

REPORT

SITE SERVICING REPORT & EROSION & CONTROL PLAN 78-90 BEECHWOOD/69-93 BARRETTE

Project: 125192-7.03.04



Prepared for Minto Communities Inc.
by IBI Group
July 31, 2020

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1 INTRODUCTION

1.1 Scope

The purpose of this report is to outline the required municipal services, including water supply, stormwater management and wastewater disposal, needed to support the redevelopment of the subject property. The property is approximately 0.42 hectares in area and is located at the following current municipal addresses, 78-90 Beechwood Avenue and 69-93 Barrette Street. The site is bound by Beechwood Avenue to the north Barrette Street to the south. Please refer to **Figure 1 – Location** plan for more details.

This Site Servicing Study, which also includes the Stormwater Management Plan, Watermain Analysis and Erosion and Sedimentation Control Plans, is being completed in support of the current Re-zoning Application and the future Site Plan Application.

1.2 Subject Site

Minto Communities proposes to construct a mixed use building with 251 residential units along with 6,000 square feet (564 square metres) of ground floor retail space fronting along Beechwood Avenue. The proposed development also includes 2 levels of underground parking. Vehicular access to the site will be from both Beechwood Avenue and Barrette Street. Please refer to **Figure 2 – Site Plan** for more information.

The site currently consists of vacant lots along with some existing low rise residential and commercial structures. All existing structures within the subject property will be demolished to facilitate the proposed development.

1.3 Pre-consultation

It should be noted that a pre-consultation with the Ministry of the Environment is not required since this site is serviced by existing separated municipal sanitary and storm sewers and is a single owner residential site, thus an ECA is not required.

2 WATER DISTRIBUTION

2.1 Existing Conditions

As previously noted, the site is located south of Beechwood Ave, and north of Barrette Street. An existing 200 mm diameter watermain is located within the Beechwood Ave right of way and an existing 300 mm watermain is located within the Barrette Street right of way. The watermains fall within the City of Ottawa's pressure zone 1E which will provide the water supply to the site.

2.2 Design Criteria

2.2.1 Water Demands

The population for apartment buildings is assumed at 1.8 persons per unit as found in Table 4.1 of the Design Guidelines. A watermain demand calculation sheet is included in **Appendix A** and the total water demands are summarized as follows:

	<u>Subject Site</u>
Average Day	1.48 l/s
Maximum Day	3.70 l/s
Peak Hour	8.12 l/s

2.2.2 System Pressure

The Ottawa Design Guidelines – Water Distribution (WDG001), July 2010, City of Ottawa, Clause 4.2.2 states that the preferred practice for design of a new distribution system is to have normal operating pressures range between 345 kPa (50 psi) and 480 kPa (80 psi) under maximum daily flow conditions. Other pressure criteria identified in Clause 4.2.2 of the guidelines are as follows:

Minimum Pressure	Minimum system pressure under peak hour demand conditions shall not be less than 276 kPa (40 psi)
Fire Flow	During the period of maximum day demand, the system pressure shall not be less than 140 kPa (20 psi) during a fire flow event.
Maximum Pressure	In accordance with the Ontario Building/Plumbing Code, the maximum pressure should not exceed 552 kPa (80 psi). Pressure reduction controls will be required for buildings where it is not possible/feasible to maintain the system pressure below 552 kPa.

2.2.3 Fire Flow Rates

A calculation using the Fire Underwriting Survey (FUS) method was conducted to determine the fire flow requirement for the site. The building is considered non-combustible construction. Results of the analysis provides a maximum fire flow rate of 8,000 l/min or 133 l/s is required which is used in the hydraulic analysis. A copy of the FUS calculation is included in **Appendix A**.

2.2.4 Boundary Conditions

A boundary condition was provided by the City of Ottawa for the 305 mm diameter watermain on Barrette Street adjacent to the development. A copy of the boundary conditions is included in **Appendix A** and summarized as follows:

BOUNDARY CONDITIONS	
SCENARIO	HGL (m)
	Barrette (proposed connection)
Maximum HGL	118.3m
Minimum HGL (Peak Hour)	107.0m
Max Day + Fire Flow	89.0m

2.3 Proposed Water Plan

The minimum water pressure inside the building at the connection is determined by the difference between the water entry elevation of 55.95m and the minimum HGL condition, resulting in a pressure 500.8 kPa which exceeds the minimum requirement of 276 kPa per the guidelines. Because the pressure at the 9th floor under minimum HGL conditions is less than the minimum requirement of 276 kPa, a domestic water pump will be necessary for this building.

Maximum water pressure is determined by the difference between the water entry elevation of 55.95m and the maximum HGL condition resulting in a pressure of 66.6 kPa, which is greater than the 552 kPa threshold in the guideline in which pressure control is required. Based on this result, pressure control is required for this building.

The boundary condition for Maximum Day and Fire Flow results in a pressure of 324.2 kPa at the ground floor level. In the guidelines, a minimum residual pressure of 140 kPa must be maintained in the distribution system for a fire flow and maximum day event. As a pressure of 324.21 kPa is achieved, the fire flow requirement is exceeded.

To service the property twin 200mm dia water services off Barrette are proposed, see site servicing plan 125192-C-001 in **Appendix D**. The proposed 200mm dia service will provide adequate supply to the building to meet demands while twining the service will provide service redundancy for this building.

3 WASTEWATER

3.1 Existing Conditions

The site is bound by 300mm concrete sanitary sewers located in both the Beechwood and Barrette ROWs. Given the proximity and elevation of the existing sewers, the sewer within the Barrette ROW has been chosen as the outlet for the subject development.

3.2 Design Criteria

The sanitary sewers for the subject site will be based on the City of Ottawa design criteria. It should be noted that the sanitary sewer design for this study incorporates the latest City of Ottawa design parameters identified in Technical Bulletin ISTB-2018-01. Some of the key criteria will include the following:

- Commercial/Institutional flow 28,000 l/ha/d
- Residential flow 280 l/c/d
- Peaking factor 1.5 if ICI in contributing area >20%
 1.0 if ICI in contributing area <20%
- Infiltration allowance 0.33 l/s/ha
- Velocities 0.60 m/s min. to 3.0 m/s max.
-

Given the above criteria, total wastewater flow from the proposed development will 5.13 l/s, the detailed sanitary sewer calculations are included in **Appendix B**.

3.3 Recommended Wastewater Plan

A 200mm dia sanitary service lateral is proposed to connect to the existing sanitary sewer in Barrette to service this site. Please refer to the site servicing plan 125192-C-001 in **Appendix D** for connection location details.

