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FUNCTIONAL SERVICING REPORT

1621158 Ontario Ltd. (EMERY INVESTMENTS)
4853 Palladium Way Business Park
Block 23, 20M-1034

City of Burlington

Prepared for

Emery Investments

Project #: 06-231

June 14, 2016

Urbantech Consulting, A Division of Leighton-Zec Ltd.
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Table of Contents

Appendices

Figures and Drawings

Urbantech Consulting, A Division of Leighton-Zec Ltd.
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1. Introduction

The proposed development is approximately 5.22 hectares located in the northeast corner of the Emery Investments residential subdivision north of Regional Road #5 (Dundas Street) and west of Regional Road #20 (Appleby Line). The legal description of this site is Part Lot 6, Concession 1, North of Dundas Street, City of Burlington. This site is to be developed in one phase to service all proposed blocks.

Storm drainage, sanitary drainage, water distribution, and grading comply with the City of Burlington and Region of Halton Standard Specifications and Drawings.

2. Site Grading

The proposed site has been graded to match the site boundary grades along Palladium Way, and existing grades at the north and east property limits as shown on **Drawing 1**. This block was pre-graded as part of the Emery Investments Phase 2 development works which included the grading of a cut-off swale on the Mikalda property as shown on the proposed grading plan. This was constructed to direct pre-development drainage towards a ditch inlet constructed as part of Phase 2 at Palladium Way.

Grading is required beyond the east property limit into the Regions of Haltons Appleby Line right of way to facilitate the development grades. Grading along the north boundary has been set to match existing grades that were set as part of the swale grading north of the property limit. This ensures that the existing swale and drainage pattern from the northern lands are not impacted.

The proposed Street A right of way has been designed in accordance with the City of Burlington design guidelines for roadways. The proposed blocks have also been graded in accordance with City standards. Since each block will be required to undergo separate site plan applications for development, they have been graded to maintain independent drainage from adjacent blocks.

3. Storm Sewers

As part of Emery Investments development Phase 2, this block was provided with two storm sewer connections as shown on **Drawing 2**. The proposed draft plan utilizes both connections, and required two new connections to existing manholes 2 and 3 to service Blocks 9 and 10. Blocks 1 to 7 will be serviced off of a proposed storm sewer on Street A that will connect to the existing 675mm storm sewer connected to existing

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manhole 5 on Palladium Way. Block 8 will utilize the existing 675mm storm sewer connected to existing manhole 4 on Palladium Way.

The proposed storm sewers have been sized to convey the 5 year return storm period as shown in the storm sewer design sheets (Appendix A) with areas and runoff coefficients as shown on the enclosed drainage plan (Drawing 2). The proposed drainage area design is consistent with the drainage areas accounted for in the existing subdivision design. The existing Phase 2 development storm sewer design sheet is included in Appendix A for comparison with the proposed design sheet. The total flow accumulated at existing manhole 5 downstream of the proposed draft plan is highlighted (in green) for comparison with the proposed design sheet. The existing design sheet shows that the total flow accumulated at manhole 5 is 2.346 m^3/s and the proposed design sheet has an accumulated total flow of 2.343 m^3/s which is less than the original design.

Blocks 9 & 10 are connected to the existing system upstream of the connections that were provided for the Business Park Block, to existing sewers that were not originally sized to accommodate drainage from the Business Park block. As a result, there is a minor surcharge from existing manhole 3 to 4 in the existing 900mm storm sewer of 31 l/s. However, the original design of the storm sewers on Palladium Way was conservative in its design when accounting for the Mikalda lands external drainage area. The 6.12Ha Mikalda drainage area was accounted for in the storm sewer with a 10 minute initial time of concentration at the property line. When these lands develop, the 10 minute time of concentration would start at the upstream end of the drainage area, resulting in a larger time of concentration at Palladium Way which would result in a lower flow in the Palladium Way storm sewer. The distance of the furthest point in the Mikalda lands drainage area from the existing storm sewer on Palladium Way is approximately 240m. Using a typical velocity of 2 m/s in the storm sewer at this distance would result in a 12 minute (Tc = 10min + 240m / (2m/s x 60s/min) = 12 min) time of concentration at Palladium Way. If 12 minutes is used as the time of concentration for the Mikalda lands, there is an excess capacity of 28 l/s in the existing 900mm storm sewer from manhole 3 to 4. Based on this the existing storm sewers are sufficiently sized to accommodate the new connections from Blocks 9 & 10.

