CALCULATION SHEET C-2: FOREBAY SIZING FOR SWM FACILITY

East Urban Community
SWM Facility 1 - Ultimate Conditions
City of Ottawa
Calculation of South Forebay Size

Settling Criteria

From the SWMP Manual, the required length for settling is as follows:

$$L_{min} = \left(\frac{r\,Q_p}{V_s}\right)^{0.5}$$

where:
- r = length to width ratio, at the invert of the inlet pipe.
- Q_p = peak outflow during design quality storm
- V_s = settling velocity

Input:

r =	3.18		143 m / 45 m
Q_p =	0.383	m^3/s	(at elevation 81.65 m)
V_s =	0.0003	m/s	

L_{min} = 63.71 m

The peak flow rate from the pond during the quality storm is taken as the flow that would occur just below the quantity controls (Refer to Table B-5 of Appendix B)

Dispersion Criteria

From the SWMP Manual, the required length for dispersion is as follows:

$$L_{min} = \frac{8\,Q}{d\,V_f}$$

where:
- Q = Inlet flowrate (10-Year, 24-Hour SCS Type II Storm)
- d = depth of pond during peak 10-year inflow (12h:15min)
- V_f = desired final velocity

Input:

Q =	10.541	m^3/s
d =	2.02	m
Vf =	0.5	m/s

L_{min} = 83.45 m

The minimum forebay length is determined by the larger of the settling or dispersion criteria.

Minimum Length of Forebay Required 83.45 m
Length of Forebay Provided 143.00 m (at elevation 81.5 m)

Average Forebay Velocity

From the SWMP Manual, the maximum allowable average velocity is 0.15 m/s:

$$V_{avg} = \frac{Q}{d\,W_{avg}}$$

where:
- Q = Inlet flowrate (10-Year, 24-Hour SCS Type II Storm)
- d = depth of pond during peak 10-year inflow (12h:15min)
- W_{avg} = average width of forebay

Input:

Q =	10.541	m^3/s	
d =	2.02	m	
W_{avg} =	38	m	(31 m bottom, 45 m permanent pool)

V = 0.14 m/s < 0.15 m/s

CALCULATION SHEET C-3: FOREBAY SIZING FOR SWM FACILITY

East Urban Community
SWM Facility 1 - Ultimate Conditions
City of Ottawa
Calculation of Northeast Forebay Size

Settling Criteria

From the SWMP Manual, the required length for settling is as follows:

$$L_{min} = \left(\frac{r\,Q_p}{V_s}\right)^{0.5}$$

where: r = length to width ratio, at the invert of the inlet pipe.
Q_p = peak outflow during design quality storm
V_s = settling velocity

Input:
r = 4.58   110 m / 24 m
Q_p = 0.383 m^3/s (at elevation 81.65 m)
V_s = 0.0003 m/s

L_{min} = 76.51 m

The peak flow rate from the pond during the quality storm is taken as the flow that would occur just below the quantity controls (Refer to Table B-5 of Appendix B)

Dispersion Criteria

From the SWMP Manual, the required length for dispersion is as follows:

$$L_{min} = \frac{8\,Q}{d\,V_f}$$

where: Q = Inlet flowrate (10-Year, 24-Hour SCS Type II Storm)
d = depth of pond during peak 10-year inflow (12h:05min)
V_f = desired final velocity

Input:
Q = 15.469 m^3/s
d = 2.40 m
V_f = 0.5 m/s

L_{min} = 103.17 m

The minimum forebay length is determined by the larger of the settling or dispersion criteria.

Minimum Length of Forebay Required   103.17 m
Length of Forebay Provided   **110.00 m**   (at elevation 80.1 m)

Average Forebay Velocity

From the SWMP Manual, the maximum allowable average velocity is 0.15 m/s:

$$V_{avg} = \frac{Q}{d\,W_{avg}}$$

where: Q = Inlet flowrate (10-Year, 24-Hour SCS Type II Storm)
d = depth of pond during peak 10-year inflow (12h:05min)
W_{avg} = average width of forebay

Input:
Q = 15.469 m^3/s
d = 2.40 m
W_{avg} = 20 m   (16 m bottom, 24 m permanent pool)

V = 0.32 m/s   > 0.15 m/s

CALCULATION SHEET C-4: FOREBAY SIZING FOR SWM FACILITY

East Urban Community
SWM Facility 1 - Ultimate Conditions
City of Ottawa
Calculation of Northwest Forebay Size

Settling Criteria

From the SWMP Manual, the required length for settling is as follows:

$$L_{min} = \left(\frac{r\,Q_p}{V_s}\right)^{0.5}$$

where:
- r = length to width ratio, at the invert of the inlet pipe.
- Q_p = peak outflow during design quality storm
- V_s = settling velocity

Input:
- r = 2.93 — 82 m / 28 m
- Q_p = 0.383 m^3/s — (at elevation 81.65 m)
- V_s = 0.0003 m/s

L_{min} = 61.16 m

The peak flow rate from the pond during the quality storm is taken as the flow that would occur just below the quantity controls (Refer to Table B-5 of Appendix B)

Dispersion Criteria

From the SWMP Manual, the required length for dispersion is as follows:

$$L_{min} = \frac{8\,Q}{d\,V_f}$$

where:
- Q = Inlet flowrate (10-Year, 24-Hour SCS Type II Storm)
- d = depth of pond during peak 10-year inflow (12h:05min)
- V_f = desired final velocity

Input:
- Q = 7.231 m^3/s
- d = 2.40 m
- Vf = 0.5 m/s

L_{min} = 48.23 m

The minimum forebay length is determined by the larger of the settling or dispersion criteria.

Minimum Length of Forebay Required 61.16 m
Length of Forebay Provided 82.00 m (at elevation 80.1 m)

Average Forebay Velocity

From the SWMP Manual, the maximum allowable average velocity is 0.15 m/s:

$$V_{avg} = \frac{Q}{d\,W_{avg}}$$

where:
- Q = Inlet flowrate (10-Year, 24-Hour SCS Type II Storm)
- d = depth of pond during peak 10-year inflow (12h:05min)
- W_{avg} = average width of forebay

Input:
- Q = 7.231 m^3/s
- d = 2.40 m
- W_{avg} = 25 m (21 m bottom, 28 m permanent pool)

V = 0.12 m/s < 0.15 m/s

GLOUCESTER AND CUMBERLAND EAST URBAN COMMUNITY EXPANSION AREA AND BILBERRY CREEK INDUSTRIAL PARK MASTER SERVICING UPDATE

Prepared for:
City of Ottawa

File No. 163400602
November 2004
Updated June 2005
Updated October 2005
Updated July 2006

Prepared by:
Stantec Consulting Ltd.
1505 Laperriere Avenue
Ottawa, Ontario
K1Z 7T1

Stantec

5.0 Orleans South Business Park

5.1 ORLEANS SOUTH BUSINESS PARK SERVICING UPDATE

As part of the development of the BCIP road network in the BCIP Infrastructure Plan Update, the road network within the Orleans South Business Park (OSBP) was revised; requiring that an update to the "Orleans South Business Campus Development Plan Report" (Stantec, November 11, 2002) be completed. The update to the OSBP servicing study involved the development of a macro grading plan and sizing of the trunk storm, sanitary and water infrastructure within the business park.

5.1.1 Concept Plan

The proposed road network through the OSBP, presented under Option 2 in the BCIP Infrastructure Plan Update, was developed by the City of Ottawa. The proposed road network shown in **Appendix O** includes four collector roads with connection points to Innes Road and Mer Bleue Road and a future connection to the Gloucester EUC south of the HEPC.

5.1.2 Storm Drainage

5.1.2.1 Stormwater Management

As per the 1992 MDP and 2000 addendum, one extended detention SWM facility is required to service the OSBP and a portion of the Gloucester EUC. The SWM facility, identified as Pond 1, straddles the HEPC and includes a north and south forebay, a main cell and an outlet structure beneath Page Road. The catchment area tributary to Pond 1 (**Figure 4-4**) and the operating levels constraining the design of the minor system (**Table 4-3**) are presented in section **4.1.3.1**. Pond 1 was sized to provide quantity control up to the 100 year event, water quality treatment and downstream erosion protection.

5.1.2.2 Minor System

The storm sewer design criteria used for sizing the storm sewers is summarized as follows:

- Design return period – 5 year for internal local roads (OSBP)
- Design return period – 10 year for arterial roads (Mer Bleue Road)
- Rational Method calculation – initial storm sewer sizing assuming free flow conditions at the outlet
- Intensity (I) for 5 year storm – $I = 998.071 / (\text{Inlet Time in min} + 6.053)^{0.814}$
- Intensity (I) for 10 year storm – $I = 1174.184 / (\text{Inlet Time in min} + 6.014)^{0.816}$
- Inlet time – 10 minutes for Commercial/Industrial land uses per section 5.4.5.1 of the Ottawa Sewer Design Guidelines
- Minimum velocity – 0.80 m/s

- Maximum velocity – 3.0 m/s
- Manning roughness coefficient for all smooth wall pipes – 0.013
- Minimum depth of cover of 2.0m with no less than 1.0m of cover above the pipe obvert
- Land use runoff coefficients (C) based on the type of development as per section 5.4.5.2 of the City's Sewer Design Guidelines
- Commercial/Industrial – C= 0.75
- Roads (26m and 36m ROW) – C = 0.80 (calculated using a standard ROW cross section)

The storm trunk sewers illustrated on **DWG STM4**, with local storm sewer details shown in **Appendix O**, were sized using the Rational Method to convey the 5 year flow from the OSBP and the 10 year flow from a section of Mer Bleue Road. The OSBP will be serviced by two storm trunk sewers that discharge into Pond 1.

- Storm Trunk No. 1 drains 105ha of the OSBP, including a segment of Mer Bleue Road. The storm trunk sewer ranges in size from 2100mm to 2400mm x 3000mm in diameter and ties into an invert elevation of 80.46m in the North Forebay of Pond 1. The NWL of 81.6m in the North Forebay results in standing water 571m along Storm Trunk No. 1 to 71m U/S of MH 10. The depth of cover above Storm Trunk No. 1 (profile **STM P1** in **Appendix O**) exceeds the guideline of 2.0m.

  The standing water in the storm sewer is a result of grade raise recommendations (**Section 5.1.2.3**) and standard depth of cover requirements above the sanitary sewers (**Section 5.1.3)**. More detailed geotechnical analysis will take place with development that may impact the grade raises permitted and consequently the extent of standing water in the storm sewer. However, if increased grade raises are not recommended and operational concerns dictate, the profile of the storm sewer may be raised to reduce the extent of standing water in the storm sewer. Raising the profile of the storm sewer will require that the sanitary sewer profile also be raised and sections insulated, as standard cover depths will not be met.

- Storm Trunk No. 2 drains 66ha of the OSBP. The storm trunk sewer ranges in size from 1500mm to 2250mm in diameter and connects to Storm Trunk No. 1 at MH 11. The depth of cover above Storm Trunk No. 2 (**DWG. STM P1** in **Appendix O**) exceeds the guideline of 2.0m.

The peak flow entering Pond 1 is estimated at 21m^3/s. Supporting design documentation (i.e. storm sewer design sheet and storm drainage area plan) is included in **Appendix O**. The minor system design did not incorporate the drainage from the HEPC, as it was assumed that the drainage would be addressed by others through a separate pipe.

5.1.2.3 Major System

Using the City's general guidelines, a master servicing level design of the major system was developed for the study area. In principle, the major system was designed where possible with a minimum road grade 0.5%. In areas where the grades are less than 0.5%, a dendritic system with a minimum grade of 0.1% between highpoints and a maximum ponding depth of 0.3m is required.

The major system catchment boundaries generally follow those of the minor system, with the exception of a short segment of the east-west collector within the OSBP that is forced to drain to Mer Bleue Road. Direction of the runoff from this segment of road to Pond 1 could either be done by providing sufficient storage in the ROW and directing the runoff through the minor system to Pond 1 or routing the runoff along Mer Bleue Road and through the HEPC to Pond 1. In general, the elevation of the road is 0 to 0.60m above existing ground and conforms to the recommendations of the geotechnical investigation ("Preliminary Geotechnical Investigation Proposed Orleans Business Park" (Golder, December 2005). The proposed road elevations and grades are shown on **DWG. GRP** in **Appendix O**.

5.1.3 Sanitary Sewers

The design criteria used in sizing the sanitary sewers are as follows:

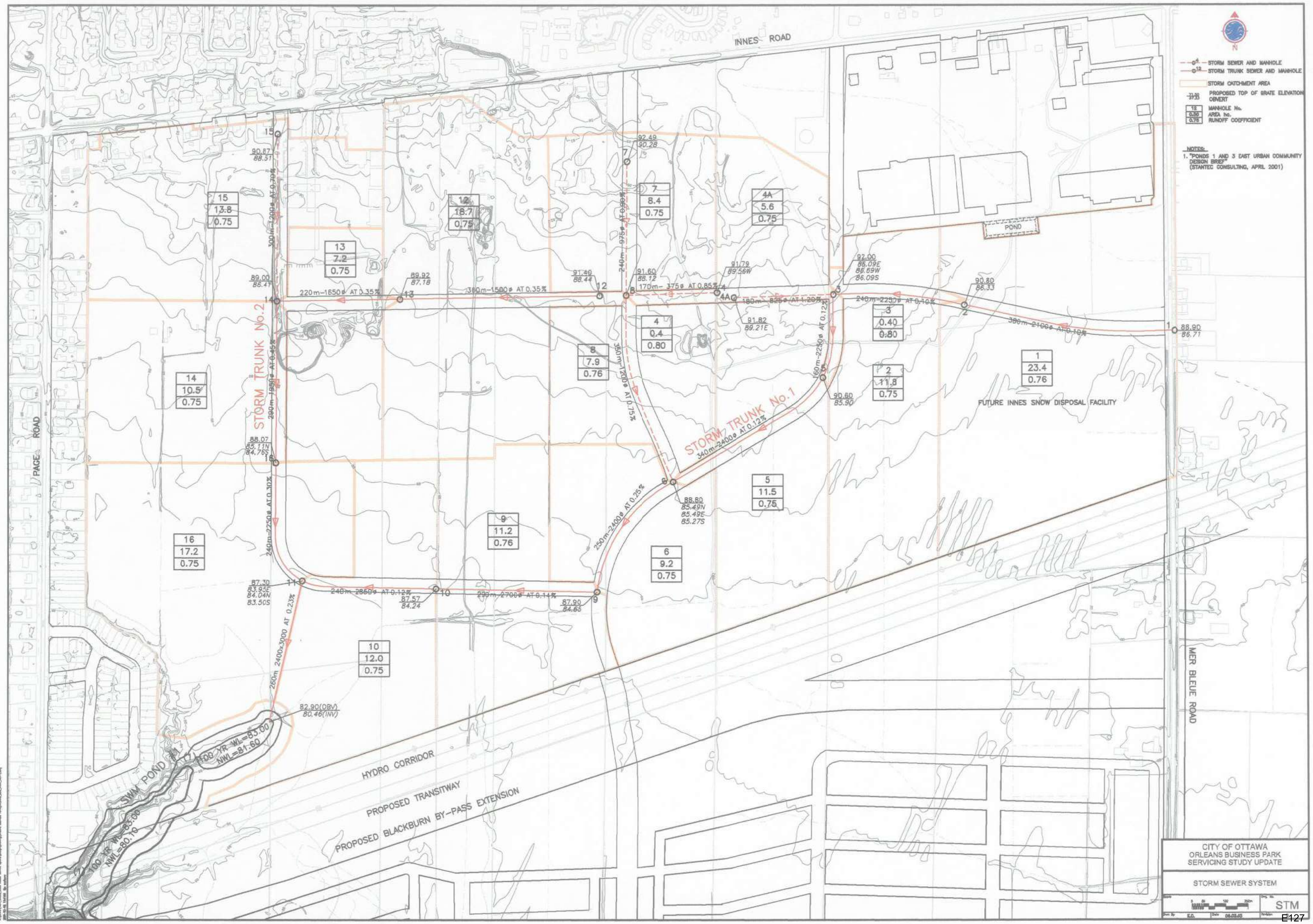
- Minimum velocity – 0.6 m/s
- Maximum velocity – 3.0 m/s
- Average Commercial flow – 50,000 l/ha/d
- Commercial peaking factor – 1.5
- Infiltration/Inflow – 0.28 l/s/ha
- Minimum depth of cover of 2.5m

The routing of the sanitary trunk sewers is shown on **DWG. SAN4**, with local sanitary sewer details and supporting design calculations (i.e. sanitary design sheet and catchment area plan) provided in **Appendix O**.

The sanitary collection system includes two sanitary trunk sewers designed to direct all flows from the OSBP westwards to the FVT (fv07400) at the intersection of Page and Silver Birch. An allowance of 255L/s has been reserved in the FVT for the OSBP. The peak flows from the OSBP is 187L/s.

- Sanitary Trunk No. 1 services 88ha of the OSBP and ranges in size from 250mm to 600mm in diameter. Sanitary Trunk No. 1 ties into an obvert elevation of 82.85m at the FVT trunk at the intersection of Page and Silver Birch. The depth of cover above sanitary sewer (profile **SAN P1** in **Appendix O**) meets or exceeds the guideline of 2.5m.

- Sanitary Trunk No. 2 services 75ha of the OSBP. The sewer ranges in size from 250m to 450mm in diameter and connects to Sanitary Trunk No. 1 at MH 110. The depth of cover above sanitary sewer (profile **SAN P1** in **Appendix O**) meets or exceeds the guideline of 2.5m.



INNES ROAD
PAGE ROAD
MER BLEUE ROAD
STORM SEWER AND MANHOLE
STORM TRUNK SEWER AND MANHOLE
STORM CATCHMENT AREA
PROPOSED TOP OF GRATE ELEVATION
OBVERT
MANHOLE No.
AREA No.
RUNOFF COEFFICIENT
NOTES:
1. "PONDS 1 AND 3 EAST URBAN COMMUNITY DESIGN BRIEF" (STANTEC CONSULTING, APRIL 2001)
STORM TRUNK No.2
STORM TRUNK No.1
FUTURE INNES SNOW DISPOSAL FACILITY
POND
HYDRO CORRIDOR
PROPOSED TRANSITWAY
PROPOSED BLACKBURN BY-PASS EXTENSION
SWM POND
100 YR WL=83.00
NWL=81.60
82.90(OBV)
80.46(INV)
CITY OF OTTAWA
ORLEANS BUSINESS PARK
SERVICING STUDY UPDATE
STORM SEWER SYSTEM
STM

E127

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Manning's n = 0.013 **Return Frequency =** 5 year for OSBP and 10 Year for Arterial Road (Mer Bleue)

Location						Flows (Development & Local Roads)				
STREET	FROM M.H.	TO M.H.	R= 0.75	R= 0.8	R= 0.8	Indiv. 2.78 AC	Accum. 2.78 AC	Time of Conc.	5 yr Rainfall Intensity	Peak Flow Q (l/s)
	1	2	19.9	0.9	2.6	43.5	43.5	10.0	104.2	4531.8
	2	3	11.2	0.6		24.7	68.2	14.0	87.1	5937.5
	4	3	5.1	0.5		11.8	11.8	10.0	104.2	1224.5
	3	5	0.0	0.4		0.9	80.9	15.3	79.4	6424.1
	5	6	10.6	0.9		24.1	105.0	17.8	75.5	7922.8
	4	8		0.4		1.0	1.0	10.0	104.2	102.4
	7	8	7.6	0.8		17.6	17.6	10.0	104.2	1835.8
	8	6	7.0	0.9		16.6	35.2	11.9	95.1	3346.0
	6	9	8.6	0.7		19.3	159.4	20.8	68.6	10942.2
	9	10	10.1	1.1		23.5	182.9	22.3	65.6	12009.1
	10	11	11.4	0.6		25.1	208.1	24.4	61.8	12864.2
	12	13	17.6	1.1		39.1	39.1	10.0	104.2	4077.9
	13	14	6.6	0.6		15.1	54.2	12.5	92.6	5020.4
	15	14	13.0	0.8		28.9	28.9	10.0	104.2	3009.2
	14	16	9.7	0.8		22.0	105.1	13.9	87.1	9157.0
	16	11	16.6	0.6		35.9	141.1	15.4	82.2	11587.9
	11	Pond 1	0.0	0.0		0.0	349.1	26.3	58.9	20568.8

FROM M.H.	TO M.H.	Flows (Arterial Roads) Indiv. 2.78 AC	Accum. 2.78 AC	Time of Conc.	10 yr Rainfall Intensity	Peak Flow Q (l/s)	TOTAL PEAK FLOW Q (l/s)	SEWER DATA DIA. (m) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (M)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min.)	RATIO Q/Q full
1	2	5.8	5.8	10.0	122.1	706.3	5238.1	2.134	2100	CONC	0.10%	380	5720.2	1.60	4.0	92%
2	3	0.0	5.8	14.0	102.0	589.8	6527.3	2.286	2250	CONC	0.10%	240	6875.6	1.68	2.4	95%
4	3	0.0	0.0	10.0	122.1	0.0	1224.5	0.838	825	CONC	1.20%	210	1640.4	2.97	1.2	75%
3	5	0.0	5.8	16.3	93.0	537.9	6961.9	2.286	2250	CONC	0.12%	160	7531.8	1.84	1.5	92%
5	6	0.0	5.8	17.8	88.4	510.9	8433.7	2.438	2400	CONC	0.12%	340	8946.3	1.92	3.0	94%
4	8	0.0	0.0	10.0	122.1	0.0	102.4	0.381	375	CONC	0.85%	170	168.6	1.48	1.9	61%
7	8	0.0	0.0	10.0	122.1	0.0	1835.8	0.991	975	CONC	0.90%	240	2218.0	2.88	1.4	83%
8	6	0.0	0.0	11.9	111.4	0.0	3346.0	1.219	1200	CONC	0.75%	350	3522.4	3.02	1.9	95%
6	9	0.0	5.8	20.8	80.3	464.4	11406.5	2.438	2400	CONC	0.25%	250	12912.9	2.77	1.5	88%
9	10	0.0	5.8	22.3	76.8	444.1	12453.2	2.743	2700	CONC	0.14%	290	13228.9	2.24	2.2	94%
10	11	0.0	5.8	24.4	72.3	418.2	13282.4	2.896	2850	CONC	0.12%	240	14147.1	2.15	1.9	94%
12	13	0.0	0.0	10.0	122.1	0.0	4077.9	1.524	1500	CONC	0.35%	360	4362.8	2.39	2.5	93%
13	14	0.0	0.0	12.5	108.5	0.0	5020.4	1.676	1650	CONC	0.35%	220	5625.3	2.55	1.4	89%
15	14	0.0	0.0	10.0	122.1	0.0	3009.2	1.219	1200	CONC	0.70%	300	3402.9	2.91	1.7	88%
14	16	0.0	0.0	13.9	102.0	0.0	9157.0	1.981	1950	CONC	0.45%	290	9958.4	3.23	1.5	92%
16	11	0.0	0.0	15.4	96.2	0.0	11587.9	2.286	2250	CONC	0.30%	240	11908.9	2.90	1.4	97%
11	Pond 1	0.0	5.8	26.3	68.9	398.4	20967.2	2.438 x 3.048	2400 x 3000	CONC	0.23%	260	21146.7	2.85	1.5	99%

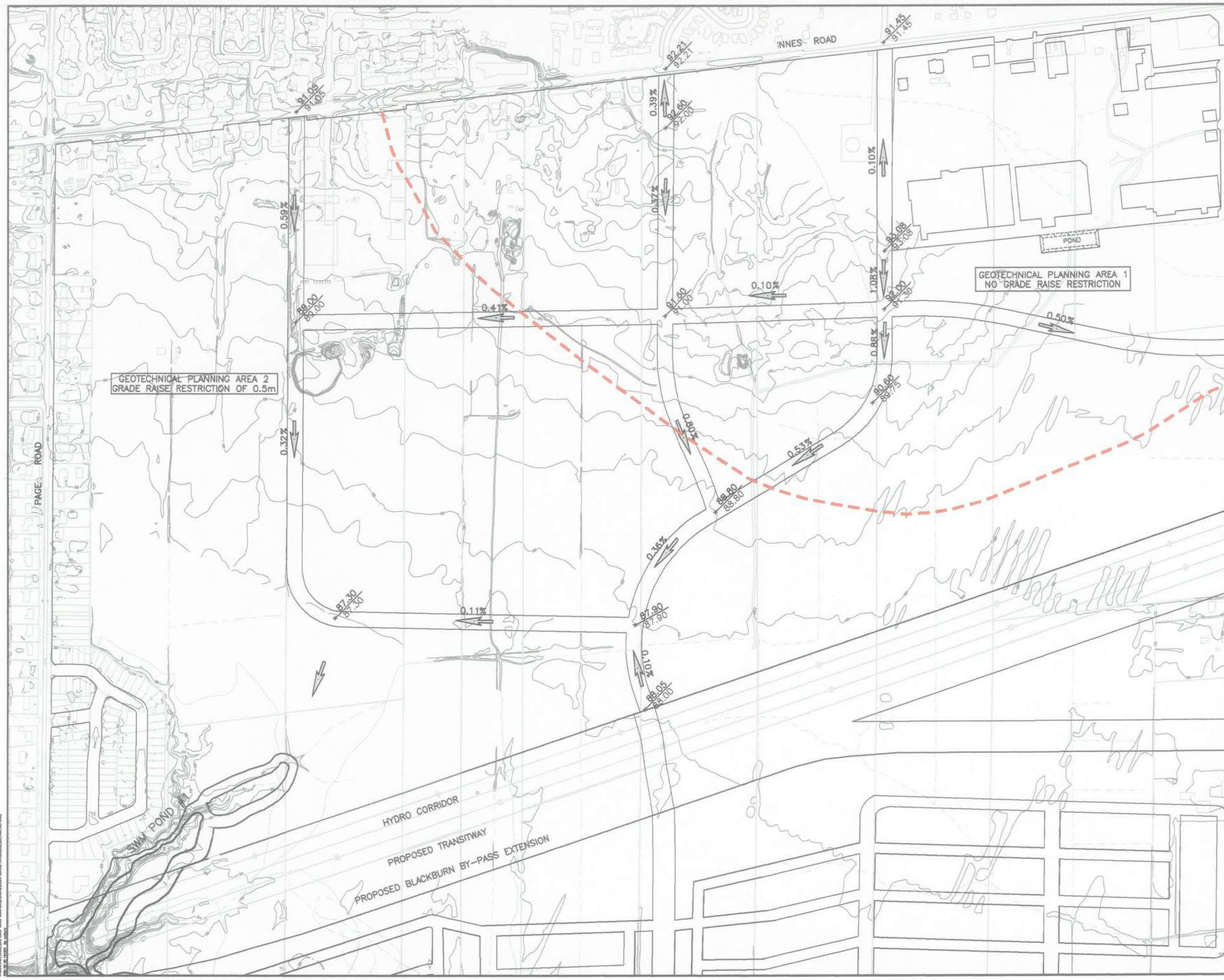
FROM M.H.	TO M.H.	SEWER DETAILS US MH T/G (m)	DS MH T/G (m)	US INV. (m)	US OBV. (m)	DS INV. (m)	DS OBV. (m)	Drop (m)	US Frost Depth (m)	DS Frost Depth (m)
1	2	88.90	90.80	84.58	86.71	84.20	86.33		2.19	4.47
2	3	90.80	92.00	84.05	86.33	83.81	86.09		4.47	5.91
4	3	91.79	92.00	88.37	89.21	85.85	86.69	0.60	2.58	5.31
3	5	92.00	90.60	83.81	86.09	83.61	85.90		5.91	4.70
5	6	90.60	88.80	83.46	85.90	83.05	85.49	0.22	4.70	3.31
4	8	91.79	91.60	89.18	89.56	87.74	88.12		2.23	3.48
7	8	92.49	91.60	89.29	90.28	87.13	88.12		2.21	3.48
8	6	91.60	88.80	86.90	88.12	84.27	85.49	0.22	3.48	3.31
6	9	88.80	87.90	82.83	85.27	82.21	84.65		3.53	3.25
9	10	87.90	87.57	81.90	84.65	81.50	84.24		3.25	3.33
10	11	87.57	87.30	81.35	84.24	81.06	83.95		3.33	3.35
12	13	91.40	89.92	86.92	88.44	85.66	87.18		2.96	2.74
13	14	89.92	89.00	85.51	87.18	84.74	86.41		2.74	2.59
15	14	90.87	89.00	87.29	88.51	85.19	86.41		2.36	2.59
14	16	89.00	88.07	84.43	86.41	83.13	85.11	0.35	2.59	2.96
16	11	88.07	87.30	82.47	84.76	81.75	84.04	0.54	3.31	3.26
11	Pond 1	87.30	87.00	81.06	83.50	80.46	82.90		3.80	4.10

