Memo

SUBJECT
City Gates Phase 2 - Interim Parking Design
Arcadis Engineering Review

TO
Andrew Kent
Senior Director, Developments
Killam REIT
Halifax, NS

DATE
22/08/2025

DEPARTMENT
Land Engineering

PROJECT NUMBER
38729-5.2.2.1

COPIES TO
Matt Anderson Petitpas
Devdatsinh Vaghela

NAME
Terry Brule
Principal – Practice Lead
Land Engineering
Arcadis

Introduction

This technical memorandum has been prepared for Killam REIT and provides a review of the civil engineering aspects supporting the proposed interim surface parking area design as part of Phase 2 of the City Gates mixed-use site plan. The memorandum is based on the City Park Redevelopment Phase 2 Design Brief, prepared by IBI Group and dated December 2018. This document can be made available if needed. However, for reference, a copy of the Phase 2 drawing (38729-C-101 Site Servicing) is included in **Appendix A** to illustrate the proposed adjustments for this phase.

Figure 1 shows the location site plan for the interim parking within Phase 2, for which the proponent is seeking approvals. This interim parking is bordered by the future Phase 3 Block 2 to the north, the previously completed Phase 2 Block 5 to the east, and Vantage Point Private to the west and south. The plan consists of constructing 64 additional parking spaces within the existing landscaped areas until the proposed future residential building in Block 3 is constructed.

Figure 1: Site Location

This memorandum will outline the impacts on stormwater management and site grading for the proposed parking addition. It should be noted due to the limited extents of construction required to support the proposed works, there will be no impacts on Sanitary collection and disposal or water supply.

Stormwater Management

The proposed storm outlet for the subject site is shown on the City Park Development Phase 2 drawing C-103 Site Servicing and is included in **Appendix B.** In the proposed interim parking design, it is proposed to connect to the existing catchbasin leads and extend to the center of proposed parking lots to maximize ponding capacities while maintaining the same release rate that was previously designed (2.0 L/s). As shown in the Stormwater Management Modified Rational Method calculations, the 2 revised ponding areas provide sufficient surface storage for the 100yr storm event. Due to the release rate of the existing inlet control devices located at the catchbasins to be utilized, there will be minor surface ponding during the 5yr storm event. A copy of these SWM calculations have been provided in **Appendix B**.

A storm sewer design sheet reflecting the revised drainage areas, runoff coefficients, and associated storm pipes, which have been highlighted for reference, is included in **Appendix B**. It should be noted that the storm pipe running from MH202 to EXMH124 remains slightly over capacity, primarily due to its dimensions and slope, as well as the increased runoff coefficients from the additional parking spaces. However, any resulting minor surcharging will not be problematic, as this storm sewer segment exclusively handles parking lot surface drainage and is not connected to any buildings. At most, this could result in temporary detention upstream within the storm pipes, associated structures, and surface areas. Importantly, all other pipes, both upstream and downstream, have sufficient capacity to convey the flows without any surcharging. A copy of the Phase 2 Interim Parking updated Storm Drainage Area plan (38729-C-502 Storm Drainage Area Plan) has been included in **Appendix B**, as well as a copy of the Phase 2 Storm Drainage Area plan (38729-C-501 Storm Drainage Area Plan) to show the extents of the drainage design changes.

Site Grading

The proposed grading for the interim parking, as shown in drawing 38729-202 Grading Plan, can be found in **Appendix C**. A review of the Phase 2 site grading plan (drawing C-201 Grading Plan) confirms that the proposed grading aligns with the existing conditions as shown on the Phase 2 plan and follows standard design concepts to ensure proper drainage and integration with surrounding areas. A copy of the Phase 2 site grading plan (C-201) is also included in **Appendix C**.

Conclusion

In summary, apart from some minor surcharging, the proposed stormwater management and servicing maintain the existing level of service prescribed in the Design Brief prepared by IBI Group, dated December 2018, for the City Parks Development Phase 2. Additionally, the proposed site grading integrates with the surrounding existing grades while ensuring sufficient stormwater surface detention and compliance with the City's design guidelines. We therefore confident that the servicing design shown on the City Parks Interim Parking engineering plans should be satisfactory to the City of Ottawa.

We trust our conclusions are satisfactory for your purposes. We are, of course, available to review and discuss the information contained within this document.

