DILLON CONSULTING

MONTGOMERY SISAM ARCHITECTS INC.

Orleans Long Term Care Facility Functional Servicing Report

1161 Old Montreal Road, City of Ottawa

August 2022 – 21-2647

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Appendices

1.0 Introduction

Dillon Consulting Limited (Dillon) was retained by Montgomery Sisam Architects Inc. to develop a functional servicing strategy for the undeveloped property fronting Famille-Laporte Avenue, located at 1161 Old Montreal Road in the City of Ottawa. This document outlines the servicing strategy including supporting studies and related information for the transportation, sanitary, stormwater management, and water main servicing for the site.

The total area of the entire site is approximately 2.01 Ha. The Developer is planning on severing the property into two separate development lots. The proposed Long Term Care development site is approximately 1.25 Ha, and the remaining undeveloped lands area are approximately 0.76 Ha. The overall site is presently zoned RI5 Rural Institutional and currently consists of a vacant/grassed field. The proposed Long Term Care Facility development will be located on the southern portion of the site within the limits of the vacant field.

This document is intended for use for the Long Term Care facility portion of the site only. A separate FSR will be prepared for the future development lands to be north.

1.1 Reference Documents

The following documents and drawings were referenced when completing this study:

- City of Ottawa– Sewer Design Guidelines (Ottawa, 2012)
- City of Ottawa – GIS Interactive Mapping (Ottawa)
- Design Guidelines for Sewage Works (MOE, 2008)
- Cardinal Creek Master Servicing Study (David Schaeffer Engineering Ltd., 2013)
- Cardinal Creek Village, Phase 1A As-Built Drawings (David Schaeffer Engineering Ltd., 2014)

2.0 Transportation Servicing

2.1 Existing Conditions

There is no existing access to the proposed development. The property is bounded on the north limit, east limit, and south limit by residential homes.

2.2 Proposed Roadways

The proposed access points to this development will be from Famille-Laporte Avenue at the west limit of the site. Staff, visitors, EMS, services and deliveries will access the site via Famille-Laporte Avenue. The site layout is shown in *Appendix A*. The pavement structure of the proposed internal roads will be consistent with geotechnical recommendations and the City's Development Manual. A Traffic Impact Study (TIS) has been completed for the site and is included as a separate submission.

3.0 Sanitary Servicing

3.1 Existing Conditions

Currently, there is an existing 200 mm diameter sanitary sewer located underneath Famille-Laporte Avenue, which is located west of the proposed development. The existing sanitary sewer heads northwards, ultimately discharges to the City of Ottawa Robert O. Pickard Environmental Centre treatment plant.

3.2 Design Criteria

The following sanitary sewer design criteria for this property are outlined in Table 1. The design criteria was established by the City of Ottawa's Design Guidelines (2012).

Table 1: Sanitary Sewer Design Criteria

Criteria	City of Ottawa's Design Guidelines (2012)
Hydraulic Sewer Sizing	Manning's Equation
Minimum Sewer Size (mm)	135 mm diameter
Minimum Cover Depth (m)	2.5
Manning's Roughness Coefficient 'n'	0.013
Velocity: Minimum (m/s) Maximum (m/s)	 0.60 3.00
Hydraulic Losses Across Manholes: • Straight Run (m) • 45 degree turn of less (m) • Greater than 45 degree turn to 90 degree turn (m)	 Grade of Sewer 0.03 0.06
Infiltration Allowance/Peak Extraneous Flow	0.28 L/Ha/s
Peaking Factor	Based on Harmon Formula
Population Densities For Facility:	224 Bed Facility Assumed 30 Staff Members Total Population = 254 ppl
Average Daily Sewage	50,000 L/Gross Ha/Day [Per City Sewer Guidelines for Institutional Lands] 350 L/Cap/Day [Residential Average Flow]
Sewer Surcharging	Maximum hydraulic grade line

3.3 Proposed Servicing

Refer to the attached *Appendix A* which illustrates the proposed sanitary servicing layout. The sanitary servicing for the proposed development is as follows:

- All sanitary flows from the proposed building will be conveyed via a new 200mm site sanitary sewer.
- The site sanitary sewer will outlet to the existing Private Drain Connection stub located at the Famille-Laporte Avenue right-of-way limit. The existing PDC sewer is 200mm in diameter, connects to an existing sanitary manhole within the Famille-Laporte right-of-way, and drains northerly via an existing 250mm diameter sewer.
- A new Sanitary Manhole will be installed at the property line/PDC stub.
- A service connection will be installed from the west side of the building and directed to the new manhole at the property line.
- Due to the elevation drop at the new manhole at the right-of-way (greater than 1.5m), an external drop structure shall be included to provide a smooth transition for effluent across the manhole.

The sanitary sewer functional design sheets are provided in *Appendix B*. Criteria used in flow calculation is listed in Table 1.

The future detailed design of the sanitary sewer and service is to be consistent with the requirements of the City of Ottawa, Cardinal Creek Master Servicing Study and the Ministry of Environment, Conservation and Parks (MECP).

4.0 Stormwater Servicing

4.1 Background Information

The proposed development is of approximately 1.21 Ha and is zoned RI5 Rural Institutional, currently consists of a vacant field. The City of Ottawa has previously installed a storm sewer stub for the proposed development at this location. There is an existing 1200 mm diameter municipal storm sewer within the Famille-Laporte Avenue right-of-way along east side of the road heading northwards, which drains to the downstream Cardinal Creek stormwater management facility and ultimately discharges to the Ottawa River. An outlet sewer/drain connection for the site drain to City of Ottawa manhole MHST74214. According to the as-built drawings provided by the City, the private drain connection is a 600mm diameter concrete pipe at 0.50% slope that terminates at the property with a manhole.

The development parcel is within the Cardinal Creek Development area. Cardinal Creek is subject to the Cardinal Creek Master Servicing Study (2013). As a part of that Master Servicing Study, a regional stormwater management pond was constructed. For the purposes of determining stormwater management criteria for the site, the subject parcel was assigned an existing Runoff Coefficient of 0.70 as per the Storm Drainage Plan for the Development (Sheet 65 – Cardinal Creek Village Phase 1A, David Schaeffer Engineering Ltd, 2014). The Storm Drainage Plan is included in *Appendix B*.

Areas to the south and southeast of the property presently grade towards the subject parcel. The offsite parcels are existing residential properties, mainly grassed with various structures. Overland flows from larger rain events will drain towards and onto the subject parcel. The offsite areas are also included in the Cardinal Creek Master Servicing Study (2013) and are also assigned an existing Runoff Coefficient of 0.70.

4.2 Design Criteria

The following storm sewer design criteria for this property are outlined in Table 2. The design criteria were established by the City of Ottawa's Design Guidelines (2012) and the Cardinal Creek Master Servicing Study (2013).

Table 2: Storm Sewer Design Criteria

Criteria	City of Ottawa's Design Guidelines (2012)
Hydraulic Sewer Sizing	Rational Method / Mannings Equation
Sewer Sizing Rainfall Event	5 year storm event
Minimum Cover Depth (m)	2
Manning's Roughness Coefficient 'n'	0.013

Criteria	City of Ottawa's Design Guidelines (2012)
Velocity: • Minimum (m/s) • Maximum (m/s)	 0.80 3.0
Roof Downspouts	Connected directly to site service connection
Rooftop Storage	Permitted (maximum 150mm depth)
Inlet Times: • Institutional	 10 minute maximum
Runoff Coefficients: • Paved and Roof Surfaces • Landscaped/Open Space	Calculated per Site Conditions 0.90 0.20
Sewer Surcharging	• No surface ponding during 5 year storm event • 100 year Hydraulic Grade Line 0.3m below building footing
Stormwater Storage Requirements	• Storage of 100 year storm event • Outlet rate to be confirmed through consultation with City
Water Quality Treatment	Required per Rideau Valley Conservation Authority (RVCA)

4.3 Proposed Servicing

It is proposed that the site's stormwater outlet to the existing 1200 mm diameter storm sewer that is currently located within the Famille-Laporte Avenue right-of-way, located west of the site.