Pond 1 Design (Stantec, Inv. 81.30, NWL 81.60) **80.46**

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s) 1) Ottawa Rainfall-Intensity Curve
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Designed: FW
Checked: FW
Dwg. Reference:

PROJECT: Orleans South Business Park
LOCATION: City of Ottawa
File Ref.: 163400602 Date: 1-Mar-06 Sheet No. 1 of 1



CITY OF OTTAWA
ORLEANS BUSINESS PARK
SERVICING STUDY UPDATE

MAJOR SYSTEM GRADING PLAN

GRP

E129

SERVICING REPORT

FOR

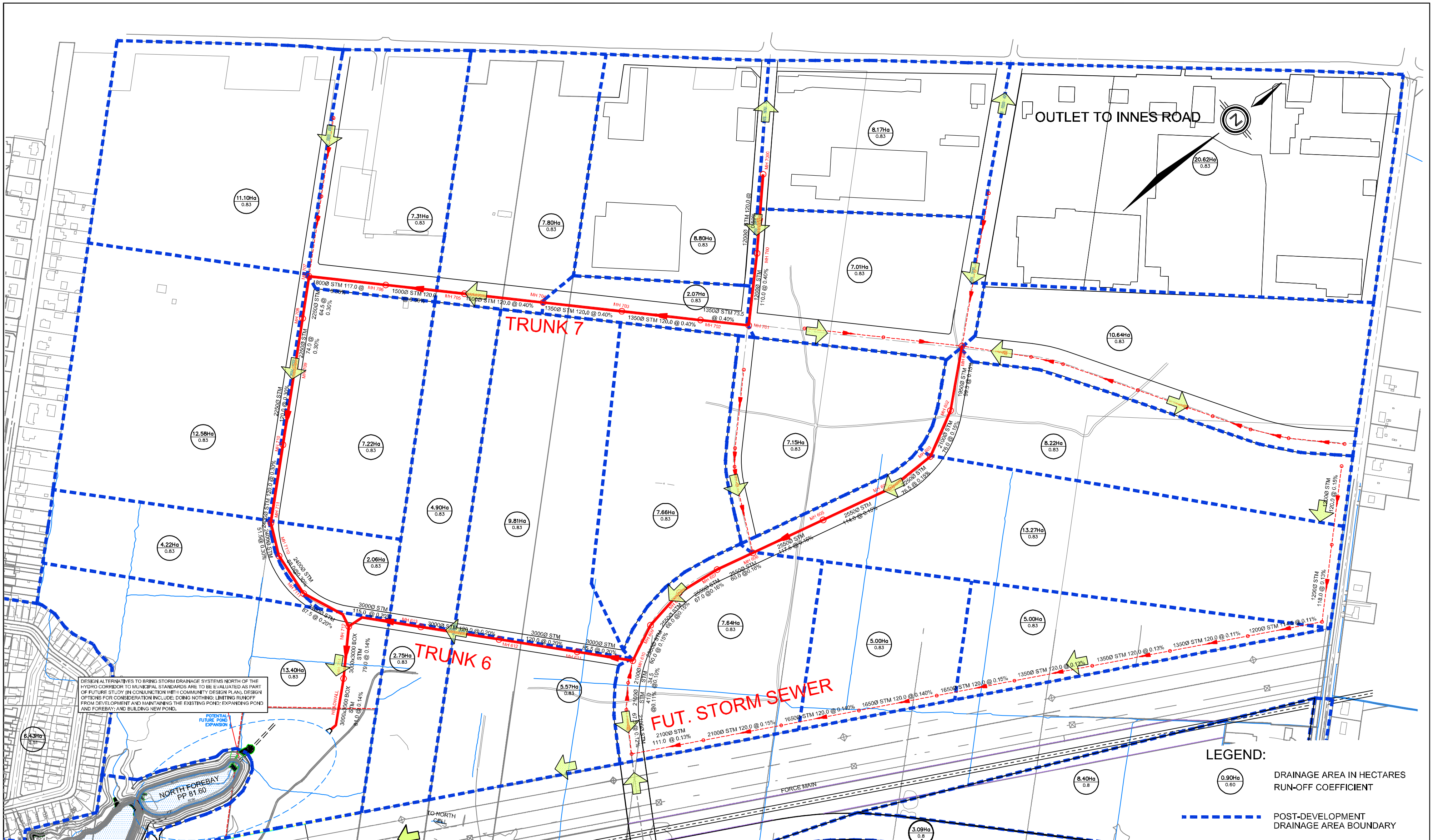
TRAILS EDGE AND ORLEANS BUSINESS PARK

MINTO DEVELOPMENTS INC. RICHCRAFT GROUP OF COMPANIES

CITY OF OTTAWA

PROJECT NO.: 10-459

JULY 2017
REVISION 7



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ORLEANS BUSINESS PARK

CONCEPTUAL STORM DRAINAGE AREA

PROJECT No. :	10-459
SCALE:	1:2500
DATE:	FEBRUARY 2014
APPENDIX No.	I-2

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Manning 0.013 Return Frequency = 5 years

	LOCATION		AREA (Ha)									FLOW			SEWER DATA								
			R=	R=	R=	R=	R=	R=	R=	Indiv.	Accum.	Time of	Rainfall	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
Location	From Node	To Node	0.25	0.60	0.65	0.70	0.80	0.83	0.90	2.78 AC	2.78 AC	Conc.	Intensity	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	FLOW (min.)	Q/Q full
FUT. STORM SEWER												Estimated TC (10 min inlet Tc + 240 m Flow Path @ 2m/s)											
	801	802						5.00		11.54	11.54	12.00	94.70	1093	1200	1200	CONC	0.15	120.0	1509	1.34	1.50	0.72
	802	803								0.00	11.54	13.50	88.75	1024	1200	1200	CONC	0.13	118.0	1405	1.24	1.58	0.73
	803	804								0.00	11.54	15.08	83.30	961	1200	1200	CONC	0.11	114.5	1292	1.14	1.67	0.74
	804	805								0.00	11.54	16.75	78.30	903	1350	1350	CONC	0.11	120.0	1769	1.24	1.62	0.51
	805	806								0.00	11.54	18.37	74.05	854	1350	1350	CONC	0.13	120.0	1923	1.34	1.49	0.44
	806	807								0.00	11.54	19.85	70.57	814	1350	1350	CONC	0.13	120.0	1923	1.34	1.49	0.42
	807	808						5.00		11.54	23.07	21.34	67.44	1556	1650	1650	CONC	0.15	120.0	3528	1.65	1.21	0.44
	808	809								0.00	23.07	22.55	65.10	1502	1650	1650	CONC	0.14	120.0	3409	1.59	1.25	0.44
	809	810								0.00	23.07	23.81	62.87	1451	1650	1650	CONC	0.14	120.0	3409	1.59	1.25	0.43
	810	811						7.64		17.63	40.70	25.06	60.80	2475	2100	2100	CONC	0.15	120.0	6712	1.94	1.03	0.37
	811	812								0.00	40.70	26.09	59.21	2410	2100	2100	CONC	0.13	111.0	6249	1.80	1.02	0.39
	812	813								0.00	40.70	27.12	57.71	2349	2100	2100	CONC	0.12	67.5	6003	1.73	0.65	0.39
	813	814								0.00	40.70	27.77	56.81	2312	2100	2100	CONC	0.11	41.0	5748	1.66	0.41	0.40
	814	610								0.00	40.70	28.18	56.25	2290	2100	2100	CONC	0.10	34.5	5480	1.58	0.36	0.42
To Trunk 6 , Pipe 610 - 611			0.00	0.00	0.00	0.00	0.00	17.64	0.00		40.70	28.54											
TRUNK 6																							
								7.01		16.17	16.17	Estimated TC (10 min inlet Tc + 1020 m Flow Path @ 2m/s)											
	601	602						10.64		24.55	40.73	18.50	73.73	3003	1950	1950	CONC	0.15	99.5	5508	1.85	0.90	0.55
	602	603						8.22		18.97	59.69	19.40	71.60	4274	2100	2100	CONC	0.15	76.0	6712	1.94	0.65	0.64
	603	604						7.15		16.50	76.19	20.05	70.14	5344	2250	2250	CONC	0.15	76.5	8068	2.03	0.63	0.66
	604	605						13.27		30.62	106.81	20.68	68.79	7348	2550	2550	CONC	0.15	114.0	11264	2.21	0.86	0.65
	605	606								0.00	106.81	21.54	67.04	7161	2550	2550	CONC	0.15	117.5	11264	2.21	0.89	0.64
	606	607						7.66		17.67	124.48	22.43	65.34	8133	2550	2550	CONC	0.16	60.0	11634	2.28	0.44	0.70
	607	608								0.00	124.48	22.87	64.53	8033	2550	2550	CONC	0.16	67.0	11634	2.28	0.49	0.69
	608	609								0.00	124.48	23.36	63.65	7924	2550	2550	CONC	0.15	66.0	11264	2.21	0.50	0.70
	609	610								0.00	124.48	23.86	62.79	7816	2550	2550	CONC	0.15	60.0	11264	2.21	0.45	0.69
Contribution From Trunk 8, Pipe 814 - 610			0.00	0.00	0.00	0.00	0.00	17.64	0.00	40.70	165.19	28.54											
								9.81		22.64	187.82												
	610	611						5.57		12.85	200.67	28.54	55.77	11192	3000	3000	CONC	0.20	85.5	20063	2.84	0.50	0.56
	611	612								0.00	200.67	29.04	55.12	11061	3000	3000	CONC	0.20	120.0	20063	2.84	0.70	0.55
	612	613								0.00	200.67	29.75	54.24	10884	3000	3000	CONC	0.20	120.0	20063	2.84	0.70	0.54
								4.90		11.31	211.98												
								2.75		6.35	218.33												
	613	614						2.06		4.75	223.08	30.45	53.38	11909	3000	3000	CONC	0.20	90.5	20063	2.84	0.53	0.59
	614	712								0.00	223.08	30.98	52.76	11770	3000	3000	CONC	0.20	24.5	20063	2.84	0.14	0.59
To Trunk 7 , Pipe 712 - 714			0.00	0.00	0.00	0.00	0.00	96.68	0.00		223.08	31.13											

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

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.76 m/sec

Designed: K.M.	PROJECT: TRAILS EDGE FSR - SUBMISSION 5		
Checked: Z.L.	LOCATION: City of Ottawa		
Dwg. Reference: Storm Drainage Plan	File Ref: 10-459	Date: February, 2014	Sheet No. E132 of 2

459FSR5_Stm_DesignSheet _Orleans.xls

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Ottawa

Manning 0.013 Return Frequency = 5 years

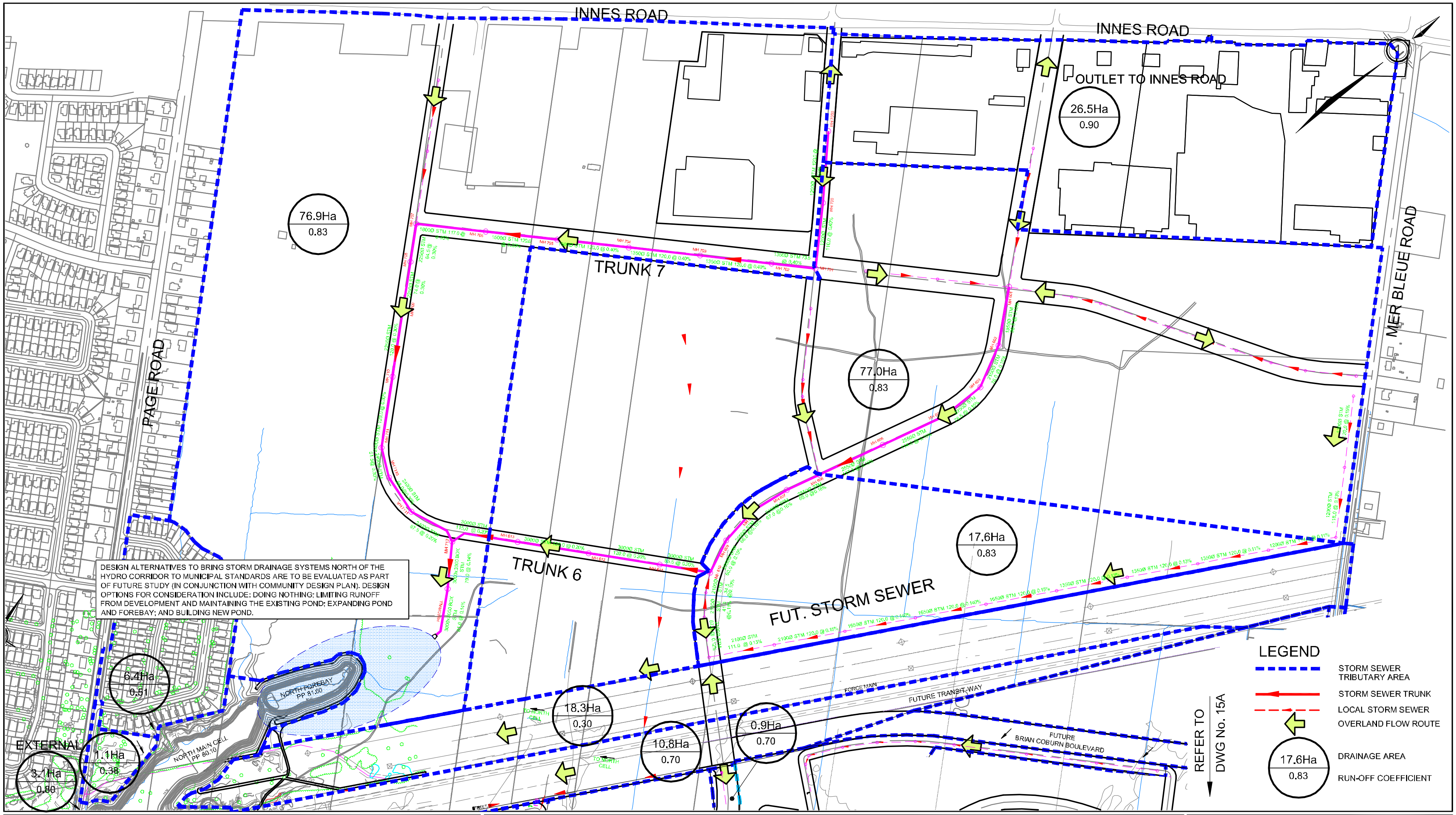
	LOCATION		AREA (Ha)									FLOW				SEWER DATA							
			R=	R=	R=	R=	R=	R=	R=	Indiv.	Accum.	Time of	Rainfall	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
Location	From Node	To Node	0.25	0.60	0.65	0.70	0.80	0.83	0.90	2.78 AC	2.78 AC	Conc.	Intensity	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	FLOW (min.)	Q/Q full
TRUNK 7												Estimated TC (10 min inlet Tc + 420 m Flow Path @ 2m/s)											
	7000	700						8.80		20.31	20.31	13.50	88.74	1802	1200	1200	CONC	0.50	120.0	2755	2.44	0.82	0.65
	700	701								0.00	20.31	14.32	85.82	1743	1200	1200	CONC	0.40	110.0	2465	2.18	0.84	0.71
	701	702						2.07		4.78	25.08	15.16	83.04	2083	1350	1350	CONC	0.40	73.5	3374	2.36	0.52	0.62
	702	703								0.00	25.08	15.68	81.42	2042	1350	1350	CONC	0.40	120.0	3374	2.36	0.85	0.61
	703	704								0.00	25.08	16.53	78.92	1979	1350	1350	CONC	0.40	120.0	3374	2.36	0.85	0.59
	704	705						7.80		18.00	43.08	17.38	76.59	3299	1500	1500	CONC	0.40	120.0	4468	2.53	0.79	0.74
	705	706								0.00	43.08	18.17	74.55	3211	1500	1500	CONC	0.50	120.0	4996	2.83	0.71	0.64
	706	707						7.31		16.87	59.95	18.87	72.82	4365	1800	1800	CONC	0.35	117.0	6797	2.67	0.73	0.64
								11.10		25.61	85.56												
	707	708						12.58		29.03	114.59	19.60	71.13	8151	2250	2250	CONC	0.30	64.5	11410	2.87	0.37	0.71
	708	709								0.00	114.59	19.98	70.30	8055	2250	2250	CONC	0.30	74.0	11410	2.87	0.43	0.71
	709	710								0.00	114.59	20.41	69.37	7949	2250	2250	CONC	0.30	120.0	11410	2.87	0.70	0.70
	710	711						7.22		16.66	131.24	21.10	67.92	8914	2400	2400	CONC	0.30	120.0	13552	3.00	0.67	0.66
	711	7110						4.22		9.74	140.98	21.77	66.59	9388	2400	2400	CONC	0.30	51.5	13552	3.00	0.29	0.69
	7110	7111								0.00	140.98	22.06	66.03	9310	2400	2400	CONC	0.30	68.0	13552	3.00	0.38	0.69
	7111	7200								0.00	140.98	22.44	65.32	9209	2400	2400	CONC	0.20	67.0	11065	2.45	0.46	0.83
	7200	712								0.00	140.98	22.89	64.48	9091	2400	2400	CONC	0.20	20.5	11065	2.45	0.14	0.82
Contribution From Trunk 6, Pipe 614 - 712			0.00	0.00	0.00	0.00	0.00	96.68	0.00	223.08	364.06	31.13											
	712	714						13.40		30.92	394.98	31.13	52.59	20773	3000x3000	3000x3000	CONC	0.14	79.0	21634	2.43	0.54	0.96
	714	HW								0.00	394.98	31.67	51.98	20530	3000x3000	3000x3000	CONC	0.14	81.0	21634	2.43	0.56	0.95
			0.00	**0.00**	**0.00**	**0.00**	**0.00**	**171.18**	**0.00**		**394.98**	**32.23**											

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

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.76 m/sec

Designed: K.M.
Checked: Z.L.
Dwg. Reference: Storm Drainage Plan

PROJECT: **TRAILS EDGE** **FSR - SUBMISSION 5**
LOCATION: **City of Ottawa**
File Ref: 10-459
Date: February, 2014
Sheet No. E132 of 2



DSEL
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FAX: (613) 836-7183
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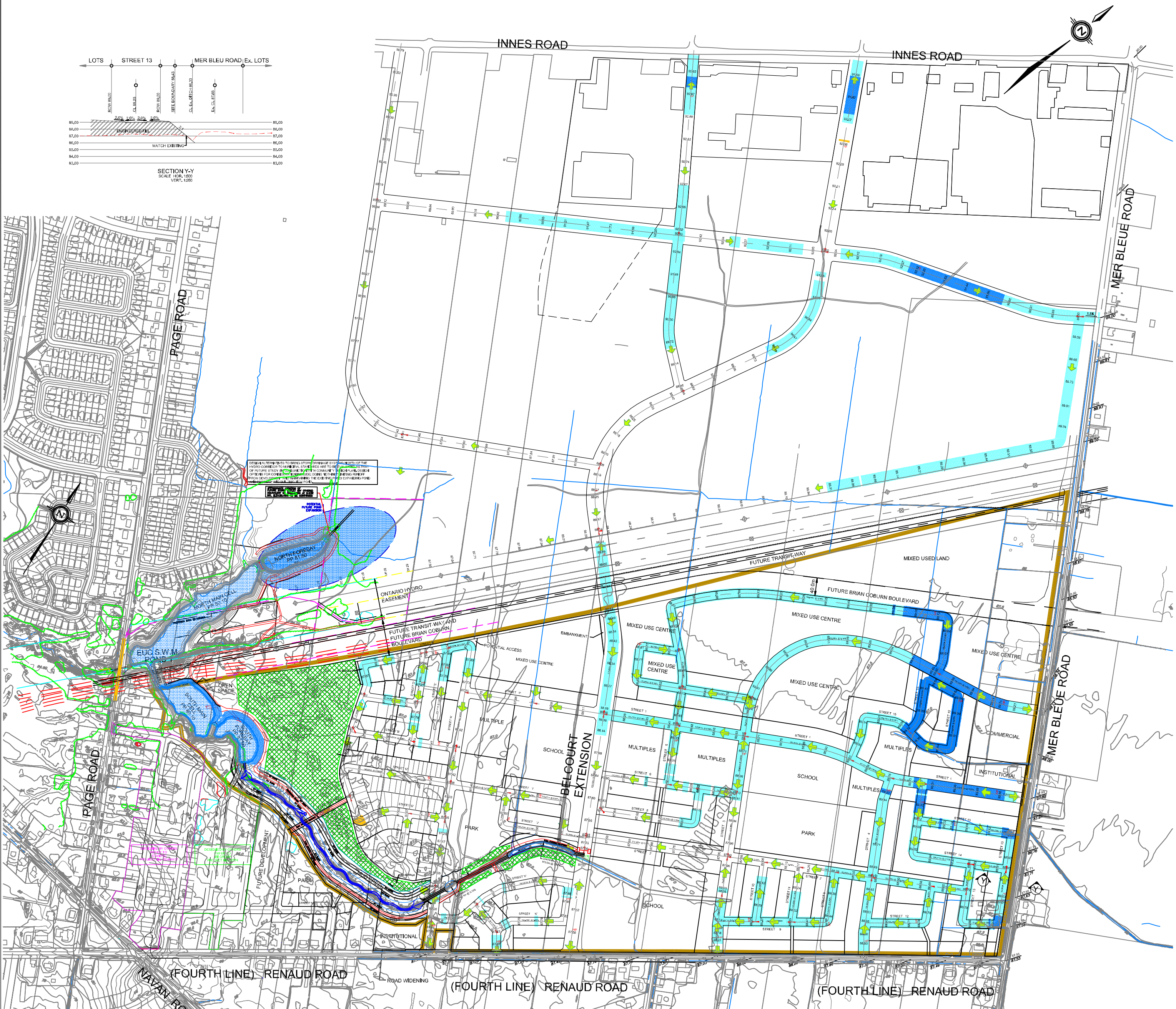
ORLEANS BUSINESS PARK

CONCEPTUAL STORM CONDITION - ULTIMATE

DATE:	FEBRUARY 2014
SCALE:	1:6000
PROJECT No.:	10-459
FIGURE	E134 15B



NOTE:

PROPOSED FINISHED GRADE EXCEEDS GRADE RAISE RESTRICTIONS IN SOME AREAS. A SURCHARGE PROGRAM MAY BE REQUIRED TO THE SATISFACTION OF A LICENSED GEOTECHNICAL ENGINEER. DETAILED GRADING PLANS WILL BE REVIEWED BY A LICENSED GEOTECHNICAL ENGINEER IN DETAILED DESIGN.

LEGEND:

- STUDY LIMIT
- STORM OVERLAND FLOW ARROW
- STORM SEWER OUTFALLS
- EXISTING WOODLOT AREAS

CUT-FILL DEPTH ALONG CENTER LINE:

CUT DEPTH (m)	FILL DEPTH (m)
0 - 1	0 - 1
1 - 2	1 - 2
2 - 3	2 - 3

ASSUMPTIONS:

- ROAD SLOPES @ 0.15%
- PROPOSED MUD CREEK CHANNEL@ 0.10%

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TRAILS EDGE

GRADING PLAN

PROJECT No. : 10-459
SCALE: 1:3000
DATE: FEBRUARY 2014
FIGURE: 11

120 Iber Road, Suite 103
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DESIGN BRIEF

FOR

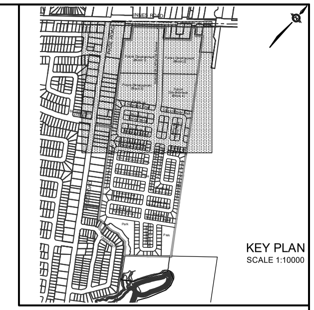
CAIVAN (ORLEANS VILLAGE) LIMITED
3490 INNES ROAD

CITY OF OTTAWA

PROJECT NO.: 15-881

MAY 2018 – VER 2

E136



LEGEND

- STORM DRAINAGE BOUNDARY
- STORM DRAINAGE BOUNDARY (OTHER PHASES)
- UPSTREAM MH TO DOWNSTREAM MH — 43 - 44
- AREA IN HECTARES — 0.37
- RUNOFF COEFFICIENT — 0.51
- EXTERNAL 2.78AC = — 2.78AC=14.40
- EXTERNAL TIME OF CONCENTRATION — TC=14.5 MIN
- EXTERNAL BLENDED RUNOFF COEFFICIENT — C= 0.70
- STREET CATCHBASIN & LEAD
- STREET CATCHBASIN WITH CLOSED LID & LEAD
- MAINTENANCE HOLE — MH202
- CURB INLET CATCHBASIN & LEAD
- CATCHBASIN/ MAINTENANCE HOLE — CBMH201
- INTERCONNECTED CATCH BASIN & LEADS
- CAP
- OVERLAND FLOW DIRECTION
- EXTERNAL OVERLAND FLOW DIRECTION
- EMERGENCY OVERLAND FLOW DIRECTION

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY J.D. BARNES LIMITED, PROJECT No. 16-10-116-00. SURVEYS DATED NOVEMBER 30, 2017.

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY J.D. BARNES LIMITED, PROJECT No. 16-10-116-00 (PHASE 1 & 2) DATED MARCH 08, 2018.

ISSUED FOR MOE APPROVAL 18-05-09

NOT FOR CONSTRUCTION

ELEVATION NOTE ELEVATION = 86.12 m

ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM SITE BENCHMARK NCC CONTROL POINT 001196530229 HAVING A PUBLISHED ELEVATION OF 86.12m

No.	DATE	BY	DESCRIPTION
2.	18-05-09	M.Z.	ISSUED FOR MOE APPROVAL
1.	18-01-24	M.Z.	1st SUBMISSION

Ottawa CITY OF OTTAWA

LICENSED PROFESSIONAL ENGINEER M.ZDRAVEVSKI 100130902 18-05-09 PROVINCE OF ONTARIO

PROJECT No. 16-881

STORM DRAINAGE PLAN

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CAIVAN (ORLEANS VILLAGE) LIMITED

ORLEANS VILLAGE

DSEL david schaeffer engineering ltd

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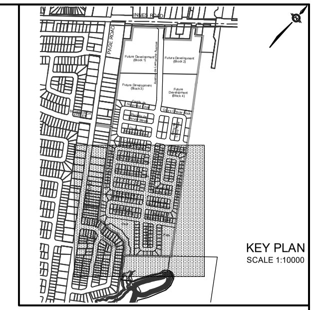
DRAWN BY:	M.Z.	CHECKED BY:	P.P.	DRAWING NO.	SHEET NO.
DESIGNED BY:	P.P.	CHECKED BY:	M.Z.		67
SCALE:	1:1000	DATE:	JANUARY 2018		

CITY PLAN No. XXXXX

CITY FILE No. D07-16-16-0022

E137



KEY PLAN
SCALE 1:10000

LEGEND

- STORM DRAINAGE BOUNDARY
- STORM DRAINAGE BOUNDARY (OTHER PHASES)
- UPSTREAM MH TO DOWNSTREAM MH (43 - 44)
- AREA IN HECTARES (0.37)
- RUNOFF COEFFICIENT (0.51)
- EXTERNAL 2.78AC = (2.78AC=14.40)
- EXTERNAL TIME OF CONCENTRATION (TC=14.5 MIN)
- EXTERNAL BLENDED RUNOFF COEFFICIENT (C=0.70)
- STREET CATCHBASIN & LEAD
- STREET CATCHBASIN WITH CLOSED LID & LEAD
- MAINTENANCE HOLE (375mmØ ST, MH202)
- CURB INLET CATCHBASIN & LEAD
- CATCHBASIN/ MAINTENANCE HOLE (CBMH201)
- INTERCONNECTED CATCH BASIN & LEADS
- CAP
- OVERLAND FLOW DIRECTION
- EXTERNAL OVERLAND FLOW DIRECTION
- EMERGENCY OVERLAND FLOW DIRECTION

EAST URBAN COMMUNITY MIXED USE CENTRE REFER TO DAVID SCHAEFFER ENGINEERING LIMITED PROJECT No. 14-733

REFER TO DWG No. 67

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY J.D. BARNES LIMITED, PROJECT No. 16-10-116-00. SURVEYS DATED NOVEMBER 30, 2017.