4. Storm Water Management

Minor system drainage for the proposed business block outlets to the existing N1/Main Stormwater Management Pond in accordance with the storm sewer design for the Emery Investments residential subdivision. The existing SWM pond provides quality and quantity control for the Emery development lands including the proposed draft plan area.

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Overland flow is being directed to the N1/Main SWM Pond through swales and right-of-ways. Flows are contained within the proposed development therefore there is no impact to Regional Roads. All minor and major system drainage concepts have been approved as part of the Alton Community - Emery Investments development.

5. Sanitary Servicing

Two existing 300mm sanitary stubs were provided to the proposed draft plan lands as part of Emery Investments development Phase 2. The proposed draft plan utilizes both connections, and required two new connections to existing manholes 2A and 3A to service Blocks 9 and 10 as shown on **Drawing 3**. Blocks 1 to 7 will be serviced off of a proposed 300mm sanitary sewer on Street A that will connect to the existing 300mm sanitary sewer connected to existing manhole 5A on Palladium Way. Block 8 will utilize the existing 300mm storm sewer connected to existing manhole 4A on Palladium Way.

The existing sanitary sewers on Palladium Way are sized adequately for the proposed draft plan as shown in the sanitary design sheets provided in **Appendix B**. The existing design sheet provided has been updated to include the proposed draft plan sewer system

6. Water Distribution

There are two existing watermain stubs provided to the draft plan area that were constructed as part of the Phase 2 development servicing as shown on **Drawing 4**. There is an existing 200mm watermain connection at the northwest corner of the plan, and an existing 200mm connection at the south east corner.

Blocks 1 to 7 will be serviced by a proposed 200 mm diameter watermain on Street A connected to the existing 200mm watermain stub at Palladium Way. This watermain will terminate at Block 7 with a hydrant as per Halton Region standards.

Blocks 8 and 9 will require connection to the existing watermain on Palladium Way, and Block 10 is proposed to be serviced from the existing 200mm stub at the northwest corner of the property.

Each block will be provided with service connections as per Region of Halton standard drawing RH 409.01.

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7. Conclusion

This report concludes that the proposed Business Park draft plan has been adequately accommodated through the design of and constructed services in the downstream Emery Investments development.

Report Prepared by:

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Senior Associate, Design

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Appendix A

Storm Sewer Design Sheet – Emery Business Park
Storm Sewer Design Sheet – Existing Emery Phase 2

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DESIGNED BY: Jeff Ormonde | CONTRACT NAME: **Emery Investments - BUSINESS PARK** | STORM RETURN PERIOD: 5 year