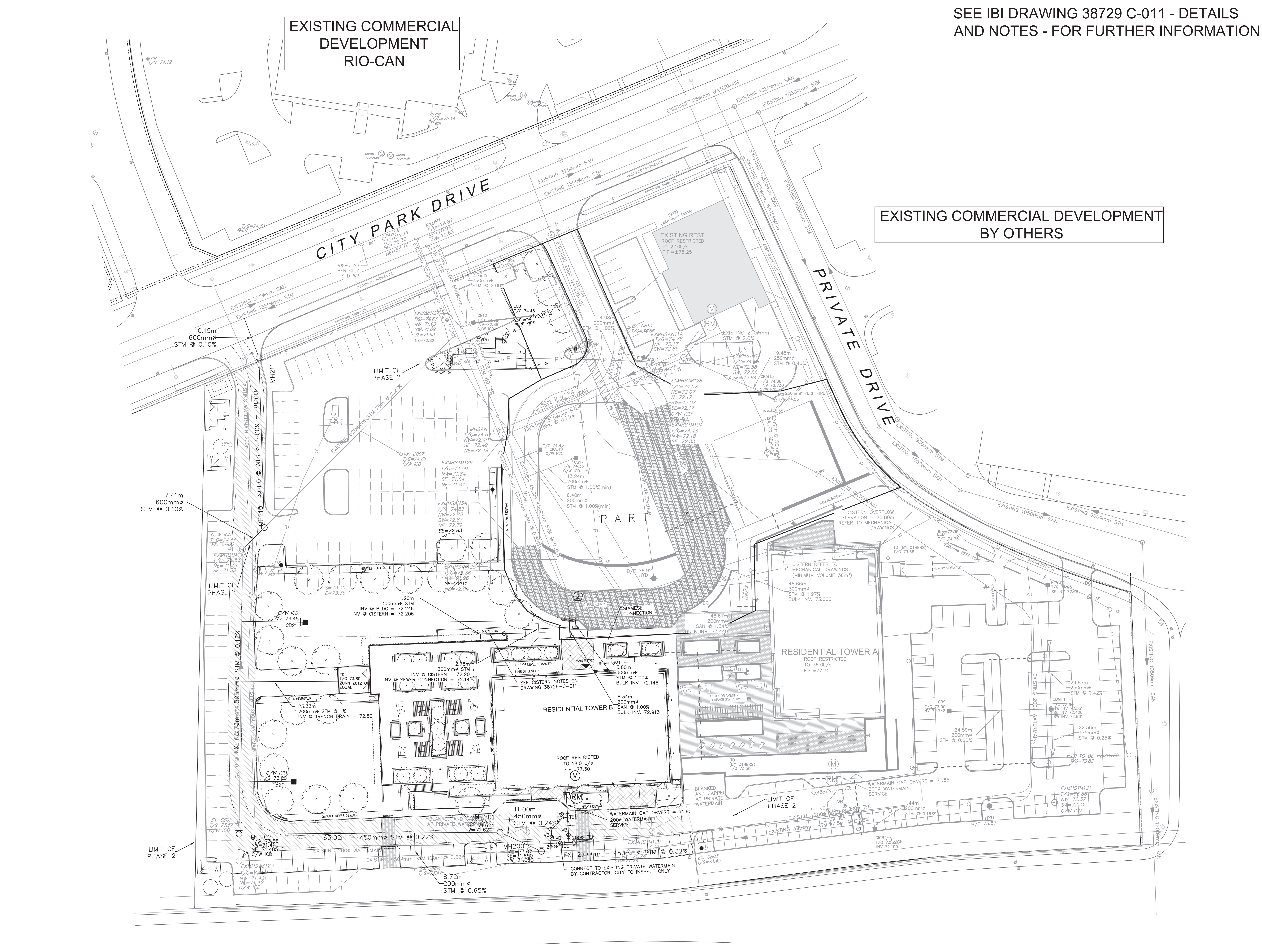
Yours truly,

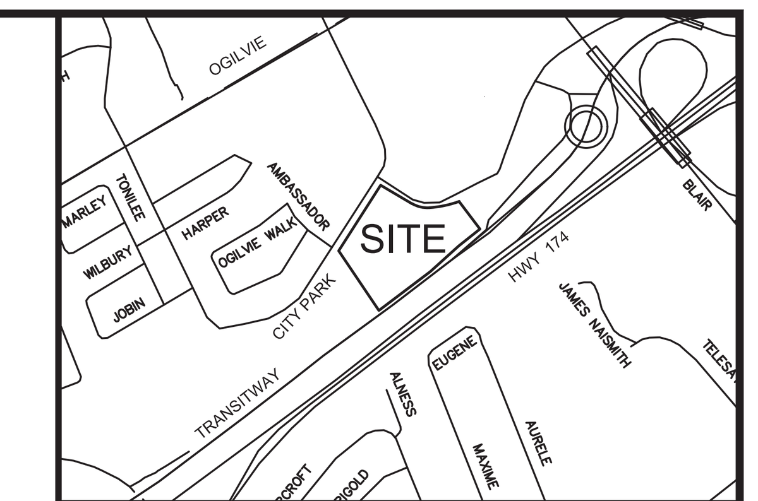
Arcadis Professional Services (Canada) Inc.

Terry Brule, P.Eng.

Appendix A

SEE IBI DRAWING 38729 C-011 - DETAILS AND NOTES - FOR FURTHER INFORMATION





RIO CAN
REAL ESTATE INVESTMENT TRUST

Killam PROPERTIES INC

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9	ISSUED FOR CONSTRUCTION	TRB	19:12:10
8	RE-ISSUED FOR TENDER	TRB	19:07:22
7	RE-ISSUED FOR CONSTRUCTION	TRB	19:03:29
6	ISSUED FOR CONSTRUCTION	TRB	19:02:21
5	REVISED PER CITY COMMENTS	TRB	18:12:12
4	ISSUED FOR TENDER	TRB	18:11:22
3	REVISED PER CITY COMMENTS	TRB	18:11:09
2	ISSUED for 66% REVIEW	TRB	18:10:31
1	ISSUED TO CITY	TRB	18:08:08