Refer to *Appendix A* for the proposed servicing. The stormwater servicing for the proposed development is as follows:

- The proposed site, and paved area will be serviced through a new storm sewer network constructed within the site.
- Onsite detention will be provided in accordance with City of Ottawa and Rideau Valley Conservation Authority Design Guidelines. The site storm outlet rate is to be restricted to the pre-development outlet rates for the 5 and 100 year storm events.
- Required restricted flows for the 100 year storm event are to be detained in an underground storage facility. The anticipated 100 year high water line will be at the top of the detention facility, which is below the lowest point on the site.
- The site will be graded to allow for overland flow to be captured onsite and directed to the storm sewer network. Rain events in excess of the 100 year event will pond onsite, then drain overland within the existing City road network.

Refer to *Appendix B* for the storm sewer design and *Appendix C* for the Stormwater Management Calculations.

4.3.1 Stormwater Design Calculations

The entire development (1.25 Ha) is located within the Cardinal Creek Village, and is subject to the Cardinal Creek Master Servicing Study. The study completed in 2013, outlines the stormwater management requirements for the site. In general, the site is tributary to a downstream regional stormwater management facility. The site was assigned an existing Rational Method runoff coefficient of 0.70. As the site is presently all grassed, the Master Serving Study assumed the site was fully developed in the roadway sewer sizing and downstream detention facility design. The increased runoff coefficient allows for the LTC site to have a reduced volume of onsite detention from what would be typically expected when a grassed site is converted to a fully developed site.

As per City of Ottawa requirements, the rooftop drainage from the site will have a direct connection to the storm drain connection for the site. The rooftop drainage will be permitted to flow uncontrolled. As such, the release rate for the roof tops has been subtracted from the allowable release rate for the remainder of the site.

Presently there are residential lands to the south and southeast of the site that have overland drainage towards the subject parcel. The properties are 1171, 1183, 1195, 1199 and 1201 Old Montreal Road. The total additional area that drains to the site is approximately 0.92 Ha of mainly grassed lots with homes and structures. Unless the City requires that these parcels improve their site drainage, the existing overland flow routes from these homes will be generally maintained. As such, these lands have been included in the overall drainage calculations for the LTC site. These lands were also included in the Cardinal Creek Master Servicing Study, as such, the tributary area to the existing City sewers and pond will not be increased. Like the LTC site, the residential lands have been allocated an existing runoff coefficient of 0.70. If these lands were to be redeveloped in the future, it is understood that the properties would accommodate their own site drainage and regrade the lands to prevent overland flows from reaching the LTC site.

In order to properly account for the offsite areas, the detention system has been sized to account for the additional 0.92 Ha of residential lands. However, to prevent any required site improvements in the future, the outlet rate and associated outlet orifice plate have been sized to the allowable release rate from the LTC site only. As shown in the design calculation in *Appendix C*, the calculated outlet rate for the 5 year event for the LTC site is 0.254 m^3/s. The 5 year design requirements utilized for the site were identified in the Cardinal Creek Master Servicing Study.

As noted above, the rooftop will drain uncontrolled into the site storm drain connection. As shown in the design calculation in *Appendix C*, the calculated outlet rate for the rooftop and courtyard area (which is connected to the building drainage system) is 0.171 m^3/s.

The remaining available allowable release rate for the site is 0.086 m^3/s. This is the outlet rate that was used to calculate the required storage for the site.

4.3.2 Drainage Areas

The proposed site drainage areas can be found on Sheet DRG-1 in *Appendix B*. These can be read in conjunction with the sewer design sheets for the development area. The drainage areas tributary to the site include the above noted offsite residential lands/areas that presently drain overland to the subject parcel. These offsite lands will be deleted from the overall site drainage area if/when the offsite lands redevelop.

4.3.3 Site Detention

The required site 100 year event detention volume was calculated using the outlet rate detailed in Section 4.3.1. The total required volume for the site, including the identified offsite residential areas, is 242.2 m^3. The site architect has confirmed that there is no planned rooftop storage.

The total required storage will be provided in ADS StormTech system, which includes open bottom chambers to permit some infiltration if feasible. Given the native soils are clay, it is anticipated that infiltration rates will be slow, although no site testing has been conducted. Details for the detention chambers are included with Civil Design Plans.

4.3.4 Water Quality

Based on the Cardinal Creek Master Servicing Study, the drainage area requires enhanced quality treatment, with a long-term average removal of 80% of suspended solids. The existing Cardinal Creek detention facility includes a wet pond to permit some removal of TSS. However, the Master Servicing Study recommends that a treatment train approach be implemented for the drainage area. As such, on top of the water quality treatment included in the downstream stormwater management pond, the site will include a water quality unit on the downstream side of the detention system.

A Hydro International First Defence FDHC-4 is proposed for the site. Refer to *Appendix C* for product information.

4.3.5 Erosion Controls

Erosion and sediment controls will be implemented by the General Contractor onsite, and within the Famille-Laporte right-of-way, prior to any earth disturbances on the site. Erosion control requirements are detailed within the civil plan drawing set. Erosion controls, including all catch basin silt bags, are to be inspected on a daily basis and/or after major rain events. Any repairs or required maintenance shall be completed promptly. Site erosion controls are to remain in place until site works and vegetative restoration has been completed and approved.

5.0 Watermain Servicing

5.1 Existing Conditions

An existing 400 mm diameter watermain is located within the Famille-Laporte Avenue right-of-way, located in the west boulevard. The site currently has one (1) 200mm diameter service connection terminated with a valve at the property line.

5.2 Proposed Servicing

Please refer to the attached *Appendix A* which illustrates the proposed watermain servicing. The watermain servicing for the proposed development is as follows:

- The new building will be serviced by a new 100 mm diameter domestic watermain connected to the existing main on Famille-Laporte Avenue. The building service lines are split prior to entering the building into a 100mm diameter domestic service, and a 150mm diameter fire service. A backflow preventer will be installed inside the building mechanical room. A meter chamber per City Standard W32.1 will be installed at the property line.
- Two (2) new fire hydrants and 150 mm diameter leads are proposed for the site. One is located in the south parking area to be in close proximity to the building FDC connection, the second is located in the north boulevard.
- One new water service crossing of Famille-Laporte Avenue will be completed via open cut to the roadway. The new water service will connect to the existing 400mm main. The roadway will be restored to its predevelopment condition following the connection.
- The Site Contractor will be responsible for acquiring all necessary City permits and traffic controls prior to commencement of work within the roadway.

A Fire Flow Boundary Condition Analysis was completed/estimated for the proposed five storey structure using the Fire Underwriters Survey Guidelines. The inputs and results can be found in *Appendix D*.

Table 3: **Water Boundary Conditions**

Item	Results
Gross Floor Area	12,516 m^2
Average Daily Demand	1.03 L/s (88.9 m^3/day)
Maximum Daily Demand	2.57 L/s
Fire Flow	20,160,000 L/d
Maximum Day + Fire Flow	20,382,250 L/d

The detailed design of the watermain service are to be consistent with the requirements of the City of Ottawa and will be coordinated during the detailed design process.

6.0 Utilities

6.1 Gas

Existing natural gas infrastructure is located along the Famille-Laporte Avenue right-of-way, located west of the site. There is no existing natural gas service currently servicing the proposed site. During detailed design, future conversation on loading will be required with Enbridge.