NOTE:
* DENOTES CONSTANT FLOW
** DENOTES TOTAL FLOW INCL. CONSTANT FLOWS

CHECKED BY: Jeff Ormonde | LOCATION: City of Burlington | n = 0.013

PAGE No. 1 of 4 | CONTRACT No. 06-231 | REMARKS: Indicates Business Block Sewers

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LOCATION			CONTRIBUTING AREA				FLOW		SEWER DESIGN										
			4 X 5 = 6				7 X 8 = 9						10 / 14 / 60 = 15		10 X 11 = 17		20-19=18	18 - 17 = 20	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
STREET	FROM MHS	TO MHS	AREA (ha)	RUNOFF C	SECTION AREA (ha)	ACCUM. AREA (ha)	RAINFALL INTENSITY (mm/hr) I	FLOW 2.778x Q(m3/s)	LENGTH (m)	SLOPE (%)	DIA. (mm)	FULL FLOW Capacity (m3/s)	FULL FLOW Velocity (m/s)	FLOW TIME in pipe (min)	TIME OF CONC. (min)	PIPE FALL (m)	MH Outlet INVERT (m)	MH LOSS (m)	MH Inlet Invert (m)
External Block	EX.CTRL MH	Ex.1	6.12	0.85	5.20	5.20	88.09	1.273	17.6	1.65	750	1.430	3.24	0.09	10.00				
						5.20									**10.09**				
Palladium Way Ext.	Ext	Ex.52	0.10	0.90	0.09	0.09													
	Ex.52	Ex.53	0.12	0.90	0.11	0.20	88.09	0.048	45.2	0.80	300	0.086	1.22	0.62	10.00				
	Ex.53	Ex.1	0.10	0.90	0.09	0.29	85.43	0.068	41.9	0.81	300	0.087	1.23	0.57	10.62				
						0.29									**11.18**				
from Palladium Way Ext.		Ex.1				0.29									11.18				
from Ext. Block		Ex.1				5.20									10.09				
Palladium Way	Ex.1	Ex.2	0.15	0.90	0.14	5.63	83.13	1.299	56.8	0.56	900	1.355	2.13	0.44	11.18				
						5.63									**11.63**				
Block 10	100	Ex.2	0.59	0.85	0.50	0.50	88.09	0.123	17.1	0.50	450	0.202	1.27	0.22	10.00				
						0.50									**10.22**				
from Palladium Way						5.63									11.63				
From Block 10						0.50									10.22				
Palladium Way	Ex.2	Ex.3	0.23	0.90	0.21	6.33	81.43	1.433	89.2	0.63	900	1.437	2.26	0.66	11.63				
						6.33									**12.29**				
Block 9	101	Ex.3	0.50	0.85	0.43	0.43	88.09	0.104	15.6	0.50	375	0.124	1.12	0.23	10.00				
						0.43									**10.23**				

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DESIGNED BY: Jeff Ormonde | CONTRACT NAME: **Emery Investments - BUSINESS PARK** | STORM RETURN PERIOD: 5 year

CHECKED BY: Jeff Ormonde | LOCATION: City of Burlington | n = 0.013

PAGE No. 2 of 4 | CONTRACT No. 06-231 | REMARKS: Indicates Business Block Sewers

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
STREET	FROM MHS	TO MHS	AREA (ha)	RUNOFF C	SECTION AREA (ha)	ACCUM. AREA (ha)	RAINFALL INTENSITY (mm/hr) I	FLOW 2.778x Q(m3/s)	LENGTH (m)	SLOPE (%)	DIA. (mm)	FULL FLOW Capacity (m3/s)	FULL FLOW Velocity (m/s)	FLOW TIME in pipe (min)	TIME OF CONC. (min)	PIPE FALL (m)	MH Outlet INVERT (m)	MH LOSS (m)	MH Inlet Invert (m)
from Palladium Way						6.33									12.29				
From Block 10						0.43									10.23				
Palladium Way	Ex.3	Ex.4	0.20	0.90	0.18	6.94	79.05	1.524	77.7	0.68	900	1.493	2.35	0.55	12.29				
						6.94									**12.84**				
Block 8	Ex.CTRL MH	Ex.4	0.45	0.85	0.38	0.38	88.09	0.094	16.1	0.50	675	0.594	1.66	0.16	10.00				
						0.38									**10.16**				
from Palladium Way						6.94									12.84				
from Business Block						0.38									10.16				
Palladium Way	Ex.4	Ex.5	0.26	0.90	0.23	7.56	77.17	1.620	100.0	0.62	1050	2.150	2.48	0.67	12.84				
						7.56									**13.51**				
CONSTANT FLOW - 100 YEAR TOTAL FLOW CAPTURE (from Palladium Way - west)																			
A=0.27ha C=1.00																			
(100 YR.)			0.27	1.00		0.27	137.92	0.103				Tc = 10 + 51 /(1.5 x 60) =			10.57				
(5 YR.)			0.27	0.90		0.24	85.62	0.058							10.57				
CONST. FLOW = Q(100YR) - Q(5YR) = 0.103 - 0.058 = 0.045								0.045*											
Palladium Way	Ex.6	Ex.5	0.39	0.90	0.35	0.35	88.09	0.131**	96.9	0.60	450	0.221	1.39	1.16	10.00				
						0.35		**0.045***							**11.16**				
Block 4	102	103	0.59	0.85	0.50	0.50	88.09	0.123	15.0	0.50	450	0.202	1.27	0.20	10.00				
						0.50									**10.20**				

