

TECHNICAL MEMO

DATE	December 20, 2017	PROJECT NO.	1110-4749
RE	Cooksville Creek Flood Spill Analysis 200 South Service Road and 201 Radley City of Mississauga	Road	
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FROM	Jurgen Koehler, P. Eng.		

1.0 INTRODUCTION

C.F. Crozier & Associates Inc. (Crozier) was retained by Dream Suites to prepare a Flood Spill Analysis Memo to support a Site Plan Application for the subject properties located at 200 South Service Road and 201 Radley Road in the City of Mississauga (the Site). This analysis was required to determine the extents of the Cooksville Creek Regional flood spill location relative to the Site. This Technical Memo was prepared to summarize the flood spill analysis and outline conclusions.

2.0 BACKGROUND

The subject properties are bounded by South Service Road to the north, Radley Road to the south, Crestview Avenue to the west and existing residential lands to the east, as shown in **Figure 1**. The Queen Elizabeth Way (QEW) is to the north of the Site. The Site is currently within a Credit Valley Conservation regulated area. Approximately 190 m east of the Site Cooksville Creek crosses under the QEW through a concrete box culvert.

R.V. Anderson Associates Limited completed a Floodline Mapping Study in 1996 which confirmed the Regional flood flow at the QEW culvert location and spill south towards South Service Road.

During the Regional storm event the existing culvert can not convey the flood flows, causing flood waters to overtop North Service Road and the QEW, and spill south towards South Service Road.

3.0 METHODOLOGY AND EXISTING CONDITIONS

A general technical methodology was followed to complete the spill analysis for Cooksville Creek at this location, as outlined below:

- 1. Obtained and analyzed as-built drawings for the existing road plan and profiles for the QEW and South Service Road.
- 2. Completed a hydraulic analysis of cross sections for both South Service Road and QEW to determine location and elevation of the regional spill.
- 3. Delineated spill location along South Service Road and adjacent to the Site.
- 3.1 Existing Conditions

The culvert east of the Site is 64 m long and is 7.9 x 4.1 m. The R.V. Anderson report confirmed that the Regional flood flow at the QEW crossing is 295 m³/s, where 100 m³/s is conveyed in the culvert. Therefore, the Regional flood flow over-topping the QEW is 195 m³/s.

The Site is bounded by Crestview Avenue to the west and South Service Road to the north. This intersection is at an elevation of approximately 98.80 m, which is approximately 1.0 m higher than the lowest elevation (the sag) of South Service Road at 97.70 m. The lowest elevation of the QEW Westbound lane is 97.80 m. The Site is located at an elevation of approximately 98.75 m. These conditions are shown in Figure 1. The cross-section information for QEW and South Service Road show that the sag is generally centered over Cooksville Creek.

3.2 South Service Rd. Spill Analysis

The South Service Rd. cross-section was modeled using FlowMaster to determine the depth of flow within the right-of-way during the Regional flood event. Based on the 195 m³/s flow over-topping the culvert, the depth of flow within South Service Rd is 0.70 m. Therefore, the Regional water surface elevation will be 98.40 m, which is 0.35 m below the Site elevation. The results of this analysis are shown in Figure 1. For details of the analysis please see the attached FlowMaster worksheets.

To further confirm that the Site is outside the Regional floodplain, the maximum capacity of South Service Road was determined. A hypothetical normal depth of 1.05 m (the maximum cross-section depth) was inputted into FlowMaster, along with the station and elevation data for South Service Road. Through this analysis it was determined that the associated flow would be approximately 511 m³/s. Since this flow is in access of the Regional flood flow determined by the R.V Anderson Study (295 m³/s), it is not feasible that the floodline from Cooksville Creek will reach the Site under Regional flood conditions. For details of the analysis please see the attached FlowMaster worksheets.

3.3 QEW Spill Analysis

The QEW West-bound cross-section was modeled using FlowMaster to determine the depth of flow within the right-of-way during the Regional flood event. Based on the 195 m³/s over-topping the culvert, the depth of flow within the QEW Westbound land will be 0.82 m. Therefore, the Regional water surface elevation will be 98.62 m. This analysis confirms that the Regional water surface elevation is below the Site elevation. For details please see the attached FlowMaster worksheets.