HOBIN ARCHITECTURE

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

Project Title
2280 CITY PARK DEVELOPMENT
PHASE 2

LICENSED PROFESSIONAL ENGINEER T. R. BRULE 2019/12/10 PROVINCE OF ONTARIO

N

Drawing Title
SITE SERVICING

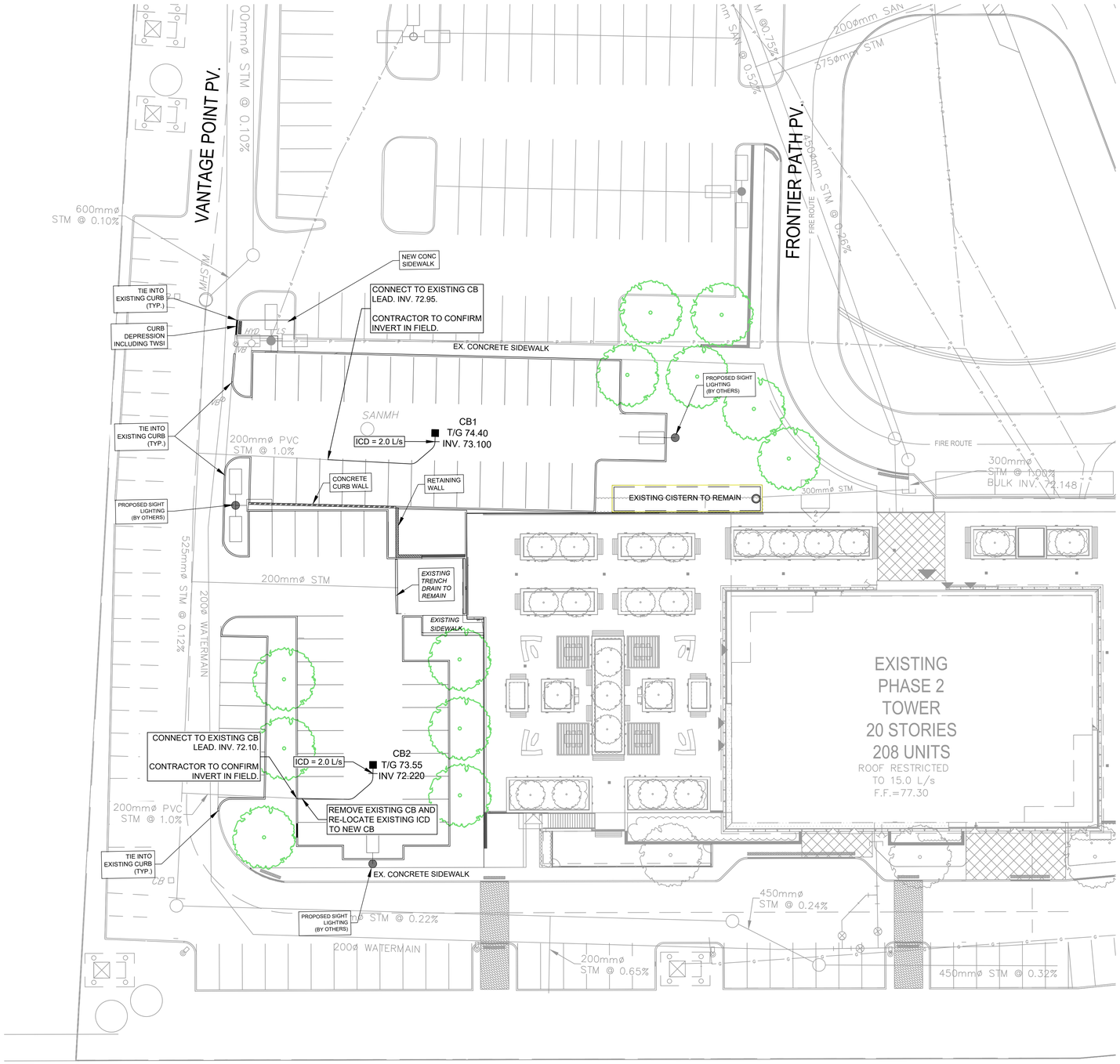
Scale
1 : 400

Design	Date
J.E.B.	AUG. 2018
Drawn	Checked
E.H.	T.R.B.
Project No.	Drawing No.
38729	C-101

D07-12-18-0122

17741

Appendix B



CLIENT

Killam PROPERTIES INC

ISSUES

No.	DESCRIPTION	DATE
1	ISSUED FOR SPRA	2025-08-21

CONSULTANTS

1:250 0 5 10 12.5m

SEAL

LICENSED PROFESSIONAL ENGINEER
T. R. BRULE
2025/08/21
PROVINCE OF ONTARIO

PRIME CONSULTANT

ARCADIS

333 Preston Street - Suite 500
Ottawa ON K1S 5N4 Canada
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PROJECT

KILLAM - CITY PARK PHASE 2 INTERIM PARKING

200 FRONTIER PATH PVT.

PROJECT NO: 38729	
DRAWN BY: **D.D. / E.H.**	CHECKED BY: **M.P.**
PROJECT MGR: **T.R.B.**	APPROVED BY: **T.R.B.**

SHEET TITLE

GENERAL SERVICING PLAN

SHEET NUMBER	ISSUE
C-103	1

SCALE CHECK 1 in 10mm XXXXX

D07-XX-XX-XXXX

File Location: J:\38729-SilverCity\ECA\5.9 Drawings\06civil\current\Parking\Sheets\C-103 SERVICING PLAN.dwg Last Saved: August 22, 2025, by dond5754 Plotted: August 22, 2025 6:48:53 AM by Dore, Denis

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

PHASE 2 - INTERIM PARKING

PROJECT: Killam REIT City Gates
DATE: 2025-08-20
FILE: 38729 - 5.7
REV #: 6 - 2025-08-20
DESIGNED BY: MAP
CHECKED BY: TB

STORMWATER MANAGEMENT

Formulas and Descriptions

i_{2yr} = 1:2 year Intensity = $732.951 / (T_c+6.199)^{0.810}$
i_{5yr} = 1:5 year Intensity = $998.071 / (T_c+6.053)^{0.814}$
i_{100yr} = 1:100 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

Restricted Flowrate (based TOD 5y @ C=0.5)

C =	0.5		
T_c =	17.27	min	*as per proposed Storm Sewer Design sheet
i_{100yr} =	76.87	mm/hr	
A_{TOTAL} =	2.86	Ha	
Q_{TOTAL} =	305.61	L/s	

Q_{TOTAL} =	305.61	L/s

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

C =	0.3	
T_c =	10	min
i_{100yr} =	178.56	mm/hr
$A_{uncontrolled}$ =	0.26	Ha
$Q_{uncontrolled}$ =	38.72	L/s

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

$Q_{max\ allowable}$ =	266.89	L/s

MODIFIED RATIONAL METHOD (100-Year & 5-Year)

Drainage Area	***1***	(1 & 8 with weighted average C)	
Area (Ha)	0.380		
C =	0.79	Restricted Flow Q_r (L/s)=	4.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
183	23.59	19.74	4.00	15.74	172.80
185	23.39	19.57	4.00	15.57	172.81
186	23.29	19.48	4.00	15.48	**172.81**
187	23.19	19.40	4.00	15.40	172.81
189	22.99	19.24	4.00	15.24	172.80

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	172.81	175.10	3.90	0.00

Drainage Area	***1***		
Area (Ha)	0.380		
C =	0.70	Restricted Flow Q_r (L/s)=	4.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
95	23.31	17.23	4.00	13.23	75.43
97	22.94	16.96	4.00	12.96	75.43
98	22.76	16.83	4.00	12.83	**75.43**
99	22.58	16.70	4.00	12.70	75.43
101	22.24	16.44	4.00	12.44	75.41

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	75.43	175.10	3.90	0.00

IN-LINE STORAGE (Structure)

0.6m X 0.6m CB			1.2mDia CBMH's		
0.36 m3/m	Height (m)	Storage (m3)	1.13 m3/m	Height (m)	Storage (m3)
RYCB11	1.12	0.40	CBMH1	1.17	1.33
RYCB12	1.02	0.37		Total:	**1.33**
CB9	0.85	0.31			
	Total:	**1.08**			

overflows to: 2,3,4

IN-LINE STORAGE (Pipe)

Pipe storage			
Structure to Structure	Length (m)	Dia (m)	Storage (m3)
RYCB12 - RYCB11	23.29	0.20	0.73
RYCB11 - CBMH1	28.43	0.25	1.40
CB9 - CBMH1	24.59	0.20	0.77
CBMH1 - EXMHSTM121	22.56	0.38	2.49
		Total:	**5.39**

overflows to: 2,3,4

Drainage Area	2,3,4		
Area (Ha)	0.310		
C =	1.00	Restricted Flow Q_r (L/s)=	25.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
27	98.66	85.02	25.00	60.02	97.24
29	94.01	81.02	25.00	56.02	97.48
30	91.87	79.17	25.00	54.17	**97.51**
31	89.83	77.41	25.00	52.41	97.49
33	86.03	74.14	25.00	49.14	97.31

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	97.51	81.48	15.75	0.28

Drainage Area	2,3,4		
Area (Ha)	0.310		
C =	0.90	Restricted Flow Q_r (L/s)=	25.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
13	90.63	70.29	25.00	45.29	35.33
15	83.56	64.81	25.00	39.81	35.83
16	80.46	62.41	25.00	37.41	**35.91**
17	77.61	60.19	25.00	35.19	35.90
19	72.53	56.25	25.00	31.25	35.63

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	35.91	81.48	15.75	0.00

IN-LINE STORAGE (Structure)

