Appendix A : Hydraulic Analysis Excerpts
February 15, 2019

APPENDICES

Appendix A : HYDRAULIC ANALYSIS EXCERPTS

residential units be completed with mitigation measures. The extent of this area should, however, be finalized pending the final grading plan and a more detailed analysis at detailed design. Although the minimum pressure constraint will not be achieved, the recommended measures are appropriate to reduce the inconvenience of low pressures. Hence, it is recommended that this deviation to the Guidelines be accepted.

7.4.2 Maximum Day plus Fire Flow Conditions

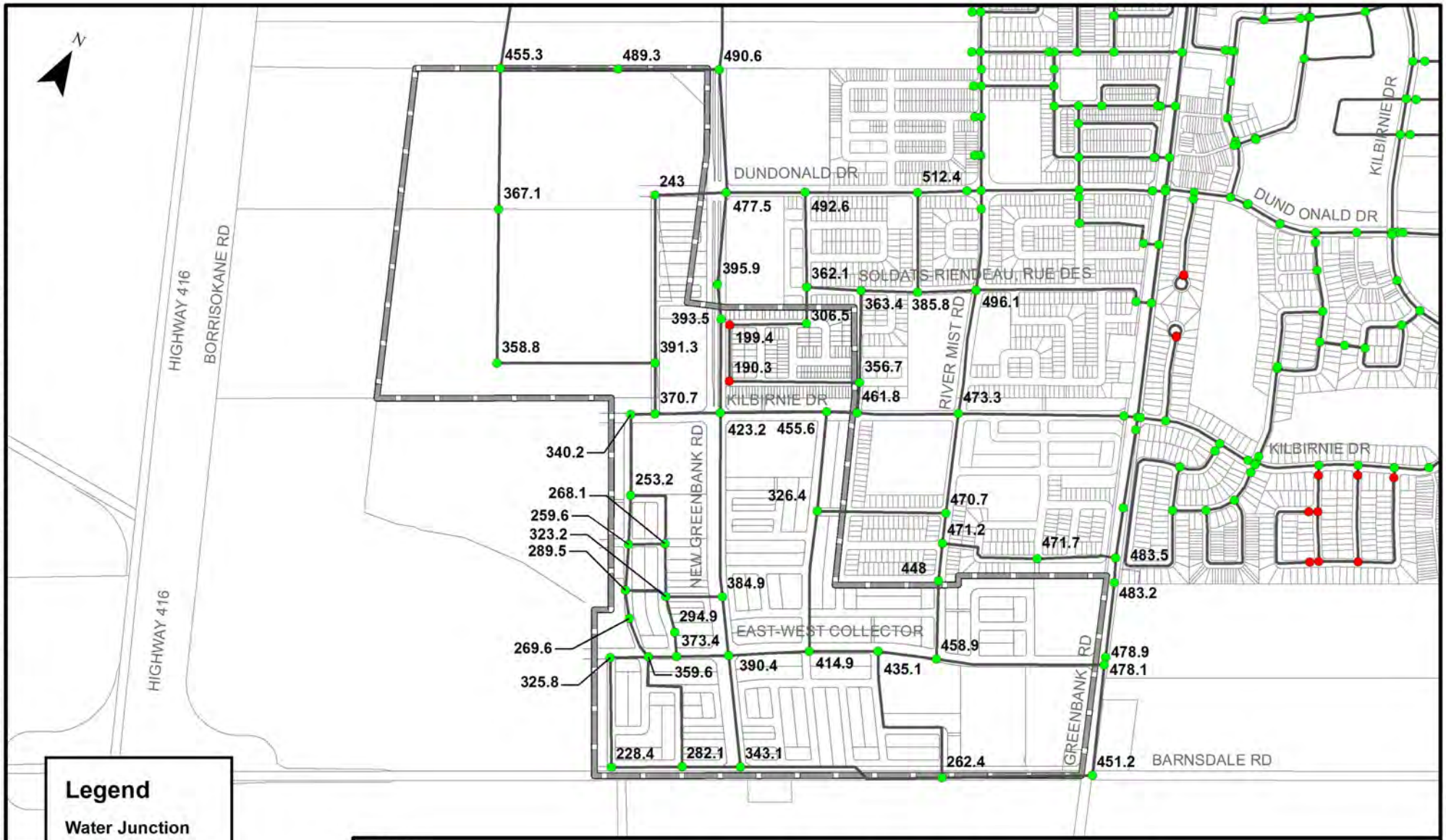
To ensure adequate fire protection, a maximum day demand was simultaneously simulated with a fire flow along the proposed watermains within the BSUEA. As per Section 7.2.4, a system level fire flow of 13,000 L/min (217 L/s) was used in this analysis with the static elevations reported in Table 7-5 under existing (2016) and build-out conditions (2031).

7.4.2.1 Existing Condition (2016 Scenario)

The watermain layout as depicted on Drawing MWM was found, in general, to be capable of delivering fire flows in excess of 13,000 L/min (217 L/s) within the BSUEA during a maximum day demand as shown on Figure 7-11. However, there are two (2) nodes located within the Mattamy Lands East that do not meet the system level fire flow of 13,000 L/min (217 L/s). Those nodes, located next to New Greenbank Road, have a fire flow availability that exceeds the cap fire flow of 10,000 L/min (167 L/s) as per Technical Bulletin ISDTB-2014-02; the two (2) nodes show fire flows of 190.3 L/s and 199.4 L/s. Given that fire flow at the boundary of the property of the Mattamy Lands East exceed 21,300 L/min (356 L/s), it is recommended that hydrant spacing within the Mattamy Lands East be developed by locating proposed hydrants closest to existing Half Moon Bay rather than New Greenbank Road. This servicing approach would increase fire flow availability within the Mattamy Lands East and potentially meet the system fire flow of 13,000 L/min (217 L/s). It is therefore recommended, that hydrant spacing be reviewed closely at detailed design of the Mattamy Lands East to maximize fire flow availability. It should also be noted that since the previous submission, the City has issued a Technical Bulletin (ISTB-2018-02) on water distribution, particularly in regard to hydrant capacity requirements and required fire flow (RFF). This Bulletin allows that the aggregate fire flow capacity of all contributing fire hydrants within 150 m of a building/structure be used against the RFF. Contributing hydrant flow should reflect those in Table 1 of Appendix I of the Technical Bulletin.

7.4.2.2 Build-out Condition (2031 Scenario)

The watermain layout as depicted on Drawing MWM was found, in general, to be capable of delivering fire flows in excess of 13,000 L/min (217 L/s) within the BSUEA during a maximum day demand as shown on Figure 7-12. However, there are two (2) nodes located within the Mattamy Lands East that do not meet the fire flow of 13,000 L/min (217 L/s). Those nodes, located next to New Greenbank Road, have a fire flow availability that exceeds the cap fire flow of 10,000 L/min (167 L/s) as per Technical Bulletin ISDTB-2014-02. Given that fire flow at the boundary of the property exceed 22,000 L/min (368 L/s), it is recommended that



Legend

Water Junction

Available fire flow

- < 217 L/s
- > 217 L/s

Watermain

Study Area

PROJECT:

BARRHAVEN SOUTH URBAN EXPANSION AREA

OTTAWA, ONTARIO

DRAWING:

MAX DAY PLUS FIRE CONDITION (2016)

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

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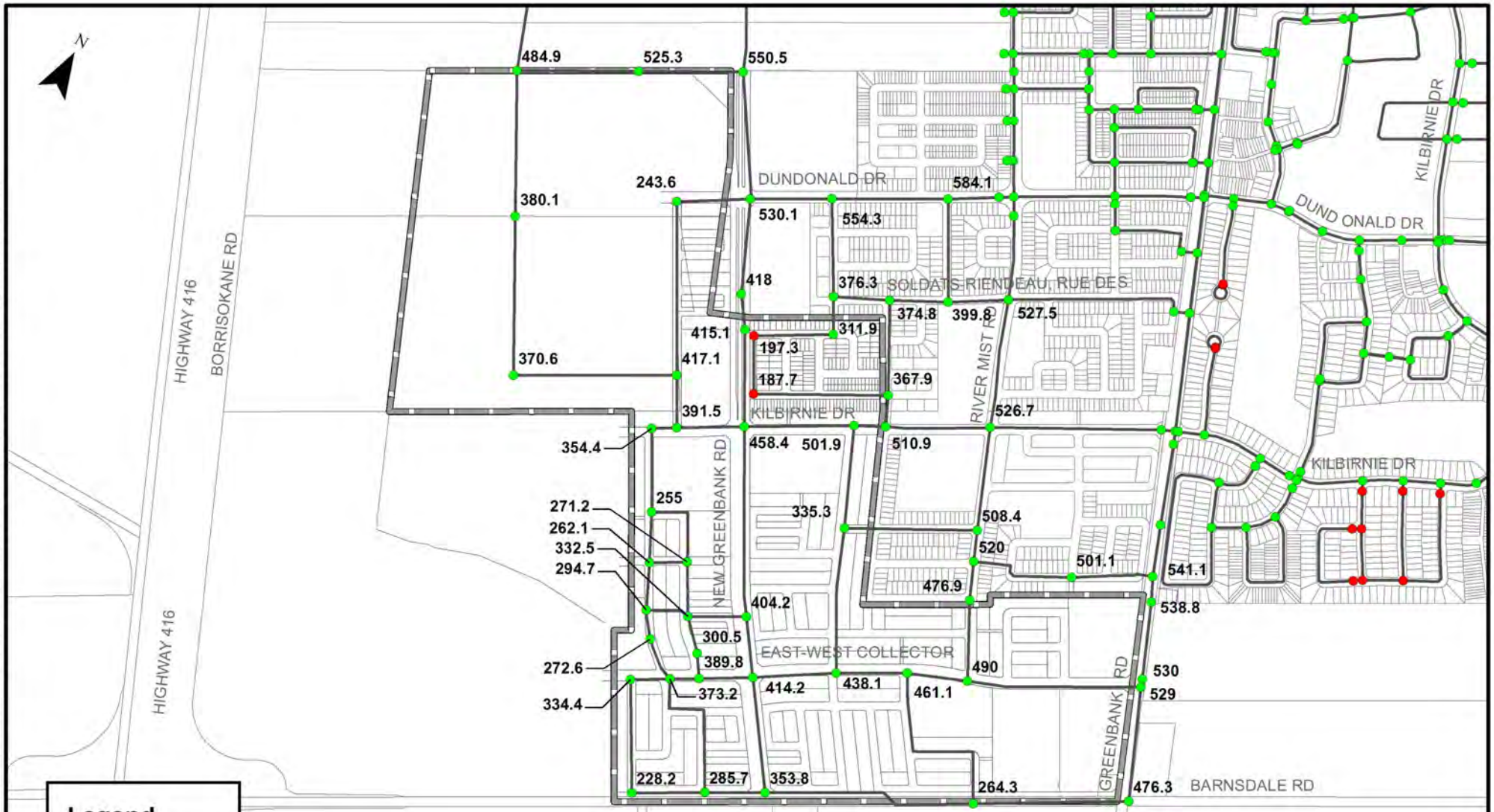
DESIGN:	ID
DRAWN:	KTK
CHECKED:	GF
JLR #:	26610

DRAWING #:

FIGURE 7-11

File Location: R:\26000\26610 - Barrhaven Expansion - Minto Brazeau Mattamy\JLR DWG\GIS\26610 C MaxDayFire_2016.mxd

Plot Date: May 2, 2018 10:41:23 AM



Legend

Water Junction

Available fire flow

- < 217 L/s
- > 217 L/s

Watermain

Study Area

PROJECT:

BARRHAVEN SOUTH URBAN EXPANSION AREA

OTTAWA, ONTARIO

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MAX DAY PLUS FIRE CONDITION (2031)

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DESIGN:	ID
DRAWN:	KTK
CHECKED:	GF
JLR #:	26610

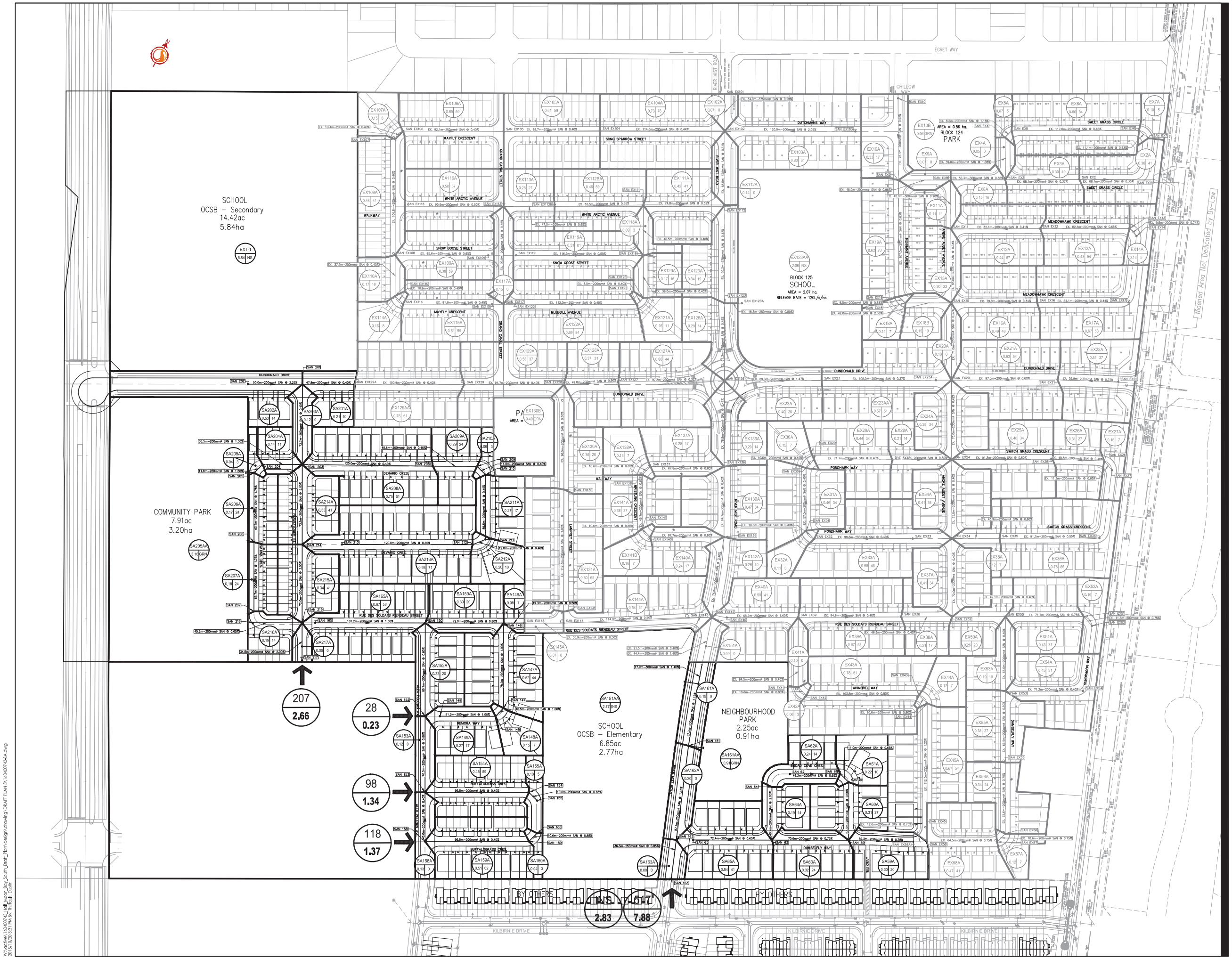
DRAWING #:

FIGURE 7-12

File Location: R:\26000\26610 - Barrhaven Expansion - Minto Brazeau Mattamy\JLR DWG\GIS\26610 C MaxDayFire_2031.mxd

Plot Date: May 2, 2018 10:54:12 AM

Appendix B : SANITARY SEWER CALCULATIONS & REPORT EXCERPTS



Stantec

Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

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Legend

SA101A — SANITARY DRAINAGE AREA ID#
0.50 | 12 — POPULATION / SANITARY DRAINAGE AREA ha.
SANITARY DRAINAGE AREA
PROPOSED SANITARY SEWER
EXISTING PHASE
FUTURE STUB
EX101A 0.50 | 12 — FUTURE SANITARY DRAINAGE AREA
891 — OFF-SITE OVERALL CONTRIBUTING POPULATION
12.72 — OFF-SITE OVERALL CONTRIBUTING AREA (ha.)

Notes

Revision		By	Appd.	YY.MM.DD
5	ISSUED FOR CONSTRUCTION	DT	DT	15.10.20
4	REVISED INTERIM DRAINAGE	DT	DT	15.09.02
3	REVISED PER CITY COMMENTS	DT	DT	15.08.26
2	REVISED PER CITY COMMENTS	WJ	DT	15.07.30
1	ISSUED FOR REVIEW	MS	DT	15.05.27

File Name: 160400743-D8	DT	PM	DT	15.05.19
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

LICENSED PROFESSIONAL ENGINEER
D. C. THIFFAULT
100186107
20/10/2015
PROVINCE OF ONTARIO

Client/Project

MATTAMY HOMES LTD.

HALF MOON BAY SOUTH
PHASE 4
Ottawa, ON

Title

SANITARY DRAINAGE PLAN

Project No. 160400743

Scale 1:1500 (0 15 45 75m)

Drawing No. SA-1

Sheet 28 of 28

Revision 5

ORIGINAL SHEET - ARCH D

Stantec

SUBDIVISION:

HALF MOON BAY SOUTH SUBDIVISION - PHASE 4

DATE: 26/8/2015
REVISION: 2
DESIGNED BY: DT
CHECKED BY:

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160400743

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	350 l/p/day	MINIMUM VELOCITY	0.60 m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	50,000 l/ha/day	MAXIMUM VELOCITY	3.00 m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000 l/ha/day	MANNINGS n	0.013
PEAKING FACTOR (COMM., INST.):	1.5	INDUSTRIAL (LIGHT)	35,000 l/ha/day	BEDDING CLASS	B
PERSONS / SINGLE UNIT	3.4	INSTITUTIONAL	50,000 l/ha/day	MINIMUM COVER	2.50 m
PERSONS / TOWNHOME	2.7	INFILTRATION	0.28 l/s/Ha		
PERSONS / APARTMENT	2.3				

LOCATION			RESIDENTIAL AREA AND POPULATION									COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+I+I	INFILTRATION			TOTAL	PIPE							
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA	UNITS SINGLE	UNITS TOWN	UNITS APT.	POP.	CUMULATIVE AREA	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW	FLOW	LENGTH	DIA	MATERIAL	CLASS	SLOPE	CAP. (FULL)	CAP. V PEAK FLOW	VEL. (FULL)	VEL. (ACT.)
			(ha)					(ha)			(l/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)			(%)	(l/s)	(%)	(m/s)	(m/s)
EX103A	EX103	EX102	0.80	18	0	0	61	0.80	61	4.00	1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.80	0.80	0.2	1.2	120.0	200	PVC	SDR 35	2.02	47.5	**2.56%**	1.49	0.54
EX123AA	EX123A	EX123	0.00	0	0	0	0	0.00	0	4.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	2.06	2.06	0.00	0.00	1.8	2.06	2.06	0.6	2.4	15.8	250	PVC	SDR 35	0.89	57.1	**4.14%**	1.15	0.47
EX23AA	EX23A	EX23	0.67	15	0	0	51	0.67	51	4.00	0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.67	0.67	0.2	1.0	105.0	200	PVC	SDR 35	0.37	20.4	**4.97%**	0.64	0.28
EX23A	EX23	EX126	0.40	6	0	0	20	1.06	71	4.00	1.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.40	1.06	0.3	1.5	89.3	200	PVC	SDR 35	1.47	40.5	**3.59%**	1.27	0.50
EX131A	EX131	EX130	0.80	19	0	0	65	0.80	65	4.00	1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.80	0.80	0.2	1.3	112.3	200	PVC	SDR 35	1.00	33.4	**3.80%**	1.05	0.42
EX130B, EX130A	EX130	EX128	0.36	6	0	0	20	1.16	85	4.00	1.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.40	0.0	0.76	1.56	0.4	1.8	96.5	200	PVC	SDR 35	0.50	23.6	**7.68%**	0.74	0.37
SA202A	202	201	0.53	4	0	0	14	0.53	14	4.00	0.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.53	0.53	0.1	0.4	50.0	200	PVC	SDR 35	3.25	60.3	**0.61%**	1.90	0.46
SA213A	213	212	0.93	21	0	0	71	0.93	71	4.00	1.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.93	0.93	0.3	1.4	120.0	200	PVC	SDR 35	0.65	27.0	**5.26%**	0.85	0.37
SA212A	212	211	0.20	3	0	0	10	1.13	82	4.00	1.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.20	1.13	0.3	1.6	12.8	200	PVC	SDR 35	0.40	21.1	**7.75%**	0.67	0.33
SA211A	211	210	0.27	5	0	0	17	1.40	99	4.00	1.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.27	1.40	0.4	2.0	59.5	200	PVC	SDR 35	0.40	21.1	**9.41%**	0.67	0.35
SA210A	210	209	0.06	1	0	0	3	1.46	102	4.00	1.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.06	1.46	0.4	2.1	11.0	200	PVC	SDR 35	0.40	21.1	**9.75%**	0.67	0.35
SA209A	209	208	0.29	7	0	0	24	1.75	126	4.00	2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.29	1.75	0.5	2.5	40.6	200	PVC	SDR 35	0.40	21.1	**11.95%**	0.67	0.37
SA208A	208	203	0.75	18	0	0	61	2.50	187	4.00	3.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.75	2.50	0.7	3.7	120.0	200	PVC	SDR 35	0.40	21.1	**17.63%**	0.67	0.42
SA207A	207	206	0.18	0	9	0	24	0.18	24	4.00	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.18	0.18	0.0	0.4	63.7	200	PVC	SDR 35	1.75	44.2	**1.00%**	1.39	0.37
SA206A	206	205	0.17	0	9	0	24	0.35	49	4.00	0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.17	0.35	0.1	0.9	63.7	200	PVC	SDR 35	1.75	44.2	**2.00%**	1.39	0.46
SA205AA	205A	205	0.00	0	0	0	0	0.00	0	4.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.10	3.10	0.0	3.10	3.10	0.9	0.9	7.7	150	PVC	DR 28	1.00	15.3	**5.66%**	0.86	0.39
SA205A	205	204	0.04	0	1	0	3	0.40	51	4.00	0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.10	0.0	0.04	3.50	1.0	1.8	11.0	200	PVC	SDR 35	1.50	41.0	**4.42%**	1.29	0.55
SA204A	204	203	0.14	0	4	0	11	0.54	62	4.00	1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.10	0.0	0.14	3.64	1.0	2.0	36.5	200	PVC	SDR 35	1.50	41.0	**4.94%**	1.29	0.55
SA216A	216	215	0.19	0	5	0	14	0.19	14	4.00	0.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.19	0.19	0.1	0.3	45.2	200	PVC	SDR 35	0.65	27.0	**1.01%**	0.85	0.23
SA217A, External	217	215	2.72	61	0	0	207	2.72	207	4.00	3.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	2.72	2.72	0.8	4.1	34.5	200	PVC	SDR 35	2.00	47.3	**8.72%**	1.49	0.76
SA215A	215	214	0.34	0	15	0	41	3.25	261	4.00	4.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.34	3.25	0.9	5.1	72.0	200	PVC	SDR 35	2.00	47.3	**10.88%**	1.49	0.81
SA214A	214	203	0.35	0	15	0	41	3.60	302	4.00	4.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.35	3.60	1.0	5.9	73.5	200	PVC	SDR 35	2.00	47.3	**12.48%**	1.49	0.85
SA203A	203	201	0.12	0	0	0	0	6.75	551	3.95	8.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.10	0.0	0.12	9.85	2.8	11.6	73.7	200	PVC	SDR 35	0.40	21.1	**54.76%**	0.67	0.58
SA201A	201	EX129A	0.21	3	0	0	10	7.49	575	3.94	9.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.10	0.0	0.21	10.59	3.0	12.1	47.8	200	PVC	SDR 35	0.40	21.1	**57.43%**	0.67	0.59
EX129AA	EX129A	EX129	0.75	18	0	0	61	8.24	636	3.92	10.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.10	0.0	0.75	11.34	3.2	13.3	100.9	200	PVC	SDR 35	0.40	21.1	**62.76%**	0.67	0.61
EX129A	EX129	EX128	0.58	11	0	0	37	8.82	673	3.90	10.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.10	0.0	0.58	11.92	3.3	14.0	91.7	200	PVC	SDR 35	0.40	21.1	**66.15%**	0.67	0.62
EX128A	EX128	EX127	0.37	9	0	0	31	10.35	789	3.86	12.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.50	0.0	0.37	13.85	3.9	16.2	49.8	200	PVC	SDR 35	0.50	23.6	**68.64%**	0.74	0.70
EX127A	EX127	EX126	0.66	13	0	0	44	11.01	833	3.85	13.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.50	0.0	0.66	14.51	4.1	17.1	97.8	200	PVC	SDR 35	0.32	19.0	**89.70%**	0.60	0.61
SA163A	163	162	7.96	118	43	0	517	7.96	517	3.97	8.3	0.00	0.00	0.00	0.00	0.00	0.00	2.83	2.83	0.00	0.00	2.5	10.79	10.79	3.0	13.8	36.3	250	PVC	SDR 35	0.85	55.9	**24.67%**	1.13	0.78
SA162A	162	161	0.20	0	0	0	0	8.16	517	3.97	8.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.83	0.00	0.00	2.5	0.20	10.99	3.1	13.8	87.2	250	PVC	SDR 35	1.15	65.0	**21.29%**	1.31	0.86
SA161AA	161A	161	0.00	0	0	0	0	0.00	0	4.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91	0.91	0.0	0.91	0.91	0.3	0.3	14.0	150	PVC	DR 28	1.00	15.3	**1.66%**	0.86	0.27
SA161A	161	151	0.19	0	0	0	0	8.35	517	3.97	8.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.83	0.00	0.91	2.5	0.19	12.09	3.4	14.2	57.7	250	PVC	SDR 35	1.15	65.0	**21.77%**	1.31	0.88
SA151AA	151A	151	0.00	0	0	0	0	0.00	0	4.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	2.77	2.77	0.00	0.00	2.4	2.77	2.77	0.8	3.2	12.7	150	PVC	DR 28	1.00	15.3	**20.77%**	0.86	0.57
EX151A	151	EX151	0.09	0	0	0	0	8.44	517	3.97	8.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.60	0.00	0.91	4.9	0.09	14.95	4.2	17.4	17.9	300	PVC	SDR 35	1.40	113.6	**15.28%**	1.61	0.98
	EX151	EX142	0.00	0	0	0	0	8.44	517	3.97	8.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.60	0.00	0.91	4.9	0.00	14.95	4.2	17.4	44.4	300	PVC	SDR 35	1.40	113.6	**15.28%**	1.61	0.98
SA165A	165	150	0.67	17	0	0	58	0.67	58	4.00	0.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.67	0.67	0.2	1.1	101.2	200	PVC	SDR 35	1.50	41.0	**2.75%**	1.29	0.47
SA155A	155	154	0.10	0	2	0	5	0.10	5	4.00	0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.10	0.10	0.0	0.1	10.6	200	PVC	SDR 35	0.65	27.0	**0.43%**	0.85	0.18
SA154A	154	153	0.48	0	22	0	59	0.59	65	4.00	1.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.48	0.59	0.2	1.2	95.5	200	PVC	SDR 35	0.40	21.1	**5.74%**	0.67	0.30
SA160A	160	159	0.04	0	1	0	3	0.04	3	4.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.04	0.04	0.0	0.1	10.6	200	PVC	SDR 35	0.65	27.0	**0.21%**	0.85	0.13
SA159A	159	158	0.51	0	23	0	62	0.56	65	4.00	1.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.51	0.56	0.2	1.2	95.5	200	PVC	SDR 35	0.40	21.1	**5.70%**	0.67	0.30
SA158A, External	158	153	1.50	14	50	0	118	2.06	183	4.00	3.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	1.50	2.06	0.6	3.5	45.0	200	PVC	SDR 35	0.40	21.1	**16.73%**	0.67	0.41
SA153A, External	153	152	1.46	12	21	0	98	4.10	345	4.00	5.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	1.46	4.10	1.1	6.7	70.0	200	PVC	SDR 35	0.80	29.9	**22.53%**	0.94	0.63
SA152A, External	152	150	0.56	14	0	0	48	4.66	393	4.00	6.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.56	4.66	1.3	7.7	85.7	200	PVC	SDR 35	0.80	29.9	**25.64%**	0.94	0.66
SA150A	150	146	0.30	6	0	0	20	5.63	471	3.99	7.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.30	5.63	1.6	9.2	72.0	200	PVC	SDR 35	0.80	29.9	**30.71%**	0.94	0.70
SA149A	149	148	0.27	5	0	0	17	0.27	17	4.00	0.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.27	0.27	0.1	0.4	51.2	200	PVC	SDR 35	1.00	33.4	**1.05%**	1.05	0.28
SA148A	148	147	0.15	2	0	0	7	0.42	24	4.00	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.15	0.42	0.1	0.5	10.5	200	PVC	SDR 35	1.00	33.4	**1.51%**	1.05	0.32
SA147A	147	146	0.52	13	0	0	44	0.95	68	4.00	1.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.52	0.95	0.3	1.4	78.2	200	PVC	SDR 35	1.00	33.4	**4.09%**	1.05	0.43
SA146A	146	EX145	0.08	2	0	0	7	6.66	546	3.95	8.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.08	6.66	1.9	10.6	19.3	200	PVC	SDR 35	0.50	23.6	**44.87%**	0.74	0.62