4.0 CONCLUSIONS

As outlined, this Spill Analysis confirms that the Site is not located within the Regional floodplain for Cooksville Creek. The spill flow over-topping the QEW will be centered along Cooksville Creek before it re-enters the system downstream. We trust this memo is sufficient to approve the Spill Analysis for 200 South Service Road and 201 Radley Road. We recommend that Credit Valley Conservation approves this Spill Analysis such that the Owner may proceed with the Site Plan Application. Should you require any clarification, please contact the undersigned.

Sincerely,

C.F. CROZIER & ASSOCIATES INC.

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Claire Phelps, E.I.T Water Resources

C.F. CROZIER & ASSOCIATES INC.

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Jurgen Koehler, P. Eng. Project Engineer

Attachments:

As-built Drawings Road Station and Elevation data South Service Road Road Station and Elevation data QEW Westbound Hydraulic Worksheet for South Service Road (Regional Spill) Hydraulic Worksheet for South Service Road (Maximum Capacity) Hydraulic Worksheet for QEW Westbound (Regional Spill) Figure 1: 200 South Service Road and 201 Radley Road Spill Analysis

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DRAINING CREATED:

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Project: 200 South Service Road &201 Radley Project No.: 1110-4749

Created By:	CVP	
Checked By:	JK	

Date: 21-Sep-17 Updated:

14-Dec-17

ROAD STATION AND ELEVATIONS SOUTH SERVICE ROAD

Station As-built Drawing: 21402-D	Elevation (m)	Station As-built Drawing: 21403-D	Elevation (m)	Station As-built Drawing: 21404-D	Elevation (m)
0+960	98.80	1+210	97.80	1+480	100.45
0+980	98.80	1+220	97.75	1+500	100.65
1+000	98.80	1+230	97.70	1+520	100.80
1+020	98.75	1+240	97.75	1+540	100.95
1+040	98.70	1+250	97.80	1+560	101.05
1+060	98.60	1+260	97.90	1+580	101.15
1 +070	98.55	1+270	97.95	1+600	101.20
1+080	98.45	1+280	98.05		
1+100	98.30	1+300	98.25		
1+110	98.25	1+320	98.45		
1+120	98.20	1+340	98.65		
1+140	98.10	1+360	98.90		
1+150	98.00	1+380	99.10		
1+160	98.00	1+400	99.40		
1+170	97.90	1+420	99.65		
1+180	97.90	1+440	99.90		
1+200	97.85	1+460	100.15		

*Note: As-builts retrieved from Region of Peel Public Works, Peel Asset Locator Application (https://epal.peelregion.ca/epal/) Plan No 21402-D, 21403-D, 21404-D.



Project: 200 S Service Rd. 201 Radley Rd. Project No.: 1110-4749

Created By:	CVP	Date:	8-Nov-17
Checked By:	JRK	Updated:	14-Dec-17

ROAD STATION AND ELEVATIONS QEW WESTBOUND

Station	Elevation	Station	Elevation
	(m)		(m)
1000.00	99.00	1300.00	98.37
1017.00	98.90	1310.00	98.43
1037.00	98.80	1320.00	98.49
1113.00	98.50	1330.00	98.55
1133.00	98.40	1340.00	98.60
1164.00	98.17	1350.00	98.66
1188.00	98.10	1360.00	98.72
1198.00	98.00	1370.00	98.78
1209.00	97.90	1380.00	98.84
1220.00	97.80	1390.00	98.90
1229.00	97.90	1400.00	98.96
1243.00	98.00	1410.00	99.02
1263.00	98.15	1420.00	99.08
1270.00	98.19	1430.00	99.14
1280.00	98.25	1440.00	99.19
1290.00	98.31	1450.00	99.25

*Note: Elevation up to 1263.00 determined using As-built WP No. 566-90-00, beyond elevations extrapolated assuming constant road slope of 0.59%

Worksheet for **QEW** Westbound

Project Description			
Friction Method Solve For	Manning Formula Normal Depth		
Input Data			
Channel Slope		0.00286 m/m	