6.2 Telecommunications

The existing site is not currently serviced by telecommunications. It is anticipated that existing telecommunications infrastructure exists within the Famille-Laporte Avenue right-of-way, located west of the site. Detailed design, additional consultation will be held with utility owner to confirm internal servicing requirements.

6.3 Hydro

Existing hydro infrastructure is buried along the east side of the Famille-Laporte Avenue right-of-way. There is no existing hydro currently servicing the proposed site. During detailed design, future conversation on loading will be required with the hydro provider.

7.0 Conclusion

The review of the adjacent services have been found to be sufficient for the proposed development. The design of the proposed internal services will be finalized during detailed design.

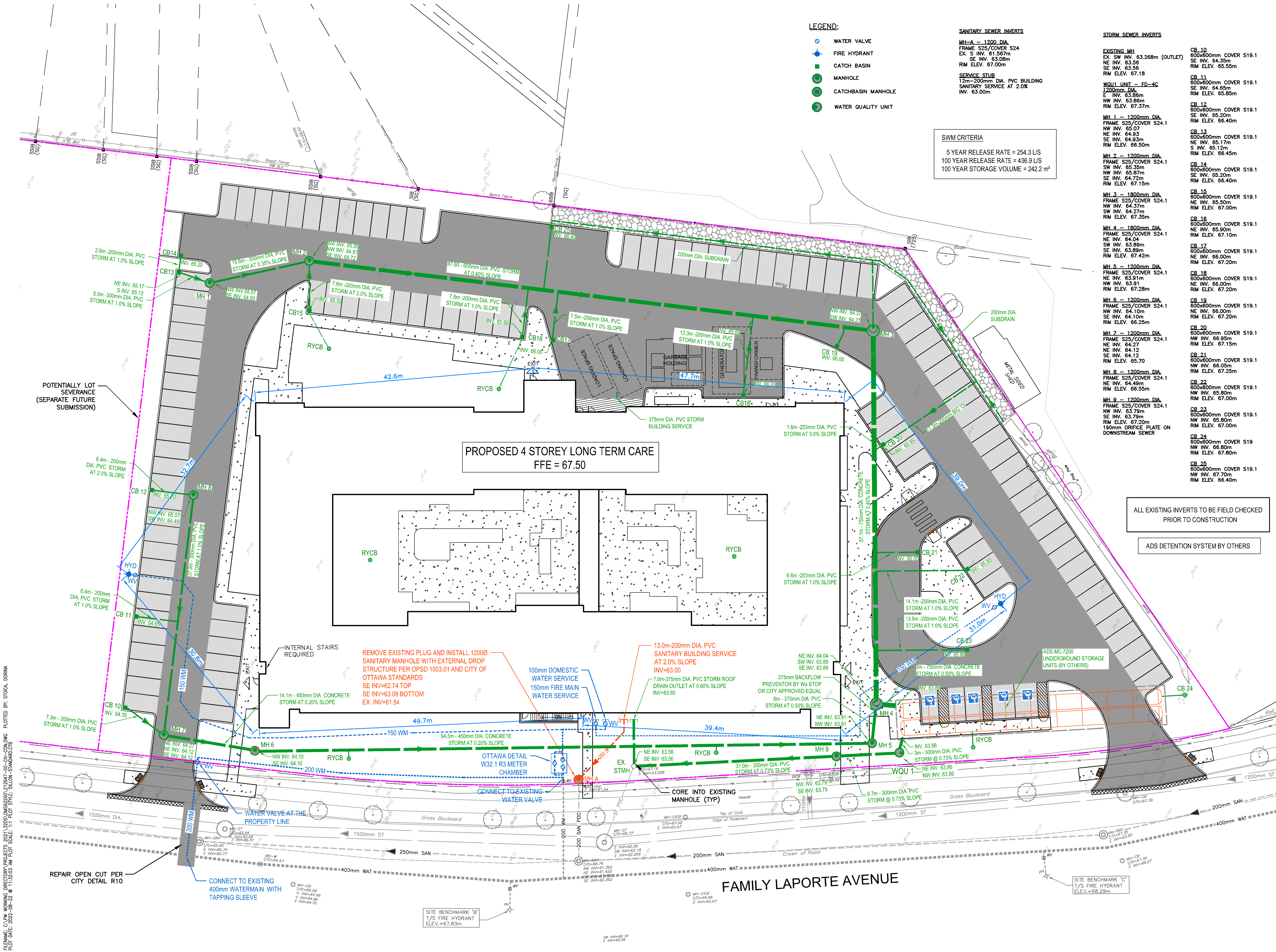
Yours sincerely,

DILLON CONSULTING LIMITED

Chris Patten, P.Eng.
Project Manager

Appendix A

Functional Servicing Plan



LEGEND:

- WATER VALVE
- FIRE HYDRANT
- CATCH BASIN
- MANHOLE
- CATCHBASIN MANHOLE
- WATER QUALITY UNIT

SWM CRITERIA

5 YEAR RELEASE RATE = 254.3 L/S
100 YEAR RELEASE RATE = 436.9 L/S
100 YEAR STORAGE VOLUME = 242.2 m³

SANITARY SEWER INVERTS

MH-A – 1200 DIA.
FRAME S25/COVER S24
EX. S INV. 61.567m
SE INV. 63.08m
RIM ELEV. 67.00m

SERVICE STUB
12m-200mm DIA. PVC BUILDING SANITARY SERVICE AT 2.0%
INV. 63.00m

STORM SEWER INVERTS

EXISTING MH
EX. SW INV. 63.268m (OUTLET)
NE INV. 63.56
SE INV. 63.56
RIM ELEV. 67.18

WQU1 UNIT – FD-4C 1200mm DIA.
E INV. 63.86m
NW INV. 63.86m
RIM ELEV. 67.37m

MH 1 – 1200mm DIA.
FRAME S25/COVER S24.1
NW INV. 65.07
NE INV. 64.93
SE INV. 64.93m
RIM ELEV. 66.50m

MH 2 – 1200mm DIA.
FRAME S25/COVER S24.1
SW INV. 65.35m
NW INV. 65.87m
SE INV. 64.72m
RIM ELEV. 67.15m

MH 3 – 1800mm DIA.
FRAME S25/COVER S24.1
NW INV. 64.37m
SW INV. 64.27m
RIM ELEV. 67.35m

MH 4 – 1800mm DIA.
FRAME S25/COVER S24.1
NE INV. 64.04
SW INV. 63.89m
SE INV. 63.89m
RIM ELEV. 67.42m

MH 5 – 1200mm DIA.
FRAME S25/COVER S24.1
NE INV. 63.91m
NW INV. 63.91
RIM ELEV. 67.28m

MH 6 – 1200mm DIA.
FRAME S25/COVER S24.1
NW INV. 64.10m
SE INV. 64.10m
RIM ELEV. 66.25m

MH 7 – 1200mm DIA.
FRAME S25/COVER S24.1
NE INV. 64.27
NE INV. 64.12
SE INV. 64.12
RIM ELEV. 65.70

MH 8 – 1200mm DIA.
FRAME S25/COVER S24.1
NE INV. 64.49m
RIM ELEV. 66.55m

MH 9 – 1200mm DIA.
FRAME S25/COVER S24.1
NW INV. 63.79m
SE INV. 63.79m
RIM ELEV. 67.20m
190mm ORIFICE PLATE ON DOWNSTREAM SEWER

