BE EMBEDDED 200mm INTO GROUND.
7. GEOTEXTILE TO CONFORM TO OPSS 805 STANDARDS.
8. SILT FENCE MUST BE INSTALLED BEFORE COMMENCEMENT OF CONSTRUCTION AND IN ACCORDANCE WITH DETAIL. SILT FENCE CAN BE REMOVED AFTER LANDSCAPING IS COMPLETE.
9. SEDIMENTS MUST BE CLEARED AWAY WHEN THEY REACH HALF THE HEIGHT OF THE FENCE.
10. CONTRACTOR RESPONSIBLE FOR KEEPING ROADS FREE AND CLEAN FROM MUD AND DEBRIS.
11. CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES TO PROVIDE PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE DURING CONSTRUCTION. FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

EROSION AND SEDIMENT CONTROLS DURING CONSTRUCTION.

DURING ALL CONSTRUCTION ACTIVITIES, EROSION AND SEDIMENTATION SHALL BE CONTROLLED BY THE FOLLOWING TECHNIQUES:

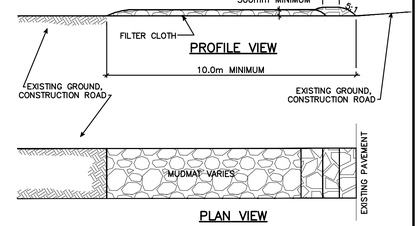
1. LIMITING THE EXTENT OF EXPOSED SOILS AT ANY GIVEN TIME.
2. REVEGETATION OF EXPOSED AREAS AS SOON AS POSSIBLE.
3. MINIMIZATION OF AREA TO BE CLEARED AND DISRUPTION TO ADJACENT AREAS.
4. INSTALLATION OF FILTER CLOTH BETWEEN FRAME AND COVER ON ALL PROPOSED CATCH BASINS AND CATCH BASIN MANHOLES.
5. A SILT FENCE TO BE INSTALLED 0.3m INSIDE THE SITE PROPERTY LINE TO LOCATIONS SHOWN ON THIS DRAWING.
6. A VISUAL INSPECTION SHALL BE COMPLETED DAILY ON SEDIMENT CONTROL BARRIERS AND ANY DAMAGE REPAIRED IMMEDIATELY. CARE WILL BE TAKEN TO PREVENT DAMAGE DURING CONSTRUCTION OPERATIONS.
7. IN SOME CASES SOME BARRIERS MAY BE REMOVED TEMPORARILY TO ACCOMODATE THE CONSTRUCTION OPERATIONS. THE AFFECTED BARRIERS WILL BE REINSTATED AT NIGHT WHEN CONSTRUCTION IS COMPLETED.
8. THE SEDIMENT CONTROL DEVICES WILL BE CLEANED OF ACCUMULATED SILT AS REQUIRED. THE DEPOSITS WILL BE DISPOSED OF AS PER THE REQUIREMENTS OF THE CONTRACT.
9. DURING THE COURSE OF CONSTRUCTION IF THE ENGINEER BELIEVES THAT ADDITIONAL PREVENTION METHODS ARE REQUIRED TO CONTROL EROSION AND SEDIMENTATION, THE CONTRACTOR WILL INSTALL ADDITONAL SILT FENCES OR OTHER METHODS AS REQUIRED TO THE SATISFACTION OF THE ENGINEER.
10. CONSTRUCTION AND MAINTENANCE REQUIRMENTS FOR EROSION AND SEDIMENT CONTROLS TO COMPLY WITH ONTARIO PROVINCIAL STANDARD SPECIFICATION (OPSS) OPSS 805, AND CITY OF OTTAWA SPECIFICATIONS.
11. SEDIMENT AND EROSION CONTROL MEASURES MAY BE MODIFIED IN THE FIELD AT THE DISCRETION OF THE CITY OF OTTAWA SITE INSPECTOR OR CONSERVATION AUTHORITY.