4 STORMWATER SYSTEM

4.1 Existing Conditions

Currently adjacent to the site is a 375mm dia storm sewer draining westward within the Barrette ROW and a 450mm dia storm sewer draining westward in the Beechwood ROW. The proposed storm sewer connection will be in keeping with the other services and connect to the Barrette Street sewer.

4.2 Design Criteria

Criteria for the stormwater management of existing infill sites discharging to separated sewers within the City of Ottawa are as follows;

- Existing adjacent storm sewers were designed to a 2 year level of service
- Site to be designed to limit the 100 year post development flow to a maximum of the 2 year pre development flow
- Pre development flow to use a maximum C of 0.5 and a minimum TC of 10 min.

The stormwater system was designed following the principles of dual drainage, making accommodations for both major and minor flow.

Some of the key criteria include the following:

- | | |
|---------------------------------|--------------------------------------|
| • Design Storm | 1:2 year return (Ottawa) |
| • Rational Method Sewer Sizing | |
| • Initial Time of Concentration | 10 minutes |
| • Runoff Coefficients | |
| - Landscaped Areas | C = 0.30 |
| - Asphalt/Concrete | C = 0.90 |
| - Roof | C = 0.90 |
| • Pipe Velocities | 0.80 m/s to 6.0 m/s |
| • Minimum Pipe Size | 250 mm diameter
(200 mm CB Leads) |

4.3 Proposed Minor System

The detailed design for this site shows a storm sewer connection along with some uncontrolled surface drainage entering into the 375mm sewer within Barrette Street Road ROW. A limited amount of uncontrolled surface flow will also enter the 450mm storm sewer within the Beechwood Avenue ROW.

Using the above-noted criteria, the proposed on-site storm sewers were sized accordingly. A detailed storm sewer design sheet and the associated storm sewer drainage area plan are included in **Appendix C**. The current servicing drawing shows 5 surface catchbasin locations. As these are located above the underground parking structure all flows will be routed inside the building via the mechanical plumbing systems and directed to the building cistern.

4.4 Stormwater Management

The subject site will be limited to a release rate established using the criteria described in section 4.2. This will be achieved through an inlet control device (ICD) at the outlet of the cistern.

Flows generated that are in excess of the site's allowable release rate will be stored within the cistern located at the buildings SW corner. The cistern has been sized at 130 cubic metres.

At certain locations within the site, the opportunity to store runoff is limited due to grading constraints and building geometry. These locations are generally located at the perimeter of the site where it is necessary to tie into public boulevards and adjacent properties, and it is not always feasible to capture or store stormwater runoff. These "uncontrolled" areas, 0.05 hectares in total, have a weighted average C value of 0.9. Based on 1:100 year storm uncontrolled flows, the uncontrolled areas generate 22.3 l/s runoff (refer to Section 4.5 for calculation). The cistern has been sized to control water generated during the 1:100-year event, with no overflow leaving the site. Please refer to the SWM calculations in **Appendix C**.

4.5 Inlet Controls

The allowable release rate for the 0.42 Ha site can be calculated as follows:

$$\begin{aligned}
 Q_{\text{allowable}} &= 2.78 \times C \times i_{2\text{yr}} \times A \quad \text{where:} \\
 C &= 0.5 \text{ (pre-development } C^*) \\
 i_{2\text{yr}} &= \text{Intensity of 2-year storm event (mm/hr)} \\
 &= 732.951 \times (T_c + 6.199)^{0.81} = 76.81 \text{ mm/hr; where } T_c = 10 \text{ minutes}^* \\
 A &= \text{Area} = 0.42 \text{ Ha} \\
 &= \mathbf{44.84 \text{ L/s}}
 \end{aligned}$$

*based on pre development calculations, see Appendix C

As noted in Section 4.4, a portion of the site will be left to discharge to the surrounding boulevards and roadways at an uncontrolled rate.

Based on a 1:100 year event, the flow from the 0.05 Ha uncontrolled area can be determined as:

$$\begin{aligned}
 Q_{\text{uncontrolled}} &= 2.78 \times C \times i_{100\text{yr}} \times A \quad \text{where:} \\
 C &= \text{Average runoff coefficient of uncontrolled area} = 0.9 \\
 i_{100\text{yr}} &= \text{Intensity of 100-year storm event (mm/hr)} \\
 &= 1735.688 \times (T_c + 6.014)^{0.820} = 178.56 \text{ mm/hr; where } T_c = 10 \text{ minutes} \\
 A &= \text{Uncontrolled Area} = 0.05 \text{ Ha}
 \end{aligned}$$

Therefore, the uncontrolled release rate can be determined as:

$$\begin{aligned}
 Q_{\text{uncontrolled}} &= 2.78 \times C \times i_{100\text{yr}} \times A \\
 &= 2.78 \times 0.9 \times 178.56 \times 0.05 \\
 &= \mathbf{22.34 \text{ L/s}}
 \end{aligned}$$

The maximum allowable release rate from the remainder of the site can then be determined as:

$$\begin{aligned}
 Q_{\text{max allowable}} &= Q_{\text{restricted}} - Q_{\text{uncontrolled}} \\
 &= 44.84 \text{ L/s} - 22.34 \text{ L/s} \\
 &= \mathbf{22.50 \text{ L/s}}
 \end{aligned}$$

4.6 On-Site Detention

As noted in section 4.4 any excess storm water up to the 100-year event is to be stored on-site within the building cistern in order to not surcharge the downstream municipal storm sewer system. As the cistern is located inside the building, coordination with the architect, structural and mechanical engineers will be needed to design the structure and associated inlet control device.

4.6.1 Site Inlet Control

The following Table summarizes the on-site storage requirements during both the 1:5-year and 1:100-year events.

ICD AREA	TRIBUTARY AREA	AVAILABLE STORAGE (M ³)	100-YEAR STORM		5-YEAR STORM	
			RESTRICTED FLOW (L/S)	REQUIRED STORAGE (M ³)	RESTRICTED FLOW (L/S)	REQUIRED STORAGE (M ³)
Cistern	0.37	130.00	22.50	129.67	22.50	51.13
Unrestricted	0.05					
TOTAL	0.42	130.00	22.50	129.67	22.50	51.13

In all instances the required storage is met with the building cistern.

4.6.2 Overall Release Rate

As demonstrated above, the site uses an inlet control device to restrict the 100 year storm event to the criteria approved by the City of Ottawa. Restricted stormwater will be contained onsite by the building cistern. In the 100 year event, there will be no overflow off-site from restricted areas.

