

NADG

**3777 STRANDHERD DRIVE
BARRHAVEN TOWN CENTRE
PAD C**

Servicing and Stormwater Management Design Brief

November 2025

**377 STRANDHERD DRIVE
BARRHAVEN TOWN CENTRE
PAD C
SERVICING AND STORMWATER MANAGEMENT DESIGN BRIEF**

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**Design Brief
City of Ottawa
Development Application File: D07-12-0106**

November 2025

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Pad C – Servicing and Stormwater Management Design Brief

Appendix A

- Drawing C-001 – Site Servicing
- Water Calculations
- Original Sanitary Sewer Design Sheet
- Original Sanitary Sewer Tributary Area Plan
- Updated Sanitary Sewer Design Sheet
- Joe Zagorski's E-mail
- Figure 1 – Pre-development Conditions
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- Modified Rational Calculation, 100-year
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1 Introduction

This Site Servicing and Stormwater Management Brief outlines the detailed design for extending storm, sanitary, and water services to Building Pad C, a proposed 740 sq. m stand-alone drive-through restaurant building located in the existing Barrhaven Town Centre shopping plaza at the intersection of Strandherd Drive and Greenbank Road. The existing shopping center is bound by Strandherd Drive to the north, undeveloped land to the south, Greenbank Road to the east, and Jockvale Road to the west. Refer to key map below in Figure 1.1.



Figure 1.1 – Key Map

2 Water Supply

The water service for Pad C will be provided through a proposed 50mm diameter Type K copper line connected to the existing 200 mm Ø private watermain network located in the existing parking lot. Fire protection will be provided by existing hydrants located in the parking lot. See Drawing C-001 in **Appendix A** for details.

The area where Pad C is proposed is over a section of the existing watermain. This portion of the watermain will be removed and reconstructed in a new alignment as detailed on Drawing C-001.

A water model of the existing watermain and service connection was previously completed using the H2O MAP version 6.0 program produced by MWH Soft. The model incorporates a boundary condition provided by the City of Ottawa at Greenbank Road, where the existing 200 mm watermain servicing the commercial development connects

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to the existing 750 mm feeder main on Greenbank Road. The model includes the existing 200 mm watermain through the existing commercial site to the location where the 50 mm water service is proposed to service the PAD C building. The model incorporates water demands for the proposed building for the basic day, maximum day and peak hour scenarios and a fire demand calculated using the Fire Underwriters Survey (FUS) method. Copies of the boundary condition, water demand calculation, FUS calculation and hydraulic model results are included in **Appendix A**. Since the completion of the original water model, the water demands for the proposed building have increased by a maximum 0.02 L/s, while fire flow requirements have increased from 3,000 L/min to 4,000 L/min. Given the minimal change in demand, the impact on the model's results is considered negligible, and the existing model is considered valid for assessing the adequacy of the watermain.

The boundary conditions provide hydraulic heads for the basic day (maximum HGL), peak hour and maximum day plus fire scenarios for both pre-configuration and post-configuration scenarios. The pre-configuration is the worst scenario, highest maximum HGL and lowest peak hour and maximum day results and is used in the hydraulic analysis.

Under the basic day (maximum HGL) scenario, the pressure of the building (Node S-1 in the hydraulic model) is 633.0 kPa. Pressure reducing control in the building is required for pressures exceeding 552 kPa (80 psi). Under the post-configuration scenario, the basic day pressure will drop to 506.6 kPa. The peak hour pressure at the building is 466.4 kPa which exceeds the requirement of 276 kPa (40 psi).

The fire flow requirement for the building has been determined to be 67 l/s (4,000 l/min) in the FUS calculation included in **Appendix A**. Fire flow has been calculated at the building connection to the existing main, Node J-1 in the hydraulic model, and a fire flow rate of 116.1 l/s is provided in the model which exceeds the requirement of 50 l/s.

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3 Sanitary Sewers

The area where Pad C is proposed to be located is adjacent to an existing 250 mmØ sanitary sewer and 75 mmØ forcemain. The proposed building will be serviced by a 150 mmØ service lateral to the realigned sewer as illustrated on Drawing C-001.

The sewer and a portion of the forcemain will be removed and reconstructed as illustrated on Drawing C-001.

Appendix A also contains a copy of the original sanitary sewer design sheet and tributary area plan for the Town Center Site Plan. Pad C is located in tributary Area 11. The original sanitary sewer design sheet included a building expansion area of approximately 897 sq. m. (9655 sq. ft.) Peak flow from the site (including expansion) was 6.97 l/s. The sewer design sheet has been updated to calculate peak flow based on actual/anticipated use for Pad B and C. Pad B was previously approved and is comprised of a Second Cup coffee house plus a 99 sq.m. general retail space. The number of seats in the Second Cup is 46, at a daily volume of 125 l/day/seat (City of Ottawa Sewer Design Guidelines Appendix 4-A) the 99 sq. m. of retail space has been allocated a daily volume of 5 l/sm. Pad C is 740 sq.m of retail space at a daily volume of 5 l/sm. The peak sanitary flow from the site, when including Pad B and C and eliminating the expansion areas is 7.026 l/s. This very minor increase in peak flow which should have no negative impact on downstream sewers. City staff had confirmed previously that an increase up to 7.2 l/s would be acceptable for this site. See the email in **Appendix A**.

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4 Storm Sewers and Stormwater Management

In 2004, the owner commenced development of the western portion of the Barrhaven Town Centre site with the construction of the Home Depot pad and followed up in 2005 with the construction of the BMO and Swiss Chalet pads. All three of these pads are serviced by storm sewers, which discharge to the Kennedy-Burnett Stormwater Management Pond. Since the Kennedy-Burnett pond was to provide off-site quantity control for this development, no on-site quantity controls were included for those site plans. Refer to the 2004 Jockvale Road Extension Design Report by Robinson Consulting Inc. This current application proposes to erect a standalone Pad. The Pad will be located within the existing parking lot constructed as part of the BMO/Swiss Chalet site plan.

The stormwater management criteria for the proposed pad was developed in response to City of Ottawa comments from the initial engineering submission. The City has requested that the 100-year release rate from the portion of the site being redeveloped as the new building be restricted to the equivalent of a 5-year storm event. The calculation is based on a time of concentration (Tc) of 20 minutes and a runoff coefficient (C) of 0.5. Accordingly, the maximum allowable release rate for the new building area is calculated as follows:

$$Tc = 20 \text{ minutes}$$

$$A = 0.047 \text{ Ha}$$

$$C = 0.50$$

$$i_5 = 70.25 \text{ mm/hr}$$

$$Q_{100} = 2.78 \times C \times i \times A = 2.78 \times 0.50 \times 70.25 \times 0.074 = 7.23 \text{ l/s}$$

Based on the aforementioned criteria, the maximum 100-year release rate from the building area is 7.23 l/s.

Inlet control devices are proposed in each roof inlet, similar to the Watts ® roof drain with flow control. With a release rate of 1.26l/s per inlet, the total release rate from the building is **5.04 l/s**.

During a 100-year storm, the maximum retention volume required is 25.09 m³, see Modified Rational Method Calculation in Appendix A. The proposed building has an estimated rooftop storage volume of 27.75 m³, based on 150 mm depth of ponding, and 75% usable rooftop area for storage; therefore, there is no overflow during the 100-year event. According to the mechanical engineer, no rooftop scuppers are proposed, as the parapet is set 150mm above the drain grate.

In order to provide a piped outlet for Pad C, a proposed 250mm diameter storm service pipe will be connected to the existing storm sewer. An existing CB will be replaced with MH1, and the catchbasin (CB1) relocated to accommodate the regrading around the proposed storm sewer service. A new catchbasin (CB2) is proposed to collect runoff within the drive-through area south of the building, conveying flows to an existing 900mm diameter storm sewer.

The total surface runoff collected by catchbasins is expected to decrease because of the restriction introduced in the building roof area. Therefore, there is expected to be a net decrease in runoff conveyed to the immediate receiving storm sewer system. The proposed storm servicing layout is shown on Drawing C-001 in **Appendix A**.

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5 Grading

The exterior grading for Pad C will generally blend into the existing parking lot grades. The finished floor was established to minimize re-grading of the existing asphalt parking lot and to accommodate the rear exits, which tie into the existing drive aisle curbs and sidewalks. Drawing C-200 in Appendix A illustrates the proposed grades and limits of regrading.

There is no off-site grading proposed for this project.

Paterson Group geotechnical report dated June 20, 2018 provides details on the existing soils within the development. The report provides recommendations which include but are not limited to the following:

- The general permissible grade raise is 2.0 m.
- Fill placed below the foundations to meet OPSS Granular 'A' or Granular 'B' Type II placed in 300 mm lifts compacted to 98% SPMDD.
- Fill for roads to be suitable native material in 300 mm lifts compared to 95% SPMDD.
- Pavement Structure:

ACCESS LANES AND HEAVY TRUCK PARKING AREAS	CAR PARKING AREAS
40 mm superpave 12.5 mm 50 mm superpave 19 mm 150 mm Granular 'A' 400 mm Granular 'B' Type II	50 mm HL3 superpave 12.5 mm 150 mm Granular 'A' 300 mm Granular 'B' Type II

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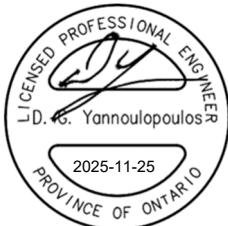
6 Sediment and Erosion Control

To reduce the possibility of sediment loads entering the existing storm sewer system during construction, a continuous row of silt bags will be placed around the perimeter of the construction limits, in addition, existing catchbasins in the vicinity of the proposed construction will have a silt sack placed in the structure. The sediment control measures should be maintained on a regular basis and remain in place until the area is repaved and vegetation is established in the landscape areas. See Drawing C-900 in Appendix A.

7 Reccomendations

This servicing and stormwater management design brief has demonstrated the proposed site plan can be serviced by connecting to existing storm, sanitary, and watermain pipes in the existing parking lot of the shopping plaza. The existing services have sufficient capacity to accommodate the proposed expansion. On-site stormwater management is provided by roof top detention to maintain post-development flows less than pre-development flows for both the 5- and 100-year storms. The construction of storm, and sanitary sewers, and watermain for the proposed building can be completed in conformance with the City of Ottawa standards. Adherence to the sediment and erosion control plan during construction will minimize harmful impacts on downstream systems.

Report prepared by:



Demetrius Yannouopoulos, P. Eng.

Director – Office Lead

A blue ink signature of "Ryan Magladry".

Ryan Magladry, C.E.T.