Stantec

SUBDIVISION:

HALF MOON BAY SOUTH SUBDIVISION - PHASE 4

DATE: 26/8/2015
REVISION: 2
DESIGNED BY: DT
CHECKED BY:

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160400743

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	350 l/p/day	MINIMUM VELOCITY	0.60 m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	50,000 l/ha/day	MAXIMUM VELOCITY	3.00 m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000 l/ha/day	MANNINGS n	0.013
PEAKING FACTOR (COMM., INST.):	1.5	INDUSTRIAL (LIGHT)	35,000 l/ha/day	BEDDING CLASS	B
PERSONS / SINGLE UNIT	3.4	INSTITUTIONAL	50,000 l/ha/day	MINIMUM COVER	2.50 m
PERSONS / TOWNHOME	2.7	INFILTRATION	0.28 l/s/Ha		
PERSONS / APARTMENT	2.3				

LOCATION			RESIDENTIAL AREA AND POPULATION									COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+I+I	INFILTRATION			TOTAL	PIPE							
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA	SINGLE	UNITS TOWN	APT.	POP.	CUMULATIVE AREA	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW	FLOW	LENGTH	DIA	MATERIAL	CLASS	SLOPE	CAP. (FULL)	CAP. V PEAK FLOW	VEL. (FULL)	VEL. (ACT.)
			(ha)					(ha)			(l/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)			(%)	(l/s)	(%)	(m/s)	(m/s)
EX145A	EX145	EX144	0.07	0	0	0	0	6.73	546	3.95	8.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.07	6.73	1.9	10.6	35.9	200	PVC	SDR 35	0.50	23.6	**44.94%**	0.74	0.62
EX144A	EX144	EX143	0.54	9	0	0	31	7.27	576	3.94	9.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.54	7.27	2.0	11.2	114.9	200	PVC	SDR 35	0.50	23.6	**47.53%**	0.74	0.62
	EX143	EX142	0.00	0	0	0	0	7.27	576	3.94	9.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	7.27	2.0	11.2	21.5	200	PVC	SDR 35	0.40	21.1	**53.14%**	0.67	0.58
EX142A	EX142	EX139	0.26	3	0	0	10	15.97	1104	3.77	16.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.60	0.00	0.91	4.9	0.26	22.48	6.3	28.0	74.8	300	PVC	SDR 35	0.40	60.7	**46.15%**	0.86	0.72
EX141B	EX141	EX140	0.16	2	0	0	7	0.16	7	4.00	0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.16	0.16	0.0	0.2	10.6	200	PVC	SDR 35	0.65	27.0	**0.58%**	0.85	0.18
EX140A	EX140	EX139	0.24	5	0	0	17	0.40	24	4.00	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.24	0.40	0.1	0.5	67.7	200	PVC	SDR 35	0.65	27.0	**1.85%**	0.85	0.28
EX139A	EX139	EX136	0.47	10	0	0	34	16.84	1162	3.76	17.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.60	0.00	0.91	4.9	0.47	23.35	6.5	29.1	64.7	300	PVC	SDR 35	0.40	60.7	**47.89%**	0.86	0.73
EX141A	EX141	EX138	0.38	8	0	0	27	0.38	27	4.00	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.38	0.38	0.1	0.5	49.7	200	PVC	SDR 35	0.65	27.0	**2.03%**	0.85	0.28
EX138A	EX138	EX137	0.18	2	0	0	7	0.56	34	4.00	0.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.18	0.56	0.2	0.7	10.6	200	PVC	SDR 35	0.65	27.0	**2.62%**	0.85	0.31
EX137A	EX137	EX136	0.28	5	0	0	17	0.84	51	4.00	0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.28	0.84	0.2	1.1	67.8	200	PVC	SDR 35	0.65	27.0	**3.94%**	0.85	0.35
EX136A	EX136	EX126	0.29	4	0	0	14	17.96	1226	3.74	18.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.60	0.00	0.91	4.9	0.29	24.48	6.9	30.3	78.9	300	PVC	SDR 35	0.41	61.7	**49.10%**	0.88	0.74
EX126A	EX126	EX123	0.29	0	5	0	14	30.32	2144	3.56	30.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.60	0.00	4.41	4.9	0.29	40.34	11.3	47.1	71.3	375	PVC	SDR 35	0.45	117.4	**40.10%**	1.06	0.85
EX123A	EX123	EX112	0.34	0	7	0	19	30.66	2163	3.56	31.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.66	0.00	4.41	6.7	0.34	42.73	12.0	49.8	90.3	375	PVC	SDR 35	0.42	113.8	**43.78%**	1.03	0.85
EX117A	EX117	EX113	0.15	0	0	0	0	0.15	0	4.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.15	0.15	0.0	0.0	90.0	200	PVC	SDR 35	0.65	27.0	**0.15%**	0.85	0.13
EX116A	EX116	EX113	0.50	0	21	0	57	0.50	57	4.00	0.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.50	0.50	0.1	1.1	90.6	200	PVC	SDR 35	0.50	23.6	**4.48%**	0.74	0.32
EX113A	EX113	EX112B	0.25	0	10	0	27	0.90	84	4.00	1.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.25	0.90	0.3	1.6	47.0	200	PVC	SDR 35	0.65	27.0	**5.96%**	0.85	0.39
EX112BA	EX112B	EX111	0.46	0	22	0	59	1.36	143	4.00	2.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.46	1.36	0.4	2.7	81.5	200	PVC	SDR 35	0.65	27.0	**10.01%**	0.85	0.45
EX119A	EX119	EX118	0.51	0	30	0	81	0.51	81	4.00	1.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.51	0.51	0.1	1.5	116.9	200	PVC	SDR 35	0.50	23.6	**6.15%**	0.74	0.34
EX122A	EX122	EX121	0.69	0	31	0	84	0.69	84	4.00	1.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.69	0.69	0.2	1.5	112.0	200	PVC	SDR 35	0.40	21.1	**7.33%**	0.67	0.32
EX121A	EX121	EX120	0.16	0	4	0	11	0.85	95	4.00	1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.16	0.85	0.2	1.8	8.5	200	PVC	SDR 35	0.40	21.1	**8.37%**	0.67	0.34
EX120A	EX120	EX118	0.17	0	6	0	16	1.02	111	4.00	1.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.17	1.02	0.3	2.1	39.0	200	PVC	SDR 35	0.40	21.1	**9.84%**	0.67	0.35
EX118A	EX118	EX111	0.09	0	1	0	3	1.62	194	4.00	3.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.09	1.62	0.5	3.6	46.5	200	PVC	SDR 35	0.40	21.1	**17.04%**	0.67	0.41
EX111A	EX111	EX112	0.42	0	15	0	41	3.39	378	4.00	6.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.42	3.39	0.9	7.1	74.8	200	PVC	SDR 35	0.32	18.9	**37.43%**	0.59	0.47
EX112A	EX112	EX102	0.14	0	0	0	0	34.19	2541	3.50	36.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.66	0.00	4.41	6.7	0.14	46.26	13.0	55.7	68.0	375	PVC	SDR 35	0.31	97.4	**57.13%**	0.88	0.79
EX115A	EX115	EX114	0.51	0	22	0	59	0.51	59	4.00	1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.51	0.51	0.1	1.1	81.6	200	PVC	SDR 35	0.40	21.1	**5.22%**	0.67	0.29
EX114A	EX114	EX110	0.16	0	3	0	8	0.67	68	4.00	1.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.16	0.67	0.2	1.3	10.6	200	PVC	SDR 35	0.40	21.1	**6.05%**	0.67	0.30
EX110A	EX110	EX108	0.17	0	6	0	16	0.83	84	4.00	1.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.17	0.83	0.2	1.6	37.5	200	PVC	SDR 35	0.40	21.1	**7.51%**	0.67	0.32
EX109A	EX109	EX108	0.38	0	22	0	59	0.38	59	4.00	1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.38	0.38	0.1	1.1	85.6	200	PVC	SDR 35	0.65	27.0	**3.96%**	0.85	0.35
EX108A	EX108	EX107	0.48	0	15	0	41	1.69	184	4.00	3.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.48	1.69	0.5	3.4	106.8	200	PVC	SDR 35	0.40	21.1	**16.30%**	0.67	0.41
EX107A	EX107	EX106	0.15	0	3	0	8	1.84	192	4.00	3.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.15	1.84	0.5	3.6	10.4	200	PVC	SDR 35	0.40	21.1	**17.13%**	0.67	0.41
EX106A	EX106	EX105	0.65	0	22	0	59	2.49	251	4.00	4.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.65	2.49	0.7	4.8	92.1	200	PVC	SDR 35	0.40	21.1	**22.54%**	0.67	0.45
EX105A	EX105	EX104	0.61	0	22	0	59	3.11	311	4.00	5.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.61	3.11	0.9	5.9	88.7	200	PVC	SDR 35	0.40	21.1	**27.90%**	0.67	0.48
EX104A	EX104	EX102	0.73	0	28	0	76	3.83	386	4.00	6.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.73	3.83	1.1	7.3	114.6	200	PVC	SDR 35	0.44	22.2	**33.05%**	0.70	0.52
EX102A	EX102	EX101	0.07	0	0	0	0	38.89	2989	3.44	41.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.66	0.00	4.41	6.7	0.07	50.96	14.3	62.6	34.0	375 375	PVC	SDR 35	0.29	95.1	**65.84%**	0.86	0.80
EX7A	EX7	EX6	0.10	0	2	0	5	0.10	5	4.00	0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.10	0.10	0.0	0.1	11.1	200	PVC	SDR 35	0.63	26.5	**0.44%**	0.83	0.18
EX6A	EX6	EX5	0.66	0	31	0	84	0.76	89	4.00	1.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.66	0.76	0.2	1.7	117.0	200	PVC	SDR 35	0.65	26.9	**6.15%**	0.85	0.39
EX5A	EX5	EX4	0.07	0	2	0	5	0.83	95	4.00	1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.07	0.83	0.2	1.8	8.5	200	PVC	SDR 35	1.18	36.3	**4.86%**	1.14	0.49
EX4A	EX4	EX3	0.05	0	0	0	0	0.88	95	4.00	1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.05	0.88	0.2	1.8	39.0	200	PVC	SDR 35	1.08	34.7	**5.12%**	1.09	0.48
EX10A, EX10B	EX10	EX9	0.33	5	0	0	17	0.33	17	4.00	0.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.56	0.0	0.89	0.89	0.2	0.5	75.3	200	PVC	SDR 35	0.92	32.0	**1.64%**	1.01	0.31
EX18A	EX18	EX19	0.14	2	0	0	7	0.14	7	4.00	0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.14	0.14	0.0	0.1	8.5	200	PVC	SDR 35	0.83	30.4	**0.49%**	0.96	0.21
EX19A	EX19	EX9	0.62	11	12	0	70	0.76	77	4.00	1.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.62	0.76	0.2	1.5	107.0	200	PVC	SDR 35	0.63	26.5	**5.50%**	0.83	0.37
EX9A	EX9	EX8	0.07	0	0	0	0	1.16	94	4.00	1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.0	0.07	1.72	0.5	2.0	48.0	200	PVC	SDR 35	0.96	32.7	**6.11%**	1.03	0.47
EX14A	EX14	EX13	0.13	0	2	0	5	0.13	5	4.00	0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.13	0.13	0.0	0.1	9.5	200	PVC	SDR 35	0.74	28.7	**0.43%**	0.90	0.20
EX13A	EX13	EX12	0.43	0	20	0	54	0.57	59	4.00	1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.43	0.57	0.2	1.1	82.1	200	PVC	SDR 35	0.65	26.9	**4.17%**	0.85	0.35
EX12A	EX12	EX11	0.44	0	21	0	57	1.01	116	4.00	1.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.44	1.01	0.3	2.2	82.1	200	PVC	SDR 35	0.41	21.5	**10.06%**	0.68	0.36
EX18B	EX18	EX15	0.15	3	0	0	10	0.15	10	4.00	0.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.15	0.15	0.0	0.2	42.0	200	PVC	SDR 35	2.38	51.6	**0.40%**	1.62	0.31
EX17A	EX17	EX16	0.67	9	10	0	58	0.67	58	4.00	0.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.67	0.67	0.2	1.1	84.1	200	PVC	SDR 35	0.44	22.2	**5.05%**	0.70	0.31
EX16A	EX16	EX15	0.49	7	9	0	48	1.16	106	4.00	1.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.49	1.16	0.3	2.0	79.0	200	PVC	SDR 35	0.34	19.5	**10.42%**	0.62	0.33

Stantec

SUBDIVISION:
HALF MOON BAY SOUTH SUBDIVISION - PHASE 4

DATE: 26/8/2015
REVISION: 2
DESIGNED BY: DT
CHECKED BY:

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160400743

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	350 l/p/day	MINIMUM VELOCITY	0.60 m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	50,000 l/ha/day	MAXIMUM VELOCITY	3.00 m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000 l/ha/day	MANNINGS n	0.013
PEAKING FACTOR (COMM., INST.):	1.5	INDUSTRIAL (LIGHT)	35,000 l/ha/day	BEDDING CLASS	B
PERSONS / SINGLE UNIT	3.4	INSTITUTIONAL	50,000 l/ha/day	MINIMUM COVER	2.50 m
PERSONS / TOWNHOME	2.7	INFILTRATION	0.28 l/s/Ha		
PERSONS / APARTMENT	2.3				

LOCATION			RESIDENTIAL AREA AND POPULATION									COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+I+I	INFILTRATION			TOTAL	PIPE							
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (ha)	SINGLE	UNITS TOWN	APT.	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	FLOW (l/s)	LENGTH (m)	DIA (mm)	MATERIAL	CLASS	SLOPE (%)	CAP. (FULL) (l/s)	CAP. V PEAK FLOW (%)	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
EX22A	EX22	EX21	0.51	11	0	0	37	0.51	37	4.00	0.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.51	0.51	0.1	0.8	55.9	200	PVC	SDR 35	0.72	28.3	2.65%	0.89	0.32
EX21A	EX21	EX20	0.63	16	0	0	54	1.14	92	4.00	1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.63	1.14	0.3	1.8	97.5	200	PVC	SDR 35	0.60	26.0	6.95%	0.82	0.39
EX33A	EX33	EX32	0.68	14	0	0	48	0.68	48	4.00	0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.68	0.68	0.2	1.0	90.6	200	PVC	SDR 35	0.40	21.1	4.54%	0.67	0.28
EX32A	EX32	EX31	0.11	1	0	0	3	0.78	51	4.00	0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.11	0.78	0.2	1.0	10.6	200	PVC	SDR 35	0.40	21.1	4.94%	0.67	0.28
EX31A	EX31	EX30	0.46	10	0	0	34	1.25	85	4.00	1.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.46	1.25	0.3	1.7	57.5	200	PVC	SDR 35	0.40	21.1	8.16%	0.67	0.33
EX30A	EX30	EX29	0.15	2	0	0	7	1.40	92	4.00	1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.15	1.40	0.4	1.9	10.6	200	PVC	SDR 35	0.40	21.1	8.89%	0.67	0.34
EX29A	EX29	EX28	0.44	10	0	0	34	1.84	126	4.00	2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.44	1.84	0.5	2.6	71.7	200	PVC	SDR 35	0.40	21.1	12.08%	0.67	0.37
EX28A	EX28	EX24	0.21	4	0	0	14	2.05	139	4.00	2.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.21	2.05	0.6	2.8	54.6	200	PVC	SDR 35	0.80	29.9	9.47%	0.94	0.49
EX27A	EX27	EX26	0.16	2	0	0	7	0.16	7	4.00	0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.16	0.16	0.0	0.2	11.2	200	PVC	SDR 35	0.65	27.0	0.57%	0.85	0.18
EX26A	EX26	EX25	0.31	8	0	0	27	0.47	34	4.00	0.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.31	0.47	0.1	0.7	48.8	200	PVC	SDR 35	0.40	21.1	3.22%	0.67	0.25
EX25A	EX25	EX24	0.48	10	0	0	34	0.95	68	4.00	1.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.48	0.95	0.3	1.4	91.3	200	PVC	SDR 35	0.60	25.9	5.28%	0.81	0.36
EX36A	EX36	EX35	0.76	19	0	0	65	0.76	65	4.00	1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.76	0.76	0.2	1.3	91.7	200	PVC	SDR 35	0.50	23.6	5.32%	0.74	0.33
EX35A	EX35	EX34	0.12	2	0	0	7	0.88	71	4.00	1.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.12	0.88	0.2	1.4	43.9	200	PVC	SDR 35	0.60	25.9	5.42%	0.81	0.36
EX40A	EX40	EX39	0.50	12	0	0	41	0.50	41	4.00	0.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.50	0.50	0.1	0.8	65.7	200	PVC	SDR 35	1.60	42.3	1.90%	1.33	0.44
EX45A	EX45	EX44	0.67	16	0	0	54	0.67	54	4.00	0.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.67	0.67	0.2	1.1	112.3	200	PVC	SDR 35	1.20	36.6	2.92%	1.15	0.44
EX44A	EX44	EX43	0.17	2	0	0	7	0.84	61	4.00	1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.17	0.84	0.2	1.2	10.6	200	PVC	SDR 35	0.80	29.9	4.10%	0.94	0.39
EX43A	EX43	EX42	0.78	18	0	0	61	1.63	122	4.00	2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.78	1.63	0.5	2.4	103.5	200	PVC	SDR 35	0.80	29.9	8.15%	0.94	0.47
EX42A	EX42	EX41	0.06	1	0	0	3	1.68	126	4.00	2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.06	1.68	0.5	2.5	10.6	200	PVC	SDR 35	0.80	29.9	8.39%	0.94	0.48
EX41A	EX41	EX39	0.10	0	0	0	0	1.79	126	4.00	2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.10	1.79	0.5	2.5	64.5	200	PVC	SDR 35	0.40	21.1	12.02%	0.66	0.37
EX39A	EX39	EX38	0.67	17	0	0	58	2.96	224	4.00	3.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.67	2.96	0.8	4.5	94.6	200	PVC	SDR 35	0.40	21.1	21.11%	0.67	0.44
EX38A	EX38	EX37	0.21	5	0	0	17	3.16	241	4.00	3.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.21	3.16	0.9	4.8	46.8	200	PVC	SDR 35	0.40	21.1	22.69%	0.67	0.45
EX52A	EX52	EX51	0.16	2	0	0	7	0.16	7	4.00	0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.16	0.16	0.0	0.2	11.6	200	PVC	SDR 35	0.75	29.0	0.54%	0.91	0.20
EX51A	EX51	EX50	0.43	11	0	0	37	0.59	44	4.00	0.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.43	0.59	0.2	0.9	71.7	200	PVC	SDR 35	0.75	29.0	3.05%	0.91	0.35
EX54A	EX54	EX53	0.45	9	0	0	31	0.45	31	4.00	0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.45	0.45	0.1	0.6	71.2	200	PVC	SDR 35	0.45	22.4	2.77%	0.71	0.26
SA62A	62	61	0.24	4	0	0	14	0.24	14	4.00	0.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.24	0.24	0.1	0.3	46.2	200	PVC	SDR 35	0.65	27.0	1.07%	0.85	0.23
SA61A	61	60	0.22	3	0	0	10	0.46	24	4.00	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.22	0.46	0.1	0.5	11.0	200	PVC	SDR 35	0.65	27.0	1.91%	0.85	0.28
SA60A	60	59	0.31	8	0	0	27	0.77	51	4.00	0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.31	0.77	0.2	1.0	53.3	200	PVC	SDR 35	0.50	23.6	4.40%	0.74	0.32
SA64A	64	63	0.19	4	0	0	14	0.19	14	4.00	0.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.19	0.19	0.1	0.3	48.9	200	PVC	SDR 35	2.00	47.3	0.58%	1.49	0.32
SA65A	65	63	0.54	12	0	0	41	0.54	41	4.00	0.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.54	0.54	0.2	0.8	72.4	200	PVC	SDR 35	0.65	27.0	3.01%	0.85	0.32
SA63A	63	59	0.32	7	0	0	24	1.05	78	4.00	1.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.32	1.05	0.3	1.6	70.6	200	PVC	SDR 35	0.75	29.0	5.39%	0.91	0.40
SA59A	59	EX58A	0.30	6	0	0	20	2.12	150	4.00	2.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.30	2.12	0.6	3.0	59.3	200	PVC	SDR 35	0.75	29.0	10.42%	0.91	0.49
	EX58A	EX58	0.00	0	0	0	0	2.12	150	4.00	2.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	2.12	0.6	3.0	12.6	200	PVC	SDR 35	0.75	29.0	10.42%	0.91	0.49
EX58A	EX58	EX57	0.47	12	0	0	41	2.59	190	4.00	3.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.47	2.59	0.7	3.8	64.5	200	PVC	SDR 35	0.75	29.0	13.16%	0.91	0.52
EX57A	EX57	EX56	0.12	2	0	0	7	2.70	197	4.00	3.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.12	2.70	0.8	4.0	10.6	200	PVC	SDR 35	0.75	29.0	13.65%	0.91	0.53
EX56A	EX56	EX55	0.34	7	0	0	24	3.05	221	4.00	3.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.34	3.05	0.9	4.4	65.6	200	PVC	SDR 35	0.75	29.0	15.31%	0.91	0.55
EX55A	EX55	EX53	0.38	8	0	0	27	3.43	248	4.00	4.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.38	3.43	1.0	5.0	65.5	200	PVC	SDR 35	0.50	23.6	21.07%	0.74	0.49
EX53A	EX53	EX50	0.19	3	0	0	10	4.07	289	4.00	4.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.19	4.07	1.1	5.8	68.5	200	PVC	SDR 35	0.40	21.1	27.53%	0.67	0.47
EX50A	EX50	EX37	0.26	6	0	0	20	4.92	354	4.00	5.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.26	4.92	1.4	7.1	49.1	200	PVC	SDR 35	0.40	21.0	33.77%	0.66	0.50
EX37A	EX37	EX34	0.41	10	0	0	34	8.49	629	3.92	10.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.41	8.49	2.4	12.4	72.0	200	PVC	SDR 35	0.40	21.1	58.49%	0.67	0.59
EX34A	EX34	EX24	0.41	10	0	0	34	9.79	734	3.88	11.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.41	9.79	2.7	14.3	72.5	200	PVC	SDR 35	0.40	21.1	67.57%	0.67	0.62
EX24A	EX24	EX20	0.38	10	0	0	34	13.16	976	3.81	15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.38	13.16	3.7	18.7	73.0	200	PVC	SDR 35	0.42	21.7	86.43%	0.68	0.69
EX20A	EX20	EX15	0.10	0	0	0	0	14.40	1068	3.78	16.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.10	14.40	4.0	20.4	71.0	250	PVC	SDR 35	0.37	36.7	55.56%	0.74	0.65
EX15A	EX15	EX11	0.20	0	8	0	22	15.92	1205	3.75	18.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.20	15.92	4.5	22.7	68.0	300	PVC	SDR 35	0.34	55.8	40.73%	0.79	0.64
EX11A	EX11	EX8	0.11	0	4	0	11	17.05	1332	3.72	20.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.11	17.05	4.8	24.8	45.0	300	PVC	SDR 35	0.98	94.9	26.15%	1.35	0.95
EX8A	EX8	EX3	0.15	0	6	0	16	18.35	1442	3.69	21.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.0	0.15	18.91	5.3	26.9	50.3	300	PVC	SDR 35	0.38	59.0	45.49%	0.84	0.70
EX3A	EX3	EX2	0.30	0	18	0	49	19.53	1585	3.66	23.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.0	0.30	20.09	5.6	29.1	68.1	300	PVC	SDR 35	0.37	58.2	50.08%	0.83	0.71
EX2A	EX2	EX1	0.36	0	15	0	41	19.89	1625	3.65	24.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.0	0.36	20.45	5.7	29.8	68.1	300	PVC	SDR 35	0.35	57.0	52.25%	0.81	0.70
																												300							