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Block 5	104	103	0.43	0.85	0.37	0.37	88.09	0.089	23.0	0.50	375	0.124	1.12	0.34	10.00				
						0.37									**10.34**				
From Block 4		103				0.50									10.20				
From Block 5		103				0.37									10.34				
Street A	103	105	0.18	0.85	0.15	1.02	86.59	0.245	52.0	0.85	525	0.396	1.83	0.47	10.34				
						1.02									**10.81**				
Block 3	106	105	0.46	0.85	0.39	0.39	88.09	0.096	12.0	0.50	375	0.124	1.12	0.18	10.00				
						0.39									**10.18**				
Block 6	107	105	0.45	0.85	0.38	0.38	88.09	0.094	10.1	0.50	375	0.124	1.12	0.15	10.00				
						0.38									**10.15**				
From Street A		105				1.02									10.81				
From Block 4		105				0.39									10.18				
From Block 5		105				0.38									10.15				
Street A	105	108	0.10	0.85	0.09	1.88	84.61	0.442	50.1	0.85	600	0.566	2.00	0.42	10.81				
						1.88									**11.23**				
Block 2	109	108	0.46	0.85	0.39	0.39	88.09	0.096	12.0	0.50	375	0.124	1.12	0.18	10.00				
						0.39									**10.18**				

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CHECKED BY: Jeff Ormonde | LOCATION: City of Burlington | n = 0.013

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
STREET	FROM MHS	TO MHS	AREA (ha)	RUNOFF C	SECTION AREA (ha)	ACCUM. AREA (ha)	RAINFALL INTENSITY (mm/hr) I	FLOW 2.778x Q(m3/s)	LENGTH (m)	SLOPE (%)	DIA. (mm)	FULL FLOW Capacity (m3/s)	FULL FLOW Velocity (m/s)	FLOW TIME in pipe (min)	TIME OF CONC. (min)	PIPE FALL (m)	MH Outlet INVERT (m)	MH LOSS (m)	MH Inlet Invert (m)
From Street A		108				1.88									11.23				
From Block 2		108				0.39									10.18				
Street A	108	Ex..CTRL MH	0.10	0.85	0.09	2.35	82.94	0.542	49.9	0.60	675	0.651	1.82	0.46	11.23				
						2.35									**11.69**				
Block 1	110	Ex..CTRL MH	0.45	0.85	0.38	0.38	88.09	0.094	12.2	0.50	375	0.124	1.12	0.18	10.00				
						0.38									**10.18**				
Block 7	111	Ex..CTRL MH	0.45	0.85	0.38	0.38	88.09	0.094	10.8	0.50	375	0.124	1.12	0.16	10.00				
						0.38									**10.16**				
From Street A		Ex..CTRL MH				2.35									11.69				
From Block 1		Ex..CTRL MH				0.38									10.18				
From Block 7		Ex..CTRL MH				0.38									10.16				
Business Block	CTRL MH	EX. 5	0.00	0.00	0.00	3.12	81.20	0.704	19.5	0.89	675	0.793	2.22	0.15	11.69				
						3.12									**11.84**				
from Palladium Way (West)		EX. 5				7.56									13.51				
from Palladium Way (East)		EX. 5				0.35		0.045*							11.16				
from Business Block		EX. 5				3.12									11.84				
Easement	EX. 5	Ex.TEE	0.00	0.00	0.00	11.03	75.03	2.343**	89.3	0.48	1200	2.701	2.39	0.62	13.51				
	Ex.TEE	Ex.7	0.00	0.00	0.00	11.03	73.15	2.286**	90.0	0.48	1200	2.701	2.39	0.63	14.13				
						11.03		**0.045***							**14.76**				

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CHECKED BY: Dragan Zec

PAGE No. 1 of 3

CONTRACT NAME: **Existing Emery Investments - Phase 2**

LOCATION: City of Burlington

CONTRACT No. U0173-Ph2

STORM RETURN PERIOD: 5 year

n = 0.013

REMARKS:

NOTE:
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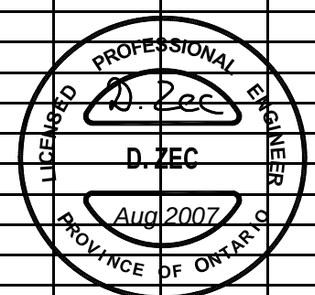
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
STREET	FROM MHS	TO MHS	AREA (ha)	RUNOFF C	SECTION AREA (ha)	ACCUM. AREA (ha)	RAINFALL INTENSITY (mm/hr) I	FLOW 2.778x Q(m3/s)	LENGTH (m)	SLOPE (%)	DIA. (mm)	FULL FLOW Capacity (m3/s)	FULL FLOW Velocity (m/s)	FLOW TIME in pipe (min)	TIME OF CONC. (min)	PIPE FALL (m)	MH Outlet INVERT (m)	MH LOSS (m)	MH Inlet Invert (m)
External Block	CTRL MH	1	6.12	0.85	5.20	5.20	88.09	1.273	15.0	1.60	750	1.408	3.19	0.08	10.00				
						5.20									**10.08**				
Palladium Way Ext.	Ext	52	0.10	0.90	0.09	0.09													
	52	53	0.12	0.90	0.11	0.20	88.09	0.048	45.2	0.80	300	0.086	1.22	0.62	10.00				
	53	1	0.10	0.90	0.09	0.29	85.43	0.068	41.8	0.75	300	0.084	1.18	0.59	10.62				
						0.29									**11.20**				
from Palladium Way Ext.		1				0.29									11.20				
from Ext. Block		1				5.20									10.08				
Palladium Way	1	2	0.15	0.90	0.14	5.63	83.05	1.298	56.4	0.60	900	1.402	2.20	0.43	11.20				
	2	3	0.23	0.90	0.21	5.83	81.42	1.319	89.1	0.65	900	1.460	2.29	0.65	11.63				
	3	4	0.20	0.90	0.18	6.01	79.08	1.321	78.7	0.65	900	1.460	2.29	0.57	12.28				
						6.01									**12.85**				
Business Block	CTRL MH	4	2.13	0.85	1.81	1.81	88.09	0.443	16.1	0.50	675	0.594	1.66	0.16	10.00				
						1.81									**10.16**				
from Palladium Way						6.01									12.85				
from Business Block						1.81									10.16				
Palladium Way	4	5	0.26	0.90	0.23	8.06	77.13	1.726	89.5	0.65	1050	2.202	2.54	0.59	12.85				
						8.06									**13.44**				



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STORM SEWER CALCULATIONS

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CHECKED BY: Dragan Zec | LOCATION: City of Burlington | n = 0.013

PAGE No. 2 of 3 | CONTRACT No. U0173-Ph2 | REMARKS:

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** DENOTES TOTAL FLOW INCL. CONSTANT FLOWS

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LOCATION			CONTRIBUTING AREA				FLOW		SEWER DESIGN										
			4 X 5 = 6				7 X 8 = 9						10 / 14 / 60 = 15		10 X 11 = 17		20-19=18	18 - 17 = 20	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
STREET	FROM MHS	TO MHS	AREA (ha)	RUNOFF C	SECTION AREA (ha)	ACCUM. AREA (ha)	RAINFALL INTENSITY (mm/hr) I	FLOW 2.778x Q(m3/s)	LENGTH (m)	SLOPE (%)	DIA. (mm)	FULL FLOW Capacity (m3/s)	FULL FLOW Velocity (m/s)	FLOW TIME in pipe (min)	TIME OF CONC. (min)	PIPE FALL (m)	MH Outlet INVERT (m)	MH LOSS (m)	MH Inlet Invert (m)
CONSTANT FLOW - 100 YEAR TOTAL FLOW CAPTURE (from Palladium Way - west)																			
A=0.27ha C=1.00																			
(100 YR.)			0.27	1.00		0.27	137.92	0.103				Tc = 10 + 51 /(1.5 x 60) =			10.57				
(5 YR.)			0.27	0.90		0.24	85.62	0.058							10.57				
CONST. FLOW = Q(100YR) - Q(5YR) = 0.103 - 0.058 = 0.045																			
								0.045*											
Palladium Way	6	5	0.39	0.90	0.35	0.35	88.09	0.131**	96.9	0.60	450	0.221	1.39	1.16	10.00				
						0.35		**0.045***							**11.16**				
Business Block	CTRL MH	5	3.06	0.85	2.60	2.60	88.09	0.637	19.5	1.20	675	0.921	2.57	0.13	10.00				
						2.60									**10.13**				
from Palladium Way (West)		5				8.06									13.44				
from Palladium Way (East)		5				0.35		0.045*							11.16				
from Business Block		5				2.60									10.13				
Easement	5	TEE 1	0.00	0.00	0.00	11.01	75.25	2.346**	89.9	0.50	1200	2.757	2.44	0.61	13.44				
	TEE 1	7	0.00	0.00	0.00	11.01	73.39	2.289**	90.0	0.50	1200	2.757	2.44	0.62	14.05				
						11.01		**0.045***							**14.67**				
Business Block	CTRL MH	7	2.14	0.85	1.82	1.82	88.09	0.445	10.0	0.50	675	0.594	1.66	0.10	10.00				
						1.82									**10.10**				

