WILLS

PARTNERS IN ENGINEERING

January 21, 2020

Ganaraska Region Conservation Authority
2216 County Road 28
Port Hope, Ontario
L1A 3V8

Attention: Leslie Benson, Director, Watershed Services

Dear Ms. Benson:

Re: Block 123, New Amherst Subdivision
Cobourg, ON
Stormwater Management Brief
D.M. Wills Associates Project No. 19-10920

D.M. Wills Associates Limited (Wills) has been retained by New Amherst Ltd. to prepare a Stormwater Management (SWM) Brief in support of a proposed 6-Plex residential development, located at Block 123 New Amherst Boulevard in the Town of Cobourg, Ontario.

The purpose of this brief is to evaluate the drainage characteristics of the existing site and proposed re-development and to advance an integrated plan for SWM that will permit the development to proceed with no adverse impacts to the receiving drainage system. This report has been prepared to address the requirements of Town of Cobourg and Ganaraska Conservation (GRCA).

Site Description

The Subject property is legally described as Lot 123, R.P. 39M-901, Town of Cobourg. The location of the site is shown on **Figure 1**. The surrounding land uses include parkland to the north and residential properties in all other directions.

Professional Engineers Ontario
Consulting Engineers of Ontario
ASSOCIATION OF CONSULTING ENGINEERING COMPANIES CANADA

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150 Jameson Drive, Peterborough, Ontario, Canada K9J 0B9
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Figure 1 – Site Location

Development Context

The site is located within the New Amherst subdivision, which includes existing stormwater management features that have been designed to treat runoff for the proposed development.

The original design for the New Amherst subdivision was completed by Sernas Associates in 2006. The stormwater management features include an internal storm sewer network to direct minor system flows and public rights-of-way to direct major system flows to an extended detention wet pond facility in the southwest corner of the subdivision. This wet pond facility provides quantity and quality control for the subdivision and was constructed during Stage 1 of the development. However, additional stormwater management studies have been completed since the original design to support other phases of construction within the New Amherst subdivision and the adjacent West Park Village subdivision.

The site is located within New Amherst Stage 2, Phase 1. The detailed design drawings and storm sewer design were prepared by GHD in January 2016. The storm sewer design sheet and storm drainage plan associated with this submission are provided for reference in **Appendix A**.

The most recent study was the Stormwater Management Implementation Report completed for Stage 2, Phase 2 of the New Amherst Subdivision and was prepared by Wills in April 2018. The Stage 2, Phase 2 SWM Implementation report provided an overview of previous studies completed and assessed the design assumptions and as-built condition of the constructed phases. As a part of this assessment, the original hydrologic modelling was updated to reflect changes in the catchment boundaries, increased density and flow splitting between major and minor systems. The updated catchment boundaries are illustrated on **Figure 2.**

Site Specific Stormwater Design Criteria

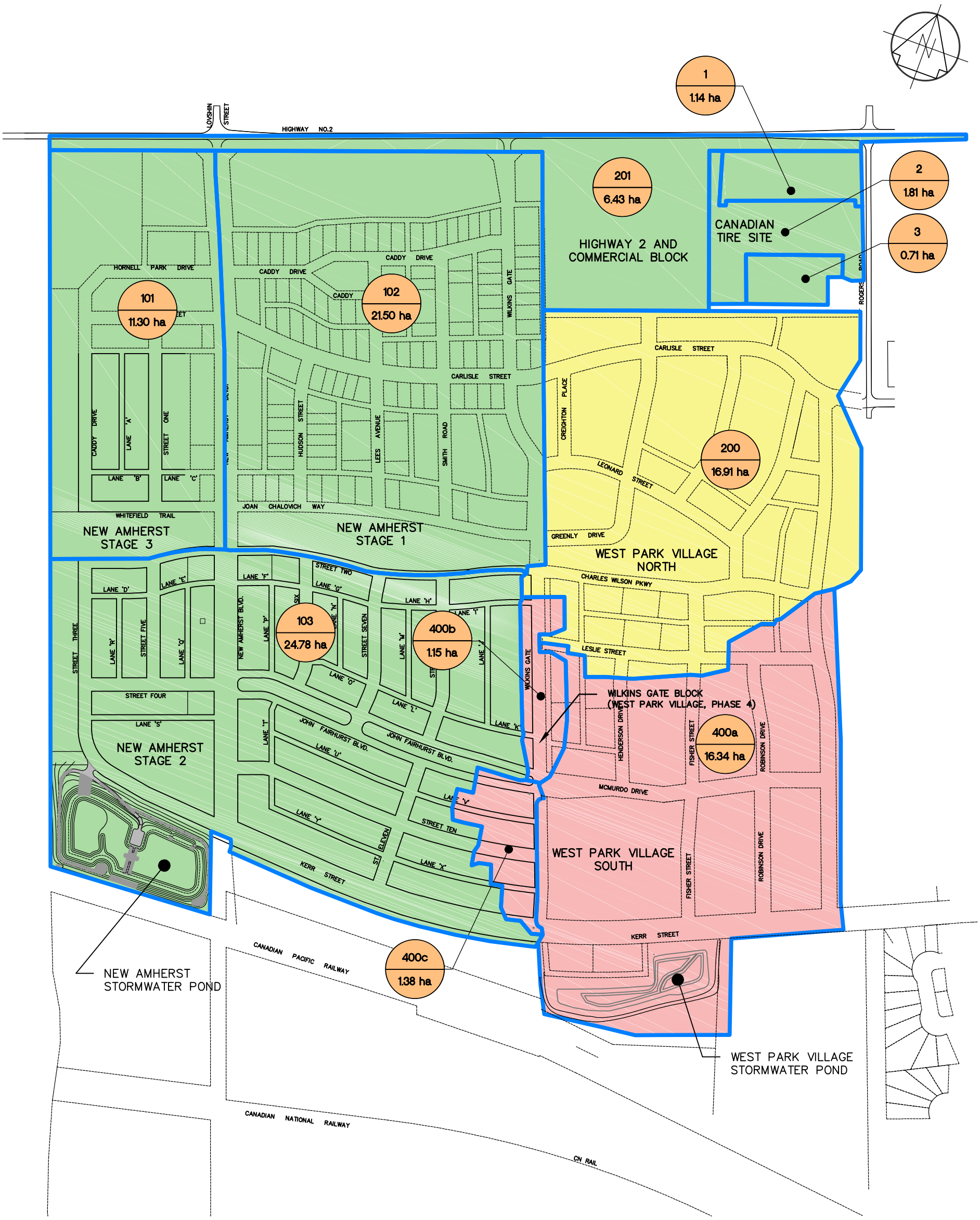
Since stormwater management controls have already been provided for the site, the stormwater design criteria are to confirm that the proposed development is consistent with the modelling assumptions of:

- The New Amherst Stage 2, Phase 1 storm sewer design; and,
- The New Amherst Stage 2, Phase 2, SWM Implementation Report.

Storm Sewer Assessment

A review of the Stage 2, Phase 1 Storm Drainage Area Plan shows that drainage for the proposed development was assumed to be split roughly evenly between the storm sewer on Charles Wilson Parkway, north of the site, and the storm sewer within the laneway, south of the site. The confluence of both storm sewers is the trunk sewer on New Amherst Boulevard, immediately west of the site.

The proposed grading plan maintains the assumed drainage configuration and, therefore, the proposed development is consistent with the existing storm sewer design. No modifications to the existing storm system are required.



MAJOR AND MINOR FLOW TO NEW AMHERST STORMWATER POND

MAJOR FLOW TO NEW AMHERST STORMWATER POND
MINOR FLOW TO WEST PARK VILLAGE STORMWATER POND

MAJOR AND MINOR FLOW TO WEST PARK VILLAGE STORMWATER POND

EX-1 / 0.22 — SUB-WATERSHED / AREA (IN HECTARES)

SUBWATERSHED BOUNDARY

Sketch No.

NEW AMHERST SUBDIVISION

STAGE 2, PHASE 2 DRAINAGE AREA PLAN

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Drawn By: CPB	Scale: 1:5000
Designed By: CPB	Plot Date: MARCH 2018
Checked By: KS	Project No.: 10719
Engineer: CPB	Drawing File No.: FIGURE 2

Stormwater Management Assessment

A review of **Figure 2** shows that the site is located along the northern boundary of Catchment 103 and both major and minor system flows are to be directed to the New Amherst Stormwater Pond which provides both quantity and quality controls for the contributing area. A review of the Stage 2, Phase 2 hydrologic parameters indicates that 65% of this catchment is assumed to be impervious (TIMP) and 55% of the catchment is assumed to be directly connected impervious (XIMP).

The proposed development has been assessed to ensure that these impervious constraints are not exceeded.

The proposed drainage plan is shown on **Figure 3** and the proposed land uses are summarized in **Table 1**. It is noted that the main and residual properties have been assessed separately since the residual property may be further developed in the future.

Table 1 – Proposed Impervious Summary

Site	Total Area (m^2)	Pervious (m^2)	Impervious (m^2)			Impervious Ratios	
			Direct		Indirect		
		Grass/ Landscaping	Roadway/ Parking	Rooftop	Sidewalk/ Walkways	Total Impervious (TIMP)	Directly Connected (XIMP)
Main Property	2080	745	739	336	260	64.2%	51.7%
Residual Property	484	371	97	0	16	23.3%	20.0%
Total	2564	1116	836	336	276	56.5%	45.7%

Notes: 1. The assessed area includes the internal site and half of the road right-of-way adjacent to the site on all sides.

A review of **Table 1**, shows that the total impervious and directly connected impervious ratios are less than the maximum allowable for both the main and residual properties. As such, the proposed development is consistent with the New Amherst Stage 2, Phase 2 SWM Implementation Report and no additional stormwater management controls are required.

CHARLES WILSON PARKWAY

NEW AMHERST BOULEVARD

Ex. 250mmØ SAN

1.5m CONCRETE SIDEWALK

2.0m CONCRETE SIDEWALK

Elev. = 91.63m

Elev. = 91.63m

FFE = 91.78m
TFW = 91.53m
BFE = 88.43m

BLOCK 123

PLANTER / WINDOW WELL

PLANTER / WINDOW WELL

0.5m WIDE DROP CURB

FRAME GARAGE

RESIDUAL PROPERTY OF SEVERING BLOCK 123

LANEWAY

10

11

12

INTERNAL DRAINAGE AREAS

IMPERVIOUS STUDY AREA

OVERLAND FLOW DIRECTION

STORM SEWER FLOW DIRECTION

PERVIOUS AREAS

DIRECTLY CONNECTED IMPERVIOUS AREAS

INDIRECTLY CONNECTED IMPERVIOUS AREAS

Sketch No.
FIGURE 3
123 NEW AMHERST BLVD
POST DEVELOPMENT
DRAINAGE AREA PLAN

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Drawn By: CPB	Scale: 1:250
Designed By: CPB	Plot Date: NOV 2019
Checked By: AH	Project No.: 19-10920
Engineer: CPB	Drawing File No.: 10920_DP

Erosion and Sediment Controls

When soils are exposed during construction, there is a potential for transport of relatively large amounts of sediment off-site to downstream areas. In order to minimize the impacts associated with sediment transfer, the following measures will be completed in the order listed:

- Install silt barrier along the property limits as shown on Detailed Design Drawings and maintain as required.
- Install a mud mat at the proposed construction entrance.
- Remove temporary erosion and sediment control devices/measures and clean out once vegetation is established.