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY J.D. BARNES LIMITED, PROJECT No. 16-10-116-00 (PHASE 1 & 2) DATED MARCH 08, 2018.

ISSUED FOR MOE APPROVAL 18-05-09

NOT FOR CONSTRUCTION

ELEVATION NOTE

ELEVATION = 86.12 m

ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM SITE BENCHMARK NCC CONTROL POINT 001196530229 HAVING A PUBLISHED ELEVATION OF 86.12m

No.	DATE	BY	DESCRIPTION
2.	18-05-09	M.Z.	ISSUED FOR MOE APPROVAL
1.	18-01-24	M.Z.	1st SUBMISSION

Ottawa CITY OF OTTAWA

PROJECT No. 16-881

LICENSED PROFESSIONAL ENGINEER M.ZDRAVEVSKI 100130902 18-05-09 PROVINCE OF ONTARIO

STORM DRAINAGE PLAN

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ORLEANS VILLAGE

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DRAWN BY:	M.Z.	CHECKED BY:	P.P.	DRAWING NO.	SHEET NO.
DESIGNED BY:	P.P.	CHECKED BY:	M.Z.		68
SCALE:	1:1000	DATE:	JANUARY 2018		

CITY FILE No. D07-16-16-0022 CITY PLAN No. XXXXX

E138

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

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

Manning 0.013

LOCATION			AREA (Ha) 2 YEAR				5 YEAR				100 YEAR				FLOW						SEWER DATA								
Location	From Node	To Node	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	Time of Conc. (min)	Intensity 2 Year (mm/h)	Intensity 5 Year (mm/h)	Intensity 10 Year (mm/h)	Intensity 100 Year (mm/h)	Peak Flow Q (l/s)	DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min.)	RATIO Q/Q full
West Boundary STM System																													
Contribution From Subdrain System																				-29									
					0.00	0.00			0.00	0.00	0.95	0.55	1.45	1.45															
	C1	C4			0.00	0.00			0.00	0.00	0.19	0.50	0.26	1.72	10.00	76.81	104.19	0.00	178.56	278	450	450	CONC	1.70	76.5	372	2.34	0.55	0.75
To Alignment 2002, Pipe C4 - 2200						0.00				0.00				1.72	10.55					-29									
					0.00	0.00			0.00	0.00	0.29	0.50	0.40	0.40															
	C2	C4			0.00	0.00			0.00	0.00	0.70	0.55	1.07	1.47	10.00	76.81	104.19	0.00	178.56	263	525	525	CONC	0.50	142.0	304	1.40	1.68	0.87
To Alignment 2002, Pipe C4 - 2200						0.00				0.00				1.47	11.68														
					0.00	0.00			0.00	0.00	0.19	0.50	0.26	0.26															
	C5	C7			0.00	0.00			0.00	0.00	0.55	0.55	0.84	1.11	10.00	76.81	104.19	0.00	178.56	197	450	450	CONC	0.70	96.0	239	1.50	1.07	0.83
To Alignment 2003, Pipe C7 - C8						0.00				0.00				1.11	11.07														
					0.00	0.00			0.00	0.00	0.01	0.56	0.02	0.02															
					0.00	0.00			0.00	0.00	0.12	0.55	0.18	0.20															
					0.00	0.00			0.00	0.00	0.22	0.50	0.31	0.50															
	C6	C7			0.00	0.00			0.00	0.00	0.57	0.55	0.87	1.38	10.00	76.81	104.19	0.00	178.56	246	600	600	CONC	0.20	110.5	275	0.97	1.90	0.90
To Alignment 2003, Pipe C7 - C8						0.00				0.00				1.38	11.90														
Alignment 2002 - 2002																													
Contribution From West Boundary STM System, Pipe C1 - C4						0.00				0.00				1.72	10.55					-29									
Contribution From West Boundary STM System, Pipe C2 - C4						0.00				0.00				1.47	11.68														
	C4	2200			0.00	0.00			0.00	0.00			0.00	3.19	11.68	70.89	96.06	0.00	164.50	496	675	675	CONC	0.55	32.5	623	1.74	0.31	0.80
To cercle de L'Argonaut circle, Pipe 2200 - 27						0.00				0.00				3.19	12.00					-29									
cercle de L'Argonaut circle																													
					0.00	0.00	0.02	0.72	0.04	0.04			0.00	0.00															
			0.04	0.50	0.06	0.06			0.00	0.04			0.00	0.00															
			0.12	0.70	0.23	0.29			0.00	0.04			0.00	0.00															
			0.16	0.54	0.24	0.53			0.00	0.04			0.00	0.00															
	19	21	0.46	0.72	0.92	1.45			0.00	0.04			0.00	0.00	10.00	76.81	104.19	0.00	178.56	116	450	450	CONC	0.75	141.0	247	1.55	1.51	0.47
To avenue de Lamarche avenue, Pipe 21 - 24						1.45				0.04				0.00	11.51														
	19	26			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	0	300	300	PVC	0.35	9.5	57	0.81	0.20	0.00
			0.07	0.70	0.14	0.14			0.00	0.00			0.00	0.00															
	26	22	0.12	0.54	0.18	0.32			0.00	0.00			0.00	0.00	10.20	76.06	103.17	0.00	176.79	24	300	300	PVC	0.40	52.0	61	0.87	1.00	0.39
	22	2200			0.00	0.32			0.00	0.00			0.00	0.00	11.20	72.49	98.27	0.00	168.31	23	300	300	PVC	0.41	29.0	62	0.88	0.55	0.37
Contribution From Alignment 2002, Pipe C4 - 2200						0.00				0.00				3.19	12.00					-29									
	2200	27			0.00	0.32			0.00	0.00			0.00	3.19	12.00	69.91	94.71	0.00	162.17	510	675	675	CONC	0.50	19.0	594	1.66	0.19	0.86
	27	28			0.00	0.32			0.00	0.00			0.00	3.19	12.19	69.32	93.91	0.00	160.77	506	675	675	CONC	1.00	10.5	841	2.35	0.07	0.60
			0.15	0.50	0.21	0.52			0.00	0.00			0.00	3.19															
			0.15	0.54	0.23	0.75			0.00	0.00			0.00	3.19															
	28	30	0.67	0.70	1.30	2.05			0.00	0.00			0.00	3.19	12.26	69.09	93.60	0.00	160.23	624	750	750	CONC	0.50	142.5	787	1.78	1.33	0.79
To avenue de Lamarche avenue, Pipe 30 - 33						2.05				0.00				3.19	13.59					-29									
placette de Darvoy mews																													
	22	24	0.50	0.72	1.00	1.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	77	450	450	CONC	0.75	147.5	247	1.55	1.58	0.31
To avenue de Lamarche avenue, Pipe 24 - 25						1.00				0.00				0.00	11.58														
croissant des Aubrais crescent																													
			0.05	0.50	0.07	0.07			0.00	0.00			0.00	0.00															
			0.29	0.50	0.40	0.47			0.00	0.00			0.00	0.00															
	31	33	0.68	0.70	1.32	1.80			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	138	450	450	CONC	0.85	143.0	263	1.65	1.44	0.52
To avenue de Lamarche avenue, Pipe 33 - 34						1.80				0.00				0.00	11.44														

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

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

Designed: P.P.	PROJECT: ORLEANS VILLAGE		
Checked: M.Z.	LOCATION: City of Ottawa		
Dwg. Reference: 67-68	File Ref: 16-881	Date: May 04/18	Sheet No. 1 of 5

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

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

Manning 0.013

LOCATION			AREA (Ha)												FLOW						SEWER DATA								
			2 YEAR				5 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	FLOW (min.)	Q/Q full
	31	35			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	0	300	300	PVC	1.05	9.5	99	1.40	0.11	0.00
	35	10			0.00	0.00			0.00	0.00			0.00	0.00	10.11	76.37	103.60	0.00	177.53	0	300	300	PVC	0.35	52.0	57	0.81	1.07	0.00
To bois de Cravant grove, Pipe 10 - 11						0.00				0.00				0.00	11.18														
	10	49	0.19	0.70	0.37	0.37			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	28	300	300	PVC	0.69	106.5	80	1.14	1.56	0.35
	49	50			0.00	0.37			0.00	0.00			0.00	0.00	11.56	71.29	96.61	0.00	165.44	26	300	300	PVC	0.35	9.5	57	0.81	0.20	0.46
			0.30	0.50	0.42	0.79			0.00	0.00			0.00	0.00															
	50	52	0.62	0.70	1.21	1.99			0.00	0.00			0.00	0.00	11.76	70.66	95.74	0.00	163.94	141	450	450	CONC	0.50	142.5	202	1.27	1.87	0.70
To avenue de Lamarche avenue, Pipe 52 - 56						1.99				0.00				0.00	13.63														
bois de Cravant grove																													
Contribution From croissant des Aubrais crescent, Pipe 35 - 10						0.00				0.00				0.00	11.18														
			0.12	0.50	0.17	0.17			0.00	0.00			0.00	0.00															
	10	11	0.26	0.70	0.51	0.67			0.00	0.00			0.00	0.00	11.18	72.54	98.33	0.00	168.42	49	375	375	PVC	0.38	69.0	108	0.98	1.18	0.45
			0.19	0.50	0.26	0.94			0.00	0.00			0.00	0.00															
	11	34	0.29	0.70	0.56	1.50			0.00	0.00			0.00	0.00	12.36	68.80	93.19	0.00	159.53	103	375	375	PVC	0.76	80.5	153	1.38	0.97	0.68
To avenue de Lamarche avenue, Pipe 34 - 38						1.50				0.00				0.00	13.33														
avenue de Lamarche avenue4																													
			0.12	0.50	0.17	0.17			0.00	0.00			0.00	0.00															
	36	37	0.26	0.70	0.51	0.67			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	52	300	300	PVC	0.68	59.0	80	1.13	0.87	0.65
			0.18	0.50	0.25	0.92			0.00	0.00			0.00	0.00															
	37	38	0.26	0.70	0.51	1.43			0.00	0.00			0.00	0.00	10.87	73.61	99.80	0.00	170.96	105	375	375	PVC	0.75	80.5	152	1.37	0.98	0.69
To avenue de Lamarche avenue, Pipe 38 - 52						1.43				0.00				0.00	11.85														
Alignment 2003																													
Contribution From West Boundary STM System, Pipe C5 - C7						0.00				0.00				1.11	11.07														
Contribution From West Boundary STM System, Pipe C6 - C7						0.00				0.00				1.38	11.90														
	C7	C8			0.00	0.00			0.00	0.00			0.00	2.48	11.90	70.22	95.14	0.00	162.90	404	675	675	CONC	0.35	42.5	497	1.39	0.51	0.81
	C8	5			0.00	0.00			0.00	0.00			0.00	2.48	12.41	68.66	93.00	0.00	159.20	395	675	675	CONC	0.30	28.0	460	1.29	0.36	0.86
To cercle du Ponthieu circle, Pipe 5 - 56						0.00				0.00				2.48	12.77														
rue de Beaugency street																													
	CTRL MH 106	4	0.66	0.40	0.73	0.73			0.00	0.00			0.00	0.00															
			0.25	0.70	0.49	1.22			0.00	0.00			0.00	0.00															
	4	58	0.13	0.50	0.18	1.40			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	108	375	375	PVC	0.70	81.5	147	1.33	1.02	0.73
			0.14	0.70	0.27	1.67			0.00	0.00			0.00	0.00															
	58	57	0.22	0.50	0.31	1.98			0.00	0.00			0.00	0.00	11.02	73.09	99.08	0.00	169.72	145	375	375	PVC	1.25	61.5	196	1.77	0.58	0.74
To avenue de Lamarche avenue3, Pipe 57 - 1 TEE						1.98				0.00				0.00	11.60														
cercle du Ponthieu circle																													
Contribution From Alignment 2003, Pipe C8 - 5						0.00				0.00				2.48	12.77														
			0.06	0.50	0.08	0.08			0.00	0.00			0.00	2.48															
			0.30	0.50	0.42	0.50			0.00	0.00			0.00	2.48															
	5	56	0.63	0.70	1.23	1.73			0.00	0.00			0.00	2.48	12.77	67.59	91.54	0.00	156.67	505	675	675	CONC	0.95	138.0	819	2.29	1.00	0.62
To avenue de Lamarche avenue, Pipe 56 - 57						1.73				0.00				2.48	13.77														
	5	6			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	0	300	300	PVC	1.00	14.5	97	1.37	0.18	0.00
	6	7			0.00	0.00			0.00	0.00			0.00	0.00	10.18	76.13	103.27	0.00	176.96	0	300	300	PVC	0.65	47.0	78	1.10	0.71	0.00
	7	8			0.00	0.00			0.00	0.00			0.00	0.00	10.89	73.56	99.73	0.00	170.84	0	300	300	PVC	0.55	12.0	72	1.01	0.20	0.00
			0.13	0.50	0.18	0.18			0.00	0.00			0.00	0.00															
	8	9	0.27	0.70	0.53	0.71			0.00	0.00			0.00	0.00	11.08	72.88	98.80	0.00	169.22	51	300	300	PVC	0.55	68.0	72	1.01	1.12	0.72
	CTRL MH 105	9	0.78	0.40	0.87	1.57			0.00	0.00			0.00	0.00															
			0.20	0.70	0.39	1.96			0.00	0.00			0.00	0.00															
	9	57	0.18	0.50	0.25	2.21			0.00	0.00			0.00	0.00	12.20	69.27	93.85	0.00	160.66	153	375	375	PVC	1.35	71.5	204	1.84	0.65	0.75
To avenue de Lamarche avenue3, Pipe 57 - 1 TEE						2.21				0.00				0.00	12.85														

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

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

Designed: P.P.	PROJECT: ORLEANS VILLAGE		
Checked: M.Z.	LOCATION: City of Ottawa		
Dwg. Reference: 67-68	File Ref: 16-881	Date: May 04/18	Sheet No. 2 of 5

E140

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

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

Manning 0.013

LOCATION			AREA (Ha)												FLOW						SEWER DATA								
			2 YEAR				5 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	FLOW (min.)	Q/Q full
rang de Loury row																													
	180	18	0.16	0.72	0.32	0.32			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	25	300	300	PVC	1.06	36.5	100	1.41	0.43	0.25
To cours Crevier walk, Pipe 18 - 21						0.32				0.00				0.00	10.43														
			0.19	0.54	0.29	0.29			0.00	0.00			0.00	0.00															
	180	41	0.23	0.72	0.46	0.75			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	57	300	300	PVC	0.88	77.0	91	1.28	1.00	0.63
To chemin de Jargeau road, Pipe 41 - 30						0.75				0.00				0.00	11.00														
cours Crevier walk																													
	17	16			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	0	300	300	PVC	2.00	9.5	137	1.93	0.08	0.00
			0.15	0.54	0.23	0.23			0.00	0.00			0.00	0.00															
	16	40	0.43	0.72	0.86	1.09			0.00	0.00			0.00	0.00	10.08	76.49	103.76	0.00	177.81	83	375	375	PVC	0.44	108.0	116	1.05	1.71	0.71
To chemin de Jargeau road, Pipe 40 - 41						1.09				0.00				0.00	11.79														
	17	18			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	0	300	300	PVC	1.09	48.0	101	1.43	0.56	0.00
Contribution From rang de Loury row, Pipe 180 - 18						0.32				0.00				0.00	10.43														
					0.00	0.32	0.02	0.72	0.04	0.04			0.00	0.00															
			0.15	0.54	0.23	0.55			0.00	0.04			0.00	0.00															
	18	21	0.21	0.72	0.42	0.97			0.00	0.04			0.00	0.00	10.56	74.72	101.32	0.00	173.60	76	375	375	PVC	0.54	67.0	129	1.17	0.96	0.59
To avenue de Lamarche avenue, Pipe 21 - 24						0.97				0.04				0.00	11.52														
chemin de Jargeau road																													
	39	40			0.00	0.00	0.04	0.54	0.06	0.06			0.00	0.00	10.00	76.81	104.19	0.00	178.56	6	300	300	PVC	1.60	27.0	122	1.73	0.26	0.05
Contribution From cours Crevier walk, Pipe 16 - 40						1.09				0.00				0.00	11.79														
			0.03	0.54	0.05	1.13			0.00	0.06			0.00	0.00															
	40	41			0.00	1.13	0.24	0.70	0.47	0.53			0.00	0.00	11.79	70.55	95.60	0.00	163.69	130	525	525	CONC	0.30	54.5	236	1.09	0.83	0.55
Contribution From rang de Loury row, Pipe 180 - 41						0.75				0.00				0.00	11.00														
			0.01	0.70	0.02	1.90			0.00	0.53			0.00	0.00															
			0.03	0.54	0.05	1.94			0.00	0.53			0.00	0.00															
	41	30			0.00	1.94	0.13	0.70	0.25	0.78			0.00	0.00	12.63	68.00	92.10	0.00	157.65	204	525	525	CONC	0.80	64.0	385	1.78	0.60	0.53
To avenue de Lamarche avenue, Pipe 30 - 33						1.94				0.78				0.00	13.23														
voi de Lesage way																													
	410	42	0.06	0.70	0.12	0.12			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	9	300	300	PVC	0.69	51.0	80	1.14	0.75	0.11
			0.16	0.50	0.22	0.34			0.00	0.00			0.00	0.00															
	42	45	0.35	0.70	0.68	1.02			0.00	0.00			0.00	0.00	10.75	74.05	100.40	0.00	172.00	76	375	375	PVC	0.35	103.0	104	0.94	1.83	0.73
	45	46			0.00	1.02			0.00	0.00			0.00	0.00	12.58	68.15	92.31	0.00	158.00	70	375	375	PVC	0.72	10.5	149	1.35	0.13	0.47
			0.06	0.50	0.08	1.10			0.00	0.00			0.00	0.00															
	46	47	0.25	0.70	0.49	1.59			0.00	0.00			0.00	0.00	12.71	67.77	91.79	0.00	157.10	108	450	450	CONC	0.47	45.5	195	1.23	0.62	0.55
To terrase de Vennecy terrace, Pipe 47 - 54						1.59				0.00				0.00	13.32														
terrase de Vennecy terrace																													
			0.22	0.50	0.31	0.31			0.00	0.00			0.00	0.00															
	42	43	0.27	0.70	0.53	0.83			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	64	375	375	PVC	0.66	45.5	142	1.29	0.59	0.45
	43	44			0.00	0.83			0.00	0.00			0.00	0.00	10.59	74.62	101.19	0.00	173.36	62	375	375	PVC	1.04	10.5	179	1.62	0.11	0.35
			0.13	0.50	0.18	1.01			0.00	0.00			0.00	0.00															
	44	47	0.34	0.70	0.66	1.67			0.00	0.00			0.00	0.00	10.70	74.23	100.65	0.00	172.44	124	450	450	CONC	0.38	103.0	176	1.11	1.55	0.71
Contribution From voi de Lesage way, Pipe 46 - 47						1.59				0.00				0.00	13.32														
			0.05	0.50	0.07	3.33			0.00	0.00			0.00	0.00															
			0.12	0.50	0.17	3.50			0.00	0.00			0.00	0.00															
			0.13	0.50	0.18	3.68			0.00	0.00			0.00	0.00															
	47	54	0.33	0.70	0.64	4.32			0.00	0.00			0.00	0.00	13.32	66.03	89.40	0.00	152.98	285	600	600	CONC	0.39	111.5	383	1.36	1.37	0.74
	54	55			0.00	4.32			0.00	0.00			0.00	0.00	14.69	62.50	84.56	0.00	144.63	270	600	600	CONC	0.35	10.0	363	1.28	0.13	0.74
			0.18	0.50	0.25	4.57			0.00	0.00			0.00	0.00															
	55	56	0.31	0.70	0.60	5.18			0.00	0.00			0.00	0.00	14.82	62.19	84.13	0.00	143.89	322	675	675	CONC	0.52	110.0	606	1.69	1.08	0.53
To avenue de Lamarche avenue, Pipe 56 - 57						5.18				0.00				0.00	15.91														

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

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

Designed: P.P.	PROJECT: ORLEANS VILLAGE		
Checked: M.Z.	LOCATION: City of Ottawa		
Dwg. Reference: 67-68	File Ref: 16-881	Date: May 04/18	Sheet No. 3 of 5

E141

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

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

Manning 0.013

LOCATION			AREA (Ha)												FLOW						SEWER DATA								
			2 YEAR				5 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	FLOW (min.)	Q/Q full
ruelle de Carden lane																													
			0.28	0.50	0.39	0.39			0.00	0.00			0.00	0.00															
	48	52	0.37	0.70	0.72	1.11			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	85	375	375	PVC	1.10	110.0	184	1.66	1.10	0.46
To avenue de Lamarche avenue, Pipe 52 - 56						1.11				0.00				0.00	11.10														
avenue de Lamarche avenue																													
			0.05	0.40	0.06	0.06			0.00	0.00			0.00	0.00															
	120	12	0.52	0.47	0.68	0.74			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	56	300	300	PVC	1.51	51.0	119	1.68	0.51	0.48
	12	13			0.00	0.74	0.35	0.85	0.83	0.83			0.00	0.00	10.51	74.92	101.60	0.00	174.06	139	375	375	PVC	2.00	76.0	248	2.25	0.56	0.56
	CTRL MH 101	13	2.54	0.85	6.00	6.74			0.00	0.83			0.00	0.00															
	CTRL MH 100	13	2.86	0.85	6.76	13.50			0.00	0.83			0.00	0.00															
			0.07	0.56	0.11	13.60			0.00	0.83			0.00	0.00															
			0.11	0.40	0.12	13.73			0.00	0.83			0.00	0.00															
	13	15			0.00	13.73	0.18	0.85	0.43	1.25			0.00	0.00	11.07	72.93	98.86	0.00	169.34	1125	825	825	CONC	1.10	139.0	1505	2.82	0.82	0.75
	CTRL MH 104	15	2.16	0.75	4.50	18.23			0.00	1.25			0.00	0.00															
	CTRL MH 103	15	2.17	0.75	4.52	22.75			0.00	1.25			0.00	0.00															
	15	21			0.00	22.75	0.30	0.85	0.71	1.96			0.00	0.00	11.89	70.23	95.16	0.00	162.93	1785	1350	1350	CONC	0.37	58.5	3247	2.27	0.43	0.55
Contribution From cours Crevier walk, Pipe 18 - 21						0.97				0.04				0.00	11.52														
Contribution From cercle de L'Argonaut circle, Pipe 19 - 21						1.45				0.04				0.00	11.51														
					0.00	25.17	0.05	0.72	0.10	2.14			0.00	0.00															
	21	24	0.18	0.54	0.27	25.44			0.00	2.14			0.00	0.00	12.32	68.91	93.34	0.00	159.79	1953	1350	1350	CONC	0.43	58.5	3500	2.45	0.40	0.56
Contribution From placette de Darvoy mews, Pipe 220 - 24						1.00				0.00				0.00	11.58														
					0.00	26.44	0.26	0.72	0.52	2.66			0.00	0.00															
	24	25	0.19	0.54	0.29	26.73			0.00	2.66			0.00	0.00	12.72	67.73	91.72	0.00	157.00	2054	1350	1350	CONC	0.50	41.5	3774	2.64	0.26	0.54
	25	30			0.00	26.73			0.00	2.66			0.00	0.00	12.98	66.98	90.69	0.00	155.22	2031	1350	1350	CONC	0.49	14.0	3736	2.61	0.09	0.54
Contribution From cercle de L'Argonaut circle, Pipe 28 - 30						2.05				0.00				3.19	13.59					-29									
Contribution From chemin de Jargeau road, Pipe 41 - 30						1.94				0.78				0.00	13.23														
	30	33			0.00	30.72			0.00	3.44			0.00	3.19	13.59	65.30	88.39	0.00	151.25	2764	1500	1500	CONC	0.20	63.5	3161	1.79	0.59	0.87
Contribution From croissant des Aubrais crescent, Pipe 31 - 33						1.80				0.00				0.00	11.44														
			0.25	0.50	0.35	32.86			0.00	3.44			0.00	3.19															
	33	34	0.31	0.70	0.60	33.47			0.00	3.44			0.00	3.19	14.19	63.76	86.29	0.00	147.60	2873	1500	1500	CONC	0.23	58.5	3390	1.92	0.51	0.85
Contribution From bois de Cravant grove, Pipe 11 - 34						1.50				0.00				0.00	13.33														
	34	38			0.00	34.97			0.00	3.44			0.00	3.19	14.69	62.50	84.56	0.00	144.63	2909	1500	1500	CONC	0.24	58.5	3463	1.96	0.50	0.84
Contribution From avenue de Lamarche avenue4, Pipe 37 - 38						1.43				0.00				0.00	11.85														
	38	52	0.28	0.70	0.54	36.94			0.00	3.44			0.00	3.19	15.19	61.32	82.95	0.00	141.84	2974	1650	1650	CONC	0.16	54.5	3646	1.71	0.53	0.82
Contribution From ruelle de Carden lane, Pipe 48 - 52						1.11				0.00				0.00	11.10														
Contribution From croissant des Aubrais crescent, Pipe 50 - 52						1.99				0.00				0.00	13.63														
	52	56			0.00	40.05			0.00	3.44			0.00	3.19	15.72	60.11	81.29	0.00	138.98	3101	1650	1650	CONC	0.18	58.5	3867	1.81	0.54	0.80
Contribution From cercle du Ponthieu circle, Pipe 5 - 56						1.73				0.00				2.48	13.77														
Contribution From terrase de Vennecy terrace, Pipe 55 - 56						5.18				0.00				0.00	15.91														
	56	57	0.11	0.70	0.21	47.16			0.00	3.44			0.00	5.67	16.26	58.94	79.69	0.00	136.22	3798	1650	1650	CONC	0.23	60.5	4371	2.04	0.49	0.87
To avenue de Lamarche avenue3, Pipe 57 - 1 TEE						47.16				3.44				5.67	16.76					-29									
avenue de Lamarche avenue3																													
Contribution From avenue de Lamarche avenue, Pipe 56 - 57						47.16				3.44				5.67	16.76					-29									
Contribution From cercle du Ponthieu circle, Pipe 58 - 57						1.98				0.00				0.00	11.60														
Contribution From cercle du Ponthieu circle, Pipe 9 - 57						2.21				0.00				0.00	12.85														
	57	1 TEE			0.00	51.35			0.00	3.44			0.00	5.67	16.76	57.91	78.28	0.00	133.79	3973	1650	1650	CONC	0.26	10.5	4647	2.17	0.08	0.85
			0.19	0.70	0.37	51.72			0.00	3.44			0.00	5.67															
	1 TEE	2	0.39	0.70	0.76	52.48			0.00	3.44			0.00	5.67	16.84	57.75	78.06	0.00	133.41	4027	1650	1650	CONC	0.26	105.0	4647	2.17	0.81	0.87
	2	3 TEE	0.25	0.50	0.35	52.83			0.00	3.44			0.00	5.67	17.64	56.16	75.89	0.00	129.67	3935	1800	1800	CONC	0.16	13.5	4598	1.81	0.12	0.86
	3 TEE	60			0.00	52.83			0.00	3.44			0.00	5.67	17.77	55.93	75.57	0.00	129.11	3918	1800	1800	CONC	0.16	41.5	4598	1.81	0.38	0.85
To Pond Outfall, Pipe 60 - 61 TEE						52.83				3.44				5.67	18.15					-29									