Associate – Manager, Land Engineering

A blue ink signature of "Ryan Robineau".

Ryan Robineau, P. Eng.

Intermediate Engineer, Land Engineering

Appendix A

Drawing C-001 – Site Servicing

Site Plan

Water Calculations

Original Sanitary Sewer Design Sheet

Original Sanitary Sewer Tributary Area Plan

Updated Sanitary Sewer Design Sheet

Joe Zagorski's E-mail

Figure 1 – Pre-development Conditions

Figure 2 – Post-Development Conditions

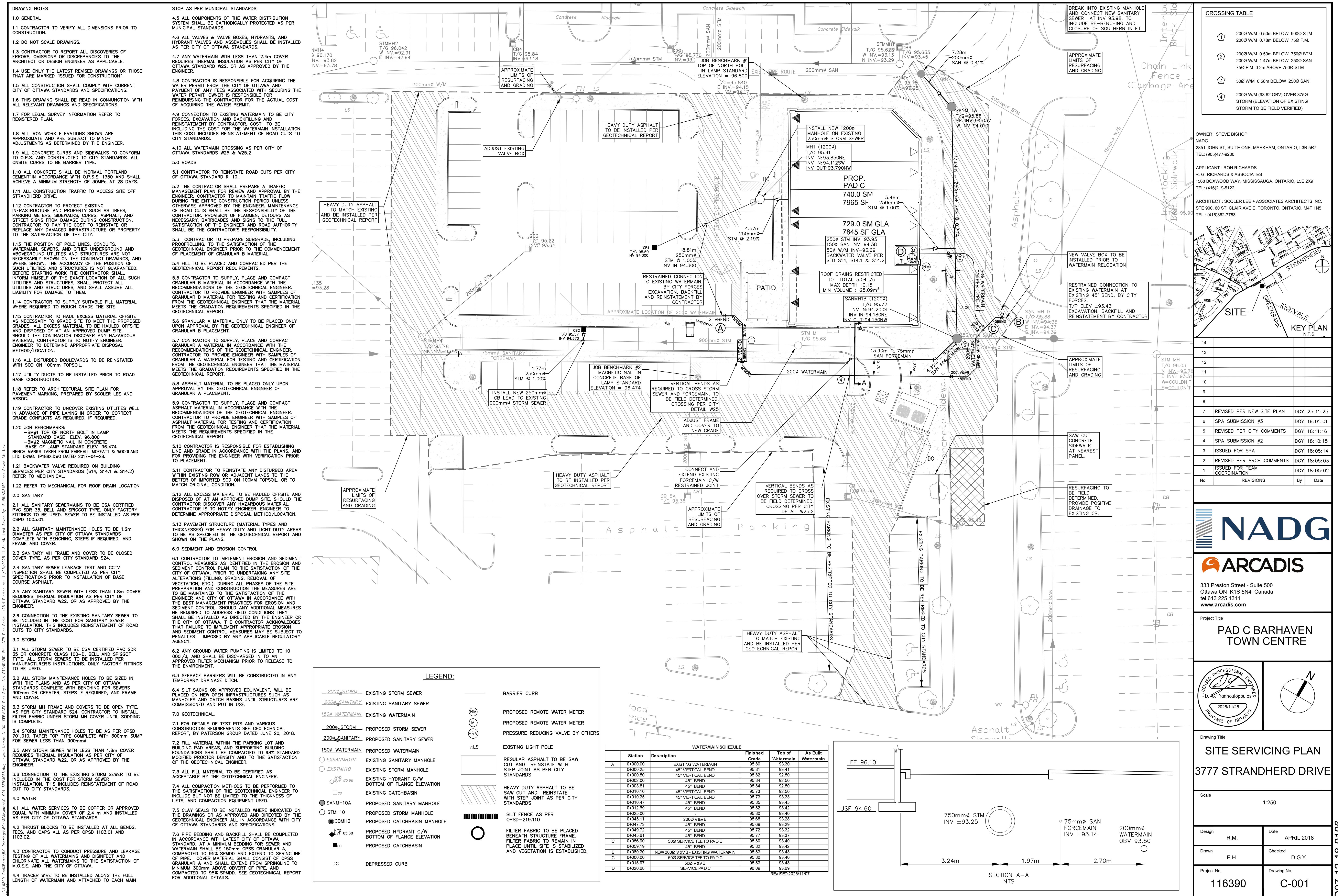
Modified Rational Calculation, 100-year

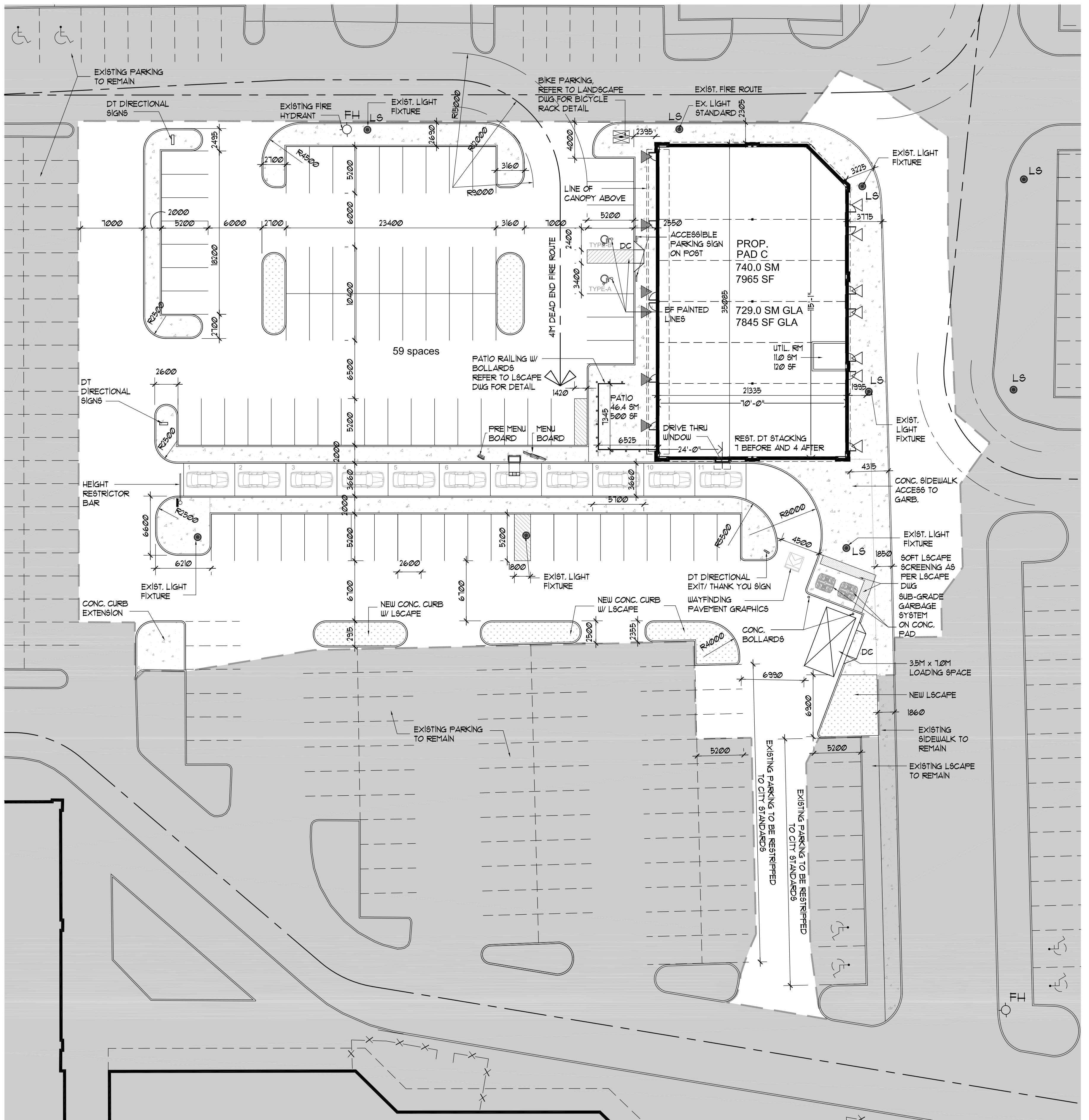
Watts Roof Drain

Drawing C-Rem - Removals

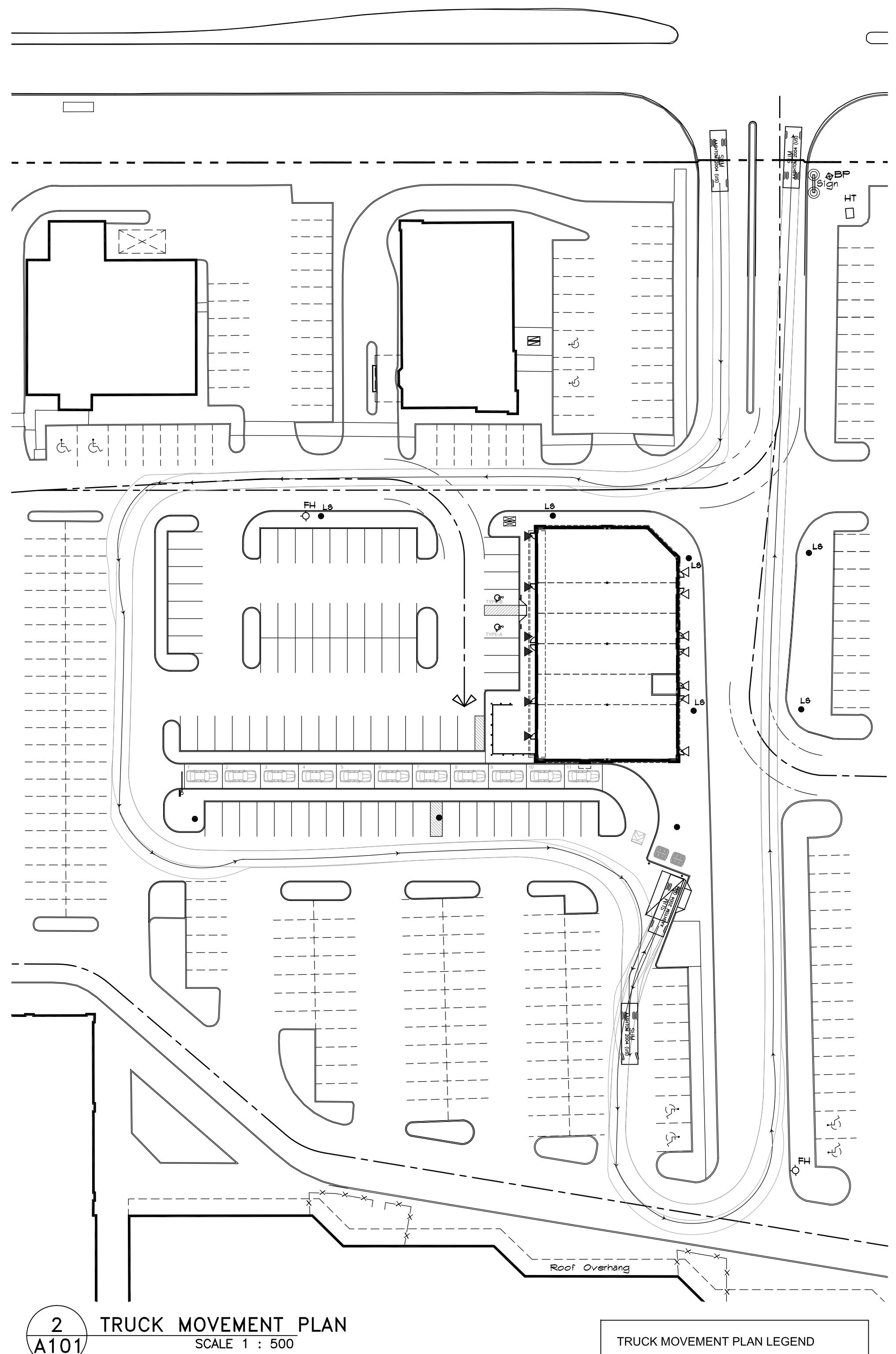
Drawing C-200 – Grading

Drawing C-900 – Sediment and Erosion Control Plan





1
A101 ENLARGED SITE PLAN
SCALE 1 : 250



2 TRUCK MOVEMENT PLAN
A101 SCALE 1 : 500

TRUCK MOVEMENT PLAN LEGEND

SURVEY INFO TAKEN FROM:
SURVEYOR'S REAL PROPERTY REPORT - PART 1
PLAN OF
PART OF LOT 15
CONCESSION 3 (Rideau Front)
GEOGRAPHIC TOWNSHIP OF NEPEAN
Now CITY OF OTTAWA

PREPARED BY:
FAIRHALL, MOFFATT & WOODLAND LIMITED
ONTARIO LAND SURVEYORS
JUNE 12 2012

1	AB	NOV21,25	SPA
NO.	BY	DATE	ISSUED
VERIFY ALL DIMENSIONS AND CONDITIONS AT THE JOB DO NOT SCALE PRINTS			
PLANS AND SPECIFICATIONS ARE THE PROPERTY OF THE ARCHITECT AND MUST BE RETURNED AT COMPLETION OF THE WORK OR UPON REQUEST			
THIS DRAWING MUST NOT BE USED FOR CONSTRUCTION UNLESS APPROVED AT RIGHT			APPROVED: DATE:
BARRHAVEN TOWN CENTRE INC			

OWNER : STEVE BISHOP
NORTH AMERICAN DEVELOPMENT GROUP.
2851 JOHN ST, SUITE ONE, MARKHAM, ONTARIO, L3R 5R7
TEL: (905)477-9200

PROJECT
BARRHAVEN TOWN CENTRE
3777 STRANDHERD DRIVE
NEPEAN, ONTARIO

DRAWING TITLE

ENLARGED SITE PLAN

ENLARGED SITE PLAN

182 DRAWN 11 FOLIO

LIBRARY ASSOCIATION
JL
CHECKED
25078

OF CHECKED AB 25070
ARCHITECTS

ALLAN MICHAEL BORENSTEIN DATE DWG. NO.

LICENCE
OCT 2025
SCALE

7172 SCALE AS NOTED

Y-REFS:

ANSWER

DRAWINGS REVISED: LAST UPDATED:

BOUNDARY CONDITIONS



Boundary Conditions For: Barrhaven Town Centre – Pad C

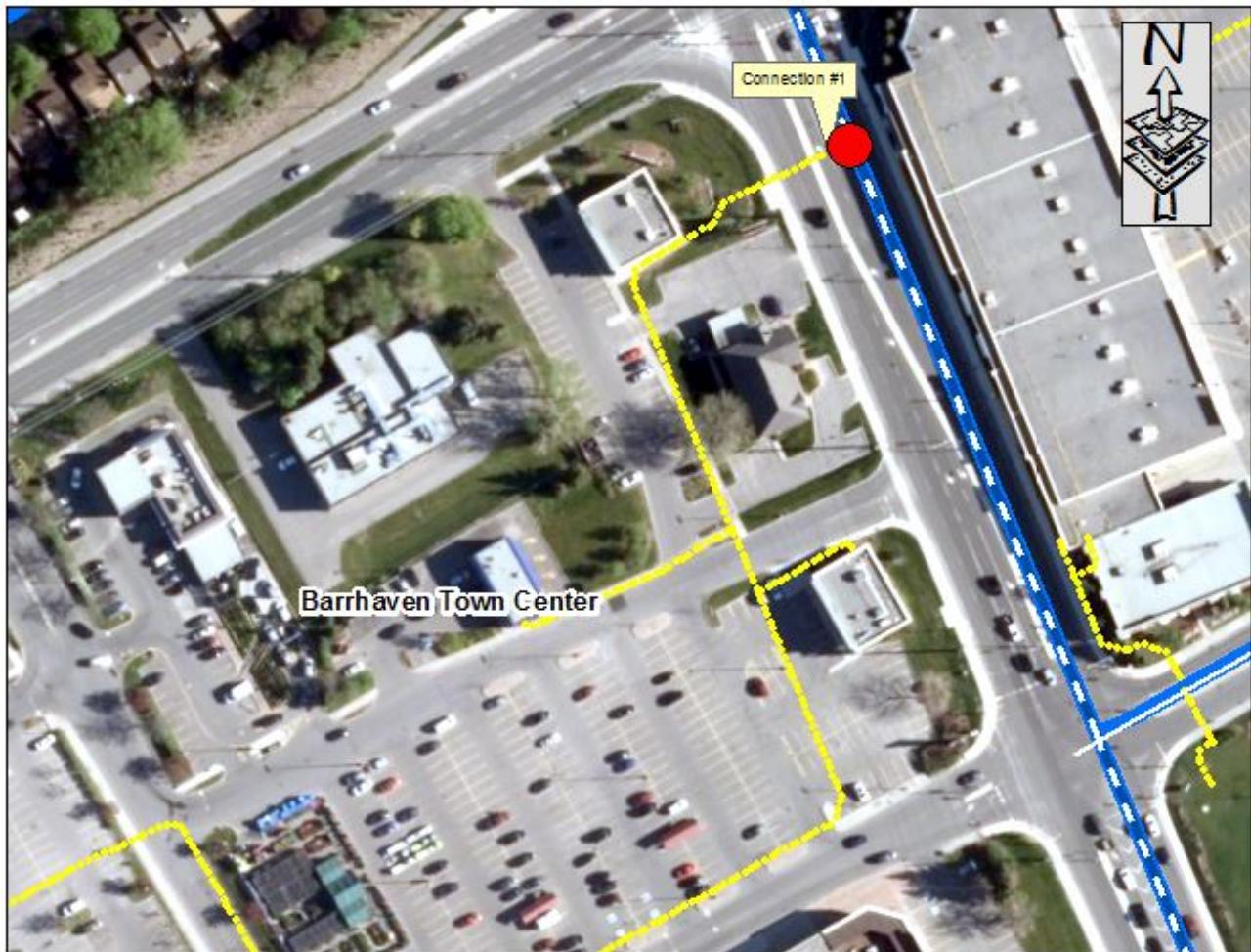
Date of Boundary Conditions: 2018-Oct-01

Provided Information:

Scenario	Demand	
	L/min	L/s
Average Daily Demand	0.8	0.01
Maximum Daily Demand	1.2	0.02
Peak Hour	2.1	0.04
Fire Flow #1 Demand	3,000	50.0

Number Of Connections: 1

Location:



BOUNDARY CONDITIONS



Results:

Pre-Configuration

Connection #: 1

Demand Scenario	Head (m)	Pressure ¹ (psi)
Maximum HGL	160.7	87.8
Peak Hour	143.7	63.7
Max Day Plus Fire (3,000) L/min	140.0	58.4

¹Elevation: **98.900 m**

Post Configuration

Connection #: 1

Demand Scenario	Head (m)	Pressure ¹ (psi)
Maximum HGL	147.8	69.5
Peak Hour	146.5	67.7
Max Day Plus Fire (3,000) L/min	147.0	68.4

¹Elevation: **98.900 m**

Notes:

1) As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:

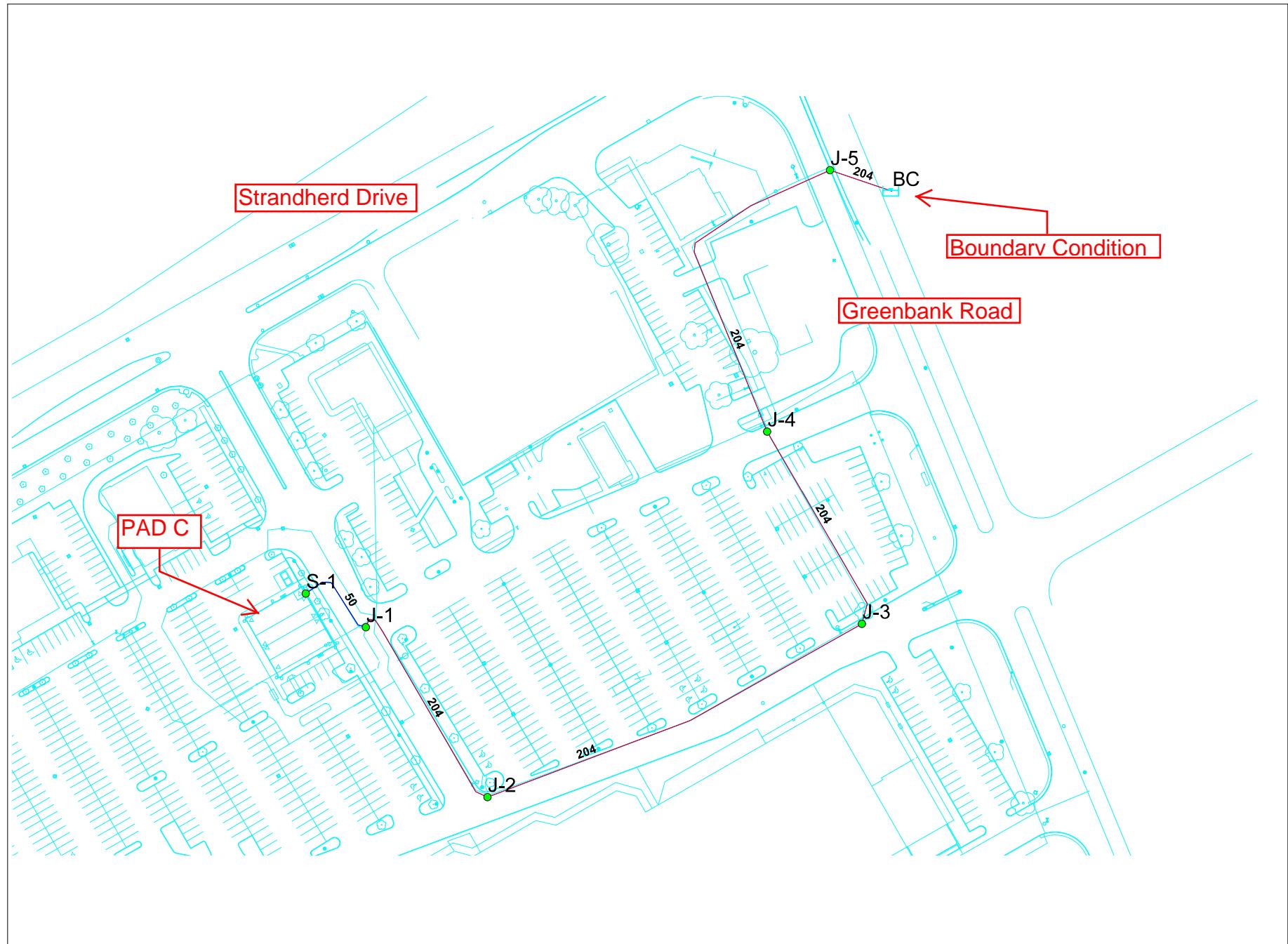
- a) If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
- b) Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

2) Connection 1 is an existing connection to backbone main on Greenbank. No new connections to backbone main are permitted without prior consultation with City Staff.

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. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

PAD C WATER MODEL



Date: Wednesday, November 14, 2018

Pad C - Basic Day (Max HGL) HGL 160.7m - Junction Report

	ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	J-1	0.00	95.80	160.70	635.97
2	J-2	0.00	95.70	160.70	636.95
3	J-3	0.00	95.70	160.70	636.95
4	J-4	0.00	96.90	160.70	625.19
5	J-5	0.00	98.90	160.70	605.59
6	S-1	0.01	96.10	160.70	633.03

Pad C Peak Hour HGL 143.7m - Junction Report

	ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	J-1	0.00	95.80	143.70	469.38
2	J-2	0.00	95.70	143.70	470.36
3	J-3	0.00	95.70	143.70	470.36
4	J-4	0.00	96.90	143.70	458.60
5	J-5	0.00	98.90	143.70	439.00
6	S-1	0.04	96.10	143.70	466.43

Pad C - Max Day + Fire HGL 140.0m - Design Fireflows

		ID	Total Demand (L/s)	Critical Node 1 ID	Critical Node 1 Pressure (kPa)	Critical Node 1 Head (m)	Adjusted Fire-Flow (L/s)	Available Flow @Hydrant (L/s)	Critical Node 2 ID	Critical Node 2 Pressure (kPa)	Critical Node 2 Head (m)	Adjusted Available Flow (L/s)	Design Flow (L/s)
1		J-1	50.00	J-1	371.51	133.71	116.10	116.10	J-1	139.96	110.08	116.10	116.10

NODE	RESIDENTIAL				NON-RESIDENTIAL (ICI)			AVERAGE DAILY DEMAND (l/s)			MAXIMUM DAILY DEMAND (l/s)			MAXIMUM HOURLY DEMAND (l/s)			FIRE DEMAND (l/min)
	SINGLE FAMILY UNITS	3 bedroom UNITS	2 bedroom UNITS	POPULATION	INDUST. (ha)	COMM. (m ²)	INSTIT. (ha)	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	
Site						740			0.02	0.02		0.03	0.03		0.06	0.06	4,000
TOTAL						740				0.02			0.03				0.06

ASSUMPTIONS

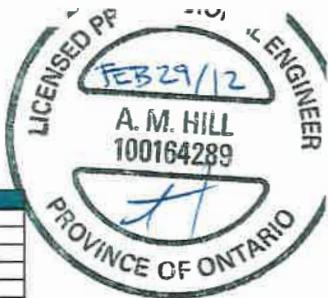
POPULATION DENSITY	WATER DEMAND RATES	PEAKING FACTORS	FIRE DEMANDS
Single Family	3.4 persons/unit	Residential 280 l/cap/day	Maximum Daily Residential 2.5 x avg. day Single Family 10,000 l/min (166.7 l/s)
3 Bedroom Units	2.7 persons/unit	Commercial Shopping Center 2,500 L/(1000m ²)/day	Commercial 1.5 x avg. day Semi Detached & Townhouse 10,000 l/min (166.7 l/s)
2 Bedroom Units	1.8 persons/unit		Residential 2.2 x max. day Commercial 1.8 x max. day Medium Density 15,000 l/min (250 l/s)

STEP	Contents	Description		Adjustment Factor	Result
1	Building A (1-storey) Total Effective Floor Area	1st Floor Area (Storage space exceeding 3m in height, floor area X 3)	740	Height 2.8m 1	740 m2
2	Type of Construction	Type V Wood Frame Type III Ordinary Construction Type II Noncombustible Construction Type I Fire Resistive Construction	1.5 1.0 0.8 0.6	Type II Noncombustible Construction 0.8	
3	Required Fire Flow	RFF = $220C\sqrt{A}$, rounded to nearest 1000 L/min			5000 L/min
4	Occupancy and Contents	Noncombustible Contents Limited Combustible Contents Combustible Contents Free Burning Contents Rapid Burning Contents	-25% -15% 0% 15% 25%	Limited Combustible Contents -15%	-750 L/min
	Fire Flow				4250 L/min
5	Automatic Sprinkler Protection	Automatic Sprinkler Conforming to NFPA 13 Standard Water Supply for both the system and Fire Department Hose Lines Fully Supervised System	-30% -10% -10%	No 0% No 0% No 0%	0 L/min 0 L/min 0 L/min
	Total Sprinkler Adjustment				0 L/min
	Exposure Adjustment	Based on Table 6 Exposure Adjustment Charges for Subject Building			
6	North	Separation (m) Length X Height Factor (m.storeys) Construction Type	17 16 Type I-II	With unprotected opening 3%	128 L/min
	South	Separation (m) Length X Height Factor (m.storeys) Construction Type	>30 18 Type II	With unprotected opening 0%	0 L/min
	East	Separation (m) Length X Height Factor (m.storeys) Construction Type	>30 6.4 Type II	With unprotected opening 0%	0 L/min
	West	Separation (m) Length X Height Factor (m.storeys) Construction Type	>30 220 Type II	With unprotected opening 0%	0 L/min
	Total Exposure Adjustment				128 L/min
7	Total Required Fire Flow	Rounded to Nearest 1000 L/min			4378 L/min
					4000 L/min
					67 L/s

Notes 1. Fire flow calculation are based on Fire Underwriters Survey version 2020.

2. If any vertical opening in the building are unprotected (e.g. interconnected floor spaces, elevators etc.), consider the two largest adjoining floor area plus 50% of all floors immediately above them up to a maximum of eight.

TABLE 1: SANITARY SEWER DESIGN SHEET



Design Criteria	
Min. Velocity	0.60 m/s
Max. Velocity	4.00 m/s
Mannings 'n'	0.013

Project Information	
D.M. Wills Project	Barrhaven Town Centre
D.M. Wills Project No.	08-10158
Project Location	Barrhaven Town Centre 3777 Strandherd Dr.
Designed by	D. Welch
Checked by	A. Hill
Date	September 22, 2010
Design/As-built	Design