Regular inspection and maintenance of the silt fence will ensure continued protection to the downstream areas for the duration of the construction period.

Conclusions

D.M. Wills Associates Limited has prepared this Stormwater Management Brief to demonstrate that the proposed development is consistent with the assumptions of the previous studies completed for the New Amherst subdivision and that the necessary stormwater controls will be provided by the existing infrastructure.

The proposed development is consistent with the New Amherst Stage 2, Phase 1 storm sewer design and no modifications to the existing storm system are required.

The proposed development is consistent with the New Amherst Stage 2, Phase 2 Stormwater Management Implementation Report and the existing New Amherst Wet Pond Facility will provide the necessary controls. No additional stormwater management controls are required

Erosion and sediment control measures have been prepared to ensure that off-site transport of sediment is minimized through temporary measures. The proper installation and ongoing maintenance of the erosion and sediment control measures will ensure that the development can proceed without adversely affecting downstream drainage conditions. The maintenance of the proposed measures will be carried out by the property owner.

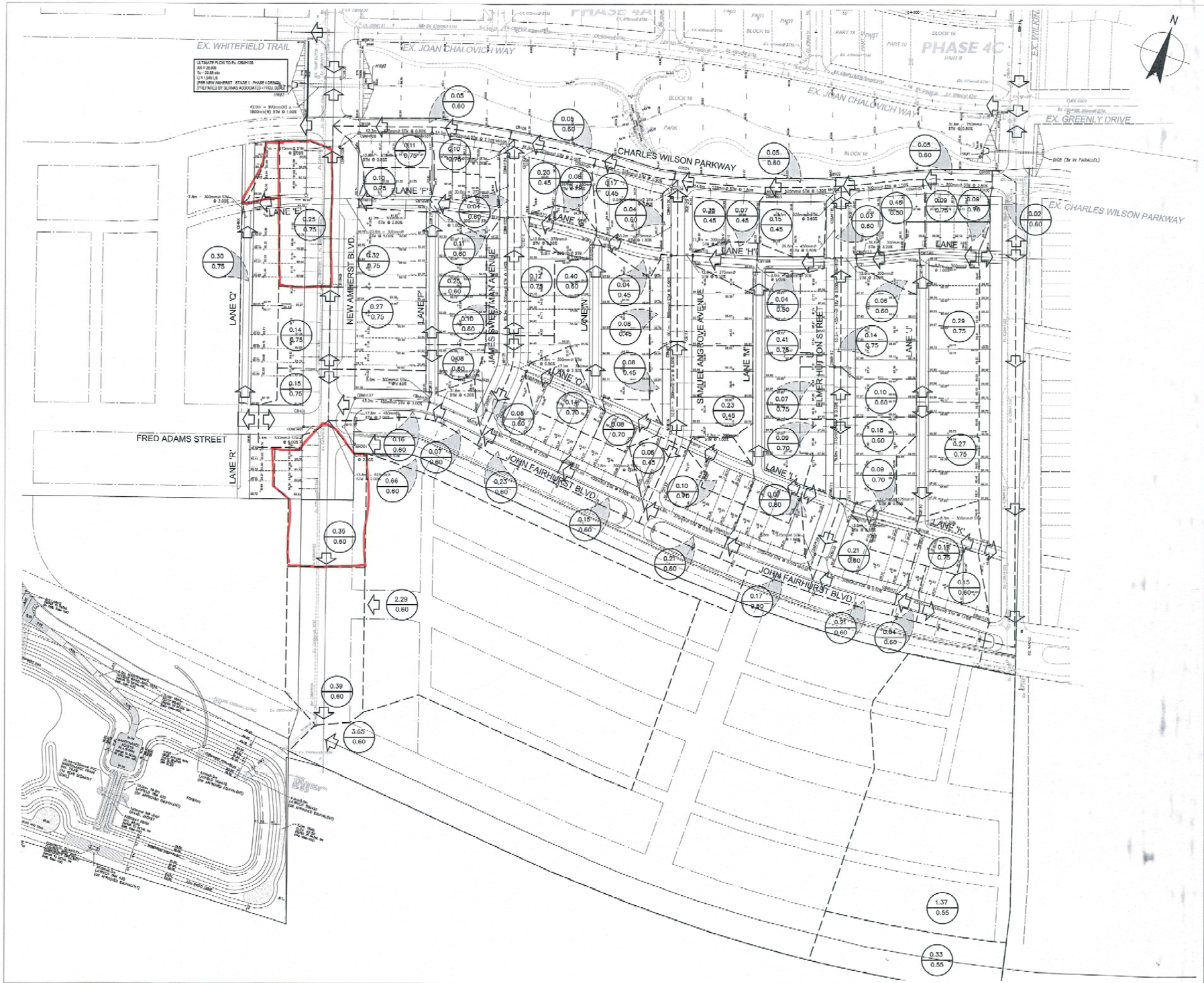
Respectfully submitted,

Chris Proctor-Bennett, P.Eng.
Water Resources Engineer

CPB/kr

Appendix A

Stage 2, Phase 2 Storm Sewer Design



NOTES

1. FOR GENERAL NOTES AND LEGENDS SEE DWG. G101.
2. MEASUREMENTS IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN.

LEGEND:

1.00 / 0.45 — AREA IN HECTARES / RUNOFF COEFFICIENT

OVERLAND FLOW

DRAINAGE AREA BOUNDARY

KEY PLAN
N.T.S.

GHD Inc.
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0 10 20 30 40 50m
SCALE 1:1000 AT ORIGINAL SIZE

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APPROVED
Approval as to form in reliance upon the professional skill and ability of GHD, consulting engineers, as to design and specification.

Date:
Director of Engineering Services
Town of Cobourg

No.	Revision	Job Manager	Project Director	Date	Approved
A	FINAL SUBMISSION	G.B.	F.Z.	01.15.16	

Drawing Revisions
Note: * indicates signatures on original issue of drawing or last revision of drawing

THE CORPORATION OF
THE TOWN OF COBOURG
Public Works Division

Project **NEW AMHERST**
STAGE 2 - PHASE 1

Title **STORM DRAINAGE AREA PLAN**

Scale	1:1000
Drawn	C.GAUDET
Designer	R.BREZINA
Drafting Check	J.RONDEAU
Design Check	G.BECKER

LICENCE PROFESSIONAL ENGINEER W.F. DURRELL PROVINCE OF ONTARIO

This Drawing must not be used for Construction unless signed as Approved

Original Size	Project No.	Drawing No.
Arch D	88-12175	G102B
Rev. A		

RP Date: DEC. 09, 2015

Plot Date: 20 January 2016 - 11:37 AM Plotted by: Curtis Mol Cad File No: G:\88\12175\CADD\Drawings\Civil\88-12175-G102D.dwg

65 Sunray St.
Whitby, Ontario
L1N 8Y3
905-686-6402

TOWN OF COBOURG
STORM SEWER DESIGN SHEET - 5YR

Project Name: **NEW AMHERST - STAGE 2 - PHASE 1**
Project No. **88-12175**

(14T-96001)

PREPARED BY: R. BREZINA
CHECKED BY: G. BECKER
DATE: 1/15/2016

15 MINUTE ENTRY TIME
5yr-Design Storm

Street	From MH	To MH	A Area (ha)	R Runoff Coeff.	2.78AR	Accum. 2.78AR	Time of Conc. (min)	Rainfall (mm/hr)	Q Peak Flow (l/s)	Pipe Diameter (mm)	Design Slope (%)	Length (m)	Capacity (l/s)	Capacity Problem	Velocity (m/s)	Time in Section (min)	Total Time (min)	Remarks
CHARLES WILSON PKWY	CB100	MH100	0.01	0.60	0.017	0.017	15.00	79.48	1	300	2.00	7.4	143	No	1.96	0.06	15.06	
CHARLES WILSON PKWY	MH100	CBMH101	0.01	0.60	0.017	0.033	15.06	79.32	3	300	2.80	40.0	169	No	2.31	0.29	15.35	
CHARLES WILSON PKWY	CBMH101	MH102	0.09	0.75	0.188	0.221	15.35	78.59	17	300	1.50	51.4	124	No	1.69	0.51	15.86	
CHARLES WILSON PKWY	CB102	MH102	0.05	0.60	0.083	0.083	15.00	79.48	7	300	2.00	7.5	143	No	1.96	0.06	15.06	
LANE 'J'	CB110	CB110B	0.27	0.75	0.563	0.563	15.00	79.48	45	300	2.70	8.5	166	No	2.27	0.06	15.06	
LANE 'K'	CB110B	CBMH110	0.11	0.75	0.229	0.792	15.06	79.32	63	375	0.50	37.7	129	No	1.13	0.55	15.62	
LANE 'K'	CBMH110	CBMH111	0.09	0.70	0.175	0.967	15.62	77.94	75	375	0.50	13.9	129	No	1.13	0.20	15.82	
ELMER HUTTON STREET	CB111	CBMH111	0.18	0.60	0.300	0.300	15.00	79.48	24	300	2.00	7.4	143	No	1.96	0.06	15.06	
ELMER HUTTON STREET	CBMH111	CBMH112	0.09	0.60	0.150	1.418	15.82	77.44	110	375	0.60	75.6	142	No	1.24	1.01	16.83	
ELMER HUTTON STREET	CB112	CBMH112	0.10	0.60	0.167	0.167	15.00	79.48	13	300	2.00	7.4	143	No	1.96	0.06	15.06	
ELMER HUTTON STREET	CBMH112	CBMH113	0.07	0.75	0.146	1.731	16.83	75.05	130	450	0.50	63.2	210	No	1.28	0.82	17.66	
LANE 'J'	CB114	CB114B	0.29	0.75	0.605	0.605	15.00	79.48	48	300	1.00	7.5	101	No	1.38	0.09	15.09	
LANE 'I'	CB114B	CBMH114	0.09	0.75	0.188	0.792	15.09	79.25	63	300	3.20	36.6	180	No	2.47	0.25	15.34	
LANE 'I'	CBMH114	CBMH113	0.06	0.60	0.100	0.892	15.34	78.63	70	300	3.00	12.6	175	No	2.39	0.09	15.42	
ELMER HUTTON STREET	CBMH113	CBMH115	0.14	0.75	0.292	2.915	17.66	73.21	213	450	0.80	29.6	266	No	1.62	0.30	17.96	
ELMER HUTTON STREET	DCB115	CBMH115	0.46	0.50	0.639	0.639	15.00	79.48	51	300	2.00	7.4	143	No	1.96	0.06	15.06	
ELMER HUTTON STREET	CBMH115	MH102	0.03	0.60	0.050	3.604	17.96	72.56	262	525	0.60	8.1	348	No	1.56	0.09	18.05	
CHARLES WILSON PKWY	MH102	CBMH103	0.00	0.00	0.000	3.909	18.05	72.37	283	525	1.30	40.2	512	No	2.29	0.29	18.34	
CHARLES WILSON PKWY	CBMH103	MH104	0.15	0.45	0.188	4.096	18.34	71.75	294	525	1.80	54.6	602	No	2.69	0.34	18.68	
CHARLES WILSON PKWY	CB104	MH104	0.05	0.60	0.083	0.083	15.00	79.48	7	300	2.00	7.5	143	No	1.96	0.06	15.06	
LANE 'L'	CB116	MH116	0.10	0.70	0.195	0.195	15.00	79.48	15	300	1.00	12.7	101	No	1.38	0.15	15.15	
SAMUEL ANGROVE AVE.	MH116	CBMH117	0.00	0.00	0.000	0.195	15.15	79.09	15	300	0.50	52.8	71	No	0.98	0.90	16.05	
SAMUEL ANGROVE AVE.	CB117	CBMH117	0.23	0.45	0.288	0.288	15.00	79.48	23	300	2.00	7.4	143	No	1.96	0.06	15.06	
SAMUEL ANGROVE AVE.	CBMH117	CBMH118	0.08	0.45	0.100	0.582	16.05	76.87	45	300	0.90	50.1	96	No	1.31	0.64	16.69	
LANE 'M'	DCB119	CB119B	0.41	0.75	0.855	0.855	15.00	79.48	68	300	1.00	8.0	101	No	1.38	0.10	15.10	
LANE 'H'	CB119B	CBMH119	0.04	0.50	0.056	0.910	15.10	79.24	72	300	2.50	37.3	160	No	2.19	0.28	15.38	
LANE 'H'	CBMH119	CBMH118	0.07	0.45	0.088	0.998	15.38	78.52	78	375	0.50	12.6	129	No	1.13	0.19	15.57	
SAMUEL ANGROVE AVE.	CBMH118	CBMH120	0.08	0.45	0.100	1.681	16.69	75.38	127	375	1.30	33.2	209	No	1.83	0.30	16.99	