0.6m X 0.6m CB			1.2mDia CBMH's		
0.36 m3/m	Height (m)	Storage (m3)	1.13 m3/m	Height (m)	Storage (m3)
CICB2	1.35	0.49	EXMHSTM121	1.37	1.55
EXCB03	1.10	0.40	EXMHSTM122	1.85	2.09
EXCB04	0.85	0.31		Total:	**3.64**
	Total:	**1.19**			

overflows to: offsite

IN-LINE STORAGE (Pipe)

Pipe storage			
Structure to Structure	Length (m)	Dia (m)	Storage (m3)
MHSTM121 - MHSTM122	97.50	0.38	10.77
MHSTM122 - MHSTM123	100.00	0.45	15.90
		Total:	**26.67**

overflows to: offsite

Drainage Area	5		
Area (Ha)	0.130		
C =	1.00	Restricted Flow Q_r (L/s)=	27.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
9	188.25	68.04	27.00	41.04	22.16
11	169.91	61.40	27.00	34.40	22.71
12	162.13	58.59	27.00	31.59	**22.75**
13	155.11	56.06	27.00	29.06	22.66
15	142.89	51.64	27.00	24.64	22.18

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
2.74	25.49	26.06	0	0.00

overflows to: offsite

Drainage Area	5		
Area (Ha)	0.130		
C =	0.86	Restricted Flow Q_r (L/s)=	27.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
2	182.69	56.78	27.00	29.78	3.57
4	152.51	47.40	27.00	20.40	4.90
5	141.18	43.88	27.00	16.88	**5.06**
6	131.57	40.89	27.00	13.89	5.00
8	116.11	36.09	27.00	9.09	4.36

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	5.06	26.06	0	0.00

overflows to: offsite

Drainage Area	5A		
Area (Ha)	0.090		
C =	0.88	Restricted Flow Q_r (L/s)=	2.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
88	41.83	9.16	2.00	7.16	37.79
90	41.11	9.00	2.00	7.00	37.80
91	40.76	8.92	2.00	6.92	**37.81**
92	40.42	8.85	2.00	6.85	37.81
94	39.76	8.70	2.00	6.70	37.81

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
	37.81	40.66	0	0.00

Drainage Area	5A		
Area (Ha)	0.090		
C =	0.70	Restricted Flow Q_r (L/s)=	2.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
40	44.18	7.74	2.00	5.74	13.77
42	42.68	7.48	2.00	5.48	13.80
43	41.97	7.35	2.00	5.35	**13.81**
44	41.29	7.23	2.00	5.23	13.81
46	39.99	7.00	2.00	5.00	13.81

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	13.81	40.66	0	0.00

Drainage Area	5B		
Area (Ha)	0.110		
C =	0.84	Restricted Flow Q_r (L/s)=	2.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
104	36.77	9.42	2.00	7.42	46.28
106	36.23	9.28	2.00	7.28	46.29
107	35.97	9.21	2.00	7.21	**46.30**
108	35.71	9.15	2.00	7.15	46.30
110	35.20	9.02	2.00	7.02	46.30

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
	46.30	52.44	0	0.00

Drainage Area	5B		
Area (Ha)	0.110		
C =	0.67	Restricted Flow Q_r (L/s)=	2.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
48	38.78	7.95	2.00	5.95	17.12
50	37.65	7.71	2.00	5.71	17.14
51	37.12	7.60	2.00	5.60	**17.15**
52	36.59	7.50	2.00	5.50	17.15
54	35.60	7.29	2.00	5.29	17.15

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	17.15	52.44	0	0.00

Drainage Area	6				
Area (Ha)	0.070				
C =	1.00	Restricted Flow Q_r (L/s)=	22.00		

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
4	262.41	51.06	22.00	29.06	6.98
6	226.01	43.98	22.00	21.98	7.91
7	211.67	41.19	22.00	19.19	**8.06**
8	199.20	38.76	22.00	16.76	8.05
10	178.56	34.75	22.00	12.75	7.65

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	8.06	5.32	0	2.74

overflows to: 5

Drainage Area	6				
Area (Ha)	0.070				
C =	0.84	Restricted Flow Q_r (L/s)=	22.00		

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
1	203.51	33.27	22.00	11.27	0.68
2	182.69	29.86	22.00	7.86	**0.94**
3	166.09	27.15	22.00	5.15	0.93
5	141.18	23.08	22.00	1.08	0.32

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.94	5.32	0	0.00

overflows to: 5

Drainage Area	17, 19 & 7				
Area (Ha)	0.580				
C =	0.83	Restricted Flow Q_r (L/s)=	30.00		

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
36	80.96	108.24	30.00	78.24	169.01
37	79.42	106.18	30.00	76.18	169.11
38	77.93	104.19	30.00	74.19	**169.16**
39	76.51	102.29	30.00	72.29	169.16
41	73.83	98.71	30.00	68.71	169.03

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
8.80	177.96	212.44	0.00	0.00

overflow from: 20, 19 overflows to: 6

Drainage Area	17, 19 & 7				
Area (Ha)	0.580				
C =	0.66	Restricted Flow Q_r (L/s)=	30.00		

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
16	80.46	86.06	30.00	56.06	53.81
18	74.97	80.19	30.00	50.19	54.20
19	72.53	77.57	30.00	47.57	**54.23**
20	70.25	75.14	30.00	45.14	54.17
22	66.15	70.75	30.00	40.75	53.79

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	54.23	212.44	0	0.00

overflows to: 6

Drainage Area	20				
Area (Ha)	0.090				
C =	1.00	Restricted Flow Q_r (L/s)=	19.80	Existing	

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
8	199.20	49.84	19.80	30.04	14.42
10	178.56	44.68	19.80	24.88	14.93
11	169.91	42.51	19.80	22.71	**14.99**
12	162.13	40.57	19.80	20.77	14.95
14	148.72	37.21	19.80	17.41	14.62

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	14.99	7.20	0.00	7.79

overflows to: 7

Drainage Area	20				
Area (Ha)	0.090				
C =	0.90	Restricted Flow Q_r (L/s)=	19.80		

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
2	182.69	41.14	19.80	21.34	2.56
4	152.51	34.34	19.80	14.54	3.49
5	141.18	31.79	19.80	11.99	**3.60**
6	131.57	29.63	19.80	9.83	3.54
8	116.11	26.15	19.80	6.35	3.05

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	3.60	7.20	0	0.00

overflows to: 7

Drainage Area	12, 13				
Area (Ha)	0.200				
C =	1.00	Restricted Flow Q_r (L/s)=	33.00		

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
12	162.13	90.15	33.00	57.15	41.15
14	148.72	82.69	33.00	49.69	41.74
15	142.89	79.45	33.00	46.45	**41.80**
16	137.55	76.48	33.00	43.48	41.74
18	128.08	71.21	33.00	38.21	41.27