The sum of restrictions on the site is 22.50 l/s, which is equal to the allowable release of 22.50 l/s noted in section 4.5.

5 SEDIMENT AND EROSION CONTROL PLAN

During construction, existing stream and storm water conveyance systems can be exposed to significant sediment loadings. A number of construction techniques designed to reduce unnecessary construction sediment loadings may be used such as;

- Filter socks will remain on open surface structures such as manholes and catchbasins until these structures are commissioned and put into use;
- Installation of silt fence, where applicable, around the perimeter of the proposed work area.

During construction of the services, any trench dewatering using pumps will be fitted with a “filter sock.” Thus, any pumped groundwater will be filtered prior to release to the existing surface runoff. The contractor will inspect and maintain the filter sock as needed including sediment removal and disposal.

All catchbasins, and to a lesser degree manholes, convey surface water to sewers. Consequently, until the surrounding surface has been completed these structures will be protected with a sediment capture filter sock to prevent sediment from entering the minor storm sewer system. These will stay in place and be maintained during construction and build-out until it is appropriate to remove them.

The Sediment and Erosion Control Plan 125192-C-010 is included in **Appendix D**.

6 CONCLUSIONS

Municipal water, wastewater and stormwater systems required to accommodate the proposed development are available to service the proposed development. Prior to construction, existing sewers are to be CCTV inspected to assess sewer condition.

This report has demonstrated sanitary and storm flows from and water supply to the subject site can be accommodated by the existing infrastructure. Also, the proposed servicing has been designed in accordance with MECP and City of Ottawa current level of service requirements.

The use of lot level controls, conveyance controls and end of pipe controls outlined in the report will result in effective treatment of surface stormwater runoff from the site. Adherence to the sediment and erosion control plan during construction will minimize harmful impacts on surface water.

Based on the information provided herein, the development can be serviced to meet City of Ottawa requirements.

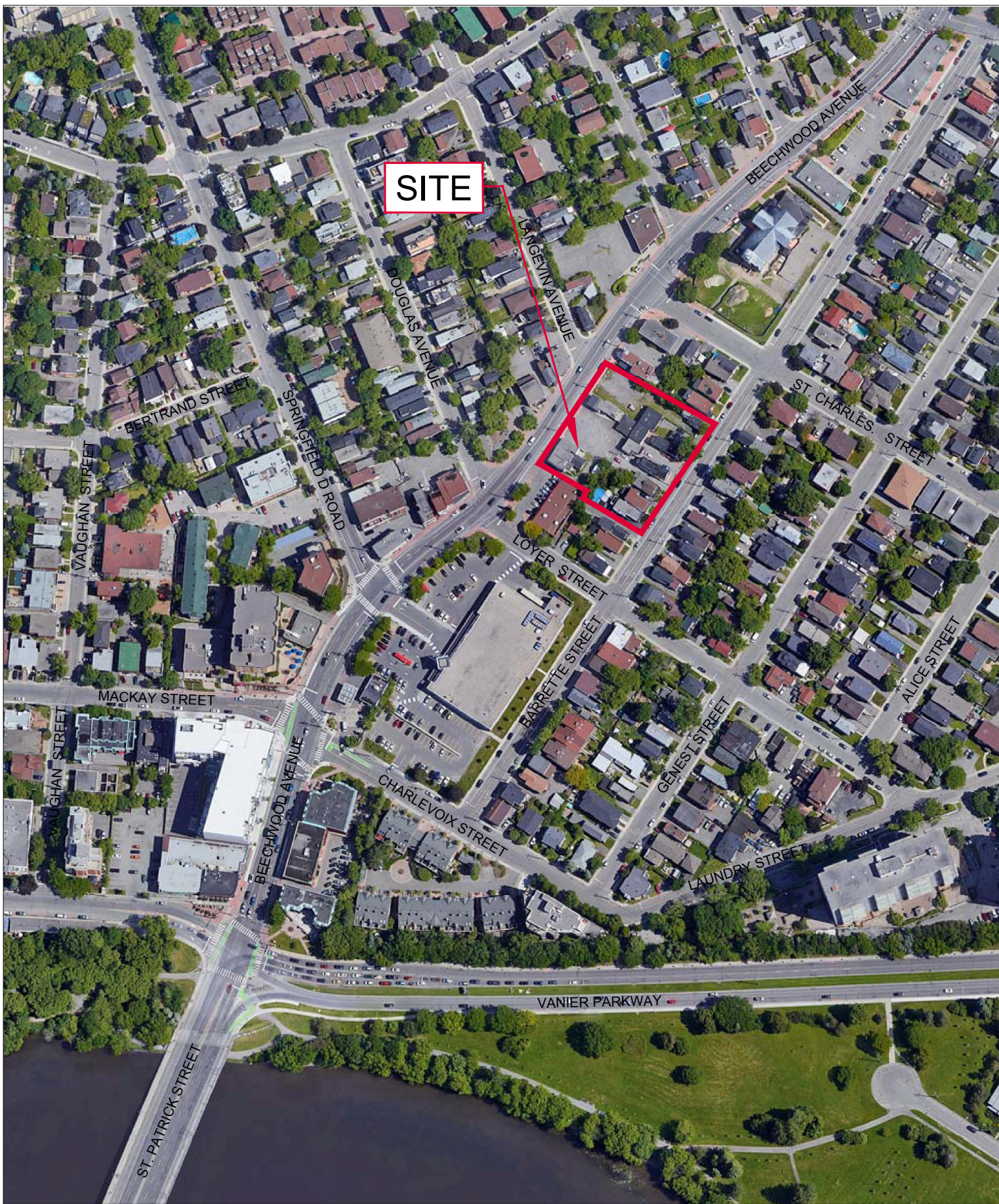
Report prepared by:



Demetrius Yannouloupoulos, P. Eng.
Director, Ottawa Office Lead

A handwritten signature in black ink, appearing to read "JB", on a light gray background.