65 Sunray St.
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L1N 8Y3
905-686-6402

TOWN OF COBOURG
STORM SEWER DESIGN SHEET - 5YR

Project Name: NEW AMHERST - STAGE 2 - PHASE 1
Project No. 88-12175

(14T-96001)

PREPARED BY: R. BREZINA
CHECKED BY: G. BECKER
DATE: 1/15/2016

15 MINUTE ENTRY TIME
5yr-Design Storm

Street	From MH	To MH	A Area (ha)	R Runoff Coeff.	2.78AR	Accum. 2.78AR	Time of Conc. (min)	Rainfall (mm/hr)	Q Peak Flow (l/s)	Pipe Diameter (mm)	Design Slope (%)	Length (m)	Capacity (l/s)	Capacity Problem	Velocity (m/s)	Time in Section (min)	Total Time (min)	Remarks
SAMUEL ANGROVE AVE.	DCB120	CBMH120	0.35	0.45	0.438	0.438	15.00	79.48	35	300	2.00	8.0	143	No	1.96	0.07	15.07	
SAMUEL ANGROVE AVE.	CBMH120	MH104	0.04	0.60	0.067	2.185	16.99	74.69	163	450	0.80	6.8	266	No	1.62	0.07	17.06	
CHARLES WILSON PKWY	MH104	CBMH105	0.00	0.00	0.000	6.365	18.68	71.06	452	525	2.40	46.4	695	No	3.11	0.25	18.93	
CHARLES WILSON PKWY	CBMH105	MH106	0.17	0.45	0.213	6.577	18.93	70.55	464	525	2.40	51.3	695	No	3.11	0.27	19.20	
CHARLES WILSON PKWY	CB106	MH106	0.05	0.60	0.083	0.083	15.00	79.48	7	300	2.00	7.4	143	No	1.96	0.06	15.06	
LANE 'O'	CB121	CBMH121B	0.08	0.70	0.156	0.156	15.00	79.48	12	300	2.30	47.1	153	No	2.10	0.37	15.37	
LANE 'O'	CBMH121B	MH121	0.14	0.70	0.272	0.428	15.37	78.54	34	300	0.50	11.8	71	No	0.98	0.20	15.58	
JAMES SWEETMAN AVE.	CB121C	MH121	0.12	0.75	0.250	0.250	15.00	79.48	20	300	2.00	7.4	143	No	1.96	0.06	15.06	
JAMES SWEETMAN AVE.	MH121	CBMH122	0.00	0.00	0.000	0.678	15.58	78.04	53	300	1.40	85.3	119	No	1.64	0.87	16.44	
LANE 'N'	DCB123	CB123B	0.40	0.60	0.667	0.667	15.00	79.48	53	300	1.00	6.8	101	No	1.38	0.08	15.08	
LANE 'G'	CB123B	CBMH123	0.04	0.45	0.050	0.717	15.08	79.27	57	300	3.30	39.7	183	No	2.51	0.26	15.35	
LANE 'G'	CBMH123	CBMH122	0.08	0.45	0.100	0.817	15.35	78.61	64	375	0.50	12.6	129	No	1.13	0.19	15.53	
JAMES SWEETMAN AVE.	CBMH122	CBMH124	0.10	0.60	0.167	1.662	16.44	75.95	126	375	1.50	35.0	224	No	1.96	0.30	16.74	
JAMES SWEETMAN AVE.	CB124	CBMH124	0.20	0.45	0.250	0.250	15.00	79.48	20	300	2.00	8.9	143	No	1.96	0.08	15.08	
JAMES SWEETMAN AVE.	CBMH124	MH106	0.04	0.60	0.067	1.979	16.74	75.26	149	375	1.50	6.7	224	No	1.96	0.06	16.80	
CHARLES WILSON PKWY	MH106	CBMH107	0.00	0.00	0.000	8.640	19.20	70.00	605	600	2.70	44.5	1,053	No	3.61	0.21	19.41	
CHARLES WILSON PKWY	CBMH107	CBMH108	0.10	0.75	0.209	8.849	19.41	69.59	616	675	0.80	42.3	784	No	2.12	0.33	19.74	
CHARLES WILSON PKWY	CB108	CBMH108	0.05	0.60	0.083	0.083	19.74	68.95	6	300	2.00	7.4	143	No	1.96	0.06	19.80	
CHARLES WILSON PKWY	CBMH108	CBMH109	0.11	0.75	0.229	9.161	19.80	68.82	631	675	1.00	13.2	877	No	2.37	0.09	19.89	
NEW AMHERST BLVD.	CBMH109	*Ex. CBMH105*	0.32	0.75	0.667	9.829	19.89	68.65	675	675	1.00	9.8	877	No	2.37	0.07	19.96	
NEW AMHERST BLVD.	*EXT.*	*Ex. CBMH106*				28.931	20.55	67.41	1,950								20.55	
NOTE: ACCUM. AR AND Tc ARE FROM NEW AMHERST - STAGE 1 - PHASE 4 PREPARED BY SERNAS ASSOCIATES																		
NEW AMHERST BLVD.	*Ex. CBMH106*	*Ex. CBMH105*				28.931	20.55	67.41	1,950	*1200*	*0.84*	*41.5*	3,728	No	3.19	0.22	20.77	
LANE 'P'	CB125	CB125B	0.25	0.60	0.417	0.417	15.00	79.48	33	300	1.00	7.2	101	No	1.38	0.09	15.09	
LANE 'F'	CB125B	CBMH125	0.11	0.60	0.183	0.600	15.09	79.26	48	300	2.80	41.2	169	No	2.31	0.30	15.38	
LANE 'F'	CBMH125	*Ex. CBMH105*	0.10	0.75	0.209	0.809	15.38	78.51	64	300	5.00	20.0	226	No	3.09	0.11	15.49	

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TOWN OF COBOURG
STORM SEWER DESIGN SHEET - 5YR

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NEW AMHERST BLVD.	*Ex. CBMH105*	*Ex. CBMH104*	0.25	0.75	0.521	40.090	20.77	67.02	2,687	*1200*	*0.45*	*80.5*	2,728	No	2.34	0.57	21.34	
NEW AMHERST BLVD.	CB104B	*Ex. CBMH104*	0.27	0.75	0.563	0.563	21.34	65.99	37	300	2.00	9.9	143	No	1.96	0.08	21.43	
NEW AMHERST BLVD.	*Ex. CBMH104*	*Ex. CBMH103*	0.14	0.75	0.292	40.945	21.43	65.84	2,696	*1200*	*0.64*	*80.7*	3,254	No	2.79	0.48	21.91	EXT-3
JOHN FAIRHURST BLVD.	CBMH126	CBMH127	0.15	0.60	0.250	0.250	15.00	79.48	20	300	1.00	55.7	101	No	1.38	0.67	15.67	
JOHN FAIRHURST BLVD.	CBMH127	MH128	0.04	0.60	0.067	0.317	15.67	77.80	25	300	0.50	52.7	71	No	0.98	0.90	16.57	
ELMER HUTTON STREET	DCB129	CBMH129	0.21	0.60	0.350	0.350	15.00	79.48	28	300	2.00	7.4	143	No	1.96	0.06	15.06	
ELMER HUTTON STREET	CBMH129	MH128	0.07	0.60	0.117	0.467	15.06	79.32	37	300	1.00	8.5	101	No	1.38	0.10	15.17	
JOHN FAIRHURST BLVD.	MH128	CBMH130	0.00	0.60		0.784	16.57	75.65	59	375	0.50	50.7	129	No	1.13	0.74	17.32	
JOHN FAIRHURST BLVD.	CBMH130	MH131	0.17	0.60	0.284	1.068	17.32	73.96	79	375	0.50	54.4	129	No	1.13	0.80	18.11	
SAMUEL ANGROVE AVE.	CB132	CBMH132	0.21	0.60	0.350	0.350	15.00	79.48	28	300	2.00	7.4	143	No	1.96	0.06	15.06	
SAMUEL ANGROVE AVE.	CBMH132	MH131	0.06	0.45	0.075	0.425	15.06	79.32	34	300	1.00	7.8	101	No	1.38	0.09	15.16	
JOHN FAIRHURST BLVD.	MH131	CBMH133	0.00	0.00	0.000	1.493	18.11	72.23	108	450	0.50	51.1	210	No	1.28	0.66	18.78	
JOHN FAIRHURST BLVD.	CBMH133	MH134	0.15	0.60	0.250	1.743	18.78	70.85	123	450	2.50	52.9	470	No	2.86	0.31	19.09	
JAMES SWEETMAN AVE.	DCB135	CBMH135	0.23	0.60	0.384	0.384	15.00	79.48	30	300	2.00	7.4	143	No	1.96	0.06	15.06	
JAMES SWEETMAN AVE.	CBMH135	MH134	0.08	0.60	0.133	0.517	15.06	79.32	41	300	1.00	8.6	101	No	1.38	0.10	15.17	
JOHN FAIRHURST BLVD.	MH134	CBMH136	0.00	0.00	0.000	2.260	19.09	70.23	159	450	4.20	31.8	610	No	3.71	0.14	19.23	
LANE 'P'	CB136	CBMH136	0.08	0.60	0.133	0.133	15.00	79.48	11	300	1.60	5.9	128	No	1.75	0.06	15.06	
JOHN FAIRHURST BLVD.	CBMH136	CBMH137	0.07	0.60	0.117	2.510	19.23	69.94	176	450	3.00	43.2	515	No	3.14	0.23	19.46	
JOHN FAIRHURST BLVD.	CBMH137	MH138	0.16	0.60	0.267	2.777	19.46	69.49	193	450	2.00	17.8	421	No	2.56	0.12	19.57	EXT-2
JOHN FAIRHURST BLVD.	FUT. 1	CBMH201	0.66	0.60	1.101	1.101												
JOHN FAIRHURST BLVD.	CBMH201	MH138	0.00	0.00	0.000	1.101	15.00	79.48	88	375	2.00	11.9	259	No	2.27	0.09	15.09	
JOHN FAIRHURST BLVD.	MH138	*Ex. CBMH103*	0.00	0.00	0.000	3.878	15.09	79.26	307	525	2.00	13.8	634	No	2.84	0.08	15.17	
FRED ADAMS STREET	CBMH401	*Ex. CBMH103*	0.15	0.75	0.313	0.313	15.00	79.48	25	300	5.00	9.4	226	No	3.09	0.05	15.05	