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
3.08	44.89	43.88	0.00	1.01

overflow from: 10.00 overflows to: 19

Drainage Area	12, 13				
Area (Ha)	0.200				
C =	0.90	Restricted Flow Q_r (L/s)=	33.00		

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
4	152.51	76.32	33.00	43.32	10.40
6	131.57	65.84	33.00	32.84	11.82
7	123.30	61.70	33.00	28.70	**12.05**
8	116.11	58.10	33.00	25.10	12.05
10	104.19	52.14	33.00	19.14	11.48

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	12.05	43.88	0	0.00

overflows to: 19

Drainage Area	10				
Area (Ha)	0.040				
C =	1.00	Restricted Flow Q_r (L/s)=	18.00		

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
2	315.00	35.03	18.00	17.03	2.04
4	262.41	29.18	18.00	11.18	2.68
5	242.70	26.99	18.00	8.99	**2.70**
6	226.01	25.13	18.00	7.13	2.57
8	199.20	22.15	18.00	4.15	1.99

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
5.02	7.71	3.63	1.00	3.08

overflow from: 9.00 overflows to: 12

Drainage Area	10				
Area (Ha)	0.040				
C =	0.30	Restricted Flow Q_r (L/s)=	18.00		

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
-5	956.98	31.92	18.00	13.92	-4.18
-3	402.34	13.42	18.00	-4.58	0.82
-2	319.47	10.66	18.00	-7.34	**0.88**
-1	266.98	8.91	18.00	-9.09	0.55
1	203.51	6.79	18.00	-11.21	-0.67

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.88	3.63	1	0.00

overflows to: 12

Drainage Area	9				
Area (Ha)	0.080				
C =	1.00	Restricted Flow Q_r (L/s)=		28.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
3	286.05	63.62	28.00	35.62	6.41
5	242.70	53.98	28.00	25.98	7.79
6	226.01	50.26	28.00	22.26	**8.02**
7	211.67	47.07	28.00	19.07	8.01
9	188.25	41.87	28.00	13.87	7.49

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	8.02	3.00	0.00	5.02

overflows to: 10

Drainage Area	9				
Area (Ha)	0.080				
C =	0.30	Restricted Flow Q_r (L/s)=		28.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
-5	956.98	63.85	28.00	35.85	-10.75
-3	402.34	26.84	28.00	-1.16	0.21
-2	319.47	21.32	28.00	-6.68	**0.80**
-1	266.98	17.81	28.00	-10.19	0.61
1	203.51	13.58	28.00	-14.42	-0.87

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.80	3.00	0	0.00

overflows to: 10

Drainage Area	PHASE 2				
Area (Ha)	0.250				
C =	1.00	Restricted Flow Q_r (L/s)=		18.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
30	91.87	63.85	18.00	45.85	82.53
32	87.89	61.08	18.00	43.08	82.71
33	86.03	59.79	18.00	41.79	**82.75**
34	84.27	58.57	18.00	40.57	82.75
36	80.96	56.27	18.00	38.27	82.66

Storage (m^3)

Overflow	Required	Cistern	Sub-surface	Balance
0.00	82.75	120.00	0.00	0.00

Drainage Area	PHASE 2				
Area (Ha)	0.250				
C =	0.90	Restricted Flow Q_r (L/s)=		18.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
15	83.56	52.27	18.00	34.27	30.84
17	77.61	48.54	18.00	30.54	31.15
18	74.97	46.89	18.00	28.89	**31.21**
19	72.53	45.36	18.00	27.36	31.20
21	68.13	42.62	18.00	24.62	31.02

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	31.21	120.00	0	0.00

Drainage Area	PHASE 2	*Cistern sizing only*			
Area (Ha)	0.250				
C =	1.00	Restricted Flow Q_r (L/s)=		9.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
62	54.54	37.91	9.00	28.91	107.54
64	53.26	37.02	9.00	28.02	107.59
65	52.65	36.59	9.00	27.59	**107.60**
66	52.05	36.17	9.00	27.17	107.60
68	50.89	35.37	9.00	26.37	107.58

Storage (m^3)

Overflow	Required	Cistern	Sub-surface	Balance
0.00	107.60	120.00	0.00	0.00

Drainage Area	PHASE 2				
Area (Ha)	0.250				
C =	0.90	Restricted Flow Q_r (L/s)=		9.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
33	50.53	31.61	9.00	22.61	44.76
35	48.52	30.35	9.00	21.35	44.83
36	47.58	29.76	9.00	20.76	**44.84**
37	46.67	29.20	9.00	20.20	44.83
39	44.98	28.14	9.00	19.14	44.78

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	44.84	120.00	0	0.00

Drainage Area	11				
Area (Ha)	0.050				
C =	1.00	Restricted Flow Q_r (L/s)=		2.10	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
53	61.28	8.52	2.10	6.42	20.41
54	60.44	8.40	2.10	6.30	20.41
55	59.62	8.29	2.10	6.19	**20.42**
56	58.83	8.18	2.10	6.08	20.42
57	58.07	8.07	2.10	5.97	20.42

Storage (m^3)

Overflow	Required	Roof	Sub-surface	Balance
0.00	20.42	22.00	0.00	0.00

Drainage Area	11				
Area (Ha)	0.050				
C =	0.90	Restricted Flow Q_r (L/s)=		2.10	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
28	56.49	7.07	2.10	4.97	8.34
30	53.93	6.75	2.10	4.65	8.36
31	52.74	6.60	2.10	4.50	**8.37**
32	51.61	6.46	2.10	4.36	8.36
34	49.50	6.19	2.10	4.09	8.35

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	8.37	22.00	0	0.00

Drainage Area	14 (TWR A)				
Area (Ha)	0.210				
C =	1.00	Restricted Flow Q_r (L/s)=		36.00	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
12	162.13	94.65	36.00	58.65	42.23
13	155.11	90.55	36.00	54.55	42.55
14	148.72	86.82	36.00	50.82	**42.69**
15	142.89	83.42	36.00	47.42	42.68
16	137.55	80.30	36.00	44.30	42.53

Storage (m^3)

Overflow	Required	Cistern	Sub-surface	Balance
0.00	42.69	48.00	0.00	0.00

Drainage Area	14 (TWR A)				
Area (Ha)	0.210				
C =	0.90	Restricted Flow Q_r (L/s)=		36.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
4	152.51	80.13	36.00	44.13	10.59
6	131.57	69.13	36.00	33.13	11.93
7	123.30	64.79	36.00	28.79	**12.09**
8	116.11	61.01	36.00	25.01	12.00
10	104.19	54.75	36.00	18.75	11.25

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	12.09	48.00	0	0.00

IBI GROUP
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Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
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PHASE 2
INTERIM PARKING

STORM SEWER DESIGN SHEET

City Park Drive Rio-Can Redevelopment
City of Ottawa
RioCan Management Inc.

