Stantec

Trails Edge East Phase 1

DATE: 2018-08-23
REVISION: 2
DESIGNED BY: DT
CHECKED BY: MJS

STORM SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160401250

DESIGN PARAMETERS

$I = a / (t+b)^c$ (As per City of Ottawa Guidelines, 2012)

	1:2 yr	1:5 yr	1:10 yr	1:100 yr
a =	732.951	998.071	1174.184	1735.688
b =	6.199	6.053	6.014	6.014
c =	0.810	0.814	0.816	0.820

MANNING'S n = 0.013
MINIMUM COVER: 2.00 m
TIME OF ENTRY 10 min
BEDDING CLASS = B

LOCATION			DRAINAGE AREA																						PIPE SELECTION											
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (5-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (2-YEAR) (-)	C (5-YEAR) (-)	C (10-YEAR) (-)	C (100-YEAR) (-)	A x C (2-YEAR) (ha)	ACCUM AxC (2YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	A x C (10-YEAR) (ha)	ACCUM. AxC (10YR) (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	I_{2-YEAR} (mm/h)	I_{5-YEAR} (mm/h)	$I_{10-YEAR}$ (mm/h)	$I_{100-YEAR}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETER (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)	VEL. (ACT) (m/s)	TIME OF FLOW (min)
L1006W	1006	1005	0.28	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.00	0.194	0.194	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	41.5	86.4	300	300	CIRCULAR	PVC	-	0.35	56.9	**72.91%**	0.81	0.77	1.86
	1005	1004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.194	0.000	0.000	0.000	0.000	0.000	0.000	11.86	70.32	95.28	111.65	163.15	0.0	0.0	38.0	9.4	300	300	CIRCULAR	PVC	-	0.35	56.9	**66.76%**	0.81	0.76	0.21
																				12.07																		
L1008A	1008	1004	0.00	27.89	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.000	0.000	22.312	22.312	0.000	0.000	0.000	0.000	17.75	55.96	75.61	88.51	129.19	0.0	0.0	4686.2	17.7	2100	2100	CIRCULAR	CONCRETE	-	0.10	5720.3	**81.92%**	1.60	1.59	0.19
																				17.94																		
	1004	1003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.194	0.000	22.312	0.000	0.000	0.000	0.000	17.94	55.61	75.13	87.95	128.36	0.0	0.0	4686.7	47.1	2100	2100	CIRCULAR	CONCRETE	-	0.10	5720.1	**81.93%**	1.60	1.59	0.50
																				18.43																		
C1007W	1007	1003	0.00	0.32	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.000	0.000	0.221	0.221	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	63.9	94.2	450	450	CIRCULAR	CONCRETE	-	0.25	148.7	**42.95%**	0.91	0.74	2.13
																				12.13																		
C1003A, C1003B	1003	1002B	0.48	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.00	0.331	0.526	0.000	22.533	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	6633.7	84.8	2100	2100	CIRCULAR	CONCRETE	-	0.10	5719.9	**115.97%**	1.60	1.60	0.88
L1002A, C1002AB	1002A	1002B	0.18	3.20	0.00	0.00	0.00	0.44	0.80	0.00	0.00	0.079	0.079	2.560	2.560	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	757.8	47.1	2100	2100	CIRCULAR	CONCRETE	-	0.10	5720.1	**13.25%**	1.60	0.91	0.86
C1002A	1002B	1001	0.00	0.13	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.000	0.526	0.090	22.622	0.000	0.000	0.000	0.000	10.88	73.57	99.75	116.91	170.87	0.0	0.0	6375.5	85.8	2100	2100	CIRCULAR	CONCRETE	-	0.10	5720.2	**111.46%**	1.60	1.60	0.89
C1001A	1001	1000	0.00	0.21	0.00	0.00	0.00	0.00	0.73	0.00	0.00	0.000	0.526	0.153	22.776	0.000	0.000	0.000	0.000	11.78	70.59	95.86	112.09	163.80	0.0	0.0	6154.9	56.9	2100	2100	CIRCULAR	CONCRETE	-	0.10	5720.1	**107.60%**	1.60	1.60	0.59
																				12.37										2100	2100							

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LOCATION			DRAINAGE AREA																					PIPE SELECTION											
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (5-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (2-YEAR) (-)	C (5-YEAR) (-)	C (10-YEAR) (-)	C (100-YEAR) (-)	A x C (2-YEAR) (ha)	ACCUM AxC (2YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	A x C (10-YEAR) (ha)	ACCUM. AxC (10YR) (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	I_{2-YEAR} (mm/h)	I_{5-YEAR} (mm/h)	$I_{10-YEAR}$ (mm/h)	$I_{100-YEAR}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETER (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)	VEL. (ACT) (m/s)	TIME OF FLOW (min)
L2007A, L2007B	2007	2006	9,20	0,00	0,00	0,00	0,00	0,65	0,00	0,00	0,00	5,972	5,972	0,000	0,000	0,000	0,000	0,000	0,000	14,08	64,02	86,64	101,48	148,22	0,0	0,0	1061,9	45,6	1200	1200	CIRCULAR	CONCRETE	-	0,10	1286,2	82,56%	1,10	1,10	0,69
																				14,78																			
	2028	2027	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	10,00	76,81	104,19	122,14	178,56	0,0	0,0	0,0	30,4	300	300	CIRCULAR	PVC	-	0,35	56,9	0,00%	0,81	0,00	0,00
																				10,00																			
L1006B, L1006A	1006	2027	0,51	0,00	0,00	0,00	0,00	0,69	0,00	0,00	0,00	0,355	0,355	0,000	0,000	0,000	0,000	0,000	0,000	10,00	76,81	104,19	122,14	178,56	0,0	0,0	75,7	120,0	450	450	CIRCULAR	CONCRETE	-	0,20	133,0	56,95%	0,81	0,72	2,79
																				12,79																			
L2027A	2027	2026	0,31	0,00	0,00	0,00	0,00	0,69	0,00	0,00	0,00	0,210	0,565	0,000	0,000	0,000	0,000	0,000	0,000	12,79	67,54	91,47	107,16	156,56	0,0	0,0	106,1	53,3	525	525	CIRCULAR	CONCRETE	-	0,20	200,6	52,88%	0,90	0,78	1,13
																				13,92																			
C1007A, C1007B	1007	2026	0,00	0,48	0,00	0,00	0,00	0,00	0,69	0,00	0,00	0,000	0,000	0,331	0,331	0,000	0,000	0,000	0,000	10,00	76,81	104,19	122,14	178,56	0,0	0,0	95,8	120,0	450	450	CIRCULAR	CONCRETE	-	0,20	133,0	72,01%	0,81	0,77	2,58
																				12,58																			
C2026B, C2026A	2026	2025	0,00	0,42	0,00	0,00	0,00	0,00	0,69	0,00	0,00	0,000	0,565	0,291	0,622	0,000	0,000	0,000	0,000	13,92	64,44	87,22	102,16	149,21	0,0	0,0	252,0	105,5	825	825	CIRCULAR	CONCRETE	-	0,10	473,6	53,21%	0,86	0,75	2,35
																				16,27																			
C2029A, L2029A	2029	2025	8,32	1,13	0,00	0,00	0,00	0,65	0,65	0,00	0,00	5,411	5,411	0,736	0,736	0,000	0,000	0,000	0,000	14,92	61,96	83,83	98,17	143,36	0,0	0,0	1102,8	19,8	1350	1350	CIRCULAR	CONCRETE	-	0,10	1760,6	62,64%	1,19	1,09	0,30
																				15,22																			
L2025B, L2025A	2025	2022	0,47	0,00	0,00	0,00	0,00	0,65	0,00	0,00	0,00	0,304	6,281	0,000	1,359	0,000	0,000	0,000	0,000	16,27	58,92	79,66	93,27	136,17	0,0	0,0	1328,6	80,8	1350	1350	CIRCULAR	CONCRETE	-	0,10	1760,8	75,45%	1,19	1,15	1,17
																				17,44																			
L2030B, L2030A	2030	2022	3,33	0,00	0,00	0,00	0,00	0,65	0,00	0,00	0,00	2,156	2,156	0,000	0,000	0,000	0,000	0,000	0,000	14,08	64,02	86,64	101,48	148,22	0,0	0,0	383,4	45,4	900	900	CIRCULAR	CONCRETE	-	0,10	597,2	64,19%	0,91	0,84	0,90
																				14,99																			
L2022S	2022	2006	0,16	0,00	0,00	0,00	0,00	0,69	0,00	0,00	0,00	0,111	8,548	0,000	1,359	0,000	0,000	0,000	0,000	17,44	56,55	76,42	89,46	130,59	0,0	0,0	1631,2	83,0	1650	1650	CIRCULAR	CONCRETE	-	0,10	3006,9	54,25%	1,36	1,20	1,16
																				18,59																			
L2039A	2039	2038	0,24	0,00	0,00	0,00	0,00	0,73	0,00	0,00	0,00	0,172	0,172	0,000	0,000	0,000	0,000	0,000	0,000	10,00	76,81	104,19	122,14	178,56	0,0	0,0	36,7	39,8	375	375	CIRCULAR	PVC	-	0,25	82,4	44,54%	0,78	0,64	1,03
	2038	2037	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,000	0,172	0,000	0,000	0,000	0,000	0,000	0,000	11,03	73,06	99,04	116,07	169,65	0,0	0,0	34,9	26,3	525	525	CIRCULAR	CONCRETE	-	0,25	224,3	15,56%	1,00	0,61	0,72
																				11,75																			
L2040A	2040	2037	0,10	0,00	0,00	0,00	0,00	0,58	0,00	0,00	0,00	0,060	0,060	0,000	0,000	0,000	0,000	0,000	0,000	10,00	76,81	104,19	122,14	178,56	0,0	0,0	12,6	44,3	450	450	CIRCULAR	CONCRETE	-	0,25	148,7	8,58%	0,91	0,46	1,60
																				11,60																			
L2037A	2037	2006	0,52	0,00	0,00	0,00	0,00	0,73	0,00	0,00	0,00	0,380	0,612	0,000	0,000	0,000	0,000	0,000	0,000	11,75	70,67	95,76	112,21	163,98	0,0	0,0	120,1	119,2	675	675	CIRCULAR	CONCRETE	-	0,15	339,6	35,37%	0,92	0,71	2,81
																				14,57																			
L2006A	2006	2005	0,29	0,00	0,00	0,00	0,00	0,73	0,00	0,00	0,00	0,208	15,339	0,000	1,359	0,000	0,000	0,000	0,000	18,59	54,41	73,49	86,02	125,54	0,0	0,0	2595,6	77,1	1950	1950	CIRCULAR	CONCRETE	-	0,10	4694,4	55,29%	1,52	1,34	0,96
																				19,55																			
	2034	2035	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	10,00	76,81	104,19	122,14	178,56	0,0	0,0	0,0	9,5	300	300	CIRCULAR	PVC	-	0,35	56,9	0,00%	0,81	0,00	0,00
L2035A	2035	2036	0,33	0,00	0,00	0,00	0,00	0,73	0,00	0,00	0,00	0,239	0,239	0,000	0,000	0,000	0,000	0,000	0,000	10,00	76,81	104,19	122,14	178,56	0,0	0,0	50,9	68,2	450	450	CIRCULAR	CONCRETE	-	0,25	148,7	34,23%	0,91	0,69	1,65
L2036B, L2036A	2036	2005	0,86	0,00	0,00	0,00	0,00	0,81	0,00	0,00	0,00	0,525	0,763	0,000	0,000	0,000	0,000	0,000	0,000	11,65	71,00	96,21	112,74	164,75	0,0	0,0	150,6	56,7	525	525	CIRCULAR	CONCRETE	-	0,20	200,6	75,03%	0,90	0,87	1,09
																				12,74																			
L2005A	2005	2004	0,31	0,00	0,00	0,00	0,00	0,73	0,00	0,00	0,00	0,227	16,329	0,000	1,359	0,000	0,000	0,000	0,000	19,55	52,76	71,24	83,38	121,66	0,0	0,0	2662,0	83,0	1950	1950	CIRCULAR	CONCRETE	-	0,10	4694,5	56,70%	1,52	1,35	1,02
																				20,58																			
L2034A, L2034B	2034	2033	0,86	0,00	0,00	0,00	0,00	0,83	0,00	0,00	0,00	0,540	0,540	0,000	0,000	0,000	0,000	0,000	0,000	10,00	76,81	104,19	122,14	178,56	0,0	0,0	115,3	67,1	525	525	CIRCULAR	CONCRETE	-	0,20	200,6	57,45%	0,90	0,80	1,39
	2033	2032	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,000	0,540	0,000	0,000	0,000	0,000	0,000	0,000	11,39	71,84	97,37	114,10	166,75	0,0	0,0	107,8	12,3	525	525	CIRCULAR	CONCRETE	-	0,20	200,6	53,74%	0,90	0,78	0,26
L2032A	2032	2031	0,23	0,00	0,00	0,00	0,00	0,73	0,00	0,00	0,00	0,168	0,709	0,000	0,000	0,000	0,000	0,000	0,000	11,66	70,98	96,19	112,72	164,72	0,0	0,0	135,7	66,7	600	600	CIRCULAR	CONCRETE	-	0,20	286,5	48,78%	0,96	0,83	1,34
L2031A, L2031B	2031	2004	0,66	0,00	0,00	0,00	0,00	0,64	0,00	0,00	0,00	0,419	1,128	0,000	0,000	0,000	0,000	0,000	0,000	12,99	66,95	90,66	106,21	155,16	0,0	0,0	209,7	66,7	750	750	CIRCULAR	CONCRETE	-	0,15	449,8	46,62%	0,99	0,83	1,34
																				14,34																			
L2004A, L2004B, L2004C	2004	2003	1,07	0,00	0,00	0,00	0,00	0,81	0,00	0,00	0,00	0,656	18,113	0,000	1,359	0,000	0,000	0,000	0,000	20,58	51,12	69,00	80,75	117,80	0,0	0,0	2832,3	69,0	1950	1950	CIRCULAR	CONCRETE	-	0,10	4694,4	60,33%	1,52	1,38	0,83
L2003A, L2003B	2003	2002	0,70	0,00	0,00	0,00	0,00	0,84	0,00	0,00	0,00	0,447	18,559	0,000	1,359	0,000	0,000	0,000	0,000	21,41	49,87	67,30	78,74	114,87	0,0	0,0	2824,8	66,2	1950	1950	CIRCULAR	CONCRETE	-	0,10	4694,4	60,17%	1,52	1,37	0,80
																				22,22																			
L2013B, L2013A	2013	2012	0,32	0,00	0,00	0,00	0,00	0,69	0,00	0,00	0,00	0,223	0,223	0,000	0,000	0,000	0,000	0,000	0,000	10,00	76,81	104,19	122,14	178,56	0,0	0,0	47,6	113,3	375	375	CIRCULAR	PVC	-	0,25	82,4	57,74%	0,78	0,70	2,70
L2012A	2012	2011	0,18	0,00	0,00	0,00	0,00	0,69	0,00	0,00	0,00	0,123	0,346	0,000	0,000	0,000	0,000	0,000	0,000	12,70	67,78	91,80	107,55	157,13	0,0	0,0	65,1	34,8	525	525	CIRCULAR	CONCRETE	-	0,25	224,3	29,01%	1,00	0,72	0,80
	2011	2010	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,000	0,346	0,000	0,000	0,000	0,000	0,000	0,000	13,50	65,54	88,73	103,93	151,82	0,0	0,0	62,9	12,4	525	525	CIRCULAR	CONCRETE	-	0,25	224,3	28,05%	1,00	0,72	0,29
L2010B, L2010A	2010	2009	0,83	0,00	0,00	0,00	0,00	0,52	0,00	0,00	0,00	0,434	0,779	0,000	0,000	0,000	0,000	0,000	0,000	13,79	64,78	87,68	102,70	150,02	0,0	0,0	140,2	72,2	600	600	CIRCULAR	CONCRETE	-	0,20	286,5	48,95%	0,96	0,83	1,45
																				15,24																			
L2015A	2015	2014	0,23	0,00	0,00	0,00	0,00	0,74	0,00	0,00	0,00	0,173	0,173	0,000	0,000	0,000	0,000	0,000	0,000	10,00	76,81	104,19	122,14	178,56	0,0	0,0	37,0	90,0	375	375	CIRCULAR	PVC	-	0,35	97,5	37,90%	0,92	0,73	2,06
L2014A, L2014B	2014	2009	0,48	0,00	0,00	0,00	0,00	0,74	0,00	0,00	0,00	0,355	0,528	0,000	0,000	0,000	0,000	0,000	0,000	12,06	69,70	94,44	110,65	161,68	0,0	0,0	102,2	82,5	525	525	CIRCULAR	CONCRETE	-	0,20	200,6	50,95%	0,90	0,77	1,77
																				13,83																			
L2009B, L2009A	2009	2008	0,81	0,00	0,00	0,00	0,00	0,50	0,00	0,00	0,00	0,402	1,709	0,000	0,000	0,000	0,000	0,000	0,000	15,24	61,21	82,80	96,96	141,59	0,0	0,0	290,6	74,4	900	900	CIRCULAR	CONCRETE	-	0,10	597,2	48,67%	0,91	0,77	1,61
																				16,85																			
L2019A	2019	2018	0,13	0,00	0,00	0,00	0,00	0,62	0,00	0,00	0,00	0,078	0,078	0,000	0,000	0,000	0,000	0,000	0,000	10,00	76,81	104,19	122,14	178,56	0,0	0,0	16,7	21,3	300	300	CIRCULAR	PVC	-	0,35	56,9	29,31%	0,81	0,59	0,60
	2018	2017	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,000	0,078	0,000	0,000	0,000	0,000	0,000	0,000	10,60	74,57	101,12	118,52	173,24	0,0	0,0	16,2	9,1	300	300	CIRCULAR	PVC	-	0,35	56,9	28,45%	0,81	0,58	0,26
L2017A	2017	2016	0,33	0,00	0,00	0,00	0,00	0,74	0,00	0,00	0,00	0,243	0,321	0,000	0,000	0,000	0,000	0,000	0,000	10,86	73,65	99,85	117,03	171,04	0,0	0,0	65,8	71,7	450	450	CIRCULAR	CONCRETE	-	0,25	148,7	44,21%	0,91	0,74	1,60
L2016A	2016	2008	0,32	0,00	0,00	0,00	0,00	0,74	0,00	0,00	0,00	0,240	0,561	0,000	0,000	0,000	0,000	0,000	0,000	12,47	68,47	92,75	108,66	158,77	0,0	0,0	106,8	91,0	525	525	CIRCULAR	CONCRETE	-	0,20	200,6	53,22%	0,90	0,78	1,94
																				14,41																			
L2022A, L2022B	2022	2021	0,52	0,00	0,00	0,00	0,00	0,73	0,00	0,00	0,00	0,380	0,380	0,000	0,000	0,000	0,000	0,000	0,000	10,00	76,81	104,19	122,14	178,56	0,0	0,0	81,1	107,4	450	450	CIRCULAR	CONCRETE	-	0,20	133,0	60,96%	0,81	0,74	2,43
L2021C, L2021B, L2021A	2021	2020A	0,56	0,00	0,00	0,00	0,00	0,85	0,00	0,00	0,00	0,368	0,748	0,000	0,000	0,000	0,000	0,000	0,000	12,43	68,58	92,89	108,84	159,02	0,0	0,0	142,5	62,8	825	825	CIRCULAR	CONCRETE	-	0,15	580,0	24,57%	1,05	0,73	1,44
																				13,87																			
L2021C	PARK	2020A	2,22	0,00	0,00	0,00	0,00	0,20	0,00	0,00	0,00	0,444	0,444	0,000	0,000	0,000	0,000	0,000	0,000	10,00	76,81	104,19	122,14	178,56	0,0	0,0	94,8	12,0	525	525	CIRCULAR	CONCRETE	-	0,35	265,4	35,70%	1,19	0,91	0,22
																				10,22																			
	2020A	2020	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,000	1,192	0,000	0,000	0,000	0,000	0,000	0,000	13,87	64,56	87,39	102,36	149,50	0,0	0,0	213,8	41,0	825	825	CIRCULAR	CONCRETE	-	0,15	580,0	36,87%	1,05	0,82	0,84
																				14,71																			
L2024A	2024	2023	0,23	0,00	0,00	0,00	0,00	0,74	0,00	0,00	0,00	0,168	0,168	0,000	0,000	0,000	0,000	0,000	0,000	10,00	76,81	104,19	122,14	178,56	0,0	0,0	35,8	83,4	300	300	CIRCULAR	PVC	-	0,35	56,9	63,00%	0,81	0,74	1,88