65 Sunray St.
Whitby, Ontario
L1N 8Y3
905-686-6402

TOWN OF COBOURG
STORM SEWER DESIGN SHEET - 5YR

Project Name: **NEW AMHERST - STAGE 2 - PHASE 1**
Project No. **88-12175**

(14T-96001)

PREPARED BY: R. BREZINA
CHECKED BY: G. BECKER
DATE: 1/15/2016

15 MINUTE ENTRY TIME
5yr-Design Storm

Street	From MH	To MH	A Area (ha)	R Runoff Coeff.	2.78AR	Accum. 2.78AR	Time of Conc. (min)	Rainfall (mm/hr)	Q Peak Flow (l/s)	Pipe Diameter (mm)	Design Slope (%)	Length (m)	Capacity (l/s)	Capacity Problem	Velocity (m/s)	Time in Section (min)	Total Time (min)	Remarks
NEW AMHERST BLVD.	*Ex. CBMH103*	*Ex. CBMH102*	0.00	0.00		45.136	21.91	65.00	2,934	*1200*	*1.43*	*80.5*	4,864	No	4.17	0.32	22.23	
NEW AMHERST BLVD.	*Ex. CBMH102*	*Ex. CBMH101*	2.64	0.60	4.404	49.539	22.23	64.45	3,193	*1200*	*1.42*	*78.4*	4,847	No	4.15	0.31	22.54	
NEW AMHERST BLVD.	*Ex. CBMH101*	*Ex. MH100*	0.39	0.60	0.651	50.190	22.54	63.93	3,208	*1200*	*1.38*	*14.5*	4,778	No	4.09	0.06	22.60	
KERR STREET	FUT. 2	*Ex. MH100*	3.65	0.60	6.088	6.088	20.10											
NEW AMHERST BLVD.	*Ex. MH100*	*Ex. HW2*	0.00	0.60		56.278	22.60	63.83	3,592	*1200*	*1.48*	*43.2*	4,948	No	4.24	0.17	22.77	
NOTE: PREVIOUS CALCULATED PEAK FLOW EXITING HEADWALL 2 PER NEW AMHERST - STAGE 1 - PHASE 2 = 3,405L/s																		

Runoff Coefficients

0.20	PARKS OVER 4 HECTARES	0.75	APARTMENTS
0.25	PARKS 4 HECTARES AND UNDER	0.75	SHOOLS AND CHURCHES
0.45	SINGLE FAMILY RESIDENTIAL	0.75	INDUSTRIAL
0.60	SINGLE FAMILY RESIDENTIAL (lot sizes less than 12.2 m)	0.90	COMMERCIAL
0.60	SEMI-DETACHED RESIDENTIAL	0.90	HEAVILY DEVELOPED AREAS
0.75	TOWNHOSES, MAISONETTES, ROW HOUSES, ETC.	0.95	PAVED AREAS

5yr: I = 2464 / (T + 16)
n = 0.013

Date	Submission
JUNE 2015	1ST SUBMISSION
SEPT 2015	2ND SUBMISSION
JAN 2016	FINAL SUBMISSION

65 Sunray St.
Whitby, Ontario
L1N 8Y3
905-686-6402

TOWN OF COBOURG
STORM SEWER DESIGN SHEET - 25YR

Project Name: NEW AMHERST - STAGE 2 - PHASE 1
Project No. 88-12175

PREPARED BY: R. BREZINA
CHECKED BY: G. BECKER
DATE: 1/15/2016

15 MINUTE ENTRY TIME
25yr-Design Storm

(14T-96001)

I = 710/(T +2.8)^0.739

NOTE: RUNOFF COEFFICIENT HAS BEEN BEEN INCREASED BY 10%

Street	From MH	To MH	A Area (ha)	R Runoff Coeff.	2.78AR	Accum. 2.78AR	Time of Conc. (min)	Rainfall (mm/hr)	Q Peak Flow (l/s)	Pipe Diameter (mm)	Design Slope (%)	Length (m)	Capacity (l/s)	Capacity Problem	Velocity (m/s)	Time in Section (min)	Total Time (min)	Remarks
CHARLES WILSON PKWY	CB100	MH100	0.01	0.66	0.018	0.018	15.00	84.57	2	300	2.00	7.4	143	No	1.96	0.06	15.06	
CHARLES WILSON PKWY	MH100	CBMH101	0.01	0.66	0.018	0.037	15.06	84.35	3	300	2.80	40.0	169	No	2.31	0.29	15.35	
CHARLES WILSON PKWY	CBMH101	MH102	0.09	0.83	0.206	0.243	15.35	83.35	20	300	1.50	51.4	124	No	1.69	0.51	15.86	
CHARLES WILSON PKWY	CB102	MH102	0.05	0.66	0.092	0.092	15.00	84.57	8	300	2.00	7.5	143	No	1.96	0.06	15.06	
													0					
LANE 'J'	CB110	CB110B	0.27	0.83	0.619	0.619	15.00	84.57	52	300	2.70	8.5	166	No	2.27	0.06	15.06	
LANE 'K'	CB110B	CBMH110	0.11	0.83	0.252	0.872	15.06	84.35	74	375	0.50	37.7	129	No	1.13	0.55	15.62	
LANE 'K'	CBMH110	CBMH111	0.09	0.77	0.193	1.064	15.62	82.47	88	375	0.50	13.9	129	No	1.13	0.20	15.82	
													0					
ELMER HUTTON STREET	CB111	CBMH111	0.18	0.66	0.330	0.330	15.00	84.57	28	300	2.00	7.4	143	No	1.96	0.06	15.06	
ELMER HUTTON STREET	CBMH111	CBMH112	0.09	0.66	0.165	1.560	15.82	81.80	128	375	0.60	75.6	142	No	1.24	1.01	16.83	
ELMER HUTTON STREET	CB112	CBMH112	0.10	0.66	0.183	0.183	15.00	84.57	16	300	2.00	7.4	143	No	1.96	0.06	15.06	
ELMER HUTTON STREET	CBMH112	CBMH113	0.07	0.83	0.161	1.904	16.83	78.66	150	450	0.50	63.2	210	No	1.28	0.82	17.66	
LANE 'J'	CB114	CB114B	0.29	0.83	0.665	0.665	15.00	84.57	56	300	1.00	7.5	101	No	1.38	0.09	15.09	
LANE 'I'	CB114B	CBMH114	0.09	0.83	0.206	0.872	15.09	84.25	73	300	3.20	36.6	180	No	2.47	0.25	15.34	
LANE 'I'	CBMH114	CBMH113	0.06	0.66	0.110	0.982	15.34	83.40	82	300	3.00	12.6	175	No	2.39	0.09	15.42	
ELMER HUTTON STREET	CBMH113	CBMH115	0.14	0.83	0.321	3.206	17.66	76.31	245	450	0.80	29.6	266	No	1.62	0.30	17.96	
ELMER HUTTON STREET	DCB115	CBMH115	0.46	0.55	0.703	0.703	15.00	84.57	59	300	2.00	7.4	143	No	1.96	0.06	15.06	
ELMER HUTTON STREET	CBMH115	MH102	0.03	0.66	0.055	3.965	17.96	75.48	299	525	0.60	8.1	348	No	1.56	0.09	18.05	
CHARLES WILSON PKWY	MH102	CBMH103	0.00	0.00	0.000	4.300	18.05	75.25	324	525	1.30	40.2	512	No	2.29	0.29	18.34	
CHARLES WILSON PKWY	CBMH103	MH104	0.15	0.50	0.206	4.506	18.34	74.48	336	525	1.80	54.6	602	No	2.69	0.34	18.68	
CHARLES WILSON PKWY	CB104	MH104	0.05	0.66	0.092	0.092	15.00	84.57	8	300	2.00	7.5	143	No	1.96	0.06	15.06	
LANE 'L'	CB116	MH116	0.10	0.77	0.214	0.214	15.00	84.57	18	300	1.00	12.7	101	No	1.38	0.15	15.15	
SAMUEL ANGROVE AVE.	MH116	CBMH117	0.00	0.00	0.000	0.214	15.15	84.03	18	300	0.50	52.8	71	No	0.98	0.90	16.05	
SAMUEL ANGROVE AVE.	CB117	CBMH117	0.23	0.50	0.317	0.317	15.00	84.57	27	300	2.00	7.4	143	No	1.96	0.06	15.06	
SAMUEL ANGROVE AVE.	CBMH117	CBMH118	0.08	0.50	0.110	0.641	16.05	81.05	52	300	0.90	50.1	96	No	1.31	0.64	16.69	
LANE 'M'	DCB119	CB119B	0.41	0.83	0.940	0.940	15.00	84.57	80	300	1.00	8.0	101	No	1.38	0.10	15.10	
LANE 'H'	CB119B	CBMH119	0.04	0.55	0.061	1.001	15.10	84.23	84	300	2.50	37.3	160	No	2.19	0.28	15.38	
LANE 'H'	CBMH119	CBMH118	0.07	0.50	0.096	1.098	15.38	83.25	91	375	0.50	12.6	129	No	1.13	0.19	15.57	
SAMUEL ANGROVE AVE.	CBMH118	CBMH120	0.08	0.50	0.110	1.849	16.69	79.09	146	375	1.30	33.2	209	No	1.83	0.30	16.99	

65 Sunray St.
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TOWN OF COBOURG
STORM SEWER DESIGN SHEET - 25YR

Project Name: NEW AMHERST - STAGE 2 - PHASE 1
Project No. 88-12175

PREPARED BY: R. BREZINA
CHECKED BY: G. BECKER
DATE: 1/15/2016

15 MINUTE ENTRY TIME
25yr-Design Storm

(14T-96001)