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW												SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.40	C= 0.50	C= 0.67	C= 0.70	C= 0.75	C= 0.80	C= 0.85	C= 0.90	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr) (L/s)	(%)
	8	RYCB11	CBMH1		0.10									0.08	0.08	10.00	0.63	10.63	104.19	122.14	178.56	8.69				8.69	42.08	31.21	250			0.46	0.830	33.39	79.35%
	1	CBMH1	EXMH121										0.28	0.70	0.78	10.63	0.23	10.86	101.00	118.38	173.03	79.18				79.18	164.62	19.95	375			0.81	1.444	85.44	51.90%
	2, 3	EXMH121	EXMH122								0.11		0.07	0.42	1.20	10.86	1.33	12.19	99.88	117.06	171.09	120.22				120.22	139.30	97.50	375			0.58	1.222	19.08	13.69%
		EXMH122	MH200											0.00	1.20	12.19	0.44	12.63	93.91	110.03	160.77	113.04				113.04	168.25	27.00	450			0.32	1.025	55.22	32.82%
		MH200	MH201											0.00	1.20	12.63	0.21	12.83	92.11	107.91	157.66	110.87				110.87	145.71	11.00	450			0.24	0.888	34.84	23.91%
	4	MH201	MH202							0.13				0.27	1.47	12.83	1.24	14.07	91.28	106.94	156.24	134.63				134.63	139.51	63.02	450			0.22	0.850	4.88	3.50%
	5, 5A, 5B	MH202	EXMH124					0.11	0.09			0.13		0.69	2.16	14.07	1.80	15.87	86.69	101.54	148.31	187.43				187.43	155.42	75.00	525			0.12	0.696	-32.01	-20.60%
	6, 7	EXMH124	EXCBMH127									0.36		0.85	3.01	15.87	1.24	17.11	80.86	94.68	138.24	243.61				243.61	293.54	75.00	600			0.21	1.006	49.93	17.01%
	9, 10	CICB13	EXMHSTM11										0.12	0.30	0.30	10.00	0.40	10.40	104.19	122.14	178.56	31.28				31.28	42.08	19.69	250			0.46	0.830	10.79	25.65%
	11	EX "REST"	EXMH11										0.05	0.00	0.00	10.00	0.10	10.10	104.19	122.14	178.56	0.00			2.10	2.10	87.74	10.00	250			2.00	1.731	85.64	97.61%
		EXMH11	EXMH128										0.00	0.00	0.30	10.40	0.16	10.56	102.15	119.74	175.03	30.67			2.10	32.77	94.09	18.00	250			2.30	1.857	61.32	65.17%
	12, 13	EXMH128	EXMH126										0.20	0.50	0.80	10.40	0.34	10.73	102.15	119.74	175.03	81.79			2.10	83.89	162.57	29.00	375			0.79	1.426	78.69	48.40%
	14	BLDG A	EXMH125										0.21	0.53	0.53	10.00	0.37	10.37	104.19	122.14	178.56	0.00			36.00	36.00	139.79	42.80	300			1.92	1.916	103.79	74.25%
	PHASE 2	PHASE 2	EXMH125										0.27	0.68	0.68	10.00	0.05	10.05	104.19	122.14	178.56	0.00			15.00	15.00	101.89	3.78	300			1.02	1.396	86.89	85.28%
	17, 19	EXMH125	EXMH126		0.14							0.15		0.47	0.47	10.37	0.83	11.20	102.27	119.87	175.23	48.19			51.00	99.19	151.66	46.00	450			0.26	0.924	52.47	34.60%
		EXMH126	EXCBMH127											0.00	1.27	10.73	0.30	11.03	100.47	117.76	172.12	127.78			53.10	180.88	257.58	28.00	450			0.75	1.569	76.70	29.78%
	20	EXCBMH127	EXMH1										0.09	0.23	4.51	17.11	0.23	17.33	77.31	90.51	132.12	348.65			53.10	401.75	429.70	20.00	600			0.45	1.472	27.95	6.50%

Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013
2. Existing pipe diameters taken from OMM design brief dated February 1999
3. Existing pipe lengths and slopes taken from field survey data by Stantec and IBI Group