Stantec

SUBDIVISION:

Half Moon Bay South Phase 5

DATE: 15/2/2019
REVISION: 1
DESIGNED BY: DT
CHECKED BY: KS

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160401476

DESIGN PARAMETERS

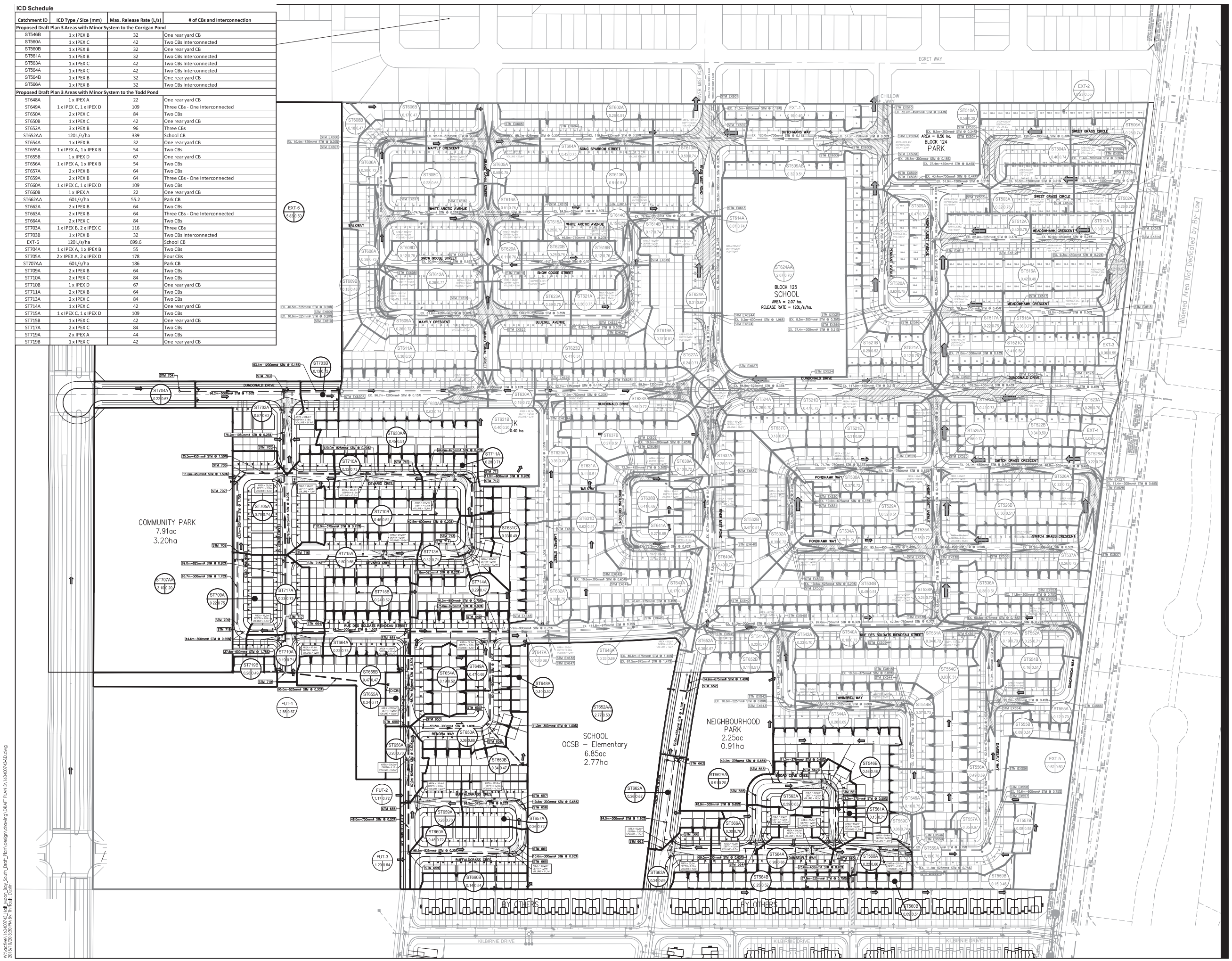
MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	280 l/p/day	MINIMUM VELOCITY	0.60 m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	28,000 l/ha/day	MAXIMUM VELOCITY	3.00 m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000 l/ha/day	MANNINGS n	0.013
PEAKING FACTOR (ICI >20%):	1.5	INDUSTRIAL (LIGHT)	35,000 l/ha/day	BEDDING CLASS	B
PERSONS / SINGLE	3.4	INSTITUTIONAL	28,000 l/ha/day	MINIMUM COVER	2.50 m
PERSONS / TOWNHOME	2.7	INFILTRATION	0.33 l/s/Ha	HARMON CORRECTION FACTOR	0.8
PERSONS / APARTMENT	1.8				

LOCATION			RESIDENTIAL AREA AND POPULATION									COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+I+I	INFILTRATION			TOTAL	PIPE							
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA	SINGLE	UNITS TOWN	APT	POP.	CUMULATIVE AREA	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW	FLOW	LENGTH	DIA	MATERIAL	CLASS	SLOPE	CAP. (FULL)	CAP. V PEAK FLOW	VEL. (FULL)	VEL. (ACT.)
			(ha)					(ha)			(l/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)			(%)	(l/s)	(%)	(m/s)	(m/s)
1/4 R227A	227	226	0.83	17	0	0	58	0.83	58	3.64	0.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.83	0.83	0.3	1.0	111.2	200	PVC	SDR 35	0.65	27.0	**3.55%**	0.85	0.34
C230A	230	226	0.00	0	0	0	0	0.00	0	3.80	0.0	2.13	2.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.0	2.13	2.13	0.7	1.7	7.8	200	PVC	SDR 35	0.65	27.0	**6.45%**	0.85	0.40
	226	225	0.00	0	0	0	0	0.83	58	3.64	0.7	0.00	2.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.0	0.00	2.96	1.0	2.7	12.7	200	PVC	SDR 35	0.50	23.6	**11.40%**	0.74	0.41
	225	222	0.00	0	0	0	0	0.83	58	3.64	0.7	0.00	2.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.0	0.00	2.96	1.0	2.7	63.0	200	PVC	SDR 35	2.30	50.7	**5.32%**	1.60	0.70
1/4 R227A	224	223	0.83	30	0	0	102	0.83	102	3.59	1.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.83	0.83	0.3	1.5	55.6	200	PVC	SDR 35	0.40	21.1	**6.92%**	0.67	0.32
	223	222	0.00	0	0	0	0	0.83	102	3.59	1.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.83	0.3	1.5	64.6	200	PVC	SDR 35	0.40	21.1	**6.92%**	0.67	0.32
	222	219	0.00	0	0	0	0	1.67	160	3.55	1.8	0.00	2.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.0	0.00	3.80	1.3	4.1	95.3	200	PVC	SDR 35	2.30	50.7	**8.13%**	1.60	0.79
1/4 R227A	165	229	0.83	3	11	0	40	0.83	40	3.67	0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.83	0.83	0.3	0.7	58.1	200	PVC	SDR 35	0.65	27.0	**2.78%**	0.85	0.31
	229	228	0.00	0	0	0	0	0.83	40	3.67	0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.83	0.3	0.7	28.2	200	PVC	SDR 35	0.40	21.1	**3.54%**	0.67	0.26
	228	219	0.00	0	0	0	0	0.83	40	3.67	0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.83	0.3	0.7	48.1	200	PVC	SDR 35	0.40	21.1	**3.54%**	0.67	0.26
1/4 R227A	221	220	0.83	9	0	0	31	0.83	31	3.68	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.83	0.83	0.3	0.6	18.9	200	PVC	SDR 35	0.65	27.0	**2.37%**	0.85	0.29
	220	219	0.00	0	0	0	0	0.83	31	3.68	0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.83	0.3	0.6	29.5	200	PVC	SDR 35	0.40	21.1	**3.03%**	0.67	0.25
	219	218	0.00	0	0	0	0	3.33	230	3.50	2.6	0.00	2.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.0	0.00	5.46	1.8	5.5	21.7	200	PVC	SDR 35	0.40	21.1	**25.77%**	0.67	0.47
	218	217	0.00	0	0	0	0	3.33	230	3.50	2.6	0.00	2.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.0	0.00	5.46	1.8	5.5	16.4	200	PVC	SDR 35	0.40	21.1	**25.77%**	0.67	0.47
																												200							
R167A	167	166	1.35	0	54	0	146	1.35	146	3.56	1.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	1.35	1.35	0.4	2.1	63.0	200	PVC	SDR 35	3.00	57.9	**3.67%**	1.82	0.72
	166	165	0.00	0	0	0	0	1.35	146	3.56	1.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	1.35	0.4	2.1	70.0	200	PVC	SDR 35	3.00	57.9	**3.67%**	1.82	0.72
	165	164	0.00	0	0	0	0	1.35	146	3.56	1.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	1.35	0.4	2.1	71.9	200	PVC	SDR 35	1.00	33.4	**6.36%**	1.05	0.49
	164	158	0.00	0	0	0	0	1.35	146	3.56	1.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	1.35	0.4	2.1	71.9	200	PVC	SDR 35	1.00	33.4	**6.36%**	1.05	0.49
																												200							
R157A	157	156	0.74	0	32	0	86	0.74	86	3.61	1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.74	0.74	0.2	1.3	62.8	200	PVC	SDR 35	1.10	35.1	**3.57%**	1.10	0.44
	156	153	0.00	0	0	0	0	0.74	86	3.61	1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.74	0.2	1.3	71.8	200	PVC	SDR 35	1.10	35.1	**3.57%**	1.10	0.44
																												200							
EX Phase 4	152	150	1.93	14	48	0	177	4.01	409	3.41	4.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	1.93	4.01	1.3	5.9	85.7	200	PVC	SDR 35	0.80	29.9	**19.57%**	0.94	0.61

Appendix C : STORM SEWER CALCULATIONS & REPORT EXCERPTS

ICD Schedule

Catchment ID	ICD Type / Size (mm)	Max. Release Rate (L/s)	# of CBs and Interconnection
Proposed Draft Plan 3 Areas with Minor System to the Corrigan Pond			
ST546B	1 x IPEX B	32	One rear yard CB
ST560A	1 x IPEX C	42	Two CBs Interconnected
ST560B	1 x IPEX B	32	One rear yard CB
ST561A	1 x IPEX B	32	Two CBs Interconnected
ST563A	1 x IPEX C	42	Two CBs Interconnected
ST564A	1 x IPEX C	42	Two CBs Interconnected
ST564B	1 x IPEX B	32	One rear yard CB
ST566A	1 x IPEX B	32	Two CBs Interconnected
Proposed Draft Plan 3 Areas with Minor System to the Todd Pond			
ST648A	1 x IPEX A	22	One rear yard CB
ST649A	1 x IPEX C, 1 x IPEX D	109	Three CBs - One Interconnected
ST650A	2 x IPEX C	84	Two CBs
ST650B	1 x IPEX C	42	One rear yard CB
ST652A	3 x IPEX B	96	Three CBs
ST652AA	120 L/s/ha	339	School CB
ST654A	1 x IPEX B	32	One rear yard CB
ST655A	1 x IPEX A, 1 x IPEX B	54	Two CBs
ST655B	1 x IPEX D	67	One rear yard CB
ST656A	1 x IPEX A, 1 x IPEX B	54	Two CBs
ST657A	2 x IPEX B	64	Two CBs
ST659A	2 x IPEX B	64	Three CBs - One Interconnected
ST660A	1 x IPEX C, 1 x IPEX D	109	Two CBs
ST660B	1 x IPEX A	22	One rear yard CB
ST662A	60 L/s/ha	55.2	Park CB
ST662A	2 x IPEX B	64	Two CBs
ST663A	2 x IPEX B	64	Three CBs - One Interconnected
ST664A	2 x IPEX C	84	Two CBs
ST703A	1 x IPEX B, 2 x IPEX C	116	Three CBs
ST703B	1 x IPEX B	32	Two CBs Interconnected
EXT-6	120 L/s/ha	699.6	School CB
ST704A	1 x IPEX A, 1 x IPEX B	55	Park CB
ST705A	2 x IPEX A, 2 x IPEX D	178	Four CBs
ST707AA	60 L/s/ha	186	Park CB
ST709A	2 x IPEX B	64	Two CBs
ST710A	2 x IPEX C	84	Two CBs
ST710B	1 x IPEX D	67	One rear yard CB
ST711A	2 x IPEX B	64	Two CBs
ST713A	2 x IPEX C	84	Two CBs
ST714A	1 x IPEX C	42	One rear yard CB
ST715A	1 x IPEX C, 1 x IPEX D	109	Two CBs
ST715B	1 x IPEX C	42	One rear yard CB
ST717A	2 x IPEX C	84	Two CBs
ST719A	2 x IPEX A	44	Two CBs
ST719B	1 x IPEX C	42	One rear yard CB



Stantec

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Legend

- PROPOSED STORM SEWER
- AREA ID
- RUNOFF COEFFICIENT
- STORM DRAINAGE AREA ha.
- STORM DRAINAGE BOUNDARY
- EXISTING/FUTURE STORM DRAINAGE BOUNDARY
- FUTURE MINOR DRAINAGE AREA
- TYPICAL SERVICE LATERAL LOCATION
- MAXIMUM PONDING LIMITS
- EXISTING STORM SEWER
- DIRECTION OF OVERLAND FLOW
- OVERLAND FLOW FROM EXTERNAL AREA
- CATCHBASIN TO BE INSTALLED WITH IPEX TYPE A OR EQUIVALENT 22.0L/S.
- CATCHBASIN TO BE INSTALLED WITH IPEX TYPE B OR EQUIVALENT 32.0L/S.
- CATCHBASIN TO BE INSTALLED WITH IPEX TYPE C OR EQUIVALENT 42.0L/S.
- CATCHBASIN TO BE INSTALLED WITH IPEX TYPE D OR EQUIVALENT 67.0L/S AND 250mmØ CB LEAD.
- CATCHBASIN TO BE INSTALLED WITH CIRCULAR ORIFICE (SEE ICD TABLE)
- CATCHBASINS TO BE INTERCONNECTED

1. AREAS ST5XX REPRESENT MINOR SYSTEM DRAINAGE AREAS TRIBUTARY TO THE STORM SEWER ON GREENBANK ROAD TO THE CORRIGAN POND, AREAS ST6XX AND ST7XX REPRESENT MINOR SYSTEM DRAINAGE AREAS TRIBUTARY TO THE STORM SEWER ON RIVER MIST ROAD TO THE TODD POND.

Notes

5	ISSUED FOR CONSTRUCTION	DT	DT	15.10.20
4	REVISED INTERIM DRAINAGE	DT	DT	15.09.02
3	REVISED PER CITY COMMENTS	DT	DT	15.08.26
2	REVISED PER CITY COMMENTS	WJ	DT	15.07.30
1	ISSUED FOR REVIEW	MS	DT	15.05.27
Revision		By	Appd.	YY.MM.DD

File Name: 160400743-08	DT	PM	DT	15.05.19
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

LICENSED PROFESSIONAL ENGINEER
D. C. THIFFAULT
100186107
20/10/2015
PROVINCE OF ONTARIO

Client/Project

MATTAMY HOMES LTD.

HALF MOON BAY SOUTH
PHASE 4
Ottawa, ON

Title

STORM DRAINAGE PLAN

Project No.	Scale	Revision
160400743	1:1500 (0, 15, 45, 75m)	
Drawing No.	Sheet	
SD-1	27 of 28	5

ORIGINAL SHEET - ARCH D

Stantec

HALF MOON BAY SOUTH SUBDIVISION - PHASE 4

DATE: 26-Aug-2015
REVISION: 2
DESIGNED BY: DT
CHECKED BY:

FILE NUMBER: 1604-00743

STORM SEWER DESIGN SHEET
(City of Ottawa)

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

	1:5 yr	1:100 yr
a =	998.071	1735.688
b =	6.053	6.014
c =	0.814	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 (5-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (-)	ACCUM. AREA (5YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	ACCUM. AREA (100YR (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ (NOTE 1) (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETEI (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)
ST510A	EX510	EX509A	0.56	0.00	0.00	0.20	0.56	0.112	0.112	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	32.4	32.9	450	450	CIRCULAR	CONCRETE	-	0.43	194.1	**16.68%**	1.18	0.73	0.75
ST509AA, ST509AB	EX509A	EX603	0.93	0.00	0.00	0.65	1.49	0.608	0.720	0.00	0.000	0.000	10.75	100.38	171.96	0.0	0.0	200.7	37.3	750	750	CIRCULAR	CONCRETE	-	0.30	630.9	**31.81%**	1.38	1.04	0.60
	EX603	EX602	0.00	0.00	0.00	0.00	1.49	0.000	0.720	0.00	0.000	0.000	11.35	97.56	167.08	0.0	0.0	195.1	120.0	750	750	CIRCULAR	CONCRETE	-	0.11	382.3	**51.03%**	0.84	0.72	2.76
													14.12																	
ST521D, ST521E	EX521	EX524	0.79	0.00	0.00	0.64	0.79	0.503	0.503	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	145.5	117.0	450	450	CIRCULAR	CONCRETE	-	0.21	134.7	**108.02%**	0.82	0.82	2.38
ST524A	EX524	EX627	0.26	0.00	0.00	0.70	1.04	0.179	0.682	0.00	0.000	0.000	12.38	93.12	159.40	0.0	0.0	176.3	84.9	525	525	CIRCULAR	CONCRETE	-	0.33	257.7	**68.43%**	1.15	1.09	1.30
													13.68																	
ST632A	EX632	EX631	0.39	0.00	0.00	0.75	0.39	0.291	0.291	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	84.1	89.3	375	375	CIRCULAR	PVC	-	1.00	175.3	**47.97%**	1.59	1.34	1.11
631A, ST631B, ST631D, ST63	EX631	EX629A	1.47	0.00	0.00	0.42	1.86	0.618	0.908	0.00	0.000	0.000	11.11	98.69	169.04	0.0	0.0	249.0	106.5	600	600	CIRCULAR	CONCRETE	-	0.25	320.2	**77.76%**	1.10	1.07	1.65
	EX629A	EX629	0.00	0.00	0.00	0.00	1.86	0.000	0.908	0.00	0.000	0.000	12.76	91.58	156.75	0.0	0.0	231.1	17.5	750	750	CIRCULAR	CONCRETE	-	0.23	555.3	**41.62%**	1.22	0.98	0.30
													13.06																	
ST719B, ST719A, FUT-1	719	717	3.02	0.00	0.00	0.66	3.02	1.983	1.983	0.00	0.000	0.000	13.77	87.75	150.14	0.0	0.0	483.4	37.6	600	600	CIRCULAR	CONCRETE	-	1.75	847.4	**57.05%**	2.90	2.57	0.24
													14.01																	
	718	717	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	0.0	44.6	300	300	CIRCULAR	PVC	-	0.65	77.5	**0.00%**	1.10	0.00	0.00
													10.00																	
ST717A	717	716	0.33	0.00	0.00	0.73	3.35	0.238	2.221	0.00	0.000	0.000	14.01	86.89	148.64	0.0	0.0	536.0	69.0	825	825	CIRCULAR	CONCRETE	-	0.20	669.7	**80.04%**	1.21	1.20	0.96
	716	705	0.00	0.00	0.00	0.00	3.35	0.000	2.221	0.00	0.000	0.000	14.97	83.64	143.04	0.0	0.0	516.0	76.5	825	825	CIRCULAR	CONCRETE	-	0.20	669.7	**77.05%**	1.21	1.18	1.08
													16.05																	
ST709A	709	708	0.22	0.00	0.00	0.75	0.22	0.163	0.163	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	47.3	66.7	300	300	CIRCULAR	PVC	-	1.75	127.2	**37.15%**	1.81	1.41	0.79
	708	707	0.00	0.00	0.00	0.00	0.22	0.000	0.163	0.00	0.000	0.000	10.79	100.19	171.64	0.0	0.0	45.4	63.7	300	300	CIRCULAR	CONCRETE	-	1.75	127.2	**35.73%**	1.81	1.39	0.76
													11.55																	
ST707AA	707A	707	3.10	0.00	0.00	0.20	3.10	0.620	0.620	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	179.5	6.2	450	450	CIRCULAR	CONCRETE	-	0.60	230.4	**77.89%**	1.40	1.37	0.08
													10.08																	
	707	706	0.00	0.00	0.00	0.00	3.32	0.000	0.783	0.00	0.000	0.000	11.55	96.64	165.49	0.0	0.0	210.3	11.0	450	450	CIRCULAR	CONCRETE	-	1.50	364.3	**57.73%**	2.22	1.98	0.09
	706	705	0.00	0.00	0.00	0.00	3.32	0.000	0.783	0.00	0.000	0.000	11.65	96.23	164.79	0.0	0.0	209.4	35.5	450	450	CIRCULAR	CONCRETE	-	1.50	364.3	**57.48%**	2.22	1.98	0.30
													11.95																	
ST715B, ST715A	715	714	0.74	0.00	0.00	0.61	0.74	0.453	0.453	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	131.1	120.0	375	375	CIRCULAR	PVC	-	0.75	151.8	**86.37%**	1.37	1.38	1.45
ST714A	714	713	0.29	0.00	0.00	0.47	1.02	0.134	0.587	0.00	0.000	0.000	11.45	97.13	166.34	0.0	0.0	158.5	12.8	525	525	CIRCULAR	CONCRETE	-	0.20	200.6	**79.00%**	0.90	0.88	0.24
ST713A	713	712	0.32	0.00	0.00	0.71	1.34	0.226	0.813	0.00	0.000	0.000	11.69	96.05	164.48	0.0	0.0	217.0	62.5	600	600	CIRCULAR	CONCRETE	-	0.20	286.5	**75.74%**	0.98	0.95	1.10
	712	711	0.00	0.00	0.00	0.00	1.34	0.000	0.813	0.00	0.000	0.000	12.78	91.48	156.57	0.0	0.0	206.6	11.0	600	600	CIRCULAR	CONCRETE	-	0.20	286.5	**72.13%**	0.98	0.94	0.20
ST711A	711	710	0.28	0.00	0.00	0.71	1.62	0.200	1.013	0.00	0.000	0.000	12.98	90.71	155.25	0.0	0.0	255.3	44.6	675	675	CIRCULAR	CONCRETE	-	0.20	392.2	**65.11%**	1.06	0.99	0.75
ST710A, ST710B	710	705	0.77	0.00	0.00	0.61	2.40	0.470	1.483	0.00	0.000	0.000	13.73	87.89	150.37	0.0	0.0	362.2	120.0	825	825	CIRCULAR	CONCRETE	-	0.20	669.7	**54.08%**	1.21	1.07	1.88
													15.61																	
ST705A	705	703	0.70	0.00	0.00	0.74	9.77	0.520	5.007	0.00	0.000	0.000	16.05	80.30	137.28	0.0	0.0	1116.9	75.2	1050	1050	CIRCULAR	CONCRETE	-	0.25	1424.4	**78.41%**	1.59	1.56	0.80
													16.86																	
ST704A	704	703	0.22	0.00	0.00	0.67	0.22	0.149	0.149	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	43.2	96.2	300	300	CIRCULAR	PVC	-	1.60	121.6	**35.49%**	1.73	1.33	1.21
													11.21																	
ST703B, ST703A	703	EX630A	0.69	0.00	0.00	0.64	10.68	0.442	5.598	0.00	0.000	0.000	16.86	78.00	133.31	0.0	0.0	1212.9	53.1	1200	1200	CIRCULAR	CONCRETE	-	0.15	1560.4	**77.73%**	1.34	1.31	0.68
ST630AA, ST630AB	EX630A	EX630	1.07	0.00	0.00	0.64	11.76	0.690	6.288	0.00	0.000	0.000	17.53	76.18	130.17	0.0	0.0	1330.6	96.7	1200	1200	CIRCULAR	CONCRETE	-	0.15	1575.2	**84.47%**	1.35	1.35	1.19
ST630A	EX630	EX629	0.16	0.00	0.00	0.72	11.92	0.119	6.407	0.00	0.000	0.000	18.72	73.18	125.00	0.0	0.0	1302.4	91.7	1200	1200	CIRCULAR	CONCRETE	-	0.15	1572.3	**82.84%**	1.35	1.34	1.14
													19.86																	
ST629A	EX629	EX628	0.36	0.00	0.00	0.70	14.13	0.251	7.567	0.00	0.000	0.000	19.86	70.55	120.47	0.0	0.0	1482.9	52.7	1350	1350	CIRCULAR	CONCRETE	-	0.15	2157.3	**68.74%**	1.46	1.38	0.64
ST628A	EX628	EX627	0.64	0.00	0.00	0.72	14.78	0.462	8.029	0.00	0.000	0.000	20.50	69.17	118.08	0.0	0.0	1542.6	99.9	1350	1350	CIRCULAR	CONCRETE	-	0.15	2188.4	**70.49%**	1.48	1.41	1.18
													21.69																	
ST663A	663	662	0.24	0.00	0.00	0.69	0.24	0.163	0.163	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	47.2	84.0	300	300	CIRCULAR	PVC	-	1.10	100.8	**46.85%**	1.43	1.20	1.17
													11.17																	
ST662AA	662A	662	0.91	0.00	0.00	0.20	0.91	0.182	0.182	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	52.7	12.5	375	375	CIRCULAR	PVC	-	0.25	87.8	**60.05%**	0.80	0.72	0.29
													10.29																	
ST662A	662	652	0.26	0.00	0.00	0.62	1.41	0.163	0.508	0.00	0.000	0.000	11.17	98.42	168.56	0.0	0.0	139.0	62.0	450	450	CIRCULAR	CONCRETE	-	1.10	311.9	**44.56%**	1.90	1.56	0.66
													11.83																	
ST652AA	652A	652	2.77	0.00	0.00	0.50	2.77	1.386	1.386	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	401.1	17.6	600	600	CIRCULAR	CONCRETE	-	0.50	452.9	**88.54%**	1.55	1.58	0.19
													10.19																	