James Battison C.E.T



SITE



Project Title

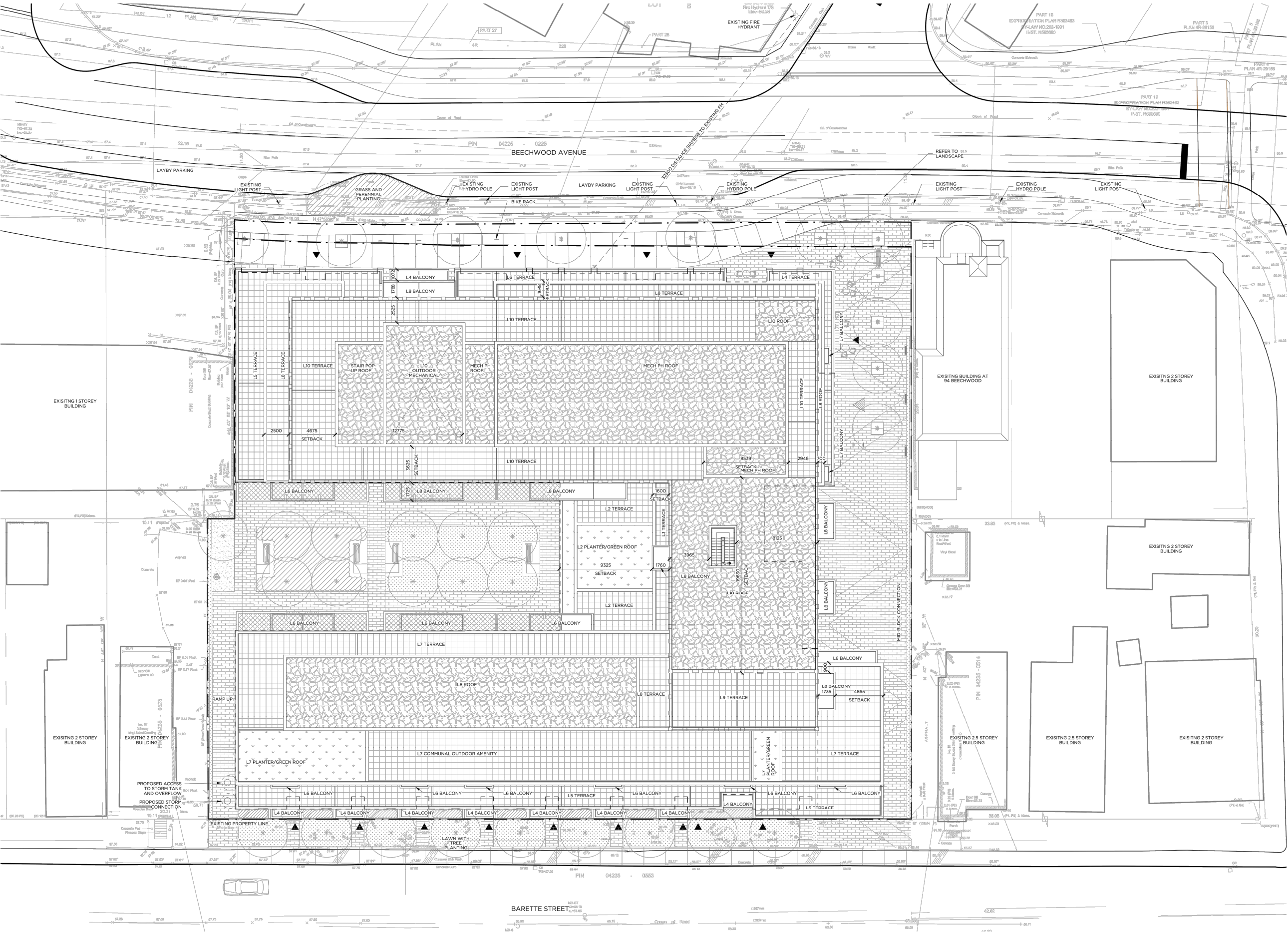
78-90 BEECHWOOD AVENUE
69-93 BARRETTE STREET

Drawing Title

KEY PLAN

Sheet No.

FIGURE 1



Scale

N.T.S.

Project Title

78-90 BEECHWOOD AVENUE
69-93 BARRETTE STREET

Drawing Title

SITE PLAN

Sheet No.

FIGURE 2

APPENDIX A



IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : 78 Beechwood Ave.
LOCATION : City of Ottawa
DEVELOPER : Minto Communities - Canada

FILE: 125192-6.4.4
DATE PRINTED: 2020-07-31
DESIGN: 2020-05-13
PAGE : 1 OF 1

NODE	RESIDENTIAL				NON-RESIDENTIAL			AVERAGE DAILY DEMAND (l/s)			MAXIMUM DAILY DEMAND (l/s)			MAXIMUM HOURLY DEMAND (l/s)			FIRE DEMAND (l/min)
	Single	Town	Apt	POP'N	INDTRL (ha.)	COMM. (ha.)	RETAIL (m ²)	Res.	Non-res.	Total	Res.	Non-res.	Total	Res.	Non-res.	Total	
BUILDING			251	452			564	1.46	0.02	1.48	3.66	0.04	3.70	8.05	0.07	8.12	8,000

ASSUMPTIONS

<u>RESIDENTIAL DENSITIES</u>				<u>AVG. DAILY DEMAND</u>				<u>MAX. HOURLY DEMAND</u>			
Apartment (ave)	1.8	p / p / u		Residential:**	280	l / cap / day		Residential:	1,540	l / cap / day	
				Industrial:		l / ha / day		Industrial:		l / ha / day	
				Commercial:		l / ha / day		Commercial:		l / ha / day	
				Retail:	2,500	l / 1000m ² / day		Retail:	11,250	l / 1000m ² / day	
** Residential Daily Demand reduced to coincide with current waste water guidelines				<u>MAX. DAILY DEMAND</u>				<u>FIRE FLOW</u>			
				Residential:	700	l / cap / day		From FUS Calculation	28,000	l / min	
				Industrial:		l / ha / day					
				Commercial:		l / ha / day					
				Retail:	6,250	l / 1000m ² / day					

Fire Flow Requirement from Fire Underwriters Survey - 78 Beechwood Avenue

78 Beechwood

Floor Area (3 & 4)	5,013 m ²
50% Floor Area (5 to 10)	4,480
Total Floor Area	9,493 m²

$$F = 220C\sqrt{A}$$

C	0.6	C =	1.5 wood frame
A	9,493 m ²		1.0 ordinary
			0.8 non-combustible
F	12,861 l/min		0.6 fire-resistive
use	13,000 l/min		

Occupancy Adjustment

		-25% non-combustible
		-15% limited combustible
Use	-15%	0% combustible
		+15% free burning
Adjustment	-1950 l/min	+25% rapid burning
Fire flow	11,050 l/min	

Sprinkler Adjustment

		-30% system conforming to NFPA 13
		-50% complete automatic system
Use	-30%	
Adjustment	-3315 l/min	

Exposure Adjustment

Building Face	Separation (m)	Adjacent Exposed Wall			Exposure Charge *
		Length	Stories	L*H Factor	
north	21.0	32.3	2	65	8%
east	3.1	46.6	2	93	19%
south	20.8	24.9	2	50	7%
west	7.9	28.8	2	58	16%

Total

Adjustment - l/min

Total adjustments	(3,315) l/min
Fire flow	7,735 l/min
Use	8,000 l/min
	133 l/s

Floor	Area (m ²)	Two Largest Floor	Floors Above at 50%
1	2218		
2	2447		
3	2519	2519	
4	2494	2494	
5	2494		1247
6	2214		1107
7	1428		714
8	1171		585.5
9	1271		635.5
10	382		191
Total	18638		9493

(Note: For fire-resistive buildings, consider two largest adjoining floors plus 50% of each of any floors immediately above them up to eight.)