CB 10
600x600mm COVER S19.1
SE INV. 64.35m
RIM ELEV. 65.55m

CB 11
600x600mm COVER S19.1
SE INV. 64.65m
RIM ELEV. 65.85m

CB 12
600x600mm COVER S19.1
SE INV. 65.20m
RIM ELEV. 66.40m

CB 13
600x600mm COVER S19.1
NE INV. 65.17m
S INV. 65.12m
RIM ELEV. 66.45m

CB 14
600x600mm COVER S19.1
SE INV. 65.20m
RIM ELEV. 66.40m

CB 15
600x600mm COVER S19.1
NE INV. 65.50m
RIM ELEV. 67.00m

CB 16
600x600mm COVER S19.1
NE INV. 65.90m
RIM ELEV. 67.10m

CB 17
600x600mm COVER S19.1
NE INV. 66.00m
RIM ELEV. 67.20m

CB 18
600x600mm COVER S19.1
NE INV. 66.00m
RIM ELEV. 67.20m

CB 19
600x600mm COVER S19.1
NE INV. 66.00m
RIM ELEV. 67.20m

CB 20
600x600mm COVER S19.1
NW INV. 66.95m
RIM ELEV. 67.15m

CB 21
600x600mm COVER S19.1
NW INV. 66.05m
RIM ELEV. 67.25m

CB 22
600x600mm COVER S19.1
NW INV. 65.80m
RIM ELEV. 67.00m

CB 23
600x600mm COVER S19.1
NW INV. 65.80m
RIM ELEV. 67.00m

CB 24
600x600mm COVER S19
NW INV. 66.80m
RIM ELEV. 67.80m

CB 25
600x600mm COVER S19.1
NW INV. 67.70m
RIM ELEV. 66.40m

ALL EXISTING INVERTS TO BE FIELD CHECKED PRIOR TO CONSTRUCTION

ADS DETENTION SYSTEM BY OTHERS

DILLON CONSULTING

Conditions of Use

Verify elevations and/or dimensions on drawing prior to use. Report any discrepancies to Dillon Consulting Limited.

Do not scale dimensions from drawing.

Do not modify drawing, re-use it, or use it for purposes other than those intended at the time of its preparation without prior written permission from Dillon Consulting Limited.

#	date:	revision:	by:
2	19/08/2021	RE-ISSUED FOR SITE PLAN CONTROL APPLICATION AND ZONING BY-LAW AMENDMENT	CDP, DS
1	12/02/2021	SPA / ZBA SUBMISSION	CDP

revisions

LICENSED PROFESSIONAL ENGINEER
C.D. PATTEN
100083837
19-AUG-22
PROVINCE OF ONTARIO

All drawing and specifications are the property of the architect. The contractor shall verify all dimensions and information on site and report any discrepancy to architect before proceeding.

Arch Corp - Orleans

1161 OLD MONTREAL RD,
ORLEANS ON, K4A 3N6

SITE SERVICING PLAN

scale:	1 : 250
drawn by:	DS
reviewed by:	CDP
job number:	21-2647
plot date:	August 22, 2022

drawing number:

CIV-1

D07-12-22-0006

18697

Appendix B

Sanitary Sewer and Storm Sewer Design Sheets

ORLEANS LONG TERM CARE FACILITY - CITY OF OTTAWA
SANITARY SEWER DESIGN SHEET

Project Name: Orleans LTC
Project No: 21-4926

City of Ottawa

The Peaking Factor was derived:
Using Harmon Formula= Y (Y or N)
From a Table= N
Value from table=

Residential Average Daily Flow= 350 L/Cap.D
Peak Extraneous Flow= 0.280 L/Ha.S

Outlet Invert Elevation= 60.770
Mannings 'n'= 0.013
Total Area= 1.220

Basement Floor Elevation = 0.000
or
Hydraulic Grade Line Cover = 2.00

Ground Elevation at Outlet = 66.790
HGL at Outlet = 61.590

Location			Flow Characteristics								Sewer Design/Profile										Cover			Hydraulic Grade Line		
ROAD/STN	LOCATION FROM MH	LOCATION TO MH	INDIVIDUAL POP	INDIVIDUAL AREA (ha.)	CUMULATIVE POP	CUMULATIVE AREA (ha.)	PEAKING FACTOR M	POP FLOW Q(p) (L/s)	PEAK EXTR. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE DIA. (mm)	Wall Thickness (mm)	SLOPE (%)	UPPER INVERT (m)	LOWER INVERT (m)	FALL (m)	VELOCITY (m/s)	DROP IN LOWER MANHOLE (m)	Ground Elevation Upper MH	Cover @ Up MH (m)	Cover @ Low MH (m)	HGL Elev at Upstream MH	HGL Elev vs. Grnd Elev @ Up MH	HGL Elev vs. Obvert @ Up MH
LTC	BLDG	DROP	254.0	1.22	254	1.22	4.108	4.227	0.342	**4.57**	**46.38**	13.0	200	15	2.00	63.000	62.740	0.260	1.48	1.140	67.450	4.235	4.045	61.598	OKAY	OKAY
Fam. Laporte	DROP	MH A	0.0	0.00	254	1.22	4.108	4.227	0.342	**4.57**	**0.03**	0.1	200	15	0.00	61.600	61.600	0.000	0.00	0.058	67.000	5.185	5.185	61.596	OKAY	OKAY
Fam. Laporte	MH A	MAIN	0.0	0.00	254	1.22	4.108	4.227	0.342	**4.57**	**29.34**	12.5	200	15	0.80	61.542	61.442	0.100	0.93	0.080	67.000	5.243	5.133	61.596	OKAY	OKAY
Fam. Laporte	MAIN	MAIN	0.0	0.00	254	1.22	4.108	4.227	0.342	**4.57**	**60.03**	58.1	250	15	1.02	61.362	60.770	0.592	1.22	0.000	66.790	5.163	5.755	61.593	OKAY	OKAY

ORLEANS LTCF
STORM SEWER DESIGN SHEET

Intensity Option # 1

Project Name: Orleans LTCF
Project Number: 21-2647

1) Intensity (i) = a/(t+b)^c **2) Intensity (i) = a*t^b** **3) Insert Intensity**

Based on 1:5 Year Storm Event
City of Ottawa (Cardinal Creek MSP)

a= 998.071 **a=** **i=**
b= 6.053 **b=**
c= 0.814

Manning's n = 0.013

Total Area (ha)= 2.17 Outlet Invert Elevation= 63.200 Ground Elevation @ Outlet = 66.77 High Water Level at Outlet= 63.33