Station (m)		Elevation (m)	
	10.00		00.00
	10+17		99.00
	10+17		08.80
	11+13		98.50
	11+33		98.40
	11+64		90.40
	11+88		98.10
	11+98		98.00
	12+09		97.90
	12+20		97.80
	12+29		97.90
	12+43		98.00
	12+63		98.15
	12+70		98.19
	12+80		98.25
	12+90		98.31
	13+00		98.37
	13+10		98.43
	13+20		98.49
	13+30		98.55
	13+40		98.60
	13+50		98.66
	13+60		98.72
	13+70		98.78
	13+80		98.84
	13+90		98.90
	14+00		98.96

Worksheet for **QEW** Westbound

Input Data

Station (m)		Elevation (m)	
	14+10		99.02
	14+20		99.08
	14+30		99.14
	14+40		99.19
	14+50		99.25

Options			
Current Rougnness weighted Method Open Channel Weighting Method	Improved Lotter's Method Improved Lotter's Method		
Closed Channel Weighting Method	Horton's Method		
Results			
Normal Depth		0.82	m
Elevation Range	97.80 to 99.25 m		
Flow Area		93.48	m²
Wetted Perimeter		258.87	m
Hydraulic Radius		0.36	m
Top Width		258.87	m
Normal Depth		0.82	m
Critical Depth		0.85	m
Critical Slope	(0.00230	m/m
Velocity		2.09	m/s
Velocity Head		0.22	m
Specific Energy		1.04	m
Froude Number		1.11	
Flow Type	Supercritical		
GVF Input Data			
Downstream Depth		0.00	m
Length		0.00	m
Number Of Steps		0	

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Worksheet for **QEW** Westbound

GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.82	m
Critical Depth	0.85	m
Channel Slope	0.00286	m/m
Critical Slope	0.00230	m/m

Worksheet for South Service Road (Regional Spill)

Project Description

Friction Method Solve For Manning Formula Normal Depth

Input Data

Channel Slope Discharge Section Definitions

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0.00286 m/m 195.00 m³/s

Regional Flow One-topping QEW (R.V. anderson, 1996)

Station (m)	Elevation (m)
9+60	98.8
9+80	98.8
10+00	98.8
10+20	98.7
10+40	98.7
10+60	98.6
10+70	98.5
10+80	98.4
11+00	98.3
11+10	98.2
11+20	98.20
11+40	98.10
11+50	98.00
11+60	98.00
11+70	97.90
11+80	97.90
12+00	97.85
12+10	97.80
12+20	97.75
12+30	97.70
12+40	97.75
12+50	97.80
12+60	97.90
12+70	97.95
12+80	98.05
13+00	98.25
13+20	98.45

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Worksheet for South Service Road (Regional Spill)

Input Data

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Elevation (m)
98.65
98.90
99.10
99.40
99.65
99.90
100.15
100.45
100.65
100.80
100.95
101.05
101.15
101.20



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Work	sheet for South Serv	ice Ro	ad (Regional Spil	1)
Results		100		
Hydraulic Radius		0.39	m	
Top Width		229.08	m	
Normal Depth		0.70	m	
Critical Depth		0.74	m	
Critical Slope		0.00223	m/m	
Velocity		2.19	m/s	
Velocity Head		0.24	m	
Specific Energy		0.95	m	
Froude Number		1.12		
Flow Type	Supercritical			
GVF Input Data				
Downstream Depth		0.00	m	
Length		0.00	m	
Number Of Steps		0		
GVF Output Data		A		
Upstream Depth		0.00	m	
Profile Description				
Profile Headloss		0.00	m	
Downstream Velocity		Infinity	m/s	
Upstream Velocity		Infinity	m/s	
Normal Depth		0.70	m	
Critical Depth		0.74	m	
Channel Slope		0.00286	m/m	
Critical Slope		0.00223	m/m	

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Worksheet for South Service Road (Maximum Capacity) **Project Description** Friction Method Manning Formula Solve For Discharge Input Data **Channel Slope** 0.00286 m/m water benel at the Site = Site Elevation - Sag Elevation = 98.75m - 97.70m Normal Depth 1.05 m Section Definitions = 1.05 m Station (m) Elevation (m) 9+60 98.80 9+80 98.80 10+00 98.80 10+20 98.75 10+40 98.70 10+60 98.60 10+70 98.55 10+80 98.45 11+00 98.30 11+10 98.25

11+20	98.20
11+40	98.10
11+50	98.00
11+60	98.00
11+70	97.90
11+80	97.90
12+00	97.85
12+10	97.80
12+20	97.75
12+30	97.70
12+40	97.75
12+50	97.80
12+60	97.90
12+70	97.95
12+80	98.05
13+00	98.25
13+20	98.45