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

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

Designed: P.P.	PROJECT: ORLEANS VILLAGE		
Checked: M.Z.	LOCATION: City of Ottawa		
Dwg. Reference: 67-68	File Ref: 16-881	Date: May 04/18	Sheet No. 4 of 5

E142

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

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

Manning 0.013

LOCATION			AREA (Ha) 2 YEAR				5 YEAR				100 YEAR				FLOW Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	SEWER DATA DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	FLOW (min.)	Q/Q full
			0.20	0.50	0.28	0.28			0.00	0.00			0.00	0.00															
			0.24	0.50	0.33	0.61			0.00	0.00			0.00	0.00															
	590	59	0.39	0.70	0.76	1.37			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	105	375	375	PVC	0.85	100.5	162	1.46	1.14	0.65
	59	63			0.00	1.37			0.00	0.00			0.00	0.00	11.14	72.67	98.51	0.00	168.73	100	375	375	PVC	2.00	12.0	248	2.25	0.09	0.40
	63	60			0.00	1.37			0.00	0.00			0.00	0.00	11.23	72.37	98.10	0.00	168.02	99	375	375	PVC	0.90	5.5	166	1.51	0.06	0.60
To Pond Outfall, Pipe 60 - 61 TEE						1.37				0.00				0.00	11.29														
Pond Outfall - 51																													
Contribution From avenue de Lamarche avenue3, Pipe 3 TEE - 60						52.83				3.44				5.67	18.15					-29									
Contribution From avenue de Lamarche avenue3, Pipe 63 - 60						1.37				0.00				0.00	11.29														
	60	61 TEE			0.00	54.20			0.00	3.44			0.00	5.67	18.15	55.21	74.59	0.00	127.43	3943	1800	1800	CONC	0.16	30.5	4598	1.81	0.28	0.86
	61 TEE	62 TEE			0.00	54.20			0.00	3.44			0.00	5.67	18.43	54.70	73.90	0.00	126.23	3906	1800	1800	CONC	0.16	73.5	4598	1.81	0.68	0.85
	62 TEE	HW			0.00	54.20			0.00	3.44			0.00	5.67	19.11	53.51	72.27	0.00	123.43	3820	1800	1800	CONC	0.16	74.5	4598	1.81	0.69	0.83

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

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

Designed: P.P.	PROJECT: ORLEANS VILLAGE		
Checked: M.Z.	LOCATION: City of Ottawa		
Dwg. Reference: 67-68	File Ref: 16-881	Date: May 04/18	Sheet No. F143 of 5

TRINITY

Trinity Development Group

TRINITY DEVELOPMENT - INNES / BELCOURT STORMWATER MANAGEMENT SYSTEM OTTAWA, ONTARIO

MUNICIPAL SERVICING
REVIEWED
CITY OF OTTAWA
DEPT OF PLANNING, TRANSIT AND THE ENVIRONMENT
INFRASTRUCTURE APPROVALS DIVISION
FOR MOE SUBMISSION
SIGNED: [signature]
DATE: 05/02/2009

D07-12-08-0001

14252
REVISED

JANUARY 2009

IBI GROUP

E144

Table 1. Post-Development Flow into the Existing Sewer at Innes Road

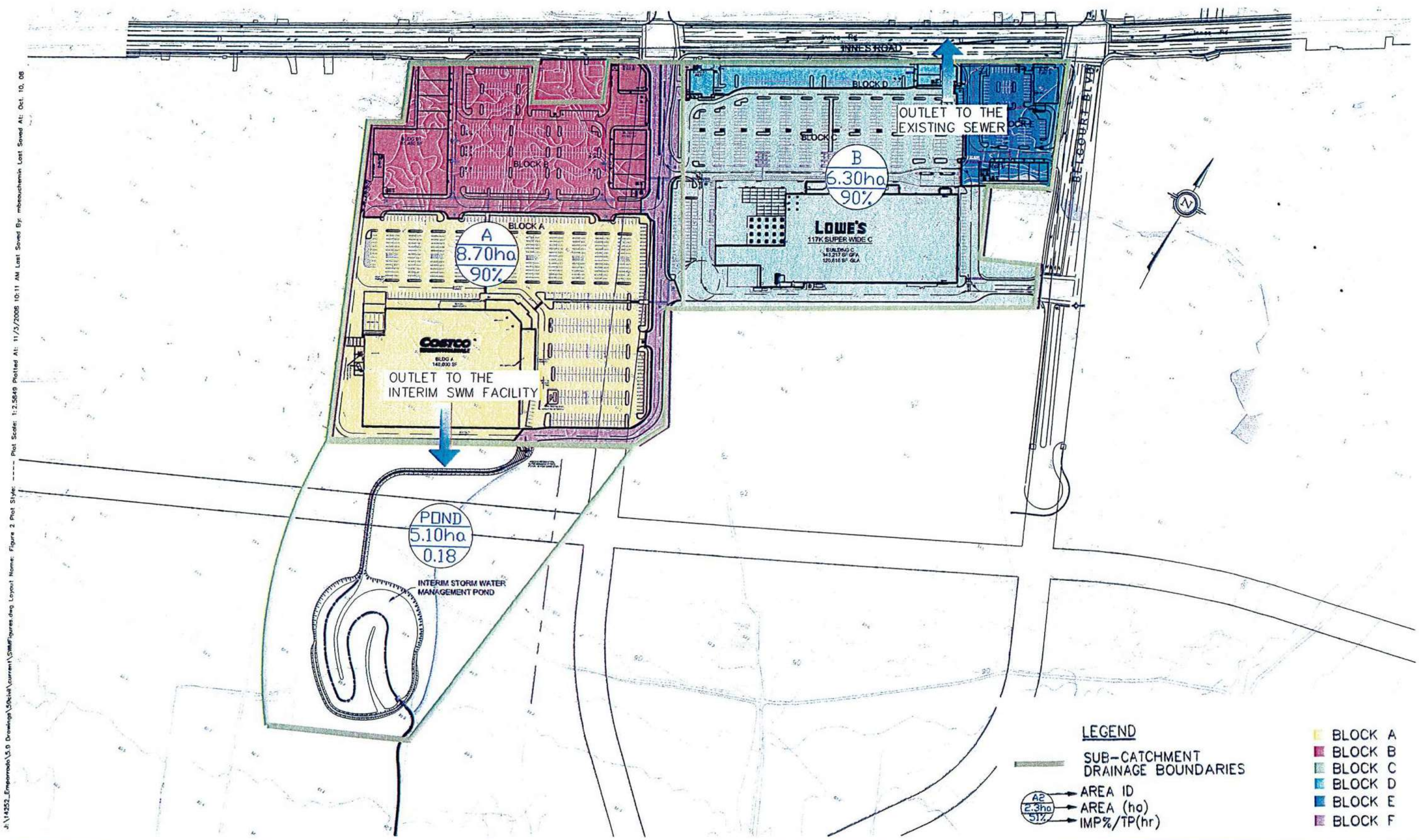
Storm Event	Post-Development Peak Flow (cms)
25 mm 4hr Chicago	0.467
2 Yr 3 hrChicago	0.471
5 Yr 3 hr Chicago	0.476
100 Yr 3hr Chicago	0.493

The above table indicates that the post-development peak flows from Area B outlet to the existing sewer at Innes Road does not exceeded the maximum allowable flow rate of 493 l/s.

From a development perspective, Area B is divided into 3 Blocks (Blocks C, D and E). The minimum required on-site storage is 1830 m^3. Blocks D and E will provide on-site-storage of approximately 400 m^3. Block C will be designed by others and the required on site-storage is approximately 1430 m^3 to ensure zero overflow. For the detail regarding the on-site storage volume and site grading for Blocks D and E, refer to the "Site Servicing Brief", (IBI Group, October 2008).

Drainage Area A

The total drainage area into the interim SWM Facility includes 8.7 ha of Area A and 5.1 ha of rural area located in the vicinity of the facility. The required level of service (85 l/s/ha) and the total inflow into the minor system will be maintained by the capacity restriction and density of the inlets directly connected into the minor system. The required on-site storage volume for Area A corresponds to a level of service of 85 l/s/ha and was determined using the route reservoir routine in SWMHYMO under the 100 year 3 hour Chicago storm. The on-site storage requirements for Area A is approximately 2700 m^3 in order to completely attenuate the runoff from the 100 year 3 hour Chicago storm event. As with the existing conditions, the 25 mm 4 hour Chicago and 2, 5 and 100 year 3 hour Chicago storms were used to evaluate peak flows. The results from the existing conditions model are presented in **Table 2** along with the post-development flows. The SWMHYMO model output and related calculations for the post-development conditions can be found in **Appendices A and C.**



IBI GROUP	Scale: 1:3000	Project Title: EMPARRADO LANDS	Drawing Title: POST - DEVELOPMENT DRAINAGE BOUNDARIES	Sheet No.: FIGURE 2

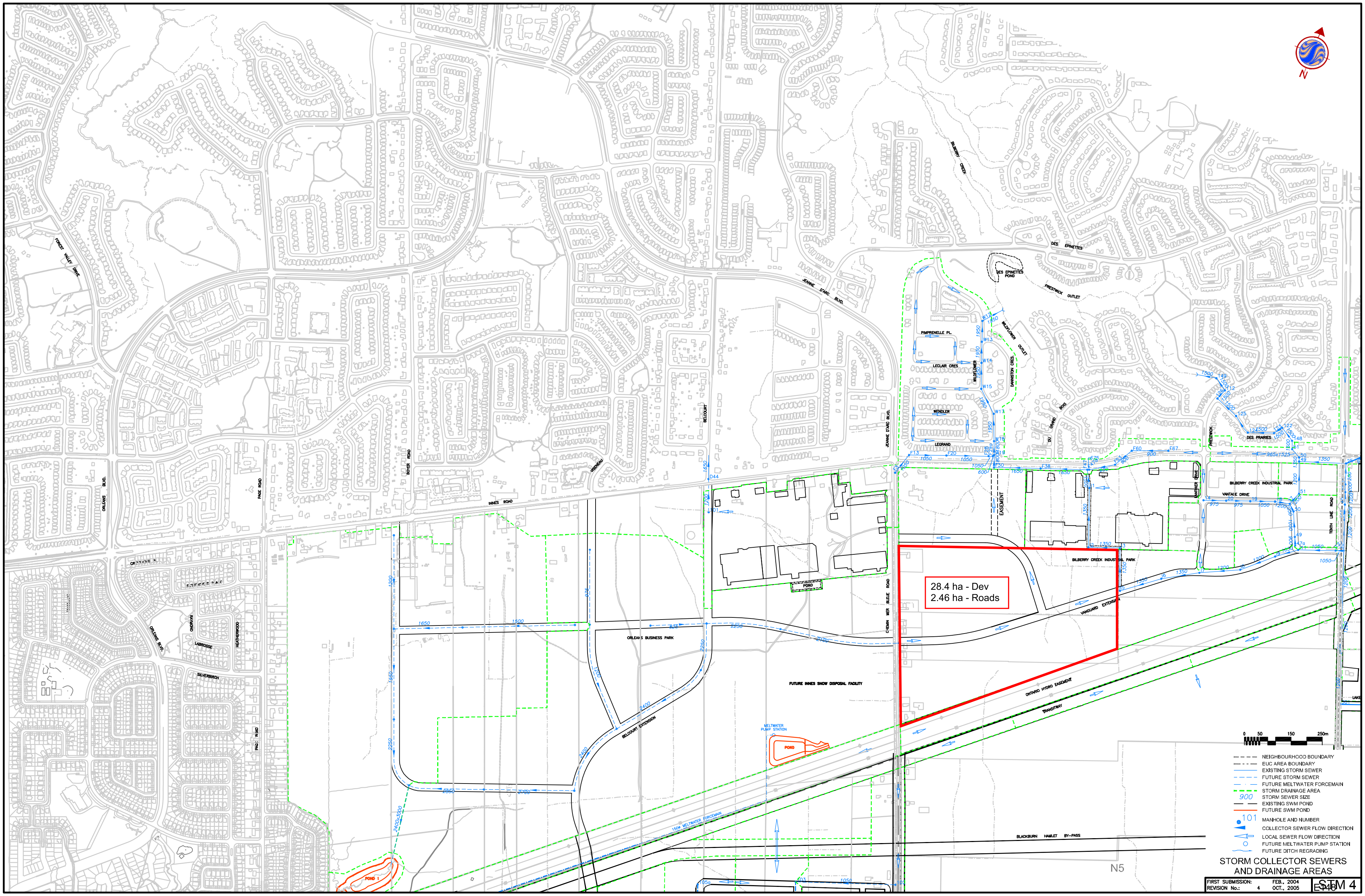
GLOUCESTER AND CUMBERLAND EAST URBAN COMMUNITY EXPANSION AREA AND BILBERRY CREEK INDUSTRIAL PARK MASTER SERVICING UPDATE

Prepared for:
City of Ottawa

File No. 163400602
November 2004
Updated June 2005
Updated October 2005
Updated July 2006

Prepared by:
Stantec Consulting Ltd.
1505 Laperriere Avenue
Ottawa, Ontario
K1Z 7T1

Stantec


28.4 ha - Dev
2.46 ha - Roads
STORM COLLECTOR SEWERS
AND DRAINAGE AREAS
FIRST SUBMISSION: FEB., 2004
REVISION No.: 4 OCT., 2005
STM 4
NEIGHBOURHOOD BOUNDARY
EUC AREA BOUNDARY
EXISTING STORM SEWER
FUTURE STORM SEWER
FUTURE MELTWATER FORCEMAIN
STORM DRAINAGE AREA
STORM SEWER SIZE
EXISTING SWM POND
FUTURE SWM POND
MANHOLE AND NUMBER
COLLECTOR SEWER FLOW DIRECTION
LOCAL SEWER FLOW DIRECTION
FUTURE MELTWATER PUMP STATION
FUTURE DITCH REGRADING
N5
INNES ROAD
ORLEANS BUSINESS PARK
FUTURE INNES SNOW DISPOSAL FACILITY
BILBERRY CREEK INDUSTRIAL PARK
VANGUARD EXTENSION
BELCOURT EXTENSION
ONTARIO HYDRO EASEMENT
TRANSITWAY
BLACKBURN HAMLET BY-PASS
MELTWATER PUMP STATION
POND
EASEMENT
TENTH LINE ROAD
VANTAGE DRIVE
JEANNE D'ARC BLVD.
BILBERRY CREEK

Line/Vanguard Intersection (that controls the flow from the N2 pond and the Tenth Line road interconnect).

The release rate from the BCIP was determined by providing a 5 year level of service for the road corridors and controlling the flow from the development parcels. Accounting for the 10 year flow contribution from the Innes and Mer Bleue road corridors and flow contributions from the remainder of the tributary area, it was found that new developments within the BCIP would have to be controlled to 50L/s/ha.

Tributary areas and peak flow contributions to the Wildflower Drive trunk sewer at Innes Road are summarized in **Table 3-1**.

TABLE 3-1
Tributary Areas and Peak Flow Contributions to the Wildflower Trunk Sewer at Innes Road – Major Flows

Tributary Area	Area (ha)	Controlled Flow Rate	
		L/s/ha	Total (L/s)
The BCIP development:			
• Future Lots (Phases 1 & 2)	63.8	50	3190
• Roads (Exist & Future)	5.19	100	519
Innes Road	3.7	235*	869.5
Mer Bleue Road	0.86	111	95.5
Existing Urban Block (south west corner of Innes and Mer Bleue Roads)	1.20	111	133.2
Existing Urban area north of Innes Road west of Prestwick Drive	2.14	150	321
The outflow from N2 SWM pond and Tenth Line Road storm sewer at Vanguard Drive	N/A	N/A	820
Total	76.89		5948

The total peak flow contribution to the Wildflower storm trunk at Innes Road of 5948L/s, shown in **Table 3-1**, represents the 100 year storm condition. For a 5 year storm, the peak flow contribution as shown in the Rational Method calculation provided in **Appendix G** is 5663L/s, which is less than the allowable flow of 5948L/s.

Areas and flow contributions to the BCIP – Innes Road trunk sewer between Tenth Line Road and Wildflower Drive are summarized in **Table 3-2**.

The required BCIP/Innes Road storm trunk size is a 1200mm diameter at Tenth Line Road and increases to a 1650mm on Innes Road at the outlet to Wildflower Drive trunk sewer. The sewer depth varies from 6.0m at Tenth Line Road to 7.2m at Wildflower Drive. The routing of the storm sewers through the BCIP for the preferred concept plan is shown on **Figure 3-3**.

TABLE 3-2
Tributary Areas and Peak Flow Contributions to the BCIP

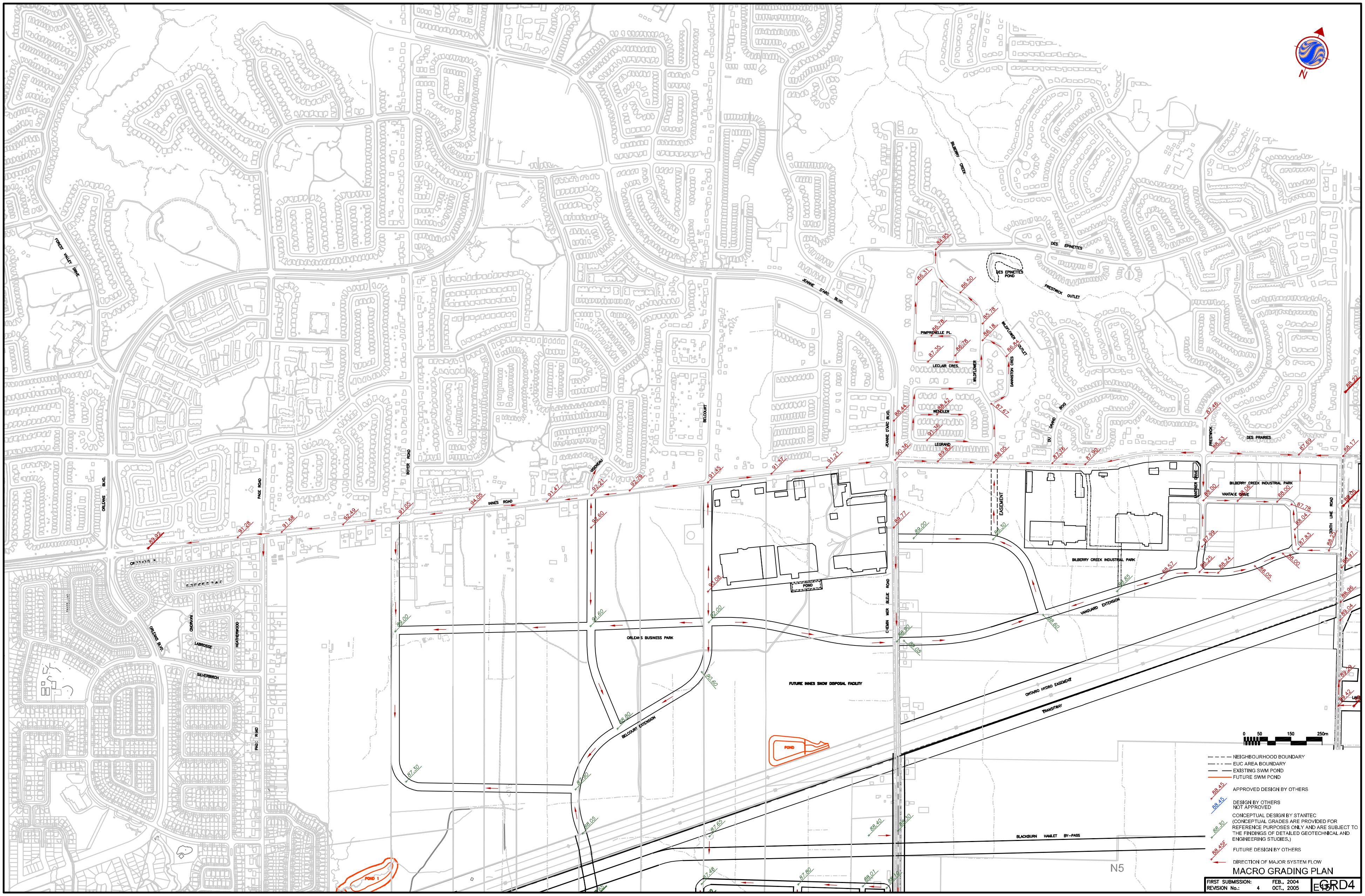
Tributary Area	Area (ha)	Controlled Flow Rate	
		L/s/ha	Total (L/s)
The BCIP development:			
• Future Lots (Phase 1) Including Loblaws Site	25.7	50	1285
• Roads (Exist & Future Phase 1)	1.74	100	174
Innes Road Prestwick Dr. to Wildflower Dr.	1.88	235	441.8
Existing Urban area north of Innes Road west of Prestwick Drive	2.14	150	321
The outflow from N2 SWM pond and Tenth Line Road storm sewer at Vanguard Drive	N/A	N/A	820
Total	**31.46**		**3042**

3.1.2.4 Major System

The developments within the BCIP are required to provide onsite storage to reduce the 100 year storm flow to 50L/s/ha. The onsite storage volume requirement for the 100 year storm is 310m^3/ha based on the release rate of 50L/s/ha and an imperviousness ratio of 0.7.

The roads within the BCIP are to be designed to maximize the amount of storage that can be provided at sag points to a maximum of 130m^3/ha. The effective road slopes should be designed to allow major system flow to overflow towards Innes Road or Mer Bleue Road. Inlet control devices are required on catch basins to control sewer flows to the 5 year level of 100L/s/ha. Given that the major system flow from the BCIP area cannot flow across Innes Road, it is proposed to store excess volume in the ditches south of Innes Road and east of Mer Bleue Road. A DDSWMM assessment of the BCIP roadway drainage system was undertaken and it was found that approximately 1330m^3 of excess runoff would be generated during the July 1st, 1979 storm event. If 130m^3/ha of storage is provided in the sag points, 900m^3 of storage will be provided along the 6.93ha of internal roads. The remaining 430m^3 will therefore need to be stored in the ditches south of Innes Road.

The City's current design guidelines, published in November 2004, dictate that the minor system within arterial roads be designed to handle the 10 year peak flow and the flow from residential developments to the minor system be restricted to 85L/s/ha. (Refer to **Appendix H** for a copy of the technical memo explaining the basis for the 85L/s/ha.) As the BCIP storm flows were approved prior to the release of the November 2004 guidelines, the criteria used in sizing the collection system do not match the current guidelines. In addition, as it is intended to upgrade


MACRO GRADING PLAN
FIRST SUBMISSION: FEB., 2004
REVISION No.: 4 OCT., 2005
GRD4
E15-1
NEIGHBOURHOOD BOUNDARY
EUC AREA BOUNDARY
EXISTING SWM POND
FUTURE SWM POND
APPROVED DESIGN BY OTHERS
DESIGN BY OTHERS NOT APPROVED
CONCEPTUAL DESIGN BY STANTEC (CONCEPTUAL GRADES ARE PROVIDED FOR REFERENCE PURPOSES ONLY AND ARE SUBJECT TO THE FINDINGS OF DETAILED GEOTECHNICAL AND ENGINEERING STUDIES.)
FUTURE DESIGN BY OTHERS
DIRECTION OF MAJOR SYSTEM FLOW
0 50 150 250m
N5
INNES ROAD
ORLEANS BUSINESS PARK
FUTURE INNES SNOW DISPOSAL FACILITY
BELCOURT EXTENSION
VANGUARD EXTENSION
ONTARIO HYDRO EASEMENT
TRANSITWAY
BLACKBURN HAMLET BY-PASS
BILBERRY CREEK INDUSTRIAL PARK
CHEMIN MER BLEUE ROAD
JEANNE D'ARC BLVD.
TENTH LINE ROAD
ORLEANS BLVD.
FOREST VALLEY DRIVE
PAGE ROAD
BOYER ROAD
BELCOURT
BILBERRY CREEK
DES EPINETTES POND
EASEMENT
POND

Site Servicing and Stormwater Management Report – Orleans II Draft Plan of Subdivision

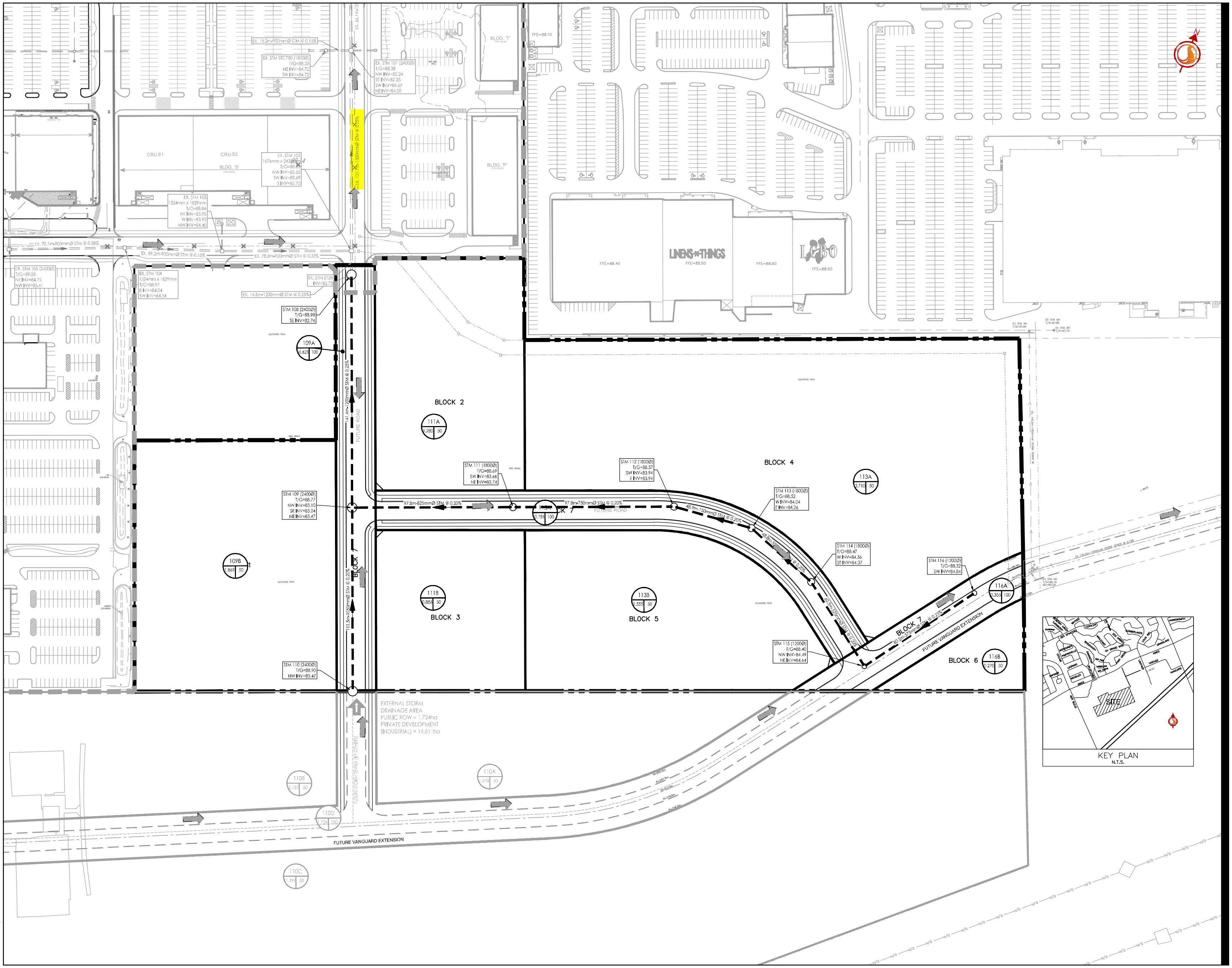
Project # 160401419

Stantec

Prepared for:
Innes Shopping Centres Limited

Prepared by:
Stantec Consulting Ltd.