Location											Sewer Design / Profile											Cover			Hydraulic Grade Line	
Road /Stations	From MH	To MH	Area (ha)	Run. Coef.	2.78AC	Accum. 2.78AC	T of In (min)	T of F (min)	T of Conc. (min)	Intensity (mm/hr)	Exp. Flow (L/s)	Capacity (L/s)	Velocity (m/s)	Wall Thickness (mm)	Length (m)	Pipe Dia. (mm)	Slope (%)	Invert Up MH	Invert Low MH	Fall (m)	Drop Across Low MH (m)	Ground Elev Up MH	Cover @ Up MH (m)	Cover @ Low MH (m)	HGL Elevation at Upstream MH	HGL Elev vs. Grnd Elev @ Up MH
	MH1	MH2	0.08	0.82	0.18	0.18	10.0	0.32	10.00	104.19	**18.53**	**57.21**	0.81	11	15.6	300	0.35	64.93	64.87	0.05	0.150	66.500	1.26	1.97		
	MH2	MH3	0.82	0.82	1.88	2.05	10.0	1.06	10.32	102.53	**210.58**	**388.33**	1.37	15	87.6	600	0.40	64.72	64.37	0.35	0.100	67.150	1.81	2.36		
	MH3	MH4	0.61	0.82	1.40	3.45	10.0	0.60	11.38	97.41	**336.41**	**704.10**	1.59	100	57.1	750	0.40	64.27	64.04	0.23	0.150	67.350	2.23	2.53		HWL GOVERNED BY SWM CHAMBER AND OUTLET ORIFICE
	MH4	STORAGE	0.00	0.82	0.00	3.79	10.0	0.03	12.83	91.28	**346.12**	**787.21**	1.78	100	3.0	750	0.50	63.89	63.88	0.02		67.420	2.68	2.67		
	STORAGE	WQU	0.00	0.82	0.00	3.79	10.0	0.04	12.86	91.17	**345.72**	**82.62**	1.17	100	3.0	300	0.73	63.88	63.86	0.02		67.400	3.12	3.11		
	WQU	MH9	0.01	0.82	0.00	3.79	10.0	0.14	12.90	91.00	**345.11**	**82.62**	1.17	100	9.7	300	0.73	63.86	63.78	0.07		67.370	3.11	3.12		
	MH9	EX MH	0.00	0.82		4.75	10.0	0.44	13.04	90.46	**429.89**	**82.62**	1.17	100	31.1	300	0.73	63.78	63.56	0.23	0.300	67.300	3.12	3.22		
	MH MH	MAIN	0.00	0.82		4.75		0.12	13.49	88.79	**421.93**	**434.17**	1.54	100	11.5	600	0.50	63.26	63.20	0.06		67.180	3.22	2.87	63.86	Okay
					#REF!	#REF!																				
					#REF!	#REF!																				
	MH8	MH7	0.12	0.82	0.28	0.28	10.0	0.45	10.00	104.19	**29.45**	**96.70**	1.37	15	37.0	300	1.00	64.49	64.12	0.37		66.550	1.74	1.26		
	MH7	MH6	0.00	0.82	0.00	0.28	10.0	0.29	10.45	101.87	**28.80**	**125.90**	0.79	15	14.0	450	0.20	64.12	64.10	0.03		65.700	1.11	1.69		
	MH6	MH5	0.10	0.20	0.06	0.34	10.0	1.99	10.75	100.41	**33.97**	**125.90**	0.79	15	94.5	450	0.20	64.10	63.91	0.18		66.250	1.69	2.90		
	MH5	MH4	0.00	0.70	0.00	0.34	10.0	0.10	12.74	91.67	**31.01**	**161.28**	1.01	15	6.0	450	0.32	63.91	63.89	0.02		67.280	2.90	3.06		HWL GOVERNED BY SWM CHAMBER AND OUTLET ORIFICE
	ROOF	EX. MH	0.42	0.82	0.96	0.96	10.0	0.09	10.00	104.19	**100.00**	**135.81**	1.23	15	7.0	375	0.60	63.60	63.56	0.04	0.300	67.400	3.41	3.23	63.97	Okay

INCLUDES OFFSITE AREAS TO SOUTH AND SOUTHEAST (0.92 Ha Total Area)

ORLEANS LTCF
STORM SEWER DESIGN SHEET

Project Name: Orleans LTCF
Project Number: 21-2647

Intensity Option # 1

1) Intensity (i) = a/(t+b)^c **2) Intensity (i) = a*t^b** **3) Insert Intensity**

Based on 1:100 Year Storm Event
City of Ottawa

a= 1735.700 **a=** **i=**
b= 6.014 **b=**
c= 0.820

Manning's n = 0.013

Total Area (ha)= 2.17 Outlet Invert Elevation= 63.200 Ground Elevation @ Outlet = 66.77 High Water Level at Outlet= 63.33

Location											Sewer Design / Profile										Cover			Hydraulic Grade Line	
Road /Stations	From MH	To MH	Area (ha)	Run. Coef.	2.78AC	Accum. 2.78AC	T of In (min)	T of F (min)	T of Conc. (min)	Intensity (mm/hr)	Exp. Flow (L/s)	Capacity (L/s)	Velocity (m/s)	Wall Thickness (mm)	Length (m)	Pipe Dia. (mm)	Slope (%)	Invert Up MH	Invert Low MH	Fall (m)	Drop Across Low MH (m)	Ground Elev Up MH	Cover @ Up MH (m)	Cover @ Low MH (m)	HGL Elevation at Upstream MH	HGL Elev vs. Grnd Elev @ Up MH
	MH1	MH2	0.08	0.82	0.18	0.18	10.0	0.32	10.00	178.56	**31.75**	**57.21**	0.81	11	15.6	300	0.35	64.93	64.87	0.05	0.150	66.500	1.26	1.97		
	MH2	MH3	0.82	0.82	1.88	2.05	10.0	1.06	10.32	175.68	**360.82**	**388.33**	1.37	15	87.6	600	0.40	64.72	64.37	0.35	0.100	67.150	1.81	2.36		HWL GOVERNED BY SWM CHAMBER AND OUTLET ORIFICE
	MH3	MH4	0.61	0.82	1.40	3.45	10.0	0.60	11.38	166.82	**576.14**	**704.10**	1.59	100	57.1	750	0.40	64.27	64.04	0.23	0.150	67.350	2.23	2.53		
	MH4	STORAGE	0.00	0.82	0.00	3.79	10.0	0.03	12.83	156.23	**592.41**	**787.21**	1.78	100	3.0	750	0.50	63.89	63.88	0.02		67.420	2.68	2.67		
	STORAGE	WQU	0.00	0.82	0.00	3.79	10.0	0.04	12.86	156.04	**591.72**	**82.62**	1.17	100	3.0	300	0.73	63.88	63.86	0.02		67.400	3.12	3.11		
	WQU	MH9	0.01	0.82	0.00	3.79	10.0	0.14	12.90	155.75	**590.66**	**82.62**	1.17	100	9.7	300	0.73	63.86	63.78	0.07		67.370	3.11	3.12		
	MH9	EX MH	0.00	0.82		4.75	10.0	0.44	13.04	154.82	**735.72**	**82.62**	1.17	100	31.1	300	0.73	63.78	63.56	0.23	0.300	67.300	3.12	3.22		
	MH MH	MAIN	0.00	0.82		4.75		0.12	13.49	151.93	**721.98**	**434.17**	1.54	100	11.5	600	0.50	63.26	63.20	0.06		67.180	3.22	2.87	63.86	Okay
					#REF!	#REF!																				
					#REF!	#REF!																				
	MH8	MH7	0.12	0.82	0.28	0.28	10.0	0.45	10.00	178.56	**50.47**	**96.70**	1.37	15	37.0	300	1.00	64.49	64.12	0.37		66.550	1.74	1.26		HWL GOVERNED BY SWM CHAMBER AND OUTLET ORIFICE
	MH7	MH6	0.00	0.82	0.00	0.28	10.0	0.29	10.45	174.54	**49.34**	**125.90**	0.79	15	14.0	450	0.20	64.12	64.10	0.03		65.700	1.11	1.69		
	MH6	MH5	0.10	0.20	0.06	0.34	10.0	1.99	10.75	172.02	**58.19**	**125.90**	0.79	15	94.5	450	0.20	64.10	63.91	0.18		66.250	1.69	2.90		
	MH5	MH4	0.00	0.70	0.00	0.34	10.0	0.10	12.74	156.90	**53.08**	**161.28**	1.01	15	6.0	450	0.32	63.91	63.89	0.02		67.280	2.90	3.06		
	ROOF	EX. MH	0.42	0.82	0.96	0.96	10.0	0.09	10.00	178.56	**171.37**	**135.81**	1.23	15	7.0	375	0.60	63.60	63.56	0.04	0.300	67.400	3.41	3.23	63.97	Okay

INCLUDES OFFSITE AREAS TO SOUTH AND SOUTHEAST (0.92 Ha Total Area)

DRAIN AREA

AREA (Ha) — RUNOFF COEFICIENT

OS1
0.56 | 0.33

OS2
0.36 | 0.33

MH1
0.08 | 0.82

MH2
0.27 | 0.82

MH3
0.25 | 0.70

MH4
0.01 | 0.20

MH6
0.09 | 0.20

MH8
0.12 | 0.82

BLDG
0.42 | 0.82

CB24
0.20 | 0.02

PROPOSED 4 STOREY LONG TERM CARE
FFE = 67.50

DILLON CONSULTING

Conditions of Use

Verify elevations and/or dimensions on drawing prior to use. Report any discrepancies to Dillon Consulting Limited.

