FUNCTIONAL SERVICING REPORT

PROPOSED CONDOMINIUM BUILDING

1381 LAKESHORE ROAD EAST
CITY PARK HOMES

CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL

FILE NO. 219-M46

AUGUST 18, 2020

SKIRA & ASSOCIATES LTD.
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1.0 INTRODUCTION

Skira & Associates Ltd. was retained by City Park Homes to prepare a Functional Servicing Report (FSR) in support of an Official Plan Amendment and Zoning Bylaw Amendment for a proposed 15-storey high-rise condominium consisting of 385.0m² commercial space and 242 condominium units, in the City of Mississauga, Regional Municipality of Peel.

The purpose of this report is to define the existing municipal services to the subject parcel of land and the proposed servicing details in support of the proposed development.

It is intended that this FSR will result in an 'approval in principle' of the design proposed by the City of Mississauga, Regional Municipality of Peel, and any other relevant authorities. detailed design will be provided during the Site Plan Application process.

2.0 SITE AREA INFORMATION

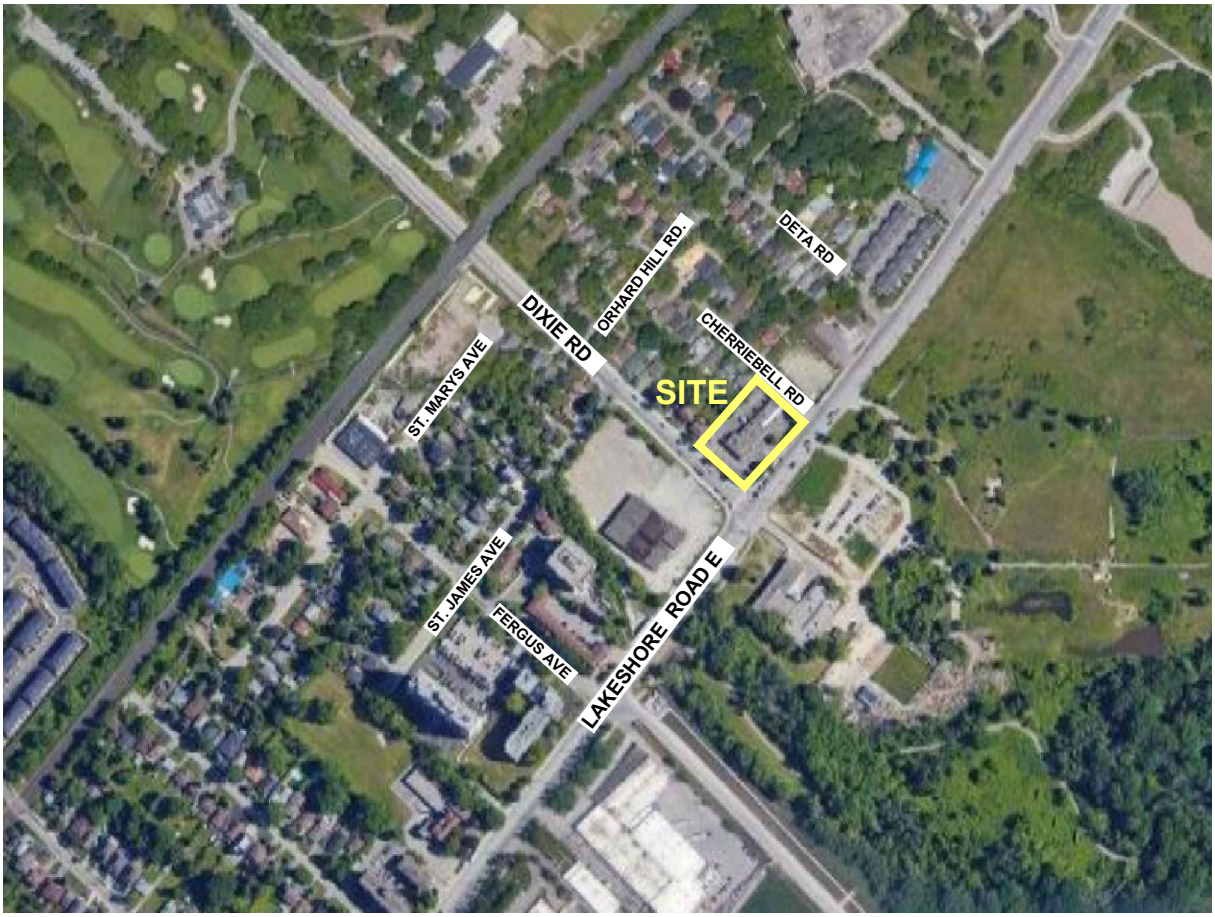
The subject property is located on 1381 Lakeshore Road East and covers an area of approx. 0.43 Ha. It is legally known as Lots 6, 7, 8, 9 & 10, Registered Plan A20, West of Hurontario Street in the City of Mississauga, Regional Municipality of Peel.