PROFESSIONAL ENGINEER LICENSED D. Zec D. ZEC Aug 2007 PROVINCE OF ONTARIO

CITY OF BURLINGTON
ENGINEERING DEPARTMENT

STORM SEWER CALCULATIONS

CALCS

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www.urbantech.com

DESIGNED BY: Jeff Ormonde

CHECKED BY: Dragan Zec

PAGE No. 3 of 3

CONTRACT NAME: **Existing Emery Investments - Phase 2**

LOCATION: City of Burlington

CONTRACT No. U0173-Ph2

STORM RETURN PERIOD: 5 year

n = 0.013

REMARKS:

NOTE:
* DENOTES CONSTANT FLOW
** DENOTES TOTAL FLOW INCL. CONSTANT FLOWS

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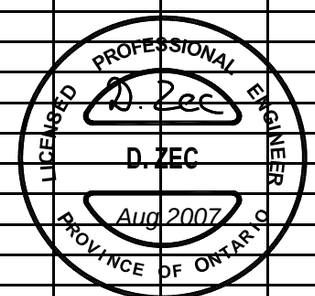
LOCATION			CONTRIBUTING AREA				FLOW		SEWER DESIGN										
			4 X 5 = 6				7 X 8 = 9						10 / 14 / 60 = 15		10 X 11 = 17		20-19=18	18 - 17 = 20	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
STREET	FROM MHS	TO MHS	AREA (ha)	RUNOFF C	SECTION AREA (ha)	ACCUM. AREA (ha)	RAINFALL INTENSITY (mm/hr) I	FLOW 2.778x Q(m3/s)	LENGTH (m)	SLOPE (%)	DIA. (mm)	FULL FLOW Capacity (m3/s)	FULL FLOW Velocity (m/s)	FLOW TIME in pipe (min)	TIME OF CONC. (min)	PIPE FALL (m)	MH Outlet INVERT (m)	MH LOSS (m)	MH Inlet Invert (m)
from Easement		7				11.01		0.045*							14.67				
from Business Block		7				1.82									10.10				
Easement	7	Ex.8	0.00	0.00	0.00	12.83	71.63	2.597**	25.0	0.55	1200	2.891	2.56	0.16	14.67				
						12.83		**0.045***							**14.83**				
Mikalda Road	51	50	0.15	0.75	0.11	0.11	88.09	0.028	33.7	0.80	300	0.086	1.22	0.46	10.00				
	50	19	0.25	0.75	0.19	0.30	86.09	0.072	31.8	0.80	300	0.086	1.22	0.43	10.46				
	19	20	0.33	0.75	0.25	0.55	84.29	0.128	84.0	0.60	375	0.136	1.23	1.14	10.89				
	20	21	0.45	0.75	0.34	0.89	79.95	0.197	72.8	0.90	450	0.270	1.70	0.71	12.03				
	21	22	0.46	0.75	0.35	1.23	77.48	0.265	67.0	0.90	450	0.270	1.70	0.66	12.74				
	22	EXT.MH	0.16	0.75	0.12	1.35	75.36	0.283	43.9	0.50	525	0.304	1.40	0.52	13.40				
						1.35									**13.92**				