Area No.	Description	Manholes			Commercial		Design Flow			Pipe Data			Comment					
		From	To	Area		Infiltr.	Comm.	Total	Length	Grade	Dia.	Capacity	Percent	Velocity				
				Unit	Accum. (ha)	Unit	Accum. (ha)	(l/s)	(l/s)	(l/s)	(m)	(l/s)	(%)	(m/s)				
1	Forcemain Sewer BBBY to Main	100	101	1.65	1.65	0.51	0.51	0.46	0.45	0.91	67.0	0.51	0.150	10.8	8.4%	0.61	Pipe Info from Wills Dwg 10158Ph2-SS03 (Aug 18/10)	
2	Sunoco to Swiss Main	R	Q	0.42	0.42	0.02	0.02	0.12	1.29	1.41	40.0	1.00	0.200	32.8	4.3%	1.04	0.52	Pipe Info from Trow Dwg No. 01 (Site Grading & Services Plan Mar /06)
2	Sunoco to Swiss Main	Q	P	0.00	0.42	0.00	0.02	0.12	1.29	1.41	3.0	1.00	0.200	32.8	4.3%	1.04	0.52	Pipe Info from Trow Dwg No. 01 (Site Grading & Services Plan Mar /06)
3	Swiss Chalet to PS	U	T	0.28	0.28	0.05	0.05	0.08	0.40	0.48	17.0	0.47	0.200	22.5	2.1%	0.72	0.29	Pipe Info from Robinson 03032-2 (June /05)
		T	S	0.28	0.28	0.05	0.05	0.08	0.40	0.48	43.8	0.48	0.200	22.7	2.1%	0.72	0.29	Pipe Info from Robinson 03032-2 (June /05)
		S	P	0.00	0.28	0.00	0.05	0.08	0.40	0.48	25.7	0.51	0.200	23.3	2.1%	0.74	0.30	Pipe Info from Robinson 03032-2 (June /05)
		P	101	0.00	0.71	0.00	0.08	0.20	1.69	1.89	67.6	0.90	0.200	31.1	6.1%	0.99	0.55	Pipe Info from Robinson 03032-2 (June /05)
		101	L	0.00	2.36	0.00	0.59	0.66	1.69	2.35	17.0	0.90	0.200	31.1	7.6%	0.99	0.58	Pipe Info from Robinson 03032-2 (June /05)
4	Shopper's	O	N	0.51	0.51	0.14	0.14	0.14	0.12	0.26		0.40	0.200	20.7	1.3%	0.66	0.23	Assumed Pipe Grade
5	Jockvale Rd	V	L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.0	0.40	0.200	20.7	0.0%	0.66	0.01	Plugged Main:
		N	L	0.42	0.93	0.00	0.14	0.26	0.12	0.38		0.58	0.200	25.0	1.5%	0.80	0.29	Pipe Info from Trow Dwg No. 01 (Site Grading & Services Plan Mar /06)
6	Home Depot	M	L	3.59	3.59	0.99	0.99	1.01	0.86	1.86		0.50	0.150	10.8	17.3%	0.61	0.46	Pipe Info from Trow Dwg No. 01 (Site Grading & Services Plan Mar /06)
	Pump Station	L	PS	0.00	6.88	0.00	1.72	1.93	3.11	5.04	18.7	2.03	0.250	84.8	5.9%	1.73		Pipe Info from Robinson 02056-11 (Jan /04)
		PS	LIFT	0.00	6.88	0.00	1.72	1.93	3.11	5.04							Lift Station	
Gravity Sewer																		
7	Veterinarian	VET	B	0.16	0.16	0.03	0.03	0.05	0.03	0.07							Service Connection	
8	Proposed Pad A	A	B	0.39	0.39	0.05	0.05	0.11	0.04	0.15	69.6	0.40	0.200	20.8	0.7%	0.66	0.19	Pipe Info from Wills Dwg 10158Ph1-SS03 (May 11/10)
		B	C	0.00	1.07	0.00	0.08	0.30	0.07	0.37	54.8	0.42	0.200	21.2	1.7%	0.68	0.26	Pipe Info from Wills Dwg 10158Ph1-SS03 (May 11/10)
9	Area 9	Area9	B	0.52	0.52	0.00	0.00	0.15	0.00	0.15							Catchment Area Only	
10	Ex. Plaza + Fut. Exp. +8,000sq ft. Future	F	E	3.31	3.31	1.01	1.01	0.93	0.87	1.80	90.0	0.38	0.200	20.2	8.9%	0.64	0.40	Pipe Info from Robinson Dwg 89112-02 (Apr 4/91)
		E	D	0.00	3.31	0.00	1.01	0.93	0.87	1.80	71.0	0.41	0.200	21.0	8.6%	0.67	0.41	Pipe Info from Robinson Dwg 89112-02 (Apr 4/91)
11	Mr Lube	104	C	0.00	0.00	0.02	0.02	0.00	0.01	0.01	5.0	2.00	0.200	46.4	0.0%	1.48	0.16	Pipe Info from Wills Dwg 10158Ph1-SS03 (May 11/10)
		C	D	0.00	1.07	0.00	0.10	0.30	0.08	0.38	74.0	0.39	0.250	37.2	1.0%	0.76	0.25	Pipe Info from Robinson Dwg 89112-02 (Apr 4/91)
		D	G	1.22	5.60	0.00	1.10	1.57	0.96	2.53	22.0	0.41	0.250	38.0	6.6%	0.77	0.44	Pipe Info from Robinson Dwg 89112-02 (Apr 4/91)
		LIFT	G	0.00	6.68	0.00	1.72	1.93	2.17	4.10							Lift Station	
		G	H	0.00	12.48	0.00	2.82	3.49	3.13	6.62	43.0	0.79	0.250	52.9	12.5%	1.08	0.74	Pipe Info from Robinson 03032-2 (June /05)
		H	I	0.00	0.00	0.05	0.05	0.00	0.30	0.30	34.3	0.29	0.250	32.1	0.9%	0.65	0.21	Pipe Info from Robinson 03032-2 (June /05)
		Mc D	H	0.00	0.00	0.04	0.04	0.00	0.04	0.04		0.50	0.200	23.2	0.2%	0.74	0.13	Service Connection
		H	J	0.00	12.48	0.00	2.91	3.49	3.47	6.96	40.0	0.40	0.250	37.6	18.5%	0.77	0.59	Pipe Info from Robinson Dwg 89112-02 (Apr 4/91)
		J	K	0.00	12.48	0.00	2.91	3.49	3.47	6.97	25.0	0.40	0.250	37.6	18.5%	0.77	0.59	Pipe Info from Robinson Dwg 89112-02 (Apr 4/91)

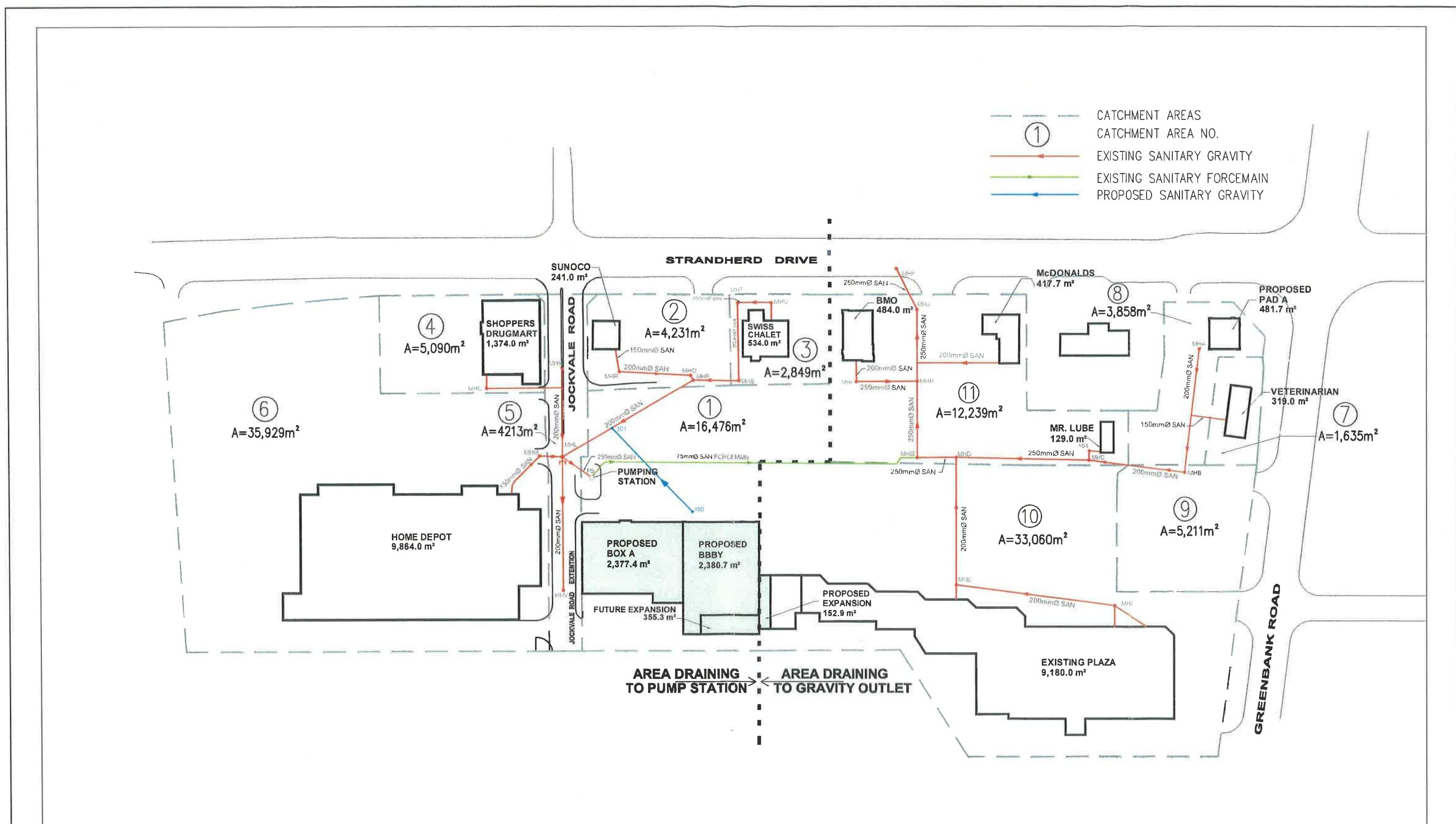


FIGURE 1: SANITARY CATCHMENT AREA PLAN

Sketch No.

WILLS

D. M. Wills Associates Limited
Consulting Engineers
452 Charlotte Street P 705-742-2297
Peterborough Ontario F 705-741-3593
Carruthers K9J 2W0 E [wills.ca](http://www.wills.ca)

• PROVEN SOLUTIONS • TRUSTED RESULTS •

Drawn By
L.D.
DESIGNED
D.W.
CHECKED
A.H.
Project No.
08-10158

Scale
Horz 1: 2000
Vert N/A
Plot Date
SEPT 13, 2010
Drawing File No.
FIG 1

From: Zagorski, Joseph
To: [Demetrius Yannouopoulos](#)
Cc: [Diduch, Roman](#)
Subject: RE: Barrhaven town center
Date: Thursday, April 18, 2013 4:27:24 PM

Hi Demetrios,

I reviewed attached information and 7.2 L/s flow is acceptable. Thx.

M.Joseph Zagorski, P.Eng.
Senior Project Manager
Infrastructure Policy, Policy Development and Urban Design
Planning and Growth Management Department
City of Ottawa, 110 Laurier Avenue West. 4th Floor, Ottawa, ON K1P 1J1
tel: (613) 580-2424, ext. 22611
fax: (613) 580-2578
e-mail: Joseph.Zagorski@ottawa.ca

From: Demetrius Yannouopoulos [mailto:dyannouopoulos@IBIGroup.com]
Sent: April 17, 2013 3:29 PM
To: Zagorski, Joseph
Subject: Barrhaven town center

Hi Joseph

See attached emails I sent Roman recently. As discussed we are looking to add a small pad to the existing commercial plaza, the flow from the site would increase from 6.97 to 7 l/s. Also the owner is also looking to fill a vacancy in the site (I thought it was a new Pad) and I had asked Roman if that could be adjusted to 7.2 l/s.