Stantec

Trails Edge East Phase 1	
DATE:	2018-08-23
REVISION:	2
DESIGNED BY:	DT
CHECKED BY:	MJS

STORM SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160401250

DESIGN PARAMETERS

$I = a / (t+b)^c$ (As per City of Ottawa Guidelines, 2012)

	1:2 yr	1:5 yr	1:10 yr	1:100 yr
a =	732,951	998,071	1174,184	1735,688
b =	6,199	6,053	6,014	6,014
c =	0,810	0,814	0,816	0,820

MANNING'S n = 0,013 BEDDING CLASS = B
MINIMUM COVER: 2,00 m
TIME OF ENTRY 10 min

LOCATION			DRAINAGE AREA																				PIPE SELECTION										
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (5-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (2-YEAR) (-)	C (5-YEAR) (-)	C (10-YEAR) (-)	C (100-YEAR) (-)	A x C (2-YEAR) (ha)	ACCUM AxC (2YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	A x C (10-YEAR) (ha)	ACCUM. AxC (10YR) (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	I_{2-YEAR} (mm/h)	I_{5-YEAR} (mm/h)	$I_{10-YEAR}$ (mm/h)	$I_{100-YEAR}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETER (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)	VEL. (ACT) (m/s)	TIME OF FLOW (min)
L2023B, L2023A	2023	2020	0,51	0,00	0,00	0,00	0,00	0,74	0,00	0,00	0,00	0,381	0,549	0,000	0,000	0,000	0,000	0,000	0,000	11,88	70,28	95,22	111,58	163,04	0,0	0,0	107,1	90,0	525	525	CIRCULAR	CONCRETE	-	0,20	200,8	53,37%	0,90	0,78	1,92
																				13,80																			
L2020A, L2020B	2020	2008	0,77	0,00	0,00	0,00	0,00	0,52	0,00	0,00	0,00	0,399	2,140	0,000	0,000	0,000	0,000	0,000	0,000	14,71	62,46	84,51	98,97	144,54	0,0	0,0	371,4	83,1	975	975	CIRCULAR	CONCRETE	-	0,10	739,4	50,23%	0,96	0,82	1,69
																				16,40																			
L2008A	2008	2002	0,32	0,00	0,00	0,00	0,00	0,74	0,00	0,00	0,00	0,234	4,645	0,000	0,000	0,000	0,000	0,000	0,000	16,85	57,73	78,03	91,35	133,36	0,0	0,0	744,8	87,8	1350	1350	CIRCULAR	CONCRETE	-	0,10	1760,8	42,30%	1,19	0,97	1,51
																				18,36																			
L2002A, L2002B, L2002C	2002	2001	1,53	0,00	0,00	0,00	0,00	0,56	0,00	0,00	0,00	0,858	24,062	0,000	1,359	0,000	0,000	0,000	0,000	22,22	48,72	65,74	76,91	112,18	0,0	0,0	3504,5	120,0	2100	2100	CIRCULAR	CONCRETE	-	0,10	5720,1	61,27%	1,60	1,45	1,38
L2001A	2001	2000	0,25	0,00	0,00	0,00	0,00	0,73	0,00	0,00	0,00	0,179	24,241	0,000	1,359	0,000	0,000	0,000	0,000	23,59	46,89	63,24	73,98	107,88	0,0	0,0	3396,0	28,1	2100	2100	CIRCULAR	CONCRETE	-	0,10	5720,1	59,37%	1,60	1,44	0,32
																				23,92									2100	2100									

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

	LOCATION		AREA (Ha)														FLOW						SEWER DATA								
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA (Ha)	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year									FLOW	
Location	From Node	To Node			2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
L1002A	301	302					3.20	0.80	7.12	7.12			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	741.52									
Per Trails Edge East Phase 1 Servicing and Stormwater Management Report (Stantec, August, 2018)										7.12				0.00				0.00	10.00													

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: BK	PROJECT: Orleans EUC MUC		
Checked:	LOCATION: City of Ottawa		
Dwg. Reference:	File Ref: 14-733	Date: #REF!	Sheet No. 3

LICENSED PROFESSIONAL ENGINEER
A. J. TEMELINI
100213887
2020-04-15
PROVINCE OF ONTARIO

DESIGN BRIEF

FOR THE

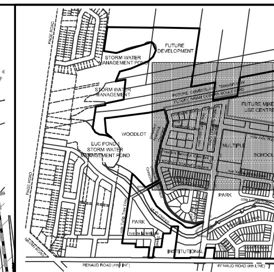
TRAILS EDGE WEST

RICHCRAFT GROUP OF COMPANIES

CITY OF OTTAWA

PROJECT NO.: 12-612

JANUARY 26, 2015
REVISION 3, 3RD SUBMISSION
© DSEL



KEY PLAN
SCALE 1:10000

LEGEND

- 0.25Ha / 0.75 — DRAINAGE AREA IN HECTARES, RUN-OFF COEFFICIENT
- 0.29Ha / 0.65 — EXTERNAL DRAINAGE AREA IN HECTARES (BY OTHERS), RUN-OFF COEFFICIENT
- OVERLAND FLOW DIRECTION
- EXTERNAL OVERLAND FLOW DIRECTION
- STORM MANHOLE
- STORM MANHOLE IN OTHER PHASES
- CATCHBASIN MANHOLE
- RLCBS – ELBOW SECTION (CITY STD. S31) / 'T' SECTION (CITY STD. S30), AS NOTED ON THE DRAWING
- SINGLE/DOUBLE CATCHBASIN
- CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST A (Q max = 19.9 l/s)
- CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST B (Q max = 28.4 l/s)
- CACHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST C (Q max = 35.5 l/s)
- CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST D (Q max = 50.1 l/s)
- CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST F (Q max = 69.1 l/s)
- STORM SEWER TRIBUTARY BOUNDARY
- EXTERNAL STORM SEWER TRIBUTARY BOUNDARY
- PHASE LINE
- SINGLE STORM HOUSE CONNECTION
- WORKS TO BE COMPLETED BY OTHERS AND OTHER PHASES

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY STANTEC GEOMATICS LIMITED, FILE No. 161611903–111. SURVEY DATED AUGUST 2, 2012.

LEGAL INFORMATION

CALCULATED M–PLAN PROVIDED BY STANTEC GEOMATICS LIMITED, JOB No. 161613137–132, RECEIVED ON OCTOBER 30, 2014.

PRE–SERVICING RE–SUBMISSION 15–01–26

ELEVATION NOTE

ELEVATION = 86.708 m

ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM NATIONAL CAPITAL COMMISSION No. 019680227, HAVING AN ELEVATION OF 86.708 m.