The site is bounded by Lakeshore Road East on the south, Dixie Road on the west, Cherriebell Road on the east and existing residential building to the north. ***Refer to Figure 1 – Key Plan.***

Currently, the property is developed with a commercial building and at-grade parking. The existing building and parking surface are scheduled for demolition prior to the start of construction.

An area of approx. 0.13 Ha of the property will be dedicated to the Region of Peel for the road widening of Dixie Road and daylights on Cherriebell Road.

The majority of the site will be developed with a high-rise condominium building, including three (3) levels of underground garage.



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KEY PLAN

PROJECT No. 219-M46		**FIGURE No. 1**
DATE - JULY 2020		
SCALE - N.T.S.	DRAWN BY - E.K.	

3.0 SITE ACCESS

The subject site is located on the northeast corner of Lakeshore Road East and Dixie Road, west of Cherriebell Road. Currently, there is an existing access for the existing plaza from Lakeshore Road.

Access to the proposed high-rise condominium will be from Dixie Road and Cherriebell Road.

A 3.0m road widening on the east size of Dixie Road will be required to provide a 42.0m ROW for the planned Region of Peel Requirements.

Boulevards will be reconstructed at min. 2.00% slope to the satisfaction of City of Mississauga and Region of Peel.

The existing road network will provide access to arterial roads and to nearby major highways, Highways 427 and Queen Elizabeth Way.

The existing road pattern will provide good access to nearby commercial districts, employment districts, school, municipal offices, community centres, and parks.

4.0 STORM DRAINAGE SYSTEM

According to available records, there is an existing 450mm dia. storm seer running west on Lakeshore Road East and a short leg of a 675mm dia. storm sewer outletting to the existing Applewood Creek.

The subject property is within the Applewood Creek sub-watershed. Accordingly, on-site stormwater management will be required to restrict 100-yr post-development flows to 2-year pre-development levels.

4.1 Existing Drainage Conditions

Currently, the land is developed with an existing commercial building, parking surface area, and landscaped area. The site has an existing storm connection at the south of the property, connecting to the existing 450mm dia. storm sewer on Lakeshore Road East. The connection will be reused.

The land is relatively flat in topography, with gentle sloping from east to west, with a grade differential of approx. 1.5m. The site is graded with a gentle slope from Cherriebell Road to Dixie Road, and storm runoff is captured by the existing storm sewer system on Dixie Road and Lakeshore Road East.

As previously mentioned, an area of approx. 0.12 Ha will be dedicated for road widening:

Total Site Area = 0.43m²
Road Widening = 0.012m²
Development Area = 0.418m²

The pre-development site statistics and associated runoff coefficients are summarised as follows:

Area of Description	Area	Runoff Coefficient
Paved Building/Roof Landscape	2,400 860 820	0.90 0.95 0.25
Total Development/Site	4,080	0.779

Refer to Dwg. 219-M46.