Thx

Demetrios

Demetrius Yannouopoulos P.Eng.
Associate Director

IBI Group
400-333 Preston Street
Ottawa ON K1S 5N4 Canada

tel 613 225 1311 ext 590
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LOCATION				SITE AREA		BUILDING AREA		DESIGN FLOW			PROPOSED SEWER							
Area	Description	From MH	To MH	IND. Area (Ha)	CUMUL. Area (Ha)	BLDG Area (SM)	CUMUL. BLDG Area (SM)	Peak Fact.	Design Flow (l/s)	Infiltration Flow (l/s)	Peak Flow (l/s)	Capacity l/s	Velocity (full) m/s	Lgth. (m)	Pipe (mm)	Grade %	Avail. Cap. (%)	
	<i>Forcemain sewer</i>																	
1	<i>BBBY tp Main</i>	100	101	1.6476	1.648	5113.00	5113.00	1.50	0.30	0.46	0.91	11.35	0.62	67.0	150	0.51	91.97%	
2	<i>Sunoco to Swiss main</i>	R	Q	0.4231	0.423	241.00	241.00	1.50	0.86	0.12	1.41	34.21	1.06	40.0	200	1.00	95.88%	
		Q	P	0	0.423	0.00	241.00	1.50	0.86	0.12	1.41	34.21	1.06	3.0	200	1.00	95.88%	
3	<i>Swiss Chalet to PS</i>	U	T	0.2849	0.285	534.00	534.00	1.50	0.27	0.08	0.48	23.45	0.72	17.0	200	0.47	97.95%	
		T	S	0	0.285	0.00	534.00	1.50	0.27	0.08	0.48	23.71	0.73	43.8	200	0.48	97.98%	
		S	P	0	0.285	0.00	534.00	1.50	0.27	0.08	0.48	24.42	0.75	25.7	200	0.51	98.04%	
		P	101	0	0.708	0.00	775.00	1.50	1.13	0.20	1.89	32.46	1.00	67.6	200	0.90	94.18%	
			101	L	0	2.356	0.00	5888.00	1.50	1.43	0.66	2.80	32.46	1.00	17.0	200	0.90	91.38%
4	<i>Shoppers</i>	O	N	0.509	0.509	1374.00	1374.00	1.50	0.08	0.14	0.26	21.63	0.67		200	0.40	98.79%	
5	<i>Jockvale Rd</i>	V	L	0	0.000	0.00	0.00	1.50	0.00	0.00	0.00	21.63	0.67		200	0.40	100.00%	
		N	L	0.4213	0.930	0.00	1374.00	1.50	0.08	0.26	0.38	26.07	0.80	49.0	200	0.58	98.54%	
6	<i>Home Depot</i>	M	L	3.5929	3.593	9864.00	9864.00	1.50	0.57	1.01	1.87	11.24	0.62		150	0.50	83.40%	
	<i>Pump Station</i>	L	PS	0	6.879	0.00	17126.00	1.50	2.08	1.93	5.05	88.37	1.74	18.7	250	2.03	94.29%	
		PS	LIFT	0	6.879	0.00	17126.00	1.50	2.08	1.93	5.05							
	<i>Gravity Sewer</i>																	
7	<i>Veterinarian</i>	VET	EX A-B	0.16	0.16	319.00	319.00	1.50	0.02	0.05	0.07							
8	<i>Pad A</i>	EX A	EX B	0.39	0.55	482.00	801.00	1.50	0.05	0.15	0.22	21.63	0.67	69.6	200	0.40	98.97%	
9	<i>Pad B</i>	Pad B*	2B	0.52	0.52	0.00	0.00	1.50	0.072	0.15	0.254	22.47	1.23	7.5	150	2.00	98.87%	
		2B	EX B	0.00	0.52	0.00	0.00	1.50	0.072	0.15	0.254	27.60	0.85	29.2	200	0.65	99.08%	
		EX B	EX C	0.00	1.07	0.00	801.00	1.50	0.12	0.30	0.476	22.18	0.68	54.8	200	0.42	97.85%	
10	<i>Ex plaza</i>	EX F	EX E	3.31	3.31	9180.00	9180.00	1.50	0.53	0.93	1.723	21.08	0.65	90.0	200	0.38	91.83%	
		EX E	EX D	0.00	3.31	0.00	9180.00	1.50	0.53	0.93	1.723	21.92	0.68	71.0	200	0.41	92.14%	
11	<i>Mr Lube</i>	104	EX C	0.00	0.00	129.00	129.00	1.50	0.01	0.00	0.011	48.38	1.49	5.0	200	2.00	99.98%	
		EX C	EX D	0.00	1.07	0.00	930.00	1.50	0.13	0.30	0.489	38.76	0.77	74.0	250	0.39	98.74%	
		EX D	1B	1.22	5.60	0.00	10110.00	1.50	0.66	1.57	2.554	39.73	0.78	15.6	250	0.41	93.57%	
1 to 6		EX LIFT	1B	0.00	6.88	0.00	17126.00	1.50	1.45	1.93	4.095							
11	<i>Pad C</i>	1B	1A	0.00	12.48	740.00	27976.00	1.50	2.146	3.49	6.713	34.00	0.67	37.6	250	0.30	80.25%	
		1A	EX H	0.00	12.48	0.00	27976.00	1.50	2.146	3.49	6.713	34.00	0.67	7.3	250	0.30	80.25%	
11	<i>BMO</i>	EX I	EX H	0.00	0.00	484.00	484.00	1.50	0.20	0.00	0.300	33.39	0.66	34.3	250	0.29	99.10%	
11	<i>McDonalds</i>	EX McD	EX H	0.00	0.00	417.00	417.00	1.50	0.02	0.00	0.036							
		EX H	EX J	0.00	12.48	0.00	28877.00	1.50	2.370	3.49	7.050	39.22	0.77	40.0	250	0.40	82.03%	
		EX J	EX K	0.00	12.48	0.00	28877.00	1.50	2.370	3.49	7.050	39.22	0.77	25.0	250	0.40	82.03%	

SPECIFY
 Coeff. of friction (n) = 0.013

Q = average daily flow (commercial lands)

M = Commercial Peaking Factor = 1.5

I = Unit of peak extraneous flow

Q(p) = Peak commercial flow (l/s)

Q(i) = Peak extraneous (infiltration) flow (l/s)

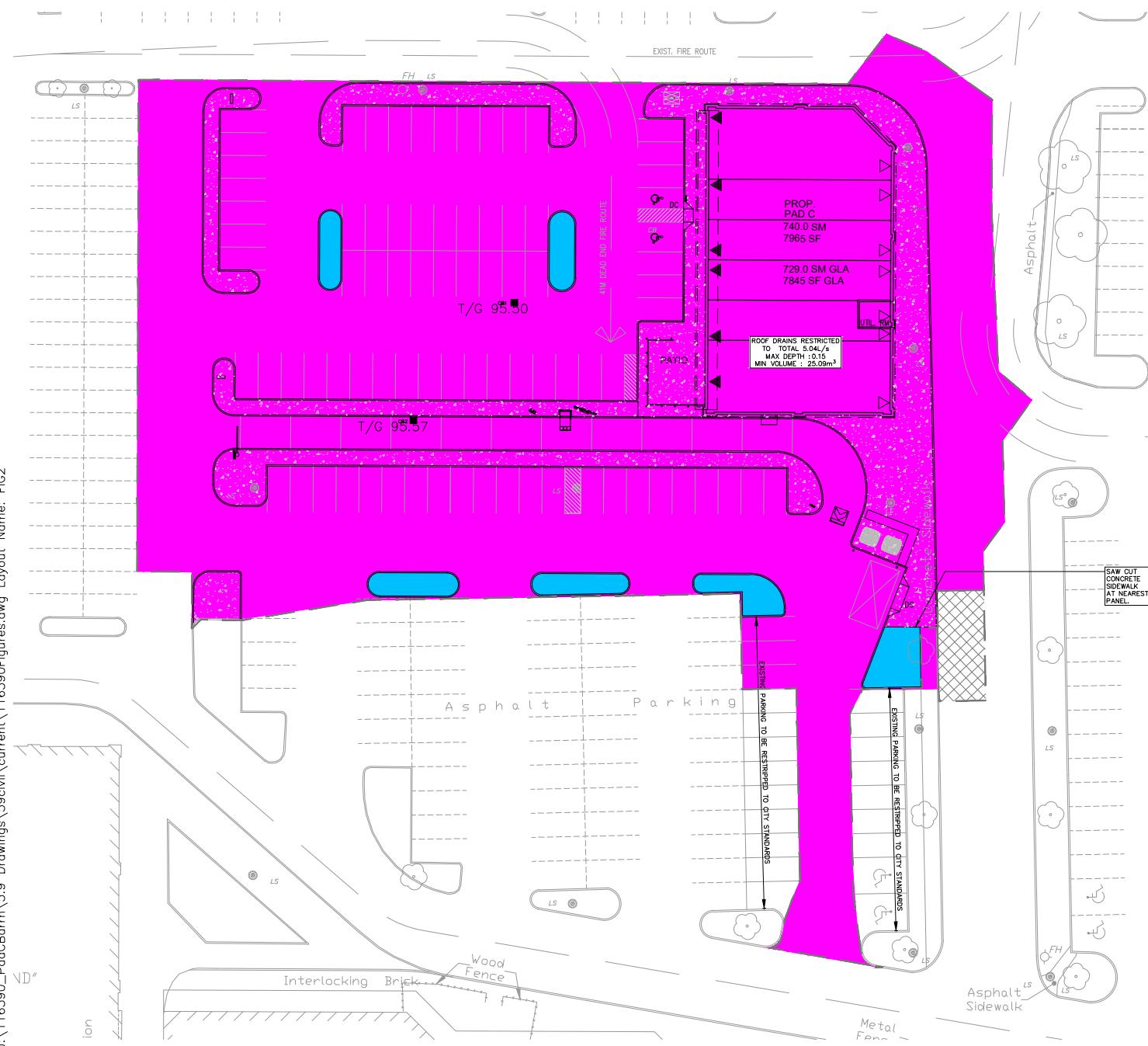
REV. #:

Except for the bolded sewers information, data contained on this spread sheet was not design by IBI but was obtained from D.M. Willis Assoc Ltd report "Barrhaven Town Centre Inc dated Sept 2010

* Design flow for Pad B based on 46 seats at 125 l/day/seat, plus 99sm of retail space at 5 l/sm

** Design flow for Pad C based on 467sm of retail space at 5 l/sm





LEGEND:

	C = 0.90 (PAVEMENT)	0.604 Ha
	C = 0.20 (GRASSED)	0.016 Ha

$$0.604 \text{ Ha} @ 0.90 = 0.544 \\ 0.016 \text{ Ha} @ 0.20 = 0.003$$

TOTAL POST-DEVELOPMENT AC = 0.547

AVG C = 0.876

NON ROOF AREA AVG C = 0.872

Scale

Project Title

Drawing Title

Sheet No.