I = 710/(T +2.8)^0.739

NOTE: RUNOFF COEFFICIENT HAS BEEN BEEN INCREASED BY 10%

Street	From MH	To MH	A Area (ha)	R Runoff Coeff.	2.78AR	Accum. 2.78AR	Time of Conc. (min)	Rainfall (mm/hr)	Q Peak Flow (l/s)	Pipe Diameter (mm)	Design Slope (%)	Length (m)	Capacity (l/s)	Capacity Problem	Velocity (m/s)	Time in Section (min)	Total Time (min)	Remarks
SAMUEL ANGROVE AVE.	DCB120	CBMH120	0.35	0.50	0.482	0.482	15.00	84.57	41	300	2.00	8.0	143	No	1.96	0.07	15.07	
SAMUEL ANGROVE AVE.	CBMH120	MH104	0.04	0.66	0.073	2.404	16.99	78.19	188	450	0.80	6.8	266	No	1.62	0.07	17.06	
CHARLES WILSON PKWY	MH104	CBMH105	0.00	0.00	0.000	7.001	18.68	73.61	515	525	2.40	46.4	695	No	3.11	0.25	18.93	
CHARLES WILSON PKWY	CBMH105	MH106	0.17	0.50	0.234	7.235	18.93	72.98	528	525	2.40	51.3	695	No	3.11	0.27	19.20	
CHARLES WILSON PKWY	CB106	MH106	0.05	0.66	0.092	0.092	15.00	84.57	8	300	2.00	7.4	143	No	1.96	0.06	15.06	
LANE 'O'	CB121	CBMH121B	0.08	0.77	0.171	0.171	15.00	84.57	14	300	2.30	47.1	153	No	2.10	0.37	15.37	
LANE 'O'	CBMH121B	MH121	0.14	0.77	0.300	0.471	15.37	83.28	39	300	0.50	11.8	71	No	0.98	0.20	15.58	
JAMES SWEETMAN AVE.	CB121C	MH121	0.12	0.83	0.275	0.275	15.00	84.57	23	300	2.00	7.4	143	No	1.96	0.06	15.06	
JAMES SWEETMAN AVE.	MH121	CBMH122	0.00	0.00	0.000	0.746	15.58	82.60	62	300	1.40	85.3	119	No	1.64	0.87	16.44	
LANE 'N'	DCB123	CB123B	0.40	0.66	0.734	0.734	15.00	84.57	62	300	1.00	6.8	101	No	1.38	0.08	15.08	
LANE 'G'	CB123B	CBMH123	0.04	0.50	0.055	0.789	15.08	84.28	66	300	3.30	39.7	183	No	2.51	0.26	15.35	
LANE 'G'	CBMH123	CBMH122	0.08	0.50	0.110	0.899	15.35	83.37	75	375	0.50	12.6	129	No	1.13	0.19	15.53	
JAMES SWEETMAN AVE.	CBMH122	CBMH124	0.10	0.66	0.183	1.829	16.44	79.83	146	375	1.50	35.0	224	No	1.96	0.30	16.74	
JAMES SWEETMAN AVE.	CB124	CBMH124	0.20	0.50	0.275	0.275	15.00	84.57	23	300	2.00	8.9	143	No	1.96	0.08	15.08	
JAMES SWEETMAN AVE.	CBMH124	MH106	0.04	0.66	0.073	2.177	16.74	78.93	172	375	1.50	6.7	224	No	1.96	0.06	16.80	
CHARLES WILSON PKWY	MH106	CBMH107	0.00	0.00	0.000	9.504	19.20	72.31	687	600	2.70	44.5	1053	No	3.61	0.21	19.41	
CHARLES WILSON PKWY	CBMH107	CBMH108	0.10	0.83	0.229	9.734	19.41	71.81	699	675	0.80	42.3	784	No	2.12	0.33	19.74	
CHARLES WILSON PKWY	CB108	CBMH108	0.05	0.66	0.092	0.092	19.74	71.03	7	300	2.00	7.4	143	No	1.96	0.06	19.80	
CHARLES WILSON PKWY	CBMH108	CBMH109	0.11	0.83	0.252	10.078	19.80	70.88	714	675	1.00	13.2	877	No	2.37	0.09	19.89	
NEW AMHERST BLVD.	CBMH109	Ex. CBMH105	0.32	0.83	0.734	10.812	19.89	70.67	764	675	1.00	9.8	877	No	2.37	0.07	19.96	
NEW AMHERST BLVD.	EXT.	Ex. CBMH106				31.824	20.55	69.20	2202					No			20.55	(10% Increase in Flow Applied to Ext. Lands)
NOTE: ACCUM. AR AND T																		
NEW AMHERST BLVD.	Ex. CBMH106	Ex. CBMH105				31.824	20.55	69.20	2202	1200	0.84	41.5	3728	No	3.19	0.22	20.77	
LANE 'P'	CB125	CB125B	0.25	0.66	0.459	0.459	15.00	84.57	39	300	1.00	7.2	101	No	1.38	0.09	15.09	
LANE 'F'	CB125B	CBMH125	0.11	0.66	0.202	0.661	15.09	84.26	56	300	2.80	41.2	169	No	2.31	0.30	15.38	
LANE 'F'	CBMH125	Ex. CBMH105	0.10	0.83	0.229	0.890	15.38	83.24	74	300	5.00	20.0	226	No	3.09	0.11	15.49	

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TOWN OF COBOURG
STORM SEWER DESIGN SHEET - 25YR

Project Name: NEW AMHERST - STAGE 2 - PHASE 1
Project No. 88-12175

PREPARED BY: R. BREZINA
CHECKED BY: G. BECKER
DATE: 1/15/2016

15 MINUTE ENTRY TIME
25yr-Design Storm

(14T-96001)

I = 710/(T +2.8)^0.739

NOTE: RUNOFF COEFFICIENT HAS BEEN BEEN INCREASED BY 10%

Street	From MH	To MH	A Area (ha)	R Runoff Coeff.	2.78AR	Accum. 2.78AR	Time of Conc. (min)	Rainfall (mm/hr)	Q Peak Flow (l/s)	Pipe Diameter (mm)	Design Slope (%)	Length (m)	Capacity (l/s)	Capacity Problem	Velocity (m/s)	Time in Section (min)	Total Time (min)	Remarks
NEW AMHERST BLVD.	Ex. CBMH105	Ex. CBMH104	0.25	0.83	0.573	44.099	20.77	68.73	3031	1200	0.45	80.5	2728	Yes	2.34	0.57	21.34	
NEW AMHERST BLVD.	CB104B	Ex. CBMH104	0.27	0.83	0.619	0.619	21.34	67.52	42	300	2.00	9.9	143	No	1.96	0.08	21.43	
NEW AMHERST BLVD.	Ex. CBMH104	Ex. CBMH103	0.14	0.83	0.321	45.039	21.43	67.34	3033	1200	0.64	80.7	3254	No	2.79	0.48	21.91	EXT-3
JOHN FAIRHURST BLVD.	CBMH126	CBMH127	0.15	0.66	0.275	0.275	15.00	84.57	23	300	1.00	55.7	101	No	1.38	0.67	15.67	
JOHN FAIRHURST BLVD.	CBMH127	MH128	0.04	0.66	0.073	0.349	15.67	82.28	29	300	0.50	52.7	71	No	0.98	0.90	16.57	
ELMER HUTTON STREET	DCB129	CBMH129	0.21	0.66	0.385	0.385	15.00	84.57	33	300	2.00	7.4	143	No	1.96	0.06	15.06	
ELMER HUTTON STREET	CBMH129	MH128	0.07	0.66	0.128	0.514	15.06	84.35	43	300	1.00	8.5	101	No	1.38	0.10	15.17	
JOHN FAIRHURST BLVD.	MH128	CBMH130	0.00	0.66	0.000	0.862	16.57	79.44	69	375	0.50	50.7	129	No	1.13	0.74	17.32	
JOHN FAIRHURST BLVD.	CBMH130	MH131	0.17	0.66	0.312	1.174	17.32	77.26	91	375	0.50	54.4	129	No	1.13	0.80	18.11	
SAMUEL ANGROVE AVE.	CB132	CBMH132	0.21	0.66	0.385	0.385	15.00	84.57	33	300	2.00	7.4	143	No	1.96	0.06	15.06	
SAMUEL ANGROVE AVE.	CBMH132	MH131	0.06	0.50	0.083	0.468	15.06	84.35	39	300	1.00	7.8	101	No	1.38	0.09	15.16	
JOHN FAIRHURST BLVD.	MH131	CBMH133	0.00	0.00	0.000	1.642	18.11	75.07	123	450	0.50	51.1	210	No	1.28	0.66	18.78	
JOHN FAIRHURST BLVD.	CBMH133	MH134	0.15	0.66	0.275	1.917	18.78	73.35	141	450	2.50	52.9	470	No	2.86	0.31	19.09	
JAMES SWEETMAN AVE.	DCB135	CBMH135	0.23	0.66	0.422	0.422	15.00	84.57	36	300	2.00	7.4	143	No	1.96	0.06	15.06	
JAMES SWEETMAN AVE.	CBMH135	MH134	0.08	0.66	0.147	0.569	15.06	84.35	48	300	1.00	8.6	101	No	1.38	0.10	15.17	
JOHN FAIRHURST BLVD.	MH134	CBMH136	0.00	0.00	0.000	2.486	19.09	72.59	180	450	4.20	31.8	610	No	3.71	0.14	19.23	
LANE 'P'	CB136	CBMH136	0.08	0.66	0.147	0.147	15.00	84.57	12	300	1.60	5.9	128	No	1.75	0.06	15.06	
JOHN FAIRHURST BLVD.	CBMH136	CBMH137	0.07	0.66	0.128	2.761	19.23	72.24	199	450	3.00	43.2	515	No	3.14	0.23	19.46	
JOHN FAIRHURST BLVD.	CBMH137	MH138	0.16	0.66	0.294	3.055	19.46	71.69	219	450	2.00	17.8	421	No	2.56	0.12	19.58	EXT-2
JOHN FAIRHURST BLVD.	FUT. 1	CBMH201	0.66	0.66	1.211	1.211												
JOHN FAIRHURST BLVD.	CBMH201	MH138	0.00	0.00	0.000	1.211	15.00	84.57	102	375	2.00	11.9	259	No	2.27	0.09	15.09	
JOHN FAIRHURST BLVD.	MH138	Ex. CBMH103	0.00	0.00	0.000	4.266	15.09	84.26	359	525	2.00	13.8	634	No	2.84	0.08	15.17	
FRED ADAMS STREET	CBMH401	Ex. CBMH103	0.15	0.83	0.344	0.344	15.00	84.57	29	300	5.00	9.4	226	No	3.09	0.05	15.05	

65 Sunray St.
Whitby, Ontario
L1N 8Y3
905-686-6402

TOWN OF COBOURG
STORM SEWER DESIGN SHEET - 25YR

Project Name: **NEW AMHERST - STAGE 2 - PHASE 1**
Project No. **88-12175**

PREPARED BY: R. BREZINA
CHECKED BY: G. BECKER
DATE: 1/15/2016

15 MINUTE ENTRY TIME
25yr-Design Storm

(14T-96001)

I = 710/(T +2.8)^0.739

NOTE: RUNOFF COEFFICIENT HAS BEEN BEEN INCREASED BY 10%

Street	From MH	To MH	A Area (ha)	R Runoff Coeff.	2.78AR	Accum. 2.78AR	Time of Conc. (min)	Rainfall (mm/hr)	Q Peak Flow (l/s)	Pipe Diameter (mm)	Design Slope (%)	Length (m)	Capacity (l/s)	Capacity Problem	Velocity (m/s)	Time in Section (min)	Total Time (min)	Remarks
NEW AMHERST BLVD.	Ex. CBMH103	Ex. CBMH102	0.00	0.00	0.000	49.649	21.91	66.37	3295	1200	1.43	80.5	4864	No	4.17	0.32	22.23	
NEW AMHERST BLVD.	Ex. CBMH102	Ex. CBMH101	2.64	0.66	4.844	54.493	22.23	65.74	3582	1200	1.42	78.4	4847	No	4.15	0.31	22.54	
NEW AMHERST BLVD.	Ex. CBMH101	Ex. MH100	0.39	0.66	0.716	55.209	22.54	65.13	3596	1200	1.38	14.5	4778	No	4.09	0.06	22.60	
KERR STREET	FUT. 2	Ex. MH100	3.65	0.66	6.697	6.697	20.10	70.20	470					No				
NEW AMHERST BLVD.	Ex. MH100	Ex. HW2	0.00	0.66	0.000	61.906	22.60	65.02	4025	1200	1.48	43.2	4948	No	4.24	0.17	22.77	

