APPENDIX 5

Storm Sewer Design Calculations

100-year Capture Calculations

URBANTECH

STORM SEWER DESIGN SHEET

10 Year Storm

Macville Argo

Town of Caledon

PROJECT DETAILS

Project No: 15-458
Date: 22-Jan-21
Designed by: E.L.
Checked by: S.H.

DESIGN CRITERIA

Min. Diameter =	300	mm	Rainfall Intensity =	A / (Tc+B)^c
Mannings 'n'=	0.013			
Starting Tc =	20	min	A =	2221
			B =	12
Factor of Safety =	10	%	c =	0.908

NOMINAL PIPE SIZE USED

STREET	FROM MH	TO MH	AREA (ha)	RUNOFF COEFFICIENT "R"	'AR'	ACCUM. 'AR'	RAINFALL INTENSITY (mm/hr)	FLOW (m^3/s)	CONSTANT FLOW (m^3/s)	ACCUM. CONSTANT FLOW (m^3/s)	TOTAL FLOW (m^3/s)	LENGTH (m)	SLOPE (%)	PIPE DIAMETER (mm)	FULL FLOW CAPACITY (m^3/s)	FULL FLOW VELOCITY (m/s)	INITIAL Tc (min)	TIME OF CONCENTRATION (min)	ACC. TIME OF CONCENTRATION (min)	PERCENT FULL (%)
POND 1																				
	MH200	MH201	0.47	0.70	0.33	0.33	95.5	0.087			0.087	82.3	0.50	375	0.124	1.12	20.00	1.22	21.22	70%
	MH210	MH201	1.40	0.75	1.05	1.05	95.5	0.278			0.278	30.0	0.50	600	0.434	1.54	20.00	0.33	20.33	64%
	MH201	MH202	1.77	0.70	1.24	2.62	92.3	0.671			0.671	148.5	0.50	750	0.787	1.78	21.22	1.39	22.61	85%
	MH220	MH202	2.23	0.75	1.67	1.67	95.5	0.444			0.444	30.0	0.50	675	0.594	1.66	20.00	0.30	20.30	75%
	MH202	MH203	1.33	0.70	0.93	5.22	88.9	1.290			1.290	181.0	0.50	975	1.585	2.12	22.61	1.42	24.03	81%
	MH230	MH203	2.79	0.75	2.09	2.09	95.5	0.555			0.555	30.0	0.50	750	0.787	1.78	20.00	0.28	20.28	70%
	MH203	MH204	0.77	0.70	0.54	7.85	85.7	1.870			1.870	163.6	0.40	1200	2.466	2.18	24.03	1.25	25.28	76%
	MH240	MH204	2.15	0.75	1.61	1.61	95.5	0.428			0.428	30.0	0.50	675	0.594	1.66	20.00	0.30	20.30	72%
	MH204	MH205	3.96	0.80	3.17	12.63	83.1	2.916			2.916	148.4	0.40	1350	3.376	2.36	25.28	1.05	26.33	86%
	MH205	MH206	0.84	0.70	0.59	13.22	81.0	2.976			2.976	130.8	0.40	1350	3.376	2.36	26.33	0.92	27.26	88%
	MH250	MH206	2.10	0.85	1.79	1.79	95.5	0.473			0.473	30.0	0.50	675	0.594	1.66	20.00	0.30	20.30	80%
	MH206	MH9				15.01	79.3	3.306			3.306	145.6	0.40	1500	4.471	2.53	27.26	0.96	28.22	74%
	MH1	MH2	2.15	0.70	1.51	1.51	95.5	0.399			0.399	146.3	0.40	675	0.532	1.49	20.00	1.64	21.64	75%
	MH15	MH2	2.09	0.70	1.46	1.46	95.5	0.388			0.388	72.8	0.50	600	0.434	1.54	20.00	0.79	20.79	89%
	MH20	MH2	9.37	0.70	6.56	6.56	95.5	1.739			1.739	43.5	1.00	975	2.241	3.00	20.00	0.24	20.24	78%
	MH2	MH3	0.48	0.70	0.34	9.86	91.2	2.500			2.500	94.3	0.40	900x1800 (BOX)	3.532	2.18	21.64	0.72	22.36	71%
	MH30	MH3	0.72	0.70	0.50	0.50	95.5	0.134			0.134	72.8	0.50	450	0.202	1.27	20.00	0.96	20.96	66%
	MH3	MH4	0.24	0.70	0.17	10.54	89.5	2.619			2.619	48.5	0.40	900x1800 (BOX)	3.532	2.18	22.36	0.37	22.73	74%
	MH40	MH4	7.13	0.70	4.99	4.99	95.5	1.324			1.324	45.7	1.00	900	1.810	2.85	20.00	0.27	20.27	73%
	MH4	MH5	3.09	0.70	2.16	17.69	88.6	4.355			4.355	234.0	0.40	900x2400 (BOX)	4.991	2.31	22.73	1.69	24.42	87%
	MH5	MH6	10.06	0.70	7.04	24.73	84.9	5.832			5.832	47.0	0.40	1200x2400 (BOX)	7.607	2.64	24.42	0.30	24.72	77%
	MH50	MH6	0.88	0.70	0.62	0.62	95.5	0.163			0.163	72.8	0.50	450	0.202	1.27	20.00	0.96	20.96	81%
	MH6	MH7	1.53	0.70	1.07	26.42	84.3	6.184			6.184	171.0	0.40	1200x2400 (BOX)	7.607	2.64	24.72	1.08	25.80	81%
	MH60	MH7	1.42	0.70	0.99	0.99	95.5	0.264			0.264	72.7	0.50	525	0.304	1.40	20.00	0.86	20.86	87%
	MH70	MH7	9.83	0.70	6.88	6.88	95.5	1.825			1.825	46.5	0.50	1200	2.757	2.44	20.00	0.32	20.32	66%
	MH7	MH8	4.82	0.70	3.37	37.67	82.1	8.588			8.588	146.0	0.40	1500x2400 (BOX)	10.460	2.91	25.80	0.84	26.63	82%
	MH8	MH9	1.94	0.70	1.36	39.03	80.5	8.722			8.722	142.6	0.40	1500x2400 (BOX)	10.460	2.91	26.63	0.82	27.45	83%
	MH9	MH10				54.03	77.6	11.644			11.644	94.5	0.40	1500x3000 (BOX)	13.792	3.06	28.22	0.51	28.73	84%
	MH10	HW1	3.19	0.85	2.71	56.74	76.7	12.088			12.088	15.0	0.40	1500x3000 (BOX)	13.792	3.06	28.73	0.08	28.81	88%