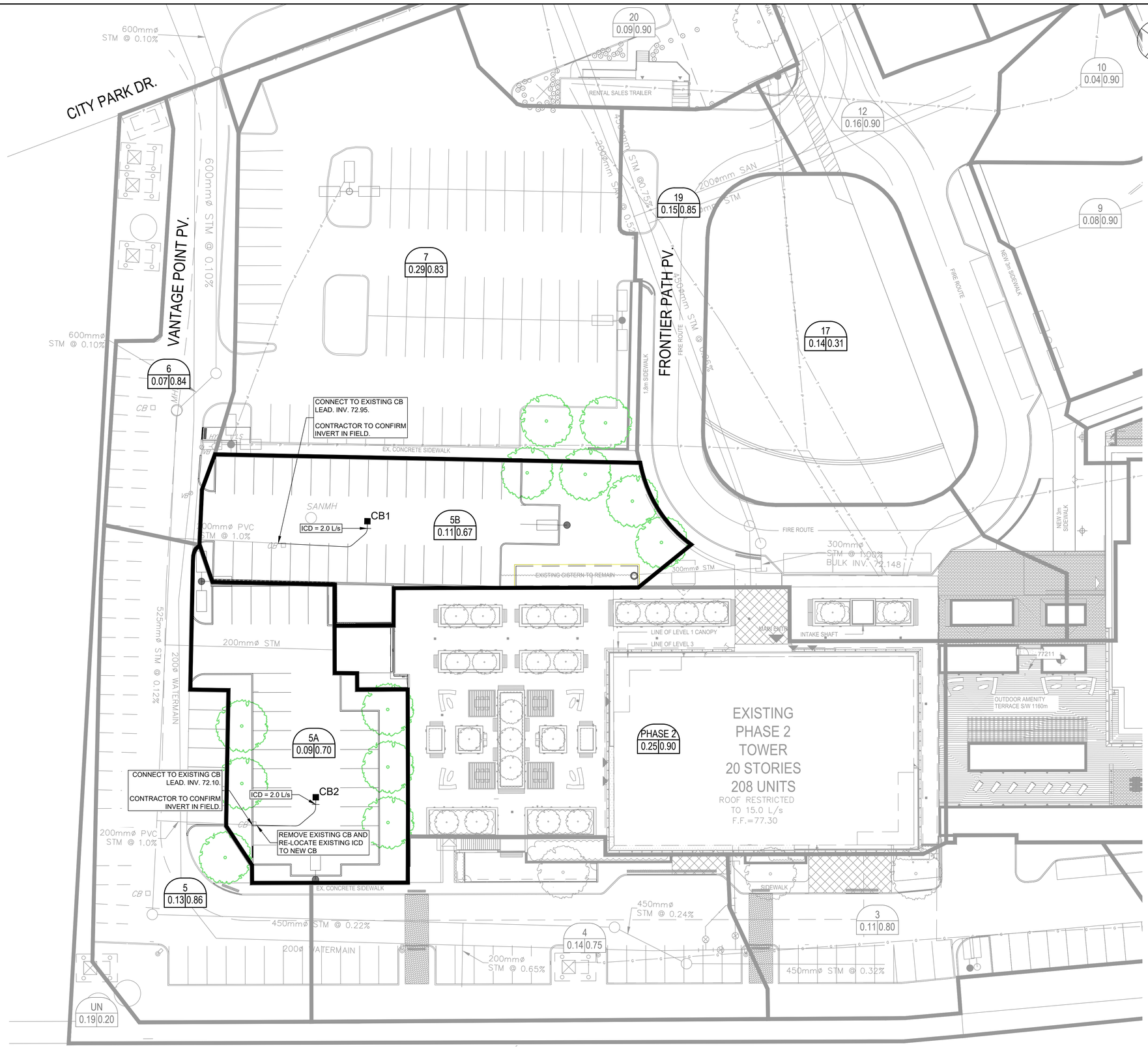
Designed: Designed: MAP

Checked: Checked: TRB

Dwg. Reference: 38729-500

No.	Revision	Date
1.	City submission No. 1	August 10, 2018
2.	City submission No. 3	December 12, 2018
3.	As-Built	December 3, 2021
4.	Interim Parking SPRA No. 1	August 21, 2025

File Reference: 38729.5.7.1
Date: 2025-08-21
Sheet No: 1 of 1



CLIENT

Killam PROPERTIES INC

ISSUES

No.	DESCRIPTION	DATE
1	ISSUED FOR SPRA	2025-08-21

CONSULTANTS

1:250 0 5 10 12.5m

SEAL

LICENSED PROFESSIONAL ENGINEER
T. R. BRULE
2025/08/21
PROVINCE OF ONTARIO

PRIME CONSULTANT

ARCADIS

333 Preston Street - Suite 500
Ottawa ON K1S 5N4 Canada
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www.arcadis.com

PROJECT

KILLAM - CITY PARK PHASE 2 INTERIM PARKING

200 FRONTIER PATH PVT.

PROJECT NO: 38729	
DRAWN BY: **D.D. / E.H.**	CHECKED BY: **M.P.**
PROJECT MGR: **T.R.B.**	APPROVED BY: **T.R.B.**

SHEET TITLE

STORM DRAINAGE AREA PLAN

SHEET NUMBER	ISSUE
C-502	1

SCALE CHECK 1 in XXXXX 10mm

D07-XX-XX-XXXX

File Location: J:\38729\Silver\City\ECA\5.9 Drawings\05civil\current\Parking\Sheets\C-502 STORM DRAINAGE AREA PLAN.dwg Last Saved: August 22, 2025, by dsnes5754 Plotted: August 22, 2025 6:50:21 AM by Dsnes, Dennis

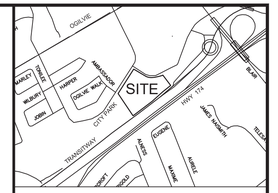
EXISTING COMMERCIAL DEVELOPMENT
RIO-CAN

SEE IBI DRAWING 38729 C-011 - DETAILS AND NOTES - FOR FURTHER INFORMATION

EXISTING COMMERCIAL DEVELOPMENT
BY OTHERS

LEGEND :

- CB08 / 0.27 | 0.50 — AREA NUMBER / RUNOFF COEFFICIENT / AREA IN HECTARES
- STORM TRIBUTARY AREA



RIO CAN
REAL ESTATE INVESTMENT TRUST

Killam PROPERTIES INC

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4	ISSUED FOR CONSTRUCTION	TRB	19: 02: 21
3	REVISED PER CITY COMMENTS	TRB	18: 12: 12
2	REVISED PER CITY COMMENTS	TRB	18: 11: 09
1	ISSUED TO CITY	TRB	18: 08: 08

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HOBIN ARCHITECTURE

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Project Title

2280 CITY PARK DEVELOPMENT

PHASE 2

LICENSED PROFESSIONAL ENGINEER
T. R. BRULE
2018/02/21
PROVINCE OF ONTARIO

Drawing Title

STORM DRAINAGE AREA PLAN

Scale: 1 : 400

Design	Date
J.E.B.	AUG. 2018
Drawn: E.H.	Checked: T.R.B.
Project No.: 38729	Drawing No.: C-501

D07-12-18-0122

17741

Appendix C

GRADING LEGEND

- SLOPE C/W FLOW DIRECTION
- PROPOSED SPOT GRADE
- RETAINING WALL C/W TOP OF WALL
- CONCRETE CURB WALL C/W ASPHALT AND BOTTOM (SURFACE) OF WALL
- FULL STATIC PONDING ELEVATION
- PARKING PAVEMENT AREA
- PROPOSED TERRACING (MAX 3:1)
- SODDED AREA
- TOPOGRAPHICAL SURVEY BY ARCADIS JULY 18th 2025