Stantec

HALF MOON BAY SOUTH SUBDIVISION - PHASE 4

DATE: 26-Aug-2015
REVISION: 2
DESIGNED BY: DT
CHECKED BY:

FILE NUMBER: 1604-00743

STORM SEWER DESIGN SHEET
(City of Ottawa)

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

	1:5 yr	1:100 yr
a =	998.071	1735.688
b =	6.053	6.014
c =	0.814	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 (5-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (-)	ACCUM. AREA (5YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	ACCUM. AREA (100YR (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ (NOTE 1) (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETEI (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)
ST652A, ST652B	652	EX652A	0.47	0.00	0.00	0.63	4.65	0.296	2.191	0.00	0.000	0.000	11.83	95.44	163.42	0.0	0.0	580.7	14.9	675	675	CIRCULAR	CONCRETE	-	1.40	1037.6	**55.97%**	2.81	2.49	0.10
	EX652A	EX643	0.00	0.00	0.00	0.00	4.65	0.000	2.191	0.00	0.000	0.000	11.93	95.01	162.67	0.0	0.0	578.1	46.6	675	675	CIRCULAR	CONCRETE	-	1.40	1037.6	**55.72%**	2.81	2.49	0.31
													12.24																	
	661	660	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	0.0	10.6	300	300	CIRCULAR	PVC	-	0.65	77.5	**0.00%**	1.10	0.00	0.00
ST660B, ST660A	660	659	0.60	0.00	0.00	0.68	0.60	0.404	0.404	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	116.9	98.5	525	525	CIRCULAR	CONCRETE	-	0.20	200.6	**58.25%**	0.90	0.80	2.05
ST659A, FUT-3	659	656	1.48	0.00	0.00	0.65	2.07	0.961	1.365	0.00	0.000	0.000	12.05	94.50	161.80	0.0	0.0	358.3	48.0	750	750	CIRCULAR	CONCRETE	-	0.20	519.4	**68.98%**	1.14	1.07	0.75
													12.79																
	658	657	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	0.0	10.6	300	300	CIRCULAR	PVC	-	0.65	77.5	**0.00%**	1.10	0.00	0.00
ST657A	657	656	0.26	0.00	0.00	0.72	0.26	0.185	0.185	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	53.4	98.5	375	375	CIRCULAR	PVC	-	0.25	87.8	**60.80%**	0.80	0.72	2.27
													12.27																
ST656A, FUT-2	656	655	1.37	0.00	0.00	0.72	3.70	0.981	2.530	0.00	0.000	0.000	12.79	91.45	156.52	0.0	0.0	642.7	67.0	825	825	CIRCULAR	CONCRETE	-	0.80	1339.4	**47.99%**	2.43	2.06	0.54
ST655B, ST655A	655	654	0.72	0.00	0.00	0.55	4.41	0.395	2.926	0.00	0.000	0.000	13.33	89.36	152.91	0.0	0.0	726.2	88.7	825	825	CIRCULAR	CONCRETE	-	0.80	1339.7	**54.21%**	2.43	2.13	0.69
													14.03																
ST664A	664	654	0.32	0.00	0.00	0.73	0.32	0.233	0.233	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	67.5	98.2	300	300	CIRCULAR	PVC	-	1.50	117.8	**57.35%**	1.67	1.50	1.09
													11.09																
ST654A	654	649	0.19	0.00	0.00	0.52	4.93	0.101	3.260	0.00	0.000	0.000	14.03	86.84	148.56	0.0	0.0	786.3	75.0	825	825	CIRCULAR	CONCRETE	-	0.80	1339.4	**58.71%**	2.43	2.19	0.57
													14.60																
	653	651	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	0.0	53.8	300	300	CIRCULAR	PVC	-	1.00	96.2	**0.00%**	1.37	0.00	0.00
	651	650	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	0.0	11.0	300	300	CIRCULAR	PVC	-	1.00	96.2	**0.00%**	1.37	0.00	0.00
ST650A, ST650B	650	649	0.70	0.00	0.00	0.58	0.70	0.403	0.403	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	116.6	80.9	450	450	CIRCULAR	CONCRETE	-	1.00	297.4	**39.20%**	1.81	1.44	0.94
													10.94																
ST649A	649	EX648	0.47	0.00	0.00	0.68	6.09	0.320	3.982	0.00	0.000	0.000	14.60	84.88	145.17	0.0	0.0	938.9	16.3	900	900	CIRCULAR	CONCRETE	-	0.75	1635.6	**57.41%**	2.49	2.23	0.12
ST648A	EX648	EX647	0.10	0.00	0.00	0.52	6.19	0.050	4.032	0.00	0.000	0.000	14.72	84.47	144.47	0.0	0.0	946.1	35.9	900	900	CIRCULAR	CONCRETE	-	0.75	1635.6	**57.85%**	2.49	2.23	0.27
ST647A	EX647	EX646	0.10	0.00	0.00	0.68	6.29	0.071	4.103	0.00	0.000	0.000	14.99	83.59	142.96	0.0	0.0	952.7	114.8	975	975	CIRCULAR	CONCRETE	-	0.75	2024.7	**47.05%**	2.63	2.20	0.87
ST646A	EX646	EX643	0.33	0.00	0.00	0.69	6.63	0.230	4.333	0.00	0.000	0.000	15.86	80.89	138.29	0.0	0.0	973.5	26.4	975	975	CIRCULAR	CONCRETE	-	0.45	1568.3	**62.07%**	2.03	1.86	0.24
													16.09																
ST643A	EX643	EX640	0.17	0.00	0.00	0.72	11.44	0.119	6.643	0.00	0.000	0.000	16.09	80.18	137.07	0.0	0.0	1479.5	71.8	975	975	CIRCULAR	CONCRETE	-	0.50	1653.2	**89.49%**	2.15	2.18	0.55
													16.64																
	EX642	EX641	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	0.0	10.6	300	300	CIRCULAR	PVC	-	0.65	77.5	**0.00%**	1.10	0.00	0.00
ST641A	EX641	EX640	0.27	0.00	0.00	0.69	0.27	0.186	0.186	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	53.9	72.2	300	300	CIRCULAR	PVC	-	0.65	77.5	**69.52%**	1.10	1.04	1.16
													11.16																
ST640A	EX640	EX637	0.40	0.00	0.00	0.72	12.11	0.286	7.114	0.00	0.000	0.000	16.64	78.60	134.34	0.0	0.0	1553.3	67.7	1350	1350	CIRCULAR	CONCRETE	-	0.10	1760.8	**88.22%**	1.19	1.21	0.93
													17.57																
	EX642	EX639	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	0.0	52.7	300	300	CIRCULAR	PVC	-	0.65	77.5	**0.00%**	1.10	0.00	0.00
	EX639	EX638	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	0.0	10.6	300	300	CIRCULAR	PVC	-	0.65	77.5	**0.00%**	1.10	0.00	0.00
ST638B, ST638A	EX638	EX637	0.51	0.00	0.00	0.70	0.51	0.357	0.357	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	103.3	72.3	450	450	CIRCULAR	CONCRETE	-	0.30	162.6	**63.55%**	0.99	0.91	1.32
													11.32																
ST637B, ST637A, ST637C	EX637	EX627	0.79	0.00	0.00	0.58	13.42	0.457	7.928	0.00	0.000	0.000	17.57	76.07	129.98	0.0	0.0	1675.2	79.4	1500	1500	CIRCULAR	CONCRETE	-	0.17	2996.1	**55.91%**	1.64	1.46	0.91
													18.48																
ST627A	EX627	EX624	0.24	0.00	0.00	0.71	29.47	0.168	16.806	0.00	0.000	0.000	21.69	66.75	113.93	0.0	0.0	3116.4	66.8	1650	1650	CIRCULAR	CONCRETE	-	0.15	3679.0	**84.71%**	1.67	1.67	0.67
													22.35																
ST624AA	EX624A	EX624	2.07	0.00	0.00	0.70	2.07	1.452	1.452	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	420.3	9.2	600	600	CIRCULAR	CONCRETE	-	1.96	896.0	**46.91%**	3.07	2.57	0.06
													10.06																
ST624A	EX624	EX613	0.31	0.00	0.00	0.67	31.86	0.207	18.466	0.00	0.000	0.000	22.35	65.48	111.73	0.0	0.0	3358.5	95.3	1650	1650	CIRCULAR	CONCRETE	-	0.26	4870.9	**68.95%**	2.21	2.08	0.76
													23.12																
	EX617	EX616	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	0.0	74.7	375	375	CIRCULAR	PVC	-	0.25	87.7	**0.00%**	0.79	0.00	0.00
ST616A	EX616	EX615	0.51	0.00	0.00	0.76	0.51	0.386	0.386	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	111.9	58.4	525	525	CIRCULAR	CONCRETE	-	0.25	224.3	**49.86%**	1.00	0.86	1.13
ST615A	EX615	EX614	0.25	0.00	0.00	0.75	0.76	0.191	0.577	0.00	0.000	0.000	11.13	98.57	168.82	0.0	0.0	158.0	84.5	525	525	CIRCULAR	CONCRETE	-	0.30	245.7	**64.29%**	1.10	1.01	1.39
													12.52																
ST620A, ST620B	EX620	EX619	0.39	0.00	0.00	0.76	0.39	0.300	0.300	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	86.8	117.2	375	375	CIRCULAR	PVC	-	0.50	124.0	**69.99%**	1.12	1.07	1.83
													11.83																

Stantec

HALF MOON BAY SOUTH SUBDIVISION - PHASE 4

DATE: 26-Aug-2015
REVISION: 2
DESIGNED BY: DT
CHECKED BY:

FILE NUMBER: 1604-00743

STORM SEWER DESIGN SHEET
(City of Ottawa)

DESIGN PARAMETERS

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

	1:5 yr	1:100 yr
a =	998.071	1735.688
b =	6.053	6.014
c =	0.814	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 (5-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (-)	ACCUM. AREA (5YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	ACCUM. AREA (100YR (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ (NOTE 1) (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETEI (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)
ST623A, ST623B	EX623	EX622	1.10	0.00	0.00	0.66	1.10	0.729	0.729	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	210.9	116.2	525	525	CIRCULAR	CONCRETE	-	0.35	265.4	**79.46%**	1.19	1.17	1.66
	EX622	EX621	0.00	0.00	0.00	0.00	1.10	0.000	0.729	0.00	0.000	0.000	11.66	96.19	164.72	0.0	0.0	194.7	8.5	525	525	CIRCULAR	CONCRETE	-	0.30	245.7	**79.23%**	1.10	1.08	0.13
ST621A	EX621	EX619	0.36	0.00	0.00	0.75	1.47	0.273	1.002	0.00	0.000	0.000	11.79	95.62	163.73	0.0	0.0	266.1	42.0	675	675	CIRCULAR	CONCRETE	-	0.20	392.2	**67.85%**	1.06	0.99	0.70
													12.49																	
ST619A, ST619B	EX619	EX614	0.49	0.00	0.00	0.57	2.35	0.279	1.581	0.00	0.000	0.000	12.49	92.65	158.60	0.0	0.0	406.9	46.5	750	750	CIRCULAR	CONCRETE	-	0.20	519.4	**78.34%**	1.14	1.12	0.69
													13.19																	
ST614B, ST614C, ST614A	EX614	EX613	0.39	0.00	0.00	0.74	3.50	0.287	2.445	0.00	0.000	0.000	13.19	89.92	153.88	0.0	0.0	610.7	76.9	900	900	CIRCULAR	CONCRETE	-	0.20	848.6	**71.96%**	1.29	1.23	1.04
													14.22																	
ST613A, ST613B	EX613	EX602	1.01	0.00	0.00	0.62	36.37	0.630	21.541	0.00	0.000	0.000	23.12	64.08	109.32	0.0	0.0	3834.2	68.0	1800	1800	CIRCULAR	CONCRETE	-	0.32	6820.9	**56.21%**	2.60	2.30	0.49
													23.61																	
ST611A	EX611	EX610	0.38	0.00	0.00	0.50	0.38	0.189	0.189	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	54.6	81.6	450	450	CIRCULAR	CONCRETE	-	0.20	133.3	**40.95%**	0.81	0.65	2.08
	EX610	EX609	0.00	0.00	0.00	0.00	0.38	0.000	0.189	0.00	0.000	0.000	12.08	94.35	161.53	0.0	0.0	49.4	10.6	525	525	CIRCULAR	CONCRETE	-	0.20	199.6	**24.77%**	0.89	0.62	0.29
ST609A, ST609B	EX609	EX608	0.42	0.00	0.00	0.63	0.79	0.263	0.452	0.00	0.000	0.000	12.37	93.15	159.46	0.0	0.0	116.9	40.5	525	525	CIRCULAR	CONCRETE	-	0.20	200.6	**58.24%**	0.90	0.80	0.84
													13.21																	
ST612A	EX612	EX608	0.26	0.00	0.00	0.77	0.26	0.201	0.201	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	58.2	90.6	300	300	CIRCULAR	PVC	-	0.65	77.5	**75.03%**	1.10	1.07	1.42
													11.42																	
608D, ST608B, ST608C, ST60	EX608	EX607	0.91	0.00	0.00	0.64	1.96	0.583	1.236	0.00	0.000	0.000	13.21	89.83	153.72	0.0	0.0	308.3	106.8	675	675	CIRCULAR	CONCRETE	-	0.20	391.7	**78.72%**	1.06	1.04	1.71
	EX607	EX606	0.00	0.00	0.00	0.00	1.96	0.000	1.236	0.00	0.000	0.000	14.92	83.81	143.32	0.0	0.0	287.6	10.4	675	675	CIRCULAR	CONCRETE	-	0.20	392.1	**73.35%**	1.06	1.02	0.17
ST606A, ST606B	EX606	EX605	0.47	0.00	0.00	0.63	2.43	0.293	1.529	0.00	0.000	0.000	15.09	83.26	142.38	0.0	0.0	353.5	92.1	825	825	CIRCULAR	CONCRETE	-	0.20	672.2	**52.60%**	1.22	1.06	1.45
ST605A	EX605	EX604	0.50	0.00	0.00	0.75	2.93	0.376	1.905	0.00	0.000	0.000	16.54	78.89	134.84	0.0	0.0	417.5	88.7	825	825	CIRCULAR	CONCRETE	-	0.20	669.7	**62.33%**	1.21	1.11	1.33
ST604A	EX604	EX602	0.42	0.00	0.00	0.75	3.35	0.312	2.217	0.00	0.000	0.000	17.87	75.30	128.65	0.0	0.0	463.7	119.6	825	825	CIRCULAR	CONCRETE	-	0.20	670.8	**69.13%**	1.22	1.15	1.74
													19.61																	
ST602A	EX602	EX601	0.26	0.00	0.00	0.51	41.46	0.134	24.612	0.00	0.000	0.000	23.61	63.21	107.83	0.0	0.0	4321.5	31.5	1800	1800	CIRCULAR	CONCRETE	-	0.16	4778.3	**90.44%**	1.82	1.86	0.28
													23.89							1800	1800									
	EX509B	EX509	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	0.0	28.3	300	300	CIRCULAR	PVC	-	0.18	40.4	**0.00%**	0.57	0.00	0.00
													10.00																	
ST520A	EX520	EX509	0.62	0.00	0.00	0.75	0.62	0.463	0.463	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	134.1	108.6	450	450	CIRCULAR	CONCRETE	-	0.32	168.8	**79.40%**	1.03	1.01	1.79
													11.79																	
ST509A	EX509	EX508	0.47	0.00	0.00	0.73	1.09	0.343	0.807	0.00	0.000	0.000	11.79	95.62	163.73	0.0	0.0	214.2	43.4	750	750	CIRCULAR	CONCRETE	-	0.44	768.5	**27.88%**	1.69	1.21	0.60
													12.38																	
ST514A	EX514	EX513	0.21	0.00	0.00	0.67	0.21	0.142	0.142	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	41.0	9.3	450	450	CIRCULAR	CONCRETE	-	0.22	138.3	**29.63%**	0.84	0.62	0.25
ST513A	EX513	EX512	0.31	0.00	0.00	0.78	0.52	0.244	0.385	0.00	0.000	0.000	10.25	102.89	176.30	0.0	0.0	110.1	82.9	450	450	CIRCULAR	CONCRETE	-	0.24	146.1	**75.38%**	0.89	0.86	1.61
ST512A	EX512	EX511	0.40	0.00	0.00	0.78	0.92	0.311	0.696	0.00	0.000	0.000	11.86	95.32	163.21	0.0	0.0	184.3	82.9	525	525	CIRCULAR	CONCRETE	-	0.37	274.3	**67.17%**	1.23	1.15	1.20
													13.06																	
	EX520	EX519	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	0.0	8.5	300	300	CIRCULAR	PVC	-	0.35	57.2	**0.00%**	0.81	0.00	0.00
	EX519	EX516	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	0.0	37.4	300	300	CIRCULAR	PVC	-	0.21	44.5	**0.00%**	0.63	0.00	0.00
													10.00																	
ST518A	EX518	EX517	0.36	0.00	0.00	0.75	0.36	0.269	0.269	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	77.9	88.0	375	375	CIRCULAR	PVC	-	0.30	95.3	**81.72%**	0.86	0.86	1.71
ST517A	EX517	EX516	0.22	0.00	0.00	0.75	0.57	0.162	0.431	0.00	0.000	0.000	11.71	95.93	164.27	0.0	0.0	114.8	79.8	375	375	CIRCULAR	PVC	-	0.45	117.8	**97.52%**	1.07	1.11	1.19
													12.91																	
ST523A	EX523	EX522	0.28	0.00	0.00	0.70	0.28	0.194	0.194	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	56.2	55.3	300	300	CIRCULAR	PVC	-	0.45	64.6	**86.98%**	0.92	0.93	0.99
ST522A, ST522B	EX522	EX521	0.75	0.00	0.00	0.63	1.03	0.472	0.667	0.00	0.000	0.000	10.99	99.23	169.97	0.0	0.0	183.8	102.2	450	450	CIRCULAR	CONCRETE	-	0.43	195.2	**94.14%**	1.19	1.23	1.39
													12.38																	
ST534B, ST534A	EX534	EX533	0.74	0.00	0.00	0.58	0.74	0.430	0.430	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	124.5	95.1	450	450	CIRCULAR	CONCRETE	-	0.40	188.1	**66.18%**	1.15	1.06	1.49
	EX533	EX532	0.00	0.00	0.00	0.00	0.74	0.000	0.430	0.00	0.000	0.000	11.49	96.94	166.01	0.0	0.0	115.8	10.6	525	525	CIRCULAR	CONCRETE	-	0.20	200.6	**57.73%**	0.90	0.80	0.22
ST532B, ST532A	EX532	EX531	0.77	0.00	0.00	0.59	1.51	0.457	0.887	0.00	0.000	0.000	11.71	95.96	164.31	0.0	0.0	236.4	60.5	600	600	CIRCULAR	CONCRETE	-	0.20	286.5	**82.51%**	0.98	0.98	1.03
	EX531	EX530	0.00	0.00	0.00	0.00	1.51	0.000	0.887	0.00	0.000	0.000	12.74	91.65	156.86	0.0	0.0	225.7	10.6	675	675	CIRCULAR	CONCRETE	-	0.15	339.6	**66.47%**	0.92	0.85	0.21
ST530A	EX530	EX529	0.37	0.00	0.00	0.72	1.89	0.270	1.156	0.00	0.000	0.000	12.95	90.84	155.46	0.0	0.0	291.8	71.7	750	750	CIRCULAR	CONCRETE	-	0.15	449.8	**64.87%**	0.99	0.91	1.31
ST529A	EX529	EX525	0.32	0.00	0.00	0.51	2.21	0.163	1.319	0.00	0.000	0.000	14.26	86.02	147.15	0.0	0.0	315.3	52.8	750	750	CIRCULAR	CONCRETE	-	0.15	449.8	**70.09%**	0.99	0.94	0.94
													15.20																	
ST528A	EX528	EX527	0.22	0.00	0.00	0.70	0.22	0.156	0.156	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	45.2	11.4	300	300	CIRCULAR	PVC	-	0.65	77.5	**58.36%**	1.10	0.98	0.19
	EX527	EX526	0.00	0.00	0.00	0.00	0.22	0.000	0.156	0.00	0.000	0.000	10.19	103.19	176.82	0.0	0.0	44.8	48.9	300	300	CIRCULAR	PVC	-	0.40	60.8	**73.68%**	0.86	0.83	0.98
ST526A, ST526B	EX526	EX525	0.69	0.00	0.00	0.61	0.91	0.417	0.574	0.00	0.000	0.000	11.17	98.38	168.50	0.0	0.0	156.7	96.1	450	450	CIRCULAR	CONCRETE	-	0.40	188.1	**83.32%**	1.15	1.14	1.40
													12.58																	

Stantec

HALF MOON BAY SOUTH SUBDIVISION - PHASE 4

DATE: 26-Aug-2015
REVISION: 2
DESIGNED BY: DT
CHECKED BY:

FILE NUMBER: 1604-00743

STORM SEWER DESIGN SHEET
(City of Ottawa)