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Worksheet for South Service Road (Maximum Capacity)

Input Data

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Station (m)	Elevation (m)
13+40	98.65
13+60	98.90
13+80	99.10
14+00	99.40
14+20	99.65
14+40	99.90
14+60	100.15
14+80	100.45
15+00	100.65
15+20	100.80
15+40	100.95
15+60	101.05
15+80	101.15
16+00	101.20

Start Station	Ending Sta	ation		Roughness Coefficient
(9+60, 9	8.80)	(16+00	, 101.20)	0.013
Options				
Current Rougnness vveigntea Method Open Channel Weighting Method	Improved Lotter's Method Improved Lotter's Method			
Closed Channel Weighting Method	Horton's Method			
Results				
Discharge		510.89	m³/s	
Elevation Range	97.70 to 101.20 m			
Flow Area		183.15	m²	
Wetted Perimeter		328.01	m	

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TOTASI	cet for oouth oer	ice noau	(maximum vapacity)
Results			
Hydraulic Radius		0.56	m
Top Width		328.00	m
Normal Depth		1.05	m
Critical Depth		1.15	m
Critical Slope		0.00202	m/m
Velocity		2.79	m/s
Velocity Head		0.40	m
Specific Energy		1.45	m
Froude Number		1.19	
Flow Type	Supercritical		
GVF Input Data	의 김 이 귀엽다.	200 B 20	
Downstream Depth		0.00	m
Length		0.00	m
Number Of Steps		0	
GVF Output Data			
Upstream Depth		0.00	m
Profile Description			
Profile Headloss		0.00	m
Downstream Velocity		Infinity	m/s
Upstream Velocity		Infinity	m/s
Normal Depth		1.05	m
Critical Depth		1.15	m
Channel Slope		0.00286	m/m
Critical Slope		0 00202	m/m

Worksheet for South Service Road (Maximum Capacity)

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Worksheet for QEW Westbound (Regional Spill)

Project Description				
Friction Method	Manning Formula			
Solve For	Normal Depth			
Input Data				
Channel Slope		0.00286	m/m	
Discharge		195.00	m³/s	

Section Definitions

Station (m)		Elevation (m)	
62993232778 ⁴			
	10+00		99.00
	10+17		98.90
	10+37		98.80
	11+13		98.50
	11+33		98.40
	11+64		98.17
	11+88		98.10
	11+98		98.00
	12+09		97.90
	12+20		97.80
	12+29		97.90
	12+43		98.00
	12+63		98.15
	12+70		98.19
	12+80		98.25
	12+90		98.31
	13+00		98.37
	13+10		98.43
	13+20		98.49
	13+30		98.55
	13+40		98.60
	13+50		98.66
	13+60		98.72
	13+70		98.78
	13+80		98.84
	13+90		98.90
	14+00		98 96

Worksheet for QEW Westbound (Regional Spill)

Input Data

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Station (m)		Elevation (m)	
	14+10		99.02
	14+20		99.08
	14+30		9 9.14
	14+40		99.19
	14+50		99.25

Options				
Current Roughness vveightea Method Open Channel Weighting Method Closed Channel Weighting Method	Improved Lotter's Method Improved Lotter's Method Horton's Method			
Results				
Normal Depth Elevation Range	97.80 to 99.25 m	0.82	m	HWL = Normal Depth + Say Elevation = 0.82 m + 97.80 m
Flow Area		93.48	m²	~ 00 (.)
Wetted Perimeter		258.87	m	- 70. 6ª m
Hydraulic Radius		0.36	m	
Top Width		258.87	m	
Normal Depth		0.82	m	
Critical Depth		0.85	m	
Critical Slope		0.00230	m/m	
Velocity		2.09	m/s	
Velocity Head		0.22	m	
Specific Energy		1.04	m	
Froude Number		1.11		
Flow Type	Supercritical			
GVF Input Data				
Downstream Depth		0.00	m	
Length		0.00	m	
Number Of Steps		0		

Worksheet for QEW Westbound (Regional Spill)

GVF Output Data		
Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.82	m
Critical Depth	0.85	m
Channel Slope	0.00286	m/m
Critical Slope	0.00230	m/m

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