The pre-development flow for a 2-yr storm event is as follows:

Q = 0.0028 CIA

Where, A = area in hectares, 0.408 Ha
C = runoff coefficient, 0.78
T_C = 15.00 min
$I_{2\text{-yr}}$ = 59.89mm/hr

Q = **0.053m³/s**

Therefore, the max. allowable discharge from the site is **0.053m³/s**.

4.2 Post-Development Storm Drainage Servicing

The proposed high-rise condominium will utilise existing storm connection located at the south of the site and will outlet to existing 450mm dia. storm sewer on Lakeshore Road. The connection will provide sufficient depth and capacity for post-development stormwater runoff.

The existing property was previously designed to discharge to Lakeshore Road East storm sewer system. ***Refer to Appendix A*** for existing drainage records for the area and confirmation of capacity in the existing storm sewer system on Lakeshore Road, downstream of the development.

The proposed high-rise condominium will cover majority of the site; most of the site will be covered by the rooftops and amenity terraces.

Though the Applewood Creek sub-watershed requires only 100-yr post-development flows to be controlled to 2-yr pre-development levels, the proposed development will restrict all discharge up to and including the 100-yr storm event to 2-yr pre-development levels (**0.053m³/s**, as previously calculated), as majority of the site is comprised of roof. Required volume will be stored in an underground storage tank located at P1 level of the underground parking structure.

Green roofs will cover approx. 400m² if the 8th or 15th floor, where currently amenity terraces are proposed. Details will be provided during Site Plan submission.

The post-development site statistics and associated runoff coefficients are summarised as follows:

Area of Description	Area	Runoff Coefficient
Greef Roof	400	0.45
Building/Roof	2,060	0.95
Hard Surface at Grade	900	0.90
Landscape at Grade	720	0.25
Total Development/Site	4,080	0.765

The underground parking foundation drains will require sump sumps to be pumped to the stormwater management tank. According to the Hydrogeological Investigation Report, prepared by Bruce A. Brown Associates Limited, the groundwater elevation is approx. 112m above mean sea level and the long-term subdrain discharge is estimated to be approx. 73,398 L/day (0.00085m³/s).

Based on the following parameters:

A	= 0.408 Ha
C	= 0.765
Allowable Discharge	= 0.052m³/s

Using the Modified Rational Method, the volume required to be store for a 100-yr storm event:

V = 90.60m³

YEAR
STORM
100 year
CITY
Mississauga

C = **0.765**
A (ha) = **0.40800**
Allow. Discharge Qa (m3/s) = **0.053000**
Safety Factor Sf = **0%**

Max. Required Detention (m3) = ***63.48***

RAINFALL DURATION *Tc (min)*	**RAINFALL INTENSITY** *I (mm/hr)*	**TOTAL UNCONTROLLED RUNOFF** *Q=CIA/360 (m3/sec)*	**INFLOW VOLUME Vi (m3)**	**OUTFLOW VOLUME Vo (m3)**	**REQUIRED DETENTION VOLUME (m3)** *D=(Vi-Vo)*Sf*
5	242.53	0.2103	63.08	17.41	45.68
10	176.31	0.1529	91.72	31.80	59.92
15	140.69	0.1220	109.78	46.30	**63.48**
20	118.12	0.1024	122.89	60.88	62.01
25	102.41	0.0888	133.18	75.52	57.66
30	90.77	0.0787	141.66	90.21	51.46
35	81.77	0.0709	148.88	104.93	43.96

Stormwater tank will be provided within underground garage.

Detailed design will be provided during Site Plan Application process.

Refer to Dwg. 219-M46 – Concept Site Servicing Plan.

4.3 Stormwater Runoff Volume Reduction

The City of Mississauga requires stormwater runoff volume reduction, where the first 5mm of runoff shall be retained on-site and managed by way of infiltration, evapotranspiration, or reuse for impervious areas.