Runoff Coefficients

0.20	PARKS OVER 4 HECTARES	0.75	APARTMENTS
0.25	PARKS 4 HECTARES AND UNDER	0.75	SHOOLS AND CHURCHES
0.45	SINGLE FAMILY RESIDENTIAL	0.75	INDUSTRIAL
0.60	SINGLE FAMILY RESIDENTIAL (lot sizes less than 12.2 m)	0.90	COMMERCIAL
0.60	SEMI-DETACHED RESIDENTIAL	0.90	HEAVILY DEVELOPED AREAS
0.75	TOWNHOSES, MAISONETTES, ROW HOUSES, ETC.	0.95	PAVED AREAS

Date	Submission
JUNE 2015	1ST SUBMISSION
SEPT 2015	2ND SUBMISSION
JAN 2016	FINAL SUBMISSION

65 Sunray St.
Whitby, Ontario
L1N 8Y3
905-686-6402

TOWN OF COBOURG
HYDRAULIC GRADE LINE CALCULATIONS

Project Name: NEW AMHERST - STAGE 2 - PHASE 1
Project No. 88-12175

(14T-96001)

PREPARED BY: R. BREZINA
CHECKED BY: G. BECKER
DATE: 1/15/16

STREET NAME	From MH	To MH	PROPOSED PIPE									MANHOLE LOSSES @ D/S MANHOLE											HGL Elevation		EGL Elevation		Surcharge	
			Bend Angle in D/S MH	Box Culvert? (Y/N)	Size mm	Length m	Slope %	Lower Inv. m	Upper Inv. m	Lower Obv. m	Upper Obv. m	Flow cms	Pipe Capacity cms	% Capacity	Frict'n Slope %	Frict'n Loss m	Vel. in m/s	Vel. out m/s	$v_t^2/2g$ m	$kv_o^2/2g$ m	$v_o^2/2g$ - $v_{int}^2/2g$ m	D/S MH Losses m	Lower m	Upper m	Lower m	Upper m	Lower m	Upper m
NEW AMHERST BLVD.	Ex. HW2	Ex. MH100	0	N	1200	43.2	1.48	80.450	81.089	81.669	82.309	4.025	4.948	81.3%	0.98	0.423	3.45	4.24	0.606	0.092	0.310	0.401	82.350	82.773	82.660	83.379	0.68	0.46
NEW AMHERST BLVD.	Ex. MH100	Ex. CBMH101	45	N	1200	14.5	1.38	81.500	81.700	82.719	82.919	3.596	4.778	75.3%	0.78	0.113	3.08	3.45	0.484	0.182	0.122	0.304	83.077	83.190	83.561	83.674	0.36	0.27
NEW AMHERST BLVD.	Ex. CBMH101	Ex. CBMH102	0	N	1200	78.4	1.42	81.720	82.833	82.939	84.052	3.582	4.847	73.9%	0.78	0.608	3.07	3.08	0.480	0.048	0.004	0.052	83.243	83.851	83.722	84.330	0.30	0.00
NEW AMHERST BLVD.	Ex. CBMH102	Ex. CBMH103	0	N	1200	80.5	1.43	82.850	84.001	84.069	85.220	3.295	4.864	67.7%	0.66	0.528	2.82	3.07	0.406	0.048	0.074	0.122	84.069	84.601	84.378	85.004	0.00	0.00
JOHN FAIRHURST BLVD.	Ex. CBMH103	MH138	90	N	525	13.8	2.00	84.750	85.026	85.283	85.559	0.359	0.634	56.7%	0.64	0.089	1.61	2.82	0.132	0.325	0.274	0.599	85.283	85.372	85.328	85.504	0.00	0.00
JOHN FAIRHURST BLVD.	MH138	CBMH201	90	N	375	11.9	2.00	87.063	87.301	87.444	87.682	0.102	0.259	39.6%	0.31	0.037	0.90	1.61	0.041	0.106	0.091	0.196	87.444	87.489	85.609	87.522	0.00	0.00
JOHN FAIRHURST BLVD.	MH138	CBMH137	90	N	450	17.8	2.00	87.240	87.596	87.697	88.054	0.219	0.421	52.1%	0.54	0.097	1.33	1.61	0.091	0.106	0.041	0.147	87.697	87.821	85.609	87.884	0.00	0.00
JOHN FAIRHURST BLVD.	CBMH137	CBMH136	90	N	450	43.2	3.00	87.676	88.971	88.133	89.428	0.199	0.515	38.7%	0.45	0.194	1.22	1.33	0.075	0.073	0.015	0.088	88.133	89.196	87.957	88.403	0.00	0.00
JOHN FAIRHURST BLVD.	CBMH136	MH134	30	N	450	31.8	4.20	89.031	90.367	89.488	90.824	0.180	0.610	29.6%	0.37	0.117	1.10	1.22	0.062	0.023	0.014	0.036	89.488	90.592	88.425	89.667	0.00	0.00
JAMES SWEETMAN AVE.	MH134	CBMH135	90	N	300	8.6	1.00	90.537	90.623	90.842	90.928	0.048	0.101	47.6%	0.23	0.019	0.66	1.10	0.022	0.049	0.040	0.089	90.842	90.861	89.716	90.883	0.00	0.00
JOHN FAIRHURST BLVD.	MH134	CBMH133	0	N	450	52.9	2.50	90.426	91.749	90.883	92.206	0.141	0.470	29.9%	0.22	0.118	0.86	1.10	0.037	0.006	0.024	0.030	90.883	91.974	89.673	91.039	0.00	0.00
JOHN FAIRHURST BLVD.	CBMH133	MH131	0	N	450	51.1	0.50	91.936	92.192	92.393	92.649	0.123	0.210	58.6%	0.17	0.088	0.75	0.86	0.029	0.004	0.009	0.012	92.393	92.481	91.043	92.510	0.00	0.00
SAMUEL ANGROVE AVE.	MH131	CBMH132	90	N	300	7.8	1.00	92.544	92.622	92.849	92.927	0.039	0.101	39.1%	0.15	0.012	0.54	0.75	0.015	0.023	0.014	0.037	92.849	92.861	92.533	92.876	0.00	0.00
JOHN FAIRHURST BLVD.	MH131	CBMH130	0	N	375	54.4	0.50	92.267	92.539	92.648	92.920	0.091	0.129	70.1%	0.25	0.134	0.80	0.75	0.032	0.003	-0.004	-0.001	92.648	92.782	92.513	92.814	0.00	0.00
JOHN FAIRHURST BLVD.	CBMH130	MH128	15	N	375	50.7	0.50	92.599	92.853	92.980	93.234	0.069	0.129	53.0%	0.14	0.071	0.60	0.80	0.018	0.003	0.014	0.017	92.980	93.051	92.817	93.070	0.00	0.00
ELMER HUTTON STREET	MH128	CBMH129	90	N	300	8.5	1.00	93.004	93.089	93.309	93.394	0.043	0.101	43.0%	0.18	0.016	0.59	0.60	0.018	0.015	0.000	0.015	93.309	93.324	93.084	93.342	0.00	0.00
JOHN FAIRHURST BLVD.	MH128	CBMH127	15	N	300	52.7	0.50	92.928	93.192	93.233	93.496	0.029	0.071	40.2%	0.08	0.043	0.39	0.60	0.008	0.002	0.011	0.012	93.233	93.342	93.071	93.283	0.00	0.00
JOHN FAIRHURST BLVD.	CBMH127	CBMH126	15	N	300	55.7	1.00	93.252	93.809	93.557	94.114	0.023	0.101	23.1%	0.05	0.030	0.32	0.39	0.005	0.001	0.003	0.003	93.557	93.959	93.284	93.592	0.00	0.00
NEW AMHERST BLVD.	Ex. CBMH103	Ex. CBMH104	0	N	1200	80.7	0.64	84.020	84.536	85.239	85.756	3.033	3.254	93.2%	0.56	0.449	2.60	2.82	0.344	0.041	0.062	0.103	85.239	85.688	85.044	86.032	0.00	0.00
NEW AMHERST BLVD.	Ex. CBMH104	Ex. CBMH105	0	N	1200	80.5	0.45	84.560	84.922	85.779	86.141	3.031	2.728	111.1%	0.56	0.447	2.60	2.60	0.344	0.034	0.001	0.035	85.779	86.226	86.066	86.570	0.00	0.08
NEW AMHERST BLVD.	Ex. CBMH105	Ex. CBMH106	0	N	1200	41.5	0.84	84.940	85.289	86.159	86.508	2.202	3.728	59.1%	0.29	0.122	1.89	2.60	0.181	0.034	0.162	0.197	86.423	86.544	86.604	86.726	0.26	0.04
NEW AMHERST BLVD.	Ex. CBMH105	CBMH109	90	N	675	9.8	1.00	85.650	85.748	86.336	86.434	0.764	0.877	87.1%	0.76	0.075	2.07	2.60	0.218	0.275	0.125	0.400	86.626	86.701	86.845	86.919	0.29	0.27
CHARLES WILSON PKWY	CBMH109	CBMH108	45	N	675	13.2	1.00	85.828	85.960	86.514	86.646	0.714	0.877	81.5%	0.66	0.088	1.93	2.07	0.191	0.065	0.027	0.093	86.794	86.882	86.985	87.072	0.28	0.24
CHARLES WILSON PKWY	CBMH108	CBMH107	45	N	675	42.3	0.80	86.565	86.903	87.251	87.589	0.699	0.784	89.1%	0.64	0.269	1.89	1.93	0.183	0.057	0.008	0.065	87.251	87.519	87.129	87.702	0.00	0.00
CHARLES WILSON PKWY	CBMH107	MH106	15	N	600	44.5	2.70	87.780	88.982	88.390	89.591	0.687	1.053	65.3%	1.15	0.512	2.35	1.89	0.283	0.018	-0.100	-0.082	88.390	89.282	87.720	89.184	0.00	0.00
JAMES SWEETMAN AVE.	MH106	CBMH124	90	N	375	6.7	1.50	89.305	89.406	89.686	89.787	0.172	0.224	76.7%	0.88	0.059	1.51	2.35	0.116	0.226	0.167	0.393	89.686	89.745	89.411	89.861	0.00	0.00
JAMES SWEETMAN AVE.	CBMH124	CBMH122	0	N	375	35.0	1.50	89.436	89.961	89.817	90.342	0.146	0.224	65.2%	0.64	0.223	1.28	1.51	0.084	0.012	0.032	0.044	89.817	90.149	89.873	90.124	0.00	0.00
JAMES SWEETMAN AVE.	CBMH122	MH121	0	N	300	85.3	1.40	90.079	91.273	90.384	91.578	0.062	0.119	51.6%	0.37	0.318	0.84	1.28	0.036	0.008	0.047	0.056	90.384	91.423	90.132	90.739	0.00	0.00
CHARLES WILSON PKWY	MH106	CBMH105	15	N	525	51.3	2.40	89.057	90.288	89.590	90.822	0.528	0.695	76.0%	1.39	0.711	2.36	2.35	0.285	0.028	-0.002	0.026	89.590	90.551	89.213	90.586	0.00	0.00

65 Sunray St.
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TOWN OF COBOURG
HYDRAULIC GRADE LINE CALCULATIONS

Project Name: NEW AMHERST - STAGE 2 - PHASE 1
Project No. 88-12175

(14T-96001)