0% (Note: According to Page G-104 in **Tech bulletin ISTB-2018-02** Revisions to Ottawa Design Guidelines - Water Distribution, "If the exposing wall of the building being considered is taller than the exposed wall of the adjacent structure, no exposure charge applies".)

Water Boundary Condition Request - 78 Beechwood Ave.

Wessel, Shawn <shawn.wessel@ottawa.ca>

Tue 5/19/2020 9:45 AM

To: Amy Zhuang <Amy.Zhuang@ibigroup.com>

Cc: O'Connor, Ann <Ann.O'Connor@ottawa.ca>; James Battison <James.Battison@ibigroup.com>; Demetrius Yannoulopoulos <dyannoulopoulos@IBIGroup.com>

 1 attachments (80 KB)

78 Beechwood May 2020.pdf;

Good morning everyone.

Please find requested conditions.

Please refer to Guidelines and Technical bulletin ISDTB-2014-02 concerning basic day demands greater than 0.5 L/s.

The following are boundary conditions, HGL, for hydraulic analysis at 78 Beechwood (zone 1E) assumed to be connected to the 305mm on Barrette (see attached PDF for location).

Minimum HGL = 107.0m

Maximum HGL = 118.3m. The maximum pressure is estimated to be more than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.

MaxDay + FireFlow (467 L/s) = 89.0m

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

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

If you require additional information or clarification, please do not hesitate to contact me anytime.

Thank you

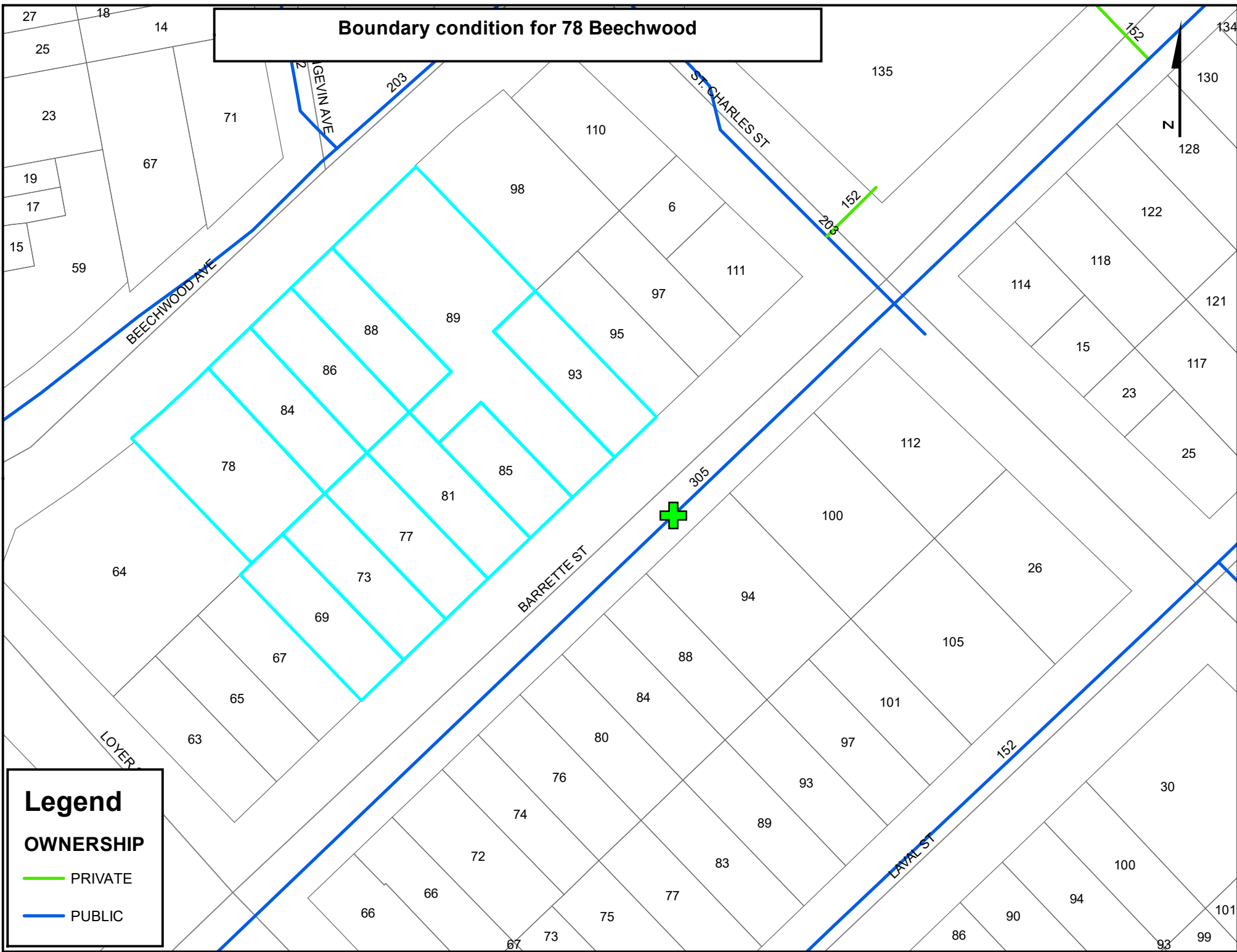
Regards,

Shawn Wessel, A.Sc.T.,rcji

Project Manager - Infrastructure Approvals

Gestionnaire de projet – Approbation des demandes d'infrastructures

Development Review Central Branch | Direction de l'examen des projets d'aménagement, Centrale