No.	BY	DATE	DESCRIPTION	BY
6	Z.L.	15–01–26	PRE–SERVICING RE–SUBMISSION	
5	Z.L.	15–01–15	PRE–SERVICING SUBMISSION	
4	Z.L.	14–10–16	3rd SUBMISSION	
3	Z.L.	14–09–11	2nd SUBMISSION	
2	Z.L.	14–05–16	1st RE–SUBMISSION	
1	Z.L.	12–09–14	1st SUBMISSION	

CITY OF OTTAWA

PROJECT No. 12–612

LICENSED PROFESSIONAL ENGINEER
Z. LI
15-01-26
PROVINCE OF ONTARIO

STORM DRAINAGE PLAN

© DSEL

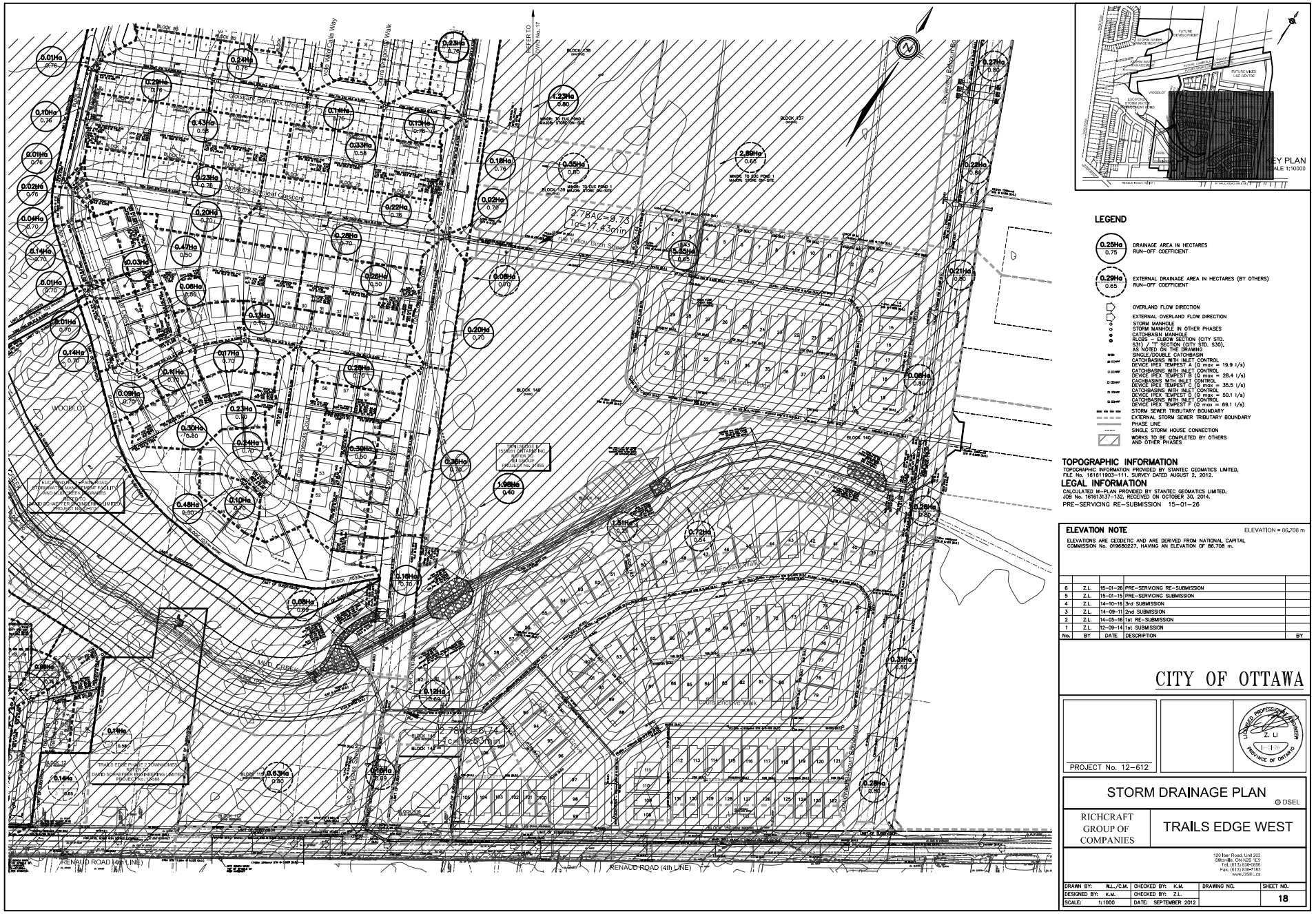
RICHCRAFT GROUP OF COMPANIES

TRAILS EDGE WEST

120 Iber Road, Unit 203
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

DRAWN BY: W.L./C.M.	CHECKED BY: K.M.	DRAWING NO.	SHEET NO.
DESIGNED BY: K.M.	CHECKED BY: Z.L.		17
SCALE: 1:1000	DATE: SEPTEMBER 2012		

E186



LEGEND

- 0.25Ha / 0.75 — DRAINAGE AREA IN HECTARES, RUN-OFF COEFFICIENT
- 0.29Ha / 0.65 — EXTERNAL DRAINAGE AREA IN HECTARES (BY OTHERS), RUN-OFF COEFFICIENT
- OVERLAND FLOW DIRECTION
- EXTERNAL OVERLAND FLOW DIRECTION
- STORM MANHOLE
- STORM MANHOLE IN OTHER PHASES
- CATCHBASIN MANHOLE
- RLCBS – ELBOW SECTION (CITY STD. S31) / "T" SECTION (CITY STD. S30), AS NOTED ON THE DRAWING
- SINGLE/DOUBLE CATCHBASIN
- CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST A (Q max = 19.9 l/s)
- CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST B (Q max = 28.4 l/s)
- CACHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST C (Q max = 35.5 l/s)
- CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST D (Q max = 50.1 l/s)
- CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST F (Q max = 69.1 l/s)
- STORM SEWER TRIBUTARY BOUNDARY
- EXTERNAL STORM SEWER TRIBUTARY BOUNDARY
- PHASE LINE
- SINGLE STORM HOUSE CONNECTION
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TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY STANTEC GEOMATICS LIMITED, FILE No. 161611903–111, SURVEY DATED AUGUST 2, 2012.

LEGAL INFORMATION

CALCULATED M–PLAN PROVIDED BY STANTEC GEOMATICS LIMITED, JOB No. 161613137–132, RECEIVED ON OCTOBER 30, 2014.

PRE–SERVICING RE–SUBMISSION 15–01–26

ELEVATION NOTE

ELEVATION = 86.708 m

ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM NATIONAL CAPITAL COMMISSION No. 019680227, HAVING AN ELEVATION OF 86.708 m.

No.	BY	DATE	DESCRIPTION
6	Z.L.	15–01–26	PRE–SERVICING RE–SUBMISSION
5	Z.L.	15–01–15	PRE–SERVICING SUBMISSION
4	Z.L.	14–10–16	3rd SUBMISSION
3	Z.L.	14–09–11	2nd SUBMISSION
2	Z.L.	14–05–16	1st RE–SUBMISSION
1	Z.L.	12–09–14	1st SUBMISSION

CITY OF OTTAWA

PROJECT No. 12–612

LICENSED PROFESSIONAL ENGINEER — Z. LI — PROVINCE OF ONTARIO

STORM DRAINAGE PLAN

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DRAWN BY: W.L./C.M.	CHECKED BY: K.M.	DRAWING NO.	SHEET NO.
DESIGNED BY: K.M.	CHECKED BY: Z.L.		18
SCALE: 1:1000	DATE: SEPTEMBER 2012		

E187

STORM SEWER CALCULATION SHEET (RATIONAL METHOD) (PRE-DEVELOPMENT CONDITION)

Manning 0.013 Return Frequency

Location	From Node	To Node	AREA (Ha) R= 0.25	R= 0.40	R= 0.50	R= 0.58	R= 0.65	R= 0.70	R= 0.73	R= 0.76	R= 0.80	R= 0.83	FLOW Indiv. 2.78 AC	Accum. 2.78 AC	Time of Conc.	Rainfall Intensity	Peak Flow Q (l/s)	ICD DATA No.	Type	Flow Q (l/s)	Accum. Flow	DESIGN FLOW	SEWER DATA DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min.)	RATIO Q/Q full
Block 135 (Access)																														
Contribution From Block 135 (Fut. Mixed Used Centre)											3.65		8.12	8.12	10.00	104.19	845.8			845.8	845.8	845.8									
																		RYCB	A	19.9	865.7										
						0.15							0.24	8.36					A	19.9	885.6										
	Cont 2	41				0.28				0.08			0.62	8.98	10.00	104.19	935.6		A	19.9	905.5	935.6	1050	1050	CONC	0.20	43.0	1221	1.41	0.51	0.77
To vole Axis Way , Pipe 41 - 17														8.98	10.51						905.5										
vole Axis Way																															
																			D	50.1	50.1										
																			A	19.9	70.0										
																			C	35.5	105.5										
	39	40								0.32			0.68	0.68	10.00	104.19	70.4		A	19.9	125.4	70.4	1050	1050	CONC	0.11	111.26	906	1.05	1.77	0.08
																		RYCB	A	19.9	145.3										
																			A	19.9	165.2										
																			C	35.5	200.7										
																			B	28.4	229.1										
	40	41								0.32			0.68	1.35	11.77	95.68	129.4		A	19.9	249.0	129.4	1200	1200	CONC	0.10	102.0	1233	1.09	1.56	0.10
Contribution From Block 136 (Access), Cont 2 - 41													8.98		10.51					905.5	1154.5										
																			C	35.5	1190.0										
																			A	19.9	1209.9										
																			D	50.1	1260.0										
	41	17								0.34			0.72	11.05	13.33	89.36	987.5		A	19.9	1279.9	987.5	1500	1500	CONC	0.10	114.0	2235	1.26	1.50	0.44
To rue Compass Street, Pipe 17 - 170														11.05	14.83						1279.9										
cours Dragonfly Walk																															
																			A	19.9	19.9										
																			A	19.9	39.8										
																			B	28.4	68.2										
																			C	35.5	103.7										
	9	10								0.56			1.18	1.18	10.00	104.19	123.3		C	35.5	139.2	123.3	525	525	CONC	0.20	100.5	192	0.89	1.89	0.64
																			C	35.5	174.7										
																			C	35.5	210.2										
																			D	50.1	260.3										
	10	11								0.51			1.08	2.26	11.89	95.19	215.2		D	50.1	310.4	215.2	675	675	CONC	0.15	110.5	326	0.91	2.02	0.66
To croissant Rainrock Crescent, Pipe 11 - 18														2.26	13.91						310.4										
vole Wild Calla Way																															
																			A	19.9	19.9										
																			D	50.1	70.0										
	5	6								0.56			1.18	1.18	10.00	104.19	123.3		D	50.1	120.1	123.3	525	525	CONC	0.20	106.0	192	0.89	1.99	0.64
																			C	35.5	155.6										
																			C	35.5	191.1										
	6	12								0.35			0.74	1.92	11.99	94.74	182.2		C	35.5	226.6	182.2	600	600	CONC	0.20	87.5	275	0.97	1.50	0.66
To croissant Rainrock Crescent, Pipe 12 - 13														1.92	13.49						226.6										
vole Featherfoil Way																															
																			E	69.1	69.1										
																		RYCB	A	19.9	89.0										
																			B	28.4	117.4										
	7	8				0.20				0.41			1.19	1.19	10.00	104.19	123.9		C	35.5	152.9	123.9	450	450	PVC	0.30	83.5	156	0.98	1.42	0.79
To croissant Rainrock Crescent, Pipe 8 - 14														1.19	11.42						152.9										
croissant Rainrock Crescent																															
From External (5-Year Flow to DICB 1)																69.0					69.0	69.0									
																			A	19.9	88.9										
																			A	19.9	108.8										
																		RYCB	A	19.9	128.7										
																			A	19.9	148.6										
	1	2				0.03				0.24			0.56	0.56	10.00	104.19	126.9		A	19.9	168.5	126.9	450	450	PVC	0.35	77.5	169	1.06	1.22	0.75
	2	3								0.04			0.08	0.64	11.22	98.17	131.8				168.5	131.8	450	450	PVC	0.40	13.0	180	1.13	0.19	0.73
Contribution From DICB3			0.85										0.59	0.59	10.00	104.19	61.6				61.6	61.6	300	300	PVC	1.00	11.0	97	1.37	0.13	0.64
	3	4				0.21				0.12			0.59	1.82	11.41	97.30	246.4	RYCB	A	19.9	250.0	246.4	600	600	CONC	0.30	38.5	336	1.19	0.54	0.73
																			A	19.9	269.9										
	4	8								0.05			0.11	1.93	11.95	94.92	252.0		B	28.4	298.3	252.0	675	675	CONC	0.20	24.0	376	1.05	0.38	0.67
Contribution From vole Featherfoil Way, Pipe 7 - 8													1.19		11.42					152.9	451.2										
																			A	19.9	471.1										
																			A	19.9	491.0										
	8	14				0.35				0.21			1.01	4.13	12.33	93.31	453.9	RYCB	B	28.4	519.4	453.9	675	675	CONC	0.50	87.0	594	1.66	0.87	0.76
To BLOCK 105 (6m Servicing Corridor), Pipe 14 - 140														4.13	13.20		69.0				519.4	69.0									

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/sec

Designed:	K.M.	PROJECT:	TRAILS EDGE WEST
Checked:	Z.L.	LOCATION:	City of Ottawa
Dwg. Reference: Storm Drainage Plan, Dwg. No. 17 to 20		File Ref: 12-612	Date: January, 2015 — Sheet No. 1 of 3

LICENSED PROFESSIONAL ENGINEER Z. LI PROVINCE OF ONTARIO

612_stm3_Submission_PreDevelopment_ICD.xls

STORM SEWER CALCULATION SHEET (RATIONAL METHOD) (PRE-DEVELOPMENT CONDITION)