DESIGN PARAMETERS

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

	1:5 yr	1:100 yr
a =	998.071	1735.688
b =	6.053	6.014
c =	0.814	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 (5-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (-)	ACCUM. AREA (5YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	ACCUM. AREA (100YR (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ (NOTE 1) (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETEI (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)
ST537A	EX537	EX536	0.26	0.00	0.00	0.72	0.26	0.186	0.186	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	54.0	91.2	300	300	CIRCULAR	PVC	-	0.50	68.0	**79.36%**	0.97	0.95	1.60
ST536A	EX536	EX535	0.38	0.00	0.00	0.51	0.64	0.195	0.381	0.00	0.000	0.000	11.60	96.45	165.17	0.0	0.0	102.1	48.4	450	450	CIRCULAR	CONCRETE	-	0.50	210.3	**48.57%**	1.28	1.08	0.74
													12.34																
ST541A	EX541	EX540	0.22	0.00	0.00	0.71	0.22	0.159	0.159	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	45.9	63.2	300	300	CIRCULAR	PVC	-	1.50	117.8	**38.99%**	1.67	1.33	0.79
													10.79																
ST546B, ST546A	EX546	EX545	0.74	0.00	0.00	0.54	0.74	0.399	0.399	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	115.5	112.3	375	375	CIRCULAR	PVC	-	1.20	192.0	**60.17%**	1.74	1.57	1.19
	EX545	EX544	0.00	0.00	0.00	0.00	0.74	0.000	0.399	0.00	0.000	0.000	11.19	98.28	168.33	0.0	0.0	109.0	10.6	375	375	CIRCULAR	PVC	-	0.80	156.8	**69.51%**	1.42	1.34	0.13
ST544A, ST544B	EX544	EX543	0.65	0.00	0.00	0.71	1.39	0.464	0.864	0.00	0.000	0.000	11.33	97.67	167.28	0.0	0.0	234.3	103.5	525	525	CIRCULAR	CONCRETE	-	0.80	401.3	**58.38%**	1.80	1.61	1.07
	EX543	EX542	0.00	0.00	0.00	0.00	1.39	0.000	0.864	0.00	0.000	0.000	12.40	93.02	159.23	0.0	0.0	223.1	10.6	525	525	CIRCULAR	CONCRETE	-	0.80	401.3	**55.60%**	1.80	1.59	0.11
ST542A	EX542	EX540	0.23	0.00	0.00	0.70	1.62	0.162	1.026	0.00	0.000	0.000	12.51	92.56	158.45	0.0	0.0	263.8	67.5	675	675	CIRCULAR	CONCRETE	-	0.55	651.5	**40.48%**	1.76	1.42	0.79
													13.30																
ST540A	EX540	EX539	0.18	0.00	0.00	0.72	2.03	0.131	1.316	0.00	0.000	0.000	13.30	89.47	153.10	0.0	0.0	326.9	97.6	750	750	CIRCULAR	CONCRETE	-	0.30	636.1	**51.39%**	1.39	1.20	1.35
	EX539	EX538	0.00	0.00	0.00	0.00	2.03	0.000	1.316	0.00	0.000	0.000	14.66	84.68	144.84	0.0	0.0	309.5	42.3	750	750	CIRCULAR	CONCRETE	-	0.30	636.1	**48.65%**	1.39	1.18	0.60
													15.25																
	EX553	EX552	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	0.0	11.8	300	300	CIRCULAR	PVC	-	0.75	83.3	**0.00%**	1.18	0.00	0.00
ST552A	EX552	EX551	0.25	0.00	0.00	0.71	0.25	0.176	0.176	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	50.9	74.7	300	300	CIRCULAR	PVC	-	0.75	83.3	**61.08%**	1.18	1.07	1.16
													11.16																
ST555B, ST555A	EX555	EX554	0.21	0.00	0.00	0.62	0.21	0.131	0.131	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	38.0	71.2	300	300	CIRCULAR	PVC	-	0.45	64.5	**58.90%**	0.92	0.83	1.44
													11.44																
ST563A	563	562	0.39	0.00	0.00	0.65	0.39	0.251	0.251	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	72.6	49.2	375	375	CIRCULAR	PVC	-	0.65	141.4	**51.39%**	1.28	1.10	0.74
	562	561	0.00	0.00	0.00	0.00	0.39	0.000	0.251	0.00	0.000	0.000	10.74	100.43	172.04	0.0	0.0	70.0	11.0	375	375	CIRCULAR	PVC	-	0.65	140.9	**49.69%**	1.28	1.09	0.17
ST561A	561	560	0.13	0.00	0.00	0.71	0.52	0.094	0.345	0.00	0.000	0.000	10.91	99.62	170.64	0.0	0.0	95.6	53.3	375	375	CIRCULAR	PVC	-	0.50	123.9	**77.13%**	1.12	1.09	0.81
													11.72																
	565	564	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	0.0	48.9	300	300	CIRCULAR	PVC	-	0.65	77.5	**0.00%**	1.10	0.00	0.00
													10.00																
ST566A	566	564	0.30	0.00	0.00	0.70	0.30	0.208	0.208	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	60.2	69.0	300	300	CIRCULAR	PVC	-	0.65	77.5	**77.60%**	1.10	1.07	1.07
													11.07																
ST564A, ST564B	564	560	0.51	0.00	0.00	0.59	0.81	0.301	0.509	0.00	0.000	0.000	11.07	98.85	169.31	0.0	0.0	139.7	73.6	450	450	CIRCULAR	CONCRETE	-	0.65	239.8	**58.26%**	1.46	1.31	0.94
													12.01																
ST560B, ST560A	560	EX559A	0.31	0.00	0.00	0.62	1.64	0.190	1.045	0.00	0.000	0.000	12.01	94.64	162.04	0.0	0.0	274.6	57.8	525	525	CIRCULAR	CONCRETE	-	0.75	388.5	**70.68%**	1.74	1.65	0.58
	EX559A	EX559	0.00	0.00	0.00	0.00	1.64	0.000	1.045	0.00	0.000	0.000	12.60	92.22	157.86	0.0	0.0	267.6	11.1	525	525	CIRCULAR	CONCRETE	-	0.75	388.5	**68.87%**	1.74	1.64	0.11
ST559B, ST559C, ST559A	EX559	EX558	0.40	0.00	0.00	0.61	2.04	0.249	1.293	0.00	0.000	0.000	12.71	91.77	157.08	0.0	0.0	329.7	64.5	600	600	CIRCULAR	CONCRETE	-	0.75	554.7	**59.43%**	1.90	1.71	0.63
	EX558	EX557	0.00	0.00	0.00	0.00	2.04	0.000	1.293	0.00	0.000	0.000	13.34	89.35	152.89	0.0	0.0	321.0	10.6	600	600	CIRCULAR	CONCRETE	-	0.75	554.8	**57.86%**	1.90	1.70	0.10
ST557B, ST557A	EX557	EX556	0.43	0.00	0.00	0.65	2.47	0.277	1.571	0.00	0.000	0.000	13.44	88.96	152.22	0.0	0.0	388.1	65.6	600	600	CIRCULAR	CONCRETE	-	0.75	554.7	**69.96%**	1.90	1.80	0.61
ST556A	EX556	EX554	0.49	0.00	0.00	0.69	2.96	0.339	1.910	0.00	0.000	0.000	14.05	86.77	148.44	0.0	0.0	460.4	62.5	675	675	CIRCULAR	CONCRETE	-	0.50	620.3	**74.21%**	1.68	1.62	0.65
													14.69																
ST554A, ST554B, ST554C	EX554	EX551	1.27	0.00	0.00	0.54	4.45	0.691	2.733	0.00	0.000	0.000	14.69	84.57	144.64	0.0	0.0	641.9	71.9	750	750	CIRCULAR	CONCRETE	-	0.55	861.3	**74.52%**	1.89	1.82	0.66
													15.35																
ST551A	EX551	EX538	0.34	0.00	0.00	0.72	5.04	0.246	3.154	0.00	0.000	0.000	15.35	82.44	140.96	0.0	0.0	722.3	50.6	975	975	CIRCULAR	CONCRETE	-	0.15	905.5	**79.77%**	1.17	1.16	0.73
													16.08																
ST538A	EX538	EX535	0.24	0.00	0.00	0.72	7.30	0.171	4.641	0.00	0.000	0.000	16.08	80.22	137.14	0.0	0.0	1034.1	68.6	1200	1200	CIRCULAR	CONCRETE	-	0.10	1286.2	**80.40%**	1.10	1.09	1.05
													17.13																
ST535A	EX535	EX525	0.66	0.00	0.00	0.72	8.61	0.478	5.500	0.00	0.000	0.000	17.13	77.24	132.00	0.0	0.0	1180.0	75.6	1200	1200	CIRCULAR	CONCRETE	-	0.13	1466.5	**80.46%**	1.26	1.24	1.02
													18.15																
ST525A	EX525	EX521	0.55	0.00	0.00	0.72	12.27	0.395	7.787	0.00	0.000	0.000	18.15	74.59	127.42	0.0	0.0	1613.5	73.0	1200	1200	CIRCULAR	CONCRETE	-	0.22	1893.0	**85.23%**	1.62	1.62	0.75
													18.90																
ST521A, ST521B, ST521C	EX521	EX516	0.82	0.00	0.00	0.54	14.12	0.444	8.898	0.00	0.000	0.000	18.90	72.76	124.27	0.0	0.0	1798.4	71.0	1350	1350	CIRCULAR	CONCRETE	-	0.13	1982.4	**90.72%**	1.34	1.37	0.86
													19.76																
ST516A	EX516	EX511	0.42	0.00	0.00	0.49	15.11	0.206	9.535	0.00	0.000	0.000	19.76	70.77	120.85	0.0	0.0	1874.6	65.0	1350	1350	CIRCULAR	CONCRETE	-	0.12	1953.4	**95.97%**	1.32	1.37	0.79
													20.55																
	EX511	EX508	0.00	0.00	0.00	0.00	16.04	0.000	10.231	0.00	0.000	0.000	20.55	69.06	117.89	0.0	0.0	1962.6	49.6	1350	1350	CIRCULAR	CONCRETE	-	0.18	2371.8	**82.75%**	1.61	1.60	0.52

Stantec

HALF MOON BAY SOUTH SUBDIVISION - PHASE 4

DATE: 26-Aug-2015
REVISION: 2
DESIGNED BY: DT
FILE NUMBER: 1604-00743
CHECKED BY:

STORM SEWER DESIGN SHEET
(City of Ottawa)

DESIGN PARAMETERS

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

	1:5 yr	1:100 yr
a =	998.071	1735.688
b =	6.053	6.014
c =	0.814	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 (5-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (-)	ACCUM. AREA (5YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	ACCUM. AREA (100YR (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ (NOTE 1) (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETEI (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)
													21.07																
	EX508	EX503	0.00	0.00	0.00	0.00	17.12	0.000	11.038	0.00	0.000	0.000	21.07	67.98	116.04	0.0	0.0	2084.4	51.9	1500	1500	CIRCULAR	CONCRETE	-	0.21	3396.7	**61.37%**	1.86	1.69	0.51
													21.58																
	EX507	EX506	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	0.0	11.4	300	300	CIRCULAR	PVC	-	0.26	49.4	**0.00%**	0.70	0.00	0.00
ST506A	EX506	EX505	0.28	0.00	0.00	0.74	0.28	0.207	0.207	0.00	0.000	0.000	10.00	104.19	178.56	0.0	0.0	60.0	120.0	300	300	CIRCULAR	PVC	-	0.39	60.2	**99.66%**	0.85	0.90	2.23
	EX505	EX504	0.00	0.00	0.00	0.00	0.28	0.000	0.207	0.00	0.000	0.000	12.23	93.73	160.46	0.0	0.0	53.9	8.5	300	300	CIRCULAR	PVC	-	0.24	46.6	**115.66%**	0.66	0.66	0.21
ST504A	EX504	EX503	0.40	0.00	0.00	0.74	0.68	0.293	0.500	0.00	0.000	0.000	12.44	92.85	158.94	0.0	0.0	128.9	37.4	450	450	CIRCULAR	CONCRETE	-	0.45	200.6	**64.26%**	1.22	1.13	0.55
													13.00																
ST503A	EX503	EX502	0.32	0.00	0.00	0.76	18.12	0.245	11.782	0.00	0.000	0.000	21.58	66.96	114.28	0.0	0.0	2191.5	60.5	1500	1500	CIRCULAR	CONCRETE	-	0.21	3418.2	**64.11%**	1.87	1.73	0.58
ST502A	EX502	EX501	0.26	0.00	0.00	0.76	18.39	0.201	11.983	0.00	0.000	0.000	22.17	65.83	112.34	0.0	0.0	2191.2	77.6	1500	1500	CIRCULAR	CONCRETE	-	0.10	2368.4	**92.52%**	1.30	1.34	0.97
													23.13							1500	1500								

depths and capture rates for areas tributary to the Corrigan system remain unchanged from that of the interim scenario.

Table 13: HMBS - Phase 4 - Major and Minor System 5 Year Storm Results

Segment Type	Segment ID	Peak Flow (m^3/s)	Depth on Segment (cm)	Max. Capture (L/s)	Storage Used (m^3)	Static Ponding Depth (cm)	Total Flow Depth (cm)
Minor System To Todd Pond							
Road	ST604A	0.111	6.31	64.0	11.5	15.0	21.3
RY	ST602A	0.033	11.82	22.0	0.0	0.0	N/A
RY	ST613B	0.065	15.58	32.0	0.0	0.0	N/A
Road	ST614A	0.018	3.08	18.4	0.2	12.0	3.1
Road	ST616A	0.144	6.66	64.0	33.1	19.0	6.7
Road	ST606A	0.075	6.00	64.0	1.2	15.0	6.0
Road	ST605A	0.134	7.45	86.0	19.5	24.0	7.5
RY	ST606B	0.019	9.78	18.7	0.0	0.0	N/A
RY	ST608C	0.033	11.80	32.0	0.0	0.0	N/A
Road	ST620A	0.030	3.75	22.0	0.0	4.0	3.8
Road	ST623A	0.190	7.74	140.0	18.2	22.0	7.7
Road	ST614B	0.053	5.18	32.0	9.6	12.0	5.2
Road	ST615A	0.066	5.66	44.0	7.1	15.0	5.7
Road	ST614C	0.066	5.67	32.0	0.0	5.0	5.7
Road	ST619B	0.032	4.33	22.0	0.0	0.0	4.3
Road	ST620B	0.074	5.97	44.0	10.7	15.0	6.0
Road	ST621A	0.095	6.50	64.0	9.5	15.0	6.5
RY	ST619A	0.060	15.16	32.0	0.0	0.0	N/A
RY	ST623B	0.053	14.32	32.0	0.0	0.0	N/A
Road	ST628A	0.158	7.90	150.0	3.0	16.0	7.9
Road	ST637A	0.086	5.48	85.9	0.4	30.0	5.5
Road	ST640A	0.106	6.22	105.5	0.4	10.0	6.2
Road	ST612A	0.070	5.82	64.0	0.3	5.0	5.8
Road	ST643A	0.054	4.80	32.0	0.0	0.0	4.8
Park	ST662AA	0.015	0.46	8.7	0.0	-	-
Road	ST662A	0.052	4.42	52.0	0.0	0.0	4.4
Road	ST663A	0.058	4.59	57.3	0.2	5.0	4.6
RY	ST637B	0.053	14.34	42.0	0.0	0.0	14.3
Road	ST609A	0.065	5.63	54.0	2.0	15.0	5.6
RY	ST652B	0.017	9.26	17.0	0.0	0.0	9.3
Road	ST652A	0.084	5.22	83.6	0.1	3.0	5.2
Road	ST638A	0.024	3.82	22.0	0.0	9.0	3.8

Segment Type	Segment ID	Peak Flow (m^3/s)	Depth on Segment (cm)	Max. Capture (L/s)	Storage Used (m^3)	Static Ponding Depth (cm)	Total Flow Depth (cm)
Road	ST608A	0.098	6.06	76.0	4.8	19.0	6.1
RY	ST608D	0.033	4.41	32.0	0.1	5.0	4.4
RY	ST608B	0.020	10.06	19.9	0.0	0.0	10.1
RY	ST609B	0.017	9.34	17.3	0.0	0.0	9.3
Road	ST647A	0.024	3.14	24.1	0.0	9.0	3.1
School	ST652AA	0.397	6.64	318.7	32.9	-	-
Road	ST630A	0.052	5.13	32.0	1.0	19.0	24.1
Park	ST631B	0.042	1.29	22.0	0.0	-	-
Road	ST630AB	0.159	6.68	134.0	2.9	19.0	6.7
RY	ST630AA	0.071	15.97	32.0	0.0	0.0	16.0
Road	ST629A	0.089	6.36	70.9	1.8	13.0	6.4
RY	ST631C	0.049	13.88	48.9	0.0	0.0	13.9
RY	ST631D	0.097	17.92	67.0	0.0	0.0	17.9
Road	ST632A	0.103	6.68	84.0	0.0	0.0	6.7
Road	ST638B	0.096	6.51	74.0	5.1	15.0	6.5
Road	ST641A	0.063	5.57	54.0	1.8	15.0	5.6
Road	ST646A	0.076	6.03	54.0	1.0	5.0	11.0
RY	ST611A	0.044	13.18	42.0	0.0	0.0	13.2
RY	ST631A	0.040	12.73	22.0	0.0	0.0	12.7
RY	EXT-1	0.028	11.09	0.0	0.0	0.0	11.1
Road	ST509AA	0.213	8.07	44.0	113.3	28.0	36.1
RY	ST509AB	0.048	13.77	22.0	0.0	0.0	13.8
RY	ST521E	0.048	13.74	22.0	0.0	0.0	13.7
Road	ST521D	0.140	7.57	22.0	81.6	30.0	7.6
Park	ST510A	0.009	0.28	2.7	0.0	-	-
Road	ST613A	0.153	7.12	149.8	1.3	30.0	7.1
School	ST624AA	0.468	10.47	232.9	117.3	0.0	10.5
Road	ST624A	0.068	5.21	57.5	7.5	30.0	5.2
Road	ST627A	0.057	5.34	55.9	0.7	20.0	5.3
Road	ST524A	0.060	4.78	44.0	8.0	30.0	4.8
RY	ST637C	0.053	14.37	22.0	0.0	0.0	14.4
RY	ST648A	0.019	9.93	19.2	0.0	0.0	9.9
RY	ST660B	0.024	10.63	22.0	0.0	0.0	10.6
Road	ST660A	0.113	6.95	109.0	1.4	14.0	7.0
Road	ST657A	0.065	5.63	62.9	1.5	15.0	5.6
Road	ST659A	0.113	6.94	64.0	0.5	5.0	11.9
Road	ST656A	0.057	5.32	54.0	2.2	15.0	5.3
Road	ST655A	0.059	4.95	54.0	1.6	15.0	5.0

Segment Type	Segment ID	Peak Flow (m^3/s)	Depth on Segment (cm)	Max. Capture (L/s)	Storage Used (m^3)	Static Ponding Depth (cm)	Total Flow Depth (cm)
RY	ST655B	0.067	15.67	66.2	0.0	0.0	15.7
RY	ST650B	0.049	13.83	42.0	0.0	0.0	13.8
Road	ST650A	0.084	5.43	84.0	0.0	0.0	5.4
Road	ST649A	0.110	5.57	109.0	0.1	5.0	5.6
RY	ST654A	0.031	11.53	31.0	0.0	0.0	11.5
Road	ST669A	0.070	4.52	67.0	0.0	5.0	4.5
RY	ST665A	0.070	4.51	64.0	0.5	0.0	4.5
Road	ST670A	0.151	6.02	84.0	0.7	0.0	6.0
RY	ST670B	0.027	10.98	26.9	0.0	0.0	11.0
Road	ST728A	0.076	6.02	67.0	0.0	5.0	6.0
Road	ST726A	0.057	4.10	55.0	0.0	0.0	4.1
Road	ST726B	0.044	13.15	42.0	0.0	5.0	13.2
Road	ST725A	0.098	5.32	96.0	0.2	0.0	5.3
Road	ST724A	0.078	4.88	77.8	0.1	15.0	4.9
Road	ST724B	0.052	14.26	42.0	0.0	14.0	14.3
Road	ST722A	0.079	5.29	74.0	0.3	15.0	5.3
Road	ST720A	0.019	2.68	19.1	0.2	15.0	2.7
Road	ST667A	0.058	4.91	54.0	0.3	0.0	4.9
Park	ST666B	0.029	11.23	28.8	0.0	-	-
School	ST666A	0.069	5.24	64.0	0.3	-	-
Road	ST673A	0.058	4.13	55.0	0.0	0.0	4.1
Road	ST672A	0.051	3.90	51.1	0.0	18.0	3.9
Road	ST672B	0.030	11.39	30.0	0.0	0.0	11.4
Road	ST723A	0.027	3.11	26.7	0.1	0.0	3.1
Road	ST664A	0.081	4.72	81.2	0.1	0.0	4.7
Road	ST715B	0.039	12.58	39.0	0.0	0.0	12.6
Road	ST714A	0.041	12.79	40.6	0.0	0.0	12.8
Road	ST719B	0.041	12.81	40.8	0.0	0.0	12.8
Road	ST719A	0.047	3.75	44.0	0.3	0.0	3.8
Road	ST717A	0.083	4.76	83.4	0.0	0.0	4.8
Road	ST705A	0.181	6.73	178.0	0.4	0.0	6.7
Road	ST709A	0.057	4.09	56.9	0.0	0.0	4.1
Road	ST715A	0.112	6.90	109.0	1.2	0.0	6.9
Road	ST713A	0.079	6.09	76.6	1.2	0.0	6.1
Road	ST711A	0.069	5.78	64.0	1.7	0.0	5.8
Road	ST710A	0.081	6.16	79.4	1.2	0.0	6.2
Road	ST710B	0.074	16.20	67.0	0.0	0.0	16.2
Road	ST707AA	0.052	1.58	46.0	2.5	0.0	1.6

Segment Type	Segment ID	Peak Flow (m^3/s)	Depth on Segment (cm)	Max. Capture (L/s)	Storage Used (m^3)	Static Ponding Depth (cm)	Total Flow Depth (cm)
Road	EXT-6	0.836	9.74	699.6	26.8	0.0	9.7
Road	ST703B	0.032	3.90	32.0	0.0	0.0	3.9
Road	ST703A	0.118	6.02	115.1	2.1	0.0	6.0
Road	ST704A	0.051	4.38	51.1	0.0	0.0	4.4

Table 14: HMBS - Phase 4 - Major and Minor System 100 Year Storm Results

Segment Type	Segment ID	Peak Flow (m^3/s)	Depth on Segment (cm)	Max. Capture (L/s)	Storage Used (m^3)	Static Ponding Depth (cm)	Total Flow Depth (cm)
Minor System To Todd Pond							
Road	ST604A	0.375	10.01	64.0	11.5	15.0	25.0
RY	ST602A	0.087	17.17	22.0	0.0	0.0	N/A
RY	ST613B	0.169	22.21	32.0	0.0	0.0	N/A
Road	ST614A	0.293	8.75	22.0	2.3	12.0	20.8
Road	ST616A	0.405	9.87	64.0	48.1	19.0	28.9
Road	ST606A	0.148	7.72	64.0	14.2	15.0	22.7
Road	ST605A	0.479	12.03	86.0	72.7	24.0	36.0
RY	ST606B	0.130	20.26	22.0	0.0	0.0	N/A
RY	ST608C	0.082	16.83	32.0	0.0	0.0	N/A
Road	ST620A	0.057	4.88	22.0	0.0	4.0	4.9
Road	ST623A	0.573	11.76	140.0	81.3	22.0	33.8
Road	ST614B	0.365	10.83	32.0	9.9	12.0	22.8
Road	ST615A	0.127	7.28	44.0	12.0	15.0	22.3
Road	ST614C	0.387	11.06	32.0	0.0	5.0	11.1
Road	ST619B	0.090	6.38	22.0	0.0	0.0	6.4
Road	ST620B	0.143	7.62	44.0	13.3	15.0	22.6
Road	ST621A	0.185	8.36	64.0	11.5	15.0	8.4
RY	ST619A	0.209	24.20	32.0	0.0	0.0	N/A
RY	ST623B	0.135	20.52	32.0	0.0	0.0	N/A
Road	ST628A	0.529	12.45	150.0	26.7	16.0	28.5
Road	ST637A	0.683	12.06	682.5	3.0	30.0	12.1
Road	ST640A	0.446	10.70	128.0	4.6	10.0	20.7
Road	ST612A	0.134	7.46	64.0	0.5	5.0	12.5
Road	ST643A	0.162	7.30	32.0	0.0	0.0	7.3
Park	ST662AA	0.101	3.09	55.2	0.0	-	-
Road	ST662A	0.127	6.18	64.0	0.0	0.0	6.2

Segment Type	Segment ID	Peak Flow (m^3/s)	Depth on Segment (cm)	Max. Capture (L/s)	Storage Used (m^3)	Static Ponding Depth (cm)	Total Flow Depth (cm)
Road	ST663A	0.118	6.03	64.0	2.0	5.0	11.0
RY	ST637B	0.267	26.47	42.0	0.0	0.0	26.5
Road	ST609A	0.129	7.32	54.0	14.6	15.0	22.3
RY	ST652B	0.049	13.80	22.0	0.0	0.0	13.8
Road	ST652A	0.223	7.64	96.0	0.5	3.0	10.6
Road	ST638A	0.100	6.61	22.0	0.0	9.0	6.6
Road	ST608A	0.228	8.28	76.0	35.3	19.0	27.3
RY	ST608D	0.063	5.56	32.0	1.0	5.0	10.6
RY	ST608B	0.114	19.25	22.0	0.0	0.0	19.3
RY	ST609B	0.093	17.67	22.0	0.0	0.0	17.7
Road	ST647A	0.472	9.68	55.0	0.0	9.0	9.7
School	ST652AA	0.851	9.84	339.0	274.5	-	-
Road	ST630A	0.486	12.08	32.0	1.0	19.0	31.1
Park	ST631B	0.246	5.58	22.0	0.0	-	-
Road	ST630AB	0.434	9.79	134.0	32.5	19.0	28.8
RY	ST630AA	0.167	22.12	32.0	0.0	0.0	22.1
Road	ST629A	0.457	11.80	70.9	1.8	13.0	11.8
RY	ST631C	0.199	23.69	100.5	0.0	0.0	23.7
RY	ST631D	0.225	24.99	67.0	0.0	0.0	25.0
Road	ST632A	0.467	11.90	84.0	0.0	0.0	11.9
Road	ST638B	0.198	8.60	74.0	15.1	15.0	23.6
Road	ST641A	0.127	7.27	54.0	12.0	15.0	22.3
Road	ST646A	0.150	7.75	54.0	1.0	5.0	12.8
RY	ST611A	0.095	17.79	42.0	0.0	0.0	17.8
RY	ST631A	0.188	23.16	22.0	0.0	0.0	23.2
RY	EXT-1	0.067	15.72	0.0	0.0	0.0	15.7
Road	ST509AA	1.221	15.68	44.0	113.3	28.0	43.7
RY	ST509AB	0.105	18.58	22.0	0.0	0.0	18.6
RY	ST521E	0.117	19.42	22.0	0.0	0.0	19.4
Road	ST521D	0.311	10.20	22.0	111.9	30.0	40.2
Park	ST510A	0.062	1.90	33.0	0.0	-	-
Road	ST613A	0.642	12.27	638.6	5.6	30.0	12.3
School	ST624AA	0.907	13.41	242.4	407.5	0.0	13.4
Road	ST624A	0.135	6.77	112.0	14.6	30.0	6.8
Road	ST627A	0.390	11.10	387.9	4.9	20.0	11.1
Road	ST524A	0.116	6.18	44.0	37.6	30.0	6.2
RY	ST637C	0.162	21.86	22.0	0.0	0.0	21.9
RY	ST648A	0.114	19.22	22.0	0.0	0.0	19.2
RY	ST660B	0.056	14.78	22.0	0.0	0.0	14.8