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STORM SEWER DESIGN SHEET

10 Year Storm

Macville Argo

Town of Caledon

PROJECT DETAILS

Project No: 15-458
Date: 22-Jan-21
Designed by: E.L.
Checked by: S.H.

DESIGN CRITERIA

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			B =	12
Factor of Safety =	10	%	c =	0.908

NOMINAL PIPE SIZE USED

STREET	FROM MH	TO MH	AREA (ha)	RUNOFF COEFFICIENT "R"	'AR'	ACCUM. 'AR'	RAINFALL INTENSITY (mm/hr)	FLOW (m^3/s)	CONSTANT FLOW (m^3/s)	ACCUM. CONSTANT FLOW (m^3/s)	TOTAL FLOW (m^3/s)	LENGTH (m)	SLOPE (%)	PIPE DIAMETER (mm)	FULL FLOW CAPACITY (m^3/s)	FULL FLOW VELOCITY (m/s)	INITIAL Tc (min)	TIME OF CONCENTRATION (min)	ACC. TIME OF CONCENTRATION (min)	PERCENT FULL (%)
POND 2																				
	MH100	MH101	1.48	0.70	1.04	1.04	95.5	0.275			0.275	183.6	0.75	525	0.372	1.72	20.00	1.78	21.78	74%
	MH120	MH101	4.90	0.70	3.43	3.43	95.5	0.910			0.910	74.0	0.50	825	1.015	1.90	20.00	0.65	20.65	90%
	MH101	MH102	0.76	0.70	0.53	5.00	90.9	1.262			1.262	142.8	1.00	825	1.435	2.69	21.78	0.89	22.66	88%
	MH130	MH102	2.82	0.70	1.97	1.97	95.5	0.524			0.524	74.1	0.50	675	0.594	1.66	20.00	0.74	20.74	88%
	MH102	MH103	1.54	0.80	1.23	8.20	88.8	2.023			2.023	164.0	1.00	975	2.241	3.00	22.66	0.91	23.58	90%
	MH140	MH103	3.74	0.70	2.62	2.62	95.5	0.694			0.694	100.9	0.50	750	0.787	1.78	20.00	0.94	20.94	88%
	MH103	MH104	0.29	0.70	0.20	11.03	86.7	2.656			2.656	70.0	1.00	1200	3.899	3.45	23.58	0.34	23.91	68%
	MH150	MH104	2.77	0.70	1.94	1.94	95.5	0.514			0.514	100.9	0.50	675	0.594	1.66	20.00	1.01	21.01	87%
	MH104	MH105	0.98	0.70	0.69	13.65	86.0	3.260			3.260	144.8	1.00	1200	3.899	3.45	23.91	0.70	24.61	84%
	MH160	MH105	5.20	0.70	3.64	3.64	95.5	0.965			0.965	74.1	0.50	900	1.280	2.01	20.00	0.61	20.61	75%
	MH105	MH106	0.14	0.70	0.10	17.39	84.5	4.080			4.080	72.8	1.00	1350	5.337	3.73	24.61	0.33	24.94	76%
	MH170	MH106	1.42	0.70	0.99	0.99	95.5	0.264			0.264	58.7	0.50	525	0.304	1.40	20.00	0.70	20.70	87%
	MH106	MH107	1.29	0.70	0.90	19.29	83.8	4.489			4.489	214.8	1.00	1350	5.337	3.73	24.94	0.96	25.90	84%
	MH107	MH108	0.12	0.70	0.08	19.37	81.9	4.405			4.405	74.1	1.00	1350	5.337	3.73	25.90	0.33	26.23	83%
	MH180	MH108	2.08	0.70	1.46	1.46	95.5	0.386			0.386	30.0	0.50	600	0.434	1.54	20.00	0.33	20.33	89%
	MH108	MH109	0.75	0.70	0.53	21.35	81.2	4.817			4.817	218.3	0.50	1650	6.445	3.01	26.23	1.21	27.44	75%
	MH190	MH109	6.43	0.70	4.50	4.50	95.5	1.194			1.194	50.0	0.50	975	1.585	2.12	20.00	0.39	20.39	75%