As such, the required volume to be retained on-site is:

V_{5mm} = 2,960m² x 0.005m
= **14.8m³** per rainfall

As majority of the site area is occupied by the proposed high-rise condominium and underground parking, infiltration is not feasible for this project. Therefore, water evapotranspiration and reuse will be the primary mechanisms utilised to address water balance.

As previously mentioned, approx. 400m² of green roof is proposed to be installed on the 8th or 15th floor, where currently amenity terraces are proposed.

Detailed design of the green roof and irrigation/grey water reuse systems will be provided at the Site Plan Application stage. Mechanical design for the irrigation system will ensure that the water temporarily stored in the sump storage tank will be emptied before switching to the potable water.

4.4 Quality Control

The City of Mississauga requires a minimum treatment of 80% total suspended solids (TSS) removal for the protection of waterways. On-site best management practice (BPM) is required to ensure the overall water quality from the proposed development meets this minimum.

As previously mentioned, majority of the site is covered by rooftops, green roods, and amenity terraces. Surface vehicle parking at grade is limited and majority of the driveway will be covered by the building rooftops and terraces above.

4.5 Orifice Control

The allowable discharge rate, 0.053m³/s, from the development will be controlled by means of an orifice restrictor plate installed over the outlet pipe inside the underground stormwater tank, at the south of the site and discharge to the existing outlet pipe. The orifice discharge rate will be calculated using FlowMaster Computer program developed by Haestad Methods Inc. (USA).

5.0 SANITARY DRAINAGE SYSTEM

According to available records, there is an existing 300mm dia. sanitary sewer running south on Dixie Road and an existing 250mm dia. sanitary sewer running west on Lakeshore Road, which connects to the 300mm dia. sanitary sewer running south ok Lakeshore Road.

Currently, the site has multiple sanitary connections, which will all be disconnected as per Region of Peel standards.

The proposed high-rise condominium will be serviced to the existing 300mm dia. sanitary sewer on Dixie Road. Proposed 200mm dia. sanitary connection will be provided to service the development to the existing sanitary sewer.

The existing 300mm dia. sanitary sewer has sufficient depth to accept the sanitary flows from the high-rise condominium building. The proposed sanitary invert at property line is approx. 81.70m. The proposed lowest finished main floor is approx. 84.55. Therefore, the building main floor and above floors will have gravity sewage flows. The basement and underground parking drains will require sanitary ejection pumps.

Refer to Dwg. 219-M46 – Concept Site Servicing Plan.

Sanitary Flow Calculations

A. Residential

- One Bedroom & One Bedroom + Den – 170 units x 1.68 PPU = 285.6
- Two Bedrooms or more – 72 units x 2.54 PPU = 182.88

B. Commercial

- 0.040 floor hectares x 50p/hectare = 2.0 population

Total Population = 285.6 + 182.88 + 2
= **470.84 ≈ 470**

Peak Factor $= 1 + \frac{14}{4 + P^{0.5}}$ Where, P = population in thousands

$= 1 + \frac{14}{4 + 0.470^{0.5}}$

= 1 + 2.98
= **3.98**

Expected Peak Flow Rate = 302.8 x 470 x 3.98
= 566,418 L/day = **6.55 L/s**

6.0 WATERMAIN DISTRIBUTION SYSTEM

According to available records, there is an existing 400mm dia. watermain on Lakeshore Road East and existing 600mm dia. watermain on Dixie Road.

Currently, the site has single water service connection which will all be disconnected as per Region of Peel standards.

The existing fire hydrants on Lakeshore Road and Dixie Road will be utilised to provide external fire coverage for the building.

The proposed high-rise condominium will be serviced to the existing 600mm dia. watermain located on Dixie Road. Proposed 200mm dia. watermain connection will be constructed for fire and 100mm dia. water service for domestic use for the proposed condominium.