LEGEND

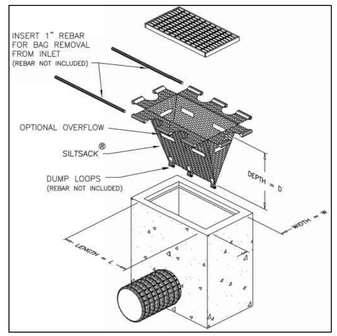
- PROPERTY LINE
- PROPOSED CURB
- SILT FENCE



MUD MAT DETAIL
N.T.S

NOTES:

1. STONE – USE CLEAR CRUSHED 100mm STONE.
2. LENGTH – AS REQUIRED BUT NOT LESS THAN 15.0m.
3. THICKNESS – NOT LESS THAN 300mm.
4. WIDTH – 7.0m MINIMUM, NOT LESS THAN THE WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
5. FILTER CLOTH – WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING STONE.
6. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT–OF–WAY. THIS MAY REQUIRED PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEAN OUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED OR TRACKED ONTO THE PUBLIC RIGHT–OF–WAY MUST BE REMOVED IMMEDIATELY.
7. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.



PROVIDE FILTER BAGS AS SHOWN (GEO–SYNTHETICS MANUFACTURER OR APPROVED EQUIVALENT)

FILTER BAG DETAIL
N.T.S

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1	ISSUED FOR SITE PLAN CONTROL	15/12/20	SK	BMT

SCALE: 0 2m 4m 8m — HORIZONTAL 1:200
NORTH
DESIGNED BY
L'ICENSED PROFESSIONAL ENGINEER Z. D. PAN 100118205 2023/07/28 PROVINCE OF ONTARIO
REVIEWED BY

CLIENT: 229 BEECHWOOD HOLDINGS INC. AND 241 BEECHWOOD HOLDINGS INC. C/O BINTEE DEV INC.BINTEE DEV INC. 226 ARGYLE Ave., OTTAWA, ON, K2P 1B9

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BASEPLAN	SK
DESIGN	JLF/ARO
CHECKED	BMT
CAD	SK
PROJECT MANAGER	BMT
APPROVED	BMT

PROJECT: 229–247 BEECHWOOD OTTAWA, ON

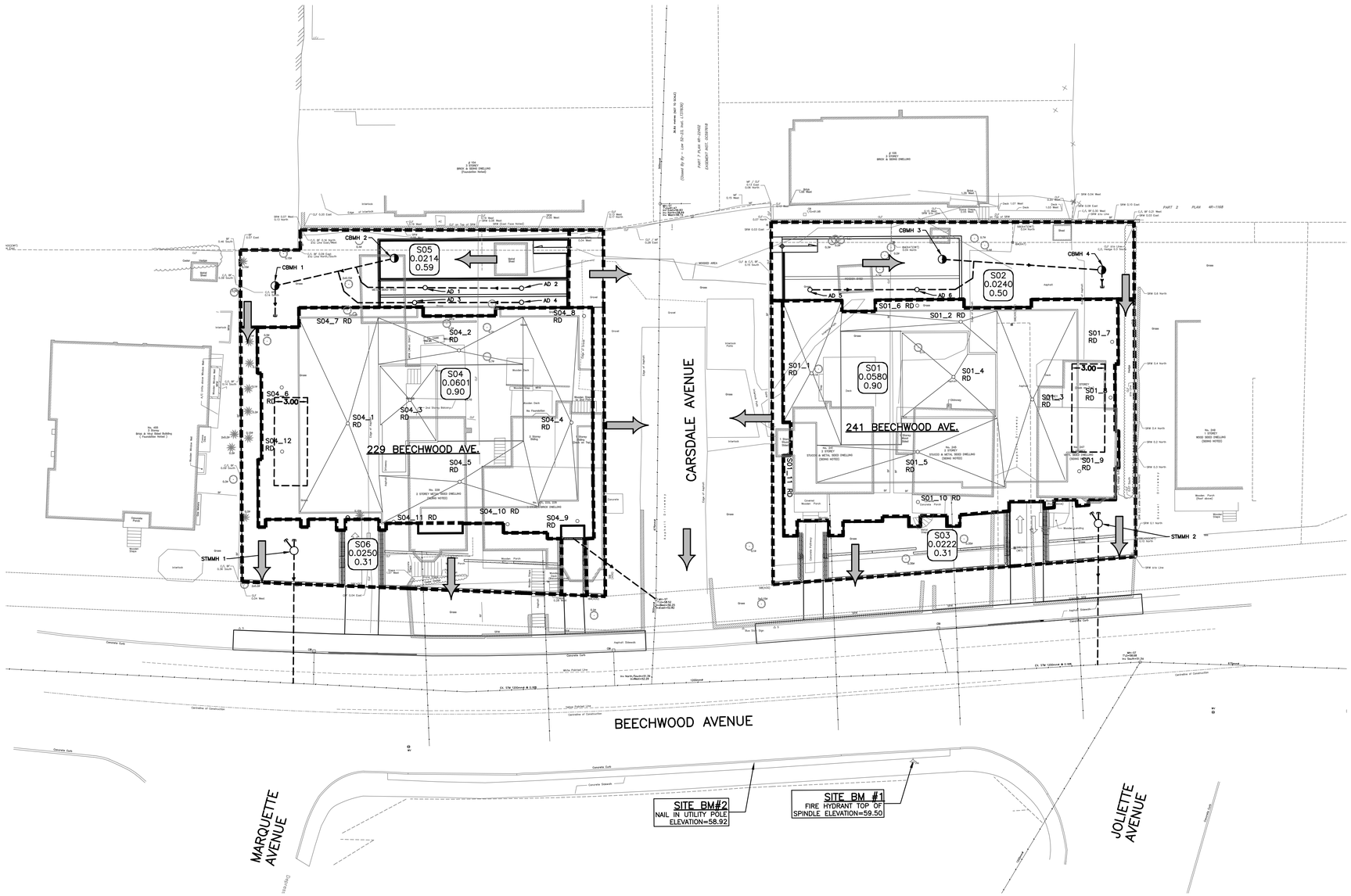
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SURVEY	AOV
DATE	DEC 2020
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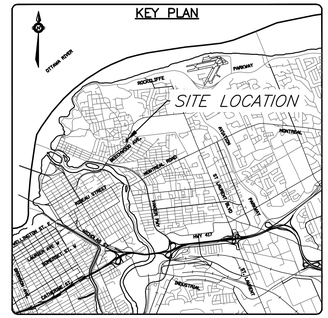
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#18403