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Appendix B

Sanitary Sewer Design Sheet

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Emery Investments - BUSINESS PARK

Project No.: **06-231**
Location: **City of Burlington**
Pipe Roughness Coeff. (n) : 0.013

THE REGIONAL MUNICIPALITY OF HALTON
SANITARY SEWER DESIGN

Shading indicates proposed sanitary sewers. All others are existing development sewers

Date: **27-May-16**
Designed By: **J.O.**
Checked By: **J.O.**

P:\Projects\06-231\Reports\FSR\Design Sheets\Sanitary\[06-231-SANDesign.xls]San. Design Sheet

Street	Manhole From	Manhole To	Leng. in metres	Tributary Area Hectares Increment Res.	Comm.	Ind.	Total	Population Tributary Increment Res.	Comm.	Ind.	Total	Average L/s Incr.	Average L/s Total	Peaking Factor	MAX L/s	infil-tration L/s	MAX FLOW EXPECTED (L/s)	SEWER Size	Slope	Q L/s	V m/s Full Flow	V m/s Act. Fl.	PIPE Type	Class	REMARKS
from Palladium Way		1A		0.34			0.34																		
Ext. Block	CTRL.	1A	13.17		5.78		6.12		722		722	2.30	2.30	3.11	7.15	1.75	8.90	300	1.02	102.06	1.397	0.816	PVC		
Palladium Way	1A	2A	60.97	0.15			6.27				722	0.00	2.30	3.11	7.15	1.79	8.94	300	0.64	80.85	1.107	0.700	PVC		
							6.27				**722**														
Block 10	100A	2A	14.80			0.59	0.59			74	74	0.24	0.24	3.42	0.81	0.17	0.97	200	0.50	24.13	0.746	0.350	PVC		New Connection
							0.59				**74**														
From Palladium Way		2A					6.27				722														
From Block 10		2A					0.59				74														
Palladium Way	2A	3A	85.50	0.23			7.09				796	0.00	2.53	3.09	7.83	2.03	9.85	300	0.65	81.48	1.115	0.727	PVC		
							7.09				**796**														
Block 9	101A	3A	13.60			0.50	0.50			63	63	0.20	0.20	3.43	0.69	0.14	0.83	200	0.50	24.13	0.746	0.337	PVC		New Connection
							0.50				**63**														
From Palladium Way		3A					7.09				796														
From Block 9		3A					0.50				63														
Palladium Way	3A	4A	76.20	0.21			7.80				859	0.00	2.73	3.07	8.40	2.23	10.63	300	0.67	82.72	1.132	0.753	PVC		
							7.80				**859**														
Block 8	MH BB	4A	11.80			0.45	0.45			57	57	0.18	0.18	3.44	0.62	0.13	0.75	300	0.51	72.17	0.988	0.283	PVC		
							0.45				**57**														
from Palladium Way		4A					7.80				859														
from Block 8		4A					0.45				57														
Palladium Way	4A	5A	103.64	0.27			8.52				916	0.00	2.92	3.14	9.15	2.44	11.59	300	0.58	76.96	1.053	0.738	PVC		
							8.52				**916**														
Block 4	102A	103A	12.40			0.59	0.59			74	74	0.24	0.24	3.42	0.81	0.17	0.97	200	0.50	24.13	0.746	0.350	PVC		
							0.59				**74**														
Block 5	104A	103A	25.50			0.43	0.43			54	54	0.17	0.17	3.45	0.59	0.12	0.72	200	0.50	24.13	0.746	0.325	PVC		
							0.43				**54**														
From Block 4		103A					0.59				74														
From Block 5		103A					0.43				54														
Street A	103A	105A	52.00			0.18	1.20			0	128	0.00	0.41	3.37	1.37	0.34	1.72	300	1.00	101.06	1.383	0.500	PVC		
							1.20				**128**														
Block 3	106A	105A	9.50			0.46	0.46			58	58	0.18	0.18	3.44	0.64	0.13	0.77	200	0.50	24.13	0.746	0.331	PVC		
							0.46				**58**														
Block 6	107A	105A	12.50			0.45	0.45			57	57	0.18	0.18	3.44	0.62	0.13	0.75	200	0.50	24.13	0.746	0.329	PVC		
							0.45				**57**														