Ottawa

Manning 0.013 Return Frequency

Location	LOCATION From Node	To Node	AREA (Ha) R= 0.25	R= 0.40	R= 0.50	R= 0.58	R= 0.65	R= 0.70	R= 0.73	R= 0.76	R= 0.80	R= 0.83	FLOW Indiv. 2.78 AC	Accum. 2.78 AC	Time of Conc.	Rainfall Intensity	Peak Flow Q (l/s)	ICD DATA No.	Type	Flow Q (l/s)	Accum. Flow	DESIGN FLOW	SEWER DATA DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min.)	RATIO Q/Q full
Contribution From cours Dragonfly Walk, Pipe 10 - 11													2.26		13.91					310.4	310.4										
																			B	28.4	338.8										
	11	18								0.13			0.27	2.54	13.91	87.25	221.2		D	50.1	388.9	221.2	675	675	CONC	0.15	50.5	326	0.91	0.93	0.68
To rue Compass Street, Pipe 18 - 19														2.54	14.83						388.9										
	11	12								0.14			0.30	0.30	10.00	104.19	30.8					30.8	300	300	PVC	0.40	48.5	61	0.87	0.93	0.50
Contribution From voie Wild Calla Way, Pipe 6 - 12													1.92		13.49					226.6	226.6										
																			A	19.9	246.5										
	12	13								0.24			0.51	2.73	13.49	88.78	242.0		C	35.5	282.0	242.0	600	600	CONC	0.30	61.5	336	1.19	0.86	0.72
																			B	28.4	310.4										
																			B	28.4	338.8										
																			A	19.9	358.7										
	13	14								0.29			0.61	3.34	14.35	85.71	266.1		B	28.4	387.1	266.1	750	750	CONC	0.30	72.5	610	1.38	0.88	0.47
To BLOCK 105 (6m Servicing Corridor), Pipe 14 - 140														3.34	15.23						387.1										
From External (5Yr Flow From Existing SWM Outlet Ditch to DICB MH 2 as per JFSA's Calculation)																	2200.0				2200.0	2200.0									
																			A	19.9	2219.9										
																			C	35.5	2255.4										
	15	17								0.43			0.91	0.91	10.00	104.19	2294.7		A	19.9	2275.3	2294.7	1200	1200	CONC	0.50	107.0	2757	2.44	0.73	0.83
To rue Compass Street, Pipe 17 - 170														0.91	10.73		2200.0				2275.3										
BLOCK 105 (6m Servicing Corridor)																															
Contribution From croissant Rainrock Crescent, Pipe 8 - 14													4.13		13.20		69.0			519.4	519.4										
Contribution From croissant Rainrock Crescent, Pipe 13 - 14													3.34		15.23					387.1	906.5										
	14	140								0.01			0.02	7.48	15.23	82.83	688.9				906.5	688.9	900	900	CONC	0.40	5.5	1145	1.80	0.05	0.60
	140	141				0.43				0.10			0.90	8.39	15.28	82.67	762.5	RYCB	B	28.4	934.9	762.5	900	900	CONC	0.40	73.0	1145	1.80	0.68	0.67
	141	24								0.01			0.02	8.41	15.95	80.60	746.8				934.9	746.8	900	900	CONC	0.40	6.5	1145	1.80	0.06	0.65
To croissant Shinleaf Crescent, Pipe 24 - 25														8.41	16.01		69.0				934.9										
cour des Tournesols Court																															
	280	28						0.10					0.19	0.19	10.00	104.19	20.3					20.3	375	375	PVC	0.40	16.0	111	1.00	0.27	0.18
	28	29						0.24					0.47	0.66	10.27	102.81	68.0					68.0	375	375	PVC	0.30	17.5	96	0.87	0.34	0.71
																			D	50.1	50.1										
																			D	50.1	100.2										
																		RYCB	A	19.9	120.1										
																		RYCB	B	28.4	148.5										
					0.30								0.42	1.08					A	19.9	168.4										
	29	30			0.39			0.23					0.99	2.07	10.60	101.12	209.2		B	28.4	196.8	209.2	600	600	CONC	0.25	82.0	307	1.09	1.26	0.68
To croissant Shinleaf Crescent, Pipe 30 - 31														2.07	11.86						196.8										
rue Compass Street																															
Contribution From voie Axis Way, Pipe 41 - 17													11.05		14.83		2200.0			1279.9	1279.9										
Contribution From croissant Rainrock Crescent, Pipe 15 - 17													0.91		10.73					2275.3	3555.2										
																			E	69.1	3624.3										
	17	170								0.24			0.51	12.47	14.83	84.10	3248.3		A	19.9	3644.2	3248.3	1800	1800	CONC	0.10	60.5	3635	1.43	0.71	0.89
																			A	19.9	3664.1										
																			C	35.5	3699.6										
	170	18								0.23			0.49	12.95	15.54	81.85	3260.1		A	19.9	3719.5	3260.1	1800	1800	CONC	0.10	64.5	3635	1.43	0.75	0.90
Contribution from Block 139											0.35		0.78	0.78																	
Contribution from Block 138 (Multiple)											1.23		2.74	3.51	10.00	104.19	366.1			366.1	366.1	366.1	675	675	CONC	0.50	17.0	594	1.66	0.17	0.62
Contribution From croissant Rainrock Crescent, Pipe 11 - 18													2.54		14.83					388.9	4474.5										
																		RYCB	B	28.4	4502.9										
																			A	19.9	4522.8										
	18	19				0.33				0.18			0.91	19.91	16.29	79.60	3785.1		A	19.9	4542.7	3785.1	1950	1950	CONC	0.10	75.0	4500	1.51	0.83	0.84
Contribution From rue Yellow Birch Street, Pipe Plug - 19													9.94		17.31					810.6	5353.4										

Definitions:
Q = 2.78 AIR, where
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A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/sec

Designed: K.M.	PROJECT: TRAILS EDGE WEST		
Checked: Z.L.	LOCATION: City of Ottawa		
Dwg. Reference: Storm Drainage Plan, Dwg. No. 17 to 20	File Ref: 12-612	Date: January, 2015	Sheet No. 2 of 3

LICENSED PROFESSIONAL ENGINEER
Z. LI
PROVINCE OF ONTARIO

STORM SEWER CALCULATION SHEET (RATIONAL METHOD) (PRE-DEVELOPMENT CONDITION)

Ottawa

Manning 0.013 Return Frequency

Location	LOCATION From Node	To Node	AREA (Ha) R= 0.25	R= 0.40	R= 0.50	R= 0.58	R= 0.65	R= 0.70	R= 0.73	R= 0.76	R= 0.80	R= 0.83	FLOW Indiv. 2.78 AC	Accum. 2.78 AC	Time of Conc.	Rainfall Intensity	Peak Flow Q (l/s)	ICD DATA No.	Type	Flow Q (l/s)	Accum. Flow	DESIGN FLOW	SEWER DATA DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min.)	RATIO Q/Q full
																		A	19.9	5373.3										
																		A	19.9	5393.2										
																	RYCB	A	19.9	5413.1										
	19	20			0.26			0.20					0.75	30.61	17.31	76.76	4549.5		A	19.9	5433.0	4549.5	2100	2100	CONC	0.10	83.0	5483	1.70	0.82	0.83
																		B	28.4	5461.4										
																		A	19.9	5481.3										
																		A	19.9	5501.2										
	20	21						0.36					0.70	31.31	18.13	74.65	4537.1		A	19.9	5521.1	4537.1	2100	2100	CONC	0.10	107.5	5483	1.70	1.06	0.83
Contribution From Block140 (Park)				1.98									2.20	2.20	10.00	104.19	229.4			229.4	5750.5	229.4	525	525	CONC	0.50	15.5	304	1.40	0.18	0.75
																		E	69.1	5819.6										
	21	22						0.16					0.31	33.82	19.18	72.09	4638.4		C	35.5	5855.1	4638.4	2100	2100	CONC	0.10	54.5	5483	1.70	0.54	0.85
	22	HW						0.06					0.12	33.94	19.72	70.87	4605.4				5855.1	4605.4	2100	2100	CONC	0.10	29.5	5483	1.70	0.29	0.84
croissant Shinleaf Crescent																														
																		A	19.9	19.9										
																		A	19.9	39.8										
																		B	28.4	68.2										
	19	23						0.28		0.22			1.01	1.01	10.00	104.19	105.2		B	28.4	96.6	105.2	750	750	CONC	0.20	120.0	498	1.13	1.77	0.21
																		B	28.4	125.0										
																		B	28.4	153.4										
																		B	28.4	181.8										
																		B	28.4	210.2										
																	RYCB	B	28.4	238.6										
																		A	19.9	258.5										
	23	230			0.47			0.20		0.23			1.53	2.54	11.77	95.67	242.8		B	28.4	286.9	242.8	750	750	CONC	0.20	109.0	498	1.13	1.61	0.49
	230	24								0.02			0.04	2.58	13.39	89.16	230.1				286.9	230.1	750	750	CONC	0.20	10.0	498	1.13	0.15	0.46
Contribution From BLOCK 104 (6m Servicing Corridor), Pipe 141 - 24													8.41		16.01		69.0			934.9	1221.8										
	24	25						0.04					0.08	11.07	16.01	80.42	959.1				1221.8	959.1	1350	1350	CONC	0.20	21.0	2387	1.67	0.21	0.40
																		A	19.9	1241.7										
	25	250						0.14					0.27	11.34	16.22	79.80	974.0		B	28.4	1270.1	974.0	1350	1350	CONC	0.20	38.5	2387	1.67	0.38	0.41
																		C	35.5	1305.6										
	250	26						0.01					0.02	11.36	16.61	78.69	963.0		A	19.9	1325.5	963.0	1350	1350	CONC	0.20	9.0	2387	1.67	0.09	0.40
To BLOCK 102 (WALKWAY), Pipe 26-27														11.36	16.70		69.0				1325.5										
																		B	28.4	28.4										
																		A	19.9	48.3										
																		B	28.4	76.7										
	20	30						0.28					0.54	0.54	10.00	104.19	56.8		A	19.9	96.6	56.8	375	375	PVC	0.25	80.5	88	0.79	1.69	0.65
Contribution From cour des Tournesols Court, Pipe 29 - 30													2.07		11.86					198.8	293.4										
	30	31						0.13					0.25	2.87	11.86	95.30	273.1				293.4	273.1	675	675	CONC	0.25	33.5	420	1.17	0.48	0.65
																		B	28.4	321.8										
	31	32						0.17					0.33	3.20	12.34	93.29	298.2		A	19.9	341.7	298.2	675	675	CONC	0.25	31.0	420	1.17	0.44	0.71
																		RYCB	A	19.9	361.6										
																		B	28.4	390.0										
	32	33			0.06			0.11					0.30	3.49	12.77	91.51	319.8		A	19.9	409.9	319.8	675	675	CONC	0.30	41.5	460	1.29	0.54	0.69
	33	34						0.09					0.18	3.67	13.31	89.44	328.2				409.9	328.2	675	675	CONC	0.30	13.0	460	1.29	0.17	0.71
																		B	28.4	438.3										
	34	35						0.14					0.27	3.94	13.48	88.81	350.1		A	19.9	458.2	350.1	675	675	CONC	0.35	44.0	497	1.39	0.53	0.70
	35	26						0.03					0.06	4.00	14.01	86.90	347.6				458.2	347.6	750	750	CONC	0.20	6.5	498	1.13	0.10	0.70
To BLOCK 102 (WALKWAY), Pipe 26 - 27														4.00	14.10						458.2										
rue Yellow Birch Street																														
Contribution From rue Yellow Birch Street, Pipe105 (B.O.) - 106 (B.O.)													9.75		15.65															
								0.08					0.16																		
	106 (B.O.)	19						0.02					0.04	9.94	15.65	81.51	810.6				810.6	810.6	1200	1200	CONC	0.12	119.18	1351	1.19	1.66	0.60
To rue Compass Street, Pipe 19-20														9.94	17.31						810.6										
BLOCK 102 (WALKWAY)																														
Contribution From croissant Shinleaf Crescent, Pipe 250 - 26													11.36		16.70		69.0			1325.5	1325.5										
Contribution From croissant Shinleaf Crescent, Pipe 35 - 26													4.00		14.10					458.2	1783.7										
	26	27						0.01					0.02	15.38	16.70	78.44	1275.5				1783.7	1275.5	1350	1350	CONC	0.50	67.5	3774	2.64	0.43	0.34
	27	HW												15.38	17.13	77.26	1257.4				1783.7	1257.4	1350	1350	CONC	0.50	35.0	3774	2.64	0.22	0.33

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R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/sec

Designed: K.M.	PROJECT: TRAILS EDGE WEST		
Checked: Z.L.	LOCATION: City of Ottawa		
Dwg. Reference: Storm Drainage Plan, Dwg. No. 17 to 20	File Ref: 12-612	Date: January, 2015	Sheet No. 3 of 3

LICENSED PROFESSIONAL ENGINEER
Z. LI
PROVINCE OF ONTARIO

612_stm3_Submission_PreDevelopment_ICD.xls

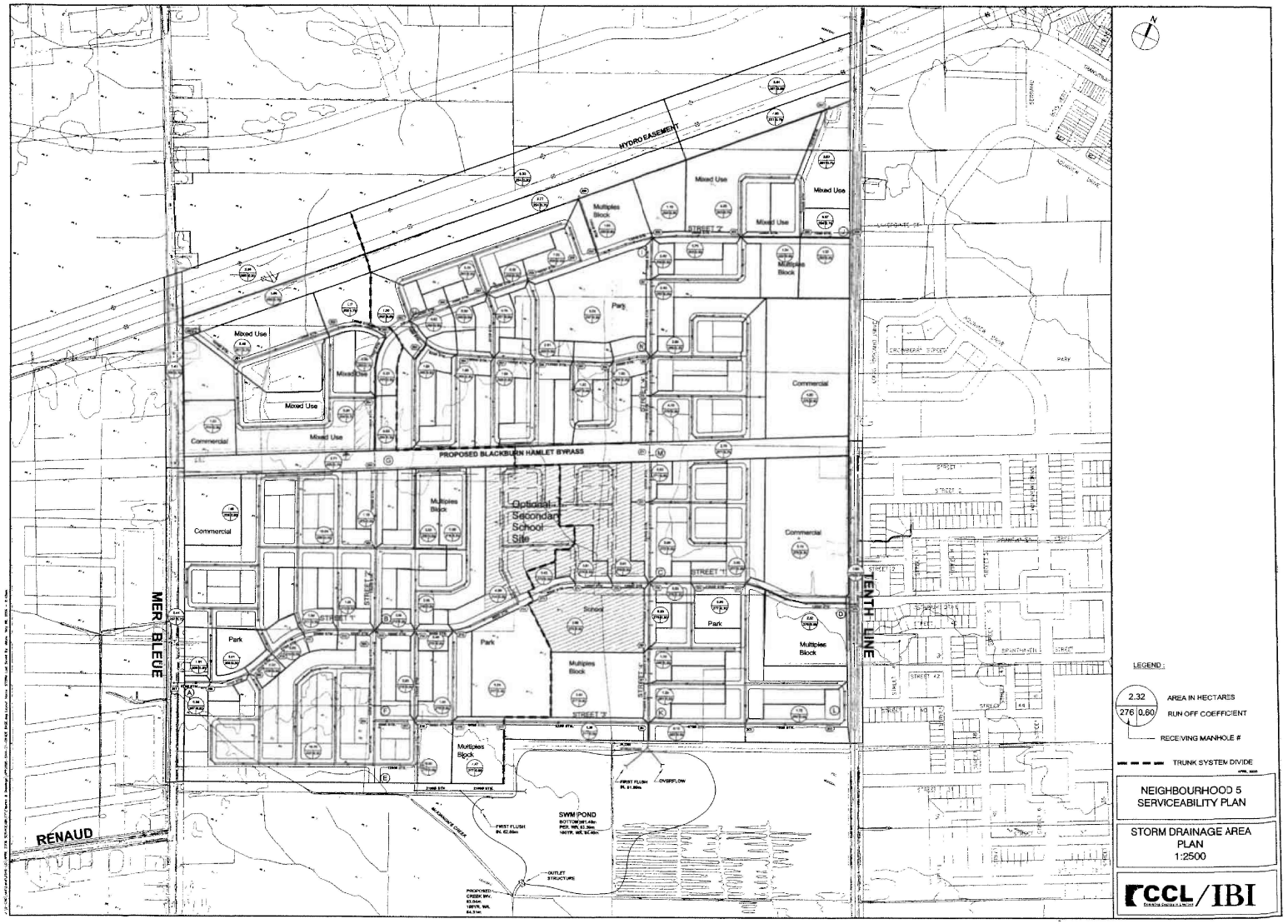
MER BLEUE COMMUNITY DESIGN PLAN
INFRASTRUCTURE SERVICING STUDY

Prepared for
C. FLEMING DEVELOPMENTS, TAGGART REALTY,
AND MINTO DEVELOPMENTS

3546-LD
APRIL, 2006

IBI GROUP

E191


HYDRO EASEMENT
PROPOSED BLACKBURN HAMLET BYPASS
Optional Secondary School Site
Mixed Use
Multiples Block
Commercial
Park
School
STREET 1
STREET 2
STREET 3
STREET 4
STREET 5
STREET 6
STREET 7
MER BLEUE
TENTH LINE
RENAUD
SWM POND
FIRST FLUSH
OVERFLOW
OUTLET STRUCTURE
LEGEND :
2.32
276 0.60
AREA IN HECTARES
RUN OFF COEFFICIENT
RECEIVING MANHOLE #
TRUNK SYSTEM DIVIDE
NEIGHBOURHOOD 5
SERVICEABILITY PLAN
STORM DRAINAGE AREA
PLAN
1:2500
CCL/IBI