APPENDIX B

LOCATION				RESIDENTIAL										ICI AREAS										INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	CAPACITY	LENGTH	PROPOSED SEWER DESIGN		
STREET	AREA ID	FROM MH	TO MH	AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		RES PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)				ICI PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)	IND	CUM	IND	CUM	TOTAL FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
					SF	SD	TH	APT		IND	CUM			IND	CUM	IND	CUM			IND	CUM												L/s	(%)
78 Beechwood Ave.		Building	MH1A	0.42				251		451.8	451.8	3.40	4.97			0.06	0.06			0.48	0.48	0.16					5.13	48.39	1.07	200	2.00	1.492	43.26	89.40%
78 Beechwood Ave.		MH1A	Main							0.0	451.8	3.40	4.97			0.00	0.06			0.00	0.48	0.16					5.13	48.39	10.59	200	2.00	1.492	43.26	89.40%
Design Parameters:				Notes:								Designed:				No.		Revision								Date								
Residential				1. Mannings coefficient (n) = 0.013								JEB				1.		Issued for Re-Zoning Application								2020-07-31								
ICI Areas				2. Demand (per capita): 280 L/day																														
SF 3.4 p/p/u				3. Infiltration allowance: 0.33 L/s/Ha								Checked:																						
TH/SD 2.7 p/p/u				4. Residential Peaking Factor:								DY																						
APT 1.8 p/p/u				Harmon Formula = 1+(14/(4+(P/1000)*0.5))0.8																														
Other 60 p/p/Ha				where K = 0.8 Correction Factor								Dwg. Reference:																						
				5. Commercial and Institutional Peak Factors based on total area, 1.5 if greater than 20%, otherwise 1.0								125192-C-001				File Reference:		Date:								Sheet No:								
																125192.7.03		2020-07-31								1 of 1								

APPENDIX C

J:\21012_78Beechwood\70_Production\703_Design\04_Civil\Sheets\C-500.dwg Layout Name: C-500 STORM DRAINAGE AREA PLAN Plot Style: AIA STANDARD-FULL CTB Plot Scale: 1:25.4 Printed At: 7/21/2020 11:22 AM User: David By



LEGEND :

- WH 1.01 0.0 AREA NUMBER
- 1.01 0.0 RUNOFF COEFFICIENT
- AREA IN HECTARES
- DRAINAGE AREA LIMITS

SEE DRAWING C-001 FOR NOTES, AND LEGEND

KEY PLAN
N.T.S.

14		
13		
12		
11		
10		
9		
8		
7		
6		
5		
4		
3		
2		
1	ISSUED FOR SPA	D.G.Y. 2020.07.31
No.	REVISIONS	By Date

minto
Communities

IBI **IBI GROUP**
400 - 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title
**78-90 BEECHWOOD/
69-93 BARRETTE**

Drawing Title
**SITE DRAINAGE
AREA PLAN**

Scale
1:200

Design	J.B.	Date	AUG. 2020
Drawn	J.B./D.P.S.	Checked	D.G.Y.
Project No.	125192	Drawing No.	C-500

CITY PLAN No. XXXX
CITY FILE No. D07-12-20-XXX

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW													SEWER DATA											
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.25	C= 0.30	C= 0.50	C= 0.57	C= 0.65	C= 0.69	C= 0.70	C= 0.76	C= 0.90	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr)		
																															DIA	W	H			(L/s)	(%)	
78 Beechwood		Cistern	Main										0.37	0.93	0.93	10.00	0.09	10.09	76.81	104.19	122.14	178.56	71.10	96.46	113.07	165.30		71.10	142.67	10.75	300			2.00	1.955	71.57	50.16%	
Definitions: Q = 2.78CIA, where: Q = Peak Flow in Litres per Second (L/s) A = Area in Hectares (Ha) i = Rainfall intensity in millimeters per hour (mm/hr) [i = 732.951 / (TC+6.199)^0.810] 2 YEAR [i = 998.071 / (TC+6.053)^0.814] 5 YEAR [i = 1174.184 / (TC+6.014)^0.816] 10 YEAR [i = 1735.688 / (TC+6.014)^0.820] 100 YEAR				Notes: 1. Mannings coefficient (n) = 0.013										Designed: JEB				No.		Revision								Date										
																		1.	Issued for Re-Zoning Application								2020-07-31											
														Checked: DY																								
														Dwg. Reference: 125192-500																								
																		File Reference: 125192.7.03				Date: 2020-07-31				Sheet No: 1 of 1												



IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

PROJECT: 78 Beechwood Ave.
DATE: 2020-07-31
FILE: 125192.7.03
REV #: 1
DESIGNED BY: JB
CHECKED BY: DY

STORMWATER MANAGEMENT

Formulas and Descriptions

$i_{2yr} = 1:2 \text{ year Intensity} = 732.951 / (T_c + 6.199)^{0.810}$
 $i_{5yr} = 1:5 \text{ year Intensity} = 998.071 / (T_c + 6.053)^{0.814}$
 $i_{100yr} = 1:100 \text{ year Intensity} = 1735.688 / (T_c + 6.014)^{0.820}$
 T_c = Time of Concentration (min)
 C = Average Runoff Coefficient
 A = Area (Ha)
 Q = Flow = $2.78CiA$ (L/s)

Maximum Allowable Release Rate

Flow Allocation

C	=	0.5 (Pre-Development)
T_c	=	10 min
i_{2yr}	=	76.81 mm/hr
A_{TOTAL}	=	0.42 Ha
Q_{TOTAL}	=	44.84 L/s

Uncontrolled Release ($Q_{uncontrolled} = 2.78 \times C \times i_{100yr} \times A_{uncontrolled}$)

C	=	0.9
T_c	=	10 min
i_{100yr}	=	178.56 mm/hr
$A_{uncontrolled}$	=	0.050 Ha
$Q_{uncontrolled}$	=	22.34 L/s

Maximum Allowable Release Rate ($Q_{max\ allowable} = Q_{restricted} - Q_{uncontrolled}$)

$Q_{max\ allowable}$	=	22.50 L/s
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MODIFIED RATIONAL METHOD (100-Year & 5-Year Pondering)