	MH195	MH109	10.25	0.80	8.20	8.20	95.5	2.175			2.175	50.0	0.50	1200	2.757	2.44	20.00	0.34	20.34	79%
	MH109	HW100				34.05	79.0	7.469			7.469	31.2	0.50	1950	10.062	3.37	27.44	0.15	27.59	74%

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STORM SEWER DESIGN SHEET

10 Year Storm

Macville Argo

Town of Caledon

PROJECT DETAILS

Project No: 15-458
Date: 22-Jan-21
Designed by: E.L.
Checked by: S.H.

DESIGN CRITERIA

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CATCHMENT 101																				
	MH300	MH301	2.87	0.80	2.30	2.30	95.5	0.609			0.609	71.2	1.00	675	0.841	2.35	20.00	0.51	20.51	72%
	MH301	MH302	4.12	0.80	3.30	5.59	94.1	1.462			1.462	132.0	1.00	900	1.810	2.85	20.51	0.77	21.28	81%
	MH302	MH303	3.89	0.80	3.11	8.70	92.1	2.228			2.228	94.9	1.50	975	2.745	3.68	21.28	0.43	21.71	81%
	MH303	MH304				8.70	91.1	2.202			2.202	48.3	1.50	975	2.745	3.68	21.71	0.22	21.93	80%
	MH304	MH305				8.70	90.5	2.189			2.189	68.3	1.00	1050	2.731	3.15	21.93	0.36	22.29	80%
	MH305	HW300				8.70	89.7	2.168			2.168	10.3	0.50	1200	2.757	2.44	22.29	0.07	22.36	79%
CATCHMENT 102																				
	MH400	MH401	2.77	0.85	2.35	2.35	95.5	0.624			0.624	92.2	0.50	750	0.787	1.78	20.00	0.86	20.86	79%
	MH401	MH402	1.39	0.85	1.18	3.54	93.2	0.915			0.915	51.0	0.50	825	1.015	1.90	20.86	0.45	21.31	90%
	MH403	MH404	4.86	0.85	4.13	4.13	95.5	1.096			1.096	111.5	0.50	900	1.280	2.01	20.00	0.92	20.92	86%
	MH401	MH402	1.53	0.85	1.30	3.66	93.2	0.946			0.946	113.0	0.50	900	1.280	2.01	20.86	0.94	21.80	74%
	MH402	HW400	3.15	0.85	2.68	9.87	90.8	2.490			2.490	89.0	0.50	1200	2.757	2.44	21.80	0.61	22.41	90%
CATCHMENTS 103 & 107																				
	MH500	MH503	3.16	0.85	2.69	2.69	95.5	0.712			0.712	122.9	0.50	750	0.787	1.78	20.00	1.15	21.15	90%
	MH502	MH503	5.09	0.85	4.33	4.33	95.5	1.147			1.147	77.0	0.50	900	1.280	2.01	20.00	0.64	20.64	90%
	MH503	HW500				7.01	92.5	1.801			1.801	99.5	1.00	975	2.241	3.00	21.15	0.55	21.70	80%
UNCONTROLLED																				
STREET P	OGS1	HW7	1.70	0.65	1.11	1.11	95.5	0.293			0.293	18.8	0.50	600	0.434	1.54	20.00	0.20	20.20	67%
STREET P	OGS2	HW8	1.20	0.65	0.78	0.78	95.5	0.207			0.207	19.1	0.50	525	0.304	1.40	20.00	0.23	20.23	68%
STREET QZ	OGS3	HW9	0.54	0.65	0.35	0.35	95.5	0.093			0.093	16.7	0.50	375	0.124	1.12	20.00	0.25	20.25	75%
STREET T	OGS4	HW10	0.26	0.65	0.17	0.17	95.5	0.045			0.045	30.0	0.50	300	0.068	0.97	20.00	0.52	20.52	66%