Refer to Dwg. No. 219-M46 – Concept Site Servicing Plan.

Water Demand Calculations

A. Residential

- Proposed Unit (residential 242) (468 population, as per previous calculations)

Site Average Flow	= 280 Litres/capita/day = 280 x 468 = 131,040 L/day = **1.52 L/s**
Total Expected Peak Flow Rate	= Site Average Flow x Peak Hour Factor = 131,040 x 3.0 = 393,120 L/day = **4.55 L/s**
Total Expected Max. Daily Flow	= Site Average Flow x Max. Day Factor = 131,040 x 3.0 = 262,080 L/day = **3.03 L/s**

B. Residential

- Population = 2 persons, as previously calculated

Site Average Flow = 300 Litres/capita/day
= 300 x 2
= 600 L/day = **0.007 L/s**

Total Expected Peak Flow Rate = Site Average Flow x Peak Hour Factor
= 600 x 3.0
= 1,800 L/day = **0.02 L/s**

Total Expected Max. Daily Flow = Site Average Flow x Max. Day Factor
= 600 x 1.4
= 840 L/day = **0.01 L/s**

Based on *Fire Underwriters Survey 1999*, the fire flow is calculated on the area of largest floor + 25% of 2 immediately adjoining floors using the following formula:

$F = 220\ C\sqrt{A}$ Where, C = coefficient for fire resistance construction = 0.60
A = area = (2,060 x 2) + (2,060 x 2 x 0.25) = 5,150m²
F = fire flow in L/min

F = 220 x 0.60 x √5,150
= 9,473 L/min ≈ 9,500 L/min

A decrease can be applied for occupancy having a low contents fire hazard:

F = 9,500 L/min – 25%
= 7,125 L/min

Therefore, the fire flow demand is:

F = 7,125 – 2,137 L/min
= 4,988 ≈ 5,000 L/min = **83.33 L/s**

Max. Peak Flow = 4.55 (res.) + 0.02 (com.) + 83.33 (fire)
= **87.90 L/s**

Max. Daily Flow = 3.03 (res.) + 0.01 (com.)
= 3.04 L/s

The fire flow was conducted on the existing watermain and confirms that the existing system can provide sufficient domestic and fire flows. ***Refer to Appendix C.***

7.0 SUMMARY

The findings and recommendations were prepared in accordance with accepted professional engineering principles and practices and reveal that the proposed high-rise condominium can be fully serviced to the available services on Dixie Road and Lakeshore Road East. The findings of this report are global and are related to the servicing functionality of this application. These findings by no means are final and are not to replace the detail review of this application which shall take place upon submission of Site Plan or Servicing Agreement.

The conclusion is as follows:

- Storm sewer outlet will be to the existing 450mm dia. storm sewer on Lakeshore Road East.
- A 300mm dia. sanitary sewer is available on Dixie Road.
- A 600mm dia. watermain is available on Dixie Road with fire protection from Lakeshore Road East.

We respectively submit this report with intention of obtaining approval in principal the recommendation.

Yours truly,

SKIRA & ASSOCIATES LTD.