April 12, 2018



Stantec

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

Legend

- TRUNK STORM SEWER
- EXISTING TRUNK STORM SEWER
- FUTURE TRUNK STORM SEWER
- MAJOR OVERLAND FLOW ROUTE
- 305A — DRAINAGE AREA No.
- 100 — CONTROLLED RELEASE RATE (L/s)
- 1.00 — STORM DRAINAGE AREA (ha)
- STORM DRAINAGE BOUNDARY
- FUTURE STORM DRAINAGE BOUNDARY
- MAJOR SYSTEM DIVIDE

Notes

1	ISSUED FOR DRAFT PLAN OF SUBDIVISION	DT	KS	18.04.11
Revision		By	Appd.	YY.MM.DD

File Name: 160401242-D8	DT	KS	DT	18.04.09
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project

INNES SHOPPING CENTRES LIMITED

ORLEANS II
DRAFT PLAN OF SUBDIVISION
Ottawa, ON

Title

OVERALL STORM SEWER LAYOUT

Project No.	Scale	
160401419	1:1000	
Drawing No.	Sheet	Revision
SD-1	2 of 4	1

ORIGINAL SHEET - ARCH D

Stantec

Orleans II - Draft Plan of Subdivision

STORM SEWER DESIGN SHEET (City of Ottawa)

DATE: 2018-04-12
REVISION: 1
DESIGNED BY: DT
CHECKED BY: KS

FILE NUMBER: 160401419

DESIGN PARAMETERS

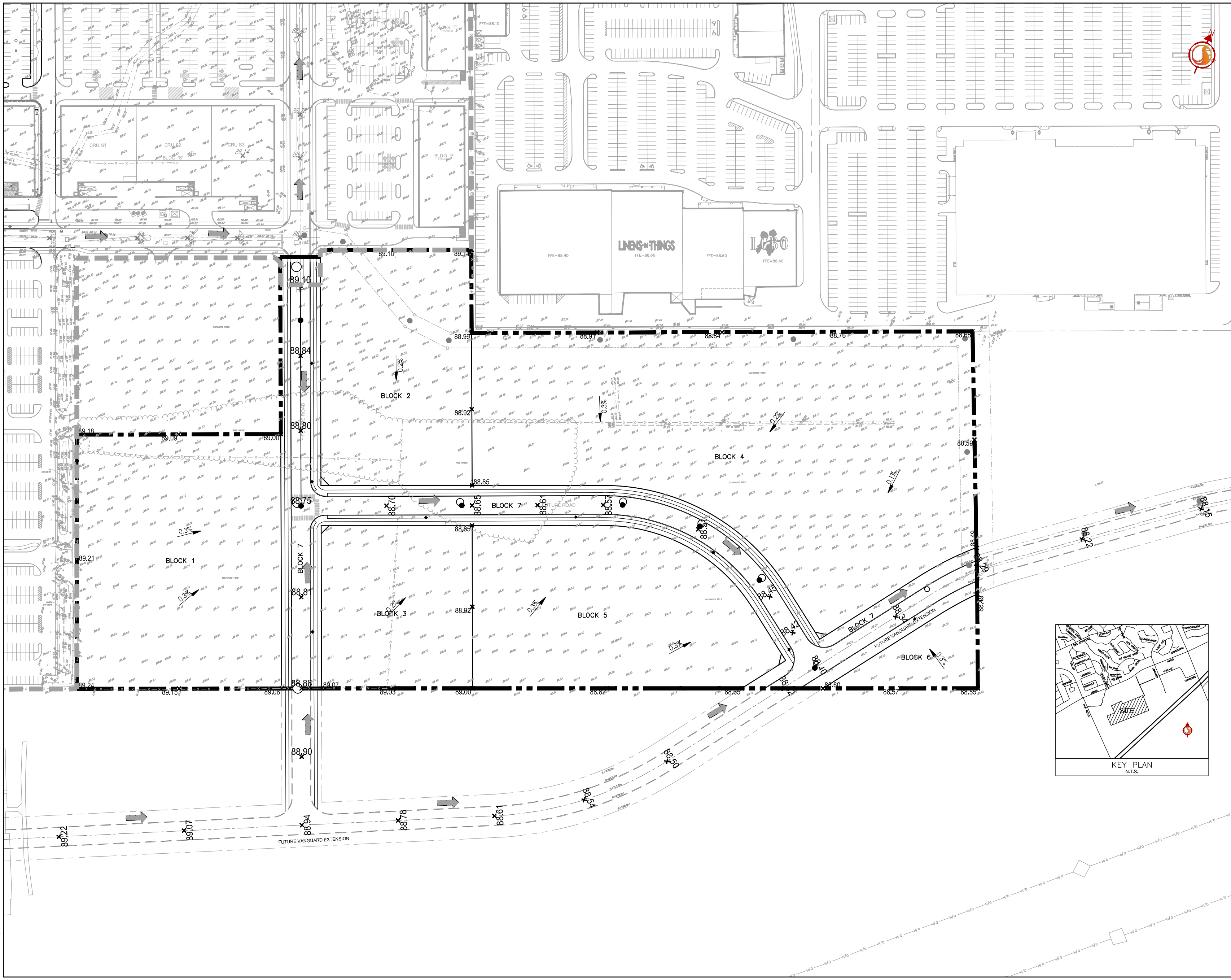
$I = a / (t+b)^c$ (As per City of Ottawa Guidelines, 2012)

	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																
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)
110A, 110B	110	109	14.61	1.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
116A, 116B	116	115	0.36	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
115A	115	114	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	114	113	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
113A, 113B	113	112	5.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	112	111	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
111A, 111B	111	109	2.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
109A, 109B	109	108	1.87	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

LOCATION											PIPE SELECTION											
AREA ID NUMBER	FROM M.H.	TO M.H.	T of C (min)	I_{2-YEAR} (mm/h)	I_{5-YEAR} (mm/h)	$I_{10-YEAR}$ (mm/h)	$I_{100-YEAR}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR 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)
110A, 110B	110	109	10.00	76.81	104.19	122.14	178.56	903.0	903.0	903.0	111.5	1050	1050	CIRCULAR	CONCRETE	-	0.20	1274.0	**70.87%**	1.43	1.35	1.37
			11.37																			
116A, 116B	116	115	10.00	76.81	104.19	122.14	178.56	44.8	44.8	44.8	80.2	375	375	CIRCULAR	PVC	-	0.25	82.4	**54.30%**	0.78	0.69	1.95
115A	115	114	11.95	70.06	94.93	111.23	162.53	78.1	122.9	122.9	60.5	525	525	CIRCULAR	CONCRETE	-	0.20	200.6	**61.23%**	0.90	0.82	1.24
	114	113	13.18	66.42	89.93	105.35	153.90	0.0	122.9	122.9	48.8	525	525	CIRCULAR	CONCRETE	-	0.20	200.6	**61.23%**	0.90	0.82	1.00
113A, 113B	113	112	14.18	63.77	86.30	101.08	147.64	263.3	386.1	386.1	48.9	750	750	CIRCULAR	CONCRETE	-	0.20	519.4	**74.34%**	1.14	1.10	0.74
	112	111	14.92	61.95	83.81	98.14	143.32	0.0	386.1	386.1	97.8	750	750	CIRCULAR	CONCRETE	-	0.20	519.4	**74.34%**	1.14	1.10	1.49
111A, 111B	111	109	16.41	58.63	79.26	92.80	135.48	108.3	494.4	494.4	97.8	825	825	CIRCULAR	CONCRETE	-	0.20	669.7	**73.82%**	1.21	1.17	1.40
			17.81																			
109A, 109B	109	108	17.81	55.85	75.47	88.34	128.94	155.6	1552.9	1552.9	141.4	1200	1200	CIRCULAR	CONCRETE	-	0.25	2033.7	**76.36%**	1.74	1.70	1.39
			19.20									1200	1200									



Stantec

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

Legend

	EXISTING ELEVATION
89.40 ×	PROPOSED ELEVATION
89.14 ×	EXISTING DESIGN ELEVATION
	MAJOR OVERLAND FLOW ROUTE
	MAJOR SYSTEM DIVIDE

Notes

1	ISSUED FOR DRAFT PLAN OF SUBDIVISION	DT	KS	18.04.11
Revision		By	Appd.	YY.MM.DD

File Name: 160401242-D8	DT	KS	DT	18.04.09
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project

INNES SHOPPING CENTRES LIMITED

ORLEANS II
DRAFT PLAN OF SUBDIVISION
Ottawa, ON

Title

OVERALL GRADING PLAN

Project No.	Scale	
160401419	1:1000 (0 10 30 50m)	
Drawing No.	Sheet	Revision
GP-1	4 of 4	1

E155

ORIGINAL SHEET - ARCH D

patersongroup

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

Geotechnical Investigation

Proposed Commercial Development - Phase 1
Innes Road at Mer Bleue Road
Ottawa, Ontario

Prepared For

SmartReit

Paterson Group Inc.
Consulting Engineers
154 Colonnade Road South
Ottawa (Nepean), Ontario
Canada K2E 7J5

Tel: (613) 226-7381
Fax: (613) 226-6344
www.patersongroup.ca

December 5, 2016

Report: PG0811-2

E156

5.3 Foundation Design

Conventional Shallow Foundations

Strip footings, up to 2 m wide, and pad footings, up to 5 m wide, founded on an undisturbed, stiff silty clay, glacial till or engineered fill bearing surface can be designed using the 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**.

Footings designed using the above-noted bearing resistance values, founded on undisturbed, stiff silty clay bearing surface or engineered fill placed on an undisturbed, stiff silty clay will be subjected to potential post-construction total and differential settlements of 25 and 20 mm, respectively.

An undisturbed soil bearing surface consists of a surface from which all topsoil and deleterious materials, such as loose, frozen or disturbed soil, whether in situ or not, have been removed, in the dry, prior to the placement of concrete for footings.

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. Adequate lateral support is provided to a silty clay above the groundwater table when a plane extending horizontally and vertically from the footing perimter at a minimum of 1.5H:1V, passing through in situ soil of the same or higher capacity as the bearing medium soil.

Settlement/Grade Raise

Consideration must be given to potential settlements which could occur due to the presence of the silty clay deposit and the combined loads from the proposed footings, any groundwater lowering effects, and grade raise fill. The foundation loads to be considered for the settlement case are the continuously applied loads which consist of the unfactored dead loads and the portion of the unfactored live load that is considered to be continuously applied.

Due to the silty clay underlying the subject site, a permissible grade raise of **2 m** is recommended for grading within 6 m of the building footprint. A permissible grade raise restriction of **2.5 m** is recommended for the parking areas and access lanes. It should be noted that the permissible grade raise values noted above are measured from the **original ground surface**, below any existing fill observed at select locations on site.

david schaeffer engineering ltd

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Fax (613) 836-7183
www.DSEL.ca

SERVICING OPTIONS REPORT

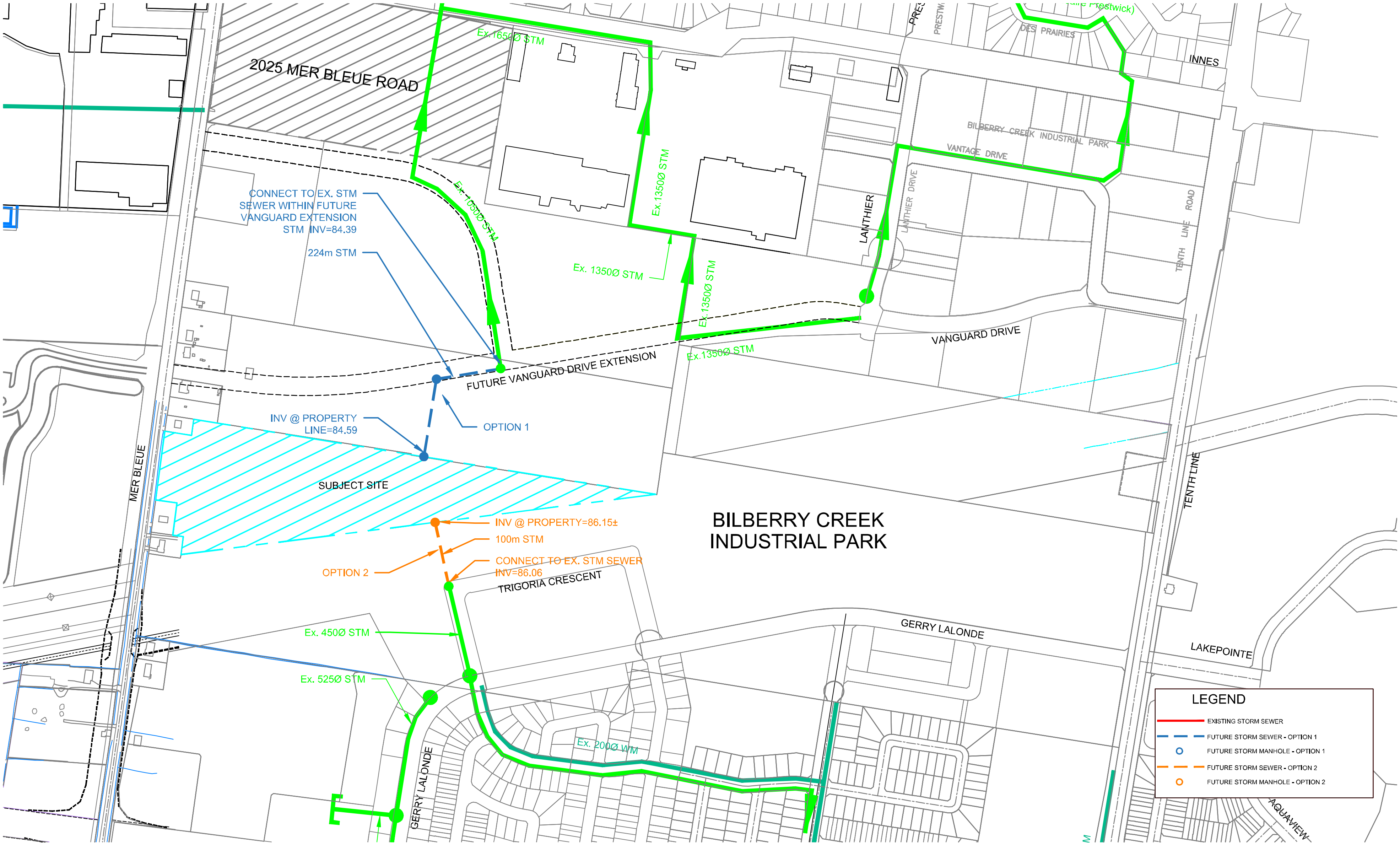
FOR

BLACKSHEEP DEVELOPMENTS
2159 MER-BLEUE ROAD

CITY OF OTTAWA

PROJECT NO.: 17-934

DECEMBER 2017 – REV 2



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Fax. (613) 836-7183
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CONCEPTUAL STORM SERVICING
BLACKSHEEP DEVELOPMENTS - MER BLEUE

PROJ NO.:	17-934
DRAWN BY:	AJG
DATE:	2017-11-28
SCALE:	NTS
FIGURE NO.:	E159
	FIG-2

z:\projects\17-934_blacksheep_mer-bleue\b_design\b2_drawings\b2-5_sketches and figures\2017-11-28_servicing-options-fig\2017-11-28_934_ex_servicing_dsel.dwg

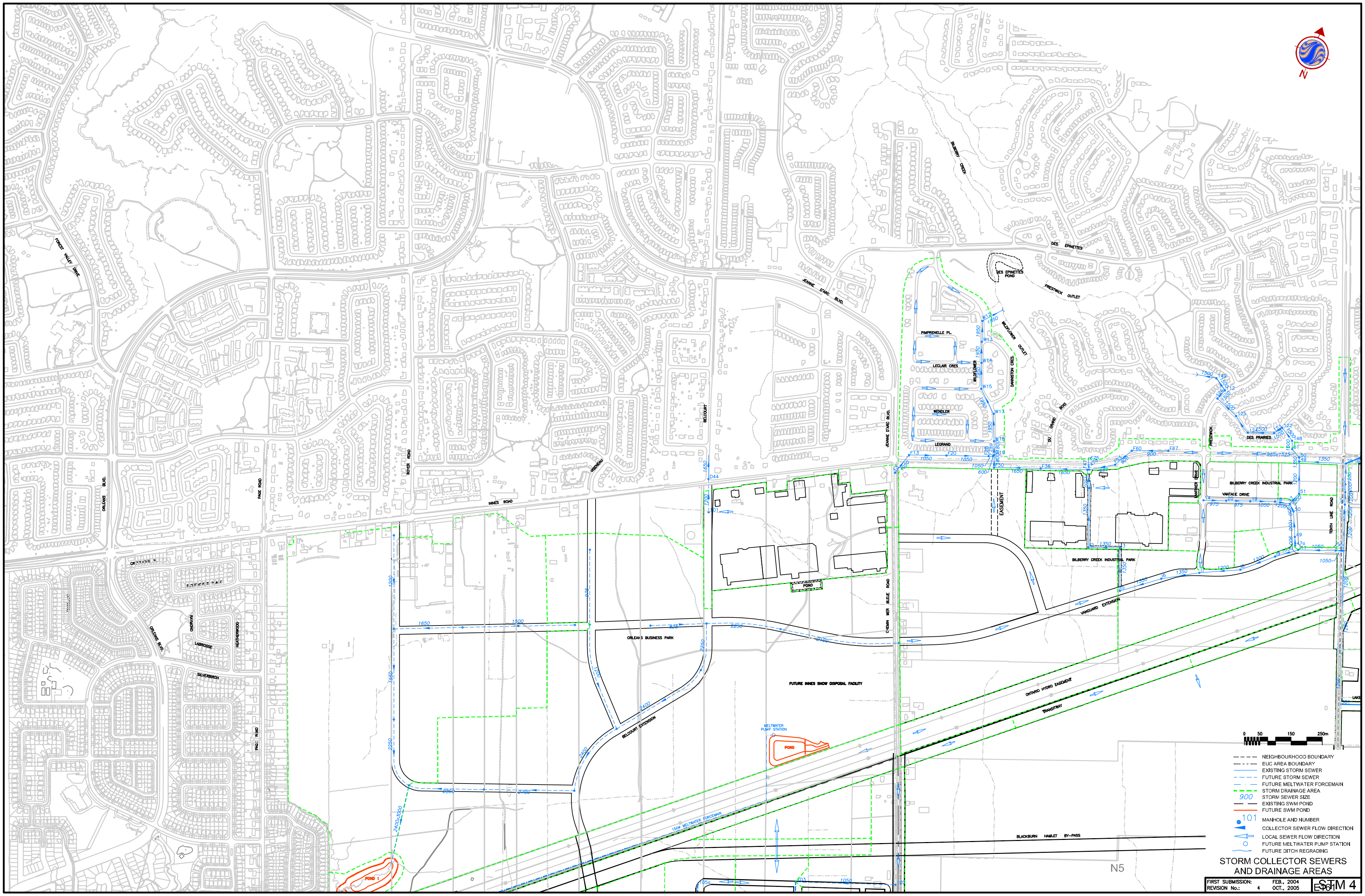
GLOUCESTER AND CUMBERLAND EAST URBAN COMMUNITY EXPANSION AREA AND BILBERRY CREEK INDUSTRIAL PARK MASTER SERVICING UPDATE

Prepared for:
City of Ottawa

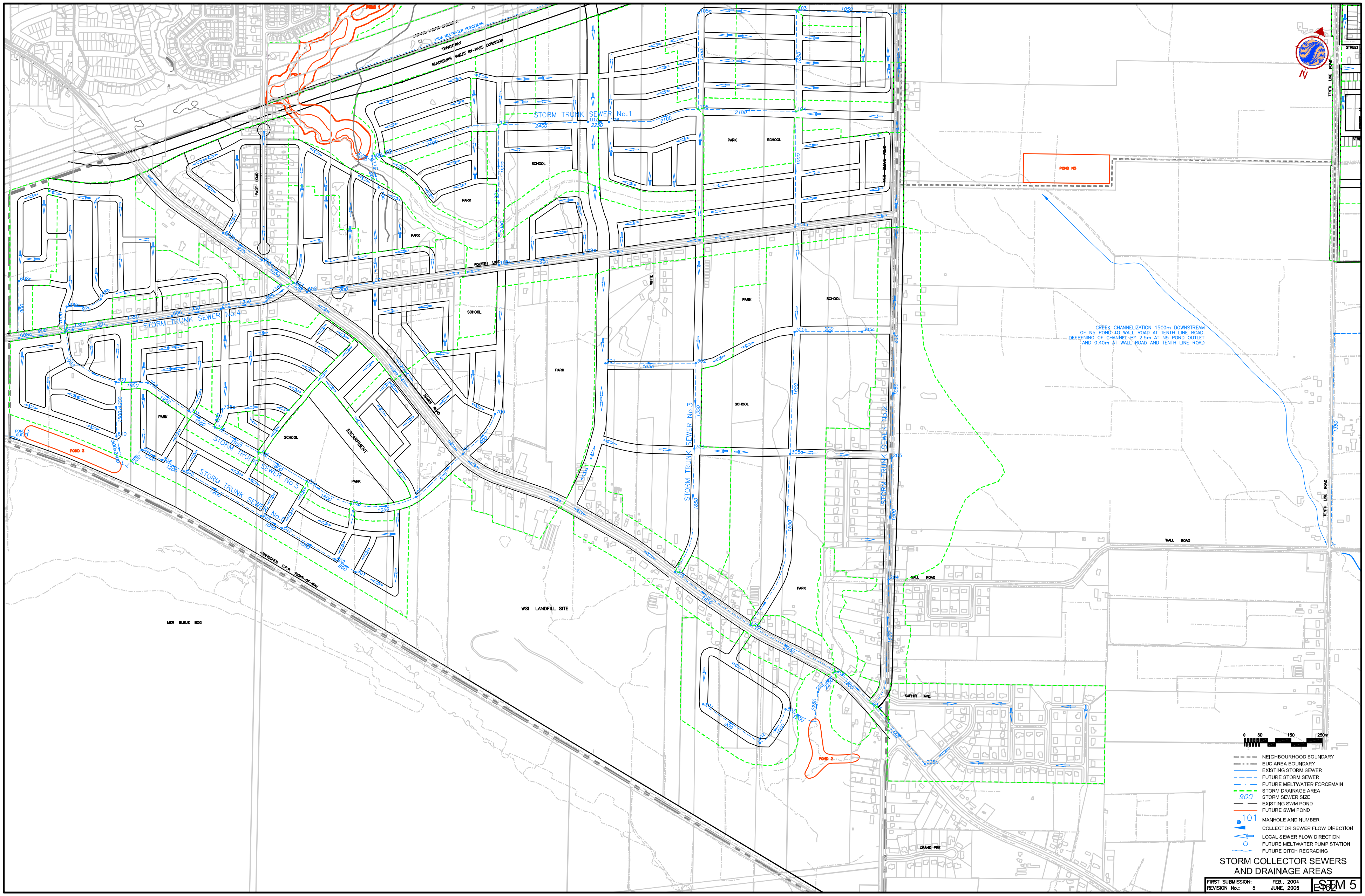
File No. 163400602
November 2004
Updated June 2005
Updated October 2005
Updated July 2006

Prepared by:
Stantec Consulting Ltd.
1505 Laperriere Avenue
Ottawa, Ontario
K1Z 7T1

Stantec



STORM COLLECTOR SEWERS
AND DRAINAGE AREAS
FIRST SUBMISSION: FEB., 2004
REVISION No.: 4 OCT., 2005
STM 4
E161
NEIGHBOURHOOD BOUNDARY
EUC AREA BOUNDARY
EXISTING STORM SEWER
FUTURE STORM SEWER
FUTURE MELTWATER FORCEMAIN
STORM DRAINAGE AREA
900
STORM SEWER SIZE
EXISTING SWM POND
FUTURE SWM POND
101
MANHOLE AND NUMBER
COLLECTOR SEWER FLOW DIRECTION
LOCAL SEWER FLOW DIRECTION
FUTURE MELTWATER PUMP STATION
FUTURE DITCH REGRADING
0
50
150
250m
N5
N
INNES ROAD
JEANNE D'ARC BLVD.
BELCOURT
PAGE ROAD
BOYER ROAD
ORLEANS BLVD.
FOREST VALLEY DRIVE
BILBERRY CREEK
DES EPINETTES
DES EPINETTES POND
PRESTWICK OUTLET
WILDFLOWER OUTLET
PIMPRENELLE PL.
LECLAIR CRES.
WENDLER
LEGRAND
EASEMENT
BILBERRY CREEK INDUSTRIAL PARK
VANTAGE DRIVE
TENTH LINE ROAD
VANGUARD EXTENSION
CHEMIN MER BLEUE ROAD
ORLEANS BUSINESS PARK
FUTURE INNES SNOW DISPOSAL FACILITY
BELCOURT EXTENSION
MELTWATER PUMP STATION
POND
POND 1
ONTARIO HYDRO EASEMENT
TRANSITWAY
BLACKBURN HAMLET BY-PASS
LABROSSE
SILVERBIRCH
HEATHERWOOD
LAKE



STORM COLLECTOR SEWERS AND DRAINAGE AREAS

FIRST SUBMISSION: FEB., 2004
REVISION No.: 5 JUNE, 2006

STM 5

Table 4-1
Feasible Building Structures Supported on Spread Footings within Geographical Areas 1, 2, 3, 4 and 5

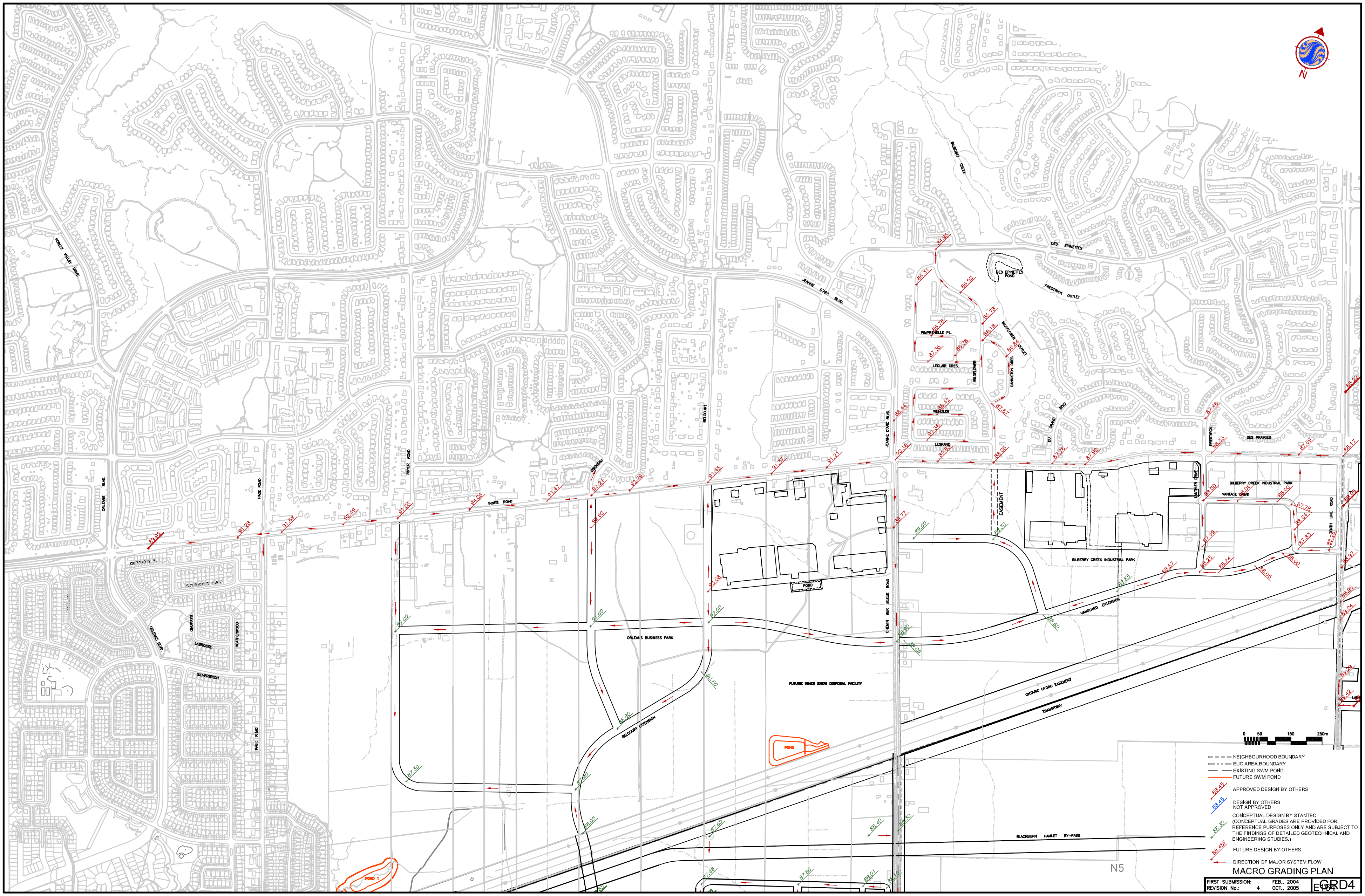
Recommended Grade Raise and Building Structures [2, 3]	Geotechnical Areas					
	1	2A	2B	3	4	5
Grade Raise Restrictions	0.6m	0-0.5m	2.0m	3.0m	0.0m	0.6m
Up to 2 storey timber frame w or w/o basements and at-grade garage (i.e. conventional suburban housing and/or "high ranch" style homes)		✓[1]				
Up to 2 storey timber frame w basements and at-grade garage (i.e. conventional suburban housing)	✓				✓	✓
Up to 3 storey(possibly 4 storey) timber frame w/o basements (i.e. townhouses or apartment buildings)	✓					✓
Up to 3 storey timber frame w basements and w garage in basement (i.e. stacked townhouses with depressed driveways)	✓					✓
Up to 3 storey (possibly 4 storey) timber frame w concrete framed ground floor and basement level parking garages	✓					✓
Higher density type developments			✓	✓		

[1] Lack of good quality geotechnical information within the area and consequently guideline may be too conservative. Type of housing (conventional suburban versus "high ranch" style homes) depends on the servicing feasibility given the 0-0.5m grade raise restriction.
[2] The assessment of the feasibility of different development densities assumed a maximum grade raise of 0.3m. The different building structures were compared taking into account the grade raise, the different footing sizes and depths, a groundwater level to at least the basement level (for the buildings with basements) and unloading on deposits due to excavation of the soils for the basement.
[3] For geotechnical purposes only. Basements may or may not be possible depending on the hydraulic grade line constraints.