CUMMING COCKBURN LIMITED
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
K2C OP8

APPENDIX I - STORM SEWER DESIGN

NH 5 CUMBERLAND EAST URBAN COMMUNITY
INFRASTRUCTURE SERVICING STUDY

JOB #: 3546-LD
DATE: APR 06
DESIGN: LME

LOCATION			AREA (Ha.)								DESIGN FLOW - RATIONAL METHOD							DESIGN FLOW - MAX INLET			SEWER DATA								
			COMMERCIAL	MIXED USE	LRT/ROW	MULTI RES	RESIDENTIAL	PARK			INLET	TIME		I	I	PEAK	TOTAL	TOTAL	ACCUM	TOTAL							RATIONAL	MAX INLET
STREET	FROM MH	TO MH	C= 0.80	C= 0.75	C= 0.70	C= 0.60	C= 0.50	C= 0.30	INDIV. 2.78AC	ACCUM. 2.78AC	TIME (min.)	IN PIPE	TOTAL	5 YEAR (mm/Hr)	10 YEAR (mm/Hr)	FLOW (l/s)	PEAK FLOW (l/s)	AREA (Ha.)	AREA (Ha.)	FLOW (l/s)	CAP. (l/s)	PIPE (mm)	LENGTH (M)	SLOPE (%)	n	VEL. (M/s)	AVAIL. CAP. (l/s)	AVAIL. CAP. (l/s)
I - H	260	262					0.62		0.86	0.86	15.00	1.43	16.43	83.56		72.01	**72.0**	0.62	0.62	**52.7**	**162.9**	450	85.1	0.30	0.013	0.99	90.90	110.21
H - N	262	263					1.30		1.81	2.67	16.43	1.24	17.67	79.20		211.38	**211.4**	1.30	1.92	**163.2**	**367.3**	750	60.0	0.10	0.013	0.81	155.89	204.07
	263	264					1.85		2.57	5.24	17.67	1.36	19.03	75.81		397.28	**397.3**	1.85	3.77	**320.5**	**473.6**	825	70.0	0.10	0.013	0.86	76.27	153.10
	264	265					1.98		2.75	7.99	19.03	1.37	20.40	72.45		579.06	**579.1**	1.98	5.75	**488.8**	**597.2**	900	74.6	0.10	0.013	0.91	18.17	108.47
H - I	260	261					0.50		0.70	0.70	15.00	1.41	16.41	83.56		58.07	**58.1**	0.50	0.50	**42.5**	**162.9**	450	83.7	0.30	0.013	0.99	104.84	120.41
I - H	258	259					1.23		1.71	1.71	15.00	2.12	17.12	83.56		142.86	**142.9**	1.23	1.23	**104.6**	**200.6**	525	114.2	0.20	0.013	0.90	57.79	96.10
	259	261					0.38		0.53	2.24	17.12	1.70	18.82	77.28		172.94	**172.9**	0.38	1.61	**136.9**	**200.6**	525	91.8	0.20	0.013	0.90	27.70	63.80
	261	265					3.88		5.39	8.33	18.82	2.29	21.12	72.94		607.33	**607.3**	3.88	5.99	**509.2**	**739.3**	975	132.0	0.10	0.013	0.96	132.00	230.18
H - N	265	266					1.64		2.28	18.60	21.12	1.31	22.43	67.89		1,262.61	**1,262.6**	1.64	13.38	**1,137.3**	**1,286.2**	1200	86.7	0.10	0.013	1.10	23.58	148.89
	266	267					2.81		3.91	22.50	22.43	1.10	23.53	65.33		1,470.29	**1,470.3**	2.81	16.19	**1,376.2**	**1,760.8**	1350	78.4	0.10	0.013	1.19	290.52	384.66
	267	268					1.52		2.11	24.62	23.53	1.21	24.73	63.36		1,559.65	**1,559.6**	1.52	17.71	**1,505.4**	**1,760.8**	1350	86.3	0.10	0.013	1.19	201.17	255.46
	268	269					1.89		2.63	27.24	24.73	1.11	25.85	61.33		1,670.80	**1,670.8**	1.89	19.60	**1,666.0**	**1,760.8**	1350	79.6	0.10	0.013	1.19	90.01	94.81
J - I	250	252		0.57		1.32			3.39	3.39	15.00	2.11	17.11	83.56		283.28	**283.3**	1.89	1.89	**160.7**	**367.3**	750	102.0	0.10	0.013	0.81	83.99	206.62
	251	252		2.63				3.61	8.49	8.49	15.00	4.16	19.16	83.56		709.76		6.24										
					1.50				2.92	2.92	15.00				97.85	285.63	**995.4**	1.50	7.74	**657.9**	**1,286.2**	1200	275.0	0.10	0.013	1.10	290.81	628.29
J - I	252	253				1.04			1.73	13.62	19.16	1.87	21.02	72.15		982.66		1.04										
									0.00	2.92	19.16				84.44	246.49	**1,229.2**	0.00	10.67	**907.0**	**1,286.2**	1200	123.3	0.10	0.013	1.10	57.03	379.24
	253	256		4.05		1.19	0.75		11.47	25.09	21.02	2.39	23.41	68.08		1,708.21		5.99										
									0.00	2.92	21.02				79.66	232.53	**1,940.7**	0.00	16.66	**1,416.1**	**2,332.0**	1500	183.3	0.10	0.013	1.28	391.29	915.92
	254	255						6.33	5.28	5.28	15.00	1.89	16.89	83.56		441.12		6.33										
					2.77				5.39	5.39	15.00				97.85	527.46	**968.6**	2.77	9.10	**773.5**	**1,286.2**	1200	125.0	0.10	0.013	1.10	317.61	512.69
H - I	255	256				1.65			2.75	8.03	16.89	1.75	18.64	77.91		625.70		1.65										
									0.00	5.39	16.89				91.21	491.65	**1,117.4**	0.00	10.75	**913.8**	**1,286.2**	1200	115.6	0.10	0.013	1.10	168.84	372.44
I - N	256	257					0.40		0.56	33.68	23.41	1.07	24.49	63.55		2,140.29		0.40										
									0.00	8.31	23.41				74.34	617.73	**2,758.0**	0.00	27.81	**2,363.9**	**3,006.9**	1650	87.5	0.10	0.013	1.36	248.85	643.01
	257	269					2.48	3.24	6.15	39.83	24.49	1.85	26.33	61.73		2,458.59		5.72										
									0.00	8.31	24.49				72.20	599.97	**3,058.6**	0.00	33.53	**2,850.1**	**3,792.1**	1800	160.1	0.10	0.013	1.44	733.57	942.08
N - M	269	270					2.98		4.14	71.21	26.33	0.84	27.17	58.85		4,190.78		2.98										
									0.00	8.31	26.33				68.82	571.85	**4,762.6**	0.00	56.11	**4,769.4**	**5,720.2**	2100	80.4	0.10	0.013	1.60	957.52	950.81
	270	271	4.92				4.19		16.77	87.98	27.17	1.21	28.38	57.64		5,070.89		9.11										
									0.00	8.31	27.17				67.40	560.04	**5,630.9**	0.00	65.22	**5,543.7**	**5,720.2**	2100	115.7	0.10	0.013	1.60	89.23	176.46

Q = 2.78AIC, where:
Q = Peak Flow in Litres per Second (l/s)
A = Area in Hectares (ha.)
I = Rainfall Intensity in Millimeters per Hour (mm/hr)
C = Runoff Coefficient

INLET RESTRICTION 85 L/S/Ha

CUMMING COCKBURN LIMITED
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
K2C OP8

LOCATION			AREA (Ha.)								DESIGN FLOW - RATIONAL METHOD							DESIGN FLOW - MAX INLET			SEWER DATA							
STREET	FROM MH	TO MH	COMMERCIAL C= 0.80	MIXED USE C= 0.75	LRT/ROW C= 0.70	MULTI RES C= 0.60	RESIDENTIAL C= 0.50	PARK C= 0.30	INDIV. 2.78AC	ACCUM. 2.78AC	INLET TIME (min.)	TIME IN PIPE	TOTAL	I 5 YEAR (mm/Hr)	I 10 YEAR (mm/Hr)	PEAK FLOW (l/s)	TOTAL PEAK FLOW (l/s)	TOTAL AREA (Ha.)	ACCUM AREA (Ha.)	TOTAL FLOW (l/s)	CAP. (l/s)	PIPE (mm)	LENGTH (M)	SLOPE (%)	n	VEL. (M/s)	RATI METH AVAIL. CAP. (l/s)	MAX INLET AVAIL. CAP. (l/s)
M - C	271	272					0.62		0.86	88.84	28.38	1.01	29.39	55.99		4,974.19		0.62										
					2.76				5.37	13.68	28.38				65.46	895.58	**5,869.8**	2.76	68.60	**5,831.0**	**6,875.6**	2250	101.8	0.10	0.013	1.68	1005.81	1044.59
	272	279					3.68		5.12	93.96	29.39	1.68	31.06	54.68		5,137.87		3.68										
									0.00	13.68	29.39				65.46	895.58	**6,033.5**	0.00	72.28	**6,143.8**	**6,875.6**	2250	168.3	0.10	0.013	1.68	842.14	731.79
B - C	273	274	2.88				0.43		7.00	7.00	15.00	1.35	16.35	83.56		585.14	**585.1**	3.31	3.31	**281.4**	**597.2**	900	73.5	0.10	0.013	0.91	12.09	315.87
	274	275					0.91		1.26	8.27	16.35	1.30	17.65	79.44		656.79	**656.8**	0.91	4.22	**358.7**	**900.9**	1050	78.5	0.10	0.013	1.01	244.07	542.17
	275	279					2.91		4.04	12.31	17.65	1.15	18.80	75.88		934.29	**934.3**	2.91	7.13	**606.1**	**1,286.2**	1200	76.3	0.10	0.013	1.10	351.90	680.14
D - C	276	277	5.13			2.32			15.28	15.28	15.00	3.24	18.24	83.56		1,276.66		7.45										
					1.90				3.70	3.70	15.00				97.85	361.80	**1,638.5**	1.90	9.35	**794.8**	**1,760.8**	1350	231.5	0.10	0.013	1.19	122.35	966.06
	277	278					2.42	0.80	4.03	19.31	18.24	1.57	19.81	74.37		1,436.16		3.22										
									0.00	3.70	18.24				87.06	321.88	**1,758.0**	0.00	12.57	**1,068.5**	**1,760.8**	1350	112.6	0.10	0.013	1.19	2.77	692.36
	278	279					0.55		0.76	20.07	19.81	1.23	21.04	70.67		1,418.63		0.55										
									0.00	3.70	19.81				82.70	305.78	**1,724.4**	0.00	13.12	**1,115.2**	**1,760.8**	1350	87.6	0.10	0.013	1.19	36.40	645.61
C - K	279	280					0.50		0.70	127.04	31.06	1.29	32.35	52.67		6,690.62		0.50										
									0.00	17.38	31.06				61.57	1,069.87	**7,760.5**	0.00	93.03	**7,907.6**	**8,166.8**	2400	135.2	0.10	0.013	1.75	406.33	259.27
	280	281					1.78		2.47	129.51	32.35	0.68	33.03	51.22		6,634.13		1.78										
									0.00	17.38	32.35				59.87	1,040.47	**7,674.6**	0.00	94.81	**8,058.9**	**8,166.8**	2400	71.5	0.10	0.013	1.75	492.22	107.97
	281	284					1.28		1.78	131.29	33.03	0.75	33.79	50.50		6,629.73		1.28										
									0.00	17.38	33.03				59.02	1,025.64	**7,655.4**	0.00	96.09	**8,167.7**	**8,565.4**	2400	82.9	0.11	0.013	1.83	910.06	397.78
F - K	217	284				2.63	1.39		6.32	6.32	15.00	5.04	20.04	83.56		527.99	**528.0**	4.02	4.02	**341.7**	**539.9**	825	295.9	0.13	0.013	0.98	11.94	198.23
L - K	282	283					1.72		2.39	2.39	15.00	4.02	19.02	83.56		199.77	**199.8**	1.72	1.72	**146.2**	**367.3**	750	194.3	0.10	0.013	0.81	167.50	221.07
	283	284					4.15		5.77	8.16	19.02	3.47	22.49	72.47		591.31	**591.3**	4.15	5.87	**499.0**	**739.3**	975	199.7	0.10	0.013	0.96	148.01	240.38
	284	OUTLET								145.77	33.79	0.42	34.20	49.72		7,247.4		0.00										
										17.38	33.79				58.11	1,009.78	**8,257.2**	0.00	105.98	**9,008.3**	**9,311.6**	2400	50.0	0.13	0.013	1.99	1054.46	303.31
	200	201						3.45	2.88	2.88	15.00	1.65	16.65	83.56		240.42		3.45										
					3.03				5.90	5.90	15.00				97.85	576.97	**817.4**	3.03	6.48	**550.8**	**900.9**	1050	100.0	0.10	0.013	1.01	83.48	350.07
	201	202		3.45					7.19	10.07	16.65	2.73	19.38	78.57		791.25		3.45										
									0.00	5.90	16.65				91.99	542.40	**1,333.7**	0.00	9.93	**844.1**	**1,760.8**	1350	195.0	0.10	0.013	1.19	427.16	916.76
	202	203		1.17					2.44	12.51	19.38	1.68	21.06	71.64		896.24		1.17										
									0.00	5.90	19.38				83.84	494.38	**1,390.6**	0.00	11.10	**943.5**	**1,760.8**	1350	120.0	0.10	0.013	1.19	370.19	817.31
H - G	203	204		0.58			0.57		2.00	14.51	21.06	1.80	22.86	68.01		986.95		1.15										
									0.00	5.90	21.06				79.58	469.23	**1,456.2**	0.00	12.25	**1,041.3**	**1,760.8**	1350	129.0	0.10	0.013	1.19	304.63	719.56
	204	205	1.22	5.66			0.53		15.25	29.76	22.86	1.63	24.50	64.54		1,920.79		7.41										
									0.00	5.90	22.86				75.50	445.17	**2,366.0**	0.00	19.66	**1,671.1**	**3,006.9**	1650	133.5	0.10	0.013	1.36	640.91	1335.76