Michael Jozwik, P. Eng.
MJ:ak

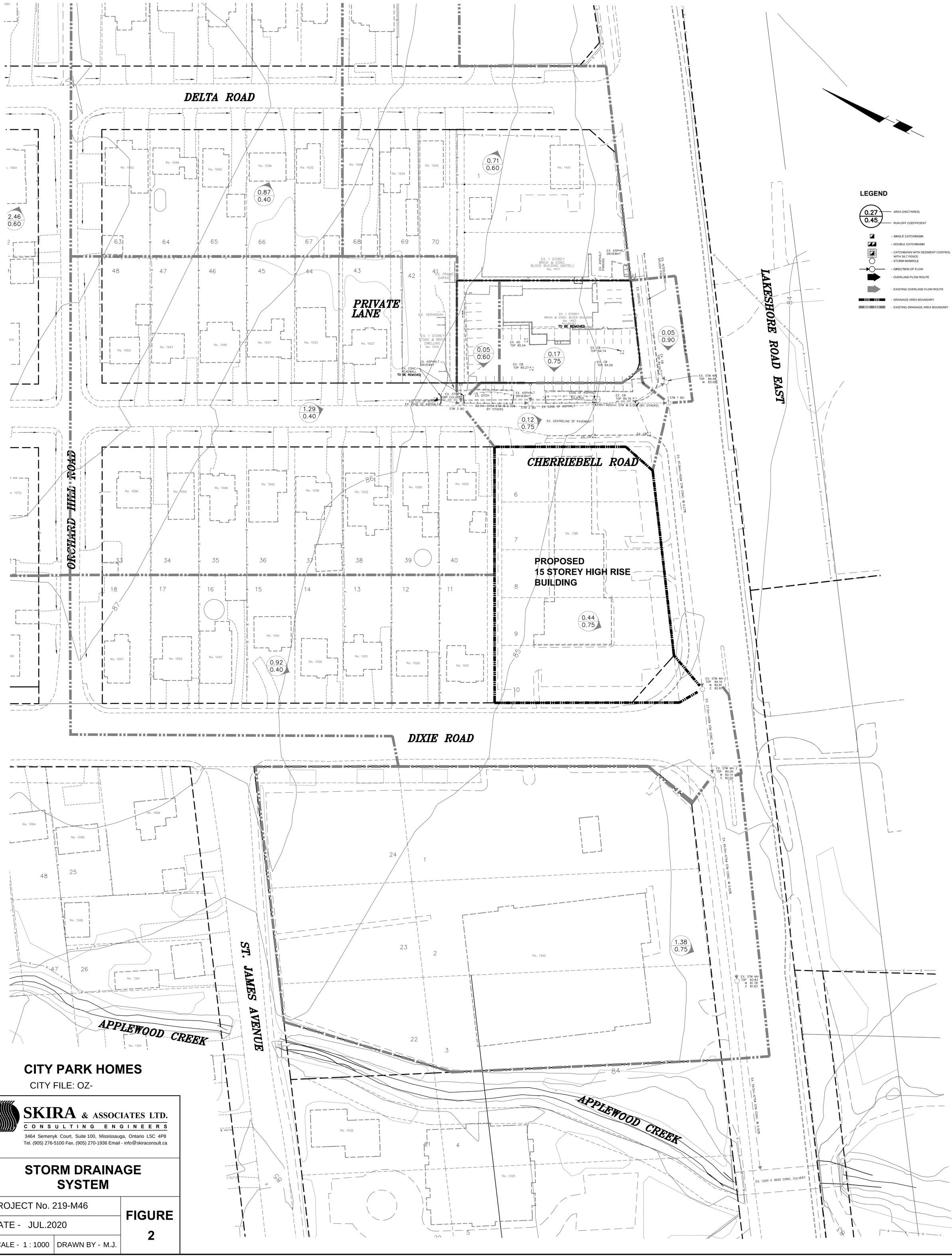
NOTE: ***Limitation of Report***

*This report was prepared by **Skira & Associates Ltd.** for **City Park Homes** for review and approval by government agencies only.*

*In light of the information available at the time of preparation of this report, any use by a **Third Party** of this report are solely the responsibility of such **Third Party** and **Skira & Associates Ltd.** accepts no responsibility for any damages, if any, suffered by the **Third Party**.*

Appendix A

Existing Storm Sewer Drainage Plan
& Storm Sewer Design Chart



CITY PARK HOMES

CITY FILE: OZ-

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STORM DRAINAGE SYSTEM

PROJECT No. 219-M46	**FIGURE 2**
DATE - JUL.2020	
SCALE - 1 : 1000 / DRAWN BY - M.J.	