Do not scale dimensions from drawing.

Do not modify drawing, re-use it, or use it for purposes other than those intended at the time of its preparation without prior written permission from Dillon Consulting Limited.

#	date:	revision:	by:
2	19/08/2021	RE-ISSUED FOR SITE PLAN CONTROL APPLICATION AND ZONING BY-LAW AMENDMENT	CDP, DS
1	12/02/2021	SPA / ZBA SUBMISSION	CDP

revisions

Arch Corp - Orleans

1161 OLD MONTREAL RD,
ORLEANS ON, K4A 3N6

SITE DRAINAGE PLAN

scale:	1 : 350
drawn by:	AAM
reviewed by:	CDP
job number:	21-2647
plot date:	August 19, 2022

drawing number:

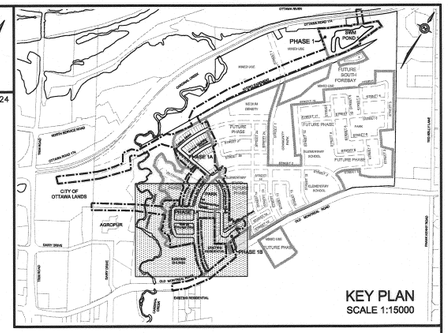
DRG-1

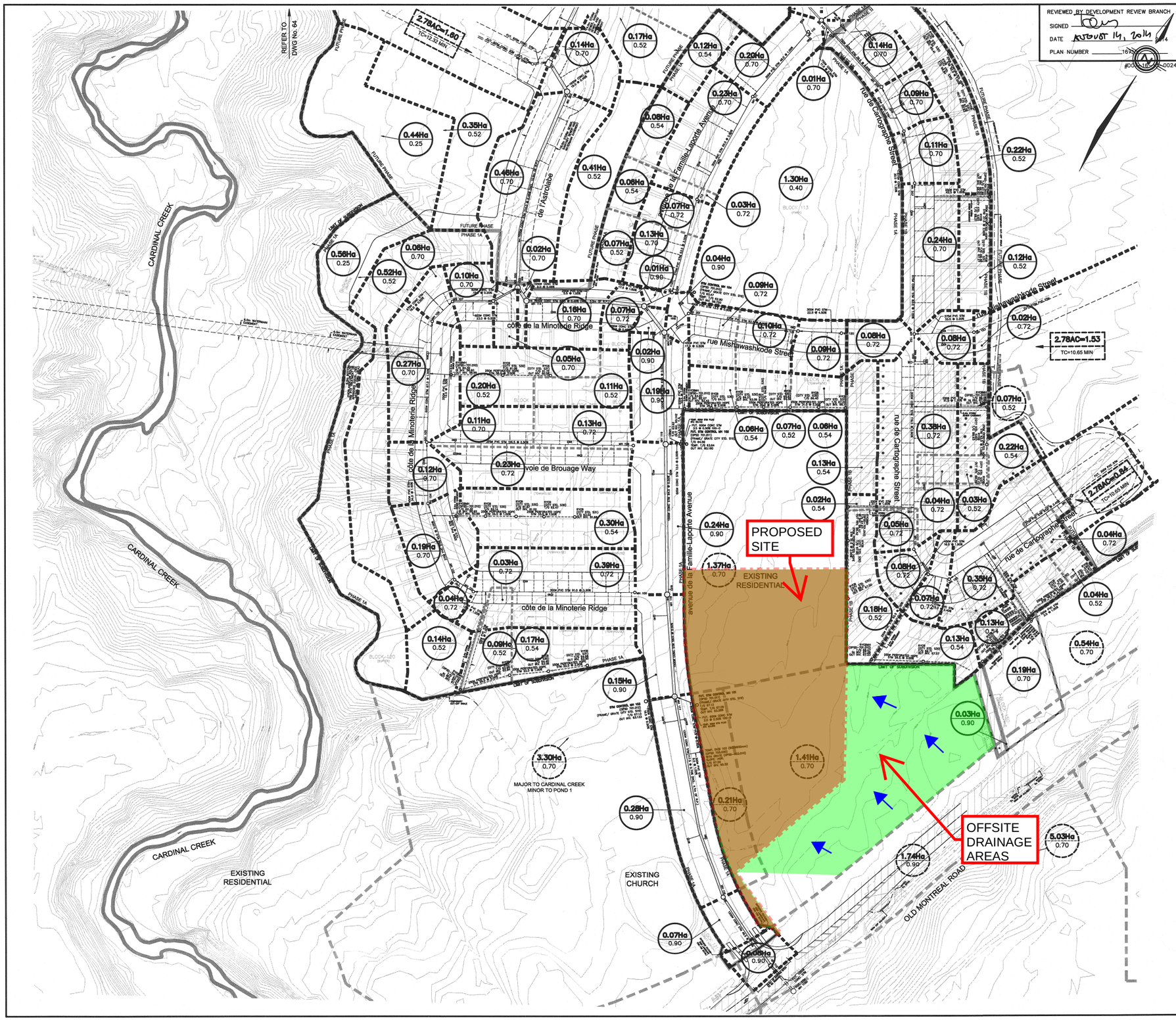
18007

Appendix C

Stormwater Management Calculations

REVIEWED BY DEVELOPMENT REVIEW BRANCH
SIGNED
DATE August 14, 2014
PLAN NUMBER 167





LEGEND

- 0.25Ha / 0.75 — DRAINAGE AREA IN HECTARES, RUN-OFF COEFFICIENT
- 0.29Ha / 0.65 — EXTERNAL DRAINAGE AREA IN HECTARES, RUN-OFF COEFFICIENT
- OVERLAND FLOW DIRECTION
- EXTERNAL OVERLAND FLOW DIRECTION
- STORM MANHOLE
- STORM MANHOLE IN OTHER PHASES
- CATCHBASIN MANHOLE
- RLCBS — ELBOW SECTION (CITY STD. S31) / "T" SECTION (CITY STD. S30), AS NOTED ON THE DRAWING
- SINGLE/DOUBLE CATCHBASIN
- CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST A (Q max = 19.9 l/s)
- CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST B (Q max = 28.4 l/s)
- CACHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST C (Q max = 35.5 l/s)
- CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST D (Q max = 50.1 l/s)
- CATCHBASINS WITH INLET CONTROL DEVICE IPEX TEMPEST E (Q max = 69.1 l/s)
- STORM SEWER TRIBUTARY BOUNDARY
- STORM SEWER SUB TRIBUTARY BOUNDARY
- EXTERNAL STORM SEWER TRIBUTARY BOUNDARY
- PHASE LINE
- SINGLE STORM HOUSE CONNECTION
- NOT INCLUDED IN PRE-SERVICING AGREEMENT FOR PHASE 1A

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY STANTEC GEOMATICS LTD, PROJECT No. 161611900-111 RECEIVED ON JULY 6, 2012 AND PROJECT No. 161629244-111 RECEIVED ON OCTOBER 24, 2013 AND NOVEMBER 29, 2013

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY STANTEC GEOMATICS LTD, PROJECT No. 161613098-132 RECEIVED ON JUNE 27, 2014.