Q = 2.78AIC, where:
Q = Peak Flow in Litres per Second (l/s)
A = Area in Hectares (ha.)
I = Rainfall Intensity in Millimeters per Hour (mm/hr)
C = Runoff Coefficient

INLET RESTRICTION 85 L/S/Ha

CUMMING COCKBURN LIMITED
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
K2C OP8

LOCATION			AREA (Ha.)								DESIGN FLOW - RATIONAL METHOD							DESIGN FLOW - MAX INLET			SEWER DATA							
STREET	FROM MH	TO MH	COMMERCIAL C= 0.80	MIXED USE C= 0.75	LRT/ROW C= 0.70	MULTI RES C= 0.60	RESIDENTIAL C= 0.50	PARK C= 0.30	INDIV. 2.78AC	ACCUM. 2.78AC	INLET TIME (min.)	TIME IN PIPE	TOTAL	I 5 YEAR (mm/Hr)	I 10 YEAR (mm/Hr)	PEAK FLOW (l/s)	TOTAL PEAK FLOW (l/s)	TOTAL AREA (Ha.)	ACCUM AREA (Ha.)	TOTAL FLOW (l/s)	CAP. (l/s)	PIPE (mm)	LENGTH (M)	SLOPE (%)	n	VEL. (M/s)	RATI METH AVAIL. CAP. (l/s)	MAX INLET AVAIL. CAP. (l/s)
G - B	205	206					1.13		1.57	31.33	24.50	2.18	26.68	61.71		1,933.66		1.13										
					2.71				5.27	11.17	24.50				72.18	806.28	**2,739.9**	2.71	23.50	**1,997.5**	**3,006.9**	1650	178.5	0.10	0.013	1.36	266.92	1009.36
	206	213	1.68			0.83	10.04		19.08	50.41	26.68	1.99	28.67	58.34		2,940.88		12.55										
									0.00	11.17	26.68				68.22	762.05	3,702.93	0.00	36.05	**3,064.3**	**3,792.1**	1800	172.4	0.10	0.013	1.44	89.20	727.88
A - B	207	208	0.36						0.80	0.80	15.00	1.31	16.31	83.56		66.90		0.36										
					2.44				4.75	4.75	15.00				97.85	464.62	**531.5**	2.44	2.80	**238.0**	**739.3**	975	75.6	0.10	0.013	0.96	207.80	501.33
	208	209					1.01	0.81	2.08	2.88	16.31	1.42	17.73	79.54		229.08		1.82										
									0.00	4.75	16.31				93.13	442.19	**671.3**	0.00	4.62	**392.7**	**739.3**	975	81.6	0.10	0.013	0.96	68.06	346.63
	209	210					0.33		0.46	3.34	17.73	1.08	18.81	75.66		252.60		0.33										
									0.00	4.75	17.73				88.56	420.52	**673.1**	0.00	4.95	**420.8**	**739.3**	975	62.0	0.10	0.013	0.96	66.20	318.58
	210	211					0.65		0.90	4.24	18.81	1.35	20.16	72.98		309.59		0.65										
									0.00	4.75	18.81				85.41	405.56	**715.1**	0.00	5.60	**476.0**	**739.3**	975	77.6	0.10	0.013	0.96	24.18	263.33
	211	212					1.32		1.83	6.08	20.16	1.26	21.42	69.90		424.81		1.32										
									0.00	4.75	20.16				81.80	388.42	**813.2**	0.00	6.92	**588.2**	**900.9**	1050	76.25	0.10	0.013	1.01	87.64	312.67
	212	213					1.20		1.67	7.75	21.42	1.15	22.57	67.28		521.10		1.20										
									0.00	4.75	21.42				78.72	373.79	**894.9**	0.00	8.12	**690.2**	**1,286.2**	1200	76.25	0.10	0.013	1.10	391.31	595.99
B - C	213	216					0.55		0.76	58.92	28.67	0.97	29.64	55.60		3,276.10		0.55										
									0.00	15.92	28.67				65.01	1,034.87	**4,311.0**	0.00	44.72	**3,801.2**	**4,694.4**	1950	88.25	0.10	0.013	1.52	383.45	893.22
C - B	214	215					4.56		6.34	6.34	15.00	2.68	17.68	83.56		529.62	**529.6**	4.56	4.56	**387.6**	**597.2**	900	146.2	0.10	0.013	0.91	67.60	209.62
	215	216					0.46		0.64	6.98	17.68	1.39	19.07	75.79		528.84	**528.8**	0.46	5.02	**426.7**	**597.2**	900	75.9	0.10	0.013	0.91	68.38	170.52
	216	219				0.90	3.49		6.35	72.25	29.64	1.93	31.56	54.37		3,928.55		4.39										
									0.00	15.92	29.64				63.57	1,011.93	**4,940.5**	0.00	54.13	**4,601.1**	**5,720.2**	2100	185.0	0.10	0.013	1.60	779.67	1119.11
K - F	217	218				1.47		3.24	5.15	5.15	15.00	1.95	16.95	83.56		430.66	**430.7**	4.71	4.71	**400.4**	**597.2**	900	106.4	0.10	0.013	0.91	166.56	196.87
	218	219					1.44		2.00	7.16	16.95	1.44	18.39	77.74		556.30	**556.3**	1.44	6.15	**522.8**	**597.2**	900	78.5	0.10	0.013	0.91	40.93	74.47
	219	220				0.86			1.43	80.84	31.56	1.77	33.33	52.10		4,211.46		0.86										
									0.00	15.92	31.56				60.90	969.38	**5,180.8**	0.00	61.14	**5,196.9**	**5,720.2**	2100	170.0	0.10	0.013	1.60	539.31	523.26
	220	OUTLET					10.78		14.98	95.82	33.33	0.57	33.90	50.18		4,808.59		10.78										
									0.00	15.92	33.33				58.65	933.63	**5,742.2**	0.00	71.92	**6,113.2**	**6,266.1**	2100	60.0	0.12	0.013	1.75	523.90	152.92

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C = Runoff Coefficient

INLET RESTRICTION 85 L/S/Ha

Orleans Family Health Hub

Stormwater Management & Servicing Report

Type of Document:
Site Plan Application

Project Name:
Orleans Family Health Hub (OFHH)

Project Number
OTT-00240132-A0

Prepared By:
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Date Submitted
April 5, 2018

Table 4.4 Summary of Minor System Capture
(SWMHYMO Output 30113-D6.dat/out)

Drainage Area		Weighted Runoff Coefficient	Flow (l/s)			Manhole (XPSWMM ID)	Peak Flow from Saved Hydrograph (SWMHYMO) – 3 hour Chicago (l/s)	
ID	Area (ha)		220 l/s/ha	Rational Method 10 Year 10 Min	Other Restriction (refer to Table 4.2)*		5 Year†	100 year†
Eastern Trunk Storm Sewer								
HE3	3.61	n/a	0	0	30	MH 605 (S605)	1015	1017
TW3	1.49	0.70	0	344.7	0			
40	4.35	0.76	0	0	645.7			
41	2.83	0.76	0	0	420.1	MH 607 (S607)	419	419
HE2	6.40	n/a	0	0	30	MH 612B (S612B)	965	1002
TW2	2.66	0.70	0	665.5	0			
43	1.49	0.62	0	0	180.4			
42	1.08	0.62	0	0	130.8			
22A	2.03	0.76	0	0	172.6	MH 602 (S602)	172	173
22A	3.02	0.59	0	0	307.7	MH 617 (S617)	306	308
23	3.16	n/a	0	0	268	MH 103 (S103)	106	267
21A	4.62	0.59	0	0	392.7	MH 102 (S102)	2778	2782
21D	3.26	0.59	0	0	278.8			
24	8.86	0.57	0	0	753.1			
25	4.85	0.80	0	0	412.3			
11	11.12	0.57	0	0	645.7			
BCB-E	3.02	0.76	0	717.8	0	MH 100 (S100)	595	867
S1	0.68	0.76	149.6	0	0			
51	1.53	0.76	335.5	0	0	MH 201 (S201)	807	1131
52	3.26	0.68	717.2	0	0			
S2	0.36	0.66	79.2	0	0			
58	2.21	0.66	486.2	0	0	MH 203 (S203)	797	1123
59	2.66	0.71	585.2	0	0			
S3	0.24	0.68	52.8	0	0			
57	2.01	0.41	442.2	0	0	MH 204 (S204)	222	538
S4	0.44	0.68	96.8	0	0			
59	3.86	0.61	849.2	0	0	MH 205 (S205)	577	985
S5	0.62	0.62	136.4	0	0			
61	2.27	0.68	499.4	0	0	MH 206 (S206)	2391	4094
62	11.32	0.68	2489.3	0	0			
59	4.78	0.68	1051.6	0	0			
S6	0.29	0.62	63.8	0	0			
10L	2.25	0.70	0	534.8	0	E-FS	369	535
Western Trunk Storm Sewer								
31	2.66	0.59	0	0	353.2	236 (S236)	1442	1767
HE1	3.61	0.27	0	0	220.1			
TW1	1.75	0.70	0	416.0	0			
30	9.16	0.68	0	0	778.6			
68	0.99	0.76	0	0	217.9	237	1033	1474

Table 4.4 cont...

Drainage Area		Weighted Runoff Coefficient	Flow (l/s)			Manhole (XPSWMM ID)	Peak Flow from Saved Hydrograph (SWMHYMO) – 3 hour Chicago (l/s)	
ID	Area (ha)		220 l/s/ha	Rational Method 10 Year 10 Min	Other Restriction (refer to Table 4.2)*		5 Year†	100 year†
MB1	1.35	0.70	0	320.9	0	(S237)		
BCB-W	2.54	0.70	0	603.7	0			
70	1.51	0.66	332.2	0	0			
71	7.08	0.69	1654.4	0	0	630 (S630)	1191	1874
78	1.05	0.66	231.0	0	0			
77	0.53	0.65	116.6	0	0	607 (S607A)	92	167
80	0.76	0.66	167.2	0	0	631A (S631A)	128	167
73	8.14	0.63	1790.8	0	0	658 (S658)	1119	2005
81	1.01	0.63	222.2	0	0			
82	0.93	0.62	204.6	0	0	659 (S659)	146	204
MB2	2.45	0.70	0	582.3	0	690 (S690)	1070	2049
79	6.08	0.59	1337.6	0	0			
83	0.35	0.62	77.0	0	0			
Area 1	103.4	n/a	Unrestricted					
72	2.42	0.68	531.9	0	0	770 (S770)	2388	4272
74	6.35	0.66	1397.0	0	0			
75	5.84	0.44	1284.8	0	0			
60	4.84	0.62	1064.8	0	0			

Note: * Refer to Table 4.2 for reference to other restriction rates.

† Results from the 5 and 100 year 3 hour Chicago evaluation from 30113-D6.dat/out as presented in **Appendix B.**

The inlet control restriction was set to match flow as indicated in **Table 4.4**. The results of the SWMHYMO evaluation indicate that when applying the inlet control restriction and storage requirements as indicated in **Table 4.4**, there is cascading flow from existing areas and some future areas north of BCB. The future development areas south of BCB are self-contained with some instances where major flow is conveyed via some drainage areas to the stormwater facility. It is anticipated that detail evaluation of the major system for the future development will be completed as part of detailed subdivision design submission. The evaluation should account for the conveyance of major flow from the existing upstream areas. As part of the detailed evaluation of the major system, the total ponding in low points is not to exceed a depth of 0.3 m under static or dynamic conditions. The surface ponding design has to ensure that emergency overflow paths are maintained and flows are conveyed safely to the end-of-pipe stormwater management facility. A safety board of 0.3 m above the emergency overflow high point and lowest house opening should be provided.

Major System

Based on the hydrological modeling undertaken for the entire site on a semi-lumped basis, there are some instances of cascading major flow from already constructed areas north of BCB and from arterial roadways within the subdivision area. The following table summarizes the estimated major flow within the site based on semi-lumped areas. It should be noted that as part of detailed evaluation of the subdivision areas, the total ponding in low points is not to exceed a depth of 0.3 m under static or dynamic conditions. The surface ponding design has to ensure that emergency overflow paths are maintained and flows are conveyed safely to the

5 Storm Sewer Design

The proposed development is within the Avalon West Neighbourhood 5 which drains to McKinnon's Creek approximately 800m south of the site. The development will be serviced by the existing trunk sewer along Gerry Lalonde Drive. During the development of the adjacent subdivision, a 1350mm diameter storm sewer stub was installed for servicing the development. This service stub will be utilized for conveying the storm water flows from the site and the flows from the external drainage area to the north of the site.

The on site storm sewer system has been designed for ultimate build out conditions and includes the future development on the north side of the site and flows from the external drainage area comprising of a section of the future transit way and a section of the Hydro corridor to the north of the site.

6 Stormwater Management Design

An on-site storm water system has been designed to convey the storm water flows from the site to the existing 1350mm diameter storm sewer stub which is connected to the 1650mm diameter trunk sewer on Gerry Lalonde Blvd. Quantity control will be achieved by limiting the stormwater runoff to the allowable release rate determined during the Avalon West Neighbourhood 5 Western Trunk Storm Sewer Design. Flows from the external drainage on the north side of the site have been accounted for in the Stormwater Management design. Storm water flows from the site will be restricted to allowable release rates by installation of inlet control devices (ICDs) and using flow control roof drains. Storm water quality control will be provided by the Neighbourhood 5 SWM facility. A 900mm diameter storm sewer will be provided to service the future development on the property towards the north side of the site. A 375mm diameter stub will be provided to service the future park on the south-east side of the property.

The site grading has been designed to limit the maximum ponding under 100-year storm events to 300mm. Overland flow paths have been provided to convey the excess run off towards the municipal roads. Overland flow from the parking lot on the north side will sheet drain towards Mer Bleue Road. Overland flow from the rest of the current phase of development will sheet drain towards Brian Coburn Boulevard. Overland flows from the areas earmarked for future expansion of the Facility and from the external drainage area to the north will sheet drain towards Gerry Lalnonde Drive through the existing easement. Until such time the future development area is fully developed, there will be minimal or no overland flow from it. Following the development of this area, overland flow will be directed towards Brian Coburn Boulevard.