STORMWATER MANAGEMENT

Formulas and Descriptions

$i_{2yr} = 1.2 \text{ year Intensity} = 732.951 / (T_c + 6.199)^{0.810}$
 $i_{5yr} = 1.5 \text{ year Intensity} = 998.071 / (T_c + 6.053)^{0.814}$
 $i_{100yr} = 1:100 \text{ year Intensity} = 1735.688 / (T_c + 6.014)^{0.820}$
 $T_c = \text{Time of Concentration (min)}$
 $C = \text{Average Runoff Coefficient}$
 $A = \text{Area (Ha)}$
 $Q = \text{Flow} = 2.78CiA \text{ (L/s)}$

Maximum Allowable Release Rate

Restricted Flowrate (based on $C=0.50$ $T_c=20\text{min}$)

$C =$	0.5
$T_c =$	20 min
$i_{100yr} =$	70.25 mm/hr
$A_{site} =$	0.074 Ha

$Q_{restricted} =$	7.23 L/s
--------------------	----------

MODIFIED RATIONAL METHOD (100-Year, 5-Year & 2-Year Ponding)

Drainage Area PAD C

Area (Ha)	0.074
$C =$	1.00

Drainage Area PAD C

Area (Ha)	0.074
$C =$	0.90

Drainage Area PAD C

Area (Ha)	0.074
$C =$	0.90

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78 \times Ci_{100yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m ³)
30	91.87	18.90	5.04	13.86	24.95
35	82.58	16.99	5.04	11.95	25.09
40	75.15	15.46	5.04	10.42	25.01
45	69.05	14.21	5.04	9.17	24.75
50	63.95	13.16	5.04	8.12	24.35

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78 \times Ci_{5yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m ³)
15	83.56	15.47	5.04	10.43	9.39
17	77.61	14.37	5.04	9.33	9.52
19	72.53	13.43	5.04	8.39	9.56
21	68.13	12.61	5.04	7.57	9.54
23	64.29	11.90	5.04	6.86	9.47

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78 \times Ci_{2yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m ³)
15	61.77	11.44	5.04	6.40	5.76
16	59.50	11.02	5.04	5.98	5.74
17	57.42	10.63	5.04	5.59	5.70
18	55.49	10.27	5.04	5.23	5.65
19	53.70	9.94	5.04	4.90	5.59

Storage (m ³)					
Overflow	Required	Surface	Sub-surface	Balance	
0.00	25.01	27.75	0	0.00	

Storage (m ³)					
Overflow	Required	Surface	Sub-surface	Balance	
0.00	9.56	27.75	0	0.00	

Storage (m ³)					
Overflow	Required	Surface	Sub-surface	Balance	
0.00	5.70	27.75	0	0.00	

overflows to: roof controlled

overflows to: roof controlled

overflows to: roof controlled

Roof Storage = 75% of roof area, at maximum ponding depth of 150mm



Adjustable Accutrol Weir
Tag: _____

Adjustable Flow Control for Roof Drains

ADJUSTABLE ACCUTROL(for Large Sump Roof Drains only)

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

Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

EXAMPLE:

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

Therefore, at 3" of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:

$$[5 \text{ gpm}(per \text{ inch of head}) \times 2 \text{ inches of head}] + 2-1/2 \text{ gpm}(for the third inch of head) = 12-1/2 \text{ gpm.}$$

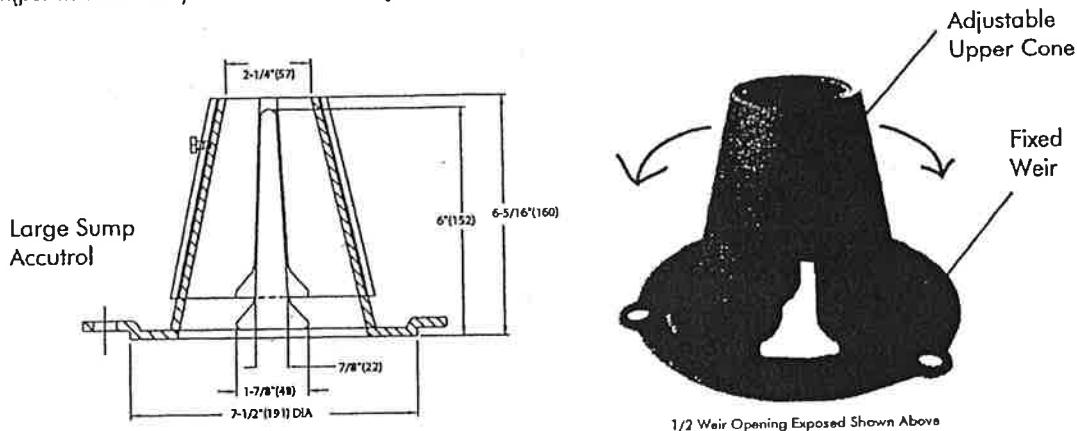


TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	Head of Water					
	1"	2"	3"	4"	5"	6"
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	10	10	10	10	10

Job Name _____ Contractor _____

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

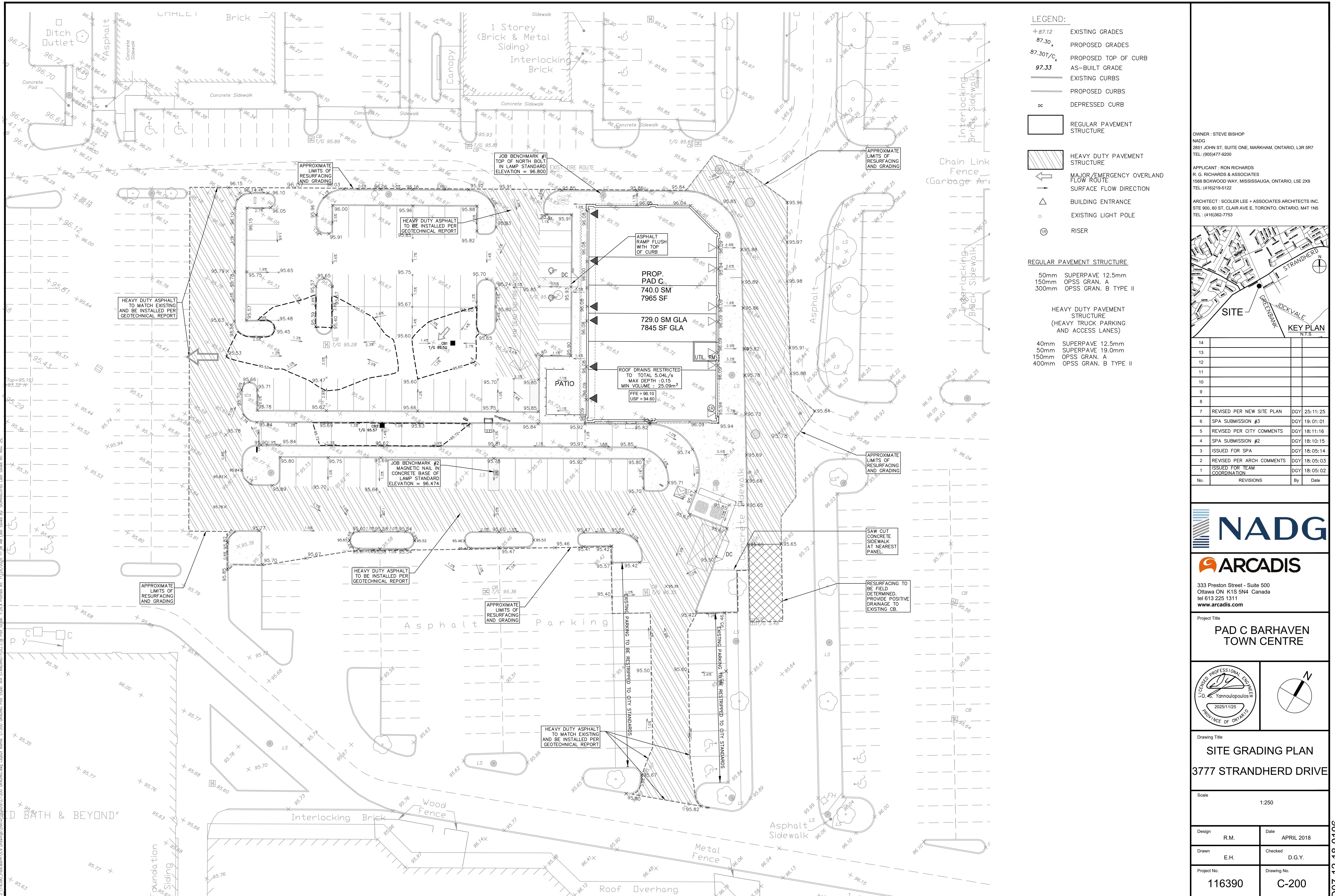
Engineer _____ Representative _____

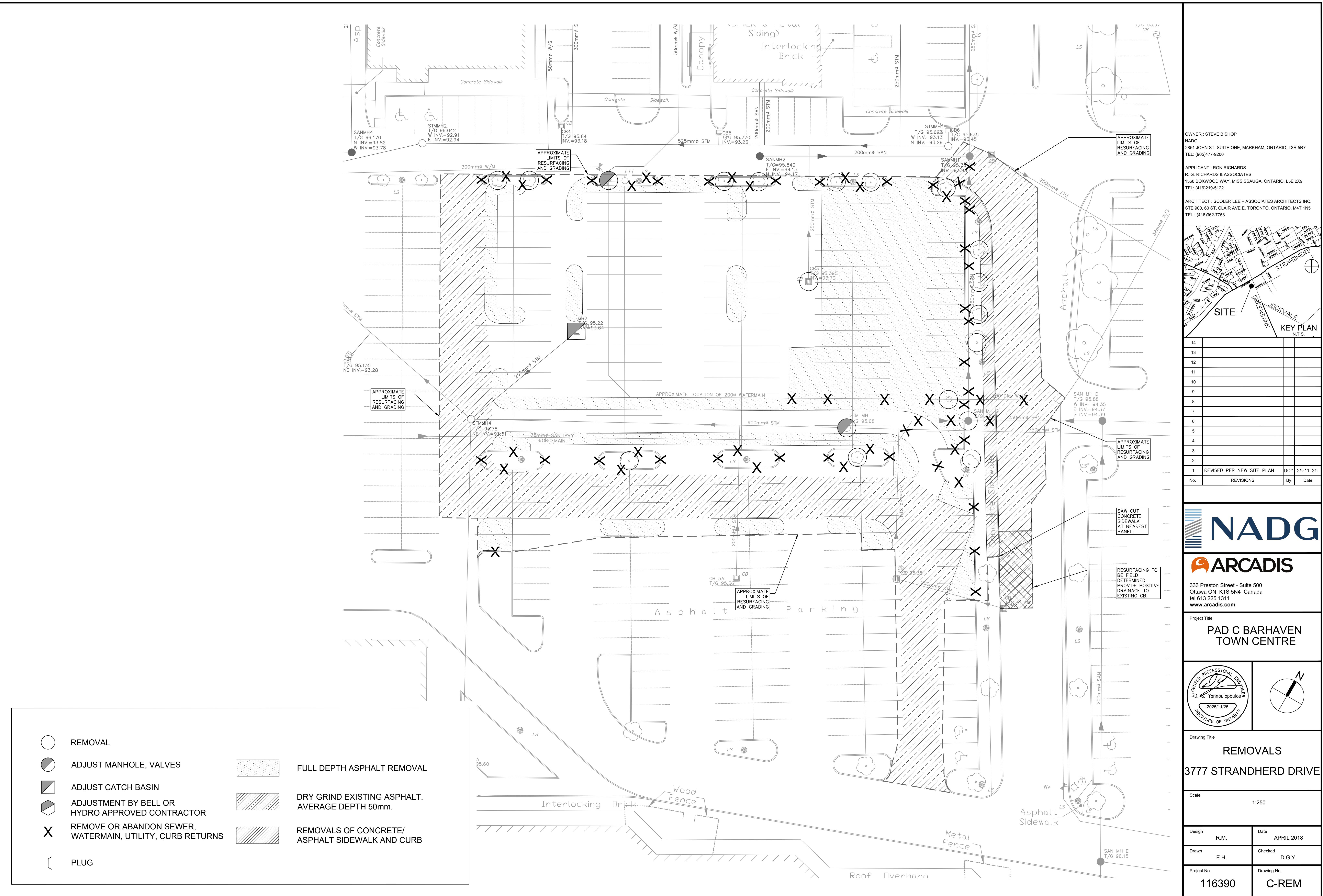
Watts Drainage reserves the right to modify or change product design or construction without prior notice and without incurring any obligation to make similar changes and modifications to products previously or subsequently sold. See your Watts Drainage representative for any clarification. Dimensions are subject to manufacturing tolerances.