PRE-SERVICING SUBMISSION FOR PHASE 1A ONLY 14-08-13

ELEVATION NOTE

ELEVATIONS HEREON ARE GEODETIC AND ARE DERIVED FROM THE CAN-NET VRS NETWORK.

No.	DATE	BY	DESCRIPTION	BY
4.	14-08-13	Z.L.	PRE-SERVICING SUBMISSION FOR PHASE 1A	
3.	14-05-27	Z.L.	3rd SUBMISSION	
2.	14-05-01	Z.L.	2nd SUBMISSION	
1.	14-02-07	Z.L.	1st SUBMISSION	

Ottawa CITY OF OTTAWA

PROJECT No. 11-513 B-1

LICENSED PROFESSIONAL ENGINEER Z. LI 14-08-15 PROVINCE OF ONTARIO

STORM DRAINAGE PLAN

TAMARACK (CARDINAL CREEK) CORPORATION

CARDINAL CREEK VILLAGE PHASE 1A

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

DRAWN BY:	W.L./H.P.	CHECKED BY:	K.M.	DRAWING NO.	SHEET NO.
DESIGNED BY:	K.M.	CHECKED BY:	Z.L.		65
SCALE:	1:1000	DATE:	FEBRUARY 2014		

16715

DILLON CONSULTING	Stormwater Management Calculations	Project: Perth LTCF	No.: 212317	
	Rational Method Calculations Pre-Development	By: SZ	Date: 2022-08-19	Page:
		Checked: JVM	Scenario: Existing	1

Calculation of existing runoff rate is undertaken using the Rational Method: **Q = CiA**

Where: Q = Peak flow rate (litres/second)
C = Runoff coefficient
I = Rainfall intensity (mm/hour)
A = Catchment area (hectares)

			Agg Maps
Project Area, A	**1.25** hectares	Soil type	**Silty Clay**	**D**

Composite Runoff Coefficient			
Land Use	Area (m^2)	C*	
Existing Site	12,543	0.70	
Composite Runoff Coefficient	12,543	0.70	<- C Factor assumed for site in Cardinal Creek MP

* - Per the Cardinal Creek Master Servicing Study

Time of Concentration		
Per Cardinal Creek Master Servicing Study	t_c (min) =	10.0

Rainfall intensity calculated in accordance with the Governing Standards/Reports:
(if only two paramters are provided, enter B as "0" and C as positive number)

$$I = \frac{A}{(B + t_c)^C}$$

Where: A, B, and C = IDF Parameters From Local Municipality Guidelines
I = Rainfall intensity (mm/hour)
T = Time of concentration (hours)

Return Period (Years)	5*	100**	
A	998.071	1735.688	
B	6.053	6.014	
C	0.814	0.820	
T (mins) **	10.0	10.0	
I (mm/hr)	104.2	178.6	
Q (L/s)	**254.3**	**435.9**	<- Allowable Release Rate for LTC Site Only (1.25 Ha)
Q (m_3/s)	0.254	0.436	

Notes:
* - Per the Cardinal Creek Master Servicing Study
** - Per the City of Ottawa Sewer Design Standards

DILLON CONSULTING	Stormwater Management Calculations	Project:	Orleans LTCF	No.:	21-2647	
	Storage Calculations	By:	SZ	Date:	2022-08-19	Page:
		Checked:	JVM	Scenario:	Proposed	2

Calculation of existing runoff rate is undertaken using the Rational Method: **Q = CiA**

Where: Q = Peak flow rate (litres/second)
C = Runoff coefficient
I = Rainfall intensity (mm/hour)
A = Catchment area (hectares)

Site Area	**1.25**	hectares
Drianage Area	**2.17**	hectares [Includes 1.25 Ha onsite and 0.92 Ha from offisite]

Composite Runoff Coefficient			
Land Use	Area (m^2)	C	
Building (Including Courtyard)	4,209	0.82	Rooftop Drainage Uncontrolled
Asphalt/Concrete Pavement	4,630	0.90	Remainder of Site to be Detained and Released at a controlled rate
Rocks, Misc Landscape	1,211	0.80	
Grass	2,494	0.25	
Offiste (South and Southeast of Site)	9,200	0.30	When Developed will control flows
Composite Runoff Coefficient	21,743	0.55	
	12,543	0.73	
Total Area of Rooftops/Courtyard, Ar	4,209	0.82	
Total Area of Remainder of Site, As	8,334	0.69	
Offsite Area, Ao	9,200	0.30	
Storage Area, As + Ao	17,534	0.49	

Allowable Discharge, Qa (m^3/s):	0.254	<- 1:5 Year Existing Design Storm Outlet Rate For Subject Parcel Only
Rooftop Discharge, Qr (m^3/s):	0.171	<- 1:100 Year Existing Design Storm Outlet Rate Assumed to discharge unrestricted to roadway sewer system
Remainder of Site Discharge, Qs (m^3/s):	0.083	<- Total Allowable Q - Rooftop Q (Qs = Qa - Qr)
Remainder of Site Discharge, Qs (L/s):	83.0	<- Total Allowable Q - Rooftop Q (Qs = Qa - Qr)

Design Event

100-Year Storm - From Ottawa SWM Guidelines 2012 /Cardinal Creek Master Servicing Study

A =	1735.7
B =	6.014
C =	0.820
Time Step =	10 min

(if only two paramters are provided, enter B as "0" and C as positive number)

$$I = \frac{A}{(B + t_c)^C}$$

Where: A, B, and C = IDF Parameters From City
I = Rainfall intensity (mm/hour)
t_c = Time of concentration (hours)

Event Duration (mins)	Rainfall Intensity (mm/hr)	Peak Runoff Rate (L/s)	Release Rate (L/s)	Storage Rate (L/s)	Required Storage Volume (m3)
10	178.56	422.87	83.0	339.9	203.9
20	119.95	284.07	83.0	201.1	241.3
30	91.87	217.56	83.0	134.6	242.2
40	75.15	177.96	83.0	95.0	227.9
50	63.95	151.46	83.0	68.5	205.4
60	55.89	132.37	83.0	49.4	177.7
70	49.79	117.91	83.0	34.9	146.6
80	44.99	106.55	83.0	23.5	113.0
90	41.11	97.36	83.0	14.4	77.5
100	37.90	89.76	83.0	6.8	40.6
110	35.20	83.37	83.0	0.4	2.4
120	32.89	77.90	83.0	-5.1	-36.7

Maximum Required Storage (m^3)	Peak Duration
242.2	30

* Per City of Ottawa Design Standards

DILLON CONSULTING	Stormwater Management Calculations	Project:	Orleans LTCF	No.:	21-2647	
	Orifice Calculations	By:	CDP	Date:	2022-08-19	Page:
		Checked:	JVM	Scenario:	Proposed	3

Calculation of Required Orifice (Inlet Control Device) Diamater

Q (cms) = 0.61 x A x sqrt(2 x g x H)

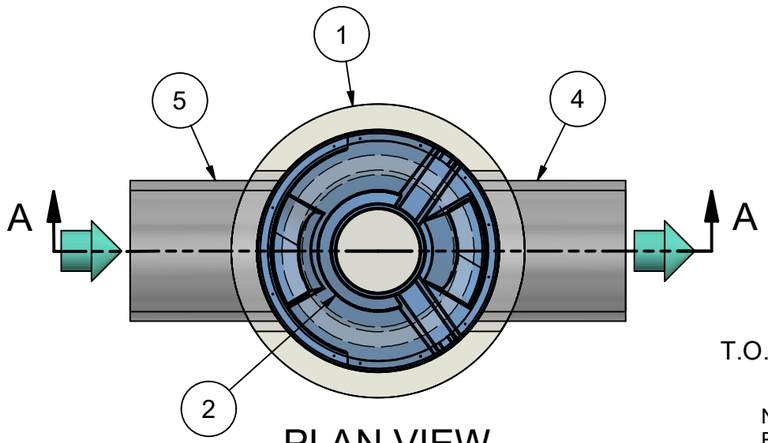
Where: Q = Peak flow rate (cubic metres/second)
0.61 = Orifice Coefficient
A = Area of Orifice (m2)
g = Gravitational Constant (9.81 m/s2)
H = Maximum Head above the centerline of the orifice (m)