6.1 Allowable Release Rate

The allowable release rate for the site was established during the design of Avalon West (Neighborhood 5) Western Trunk Sewer and Stormwater Management Facility. Reference Table 4.4 and Figure 4 of the IBI report (Revision 2, 2012) included in Appendix A. The release rate for the OFHH site in IBI's report for up to the 100-year events is **778.6 L/s.** This release rate has been used for the SWM design of OFHH.

6.2 Design Criteria

The storm sewer system was designed in conformance with the latest version of the City of Ottawa Design Guidelines (October 2012).

Minor System Design Criteria

- The storm sewers and service laterals have been designed and sized based on the Rational Method and the Manning's Equation under free flow conditions for the 5-year storm using a 10-minute inlet time.
- Inflow rates into the minor system are limited to the allowable release rates determined in the Avalon West (Neighborhood 5) IBI Group Western Trunk Sewer and Stormwater Management Facility reports.

Major System Design Criteria

- The major system has been designed to accommodate onsite detention with sufficient capacity to attenuate the 100-year design storm. Excess runoff above the 100-year event will flow overland offsite.
- Onsite storage is provided for up to the 100-year design storm with maximum allowable ponding depth of 300mm on the ground surface and 150mm on the building roof. Calculations for the required onsite storage volumes are provided in Appendix A.
- Calculations of the required storage volumes have been prepared based on the Modified Rational Method as identified in Section 8.3.10.3 of the City's Sewer Guidelines. The depth and extent of surface storage is illustrated on the Site Servicing and Grading plan.

6.3 Runoff Coefficients

Runoff coefficients used for post-development conditions were based on actual areas measured in AutoCAD. Runoff coefficients for impervious surfaces (roofs, asphalt, and concrete) were taken as 0.90, whereas pervious surfaces (grass/landscaping) were taken as 0.20. Runoff coefficients were increased by 25% during the 100-year storm event, with a maximum of 1.0.

6.4 Calculation of Post-Development Runoff

Refer to the storm drainage plan drawing C003 for the post-development storm drainage areas. There will be small portions of the site that will be subject to free flow conditions due to site constraints and for matching existing grades at the perimeter of the site. There will be some uncontrolled flow from the western side of the site towards the Mer Bleue ROW and from the southern edge of the site towards the Brian Coburn Blvd ROW. The drainage from the loading dock area will also flow uncontrolled into the storm sewer network.

Based on the storm drainage areas presented on the storm drainage plan drawing C002, the 5-year and 100-year post-development peak flows are calculated based on the Rational Method and are summarized in the Table 6.1 below with detailed calculations provided in Appendix A.

Table 6.1: Summary of Post-Development Flows

Area No	Outlet Location	Area (ha)	Storm = 5-year			Storm = 100-year		
			C_{AVG}	Q (L/sec)	Q_{CAP} (L/sec)	C_{AVG}	Q (L/sec)	Q_{CAP} (L/sec)
Post-1	Roof	0.79	0.90	206.1	**23.0**	1.00	392.2	**23.0**
Post-2	Parking/Roads	2.89	0.80	673.7	**104.2**	1.00	1434.1	**104.2**
Post-3	Future Dev Area	5.20	0.20	301.5	301.5	0.25	645.3	**502.1**
Post-4	ROW Free Flow	0.21	0.34	20.6	20.6	0.42	44.0	44.0
Post-5	Loading Dock	0.07	0.90	18.3	18.3	1.00	34.7	34.7
Total		9.16		1220.2	**467.5**		2550.3	**708**

Flows in **bold** under Q_{CAP} denotes flows that are controlled.

Flow control devices will be used to restrict these runoff rates from the site to 708 L/sec up to the 100-year events which is less than the allowable 778.6 L/s. Further details regarding the onsite detention and storage methods are provided in the proceeding section.

6.5 Flow Control Method

It will be necessary to control runoff to the allowable rate; therefore, runoff will be detained using inlet control devices (ICDs) within the storm system as well as flow control roof drains. The following Table 6.2 summarizes the ICDs that are proposed.

Table 6.2: Summary of ICDs

Area No	ICD Location	Controlled Rate (L/sec)	Orifice Centre Elev. (m)	Max Elev. (m)	Head (m)	ICD Type / Model
Post-2	CBMH221	104.2	85.34	88.70	3.36	165mm diameter Plug Type Orifice
Post-3	CBMH226	502.1	85.04	88.00	2.96	375mm diameter Plug Type Orifice
Post-5	Roof Drains	23	N/A	N/A	0.15	By Mechanical

The discharge rate for the two ICDs was calculated based on the Orifice Equation, assuming it was fully submerged, as follows:

$Q_{ORF} = C * A * \sqrt{(2gH)}$

where:

Q_{ORF}	=	Flow through orifice, m^3/sec
C	=	Discharge Coefficient [0.61]
A	=	Area of orifice (m^2)
g	=	Acceleration due to gravity, m/sec^2 [9.81]
H	=	Head above centerline of orifice, m

6.6 Storage Requirements

Stormwater storage requirements and associated controlled release rates within the site are summarized below in Table 6.3. Detailed calculations using the Modified Rational Method of the onsite storage requirements are provided in Appendix A.

Table 6.3: Summary of Storage Requirements and Release Rates

Area No	Controlled Rate (L/sec)	Storage Volume Required (m^3)	Storage Volume Provided (m^3)
Post-2	104.2	1242.6	1287.9
Post-3	502.1	112.5	683.6
Post-5	23	363.9	375

The storage provided on the surface areas were estimated using the prism formula as follows:

$V = 1/3 \times A \times d$

where:

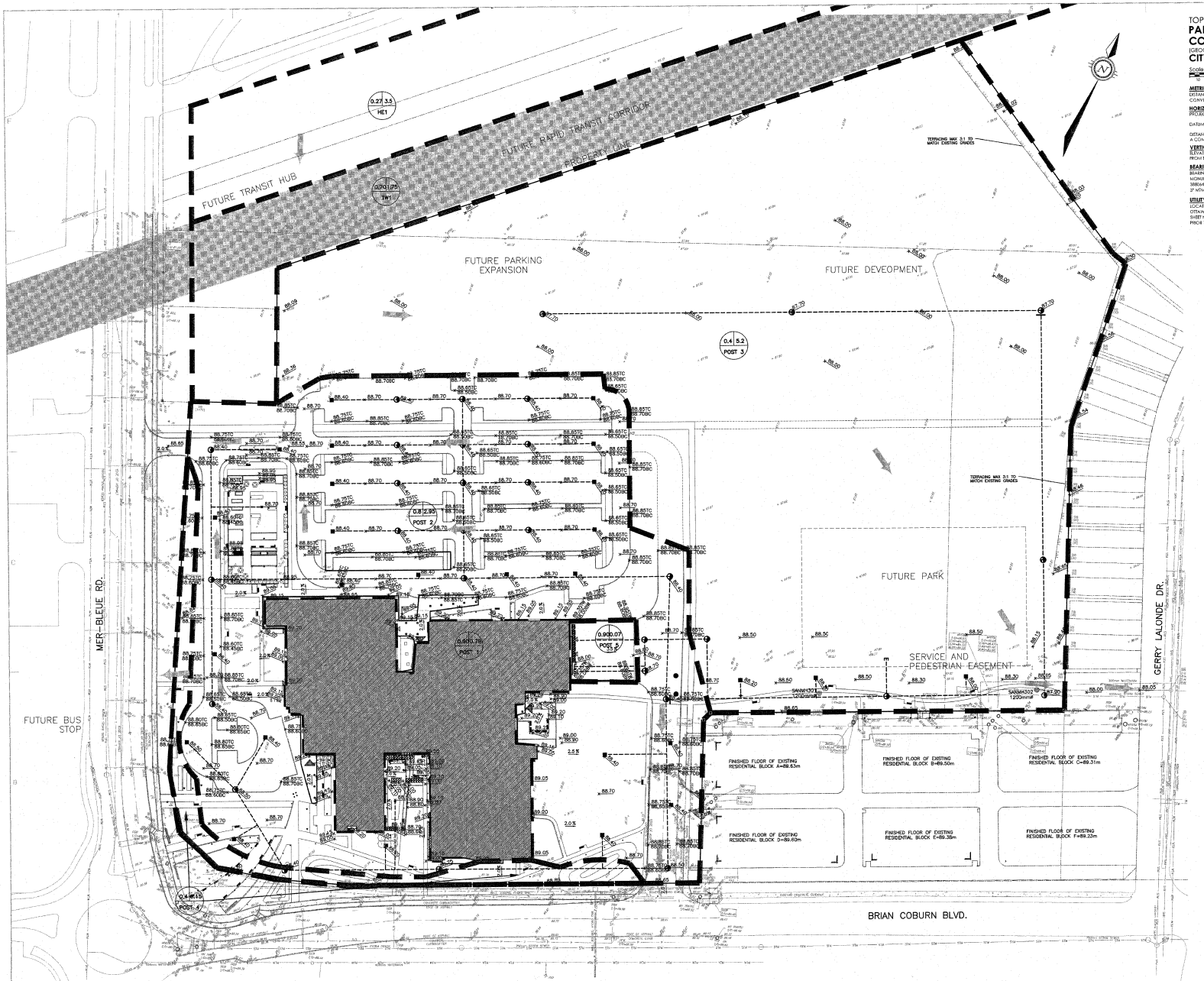
V	=	storage volume (cu.m.)
A	=	storage area (sq.m.)
d	=	maximum storage depth (m)

The depth is the difference in elevation between the low point elevation and the maximum water level. Refer to Appendix A for storage volume calculation details.

6.7 City Stress Test

As per Technical Bulletin ISDTB-2012-1 issued by the City of Ottawa, it is now a requirement that all drainage systems be stress tested using design storms calculated on the basis of a 20% increase of the City's IDF curves rainfall values. Modifications to the drainage system would be required if severe flooding to properties is identified.

As indicated previously, stormwater is to be stored on site for storms up to and including the 100 year storm events. An increase of 20% of the 100 year storm event will result in excess water following the overland flow route and spilling onto the City Right-of-Way before impacting the building. The building finished floor elevation has been established to maintain a minimum of 300mm freeboard from the spill elevation for each ponding area to the Finished Floor Elevation of for 100 year and larger storm events.



TOPOGRAPHIC PLAN OF SURVEY of
PART OF LOT 2
CONCESSION 11
[GEOGRAPHIC TOWNSHIP OF CUMBERLAND]
CITY OF OTTAWA

Scale 1:600

METRIC CONVERSION
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

HORIZONTAL DATUM NOTE
PROJECTION: MODIFIED TRANSVERSE MERCATOR
(MTM, ZONE 9, CM 76°30'W)
DATUM: NAD 83 (ORIGINAL)

DISTANCES ON THIS PLAN MAY BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY A COMBINED SCALE FACTOR OF 0.999647.

VERTICAL DATUM NOTE
ELEVATIONS SHOWN HEREON ARE GEODETIC (CGVD-1928:1978) AND ARE DERIVED FROM THE CAN-NET VRS NETWORK MONUMENT: OTTAWA ELEVATION=93.230.

BEARING NOTE
BEARINGS HEREON ARE GRID BEARINGS DERIVED FROM HORIZONTAL CONTROL MONUMENTS 1968017 (N 5033507.118 E 379109.89) AND 1968019 (N 5035664.24 E 380614.94) AND ARE REFERRED TO THE CENTRAL MERIDIAN 76° 30' WEST LONGITUDE OF THE 3° MTM ONTARIO COORDINATE SYSTEM, NAD83 (ORIGINAL) ZONE 9.

UTILITY NOTE
LOCATION OF UNDERGROUND SERVICES ARE APPROXIMATE AND ARE PER THE CITY OF OTTAWA PLAN & PROFILE DRAWINGS 14434 SHEET No's P1, P2, P3, P4, P9, P10 AND 14032 SHEET No. 10A AND CITY SHEETS N-22-02, H32-26, H32-02 AND H32-03 AND MUST BE VERIFIED PRIOR TO CONSTRUCTION.

LEGEND

- PROPOSED STORM SEWER
- EXISTING SWALE
- PROPOSED CATCHBASIN
- PROPOSED CATCHBASIN MANHOLE
- 0.9 0.37 / DA1 — RUNOFF COEFFICIENT, AREA (Ha), DRAINAGE AREA ID
- OVERLAND FLOW

PRELIMINARY
NOT FOR CONSTRUCTION

HDR Architecture Associates Inc.
300 Richmond Road, Suite 200, Ottawa, ON K1Z 6X6

exp Services Inc.
t +1.613.688.1899 | f +1.613.225.7337
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Ottawa, ON K2B 8H6
Canada

Orleans Health Hub (OHH)

2225 Mer-Bleue Road
Orleans, ON., K4A 3T8

LICENSED PROFESSIONAL ENGINEER
M.A. ANSARI
2018
PROVINCE OF ONTARIO

MARK	DATE	DESCRIPTION
01.	2017-11-22	MOHLTC Stage 3.2 Submission
02.	2018-04-05	SITE PLAN APPLICATION

Project Number: OTT-00240132-A0
Original Issue

Sheet Name
OHH - STORM DRAINAGE PLAN

Scale 1:600

Sheet Number
C-003

Project Status

• Taggart Group of Companies

Infrastructure Servicing Brief

Type of Document
Issued for Site Plan Application

Project Name
Chaperal – Site Plan

Project Number
2762

Prepared By:

exp Services Inc.
100-2650 Queensview Drive
Ottawa, ON K2B 8H6
Canada

Date Submitted
February 22, 2013
August 22, 2013 – Revision 1
October 8, 2013 – Revision 2
November 20, 2013 – Revision 3

4.4 Storm Sewer Temporary Flow Control Devices

As required per the City of Ottawa's Technical Bulletin No. SD-2011-1, a temporary orifice flow limiting/control device is required for the new storm sewer system. The storm system for the development will have a plug-type control implemented in the outlet pipe of proposed MH251. The sizing of the orifice requirements is as per Section 8.3.8.1 of the City's Sewer design guidelines as follows:

$Q = C(A)(2gh)^{0.5}$ $Q_{(MH251)}$ = 170 L/s (per allowable flow evaluated in Section 5.1)

$A = Q / (C(2gh)^{0.5})$
$\pi r^2 = Q / (C(2gh)^{0.5})$
$D = 2r = 2 \times (Q / (\pi (C(2gh)^{0.5})))^{0.5}$

$D_{(MH251)} = 2 \times (0.170 / (3.14*(0.6(2*9.81*1.5)^{0.5})))^{0.5}$ =**220 mm** (in the 525mm outlet pipe)

Where;
C = 0.6 head loss coefficient for an orifice
H = 2.74 m
A= Area of orifice; r= radius of orifice; g= acceleration due to gravity

The control above represents the final orifice sizing that will be required for the site and is located at the outlet point of the development. Therefore it will be considered permanent and will not be removed once the newly connected storm sewer systems are constructed.