Segment Type	Segment ID	Peak Flow (m^3/s)	Depth on Segment (cm)	Max. Capture (L/s)	Storage Used (m^3)	Static Ponding Depth (cm)	Total Flow Depth (cm)
Road	ST660A	0.226	9.07	109.0	10.8	14.0	23.1
Road	ST657A	0.152	7.78	64.0	14.7	15.0	22.8
Road	ST659A	0.472	11.96	64.0	0.5	5.0	17.0
Road	ST656A	0.744	14.17	54.0	16.8	15.0	29.2
Road	ST655A	0.621	12.13	54.0	13.5	15.0	27.1
RY	ST655B	0.166	22.07	67.0	0.0	0.0	22.1
RY	ST650B	0.125	20.02	42.0	0.0	0.0	20.0
Road	ST650A	0.171	7.13	84.0	0.0	0.0	7.1
Road	ST649A	0.567	10.42	109.0	0.7	5.0	15.4
RY	ST654A	0.074	16.19	32.0	0.0	0.0	16.2
Road	ST669A	0.151	6.01	67.0	0.0	5.0	6.0
RY	ST665A	0.442	9.00	64.0	0.5	0.0	9.0
Road	ST670A	0.394	8.57	84.0	0.7	0.0	8.6
RY	ST670B	0.094	17.74	32.0	0.0	0.0	17.7
Road	ST728A	0.147	7.69	67.0	0.0	5.0	7.7
Road	ST726A	0.237	7.07	55.0	0.0	0.0	7.1
Road	ST726B	0.109	18.81	42.0	0.0	5.0	18.8
Road	ST725A	0.195	6.92	96.0	0.5	0.0	6.9
Road	ST724A	0.385	9.02	84.0	0.7	15.0	9.0
Road	ST724B	0.111	19.03	42.0	0.0	14.0	19.0
Road	ST722A	0.206	7.67	74.0	1.0	15.0	7.7
Road	ST720A	0.039	3.51	22.0	2.3	15.0	3.5
Road	ST667A	0.370	9.96	54.0	1.0	0.0	10.0
Park	ST666B	0.061	15.27	32.0	0.0	-	-
School	ST666A	0.411	10.39	64.0	0.5	-	-
Road	ST673A	0.124	5.51	55.0	0.0	0.0	5.5
Road	ST672A	0.169	6.24	55.0	0.0	18.0	6.2
Road	ST672B	0.073	16.14	32.0	0.0	0.0	16.1
Road	ST723A	0.055	4.01	32.0	1.0	0.0	4.0
Road	ST664A	0.159	6.11	84.0	0.7	0.0	6.1
Road	ST715B	0.091	17.53	42.0	0.0	0.0	17.5
Road	ST714A	0.141	20.84	42.0	0.0	0.0	20.8
Road	ST719B	0.098	18.04	42.0	0.0	0.0	18.0
Road	ST719A	0.126	5.54	44.0	1.6	0.0	5.5
Road	ST717A	0.210	6.74	84.0	0.0	0.0	6.7
Road	ST705A	0.594	10.60	178.0	1.6	0.0	10.6
Road	ST709A	0.109	5.24	64.0	0.0	0.0	5.2
Road	ST715A	0.227	9.08	109.0	10.8	0.0	9.1
Road	ST713A	0.187	8.40	84.0	13.0	0.0	8.4

Segment Type	Segment ID	Peak Flow (m^3/s)	Depth on Segment (cm)	Max. Capture (L/s)	Storage Used (m^3)	Static Ponding Depth (cm)	Total Flow Depth (cm)
Road	ST711A	0.164	7.99	64.0	14.7	0.0	8.0
Road	ST710A	0.170	8.09	84.0	13.0	0.0	8.1
Road	ST710B	0.172	22.38	67.0	0.0	0.0	22.4
Road	ST707AA	0.345	6.28	186.0	14.0	0.0	6.3
Road	EXT-6	1.737	12.88	699.6	500.6	0.0	12.9
Road	ST703B	0.354	9.79	32.0	0.0	0.0	9.8
Road	ST703A	0.532	10.61	116.0	21.3	0.0	10.6
Road	ST704A	0.107	5.78	55.0	0.0	0.0	5.8

The results of the hydrologic analyses (DDSWMM input and output files) for the different storm events are summarized in **Appendix A2.**

The following table shows the segments with 100 year total flow depth greater than 30 cm as shown in the above **Table 12 and Table 14**, along with a comparison to the 100 year total flow depth on those segments as per the approved SWM Report for Draft Plan #2 (Stantec, August 2014).

Table 15: 100 Year Total Flow Depth Comparison

Catchment ID	Approved SWM Plan (August 2014) Total Flow Depth (cm)	Interim Phase 4 SWM Plan (July 2015) Total Flow Depth (cm)	Ultimate Phase 4 SWM Plan (July 2015) Total Flow Depth (cm)
Minor System to Corrigan Pond			
'1-1' / ST525A	34.4	31.2	31.2
'1-9' / ST535A	39.3	30.7	30.7
'1-20' / ST551A	34.3	26.9	26.9
Minor System to Todd Pond			
'2-5' / ST616A	33.4	28.9	28.9
'2-7' / ST605A	38.7	36.0	36.0
'2-11' / ST623A	33.7	33.8	33.8
ST630A	<30	31.1	31.1

The above table shows that total flow depths have been reduced in the majority of areas with the exception of area ST630A, which shows a negligible flow depth increase. These areas were previously designed and approved prior to the flow depth requirement and/or are within Draft Plan #2 and were approved with flow depths in excess of the required 30cm. It should be noted that several efforts were made during detailed design of the approved phases in order to reduce the 100 year flow depths on streets as much as possible. The total 100 year flow depth over the proposed Phase 4 segments remains below 30cm.

Stantec

Half Moon Bay South Phase 5

DATE: 2019-02-15
REVISION: 1
DESIGNED BY: DT
CHECKED BY: KS

FILE NUMBER: **160401476**

STORM SEWER DESIGN SHEET
(City of Ottawa)

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)	$I_{2\text{-YEAR}}$ (mm/h)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$I_{100\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETEI (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)
C729A	729	728	0.00	0.34	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.000	0.000	0.241	0.241	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	69.7	115.2	375	375	CIRCULAR	PVC	-	0.50	116.6	**59.83%**	1.11
	728	727	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.241	0.000	0.000	0.000	0.000	11.93	70.12	95.01	111.33	162.67	0.0	0.0	63.6	11.9	375	375	CIRCULAR	PVC	-	2.30	250.0	**25.44%**	2.37
C727B, C727A	727	726	0.00	0.51	0.00	0.00	0.00	0.00	0.61	0.00	0.00	0.000	0.000	0.308	0.549	0.000	0.000	0.000	0.000	12.05	69.75	94.50	110.72	161.79	0.0	0.0	144.1	63.2	375	375	CIRCULAR	PVC	-	2.30	250.0	**57.65%**	2.37
																				12.54																	
C731A	731	730	0.00	0.27	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.000	0.000	0.186	0.186	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	53.8	54.1	300	300	CIRCULAR	PVC	-	0.50	68.0	**79.09%**	0.97
C730A	730	726	0.00	0.23	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.000	0.000	0.162	0.348	0.000	0.000	0.000	0.000	10.95	73.33	99.41	116.51	170.29	0.0	0.0	96.0	67.6	375	375	CIRCULAR	PVC	-	0.50	116.6	**82.38%**	1.11
																				11.98																	
C726B, C726A	726	721	0.00	0.50	0.00	0.00	0.00	0.00	0.66	0.00	0.00	0.000	0.000	0.327	1.223	0.000	0.000	0.000	0.000	12.54	68.25	92.44	108.30	158.23	0.0	0.0	314.1	96.1	450	450	CIRCULAR	CONCRETE	-	2.30	451.1	**69.64%**	2.75
																				13.16																	
C667B	667	725	0.00	0.12	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.000	0.000	0.083	0.083	0.000	0.000	0.000	0.000	0.00	167.22	230.48	271.61	398.62	0.0	0.0	53.0	61.1	300	300	CIRCULAR	PVC	-	0.50	68.0	**77.94%**	0.97
	725	724	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	1.08	146.90	201.75	237.48	348.31	0.0	0.0	46.4	25.9	300	300	CIRCULAR	PVC	-	0.50	68.0	**68.23%**	0.97
C724A, C724B	724	721	0.00	0.59	0.00	0.00	0.00	0.00	0.61	0.00	0.00	0.000	0.000	0.362	0.445	0.000	0.000	0.000	0.000	1.55	139.53	191.39	225.19	330.19	0.0	0.0	236.5	50.7	525	525	CIRCULAR	CONCRETE	-	0.50	317.2	**74.55%**	1.42
																				2.17																	
C723A	723	722	0.00	0.31	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.000	0.000	0.218	0.218	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	63.2	17.4	375	375	CIRCULAR	PVC	-	0.50	116.6	**54.24%**	1.11
	722	721	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.218	0.000	0.000	0.000	0.000	10.30	75.68	102.64	120.31	175.87	0.0	0.0	62.3	31.6	375	375	CIRCULAR	PVC	-	0.50	116.6	**53.43%**	1.11
																				10.85																	
	721	720	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	1.887	0.000	0.000	0.000	0.000	13.16	66.48	90.01	105.44	154.03	0.0	0.0	471.7	21.6	600	600	CIRCULAR	CONCRETE	-	0.80	572.9	**82.33%**	1.96
C720B	720	719	0.00	0.16	0.00	0.00	0.00	0.00	0.52	0.00	0.00	0.000	0.000	0.083	1.970	0.000	0.000	0.000	0.000	13.35	65.97	89.31	104.62	152.83	0.0	0.0	488.7	13.2	600	600	CIRCULAR	CONCRETE	-	0.80	572.9	**85.29%**	1.96
																				13.46									600	600							
C669A	669	668	0.00	0.22	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.000	0.000	0.154	0.154	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	44.6	62.6	300	300	CIRCULAR	PVC	-	3.10	169.3	**26.32%**	2.41
C668A	668	667	0.00	0.22	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.000	0.000	0.151	0.305	0.000	0.000	0.000	0.000	10.62	74.51	101.03	118.42	173.09	0.0	0.0	85.7	70.2	300	300	CIRCULAR	PVC	-	3.10	169.3	**50.61%**	2.41
C667A	667	666	0.00	0.31	0.00	0.00	0.00	0.00	0.72	0.00	0.00	0.000	0.000	0.223	0.529	0.000	0.000	0.000	0.000	11.19	72.53	98.31	115.21	168.38	0.0	0.0	144.3	72.1	450	450	CIRCULAR	CONCRETE	-	1.00	297.4	**48.53%**	1.81
C666B, C666A	666	659	0.00	0.64	0.00	0.00	0.00	0.00	0.62	0.00	0.00	0.000	0.000	0.394	0.923	0.000	0.000	0.000	0.000	11.97	69.98	94.82	111.10	162.35	0.0	0.0	243.0	71.9	450	450	CIRCULAR	CONCRETE	-	1.00	297.4	**81.70%**	1.81
																				12.64									825	825							
C665A	665	664	0.00	0.29	0.00	0.00	0.00	0.00	0.72	0.00	0.00	0.000	0.000	0.210	0.210	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	60.8	58.3	300	300	CIRCULAR	PVC	-	1.10	100.8	**60.27%**	1.43
C664A	664	656	0.00	0.33	0.00	0.00	0.00	0.00	0.72	0.00	0.00	0.000	0.000	0.237	0.447	0.000	0.000	0.000	0.000	10.75	74.03	100.38	117.65	171.96	0.0	0.0	124.8	71.9	375	375	CIRCULAR	PVC	-	1.10	172.9	**72.16%**	1.64
																				11.52									750	750							

Appendix D : Geotechnical Investigation
15/2/2019 12:00:00 AM

Appendix D : GEOTECHNICAL INVESTIGATION

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

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Geotechnical Investigation

Proposed Residential Development
Half Moon Bay South (Phase 5)
Greenbank Road
Ottawa, Ontario

Prepared For

Mattamy Homes

February 8, 2019

Report: PG4803-1

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Appendices

Appendix 1 Soil Profile and Test Data Sheets
Symbols and Terms

Appendix 2 Figure 1 - Key Plan
Drawing PG4803-1 - Test Hole Location Plan

1.0 Introduction

Paterson Group (Paterson) was commissioned by Mattamy Homes to conduct a geotechnical investigation for the current phase of the proposed residential development to be located within the Half Moon Bay South subdivision in the City of Ottawa (refer to Figure 1 - Key Plan in Appendix 2 of this report).

The objectives of the current investigation were to:

- ❑ Determine the subsoil and groundwater conditions at this site by means of test holes.
- ❑ Provide geotechnical recommendations pertaining to design of the proposed development including construction considerations which may affect the design.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes geotechnical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

2.0 Proposed Development

Based on the available conceptual drawings, it is our understanding that the proposed development consists of a series of townhomes and/or single family residential houses with associated driveways, access lanes, local roadways and landscaped areas. It is further understood that the proposed development will be serviced by future municipal water, sanitary and storm services.

3.0 Method of Investigation

3.1 Field Investigation

The field program for the current geotechnical investigation was conducted on February 5, 2019 which consisted of extending a total of 8 test pits (TP1-19 to TP8-19) to a maximum depth of 5.0 m. Previous field programs were conducted in March and December, 2015. During that time, a total of 7 test holes were advanced to a maximum depth of 9.8 m.

The test holes were distributed in a manner to provide general coverage of the proposed development. The locations were determined in the field by Paterson personnel taking into consideration site features and underground services. Approximate locations of the test holes are shown in Drawing PG4803-1 - Test Hole Location Plan included in Appendix 2.

Boreholes were put down using a track-mounted auger drill rig operated by a two-person crew. The test pits were excavated using a hydraulic excavator. All fieldwork was conducted under the full-time supervision of our personnel under the direction of a senior engineer from our geotechnical department. The drilling procedure consisted of augering to the required depths at the selected locations, sampling and testing the overburden. The excavating procedures consisted of advancing each test hole to the required depths at the selected locations and sampling the overburden.

Sampling and In Situ Testing

Soil samples were collected from the boreholes using a 50 mm diameter split-spoon (SS) sampler, or from the auger flights. Soil samples from the open test pits were recovered from the excavation side walls. All soil samples were placed in sealed plastic bags and transported to our laboratory. The depths at which the auger, split-spoon and grab samples were recovered from the test holes are shown as AU, SS and G, respectively, on the Soil Profile and Test Data sheets in Appendix 1.

The Standard Penetration Test (SPT) was conducted in conjunction with the recovery of the split spoon samples. The SPT results are recorded as 'N' values on the Soil Profile and Test Data sheets. The 'N' value is the number of blows required to drive the split spoon sampler 300 mm into the soil after a 150 mm initial penetration using a 63.5 kg hammer falling from a height of 760 mm.

Subsurface conditions observed in the test holes were recorded in detail in the field. Reference should be made to the Soil Profile and Test Data sheets presented in Appendix 1 for specific details of the soil profile encountered at the test hole locations.

Groundwater

Monitoring wells consisting of 50 mm diameter rigid PVC pipe were installed in 3 borehole locations and flexible standpipe piezometers were installed in 2 borehole locations during the course of the previous field investigations to permit monitoring of the groundwater levels. Groundwater infiltration throught the side walls of the test pits was recorded during the current field program. All groundwater observations are noted on the Soil Profile and Test Data sheets presented in Appendix 1.

Sample Storage

All samples will be stored in the laboratory for a period of one month after issuance of this report. They will then be discarded unless we are otherwise directed.

3.2 Field Survey

The test hole locations for the current field investigation were selected by Paterson and surveyed in the field by Agrodrain Services Ltd. (ASL). The elevations at the test hole locations are referenced to a geodetic datum. Ground surface elevations at the test hole locations from previous investigations were surveyed by J.D. Barnes Ltd. or were inferred based on available topographic mapping. The ground surface elevations at the test hole locations are presented on Drawing PG4803-1 - Test Hole Location Plan included in Appendix 2.

3.3 Laboratory Testing

The soil samples recovered from the subject site were visually examined in our laboratory to review the results of the field logging.

4.0 Observations

4.1 Surface Conditions

The ground surface across the subject site generally slopes down towards the east and northeast, with a change in elevation of approximately 4 to 5 m. It should be noted that the site is slightly lower than Alex Polowin Avenue towards the northeast portion of the site. The subject site is bordered to the east and northeast by the existing Half Moon Bay subdivision and to the north, west and south by vacant lands. Several fill piles were noted across the subject site due to ongoing construction operations.

4.2 Subsurface Profile

Overburden

Generally, the subsurface profile encountered at the test holes consists of a topsoil or fill layer consisting of silty clay with sand and trace gravel and organics overlying a loose to compact silty sand. A glacial till deposit was encountered below the silty sand layer consisting of silty sand with gravel, cobbles and boulders. Specific details of the soil profile at each test hole location are provided on the Soil Profile and Test Data sheets in Appendix 1.

Bedrock

Based on available geological mapping, the local bedrock consists of dolomite of the Oxford formation with an anticipated overburden thickness of 15 to 25 m.

4.3 Groundwater

Groundwater levels were measured in the monitoring wells and standpipes installed at the borehole locations following completion of the previous investigations. The results are summarized in Table 1 and provided on the Soil Profile and Test Data sheets in Appendix 1.

Table 1 - Summary of Groundwater Level Readings

Test Hole Number	Ground Surface Elevation (m)	Groundwater Depth (m)	Groundwater Elevation (m)	Date
BH 5-15 (PG3607)	108.75	Dry	-	July 28, 2016
BH 6-15 (PG3607)	102.59	Dry	-	July 28, 2016
BH 12-15 (PG3607)	105.26	Dry	-	July 28, 2016
BH 5-15 (PG3450)	103.02	7.15 6.80 6.76	95.87 96.22 96.26	March 23, 2015 April 21, 2015 May 12, 2015
BH 6-15 (PG3450)	101.42	2.93 0.99 1.45	98.49 100.43 99.97	March 23, 2015 April 21, 2015 May 12, 2015

Note: Ground surface elevations at PG3607 test hole locations were inferred based on available topographic mapping. Ground surface elevations at PG3450 test hole locations were provided by J.D. Barnes Ltd. and are understood to be referenced to a geodetic datum.

Based on our observations during the current field program, all test pits were noted to be dry within no infiltration through the side walls of the open test pits. The long-term groundwater level can also be estimated based on the recovered soil samples' moisture levels and consistency at the test hole locations. Based on these observations, the long-term groundwater table is estimated to be between 4 to 5 m below existing ground surface. It should be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater levels could vary at the time of construction.

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is satisfactory for the proposed development. It is anticipated that the proposed buildings can be constructed using conventional shallow footings placed on an undisturbed, compact silty sand or glacial till bearing surface.

The above and other considerations are discussed in the following paragraphs.

5.2 Site Grading and Preparation

Stripping Depth

Topsoil and any deleterious fill, such as those containing organics, should be stripped from under any buildings and other settlement sensitive structures, such as underground services or paved areas.

Fill Placement

Fill used for grading beneath the building areas should consist, unless otherwise specified, of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II material. The fill should be placed in lifts no greater than 300 mm thick and compacted using suitable compaction equipment for the lift thickness. Fill placed beneath the buildings should be compacted to at least 98% of its standard Proctor maximum dry density (SPMDD).

Non-specified existing fill along with site-excavated soil could be placed as general landscaping fill where surface settlement is of minor concern. The existing materials should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If the existing materials are to be placed to increase the subgrade level for areas to be paved, the non-specified existing fill should be compacted in 300 mm lifts and compacted to a minimum density of 95% of the respective SPMDD.

5.3 Foundation Design

Footings placed on an undisturbed, compact silty sand bearing surface can be designed using a bearing resistance value at serviceability limit states (SLS) of **100 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **175 kPa**. A geotechnical resistance factor of 0.5 was applied to the reported bearing resistance value at ULS. If the subgrade medium is noted to be in a loose state of compactness, it is recommended to proof-roll the bearing medium under dry conditions and above freezing temperature using appropriate compaction equipment. The subgrade should be inspected by a Paterson at the time of construction.

Footings placed on an undisturbed, glacial till bearing surface can be designed using a bearing resistance value at serviceability limit states (SLS) of **150 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **225 kPa**. A geotechnical resistance factor of 0.5 was applied to the reported bearing resistance value at ULS.

An undisturbed soil bearing surface consists of one from which all topsoil and deleterious materials, such as loose, frozen or disturbed soil, have been removed prior to the placement of concrete for footings.

Settlement

The bearing resistance value given for footings at SLS will be subjected to potential post construction total and differential settlements of 25 and 20 mm, respectively.

Lateral Support

The bearing medium under footing-supported structures is required to be provided with adequate lateral support with respect to excavations and different foundation levels. Above the groundwater level, adequate lateral support is provided to a compact glacial till, stiff silty clay, or engineered fill when a plane extending down and out from the bottom edge of the footing at a minimum of 1.5H:1V passes only through in situ soil or engineered fill.

5.4 Design for Earthquakes

The site class for seismic site response can be taken as **Class D** for the foundations considered at the subject site. Soils underlying the subject site are not susceptible to liquefaction. Reference should be made to the latest revision of the 2012 Ontario Building Code for a full discussion of the earthquake design requirements.

5.5 Basement Slab

With the removal of all topsoil and deleterious fill, such as those containing organic materials, from within the footprint of the proposed buildings, the native soil surface or approved engineered fill surface will be considered to be an acceptable subgrade on which to commence backfilling for floor slab construction.

Any soft areas should be removed and backfilled with appropriate backfill material prior to placing any fill. OPSS Granular B Type II, with a maximum particle size of 50 mm, are recommended for backfilling below the floor slab. It is recommended that the upper 200 mm of sub-floor fill consist of 19 mm clear crushed stone. All backfill material within the footprint of the proposed buildings should be placed in maximum 300 mm thick loose layers and compacted to at least 98% of its SPMDD.

5.6 Pavement Design

Car only parking and local roadways are anticipated at this site. The proposed pavement structures are shown in Tables 2 and 3.

Table 2 - Recommended Pavement Structure - Car Only Parking Areas

Thickness (mm)	Material Description
50	**Wear Course -** HL-3 or Superpave 12.5 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
300	**SUBBASE** - OPSS Granular B Type II
	SUBGRADE - Either fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil or fill

Table 3 - Recommended Pavement Structure - Local Roadways

Thickness (mm)	Material Description
40	**Wear Course -** HL-3 or Superpave 12.5 Asphaltic Concrete
50	**Binder Course -** HL-8 or Superpave 19.0 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
400	**SUBBASE** - OPSS Granular B Type II
	SUBGRADE - Either fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil or fill

Minimum Performance Graded (PG) 58-34 asphalt cement should be used for this project.

If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type I or Type II material.

The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 98% of the material's SPMDD using suitable compaction equipment.

6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

It is recommended that a perimeter foundation drainage system be provided for the proposed structures. The system should consist of a 150 mm diameter perforated corrugated plastic pipe, surrounded on all sides by 150 mm of 19 mm clear crushed stone, placed at the footing level around the exterior perimeter of the structure. The pipe should have a positive outlet, such as a gravity connection to the storm sewer.

Backfill against the exterior sides of the foundation walls should consist of free-draining non frost susceptible granular materials. The site excavated materials will be frost susceptible and, as such, are not recommended for re-use as backfill against the foundation walls unless placed in conjunction with a composite drainage system, such as Delta Drain 6000 or equivalent. Imported granular materials, such as clean sand or OPSS Granular B Type I granular material, should be used for this purpose.

6.2 Protection of Footings Against Frost Action

Perimeter footings, of heated structures are required to be insulated against the deleterious effect of frost action. A minimum of 1.5 m thick soil cover, or an equivalent combination of soil cover and foundation insulation should be provided in this regard.

Exterior unheated footings, such as those for isolated exterior piers, are more prone to deleterious movement associated with frost action than the exterior walls of the structure proper and require additional protection, such as soil cover of 2.1 m or an equivalent combination of soil cover and foundation insulation.

6.3 Excavation Side Slopes

The side slopes of excavations in the soil and fill overburden materials should be either cut back at acceptable slopes or should be retained by shoring systems from the start of the excavation until the structure is backfilled. It is assumed that sufficient room will be available for the greater part of the excavation to be undertaken by open-cut methods (i.e. unsupported excavations).

The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be cut back at 1H:1V or flatter. The flatter slope is required for excavation below groundwater level. The subsoil at this site is considered to be mainly a Type 2 and 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.

Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should be kept at least 3 m away from the excavation sides.

Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant in order to detect if the slopes are exhibiting signs of distress.