Maximum Allowable Outlet Rate (Qt) =	**0.254**	m3 / s	<- Total Site Release Rate including rooftop area
Detention Allowable Outlet Rate (Qd) =	**0.083**	m3 / s	<- Excludes rooftop runoff (for use in sizing orifice)

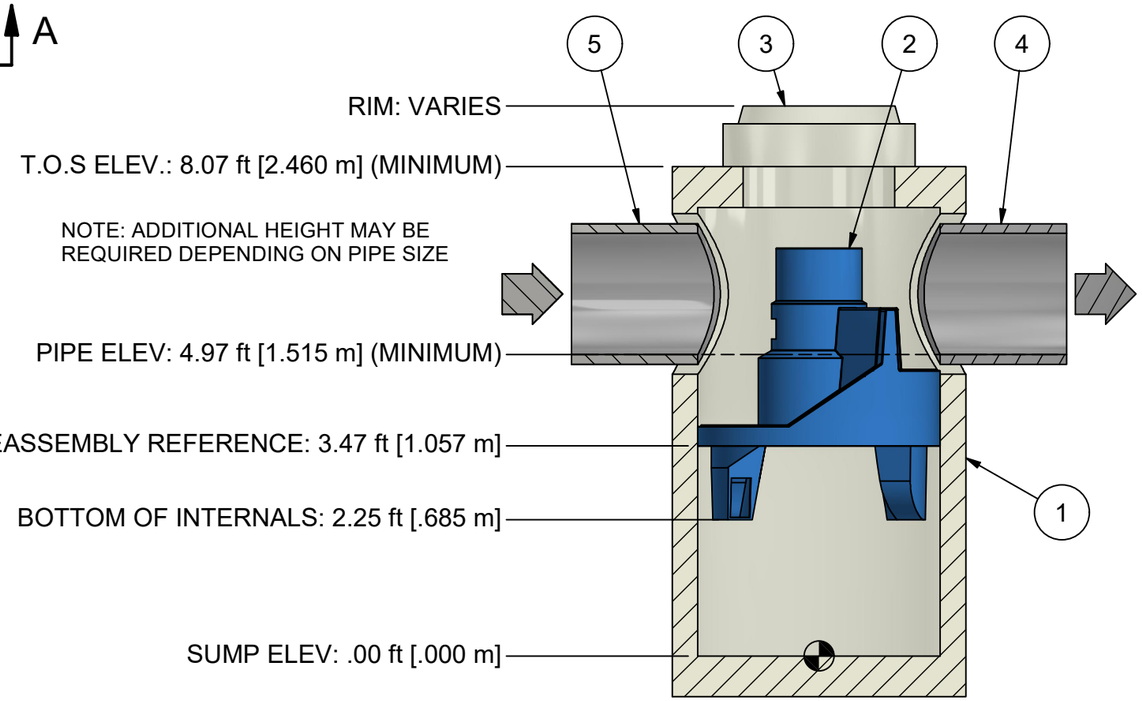
Equation Inputs		
Input	Value	Unit
H1 = Outlet Sewer Invert (at Orifice MH)	63.86	m
H2 = 100 Year High Water Line	65.00	m
100 Year Head (H2 - H1)	1.14	m
Trial Orifice Diameter	0.190	m

Orifice Equation (Peak Outflow)	0.082	m3 / s

Peak Site Outflow is less than Maximum Allowable Site Outlet Rate
Utilize an orifice of 190mm in diameter.



PLAN VIEW



SECTION A-A

HYDRO FRAME AND COVER (INCLUDED)

GRADE RINGS BY OTHERS AS REQUIRED

1. MANHOLE WALL AND SLAB THICKNESSES ARE NOT TO SCALE.

2. CONTACT HYDRO INTERNATIONAL FOR A BOTTOM OF STRUCTURE ELEVATION PRIOR TO SETTING FIRST DEFENSE MANHOLE.

3. CONTRACTOR TO CONFIRM RIM, PIPE INVERTS, PIPE DIA. AND PIPE ORIENTATION PRIOR TO RELEASE OF UNIT TO FABRICATION.

PRODUCT SPECIFICATION:

1. Peak Hydraulic Flow: 18.0 cfs (510 l/s)
2. Min Sediment Storage Capacity: 0.7 cu. yd. (0.5 cu. m.)
3. Maximum Inlet/Outlet Pipe Diameters: 24 in. (600 mm)
4. The Treatment System Shall Use An Induced Vortex To Separate Pollutants From Stormwater Runoff.
5. For More Product Information Including Regulatory Acceptances, Please Visit https://hydro-int.com/en/products/first-defense

GENERAL NOTES:
1. General Arrangement drawings only. Contact Hydro International for site specific drawings.
2. The diameter of the inlet and outlet pipes may be no more than 24".
3. Multiple inlet pipes possible (refer to project plan).
4. Inlet/outlet pipe angle can vary to align with drainage network (refer to project plans).
5. Peak flow rate and minimum height limited by available cover and pipe diameter.
6. Larger sediment storage capacity may be provided with a deeper sump depth.

PARTS LIST				
ITEM	QTY	SIZE (in)	SIZE (mm)	DESCRIPTION
1	1	48	1200	I.D. PRECAST MANHOLE
2	1			INTERNAL COMPONENTS (PRE-INSTALLED)
3	1	30	750	FRAME AND COVER (ROUND)
4	1	24 (MAX)	600 (MAX)	OUTLET PIPE (BY OTHERS)
5	1	24 (MAX)	600 (MAX)	INLET PIPE (BY OTHERS)

PROJECTION

IF IN DOUBT ASK

DATE:	SCALE:
11/2/2021	1:30

DRAWN BY:	CHECKED BY:	APPROVED BY
ER	MRJ	

Title
4-ft DIAMETER
FIRST DEFENSE

GENERAL ARRANGEMENT

Hydro International®
hydro-int.com
HYDRO INTERNATIONAL

WEIGHT:	MATERIAL:

STOCK NUMBER:

DRAWING NO.: FD GA-4

SHEET SIZE:	SHEET:	Rev:
B	1 OF 1	-

Appendix D

Water Boundary Conditions

Water Demand Calculations

Project: Long Term Care Home, Famile-Laporte Avenue, Orleans ON
Project #: 21-2647
Location: Orleans, Ontario

Watermains shall be sized to accommodate the greater of:
1. Maximum day demand plus fire flow or;
2. Peak Hour Demand

Water Demand Design Criteria (Ottawa Water Distribution Design Guidelines, July 2010):

Maximum Hour Factor	2.2
Maximum Day Factor	2.5
Average Daily Demand per Capita (Residential) (l/c/d)	350
Persons Per Bed (1 + employees)	1

Water Demand Calculations:

Building	Gross Floor Area (m^2)	Number of Beds	Number of Employees	Population	Avg. Daily Demand (L/s)	Max Daily Demand (L/s)	Max Hourly Demand (L/s)	Fire Flow (L/d)	Fire Flow Duration (hr.)	Max Day + Fire Flow (L/d)
Long Term Care Facility	12,516	224	30	254	1.03	2.57	2.26	20,160,000.00	3.25	20,382,250.00
Total					88.9 m3/day					20,382,250.00