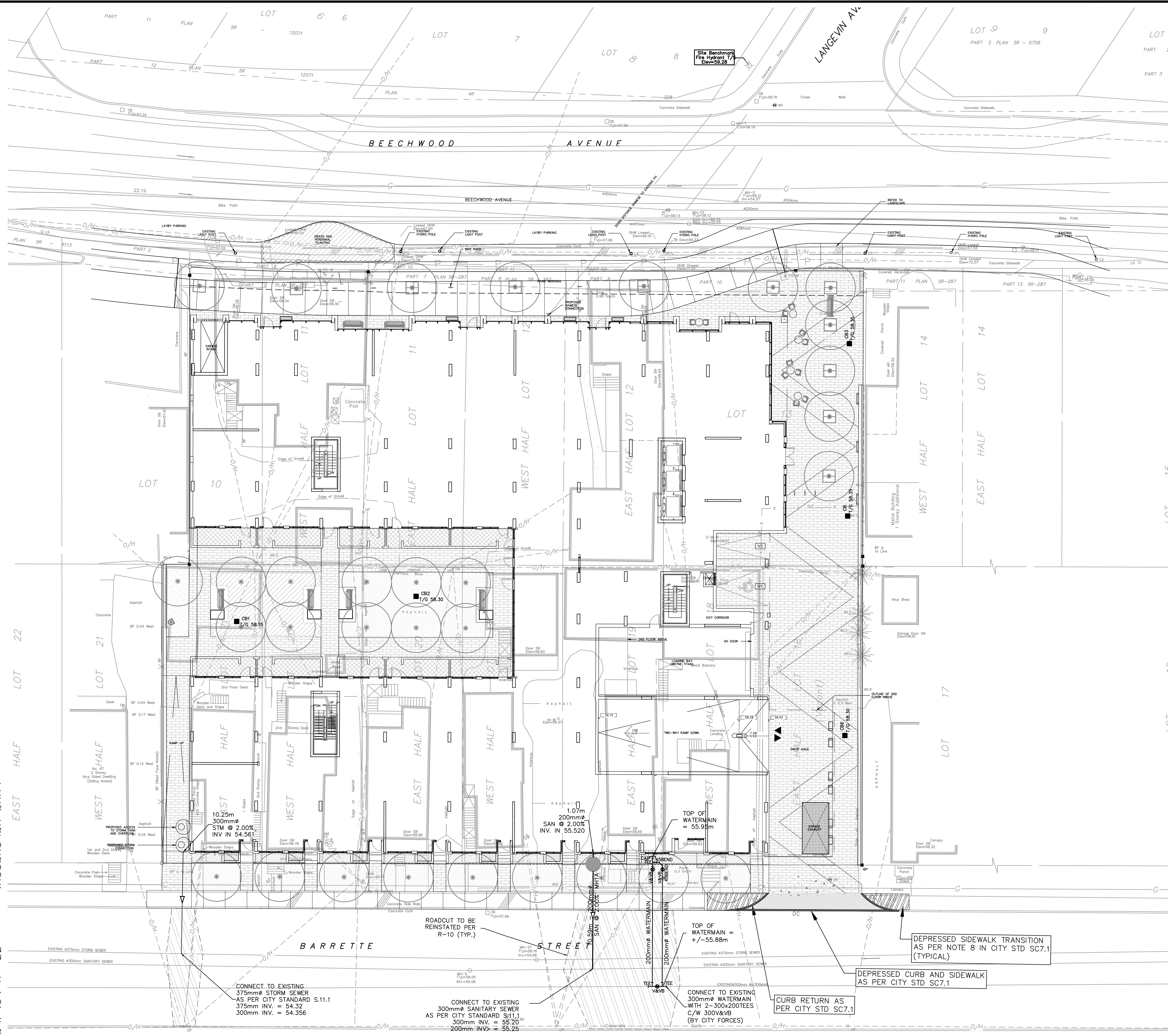
Drainage Area		Cistern			
Area (Ha)		0.370			
C =		0.99			
		Restricted Flow Q_r (L/s)= 22.50			
100-Year Pondering					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78 \times C i_{100yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
36	80.96	82.45	22.50	59.95	129.48
38	77.93	79.36	22.50	56.86	129.64
39	76.51	77.91	22.50	55.41	129.67
40	75.15	76.52	22.50	54.02	129.65
42	72.57	73.90	22.50	51.40	129.52

Storage (m^3)				
Overflow	Required	Surface	Cistern	Balance
0.00	129.67	0.00	130.00	0.00

Drainage Area		Cistern			
Area (Ha)	0.370				
C =	0.90	Restricted Flow Q_r (L/s)= 22.50			
5-Year Ponding					
T_c Variable (min)	i_{sy_r} (mm/hour)	Peak Flow $Q_p = 2.78 \times C i_{sy_r} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
19	72.53	67.14	22.50	44.64	50.89
21	68.13	63.07	22.50	40.57	51.12
22	66.15	61.23	22.50	38.73	51.13
23	64.29	59.51	22.50	37.01	51.08
25	60.90	56.37	22.50	33.87	50.81

Storage (m^3)				
Overflow	Required	Surface	Cistern	Balance
0.00	51.13	0.00	130.00	0.00