It is recommended that a trench box be used at all times to protect personnel working in trenches with steep or vertical sides. It is expected that services will be installed by "cut and cover" methods and excavations will not be left open for extended periods of time.

6.4 Pipe Bedding and Backfill

At least 150 mm of OPSS Granular A should be used for bedding for sewer pipes when placed on soil subgrade. The bedding should extend to the spring line of the pipe. Cover material, from the spring line to at least 300 mm above the obvert of the pipe should consist of OPSS Granular A (concrete or PSM PVC pipes) or sand (concrete pipe). The bedding and cover materials should be placed in maximum 225 mm thick lifts compacted to a minimum of 95% of the material's standard Proctor maximum dry density (SPMDD).

The cover material, which should consist of OPSS Granular A, should extend from the spring line of the pipe to at least 300 mm above the obvert of the pipe. The material should be placed in maximum 300 mm thick lifts and compacted to a minimum of 95% of its SPMDD.

Generally, it should be possible to re-use the moist (not wet) brown silty sand above the cover material if the excavation and filling operations are carried out in dry weather conditions. Wet silty sand materials will be difficult to re-use, as the high water contents make compacting impractical without an extensive drying period.

Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) should match the soils exposed at the trench walls to minimize differential frost heaving. The trench backfill should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 95% of the material's SPMDD.

6.5 Groundwater Control

The contractor should be prepared to direct water away from all bearing surfaces and subgrades, regardless of the source, to prevent disturbance to the founding medium. It is anticipated that groundwater infiltration into the excavations should be moderate, if encountered, and controllable using open sumps.

A temporary Ministry of the Environment, Conservation and Parks (MECP) permit to take water (PTTW) may be required for this project if more than 400,000 L/day of ground and/or surface water is to be pumped during the construction phase. A minimum of 4 to 5 months should be allowed for completion of the PTTW application package and issuance of the permit by the MECP.

For typical ground or surface water volumes being pumped during the construction phase, between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Person as stipulated under O.Reg. 63/16. If a project qualifies for a PTTW based upon anticipated conditions, an EASR will not be allowed as a temporary dewatering measure while awaiting the MECP review of the PTTW application.

6.6 Winter Construction

Precautions must be taken if winter construction is considered for this project.

The subsoil conditions for the silty-clay area of the site consist of frost susceptible materials. In the presence of water and freezing conditions, ice could form within the soil mass. Heaving and settlement upon thawing could occur.

In the event of construction during below zero temperatures, the founding stratum should be protected from freezing temperatures by the use of straw, propane heaters and tarpaulins or other suitable means. In this regard, the base of the excavations should be insulated from sub-zero temperatures immediately upon exposure and until such time as heat is adequately supplied to the building and the footings are protected with sufficient soil cover to prevent freezing at founding level.

Trench excavations and pavement construction are also difficult activities to complete during freezing conditions without introducing frost in the subgrade or in the excavation walls and bottoms. Precautions should be taken if such activities are to be carried out during freezing conditions. Additional information could be provided, if required.

7.0 Recommendations

It is a requirement for the foundation design data provided herein to be applicable that the following material testing and observation program be performed by the geotechnical consultant.

- ❑ Review detailed grading plan(s) from a geotechnical perspective.
- ❑ Observation of all bearing surfaces prior to the placement of concrete.
- ❑ Sampling and testing of the concrete and fill materials used.
- ❑ Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
- ❑ Observation of all subgrades prior to backfilling
- ❑ Field density tests to determine the level of compaction achieved.
- ❑ Sampling and testing of the bituminous concrete including mix design reviews.

A report confirming that these works have been conducted in general accordance with our recommendations could be issued upon the completion of a satisfactory inspection program by the geotechnical consultant.

8.0 Statement of Limitations

The recommendations made in this report are in accordance with our present understanding of the project. We request that we be permitted to review our recommendations when the grading plan, drawings and specifications are completed.

A geotechnical investigation is a limited sampling of a site. The recommendations are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around the test locations. Should any conditions at the site be encountered which differ from those at the test locations, Paterson requests immediate notification in order to permit reassessment of our recommendations.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Mattamy Homes or their agent(s) is not authorized without review by this firm for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.



Nathan F. S. Christie, P.Eng. Faisal I. Abou-Seido, P.Eng.

Report Distribution:

- ❑ Mattamy Homes (3 copies)
- ❑ Paterson Group (1 copy)

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Half Moon Bay South
Ottawa, Ontario

DATUM Ground surface elevations provided by Agrodrain Systems Limited Contractors (ASL)

FILE NO. PG4803

REMARKS

HOLE NO. TP 1-19

BORINGS BY Excavator **DATE** 2019 February 5

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	104.31		
FILL: Reddish brown silt and sand, some cobbles, trace topsoil									
0.30									
Loose to compact, light brown coarse **SILTY SAND**		G	1			1	103.31		
1.50									
		G	2			2	102.31		
Compact, light greyish brown fine **SILTY SAND**		G	3						
		G	4			3	101.31		
		G	5			4	100.31		
4.30									
Compact, grey **SILTY SAND**		G	6						
4.50									
End of Test Pit									
(TP dry upon completion)									

20 40 60 80

20 40 60 80 100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Half Moon Bay South
Ottawa, Ontario

DATUM Ground surface elevations provided by Agrodrain Systems Limited Contractors (ASL)

FILE NO. PG4803

REMARKS

HOLE NO. TP 2-19

BORINGS BY Excavator **DATE** 2019 February 5

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE									
Brown **SILTY SAND**, trace topsoil 0.15		G	1			0	101.36		
		G	2			1	100.36		
Loose to compact, light brown **SILTY SAND**		G	3			2	99.36		
		G	4						
		G	5			3	98.36		
4.10		G	6			4	97.36		
End of Test Pit									
(TP dry upon completion)									

Pen. Resist. Blows/0.3m: 20 40 60 80

Water Content %: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Half Moon Bay South
Ottawa, Ontario

DATUM Ground surface elevations provided by Agrodrain Systems Limited Contractors (ASL)

FILE NO. PG4803

REMARKS

HOLE NO. TP 3-19

BORINGS BY Excavator **DATE** 2019 February 5

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	101.16		
FILL: Dark brown clayey silt with sand, topsoil and gravel		G	1						
0.50									
Loose, brown **SILTY SAND** with clay and some gravel		G	2			1	100.16		
1.50									
GLACIAL TILL: Coarse, brown to grey sand with gravel, cobbles and boulders		G	3			2	99.16		
		G	4						
3.00		G	5			3	98.16		
End of Borehole									
Refusal to excavation on boulder @ 3m depth									
(TP dry upon completion)									

Pen. Resist. Blows/0.3m: 20 40 60 80

Water Content %: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Half Moon Bay South
Ottawa, Ontario

DATUM Ground surface elevations provided by Agrodrain Systems Limited Contractors (ASL)

FILE NO. PG4803

REMARKS

HOLE NO. TP 4-19

BORINGS BY Excavator **DATE** 2019 February 5

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	104.60		
Loose, light brown **SAND**, trace clay and topsoil									
0.15									
Loose, light brown **SILTY SAND**, trace clay		G	1			1	103.60		
1.40									
Compact, light brown **SILTY SAND** with trace silt		G	2			2	102.60		
		G	3						
		G	4			3	101.60		
		G	5						
4.10		G	6			4	100.60		
End of Test Pit									
(TP dry upon completion)									

Pen. Resist. Blows/0.3m: 20 40 60 80

Water Content %: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Half Moon Bay South
Ottawa, Ontario

DATUM Ground surface elevations provided by Agrodrain Systems Limited Contractors (ASL)

REMARKS

BORINGS BY Excavator

DATE 2019 February 5

FILE NO. PG4803

HOLE NO. TP 5-19

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone / ○ Water Content % (20 40 60 80)	Piezometer Construction
GROUND SURFACE						0	105.52		
FILL: Silty sand with cobbles, trace clay (0.30)									
Loose to compact, light brown **SILTY SAND**		G	1			1	104.52		
		G	2						
						2	103.52		
		G	3						
		G	4			3	102.52		
		G	5						
						4	101.52		
(4.50) End of Test Pit		G	6						
(TP dry upon completion)									

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Half Moon Bay South
Ottawa, Ontario

DATUM Ground surface elevations provided by Agrodrain Systems Limited Contractors (ASL)

FILE NO. PG4803

REMARKS

HOLE NO. TP 6-19

BORINGS BY Excavator **DATE** 2019 February 5

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	104.12	20 40 60 80	
TOPSOIL 0.30		G	1						
FILL: Brown silty sand with clay, gravel and cobbles 0.60		G	2			1	103.12		
Light brown, loose to compact **SAND**, trace silt		G	3			2	102.12		
		G	4						
		G	5			3	101.12		
		G	6			4	100.12		
		G	7						
5.00 End of Test Pit (TP dry upon completion)						5	99.12	20 40 60 80 100 **Shear Strength (kPa)** ▲ Undisturbed △ Remoulded	

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Half Moon Bay South
Ottawa, Ontario

DATUM Ground surface elevations provided by Agrodrain Systems Limited Contractors (ASL)

FILE NO. PG4803

REMARKS

HOLE NO. TP 7-19

BORINGS BY Excavator **DATE** 2019 February 5

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	101.50		
TOPSOIL 0.30		G	1						
GLACIAL TILL: Brown silty sand with cobbles and boulders 0.60		G	2			1	100.50		
GLACIAL TILL: Brown sand with cobbles and boulders 1.80		G	3						
GLACIAL TILL: Dense silt with gravel, trace sand 2.40		G	4			2	99.50		
		G	5						
		G	6						
GLACIAL TILL: Light brown, fine sand with cobbles and boulders		G	7			3	98.50		
4.00		G	8			4	97.50		
End of Test Pit									
(TP dry upon completion)									

Pen. Resist. Blows/0.3m: ○ Water Content % — 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Half Moon Bay South
Ottawa, Ontario

DATUM Ground surface elevations provided by Agrodrain Systems Limited Contractors (ASL)

FILE NO. PG4803

REMARKS

HOLE NO. TP 8-19

BORINGS BY Excavator **DATE** 2019 February 5

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	102.41		
FILL: Brown silty clay with sand, trace topsoil									
0.60									
FILL: Grey silty clay with sand		G	1						
0.90						1	101.41		
GLACIAL TILL: Sand with cobbles and boulders		G	2						
						2	100.41		
		G	3						
2.80									
End of Test Pit									
(TP dry upon completion)									

Pen. Resist. Blows/0.3m: ● 50 mm Dia. Cone; ○ Water Content %
20 40 60 80

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Barrhaven South Urban Expansion
Ottawa, Ontario

DATUM Geodetic elevations interpolated from City of Ottawa basemap.

FILE NO. PG3607

REMARKS

HOLE NO. TP 1-15

BORINGS BY Backhoe **DATE** December 2, 2015

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE									
TOPSOIL 0.10		G	1			0	105.10		
Compact, brown **SILTY SAND**, trace boulders and cobbles		G	2			1	104.10		
						2	103.10		
3.00 End of Test Pit						3	102.10		
(TP dry upon completion)									

Pen. Resist. Blows/0.3m: ● 50 mm Dia. Cone; ○ Water Content %; 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Barrhaven South Urban Expansion
Ottawa, Ontario

DATUM Geodetic elevations interpolated from City of Ottawa basemap.

FILE NO. PG3607

REMARKS

HOLE NO. TP 2-15

BORINGS BY Backhoe **DATE** December 2, 2015

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE									
TOPSOIL 0.10						0	106.80		
Compact, brown **SILTY SAND**		G	1			1	105.80		
		G	2			2	104.80		
3.00 End of Test Pit						3	103.80		
(TP dry upon completion)									

Pen. Resist. Blows/0.3m: 20 40 60 80

Water Content %: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Barrhaven South Urban Expansion
Ottawa, Ontario

DATUM Geodetic elevations interpolated from City of Ottawa basemap.

FILE NO. PG3607

REMARKS

HOLE NO. BH 5-15

BORINGS BY CME 75 Power Auger **DATE** December 10, 2015

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	108.75
		SS	1	42	13	1	107.75
		SS	2	25	21	2	106.75
		SS	3	33	5	3	105.75
		SS	4	42	4	4	104.75
FILL: Grey silty sand with clay, gravel and wood		SS	5	42	3	5	103.75
		SS	6	42	3	6	102.75
		SS	7	17	5	7	101.75
		SS	8	25	37	8	100.75
		SS	9	0	50+	9	99.75
		SS	10	58	9		
		SS	11	0	1		
9.14							
End of Borehole (BH dry to 9.14m depth - July 28, 2016)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %

20 40 60 80

Monitoring Well Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Barrhaven South Urban Expansion
Ottawa, Ontario

DATUM Geodetic elevations interpolated from City of Ottawa basemap.

FILE NO. PG3607

REMARKS

HOLE NO. BH 6-15

BORINGS BY CME 75 Power Auger **DATE** December 3, 2015

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	102.59		
		AU	1						
Dense to very dense, grey-brown **SILTY SAND** with gravel, cobbles and boulders		SS	2	75	31	1	101.59		
		SS	3	100	50+	2	100.59		
2.29									
		SS	4	83	27	3	99.59		
		SS	5	58	27				
		SS	6	67	26	4	98.59		
Compact to dense, grey-brown **SILTY SAND**		SS	7	71	31	5	97.59		
		SS	8	67	30	6	96.59		
		SS	9	63	30				
		SS	10	75	25	7	95.59		
		SS	11	100	19	8	94.59		
		SS	12	100	15				
		SS	13	100	15	9	93.59		
9.75									
End of Borehole									
(BH dry to4.40m depth - July 28, 2016)									

Pen. Resist. Blows/0.3m: ● 50 mm Dia. Cone; ○ Water Content %
20 40 60 80

Shear Strength (kPa)
20 40 60 80 100
▲ Undisturbed △ Remoulded

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Barrhaven South Urban Expansion
Ottawa, Ontario

DATUM Geodetic elevations interpolated from City of Ottawa basemap.

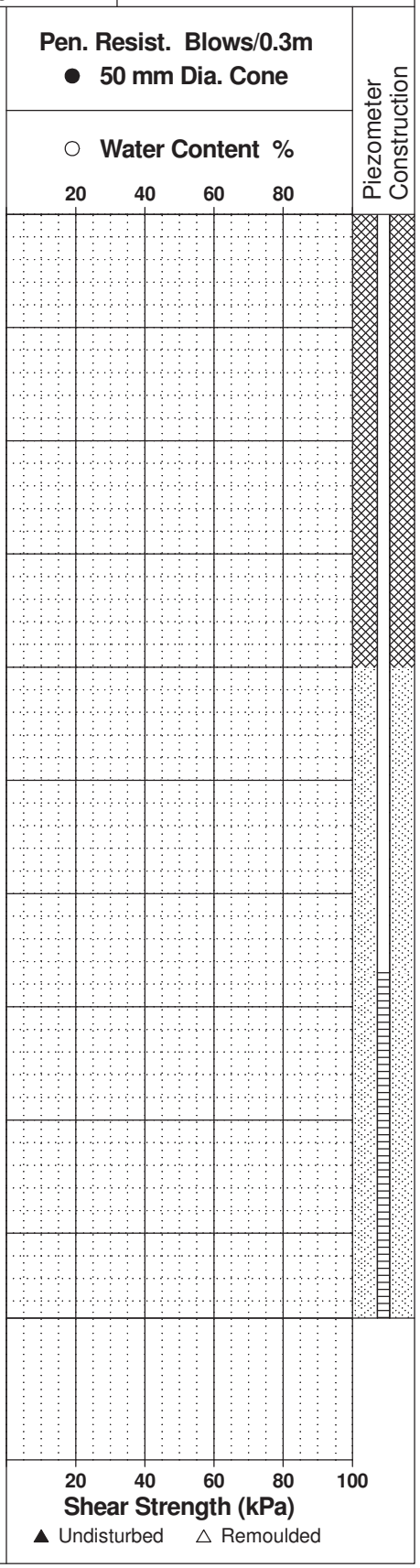
FILE NO. PG3607

REMARKS

HOLE NO. BH12-15

BORINGS BY CME 75 Power Auger **DATE** December 2, 2015

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	105.26
		AU	1				
Dense to very dense, brown **SILTY SAND** with gravel, cobbles and boulders		SS	2	88	42	1	104.26
		SS	3	33	50+		
- rootlets in upper 100mm						2	103.26
		SS	4	67	50+		
						3	102.26
3.35		SS	5	83	58		
		SS	6	100	31	4	101.26
		SS	7	75	47		
Dense, brown **SILTY SAND**		SS	8	92	30	5	100.26
		SS	9	79	31		
		SS	10	75	35	6	99.26
- grey by 7.6m depth		SS	11	92	34		
		SS	12	100	32	7	98.26
		SS	13	88	37		
9.75						8	97.26
End of Borehole							
(BH dry to 7.79m depth - July 28, 2016)						9	96.26



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Hydrogeological Investigation
Residential Development - Half Moon Bay South
Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes Limited.

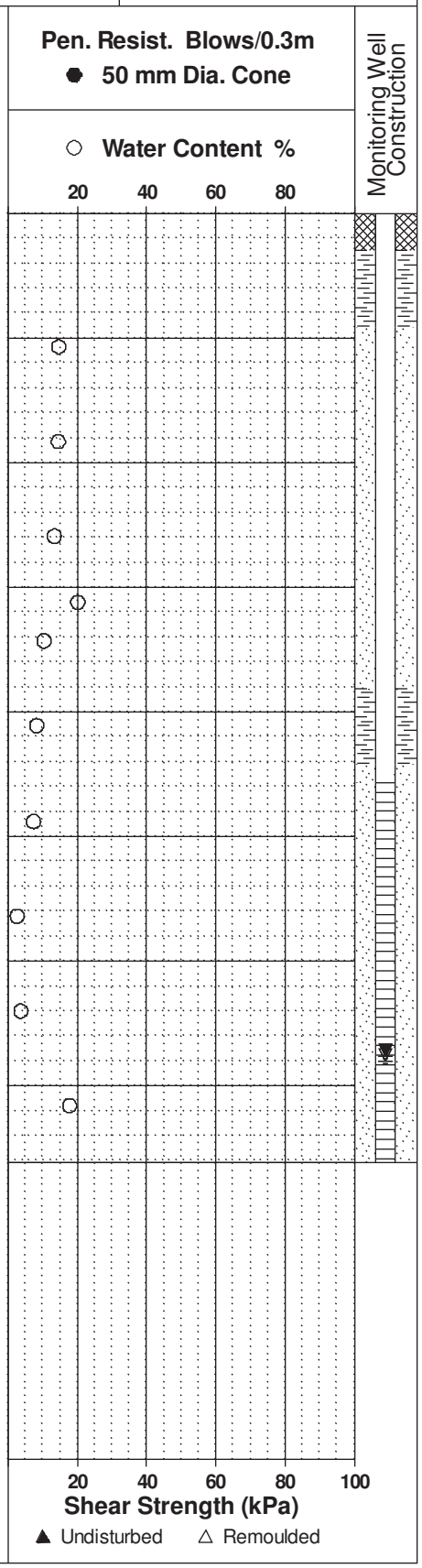
FILE NO. PG3450

REMARKS

HOLE NO. BH 5-15

BORINGS BY CME 55 Power Auger **DATE** March 6, 2015

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	103.02
FILL: Dark brown silty fine sand with topsoil and gravel		SS	1	100	61	1	102.02
		SS	2	42	5	2	101.02
		SS	3	67	3	3	100.02
3.50		SS	4	67	6		
Dense, brown **SILTY FINE SAND,** with gravel, trace clay		SS	5	100	49	4	99.02
4.42		SS	6	92	46	5	98.02
Dense to compact, light brown **SILTY FINE SAND**		SS	7	83	38	6	97.02
- trace to some medium sand by 6.1m depth		SS	8	67	40		
- running sand by 7.0m depth		SS	9	83	26	7	96.02
7.62							
End of Borehole							
(GWL @ 7.15m-March 23, 2015)							
(GWL @ 6.80m-April 21, 2015)							
(GWL @ 6.76m-May 12, 2015)							
High groundwater infiltration rate							



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Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Hydrogeological Investigation
Residential Development - Half Moon Bay South
Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes Limited.

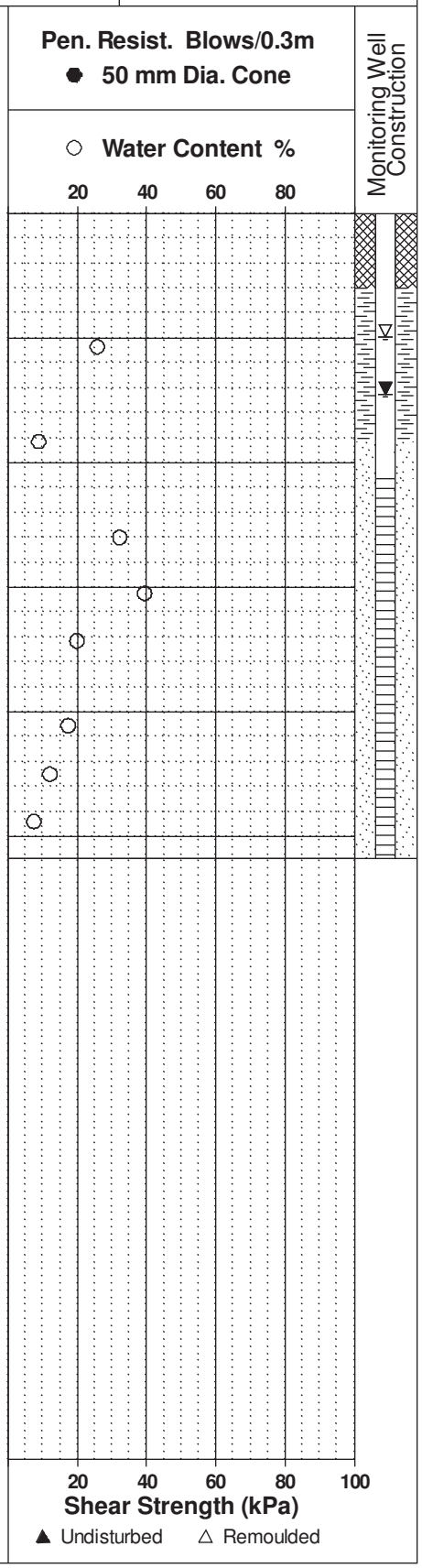
FILE NO. PG3450

REMARKS

HOLE NO. BH 6-15

BORINGS BY CME 55 Power Auger **DATE** March 5, 2015

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	101.42
FILL: Brown silty clay with sand, trace gravel and topsoil							
0.60							
Very stiff, brown **SILTY CLAY**		SS	1	42	14	1	100.42
		SS	2	67	12	2	99.42
- 75mm thick sand seams at 2.1 and 2.7m depths		SS	3	67	7		
3.20						3	98.42
Compact to dense, brown **SILTY FINE SAND,** trace gravel		SS	4	92	17		
- running sand at 3.2 to 4.1m depth							
4.11		SS	5	92	50	4	97.42
GLACIAL TILL: Very dense, brown to grey silty sand with clay, gravel, trace cobbles		SS	6	92	52		
5.18						5	96.42
End of Borehole							
(GWL @ 2.93m-March 23, 2015)							
(GWL @ 0.99m-April 21, 2015)							
(GWL @ 1.45m-May 12, 2015)							
High groundwater infiltration rate							



SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the strength of cohesionless soils is the relative density, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm.

Relative Density	'N' Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their “sensitivity”. The sensitivity is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

Terminology used for describing soil strata based upon texture, or the proportion of individual particle sizes present is provided on the Textural Soil Classification Chart at the end of this information package.

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NXL size core. However, it can be used on smaller core sizes, such as BX, if the bulk of the fractures caused by drilling stresses (called “mechanical breaks”) are easily distinguishable from the normal in situ fractures.

RQD %	ROCK QUALITY
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube
PS	-	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

MC%	-	Natural moisture content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic limit, % (water content above which soil behaves plastically)
PI	-	Plasticity index, % (difference between LL and PL)
Dxx	-	Grain size which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D30)^2$ / (D10 x D60)
Cu	-	Uniformity coefficient = D60 / D10

Cc and Cu are used to assess the grading of sands and gravels:
Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$
Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$
Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.
Cc and Cu are not applicable for the description of soils with more than 10% silt and clay
(more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

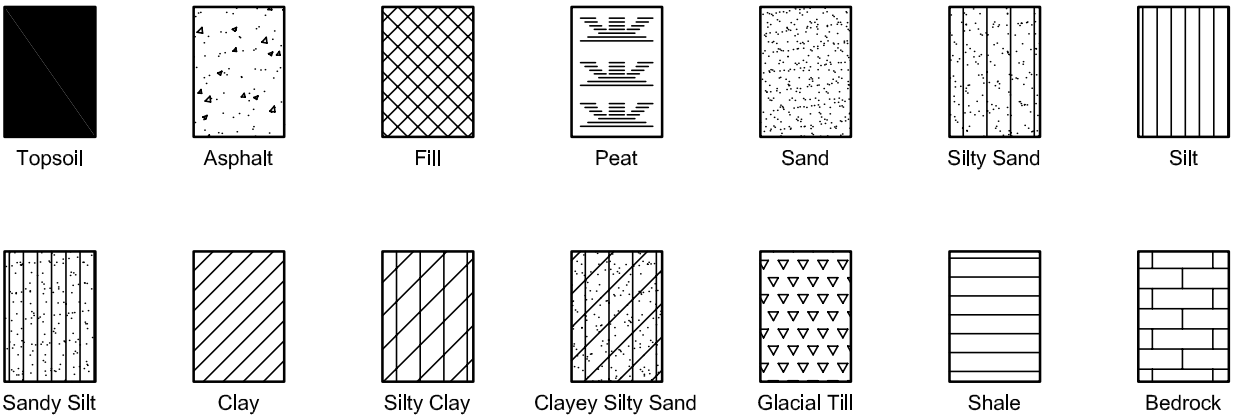
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
Wo	-	Initial water content (at start of consolidation test)

PERMEABILITY TEST

k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.