DO7-12-21-0001

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Layout: C300 ESC
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LEGEND

- PROPERTY LINE
- OVERLAND FLOW ROUTE
- S01 / 0.184 / 0.79 — AREA NO / AREA IN HECTARES / RUNOFF COEFFICIENT
- CATCHMENT AREA

GENERAL NOTES FOR STORMWATER MANAGEMENT

1. WATTS ADJUSTABLE FLOW CONTROLLED ROOF DRAINS TO BE INSTALLED TO ALLOW PONDING ON ROOF.
2. ROOF AND REAR YARD DRAINAGE TO BE DRAINED TO UNDERGROUND 8.0m x 3.0m x 1.5m STORMWATER TANK (EXACT LOCATION AND SPECIFICATIONS TO BE COORDINATED WITH MECHANICAL AND STRUCTURAL ENGINEERS DURING BUILDING PERMIT SUBMISSION).
3. EACH UNDERGROUND STORMWATER TANK TO CONTROL FLOW TO MAX 6.0 L/SEC TOWARDS BEECHWOOD AVE. WITH PROPOSED TEMPEST LMF 75 ICD @ 1.5m HEAD.

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SCALE: 0 2m 4m 8m — HORIZONTAL 1:200
NORTH

DESIGNED BY: LICENSED PROFESSIONAL ENGINEER Z. D. PAN 100118205 2023/07/28 PROVINCE OF ONTARIO
REVIEWED BY:

CLIENT: 229 BEECHWOOD HOLDINGS INC. AND 241 BEECHWOOD HOLDINGS INC. C/O BINTEE DEV INC.BINTEE DEV INC. 226 ARGYLE Ave., OTTAWA, ON, K2P 1B9

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BASEPLAN: SK
DESIGN: JLF/ARO
CHECKED: BMT
CAD: SK
PROJECT MANAGER: BMT
APPROVED: BMT

PROJECT: 229–247 BEECHWOOD OTTAWA, ON
TITLE: STORM DRAINAGE PLAN

PROJECT No.: OTT-238207-C0
SURVEY: AOV
DATE: DEC 2020
DRAWING No.: C400

DO7-12-21-0001
#18403

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