PREPARED BY: R. BREZINA
CHECKED BY: G. BECKER
DATE: 1/15/16

STREET NAME	From MH	To MH	PROPOSED PIPE									MANHOLE LOSSES @ D/S MANHOLE										HGL Elevation		EGL Elevation		Surcharge	
			Bend Angle in D/S MH	Box Culvert? (Y/N)	Size mm	Length m	Slope %	Lower Inv. m	Upper Inv. m	Lower Obv. m	Upper Obv. m	Flow cms	Pipe Capacity cms	% Capacity	Frict'n Slope %	Frict'n Loss m	Vel. in m/s	Vel. out m/s	$v_i^2/2g$ m	$kv_o^2/2g$ m	$v_o^2/2g - v_{int}^2/2g$ m	D/S MH Losses m	Lower m	Upper m	Lower m	Upper m	Lower m	Upper m
CHARLES WILSON PKWY	CBMH105	MH104	0	N	525	46.4	2.40	90.318	91.432	90.851	91.965	0.515	0.695	74.1%	1.32	0.612	2.31	2.36	0.271	0.028	0.014	0.042	90.851	91.694	90.614	91.735	0.00	0.00
SAMUEL ANGROVE AVE.	MH104	CBMH120	90	N	450	6.8	0.80	91.616	91.670	92.073	92.128	0.188	0.266	70.6%	0.40	0.027	1.14	2.31	0.067	0.217	0.204	0.421	92.073	92.100	91.952	92.167	0.00	0.00
SAMUEL ANGROVE AVE.	CBMH120	CBMH118	0	N	375	33.2	1.30	91.812	92.243	92.193	92.624	0.146	0.209	70.1%	0.64	0.212	1.28	1.14	0.084	0.007	-0.017	-0.010	92.193	92.431	92.174	92.489	0.00	0.00
SAMUEL ANGROVE AVE.	CBMH118	CBMH117	0	N	300	50.1	0.90	92.340	92.791	92.645	93.096	0.052	0.096	54.3%	0.26	0.133	0.71	1.28	0.026	0.008	0.058	0.066	92.645	92.941	92.497	92.803	0.00	0.00
SAMUEL ANGROVE AVE.	CBMH117	MH116	0	N	300	52.8	0.50	92.840	93.104	93.145	93.409	0.018	0.071	25.2%	0.03	0.017	0.25	0.71	0.003	0.003	0.023	0.025	93.145	93.254	92.806	93.165	0.00	0.00
CHARLES WILSON PKWY	MH104	CBMH103	15	N	525	54.6	1.80	91.507	92.490	92.040	93.023	0.336	0.602	55.8%	0.56	0.305	1.50	2.31	0.115	0.027	0.156	0.183	92.040	92.752	91.762	92.461	0.00	0.00
CHARLES WILSON PKWY	CBMH103	MH102	15	N	525	40.2	1.30	92.550	93.073	93.083	93.606	0.324	0.512	63.2%	0.52	0.209	1.45	1.50	0.107	0.011	0.008	0.020	93.083	93.335	92.472	93.399	0.00	0.00
ELMER HUTTON STREET	MH102	CBMH115	90	N	525	8.1	0.60	93.184	93.233	93.717	93.766	0.299	0.348	86.1%	0.44	0.036	1.34	1.45	0.091	0.085	0.015	0.101	93.717	93.753	93.485	93.845	0.00	0.00
ELMER HUTTON STREET	CBMH115	CBMH113	0	N	450	29.6	0.80	93.308	93.545	93.765	94.002	0.245	0.266	92.0%	0.68	0.200	1.49	1.34	0.113	0.009	-0.022	-0.013	93.765	93.965	93.854	94.079	0.00	0.00
ELMER HUTTON STREET	CBMH113	CBMH112	0	N	450	63.2	0.50	93.575	93.891	94.032	94.348	0.150	0.210	71.2%	0.25	0.160	0.91	1.49	0.042	0.011	0.071	0.082	94.047	94.208	94.090	94.250	0.02	0.00
ELMER HUTTON STREET	CBMH112	CBMH111	0	N	375	75.6	0.60	93.966	94.420	94.347	94.801	0.128	0.142	90.0%	0.49	0.368	1.12	0.91	0.064	0.004	-0.021	-0.017	94.347	94.715	94.254	94.779	0.00	0.00
CHARLES WILSON PKWY	MH102	CBMH101	0	N	300	51.4	1.50	93.482	94.253	93.787	94.558	0.020	0.124	16.4%	0.04	0.021	0.28	1.45	0.004	0.011	0.103	0.114	93.787	94.403	93.410	93.811	0.00	0.00
CHARLES WILSON PKWY	CBMH101	MH100	15	N	300	40.0	2.80	94.313	95.433	94.618	95.738	0.003	0.169	1.8%	0.00	0.000	0.04	0.28	0.000	0.000	0.004	0.004	94.618	95.583	93.812	94.618	0.00	0.00

65 Sunray St.
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TOWN OF COBOURG
SANITARY SEWER DESIGN SHEET

Project Name: NEW AMHERST - STAGE 2 - PHASE 1
Project No. 88-12175

PREPARED BY: R. BREZINA
CHECKED BY: G. BECKER
DATE: 1/15/2016

STREET	FROM MH	TO MH	RESIDENTIAL						COMMERCIAL				INDUST.		INSTIT.		FLOW IN L/s						PROPOSED SEWER					PRESENT CONDITION
			LOT AREA		POP.	POPULATION		PEAK	LOT	FLOOR	FLOOR AREA		LOT AREA		LOT AREA		RESIDENTIAL FLOW		COMM.	INDUST.	INSTIT.	TOTAL	PIPE	PIPE	SLOPE	CAPACITY	VELOCITY	
			UNIT	ACCUM.	DENSITY	UNIT	ACCUM.	FLOW FACTOR	AREA	SPACE INDEX	UNIT	ACCUM.	UNIT	ACCUM.	UNIT	ACCUM.	INFIL. * 0.26	SEWAGE 0.0042	2.08	2.08	1.29	FLOW IN	LENGTH	SIZE				
			(Ha)	(Ha)	UNITS				(Ha)		(Ha)	(Ha)	(Ha)	(Ha)	(Ha)	(Ha)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(L/s)	(m/s)	(% Cap.)
CHARLES WILSON PKWY	MH100A	MH101A	0.18	0.18	2.68	11	11	3.80									0.05	0.18				0.22	25.3	200	3.10	60.24	1.86	0.4%
CHARLES WILSON PKWY	MH101A	MH102A	0.21	0.39	MIX	10	21	3.80									0.10	0.34				0.44	54.0	200	2.00	48.39	1.49	0.9%
ELMER HUTTON STREET	MH111A	MH110A	0.47	0.47	MIX	37	37	3.80									0.12	0.59				0.71	62.7	200	1.00	34.22	1.06	2.1%
ELMER HUTTON STREET	MH110A	MH109A	0.65	1.12	MIX	33	70	3.80									0.29	1.12				1.41	69.7	200	0.50	24.19	0.75	5.8%
ELMER HUTTON STREET	MH109A	MH102A	0.07	1.19	3.23		70	3.80									0.31	1.12				1.43	43.6	200	0.50	24.19	0.75	5.9%
CHARLES WILSON PKWY	MH102A	MH103A	0.19	1.77	3.23	7	98	3.80									0.46	1.56				2.02	43.9	200	1.50	41.91	1.29	4.8%
CHARLES WILSON PKWY	MH103A	MH104A	0.20	1.97	3.23	7	105	3.80									0.51	1.68				2.19	51.0	200	1.70	44.61	1.38	4.9%
SAMUEL ANGROVE AVE	MH114A	MH113A	0.47	0.47	3.23	20	20	3.80									0.12	0.32				0.44	45.1	200	1.00	34.22	1.06	1.3%
SAMUEL ANGROVE AVE	MH113A	MH112A	0.53	1.00	3.23	23	43	3.80									0.26	0.69				0.95	56.1	200	0.50	24.19	0.75	3.9%
SAMUEL ANGROVE AVE	MH112A	MH104A	0.06	1.06	3.23		43	3.80									0.28	0.69				0.96	40.8	200	1.50	41.91	1.29	2.3%
CHARLES WILSON PKWY	MH104A	MH105A	0.23	3.26	3.23	10	158	3.80									0.85	2.52				3.37	48.8	200	2.40	53.01	1.63	6.4%
CHARLES WILSON PKWY	MH105A	MH106A	0.17	3.43	3.23	7	165	3.80									0.89	2.63				3.53	48.8	200	2.40	53.01	1.63	6.7%
JAMES SWEETMAN AVE	MH116A	MH115A	0.89	0.89	MIX	46	46	3.80									0.23	0.73				0.97	90.4	200	1.50	41.91	1.29	2.3%
JAMES SWEETMAN AVE	MH115A	MH106A	0.07	0.96	3.23		46	3.80									0.25	0.73				0.98	42.4	200	1.50	41.91	1.29	2.3%
CHARLES WILSON PKWY	MH106A	MH107A	0.20	4.59	2.68	11	222	3.80									1.19	3.54				4.74	46.4	200	1.90	47.16	1.45	10.0%
CHARLES WILSON PKWY	MH107A	MH108A	0.21	4.80	2.68	11	233	3.80									1.25	3.72				4.97	46.1	200	0.70	28.63	0.88	17.3%
CHARLES WILSON PKWY	MH108A	Ex. MH78		4.80			233	3.80									1.25	3.72				4.97	14.3	200	0.50	24.19	0.75	20.5%
NEW AMHERST BLVD.	EXT.	Ex. MH78	16.50	16.50		718	718	3.80	4.70		2.35	2.35					4.29	11.46	4.89			20.64						
NOTE: FLOW TO Ex. MH78 IS PER NEW AMHERST - STAGE 1 - PHASE 4 DESIGN PREPARED BY SERNAS ASSOCIATES - PROJ. 06045)																												
NEW AMHERST BLVD.	*Ex. MH78*	*Ex. MH79*	0.45	21.75	MIX	14	965	3.80				2.35					5.66	15.40	4.89			25.94	61.5	*250*	*0.45*	41.62	0.82	62.3%
NEW AMHERST BLVD.	*Ex. MH79*	*Ex. MH80*	0.64	22.39	MIX	44	1,009	3.80				2.35					5.82	16.09	4.89			26.80	61.6	*250*	*0.34*	36.17	0.71	74.1%
NEW AMHERST BLVD.	*Ex. MH80*	*Ex. MH84*	0.44	22.83	MIX	31	1,040	3.79				2.35					5.94	16.55	4.89			27.37	60.2	*250*	*0.56*	46.43	0.92	59.0%
JOHN FAIRHURST BLVD	MH117A	MH118A	0.29	0.29	MIX	14	14	3.80									0.08	0.22				0.30	47.0	200	1.00	34.22	1.06	0.9%
JOHN FAIRHURST BLVD	MH118A	MH119A	0.21	0.50	MIX	9	23	3.80									0.13	0.37				0.50	46.9	200	0.50	24.19	0.75	2.1%
ELMER HUTTON STREET		MH119A	0.07	0.07	3.23												0.02					0.02						
JOHN FAIRHURST BLVD	MH119A	MH120A	0.25	0.82	MIX	12	35	3.80									0.21	0.56				0.77	52.6	200	0.50	24.19	0.75	3.2%
JOHN FAIRHURST BLVD	MH120A	MH121A	0.24	1.06	MIX	12	47	3.80									0.28	0.75				1.03	52.6	200	0.50	24.19	0.75	4.2%
SAMUEL ANGROVE AVE		MH121A	0.07	0.07	3.23												0.02					0.02						
JOHN FAIRHURST BLVD	MH121A	MH122A	0.25	1.38	MIX	12	59	3.80									0.36	0.94				1.30	52.0	200	0.50	24.19	0.75	5.4%
JOHN FAIRHURST BLVD	MH122A	MH124A	0.24	1.62	MIX	12	71	3.80									0.42	1.13				1.55	52.0	200	2.50	54.10	1.67	2.9%
JAMES SWEETMAN AVE	MH123A	MH124A	0.10	0.10	3.23	4	4	3.80									0.03	0.06				0.09	17.7	200	1.00	34.22	1.06	0.3%