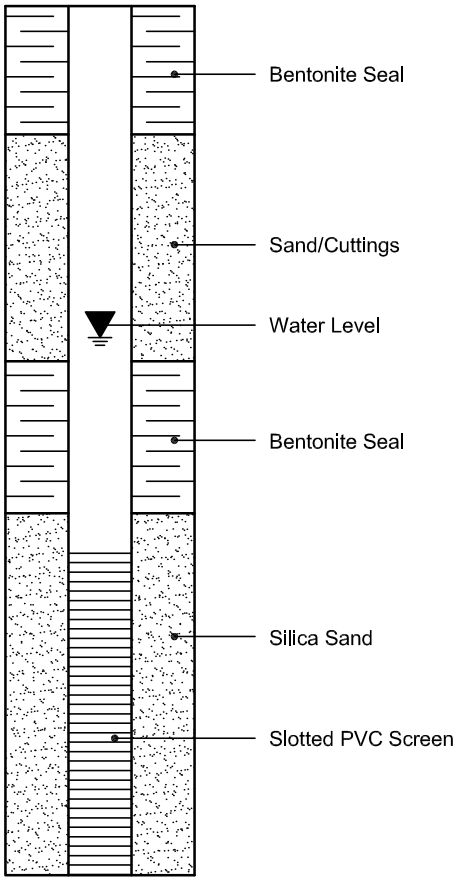
SYMBOLS AND TERMS (continued)

STRATA PLOT

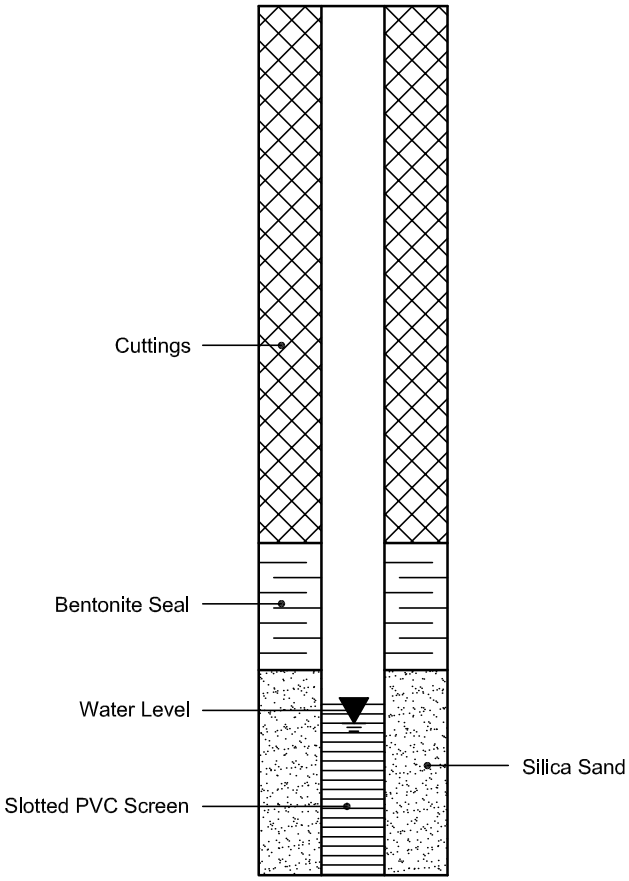


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



APPENDIX 2

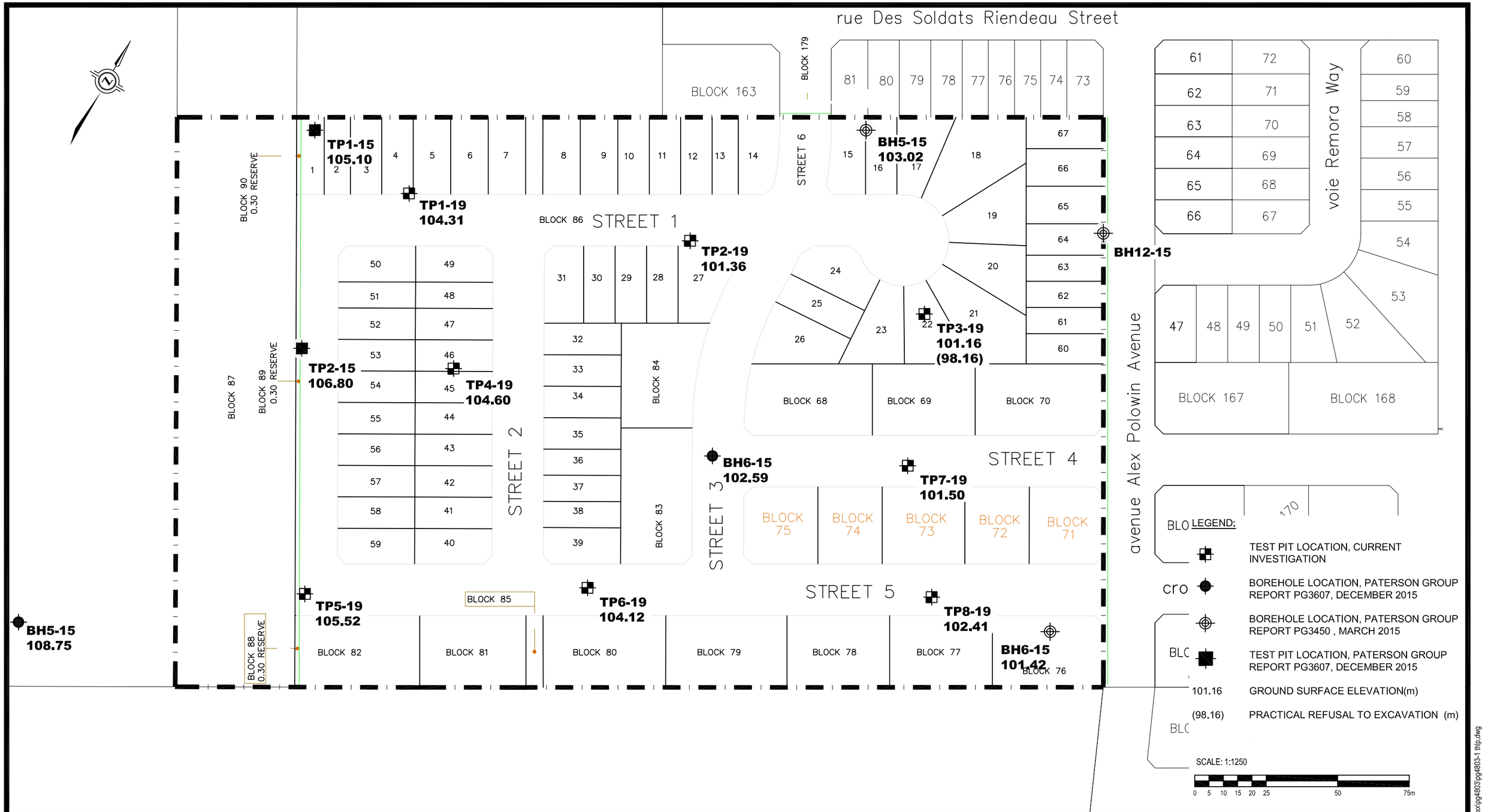
FIGURE 1 - KEY PLAN

DRAWING PG4803-1 - TEST HOLE LOCATION PLAN



FIGURE 1

KEY PLAN



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NO.	REVISIONS	DATE	INITIAL

MATTAMY HOMES

GEOTECHNICAL INVESTIGATION
HALF MOON BAY SOUTH - GREENBANK ROAD

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:1250	Date: 01/2019
Drawn by: MPG	Report No.: PG4803-1
Checked by: NC	PG4803-1
Approved by: DJG	Revision No.:

p:\autocad drawings\geotechnical\pg48xx\pg4803\pg4803-1 thlp.dwg

Appendix E : Drawings
15/2/2019 12:00:00 AM

Appendix E : DRAWINGS

OUTLET TRUNK STORM SEWER TO JOCK RIVER
DISTANCE FROM MH205 TO JOCK RIVER 1:100 YR FLOOD PLAIN LIMIT IS APPROXIMATELY 815 M
INVERT AT MH205 = 93.42 M
INVERT AT JOCK RIVER 100 YR FLOOD PLAIN = APPROXIMATELY 92.0 M
OUTLET SEWER = 825 MM DIA. @ 0.17 %

TO CLARK POND

CAMBRIAN RD

BORRISOKANE RD

FUTURE COLLECTOR RD

HIGHWAY 416

TRAIL RD

BARNSDALE RD

DRUMMOND SWM POND

DRUMMOND AGGREGATE EXTRACTION AREA

BRAZEAU SWM POND

BRAZEAU AGGREGATE EXTRACTION AREA

DRY SWM POND

COMMERCIAL

SCHOOL

PARK

DUNDONALD DR

FAMEFLOWER ST

DES SOLDATS RIENDEAU ST

TODD POND

OUTLET

EX GREENBANK RD

RIVER MIST RD

KILBIRNIE DR

LAURALEAF CR

BREAKSTONE RD

KNOCKADERRY CR

ALEX FOLOWIN AVE

NEW GREENBANK RD

STREET 1

STREET 2

STREET 3

STREET 4

STREET 5

STREET 6

PARK & RIDE

MEDIUM DENSITY

FRENCH PUBLIC ELEMENTARY SCHOOL

FRENCH CATHOLIC ELEMENTARY SCHOOL

NEIGHBOURHOOD PARK

PARKETTE 1

PARKETTE 2

EAST-WEST COLLECTOR

SWM DRY POND

POND 1 (NORTH)

POND 2 (SOUTH)

710 HDS

MA10 GRD 93.5 OBV 91.38

MA11 GRD 96.0 OBV 92.27

MA13 GRD 95.0 OBV 92.27

MA14 GRD 103.0 OBV 96.10

206 OBV 91.61

222 OBV 91.41

223A OBV 91.74

224 OBV 92.31

227 OBV 100.46

228 OBV 102.93

375mmØ @ 0.4%

400mmØ

300mmØ @ 0.75%

300mmØ @ 0.3%

300mmØ

350mmØ @ 1.3%

500mmØ @ 0.25%

750mmØ @ 0.13%

600mmØ @ 0.3%

600mmØ @ 0.13%

750mmØ @ 0.13%

600mmØ

750mmØ

300mmØ

200mmØ

NOTE:
REFER TO DWG SWM-CONV FOR DETAILS

NOTE:

STREETS 1, 2, 3, 4, 5, AND 6 ARE LOCAL ROADS.

LEGEND

- PROPOSED SANITARY, PER 2018 BSUEA MSS
- FUTURE SANITARY, PER 2014 BS MSS
- EXISTING SANITARY
- PROPOSED STORM (CONVENTIONAL SYSTEM), PER 2018 BSUEA MSS
- FUTURE STORM, PER 2014 BS MSS
- EXISTING STORM
- PROPOSED WATERMAIN, PER 2018 BSUEA MSS
- FUTURE WATERMAIN, PER 2014 BS MSS
- EXISTING WATERMAIN
- LIMIT OF STUDY AREA FOR BSUEA
- 710 HDS — HYDROLOGY DYNAMIC SEPARATOR

SANITARY SEWERS

M.H. #		SEWER DATA			Upstream	Downstream
		DIA.	SLOPE	LENGTH	Obvert	Obvert
FROM	TO	mm	%	m		
572	511	200	2.87	136.5	102.79	98.88
511	512	200	0.80	97.5	98.88	98.10
514	512	200	0.74	212.1	99.67	98.10
512	10 (ex.)	200	1.60	74.4	98.10	96.91
514	516	200	0.35	127.9	102.70	102.25
516	554	200	0.35	170.9	102.25	101.65
500	502	200	0.35	174.0	105.03	104.42
502	551	200	0.89	163.6	104.42	102.92
550	551	200	0.35	161.5	103.20	102.63
551	552	200	0.35	113.6	102.63	102.24
552	554	200	0.35	173.3	102.24	101.61
554	556	250	0.33	295.7	101.61	100.64
517	564	200	0.58	282.4	102.10	100.45
13 (ex.)	14 (ex.)	200	0.67	74.6	102.55	102.05
14 (ex.)	90 (ex.)	200	0.94	112.1	102.00	101.95
90 (ex.)	5 (ex.)	200	0.35	109.2	100.95	100.57
5 (ex.)	564	200	0.35	74.2	100.30	100.04
564	556	200	0.35	94.6	100.04	99.71
556	557	250	1.39	44.3	99.71	99.09
557	558	250	1.39	158.4	99.09	96.89
560	558	200	0.35	142.3	99.32	94.82
558	119	375	0.18	150.7	93.71	93.43
521	522	200	1.50	37.1	102.18	101.62
522	523	200	0.80	73.3	101.82	101.04
523	524	200	0.35	164.0	101.04	100.46
520	524	300	0.20	145.3	98.40	98.11
524	578	300	0.20	129.9	98.11	97.85
578	532	300	0.20	173.7	97.85	97.51
532	534	300	0.20	127.5	97.51	97.25
534	536	450	0.20	173.3	95.50	95.15
536	538	450	0.20	309.7	95.15	94.53
538	119	525	0.15	245.3	93.80	93.43
119	120 (ex.)	600	0.15	168.7	93.43	93.17
900	158 (ex.)	200	0.35	280.0	97.23	97.13
910	153 (ex.)	200	0.35	132.0	96.70	96.65
920	930	200	0.35	165.0	97.42	97.36
930	217 (ex.)	200	0.35	40.0	97.36	97.24
585	575	250	0.24	431.0	98.56	97.52
575	555	250	0.24	228.0	97.52	96.98
565	555	250	0.24	431.0	98.01	96.98
555	545	250	0.24	133.0	96.98	96.66
545	900	250	0.24	72.0	96.66	96.48
900	MA 14	250	0.24	160.0	96.48	96.10
900	MA 14	250	1.30	60.0	96.88	96.10
MA 14	MA13	250	1.30	295.0	96.10	92.27
MA13	MH57A	375	0.30	413.1	90.77	89.53
593	592	200	0.35	300.0	99.19	98.14
592	590	200	0.35	220.0	98.14	97.37
591	590	200	0.35	300.0	98.42	97.37
590	MA 11	300	0.35	80.0	97.37	97.09
MA 11	MA 10	300	0.75	482.1	95.00	91.38
MA 10	MH57A	375	0.41	449.7	91.38	89.53

CONVENTIONAL STORM SEWERS

Maintenance Hole Number		SEWER DATA PIPE			Upstream	Downstream
		Dia	Slope	Length	Obvert	Obvert
FROM	TO	(mm)	(%)	(m)		
110	111	450	2.70	69.4	102.90	100.49
111	112	675	0.90	101.2	100.49	99.58
113	112	525	0.74	140.0	100.60	99.56
112	710 (ex)	675	1.30	73.3	99.56	98.61
112	710	675	1.30	73.3	99.56	98.61
712	711	375	2.56	104.3	102.03	99.36
711	710	450	1.32	104.4	99.41	98.03
710	720	750	0.61	115.2	98.10	97.40
753	754	1800	0.11	54.9	95.01	94.95
754	755	1800	0.13	76.9	94.84	94.74
754	190	1800	0.15	15.0	94.95	94.93
190	190A	1200	0.06	30.0	94.32	94.30
190A	190B	1200	0.10	52.7	94.30	94.25
190B	755	600	0.11	15.0	93.64	93.62
755	822	1800	0.13	79.5	94.84	94.74
152	154	525	0.35	141.1	101.47	100.98
114	116	975	0.35	170.2	102.21	101.61
116	154	1200	0.35	171.2	101.81	101.01
154	156	1200	0.69	311.7	100.75	98.60
705(ex.)	164	375	0.35	65.2	99.49	99.26
164	156	900	0.35	95.4	99.26	98.93
156	158	1800	0.40	202.6	98.26	97.45
160	158	1350	0.15	137.5	96.59	96.38
158	Pl-in	1800	0.15	14.5	95.84	95.82
Diton Inlet	170	900	1.05	55.9	107.04	106.45
170	172	900	1.05	188.5	106.45	104.47
172	174	1350	0.30	184.4	104.47	103.92
174	176	1350	0.30	166.7	103.92	103.45
176	179	1350	0.30	161.4	103.45	102.96
150	151	900	0.35	152.8	102.60	102.06
Ditch Inlet 2	101	900	0.35	131.1	104.92	104.40
101	102	900	0.35	168.1	104.40	103.81
102	151	900	0.96	156.9	103.81	102.30
151	179	1200	0.35	111.8	102.06	101.67
120	124	1200	0.15	139.2	99.10	98.69
121	122	750	0.15	64.0	101.56	101.46
122	123	750	0.15	75.4	101.46	101.35
123	124	750	0.15	149.9	100.68	100.51
124	178	1200	0.15	122.1	98.89	98.71
178	178	1800	0.15	245.7	101.46	101.09
178	132	1950	0.15	185.6	98.71	98.43
132	134	1950	0.20	131.1	98.43	98.17
134	136	1950	0.20	173.3	98.17	97.82
136	137	1950	0.16	168.8	97.82	97.55
137	P2-IN	1950	0.16	38.0	97.55	97.49
P2-out	HDS825	750	0.15	50.0	98.35	98.28
HDS825	EX 822	1800	0.18	160.8	97.19	96.90
EX 822	EX 821	1800	0.14	123.1	94.07	93.90
EX 821	EX 820	1800	0.15	121.9	93.89	93.71
EX 748	EX 747	600	0.20	83.1	95.95	95.79
EX 747	EX 746	600	0.99	17.1	95.72	95.90
EX 746	EX 744	600	0.20	69.4	95.58	95.44
EX 743	EX 744	450	1.31	81.4	95.59	94.52
EX 744	EX 820	675	0.52	12.4	93.76	93.70
EX 820	EX 102	1800	0.16	121.7	93.71	93.52
270	265	1500	0.15	100.0	99.45	99.30
265	260	1500	0.15	367.3	98.00	97.47
260	245	1500	0.15	227.9	97.47	97.12
250	245	1500	0.15	345.0	97.64	97.12
245	240	2100	0.15	84.9	97.12	97.00
240	Brazeau SWM Pond	2100	0.15	241.7	97.00	96.63
230	225	1500	0.15	450.0	97.66	96.99
225	215	1500	0.15	220.1	96.99	96.66
220	215	1500	0.15	408.7	97.27	96.66
215	Drummond SWM Pond	2100	0.15	350.0	96.66	96.13
Drummond SWM Pond	210	675	0.15	25.0	94.69	94.65
235	210	675	0.17	272.0	95.12	94.65
210	205	825	0.17	223.0	94.65	94.26
205	Flood Plain	825	0.17	817.0	94.26	92.84
900	227 (ex.)	975	0.15	120.0	97.93	97.75

No.	ISSUE / REVISION	DD/MM/YY
4	ISSUED FOR PLANNING COMMITTEE APPROVAL	04/05/18
3	ADDRESS COMMENTS, RE-ISSUE BSUEA MSS 2ND SUBMISSION	26/02/18
2	ISSUED AS PART OF DRAFT MSS	20/09/17
1	ISSUED FOR PRE-TAC WORKING MEETING	31/08/17

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SCALE: 1:4000

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CONSULTANT:

PROFESSIONAL STAMP

LICENSED PROFESSIONAL ENGINEER — N. K. L. DALRYMPLE — May 4/18 — PROVINCE OF ONTARIO

PROJECT NORTH

PROJECT:

BARRHAVEN SOUTH URBAN EXPANSION AREA (BSUEA)

-

DRAWING:

KEY SERVICING PLAN WITH CONVENTIONAL STORM SEWER SYSTEM

DESIGN:	JW
DRAWN:	CJM
CHECKED:	LD
JLR #:	26610

DRAWING #: KS1

PLOT DATE: May 3, 2018 4:30:48 PM

File Location: r:\26000\26610 - barrhaven expansion - minto brazeau mattamy\JLR DWG\Civil\26610 C KS1.dwg

BRAZEAU AGGREGATE EXTRACTION AREA

COMMERCIAL

SCHOOL

PARK

KILBIRNIE DR

SCHOOL

PARK

LAURALEAF CR.

BREAKSTONE RD

RIVER MIST RD

ALEX POLOWIN AVE

KNOCKADERRY CR.

STREET 2

PARK & RIDE

FRENCH PUBLIC ELEMENTARY SCHOOL

NEW GREENBANK RD

STREET 1

MEDIUM DENSITY

STREET 3

PARKETTE 2

STREET 4

PARKETTE 1

EAST-WEST COLLECTOR

STREET 5

POND 1 (NORTH)

FRENCH CATHOLIC ELEMENTARY SCHOOL

STREET 6

POND 2 (SOUTH)

EX GREENBANK RD

DRY SWM POND

NEIGHBOURHOOD PARK

BARNSDALE RD

BARNSDALE RD

LEGEND

100.95 +	GRADES TAKEN FROM: TODD POND AND CLARK POND MODEL KEEPER ANALYSIS (JFSA)
102.85 +	MINTO LANDS WITHIN BHSUEA
99.75 +	GRADES TAKEN FROM: STANTEC TOPOGRAPHIC SKETCH OCTOBER 2015
96.13 +	GRADES TAKEN FROM: REALIGNED GREENBANK ROAD AND TRANSITWAY EXTENSION PLANNING AND ENVIRONMENT ASSESSMENT
94.5 +	GRADES TAKEN FROM: BARRHAVEN SOUTH MASTER SERVICING STUDY ADDENDUM (STANTEC)
103.5 +	MINIMUM FILL ELEVATION REQUIREMENT WITHIN PITS
	MAJOR OVERLAND FLOW DIRECTION
	LIMIT OF STUDY AREA FOR BSUEA

No.	ISSUE / REVISION	DD/MM/YY
4	ISSUED FOR PLANNING COMMITTEE APPROVAL	04/05/18
3	ADDRESS COMMENTS, RE-ISSUE BSUEA MSS 2ND SUBMISSION	26/02/18
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SCALE: 1:2000

CLIENT:

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LICENSED PROFESSIONAL ENGINEER M. N. L. DALRYMPLE PROVINCE OF ONTARIO May 4, 2018

PROJECT NORTH

PROJECT:

BARRHAVEN SOUTH URBAN EXPANSION AREA (BSUEA)

-

DRAWING:

MASTER GRADING PLAN (1:2000)

DESIGN:

DRAWN:

CHECKED:

JLR #:

DRAWING #: MG2

File Location: r:\26000\26610 - barrhaven expansion - minto brazeau mattamy\JLR DWG\Civil\26610 C G2.dwg

PLOT DATE: May 3, 2018 4:33:33 PM

OUTLET TRUNK STORM SEWER TO JOCK RIVER
DISTANCE FROM MH205 TO JOCK RIVER 1:100 YR FLOOD PLAIN LIMIT IS APPROXIMATELY 815 M
INVERT AT MH205 = 93.42 M
INVERT AT JOCK RIVER 100 YR FLOOD PLAIN = APPROXIMATELY 92.0 M
OUTLET SEWER = 825 MM DIA. @ 0.17 %

CAMBRIAN RD
TO CLARK POND
TODD POND
OUTLET
FUTURE COLLECTOR RD
BORRISOKANE RD
HIGHWAY 416
TRAIL RD
RIVER MIST RD
EX GREENBANK RD
DUNDONALD DR
KILBIRNIE DR
KILBIRNIE CR
LAURALEAF CR
BREAKSTONE RD
KNOCKADERRY CR
DES SOLDATS RIENDEAU ST
FAMEFLOWER ST
NEW GREENBANK RD
ALEX POLOVIN AVE
STREET 1
STREET 2
STREET 3
STREET 4
STREET 5
EAST WEST COLLECTOR
PARKETTE 1
PARKETTE 2
DRUMMOND SWM POND
DRUMMOND AGGREGATE EXTRACTION AREA
BRAZEAU SWM POND
BRAZEAU AGGREGATE EXTRACTION AREA
SWM DRY POND
DRY SWM POND
POND 1 (NORTH)
POND 2 (SOUTH)
FRENCH PUBLIC ELEMENTARY SCHOOL
FRENCH CATHOLIC ELEMENTARY SCHOOL
NEIGHBOURHOOD PARK
PARK & RIDE
MEDIUM DENSITY
COMMERCIAL
SCHOOL
PARK
BARNSDALE RD
EX GREENBANK RD
373m ST
352m ST
357m ST
161m ST
194m ST
230m ST
233m ST
310m ST
336m ST
270m ST
22m ST
10HDS
680 HDS
750mmØ
825mmØ
1050mmØ
1200mmØ
1500mmØ
1800mmØ
2100mmØ
2400mmØ
2700mmØ
3000mmØ
3300mmØ
3600mmØ
3900mmØ
4200mmØ
4500mmØ
4800mmØ
5100mmØ
5400mmØ
5700mmØ
6000mmØ
6300mmØ
6600mmØ
6900mmØ
7200mmØ
7500mmØ
7800mmØ
8100mmØ
8400mmØ
8700mmØ
9000mmØ
9300mmØ
9600mmØ
9900mmØ
10200mmØ
10500mmØ
10800mmØ
11100mmØ
11400mmØ
11700mmØ
12000mmØ
12300mmØ
12600mmØ
12900mmØ