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Emery Investments - BUSINESS PARK

Project No.: **06-231**
Location: **City of Burlington**
Pipe Roughness Coeff. (n) : 0.013

THE REGIONAL MUNICIPALITY OF HALTON
SANITARY SEWER DESIGN

Shading indicates proposed sanitary sewers. All others are existing development sewers

Date: **27-May-16**
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Street	Manhole From	Manhole To	Leng. in metres	Tributary Area Hectares Increment Res.	Comm.	Ind.	Total	Population Tributary Increment Res.	Comm.	Ind.	Total	Average L/s Incr.	Average L/s Total	Peaking Factor	MAX L/s	infil-tration L/s	MAX FLOW EXPECTED (L/s)	SEWER Size	Slope	Q L/s	V m/s Full Flow	Act. Fl.	PIPE Type	Class	REMARKS
From Street A		105A					1.20				128														
From Block 3		105A					0.46				58														
From Block 6		105A					0.45				57														
Street A	105A	108A	50.10			0.10	2.21			0	243	0.00	0.77	3.29	2.55	0.63	3.18	300	0.85	93.17	1.275	0.575	PVC		
							2.21				**243**														
Block 2	109A	108A	9.50			0.46	2.67			58	301	0.18	0.96	3.26	3.13	0.76	3.89	200	0.50	24.13	0.746	0.534	PVC		
							2.67				**301**														
From Street A		108A					2.21				243														
From Block 2		108A					2.67				301														
Street A	108A	MH AA	49.50			0.10	4.98			0	544	0.00	1.73	3.16	5.48	1.42	6.90	300	0.60	78.28	1.071	0.628	PVC		
							4.98				**544**														
							4.98				544														
Street A	MH AA	5A	3.60			0.00	4.98			0	544	0.00	1.73	3.16	5.48	1.42	6.90	300	0.93	97.46	1.334	0.728	PVC		
							4.98				**544**														
from Palladium Way		5A					8.52				916														
from Bus. Block		5A					4.98				544														
Easement	5A	6A	93.80				13.50				1460	0.00	4.65	3.05	14.19	3.86	18.05	300	0.42	65.49	0.896	0.756	PVC		
	6A	7A	90.40				13.50				1460	0.00	4.65	3.05	14.19	3.86	18.05	300	0.60	78.28	1.071	0.858	PVC		
							13.50				**1460**														
Business Block	CTRL	7A	4.43			2.14	2.14			268	268	0.85	0.85	3.28	2.80	0.61	3.41	300	0.68	83.33	1.141	0.537	PVC		
							2.14				**268**														
from Easement		7A					13.50				1460														
from Bus. Block		7A					2.14				268														
Easement	7A	EX.8A	28.60				15.64				1728	0.00	5.50	2.99	16.47	4.47	20.94	300	0.52	72.87	0.997	0.852	PVC		
							15.64				**1728**														
Mikalda Road	51A	50A	35.50	0.17			0.17	16			16	0.05	0.05	4.39	0.22	0.05	0.27	200	1.13	36.28	1.121	0.265	PVC		
	50A	20A	35.40	0.15			0.32	14			30	0.04	0.10	4.35	0.42	0.09	0.51	200	0.96	33.44	1.033	0.356	PVC		
	20A	21A	81.20	0.38			0.70	34			64	0.11	0.20	4.29	0.87	0.20	1.07	200	0.64	27.30	0.844	0.394	PVC		
	21A	22A	142.60	0.76			1.46	103			167	0.33	0.53	4.18	2.22	0.42	2.64	200	0.71	28.76	0.888	0.528	PVC		
	22A	EXT	44.20	0.13			1.59	18			185	0.06	0.59	4.16	2.45	0.45	2.90	200	0.54	25.08	0.775	0.498	PVC		
							1.59				**185**														

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Figures and Drawings

DWG. 1 – Grading Plan
DWG. 2 – Storm Drainage Plan
DWG. 3 – Sanitary Drainage Plan
DWG. 4 – Watermain Plan

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