CANADA: 5435 North Service Road, Burlington, ON, L7L 5H7 TEL: 905-332-6718 TOLL-FREE: 1-888-208-8927 Website: www.wattsdrainage.ca



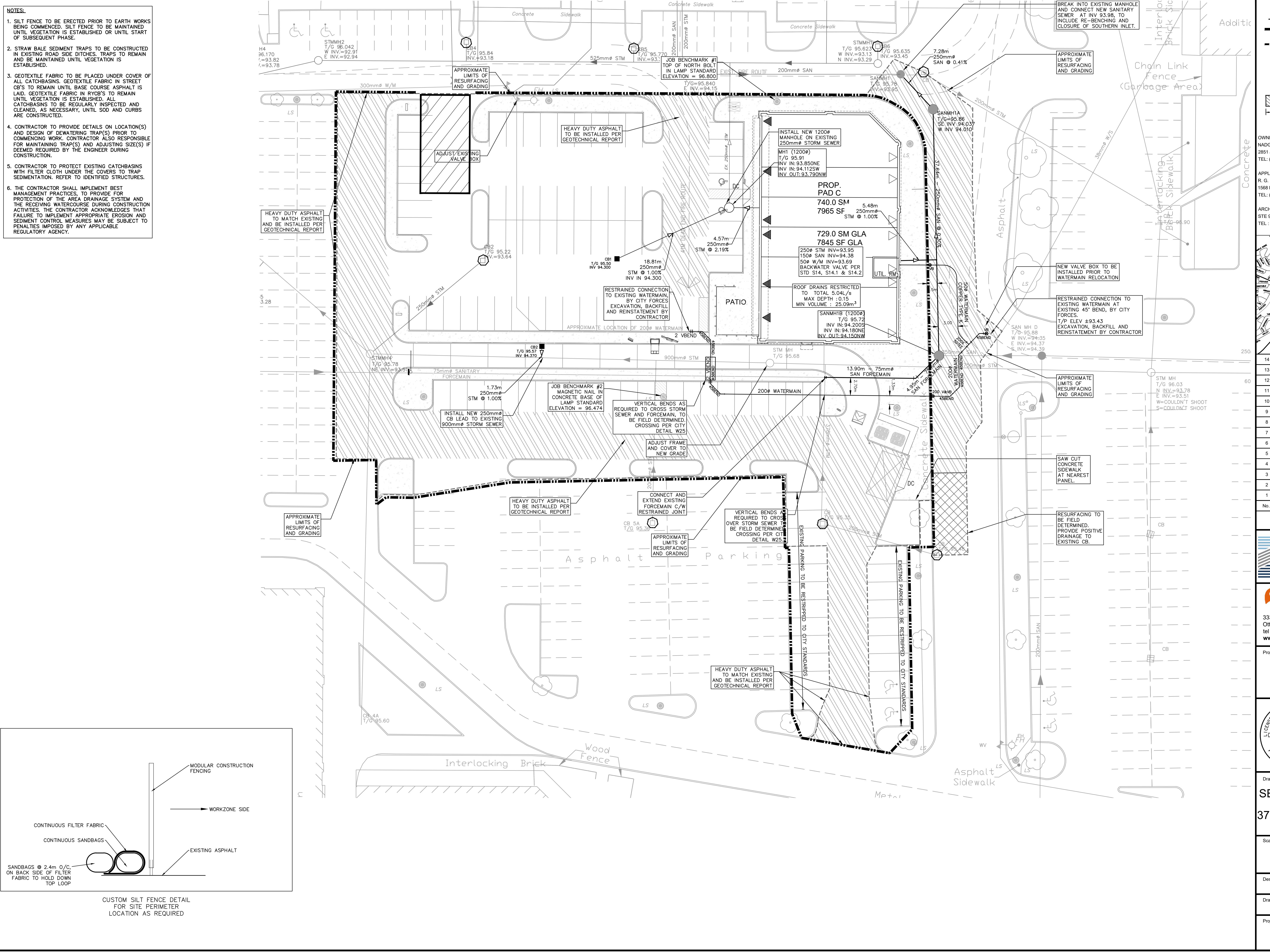




NOTES:

1. SILT FENCE TO BE ERECTED PRIOR TO EARTH WORKS BEING COMMENCED. SILT FENCE TO BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED OR UNTIL START OF SUBSEQUENT PHASE.
2. STRAW BALE SEDIMENT TRAPS TO BE CONSTRUCTED IN EXISTING ROAD SIDE DITCHES. TRAPS TO REMAIN AND BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED.
3. GEOTEXTILE FABRIC TO BE PLACED UNDER COVER OF ALL CATCHBASINS. GEOTEXTILE FABRIC IN STREET CB'S TO REMAIN UNTIL BASE COURSE ASPHALT IS LAID. GEOTEXTILE FABRIC IN RYCB'S TO REMAIN UNTIL VEGETATION IS ESTABLISHED. ALL CATCHBASINS TO BE REGULARLY INSPECTED AND CLEANED, AS NECESSARY, UNTIL SOD AND CURBS ARE CONSTRUCTED.
4. CONTRACTOR TO PROVIDE DETAILS ON LOCATION(S) AND DESIGN OF DEWATERING TRAP(S) PRIOR TO COMMENCING WORK. CONTRACTOR ALSO RESPONSIBLE FOR MAINTAINING TRAP(S) AND ADJUSTING SIZE(S) IF DEEMED REQUIRED BY THE ENGINEER DURING CONSTRUCTION.
5. CONTRACTOR TO PROTECT EXISTING CATCHBASINS WITH FILTER CLOTH UNDER THE COVERS TO TRAP SEDIMENTATION. REFER TO IDENTIFIED STRUCTURES.
6. 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.

58



LEGEND

- LIGHT DUTY SILT FENCE AS PER OPSD-219.110
- SNOW FENCE
- STRAW BALE CHECK DAM AS PER OPSD-219.180
- ROCK CHECK DAM AS PER OPSD-219.210
- SILT SACK PLACED UNDER EXISTING CB COVER
- TEMPORARY MUD MAT 0.15m THICK 50mm CLEAR STONE ON NON WOVEN FILTER CLOTH

STEVE BISHOP
1111 MARKHAM ST, SUITE ONE, MARKHAM, ONTARIO, L3R 5R7
(905)477-9200

NT : RON RICHARDS
RICHARDS & ASSOCIATES
100 WOOD WAY, MISSISSAUGA, ONTARIO, L5E 2X9
(905)219-5122

ECT : SCOLER LEE + ASSOCIATES ARCHITECTS INC.
60 ST, CLAIR AVE E, TORONTO, ONTARIO, M4T 1N5
(6)362-7753

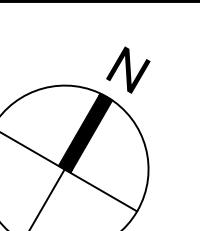
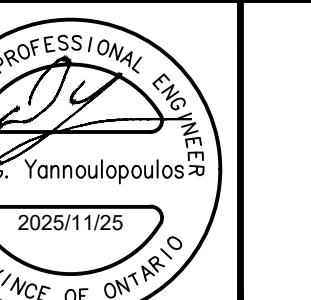
A detailed map of the Strandherd area in Portrush, Northern Ireland. The map shows several streets including Strandherd, Greenbank, Jockvale, and Market Place. A specific location is marked with a black dot at the corner of Strandherd and Greenbank, labeled 'SITE'. The map also includes a compass rose indicating North. Other labeled areas include Montavista, Chester, and Tullane.

REVISED PER NEW SITE PLAN	DGY	25:11:2
SPA SUBMISSION #3	DGY	19:01:0
REVISED PER CITY COMMENTS	DGY	18:11:16
SPA SUBMISSION #2	DGY	18:10:1
ISSUED FOR SPA	DGY	18:05:1
ISSUED FOR TEAM COORDINATION	DGY	18:05:0
REVISIONS	By	Date

NADG

The image contains the Arcadis logo, which consists of a stylized orange 'A' icon followed by the word 'ARCADIS' in a large, bold, black sans-serif font. Below the logo is a horizontal line. Underneath the line, the company's address is listed: '1000 Preston Street - Suite 500', 'Vancouver BC V6E 1S4 Canada', and a phone number '604 225 1311'. At the bottom, the website 'arcadis.com' is written in a smaller, orange sans-serif font.

PAD C BARHAVEN TOWN CENTRE



SEDIMENT AND EROSION CONTROL PLAN 7 OTTAWA DRIVE

1:250

R.M.	Date APRIL 2018
E.H.	Checked D.G.Y.
No.	Drawing No.

D07-12-18-0106

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