SUBDIVISION : **PROPOSED TOWNHOUSES DEVELOPMENT**
CITY PARK HOMES

MAJOR DRAINAGE AREA:

CITY FILE:

CONSULTANT : **SKIRA & ASSOCIATES LTD.**

CITY OF MISSISSAUGA

STORM SEWER DESIGN CHART

CONTROLLED DISCHARGE

SHEET No. 1 of 1

PROJECT No. : 219-M46

DESIGNED BY : M.B.

DATE : Jul - '20

$I_{(10YR)} = 1010/(Tc+4.6)^{0.78}$

MANNING'S ROUGHNESS COEFF. n = 0.013

LOCATION	FROM MH	TO MH	AREA Aa	RUNOFF COEFF. Ca	AaxCa	ACCUM. AREA A=∑Aa	ACCUM. AaxCa C=∑AaxCa	Tc	INTENSITY I	EXPECTED FLOW Q=I·A·C / 360	TYPE OF PIPE	LENGTH L	SLOPE S	PIPE SIZE NOMINAL D	CAPACITY n=0.013 e	VELOCITY n=0.013 V	TIME OF FLOW T = L / V x 60	VELOCITY n = 0.009	VELOCITY ACTUAL	INVERT ELEV. UPPER	INVERT ELEV. LOWER
	MH#	MH#	ha			ha		min	mm/hr	m^3/s		m	%	mm	m^3/s	m/s	min	m/s		MH	MH
EXTERNAL	TO	3 BO	1.29	0.40	0.52	1.29	0.52	15.83	96.01	**0.139**											
1407	PLUG	3 BO	0.05	0.60	0.03	0.05	0.03	15.00	99.17	**0.008**	PVC	6.5	1.00	250	**0.062**	1.22	0.06	1.77			
CHERRIEBELL RD	3 BO	2 BO	0.00	0.00	0.00	1.34	0.55	15.89	95.79	**0.146**	PVC	22.0	0.70	375	**0.153**	1.34	0.19	1.94			
1407	PLUG	2 BO	0.17	0.25	0.04	0.17	0.04	15.00	99.17	**0.011**								SITE IS CONTROLLED TO PRE DEV.			
CHERRIBELL RD	2 BO	1 BO	0.12	0.75	0.09	1.46	0.64	16.08	95.10	**0.156**	PVC	42.0	0.50	450	**0.210**	1.28	0.38	1.85			
LAKESHORE RD	1 BO	EX.1	0.05	0.90	0.05	1.51	0.69	16.46	93.76	**0.191**	PVC	97.8	0.27	450	**0.154**	0.94	1.20	1.36			
PROP SITE	EX.1	EX.2	**0.44**	0.75	0.33	1.95	1.02	17.66	89.79	**0.265**	PVC	27.5	1.12	450	**0.314**	1.92	0.17	2.77			
	EX.2	EX.3	0.95	0.40	0.38	2.90	1.40	17.83	89.26	**0.358**	CONC	65.5	0.50	675	**0.621**	1.68	0.65	2.43			
APPLEWOOD	EX.3	CULV	1.38	0.75	1.04	4.28	2.06	18.48	87.30	**0.500**	CONC	59.5	0.50	675	**0.621**	1.68	0.59	2.43			

Appendix B
Orifice Output Report

Worksheet
Worksheet for Circular Orifice

Project Description	
Worksheet	Orifice - 1
Type	Circular Orifice
Solve For	Diameter

Input Data		
Discharge	0.0530	m³/s
Headwater Elevat	84.30	m
Centroid Elevatior	83.45	m
Tailwater Elevatio	83.37	m
Discharge Coeffic	0.60	

Results		
Diameter	166	mm
Headwater Height Above	0.85	m
Tailwater Height Above C	-0.08	m
Flow Area	2.2e-2	m²
Velocity	2.45	m/s

Appendix C
Water Supply Test