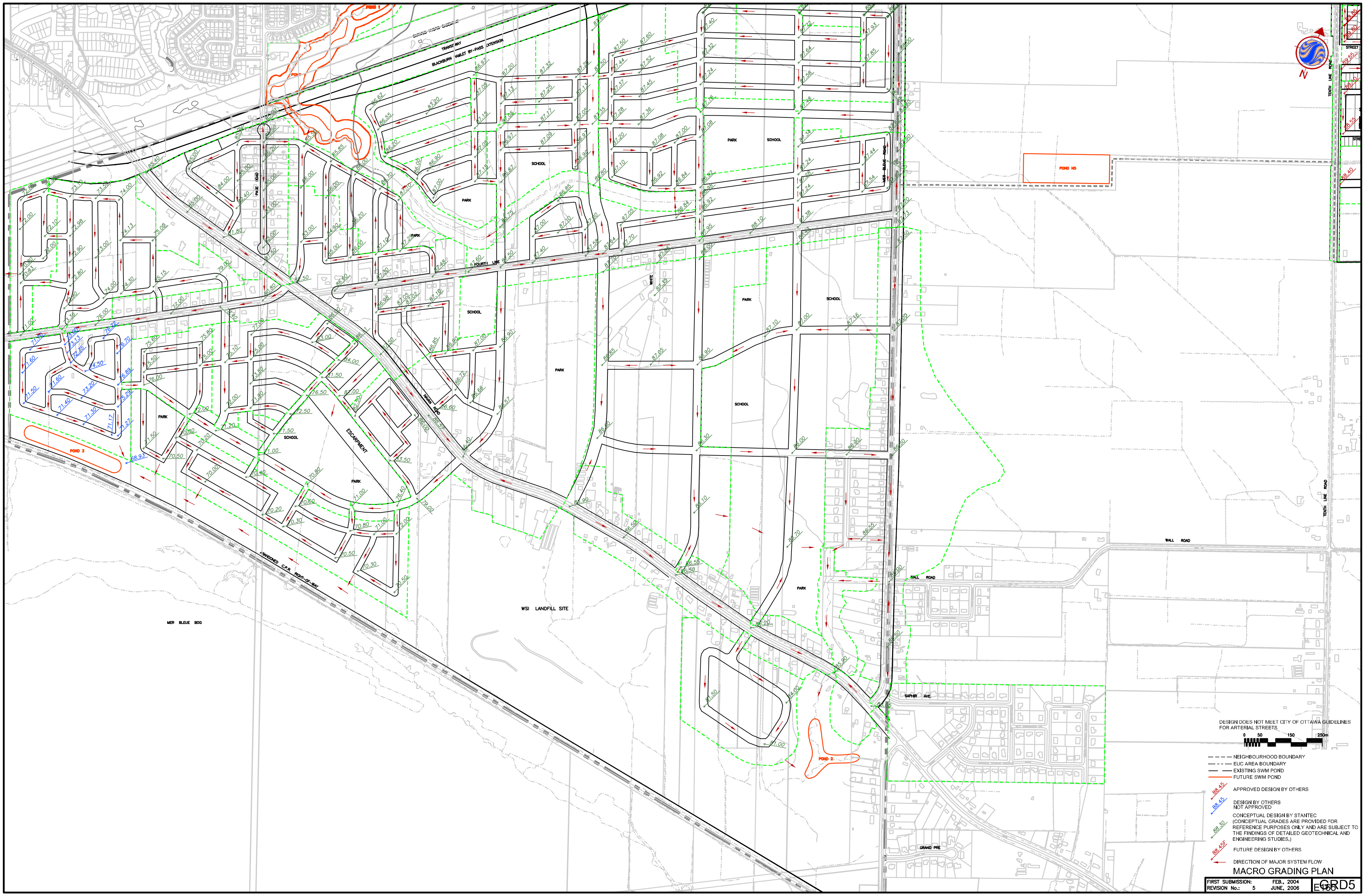
4.1.1.2 Forest Valley Trunk Capacity Assessment

Current development applications within the Gloucester EUC Expansion Area, coupled with the new policies put forward in the City's 2003 Official Plan suggest higher development densities than those considered in the previous servicing studies.

A capacity analysis of the FVT was completed, to assess whether there was residual capacity within the trunk to accommodate more aggressive development densities (conversion of industrial lands to residential increasing the total units in the Gloucester EUC to as much as 10,000 units) and potential future expansion beyond the current urban boundary. In addition, a broad level capacity analysis of the Orleans Cumberland Collector (OCC) was completed to assess the impact of higher development densities within the FVT catchment and updated Buildout projections within the Cumberland Collector (CM), Gloucester Cumberland Trunk (GL) and Orleans Collector (OR). A summary of the capacity assessment findings is presented below with additional details provided in the technical memo in **Appendix K**.



NEIGHBOURHOOD BOUNDARY
EUC AREA BOUNDARY
EXISTING SWM POND
FUTURE SWM POND
APPROVED DESIGN BY OTHERS
DESIGN BY OTHERS NOT APPROVED
CONCEPTUAL DESIGN BY STANTEC (CONCEPTUAL GRADES ARE PROVIDED FOR REFERENCE PURPOSES ONLY AND ARE SUBJECT TO THE FINDINGS OF DETAILED GEOTECHNICAL AND ENGINEERING STUDIES.)
FUTURE DESIGN BY OTHERS
DIRECTION OF MAJOR SYSTEM FLOW
MACRO GRADING PLAN
FIRST SUBMISSION: FEB., 2004
REVISION No.: 4 OCT., 2005
GRD4
N5
INNES ROAD
JEANNE D'ARC BLVD.
BELCOURT
ORLEANS BUSINESS PARK
FUTURE INNES SNOW DISPOSAL FACILITY
BILBERRY CREEK INDUSTRIAL PARK
VANGUARD EXTENSION
BELCOURT EXTENSION
ONTARIO HYDRO EASEMENT
TRANSITWAY
BLACKBURN HAMLET BY-PASS


TENTH LINE ROAD
WALL ROAD
MER BLEUE ROAD
FOURTH LINE ROAD
PAGE ROAD
NAVAN ROAD
TRANSITWAY
BLACKBURN HAMLET BY-PASS EXTENSION
SAPHIR AVE.
GRAND PRE
POND N5
POND 2
POND 3
ESCARPMENT
PARK
SCHOOL
WSI LANDFILL SITE
MER BLEUE BOG
ABANDONED C.P.R. RIGHT-OF-WAY
DESIGN DOES NOT MEET CITY OF OTTAWA GUIDELINES FOR ARTERIAL STREETS
0 50 150 250m
NEIGHBOURHOOD BOUNDARY
EUC AREA BOUNDARY
EXISTING SWM POND
FUTURE SWM POND
88.45 APPROVED DESIGN BY OTHERS
88.45 DESIGN BY OTHERS NOT APPROVED
88.30 CONCEPTUAL DESIGN BY STANTEC (CONCEPTUAL GRADES ARE PROVIDED FOR REFERENCE PURPOSES ONLY AND ARE SUBJECT TO THE FINDINGS OF DETAILED GEOTECHNICAL AND ENGINEERING STUDIES.)
88.45F FUTURE DESIGN BY OTHERS
DIRECTION OF MAJOR SYSTEM FLOW
MACRO GRADING PLAN
FIRST SUBMISSION: FEB., 2004
REVISION No.: 5 JUNE, 2006
GRD5

SERVICING REPORT

FOR

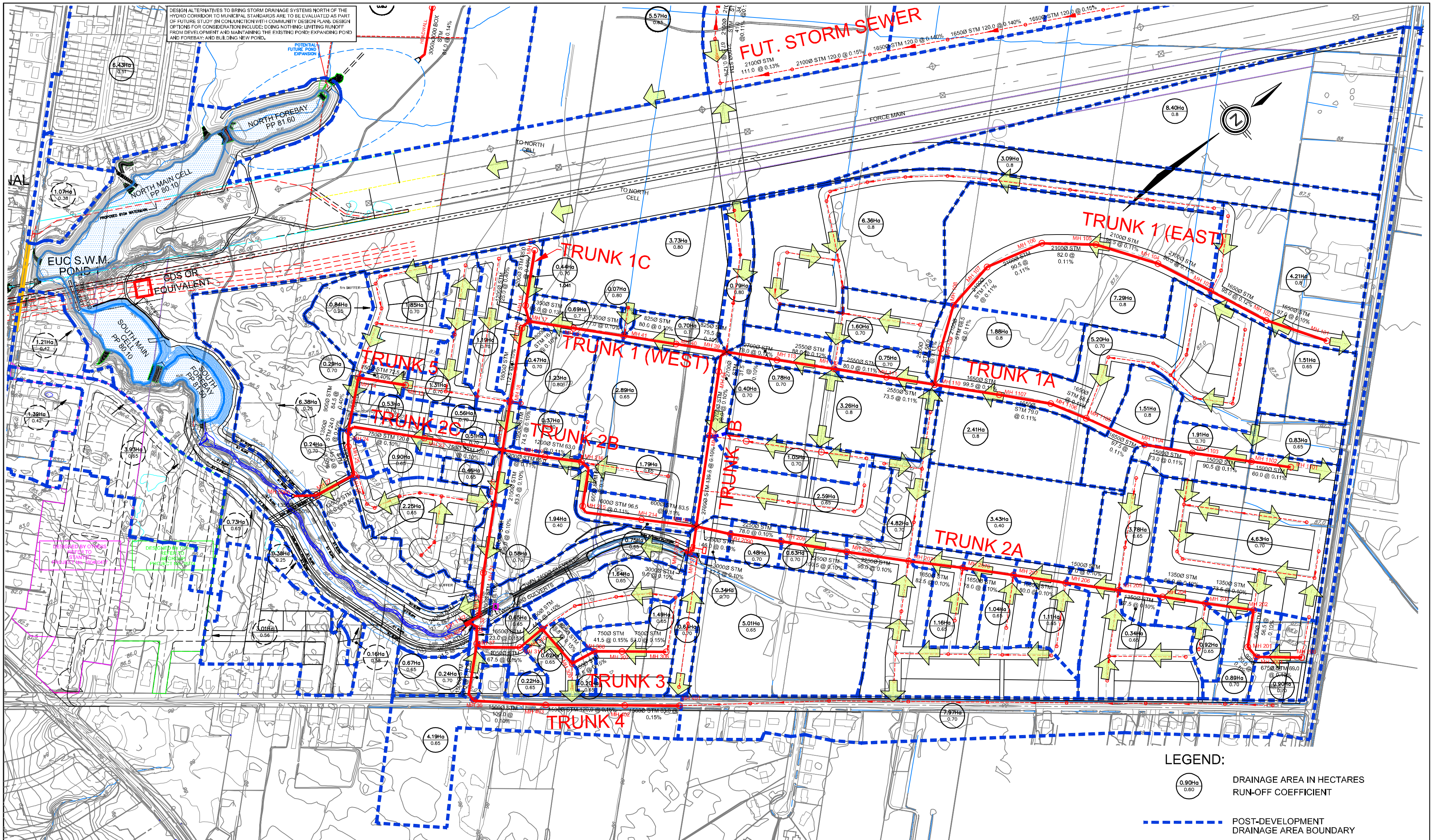
TRAILS EDGE AND ORLEANS BUSINESS PARK

MINTO DEVELOPMENTS INC.
RICHCRAFT GROUP OF COMPANIES

CITY OF OTTAWA

PROJECT NO.: 10-459

JULY 2017
REVISION 7



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TRAILS EDGE

CONCEPTUAL STORM DRAINAGE AREA

PROJECT No. : 10-459

SCALE: 1:2500

DATE: FEBRUARY 2014

APPENDIX No. I-1

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Manning 0.013 Return Frequency = 5 years

Location	LOCATION From Node	To Node	AREA (Ha) R= 0.25	R= 0.40	R= 0.65	R= 0.70	R= 0.75	R= 0.80	R= 0.83	FLOW Indiv. 2.78 AC	Accum. 2.78 AC	Time of Conc.	Rainfall Intensity	Peak Flow Q (l/s)	SEWER DATA DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min.)	RATIO Q/Q full
TRUNK 3																							
					1.49					2.69	2.69												
	306	307			0.00					0.00	2.69	10.00	104.19	281	750	750	CONC	0.15	67.0	431	0.98	1.14	0.65
	307	308			0.000					0.00	2.69	11.14	98.51	265	750	750	CONC	0.15	41.5	431	0.98	0.71	0.62
	308	309			0.20					0.36	3.05	11.85	95.33	291	750	750	CONC	0.15	38.5	431	0.98	0.66	0.68
	309	310			0.62					1.12	4.17	12.51	92.57	386	825	825	CONC	0.15	69.5	556	1.04	1.11	0.70
					1.64					2.96	7.14												
	310	311			0.65					1.17	8.31	13.62	88.28	734	1050	1050	CONC	0.15	44.0	1057	1.22	0.60	0.69
	311	37			0					0.00	8.31	14.22	86.15	716	1050	1050	CONC	0.15	67.5	1057	1.22	0.92	0.68
To Trunk 4, Pipe 311 to 37			0.00	0.00	4.60	0.00	0.00	0.00	0.00		8.31	15.15											
TRUNK 4																							
						7.970				15.51	15.51	Estimated TC (10 min inlet Tc + 1620 m Flow Path @ 2m/s)											
	401	402			4.19					7.57	23.08	23.50	63.40	1463	1500	1500	CONC	0.15	83.0	2736	1.55	0.89	0.53
	402	403								0.00	23.08	24.39	61.88	1428	1500	1500	CONC	0.15	120.0	2736	1.55	1.29	0.52
	403	36			0.22					0.40	23.48	25.68	59.83	1405	1500	1500	CONC	0.10	109.0	2234	1.26	1.44	0.63
	36	37			0.67	0.24				1.68	25.16	27.12	57.71	1452	1500	1500	CONC	0.17	90.0	2913	1.65	0.91	0.50
Contribution From Trunk 3, MH 311 - 37			0.00	0.00	4.60	0.00	0.00	0.00	0.00	8.31	33.47	15.15											
	37	38								0.00	33.47	28.03	56.45	1889	1650	1650	CONC	0.15	23.0	3528	1.65	0.23	0.54
	38	4050								0.00	33.47	28.26	56.14	1879	1650	1650	CONC	0.15	21.5	3528	1.65	0.22	0.53
To Mud Creek			**0.000**	**0.000**	**9.680**	**8.210**	**0.000**	**0.000**	**0.000**		**33.47**	**28.48**											
TRUNK 1A																							
					1.51					2.73	2.73	Estimated TC (10 min inlet Tc + 420m Flow Path @ 2m/s)											
	1101	1102			0.83	1.91				5.22	7.95	13.50	88.74	705	1500	1500	CONC	0.11	60.0	2343	1.33	0.75	0.30
	1102	1103								0.00	7.95	14.25	86.05	684	1500	1500	CONC	0.11	90.5	2343	1.33	1.14	0.29
	1103	1104								0.00	7.95	15.39	82.32	654	1500	1500	CONC	0.11	73.0	2343	1.33	0.92	0.28
	1104	1105						1.51		3.36	11.30	16.31	79.56	899	1650	1650	CONC	0.11	97.5	3021	1.41	1.15	0.30
	1105	1106				5.20				10.12	21.42	17.46	76.38	1636	1650	1650	CONC	0.11	58.5	3021	1.41	0.69	0.54
	1106	1107								0.00	21.42	18.15	74.60	1598	1650	1650	CONC	0.11	79.0	3021	1.41	0.93	0.53
	1107	110								0.00	21.42	19.08	72.34	1550	1650	1650	CONC	0.11	99.5	3021	1.41	1.17	0.51
To Trunk 1 , Pipe 110 - 111			0.000	0.000	2.340	7.110	0.000	1.510	0.000		21.42	20.25											
TRUNK 2A												Estimated TC (10 min inlet Tc + 480 m Flow Path @ 2m/s)											
	200	2001				0.90				1.75	1.75	14.00	86.93	152	675	675	CONC	0.10	69.0	266	0.74	1.55	0.57
	2001	201				0.89				1.73	3.48	15.55	81.83	285	900	900	CONC	0.10	20.0	572	0.90	0.37	0.50
	201	202								0.00	3.48	15.92	80.70	281	900	900	CONC	0.10	56.5	572	0.90	1.05	0.49
	202	203				4.63				9.01	12.49	16.97	77.70	971	1350	1350	CONC	0.10	73.5	1687	1.18	1.04	0.58
	203	204			0.92					1.66	14.16	18.00	74.96	1061	1350	1350	CONC	0.10	66.0	1687	1.18	0.93	0.63
	204	205			0.34					0.61	14.77	18.94	72.67	1073	1350	1350	CONC	0.10	67.5	1687	1.18	0.95	0.64
	205	206			3.78					6.83	21.60	19.89	70.49	1523	1500	1500	CONC	0.10	81.0	2234	1.26	1.07	0.68
	206	207			1.11					2.01	23.61	20.96	68.22	1610	1650	1650	CONC	0.10	80.0	2881	1.35	0.99	0.56
	207	2070			1.04					1.88	25.49	21.95	66.25	1688	1650	1650	CONC	0.10	78.0	2881	1.35	0.96	0.59
	2070	2071			1.16					2.10	27.58	22.91	64.45	1778	1650	1650	CONC	0.10	82.5	2881	1.35	1.02	0.62
	2071	208		3.43		4.82		2.41		18.55	46.14	23.93	62.66	2891	2250	2250	CONC	0.10	95.0	6587	1.66	0.96	0.44
	208	209				0.63				1.23	47.36	24.89	61.08	2893	2250	2250	CONC	0.10	100.5	6587	1.66	1.01	0.44
	209	2090				0.48				0.93	48.30	25.90	59.50	2874	2250	2250	CONC	0.10	78.0	6587	1.66	0.78	0.44
	2090	56				0.34				0.66	48.96	26.68	58.34	2856	2250	2250	CONC	0.10	46.0	6587	1.66	0.46	0.43
To Trunk 1B , Pipe 56 - 57			0.000	3.430	8.350	12.690	0.000	2.410	0.000		48.96	27.14											

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

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.76 m/sec

Designed: K.M.	PROJECT: **TRAILS EDGE** **FSR - SUBMISSION 5**		
Checked: Z.L.	LOCATION: **City of Ottawa**		
Dwg. Reference: Storm Drainage Plan	File Ref: 10-459	Date: February, 2014	Sheet No. 1 of 3

459FSR5_Stm_DesignSheet_TrailsEdge.xls

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Manning 0.013 Return Frequency = 5 years

Location	LOCATION From Node	To Node	AREA (Ha) R= 0.25	R= 0.40	R= 0.65	R= 0.70	R= 0.75	R= 0.80	R= 0.83	FLOW Indiv. 2.78 AC	Accum. 2.78 AC	Time of Conc.	Rainfall Intensity	Peak Flow Q (l/s)	SEWER DATA DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min.)	RATIO Q/Q full
TRUNK 1 (East)																							
								8.40		18.68	18.68												
								3.09		6.87	25.55	Estimated TC (10 min inlet Tc + 960 m Flow Path @ 2m/s)											
	101	102						4.21		9.36	34.92	18.00	74.97	2618	1650	1650	CONC	0.10	97.0	2881	1.35	1.20	0.91
	102	103								0.00	34.92	19.20	72.06	2516	1650	1650	CONC	0.12	95.0	3156	1.48	1.07	0.80
	103	104						7.29		16.21	51.13	20.27	69.66	3562	2100	2100	CONC	0.11	90.0	5748	1.66	0.90	0.62
	104	105								0.00	51.13	21.18	67.77	3465	2100	2100	CONC	0.11	98.5	5748	1.66	0.99	0.60
	105	106								0.00	51.13	22.16	65.83	3366	2100	2100	CONC	0.11	82.0	5748	1.66	0.82	0.59
	106	107								0.00	51.13	22.99	64.31	3288	2100	2100	CONC	0.11	90.5	5748	1.66	0.91	0.57
	107	108								0.00	51.13	23.90	62.72	3207	2100	2100	CONC	0.11	77.0	5748	1.66	0.77	0.56
	108	109						1.88		4.18	55.31	24.67	61.43	3398	2100	2100	CONC	0.11	68.5	5748	1.66	0.69	0.59
	109	110								0.00	55.31	25.36	60.33	3337	2550	2550	CONC	0.11	55.0	9646	1.89	0.49	0.35
Contribution From Trunk 1A, Pipe 1107 - 110			0.00	0.00	2.34	7.11	0.00	1.51	0.00	21.42	76.73	20.25											
	110	111				0.75				1.46	78.19	25.84	59.59	4659	2550	2550	CONC	0.11	73.5	9646	1.89	0.65	0.48
	111	112								0.00	78.19	26.49	58.62	4583	2550	2550	CONC	0.11	80.0	9646	1.89	0.71	0.48
						1.60				3.11	81.31												
	112	113				0.78		6.36		15.66	96.97	27.19	57.60	5586	2550	2550	CONC	0.12	88.0	10075	1.97	0.74	0.55
	113	3900								0.00	96.97	27.94	56.58	5486	2700	2700	CONC	0.12	78.0	11734	2.05	0.63	0.47
To Trunk 1B, Pipe 39 to 54			0.00	0.00	2.34	10.24	0.00	32.74	0.00		96.97	28.57											
TRUNK 1B																							
Contribution From Trunk 1 (East), Pipe 113 to 3900			0.00	0.00	2.34	10.24	0.00	32.74	0.00	96.97	96.97	28.57											
	3900	54				0.40		0.79		2.54	99.50	28.57	55.73	5546	2700	2700	CONC	0.10	31.5	10712	1.87	0.28	0.52
	54	55								0.00	99.50	28.85	55.37	5509	2700	2700	CONC	0.10	98.0	10712	1.87	0.87	0.51
	55	56			2.59	1.05		3.26		13.97	113.48	29.73	54.26	6158	2700	2700	CONC	0.10	139.5	10712	1.87	1.24	0.57
Contribution From Trunk 2A, Pipe 2090 - 56			0.00	3.43	8.35	12.69	0.00	2.41	0.00	48.96	162.44	27.14											
	56	57								0.00	162.44	30.97	52.78	8573	3000	3000	CONC	0.10	42.5	14187	2.01	0.35	0.60
Contribution from School Control MH, Pipe School MH - 57			0.00	0.00	5.01	0.00	0.00	0.00	0.00	9.05	171.49	12.61											
	57	57000				0.64				1.25	172.73	31.32	52.37	9046	3000	3000	CONC	0.10	9.0	14187	2.01	0.07	0.64
To Mud Creek			**0.00**	**3.43**	**18.29**	**25.02**	**0.00**	**39.20**	**0.00**		**172.73**	**31.39**											
Trunk 1C																							
Interim to Temp DICB (8.7Ha & 7.2Ha)														**2208**	**(5 Yr Flow from Existing SWM Pond Outlet Ditch)**								
	15	16				0.44				0.86	0.86	10.00	104.19	2297	1200	1200	CONC	0.40	85.0	2465	2.18	0.65	0.93
	16	17								0.00	0.86	10.65	100.88	2294	1200	1200	CONC	0.40	25.0	2465	2.18	0.19	0.93
To Trunk 1 (West) , Pipe 17 - 170			0.00	0.00	0.00	0.44	0.00	0.00	0.00		0.86	10.84											

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

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.76 m/sec

Designed: K.M.
Checked: Z.L.
Dwg. Reference: Storm Drainage Plan

PROJECT: **TRAILS EDGE FSR - SUBMISSION 5**
LOCATION: **City of Ottawa**
File Ref: 10-459
Date: February, 2014
Sheet No. 2 of 3

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Manning 0.013 Return Frequency = 5 years