5 Stormwater Management Calculations

5.1 Maximum Allowable Site Release Rate

The storm design information from the IBI report for the ultimate Stormwater Management Facility design will form the basis of determining the allowable release rate from the site. The IBI report models the overall contributions to the Western Trunk sewer that services the proposed development and as such specifies the anticipated inflows into the minor system.
With reference to *Table 4.4 and Figure 4* from the IBI report (provided in Appendix 4) the following is determined:

(a) Minor system inflow from "Block 20" = **217.9 L/s** (Area ID '68' in the IBI report)

In addition to the above, there has been an adjustment to the subdivision configuration as it relates to Area IDs '68' and '31' in the IBI Report. Through development of the site plan, via coordination with the City of Ottawa 'Block 20' has been merged with two other blocks (formerly Blocks 13 and 14) which were previously a part of Phase 4 of the Chaperal Subdivision (see the marked up IBI Group "*Figure 4" Drainage Area Plan* in Appendix 4). Given that the former Blocks 13/14 will now be incorporated into the site plan, the amount of inflow into the minor system represented by their tributary area can now be removed from Area '31' and added to the allowable release rate from Block 20.

The reallocated flows from Blocks 13 and 14, based upon their proportionate share contributed to Area '31', are determined as follows:

Area of Block 13/14 =	0.11 ha	
Area ID '31' total area =	2.06 ha	(from Table 4.2 in IBI report)
Area '31' Minor System Restriction =	353.2 L/s	(from Table 4.2 in IBI report)
(b) Portion of flows attributed to Block 13/14	(0.11/2.06)x353.2 L/s =	**18.9 L/s**

Therefore, the maximum allowable release rate from the site is determined to be:

Allowable release rate = 217.9 + 18.9 = **236.8 L/s**.

5.2 Free Flow Areas

Due to site constraints (grade raise restrictions), overland flows within the site and tie-ins to existing perimeter development there will be minor portions of the site that will be subject to free flow conditions. There will be some free flow off of the west end of the site and the east end of the site. Below is a summary of the free flow areas, their runoff coefficient and the resultant free flow rate (see 2762-STM1 in Appendix 4 for details).

Table 5.1 – Free Flow Summary

Free Flow Location	Area (ha)	Weighted Runoff Coefficient C (100 Yr)	Release Rate (L/s) – 100 Yr	
West	0.048	0.40	9.52	
East 1	0.013	0.30	2.00	
East 2	0.122	0.90	54.62	
East 3	0.006	0.31	0.99	
	0.189		**67.13**	**Totals**

Note: Runoff coefficient "C" and release rates are determined in Table 5.4 in Appendix 4

5.3 Post Development Average Run-off Coefficient, C

Run-off Coefficient used for asphalt and building areas – 0.9
Run-off Coefficient used for grass areas – 0.2

As determined in Tables 5.2 and 5.3 in Appendix 4, the weighted runoff coefficients for the central portion of the development that are not free flow are:

5 Year Runoff Coefficient = 0.82
100 Year Runoff Coefficient = 0.91

5.4 Storage Requirements

The allowable release rate from the development, in consideration of the free flow areas determined in Section 5.2 will be as follows:

Total Allowable Release Rate

= Allowable – Free Flow (100 year) = 236.8 L/s – 67.13 L/s = **170 L/s**

Utilizing the total allowable release rate, site area and average runoff coefficient, the storage requirements for the development are determined via Tables 5.2 to 5.12 (and Charts 5-1 to 5-3) in Appendix 4 and summarized as follows:

5-Year Storage Required = **104 m^3**

100-Year Storage Required = **219 m^3**

The 100-year storage required that is detailed above is based upon having the storage volume over and above any potential downstream HGL impacts as required by Section 8.3.11.4 of the sewer design guidelines. As discussed in Section 4.3 of this report the anticipated HGL in the vicinity of the site will be approximately 85.45m (conservatively use 85.50m). In order to account for this potential for backwater in the underground storage, the volume of water at this elevation added "on top" of the required storage volume for the site. From Table 5.8 in Appendix 4 the underground storage at 85.50m is 20.6 cubic meters. Therefore, the required 100-year storage volume from Chart 5-3 is approximately 216 cubic meters (195+20.6).

Flows will be controlled via a plug-type orifice in the outlet pipe of manhole MH251 (see 2762-SS1, Appendix 1). Given the site surface constraints resulting from the preferred unit layout, the majority of the site storage will be provided via underground oversized storm sewers and manhole structures. The volumes required and provided are summarized as follows:

Table 5.13 – Summary of Storage Requirements and Release Rates

Drainage Area No.	Storm Event	Area (ha)	Release Rate (L/s)	Required Storage (cu.m.)	Provided Storage (cu.m.)
Site Plan	5-year	1.19	78.9	104	221
	100-year	1.19	170	216	230

5.5 Flow Control Device Calculations

A 220mm plug-type orifice flow control at the outlet from the site (MH251) has been sized based upon a standard orifice equation to achieve the target release rates as per Section 4.4. Detailed calculations are also shown in Table 5.9 in Appendix 4.

LEGEND

RUNOFF COEFFICIENT
0.820.28 — AREA (ha)
1 — DOWNSTREAM MANHOLE

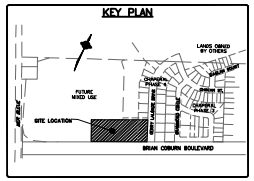
MAXIMUM PONDING FOR EVENTS IN EXCESS OF THE 100 YEAR RAIN EVENT

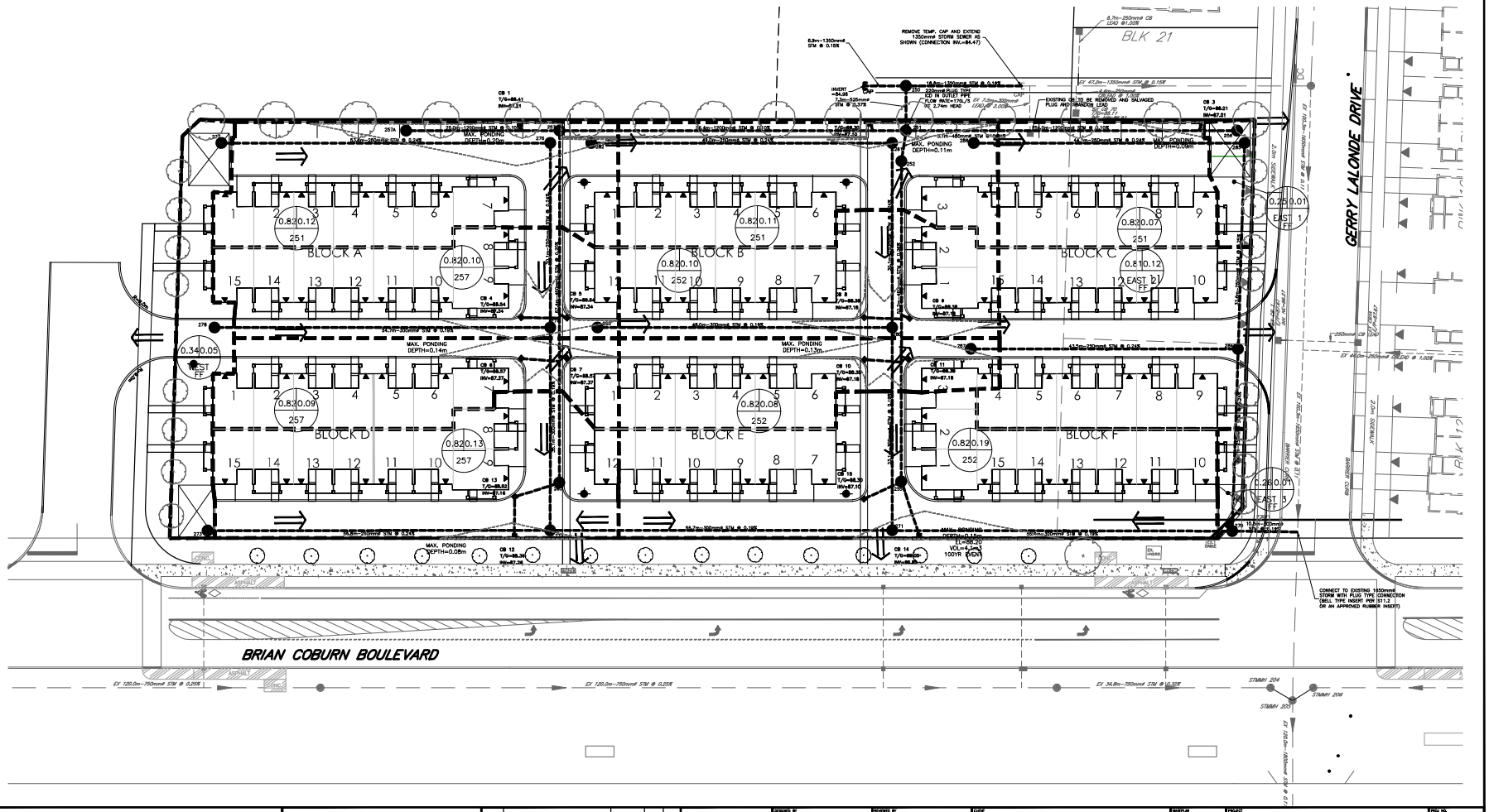
OVERLAND DRAINAGE DIRECTION

SUMMARY OF STORAGE PROVIDED

STRUCTURE	STORAGE VOLUME
1200mmø SEWERS	158.0 cu.m.
450mmø SEWERS	18.8 cu.m.
MH257, MH257A MH251, MH256	31.0 cu.m.
MH252, MH255, MH260	10.8 cu.m.
CBs	7.2 cu.m.
SURFACE (AT CB14 – depth 0.15m)	4.1 cu.m.
TOTAL	229.9 cu.m.
(REFERENCE TABLE 5.5 IN SERVICING REPORT)	

KEY PLAN





NOTES

THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

REV	REVISION DESCRIPTION	DATE	BY	APPD
3	REVISED AS PER CITY COMMENTS	08/10/13	SAB	BMT
2	REVISED AS PER CITY COMMENTS	22/08/13	KLM	BMT
1	ISSUED FOR SITE PLAN APPLICATION	22/02/13	KLM	KLM

SCALE: HORZ 1:300 (0, 3m, 6m, 12m)

DESIGNED BY

REVIEWED BY: B. M. THOMAS, Oct/18/13, PROFESSIONAL ENGINEER, PROVINCE OF ONTARIO

CLIENT: TAGGART GROUP OF COMPANIES

exp. Services Inc.

DESIGN: EXD
DRAWN: KLM
CHECKED: KLM
QA/QC: SAB
FINAL SIGN: KLM
APPROVED: KLM

PROJECT: CHAPERAL – BLOCK 20
CITY OF OTTAWA

PROJ NO.: 2762
SURVEY: exp.
DATE: FEBRUARY 2013

TITLE: STORM DRAINAGE AREA PLAN

DRAWING NO.: STM1
E210

david schaeffer engineering ltd
SMART SUBDIVISIONS™

120 Iber Road, Unit 103
Stittsville, Ontario K2S 1E9
Tel (613) 836-0856
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MEMORANDUM

DATE: April 13, 2018

TO: **Frank Cairo, Caivan (Orleans Village) Limited**

SUBJECT: **EUC SWM Pond 1 – Facility Capacity Allocation**

OUR FILE: DSEL Project No.881

ATTACHMENTS: EUC SWM Pond 1 – Original ECA and Amended ECA

Frank,

Further to your request, please see the following background information with respect to capacity allocation in the East Urban Community Stormwater Pond #1 (EUC SWM Pond 1) for the Orleans Village development area located at 3490 Innes Road.

A. Original Pond Approval

For background context, the original Environmental Compliance Approval (ECA) for the EUC SWM Pond #1 was based on the Stantec report "*EUC Urban Community Pond No. 1" (April 2008).*
The MOECC approval listed details as follows:

- ECA # 3330-4SUM4R;
- Two main cells (North Main cell and South Main cell);
- 'Normal' level of treatment (70% TSS);
- Total tributary area = 333 ha;
- Average imperviousness = 55%;
- 100,700 m^3 = Combined available storage volume of extended detention (quality/erosion) storage in the wet ponds;
- 30,529 m^3 = permanent pool (PP) storage (including forebays).

B. Amended SWM Pond Approval

An update to the original Stantec pond design and subsequent updates to the facility were documented in the DSEL Report "*Design Brief for the Reconstruction of the East Urban Community Stormwater Management Pond 1 for the Trail Edge Subdivision" (March 2014).*
The MOECC amended approval listed details as follows:

- Amended ECA # 0489-9KPPEJ;
- Two main cells (North Main cell and South Main cell);

- Total tributary area = 370.4 ha;
- Average imperviousness = 55%;
- 145,410 m^3 = Combined available storage volume of extended detention (quality/erosion) storage in the wet ponds (including PP volume);
- 109,010 m^3 = Combined available storage volume of extended detention without PP;
- *Plus add in new channel storage of 25,028m^3 for a total of 109,010+25,028 = 134,038 m^3 (note: this is not documented in the ECA but is a component of the updated design);
- 43,988 m^3 = extended detention volume;
- 36,400 m^3 = combined permanent pool storage (including forebays).

C. Ultimate SWM Pond Requirements and Allocation

As per the latest modelling for the Ultimate Pond Updates the following is noted:

- The current modelling accounts for prior pond upgrades and the most current development plan information for the Orleans Village (OV) development area; EUC CDP plan concepts and other residential contributing areas;
- The Ultimate Pond will require approximately 182,250 m^3 (per JFSA latest modelling and includes channel storage already provided);
- Current capacity is 134,038 m^3 (per ECA amendment above);
- Shortfall of 48,212 m^3 (between what we have now and the Ultimate requirement);
- All things being equal, this is approximately a 26% shortfall in volume for the Ultimate pond volume requirement;
- Therefore, 74% of the development area could be added to the EUC SWM Pond 1 in its interim condition;
- (OV) land area is 20.1ha residential and 10.6ha Development Reserve = 30.7ha;
- Assuming 74% of the OV area can go to the pond equates to ~22.7ha;
- **This contributing area accounts for all of the residential component going to the EUC Pond 1 since 20.1ha<22.7ha.**

Please contact the undersigned if you have any questions on the above servicing summary.

Yours truly,
David Schaeffer Engineering Ltd.

Per: Kevin L. Murphy, P.Eng.

Apr1318_EUC_Pond1_Allocation_memo.docx