65 Sunray St.
Whitby, Ontario
L1N 8Y3
905-686-6402

TOWN OF COBOURG
SANITARY SEWER DESIGN SHEET

Project Name: NEW AMHERST - STAGE 2 - PHASE 1
Project No. 88-12175

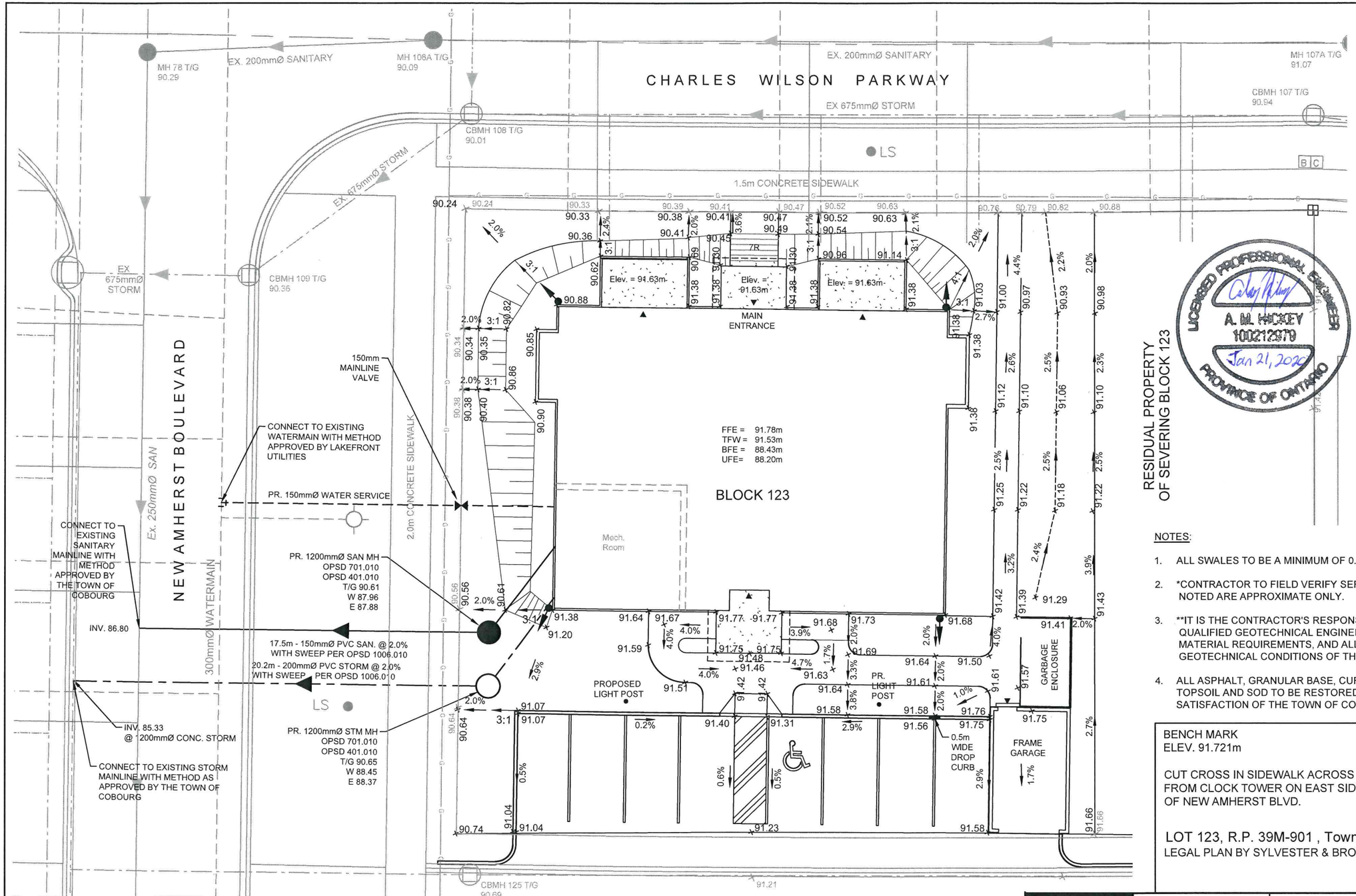
PREPARED BY: R. BREZINA
CHECKED BY: G. BECKER
DATE: 1/15/2016

STREET	FROM MH	TO MH	RESIDENTIAL LOT AREA UNIT (Ha)	RESIDENTIAL LOT AREA ACCUM. (Ha)	POP. DENSITY UNITS	POPULATION UNIT	POPULATION ACCUM.	PEAK FLOW FACTOR	COMMERCIAL LOT AREA (Ha)	COMMERCIAL FLOOR SPACE INDEX	COMMERCIAL FLOOR AREA UNIT (Ha)	COMMERCIAL FLOOR AREA ACCUM. (Ha)	INDUST. LOT AREA UNIT (Ha)	INDUST. LOT AREA ACCUM. (Ha)	INSTIT. LOT AREA UNIT (Ha)	INSTIT. LOT AREA ACCUM. (Ha)	FLOW IN L/s RESIDENTIAL FLOW INFIL. * 0.26 (L/s)	RESIDENTIAL FLOW SEWAGE 0.0042 (L/s)	COMM. 2.08 (L/s)	INDUST. 2.08 (L/s)	INSTIT. 1.29 (L/s)	TOTAL FLOW IN (L/s)	PROPOSED SEWER PIPE LENGTH (m)	PIPE SIZE (mm)	SLOPE (%)	CAPACITY (L/s)	VELOCITY (m/s)	PRESENT CONDITION (% Cap.)
JOHN FAIRHURST BLVD	MH124A	MH125A	0.06	1.78	3.23		75	3.80									0.46	1.20				1.66	35.0	200	4.20	70.12	2.16	2.4%
JOHN FAIRHURST BLVD	MH125A	MH126A	0.08	1.86	3.23		75	3.80									0.48	1.20				1.68	40.6	200	3.80	66.70	2.06	2.5%
JOHN FAIRHURST BLVD	MH126A	MH127A		1.86			75	3.80									0.48	1.20				1.68	20.3	200	1.50	41.91	1.29	4.0%
JOHN FAIRHURST BLVD	FUT.	MH127A	1.87	1.87	3.23	123	123	3.80									0.49	1.96				2.45						
JOHN FAIRHURST BLVD	MH127A	*Ex. MH84*		3.73			198	3.80									0.97	3.16				4.13	18.1	200	1.00	34.22	1.06	12.1%
NEW AMHERST BLVD.	EXT.	*Ex. MH84*	3.00	3.00	MIX	333	333	3.80									0.78	5.31				6.09						
NOTE: FLOW TO Ex. MH84 IS PER NEW AMHERST - STAGE 1 - PHASE 4 DESIGN PREPARED BY SERNAS ASSOCIATES - PROJ. 06045)																												
NEW AMHERST BLVD.	*Ex. MH84*	*Ex. MH89*	0.22	29.78	3.23	14	1,585	3.66				2.35					7.74	24.38	4.89			37.01	83.5	*300*	*0.46*	68.42	0.94	54.1%
NEW AMHERST BLVD.	*Ex. MH89*	*Ex. MH91*		29.78	3.23		1,585	3.66				2.35					7.74	24.38	4.89			37.01	87.1	*300*	*0.89*	95.17	1.30	38.9%
NOTE: FLOW AT Ex. MH84 WAS CALCULATED TO BE 33.02 L/s PER THE NEW AMHERST STAGE 1 - PHASE 2 DESIGN PREPARED BY SERNAS ASSOCIATES - PROJ. 06045)																												
NOTE: FLOW AT Ex. MH91 WAS CALCULATED TO BE 38.49 L/s PER THE NEW AMHERST STAGE 1 - PHASE 2 DESIGN PREPARED BY SERNAS ASSOCIATES - PROJ. 06045)																												

NOTES: 1ST SUBMISSION			INFILTRATION: 0.26L/s = 22.5 m3/ha/day
	SINGLE (3.23 PER/UNIT)	SINGLE (20 UNITS / Ha)	SEWAGE: 0.0042L/s = 364 L/person/day
	TOWNHOUSE (2.68 PER/UNIT)	TOWNHOUSE (50 UNITS / Ha)	COMM./INDUST: 2.08L/s = 180.0 m3/ha/day
	APARTMENTS (1.62/UNIT)	APARTMENTS (100 UNITS / Ha)	INSTITUTIONAL: 1.29L/s = 112 m3/ha/day

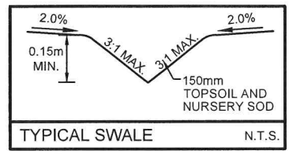
Appendix B

Design Drawings



LEGEND

FFE	FINISHED FLOOR ELEVATION
TFW	TOP OF FOUNDATION WALL
USF	UNDER SIDE OF FOOTING
GFE	GARAGE FLOOR ELEVATION
▼	EXTERIOR DOOR
BFE	BASEMENT FLOOR ELEVATION
261.43	PROPOSED ELEVATION
261.43	EXISTING ELEVATION
	3:1 SLOPE (MAXIMUM)
	PROPOSED SWALE
	SANITARY SERVICE
	WATER SERVICE
	STORM SERVICE
	WATER VALVE
C/O ●	CLEANOUT
	RAINWATER OUTLET LEADER



TYPICAL SWALE N.T.S.

NOTES:

1. ALL SWALES TO BE A MINIMUM OF 0.15 DEEP, 3:1 SIDE SLOPES MAX.
2. *CONTRACTOR TO FIELD VERIFY SERVICE ELEVATIONS AND SIZES. ELEVATIONS NOTED ARE APPROXIMATE ONLY.
3. **IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN RECOMMENDATIONS FROM A QUALIFIED GEOTECHNICAL ENGINEER REGARDING COMPACTION REQUIREMENTS, MATERIAL REQUIREMENTS, AND ALL OTHER REQUIREMENTS PERTAINING TO THE GEOTECHNICAL CONDITIONS OF THE SITE.
4. ALL ASPHALT, GRANULAR BASE, CURB AND GUTTER, CONCRETE SIDEWALK AND TOPSOIL AND SOD TO BE RESTORED TO PRE-CONSTRUCTION CONDITIONS TO THE SATISFACTION OF THE TOWN OF COBOURG.

BENCH MARK
ELEV. 91.721m

CUT CROSS IN SIDEWALK ACROSS
FROM CLOCK TOWER ON EAST SIDE
OF NEW AMHERST BLVD.

LOT 123, R.P. 39M-901 , Town of Cobourg
LEGAL PLAN BY SYLVESTER & BROWN, O.L.S, PORT HOPE, ONTARIO.

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Drawn: M.B.J.	Scale: 1:200
Checked: A.M.H.	Plot Date: JAN. 21/2020
Project No.: 10920	Drawing File No.: 10920 MP