	LOCATION		AREA (Ha)							FLOW					SEWER DATA								
Location	From Node	To Node	R= 0.25	R= 0.40	R= 0.65	R= 0.70	R= 0.75	R= 0.80	R= 0.83	Indiv. 2.78 AC	Accum. 2.78 AC	Time of Conc.	Rainfall Intensity	Peak Flow Q (l/s)	DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min.)	RATIO Q/Q full
TRUNK 2B																							
	213	214			0.75					1.36	1.36	10.00	104.19	141	600	600	CONC	0.11	83.5	204	0.72	1.93	0.69
	214	215								0.00	1.36	11.93	94.99	129	600	600	CONC	0.11	96.5	204	0.72	2.23	0.63
	215	216								0.00	1.36	14.17	86.35	117	600	600	CONC	0.11	66.5	204	0.72	1.54	0.57
					1.79					3.23	4.59												
	216	217			2.89					5.22	9.81	15.70	81.35	798	1200	1200	CONC	0.11	63.0	1292	1.14	0.92	0.62
	217	19								0.00	9.81	16.62	78.66	772	1200	1200	CONC	0.11	65.0	1292	1.14	0.95	0.60
To Trunk 1 (West), MH 19 - 20			0.000	0.000	5.430	0.000	0.000	0.000	0.000		9.81	17.57											
Trunk 1 (West)																							
	39	40				0.70				1.36	1.36	10.00	104.19	142	825	825	CONC	0.10	75.5	454	0.85	1.48	0.31
	40	41								0.00	1.36	11.48	96.97	132	825	825	CONC	0.10	80.0	454	0.85	1.57	0.29
								3.73		8.30	9.66												
	41	42				0.69		0.07		1.50	11.16	13.05	90.43	1009	1350	1350	CONC	0.10	77.0	1687	1.18	1.09	0.60
	42	17								0.00	11.16	14.14	86.44	964	1350	1350	CONC	0.10	68.0	1687	1.18	0.96	0.57
Contribution From Trunk 1C, Pipe 16 - 17			0.000	0.000	0.000	0.440	0.000	0.000	0.000	0.86	12.01	10.84		2208									
	17	170								0.00	12.01	15.10	83.23	3208	1800	1800	CONC	0.10	16.0	3633	1.43	0.19	0.88
	170	18				0.47				0.91	12.93	15.29	82.64	3276	1800	1800	CONC	0.10	112.5	3633	1.43	1.31	0.90
						0.56		1.23		3.83	16.75												
	18	19				1.19		0.37		3.14	19.89	16.60	78.72	3774	1950	1950	CONC	0.10	74.5	4498	1.51	0.82	0.84
Contribution From Trunk 2b, Pipe 217 - 19			0.000	0.000	5.430	0.000	0.000	0.000	0.000	9.81	29.70	17.57											
				1.94						2.16	31.86												
	19	20			0.46					0.83	32.69	17.57	76.08	4695	2100	2100	CONC	0.10	83.5	5480	1.58	0.88	0.86
	20	21								0.00	32.69	18.45	73.85	4622	2100	2100	CONC	0.10	105.0	5480	1.58	1.11	0.84
	21	22				0.58				1.13	33.82	19.55	71.24	4617	2100	2100	CONC	0.10	64.0	5480	1.58	0.67	0.84
	22	1152								0.00	33.82	20.23	69.75	4567	2400	2400	CONC	0.10	27.5	7824	1.73	0.26	0.58
To Mud Creek			**0.00**	**1.94**	**5.89**	**4.63**	**0.00**	**5.40**	**0.00**		**33.82**	**20.49**											
TRUNK 2C																							
	1140	23				0.51				0.99	0.99	10.00	104.19	103	750	750	CONC	0.10	120.0	352	0.80	2.51	0.29
	23	24			0.90					1.63	2.62	12.51	92.57	242	750	750	CONC	0.10	120.0	352	0.80	2.51	0.69
To Trunk 5, Pipe 24-25			0.00	0.00	0.90	0.51	0.00	0.00	0.00		2.62	15.02											
TRUNK 5																							
						1.31				2.55	2.55												
	13	14				0.29				0.56	3.11	10.00	104.19	324	750	750	CONC	0.40	72.5	704	1.59	0.76	0.46
						1.85				3.60	6.71												
	14	24	0.84			0.53				1.62	8.33	10.76	100.35	836	900	900	CONC	0.40	84.5	1144	1.80	0.78	0.73
Contribution From Trunk 2C, Pipe 23 - 24			0.00	0.00	0.90	0.51	0.00	0.00	0.00	2.62	10.95	15.02											
	24	25				0.24				0.47	11.41	15.02	83.49	953	1350	1350	CONC	0.50	24.0	3772	2.64	0.15	0.25
	25	26								0.00	11.41	15.17	83.01	948	1350	1350	CONC	0.50	45.0	3772	2.64	0.28	0.25
	26	27			2.25					4.07	15.48	15.46	82.11	1271	1350	1350	CONC	0.50	65.0	3772	2.64	0.41	0.34
	27	5060								0.00	15.48	15.87	80.86	1252	1350	1350	CONC	0.50	35.0	3772	2.64	0.22	0.33
To Mud Creek			**0.84**	**0.00**	**3.15**	**4.73**	**0.00**	**0.00**	**0.00**		**15.48**	**16.09**											
School Control Manhole												Estimated TC (10 min inlet Tc + 240 m Flow Path @ 2m/s)											
	Control MH	57			5.01					9.05	9.05	12.00	94.70	857	1050	1050	CONC	0.15	45.0	1057	1.22	0.61	0.81
To Trunk 1B, Pipe 57 - 57000			0.00	0.00	5.01	0.00	0.00	0.00	0.00		9.05	12.61											
To Mud Creek from Trails Edge																							
Contribution from Trunk 4			0.00	0.00	9.68	8.21	0.00	0.00	0.00														
Contribution from Trunk 1B			0.00	3.43	18.29	25.02	0.00	39.20	0.00														
Contribution from Trunk 1 (West)			0.00	1.94	5.89	4.63	0.00	5.40	0.00														
Contribution from Trunk 5			0.84	0.00	3.15	4.73	0.00	0.00	0.00														
		Total:	**0.84**	**5.37**	**37.01**	**42.59**	**0.00**	**44.60**	**0.00**	**130.41**													

Definitions:
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A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.76 m/sec

Designed: K.M.	PROJECT: **TRAILS EDGE FSR - SUBMISSION 5**		
Checked: Z.L.	LOCATION: **City of Ottawa**		
Dwg. Reference: Storm Drainage Plan	File Ref: 10-459	Date: February, 2014	Sheet No. 3 of 3 E170

REPORT
PROJECT: 31855-5.2.2

DESIGN BRIEF
MINTO TRAILSEDGE PHASE II

Prepared for MINTO COMMUNITIES INC.
by IBI GROUP
REVISED FEB 2015
REVISED MAY 2015

IBI GROUP

IBI Group
400-333 Preston Street
Ottawa, Ontario
K1S 5N4

STORM SEWER DESIGN SHEET

PROJECT: TRAILSEDGE II
LOCATION: CITY OF OTTAWA
CLIENT: MINTO COMMUNITIES INC.

LOCATION				AREA (Ha)													RATIONAL DESIGN FLOW											SEWER DATA								
STREET	Area #	FROM MH	TO MH	C= 0.20	C= 0.25	C= 0.40	C= 0.50	C= 0.54	C= 0.64	C= 0.65	C= 0.69	C= 0.70	C= 0.71	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAP (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VEL (m/s)	AVAIL CAP (5yr) (L/s)	(%)
OUTLET TO Mudd Creek - Street 'A' South (1800 mm dia)																																				
Renaud Road	EXT400, 400E	BLKHD	400									7.97			15.51	15.51	23.50	*AC and Tc FROM DSEL MSS REV. 6 , split using % flows from IBI SWM model (100% to MH400)*										2,554.60	82.00	1500			0.12	1.400	2554.60	100.00%
Renaud Road	400A-D	400	401									0.39			0.76	16.27	23.50	0.99	24.49	63.40	74.16	108.16	1,031.43			62.50	1,031.43	2,554.60	83.00	1500			0.12	1.400	1523.17	59.62%
Renaud Road	401A-E	401	402									0.48			0.93	17.20	24.49	1.37	25.86	61.73	72.20	105.27	1,061.85			375.20	1,061.85	2,554.60	115.00	1500			0.12	1.400	1492.75	58.43%
Renaud Road	402A-I,R402A-B	402	403					0.26	0.76			0.96			3.61	20.81	25.86	1.13	26.98	59.56	69.66	101.55	1,239.69			253.90	1,239.69	2,554.60	94.55	1500			0.12	1.400	1314.92	51.47%
Renaud Road		403	404												0.00	20.81	26.98	0.19	27.17	57.91	67.71	98.70	1,205.21				1,205.21	2,554.60	15.79	1500			0.12	1.400	1349.40	52.82%
SCHOOL - surface outlet	EXT	STUB	410B	REFER TO GENIVAR PROJECT 0808											1.96	1.96	39.70	0.36	40.06	44.42	51.90	75.55	86.94				86.94	91.46	17.26	375			0.25	0.802	4.52	4.94%
Renaud Road	410A	410B	410											0.21	0.47	2.42	10.00	0.53	10.53	104.19	122.14	178.56	252.58			73.00	252.58	401.29	57.41	525			0.80	1.796	148.71	37.06%
SCHOOL - bldg outlet	EXT	STUB	410	REFER TO GENIVAR PROJECT 0808											0.63	0.63	10.00	0.28	10.28	104.19	122.14	178.56	65.75				65.75	34.22	17.66	200			1.00	1.055	-31.54	-92.16%
Renaud Road	410B	410	412											0.09	0.20	3.26	10.00	0.26	10.26	104.19	122.14	178.56	339.19			17.50	339.19	448.66	30.88	525			1.00	2.008	109.47	24.40%
Renaud Road		412	404												0.00	3.26	10.26	0.06	10.32	102.86	120.57	176.25	334.84				334.84	876.93	8.52	675			1.00	2.374	542.09	61.82%
Institutional Block 249	21	409	404											0.63	1.40	1.40	10.00	0.16	10.16	104.19	122.14	178.56	145.99				145.99	210.32	12.00	450			0.50	1.281	64.33	30.59%
Compass Street	S404	404	406								0.16				0.31	25.78	27.17	0.98	28.15	57.64	67.40	98.25	1,485.74			104.00	1,485.74	2,332.02	75.31	1500			0.10	1.278	846.29	36.29%
Enclave Walk	**S307**	**307**	**308**										**0.25**		**0.49**	**0.49**	**10.00**	**1.12**	**11.12**	**104.19**	**122.14**	**178.56**	**51.41**			**68.00**	**51.41**	**115.68**	**68.17**	**375**			**0.40**	**1.015**	**64.27**	**55.56%**
Enclave Walk		**308**	**309**												**0.00**	**0.49**	**11.12**	**0.19**	**11.31**	**98.63**	**115.59**	**168.93**	**48.67**				**48.67**	**115.68**	**11.53**	**375**			**0.40**	**1.015**	**67.01**	**57.93%**
Enclave Walk		**309**	**310**												**0.00**	**0.49**	**11.31**	**0.56**	**11.87**	**97.75**	**114.56**	**167.42**	**48.24**				**48.24**	**115.68**	**34.32**	**375**			**0.40**	**1.015**	**67.45**	**58.30%**
Enclave Walk		**310**	**311**												**0.00**	**0.49**	**11.87**	**0.50**	**12.37**	**95.24**	**111.60**	**163.08**	**47.00**				**47.00**	**115.68**	**30.56**	**375**			**0.40**	**1.015**	**68.69**	**59.37%**
Enclave Walk	**S311**	**311**	**312**										**0.43**		**0.85**	**1.34**	**12.37**	**1.57**	**13.94**	**93.12**	**109.11**	**159.42**	**124.99**			**120.00**	**124.99**	**248.09**	**80.08**	**600**			**0.15**	**0.850**	**123.10**	**49.62%**
Enclave Walk	**S312, R312A-B**	**312**	**313**					**0.44**					**0.35**		**1.35**	**2.69**	**13.94**	**0.77**	**14.72**	**87.13**	**102.05**	**149.06**	**234.68**			**143.00**	**234.68**	**339.63**	**42.75**	**675**			**0.15**	**0.919**	**104.95**	**30.90%**
Enclave Walk		**313**	**305**												**0.00**	**2.69**	**14.72**	**0.51**	**15.23**	**84.47**	**98.93**	**144.48**	**227.53**				**227.53**	**339.63**	**28.05**	**675**			**0.15**	**0.919**	**112.10**	**33.01%**
Enclave Walk	**S301, R301A, B, C, D**	**301**	**303**					**0.53**					**0.36**		**1.51**	**1.51**	**10.00**	**1.47**	**11.47**	**104.19**	**122.14**	**178.56**	**156.94**			**196.00**	**156.94**	**283.76**	**112.37**	**525**			**0.40**	**1.270**	**126.82**	**44.69%**
Enclave Walk	**S303**	**303**	**304**										**0.31**		**0.61**	**2.12**	**11.47**	**0.46**	**11.94**	**97.00**	**113.67**	**166.11**	**205.45**			**87.00**	**205.45**	**480.32**	**36.08**	**675**			**0.30**	**1.300**	**274.86**	**57.23%**
Pin Cherry Grove	**S314**	**314**	**304**										**0.17**		**0.34**	**0.34**	**10.00**	**0.69**	**10.69**	**104.19**	**122.14**	**178.56**	**34.96**			**48.00**	**34.96**	**67.67**	**38.16**	**300**			**0.45**	**0.927**	**32.71**	**48.34%**
Pin Cherry Grove	**S304**	**304**	**305**										**0.28**		**0.55**	**3.01**	**11.94**	**1.28**	**13.21**	**94.96**	**111.27**	**162.60**	**285.49**			**78.00**	**285.49**	**449.81**	**75.56**	**750**			**0.15**	**0.986**	**164.32**	**36.53%**
Enclave Walk	**R305**	**305**	**306**					**0.17**							**0.26**	**5.96**	**15.23**	**0.65**	**15.88**	**82.83**	**96.99**	**141.63**	**493.24**			**31.00**	**493.24**	**731.45**	**43.68**	**900**			**0.15**	**1.114**	**238.21**	**32.57%**
Enclave Walk	**S306**	**306**	**406**										**0.39**		**0.77**	**6.72**	**15.88**	**0.94**	**16.83**	**80.81**	**94.62**	**138.16**	**543.45**			**142.00**	**543.45**	**842.96**	**61.91**	**975**			**0.13**	**1.094**	**299.51**	**35.53%**
Compass Street		**406**	**407**												**0.00**	**32.50**	**16.83**	**0.31**	**17.14**	**78.09**	**91.42**	**133.46**	**2,538.01**				**2,538.01**	**3,792.13**	**27.23**	**1800**			**0.10**	**1.444**	**1254.12**	**33.07%**
Compass Street	OUTLET	**407**	**HW**												**0.00**	**32.50**	**17.14**	**0.08**	**17.22**	**77.23**	**90.41**	**131.97**	**2,509.97**				**2,509.97**	**3,792.13**	**6.87**	**1800**			**0.10**	**1.444**	**1282.15**	**33.81%**
				0.00	**0.00**	**0.00**	**0.00**	**1.40**	**0.76**	**0.00**	**0.16**	**9.80**	**2.54**	**0.93**	**32.50**	**TRUE**																				
OUTLET TO RENAUD ROAD (Ex 750mm dia)																																				
Renaud Road	410C-E	410C	STUB							1.07				0.29	2.58	2.58	10.00	1.19	11.19	104.19	122.14	178.56	268.66			106.20	268.66	375.37	120.00	525			0.70	1.680	106.72	28.43%
				0.00	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.07**	**0.00**	**0.00**	**0.00**	**0.29**	**2.58**	**TRUE**																				

J:\31855-TrailsEdgeII\5.7 Calculations\5.7.1 Sewers & Grading\5th Submission Subdivision_ongoing_feb 2015\CCS-storm-2015-02-12

IBI GROUP

IBI Group
400-333 Preston Street
Ottawa, Ontario
K1S 5N4

STORM SEWER DESIGN SHEET

PROJECT: TRAILSEDGE II
LOCATION: CITY OF OTTAWA
CLIENT: MINTO COMMUNITIES INC.

LOCATION				AREA (Ha)													RATIONAL DESIGN FLOW											SEWER DATA								
STREET	Area #	FROM MH	TO MH	C= 0.20	C= 0.25	C= 0.40	C= 0.50	C= 0.54	C= 0.64	C= 0.65	C= 0.69	C= 0.70	C= 0.71	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAP (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VEL (m/s)	AVAIL CAP (5yr) (L/s)	(%)
OUTLET TO Mudd Creek - Belcourt (3000mm dia)																																				
Belcourt Boulevard	S500	500	500C											0.26	0.58	0.58	10.00	1.40	11.40	104.19	122.14	178.56	60.25			84.00	60.25	91.46	67.36	375			0.25	0.802	31.21	34.12%
Belcourt Boulevard	S500C	500C	501											0.31	0.69	0.69	11.40	1.12	12.52	97.34	114.07	166.70	67.11			101.00	67.11	224.33	67.36	525			0.25	1.004	157.22	70.08%
SCHOOL	EXT-501	EXT-501	501							5.01					9.05	9.05	12.31	0.27	12.58	93.39	109.42	159.88	845.49				845.49	986.85	17.80	1050			0.12	1.104	141.36	14.32%
Belcourt Boulevard	S501	501	MH501B												0.00	9.74	12.58	0.54	13.11	92.29	108.13	157.98	899.18				899.18	986.85	35.46	1050			0.12	1.104	87.67	8.88%
		MH501B	57												0.00	9.74	13.11	0.07	13.18	90.19	105.66	154.35	878.69				878.69	986.85	4.52	1050			0.12	1.104	108.17	10.96%
Belcourt Boulevard	S3901	3901	3900											0.460	1.02	1.02	10.00	0.98	10.98	104.19	122.14	178.56	106.59			149.00	106.59	148.72	53.35	450			0.25	0.906	42.12	28.32%
	EXT-113, S3900B	EXT-113	3900											43.601	96.97	96.97	28.41	0.16	28.57	55.94	65.41	95.33	5,424.84			69.40	5,424.84	11,180.46	17.90	2700			0.10	1.892	5755.62	51.48%
Axis Street	HGL Relief Pipe	3900	STUB												0.00	0.00	10.00	0.56	10.56	104.19	122.14	178.56	0.00				0.00	1,103.33	41.26	1050			0.15	1.234	1103.33	100.00%
Belcourt Boulevard		3900	54												0.00	97.99	28.57	0.20	28.77	55.74	65.17	94.98	5,461.74				5,461.74	11,180.46	22.92	2700			0.10	1.892	5718.72	51.15%
Belcourt Boulevard	S54	54	55											0.28	0.62	98.61	28.77	1.01	29.78	55.47	64.86	94.52	5,470.49			91.00	5,470.49	11,180.46	114.70	2700			0.10	1.892	5709.97	51.07%
	EXT-55	EXT-55	55							2.59		1.05		3.26	13.97	13.97	14.00	0.33	14.33	86.93	101.82	148.72	1,214.78				1,214.78	1,760.81	23.24	1350			0.10	1.192	546.03	31.01%
Belcourt Boulevard	S55A	55	55B											0.22	0.49	113.08	29.70	0.26	29.96	54.30	63.48	92.50	6,139.61			72.00	6,139.61	11,180.46	29.89	2700			0.10	1.892	5040.86	45.09%
Belcourt Boulevard	S55B-C	55B	56											0.27	0.60	113.68	30.70	1.04	31.74	53.09	62.06	90.43	6,035.16			94.00	6,035.16	11,180.46	118.40	2700			0.10	1.892	5145.30	46.02%
	EXT-2090	EXT-2090	56											22.014	48.96	48.96	27.09	0.31	27.40	57.75	67.53	98.44	2,827.46				2,827.46	6,875.59	30.96	2250			0.10	1.675	4048.13	58.88%
Belcourt Boulevard	S56	56	BEND											0.27	0.60	163.24	31.74	0.20	31.94	51.89	60.66	88.38	8,471.08			88.00	8,471.08	14,807.43	24.18	3000			0.10	2.029	6336.35	42.79%
		BEND	57												0.00	163.24	31.94	0.05	31.99	51.67	60.40	88.00	8,435.02				8,435.02	14,807.43	5.98	3000			0.10	2.029	6372.41	43.04%
Belcourt Boulevard	EXT-10	57	BEND												0.00	172.98	31.99	0.05	32.04	51.62	60.34	87.90	8,929.06				8,929.06	14,807.43	5.98	3000			0.10	2.029	5878.37	39.70%
Belcourt Boulevard		BEND	HW												0.00	172.98	32.04	0.08	32.12	51.56	60.27	87.81	8,919.69				8,919.69	14,807.43	9.93	3000			0.10	2.029	5887.75	39.76%
				0.00	0.00	0.00	0.00	0.00	0.00	7.60	0.00	1.05	0.00	70.69	172.98	TRUE																				
OUTLET TO Mudd Creek - Street 'A' North (2100 mm dia)																																				
Yellow Birch Street	S112A-B, R112A-B	112	101					0.26					0.20		0.79	0.79	10.00	1.31	11.31	104.19	122.14	178.56	81.80			133.00	81.80	100.18	68.85	375			0.30	0.879	18.39	18.35%
Locust Ridge	HGL Relief pipe	56	101												0.00	0.00	10.00	1.33	11.33	104.19	122.14	178.56	0.00				0.00	230.96	63.08	600			0.13	0.791	230.96	100.00%
Locust Ridge	S101	101	102										0.20		0.39	1.18	11.31	1.23	12.53	97.77	114.57	167.44	115.35			55.00	115.35	316.18	63.08	675			0.13	0.856	200.83	63.52%
Locust Ridge	S102	102	103										0.18		0.36	1.54	12.53	1.26	13.79	92.47	108.34	158.29	141.96			49.00	141.96	316.18	64.65	675			0.13	0.856	174.22	55.10%
Locust Ridge		103	104												0.00	1.54	13.79	0.26	14.05	87.67	102.69	150.00	134.59				134.59	385.20	13.13	750			0.11	0.845	250.61	65.06%
Protected Tree Area	P104	CBMH002	MAIN	0.42											0.23	0.23	10.00	0.18	10.18	104.19	122.14	178.56	24.33			9.00	24.33	62.04	13.13	250			1.00	1.224	37.71	60.78%
Locust Ridge	S104,R104	104	105					0.22					0.10		0.53	2.30	13.79	1.08	14.87	87.67	102.69	150.00	201.32			67.00	201.32	944.84	68.21	1050			0.11	1.057	743.52	78.69%
Yellow Birch Street		112B	113												0.00	0.00	10.00	0.14	10.14	104.19	122.14	178.56	0.00				0.00	100.88	11.61	300			1.00	1.383	100.88	100.00%
Yellow Birch Street	S113, R113	113	114					0.13					0.34		0.87	0.87	10.14	0.75	10.89	103.46	121.28	177.29	89.62			117.00	89.62	153.03	60.03	375			0.70	1.342	63.41	41.44%
Yellow Birch Street	S114, R114	114	105					0.11					0.29		0.74	1.60	10.89	1.13	12.01	99.74	116.89	170.85	159.96			101.00	159.96	224.33	67.96	525			0.25	1.004	64.37	28.69%
Yellow Birch Street	S105,R105B	105	106												0.00	3.90	15.60	0.14	15.73	81.67	95.64	139.65	318.54				318.54	1,348.97	9.48	1200			0.11	1.155	1030.44	76.39%
SCHOOL	BLK 246	MH206	106						2.89						5.14	5.14	15.00	0.60	15.60	83.56	97.85	142.89	429.64			613.00	429.64	654.22	35.73	900			0.12	0.996	224.58	34.33%
Yellow Birch Street	S106, R106	106	STUB										0.15		0.30	9.34	15.73	1.42	17.16	81.26	95.15	138.92	758.78			570.00	758.78	1,348.97	98.63	1200			0.11	1.155	590.19	43.75%
				0.42	0.00	0.00	0.00	0.72	2.89	0.00	0.00	0.00	1.46	0.00	9.34	TRUE																				

Designed:	RM	Revision	Date
		Trailsedge - Revised per City Comments/Issued to MOE	1/26/2015
		Trailsedge - Revised per City Comments	9/16/2014
		Trailsedge - Revised per City Comments Phase 2A only & Renaud Ashcroft Design	7/25/2014
Checked:	DGY	Renaud Road Submission #3	4/30/2014
		Trailsedge - Issued to City for Review	3/20/2014
		Renaud Road Submission #2	3/13/2014
		Renaud Road Submission #1	12/12/2013
		Issued for City Review	2/2/2013
Dwg. Reference:	31855-500	File Reference: 31855.5.7.1 / Date: ######	Sheet No: 1 of 1

Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)

[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Mannings Coefficient (n) = 0.013

LEGEND :

- r12 — AREA NUMBER; 0.64 — RUNOFF COEFFICIENT; 0.08 — AREA IN HECTARES
- r12c — 100 YEAR FLOW AREA NUMBER; 0.45 — RUNOFF COEFFICIENT; 0.36 — AREA IN HECTARES
- 0.36 — OFFSITE AREA IN HECTARES; 0.58 — RUNOFF COEFFICIENT
- 1.21 — OFFSITE AREA IN HECTARES
- TO MH300, AC=2.317, Tc=14.43 — EXTERNAL FLOW, AREA x RUNOFF COEFFICIENT, TIME OF CONCENTRATION
- SPLIT FLOW SOUTH, AC=2.44, Tc=24.70 — SPLIT FLOW, AREA x RUNOFF COEFFICIENT, TIME OF CONCENTRATION
- EMERGENCY FLOW ROUTE FOR STORM ABOVE THE 1:100 EVENT
- MINOR FLOW ROUTE

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8	REVISED PER CITY COMMENTS	DGY	15:02:12
7	REVISED PER CITY COMMENTS	DGY	15:01:26
6	REVISED PER CITY COMMENTS	DGY	14:11:07
5	REVISED PER CITY COMMENTS	DGY	14:09:16
4	REVISED PER CITY COMMENTS	DGY	14:07:28
3	REVISED PER NEW LEGAL	DGY	14:04:02
2	REVISED PER MASTER SERVICING STUDY	DGY	14:03:24
1	ISSUED FOR CITY REVIEW	DGY	13:02:01

minto

IBI GROUP
333 Preston Street
Tower 1, Suite 400
Ottawa, Ontario
Canada K1S 5N4
Tel (613)225-1311
Fax (613)225-9868

Project Title
TRAILSEDGE II
1578051 ONTARIO INC.