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PROJECT DETAILS

Title1:	**PR. STORM SEWER DESIGN SHEET**
Title2:	**100 Year Constant Flow Calculation**
Project Name:	**BRES 3 - Macville**
Municipality:	**Town of Caledon**
Project No:	**15-458**
Date:	**21-Jan-21**
Designed by:	**P.C.**
Checked by:	

IDF Parameters for Town of Caledon

		10-yr	100-yr
$I=A/(T+b)^c$	A	2221	4688
	B	12	17
	C	0.908	0.9624

CAPTURE LOCATION	AREA ID	AREA DESCRIPTION	Area ha	R	AR	L m	Tc min	I10 mm/hr	I100 mm/hr	Q10 m^3/s	Q100 m^3/s	Q100-Q10 m^3/s	Const. flow m^3/s
OGS-1 to HW7	104-1	Catchment 104	1.32	0.65	0.86	222.00	11.9	124.7	184.4	0.297	0.439	0.142	0.142
OGS 2 to HW8	104-2		1.76	0.65	1.14	320.00	12.7	120.9	179.5	0.384	0.570	0.186	0.186
OGS 8 to HW9	104-3		0.54	0.65	0.35	73.50	10.6	130.9	192.3	0.128	0.188	0.060	0.060
OGS 9 to HW10	104-4		0.26	0.65	0.17	143.00	11.2	127.9	188.5	0.060	0.089	0.028	0.028
STM.MH305	101	Catchment 101	13.25	0.80	10.60	416.40	13.5	117.5	174.9	3.458	5.151	1.693	1.693
STM.HW400	102	Catchment 102	13.70	0.82	11.23	313.50	12.6	121.2	179.8	3.781	5.611	1.830	1.830
STM.HW500	103	Catchment 103	8.30	0.82	6.81	222.40	11.9	124.7	184.4	2.357	3.486	1.129	1.129
STREET X	100YR-1	Catchment 106B	0.08	0.85	0.07	35.00	10.3	132.6	194.5	0.025	0.037	0.012	0.012
STREET ZC	100YR-2	Catchment 105A	0.34	0.66	0.22	145.00	11.2	127.8	188.4	0.080	0.117	0.038	0.038
STREET L	100YR-3	Catchment 105A	0.35	0.66	0.23	95.00	10.8	129.9	191.1	0.083	0.123	0.039	0.039
STREET K	100YR-4	Catchment 105A	0.74	0.66	0.49	115.00	11.0	129.1	190.0	0.175	0.258	0.083	0.083
STREET K	100YR-5	Catchment 105A	1.18	0.66	0.78	220.00	11.8	124.8	184.5	0.270	0.399	0.129	0.129

Tc calcs *where Tc = starting Tc + length/velocity*

Starting Tc (min) = 10

Velocity (m/s) = 2