CLIENT

Killam PROPERTIES INC

ISSUES

No.	DESCRIPTION	DATE
1	ISSUED FOR SPRA	2025-08-21

CONSULTANTS

1:250 0 5 10 12.5m

SEAL

LICENSED PROFESSIONAL ENGINEER
T. R. BRULE
2025/08/21
PROVINCE OF ONTARIO

PRIME CONSULTANT

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PROJECT

KILLAM - CITY PARK PHASE 2 INTERIM PARKING

200 FRONTIER PATH PVT.

PROJECT NO: 38729	
DRAWN BY: **D.D. / E.H.**	CHECKED BY: **M.P.**
PROJECT MGR: **T.R.B.**	APPROVED BY: **T.R.B.**

SHEET TITLE

GRADING PLAN

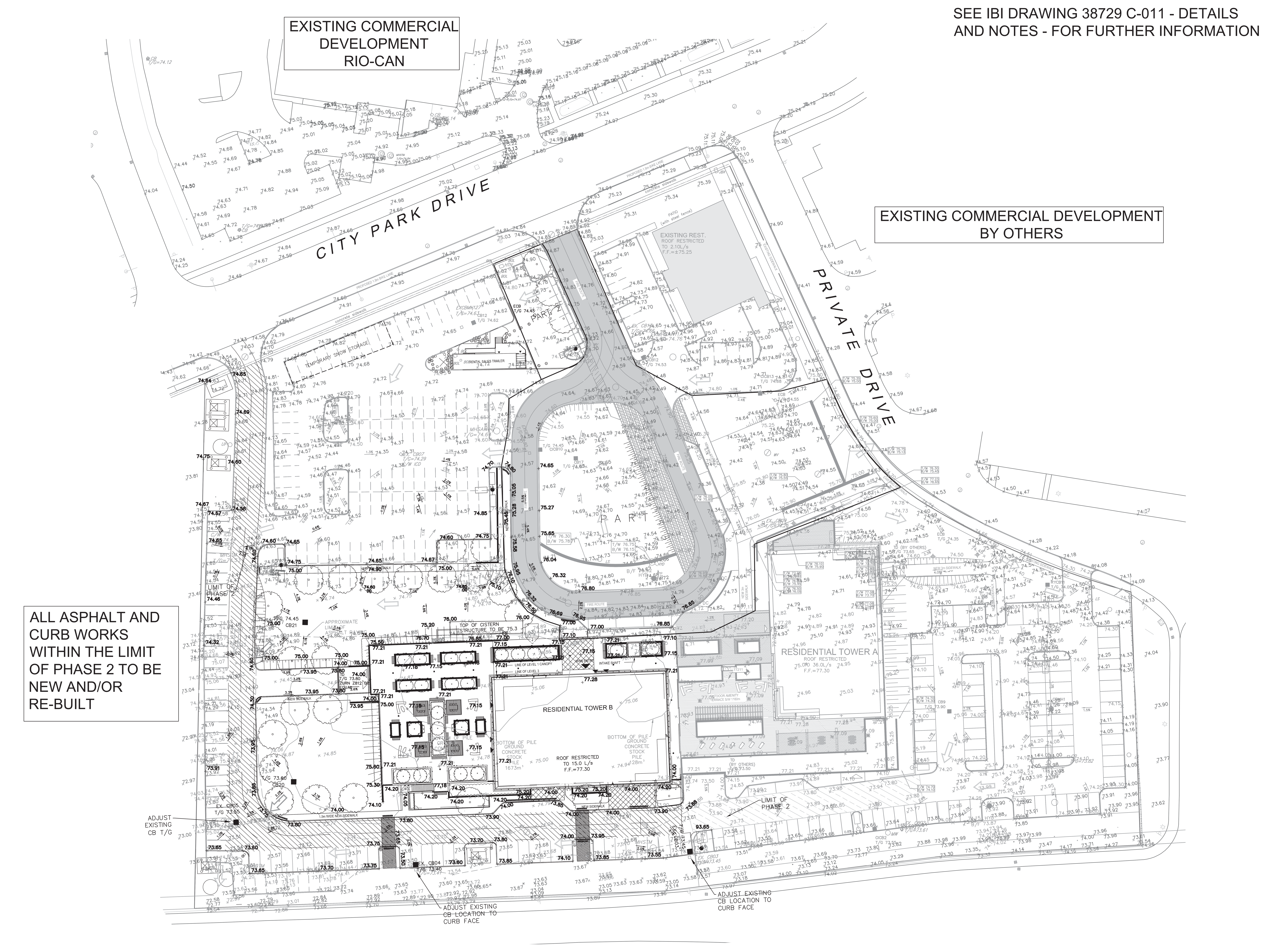
SHEET NUMBER	ISSUE
C-202	1

SCALE CHECK 1 in 10mm XXXXX

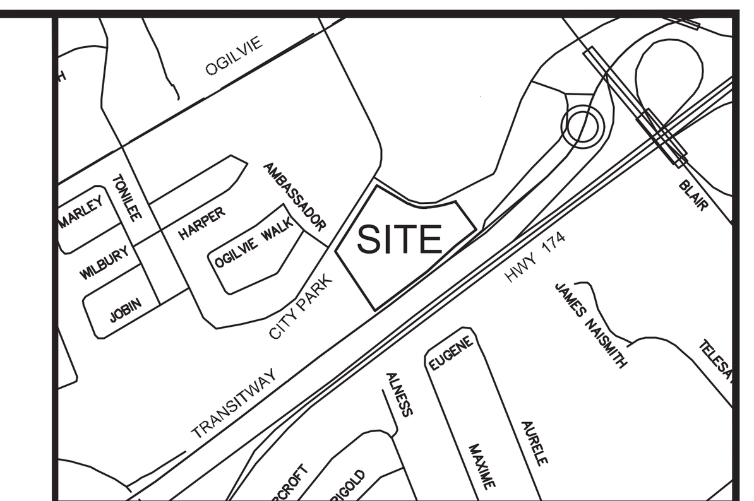
File Location: J:\38729-Shwr\City\ECAS\9 Drawings\95civil\current\Parking\Sheets\C-202 GRADING PLAN.dwg Last Saved: August 22, 2025, by dcnes5754 Plotted: August 22, 2025 6:47:31 AM by Dcnes, Denis

D07-XX-XX-XXXX

SEE IBI DRAWING 38729 C-011 - DETAILS AND NOTES - FOR FURTHER INFORMATION



ALL ASPHALT AND CURB WORKS WITHIN THE LIMIT OF PHASE 2 TO BE NEW AND/OR RE-BUILT



RIO CAN
REAL ESTATE INVESTMENT TRUST

Killam PROPERTIES INC

No.	REVISIONS	By	Date
14			
13			
12	REVISED PHASE 2 GRADING	TRB	21:06:23
11	UPDATED ASPHALT AREAS	TRB	20:11:12
10	ISSUED FOR CONSTRUCTION	TRB	19:12:10
9	RE-ISSUED FOR TENDER	TRB	19:09:24
8	RE-ISSUED FOR CONSTRUCTION	TRB	19:03:29
7	ISSUED FOR CONSTRUCTION	TRB	19:02:21
6	REVISED PER CITY COMMENTS	TRB	18:12:12
5	REVISED PH. 2 EXISTING GROUND GRADES	TRB	18:12:03
4	ISSUED FOR TENDER	TRB	18:11:22
3	REVISED PER CITY COMMENTS	TRB	18:11:09
2	ISSUED FOR 66% REVIEW	TRB	18:10:31
1	ISSUED TO CITY	TRB	18:08:08

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Project Title

2280 CITY PARK DEVELOPMENT
PHASE 2

LICENSED PROFESSIONAL ENGINEER
T. R. BRULE
2021/06/23
PROVINCE OF ONTARIO

N

Drawing Title

SITE GRADING

Scale: 1 : 400

Design	Date
J.E.B.	AUG. 2018
Drawn	**Checked**
E.H.	T.R.B.
Project No.	**Drawing No.**
38729	C-201

D07-12-18-0122

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