LICENSED PROFESSIONAL ENGINEER
D. Yannoulopoulos
2015/02/12
PROVINCE OF ONTARIO

N

Drawing Title
STORM DRAINAGE
AREA PLAN

Scale 1 : 1000

Design	R.M.	Date	FEB 2014
Drawn	E.H.	Checked	D.Y.G.
Project No.	31855	Drawing No.	500

D07-16-07-0018PH3

16688

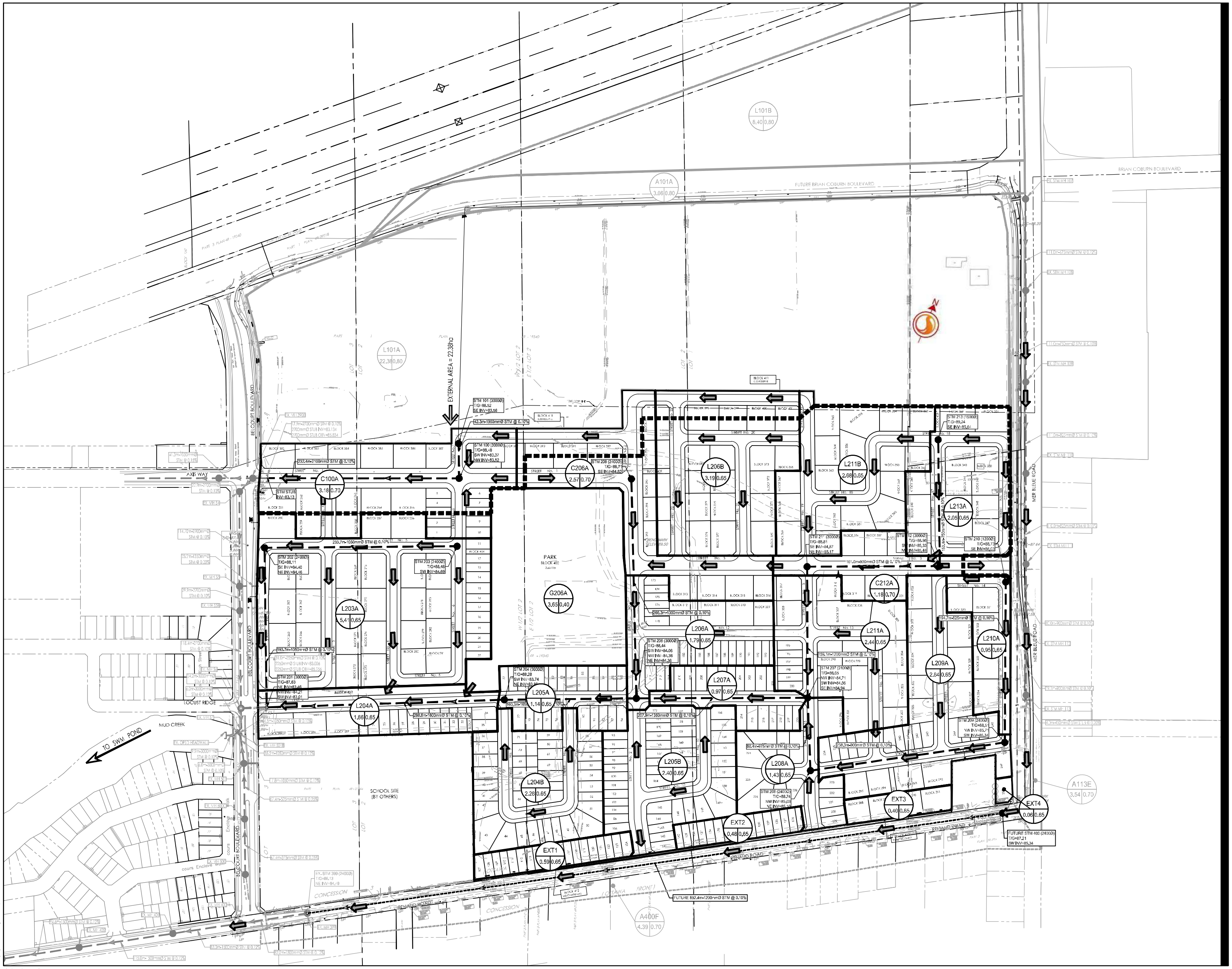
Trails Edge East – Functional Servicing Report

Project #160401250

Prepared for:
Richcraft Group of Companies

Prepared by:
Stantec Consulting Ltd.

August 11, 2017



Stantec

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www.stantec.com

Legend

- TRUNK STORM SEWER
- EXISTING TRUNK STORM SEWER
- FUTURE TRUNK STORM SEWER
- MAJOR OVERLAND FLOW ROUTE
- ST101 1.00 0.80: DRAINAGE AREA No.; RUNOFF COEFFICIENT; STORM DRAINAGE AREA (ha)
- ST101F 1.00 0.80: EXISTING DRAINAGE AREA No.; EXISTING RUNOFF COEFFICIENT; EXISTING STORM DRAINAGE AREA (ha)
- ST101F 1.00 0.80: FUTURE DRAINAGE AREA No.; FUTURE RUNOFF COEFFICIENT; FUTURE STORM DRAINAGE AREA (ha)
- STORM DRAINAGE BOUNDARY
- EXISTING STORM DRAINAGE BOUNDARY
- FUTURE STORM DRAINAGE BOUNDARY
- MAJOR SYSTEM DIVIDE

Notes

	Revision	By	Appd.	YY.MM.DD
2	DRAFT PLAN APPROVAL 2ND SUBMISSION	DT	SG	17.08.11
1	DRAFT PLAN APPROVAL 1ST SUBMISSION	MJS	SG	16.11.02

File Name: 160401250 MSS	MJS	SG	MJS	16.10.06
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

LICENSED PROFESSIONAL ENGINEER D. C. THIFFAULT 100186107 11/08/2017 PROVINCE OF ONTARIO

Client/Project

RICHCRAFT GROUP OF COMPANIES
2280 ST. LAURENT BLVD
OTTAWA, ON, K1G 4K1

TRAILSEDGE EAST SUBDIVISION

Title

OVERALL STORM SEWER SYSTEM

Project No.	Scale
160401250	1:2000 (0 20 60 100m)

Drawing No.	Sheet	Revision
STM-1	1 of 5 (E176)	2

Stantec	Trailsedge East Subdivision		STORM SEWER DESIGN SHEET (City of Ottawa)
	DATE:	2017-08-11	
	REVISION:	2	
	DESIGNED BY:	DT	FILE NUMBER: 160401250
	CHECKED BY:	AMP	

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	MANNING'S n =	0.013	
b =	6.199	6.053	6.014	6.014	MINIMUM COVER:	2.00	m
c =	0.810	0.814	0.816	0.820	TIME OF ENTRY	10	min

BEDDING CLASS = B

LOCATION / DRAINAGE AREA

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)
L101A, L101B, A101A	101	100	30.78	0.00	3.06	0.00	0.00	0.80	0.00	0.80	0.00	24.622	24.622	0.000	0.000	2.449	2.449	0.000	0.000
C100A	100	ORTH STU	0.00	3.18	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.000	24.622	2.229	2.229	0.000	2.449	0.000	0.000
A400F	400	399	0.00	0.00	4.39	0.00	0.00	0.00	0.00	0.70	0.00	0.000	0.000	0.000	0.000	3.073	3.073	0.000	0.000
L206B, C206A, L206A, G206A	206	205	8.63	2.57	0.00	0.00	0.00	0.54	0.70	0.00	0.00	4.699	4.699	1.797	1.797	0.000	0.000	0.000	0.000
L210A	210	209	0.95	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.617	0.617	0.000	0.000	0.000	0.000	0.000	0.000
L209A	209	208	2.84	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	1.846	2.463	0.000	0.000	0.000	0.000	0.000	0.000
L208A	208	207	1.43	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.930	3.393	0.000	0.000	0.000	0.000	0.000	0.000
L213A	213	212	2.05	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	1.334	1.334	0.000	0.000	0.000	0.000	0.000	0.000
C212A	212	211	0.00	1.18	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.000	1.334	0.824	0.824	0.000	0.000	0.000	0.000
L211B, L211A	211	207	5.12	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	3.329	4.663	0.000	0.824	0.000	0.000	0.000	0.000
L207A	207	205	0.97	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.628	8.684	0.000	0.824	0.000	0.000	0.000	0.000
L205B, L205A	205	204	3.54	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	2.300	15.683	0.000	2.621	0.000	0.000	0.000	0.000
L204A, L204B	204	201	3.95	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	2.566	18.249	0.000	2.621	0.000	0.000	0.000	0.000
L203A	203	202	5.41	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	3.515	3.515	0.000	0.000	0.000	0.000	0.000	0.000
	202	201	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	3.515	0.000	0.000	0.000	0.000	0.000	0.000
	201	OUTH STU	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	21.765	0.000	2.621	0.000	0.000	0.000	0.000

PIPE SELECTION

AREA ID NUMBER	FROM M.H.	TO M.H.	T of C (min)	I_{2-YEAR} (mm/h)	I_{5-YEAR} (mm/h)	$I_{10-YEAR}$ (mm/h)	$I_{100-YEAR}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR 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)
L101A, L101B, A101A	101	100	17.75	55.96	75.61	88.51	129.19	0.0	0.0	4429.3	42.3	1950	1950	CIRCULAR	CONCRETE	-	0.10	4694.4	**94.35%**	1.52	1.57	0.45
C100A	100	ORTH STU	18.20	55.12	74.47	87.17	127.22	0.0	0.0	4824.3	232.4	2100	2100	CIRCULAR	CONCRETE	-	0.10	5720.2	**84.34%**	1.60	1.60	2.42
			20.62									2100	2100									
A400F	400	399	10.00	76.81	104.19	122.14	178.56	0.0	0.0	1042.6	852.4	1200	1200	CIRCULAR	CONCRETE	-	0.10	1286.2	**81.06%**	1.10	1.09	13.02
			23.02									1500	1500									
L206B, C206A, L206A, G206A	206	205	10.00	76.81	104.19	122.14	178.56	0.0	0.0	1522.6	266.3	1350	1350	CIRCULAR	CONCRETE	-	0.10	1760.8	**86.47%**	1.19	1.20	3.70
			13.70																			
L210A	210	209	10.00	76.81	104.19	122.14	178.56	0.0	0.0	131.6	194.7	525	525	CIRCULAR	CONCRETE	-	0.16	179.5	**73.34%**	0.80	0.77	4.20
L209A	209	208	14.20	63.72	86.23	101.00	147.51	0.0	0.0	435.9	238.3	900	900	CIRCULAR	CONCRETE	-	0.10	597.2	**72.99%**	0.91	0.87	4.57
L208A	208	207	18.77	54.10	73.07	85.52	124.81	0.0	0.0	509.9	88.4	975	975	CIRCULAR	CONCRETE	-	0.10	739.3	**68.96%**	0.96	0.90	1.63
			20.40																			
L213A	213	212	10.00	76.81	104.19	122.14	178.56	0.0	0.0	284.7	153.4	750	750	CIRCULAR	CONCRETE	-	0.10	367.3	**77.51%**	0.81	0.78	3.26
C212A	212	211	13.26	66.20	89.64	105.00	153.39	0.0	0.0	450.5	161.0	900	900	CIRCULAR	CONCRETE	-	0.10	597.2	**75.43%**	0.91	0.88	3.05
L211B, L211A	211	207	16.31	58.84	79.55	93.14	135.98	0.0	0.0	944.2	159.1	1200	1200	CIRCULAR	CONCRETE	-	0.10	1286.2	**73.41%**	1.10	1.06	2.50
			18.81																			
L207A	207	205	20.40	51.40	69.38	81.19	118.46	0.0	0.0	1398.6	207.9	1350	1350	CIRCULAR	CONCRETE	-	0.10	1760.8	**79.43%**	1.19	1.17	2.95
			23.35																			
L205B, L205A	205	204	23.35	47.20	63.66	74.47	108.60	0.0	0.0	2519.5	160.3	1650	1650	CIRCULAR	CONCRETE	-	0.10	3006.9	**83.79%**	1.36	1.36	1.97
L204A, L204B	204	201	25.32	44.79	60.39	70.63	102.97	0.0	0.0	2710.4	288.6	1800	1800	CIRCULAR	CONCRETE	-	0.10	3792.1	**71.47%**	1.44	1.38	3.49
			28.81																			
L203A	203	202	10.00	76.81	104.19	122.14	178.56	0.0	0.0	750.0	233.7	1050	1050	CIRCULAR	CONCRETE	-	0.10	900.9	**83.25%**	1.01	1.00	3.88
	202	201	13.88	64.54	87.36	102.32	149.46	0.0	0.0	630.3	193.7	1050	1050	CIRCULAR	CONCRETE	-	0.10	900.9	**69.96%**	1.01	0.96	3.37
			17.25																			
	201	OUTH STU	28.81	41.14	55.42	64.80	94.44	0.0	0.0	2891.0	31.2	2250	2250	CIRCULAR	CONCRETE	-	0.10	6875.6	**42.05%**	1.68	1.36	0.38
			29.19									2250	2250									

Trails Edge East Phase 1

Servicing and Stormwater Management
Report

Project # 160401250

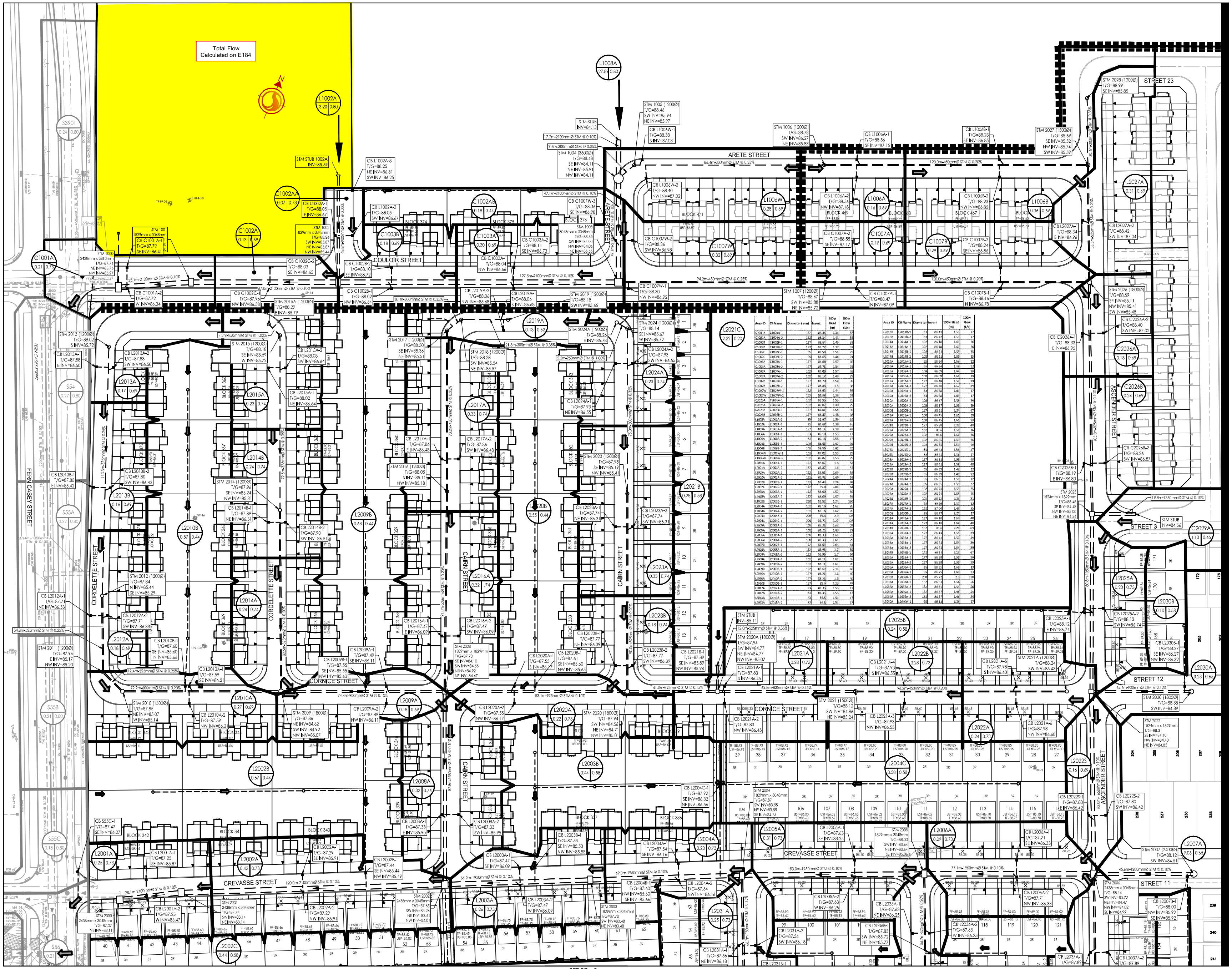
August 23, 2018

Prepared for:

Richcraft Group of Companies

Prepared by:

Stantec Consulting Ltd.



Stantec

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Legend

- AREA ID
- RUNOFF COEFFICIENT
- STORM DRAINAGE AREA ha.
- STORM DRAINAGE BOUNDARY
- EXISTING/FUTURE STORM DRAINAGE BOUNDARY
- EXISTING/FUTURE DRAINAGE AREA
- TYPICAL SERVICE LATERAL LOCATION
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Notes

2	REVISED AS PER CITY COMMENTS AND DRAFT PLAN	MJS	DT	18.08.23
1	REVISED AS PER CITY COMMENTS	MJS	DT	18.05.30
0	ISSUED TO CITY FOR REVIEW	MJS	DT	18.03.06
Revision		By	Appd.	YY.MM.DD

File Name: 160401250 SD.DWG	JP	MJS	JP	18.02.14
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project

RICHCRAFT GROUP OF COMPANIES
2280 ST. LAURENT BLVD
OTTAWA, ON, K1G 4K1

TRAILSEDGE EAST SUBDIVISION
OTTAWA, ON, CANADA

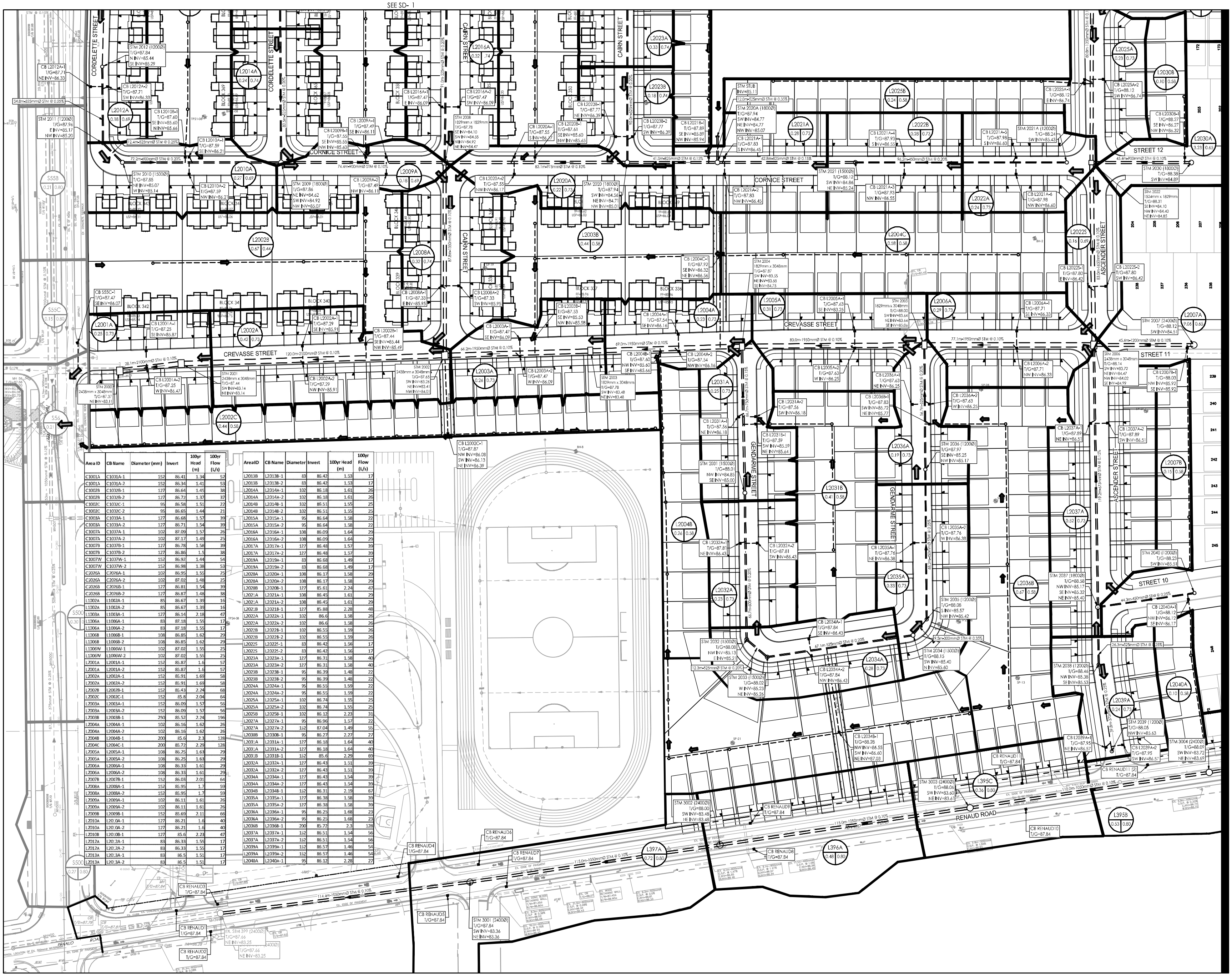
Title

STORM DRAINAGE PLAN

Project No. 160401250
Scale 1:750 (0, 7.5, 22.5, 37.5m)

Drawing No. SD-1
Sheet 40 of 44
Revision 3

E179



Area ID	CB Name	Diameter (mm)	Invert	100yr Head (m)	100yr Flow (L/s)
C1001A	C1001A-1	152	86.41	1.34	52
C1001A	C1001A-2	152	86.34	1.41	53
C1002B	C1002B-1	127	86.64	1.45	38
C1002B	C1002B-2	127	86.72	1.37	37
C1002C	C1002C-1	95	86.58	1.51	22
C1002C	C1002C-2	95	86.65	1.44	21
C1003A	C1003A-1	127	86.68	1.57	39
C1003A	C1003A-2	127	86.71	1.54	39
C1007A	C1007A-1	102	87.09	1.57	26
C1007A	C1007A-2	102	87.17	1.49	25
C1007B	C1007B-1	127	86.78	1.58	39
C1007B	C1007B-2	127	86.86	1.5	38
C1007W	C1007W-1	152	86.92	1.44	54
C1007W	C1007W-2	152	86.98	1.38	53
C2026A	C2026A-1	102	86.95	1.55	25
C2026A	C2026A-2	102	87.02	1.48	25
C2026B	C2026B-1	127	86.81	1.54	39
C2026B	C2026B-2	127	86.87	1.48	38
L1002A	L1002A-1	85	86.67	1.39	16
L1002A	L1002A-2	85	86.67	1.39	16
L1003A	L1003A-1	127	86.14	2.18	47
L1006A	L1006A-1	83	87.18	1.55	17
L1006A	L1006A-2	83	87.18	1.55	17
L1006B	L1006B-1	108	86.85	1.62	29
L1006B	L1006B-2	108	86.85	1.62	29
L1006W	L1006W-1	102	87.02	1.55	25
L1006W	L1006W-2	102	87.02	1.55	25
L2001A	L2001A-1	152	85.87	1.6	57
L2001A	L2001A-2	152	85.87	1.6	57
L2002A	L2002A-1	152	85.91	1.69	58
L2002A	L2002A-2	152	85.91	1.69	58
L2002B	L2002B-1	152	85.43	2.24	68
L2002C	L2002C-1	152	85.8	2.04	64
L2003A	L2003A-1	152	86.09	1.57	56
L2003A	L2003A-2	152	86.09	1.57	56
L2003B	L2003B-1	250	85.52	2.24	196
L2004A	L2004A-1	102	86.16	1.62	26
L2004A	L2004A-2	102	86.16	1.62	26
L2004B	L2004B-1	200	85.6	2.3	128
L2004C	L2004C-1	200	85.72	2.29	128
L2005A	L2005A-1	108	86.25	1.63	29
L2005A	L2005A-2	108	86.25	1.63	29
L2006A	L2006A-1	108	86.33	1.61	29
L2006A	L2006A-2	108	86.33	1.61	29
L2007B	L2007B-1	152	86.03	2.01	64
L2008A	L2008A-1	152	85.95	1.7	59
L2008A	L2008A-2	152	85.95	1.7	59
L2009A	L2009A-1	102	86.11	1.61	26
L2009A	L2009A-2	102	86.11	1.61	26
L2009B	L2009B-1	152	85.69	2.11	66
L2010A	L2010A-1	127	86.21	1.6	40
L2010A	L2010A-2	127	86.21	1.6	40
L2010B	L2010B-1	127	85.6	2.23	47
L2012A	L2012A-1	83	86.33	1.55	17
L2012A	L2012A-2	83	86.33	1.55	17
L2013A	L2013A-1	83	86.5	1.51	17
L2013A	L2013A-2	83	86.5	1.51	17

Area ID	CB Name	Diameter	Invert	100yr Head (m)	100yr Flow (L/s)
L2013B	L2013B-1	83	86.42	1.53	17
L2013B	L2013B-2	83	86.42	1.53	17
L2014A	L2014A-1	102	86.18	1.61	26
L2014A	L2014A-2	102	86.18	1.61	26
L2014B	L2014B-1	102	86.51	1.55	25
L2014B	L2014B-2	102	86.51	1.55	25
L2015A	L2015A-1	95	86.64	1.58	22
L2015A	L2015A-2	95	86.64	1.58	22
L2016A	L2016A-1	108	86.09	1.64	29
L2016A	L2016A-2	108	86.09	1.64	29
L2017A	L2017A-1	127	86.48	1.57	39
L2017A	L2017A-2	127	86.48	1.57	39
L2019A	L2019A-1	83	86.68	1.49	17
L2019A	L2019A-2	83	86.68	1.49	17
L2020A	L2020A-1	108	86.17	1.58	29
L2020A	L2020A-2	108	86.17	1.58	29
L2020B	L2020B-1	127	85.61	2.24	47
L2021A	L2021A-1	108	86.45	1.61	29
L2021A	L2021A-2	108	86.45	1.61	29
L2021B	L2021B-1	127	85.88	2.28	48
L2022A	L2022A-1	102	86.6	1.58	26
L2022A	L2022A-2	102	86.6	1.58	26
L2022B	L2022B-1	102	86.55	1.59	26
L2022B	L2022B-2	102	86.55	1.59	26
L2022S	L2022S-1	83	86.42	1.56	17
L2022S	L2022S-2	83	86.42	1.56	17
L2023A	L2023A-1	127	86.31	1.58	40
L2023A	L2023A-2	127	86.31	1.58	40
L2023B	L2023B-1	95	86.39	1.48	22
L2023B	L2023B-2	95	86.39	1.48	22
L2024A	L2024A-1	95	86.55	1.59	22
L2024A	L2024A-2	95	86.55	1.59	22
L2025A	L2025A-1	102	86.74	1.55	25
L2025A	L2025A-2	102	86.74	1.55	25
L2025B	L2025B-1	102	86.12	2.23	31
L2027A	L2027A-1	95	86.96	1.57	22
L2027A	L2027A-2	152	87.04	1.49	55
L2030B	L2030B-1	95	86.27	2.27	27
L2031A	L2031A-1	127	86.18	1.64	40
L2031A	L2031A-2	127	86.18	1.64	40
L2031B	L2031B-1	152	85.6	2.29	69
L2032A	L2032A-1	127	86.43	1.51	39
L2032A	L2032A-2	127	86.43	1.51	39
L2034A	L2034A-1	127	86.43	1.54	39
L2034A	L2034A-2	127	86.43	1.54	39
L2034B	L2034B-1	152	86.31	2.19	67
L2035A	L2035A-1	127	86.38	1.58	39
L2035A	L2035A-2	127	86.38	1.58	39
L2036A	L2036A-1	95	86.25	1.68	23
L2036A	L2036A-2	95	86.25	1.68	23
L2036B	L2036B-1	200	85.72	2.3	128
L2037A	L2037A-1	152	86.51	1.54	56
L2037A	L2037A-2	152	86.51	1.54	56
L2039A	L2039A-1	152	86.57	1.46	54
L2039A	L2039A-2	152	86.57	1.46	54
L2040A	L2040A-1	95	86.12	2.28	27

Stantec

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Legend

- L202A / 1.13 / 0.80 — AREA ID; RUNOFF COEFFICIENT; STORM DRAINAGE AREA ha.
- STORM DRAINAGE BOUNDARY
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2	REVISED AS PER CITY COMMENTS AND DRAFT PLAN	MJS	DT	18.08.23
1	REVISED AS PER CITY COMMENTS	MJS	DT	18.05.30
0	ISSUED TO CITY FOR REVIEW	MJS	DT	18.03.06
Revision		By	Appd.	YY.MM.DD

File Name: 160401250 SD.DWG	JP	MJS	JP	18.02.14
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project
RICHCRAFT GROUP OF COMPANIES
2280 ST. LAURENT BLVD
OTTAWA, ON, K1G 4K1

TRAILSEDGE EAST SUBDIVISION
OTTAWA, ON, CANADA

Title
STORM DRAINAGE PLAN

Project No. 160401250
Scale 1:750 (0 7.5 22.5 37.5m)
Drawing No. SD-2
Sheet 41 of 44
Revision 3
E180