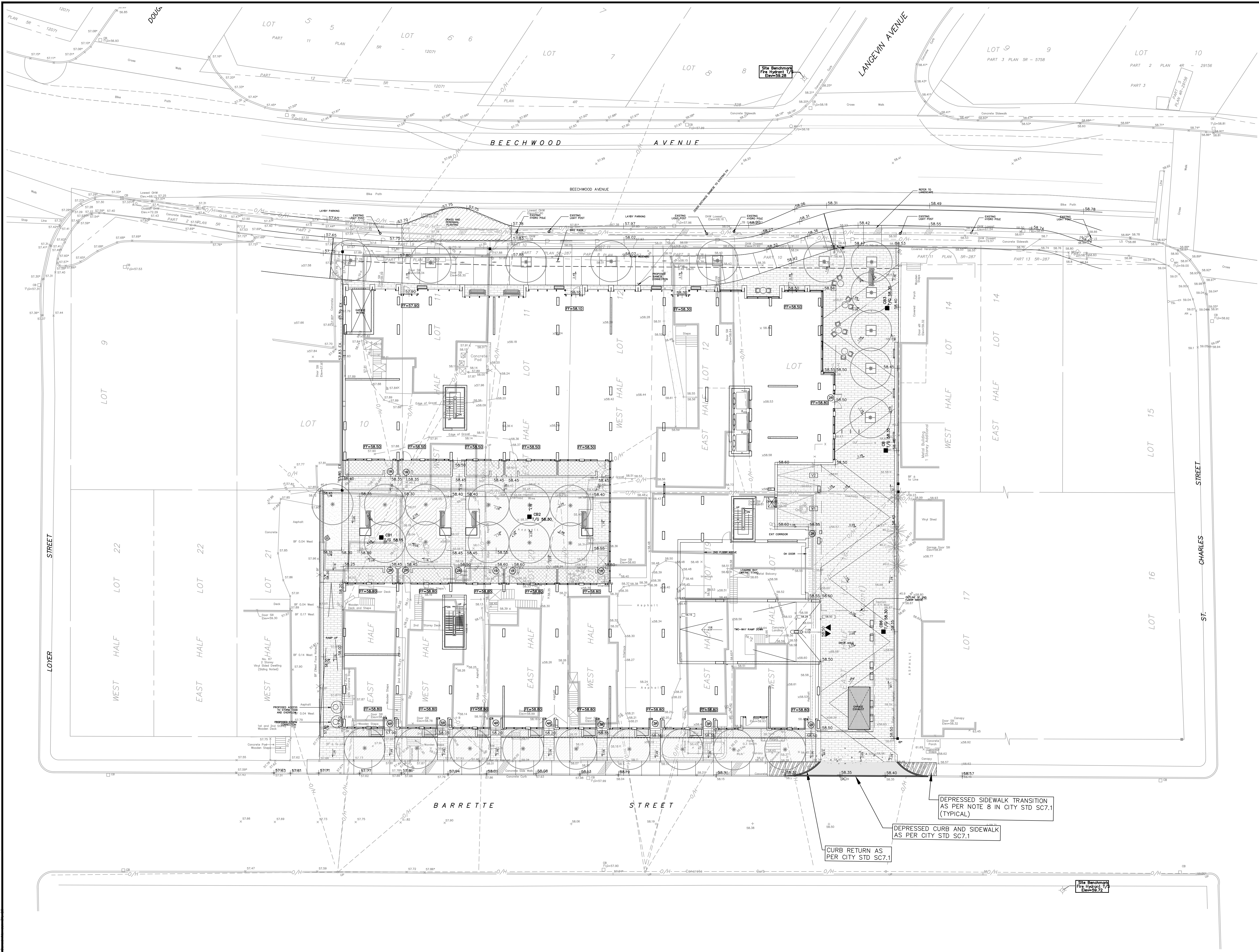
APPENDIX D



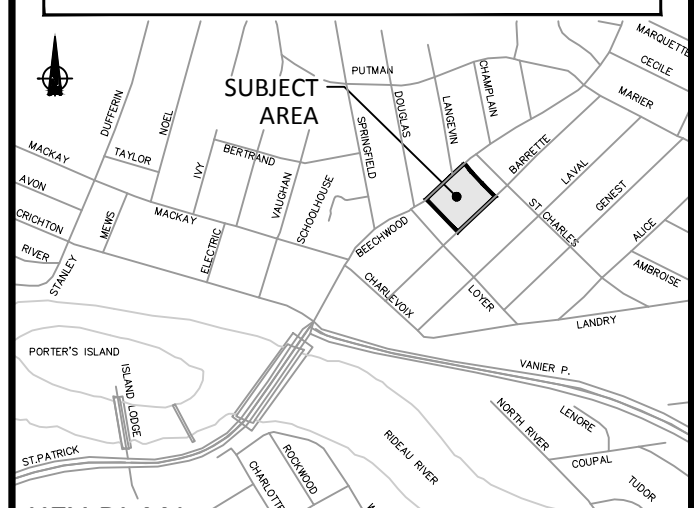
11. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATER BODY DURING CONSTRUCTION ACTIVITIES. THIS INCLUDES LIMITING THE AMOUNT OF EXPOSED SOIL, USING FILTER CLOTH UNDER THE GRATES OF CATCHBASINS AND MANHOLES AND INSTALLING SLIT FENCES AND EFFECTIVE SEDIMENT TRAPS. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCIES.
12. BEARINGS SHOWN HEREON AND ELEVATIONS ARE INDICATED ON THE LOT SURVEY BY ANNE O'SULLIVAN OF VOLLEBEKK LTD., DATED JULY 20, 2020.
13. CLAY SEAL TO BE INSTALLED IN SERVICE TRENCHES BETWEEN CONNECTION POINT AND CAP.
14. THE EXISTING BUILDING SERVICES ARE TO BE FIELD LOCATED AND DECOMMISSIONED AS PER CURRENT CITY STANDARDS. THE WATER SERVICES ARE TO BE BLANKED AT THE WATERMAIN BY CITY FORCES AS PART OF THE WATER PERMIT. EXISTING SEWERS ARE TO BE CAPPED AT THE PROPERTY LINE BY THE CONTRACTOR TO THE SATISFACTION OF THE CITY'S SEWER OFFICIAL STAFF.



J:\125192_78Beechwood\70_Production\703_Design\04_Construction\70300.dwg Layout Name: C-200 SITE GRADING-FULL CIB Plot Scale: 1:25.4 Printed At: 7/31/2020 11:20 AM Lot Saved By: DSURNA, Lot



SEE DRAWING C-001 FOR NOTES, AND LEGEND

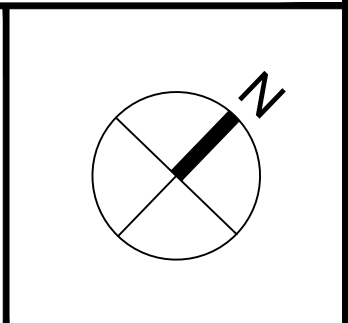
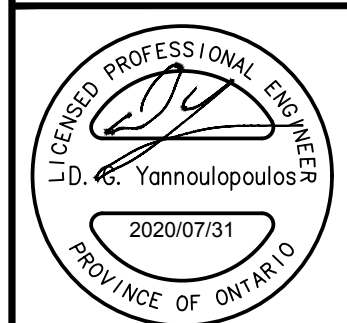


KEY PLAN		
N.T.S.		
14		
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1	ISSUED FOR SPA	D.G.Y. 2020.07.31
No.	REVISIONS	By Date

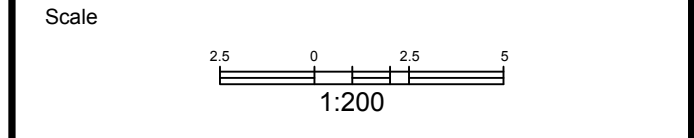


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Project Title
**78-90 BEECHWOOD/
69-93 BARRETTE**



Drawing Title
SITE GRADING PLAN



Design	J.B.	Date	AUG. 2020
Drawn	J.B./D.P.S.	Checked	D.G.Y.
Project No.	125192	Drawing No.	C-200

CITY PLAN No. XXXX
CITY FILE No. D07-12-20-XXX

